Open Source Used In 5GaaS Edge AC-4

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Text Part Number: 78EE117C99-1253038217
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/* List of signals. BSD version.
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/* List of signals that are sent when an invalid virtual memory address is accessed, or when the stack overflows. */
#define SIGSEGV_FOR_ALL_SIGNALS(var, body) 
  { int var; var = SIGSEGV; { body } var = SIGBUS; { body } }

/* Fault handler information. BSD Unix version. 
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#define SIGSEGV_FAULT_HANDLER_ARGLIST int sig, int code, void *scp, void *addr
#define SIGSEGV_FAULT_ADDRESS addr

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fields:
  site: string
  author: root
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1.22 zstd 1.3.3+dfsg-2ubuntu1.2

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`make' implicit rules from creating a file called install from it
when there is no Makefile.

This script is compatible with the BSD install script, but was written
from scratch. It can only install one file at a time, a restriction
shared with many OS's install programs.

Files: debian/*
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@heading Vincent Rijmen, Antoon Bosselaers, Paulo Barreto

AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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DES core in libhcrypto

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D3DES (V5.09) -

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Version 3, 29 June 2007

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If you modify a copy of the Library, and, in your modifications, a facility refers to a function or data to be supplied by an Application that uses the facility (other than as an argument passed when the facility is invoked), then you may convey a copy of the modified version:

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You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities that are not Applications and are not covered by this License, and convey such a combined library under terms of your choice, if you do both of the following:

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[This is the first released version of the library GPL. It is
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Preamble

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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The
former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.
In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or
link a “work that uses the Library” with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer’s own use and reverse
engineering for debugging such modifications.

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directing the user to the copy of this License. Also, you must do one
of these things:

a) Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable “work that
uses the Library”, as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library 'Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice
That's all there is to it!

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For example, if you distribute copies of such a program, whether
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For the developers' and authors' protection, the GPL clearly explains
that there is no warranty for this free software. For both users' and
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Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a
computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

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The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

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io.fabric8.kubernetes.client.URLFromClusterIPImpl

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1.45 libpython3-6-minimal 3.6.9-1~18.04ubuntu1.6

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==============

A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python’s principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related
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All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

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Mersenne Twister

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The `_random' module includes code based on a download from `http://www.math.keio.ac.jp/~matumoto/MT2002/emt19937ar.html’. The following are the verbatim comments from the original code:

A C-program for MT19937, with initialization improved 2002/1/26. Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed) or init_by_array(init_key, key_length).

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Any feedback is very welcome.
http://www.math.keio.ac.jp/matumoto/emt.html
Sockets
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The `socket' module uses the functions, `getaddrinfo', and `getnameinfo', which are coded in separate source files from the WIDE Project, `http://www.wide.ad.jp/about/index.html'.

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Modified by Jack Jansen, CWI, July 1995:
- Use binascii module to do the actual line-by-line conversion between ascii and binary. This results in a 1000-fold speedup. The C version is still 5 times faster, though.
- Arguments more compliant with python standard

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---------------------------

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1.48 types-paramiko 2.8.5

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No license file was found, but licenses were detected in source scan.

Metadata-Version: 2.1
Name: types-paramiko
Version: 2.8.5
Summary: Typing stubs for paramiko
Home-page: https://github.com/python/typeshed
License: Apache-2.0 license
Platform: UNKNOWN
Classifier: License :: OSI Approved :: Apache Software License
Classifier: Typing :: Typed
Description-Content-Type: text/markdown

## Typing stubs for paramiko

This is a PEP 561 type stub package for the `paramiko` package.
It can be used by type-checking tools like mypy, PyCharm, pytype etc. to check code
that uses `paramiko`. The source for this package can be found at
https://github.com/python/typeshed/tree/master/stubs/paramiko. All fixes for
types and metadata should be contributed there.

See https://github.com/python/typeshed/blob/master/README.md for more details.
This package was generated from typeshed commit `df0a724c0f0ca558396aeb0f2fe755dc57c967a4`

Found in path(s):
* /opt/cola/permits/1253286016_1643422192.08/0/types-paramiko-2-8-5-tar-gz/types-paramiko-2.8.5/PKG-INFO
1.49 lsb 9.20170808ubuntu1

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Format: http://www.debian.org/doc/packaging-manuals/copyright-format/1.0/
Upstream-Name: LSB implementation package

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1.50 p11-kit 0.23.9-2ubuntu0.1

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1.53 libpython3-6-stdlib 3.6.9-1~18.04ubuntu1.6

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==============

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============================

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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Mersenne Twister

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The `random' module includes code based on a download from `http://www.math.keio.ac.jp/~matumoto/MT2002/emt19937ar.html'. The following are the verbatim comments from the original code:

A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)
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Any feedback is very welcome.
http://www.math.keio.ac.jp/matumoto/emt.html
email: matumoto@math.keio.ac.jp

Sockets
-------

The `socket' module uses the functions, `getaddrinfo', and `getnameinfo', which are coded in separate source files from the WIDE Project, `http://www.wide.ad.jp/about/index.html'.

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UUencode and UUdecode functions

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Modified by Jack Jansen, CWI, July 1995:
- Use binascii module to do the actual line-by-line conversion between ascii and binary. This results in a 1000-fold speedup. The C version is still 5 times faster, though.
- Arguments more compliant with python standard

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-----------------------------

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1.63 hashicorp-go-secure-stdlib-mlock 0.1.1

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1.70 webencodings 0.5
1.70.1 Available under license:

No license file was found, but licenses were detected in source scan.

from setuptools import setup, find_packages
import io
import os
import re

VERSION = re.search("VERSION = '(.*?)'", io.open(path.join(path.dirname(__file__), 'webencodings', '__init__.py'), encoding='utf-8').read().strip()).group(1)

LONG_DESCRIPTION = io.open
path.join(path.dirname(__file__), 'README.rst'),
encoding='utf-8')
).read()

setup(
    name='webencodings',
    version=VERSION,
    url='https://github.com/SimonSapin/python-webencodings',
    license='BSD',
    author='Simon Sapin',
    author_email='simon.sapin@exyr.org',
    description='Character encoding aliases for legacy web content',
    long_description=LONG_DESCRIPTION,
    classifiers=[
        'Development Status :: 4 - Beta',
        'Intended Audience :: Developers',
        'License :: OSI Approved :: BSD License',
        'Programming Language :: Python :: 2',
        'Programming Language :: Python :: 3',
        'Topic :: Internet :: WWW/HTTP',
    ],
    packages=find_packages(),
)

Found in path(s):
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5-tar-gz/webencodings-0.5/setup.py

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python-webencodings
====================

This is a Python implementation of the `WHATWG Encoding standard <http://encoding.spec.whatwg.org/>`_.

* Latest documentation: http://packages.python.org/webencodings/
* Source code and issue tracker: https://github.com/gsnedders/python-webencodings
* PyPI releases: http://pypi.python.org/pypi/webencodings
* License: BSD
* Python 2.6+ and 3.3+

In order to be compatible with legacy web content when interpreting something like `"Content-Type: text/html; charset=latin1"`, tools need to use a particular set of aliases for encoding labels as well as some overriding rules.

For example, `"US-ASCII"` and `"iso-8859-1"` on the web are actually aliases for `"windows-1252"`, and an UTF-8 or UTF-16 BOM takes precedence
over any other encoding declaration. The Encoding standard defines all such details so that implementations do not have to reverse-engineer each other.

This module has encoding labels and BOM detection, but the actual implementation for encoders and decoders is Python.

Found in path(s):
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5-tar-gz/webencodings-0.5/README.rst
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Found in path(s):
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5-tar-gz/webencodings-0.5/webencodings/labels.py
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5-tar-gz/webencodings-0.5/webencodings/__init__.py
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5-tar-gz/webencodings-0.5/webencodings/tests.py
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5-tar-gz/webencodings-0.5/webencodings/x_user_defined.py
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Metadata-Version: 1.1
Name: webencodings
Version: 0.5
Summary: Character encoding aliases for legacy web content
Home-page: https://github.com/SimonSapin/python-webencodings
Author: Simon Sapin
Author-email: simon.sapin@exyr.org
License: BSD
Description: python-webencodings

This is a Python implementation of the `WHATWG Encoding standard`_.

.. _`WHATWG Encoding standard`: http://encoding.spec.whatwg.org/

* Latest documentation: http://packages.python.org/webencodings/
* Source code and issue tracker: https://github.com/gsnedders/python-webencodings
* PyPI releases: http://pypi.python.org/pypi/webencodings
* License: BSD
* Python 2.6+ and 3.3+

In order to be compatible with legacy web content when interpreting something like `'Content-Type: text/html; charset=latin1`", tools need to use a particular set of aliases for encoding labels.
as well as some overriding rules.
For example, ``US-ASCII`` and ``iso-8859-1`` on the web are actually
aliases for ``windows-1252``, and an UTF-8 or UTF-16 BOM takes precedence
over any other encoding declaration.
The Encoding standard defines all such details so that implementations do
not have to reverse-engineer each other.

This module has encoding labels and BOM detection,
but the actual implementation for encoders and decoders is Pythons.

Platform: UNKNOWN
Classifier: Development Status :: 4 - Beta
Classifier: Intended Audience :: Developers
Classifier: License :: OSI Approved :: BSD License
Classifier: Programming Language :: Python :: 2
Classifier: Programming Language :: Python :: 3
Classifier: Topic :: Internet :: WWW/HTTP

Found in path(s):
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5.tar-gz/webencodings-0.5/PKG-INFO
* /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5.tar-gz/webencodings-0.5/webencodings.egg-info/PKG-INFO
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```python
webencodings.mklabels
~~~~~~~~~~~~~~
Regenerate the webencodings.labels module.

:copyright: Copyright 2012 by Simon Sapin
:license: BSD, see LICENSE for details.
```

```python
import json
try:
    from urllib import urlopen
except ImportError:
    from urllib.request import urlopen

def assert_lower(string):
    assert string == string.lower()
    return string
```
def generate(url):
    parts = ['''
    ""
    webencodings.labels
    ~~~~~~~~~~~~~~~~~~~~
    Map encoding labels to their name.
    
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    ""

    # XXX Do not edit!
    # This file is automatically generated by mklabels.py

    LABELS = {
        '''
        labels = [
            repr(assert_lower(label)).lstrip('u'),
            repr(encoding['name']).lstrip('u'))
            for category in json.loads(urlopen(url).read().decode('ascii'))
            for encoding in category['encodings']
            for label in encoding['labels']]
        max_len = max(len(label) for label, name in labels)
        parts.extend(
            '    %s:%s %s,
' % (label, ' ' * (max_len - len(label)), name)
            for label, name in labels)
        parts.append('}
    return ''.join(parts)

    if __name__ == '__main__':
        print(generate('http://encoding.spec.whatwg.org/encodings.json'))

    Found in path(s):
    * /opt/cola/permits/1121503976_1610155523.01/0/webencodings-0.5-tar-gz/webencodings-0.5/webencodings/mklabels.py

1.71 jul-to-slf4j 1.7.32
1.71.1 Available under license:
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*
*/

Found in path(s):
* /opt/cola/permits/1182802247_1629961496.53/0/jul-to-slf4j-1-7-32-sources-jar/org/slf4j/bridge/SLF4JBridgeHandler.java

1.72 certifi 2019.11.28

1.72.1 Available under license:

This package contains a modified version of ca-bundle.crt:

c_ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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1.73 diffutils 3.7-3

1.73.1 Available under license:

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Version 3, 29 June 2007

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1.81 types-cryptography 3.3.9

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## Typing stubs for cryptography

This is a PEP 561 type stub package for the `cryptography` package. It can be used by type-checking tools like mypy, PyCharm, pytype etc. to check code that uses `cryptography`. The source for this package can be found at https://github.com/python/typeshed/tree/master/stubs/cryptography. All fixes for types and metadata should be contributed there.

*Note:* The `cryptography` package includes type annotations or type stubs since version 3.4.4. Please uninstall the `types-cryptography` package if you use this or a newer version.

See https://github.com/python/typeshed/blob/master/README.md for more details.

This package was generated from typeshed commit `2445eddb4b67fdaa58ec7c2113ff1542021a6206`.

Found in path(s):
* /opt/cola/permits/1253285998_1642037528.74/0/types-cryptography-3.3.9-tar-gz/types-cryptography-3.3.9/types_cryptography.egg-info/PKG-INFO
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---

**1.82 jboss-logging 3.4.2.Final**

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1.83 classmate 1.5.1

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1.84 libasound 1.1.3-5ubuntu0.6

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1.85 python-requests 2.27.0

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1.87 jackson-datatype-jsr310 2.12.4

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1.89 aws-sdk-go-v2 1.3.2
1.89.1 Available under license:
   // Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
// Deletes the specified license.
func (c *Client) DeleteLicense(ctx context.Context, params *DeleteLicenseInput, optFns ...func(*Options)) (*DeleteLicenseOutput, error) {
    if params == nil {
        params = &DeleteLicenseInput{
    }

    result, metadata, err := c.invokeOperation(ctx, "DeleteLicense", params, optFns,
        addOperationDeleteLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*DeleteLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type DeleteLicenseInput struct {

    // Amazon Resource Name (ARN) of the license.
    //
    // This member is required.
    LicenseArn *string

    // Current version of the license.
    //
    // This member is required.
    SourceVersion *string
}

type DeleteLicenseOutput struct {

    // Date on which the license is deleted.
    DeletionDate *string

    // License status.
    Status types.LicenseDeletionStatus

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationDeleteLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {

err = stack.Serialize.Add(&awsAwsjson11_serializeOpDeleteLicense{}, middleware.After)
if err != nil {
    return err
}
err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpDeleteLicense{}, middleware.After)
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpDeleteLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDeleteLicense(options.Region),
middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opDeleteLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "DeleteLicense",
    }
}

AWS SDK for Go
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package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Lists received licenses.
func (c *Client) ListReceivedLicenses(ctx context.Context, params *ListReceivedLicensesInput, optFns ...
    func(*Options)) (*ListReceivedLicensesOutput, error) {
    if params == nil {
        params = &ListReceivedLicensesInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "ListReceivedLicenses", params, optFns,
        addOperationListReceivedLicensesMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*ListReceivedLicensesOutput)
out.ResultMetadata = metadata
return out, nil


type ListReceivedLicensesInput struct {
    // Filters to scope the results. The following filters are supported:
    // 
    // * ProductSKU
    // * Status
    // * KeyFingerprint
    // * Issuer
    Filters []types.Filter

    // Amazon Resource Names (ARNs) of the licenses.
    LicenseArns []string

    // Maximum number of results to return in a single call.
    MaxResults *int32

    // Token for the next set of results.
    NextToken *string
}


type ListReceivedLicensesOutput struct {
    // Received license details.
    Licenses []types.GrantedLicense

    // Token for the next set of results.
    NextToken *string

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationListReceivedLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {

return err
}
err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListReceivedLicenses{}, middleware.After)
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListReceivedLicenses(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opListReceivedLicenses(region string) *
awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListReceivedLicenses",
    }
    // Code generated by smithy-go-codegen DO NOT EDIT.
}

package licensemanager

import (    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Creates a license.
func (c *Client) CreateLicense(ctx context.Context, params *CreateLicenseInput, optFns ...func(*Options)) (*CreateLicenseOutput, error) {
    if params == nil {
        params = &CreateLicenseInput{
    }
    }
    result, metadata, err := c.invokeOperation(ctx, "CreateLicense", params, optFns, addOperationCreateLicenseMiddlewares)
    if err != nil {
        return nil, err
    }
    out := result.(*CreateLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
type CreateLicenseInput struct {

    // License beneficiary.
    // This member is required.
    Beneficiary *string

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    // This member is required.
    ClientToken *string

    // Configuration for consumption of the license. Choose a provisional configuration
    // for workloads running with continuous connectivity. Choose a borrow
    // configuration for workloads with offline usage.
    // This member is required.
    ConsumptionConfiguration *types.ConsumptionConfiguration

    // License entitlements.
    // This member is required.
    Entitlements []types.Entitlement

    // Home Region for the license.
    // This member is required.
    HomeRegion *string

    // License issuer.
    // This member is required.
    Issuer *types.Issuer

    // License name.
    // This member is required.
    LicenseName *string

    // Product name.
    // This member is required.
    ProductName *string

    // Product SKU.
}
//
// This member is required.
ProductSKU *string

// Date and time range during which the license is valid, in ISO8601-UTC format.
//
// This member is required.
Validity *types.DatetimeRange

// Information about the license.
LicenseMetadata []types.Metadata

} type CreateLicenseOutput struct {

// Amazon Resource Name (ARN) of the license.
LicenseArn *string

// License status.
Status types.LicenseStatus

// License version.
Version *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

}

func addOperationCreateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
if err != nil {
    return err
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
func newServiceMetadataMiddleware_opCreateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
    }
}
package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks out the specified license.
func (c *Client) CheckoutLicense(ctx context.Context, params *CheckoutLicenseInput, optFns ...func(*Options)) (*CheckoutLicenseOutput, error) {
    if params == nil {
        params = &CheckoutLicenseInput{
        }
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckoutLicense", params, optFns,
        addOperationCheckoutLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckoutLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckoutLicenseInput struct {
    // Checkout type.
    // // This member is required.
    CheckoutType types.CheckoutType

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    // // This member is required.
    ClientToken *string
// License entitlements.
//
// This member is required.
Entitlements []types.EntitlementData

// Key fingerprint identifying the license.
//
// This member is required.
KeyFingerprint *string

// Product SKU.
//
// This member is required.
ProductSKU *string

// License beneficiary.
Beneficiary *string

// Node ID.
NodeId *string
}

type CheckoutLicenseOutput struct {

// Checkout type.
CheckoutType types.CheckoutType

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}
func addOperationCheckoutLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
    if err = addOpCheckoutLicenseValidationMiddleware(stack); err != nil {
        return err
    }
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckoutLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckoutLicense",
    }
}

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package licensemanager

import {
    "context"
    aws middleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Checks out the specified license for offline use.
func (c *Client) CheckoutBorrowLicense(ctx context.Context, params *CheckoutBorrowLicenseInput, optFns ...func(*Options)) (*CheckoutBorrowLicenseOutput, error) {
    if params == nil {
        params = &CheckoutBorrowLicenseInput{ }
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckoutBorrowLicense", params, optFns, addOperationCheckoutBorrowLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckoutBorrowLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

// Unique, case-sensitive identifier that you provide to ensure the idempotency of // the request.
//
// This member is required.
ClientToken *string

// Digital signature method. The possible value is JSON Web Signature (JWS) // algorithm PS384. For more information, see RFC 7518 Digital Signature with // RSASSA-PSS (https://tools.ietf.org/html/rfc7518#section-3.5). //
// This member is required.
DigitalSignatureMethod types.DigitalSignatureMethod

// License entitlements. Partial checkouts are not supported.
//
// This member is required.
Entitlements []types.EntitlementData

// Amazon Resource Name (ARN) of the license. The license must use the borrow
// consumption configuration.
//
// This member is required.
LicenseArn *string

// Information about constraints.
CheckoutMetadata []types.Metadata

// Node ID.
NodeId *string
}

type CheckoutBorrowLicenseOutput struct {

// Information about constraints.
CheckoutMetadata []types.Metadata

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// Amazon Resource Name (ARN) of the license.
LicenseArn *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
func addOperationCheckoutBorrowLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsMiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsMiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
}
if err = addOpCheckoutBorrowLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutBorrowLicense(options.Region),
middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckoutBorrowLicense(region string)
*awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata {
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckoutBorrowLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Lists the licenses for your account.
func (c *Client) ListLicenses(ctx context.Context, params *ListLicensesInput, optFns ...func(*Options)) (*ListLicensesOutput, error) {
    if params == nil {
        params = &ListLicensesInput{
    }
result, metadata, err := c.invokeOperation(ctx, "ListLicenses", params, optFns, addOperationListLicensesMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*ListLicensesOutput)
out.ResultMetadata = metadata
return out, nil

type ListLicensesInput struct {
    // Filters to scope the results. The following filters are supported:
    // 
    // * Beneficiary
    // 
    // * ProductSKU
    // 
    // * KeyFingerprint
    // 
    // * Status
    Filters []types.Filter

    // Amazon Resource Names (ARNs) of the licenses.
    LicenseArns []string

    // Maximum number of results to return in a single call.
    MaxResults *int32

    // Token for the next set of results.
    NextToken *string
}

type ListLicensesOutput struct {
    // License details.
    Licenses []types.License

    // Token for the next set of results.
    NextToken *string

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationListLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
if err != nil {
    return err
}

if err != nil {
    return err
}

if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}

if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}

if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}

if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}

if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}

if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}

if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}

if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}

if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}

if err = addClientUserAgent(stack); err != nil {
    return err
}

if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}

if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}

if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListLicenses(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opListLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:    region,
        ServiceID: ServiceID,
        SigningName: "license-manager",
        OperationName: "ListLicenses",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.
package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Gets detailed information about the specified license.
func (c *Client) GetLicense(ctx context.Context, params *GetLicenseInput, optFns ...func(*Options)) (*GetLicenseOutput, error) {
    if params == nil {
        params = &GetLicenseInput{
    }
    result, metadata, err := c.invokeOperation(ctx, "GetLicense", params, optFns, addOperationGetLicenseMiddlewares)
    if err != nil {
        return nil, err
    }
    out := result.(*GetLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil

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type GetLicenseInput struct {
    // Amazon Resource Name (ARN) of the license.
    // This member is required.
    LicenseArn *string
    // License version.
    Version *string
}

type GetLicenseOutput struct {
    // License details.
    License *types.License
    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationGetLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpGetLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opGetLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opGetLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region: region,
        ServiceID: ServiceID,
        SigningName: "license-manager",
        OperationName: "GetLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.
package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Checks in the specified license. Check in a license when it is no longer in use.
func (c *Client) CheckInLicense(ctx context.Context, params *CheckInLicenseInput, optFns ...func(*Options)) (*CheckInLicenseOutput, error) {
    if params == nil {
        params = &CheckInLicenseInput{
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckInLicense", params, optFns, addOperationCheckInLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckInLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckInLicenseInput struct {
    // License consumption token.
    //
    //   This member is required.
    LicenseConsumptionToken *string

    // License beneficiary.
    Beneficiary *string
}

type CheckInLicenseOutput struct {
    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationCheckInLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
}
err = stack.Deserialize.Add(awsAwsjson11_deserializeOpCheckInLicense{}, middleware.After)
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckInLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckInLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckInLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckInLicense",
    }
}

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1.90 apt-utils 1.6.14

1.90.1 Available under license :

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   version 1.2.11, January 15th, 2017

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Jean-loup Gailly        Mark Adler
jloup@gzip.org          madler@alumni.caltech.edu

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1.93 golang-protobuf-extensions 1.0.1

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- Chris McDonough, 2011/02/16
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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python’s
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
Intellectual Property. Zope Corporation is a sponsoring member of
the PSF.

All Python releases are Open Source (see http://www.opensource.org
for the Open Source Definition). Historically, most, but not all, Python
releases have also been GPL-compatible; the table below summarizes
the various releases.

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

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This package contains a modified version of ca-bundle.crt:

c-a-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserv for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python’s principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

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2.6   2.5  2008  PSF  yes  
2.6.1  2.6  2008  PSF  yes  
2.6.2  2.6.1  2009  PSF  yes  
2.6.3  2.6.2  2009  PSF  yes  
2.6.4  2.6.3  2009  PSF  yes  
2.6.5  2.6.4  2010  PSF  yes  
3.0   2.6  2008  PSF  yes  
3.0.1  3.0  2009  PSF  yes  
3.1   3.0.1  2009  PSF  yes  
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3.2   3.1  2010  PSF  yes  

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anyone to deny you these rights or to ask you to surrender the rights.
These restrictions translate to certain responsibilities for you if
you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis
or for a fee, you must give the recipients all the rights that we gave
you. You must make sure that they, too, receive or can get the source
code. If you link a program with the library, you must provide
complete object files to the recipients so that they can relink them
with the library, after making changes to the library and recompiling
it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright
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that everyone understands that there is no warranty for this free
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Finally, any free program is threatened constantly by software
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one; be sure to read it in full, and don't assume that anything in it is
the same as in the ordinary license.

The reason we have a separate public license for some libraries is that
they blur the distinction we usually make between modifying or adding to a
program and simply using it. Linking a program with a library, without
changing the library, is in some sense simply using the library, and is
analogous to running a utility program or application program. However, in
a textual and legal sense, the linked executable is a combined work, a
derivative of the original library, and the ordinary General Public License
treats it as such.

Because of this blurred distinction, using the ordinary General
Public License for libraries did not effectively promote software
sharing, because most developers did not use the libraries. We
concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the
users of those programs of all benefit from the free status of the
libraries themselves. This Library General Public License is intended to
permit developers of non-free programs to use free libraries, while
preserving your freedom as a user of such programs to change the free
libraries that are incorporated in them. (We have not seen how to achieve
this as regards changes in header files, but we have achieved it as regards
changes in the actual functions of the Library.) The hope is that this
will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and
modification follow. Pay close attention to the difference between a
"work based on the library" and a "work that uses the library". The
former contains code derived from the library, while the latter only
works together with the library.

Note that it is possible for a library to be covered by the ordinary
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A "library" means a collection of software functions and/or data
prepared so as to be conveniently linked with application programs
(which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work
which has been distributed under these terms. A "work based on the
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included without limitation in the term "modification").
"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

   a) The modified work must itself be a software library.

   b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

   c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

   d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.
(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library
facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

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That's all there is to it!

1.97 pyParsing 2.4.6
1.97.1 Available under license:

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1.98 cachecontrol 0.11.7

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1.99 mux 1.8.0

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For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know
that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.
Although the Lesser General Public License is less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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b) You must cause the files modified to carry prominent notices
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c) You must cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

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1.110 distlib 0.3.0

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A. HISTORY OF THE SOFTWARE
==========================

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python’s
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
Intellectual Property. Zope Corporation is a sponsoring member of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for
the Open Source Definition). Historically, most, but not all, Python
releases have also been GPL-compatible; the table below summarizes
the various releases.

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Distutils2 Contributors
==========================================

The Distutils2 project was started by Tarek Ziad and is currently
maintained by ric Araujo. Many people have contributed to the project.

distlib has started off using some of the code from distutil2.

If you're making a patch, please add your name below in alphabetical order,
and welcome into the Fellowship of the Packaging!

Thanks to:

- Rajiv Abraham
- Ali Afshar
- David Barnett
- Pior Bastida
- Anthony Baxter
- Erik Bray
- C. Titus Brown
- Francisco Martin Brugu
- Nicolas Cadou
- Godefroid Chapelle
- Julien Courteau
- Christophe Combelles
- Jason R. Coombs
- Pierre-Yves David
- Ned Deily
- Konrad Delong
- Josip Djolonga
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1.114 contextlib2 0.6.0
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1.115 python3.8 3.8.10-0ubuntu1~20.04.2

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1.122 libjbig 2.1-3.1build1

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1.136 pixman 0.34.0-2

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    extensions-3.9.5/3.10/Lib/lib2to3/pytree.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.8/Lib/lib2to3/fixtures/fix_execfile.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
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* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.6/Lib/lib2to3/pytree.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/fixtures/fix_exec.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/patcomp.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/fixer_base.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/fixes/fix_exec.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/patcomp.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/fixer_base.py
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    extensions-3.9.5/3.10/Lib/lib2to3/fixes/fix_ne.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
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* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
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* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/tests/pytree_idempotency.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/fixtures/fix_execfile.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/fixtures/fix_print.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
    extensions-3.9.5/3.10/Lib/lib2to3/fixtures/fix_ne.py
* /opt/cola/permits/1189732833_1628745621.310/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-
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* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.7/Modules/_tkinter.c
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.8/Modules/_tkinter.c
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* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.7/Lib/lib2to3/pgen2/tokenize.py
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* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.10/Lib/lib2to3/pgen2/driver.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.8/Lib/lib2to3/pgen2/driver.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.9/Lib/lib2to3/pgen2/driver.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.10/Lib/lib2to3/pgen2/driver.py

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# A grammar to describe tree matching patterns.
# Not shown here:
# - 'TOKEN' stands for any token (leaf node)
# - 'any' stands for any node (leaf or interior)
# With 'any' we can still specify the sub-structure.

# The start symbol is 'Matcher'.

Matcher: Alternatives ENDMARKER

Alternatives: Alternative (\| Alternative)*

Alternative: (Unit | NegatedUnit)+

Unit: [NAME '='] ( STRING [Repeater]
  | NAME [Details] [Repeater]
  | '(' Alternatives ')' [Repeater]
NegatedUnit: 'not' (STRING | NAME [Details] | (' Alternatives '))

Repeater: '* | '+' | '{' NUMBER [, NUMBER] '}'

Details: '<' Alternatives '>

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* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.8/Lib/distutils/spawn.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.6/Lib/distutils/spawn.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.7/Lib/distutils/spawn.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.10/Lib/distutils/spawn.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.9/Lib/distutils/spawn.py

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* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.6/Lib/lib2to3/pgen2/literals.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.8/Lib/lib2to3/pgen2/parse.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.8/Lib/lib2to3/pgen2/grammar.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.7/Lib/lib2to3/pgen2/conv.py
* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3-8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.10/Lib/lib2to3/pgen2/grammar.py
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('binary-only', None, "cannot supply both '--source-only' and '--binary-only'")
'License: ' + self.distribution.get_license(),

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* /opt/cola/permits/1189732833_1628745621.31/0/python3-stdlib-extensions-3.8-10-orig-1-tar-xz/python3-stdlib-extensions-3.9.5/3.9/Lib/distutils/command/bdist_rpm.py
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1.146 gogoprotobuf 1.3.2

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1.147 go-runtime 1.16.5

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@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
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file (certdata.txt). This file can be found in the mozilla source tree:
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
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1.151 tdb 1.44.1

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```

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1.152 jakarta-validation-api 2.0.2
1.152.1 Available under license:

No license file was found, but licenses were detected in source scan.

```bash
/*
 * Jakarta Bean Validation API
 *
 * License: Apache License, Version 2.0
 * See the license.txt file in the root directory or <http://www.apache.org/licenses/LICENSE-2.0>.
 *
*/
```

Found in path(s):

```bash
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2-0-2-sources-3-jar/javax/validation/Validator.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2-0-2-sources-3-jar/javax/validation/metadata/CascadableDescriptor.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2-0-2-sources-3-jar/javax/validation/ConstraintTarget.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2-0-2-sources-3-
```
jar/javax/validation/constraints/FutureOrPresent.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/constraints/Null.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/ConstraintValidatorContext.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/metadata/ExecutableDescriptor.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/groups/Default.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/MessageInterpolator.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/validation/package-info.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/ValueExtractor.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/constraintvalidation/ValidationTarget.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/metadata/MethodDescriptor.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/metadata/package-info.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/valueextraction/Unwrapping.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/valueextraction/ValueExtractor.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/validation/constraintvalidation/ValidationTarget.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/metadata/MethodDescriptor.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/constraints/Digits.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/bootstrap/ProviderSpecificBootstrap.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/valueextraction/UnwrapByDefault.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/constraints/NegativeOrZero.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/validation/ConstraintViolation.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/constraintvalidation/SupportedValidationTarget.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/groups/package-info.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
jar/javax/validation/spe/ValidationProvider.java
* /opt/cola/permits/1135880235_1613624044.2/0/jakarta-validation-api-2.0-2-sources-3-
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~ Jakarta Bean Validation API
~
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1.153 msgp 1.1.5

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1.154 base-files 11ubuntu5.3

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1.158 xz 5.2.2 1.3

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1.159 libxi 1.7.9-1

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AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
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D3DES (V5.09)

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Thanks to: Dan Hoey for his excellent Initial and Inverse permutation code; Jim Gillogly & Phil Karn for the DES key schedule code; Dennis Ferguson, Eric Young and Dana How for comparing notes; and Ray Lau, for humouring me on.

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lib/hcrypto/test_dh.c

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1.164 msgpack 0.6.2

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1.165 netty-resolver-dns 4.1.67.Final

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* /opt/cola/permits/1196668626_1629951631.22/0/netty-resolver-dns-4-1-67-final-jar/META-INF/native-image/io.netty/resolver-dns/native-image.properties
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Manifest-Version: 1.0
Implementation-Title: Netty/Resolver/DNS
Bundle-Description: Netty is an asynchronous event-driven network application framework for rapid development of maintainable high performance protocol servers and clients.
Automatic-Module-Name: io.netty.resolver.dns
Bundle-License: https://www.apache.org/licenses/LICENSE-2.0
Bundle-SymbolicName: io.netty.resolver-dns
Implementation-Version: 4.1.67.Final
Built-By: norman
Bnd-LastModified: 1629104654108
Bundle-ManifestVersion: 2
Implementation-Vendor-Id: io.netty
Bundle-DocURL: https://netty.io/
Bundle-Vendor: The Netty Project
Import-Package: io.netty.bootstrap;version="[4.1,5)",io.netty.buffer;version="[4.1,5)",io.netty.channel;version="[4.1,5)",io.netty.channel.socket;version="[4.1,5)",io.netty.handler.codec;version="[4.1,5)",io.netty.handler.codec.dns;version="[4.1,5)",io.netty.handler.logging;version="[4.1,5)",io.netty.resolver;io.netty.util;version="[4.1,5)",io.netty.util.collection;version="[4.1,5)",io.netty.util.concurrent;version="[4.1,5)",io.netty.util.internal;version="[4.1,5)",io.netty.util.internal.logging;version="[4.1,5)",javax.naming;javax.naming директорy.sun.nio.ch;resolution:=optional.org.eclipse.jetty.npm;version="[1,2
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1.166 appdirs 1.4.3

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1.167 go-jose.v1 2.5.1
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1.168 wrapt 1.13.3

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1.169 sound-theme-freedesktop 0.8 2ubuntu1

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1.176 python3-crypto 2.6.1-8ubuntu2

1.176.1 Available under license:

Copyright and licensing of the Python Cryptography Toolkit ("PyCrypto"):
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Previously, the copyright and/or licensing status of the Python
Cryptography Toolkit ("PyCrypto") had been somewhat ambiguous. The
original intention of Andrew M. Kuchling and other contributors has been to dedicate PyCrypto to the public domain, but that intention was not necessarily made clear in the original disclaimer (see LEGAL/copy/LICENSE.orig).

Additionally, some files within PyCrypto had specified their own licenses that differed from the PyCrypto license itself. For example, the original RIPEMD.c module simply had a copyright statement and warranty disclaimer, without clearly specifying any license terms. (An updated version on the author's website came with a license that contained a GPL-incompatible advertising clause.)

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PyCrypto Code Submission Requirements - Rev. C

Last updated: 2009-02-28

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### EOF ###

1.177 deprecated 1.2.13

1.177.1 Available under license:

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Found in path(s):
* /opt/cola/permits/1201203897_1631116519.19/0/deprecated-1-2-13-tar-gz/Deprecated-1.2.13/Deprecated.egg-info/PKG-INFO
* /opt/cola/permits/1201203897_1631116519.19/0/deprecated-1-2-13-tar-gz/Deprecated-1.2.13/PKG-INFO

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* /opt/cola/permits/1201203897_163116519.19/0/deprecated-1-2-13-tar-gz/Deprecated-1.2.13/setup.py
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%global srcname Deprecated
%global pkgname deprecated

Name:           python-%{pkgname}
Version:        1.2.13
Release:        1%{?dist}
Summary:        Python decorator to deprecate old python classes, functions or methods
License:        MIT
URL:            https://github.com/tantale/%{pkgname}
Source0:        %{pypi_source}
BuildArch:      noarch

%description
Python @deprecated decorator to deprecate old python classes, functions or methods.

%package -n python3-%{pkgname}
Summary:        %{summary}
BuildRequires:  python3-devel
BuildRequires:  python3-setuptools
%{?python_provide:%python_provide python3-%{pkgname}}

%description -n python3-%{pkgname}
Python @deprecated decorator to deprecate old python classes, functions or methods.

%prep
%autosetup -n %{srcname}-%{version}
rm -rf %{pkgname}.egg-info

%build
%py3_build
%install
%py3_install

%files -n python3-%{pkgname}
%license LICENSE.rst
%doc README.md
%{python3_sitelib}/%{pkgname}/
%{python3_sitelib}/%{srcname}-*.egg-info/

%changelog
* Fri Jul 26 2019 Petr Hracek <phracek@redhat.com> - 1.2.6-2
  - Fix python3_sitelib issue

* Fri Jul 26 2019 Petr Hracek <phracek@redhat.com> - 1.2.6-1
  - Initial package

Found in path(s):
  * /opt/cola/permits/1201203897_1631116519.19/0/deprecated-1-2-13-tar-gz/Deprecated-1.2.13/python-
deprecated.spec

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# Contributor Covenant Code of Conduct

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In the interest of fostering an open and welcoming environment, we as contributors and maintainers pledge to making participation in our project and our community a harassment-free experience for everyone, regardless of age, body size, disability, ethnicity, sex characteristics, gender identity and expression, level of experience, education, socio-economic status, nationality, personal appearance, race, religion, or sexual identity and orientation.

## Our Standards

Examples of behavior that contributes to creating a positive environment include:

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* Being respectful of differing viewpoints and experiences
* Gracefully accepting constructive criticism
* Focusing on what is best for the community
* Showing empathy towards other community members

Examples of unacceptable behavior by participants include:

* The use of sexualized language or imagery and unwelcome sexual attention or
advances
* Trolling, insulting/derogatory comments, and personal or political attacks
* Public or private harassment
* Publishing others’ private information, such as a physical or electronic address, without explicit permission
* Other conduct which could reasonably be considered inappropriate in a professional setting

## Our Responsibilities

Project maintainers are responsible for clarifying the standards of acceptable behavior and are expected to take appropriate and fair corrective action in response to any instances of unacceptable behavior.

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This Code of Conduct applies both within project spaces and in public spaces when an individual is representing the project or its community. Examples of representing a project or community include using an official project e-mail address, posting via an official social media account, or acting as an appointed representative at an online or offline event. Representation of a project may be further defined and clarified by project maintainers.

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[homepage]: https://www.contributor-covenant.org
1.178 binutils 2.34-6ubuntu1.3
1.178.1 Available under license:

This is the Debian GNU/Linux prepackaged version of the GNU assembler, linker, and binary utilities.

This package was put together by me, James Troup <james@nocrew.org>, from sources, which I obtained from:


and:

cvs://:pserver:anoncvs@sources.redhat.com:/cvs/src

It was previously maintained by Christopher C. Chimelis <chris@debian.org>


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The binutils manuals and associated documentation are also Copyright
1.179 binutils 2.30-21ubuntu1~18.04.7

1.179.1 Available under license:

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If you've contributed to gas and your name isn't listed here, it is not meant as a slight. I just don't know about it. Email me, nickc@redhat.com and I'll correct the situation.

This file will eventually be deleted: The general info will go into the documentation, and info on specific files will go into an AUTHORS file, as requested by the FSF.

++++++++++++++++

Dean Elsner wrote the original gas for vax. [more details?]

Jay Fenlason maintained gas for a while, adding support for gdb-specific debug information and the 68k series machines, most of the preprocessing pass, and extensive changes in messages.c, input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various enhancements and many bug fixes, including merging support for several processors, breaking gas up to handle multiple object file format backends (including heavy rewrite, testing, an integration of the coff and b.out backends), adding configuration including heavy testing and verification of cross assemblers and file splits and renaming, converted gas to strictly ansi C including full prototypes, added support for m680[34]j0 & cpu32, considerable work on i960 including a coff port (including considerable amounts of reverse engineering), a sparc opcode file rewrite, decstation, rs6000, and hp300hpux host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of
the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete
Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many small bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30 (tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kuzielis and H.J. Lu.

Many others have contributed large or small bug fixes and enhancements. If you've contributed significant work and are not mentioned on this list, and want to be, let us know. Some of the history has been lost; we aren't intentionally leaving anyone out.

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or
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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a
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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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      (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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```
# COPYING.other
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#*TITLE: List of code with permissive licenses as used by GnuPG.
#*STARTUP: showall

* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.

----------------------------------------------
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stand ready to extend this provision to those domains in future versions
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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

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Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite
different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.
The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification").

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

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   b. You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

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d. If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section
6. Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
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reference directing the user to the copy of this License. Also,
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a. Accompany the work with the complete corresponding
machine-readable source code for the Library including
whatever changes were used in the work (which must be
distributed under Sections 1 and 2 above); and, if the work
is an executable linked with the Library, with the complete
machine-readable "work that uses the Library", as object code
and/or source code, so that the user can modify the Library
and then relink to produce a modified executable containing
the modified Library. (It is understood that the user who
changes the contents of definitions files in the Library will
not necessarily be able to recompile the application to use
the modified definitions.)

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c. If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the
above specified materials from the same place.

d. Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special
exception, the source code distributed need not include anything
that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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Ty Coon, President of Vice

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c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python’s principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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# Contributions to the urllib3 project

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  * HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <http://code.google.com/u/erikcederstrand/>
  * NTLM-authenticated HTTPSConnectionPool
  * Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>
  * Client-verified SSL certificates for HTTPSConnectionPool
  * Response gzip and deflate encoding support
  * Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>
  * Non-multipart encoding for POST requests

* p.dobrogost <http://code.google.com/u/@WBRSR1BZDhBFXQB6/>
  * Code review, PEP8 compliance, benchmark fix

* kennethreitz <me@kennethreitz.com>
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  * Python 3 support

* brandon-rhodes <http://rhodesmill.org/brandon>
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* studer <theo.studer@gmail.com>
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* Shivaram Lingamneni <slingamn@cs.stanford.edu>
  * Support for explicitly closing pooled connections

* hartator <hartator@gmail.com>
  * Corrected multipart behavior for params

* Thomas Weischuh <thomas@t-8ch.de>
  * Support for TLS SNI
  * API unification of ssl_version/cert_reqs
  * SSL fingerprint and alternative hostname verification
  * Bugfixes in testsuite

* Sune Kirkeby <mig@ibofobi.dk>
  * Optional SNI-support for Python 2 via PyOpenSSL.
* Marc Schlaich <marc.schlaich@gmail.com>
  * Various bugfixes and test improvements.

* Bryce Boe <bbzbryce@gmail.com>
  * Correct six.moves conflict
  * Fixed pickle support of some exceptions

* Boris Figovsky <boris.figovsky@ravellosystems.com>
  * Allowed to skip SSL hostname verification

* Cory Benfield <http://lukasa.co.uk/about/>
  * Stream method for Response objects.
  * Return native strings in header values.
  * Generate 'Host' header when using proxies.

* Jason Robinson <jaywink@basshero.org>
  * Add missing WrappedSocket.fileno method in PyOpenSSL

* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
  * Fixed a race condition

* Stanislaw Vitkovskiy <stas.vitkovsky@gmail.com>
  * Added HTTPS (CONNECT) proxy support

* Stephen Holsapple <sholsapp@gmail.com>
  * Added abstraction for granular control of request fields

* Martin von Gagern <Martin.vGagern@gmx.net>
  * Support for non-ASCII header parameters

* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
  * Support for separate connect and request timeouts

* Peter Waller <p@pwaller.net>
  * HTTPResponse.tell() for determining amount received over the wire

* Nipunn Koorapati <nipunn1313@gmail.com>
  * Ignore default ports when comparing hosts for equality

* Danilo @dbrgn <http://dbrgn.ch/>
  * Disabled TLS compression by default on Python 3.2+
  * Disabled TLS compression in pyopenssl contrib module
  * Configurable cipher suites in pyopenssl contrib module

* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
  * Account retries on proxy errors

* Nicolas Delaby <nicolas.delaby@ezeep.com>
* Use the platform-specific CA certificate locations

* Josh Schneier <https://github.com/jschneier>
* HTTPHeaderDict and associated tests and docs
* Bugfixes, docs, test coverage

* Tahia Khan <http://tahia.tk/>
* Added Timeout examples in docs

* Arthur Grunseid <http://grunseid.com>
* source_address support and tests (with https://github.com/bui)

* Ian Cordasco <graffatcolmingov@gmail.com>
* PEP8 Compliance and Linting
* Add ability to pass socket options to an HTTP Connection

* Erik Tollerud <erik.tollerud@gmail.com>
* Support for standard library io module.

* Krishna Prasad <kprasad.iitd@gmail.com>
* Google App Engine documentation

* Aaron Meurer <asmeurer@gmail.com>
* Added Url.url, which unparses a Url

* Evgeny Kapun <abacabadabacaba@gmail.com>
* Bugfixes

* Benjamen Meyer <bm_witness@yahoo.com>
* Security Warning Documentation update for proper capture

* Shivan Sornarajah <github@sornars.com>
* Support for using ConnectionPool and PoolManager as context managers.

* Alex Gaynor <alex.gaynor@gmail.com>
* Updates to the default SSL configuration

* Tomas Tomecek <ttomecek@redhat.com>
* Implemented generator for getting chunks from chunked responses.

* tlynn <https://github.com/tlynn>
* Respect the warning preferences at import.

* David D. Riddle <ddriddle@illinois.edu>
* IPv6 bugfixes in testsuite

* Jon Wayne Parrott <jonwayne@google.com>
* App Engine environment tests.
* John Krauss <https://github.com/talos>
  * Clues to debugging problems with `cryptography` dependency in docs

* Disassem <https://github.com/Disassem>
  * Fix pool-default headers not applying for url-encoded requests like GET.

* James Atherfold <jlatherfold@hotmail.com>
  * Bugfixes relating to cleanup of connections during errors.

* Christian Pedersen <https://github.com/chripede>
  * IPv6 HTTPS proxy bugfix

* Jordan Moldow <https://github.com/jmoldow>
  * Fix low-level exceptions leaking from `HTTPResponse.stream()`.
  * Bugfix for `ConnectionPool.urllopen(release_conn=False)`.
  * Creation of `HTTPConnectionPool.ResponseCls`.

* Predrag Gruevski <https://github.com/obi1kenobi>
  * Made cert digest comparison use a constant-time algorithm.

* Adam Talsma <https://github.com/a-tal>
  * Bugfix to ca_cert file paths.

* Evan Meagher <https://evanmeagher.net>
  * Bugfix related to `memoryview` usage in PyOpenSSL adapter

* John Vandenberg <jayvdb@gmail.com>
  * Python 2.6 fixes; pyflakes and pep8 compliance

* Andy Caldwell <andy.m.caldwell@googlemail.com>
  * Bugfix related to reusing connections in indeterminate states.

* Ville Skytt <ville.skytt@iki.fi>
  * Logging efficiency improvements, spelling fixes, Travis config.

* Shige Takeda <smtakeda@gmail.com>
  * Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

* Jesse Shapiro <jesse@jesseshapiro.net>
  * Various character-encoding fixes/tweaks
  * Disabling IPv6 DNS when IPv6 connections not supported

* David Foster <http://dafoster.net/>
  * Ensure order of request and response headers are preserved.

* Jeremy Cline <jeremy@jcline.org>
  * Added connection pool keys by scheme
* Aviv Palivoda <palaviv@gmail.com>
  * History list to Retry object.
  * HTTPResponse contains the last Retry object.

* Nate Prewitt <nate.prewitt@gmail.com>
  * Ensure timeouts are not booleans and greater than zero.
  * Fixed infinite loop in `stream` when amt=None.
  * Added length_remaining to determine remaining data to be read.
  * Added enforce_content_length to raise exception when incorrect content-length received.

* Seth Michael Larson <sethmichaellarson@protonmail.com>
  * Created selectors backport that supports PEP 475.

* Alexandre Dias <alex.dias@smarkets.com>
  * Don't retry on timeout if method not in whitelist

* Moinuddin Quadri <moin18@gmail.com>
  * Lazily load idna package

* Tom White <s6yg1ez3@mail2tor.com>
  * Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

* Tim Burke <tim.burke@gmail.com>
  * Stop buffering entire deflate-encoded responses.

* Tuukka Mustonen <tuukka.mustonen@gmail.com>
  * Add counter for status_forcelist retries.

* Erik Rose <erik@mozilla.com>
  * Bugfix to pyopenssl vendoring

* [Your name or handle] <[email or website]>
  * [Brief summary of your changes]

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1.199 go-testing-interface 1.0.0

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1.200 golang-lru 0.5.1

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io.helidon.config.yaml.internal.YamlFileTypeDetector

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DRuntime: Runtime Library for the D Programming Language
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Version 3.1, 31 March 2009

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1.209 eddsa 0.3.0

1.210 sysv-init 2.88dsf 59.10ubuntu1
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The of the start-stop-daemon

* A rewrite of the original Debian's start-stop-daemon Perl script
* in C (faster - it is executed many times during system startup).
* Written by Marek Michalkiewicz <marekm@i17linuxb.ists.pwr.wroc.pl>,
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1.214 e2fsprogs 1.44.1 1ubuntu1.3

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*/
Index: tdbsa/tdb.c
===================================================================
--- tdbsa.orig/tdb.c
+++ tdbsa/tdb.c
@@ -4,11 +4,11 @@
 Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
 */
 */
- Unix SMB/CIFS implementation.
+ trivial database library - standalone version
Open Source Used In 5GaaS Edge AC-4 1792

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This is the Debian GNU/Linux prepackaged version of the EXT2 file system utilities (e2fsck, mke2fs, etc.). The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

Sources were obtained from http://sourceforge.net/projects/e2fsprogs

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Theodore Ts'o
23-June-2007

------------------------------------------------------------------

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That's all there is to it!
This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

http://sourceforge.net/projects/e2fsprogs

Upstream Author: Theodore Ts'o <tytso@mit.edu>

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This is the Debian GNU/Linux prepackaged version of the ss
command-line interface parsing library. It is currently
distributed together with the EXT2 file system utilities, which are
otherwise packaged as "e2fsprogs".

This package was put together by Yann Dirson <dirson@debian.org>,
from sources obtained from a mirror of:
tsx-11.mit.edu:/pub/linux/packages/ext2fs/

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#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#
all:: image
real-subdirs:: Makefile
@echo "MKDIR pic"
@mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:$(BSD_LIB)

$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) `echo $(my_dir) | sed -e 's;lib/;;'" $(BSD_LIB) $(BSD_LIB))

install-shlibs install: $(BSD_LIB)
@echo "INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)

install-strip: install

install-shlibs-strip: install-shlibs

uninstall-shlibs uninstall: $(BSD_LIB)

$(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean:
$(RM) -rf pic
$(RM) -f $(BSD_LIB)
$(RM) -f ../$(BSD_LIB)

This is the Debian GNU/Linux prepackaged version of the Common Error Description library. It is currently distributed together with the EXT2 file system utilities, which are otherwise packaged as "e2fsprogs".

This package was put together by Yann Dirson <dirson@debian.org>, from sources obtained from a mirror of:
tsx-11.mit.edu:/pub/linux/packages/ext2fs/

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Gadi Oxman, August 1995

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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https://github.com/golang/protobuf

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That's all there is to it!

1.223 gojsonpointer 0.0.0-20180127040702-4e3ac2762d5f

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1.224 makenowjust-heredoc 0.0.0-
20170808103936-bb23615498cd

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1.225 mpdecimal 2.4.2-3

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1.226 pam 1.1.8-3.6ubuntu2.18.04.3

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-------------------------------------------------------------------------
Display the contents of /etc/legal as part of the MOTD, the first time the user logs in, and set a flag in the user's homedir if possible to prevent repeat displays.

Authors: Dustin Kirkland <kirkland@canonical.com>

Upstream status: Ubuntu-specific, maybe submit to Debian

Index: pam.ubuntu/modules/pam_motd/pam_motd.c

--- pam.ubuntu.orig/modules/pam_motd/pam_motd.c
+++ pam.ubuntu/modules/pam_motd/pam_motd.c
@@ -73,6 +73,61 @@
close(fd);
}

+int display_legal(pam_handle_t *pamh)
+{
+    int retval = PAM_IGNORE, rc;
+    char *user = NULL;
+    char *dir = NULL;
+    char *flag = NULL;
+    struct passwd *pwd = NULL;
+    struct stat s;
+    int f;
+    /* Get the user name to determine if we need to print the disclaimer */
+    rc = pam_get_item(pamh, PAM_USER, &user);
+    if (rc == PAM_SUCCESS && user != NULL && *(const char *)user != '\0')
+    {
+        PAM_MODUTIL_DEF_PRIVS(privs);
+
+        /* Get the password entry */
+        pwd = pam_modutil_getpwnam (pamh, user);
+        if (pwd != NULL)
+        {
+            if (pam_modutil_drop_priv(pamh, &privs, pwd)) {
+                pam_syslog(pamh, LOG_ERR,
+                    "Unable to change UID to %d temporarily\n",
+                    pwd->pw_uid);
+                retval = PAM_SESSION_ERR;
+                goto finished;
+            }
+        }
+        if ((tmp = strdup(pwd->pw_dir)) != NULL)
+        {
+            if (asprintf(&dir, %s/.cache", pwd->pw_dir)) == -1 || !dir)
+        goto finished;
+        if (asprintf(&flag, %s/motd.legal-displayed", dir)) == -1 || !flag)
goto finished;
+
+ if (stat(flag, &s) != 0)
+ {
+   display_file(pamh, "/etc/legal");
+   mkdir(dir, 0700);
+   f = open(flag, O_WRONLY|O_CREAT|O_EXCL,
+            S_IRUSR|S_IWUSR|S_IRGRP|S_IROTH);
+   if (f>=0) close(f);
+ }
+
+ finished:
+   if (pam_modutil_regain_priv(pamh, &privs)) {
+     pam_syslog(pamh, LOG_ERR,
+                 "Unable to change UID back to %d\n", privs.old_uid);
+     retval = PAM_SESSION_ERR;
+   }
+
+   _pam_drop(flag);
+   _pam_drop(dir);
+ }
+
+ return retval;
+
+}

PAM_EXTERN
int pam_sm_open_session(pam_handle_t *pamh, int flags,
int argc, const char **argv)
@@ -116,6 +171,9 @@
/* Display the updated motd */
display_file(pamh, motd_path);
+
+ /* Display the legal disclaimer only if necessary */
+ retval = display_legal(pamh);
+ return retval;
}

This package was debianized by J.H.M. Dassen (Ray) jdassen@debian.org on Wed, 23 Sep 1998 20:29:32 +0200.

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1.232 golang-lru 0.5.4

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* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans.factory/support/AutowireCandidateQualifier.java
* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans.factory/noUniqueBeanDefinitionException.java
* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans.factory/support/BeanDefinitionResource.java
* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/MethodInvocationException.java
* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/support/PagedListHolder.java
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* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/support/ManagedMap.java
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* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/support/DefaultBeanDefinitionDocumentReader.java
* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/config/CustomEditorConfigurer.java
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* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/factory/xml/UtilNamespaceHandler.java

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* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/BeanInfoFactory.java
* /opt/cola/permits/1182802071_1627053533.89/0/spring-beans-5-3-9-sources-jar/org/springframework/beans/ExtendedBeanInfoFactory.java
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python’s principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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The Distutils2 project was started by Tarek Ziad and is currently maintained by ric Araujo. Many people have contributed to the project.

distlib has started off using some of the code from distutil2.

If you're making a patch, please add your name below in alphabetical order, and welcome into the Fellowship of the Packaging!

Thanks to:

- Rajiv Abraham
- Ali Afshar
- David Barnett
- Pior Bastida
- Anthony Baxter
- Erik Bray
- C. Titus Brown
- Francisco Martín Brugu
- Nicolas Cadou
- Godefroid Chapelle
- Julien Courteau
- Christophe Combelles
- Jason R. Coombs
- Pierre-Yves David
- Ned Deily
- Konrad Delong
- Josip Djolonga
- John Edmonds
- Andr Espaze
- Boris Feld
- Andrew Francis
- Hallvard B Furuseth
- Patrice Gauthier
- Yannick Gingras
- Filip Gruszczyski
- Walker Hale IV
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awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Deletes the specified license.
func (c *Client) DeleteLicense(ctx context.Context, params *DeleteLicenseInput, optFns ...func(*Options)) (*DeleteLicenseOutput, error) {
    if params == nil {
        params = &DeleteLicenseInput{ }
    }
    result, metadata, err := c.invokeOperation(ctx, "DeleteLicense", params, optFns,
addOperationDeleteLicenseMiddlewares)
    if err != nil {
        return nil, err
    }
    out := result.(*DeleteLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type DeleteLicenseInput struct {
// Amazon Resource Name (ARN) of the license.
//
// This member is required.
LicenseArn *string

// Current version of the license.
//
// This member is required.
SourceVersion *string

}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpDeleteLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDeleteLicense(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opDeleteLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region: region,
        ServiceID: ServiceID,
        SigningName: "license-manager",
        OperationName: "DeleteLicense",
    }
}
// Lists received licenses.
func (c *Client) ListReceivedLicenses(ctx context.Context, params *ListReceivedLicensesInput, optFns ...func(*Options)) (*ListReceivedLicensesOutput, error) {
    if params == nil {
        params = &ListReceivedLicensesInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "ListReceivedLicenses", params, optFns,
        addOperationListReceivedLicensesMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*ListReceivedLicensesOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type ListReceivedLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // ProductSKU
    //
    // * Status
    //
    // * KeyFingerprint
    //
    // * Issuer
    Filters []types.Filter
// Amazon Resource Names (ARNs) of the licenses.
LicenseArns []string

// Maximum number of results to return in a single call.
MaxResults *int32

// Token for the next set of results.
NextToken *string

// Received license details.
Licenses []types.GrantedLicense

// Token for the next set of results.
NextToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationListReceivedLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListReceivedLicenses(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opListReceivedLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListReceivedLicenses",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager
import 
"context"
awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
"github.com/aws/aws-sdk-go-v2/aws/signer/v4"
"github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
"github.com/aws/smithy-go/middleware"
smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Creates a license.
func (c *Client) CreateLicense(ctx context.Context, params *CreateLicenseInput, optFns ...func(*Options)) (*CreateLicenseOutput, error) {
    if params == nil {
        params = &CreateLicenseInput{ }
    }

    result, metadata, err := c.invokeOperation(ctx, "CreateLicense", params, optFns,
        addOperationCreateLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CreateLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CreateLicenseInput struct {

    // License beneficiary.

    // This member is required.
    Beneficiary *string

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.

    // This member is required.
    ClientToken *string

    // Configuration for consumption of the license. Choose a provisional configuration
    // for workloads running with continuous connectivity. Choose a borrow
    // configuration for workloads with offline usage.

    // This member is required.
    ConsumptionConfiguration *types.ConsumptionConfiguration

    // License entitlements.
//
// This member is required.
Entitlements []types.Entitlement

// Home Region for the license.
//
// This member is required.
HomeRegion *string

// License issuer.
//
// This member is required.
Issuer *types.Issuer

// License name.
//
// This member is required.
LicenseName *string

// Product name.
//
// This member is required.
ProductName *string

// Product SKU.
//
// This member is required.
ProductSKU *string

// Date and time range during which the license is valid, in ISO8601-UTC format.
//
// This member is required.
Validity *types.DatetimeRange

// Information about the license.
LicenseMetadata []types.Metadata
}

type CreateLicenseOutput struct {

// Amazon Resource Name (ARN) of the license.
LicenseArn *string

// License status.
Status types.LicenseStatus

// License version.
Version *string
// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}

func addOperationCreateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {


return err
}
if err = addOpCreateLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCreateLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCreateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CreateLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Checks out the specified license.
func (c *Client) CheckoutLicense(ctx context.Context, params *CheckoutLicenseInput, optFns ...func(*Options)) (*CheckoutLicenseOutput, error) {
    if params == nil {
        params = &CheckoutLicenseInput{
    }
}
result, metadata, err := c.invokeOperation(ctx, "CheckoutLicense", params, optFns, 
addOperationCheckoutLicenseMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*CheckoutLicenseOutput)
out.ResultMetadata = metadata
return out, nil


type CheckoutLicenseInput struct {

    // Checkout type.
    //
    // This member is required.
    CheckoutType types.CheckoutType

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    //
    // This member is required.
    ClientToken *string

    // License entitlements.
    //
    // This member is required.
    Entitlements []types.EntitlementData

    // Key fingerprint identifying the license.
    //
    // This member is required.
    KeyFingerprint *string

    // Product SKU.
    //
    // This member is required.
    ProductSKU *string

    // License beneficiary.
    Beneficiary *string

    // Node ID.
    NodeId *string

}

type CheckoutLicenseOutput struct {
// Checkout type.
CheckoutType types.CheckoutType

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationCheckoutLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
if err != nil {
    return err
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {

return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.CloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckoutLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutLicense(options.Region),
middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCheckoutLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region: region,
        ServiceID: "license-manager",
        SigningName: "license-manager",
    }
}
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// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks out the specified license for offline use.
func (c *Client) CheckoutBorrowLicense(ctx context.Context, params *CheckoutBorrowLicenseInput, optFns ...func(*Options)) (*CheckoutBorrowLicenseOutput, error) {
    if params == nil {
        params = &CheckoutBorrowLicenseInput{ }
    }
result, metadata, err := c.invokeOperation(ctx, "CheckoutBorrowLicense", params, optFns, addOperationCheckoutBorrowLicenseMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*CheckoutBorrowLicenseOutput)
out.ResultMetadata = metadata
return out, nil

type CheckoutBorrowLicenseInput struct {

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    //
    // This member is required.
    ClientToken *string

    // Digital signature method. The possible value is JSON Web Signature (JWS)
    // algorithm PS384. For more information, see RFC 7518 Digital Signature with
    //
    // This member is required.
    DigitalSignatureMethod types.DigitalSignatureMethod

    // License entitlements. Partial checkouts are not supported.
    //
    // This member is required.
    Entitlements []types.EntitlementData

    // Amazon Resource Name (ARN) of the license. The license must use the borrow
    // consumption configuration.
    //
    // This member is required.
    LicenseArn *string

    // Information about constraints.
    CheckoutMetadata []types.Metadata

    // Node ID.
    NodeId *string

}

type CheckoutBorrowLicenseOutput struct {

}
func addOperationCheckoutBorrowLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    // Information about constraints.
    CheckoutMetadata [types.Metadata]

    // Allowed license entitlements.
    EntitlementsAllowed [types.EntitlementData]

    // Date and time at which the license checkout expires.
    Expiration *string

    // Date and time at which the license checkout is issued.
    IssuedAt *string

    // Amazon Resource Name (ARN) of the license.
    LicenseArn *string

    // License consumption token.
    LicenseConsumptionToken *string

    // Node ID.
    NodeId *string

    // Signed token.
    SignedToken *string

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}

if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}

if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}

if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}

if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}

if err = addClientUserAgent(stack); err != nil {
    return err
}

if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}

if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}

if err = addOpCheckoutBorrowLicenseValidationMiddleware(stack); err != nil {
    return err
}

if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutBorrowLicense(options.Region),
    middleware.Before); err != nil {
    return err
}

if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}

if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}

if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}

return nil
}

func newServiceMetadataMiddleware_opCheckoutBorrowLicense(region string)
    *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:    region,
package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Lists the licenses for your account.
func (c c*Client) ListLicenses(ctx context.Context, params *ListLicensesInput, optFns ...func(*Options)) (*ListLicensesOutput, error) {
    if params == nil {
        params = &ListLicensesInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "ListLicenses", params, optFns,
        addOperationListLicensesMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*ListLicensesOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type ListLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // Beneficiary
    //
    // * ProductSKU
    //
    // * KeyFingerprint
    //
    // * Status


Filters []types.Filter

// Amazon Resource Names (ARNs) of the licenses.
LicenseArns []string

// Maximum number of results to return in a single call.
MaxResults *int32

// Token for the next set of results.
NextToken *string

// License details.
Licenses []types.License

// Token for the next set of results.
NextToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationListLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListLicenses(options.Region), middleware.Before);
    err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opListLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListLicenses",
    }
}
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager
// Gets detailed information about the specified license.
func (c *Client) GetLicense(ctx context.Context, params *GetLicenseInput, optFns ...func(*Options)) (*GetLicenseOutput, error) {
    if params == nil {
        params = &GetLicenseInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "GetLicense", params, optFns, addOperationGetLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*GetLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type GetLicenseInput struct {

    // Amazon Resource Name (ARN) of the license.
    // This member is required.
    LicenseArn *string

    // License version.
    Version *string
}

type GetLicenseOutput struct {

    // License details.
    License *types.License

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationGetLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {


if err != nil {
    return err
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpGetLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opGetLicense(options.Region), middleware.Before);
err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opGetLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "GetLicense",
        }
    }

    // Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

    // Checks in the specified license. Check in a license when it is no longer in use.
    func (c *Client) CheckInLicense(ctx context.Context, params *CheckInLicenseInput, optFns ...func(*Options)) (*CheckInLicenseOutput, error) {
        if params == nil {
            params = &CheckInLicenseInput{
        }
        result, metadata, err := c.invokeOperation(ctx, "CheckInLicense", params, optFns, addOperationCheckInLicenseMiddlewares)
        if err != nil {
            return nil, err
        }
out := result.(*CheckInLicenseOutput)
out.ResultMetadata = metadata
return out, nil
}

type CheckInLicenseInput struct {
    // License consumption token.
    // This member is required.
    LicenseConsumptionToken *string
    // License beneficiary.
    Beneficiary *string
}

type CheckInLicenseOutput struct {
    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationCheckInLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckInLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckInLicense(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckInLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckInLicense",
    }
}

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Contributors
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- Chris McDonough, 2011/02/16
- Wichert Akkerman, 2012/02/02

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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python’s
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
Intellectual Property. Zope Corporation is a sponsoring member of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for
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releases have also been GPL-compatible; the table below summarizes
the various releases.

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DRuntime: Runtime Library for the D Programming Language

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Version 3, 29 June 2007

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively state the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) <year>  <name of author>

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If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

<program> Copyright (C) <year> <name of author>
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Version 2, June 1991

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble
========

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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Developed by:

LLVM Team

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<thead>
<tr>
<th>Program</th>
<th>Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>mach_override</td>
<td>lib/interception/mach_override</td>
</tr>
</tbody>
</table>
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1.246 python3-lib2to3 3.6.9-1~18.04

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# version.

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* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/distutils/command/bdist_wininst.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/distutils/command/bdist_wininst.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.5/Lib/distutils/command/bdist_wininst.py
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* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.3/Lib/distutils/command/bdist_msi.py
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Found in path(s):
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixes/fix_dict.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixes/fix_buffer.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tarb2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/fixes/fix_map.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.8/3.7/Lib/lib2to3/fixes/fix_xmlrpc.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.8/3.8/Lib/lib2to3/fixes/fix_stdarg.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.6/Lib/lib2to3/fixes/fix_buffer.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.7/Lib/lib2to3/fixes/fix_map.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.8/Lib/lib2to3/fixes/fix_types.py

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('binary-only', None,
"cannot supply both '--source-only' and '--binary-only'")
'Licence: ' + self.distribution.get_license(),

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* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.7/Lib/distutils/command/bdist_rpm.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.6/Lib/distutils/command/bdist_rpm.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.6/Lib/distutils/command/bdist_rpm.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.6/Lib/distutils/command/bdist_rpm.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tarb2/python3-stdlib-extensions-3.7/3.6/Lib/distutils/command/bdist_rpm.py

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# A grammar to describe tree matching patterns.
# Not shown here:
# - 'TOKEN' stands for any token (leaf node)
# - 'any' stands for any node (leaf or interior)
# With 'any' we can still specify the sub-structure.

# The start symbol is 'Matcher'.

Matcher: Alternatives ENDMARKER

Alternatives: Alternative (\| Alternative)*

Alternative: (Unit | NegatedUnit)+

Unit: [NAME '='] ( STRING [Repeater]
    | NAME [Details] [Repeater]
    | '(' Alternatives ')' [Repeater]
    | '[' Alternatives ']' )

NegatedUnit: 'not' (STRING | NAME [Details] | '(' Alternatives ')')

Repeater: '*' | '+' | '{' NUMBER [',' NUMBER] '}'

Details: '<' Alternatives '>'

Found in path(s):
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/PatternGrammar.txt
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/PatternGrammar.txt
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/PatternGrammar.txt

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* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/fixes/fix_apply.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/fixes/fix_has_key.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/refactor.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixes/fix_long.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3.6-9-orig-1-tar-
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* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/conv.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/grammar.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/parses.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdlib-extensions-3-6-9-orig-1-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/literals.py
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file.write('License: %s
' % self.get_license())

Found in path(s):
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/literals.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/__init__.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/literals.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/grammar.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/conv.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/parse.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/__init__.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/conv.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/parse.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/grammar.py

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Executable.

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* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/distutils/dist.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/distutils/spawn.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/distutils/dist.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/distutils/spawn.py
* /opt/ws_local/PERMITS_SQL/1075369341_1596120497.64/0/python3-stdblib-extensions-3.6-9-orig-1-tar-
  bz2/python3-stdblib-extensions-3.7.5/3.6/Lib/distutils/spawn.py

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1.249 asn1crypto 0.24.0

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1.250 libffi 3.2.1 8

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1.251 python-setuptools 39.0.1

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1.252 fwd 1.1.1

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1.253 charset-normalizer 2.0.10

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1.255 netcat-openbsd 1.187 1ubuntu0.1

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Source: http://www.openbsd.org/cgi-bin/cvsweb/src/usr.bin/nc/

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1.256 adduser 3.116ubuntu1

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1.257 vavr-match 0.10.2
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xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/maven-v4_0_0.xsd">
  <modelVersion>4.0.0</modelVersion>
  <parent>
    <groupId>io.vavr</groupId>
    <artifactId>vavr-parent</artifactId>
    <version>0.10.2</version>
    <relativePath>../pom.xml</relativePath>
  </parent>
  <artifactId>vavr-match</artifactId>
  <packaging>jar</packaging>
  <name>Vavr Match</name>
  <description>Annotation for structural pattern matching.</description>
  <url>http://vavr.io</url>
  <licenses>
    <license>
      <name>The Apache Software License, Version 2.0</name>
      <url>http://www.apache.org/licenses/LICENSE-2.0.txt</url>
      <distribution>repo</distribution>
    </license>
  </licenses>
</project>
<groupId>org.apache.maven.plugins</groupId>
<artifactId>maven-source-plugin</artifactId>
</plugin>

/plugin>
<groupId>org.apache.maven.plugins</groupId>
<artifactId>maven-javadoc-plugin</artifactId>
</plugin>

/plugin>
<groupId>org.apache.felix</groupId>
<artifactId>maven-bundle-plugin</artifactId>
</plugin>
</plugins>
</build>
</project>

Found in path(s):
* /opt/cola/permits/1135892294_1613626827.85/0/vavr-match-0-10-2-jar/META-INF/maven/io.vavr/vavr-match/pom.xml
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Manifest-Version: 1.0
Bundle-Description: Annotation for structural pattern matching.
Bundle-License: http://www.apache.org/licenses/LICENSE-2.0.txt
Bundle-SymbolicName: io.vavr.match
Built-By: daniel
Bnd-LastModified: 1564762773204
Bundle-ManifestVersion: 2
Require-Capability: osgi.ee;filter="(&osgi.ee=JavaSE)(version=1.8)"
Tool: Bnd-4.1.0.201810181252
Export-Package: io.vavr.match.annotation;version="0.10.2"
Bundle-Name: Vavr Match
Bundle-Version: 0.10.2
Created-By: Apache Maven Bundle Plugin
Build-Jdk: 1.8.0_201

Found in path(s):
* /opt/cola/permits/1135892294_1613626827.85/0/vavr-match-0-10-2-jar/META-INF/MANIFEST.MF

1.258 netty-handler 4.1.67.Final
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Found in path(s):
* /opt/cola/permits/1196668640_1629951641.8/0/netty-handler-4-1-67-final-jar/META-INF/maven/io.netty/netty-handler/pom.xml

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Manifest-Version: 1.0
Implementation-Title: Netty/Handler
Bundle-Description: Netty is an asynchronous event-driven network application framework for rapid development of maintainable high performance protocol servers and clients.
Automatic-Module-Name: io.netty.handler
Bundle-License: https://www.apache.org/licenses/LICENSE-2.0
Bundle-SymbolicName: io.netty.handler
Implementation-Version: 4.1.67.Final
Built-By: norman
Bnd-LastModified: 1629104626371
Bundle-ManifestVersion: 2
Implementation-Vendor-Id: io.netty
Bundle-DocURL: https://netty.io/
Bundle-Vendor: The Netty Project
Import-Package: sun.security.x509;resolution:=optional,org.eclipse.jetty.npn;version="[1,2)";resolution:=optional,org.eclipse.jetty.alpn;version="[1,2)";resolution:=optional,io.netty.buffer;version="[4.1,5)";io.netty.channel;version="[4.1,5)";io.netty.channel.socket;version="[4.1,5)";io.netty.handler.codec;version="[4.1,5)";io.netty.handler.codec.base64;version="[4.1,5)";io.netty.internal.tcnative;resolution:=optional,io.netty.resolver;version="[4.1,5)";io.netty.util;version="[4.1,5)";io.netty.util.concurrent;version="[4.1,5)";io.netty.util.internal;version="[4.1,5)";io.netty.util.internal.logging;version="[4.1,5)";javax.crypto,javax.crypto.spec,javax.net.ssl,javax.security.auth.x500,javax.security.cert;org.bouncycastle.asn1;org.bouncycastle.asn1.x500;version="[1.69,2)";resolution:=optional,org.bouncycastle.cert;version="[1.69,2)";resolution:=optional,org.bouncycastle.cert.jcajce;version="[1.69,2)";resolution:=optional,org.bouncycastle.jce.provider;version="[1.69,2)";resolution:=optional,org.bouncycastle.operator;version="[1.69,2)";resolution:=optional,org.conscrypt;version="[2.5,3)";resolution:=optional,
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1.260 python-setuptools 45.2.0-1

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1.261 sed 4.7 1

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### 1.262 Jackson-databind 2.12.4

#### 1.262.1 Available under license :

```
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1.267 jctools-core 3.1.0

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1.273 httpcomponents-client 4.5.13

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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The precise terms and conditions for copying, distribution and modification follow.

@heading TERMS AND CONDITIONS

@enumerate 0
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@enumerate a
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@end enumerate

@item
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to copy the Corresponding Source from a network server at no charge.

@item
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6b.

@item
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Regardless of what server hosts the Corresponding Source, you remain
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satisfy these requirements.

@item
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@end enumerate

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d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble
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library. The threshold for this to be true is not precisely
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functions (ten lines or less in length), then the use of the object
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portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
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To: Stephen Frost <sfrost@debian.org>
X-Mailer: Lotus Notes Release 5.0.2a (Intl) 23 November 1999
Subject: Re: Juan C. Gomez license in OpenLDAP Source

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1.285 shadow 4.8.1-1ubuntu5

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1.288 types-paramiko 2.8.6
1.288.1 Available under license :

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Metadata-Version: 2.1
Name: types-paramiko
Version: 2.8.6
Summary: Typing stubs for paramiko
Home-page: https://github.com/python/typeshed
License: Apache-2.0 license
Platform: UNKNOWN
Classifier: License :: OSI Approved :: Apache Software License
Classifier: Typing :: Typed
Description-Content-Type: text/markdown

## Typing stubs for paramiko
This is a PEP 561 type stub package for the `paramiko` package. It can be used by type-checking tools like mypy, PyCharm, pytype etc. to check code that uses `paramiko`. The source for this package can be found at https://github.com/python/typeshed/tree/master/stubs/paramiko. All fixes for types and metadata should be contributed there.

See https://github.com/python/typeshed/blob/master/README.md for more details. This package was generated from typeshed commit `22bf9e8a787b38b1a0e193edd5b47119e43286ca`.

Found in path(s):
* /opt/cola/permits/1253284117_1643391230.63/0/types-paramiko-2.8.6-tar-gz/types-paramiko-2.8.6/PKG-INFO
* /opt/cola/permits/1253284117_1643391230.63/0/types-paramiko-2.8.6/types_paramiko.egg-info/PKG-INFO

1.289 netcat-traditional 1.10-41.1

1.289.1 Available under license:
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This is the traditional netcat,
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1.290 wget 1.20.3 1ubuntu1

1.290.1 Available under license:
This package was debianized by
Christian Schwarz <schwarz@monet.m.isar.de> on Mon, 18 Nov 1996 00:59:57 +0100
J. Ramos Goncalves <ramos@debian.org> on Thu, 13 Feb 1997 23:15:18 +0000
Nicols Lichtmaier <nick@debian.org> on Sat, 18 Oct 1997 21:23:12 -0300
Nol Kthe <noel@debian.org> on Mon, 18 Feb 2002 09:53:00 +0100

It was downloaded from ftp://ftp.gnu.org/gnu/wget/
Homepage: http://www.gnu.org/directory/wget.html
http://www.gnu.org/software/wget/wget.html

Upstream Author: Giuseppe Scrivano <gscrivano@gnu.org>

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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@item
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@end enumerate

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@end example

Also add information on how to contact you by electronic and paper mail.

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

========

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Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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<td>lib/interception/mach_override</td>
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------------
- Chris McDonough, 2011/12/17
- Michael Merickel, 2012/01/16
- Damien Baty, 2012/10/25
- Georges Dubus, 2012/11/24
- Tres Seaver, 2013/04/09
- Tshepang Lekhonkhobe, 2013/04/09
- Keith Gaughan, 2013/05/11
- Jamie Matthews, 2013/06/19
1.298 mpdecimal 2.4.2-1ubuntu1

1.298.1 Available under license:

Format: http://www.debian.org/doc/packaging-manuals/copyright-format/1.0/
Upstream-Name: mpdecimal
Source: http://www.bytereef.org/mpdecimal/download.html

Files: *
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1.299 gpm 1.20.7-5
1.299.1 Available under license :

Format: https://www.debian.org/doc/packaging-manuals/copyright-format/1.0/
Upstream-Name: gpm - general purpose mouse
Upstream-Contact: gpm@lists.linux.it
Source: https://nico.schottelius.org/software/gpm/archives/

Files: *
Copyright: 1993 Andrew Haylett <ajh@gec-mrc.co.uk>
1994-2000 Alessandro Rubini <rubini@linux.it>
1998-1999 Ian Zimmerman <itz@rahul.net>
2001-2012 Nico Schottelius <nico@schottelius.org>
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Comment: It is assumed that the packaging is licensed under the same
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1.300 aws-sdk-go-v2 1.1.0
1.300.1 Available under license:

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Deletes the specified license.
func (c *Client) DeleteLicense(ctx context.Context, params *DeleteLicenseInput, optFns ...func(*Options)) (*DeleteLicenseOutput, error) {
    if params == nil {
        params = &DeleteLicenseInput{ }
    }

    result, metadata, err := c.invokeOperation(ctx, "DeleteLicense", params, optFns, addOperationDeleteLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*DeleteLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type DeleteLicenseInput struct {

    // Amazon Resource Name (ARN) of the license.
    //
    // This member is required.
    LicenseArn *string

    // Current version of the license.
    //
    // This member is required.
    SourceVersion *string
}

type DeleteLicenseOutput struct {

    // Date on which the license is deleted.
    DeletionDate *string

    // License status.
    Status types.LicenseDeletionStatus

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationDeleteLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpDeleteLicense{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpDeleteLicense{}, middleware.After)
    return err
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpDeleteLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDeleteLicense(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opDeleteLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:      region,
        ServiceID:   ServiceID,
        SigningName: "license-manager",
        OperationName: "DeleteLicense",
    }
}

AWS SDK for Go
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package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Lists received licenses.
func (c *Client) ListReceivedLicenses(ctx context.Context, params *ListReceivedLicensesInput, optFns ...func(*Options)) (*ListReceivedLicensesOutput, error) {
    if params == nil {
        params = &ListReceivedLicensesInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "ListReceivedLicenses", params, optFns,
        addOperationListReceivedLicensesMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*ListReceivedLicensesOutput)
out.ResultMetadata = metadata
return out, nil
}

type ListReceivedLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // ProductSKU
    //
    // * Status
    //
    // * KeyFingerprint
    //
    // * Issuer
    Filters []types.Filter

    // Amazon Resource Names (ARNs) of the licenses.
    LicenseArns []string

    // Maximum number of results to return in a single call.
    MaxResults *int32

    // Token for the next set of results.
    NextToken *string
}

type ListReceivedLicensesOutput struct {

    // Received license details.
    Licenses []types.GrantedLicense

    // Token for the next set of results.
    NextToken *string

    // Metadata pertaining to the operation’s result.
    ResultMetadata middleware.Metadata
}

func addOperationListReceivedLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    return
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListReceivedLicenses(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
func newServiceMetadataMiddleware_opListReceivedLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListReceivedLicenses",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Creates a license.
func (c *Client) CreateLicense(ctx context.Context, params *CreateLicenseInput, optFns ...func(*Options)) (*CreateLicenseOutput, error) {
    if params == nil {
        params = &CreateLicenseInput{ }
    }

    result, metadata, err := c.invokeOperation(ctx, "CreateLicense", params, optFns,
        addOperationCreateLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CreateLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CreateLicenseInput struct {

    // License beneficiary.
Beneficiary *string

// Unique, case-sensitive identifier that you provide to ensure the idempotency of
// the request.
//
// This member is required.
ClientToken *string

// Configuration for consumption of the license. Choose a provisional configuration
// for workloads running with continuous connectivity. Choose a borrow
// configuration for workloads with offline usage.
//
// This member is required.
ConsumptionConfiguration *types.ConsumptionConfiguration

// License entitlements.
//
// This member is required.
Entitlements []types.Entitlement

// Home Region for the license.
//
// This member is required.
HomeRegion *string

// License issuer.
//
// This member is required.
Issuer *types.Issuer

// License name.
//
// This member is required.
LicenseName *string

// Product name.
//
// This member is required.
ProductName *string

// Product SKU.
//
// This member is required.
ProductSKU *string

// Date and time range during which the license is valid, in ISO8601-UTC format.
//
// This member is required.
Validity *types.DatetimeRange

// Information about the license.
LicenseMetadata []types.Metadata

type CreateLicenseOutput struct {

// Amazon Resource Name (ARN) of the license.
LicenseArn *string

// License status.
Status types-licenseStatus

// License version.
Version *string

// Metadata pertaining to the operation's result.\nResultMetadata middleware.Metadata

}

func addOperationCreateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAmazon11_serializeOpCreateLicense{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAmazon11_deserializeOpCreateLicense{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsMiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyHTTP.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = v4.AddResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {

return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCreateLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCreateLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCreateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
Region: region,
ServiceID: ServiceID,
SigningName: "license-manager",
OperationName: "CreateLicense",
}
package licensemanage

import {
    "context"
    aws厉害 "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanage/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Checks out the specified license.
func (e *Client) CheckoutLicense(ctx context.Context, params *CheckoutLicenseInput, optFns ...func(*Options)) (*CheckoutLicenseOutput, error) {
    if params == nil {
        params = &CheckoutLicenseInput{
    }
    }

    result, metadata, err := e.invokeOperation(ctx, "CheckoutLicense", params, optFns, addOperationCheckoutLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckoutLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckoutLicenseInput struct {

    // Checkout type.
    //
    // This member is required.
    CheckoutType types.CheckoutType

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    //
    // This member is required.
    ClientToken *string

    // License entitlements.
    //
    // This member is required.
    Entitlements []types.EntitlementData


// Key fingerprint identifying the license.
//
// This member is required.
KeyFingerprint *string

// Product SKU.
//
// This member is required.
ProductSKU *string

// License beneficiary.
Beneficiary *string

// Node ID.
NodeId *string

// Checkout type.
CheckoutType types.CheckoutType

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationCheckoutLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
    }
return err
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckoutLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}  
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}  
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckoutLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:     region,
        ServiceID:  ServiceID,
        SigningName: "license-manager",
        OperationName: "CheckoutLicense",
    }
}

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package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Checks out the specified license for offline use.
func (c *Client) CheckoutBorrowLicense(ctx context.Context, params *CheckoutBorrowLicenseInput, optFns ...func(*Options)) (*CheckoutBorrowLicenseOutput, error) {
    if params == nil {
        params = &CheckoutBorrowLicenseInput{
    }
}

    result, metadata, err := c.invokeOperation(ctx, "CheckoutBorrowLicense", params, optFns, addOperationCheckoutBorrowLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckoutBorrowLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckoutBorrowLicenseInput struct {
    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    //
    // This member is required.
    ClientToken *string

    // Digital signature method. The possible value is JSON Web Signature (JWS)
    // algorithm PS384. For more information, see RFC 7518 Digital Signature with
    //
    // This member is required.
    DigitalSignatureMethod types.DigitalSignatureMethod

    // License entitlements. Partial checkouts are not supported.
}
// This member is required.
Entitlements []types.EntitlementData

// Amazon Resource Name (ARN) of the license. The license must use the borrow
// consumption configuration.
// This member is required.
LicenseArn *string

// Information about constraints.
CheckoutMetadata []types.Metadata

// Node ID.
NodeId *string

} type CheckoutBorrowLicenseOutput struct {

// Information about constraints.
CheckoutMetadata []types.Metadata

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// Amazon Resource Name (ARN) of the license.
LicenseArn *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}

func addOperationCheckoutBorrowLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
if err != nil {
    return err
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckoutBorrowLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutBorrowLicense(options.Region),}
func newServiceMetadataMiddleware_opCheckoutBorrowLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckoutBorrowLicense",
    }
}

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Lists the licenses for your account.
func (c *Client) ListLicenses(ctx context.Context, params *ListLicensesInput, optFns ...func(*Options)) (*ListLicensesOutput, error) {
    if params == nil {
        params = &ListLicensesInput{
    }

    result, metadata, err := c.invokeOperation(ctx, "ListLicenses", params, optFns,
        addOperationListLicensesMiddlewares)
    if err != nil {
        return nil, err
    }
out := result.(*ListLicensesOutput)
out.ResultMetadata = metadata
return out, nil
}

type ListLicensesInput struct {

// Filters to scope the results. The following filters are supported:
//
// * Beneficiary
//
// * ProductSKU
//
// * KeyFingerprint
//
// * Status
Filters []types.Filter

// Amazon Resource Names (ARNs) of the licenses.
LicenseArns []string

// Maximum number of results to return in a single call.
MaxResults *int32

// Token for the next set of results.
NextToken *string
}

type ListLicensesOutput struct {

// License details.
Licenses []types.License

// Token for the next set of results.
NextToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}

func addOperationListLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
if err != nil {
    return err
}
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListLicenses(options.Region), middleware.Before);
err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
func newServiceMetadataMiddleware_opListLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListLicenses",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Gets detailed information about the specified license.
func (c *Client) GetLicense(ctx context.Context, params *GetLicenseInput, optFns ...func(*Options)) (*GetLicenseOutput, error) {
    if params == nil {
        params = &GetLicenseInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "GetLicense", params, optFns, addOperationGetLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*GetLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type GetLicenseInput struct {


// Amazon Resource Name (ARN) of the license.

// This member is required.
LicenseArn *string

// License version.
Version *string

func addOperationGetLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
  if err != nil {
    return err
  }
  if err != nil {
    return err
  }
  if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
  }
  if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
  }
  if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
  }
  if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
  }
  if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
  }
  if err = addRetryMiddlewares(stack, options); err != nil {
    return err
  }
  if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
  }
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpGetLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opGetLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opGetLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "GetLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
// Checks in the specified license. Check in a license when it is no longer in use.
func (c *Client) CheckInLicense(ctx context.Context, params *CheckInLicenseInput, optFns ...func(*Options)) (*CheckInLicenseOutput, error) {
    if params == nil {
        params = &CheckInLicenseInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckInLicense", params, optFns,
        addOperationCheckInLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckInLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckInLicenseInput struct {
    // License consumption token.
    // This member is required.
    LicenseConsumptionToken *string

    // License beneficiary.
    Beneficiary *string
}

type CheckInLicenseOutput struct {
    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationCheckInLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }

    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsMiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyMiddleware.ComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.ComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddleware(stack, options); err != nil {
    return err
}
if err = awsMiddleware.RawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsMiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = awsMiddleware.ClientUserAgent(stack); err != nil {
    return err
}
if err = smithyMiddleware.ErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyMiddleware.CloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckInLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckInLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {

return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckInLicense(region string) *awsmiddleware.RegisterServiceMetadata
{
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckInLicense",
    }
}

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1.302 netty-resolver 4.1.67.Final
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Found in path(s):
* /opt/cola/permits/1196668531_1629951718.15/0/netty-resolver-4.1.67-final-jar/META-INF/maven/io.netty/netty-resolver/pom.xml

No license file was found, but licenses were detected in source scan.

Manifest-Version: 1.0
Implementation-Title: Netty/Resolver
Bundle-Description: Netty is an asynchronous event-driven network application framework for rapid development of maintainable high performance protocol servers and clients.
Automatic-Module-Name: io.netty.resolver
Bundle-License: https://www.apache.org/licenses/LICENSE-2.0
Bundle-SymbolicName: io.netty.resolver
Implementation-Version: 4.1.67.Final
Built-By: norman
Bnd-LastModified: 1629104583355
Bundle-ManifestVersion: 2
Implementation-Vendor-Id: io.netty
Bundle-DocURL: https://netty.io/
Bundle-Vendor: The Netty Project
Import-Package: io.netty.util;version="[4.1,5)",io.netty.util.concurrent;version="[4.1,5)",io.netty.util.internal;version="[4.1,5)",io.netty.util.internal.logging;version="[4.1,5)",sun.nio.ch;resolution=optional,org.eclipse.jetty.npn;version="[1,2)";resolution=optional,org.eclipse.jetty.alpn;version="[1,2)";resolution=optional
Require-Capability: osgi.ee;filter="(&(osgi.ee=JavaSE)(version=1.6))"
Tool: Bnd-2.4.1.201501161923
Implementation-Vendor: The Netty Project
Export-Package: io.netty.resolver;uses="io.netty.util.concurrent";version="4.1.67"
1.303 python3-venv 3.6.7-1~18.04

1.303.1 Available under license:

This is the Debian GNU/Linux prepackaged version of the Python programming language. Python was written by Guido van Rossum <guido@cwi.nl> and others.

This package was put together by Klee Dienes <klee@debian.org> from sources from ftp.python.org:/pub/python, based on the Debianization by the previous maintainers Bernd S. Breitrup <bsb@uni-muenster.de> and Bruce Perens.

Current maintainer is Matthias Klose <doko@debian.org> until the final 2.3 version is released.

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--------------------------------------------------------------

A. HISTORY OF THE SOFTWARE

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of
All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

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py3compile, py3clean and debpython module:
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1.304 go-yaml 2.2.8

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1.305 python3-cryptography 2.8-3ubuntu0.1

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1.308 apt-utils 2.0.5

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1.310 kubernetes-klog 1.0.0

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tools/shhopt.c, tools/shhopt.h:
Title: shhopt - library for parsing command line options.
Version: 1.1.2
Entered-date: 23MAR97
Description: C-functions for parsing command line options, both
  traditional one-character options, and GNU'ish
  --long-options.
Keywords: programming, library, lib, commandline, options
Author: s.h.huseby@usit.uio.no (Sverre H. Huseby)
Primary-site: http://www.ifi.uio.no/~sverrehu/pub-unix/
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  shhopt-1.1.2.tar.gz
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1.313 gorilla 1.7.3
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1.314 typed-ast 1.5.1

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Read the comments at the top of the Makefile, then edit the area marked
'configurable stuff'.

Edit config.h. The stuff I expect you to change is down a bit from the
top of the file, but it's clearly marked. Also look at pathnames.h.

You don't have to create the /var/cron or /var/cron/tabs directories, since
both the daemon and the `crontab' program will do this the first time they
run if they don't exist. You do need to have a /var, though -- just "mkdir
/var" if you don't have one, or you can "mkdir /usr/var; ln -s /usr/var /var"
if you expect your /var to have a lot of stuff in it.

You will also need /usr/local/etc and /usr/local/bin directories unless you
change the Makefile. These will have to be created by hand, but if you are
a long-time Usenet user you probably have them already. /usr/local/man is
where I keep my man pages, but I have the source for `man' and you probably
do not. Therefore you may have to put the man pages into /usr/man/manl,
which will be hard since there will be name collisions. (Note that the man
command was originally written by Bill Joy before he left Berkeley, and it
contains no AT&T code, so it is in UUNET's archive of freely-distributable
BSD code.)

LINUX note: /usr/include/paths.h on some linux systems shows _PATH_SENDMAIL
to be /usr/bin/sendmail even though sendmail is installed in /usr/lib.
you should check this out.

say:
make all

su and say:
make install

Note that if I can get you to "su and say" something just by asking, you have
a very serious security problem on your system and you should look into it.

Edit your /usr/lib/crontab file into little pieces -- see the CONVERSION file for help on this.

Use the `crontab' command to install all the little pieces you just created. Some examples (see below before trying any of these!)

```
crontab -u uucp -r /usr/lib/uucp/crontab.src
 crontab -u news -r /usr/lib/news/crontab.src
 crontab -u root -r /usr/adm/crontab.src
```

Notes on above examples: (1) the .src files are copied at the time the command is issued; changing the source files later will have no effect until they are reinstalled with another `crontab -r' command. (2) The crontab command will affect the crontab of the person using the command unless `-u USER' is given; `-u' only works for root. When using most `su' commands under most BSD's, `crontab' will still think of you as yourself even though you may think of yourself as root -- so use `-u' liberally. (3) the `-r' option stands for `replace'; check the man page for crontab(1) for other possibilities.

Kill your existing cron daemon -- do `ps aux' and look for /etc/cron.

Edit your /etc/rc or /etc/rc.local, looking for the line that starts up /etc/cron. Comment it out and add a line to start the new cron daemon -- usually /usr/local/etc/cron, unless you changed it in the Makefile.

Start up this cron daemon yourself as root. Just type /usr/local/etc/cron (or whatever); no `&' is needed since the daemon forks itself and the process you executed returns immediately.

ATT notes: for those people unfortunate enough to be stuck on a AT&T UNIX, you will need the public-domain "libndir", found in the B News source and in any comp.sources.unix archive. You will also need to hack the code some.

Found in path(s):
* /opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/INSTALL
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*/opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/compat.h
*/opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/pathnames.h
*/opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/externs.h

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$Id: cron.8,v 2.2 1993/12/28 08:34:43 vixie Exp $

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* /opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/cron.8

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*
* @(#)bitstring.h 5.2 (Berkeley) 4/4/90
*/

Found in path(s):

* /opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/bitstring.h

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*
Vixie Cron V3.0
December 27, 1993
[V2.2 was some time in 1992]
[V2.1 was May 29, 1991]
[V2.0 was July 5, 1990]
[V2.0-beta was December 9, 1988]
[V1.0 was May 6, 1987]
Paul Vixie

This is a version of 'cron' that is known to run on BSD 4.23 systems. It
is functionally based on the SysV cron, which means that each user can have
their own crontab file (all crontab files are stored in a read-protected
directory, usually /var/cron/tabs). No direct support is provided for
'at'; you can continue to run 'atrun' from the crontab as you have been

Found in path(s):
* /opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/crontab.5
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doing. If you don't have atrun (i.e., System V) you are in trouble.

A messages is logged each time a command is executed; also, the files "allow" and "deny" in /var/cron can be used to control access to the "crontab" command (which installs crontabs). It hasn't been tested on SysV, although some effort has gone into making the port an easy one.

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To use this: Sorry, folks, there is no cutesy 'Configure' script. You'll have to go edit a couple of files... So, here's the checklist:

Read all the FEATURES, INSTALL, and CONVERSION files
Edit config.h
Edit Makefile
(both of these files have instructions inside; note that some things in config.h are definable in Makefile and are therefore surrounded by #ifndef...#endif)
'make'
'su' and 'make install'
(you may have to install the man pages by hand)
kill your existing cron process
(actually you can run your existing cron if you want, but why?)
build new crontabs using /usr/lib/{crontab,crontab.local}
(either put them all in "root"'s crontab, or divide it up and rip out all the 'su' commands, collapse the lengthy lists into ranges with steps -- basically, this step is as much work as you want to make it)
start up the new cron (must be done as root)
watch it. test it with 'crontab -r' and watch the daemon track your changes.
if you like it, change your /etc/{rc,rc.local} to use it instead of the old one.

$Id: README,v 2.3 1993/12/28 08:34:43 vixie Exp $

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* /opt/cola/permits/1029757352_1619638247.49/0/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/README
1.318 lz4 0.0~r131-2ubuntu3.1
1.318.1 Available under license:

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package engine

import (  
  "bytes"  
  "encoding/json"  
  "strings"  
  "testing"  
  "time"

  "github.com/docker/cli/cli/command/formatter"  
  "github.com/docker/cli/internal/licenseutils"  
  "github.com/docker/licensing/model"  
  "gotest.tools/v3/assert"  
  is "gotest.tools/v3/assert/cmp"

)

func TestSubscriptionContextWrite(t *testing.T) {
  cases := []struct {
    context  formatter.Context
    expected string
  }{
    // Errors
    {
      formatter.Context{Format: "{{InvalidFunction}}"},
      "Template parsing error: template: :1: function "InvalidFunction" not defined"
    },
    {
      formatter.Context{Format: "{{nil}}"},
      "Template parsing error: template: :1:2: executing "" at <nil>: nil is not a command"
    },
    // Table format

}
<table>
<thead>
<tr>
<th>NUM</th>
<th>OWNER</th>
<th>PRODUCT ID</th>
<th>EXPIRES</th>
<th>PRICING COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>owner1</td>
<td>productid1</td>
<td>2020-01-01 10:00:00 +0000 UTC</td>
<td>compstring</td>
</tr>
<tr>
<td>2</td>
<td>owner2</td>
<td>productid2</td>
<td>2020-01-01 10:00:00 +0000 UTC</td>
<td>compstring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>License Name: name1</th>
<th>Quantity: 10 nodes</th>
<th>Expiration date: 2020-01-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>License Name: name2</td>
<td>Quantity: 20 nodes</td>
<td>Expiration date: 2020-01-01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OWNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>owner1</td>
</tr>
<tr>
<td>owner2</td>
</tr>
</tbody>
</table>
expiration, _ := time.Parse(time.RFC822, "01 Jan 20 10:00 UTC")

for _, testcase := range cases {
subscriptions := []licenseutils.LicenseDisplay{
{
Num: 1,
Owner: "owner1",
Subscription: model.Subscription{
ID: "id1",
Name: "name1",
ProductID: "productid1",
Expires: &expiration,
PricingComponents: model.PricingComponents{
&model.SubscriptionPricingComponent{
Name: "nodes",
Value: 10,
},
},
ComponentsString: "compstring",
},
{
Num: 2,
Owner: "owner2",
Subscription: model.Subscription{
ID: "id2",
Name: "name2",
ProductID: "productid2",
Expires: &expiration2,
PricingComponents: model.PricingComponents{
&model.SubscriptionPricingComponent{
Name: "nodes",
Value: 20,
},
},
ComponentsString: "compstring",
},
}
out := &bytes.Buffer{
}
testcase.context.Output = out
err := SubscriptionsWrite(testcase.context, subscriptions)
if err != nil {
    assert.Error(t, err, testcase.expected)
} else {
    assert.Check(t, is.Equal(testcase.expected, out.String()))
}

func TestSubscriptionContextWriteJSON(t *testing.T) {
    expiration, _ := time.Parse(time.RFC822, "01 Jan 20 10:00 UTC")
    subscriptions := []licenseutils.LicenseDisplay{
        {
            Num: 1,
            Owner: "owner1",
            Subscription: model.Subscription{
                ID:  "id1",
                Name:  "name1",
                ProductID: "productid1",
                Expires: &expiration,
                PricingComponents: model.PricingComponents{
                    &model.SubscriptionPricingComponent{
                        Name: "nodes",
                        Value: 10,
                    },
                },
                ComponentsString: "compstring",
            },
        },
        {
            Num: 2,
            Owner: "owner2",
            Subscription: model.Subscription{
                ID:  "id2",
                Name:  "name2",
                ProductID: "productid2",
                Expires: &expiration,
                PricingComponents: model.PricingComponents{
                    &model.SubscriptionPricingComponent{
                        Name: "nodes",
                        Value: 20,
                    },
                },
                ComponentsString: "compstring",
            },
        },
    }
}
expectedJSONs := []map[string]interface{}{
    {
        "Owner": "owner1",
        "ComponentsString": "compstring",
        "Expires": "2020-01-01T10:00:00Z",
        "DockerID": "",
        "Eusa": nil,
        "ID": "id1",
        "Start": nil,
        "Name": "name1",
        "Num": float64(1),
        "PricingComponents": []interface{}
            {
                map[string]interface{}
                    {
                        "name": "nodes",
                        "value": float64(10),
                    },
            },
        "ProductID": "productid1",
        "ProductRatePlan": "",
        "ProductRatePlanID": "",
        "State": "",
        "Summary": "License Name: name1 Quantity: 10 nodes Expiration date: 2020-01-01",
    },
    {
        "Owner": "owner2",
        "ComponentsString": "compstring",
        "Expires": "2020-01-01T10:00:00Z",
        "DockerID": "",
        "Eusa": nil,
        "ID": "id2",
        "Start": nil,
        "Name": "name2",
        "Num": float64(2),
        "PricingComponents": []interface{}
            {
                map[string]interface{}
                    {
                        "name": "nodes",
                        "value": float64(20),
                    },
            },
        "ProductID": "productid2",
        "ProductRatePlan": "",
        "ProductRatePlanID": "",
        "State": "",
        "Summary": "License Name: name2 Quantity: 20 nodes Expiration date: 2020-01-01",
    },
}
func TestSubscriptionContextWriteJSONField(t *testing.T) {
.subscriptions := []licenseutils.LicenseDisplay{
    {Num: 1, Owner: "owner1"},
    {Num: 2, Owner: "owner2"},
}
out := &bytes.Buffer{
}
if err != nil {
    t.Fatal(err)
}
for i, line := range strings.Split(strings.TrimSpace(out.String()), "\n") {
    var s string
    if err := json.Unmarshal([]byte(line), &s); err != nil {
        t.Fatal(err)
    }
    assert.Check(t, is.Equal(subscriptions[i].Owner, s))
}
}

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    "context"
    "crypto/hmac"
    "crypto/sha256"
    "encoding/base64"
    "encoding/json"
    "fmt"
    "time"
    "github.com/docker/libtrust"
    "github.com/docker/licensing/lib/errors"
    "github.com/docker/libtrust/lib/go-clientlib"
    "github.com/docker/licensing/model"
}

func (c *client) getLicenseFile(ctx context.Context, subID string) (*model.IssuedLicense, error) {
    url := c.baseURI
    url.Path += fmt.Sprintf("/api/billing/v4/subscriptions/%s/license-file", subID)

    license := new(model.IssuedLicense)
    if _, _, err := c.doReq(ctx, "GET", &url, clientlib.RecvJSON(license)); err != nil {
        return nil, err
    }

    return license, nil
}

// Check verifies that the license identified by the given key id is valid. Note that it does not
// interrogate the contents of the license.
func (c *client) check(ctx context.Context, license model.IssuedLicense) (*model.CheckResponse, error) {
    keyID := license.KeyID
    privateKey := license.PrivateKey

authorization, err := c.getAuthorization(ctx, license)
if err != nil {
    return nil, err
}

// TODO: Mason - replace this parseJWS with a non libtrust lib
signature, err := libtrust.ParseJWS(authorization)
if err != nil {
    return nil, errors.Wrap(err, errors.Fields{
        "key_id": keyID,
    }, "license parse JWS failed")
}

keys, err := signature.Verify()
if err != nil {
    return nil, errors.Wrap(err, errors.Fields{
        "key_id": keyID,
    }, "license signature verification failed")
}

keyCnt := len(keys)
if keyCnt != 1 {
    err = fmt.Errorf("unexpected number of signing keys (%d)", keyCnt)
    return nil, errors.WithStack(err).With(errors.Fields{
        "key_id": keyID,
    })
}

key := keys[0]
if !c.recognizedSigningKey(key) {
    return nil, errors.New("unrecognized signing key")
}

payload, err := signature.Payload()
if err != nil {
    return nil, errors.Wrap(err, errors.Fields{
        "key_id": keyID,
    }, "malformed signature payload")
}

checkRes := new(model.CheckResponse)
err = json.Unmarshal(payload, &checkRes)
if err != nil {
    return nil, errors.Wrap(err, errors.Fields{
        "key_id": keyID,
    }, "malformed signature payload")
}
msg := checkRes.Expiration.Format(time.RFC3339)
if err := checkToken(msg, checkRes.Token, privateKey); err != nil {
    return nil, errors.Wrap(err, errors.Fields{
        "key_id": keyID,
    })
}

return checkRes, nil

// recognizedSigningKey returns true if the given key is signed with a recognized signing key, false otherwise
func (c *client) recognizedSigningKey(key libtrust.PublicKey) bool {
    for _, publicKey := range c.publicKeys {
        if key.KeyID() == publicKey.KeyID() {
            return true
        }
    }
    return false
}

// getAuthorization returns the decoded license authorization
func (c *client) getAuthorization(ctx context.Context, license model.IssuedLicense) ([]byte, error) {
    decoded, err := base64.StdEncoding.DecodeString(license.Authorization)
    if err != nil {
        return nil, errors.Wrapf(err, errors.Fields{
            "key_id": license.KeyID,
        }, "decoding license authorization failed")
    }
    return decoded, nil
}

// All of the functions in this file assume that they are receiving a properly
// formatted private key.

// checkToken performs a MAC algorithm (where token is generated by hashing the
// message with the privateKey via GenerateToken) with the purpose of authenticating
// the validity of both the message and the private key of the person who generated
// the token.
func checkToken(message, token, privateKey string) error {
    tokenBytes, err := base64.URLEncoding.DecodeString(token)
    if err != nil {
        return errors.Wrap(err, errors.Fields("token": token))
    }
    generatedToken, err := generateToken(message, privateKey)
if err != nil {
    return errors.Wrap(err, errors.Fields{"token": token})
}

generatedBytes, err := base64.URLEncoding.DecodeString(generatedToken)
if err != nil {
    return errors.Wrap(err, errors.Fields{"token": token})
}

if !hmac.Equal(tokenBytes, generatedBytes) {
    return errors.Forbidden(errors.Fields{"token": token}, "invalid token")
}

return nil
}

// generateToken generates a hash of the message with the privateKey via the
// sha256 algorithm.
func generateToken(message, privateKey string) (string, error) {
    key, err := base64.URLEncoding.DecodeString(privateKey)
    if err != nil {
        return "", errors.Wrap(err, errors.Fields{"msg": message})
    }

    h := hmac.New(sha256.New, key)
    h.Write([]byte(message))
    return base64.URLEncoding.EncodeToString(h.Sum(nil)), nil
}

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procfs provides functions to retrieve system, kernel and process metrics from the pseudo-filesystem proc.

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package model

import "time"

// A CheckResponse is the internal content of the PublicCheckResponse signed json blob.

type CheckResponse struct {
    Expiration      time.Time `json:"expiration"
    Token           string    `json:"token"
    MaxEngines      int       `json:"maxEngines"
    ScanningEnabled bool      `json:"scanningEnabled"
    Type            string    `json:"licenseType"
    Tier            string    `json:"tier"
}

// IssuedLicense represents an issued license

type IssuedLicense struct {
    KeyID         string `json:"key_id"
    PrivateKey    string `json:"private_key"
    Authorization string `json:"authorization"
}

// Valid returns true if the License is syntactically valid, false otherwise
func (l *IssuedLicense) Valid() (bool, string) {
    if l.KeyID == "" {
        return false, "empty key_id"
    }

    if l.PrivateKey == "" {
        return false, "empty private_key"
    }
}
if l.Authorization == "" {
    return false, "empty authorization"
}

return true, ""

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package engine

import (
    "time"
    "github.com/docker/cli/cli/command/formatter"
    "github.com/docker/cli/internal/licenseutils"
    "github.com/docker/licensing/model"
)

const (  
defaultSubscriptionsTableFormat = "table
{{.Num}}	{{.Owner}}	{{.ProductID}}	{{.Expires}}	{{.ComponentsString}}"
defaultSubscriptionsQuietFormat = "{{.Num}}:{{.Summary}}"
umHeader               = "NUM"
ownerHeader             = "OWNER"
licenseNameHeader       = "NAME"
idHeader                = "ID"
dockerIDHeader          = "DOCKER ID"
productIDHeader         = "PRODUCT ID"
productRatePlanHeader   = "PRODUCT RATE PLAN"
productRatePlanIDHeader = "PRODUCT RATE PLAN ID"
startHeader             = "START"
expiresHeader           = "EXPIRES"
stateHeader             = "STATE"
eusaHeader              = "EUSA"
pricingComponentsHeader = "PRICING COMPONENTS"
)

// NewSubscriptionsFormat returns a Format for rendering using a license Context  
func NewSubscriptionsFormat(source string, quiet bool) formatter.Format {  
    switch source {  
        case formatter.TableFormatKey:  
            if quiet {  
                return defaultSubscriptionsQuietFormat  
            }  
            return defaultSubscriptionsTableFormat  
    }
}

Open Source Used In 5GaaS Edge AC-4 3175
case formatter.RawFormatKey:
if quiet {
    return `license: {{.ID}}`
} else {
    return `license: {{.ID}}
name: {{.Name}}
owner: {{.Owner}}
components: {{.ComponentsString}}
`}
return formatter.Format(source)
}

// SubscriptionsWrite writes the context
func SubscriptionsWrite(ctx formatter.Context, subs []licenseutils.LicenseDisplay) error {
    render := func(format func(subContext formatter.SubContext) error) error {
        for _, sub := range subs {
            licenseCtx := &licenseContext{trunc: ctx.Trunc, l: sub}
            if err := format(licenseCtx); err != nil {
                return err
            }
        }
        return nil
    }
    licenseCtx := licenseContext{ }
    licenseCtx.Header = map[string]string{
        "Num":               numHeader,
        "Owner":             ownerHeader,
        "Name":              licenseNameHeader,
        "ID":                idHeader,
        "DockerID":          dockerIDHeader,
        "ProductID":         productIDHeader,
        "ProductRatePlan":   productRatePlanHeader,
        "ProductRatePlanID": productRatePlanIDHeader,
        "Start":             startHeader,
        "Expires":           expiresHeader,
        "State":             stateHeader,
        "Eusa":              eusaHeader,
        "ComponentsString":  pricingComponentsHeader,
    }
    return ctx.Write(&licenseCtx, render)
}

type licenseContext struct {
    formatter.HeaderContext
    trunc bool
    licenseutils.LicenseDisplay
}

func (c *licenseContext) MarshalJSON() ([]byte, error) {
    return formatter.MarshalJSON(c)
}
func (c *licenseContext) Num() int {
    return c.l.Num
}

func (c *licenseContext) Owner() string {
    return c.l.Owner
}

func (c *licenseContext) ComponentsString() string {
    return c.l.ComponentsString
}

func (c *licenseContext) Summary() string {
    return c.l.String()
}

func (c *licenseContext) Name() string {
    return c.l.Name
}

func (c *licenseContext) ID() string {
    return c.l.ID
}

func (c *licenseContext) DockerID() string {
    return c.l.DockerID
}

func (c *licenseContext) ProductID() string {
    return c.l.ProductID
}

func (c *licenseContext) ProductRatePlan() string {
    return c.l.ProductRatePlan
}

func (c *licenseContext) ProductRatePlanID() string {
    return c.l.ProductRatePlanID
}

func (c *licenseContext) Start() *time.Time {
    return c.l.Start
}

func (c *licenseContext) Expires() *time.Time {
    return c.l.Expires
}
func (c *licenseContext) State() string {
    return c.l.State
}

func (c *licenseContext) Eusa() *model.EusaState {
    return c.l.Eusa
}

func (c *licenseContext) PricingComponents() []model.SubscriptionPricingComponent {
    // Dereference the pricing component pointers in the pricing components
    // so it can be rendered properly with the template formatter

    var ret []model.SubscriptionPricingComponent
    for _, spc := range c.l.PricingComponents {
        if spc == nil {
            continue
        }
        ret = append(ret, *spc)
    }
    return ret
}

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#+STARTUP: showall

* DNS resolver (dirmngr/dns.c)

    dns.c - Recursive, Reentrant DNS Resolver.
    "-----------------------------"
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1.333 icu 60.2-3ubuntu3.2

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## Commands to generate dependency files
GEN_DEPS.c=$(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc=$(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADS CPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =
```
## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE=-Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so

## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation rules
%.$(STATIC_O): $(srcdir)/%.c
$(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
$(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
$(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
$(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<

## Dependency rules
%.d: $(srcdir)/%.c
@echo "generating dependency information for $<"
@$(SHELL) -ec "$\(GEN_DEPS.c\) $< \| sed ^\"[a-zA-Z0-9_]\(\).*\"a\:\[ :]
| \s@\ ]\| rm -f $@’

%.d: $(srcdir)/%.cpp
@echo "generating dependency information for $<"
@$(SHELL) -ec "$\(GEN_DEPS.cc\) $< \| sed ^\"[a-zA-Z0-9_]\(\).*\"a\:\[ :]
| \s@\ ]\| rm -f $@’

## Versioned libraries rules
%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
$(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
$(RM) $@ && ln -s {*F}.$(SO).$(SO_TARGET_VERSION_MAJOR) $@
## Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymblic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

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 * Set the {code TCP_MD5SIG} option on the socket. See {code linux/tcp.h} for more details.
 * Keys can only be set on, not read to prevent a potential leak, as they are confidential.
 * Allowing them being read would mean anyone with access to the channel could get them.
 */
/**
 * Set the {code TCP_QUICKACK} option on the socket.
 * See <a href="https://linux.die.net//man/7/tcp">TCP_QUICKACK</a>
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D3DES (V5.09)

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Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software
patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification").

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1
above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License. (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.) Do not make any other change in
these notices.

Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.
For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

   a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

   b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries
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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

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Version 3, 29 June 2007

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To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

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For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to
use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

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An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.


The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.
The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

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You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

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b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".

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d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.
You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be
included in conveying the object code work.

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
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If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
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<signature of Ty Coon>, 1 April 1989
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1.345 wheel 0.37.0

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- Copy files to and from Containers in a cluster

# Copying Container Files

## Motivation

- Copying files from Containers in a cluster to a local filesystem
- Copying files from a local filesystem to Containers in a cluster

Copy requires that *tar* be installed in the container image.

## Local to Remote

Copy a local file to a remote Pod in a cluster.

- Local file format is `"<path>"`
- Remote file format is `"<pod-name>:/<path>"`

```bash
kubectl cp /tmp/foo_dir <some-pod>:/tmp/bar_dir
```

---

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## Remote to Local

Copy a remote file from a Pod to a local file.

- Local file format is `<path>`
- Remote file format is `<pod-name>:<path>`

```bash
kubectl cp <some-pod>:/tmp/foo /tmp/bar
```

## Specify the Container

Specify the Container within a Pod running multiple containers.

- `-c <container-name>`

```bash
kubectl cp /tmp/foo <some-pod>:/tmp/bar -c <specific-container>
```

## Namespaces

Set the Pod namespace by prefixing the Pod name with `<namespace>/`.

- `<pod-namespace>/<pod-name>:<path>`

```bash
kubectl cp /tmp/foo <some-namespace>/<some-pod>:/tmp/bar
```
1.357 objx 0.3.0

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1.361 aws-sdk-go-v2 1.1.5
package licensemanager

import (  
    "context"  
    awsmiddlware "github.com/aws/aws-sdk-go-v2/aws/middleware"  
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"  
    "github.com/aws/aws-sdk-go-v2/service/ licensemanager/types"  
    "github.com/aws/smithy-go/middleware"  
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Deletes the specified license.  
func (c *Client) DeleteLicense(ctx context.Context, params *DeleteLicenseInput, optFns ...func(*Options)) (*DeleteLicenseOutput, error) {  
    if params == nil {  
        params = &DeleteLicenseInput{}  
    }
    result, metadata, err := c.invokeOperation(ctx, "DeleteLicense", params, optFns,  
        addOperationDeleteLicenseMiddlewares)  
    if err != nil {  
        return nil, err  
    }
    out := result.(*DeleteLicenseOutput)  
    out.ResultMetadata = metadata  
    return out, nil
}

type DeleteLicenseInput struct {  
    // Amazon Resource Name (ARN) of the license.  
    //  
    // This member is required.  
    LicenseArn *string

    // Current version of the license.  
    //  
    // This member is required.  
    SourceVersion *string
}

type DeleteLicenseOutput struct {  
    // Date on which the license is deleted.  
}
DeletionDate *string

// License status.
Status types.LicenseDeletionStatus

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationDeleteLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpDeleteLicense{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpDeleteLicense{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpDeleteLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDeleteLicense(options.Region),
middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opDeleteLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "DeleteLicense",
    }
}

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package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}
// Lists received licenses.
func (c *Client) ListReceivedLicenses(ctx context.Context, params *ListReceivedLicensesInput, optFns ...func(*Options)) (*ListReceivedLicensesOutput, error) {
    if params == nil {
        params = &ListReceivedLicensesInput{
    }

    result, metadata, err := c.invokeOperation(ctx, "ListReceivedLicenses", params, optFns,
                                       addOperationListReceivedLicensesMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*ListReceivedLicensesOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type ListReceivedLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // ProductSKU
    //
    // * Status
    //
    // * KeyFingerprint
    //
    // * Issuer
    Filters []types.Filter

    // Amazon Resource Names (ARNs) of the licenses.
    LicenseArns []string

    // Maximum number of results to return in a single call.
    MaxResults *int32

    // Token for the next set of results.
    NextToken *string
}

type ListReceivedLicensesOutput struct {

    // Received license details.
    Licenses []types.GrantedLicense
// Token for the next set of results.
NextToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationListReceivedLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListReceivedLicenses(options.Region),
middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opListReceivedLicenses(region string)
*awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListReceivedLicenses",
    }
}

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package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Creates a license.
func (c *Client) CreateLicense(ctx context.Context, params *CreateLicenseInput, optFns ...func(*Options)) (*CreateLicenseOutput, error) {
    if params == nil {
        params = &CreateLicenseInput{ }
    }
}
result, metadata, err := c.invokeOperation(ctx, "CreateLicense", params, optFns, addOperationCreateLicenseMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*CreateLicenseOutput)
out.ResultMetadata = metadata
return out, nil
}

type CreateLicenseInput struct {

    // License beneficiary.
    //
    // This member is required.
    Beneficiary *string

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    //
    // This member is required.
    ClientToken *string

    // Configuration for consumption of the license. Choose a provisional configuration
    // for workloads running with continuous connectivity. Choose a borrow
    // configuration for workloads with offline usage.
    //
    // This member is required.
    ConsumptionConfiguration *types.ConsumptionConfiguration

    // License entitlements.
    //
    // This member is required.
    Entitlements []types.Entitlement

    // Home Region for the license.
    //
    // This member is required.
    HomeRegion *string

    // License issuer.
    //
    // This member is required.
    Issuer *types.Issuer

    // License name.

}
LicenseName *string

// Product name.

ProductName *string

// Product SKU.

ProductSKU *string

// Date and time range during which the license is valid, in ISO8601-UTC format.

Validity *types.DatetimeRange

// Information about the license.

LicenseMetadata []types.Metadata

// Amazon Resource Name (ARN) of the license.

LicenseArn *string

// License status.

Status types.LicenseStatus

// License version.

Version *string

// Metadata pertaining to the operation's result.

ResultMetadata middleware.Metadata

func addOperationCreateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
  if err != nil {
    return err
  }

  if err != nil {
    return err
  }

  if err = addSetLoggerMiddleware(stack, options); err != nil {

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return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.CloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCreateLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCreateLicense(options.Region),
middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCreateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CreateLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks out the specified license.
func (c *Client) CheckoutLicense(ctx context.Context, params *CheckoutLicenseInput, optFns ...func(*Options)) (*CheckoutLicenseOutput, error) {
    if params == nil {
        params = &CheckoutLicenseInput{
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckoutLicense", params, optFns,
    addOperationCheckoutLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckoutLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckoutLicenseInput struct {
    // Checkout type.
// This member is required.
CheckoutType types.CheckoutType

// Unique, case-sensitive identifier that you provide to ensure the idempotency of
// the request.

// This member is required.
ClientToken *string

// License entitlements.

// This member is required.
Entitlements []types.EntitlementData

// Key fingerprint identifying the license.

// This member is required.
KeyFingerprint *string

// Product SKU.

// This member is required.
ProductSKU *string

// License beneficiary.
Beneficiary *string

// Node ID.
NodeId *string
}

type CheckoutLicenseOutput struct {

// Checkout type.
CheckoutType types.CheckoutType

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// License consumption token.
LicenseConsumptionToken *string
// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationCheckoutLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsbackend.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsbackend.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
}
return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckoutLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutLicense(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCheckoutLicense(region string) *awsmiddleware.RegisterServiceMetadata
{
    return &awsmiddleware.RegisterServiceMetadata{
        Region: region,
        ServiceID: ServiceID,
        SigningName: "license-manager",
        OperationName: "CheckoutLicense",
    }
}

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// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks out the specified license for offline use.
func (c *Client) CheckoutBorrowLicense(ctx context.Context, params *CheckoutBorrowLicenseInput, optFns ...func(*Options)) (*CheckoutBorrowLicenseOutput, error) {
    if params == nil {
        params = &CheckoutBorrowLicenseInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckoutBorrowLicense", params, optFns, addOperationCheckoutBorrowLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckoutBorrowLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckoutBorrowLicenseInput struct {
// Unique, case-sensitive identifier that you provide to ensure the idempotency of
// the request.

// This member is required.
ClientToken *string

// Digital signature method. The possible value is JSON Web Signature (JWS)
// algorithm PS384. For more information, see RFC 7518 Digital Signature with

// This member is required.
DigitalSignatureMethod types.DigitalSignatureMethod

// License entitlements. Partial checkouts are not supported.

// This member is required.
Entitlements []types.EntitlementData

// Amazon Resource Name (ARN) of the license. The license must use the borrow
// consumption configuration.

// This member is required.
LicenseArn *string

// Information about constraints.
CheckoutMetadata []types.Metadata

// Node ID.
NodeId *string

}

type CheckoutBorrowLicenseOutput struct {

// Information about constraints.
CheckoutMetadata []types.Metadata

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// Amazon Resource Name (ARN) of the license.
LicenseArn *string
// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}

cfunc addOperationCheckoutBorrowLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSingerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckoutBorrowLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutBorrowLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckoutBorrowLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckoutBorrowLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
// Lists the licenses for your account.
func (c *Client) ListLicenses(ctx context.Context, params *ListLicensesInput, optFns ...func(*Options)) (*ListLicensesOutput, error) {
    if params == nil {
        params = &ListLicensesInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "ListLicenses", params, optFns,
        addOperationListLicensesMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*ListLicensesOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type ListLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // Beneficiary
    //
    // * ProductSKU
    //
    // * KeyFingerprint
    //
    // * Status
    Filters []types.Filter

    // Amazon Resource Names (ARNs) of the licenses.
    LicenseArns []string

    // Maximum number of results to return in a single call.
    MaxResults *int32

    // Token for the next set of results.
    NextToken *string
}

type ListLicensesOutput struct {

    // License details.
func addOperationListLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListLicenses(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opListLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListLicenses",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Gets detailed information about the specified license.
func (c *Client) GetLicense(ctx context.Context, params *GetLicenseInput, optFns ...func(*Options)) (*GetLicenseOutput, error) {
    if params == nil {
        params = &GetLicenseInput{}
    }
result, metadata, err := c.invokeOperation(ctx, "GetLicense", params, optFns, addOperationGetLicenseMiddlewares) if err != nil { return nil, err }

out := result.(*GetLicenseOutput) out.ResultMetadata = metadata return out, nil

type GetLicenseInput struct {

// Amazon Resource Name (ARN) of the license.
//
// This member is required.
LicenseArn *string

// License version.
Version *string
}

type GetLicenseOutput struct {

// License details.
License *types.License

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}


err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpGetLicense{}, middleware.After) if err != nil { return err }

if err = addSetLoggerMiddleware(stack, options); err != nil { return err }

if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil { return err }

if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil{
return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSingerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmd.Middleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmd.Middleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.CloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpGetLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opGetLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
func newServiceMetadataMiddleware_opGetLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "GetLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware    "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/smithy-go/middleware"
    smithyhttp    "github.com/aws/smithy-go/transport/http"
}

// Checks in the specified license. Check in a license when it is no longer in use.
func (c *Client) CheckInLicense(ctx context.Context, params *CheckInLicenseInput, optFns ...func(*Options)) (*CheckInLicenseOutput, error) {
    if params == nil {
        params = &CheckInLicenseInput{}
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckInLicense", params, optFns,
        addOperationCheckInLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckInLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckInLicenseInput struct {

    // License consumption token.
    //
    // This member is required.
    LicenseConsumptionToken *string

    // License beneficiary.
    Beneficiary *string
}
type CheckInLicenseOutput struct {
    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationCheckInLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckInLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckInLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCheckInLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckInLicense",
    }
}

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1.363 cups 2.2.7-1ubuntu2.8

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usr/bin/lpq
usr/bin/lpr
usr/bin/lprm
usr/share/man/man1/lpr.1.gz
usr/share/man/man1/lprm.1.gz
usr/share/man/man1/lpq.1.gz
usr/share/man/man8/lpc.8.gz

Format: https://www.debian.org/doc/packaging-manuals/copyright-format/1.0/
Upstream-Name: CUPS
Upstream-Contact: Michael Sweet <msweet@apple.com>
Source: https://cups.org/software.php

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1.364 x-term 0.0.0-20201126162022-7de9c90e9dd1

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# Copy of _expand_tilde_by_ref from bash-completion
__python_argcomplete_expand_tilde_by_ref () {
    if [ "${!1:0:1}" = "~" ]; then
        if [ "${!1}" != "${!1///}" ]; then
            eval $1="${!1/%\/*}""/"${!1#*/}"
        else
            eval $1="${!1}"
        fi
    fi
}

# Run something, muting output or redirecting it to the debug stream
# depending on the value of _ARC_DEBUG.
# If ARGCOMPLETE_USE_TEMPFILES is set, use tempfiles for IPC.
__python_argcomplete_run() {
    if [[ -z "${ARGCOMPLETE_USE_TEMPFILES-}" ]]; then
        __python_argcomplete_run_inner "$@
        return
    fi
    local tmpfile="$(mktemp)
    _ARGCOMPLETE_STDOUT_FILENAME="$tmpfile" __python_argcomplete_run_inner "$@"
    local code=$?
    cat "$tmpfile"
    rm "$tmpfile"
    return $code
}

__python_argcomplete_run_inner() {
    if [[ -z "${_ARC_DEBUG-}" ]]; then
        "$@" 8>&1 9>&2 1>/dev/null 2>&1
    else
        "$@" 8>&1 9>&2 1>&9 2>&1
    fi
}
# Scan the beginning of an executable file ($1) for a regexp ($2). By default,
# scan for the magic string indicating that the executable supports the
# argcomplete completion protocol. By default, scan the first kilobyte;
# if $3 is set to -n, scan until the first line break up to a kilobyte.
__python_argcomplete_scan_head() {
read -s -r ${3:--N} 1024 < "$1"
[[ "$REPLY" =~ ${2:-PYTHON_ARGCOMPLETE_OK} ]]}

__python_argcomplete_scan_head_noerr() {
__python_argcomplete_scan_head "$@" 2>/dev/null
}

__python_argcomplete_global() {
local executable=$1
__python_argcompleteexpand_tilde_by_ref executable

local ARGCOMPLETE=0
if [[ "$executable" == python* ]] || [[ "$executable" == pypy* ]]; then
  if [[ "$COMP_WORDS[1]" == -m ]]; then
    if __python_argcomplete_run "$executable" -m argcomplete._check_module "$COMP_WORDS[2]"; then
      ARGCOMPLETE=3
    else
      return
    fi
  elif [[ -f "$COMP_WORDS[1]" ]] && __python_argcomplete_scan_head_noerr "$SCRIPT_NAME" 2>/dev/null;
    then
    local ARGCOMPLETE=2
  else
    return
  fi
  elif type -P "$executable" >/dev/null 2>&1; then
    local SCRIPT_NAME=$(type -P "$executable")
    if (type -t pyenv &;& ["$SCRIPT_NAME" = $(pyenv root)/shims/* ])) >/dev/null 2>&1; then
      local SCRIPT_NAME=$(pyenv which "$executable")
    fi
    if __python_argcomplete_scan_head_noerr "$SCRIPT_NAME"; then
      local ARGCOMPLETE=1
    elif __python_argcomplete_scan_head_noerr "$SCRIPT_NAME" "^\.(.*)$" -n &;& ["${BASH_REMATCH[1]}" =- ^\.(python|pypy)[0-9.]*$ ];
     then
      local interpreter="$BASH_REMATCH"
      if __python_argcomplete_scan_head_noerr "$SCRIPT_NAME" "^(PBR Generated)|(EASY-INSTALL-
(SCRIPT|ENTRY-SCRIPT|DEV-SCRIPT))" \
      && "$interpreter" "$type-P python-argcomplete-check-easy-install-script" "$SCRIPT_NAME"
    fi
  fi}
local ARGCOMPLETE=1
elif __python_argcomplete_run "$interpreter" -m argcomplete._check_console_script "$SCRIPT_NAME";
then
local ARGCOMPLETE=1
fi
fi
fi
if [[ $ARGCOMPLETE != 0 ]]; then
local IFS=$(echo -e '\v')
COMPREPLY=( $(_ARGCOMPLETE_IFS="$IFS" \
COMP_LINE="$COMP_LINE" \
COMP_POINT="$COMP_POINT" \
COMP_TYPE="$COMP_TYPE" \
_ARGCOMPLETE_COMP_WORDBREAKS="$COMP_WORDBREAKS" \
_ARGCOMPLETE=$ARGCOMPLETE \
_ARGCOMPLETE_SUPPRESS_SPACE=1 \
__python_argcomplete_run "$executable" "${COMP_WORDS[@]:1:ARGCOMPLETE-1}") )
if [[ $? != 0 ]]; then
unset COMPREPLY
elif [[ "${COMPREPLY-}" =~ [=/:]$ ]]; then
compopt -o nospace
fi
else
type -t _completion_loader | grep -q 'function' && _completion_loader "$@"
fi
}
complete -o default -o bashdefault -D -F _python_argcomplete_global
Found in path(s):
* /opt/cola/permits/1158616940_1619802213.38/0/kislyuk-argcomplete-v1-12-3-0-gce54b6d-tar-gz/kislyukargcomplete-5c73750/argcomplete/bash_completion.d/python-argcomplete
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Gocheck - A rich testing framework for Go

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1.380 gzip 1.10 0ubuntu4

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1.381 jackson-dataformat-yaml 2.12.4
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1.382 picocontainer 2.13.5

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@var{one line to give the program's name and a brief idea of what it does.}
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Also add information on how to contact you by electronic and paper mail.

If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

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@end example

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1.399 gorilla 1.8.0

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1.400 python 3.8.10-0ubuntu1~20.04.2

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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1.401 keyutils 1.6-6ubuntu1

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AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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DES core in libhcrypto

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D3DES (V5.09) -

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Written with Symantec's THINK (Lightspeed) C by Richard Outerbridge.
Thanks to: Dan Hoey for his excellent Initial and Inverse permutation
code; Jim Gillogly & Phil Karn for the DES key schedule code; Dennis
Ferguson, Eric Young and Dana How for comparing notes; and Ray Lau,
for humouring me on.

(GEnie : OUTER; CIS : [71755,204]) Graven Imagery, 1992.

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Windows support

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@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

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lib/hcrypto/test_dh.c

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python’s principal author, although it includes many contributions from others.

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All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases that included the contextlib module.

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c-a-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov  3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:

It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php_curl, or with an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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1.423 generex 1.0.2

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  <modelVersion>4.0.0</modelVersion>
  <groupId>com.github.mifmif</groupId>
  <artifactId>generex</artifactId>
  <version>1.0.2</version>
  <name>Generex</name>
  <url>https://github.com/mifmif/Generex/tree/master</url>
  <description>Generex A Java Library for regex to Strings generation</description>
  <packaging>jar</packaging>
  <licenses>
    <license>
      <name>The Apache Software License, Version 2.0</name>
      <url>http://www.apache.org/licenses/LICENSE-2.0.txt</url>
    </license>
  </licenses>
  <developers>
    <developer>
    </developer>
  </developers>
</project>
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</repository>
</distributionManagement>

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<testSourceDirectory>src/test/java</testSourceDirectory>
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<excludes>
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</resource>
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<version>${project.version}</version>
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</configuration>
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<version>3.5.1</version>
<configuration>
<source>1.5</source>
<target>1.5</target>
</configuration>
</plugin>

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<configuration>
  <excludes>
    <exclude>*</exclude>
    <exclude>com/thoughtworks/**/*</exclude>
    <exclude>freemarker/**/*</exclude>
    <exclude>ftl/**/*</exclude>
    <exclude>i18n/**/*</exclude>
    <exclude>style/**/*</exclude>
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  </excludes>
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<archive>
  <manifest>
    <addClasspath>false</addClasspath>
    <addDefaultImplementationEntries>true</addDefaultImplementationEntries>
    <addDefaultSpecificationEntries>true</addDefaultSpecificationEntries>
    <addExtensions>false</addExtensions>
    <classpathLayoutType>simple</classpathLayoutType>
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<configuration>
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  <descriptor>.sources.xml</descriptor>
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  <artifactId>maven-javadoc-plugin</artifactId>
  <executions>
    <execution>
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      <goals>
        <goal>jar</goal>
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  <groupId>org.apache.maven.plugins</groupId>
  <artifactId>maven-gpg-plugin</artifactId>
  <executions>
    <execution>
      <id>sign-artifacts</id>
      <phase>deploy</phase>
      <goals>
        <goal>sign</goal>
      </goals>
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  </executions>
</plugin>

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  <groupId>org.sonatype.plugins</groupId>
  <artifactId>nexus-staging-maven-plugin</artifactId>
  <version>1.6.3</version>
  <executions>
    <execution>
      <id>default-deploy</id>
      <phase>deploy</phase>
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    <artifactId>maven-pmd-plugin</artifactId>
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        <excludes>
            <exclude>*/HelpMojo.java</exclude>
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        <execution>
            <goals>
                <goal>check</goal>
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</plugin>

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        <suppressionsLocation>./checkstyle-suppressions.xml</suppressionsLocation>
        <failOnViolation>true</failOnViolation>
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    <totalLineRate>80</totalLineRate>
    <packageLineRate>80</packageLineRate>
    <packageBranchRate>80</packageBranchRate>
  </check>
  <instrumentation>
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  </instrumentation>
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<executions>
  <execution>
    <id>verification</id>
    <phase>verify</phase>
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      <goal>check</goal>
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</executions>
</plugin>

<groupId>org.codehaus.mojo</groupId>
<artifactId>javancss-maven-plugin</artifactId>
<version>2.0</version>
<configuration>
  <encoding>${project.build.sourceEncoding}</encoding>
  <ccnLimit>15</ccnLimit>
  <ncssLimit>100</ncssLimit>
  <failOnViolation>true</failOnViolation>
  <excludes>
    <exclude>**/tests/**/*.*</exclude>
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<executions>
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    <goals>
      <goal>check</goal>
    </goals>
  </execution>
</executions>
</plugin>
INF/maven/com.github.mifmif/generex/pom.xml
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 */

Found in path(s):
* /opt/cola/permits/1000610466_1606952086.17/0/generex-1-0-2-sources-1-jar/com/mifmif/common/regex/GenerexIterator.java
* /opt/cola/permits/1000610466_1606952086.17/0/generex-1-0-2-sources-1-jar/com/mifmif/common/regex/Generex.java
* /opt/cola/permits/1000610466_1606952086.17/0/generex-1-0-2-sources-1-jar/com/mifmif/common/regex/Node.java
* /opt/cola/permits/1000610466_1606952086.17/0/generex-1-0-2-sources-1-jar/com/mifmif/common/regex/util/Iterator.java
* /opt/cola/permits/1000610466_1606952086.17/0/generex-1-0-2-sources-1-jar/com/mifmif/common/regex/util/Iterable.java

1.424 libasnheimdal 7.5.0+dfsg-1
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AES in libhcrypto

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DES core in libhcrypto

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lib/hcrypto/test_dh.c

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1.428 unzip 6.0-21ubuntu1.1

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There are no known patents on any of the code in UnZip. Unisys claims a patent on LZW encoding and on LZW decoding _in an apparatus that performs LZW encoding_, but the patent appears to exempt a stand-alone decoder (as in UnZip's unshrink.c). Unisys has publicly claimed otherwise, but the issue has never been tested in court. Since this point is unclear, unshrinking is not enabled by default. It is the responsibility of the user to make his or her peace with Unisys and its licensing requirements. (unshrink.c may be removed from future releases altogether.)

The original unzip source code has been extensively modified and almost entirely rewritten (changes include random zipfile access rather than sequential; replacement of unimplode() with explode(); replacement of old unshrink() with new (unrelated) unshrink(); replacement of output routines; addition of inflate(), wildcards, filename-mapping, text translation, ...; etc.). As far as we can tell, only the core code of the unreduce method remained substantially
similar to Mr. Smith's original source. As of UnZip 5.42, the complete core code is now covered by the Info-ZIP Licence. Therefore, support for the reduce method has been removed.
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  *
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71150.2731@compuserve.com]:

"He says that he thought that whoever contacted him understood that
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-----
The remaining code was written by many people associated with the Info-ZIP group, with large contributions from (but not limited to): Greg Roelofs (overall program logic, ZipInfo, unshrink, filename mapping/portability, etc.), Mark Adler (inflate, explode, funzip), Kai Uwe Rommel (OS/2), John Bush and Paul Kienitz (Amiga), Antoine Verheijen (Macintosh), Hunter Goatley (more VMS), Mike White (Windows DLLs), Christian Spieler (overall logic, optimization, VMS, etc.) and others. See the file CONTRIBUTIONS in the source distribution for a much more complete list of contributors.

The decompression core code for the deflate method (inflate.*.ch, explode.c) was originally written by Mark Adler who submitted it as public domain code.

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1.429 go-redis-redis v6.15.9+incompatible

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1.431 python-stdlib-extensions 3.8.10-0ubuntu1~20.04

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* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.6/Lib/lib2to3/tests/pytree_idempotency.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.7/Lib/lib2to3/tests/pytree_idempotency.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.8/Lib/lib2to3/refactor.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.6/Lib/lib2to3/patcomp.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_execfile.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.8/Lib/lib2to3/fixes/fix_long.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.8/Lib/lib2to3/pytree.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.6/Lib/lib2to3/pytree.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_repr.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_exec.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.6/Lib/lib2to3/patcomp.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_base.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.8/Lib/lib2to3/refactor.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.7/Lib/lib2to3/tests/pytree_idempotency.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_ne.py
extensions-3.8.2/3.6/Lib/lib2to3/fixtures/fix_has_key.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.6/Lib/lib2to3/fixtures/fix_print.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
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* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
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* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.6/Lib/lib2to3/fixer_base.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.6/Lib/lib2to3/fixtures/fix_apply.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.3/Lib/lib2to3/pytree.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_pytree.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_pytree_idempotency.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.6/Lib/lib2to3/pygram.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.7/Lib/lib2to3/pytree.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.7/Lib/lib2to3/pytree_idempotency.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.7/Lib/lib2to3/pygram.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
exensions-3.8.2/3.7/Lib/lib2to3/fixtures/fix_exec.py
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('binary-only', None,
"cannot supply both '--source-only' and '--binary-only'"
)'License: ' + self.distribution.get_license(),

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extensions-3.8.2/3.6/Lib/distutils/command/bdist_rpm.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/distutils/command/bdist_rpm.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/distutils/command/bdist_rpm.py
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# A grammar to describe tree matching patterns.
# Not shown here:
# - 'TOKEN' stands for any token (leaf node)
# - 'any' stands for any node (leaf or interior)
# With 'any' we can still specify the sub-structure.

# The start symbol is 'Matcher'.

Matcher: Alternatives ENDMARKER

Alternatives: Alternative ('|' Alternative)*

Alternative: (Unit | NegatedUnit)+

Unit: [NAME '='] ( STRING [Repeater]
          | NAME [Details] [Repeater]
          | '(' Alternatives ')' [Repeater]
          | '[' Alternatives ']'
          )

NegatedUnit: 'not' (STRING | NAME [Details] | '(' Alternatives ')')

Repeater: '*' | '+' | '{' NUMBER [',' NUMBER] '}'

Details: '<' Alternatives '>'

Found in path(s):
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/lib2to3/PatternGrammar.txt
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/lib2to3/PatternGrammar.txt
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/lib2to3/PatternGrammar.txt
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extensions-3.8.2/3.8/Modules/_tkinter.c
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Modules/_tkinter.c
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Modules/_tkinter.c
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# version.

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extensions-3.8.2/3.8/Lib/distutils/command/bdist_wininst.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/distutils/command/bdist_wininst.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/distutils/command/bdist_wininst.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/distutils/cygwinccompiler.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/distutils/command/bdist_msi.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/distutils/command/bdist_msi.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
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* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
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* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_map.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/lib2to3/fixes/fix_xrange.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_xrange.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_dict.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/lib2to3/fixes/fix_buffer.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_dict.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_buffer.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/lib2to3/fixes/fix_buffer.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_map.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_types.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/lib2to3/fixes/fix_types.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
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* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_filter.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/lib2to3/fixes/fix_filter.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_buffer.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.7/Lib/lib2to3/fixes/fix_buffer.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.8/Lib/lib2to3/fixes/fix_buffer.py
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/lib2to3/fixes/fix_map.py
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found executable.

Found in path(s):
* /opt/cola/permits/1168963812_1622802919.99/0/python3-stdlib-extensions-3-8-2-orig-tar-xz/python3-stdlib-
extensions-3.8.2/3.6/Lib/distutils/spawn.py
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file.write('License: %s
' % self.get_license())
```

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```

```
1.432 builder 0.0.0-20180802200727-47ae307949d0
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1.433 yq 2.13.0

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1.434 crypto 1.4.1

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Found in path(s):
* /opt/cola/permits/1159368677_1620120029.59/0/fabric-shim-crypto-1-4-1-tgz/package/lib/ecdsa-key.js
* /opt/cola/permits/1159368677_1620120029.59/0/fabric-shim-crypto-1-4-1-tgz/package/test/shim-crypto.js
* /opt/cola/permits/1159368677_1620120029.59/0/fabric-shim-crypto-1-4-1-tgz/package/index.js
* /opt/cola/permits/1159368677_1620120029.59/0/fabric-shim-crypto-1-4-1-tgz/package/test/ecdsa-key.js
* /opt/cola/permits/1159368677_1620120029.59/0/fabric-shim-crypto-1-4-1-tgz/package/lib/enc-sign.js
No license file was found, but licenses were detected in source scan.

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Found in path(s):

1.435 alsa 1.2.2-2.1ubuntu2.5

1.435.1 Available under license :

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1.436 libpsl 0.19.1-5build1
1.436.1 Available under license:

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1.437 geo 0.0.0-20190916061304-5b978397cfec

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1.438 snake-yaml 1.28
1.438.1 Available under license:

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Manifest-Version: 1.0
Automatic-Module-Name: org.yaml.snakeyaml
Bnd-LastModified: 161397356620
Build-Jdk: 11.0.10
Built-By: alex13
Bundle-Description: YAML 1.1 parser and emitter for Java
Bundle-License: http://www.apache.org/licenses/LICENSE-2.0.txt
Bundle-ManifestVersion: 2
Bundle-Name: SnakeYAML
Bundle-SymbolicName: org.yaml.snakeyaml
Bundle-Version: 1.28.0
Created-By: Apache Maven Bundle Plugin
Export-Package: org.yaml.snakeyaml;version="1.28",org.yaml.snakeyaml.comments;version="1.28",org.yaml.snakeyaml.composer;version="1.28",org.yaml.snakeyaml.constructor;version="1.28",org.yaml.snakeyaml.emitter;version="1.28",org.yaml.snakeyaml.env;version="1.28",org.yaml.snakeyaml.error;version="1.28",org.yaml.snakeyaml.events;version="1.28",org.yaml.snakeyaml.extensions.compactnotation;version="1.28",org.yaml.snakeyaml.introspector;version="1.28",org.yaml.snakeyaml.nodes;version="1.28",org.yaml.snakeyaml.parser;version="1.28",org.yaml.snakeyaml.resolver;version="1.28",org.yaml.snakeyaml.scanner;version="1.28",org.yaml.snakeyaml.tokens;version="1.28",org.yaml.snakeyaml.util;version="1.28"
Import-Package: org.yaml.snakeyaml;version="[1.28,2)"
Require-Capability: osgi.ee;filter="(&osgi.ee=JavaSE)(version=1.7)"
Tool: Bnd-3.5.0.201709291849

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1.439 charset-normalizer 2.0.9

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package cloud

import (  "bytes"  "io/ioutil"  "os"  "path/filepath"  "strings"  "testing" )

var sentinels = []string{
func TestLicense(t *testing.T) {
    t.Parallel()
    skip := make(map[string]bool)
    // Automatically generated.
    "bigtable/cmd/cbt/cbtdoc.go": true,

    // BSD license, which is compatible, is embedded in the file.
    "cmd/go-cloud-debug-agent/internal/debug/elf/elf.go": true,

    "third_party/pkgsite/print_type.go": true,
    "third_party/pkgsite/synopsis.go": true,
}
err := filepath.Walk(".", func(path string, fi os.FileInfo, err error) error {
    if err != nil {
        return err
    }
    if ext := filepath.Ext(path); ext != ".go" && ext != ".proto" {
        return nil
    }
    if skip[path] {
        return nil
    }
    src, err := ioutil.ReadFile(path)
    if err != nil {
        return nil
    }
    src = src[:300] // Ensure all of the sentinel values are at the top of the file.

    // Find license
    for _, sentinel := range sentinels {
        if !bytes.Contains(src, []byte(sentinel)) {
            t.Errorf("%v: license header not present. want %q", path, sentinel)
            return nil
        }
    }
}
return nil
)
}
if err != nil {
    t.Fatal(err)
}

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# Copying Container Files

## Motivation

- Copying files from Containers in a cluster to a local filesystem
- Copying files from a local filesystem to Containers in a cluster

Copy requires that *tar* be installed in the container image.

## Local to Remote

Copy a local file to a remote Pod in a cluster.

- Local file format is `<path>`
- Remote file format is `<pod-name>:<path>`

```bash
kubectl cp /tmp/foo_dir <some-pod>:/tmp/bar_dir
```

## Remote to Local

Copy a remote file from a Pod to a local file.

- Local file format is `'<path>'`
- Remote file format is `<pod-name>:<path>`

```bash
kubectl cp <some-pod>:/tmp/foo /tmp/bar
```

---
## Specify the Container

Specify the Container within a Pod running multiple containers.

```
- `\-c <container-name>`
```

```
bash
kubectl cp /tmp/foo <some-pod>:/tmp/bar -c <specific-container>
```

## Namespaces

Set the Pod namespace by prefixing the Pod name with `\<namespace>/` .

```
- `\<pod-namespace>/\<pod-name>:\<path>`
```

```
bash
kubectl cp /tmp/foo <some-namespace>/<some-pod>:/tmp/bar
```

1.444 google-uuid 1.3.0

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1.445 errors 0.9.1

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1.446 git 2.25.1-1ubuntu3.2

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@heading Vincent Rijmen, Antoon Bosselaers, Paulo Barreto

AES in libhcrypto

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tijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>
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DES core in libhcrypto

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D3DES (V5.09) -

A portable, public domain, version of the Data Encryption Standard.

Written with Symantec’s THINK (Lightspeed) C by Richard Outerbridge. Thanks to: Dan Hoey for his excellent Initial and Inverse permutation code; Jim Gillogly & Phil Karn for the DES key schedule code; Dennis Ferguson, Eric Young and Dana How for comparing notes; and Ray Lau, for humouring me on.


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Windows support

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lib/hcrypto/test_dh.c

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1.458 golang-protobuf-extensions 1.0.2-0.20181231171920-c182affec369

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Flask

Flask is a lightweight WSGI web application framework. It is designed to make getting started quick and easy, with the ability to scale up to
complex applications. It began as a simple wrapper around `Werkzeug`\_ and `Jinja`\_ and has become one of the most popular Python web application frameworks.

Flask offers suggestions, but doesn't enforce any dependencies or project layout. It is up to the developer to choose the tools and libraries they want to use. There are many extensions provided by the community that make adding new functionality easy.

.. _WSGI: https://wsgi.readthedocs.io/
.. _Werkzeug: https://werkzeug.palletsprojects.com/
.. _Jinja: https://jinja.palletsprojects.com/

Installing
----------

Install and update using `pip`\_:

.. code-block:: text

    $ pip install -U Flask


A Simple Example
----------------

.. code-block:: python

    # save this as app.py
    from flask import Flask
    app = Flask(__name__)
    @app.route("/")
    def hello():
        return "Hello, World!"

    $ flask run
    * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)

Contributing
------------
For guidance on setting up a development environment and how to make a contribution to Flask, see the `contribution guidelines`.

.. _contribution guidelines: https://github.com/pallets/flask/blob/main/CONTRIBUTING.rst

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-----

The Pallets organization develops and supports Flask and the libraries it uses. In order to grow the community of contributors and users, and allow the maintainers to devote more time to the projects, `please donate today`.

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Links
-----

- Documentation: https://flask.palletsprojects.com/
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Flask leverages Jinja2 as its template engine. You are obviously free to use

Found in path(s):
* /opt/cola/permits/1210655077_1633438616.77/0/flask-2.0-2-tar-gz/Flask-2.0.2/src/Flask.egg-info/PKG-INFO
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Flask Extension Development
Flask, being a microframework, often requires some repetitive steps to get a third party library working. Many such extensions are already available on `PyPI`.

If you want to create your own Flask extension for something that does not exist yet, this guide to extension development will help you get your extension running in no time and to feel like users would expect your extension to behave.

Anatomy of an Extension

Extensions are all located in a package called ``flask_something`` where "something" is the name of the library you want to bridge. So for example if you plan to add support for a library named `simplexml` to Flask, you would name your extension's package ``flask_simplexml``.

The name of the actual extension (the human readable name) however would be something like "Flask-SimpleXML". Make sure to include the name "Flask" somewhere in that name and that you check the capitalization. This is how users can then register dependencies to your extension in their :file:`setup.py` files.

But what do extensions look like themselves? An extension has to ensure that it works with multiple Flask application instances at once. This is a requirement because many people will use patterns like the :doc:`/patterns/appfactories` pattern to create their application as needed to aid unittests and to support multiple configurations. Because of that it is crucial that your application supports that kind of behavior.

Most importantly the extension must be shipped with a :file:`setup.py` file and registered on PyPI. Also the development checkout link should work so that people can easily install the development version into their virtualenv without having to download the library by hand.

Flask extensions must be licensed under a BSD, MIT or more liberal license in order to be listed in the Flask Extension Registry. Keep in mind that the Flask Extension Registry is a moderated place and libraries will be reviewed upfront if they behave as required.

"Hello Flaskext!"

So let's get started with creating such a Flask extension. The extension we want to create here will provide very basic support for SQLite3.
First we create the following folder structure:

```
flask-sqlite3/
    flask_sqlite3.py
LICENSE
README
```

Here's the contents of the most important files:

```
setup.py
```

The next file that is absolutely required is the :file:`setup.py` file which is used to install your Flask extension. The following contents are something you can work with:

```````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````````
That's a lot of code but you can really just copy/paste that from existing extensions and adapt.

```
flask_sqlite3.py
```

Now this is where your extension code goes. But how exactly should such an extension look like? What are the best practices? Continue reading for some insight.

**Initializing Extensions**

Many extensions will need some kind of initialization step. For example, consider an application that's currently connecting to SQLite like the documentation suggests (`/patterns/sqlite3`). So how does the extension know the name of the application object?

Quite simple: you pass it to it.

There are two recommended ways for an extension to initialize:

**initialization functions:**

If your extension is called `helloworld` you might have a function called `init_helloworld(app, extra_args)` that initializes the extension for that application. It could attach before / after handlers etc.

**classes:**

Classes work mostly like initialization functions but can later be used to further change the behavior.

What to use depends on what you have in mind. For the SQLite 3 extension we will use the class-based approach because it will provide users with an object that handles opening and closing database connections.

When designing your classes, it's important to make them easily reusable at the module level. This means the object itself must not under any
circumstances store any application specific state and must be shareable between different applications.

The Extension Code
-------------------

Here's the contents of the `flask_sqlite3.py` for copy/paste:

```python
import sqlite3
from flask import current_app, _app_ctx_stack

class SQLite3(object):
    def __init__(self, app=None):
        self.app = app
        if app is not None:
            self.init_app(app)

    def init_app(self, app):
        app.config.setdefault('SQLITE3_DATABASE', ':memory:)
        app.teardown_appcontext(self.teardown)

    def connect(self):
        return sqlite3.connect(current_app.config['SQLITE3_DATABASE'])

    def teardown(self, exception):
        ctx = _app_ctx_stack.top
        if hasattr(ctx, 'sqlite3_db'):
            ctx.sqlite3_db.close()

    @property
def connection(self):
        ctx = _app_ctx_stack.top
        if ctx is not None:
            if not hasattr(ctx, 'sqlite3_db'):
                ctx.sqlite3_db = self.connect()
            return ctx.sqlite3_db

So here's what these lines of code do:

1. The `__init__` method takes an optional app object and, if supplied, will call `init_app`
2. The `init_app` method exists so that the `SQLite3` object can be instantiated without requiring an app object. This method supports the factory pattern for creating applications. The `init_app` will set the configuration for the database, defaulting to an in memory database if no configuration is supplied. In addition, the `init_app` method
attaches the `teardown` handler.

3. Next, we define a `connect` method that opens a database connection.

4. Finally, we add a `connection` property that on first access opens the database connection and stores it on the context. This is also the recommended way to handling resources: fetch resources lazily the first time they are used.

Note here that we're attaching our database connection to the top application context via `_app_ctx_stack.top`. Extensions should use the top context for storing their own information with a sufficiently complex name.

So why did we decide on a class-based approach here? Because using our extension looks something like this:

```python
from flask import Flask
from flask_sqlite3 import SQLite3

app = Flask(__name__)
app.config.from_pyfile('the-config.cfg')
db = SQLite3(app)
```

You can then use the database from views like this:

```python
@app.route('/)
def show_all():
    cur = db.connection.cursor()
    cur.execute(...)
```

Likewise if you are outside of a request you can use the database by pushing an app context:

```python
with app.app_context():
    cur = db.connection.cursor()
    cur.execute(...)
```

At the end of the `with` block the teardown handles will be executed automatically.

Additionally, the `init_app` method is used to support the factory pattern for creating apps:

```python
db = SQLite3()
# Then later on.
app = create_app('the-config.cfg')
db.init_app(app)
```

Keep in mind that supporting this factory pattern for creating apps is required
for approved flask extensions (described below).

.. admonition:: Note on ``init_app``

As you noticed, ``init_app`` does not assign ``app`` to ``self``. This is intentional! Class based Flask extensions must only store the application on the object when the application was passed to the constructor. This tells the extension: I am not interested in using multiple applications.

When the extension needs to find the current application and it does not have a reference to it, it must either use the :data:`~flask.current_app` context local or change the API in a way that you can pass the application explicitly.

Using `_app_ctx_stack`
----------------------

In the example above, before every request, a ``sqlite3_db`` variable is assigned to ``_app_ctx_stack.top``. In a view function, this variable is accessible using the ``connection`` property of ``SQLite3``. During the teardown of a request, the ``sqlite3_db`` connection is closed. By using this pattern, the *same* connection to the sqlite3 database is accessible to anything that needs it for the duration of the request.

Learn from Others
-----------------

This documentation only touches the bare minimum for extension development. If you want to learn more, it's a very good idea to check out existing extensions on the PyPI. If you feel lost there is still the mailinglist and the Discord server to get some ideas for nice looking APIs. Especially if you do something nobody before you did, it might be a very good idea to get some more input. This not only generates useful feedback on what people might want from an extension, but also avoids having multiple developers working in isolation on pretty much the same problem.

Remember: good API design is hard, so introduce your project on the mailing list, and let other developers give you a helping hand with designing the API.

The best Flask extensions are extensions that share common idioms for the API. And this can only work if collaboration happens early.

Approved Extensions
-------------------
Flask previously had the concept of approved extensions. These came with some vetting of support and compatibility. While this list became too difficult to maintain over time, the guidelines are still relevant to all extensions maintained and developed today, as they help the Flask ecosystem remain consistent and compatible.

0. An approved Flask extension requires a maintainer. In the event an extension author would like to move beyond the project, the project should find a new maintainer and transfer access to the repository, documentation, PyPI, and any other services. If no maintainer is available, give access to the Pallets core team.

1. The naming scheme is *Flask-ExtensionName* or *ExtensionName-Flask*.
   - It must provide exactly one package or module named ``flask_extension_name``.
2. The extension must be BSD or MIT licensed. It must be open source and publicly available.

3. The extension's API must have the following characteristics:
   - It must support multiple applications running in the same Python process. Use `current_app` instead of `self.app`, store configuration and state per application instance.
   - It must be possible to use the factory pattern for creating applications. Use the `ext.init_app()` pattern.

4. From a clone of the repository, an extension with its dependencies must be installable with `pip install -e .`.

5. It must ship a testing suite that can be invoked with `tox -e py` or `pytest`. If not using `tox`, the test dependencies should be specified in a `requirements.txt` file. The tests must be part of the sdist distribution.

6. The documentation must use the `flask` theme from the `Official Pallets Themes`_. A link to the documentation or project website must be in the PyPI metadata or the readme.

7. For maximum compatibility, the extension should support the same versions of Python that Flask supports. 3.6+ is recommended as of 2020. Use `python_requires=">= 3.6"` in `setup.py` to indicate supported versions.

.. _PyPI: https://pypi.org/search/?c=Framework+%3A%3A+Flask
.. _mailinglist: https://mail.python.org/mailman/listinfo/flask
.. _Discord server: https://discord.gg/pallets
.. _Official Pallets Themes: https://pypi.org/project/Pallets-Sphinx-Themes/

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* /opt/cola/permits/1210655077_1633438616.77/0/flask-2.0.2-tar-gz/Flask-2.0.2/docs/extensiondev.rst

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Blog Blueprint
==============

You'll use the same techniques you learned about when writing the
authentication blueprint to write the blog blueprint. The blog should
list all posts, allow logged in users to create posts, and allow the
author of a post to edit or delete it.

As you implement each view, keep the development server running. As you
save your changes, try going to the URL in your browser and testing them
out.

The Blueprint
------------

Define the blueprint and register it in the application factory.

```python
from flask import Blueprint, flash, g, redirect, render_template, request, url_for
```

.. currentmodule:: flask
from werkzeug.exceptions import abort
from flaskr.auth import login_required
from flaskr.db import get_db

bp = Blueprint('blog', __name__)

Import and register the blueprint from the factory using :

.. code-block:: python
   :caption: `flaskr/__init__.py`

   def create_app():
       app = ...
       # existing code omitted

       from . import blog
       app.register_blueprint(blog.bp)
       app.add_url_rule('/', endpoint='index')

       return app

Unlike the auth blueprint, the blog blueprint does not have a
``url_prefix``. So the ``index`` view will be at ``/``, the ``create``
view at ``/create``, and so on. The blog is the main feature of Flaskr,
so it makes sense that the blog index will be the main index.

However, the endpoint for the ``index`` view defined below will be
``blog.index``. Some of the authentication views referred to a plain
``index`` endpoint. :meth:`app.add_url_rule() <Flask.add_url_rule>`
associates the endpoint name ``''index''`` with the ``''/'' url so that
``url_for('index')`` or ``url_for('blog.index')`` will both work,
generating the same ``''/'' URL either way.

In another application you might give the blog blueprint a
``url_prefix`` and define a separate ``index`` view in the application
factory, similar to the ``hello`` view. Then the ``index`` and
``blog.index`` endpoints and URLs would be different.

Index
-----

The index will show all of the posts, most recent first. A ``JOIN`` is
used so that the author information from the `user` table is available in the result.

```python
@bp.route('/

def index():
    db = get_db()
    posts = db.execute(
        'SELECT p.id, title, body, created, author_id, username
        FROM post p JOIN user u ON p.author_id = u.id
        ORDER BY created DESC'
    ).fetchall()
    return render_template('blog/index.html', posts=posts)
```

```html+jinja
{% extends 'base.html' %}
{% block header %}
<h1>{% block title %}Posts{% endblock %}</h1>
{% if g.user %}
    <a class="action" href="{{ url_for('blog.create') }}">New</a>
{% endif %}
{% endblock %}

{% block content %}
{% for post in posts %}
<article class="post">
<header>
    <div>
        <h1>{{ post['title'] }}</h1>
        <div class="about">by {{ post['username'] }} on {{ post['created'].strftime('%Y-%m-%d') }}</div>
    </div>
    {% if g.user['id'] == post['author_id'] %}
        <a class="action" href="{{ url_for('blog.update', id=post['id']) }}">Edit</a>
    {% endif %}
</header>
<p class="body">{{ post['body'] }}</p>
</article>
{% if not loop.last %}
<hr>
{% endif %}
{% endfor %}
{% endblock %}
```
When a user is logged in, the `header` block adds a link to the `create` view. When the user is the author of a post, they'll see an "Edit" link to the `update` view for that post. `loop.last` is a special variable available inside `Jinja for loops`. It's used to display a line after each post except the last one, to visually separate them.

.. _Jinja for loops: https://jinja.palletsprojects.com/templates/#for

Create
------

The `create` view works the same as the auth `register` view. Either the form is displayed, or the posted data is validated and the post is added to the database or an error is shown.

The `login_required` decorator you wrote earlier is used on the blog views. A user must be logged in to visit these views, otherwise they will be redirected to the login page.

```python
@bp.route('/create', methods=('GET', 'POST'))
@login_required
def create():
    if request.method == 'POST':
        title = request.form['title']
        body = request.form['body']
        error = None

        if not title:
            error = 'Title is required.'

        if error is not None:
            flash(error)
        else:
            db = get_db()
            db.execute(
                'INSERT INTO post (title, body, author_id)
                VALUES (?, ?, ?)',
                (title, body, g.user['id'])
                )
            db.commit()
            return redirect(url_for('blog.index'))

    return render_template('blog/create.html')
```

---

Open Source Used In 5GasS Edge AC-4  4377
Update
-------

Both the `update` and `delete` views will need to fetch a `post` by `id` and check if the author matches the logged in user. To avoid duplicating code, you can write a function to get the `post` and call it from each view.

.. code-block:: python
   :caption: `flaskr/blog.py`

   ```python
   def get_post(id, check_author=True):
       post = get_db().execute(
           'SELECT p.id, title, body, created, author_id, username
           FROM post p JOIN user u ON p.author_id = u.id
           WHERE p.id = ?',
           (id,))
       .fetchone()

       if post is None:
           abort(404, f"Post id {id} doesn't exist.")

       if check_author and post['author_id'] != g.user['id']:
           abort(403)

       return post
   ```
:func:`abort` will raise a special exception that returns an HTTP status code. It takes an optional message to show with the error, otherwise a default message is used. ``404`` means "Not Found", and ``403`` means "Forbidden". (``401`` means "Unauthorized", but you redirect to the login page instead of returning that status.)

The ``check_author`` argument is defined so that the function can be used to get a "post" without checking the author. This would be useful if you wrote a view to show an individual post on a page, where the user doesn't matter because they're not modifying the post.

```python
@bp.route('/<int:id>/update', methods=('GET', 'POST'))
@login_required
def update(id):
    post = get_post(id)
    if request.method == 'POST':
        title = request.form['title']
        body = request.form['body']
        error = None
        if not title:
            error = 'Title is required.'
        if error:
            flash(error)
        else:
            db = get_db()
            db.execute(
                'UPDATE post SET title = ?, body = ?
                WHERE id = ?',
                (title, body, id)
            )
            db.commit()
            return redirect(url_for('blog.index'))
    return render_template('blog/update.html', post=post)
```

Unlike the views you've written so far, the "update" function takes an argument, "id". That corresponds to the "<int:id>" in the route. A real URL will look like "/1/update". Flask will capture the "1", ensure it's an :class:`int`, and pass it as the "id" argument. If you don't specify "int:" and instead do "<id>"", it will be a string.

To generate a URL to the update page, :func:`url_for` needs to be passed the "id" so it knows what to fill in:
This is also in the `index.html` file above.

The `create` and `update` views look very similar. The main difference is that the `update` view uses a `post` object and an `UPDATE` query instead of an `INSERT`. With some clever refactoring, you could use one view and template for both actions, but for the tutorial it's clearer to keep them separate.

.. code-block:: html+jinja
   :caption: `flaskr/templates/blog/update.html`

   {% extends 'base.html' %}

   {% block header %}
   <h1>{% block title %}Edit "{{ post['title'] }}"{% endblock %}</h1>
   {% endblock %}

   {% block content %}
   <form method="post">
   <label for="title">Title</label>
   <input name="title" id="title"
   value="{{ request.form['title'] or post['title'] }}" required>
   <label for="body">Body</label>
   <textarea name="body" id="body">{{ request.form['body'] or post['body'] }}</textarea>
   <input type="submit" value="Save">
   </form>
   <hr>
   <form action="{{ url_for('blog.delete', id=post['id']) }}" method="post">
   <input class="danger" type="submit" value="Delete" onclick="return confirm('Are you sure?');">
   </form>
   {% endblock %}

This template has two forms. The first posts the edited data to the current page (`/<id>/update`). The other form contains only a button and specifies an `action` attribute that posts to the delete view instead. The button uses some JavaScript to show a confirmation dialog before submitting.

The pattern `{{ request.form['title'] or post['title'] }}` is used to choose what data appears in the form. When the form hasn't been submitted, the original `post` data appears, but if invalid form data was posted you want to display that so the user can fix the error, so `request.form` is used instead. :data:`request` is another variable that's automatically available in templates.
The delete view doesn't have its own template, the delete button is part of `update.html` and posts to the `/<id>/delete` URL. Since there is no template, it will only handle the `POST` method and then redirect to the `index` view.

```python
@bp.route('/<int:id>/delete', methods=('POST',))
@login_required
def delete(id):
    get_post(id)
    db = get_db()
    db.execute('DELETE FROM post WHERE id = ?', (id,))
    db.commit()
    return redirect(url_for('blog.index'))
```

Congratulations, you've now finished writing your application! Take some time to try out everything in the browser. However, there's still more to do before the project is complete.

Continue to :doc:`install`.

Found in path(s):
* /opt/cola/permits/1210655077_1633438616.77/0/flask-2-0-2-tar-gz/Flask-2.0.2/docs/tutorial/blog.rst

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```metadata
name = Flask
version = attr: flask.__version__
url = https://palletsprojects.com/p/flask
project_urls =
    Donate = https://palletsprojects.com/donate
    Documentation = https://flask.palletsprojects.com/
    Changes = https://flask.palletsprojects.com/changes/
    Source Code = https://github.com/pallets/flask/
    Issue Tracker = https://github.com/pallets/flask/issues/
    Twitter = https://twitter.com/PalletsTeam
    Chat = https://discord.gg/pallets
license = BSD-3-Clause
author = Armin Ronacher
author_email = armin.ronacher@active-4.com
maintainer = Pallets
maintainer_email = contact@palletsprojects.com
description = A simple framework for building complex web applications.
long_description = file: README.rst
```
long_description_content_type = text/x-rst
classifiers =
Development Status :: 5 - Production/Stable
Environment :: Web Environment
Framework :: Flask
Intended Audience :: Developers
License :: OSI Approved :: BSD License
Operating System :: OS Independent
Programming Language :: Python
Topic :: Internet :: WWW/HTTP :: Dynamic Content
Topic :: Internet :: WWW/HTTP :: WSGI
Topic :: Internet :: WWW/HTTP :: WSGI :: Application
Topic :: Software Development :: Libraries :: Application Frameworks

[options]
packages = find:
    package_dir = = src
    include_package_data = true
    python_requires = >= 3.6

[options.packages.find]
where = src

[options.entry_points]
    console_scripts =
        flask = flask.cli:main

[tool:pytest]
    testpaths = tests
    filterwarnings =
        error

[coverage:run]
    branch = True
    source =
        flask
        tests

[coverage:paths]
    source =
        src
        */site-packages

[flake8]
    select = B, E, F, W, B9, ISC
    ignore =
        E203
        E402
mypy]
files = src/flask
python_version = 3.6
allow_redefinition = True
disable_subclassing_any = True
no_implicit_optional = True
local_partial_types = True
strict_equality = True
warn_redundant_casts = True
warn_unused_configs = True
warn_unused_ignores = True

[mypy-asgiref.*]
ignore_missing_imports = True

[mypy-blinker.*]
ignore_missing_imports = True

[mypy-dotenv.*]
ignore_missing_imports = True

[egg_info]
tag_build =
tag_date = 0

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1.461 go-colorable 0.1.6

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1.462 python-setuptools 39.0.1-2

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1.463 coverage 6.2

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Coverage.py was originally written by Gareth Rees, and since 2004 has been extended and maintained by Ned Batchelder.

Other contributions, including writing code, updating docs, and submitting useful bug reports, have been made by:

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1.469 goprotobuf 1.5.2

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Go support for Protocol Buffers - Google's data interchange format

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1.470 tdb 1.45.5

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1.479 mime-support 3.64ubuntu1

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1.481 python-pkg-resources 45.2.0-1

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* /opt/cola/permits/1135840548_1613612864.41/0/automaton-1-11-8-sources-3-jar/dk/brics/automaton/Datatypes.java
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* /opt/cola/permits/1135840548_1613612864.41/0/automaton-1-11-8-sources-3-jar/dk/brics/automaton/AutomatonMatcher.java

1.483 gnutls 3.5.18-1ubuntu1.5

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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Version 3.1, 31 March 2009

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Local-Date: Fri, 06 Jun 2003 13:18:52 -0400
Date: Fri, 6 Jun 2003 10:18:52 -0700
From: Juan Gomez <juang@us.ibm.com>
To: Stephen Frost <sfrost@debian.org>
Stephen,

"There is no restriction on modifications and derived works" on the work I did for the openldap server as long as this is consistent with the openldap license. Please forward this email to Kurt so he does the appropriate changes to the files to reflect this.

Regards, Juan

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MA

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Local-Date: Thu, 05 Jun 2003 16:53:32 -0400
Date: Thu, 5 Jun 2003 16:53:32 -0400 (EDT)
From: Mark Adamson <adamson@andrew.cmu.edu>
To: Stephen Frost <sfrost@debian.org>
Subject: Re: Mark Adamson license in OpenLDAP source

Hi Stephen,

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-Mark

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---
After discussing this license with the OpenLDAP Foundation we received clarification on it:
---

* To: Stephen Frost <sfrost@snowman.net>
* Subject: Re: OpenLDAP Licenseing issues
* From: "Kurt D. Zeilenga" <Kurt@OpenLDAP.org>
* Date: Wed, 28 May 2003 10:55:44 -0700
* Cc: Steve Langasek <vorlon@netexpress.net>,debian-legal@lists.debian.org, openldap-devel@OpenLDAP.org
* In-reply-to: <20030528162613.GB8524@ns.snowman.net>
* Message-id: <5.2.0.9.0.20030528094229.02924780@127.0.0.1>
* Old-return-path: <Kurt@OpenLDAP.org>

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Regards, Kurt

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1.486 x-net 0.0.0-20211216030914-fe4d6282115f

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1.488 libsemanage 3.0 1build2

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1.489 dash 0.5.10.2 6
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====

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====

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1.490 googleapis-gnostic 0.4.1

1.490.1 Available under license :

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1.491 libxmu 1.1.2-2

1.491.1 Available under license:

No license file was found, but licenses were detected in source scan.

--- libxmu-1.1.2.orig/autogen.sh
+++ libxmu-1.1.2/autogen.sh
@@ -0,0 +1,14 @@
+#!/bin/sh
+
+srcdir=`dirname $0`
+test -z "$srcdir" && srcdir=.
+
+ORIGDIR=`pwd`
+cd $srcdir
+
+autoreconf -v --install || exit 1
+cd $ORIGDIR || exit $?
+
+if test -z "$NOCONFIGURE"; then
+    $srcdir/configure "$@"
+f
--- libxmu-1.1.2.orig/debian/changelog
+++ libxmu-1.1.2/debian/changelog
@@ -0,0 +1,219 @@
+libxmu (2:1.1.2-2) unstable; urgency=medium
+
+ [ Andreas Boll ]
+ * Switch to dh with the autoreconf and quilt addons, fixing possible FTBFS
+ * when building in parallel (closes: #801059). Thanks, Matthias Klose!
+
+ [ Julien Cristau ]
+ * Remove Cyril from Uploaders.
+ * Bump Standards-Version to 3.9.6, update Vcs-* control fields.
+
+ -- Julien Cristau <jcristau@debian.org> Sat, 14 Nov 2015 10:04:44 +0100
+
+libxmu (2:1.1.2-1) unstable; urgency=low
+
+ * New upstream release.
+ * Add ${misc:Depends} to libxmu-headers.
+ * Use /usr/share/quilt/quilt.make instead of xsfbs for patching.
+ * Add build-[arch.indep] debian/rules targets.
+ * Bump debhelper compat level from 5 to 7.
+
+ -- Julien Cristau <jcristau@debian.org> Mon, 05 May 2014 14:13:01 +0200
+
+libxmu (2:1.1.1-1) unstable; urgency=low
+
+ * New upstream release.
+ * Don't require (fake)root for debian/rules clean.
+ * Bump build-deps on xutils-dev, xmlto and xorg-sgml-doctools per configure.ac.
+ * Xmu.html no longer hardcodes the full path to xlogo.svg, drop sed call from debian/rules.
+ * Remove David Nusinow from Up uploaders.
+ * Bump debhelper build-dep for ${misc:Pre-Depends} usage.
+
+ -- Julien Cristau <jcristau@debian.org> Sat, 21 Apr 2012 10:50:11 +0200
+
+libxmu (2:1.1.0-3) unstable; urgency=low
+
+ * Build for multiarch.
+
+ -- Steve Langasek <vorlon@debian.org> Fri, 21 Oct 2011 14:47:59 -0700
+
+libxmu (2:1.1.0-2) unstable; urgency=low
+
+ [ Christopher James Halse Rogers ]
+ * debian/patches/01_dont_export_private_deps.patch:
+   - The Xmu.h header uses libXt symbols in a #define, so libXt is not a private dep. With binutils-gold, the indirect dependency on Xt is not considered when linking with Xmu so this causes build failures.
+
+ [ Julien Cristau ]
+ * Drop Pre-Depends on x11-common, only needed for upgrades from the monolith.
+
+ -- Julien Cristau <jcristau@debian.org> Thu, 28 Apr 2011 14:10:11 +0200
+
+libxmu (2:1.1.0-1) unstable; urgency=low
+
+ * New upstream release.
+ * Bump xutils-dev build-dep for new macros.
+ * Add xmlto, xorg-sgml-doctools, and w3m build-dep for the doc.
+ * Pass --with-xmlto and --without-fop (we want html and txt only).
+ * Pass --docdir=/usr/share/doc/libxmu-headers and add this directory to libxmu-headers.install file.
+ * Remove the hardcoded path to the X logo in the Xmu.html file.
+ * Kill *.xml in the doc directory, no point in shipping them.
+ * Switch from --list-missing to --fail-missing for additional safety.
+
+ -- Cyril Brulebois <kibi@debian.org> Fri, 19 Nov 2010 08:42:29 +0100
+
+libxmu (2:1.0.5-2) unstable; urgency=high
+  [ Julien Cristau ]
+  * Rename the build directory to not include DEB_BUILD_GNU_TYPE for no
+    good reason. Thanks, Colin Watson!
+  * Remove myself from Upolders
+  * Don't pass both -s and -Nfoo/-pfoo to dh_strip. This resulted in an empty
+    libxmuu1-dbg (Closes: #594500). Thanks to Luca Falavigna for the report.
+  +  [ Cyril Brulebois ]
+  * Add myself to Upolders.
+  * Bump urgency to high for the RC bugfix. Thanks to Jakub Wilk as well
+    for the report.
+  +  -- Cyril Brulebois <kibi@debian.org>  Sat, 04 Sep 2010 14:32:30 +0200
+  +  +libxmu (2:1.0.5-1) unstable; urgency=low
+  +  +  [ Timo Aaltonen ]
+  * New upstream release.
+  + Fix 64bit support (closes: #521887)
+  +  +  [ Julien Cristau ]
+  * Bump Standards-Version to 3.8.3.
+  +  -- Julien Cristau <jcristau@debian.org>  Wed, 25 Nov 2009 19:20:17 +0100
+  +  +libxmu (2:1.0.4-2) unstable; urgency=low
+  +  +  [ Julien Cristau ]
+  * Drop -1 debian revisions from build-deps.
+  * libxmu6{,-dbg}, libxmu-dev, libxmuu1{,-dbg} and libxmuu-dev don't need a
+    dependency on x11-common.
+  * Build libxmu-headers in binary-indep instead of binary-arch
+    (closes: #486418). Thanks, Martin Koeppe!
+  * Run autoreconf on build; build-depend on automake, libtool, xutils-dev.
+  * Handle parallel builds.
+  +  +  [ Brice Goglin ]
+  * Add a link to www.X.org and a reference to the upstream module
+    in the long description.
+  * Add upstream URL to debian/copyright.
+  * Add README.source, bump Standards-Version to 3.8.2.
+  * Use updated xsfbs, closes: #538587.
+  * Move -dbg packages to section debug.
+  +  -- Julien Cristau <jcristau@debian.org>  Fri, 07 Aug 2009 14:30:36 +0200
+  +  +libxmu (2:1.0.4-1) unstable; urgency=low
+ [ Julien Cristau ]
+ * New upstream release.
+ * Make libxmu*-dev depend on libxmu-headers (= ${source:Version}). Thanks,
+   Josh Triplett.
+ * Don't export private dependencies in xmu.pc and xmuu.pc. These
+   dependencies are handled by Requires.private.
+ * Due to the above, build-depend on quilt and apply the xsfbs patch rules.
+ * Update xsfbs to the latest version as of 2008-01-06.
+ * Add myself to Up uploaders, and remove Branden and Fabio with their
   permission.
+ * Bump Standards-Version to 3.7.3 (no changes).
+ * s/^XS-Vcs/Vcs/

+ [ Timo Aaltonen ]
+ * Bump the epoch so that this can be synced to Ubuntu in the future.
+
-- Julien Cristau <jcristau@debian.org>  Thu, 17 Jan 2008 14:57:47 +0100

+libxmu (1:1.0.3-1) unstable; urgency=low
+
+ * New upstream release.
+ * Install the upstream changelog.
+ * Remove outdated CVS information from the package descriptions, and add
+   XS-Vcs-Git and XS-Vcs-Browser.
+ * Fix package sections (libraries in libs, development stuff in libdevel).
+ * Use ${binary:Version} instead of ${Source-Version}.
+
-- Julien Cristau <jcristau@debian.org>  Thu, 12 Apr 2007 13:40:07 +0200

+libxmu (1:1.0.2-2) unstable; urgency=low
+
+ [ Andres Salomon ]
+ * Test for obj-S(DEB_BUILD_GNU_TYPE) before creating it during build;
+   idempotency fix.
+
+ [ Drew Parsons ]
+ * dbg package has priority extra.
+
-- David Nusinow <dnusinow@debian.org> Wed, 30 Aug 2006 16:53:25 -0400

+libxmu (1:1.0.2-1) experimental; urgency=low
+
+ * New upstream release
+ * Bump deh helper compat to 5
+ * Run dh_install with --list-missing
+ * Version the -headers package's x11-common pre-dep to use version 1:7.0.0
+ to match the rest of Debian and shut lintian up
+ * Bump standards version to 3.7.2.0
+ -- David Nusinow <dnusinow@debian.org> Mon, 3 Jul 2006 18:43:32 -0400
+ +libxmu (1:1.0.1-3) unstable; urgency=low
+ + * Reorder makeshlib command in rules file so that ldconfig is run
+ + properly. Thanks Drew Parsons and Steve Langasek.
+ + -- David Nusinow <dnusinow@debian.org> Tue, 18 Apr 2006 21:49:59 -0400
+ +libxmu (1:1.0.1-2) unstable; urgency=low
+ + * Upload to unstable
+ + -- David Nusinow <dnusinow@debian.org> Thu, 23 Mar 2006 22:44:59 -0500
+ +libxmu (1:1.0.1-1) experimental; urgency=low
+ + * First upload to Debian
+ + -- David Nusinow <dnusinow@debian.org> Thu, 29 Dec 2005 20:53:53 -0500
+ +libxmu (1:6.2.3-5) breezy; urgency=low
+ + * Also, libxmu-dev needs to depend on libxt-dev too.
+ + -- Adam Conrad <adconrad@ubuntu.com> Mon, 25 Jul 2005 09:43:47 +0000
+ +libxmu (1:6.2.3-4) breezy; urgency=low
+ + * Bump libxto-dev build-dep once more, _XOPEN_SOURCE begone!
+ + -- Adam Conrad <adconrad@ubuntu.com> Sun, 24 Jul 2005 10:48:14 +0000
+ +libxmu (1:6.2.3-3) breezy; urgency=low
+ + * Make libxmu-dev depend on libx11-dev, since libxmu links to it.
+ + -- Adam Conrad <adconrad@ubuntu.com> Sun, 24 Jul 2005 07:56:02 +0000
+ +libxmu (1:6.2.3-2) breezy; urgency=low
+ + * Bump Build-Depends on libx11-dev, libxext-dev and libxt-dev to avoid
+ + _XOPEN_SOURCE.
+ + -- Daniel Stone <daniel.stone@ubuntu.com> Sat, 23 Jul 2005 00:20:50 +1000
+ 

Open Source Used In 5GaaS Edge AC-4 4583
+libxmu (1:6.2.3-1) breezy; urgency=low
+
+ * First libxmu release.
+
+ -- Daniel Stone <daniel.stone@ubuntu.com>  Mon, 16 May 2005 22:10:17 +1000
--- libxmu-1.1.2.orig/debian/compat
+++ libxmu-1.1.2/debian/compat
@@ -0,0 +1 @@
9
--- libxmu-1.1.2.orig/debian/control
+++ libxmu-1.1.2/debian/control
@@ -0,0 +1,155 @@
+Source: libxmu
+Section: x11
+Priority: optional
+Maintainer: Debian X Strike Force <debian-x@lists.debian.org>
+Build-Depends:
+  debhelper (>= 9),
+  dh-autoreconf,
+  libx11-dev (>= 1:0.99.2),
+  libxt-dev (>= 1:0.99.1),
+  libxext-dev (>= 1:0.99.1),
+  pkg-config,
+  quilt,
+  automake,
+  libtool,
+  xutils-dev (>= 1:7.6+2),
+# devel-docs:
+  xmlto (>= 0.0.22),
+  xorg-sgml-doctools (>= 1:1.8),
+  w3m,
+Standards-Version: 3.9.6
+Vcs-Git: git://anonscm.debian.org/git/pkg-xorg/lib/libxmu
+Vcs-Browser: https://anonscm.debian.org/cgit/pkg-xorg/lib/libxmu.git
+
+Package: libxmu6
+Section: libs
+Architecture: any
+Multi-Arch: same
+Pre-Depends: ${misc:Pre-Depends}
+Depends: ${shlibs:Depends}, ${misc:Depends}
+Description: X11 miscellaneous utility library
+ libXmu provides a set of miscellaneous utility convenience functions for X
+ libraries to use. libXmuu is a lighter-weight version that does not depend
+ on libXt or libXext; for more information, see libxmuu1.
+ .
+ More information about X.Org can be found at:
+ <URL:http://www.X.org>
This module can be found at
+ git://anongit.freedesktop.org/git/xorg/lib/libXmu
+ Package: libxmu6-dbg
+ Section: debug
+ Architecture: any
+ Multi-Arch: same
+ Priority: extra
+ Depends: ${shlibs:Depends}, ${misc:Depends}, libxmu6 (= ${binary:Version})
+ Description: X11 miscellaneous utility library (debug package)
+ libXmu provides a set of miscellaneous utility convenience functions for X
+ libraries to use. libXmuu is a lighter-weight version that does not depend
+ on libXt or libXext; for more information, see libxmuu1.
+ This package contains the debug versions of the library found in libxmu6.
+ Non-developers likely have little use for this package.
+ More information about X.Org can be found at:
+ <URL:http://www.X.org>

This module can be found at
+ git://anongit.freedesktop.org/git/xorg/lib/libXmu
+ Package: libxmu-dev
+ Section: libdevel
+ Architecture: any
+ Multi-Arch: same
+ Depends: ${shlibs:Depends}, ${misc:Depends}, libxext-dev, libxt-dev, libxmu6 (= ${binary:Version}), libxmu-
headers (= ${source:Version})
+ Description: X11 miscellaneous utility library (development headers)
+ libXmu provides a set of miscellaneous utility convenience functions for X
+ libraries to use. libXmuu is a lighter-weight version that does not depend
+ on libXt or libXext; for more information, see libxmuu1.
+ This package contains the development headers for the library found in
+ libxmu6. Non-developers likely have little use for this package.
+ More information about X.Org can be found at:
+ <URL:http://www.X.org>

This module can be found at
+ git://anongit.freedesktop.org/git/xorg/lib/libXmu
+ Package: libxmuu1
+ Section: libs
+ Architecture: any
+ Multi-Arch: same
+Pre-Depends: ${misc:Pre-Depends}
+Depends: ${shlibs:Depends}, ${misc:Depends}
+Description: X11 miscellaneous micro-utility library
+ libXmuu provides a set of miscellaneous utility convenience functions for X
+ libraries to use. It is a lighter version of libXmu that does not depend
+ on libXt or libXext; for more information on libXmu, see libxmu6.
+.
+ More information about X.Org can be found at:
+ <URL:http://www.X.org>
+.
+ This module can be found at
+ git://anongit.freedesktop.org/git/xorg/lib/libXmu
+
+Package: libxmuu1-dbg
+Section: debug
+Architecture: any
+Multi-Arch: same
+Priority: extra
+Depends: ${shlibs:Depends}, ${misc:Depends}, libxmuu1 (= ${binary:Version})
+Description: X11 miscellaneous micro-utility library (debug package)
+ libXmuu provides a set of miscellaneous utility convenience functions for X
+ libraries to use. It is a lighter version of libXmu that does not depend
+ on libXt or libXext; for more information on libXmu, see libxmu6.
+.
+ This package contains the debug versions of the library found in libxmuu1.
+ Non-developers likely have little use for this package.
+.
+ More information about X.Org can be found at:
+ <URL:http://www.X.org>
+.
+ This module can be found at
+ git://anongit.freedesktop.org/git/xorg/lib/libXmu
+
+Package: libxmuu-dev
+Section: libdevel
+Architecture: any
+Multi-Arch: same
+Depends: ${shlibs:Depends}, ${misc:Depends}, libxmuu1 (= ${binary:Version}), libxmu-headers (= ${source:Version})
+Description: X11 miscellaneous micro-utility library (development headers)
+ libXmuu provides a set of miscellaneous utility convenience functions for X
+ libraries to use. It is a lighter version of libXmu that does not depend
+ on libXt or libXext; for more information on libXmu, see libxmu6.
+.
+ This package contains the development headers for the library found in
+ libxmuu1. Non-developers likely have little use for this package.
+.
+ More information about X.Org can be found at:
Package: libxmu-headers
Section: libdevel
Architecture: all
Multi-Arch: foreign

Description: X11 miscellaneous utility library headers
libXmu and libXmuu are miscellaneous utility libraries for X library
developers to abstract some common functions. This package provides the
headers for both libraries (as libXmuu is a subset of libXmu), and
is depended upon by both. For more information, please see libxmu-dev or
libxmuu-dev.

More information about X.Org can be found at:

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--- libxmu-1.1.2.orig/debian/libxmu-dev.install
+++ libxmu-1.1.2/debian/libxmu-dev.install
@@ -0,0 +1,3 @@
usr/lib/*/libXmu.a
usr/lib/*/libXmu.so
usr/lib/*/pkgconfig/xmu.pc
--- libxmu-1.1.2.orig/debian/libxmu-headers.install
+++ libxmu-1.1.2/debian/libxmu-headers.install
@@ -0,0 +1,2 @@
usr/include/X11/*
usr/share/doc/libxmu-headers
--- libxmu-1.1.2.orig/debian/libxmu6.install
+++ libxmu-1.1.2/debian/libxmu6.install
@@ -0,0 +1 @@
usr/lib/*/libXmu.so.6*
--- libxmu-1.1.2.orig/debian/libxmuu-dev.install
+++ libxmu-1.1.2/debian/libxmuu-dev.install
@@ -0,0 +1,3 @@
usr/lib/*/libXmuu.a
usr/lib/*/libXmuu.so
usr/lib/*/pkgconfig/xmuu.pc
--- libxmu-1.1.2.orig/debian/libxmuu1.install
+++ libxmu-1.1.2/debian/libxmuu1.install
@@ -0,0 +1 @@
usr/lib/*/libXmuu.so.1*
--- libxmu-1.1.2.orig/debian/patches/01_dont_export_private_deps.diff
+++ libxmu-1.1.2/debian/patches/01_dont_export_private_deps.diff
@@ -0,0 +1,26 @@
diff --git a/xmu.pc.in b/xmu.pc.in
index a086f83..15dabbf 100644
+--- a/xmu.pc.in
++++ b/xmu.pc.in
+@@ -6,7 +6,7 @@ includedir=@includedir@
+ Name: Xmu
+ Description: Xmu Library
+ Version: @PACKAGE_VERSION@
+ Requires: xproto x11 xt
++ Requires: xproto xt
+ Requires.private: x11 xt xext
diff --git a/xmuu.pc.in b/xmuu.pc.in
index 1e91ac4..72fa5f9 100644
--- a/xmuu.pc.in
+++ b/xmuu.pc.in
@@ -6,7 +6,7 @@ includedir=@includedir@
 Name: Xmuu
 + Description: Mini Xmu Library
 + Version: @PACKAGE_VERSION@
 +Requires: xproto x11
 ++Requires: xproto
 + Requires.private: x11
 + Cflags: -I${includedir}
 + Libs: -L${libdir} -lXmuu
 --- libxmu-1.1.2.orig/debian/patches/series
 +++ libxmu-1.1.2/debian/patches/series
 @@ -0,0 +1 @@
+01_dont_export_private_deps.diff
 --- libxmu-1.1.2.orig/debian/rules
 +++ libxmu-1.1.2/debian/rules
 @@ -0,0 +1,34 @@
 #!/usr/bin/make -f
 # debian/rules for the Debian libxmu package.
 +# Copyright 2004 Scott James Remnant <scott@netsplit.com>
 +# Copyright 2005 Daniel Stone <daniel@fooishbar.org>
 +# Copyright 2005 David Nusinow <dnusinow@debian.org>
 +
 +# Uncomment this to turn on verbose mode.
 +#export DH_VERBOSE=1
 +
 .PHONY: build
 +build:
 +dh build --with quilt,autoreconf --builddirectory=build/ --parallel
 +
 +%
 +dh $@ --with quilt,autoreconf --builddirectory=build/ --parallel
 +
 +override_dh_auto_configure:
 +dh_auto_configure -- \
 +--disable-silent-rules \ 
 +--docdir=${prefix}/share/doc/libxmu-headers \ 
 +--with-xmlto \ 
 +--without-fop
 +
 +override_dh_auto_install:
 +dh_auto_install
 +find debian/tmp/usr/share/doc/libxmu-headers -name "*.xml" -delete
+
+override_dh_install-arch:
+dh_install --fail-missing -Xusr/include -X.la
+
+override_dh_strip:
+dh_strip -Nlibxmu6 -Nlibxmuu1
+dh_strip -plibxmu6 --dbg-package=libxmu6-dbg
+dh_strip -plibxmuu1 --dbg-package=libxmuu1-dbg
--- libxmu-1.1.2.orig/debian/watch
+++ libxmu-1.1.2/debian/watch
@@ -0,0 +1,3 @@
+#git=git://anongit.freedesktop.org/xorg/lib/libXmu
+version=3
+http://xorg.freedesktop.org/releases/individual/lib/ libXmu-(.*)\.tar\.gz
Found in path(s):
* /opt/ws_local/PERMITS_SQL/1013987576_1591897387.78/0/libxmu-1-1-2-2-diff-gz/libxmu_1.1.2-2.diff

1.492 python-six 1.11.0-2
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1.493 zlib 1.2.3
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/* zlib.h -- interface of the 'zlib' general purpose compression library
version 1.2.11, January 15th, 2017

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1.494 markupsafe 2.0.1

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* /opt/cola/permits/1166365833_1621397079.41/0/sailfishos-mirror-markupsafe-2-0-1-0-g7666dff-tar-gz/sailfishos-mirror-markupsafe-dfb5bc1/LICENSE.rst

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1.495 aec 1.0.0

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1.496 debianutils 4.9.1

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1.497 sudo 1.8.21p2 3ubuntu1.4

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Jean-loup Gailly    Mark Adler
jloup@gzip.org      madler@alumni.caltech.edu
The following list of people, sorted by last name, have contributed
code or patches to this implementation of sudo since I began
maintaining it in 1993. This list is known to be incomplete--if
you believe you should be listed, please send a note to sudo@sudo.ws.

Ackeret, Matt
Adler, Mark
Allbery, Russ
Anderson, Jamie
Andrew, Nick
Andric, Dimitry
Barron, Danny
Bates, Tom
Behan, Zdenk
Bellis, Ray
Benali, Elias
Beverly, Jamie
Boardman, Spider
Bostley, P.J.
Bowes, Keith
Boyce, Keith Garry
Brantley, Michael
Braun, Rob
Bezina, Pavel
Brooks, Piete
Brown, Jerry
Burr, Michael E
Burton, Ross
Bussjæger, Andreas
Calvin, Gary
Campbell, Aaron
Chazelas, Stephane
ék, Vtzslav
Coleman, Chris
Corzine, Deven T.
Cusack, Frank
Dai, Wei
Dill, David
Earickson, Jeff
Eckhardt, Drew
Edgington, Ben
Esipovich, Marc
Espie, Marc
Faigon, Ariel
Farrell, Brian
Fobes, Steve
Frysinger, Mike
G., Daniel Richard
Gailly, Jean-loup
Gelman, Stephen
Gerraty, Simon J.
Graber, Stephane
Guillory, B.
Hayman, Randy M.
Henke, Joachim
Hideaki, YOSHIFUJI
Hieb, Dave
Holloway, Nick
Hoover, Adam
Hunter, Michael T.
Hutchings, Ben
Irrgang, Eric
Jackson, Brian
Jackson, John R.
Jackson, Richard L., Jr.
Janssen, Mark
Jepeway, Chris
Jorge, Joel Pele
Pele Jorge, Joel
Juhani, Timo
KIKUCHI, Ayamura
Kadow, Kevin
Kasal, Stepan
Kienenberger, Mike
King, Dale
King, Michael
Klyachkin, Andrey
Knoble, Jim
Knox, Tim
Komarnitsky, Alek O.
Kondrashov, Nikolai
Kopeek, Daniel
Kranenburg, Paul
Krause, David
Lakin, Eric
Larsen, Case
Levin, Dmitry V.
Libby, Kendall
Lobbes, Phillip E.
McIntyre, Jason
MacKenzie, David J.
McLaughlin, Tom
Makey, Jeff
Marchionna, Michael D.
Markham, Paul
Martinian, Emin
Meskes, Michael
Michael, David
Miller, Todd C.
Minier, Loc
Moffat, Darren
Moldung, Jan Thomas
Morris, Charles
Mueller, Andreas
Miller, Dworkin
Nieusma, Jeff
Nikitser, Peter A.
Nussel, Ludwig
Ouellet, Jean-Philippe
Paquet, Eric
Paradis, Chantal
Percival, Ted
Perera, Andres
Peron, Christian S.J.
Peschel, Aaron
Peslyak, Alexander
Peterson, Toby
Petten, Diego Elio
Pickett, Joel
Plotnick, Alex
de Raadt, Theo
Rasch, Gudleik
Reid, Steve
Richards, Matt
Rossum, Guido van
Rouillard, John P.
Rowe, William A., Jr.
Roy, Alain
Ruusame, Elan
Ryabinkin, Eygene
SATO, Yuichi
Sanchez, Wilfredo
Saucier, Jean-Francois
Schoenfeld, Patrick
Schuring, Arno
Schwarze, Ingo
Scott, Dougal
Sieger, Nick
Simon, Thor Lancelot
Slemko, Marc
Smith, Andy
Sobrado, Igor
Soulen, Steven
Spangler, Aaron
The following people have worked to translate sudo into other languages:

Blittermann, Mario
Bogusz, Jakub
Casagrande, Milo
Castro, Felipe
Cho, Seong-ho
Chornoivan, Yuri
Diguez, Francisco
Ferreira, Rafael
Garca-Fontes, Walter
Gezer, Volkan
Hamasaki, Takeshi
Hamming, Peter
Hansen, Joe
Hantrais, Frédric
Hein, Jochen
1.498 docker-credential-helpers 0.6.3

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<signature of Ty Coon>, 1 April 1989
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    <signature of Ty Coon>, 1 April 1989
    Ty Coon, President of Vice

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The End

#!perl

=head1 NAME

copyright.t

=head1 DESCRIPTION

Tests that the latest copyright years in the top-level README file and the C<perl -v> output match each other.

If the test fails, update at least one of README and perl.c so that they match reality.

Optionally you can pass the C<--now> option to check they are at the current year. This isn't checked by default, so that it doesn't fail for people working on older releases. It should be run before making a new release.

=cut

use strict;
use Config;
BEGIN { require './test.pl' }  

if ( $Config{usecrosscompile} ) {  
  skip_all( "Not all files are available during cross-compilation" );  
}

my ($opt) = @ARGV;  

my $readme_year = readme_year();  
my $v_year = v_year();  

# Check that both copyright dates are up-to-date, but only if requested, so # that tests still pass for people intentionally working on older versions:
if ($opt eq '--now') {  

my $current_year = (gmtime)[5] + 1900;
is $v_year, $current_year, 'perl -v copyright includes current year';
is $readme_year, $current_year, 'README copyright includes current year';
}

# Otherwise simply check that the two copyright dates match each other:
else
{
  is $readme_year, $v_year, 'README and perl -v copyright dates match';
}
done_testing;

sub readme_year
# returns the latest copyright year from the top-level README file
{
  open my $readme, '<', '../README' or die "Opening README failed: $!";

  # The copyright message is the first paragraph:
  local $/ = "";
  my $copyright_msg = <$readme>;

  my ($year) = $copyright_msg =~ /.*(\d{4,})/s
    or die "Year not found in README copyright message '$copyright_msg'";

  $year;
}

sub v_year
# returns the latest copyright year shown in perl -v
{
  my $output = runperl switches => ['-v'];
  my ($year) = $output =~ /copyright 1987.*\b(\d{4,})/i
    or die "Copyright statement not found in perl -v output '$output'";

  $year;
}

1.503 types-python-dateutil 2.8.4
1.503.1 Available under license:

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1.511 python-setuptools 45.2.0

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1.512 jdk-zulu 8.58.0.13-1

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1.513 vcs 1.13.1

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1.514 go-isatty 0.0.4

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1.515 e2fsprogs 1.45.5 2ubuntu1

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This is the Debian GNU/Linux prepackaged version of the static EXT2 file system consistency checker (e2fsck.static). The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

Sources were obtained from http://sourceforge.net/projects/e2fsprogs

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#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
all:: image

real-subdirs:: Makefile
@echo "MKDIR pic"
@mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:$<

$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic$/$(BSD_LIB) .
$(RM) -f $<
(cd ..; $(LN) $(LINK_BUILD_FLAGS) `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
@echo "INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
$(RM) -f $(DESTDIR)/$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
$(RM) -rf pic
$(RM) -f $(BSD_LIB)
$(RM) -f $(BSD_LIB)

This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

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It is part of the main e2fsprogs distribution, which can be found at:

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Upstream Author: Theodore Ts'o <tytso@mit.edu>

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===================================================================
--- tdbus.org/tdb.c
+++ tdbus/tdb.c
@@ -4,11 +4,11 @@
Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
*/
/*
- Unix SMB/CIFS implementation.
+ trivial database library - standalone version

- trivial database library - private includes
-
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Theodore Ts'o
23-June-2007

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That's all there is to it!
This package was added to the e2fsprogs debian source package by
Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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Upstream Author: Theodore Ts'o <tytso@mit.edu>

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command-line interface parsing library. It is currently
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This package was put together by Yann Dirson <dirson@debian.org>,
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tsx-11.mit.edu:/pub/linux/packages/ext2fs/

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Gadi Oxman, August 1995

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  jar/io/netty/channel/ChannelOption.java
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  jar/io/netty/channel/ChannelInboundHandlerAdapter.java
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  jar/io/netty/channel/ServerChannel.java
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  jar/io/netty/channel/CombinedChannelDuplexHandler.java
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  jar/io/netty/channel/local/LocalChannelRegistry.java
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  jar/io/netty/channel/ThreadPerChannelEventLoopGroup.java
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  jar/io/netty/channel/ChannelInitializer.java
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  jar/io/netty/channel/group/ChannelGroupFutureListener.java
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*/
/**
* Handles an I/O event or intercepts an I/O operation, and forwards it to its next handler in
* its {link ChannelPipeline}.
* 
* <h3>Sub-types</h3>
* <p>
* {link ChannelHandler} itself does not provide many methods, but you usually have to implement one of its
* subtypes:
* <ul>
* <li>{link ChannelInboundHandler} to handle inbound I/O events, and</li>
* <li>{link ChannelOutboundHandler} to handle outbound I/O operations.</li>
* </ul>
* </p>
* <p>
* Alternatively, the following adapter classes are provided for your convenience:
* <ul>
* <li>{link ChannelInboundHandlerAdapter} to handle inbound I/O events,</li>
* <li>{link ChannelOutboundHandlerAdapter} to handle outbound I/O operations, and</li>
* <li>{link ChannelDuplexHandler} to handle both inbound and outbound events</li>
* </ul>
* </p>
* <p>
* For more information, please refer to the documentation of each subtype.
* </p>
* 
* <h3>The context object</h3>
* <p>
* A {link ChannelHandler} is provided with a {link ChannelHandlerContext}
* object. A {link ChannelHandlerContext} is supposed to interact with the
* {link ChannelPipeline} it belongs to via a context object. Using the
* context object, the {link ChannelHandler} can pass events upstream or
* downstream, modify the pipeline dynamically, or store the information
* (using {link AttributeKey}s) which is specific to the handler.
*
* State management

A `@link ChannelHandler` often needs to store some stateful information. The simplest and recommended approach is to use member variables:

```java
public interface Message {
    // your methods here
}

public class DataServerHandler extends `@link SimpleChannelInboundHandler<Message>` {

    private boolean loggedIn;

    `@code @Override`
    public void channelRead0(`@link ChannelHandlerContext` ctx, Message message) {
        if (message instanceof LoginMessage) {
            authenticate((LoginMessage) message);
            loggedIn = true;
        } else (message instanceof GetDataMessage) {
            if (loggedIn) {
                ctx.writeAndFlush(fetchSecret((GetDataMessage) message));
            } else {
                fail();
            }
        }
    }
    ...
}
```

Because the handler instance has a state variable which is dedicated to one connection, you have to create a new handler instance for each new channel to avoid a race condition where a unauthenticated client can get the confidential information:

```java
`@code @Override`
public void initChannel(`@link Channel` channel) {
    channel.pipeline().addLast("handler", new DataServerHandler());
}
```

**Using `@link AttributeKey`s**

Although it's recommended to use member variables to store the state of a
* handler, for some reason you might not want to create many handler instances.
* In such a case, you can use `{@link AttributeKey}s` which is provided by
  * `{@link ChannelHandlerContext}`:
  * `<pre>`
  * public interface Message {
    * // your methods here
  * }
  *
  * `{@code @Sharable}`
  * public class DataServerHandler extends `{@link SimpleChannelInboundHandler}` &lt;Message&gt; {
    * private final `{@link AttributeKey}&lt;{@link Boolean}&gt; auth =
      * `{@link AttributeKey#valueOf(String) AttributeKey.valueOf("auth")};
    *
    * `{@code @Override}
    * public void channelRead({@link ChannelHandlerContext} ctx, Message message) {
    *   * attr = ctx.attr(auth);
    *   * if (message instanceof LoginMessage) {
    *     * authenticate((LoginMessage) o);
    *     * attr.set(true);
    *   * } else (message instanceof GetDataMessage) {
    *     * if (&lt;@b&gt;Boolean.TRUE.equals(attr.get())&lt;/b&gt;) {
    *       * ctx.writeAndFlush(fetchSecret((GetDataMessage) o));
    *     * } else {
    *       * fail();
    *     * }
    *   * }
    *   * ...
    * }
  * </pre>
  * Now that the state of the handler is attached to the `{@link ChannelHandlerContext}`, you can add the
  * same handler instance to different pipelines:
  * `<pre>`
  * public class DataServerInitializer extends `{@link ChannelInitializer}` &lt;{@link Channel}&gt; {
  *
  *   * private static final DataServerHandler &lt;b&gt;SHARED&lt;/b&gt; = new DataServerHandler();
  *
  *   * `{@code @Override}
  *   * public void initChannel({@link Channel} channel) {
  *     * channel.pipeline().addLast("handler", &lt;b&gt;SHARED&lt;/b&gt;);
* you might have noticed the [@code @Sharable] annotation.
* <p>
* If a [@link ChannelHandler] is annotated with the [@code @Sharable]
* annotation, it means you can create an instance of the handler just once and
* add it to one or more [@link ChannelPipeline]s multiple times without
* a race condition.
* <p>
* If this annotation is not specified, you have to create a new handler
* instance every time you add it to a pipeline because it has unshared state
* such as member variables.
* <p>
* This annotation is provided for documentation purpose, just like
* <h3>Additional resources worth reading</h3>
* <p>
* Please refer to the [@link ChannelHandler], and
* [@link ChannelPipeline] to find out more about inbound and outbound operations,
* what fundamental differences they have, how they flow in a pipeline, and how to handle
* the operation in your application.
*/

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  jar/io/netty/channel/socket/ChannelOutputShutdownEvent.java
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  jar/io/netty/channel/socket/oio/OioDatagramChannelConfig.java
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  jar/io/netty/channel/PendingBytesTracker.java
* /opt/cola/permits/1196668583_1629951720.64/0/netty-transport-4-1-67-final-sources-
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  jar/io/netty/channel/pool/ChannelPoolMap.java
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  jar/io/netty/channel/pool/ChannelHealthChecker.java
* /opt/cola/permits/1196668583_1629951720.64/0/netty-transport-4-1-67-final-sources-
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* /opt/cola/permits/1196668583_1629951720.64/0/netty-transport-4-1-67-final-sources-
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1.520 numpy 1.19.5

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The ziggurat methods were derived from Julia.

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SFC64

Adapted from a C++ implementation of Chris Doty-Humphrey's SFC PRNG.

https://gist.github.com/imneme/f1f7821f07cf76504a97f6537c818083

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Original algorithm for the implementation of rk_interval function from Richard J. Wagner's implementation of the Mersenne Twister RNG, optimised by Magnus Jonsson.

Constants used in the rk_double implementation by Isaku Wada.

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1.522 xxd 8.1.2269-1ubuntu5.4

1.523 jackson-xc 2.12.4

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1.524 hashicorp-uuid 1.0.2

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1.527 x-crypto 0.0.0-20211115234514-b4de73f9ece8

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1.531 python-cffi 1.11.5-1

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* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-
jar/org/springframework/http/server/ServletServerHttpAsyncRequestControl.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-
jar/org/springframework/remoting/httpinvoker/HttpInvokerClientInterceptor.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-
jar/org/springframework/http/codec/json/Jackson2Tokenizer.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-
jar/org/springframework/remoting/httpinvoker/AbstractHttpInvokerRequestExecutor.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-
jar/org/springframework/web/cors/reactive/DefaultCorsProcessor.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/context/request/WebRequest.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/method/support/CompositeUriComponentsContributor.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/client/reactive/AbstractClientHttpRequest.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/client/reactive/ClientHttpRequest.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/context/support/ServletContextResourcePatternResolver.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/codec/multipart/MultipartUtils.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/converter/json/MappingJackson2HttpMessageConverter.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/codec/support/AllEncompassingFormHttpMessageConverter.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/server/DelegatingServerHttpResponse.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/server/i18n/AcceptHeaderLocaleContextResolver.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/context/support/ServletContextResourcePatternResolver.java  
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/util/pattern/LiteralPathElement.java
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* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/codec/json/KotlinSerializationJsonDecoder.java
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* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/HttpHeaders.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/server/reactive/JettyHeadersAdapter.java
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* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/util/pattern/CaptureVariablePathElement.java
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* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/client/MultipartBodyBuilder.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/codec/multipart/DefaultPartHttpMessageReader.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/codec/multipart/PartGenerator.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/bind/support/WebExchangeBindException.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/codec/multipart/DefaultPartHttpMessageReader.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/http/codec/multipart/PartGenerator.java
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/bind/ServletRequestDataBinder.java
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# This file maps Internet media types to unique file extension(s).
# Although created for httpd, this file is used by many software systems
# and has been placed in the public domain for unlimited redistribution.
#
# The table below contains both registered and (common) unregistered types.
# A type that has no unique extension can be ignored -- they are listed
# here to guide configurations toward known types and to make it easier to
# identify "new" types. File extensions are also commonly used to indicate
# content languages and encodings, so choose them carefully.
#
# Internet media types should be registered as described in RFC 4288.
# The registry is at <https://www.iana.org/assignments/media-types/>.
#
# This file was retrieved from
#
# MIME type (lowercased)Extensions
# ==================================================
# application/1d-interleaved-parityfec
# application/3gpdash-qoe-report+xml
# application/3gpp-ims+xml
# application/a2l
# application/activemessage
# application/alto-costmap+json
# application/alto-costmapfilter+json
# application/alto-directory+json
# application/alto-endpointcost+json
# application/alto-endpointcostparams+json
# application/alto-endpointprop+json
application/cu-seemecu
# application/cybercash
# application/dash+xml
# application/dashdelta
application/davmount+xml
# application/dca-rft
# application/dcd
# application/dec-dx
# application/dialog-info+xml
# application/dicom
# application/dii
# application/dit
# application/dns
application/docbook+xml
# application/dskpp+xml
application/dssc+der
application/dssc+xml
# application/dvcs
application/ecmascript
# application/edi-consent
# application/edi-x12
# application/edifact
# application/efi
# application/emergencycalldata.comment+xml
# application/emergencycalldata.deviceinfo+xml
# application/emergencycalldata.providerinfo+xml
# application/emergencycalldata.serviceinfo+xml
# application/emergencycalldata.subscriberinfo+xml
application/emma+xml
# application/emotionml+xml
# application/encaprtp
# application/epp+xml
application/epub+xml
# application/eshop
# application/example
application/exi
# application/fastinfoset
# application/fastsoap
# application/fdt+xml
# application/fits
# application/font-sfnt
application/font-tdpfr
application/font-woff
# application/framework-attributes+xml
# application/geo+json
application/gml+xml
application/gxf
application/gpx+xml
application/gxf
# application/nss
# application/ocsp-request
# application/ocsp-response
application/octet-stream	bindms lrf mar so distz pkg bpk dump elc deploy
application/oda
# application/odx
application/ogbpx
application/omdoc+xml
# application/odx
application/oebps-package+xml
application/ogg
application/omdoc+xml
application/onenote
application/oxps
# application/p2p-overlay+xml
# application/parityfec
application/pat-ch-ops-error+xml
application/pdf
# application/pdx
application/pgp-encrypted
# application/pgp-keys
application/pgp-signature
application/pics-rules
# application/pidf+xml
# application/pidf-diff+xml
application/pkcs10
# application/pkcs12
application/pkcs7-mime
application/pkcs7-signature
application/pkcs8
application/pkix-attr-cert
application/pkix-cert
application/pkix-crl
application/pkix-pkipath
application/pkix-emppki
application/pls+xml
# application/poc-settings+xml
application/postscript
application/postscriptai
application/ppsp-tracker+json
# application/problem+xml
# application/prs.alvestrand.titrax-sheet
application/prs.cww
# application/prs.hpub+zip
# application/prs.nprend
# application/prs.plucker
# application/prs.rdf-xml-crypt
# application/prs.xsf+xml
application/pskc+xml
# application/qsig
# application/raptorfec
# application/rdap+json
application/rdf+xml
application/reginfo+xml
application/relax-ng-compact-syntax
# application/remote-printing
# application/reputon+json
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# application/rpki-updown
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# application/saml-metadata+xml
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# application/sieve
# application/simple-filter+xml
# application/simple-message-summary
# application/simplesymbolcontainer
# application/slate
# application/smil
application/smil+xml
# application/smpate336m
# application/soap+fastinfoset
# application/soap+xml
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application/sparql-results+xml
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application/ssdl+xml
application/ssml+xml
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# application/tamp-status-response
# application/tamp-update
# application/tamp-update-confirm
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application/thraud+xml
# application/timestamp-query
# application/timestamp-reply
application/timestamped-datatsd
# application/ttml+xml
# application/tve-trigger
# application/ulpfec
# application/urc-grpsheet+xml
# application/urc-ressheet+xml
# application/urc-targetdesc+xml
# application/urc-uisocketdesc+xml
# application/vcard+json
# application/vcard+xml
# application/vemmi
# application/vividence.scriptfile
# application/vnd.3gpp-prose+xml
# application/vnd.3gpp-prose-pc3ch+xml
# application/vnd.3gpp.access-transfer-events+xml
# application/vnd.3gpp.bsf+xml
# application/vnd.3gpp.mid-call+xml
application/vnd.3gpp.pic-bw-large
application/vnd.3gpp.pic-bw-small
application/vnd.3gpp.pic-bw-var
# application/vnd.gov.sk.xmldatacontainer+xml
application/vnd.grafeqgqf gqs
# application/vnd.gridmp
application/vnd.groove-account gac
application/vnd.groove-help ghf
application/vnd.groove-identity-message gim
application/vnd.groove-injector grv
application/vnd.groove-tool-message gtm
application/vnd.groove-tool-templatetpl
gapplication/vnd.groove-vcard veg
# application/vnd.hal+json
application/vnd.hal+hjson
application/vnd.hbci
# application/vnd.hcl-bireports
# application/vnd.hdt
# application/vnd.heroku+json
# application/vnd.hen+json
# application/vnd.hORIZON-3D-CROSSWORD
# application/vnd.ibm.afplinedata
# application/vnd.ibm.electronic-media
application/vnd.ibm.minipay mpy
application/vnd.ibm.modcap afp list3820
application/vnd.ibm.rights-management irm
application/vnd.ibm.secure-container sc
application/vnd.iccprofile icc icm
# application/vnd.ieee.1905
application/vnd.igloaderigl
application/vnd.immervision-ivpivp
application/vnd.immervision-iviu
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# application/vnd.ims.imscv1p2
# application/vnd.ims.imscv1p3
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# application/vnd.ims.lti.v2.toolsettings+json
# application/vnd.ims.lti.v2.toolsettings.simple+json
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application/vnd.lotus-screencam
application/vnd.lotus-wordpro/lwp
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# application/vnd.motorola.flexsuite.gotap
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application/vnd.musician
application/vnd.music-niff
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application/vnd.noblenet-directory
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application/vnd.noblenet-web
# application/vnd.nokia.catalogs
# application/vnd.nokia.conml+wbxml
# application/vnd.nokia.conml+xml
# application/vnd.nokia.iptv.config+xml
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# application/vnd.nokia.landmarkcollection+xml
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# application/vnd.nokia.pcd+xml
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# audio/raptorfec
# audio/red
# audio/rtp-enc-aescm128
# audio/rtp-midi
# audio/rtploopback
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# audio/smv0
# audio/sp-midi
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# message/s-http
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*/
/**
 * Return the web session for the current request. Always guaranteed to
 * return an instance either matching to the session id requested by the
 * client, or with a new session id either because the client did not
 * specify one or because the underlying session had expired. Use of this
 * method does not automatically create a session. See {@link WebSession}
 * for more details.
 */

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* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/server/ServerWebExchange.java
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org.springframework.web.server.adapter.WebHttpHandlerBuilder$SpringWebBlockHoundIntegration

Found in path(s):
* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/META-INF/services/reactor.blockhound.integration.BlockHoundIntegration
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* /opt/cola/permits/1182802168_1627053521.1/0/spring-web-5-3-9-sources-jar/org/springframework/web/context/support/ServletContextResourceLoader.java

1.533 pip 9.0.1
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1.534 jackson-module-parameter-names

2.12.4

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set yrange [0:]
set terminal pngcairo font 'Sans, 8' lw 1 size 1400,1024
set xtics rotate by -45
set style histogram errorbars gap 2 lw 1
set style fill solid border -1
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1.539 selinux 2.7-2build2

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arch-tag: d4250e44-a0e0-4ee0-adb9-2bd74f6eeb27

1.540 runc 0.1.1

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Gocheck - A rich testing framework for Go

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Go support for Protocol Buffers - Google's data interchange format

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1.541 base-passwd 3.5.44

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Name: base-passwd
Maintainer: Colin Watson <cjwatson@debian.org>

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1.546 python-setuptools 44.0.0

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1.547 sprig 3.1.0

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1.548 prometheus-client 0.2.0
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1.549 lsb 11.1.0ubuntu2
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Upstream-Name: LSB implementation package

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1.551 jq.py 1.2.1

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1.553 govalidator 0.0.0-20200428143746-21a406dcc535

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1.554 pylint 2.12.2
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------------

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* Ashley Whetter: maintainer, contributor
* Bryce Guinta: maintainer, contributor
* Claudiu Popa: maintainer, contributor
* Cara Vinson: astroid committer.
* Guillaume Peillex: committer
* ukasz Rogalski: committer.
* Roy Williams (Lyft): committer

added check for implementing __eq__ without implementing __hash__.
Added Python 3 check for accessing Exception.message.
Added Python 3 check for calling encode/decode with invalid codecs.
Added Python 3 check for accessing sys.maxint.
Added Python 3 check for bad import statements.
Added Python 3 check for accessing deprecated methods on the 'string' module,
various patches.

* Dmitri Prybysh: committer

multiple-imports, not-iterable, not-a-mapping, various patches.
* Jim Robertson: committer

Ex-maintainers:

* Sylvain Thenault (Logilab): main author / maintainer

* Torsten Marek (Google): committer / contributor

We would not be here without folks that contributed patches, pull requests, issues and their time to pylint. We're incredibly grateful to all of these contributors:

* Daniel Balparda (Google): GPyLint maintainer (Google's pylint variant), various patches

* Martin Pool (Google): warnings for anomalous backslashes, symbolic names for messages (like 'unused'), etc

* Alexandre Fayolle (Logilab): TkInter gui, documentation, debian support

* Julien Cristau, Emile Anclin (Logilab): python 3 support

* Sandro Tosi: Debian packaging

* Mads Kiilerich, Boris Feld, Bill Wendling, Sebastian Ulrich: various patches

* Brian van den Broek: windows installation documentation

* Amaury Forgeot d'Arc: check names imported from a module exists in the module

* Benjamin Niemann: allow block level enabling/disabling of messages

* Nathaniel Manista: suspicious lambda checking

* David Shea: invalid sequence and slice index

* Carl Crowder: don't evaluate the value of arguments for 'dangerous-default-value'


* David Lindquist: logging-format-interpolation warning.

* Brett Cannon: Port source code to be Python 2/3 compatible, Python 3 checker.
* Vlad Temian: redundant-unittest-assert and the JSON reporter.

* Cosmin Poiean: unichr-builtin and improvements to bad-open-mode.

* Viorel tirbu: intern-builtin warning.

* Dan Goldsmith: support for msg-template in HTML reporter.

* Chris Rebert: unidiomatic-typecheck.

* Steven Myint: duplicate-except.


* Bruno Daniel: check_docs extension.

* James Morgensen: ignored-modules option applies to import errors.

* Cezar Elnazli: deprecated-method

* Stphane Wirte: nonlocal-without-binding

* Laura Medioni (Logilab, on behalf of the CNES): misplaced-comparison-constant, no-classmethod-decorator, no-staticmethod-decorator, too-many-nested-blocks, too-many-boolean-expressions, unneeded-not, wrong-import-order, ungrouped-imports, wrong-import-position, redefined-variable-type

* Aru Sahni: Git ignoring, regex-based ignores

* Mike Fryssinger: contributor.

* Moiss Lpez (Vauxoo): Support for deprecated-modules in modules not installed, Refactor wrong-import-order to integrate it with `isort` library Add check too-complex with mccabe for cyclomatic complexity Refactor wrong-import-position to skip try-import and nested cases Add consider-merging-isinstance, superfluous-else-return Fix consider-using-ternary for 'True and True and True or True' case

* Luis Escobar (Vauxoo), Moiss Lpez (Vauxoo): Add bad-docstring-quotes and docstring-first-line-empty

* Yannick Brehon: contributor.

* Glenn Matthews: autogenerated documentation for optional extensions, bug fixes and enhancements for docparams (ne check_docs) extension

* Elias Dorneles: minor adjust to config defaults and docs
* Yuri Bochkarev: Added epytext support to docparams extension.

* Alexander Todorov: added new error conditions to 'bad-super-call',
  Added new check for incorrect len(SEQUENCE) usage,
  Added new extension for comparison against empty string constants,
  Added new extension which detects comparing integers to zero,
  Added new useless-return checker,
  Added new try-except-raise checker

* Erik Eriksson - Added overlapping-except error check.

* Anthony Foglia (Google): Added simple string slots check.

* Derek Gustafson: contributor

* Petr Pulc: require whitespace around annotations

* John Paraskevopoulos: add 'differing-param-doc' and 'differing-type-doc'

* Martin von Gagern (Google): Added 'raising-format-tuple' warning.

* Ahirnish Pareek, 'keyword-arg-before-var-arg' check

* Daniel Miller: contributor.

* Bryce Guinta: contributor

* Martin Bati: contributor
  Added new check for shallow copy of os.environ
  Added new check for useless `with threading.Lock():` statement

* Jacques Kvam: contributor

* Brian Shaginaw: prevent error on exception check for functions

* Ioana Tagirta: fix bad thread instantiation check

* Reverb Chu: contributor

* Tobias Hernstig: contributor

* Konstantin Manna: contributor

* Andreas Freimuth: fix indentation checking with tabs

* Renat Galimov: contributor

* Thomas Snowden: fix missing-docstring for inner functions
* Mitchell Young: minor adjustment to docparams

* Marianna Polatoglou: minor contribution for wildcard import check

* Ben Green: contributor

* Benjamin Freeman: contributor

* Fureigh: contributor

* Jace Browning: updated default report format with clickable paths

* Sushobhit (sushobhit27): contributor
  Added new check 'comparison-with-itself'.
  Added new check 'useless-import-alias'.
  Added support of annotations in missing-type-doc and missing-return-type-doc.
  Added new check 'comparison-with-callable'.
  Removed six package dependency.
  Added new check 'chained-comparison'.
  Added new check 'useless-object-inheritance'.

* Mariatta Wijaya: contributor
  Added new check `logging-fstring-interpolation`
  Documentation typo fixes

* Jason Owen: contributor

* Mark Roman Miller: fix inline defs in too-many-statements

* Adam Dangoor: contributor

* Gary Tyler McLeod: contributor

* Wolfgang Grafen, Axel Muller, Fabio Zadrozny, Pierre Rouleau,
  Maarten ter Huurne, Mirko Friedenhagen and all the Logilab's team (among others).

* Matej Marusak: contributor

* Nick Drozd: contributor, performance improvements to astroid

* Kosarchuk Sergey: contributor

* Carey Metcalfe: demoted `try-except-raise` from error to warning

* Marcus Nslund (naslundx): contributor

* Natalie Serebryakova: contributor
* Caio Carrara: contributor

* Roberto Leinardi: PyCharm plugin maintainer

* Aivar Annamaa: contributor

* Hornwitser: fix import graph

* Yuri Gribov: contributor

* Drew Risinger: committer (docs)

* Ben James

* Tomer Chachamu, Richard Goodman: simplifiable-if-expression

* Alan Chan: contributor

* Benjamin Drung: contributing Debian Developer

* Scott Worley: contributor

* Michael Hudson-Doyle

* Lucas Cimon: contributor

* Mike Miller: contributor

* Sergei Lebedev: contributor

* Sasha Bagan

* Pablo Galindo Salgado: contributor
  Fix false positive 'Non-iterable value' with async comprehensions.

* Matus Valo

* Sardorbek Imomaliev: contributor

* Justin Li (justinnhli)

* Nicolas Dickreuter

* Pascal Corpet

* Svetoslav Neykov: contributor
* Federico Bond: contributor

* Fantix King (UChicago): contributor

* Yory (yory8): contributor

* Thomas Hisch: contributor

* Clément Pit-Claudel: contributor

* Goudcode: contributor

* Paul Renvoise: contributor

* Bluesheep-token: contributor

* Michael Scott Cuthbert: contributor

* Pierre Sassoulas: maintainer, contributor

* Nathan Marrow

* Taewon Kim: contributor

* Daniil Kharkov: contributor

* Tyler N. Thieding: contributor

* Zeb Nicholls: contributor
  - Made W9011 compatible with 'of' syntax in return types

* Martin Vielsmaier: contributor

* Agustin Toledo: contributor

* Nicholas Smith: contributor

* Peter Kolbus (Garmin): contributor

* Oisin Moran: contributor

* Andrzej Klajnert: contributor

* Andrés Prez Hortal: contributor

* Niko Wenselowski: contributor

* Danny Hermes: contributor
* Eric Froemling: contributor

* Robert Schweizer: contributor

* Hugo van Kemenade: contributor

* Mikhail Fesenko: contributor

* Trevor Bekolay: contributor
  - Added --list-msgs-enabled command

* Rmi Cardona: contributor

* Daniel Draper: contributor

* Gabriel R. Sezefredo: contributor
  - Fixed "exception-escape" false positive with generators

* laike9m: contributor

* Janne Rnkk: contributor

* Hugues Bruant: contributor

* Tim Gates: contributor

* Enji Cooper: contributor

* Bastien Vallet: contributor

* Pek Chhan: contributor

* Craig Henriques: contributor

* Matthijs Blom: contributor

* Andy Palmer: contributor

* Wes Turner (Google): added new check 'inconsistent-quotes'

* Athos Ribeiro
  Fixed dict-keys-not-iterating false positive for inverse containment checks

* Anubhav: contributor

* Ben Graham: contributor
* Anthony Tan: contributor

* Benny Miller: contributor

* Bernie Gray: contributor

* Slavfox: contributor

* Matthew Beckers (mattlbeck): contributor

* Yang Yang: contributor

* Andrew J. Simmons (anjsimmo): contributor

* Damien Baty: contributor

* Daniel R. Neal (danrneal): contributor

* Jeremy Fleischman (jfly): contributor

* Shiv Venkatasubrahmanyam

* Jochen Preusche (jilei): contributor

* Ram Rachum (cool-RR)

* D. Alphus (Alphadelta14): contributor

* Pieter Engelbrecht

* Ethan Leba: contributor

* Matj Grabovsk: contributor

* Yeting Li (yetingli): contributor

* Frost Ming (frostming): contributor

* Luigi Bertaco Cristofolini (luigibertaco): contributor

* Eli Fine (eli88fine): Fixed false positive duplicate code warning for lines with symbols only

* Ganden Schaffner: contributor

* Josselin Feist: contributor

* David Cain: contributor
* Pedro Algarvio (s0undt3ch): contributor
* Luigi Bertaco Cristofolini (luigibertaco): contributor
* Or Bahari
* Joshua Cannon: contributor
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* Takashi Hirashima: contributor
* Joffrey Mander: contributor
* Julien Palard: contributor
* Raphael Gaschignard: contributor
* Sorin Sbarnea: contributor
* Gergely Kalmr: contributor
* Batuhan Taskaya: contributor
* Frank Harrison (doublethefish): contributor
* Gauthier Sebaux: contributor
* Logan Miller (komodo472): contributor
* Matthew Suozzo: contributor
* Marc Mueller (cdce8p): contributor
* David Gilman: contributor
* Ikraduya Edian: contributor
  - Added new checks 'consider-using-generator' and 'use-a-generator'.
* Tiago Honorato: contributor
* Lefteris Karapetsas: contributor
* Louis Sautier: contributor
* Quentin Young: contributor
* Alexander Kapshuna: contributor
* Mark Byrne: contributor

* Konstantina Saketou: contributor

* Andrew Howe: contributor

* James Sinclair (irgeek): contributor

* Andreas Finkler: contributor

* Aidan Haase, Elizabeth Bott: contributor

* Sebastian Miller: contributor

* Ramiro Leal-Cavazos (ramiro050): Fixed bug preventing pylint from working with emacs tramp

* manderj: contributor

* qwiddle: contributor

* das-intensity: contributor

* Jiajunsu (victor): contributor

* Andrew Haigh (nelfin): contributor

* Pang Yu Shao (yushao2): contributor

* Aditya Gupta (adityagupta1089): Added ignore_signatures to duplicate checker

* Jacob Walls: contributor

* ruro: contributor

* David Liu (david-yz-liu): contributor

* Bernard Nauwelaerts: contributor

* Fabian Damken: contributor

* Markus Siebenhaar: contributor

* Lorena Buciu (lorena-b): contributor

* Sergei Lebedev (superbobry): contributor
* Maksym Humetskyi (mhumetskyi): contributor
  - Fixed ignored empty functions by similarities checker with "ignore-signatures" option enabled
  - Ignore function decorators signatures as well by similarities checker with "ignore-signatures" option enabled
  - Ignore class methods and nested functions signatures as well by similarities checker with "ignore-signatures" option enabled

* Daniel Dorani (doranid): contributor

* Will Shanks: contributor

* Mark Bell: contributor

* Marco Gorelli: contributor
  - Documented Jupyter integration

* Rebecca Turner (9999years): contributor

* Yilei Yang: contributor

* Marcin Kurczewski (rr-): contributor

* Tanvi Moharir: contributor
  - Fix for invalid toml config

* Eisuke Kawashima (e-kwsm): contributor

* Daniel van Noord (DanielNoord): contributor

* Michal Vasilek: contributor

* Kai Mueller (kasium): contributor

* Sam Vermeiren (PaaEl): contributor

* Phil A. (flying-sheep): contributor

* Melvin Hazeleger (melvio): contributor

* Hayden Richards (SupImDos): contributor
  - Fixed "no-self-use" for async methods
  - Fixed "docparams" extension for async functions and methods

* Jeroen Seegers (jeroenseegers): contributor
  - Fixed `toml` dependency issue

* Tim Martin: contributor

* Jaehoon Hwang (jaehoonhwang): contributor
* Samuel Forestier: contributor

* Nick Pesce: contributor

* James DesLauriers: contributor

* Youngsoo Sung: contributor

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* Mike Fiedler (miketheman): contributor

* Takahide Nojima: contributor

* Tushar Sadhwani (tusharsadhwani): contributor

* Ikraduya Edian: contributor

* Antonio Quarta (sgheppy): contributor

* Harshil (harshil21): contributor

* Felix von Drigalski (felixvd): contributor

* Philipp Albrecht (pylbrecht): contributor

* Allan Chandler (allanc65): contributor
  - Fixed issue 5452, false positive missing-param-doc for multi-line Google-style params

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* /opt/cola/permits/1110810307_1606855956.290/kjd-idna-v2-8-0-g1cdf175-1-tar-gz/kjd-idna-375dc46/LICENSE.rst

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===

A library to support the Internationalised Domain Names in Applications (IDNA) protocol as specified in RFC 5890 et.al. This new methodology, known as IDNA 2008, can generate materially different results to the previous standard. The library can act as a drop-in replacement for the "encodings.idna" module.

===

import io, sys
from setuptools import setup

def main():

    python_version = sys.version_info[:2]
    if python_version < (2,7):
raise SystemExit("Sorry, Python 2.7 or newer required")

package_data = {}
exec(open('idna/package_data.py').read(), package_data)

arguments = {
    'name': 'idna',
    'packages': ['idna'],
    'version': package_data['__version__'],
    'description': 'Internationalized Domain Names in Applications (IDNA)',
    'long_description': io.open("README.rst", encoding="UTF-8").read(),
    'author': 'Kim Davies',
    'author_email': 'kim@cynosure.com.au',
    'license': 'BSD-like',
    'url': 'https://github.com/kjd/idna',
    'classifiers': [
        'Development Status :: 5 - Production/Stable',
        'Intended Audience :: Developers',
        'Intended Audience :: System Administrators',
        'License :: OSI Approved :: BSD License',
        'Operating System :: OS Independent',
        'Programming Language :: Python',
        'Programming Language :: Python :: 2',
        'Programming Language :: Python :: 2.7',
        'Programming Language :: Python :: 3',
        'Programming Language :: Python :: 3.4',
        'Programming Language :: Python :: 3.5',
        'Programming Language :: Python :: 3.6',
        'Topic :: Internet :: Name Service (DNS)',
        'Topic :: Software Development :: Libraries :: Python Modules',
        'Topic :: Utilities',
    ],
    'python_requires': '>=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*',
    'test_suite': 'tests',
}

setup(**arguments)

if __name__ == '__main__':
    main()

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* /opt/cola/permits/1110810307_1606855956.29/0/kjd-idna-v2-8-0-g1cdf175-1-tar-gz/kjd-idna-375dc46/setup.py

1.556 paramiko 2.8.1
**1.556.1 Available under license :**

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.
5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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b) Use a suitable shared library mechanism for linking with the
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Optimised ANSI C code for the Rijndael cipher (now AES)

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Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

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threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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1.580 libyaml 0.1.7

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1.581 go-openapi-swag 0.19.5

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1.582 zulu 8.58.0.13-1

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1.586 libjpeg 6b

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and have a chance to participate in technical discussions, etc.

This software is the work of Tom Lane, Philip Gladstone, Jim Boucher,
Lee Crocker, Julian Minguillon, Luis Ortiz, George Phillips, Davide Rossi,
Guido Vollbeding, Ge' Weijers, and other members of the Independent JPEG
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DOCUMENTATION ROADMAP

This file contains the following sections:
OVERVIEW
========

This package contains C software to implement JPEG image compression and decompression. JPEG (pronounced "jay-peg") is a standardized compression method for full-color and gray-scale images. JPEG is intended for compressing "real-world" scenes; line drawings, cartoons and other non-realistic images are not its strong suit. JPEG is lossy, meaning that the output image is not exactly identical to the input image. Hence you must not use JPEG if you have to have identical output bits. However, on typical photographic images, very good compression levels can be obtained with no visible change, and remarkably high compression levels are possible if you can tolerate a low-quality image. For more details, see the references, or just experiment with various compression settings.
This software implements JPEG baseline, extended-sequential, and progressive compression processes. Provision is made for supporting all variants of these processes, although some uncommon parameter settings aren't implemented yet. For legal reasons, we are not distributing code for the arithmetic-coding variants of JPEG; see LEGAL ISSUES. We have made no provision for supporting the hierarchical or lossless processes defined in the standard.

We provide a set of library routines for reading and writing JPEG image files, plus two sample applications "cjpeg" and "djep", which use the library to perform conversion between JPEG and some other popular image file formats. The library is intended to be reused in other applications.

In order to support file conversion and viewing software, we have included considerable functionality beyond the bare JPEG coding/decoding capability; for example, the color quantization modules are not strictly part of JPEG decoding, but they are essential for output to colormapped file formats or colormapped displays. These extra functions can be compiled out of the library if not required for a particular application. We have also included "jpegtran", a utility for lossless transcoding between different JPEG processes, and "rdjpgcom" and "wrjpgcom", two simple applications for inserting and extracting textual comments in JFIF files.

The emphasis in designing this software has been on achieving portability and flexibility, while also making it fast enough to be useful. In particular, the software is not intended to be read as a tutorial on JPEG. (See the REFERENCES section for introductory material.) Rather, it is intended to be reliable, portable, industrial-strength code. We do not claim to have achieved that goal in every aspect of the software, but we strive for it.

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The Unix configuration script "configure" was produced with GNU Autoconf.
It is copyright by the Free Software Foundation but is freely distributable.
The same holds for its supporting scripts (config.guess, config.sub,
ltconfig, ltmain.sh). Another support script, install-sh, is copyright by M.I.T. but is also freely distributable.

It appears that the arithmetic coding option of the JPEG spec is covered by patents owned by IBM, AT&T, and Mitsubishi. Hence arithmetic coding cannot legally be used without obtaining one or more licenses. For this reason, support for arithmetic coding has been removed from the free JPEG software. (Since arithmetic coding provides only a marginal gain over the unpatented Huffman mode, it is unlikely that very many implementations will support it.)

So far as we are aware, there are no patent restrictions on the remaining code.

The IJG distribution formerly included code to read and write GIF files. To avoid entanglement with the Unisys LZW patent, GIF reading support has been removed altogether, and the GIF writer has been simplified to produce "uncompressed GIFs". This technique does not use the LZW algorithm; the resulting GIF files are larger than usual, but are readable by all standard GIF decoders.

We are required to state that "The Graphics Interchange Format(c) is the Copyright property of CompuServe Incorporated. GIF(sm) is a Service Mark property of CompuServe Incorporated."

REFERENCES
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We highly recommend reading one or more of these references before trying to understand the innards of the JPEG software.

The best short technical introduction to the JPEG compression algorithm is Wallace, Gregory K. "The JPEG Still Picture Compression Standard", Communications of the ACM, April 1991 (vol. 34 no. 4), pp. 30-44. (Adjacent articles in that issue discuss MPEG motion picture compression, applications of JPEG, and related topics.) If you don't have the CACM issue handy, a PostScript file containing a revised version of Wallace's article is available at ftp://ftp.uu.net/graphics/jpeg/wallace.ps.gz. The file (actually a preprint for an article that appeared in IEEE Trans. Consumer Electronics) omits the sample images that appeared in CACM, but it includes corrections and some added material. Note: the Wallace article is copyright ACM and IEEE, and it may not be used for commercial purposes.

A somewhat less technical, more leisurely introduction to JPEG can be found in "The Data Compression Book" by Mark Nelson and Jean-loup Gailly, published by M&T Books (New York), 2nd ed. 1996, ISBN 1-55851-434-1. This book provides good explanations and example C code for a multitude of compression methods including JPEG. It is an excellent source if you are comfortable reading C
code but don't know much about data compression in general. The book's JPEG sample code is far from industrial-strength, but when you are ready to look at a full implementation, you've got one here...


The JPEG standard itself is not available electronically; you must order a paper copy through ISO or ITU. (Unless you feel a need to own a certified official copy, we recommend buying the Pennebaker and Mitchell book instead; it's much cheaper and includes a great deal of useful explanatory material.) In the USA, copies of the standard may be ordered from ANSI Sales at (212) 642-4900, or from Global Engineering Documents at (800) 854-7179. (ANSI doesn't take credit card orders, but Global does.) It's not cheap: as of 1992, ANSI was charging $95 for Part 1 and $47 for Part 2, plus 7% shipping/handling. The standard is divided into two parts, Part 1 being the actual specification, while Part 2 covers compliance testing methods. Part 1 is titled "Digital Compression and Coding of Continuous-tone Still Images, Part 1: Requirements and guidelines" and has document numbers ISO/IEC IS 10918-1, ITU-T T.81. Part 2 is titled "Digital Compression and Coding of Continuous-tone Still Images, Part 2: Compliance testing" and has document numbers ISO/IEC IS 10918-2, ITU-T T.83.

Some extensions to the original JPEG standard are defined in JPEG Part 3, a newer ISO standard numbered ISO/IEC IS 10918-3 and ITU-T T.84. IJG currently does not support any Part 3 extensions.

The JPEG standard does not specify all details of an interchangeable file format. For the omitted details we follow the "JFIF" conventions, revision 1.02. A copy of the JFIF spec is available from:

Literature Department
C-Cube Microsystems, Inc.
1778 McCarthy Blvd.
Milpitas, CA 95035
phone (408) 944-6300, fax (408) 944-6314
A PostScript version of this document is available by FTP at ftp://ftp.uu.net/graphics/jpeg/jfif.ps.gz. There is also a plain text version at ftp://ftp.uu.net/graphics/jpeg/jfif.txt.gz, but it is missing the figures.

The TIFF 6.0 file format specification can be obtained by FTP from ftp://ftp.sgi.com/graphics/tiff/TIFF6.ps.gz. The JPEG incorporation scheme found in the TIFF 6.0 spec of 3-June-92 has a number of serious problems. IJG does not recommend use of the TIFF 6.0 design (TIFF Compression tag 6).
Instead, we recommend the JPEG design proposed by TIFF Technical Note #2 (Compression tag 7). Copies of this Note can be obtained from ftp.sgi.com or from ftp://ftp.uu.net/graphics/jpeg/. It is expected that the next revision of the TIFF spec will replace the 6.0 JPEG design with the Note's design. Although IJG's own code does not support TIFF/JPEG, the free libtiff library uses our library to implement TIFF/JPEG per the Note. libtiff is available from ftp://ftp.sgi.com/graphics/tiff/.

ARCHIVE LOCATIONS
=================

The "official" archive site for this software is ftp.uu.net (Internet address 192.48.96.9). The most recent released version can always be found there in directory graphics/jpeg. This particular version will be archived as ftp://ftp.uu.net/graphics/jpeg/jpegsrc.v6b.tar.gz. If you don't have direct Internet access, UUNET's archives are also available via UUCP; contact help@uunet.uu.net for information on retrieving files that way.

Numerous Internet sites maintain copies of the UUNET files. However, only ftp.uu.net is guaranteed to have the latest official version.

You can also obtain this software in DOS-compatible "zip" archive format from the SimTel archives (ftp://ftp.simtel.net/pub/simtelnet/msdos/graphics/), or on CompuServe in the Graphics Support forum (GO CIS:GRAPHSUP), library 12 "JPEG Tools". Again, these versions may sometimes lag behind the ftp.uu.net release.

The JPEG FAQ (Frequently Asked Questions) article is a useful source of general information about JPEG. It is updated constantly and therefore is not included in this distribution. The FAQ is posted every two weeks to Usenet newsgroups comp.graphics.misc, news.answers, and other groups. It is available on the World Wide Web at http://www.faqs.org/faqs/jpeg-faq/ and other news.answers archive sites, including the official news.answers archive at rtfm.mit.edu: ftp://rtfm.mit.edu/pub/usenet/news.answers/jpeg-faq/.

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send usenet/news.answers/jpeg-faq/part1
send usenet/news.answers/jpeg-faq/part2

RELATED SOFTWARE
=================

Numerous viewing and image manipulation programs now support JPEG. (Quite a few of them use this library to do so.) The JPEG FAQ described above lists some of the more popular free and shareware viewers, and tells where to obtain them on Internet.
If you are on a Unix machine, we highly recommend Jef Poskanzer's free PBMPLUS software, which provides many useful operations on PPM-format image files. In particular, it can convert PPM images to and from a wide range of other formats, thus making cjpeg/djpeg considerably more useful. The latest version is distributed by the NetPBM group, and is available from numerous sites, notably ftp://wuarchive.wustl.edu/graphics/graphics/packages/NetPBM/. Unfortunately PBMPLUS/NETPBM is not nearly as portable as the IJG software is; you are likely to have difficulty making it work on any non-Unix machine.

A different free JPEG implementation, written by the PVRG group at Stanford, is available from ftp://havefun.stanford.edu/pub/jpeg/. This program is designed for research and experimentation rather than production use; it is slower, harder to use, and less portable than the IJG code, but it is easier to read and modify. Also, the PVRG code supports lossless JPEG, which we do not. (On the other hand, it doesn't do progressive JPEG.)

FILE FORMAT WARS
================

Some JPEG programs produce files that are not compatible with our library. The root of the problem is that the ISO JPEG committee failed to specify a concrete file format. Some vendors "filled in the blanks" on their own, creating proprietary formats that no one else could read. (For example, none of the early commercial JPEG implementations for the Macintosh were able to exchange compressed files.)

The file format we have adopted is called JFIF (see REFERENCES). This format has been agreed to by a number of major commercial JPEG vendors, and it has become the de facto standard. JFIF is a minimal or "low end" representation. We recommend the use of TIFF/JPEG (TIFF revision 6.0 as modified by TIFF Technical Note #2) for "high end" applications that need to record a lot of additional data about an image. TIFF/JPEG is fairly new and not yet widely supported, unfortunately.

The upcoming JPEG Part 3 standard defines a file format called SPIFF. SPIFF is interoperable with JFIF, in the sense that most JFIF decoders should be able to read the most common variant of SPIFF. SPIFF has some technical advantages over JFIF, but its major claim to fame is simply that it is an official standard rather than an informal one. At this point it is unclear whether SPIFF will supersede JFIF or whether JFIF will remain the de-facto standard. IJG intends to support SPIFF once the standard is frozen, but we have not decided whether it should become our default output format or not. (In any case, our decoder will remain capable of reading JFIF indefinitely.)

Various proprietary file formats incorporating JPEG compression also exist. We have little or no sympathy for the existence of these formats. Indeed,
one of the original reasons for developing this free software was to help force convergence on common, open format standards for JPEG files. Don't use a proprietary file format!

**TO DO**

The major thrust for v7 will probably be improvement of visual quality. The current method for scaling the quantization tables is known not to be very good at low Q values. We also intend to investigate block boundary smoothing, "poor man's variable quantization", and other means of improving quality-vs-file-size performance without sacrificing compatibility.

In future versions, we are considering supporting some of the upcoming JPEG Part 3 extensions --- principally, variable quantization and the SPIFF file format.

As always, speeding things up is of great interest.

Please send bug reports, offers of help, etc. to jpeg-info@uunet.uu.net.

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**1.587 lazy-object-proxy 1.7.1**

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Jean-loup Gailly        Mark Adler
jloup@gzip.org          madler@alumni.caltech.edu

The following list of people, sorted by last name, have contributed code or patches to this implementation of sudo since I began maintaining it in 1993. This list is known to be incomplete--if you believe you should be listed, please send a note to sudo@sudo.ws.

Ackeret, Matt
Adler, Mark
Allbery, Russ
Anderson, Jamie
Andrew, Nick
Andric, Dimitry
Barron, Danny
Bates, Tom
Behan, Zdenk
Bellis, Ray
Benali, Elias
Beverly, Jamie
Boardman, Spider
Pasteleurs, Frederic
Percival, Ted
Perera, Andres
Peron, Christian S.J.
Peschel, Aaron
Peslyak, Alexander
Peterson, Toby
Petten, Diego Elio
Pickett, Joel
Plotnick, Alex
de Raadt, Theo
Rasch, Gudleik
Reid, Steve
Richards, Matt
Rossum, Guido van
Rouillard, John P.
Rowe, William A., Jr.
Roy, Alain
Ruusame, Elan
Ryabinkin, Eygene
Sato, Yuichi
Snchez, Wilfredo
Sanders, Miguel
Sasaki, Kan
Saucier, Jean-Francois
Schoenfeld, Patrick
Schuring, Arno
Schwarze, Ingo
Scott, Dougal
Sieger, Nick
Simon, Thor Lancelot
Slemko, Marc
Smith, Andy
Sobrado, Igor
Soulen, Steven
Spangler, Aaron
Spradling, Cloyce D.
Spradling, Michael
Stier, Matthew
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Street, Russell
Stritzky, Tilo
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Tarrall, Robert
Thomas, Matthew
Todd, Giles
Toft, Martin
Torek, Chris
Tucker, Darren
Uhl, Robert
Uzel, Petr
Valery, Reznic
Van Dinter, Theo
Venckus, Martynas
de Vries, Maarten
Wagner, Klaus
Walsh, Dan
Warburton, John
Webb, Kirk
Wetzel, Timm
Wieringen, Marco van
Wilk, Jakub
Winiger, Gary
Wood, David
Zacarias, Gustavo
Zolnowsky, John

The following people have worked to translate sudo into other languages as part of the Translation Project, see https://translationproject.org for more details.

Albuquerque, Pedro
Blittermann, Mario
Bogusz, Jakub
Buo-ren, Lin
Casagrande, Milo
Castro, Felipe
Cho, Seong-ho
Chornoivan, Yuri
Diguez, Francisco
Fontenelle, Rafael
Garcia-Fontes, Walter
Gezer, Volkan
Hamasaki, Takeshi
Hamming, Peter
Hansen, Joe
Hantrais, Frédric
Hein, Jochen
Hufthammer, Karl Ove
Jerovek, Damir
Karvonen, Jorma
Kazik, Duan
Kelemen, Gbor
Keeci, Mehmet
Koir, Klemen
Kozlov, Yuri
1.590 cobra 1.0.0

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1.591 go-openapi-jsonpointer 0.19.3

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1.600 apt 1.6.13

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# version 0.1
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1.606 hashicorp-go-secure-stdlib-parseutil

0.1.1

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lib/gssapi/generic/gssapi_err_generic.et
and the initial implementation of incremental propagation, including the following new or changed files:

include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
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1.611 netty-codec-dns 4.1.67.Final

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1.624 prometheus-common 0.26.0

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[metadata]
name = Jinja2
version = attr: jinja2.__version__
url = https://palletsprojects.com/p/jinja/
project_urls =
  Donate = https://palletsprojects.com/donate
  Documentation = https://jinja.palletsprojects.com/
  Changes = https://jinja.palletsprojects.com/changes/
  Source Code = https://github.com/pallets/jinja/
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license = BSD-3-Clause
license_files = LICENSE.rst
author = Armin Ronacher
author_email = armin.ronacher@active-4.com
maintainer = Pallets
maintainer_email = contact@palletsprojects.com
description = A very fast and expressive template engine.
long_description = file: README.rst
long_description_content_type = text/x-rst
classifiers =
  Development Status :: 5 - Production/Stable
  Environment :: Web Environment
  Intended Audience :: Developers
  License :: OSI Approved :: BSD License
Operating System :: OS Independent
Programming Language :: Python
Topic :: Internet :: WWW/HTTP :: Dynamic Content
Topic :: Text Processing :: Markup :: HTML

[options]
packages = find:
    package_dir = = src
    include_package_data = true
    python_requires = >= 3.6

[options.packages.find]
    where = src

[options.entry_points]
babel.extractors =
jinja2 = jinja2.ext:babel_extract[i18n]

[tool:pytest]
testpaths = tests
    filterwarnings =
        error
        ignore:The loop argument:DeprecationWarning:asyncio[.]base_events:542

[coverage:run]
branch = True
    source =
        jinja2
tests

[coverage:paths]
    source =
        src
    */site-packages

[flake8]
    select = B, E, F, W, B9, ISC
    ignore =
        E203
        E501
        E722
        W503
    max-line-length = 80
    per-file-ignores =
        src/jinja2/__init__.py: F401

[mypy]
    files = src/jinja2
python_version = 3.6
disallow_subclassing_any = True
disallow_untyped_calls = True
disallow_untyped_defs = True
disallow_incomplete_defs = True
no_implicit_optional = True
local_partial_types = True
no_implicit_reexport = True
strict_equality = True
warn_redundant_casts = True
warn_unused_configs = True
warn_unused_ignores = True
warn_return_any = True
warn_unreachable = True

[mypy-jinja2.defaults]
no_implicit_reexport = False

[mypy-markupsafe]
no_implicit_reexport = False

[egg_info]
tag_build =
tag_date = 0

Found in path(s):
* /opt/cola/permits/1226358395_1636965021.11/0/jinja2-3-0-3-tar-gz/Jinja2-3.0.3/setup.cfg
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Metadata-Version: 2.1
Name: Jinja2
Version: 3.0.3
Summary: A very fast and expressive template engine.
Home-page: https://palletsprojects.com/p/jinja/
Author: Armin Ronacher
Author-email: armin.ronacher@active-4.com
Maintainer: Pallets
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Project-URL: Changes, https://jinja.palletsprojects.com/changes/
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Platform: UNKNOWN
Classifier: Development Status :: 5 - Production/ Stable
Jinja

Jinja is a fast, expressive, extensible templating engine. Special placeholders in the template allow writing code similar to Python syntax. Then the template is passed data to render the final document.

It includes:

- Template inheritance and inclusion.
- Define and import macros within templates.
- HTML templates can use autoescaping to prevent XSS from untrusted user input.
- A sandboxed environment can safely render untrusted templates.
- AsyncIO support for generating templates and calling async functions.
- I18N support with Babel.
- Templates are compiled to optimized Python code just-in-time and cached, or can be compiled ahead-of-time.
- Exceptions point to the correct line in templates to make debugging easier.
- Extensible filters, tests, functions, and even syntax.

Jinja's philosophy is that while application logic belongs in Python if possible, it shouldn't make the template designer's job difficult by restricting functionality too much.

Installing

-------------

Install and update using `pip`:

.. code-block:: text

    $ pip install -U Jinja2

In A Nutshell
-------------

.. code-block:: jinja

    {% extends "base.html" %}
    {% block title %}Members{% endblock %}
    {% block content %}
    <ul>
    {% for user in users %}
    <li><a href="{{ user.url }}">{{ user.username }}</a></li>
    {% endfor %}
    </ul>
    {% endblock %}

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- Changes: https://jinja.palletsprojects.com/changes/
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procs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain
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This script is compatible with the BSD install script, but was written from scratch. It can only install one file at a time, a restriction shared with many OS's install programs.

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-- vile: txtmode file-encoding=utf-8
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It is based somewhat on work done by Bruce Perens <Bruce@Pixar.com>, David Engel <david@elo.ods.com>. Michael Alan Dorman <mdorman@debian.org>, Richard Braakman <dark@xs4all.nl>, James Troup <jjtroup@comp.brad.ac.uk>, J.H.M. Dassen (Ray) <jdassen@wi.LeidenUniv.nl>, and Galen Hazelwood <galenh@micron.net> over various years.

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Upstream source https://invisible-island.net/ncurses/ncurses.html
This package is used for testing builds of ncurses.

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1.631 debianutils 4.8.4

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1.632 python3-crypto 2.6.1-13ubuntu2

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Last updated: 2009-02-28

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1.635 dataclasses 0.8

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Found in path(s):
* /opt/cola/permits/1222421618_1635579121.68/0/spring-cloud-commons-3-0-4-sources-jar/org/springframework/cloud/configuration/TlsProperties.java
* /opt/cola/permits/1222421618_1635579121.68/0/spring-cloud-commons-3-0-4-sources-jar/org/springframework/cloud/configuration/SSLCertificateFactory.java

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Found in path(s):
* /opt/cola/permits/1222421618_1635579121.68/0/spring-cloud-commons-3-0-4-sources-
  jar/org/springframework/cloud/client/loadbalancer/reactive/RetryableLoadBalancerExchangeFilterFunction.java
* /opt/cola/permits/1222421618_1635579121.68/0/spring-cloud-commons-3-0-4-sources-
  jar/org/springframework/commons/util/TaskSchedulerWrapper.java
* /opt/cola/permits/1222421618_1635579121.68/0/spring-cloud-commons-3-0-4-sources-
  jar/org/springframework/cloud/client/loadbalancer/reactive/ExchangeFilterFunctionUtils.java

1.637 systemd 245.4-4ubuntu3.6

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1.638 aws-sdk-go-v2 1.0.6
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package licensemanager

)

// Deletes the specified license.  func (c *Client) DeleteLicense(ctx context.Context, params *DeleteLicenseInput, optFns ...func(*Options)) (*DeleteLicenseOutput, error) {  if params == nil {  params = &DeleteLicenseInput{  }  }

result, metadata, err := c.invokeOperation(ctx, "DeleteLicense", params, optFns, addOperationDeleteLicenseMiddlewares)  if err != nil {  return nil, err  }

out := result.(*DeleteLicenseOutput)  out.ResultMetadata = metadata  return out, nil  }

type DeleteLicenseInput struct {
// Amazon Resource Name (ARN) of the license.

// This member is required.
LicenseArn *string

// Current version of the license.

// This member is required.
SourceVersion *string

} type DeleteLicenseOutput struct {

// Date on which the license is deleted.
DeletionDate *string

// License status.
Status types.LicenseDeletionStatus

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

}

func addOperationDeleteLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
err = stack.Serialize.Add(&awsAwsjson11_serializeOpDeleteLicense{}, middleware.After)
if err != nil {
    return err
}
err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpDeleteLicense{}, middleware.After)
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpDeleteLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDeleteLicense(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opDeleteLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:     region,
        ServiceID:  ServiceID,
        SigningName:  "license-manager",
        OperationName:  "DeleteLicense",
    }
}
package licensemanager

import (    
    "context"
)

// Lists received licenses.    func (c *Client) ListReceivedLicenses(ctx context.Context, params *ListReceivedLicensesInput, optFns ...func(*Options)) (*ListReceivedLicensesOutput, error) {    if params == nil {        params = &ListReceivedLicensesInput{}    }
    
    result, metadata, err := c.invokeOperation(ctx, "ListReceivedLicenses", params, optFns, addOperationListReceivedLicensesMiddlewares)
    if err != nil {        return nil, err
    }
    
    out := result.(*ListReceivedLicensesOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type ListReceivedLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //    //    // *    // ProductSKU
    //    // * Status
    //    // * KeyFingerprint
    //    // * Issuer
    Filters []types.Filter
// Amazon Resource Names (ARNs) of the licenses.
LicenseArns []string

// Maximum number of results to return in a single call.
MaxResults *int32

// Token for the next set of results.
NextToken *string

} type ListReceivedLicensesOutput struct {

// Received license details.
Licenses []types.GrantedLicense

// Token for the next set of results.
NextToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

}

func addOperationListReceivedLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListReceivedLicenses(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opListReceivedLicenses(region string)
    *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListReceivedLicenses",
    }
}
import {
  "context"
  "awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
  "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
  "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
  "github.com/aws/smithy-go/middleware"
  smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Creates a license.
func (c *Client) CreateLicense(ctx context.Context, params *CreateLicenseInput, optFns ...func(*Options)) (*CreateLicenseOutput, error) {
  if params == nil {
    params = &CreateLicenseInput{}
  }

  result, metadata, err := c.invokeOperation(ctx, "CreateLicense", params, optFns, addOperationCreateLicenseMiddlewares)
  if err != nil {
    return nil, err
  }

  out := result.(*CreateLicenseOutput)
  out.ResultMetadata = metadata
  return out, nil
}

type CreateLicenseInput struct {

  // License beneficiary.
  //
  // This member is required.
  Beneficiary *string

  // Unique, case-sensitive identifier that you provide to ensure the idempotency of
  // the request.
  //
  // This member is required.
  ClientToken *string

  // Configuration for consumption of the license. Choose a provisional configuration
  // for workloads running with continuous connectivity. Choose a borrow
  // configuration for workloads with offline usage.
  //
  // This member is required.
  ConsumptionConfiguration *types.ConsumptionConfiguration

  // License entitlements.
}
//
// This member is required.
Entitlements []types.Entitlement

// Home Region for the license.
//
// This member is required.
HomeRegion *string

// License issuer.
//
// This member is required.
Issuer *types.Issuer

// License name.
//
// This member is required.
LicenseName *string

// Product name.
//
// This member is required.
ProductName *string

// Product SKU.
//
// This member is required.
ProductSKU *string

// Date and time range during which the license is valid, in ISO8601-UTC format.
//
// This member is required.
Validity *types.DatetimeRange

// Information about the license.
LicenseMetadata []types.Metadata
}

type CreateLicenseOutput struct {

// Amazon Resource Name (ARN) of the license.
LicenseArn *string

// License status.
Status types.LicenseStatus

// License version.
Version *string
// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationCreateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsMiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = awsMiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsMiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
}
return err
}
if err = addOpCreateLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCreateLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCreateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CreateLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Checks out the specified license.
func (c *Client) CheckoutLicense(ctx context.Context, params *CheckoutLicenseInput, optFns ...func(*Options)) (*CheckoutLicenseOutput, error) {
    if params == nil {
        params = &CheckoutLicenseInput{}
    }
result, metadata, err := c.invokeOperation(ctx, "CheckoutLicense", params, optFs, addOperationCheckoutLicenseMiddlewares)
if err != nil {
    return nil, err
}
out := result.(*CheckoutLicenseOutput)
out.ResultMetadata = metadata
return out, nil

type CheckoutLicenseInput struct {
    // Checkout type.
    // This member is required.
    CheckoutType types.CheckoutType

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    // This member is required.
    ClientToken *string

    // License entitlements.
    // This member is required.
    Entitlements []types.EntitlementData

    // Key fingerprint identifying the license.
    // This member is required.
    KeyFingerprint *string

    // Product SKU.
    // This member is required.
    ProductSKU *string

    // License beneficiary.
    Beneficiary *string

    // Node ID.
    NodeId *string
}

type CheckoutLicenseOutput struct {
// Checkout type.
CheckoutType types.CheckoutType

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation’s result.
ResultMetadata middleware.Metadata
}

func addOperationCheckoutLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {

return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckoutLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCheckoutLicense(region string) *awsmiddleware.RegisterServiceMetadata
{
    return &awsmiddleware.RegisterServiceMetadata{
        Region: region,
        ServiceID: ServiceID,
        SigningName: "license-manager", 
    }
}
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package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks out the specified license for offline use.
func (c *Client) CheckoutBorrowLicense(ctx context.Context, params *CheckoutBorrowLicenseInput, optFns ...
    func(*Options)) (*CheckoutBorrowLicenseOutput, error) {
    if params == nil {
        params = &CheckoutBorrowLicenseInput{ }
result, metadata, err := c.invokeOperation(ctx, "CheckoutBorrowLicense", params, optFns, addOperationCheckoutBorrowLicenseMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*CheckoutBorrowLicenseOutput)
out.ResultMetadata = metadata
return out, nil

// checkoutBorrowLicenseInput struct {

// Unique, case-sensitive identifier that you provide to ensure the idempotency of
// the request.
// This member is required.
// ClientToken *string

// Digital signature method. The possible value is JSON Web Signature (JWS)
// algorithm PS384. For more information, see RFC 7518 Digital Signature with
// This member is required.
DigitalSignatureMethod types.DigitalSignatureMethod

// License entitlements. Partial checkouts are not supported.
// This member is required.
Entitlements []types.EntitlementData

// Amazon Resource Name (ARN) of the license. The license must use the borrow
// consumption configuration.
// This member is required.
LicenseArn *string

// Information about constraints.
CheckoutMetadata []types.Metadata

// Node ID.
NodeId *string
}

type CheckoutBorrowLicenseOutput struct {

// Unique, case-sensitive identifier that you provide to ensure the idempotency of
// the request.
// This member is required.
ClientToken *string

// Digital signature method. The possible value is JSON Web Signature (JWS)
// algorithm PS384. For more information, see RFC 7518 Digital Signature with
// This member is required.
DigitalSignatureMethod types.DigitalSignatureMethod

// License entitlements. Partial checkouts are not supported.
// This member is required.
Entitlements []types.EntitlementData

// Amazon Resource Name (ARN) of the license. The license must use the borrow
// consumption configuration.
// This member is required.
LicenseArn *string

// Information about constraints.
CheckoutMetadata []types.Metadata

// Node ID.
NodeId *string
}
// Information about constraints.
CheckoutMetadata []types.Metadata

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// Amazon Resource Name (ARN) of the license.
LicenseArn *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationCheckoutBorrowLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
}
func newServiceMetadataMiddleware_opCheckoutBorrowLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:      region,
        // Other fields
ServiceID: ServiceID,
SigningName: "license-manager",
OperationName: "CheckoutBorrowLicense",
}
}
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (    "context"
awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
"github.com/aws/aws-sdk-go-v2/aws/signer/v4"
"github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
"github.com/aws/smithy-go/middleware"
smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Lists the licenses for your account.
func (c *Client) ListLicenses(ctx context.Context, params *ListLicensesInput, optFns ...func(*Options)) (*ListLicensesOutput, error) {
if params == nil {
    params = &ListLicensesInput{
}
}

result, metadata, err := c.invokeOperation(ctx, "ListLicenses", params, optFns,
addOperationListLicensesMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*ListLicensesOutput)
out.ResultMetadata = metadata
return out, nil
}

type ListLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // Beneficiary
    //
    // * ProductSKU
    //
    // * KeyFingerprint
    //
    // * Status
Filters []types.Filter

// Amazon Resource Names (ARNs) of the licenses.
LicenseArns []string

// Maximum number of results to return in a single call.
MaxResults *int32

// Token for the next set of results.
NextToken *string

type ListLicensesOutput struct {

// License details.
Licenses []types.License

// Token for the next set of results.
NextToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}

func addOperationListLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSingerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListLicenses(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opListLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "ListLicenses",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager
import {
  "context"
  "awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
  "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
  "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
  "github.com/aws/smithy-go/middleware"
  smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Gets detailed information about the specified license.
func (c *Client) GetLicense(ctx context.Context, params *GetLicenseInput, optFns ...func(*Options)) (*GetLicenseOutput, error) {
  if params == nil {
    params = &GetLicenseInput{ }
  }
  result, metadata, err := c.invokeOperation(ctx, "GetLicense", params, optFns, addOperationGetLicenseMiddlewares)
  if err != nil {
    return nil, err
  }
  out := result.(*GetLicenseOutput)
  out.ResultMetadata = metadata
  return out, nil
}

type GetLicenseInput struct {

  // Amazon Resource Name (ARN) of the license.
  // This member is required.
  LicenseArn *string

  // License version.
  Version *string
}

type GetLicenseOutput struct {

  // License details.
  License *types.License

  // Metadata pertaining to the operation's result.
  ResultMetadata middleware.Metadata
}

func addOperationGetLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {

if err != nil {
    return err
}
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpGetLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opGetLicense(options.Region), middleware.Before);
err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opGetLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "GetLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks in the specified license. Check in a license when it is no longer in use.
func (c *Client) CheckInLicense(ctx context.Context, params *CheckInLicenseInput, optFns ...func(*Options)) (*CheckInLicenseOutput, error) {
    if params == nil {
        params = &CheckInLicenseInput{}
    }
    result, metadata, err := c.invokeOperation(ctx, "CheckInLicense", params, optFns,
        addOperationCheckInLicenseMiddlewares)
    if err != nil {
        return nil, err
    }
type CheckInLicenseInput struct {

    // License consumption token.
    //
    // This member is required.
    LicenseConsumptionToken *string

    // License beneficiary.
    Beneficiary *string
}

type CheckInLicenseOutput struct {

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationCheckInLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckInLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckInLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opCheckInLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckInLicense",
    }
}

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1.645 glibc 2.31-0ubuntu9.2

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#   Name <email address>
#
# An entry with two email addresses specifies that the
# first address should be used in the submit logs and
# that the second address should be recognized as the
# same person when interacting with Rietveld.
#
# Please keep the list sorted.

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The `/sys/license` endpoint is used to view and update the license used in Vault.

---

# `/sys/license`

`-> **Enterprise Only** These endpoints require Vault Enterprise.

The `/sys/license` endpoint is used to view and update the license used in Vault.

## Read License

This endpoint returns information about the currently installed license.

<table>
<thead>
<tr>
<th>Method</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>GET</code></td>
<td><code>/sys/license</code></td>
</tr>
</tbody>
</table>

### Sample Request

```sh
$ curl
   --header "X-Vault-Token: ..."
   http://127.0.0.1:8200/v1/sys/license
```

### Sample Response

```json
{
  "data": {
    "expiration_time": "2017-11-14T16:34:36.546753-05:00",
    "features": [
      "UI",
      "HSM",
      "Performance Replication",
      "DR Replication"
    ],
    "license_id": "temporary",
    "start_time": "2017-11-14T16:04:36.546753-05:00"
  },
  "warnings": [
    "time left on license is 29m33s"
  ]
}
```
## Install License

This endpoint is used to install a license into Vault.

<table>
<thead>
<tr>
<th>Method</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>PUT</code></td>
<td><code>/sys/license</code></td>
</tr>
</tbody>
</table>

### Parameters

- `text` *(string: <required>)* - The text of the license.

*DR Secondary Specific Parameters*

- `dr_operation_token` *(string: <required>)* - DR operation token used to authorize this request.

### Sample Payload

```json
{
  "text": "01ABCDEFG..."
}
```

### Sample Request

```bash
$ curl
   --header "X-Vault-Token: ..."
   --request PUT
   --data @payload.json
   http://127.0.0.1:8200/v1/sys/license
```

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mgo - MongoDB driver for Go

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BSON library for Go

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      {{/info-table-row}}
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package github

import {
    "context"
    "fmt"
}

// LicensesService handles communication with the license related
// methods of the GitHub API.
// GitHub API docs: https://developer.github.com/v3/licenses/
type LicensesService service

// RepositoryLicense represents the license for a repository.
type RepositoryLicense struct {
    Name *string `json:"name,omitempty"`
Path *string `json:"path,omitempty"`

SHA *string `json:"sha,omitempty"`
Size *int `json:"size,omitempty"`
URL *string `json:"url,omitempty"`
HTMLURL *string `json:"html_url,omitempty"`
GitURL *string `json:"git_url,omitempty"`
DownloadURL *string `json:"download_url,omitempty"`
Type *string `json:"type,omitempty"`
Content *string `json:"content,omitempty"`
Encoding *string `json:"encoding,omitempty"`
License *License `json:"license,omitempty"`

func (l RepositoryLicense) String() string {
    return Stringify(l)
}

// License represents an open source license.
type License struct {
    Key *string `json:"key,omitempty"`
    Name *string `json:"name,omitempty"`
    URL  *string `json:"url,omitempty"
    SPDXID         *string   `json:"spdx_id,omitempty"`
    HTMLURL        *string   `json:"html_url,omitempty"
    Featured       *bool     `json:"featured,omitempty"
    Description    *string   `json:"description,omitempty"
    Implementation *string   `json:"implementation,omitempty"
    Permissions    *[]string `json:"permissions,omitempty"
    Conditions     *[]string `json:"conditions,omitempty"
    Limitations    *[]string `json:"limitations,omitempty"
    Body           *string   `json:"body,omitempty"
}

func (l License) String() string {
    return Stringify(l)
}

// List popular open source licenses.
//
// GitHub API docs: https://developer.github.com/v3/licenses/#list-all-licenses
func (s *LicensesService) List(ctx context.Context) (*[]License, *Response, error) {
    req, err := s.client.NewRequest("GET", "licenses", nil)
    if err != nil {
        return nil, nil, err
    }
    return nil, nil, err
}
var licenses []*License
resp, err := s.client.Do(ctx, req, &licenses)
if err != nil {
    return nil, resp, err
}

return licenses, resp, nil

// Get extended metadata for one license.
// GitHub API docs: https://developer.github.com/v3/licenses/#get-an-individual-license
func (s *LicensesService) Get(ctx context.Context, licenseName string) (*License, *Response, error) {
u := fmt.Sprintf("licenses/%s", licenseName)

req, err := s.client.NewRequest("GET", u, nil)
if err != nil {
    return nil, nil, err
}

license := new(License)
resp, err := s.client.Do(ctx, req, license)
if err != nil {
    return nil, resp, err
}

return license, resp, nil

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XZ Embedded  <http://tukaani.org/xz/embedded.html>

The contents of the testdata directory are modified versions of
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XZ Utils  <http://tukaani.org/xz/>

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type Features uint

const FeatureNone Features = 0

func (f Features) HasFeature(flag Features) bool {
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1.658 go-multierror 1.1.1

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1.660 python-defaults 3.8.2-0ubuntu2

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This package was put together by Klee Dienes <klee@debian.org> from sources from ftp.python.org:/pub/python, based on the Debainization by the previous maintainers Bernd S. Brentrup <bsb@uni-muenster.de> and Bruce Perens.

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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py3compile, py3clean and debpython module:

=====================================================================

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1.661 bzip2 1.0.8 2
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Julian Seward, jseward@acm.org
bzip2/libbzip2 version 1.0.8 of 13 July 2019

1.662 libmpc 1.1.0 1
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1.663 zlib 1.2.11

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/* zlib.h -- interface of the 'zlib' general purpose compression library
version 1.2.11, January 15th, 2017

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*/

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$Id: INSTALL,v 2.5 1994/01/15 20:43:43 vixie Exp $

Read the comments at the top of the Makefile, then edit the area marked
'configurable stuff'.

Edit config.h. The stuff I expect you to change is down a bit from the
top of the file, but it's clearly marked. Also look at pathnames.h.

You don't have to create the /var/cron or /var/cron/tabs directories, since
both the daemon and the 'crontab' program will do this the first time they
run if they don't exist. You do need to have a /var, though -- just "mkdir
/var" if you don't have one, or you can "mkdir /usr/var; ln -s /usr/var /var"
if you expect your /var to have a lot of stuff in it.

You will also need /usr/local/etc and /usr/local/bin directories unless you
change the Makefile. These will have to be created by hand, but if you are
a long-time Usenet user you probably have them already. /usr/local/man is
where I keep my man pages, but I have the source for 'man' and you probably
do not. Therefore you may have to put the man pages into /usr/man/manl,
which will be hard since there will be name collisions. (Note that the man
command was originally written by Bill Joy before he left Berkeley, and it
contains no AT&T code, so it is in UUNET's archive of freely-distributable
BSD code.)

LINUX note: /usr/include/paths.h on some linux systems shows _PATH_SENDMAIL
to be /usr/bin/sendmail even though sendmail is installed in /usr/lib.
you should check this out.

say:
make all

su and say:
make install

Note that if I can get you to "su and say" something just by asking, you have
a very serious security problem on your system and you should look into it.

Edit your /usr/lib/crontab file into little pieces -- see the CONVERSION file for help on this.

Use the `crontab' command to install all the little pieces you just created.  Some examples (see below before trying any of these!)

crontab -u uucp -r /usr/lib/uucp/crontab.src

`crontab' command will affect the crontab of the person using the command unless ``-u USER' is given; `-u' only works for root. When using most `su' commands under most BSD's, `crontab' will still think of you as yourself even though you may think of yourself as root -- so use `-u' liberally.  (3) the `-r' option stands for `replace'; check the man page for crontab(1) for other possibilities.

Kill your existing cron daemon -- do `ps aux' and look for /etc/cron.

Edit your /etc/rc or /etc/rc.local, looking for the line that starts up /etc/cron.  Comment it out and add a line to start the new cron daemon -- usually /usr/local/etc/cron, unless you changed it in the Makefile.

Start up this cron daemon yourself as root.  Just type /usr/local/etc/cron (or whatever); no `&' is needed since the daemon forks itself and the process you executed returns immediately.

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Found in path(s):
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Vixie Cron V3.0
December 27, 1993
[V2.2 was some time in 1992]
[V2.1 was May 29, 1991]
[V2.0 was July 5, 1990]
[V2.0-beta was December 9, 1988]
[V1.0 was May 6, 1987]
Paul Vixie

This is a version of 'cron' that is known to run on BSD 4.[23] systems. It is functionally based on the SysV cron, which means that each user can have their own crontab file (all crontab files are stored in a read-protected directory, usually /var/cron/tabs). No direct support is provided for 'at'; you can continue to run 'atrun' from the crontab as you have been doing. If you don't have atrun (i.e., System V) you are in trouble.

A messages is logged each time a command is executed; also, the files "allow" and "deny" in /var/cron can be used to control access to the "crontab" command (which installs crontabs). It hasn't been tested on SysV, although some effort has gone into making the port an easy one.

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To use this: Sorry, folks, there is no cutesy 'Configure' script. You'll have to go edit a couple of files... So, here's the checklist:

Read all the FEATURES, INSTALL, and CONVERSION files
Edit config.h
Edit Makefile
(both of these files have instructions inside; note that some things in config.h are definable in Makefile and are therefore surrounded by #ifndef...#endif)
'make'
'su' and 'make install' 
(you may have to install the man pages by hand)
kill your existing cron process
(actually you can run your existing cron if you want, but why?)
built new crontabs using /usr/lib/(crontab,crontab.local)
(either put them all in "root"'s crontab, or divide it up
and rip out all the 'su' commands, collapse the lengthy
lists into ranges with steps -- basically, this step is
as much work as you want to make it)
start up the new cron
(must be done as root)
watch it. test it with 'crontab -r' and watch the daemon track your
changes.
if you like it, change your /etc/{rc,rc.local} to use it instead of
the old one.

$Id: README,v 2.3 1993/12/28 08:34:43 vixie Exp $

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* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/externs.h
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/pathnames.h

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* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/env.c
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/misc.c
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/job.c
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/entry.c
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/cron.c
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/config.h
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/database.c
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-3.0pl1.orig/crontab.c
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 */
/** */
/**
 */
/** $Id: crontab.5,v 2.4 1994/01/15 20:43:43 vixie Exp $
 */

Found in path(s):
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-
  3.0pl1.orig/crontab.5
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A" * Send bug reports, bug fixes, enhancements, requests, flames, etc., and
A" * I’ll try to keep a version up to date. I can be reached as follows:
A" * Paul Vixie <paul@vix.com> uunet!decwrl!vixie!paul
A" */
A"
A" $Id: cron.8,v 2.2 1993/12/28 08:34:43 vixie Exp $
A"

Found in path(s):
* /opt/cola/permits/1223164981_1635867556.65/0/cron-3-0pl1-orig-tar-bz2/cron-3-0pl1-orig-tar-gz/cron-
3.0pl1.orig/cron.8

1.666 base-files 11ubuntu5.4

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@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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Thanks to: Dan Hoey for his excellent Initial and Inverse permutation
code; Jim Gillogly & Phil Karn for the DES key schedule code; Dennis
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1.676 golang-protobuf-extensions 1.0.2-
0.20181231171920-c182affec369

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1.679 fonts-dejavu 2.37-1

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$\Id$

1.680 python3-6-minimal 3.6.9-1\~18.04ubuntu1.6

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In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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Mersenne Twister

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A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)
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-------

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1.682 util-linux 2.31.1 0.4ubuntu3.7

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1.684 pycrypto 2.6.1-13ubuntu2

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1.685 protobuf 1.24.0

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1.686 paramiko 2.9.1

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1.687 ruamel.yaml 0.17.17

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1.689 diffutils 3.6-1

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1.691 python3.6-venv 3.6.9-1~18.04ubuntu1.6

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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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c-a bundle.crt -- Bundle of CA Root Certificates

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This is a bundle of X.509 certificates of public Certificate Authorities (CA). These were automatically extracted from Mozilla's root certificates file (certdata.txt). This file can be found in the mozilla source tree:
It contains the certificates in PEM format and therefore can be directly used with curl / libcurl / php_curl, or with an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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1.700 netcat 1.10 41.1

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1.701 python-requests 2.18.4

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1.702 urllib3 1.25.8
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# Contributions to the urllib3 project

## Creator & Maintainer

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## Contributors

In chronological order:

* victor.vde <http://code.google.com/u/victor.vde/>
  * HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <http://code.google.com/u/erikcederstrand/>
  * NTLM-authenticated HTTPSConnectionPool
  * Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>
  * Client-verified SSL certificates for HTTPSConnectionPool
  * Response gzip and deflate encoding support
  * Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>
  * Non-multipart encoding for POST requests

* p.dobrogost <http://code.google.com/u/@WBRSRIBZDhBFXQB6/>
  * Code review, PEP8 compliance, benchmark fix

* kennethreitz <me@kennethreitz.com>
  * Bugfixes, suggestions, Requests integration

* georgemarshall <https://github.com/georgemarshall>
  * Bugfixes, Improvements and Test coverage

* Thomas Kluyver <thomas@kluyver.me.uk>
  * Python 3 support
* Brandon Rhodes <http://rhodesmill.org/brandon>
  * Design review, bugfixes, test coverage.

* Studer <theo.studer@gmail.com>
  * IPv6 url support and test coverage

* Shivaram Lingamneni <slingamn@cs.stanford.edu>
  * Support for explicitly closing pooled connections

* Hartator <hartator@gmail.com>
  * Corrected multipart behavior for params

* Thomas Weischuh <thomas@t-8ch.de>
  * Support for TLS SNI
  * API unification of ssl_version/cert_reqs
  * SSL fingerprint and alternative hostname verification
  * Bugfixes in testsuite

* Sune Kirkeby <mig@ibofobi.dk>
  * Optional SNI-support for Python 2 via PyOpenSSL.

* Marc Schlaich <marc.schlaich@gmail.com>
  * Various bugfixes and test improvements.

* Bryce Boe <bbzbryce@gmail.com>
  * Correct six.moves conflict
  * Fixed pickle support of some exceptions

* Boris Figovsky <boris.figovsky@ravelosystems.com>
  * Allowed to skip SSL hostname verification

* Cory Benfield <https://lukasa.co.uk/about/>
  * Stream method for Response objects.
  * Return native strings in header values.
  * Generate 'Host' header when using proxies.

* Jason Robinson <jaywink@basshero.org>
  * Add missing WrappedSocket.fileno method in PyOpenSSL

* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
  * Fixed a race condition

* Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
  * Added HTTPS (CONNECT) proxy support

* Stephen Holsapple <sholsapp@gmail.com>
  * Added abstraction for granular control of request fields
* Martin von Gagern <Martin.vGagern@gmx.net>
  * Support for non-ASCII header parameters

* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
  * Support for separate connect and request timeouts

* Peter Waller <p@pwaller.net>
  * HTTPResponse.tell() for determining amount received over the wire

* Nipunn Koorapati <nipunn1313@gmail.com>
  * Ignore default ports when comparing hosts for equality

* Danilo @dbrgn <https://dbrgn.ch/>
  * Disabled TLS compression by default on Python 3.2+
  * Disabled TLS compression in pyopenssl contrib module
  * Configurable cipher suites in pyopenssl contrib module

* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
  * Account retries on proxy errors

* Nicolas Delaby <nicos.delaby@ezeep.com>
  * Use the platform-specific CA certificate locations

* Josh Schneier <https://github.com/jschneier>
  * HTTPHeaderDict and associated tests and docs
  * Bugfixes, docs, test coverage

* Tahia Khan <http://tahia.tk/>
  * Added Timeout examples in docs

* Arthur Grunseid <https://grunseid.com>
  * source_address support and tests (with https://github.com/bui)

* Ian Cordasco <graffatcolmingov@gmail.com>
  * PEP8 Compliance and Linting
  * Add ability to pass socket options to an HTTP Connection

* Erik Tollerud <erik.tollerud@gmail.com>
  * Support for standard library io module.

* Krishna Prasad <kprasad.iitd@gmail.com>
  * Google App Engine documentation

* Aaron Meurer <asmeurer@gmail.com>
  * Added Url.url, which unparses a Url

* Evgeny Kapun <abacabadabacaba@gmail.com>
* Bugfixes

* Benjamen Meyer <bm_witness@yahoo.com>
  * Security Warning Documentation update for proper capture

* Shivan Sornarajah <github@sornars.com>
  * Support for using ConnectionPool and PoolManager as context managers.

* Alex Gaynor <alex.gaynor@gmail.com>
  * Updates to the default SSL configuration

* Tomas Tomecek <ttomecek@redhat.com>
  * Implemented generator for getting chunks from chunked responses.

* tlynn <https://github.com/tlynn>
  * Respect the warning preferences at import.

* David D. Riddle <ddriddle@illinois.edu>
  * IPv6 bugfixes in testsuite

* Thea Flowers <magicalgirl@google.com>
  * App Engine environment tests.
  * Documentation re-write.

* John Krauss <https://github.com/talos>
  * Clues to debugging problems with `cryptography` dependency in docs

* Disassem <https://github.com/Disassem>
  * Fix pool-default headers not applying for url-encoded requests like GET.

* James Atherfold <jlatherfold@hotmail.com>
  * Bugfixes relating to cleanup of connections during errors.

* Christian Pedersen <https://github.com/chripede>
  * IPv6 HTTPS proxy bugfix

* Jordan Moldow <https://github.com/jmoldow>
  * Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
  * Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
  * Creation of ``HTTPConnectionPool.ResponseCls``.

* Predrag Gruevski <https://github.com/obi1kenobi>
  * Made cert digest comparison use a constant-time algorithm.

* Adam Talsma <https://github.com/a-tal>
  * Bugfix to ca_cert file paths.

* Evan Meagher <https://evanmeagher.net>
* Bugfix related to `memoryview` usage in PyOpenSSL adapter

* John Vandenberg <jayvdb@gmail.com>
  * Python 2.6 fixes; pyflakes and pep8 compliance

* Andy Caldwell <andy.m.caldwell@googlemail.com>
  * Bugfix related to reusing connections in indeterminate states.

* Ville Skytt <ville.skytt@iki.fi>
  * Logging efficiency improvements, spelling fixes, Travis config.

* Shige Takeda <smtakeda@gmail.com>
  * Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

* Jess Shapiro <jesse@jesseshapiro.net>
  * Various character-encoding fixes/tweaks
  * Disabling IPv6 DNS when IPv6 connections not supported

* David Foster <http://dafoster.net/>
  * Ensure order of request and response headers are preserved.

* Jeremy Cline <jeremy@jcline.org>
  * Added connection pool keys by scheme

* Aviv Palivoda <palaviv@gmail.com>
  * History list to Retry object.
  * HTTPResponse contains the last Retry object.

* Nate Prewitt <nate.prewitt@gmail.com>
  * Ensure timeouts are not booleans and greater than zero.
  * Fixed infinite loop in ``stream`` when amt=None.
  * Added length_remaining to determine remaining data to be read.
  * Added enforce_content_length to raise exception when incorrect content-length received.

* Seth Michael Larson <sethmichaellarson@protonmail.com>
  * Created selectors backport that supports PEP 475.

* Alexandre Dias <alex.dias@smarkets.com>
  * Don’t retry on timeout if method not in whitelist

* Moinuddin Quadri <moin18@gmail.com>
  * Lazily load idna package

* Tom White <s6yg1ez3@mail2tor.com>
  * Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

* Tim Burke <tim.burke@gmail.com>
  * Stop buffering entire deflate-encoded responses.
* Tuukka Mustonen <tuukka.mustonen@gmail.com>
  * Add counter for status_forcelist retries.

* Erik Rose <erik@mozilla.com>
  * Bugfix to pyopenssl vendoring

* Wolfgang Richter <wolfgang.richter@gmail.com>
  * Bugfix related to loading full certificate chains with PyOpenSSL backend.

* Mike Miller <github@mikeage.net>
  * Logging improvements to include the HTTP(S) port when opening a new connection

* Ioannis Tziakos <mail@itziakos.gr>
  * Fix `utilselectors._fileobj_to_fd` to accept `long`.
  * Update appveyor tox setup to use the 64bit python.

* Akamai (through Jess Shapiro) <jshapiro@akamai.com>
  * Ongoing maintenance; 2017-2018

* Dominique Leuenberger <dimstar@opensuse.org>
  * Minor fixes in the test suite

* Will Bond <will@wbond.net>
  * Add Python 2.6 support to `contrib.securetransport`

* Aleksei Alekseev <alekseev.yeskela@gmail.com>
  * using auth info for socks proxy

* Chris Wilcox <git@crwilcox.com>
  * Improve contribution guide
  * Add `HTTPResponse.geturl` method to provide `urllib2.urlopen().geturl()` behavior

* Bruce Merry <https://www.brucemerry.org.za>
  * Fix leaking exceptions when system calls are interrupted with zero timeout

* Hugo van Kemenade <https://github.com/hugovk>
  * Drop support for EOL Python 2.6

* Tim Bell <https://github.com/timb07>
  * Bugfix for responses with Content-Type: message/* logging warnings

* Justin Bramley <https://github.com/jbramleycl>
  * Add ability to handle multiple Content-Encodings

* Katsuhiko YOSHIDA <https://github.com/kyoshidajp>
  * Remove Authorization header regardless of case when redirecting to cross-site
* James Meickle <https://permadeath.com/>
* Improve handling of Retry-After header

* Chris Jerdonek <chris.jerdonek@gmail.com>
* Remove a spurious TypeError from the exception chain inside
  HTTPConnectionPool._make_request(), also for BaseExceptions.

* [Your name or handle] <[email or website]>
* [Brief summary of your changes]

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1.703 x-sys 0.0.0-20211103235746-7861aae1554b

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1.708 python3-cffi-backend 1.14.0-1build1

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@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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1.720 docker-cli 0.0.0-20200130152716-5d0cf8839492

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Gocheck - A rich testing framework for Go

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# PCG64

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PCG Random Number Generation for C.

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# SPLITMIX64

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# SFC64

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Adapted from a C++ implementation of Chris Doty-Humphrey's SFC PRNG.

https://gist.github.com/imneme/f1f7821f07cf76504a97f6537c818083
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The rk_random and rk_seed functions algorithms and the original design of the Mersenne Twister RNG:

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Original algorithm for the implementation of rk_interval function from Richard J. Wagner's implementation of the Mersenne Twister RNG, optimised by Magnus Jonsson.

Constants used in the rk_double implementation by Isaku Wada.

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 * Tim Martin
 * Rob Earhart
 * Rob Siemborski
 */

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@heading Vincent Rijmen, Antoon Bosselaers, Paulo Barreto

AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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Written with Symantec's THINK (Lightspeed) C by Richard Outerbridge. Thanks to: Dan Hoey for his excellent Initial and Inverse permutation code; Jim Gillogly & Phil Karn for the DES key schedule code; Dennis Ferguson, Eric Young and Dana How for comparing notes; and Ray Lau, for humouring me on.


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1.727 pep517 0.8.2

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1.731 typing-extensions 4.0.1
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Python was created in the early 1990s by Guido van Rossum at Stichting
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as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
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1.733 text-table 1.6.4

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative
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6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

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Corresponding Source fixed on a durable physical medium
customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product
(including a physical distribution medium), accompanied by a
written offer, valid for at least three years and valid for as
long as you offer spare parts or customer support for that product
model, to give anyone who possesses the object code either (1) a
copy of the Corresponding Source for all the software in the
product that is covered by this License, on a durable physical
medium customarily used for software interchange, for a price no
more than your reasonable cost of physically performing this
conveying of source, or (2) access to copy the
Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the
written offer to provide the Corresponding Source. This
alternative is allowed only occasionally and noncommercially, and
only if you received the object code with such an offer, in accord
with subsection 6b.

d) Convey the object code by offering access from a designated
place (gratis or for a charge), and offer equivalent access to the
Corresponding Source in the same way through the same place at no
further charge. You need not require recipients to copy the
Corresponding Source along with the object code. If the place to
copy the object code is a network server, the Corresponding Source
may be on a different server (operated by you or a third party)
that supports equivalent copying facilities, provided you maintain
clear directions next to the object code saying where to find the
Corresponding Source. Regardless of what server hosts the
Corresponding Source, you remain obligated to ensure that it is
available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided
you inform other peers where the object code and Corresponding
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A separable portion of the object code, whose source code is excluded
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Version 2, June 1991

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble
========

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

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facility is invoked, then you must make a good faith effort
to ensure that, in the event an application does not supply
such function or table, the facility still operates, and
performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots
has a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function
must be optional: if the application does not supply it, the
square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a
library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer’s own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a. Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b. Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
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<th>Directory</th>
</tr>
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<tbody>
<tr>
<td>mach_override</td>
<td>lib/interception/mach_override</td>
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1.735 nettle 3.5.1+really3.5.1-2ubuntu0.2

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SHA224, SHA256, SHA384, and SHA512
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# A grammar to describe tree matching patterns.
# Not shown here:
# - 'TOKEN' stands for any token (leaf node)
# - 'any' stands for any node (leaf or interior)
# With 'any' we can still specify the sub-structure.
# The start symbol is 'Matcher'.

Matcher: Alternatives ENDMARKER

Alternatives: Alternative ('\|' Alternative)*

Alternative: (Unit | NegatedUnit)+

Unit: [NAME '='] ( STRING [Repeater]
    | NAME [Details] [Repeater]
    | (' Alternatives ') [Repeater]
    | ']' Alternatives ']
)

NegatedUnit: 'not' (STRING | NAME [Details] | '(' Alternatives ')')

Repeater: '*' | '+' | '{' NUMBER [',' NUMBER] '}'

Details: '<' Alternatives '>'

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* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/distutils/cygwinccompiler.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/distutils/command/bdist_wininst.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/distutils/command/bdist_msi.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/distutils/command/bdist_wininst.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/distutils/command/bdist_msi.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/distutils/command/bdist_msi.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/distutils/command/bdist_wininst.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/distutils/cygwinccompiler.py

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Found in path(s):
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/pgen2/driver.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/pgen2/driver.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/pgen2/driver.py

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executable.

Found in path(s):
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/distutils/spawn.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/distutils/spawn.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/distutils/spawn.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/distutils/spawn.py

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('binary-only', None,
"cannot supply both '--source-only' and '--binary-only'"
)
'License': ' + self.distribution.get_license(),

Found in path(s):
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/distutils/command/bdist_rpm.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/distutils/command/bdist_rpm.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/distutils/command/bdist_rpm.py
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Found in path(s):
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* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/fixtures/fix_repr.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/fixtures/fix_repr.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/fixtures/fix_execfile.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/fixtures/fix_execfile.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/fixtures/fix_long.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/pytree.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixtures/fix_exec.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixtures/fixer_base.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/fixtures/fix_exec.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/fixtures/fixer_base.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/fixtures/fix_long.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/tests/test_pytree.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.8/Lib/lib2to3/tests/test_pytree.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixtures/fix_has_key.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixtures/fix_has_key.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixtures/refactor.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.6/Lib/lib2to3/fixtures/pytree_idempotency.py
* /opt/ws_local/PERMITS_SQL/1016069485_1591897890.69/0/python3-stdlib-extensions-3.6-9-orig-tar-bz2/python3-stdlib-extensions-3.7.5/3.7/Lib/lib2to3/fixtures/fix_apply.py
1.738 sanitized-anchor-name 1.0.0

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1.739 libxcursor 1.1.15-1
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1.741 ucf 3.0038

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1.742 netty-buffer 4.1.67.Final
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Manifest-Version: 1.0
Implementation-Title: Netty/Buffer
Bundle-Description: Netty is an asynchronous event-driven network application framework for rapid development of maintainable high performance protocol servers and clients.
Automatic-Module-Name: io.netty.buffer
Bundle-License: https://www.apache.org/licenses/LICENSE-2.0
Bundle-SymbolicName: io.netty.buffer
Implementation-Version: 4.1.67.Final
Built-By: norman
Bnd-LastModified: 1629104574614
Bundle-ManifestVersion: 2
Implementation-Vendor-Id: io.netty
Bundle-DocURL: https://netty.io/
Bundle-Vendor: The Netty Project
Import-Package: io.netty.util;version=\"[4.1,5)\", io.netty.util.concurrent;version=\"[4.1,5)\", io.netty.util.internal;version=\"[4.1,5)\", io.netty.util.internal.logging;version=\"[4.1,5)\", sun.nio.ch;resolution=optional, org.eclipse.jetty.npn;version=\"[1,2)\";resolution=optional, org.eclipse.jetty.alpn;version=\"[1,2)\";resolution=optional
Require-Capability: osgi.ee;filter=\"(&(osgi.ee=JavaSE)(version=1.6))\"
Tool: Bnd-2.4.1.201501161923
Implementation-Vendor: The Netty Project
Export-Package: io.netty.buffer;uses=\"io.netty.util\";version=\"4.1.67\" ,io.netty.buffer.search;uses=\"io.netty.util\";version=\"4.1.67\"
Bundle-Name: Netty/Buffer
Bundle-Version: 4.1.67.Final
Created-By: Apache Maven Bundle Plugin
Build-Jdk: 1.8.0_252
Implementation-URL: https://netty.io/netty-buffer/

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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Version 3.1, 31 March 2009

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=========

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1.753 berkeley-db 5.3.28-13.1ubuntu1

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* /opt/cola/permits/1189736168_1643748553.34/0/kubernetes-model-common-4-13-2-sources-jar/io/fabric8/kubernetes/model/annotation/PackageSuffix.java

1.756 commons-codec 1.15

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1.758 x-crypto 0.0.0-20200622213623-75b288015ac9

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1.759 nghttp2 1.40.0-1build1

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set yrange [0:]
set terminal pngcairo font 'Sans, 8' lw 1 size 1400,1024
set xtics rotate by -45
set style histogram errorbars gap 2 lw 1
set style fill solid border -1
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1.760 go-openapi-spec 0.19.3

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  //
package spec

import "testing"

func TestIntegrationLicense(t *testing.T) {
    license := License{Name: "the name", URL: "the url"}
    const licenseJSON = `{"name":"the name","url":"the url"}`
    const licenseYAML = "name: the name\nurl: the url"

    assertSerializeJSON(t, license, licenseJSON)
    assertSerializeYAML(t, license, licenseYAML)
    assertParsesJSON(t, licenseJSON, license)
    assertParsesYAML(t, licenseYAML, license)
}

package spec

// License information for the exposed API.

// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
    Name string `json:"name",omitempty"`
    URL  string `json:"url",omitempty"`
}

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1.761 typing 4.0.1

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=================================

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
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1.762 python-cryptography 2.1.4 1ubuntu1.4

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   (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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1.780 types-enum34 1.1.1

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Metadata-Version: 2.1
Name: types-enum34
Version: 1.1.1
Summary: Typing stubs for enum34
Home-page: https://github.com/python/typeshed
License: Apache-2.0 license
Platform: UNKNOWN
Classifier: License :: OSI Approved :: Apache Software License
Classifier: Typing :: Typed
Description-Content-Type: text/markdown

## Typing stubs for enum34

This is a PEP 561 type stub package for the `enum34` package. It can be used by type-checking tools like mypy, PyCharm, pytype etc. to check code that uses `enum34`. The source for this package can be found at https://github.com/python/typeshed/tree/master/stubs/enum34. All fixes for types and metadata should be contributed there.

See https://github.com/python/typeshed/blob/master/README.md for more details.

This package was generated from typeshed commit `9f869723509ac027bae6b6f567b921d6a229e8ec`.

Found in path(s):
* /opt/cola/permits/1228747660_1643391577.05/0/types-enum34-1-1-1-tar-gz/types-enum34-1.1.1/types_enum34.egg-info/PKG-INFO
* /opt/cola/permits/1228747660_1643391577.05/0/types-enum34-1-1-1-tar-gz/types-enum34-1.1.1/PKG-INFO
1.781 iconv 2.31

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Written by: Philip Hazel
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   Jean-loup Gailly        Mark Adler
   jloup@gzip.org          madler@alumni.caltech.edu

   The data format used by the zlib library is described by RFCs (Request for
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*/

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[fp16]

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1.786 python-webencodings 0.5
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1.789 pango 1.40.14 1ubuntu0.1
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## Typing stubs for ipaddress

This is a PEP 561 type stub package for the `ipaddress` package.
It can be used by type-checking tools like mypy, PyCharm, pytype etc. to check code
that uses `ipaddress`. The source for this package can be found at
https://github.com/python/typeshed/tree/master/stubs/ipaddress. All fixes for
types and metadata should be contributed there.

See https://github.com/python/typeshed/blob/master/README.md for more details.
This package was generated from typeshed commit `9f869723509ac027bae6b6f567b921d6a229e8ec`.

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1.800 influxdata-wlog 0.0.0-20160411224016-7c63b0a71ef8

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1.801 prometheus 1.8.2-0.20200911110723-e83ef207b6c2

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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
    Name string `json:"name,omitempty"`
    URL  string `json:"url,omitempty"`
}

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procfs provides functions to retrieve system, kernel and process metrics from the pseudo-filesystem proc.

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Protocol Buffers for Go with Gadgets

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Go support for Protocol Buffers - Google's data interchange format

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* https://github.com/eclipse-ee4j/common-annotations-api

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*/
/* checkTag : validation tool for libzstd
* command :
* $ ./checkTag tag
* checkTag validates tags of following format : v[0-9].[0-9].[0-9]{any}
* The tag is then compared to zstd version number.
* They are compatible if first 3 digits are identical.
* Anything beyond that is free, and doesn't impact validation.
* Example : tag v1.8.1.2 is compatible with version 1.8.1
* When tag and version are not compatible, program exits with error code 1.
* When they are compatible, it exists with a code 0.
* checkTag is intended to be used in automated testing environment.
*/

1.807 x-oauth2 0.0.0-20211104180415-d3ed0bb246c8

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1.808 hostname 3.20

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hostname -- set the host name or show the host/domain name

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1.809 pycparser 2.21

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pycparser -- A C parser in Python

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procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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1.811 python3-idna 2.6-1

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Metadata-Version: 1.1
Name: idna
Version: 2.6
Summary: Internationalized Domain Names in Applications (IDNA)
Home-page: https://github.com/kjd/idna
Author: Kim Davies
Author-email: kim@cynosure.com.au
License: BSD-like
Description: Internationalized Domain Names in Applications (IDNA)

Support for the Internationalised Domain Names in Applications
(IDNA) protocol as specified in `RFC 5891 <http://tools.ietf.org/html/rfc5891>`_.
This is the latest version of the protocol and is sometimes referred to as
“IDNA 2008”.

This library also provides support for Unicode Technical Standard 46,
`Unicode IDNA Compatibility Processing <http://unicode.org/reports/tr46>`_.

This acts as a suitable replacement for the “encodings.idna” module that
comes with the Python standard library, but only supports the

Basic functions are simply executed:
.. code-block:: pycon

    # Python 3
    >>> import idna
    >>> idna.encode('.')
    b'xn--eckwd4c7c.xn--zckzah'
    >>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
    .

    # Python 2
    >>> import idna
    >>> idna.encode(u'.')
    'xn--eckwd4c7c.xn--zckzah'
    >>> print idna.decode('xn--eckwd4c7c.xn--zckzah')
    .

Packages
--------

The latest tagged release version is published in the PyPI repository:

.. image:: https://badge.fury.io/py/idna.svg
   :target: http://badge.fury.io/py/idna

Installation
------------

To install this library, you can use pip:

.. code-block:: bash

    $ pip install idna

Alternatively, you can install the package using the bundled setup script:

.. code-block:: bash

    $ python setup.py install

This library works with Python 2.6 or later, and Python 3.3 or later.

Usage
-----

For typical usage, the ``encode`` and ``decode`` functions will take a domain
name argument and perform a conversion to A-labels or U-labels respectively.

```python
# Python 3
>>> import idna
>>> idna.encode('.')
'b'xn--eckwd4c7c.xn--zckzah'
>>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
```

You may use the codec encoding and decoding methods using the `idna.codec` module:

```python
# Python 2
>>> import idna.codec
>>> print u'.'.encode('idna')
xn--80ahd1agd.xn--80akhbyknj4f
>>> print 'xn--80ahd1agd.xn--80akhbyknj4f'.decode('idna')
```

Conversions can be applied at a per-label basis using the `ulabel` or `alabel` functions if necessary:

```python
# Python 2
>>> idna.alabel(u''
'xn--0zwm56d'
```

Compatibility Mapping (UTS #46)

As described in `RFC 5895 <http://tools.ietf.org/html/rfc5895>`, the IDNA specification no longer normalizes input from different potential ways a user may input a domain name. This functionality, known as a “mapping”, is now considered by the specification to be a local user-interface issue distinct from IDNA conversion functionality.

This library provides one such mapping, that was developed by the Unicode Consortium. Known as `Unicode IDNA Compatibility Processing <http://unicode.org/reports/tr46/>`, it provides for both a regular mapping for typical applications, as well as a transitional mapping to help migrate from older IDNA 2003 applications.

For example, “Königsgäßchen” is not a permissible label as *LATIN CAPITAL LETTER K* is not allowed (nor are capital letters in general). UTS 46 will
convert this into lower case prior to applying the IDNA conversion.

.. code-block:: pycon

    # Python 3
    >>> import idna
    >>> idna.encode(u'Königsgäßchen')
    ...
    idna.core.InvalidCodepoint: Codepoint U+004B at position 1 of 'Königsgäßchen' not allowed
    >>> idna.encode('Königsgäßchen', uts46=True)
    b'xn--knigsgchen-b4a3dun'
    >>> print(idna.decode('xn--knigsgchen-b4a3dun'))
    königsgäßchen

Transitional processing provides conversions to help transition from the older 2003 standard to the current standard. For example, in the original IDNA specification, the *LATIN SMALL LETTER SHARP S* (ß) was converted into two *LATIN SMALL LETTER S* (ss), whereas in the current IDNA specification this conversion is not performed.

.. code-block:: pycon

    # Python 2
    >>> idna.encode(u'Königsgäßchen', uts46=True, transitional=True)
    'xn--knigsgsschen-lcb0w'

Implementors should use transitional processing with caution, only in rare cases where conversion from legacy labels to current labels must be performed (i.e. IDNA implementations that pre-date 2008). For typical applications that just need to convert labels, transitional processing is unlikely to be beneficial and could produce unexpected incompatible results.

``encodings.idna`` Compatibility

++++++++++++++++++++++++++++++

Function calls from the Python built-in ``encodings.idna`` module are mapped to their IDNA 2008 equivalents using the ``idna.compat`` module. Simply substitute the ``import`` clause in your code to refer to the new module name.

Exceptions

--------

All errors raised during the conversion following the specification should raise an exception derived from the ``idna.IDNAError`` base class.

More specific exceptions that may be generated as ``idna.IDNABidiError`` when the error reflects an illegal combination of left-to-right and right-to-left
characters in a label: `idna.InvalidCodepoint` when a specific codepoint is an illegal character in an IDN label (i.e. INVALID); and `idna.InvalidCodepointContext` when the codepoint is illegal based on its positional context (i.e. it is CONTEXTO or CONTEXTJ but the contextual requirements are not satisfied.)

Building and Diagnostics
------------------------

The IDNA and UTS 46 functionality relies upon pre-calculated lookup tables for performance. These tables are derived from computing against eligibility criteria in the respective standards. These tables are computed using the command-line script `tools/idna-data`.

This tool will fetch relevant tables from the Unicode Consortium and perform the required calculations to identify eligibility. It has three main modes:

* `idna-data make-libdata`. Generates `idnadata.py` and `uts46data.py`, the pre-calculated lookup tables using for IDNA and UTS 46 conversions. Implementors who wish to track this library against a different Unicode version may use this tool to manually generate a different version of the `idnadata.py` and `uts46data.py` files.

* `idna-data make-table`. Generate a table of the IDNA disposition (e.g. PVALID, CONTEXTJ, CONTEXTO) in the format found in Appendix B.1 of RFC 5892 and the pre-computed tables published by IANA.

* `idna-data U+0061`. Prints debugging output on the various properties associated with an individual Unicode codepoint (in this case, U+0061), that are used to assess the IDNA and UTS 46 status of a codepoint. This is helpful in debugging or analysis.

The tool accepts a number of arguments, described using `idna-data -h`. Most notably, the `--version` argument allows the specification of the version of Unicode to use in computing the table data. For example, `idna-data --version 9.0.0 make-libdata` will generate library data against Unicode 9.0.0.

Note that this script requires Python 3, but all generated library data will work in Python 2.6+.

Testing
-------

The library has a test suite based on each rule of the IDNA specification, as well as tests that are provided as part of the Unicode Technical Standard 46, `Unicode IDNA Compatibility Processing`.

The tests are run automatically on each commit at Travis CI:
A library to support the Internationalised Domain Names in Applications (IDNA) protocol as specified in RFC 5890 et.al. This new methodology, known as IDNA 2008, can generate materially different results to the previous standard. The library can act as a drop-in replacement for the "encodings.idna" module.

import io, sys
from setuptools import setup

def main():

    python_version = sys.version_info[:2]
    if python_version < (2,6):
        raise SystemExit("Sorry, Python 2.6 or newer required")

    package_data = {}
    exec(open('idna/package_data.py').read(), package_data)
arguments = {
    'name': 'idna',
    'packages': ['idna'],
    'version': package_data['__version__'],
    'description': 'Internationalized Domain Names in Applications (IDNA)',
    'long_description': io.open("README.rst", encoding="UTF-8").read(),
    'author': 'Kim Davies',
    'author_email': 'kim@cynosure.com.au',
    'license': 'BSD-like',
    'url': 'https://github.com/kjd/idna',
    'classifiers': [
        'Development Status :: 5 - Production/Stable',
        'Intended Audience :: Developers',
        'Intended Audience :: System Administrators',
        'License :: OSI Approved :: BSD License',
        'Operating System :: OS Independent',
        'Programming Language :: Python',
        'Programming Language :: Python :: 2.6',
        'Programming Language :: Python :: 2.7',
        'Programming Language :: Python :: 3',
        'Programming Language :: Python :: 3.3',
        'Programming Language :: Python :: 3.4',
        'Programming Language :: Python :: 3.5',
        'Programming Language :: Python :: 3.6',
        'Topic :: Internet :: Name Service (DNS)',
        'Topic :: Software Development :: Libraries :: Python Modules',
        'Topic :: Utilities',
    ],
    'test_suite': 'tests',
}

setup(**arguments)

if __name__ == '__main__':
    main()

Found in path(s):
* /opt/cola/permits/1114240575_1607457212.69/0/python-idna-2.6-orig-1-tar-gz/idna-2.6/setup.py

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jar/org/reactivestreams/Publisher.java
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1.813 okhttp 3.14.9
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Bnd-LastModified: 1575980548657
Build-Jdk: 1.8.0_232
Built-By: gil
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AES in libhcrypto

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@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

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interface-compatible with the version that the work was made with.

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice
1.821 webencodings 0.5.1

1.821.1 Available under license:

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* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0-5-1-1-tar-gz/webencodings-0.5.1/webencodings/x_user_defined.py
* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0-5-1-1-tar-gz/webencodings-0.5.1/webencodings/tests.py
* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0-5-1-1-tar-gz/webencodings-0.5.1/webencodings/labels.py
* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0-5-1-1-tar-gz/webencodings-0.5.1/webencodings/__init__.py

No license file was found, but licenses were detected in source scan.

from setuptools import setup, find_packages
import io
import os
import re

VERSION = re.search("VERSION = '\([^']\)+'\", io.open(
    path.join(path.dirname(__file__), 'webencodings', '__init__.py'),
    encoding='utf-8')
).read().strip() .group(1)

LONG_DESCRIPTION = io.open(
    path.join(path.dirname(__file__), 'README.rst'),
    encoding='utf-8')
).read()

setup(
    name='webencodings',
    version=VERSION,
    url='https://github.com/SimonSapin/python-webencodings',
    license='BSD',
    author='Simon Sapin',
    author_email='simon.sapin@exyr.org',
    maintainer='Geoffrey Sneddon',
    maintainer_email='me@gsnedders.com',
    description='Character encoding aliases for legacy web content',
    )
long_description=LONG_DESCRIPTION,
classifiers=[
    'Development Status :: 4 - Beta',
    'Intended Audience :: Developers',
    'License :: OSI Approved :: BSD License',
    'Programming Language :: Python',
    'Programming Language :: Python :: 2',
    'Programming Language :: Python :: 2.6',
    'Programming Language :: Python :: 2.7',
    'Programming Language :: Python :: 3',
    'Programming Language :: Python :: 3.3',
    'Programming Language :: Python :: 3.4',
    'Programming Language :: Python :: 3.5',
    'Programming Language :: Python :: 3.6',
    'Programming Language :: Python :: Implementation :: CPython',
    'Programming Language :: Python :: Implementation :: PyPy',
    'Topic :: Internet :: WWW/HTTP',
],
packages=find_packages(),
)

Found in path(s):
* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0.5.1-1.tar.gz/webencodings-0.5.1/setup.py
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==

webencodings.mklabels
~~~~~~~~~~~~~~~~~~~~~

Regenerate the webencodings.labels module.

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==

import json
try:
    from urllib import urlopen
except ImportError:
    from urllib.request import urlopen

def assert_lower(string):
    assert string == string.lower()
    return string
def generate(url):
    parts = ['""
    
    webencodings.labels
    ~~~~~~~~~~~~~~~~~~~~
    
    Map encoding labels to their name.
    
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    :license: BSD, see LICENSE for details.
    
    # XXX Do not edit!
    # This file is automatically generated by mklabels.py

    LABELS = {
        
        labels = [
            (repr(assert_lower(label)).lstrip('u'),
             repr(encoding['name']).lstrip('u'))
            for category in json.loads(urlopen(url).read().decode('ascii'))
            for encoding in category['encodings']
            for label in encoding['labels']]
        max_len = max(len(label) for label, name in labels)
        parts.extend(
            '    %s:%s %s,
' % (label, ' ' * (max_len - len(label)), name)
            for label, name in labels)
        parts.append('}"
    
    if __name__ == '__main__':
        print(generate('http://encoding.spec.whatwg.org/encodings.json'))

    Found in path(s):
* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0.5.1/webencodings/mklabels.py
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Metadata-Version: 1.1
Name: webencodings
Version: 0.5.1
Summary: Character encoding aliases for legacy web content
Home-page: https://github.com/SimonSapin/python-webencodings
Author: Geoffrey Sneddon
This is a Python implementation of the `WHATWG Encoding standard <http://encoding.spec.whatwg.org/>`_.

* Latest documentation: http://packages.python.org/webencodings/
* Source code and issue tracker: https://github.com/gsnedders/python-webencodings
* PyPI releases: http://pypi.python.org/pypi/webencodings
* License: BSD
* Python 2.6+ and 3.3+

In order to be compatible with legacy web content
when interpreting something like `Content-Type: text/html; charset=latin1`,
tools need to use a particular set of aliases for encoding labels
as well as some overriding rules.
For example, ``US-ASCII`` and ```iso-8859-1``` on the web are actually
aliases for ```windows-1252```, and an UTF-8 or UTF-16 BOM takes precedence
over any other encoding declaration.
The Encoding standard defines all such details so that implementations do
not have to reverse-engineer each other.

This module has encoding labels and BOM detection,
but the actual implementation for encoders and decoders is Pythons.

Platform: UNKNOWN
Classifier: Development Status :: 4 - Beta
Classifier: Intended Audience :: Developers
Classifier: License :: OSI Approved :: BSD License
Classifier: Programming Language :: Python
Classifier: Programming Language :: Python :: 2
Classifier: Programming Language :: Python :: 2.6
Classifier: Programming Language :: Python :: 2.7
Classifier: Programming Language :: Python :: 3
Classifier: Programming Language :: Python :: 3.3
Classifier: Programming Language :: Python :: 3.4
Classifier: Programming Language :: Python :: 3.5
Classifier: Programming Language :: Python :: 3.6
Classifier: Programming Language :: Python :: Implementation :: CPython
Classifier: Programming Language :: Python :: Implementation :: PyPy
Classifier: Topic :: Internet :: WWW/HTTP

Found in path(s):
* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0-5-1-1-tar-gz/webencodings-0.5.1/PKG-INFO
* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0-5-1-1-tar-gz/webencodings-
python-webencodings

This is a Python implementation of the `WHATWG Encoding standard`
<http://encoding.spec.whatwg.org/>.

* Latest documentation: http://packages.python.org/webencodings/
* Source code and issue tracker:
  https://github.com/gsnedders/python-webencodings
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The Encoding standard defines all such details so that implementations do
not have to reverse-engineer each other.

This module has encoding labels and BOM detection,
but the actual implementation for encoders and decoders is Pythons.

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* /opt/cola/permits/1110814957_1606854649.94/0/webencodings-0.5.1-1-tar-gz/webencodings-0.5.1/README.rst

1.822 x-text 0.3.6

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1.823 six 1.14.0

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The primary author and maintainer of six is Benjamin Peterson. He would like to
acknowledge the following people who submitted bug reports, pull requests, and
otherwise worked to improve six:

Marc Abramowitz
immerrr again
Alexander Artemenko
Aymeric Augustin
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1.824 ghodss-yaml 1.0.1-0.20190212211648-25d852aebe32
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1.825 libvorbisfile 1.3.6-2ubuntu1

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1.826 tdb 1.4.3-0ubuntu0.20.04.1

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1.827 cpp-7 7.5.0-3ubuntu1~18.04

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bzip2/libbzip2 version 1.0.6 of 6 September 2010

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The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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When a "work that uses the Library" uses material from a header file
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Whether this is true is especially significant if the work can be
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threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
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Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
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6. As an exception to the Sections above, you may also combine or
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a) Accompany the work with the complete corresponding
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Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable “work that
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to use the modified definitions.)

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which the executable runs, unless that component itself accompanies
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because
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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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b. Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c. If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d. Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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   (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any
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(34) - Jon Beniston (only lm32-* targets)

Contributed by Jon Beniston <jon@beniston.com>

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Developed by:

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<table>
<thead>
<tr>
<th>Program</th>
<th>Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>mach_override</td>
<td>lib/interception/mach_override</td>
</tr>
</tbody>
</table>

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1.828 jwt-go 3.2.0+incompatible
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1.829 aws-sdk-go-v2 1.2.2
1.829.1 Available under license:
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (  
"context"  
awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"  
"github.com/aws/aws-sdk-go-v2/aws/signer/v4"  
"github.com/aws/aws-sdk-go-v2/service/licensemanager/types"  
"github.com/aws/smithy-go/middleware"  
smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Deletes the specified license.
func (c *Client) DeleteLicense(ctx context.Context, params *DeleteLicenseInput, optFns ...func(*Options)) (*DeleteLicenseOutput, error) {  
if params == nil {  
params = &DeleteLicenseInput{}  
}  
result, metadata, err := c.invokeOperation(ctx, "DeleteLicense", params, optFns, addOperationDeleteLicenseMiddlewares)  
if err != nil {  
return nil, err  
}
out := result.(*DeleteLicenseOutput)
out.ResultMetadata = metadata
return out, nil

}

type DeleteLicenseInput struct {

// Amazon Resource Name (ARN) of the license.
//
// This member is required.
LicenseArn *string

// Current version of the license.
//
// This member is required.
SourceVersion *string

}

type DeleteLicenseOutput struct {

// Date on which the license is deleted.
DeletionDate *string

// License status.
Status types.LicenseDeletionStatus

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

}

func addOperationDeleteLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
err = stack.Serialize.Add(&awsAwsjson11_serializeOpDeleteLicense{}, middleware.After)
if err != nil {
    return err
}
err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpDeleteLicense{}, middleware.After)
if err != nil {
    return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpDeleteLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDeleteLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opDeleteLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Lists received licenses.
func (c *Client) ListReceivedLicenses(ctx context.Context, params *ListReceivedLicensesInput, optFns ...
    func(*Options)) (*ListReceivedLicensesOutput, error) {
    if params == nil {
        params = &ListReceivedLicensesInput{
    }
    }
    result, metadata, err := c.invokeOperation(ctx, "ListReceivedLicenses", params, optFns,
        addOperationListReceivedLicensesMiddlewares)
    if err != nil {
        return nil, err
    }
    out := result.(*ListReceivedLicensesOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type ListReceivedLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // ProductSKU
    //
    // * Status
//
//@ KeyFingerprint
//@
//@ Issuer
Filters []types.Filter

// Amazon Resource Names (ARNs) of the licenses.
LicenseArns []string

// Maximum number of results to return in a single call.
MaxResults *int32

// Token for the next set of results.
NextToken *string

} type ListReceivedLicensesOutput struct {

// Received license details.
Licenses []types.GrantedLicense

// Token for the next set of results.
NextToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}

func addOperationListReceivedLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListReceivedLicenses{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
}

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if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsMiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsMiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListReceivedLicenses(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opListReceivedLicenses(region string)
    *awsMiddleware.RegisterServiceMetadata {
    return &awsMiddleware.RegisterServiceMetadata{
      Region:     region,
      ServiceID: ServiceID,
      SigningName: "license-manager",
      OperationName: "ListReceivedLicenses",}
package licensemanager

)

// Creates a license.
func (c *Client) CreateLicense(ctx context.Context, params *CreateLicenseInput, optFns ...func(*Options)) (*CreateLicenseOutput, error) {
    if params == nil {
        params = &CreateLicenseInput{
    }

    result, metadata, err := c.invokeOperation(ctx, "CreateLicense", params, optFns, addOperationCreateLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CreateLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CreateLicenseInput struct {

    // License beneficiary.
    //
    // This member is required.
    Beneficiary *string

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    //
    // This member is required.
    ClientToken *string

    // Configuration for consumption of the license. Choose a provisional configuration
    // for workloads running with continuous connectivity. Choose a borrow

}
// configuration for workloads with offline usage.
//
// This member is required.
ConsumptionConfiguration *types.ConsumptionConfiguration

// License entitlements.
//
// This member is required.
Entitlements []types.Entitlement

// Home Region for the license.
//
// This member is required.
HomeRegion *string

// License issuer.
//
// This member is required.
Issuer *types.Issuer

// License name.
//
// This member is required.
LicenseName *string

// Product name.
//
// This member is required.
ProductName *string

// Product SKU.
//
// This member is required.
ProductSKU *string

// Date and time range during which the license is valid, in ISO8601-UTC format.
//
// This member is required.
Validity *types.DatetimeRange

// Information about the license.
LicenseMetadata []types.Metadata

}
// License status.
Status types.LicenseStatus

// License version.
Version *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationCreateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }

    if err != nil {
        return err
    }

    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }

    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }

    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }

    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }

    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }

    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }

    if err = addHTTPSingerV4Middleware(stack, options); err != nil {
        return err
    }

    if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }

    if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }

    if err = addClientUserAgent(stack); err != nil {
        return err
    }
}
func newServiceMetadataMiddleware_opCreateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region: region,
        ServiceID: ServiceID,
        SigningName: "license-manager",
        OperationName: "CreateLicense",
    }
}

// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}
// Checks out the specified license.
func (c *Client) CheckoutLicense(ctx context.Context, params *CheckoutLicenseInput, optFns ...func(*Options)) (*CheckoutLicenseOutput, error) {
    if params == nil {
        params = &CheckoutLicenseInput{
        }
    }

    result, metadata, err := c.invokeOperation(ctx, "CheckoutLicense", params, optFns,
addOperationCheckoutLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*CheckoutLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type CheckoutLicenseInput struct {

    // Checkout type.
    //
    // This member is required.
    CheckoutType types.CheckoutType

    // Unique, case-sensitive identifier that you provide to ensure the idempotency of
    // the request.
    //
    // This member is required.
    ClientToken *string

    // License entitlements.
    //
    // This member is required.
    Entitlements []types.EntitlementData

    // Key fingerprint identifying the license.
    //
    // This member is required.
    KeyFingerprint *string

    // Product SKU.
    //
    // This member is required.
    ProductSKU *string

    // License beneficiary.
    Beneficiary *string
// Node ID.
NodeId *string

type CheckoutLicenseOutput struct {

// Checkout type.
CheckoutType types.CheckoutType

// Allowed license entitlements.
EntitlementsAllowed []types.EntitlementData

// Date and time at which the license checkout expires.
Expiration *string

// Date and time at which the license checkout is issued.
IssuedAt *string

// License consumption token.
LicenseConsumptionToken *string

// Node ID.
NodeId *string

// Signed token.
SignedToken *string

// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata
}

func addOperationCheckoutLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
}
return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSingerV4Middleware(stack, options); err != nil {
    return err
}
if err = aws.ToMetadata(stack); err != nil {
    return err
}
if err = aws.ToRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.ToExceptionBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.ToCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutLicense(options.Region),
middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
func newServiceMetadataMiddleware_opCheckoutLicense(region string) *awsmiddleware.RegisterServiceMetadata
{
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckoutLicense",
    }
}

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// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (  
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)
// Checks out the specified license for offline use.
func (c *Client) CheckoutBorrowLicense(ctx context.Context, params *CheckoutBorrowLicenseInput, optFns ...
func(*Options)) (*CheckoutBorrowLicenseOutput, error) {
  if params == nil {
    params = &CheckoutBorrowLicenseInput{} 
  }
  
  result, metadata, err := c.invokeOperation(ctx, "CheckoutBorrowLicense", params, optFns,
  addOperationCheckoutBorrowLicenseMiddlewares)
  if err != nil {
    return nil, err 
  }
  
  out := result.(*CheckoutBorrowLicenseOutput)
  out.ResultMetadata = metadata
  return out, nil 
}

type CheckoutBorrowLicenseInput struct {

  // Unique, case-sensitive identifier that you provide to ensure the idempotency of
  // the request.
  //
  // This member is required.
  ClientToken *string

  // Digital signature method. The possible value is JSON Web Signature (JWS)
  // algorithm PS384. For more information, see RFC 7518 Digital Signature with
  //
  // This member is required.
  DigitalSignatureMethod types.DigitalSignatureMethod

  // License entitlements. Partial checkouts are not supported.
  //
  // This member is required.
  Entitlements []types.EntitlementData

  // Amazon Resource Name (ARN) of the license. The license must use the borrow
  // consumption configuration.
  //
  // This member is required.
  LicenseArn *string

  // Information about constraints.
  CheckoutMetadata []types.Metadata
}
// Node ID.
NodeId *string
}

type CheckoutBorrowLicenseOutput struct {

    // Information about constraints.
    CheckoutMetadata []types.Metadata

    // Allowed license entitlements.
    EntitlementsAllowed []types.EntitlementData

    // Date and time at which the license checkout expires.
    Expiration *string

    // Date and time at which the license checkout is issued.
    IssuedAt *string

    // Amazon Resource Name (ARN) of the license.
    LicenseArn *string

    // License consumption token.
    LicenseConsumptionToken *string

    // Node ID.
    NodeId *string

    // Signed token.
    SignedToken *string

    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationCheckoutBorrowLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
}
if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
    return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSignerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckoutBorrowLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutBorrowLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
func newServiceMetadataMiddleware_opCheckoutBorrowLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "CheckoutBorrowLicense",
    }
}

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package licensemanager

import (  
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Lists the licenses for your account.
func (c *Client) ListLicenses(ctx context.Context, params *ListLicensesInput, optFns ...func(*Options)) (*ListLicensesOutput, error) {
    if params == nil {
        params = &ListLicensesInput{
    }

    result, metadata, err := c.invokeOperation(ctx, "ListLicenses", params, optFns,
    addOperationListLicensesMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*ListLicensesOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type ListLicensesInput struct {

    // Filters to scope the results. The following filters are supported:
    //
    // *
    // Beneficiary


func addOperationListLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
    return err
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSingerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.CloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListLicenses(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opListLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:     region,
        ServiceID:  ServiceID,
        SigningName: "license-manager",
// Code generated by smithy-go-codegen DO NOT EDIT.

package licencemanager

import (
    "context"
    awsrmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/aws-sdk-go-v2/service/licencemanager/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Gets detailed information about the specified license.
func (c *Client) GetLicense(ctx context.Context, params *GetLicenseInput, optFns ...func(*Options)) (*GetLicenseOutput, error) {
    if params == nil {
        params = &GetLicenseInput{ }
    }

    result, metadata, err := c.invokeOperation(ctx, "GetLicense", params, optFns, addOperationGetLicenseMiddlewares)
    if err != nil {
        return nil, err
    }

    out := result.(*GetLicenseOutput)
    out.ResultMetadata = metadata
    return out, nil
}

type GetLicenseInput struct {

    // Amazon Resource Name (ARN) of the license.
    // This member is required.
    LicenseArn *string

    // License version.
    Version *string
}

type GetLicenseOutput struct {

    // License details.
    License *types.License
// Metadata pertaining to the operation's result.
ResultMetadata middleware.Metadata

func addOperationGetLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    if err != nil {
        return err
    }
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsMiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
    if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
        return err
    }
    if err = addRetryMiddlewares(stack, options); err != nil {
        return err
    }
    if err = addHTTPSignerV4Middleware(stack, options); err != nil {
        return err
    }
    if err = awsMiddleware.AddRawResponseToMetadata(stack); err != nil {
        return err
    }
    if err = awsMiddleware.AddRecordResponseTiming(stack); err != nil {
        return err
    }
    if err = addClientUserAgent(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
        return err
    }
    return err
}
return err
}
if err = addOpGetLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opGetLicense(options.Region), middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil

func newServiceMetadataMiddleware_opGetLicense(region string) *awsmiddleware.RegisterServiceMetadata {
    return &awsmiddleware.RegisterServiceMetadata{
        Region:        region,
        ServiceID:     ServiceID,
        SigningName:   "license-manager",
        OperationName: "GetLicense",
    }
}

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package licensemanager

import {
    "context"
    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
}

// Checks in the specified license. Check in a license when it is no longer in use.
func (c *Client) CheckInLicense(ctx context.Context, params *CheckInLicenseInput, optFns ...func(*Options)) (*CheckInLicenseOutput, error) {
    if params == nil {
        params = &CheckInLicenseInput{}
    }
}
result, metadata, err := c.invokeOperation(ctx, "CheckInLicense", params, optFns, addOperationCheckInLicenseMiddlewares)
if err != nil {
    return nil, err
}

out := result.(*CheckInLicenseOutput)
out.ResultMetadata = metadata
return out, nil

type CheckInLicenseInput struct {
    // License consumption token.
    // // This member is required.
    LicenseConsumptionToken *string
    // License beneficiary.
    Beneficiary *string
}

type CheckInLicenseOutput struct {
    // Metadata pertaining to the operation's result.
    ResultMetadata middleware.Metadata
}

func addOperationCheckInLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
    err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckInLicense{}, middleware.After)
    if err != nil {
        return err
    }
    if err = addSetLoggerMiddleware(stack, options); err != nil {
        return err
    }
    if err = awsmiddleware.AddClientRequestIDMiddleware(stack); err != nil {
        return err
    }
    if err = smithyhttp.AddComputeContentLengthMiddleware(stack); err != nil {
        return err
    }
    if err = addResolveEndpointMiddleware(stack, options); err != nil {
        return err
    }
}
if err = v4.AddComputePayloadSHA256Middleware(stack); err != nil {
    return err
}
if err = addRetryMiddlewares(stack, options); err != nil {
    return err
}
if err = addHTTPSingerV4Middleware(stack, options); err != nil {
    return err
}
if err = awsmiddleware.AddRawResponseToMetadata(stack); err != nil {
    return err
}
if err = awsmiddleware.AddRecordResponseTiming(stack); err != nil {
    return err
}
if err = addClientUserAgent(stack); err != nil {
    return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
    return err
}
if err = addOpCheckInLicenseValidationMiddleware(stack); err != nil {
    return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckInLicense(options.Region),
    middleware.Before); err != nil {
    return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
    return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
    return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
    return err
}
return nil
}

func newServiceMetadataMiddleware_opCheckInLicense(region string) *awsmiddleware.RegisterServiceMetadata
{
    return &awsmiddleware.RegisterServiceMetadata{
        Region: region,
        ServiceID: ServiceID,
    }
}
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1.830 libc 2.27-3ubuntu1.4
1.830.1 Available under license:

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Export-Package: io.prometheus.client.exporter.common;uses:="io.prometheus.client";version="0.10.0"
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1.840 pcre 8.43

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SUMMARY OF CHANGES

The cPython 3.8.1 function `quote` from the `shlex` module (`shlex.quote()`) was backported in order to provide
access
to this function in earlier versions of Python. The regular expression used to identify unsafe command line strings
was modified to:

```python
_find_unsafe = re.compile(r'[^\w@%+=:,./-]').search
```

from:

```python
_find_unsafe = re.compile(r'[^\w@%+=:,./-]', re.ASCII).search
```

in order to remove the `re.ASCII` flag which is not available in the Python 2.x re module.

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1.846 python-cryptography 2.8-3ubuntu0.1

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### 1.847 pyyaml 6.0

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1.849 go-autorest-adal 0.8.2

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1.850 python-ping 1.1.0

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Upstream source https://invisible-island.net/ncurses/ncurses.html
This package is used for testing builds of ncurses.

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Upstream source https://invisible-island.net/ncurses/ncurses-examples.html

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-- vile: txtmode fc=72
-- $Id: COPYING,v 1.9 2020/02/08 13:34:12 tom Exp $
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Current team:

* Ashley Whetter: maintainer, contributor
* Bryce Guinta: maintainer, contributor
* Claudiu Popa: maintainer, contributor
* Cara Vinson: astroid committer.
* Guillaume Peillex: committer
* ukasz Rogalski: committer.
* Roy Williams (Lyft): committer

added check for implementing __eq__ without implementing __hash__.
Added Python 3 check for accessing Exception.message.
Added Python 3 check for calling encode/decode with invalid codecs.
Added Python 3 check for accessing sys.maxint.
Added Python 3 check for bad import statements.
Added Python 3 check for accessing deprecated methods on the 'string' module,
various patches.

* Dmitry Pribysh: committer

multiple-imports, not-iterable, not-a-mapping, various patches.

* Jim Robertson: committer

Ex-maintainers:

* Sylvain Thenault (Logilab): main author / maintainer

* Torsten Marek (Google): committer / contributor
We would not be here without folks that contributed patches, pull requests, issues and their time to pylint. We're incredibly grateful to all of these contributors:

* Daniel Balparda (Google): GPyLint maintainer (Google's pylint variant), various patches

* Martin Pool (Google): warnings for anomalous backslashes, symbolic names for messages (like 'unused'), etc

* Alexandre Fayolle (Logilab): TkInter gui, documentation, debian support

* Julien Cristau, Emile Anclin (Logilab): python 3 support

* Sandro Tosi: Debian packaging

* Mads Kiilerich, Boris Feld, Bill Wendling, Sebastian Ulrich: various patches

* Brian van den Broek: windows installation documentation

* Amaury Forgeot d'Arc: check names imported from a module exists in the module

* Benjamin Niemann: allow block level enabling/disabling of messages

* Nathaniel Manista: suspicious lambda checking

* David Shea: invalid sequence and slice index

* Carl Crowder: don't evaluate the value of arguments for 'dangerous-default-value'


* David Lindquist: logging-format-interpolation warning.

* Brett Cannon: Port source code to be Python 2/3 compatible, Python 3 checker.

* Vlad Temian: redundant-unittest-assert and the JSON reporter.

* Cosmin Poiean: unichr-builtin and improvements to bad-open-mode.

* Viorel tirbu: intern-builtin warning.

* Dan Goldsmith: support for msg-template in HTML reporter.
* Chris Rebert: unidiomatic-typecheck.

* Steven Myint: duplicate-except.


* Bruno Daniel: check_docs extension.

* James Morgensen: ignored-modules option applies to import errors.

* Cezar Elnazli: deprecated-method

* Stéphane Wirtel: nonlocal-without-binding

* Laura Medioni (Logilab, on behalf of the CNES): misplaced-comparison-constant, no-classmethod-decorator, no-staticmethod-decorator, too-many-nested-blocks, too-many-boolean-expressions, unneeded-not, wrong-import-order, ungrouped-imports, wrong-import-position, redefined-variable-type

* Aru Sahni: Git ignoring, regex-based ignores

* Mike Frysinger: contributor.

* Moiss López (Vauxoo): Support for deprecated-modules in modules not installed, Refactor wrong-import-order to integrate it with `isort` library Add check too-complex with mccabe for cyclomatic complexity Refactor wrong-import-position to skip try-import and nested cases Add consider-merging-istbasename, superfluous-else-return Fix consider-using-ternary for `True and True and True or True` case

* Luis Escobar (Vauxoo), Moiss López (Vauxoo): Add bad-docstring-quotes and docstring-first-line-empty

* Yannick Brehon: contributor.

* Glenn Matthews: autogenerated documentation for optional extensions, bug fixes and enhancements for docparams (ne check_docs) extension

* Elias Dorneles: minor adjust to config defaults and docs

* Yuri Bochkarev: Added epytext support to docparams extension.

* Alexander Todorov: added new error conditions to 'bad-super-call', Added new check for incorrect len(SEQUENCE) usage, Added new extension for comparison against empty string constants, Added new extension which detects comparing integers to zero, Added new useless-return checker, Added new try-except-raise checker
* Erik Eriksson - Added overlapping-except error check.

* Anthony Foglia (Google): Added simple string slots check.

* Derek Gustafson: contributor

* Petr Pulc: require whitespace around annotations

* John Paraskevopoulos: add 'differing-param-doc' and 'differing-type-doc'

* Martin von Gagern (Google): Added 'raising-format-tuple' warning.

* Ahirnish Pareek, 'keyword-arg-before-var-arg' check

* Daniel Miller: contributor.

* Bryce Guinta: contributor

* Martin Bati: contributor
  Added new check for shallow copy of os.environ

* Jacques Kvam: contributor

* Brian Shaginaw: prevent error on exception check for functions

* Ioana Tagirta: fix bad thread instantiation check

* Reverb Chu: contributor

* Tobias Hernstig: contributor

* Konstantin Manna: contributor

* Andreas Freimuth: fix indentation checking with tabs

* Renat Galimov: contributor

* Thomas Snowden: fix missing-docstring for inner functions

* Mitchell Young: minor adjustment to docparams

* Marianna Polatoglou: minor contribution for wildcard import check

* Ben Green: contributor

* Benjamin Freeman: contributor
* Fureigh: contributor

* Jace Browning: updated default report format with clickable paths

* Sushobhit (sushobhith27): contributor
  Added new check 'comparison-with-itself'.
  Added new check 'useless-import-alias'.
  Added support of annotations in missing-type-doc and missing-return-type-doc.
  Added new check 'comparison-with-callable'.
  Removed six package dependency.
  Added new check 'chained-comparison'.
  Added new check 'useless-object-inheritance'.

* Mariatta Wijaya: contributor
  Added new check `logging-fstring-interpolation`
  Documentation typo fixes

* Jason Owen: contributor

* Mark Roman Miller: fix inline defs in too-many-statements

* Adam Dangoor: contributor

* Gary Tyler McLeod: contributor

* Wolfgang Grafen, Axel Muller, Fabio Zadrozny, Pierre Rouleau,
  Maarten ter Huurne, Mirko Friedenhagen and all the Logilab's team (among others).

* Matej Marusak: contributor

* Nick Drozd: contributor, performance improvements to astroid

* Kosarchuk Sergey: contributor

* Carey Metcalfe: demoted `try-except-raise` from error to warning

* Marcus Nslund (naslundx): contributor

* Natalie Serebryakova: contributor

* Caio Carrara: contributor

* Roberto Leinardi: PyCharm plugin maintainer

* Aivar Annamaa: contributor

* Hornwitser: fix import graph
* Yuri Gribov: contributor

* Drew Risinger: committer (docs)

* Ben James

* Tomer Chachamu, Richard Goodman: simplifiable-if-expression

* Alan Chan: contributor

* Benjamin Drung: contributing Debian Developer

* Scott Worley: contributor

* Michael Hudson-Doyle

* Lucas Cimon: contributor

* Mike Miller: contributor

* Sergei Lebedev: contributor

* Sasha Bagan

* Pablo Galindo Salgado: contributor
  Fix false positive 'Non-iterable value' with async comprehensions.

* Matus Valo

* Sardorbek Imomaliev: contributor

* Justin Li (justinnhli)

* Nicolas Dickreuter

* Pascal Corpet

* Svetoslav Neykov: contributor

* Federico Bond: contributor

* Fantix King (UChicago): contributor

* Yory (yory8): contributor

* Thomas Hisch: contributor

* Clément Pit-Claudel: contributor
* Goudcode: contributor

* Paul Renvoise: contributor

* Bluesheep: contributor

* Michael Scott Cuthbert: contributor

* Pierre Sassoulas: maintainer, contributor

* Nathan Marrow

* Taewon Kim: contributor

* Daniil Kharkov: contributor

* Tyler N. Thieding: contributor

* Zeb Nicholls: contributor
  - Made W9011 compatible with 'of' syntax in return types

* Martin Vielsmaier: contributor

* Agustín Toledo: contributor

* Nicholas Smith: contributor

* Peter Kolbus (Garmin): contributor

* Oisin Moran: contributor

* Andrzej Klajnert: contributor

* Andrés Prez Hortal: contributor

* Niko Wenselowski: contributor

* Danny Hermes: contributor

* Eric Froemling: contributor

* Robert Schweizer: contributor

* Hugo van Kemenade: contributor

* Mikhail Fesenko: contributor
* Trevor Bekolay: contributor
  - Added --list-msgs-enabled command

* Rmi Cardona: contributor

* Daniel Draper: contributor

* Gabriel R. Sezefredo: contributor
  - Fixed "exception-escape" false positive with generators

* laike9m: contributor

* Janne Rnkk: contributor

* Hugues Bruant: contributor

* Tim Gates: contributor

* Enji Cooper: contributor

* Bastien Vallet: contributor

* Pek Chhan: contributor

* Craig Henriques: contributor

* Matthijs Blom: contributor

* Andy Palmer: contributor

* Wes Turner (Google): added new check 'inconsistent-quotes'

* Athos Ribeiro
  Fixed dict-keys-not-iterating false positive for inverse containment checks

* Anubhav: contributor

* Ben Graham: contributor

* Anthony Tan: contributor

* Benny Miller: contributor

* Bernie Gray: contributor

* Slavfox: contributor

* Matthew Beckers (mattlbeck): contributor
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* Andrew J. Simmons (anjsimmo): contributor

* Damien Baty: contributor

* Daniel R. Neal (danrneal): contributor

* Jeremy Fleishman (jfly): contributor

* Shiv Venkatasubrahmanyam

* Jochen Preusche (iilei): contributor

* Ram Rachum (cool-RR)

* Pieter Engelbrecht

* Ethan Leba: contributor

* Matj Grabovsk: contributor

* Yeting Li (yetingli): contributor

* Frost Ming (frostming): contributor

* Luigi Bertaco Cristofolini (luigibertaco): contributor

* Eli Fine (eli88fine): Fixed false positive duplicate code warning for lines with symbols only

* Ganden Schaffner: contributor

* Josselin Feist: contributor

* David Cain: contributor

* Pedro Algarvio (s0undt3ch): contributor

* Luigi Bertaco Cristofolini (luigibertaco): contributor

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* Sorin Sbarnea: contributor
* Gergely Kalnr: contributor
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* Frank Harrison (doublethefish): contributor
* Gauthier Sebaux: contributor
* Logan Miller (komodo472): contributor
* Matthew Suozzo: contributor
* Marc Mueller (cdce8p): contributor
* David Gilman: contributor
* Ikraduya Edian: contributor
  - Added new checks ‘consider-using-generator’ and ‘use-a-generator’.
* Tiago Honorato: contributor
* Lefteris Karapetsas: contributor
* Louis Sautier: contributor
* Quentin Young: contributor
* Alexander Kapshuna: contributor
* Mark Byrne: contributor
* Konstantina Saketou: contributor
* Andrew Howe: contributor
* James Sinclair (irgeek): contributor
* Andreas Finkler: contributor
* Aidan Haase, Elizabeth Bott: contributor

* Sebastian Müller: contributor

* Ramiro Leal-Cavazos (ramiro050): Fixed bug preventing pylint from working with emacs tramp

* manderj: contributor

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* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/asm/Type.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/asm/Attribute.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/asm/MethodWriter.java
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* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/asm/ClassWriter.java
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* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/core/log/LogDelegateFactory.java
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* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/core/env/AbstractEnvironment.java
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* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/core/type/StandardMethodMetadata.java
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jar/org/springframework/core/io/support/EncodedResource.java
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jar/org/springframework/core/convert/support/ArrayToArrayConverter.java
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jar/org/springframework/core/convert/support/IdToEntityConverter.java
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jar/org/springframework/core/MethodClassKey.java
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jar/org/springframework/core/convert/ConversionService.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-
jar/org/springframework/core/codec/CodecException.java
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jar/org/springframework/core/convert/support/StreamConverter.java
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jar/org/springframework/core/KotlinReflectionParameterNameDiscoverer.java
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jar/org/springframework/lang/NonNullApi.java
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jar/org/springframework/core/ResolvableTypeProvider.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-
jar/org/springframework/core/codec/DecodingException.java
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org.springframework.core.ReactiveAdapterRegistry$SpringCoreBlockHoundIntegration

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* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/core/codec/ByteArrayDecoder.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/core/annotation/AbstractMergedAnnotation.java
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jar/org/springframework/core/io/ProtocolResolver.java
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jar/org/springframework/core/type/filter/AssignableTypeFilter.java
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jar/org/springframework/core/convert/support/ZonedDateTimeToCalendarConverter.java
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jar/org/springframework/core/convert/support/CharacterToNumberFactory.java

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  jar/org/springframework/core/io/ContextResource.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-
  jar/org/springframework/core/io/support/ResourcePropertiesPersister.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-
  jar/org/springframework/core/KotlinDetector.java
* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-
  jar/org/springframework/util/IdGenerator.java

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  jar/org/springframework/core/KotlinDetector.java
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jar/org/springframework/core/converter/support/MapToMapConverter.java
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* /opt/cola/permits/1182802116_1627053546.21/0/spring-core-5-3-9-sources-jar/org/springframework/util/AlternativeJdkIdGenerator.java
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Andreas Henriksson <andreas@fatal.se> later reused the gnome-icon-theme packaging for the new adwaita-icon-theme package name.

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AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
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code; Jim Gillogly & Phil Karn for the DES key schedule code; Dennis
Ferguson, Eric Young and Dana How for comparing notes; and Ray Lau,
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lib/hcrypto/test_dh.c

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1.870 libpsl 0.21.0-1ubuntu1

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In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

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Version 2.1, February 1999

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice
That's all there is to it!

/* Definitions for BSD assembler syntax for Intel 386 
    (actually AT&T syntax for insns and operands, 
    adapted to BSD conventions for symbol names and debugging.) 
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along with GCC; see the file COPYING3. If not see 
<http://www.gnu.org/licenses/>. */ 

/* Use the Sequent Symmetry assembler syntax. */ 

/* Define the syntax of pseudo-ops, labels and comments. */ 

/* Prefix for internally generated assembler labels. If we aren't using 
underscores, we are using prefix `.s to identify labels that should 
be ignored, as in `i386/gas.h' --karl@cs.umb.edu */ 

#define LPREFIX "L" 

/* Assembler pseudos to introduce constants of various size. */ 

#define ASM_BYTE "\t.byte\t" 
#define ASM_SHORT "\t.word\t" 
#define ASM_LONG "\t.long\t" 
#define ASM_QUAD "\t.quad\t" /* Should not be used for 32bit compilation. */ 

/* This was suggested, but it shouldn't be right for DBX output. -- RMS 
#define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */ 

/* Define the syntax of labels and symbol definitions/declarations. */ 

/* This is how to output an assembler line 
   that says to advance the location counter by SIZE bytes. */
#define ASM_OUTPUT_SKIP(FILE, SIZE)  
    fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED\"u\", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations. */

/* This says how to output an assembler line
to define a global common symbol. */

#define ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  
    ( fputs (".comm ", (FILE)),
        assemble_name ((FILE), (NAME)),
        fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
to define a local common symbol. */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  
    ( fputs (".lcomm ", (FILE)),
        assemble_name ((FILE), (NAME)),
        fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUTAligned_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  
    ( fputs (".lcomm ", (FILE)),
        assemble_name ((FILE), (NAME)),
        fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
that says to advance the location counter
to a multiple of 2**LOG bytes. */

#define ASM_OUTPUT_ALIGN(FILE, LOG)  
    if ((LOG)!=(0)) fprintf ((FILE), "\t.align \%d\n", (LOG))

/* This is how to store into the string BUF
the symbol_ref name of an internal numbered label where
PREFIX is the class of label and NUM is the number within the class.
This is suitable for output with `assemble_name'. */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER)  
    sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols. */

#define USER_LABEL_PREFIX "_"

/* Sequent has some changes in the format of DBX symbols. */
#define DBX_NO_XREFS 1

/* Don't split DBX symbols into continuations. */
#define DBX_CONTIN_LENGTH 0
@ignore
@c Set file name and title for man page.
@setfilename gpl
@settitle GNU General Public License
@c man begin SEEALSO
gfdl(7), fsf-funding(7).
@c man end
@c man begin COPYRIGHT
Copyright @copyright{} 2007 Free Software Foundation, Inc.

Everyone is permitted to copy and distribute verbatim copies of this
license document, but changing it is not allowed.
@c man end
@end ignore
@c This file is intended to be included in another file.

display
Copyright @copyright{} 2007 Free Software Foundation, Inc. @url{http://fsf.org/}

Everyone is permitted to copy and distribute verbatim copies of this
license document, but changing it is not allowed.
@end display

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Therefore, we have designed this version of the GPL to prohibit the
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other domains, we stand ready to extend this provision to those
domains in future versions of the GPL, as needed to protect the
freedom of users.

Finally, every program is threatened constantly by software patents.
States should not allow patents to restrict development and use of
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could make it effectively proprietary. To prevent this, the GPL
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modification follow.
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      (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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That's all there is to it!

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Julian Seward, jseward@bzip.org
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" Standard preamble:
" ========================================================================
de Sp " Vertical space (when we can't use .PP)
if t .sp .5v
if n .sp
..
de Vb " Begin verbatim text
.ft CW
.nf
.ne \
.. 
de Ve " End verbatim text
Set up some character translations and predefined strings. \* will give an unbreakable dash, \*PI will give pi, \*L will give a left double quote, and \*R will give a right double quote. \*C will give a nicer C++. Capital omega is used to do unbreakable dashes and therefore won't be available. \*C and \*[C] expand to ` in nroff, nothing in troff, for use with C<>.

\tr \(*W-
\ds C+ \(v'\cdot1v'\h'\cdot1p\'s\cdot2+\h'\cdot1p'+\$0v'\cdot1v'\h'\cdot1p'
\ie n \{|"
  . ds -- \(*W-
  . ds PI pi
  . if (\(H=4u)&(1m=24u) .ds -- \(*W\h'\cdot12u\'(\*W\h'\cdot12u\'-\h'\) \h'\) diablo 10 pitch
  . if (\(H=4u)&(1m=20u) .ds -- \(*W\h'\cdot12u\'(\*W\h'\cdot8u\'-\h'\) diablo 12 pitch
  . ds L'' "
  . ds R" "
  . ds C" "
  . ds C" "
'br\}
\el{|"
  . ds -- \(em|"
  . ds PI \"p
  . ds L" "
  . ds R" "
  . ds C'
  . ds C'
'br\}
"
" Escape single quotes in literal strings from groff's Unicode transform.
.ie \n(, .ds Aq \(aq
.el .ds Aq 
"
" If the F register is turned on, we'll generate index entries on stderr for titles (.TH), headers (.SH), subsections (.SS), items (.Ip), and index entries marked with X<> in POD. Of course, you'll have to process the output yourself in some meaningful fashion.
"
" Avoid warning from groff about undefined register 'F'.
.de IX
.. .nr rF 0
  .if \n(, .if rF .nr rF 1
  .if (\(rF:\(n(,g==0)) |{
    .if \nF |
      . de IX
      . tm Index:\$1\"n\%"\S1\"S2"
.. 
. if !nF==2 \{
.   nr % 0
.   nr F 2
. \}
. \}
\}
.rr rF
\"
" Accent mark definitions (@(#)ms.acc 1.5 88/02/08 SMI; from UCB 4.2).
" Fear. Run. Save yourself. No user-serviceable parts.
. " fudge factors for nroff and troff
.if n \{
. ds #H 0
. ds #V .8m
. ds #F .3m
. ds #[ M1
. ds [#] \P
.\}
.if t \{
. ds #H ((1u-(\\n(.fu%2u))* .13m)
. ds #V .6m
. ds #F 0
. ds [#] \&
. ds [#] \&
.\}
. " simple accents for nroff and troff
.if n \{
. ds ' \&
. ds ` \&
. ds ^ \&
. ds , \&
. ds ~ ~
. ds /
.\}
.if t \{
. ds `\k::h'-(\n(.wu*8/10-\*(#H))\v'\n:u'
. ds `\k::h'-(\n(.wu*8/10-\*(#H))\v'\n:u'
. ds ^ \k::h'-(\n(.wu*10/11-\*(#H))\v'\n:u'
. ds , \k::h'-(\n(.wu*8/10)'h\v'\n:u'
. ds ~ \k::h'-(\n(.wu-*\*(#H)-1m)~h\v'\n:u'
. ds /\k::h'-(\n(.wu*8/10-\*(#H))\v'(s\h)\v'\n:u'
.\}
. " troff and (daisy-wheel) nroff accents
.ds : \k::h'-(\n(.wu*8/10-\*(#H)+.1m+\*(#F))\v'\n:u'\n:V'\n:V'\n:V'
. ds 8 \h\v'\n:V'(b\h'\v'\n:V'
. ds o \k::h'-(\n(.wu+\w\v(\nde'u-\*(#H))/2u\v'.'3n\v'\n(\v(\v(\n:u'\v'\n:u'\v'
. ds d- \h\v'\n(\p\h'\v'-'u\v'-.25m\f2\v(\P'\v'-.25m\h'\v'\n(#H)'}
For nroff, turn off justification. Always turn off hyphenation; it makes way too many mistakes in technical documents.

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```
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# It doesn't change code that is known to be maintained elsewhere or
# that carries a non-FSF copyright.
#
# The script also doesn't change testsuite files, except those in
# libstdc++-v3. This is because libstdc++-v3 has a conformance testsuite,
# while most tests in other directories are just things that failed at some
# point in the past.
#
# Pass --this-year to the script if you want it to add the current year
# to all applicable notices. Pass --quilt if you are using quilt and
# want files to be added to the quilt before being changed.
#
# By default the script will update all directories for which the
# output has been vetted. You can instead pass the names of individual
# directories, including those that haven't been approved. So:
#
#   update-copyright.py --this-year
#
# is the command that would be used at the beginning of a year to update
# all copyright notices (and possibly at other times to check whether
# new files have been added with old years). On the other hand:
#
#   update-copyright.py --this-year libitm
#
# would run the script on just libitm/.
#
# Note that things like --version output strings must be updated before
# this script is run. There's already a separate procedure for that.

import os
import re
import sys
import time
import subprocess

class Errors:
    def __init__(self):
        self.num_errors = 0
def report (self, filename, string):
    if filename:
        string = filename + ': ' + string
    sys.stderr.write (string + '\n')
    self.num_errors += 1

def ok (self):
    return self.num_errors == 0

class GenericFilter:
    def __init__ (self):
        self.skip_files = set()
        self.skip_dirs = set()
        self.skip_extensions = set()
        self.fossilised_files = set()
        self.own_files = set()

        self.skip_files |= set (['
            # Skip licence files.
            'COPYING',
            'COPYING.LIB',
            'COPYING3',
            'COPYING3.LIB',
            'LICENSE',
            'fdl.texi',
            'gpl_v3.texi',
            'fdl-1.3.xml',
            'gpl-3.0.xml',

            # Skip auto- and libtool-related files
            'aclocal.m4',
            'compile',
            'config.guess',
            'config.sub',
            'depcomp',
            'install-sh',
            'libtool.m4',
            'ltmain.sh',
            'ltoptions.m4',
            'ltversion.m4',
            'lt~obsolete.m4',
            'missing',
            'mkdep',
            'mkinstalldirs',
            'move-if-change',
            'shlibpath.m4',
            'symlink-tree',]
def get_line_filter(self, dir, filename):
    if filename.startswith('ChangeLog'):
        # Ignore references to copyright in changelog entries.
        return re.compile(r'	')
    return None

def skip_file(self, dir, filename):
    if filename in self.skip_files:
        return True
    (base, extension) = os.path.splitext(os.path.join(dir, filename))
    if extension in self.skip_extensions:
        return True
    if extension == '.in':
        # Skip .in files produced by automake.
        if os.path.exists(base + '.am'):
            return True
    # Skip files produced by autogen
    if (os.path.exists(base + '.def')
        and os.path.exists(base + '.tpl')):
        return True
    # Skip configure files produced by autoconf
    if filename == 'configure':
        if os.path.exists(base + '.ac'):
            return True
        if os.path.exists(base + '.in'):
            return True
    return False

def skip_dir(self, dir, subdir):
    return subdir in self.skip_dirs
def is_fossilised_file (self, dir, filename):
    if filename in self.fossilised_files:
        return True
    # Only touch current current ChangeLogs.
    if filename != 'ChangeLog' and filename.find ('ChangeLog') >= 0:
        return True
    return False

def by_package_author (self, dir, filename):
    return filename in self.own_files

class Copyright:
    def __init__ (self, errors):
        self.errors = errors

        # Characters in a range of years. Include '.' for typos.
        ranges = '[0-9][?:-0-9,\s]\s+and\s+)*[0-9]'

        # Non-whitespace characters in a copyright holder's name.
        name = '[\w-]'

        # Matches one year.
        self.year_re = re.compile ('^[0-9]+$')

        # Matches part of a year or copyright holder.
        self.continuation_re = re.compile (ranges + '|' + name)

        # Matches a full copyright notice:
        self.copyright_re = re.compile ('^\s*Copyright (C), etc.
            \[(Cc)opyright
            \[(Cc)opyright\s+(\[(Cc)])\]
            \[(Cc)opyright\s+%s
            \[(Cc)opyright\s+\&copy;
            \[(Cc)opyright\s+@copyright\]
            \[copyright = u\]
            \[@set\s+copyright[\w-]+\]'
        # 2: the years. Include the whitespace in the year, so that
        # we can remove any excess.
        '\s*\([?+\s+\.\s+\+]+\)'
        '\[@value\{[^{}]*\}\s+\]'

        # 3: 'by ', if used
        '\(by\s+\)'

        # 4: the copyright holder. Don't allow multiple consecutive
# spaces, so that right-margin gloss doesn't get caught
# (e.g. gnat_ugn.texi).
'
' + name + '(\?\s?*name + *)?')

# A regexp for notices that might have slipped by. Just matching
# 'copyright' is too noisy, and 'copyright.*[0-9]' falls foul of
# HTML header markers, so check for 'copyright' and two digits.
self.other_copyright_re = re.compile('copyright.*[0-9][0-9]',
                                          re.IGNORECASE)
self.comment_re = re.compile('#+|[*]+|;+|%+|//+|@c |dnl ')
sself.holders = { '@copying': '@copying' }
sself.holder_prefixes = set()

# True to 'quilt add' files before changing them.
sself.use_quilt = False

# If set, force all notices to include this year.
sself.max_year = None

# Goes after the year(s). Could be ',', .
sself.separator = ' '

def add_package_author (self, holder, canon_form = None):
    if not canon_form:
        canon_form = holder
    self.holders[holder] = canon_form
    index = holder.find (' ')
    while index >= 0:
        self.holder_prefixes.add (holder[:index])
        index = holder.find (' ', index + 1)

def add_external_author (self, holder):
    self.holders[holder] = None

class BadYear():
    def __init__ (self, year):
        self.year = year

    def __str__ (self):
        return 'unrecognised year: ' + self.year

def parse_year (self, string):
    year = int (string)
    if len (string) == 2:
        if year > 70:
            return year + 1900
        elif len (string) == 4:
            return year

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raise self.BadYear (string)

def year_range (self, years):
    year_list = [self.parse_year (year)
                 for year in self.year_re.findall (years)]
    assert len (year_list) > 0
    return (min (year_list), max (year_list))

def set_use_quilt (self, use_quilt):
    self.use_quilt = use_quilt

def include_year (self, year):
    assert not self.max_year
    self.max_year = year

def canonicalise_years (self, dir, filename, filter, years):
    # Leave texinfo variables alone.
    if years.startswith ("@value"):
        return years
    (min_year, max_year) = self.year_range (years)

    # Update the upper bound, if enabled.
    if self.max_year and not filter.is_fossilised_file (dir, filename):
        max_year = max (max_year, self.max_year)

    # Use a range.
    if min_year == max_year:
        return '%d' % min_year
    else:
        return '%d-%d' % (min_year, max_year)

def strip_continuation (self, line):
    line = line.lstrip()
    match = self.comment_re.match (line)
    if match:
        line = line[match.end():].lstrip()
    return line

def is_complete (self, match):
    holder = match.group (4)
    return (holder
             and (holder not in self.holder_prefixes
                  or holder in self.holders))

def update_copyright (self, dir, filename, filter, file, line, match):
    orig_line = line
    next_line = None
pathname = os.path.join (dir, filename)

intro = match.group (1)
if intro.startswith ('@set'):
    # Texinfo year variables should always be on one line
    after_years = line[match.end (2):].strip()
    if after_years != '':
        self.errors.report (pathname,
            'trailing characters in @set: ' + after_years)
        return (False, orig_line, next_line)
else:
    # If it looks like the copyright is incomplete, add the next line.
    while not self.is_complete (match):
        try:
            next_line = file.next()
        except StopIteration:
            break
        # If the next line doesn't look like a proper continuation,
        # assume that what we've got is complete.
        continuation = self.strip_continuation (next_line)
        if not self.continuation_re.match (continuation):
            break
        # Merge the lines for matching purposes.
        orig_line += next_line
        line = line.rstrip() + ' ' + continuation
        next_line = None
        # Rematch with the longer line, at the original position.
        match = self.copyright_re.match (line, match.start())
        assert match
        holder = match.group (4)

    # Use the filter to test cases where markup is getting in the way.
    if filter.by_package_author (dir, filename):
        assert holder not in self.holders

    elif not holder:
        self.errors.report (pathname, 'missing copyright holder')
        return (False, orig_line, next_line)

    elif holder not in self.holders:
        self.errors.report (pathname, 'unrecognised copyright holder: ' + holder)
        return (False, orig_line, next_line)
else:
    # See whether the copyright is associated with the package
    # author.
    canon_form = self.holders[holder]
    if not canon_form:
        return (False, orig_line, next_line)

    # Make sure the author is given in a consistent way.
    line = (line[:match.start(4)]
            + canon_form
            + line[match.end(4):])

    # Remove any 'by'
    line = line[:match.start(3)] + line[match.end(3):]

    # Update the copyright years.
    years = match.group(2).strip()
    try:
        canon_form = self.canonicalise_years(dir, filename, filter, years)
    except self.BadYear as e:
        self.errors.report(pathname, str(e))
        return (False, orig_line, next_line)

    line = (line[:match.start(2)]
            + ('' if intro.startswith('copyright = ') else ' ')
            + canon_form + self.separator
            + line[match.end(2):])

    # Use the standard (C) form.
    if intro.endswith('right'):
        intro += ' (C)'
    elif intro.endswith('c)'):
        intro = intro[:-3] + '(C)'
    line = line[:match.start(1)] + intro + line[match.end(1):]

    # Strip trailing whitespace
    line = line.rstrip() + '

    return (line != orig_line, line, next_line)

def process_file(self, dir, filename, filter):
    pathname = os.path.join(dir, filename)
    if filename.endswith('.tmp'):
        # Looks like something we tried to create before.
        try:
            os.remove(pathname)
        except OSError:
pass
return

lines = []
changed = False
line_filter = filter.get_line_filter (dir, filename)
mode = None
with open (pathname, 'r') as file:
    prev = None
    mode = os.fstat (file.fileno()).st_mode
    for line in file:
        next_line = None
        # Leave filtered-out lines alone.
        if not (line_filter and line_filter.match (line)):
            match = self.copyright_re.search (line)
            if match:
                res = self.update_copyright (dir, filename, filter,
                                             file, line, match)
                (this_changed, line, next_line) = res
                changed = changed or this_changed
                # Check for copyright lines that might have slipped by.
                elif self.other_copyright_re.search (line):
                    self.errors.report (pathname,
                                        'unrecognised copyright: %s'
                                        % line.strip())
                    lines.append (line)
                    line = next_line

        # If something changed, write the new file out.
        if changed and self.errors.ok():
            tmp_pathname = pathname + '.tmp'
            with open (tmp_pathname, 'w') as file:
                for line in lines:
                    file.write (line)
                os.fchmod (file.fileno(), mode)
                if self.use_quilt:
                    subprocess.call (["quilt", 'add', pathname])
                os.rename (tmp_pathname, pathname)

    def process_tree (self, tree, filter):
        for (dir, subdirs, filenames) in os.walk (tree):
            # Don't recurse through directories that should be skipped.
            for i in xrange (len (subdirs) - 1, -1, -1):
                if filter.skip_dir (dir, subdirs[i]):
                    del subdirs[i]
# Handle the files in this directory.
for filename in filenames:
    if filter.skip_file (dir, filename):
        sys.stdout.write ('Skipping %s
% os.path.join (dir, filename))
    else:
        self.process_file (dir, filename, filter)

class CmdLine:
    def __init__ (self, copyright = Copyright):
        self.errors = Errors()
        self.copyright = copyright (self.errors)
        self.dirs = []
        self.default_dirs = []
        self.chosen_dirs = []
        self.option_handlers = dict()
        self.option_help = []
        self.add_option ('--help', 'Print this help', self.o_help)
        self.add_option ('--quilt', '"quilt add" files before changing them',
                        self.o_quilt)
        self.add_option ('--this-year', 'Add the current year to every notice',
                        self.o_this_year)

    def add_option (self, name, help, handler):
        self.option_help.append ((name, help))
        self.option_handlers[name] = handler

    def add_dir (self, dir, filter = GenericFilter()):
        self.dirs.append ((dir, filter))

    def o_help (self, option = None):
        sys.stdout.write ('Usage: %s \[options\] dir1 dir2...

' % sys.argv[0])
        format = '%-15s %s
'
        for (what, help) in self.option_help:
            sys.stdout.write (format % (what, help))
        sys.stdout.write ('
Directories:
')
        format = '%-25s'
        i = 0
        for (dir, filter) in self.dirs:
            i += 1
            if i % 3 == 0 or i == len (self.dirs):
                sys.stdout.write (dir + '\n')
            else:
                sys.stdout.write (format % dir)
        sys.exit (0)
def o_quilt (self, option):
    self.copyright.set_use_quilt (True)

def o_this_year (self, option):
    self.copyright.include_year (time.localtime().tm_year)

def main (self):
    for arg in sys.argv[1:]:
        if arg[1:] != ':
            self.chosen_dirs.append (arg)
        elif arg in self.option_handlers:
            self.option_handlers[arg] (arg)
        else:
            self.errors.report (None, 'unrecognised option: ' + arg)
    if self.errors.ok():
        if len (self.chosen_dirs) == 0:
            self.chosen_dirs = self.default_dirs
        if len (self.chosen_dirs) == 0:
            self.o_help()
        else:
            for chosen_dir in self.chosen_dirs:
                canon_dir = os.path.join (chosen_dir, '')
                count = 0
                for (dir, filter) in self.dirs:
                    if (dir + os.sep).startswith (canon_dir):
                        count += 1
                        self.copyright.process_tree (dir, filter)
                if count == 0:
                    self.errors.report (None, 'unrecognised directory: ' + chosen_dir)
                    sys.exit (0 if self.errors.ok() else 1)

#----------------------------------------------------------------------------------

class TopLevelFilter (GenericFilter):
    def skip_dir (self, dir, subdir):
        return True

class ConfigFilter (GenericFilter):
    def __init__ (self):
        GenericFilter.__init__ (self)
    def skip_file (self, dir, filename):
        if filename.endswith ('.m4'):
            pathname = os.path.join (dir, filename)
            with open (pathname) as file:
                # Skip files imported from gettext.
if file.readline().find('gettext-') >= 0:
    return True

return GenericFilter.skip_file(self, dir, filename)

class GCCFilter(GenericFilter):
    def __init__(self):
        GenericFilter.__init__(self)

        self.skip_files |= set([
            # Not part of GCC
            'math-68881.h',
        ])

        self.skip_dirs |= set([
            # Better not create a merge nightmare for the GNAT folks.
            'ada',

            # Handled separately.
            'testsuite',
        ])

        self.skip_extensions |= set([.
            # Maintained by the translation project.
            '.po',

            # Automatically-generated.
            '.pot',
        ])

        self.fossilised_files |= set([.
            # Old news won't be updated.
            'ONEWS',
        ])

class TestsuiteFilter(GenericFilter):
    def __init__(self):
        GenericFilter.__init__(self)

        self.skip_extensions |= set([.
            # Don't change the tests, which could be woend by anyone.
            '.c',
            '.C',
            '.cc',
            '.h',
            '.hs',
            '.f',
            '.f90',
            '.go',
        ])

        self.fossilised_files |= set([.
            # Old news won't be updated.
            'ONEWS',
        ])
`'inc',
'java',
])

def skip_file (self, dir, filename):
    # g++.niklas/README contains historical copyright information
    # and isn't updated.
    if filename == 'README' and os.path.basename (dir) == 'g++.niklas':
        return True
    # Similarly params/README.
    if filename == 'README' and os.path.basename (dir) == 'params':
        return True
    return GenericFilter.skip_file (self, dir, filename)

class LibCppFilter (GenericFilter):
    def __init__ (self):
        GenericFilter.__init__ (self)

        self.skip_extensions |= set ([
            # Maintained by the translation project.
            '.po',

            # Automatically-generated.
            '.pot',
        ])

class LibGCCFilter (GenericFilter):
    def __init__ (self):
        GenericFilter.__init__ (self)

        self.skip_dirs |= set ([
            # Imported from GLIBC.
            'soft-fp',
        ])

class LibStdCxxFilter (GenericFilter):
    def __init__ (self):
        GenericFilter.__init__ (self)

        self.skip_files |= set ([
            # Contains no copyright of its own, but quotes the GPL.
            'intro.xml',
        ])

        self.skip_dirs |= set ([
            # Contains automatically-generated sources.
            'html',
        ])

        self.skip_files |= set ([
            # Maintained by the translation project.
            '.po',

            # Automatically-generated.
            '.pot',
        ])
# The testsuite data files shouldn't be changed.
'data',

# Contains imported images
'images',
})

self.own_files |= set([
    # Contains markup around the copyright owner.
    'spine.xml',
])

def get_line_filter(self, dir, filename):
    if filename == 'boost_concept_check.h':
        return re.compile('// (C) Copyright Jeremy Siek')
    return GenericFilter.get_line_filter(self, dir, filename)

class GCCCopyright(Copyright):
def __init__(self, errors):
    Copyright.__init__(self, errors)

    canon_fsf = 'Free Software Foundation, Inc.'
    self.add_package_author('Free Software Foundation', canon_fsf)
    self.add_package_author('Free Software Foundation.', canon_fsf)
    self.add_package_author('Free Software Foundation Inc.', canon_fsf)
    self.add_package_author('Free Software Foundation, Inc', canon_fsf)
    self.add_package_author('Free Software Foundation, Inc.', canon_fsf)
    self.add_package_author('The Free Software Foundation', canon_fsf)
    self.add_package_author('The Free Software Foundation, Inc.', canon_fsf)
    self.add_package_author('Software Foundation, Inc.', canon_fsf)

    self.add_external_author('ARM')
    self.add_external_author('AdaCore')
    self.add_external_author('Ami Tavory and Vladimir Dreizin, IBM-HRL.')
    self.add_external_author('Cavium Networks.')
    self.add_external_author('Faraday Technology Corp.')
    self.add_external_author('Florida State University')
    self.add_external_author('Greg Colvin and Beman Dawes.')
    self.add_external_author('Hewlett-Packard Company')
    self.add_external_author('Intel Corporation')
    self.add_external_author('Information Technology Industry Council.')
    self.add_external_author('James Theiler, Brian Gough')
    self.add_external_author('Makoto Matsumoto and Takuji Nishimura,')
    self.add_external_author('National Research Council of Canada.')
    self.add_external_author('NVIDIA Corporation')
    self.add_external_author('Peter Dimov and Multi Media Ltd.')
    self.add_external_author('Peter Dimov')
    self.add_external_author('Pipeline Associates, Inc.')
self.add_external_author('Regents of the University of California.')
self.add_external_author('Silicon Graphics Computer Systems, Inc.')
self.add_external_author('Silicon Graphics')
self.add_external_author('Stephen L. Moshier')
self.add_external_author('Sun Microsystems, Inc. All rights reserved.')
self.add_external_author('The Go Authors.  All rights reserved.')
self.add_external_author('The Regents of the University of California.')
self.add_external_author('Unicode, Inc.')
self.add_external_author('University of Toronto.')

class GCCCmdLine (CmdLine):
    def __init__(self):
        CmdLine.__init__(self, GCCCopyright)

        self.add_dir ('.', TopLevelFilter())
        # boehm-gc is imported from upstream.
        self.add_dir ('config', ConfigFilter())
        # contrib isn't really part of GCC.
        self.add_dir ('fixincludes')
        self.add_dir ('gcc', GCCFilter())
        self.add_dir (os.path.join ('gcc', 'testsuite'), TestsuiteFilter())
        self.add_dir ('gnatools')
        self.add_dir ('gotools')
        self.add_dir ('include')
        # intl is imported from upstream.
        self.add_dir ('libada')
        self.add_dir ('libatomic')
        self.add_dir ('libbacktrace')
        self.add_dir ('libcc1')
        # libcilk is imported from upstream.
        self.add_dir ('libc++', LibStdCxxFilter())
        self.add_dir ('libcpp', LibCppFilter())
        self.add_dir ('libdecnumber')
        # libffi is imported from upstream.
        self.add_dir ('libgcc', LibGCCFilter())
        self.add_dir ('libgfortran')
        # libgo is imported from upstream.
        self.add_dir ('libgomp')
        self.add_dir ('libhsail-rt')
        self.add_dir ('libiberty')
        self.add_dir ('libitm')
        self.add_dir ('libobjc')
        # liboffload is imported from upstream.
        self.add_dir ('libquadmath')
        # libsanitizer is imported from upstream.
        self.add_dir ('libswpc')
        self.add_dir ('libstdc++-v3', LibStdCxxFilter())
self.add_dir ('libvtv')
self.add_dir ('lto-plugin')
# maintainer-scripts maintainer-scripts
# zlib is imported from upstream.

self.default_dirs = [
    'gcc',
    'include',
    'libada',
    'libatomic',
    'libbacktrace',
    'libcc1',
    'libcpp',
    'libdecrnumber',
    'libgcc',
    'libgfortran',
    'libgomp',
    'libhsail-rt',
    'libiberty',
    'libitm',
    'libobjc',
    'libssp',
    'libstdc++-v3',
    'libvtv',
    'lto-plugin',
]

GCCCmdLine().main()
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iconv (Charset Conversion Library) v2.0

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1.882 gosnmp 1.32.0

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1.884 python-pip 20.0.2-5ubuntu1.6

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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A. HISTORY OF THE SOFTWARE

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contextlib2 is a derivative of the contextlib module distributed by the PSF
as part of the Python standard library. According, it is itself redistributed
under the PSF license (reproduced in full below). As the contextlib module
was added only in Python 2.5, the licenses for earlier Python versions are
not applicable and have not been included.

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
Intellectual Property. Zope Corporation is a sponsoring member of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for
the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases that included the contextlib module.

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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python’s
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
Intellectual Property. Zope Corporation is a sponsoring member of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for
the Open Source Definition). Historically, most, but not all, Python
releases have also been GPL-compatible; the table below summarizes
the various releases.

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1.887 types-python-dateutil 2.8.3

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Metadata-Version: 2.1
Name: types-python-dateutil
Version: 2.8.3
Summary: Typing stubs for python-dateutil
Home-page: https://github.com/python/typeshed
License: Apache-2.0 license
Platform: UNKNOWN
Classifier: License :: OSI Approved :: Apache Software License
Classifier: Typing :: Typed
Description-Content-Type: text/markdown

## Typing stubs for python-dateutil

This is a PEP 561 type stub package for the `python-dateutil` package. It can be used by type-checking tools like mypy, PyCharm, pytype etc. to check code that uses `python-dateutil`. The source for this package can be found at https://github.com/python/typeshed/tree/master/stubs/python-dateutil. All fixes for types and metadata should be contributed there.

See https://github.com/python/typeshed/blob/master/README.md for more details.

This package was generated from typeshed commit `7e836db2f315787421b094401f768d7f8957d64d`.

Found in path(s):
* /opt/cola/permits/1253286010_1642037503.63/0/types-python-dateutil-2.8.3/types_python_dateutil.egg-info/PKG-INFO
* /opt/cola/permits/1253286010_1642037503.63/0/types-python-dateutil-2.8.3/PKG-INFO

1.888 six 1.11.0

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The primary author and maintainer of six is Benjamin Peterson. He would like to acknowledge the following people who submitted bug reports, pull requests, and otherwise worked to improve six:

Marc Abramowitz
Alexander Artemenko
Aymeric Augustin  
Ned Batchelder  
Wouter Bolsterlee  
Brett Cannon  
Jason R. Coombs  
Julien Danjou  
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1.890 pcre2 10.34-7

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THE BASIC LIBRARY FUNCTIONS

-----------------------------

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PCRE2 JUST-IN-TIME COMPILATION SUPPORT
--------------------------------------
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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for
the Open Source Definition). Historically, most, but not all, Python
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Built-By: root
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@heading Vincent Rijmen, Antoon Bosselaers, Paulo Barreto

AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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DES core in libhcrypto

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D3DES (V5.09) -

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Written with Symantec's THINK (Lightspeed) C by Richard Outerbridge. Thanks to: Dan Hoey for his excellent Initial and Inverse permutation code; Jim Gillogly & Phil Karn for the DES key schedule code; Dennis Ferguson, Eric Young and Dana How for comparing notes; and Ray Lau, for humouring me on.

(GEnie : OUTER; CIS : [71755,204]) Graven Imagery, 1992.

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1.906 go-radix 1.0.0

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1.907 python-defaults 3.6.7-1~18.04

1.907.1 Available under license:
   This is the Debian GNU/Linux prepackaged version of the Python programming language. Python was written by Guido van Rossum <guido@cwi.nl> and others.

   This package was put together by Klee Dienes <klee@debian.org> from sources from ftp.python.org:/pub/python, based on the Debianization by the previous maintainers Bernd S. Brentrup <bsb@uni-muenster.de> and Bruce Perens.
Current maintainer is Matthias Klose <doko@debian.org> until the final 2.3 version is released.

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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for
the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

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1.914 goprotobuf 1.4.2

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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winsup\testsuite\winsup.api\msgtest.c
winsup\testsuite\winsup.api\semtest.c
winsup\testsuite\winsup.api\shmtest.c
```

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winsup\cygserver\sysv_shm.cc

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GCC RUNTIME LIBRARY EXCEPTION

Version 3.1, 31 March 2009

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========

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<td>lib/interception/mach_override</td>
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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1.931 typed-ast 1.4.3

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1.932 gofrs-flock 0.8.0

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1.933 argparse 1.4.0

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A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python’s principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes.
the various releases.

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@heading Vincent Rijmen, Antoon Bosselaers, Paulo Barreto

AES in libhcrypto

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rijndael-alg-fst.c
@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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DES core in libhcrypto

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D3DES (V5.09) -

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1.943 click 7.1.2
1.943.1 Available under license:

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# binary only, patch it back to the system, and then use a wrapper

Found in path(s):
* /opt/cola/permits/1160566381_1620335255.38/0/pallets-click-7-1-2-0-g1784558-1-tar-gz/pallets-click-1784558/src/click/_compat.py
No license file was found, but licenses were detected in source scan.

import io
import re

from setuptools import find_packages
from setuptools import setup

with io.open("README.rst", "rt", encoding="utf8") as f:
    readme = f.read()

with io.open("src/click/__init__.py", "rt", encoding="utf8") as f:
    version = re.search(r'__version__ = "(.*)"', f.read()).group(1)

setup(
    name="click",
    version=version,
    url="https://palletsprojects.com/p/click/",
    project_urls={
        "Documentation": "https://click.palletsprojects.com/",
        "Code": "https://github.com/pallets/click",
        "Issue tracker": "https://github.com/pallets/click/issues",
    },
    license="BSD-3-Clause",
    maintainer="Pallets",
    maintainer_email="contact@palletsprojects.com",
    description="Composable command line interface toolkit",
    long_description=readme,
    packages=find_packages("src"),
    package_dir={"": "src"},
    include_package_data=True,
    python_requires=">=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*, !=3.4.*",
)
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This is why click-contrib exists. The GitHub organization is a collection of possibly experimental third-party packages whose featureset does not belong into Click, but also a playground for major features that may be added to Click in the future. It is also meant to coordinate and concentrate effort on writing third-party extensions for Click, and to ease the effort of searching for such extensions. In that sense it could be described as a low-maintenance alternative to extension repositories of other frameworks.

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.. _click-contrib: https://github.com/click-contrib/

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Found in path(s):
* /opt/cola/permits/1160566381_1620335255.38/0/pallets-click-7-1-2-0-g1784558-1-tar-gz/pallets-click-1784558/src/click/parser.py
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* /opt/cola/permits/1160566381_1620335255.38/0/pallets-click-7-1-2-0-g1784558-1-tar-gz/pallets-click-1784558/tests/test_formatting.py
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1.945 benbjohnson-clock 1.0.3

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 */
/**
 * Retrieves constraint related meta data for the parameters of the given executable.
 *
 * @param javaBeanExecutable The executable of interest.
 *
 * @return A list with parameter meta data for the given executable.
 */

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* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources-
jar/org/hibernate/validator/internal/constraintvalidators/bv/number/sign/PositiveOrZeroValidatorForLong.java
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources-
jar/org/hibernate/validator/spi/resourceloading/ResourceBundleLocator.java
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources-
jar/org/hibernate/validator/spi/nodenameprovider/PropertyNodeNameProvider.java
jar/org/hibernate/validator/internal/engine/valueextraction/IterableValueExtractor.java
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources.jar/org/hibernate/validator/spi/scripting/package-info.java
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources.jar/org/hibernate/validator/internal/constraintvalidators/bv/ModCheckValidator.java
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources.jar/org/hibernate/validator/internal/metadata/BeanMetaDataManager.java
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources.jar/org/hibernate/validator/internal/xml/mapping/GroupConversionStaxBuilder.java
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* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources.jar/org/hibernate/validator/internal/constraintvalidators/bv/number/bound/MaxValidatorForBigInteger.java
No license file was found, but licenses were detected in source scan.

/*
* Hibernate Validator, declare and validate application constraints
  *
  * License: Apache License, Version 2.0
  * See the license.txt file in the root directory or <http://www.apache.org/licenses/LICENSE-2.0>.
  */
/**
  * A method-level constraint, that evaluates a script expression against the
  * annotated method or constructor. This constraint can be used to implement
  * validation routines that depend on several parameters of the annotated
  * executable.
  * </p>
  * <p>
  * Script expressions can be written in any scripting or expression language,
  * for which a <a href="http://jcp.org/en/jsr/detail?id=223">JSR 223</a>
  * ("Scripting for the Java<sup>TM</sup> Platform") compatible engine can be
  * found on the classpath. To refer to a parameter within the scripting
  * expression, use its name as obtained by the active
  * <link javax.validation.ParameterNameProvider>. The default provider will
  * return the actual parameter names, if the -parameters compiler option
  * has been enabled, and {code arg0}, {code arg1} etc. otherwise.
  * </p>
  * <p>
  * The following listing shows an example using the JavaScript engine which
  * comes with the JDK:
  * </p>
  * <pre>
  * {@code @ParameterScriptAssert(script = "start.before(end)", lang = "javascript")
  * public void createEvent(Date start, Date end) { ... }
  * }
  * </pre>
  * <p>
  * Can be specified on any method or constructor.
  * </p>
  *
  * @author Gunnar Morling
  */

Found in path(s):
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources-
  jar/org/hibernate/validator/constraints/ParameterScriptAssert.java
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INF/validation-mapping-1.0.xsd
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources-jar/org/hibernate/validator/overview.html
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources-jar/META-INF/validation-mapping-1.1.xsd
* /opt/cola/permits/1179350176_1626075468.15/0/hibernate-validator-6-2-0-final-sources-jar/META-INF/validation-configuration-2.0.xsd

1.947 procps 3.3.16-1ubuntu2.3
1.947.1 Available under license:

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1.948 python3-cryptography 2.1.4-1ubuntu1.4

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1.949 gtk 2.24.32-1ubuntu1

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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#
src/base/fthash.c
src/base/md5.c
src/base/md5.h
#
src/bdf/bdf.c
src/bdf/bdf.h
src/bdf/bdfdrivr.c
src/bdf/bdfdrivr.h
src/bdf/bdferror.h
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src/pcf/module.mk
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src/pcf/pcfutil.c
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src/pcf/README
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#
src/gzip/adler32.c
src/gzip/infblock.c
src/gzip/infblock.h
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src/gzip/inffixed.h
src/gzip/inflate.c
src/gzip/inftrees.c
src/gzip/inftrees.h
src/gzip/infutil.c
src/gzip/infutil.h
src/gzip/zconf.h
src/gzip/zlib.h
src/gzip/zutil.c
src/gzip/zutil.h
#
src/tools/apinames.c
src/tools/ftrandom/ftrandom.c
#
# EOF

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1.958 linux-libc-dev 4.15.0-166.174

1.958.1 Available under license:
No license file was found, but licenses were detected in source scan.

--- linux-4.15.0.org/Documentation/ABI/testing/debugfs-aufs
+++ linux-4.15.0/Documentation/ABI/testing/debugfs-aufs
@@ -0,0 +1,50 @@
+What:	/debug/aufs/si_<id>/
+Date:March 2009
+Contact:J. R. Okajima <hooanon05g@gmail.com>
+Description:
+Under /debug/aufs, a directory named si_<id> is created
+per aufs mount, where <id> is a unique id generated
+internally.
+
+What:/debug/aufs/si_<id>/plink
+Date:Apr 2013
+Contact:J. R. Okajima <hooanon05g@gmail.com>
+Description:
+It has three lines and shows the information about the
+pseudo-link. The first line is a single number
+representing a number of buckets. The second line is a
+number of pseudo-links per buckets (separated by a
+blank). The last line is a single number representing a
+total number of pseudo-links.
+When the aufs mount option 'noplink' is specified, it
+will show "1\n0\n0\n".
+
+What:/debug/aufs/si_<id>/xib
+Date:March 2009
+Contact:J. R. Okajima <hooanon05g@gmail.com>
+Description:
+It shows the consumed blocks by xib (External Inode Number
+Bitmap), its block size and file size.
+When the aufs mount option 'noxino' is specified, it
+will be empty. About XINO files, see the aufs manual.
+
+What:/debug/aufs/si_<id>/xino0, xino1 ... xinoN
+Date:March 2009
+Contact:J. R. Okajima <hooanon05g@gmail.com>
+Description:
+It shows the consumed blocks by xino (External Inode Number
+Translation Table), its link count, block size and file
+size.
+When the aufs mount option 'noxino' is specified, it
+will be empty. About XINO files, see the aufs manual.
What: /debug/aufs/si_<id>/xigen
Date: March 2009
Contact: J. R. Okajima <hooanon05g@gmail.com>
Description:
It shows the consumed blocks by xigen (External Inode Generation Table), its block size and file size.
If CONFIG_AUFS_EXPORT is disabled, this entry will not be created.
When the aufs mount option 'noxino' is specified, it will be empty. About XINO files, see the aufs manual.

---
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-aufs
@@ -0,0 +1,31 @@
What: /sys/fs/aufs/si_<id>/
Date: March 2009
Contact: J. R. Okajima <hooanon05g@gmail.com>
Description:
Under /sys/fs/aufs, a directory named si_<id> is created per aufs mount, where <id> is a unique id generated internally.

What: /sys/fs/aufs/si_<id>/br0, br1 ... brN
Date: March 2009
Contact: J. R. Okajima <hooanon05g@gmail.com>
Description:
It shows the absolute path of a member directory (which is called branch) in aufs, and its permission.

What: /sys/fs/aufs/si_<id>/brid0, brid1 ... bridN
Date: July 2013
Contact: J. R. Okajima <hooanon05g@gmail.com>
Description:
It shows the id of a member directory (which is called branch) in aufs.

What: /sys/fs/aufs/si_<id>/xi_path
Date: March 2009
Contact: J. R. Okajima <hooanon05g@gmail.com>
Description:
It shows the absolute path of XINO (External Inode Number Bitmap, Translation Table and Generation Table) file even if it is the default path.
When the aufs mount option 'noxino' is specified, it will be empty. About XINO files, see the aufs manual.
---
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-bus-iio
@@ -32,7 +32,7 @@

---
+++
Description of the physical chip / device for device X.
Typically a part number.

- What: /sys/bus/iio/devices/iio:deviceX/timestamp_clock
+ What: /sys/bus/iio/devices/iio:deviceX/current_timestamp_clock

KernelVersion: 4.5
Contact: linux-iio@vger.kernel.org
Description:
@@ -1525,7 +1525,8 @@

KernelVersion: 4.3
Contact: linux-iio@vger.kernel.org
Description:
- Raw (unscaled no offset etc.) percentage reading of a substance.
+ Raw (unscaled no offset etc.) reading of a substance. Units
+ after application of scale and offset are percents.

--- linux-4.15.0.orig/Documentation/ABI/testing/sysfs-bus-mei
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-bus-mei
@@ -4,7 +4,7 @@

Contact: Samuel Ortiz <sameo@linux.intel.com>
linux-mei@linux.intel.com
Description: Stores the same MODALIAS value emitted by uevent
- Format: mei:<mei device name>..<device uuid>:
+ Format: mei:<mei device name>..<device uuid>..<protocol version>

What: /sys/bus/mei/devices/.../name
Date: May 2015
--- linux-4.15.0.orig/Documentation/ABI/testing/sysfs-bus-pci-drivers-xhci_hcd
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-bus-pci-drivers-xhci_hcd
@@ -0,0 +1,25 @@
+ What: /sys/bus/pci/drivers/xhci_hcd/.../dbc
+ Date: June 2017
+ Contact: Lu Baolu <baolu.lu@linux.intel.com>
+ Description:
+ xHCI compatible USB host controllers (i.e. super-speed
+ USB3 controllers) are often implemented with the Debug
+ Capability (DbC). It can present a debug device which
+ is fully compliant with the USB framework and provides
+ the equivalent of a very high performance full-duplex
+ serial link for debug purpose.
+ The DbC debug device shares a root port with xHCI host.
+ When the DbC is enabled, the root port will be assigned
+ to the Debug Capability. Otherwise, it will be assigned
+ to xHCI.
Writing "enable" to this attribute will enable the DbC functionality and the shared root port will be assigned to the DbC device. Writing "disable" to this attribute will disable the DbC functionality and the shared root port will roll back to the xHCI.

+ Reading this attribute gives the state of the DbC. It can be one of the following states: disabled, enabled, initialized, connected, configured and stalled.

--- linux-4.15.0.org/Documentation/ABI/testing/sysfs-bus-thunderbolt
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-bus-thunderbolt
@@ -1,3 +1,35 @@
+What: /sys/bus/thunderbolt/devices/.../domainX/boot_acl
+Date: Jun 2018
+KernelVersion: 4.17
+Contact: thunderbolt-software@lists.01.org
+Description: Holds a comma separated list of device unique_ids that are allowed to be connected automatically during system startup (e.g boot devices). The list always contains maximum supported number of unique_ids where unused entries are empty. This allows the userspace software to determine how many entries the controller supports. If there are multiple controllers, each controller has its own ACL list and size may be different between the controllers.
+
+System BIOS may have an option "Preboot ACL" or similar that needs to be selected before this list is taken into consideration.
+
+Software always updates a full list in each write.
+
+If a device is authorized automatically during boot its boot attribute is set to 1.
+
+What: /sys/bus/thunderbolt/devices/.../domainX/iommu_dma_protection
+Date: Mar 2019
+KernelVersion: 4.21
+Contact: thunderbolt-software@lists.01.org
+Description: This attribute tells whether the system uses IOMMU for DMA protection. Value of 1 means IOMMU is used 0 means it is not (DMA protection is solely based on Thunderbolt security levels).
+
What: /sys/bus/thunderbolt/devices/.../domainX/security
Date: Sep 2017
KernelVersion: 4.13
@@ -12,6 +44,9 @@
minimum. User needs to authorize each device.
dponly: Automatically tunnel Display port (and USB). No
PCIe tunnels are created.
+usbonly: Automatically tunnel USB controller of the
+connected Thunderbolt dock (and Display Port). All
+PCIe links downstream of the dock are removed.

What: /sys/bus/thunderbolt/devices/.../authorized
Date: Sep 2017
@@ -38,6 +73,13 @@
the device did not contain a key at all, and
EKEYREJECTED if the challenge response did not match.

+What: /sys/bus/thunderbolt/devices/.../boot
+Date: Jun 2018
+KernelVersion: 4.17
+Contact: thunderbolt-software@lists.01.org
+Description: This attribute contains 1 if Thunderbolt device was already
+authorized on boot and 0 otherwise.
+
What: /sys/bus/thunderbolt/devices/.../key
Date: Sep 2017
KernelVersion: 4.13
--- linux-4.15.0.orig/Documentation/ABI/testing/sysfs-class-cxl
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-class-cxl
@@ -69,7 +69,9 @@
Contact: linuxppc-dev@lists.ozlabs.org
Description: read/write
    Set the mode for prefaulting in segments into the segment table
-    when performing the START_WORK ioctl. Possible values:
+    when performing the START_WORK ioctl. Only applicable when
+    running under hashed page table mmu.
+    Possible values:
+        none: No prefaulting (default)
+        work_element_descriptor: Treat the work element
descriptor as an effective address and
@@ -244,3 +246,11 @@
Returns 1 if the psl timebase register is synchronized
with the core timebase register, 0 otherwise.
Users: https://github.com/ibm-capi/libcxl
+
+What: /sys/class/cxl/<card>/tunneled_ops_supported
+Date: May 2018
+Contact: linuxppc-dev@lists.ozlabs.org
+Description: read only
+    Returns 1 if tunneled operations are supported in capi mode,
+    0 otherwise.
+Users: https://github.com/ibm-capi/libcxl
The name of devfreq object denoted as ... is same as the name of device using devfreq.

What:	(sys/class/devfreq/.../name
Date:	November 2019
Contact:	Chanwoo Choi <cw00.choi@samsung.com>
Description:
The /sys/class/devfreq/.../name shows the name of device of the corresponding devfreq object.
+
What:	(sys/class/devfreq/.../governor
Date:	September 2011
Contact:	MyungJoo Ham <myungjoo.ham@samsung.com>
Description:
Symbolic link to the PHY device this network device is attached to.
+
What:	(sys/class/net/<iface>/carrier_changes
Date:	Mar 2014
KernelVersion:3.15
Contact:netdev@vger.kernel.org
Description:
32-bit unsigned integer counting the number of times the link has seen a change from UP to DOWN and vice versa
+
What:	(sys/class/net/<iface>/carrier_up_count
Date:	Jan 2018
KernelVersion:4.16
Contact:netdev@vger.kernel.org
Description:
32-bit unsigned integer counting the number of times the link has been up
+
What:	(sys/class/net/<iface>/carrier_down_count
Date:	Jan 2018
KernelVersion:4.16
Contact:netdev@vger.kernel.org
Description:
32-bit unsigned integer counting the number of times the link has been down
Description:
 Unsigned integer.

-Write a number ranging from 1 to 127 to add a qmap mux
+Write a number ranging from 1 to 254 to add a qmap mux
   based network device, supported by recent Qualcomm based
   modems.

Description:
 Unsigned integer.

-Write a number ranging from 1 to 127 to delete a previously
+Write a number ranging from 1 to 254 to delete a previously
   created qmap mux based network device.
--- linux-4.15.0.orig/Documentation/ABI/testing/sysfs-class-ocxl
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-class-ocxl
@@ -0,0 +1,35 @@
+What:/sys/class/ocxl/<afu name>/afu_version
+Date:January 2018
+Contact:linuxppc-dev@lists.oczlabs.org
+Description:read only
+Version of the AFU, in the format <major>:<minor>
+Reflects what is read in the configuration space of the AFU
+
+What:/sys/class/ocxl/<afu name>/contexts
+Date:January 2018
+Contact:linuxppc-dev@lists.oczlabs.org
+Description:read only
+Number of contexts for the AFU, in the format <n>/<max>
+where:
+\n:number of currently active contexts, for debug
+max:maximum number of contexts supported by the AFU
+
+What:/sys/class/ocxl/<afu name>/pp_mmio_size
+Date:January 2018
+Contact:linuxppc-dev@lists.oczlabs.org
+Description:read only
+Size of the per-process mmio area, as defined in the
+configuration space of the AFU
+
+What:/sys/class/ocxl/<afu name>/global_mmio_size
+Date:January 2018
+Contact:linuxppc-dev@lists.oczlabs.org
+Description:read only
+Size of the global mmio area, as defined in the
+configuration space of the AFU
+ What: /sys/class/ocxl/<afu name>/global_mmio_area
+ Date: January 2018
+ Contact: linuxppc-dev@lists.ozlabs.org
+ Description: read/write
+ Give access the global mmio area for the AFU

--- linux-4.15.0.orig/Documentation/ABI/testing/sysfs-devices-system-cpu
+++ linux-4.15.0/Documentation/ABI/testing/sysfs-devices-system-cpu
@@ -380,6 +380,12 @@
/sys/devices/system/cpu/vulnerabilities/meltdown
/sys/devices/system/cpu/vulnerabilities/spectre_v1
/sys/devices/system/cpu/vulnerabilities/spectre_v2
+ /sys/devices/system/cpu/vulnerabilities/spec_store_bypass
+ /sys/devices/system/cpu/vulnerabilities/l1tf
+ /sys/devices/system/cpu/vulnerabilities/mds
+ /sys/devices/system/cpu/vulnerabilities/srbds
+ /sys/devices/system/cpu/vulnerabilities/tsx_async_abort
+ /sys/devices/system/cpu/vulnerabilities/itlb_multihit
Date: January 2018
Contact: Linux kernel mailing list <linux-kernel@vger.kernel.org>
Description: Information about CPU vulnerabilities
@@ -391,3 +397,25 @@
"Not affected" CPU is not affected by the vulnerability
"Vulnerable" CPU is affected and no mitigation in effect
"Mitigation: $M" CPU is affected and mitigation $M is in effect
+
+ See also: Documentation/admin-guide/hw-vuln/index.rst
+
+ What: /sys/devices/system/cpu/smt
+ /sys/devices/system/cpu/smt/active
+ /sys/devices/system/cpu/smt/control
+ Date: June 2018
+ Contact: Linux kernel mailing list <linux-kernel@vger.kernel.org>
+ Description: Control Symetric Multi Threading (SMT)
+
+ active: Tells whether SMT is active (enabled and siblings online)
+
+ control: Read/write interface to control SMT. Possible
+ values:
+
+ "on" SMT is enabled
+ "off" SMT is disabled
+ "forceoff" SMT is force disabled. Cannot be changed.
+ "notsupported" SMT is not supported by the CPU
+
+ If control status is "forceoff" or "notsupported" writes
+ are rejected.
--- linux-4.15.0.orig/Documentation/ABI/testing/sysfs-power
Writing a "1" to this file enables the debug messages and writing a "0" (default) to it disables them. Reads from this file return the current value.

```
+What:/sys/power/resume_offset
+Date:April 2018
+Contact:Mario Limonciello <mario.limonciello@dell.com>
+Description:
+This file is used for telling the kernel an offset into a disk 
+to use when hibernating the system such as with a swap file.
+
+Reads from this file will display the current offset
+the kernel will be using on the next hibernation
+attempt.
+
+Using this sysfs file will override any values that were
+set using the kernel command line for disk offset.
```

---

### High-level view

OpenCAPI defines a Data Link Layer (DL) and Transaction Layer (TL), to be implemented on top of a physical link. Any processor or device implementing the DL and TL can start sharing memory.
Device discovery

OpenCAPI relies on a PCI-like configuration space, implemented on the device. So the host can discover AFUs by querying the config space.

OpenCAPI devices in Linux are treated like PCI devices (with a few caveats). The firmware is expected to abstract the hardware as if it was a PCI link. A lot of the existing PCI infrastructure is reused: devices are scanned and BARs are assigned during the standard PCI enumeration. Commands like `lspci` can therefore be used to see what devices are available.

The configuration space defines the AFU(s) that can be found on the physical adapter, such as its name, how many memory contexts it can work with, the size of its MMIO areas, ...

MMIO

OpenCAPI defines two MMIO areas for each AFU:
Open Source Used In 5GaaS Edge AC-4 9343

+ the global MMIO area, with registers pertinent to the whole AFU.
+ a per-process MMIO area, which has a fixed size for each context.
+
+ AFU interrupts
+ ============
+
+ OpenCAPI includes the possibility for an AFU to send an interrupt to a
+ host process. It is done through a ‘intrp_req’ defined in the
+ Transaction Layer, specifying a 64-bit object handle which defines the
+ interrupt.
+
+ The driver allows a process to allocate an interrupt and obtain its
+ 64-bit object handle, that can be passed to the AFU.
+
+
+ char devices
+ ===========
+
+ The driver creates one char device per AFU found on the physical
+ device. A physical device may have multiple functions and each
+ function can have multiple AFUs. At the time of this writing though,
+ it has only been tested with devices exporting only one AFU.
+
+ Char devices can be found in /dev/ocxl/ and are named as:
+ /dev/ocxl/<AFU name>.<location>.<index>
+
+ where <AFU name> is a max 20-character long name, as found in the
+ config space of the AFU.
+ <location> is added by the driver and can help distinguish devices
+ when a system has more than one instance of the same OpenCAPI device.
+ <index> is also to help distinguish AFUs in the unlikely case where a
+ device carries multiple copies of the same AFU.
+
+
+ Sysfs class
+ ===========
+
+ An ocxl class is added for the devices representing the AFUs. See
+ /sys/class/ocxl. The layout is described in
+ Documentation/ABI/testing/sysfs-class-ocxl
+
+
Based on the AFU definition found in the config space, an AFU may support working with more than one memory context, in which case the associated char device may be opened multiple times by different processes.

`ioctl`

`OCXL_IOCTL_ATTACH`:
Attach the memory context of the calling process to the AFU so that the AFU can access its memory.

`OCXL_IOCTL_IRQ_ALLOC`:
Allocate an AFU interrupt and return an identifier.

`OCXL_IOCTL_IRQ_FREE`:
Free a previously allocated AFU interrupt.

`OCXL_IOCTL_IRQ_SET_FD`:
Associate an event fd to an AFU interrupt so that the user process can be notified when the AFU sends an interrupt.

`OCXL_IOCTL_GET_METADATA`:
Obtains configuration information from the card, such as the size of MMIO areas, the AFU version, and the PASID for the current context.

`OCXL_IOCTL_ENABLE_P9_WAIT`:
Allows the AFU to wake a userspace thread executing 'wait'. Returns information to userspace to allow it to configure the AFU. Note that this is only available on POWER9.

`OCXL_IOCTL_GET_FEATURES`:
Reports on which CPU features that affect OpenCAPI are usable from userspace.
A process can mmap the per-process MMIO area for interactions with the AFU.

Specific changes to system operation when these tweaks are not available in the core functionality of Linux itself.

Without a specific LSM built into the kernel, the default LSM will be the Linux capabilities system. Most LSMS choose to extend the capabilities system, building their checks on top of the defined capability hooks.

For more details on capabilities, see ``capabilities(7)`` in the Linux man-pages project.

The Linux capabilities modules will always be included. For more details on capabilities, see ``capabilities(7)`` in the Linux man-pages project.

Security modules that do not use the security data blobs maintained by the LSM infrastructure are considered "minor" modules. These may be included at compile time and stacked explicitly. Security modules that use the LSM maintained security blobs are considered "major" modules.

These may only be stacked if the CONFIG_LSM_STACKED configuration option is used. If this is chosen all of the security modules selected will be used.

A list of the active security modules can be found by reading `/sys/kernel/security/lsm`. This is a comma separated list, and be first, followed by any "minor" modules (e.g. Yama) and then the one "major" module (e.g. SELinux) if there is one configured.

Process attributes associated with "major" security modules should be accessed and maintained using the special files in `/proc/.../attr`.

A security module may maintain a module specific subdirectory there, named after the module. `/proc/.../attr/smack` is provided by the Smack security module and contains all its special files. The files directly in `/proc/.../attr` remain as legacy interfaces for modules that provide subdirectories.

.. toctree::

   :maxdepth: 1
232 char
Biometric Devices
0 = /dev/biometric/sensor0/fingerprint first fingerprint sensor on first device
--- linux-4.15.0.orig/Documentation/admin-guide/hw-vuln/index.rst
+++ linux-4.15.0/Documentation/admin-guide/hw-vuln/index.rst
@@ -0,0 +1,17 @@
+========================
+Hardware vulnerabilities
+=================================
+
+This section describes CPU vulnerabilities and provides an overview of the
+possible mitigations along with guidance for selecting mitigations if they
+are configurable at compile, boot or run time.
+
+.. toctree::
+   :maxdepth: 1
+
+   spectre
+   l1tf
+   mds
+   tsx_async_abort
+   multihit.rst
+   special-register-buffer-data-sampling.rst
--- linux-4.15.0.orig/Documentation/admin-guide/hw-vuln/l1tf.rst
+++ linux-4.15.0/Documentation/admin-guide/hw-vuln/l1tf.rst
@@ -0,0 +1,611 @@
+L1TF - L1 Terminal Fault
+=================================
+
+L1 Terminal Fault is a hardware vulnerability which allows unprivileged
+speculative access to data which is available in the Level 1 Data Cache
+when the page table entry controlling the virtual address, which is used
+for the access, has the Present bit cleared or other reserved bits set.
+
+Affected processors
+--------------------
+
This vulnerability affects a wide range of Intel processors. The vulnerability is not present on:

- Processors from AMD, Centaur and other non Intel vendors
- Older processor models, where the CPU family is < 6
- A range of Intel ATOM processors (Cedarview, Cloverview, Lincroft, Penwell, Pineview, Silvermont, Airmont, Merrifield)
- The Intel XEON PHI family
- Intel processors which have the ARCH_CAP_RDCL_NO bit set in the IA32_ARCH_CAPABILITIES MSR. If the bit is set the CPU is not affected by the Meltdown vulnerability either. These CPUs should become available by end of 2018.

Whether a processor is affected or not can be read out from the L1TF vulnerability file in sysfs. See :ref:`l1tf_sys_info`.

Related CVEs
------------

The following CVE entries are related to the L1TF vulnerability:

| CVE-2018-3615 | L1 Terminal Fault | SGX related aspects |
| CVE-2018-3620 | L1 Terminal Fault | OS, SMM related aspects |
| CVE-2018-3646 | L1 Terminal Fault | Virtualization related aspects |

Problem
-------

If an instruction accesses a virtual address for which the relevant page table entry (PTE) has the Present bit cleared or other reserved bits set, then speculative execution ignores the invalid PTE and loads the referenced data if it is present in the Level 1 Data Cache, as if the page referenced by the address bits in the PTE was still present and accessible.

While this is a purely speculative mechanism and the instruction will raise a page fault when it is retired eventually, the pure act of loading the data and making it available to other speculative instructions opens up the opportunity for side channel attacks to unprivileged malicious code, similar to the Meltdown attack.

While Meltdown breaks the user space to kernel space protection, L1TF allows to attack any physical memory address in the system and the attack
Attack scenarios

1. Malicious user space
   Operating Systems store arbitrary information in the address bits of a PTE which is marked non present. This allows a malicious user space application to attack the physical memory to which these PTEs resolve. In some cases user-space can maliciously influence the information encoded in the address bits of the PTE, thus making attacks more deterministic and more practical.
   The Linux kernel contains a mitigation for this attack vector, PTE inversion, which is permanently enabled and has no performance impact. The kernel ensures that the address bits of PTEs, which are not marked present, never point to cacheable physical memory space.
   A system with an up to date kernel is protected against attacks from malicious user space applications.

2. Malicious guest in a virtual machine
   The fact that L1TF breaks all domain protections allows malicious guest OSes, which can control the PTEs directly, and malicious guest user space applications, which run on an unprotected guest kernel lacking the PTE inversion mitigation for L1TF, to attack physical host memory.
   A special aspect of L1TF in the context of virtualization is symmetric multi threading (SMT). The Intel implementation of SMT is called HyperThreading. The fact that Hyperthreads on the affected processors share the L1 Data Cache (L1D) is important for this. As the flaw allows only to attack data which is present in L1D, a malicious guest running on one Hyperthread can attack the data which is brought into the L1D by the context which runs on the sibling Hyperthread of the same physical core. This context can be host OS, host user space or a different guest.
   If the processor does not support Extended Page Tables, the attack is only possible, when the hypervisor does not sanitize the content of the effective (shadow) page tables.
   While solutions exist to mitigate these attack vectors fully, these
mitigations are not enabled by default in the Linux kernel because they can affect performance significantly. The kernel provides several mechanisms which can be utilized to address the problem depending on the deployment scenario. The mitigations, their protection scope and impact are described in the next sections.

The default mitigations and the rationale for choosing them are explained at the end of this document. See :ref:`default_mitigations`.

.. _l1tf_sys_info:

L1TF system information
-----------------------

The Linux kernel provides a sysfs interface to enumerate the current L1TF status of the system: whether the system is vulnerable, and which mitigations are active. The relevant sysfs file is:

+ /sys/devices/system/cpu/vulnerabilities/l1tf

+ The possible values in this file are:

+ "Not affected"The processor is not vulnerable
+ "Mitigation: PTE Inversion"The host protection is active

+ If KVM/VMX is enabled and the processor is vulnerable then the following information is appended to the 'Mitigation: PTE Inversion' part:

+ - SMT status:

  + "VMX: SMT vulnerable" SMT is enabled
  + "VMX: SMT disabled" SMT is disabled

+ - L1D Flush mode:

  + "L1D vulnerable" L1D flushing is disabled
  + "L1D conditional cache flushes" L1D flush is conditionally enabled
  + "L1D cache flushes" L1D flush is unconditionally enabled

+ The resulting grade of protection is discussed in the following sections.
Host mitigation mechanism

The kernel is unconditionally protected against L1TF attacks from malicious user space running on the host.

Guest mitigation mechanisms

.. _l1d_flush:

1. L1D flush on VMENTER

To make sure that a guest cannot attack data which is present in the L1D, the hypervisor flushes the L1D before entering the guest.

Flushing the L1D evicts not only the data which should not be accessed by a potentially malicious guest, it also flushes the guest data. Flushing the L1D has a performance impact as the processor has to bring the flushed guest data back into the L1D. Depending on the frequency of VMEXIT/VMENTER and the type of computations in the guest, performance degradation in the range of 1% to 50% has been observed. For scenarios where guest VMEXIT/VMENTER are rare the performance impact is minimal. Virtio and mechanisms like posted interrupts are designed to confine the VMEXITs to a bare minimum, but specific configurations and application scenarios might still suffer from a high VMEXIT rate.

The kernel provides two L1D flush modes:

- conditional ('cond')
- unconditional ('always')

The conditional mode avoids L1D flushing after VMEXITs which execute only audited code paths before the corresponding VMENTER. These code paths have been verified that they cannot expose secrets or other interesting data to an attacker, but they can leak information about the address space layout of the hypervisor.

Unconditional mode flushes L1D on all VMENTER invocations and provides maximum protection. It has a higher overhead than the conditional mode. The overhead cannot be quantified correctly as it depends on the workload scenario and the resulting number of VMEXITs.

The general recommendation is to enable L1D flush on VMENTER. The kernel defaults to conditional mode on affected processors.
**Note**, that L1D flush does not prevent the SMT problem because the sibling thread will also bring back its data into the L1D which makes it attackable again.

L1D flush can be controlled by the administrator via the kernel command line and sysfs control files. See :ref:`mitigation_control_command_line` and :ref:`mitigation_control_kvm`.

.. _guest_confinement:

2. Guest VCPU confinement to dedicated physical cores

   To address the SMT problem, it is possible to make a guest or a group of guests affine to one or more physical cores. The proper mechanism for that is to utilize exclusive cpusets to ensure that no other guest or host tasks can run on these cores.

   If only a single guest or related guests run on sibling SMT threads on the same physical core then they can only attack their own memory and restricted parts of the host memory.

   Host memory is attackable, when one of the sibling SMT threads runs in host OS (hypervisor) context and the other in guest context. The amount of valuable information from the host OS context depends on the context which the host OS executes, i.e. interrupts, soft interrupts and kernel threads. The amount of valuable data from these contexts cannot be declared as non-interesting for an attacker without deep inspection of the code.

   **Note**, that assigning guests to a fixed set of physical cores affects the ability of the scheduler to do load balancing and might have negative effects on CPU utilization depending on the hosting scenario. Disabling SMT might be a viable alternative for particular scenarios.

   For further information about confining guests to a single or to a group of cores consult the cpusets documentation:

   https://www.kernel.org/doc/Documentation/cgroup-v1/cpusets.txt

.. _interrupt_isolation:

3. Interrupt affinity

   Interrupts can be made affine to logical CPUs. This is not universally
true because there are types of interrupts which are truly per CPU
interrupts, e.g. the local timer interrupt. Aside of that multi queue
devices affine their interrupts to single CPUs or groups of CPUs per
queue without allowing the administrator to control the affinities.

Moving the interrupts, which can be affinity controlled, away from CPUs
which run untrusted guests, reduces the attack vector space.

Whether the interrupts with are affine to CPUs, which run untrusted
guests, provide interesting data for an attacker depends on the system
configuration and the scenarios which run on the system. While for some
of the interrupts it can be assumed that they won't expose interesting
information beyond exposing hints about the host OS memory layout, there
is no way to make general assumptions.

Interrupt affinity can be controlled by the administrator via the
/proc/irq/$NR/smp_affinity[_list] files. Limited documentation is
available at:


.. _smt_control:

4. SMT control

To prevent the SMT issues of L1TF it might be necessary to disable SMT
completely. Disabling SMT can have a significant performance impact, but
the impact depends on the hosting scenario and the type of workloads.
The impact of disabling SMT needs also to be weighted against the impact
of other mitigation solutions like confining guests to dedicated cores.

The kernel provides a sysfs interface to retrieve the status of SMT and
to control it. It also provides a kernel command line interface to
control SMT.

The kernel command line interface consists of the following options:

nosmt Affects the bring up of the secondary CPUs during boot. The
kernel tries to bring all present CPUs online during the
boot process. "nosmt" makes sure that from each physical
core only one - the so called primary (hyper) thread is
activated. Due to a design flaw of Intel processors related
to Machine Check Exceptions the non primary siblings have
to be brought up at least partially and are then shut down
again. "nosmt" can be undone via the sysfs interface.
nosmt=force Has the same effect as "nosmt" but it does not allow to undo the SMT disable via the sysfs interface.

The sysfs interface provides two files:

- /sys/devices/system/cpu/smt/control
- /sys/devices/system/cpu/smt/active

/sys/devices/system/cpu/smt/control:

This file allows to read out the SMT control state and provides the ability to disable or (re)enable SMT. The possible states are:

- on: SMT is supported by the CPU and enabled. All logical CPUs can be onlined and offlined without restrictions.
- off: SMT is supported by the CPU and disabled. Only the so called primary SMT threads can be onlined and offlined without restrictions. An attempt to online a non-primary sibling is rejected.
- forceoff: Same as 'off' but the state cannot be controlled. Attempts to write to the control file are rejected.
- notsupported: The processor does not support SMT. It's therefore not affected by the SMT implications of L1TF. Attempts to write to the control file are rejected.

The possible states which can be written into this file to control SMT state are:

- on
- off
- forceoff

/sys/devices/system/cpu/smt/active:

This file reports whether SMT is enabled and active, i.e. if on any physical core two or more sibling threads are online.

SMT control is also possible at boot time via the l1tf kernel command line parameter in combination with L1D flush control. See :ref:`mitigation_control_command_line`.
+5. Disabling EPT
+ Disabling EPT for virtual machines provides full mitigation for L1TF even
+ with SMT enabled, because the effective page tables for guests are
+ managed and sanitized by the hypervisor. Though disabling EPT has a
+ significant performance impact especially when the Meltdown mitigation
+ KPTI is enabled.
+ + EPT can be disabled in the hypervisor via the 'kvm-intel.ept' parameter.
+ + There is ongoing research and development for new mitigation mechanisms to
+ + address the performance impact of disabling SMT or EPT.
+ + .. _mitigation_control_command_line:
+ + Mitigation control on the kernel command line
+ + The kernel command line allows to control the L1TF mitigations at boot
time with the option "l1tf=". The valid arguments for this option are:
+ + ==full== Provides all available mitigations for the L1TF
+ + vulnerability. Disables SMT and enables all mitigations in
+ + the hypervisors, i.e. unconditional L1D flushing
+ + +SMT control and L1D flush control via the sysfs interface
+ + is still possible after boot. Hypervisors will issue a
+ + warning when the first VM is started in a potentially
+ + insecure configuration, i.e. SMT enabled or L1D flush
disabled.
+ + ==full,force== Same as 'full', but disables SMT and L1D flush runtime
+ + control. Implies the 'nosmt=force' command line option.
+ + (i.e. sysfs control of SMT is disabled.)
+ + ==flush== Leaves SMT enabled and enables the default hypervisor
+ + mitigation, i.e. conditional L1D flushing
+ + +SMT control and L1D flush control via the sysfs interface
+ + is still possible after boot. Hypervisors will issue a
+ + warning when the first VM is started in a potentially
+ + insecure configuration, i.e. SMT enabled or L1D flush
disabled.
+ + ==flush,nosmt== Disables SMT and enables the default hypervisor mitigation,
i.e. conditional L1D flushing.
SMT control and L1D flush control via the sysfs interface is still possible after boot. Hypervisors will issue a warning when the first VM is started in a potentially insecure configuration, i.e. SMT enabled or L1D flush disabled.

+ flush, nowarn Same as 'flush', but hypervisors will not warn when a VM is started in a potentially insecure configuration.
+ off Disables hypervisor mitigations and doesn't emit any warnings.

The default is 'flush'. For details about L1D flushing see :ref:`l1d_flush`.

Mitigation control for KVM - module parameter

The KVM hypervisor mitigation mechanism, flushing the L1D cache when entering a guest, can be controlled with a module parameter.

The option/parameter is "kvm-intel.vmentry_l1d_flush=". It takes the following arguments:

+ always L1D cache flush on every VMENTER.
+ cond Flush L1D on VMENTER only when the code between VMEXIT and VMENTER can leak host memory which is considered interesting for an attacker. This still can leak host memory which allows e.g. to determine the hosts address space layout.
+ never Disables the mitigation

The parameter can be provided on the kernel command line, as a module parameter when loading the modules and at runtime modified via the sysfs file:

+/sys/module/kvm_intel/parameters/vmentry_l1d_flush

The default is 'cond'. If 'l1tf=full,force' is given on the kernel command line, then 'always' is enforced and the kvm-intel.vmentry_l1d_flush module parameter is ignored and writes to the sysfs file are rejected.
Mitigation selection guide

1. No virtualization in use

   The system is protected by the kernel unconditionally and no further action is required.

2. Virtualization with trusted guests

   If the guest comes from a trusted source and the guest OS kernel is guaranteed to have the L1TF mitigations in place the system is fully protected against L1TF and no further action is required.

   To avoid the overhead of the default L1D flushing on VMENTER the administrator can disable the flushing via the kernel command line and sysfs control files. See :ref:`mitigation_control_command_line` and :ref:`mitigation_control_kvm`.

3. Virtualization with untrusted guests

3.1. SMT not supported or disabled

   If SMT is not supported by the processor or disabled in the BIOS or by the kernel, it's only required to enforce L1D flushing on VMENTER.

   Conditional L1D flushing is the default behaviour and can be tuned. See :ref:`mitigation_control_command_line` and :ref:`mitigation_control_kvm`.

3.2. EPT not supported or disabled

   If EPT is not supported by the processor or disabled in the hypervisor, the system is fully protected. SMT can stay enabled and L1D flushing on VMENTER is not required.

   EPT can be disabled in the hypervisor via the 'kvm-intel.ept' parameter.

3.3. SMT and EPT supported and active

   Conditional L1D flushing is the default behaviour and can be tuned. See :ref:`mitigation_control_command_line` and :ref:`mitigation_control_kvm`.
If SMT and EPT are supported and active then various degrees of mitigations can be employed:

- L1D flushing on VMENTER:

  L1D flushing on VMENTER is the minimal protection requirement, but it is only potent in combination with other mitigation methods.

  Conditional L1D flushing is the default behaviour and can be tuned. See :ref:`mitigation_control_command_line` and :ref:`mitigation_control_kvm`.

- Guest confinement:

  Confinement of guests to a single or a group of physical cores which are not running any other processes, can reduce the attack surface significantly, but interrupts, soft interrupts and kernel threads can still expose valuable data to a potential attacker. See :ref:`guest_confinement`.

- Interrupt isolation:

  Isolating the guest CPUs from interrupts can reduce the attack surface further, but still allows a malicious guest to explore a limited amount of host physical memory. This can at least be used to gain knowledge about the host address space layout. The interrupts which have a fixed affinity to the CPUs which run the untrusted guests can depending on the scenario still trigger soft interrupts and schedule kernel threads which might expose valuable information. See :ref:`interrupt_isolation`.

The above three mitigation methods combined can provide protection to a certain degree, but the risk of the remaining attack surface has to be carefully analyzed. For full protection the following methods are available:

- Disabling SMT:

  Disabling SMT and enforcing the L1D flushing provides the maximum amount of protection. This mitigation is not depending on any of the above mitigation methods.

  SMT control and L1D flushing can be tuned by the command line parameters 'nosmt', 'l1tf', 'kvm-intel.vmentry_l1d_flush' and at run time with the matching sysfs control files. See :ref:`smt_control`, :ref:`mitigation_control_command_line` and :ref:`mitigation_control_kvm`.
+ Disabling EPT:
+ Disabling EPT provides the maximum amount of protection as well. It is
+ not depending on any of the above mitigation methods. SMT can stay
+ enabled and L1D flushing is not required, but the performance impact is
+ significant.
+ EPT can be disabled in the hypervisor via the 'kvm-intel.ept'
+ parameter.

3.4. Nested virtual machines

When nested virtualization is in use, three operating systems are involved:
the bare metal hypervisor, the nested hypervisor and the nested virtual
machine. VMENTER operations from the nested hypervisor into the nested
guest will always be processed by the bare metal hypervisor. If KVM is the
bare metal hypervisor it will:

- Flush the L1D cache on every switch from the nested hypervisor to the
  nested virtual machine, so that the nested hypervisor's secrets are not
  exposed to the nested virtual machine;
- Flush the L1D cache on every switch from the nested virtual machine to
  the nested hypervisor; this is a complex operation, and flushing the L1D
  cache avoids that the bare metal hypervisor's secrets are exposed to the
  nested virtual machine;
- Instruct the nested hypervisor to not perform any L1D cache flush. This
  is an optimization to avoid double L1D flushing.

.. _default_mitigations:

Default mitigations

The kernel default mitigations for vulnerable processors are:

- PTE inversion to protect against malicious user space. This is done
  unconditionally and cannot be controlled.
- L1D conditional flushing on VMENTER when EPT is enabled for
  a guest.
The kernel does not by default enforce the disabling of SMT, which leaves
SMT systems vulnerable when running untrusted guests with EPT enabled.
+ The rationale for this choice is:
+ - Force disabling SMT can break existing setups, especially with
  unattended updates.
+ - If regular users run untrusted guests on their machine, then L1TF is
  just an add on to other malware which might be embedded in an untrusted
  guest, e.g. spam-bots or attacks on the local network.
+ - There is no technical way to prevent a user from running untrusted code
  on their machines blindly.
+ - It's technically extremely unlikely and from today's knowledge even
  impossible that L1TF can be exploited via the most popular attack
  mechanisms like JavaScript because these mechanisms have no way to
  control PTEs. If this would be possible and not other mitigation would
  be possible, then the default might be different.
+ - The administrators of cloud and hosting setups have to carefully
  analyze the risk for their scenarios and make the appropriate
  mitigation choices, which might even vary across their deployed
  machines and also result in other changes of their overall setup.
+ - There is no way for the kernel to provide a sensible default for this
  kind of scenarios.

--- linux-4.15.0.orig/Documentation/admin-guide/hw-vuln/mds.rst
+++ linux-4.15.0/Documentation/admin-guide/hw-vuln/mds.rst
@@ -0,0 +1,311 @@
+MDS - Microarchitectural Data Sampling
+===============================================================================
+
+Microarchitectural Data Sampling is a hardware vulnerability which allows
+unprivileged speculative access to data which is available in various CPU
+internal buffers.
+
+AFFECTED PROCESSORS
+
+This vulnerability affects a wide range of Intel processors. The
+vulnerability is not present on:
+
+ - Processors from AMD, Centaur and other non Intel vendors
+ - Older processor models, where the CPU family is < 6
+ - Some Atoms (Bonnell, Saltwell, Goldmont, GoldmontPlus)
+ - Intel processors which have the ARCH_CAP_MDS_NO bit set in the
  IA32_ARCH_CAPABILITIES MSR.
Whether a processor is affected or not can be read out from the MDS vulnerability file in /sysfs. See :ref:`mds_sys_info`.

Not all processors are affected by all variants of MDS, but the mitigation is identical for all of them so the kernel treats them as a single vulnerability.

Related CVEs
-------------

The following CVE entries are related to the MDS vulnerability:

<table>
<thead>
<tr>
<th>CVE-2018-12126</th>
<th>MSBDS</th>
<th>Microarchitectural Store Buffer Data Sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVE-2018-12130</td>
<td>MFBDS</td>
<td>Microarchitectural Fill Buffer Data Sampling</td>
</tr>
<tr>
<td>CVE-2018-12127</td>
<td>MLPDS</td>
<td>Microarchitectural Load Port Data Sampling</td>
</tr>
<tr>
<td>CVE-2019-11091</td>
<td>MDSUM</td>
<td>Microarchitectural Data Sampling Uncacheable Memory</td>
</tr>
</tbody>
</table>

Problem
-------

When performing store, load, L1 refill operations, processors write data into temporary microarchitectural structures (buffers). The data in the buffer can be forwarded to load operations as an optimization.

Under certain conditions, usually a fault/assist caused by a load operation, data unrelated to the load memory address can be speculatively forwarded from the buffers. Because the load operation causes a fault or assist and its result will be discarded, the forwarded data will not cause incorrect program execution or state changes. But a malicious operation may be able to forward this speculative data to a disclosure gadget which allows in turn to infer the value via a cache side channel attack.

Because the buffers are potentially shared between Hyper-Threads cross Hyper-Thread attacks are possible.

Deeper technical information is available in the MDS specific x86 architecture section: :ref:`Documentation/x86/mds.rst <mds>`.

Attack scenarios
-----------------

Attacks against the MDS vulnerabilities can be mounted from malicious non privileged user space applications running on hosts or guest. Malicious guest OSes can obviously mount attacks as well.
Contrary to other speculation based vulnerabilities the MDS vulnerability does not allow the attacker to control the memory target address. As a consequence the attacks are purely sampling based, but as demonstrated with the TLBleed attack samples can be postprocessed successfully.

Web-Browsers

It's unclear whether attacks through Web-Browsers are possible at all. The exploitation through Java-Script is considered very unlikely, but other widely used web technologies like Webassembly could possibly be abused.

.. _mds_sys_info:

MDS system information
-----------------------

The Linux kernel provides a sysfs interface to enumerate the current MDS status of the system: whether the system is vulnerable, and which mitigations are active. The relevant sysfs file is:

```
/sys/devices/system/cpu/vulnerabilities/mds
```

The possible values in this file are:

- `Not affected` - The processor is not vulnerable
- `Vulnerable` - The processor is vulnerable, but no mitigation enabled
- `Vulnerable: Clear CPU buffers attempted, no microcode` - The processor is vulnerable but microcode is not updated.
- `Mitigation: Clear CPU buffers` - The processor is vulnerable and the CPU buffer clearing mitigation is enabled.

The mitigation is enabled on a best effort basis. See :ref:`vmwerv`

- `Mitigation: Clear CPU buffers` - The processor is vulnerable and the CPU buffer clearing mitigation is enabled.

If the processor is vulnerable then the following information is appended to the above information:

- `SMT vulnerable` - SMT is enabled
- `SMT mitigated` - SMT is enabled and mitigated
Best effort mitigation mode

If the processor is vulnerable, but the availability of the microcode based mitigation mechanism is not advertised via CPUID the kernel selects a best effort mitigation mode. This mode invokes the mitigation instructions without a guarantee that they clear the CPU buffers.

This is done to address virtualization scenarios where the host has the microcode update applied, but the hypervisor is not yet updated to expose the CPUID to the guest. If the host has updated microcode the protection takes effect otherwise a few cpu cycles are wasted pointlessly.

The state in the mds sysfs file reflects this situation accordingly.

Mitigation mechanism

The kernel detects the affected CPUs and the presence of the microcode which is required.

If a CPU is affected and the microcode is available, then the kernel enables the mitigation by default. The mitigation can be controlled at boot time via a kernel command line option. See :ref:`mds_mitigation_control_command_line`.

CPU buffer clearing

The mitigation for MDS clears the affected CPU buffers on return to user space and when entering a guest.

If SMT is enabled it also clears the buffers on idle entry when the CPU is only affected by MSBDS and not any other MDS variant, because the other variants cannot be protected against cross Hyper-Thread attacks.

For CPUs which are only affected by MSBDS the user space, guest and idle transition mitigations are sufficient and SMT is not affected.
The protection for host to guest transition depends on the L1TF vulnerability of the CPU:

- CPU is affected by L1TF:
  - If the L1D flush mitigation is enabled and up to date microcode is available, the L1D flush mitigation is automatically protecting the guest transition.
  - If the L1D flush mitigation is disabled then the MDS mitigation is invoked explicit when the host MDS mitigation is enabled.
  - For details on L1TF and virtualization see: :ref:`Documentation/admin-guide/hw-vuln//l1tf.rst <mitigation_control_kvm>`.

- CPU is not affected by L1TF:
  - CPU buffers are flushed before entering the guest when the host MDS mitigation is enabled.

The resulting MDS protection matrix for the host to guest transition:

<table>
<thead>
<tr>
<th>L1TF</th>
<th>MDS</th>
<th>VMX-L1FLUSH</th>
<th>Host MDS</th>
<th>MDS-State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't care</td>
<td>No</td>
<td>Don't care</td>
<td>N/A</td>
<td>Not affected</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Disabled</td>
<td>Off</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Disabled</td>
<td>Full</td>
<td>Mitigated</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Enabled</td>
<td>Don't care</td>
<td>Mitigated</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>Off</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>N/A</td>
<td>Full</td>
<td>Mitigated</td>
</tr>
</tbody>
</table>

This only covers the host to guest transition, i.e. prevents leakage from host to guest, but does not protect the guest internally. Guests need to have their own protections.
The XEON PHI processor family is affected by MSBDS which can be exploited cross Hyper-Threads when entering idle states. Some XEON PHI variants allow to use MWAIT in user space (Ring 3) which opens an potential attack vector for malicious user space. The exposure can be disabled on the kernel command line with the 'ring3mwait=disable' command line option.

XEON PHI is not affected by the other MDS variants and MSBDS is mitigated before the CPU enters a idle state. As XEON PHI is not affected by L1TF either disabling SMT is not required for full protection.

SMT control

All MDS variants except MSBDS can be attacked cross Hyper-Threads. That means on CPUs which are affected by MFBDS or MLPDS it is necessary to disable SMT for full protection. These are most of the affected CPUs; the exception is XEON PHI, see :ref:`xeon_phi`.

Disabling SMT can have a significant performance impact, but the impact depends on the type of workloads.

See the relevant chapter in the L1TF mitigation documentation for details: :ref:`Documentation/admin-guide/hw-vuln/l1tf.rst <smt_control>`.

Mitigation control on the kernel command line

The kernel command line allows to control the MDS mitigations at boot time with the option "mds=". The valid arguments for this option are:

full: If the CPU is vulnerable, enable all available mitigations for the MDS vulnerability, CPU buffer clearing on exit to userspace and when entering a VM. Idle transitions are protected as well if SMT is enabled.

It does not automatically disable SMT.

full,nosmt: The same as mds=full, with SMT disabled on vulnerable
+CPUs. This is the complete mitigation.
+
+ off Disables MDS mitigations completely.
+
+ ===============

+ Not specifying this option is equivalent to "mds=full". For processors
+ that are affected by both TAA (TSX Asynchronous Abort) and MDS,
+ specifying just "mds=off" without an accompanying "tsx_async_abort=off"
+ will have no effect as the same mitigation is used for both
+ vulnerabilities.
+
+ Mitigation selection guide
+
+ 1. Trusted userspace
+    ^^^^^^^^^^^^^^^^^^^^^
+
+   If all userspace applications are from a trusted source and do not
+   execute untrusted code which is supplied externally, then the mitigation
+   can be disabled.
+
+ 2. Virtualization with trusted guests
+    ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
+
+   The same considerations as above versus trusted user space apply.
+
+ 3. Virtualization with untrusted guests
+    ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
+
+   The protection depends on the state of the L1TF mitigations.
+   See :ref:`virt_mechanism`.
+
+ If the MDS mitigation is enabled and SMT is disabled, guest to host and
+ guest to guest attacks are prevented.
+
+ .. _mds_default_mitigations:

+ Default mitigations
+-------------------
+
+ The kernel default mitigations for vulnerable processors are:
+
+ - Enable CPU buffer clearing
+
+ The kernel does not by default enforce the disabling of SMT, which leaves
+ SMT systems vulnerable when running untrusted code. The same rationale as
iTLB multihit

iTLB multihit is an erratum where some processors may incur a machine check error, possibly resulting in an unrecoverable CPU lockup, when an instruction fetch hits multiple entries in the instruction TLB. This can occur when the page size is changed along with either the physical address or cache type. A malicious guest running on a virtualized system can exploit this erratum to perform a denial of service attack.

Affected processors

Variations of this erratum are present on most Intel Core and Xeon processor models. The erratum is not present on:

- non-Intel processors
- Some Atoms (Airmont, Bonnell, Goldmont, GoldmontPlus, Saltwell, Silvermont)
- Intel processors that have the PSCHANGE_MC_NO bit set in the IA32_ARCH_CAPABILITIES MSR.

Related CVEs

The following CVE entry is related to this issue:

CVE-2018-12207  Machine Check Error Avoidance on Page Size Change

Problem

Privileged software, including OS and virtual machine managers (VMM), are in charge of memory management. A key component in memory management is the control of the page tables. Modern processors use virtual memory, a technique that creates the illusion of a very large memory for processors. This virtual space is split into pages of a given size. Page tables translate virtual addresses to physical addresses.
To reduce latency when performing a virtual to physical address translation, processors include a structure, called TLB, that caches recent translations. There are separate TLBs for instruction (iTLB) and data (dTLB).

Under this errata, instructions are fetched from a linear address translated using a 4 KB translation cached in the iTLB. Privileged software modifies the paging structure so that the same linear address using large page size (2 MB, 4 MB, 1 GB) with a different physical address or memory type. After the page structure modification but before the software invalidates any iTLB entries for the linear address, a code fetch that happens on the same linear address may cause a machine-check error which can result in a system hang or shutdown.

Attack scenarios
----------------

Attacks against the iTLB multihit erratum can be mounted from malicious guests in a virtualized system.

iTLB multihit system information
--------------------------------

The Linux kernel provides a sysfs interface to enumerate the current iTLB multihit status of the system: whether the system is vulnerable and which mitigations are active. The relevant sysfs file is:

/sys/devices/system/cpu/vulnerabilities/itlb_multihit

The possible values in this file are:

.. list-table::
   :widths: 1 1

   * - Not affected
     - The processor is not vulnerable.
   * - KVM: Mitigation: Split huge pages
     - Software changes mitigate this issue.
   * - KVM: Vulnerable
     - The processor is vulnerable, but no mitigation enabled

Enumeration of the erratum
--------------------------

A new bit has been allocated in the IA32_ARCH_CAPABILITIES (PSCHANGE_MC_NO) msr and will be set on CPU's which are mitigated against this issue.
Mitigation mechanism

This erratum can be mitigated by restricting the use of large page sizes to non-executable pages. This forces all iTLB entries to be 4K, and removes the possibility of multiple hits.

In order to mitigate the vulnerability, KVM initially marks all huge pages as non-executable. If the guest attempts to execute in one of those pages, the page is broken down into 4K pages, which are then marked executable.

If EPT is disabled or not available on the host, KVM is in control of TLB flushes and the problematic situation cannot happen. However, the shadow EPT paging mechanism used by nested virtualization is vulnerable, because the nested guest can trigger multiple iTLB hits by modifying its own (non-nested) page tables. For simplicity, KVM will make large pages non-executable in all shadow paging modes.

Mitigation control on the kernel command line and KVM - module parameter

The KVM hypervisor mitigation mechanism for marking huge pages as non-executable can be controlled with a module parameter "nx_huge_pages=". The kernel command line allows to control the iTLB multihit mitigations at boot time with the option "kvm.nx_huge_pages=".

The valid arguments for these options are:

force Mitigation is enabled. In this case, the mitigation implements non-executable huge pages in Linux kernel KVM module. All huge pages in the EPT are marked as non-executable.

off Mitigation is disabled.

auto Enable mitigation only if the platform is affected and the kernel
was not booted with the "mitigations=off" command line parameter.
This is the default option.

Mitigation selection guide

1. No virtualization in use
   The system is protected by the kernel unconditionally and no further action is required.

2. Virtualization with trusted guests
   If the guest comes from a trusted source, you may assume that the guest will not attempt to maliciously exploit these errata and no further action is required.

3. Virtualization with untrusted guests
   If the guest comes from an untrusted source, the guest host kernel will need to apply iTLB multihit mitigation via the kernel command line or kvm module parameter.

--- linux-4.15.0.orig/Documentation/admin-guide/hw-vuln/special-register-buffer-data-sampling.rst
+++ linux-4.15.0/Documentation/admin-guide/hw-vuln/special-register-buffer-data-sampling.rst
@@ -0,0 +1,149 @@
.. SPDX-License-Identifier: GPL-2.0

SRBDS - Special Register Buffer Data Sampling

SRBDS is a hardware vulnerability that allows MDS techniques to infer values returned from special register accesses. Special register accesses are accesses to off core registers. According to Intel's evaluation, the special register reads that have a security expectation of privacy are RDRAND, RDSEED and SGX EGETKEY.

When RDRAND, RDSEED and EGETKEY instructions are used, the data is moved to the core through the special register mechanism that is susceptible to MDS attacks.

Affected processors

Core models (desktop, mobile, Xeon-E3) that implement RDRAND and/or RDSEED may be affected.
A processor is affected by SRBDS if its Family_Model and stepping is in the following list, with the exception of the listed processors exporting MDS_NO while Intel TSX is available yet not enabled. The latter class of processors are only affected when Intel TSX is enabled by software using TSX_CTRL_MSR otherwise they are not affected.

<table>
<thead>
<tr>
<th>common name</th>
<th>Family_Model</th>
<th>Stepping</th>
</tr>
</thead>
<tbody>
<tr>
<td>IvyBridge</td>
<td>06_3AH</td>
<td>All</td>
</tr>
<tr>
<td>Haswell</td>
<td>06_3CH</td>
<td>All</td>
</tr>
<tr>
<td>Haswell_L</td>
<td>06_45H</td>
<td>All</td>
</tr>
<tr>
<td>Haswell_G</td>
<td>06_46H</td>
<td>All</td>
</tr>
<tr>
<td>Broadwell_G</td>
<td>06_47H</td>
<td>All</td>
</tr>
<tr>
<td>Broadwell</td>
<td>06_3DH</td>
<td>All</td>
</tr>
<tr>
<td>Skylake_L</td>
<td>06_4EH</td>
<td>All</td>
</tr>
<tr>
<td>Skylake</td>
<td>06_5EH</td>
<td>All</td>
</tr>
<tr>
<td>Kabylake_L</td>
<td>06_8EH &lt;= 0xC</td>
<td>&lt;= 0xC</td>
</tr>
<tr>
<td>Kabylake</td>
<td>06_9EH &lt;= 0xD</td>
<td>&lt;= 0xD</td>
</tr>
</tbody>
</table>

Related CVEs
-------------

The following CVE entry is related to this SRBDS issue:

<table>
<thead>
<tr>
<th>CVE-2020-0543</th>
<th>SRBDS</th>
<th>Special Register Buffer Data Sampling</th>
</tr>
</thead>
</table>

Attack scenarios
-----------------

An unprivileged user can extract values returned from RDRAND and RDSEED executed on another core or sibling thread using MDS techniques.

Mitigation mechanism
-------------------

Intel will release microcode updates that modify the RDRAND, RDSEED, and EGETKEY instructions to overwrite secret special register data in the shared staging buffer before the secret data can be accessed by another logical processor.
During execution of the RDRAND, RDSEED, or EGETKEY instructions, off-core accesses from other logical processors will be delayed until the special register read is complete and the secret data in the shared staging buffer is overwritten.

This has three effects on performance:

1. RDRAND, RDSEED, or EGETKEY instructions have higher latency.
2. Executing RDRAND at the same time on multiple logical processors will be serialized, resulting in an overall reduction in the maximum RDRAND bandwidth.
3. Executing RDRAND, RDSEED or EGETKEY will delay memory accesses from other logical processors that miss their core caches, with an impact similar to legacy locked cache-line-split accesses.

The microcode updates provide an opt-out mechanism (RNGDS_MITG_DIS) to disable the mitigation for this issue, Intel added a new thread-scope IA32_MCU_OPT_CTRL MSR, (address 0x123). The presence of this MSR and RNGDS_MITG_DIS (bit 0) is enumerated by CPUID.(EAX=07H,ECX=0).EDX[SRBDS_CTRL = 9]==1. This MSR is introduced through the microcode update.

Setting IA32_MCU_OPT_CTRL[0] (RNGDS_MITG_DIS) to 1 for a logical processor disables the mitigation for RDRAND and RDSEED executed outside of an Intel SGX enclave on that logical processor. Opting out of the mitigation for a particular logical processor does not affect the RDRAND and RDSEED mitigations for other logical processors.

Note that inside of an Intel SGX enclave, the mitigation is applied regardless of the value of RNGDS_MITG_DS.

Mitigation control on the kernel command line

The kernel command line allows control over the SRBDS mitigation at boot time with the option "srbds=". The option for this is:

--------------------
This option disables SRBDS mitigation for RDRAND and RDSEED on affected platforms.

+ The Linux kernel provides vulnerability status information through sysfs. For SRBDS this can be accessed by the following sysfs file: `/sys/devices/system/cpu/vulnerabilities/srbds`

+ The possible values contained in this file are:

```
+ Not affected  Processor not vulnerable
+ Vulnerable: No microcode  Processor vulnerable and microcode is missing mitigation
+ Mitigation: Microcode  Processor is vulnerable and mitigation is in effect.
+ Mitigation: TSX disabled  Processor is only vulnerable when TSX is enabled while this system was booted with TSX disabled.
+ Unknown: Dependent on hypervisor status  Running on virtual guest processor that is affected but with no way to know if host processor is mitigated or vulnerable.
```

+ SRBDS Default mitigation

+ This new microcode serializes processor access during execution of RDRAND, RDSEED ensures that the shared buffer is overwritten before it is released for reuse. Use the "srbd=off" kernel command line to disable the mitigation for RDRAND and RDSEED.

Spectre Side Channels

Spectre is a class of side channel attacks that exploit branch prediction and speculative execution on modern CPUs to read memory, possibly bypassing access controls. Speculative execution side channel exploits do not modify memory but attempt to infer privileged data in the memory.

This document covers Spectre variant 1 and Spectre variant 2.
Speculative execution side channel methods affect a wide range of modern high performance processors, since most modern high speed processors use branch prediction and speculative execution.

The following CPUs are vulnerable:

- Intel Core, Atom, Pentium, and Xeon processors
- AMD Phenom, EPYC, and Zen processors
- IBM POWER and zSeries processors
- Higher end ARM processors
- Apple CPUs
- Higher end MIPS CPUs
- Likely most other high performance CPUs. Contact your CPU vendor for details.

Whether a processor is affected or not can be read out from the Spectre vulnerability files in sysfs. See `spectre_sys_info`.

Related CVEs

The following CVE entries describe Spectre variants:

- CVE-2017-5753 Bounds check bypass Spectre variant 1
- CVE-2017-5715 Branch target injection Spectre variant 2
- CVE-2019-1125 Spectre v1 swaps Spectre variant 1 (swaps)

Problem

CPUs use speculative operations to improve performance. That may leave traces of memory accesses or computations in the processor's caches, buffers, and branch predictors. Malicious software may be able to influence the speculative execution paths, and then use the side effects of the speculative execution in the CPUs' caches and buffers to infer privileged data touched during the speculative execution.
Spectre variant 1 attacks take advantage of speculative execution of conditional branches, while Spectre variant 2 attacks use speculative execution of indirect branches to leak privileged memory.


+ Spectre variant 1 (Bounds Check Bypass)
+ +The bounds check bypass attack :ref:`[2] <spec_ref2>` takes advantage of speculative execution that bypasses conditional branch instructions used for memory access bounds check (e.g. checking if the index of an array results in memory access within a valid range). This results in memory accesses to invalid memory (with out-of-bound index) that are done speculatively before validation checks resolve. Such speculative memory accesses can leave side effects, creating side channels which leak information to the attacker.
+ +There are some extensions of Spectre variant 1 attacks for reading data over the network, see :ref:`[12] <spec_ref12>`. However such attacks are difficult, low bandwidth, fragile, and are considered low risk.
+ +Note that, despite "Bounds Check Bypass" name, Spectre variant 1 is not only about user-controlled array bounds checks. It can affect any conditional checks. The kernel entry code interrupt, exception, and NMI handlers all have conditional swaps checks. Those may be problematic in the context of Spectre v1, as kernel code can speculatively run with a user GS.

+ Spectre variant 2 (Branch Target Injection)
+ +The indirect branch predictors inside the processor used to guess the target of indirect branches can be influenced by an attacker, causing gadget code to be speculatively executed, thus exposing sensitive data touched by the victim. The side effects left in the CPU's caches during speculative execution can be measured to infer data values.
+ +.. _poison_btb:
+ +In Spectre variant 2 attacks, the attacker can steer speculative indirect branches in the victim to gadget code by poisoning the branch target buffer of a CPU used for predicting indirect branch addresses. Such poisoning could be done by indirect branching into existing code, with the address offset of the indirect branch under the attacker's control. Since the branch prediction on impacted hardware does not
The most useful gadgets take an attacker-controlled input parameter (such as a register value) so that the memory read can be controlled. Gadgets without input parameters might be possible, but the attacker would have very little control over what memory can be read, reducing the risk of the attack revealing useful data.

One other variant 2 attack vector is for the attacker to poison the return stack buffer (RSB) to cause speculative subroutine return instruction execution to go to a gadget. An attacker's imbalanced subroutine call instructions might "poison" entries in the return stack buffer which are later consumed by a victim's subroutine return instructions. This attack can be mitigated by flushing the return stack buffer on context switch, or virtual machine (VM) exit.

On systems with simultaneous multi-threading (SMT), attacks are possible from the sibling thread, as level 1 cache and branch target buffer (BTB) may be shared between hardware threads in a CPU core. A malicious program running on the sibling thread may influence its peer's BTB to steer its indirect branch speculations to gadget code, and measure the speculative execution's side effects left in level 1 cache to infer the victim's data.

Attack scenarios
---------------

The following list of attack scenarios have been anticipated, but may not cover all possible attack vectors.

1. A user process attacking the kernel

The attacker passes a parameter to the kernel via a register or via a known address in memory during a syscall. Such parameter may be used later by the kernel as an index to an array or to derive a pointer for a Spectre variant 1 attack. The index or pointer is invalid, but bound checks are bypassed in the code branch taken for speculative execution. This could cause privileged memory to be accessed and leaked.

For kernel code that has been identified where data pointers could potentially be influenced for Spectre attacks, new "nospec" accessor
+ macros are used to prevent speculative loading of data.
+
+ Spectre variant 1 (swapgs)
+ ~~~~~~~~~~~~~~~~~~~~~~~~~~~
+
+ An attacker can train the branch predictor to speculatively skip the
+ swapgs path for an interrupt or exception. If they initialize
+ the GS register to a user-space value, if the swapgs is speculatively
+ skipped, subsequent GS-related percpu accesses in the speculation
+ window will be done with the attacker-controlled GS value. This
+ could cause privileged memory to be accessed and leaked.
+
+ For example:
+
+ ::
+
+ if (coming from user space)
+   swapgs
+   mov %gs:<percpu_offset>, %reg
+   mov (%reg), %reg1
+
+ When coming from user space, the CPU can speculatively skip the
+ swapgs, and then do a speculative percpu load using the user GS
+ value. So the user can speculatively force a read of any kernel
+ value. If a gadget exists which uses the percpu value as an address
+ in another load/store, then the contents of the kernel value may
+ become visible via an L1 side channel attack.
+
+ A similar attack exists when coming from kernel space. The CPU can
+ speculatively do the swapgs, causing the user GS to get used for the
+ rest of the speculative window.
+
+Spectre variant 2
+ ~~~~~~~~~~~~~~~~
+
+ A spectre variant 2 attacker can :ref:`poison <poison_btb>` the branch
+ target buffer (BTB) before issuing syscall to launch an attack.
+ After entering the kernel, the kernel could use the poisoned branch
+ target buffer on indirect jump and jump to gadget code in speculative
+ execution.
+
+ If an attacker tries to control the memory addresses leaked during
+ speculative execution, he would also need to pass a parameter to the
+ gadget, either through a register or a known address in memory. After
+ the gadget has executed, he can measure the side effect.
+
+ The kernel can protect itself against consuming poisoned branch
+ target buffer entries by using return trampolines (also known as
2. A user process attacking another user process

A malicious user process can try to attack another user process, either via a context switch on the same hardware thread, or from the sibling hyperthread sharing a physical processor core on simultaneous multi-threading (SMT) system.

Spectre variant 1 attacks generally require passing parameters between the processes, which needs a data passing relationship, such as remote procedure calls (RPC). Those parameters are used in gadget code to derive invalid data pointers accessing privileged memory in the attacked process.

Spectre variant 2 attacks can be launched from a rogue process by poisoning the branch target buffer. This can influence the indirect branch targets for a victim process that either runs later on the same hardware thread, or running concurrently on a sibling hardware thread sharing the same physical core.

A user process can protect itself against Spectre variant 2 attacks by using the prctl() syscall to disable indirect branch speculation for itself. An administrator can also cordon off an unsafe process from polluting the branch target buffer by disabling the process's indirect branch speculation. This comes with a performance cost from not using indirect branch speculation and clearing the branch target buffer. When SMT is enabled on x86, for a process that has indirect branch speculation disabled, Single Threaded Indirect Branch Predictors (STIBP) are turned on to prevent the sibling thread from controlling branch target buffer. In addition, the Indirect Branch Prediction Barrier (IBPB) is issued to clear the branch target buffer when context switching to and from such process.

On x86, the return stack buffer is stuffed on context switch. This prevents the branch target buffer from being used for branch
+ prediction when the return stack buffer underflows while switching to
+ a deeper call stack. Any poisoned entries in the return stack buffer
+ left by the previous process will also be cleared.
+
+ User programs should use address space randomization to make attacks
+ more difficult (Set /proc/sys/kernel/randomize_va_space = 1 or 2).
+
+ 3. A virtualized guest attacking the host
+ The attack mechanism is similar to how user processes attack the
+ kernel. The kernel is entered via hyper-calls or other virtualization
+ exit paths.
+
+ For Spectre variant 1 attacks, rogue guests can pass parameters
+ (e.g. in registers) via hyper-calls to derive invalid pointers to
+ speculate into privileged memory after entering the kernel. For places
+ where such kernel code has been identified, nospec accessor macros
+ are used to stop speculative memory access.
+
+ For Spectre variant 2 attacks, rogue guests can \ref{poison_btb} the branch target buffer or return stack buffer, causing
+ the kernel to jump to gadget code in the speculative execution paths.
+
+ To mitigate variant 2, the host kernel can use return trampolines
+ for indirect branches to bypass the poisoned branch target buffer,
+ and flushing the return stack buffer on VM exit. This prevents rogue
+ guests from affecting indirect branching in the host kernel.
+
+ To protect host processes from rogue guests, host processes can have
+ indirect branch speculation disabled via prctl(). The branch target
+ buffer is cleared before context switching to such processes.
+
+ 4. A virtualized guest attacking other guest
+ A rogue guest may attack another guest to get data accessible by the
+ other guest.
+
+ Spectre variant 1 attacks are possible if parameters can be passed
+ between guests. This may be done via mechanisms such as shared memory
+ or message passing. Such parameters could be used to derive data
+ pointers to privileged data in guest. The privileged data could be
+ accessed by gadget code in the victim's speculation paths.
+
+ Spectre variant 2 attacks can be launched from a rogue guest by
+ \ref{poisoning} the branch target buffer or the return
+ stack buffer. Such poisoned entries could be used to influence
speculation execution paths in the victim guest.

Linux kernel mitigates attacks to other guests running in the same
CPU hardware thread by flushing the return stack buffer on VM exit,
and clearing the branch target buffer before switching to a new guest.

If SMT is used, Spectre variant 2 attacks from an untrusted guest
in the sibling hyperthread can be mitigated by the administrator,
by turning off the unsafe guest’s indirect branch speculation via
prctl(). A guest can also protect itself by turning on microcode
based mitigations (such as IBPB or STIBP on x86) within the guest.

.. _spectre_sys_info:

Spectre system information
--------------------------

The Linux kernel provides a sysfs interface to enumerate the current
mitigation status of the system for Spectre: whether the system is
vulnerable, and which mitigations are active.

The sysfs file showing Spectre variant 1 mitigation status is:

/sys/devices/system/cpu/vulnerabilities/spectre_v1

The possible values in this file are:

.. list-table::

   * - 'Not affected'
   - The processor is not vulnerable.
   * - 'Vulnerable: __user pointer sanitization and usercopy barriers only; no swapgs barriers'
   - The swapgs protections are disabled; otherwise it has
   protection in the kernel on a case by case base with explicit
   pointer sanitation and usercopy LFENCE barriers.
   * - 'Mitigation: usercopy/swapgs barriers and __user pointer sanitization'
   - Protection in the kernel on a case by case base with explicit
   pointer sanitation, usercopy LFENCE barriers, and swapgs LFENCE
   barriers.

However, the protections are put in place on a case by case basis,
and there is no guarantee that all possible attack vectors for Spectre
variant 1 are covered.

The spectre_v2 kernel file reports if the kernel has been compiled with
retpoline mitigation or if the CPU has hardware mitigation, and if the
CPU has support for additional process-specific mitigation.
+This file also reports CPU features enabled by microcode to mitigate
+attack between user processes:
+
+1. Indirect Branch Prediction Barrier (IBPB) to add additional
+ isolation between processes of different users.
+2. Single Thread Indirect Branch Predictors (STIBP) to add additional
+ isolation between CPU threads running on the same core.
+
+These CPU features may impact performance when used and can be enabled
+ per process on a case-by-case base.
+
+The sysfs file showing Spectre variant 2 mitigation status is:
+
+ /sys/devices/system/cpu/vulnerabilities/spectre_v2
+
+The possible values in this file are:
+
+ - Kernel status:
+
+  ==============================================================  ===============
+  ‘Not affected’                        The processor is not vulnerable
+  ‘Vulnerable’                           Vulnerable, no mitigation
+  ‘Mitigation: Full generic retpoline’  Software-focused mitigation
+  ‘Mitigation: Full AMD retpoline’      AMD-specific software mitigation
+  ‘Mitigation: Enhanced IBRS’            Hardware-focused mitigation
+  ==============================================================  ===============
+
+ - Firmware status: Show if Indirect Branch Restricted Speculation (IBRS) is
+ used to protect against Spectre variant 2 attacks when calling firmware (x86 only).
+
+  ==============================================================  ===============
+  ‘IBRS_FW’  Protection against user program attacks when calling firmware
+  ==============================================================  ===============
+
+ - Indirect branch prediction barrier (IBPB) status for protection between
+ processes of different users. This feature can be controlled through
+ prctl() per process, or through kernel command line options. This is
+ an x86 only feature. For more details see below.
+
+  ==============================================================  ===============
+  ‘IBPB: disabled’          IBPB unused
+  ‘IBPB: always-on’        Use IBPB on all tasks
+  ‘IBPB: conditional’      Use IBPB on SECCOMP or indirect branch restricted tasks
+  ==============================================================  ===============
+
+ - Single threaded indirect branch prediction (STIBP) status for protection
+ between different hyper threads. This feature can be controlled through
+ prctl per process, or through kernel command line options. This is x86
only feature. For more details see below.

+ 'STIBP: disabled' STIBP unused
+ 'STIBP: forced' Use STIBP on all tasks
+ 'STIBP: conditional' Use STIBP on SECCOMP or indirect branch restricted tasks

- Return stack buffer (RSB) protection status:

- Full mitigation might require a microcode update from the CPU vendor. When the necessary microcode is not available, the kernel will report vulnerability.

+ Turning on mitigation for Spectre variant 1 and Spectre variant 2

1. Kernel mitigation

For the Spectre variant 1, vulnerable kernel code (as determined by code audit or scanning tools) is annotated on a case by case basis to use nospec accessor macros for bounds clipping :ref:`[2] <spec_ref2>` to avoid any usable disclosure gadgets. However, it may not cover all attack vectors for Spectre variant 1.

Copy-from-user code has an LFENCE barrier to prevent the access_ok() check from being mis-speculated. The barrier is done by the barrier_nospec() macro.

For the swapgs variant of Spectre variant 1, LFENCE barriers are added to interrupt, exception and NMI entry where needed. These barriers are done by the FENCE_SWAPGS_KERNEL_ENTRY and FENCE_SWAPGS_USER_ENTRY macros.

+ Spectre variant 2

For Spectre variant 2 mitigation, the compiler turns indirect calls or jumps in the kernel into equivalent return trampolines (retpolines) :ref:`[3] <spec_ref3>` :ref:`[9] <spec_ref9>` to go to the target
addresses. Speculative execution paths under retpolines are trapped
in an infinite loop to prevent any speculative execution jumping to
a gadget.

To turn on retpoline mitigation on a vulnerable CPU, the kernel
needs to be compiled with a gcc compiler that supports the
-mindirect-branch=thunk-extern -mindirect-branch-register options.
If the kernel is compiled with a Clang compiler, the compiler needs
to support -mretpoline-external-thunk option. The kernel config
CONFIG_RETPOLINE needs to be turned on, and the CPU needs to run with
the latest updated microcode.

On Intel Skylake-era systems the mitigation covers most, but not all,

On CPUs with hardware mitigation for Spectre variant 2 (e.g. Enhanced
IBRS on x86), retpoline is automatically disabled at run time.

The retpoline mitigation is turned on by default on vulnerable
CPUs. It can be forced on or off by the administrator
via the kernel command line and sysfs control files. See
:ref:`spectre_mitigation_control_command_line`.

On x86, indirect branch restricted speculation is turned on by default
before invoking any firmware code to prevent Spectre variant 2 exploits
using the firmware.

Using kernel address space randomization (CONFIG_RANDOMIZE_SLAB=y
and CONFIG_SLAB_FREELIST_RANDOM=y in the kernel configuration) makes
attacks on the kernel generally more difficult.

2. User program mitigation

User programs can mitigate Spectre variant 1 using LFENCE or "bounds
clipping". For more details see :ref:`[2] <spec_ref2>`.

For Spectre variant 2 mitigation, individual user programs
can be compiled with return trampolines for indirect branches.
This protects them from consuming poisoned entries in the branch
target buffer left by malicious software. Alternatively, the
programs can disable their indirect branch speculation via prctl()
(See :ref:`Documentation/userspace-api/spec_ctrl.rst <set_spec_ctrl>`).
On x86, this will turn on STIBP to guard against attacks from the
sibling thread when the user program is running, and use IBPB to
flush the branch target buffer when switching to/from the program.

Restricting indirect branch speculation on a user program will
also prevent the program from launching a variant 2 attack on x86. All sand-boxed SECCOMP programs have indirect branch speculation restricted by default. Administrators can change that behavior via the kernel command line and sysfs control files. See :ref:`spectre_mitigation_control_command_line`.

- Programs that disable their indirect branch speculation will have more overhead and run slower.

- User programs should use address space randomization (/proc/sys/kernel/randomize_va_space = 1 or 2) to make attacks more difficult.

3. VM mitigation

Within the kernel, Spectre variant 1 attacks from rogue guests are mitigated on a case by case basis in VM exit paths. Vulnerable code uses nospec accessor macros for "bounds clipping", to avoid any usable disclosure gadgets. However, this may not cover all variant 1 attack vectors.

- For Spectre variant 2 attacks from rogue guests to the kernel, the Linux kernel uses retpoline or Enhanced IBRS to prevent consumption of poisoned entries in branch target buffer left by rogue guests. It also flushes the return stack buffer on every VM exit to prevent a return stack buffer underflow so poisoned branch target buffer could be used, or attacker guests leaving poisoned entries in the return stack buffer.

- To mitigate guest-to-guest attacks in the same CPU hardware thread, the branch target buffer is sanitized by flushing before switching to a new guest on a CPU.

- The above mitigations are turned on by default on vulnerable CPUs.

- To mitigate guest-to-guest attacks from sibling thread when SMT is in use, an untrusted guest running in the sibling thread can have its indirect branch speculation disabled by administrator via prctl().

- The kernel also allows guests to use any microcode based mitigation they choose to use (such as IBPB or STIBP on x86) to protect themselves.

.. _spectre_mitigation_control_command_line:

Mitigation control on the kernel command line

-----------------------------

- Spectre variant 2 mitigation can be disabled or force enabled at the
+kernel command line.
+
+nospectre_v1
+
+[X86, PPC] Disable mitigations for Spectre Variant 1
+(bounds check bypass). With this option data leaks are
+possible in the system.
+
+nospectre_v2
+
+[X86] Disable all mitigations for the Spectre variant 2
+(indirect branch prediction) vulnerability. System may
+allow data leaks with this option, which is equivalent
+to spectre_v2=off.
+
+
+spectre_v2=
+
+[X86] Control mitigation of Spectre variant 2
+(indirect branch speculation) vulnerability.
+The default operation protects the kernel from
+user space attacks.
+
+on
+unconditionally enable, implies
+spectre_v2_user=on
+off
+unconditionally disable, implies
+spectre_v2_user=off
+auto
+kernel detects whether your CPU model is
+vulnerable
+
+Selecting 'on' will, and 'auto' may, choose a
+mitigation method at run time according to the
+CPU, the available microcode, the setting of the
+CONFIG_RETPOLINE configuration option, and the
+compiler with which the kernel was built.
+
+Selecting 'on' will also enable the mitigation
+against user space to user space task attacks.
+
+Selecting 'off' will disable both the kernel and
+the user space protections.
+
+Specific mitigations can also be selected manually:
+
+retpoline
+replace indirect branches
+ret polyline, generic
+google's original ret polyline
+ret polyline, amd
+AMD-specific minimal thunk
+
+Not specifying this option is equivalent to
+spectre_v2=auto.
+
+For user space mitigation:
+
+    spectre_v2_user=
+
+[X86] Control mitigation of Spectre variant 2
+(indirect branch speculation) vulnerability between
+user space tasks
+
+on
+Unconditionally enable mitigations. Is
+enforced by spectre_v2=on
+
+off
+Unconditionally disable mitigations. Is
+enforced by spectre_v2=off
+
+prctl
+Indirect branch speculation is enabled,
+but mitigation can be enabled via prctl
+per thread. The mitigation control state
+is inherited on fork.
+
+prctl, ibpb
+Like "prctl" above, but only STIBP is
+controlled per thread. IBPB is issued
+always when switching between different user
+space processes.
+
+seccomp
+Same as "prctl" above, but all seccomp
+threads will enable the mitigation unless
+they explicitly opt out.
+
+seccomp, ibpb
+Like "seccomp" above, but only STIBP is
+controlled per thread. IBPB is issued
+always when switching between different
+user space processes.
auto
+ Kernel selects the mitigation depending on
+ the available CPU features and vulnerability.
+
+ Default mitigation:
+ If CONFIG_SECCOMP=y then "seccomp", otherwise "prctl"
+
+ Not specifying this option is equivalent to
+ spectre_v2_user=auto.
+
+ In general the kernel by default selects
+ reasonable mitigations for the current CPU. To
+ disable Spectre variant 2 mitigations, boot with
+ spectre_v2=off. Spectre variant 1 mitigations
+ cannot be disabled.
+
+ Mitigation selection guide
+ --------------------------
+
+ 1. Trusted userspace
+ ^^^^^^^^^^^^^^^^^^^^^
+
+ If all userspace applications are from trusted sources and do not
+ execute externally supplied untrusted code, then the mitigations can
+ be disabled.
+
+ 2. Protect sensitive programs
+ ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
+
+ For security-sensitive programs that have secrets (e.g. crypto
+ keys), protection against Spectre variant 2 can be put in place by
+ disabling indirect branch speculation when the program is running
+ (See :ref:`Documentation/userspace-api/spec_ctrl.rst <set_spec_ctrl>`).
+
+ 3. Sandbox untrusted programs
+ ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
+
+ Untrusted programs that could be a source of attacks can be cordoned
+ off by disabling their indirect branch speculation when they are run
+ (See :ref:`Documentation/userspace-api/spec_ctrl.rst <set_spec_ctrl>`).
+ This prevents untrusted programs from polluting the branch target
+ buffer. All programs running in SECCOMP sandboxes have indirect
+ branch speculation restricted by default. This behavior can be
+ changed via the kernel command line and sysfs control files. See
+ :ref:`spectre_mitigation_control_command_line`.
+
+ 3. High security mode
+ ^^^^^^^^^^^^^^^^^^^^^

All Spectre variant 2 mitigations can be forced on at boot time for all programs (See the "on" option in :ref:`spectre_mitigation_control_command_line`). This will add overhead as indirect branch speculations for all programs will be restricted.

On x86, branch target buffer will be flushed with IBPB when switching to a new program. STIBP is left on all the time to protect programs against variant 2 attacks originating from programs running on sibling threads.

Alternatively, STIBP can be used only when running programs whose indirect branch speculation is explicitly disabled, while IBPB is still used all the time when switching to a new program to clear the branch target buffer (See "ibpb" option in :ref:`spectre_mitigation_control_command_line`). This "ibpb" option has less performance cost than the "on" option, which leaves STIBP on all the time.

References on Spectre
---------------------

Intel white papers:

.. _spec_ref1:


.. _spec_ref2:


.. _spec_ref3:


.. _spec_ref4:


AMD white papers:
+ +.. _spec_ref6:
+ + ARM white papers:
+ + +.. _spec_ref7:
+ + +.. _spec_ref8:
+ + Google white paper:
+ + +.. _spec_ref9:
+ + MIPS white paper:
+ + +.. _spec_ref10:
+ + Academic papers:
+ + +.. _spec_ref11:
+ + +.. _spec_ref12:
+ + +.. _spec_ref13:
+ + [13] Spectre Returns! Speculation Attacks using the Return Stack Buffer
TAA - TSX Asynchronous Abort

TAA is a hardware vulnerability that allows unprivileged speculative access to data which is available in various CPU internal buffers by using asynchronous aborts within an Intel TSX transactional region.

Affected processors

This vulnerability only affects Intel processors that support Intel Transactional Synchronization Extensions (TSX) when the TAA_NO bit (bit 8) is 0 in the IA32_ARCH_CAPABILITIES MSR. On processors where the MDS_NO bit (bit 5) is 0 in the IA32_ARCH_CAPABILITIES MSR, the existing MDS mitigations also mitigate against TAA.

Whether a processor is affected or not can be read out from the TAA vulnerability file in sysfs. See :ref:`tsx_async_abort_sys_info`.

Related CVEs

The following CVE entry is related to this TAA issue:

CVE-2019-11135  TAA  TSX Asynchronous Abort (TAA) condition on some microprocessors utilizing speculative execution may allow an authenticated user to potentially enable information disclosure via a side channel with local access.

Problem

When performing store, load or L1 refill operations, processors write data into temporary microarchitectural structures (buffers). The data in those buffers can be forwarded to load operations as an optimization.

Intel TSX is an extension to the x86 instruction set architecture that adds hardware transactional memory support to improve performance of multi-threaded software. TSX lets the processor expose and exploit concurrency hidden in an
TSX supports atomic memory transactions that are either committed (success) or aborted. During an abort, operations that happened within the transactional region are rolled back. An asynchronous abort takes place, among other options, when a different thread accesses a cache line that is also used within the transactional region when that access might lead to a data race.

Immediately after an uncompleted asynchronous abort, certain speculatively executed loads may read data from those internal buffers and pass it to dependent operations. This can be then used to infer the value via a cache side channel attack.

Because the buffers are potentially shared between Hyper-Threads cross Hyper-Thread attacks are possible.

The victim of a malicious actor does not need to make use of TSX. Only the attacker needs to begin a TSX transaction and raise an asynchronous abort which in turn potentially leaks data stored in the buffers.

More detailed technical information is available in the TAA specific x86 architecture section: :ref:`Documentation/x86/tsx_async_abort.rst <tsx_async_abort>`.

Attack scenarios
-----------------

Attacks against the TAA vulnerability can be implemented from unprivileged applications running on hosts or guests.

As for MDS, the attacker has no control over the memory addresses that can be leaked. Only the victim is responsible for bringing data to the CPU. As a result, the malicious actor has to sample as much data as possible and then postprocess it to try to infer any useful information from it.

A potential attacker only has read access to the data. Also, there is no direct privilege escalation by using this technique.

TAA system information
-----------------------

The Linux kernel provides a sysfs interface to enumerate the current TAA status of mitigated systems. The relevant sysfs file is:

```
/sys/devices/system/cpu/vulnerabilities/tsx_async_abort
```
The possible values in this file are:

.. list-table::

   * - 'Vulnerable'
     - The CPU is affected by this vulnerability and the microcode and kernel mitigation are not applied.
   * - 'Vulnerable: Clear CPU buffers attempted, no microcode'
     - The system tries to clear the buffers but the microcode might not support the operation.
   * - 'Mitigation: Clear CPU buffers'
     - The microcode has been updated to clear the buffers. TSX is still enabled.
   * - 'Mitigation: TSX disabled'
     - TSX is disabled.
   * - 'Not affected'
     - The CPU is not affected by this issue.

Best effort mitigation mode
^^^^^^^^^^^^^^^^^^^^^^^^^^^

If the processor is vulnerable, but the availability of the microcode-based mitigation mechanism is not advertised via CPUID the kernel selects a best effort mitigation mode. This mode invokes the mitigation instructions without a guarantee that they clear the CPU buffers.

This is done to address virtualization scenarios where the host has the microcode update applied, but the hypervisor is not yet updated to expose the CPUID to the guest. If the host has updated microcode the protection takes effect; otherwise a few CPU cycles are wasted pointlessly.

The state in the tsx_async_abort sysfs file reflects this situation accordingly.

Mitigation mechanism
---------------------

The kernel detects the affected CPUs and the presence of the microcode which is required. If a CPU is affected and the microcode is available, then the kernel enables the mitigation by default.

The mitigation can be controlled at boot time via a kernel command line option. See :ref:`taa_mitigation_control_command_line`.

.. _virt_mechanism:
+Virtualization mitigation
+^^^^^^^^^^^^^^^^^^^^^^^^^  
+
+Affected systems where the host has TAA microcode and TAA is mitigated by
+having disabled TSX previously, are not vulnerable regardless of the status
+of the VMs.
+
+In all other cases, if the host either does not have the TAA microcode or
+the kernel is not mitigated, the system might be vulnerable.
+
+
+.. _taa_mitigation_control_command_line:
+
+Mitigation control on the kernel command line
+---------------------------------------------
+
+The kernel command line allows to control the TAA mitigations at boot time with
+the option "tsx_async_abort=". The valid arguments for this option are:
+
+  ============  =============================================================
+  off		This option disables the TAA mitigation on affected platforms.
+        If the system has TSX enabled (see next parameter) and the CPU
+        is affected, the system is vulnerable.
+  full	        TAA mitigation is enabled. If TSX is enabled, on an affected
+        system it will clear CPU buffers on ring transitions. On
+        systems which are MDS-affected and deploy MDS mitigation,
+        TAA is also mitigated. Specifying this option on those
+        systems will have no effect.
+  full,nosmt    The same as tsx_async_abort=full, with SMT disabled on
+        vulnerable CPUs that have TSX enabled. This is the complete
+        mitigation. When TSX is disabled, SMT is not disabled because
+        CPU is not vulnerable to cross-thread TAA attacks.
+  ============  =============================================================
+
+Not specifying this option is equivalent to "tsx_async_abort=full". For
+processors that are affected by both TAA and MDS, specifying just
+"tsx_async_abort=off" without an accompanying "mds=off" will have no
+effect as the same mitigation is used for both vulnerabilities.
+
+The kernel command line also allows to control the TSX feature using the
+parameter "tsx=" on CPUs which support TSX control. MSR_IA32_TSX_CTRL is used
+to control the TSX feature and the enumeration of the TSX feature bits (RTM
+and HLE) in CPUID.
+
+The valid options are:
off

Disables TSX on the system.

Note that this option takes effect only on newer CPUs which are not vulnerable to MDS, i.e., have MSR_IA32_ARCH_CAPABILITIES.MDS_NO=1 and which get the new IA32_TSX_CTRL MSR through a microcode update. This new MSR allows for the reliable deactivation of the TSX functionality.

on

Enables TSX.

Although there are mitigations for all known security vulnerabilities, TSX has been known to be an accelerator for several previous speculation-related CVEs, and so there may be unknown security risks associated with leaving it enabled.

auto

Disables TSX if X86_BUG_TAA is present, otherwise enables TSX on the system.

Not specifying this option is equivalent to "tsx=off".

The following combinations of the "tsx_async_abort" and "tsx" are possible. For affected platforms tsx=auto is equivalent to tsx=off and the result will be:

tsx=on tsx_async_abort=full The system will use VERW to clear CPU buffers. Cross-thread attacks are still possible on SMT machines.

tsx=on tsx_async_abort=full,nosmt As above, cross-thread attacks on SMT mitigated.

tsx=on tsx_async_abort=off The system is vulnerable.

tsx=off tsx_async_abort=full TSX might be disabled if microcode provides a TSX control MSR. If so, system is not vulnerable.

tsx=off tsx_async_abort=full,nosmt Ditto

tsx=off tsx_async_abort=off ditto

For unaffected platforms "tsx=on" and "tsx_async_abort=full" does not clear CPU buffers. For platforms without TSX control (MSR_IA32_ARCH_CAPABILITIES.MDS_NO=0) "tsx" command line argument has no effect.

For the affected platforms below table indicates the mitigation status for the combinations of CPUID bit MD_CLEAR and IA32_ARCH_CAPABILITIES MSR bits MDS_NO and TSX_CTRL_MSR.
### Mitigation selection guide

1. **Trusted userspace and guests**

If all user space applications are from a trusted source and do not execute untrusted code which is supplied externally, then the mitigation can be disabled. The same applies to virtualized environments with trusted guests.

2. **Untrusted userspace and guests**

If there are untrusted applications or guests on the system, enabling TSX might allow a malicious actor to leak data from the host or from other processes running on the same physical core.

If the microcode is available and the TSX is disabled on the host, attacks are prevented in a virtualized environment as well, even if the VMs do not explicitly enable the mitigation.

### Default mitigations

The kernel's default action for vulnerable processors is:

- Deploy TSX disable mitigation (tsx_async_abort=full tsx=off).
+This section describes CPU vulnerabilities and their mitigations.
+
+.. toctree::
+   :maxdepth: 1
+
+   hw-vuln/index
+
Here is a set of documents aimed at users who are trying to track down problems and bugs in particular.

---

 dynamic table installation which will install SSDT tables to /sys/firmware/acpi/tables/dynamic.

+acpi_no_watchdog[HW,ACPI,WDT]
+Ignore the ACPI-based watchdog interface (WDAT) and let
+a native driver control the watchdog device instead.
+
+acpi_rsdp=[ACPI,EFI,KEXEC]
Pass the RSDP address to the kernel, mostly used on machines running EFI runtime service to boot the
@@ -552,7 +556,7 @@ loops can be debugged more effectively on production systems.

+clearcpuid=BITNUM [X86]
+clearcpuid=BITNUM[,BITNUM...] [X86]
Disable CPUID feature X for the kernel. See arch/x86/include/asm/cpufeatures.h for the valid bit numbers. Note the Linux specific bits are not necessarily
@@ -660,6 +664,10 @@
0: default value, disable debugging
1: enable debugging at boot time
+
+cpufreq_driver= [X86] Allow only the named cpu frequency scaling driver
to register. Example: cpufreq_driver=powernow-k8
+Format: { none | STRING }
+
+cpuidle.off=1[CPU_IDLE]
disable the cpuidle sub-system
@@ -1015,7 +1023,7 @@ earlyprintk=serial[,0x...[,baudrate]]
earlyprintk=ttySn[,baudrate]
earlyprintk=dbgp[debugController#]
earlyprintk is useful when the kernel crashes before
@@ -1047,6 +1055,10 @@
The sclp output can only be used on s390.

+The optional "force" to "pciserial" enables use of a
+PCI device even when its classcode is not of the
+UART class.
+
edac_report=[HW,EDAC] Control how to report EDAC event
Format: {"on" | "off" | "force"}
on: enable EDAC to report H/W event. May be overridden
@@ -1690,6 +1702,18 @@
nobypass
[PPC/POWERNV]
Disable IOMMU bypass, using IOMMU for PCI devices.

+iommu.strict=[ARM64] Configure TLB invalidation behaviour
+Format: { "0" | "1" }
+0 - Lazy mode.
+ Request that DMA unmap operations use deferred
+ invalidation of hardware TLBs, for increased
+ throughput at the cost of reduced device isolation.
+ Will fall back to strict mode if not supported by
+ the relevant IOMMU driver.
+1 - Strict mode (default).
+ DMA unmap operations invalidate IOMMU hardware TLBs
+ synchronously.
+
+iommu.passsthrough=
[ARM64] Configure DMA to bypass the IOMMU by default.
Format: { "0" | "1" }
@@ -1865,6 +1889,12 @@
Built with CONFIG_DEBUG_KMEMLEAK_DEFAULT_OFF=y, the default is off.

+kpti=[ARM64] Control page table isolation of user
+and kernel address spaces.
+Default: enabled on cores which need mitigation.
+0: force disabled
+1: force enabled
+
kvm.ignore_msr=[KVM] Ignore guest accesses to unhandled MSRs.
Default is 0 (don't ignore, but inject #GP)
@@ -1872,6 +1902,23 @@
KVM MMU at runtime.
Default is 0 (off)

+kvm.nx_huge_pages=
+  [KVM] Controls the sw workaround for bug
+X86_BUG_ITLB_MULTIHIT.
+force: Always deploy workaround.
+off: Default. Never deploy workaround.
+auto: Deploy workaround based on presence of
+  X86_BUG_ITLB_MULTIHIT.
+
+If the sw workaround is enabled for the host, guests
+need not enable it for nested guests.
+
+kvm.nx_huge_pages_recovery_ratio=
+  [KVM] Controls how many 4KiB pages are periodically zapped
+  back to huge pages. 0 disables the recovery, otherwise if
+  the value is N KVM will zap 1/Nth of the 4KiB pages every
+  minute. The default is 60.
+
+kvm-amd.nested=[KVM,AMD] Allow nested virtualization in KVM/SVM.
Default is 1 (enabled)

@@ -1916,10 +1963,87 @@
(virtualized real and unpaged mode) on capable
Intel chips. Default is 1 (enabled)

+kvm-intel.vmentry_l1d_flush=[KVM,Intel] Mitigation for L1 Terminal Fault
+CVE-2018-3620.
+
+Valid arguments: never, cond, always
+
+always: L1D cache flush on every VMENTER.
+cond: Flush L1D on VMENTER only when the code between
+  VMEXIT and VMENTER can leak host memory.
+never: Disables the mitigation
+
+Default is cond (do L1 cache flush in specific instances)
+
+kvm-intel.vpid=[KVM,Intel] Disable Virtual Processor Identification
feature (tagged TLBs) on capable Intel chips.
Default is 1 (enabled)

+l1tf=           [X86] Control mitigation of the L1TF vulnerability on
+  affected CPUs
+
+The kernel PTE inversion protection is unconditionally
+enabled and cannot be disabled.
+
+full
+Provides all available mitigations for the
+L1TF vulnerability. Disables SMT and
+enables all mitigations in the
+hypervisors, i.e. unconditional L1D flush.
+
+SMT control and L1D flush control via the
+sysfs interface is still possible after
+boot. Hypervisors will issue a warning
+when the first VM is started in a
+potentially insecure configuration,
+i.e. SMT enabled or L1D flush disabled.
+
+full,force
+Same as 'full', but disables SMT and L1D
+flush runtime control. Implies the
+'nosmt=force' command line option.
+(i.e. sysfs control of SMT is disabled.)
+
+flush
+Leaves SMT enabled and enables the default
+hypervisor mitigation, i.e. conditional
+L1D flush.
+
+SMT control and L1D flush control via the
+sysfs interface is still possible after
+boot. Hypervisors will issue a warning
+when the first VM is started in a
+potentially insecure configuration,
+i.e. SMT enabled or L1D flush disabled.
+
+flush,nosmt
+
+Disables SMT and enables the default
+hypervisor mitigation.
+
+SMT control and L1D flush control via the
+sysfs interface is still possible after
+boot. Hypervisors will issue a warning
+when the first VM is started in a
+potentially insecure configuration,
+i.e. SMT enabled or L1D flush disabled.
+
+flush,nowarn
+Same as 'flush', but hypervisors will not
+warn when a VM is started in a potentially
+insecure configuration.
+
+off
+Disables hypervisor mitigations and doesn't
+emit any warnings.
+It also drops the swap size and available
+RAM limit restriction on both hypervisor and
+bare metal.
+
+Default is 'flush'.
+
+For details see: Documentation/admin-guide/hw-vuln/l1tf.rst
+
ldcr=[PPC]

l2cr=[PPC]
@@ -2161,6 +2285,38 @@
Format: <first>,<last>
Specifies range of consoles to be captured by the MDA.

+mds=[X86,INTEL]
+Control mitigation for the Micro-architectural Data
+Sampling (MDS) vulnerability.
+
+Certain CPUs are vulnerable to an exploit against CPU
+internal buffers which can forward information to a
+disclosure gadget under certain conditions.
+
+In vulnerable processors, the speculatively
+forwarded data can be used in a cache side channel
+attack, to access data to which the attacker does
+not have direct access.
+
+This parameter controls the MDS mitigation. The
+options are:
+
+full - Enable MDS mitigation on vulnerable CPUs
+full,nosmt - Enable MDS mitigation and disable
+  SMT on vulnerable CPUs
+off - Unconditionally disable MDS mitigation
+
+On TAA-affected machines, mds=off can be prevented by
+an active TAA mitigation as both vulnerabilities are
+mitigated with the same mechanism so in order to disable
+this mitigation, you need to specify tsx_async_abort=off
+too.
+
+Not specifying this option is equivalent to
+mds=full.
+
+For details see: Documentation/admin-guide/hw-vuln/mds.rst
+
+mem=nn[KMG][KNL,BOOT] Force usage of a specific amount of memory
Amount of memory to be used when the kernel is not able
to see the whole system memory or for test.
@@ -2309,6 +2465,52 @@
in the "bleeding edge" mini2440 support kernel at
http://repo.or.cz/w/linux-2.6/mini2440.git
+
+mitigations=
+[X86,PPC,S390,ARM64] Control optional mitigations for
+CPU vulnerabilities. This is a set of curated,
+arch-independent options, each of which is an
+aggregation of existing arch-specific options.
+
+off
+Disable all optional CPU mitigations. This
+improves system performance, but it may also
+expose users to several CPU vulnerabilities.
+Equivalent to: nopti [X86,PPC]
+  kpti=0 [ARM64]
+  nospectre_v1 [X86,PPC]
+  nobp=0 [S390]
+  nospectre_v2 [X86,PPC,S390,ARM64]
+  spectre_v2_user=off [X86]
+  spec_store_bypass_disable=off [X86,PPC]
+  ssbd=force-off [ARM64]
+  l1tf=off [X86]
+  mds=off [X86]
+  tsx_async_abort=off [X86]
+  kvm.nx_huge_pages=off [X86].
+  no_entry_flush [PPC]
+  no_uaccess_flush [PPC]
+
+Exceptions:
+  This does not have any effect on
+  kvm.nx_huge_pages when
+  kvm.nx_huge_pages=force.
+
+auto (default)
+Mitigate all CPU vulnerabilities, but leave SMT
+enabled, even if it's vulnerable. This is for
+users who don't want to be surprised by SMT
+getting disabled across kernel upgrades, or who
+have other ways of avoiding SMT-based attacks.
+Equivalent to: (default behavior)
+auto,nosmt
+Mitigate all CPU vulnerabilities, disabling SMT
+if needed. This is for users who always want to
+be fully mitigated, even if it means losing SMT.
+Equivalent to: l1tf=flush,nosmt [X86]
+    mds=full,nosmt [X86]
+    tsx_async_abort=full,nosmt [X86]
+
+mninit_loglevel=
+[KNL] When CONFIG_DEBUG_MEMORY_INIT is set, this
+parameter allows control of the logging verbosity for
@@ -2590,6 +2792,8 @@

noefi
+no_entry_flush  [PPC] Don’t flush the L1-D cache when entering the kernel.
+
+noexec[IA-64]

noexec[X86]
@@ -2623,10 +2827,24 @@

nosmt[KNL,S390] Disable symmetric multithreading (SMT).
Equivalent to smt=1.
-
nospectre_v2[X86] Disable all mitigations for the Spectre variant 2
-(indirect branch prediction) vulnerability. System may
-allow data leaks with this option, which is equivalent
-to spectre_v2=off.
+[KNL,x86] Disable symmetric multithreading (SMT).
+nosmt=force: Force disable SMT, cannot be undone
+
+via the sysfs control file.
+
+nospectre_v1[X86,PPC] Disable mitigations for Spectre Variant 1 (bounds
+check bypass). With this option data leaks are possible
+in the system.
+
+nospectre_v2[X86,PPC_FSL_BOOK3E,ARM64] Disable all mitigations for
+the Spectre variant 2 (indirect branch prediction)
+vulnerability. System may allow data leaks with this
+option.
+
+nospec_store_bypass_disable
+[HW] Disable all mitigations for the Speculative Store Bypass vulnerability
+
+no_uaccess_flush
+  [PPC] Don’t flush the L1-D cache after accessing user data.
noxsave[BUGS=X86] Disables x86 extended register state save and restore using xsave. The kernel will fallback to
@@ -2742,8 +2960,6 @@
norandmapsDon't use address space randomization. Equivalent to
echo 0 > /proc/sys/kernel/randomize_va_space
-noreplace-paravirt[X86,IA-64,PV_OPS] Don't patch paravirt_ops
-
-noreplace-smp[X86-32,SMP] Don't replace SMP instructions with UP alternatives
@@ -2966,6 +3182,12 @@
nomsi[MSI] If the PCI_MSI kernel config parameter is enabled, this kernel boot option can be used to
disable the use of MSI interrupts system-wide.
+clearmsi[X86] Clears MSI/MSI-X enable bits early in boot
+time in order to avoid issues like adapters
+screaming irqs and preventing boot progress.
+Also, it enforces the PCI Local Bus spec
+rule that those bits should be 0 in system reset
+events (useful for kexec/kdump cases).
noioapicquirk[APIC] Disable all boot interrupt quirks.
Safety option to keep boot IRQs enabled. This should never be necessary.
@@ -3680,9 +3902,17 @@
Run specified binary instead of /init from the ramdisk, used for early userspace startup. See initrd.
+rdrand=[X86]
+force - Override the decision by the kernel to hide the
+advertisement of RDRAND support (this affects
+certain AMD processors because of buggy BIOS
+support, specifically around the suspend/resume
+path).
+
+rdt=[HW,X86,RDT]
Turn on/off individual RDT features. List is:
-cmt, mbmtotal, mbmlocal, l3cat, l3cdp, l2cat, mba.
+cmt, mbmtotal, mbmlocal, l3cat, l3cdp, l2cat, l2cdp, mba.
E.g. to turn on cmt and turn off mba use:
rdt=cmt,!mba
@@ -3960,9 +4190,13 @@
spectre_v2=[X86] Control mitigation of Spectre variant 2
(indirect branch speculation) vulnerability.
+The default operation protects the kernel from
user space attacks.

- `on` - unconditionally enable
- `off` - unconditionally disable
+ `on` - unconditionally enable, implies `spectre_v2_user=on`
+ `off` - unconditionally disable, implies `spectre_v2_user=off`

auto - kernel detects whether your CPU model is vulnerable

```
@@ -3972,6 +4206,12 @@
CONFIG_RETPOLINE configuration option, and the compiler with which the kernel was built.
+Selecting 'on' will also enable the mitigation against user space to user space task attacks.
+Selecting 'off' will disable both the kernel and the user space protections.
Specific mitigations can also be selected manually:
```

retpoline - replace indirect branches
```
Not specifying this option is equivalent to `spectre_v2=auto`.
```
+spectre_v2_user=
+[X86] Control mitigation of Spectre variant 2
+ (indirect branch speculation) vulnerability between user space tasks
+ +on- Unconditionally enable mitigations. Is enforced by `spectre_v2=on`
+ +off - Unconditionally disable mitigations. Is enforced by `spectre_v2=off`
+ +prctl - Indirect branch speculation is enabled, but mitigation can be enabled via `prctl`
+ per thread. The mitigation control state is inherited on fork.
+ +prctl,ibpb
+ + Like "prctl" above, but only STIBP is controlled per thread. IBPB is issued
+ always when switching between different user
+ space processes.
+
+seccomp
+ Same as "prctl" above, but all seccomp
+ threads will enable the mitigation unless
+ they explicitly opt out.
+
+seccomp,ibpb
+ Like "seccomp" above, but only STIBP is
+ controlled per thread. IBPB is issued
+ always when switching between different
+ user space processes.
+
+ auto  - Kernel selects the mitigation depending on
+ the available CPU features and vulnerability.
+
+ Default mitigation:
+ If CONFIG_SECCOMP=y then "seccomp", otherwise "prctl"
+
+ Not specifying this option is equivalent to
+ spectre_v2_user=auto.
+
+ spec_store_bypass_disable=
+ [HW] Control Speculative Store Bypass (SSB) Disable mitigation
+ (Speculative Store Bypass vulnerability)
+
+ Certain CPUs are vulnerable to an exploit against a
+ common industry wide performance optimization known
+ as "Speculative Store Bypass" in which recent stores
+ to the same memory location may not be observed by
+ later loads during speculative execution. The idea
+ is that such stores are unlikely and that they can
+ be detected prior to instruction retirement at the
+ end of a particular speculation execution window.
+
+ In vulnerable processors, the speculatively forwarded
+ store can be used in a cache side channel attack, for
+ example to read memory to which the attacker does not
+ directly have access (e.g. inside sandboxed code).
+
+ This parameter controls whether the Speculative Store
+ Bypass optimization is used.
+
+ on  - Unconditionally disable Speculative Store Bypass
+ off  - Unconditionally enable Speculative Store Bypass
+ auto - Kernel detects whether the CPU model contains an
+ implementation of Speculative Store Bypass and
+ picks the most appropriate mitigation. If the
+ CPU is not vulnerable, "off" is selected. If the
+ CPU is vulnerable the default mitigation is
+ architecture and Kconfig dependent. See below.
+prctl   - Control Speculative Store Bypass per thread
+ via prctl. Speculative Store Bypass is enabled
+ for a process by default. The state of the control
+ is inherited on fork.
+seccomp - Same as "prctl" above, but all seccomp threads
+ will disable SSB unless they explicitly opt out.
+
+Not specifying this option is equivalent to
+spec_store_bypass_disable=auto.
+
+Default mitigations:
+ X86: If CONFIG_SECCOMP=y "seccomp", otherwise "prctl"
+
spia_io_base=[HW,MTD]
spia_fio_base=
spia_pedr=
spia_peddr=

+srbds=[X86,INTEL]
+Control the Special Register Buffer Data Sampling
+(SRBDS) mitigation.
+
Certain CPUs are vulnerable to an MDS-like
exploit which can leak bits from the random
+number generator.
+
+By default, this issue is mitigated by
+microcode. However, the microcode fix can cause
+the RDRAND and RDSEED instructions to become
+much slower. Among other effects, this will
+result in reduced throughput from /dev/urandom.
+
+The microcode mitigation can be disabled with
+the following option:
+
+off: Disable mitigation and remove
+performance impact to RDRAND and RDSEED
+
srcutree.counter_wrap_check [KNL]
Specifies how frequently to check for
grace-period sequence counter wrap for the
@@ -4003,6 +4347,23 @@ expediting. Set to zero to disable automatic expediting.
+ssbd=[ARM64,HW]
+Speculative Store Bypass Disable control
+
+On CPUs that are vulnerable to the Speculative
+Store Bypass vulnerability and offer a
+firmware based mitigation, this parameter
+indicates how the mitigation should be used:
+
+force-on: Unconditionally enable mitigation for
+for both kernel and userspace
+force-off: Unconditionally disable mitigation for
+for both kernel and userspace
+kernel: Always enable mitigation in the
+kernel, and offer a prctl interface
+to allow userspace to register its
+interest in being mitigated too.
+
+stack_guard_gap=[MM]
override the default stack gap protection. The value
is in page units and it defines how many pages prior
@@ -4286,6 +4647,76 @@ marks the TSC unconditionally unstable at bootup and
avoids any further wobbles once the TSC watchdog notices.

+tsx=[X86] Control Transactional Synchronization
+Extensions (TSX) feature in Intel processors that
+support TSX control.
+
+This parameter controls the TSX feature. The options are:
+
+on- Enable TSX on the system. Although there are
+mitigations for all known security vulnerabilities,
+TSX has been known to be an accelerator for
+several previous speculation-related CVEs, and
+so there may be unknown security risks associated
+with leaving it enabled.
+
+off- Disable TSX on the system. (Note that this
+option takes effect only on newer CPUs which are
+not vulnerable to MDS, i.e., have
+MSR_IA32_ARCH_CAPABILITIES.MDS_NO=1 and which get
+the new IA32_TXS_CTRL MSR through a microcode
+update. This new MSR allows for the reliable
+deactivation of the TSX functionality.)
+
+auto- Disable TSX if X86_BUG_TAA is present,
+otherwise enable TSX on the system.
+
+Not specifying this option is equivalent to tsx=off.
+
+See Documentation/admin-guide/hw-vuln/tsx_async_abort.rst
+for more details.
+
+tsx_async_abort= [X86,INTEL] Control mitigation for the TSX Async
+Abort (TAA) vulnerability.
+
+Similar to Micro-architectural Data Sampling (MDS)
+certain CPUs that support Transactional
+Synchronization Extensions (TSX) are vulnerable to an
+exploit against CPU internal buffers which can forward
+information to a disclosure gadget under certain
+conditions.
+
+In vulnerable processors, the speculatively forwarded
+data can be used in a cache side channel attack, to
+access data to which the attacker does not have direct
+access.
+
+This parameter controls the TAA mitigation. The
+options are:
+
+full - Enable TAA mitigation on vulnerable CPUs
+if TSX is enabled.
+
+full,nosmt - Enable TAA mitigation and disable SMT on
+vulnerable CPUs. If TSX is disabled, SMT
+is not disabled because CPU is not
+vulnerable to cross-thread TAA attacks.
+off - Unconditionally disable TAA mitigation
+
+On MDS-affected machines, tsx_async_abort=off can be
+prevented by an active MDS mitigation as both vulnerabilities
+are mitigated with the same mechanism so in order to disable
+this mitigation, you need to specify mds=off too.
+
+Not specifying this option is equivalent to
+tsx_async_abort=full. On CPUs which are MDS affected
+and deploy MDS mitigation, TAA mitigation is not
+required and doesn't provide any additional
+mitigation.
+
+For details see:
+Documentation/admin-guide/hw-vuln/tsx_async_abort.rst
+
+turbografx.map[2|3]=[HW,JOY]
TurboGraFX parallel port interface
Format:
@@ -4352,6 +4783,66 @@

usbcore.nousb[USB] Disable the USB subsystem

+usbcore.quirks=
+[USB] A list of quirk entries to augment the built-in
+usb core quirk list. List entries are separated by
+commas. Each entry has the form
+VendorID:ProductID:Flags. The IDs are 4-digit hex
+numbers and Flags is a set of letters. Each letter
+will change the built-in quirk; setting it if it is
+clear and clearing it if it is set. The letters have
+the following meanings:
+a = USB_QUIRK_STRING_FETCH_255 (string
descriptors must not be fetched using
+a 255-byte read);
+b = USB_QUIRK_RESET_RESUME (device can't resume
+correctly so reset it instead);
+c = USB_QUIRK_NO_SET_INTF (device can't handle
+Set-Interface requests);
+d = USB_QUIRK_CONFIG_INTF_STRINGS (device can't
+handle its Configuration or Interface
+strings);
+e = USB_QUIRK_RESET (device can't be reset
+(e.g morph devices, don't use reset);
+f = USB_QUIRK_HONOR_BNUMINTERFACES (device has
+more interface descriptions than the
+bNumInterfaces count, and can't handle
+talking to these interfaces);
+g = USB_QUIRK_DELAY_INIT (device needs a pause
+during initialization, after we read
+the device descriptor);
+h = USB_QUIRK_LINEAR_UFRAME_INTR_BINTERVAL (For
+high speed and super speed interrupt
+endpoints, the USB 2.0 and USB 3.0 spec
+require the interval in microframes (1
+microframe = 125 microseconds) to be
+calculated as interval = 2 ^
+(bInterval-1).
+Devices with this quirk report their
+bInterval as the result of this
+calculation instead of the exponent
+variable used in the calculation);
+i = USB_QUIRKDEVICE_QUALIFIER (device can't
+handle device_qualifier descriptor
+requests);
+j = USB_QUIRK_IGNORE_REMOTE_WAKEUP (device
generates spurious wakeup, ignore
+remote wakeup capability);
+k = USB_QUIRK_NO_LPM (device can't handle Link
+Power Management);
+l = USB_QUIRK_LINEAR_FRAME_INTR_BINTERVAL
+(Device reports its bInterval as linear
+frames instead of the USB 2.0
+calculation);
+m = USB_QUIRK_DISCONNECT_SUSPEND (Device needs
+to be disconnected before suspend to
+prevent spurious wakeup);
+n = USB_QUIRK_DELAY_CTRL_MSG (Device needs a
+pause after every control message);
+o = USB_QUIRK_HUB_SLOW_RESET (Hub needs extra
+delay after resetting its port);
+Example: quirks=0781:5580:bk,0a5c:5834:gij
+
+usbhid.mousepoll=

[USBHID] The interval which mice are to be polled at.

@@ -4371,13 +4862,13 @@
Flags is a set of characters, each corresponding
to a common usb-storage quirk flag as follows:
a = SANE_SENSE (collect more than 18 bytes
+of sense data);
+of sense data, not on uas);
b = BAD_SENSE (don't collect more than 18
+bytes of sense data);
+bytes of sense data, not on uas);
c = FIX_CAPACITY (decrease the reported
device capacity by one sector);
+d = NO_READ_DISC_INFO (don't use
+READ_DISC_INFO command);
+READ_DISC_INFO command, not on uas);
e = NO_READ_CAPACITY_16 (don't use
READ_CAPACITY_16 command);
f = NO_REPORT_OPCODES (don't use report opcodes
@@ -4391,18 +4882,20 @@
device);
+j = NO_REPORT_LUNS (don't use report luns
command, uas only);
+k = NO_SAME (do not use WRITE_SAME, uas only)
l = NOT_LOCKABLE (don't try to lock and
+unlock ejectable media);
+unlock ejectable media, not on uas);
m = MAX_SECTORS_64 (don't transfer more
+than 64 sectors = 32 KB at a time);
+than 64 sectors = 32 KB at a time,
n = INITIAL_READ10 (force a retry of the initial READ(10) command);
+initial READ(10) command, not on uas);
o = CAPACITY_OK (accept the capacity reported by the device);
+reported by the device, not on uas);
p = WRITE_CACHE (the device cache is ON by default);
+by default, not on uas);
r = IGNORE_RESIDUE (the device reports bogus residue values);
+bogus residue values, not on uas);
s = SINGLE_LUN (the device has only one Logical Unit);
t = NO_ATA_1X (don't allow ATA(12) and ATA(16)
@@ -4411,7 +4904,8 @@
 w = NO_WP_DETECT (don't test whether the medium is write-protected).
y = ALWAYS_SYNC (issue a SYNCHRONIZE_CACHE even if the device claims no cache)
+even if the device claims no cache,
+not on uas)
Example: quirks=0419:aaf5:rl,0421:0433:rc

user_debug=[KNL,ARM]
@@ -4519,12 +5013,6 @@
 emulate     [default] Vsyscalls turn into traps and are emulated reasonably safely.

-native     Vsyscalls are native syscall instructions.
-      This is a little bit faster than trapping
-      and makes a few dynamic recompilers work better than they would in emulation mode.
-      It also makes exploits much easier to write.

-native     Vsyscalls are native syscall instructions.
-      This is a little bit faster than trapping
-      and makes a few dynamic recompilers work better than they would in emulation mode.
-      It also makes exploits much easier to write.

none        Vsyscalls don't work at all. This makes them quite hard to use for exploits but might break your system.
@@ -4656,6 +5144,10 @@
 the unplug protocol
 never -- do not unplug even if version check succeeds
+xen_legacy_crash[X86,XEN]
+Crash from Xen panic notifier, without executing late panic() code such as dumping handler.
+xen_nopvspin[X86,XEN]
Disables the ticketlock slowpath using Xen PV optimizations.
@@ -4664,6 +5156,14 @@
Disables the PV optimizations forcing the HVM guest to run as generic HVM guest with no PV drivers.

+xen.event_eoi_delay=[XEN]
+How long to delay EOI handling in case of event storms (jiffies). Default is 10.
+
+xen.event_loop_timeout=[XEN]
+After which time (jiffies) the event handling loop should start to delay EOI handling. Default is 2.
+
+xirc2ps_cs=[NET,PCMCIA]

Format:
<irq>,<irq_mask>,<io>,<full_duplex>,<do_sound>,<lockup_hack>[,<irq2>[,<irq3>[,<irq4>]]]
--- linux-4.15.0.orig/Documentation/admin-guide/security-bugs.rst
+++ linux-4.15.0/Documentation/admin-guide/security-bugs.rst
@@ -26,21 +26,35 @@
be released without consent from the reporter unless it has already been made public.

-Disclosure
-----------

+Disclosure and embargoed information
+------------------------------------

-The goal of the Linux kernel security team is to work with the bug submitter to bug resolution as well as disclosure. We prefer to fully disclose the bug as soon as possible. It is reasonable to delay disclosure when the bug or the fix is not yet fully understood, the solution is not well-tested or for vendor coordination. However, we expect these delays to be short, measurable in days, not weeks or months.
-A disclosure date is negotiated by the security team working with the bug submitter as well as vendors. However, the kernel security team holds the final say when setting a disclosure date. The timeframe for disclosure is from immediate (esp. if it's already publicly known) to a few weeks. As a basic default policy, we expect report date to disclosure date to be on the order of 7 days.
+The security list is not a disclosure channel. For that, see Coordination below.
+
+Once a robust fix has been developed, the release process starts. Fixes for publicly known bugs are released immediately.
+
+Although our preference is to release fixes for publicly undisclosed bugs as soon as they become available, this may be postponed at the request of
+the reporter or an affected party for up to 7 calendar days from the start
+of the release process, with an exceptional extension to 14 calendar days
+if it is agreed that the criticality of the bug requires more time. The
+only valid reason for deferring the publication of a fix is to accommodate
+the logistics of QA and large scale rollouts which require release
+coordination.
+
+Whilst embargoed information may be shared with trusted individuals in
+order to develop a fix, such information will not be published alongside
+the fix or on any other disclosure channel without the permission of the
+reporter. This includes but is not limited to the original bug report
+and followup discussions (if any), exploits, CVE information or the
+identity of the reporter.
+
+In other words our only interest is in getting bugs fixed. All other
+information submitted to the security list and any followup discussions
+of the report are treated confidentially even after the embargo has been
+lifted, in perpetuity.

Coordination
-------------
@@ -66,7 +80,7 @@
assigned ahead of public disclosure, they will need to contact the private
linux-distros list, described above. When such a CVE identifier is known
before a patch is provided, it is desirable to mention it in the commit
-message, though.
+message if the reporter agrees.

Non-disclosure agreements
-------------------------
--- linux-4.15.0.orig/Documentation/admin-guide/thunderbolt.rst
+++ linux-4.15.0/Documentation/admin-guide/thunderbolt.rst
@@ -3,13 +3,13 @@

The interface presented here is not meant for end users. Instead there
should be a userspace tool that handles all the low-level details, keeps
-database of the authorized devices and prompts user for new connections.
+the database of the authorized devices and prompts users for new connections.

More details about the sysfs interface for Thunderbolt devices can be
found in ```Documentation/ABI/testing/sysfs-bus-thunderbolt```.

Those users who just want to connect any device without any sort of
-manual work, can add following line to
+manual work can add following line to
```/etc/udev/rules.d/99-local.rules```::

ACTION="add", SUBSYSTEM="thunderbolt", ATTR{authorized}="0", ATTR{authorized}="1"
Security levels and how to use them
-----------------------------------
- Starting from Intel Falcon Ridge Thunderbolt controller there are 4
- security levels available. The reason for these is the fact that the
- connected devices can be DMA masters and thus read contents of the host
- memory without CPU and OS knowing about it. There are ways to prevent
- this by setting up an IOMMU but it is not always available for various
- reasons.
+ Starting with Intel Falcon Ridge Thunderbolt controller there are 4
+ security levels available. Intel Titan Ridge added one more security level
+(usbonly). The reason for these is the fact that the connected devices can
+ be DMA masters and thus read contents of the host memory without CPU and OS
+ knowing about it. There are ways to prevent this by setting up an IOMMU but
+ it is not always available for various reasons.

The security levels are as follows:

@@ -20,12 +20,12 @@

user
User is asked whether the device is allowed to be connected.
Based on the device identification information available through
-    `/sys/bus/thunderbolt/devices` user then can do the decision.
+    `/sys/bus/thunderbolt/devices`, the user then can make the decision.
In BIOS settings this is typically called *Unique ID*.

secure
User is asked whether the device is allowed to be connected. In
addition to UUID the device (if it supports secure connect) is sent
a challenge that should match the expected one based on a random key
- written to `key` sysfs attribute. In BIOS settings this is
+ written to the `key` sysfs attribute. In BIOS settings this is
typically called *One time saved key*.

dponly
@@ -52,6 +52,11 @@
USB. No PCIe tunneling is done. In BIOS settings this is
typically called *Display Port Only*.

+ usbonly
+ The firmware automatically creates tunnels for the USB controller and
+ Display Port in a dock. All PCIe links downstream of the dock are
+ removed.
+
+ The current security level can be read from
`/sys/bus/thunderbolt/devices/domainX/security` where `domainX` is
the Thunderbolt domain the host controller manages. There is typically
The `authorized` attribute reads 0 which means no PCIe tunnels are created yet. The user can authorize the device by simply:
+ entered:

```
# echo 1 > /sys/bus/thunderbolt/devices/0-1/authorized
```

If the device supports secure connect, and the domain security level is set to `secure`, it has an additional attribute `key` which can hold a random 32-byte value used for authorization and challenging the device in future connects:
+ entered:

```
/sys/bus/thunderbolt/devices/0-3/authorized 0
```

Notice the key is empty by default.

-If the user does not want to use secure connect it can just `echo 1`
+ entered:

```
# echo $key > /sys/bus/thunderbolt/devices/0-3/key
```

If the challenge the device returns back matches the one we expect based on the key, the device is connected and the PCIe tunnels are created.
-However, if the challenge failed no tunnels are created and error is returned to the user.

-If the user still wants to connect the device it can either approve the device without a key or write new key and write 1 to the `authorized` file to get the new key stored on the device NVM.
Open Source Used In 5GaaS Edge AC-4  9415

+DMA protection utilizing IOMMU
+----------------------------------
+Recent systems from 2018 and forward with Thunderbolt ports may natively
+support IOMMU. This means that Thunderbolt security is handled by an IOMMU
+so connected devices cannot access memory regions outside of what is
+allocated for them by drivers. When Linux is running on such system it
+automatically enables IOMMU if not enabled by the user already. These
+systems can be identified by reading `1` from
+``/sys/bus/thunderbolt/devices/domainX/iommu_dma_protection`` attribute.
+
+The driver does not do anything special in this case but because DMA
+protection is handled by the IOMMU, security levels (if set) are
+redundant. For this reason some systems ship with security level set to
+``none``. Other systems have security level set to ``user`` in order to
+support downgrade to older OS, so users who want to automatically
+authorize devices when IOMMU DMA protection is enabled can use the
+following `udev` rule::

  ACTION=="add", SUBSYSTEM=="thunderbolt", ATTRS{iommu_dma_protection}=="1",
ATTR{authorized}=="0", ATTR{authorized}=="1"
+
Upgrading NVM on Thunderbolt device or host
-----------------------------------------------
-Since most of the functionality is handled in firmware running on a
+Since most of the functionality is handled in firmware running on a
host controller or a device, it is important that the firmware can be
upgraded to the latest where possible bugs in it have been fixed.
Typically OEMs provide this firmware from their support site.

-There is also a central site which has links where to download firmwares
+There is also a central site which has links where to download firmware
for some machines:

  `Thunderbolt Updates <https://thunderbolttechnology.net/updates>`_

-Before you upgrade firmware on a device or host, please make sure it is
-the suitable. Failing to do that may render the device (or host) in a
+Before you upgrade firmware on a device or host, please make sure it is a
+suitable upgrade. Failing to do that may render the device (or host) in a
state where it cannot be used properly anymore without special tools!

Host NVM upgrade on Apple Macs is not supported.
@@ -151,7 +176,7 @@
 matter which device is connected (unless you are upgrading NVM on a
device - then you need to connect that particular device).

-Note OEM-specific method to power the controller up ("force power") may
+Note an OEM-specific method to power the controller up ("force power") may
be available for your system in which case there is no need to plug in a Thunderbolt device.

@@ -171,7 +196,7 @@
After a while the host controller appears again and this time it should be fully functional.

-We can verify that the new NVM firmware is active by running following commands:
+We can verify that the new NVM firmware is active by running the following commands:

    # cat /sys/bus/thunderbolt/devices/0-0/nvm_authenticate
    # cat /sys/bus/thunderbolt/devices/0-0/nvm_version
    18.0

-If `nvm_authenticate` contains anything else than 0x0 it is the error code from the last authentication cycle, which means the authentication of the NVM image failed.
+If `nvm_authenticate` contains anything other than 0x0 it is the error code from the last authentication cycle, which means the authentication of the NVM image failed.

Note names of the NVMem devices `nvm_activeN` and `nvm_non_activeN` depend on the order they are registered in the NVMem subsystem. N in the name is the identifier added by the NVMem subsystem.

Upgrading NVM when host controller is in safe mode
--------------------------------------------------

If the existing NVM is not properly authenticated (or is missing) the host controller goes into safe mode which means that only available functionality is flashing new NVM image. When in this mode the reading of `nvm_version` fails with `ENODATA` and the device identification information is missing.

To recover from this mode, one needs to flash a valid NVM image to the host controller in the same way it is done in the previous chapter.

Networking over Thunderbolt cable
----------------------------------

-Thunderbolt technology allows software communication across two hosts
+Thunderbolt technology allows software communication between two hosts connected by a Thunderbolt cable.

-It is possible to tunnel any kind of traffic over Thunderbolt link but
+It is possible to tunnel any kind of traffic over a Thunderbolt link but
currently we only support Apple ThunderboltIP protocol.

-If the other host is running Windows or macOS only thing you need to do is to connect Thunderbolt cable between the two hosts, the "thunderbolt-net" is loaded automatically. If the other host is also Linux you should load "thunderbolt-net" manually on one host (it does not matter which one):

+If the other host is running Windows or macOS, the only thing you need to do is to connect a Thunderbolt cable between the two hosts; the "thunderbolt-net" driver is loaded automatically. If the other host is also Linux you should load "thunderbolt-net" manually on one host (it does not matter which one):

```
# modprobe thunderbolt-net
```

The driver will create one virtual ethernet interface per Thunderbolt port which are named like "thunderbolt0" and so on. From this point you can either use standard userspace tools like "ifconfig" to configure the interface or let your GUI handle it automatically. Forcing power
---------------
Many OEMs include a method that can be used to force the power of a Thunderbolt controller to an "On" state even if nothing is connected. If supported by your machine this will be exposed by the WMI bus with a sysfs attribute called "force_power".

```
--- linux-4.15.0.orig/Documentation/arm/kernel_mode_neon.txt
+++ linux-4.15.0/Documentation/arm/kernel_mode_neon.txt
@@ -6,7 +6,7 @@
 * Use only NEON instructions, or VFP instructions that don't rely on support code
 * Isolate your NEON code in a separate compilation unit, and compile it with
  - '-mcpu=armv7-a -mfpu=neon -mfloat-abi=softfp'
+  '-march=armv7-a -mfpu=neon -mfloat-abi=softfp'
 * Put kernel_neon_begin() and kernel_neon_end() calls around the calls into your NEON code
 * Don't sleep in your NEON code, and be aware that it will be executed with
    @ @ -87,7 +87,7 @@

 Therefore, the recommended and only supported way of using NEON/VFP in the kernel is by adhering to the following rules:
 * isolate the NEON code in a separate compilation unit and compile it with
  - '-mcpu=armv7-a -mfpu=neon -mfloat-abi=softfp';
+  '-march=armv7-a -mfpu=neon -mfloat-abi=softfp';
 * issue the calls to kernel_neon_begin(), kernel_neon_end() as well as the calls
into the unit containing the NEON code from a compilation unit which is *not*
built with the GCC flag `-mcpu=neon` set.

--- linux-4.15.0.orig/Documentation/arm64/cpu-feature-registers.txt
+++ linux-4.15.0/Documentation/arm64/cpu-feature-registers.txt
@@ -110,7 +110,9 @@
 x--------------------------------------------------x
 | Name                         |  bits   | visible |
 |--------------------------------------------------|
- | RES0                         | [63-48] |    n    |
+ | TS                           | [55-52] |    y    |
+ |--------------------------------------------------|
+ | FHM                          | [51-48] |    y    |
+ |--------------------------------------------------|
+ | DP                           | [47-44] |    y    |
+x--------------------------------------------------x
@@ -122,8 +124,6 @@
 |--------------------------------------------------|
- | RES0                         | [27-24] |    n    |
- |--------------------------------------------------|
+ | ATOMICS                      | [23-20] |    y    |
+ |--------------------------------------------------|
+ | CRC32                        | [19-16] |    y    |
+x--------------------------------------------------x
@@ -133,8 +133,6 @@
 |--------------------------------------------------|
- | RES0                         | [3-0]   |    n    |
+ |--------------------------------------------------|
+ | SHA1                         | [11-8]  |    y    |
+ |--------------------------------------------------|
+ | AES                          | [7-4]   |    y    |
+x--------------------------------------------------x
@@ -197,6 +193,14 @@
 |--------------------------------------------------|
- | RES0                         | [63-36] |    n    |
+ | DIT                          | [51-48] |    y    |
+ |--------------------------------------------------|
| SVE                          | [35-32] |    y    |
+ |--------------------------------------------------|
- | RES0                         | [31-28] |    n    |
- |--------------------------------------------------|
+ | GIC                          | [27-24] |    n    |
+ |--------------------------------------------------|
+ | AdvSIMD                       | [23-20] |    y    |
+x--------------------------------------------------x
@@ -142,12 +140,10 @@
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SHA1</td>
</tr>
</tbody>
</table>
+ |--------------------------------------------------|
+ | AES                          | [7-4]   |    y    |
+x--------------------------------------------------x
@@ -140,11 +138,13 @@
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SVE</td>
</tr>
</tbody>
</table>
+x--------------------------------------------------x
@@ -136,6 +132,14 @@
 x--------------------------------------------------x

<table>
<thead>
<tr>
<th>Name</th>
<th>bits</th>
<th>visible</th>
</tr>
</thead>
<tbody>
<tr>
<td>RES0</td>
<td>[63-36]</td>
<td>n</td>
</tr>
<tr>
<td>DIT</td>
<td>[51-48]</td>
<td>y</td>
</tr>
<tr>
<td>SVE</td>
<td>[35-32]</td>
<td>y</td>
</tr>
<tr>
<td>GIC</td>
<td>[27-24]</td>
<td>n</td>
</tr>
<tr>
<td>AdvSIMD</td>
<td>[23-20]</td>
<td>y</td>
</tr>
</tbody>
</table>

--- linux-4.15.0.orig/Documentation/arm64/cpu-feature-registers.txt
+++ linux-4.15.0/Documentation/arm64/cpu-feature-registers.txt
Appendix I: Example

--- linux-4.15.0.orig/Documentation/arm64/silicon-errata.txt
+++ linux-4.15.0/Documentation/arm64/silicon-errata.txt
@@ -44,6 +44,8 @@
| Implementor    | Component       | Erratum ID      | Kconfig                     |
+----------------+-----------------+-----------------+-----------------------------+
+| Allwinner      | A64/R18         | UNKNOWN1        | SUN50I_ERRATUM_UNKNOWN1     |
+| ARM            | Cortex-A53      | #826319         | ARM64_ERRATUM_826319        |
+| ARM            | Cortex-A53      | #827319         | ARM64_ERRATUM_827319        |
+| ARM            | Cortex-A53      | #824069         | ARM64_ERRATUM_824069        |
+| ARM            | Cortex-A57      | #834220         | ARM64_ERRATUM_834220        |
+| ARM            | Cortex-A72      | #853709         | N/A                         |
+| ARM            | Cortex-A73      | #858921         | ARM64_ERRATUM_858921        |
+| ARM            | Cortex-A55      | #1024718        | ARM64_ERRATUM_1024718       |
+| ARM            | MMU-500         | #841119,#826419 | N/A                         |
+| Cavium         | ThunderX ITS    | #22375, #24313  | CAVIUM_ERRATUM_22375        |
+| Hisilicon      | Hip0{6,7}       | #161010701      | N/A                         |
+| Hisilicon      | Hip07           | #161600802      | HSilICON_ERRATUM_161600802 |
+| Qualcomm Tech. | Falkor v1       | E1003            | QCOM_FALKOR_ERRATUM_1003    |
+| Qualcomm Tech. | Kryo/Falkor v1  | E1003            | QCOM_FALKOR_ERRATUM_1003    |
+| Qualcomm Tech. | Falkor v1       | E1009            | QCOM_FALKOR_ERRATUM_1009    |
+| Qualcomm Tech. | QDF2400 ITS     | E0065            | QCOM_QDF2400_ERRATUM_0065   |
+| Qualcomm Tech. | Falkor v{1,2}   | E1041            | QCOM_FALKOR_ERRATUM_1041    |
--- linux-4.15.0.orig/Documentation/atomic_t.txt
+++ linux-4.15.0/Documentation/atomic_t.txt
@@ -177,6 +177,9 @@
ordering on their SMP atomic primitives. For example our TSO architectures provide full ordered atomics and these barriers are no-ops.
NOTE: when the atomic RmW ops are fully ordered, they should also imply a
compiler barrier.

Thus:

atomic_fetch_add();

--- linux-4.15.0.orig/Documentation/cgroups/namespace.txt
+++ linux-4.15.0/Documentation/cgroups/namespace.txt
@@ -0,0 +1,142 @@

CGroup Namespaces

+ CGroup Namespace provides a mechanism to virtualize the view of the
+ /proc/<pid>/cgroup file. The CLONE_NEWCGROUP clone-flag can be used with
+ clone() and unshare() syscalls to create a new cgroup namespace.
+ The process running inside the cgroup namespace will have its /proc/<pid>/cgroup
+ output restricted to cgroupns-root. cgroupns-root is the cgroup of the process
+ at the time of creation of the cgroup namespace.

+ Prior to CGroup Namespace, the /proc/<pid>/cgroup file used to show complete
+ path of the cgroup of a process. In a container setup (where a set of cgroups
+ and namespaces are intended to isolate processes), the /proc/<pid>/cgroup file
+ may leak potential system level information to the isolated processes.

+ For Example:
  + $ cat /proc/self/cgroup
  + 0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/batchjobs/container_id1
  +
  + The path '/batchjobs/container_id1’ can generally be considered as system-data
  + and its desirable to not expose it to the isolated process.

+ CGroup Namespaces can be used to restrict visibility of this path.
+ For Example:
  + # Before creating cgroup namespace
  + $ ls -l /proc/self/ns/cgroup
  + lrwxrwxrwx 1 root root 0 2014-07-15 10:37 /proc/self/ns/cgroup -> cgroup:[4026531835]
  + $ cat /proc/self/cgroup
  + 0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/batchjobs/container_id1
  +
  + # unshare(CLONE_NEWCGROUP) and exec /bin/bash
  + $ ~/unshare -c
  + [ns]$ ls -l /proc/self/ns/cgroup
  + lrwxrwxrwx 1 root 0 2014-07-15 10:37 /proc/self/ns/cgroup -> cgroup:[4026532183]
  + # From within new cgroupns, process sees that its in the root cgroup
  + [ns]$ cat /proc/self/cgroup
  + 0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/
  +
  + # From global cgroupns:
  + $ cat /proc/<pid>/cgroup
# Unshare cgroupns along with userns and mountns
+ # Following calls unshare(CLONE_NEWCGROUP|CLONE_NEWUSER|CLONE_NEWNS), then
+ # sets up uid/gid map and execs /bin/bash
+ $ ~/unshare -c -u -m
+ # Originally, we were in /batchjobs/container_id1 cgroup. Mount our own cgroup
+ # hierarchy.
+ [ns]$ mount -t cgroup cgroup /tmp/cgroup
+ [ns]$ ls -l /tmp/cgroup
+ total 0
+ -r--r--r-- 1 root root 0 2014-10-13 09:32 cgroup.controllers
+ -r--r--r-- 1 root root 0 2014-10-13 09:32 cgroup.populated
+ -rw-r--r-- 1 root root 0 2014-10-13 09:25 cgroup.procs
+ -rw-r--r-- 1 root root 0 2014-10-13 09:32 cgroup.subtree_control
+
+The cgroupns-root (/batchjobs/container_id1 in above example) becomes the
+filesystem root for the namespace specific cgroupfs mount.
+
+The virtualization of /proc/self/cgroup file combined with restricting
+the view of cgroup hierarchy by namespace-private cgroupfs mount
+should provide a completely isolated cgroup view inside the container.
+
+In its current form, the cgroup namespaces patchset provides following
+behavior:
+
+(1) The 'cgroupns-root' for a cgroup namespace is the cgroup in which
+the process calling unshare is running.
+For ex. if a process in /batchjobs/container_id1 cgroup calls unshare,
cgroup /batchjobs/container_id1 becomes the cgroupns-root.
+For the init_cgroup_ns, this is the real root ('/') cgroup
+(identified in code as cgrp_dfl_root.cgrp).
+
+(2) The cgroupns-root cgroup does not change even if the namespace
creator process later moves to a different cgroup.
+$ ~/unshare -c # unshare cgroupns in some cgroup
+[ns]$ cat /proc/self/cgroup
+0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/
+[ns]$ mkdir sub_cgrp_1
+[ns]$ echo 0 > sub_cgrp_1/cgroup.procs
+[ns]$ cat /proc/self/cgroup
+0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/sub_cgrp_1
+
+(3) Each process gets its CGROUPNS specific view of /proc/<pid>/cgroup
+(a) Processes running inside the cgroup namespace will be able to see
+cgroup paths (in /proc/self/cgroup) only inside their root cgroup
+[ns]$ sleep 100000 & # From within unshared cgroupns
+[1] 7353
+(b) From global cgroupns, the real cgroup path will be visible:
+  $ cat /proc/7353/cgroup
+  0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/batchjobs/container_id1/sub_cgrp_1
+
+(c) From a sibling cgroupns (cgroupns root-ed at a different cgroup), cgroup
+  path relative to its own cgroupns-root will be shown:
+  # ns2's cgroupns-root is at '/batchjobs/container_id2'
+  [ns2]$ cat /proc/7353/cgroup
+  0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/../container_id2/sub_cgrp_1
+
+  Note that the relative path always starts with '/' to indicate that its
+  relative to the cgroupns-root of the caller.
+
+(4) Processes inside a cgroupns can move in-and-out of the cgroupns-root
+  (if they have proper access to external cgroups).
+  # From inside cgroupns (with cgroupns-root at /batchjobs/container_id1), and
+  # assuming that the global hierarchy is still accessible inside cgroupns:
+  $ cat /proc/7353/cgroup
+  0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/sub_cgrp_1
+  $ echo 7353 > batchjobs/container_id2/cgroup.procs
+  $ cat /proc/7353/cgroup
+  0:cpuset,cpu,cpuacct,memory,devices,freezer,hugetlb:/../container_id2
+
+  Note that this kind of setup is not encouraged. A task inside cgroupns
+  should only be exposed to its own cgroupns hierarchy. Otherwise it makes
+  the virtualization of /proc/<pid>/cgroup less useful.
+
+(5) Setns to another cgroup namespace is allowed when:
+  (a) the process has CAP_SYS_ADMIN in its current userns
+  (b) the process has CAP_SYS_ADMIN in the target cgroupns' userns
+  No implicit cgroup changes happen with attaching to another cgroupns. It
+  is expected that the someone moves the attaching process under the target
+  cgroupns-root.
+
+(6) When some thread from a multi-threaded process unshares its
+  cgroup-namespace, the new cgroupns gets applied to the entire process (all
+  the threads). For the unified-hierarchy this is expected as it only allows
+  process-level containerization. For the legacy hierarchies this may be
+  unexpected. So all the threads in the process will have the same cgroup.
+
+(7) The cgroup namespace is alive as long as there is atleast 1
+  process inside it. When the last process exits, the cgroup
+  namespace is destroyed. The cgroupns-root and the actual cgroup
+  remain though.
Namespace specific cgroup hierarchy can be mounted by a process running inside cgroupns:

```
$ mount -t cgroup -o __DEVEL__sane_behavior cgroup $MOUNT_POINT
```

This will mount the unified cgroup hierarchy with cgroupns-root as the filesystem root. The process needs CAP_SYS_ADMIN in its usersn and mntns.

# The name of the math extension changed on Sphinx 1.4

-if major == 1 and minor > 3:
+if (major == 1 and minor > 3) or (major > 1):
    extensions.append("sphinx.ext.imgmath")
else:
    extensions.append("sphinx.ext.pngmath")

A low water mark for the metadata device is maintained in the kernel and will trigger a dm event if free space on the metadata device drops below

--- linux-4.15.0.orig/Documentation/device-mapper/thin-provisioning.txt
+++ linux-4.15.0/Documentation/device-mapper/thin-provisioning.txt
 @@ -112,9 +112,11 @@
 free space on the data device drops below this level then a dm event will be triggered which a userspace daemon should catch allowing it to extend the pool device. Only one such event will be sent.
-Resuming a device with a new table itself triggers an event so the userspace daemon can use this to detect a situation where a new table -already exceeds the threshold.
+
+No special event is triggered if a just resumed device's free space is below the low water mark. However, resuming a device always triggers an event; a userspace daemon should verify that free space exceeds the low water mark when handling this event.

Software Delegated Exception Interface (SDEI)

Firmware implementing the SDEI functions described in ARM document number ARM DEN 0054A ("Software Delegated Exception Interface") can be used by Linux to receive notification of events such as those generated by firmware-first error handling, or from an IRQ that has been promoted to a firmware-assisted NMI.

The interface provides a number of API functions for registering callbacks and enabling/disabling events. Functions are invoked by trapping to the
+privilege level of the SDEI firmware (specified as part of the binding
+below) and passing arguments in a manner specified by the "SMC Calling
+Convention (ARM DEN 0028B):
+
+ r0 => 32-bit Function ID / return value
+{r1 - r3} => Parameters
+
+ Note that the immediate field of the trapping instruction must be set
to #0.
+
+ The SDEI_EVENT_REGISTER function registers a callback in the kernel
text to handle the specified event number.
+
+ The sdei node should be a child node of '/firmware' and have required
+ properties:
+
+ + - compatible : should contain:
+   +* "arm,sdei-1.0" : For implementations complying to SDEI version 1.x.
+   +
+   + - method : The method of calling the SDEI firmware. Permitted
+   + values are:
+   +* "smc" : SMC #0, with the register assignments specified in this
+   +   binding.
+   +* "hvc" : HVC #0, with the register assignments specified in this
+   +   binding.
+   +Example:
+   +firmware {
+   +  sdei {
+   +   +compatible="arm,sdei-1.0";
+   +   +method="smc";
+   +   +};
+   +};
++- linux-4.15.0.orig/Documentation/devicetree/bindings/arm/hisilicon/hisilicon-low-pin-count.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/arm/hisilicon/hisilicon-low-pin-count.txt
@@ -0,0 +1,33 @@
+Hisilicon Hip06 Low Pin Count device
+ Hisilicon Hip06 SoCs implement a Low Pin Count (LPC) controller, which
+ provides I/O access to some legacy ISA devices.
+ Hip06 is based on arm64 architecture where there is no I/O space. So, the
+ I/O ports here are not CPU addresses, and there is no 'ranges' property in
+ LPC device node.
+
+ +Required properties:
+ + - compatible: value should be as follows:
+ +(a) "hisilicon,hip06-lpc"
+ +(b) "hisilicon,hip07-lpc"
+ +#address-cells: must be 2 which stick to the ISA/EISA binding doc.
+ +#size-cells: must be 1 which stick to the ISA/EISA binding doc.
reg: base memory range where the LPC register set is mapped.

Note:

  The node name before '@' must be "isa" to represent the binding stick to the ISA/EISA binding specification.

Example:

  isa@a01b0000 {
    compatible = "hisilicon,hip06-lpc";
    #address-cells = <2>;
    #size-cells = <1>;
    reg = <0x0 0xa01b0000 0x0 0x1000>;
  }

  ipmi0: bt@e4 {
    compatible = "ipmi-bt";
    device_type = "ipmi";
    reg = <0x01 0xe4 0x04>;
  }

The A53 PLL on MSM8916 platforms is the main CPU PLL used used for frequencies above 1GHz.

Required properties:

  compatible : Shall contain only one of the following:

    "qcom,msm8916-a53pll"

  reg : shall contain base register location and length

  #clock-cells : must be set to <0>

Example:

  a53pll: clock@b016000 {
    compatible = "qcom,msm8916-a53pll";
    reg = <0xb016000 0x40>
    #clock-cells = <0>;
  }
Example (R-Car H3):

```
usb2_clksel: clock-controller@e6590630 {

-		-compatible = "renesas,r8a77950-rcar-usb2-clock-sel",
+		-compatible = "renesas,r8a7795-rcar-usb2-clock-sel",

"renesas,rcar-gen3-usb2-clock-sel";

-reg = <0 0xe6590630 0 0x02>;

-clocks = <&cpg CPG_MOD 703>, <&usb_extal>, <&usb_xtal>;

--- linux-4.15.0.orig/Documentation/devicetree/bindings/clock/sunxi-ccu.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/clock/sunxi-ccu.txt
@@ -20,6 +20,7 @@
- "allwinner,sun50i-a64-ccu"
- "allwinner,sun50i-a64-r-ccu"
- "allwinner,sun50i-h5-ccu"
+	- "allwinner,sun50i-h6-ccu"
- "nextthing,gr8-ccu"

-reg: Must contain the registers base address and length
@@ -31,6 +32,9 @@
- #clock-cells : must contain 1
- #reset-cells : must contain 1

+For the main CCU on H6, one more clock is needed:
+ "iosc": the SoC's internal frequency oscillator
+
For the PRCM CCUs on A83T/H3/A64, two more clocks are needed:
- "pll-periph": the SoC's peripheral PLL from the main CCU
- "iosc": the SoC's internal frequency oscillator

--- linux-4.15.0.orig/Documentation/devicetree/bindings/display/mediatek/mediatek,dpi.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/display/mediatek/mediatek,dpi.txt
@@ -16,6 +16,9 @@

Documentation/devicetree/bindings/graph.txt. This port should be connected
to the input port of an attached HDMI or LVDS encoder chip.

+Optional properties:
+ pinctrl-names: Contain "default" and "sleep".
+
Example:

dpi0: dpi@1401d000 {
@@ -26,6 +29,9 @@

- &mmsys CLK_MM_DPI_ENGINE>,
- &apmixedsys CLK_APMIXED_TVDPLL>
-
clock-names = "pixel", "engine", "pll";
+ pinctrl-names = "default", "sleep";
+ pinctrl-0 = &dpi_pin_func;
+ pinctrl-1 = &dpi_pin_idle;
```
port {
  dpi0_out: endpoint {
  --- linux-4.15.0.orig/Documentation/devicetree/bindings/display/msm/dsi.txt
  +++ linux-4.15.0/Documentation/devicetree/bindings/display/msm/dsi.txt
  @ @ -102.7 +102.11 @@
  - clocks: Phandles to device clocks. See [1] for details on clock bindings.
  - clock-names: the following clocks are required:
    * "iface"
    + For 28nm HPM/LP, 28nm 8960 PHYs:
      - vddio-supply: phandle to vdd-io regulator device node
    + For 20nm PHY:
      + vddio-supply: phandle to vdd-io regulator device node
      + vcca-supply: phandle to vcca regulator device node

  Optional properties:
  - qcom,dsi-phy-regulator-ldo-mode: Boolean value indicating if the LDO mode PHY
  --- linux-4.15.0.orig/Documentation/devicetree/bindings/display/panel/armadeus,st0700-adapt.txt
  +++ linux-4.15.0/Documentation/devicetree/bindings/display/panel/armadeus,st0700-adapt.txt
  @ @ -0.0 +1.9 @@
  +Armadeus ST0700 Adapt. A Santek ST0700I5Y-RBSLW 7.0" WVGA (800x480) TFT with
  +an adapter board.
  +
  +Required properties:
  +  compatible: "armadeus,st0700-adapt"
  +  power-supply: see panel-common.txt
  +
  +Optional properties:
  +  backlight: see panel-common.txt
  --- linux-4.15.0.orig/Documentation/devicetree/bindings/display/panel/panel-common.txt
  +++ linux-4.15.0/Documentation/devicetree/bindings/display/panel/panel-common.txt
  @ @ -38.7 +38.7 @@
  require specific display timings. The panel-timing subnode expresses those
  timings as specified in the timing subnode section of the display timing
  bindings defined in
  - Documentation/devicetree/bindings/display/display-timing.txt.
  + Documentation/devicetree/bindings/display/panel/display-timing.txt.

  Connectivity
  --- linux-4.15.0.orig/Documentation/devicetree/bindings/display/panel/toshiba,lt089ac29000.txt
  +++ linux-4.15.0/Documentation/devicetree/bindings/display/panel/toshiba,lt089ac29000.txt
  @ @ -1.7 +1.7 @@
  Toshiba 8.9" WXGA (1280x768) TFT LCD panel

  Required properties:
  -- compatible: should be "toshiba,lt089ac29000.txt"
  +- compatible: should be "toshiba,lt089ac29000"
  - power-supply: as specified in the base binding
This binding is compatible with the simple-panel binding, which is specified.

--- linux-4.15.0.orig/Documentation/devicetree/bindings/display/panel/tpo,td028ttec1.txt
++  linux-4.15.0/Documentation/devicetree/bindings/display/panel/tpo,td028ttec1.txt
@@ -0,0 +1,30 @@
+Toppoly TD028TTEC1 Panel
+========================================
+
+Required properties:
+  - compatible: "tpo,td028ttec1"
+
+Optional properties:
+  - label: a symbolic name for the panel
+
+Required nodes:
+  - Video port for DPI input
+
+Example
+-------
+
+lcd-panel: td028ttec1@0 {
+compatible = "tpo,td028ttec1";
+reg = <0>;
+spi-max-frequency = <100000>;
+spi-cpol;
+spi-cpha;
+
+label = "lcd";
+port {
+lcd_in: endpoint {
+remote-endpoint = <&dpi_out>;
+};
+};
+};
+
--- linux-4.15.0.orig/Documentation/devicetree/bindings/dma/mv-xor-v2.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/dma/mv-xor-v2.txt
@@ -11,7 +11,11 @@
interrupts.

Optional properties:
-- clocks: Optional reference to the clock used by the XOR engine.
+ clocks: Optional reference to the clocks used by the XOR engine.
+ clock-names: mandatory if there is a second clock, in this case the
+ name must be "core" for the first clock and "reg" for the second
+ one
+
Example:

--- linux-4.15.0.org/Documentation/devicetree/bindings/dma/renesas,rca-dmac.txt
+++] linux-4.15.0.org/Documentation/devicetree/bindings/dma/renesas,rca-dmac.txt
@@ @ -25,6 +25,7 @@
- "renesas,dmac-r8a7794" (R-Car E2)
- "renesas,dmac-r8a7795" (R-Car H3)
- "renesas,dmac-r8a7796" (R-Car M3-W)
-+ "renesas,dmac-r8a77965" (R-Car M3-N)
- "renesas,dmac-r8a77970" (R-Car V3M)

- reg : base address and length of the registers block for the DMAC

--- linux-4.15.0.org/Documentation/devicetree/bindings/dma/snps-dma.txt
+++ linux-4.15.0.org/Documentation/devicetree/bindings/dma/snps-dma.txt
@@ -64,6 +64,6 @@
    interrupts = <0 35 0x4>;
    dmas = <&dmahost 12 0 1>,
    <&dmahost 13 0 1 0>;
+    <&dmahost 13 1 0>;
    dma-names = "rx", "rx";
};
--- linux-4.15.0.org/Documentation/devicetree/bindings/eeprom/eeprom.txt
+++ linux-4.15.0.org/Documentation/devicetree/bindings/eeprom/eeprom.txt
@@ -6,7 +6,8 @@
"atmel,24c00", "atmel,24c01", "atmel,24c02", "atmel,24c04",
"atmel,24c08", "atmel,24c16", "atmel,24c32", "atmel,24c64",
-"atmel,24c128", "atmel,24c256", "atmel,24c512", "atmel,24c1024"
+"atmel,24c128", "atmel,24c256", "atmel,24c512", "atmel,24c1024",
+"atmel,24c2048"
"catalyst,24c32"

@@ @ -23,7 +24,7 @@
device with <type> and manufacturer "atmel" should be used.
Possible types are:
"24c00", "24c01", "24c02", "24c04", "24c08", "24c16", "24c32", "24c64",
-"24c128", "24c256", "24c512", "24c1024", "spd"
+"24c128", "24c256", "24c512", "24c1024", "24c2048", "spd"

- reg : the I2C address of the EEPROM

--- linux-4.15.0.org/Documentation/devicetree/bindings/i2c/i2c-qcom-cci.txt
+++ linux-4.15.0.org/Documentation/devicetree/bindings/i2c/i2c-qcom-cci.txt
@@ @ -0,0 +1,46 @@
+Qualcomm Camera Control Interface controller
+
+ Required properties:
+ - compatible: Should be one of:
+   - "qcom,cci-v1.0.8" for 8916;
+   - "qcom,cci-v1.4.0" for 8996.
+ - #address-cells: Should be <1>.
+ - #size-cells: Should be <0>.
+ - reg: Base address of the controller and length of memory mapped region.
+ - interrupts: Specifier for CCI interrupt.
+ - clocks: List of clock specifiers, one for each entry in clock-names.
+ - clock-names: Should contain:
+   - "mmss_mmagic_ahb" - on 8996 only;
+   - "camss_top_ahb";
+   - "cci_ahb";
+   - "cci";
+   - "camss_ahb".
+ - #Required properties on 8996:
+ - power-domains: Power domain specifier.
+ - Optional:
+ - clock-frequency: Desired I2C bus clock frequency in Hz, defaults to 100 kHz
+ - if omitted.
+ - Example:
+  
+  cci@a0c000 {
+    compatible = "qcom,cci-v1.4.0";
+    #address-cells = <1>;
+    #size-cells = <0>;
+    reg = <0xa0c000 0x1000>;
+    interrupts = <GIC_SPI 295 IRQ_TYPE_EDGE_RISING>;
+    power-domains = <&mmcc CAMSS_GDSC>;
+    clocks = <&mmcc MMSS_MMAGIC_AHB_CLK>,
+      <&mmcc CAMSS_TOP_AHB_CLK>,
+      <&mmcc CAMSS_CCI_AHB_CLK>,
+      <&mmcc CAMSS_CCI_CLK>,
+      <&mmcc CAMSS_AHB_CLK>;
+    clock-names = "mmss_mmagic_ahb",
+      "camss_top_ahb",
+      "cci_ahb",
+      "cci",
+      "camss_ahb";
+    clock-frequency = <400000>;
+  };
--- linux-4.15.0.orig/Documentation/devicetree/bindings/iio/multiplexer/io-channel-mux.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/iio/multiplexer/io-channel-mux.txt
@@ -21,7 +21,7 @@
Example:
mux: mux-controller {
  -compatible = "mux-gpio";
  +compatible = "gpio-mux";
  mux-control-cells = <0>;

  mux-gpios = <&pioA 0 GPIO_ACTIVE_HIGH>,

--- linux-4.15.0.org/Documentation/devicetree/bindings/leds/leds-qcom-lpg.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/leds/leds-qcom-lpg.txt
@@ -0,0 +1,66 @@
+Binding for Qualcomm Light Pulse Generator
+
+The Qualcomm Light Pulse Generator consists of three different hardware blocks;
+a ramp generator with lookup table, the light pulse generator and a three
+channel current sink. These blocks are found in a wide range of Qualcomm PMICs.
+
+Required properties:
+  + compatible: one of:
+    + "qcom,pm8916-pwm",
+    + "qcom,pm8941-lpg",
+    + "qcom,pm8994-lpg",
+    + "qcom,pmi8994-lpg",
+    + "qcom,pmi8998-lpg",
+    +
+Optional properties:
+  + qcom,power-source: power-source used to drive the output, as defined in the
datasheet. Should be specified if the TRILED block is
  + present
  + qcom,dtest: configures the output into an internal test line of the
  + pmic. Specified by a list of u32 pairs, one pair per channel,
  + where each pair denotes the test line to drive and the second
  + configures how the value should be outputed, as defined in the
  + datasheet
  + #pwm-cells: should be 2, see ../pwm/pwm.txt
  +
  +LED subnodes:
+A set of subnodes can be used to specify LEDs connected to the LPG. Channels
+not associated with a LED are available as pwm channels, see ../pwm/pwm.txt.
+
+Required properties:
+  + led-sources: list of channels associated with this LED, starting at 1 for the
  + first LPG channel
+
+Optional properties:
+  + label: see Documentation/devicetree/bindings/leds/common.txt
+  + default-state: see Documentation/devicetree/bindings/leds/common.txt
+  + linux,default-trigger: see Documentation/devicetree/bindings/leds/common.txt
+  +
Example:
The following example defines a RGB LED attached to the PM8941.

```
&spmi_bus {
  pm8941@1 {
    lpg {
      compatible = "qcom,pm8941-lpg";
      qcom,power-source = <1>;
      rgb {
        led-sources = <7 6 5>;
      };
    };
  };
  +;
  +;
  +;
  +;
  +;
  +;
  +;
  +;
}
```

The following example defines the single PWM channel of the PM8916, which can be muxed by the MPP4 as a current sink.

```
&spmi_bus {
  pm8916@1 {
    pm8916_pwm: pwm {
      compatible = "qcom,pm8916-pwm";
      #pwm-cells = <2>;
    };
  };
  +;
  +;
  +;
  +;
}
```

---

Usage: required
Value type: <prop-encoded-array>
Definition: must specify the base address and size of the global block

- clocks:
  Usage: required if #clocks-cells property is present
  Value type: <phandle>
  Definition: phandle to the input PLL, which feeds the APCS mux/divider

- #mbox-cells:
  Usage: required
  Value type: <u32>
  Definition: as described in mailbox.txt, must be 1

- #clock-cells:
  Usage: optional
  Value type: <u32>
  Definition: as described in clock.txt, must be 0
The following example describes the APCS HMSS found in MSM8996 and part of the
mbox-names = "rpm_hlos";

+Below is another example of the APCS binding on MSM8916 platforms:
+
+apcs: mailbox@b011000 {
+compatible = "qcom,msm8916-apcs-kpss-global";
+reg = <0xb011000 0x1000>;
+#mbox-cells = <1>;
+clocks = <&a53pll>;
+#clock-cells = <0>;
+};

--- linux-4.15.0.orig/Documentation/devicetree/bindings/media/cec-gpio.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/media/cec-gpio.txt
@@ -4,6 +4,10 @@
is hooked up to a pull-up GPIO line and - optionally - the HPD line is
hooked up to another GPIO line.

+Please note: the maximum voltage for the CEC line is 3.63V, for the HPD
+line it is 5.3V. So you may need some sort of level conversion circuitry
+when connecting them to a GPIO line.
+
Required properties:
- compatible: value must be "cec-gpio".
- cec-gpios: gpio that the CEC line is connected to. The line should be
- connected to pin 26 aka BCM7 aka CE1 on the GPIO pin header and the HPD line is
-connected to pin 11 aka BCM17:
+connected to pin 11 aka BCM17 (some level shifter is needed for this!):

#include <dt-bindings/gpio/gpio.h>

--- linux-4.15.0.orig/Documentation/devicetree/bindings/media/i2c/adv748x.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/media/i2c/adv748x.txt
@@ -73,7 +73,7 @@
};

Example for the Raspberry Pi 3 where the CEC line is connected to
pin 26 aka BCM7 aka CE1 on the GPIO pin header and the HPD line is
-connected to pin 11 aka BCM17:
+connected to pin 11 aka BCM17 (some level shifter is needed for this!):
adv7482_txa: endpoint {
	@ -83,7 +83,7 @@
};
};

-port@11 {
+port@b {
    reg = <11>;

adv7482_txb: endpoint {
    --- linux-4.15.0.orig/Documentation/devicetree/bindings/mtd/gpmc-nand.txt
    +++ linux-4.15.0/Documentation/devicetree/bindings/mtd/gpmc-nand.txt
    @ @ -123,7 +123,7 @@
    so the device should have enough free bytes available its OOB/Spare
    area to accommodate ECC for entire page. In general following expression
    helps in determining if given device can accommodate ECC syndrome:
    "2 + (PAGESIZE / 512) * ECC_BYTES" >= OOBSIZE"
    "+2 + (PAGESIZE / 512) * ECC_BYTES" <= OOBSIZE"
    where
    OOBSIZE: number of bytes in OOB/spare area
    PAGESIZE: number of bytes in main-area of device page
    --- linux-4.15.0.orig/Documentation/devicetree/bindings/net/brcm,unimac-mdio.txt
    +++ linux-4.15.0/Documentation/devicetree/bindings/net/brcm,unimac-mdio.txt
    @ @ -19,6 +19,9 @@
    - interrupt-names: must be "mdio_done_error" when there is a share interrupt fed
    to this hardware block, or must be "mdio_done" for the first interrupt and
    "mdio_error" for the second when there are separate interrupts
    + clocks: A reference to the clock supplying the MDIO bus controller
    + clock-frequency: the MDIO bus clock that must be output by the MDIO bus
    + hardware, if absent, the default hardware values are used
    Child nodes of this MDIO bus controller node are standard Ethernet PHY device
    nodes as described in Documentation/devicetree/bindings/net/phy.txt
    --- linux-4.15.0.orig/Documentation/devicetree/bindings/net/btusb.txt
    +++ linux-4.15.0/Documentation/devicetree/bindings/net/btusb.txt
    @ @ -36,7 +36,7 @@
    compatible = "usb1286,204e";
    reg = <1>;
    interrupt-parent = <&gpio0>;
    -interrupt-name = "wakeup";
    +interrupt-names = "wakeup";
    interrupts = <3 IRQ_TYPE_LEVEL_LOW>;
};
};
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/can/holt_hi311x.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/can/holt_hi311x.txt
@ @ -18,7 +18,7 @@
reg = <1>;
clocks = <&clk32m>;
interrupt-parent = <&gpio4>;
-interrupts = <13 IRQ_TYPE_EDGE_RISING>
+interrupts = <13 IRQ_TYPE_LEVEL_HIGH>
vdd-supply = <&reg5v0>
xceiver-supply = <&reg5v0>
};
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/can/microchip,mcp251x.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/can/microchip,mcp251x.txt
@@ -4,6 +4,7 @@
- compatible: Should be one of the following:
+   - "microchip,mcp25625" for MCP25625.
- reg: SPI chip select.
- clocks: The clock feeding the CAN controller.
- interrupt-parent: The parent interrupt controller.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/dsa/b53.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/dsa/b53.txt
@@ -10,6 +10,7 @@
"brcm,bcm53128"
"brcm,bcm5365"
"brcm,bcm5395"
+ "brcm,bcm5389"
"brcm,bcm5397"
"brcm,bcm5398"
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/dsa/qca8k.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/dsa/qca8k.txt
@@ -2,7 +2,10 @@
referencing the internal PHY connected to it. The CPU port of this switch is always port 0.

+A CPU port node has the following optional node:
+ fixed-link : Fixed-link subnode describing a link to a non-MDIO managed entity. See Documentation/devicetree/bindings/net/fixed-link.txt for details.

+ For QCA8K the 'fixed-link' sub-node supports only the following properties:
+ - 'speed' (integer, mandatory), to indicate the link speed. Accepted values are 10, 100 and 1000
+ - 'full-duplex' (boolean, optional), to indicate that full duplex is used. When absent, half duplex is assumed.

Example:

```plaintext
@@ -53,6 +70,10 @@
label = "cpu";
ethernet = <&gmac1>;
phy-mode = "rgmii";
+fixed-link {
+speed = 1000;
+full-duplex;
+};
+};

port@1 {
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/fsl-fman.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/fsl-fman.txt
@@ -110,6 +110,13 @@
Usage: required
Definition: See soc/fsl/qman.txt and soc/fsl/bman.txt

+ fsl,erratum-a050385
+Usage: optional
+Value type: boolean
+Definition: A boolean property. Indicates the presence of the erratum A050385 which indicates that DMA transactions that are split can result in a FMan lock.
+
FMan MURAM Node

--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/mach.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/mach.txt
@@ -10,6 +10,7 @@
Use "cdns,pc302-gem" for Picopichd picoXcell pc302 and later devices based on the Cadence GEM, or the generic form: "cdns,gem".
Use "atmel,sama5d2-gem" for the GEM IP (10/100) available on Atmel sama5d2 SoCs.
```
+ Use "atmel,sama5d3-macb" for the 10/100Mbit IP available on Atmel sama5d3 SoCs.
Use "atmel,sama5d3-gem" for the Gigabit IP available on Atmel sama5d3 SoCs.
Use "atmel,sama5d4-gem" for the GEM IP (10/100) available on Atmel sama5d4 SoCs.
Use "cdns,zynq-gem" Xilinx Zynq-7xxx SoC.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/marvell-orion-mdio.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/marvell-orion-mdio.txt
@@ -16,7 +16,7 @@
Optional properties:
- interrupts: interrupt line number for the SMI error/done interrupt
-- clocks: phandle for up to three required clocks for the MDIO instance
+ clocks: phandle for up to four required clocks for the MDIO instance

The child nodes of the MDIO driver are the individual PHY devices
connected to this MDIO bus. They must have a "reg" property given the
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/meson-dwmac.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/meson-dwmac.txt
@@ -10,6 +10,7 @@
- "amlogic,meson6-dwmac"
- "amlogic,meson8b-dwmac"
- "amlogic,meson-gxbb-dwmac"
+ "amlogic,meson-axg-dwmac"
Additionally "snps,dwmac" and any applicable more
detailed version number described in net/stmmac.txt
should be used.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/nfc/nxp-nci.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/nfc/nxp-nci.txt
@@ -26,7 +26,7 @@
clock-frequency = <1000000>;
interrupt-parent = &gpio1;
-interrupts = <29 GPIO_ACTIVE_HIGH>;
+interrupts = <29 IRQ_TYPE_LEVEL_HIGH>;

enable-gpios = &gpio0 30 GPIO_ACTIVE_HIGH;
firmware-gpios = &gpio0 31 GPIO_ACTIVE_HIGH;
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/nfc/pn544.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/net/nfc/pn544.txt
@@ -26,7 +26,7 @@
clock-frequency = <4000000>;
interrupt-parent = &gpio1;
-interrupts = <17 GPIO_ACTIVE_HIGH>;
+interrupts = <17 IRQ_TYPE_LEVEL_HIGH>;

enable-gpios = &gpio3 21 GPIO_ACTIVE_HIGH;
firmware-gpios = &gpio3 19 GPIO_ACTIVE_HIGH;
--- linux-4.15.0.orig/Documentation/devicetree/bindings/net/renesas,ravb.txt
- "renesas,etheravb-r8a7795" for the R8A7795 SoC.
- "renesas,etheravb-r8a7796" for the R8A7796 SoC.
+ - "renesas,etheravb-r8a77965" for the R8A77965 SoC.
- "renesas,etheravb-r8a77970" for the R8A77970 SoC.
- "renesas,etheravb-r8a77995" for the R8A77995 SoC.
- "renesas,etheravb-rcar-gen3" as a fallback for the above

--- linux-4.15.0.orig/Documentation/devicetree/bindings/pinctrl/allwinner,sunxi-pinctrl.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/pinctrl/allwinner,sunxi-pinctrl.txt
@@ -55,9 +55,9 @@
configuration, drive strength and pullups. If one of these options is not set, its actual value will be unspecified.

-This driver supports the generic pin multiplexing and configuration
-bindings. For details on each properties, you can refer to
-./pinctrl-bindings.txt.
+Allwinner A1X Pin Controller supports the generic pin multiplexing and
+configuration bindings. For details on each properties, you can refer to
+ ./pinctrl-bindings.txt.

Required sub-node properties:
- pins
--- linux-4.15.0.orig/Documentation/devicetree/bindings/pinctrl/axis,artpec6-pinctrl.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/pinctrl/axis,artpec6-pinctrl.txt
@@ -20,7 +20,8 @@
gpio: cpuclkoutgrp0, udlclkoutgrp0, i2c1grp0, i2c2grp0,
      i2c3grp0, i2s0grp0, i2s1grp0, i2srefclkgrp0, spi0grp0,
      spi1grp0, pciedebuggrp0, uart0grp0, uart0grp1, uart1grp0,
-  uart2grp0, uart2grp1, uart3grp0, uart4grp0, uart5grp0
+  uart2grp0, uart2grp1, uart3grp0, uart4grp0, uart5grp0,
+  uart5nocts
    cpuclkout: cpuclkoutgrp0
    udlclkout: udlclkoutgrp0
    i2c1: i2c1grp0
@@ -37,7 +38,7 @@
    uart2: uart2grp0, uart2grp1
    uart3: uart3grp0
    uart4: uart4grp0
-  uart5: uart5grp0
+  uart5: uart5grp0, uart5nocts
    nand: nandgrp0
    sdio0: sdio0grp0
    sdio1: sdio1grp0
--- linux-4.15.0.orig/Documentation/devicetree/bindings/pinctrl/meson,pinctrl.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/pinctrl/meson,pinctrl.txt
@@ -3,8 +3,10 @@

Required properties for the root node:
- compatible: one of "amlogic.meson8-cbus-pinctrl"
  "amlogic.meson8b-cbus-pinctrl"
+  "amlogic.meson8m2-cbus-pinctrl"
  "amlogic.meson8-aobus-pinctrl"
  "amlogic.meson8b-aobus-pinctrl"
+  "amlogic.meson8m2-aobus-pinctrl"
  "amlogic.meson-gxbb-periphs-pinctrl"
  "amlogic.meson-gxbb-aobus-pinctrl"
  "amlogic.meson-gxl-periphs-pinctrl"
--- linux-4.15.0.orig/Documentation/devicetree/bindings/power/avs/qcom,cpr.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/power/avs/qcom,cpr.txt
@@ -0,0 +1,125 @@
+QCOM CPR (Core Power Reduction)
+
+CPR (Core Power Reduction) is a technology to reduce core power on a CPU
+or other device. Each OPP of a device corresponds to a "corner" that has
+a range of valid voltages for a particular frequency. While the device is
+running at a particular frequency, CPR monitors dynamic factors such as
+temperature, etc. and suggests adjustments to the voltage to save power
+and meet silicon characteristic requirements.
+
+- compatible:
  +Usage: required
  +Value type: <string>
  +Definition: must be "qcom,cpr"
+
+- reg:
  +Usage: required
  +Value type: <prop-encoded-array>
  +Definition: base address and size of the rbctrl register region
+
+- interrupts:
  +Usage: required
  +Value type: <prop-encoded-array>
  +Definition: list of three interrupts in order of irq0, irq1, irq2
+
+- acc-syscon:
  +Usage: optional
  +Value type: <phandle>
  +Definition: phandle to syscon for writing ACC settings
+
+- nvmem:
  +Usage: required
  +Value type: <phandle>
  +Definition: phandle to nvmem provider containing efuse settings
+
+- nvmem-names:
+ Usage: required
+ Value type: <string>
+ Definition: must be "qf prom"
+
+vdd-mx-supply = &pm8916_l3;
+
+ qcom,cpr-ref-clk:
+ Usage: required
+ Value type: <u32>
+ Definition: rate of reference clock in kHz
+
+ qcom,cpr-timer-delay-us:
+ Usage: required
+ Value type: <u32>
+ Definition: delay in uS for the timer interval
+
+ qcom,cpr-timer-cons-up:
+ Usage: required
+ Value type: <u32>
+ Definition: Consecutive number of timer intervals, or units of
+ qcom,cpr-timer-delay-us, that occur before issuing an up
+ interrupt
+
+ qcom,cpr-timer-cons-down:
+ Usage: required
+ Value type: <u32>
+ Definition: Consecutive number of timer intervals, or units of
+ qcom,cpr-timer-delay-us, that occur before issuing a down
+ interrupt
+
+ qcom,cpr-up-threshold:
+ Usage: optional
+ Value type: <u32>
+ Definition: The threshold for CPR to issue interrupt when error_steps
+ is greater than it when stepping up
+
+ qcom,cpr-down-threshold:
+ Usage: optional
+ Value type: <u32>
+ Definition: The threshold for CPR to issue interrdownt when error_steps
+ is greater than it when stepping down
+
+ qcom,cpr-down-threshold:
+ Usage: optional
+ Value type: <u32>
+ Definition: Idle clock cycles ring oscillator can be in
+
+ qcom,cpr-gcnt-us:
Usage: required
+Value type: <u32>
+Definition: The time for gate count in uS
+
+- qcom,vdd-apc-step-up-limit:
+Usage: required
+Value type: <u32>
+Definition: Limit of vdd-apc-supply steps for scaling up
+
+- qcom,vdd-apc-step-down-limit:
+Usage: required
+Value type: <u32>
+Definition: Limit of vdd-apc-supply steps for scaling down
+
+- qcom,cpr-cpus:
+Usage: required
+Value type: <prop-encoded-array>
+Definition: List of CPUs that are being monitored
+
+Example:
+
+avs@b018000 {
+compatible = "qcom,cpr";
+reg = <0xb018000 0x1000>;
+interrupts = <0 15 1>, <0 16 1>, <0 17 1>;
+vdd-mx-supply = <&pm8916_l3>;
+acc-syscon = <&tcsr>;
+nvmem = <&qfprom>;
+nvmem-names = "qfprom";
+
+qcom,cpr-ref-clk = <192000>;
+qcom,cpr-timer-delay-us = <5000>;
+qcom,cpr-timer-cons-up = <0>;
+qcom,cpr-timer-cons-down = <2>;
+qcom,cpr-up-threshold = <0>;
+qcom,cpr-down-threshold = <2>;
+qcom,cpr-idle-clocks = <15>;
+qcom,cpr-gcnt-us = <1>;
+qcom,vdd-apc-step-up-limit = <1>;
+qcom,vdd-apc-step-down-limit = <1>;
+qcom,cpr-cpus = <&CPU0 &CPU1 &CPU2 &CPU3>;
+};

--- linux-4.15.0.orig/Documentation/devicetree/bindings/power/mti,mips-cpc.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/power/mti,mips-cpc.txt
@@ -0,0 +1,8 @@
+Binding for MIPS Cluster Power Controller (CPC).
+
+This binding allows a system to specify where the CPC registers are
+Located.
+
+Required properties:
+compatible: Should be "mti,mips-cpc".
+regs: Should describe the address & size of the CPC register region.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/rng/omap3_rom_rng.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/rng/omap3_rom_rng.txt
@@ -0,0 +1,27 @@
+OMAP ROM RNG driver binding
+
+Secure SoCs may provide RNG via secure ROM calls like Nokia N900 does. The
+implementation can depend on the SoC secure ROM used.
+
+compatible:
+Usage: required
+Value type: <string>
+Definition: must be "nokia,n900-rom-rng"
+
clocks:
+Usage: required
+Value type: <prop-encoded-array>
+Definition: reference to the the RNG interface clock
+
clock-names:
+Usage: required
+Value type: <stringlist>
+Definition: must be "ick"
+
+Example:
+
+rom_rng: rng {
++ compatible = "nokia,n900-rom-rng";
++ clocks = <&rng_ick>;
++ clock-names = "ick";
+};
--- linux-4.15.0.orig/Documentation/devicetree/bindings/rtc/abracon,abx80x.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/rtc/abracon,abx80x.txt
@@ -27,4 +27,4 @@
- "abracon,tc-diode": should be "standard" (0.6V) or "schottky" (0.3V)
- "abracon,tc-resistor": should be <0>, <3>, <6> or <11>. 0 disables the output
- resistor, the other values are in ohm.
+ resistor, the other values are in kOhm.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/scsi/hisilicon-sas.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/scsi/hisilicon-sas.txt
@@ -50,6 +50,13 @@
Optional main node properties:
- hip06-sas-v2-quirk-amt: when set, indicates that the v2 controller has the
"am-max-transmissions" limitation.
+ - hisilicon,signal-attenuation : array of 3 32-bit values, containing de-emphasis,
+ - preshoot, and boost attenuation readings for the board. They
+ - are used to describe the signal attenuation of the board. These
+ - values' range is 7600 to 12400, and used to represent -24dB to
+ - 24dB.
+ - The formula is "y = (x-10000)/10000". For example, 10478
+ - means 4.78dB.

Example:
sas0: sas@c1000000 {
--- linux-4.15.0.orig/Documentation/devicetree/bindings/serial/8250.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/serial/8250.txt
@@ -24,6 +24,7 @@
- "ti,da830-uart"
- "aspeed,ast2400-vuart"
- "aspeed,ast2500-vuart"
+ - "nuvoton,npcm750-uart"
- "serial" if the port type is unknown.
- reg : offset and length of the register set for the device.
- interrupts : should contain uart interrupt.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/serial/amlogic.meson-uart.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/serial/amlogic.meson-uart.txt
@@ @ @ -21.7 +21.7 @@
- interrupts : identifier to the device interrupt
- clocks : a list of phandle + clock-specifier pairs, one for each
+ - entry in clock names.
-- clocks-names :
+ - clock-names :
* "xtal" for external xtal clock identifier
* "pclk" for the bus core clock, either the clk81 clock or the gate clock
* "baud" for the source of the baudrate generator, can be either the xtal
--- linux-4.15.0.orig/Documentation/devicetree/bindings/serial/fsl-imx-uart.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/serial/fsl-imx-uart.txt
@@ @ -9.7 +9.8 @@
- fsl,irda-mode : Indicate the uart supports irda mode
- fsl,dte-mode : Indicate the uart works in DTE mode. The uart works
  in DCE mode by default.
-- rs485-rts-delay, rs485-rx-during-tx, linux,rs485-enabled-at-boot-time: see rs485.txt
+ - rs485-rts-delay, rs485-rts-active-low, rs485-rx-during-tx,
+ - linux,rs485-enabled-at-boot-time: see rs485.txt

Please check Documentation/devicetree/bindings/serial/serial.txt
for the complete list of generic properties.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/serial/fsl-lpuart.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/serial/fsl-lpuart.txt
@@ @ @ -16.7 +16.8 @@
Optional properties:
- dmas: A list of two dma specifiers, one for each entry in dma-names.
- dma-names: should contain "tx" and "rx".
- rs485-rts-delay, rs485-rx-during-tx, linux,rs485-enabled-at-boot-time: see rs485.txt
+ rs485-rts-delay, rs485-rts-active-low, rs485-rx-during-tx,
+ linux,rs485-enabled-at-boot-time: see rs485.txt

Note: Optional properties for DMA support. Write them both or both not.

--- linux-4.15.0.orig/Documentation/devicetree/bindings/serial/omap_serial.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/serial/omap_serial.txt
@@ -20,6 +20,7 @@
        node and a DMA channel number.
- dma-names : "rx" for receive channel, "tx" for transmit channel.
- rs485-rts-delay, rs485-rx-during-tx, linux,rs485-enabled-at-boot-time: see rs485.txt
+ rs485-rts-active-high: drive RTS high when sending (default is low).
Example:

--- linux-4.15.0.orig/Documentation/devicetree/bindings/serial/renesas,sci-serial.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/serial/renesas,sci-serial.txt
@@ -41,6 +41,8 @@
- "renesas,hscif-r8a7795" for R8A7795 (R-Car H3) HSCIF compatible UART.
- "renesas,scif-r8a7796" for R8A7796 (R-Car M3-W) SCIF compatible UART.
- "renesas,hscif-r8a7796" for R8A7796 (R-Car M3-W) HSCIF compatible UART.
+ "renesas,scif-r8a77965" for R8A77965 (R-Car M3-N) SCIF compatible UART.
+ "renesas,hscif-r8a77965" for R8A77965 (R-Car M3-N) HSCIF compatible UART.
- "renesas,scif-r8a77970" for R8A77970 (R-Car V3M) SCIF compatible UART.
- "renesas,hscif-r8a77970" for R8A77970 (R-Car V3M) HSCIF compatible UART.
- "renesas,scif-r8a77995" for R8A77995 (R-Car D3) SCIF compatible UART.
--- linux-4.15.0.orig/Documentation/devicetree/bindings/serial/rs485.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/serial/rs485.txt
@@ -12,6 +12,7 @@
  - AVDD2-supply, DBVDD1-supply, DBVDD2-supply, DBVDD3-supply, CPVDD-supply,
- SPKVDD1-supply, SPKVDD2-supply : power supplies for the device, as covered
- in Documentation/devicetree/bindings/regulator/regulator.txt
+ - power supplies for the device, as covered in Documentation/devicetree/bindings/regulator/regulator.txt, depending
+ on compatible:
+ - for wlf,wm1811 and wlf,wm8958:
+  AVDD1-supply, AVDD2-supply, DBVDD1-supply, DBVDD2-supply, DBVDD3-supply,
+  DCVDD-supply, CPVDD-supply, SPKVDD1-supply, SPKVDD2-supply
+ - for wlf,wm8994:
+  AVDD1-supply, AVDD2-supply, DBVDD-supply, DCVDD-supply, CPVDD-supply,
+  SPKVDD1-supply, SPKVDD2-supply

Optional properties:

@@ -68,11 +74,11 @@
lineout1-se;

+AVDD1-supply = <&regulator>;
AVDD2-supply = <&regulator>;
CPVDD-supply = <&regulator>;
-DBVDD1-supply = <&regulator>;
-DBVDD2-supply = <&regulator>;
-DBVDD3-supply = <&regulator>;
+DBVDD-supply = <&regulator>;
+DCVDD-supply = <&regulator>;
SPKVDD1-supply = <&regulator>;
SPKVDD2-supply = <&regulator>;
];
--- linux-4.15.0.orig/Documentation/devicetree/bindings/usb/dwc2.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/usb/dwc2.txt
@@ -19,7 +19,7 @@
configured in FS mode;
- "st,stm32f4x9-hsotg": The DWC2 USB HS controller instance in STM32F4x9 SoCs
configured in HS mode;
- - "st,stm32f7xx-hsotg": The DWC2 USB HS controller instance in STM32F7xx SoCs
+ - "st,stm32f7-hsotg": The DWC2 USB HS controller instance in STM32F7 SoCs
    configured in HS mode;
- reg : Should contain 1 register range (address and length)
- interrupts : Should contain 1 interrupt
--- linux-4.15.0.orig/Documentation/devicetree/bindings/usb/dwc3.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/usb/dwc3.txt
@@ -47,6 +47,10 @@
from P0 to P1/P2/P3 without delay.
- snps,dis-tx-ipgap-linecheck-quirk: when set, disable u2mac linestate check
during HS transmit.
+ - snps,parkmode-disable-ss-quirk: when set, all SuperSpeed bus instances in
+   park mode are disabled.
+ - snps,dis_metastability_quirk: when set, disable metastability workaround.
+CAUTION: use only if you are absolutely sure of it.
- `snps,is-utmi-l1-suspend`: true when DWC3 asserts output signal
  `utmi_l1_suspend_n`, false when asserts `utmi_sleep_n`
- `snps,hird-threshold`: HIRD threshold

--- linux-4.15.0.orig/Documentation/devicetree/bindings/usb/usb-xhci.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/usb/usb-xhci.txt
@@ -12,6 +12,7 @@
- "renesas,xhci-r8a7793" for r8a7793 SoC
- "renesas,xhci-r8a7795" for r8a7795 SoC
- "renesas,xhci-r8a7796" for r8a7796 SoC
+ - "renesas,xhci-r8a77965" for r8a77965 SoC
- "renesas,rcar-gen2-xhci" for a generic R-Car Gen2 compatible device
- "renesas,rcar-gen3-xhci" for a generic R-Car Gen3 compatible device
- "xhci-platform" (deprecated)

--- linux-4.15.0.orig/Documentation/devicetree/bindings/vendor-prefixes.txt
+++ linux-4.15.0/Documentation/devicetree/bindings/vendor-prefixes.txt
@@ -176,6 +176,7 @@
keithkoepKeith & Koep GmbH
keymileKeymile GmbH
khadasKhadas
+kiebackpeter Kieback & Peter GmbH
kinetic Kinetic Technologies
kosagiSutajio Ko-Usagi PTE Ltd.
--- linux-4.15.0.orig/Documentation/driver-api/device_link.rst
+++ linux-4.15.0/Documentation/driver-api/device_link.rst
@@ -59,11 +59,15 @@
Another example for an inconsistent state would be a device link that represents a driver presence dependency, yet is added from the consumer's `->probe` callback while the supplier hasn't probed yet: Had the driver core known about the device link earlier, it wouldn't have probed the `+`->probe` callback while the supplier hasn't started to probe yet: Had the +driver core known about the device link earlier, it wouldn't have probed the consumer in the first place. The onus is thus on the consumer to check presence of the supplier after adding the link, and defer probing on -non-presence. 
+non-presence. [Note that it is valid to create a link from the consumer's +`->probe` callback while the supplier is still probing, but the consumer must +know that the supplier is functional already at the link creation time (that is +the case, for instance, if the consumer has just acquired some resources that +would not have been available had the supplier not been functional then).]

If a device link is added in the `->probe` callback of the supplier or consumer driver, it is typically deleted in its `->remove` callback for

--- linux-4.15.0.orig/Documentation/driver-api/libata.rst
+++ linux-4.15.0/Documentation/driver-api/libata.rst
@@ -251,7 +251,7 @@

Open Source Used In 5GaaS Edge AC-4 9446
-    void (*qc_prep) (struct ata_queued_cmd *qc);
+    enum ata_completion_errors (*qc_prep) (struct ata_queued_cmd *qc);
    int (*qc_issue) (struct ata_queued_cmd *qc);

--- linux-4.15.0.orig/Documentation/driver-api/mtdnand.rst
+++ linux-4.15.0/Documentation/driver-api/mtdnand.rst
@@ -277,7 +277,7 @@
     static void __exit board_cleanup (void)
     {
         /* Release resources, unregister device */
-        nand_release (board_mtd);
+        nand_release (mtd_to_nand(board_mtd));

         /* unmap physical address */
         iounmap(baseaddr);
--- linux-4.15.0.orig/Documentation/driver-api/pm/devices.rst
+++ linux-4.15.0/Documentation/driver-api/pm/devices.rst
@@ -788,6 +788,29 @@
 During system-wide resume from a sleep state it's easiest to put devices into
 the full-power state, as explained in :file:`Documentation/power/runtime_pm.txt`
. -Refer to that document for more information regarding this particular issue as
+Refer to that document for more information regarding this particular issue as
 well as for information on the device runtime power management framework in
 -general.
+general.]
 +
 +However, it often is desirable to leave devices in suspend after system
 +transitions to the working state, especially if those devices had been in
 +runtime suspend before the preceding system-wide suspend (or analogous)
 +transition. Device drivers can use the `DPM_FLAG_LEAVE_SUSPENDED` flag to
 +indicate to the PM core (and middle-layer code) that they prefer the specific
 +devices handled by them to be left suspended and they have no problems with
 +skipping their system-wide resume callbacks for this reason. Whether or not the
 +devices will actually be left in suspend may depend on their state before the
 +given system suspend-resume cycle and on the type of the system transition under
 +way. In particular, devices are not left suspended if that transition is a
 +restore from hibernation, as device states are not guaranteed to be reflected
 +by the information stored in the hibernation image in that case.
 +
 +The middle-layer code involved in the handling of the device is expected to
 +indicate to the PM core if the device may be left in suspend by setting its
 +:c:member: `power.may_skip_resume` status bit which is checked by the PM core
 +during the "noirq" phase of the preceding system-wide suspend (or analogous)
 +transition. The middle layer is then responsible for handling the device as
Drivers need not be concerned about balancing changes to the usage counter; the USB core will undo any remaining "get"s when a driver is unbound from its interface. As a corollary, drivers must not call any of the `usb_autopm_*` functions after their `disconnect` routine has returned.

Drivers must be careful to balance their overall changes to the usage counter. Unbalanced "get"s will remain in effect when a driver is unbound from its interface, preventing the device from going into runtime suspend should the interface be bound to a driver again. On the other hand, drivers are allowed to achieve this balance by calling the `usb_autopm_*` functions even after their `disconnect` routine has returned -- say from within a work-queue routine -- provided they retain an active reference to the interface (via `usb_get_intf` and `usb_put_intf`).

Drivers using the async routines are responsible for their own synchronization and mutual exclusion.

- R maps to r for user, group and others. On directories, R implies x.
- W maps to w.
- E maps to x.
- H and P are always retained and ignored under Linux.
- D is ignored.

User id and group id will be used unless set[gu]id are given as mount options. Since most of the Amiga file systems are single user systems.
The Linux rwxrwxrwx file mode is handled as follows:

- r permission will set R for user, group and others.
+ r permission will allow R for user, group and others.
+ w permission will allow W for user, group and others.
+ w permission will set W and D for user, group and others.
+ x permission of the user will allow E for plain files.
+ x permission of the user will set E for plain files.
+ D will be allowed for user, group and others.

- All other flags (suid, sgid, ...) are ignored and will not be retained.

Aufs4 -- advanced multi layered unification filesystem version 4.x
http://aufs.sf.net
Junjiro R. Okajima

0. Introduction
----------------------------------------
In the early days, aufs was entirely re-designed and re-implemented
Unionfs Version 1.x series. Adding many original ideas, approaches,
+improvements and implementations, it becomes totally different from
+Unionfs while keeping the basic features.
+Recently, Unionfs Version 2.x series begin taking some of the same
+approaches to aufs1’s.
+Unionfs is being developed by Professor Erez Zadok at Stony Brook
+University and his team.
+Aufs4 supports linux-4.0 and later, and for linux-3.x series try aufs3.
+If you want older kernel version support, try aufs2-2.6.git or
+aufs2-standalone.git repository, aufs1 from CVS on SourceForge.
+Note: it becomes clear that "Aufs was rejected. Let's give it up."
+According to Christoph Hellwig, linux rejects all union-type
+filesystems but UnionMount.
+<http://marc.info/?l=linux-kernel&m=123938533724484&w=2>
+PS. Al Viro seems have a plan to merge aufs as well as overlayfs and
+UnionMount, and he pointed out an issue around a directory mutex
+ lock and aufs addressed it. But it is still unsure whether aufs will
+ be merged (or any other union solution).
+<http://marc.info/?l=linux-kernel&m=136312705029295&w=1>
+
+
+1. Features
+-------------------------------
+ unite several directories into a single virtual filesystem. The member
+ directory is called as a branch.
+ you can specify the permission flags to the branch, which are ‘readonly’,
+ ‘readwrite’ and ‘whiteout-able.’
+ by upper writable branch, internal copyup and whiteout, files/dirs on
+ readonly branch are modifiable logically.
+ dynamic branch manipulation, add, del.
+ etc...
+
+Also there are many enhancements in aufs, such as:
+ test only the highest one for the directory permission (dirperm1)
+ copyup on open (coo=)
+ ‘move’ policy for copy-up between two writable branches, after
+ checking free space.
+ xattr, acl
+ readdir(3) in userspace.
+ keep inode number by external inode number table
+ keep the timestamps of file/dir in internal copyup operation
+ seekable directory, supporting NFS readdir.
+ whiteout is hardlinked in order to reduce the consumption of inodes
+ on branch
+ do not copyup, nor create a whiteout when it is unnecessary
+ revert a single systemcall when an error occurs in aufs
+ remount interface instead of ioctl
+ maintain /etc/mtab by an external command, /sbin/mount.aufs.
+ loopback mounted filesystem as a branch
+ kernel thread for removing the dir who has a plenty of whiteouts
+ support copyup sparse file (a file which has a ‘hole’ in it)
+ default permission flags for branches
+ selectable permission flags for ro branch, whether whiteout can
+ exist or not
+ export via NFS.
+ support <sysfs>/fs/aufs and <debugfs>/aufs.
+ support multiple writable branches, some policies to select one
+ among multiple writable branches.
+ a new semantics for link(2) and rename(2) to support multiple
+ writable branches.
+ no glibc changes are required.
+ pseudo hardlink (hardlink over branches)
+ allow a direct access manually to a file on branch, e.g. bypassing aufs.
+ including NFS or remote filesystem branch.
- userspace wrapper for pathconf(3)/fpathconf(3) with _PC_LINK_MAX.
- and more...

+ Currently these features are dropped temporary from aufs4.
+ See design/08plan.txt in detail.
+ nested mount, i.e. aufs as readonly no-whiteout branch of another aufs
+ (robr)
+ statistics of aufs thread (/sys/fs/aufs/stat)
+ 
+ Features or just an idea in the future (see also design/*.txt),
+ reorder the branch index without del/re-add.
+ permanent xino files for NFSD
+ an option for refreshing the opened files after add/del branches
+ light version, without branch manipulation. (unnecessary?)
+ copyup in userspace
+ inotify in userspace
+ readv/writev
+

+2. Download
+----------------------------------------
+There are three GIT trees for aufs4, aufs4-linux.git,
aufs4-standalone.git, and aufs-util.git. Note that there is no "4" in
"aufs-util.git."
+ While the aufs-util is always necessary, you need either of aufs4-linux
or aufs4-standalone.
+
+ The aufs4-linux tree includes the whole linux mainline GIT tree,
git://git.kernel.org/.../torvalds/linux.git.
+ And you cannot select CONFIG_AUFS_FS=m for this version, eg. you cannot
+ build aufs4 as an external kernel module.
+ Several extra patches are not included in this tree. Only
+ aufs4-standalone tree contains them. They are described in the later
+ section "Configuration and Compilation."
+
+ On the other hand, the aufs4-standalone tree has only aufs source files
+ and necessary patches, and you can select CONFIG_AUFS_FS=m.
+ But you need to apply all aufs patches manually.
+
+ You will find GIT branches whose name is in form of "aufs4.x" where "x"
+ represents the linux kernel version, "linux-4.x". For instance,
+ "aufs4.0" is for linux-4.0. For latest "linux-4.x-rcN", use
+ "aufs4.0-rcN" branch.
+
+ on aufs4-linux tree
+$ git clone --reference /your/linux/git/tree \
git://github.com/sfjro/aufs4-linux.git aufs4-linux.git
+ if you don't have linux GIT tree, then remove "--reference ..."
+$ cd aufs4-linux.git
+$ git checkout origin/aufs4.0
+
+Or You may want to directly git-pull aufs into your linux GIT tree, and
+leave the patch-work to GIT.
+$ cd /your/linux/git/tree
+$ git remote add aufs4 git://github.com/sfjro/aufs4-linux.git
+$ git fetch aufs4
+$ git checkout -b my4.0 v4.0
+$ (add your local change...)
+$ git pull aufs4 aufs4.0
+- now you have v4.0 + your_changes + aufs4.0 in you my4.0 branch.
+- you may need to solve some conflicts between your_changes and
+ aufs4.0. in this case, git-rerere is recommended so that you can
+ solve the similar conflicts automatically when you upgrade to 4.1 or
+ later in the future.
+
+o aufs4-standalone tree
+$ git clone git://github.com/sfjro/aufs4-standalone.git aufs4-standalone.git
+$ cd aufs4-standalone.git
+$ git checkout origin/aufs4.0
+
+o aufs-util tree
+$ git clone git://git.code.sf.net/p/aufs/aufs-util aufs-util.git
+- note that the public aufs-util.git is on SourceForge instead of
+ GibHUB.
+$ cd aufs-util.git
+$ git checkout origin/aufs4.0
+
+Note: The 4.x-rcN branch is to be used with `rc` kernel versions ONLY.
+The minor version number, `x` in `4.x`, of aufs may not always
+follow the minor version number of the kernel.
+Because changes in the kernel that cause the use of a new
+minor version number do not always require changes to aufs-util.
+
+Since aufs-util has its own minor version number, you may not be
+able to find a GIT branch in aufs-util for your kernel's
+exact minor version number.
+In this case, you should git-checkout the branch for the
+nearest lower number.
+
+For (an unreleased) example:
+If you are using "linux-4.10" and the "aufs4.10" branch
+does not exist in aufs-util repository, then "aufs4.9", "aufs4.8"
+or something numerically smaller is the branch for your kernel.
+
+Also you can view all branches by
+$ git branch -a
3. Configuration and Compilation

Make sure you have git-checkout'ed the correct branch.

For aufs4-linux tree,
- enable CONFIG_AUFS_FS.
- set other aufs configurations if necessary.

For aufs4-standalone tree,
There are several ways to build.

1. apply ./aufs4-kbuild.patch to your kernel source files.
- apply ./aufs4-base.patch too.
- apply ./aufs4-mmap.patch too.
- apply ./aufs4-standalone.patch too, if you have a plan to set
  CONFIG_AUFS_FS=m. otherwise you don't need ./aufs4-standalone.patch.
- copy ./Documentation,fs,include/uapi/linux/aufs_type.h] files to your
  kernel source tree. Never copy $PWD/include/uapi/linux/Kbuild.
- enable CONFIG_AUFS_FS. you can select either
  =m or =y.
- and build your kernel as usual.
- install the built kernel.
  Note: Since linux-3.9, every filesystem module requires an alias
  "fs-<fsname>". You should make sure that "fs-aufs" is listed in your
  modules.aliases file if you set CONFIG_AUFS_FS=m.
- install the header files too by "make headers_install" to the
  directory where you specify. By default, it is $PWD/usr.
  "make help" shows a brief note for headers_install.
- and reboot your system.

2. module only (CONFIG_AUFS_FS=m).
- apply ./aufs4-base.patch to your kernel source files.
- apply ./aufs4-mmap.patch too.
- apply ./aufs4-standalone.patch too.
- build your kernel, don't forget "make headers_install", and reboot.
- edit ./config.mk and set other aufs configurations if necessary.
  Note: You should read $PWD/fs/aufs/Kconfig carefully which describes
  every aufs configurations.
- build the module by simple "make".
  Note: Since linux-3.9, every filesystem module requires an alias
  "fs-<fsname>". You should make sure that "fs-aufs" is listed in your
  modules.aliases file.
- you can specify ${KDIR} make variable which points to your kernel
  source tree.
+ install the files
+ + run "make install" to install the aufs module, or copy the built
+ + $PWD/aufs.ko to /lib/modules/... and run depmod -a (or reboot simply).
+ + run "make install_headers" (instead of headers_install) to install
+ + the modified aufs header file (you can specify DESTDIR which is
+ + available in aufs standalone version’s Makefile only), or copy
+ + $PWD/usr/include/linux/aufs_type.h to /usr/include/linux or wherever
+ + you like manually. By default, the target directory is $PWD/usr.
+ + no need to apply aufs4-kbuild.patch, nor copying source files to your
+ + kernel source tree.
+ +
+ +Note: The header file aufs_type.h is necessary to build aufs-util
+ + as well as "make headers_install" in the kernel source tree.
+ + headers_install is subject to be forgotten, but it is essentially
+ + necessary, not only for building aufs-util.
+ + You may not meet problems without headers_install in some older
+ + version though.
+ +
+ +And then,
+ + read README in aufs-util, build and install it
+ + note that your distribution may contain an obsoleted version of
+ + aufs_type.h in /usr/include/linux or something. When you build aufs
+ + utilities, make sure that your compiler refers the correct aufs header
+ + file which is built by "make headers_install."
+ + if you want to use readdir(3) in userspace or pathconf(3) wrapper,
+ + then run "make install_ulib" too. And refer to the aufs manual in
+ + detail.
+ +
+ +There several other patches in aufs4-standalone.git. They are all
+ +optional. When you meet some problems, they will help you.
+ +aufs4-loopback.patch
+ + Supports a nested loopback mount in a branch-fs. This patch is
+ + unnecessary until aufs produces a message like "you may want to try
+ + another patch for loopback file."
+ + vfs-ino.patch
+ + Modifies a system global kernel internal function get_next_ino() in
+ + order to stop assigning 0 for an inode-number. Not directly related to
+ + aufs, but recommended generally.
+ + tmpfs-idr.patch
+ + Keeps the tmpfs inode number as the lowest value. Effective to reduce
+ + the size of aufs XINO files for tmpfs branch. Also it prevents the
+ + duplication of inode number, which is important for backup tools and
+ + other utilities. When you find aufs XINO files for tmpfs branch
+ + growing too much, try this patch.
+ + lockdep-debug.patch
+ + Because aufs is not only an ordinary filesystem (callee of VFS), but
+ + also a caller of VFS functions for branch filesystems, subclassing of
+ + the internal locks for LOCKDEP is necessary. LOCKDEP is a debugging
+ feature of linux kernel. If you enable CONFIG_LOCKDEP, then you will
+ need to apply this debug patch to expand several constant values.
+ If don't know what LOCKDEP, then you don't have apply this patch.
+
+4. Usage
+----------------------------------------
+$ man -l aufs.5
+
+And then,
+$ mkdir /tmp/rw /tmp/aufs
 +# mount -t aufs -o br=/tmp/rw:${HOME} none /tmp/aufs
 +
+Here is another example. The result is equivalent.
+# mount -t aufs -o br=/tmp/rw=${HOME}=ro none /tmp/aufs
 + Or
+# mount -t aufs -o br:/tmp/rw none /tmp/aufs
+# mount -o remount,append:=${HOME} /tmp/aufs
 +
+Then, you can see whole tree of your home dir through /tmp/aufs. If
+you modify a file under /tmp/aufs, the one on your home directory is
+not affected, instead the same named file will be newly created under
+/tmp/rw. And all of your modification to a file will be applied to
+the one under /tmp/rw. This is called the file based Copy on Write
+(COW) method.
+Aufs mount options are described in aufs.5.
+If you run chroot or something and make your aufs as a root directory,
+then you need to customize the shutdown script. See the aufs manual in
+detail.
+
+Additionally, there are some sample usages of aufs which are a
+diskless system with network booting, and LiveCD over NFS.
+See sample dir in CVS tree on SourceForge.
+
+5. Contact
+----------------------------------------
+When you have any problems or strange behaviour in aufs, please let me
+know with:
+ /proc/mounts (instead of the output of mount(8))
+ /sys/module/aufs/*/ (if you have them)
+ /sys/fs/aufs/*/ (if you have them)
+ /debug/aufs/*/ (if you have them)
+ linux kernel version
+ if your kernel is not plain, for example modified by distributor,
+ the url where i can download its source is necessary too.
+ aufs version which was printed at loading the module or booting the
+ system, instead of the date you downloaded.
+ configuration (define/undefine CONFIG_AUFS_xxx)
+ kernel configuration or /proc/config.gz (if you have it)
+ behaviour which you think to be incorrect
+ actual operation, reproducible one is better
+ mailto: aufs-users at lists.sourceforge.net
+
+Usually, I don’t watch the Public Areas (Bugs, Support Requests, Patches,
+ and Feature Requests) on SourceForge. Please join and write to
+ aufs-users ML.
+
+6. Acknowledgements
+
+- Thanks to everyone who have tried and are using aufs, whoever
+- have reported a bug or any feedback.
+
+- Especially donators:
  + Tomas Matejicek (slax.org) made a donation (much more than once).
  + Since Apr 2010, Tomas M (the author of Slax and Linux Live
    + scripts) is making “doubling” donations.
  + Unfortunately I cannot list all of the donators, but I really
    + appreciate.
  + It ends Aug 2010, but the ordinary donation URL is still available.
  + <http://sourceforge.net/donate/index.php?group_id=167503>
  + Dai Itasaka made a donation (2007/8).
  + Chuck Smith made a donation (2008/4, 10 and 12).
  + Henk Schoneveld made a donation (2008/9).
  + Chih-Wei Huang, ASUS, CTC donated Eee PC 4G (2008/10).
  + Francois Dupoux made a donation (2008/11).
  + Bruno Cesar Ribas and Luis Carlos Erpen de Bona, C3SL serves public
    + aufs2 GIT tree (2009/2).
  + William Grant made a donation (2009/3).
  + Patrick Lane made a donation (2009/4).
  + The Mail Archive (mail-archive.com) made donations (2009/5).
  + Nippy Networks (Ed Wildgoose) made a donation (2009/7).
  + Pavel Pronskiy made a donation (2011/2).
  + Iridium and Inmarsat satellite phone retailer (www.mailasail.com), Nippy
    + Networks (Ed Wildgoose) made a donation for hardware (2011/3).
  + Max Lekomcev (DOM-TV project) made a donation (2011/7, 12, 2012/3, 6 and
    + 11).
  + Sam Liddicott made a donation (2011/9).
  + Era Scarecrow made a donation (2013/4).
  + Bor Ratajc made a donation (2013/4).
  + Alessandro Gorreta made a donation (2013/4).
  + POIRETTE Marc made a donation (2013/4).
+Alessandro Gorreta made a donation (2013/4).
+lauri kasvandik made a donation (2013/5).
+"pemasu from Finland" made a donation (2013/7).
+The Parted Magic Project made a donation (2013/9 and 11).
+Pavel Barta made a donation (2013/10).
+Nikolay Pertsev made a donation (2014/5).
+James B made a donation (2014/7 and 2015/7).
+Stefano Di Biase made a donation (2014/8).
+Daniel Epellei made a donation (2015/1).
+OmegaPhil made a donation (2016/1).
+Tomasz Szewczyk made a donation (2016/4).
+James Burry made a donation (2016/12).
+
+Thank you very much.
+Donations are always, including future donations, very important and
+helpful for me to keep on developing aufs.
+
+7.
+----------------------------------------
+If you are an experienced user, no explanation is needed. Aufs is
+just a linux filesystem.
+
+7.
+Enjoy!
+
+# Local variables: ;
+# mode: text;
+# End: ;
--- linux-4.15.0.orig/Documentation/filesystems/aufs/design/01intro.txt
+++ linux-4.15.0/Documentation/filesystems/aufs/design/01intro.txt
@@ -0,0 +1,171 @@
+
+# Copyright (C) 2005-2017 Junjiro R. Okajima
+
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+# (at your option) any later version.
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Introduction

+aufs [ei ju: ef es] | /ey-yoo-ef-es/ | [a u f s]
+1. abbrev. for "advanced multi-layered unification filesystem".
+2. abbrev. for "another unionfs".
+3. abbrev. for "auf das" in German which means "on the" in English.
+ Ex. "Butter aufs Brot"(G) means "butter onto bread"(E).
+ But "Filesystem aufs Filesystem" is hard to understand.
+4. abbrev. for "African Urban Fashion Show".
+
+AUFS is a filesystem with features:
+ multi layered stackable unification filesystem, the member directory
+ is called as a branch.
+ branch permission and attribute, 'readonly', 'real-readonly',
+ 'readwrite', 'whiteout-able', 'link-able whiteout', etc. and their
+ combination.
+ internal "file copy-on-write".
+ logical deletion, whiteout.
+ dynamic branch manipulation, adding, deleting and changing permission.
+ allow bypassing aufs, user's direct branch access.
+ external inode number translation table and bitmap which maintains the
+ persistent aufs inode number.
+ seekable directory, including NFS readdir.
+ file mapping, mmap and sharing pages.
+ pseudo-link, hardlink over branches.
+ loopback mounted filesystem as a branch.
+ several policies to select one among multiple writable branches.
+ revert a single systemcall when an error occurs in aufs.
+ and more...
+
+Multi Layered Stackable Unification Filesystem

+Most people already knows what it is.
+It is a filesystem which unifies several directories and provides a
+merged single directory. When users access a file, the access will be
+passed/re-directed/converted (sorry, I am not sure which English word is
+correct) to the real file on the member filesystem. The member
+filesystem is called 'lower filesystem' or 'branch' and has a mode
+readonly' and 'readwrite.' And the deletion for a file on the lower
+readonly branch is handled by creating 'whiteout' on the upper writable
+branch.
+
+On LKML, there have been discussions about UnionMount (Jan Blunck,
+Bharaet B Rao and Valerie Aurora) and Unionfs (Erez Zadok). They took
+different approaches to implement the merged-view.
+The former tries putting it into VFS, and the latter implements as a
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+separate filesystem.
+(If I misunderstand about these implementations, please let me know and
+I shall correct it. Because it is a long time ago when I read their
+source files last time).
+
+UnionMount's approach will be able to small, but may be hard to share
+branches between several UnionMount since the whiteout in it is
+implemented in the inode on branch filesystem and always
+shared. According to Bharata's post, readdir does not seems to be
+finished yet.
+There are several missing features known in this implementations such as
+- for users, the inode number may change silently. eg. copy-up.
+- link(2) may break by copy-up.
+- read(2) may get an obsoleted filedata (fstat(2) too).
+- fcntl(F_SETLK) may be broken by copy-up.
+- unnecessary copy-up may happen, for example mmap(MAP_PRIVATE) after
+ open(O_RDWR).
+
+In linux-3.18, "overlay" filesystem (formerly known as "overlayfs") was
+merged into mainline. This is another implementation of UnionMount as a
+separated filesystem. All the limitations and known problems which
+UnionMount are equally inherited to "overlay" filesystem.
+
+Unionfs has a longer history. When I started implementing a stackable
+filesystem (Aug 2005), it already existed. It has virtual super_block,
+inode, dentry and file objects and they have an array pointing lower
+same kind objects. After contributing many patches for Unionfs, I
+re-started my project AUFS (Jun 2006).
+
+In AUFS, the structure of filesystem resembles to Unionfs, but I
+implemented my own ideas, approaches and enhancements and it became
+totally different one.
+
+Comparing DM snapshot and fs based implementation
+- the number of bytes to be copied between devices is much smaller.
+- the type of filesystem must be one and only.
+- the fs must be writable, no readonly fs, even for the lower original
+ device. so the compression fs will not be usable. but if we use
+ loopback mount, we may address this issue.
+ for instance,
+mount /cdrom/squashfs.img /sq
+losetup /sq/ext2.img
+losetup /somewhere/cow
+dmsetup "snapshot /dev/loop0 /dev/loop1 ..."
+- it will be difficult (or needs more operations) to extract the
+ difference between the original device and COW.
+- DM snapshot-merge may help a lot when users try merging. in the
+ fs-layer union, users will use rsync(1).
You may want to read my old paper "Filesystems in LiveCD"

Several characters/aspects/persona of aufs

Aufs has several characters, aspects or persona.

1. a filesystem, callee of VFS helper
2. sub-VFS, caller of VFS helper for branches
3. a virtual filesystem which maintains persistent inode number
4. reader/writer of files on branches such like an application

1. Callee of VFS Helper

As an ordinary linux filesystem, aufs is a callee of VFS. For instance, unlink(2) from an application reaches sys_unlink() kernel function and then vfs_unlink() is called. vfs_unlink() is one of VFS helper and it calls filesystem specific unlink operation. Actually aufs implements the unlink operation but it behaves like a redirector.

2. Caller of VFS Helper for Branches

aufs_unlink() passes the unlink request to the branch filesystem as if it were called from VFS. So the called unlink operation of the branch filesystem acts as usual. As a caller of VFS helper, aufs should handle every necessary pre/post operation for the branch filesystem.

- acquire the lock for the parent dir on a branch
- lookup in a branch
- revalidate dentry on a branch
- mnt_want_write() for a branch
- vfs_unlink() for a branch
- mnt_drop_write() for a branch
- release the lock on a branch

3. Persistent Inode Number

One of the most important issue for a filesystem is to maintain inode numbers. This is particularly important to support exporting a filesystem via NFS. Aufs is a virtual filesystem which doesn't have a backend block device for its own. But some storage is necessary to keep and maintain the inode numbers. It may be a large space and may not suit to keep in memory. Aufs rents some space from its first writable branch filesystem (by default) and creates file(s) on it. These files are created by aufs internally and removed soon (currently) keeping opened.

Note: Because these files are removed, they are totally gone after unmounting aufs. It means the inode numbers are not persistent across unmount or reboot. I have a plan to make them really persistent which will be important for aufs on NFS server.
+4. Read/Write Files Internally (copy-on-write)
+Because a branch can be readonly, when you write a file on it, aufs will
+"copy-up" it to the upper writable branch internally. And then write the
+originally requested thing to the file. Generally kernel doesn't
+open/read/write file actively. In aufs, even a single write may cause a
+internal "file copy". This behaviour is very similar to cp(1) command.
+
+Some people may think it is better to pass such work to user space
+helper, instead of doing in kernel space. Actually I am still thinking
+about it. But currently I have implemented it in kernel space.
--- linux-4.15.0.orig/Documentation/filesystems/aufs/design/02struct.txt
+++ linux-4.15.0/Documentation/filesystems/aufs/design/02struct.txt
@@ -0,0 +1,258 @@
+
+# Copyright (C) 2005-2017 Junjiro R. Okajima
+#
+# This program is free software; you can redistribute it and/or modify
+# it under the terms of the GNU General Public License as published by
+# the Free Software Foundation; either version 2 of the License, or
+# (at your option) any later version.
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+#
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+# along with this program. If not, see <http://www.gnu.org/licenses/>.
+
+Basic Aufs Internal Structure
+
+Superblock/Inode/Dentry/File Objects
+---------------------------------------------------------------
+As like an ordinary filesystem, aufs has its own
+superblock/inode/dentry/file objects. All these objects have a
+dynamically allocated array and store the same kind of pointers to the
+lower filesystem, branch.
+For example, when you build a union with one readwrite branch and one
+readonly, mounted /au, /rw and /ro respectively.
+- /au = /rw + /ro
+- /ro/fileA exists but /rw/fileA
+
+Aufs lookup operation finds /ro/fileA and gets dentry for that. These
+pointers are stored in a aufs dentry. The array in aufs dentry will be,
+- [0] = NULL (because /rw/fileA doesn't exist)
+- [1] = /ro/fileA
+
This style of an array is essentially same to the aufs superblock/inode/dentry/file objects.

Because aufs supports manipulating branches, ie. add/delete/change branches dynamically, these objects has its own generation. When branches are changed, the generation in aufs superblock is incremented. And a generation in other object are compared when it is accessed. When a generation in other objects are obsoleted, aufs refreshes the internal array.

Superblock

Additionally aufs superblock has some data for policies to select one among multiple writable branches, XIB files, pseudo-links and kobject. See below in detail.

About the policies which supports copy-down a directory, see wbr_policy.txt too.

Branch and XINO(External Inode Number Translation Table)

Every branch has its own xino (external inode number translation table) file. The xino file is created and unlinked by aufs internally. When two members of a union exist on the same filesystem, they share the single xino file.

The struct of a xino file is simple, just a sequence of aufs inode numbers which is indexed by the lower inode number.

In the above sample, assume the inode number of /ro/fileA is i111 and aufs assigns the inode number i999 for fileA. Then aufs writes 999 as +4(8) bytes at 111 * 4(8) bytes offset in the xino file.

When the inode numbers are not contiguous, the xino file will be sparse which has a hole in it and doesn't consume as much disk space as it might appear. If your branch filesystem consumes disk space for such holes, then you should specify 'xino=' option at mounting aufs.

Aufs has a mount option to free the disk blocks for such holes in XINO files on tmpfs or ramdisk. But it is not so effective actually. If you meet a problem of disk shortage due to XINO files, then you should try "tmpfs-ino.patch" (and "vfs-ino.patch" too) in aufs4-standalone.git. The patch localizes the assignment inumbers per tmpfs-mount and avoid the holes in XINO files.

Also a writable branch has three kinds of "whiteout bases". All these are existed when the branch is joined to aufs, and their names are whiteout-ed doubly, so that users will never see their names in aufs hierarchy.
1. a regular file which will be hardlinked to all whiteouts.
2. a directory to store a pseudo-link.
3. a directory to store an "orphan"-ed file temporary.

+  
+1. Whiteout Base
+ When you remove a file on a readonly branch, aufs handles it as a
+ logical deletion and creates a whiteout on the upper writable branch
+ as a hardlink of this file in order not to consume inode on the
+ writable branch.
+2. Pseudo-link Dir
+ See below, Pseudo-link.
+3. Step-Parent Dir
+ When "fileC" exists on the lower readonly branch only and it is
+ opened and removed with its parent dir, and then user writes
+ something into it, then aufs copies-up fileC to this
+ directory. Because there is no other dir to store fileC. After
+ creating a file under this dir, the file is unlinked.
+
+Because aufs supports manipulating branches, ie. add/delete/change
+dynamically, a branch has its own id. When the branch order changes,
aufs finds the new index by searching the branch id.
+
+Pseudo-link
+----------------------------------------------------------------------
+Assume "fileA" exists on the lower readonly branch only and it is
+hardlinked to "fileB" on the branch. When you write something to fileA,
aufs copies-up it to the upper writable branch. Additionally aufs
+creates a hardlink under the Pseudo-link Directory of the writable
+branch. The inode of a pseudo-link is kept in aufs super_block as a
+simple list. If fileB is read after unlinking fileA, aufs returns
+filedata from the pseudo-link instead of the lower readonly
+branch. Because the pseudo-link is based upon the inode, to keep the
+inode number by xino (see above) is essentially necessary.
+
+All the hardlinks under the Pseudo-link Directory of the writable branch
+should be restored in a proper location later. Aufs provides a utility
+to do this. The userspace helpers executed at remounting and unmounting
+aufs by default.
+During this utility is running, it puts aufs into the pseudo-link
+maintenance mode. In this mode, only the process which began the
+maintenance mode (and its child processes) is allowed to operate in
+aufs. Some other processes which are not related to the pseudo-link will
+be allowed to run too, but the rest have to return an error or wait
+until the maintenance mode ends. If a process already acquires an inode
+mutex (in VFS), it has to return an error.
XIB (external inode number bitmap)

Addition to the xino file per a branch, aufs has an external inode number bitmap in a superblock object. It is also an internal file such like a xino file.

It is a simple bitmap to mark whether the aufs inode number is in-use or not.

To reduce the file I/O, aufs prepares a single memory page to cache xib.

As well as XINO files, aufs has a feature to truncate/refresh XIB to reduce the number of consumed disk blocks for these files.

Virtual or Vertical Dir, and Readdir in Userspace

In order to support multiple layers (branches), aufs readdir operation constructs a virtual dir block on memory. For readdir, aufs calls vfs_readdir() internally for each dir on branches, merges their entries with eliminating the whiteout-ed ones, and sets it to file (dir) object. So the file object has its entry list until it is closed. The entry list will be updated when the file position is zero and becomes obsoleted. This decision is made in aufs automatically.

The dynamically allocated memory block for the name of entries has a unit of 512 bytes (by default) and stores the names contiguously (no padding). Another block for each entry is handled by kmem_cache too.

During building dir blocks, aufs creates hash list and judging whether the entry is whiteout by its upper branch or already listed. The merged result is cached in the corresponding inode object and maintained by a customizable life-time option.

Some people may call it can be a security hole or invite DoS attack since the opened and once readdir-ed dir (file object) holds its entry list and becomes a pressure for system memory. But I’d say it is similar to files under /proc or /sys. The virtual files in them also holds a memory page (generally) while they are opened. When an idea to reduce memory for them is introduced, it will be applied to aufs too.

For those who really hate this situation, I’ve developed readdir(3) library which operates this merging in userspace. You just need to set LD_PRELOAD environment variable, and aufs will not consume no memory in kernel space for readdir(3).

Workqueue

Aufs sometimes requires privilege access to a branch. For instance, in copy-up/down operation. When a user process is going to make changes to a file which exists in the lower readonly branch only, and the mode
+of one of ancestor directories may not be writable by a user
+process. Here aufs copy-up the file with its ancestors and they may
+require privilege to set its owner/group/mode/etc.
+This is a typical case of a application character of aufs (see
+Introduction).
+
+Aufs uses workqueue synchronously for this case. It creates its own
+workqueue. The workqueue is a kernel thread and has privilege. Aufs
+passes the request to call mkdir or write (for example), and wait for
+its completion. This approach solves a problem of a signal handler
+simply.
+If aufs didn't adopt the workqueue and changed the privilege of the
+process, then the process may receive the unexpected SIGXFSZ or other
+signals.
+
+Also aufs uses the system global workqueue ("events" kernel thread) too
+for asynchronous tasks, such like handling inotify/fsnotify, re-creating a
+whiteout base and etc. This is unrelated to a privilege.
+Most of aufs operation tries acquiring a rw_semaphore for aufs
+superblock at the beginning, at the same time waits for the completion
+of all queued asynchronous tasks.
+
+
+Whiteout
+-----------------------------------------------
+
+The whiteout in aufs is very similar to Unionfs's. That is represented
+by its filename. UnionMount takes an approach of a file mode, but I am
+afraid several utilities (find(1) or something) will have to support it.
+
+Basically the whiteout represents "logical deletion" which stops aufs to
+lookup further, but also it represents "dir is opaque" which also stop
+further lookup.
+
+In aufs, rmdir(2) and rename(2) for dir uses whiteout alternatively.
+In order to make several functions in a single systemcall to be
+revertible, aufs adopts an approach to rename a directory to a temporary
+unique whiteouted name.
+For example, in rename(2) dir where the target dir already existed, aufs
+renames the target dir to a temporary unique whiteouted name before the
+actual rename on a branch, and then handles other actions (make it opaque,
+update the attributes, etc). If an error happens in these actions, aufs
+simply renames the whiteouted name back and returns an error. If all are
+succeeded, aufs registers a function to remove the whiteouted unique
+temporary name completely and asynchronously to the system global
+workqueue.
+
+
+Copy-up
It is a well-known feature or concept. When user modifies a file on a readonly branch, aufs operate "copy-up" internally and makes change to the new file on the upper writable branch. When the trigger syscall does not update the timestamps of the parent dir, aufs reverts it after copy-up.

Move-down (aufs3.9 and later)

"Copy-up" is one of the essential feature in aufs. It copies a file from the lower readonly branch to the upper writable branch when a user changes something about the file. "Move-down" is an opposite action of copy-up. Basically this action is ran manually instead of automatically and internally. For design and implementation, aufs has to consider these issues.

- whiteout for the file may exist on the lower branch.
- ancestor directories may not exist on the lower branch.
- diropq for the ancestor directories may exist on the upper branch.
- free space on the lower branch will reduce.
- another access to the file may happen during moving-down, including UDBA (see "Revalidate Dentry and UDBA").
- the file should not be hard-linked nor pseudo-linked. they should be handled by auplink utility later.

Sometimes users want to move-down a file from the upper writable branch to the lower readonly or writable branch. For instance,
- the free space of the upper writable branch is going to run out.
- create a new intermediate branch between the upper and lower branch.
- etc.

For this purpose, use "aumvdown" command in aufs-util.git.
The filesystems who implement its \texttt{->atomic\_open()} are not majority. For example NFSv4 does, and aufs should call NFSv4 \texttt{->atomic\_open}, particularly for \texttt{open(O\_CREAT|O\_EXCL, 0400)} case. Other than \texttt{->atomic\_open()}, NFSv4 returns an error for this \texttt{open(2)}. While I am not sure whether all filesystems who have \texttt{->atomic\_open()} behave like this, but NFSv4 surely returns the error.

In order to support \texttt{->atomic\_open()} for aufs, there are a few approaches.

A. Introduce aufs\_atomic\_open()
   - calls one of VFS:do\_last(), lookup\_open() or atomic\_open() for branch fs.
B. Introduce aufs\_atomic\_open() calling create, open and chmod. this is an aufs user Pip Cet's approach
   - calls aufs\_create(), VFS finish\_open() and notify\_change().
   - pass fake-mode to finish\_open(), and then correct the mode by notify\_change().
C. Extend aufs\_open() to call branch fs's \texttt{->atomic\_open()}
   - no aufs\_atomic\_open().
   - aufs\_lookup() registers the TID to an aufs internal object.
   - aufs\_create() does nothing when the matching TID is registered, but registers the mode.
   - aufs\_open() calls branch fs's \texttt{->atomic\_open()} when the matching TID is registered.
D. Extend aufs\_open() to re-try branch fs's \texttt{->open()} with superuser's credential
   - no aufs\_atomic\_open().
   - aufs\_create() registers the TID to an internal object. this info represents "this process created this file just now."
   - when aufs gets EACCES from branch fs's \texttt{->open()}, then confirm the registered TID and re-try open() with superuser's credential.

Pros and cons for each approach.

A.
   - straightforward but highly depends upon VFS internal.
   - the atomic behaviour is kept.
   - some of parameters such as nameidata are hard to reproduce for branch fs.
   - large overhead.
B. 
   - easy to implement.
+ - the atomic behavaiour is lost.
+C.
+ - the atomic behavaiour is kept.
+ - dirty and tricky.
+ - VFS checks whether the file is created correctly after calling
+ - >create(), which means this approach doesn't work.
+D.
+ - easy to implement.
+ - the atomic behavaiour is lost.
+ - to open a file with superuser's credential and give it to a user
+ - process is a bad idea, since the file object keeps the credential
+ - in it. It may affect LSM or something. This approach doesn't work
+ - either.
+
+The approach A is ideal, but it hard to implement. So here is a
+variation of A, which is to be implemented.
+
+A-1. Introduce aufs_atomic_open()
+ - calls branch fs ->atomic_open() if exists. otherwise calls
+ - vfs_create() and finish_open().
+ - the demerit is that the several checks after branch fs
+ - ->atomic_open() are lost. in the ordinary case, the checks are
+ - done by VFS:do_last(), lookup_open() and atomic_open(). some can
+ - be implemented in aufs, but not all I am afraid.

--- linux-4.15.0.orig/Documentation/filesystems/aufs/design/03lookup.txt
+++ linux-4.15.0/Documentation/filesystems/aufs/design/03lookup.txt
@@ -0,0 +1,113 @@
#
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#
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#
+Lookup in a Branch
+-----------------------------------------------
+Since aufs has a character of sub-VFS (see Introduction), it operates
+lookup for branches as VFS does. It may be a heavy work. But almost all
+lookup operation in aufs is the simplest case, ie. lookup only an entry
When a branch is a remote filesystem, aufs basically relies upon its
->d_revalidate(); also aufs forces the hardest revalidate tests for
them.
For d_revalidate, aufs implements three levels of revalidate tests. See
"Revalidate Dentry and UDBA" in detail.

Test Only the Highest One for the Directory Permission (dirperm1 option)

Let's try case study.
- aufs has two branches, upper readwrite and lower readonly.
  /au = /rw + /ro
- "dirA" exists under /ro, but /rw. and its mode is 0700.
- user invoked "chmod a+rX /au/dirA"
- the internal copy-up is activated and "/rw/dirA" is created and its
  permission bits are set to world readable.
- then "/au/dirA" becomes world readable?

In this case, /ro/dirA is still 0700 since it exists in readonly branch,
or it may be a natively readonly filesystem. If aufs respects the lower
branch, it should not respond readdir request from other users. But user
allowed it by chmod. Should really aufs rejects showing the entries
under /ro/dirA?

To be honest, I don't have a good solution for this case. So aufs
implements 'dirperm1' and 'nodirperm1' mount options, and leave it to
users.
When dirperm1 is specified, aufs checks only the highest one for the
directory permission, and shows the entries. Otherwise, as usual, checks
every dir existing on all branches and rejects the request.

As a side effect, dirperm1 option improves the performance of aufs
because the number of permission check is reduced when the number of
branch is many.

Revalidate Dentry and UDBA (User's Direct Branch Access)

Generally VFS helpers re-validate a dentry as a part of lookup.
0. digging down the directory hierarchy.
1. lock the parent dir by its i_mutex.
2. lookup the final (child) entry.
3. revalidate it.
4. call the actual operation (create, unlink, etc.)
+5. unlock the parent dir
+
+If the filesystem implements its ->d_revalidate() (step 3), then it is
+called. Actually aufs implements it and checks the dentry on a branch is
+still valid.
+But it is not enough. Because aufs has to release the lock for the
+parent dir on a branch at the end of ->lookup() (step 2) and
+->d_revalidate() (step 3) while the i_mutex of the aufs dir is still
+held by VFS.
+If the file on a branch is changed directly, eg. bypassing aufs, after
+aufs released the lock, then the subsequent operation may cause
+something unpleasant result.
+
+This situation is a result of VFS architecture, ->lookup() and
+->d_revalidate() is separated. But I never say it is wrong. It is a good
+design from VFS's point of view. It is just not suitable for sub-VFS
+character in aufs.
+
+Aufs supports such case by three level of revalidation which is
+selectable by user.
+1. Simple Revalidate
+ Addition to the native flow in VFS's, confirm the child-parent
+ relationship on the branch just after locking the parent dir on the
+ branch in the "actual operation" (step 4). When this validation
+ fails, aufs returns EBUSY. ->d_revalidate() (step 3) in aufs still
+ checks the validation of the dentry on branches.
+2. Monitor Changes Internally by Inotify/Fsnotify
+ Addition to above, in the "actual operation" (step 4) aufs re-lookup
+ the dentry on the branch, and returns EBUSY if it finds different
+ dentry.
+ Additionally, aufs sets the inotify/fsnotify watch for every dir on branches
+ during it is in cache. When the event is notified, aufs registers a
+ function to kernel 'events' thread by schedule_work(). And the
+ function sets some special status to the cached aufs dentry and inode
+ private data. If they are not cached, then aufs has nothing to
+ do. When the same file is accessed through aufs (step 0-3) later,
+ aufs will detect the status and refresh all necessary data.
+ In this mode, aufs has to ignore the event which is fired by aufs
+ itself.
+3. No Extra Validation
+ This is the simplest test and doesn't add any additional revalidation
+ test, and skip the revalidation in step 4. It is useful and improves
+ aufs performance when system surely hide the aufs branches from user,
+ by over-mounting something (or another method).
Branch Manipulation

Since aufs supports dynamic branch manipulation, i.e. add/remove a branch and changing its permission/attribute, there are a lot of works to do.

Add a Branch
---------------------------------------------------------------------
+ o Confirm the adding dir exists outside of aufs, including loopback mount, and its various attributes.
+ o Initialize the xino file and whiteout bases if necessary. See struct.txt.
+ o Check the owner/group/mode of the directory
+ When the owner/group/mode of the adding directory differs from the existing branch, aufs issues a warning because it may impose a security risk.
+ For example, when a upper writable branch has a world writable empty top directory, a malicious user can create any files on the writable branch directly, like copy-up and modify manually. If something like /etc/{passwd,shadow} exists on the lower readonly branch but the upper writable branch, and the writable branch is world-writable, then a malicious guy may create /etc/passwd on the writable branch directly and the infected file will be valid in aufs.
+ I am afraid it can be a security issue, but aufs can do nothing except producing a warning.
+
Delete a Branch
---------------------------------------------------------------------
+ o Confirm the deleting branch is not busy
+ To be general, there is one merit to adopt "remount" interface to manipulate branches. It is to discard caches. At deleting a branch,
aufs checks the still cached (and connected) dentries and inodes. If there are any, then they are all in-use. An inode without its corresponding dentry can be alive alone (for example, inotify/fsnotify case).

For the cached one, aufs checks whether the same named entry exists on other branches. If the cached one is a directory, because aufs provides a merged view to users, as long as one dir is left on any branch aufs can show the dir to users. In this case, the branch can be removed from aufs. Otherwise aufs rejects deleting the branch.

If any file on the deleting branch is opened by aufs, then aufs rejects deleting.

Modify the Permission of a Branch

- Re-initialize or remove the xino file and whiteout bases if necessary. See struct.txt.
- Confirm the modifying branch is not busy
  - a file on the branch is mmap-ed.
  - a regular file on the branch is opened for write and there is no same named entry on the upper branch.

Policies to Select One among Multiple Writable Branches

When the number of writable branch is more than one, aufs has to decide the target branch for file creation or copy-up. By default, the highest
+writable branch which has the parent (or ancestor) dir of the target
+file is chosen (top-down-parent policy).
+By user's request, aufs implements some other policies to select the
+writable branch, for file creation several policies, round-robin,
+most-free-space, and other policies. For copy-up, top-down-parent,
+bottom-up-parent, bottom-up and others.
+
+As expected, the round-robin policy selects the branch in circular. When
+you have two writable branches and creates 10 new files, 5 files will be
+created for each branch. mkdir(2) systemcall is an exception. When you
+create 10 new directories, all will be created on the same branch.
+And the most-free-space policy selects the one which has most free
+space among the writable branches. The amount of free space will be
+checked by aufs internally, and users can specify its time interval.
+
+The policies for copy-up is more simple,
+top-down-parent is equivalent to the same named on in create policy,
+bottom-up-parent selects the writable branch where the parent dir
+exists and the nearest upper one from the copyup-source,
+bottom-up selects the nearest upper writable branch from the
+copyup-source, regardless the existence of the parent dir.
+
+There are some rules or exceptions to apply these policies.
+If there is a readonly branch above the policy-selected branch and
+the parent dir is marked as opaque (a variation of whiteout), or the
+target (creating) file is whiteout-ed on the upper readonly branch,
+then the result of the policy is ignored and the target file will be
+created on the nearest upper writable branch than the readonly branch.
+If there is a writable branch above the policy-selected branch and
+the parent dir is marked as opaque or the target file is whiteouted
+on the branch, then the result of the policy is ignored and the target
+file will be created on the highest one among the upper writable
+branches who has diropq or whiteout. In case of whiteout, aufs removes
+it as usual.
+link(2) and rename(2) systemcalls are exceptions in every policy.
+They try selecting the branch where the source exists as possible
+since copyup a large file will take long time. If it can't be,
+ie. the branch where the source exists is readonly, then they will
+follow the copyup policy.
+
+There is an exception for rename(2) when the target exists.
+If the rename target exists, aufs compares the index of the branches
+where the source and the target exists and selects the higher
+one. If the selected branch is readonly, then aufs follows the
+copyup policy.
--- linux-4.15.0.org/Documentation/filesystems/aufs/design/06dirren.dot
+++ linux-4.15.0/Documentation/filesystems/aufs/design/06dirren.dot
@@ -0,0 +1,31 @@
// to view this graph, run dot(1) command in GRAPHVIZ.
+
+digraph G {
+node [shape=box];
+whinfo [label="detailed info file\n(lower_brid_root-hinum, h_inum, namelen, old name)"];
+
+node [shape=oval];
+
aufs_rename -> whinfo [label="store/remove"];
+
+node [shape=oval];
+inode_list [label="h_inum list in branch\ncache"];
+
+node [shape=box];
+whinode [label="h_inum list file"];
+
+node [shape=oval];
+brmgmt [label="br_add/del/mod/umount"];+
+brmgmt -> inode_list [label="create/remove"]; +
+brmgmt -> whinode [label="load/store"]; +
+inode_list -> whinode [style=dashed,dir=both]; +
+aufs_rename -> inode_list [label="add/del"]; +
aufs_lookup -> inode_list [label="search"]; +
aufs_lookup -> whinfo [label="load/remove"]; +
}
--- linux-4.15.0.orig/Documentation/filesystems/aufs/design/06dirren.txt
+++ linux-4.15.0/Documentation/filesystems/aufs/design/06dirren.txt
@@ -0,0 +1,102 @@
+
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Special handling for renaming a directory (DIRREN)

+First, let's assume we have a simple use case.
+ /u = /rw + /ro
+ /rw/dirA exists
+ /ro/dirA and /ro/dirA/file exist too
+ there is no dirB on both branches
+ a user issues rename("dirA", "dirB")
+
+Now, what should aufs behave against this rename(2)?
+ There are a few possible cases.
+ +A. returns EROFS.
+   since dirA exists on a readonly branch which cannot be renamed.
+ B. returns EXDEV.
+   it is possible to copy-up dirA (only the dir itself), but the child
+   entries ("file" in this case) should not be. it must be a bad
+   approach to copy-up recursively.
+ C. returns a success.
+   even the branch /ro is readonly, aufs tries renaming it. Obviously it
+   is a violation of aufs' policy.
+ D. construct an extra information which indicates that /ro/dirA should
+   be handled as the name of dirB.
+ overlayfs has a similar feature called REDIRECT.
+
+Until now, aufs implements the case B only which returns EXDEV, and
+expects the userspace application behaves like mv(1) which tries
+issuing rename(2) recursively.
+
+A new aufs feature called DIRREN is introduced which implements the case
+D. There are several "extra information" added.
+
+1. detailed info per renamed directory
+   path: /rw/dirB/$AUFS_WH_DR_INFO_PFX.<lower branch-id>
+ 2. the inode-number list of directories on a branch
+   path: /rw/dirB/$AUFS_WH_DR_BRHINO
+
+The filename of "detailed info per directory" represents the lower
+branch, and its format is
+  a type of the branch id
+  one of these.
+  + uuid (not implemented yet)
+  + fsid
+  + dev
+  the inode-number of the branch root dir
And it contains these info in a single regular file.
+ magic number
+ branch's inode-number of the logically renamed dir
+ the name of the before-renamed dir
+
+ The "detailed info per directory" file is created in aufs rename(2), and
+ loaded in any lookup.
+ The info is considered in lookup for the matching case only. Here
+ "matching" means that the root of branch (in the info filename) is same
+ to the current looking-up branch. After looking-up the before-renamed
+ name, the inode-number is compared. And the matched dentry is used.
+
+ The "inode-number list of directories" is a regular file which contains
+ simply the inode-numbers on the branch. The file is created or updated
+ in removing the branch, and loaded in adding the branch. Its lifetime is
+ equal to the branch.
+ The list is refered in lookup, and when the current target inode is
+ found in the list, the aufs tries loading the "detailed info per
+ directory" and get the changed and valid name of the dir.
+
+ Theoretically these "extra information" may be able to be put into XATTR
+ in the dir inode. But aufs doesn't choose this way because
+ 1. XATTR may not be supported by the branch (or its configuration)
+ 2. XATTR may have its size limit.
+ 3. XATTR may be less easy to convert than a regular file, when the
+ format of the info is changed in the future.
+ At the same time, I agree that the regular file approach is much slower
+ than XATTR approach. So, in the future, aufs may take the XATTR or other
+ better approach.
+
+ This DIRREN feature is enabled by aufs configuration, and is activated
+ by a new mount option.
+
+ For the more complicated case, there is a work with UDBA option, which
+ is to detected the direct access to the branches (by-passing aufs) and to
+ maintain the cashes in aufs. Since a single cached aufs dentry may
+ contains two names, before- and after-rename, the name comparision in
+ UDBA handler may not work correctly. In this case, the behaviour will be
+ equivalent to udba=reval case.

--- linux-4.15.0.orig/Documentation/filesystems/aufs/design/06fhsm.txt
+++ linux-4.15.0/Documentation/filesystems/aufs/design/06fhsm.txt
@@ -0,0 +1,120 @@
+# Copyright (C) 2011-2017 Junjiro R. Okajima
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Hierarchical Storage Management (or HSM) is a well-known feature in the storage world. Aufs provides this feature as file-based with multiple writable branches, based upon the principle of "Colder, the Lower". Here the word "colder" means that the less used files, and "lower" means that the position in the order of the stacked branches vertically. These multiple writable branches are prioritized, ie. the topmost one should be the fastest drive and be used heavily.

Characters in aufs FHSM story
- aufs itself and a new branch attribute.
- a new ioctl interface to move-down and to establish a connection with the daemon ("move-down" is a converse of "copy-up").
- userspace tool and daemon.

The userspace daemon establishes a connection with aufs and waits for the notification. The notified information is very similar to struct statfs containing the number of consumed blocks and inodes. When the consumed blocks/inodes of a branch exceeds the user-specified upper watermark, the daemon activates its move-down process until the consumed blocks/inodes reaches the user-specified lower watermark.

The actual move-down is done by aufs based upon the request from userspace since we need to maintain the inode number and the internal pointer arrays in aufs.

Currently aufs FHSM handles the regular files only. Additionally they must not be hard-linked nor pseudo-linked.

Cowork of aufs and the user-space daemon
During the userspace daemon established the connection, aufs sends a small notification to it whenever aufs writes something into the writable branch. But it may cost high since aufs issues statfs(2) internally. So user can specify a new option to cache the
+ info. Actually the notification is controlled by these factors.
+ + the specified cache time.
+ + classified as "force" by aufs internally.
+ + Until the specified time expires, aufs doesn't send the info
+ + except the forced cases. When aufs decide forcing, the info is always
+ + notified to userspace.
+ + For example, the number of free inodes is generally large enough and
+ + the shortage of it happens rarely. So aufs doesn't force the
+ + notification when creating a new file, directory and others. This is
+ + the typical case which aufs doesn't force.
+ + When aufs writes the actual filedata and the files consumes any of new
+ + blocks, the aufs forces notifying.
+ +
+ + Interfaces in aufs
+ +- New branch attribute.
+ +  + fhsm
+ +  + Specifies that the branch is managed by FHSM feature. In other word,
+ +  + participant in the FHSM.
+ +  + When nofhsm is set to the branch, it will not be the source/target
+ +  + branch of the move-down operation. This attribute is set
+ +  + independently from coo and moo attributes, and if you want full
+ +  + FHSM, you should specify them as well.
+ +  + New mount option.
+ +  + fhsm_sec
+ +  + Specifies a second to suppress many less important info to be
+ +  + notified.
+ +  + New ioctl.
+ +  + + AUFS_CTL_FHSM_FD
+ +  + create a new file descriptor which userspace can read the notification
+ +  + (a subset of struct statfs) from aufs.
+ - Module parameter 'brs'
+ + It has to be set to 1. Otherwise the new mount option 'fhsm' will not
+ + be set.
+ - mount helpers /sbin/mount.aufs and /sbin/umount.aufs
+ + When there are two or more branches with fhsm attributes,
+ + /sbin/mount.aufs invokes the user-space daemon and /sbin/umount.aufs
+ + terminates it. As a result of remounting and branch-manipulation, the
+ + number of branches with fhsm attribute can be one. In this case,
+ + /sbin/mount.aufs will terminate the user-space daemon.
+ +
+ + Finally the operation is done as these steps in kernel-space.
+ +- make sure that,
+ +  + no one else is using the file.
+ +  + the file is not hard-linked.
+ +  + the file is not pseudo-linked.
+ +  + the file is a regular file.
+ + the parent dir is not opaqued.
+ find the target writable branch.
+ make sure the file is not whiteout-ed by the upper (than the target)
+ branch.
+ make the parent dir on the target branch.
+ mutex lock the inode on the branch.
+ unlink the whiteout on the target branch (if exists).
+ lookup and create the whiteout-ed temporary name on the target branch.
+ copy the file as the whiteout-ed temporary name on the target branch.
+ rename the whiteout-ed temporary name to the original name.
+ unlink the file on the source branch.
+ maintain the internal pointer array and the external inode number
+ table (XINO).
+ maintain the timestamps and other attributes of the parent dir and the
+ file.

+ And of course, in every step, an error may happen. So the operation
+ should restore the original file state after an error happens.

--- linux-4.15.0.orig/Documentation/filesystems/aufs/design/06mmap.txt
+++ linux-4.15.0/Documentation/filesystems/aufs/design/06mmap.txt
@@ -0,0 +1,72 @@
+
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+
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+
+mmmap(2) -- File Memory Mapping
+---------------------------------------------
+In aufs, the file-mapped pages are handled by a branch fs directly, no
+interaction with aufs. It means aufs_mmap() calls the branch fs’s
+-mmap().
+This approach is simple and good, but there is one problem.
+Under /proc, several entries show the mmapped files by its path (with
+device and inode number), and the printed path will be the path on the
+branch fs’s instead of virtual aufs’s.
+This is not a problem in most cases, but some utilities lsof(1) (and its
+user) may expect the path on aufs.
To address this issue, aufs adds a new member called vm_prfile in struct vm_area_struct (and struct vm_region). The original vm_file points to the file on the branch fs in order to handle everything correctly as usual. The new vm_prfile points to a virtual file in aufs, and the show-functions in procfs refers to vm_prfile if it is set. Also we need to maintain several other places where touching vm_file such like:

- fork()/clone() copies vma and the reference count of vm_file is incremented.
- merging vma maintains the ref count too.

This is not a good approach. It just fakes the printed path. But it leaves all behaviour around f_mapping unchanged. This is surely an advantage.

Actually aufs had adopted another complicated approach which calls generic_file_mmap() and handles struct vm_operations_struct. In this approach, aufs met a hard problem and I could not solve it without switching the approach.

There may be one more another approach which is:

- bind-mount the branch-root onto the aufs-root internally
- grab the new vfsmount (ie. struct mount)
- lazy-umount the branch-root internally
- in open(2) the aufs-file, open the branch-file with the hidden vfsmount (instead of the original branch’s vfsmount)
- ideally this “bind-mount and lazy-umount” should be done atomically, but it may be possible from userspace by the mount helper.

Adding the internal hidden vfsmount and using it in opening a file, the file path under /proc will be printed correctly. This approach looks smarter, but is not possible I am afraid.

- aufs-root may be bind-mount later, when it happens, another hidden vfsmount will be required.
- it is hard to get the chance to bind-mount and lazy-umount
- in kernel-space, FS can have vfsmount in open(2) via file->f_path, and aufs can know its vfsmount. But several locks are already acquired, and if aufs tries to bind-mount and lazy-umount here, then it may cause a deadlock.
- in user-space, bind-mount doesn’t invoke the mount helper.
- since /proc shows dev and ino, aufs has to give vma these info. it means a new member vm_prinode will be necessary. this is essentially equivalent to vm_prfile described above.

I have to give up this “looks-smater” approach.
Listing XATTR/EA and getting the value

+For the inode standard attributes (owner, group, timestamps, etc.), aufs shows the values from the topmost existing file. This behaviour is good for the non-dir entries since the bahaviour exactly matches the shown information. But for the directories, aufs considers all the same named entries on the lower branches. Which means, if one of the lower entry rejects readdir call, then aufs returns an error even if the topmost entry allows it. This behaviour is necessary to respect the branch fs's security, but can make users confused since the user-visible standard attributes don't match the behaviour.
+To address this issue, aufs has a mount option called dirperm1 which checks the permission for the topmost entry only, and ignores the lower entry's permission.
+A similar issue can happen around XATTR.
+getxattr(2) and listxattr(2) families behave as if dirperm1 option is always set. Otherwise these very unpleasant situation would happen.
+- listxattr(2) may return the duplicated entries.
+- users may not be able to remove or reset the XATTR forever.
+
+XATTR/EA support in the internal (copy,move)-(up,down)

+Generally the extended attributes of inode are categorized as these.
+ "security" for LSM and capability.
+ "system" for posix ACL, 'acl' mount option is required for the branch fs generally.
+ "trusted" for userspace, CAP_SYS_ADMIN is required.
+ "user" for userspace, 'user_xattr' mount option is required for the
Moreover there are some other categories. Aufs handles these rather unpopular categories as the ordinary ones, i.e., there is no special condition nor exception.

In copy-up, the support for XATTR on the dst branch may differ from the src branch. In this case, the copy-up operation will get an error and the original user operation which triggered the copy-up will fail. It can happen that even all copy-up will fail.

When both of src and dst branches support XATTR and if an error occurs during copying XATTR, then the copy-up should fail obviously. That is a good reason and aufs should return an error to userspace. But when only the src branch support that XATTR, aufs should not return an error.

For example, the src branch supports ACL but the dst branch doesn't because the dst branch may natively un-support it or temporary un-support it due to "noacl" mount option. Of course, the dst branch fs may NOT return an error even if the XATTR is not supported. It is totally up to the branch fs.

Anyway when the aufs internal copy-up gets an error from the dst branch fs, then aufs tries removing the just copied entry and returns the error to the userspace. The worst case of this situation will be all copy-up will fail.

For the copy-up operation, there two basic approaches.
- copy the specified XATTR only (by category above), and return the error unconditionally if it happens.
- copy all XATTR, and ignore the error on the specified category only.

In order to support XATTR and to implement the correct behaviour, aufs chooses the latter approach and introduces some new branch attributes, "icexsec", "icexsys", "icextr", "icexusr", and "icexoth". They correspond to the XATTR namespaces (see above). Additionally, to be convenient, "icex" is also provided which means all "icex*" attributes are set (here the word "icex" stands for "ignore copy-error on XATTR").

The meaning of these attributes is to ignore the error from setting XATTR on that branch.

Note that aufs tries copying all XATTR unconditionally, and ignores the error from the dst branch according to the specified attributes.

Some XATTR may have its default value. The default value may come from the parent dir or the environment. If the default value is set at the file creating-time, it will be overwritten by copy-up. Some contradiction may happen I am afraid.

Do we need another attribute to stop copying XATTR? I am unsure. For now, aufs implements the branch attributes to ignore the error.
This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.

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Export Aufs via NFS

Here is an approach.
- like xino/xib, add a new file 'xigen' which stores aufs inode
generation.
- iget_locked(): initialize aufs inode generation for a new inode, and
  store it in xigen file.
- destroy_inode(): increment aufs inode generation and store it in xigen
  file. it is necessary even if it is not unlinked, because any data of
  inode may be changed by UDBA.
- encode_fh(): for a root dir, simply return FILEID_ROOT. otherwise
  build file handle by
  + branch id (4 bytes)
  + superblock generation (4 bytes)
  + inode number (4 or 8 bytes)
  + parent dir inode number (4 or 8 bytes)
  + inode generation (4 bytes))
  + return value of exportfs_encode_fh() for the parent on a branch (4
    bytes)
  + file handle for a branch (by exportfs_encode_fh())
  + fh_to_dentry():
    + find the index of a branch from its id in handle, and check it is
      still exist in aufs.
    + 1st level: get the inode number from handle and search it in cache.
    + 2nd level: if not found in cache, get the parent inode number from
      the handle and search it in cache. and then open the found parent
      dir, find the matching inode number by vfs_readdir() and get its
      name, and call lookup_one_len() for the target dentry.
    + 3rd level: if the parent dir is not cached, call
Show Whiteout Mode (shwh)

---

Generally aufs hides the name of whiteouts. But in some cases, to show them is very useful for users. For instance, creating a new middle layer (branch) by merging existing layers.

+borrowing aufs1 HOW-TO from a user, Michael Towers
+b+ When you have three branches,
+b- Bottom: 'system', squashfs (underlying base system), read-only
+b- Middle: 'mods', squashfs, read-only
+b+ Top: 'overlay', ram (tmpfs), read-write
+b+
+b+The top layer is loaded at boot time and saved at shutdown, to preserve the changes made to the system during the session.
+b+When larger changes have been made, or smaller changes have accumulated, +the size of the saved top layer data grows. At this point, it would be
nice to be able to merge the two overlay branches ('mods' and 'overlay')
+and rewrite the 'mods' squashfs, clearing the top layer and thus
+restoring save and load speed.
+
+This merging is simplified by the use of another aufs mount, of just the
+two overlay branches using the 'shwh' option.
+## mount -t aufs -o ro,shwh,br:/livesys/overlay=ro+wh:/livesys/mods=rr+wh \
+aufs /livesys/merge_union
+
+A merged view of these two branches is then available at
+ /livesys/merge_union, and the new feature is that the whiteouts are
+ visible!
+Note that in 'shwh' mode the aufs mount must be 'ro', which will disable
+ writing to all branches. Also the default mode for all branches is 'ro'.
+It is now possible to save the combined contents of the two overlay
+ branches to a new squashfs, e.g.:
+## mksquashfs /livesys/merge_union /path/to/newmods.squash
+
+This new squashfs archive can be stored on the boot device and the
+ initramfs will use it to replace the old one at the next boot.
--- linux-4.15.0.orig/Documentation/filesystems/aufs/design/10dynop.txt
+++ linux-4.15.0/Documentation/filesystems/aufs/design/10dynop.txt
@@ -0,0 +1,47 @@
+
+This program is free software; you can redistribute it and/or modify
+it under the terms of the GNU General Public License as published by
+the Free Software Foundation; either version 2 of the License, or
+(at your option) any later version.
+
+This program is distributed in the hope that it will be useful,
+but WITHOUT ANY WARRANTY; without even the implied warranty of
+MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+GNU General Public License for more details.
+
+You should have received a copy of the GNU General Public License
+along with this program. If not, see <http://www.gnu.org/licenses/>.
+
+Dynamically customizable FS operations
+-+Generally FS operations (struct inode_operations, struct
+address_space_operations, struct file_operations, etc.) are defined as
+"static const", but it never means that FS have only one set of
+operation. Some FS have multiple sets of them. For instance, ext2 has
+three sets, one for XIP, for NOBH, and for normal.
+Since aufs overrides and redirects these operations, sometimes aufs has
+to change its behaviour according to the branch FS type. More importantly
VFS acts differently if a function (member in the struct) is set or not. It means aufs should have several sets of operations and select one among them according to the branch FS definition.

In order to solve this problem and not to affect the behaviour of VFS, aufs defines these operations dynamically. For instance, aufs defines dummy direct IO function for struct address_space_operations, but it may not be set to the address_space_operations actually. When the branch FS doesn't have it, aufs doesn't set it to its address_space_operations while the function definition itself is still alive. So the behaviour itself will not change, and it will return an error when direct_IO is not set.

The lifetime of these dynamically generated operation object is maintained by aufs branch object. When the branch is removed from aufs, the reference counter of the object is decremented. When it reaches zero, the dynamically generated operation object will be freed.

This approach is designed to support AIO (io_submit), Direct I/O and XIP (DAX) mainly. Currently this approach is applied to address_space_operations for regular files only.

Finally, Ceph also allows quotas to be set on any directory in the system. The quota can restrict the number of bytes or the number of files stored beneath that point in the directory hierarchy. Quotas can be set using extended attributes 'ceph.quota.max_files' and 'ceph.quota.max_bytes', eg:

```bash
setfattr -n ceph.quota.max_bytes -v 100000000 /some/dir
getfattr -n ceph.quota.max_bytes /some/dir
```

A limitation of the current quotas implementation is that it relies on the cooperation of the client mounting the file system to stop writers when a limit is reached. A modified or adversarial client cannot be prevented from writing as much data as it needs.

Mount Syntax

---

Open Source Used In 5GaaS Edge AC-4 9486
-grpidGive objects the same group ID as their creator.
+grpidNew objects have the group ID of their parent.

bsdgroups

nogrpid(*) New objects have the group ID of their creator.

--- linux-4.15.0.orig/Documentation/filesystems/fscrypt.rst
+++ linux-4.15.0/Documentation/filesystems/fscrypt.rst
@@ -426,10 +426,18 @@
- Unencrypted files, or files encrypted with a different encryption policy (i.e. different key, modes, or flags), cannot be renamed or linked into an encrypted directory; see `Encryption policy - enforcement`_. Attempts to do so will fail with EPERM. However, +enforcement`. Attempts to do so will fail with EXDEV. However, encrypted files can be renamed within an encrypted directory, or into an unencrypted directory.

+ Note: "moving" an unencrypted file into an encrypted directory, e.g. + with the `mv` program, is implemented in userspace by a copy + followed by a delete. Be aware that the original unencrypted data + may remain recoverable from free space on the disk; prefer to keep + all files encrypted from the very beginning. The `shred` program + may be used to overwrite the source files but isn't guaranteed to be + effective on all filesystems and storage devices.

- Direct I/O is not supported on encrypted files. Attempts to use direct I/O on such files will fall back to buffered I/O.

@@ -510,7 +518,7 @@
Except for those special files, it is forbidden to have unencrypted files, or files encrypted with a different encryption policy, in an encrypted directory tree. Attempts to link or rename such a file into - an encrypted directory will fail with EPERM. This is also enforced +an encrypted directory will fail with EXDEV. This is also enforced during ->lookup() to provide limited protection against offline attacks that try to disable or downgrade encryption in known locations where applications may later write sensitive data. It is recommended --- linux-4.15.0.orig/Documentation/filesystems/mandatory-locking.txt
+++ linux-4.15.0/Documentation/filesystems/mandatory-locking.txt
@@ -169,3 +169,13 @@
permissions (remove the setgid bit) before trying to read or write to it. Of course, that might be a bit tricky if the system is hung :-(

+7. The "mand" mount option

+--------------------------
+Mandatory locking is disabled on all filesystems by default, and must be
+administratively enabled by mounting with "-o mand". That mount option
+is only allowed if the mounting task has the CAP_SYS_ADMIN capability.
Since kernel v4.5, it is possible to disable mandatory locking altogether by setting CONFIG_MANDATORY_FILE_LOCKING to "n". A kernel with this disabled will reject attempts to mount filesystems with the "mand" mount option with the error status EPERM.

--- linux-4.15.0.orig/Documentation/filesystems/porting
+++ linux-4.15.0/Documentation/filesystems/porting
@@ -602,3 +602,10 @@
     dentry separately, and it now has request_mask and query_flags arguments to specify the fields and sync type requested by statx. Filesystems not supporting any statx-specific features may ignore the new arguments.
+
+[mandatory]
+
+[should've been added in 2016] stale comment in finish_open()
+nonwithstanding, failure exits in ->atomic_open() instances should *NOT* fput() the file, no matter what. Everything is handled by the caller.
--- linux-4.15.0.orig/Documentation/filesystems/proc.txt
+++ linux-4.15.0/Documentation/filesystems/proc.txt
@@ @ -496,7 +496,9 @
     Note that there is no guarantee that every flag and associated mnemonic will be present in all further kernel releases. Things get changed, the flags may -be vanished or the reverse -- new added.
+be vanished or the reverse -- new added. Interpretation of their meaning +might change in future as well. So each consumer of these flags has to +follow each specific kernel version for the exact semantic.

This file is only present if the CONFIG_MMU kernel configuration option is enabled.
--- linux-4.15.0.orig/Documentation/filesystems/seq_file.txt
+++ linux-4.15.0/Documentation/filesystems/seq_file.txt
@@ @ -171,6 +171,12 @
     is a reasonable thing to do. The seq_file code will also avoid taking any other locks while the iterator is active.
+
+The iterater value returned by start() or next() is guaranteed to be +passed to a subsequent next() or stop() call. This allows resources +such as locks that were taken to be reliably released. There is *no* +guarantee that the iterator will be passed to show(), though in practice +it often will be.
+
Formatted output
--- linux-4.15.0.orig/Documentation/filesystems/sysfs.txt
+++ linux-4.15.0/Documentation/filesystems/sysfs.txt
is 4096.

- show() methods should return the number of bytes printed into the
  buffer. This is the return value of scnprintf().
+ buffer.

-- show() must not use snprintf() when formatting the value to be
  returned to user space. If you can guarantee that an overflow
  will never happen you can use sprintf() otherwise you must use
  scnprintf().
+ show() should only use sysfs_emit() or sysfs_emit_at() when formatting
  the value to be returned to user space.

- store() should return the number of bytes used from the buffer. If the
  entire buffer has been used, just return the count argument.

-- linux-4.15.0.orig/Documentation/hid/uhid.txt
+++ linux-4.15.0/Documentation/hid/uhid.txt
@@ -160,7 +160,7 @@
     UHID_OUTPUT:
     This is sent if the HID device driver wants to send raw data to the I/O
     device on the interrupt channel. You should read the payload and forward it to
-    the device. The payload is of type "struct uhid_data_req".
+    the device. The payload is of type "struct uhid_output_req".
     This may be received even though you haven't received UHID_OPEN, yet.

     UHID_GET_REPORT:
--- linux-4.15.0.orig/Documentation/hwmon/ina2xx
+++ linux-4.15.0/Documentation/hwmon/ina2xx
@@ -32,7 +32,7 @@
     Datasheet: Publicly available at the Texas Instruments website
           http://www.ti.com/

-Author: Lothar Felten <l-felten@ti.com>
+A-Author: Lothar Felten <lothar.felten@gmail.com>

Description
--------
--- linux-4.15.0.orig/Documentation/i2c/busses/i2c-amd-mp2
+++ linux-4.15.0/Documentation/i2c/busses/i2c-amd-mp2
@@ -0,0 +1,23 @@
+Kernel driver i2c-amd-mp2
+ 
+Supported adapters:
+  * AMD MP2 PCIe interface
+  
+Datasheet: not publicly available.
+
+Authors:
+Shyam Sundar S K <Shyam-sundar.S-k@amd.com>
+Nehal Shah <nehal-bakulchandra.shah@amd.com>
+Elie Morisse <syniurge@gmail.com>
+
++Description
+----------
+
+The MP2 is an ARM processor programmed as an I2C controller and communicating
+with the x86 host through PCI.
+
+If you see something like this:
+
+03:00.7 MP2 I2C controller: Advanced Micro Devices, Inc. [AMD] Device 15e6
+
+in your 'lspci -v', then this driver is for your device.

--- linux-4.15.0.orig/Documentation/i2c/busses/i2c-i801
+++ linux-4.15.0/Documentation/i2c/busses/i2c-i801
@@ -37,6 +37,7 @@
* Intel Cannon Lake-H (PCH)
* Intel Cannon Lake-LP (PCH)
* Intel Cedar Fork (PCH)
+* Intel Comet Lake (PCH)

Datasheets: Publicly available at the Intel website

On Intel Patsburg and later chipsets, both the normal host SMBus controller
--- linux-4.15.0.orig/Documentation/index.rst
+++ linux-4.15.0/Documentation/index.rst
@@ -86,6 +86,7 @@
:maxdepth: 2

```
sh/index
+ x86/index

Korean translations
----------------------
--- linux-4.15.0.orig/Documentation/ioctl/ioctl-number.txt
+++ linux-4.15.0/Documentation/ioctl/ioctl-number.txt
@@ -326,6 +326,7 @@
0xB500-0Fuapi/linux/rpmmsg.h<mailto:linux-remoteproc@vger.kernel.org>
0xC000-0Flinux/usb/iowarrior.h
0xCA00-0Fuapi/misc/cxl.h
+0xCA10-2Fuapi/misc/ocxl.h
0xCA80-BFuapi/scsi/cxlflash_ioctl.h
0xCB00-1FCBM serial IEC busin development:
<mailto:michael.klein@puffin.lb.shuttle.de>
--- linux-4.15.0.orig/Documentation/kbuild/kbuild.txt
+++ linux-4.15.0/Documentation/kbuild/kbuild.txt
the default option --strip-debug will be used. Otherwise, INSTALL_MOD_STRIP value will be used as the options to the strip command.

-INSTALL_FW_PATH

-INSTALL_FW_PATH specifies where to install the firmware blobs.
- The default value is:
  - $(INSTALL_MOD_PATH)/lib/firmware
  -
- The value can be overridden in which case the default value is ignored.

 INSTALL_HDR_PATH

INSTALL_HDR_PATH specifies where to install user space headers when

--- linux-4.15.0.orig/Documentation/kbuild/llvm.rst
+++ linux-4.15.0/Documentation/kbuild/llvm.rst
@@ -0,0 +1,83 @@
+==============================
+Building Linux with Clang/LLVM
+==================================
+
+This document covers how to build the Linux kernel with Clang and LLVM
+utilities.
+
+About
+++-----
++++
+The Linux kernel has always traditionally been compiled with GNU toolchains
+such as GCC and binutils. Ongoing work has allowed for `Clang
+<https://clang.llvm.org/>`_ and `LLVM <https://llvm.org/>`_ utilities to be
+used as viable substitutes. Distributions such as `Android
+<https://www.android.com/>`_, `ChromeOS
+<https://www.chromium.org/chromium-os>`_, and `OpenMandriva
+<https://www.openmandriva.org/>`_ use Clang built kernels. `LLVM is a
+collection of toolchain components implemented in terms of C++ objects
+<https://www.aosabook.org/en/llvm.html>`_. Clang is a front-end to LLVM that
+supports C and the GNU C extensions required by the kernel, and is pronounced
+"klang," not "see-lang."
+
+Clang
+++-----
++++
+The compiler used can be swapped out via `CC=` command line argument to `make`
+`CC=` should be set when selecting a config and during a build.
+
+make CC=clang defconfig
+make CC=clang
+Cross Compiling
+---------------
+A single Clang compiler binary will typically contain all supported backends, which can help simplify cross compiling.
+ARCH=arm64 CROSS_COMPILE=arm64-linux-gnu make CC=clang
+CROSS_COMPILE` is not used to prefix the Clang compiler binary, instead `CROSS_COMPILE` is used to set a command line flag: `--target <triple>`.
+example:
+clang --target aarch64-linux-gnu foo.c
+LLVM Utilities
+--------------
+LLVM has substitutes for GNU binutils utilities. These can be invoked as additional parameters to `make`.
+make CC=clang LD=ld.lld AR=llvm-ar NM=llvm-nm STRIP=llvm-strip \`
+OBJCOPY=llvm-objcopy OBJDUMP=llvm-objdump OBJSIZE=llvm-size \`
+READELF=llvm-readelf HOSTCC=clang HOSTCXX=clang++ HOSTAR=llvm-ar \`
+HOSTLD=ld.lld
+Currently, the integrated assembler is disabled by default. You can pass `LLVM_IAS=1` to enable it.
+Getting Help
+-------------
+- Website <https://clangbuiltlinux.github.io/>`
+- Mailing List <https://groups.google.com/forum/#!forum/clang-built-linux>`_: <clang-built-linux@googlegroups.com>
+- Issue Tracker <https://github.com/ClangBuiltLinux/linux/issues>`_
+- IRC: #clangbuiltlinux on chat.freenode.net
+- Telegram <https://t.me/ClangBuiltLinux>`_: @ClangBuiltLinux
+- Wiki <https://github.com/ClangBuiltLinux/linux/wiki>`_
+- Beginner Bugs <https://github.com/ClangBuiltLinux/linux/issues?q=is%3Aopen+is%3Aissue+label%3A%22good+first+issue%22>`_
+Getting LLVM
+-------------
Open Source Used In 5GaaS Edge AC-4

- http://releases.llvm.org/download.html
- https://github.com/llvm/llvm-project
- https://llvm.org/docs/GettingStarted.html
- https://llvm.org/docs/CMake.html
- https://apt.llvm.org/
- https://www.archlinux.org/packages/extras/x86_64/llvm/
- https://github.com/ClangBuiltLinux/tc-build
- https://github.com/ClangBuiltLinux/linux/wiki/Building-Clang-from-source
- https://android.googlesource.com/platform/prebuilts/clang/host/linux-x86/

--- linux-4.15.0.org/Documentation/kmsg/IPVS
+++ linux-4.15.0.org/Documentation/kmsg/IPVS
@@ -0,0 +1,81 @@
+/*? Text: "%s(): NULL arg
+/*? Text: "%s(): NULL scheduler_name
+/*? Text: "%s(): [ scheduler_name already existed in the system
+/*? Text: "%s(): [ scheduler_name already linked
+/*? Text: "%s(): [ scheduler_name already not in the list. failed
+/*? Text: "%s(): done error
+/*? Text: "%s(): init error
+/*? Text: "%s(): lower threshold is higher than upper threshold
+/*? Text: "%s(): no memory
+/*? Text: "%s(): request for already hashed, called from %pF
+/*? Text: "%s(): request for unhash flagged, called from %pF
+/*? Text: "%s(): server weight less than zero
+/*? Text: "%s: [pF]:%d - %s
+/*? Text: "BACKUP v0, Dropping buffer bogus conn options
+/*? Text: "BACKUP v0, bogus conn
+/*? Text: "BACKUP, Dropping buffer, Err: %d in decoding
+/*? Text: "BACKUP, Dropping buffer, Unknown version %d
+/*? Text: "BACKUP, Dropping buffer, msg > buffer
+/*? Text: "BACKUP, Invalid PE parameters
+/*? Text: "BUG control DEL with n=0 : %s to %s
+/*? Text: "Connection hash table configured (size=%d, memory=%d bytes)
+/*? Text: "Error binding address of the mcast interface
+/*? Text: "Error binding to the multicast addr
+/*? Text: "Error connecting to the multicast addr
+/*? Text: "Error during creation of socket; terminating
+/*? Text: "Error joining to the multicast group
+/*? Text: "Error setting outbound mcast interface

Failed to stop Backup Daemon
Failed to stop Master Daemon
Registered protocols (%s)
SYNC, connection pe_data invalid
Schedule: port zero only supported in persistent services, check your ipvs configuration
Scheduler module ip_vs_%s not found
There is no net_ptr to find in the skb in %s() line:%d
UDP no ns data
You probably need to specify IP address on multicast interface
[)%s] pe registered.
[)%s] pe unregistered.
[)%s] scheduler registered.
[)%s] scheduler unregistered.
[)%s] can't register hooks.
[)%s] can't register netlink/ioctl
[)%s] can't setup connection table.
[)%s] can't setup control.
[)%s] persistence engine module ip_vs_pe_%s not found
[)%s] receiving message error
[)%s] set_ctl: invalid protocol: %d %pI4:%d %s
[)%s] set_ctl: len %u != %u
shouldn't reach here, because the box is on the half connection in the tun/dr module
[)%s] stopping backup sync thread %d ...
[)%s] stopping master sync thread %d ...
[)%s] sync thread started: state = BACKUP, mcast_ifn = %s, syncid = %d
[)%s] sync thread started: state = MASTER, mcast_ifn = %s, syncid = %d
[)%s] unknown Generic Netlink command
[)%s] sync thread started: state = MASTER, mcast_ifn = %s, syncid = %d, id = %d
[)%s] sync thread started: state = BACKUP, mcast_ifn = %s, syncid = %d, id = %d
[)%s] flen=%u proglen=%u pass=%u image=%pK from=%s pid=%d
[)%s] %s selects TX queue %d, but real number of TX queues is %d
[)%s] Unknown mcast interface: %s
[)%s] %s output lines suppressed due to ratelimiting
--- linux-4.15.0.orig/Documentation/kmsg/s390/aes_s390
+++ linux-4.15.0/Documentation/kmsg/s390/aes_s390
@@ -0,0 +1,45 @@
### Allocating XTS fallback algorithm %s failed

* Severity: Error
* Parameter: @1: algorithm name
* Description:
The aes_s390 module failed to allocate a software fallback for the AES modes that are not supported by the hardware. A possible reason for this problem is that the aes_generic module that provides the fallback
* User action:
  * Ensure that the aes_generic module is available and loaded and reload the aes_s390 module.

### Allocating AES fallback algorithm %s failed

* Severity: Error
* Parameter: @1: algorithm name
* Description:
The advanced encryption standard (AES) algorithm includes three modes with 128-bit, 192-bit, and 256-bit keys. Your hardware system only provides hardware acceleration for the 128-bit mode. The aes_s390 module failed to allocate a software fallback for the AES modes that are not supported by the hardware. A possible reason for this problem is that the aes_generic module that provides the fallback algorithms is not available.
* User action:
  * Use the 128-bit mode only or ensure that the aes_generic module is available and loaded and reload the aes_s390 module.

### AES hardware acceleration is only available for 128-bit keys

* Severity: Informational
* Description:
The advanced encryption standard (AES) algorithm includes three modes with 128-bit, 192-bit, and 256-bit keys. Your hardware system only provides hardware acceleration for the 128-bit key mode. The aes_s390 module will use the less performant software fallback algorithm for the 192-bit and 256-bit key modes.
* User action:
  * None.

---

"%s: %d output lines suppressed due to ratelimiting"

---

@ @ -0,0 +1,23 @@

---

Open Source Used In 5GasS Edge AC-4 9495
Application %s on z/VM guest %s exceeds message limit
Severity: Error
Parameter:
@1: application name
@2: z/VM user ID
Description:
Messages or packets destined for the application have accumulated and reached the maximum value. The default for the message limit is 65535.
You can specify a different limit as the value for MSGLIMIT within the IUCV statement of the z/VM virtual machine on which the application runs.
User action:
Ensure that you do not send data faster than the application retrieves. Ensure that the message limit on the z/VM guest virtual machine on which the application runs is high enough.

%d is not a valid cryptographic domain
Severity: Warning
Parameter:
@1: AP domain index
Description:
The cryptographic domain specified for the 'domain=' module or kernel parameter must be an integer in the range 0 to 15.
User action:
Reload the cryptographic device driver with a correct module parameter. If the device driver has been compiled into the kernel, correct the value in the kernel parameter line and reboot Linux.

The hardware system does not support AP instructions
Severity: Warning
Description:
The ap module addresses AP adapters through AP instructions. The hardware system on which the Linux instance runs does not support AP instructions.
User action:
+ * Load the ap module only if your Linux instance runs on hardware that
+ * supports AP instructions. If the ap module has been compiled into the kernel,
+ * ignore this message.
+ */
+
+ */?
+ * Text: "Registering adapter interrupts for AP device %02x.%04x failed\n"
+ * Severity: Error
+ * Parameter:
+ *  @1: AP device ID
+ *  @2: AP queue
+ * Description:
+ * The hardware system supports AP adapter interrupts but failed to enable
+ * an adapter for interrupts. Possible causes for this error are:
+ * i) The AP adapter firmware does not support AP interrupts.
+ * ii) An AP adapter firmware update to a firmware level that supports AP
+ *      adapter interrupts failed.
+ * iii) The AP adapter firmware has been successfully updated to a level that
+ *      supports AP interrupts but the new firmware has not been activated.
+ * User action:
+ * Ensure that the firmware on your AP adapters support AP interrupts and that
+ * any firmware updates have completed successfully. If necessary, deconfigure
+ * your cryptographic adapters and reconfigure them to ensure that any firmware
+ * updates become active, then reload the ap module. If the ap module has been
+ * compiled into the kernel, reboot Linux.
+ */?
+ */? Text: "%s; %d output lines suppressed due to ratelimiting\n"
--- linux-4.15.0.orig/Documentation/kmsg/s390/appldata
+++ linux-4.15.0/Documentation/kmsg/s390/appldata
@@ -0,0 +1,91 @@
+*/?
+ * Text: "Starting the data collection for %s failed with rc=%d\n"
+ * Severity: Error
+ * Parameter:
+ *  @1: appldata module
+ *  @2: return code
+ * Description:
+ * The specified data collection module used the z/VM diagnose call
+ * DIAG 0xDC to start writing data. z/VM returned an error and the data
+ * collection could not start. If the return code is 5, your z/VM guest
+ * virtual machine is not authorized to write data records.
+ * User action:
+ * If the return code is 5, ensure that your z/VM guest virtual machine's
+ * entry in the z/VM directory includes the OPTION APPLMON statement.
+ * For other return codes see the section about DIAGNOSE Code X'DC'
+ * in "z/VM CP Programming Services".
+ */
+ */
+/*?
+ * Text: "Stopping the data collection for %s failed with rc=%d\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: appldata module
+ *   @2: return code
+ * Description:
+ * The specified data collection module used the z/VM diagnose call DIAG 0xDC
+ * to stop writing data. z/VM returned an error and the data collection
+ * continues.
+ * User action:
+ * See the section about DIAGNOSE Code X'DC' in "z/VM CP Programming Services".
+ */
+
+/*?
+ * Text: "Starting a new OS data collection failed with rc=%d\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: return code
+ * Description:
+ * After a CPU hotplug event, the record size for the running operating
+ * system data collection is no longer correct. The appldata_os module tried
+ * to start a new data collection with the correct record size but received
+ * an error from the z/VM diagnose call DIAG 0xDC. Any data collected with
+ * the current record size might be faulty.
+ * User action:
+ * Start a new data collection with the cappldata_os module. For information
+ * about starting data collections see "Device Drivers, Features, and
+ * Commands". For information about the return codes see the section about
+ * DIAGNOSE Code X'DC' in "z/VM CP Programming Services".
+ */
+
+/*?
+ * Text: "Stopping a faulty OS data collection failed with rc=%d\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: return code
+ * Description:
+ * After a CPU hotplug event, the record size for the running operating
+ * system data collection is no longer correct. The appldata_os module tried
+ * to stop the faulty data collection but received an error from the z/VM
+ * diagnose call DIAG 0xDC. Any data collected with the current record size
+ * might be faulty.
+ * User action:
+ * Try to restart appldata_os monitoring. For information about stopping
+ * and starting data collections see "Device Drivers, Features, and
+ * Commands". For information about the return codes see the section about
+ * DIAGNOSE Code X'DC' in "z/VM CP Programming Services".
Maximum OS record size %i exceeds the maximum record size %i

Severity: Error
Parameter:
   @1: no of bytes
   @2: no of bytes
Description:
The OS record size grows with the number of CPUs and is adjusted by the appdata_os module in response to CPU hotplug events. For more than 110 CPUs the record size would exceed the maximum record size of 4024 bytes that is supported by the z/VM hypervisor. To prevent the maximum supported record size from being exceeded while data collection is in progress, you cannot load the appdata_os module on Linux instances that are configured for a maximum of more than 110 CPUs.
User action:
* If you do not want to collect operating system data, you can ignore this message. If you want to collect operating system data, reconfigure your Linux instance to support less than 110 CPUs.

Netif_stop_queue() cannot be called before register_netdev()
%s selects TX queue %d, but real number of TX queues is %d
%d output lines suppressed due to ratelimiting

Unknown opcode %02x
Severity: Error
Parameter:
   @1: Instruction opcode
Description:
The BPF JIT compiler has found an unknown instruction in the BPF program and therefore stops the compilation. As a fallback, the interpreter is used.
User action:
* Report this problem and the error message to your support organization.

Netif_stop_queue() cannot be called before register_netdev()
+ * Text: "%s is not a valid device for the cio_ignore kernel parameter\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: device bus-ID
+ * Description:
+ * The device specification for the cio_ignore kernel parameter is
+ * syntactically incorrect or specifies an unknown device. This device is not
+ * excluded from being sensed and analyzed.
+ * User action:
+ * Correct your device specification in the kernel parameter line to have the
+ * device excluded when you next reboot Linux. You can write the correct
+ * device specification to /proc/cio_ignore to add the device to the list of
+ * devices to be excluded. This does not immediately make the device
+ * inaccessible but the device is ignored if it disappears and later reappears.
+ */
+ */
+ */
+ * Text: "0.%x.%04x to 0.%x.%04x is not a valid range for cio_ignore\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: from subchannel set ID
+ * @2: from device number
+ * @3: to subchannel set ID
+ * @4: to device number
+ * Description:
+ * The device range specified for the cio_ignore kernel parameter is
+ * syntactically incorrect. No devices specified with this range are
+ * excluded from being sensed and analyzed.
+ * User action:
+ * Correct your range specification in the kernel parameter line to have the
+ * range of devices excluded when you next reboot Linux. You can write the
+ * correct range specification to /proc/cio_ignore to add the range of devices
+ * to the list of devices to be excluded. This does not immediately make the
+ * devices in the range inaccessible but any of these devices are ignored if
+ * they disappear and later reappear.
+ */
+ */
+ */
+ * Text: "Processing %s for channel path %x.%02x\n"
+ * Severity: Notice
+ * Parameter:
+ * @1: configuration change
+ * @2: channel subsystem ID
+ * @3: CHPID
+ * Description:
+ * A configuration change is in progress for the given channel path.
+ * User action:
+ * None.
+ */
+
+ */?
+ * Text: "No CCW console was found"
+ * Severity: Warning
+ * Description:
+ * Linux did not find the expected CCW console and tries to use an alternative
+ * console. A possible reason why the console was not found is that the console
+ * has been specified in the cio_ignore list.
+ * User action:
+ * None, if an appropriate alternative console has been found, and you want
+ * to use this alternative console. If you want to use the CCW console, ensure
+ * that is not specified in the cio_ignore list, explicitly specify the console
+ * with the 'condev=' kernel parameter, and reboot Linux.
+ */
+
+ */?
+ * Text: "Channel measurement facility initialized using format %s (mode %s)"
+ * Severity: Informational
+ * Parameter:
+ * @1: format
+ * @2: mode
+ * Description:
+ * The channel measurement facility has been initialized successfully.
+ * Format 'extended' should be used for z990 and later mainframe systems.
+ * Format 'basic' is intended for earlier mainframes. Mode 'autodetected' means
+ * that the format has been set automatically. Mode 'parameter' means that the
+ * format has been set according to the 'format=' kernel parameter.
+ * User action:
+ * None.
+ */
+
+ */?
+ * Text: "The CSS device driver initialization failed with errno=%d"
+ * Severity: Alert
+ * Parameter:
+ * @1: Return code
+ * Description:
+ * The channel subsystem bus could not be established.
+ * User action:
+ * See the errno man page to find out what caused the problem.
+ */
+
+ */?
+ * Text: "%s: Got subchannel machine check but no sch_event handler provided."
+ * Severity: Warning
+ * Parameter:
@1: Device bus-ID

Description:

Initialization of a device did not complete because it did not respond in
time or it was reserved by another operating system.

User action:

Make sure that the device is working correctly, then try again to set it
online. For devices that support the reserve/release mechanism (for example
DASDs), you can try to override the reservation of the other system by
writing 'force' to the 'online' sysfs attribute of the affected device.

Text: "%s: Setting the device online failed because it is not operational\n"

Severity: Warning

Parameter:

@1: Device bus-ID

Description:

Initialization of a device did not complete because it is not present or
not operational.

User action:

Make sure that the device is present and working correctly, then try again
to set it online.

Text: "%s: The device stopped operating while being set offline\n"

Severity: Warning

Parameter:

@1: Device bus-ID

Description:

The device is set offline, it was not present or not operational.
The device is now inactive, but setting it online again might fail.

User action:

None.

Text: "%s: The device entered boxed state while being set offline\n"

Severity: Warning

Parameter:

@1: Device bus-ID

Description:

While the device was set offline, it did not respond in time or it was
reserved by another operating system. The device is now inactive, but
setting it online again might fail.

User action:

None.
"Logging for subchannel 0.%x.%04x failed with errno=%d\n"
Severity: Warning
Parameter:
@1: subchannel set ID
@2: subchannel number
@3: errno
Description:
Capturing model-dependent logs and traces could not be triggered for the specified subchannel.
User action:
See the errno man page to find out what caused the problem.

"Logging for subchannel 0.%x.%04x was triggered\n"
Severity: Notice
Parameter:
@1: subchannel set ID
@2: subchannel number
Description:
Model-dependent logs and traces may be captured for the specified subchannel.
User action:
None.

"%s: No interrupt was received within %lus (CS=%02x, DS=%02x, CHPID=%x.%02x)\n"
Severity: Warning
Parameter:
@1: device number
@2: timeout value
@3: channel status
@4: device status
@5: channel subsystem ID
@6: CHPID
Description:
Internal I/Os are used by the common I/O layer to ensure that devices are operational and accessible.
The common I/O layer did not receive an interrupt for an internal I/O during the specified timeout period.
As a result, the device might assume a state that makes the device unusable to Linux until the problem is resolved.
User action:
Make sure that the device is working correctly and try the action again.
+ /*?
+ * Text: "Link stopped: RS=%02x RSID=%04x IC=%02x IUPARAMS=%s IUNODEID=%s AUPARAMS=%s
+ * Severity: Error
+ * Parameter:
+ *   @1: reporting source
+ *   @2: reporting source ID
+ *   @3: incident code
+ *   @4: incident unit parameters
+ *   @5: incident unit node ID
+ *   @6: attached unit parameters
+ *   @7: attached unit node ID
+ */
+
+ * Description:
+ * A hardware error has occurred. A unit at one end of an interface link has detected a failure in the link or in one of the units attached to the link. As a result, data transfer across the link has stopped. In the message text, the node IDs of involved units are represented in the following format: TTTTTT/MDL,MMM,PPSSSSSSSSSSSS,XXXX where TTTTTT refers to the machine type, MDL the model number, MMM the manufacturer, PP the manufacturing plant, SSSSSSSSSSS the unit sequence number and XXXX the machine type-dependent physical interface number. If no data is available for the unit parameters or node ID field, "n/a" is used instead.
+
+ * User action:
+ * Report the problem to your support organization.
+ */
+
+ /*?
+ * Text: "Link degraded: RS=%02x RSID=%04x IC=%02x IUPARAMS=%s IUNODEID=%s AUPARAMS=%s
+ * Severity: Warning
+ * Parameter:
+ *   @1: reporting source
+ *   @2: reporting source ID
+ *   @3: incident code
+ *   @4: incident unit parameters
+ *   @5: incident unit node ID
+ *   @6: attached unit parameters
+ *   @7: attached unit node ID
+ */
+
+ * Description:
+ * A hardware error has occurred. A unit at one end of an interface link has detected a failure in the link or in one of the units attached to the link. As a result, data transfer across the link is degraded. In the message text, the node IDs of involved units are represented in the following format: TTTTTT/MDL,MMM,PPSSSSSSSSSSSS,XXXX where TTTTTT refers to the machine type, MDL the model number, MMM the manufacturer, PP the
+ * manufacturing plant, SSSSSSSSSSSS the unit sequence number and XXXX the
+ * machine type-dependent physical interface number. If no data is available
+ * for the unit parameters or node ID field, ”n/a” is used instead.
+ *
+ * User action:
+ * Report the problem to your support organization.
+ */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting
" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/cpcmd
+++ linux-4.15.0/Documentation/kmsg/s390/cpcmd
@@ -0,0 +1,16 @@
+/*?
+ * Text: "The cpcmd kernel function failed to allocate a response buffer
" 
+ * Severity: Warning
+ * Description:
+ * IPL code, console detection, and device drivers like vmcp or vmlogrdr use
+ * the cpcmd kernel function to send commands to the z/VM control program (CP).
+ * If a program that uses the cpcmd function does not allocate a contiguous
+ * response buffer below 2 GB guest real storage, cpcmd creates a bounce buffer
+ * to be used as the response buffer. Because of low memory or memory
+ * fragmentation, cpcmd could not create the bounce buffer.
+ * User action:
+ * Look for related page allocation failure messages and at the stack trace to
+ * find out which program or operation failed. Free some memory and retry the
+ * failed operation. Consider allocating more memory to your z/VM guest virtual
+ * machine.
+ */
--- linux-4.15.0.orig/Documentation/kmsg/s390/cpu
+++ linux-4.15.0/Documentation/kmsg/s390/cpu
@@ -0,0 +1,46 @@
+/*?
+ * Text: "%d configured CPUs, %d standby CPUs
" 
+ * Severity: Informational
+ * Parameter:
+ * @1: number of configured CPUs
+ * @2: number of standby CPUs
+ * Description:
+ * The kernel detected the given number of configured and standby CPUs.
+ * User action:
+ * None.
+ */
+/*?
+ * Text: "The CPU configuration topology of the machine is:
" 
+ * Severity: Informational
+ * Description:
+ * The first six values of the topology information represent fields Mag6 to
+ * Mag1 of system-information block (SYSIB) 15.1.2. These fields specify the
maximum numbers of topology-list entries (TLE) at successive topology nesting
levels. The last value represents the MNest value of SYSIB 15.1.2 which
specifies the maximum possible nesting that can be configured through
dynamic changes. For details see the SYSIB 15.1.2 information in the
"Principles of Operation."
User action:
None.
*/

Text: "CPU %i exceeds the maximum %i and is excluded from the dump\n"
Severity: Warning
Parameter:
@1: CPU number
@2: maximum CPU number
Description:
The Linux kernel is used as a system dumper but it runs on more CPUs than
it has been compiled for with the CONFIG_NR_CPUS kernel configuration.
The system dump will be created but information on one or more
CPUs will be missing.
User action:
Update the system dump kernel to a newer version that supports more
CPUs or reduce the number of installed CPUs and reproduce the problem
that should be analyzed. If you send the system dump that prompted this
message to a support organization, be sure to communicate that the dump
does not include all CPU information.
*/

Text: "Enabling the performance measuring unit failed with rc=%x\n"
Severity: Error
Parameter:
@1: error condition
Description:
The device driver failed to enable CPU counter sets with the
load counter controls (lcctl) instruction.
See the section about lcctl in "The Load-Program-Parameter and the CPU-Measurement
Facilities", SA23-2260, for an explanation of the error conditions.
User action:
Stop the performance measurement programs and try again.
*/

Text: "Disabling the performance measuring unit failed with rc=%x\n"
Severity: Error
Parameter:
@1: error condition

Description:
The device driver failed to disable CPU counter sets with the
load counter controls (lcctl) instruction.
See the section about lcctl in "The Load-Program-Parameter and the CPU-Measurement
Facilities", SA23-2260, for an explanation of the error conditions.
User action:
Stop the performance measurement programs and try again.

Text: "Registering the cpum_cf PMU failed with rc=%i"
Severity: Error
Parameter:
@1: error code
Description:
The device driver could not register the Performance Measurement Unit (PMU)
for the CPU-measurement counter facility.
A possible cause of this problem is memory constraints.
User action:
If the error code is -12 (ENOMEM), consider assigning more memory
to your Linux instance.

Text: "CPU[%i] Counter data was lost"
Severity: Error
Parameter:
@1: cpu number
Description:
CPU counter data was lost because of machine internal
high-priority activities.
User action:
None.

Text: "Registering for CPU-measurement alerts failed with rc=%i"
Severity: Error
Parameter:
@1: error code
Description:
The device driver could not register to receive CPU-measurement alerts.
Alerts make you aware of measurement errors.
A possible cause of this problem is memory constraints.
User action:
If the error code is -12 (ENOMEM), consider assigning more memory
+ * to your Linux instance.
+ */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/cpum_sf
+++ linux-4.15.0/Documentation/kmsg/s390/cpum_sf
@@ -0,0 +1,104 @@
+/*?
+ * Text: "The sampling buffer limits have changed to: min=%lu max=%lu (diag=x%lu)\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: minimum size in sample-data-blocks
+ *   @2: maximum size in sample-data-blocks
+ *   @3: size factor for buffering diagnostic-sampling data entries
+ * Description:
+ * The minimum or maximum size limit for the sampling facility buffer was
+ * changed. The change is effective immediately.
+ * User action:
+ * None.
+ */
+
+/*? 
+ * Text: "Switching off the sampling facility failed with rc=%i\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: error condition
+ * Description:
+ * The CPU-measurement sampling facility could not be switched off and continues
+ * to run. For details, see LOAD SAMPLING CONTROLS in
+ * User action:
+ * If this problem persists, reboot your Linux instance.
+ */
+
+/*? 
+ * Text: "Sample data was lost\n"
+ * Severity: Error
+ * Description:
+ * Sample data was lost because of machine-internal high-priority activities.
+ * The sampling facility is stopped.
+ * User action:
+ * End all performance measurement sessions. Discard the measurement data,
+ * which are likely to be flawed. Repeat your measurements.
+ * If the problem persists, contact your hardware administrator.
+ */
+
+/*? 
+ * Text: "Sampling facility support for perf is not available: reason=%04x\n"
+ * Severity: Error
Parameter:
   @1: reason code

Description:
   The device driver could not initialize the sampling facility support.
   Possible reason codes are:
   0001: The device driver failed to query CPU-measurement sampling facility information.
   0002: The device driver does not support the basic-sampling function that is available on the LPAR within which the Linux instance runs.
   0003: The device driver could not register to receive CPU-measurement alerts. A possible cause of this problem is memory constraints.
   0004: The device driver could not register the Performance Measurement Unit (PMU) for the CPU-measurement sampling facility. A possible cause of this problem is memory constraints.

User action:
   Consider assigning more memory to your Linux instance.

Text: "Loading sampling controls failed: op=%i err=%i\n"
   Severity: Error
   @1: Type of operation
   @2: Error condition

Description:
   The sampling facility support could not load sampling controls to enable (operation type 1) or disable (operation type 2) the CPU-measurement sampling facility. For details of the error condition, see LOAD SAMPLING CONTROLS in "The Load-Program-Parameter and the CPU-Measurement Facilities", SA23-2260.

User action:
   If the problem persists, reboot your Linux instance.

Text: "A sampling buffer entry is incorrect (alert=0x%x)\n"
   Severity: Error
   @1: Alert code

Description:
   An incorrect sampling facility buffer entry was detected. The alert code indicates the root cause, for example, an incorrect entry address or an incorrect sample-data-block-table entry.

User action:
   End active performance measurement sessions, for example, perf processes. If the problem persists, reboot your Linux instance.
Registering for s390dbf failed
Severity: Error
Description:
The device driver failed to register for the s390 debug feature. You will not receive any debug information. A possible cause of this problem is memory constraints.
User action:
Consider assigning more memory
to your Linux instance.

%s: %d output lines suppressed due to ratelimiting

An I/O-error occurred on the CTCM device
Severity: Error
Parameter:
@1: bus ID of the CTCM device
Description:
Depending on the error, the CTCM device driver might attempt an automatic recovery.
User action:
Check the status of the CTCM device, for example, with ifconfig. If the device is not operational, perform a manual recovery. See "Device Drivers, Features, and Commands" for details about how to recover a CTCM device.

An adapter hardware operation timed out
Severity: Error
Parameter:
@1: bus ID of the CTCM device
Description:
The CTCM device uses an adapter to physically connect to its communication peer. An operation on this adapter timed out.
User action:
Check the status of the CTCM device, for example, with ifconfig. If the device is not operational, perform a manual recovery. See "Device Drivers, Features, and Commands" for details about how to recover a CTCM device.
+ */
+
+/*.?
+ * Text: "%s: An error occurred on the adapter hardware"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the CTCM device
+ * Description:
+ * The CTCM device uses an adapter to physically connect to its communication peer. An operation on this adapter returned an error.
+ * User action:
+ * Check the status of the CTCM device, for example, with ifconfig. If the device is not operational, perform a manual recovery. See "Device Drivers, Features, and Commands" for details about how to recover a CTCM device.
+ */
+
+/*.?
+ * Text: "%s: The communication peer has disconnected"
+ * Severity: Notice
+ * Parameter:
+ *   @1: channel ID
+ * Description:
+ * The remote device has disconnected. Possible reasons are that the remote interface has been closed or that the operating system instance with the communication peer has been rebooted or shut down.
+ * User action:
+ * Check the status of the peer device. Ensure that the peer operating system instance is running and that the peer interface is operational.
+ */
+
+/*.?
+ * Text: "%s: The remote operating system is not available"
+ * Severity: Notice
+ * Parameter:
+ *   @1: channel ID
+ * Description:
+ * The operating system instance with the communication peer has disconnected. Possible reasons are that the operating system instance has been rebooted or shut down.
+ * User action:
+ * Ensure that the peer operating system instance is running and that the peer interface is operational.
+ */
+
+/*.?
+ * Text: "%s: The adapter received a non-specific IRQ"
+ * Severity: Warning
+ * Parameter:
@1: bus ID of the CTCM device

Description:
The adapter hardware used by the CTCM device received an IRQ that cannot be mapped to a particular device. This is a hardware problem.

User action:
Check the status of the CTCM device, for example, with `ifconfig`. Check if the connection to the remote device still works. If the CTCM device is not operational, set it offline and back online. If this does not resolve the problem, perform a manual recovery. See "Device Drivers, Features, and Commands" for details about how to recover a CTCM device. If this problem persists, gather Linux debug data, collect the hardware logs, and report the problem to your support organization.

Text: 
%: A check occurred on the subchannel
Severity: Warning
Parameter:
@1: bus ID of the CTCM device

Description:
A check condition has been detected on the subchannel.

User action:
Check if the connection to the remote device still works. If the CTCM device is not operational, set it offline and back online. If this does not resolve the problem, perform a manual recovery. See "Device Drivers, Features, and Commands" for details about how to recover a CTCM device. If this problem persists, gather Linux debug data and report the problem to your support organization.

Text: 
%: The communication peer is busy
Severity: Informational
Parameter:
@1: channel ID

Description:
A busy target device was reported. This might be a temporary problem.

User action:
If this problem persists or is reported frequently ensure that the target device is working properly.

Text: 
%: The specified target device is not valid
Severity: Error
Parameter:
@1: channel ID

Description:
A target device was called with a faulty device specification. This is an adapter hardware problem.

User action:
Gather Linux debug data, collect the hardware logs, and contact IBM support.

/*
 * Text: "An I/O operation resulted in error %04x\n"
 * Severity: Error
 * Parameter:
 * @1: channel ID
 * @2: error information
 * Description:
 * A hardware operation ended with an error.
 * User action:
 * Check the status of the CTCM device, for example, with ifconfig. If the device is not operational, perform a manual recovery. See "Device Drivers, Features, and Commands" for details about how to recover a CTCM device.
 * If this problem persists, gather Linux debug data, collect the hardware logs, and report the problem to your support organization.
 */

/*
 * Text: "%s: Initialization failed with RX/TX init handshake error %s\n"
 * Severity: Warning
 * Parameter:
 * @1: bus ID of the CTCM device
 * @2: error information
 * Description:
 * A problem occurred during the initialization of the connection. If the connection can be established after an automatic recovery, a success message is issued.
 * User action:
 * If the problem is not resolved by the automatic recovery process, check the local and remote device. If this problem persists, gather Linux debug data and report the problem to your support organization.
 */

/*
 * Text: "%s: The network backlog for %s is exceeded, package dropped\n"
 * Severity: Warning
 * Parameter:
 * @1: bus ID of the CTCM device
 * @2: calling function
 * Description:
 * There is more network traffic than can be handled by the device. The device is closed and some data has not been transmitted. The device might be recovered automatically.
+ * User action:
+ * Investigate and resolve the congestion. If necessary, set the device
+ * online to make it operational.
+ */
+
+ /* User action:
+ * @1: bus ID of the CTCM device
+ * @2: return code
+ */
+
+ /* Text: "%s: The XID used in the MPC protocol is not valid, rc = %d\n"
+ * Severity: Warning
+ * Parameter:
+ * The exchange identification (XID) used by the CTCM device driver when
+ * in MPC mode is not valid.
+ * User action:
+ * Note the error information provided with this message and contact your
+ * support organization.
+ */
+
+ /*? Text: "CTCM driver unloaded\n" */
+ /*? Text: "%s: %s Internal error: net_device is NULL, ch = 0x%p\n" */
+ /*? Text: "%s / Initializing the ctcm device driver failed, ret = %d\n" */
+ /*? Text: "%s: %s Internal error: Can't determine channel for interrupt device %s\n" */
+ /*? Text: "CTCM driver initialized\n" */
+ /*? Text: "%s: setup OK : r/w = %s/%s, protocol : %d\n" */
+ /*? Text: "%s: Connected with remote side\n" */
+ /*? Text: "%s: Restarting device\n" */
+ /*? Text: "netif_stop_queue() cannot be called before register_netdev()\n" */
+ /*? Text: "flen=%u proglen=%u pass=%u image=%pK from=%s pid=%d\n" */
+ /*? Text: "%s selects TX queue %d, but real number of TX queues is %d\n" */
+ /*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/dasd
+++ linux-4.15.0/Documentation/kmsg/s390/dasd
@@ -0,0 +1,704 @@
+/* dasd_ioctl */
+
+ /* Text: "%s: The DASD has been put in the quiesce state\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: bus ID of the DASD
+ */
+
+ /* Text: "%s: The DASD has been put in the quiesce state\n"
Text: "%s: I/O operations have been resumed on the DASD\n"
Severity: Informational
Parameter:
@1: bus ID of the DASD
Description:
The DASD is no longer in state quiesce and I/O operations can be performed
on the device.
User action:
None.

Text: "%s: The DASD cannot be formatted while it is enabled\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
The DASD you try to format is enabled. Enabled devices cannot be formatted.
User action:
Contact the owner of the formatting tool.

Text: "%s: The specified DASD is a partition and cannot be formatted\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
The DASD you try to format is a partition. Partitions cannot be formatted
separately. You can only format a complete DASD including all its partitions.
User action:
Format the complete DASD.
ATTENTION: Formatting irreversibly destroys all data on all partitions
of the DASD.

Text: "%s: The specified DASD is a partition and cannot be checked\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
The DASD you try to check is a partition. Partitions cannot be checked
separately. You can only check a complete DASD including all its partitions.
User action:
Check the complete DASD.
+/*?
+ * Text: "%s: Formatting unit %d failed with rc=%d\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: start track
+ *   @3: return code
+ * Description:
+ *   The formatting process might have been interrupted by a signal, for example,
+ *   CTRL+C. If the process was not interrupted intentionally, an I/O error
+ *   might have occurred.
+ * User action:
+ *   Retry to format the device. If the error persists, check the log file for
+ *   related error messages. If you cannot resolve the error, note the return
+ *   code and contact your support organization.
+ */
+
+/* dasd */
+
+/*?
+ * Text: "%s: Cancelling request %p failed with rc=%d\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: pointer to request
+ *   @3: return code of previous function
+ * Description:
+ *   In response to a user action, the DASD device driver tried but failed to
+ *   cancel a previously started I/O operation.
+ * User action:
+ *   Try the action again.
+ */
+
+/*?
+ * Text: "%s: Flushing the DASD request queue failed for request %p\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: pointer to request
+ * Description:
+ *   As part of the unloading process, the DASD device driver flushes the
+ *   request queue. This failed because a previously started I/O operation
+ *   could not be canceled.
+ * User action:
+ *   Try again to unload the DASD device driver or to shut down Linux.
+ */
+
The DASD device driver could not be initialized
Severity: Informational
Description:
The initialization of the DASD device driver failed because of previous
errors.
User action:
Check for related previous error messages.
*/

Text: "%s: Accessing the DASD failed because it is in probeonly mode"
Severity: Informational
Parameter:
@1: bus ID of the DASD
Description:
The dasd= module or kernel parameter specified the probeonly attribute for
the DASD you are trying to access. The DASD device driver cannot access
DASDs that are in probeonly mode.
User action:
Change the dasd= parameter as to omit probeonly for the DASD and reload
the DASD device driver. If the DASD device driver has been compiled into
the kernel, reboot Linux.
*/

Text: "%s: cqr %p timed out (%lus), %i retries remaining"
Severity: Error
Parameter:
@1: bus ID of the DASD
@2: request
@3: timeout value
@4: number of retries left
Description:
A try of the error recovery procedure (ERP) for the channel queued request
(cqr) timed out and failed to recover the error. ERP continues for the DASD.
User action:
Ignore this message if it occurs infrequently and if the recovery succeeds
during one of the retries. If this error persists, check for related
previous error messages and report the problem to your support organization.

The timeout can be changed by writing a new value to the sysfs 'expires' attribute of the DASD. The value specifies the timeout in seconds.
*/

Text: "%s: cqr %p timed out (%lus) but cannot be ended, retrying in 5 s"
Severity: Error
Parameter:
@1: bus ID of the DASD
@2: request
@3: timeout value

Description:
A try of the error recovery procedure (ERP) for the channel queued request timed out and failed to recover the error. The I/O request submitted during the try could not be canceled. The ERP waits for 5 seconds before trying again.

User action:
Ignore this message if it occurs infrequently and if the recovery succeeds during one of the retries. If this error persists, check for related previous error messages and report the problem to your support organization.

The timeout can be changed by writing a new value to the sysfs 'expires' attribute of the DASD. The value specifies the timeout in seconds.

Text: "%s: The DASD cannot be set offline while it is in use\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
The DASD cannot be set offline because it is in use by an internal process. An action to free the DASD might not have completed yet.

User action:
Wait some time and set the DASD offline later.

Text: "%s: The DASD cannot be set offline with open count %i\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
@2: count

Description:
The DASD is being used by one or more processes and cannot be set offline.

User action:
Ensure that the DASD is not in use anymore, for example, unmount all partitions. Then try again to set the DASD offline.

Text: "%s: Setting the DASD online failed with rc=%d\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
@2: return code
+ * Description:
+ * The DASD could not be set online because of previous errors.
+ * User action:
+ * Look for previous error messages. If you cannot resolve the error, note
+ * the return code and contact your support organization.
+ */
+
+ /*?
+ * Text: "%s Setting the DASD online with discipline %s failed with rc=%i\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * @2: discipline
+ * @3: return code
+ * Description:
+ * The DASD could not be set online because of previous errors.
+ * User action:
+ * Look for previous error messages. If you cannot resolve the error, note the
+ * return code and contact your support organization.
+ */
+
+ /*?
+ * Text: "%s Setting the DASD online failed because of missing DIAG discipline\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * The DASD was to be set online with discipline DIAG but this discipline of
+ * the DASD device driver is not available.
+ * User action:
+ * Ensure that the dasd_diag_mod module is loaded. If your Linux system does
+ * not include this module, you cannot set DASDs online with the DIAG
+ * discipline.
+ */
+
+ /*?
+ * Text: "%s Setting the DASD online failed because of a missing discipline\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * The DASD was to be set online with a DASD device driver discipline that
+ * is not available.
+ * User action:
+ * Ensure that all DASD modules are loaded correctly.
+ */
+ +
+---------------------------
+/*
+ * Text: "The statistics feature has been switched off"
+ * Severity: Informational
+ * Description:
+ * The statistics feature of the DASD device driver has been switched off.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "The statistics feature has been switched on"
+ * Severity: Informational
+ * Description:
+ * The statistics feature of the DASD device driver has been switched on.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "The statistics have been reset"
+ * Severity: Informational
+ * Description:
+ * The DASD statistics data have been reset.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "%s is not a supported value for /proc/dasd/statistics"
+ * Severity: Warning
+ * Parameter:
+ *   @1: value
+ * Description:
+ * An incorrect value has been written to /proc/dasd/statistics.
+ * The supported values are: 'set on', 'set off', and 'reset'.
+ * User action:
+ * Write a supported value to /proc/dasd/statistics.
+ */
+
+/*?
+ * Text: "%s is not a valid device range"
+ * Severity: Error
+ * Parameter:
+ *   @1: range
+ * Description:
+ * A device range specified with the dasd= parameter is not valid.
User action:
Examine the dasd= parameter and correct the device range.

User action:

User action:

User action:

User action:

User action:

User action:

User action:
%s is not a supported device option

**Severity:** Warning

**Parameter:**
- **@1:** length of option code
- **@2:** option code

**Description:**
The dasd= parameter includes an unknown option for a DASD or a device range.
Options are specified in parenthesis and immediately follow a device or device range.

**User action:**
Check the dasd= syntax and remove any unsupported options from the dasd= parameter specification.

---

PAV support has be deactivated

**Severity:** Informational

**Description:**
The 'nopav' keyword has been specified with the dasd= kernel or module parameter. The Parallel Access Volume (PAV) support of the DASD device driver has been deactivated.

**User action:**
None.

---

'nopav' is not supported on z/VM

**Severity:** Informational

**Description:**
For Linux instances that run as guest operating systems of the z/VM hypervisor Parallel Access Volume (PAV) support is controlled by z/VM not by Linux.

**User action:**
Remove 'nopav' from the dasd= module or kernel parameter specification.

---

High Performance FICON support has been deactivated

**Severity:** Informational

**Description:**
The 'nofcx' keyword has been specified with the dasd= kernel or module parameter. The High Performance FICON (transport mode) support of the DASD device driver has been deactivated.

**User action:**
None.

The dasd= parameter value %s has an invalid ending.
Severity: Warning
Parameter:
@1: parameter value
Description:
The specified value for the dasd= kernel or module parameter is not correct.
User action:
Check the module or the kernel parameter.
*/

Registering the device driver with major number %d failed.
Severity: Warning
Parameter:
@1: DASD major
Description:
Major number 94 is reserved for the DASD device driver. The DASD device
driver failed to register with this major number. Another device driver
might have used major number 94.
User action:
Determine which device driver uses major number 94 instead of the DASD
device driver and unload this device driver. Then try again to load the
DASD device driver.
*/

%s: default ERP has run out of retries and failed.
Severity: Error
Parameter:
@1: bus ID of the DASD
Description:
The error recovery procedure (ERP) tried to recover an error but the number
of retries for the I/O was exceeded before the error could be resolved.
User action:
Check for related previous error messages.
*/

%s: Unable to terminate request %p on suspend.
Severity: Error
Parameter:
@1: bus ID of the DASD
@2: pointer to request
Description:
As part of the suspend process, the DASD device driver terminates requests
on the request queue. This failed because a previously started I/O operation
could not be canceled. The suspend process will be stopped.
User action:
+ * Try again to suspend the system.
+ */
+
+ /*?
+ * Text: "%s: ERP failed for the DASD\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * An error recovery procedure (ERP) was performed for the DASD but failed.
+ * User action:
+ * Check the message log for previous related error messages.
+ */
+
+ /*?
+ * Text: "%s: An error occurred in the DASD device driver, reason=%s\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the DASD
+ * @2: reason code
+ * Description:
+ * This problem indicates a program error in the DASD device driver.
+ * User action:
+ * Note the reason code and contact your support organization.
+ */
+
+ /*?
+ * Text: "%s: No operational channel path is left for the device\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * All channel paths to the device have become non-operational. The DASD device driver suspends I/O operations and queues I/O requests for this device until at least one channel path becomes operational again.
+ * User action:
+ * Ensure that each channel path to the device has been set up correctly and that the related physical cable connections are in place.
+ */
+
+ /*?
+ * Text: "%s: No verified channel paths remain for the device\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * All verified channel paths to the device have become non-operational.
+ * Any other paths to the device have previously been identified as not usable.
The DASD device driver suspends I/O operations and queues I/O requests for this device until at least one channel path becomes operational again.

User action:

Ensure that each channel path to the device has been set up correctly and that the related physical cable connections are in place.

Set all paths to the device offline and online again to repeat the path verification. Alternatively, set the device offline and online again to verify all available paths for this device.

If this problem persists, gather Linux debug data and report the problem to your support organization.

Text: "%s: A channel path to the device has become operational\n"
Severity: Informational
Parameter:
   @1: bus ID of the DASD
Description:
At least one channel path of this device has become operational again.
The DASD device driver resumes I/O operations to the device and processes the I/O requests that were queued while there was no operational channel path.

User action:
None.

Text: "%s: A 64-bit DIAG call failed\n"
Severity: Warning
Parameter:
   @1: bus ID of the DASD
Description:
64-bit DIAG calls require a 64-bit z/VM version.
User action:
Use z/VM 5.2 or later or set the sysfs `use_diag' attribute of the DASD to 0 to switch off DIAG.

Text: "%s: Accessing the DASD failed because of an incorrect format (rc=%d)\n"
Severity: Warning
Parameter:
   @1: bus ID of the DASD
   @2: return code
Description:
The format of the DASD is not correct.

User action:

Check the device format. For details about the return code see the section about the INITIALIZE function for DIAGNOSE Code '250' in "z/VM CP Programming Services". If you cannot resolve the error, note the return code and contact your support organization.

User action:
this problem are that the device has a device type other than FBA or ECKD,
+ or has a block size other than one of the supported sizes:
+ 512 byte, 1024 byte, 2048 byte, or 4096 byte.
+ User action:
+ Ensure that the device can be written to and has a supported device type
+ and block size. For details about the return code see the section about
+ the INITIALIZE function for DIAGNOSE Code X'250' in "z/VM CP Programming
+ Services". If you cannot resolve the error, note the error code and contact
+ your support organization.
+ */
+
+ Text: "%s: Device type %d is not supported in DIAG mode\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the DASD
+ @2: device type
+ Description:
+ Only DASD of type FBA and ECKD are supported in DIAG mode.
+ User action:
+ Set the sysfs 'use_diag' attribute of the DASD to 0 and try again to access
+ the DASD.
+ */
+
+ Text: "Discipline %s cannot be used without z/VM\n"
+ Severity: Informational
+ Parameter:
+ @1: discipline name
+ Description:
+ The discipline that is specified with the dasd= kernel or module parameter
+ is only available for Linux instances that run as guest operating
+ systems of the z/VM hypervisor.
+ User action:
+ Remove the unsupported discipline from the parameter string.
+ */
+
+ Text: "%s: The access mode of a DIAG device changed to read-only\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the DASD
+ Description:
+ A device changed its access mode from writeable to
+ read-only while in use.
+ User action:
+ Set the device offline, ensure that the device is configured correctly in
+ z/VM, then set the device online again.
%s: A timeout error occurred for cqr %p

Severity: Error
Parameter:
   @1: bus ID of the DASD
   @2: pointer to request
Description:
A channel queued request (cqr) failed because it timed out.
One possible reason for this error is that a request did not
complete within the timeout interval specified for the DASD.
The timeout interval is set as the value of the 'timeout' sysfs
attribute of a DASD. A value of 0 disables the timeout function.
The timeout function can be used; for example, by mirroring setups;
to quickly process a request queue for a DASD that has become unavailable.
User action:
Check the message log for previous related error messages. Verify
that the storage server and the connection from host to storage
server are operational. If the 'timeout' sysfs attribute of the
DASD has been set to a value other than 0, verify that this
setting is intentional and change it if required.

%s: A transport error occurred for cqr %p

Severity: Error
Parameter:
   @1: bus ID of the DASD
   @2: pointer to request
Description:
A channel queued request (cqr) failed because the connection to the
device was lost and the 'failfast' flag is set for the request.
This flag can result from, for example:
- A software layer above the DASD device driver;
  for example, in a host based mirroring setup.
- Value 1 for the 'failfast' sysfs attribute of the DASD.
  This setting applies to all requests on the DASD.
User action:
Ensure that each channel path to the device has been set up
correctly and that the related physical cable connections are in
place. If the 'failfast' attribute of the DASD is set to 1,
verify that this setting is intentional and change it to 0 if required.

+*/

+*/?

+ Text: "%s Setting the DASD online failed because the required module %s could not be loaded (rc=%d)\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the DASD
+ @2: kernel module name
+ @3: return code
+ Description:
+ The DASD was to be set online with discipline DIAG but this discipline of
+ the DASD device driver is not available and an attempt to load the
+ corresponding kernel module failed with the specified return code.
+ User action:
+ Ensure that the kernel module with the specified name is correctly installed
+ or set the sysfs 'use_diag' attribute of the DASD to 0 to switch off DIAG.
+ */
+*/? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/dasd-eckd
+++ linux-4.15.0/Documentation/kmsg/s390/dasd-eckd
@@ -0,0 +1,2154 @@
+ dasd_eckd */
+
+*/?
+ Text: "%s: ERP failed for the DASD\n"
+ Severity: Error
+ Parameter:
+ @1: bus ID of the DASD
+ Description:
+ An error recovery procedure (ERP) was performed for the DASD but failed.
+ User action:
+ Check the message log for previous related error messages.
+ */
+
+*/?
+ Text: "%s: An error occurred in the DASD device driver, reason=%s\n"
+ Severity: Error
+ Parameter:
+ @1: bus ID of the DASD
+ @2: reason code
+ Description:
+ This problem indicates a program error in the DASD device driver.
+ User action:
+ Note the reason code and contact your support organization.
+ */

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+/*?
+ * Text: "%s: Allocating memory for private DASD data failed\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * The DASD device driver maintains data structures for each DASD it manages.
+ * There is not enough memory to allocate these data structures for one or
+ * more DASD.
+ * User action:
+ * Free some memory and try the operation again.
+ */
+
+/*?
+ * Text: "%s: DASD with %d KB/block, %d KB total size, %d KB/track, %s\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: block size
+ *   @3: DASD size
+ *   @4: track size
+ *   @5: disc layout
+ * Description:
+ * A DASD with the shown characteristics has been set online.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "%s: Start track number %u used in formatting is too big\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: track number
+ * Description:
+ * The DASD format I/O control was used incorrectly by a formatting tool.
+ * User action:
+ * Contact the owner of the formatting tool.
+ */
+
+/*?
+ * Text: "%s: Stop track number %u used in formatting is too big\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: track number
+ * Description:
+ * The DASD format I/O control was used incorrectly by a formatting tool.
/* User action:
   Contact the owner of the formatting tool.
*/

/* Text: "%s: The DASD is not formatted\n"
* Severity: Warning
* Parameter:
  @1: bus ID of the DASD
* Description:
  A DASD has been set online but it has not been formatted yet. You must
  format the DASD before you can use it.
* User action:
  Format the DASD, for example, with dasdfmt.
*/

/* Text: "%s: 0x%x is not a known command\n"
* Severity: Error
* Parameter:
  @1: bus ID of the DASD
  @2: command
* Description:
  This problem is likely to be caused by a programming error.
* User action:
  Contact your support organization.
*/

/* Text: "%s: Track 0 has no records following the VTOC\n"
* Severity: Warning
* Parameter:
  @1: bus ID of the DASD
* Description:
  Linux has identified a volume table of contents (VTOC) on the DASD but
  cannot read any data records following the VTOC. A possible cause of this
  problem is that the DASD has been used with another System z operating
  system.
* User action:
  Format the DASD for usage with Linux, for example, with dasdfmt.
  ATTENTION: Formatting irreversibly destroys all data on the DASD.
*/

/* Text: "%s: An I/O control call used incorrect flags 0x%x\n"
* Severity: Warning
* Parameter:
  @1: bus ID of the DASD
The DASD format I/O control was used incorrectly.

User action:

Contact the owner of the formatting tool.

Description:

The DASD with the shown characteristics has been set online.

User action:

None.

Description:

The DASD device driver only supports the following disk layouts: CDL, LDL, FBA, CMS, and CMS RESERVED.

User action:

None.

Description:

Start track used in formatting exceeds end track

User action:

None.
+ * Description:
+ * The DASD format I/O control was used incorrectly by a formatting tool.
+ * User action:
+ * Contact the owner of the formatting tool.
+ */
+
+/*?
+ * Text: "%s: The DASD cache mode was set to %x (%i cylinder prestage)\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: bus ID of the DASD
+ * @2: operation mode
+ * @3: number of cylinders
+ * Description:
+ * The DASD cache mode has been changed. See the storage system documentation
+ * for information about the different cache operation modes.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "%s: The DASD cannot be formatted with block size %u\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * @2: block size
+ * Description:
+ * The block size specified for a format instruction is not valid. The block
+ * size must be between 512 and 4096 byte and must be a power of 2.
+ * User action:
+ * Call the format command with a supported block size.
+ */
+
+/*?
+ * Text: "%s: The UID of the DASD has changed\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * The Unique Identifier (UID) of a DASD that is currently in use has changed.
+ * This indicates that the physical disk has been replaced.
+ * User action:
+ * None if the replacement was intentional.
+ * If the disk change is not expected, stop using the disk to prevent possible
+ * data loss.
+ */
+
+}
/* dasd_3990_erp */
+
+ /* Text: "%s: is offline or not installed - INTERVENTION REQUIRED!!\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * The DASD to be accessed is not in an accessible state. The I/O operation
+ * will wait until the device is operational again. This is an operating system
+ * independent message that is issued by the storage system.
+ * User action:
+ * Make the DASD accessible again. For details see the storage system
+ * documentation.
+ */
+
+ /* Text: "%s: The DASD cannot be reached on any path (lpum=%x/opm=%x)\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: last path used mask
+ *   @3: online path mask
+ * Description:
+ * After a path to the DASD failed, the error recovery procedure of the DASD
+ * device driver tried but failed to reconnect the DASD through an alternative
+ * path.
+ * User action:
+ * Ensure that the cabling between the storage server and the mainframe
+ * system is securely in place. Check the file systems on the DASD when it is
+ * accessible again.
+ */
+
+ /* Text: "%s: Unable to allocate DCTL-CQR\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an internal error.
+ * User action:
+ * Contact your support organization.
+ */
+
+ /* Text: "%s: FORMAT 0 - Invalid Parameter\n"
+ * Severity: Warning
+ * Parameter:
@1: bus ID of the DASD

Description:
A data argument of a command is not valid. This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

/*
*/

Text: "%s: FORMAT 0 - DPS Installation Check\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
This operating system independent message is issued by the storage system for one of the following reasons:
- A 3380 Model D or E DASD does not have the Dynamic Path Selection (DPS) feature in the DASD A-unit.
- The device type of an attached DASD is not supported by the firmware.
- A type 3390 DASD is attached to a 3 MB channel.

User action:
For more information see the documentation of your storage system.

*/

Text: "%s: FORMAT 2 - Reserved\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

*/

Text: "%s: FORMAT 1 - Drive motor switch is off\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

*/
Parameter:
@1: bus ID of the DASD

Description:
This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 1 - Device status 1 not valid"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 0 - Storage Path Restart"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
An operation for an active channel program was queued in a Storage Control when a warm start was received by the path. This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 0 - Reset Notification"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
A system reset or its equivalent was received on an interface. The Unit Check that generates this sense is posted to the next channel initiated selection following the resetting event. This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

 
+/#?
+  * Text: "%s: FORMAT 0 - Invalid Command Sequence\n"
+  * Severity: Warning
+  * Parameter:
+  *   @1: bus ID of the DASD
+  * Description:
+  * An incorrect sequence of commands has occurred. This is an operating system
+  * independent message that is issued by the storage system.
+  * User action:
+  * For more information see the documentation of your storage system.
+  */
+
+/#?
+  * Text: "%s: FORMAT 1 - Missing device address bit\n"
+  * Severity: Warning
+  * Parameter:
+  *   @1: bus ID of the DASD
+  * Description:
+  * This is an operating system independent message that is issued by the
+  * storage system.
+  * User action:
+  * For more information see the documentation of your storage system.
+  */
+
+/#?
+  * Text: "%s: FORMAT F - Subsystem Processing Error\n"
+  * Severity: Warning
+  * Parameter:
+  *   @1: bus ID of the DASD
+  * Description:
+  * A firmware logic error has been detected. This is an operating system
+  * independent message that is issued by the storage system.
+  * User action:
+  * For more information see the documentation of your storage system.
+  */
+
+/#?
+  * Text: "%s: FORMAT 1 - Seek incomplete\n"
+  * Severity: Warning
+  * Parameter:
+  *   @1: bus ID of the DASD
+  * Description:
+  * This is an operating system independent message that is issued by the
+  * storage system.
+  * User action:
+  * For more information see the documentation of your storage system.
+  */
+
+/*?
+ * Text: "%s: FORMAT 0 - Invalid Command"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * A command was issued that is not in the 2107/1750 command set.
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 0 - Reserved"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 0 - Command Invalid on Secondary Address"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * A command or order not allowed on a PPRC secondary device has been received
+ * by the secondary device. This is an operating system independent message
+ * that is issued by the storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 0 - Invalid Defective/Alternate Track Pointer"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * A defective track has been accessed. The subsystem generates an invalid
+ * Defective/Alternate Track Pointer as a part of RAID Recovery.
+ * This is an operating system independent message that is issued by the
+ * storage system.
/*
 * This is an operating system independent message that is issued by the
 * storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */

/*?
 * Text: "%s: FORMAT 1 - Device did not respond to selection\n"
 * Severity: Warning
 * Parameter:
 * @1: bus ID of the DASD
 * Description:
 * This is an operating system independent message that is issued by the
 * storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */

/*?
 * Text: "%s: FORMAT 1 - Device check-2 error or Set Sector is not complete\n"
 * Severity: Warning
 * Parameter:
 * @1: bus ID of the DASD
 * Description:
 * This is an operating system independent message that is issued by the
 * storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */

/*?
 * Text: "%s: FORMAT 0 - Device Error Source\n"
 * Severity: Warning
 * Parameter:
 * @1: bus ID of the DASD
 * Description:
 * The device has completed soft error logging. This is an operating system
 * independent message that is issued by the storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */

/*?
 * Text: "%s: FORMAT 0 - Data Pinned for Device\n"
 * Severity: Warning
 * Parameter:
 * @1: bus ID of the DASD
 * Description:
Modified data in cache or in persistent storage exists for the DASD. The data cannot be destaged to the device. This track is the first track pinned for this device. This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.
*/
+
*/?

Text: "%s: FORMAT 6 - Overrun on channel C\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.
*/
+
*/?

Text: "%s: FORMAT 1 - Device Status 1 not as expected\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD

Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.
*/
+
*/?

Text: "%s: FORMAT 0 - Device Fenced - device = %02x\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
@2: sense data byte 4

Description:
The device shown in sense byte 4 has been fenced. This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.
*/
+
*/?

Text: "%s: FORMAT 1 - Interruption cannot be reset\n"
Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 1 - Index missing\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT F - DASD Fast Write inhibited\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * DASD Fast Write is not allowed because of a nonvolatile storage battery
+ * check condition. This is an operating system independent message that is
+ * issued by the storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 7 - Invalid tag-in for an extended command sequence\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 4 - Key area error; offset active\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.
*/

/*?
* Text: "%s: FORMAT 4 - Count area error; offset active\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.
*/

/*?
* Text: "%s: FORMAT 1 - Track physical address did not compare\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.
*/

/*?
* Text: "%s: FORMAT 2 - 3990 check-2 error\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.
*/

/*?
* Text: "%s: FORMAT 1 - Offset active cannot be reset\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 7 - RCC 1 and RCC 2 sequences not successful\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 4 - No sync byte in count address area; offset active\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 4 - Data area error\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 6 - Overrun on channel A\n"
+ * Severity: Warning
+ * Parameter:
+ *  @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 4 - No sync byte in count address area\n"
+ * Severity: Warning
+ * Parameter:
+ *  @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 5 - Data Check in the key area\n"
+ * Severity: Warning
+ * Parameter:
+ *  @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT F - Caching status reset to default\n"
+ * Severity: Warning
+ * Parameter:
+ *  @1: bus ID of the DASD
+ * Description:
+ * The storage director has assigned two new subsystem status devices and
+ * resets the status to its default value. This is an operating system
+ * independent message that is issued by the storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
Text: "%s: FORMAT 5 - Data Check in the data area; offset active\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 5 - Reserved\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 1 - Device not ready\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 4 - No sync byte in key area\n"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the
storage system.
User action:
For more information see the documentation of your storage system.
+ * Text: "%s: FORMAT 8 - DASD controller failed to set or reset the long busy latch\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 1 - Cylinder address did not compare\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 3 - Reserved\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 4 - No sync byte in data area; offset active\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 2 - Support facility errors\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ *   This is an operating system independent message that is issued by the
+ *   storage system.
+ * User action:
+ *   For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 4 - Key area error\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ *   This is an operating system independent message that is issued by the
+ *   storage system.
+ * User action:
+ *   For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 8 - End operation with transfer count not zero\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ *   This is an operating system independent message that is issued by the
+ *   storage system.
+ * User action:
+ *   For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 2 - Microcode detected error %02x\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: error code
+ * Description:
+ *   This is an operating system independent message that is issued by the
+ *   storage system.
+ * User action:
+ *   For more information see the documentation of your storage system.
+ */
+ 
+/#?
+ * Text: "%s: FORMAT 5 - Data Check in the count area; offset active\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/#?
+ * Text: "%s: FORMAT 3 - Allegiance terminated\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * Allegiance terminated because of a Reset Allegiance or an Unconditional
+ * Reserve command on another channel. This is an operating system independent
+ * message that is issued by the storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/#?
+ * Text: "%s: FORMAT 4 - Home address area error\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/#?
+ * Text: "%s: FORMAT 4 - Count area error\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
%s: FORMAT 7 - Invalid tag-in during selection sequence
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.
/

%*?
%s: FORMAT 4 - No sync byte in data area
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.
/

%*?
%s: FORMAT 4 - No sync byte in home address area; offset active
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.
/

%*?
%s: FORMAT 4 - Home address area error; offset active
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.
/
/*?
 * Text: "%s: FORMAT 5 - Data Check in the count area\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the DASD
 * Description:
 * This is an operating system independent message that is issued by the
 * storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */

/*?
 * Text: "%s: FORMAT 4 - No sync byte in key area; offset active\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the DASD
 * Description:
 * This is an operating system independent message that is issued by the
 * storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */

/*?
 * Text: "%s: FORMAT 7 - Invalid DCC selection response or timeout\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the DASD
 * Description:
 * This is an operating system independent message that is issued by the
 * storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */

/*?
 * Text: "%s: FORMAT 5 - Data Check in the data area\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the DASD
 * Description:
 * This is an operating system independent message that is issued by the
 * storage system.
 * User action:
 * For more information see the documentation of your storage system.
 */
+ /*?
+ * Text: "%s: FORMAT F - Operation Terminated\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * The storage system ends an operation related to an active channel program
+ * when termination and redrive are required and logging is not desired.
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 6 - Overrun on channel B\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 5 - Data Check in the key area; offset active\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT F - Volume is suspended duplex\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ * Description:
+ * The duplex pair volume has entered the suspended duplex state because of a
+ * failure. This is an operating system independent message that is issued by
+ * the storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 6 - Overrun on channel D\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 7 - RCC 1 sequence not successful\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 6 - Overrun on channel E\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 7 - 3990 microcode time out when stopping selection\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+ */?

+ * Text: "%s: FORMAT 6 - Overrun on channel F\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+ */?

+ * Text: "%s: FORMAT 6 - Reserved\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+ */?

+ * Text: "%s: FORMAT 7 - RCC initiated by a connection check alert\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+ */?

+ * Text: "%s: FORMAT 6 - Overrun on channel G\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+*/?
+ * Text: "%s: FORMAT 7 - extra RCC required\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+*/?
+ * Text: "%s: FORMAT 6 - Overrun on channel H\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+*/?
+ * Text: "%s: FORMAT 8 - Unexpected end operation response code\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+*/?
+ * Text: "%s: FORMAT 7 - Permanent path error (DASD controller not available)\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 7 - Missing end operation; device transfer incomplete\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT F - Reserved\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT F - Cache or nonvolatile storage equipment failure\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * An equipment failure has occurred in the cache storage or nonvolatile
+ * storage of the storage system. This is an operating system independent
+ * message that is issued by the storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ /*?
+ * Text: "%s: FORMAT 8 - DPS cannot be filled\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 8 - Error correction code hardware fault"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 7 - Missing end operation; device transfer complete"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 7 - DASD controller not available on disconnected command chain"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+/*?
+ * Text: "%s: FORMAT 8 - No interruption from device during a command chain"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ */?
+ * Text: "%s: FORMAT 9 - Cylinder address did not compare\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ */?
+ * Text: "%s: FORMAT 8 - DPS checks after a system reset or selective reset\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ */?
+ * Text: "%s: FORMAT F - Caching reinitiated\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * Caching has been automatically reinitiated following an error.
+ * This is an operating system independent message that is issued by the
+ * storage system.
+ * User action:
+ * For more information see the documentation of your storage system.
+ */
+
+ */?
+ * Text: "%s: FORMAT 8 - End operation with transfer count zero\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
This is an operating system independent message that is issued by the storage system.

User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 7 - Reserved"
Severity: Warning
Parameter:
   @1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT 8 - Short busy time-out during device selection"
Severity: Warning
Parameter:
   @1: bus ID of the DASD
Description:
This is an operating system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.

Text: "%s: FORMAT F - Caching terminated"
Severity: Warning
Parameter:
   @1: bus ID of the DASD
Description:
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* The storage system was unable to initiate caching or had to suspend caching
* for a 3990 control unit. If this problem is caused by a failure condition,
* an additional message will provide more information about the failure.
* This is an operating system independent message that is issued by the
* storage system.
* User action:
* Check for additional messages that point out possible failures. For more
* information see the documentation of your storage system.
* */

*/

* Text: "%s: FORMAT F - Subsystem status cannot be determined\n"
* Severity: Warning
* Parameter:
* @1: bus ID of the DASD
* Description:
* The status of a DASD Fast Write or PPRC volume cannot be determined.
* This is an operating system independent message that is issued by the
* storage system.
* User action:
* For more information see the documentation of your storage system.
* */

*/

* Text: "%s: FORMAT F - Nonvolatile storage terminated\n"
* Severity: Warning
* Parameter:
* @1: bus ID of the DASD
* Description:
* The storage director has stopped using nonvolatile storage or cannot
* initiate nonvolatile storage. If this problem is caused by a failure, an
* additional message will provide more information about the failure. This is
* an operating system independent message that is issued by the storage system.
* User action:
* Check for additional messages that point out possible failures. For more
* information see the documentation of your storage system.
* */

*/

* Text: "%s: FORMAT 8 - Reserved\n"
* Severity: Warning
* Parameter:
* @1: bus ID of the DASD
* Description:
* This is an operating system independent message that is issued by the
* storage system.
* User action:
* For more information see the documentation of your storage system.
%s: Write inhibited path encountered
Severity: Informational
Parameter:
  @1: bus ID of the DASD
Description:
  This is an informational message.
User action:
  None.

%s: FORMAT 9 - Device check-2 error
Severity: Warning
Parameter:
  @1: bus ID of the DASD
Description:
  This is an operating system independent message that is issued by the
  storage system.
User action:
  For more information see the documentation of your storage system.

%s: FORMAT F - Track format incorrect
Severity: Warning
Parameter:
  @1: bus ID of the DASD
Description:
  A track format error occurred while data was being written to the DASD or
  while a duplex pair was being established. This is an operating system
  independent message that is issued by the storage system.
User action:
  For more information see the documentation of your storage system.

%s: FORMAT F - Cache fast write access not authorized
Severity: Warning
Parameter:
  @1: bus ID of the DASD
Description:
  A request for Cache Fast Write Data access cannot be satisfied because
  of missing access authorization for the storage system. This is an operating
  system independent message that is issued by the storage system.
User action:
For more information see the documentation of your storage system.

Text: "%s: Data recovered during retry with PCI fetch mode active\n"
Severity: Emerg
Parameter:
@1: bus ID of the DASD
Description:
A data error has been recovered on the storages system but the Linux file
system cannot be informed about the data mismatch. To prevent Linux from
running with incorrect data, the DASD device driver will trigger a kernel
panic.
User action:
Reset your real or virtual hardware and reboot Linux.

Text: "%s: The specified record was not found\n"
Severity: Error
Parameter:
@1: bus ID of the DASD
Description:
The record to be accessed does not exist. The DASD might be unformatted
or defect.
User action:
Try to format the DASD or replace it.
ATTENTION: Formatting irreversibly destroys all data on the DASD.

Text: "%s: ERP %p (%02x) refers to %p\n"
Severity: Error
Parameter:
@1: bus ID of the DASD
@2: pointer to ERP
@3: ERP status
@4: cqr
Description:
This message provides debug information for the enhanced error recovery
procedure (ERP).
User action:
If you do not need this information, you can suppress this message by
switching off ERP logging, for example, by writing '1' to the 'erplog'
sysfs attribute of the DASD.
%s: ERP chain at END of ERP-ACTION

Severity: Error
Parameter:
@1: bus ID of the DASD
Description:
This message provides debug information for the enhanced error recovery procedure (ERP).
User action:
If you do not need this information, you can suppress this message by switching off ERP logging, for example, by writing '1' to the 'erplog' sysfs attribute of the DASD.

%s: The cylinder data for accessing the DASD is inconsistent
Severity: Error
Parameter:
@1: bus ID of the DASD
Description:
An error occurred in the storage system hardware.
User action:
For more information see the documentation of your storage system.

%s: Accessing the DASD failed because of a hardware error
Severity: Error
Parameter:
@1: bus ID of the DASD
Description:
An error occurred in the storage system hardware.
User action:
For more information see the documentation of your storage system.

%s: ERP chain at BEGINNING of ERP-ACTION
Severity: Error
Parameter:
@1: bus ID of the DASD
Description:
This message provides debug information for the enhanced error recovery procedure (ERP).
User action:
If you do not need this information, you can suppress this message by switching off ERP logging, for example, by writing '1' to the 'erplog' sysfs attribute of the DASD.
+ /*?
+ * Text: "%s: ERP %p has run out of retries and failed\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the DASD
+ * @2: ERP pointer
+ * Description:
+ * The error recovery procedure (ERP) tried to recover an error but the number
+ * of retries for the I/O was exceeded before the error could be resolved.
+ * User action:
+ * Check for related previous error messages.
+ */
+
+ /*?
+ * Text: "%s: SIM - SRC: %02x%02x%02x%02x\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the DASD
+ * @2: sense byte
+ * @3: sense byte
+ * @4: sense byte
+ * @5: sense byte
+ * Description:
+ * This error message is a System Information Message (SIM) generated by the
+ * storage system. The System Reference Code (SRC) defines the error in detail.
+ * User action:
+ * Look up the SRC in the storage server documentation.
+ */
+
+ /*?
+ * Text: "%s: log SIM - SRC: %02x%02x%02x%02x\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * @2: sense byte
+ * @3: sense byte
+ * @4: sense byte
+ * @5: sense byte
+ * Description:
+ * This System Information Message (SIM) is generated by the storage system.
+ * The System Reference Code (SRC) defines the error in detail.
+ * User action:
+ * Look up the SRC in the storage server documentation.
+ */
+
+ /*?
+ * Text: "%s: Reading device feature codes failed with rc=%d\n"

Severity: Warning
Parameter:
@1: bus ID of the DASD
@2: return code
Description:
The device feature codes state which advanced features are supported by a device.
Examples for advanced features are PAV or high performance FICON.
Some early devices do not provide feature codes and no advanced features are available on these devices.
User action:
None, if the DASD does not provide feature codes. If the DASD provides feature codes, make sure that it is working correctly, then set it offline and back online.

Text: "%s: A channel path group could not be established"
Severity: Warning
Parameter:
@1: bus ID of the DASD
Description:
Initialization of a DASD did not complete because a channel path group could not be established.
User action:
Make sure that the DASD is working correctly, then try again to set it online. If initialization still fails, reboot.

Text: "%s: The DASD is not operating in multipath mode"
Severity: Informational
Parameter:
@1: bus ID of the DASD
Description:
The DASD channel path group could not be configured to use multipath mode. This might negatively affect I/O performance on this DASD.
User action:
Make sure that the DASD is working correctly, then try again to set it online. If initialization still fails, reboot.

Text: "%s: Detecting the DASD disk layout failed because of an I/O error"
Severity: Error
Parameter:
@1: bus ID of the DASD
Description:
The disk layout of the DASD could not be detected because of an unexpected I/O error. The DASD device driver treats the device like an unformatted DASD, and partitions on the device are not accessible.

User action:
- If the DASD is formatted, make sure that the DASD is working correctly, then set it offline and back online. If the DASD is unformatted, format the DASD, for example, with dasdfmt.
- ATTENTION: Formatting irreversibly destroys all data on the DASD.

Text: "An I/O request was rejected because writing is inhibited\n" Severity: Error Parameter: @1: bus ID of the DASD Description:
An I/O request was returned with an error indication of 'command reject' and 'write inhibited'. The most likely reason for this error is a failed write request to a device that was attached as read-only in z/VM.
User action:
- Set the device offline, ensure that the device is configured correctly in z/VM, then set the device online again.

Text: "An Alias device was reassigned to a new base device with UID: %s\n" Severity: Informational Parameter: @1: bus ID of the alias @2: UID of new base device Description:
The alias device with the indicated bus ID has been reassigned. The UID of the new base device is shown in the message.
User action:
- None.

Text: "Detecting the maximum supported data size for zHPF requests failed\n" Severity: Warning Parameter: @1: bus ID of the DASD Description:
High Performance FICON (zHPF) requests are limited to a hardware-dependent maximum data size. The DASD device driver failed to detect this size and zHPF is not available for this device.
User action:
- Set the device offline and online again. If this problem persists, gather
+ * Linux debug data and report the problem to your support organization.
+ */
+
+ */?
+ * Text: "%s: Reading device feature codes failed (rc=%d) for new path %x\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: return code
+ *   @3: path mask
+ * Description:
+ * A new path has been made available to the a device.
+ * A command to read the device feature codes on this device returned an error.
+ * The new path will not be used for I/O.
+ * User action:
+ * Set the new path offline and online again to repeat the path verification.
+ * Alternatively, set the device offline and online again to
+ * verify all available paths for this device.
+ * If this problem persists, gather Linux debug data and report the problem
+ * to your support organization.
+ */
+
+ */?
+ * Text: "%s: Detecting the maximum data size for zHPF requests failed (rc=%d) for a new path %x\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: return code
+ *   @3: path mask
+ * Description:
+ * High Performance FICON (zHPF) requests are limited to a hardware-dependent
+ * maximum data size. A command to detect this size for
+ * a new path returned an error. The new path will not be used for I/O.
+ * User action:
+ * Set the new path offline and online again to repeat the path verification.
+ * Alternatively, set the device offline and online again to
+ * verify all available paths for this device.
+ * If this problem persists, gather Linux debug data and report the problem
+ * to your support organization.
+ */
+
+ */?
+ * Text: "%s: The maximum data size for zHPF requests %u on a new path %x is below the active maximum
+ * %u\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: size in bytes
@ 3: path mask  
@ 4: size in bytes  
* Description:  
High Performance FICON (zHPF) requests are limited to a hardware-dependent  
maximum data size. The maximum of the new path is below  
the previously established common maximum for the  
existing paths for this device. This could cause requests on the new  
path to fail. The new path will not be used for I/O.  
* User action:  
Set the device offline and online again to establish a new common maximum  
data size for the device.  
*/  
*/  
* Text: "%s: The device reservation was lost\n"  
* Severity: Error  
* Parameter:  
  @ 1: bus ID of the DASD  
* Description:  
This Linux instance has lost its reservation of the device to another  
operating system instance. Depending on the reservation policy for the  
device, I/O might be blocked until the other operating system instance  
surrenders the reservation or all I/O requests might fail until the  
device is reset.  
* User action:  
  None, if this situation is handled by system automation software.  
  If this situation is not handled by automation, check the  
  last_known_reservation_state attribute of the device in sysfs.  
  If the value is 'lost', verify that the device is no longer reserved  
  by another operating system instance, then set the device offline and  
  online again. For any other value of the last_known_reservation_state  
  no action is required. I/O will resume when the device reservation is  
surrendered by the other operating system instance.  
*/  
*/  
* Text: "%s: The storage server does not support raw-track access\n"  
* Severity: Error  
* Parameter:  
  @ 1: bus ID of the DASD  
* Description:  
The DASD cannot be accessed in raw-track access mode because the storage  
server does not have all required features for this access mode.  
In raw-track access mode, the DASD device driver accesses complete ECKD  
tracks.  
By default, the DASD device driver accesses only the data fields of ECKD  
devices and omits the count and key data fields.  
* User action:
+ * Ensure that the raw_track_access sysfs attribute of the DASD has the value
+ * 0 to access the device in default ECKD mode.
+ */
+
+ /*
+ * Text: "%s: The newly added channel path %02X will not be used because it leads to a different device %s\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: logical path mask
+ *   @3: UID
+ * Description:
+ * The newly added channel path has a different UID than the DASD device. This indicates
+ * an incorrect cabling. This path is not going to be used.
+ * User action:
+ * Check the cabling of the DASD device. Disconnect and reconnect the cable.
+ */
+
+ /*
+ * Text: "%s: Not all channel paths lead to the same device, path %02X leads to device %s instead of %s\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the DASD
+ *   @2: logical path mask
+ *   @3: UID
+ *   @4: UID
+ * Description:
+ * Some channel paths have a different UID than others. This indicates
+ * an incorrect cabling. The DASD device is not enabled.
+ * User action:
+ * Check cabling of the DASD device and retry to enable the device.
+ */
+
+ /*
+ * Text: "Service on the storage server caused path %x.%02x to go offline"
+ * Severity: Warning
+ * Parameter:
+ *   @1: channel subsystem ID
+ *   @2: CHPID
+ * Description:
+ * A channel path to the DASD has been set offline because of
+ * a service action on the storage server. The path will be set back
+ * online automatically when the service action is completed.
+ * User action:
+ * None.
+ */
+
+ */
Path %x.%02x is back online after service on the storage server
Severity: Informational
Parameter:
   @1: channel subsystem ID
   @2: CHPID
Description:
   A path had been set offline temporarily because of a service action on the storage server.
   The service action has completed, and the channel path is available again.
User action:
   None.

%s: High Performance FICON disabled
Severity: Error
Parameter:
   @1: bus ID of the DASD
Description:
   High Performance FICON (HPF) has been disabled. Either the device lost HPF functionality, or none of the remaining channel paths are HPF capable.
User action:
   Report the problem to your support organization.
   Ensure that the cabling between the storage server and the mainframe system is securely in place.
   Reset the device and channel paths by writing "all" or a logical path mask to the path_reset sysfs attribute of the device.

%s: Channel path %02X lost HPF functionality and is disabled
Severity: Error
Parameter:
   @1: bus ID of the DASD
   @2: logical path mask
Description:
   A channel path has lost High Performance FICON (HPF) functionality and was removed from regular operations.
User action:
   Report the problem to your support organization.
   Ensure that the cabling between the storage server and the mainframe system is securely in place.
   Reset the device and channel paths by writing "all" or a logical path mask to the path_reset sysfs attribute of the device.
Text: "%s: Path %x.%02x (pathmask %02x) is disabled - IFCC threshold exceeded\n"
Severity: Error
Parameter:
   @ 1: bus ID of the DASD
   @ 2: cssid
   @ 3: chpid
   @ 4: logical path mask
Description:
Due to numerous interface or channel control checks (IFCCs), a channel path was removed from regular operations to retain good I/O performance.
User action:
   Ensure that the cabling between the storage server and the mainframe system is securely in place.
   Reset the device and channel paths by writing "all" or a logical path mask to the path_reset sysfs attribute of the device.
   If the problem persists, report it to your support organization.

Text: "%s: %d output lines suppressed due to ratelimiting\n"
--- linux-4.15.0.orig/Documentation/kmsg/s390/dasd-fba
+++ linux-4.15.0/Documentation/kmsg/s390/dasd-fba
@@ -0,0 +1,36 @@
+/*?
 * Text: "%s: New FBA DASD %04X/%02X (CU %04X/%02X) with %d MB and %d B/blk%s\n"
Severity: Informational
Parameter:
   @ 1: bus ID of the DASD
   @ 2: device type
   @ 3: device model
   @ 4: control unit type
   @ 5: control unit model
   @ 6: size
   @ 7: bytes per block
   @ 8: access mode
Description:
A DASD with the shown characteristics has been set online.
If the DASD is configured as read-only to the real or virtual hardware, the message includes an indication of this hardware access mode. The hardware access mode is independent from the 'readonly' attribute of the device in sysfs.
User action:
   None.
*/
+/*?
Text: "%s: Allocating memory for private DASD data failed\n"
Severity: Warning
+ * Parameter:
+ * @1: bus ID of the DASD
+ * Description:
+ * The DASD device driver maintains data structures for each DASD it manages.
+ * There is not enough memory to allocate these data structures for one or
+ * more DASD.
+ * User action:
+ * Free some memory and try the operation again.
+ */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/dcssblk
+++ linux-4.15.0/Documentation/kmsg/s390/dcssblk
@@ -0,0 +1,206 @@
+/*?
 + * Text: "Adjacent DCSSs %s and %s are not contiguous\n"
 + * Severity: Error
 + * Parameter:
 + * @1: name 1
 + * @2: name 2
 + * Description:
 + * You can only map a set of two or more DCSSs to a single DCSS device if the
 + * DCSSs in the set form a contiguous memory space. The DCSS device cannot be
 + * created because there is a memory gap between two adjacent DCSSs.
 + * User action:
 + * Ensure that you have specified all DCSSs that belong to the set. Check the
 + * definitions of the DCSSs on the z/VM hypervisor to verify that they form
 + * a contiguous memory space.
 + */
 +
 +/*?
 + * Text: "DCSS %s and DCSS %s have incompatible types\n"
 + * Severity: Error
 + * Parameter:
 + * @1: name 1
 + * @2: name 2
 + * Description:
 + * You can only map a set of two or more DCSSs to a single DCSS device if
 + * either all DCSSs in the set have the same type or if the set contains DCSSs
 + * of the two types EW and EN but no other type. The DCSS device cannot be
 + * created because at least two of the specified DCSSs are not compatible.
 + * User action:
 + * Check the definitions of the DCSSs on the z/VM hypervisor to verify that
 + * their types are compatible.
 + */
 +
 +/*?
 + * Text: "DCSS %s is of type SC and cannot be loaded as exclusive-writable\n"
 + * Severity: Error
+ * Parameter:
+ *  @1: device name
+ * Description:
+ * You cannot load a DCSS device in exclusive-writable access mode if the DCSS devise maps to one or more DCSSs of type SC.
+ * User action:
+ * Load the DCSS in shared access mode.
+ */
+
+/*?
+ * Text: "DCSS device %s is removed after a failed access mode change\n"
+ * Severity: Error
+ * Parameter:
+ *  @1: device name
+ * Description:
+ * To change the access mode of a DCSS device, all DCSSs that map to the device were unloaded. Reloading the DCSSs for the new access mode failed and the device is removed.
+ * User action:
+ * Look for related messages to find out why the DCSSs could not be reloaded.
+ * If necessary, add the device again.
+ */
+
+/*?
+ * Text: "All DCSSs that map to device %s are saved\n"
+ * Severity: Informational
+ * Parameter:
+ *  @1: device name
+ * Description:
+ * A save request has been submitted for the DCSS device. Changes to all DCSSs that map to the device are saved permanently.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "Device %s is in use, its DCSSs will be saved when it becomes idle\n"
+ * Severity: Informational
+ * Parameter:
+ *  @1: device name
+ * Description:
+ * A save request for the device has been deferred until the device becomes idle. Then changes to all DCSSs that the device maps to will be saved permanently.
+ * User action:
+ * None.
+ */
A pending save request for device %s has been canceled.
Severity: Informational
Parameter:
   @1: device name
Description:
A save request for the DCSSs that map to a DCSS device has been pending while the device was in use. This save request has been canceled. Changes to the DCSSs will not be saved permanently.
User action:
None.

Loaded %s with total size %lu bytes and capacity %lu sectors
Severity: Informational
Parameter:
   @1: DCSS names
   @2: total size in bytes
   @3: total size in 512 byte sectors
Description:
The listed DCSSs have been verified as contiguous and successfully loaded. The displayed sizes are the sums of all DCSSs.
User action:
None.

Device %s cannot be removed because it is not a known device
Severity: Warning
Parameter:
   @1: device name
Description:
The DCSS device you are trying to remove is not known to the DCSS device driver.
User action:
List the entries under /sys/devices/dcssblk/ to see the names of the existing DCSS devices.

Device %s cannot be removed while it is in use
Severity: Warning
Parameter:
   @1: device name
Description:
You are trying to remove a device that is in use.
User action:
Make sure that all users of the device close the device before you try to remove it.

```
/*
 * Text: "Device %s has become idle and is being saved now\n"
 * Severity: Informational
 * Parameter:
 *   @1: device name
 * Description:
 * A save request for the DCSSs that map to a DCSS device has been pending while the device was in use. The device has become idle and all changes to the DCSSs are now saved permanently.
 * User action:
 * None.
 */
```

```
/*
 * Text: "Writing to %s failed because it is a read-only device\n"
 * Severity: Warning
 * Parameter:
 *   @1: device name
 * Description:
 * The DCSS device is in shared access mode and cannot be written to. Depending on the type of the DCSSs that the device maps to, you might be able to change the access mode to exclusive-writable.
 * User action:
 * If the DCSSs of the device are of type SC, do not attempt to write to the device. If the DCSSs of the device are of type ER or SR, change the access mode to exclusive-writable before writing to the device.
 */
```

```
/*
 * Text: "The address range of DCSS %s changed while the system was suspended\n"
 * Severity: Error
 * Parameter:
 *   @1: device name
 * Description:
 * After resuming the system, the start address or end address of a DCSS does not match the address when the system was suspended. DCSSs must not be changed after the system was suspended.
 * This error cannot be recovered. The system is stopped with a kernel panic.
 * User action:
 * Reboot Linux.
 */
```

```
/*
 * Text: "Suspending the system failed because DCSS device %s is writable\n"
```
Severity: Error
Parameter:
@1: device name
Description:
A system cannot be suspended if one or more DCSSs are accessed in exclusive-writable mode. DCSS segment types EW, SW, and EN are always writable and must be removed before a system is suspended.
User action:
Remove all DCSSs of segment types EW, SW, and EN by writing the DCSS name to the sysfs 'remove' attribute. Set the access mode for all DCSSs of segment types SR and ER to read-only by writing 1 to the sysfs 'shared' attribute of the DCSS. Then try again to suspend the system.

Severity: Warning
Parameter:
@1: DCSS name
Description:
DCSSs of type SN or EN cannot be saved.
User action:
If the DCSS was set up with the intention to prevent the content from being saved, no action is necessary.
To be able to save the content, you must define the DCSS with a type other than SN or EN.

Text: "DCSS %s is of type SN or EN and cannot be saved"
Severity: Error
Parameter:
@1: DCSS name
Description:
Diagnose instruction 0x288 was called to activate the diag288 watchdog.
The diagnose call returned an error that cannot be handled by the device driver.
The watchdog stays inactive.
User action:
Contact your support organization.

Text: "The watchdog cannot be activated"
Severity: Error
Description:
Diagnose instruction 0x288 was called to initialize the diag288 watchdog.
The diagnose call returned an error that cannot be handled by the device driver.
The watchdog stays inactive.

Text: "The watchdog cannot be initialized"
+ * A possible reason for this error is that your real or virtual hardware does not support
+ * the diag288 watchdog.
+ * User action:
+ * Confirm that the diag288 watchdog is supported in your environment.
+ * Use a watchdog that is supported in your environment.
+ */
+/*
+ */?
+ * Text: "The watchdog cannot be deactivated"
+ * Severity: Error
+ * Description:
+ * Diagnose instruction 0x288 was called to deactivate the diag288 watchdog.
+ * The diagnose call returned an error that cannot be handled by the device driver.
+ * The watchdog stays active and a watchdog timeout will trigger the configured timeout action.
+ * The diag288 watchdog device driver might intentionally be configured to prevent deactivation.
+ * User action:
+ * You can configure the diag288 watchdog device driver such that it can be deactivated.
+ * If the diag288 device driver has been compiled as a separate module, diag288_wdt, reload the module
+ * without specifying the 'nowayout' module parameter.
+ * If the diag288 device driver has been compiled into your kernel,
+ * reboot Linux without specifying the 'diag288.nowayout' kernel parameter'.
+ */
+ */?
+ * Text: "The watchdog timer cannot be started or reset"
+ * Severity: Error
+ * Description:
+ * Diagnose instruction 0x288 was called to start the diag288 watchdog or to set timer back to zero.
+ * The diagnose call returned an error that cannot be handled by the device driver.
+ * The watchdog stays inactive or becomes inactive.
+ * User action:
+ * Contact your support organization.
+ */
+ */?
+ * Text: "Linux cannot be suspended while the watchdog is in use"
+ * Severity: Error
+ * Description:
+ * The watchdog must not time out while Linux is suspended.
+ * Therefore, the diag288 watchdog device driver prevents Linux from being suspended
+ * while the watchdog is in use.
+ * User action:
+ * i) Stop the watchdog application. ii) If the problem persists, close the watchdog
+ * device node by issuing 'echo V > /dev/watchdog'.
+ * iii) If the device driver still prevents Linux from being suspended,
+ * contact your support organization.
+ */
+ */? Text: "%s: %d output lines suppressed due to ratelimiting
" */
/*?
 * Text: "Querying a DCSS type failed with rc=%ld\n"
 * Severity: Warning
 * Parameter:
 *   @1: return code
 * Description:
 * The DCSS kernel interface used z/VM diagnose call X'64' to query the
 * type of a DCSS. z/VM failed to determine the type and returned an error.
 * User action:
 * Look for related messages to find out which DCSS is affected.
 * For details about the return codes see the section about DIAGNOSE Code
 * X'64' in "z/VM CP Programming Services".
 */

/*?
 * Text: "Loading DCSS %s failed with rc=%ld\n"
 * Severity: Warning
 * Parameter:
 *   @1: DCSS name
 *   @2: return code
 * Description:
 * The DCSS kernel interface used diagnose call X'64' to load a DCSS. z/VM
 * failed to load the DCSS and returned an error.
 * User action:
 * For details about the return codes see the section about DIAGNOSE Code
 * X'64' in "z/VM CP Programming Services".
 */

/*?
 * Text: "DCSS %s of range %p to %p and type %s loaded as exclusive-writable\n"
 * Severity: Informational
 * Parameter:
 *   @1: DCSS name
 *   @2: starting page address
 *   @3: ending page address
 *   @4: DCSS type
 * Description:
 * The DCSS was loaded successfully in exclusive-writable access mode.
 * User action:
 * None.
 */

/*?
 * Text: "DCSS %s of range %p to %p and type %s loaded in shared access mode\n"
 * Severity: Informational
 */
* Parameter:
  * @1: DCSS name
  * @2: starting page address
  * @3: ending page address
  * @4: DCSS type

* Description:
  * The DCSS was loaded successfully in shared access mode.

* User action:
  * None.

*/

/*?
 * Text: "DCSS %s is already in the requested access mode\n"
 * Severity: Informational
 * Parameter:
  * @1: DCSS name

* Description:
  * A request to reload a DCSS with a new access mode has been rejected
  * because the new access mode is the same as the current access mode.

* User action:
  * None.

*/

/*?
 * Text: "DCSS %s is in use and cannot be reloaded\n"
 * Severity: Warning
 * Parameter:
  * @1: DCSS name

* Description:
  * Reloading a DCSS in a different access mode has failed because the DCSS is
  * being used by one or more device drivers. The DCSS remains loaded with the
  * current access mode.

* User action:
  * Ensure that the DCSS is not used by any device driver then try again to
  * load the DCSS with the new access mode.

*/

/*?
 * Text: "DCSS %s overlaps with used memory resources and cannot be reloaded\n"
 * Severity: Warning
 * Parameter:
  * @1: DCSS name

* Description:
  * The DCSS has been unloaded and cannot be reloaded because it overlaps with
  * another loaded DCSS or with the memory of the z/VM guest virtual machine
  * (guest storage).

* User action:
  * Ensure that no DCSS is loaded that has overlapping memory resources
with the DCSS you want to reload. If the DCSS overlaps with guest storage,
use the DEF STORE CONFIG z/VM CP command to create a sufficient storage gap
for the DCSS. For details, see the section about the DCSS device driver in
"Device Drivers, Features, and Commands".

/*
 */

/*?
 * Text: "Reloading DCSS %s failed with rc=%ld"
 * Severity: Warning
 * Parameter:
 *   @1: DCSS name
 *   @2: return code
 * Description:
 * The DCSS kernel interface used z/VM diagnose call X'64' to reload a DCSS
 * in a different access mode. The DCSS was unloaded but z/VM failed to reload
 * the DCSS.
 * User action:
 * For details about the return codes see the section about DIAGNOSE Code
 * X'64' in "z/VM CP Programming Services".
 */

/*?
 * Text: "Unloading unknown DCSS %s failed"
 * Severity: Error
 * Parameter:
 *   @1: DCSS name
 * Description:
 * The specified DCSS cannot be unloaded. The DCSS is known to the DCSS device
 * driver but not to the DCSS kernel interface. This problem indicates a
 * program error in extmem.c.
 * User action:
 * Report this problem to your support organization.
 */

/*?
 * Text: "Saving unknown DCSS %s failed"
 * Severity: Error
 * Parameter:
 *   @1: DCSS name
 * Description:
 * The specified DCSS cannot be saved. The DCSS is known to the DCSS device
 * driver but not to the DCSS kernel interface. This problem indicates a
 * program error in extmem.c.
 * User action:
 * Report this problem to your support organization.
 */
* Text: "Saving a DCSS failed with DEFSEG response code %i
* Severity: Error
* Parameter:
  * @1: response-code
* Description:
  * The DEFSEG z/VM CP command failed to permanently save changes to a DCSS.
  * User action:
  * Ensure that the z/VM guest virtual machine is authorized to issue
  * the CP DEFSEG command (typically privilege class E).
  * Look for related messages to find the cause of this error. See also message
  * HCP<response-code>E in the DEFSEG section of the "z/VM CP Command and
  * Utility Reference".
* */

* Text: "Saving a DCSS failed with SAVESEG response code %i
* Severity: Error
* Parameter:
  * @1: response-code
* Description:
  * The SAVESEG z/VM CP command failed to permanently save changes to a DCSS.
  * User action:
  * Ensure that the z/VM guest virtual machine is authorized to issue
  * the CP SAVESEG command (typically privilege class E).
  * Look for related messages to find the cause of this error. See also message
  * HCP<response-code>E in the SAVESEG section of the "z/VM CP Command and
  * Utility Reference".
* */

* Text: "DCSS %s cannot be loaded or queried
* Severity: Error
* Parameter:
  * @1: DCSS name
* Description:
  * You cannot load or query the specified DCSS because it either is not defined
  * in the z/VM hypervisor, or it is a class S DCSS, or it is above 2047 MB
  * and the Linux system is a 31-bit system.
  * User action:
  * Use the CP command "QUERY NSS" to find out if the DCSS is a valid
  * DCSS that can be loaded.
* */

* Text: "DCSS %s cannot be loaded or queried without z/VM
* Severity: Error
* Parameter:
  * @1: DCSS name
+ * Description:
+ * A DCSS is a z/VM resource. Your Linux instance is not running as a z/VM
+ * guest operating system and, therefore, cannot load DCSSs.
+ * User action:
+ * Load DCSSs only on Linux instances that run as z/VM guest operating systems.
+ */
+
+/*?
+ * Text: "Loading or querying DCSS %s resulted in a hardware error\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: DCSS name
+ * Description:
+ * Either the z/VM DIAGNOSE X'64' query or load call issued for the DCSS
+ * returned with an error.
+ * User action:
+ * Look for previous extmem message to find the return code from the
+ * DIAGNOSE X'64' query or load call. For details about the return codes see
+ * the section about DIAGNOSE Code X'64' in "z/VM CP Programming Services".
+ */
+
+/*?
+ * Text: "DCSS %s has multiple page ranges and cannot be loaded or queried\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: DCSS name
+ * Description:
+ * You can only load or query a DCSS with multiple page ranges if:
+ * - The DCSS has 6 or fewer page ranges
+ * - The page ranges form a contiguous address space
+ * - The page ranges are of type EW or EN
+ * User action:
+ * Check the definition of the DCSS to make sure that the conditions for
+ * DCSSs with multiple page ranges are met.
+ */
+
+/*?
+ * Text: "%s needs used memory resources and cannot be loaded or queried\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: DCSS name
+ * Description:
+ * You cannot load or query the DCSS because it overlaps with an already
+ * loaded DCSS or with the memory of the z/VM guest virtual machine
+ * (guest storage).
+ * User action:
+ * Ensure that no DCSS is loaded that has overlapping memory resources
+ * with the DCSS you want to load or query. If the DCSS overlaps with guest
storage, use the DEF STORE CONFIG z/VM CP command to create a sufficient storage gap for the DCSS. For details, see the section about the DCSS device driver in "Device Drivers, Features, and Commands".

/*
 * Text: "DCSS %s is already loaded in a different access mode"
 * Severity: Error
 * Parameter:
 *   @1: DCSS name
 * Description:
 * The DCSS you are trying to load has already been loaded in a different access mode. You cannot simultaneously load the DCSS in different modes.
 * User action:
 * Reload the DCSS in a different mode or load it with the same mode in which it has already been loaded.
 */

/*
 * Text: "There is not enough memory to load or query DCSS %s"
 * Severity: Error
 * Parameter:
 *   @1: DCSS name
 * Description:
 * The available memory is not enough to load or query the DCSS.
 * User action:
 * Free some memory and repeat the failed operation.
 */

/*
 * Text: "DCSS %s overlaps with used storage and cannot be loaded"
 * Severity: Error
 * Parameter:
 *   @1: DCSS name
 * Description:
 * You cannot load the DCSS because it overlaps with an already loaded DCSS or with the memory of the z/VM guest virtual machine (guest storage).
 * User action:
 * Ensure that no DCSS is loaded that has overlapping memory resources with the DCSS you want to load. If the DCSS overlaps with guest storage,
 * use the DEF STORE CONFIG z/VM CP command to create a sufficient storage gap for the DCSS. For details, see the section about the DCSS device driver in "Device Drivers, Features, and Commands".
 */

/*
 * Text: "DCSS %s exceeds the kernel mapping range (%lu) and cannot be loaded"
 * Severity: Error
Parameter:
- @1: DCSS name
- @2: kernel mapping range in bytes

Description:
- You cannot load the DCSS because it exceeds the kernel mapping range limit.
- Ensure that the DCSS range is defined below the kernel mapping range.

User action:
- Ensure that the DCSS range is defined below the kernel mapping range.

Text: "Allocating the requested cache size of %zu bytes failed\n"
Severity: Error
Parameter:
- @1: size

Description:
- You cannot use the 'hmcdrv' module.
- Either the cache size that was specified for the 'hmcdrv' module exceeded
- the maximum of 1048576 (1 megabyte), or not enough free memory was
- available.
- If the 'hmcdrv' module was compiled into the kernel, the cache size was
- specified with the 'hmcdrv.cachesize' kernel parameter.
- For a separate 'hmcdrv' module, the cache size was specified with the
- 'cachesize=' module parameter.

User action:
- Specify a smaller cache size and try again to load the module.
- Do not exceed the maximum specification of 1048576 (1 megabyte).
- If necessary, free some memory and try again.
- If the module is compiled into the kernel, you must reboot Linux to change
- the cache size specification.

Text: "hugepagesz= specifies an unsupported page size %s\n"
Severity: Error
Parameter:
- @1: size

Description:
- The hugepagesz= kernel parameter specifies a huge page size
- that is not supported.

User action:
- Specify "1M" for 1 MB huge pages. These are supported as of z10.
- Specify "2G" for 2 GB huge pages. These are supported as of zEC12
- and zBC12 machines.
/* Text: "The z/VM IUCV HVC device driver cannot be used without z/VM"n" */
* Severity: Notice
* Description:
* The z/VM IUCV hypervisor console (HVC) device driver requires the
* z/VM inter-user communication vehicle (IUCV).
* User action:
* Set "hvc_iucv=" to zero in the kernel parameter line and reboot Linux.
*/

/* Text: "%lu is not a valid value for the hvc_iucv= kernel parametern" */
* Severity: Error
* Parameter:
*   @1: hvc_iucv_devices
* Description:
* The "hvc_iucv=" kernel parameter specifies the number of z/VM IUCV
* hypervisor console (HVC) terminal devices.
* The parameter value ranges from 0 to 8.
* If zero is specified, the z/VM IUCV HVC device driver is disabled
* and no IUCV-based terminal access is available.
* User action:
* Correct the "hvc_iucv=" setting in the kernel parameter line and
* reboot Linux.
*/

/* Text: "Creating a new HVC terminal device failed with error code=%dn" */
* Severity: Error
* Parameter:
*   @1: errno
* Description:
* The device driver initialization failed to allocate a new
* HVC terminal device.
* A possible cause of this problem is memory constraints.
* User action:
* If the error code is -12 (ENOMEM), consider assigning more memory
* to your z/VM guest virtual machine.
*/

/* Text: "Registering HVC terminal device as Linux console failedn" */
* Severity: Error
* Description:
The device driver initialization failed to set up the first HVC terminal
device for use as Linux console.

User action:
If the error code is -12 (ENOMEM), consider assigning more memory
to your z/VM guest virtual machine.

User action:

/*?
 * Text: "Registering IUCV handlers failed with error code=%d\n"
 * Severity: Error
 * Parameter:
 * @1: errno
 * Description:
The device driver initialization failed to register with z/VM IUCV to
handle IUCV connections, as well as sending and receiving of IUCV messages.
User action:
Check for related IUCV error messages and see the errno manual page
to find out what caused the problem.

User action:

/*?
 * Text: "Allocating memory failed with reason code=%d\n"
 * Severity: Error
 * Parameter:
 * @1: reason
 * Description:
The z/VM IUCV hypervisor console (HVC) device driver initialization failed,
because of a general memory allocation failure. The reason code indicates
the memory operation that has failed:
kmem_cache (reason code=1),
mempool (reason code=2), or
hvc_iucv_allow= (reason code=3)
User action:
Consider assigning more memory to your z/VM guest virtual machine.

User action:

/*?
 * Text: "hvc_iucv_allow= does not specify a valid z/VM user ID list\n"
 * Severity: Error
 * Description:
The "hvc_iucv_allow=" kernel parameter specifies a comma-separated list
of z/VM user IDs that are permitted to connect to the z/VM IUCV hypervisor
device driver.
The z/VM user IDs in the list must not exceed eight characters and must
not contain spaces.
User action:
Correct the "hvc_iucv_allow=" setting in the kernel parameter line and reboot
Linux.
+ */
+
+/*? 
+ * Text: "hvc_iucv_allow= specifies too many z/VM user IDs\n"
+ * Severity: Error
+ * Description:
+ * The "hvc_iucv_allow=" kernel parameter specifies a comma-separated list
+ * of z/VM user IDs that are permitted to connect to the z/VM IUCV hypervisor
+ * device driver.
+ * The number of z/VM user IDs that are specified with the "hvc_iucv_allow="
+ * kernel parameter exceeds the maximum of 500.
+ * User action:
+ * Correct the "hvc_iucv_allow=" setting by reducing the z/VM user IDs in
+ * the list and reboot Linux.
+ */
+
+/*? 
+ * Text: "A connection request from z/VM user ID %s was refused\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: ID
+ * Description:
+ * An IUCV connection request from another z/VM guest virtual machine has been
+ * refused. The request was from a z/VM guest virtual machine that is not
+ * listed by the "hvc_iucv_allow=" kernel parameter.
+ * User action:
+ * Check the "hvc_iucv_allow=" kernel parameter setting.
+ * Consider adding the z/VM user ID to the "hvc_iucv_allow=" list in the kernel
+ * parameter line and reboot Linux.
+ */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/hypfs
+++ linux-4.15.0/Documentation/kmsg/s390/hypfs
@@ -0,0 +1,56 @@
+/*? 
+ * Text: "The hardware system does not support hypfs\n"
+ * Severity: Error
+ * Description:
+ * hypfs requires DIAGNOSE Code X'204' but this diagnose code is not available
+ * on your hardware. You need more recent hardware to use hypfs.
+ * User action:
+ * None.
+ */
+
+/*? 
+ * Text: "The hardware system does not provide all functions required by hypfs\n"
+ * Severity: Error
+ * Description:
+ * hypfs requires DIAGNOSE Code X'224' but this diagnode code is not available
+ * on your hardware. You need more recent hardware to use hypfs.
+ * User action:
+ * None.
+ */
+
+/*/
+ Text: "Updating the hypfs tree failed\n"
+ Severity: Error
+ Description:
+ There was not enough memory available to update the hypfs tree.
+ User action:
+ Free some memory and try again to update the hypfs tree. Consider assigning
+ more memory to your LPAR or z/VM guest virtual machine.
+ */
+
+/*/
+ Text: "%s is not a valid mount option\n"
+ Severity: Error
+ Parameter:
+ @1: mount option
+ Description:
+ hypfs has detected mount options that are not valid.
+ User action:
+ See "Device Drivers Features and Commands" for information about valid
+ mount options for hypfs.
+ */
+
+/*/
+ Text: "Initialization of hypfs failed with rc=%i\n"
+ Severity: Error
+ Parameter:
+ @1: error code
+ Description:
+ Initialization of hypfs failed because of resource or hardware constraints.
+ Possible reasons for this problem are insufficient free memory or missing
+ hardware interfaces.
+ User action:
+ See errno.h for information about the error codes.
+ */
+
+/*/ Text: "Hypervisor filesystem mounted\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/iucv
+++ linux-4.15.0/Documentation/kmsg/s390/iucv
@@ -0,0 +1,33 @@
+ Text: "Defining an interrupt buffer on CPU %i failed with 0x%02x (%s)\n"
+ Severity: Warning
Parameter:
   @1: CPU number
   @2: hexadecimal error value
   @3: short error code explanation
Description:
Defining an interrupt buffer for external interrupts failed. Error value 0x03 indicates a problem with the z/VM directory entry of the z/VM guest virtual machine. This problem can also be caused by a program error.
User action:
If the error value is 0x03, examine the z/VM directory entry of your z/VM guest virtual machine. If the directory entry is correct or if the error value is not 0x03, report this problem to your support organization.

Text: "Suspending Linux did not completely close all IUCV connections\n"
Severity: Warning
Description:
When resuming a suspended Linux instance, the IUCV base code found data structures from one or more IUCV connections that existed before the Linux instance was suspended. Modules that use IUCV connections must close these connections when a Linux instance is suspended. This problem indicates an error in a program that used an IUCV connection.
User action:
Report this problem to your support organization.

Text: "iucv_external_interrupt: out of memory\n"
Severity: Error
Description:
LAN channel station (LCS) devices require a socket buffer (SKB) structure for storing incoming data. The LCS device driver failed to allocate an SKB structure to the LCS device. A likely cause of this problem is memory constraints.
User action:
Free some memory and repeat the failed operation.
+/
+ * Text: "%s: Shutting down the LCS device failed\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the LCS device
+ * Description:
+ * A request to shut down a LAN channel station (LCS) device resulted in an
+ * error. The error is logged in the LCS trace at trace level 4.
+ * User action:
+ * Try again to shut down the device. If the error persists, see the LCS trace
+ * to find out what causes the error.
+ */
+
+/
+ * Text: "%s: Detecting a network adapter for LCS devices failed with rc=%d (0x%x)\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the LCS device
+ *   @2: lcs_detect return code in decimal notation
+ *   @3: lcs_detect return code in hexadecimal notation
+ * Description:
+ * The LCS device driver could not initialize a network adapter.
+ * User action:
+ * Ensure that the physical connection from the port to the network is
+ * in place. If the error persists, note the return code from the error
+ * message and contact IBM support.
+ */
+
+/
+ * Text: "%s: A recovery process has been started for the LCS device\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the LCS device
+ * Description:
+ * The LAN channel station (LCS) device is shut down and restarted. The recovery
+ * process might have been initiated by a user or started automatically as a
+ * response to a device problem.
+ * User action:
+ * Wait until a message indicates the completion of the recovery process.
+ */
+
+/
+ * Text: "%s: An I/O-error occurred on the LCS device\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the LCS device
+ * Description:
+ * The LAN channel station (LCS) device reported a problem that can be recovered
The LAN channel station (LCS) device reported a problem that can be recovered by the LCS device driver. Repeated occurrences of this problem indicate a malfunctioning device.

User action:
If this problem occurs frequently, initiate a recovery process for the device, for example, by writing '1' to the 'recover' sysfs attribute of the device.

/*
 * Text: "%s: A command timed out on the LCS device\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the LCS device
 * Description:
 * The LAN channel station (LCS) device reported a problem that can be recovered by the LCS device driver. Repeated occurrences of this problem indicate a malfunctioning device.
 * User action:
 * If this problem occurs frequently, initiate a recovery process for the device, for example, by writing '1' to the 'recover' sysfs attribute of the device.
 */

/*
 * Text: "%s: An error occurred on the LCS device, rc=%ld\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the LCS device
 *   @2: return code
 * Description:
 * The LAN channel station (LCS) device reported a problem that can be recovered by the LCS device driver. Repeated occurrences of this problem indicate a malfunctioning device.
 * User action:
 * If this problem occurs frequently, initiate a recovery process for the device, for example, by writing '1' to the 'recover' sysfs attribute of the device.
 */

/*
 * Text: "%s: The LCS device stopped because of an error, dstat=0x%X, cstat=0x%X \n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the LCS device
 *   @2: device status
 *   @3: subchannel status
 * Description:
 * The LAN channel station (LCS) device reported an error. The LCS device driver
might start a device recovery process.
User action:
If the device driver does not start a recovery process, initiate a recovery
process, for example, by writing 'l' to the 'recover' sysfs attribute of the
device. If the problem persists, note the status information provided with
the message and contact IBM support.
*/

/*? Text: "%s: Starting an LCS device resulted in an error, rc=%d\n"
Severity: Error
Parameter:
@1: bus ID of the LCS device
@2: ccw_device_start return code in decimal notation
Description:
The LAN channel station (LCS) device driver failed to initialize an LCS
device. The device is not operational.
User action:
Initiate a recovery process, for example, by writing 'l' to the 'recover'
sysfs attribute of the device. If the problem persists, contact IBM support.
*/

/*? Text: "%s: Sending data from the LCS device to the LAN failed with rc=%d\n"
Severity: Error
Parameter:
@1: bus ID of the LCS device
@2: ccw_device_resume return code in decimal notation
Description:
The LAN channel station (LCS) device driver could not send data to the LAN
using the LCS device. This might be a temporary problem. Operations continue
on the LCS device.
User action:
If this problem occurs frequently, initiate a recovery process, for example,
by writing 'l' to the 'recover' sysfs attribute of the device. If the
problem persists, contact IBM support.
*/

/*? Text: "Query IPAssist failed. Assuming unsupported!\n" */
/*? Text: "Stoplan for %s initiated by LGW\n" */
/*? Text: "Not enough memory to add new multicast entry!\n" */
/*? Text: "Not enough memory for debug facility.\n" */
/*? Text: "Adding multicast address failed. Table possibly full!\n" */
/*? Text: "Error in opening device!\n" */
/*? Text: "LCS device %s %s IPv6 support!\n" */
/*? Text: "Device %s successfully recovered!\n" */
/*? Text: "LCS device %s %s Multicast support!\n" */
/*? Text: " Initialization failed!\n" */
"Reading monitor data failed with rc=%i\n"
Severity: Error
Parameter:
@1: return code
Description:
The z/VM *MONITOR record device driver failed to read monitor data
because the IUCV REPLY function failed. The read function against
the monitor record device returns EIO. All monitor data that has been read
since the last read with 0 size is incorrect.
User action:
Disregard all monitor data that has been read since the last read with
0 size. If the device driver has been compiled as a separate module, unload
and reload the monreader module. If the device driver has been compiled
into the kernel, reboot Linux. For more information about possible causes
of the error see the IUCV section in "z/VM CP Programming Services" and
the *MONITOR section in "z/VM Performance".
*/

"z/VM *MONITOR system service disconnected with rc=%i\n"
Severity: Error
Parameter:
@1: IPUSER SEVER return code
Description:
The z/VM *MONITOR record device driver receives monitor records through
an IUCV connection to the z/VM *MONITOR system service. This connection
has been severed and the read function of the z/VM *MONITOR device driver
returns EIO. All data received since the last read with 0 size is incorrect.
User action:
Disregard all monitor data read since the last read with 0 size. Close and
close and reopen the monitor record device. For information about the IPUSER SEVER
return codes see "z/VM Performance".
The read queue for monitor data is full.

Severity: Warning

Description:
The read function of the z/VM *MONITOR device driver returns EOVERFLOW because not enough monitor data has been read since the monitor device has been opened. Monitor data already read are valid and subsequent reads return valid data but some intermediate data might be missing.

User action:
Be aware that monitor data might be missing. Assure that you regularly read monitor data after opening the monitor record device.

Connecting to the z/VM *MONITOR system service failed with rc=%i

Severity: Error

Parameter:
@1: IUCV CONNECT return code

Description:
The z/VM *MONITOR record device driver receives monitor records through an IUCV connection to the z/VM *MONITOR system service. This connection could not be established when the monitor record device was opened. If the return code is 15, your z/VM guest virtual machine is not authorized to connect to the *MONITOR system service.

User action:
If the return code is 15, ensure that the IUCV *MONITOR statement is included in the z/VM directory entry for your z/VM guest virtual machine. For other IUCV CONNECT return codes see the IUCV section in "CP Programming Services" and the *MONITOR section in "z/VM Performance".

Disconnecting the z/VM *MONITOR system service failed with rc=%i

Severity: Warning

Parameter:
@1: IUCV SEVER return code

Description:
The z/VM *MONITOR record device driver receives monitor data through an IUCV connection to the z/VM *MONITOR system service. This connection could not be closed when the monitor record device was closed. You might not be able to resume monitoring.

User action:
No immediate action is necessary. If you cannot open the monitor record device in the future, reboot Linux. For information about the IUCV SEVER return codes see the IUCV section in "CP Programming Services" and the *MONITOR section in "z/VM Performance".
The z/VM *MONITOR record device driver cannot be loaded without z/VM

Severity: Error

Description:
The z/VM *MONITOR record device driver uses z/VM system services to provide
monitor data about z/VM guest operating systems to applications on Linux.
On Linux instances that run in environments other than the z/VM hypervisor,
the z/VM *MONITOR record device driver does not provide any useful
function and the corresponding monreader module cannot be loaded.

User action:
Load the z/VM *MONITOR record device driver only on Linux instances that run
as guest operating systems of the z/VM hypervisor. If the z/VM *MONITOR
record device driver has been compiled into the kernel, ignore this message.

The z/VM *MONITOR record device driver failed to register with IUCV

Severity: Error

Description:
The z/VM *MONITOR record device driver receives monitor data through an IUCV
connection and needs to register with the IUCV device driver. This
registration failed and the z/VM *MONITOR record device driver was not
loaded. A possible cause of this problem is insufficient memory.

User action:
Free some memory and try again to load the module. If the z/VM *MONITOR
record device driver has been compiled into the kernel, you might have to
configure more memory and reboot Linux. If you do not want to read monitor
data, ignore this message.

The specified *MONITOR DCSS %s does not have the required type SC

Severity: Error

Parameter:
@1: DCSS name

Description:
The DCSS that was specified with the monreader.mondcss kernel parameter or
with the mondcss module parameter cannot be a *MONITOR DCSS because it is
not of type SC.

User action:
Confirm that you are using the name of the DCSS that has been configured as
the *MONITOR DCSS on the z/VM hypervisor. If the default name, MONDCSS, is
used, omit the monreader.mondcss or mondcss parameter.

%/? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/monwriter
+++ linux-4.15.0/Documentation/kmsg/s390/monwriter
@@ -0,0 +1,17 @@
+/*?
+ * Text: "Writing monitor data failed with rc=%i\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: return code
+ * Description:
+ * The monitor stream application device driver used the z/VM diagnose call
+ * DIAG X'DC' to start writing monitor data. z/VM returned an error and the
+ * monitor data cannot be written. If the return code is 5, your z/VM guest
+ * virtual machine is not authorized to write monitor data.
+ * User action:
+ * If the return code is 5, ensure that your z/VM guest virtual machine's
+ * entry in the z/VM directory includes the OPTION APPLMON statement.
+ * For other return codes see the section about DIAGNOSE Code X'DC'
+ * in "z/VM CP Programming Services".
+ */
+/*?
  %s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/netiucv
+++ linux-4.15.0/Documentation/kmsg/s390/netiucv
@@ -0,0 +1,156 @@
+/*?
+ * Text: "%s: The peer interface of the IUCV device has closed the connection\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: bus ID of the IUCV device
+ * Description:
+ * The peer interface on the remote z/VM guest virtual machine has closed the
+ * connection. Do not expect further packets on this interface. Any packets
+ * you send to this interface will be dropped.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "%s: The IUCV device failed to connect to z/VM guest %s\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the IUCV device
+ *   @2: z/VM user ID
+ * Description:
+ * The connection cannot be established because the z/VM guest virtual
+ * machine with the peer interface is not running.
+ * User action:
+ * Ensure that the z/VM guest virtual machine with the peer interface is
+ * running; then try again to establish the connection.
+ */
+
+/*?
+ * Text: "%s: The IUCV device failed to connect to the peer on z/VM guest %s\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the IUCV device
+ * @2: z/VM user ID
+ * Description:
+ * The connection cannot be established because the z/VM guest virtual machine
+ * with the peer interface is not configured for IUCV connections.
+ * User action:
+ * Configure the z/VM guest virtual machine with the peer interface for IUCV
+ * connections; then try again to establish the connection.
+ */
+
+/*?
+ * Text: "%s: Connecting the IUCV device would exceed the maximum number of IUCV connections\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the IUCV device
+ * Description:
+ * The connection cannot be established because the maximum number of IUCV
+ * connections has been reached on the local z/VM guest virtual machine.
+ * User action:
+ * Close some of the established IUCV connections on the local z/VM guest
+ * virtual machine; then try again to establish the connection.
+ */
+
+/*?
+ * Text: "%s: z/VM guest %s has too many IUCV connections to connect with the IUCV device\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the IUCV device
+ * @2: remote z/VM user ID
+ * Description:
+ * Connecting to the remote z/VM guest virtual machine failed because the
+ * maximum number of IUCV connections for the remote z/VM guest virtual
+ * machine has been reached.
+ * User action:
+ * Close some of the established IUCV connections on the remote z/VM guest
+ * virtual machine; then try again to establish the connection.
+ */
+
+/*?
+ * Text: "%s: The IUCV device cannot connect to a z/VM guest with no IUCV authorization\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the IUCV device
+ * Description:
+ * Because the remote z/VM guest virtual machine is not authorized for IUCV
+ * connections, the connection cannot be established.
+ * User action:
+ * Add the statements 'IUCV ALLOW' and 'IUCV ANY' to the z/VM directory
+ * entry of the remote z/VM guest virtual machine; then try again to
+ * establish the connection. See "z/VM CP Planning and Administration"
+ * for details about the IUCV statements.
+ */
+
+ /*?
+ * Text: "%s: Connecting the IUCV device failed with error %d\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the IUCV device
+ *   @2: error code
+ * Description:
+ * The connection cannot be established because of an IUCV CONNECT error.
+ * User action:
+ * Report this problem to your support organization.
+ */
+
+ /*?
+ * Text: "%s: The IUCV device has been connected successfully to %s\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: bus ID of the IUCV device
+ *   @2: remote z/VM user ID
+ * Description:
+ * The connection has been established and the interface is ready to
+ * transmit communication packages.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "%s: The IUCV interface to %s has been established successfully\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: bus ID of the IUCV device
+ *   @2: remote z/VM user ID
+ * Description:
+ * The IUCV interface to the remote z/VM guest virtual machine has been
+ * established and can be activated with "ifconfig up" or an equivalent
+ * command.
+ * User action:
+ * None.
+ */
+
+ */?
+ * Text: "%s: The IUCV device is connected to %s and cannot be removed\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the IUCV device
+ * @2: remote z/VM user ID
+ * Description:
+ * Removing a connection failed because the interface is active with a peer
+ * interface on a remote z/VM guest virtual machine.
+ * User action:
+ * Deactivate the interface with "ifconfig down" or an equivalent command;
+ * then try again to remove the interface.
+ */
+
+/*?
+ * Text: "%s: The peer z/VM guest %s has closed the connection\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: bus ID of the IUCV device
+ * @2: remote z/VM user ID
+ * Description:
+ * The peer interface is no longer available.
+ * User action:
+ * Either deactivate and remove the interface, or wait for the peer
+ * z/VM guest to re-establish the interface.
+ */
+
+/*?
+ * Text: "driver unloaded\n" */
+/*?
+ * Text: "driver initialized\n" */
+/*?
+ * Text: "netif_stop_queue() cannot be called before register_netdev()\n" */
+/*?
+ * Text: "flen=%u proglen=%u pass=%u image=%pK from=%s pid=%d\n" */
+/*?
+ * Text: "%s selects TX queue %d, but real number of TX queues is %d\n" */
+/*?
+ * Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/numa
+++ linux-4.15.0/Documentation/kmsg/s390/numa
@@ -0,0 +1,11 @@
+/*?
+ * Text: "NUMA mode: %s\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: mode
+ * Description:
+ * Linux started with the specified NUMA mode.
+ * User action:
+ * None.
+ */
+/*?
+ * Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/numa_emu
+++ linux-4.15.0/Documentation/kmsg/s390/numa_emu
/*?
 * Text: "Not enough memory for %d nodes, reducing node count\n"
 * Severity: Warning
 * Parameter:
 *   @1: requested number of nodes
 * Description:
 * Using the requested memory stripe size for emulating the requested number of
 * NUMA nodes requires more than the available memory. The number of nodes is
 * specified with the emu_nodes= kernel parameter. The memory stripe size to
 * be used for distributing the available memory among the nodes is specified
 * with the emu_size= kernel parameter. Fewer nodes were created than the
 * requested number; each node has one memory stripe of the requested size.
 * User action:
 * Specify fewer nodes, reduce the memory stripe size, or make more memory
 * available to your Linux instance.
 */

/*?
 * Text: "Creating %d nodes with memory stripe size %ld MB\n"
 * Severity: Informational
 * Parameter:
 *   @1: number of nodes
 *   @2: stripe size
 * Description:
 * NUMA emulation is activated with the reported number of NUMA nodes.
 * The specified memory stripe size is used to distribute, in round-robin
 * fashion, the available memory among the nodes.
 * User action:
 * None.
 */

/*?
 * Text: "Increasing memory stripe size from %ld MB to %ld MB\n"
 * Severity: Warning
 * Parameter:
 *   @1: requested memory stripe size
 *   @2: adjusted memory stripe size
 * Description:
 * NUMA emulation could not use the requested memory stripe size and
 * therefore has increased it to the next possible value.
 * The requested memory stripe size is a default value or it was specified
 * with the emu_size= kernel parameter.
 * The memory stripe size must be a multiple of the memory block size that
 * can be read in hexadecimal notation from
 * /sys/devices/system/memory/block_size_bytes.
 * User action:
 * To avoid this message in the future, specify a valid memory stripe size
+ * with the emu_size= kernel parameter.
+ */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/os_info
+++ linux-4.15.0/Documentation/kmsg/s390/os_info
@@ -0,0 +1,36 @@
+/*?
+ * Text: "entry %i: %s (addr=0x%lx size=%lu)\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: entry ID
+ * @2: entry state
+ * @3: entry address
+ * @4: entry size
+ * Description:
+ * Linux is running in kdump mode and reports information defined by the
+ * previously running production kernel. Possible values for
+ * "entry state" are:
+ *
+ * - copied: The entry has been found, verified, and copied
+ *
+ * - not available: The entry has not been defined
+ *
+ * - checksum failed: The entry has been found, but it is not valid
+ * User action:
+ * If kdump fails, contact your service organization and include this message
+ * in the error report.
+ */
+
+/*?
+ * Text: "crashkernel: addr=0x%lx size=%lu\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: address
+ * @2: size
+ * Description:
+ * Linux is running in kdump mode and reports the address and size of
+ * the memory area that was reserved for kdump by the previously running
+ * production kernel.
+ * User action:
+ * None.
+ */
--- linux-4.15.0.orig/Documentation/kmsg/s390/perf
+++ linux-4.15.0/Documentation/kmsg/s390/perf
@@ -0,0 +1,90 @@
+/*?
+ * Text: "CPU[%i] CPUM_CF: ver=%u.%u A=%04x E=%04x C=%04x\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: cpu number
+ *   @2: first version number
+ *   @3: second version number
+ *   @4: counter set authorization
+ *   @5: counter set enable controls
+ *   @6: counter set activation controls
+ * Description:
+ * This message displays information about the CPU-measurement counter facility
+ * (CPUM_CF) on a particular CPU. For details, see
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "CPU[%i] CPUM_SF: basic=%i diag=%i min=%lu max=%lu cpu_speed=%u\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: cpu number
+ *   @2: authorization status for the basic-sampling function
+ *   @3: authorization status for the diagnostic-sampling function
+ *   @4: minimum sampling interval
+ *   @5: maximum sampling interval
+ *   @6: cpu speed
+ * Description:
+ * This message displays generic information about the CPU-measurement sampling
+ * facility (CPUM_SF) on a particular CPU. For details, see
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "CPU[%i] CPUM_SF: Basic-sampling: a=%i e=%i c=%i bsdes=%i tear=016lx dear=016lx\n"
+ * Severity: Informational
+ * Parameter:
+ *   @1: cpu number
+ *   @2: authorization control
+ *   @3: enable control
+ *   @4: activation control
+ *   @5: basic-sampling-data-entry size
+ *   @6: tear register contents
+ *   @7: dear register contents
+ * Description:
+ * This message displays information about the basic-sampling function of the
+ * CPU-measurement sampling facility (CPUM_SF) on a particular CPU.
+ * For details, see

User action:
None.

Text: "CPU[%i] CPUM_SF: Diagnostic-sampling: a=%i e=%i c=%i dsdes=%i tear=%016lx dear=%016lx\n"
Severity: Informational
Parameter:
@1: cpu number
@2: authorization control
@3: enable control
@4: activation control
@5: diagnostic-sampling-data-entry size
@6: tear register contents
@7: dear register contents
Description:
This message displays information about the diagnostic-sampling function of the CPU-measurement sampling facility (CPUM_SF) on a particular CPU.
For details, see "The Load-Program-Parameter and the CPU-Measurement Facilities", SA23-2260.
User action:
None.

Text: "The sampling facility is already reserved by %p\n"
Severity: Warning
Parameter:
@1: address of perf sampling support owner
Description:
A process tried to reserve the sampling facility support, but it was already reserved by another process.
User action:
Check whether another process, for example, the perf program or OProfile is currently active. Retry activating the sampling facility after the other process has ended.

Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/prng
+++ linux-4.15.0/Documentation/kmsg/s390/prng
@@ -0,0 +1,103 @@
+ prng */

Text: "prng runs in TDES mode with chunksize=%d and reseed_limit=%u\n"
+ * @1: read chunk size in bytes
+ * @2: reseed limit
+ * Description:
+ * The pseudo-random number device driver started in triple DES mode.
+ * For IBM mainframes earlier than IBM zEnterprise EC12 (zEC12),
+ * triple DES is the only available mode.
+ * As of zEC12, the preferred mode is SHA-512.
+ * User action:
+ * If triple DES is the expected mode, no action is required.
+ * Otherwise, verify that the prng started with the mode= module or
+ * prng.mode= kernel parameter set to a value other than 1.
+ * The value 1 forces triple DES mode. Also ensure that the mainframe
+ * runs with the latest firmware level.
+ */
+
+ /*?
+ * Text: "The prng module stopped after running in triple DES mode"
+ * Severity: Informational
+ * Description:
+ * The pseudo-random number device driver was running in triple DES mode.
+ * The device driver module, prng, was unloaded, or it stopped
+ * because Linux shut down.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "The prng module cannot start in SHA-512 mode"
+ * Severity: Error
+ * Description:
+ * The pseudo-random number device driver was loaded with the mode= module parameter
+ * or the prng.mode= kernel parameter set to 2. This setting forces SHA-512 mode,
+ * but the required support for MSA 5 is not available. This support requires an IBM
+ * zEnterprise EC12 (zEC12) or later mainframe.
+ * User action:
+ * If your mainframe is earlier than zEC12, set the mode= module or
+ * prng.mode= kernel parameter to 0 or 1 to run the
+ * pseudo-random number device driver in triple DES mode.
+ * Otherwise, ensure that MSA 5 support available.
+ */
+
+ /*?
+ * Text: "prng runs in SHA-512 mode with chunksize=%d and reseed_limit=%u"
+ * Severity: Informational
+ * Parameter:
+ * @1: read chunk size in bytes
+ * @2: reseed limit
+ * Description:
The pseudo-random number device driver started in SHA-512 mode.
As of IBM zEnterprise EC12, this is the preferred mode.
User action:
None.

Text: "The prng module stopped after running in SHA-512 mode"
Severity: Informational
Description:
The pseudo-random number device driver was running in SHA-512 mode.
The device driver module, prng, was unloaded, or stopped because Linux shut down.
User action:
None.

Text: "The prng self test state test for the SHA-512 mode failed"
Severity: Error
Description:
The pseudo-random number device driver is not operational because the self test failed.
After processing a published National Institute of Standards and Technology (NIST) test vector for the Deterministic Random Bit Generator (DRBG) algorithm, the device driver was not in the expected working state. This failure might indicate that the cryptographic software or hardware is not working correctly.
The processed NIST test vector was: Hash Drbg, Sha-512, Count #0.
User action:
Unload and reload the prng module, or if prng was compiled into the kernel, restart Linux.
If the error persists, contact your support organization.

Text: "The prng self test data test for the SHA-512 mode failed"
Severity: Error
Description:
The pseudo-random number device driver is not operational because the self test failed.
After processing a published National Institute of Standards and Technology (NIST) test vector for the Deterministic Random Bit Generator (DRBG) algorithm, the device driver did not produce the expected pseudo-random data. This failure might indicate that the cryptographic software or hardware is not working correctly.
The processed NIST test vector was: Hash Drbg, Sha-512, Count #0.
User action:
Unload and reload the prng module, or if prng was compiled into the kernel, restart Linux.
If the error persists, contact your support organization.
# Warning: LAN Offline

**Text:** "%s: The LAN is offline\n"

**Severity:** Warning

**Parameter:**

- `@1`: bus ID of the qeth device

**Description:**

A start LAN command was sent by the qeth device driver but the physical or virtual adapter has not started the LAN. The LAN might take a few seconds to become available.

**User action:**

- Check the status of the qeth device, for example, with the lsqeth command.
- If the device does not become operational within a few seconds, initiate a recovery process, for example, by writing '1' to the 'recover' sysfs attribute of the device.

# Warning: Recovery Process Started

**Text:** "%s: A recovery process has been started for the device\n"

**Severity:** Warning

**Parameter:**

- `@1`: bus ID of the qeth device

**Description:**

A recovery process was started either by the qeth device driver or through a user command.

**User action:**

- Wait until a message indicates the completion of the recovery process.

# Warning: Recovery Failed

**Text:** "%s: The qeth device driver failed to recover an error on the device\n"

**Severity:** Warning

**Parameter:**

- `@1`: bus ID of the qeth device

**Description:**

The qeth device driver performed an automatic recovery operation to recover an error on a qeth device. The recovery operation failed.

**User action:**

- Try the following actions in the given order: i) Check the status of the qeth device, for example, with the lsqeth command. ii) Initiate a recovery process by writing '1' to the 'recover' sysfs attribute of the device. iii) Ungroup and regroup the subchannel triplet of the device. vi) Reboot Linux. v) If the problem persists, gather Linux debug data and report the problem to your support organization.
%s: Device recovery failed to restore all offload features
Severity: Warning
Parameter:
@1: bus ID of the qeth device
Description:
The qeth device driver performed a recovery operation on a qeth device. Part of the recovery is to restore the offload features that were enabled before the recovery. At least one of those offload features could not be restored.
User action:
Check which offload features are enabled on the device, for example with the "ethtool -K" command. Try to explicitly re-enable the missing offload features for the device, for example with the "ethtool -K" command.

%s: The link for interface %s on CHPID 0x%X failed
Severity: Warning
Parameter:
@1: bus ID of the qeth device
@2: network interface name
@3: CHPID
Description:
a network link failed. A possible reason for this error is that a physical network cable has been disconnected.
User action:
Ensure that the network cable on the adapter hardware is connected properly.
If the connection is to a guest LAN, ensure that the device is still coupled to the guest LAN.

%s: The link for %s on CHPID 0x%X has been restored
Severity: Informational
Parameter:
@1: bus ID of the qeth device
@2: network interface name
@3: CHPID
Description:
a failed network link has been re-established. A device recovery is in progress.
User action:
Wait until a message indicates the completion of the recovery process.

%s: A hardware operation timed out on the device
Severity: Warning
Parameter:
@1: bus ID of the qeth device
Description:
A hardware operation timed out on the qeth device.
User action:
Check the status of the qeth device, for example, with the lsqeth command.
If the device is not operational, initiate a recovery process, for example,
by writing '1' to the 'recover' sysfs attribute of the device.

Severity: Error
Parameter:
@1: bus ID of the qeth device
Description:
The qeth device driver does not recognize the adapter hardware. The cause
of this problem could be a hardware error or a Linux level that does not
support your adapter hardware.
User action:
i) Investigate if your adapter hardware is supported by your Linux level.
Consider using hardware that is supported by your Linux level or upgrading
to a Linux level that supports your hardware. ii) Install the latest
firmware on your adapter hardware. iii) If the problem persists and is not
caused by a version mismatch, contact IBM support.

Severity: Error
Parameter:
@1: bus ID of the qeth device
Description:
The qeth adapter is exclusively used by another host.
User action:
Use another qeth adapter or configure this one not exclusively to a
particular host.

Severity: Warning
Parameter:
@1: bus ID of the qeth device
@2: return code
Description:
The QDIO subsystem reported an error.
+ * User action:
+ * Check for related QDIO errors. Check the status of the qeth device, for
+ * example, with the lsqeth command. If the device is not operational, initiate
+ * a recovery process, for example, by writing '1' to the 'recover' sysfs
+ * attribute of the device.
+ */
+
+/*?
+ * Text: "%s: There is no kernel module to support discipline %d
+
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the qeth device
+ *   @2: discipline
+ */
+
+/*?
+ * Text: "Initializing the qeth device driver failed"
+ * Severity: Error
+ */
+
+/*?
+ * Text: "%s: Registering IP address %s failed"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the qeth device
+ *   @2: IP address
+ */
%s: Reading the adapter MAC address failed
 Severity: Warning
 Parameter:
   @1: bus ID of the qeth device
 Description:
The qeth device driver could not read the MAC address from the network adapter.
 User action:
 Ungroup and regroup the subchannel triplet of the device. If this does not resolve the problem, reboot Linux. If the problem persists, gather Linux debug data and report the problem to your support organization.

%s: Starting ARP processing support for %s failed
 Severity: Warning
 Parameter:
   @1: bus ID of the qeth device
   @2: network interface name
 Description:
The qeth device driver could not start ARP support on the network adapter.
 User action:
 Ungroup and regroup the subchannel triplet of the device. If this does not resolve the problem, reboot Linux. If the problem persists, gather Linux debug data and report the problem to your support organization.

%s: Starting IP fragmentation support for %s failed
 Severity: Warning
 Parameter:
   @1: bus ID of the qeth device
   @2: network interface name
 Description:
The qeth device driver could not start IP fragmentation support on the network adapter.
 User action:
 Ungroup and regroup the subchannel triplet of the device. If this does not resolve the problem, reboot Linux. If the problem persists, gather Linux debug data and report the problem to your support organization.

%s: Starting VLAN support for %s failed
 Severity: Warning
 Parameter:
   @1: bus ID of the qeth device
+ * @2: network interface name
+ * Description:
+ * The qeth device driver could not start VLAN support on the network adapter.
+ * User action:
+ * None if you do not require VLAN support. If you need VLAN support,
+ * ungroup and regroup the subchannel triplet of the device. If this does not
+ * resolve the problem, reboot Linux. If the problem persists, gather Linux
+ * debug data and report the problem to your support organization.
+ */
+
+ /*?
+ * Text: "%s: Starting multicast support for %s failed\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the qeth device
+ *   @2: network interface name
+ * Description:
+ * The qeth device driver could not start multicast support on the network
+ * adapter.
+ * User action:
+ * Ungroup and regroup the subchannel triplet of the device. If this does not
+ * resolve the problem, reboot Linux. If the problem persists, gather Linux
+ * debug data and report the problem to your support organization.
+ */
+
+ /*?
+ * Text: "%s: Activating IPv6 support for %s failed\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the qeth device
+ *   @2: network interface name
+ * Description:
+ * The qeth device driver could not activate IPv6 support on the network
+ * adapter.
+ * User action:
+ * None if you do not require IPv6 communication. If you need IPv6 support,
+ * ungroup and regroup the subchannel triplet of the device. If this does not
+ * resolve the problem, reboot Linux. If the problem persists, gather Linux
+ * debug data and report the problem to your support organization.
+ */
+
+ /*?
+ * Text: "%s: Enabling the passthrough mode for %s failed\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the qeth device
+ *   @2: network interface name
+ * Description:
The qeth device driver could not enable the passthrough mode on the
network adapter. The passthrough mode is required for all network traffic
other than IPv4. In particular, the passthrough mode is required for IPv6
traffic.

User action:

None if all you want to support is IPv4 communication. If you want to support
IPv6 or other network traffic apart from IPv4, ungroup and regroup the
subchannel triplet of the device. If this does not resolve the problem,
reboot Linux. If the problem persists, gather Linux debug data and report
the problem to your support organization.

Text: "%s: Enabling broadcast filtering for %s failed\n"
Severity: Warning
Parameter:
@1: bus ID of the qeth device
@2: network interface name

Description:
The qeth device driver could not enable broadcast filtering on the network
adapter.

User action:
Ungroup and regroup the subchannel triplet of the device. If this does not
resolve the problem, reboot Linux. If the problem persists, gather Linux
data and report the problem to your support organization.

Text: "%s: Setting up broadcast filtering for %s failed\n"
Severity: Warning
Parameter:
@1: bus ID of the qeth device
@2: network interface name

Description:
The qeth device driver could not set up broadcast filtering on the network
adapter.

User action:
Ungroup and regroup the subchannel triplet of the device. If this does not
resolve the problem, reboot Linux. If the problem persists, gather Linux
data and report the problem to your support organization.

Text: "%s: Setting up broadcast echo filtering for %s failed\n"
Severity: Warning
Parameter:
@1: bus ID of the qeth device
@2: network interface name
* Description:
The qeth device driver could not set up broadcast echo filtering on the
network adapter.
* User action:
  * Ungroup and regroup the subchannel triplet of the device. If this does not
  * resolve the problem, reboot Linux. If the problem persists, gather Linux
data and report the problem to your support organization.
*/

/*?
 * Text: "%s: Starting HW checksumming for %s failed, using SW checksumming\n"
 * Severity: Warning
 * Parameter:
  * @1: bus ID of the qeth device
  * @2: network interface name
 * Description:
The network adapter supports hardware checksumming for IP packages
but the qeth device driver could not start hardware checksumming on the
adapter. The qeth device driver continues to use software checksumming for
IP packages.
 * User action:
  * None if you do not require hardware checksumming for network
  * traffic. If you want to enable hardware checksumming, ungroup and regroup
  * the subchannel triplet of the device. If this does not resolve the problem,
  * reboot Linux. If the problem persists, gather Linux debug data and report
  * the problem to your support organization.
*/

/*?
 * Text: "%s: Enabling HW checksumming for %s failed, using SW checksumming\n"
 * Severity: Warning
 * Parameter:
  * @1: bus ID of the qeth device
  * @2: network interface name
 * Description:
The network adapter supports hardware checksumming for IP packages
but the qeth device driver could not enable hardware checksumming on the
adapter. The qeth device driver continues to use software checksumming for
IP packages.
 * User action:
  * None if you do not require hardware checksumming for network
  * traffic. If you want to enable hardware checksumming, ungroup and regroup
  * the subchannel triplet of the device. If this does not resolve the problem,
  * reboot Linux. If the problem persists, gather Linux debug data and report
  * the problem to your support organization.
*/
+ * Text: "%s: Starting outbound TCP segmentation offload for %s failed\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the qeth device
+ *   @2: network interface name
+ * Description:
+ * The network adapter supports TCP segmentation offload, but the qeth device
+ * driver could not start this support on the adapter.
+ * User action:
+ * None if you do not require TCP segmentation offload. If you want to
+ * enable TCP segmentation offload, ungroup and regroup the subchannel triplet
+ * of the device. If this does not resolve the problem, reboot Linux. If the
+ * problem persists, gather Linux debug data and report the problem to your
+ * support organization.
+ */
+
+ /*?
+ * Text: "%s: The network adapter failed to generate a unique ID\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the qeth device
+ * Description:
+ * In IBM mainframe environments, network interfaces are not identified by
+ * a specific MAC address. Therefore, the network adapters provide the network
+ * interfaces with unique IDs to be used in their IPv6 link local addresses.
+ * Without such a unique ID, duplicate addresses might be assigned in other
+ * LPARs.
+ * User action:
+ * Install the latest firmware on the adapter hardware. Manually, configure
+ * an IPv6 link local address for this device.
+ */
+
+ /*?
+ * Text: "There is no IPv6 support for the layer 3 discipline\n"
+ * Severity: Warning
+ * Description:
+ * If you want to use IPv6 with the layer 3 discipline, you need a Linux kernel
+ * with IPv6 support. Because your Linux kernel has not been compiled with
+ * IPv6 support, you cannot use IPv6 with the layer 3 discipline, even if your
+ * adapter supports IPv6.
+ * User action:
+ * Use a Linux kernel that has been complied to include IPv6 support if you
+ * want to use IPv6 with layer 3 qeth devices.
+ */
+
+ /*?
+ * Text: "%s: The qeth device is not configured for the OSI layer required by z/VM\n"
+ * Severity: Error
A qeth device that connects to a virtual network on z/VM must be configured for the same Open Systems Interconnection (OSI) layer as the virtual network. An ETHERNET guest LAN or VSWITCH uses the data link layer (layer 2) while an IP guest LAN or VSWITCH uses the network layer (layer 3).

User action:
- If you are connecting to an ETHERNET guest LAN or VSWITCH, set the layer2 sysfs attribute of the qeth device to 1. If you are connecting to an IP guest LAN or VSWITCH, set the layer2 sysfs attribute of the qeth device to 0.

Text: "%s: Starting source MAC-address support for %s failed"
Severity: Warning
Parameter:
- @1: bus ID of the qeth device
- @2: network interface name
Description:
The qeth device driver could not enable source MAC-address on the network adapter.
User action:
- Ungroup and regroup the subchannel triplet of the device. If this does not resolve the problem, reboot Linux. If the problem persists, gather Linux debug data and report the problem to your support organization.

Text: "%s: MAC address %pM already exists"
Severity: Warning
Parameter:
- @1: bus ID of the qeth device
- @2: MAC-address
Description:
Setting the MAC address for the qeth device fails, because this MAC address is already defined on the OSA CHPID.
User action:
- Use a different MAC address for this qeth device.

Text: "%s: MAC address %pM is not authorized"
Severity: Warning
Parameter:
- @1: bus ID of the qeth device
- @2: MAC-address
Description:
This qeth device is a virtual network interface card (NIC), to which z/VM has already assigned a MAC address. z/VM MAC address verification does not allow you to change this predefined address.

User action:
None; use the MAC address that has been assigned by z/VM.

Text: "%s: The HiperSockets network traffic analyzer is activated\n"
Severity: Informational
Parameter:
@1: bus ID of the qeth device
Description:
The sysfs 'sniffer' attribute of the HiperSockets device has the value '1'. The corresponding HiperSockets interface has been switched into promiscuous mode. As a result, the HiperSockets network traffic analyzer is started on the device.
User action:
None.

Text: "%s: The HiperSockets network traffic analyzer is deactivated\n"
Severity: Informational
Parameter:
@1: bus ID of the qeth device
Description:
The sysfs 'sniffer' attribute of the HiperSockets device has the value '1'. Promiscuous mode has been switched off for the corresponding HiperSockets interface As a result, the HiperSockets network traffic analyzer is stopped on the device.
User action:
None.

Text: "%s: The device is not authorized to run as a HiperSockets network traffic analyzer\n"
Severity: Warning
Parameter:
@1: bus ID of the qeth device
Description:
The sysfs 'sniffer' attribute of the HiperSockets device has the value '1'. The corresponding HiperSockets interface is switched into promiscuous mode but the network traffic analyzer (NTA) rules configured at the Support Element (SE) do not allow tracing. Possible reasons are:
- Tracing is not authorized for all HiperSockets LANs in the mainframe system
- Tracing is not authorized for this HiperSockets LAN
- LPAR is not authorized to enable an NTA
User action:
Configure appropriate HiperSockets NTA rules at the SE.
+ */
+
+ /*?
+ * Text: "%s: A HiperSockets network traffic analyzer is already active in the HiperSockets LAN"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * The sysfs 'sniffer' attribute of the HiperSockets device has the value '1'.
+ * The HiperSockets interface is switched into promiscuous mode but another
+ * HiperSockets device on the same HiperSockets LAN is already running as
+ * a network traffic analyzer.
+ * A HiperSockets LAN can only have one active network traffic analyzer.
+ * User action:
+ * Do not configure multiple HiperSockets devices in the same HiperSockets LAN as
+ * tracing devices.
+ */
+
+ /*?
+ * Text: "%s: Enabling HW TX checksumming for %s failed, using SW TX checksumming"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * @2: network interface name
+ * Description:
+ * The network adapter supports hardware checksumming for outgoing IP packages
+ * but the qeth device driver could not enable hardware TX checksumming on the
+ * adapter. The qeth device driver continues to use software checksumming for
+ * outgoing IP packages.
+ * User action:
+ * None if you do not require hardware checksumming for outgoing network
+ * traffic. If you want to enable hardware checksumming, ungroup and regroup
+ * the subchannel triplet of the device. If this does not resolve the problem,
+ * reboot Linux. If the problem persists, gather Linux debug data and report
+ * the problem to your support organization.
+ */
+
+ /*?
+ * Text: "%s: A connection could not be established because of an OLM limit"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * z/OS has activated Optimized Latency Mode (OLM) for a connection through an OSA Express3 adapter.
+ * This reduces the maximum number of concurrent connections per physical port for shared adapters.
+ * The new connection would exceed the maximum. Linux cannot establish further connections using
+ * this adapter.
+ * User action:
** If possible, deactivate an existing connection that uses this adapter and try again to establish
** the new connection. If you cannot free an existing connection, use a different adapter for the
** new connection.
** */

/* Text: "%s: Setting the device online failed because of insufficient authorization\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * The qeth device is configured with OSX CHPIDs. An OSX CHPID cannot be activated unless the LPAR is
explicitly authorized to access it.
+ * For z/VM guest operating systems, the z/VM user ID must be explicitly authorized in addition to the LPAR.
+ * You grant these authorizations through the Service Element.
+ * User action:
+ * At the Service Element, authorize the LPAR and, if applicable, the z/VM user ID for using the OSX CHPIDs
with which the qeth device has been configured.
+ * Then try again to set the device online.
+ */

/* Text: "%s: portname is deprecated and is ignored\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * An OSA-Express port name was required to identify a shared OSA port.
+ * All operating system instances that shared the port had to use the same port name.
+ * This requirement no longer applies, and the specified portname attribute is ignored.
+ * User action:
+ * For future upgrades, remove OSA port name specifications from your
+ * network configuration.
+ */

/* Text: "core functions removed\n" */
/* Text: "%s: Device is a%s card%s%s%s\nwith link type %s\n" */
/* Text: "%s: issue_next_read failed: no iob available!\n" */
/* Text: "%s: Priority Queueing not supported\n" */
/* Text: "%s: sense data available. cstat 0x%X dstat 0x%X\n" */
/* Text: "loading core functions\n" */
/* Text: "%s: MAC address %pM successfully registered on device %s\n" */
/* Text: "%s: Device successfully recovered!\n" */
/* Text: "register layer 2 discipline\n" */
/* Text: "unregister layer 2 discipline\n" */
/* Text: "%s: Hardware IP fragmentation not supported on %s\n" */
/* Text: "%s: IPv6 not supported on %s\n" */
/* Text: "%s: VLAN not supported on %s\n" */
%s: Inbound source MAC-address not supported on %s

%s: IPV6 enabled

%s: ARP processing not supported on %s

%s: Hardware IP fragmentation enabled

%s: set adapter parameters not supported.

%s: VLAN enabled

%s: Outbound TSO enabled

%s: Broadcast not supported on %s

%s: Outbound TSO not supported on %s

%s: Inbound HW Checksumming not supported on %s, continuing using Inbound SW Checksumming

%s: Using no checksumming on %s

%s: Multicast not supported on %s

%s: Using SW checksumming on %s

%s: HW Checksumming(%sbound) enabled

%s: unregister layer 3 discipline

%s: Multicast enabled

%s: QDIO data connection isolation is deactivated

%s: QDIO data connection isolation is activated

%s: Adapter does not support QDIO data connection isolation

%s: Adapter is dedicated. QDIO data connection isolation not supported

%s: TSO does not permit QDIO data connection isolation

%s: HW TX Checksumming enabled

%s: netif_stop_queue() cannot be called before register_netdev()

%s: qeth_i3: ignoring TR device

flen=%u proglen=%u pass=%u image=%pK from=%s pid=%d

%s selects TX queue %d, but real number of TX queues is %d

@register layer 3 discipline

%s: Turning off reflective relay mode at the adjacent switch failed

* Severity: Warning

* Parameter:

* @1: bus ID of the qeth device

* Description:

* The policy for the QDIO data connection isolation was

* changed successfully, and communications are now handled according to the

* new policy. The ISOLATION_FORWARD policy is no longer used, but the qeth

* device driver could not turn off the reflective relay mode on the adjacent

* switch port.

* User action:

* Check the adjacent switch for errors and correct the problem.

* /

*

* Text: "%s: The adjacent switch port does not support reflective relay mode"

* Severity: Error
Parameter:
@1: bus ID of the qeth device

Description:
The 'isolation' sysfs attribute of the qeth device could not be set to 'forward'. This setting selects the ISOLATION_FORWARD policy for the QDIO data connection isolation. The ISOLATION_FORWARD policy requires a network adapter in Virtual Ethernet Port Aggregator (VEPA) mode with an adjacent switch port in reflective relay mode.

User action:
Use a switch port that supports reflective relay mode if you want to use the ISOLATION_FORWARD policy for the qeth device.

Text: "%s: The reflective relay mode cannot be enabled at the adjacent switch port"
Severity: Error
Parameter:
@1: bus ID of the qeth device

Description:
The 'isolation' sysfs attribute of the qeth device could not be set to 'forward'. This setting selects the ISOLATION_FORWARD policy for the QDIO data connection isolation. The ISOLATION_FORWARD policy requires a network adapter in Virtual Ethernet Port Aggregator (VEPA) mode with an adjacent switch port in reflective relay mode. The qeth device driver failed to enable the required reflective relay mode on the adjacent switch port although the switch port supports this mode.

User action:
Enable reflective relay mode on the switch for the adjacent port and try again.

Text: "%s: Interface %s is down because the adjacent port is no longer in reflective relay mode"
Severity: Error
Parameter:
@1: bus ID of the qeth device
@2: interface name

Description:
The ISOLATION_FORWARD policy is active for the QDIO data connection isolation of the qeth device. This policy requires a network adapter in Virtual Ethernet Port Aggregator (VEPA) mode with an adjacent switch port in reflective relay mode. The reflective relay mode on the adjacent switch port was disabled. The qeth device was set offline and the interface was deactivated to prevent any unintended network traffic.

User action:
Enable the reflective relay mode again on the adjacent port or use the 'isolation' sysfs attribute of the qeth device to set a different policy for the QDIO data connection isolation. You can then resume operations by setting the qeth device back online and activating the interface.
+ * @1: bus ID of the qeth device
+ * Description:
+ * You can configure this device as a Bridge Port.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "%s: The device is not configured as a Bridge Port\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * The Bridge Port role cannot be withdrawn from a device
+ * that is not configured as a Bridge Port.
+ * User action:
+ * None.
+ */
+
+/*?
+ * Text: "%s: The LAN already has a primary Bridge Port\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * A LAN can have multiple secondary Bridge Ports, but only
+ * one primary Bridge Port. Configuring the device as a
+ * primary Bridge Port failed because another port on the
+ * LAN has been configured as the primary Bridge Port.
+ * User action:
+ * Find out which operating system instance has configured the primary
+ * Bridge Port. Assure that the primary role for this port is withdrawn
+ * before trying again to configure your device as the primary Bridge
+ * Port. Alternatively, consider configuring your device as a secondary
+ * Bridge Port.
+ */
+
+/*?
+ * Text: "%s: The device is already a secondary Bridge Port\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * A device cannot be configured as a primary or secondary
+ * Bridge Port if it is already configured as a secondary Bridge Port.
+ * User action:
+ * None, if you want the device to be a secondary Bridge Port.
+ * If you want to configure the device as the primary Bridge Port,
* withdraw the secondary role by writing 'none' to the 'bridgeport_role'
* sysfs attribute of the device. Then try again to configure the
* device as the primary Bridge Port.
* */
+
+*/?

+ /* Text: "%s: The LAN cannot have more secondary Bridge Ports\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * A LAN can have up to five secondary Bridge Ports.
+ * You cannot configure a further device as a secondary
+ * Bridge Port unless the Bridge Ports role is withdrawn from one of
+ * the existing secondary Bridge Ports.
+ * User action:
+ * Assure that the Bridge Port role is withdrawn from one of the
+ * existing secondary Bridge Ports before trying again to configure your
+ * device as a secondary Bridge Port.
+ */
+
+/*?

+ /* Text: "%s: The device is already a primary Bridge Port\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * A device cannot be configured as a primary or secondary
+ * Bridge Port if it is already configured as a primary Bridge Port.
+ * User action:
+ * None, if you want the device to be a primary Bridge Port.
+ * If you want to configure the device as a secondary Bridge Port,
+ * withdraw the primary role by writing 'none' to the 'bridgeport_role'
+ * sysfs attribute of the device. Then try again to configure the
+ * device as the secondary Bridge Port.
+ */
+
+/*?

+ /* Text: "%s: The device is not authorized to be a Bridge Port\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the qeth device
+ * Description:
+ * The device cannot be configured as a Bridge Port because
+ * the required authorizations in the hardware are not in place.
+ * User action:
+ * See your hardware documentation about how to authorize
+ * ports for becoming a Bridge Port.
# Linux instances cannot configure the target port as a Bridge Port.

Another operating system already uses a Bridge Port on the HiperSockets or on the OSA adapter. For example, a z/VM instance might be using a port in a VSWITCH configuration. Multiple Bridge Ports on the same HiperSockets or OSA adapter must be configured by instances of the same operating system, for example, all Linux or all z/VM.

**User action:**

- Reconsider your network topology. Configure Bridge Ports only for ports on adapters where any other Bridge Ports are configured by other Linux instances.

---

# Setting address notification failed

Enabling or disabling the address notification feature of a HiperSockets device failed. The device might not be configured as a Bridge Port.

**User action:**

- None, unless you need address notifications for this device.

If you need notifications, confirm that your device is attached to a HiperSockets LAN that supports Bridge Capable Ports and that your device is configured as a Bridge Port. If the 'bridgeport_role' sysfs attribute of the device contains, one of the values 'primary' or 'secondary' and you cannot set the address notification, contact your support organization.

---

# Address notification from the Bridge Port stopped %s (%s)

A Bridge Port no longer provides address notifications.
Possible reasons include traffic overflow and that the device is no longer configured as a Bridge Port. A udev event with BRIDGEDHOST=abort was emitted to alert applications that rely on the address notifications.

User action:
None.

Text: "%s: The qeth driver ran out of channel command buffers"
Severity: Warning
Parameter:
@1: bus ID of the qeth device
Description:
Command buffers can temporarily run out during periods of intense network configuration activities.
The device driver recovers from this condition as outstanding commands are completed.
User action:
Wait for a short time. If the problem persists, initiate a recovery process by writing '1' to the 'recover' sysfs attribute of the device.

Text: "%s: %d output lines suppressed due to ratelimiting"
--- linux-4.15.0.orig/Documentation/kmsg/s390/s390dbf
+++ linux-4.15.0/Documentation/kmsg/s390/s390dbf
@@ -0,0 +1,83 @@

Text: "Root becomes the owner of all s390dbf files in sysfs"
Severity: Warning
Description:
The S/390 debug feature you are using only supports uid/gid = 0.
User action:
None.

Text: "Registering debug feature %s failed"
Severity: Error
Parameter:
@1: feature name
Description:
The initialization of an S/390 debug feature failed. A likely cause of this problem is memory constraints. The system keeps running, but the debug data for this feature will not be available in sysfs.
User action:
Consider assigning more memory to your LPAR or z/VM guest virtual machine.
* Text: "Registering view %s/%s would exceed the maximum number of views %i"
* Severity: Error
* Parameter:
  * @1: feature name
  * @2: view name
  * @3: maximum
* Description:
  * The maximum number of allowed debug feature views has been reached. The
  * view has not been registered. The system keeps running but the new view
  * will not be available in sysfs. This is a program error.
* User action:
  * Report this problem to your support partner.
*/

* Text: "%s is not a valid level for a debug feature"
* Severity: Warning
* Parameter:
  * @1: level
* Description:
  * Setting a new level for a debug feature by using the 'level' sysfs attribute
  * failed. Valid levels are the minus sign (-) and the integers in the
  * range 0 to 6. The minus sign switches off the feature. The numbers switch
  * the feature on, where higher numbers produce more debug output.
* User action:
  * Write a valid value to the 'level' sysfs attribute.
*/

* Text: "Flushing debug data failed because %c is not a valid area"
* Severity: Informational
* Parameter:
  * @1: debug area number
* Description:
  * Flushing a debug area by using the 'flush' sysfs attribute failed. Valid
  * values are the minus sign (-) for flushing all areas, or the number of the
  * respective area for flushing a single area.
* User action:
  * Write a valid area number or the minus sign (-) to the 'flush' sysfs
  * attribute.
*/

* Text: "Allocating memory for %i pages failed"
* Severity: Informational
* Parameter:
+ * @1: number of pages
+ * Description:
+ * Setting the debug feature size by using the 'page' sysfs attribute failed.
+ * Linux did not have enough memory for expanding the debug feature to the
+ * requested size.
+ * User action:
+ * Use a smaller number of pages for the debug feature or allocate more
+ * memory to your LPAR or z/VM guest virtual machine.
+ */
+
+/* ? Text: "%s: set new size (%i pages)\n" */
+/* ? Text: "%s: switched off\n" */
+/* ? Text: "%s: level %i is out of range (%i - %i)\n" */
+/* ? Text: "Registering view %s/%s failed due to out of memory\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/sclp_cmd
+++ linux-4.15.0/Documentation/kmsg/s390/sclp_cmd
@@ -0,0 +1,44 @@
+/* ? Text: "sync request failed (cmd=0x%08x, status=0x%02x)\n" */
+/* ? Text: "readcpuinfo failed (response=0x%04x)\n" */
+/* ? Text: "configure cpu failed (cmd=0x%08x, response=0x%04x)\n" */
+/* ? Text: "configure channel-path failed (cmd=0x%08x, response=0x%04x)\n" */
+/* ? Text: "read channel-path info failed (response=0x%04x)\n" */
+/* ? Text: "assign storage failed (cmd=0x%08x, response=0x%04x, rn=0x%04x)\n" */
+/* ? Text: "configure PCI I/O adapter failed: cmd=0x%08x response=0x%04x)\n" */
+/* ? Text: "request failed (status=0x%02x)\n" */
+/* ? Text: "request failed with response code 0x%0x)\n" */
+
+/* ?
+ * Text: "Memory hotplug state changed, suspend refused.\n"
+ * Severity: Error
+ * Description:
+ * Suspend is refused after a memory hotplug operation was performed.
+ * User action:
+ * The system needs to be restarted and no memory hotplug operation must be
+ * performed in order to allow suspend.
+ */
+
+/* ?
+ * Text: "Standby memory at 0x%llx (%lluM of %lluM usable)\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: start address of standby memory
+ * @2: usable memory in MB
+ * @3: total detected memory in MB
+ * Description:
+ * Standby memory was detected. It can be used for memory hotplug only
+ * if it is aligned to the Linux hotplug memory block size.
+ * If the aligned amount of memory matches the total amount,
all detected standby memory can be used. Otherwise, some of the detected memory is unaligned and cannot be used.

User action:

None, if the usable and the total amount of detected standby memory match.

If the amounts of memory do not match, check the memory setup of your guest virtual machine and ensure that the standby memory start and end address is aligned to the Linux hotplug memory block size.

On Linux, issue "cat /sys/devices/system/memory/block_size_bytes" to find the hotplug memory block size value in hexadecimal notation.

On z/VM, query your memory setup with "vmcp q v store".

* User action:

None, if the usable and the total amount of detected standby memory match.

If the amounts of memory do not match, check the memory setup of your guest virtual machine and ensure that the standby memory start and end address is aligned to the Linux hotplug memory block size.

On Linux, issue "cat /sys/devices/system/memory/block_size_bytes" to find the hotplug memory block size value in hexadecimal notation.

On z/VM, query your memory setup with "vmcp q v store".

+/* Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/sclp_config
+++ linux-4.15.0/Documentation/kmsg/s390/sclp_config
@@ -0,0 +1,15 @@
+/*?
 * Text: "CPU capability may have changed\n"
+ * Severity: Informational
+ * Description:
+ * The capability of the CPUs in the configuration may have been upgraded
+ * or downgraded. This message may also appear if the capability of the CPUs in the configuration did not change.
+ * For details see the STORE SYSTEM INFORMATION description in the "Principles of Operation."
+ * User action:
+ * The user can examine /proc/sysinfo for CPU capability values.
+ */
+/*? Text: "Open for Business request failed with response code 0x%04x\n" */
+/*? Text: "SCLP receiver did not register to receive Configuration Management Data Events.\n" */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/sclp_cpi
+++ linux-4.15.0/Documentation/kmsg/s390/sclp_cpi
@@ -0,0 +1,3 @@
+/*?
 * Text: "request failed (status=0x%02x)\n" */
+/*? Text: "request failed with response code 0x%x\n" */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/sclp_ocf
+++ linux-4.15.0/Documentation/kmsg/s390/sclp_ocf
@@ -0,0 +1 @ @
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/sclp_sdias
+++ linux-4.15.0/Documentation/kmsg/s390/sclp_sdias
@@ -0,0 +1,4 @@
+/*? Text: "sclp_send failed for get_nr_blocks\n" */
+/*? Text: "SCLP error: %x\n" */
+/*? Text: "sclp_send failed: %x\n" */
+/*? Text: "Error from SCLP while copying hsa. Event status = %x\n" */
/*?
 * Text: "%lx: The capabilities of the SCM increment changed\n"
 * Severity: Informational
 * Parameter:
 * @1: start address of the SCM increment
 * Description:
 * A configuration change is in progress for the storage class memory (SCM)
 * increment.
 * User action:
 * Verify that the capability of the SCM increment is as intended; for
 * example, with lsscm.
 */
+
+/*?
 * Text: "An I/O operation to SCM failed with rc=%d\n"
 * Severity: Error
 * Parameter:
 * @1: return code
 * Description:
 * An error occurred during I/O to storage class memory (SCM). The operation
 * was repeated, but the maximum number of retries was exceeded before the
 * request could be fulfilled.
 * User action:
 * Contact your support organization.
 */
+
+/*?
 * Text: "%lx: Write access to the SCM increment is suspended\n"
 * Severity: Informational
 * Parameter:
 * @1: start address of the SCM increment
 * Description:
 * A concurrent firmware upgrade is in progress. For the duration of the
 * upgrade, write access to the storage class memory (SCM) increment has been
 * suspended.
 * User action:
 * None.
 */
+
+/*?
 * Text: "%lx: Write access to the SCM increment is restored\n"
 * Severity: Informational
 * Parameter:
 * @1: start address of the SCM increment
 * Description:
Write access to the storage class memory (SCM) increment was restored after a temporary suspension during a concurrent firmware upgrade.

User action:
None.

Text: "The initial RAM disk does not fit into the memory"
Severity: Error
Description:
The load address and the size of the initial RAM disk specify a memory area that is not available.
User action:
Lower the load address of the initial RAM disk, reduce the size of the initial RAM disk, or increase the size of the system memory to make the initial RAM disk fit into the memory.

Text: "The maximum memory size is %luMB"
Severity: Notice
Parameter:
@1: size in MB
Description:
The system memory size cannot exceed the amount of memory that is provided by the real or virtual hardware. It can be further reduced through an upper memory address limit that is specified with the mem= kernel parameter.
User action:
None.

Text: "Linux is running as a z/VM guest operating system in 31-bit mode"
Severity: Informational
Description:
The 31-bit Linux kernel detected that it is running as a guest operating system of the z/VM hypervisor.
User action:
None.

Text: "Linux is running natively in 31-bit mode"
Severity: Informational
+ * Description:
+ * The 31-bit Linux kernel detected that it is running on an IBM mainframe,
+ * either as the sole operating system in an LPAR or as the sole operating
+ * system on the entire mainframe. The Linux kernel is not running as a
+ * guest operating system of the z/VM hypervisor.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "The hardware system has IEEE compatible floating point units\n"
+ * Severity: Informational
+ * Description:
+ * The Linux kernel detected that it is running on a hardware system with
+ * CPUs that have IEEE compatible floating point units.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "The hardware system has no IEEE compatible floating point units\n"
+ * Severity: Informational
+ * Description:
+ * The Linux kernel detected that it is running on a hardware system with
+ * CPUs that do not have IEEE compatible floating point units.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "Linux is running as a z/VM guest operating system in 64-bit mode\n"
+ * Severity: Informational
+ * Description:
+ * The 64-bit Linux kernel detected that it is running as a guest operating
+ * system of the z/VM hypervisor.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "Linux is running under KVM in 64-bit mode\n"
+ * Severity: Informational
+ * Description:
+ * The 64-bit Linux kernel detected that it is running as a guest operating
+ * system of the KVM hypervisor.
+ * User action:
+ * None.
+ */
The 64-bit Linux kernel detected that it is running on an IBM mainframe, either as the sole operating system in an LPAR or as the sole operating system on the entire mainframe. The Linux kernel is not running as a guest operating system of the z/VM hypervisor.

User action:

None.

*/

Defining the Linux kernel NSS failed with rc=%d

The Linux kernel could not define the named saved system (NSS) with the z/VM CP DEFSYS command. The return code represents the numeric portion of the CP DEFSYS error message.

User action:

For return code 1, the z/VM guest virtual machine is not authorized to define named saved systems.

Ensure that the z/VM guest virtual machine is authorized to issue the CP DEFSYS command (typically privilege class E).

For other return codes, see the help and message documentation for the CP DEFSYS command.

*/

Saving the Linux kernel NSS failed with rc=%d

The Linux kernel could not save the named saved system (NSS) with the z/VM CP SAVESYS command. The return code represents the numeric portion of the CP SAVESYS error message.

User action:

For return code 1, the z/VM guest virtual machine is not authorized to save named saved systems.

Ensure that the z/VM guest virtual machine is authorized to issue the CP SAVESYS command (typically privilege class E).

For other return codes, see the help and message documentation for the CP SAVESYS command.

*/
Text: "crashkernel reservation failed: %s\n"
Severity: Informational
Parameter:
@1: reason string
Description:
The memory reservation for the kdump "crashkernel" parameter was not successful. The Linux kernel was either not able to find a free memory area or an invalid area has been defined. The reason string describes the cause of the failure in more detail.
User action:
Increase the memory footprint of your virtual machine or adjust the values for the "crashkernel" kernel parameter. Then boot your Linux system again.

Text: "Reserving %lluMB of memory at %lluMB for crashkernel (System RAM: %luMB)\n"
Severity: Informational
Parameter:
@1: amount of reserved memory
@2: storage location of reserved memory
@3: amount of system RAM
Description:
The memory reservation for the kdump "crashkernel" parameter was successful and a kdump kernel can now be loaded with the kexec tool.
User action:
None.

%? Text: "%s: %d output lines suppressed due to ratelimiting\n"
--- linux-4.15.0.orig/Documentation/kmsg/s390/smsgiucv
+++ linux-4.15.0/Documentation/kmsg/s390/smsgiucv
@@ -0,0 +1 @@
%? Text: "%s: %d output lines suppressed due to ratelimiting\n"
--- linux-4.15.0.orig/Documentation/kmsg/s390/smsgiucv_app
+++ linux-4.15.0/Documentation/kmsg/s390/smsgiucv_app
@@ -0,0 +1 @@
%? Text: "%s: %d output lines suppressed due to ratelimiting\n"
--- linux-4.15.0.orig/Documentation/kmsg/s390/tape
+++ linux-4.15.0/Documentation/kmsg/s390/tape
@@ -0,0 +1,63 @@
%? Text: "%s: A tape unit was detached while in use\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device
Description:
A tape unit has been detached from the I/O configuration while a tape
+ * was being accessed. This typically results in I/O error messages and
+ * potentially in damaged data on the tape.
+ * User action:
+ * Check the output of the application that accesses the tape device.
+ * If this problem occurred during a write-type operation, consider repeating
+ * the operation after bringing the tape device back online.
+ */
+
+ */?
+ * Text: "%s: A tape cartridge has been mounted\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * A tape cartridge has been inserted into the tape unit. The tape in the
+ * tape unit is ready to be accessed.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "%s: The tape cartridge has been successfully unloaded\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * The tape cartridge has been unloaded from the tape unit. Insert a tape
+ * cartridge before accessing the tape device.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "A cartridge is loaded in tape device %s, refusing to suspend\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * A request to suspend a tape device currently loaded with a cartridge is
+ * rejected.
+ * User action:
+ * Unload the tape device. Then try to suspend the system again.
+ */
+
+ /*?
+ * Text: "Tape device %s is busy, refusing to suspend\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * A request to suspend a tape device being currently in use is rejected.
+ * User action:
+ * Terminate applications performing tape operations
+ * and then try to suspend the system again.
+ */
+ */? Text: ">
--- linux-4.15.0.orig/Documentation/kmsg/s390/tape_34xx
+++ linux-4.15.0/Documentation/kmsg/s390/tape_34xx
@@ -0,0 +1,418 @@
+ /*?
+ * Text: ">
+ */
+ */?
+ * Text: "@1: bus ID of the tape device
+ * @2: number
+ * Description:
+ * The control unit has reported an error condition that is not recognized by
+ * the error recovery process of the tape device driver.
+ * User action:
+ * Report this problem and the condition number from the message to your
+ * support organization.
+ */
+ +
+ */?
+ * Text: "@1: bus ID of the tape device
+ * Description:
+ * A data overrun error has occurred on the connection between the control
+ * unit and the tape unit. If this problem occurred during a write-type
+ * operation, the integrity of the data on the tape might be compromised.
+ * User action:
+ * Use a faster connection. If this problem occurred during a write-type
+ * operation, consider repositioning the tape and repeating the operation.
+ */
+ +
+ */?
+ * Text: "@1: bus ID of the tape device
+ * Description:
+ * The control unit has detected an incorrect block ID sequence on the tape.
+ * This problem typically indicates that the data on the tape is damaged.
+ * User action:
+ * If this problem occurred during a write-type operation reposition the tape
+ * and repeat the operation.
+ */
+ */
+ */?
+ * Text: "%s: A read error occurred that cannot be recovered\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * A read error has occurred that cannot be recovered. The current tape might
+ * be damaged.
+ * User action:
+ * None.
+ */
+ */?
+ * Text: "%s: A write error on the tape cannot be recovered\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * A write error has occurred that could not be recovered by the automatic
+ * error recovery process.
+ * User action:
+ * Use a different tape cartridge.
+ */
+ */?
+ * Text: "%s: Writing the ID-mark failed\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * The ID-mark at the beginning of tape could not be written. The tape medium
+ * might be write-protected.
+ * User action:
+ * Try a different tape cartridge. Ensure that the write-protection on the
+ * cartridge is switched off.
+ */
+ */?
+ * Text: "%s: Reading the tape beyond the end of the recorded area failed\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * A read-type operation failed because it extended beyond the end of the
+ * recorded area on the tape medium.
+ * User action:
+ * None.
+ */
+ */
+ */
+ Text: "%s: The tape contains an incorrect block ID sequence\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the tape device
+ Description:
+ The control unit has detected an incorrect block ID sequence on the tape.
+ This problem typically indicates that the data on the tape is damaged.
+ User action:
+ If this problem occurred during a write-type operation reposition the tape
+ and repeat the operation.
+ */
+ */
+ */
+ Text: "%s: A path equipment check occurred for the tape device\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the tape device
+ Description:
+ A path equipment check has occurred. This check indicates problems with the
+ connection between the mainframe system and the tape control unit.
+ User action:
+ Ensure that the cable connections between the mainframe system and the
+ control unit are securely in place and not damaged.
+ */
+ */
+ */
+ Text: "%s: The tape unit cannot process the tape format\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the tape device
+ Description:
+ Either the tape unit is not able to read the format ID mark, or the
+ specified format is not supported by the tape unit.
+ User action:
+ If you do not need the data recorded on the current tape, use a different
+ tape or write a new format ID mark at the beginning of the tape. Be aware
+ that writing a new ID mark leads to a loss of all data that has been
+ recorded on the tape. If you need the data on the current tape, use a tape
+ unit that supports the tape format.
+ */
+ */
+ * Text: "%s: The tape medium is write-protected\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * A write-type operation failed because the tape medium is write-protected.
+ * User action:
+ * Eject the tape cartridge, switch off the write protection on the cartridge,
+ * insert the cartridge, and try the operation again.
+ */
+
+/*?
+ * Text: "%s: The tape does not have the required tape tension\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape does not have the required tape tension.
+ * User action:
+ * Rewind and reposition the tape, then repeat the operation.
+ */
+
+/*?
+ * Text: "%s: The tape unit failed to load the cartridge\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * An error has occurred while loading the tape cartridge.
+ * User action:
+ * Unload the cartridge and load it again.
+ */
+
+/*?
+ * Text: "%s: Automatic unloading of the tape cartridge failed\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape unit failed to unload the cartridge.
+ * User action:
+ * Unload the cartridge manually by using the eject button on the tape unit.
+ */
+
+/*?
+ * Text: "%s: An equipment check has occurred on the tape unit\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * Possible reasons for the check condition are a unit adapter error, a buffer
+ * error on the lower interface, an unusable internal path, or an error that
+ * has occurred while loading the cartridge.
+ * User action:
+ * Examine the tape unit and the cartridge loader. Consult the tape unit
+ * documentation for details.
+ */
+
+/*?
+ * Text: "%s: The tape information states an incorrect length\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape is shorter than stated at the beginning of the tape data. A
+ * possible reason for this problem is that the tape might have been physically
+ * truncated. Data written to the tape might be incomplete or damaged.
+ * User action:
+ * If this problem occurred during a write-type operation, consider repeating
+ * the operation with a different tape cartridge.
+ */
+
+/*?
+ * Text: "%s: The tape unit is not ready\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape unit is online but not ready.
+ * User action:
+ * Turn the ready switch on the tape unit to the ready position and try the
+ * operation again.
+ */
+
+/*?
+ * Text: "%s: The tape medium has been rewound or unloaded manually\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape unit rewind button, unload button, or both have been used to
+ * rewind or unload the tape cartridge. A tape cartridge other than the
+ * intended cartridge might have been inserted or the tape medium might not
+ * be at the expected position.
+ * User action:
+ * Verify that the correct tape cartridge has been inserted and that the tape
+ * medium is at the required position before continuing to work with the tape.
+ */
+
+ /*
+ * Text: "%s: The tape subsystem is running in degraded mode\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape subsystem is not operating at its maximum performance.
+ * User action:
+ * Contact your service representative for the tape unit and report this
+ * problem.
+ */
+
+ /*
+ * Text: "%s: The tape unit is already assigned\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape unit is already assigned to another channel path.
+ * User action:
+ * Free the tape unit from the operating system instance to which it is
+ * currently assigned then try again.
+ */
+
+ /*
+ * Text: "%s: The tape unit is not online\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The tape unit is not online to the tape device driver.
+ * User action:
+ * Ensure that the tape unit is operational and that the cable connections
+ * between the control unit and the tape unit are securely in place and not
+ * damaged.
+ */
+
+ /*
+ * Text: "%s: The control unit has fenced access to the tape volume\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the tape device
+ * Description:
+ * The control unit fences further access to the current tape volume. The data
+ * integrity on the tape volume might have been compromised.
User action:
Rewind and unload the tape cartridge.

Text: "%s: A parity error occurred on the tape bus\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device
Description:
A data parity check error occurred on the bus. Data that was read or written
while the error occurred is not valid.
User action:
Reposition the tape and repeat the read-type or write-type operation.

Text: "%s: I/O error recovery failed on the tape control unit\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device
Description:
An I/O error occurred that cannot be recovered by the automatic error
recovery process of the tape control unit. The application that operates
the tape unit will receive a return value of -EIO which indicates an
I/O error. The data on the tape might be damaged.
User action:
If this problem occurred during a write-type operation, consider
repositioning the tape and repeating the operation.

Text: "%s: The tape unit requires a firmware update\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device
Description:
The tape unit requires firmware patches from the tape control unit but the
required patches are not available on the control unit.
User action:
Make the require patches available on the control unit then reposition the
tape and retry the operation. For details about obtaining and installing
firmware updates see the control unit documentation.

Text: "%s: The maximum block size for buffered mode is exceeded\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device

Description:
The block to be written is larger than allowed for the buffered mode.
User action:
Use a smaller block size.

Text: "%s: A channel interface error cannot be recovered\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device
Description:
An error has occurred on the channel interface. This error cannot
be recovered by the control unit error recovery process.
User action:
See the documentation of the control unit.

Text: "%s: A channel protocol error occurred\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device
Description:
An error was detected in the channel protocol.
User action:
Reposition the tape and try the operation again.

Text: "%s: The tape unit does not support the compaction algorithm\n"
Severity: Warning
Parameter:
@1: bus ID of the tape device
Description:
The tape unit cannot read the current tape. The data on the tape has been
compressed with an algorithm that is not supported by the tape unit.
User action:
Use a tape unit that supports the compaction algorithm used for the
current tape.

Text: "%s: The tape unit does not support tape format 3480-2 XF\n"
Severity: Warning
Parameter:
"%s: The tape unit does not support tapes recorded in the 3480-2 XF format.
User action:
If you do not need the data recorded on the current tape, rewind the tape
and overwrite it with a supported format. If you need the data on the
current tape, use a tape unit that supports the tape format.
*/

"%s: The tape unit does not support the current tape length
User action:
Either use a different tape unit or use a tape with a supported length.
*/

"%s: The tape unit does not support the tape length
User action:
Either use a different tape unit or use a tape with a supported length.
*/

%d output lines suppressed due to ratelimiting
--- linux-4.15.0.orig/Documentation/kmsg/s390/tape_3590
+++ linux-4.15.0/Documentation/kmsg/s390/tape_3590
@@ -0,0 +1,183 @@
/**
 * Text: "%s: The tape medium must be loaded into a different tape unit\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the tape device
 * Description:
 * The tape device has indicated an error condition that requires loading
 * the tape cartridge into a different tape unit to recover.
 * User action:
 * Unload the cartridge and use a different tape unit to retry the operation.
 */

/**
 * Text: "%s: Tape media information: exception %s, service %s\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the tape device
 *   @2: exception
 *   @3: service
 * Description:
 * This is an operating system independent tape medium information message
 * that was issued by the tape unit. The information in the message is
 * intended for the IBM customer engineer.
 * User action:
 * See the documentation for the tape unit for further information.
 */

/**
 * Text: "%s: Device subsystem information: exception %s, service %s\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the tape device
 *   @2: exception
 *   @3: required service action
 * Description:
 * This is an operating system independent device subsystem information message
 * that was issued by the tape unit. The information in the message is
 * intended for the IBM customer engineer.
 * User action:
 * See the documentation for the tape unit for further information.
 */

/**
 * Text: "%s: I/O subsystem information: exception %s, service %s\n"
 * Severity: Warning
 * Parameter:
 *   @1: bus ID of the tape device
 *   @2: exception
 */
* @3: required service action

* Description:
* This is an operating system independent I/O subsystem information message
* that was issued by the tape unit. The information in the message is
* intended for the IBM customer engineer.

* User action:
* See the documentation for the tape unit for further information.
* */

*/
* Text: "%s: The tape unit has issued sense message %s\n"
* Severity: Warning
* Parameter:
* @1: bus ID of the tape device
* @2: sense message code

* Description:
* The tape unit has issued an operating system independent sense message.
* User action:
* See the documentation for the tape unit for further information.
* */

*/
* Text: "%s: The tape unit has issued an unknown sense message code 0x%x\n"
* Severity: Warning
* Parameter:
* @1: bus ID of the tape device
* @2: code

* Description:
* The tape device driver has received an unknown sense message from the
* tape unit.
* User action:
* See the documentation for the tape unit for further information.
* */

*/
* Text: "%s: MIM SEV=%i, MC=%02x, ES=%x/%x, RC=%02x-%04x-%02x\n"
* Severity: Warning
* Parameter:
* @1: bus ID of the tape device
* @2: SEV
* @3: message code
* @4: exception
* @5: required service action
* @6: refcode
* @7: mid
* @8: fid

* Description:
* This is an operating system independent information message that was
+ * issued by the tape unit. The information in the message is intended for
+ * the IBM customer engineer.
+ * User action:
+ * See to the documentation for the tape unit for further information.
+ */
+
+/*!?
+ * Text: "%s: IOSIM SEV=%i, DEVTYPE=3590/%02x, MC=%02x, ES=%x/%x, REF=0x%04x-0x%04x-0x%04x\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * @2: SEV
+ * @3: model
+ * @4: message code
+ * @5: exception
+ * @6: required service action
+ * @7: refcode1
+ * @8: refcode2
+ * @9: refcode3
+ * Description:
+ * This is an operating system independent I/O subsystem information message
+ * that was issued by the tape unit. The information in the message is
+ * intended for the IBM customer engineer.
+ * User action:
+ * See the documentation for the tape unit for further information.
+ */
+
+/*!?
+ * Text: "%s: DEVSIM SEV=%i, DEVTYPE=3590/%02x, MC=%02x, ES=%x/%x, REF=0x%04x-0x%04x-0x%04x\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * @2: SEV
+ * @3: model
+ * @4: message code
+ * @5: exception
+ * @6: required service action
+ * @7: refcode1
+ * @8: refcode2
+ * @9: refcode3
+ * Description:
+ * This is an operating system independent device subsystem information message
+ * issued by the tape unit. The information in the message is intended for
+ * the IBM customer engineer.
+ * User action:
+ * See the documentation for the tape unit for further information.
+ */
+
+*/?
+ * Text: "%s: The tape unit has issued an unknown sense message code %x\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * @2: code
+ * Description:
+ * The tape device has issued a sense message, that is unknown to the device
+ * driver.
+ * User action:
+ * Use the message code printed as hexadecimal value and see the documentation
+ * for the tape unit for further information.
+ */
+
+*/?
+ * Text: "%s: The tape unit failed to obtain the encryption key from EKM\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * The tape unit was unable to retrieve the encryption key required to decode
+ * the data on the tape from the enterprise key manager (EKM).
+ * User action:
+ * See the EKM and tape unit documentation for information about how to enable
+ * the tape unit to retrieve the encryption key.
+ */
+
+ */?
+ * Text: "%s: A different host has privileged access to the tape unit\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the tape device
+ * Description:
+ * You cannot access the tape unit because a different operating system
+ * instance has privileged access to the unit.
+ * User action:
+ * Unload the current cartridge to solve this problem.
+ */

+*/? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/time
+++ linux-4.15.0/Documentation/kmsg/s390/time
@@ -0,0 +1,36 @@
+ * Text: "The ETR interface has adjusted the clock by %li microseconds\n"
+ * Severity: Notice
+ * Parameter:
+ * @1: number of microseconds
+ * Description:
+ * The external time reference (ETR) interface has synchronized the system
+ * clock with the external reference and set it to a new value. The time
+ * difference between the old and new clock value has been passed to the
+ * network time protocol (NTP) as a single shot adjustment.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "The real or virtual hardware system does not provide an ETR interface\n"
+ * Severity: Warning
+ * Description:
+ * The 'etr=' parameter has been passed on the kernel parameter line for
+ * a Linux instance that does not have access to the external time reference
+ * (ETR) facility.
+ * User action:
+ * To avoid this warning remove the 'etr=' kernel parameter.
+ */
+
+ /*?
+ * Text: "The real or virtual hardware system does not provide an STP interface\n"
+ * Severity: Warning
+ * Description:
+ * The 'stp=' parameter has been passed on the kernel parameter line for
+ * a Linux instance that does not have access to the server time protocol
+ * (STP) facility.
+ * User action:
+ * To avoid this warning remove the 'stp=' kernel parameter.
+ */
+
+ /*?
+ * Text: "%s: %d output lines suppressed due to ratelimiting\n"
--- linux-4.15.0.orig/Documentation/kmsg/s390/vmlogrdr
+++ linux-4.15.0/Documentation/kmsg/s390/vmlogrdr
@@ -0,0 +1,19 @@
+ /*? Text: "vmlogrdr: failed to start recording automatically\n"
+ */
+ /*? Text: "vmlogrdr: connection severed with reason %i\n"
+ */
+ /*? Text: "vmlogrdr: iucv connection to %s failed with rc %i\n"
+ */
+ /*? Text: "vmlogrdr: failed to stop recording automatically\n"
+ */
+ /*? Text: "not running under VM, driver not loaded.\n"
+ */
+
+ /*?
+ * Text: "vmlogrdr: device %s is busy. Refuse to suspend.\n"
+ * Severity: Error
+ * Parameter:
+ * @1: device name
+ * Description:
+ * Suspending vmlogrdr devices that are in uses is not supported.
A request to suspend such a device is refused.

User action:
Close all applications that use any of the vmlogrdr devices
and then try to suspend the system again.

/**
* Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/vmur
+++ linux-4.15.0/Documentation/kmsg/s390/vmur
@@ -0,0 +1,48 @@
/*?
 * Text: "The %s cannot be loaded without z/VM\n"
* Severity: Error
* Parameter:
* @1: z/VM virtual unit record device driver
* Description:
* The z/VM virtual unit record device driver provides Linux with access to
* z/VM virtual unit record devices like punch card readers, card punches, and
* line printers. On Linux instances that run in environments other than the
* z/VM hypervisor, the device driver does not provide any useful function and
* the corresponding vmur module cannot be loaded.
* User action:
* Load the vmur module only on Linux instances that run as guest operating
* systems of the z/VM hypervisor. If the z/VM virtual unit record device
* has been compiled into the kernel, ignore this message.
* */
+ /*?
+ * Text: "Kernel function alloc_chrdev_region failed with error code %d\n"
+ * Severity: Error
+ * Parameter:
+ * @1: error code according to errno definitions
+ * Description:
+ * The z/VM virtual unit record device driver (vmur) needs to register a range
+ * of character device minor numbers from 0x0000 to 0xffff.
+ * This registration failed, probably because of memory constraints.
+ * User action:
+ * Free some memory and reload the vmur module. If the z/VM virtual unit
+ * record device driver has been compiled into the kernel reboot Linux.
+ * Consider assigning more memory to your LPAR or z/VM guest virtual machine.
+ */
+ /*?
+ * Text: "Unit record device %s is busy, %s refusing to suspend.\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the unit record device
+ * @1: z/VM virtual unit record device driver
+ * Description:
+ * Linux cannot be suspended while a unit record device is in use.
+ * User action:
+ * Stop all applications that work on z/VM spool file queues, for example, the
+ * vmur tool. Then try again to suspend Linux.
+ */
+
+/*? Text: "%s loaded\n" */
+/*? Text: "%s unloaded\n" */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/xpram
+++ linux-4.15.0/Documentation/kmsg/s390/xpram
@@ -0,0 +1,74 @@
+/*?
 * Text: "%d is not a valid number of XPRAM devices\n"
+ * Severity: Error
+ * Parameter:
+ * @1: number of partitions
+ * Description:
+ * The number of XPRAM partitions specified for the 'devs' module parameter
+ * or with the 'xpram.parts' kernel parameter must be an integer in the
+ * range 1 to 32. The XPRAM device driver created a maximum of 32 partitions
+ * that are probably not configured as intended.
+ * User action:
+ * If the XPRAM device driver has been compiled as a separate module,
+ * unload the module and load it again with a correct value for the 'devs'
+ * module parameter. If the XPRAM device driver has been compiled
+ * into the kernel, correct the 'xpram.parts' parameter in the kernel
+ * command line and restart Linux.
+ */
+
+/*?
+ * Text: "Not enough expanded memory available\n"
+ * Severity: Error
+ * Description:
+ * The amount of expanded memory required to set up your XPRAM partitions
+ * depends on the 'sizes' parameter specified for the xpram module or on
+ * the specifications for the 'xpram.parts' parameter if the XPRAM device
+ * driver has been compiled into the kernel. Your
+ * current specification exceed the amount of available expanded memory.
+ * Your XPRAM partitions are probably not configured as intended.
+ * User action:
+ * If the XPRAM device driver has been compiled as a separate module,
+ * unload the xpram module and load it again with an appropriate value
+ * for the 'sizes' module parameter. If the XPRAM device driver has been
+ * compiled into the kernel, adjust the 'xpram.parts' parameter in the
+ * kernel command line and restart Linux. If you need more than the
+ * available expanded memory, increase the expanded memory allocation for
+ * your virtual hardware or LPAR.
+ */
+
+/*?
+ * Text: "No expanded memory available\n"
+ * Severity: Error
+ * Description:
+ * The XPRAM device driver has been loaded in a Linux instance that runs
+ * in an LPAR or virtual hardware without expanded memory.
+ * No XPRAM partitions are created.
+ * User action:
+ * Allocate expanded memory for your LPAR or virtual hardware or do not
+ * load the xpram module. You can ignore this message, if you do not want
+ * to create XPRAM partitions.
+ */
+
+ /*?
+ * Text: "Resuming the system failed: %s\n"
+ * Severity: Error
+ * Parameter:
+ * @1: cause of the failure
+ * Description:
+ * A system cannot be resumed if the expanded memory setup changes
+ * after hibernation. Possible reasons for the failure are:
+ * - Expanded memory was removed after hibernation.
+ * - Size of the expanded memory changed after hibernation.
+ * The system is stopped with a kernel panic.
+ * User action:
+ * Reboot Linux.
+ */
+
+ /*? Text: "  number of devices (partitions): %d  
"*/
+ /*? Text: "  size of partition %d: %u kB\n" */
+ /*? Text: "  size of partition %d to be set automatically\n" */
+ /*? Text: "  memory needed (for sized partitions): %lu kB\n" */
+ /*? Text: "  partitions to be sized automatically: %d  
"*/
+ /*? Text: "  automatically determined partition size: %lu kB\n" */
+ /*? Text: "  %u pages expanded memory found (%lu KB).\n" */
+ /*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
--- linux-4.15.0.orig/Documentation/kmsg/s390/zcrypt
+++ linux-4.15.0/Documentation/kmsg/s390/zcrypt
@@ -0,0 +1,22 @@
+ /*?
+ * Text: "Cryptographic device %02x.%04x failed and was set offline\n"
+ * Severity: Error
+ * Parameter:
+ * @1: AP device ID
+ * @2: AP queue
+ * Description:
A cryptographic device failed to process a cryptographic request. The cryptographic device driver could not correct the error and set the device offline. The application that issued the request received an indication that the request has failed. 

User action:

Use the lszcrypt command to confirm that the cryptographic hardware is still configured to your LPAR or z/VM guest virtual machine. If the device is available to your Linux instance the command output contains a line that begins with 'card<device index>', where <device index> is the two-digit decimal number in the message text.

After ensuring that the device is available, use the chzcrypt command to set it online again.

If the error persists, contact your support organization.

User action:

Use the lszcrypt command to confirm that the cryptographic hardware is still configured to your LPAR or z/VM guest virtual machine. If the device is available to your Linux instance the command output contains a line that begins with 'card<device index>', where <device index> is the two-digit decimal number in the message text.

After ensuring that the device is available, use the chzcrypt command to set it online again.

If the error persists, contact your support organization.

User action:

Use the lszcrypt command to confirm that the cryptographic hardware is still configured to your LPAR or z/VM guest virtual machine. If the device is available to your Linux instance the command output contains a line that begins with 'card<device index>', where <device index> is the two-digit decimal number in the message text.

After ensuring that the device is available, use the chzcrypt command to set it online again.

If the error persists, contact your support organization.

User action:

Use the lszcrypt command to confirm that the cryptographic hardware is still configured to your LPAR or z/VM guest virtual machine. If the device is available to your Linux instance the command output contains a line that begins with 'card<device index>', where <device index> is the two-digit decimal number in the message text.

After ensuring that the device is available, use the chzcrypt command to set it online again.

If the error persists, contact your support organization.

User action:

Use the lszcrypt command to confirm that the cryptographic hardware is still configured to your LPAR or z/VM guest virtual machine. If the device is available to your Linux instance the command output contains a line that begins with 'card<device index>', where <device index> is the two-digit decimal number in the message text.

After ensuring that the device is available, use the chzcrypt command to set it online again.

If the error persists, contact your support organization.

User action:

Use the lszcrypt command to confirm that the cryptographic hardware is still configured to your LPAR or z/VM guest virtual machine. If the device is available to your Linux instance the command output contains a line that begins with 'card<device index>', where <device index> is the two-digit decimal number in the message text.

After ensuring that the device is available, use the chzcrypt command to set it online again.

If the error persists, contact your support organization.

User action:

Use the lszcrypt command to confirm that the cryptographic hardware is still configured to your LPAR or z/VM guest virtual machine. If the device is available to your Linux instance the command output contains a line that begins with 'card<device index>', where <device index> is the two-digit decimal number in the message text.

After ensuring that the device is available, use the chzcrypt command to set it online again.

If the error persists, contact your support organization.

User action:
+/*?
+ * Text: "%s is not a valid SCSI device\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: device specification
+ * Description:
+ * The specification for an initial SCSI device provided with the 'zfcp.device'
+ * kernel parameter or with the 'device' module parameter is syntactically
+ * incorrect. The specified SCSI device could not be attached to the Linux
+ * system.
+ * User action:
+ * Correct the value for the 'zfcp.device' or 'device' parameter and reboot
+ * Linux. See "Device Drivers, Features, and Commands" for information about
+ * the syntax.
+ */
+
+/*?
+ * Text: "The zfcp device driver could not register with the common I/O layer\n"
+ * Severity: Error
+ * Description:
+ * The device driver initialization failed. A possible cause of this problem is
+ * memory constraints.
+ * User action:
+ * Free some memory and try again to load the zfcp device driver. If the zfcp
+ * device driver has been compiled into the kernel, reboot Linux. Consider
+ * assigning more memory to your LPAR or z/VM guest virtual machine. If the
+ * problem persists, contact your support organization.
+ */
+
+/*?
+ * Text: "%s: Setting up data structures for the FCP adapter failed\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the zfcp device
+ * Description:
+ * The zfcp device driver could not allocate data structures for an FCP adapter.
+ * A possible reason for this problem is memory constraints.
+ * User action:
+ * Set the FCP adapter offline or detach it from the Linux system, free some
+ * memory and set the FCP adapter online again or attach it again. If this
+ * problem persists, gather Linux debug data, collect the FCP adapter
+ * hardware logs, and report the problem to your support organization.
+ */
+
+/*?
+ * Text: "%s: The FCP device is operational again\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * An FCP device has been unavailable because it had been detached from the
+ * Linux system or because the corresponding CHPID was offline. The FCP device
+ * is now available again and the zfcp device driver resumes all operations to
+ * the FCP device.
+ * User action:
+ * None.
+ */
+
+ /*?
+ * Text: "%s: The CHPID for the FCP device is offline\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The CHPID for an FCP device has been set offline, either logically in Linux
+ * or on the hardware.
+ * User action:
+ * Find out which CHPID corresponds to the FCP device, for example, with the
+ * lsccs command. Check if the CHPID has been set logically offline in sysfs.
+ * Write 'on' to the CHPID's status attribute to set it online. If the CHPID is
+ * online in sysfs, find out if it has been varied offline through a hardware
+ * management interface, for example the service element (SE).
+ */
+
+ /*?
+ * Text: "%s: The FCP device has been detached\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * An FCP device is no longer available to Linux.
+ * User action:
+ * Ensure that the FCP adapter is operational and attached to the LPAR or z/VM
+ * virtual machine.
+ */
+
+ /*?
+ * Text: "%s: The FCP device did not respond within the specified time\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The common I/O layer waited for a response from the FCP adapter but
+ * no response was received within the specified time limit. This might
+ * indicate a hardware problem.
+ * User action:
Consult your hardware administrator. If this problem persists, gather Linux debug data, collect the FCP adapter hardware logs, and report the problem to your support organization.

Text: "%s: Registering the FCP device with the SCSI stack failed

Severity: Error
Parameter:
@1: bus ID of the zfcp device
Description:
The FCP adapter could not be registered with the Linux SCSI stack. A possible reason for this problem is memory constraints.
User action:
Set the FCP adapter offline or detach it from the Linux system, free some memory and set the FCP adapter online again or attach it again. If this problem persists, gather Linux debug data, collect the FCP adapter hardware logs, and report the problem to your support organization.

Text: "%s: ERP cannot recover an error on the FCP device

Severity: Error
Parameter:
@1: bus ID of the zfcp device
Description:
An error occurred on an FCP device. The error recovery procedure (ERP) could not resolve the error. The FCP device driver cannot use the FCP device.
User action:
Check for previous error messages for the same FCP device to find the cause of the problem.

Text: "%s: Creating an ERP thread for the FCP device failed.

Severity: Error
Parameter:
@1: bus ID of the zfcp device
Description:
The zfcp device driver could not set up error recovery procedure (ERP) processing for the FCP device. The FCP device is not available for use in Linux.
User action:
Free some memory and try again to load the zfcp device driver. If the zfcp device driver has been compiled into the kernel, reboot Linux. Consider assigning more memory to your LPAR or z/VM guest virtual machine. If the problem persists, contact your support organization.
%s: ERP failed for LUN 0x%016Lx on port 0x%016Lx

Severity: Error
Parameter:
   @1: bus ID of the zfcp device
   @2: LUN
   @3: WWPN
Description:
An error occurred on the SCSI device at the specified LUN. The error recovery procedure (ERP) could not resolve the error. The SCSI device is not available.
User action:
Verify that the LUN is correct. Check the fibre channel fabric for errors related to the specified WWPN and LUN, the storage server, and Linux.

%s: ERP failed for remote port 0x%016Lx

Severity: Error
Parameter:
   @1: bus ID of the zfcp device
   @2: WWPN
Description:
An error occurred on a remote port. The error recovery procedure (ERP) could not resolve the error. The port is not available.
User action:
Verify that the WWPN is correct and check the fibre channel fabric for errors related to the WWPN.

%s: Registering port 0x%016Lx failed

Severity: Error
Parameter:
   @1: bus ID of the zfcp device
   @2: WWPN
Description:
The Linux kernel could not allocate enough memory to register the remote port with the indicated WWPN with the SCSI stack. The remote port is not available.
User action:
Free some memory and trigger the rescan for ports.

%s: A QDIO problem occurred
Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * QDIO reported a problem to the zfcp device driver. The zfcp device driver
+ * tries to recover this problem.
+ * User action:
+ * Check for related error messages. If this problem occurs frequently, gather
+ * Linux debug data and contact your support organization.
+ */
+
+ /*?
+ * Text: "%s: Setting up the QDIO connection to the FCP adapter failed\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The zfcp device driver failed to establish a QDIO connection with the FCP
+ * adapter.
+ * User action:
+ * Set the FCP adapter offline or detach it from the Linux system, free some
+ * memory and set the FCP adapter online again or attach it again. If this
+ * problem persists, gather Linux debug data, collect the FCP adapter
+ * hardware logs, and report the problem to your support organization.
+ */
+
+ /*?
+ * Text: "%s: The FCP adapter reported a problem that cannot be recovered\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The FCP adapter has a problem that cannot be recovered by the zfcp device
+ * driver. The zfcp device driver stopped using the FCP device.
+ * User action:
+ * Gather Linux debug data, collect the FCP adapter hardware logs, and report
+ * this problem to your support organization.
+ */
+
+ /*?
+ * Text: "%s: There is a wrap plug instead of a fibre channel cable\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The FCP adapter is not physically connected to the fibre channel fabric.
+ * User action:
+ * Remove the wrap plug from the FCP adapter and connect the adapter with the
+ * fibre channel fabric.
+ */
+
+/*?
+ * Text: "%s: FCP device not operational because of an unsupported FC class\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The FCP adapter hardware does not support the fibre channel service class
+ * requested by the zfcp device driver. This problem indicates a program error
+ * in the zfcp device driver.
+ * User action:
+ * Gather Linux debug data, collect the FCP adapter hardware logs, and report
+ * this problem to your support organization.
+ */
+
+/*?
+ * Text: "%s: 0x%Lx is an ambiguous request identifier\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * @2: request ID
+ * Description:
+ * The FCP adapter reported that it received the same request ID twice. This is
+ * an error. The zfcp device driver stopped using the FCP device.
+ * User action:
+ * Gather Linux debug data, collect the FCP adapter hardware logs, and report
+ * this problem to your support organization.
+ */
+
+/*?
+ * Text: "%s: QTCB version 0x%x not supported by FCP adapter (0x%x to 0x%x)\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * @2: requested version
+ * @3: lowest supported version
+ * @4: highest supported version
+ * Description:
+ * See message text.
+ * The queue transfer control block (QTCB) version requested by the zfcp device
+ * driver is not supported by the FCP adapter hardware.
+ * User action:
+ * If the requested version is higher than the highest version supported by the
+ * hardware, install more recent firmware on the FCP adapter. If the requested
+ * version is lower then the lowest version supported by the hardware, upgrade
+ * to a Linux level with a more recent zfcp device driver.
+ */
+ /*
 + * Text: "%s: The FCP adapter could not log in to the fibre channel fabric\n"
 + * Severity: Warning
 + * Parameter:
 + * @1: bus ID of the zfcp device
 + * Description:
 + * The fibre channel switch rejected the login request from the FCP adapter.
 + * User action:
 + * Check the fibre channel fabric or switch logs for possible errors.
 + */
 +
 + /*
 + * Text: "%s: The FCP device is suspended because of a firmware update\n"
 + * Severity: Warning
 + * Parameter:
 + * @1: bus ID of the zfcp device
 + * Description:
 + * The FCP device is not available while a firmware update is in progress. This
 + * problem is temporary. The FCP device will resume operations when the
 + * firmware update is completed.
 + * User action:
 + * Wait 10 seconds and try the operation again.
 + */
 +
 + /*
 + * Text: "%s: All NPIV ports on the FCP adapter have been assigned\n"
 + * Severity: Warning
 + * Parameter:
 + * @1: bus ID of the zfcp device
 + * Description:
 + * The number of N_Port ID Virtualization (NPIV) ports that can be assigned
 + * on an FCP adapter is limited. Once assigned, NPIV ports are not released
 + * automatically but have to be released explicitly through the support
 + * element (SE).
 + * User action:
 + * Identify NPIV ports that have been assigned but are no longer in use and
 + * release them from the SE.
 + */
 +
 + /*
 + * Text: "%s: The link between the FCP adapter and the FC fabric is down\n"
 + * Severity: Warning
 + * Parameter:
 + * @1: bus ID of the zfcp device
 + * Description:
 + * The FCP adapter is not usable. Specific error information is not available.
 + * User action:
+ * Check the cabling and the fibre channel fabric configuration. If this
+ * problem persists, gather Linux debug data, collect the FCP adapter
+ * hardware logs, and report the problem to your support organization.
+ */
+
+*/?
+ * Text: "%s: The QTCB type is not supported by the FCP adapter\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The queue transfer control block (QTCB) type requested by the zfcp device
+ * driver is not supported by the FCP adapter hardware.
+ * User action:
+ * Install the latest firmware on your FCP adapter hardware. If this does not
+ * resolve the problem, upgrade to a Linux level with a more recent zfcp device
+ * driver. If the problem persists, contact your support organization.
+ */
+
+*/?
+ * Text: "%s: The error threshold for checksum statistics has been exceeded\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The FCP adapter has reported a large number of bit errors. This might
+ * indicate a problem with the physical components of the fibre channel fabric.
+ * Details about the errors have been written to the HBA trace for the FCP
+ * adapter.
+ * User action:
+ * Check for problems in the fibre channel fabric and ensure that all cables
+ * are properly plugged.
+ */
+
+*/?
+ * Text: "%s: The local link has been restored\n"
+ * Severity: Informational
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * A problem with the connection between the FCP adapter and the adjacent node
+ * on the fibre channel fabric has been resolved. The FCP adapter is now
+ * available again.
+ * User action:
+ * None.
+ */
+*/?
+ * Text: "%s: The mode table on the FCP adapter has been damaged\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * This is an FCP adapter hardware problem.
+ * User action:
+ * Report this problem with FCP hardware logs to IBM support.
+ */
+
+ /*
+ * Text: "%s: The adjacent fibre channel node does not support FCP\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The fibre channel switch or storage system that is connected to the FCP
+ * channel does not support the fibre channel protocol (FCP). The zfcp
+ * device driver stopped using the FCP device.
+ * User action:
+ * Check the adjacent fibre channel node.
+ */
+
+ */
+ * Text: "%s: The FCP adapter does not recognize the command 0x%x\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * @2: command
+ * Description:
+ * A command code that was sent from the zfcp device driver to the FCP adapter
+ * is not valid. The zfcp device driver stopped using the FCP device.
+ * User action:
+ * Gather Linux debug data, collect the FCP adapter hardware logs, and report
+ * this problem to your support organization.
+ */
+
+ /*
+ * Text: "%s: There is no light signal from the local fibre channel cable\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * There is no signal on the fibre channel cable that connects the FCP adapter
+ * to the fibre channel fabric.
+ * User action:
+ * Ensure that the cable is in place and connected properly to the FCP adapter
+ * and to the adjacent fibre channel switch or storage system.
+ */
+
+/
+ Text: "%s: The WWPN assignment file on the FCP adapter has been damaged\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the zfcp device
+ Description:
+ This is an FCP adapter hardware problem.
+ User action:
+ Report this problem with FCP hardware logs to IBM support.
+ */
+
+/
+ Text: "%s: The FCP device detected a WWPN that is duplicate or not valid\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the zfcp device
+ Description:
+ This condition indicates an error in the FCP adapter hardware or in the z/VM hypervisor.
+ User action:
+ Gather Linux debug data, collect the FCP adapter hardware logs, and report this problem to IBM support.
+ */
+
+/
+ Text: "%s: The fibre channel fabric does not support NPIV\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the zfcp device
+ Description:
+ The FCP adapter requires N_Port ID Virtualization (NPIV) from the adjacent fibre channel node. Either the FCP adapter is connected to a fibre channel switch that does not support NPIV or the FCP adapter tries to use NPIV in a point-to-point setup. The connection is not operational.
+ User action:
+ Verify that NPIV is correctly used for this connection. Check the FCP adapter configuration and the fibre channel switch configuration. If necessary, update the fibre channel switch firmware.
+ */
+
+/
+ Text: "%s: The FCP adapter cannot support more NPIV ports\n"
+ Severity: Warning
+ Parameter:
+ @1: bus ID of the zfcp device
+ Description:
N_Port ID Virtualization (NPIV) ports consume physical resources on the FCP adapter. The FCP adapter resources are exhausted. The connection is not operational.

User action:
- Analyze the number of available NPIV ports and which operating system instances use them. If necessary, reconfigure your setup to move some NPIV ports to an FCP adapter with free resources.

Text: "%s: The adjacent switch cannot support more NPIV ports\n"
Severity: Warning
Parameter:
- @1: bus ID of the zfcp device
Description:
- N_Port ID Virtualization (NPIV) ports consume physical resources. The resources of the fibre channel switch that is connected to the FCP adapter are exhausted. The connection is not operational.
- User action:
- Analyze the number of available NPIV ports on the adjacent fibre channel switch and how they are used. If necessary, reconfigure your fibre channel fabric to accommodate the required NPIV ports.

Text: "%s: 0x%x is not a valid transfer protocol status\n"
Severity: Error
Parameter:
- @1: bus ID of the zfcp device
- @2: status information
Description:
- The transfer protocol status information reported by the FCP adapter is not a valid status for the zfcp device driver. The zfcp device driver stopped using the FCP device.
- User action:
- Gather Linux debug data, collect the FCP adapter hardware logs, and report this problem to your support organization.

Text: "%s: Unknown or unsupported arbitrated loop fibre channel topology detected\n"
Severity: Error
Parameter:
- @1: bus ID of the zfcp device
Description:
- The FCP device is connected to a fibre channel arbitrated loop or the FCP adapter reported an unknown fibre channel topology. The zfcp device driver supports point-to-point connections and switched fibre channel fabrics but not arbitrated
+ * loop topologies. The FCP device cannot be used.
+ * User action:
+ * Check the fibre channel setup and ensure that only supported topologies are
+ * connected to the FCP adapter.
+ */
+
+/*/
+ * Text: "%s: FCP adapter maximum QTCB size (%d bytes) is too small\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * @2: maximum supported size
+ * @3: requested QTCB size
+ * Description:
+ * The queue transfer control block (QTCB) size requested by the zfcp
+ * device driver is not supported by the FCP adapter hardware.
+ * User action:
+ * Update the firmware on your FCP adapter hardware to the latest
+ * available level and update the Linux kernel to the latest supported
+ * level. If the problem persists, contact your support organization.
+ */
+
+/*/
+ * Text: "%s: The FCP adapter only supports newer control block versions\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The protocol supported by the FCP adapter is not compatible with the zfcp
+ * device driver.
+ * User action:
+ * Upgrade your Linux kernel to a level that includes a zfcp device driver
+ * with support for the control block version required by your FCP adapter.
+ */
+
+/*/
+ * Text: "%s: The FCP adapter only supports older control block versions\n"
+ * Severity: Error
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * Description:
+ * The protocol supported by the FCP adapter is not compatible with the zfcp
+ * device driver.
+ * User action:
+ * Install the latest firmware on your FCP adapter.
+ */
Text: "%s: Not enough FCP adapter resources to open remote port 0x%016Lx\n"
Severity: Warning
Parameter:
@1: bus ID of the zfcp device
@2: WWPN
Description:
Each port that is opened consumes physical resources of the FCP adapter to which it is attached. These resources are exhausted and the specified port cannot be opened.
User action:
Reduce the total number of remote ports that are attached to the FCP adapter.

Text: "%s: LUN 0x%Lx on port 0x%Lx is already in use by CSS%d, MIF Image ID %x\n"
Severity: Warning
Parameter:
@1: bus ID of the zfcp device
@2: LUN
@3: remote port WWPN
@4: channel subsystem ID
@5: MIF Image ID of the LPAR
Description:
The SCSI device at the indicated LUN is already in use by another system.
User action:
Ensure that the other system stops using the device before trying to use it.

Text: "%s: No handle is available for LUN 0x%016Lx on port 0x%016Lx\n"
Severity: Warning
Parameter:
@1: bus ID of the zfcp device
@2: LUN
@3: WWPN
Description:
The FCP adapter can only open a limited number of SCSI devices. This limit has been reached and the SCSI device at the indicated LUN cannot be opened.
User action:
For FCP subchannels running in non-NPIV mode, check all SCSI devices opened through the FCP adapter and close some of them. For FCP subchannels running in NPIV mode, verify the SAN zoning and host connections on the storage systems. Ensure that the zoning and host connections only allow access to the required LUNs. As a workaround, disable the automatic LUN scanning by setting the zfcp.allow_lun_scan kernel parameter or the allow_lun_scan module.
+ * parameter to 0.
+ */
+
+/*?
+ * Text: "%s: Incorrect direction %d, LUN 0x%016Lx on port 0x%016Lx closed\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the zfcp device
+ *   @2: value in direction field
+ *   @3: LUN
+ *   @4: WWPN
+ * Description:
+ * The direction field in a SCSI request contains an incorrect value. The zfcp
device driver closed down the SCSI device at the indicated LUN.
+ * User action:
+ * Gather Linux debug data and report this problem to your support organization.
+ */
+
+/*?
+ * Text: "%s: Incorrect CDB length %d, LUN 0x%016Lx on port 0x%016Lx closed\n"
+ * Severity: Error
+ * Parameter:
+ *   @1: bus ID of the zfcp device
+ *   @2: value in length field
+ *   @3: LUN
+ *   @4: WWPN
+ * Description:
+ * The control-data-block (CDB) length field in a SCSI request is not valid or
too large for the FCP adapter. The zfcp device driver closed down the SCSI
device at the indicated LUN.
+ * User action:
+ * Gather Linux debug data and report this problem to your support organization.
+ */
+
+/*?
+ * Text: "%s: Opening WKA port 0x%x failed\n"
+ * Severity: Warning
+ * Parameter:
+ *   @1: bus ID of the zfcp device
+ *   @2: destination ID of the WKA port
+ * Description:
+ * The FCP adapter rejected a request to open the specified
well-known address (WKA) port. No retry is possible.
+ * User action:
+ * Verify the setup and check if the maximum number of remote ports
used through this adapter is below the maximum allowed. If the
problem persists, gather Linux debug data, collect the FCP adapter
hardware logs, and report the problem to your support organization.
Text: "%s: The name server reported %d words residual data\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * @2: number of words in residual data
+ * Description:
+ * The fibre channel name server sent too much information about remote ports.
+ * The zfcp device driver did not receive sufficient information to attach all
+ * available remote ports in the SAN.
+ * User action:
+ * Verify that you are running the latest firmware level on the FCP
+ * adapter. Check your SAN setup and consider reducing the number of ports
+ * visible to the FCP adapter by using more restrictive zoning in the SAN.
+ */
+
+/*?
Text: "%s: A port opened with WWPN 0x%016Lx returned data that identifies it as WWPN 0x%016Lx\n"
+ * Severity: Warning
+ * Parameter:
+ * @1: bus ID of the zfcp device
+ * @2: expected WWPN
+ * @3: reported WWPN
+ * Description:
+ * A remote port was opened successfully, but it reported an
+ * unexpected WWPN in the returned port login (PLOGI) data. This
+ * condition might have been caused by a change applied to the SAN
+ * configuration while the port was being opened.
+ * User action:
+ * If this condition is only temporary and access to the remote port
+ * is possible, no action is required. If the condition persists,
+ * identify the storage system with the specified WWPN and contact the
+ * support organization of the storage system.
+ */
+/*? Text: "%s: %d output lines suppressed due to ratelimiting\n" */
The availability of a PCI function has changed.
Possible reasons for the change include PCI configuration actions on the Hardware Management Console or hypervisor.
For shared PCI functions, the function might also have been reserved or released by another system.
If the device name of a function is shown as 'n/a', the device registration with the PCI device driver has not completed.
The function ID identifies the function to the I/O configuration (IOCDS).
The PCI event code can be useful diagnostic information for your support organization.

User action:
None.

Text: "%s: Event 0x%x reports an error for PCI function 0x%x\n"
Severity: Error
Parameter:
@1: device name of the function
@2: PCI event code
@3: function ID
Description:
A PCI function entered an error state from which it cannot recover automatically.
User action:
Trigger a recovery action by writing '1' to the 'recover' sysfs attribute of the PCI function.

In sysfs, PCI functions are represented as /sys/bus/pci/devices/<name>, where <name> is the device name of the function.
If the device name of a function is shown as 'n/a', the device registration with the PCI device driver has not completed.
If the problem persists, contact your support organization.

Error allocating compressor buffer space

Error allocating memory for compressed page

Error creating memory pool

Error allocating zram address table

num_devices not specified. Using default: 1

Error allocating compressor working memory

Error allocating zram address table

No newline at end of file

---

linux-4.15.0.orig/Documentation/kmsg/zram
+++ linux-4.15.0/Documentation/kmsg/zram

@ -0.0 +1,34 @

+/*? Text: "SET PASSWORD not implemented"
+/*? Text: "TARGET RESET not implemented"
+/*? Text: "Unable to allocate struct sbp_nacl
+/*? Text: "Unable to allocate struct sbp_tpg
+/*? Text: "Unable to allocate struct sbp_tport
+/*? Text: "Waiting for reconnect from node: %016llx"
+/*? Text: "cannot find login: %d"
+/*? Text: "failed to allocate login descriptor"
+/*? Text: "failed to allocate login response block"
+/*? Text: "failed to allocate session descriptor"
+/*? Text: "failed to init se_session"
+/*? Text: "failed to map command block handler: %d"
+/*? Text: "failed to read peer GUID: %d"
+/*? Text: "ignoring management request while busy"
+/*? Text: "ignoring request from foreign node (%x != %x)"
+/*? Text: "ignoring request with wrong generation"
+/*? Text: "initiator already logged-in"
+/*? Text: "login to unknown LUN: %d"
+/*? Text: "logout from different node ID"
+/*? Text: "max number of logins reached"
+/*? Text: "mgt_agent LOGIN to LUN %d from %016llx"
+/*? Text: "mgt_agent LOGOUT from LUN %d session %d"
+/*? Text: "mgt_agent RECONNECT from %016llx"
+/*? Text: "mgt_agent RECONNECT login GUID doesn't match"
+/*? Text: "mgt_agent RECONNECT unknown login ID"
+/*? Text: "mgt_orb bad request"
+/*? Text: "netif_stop_queue() cannot be called before register_netdev()"
+/*? Text: "refusing exclusive login with other active logins"
+/*? Text: "refusing login while another exclusive login present"
+/*? Text: "sbp_run_transaction: page size ignore"
+/*? Text: "sbp_send_sense: unknown sense format: 0x%x"
+/*? Text: "target_fabric_configfs_init() failed"
+/*? Text: "target_fabric_configfs_register() failed for SBP"
+/*? Text: "unknown management function 0x%x"
+/*? Text: "unlink LUN: failed to update unit directory"
+/*? Text: "flen=%u proglen=%u pass=%u image=%pK from=%s pid=%d"
+/*? Text: "%s selects TX queue %d, but real number of TX queues is %d"
+/*? Text: "%s: %d output lines suppressed due to ratelimiting"

\ No newline at end of file
+/*? Text: "Unable to get major number\n" */
+/*? Text: "Compression failed! err=%d\n" */
+/*? Text: "Decompression failed! err=%d, page=%u\n" */
+/*? Text: "There is little point creating a zram of greater than twice the size of memory since we expect a 2:1 compression ratio. Note that zram uses about 0.1% of the size of the disk when not in use so a huge zram is wasteful.\nMemory Size: %zu kB\nSize you selected: %llu kB\nContinuing anyway ...
" */
+/*? Text: "Disk size not provided. You can use disksize_kb module param to specify size. Using default: (%u%% of RAM).\n" */
+/*? Text: "Error creating sysfs group" */
+/*? Text: "Error allocating memory for incompressible page: %u\n" */
+/*? Text: "Creating %u devices ...\n" */
+/*? Text: "Initialization failed: err=%d\n" */
+/*? Text: "Error allocating disk queue for device %d\n" */
+/*? Text: "Error allocating disk structure for device %d\n" */
+/*? Text: "Invalid value for num_devices: %u\n" */
+/*? Text: "Error allocating temp memory!\n" */
+/*? Text: "Unable to allocate temp memory!\n" */
+/*? Text: "Created %u device(s) ...\n" */
+/*? Text: "There is little point creating a zram of greater than twice the size of memory since we expect a 2:1 compression ratio. Note that zram uses about 0.1% of the size of the disk when not in use so a huge zram is wasteful.\nMemory Size: %lu kB\nSize you selected: %llu kB\nContinuing anyway ...
" */
+/*? Text: "Cannot change disksize for initialized device\n" */
+/*? Text: "Can't change algorithm for initialized device\n" */
+/*? Text: "Cannot initialise %s compressing backend\n" */
+/*? Text: "Cannot change max compression streams\n" */
+/*? Text: "Destroyed %u device(s)\n" */
+/*? Text: "Created %u device(s)\n" */
+/*? Text: "Unable to register zram-control class\n" */
+/*? Text: "Removed device: %s\n" */
+/*? Text: "Added device: %s\n" */
+/*? Text: "Error creating sysfs group for device %d\n" */
+/*? Text: "Error allocating memory for compressed page: %u, size=%u\n" */
+/*? Text: "%s; %d output lines suppressed due to ratelimiting!\n" */

No newline at end of file
---
linux-4.15.0.orig/Documentation/media/uapi/v4l/biblio.rst
+++ linux-4.15.0/Documentation/media/uapi/v4l/biblio.rst
@@ -226,16 +226,6 @@


-.. _adobergb:
-  
-AdobeRGB
-  
-  
-
.. _oprgb:

opRGB

---

.. note:: The default R'G'B' quantization is full range for all
   - colorspaces except for BT.2020 which uses limited range R'G'B'
   - quantization.
+ colorspaces. HSV formats are always full range.

.. tabularcolumns:: |p{6.0cm}|p{11.5cm}|

```bash
@@ -29,8 +29,7 @@
    :c:type:`v4l2_hsv_encoding` specifies which encoding is used.

  - See :ref:`col-rec709`.
  - * - ``V4L2_COLORSPACE_SRGB``
    - See :ref:`col-srgb`.
- * - ``V4L2_COLORSPACE_ADOBERGB``
-    - See :ref:`col-adobergb`.
+ * - ``V4L2_COLORSPACE_OPRGB``
+    - See :ref:`col-oprgb`.
- * - ``V4L2_COLORSPACE_BT2020``
+ * - ``V4L2_COLORSPACE_DCI_P3``
@@ -51,8 +50,8 @@
    - Use the Rec. 709 transfer function.
  - * - ``V4L2_XFER_FUNC_SRGB``
    - Use the sRGB transfer function.
- * - ``V4L2_XFER_FUNC_ADOBERGB``
-    - Use the AdobeRGB transfer function.
+ * - ``V4L2_XFER_FUNC_OPRGB``
+    - Use the opRGB transfer function.
- * - ``V4L2_XFER_FUNC_SMPTE240M``
-    - Use the SMPTE 240M transfer function.
+ * - ``V4L2_XFER_FUNC_NONE``
@@ -162,8 +161,8 @@
    - Details
  * - ``V4L2_QUANTIZATION_DEFAULT``
    - Use the default quantization encoding as defined by the
   - colorspace. This is always full range for R'G'B' (except for the
   - BT.2020 colorspace) and HSV. It is usually limited range for Y'CbCr.
+ colorspace. This is always full range for R'G'B' and HSV.
+ It is usually limited range for Y'CbCr.
  * - ``V4L2_QUANTIZATION_FULL_RANGE``
```
- Use the full range quantization encoding. I.e. the range [01] is
  mapped to [0255] (with possible clipping to [1254] to avoid the
  \[@@ -173,4 +172,4 @@\]
- Use the limited range quantization encoding. I.e. the range [01]
is mapped to [16235]. Cb and Cr are mapped from [-0.5,0.5] to
  \[@@ -16240,4 +16240,4 @@\]
+16240]. Limited Range cannot be used with HSV.

---
---
+++
---
---
+++
@@ -290,15 +290,14 @@
170M/BT.601. The Y'CbCr quantization is limited range.

.. _col-oprgb:

---
---
+++
---
---
+++
@@ -312,7 +311,7 @@
``V4L2_YCBCR_ENC_BT2020``. The default Y'CbCr quantization is limited
range.

@@ -362,7 +362,7 @@
The :ref:`itu2020` standard defines the colorspace used by Ultra-high
definition television (UHDTV). The default transfer function is
``V4L2_XFERFUNC_BT2020``. The default Y'CbCr quantization is limited
range, and so is the default Y'CbCr quantization. The chromaticities
-of the primary colors and the white reference are:
+of the primary colors and the white reference are:
``V4L2_YCBCR_ENC_BT2020``. The default Y'CbCr quantization is limited range.
The chromaticities of the primary colors and the white reference are:

- ENA introduces a very small set of management commands with room for vendor-specific extensions. Most of the management operations are framed in a generic Get/Set feature command.

@ @ -202,11 +202,14 @@
The user can enable/disable adaptive moderation, modify the interrupt delay table and restore its default values through sysfs.

+RX copybreak:
+================
The rx_copybreak is initialized by default to ENA_DEFAULT_RX_COPYBREAK and can be configured by the ETHTOOL_STUNABLE command of the SIOCETHTOOL ioctl.

SKB:
The driver-allocated SKB for frames received from Rx handling using NAPI context. The allocation method depends on the size of the packet. If the frame length is larger than rx_copybreak, napi_get_frags()

The driver configures RSS settings using the AQ SetFeature command (ENA_ADMIN_RSS_HASH_FUNCTION, ENA_ADMIN_RSS_HASH_INPUT and ENA_ADMIN_RSS_INDIRECTION_TABLE_CONFIG properties).

- If the NETIF_F_RXHASH flag is set, the 32-bit result of the hash function delivered in the Rx CQ descriptor is set in the received SKB.

--- linux-4.15.0.orig/Documentation/networking/ip-sysctl.txt
+++ linux-4.15.0/Documentation/networking/ip-sysctl.txt
@@ -133,14 +133,11 @@
 IP Fragmentation:

-ipfrag_high_thresh - INTEGER
+ipfrag_high_thresh - LONG INTEGER
  Maximum memory used to reassemble IP fragments. When
-ipfrag_high_thresh bytes of memory is allocated for this purpose,
+ipfrag_high_thresh - LONG INTEGER
+  (Obsolete since linux-4.17)
-the fragment handler will toss packets until ipfrag_low_thres
-is reached. This also serves as a maximum limit to namespaces
-different from the initial one.
+Maximum memory used to reassemble IP fragments.

-ipfrag_low_thresh - INTEGER
+ipfrag_low_thresh - LONG INTEGER
+(Obsulate since linux-4.17)
Maximum memory used to reassemble IP fragments before the kernel begins to remove incomplete fragment queues to free up resources.
The kernel still accepts new fragments for defragmentation.

Path MTU discovery (MTU probing). If MTU probing is enabled, this is the initial MSS used by the connection.

+tcp_min_snd_mss - INTEGER
+TCP SYN and SYNACK messages usually advertise an ADVMSS option,
as described in RFC 1122 and RFC 6691.
+If this ADVMSS option is smaller than tcp_min_snd_mss,
it is silently capped to tcp_min_snd_mss.
+
+Default : 48 (at least 8 bytes of payload per segment)
+
tcp_congestion_control - STRING
Set the congestion control algorithm to be used for new
connections. The algorithm "reno" is always available, but
minimum RTT when it is moved to a longer path (e.g., due to traffic
engineering). A longer window makes the filter more resistant to RTT
inflations such as transient congestion. The unit is seconds.
+Possible values: 0 - 86400 (1 day)
Default: 300

tcp_moderate_rcvbuf - BOOLEAN
@ @ -508,7 +514,7 @ @
min: Minimal size of receive buffer used by TCP sockets.
It is guaranteed to each TCP socket, even under moderate memory
pressure.
-Default: 1 page
+Default: 4K

default: initial size of receive buffer used by TCP sockets.
This value overrides net.core.rmem_default used by other protocols.
@ @ -666,7 +672,7 @ @
tcp_wmem - vector of 3 INTEGERS: min, default, max
min: Amount of memory reserved for send buffers for TCP sockets.
Each TCP socket has rights to use it due to fact of its birth.
-Default: 1 page
+Default: 4K

default: initial size of send buffer used by TCP sockets. This
value overrides net.core.wmem_default used by other protocols.
@ @ -899,12 +905,14 @ @
icmp_msgs_per_sec - INTEGER
Limit maximal number of ICMP packets sent per second from this host.
Only messages whose type matches icmp_ratemask (see below) are
controlled by this limit.
+controlled by this limit. For security reasons, the precise count
+of messages per second is randomized.
Default: 1000

icmp_msgs_burst - INTEGER
icmp_msgs_per_sec controls number of ICMP packets sent per second,
while icmp_msgs_burst controls the burst size of these packets.
+For security reasons, the precise burst size is randomized.
Default: 50

icmp_ratemask - INTEGER
@ @ -1385,26 +1393,26 @ @
Default: 2 (as specified by RFC3810 9.1)
Minimum: 1 (as specified by RFC6636 4.5)

-max_dst_opts_cnt - INTEGER
+max_dst_opts_number - INTEGER
Maximum number of non-padding TLVs allowed in a Destination
options extension header. If this value is less than zero
then unknown options are disallowed and the number of known
TLVs allowed is the absolute value of this number.
Default: 8

-max_hbh_opts_cnt - INTEGER
+max_hbh_opts_number - INTEGER
Maximum number of non-padding TLVs allowed in a Hop-by-Hop
options extension header. If this value is less than zero
then unknown options are disallowed and the number of known
TLVs allowed is the absolute value of this number.
Default: 8

-max_dst_opts_len - INTEGER
+max_dst_opts_length - INTEGER
Maximum length allowed for a Destination options extension
header.
Default: INT_MAX (unlimited)

-max_hbh_opts_len - INTEGER
+max_hbh_length - INTEGER
Maximum length allowed for a Hop-by-Hop options extension
header.
Default: INT_MAX (unlimited)

--- linux-4.15.0.orig/Documentation/networking/netdev-FAQ.txt
+++ linux-4.15.0/Documentation/networking/netdev-FAQ.txt
@@ -179,6 +179,15 @@
dash marker line as described in Documentation/process/submitting-patches.rst to
temporarily embed that information into the patch that you send.

+Q: Are all networking bug fixes backported to all stable releases?
+  +A: Due to capacity, Dave could only take care of the backports for the last
+    2 stable releases. For earlier stable releases, each stable branch maintainer
+    is supposed to take care of them. If you find any patch is missing from an
+    earlier stable branch, please notify stable@vger.kernel.org with either a
+    commit ID or a formal patch backported, and CC Dave and other relevant
+    networking developers.
+  +
+Q: Someone said that the comment style and coding convention is different
   for the networking content. Is this true?

--- linux-4.15.0.orig/Documentation/perf/thunderx2-pmu.txt
+++ linux-4.15.0/Documentation/perf/thunderx2-pmu.txt
@@ -0,0 +1,41 @@
+Cavium ThunderX2 SoC Performance Monitoring Unit (PMU UNCORE)
The ThunderX2 SoC PMU consists of independent, system-wide, per-socket PMUs such as the Level 3 Cache (L3C) and DDR4 Memory Controller (DMC).

The DMC has 8 interleaved channels and the L3C has 16 interleaved tiles. Events are counted for the default channel (i.e. channel 0) and prorated to the total number of channels/tiles.

The DMC and L3C support up to 4 counters. Counters are independently programmable and can be started and stopped individually. Each counter can be set to a different event. Counters are 32-bit and do not support an overflow interrupt; they are read every 2 seconds.

PMU UNCORE (perf) driver:

The thunderx2_pmu driver registers per-socket perf PMUs for the DMC and L3C devices. Each PMU can be used to count up to 4 events simultaneously. The PMUs provide a description of their available events and configuration options under sysfs, see /sys/devices/uncore_<l3c_S/dmc_S>/; S is the socket id.

The driver does not support sampling, therefore "perf record" will not work. Per-task perf sessions are also not supported.

Examples:

```
# perf stat -a -e uncore_dmc_0/cnt_cycles/ sleep 1
```

```
# perf stat -a -e uncore_dmc_0/cnt_cycles/,uncore_dmc_0/data_transfers/,uncore_dmc_0/read_txns/,uncore_dmc_0/write_txns/ sleep 1
```

```
# perf stat -a -e uncore_l3c_0/read_request/,uncore_l3c_0/read_hit/,uncore_l3c_0/inv_request/,uncore_l3c_0/inv_hit/ sleep 1
```

--- linux-4.15.0.orig/Documentation/power/pci.txt
+++ linux-4.15.0/Documentation/power/pci.txt
@@ -994,6 +994,17 @@
 the function will set the power.direct_complete flag for it (to make the PM core skip the subsequent "thaw" callbacks for it) and return.

+Setting the DPM_FLAG_LEAVE_SUSPENDED flag means that the driver prefers the device to be left in suspend after system-wide transitions to the working state.
This flag is checked by the PM core, but the PCI bus type informs the PM core which devices may be left in suspend from its perspective (that happens during the "noirq" phase of system-wide suspend and analogous transitions) and next it uses the dev_pm_may_skip_resume() helper to decide whether or not to return from pci_pm_resume_noirq() early, as the PM core will skip the remaining callbacks for the device during the transition under way and will set its runtime PM status to "suspended" if dev_pm_may_skip_resume() returns "true" for it.

3.2. Device Runtime Power Management

In addition to providing device power management callbacks PCI device drivers

--- linux-4.15.0.orig/Documentation/power/swsusp.txt
+++ linux-4.15.0/Documentation/power/swsusp.txt
@@ -24,8 +24,16 @@
* see the FAQ below for details. (This is not true for more traditional * power states like "standby", which normally don't turn USB off.)

+Swap partition:
+You need to append resume=/dev/your_swap_partition to kernel command
+line. Then you suspend by
+line or specify it using /sys/power/resume.
+
+Swap file:
+If using a swapfile you can also specify a resume offset using
+resume_offset=<number> on the kernel command line or specify it
+in /sys/power/resume_offset.
+
+After preparing then you suspend by

echo shutdown > /sys/power/disk; echo disk > /sys/power/state

--- linux-4.15.0.orig/Documentation/printk-formats.txt
+++ linux-4.15.0/Documentation/printk-formats.txt
@@ -422,11 +422,10 @@
	%pCr	1560000000

For printing struct clk structures. ``%pC`` and ``%pCn`` print the name (Common Clock Framework) or address (legacy clock framework) of the -structure; ``%pCr`` prints the current clock rate.
+structure.

Passed by reference.

@@ -476,6 +475,12 @@
Passed by reference.

+Kernel messages:
+    + %pj123456
+    + For generating the jhash of a string truncated to six digits
+    +
+If you add other `%-p` extensions, please extend lib/test_printf.c with one or more test cases, if at all feasible.

--- linux-4.15.0.org/Documentation/process/changes.rst
+++ linux-4.15.0/Documentation/process/changes.rst
@@ -33,7 +33,7 @@
GNU make               3.81             make --version
binutils               2.20             ld -v
util-linux             2.10o            fdformat --version
-module-init-tools      0.9.10           depmod -V
+module-init-tools      0.9.10           depmod -V
kmod                   13               depmod -V
jfsutils               1.1.3            fsck.jfs -V
reiserfsprogs          3.6.3            reiserfsck -V
@@ -141,12 +141,6 @@
reproduce the Oops with that option, then you can still decode that Oops with ksymoops.

-Module-Init-Tools
------------------
-Module-Init-Tools

-A new module loader is now in the kernel that requires `module-init-tools`
to use. It is backward compatible with the 2.4.x series kernels.

-Mkinitrd
--------

@@ -346,16 +340,17 @@

- <https://www.kernel.org/pub/linux/utils/util-linux/>

-Kmod
-----

-Kmod
-----

-Ksymoops
--------
- <https://www.kernel.org/pub/linux/utils/kernel/ksymoops/v2.4/>

-Module-Init-Tools

------------------


- Mkinitrd

---

--- linux-4.15.0.orig/Documentation/process/stable-kernel-rules.rst
+++ linux-4.15.0/Documentation/process/stable-kernel-rules.rst
@@ -38,6 +38,9 @@
- If the patch covers files in net/ or drivers/net please follow netdev stable
  submission guidelines as described in
  Documentation/networking/netdev-FAQ.txt
+ after first checking the stable networking queue at
+ https://patchwork.ozlabs.org/bundle/davem/stable/?series=&submitter=&state=*&q=&&archive=
+ to ensure the requested patch is not already queued up.
- Security patches should not be handled (solely) by the -stable review
  process but should follow the procedures in
  :ref:`Documentation/admin-guide/security-bugs.rst <securitybugs>`.
--- linux-4.15.0.orig/Documentation/robust-futexes.txt
+++ linux-4.15.0/Documentation/robust-futexes.txt
@@ -218,5 +218,4 @@
the new sysoptatomic() function before writing up the sysopts (that function returns
--ENOSYS right now).
+inline function before writing up the sysopts.
--- linux-4.15.0.orig/Documentation/s390/vfio-ap.txt
+++ linux-4.15.0/Documentation/s390/vfio-ap.txt
@@ -0,0 +1,837 @@
+Introduction:
+================
+The Adjunct Processor (AP) facility is an IBM Z cryptographic facility comprised
+of three AP instructions and from 1 up to 256 PCIe cryptographic adapter cards.
+The AP devices provide cryptographic functions to all CPUs assigned to a
+linux system running in an IBM Z system LPAR.
+
+The AP adapter cards are exposed via the AP bus. The motivation for vfio-ap
+is to make AP cards available to KVM guests using the VFIO mediated device
+framework. This implementation relies considerably on the s390 virtualization
+facilities which do most of the hard work of providing direct access to AP
+devices.
+
+AP Architectural Overview:
+=================================
+To facilitate the comprehension of the design, let's start with some
+definitions:
+
+* AP adapter
+
+  An AP adapter is an IBM Z adapter card that can perform cryptographic
+  functions. There can be from 0 to 256 adapters assigned to an LPAR. Adapters
+  assigned to the LPAR in which a Linux host is running will be available to
+  the Linux host. Each adapter is identified by a number from 0 to 255; however,
+  the maximum adapter number is determined by machine model and/or adapter type.
+  When installed, an AP adapter is accessed by AP instructions executed by any
+  CPU.
+
+  The AP adapter cards are assigned to a given LPAR via the system's Activation
+  Profile which can be edited via the HMC. When the Linux host system is IPL'd
+  in the LPAR, the AP bus detects the AP adapter cards assigned to the LPAR and
+  creates a sysfs device for each assigned adapter. For example, if AP adapters
+  4 and 10 (0x0a) are assigned to the LPAR, the AP bus will create the following
+  sysfs device entries:
+
+  /sys/devices/ap/card04
+  /sys/devices/ap/card0a
+
+  Symbolic links to these devices will also be created in the AP bus devices
+  sub-directory:
+
+  /sys/bus/ap/devices/[card04]
+  /sys/bus/ap/devices/[card04]
+
+  * AP domain
+
+  An adapter is partitioned into domains. An adapter can hold up to 256 domains
+  depending upon the adapter type and hardware configuration. A domain is
+  identified by a number from 0 to 255; however, the maximum domain number is
+  determined by machine model and/or adapter type. A domain can be thought of
+  as a set of hardware registers and memory used for processing AP commands. A
+  domain can be configured with a secure private key used for clear key
+  encryption. A domain is classified in one of two ways depending upon how it
+  may be accessed:
+
+  * Usage domains are domains that are targeted by an AP instruction to
+    process an AP command.
+
+  * Control domains are domains that are changed by an AP command sent to a
+    usage domain; for example, to set the secure private key for the control
+    domain.
The AP usage and control domains are assigned to a given LPAR via the system's Activation Profile which can be edited via the HMC. When a Linux host system is IPL'd in the LPAR, the AP bus module detects the AP usage and control domains assigned to the LPAR. The domain number of each usage domain and adapter number of each AP adapter are combined to create AP queue devices (see AP Queue section below). The domain number of each control domain will be represented in a bitmask and stored in a sysfs file /sys/bus/ap/ap_control_domain_mask. The bits in the mask, from most to least significant bit, correspond to domains 0-255.

**AP Queue**

An AP queue is the means by which an AP command is sent to a usage domain inside a specific adapter. An AP queue is identified by a tuple comprised of an AP adapter ID (APID) and an AP queue index (APQI). The APQI corresponds to a given usage domain number within the adapter. This tuple forms an AP Queue Number (APQN) uniquely identifying an AP queue. AP instructions include a field containing the APQN to identify the AP queue to which the AP command is to be sent for processing.

The AP bus will create a sysfs device for each APQN that can be derived from the cross product of the AP adapter and usage domain numbers detected when the AP bus module is loaded. For example, if adapters 4 and 10 (0x0a) and usage domains 6 and 71 (0x47) are assigned to the LPAR, the AP bus will create the following sysfs entries:

```
/sys/devices/ap/card04/04.0006
/sys/devices/ap/card04/04.0047
/sys/devices/ap/card0a/0a.0006
/sys/devices/ap/card0a/0a.0047
```

The following symbolic links to these devices will be created in the AP bus devices subdirectory:

```
/sys/bus/ap/devices/[04.0006]
/sys/bus/ap/devices/[04.0047]
/sys/bus/ap/devices/[0a.0006]
/sys/bus/ap/devices/[0a.0047]
```

**AP Instructions:**

There are three AP instructions:

* NQAP: to enqueue an AP command-request message to a queue
* DQAP: to dequeue an AP command-reply message from a queue
* PQAP: to administer the queues
+ AP instructions identify the domain that is targeted to process the AP
+ command; this must be one of the usage domains. An AP command may modify a
+ domain that is not one of the usage domains, but the modified domain
+ must be one of the control domains.
+
+ AP and SIE:
+ ===========
+ Let's now take a look at how AP instructions executed on a guest are interpreted
+ by the hardware.
+
+ A satellite control block called the Crypto Control Block (CRYCB) is attached to
+ our main hardware virtualization control block. The CRYCB contains three fields
+ to identify the adapters, usage domains and control domains assigned to the KVM
+ guest:
+
+ * The AP Mask (APM) field is a bit mask that identifies the AP adapters assigned
+ to the KVM guest. Each bit in the mask, from left to right (i.e. from most
+ significant to least significant bit in big endian order), corresponds to
+ an APID from 0-255. If a bit is set, the corresponding adapter is valid for
+ use by the KVM guest.
+
+ * The AP Queue Mask (AQM) field is a bit mask identifying the AP usage domains
+ assigned to the KVM guest. Each bit in the mask, from left to right (i.e. from
+ most significant to least significant bit in big endian order), corresponds to
+ an AP queue index (APQI) from 0-255. If a bit is set, the corresponding queue
+ is valid for use by the KVM guest.
+
+ * The AP Domain Mask field is a bit mask that identifies the AP control domains
+ assigned to the KVM guest. The ADM bit mask controls which domains can be
+ changed by an AP command-request message sent to a usage domain from the
+ guest. Each bit in the mask, from left to right (i.e. from most significant to
+ least significant bit in big endian order), corresponds to a domain from
+ 0-255. If a bit is set, the corresponding domain can be modified by an AP
+ command-request message sent to a usage domain.
+
+ If you recall from the description of an AP Queue, AP instructions include
+ an APQN to identify the AP queue to which an AP command-request message is to be
+ sent (NQAP and PQAP instructions), or from which a command-reply message is to
+ be received (DQAP instruction). The validity of an APQN is defined by the matrix
+ calculated from the APM and AQM; it is the cross product of all assigned adapter
+ numbers (APM) with all assigned queue indexes (AQM). For example, if adapters 1
+ and 2 and usage domains 5 and 6 are assigned to a guest, the APQNs (1,5), (1,6),
+ (2,5) and (2,6) will be valid for the guest.
+
+ The APQNs can provide secure key functionality - i.e., a private key is stored
+ on the adapter card for each of its domains - so each APQN must be assigned to
+ at most one guest or to the linux host.
+
Example 1: Valid configuration:
-----------------------------
Guest1: adapters 1,2 domains 5,6
Guest2: adapter 1,2 domain 7

This is valid because both guests have a unique set of APQNs:
Guest1 has APQNs (1,5), (1,6), (2,5), (2,6);
Guest2 has APQNs (1,7), (2,7)

Example 2: Valid configuration:
-----------------------------
Guest1: adapters 1,2 domains 5,6
Guest2: adapters 3,4 domains 5,6

This is also valid because both guests have a unique set of APQNs:
Guest1 has APQNs (1,5), (1,6), (2,5), (2,6);
Guest2 has APQNs (3,5), (3,6), (4,5), (4,6)

Example 3: Invalid configuration:
-----------------------------
Guest1: adapters 1,2 domains 5,6
Guest2: adapter 1 domains 6,7

This is an invalid configuration because both guests have access to
APQN (1,6).

The Design:
============
The design introduces three new objects:

1. AP matrix device
2. VFIO AP device driver (vfio_ap.ko)
3. VFIO AP mediated matrix pass-through device

The VFIO AP (vfio_ap) device driver serves the following purposes:

1. Provides the interfaces to secure APQNs for exclusive use of KVM guests.
2. Sets up the VFIO mediated device interfaces to manage a mediated matrix
device and creates the sysfs interfaces for assigning adapters, usage
domains, and control domains comprising the matrix for a KVM guest.
3. Configures the APM, AQM and ADM in the CRYCB referenced by a KVM guest's
SIE state description to grant the guest access to a matrix of AP devices
4. Reserve APQNs for exclusive use of KVM guests
+The following block diagram illustrates the mechanism by which APQNs are reserved:

+1. The administrator loads the vfio_ap device driver
+2. The vfio-ap driver during its initialization will register a single 'matrix'
   device with the device core. This will serve as the parent device for
   all mediated matrix devices used to configure an AP matrix for a guest.
+3. The /sys/devices/vfio_ap/matrix device is created by the device core
+4. The vfio_ap_device driver will register with the AP bus for AP queue devices
Open Source Used In 5GaaS Edge AC-4  9689

of type 10 and higher (CEX4 and newer). The driver will provide the vfio_ap
driver's probe and remove callback interfaces. Devices older than CEX4 queues
are not supported to simplify the implementation by not needlessly
complicating the design by supporting older devices that will go out of
service in the relatively near future, and for which there are few older
systems around on which to test.

5. The AP bus registers the vfio_ap device driver with the device core
6. The administrator edits the AP adapter and queue masks to reserve AP queues
for use by the vfio_ap device driver.
7. The AP bus removes the AP queues reserved for the vfio_ap driver from the
default zcrypt cex4queue driver.
8. The AP bus probes the vfio_ap device driver to bind the queues reserved for
it.
9. The administrator creates a passthrough type mediated matrix device to be
used by a guest
10. The administrator assigns the adapters, usage domains and control domains
to be exclusively used by a guest.

+ Set up the VFIO mediated device interfaces

The VFIO AP device driver utilizes the common interface of the VFIO mediated
device core driver to:
+ Register an AP mediated bus driver to add a mediated matrix device to and
remove it from a VFIO group.
+ Create and destroy a mediated matrix device
+ Add a mediated matrix device to and remove it from the AP mediated bus driver
+ Add a mediated matrix device to and remove it from an IOMMU group

The following high-level block diagram shows the main components and interfaces
of the VFIO AP mediated matrix device driver:

Set up the VFIO mediated device interfaces
+---------------------------------------------------------------+
+|                  | mdev_register_driver() +-----------------------+
+|                   | mdev | +<-----------------------+ | mdev_register_device() +-----------------------+
+|                   | Mdev | |                        | mdev | |
+|                   | bus | | vpio_mdev.ko | |
+|                   | driver | +----------------------->+ | driver | +----------------------->+ |
+|                   | probe()/remove() +------------------- APIs |
+|                   | MDEV CORE | |
+|                   | MODULE | |
+|                   | mdev.ko | |
+|                   | mdev_register_device() +-------------------+ |
+|Physical | +<-----------------------+ |
+|device | | vpio_ap.ko |<-> matrix |
+|interface| +----------------------->+ | device |
+|callback | +-------------------+ |
+-------------------+ |
During initialization of the vfio_ap module, the matrix device is registered with an 'mdev_parent_ops' structure that provides the sysfs attribute structures, mdev functions and callback interfaces for managing the mediated matrix device.

* sysfs attribute structures:
  * supported_type_groups
    The VFIO mediated device framework supports creation of user-defined mediated device types. These mediated device types are specified via the 'supported_type_groups' structure when a device is registered with the mediated device framework. The registration process creates the sysfs structures for each mediated device type specified in the 'mdev_supported_types' sub-directory of the device being registered. Along with the device type, the sysfs attributes of the mediated device type are provided.
    
    The VFIO AP device driver will register one mediated device type for passthrough devices:
    /sys/devices/vfio_ap/matrix/mdev_supported_types/vfio_ap-passthrough
    Only the read-only attributes required by the VFIO mdev framework will be provided:
    ...
    device_api
    ... available_instances
    ...
    device_api
    Where:
    * name: specifies the name of the mediated device type
    * device_api: the mediated device type's API
    * available_instances: the number of mediated matrix passthrough devices that can be created
    * device_api: specifies the VFIO API
  * mdev_attr_groups
    This attribute group identifies the user-defined sysfs attributes of the mediated device. When a device is registered with the VFIO mediated device framework, the sysfs attribute files identified in the 'mdev_attr_groups' structure will be created in the mediated matrix device's directory. The sysfs attributes for a mediated matrix device are:
    * assign_adapter:
    * unassign_adapter:
      Write-only attributes for assigning/unassigning an AP adapter to/from the mediated matrix device. To assign/unassign an adapter, the APID of the adapter is echoed to the respective attribute file.
    * assign_domain:
    * unassign_domain:
      Write-only attributes for assigning/unassigning an AP usage domain to/from the mediated matrix device. To assign/unassign a domain, the domain number of the the usage domain is echoed to the respective attribute
Configure the APM, AQM and ADM in the CRYCB:

+ Configure the APM, AQM and ADM in the CRYCB:

+ Setting the bits in the APM corresponding to the APIDs assigned to the
  + mediated matrix device via its 'assign_adapter' interface.
+ Setting the bits in the AQM corresponding to the domains assigned to the
  + mediated matrix device via its 'assign_domain' interface.
+ Setting the bits in the ADM corresponding to the domain dIDs assigned to the
The AP stack relies on the presence of the AP instructions as well as two facilities: The AP Facilities Test (APFT) facility; and the AP Query Configuration Information (QCI) facility. These features/facilities are made available to a KVM guest via the following CPU model features:

1. ap: Indicates whether the AP instructions are installed on the guest. This feature will be enabled by KVM only if the AP instructions are installed on the host.

2. apft: Indicates the APFT facility is available on the guest. This facility can be made available to the guest only if it is available on the host (i.e., facility bit 15 is set).

3. apqci: Indicates the AP QCI facility is available on the guest. This facility can be made available to the guest only if it is available on the host (i.e., facility bit 12 is set).

Note: If the user chooses to specify a CPU model different than the 'host' model to QEMU, the CPU model features and facilities need to be turned on explicitly; for example:

```
/usr/bin/qemu-system-s390x ... -cpu z13,ap=on,apqci=on,apft=on
```

A guest can be precluded from using AP features/facilities by turning them off explicitly; for example:

```
/usr/bin/qemu-system-s390x ... -cpu host,ap=off,apqci=off,apft=off
```

Note: If the APFT facility is turned off (apft=off) for the guest, the guest will not see any AP devices. The zcrypt device drivers that register for type 10 and newer AP devices - i.e., the cex4card and cex4queue device drivers - need the APFT facility to ascertain the facilities installed on a given AP device. If the APFT facility is not installed on the guest, then the probe of device drivers will fail since only type 10 and newer devices can be configured for guest use.

Example:

```
Let's now provide an example to illustrate how KVM guests may be given access to AP facilities. For this example, we will show how to configure three guests such that executing the lszcrypt command on the guests would look like this:
```

+ Guest1
These are the steps:

1. Install the vfio_ap module on the linux host. The dependency chain for the vfio_ap module is:

   * iommu
   * s390
   * zcrypt
   * vfio
   * vfio_mdev
   * vfio_mdev_device
   * KVM

   To build the vfio_ap module, the kernel build must be configured with the following Kconfig elements selected:

   * IOMMU_SUPPORT
   * S390
   * ZCRYPT
   * S390_AP_IOMMU
   * VFIO
   * VFIO_MDEV
   * VFIO_MDEV_DEVICE
   * KVM
If using make menuconfig select the following to build the vfio_ap module:

- Device Drivers
  - IOMMU Hardware Support
    - Select S390 AP IOMMU Support
  - VFIO Non-Privileged userspace driver framework
    - Mediated device driver framework
  - VFIO driver for Mediated devices

- I/O subsystem
  - VFIO support for AP devices

2. Secure the AP queues to be used by the three guests so that the host can not access them. To secure them, there are two sysfs files that specify bitmasks marking a subset of the APQN range as 'usable by the default AP queue device drivers' or 'not usable by the default device drivers' and thus available for use by the vfio_ap device driver. The location of the sysfs files containing the masks are:

/sys/bus/ap/apmask
/sys/bus/ap/aqmask

The 'apmask' is a 256-bit mask that identifies a set of AP adapter IDs (APID). Each bit in the mask, from left to right (i.e., from most significant to least significant bit in big endian order), corresponds to an APID from 0-255. If a bit is set, the APID is marked as usable only by the default AP queue device drivers; otherwise, the APID is usable by the vfio_ap device driver.

The 'aqmask' is a 256-bit mask that identifies a set of AP queue indexes (APQI). Each bit in the mask, from left to right (i.e., from most significant to least significant bit in big endian order), corresponds to an APQI from 0-255. If a bit is set, the APQI is marked as usable only by the default AP queue device drivers; otherwise, the APQI is usable by the vfio_ap device driver.

Take, for example, the following mask:

```
0x7fffffffffffffffffffffffffffffffffffffffffffffffffffffffffff
```

It indicates:

1, 2, 3, 4, 5, and 7-255 belong to the default drivers' pool, and 0 and 6 belong to the vfio_ap device driver's pool.

The APQN of each AP queue device assigned to the linux host is checked by the AP bus against the set of APQNs derived from the cross product of APIDs and APQIs marked as usable only by the default AP queue device drivers. If a match is detected, only the default AP queue device drivers will be probed;
By default, the two masks are set to reserve all APQNs for use by the default AP queue device drivers. There are two ways the default masks can be changed:

1. The sysfs mask files can be edited by echoing a string into the respective sysfs mask file in one of two formats:

   * An absolute hex string starting with 0x - like "0x12345678" - sets the mask. If the given string is shorter than the mask, it is padded with 0s on the right; for example, specifying a mask value of 0x41 is the same as specifying:
     0x4100000000000000000000000000000000000000000000000000000000000000
   * Individual bits in the mask can be switched on and off by specifying each bit number to be switched in a comma separated list. Each bit number string must be prepended with a (+) or minus (-) to indicate the corresponding bit is to be switched on (+) or off (-). Some valid values are:
     
     +0    switches bit 0 on
     -13   switches bit 13 off
     +0x41 switches bit 65 on
     -0xff switches bit 255 off
     
     The following example:
     +0,-6,+0x47,-0xf0
     
     Switches bits 0 and 71 (0x47) on
     Switches bits 6 and 240 (0xf0) off
     
     Note that the bits not specified in the list remain as they were before the operation.

2. The masks can also be changed at boot time via parameters on the kernel command line like this:

   ap.apmask=0xffff ap.aqmask=0x40

   This would create the following masks:
Open Source Used In 5GaaS Edge AC-4

+ apmask:
+ 0xffff000000000000000000000000000000000000000000000000000000000000
+ aqmask:
+ 0x4000000000000000000000000000000000000000000000000000000000000000

+ Resulting in these two pools:
+  
+      default drivers pool:  adapter 0-15, domain 1
+      alternate drivers pool:  adapter 16-255, domains 0, 2-255
+
+ Securing the APQNs for our example:
+  ----------------------------------
+  To secure the AP queues 05.0004, 05.0047, 05.00ab, 05.00ff, 06.0004, 06.0047, 06.00ab, and 06.00ff for use by the vfio_ap device driver, the corresponding APQNs can either be removed from the default masks:
+  
+      echo -5,-6 > /sys/bus/ap/apmask
+  
+      echo -4,-0x47,-0xab,-0xff > /sys/bus/ap/aqmask
+  
+  Or the masks can be set as follows:
+  
+      echo 0xf9ffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff \  
+      > apmask
+  
+      echo 0xf7fffffffffffffffeffffffffffffffffffffffffffffffff \  
+      > aqmask
+  
+  This will result in AP queues 05.0004, 05.0047, 05.00ab, 05.00ff, 06.0004, 06.0047, 06.00ab, and 06.00ff getting bound to the vfio_ap device driver. The sysfs directory for the vfio_ap device driver will now contain symbolic links to the AP queue devices bound to it:
+  
+  /sys/bus/ap
+  ... [drivers]
+  ...... [vfio_ap]
+  .......... [05.0004]
+  .......... [05.0047]
+  .......... [05.00ab]
+  .......... [05.00ff]
+  .......... [06.0004]
+  .......... [06.0047]
+  .......... [06.00ab]
+  .......... [06.00ff]
+  
+  Keep in mind that only type 10 and newer adapters (i.e., CEX4 and later)
can be bound to the vfio_ap device driver. The reason for this is to simplify the implementation by not needlessly complicating the design by supporting older devices that will go out of service in the relatively near future and for which there are few older systems on which to test.

The administrator, therefore, must take care to secure only AP queues that can be bound to the vfio_ap device driver. The device type for a given AP queue device can be read from the parent card's sysfs directory. For example, to see the hardware type of the queue 05.0004:

cat /sys/bus/ap/devices/card05/hwtype

The hwtype must be 10 or higher (CEX4 or newer) in order to be bound to the vfio_ap device driver.

3. Create the mediated devices needed to configure the AP matrixes for the three guests and to provide an interface to the vfio_ap driver for use by the guests:

/sys/devices/vfio_ap/matrix/
   --- [mdev_supported_types]
   ------ [vfio_ap-passthrough] (passthrough mediated matrix device type)
   --------- create
   --------- [devices]

To create the mediated devices for the three guests:

typegen > create
typegen > create
typegen > create

or

    echo $uuid1 > create
    echo $uuid2 > create
    echo $uuid3 > create

This will create three mediated devices in the [devices] subdirectory named after the UUID written to the create attribute file. We call them $uuid1, $uuid2 and $uuid3 and this is the sysfs directory structure after creation:

/sys/devices/vfio_ap/matrix/
   --- [mdev_supported_types]
   ------ [vfio_ap-passthrough]
   [devices]
   [[$uuid1]
    ----------- assign_adapter
    ----------- assign_control_domain
4. The administrator now needs to configure the matrices for the mediated devices $uuid1 (for Guest1), $uuid2 (for Guest2) and $uuid3 (for Guest3).

This is how the matrix is configured for Guest1:

```
  echo 5 > assign_adapter
  echo 6 > assign_adapter
  echo 4 > assign_domain
  echo 0xab > assign_domain

  Control domains can similarly be assigned using the assign_control_domain sysfs file.

  If a mistake is made configuring an adapter, domain or control domain, you can use the unassign_xxx files to unassign the adapter, domain or control domain.

  To display the matrix configuration for Guest1:
  cat matrix
```

This is how the matrix is configured for Guest2:

```
  echo 5 > assign_adapter
```

echo 0x47 > assign_domain
echo 0xff > assign_domain

This is how the matrix is configured for Guest3:

echo 6 > assign_adapter
echo 0x47 > assign_domain
echo 0xff > assign_domain

In order to successfully assign an adapter:

* The adapter number specified must represent a value from 0 up to the
  maximum adapter number configured for the system. If an adapter number
  higher than the maximum is specified, the operation will terminate with
  an error (ENODEV).

* All APQNs that can be derived from the adapter ID and the IDs of
  the previously assigned domains must be bound to the vfio_ap device
  driver. If no domains have yet been assigned, then there must be at least
  one APQN with the specified APID bound to the vfio_ap driver. If no such
  APQNs are bound to the driver, the operation will terminate with an
  error (EADDRNOTAVAIL).

No APQN that can be derived from the adapter ID and the IDs of the
previously assigned domains can be assigned to another mediated matrix
device. If an APQN is assigned to another mediated matrix device, the
operation will terminate with an error (EADDRINUSE).

In order to successfully assign a domain:

* The domain number specified must represent a value from 0 up to the
  maximum domain number configured for the system. If a domain number
  higher than the maximum is specified, the operation will terminate with
  an error (ENODEV).

* All APQNs that can be derived from the domain ID and the IDs of
  the previously assigned adapters must be bound to the vfio_ap device
  driver. If no domains have yet been assigned, then there must be at least
  one APQN with the specified APQI bound to the vfio_ap driver. If no such
  APQNs are bound to the driver, the operation will terminate with an
  error (EADDRNOTAVAIL).

No APQN that can be derived from the domain ID and the IDs of the
previously assigned adapters can be assigned to another mediated matrix
device. If an APQN is assigned to another mediated matrix device, the
operation will terminate with an error (EADDRINUSE).

In order to successfully assign a control domain, the domain number
+specified must represent a value from 0 up to the maximum domain number
+configured for the system. If a control domain number higher than the maximum
+is specified, the operation will terminate with an error (ENODEV).
+
+5. Start Guest1:
+
+ /usr/bin/qemu-system-s390x ... -cpu host,ap=on,apqci=on,apft=on \n+    -device vfio-ap.sysfsdev=/sys/devices/vfio_api/matrix/$uuid1 ... 
+
+7. Start Guest2:
+
+ /usr/bin/qemu-system-s390x ... -cpu host,ap=on,apqci=on,apft=on \n+    -device vfio-ap.sysfsdev=/sys/devices/vfio_api/matrix/$uuid2 ... 
+
+7. Start Guest3:
+
+ /usr/bin/qemu-system-s390x ... -cpu host,ap=on,apqci=on,apft=on \n+    -device vfio-ap.sysfsdev=/sys/devices/vfio_api/matrix/$uuid3 ... 
+
+When the guest is shut down, the mediated matrix devices may be removed.
+
+Using our example again, to remove the mediated matrix device $uuid1:
+
+ /sys/devices/vfio_api/matrix/
+   --- [mdev_supported_types]
+   ------ [vfio_api-passthrough]
+   -------- [devices]
+   --------- [$uuid1]
+   ------------ remove
+
+
+ echo 1 > remove
+
+ This will remove all of the mdev matrix device's sysfs structures including
+ the mdev device itself. To recreate and reconfigure the mdev matrix device,
+ all of the steps starting with step 3 will have to be performed again. Note
+ that the remove will fail if a guest using the mdev is still running.
+
+ It is not necessary to remove an mdev matrix device, but one may want to
+ remove it if no guest will use it during the remaining lifetime of the linux
+ host. If the mdev matrix device is removed, one may want to also reconfigure
+ the pool of adapters and queues reserved for use by the default drivers.
+
+Limitations
+==========
+
+* The KVM/kernel interfaces do not provide a way to prevent restoring an APQN
+ to the default drivers pool of a queue that is still assigned to a mediated
+ device in use by a guest. It is incumbent upon the administrator to
ensure there is no mediated device in use by a guest to which the APQN is
assigned lest the host be given access to the private data of the AP queue
device such as a private key configured specifically for the guest.

+* Dynamically modifying the AP matrix for a running guest (which would amount to
hot(un)plug of AP devices for the guest) is currently not supported
+
+* Live guest migration is not supported for guests using AP devices.

--- linux-4.15.0.orig/Documentation/scheduler/sched-bwc.txt
+++ linux-4.15.0/Documentation/scheduler/sched-bwc.txt
@@ -8,15 +8,16 @@
specification of the maximum CPU bandwidth available to a group or hierarchy.

The bandwidth allowed for a group is specified using a quota and period. Within
-each given "period" (microseconds), a group is allowed to consume only up to
-"quota" microseconds of CPU time. When the CPU bandwidth consumption of a
-group exceeds this limit (for that period), the tasks belonging to its
-hierarchy will be throttled and are not allowed to run again until the next
-period.
-
-A group's unused runtime is globally tracked, being refreshed with quota units
-above at each period boundary. As threads consume this bandwidth it is
-transferred to cpu-local "silos" on a demand basis. The amount transferred
+each given "period" (microseconds), a task group is allocated up to "quota"
+microseconds of CPU time. That quota is assigned to per-cpu run queues in
+slices as threads in the cgroup become runnable. Once all quota has been
+assigned any additional requests for quota will result in those threads being
+throttled. Throttled threads will not be able to run again until the next
+period when the quota is replenished.
+
+A group's unassigned quota is globally tracked, being refreshed back to
+cfs_quota units at each period boundary. As threads consume this bandwidth it
+is transferred to cpu-local "silos" on a demand basis. The amount transferred
within each of these updates is tunable and described as the "slice".

Management
@@ -33,12 +34,12 @@

A value of -1 for cpu.cfs_quota_us indicates that the group does not have any
bandwidth restriction in place, such a group is described as an unconstrained
-bandwidth group. This represents the traditional work-conserving behavior for
+bandwidth group. This represents the traditional work-conserving behavior for
CFS.

Writing any (valid) positive value(s) will enact the specified bandwidth limit.
-The minimum quota allowed for the quota or period is 1ms. There is also an
-upper bound on the period length of 1s. Additional restrictions exist when
+The minimum quota allowed for the quota or period is 1ms. There is also an
+upper bound on the period length of 1s. Additional restrictions exist when
bandwidth limits are used in a hierarchical fashion, these are explained in
more detail below.

@@ -51,8 +52,8 @@
System wide settings

---------------------
For efficiency run-time is transferred between the global pool and CPU local
"silos" in a batch fashion. This greatly reduces global accounting pressure
+"silos" in a batch fashion. This greatly reduces global accounting pressure
+on large systems. The amount transferred each time such an update is required
+on large systems. The amount transferred each time such an update is required
is described as the "slice".

This is tunable via procs:
@@ -90,6 +91,51 @@
In case b) above, even though the child may have runtime remaining it will not
be allowed to until the parent's runtime is refreshed.

+CFS Bandwidth Quota Caveats
+---------------------------
+Once a slice is assigned to a cpu it does not expire. However all but 1ms of
+the slice may be returned to the global pool if all threads on that cpu become
+unrunnable. This is configured at compile time by the min_cfs_rq_runtime
+variable. This is a performance tweak that helps prevent added contention on
+the global lock.
+
+The fact that cpu-local slices do not expire results in some interesting corner
+cases that should be understood.
+
+For cgroup cpu constrained applications that are cpu limited this is a
+relatively moot point because they will naturally consume the entirety of their
+quota as well as the entirety of each cpu-local slice in each period. As a
+result it is expected that nr_periods roughly equal nr_throttled, and that
cpuacct.usage will increase roughly equal to cfs_quota_us in each period.
+
+For highly-threaded, non-cpu bound applications this non-expiration nuance
+allows applications to briefly burst past their quota limits by the amount of
+unused slice on each cpu that the task group is running on (typically at most
+1ms per cpu or as defined by min_cfs_rq_runtime). This slight burst only
+applies if quota had been assigned to a cpu and then not fully used or returned
+in previous periods. This burst amount will not be transferred between cores.
+As a result, this mechanism still strictly limits the task group to quota
+average usage, albeit over a longer time window than a single period. This
+also limits the burst ability to no more than 1ms per cpu. This provides
+better more predictable user experience for highly threaded applications with
+small quota limits on high core count machines. It also eliminates the
+propensity to throttle these applications while simultaneously using less than
Another way to say this, is that by allowing the unused portion of a slice to remain valid across periods we have decreased the possibility of wastefully expiring quota on cpu-local silos that don't need a full slice's amount of cpu time.

The interaction between cpu-bound and non-cpu-bound-interactive applications should also be considered, especially when single core usage hits 100%. If you gave each of these applications half of a cpu-core and they both got scheduled on the same CPU it is theoretically possible that the non-cpu bound application will use up to 1ms additional quota in some periods, thereby preventing the cpu-bound application from fully using its quota by that same amount. In these instances it will be up to the CFS algorithm (see sched-design-CFS.rst) to decide which application is chosen to run, as they will both be runnable and have remaining quota. This runtime discrepancy will be made up in the following periods when the interactive application idles.

Examples
--------

1. Limit a group to 1 CPU worth of runtime.

```c
int i;
unsigned int x;

-printf("static const u32 runnable_avg_yN_inv[] = {");
+/* To silence -Wunused-but-set-variable warnings. */
+printf("static const u32 runnable_avg_yN_inv[] __maybe_unused = {");

for (i = 0; i < HALFLIFE; i++) {
  x = ((1UL<<32)-1)*pow(y, i);
```

---

This file documents the "PC Beep Hidden Register", which is present in certain Realtek HDA codecs and controls a muxer and pair of passthrough mixers that can route audio between pins but aren't themselves exposed as HDA widgets. As far

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Realtek PC Beep Hidden Register

This file documents the "PC Beep Hidden Register", which is present in certain Realtek HDA codecs and controls a muxer and pair of passthrough mixers that can route audio between pins but aren't themselves exposed as HDA widgets. As far
+as I can tell, these hidden routes are designed to allow flexible PC Beep output +for codecs that don't have mixer widgets in their output paths. Why it's easier +to hide a mixer behind an undocumented vendor register than to just expose it +as a widget, I have no idea.
+
+Register Description
+====================
+
+The register is accessed via processing coefficient 0x36 on NID 20h. Bits not +identified below have no discernible effect on my machine, a Dell XPS 13 9350::
+
+  MSB                            LSB
+  +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
+  | |h|S|L|         | B |R|       | Known bits
+  +=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
+  |0|0|1|1|  0x7  |0|0x0|1|  0x7  | Reset value
+  +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
+
+1Ah input select (B): 2 bits
+  When zero, expose the PC Beep line (from the internal beep generator, when + enabled with the Set Beep Generation verb on NID 01h, or else from the + external PCBEEP pin) on the 1Ah pin node. When nonzero, expose the headphone + jack (or possibly Line In on some machines) input instead. If PC Beep is + selected, the 1Ah boost control has no effect.
+
+Amplify 1Ah loopback, left (L): 1 bit
+  Amplify the left channel of 1Ah before mixing it into outputs as specified + by h and S bits. Does not affect the level of 1Ah exposed to other widgets. +
+
+Amplify 1Ah loopback, right (R): 1 bit
+  Amplify the right channel of 1Ah before mixing it into outputs as specified + by h and S bits. Does not affect the level of 1Ah exposed to other widgets. +
+
+Loopback 1Ah to 21h [active low] (h): 1 bit
+  When zero, mix 1Ah (possibly with amplification, depending on L and R bits) + into 21h (headphone jack on my machine). Mixed signal respects the mute + setting on 21h.
+
+Loopback 1Ah to 14h (S): 1 bit
+  When one, mix 1Ah (possibly with amplification, depending on L and R bits) + into 14h (internal speaker on my machine). Mixed signal **ignores** the mute + setting on 14h and is present whenever 14h is configured as an output. +
+
+Path diagrams
+====================
+
+1Ah input selection (DIV is the PC Beep divider set on NID 01h)::
+
All Realtek HDA codecs have a vendor-defined widget with node ID 20h which provides access to a bank of registers that control various codec functions. Registers are read and written via the standard HDA processing coefficient verbs (Set/Get Coefficient Index, Set/Get Processing Coefficient). The node is named "Realtek Vendor Registers" in public datasheets' verb listings and, apart from that, is entirely undocumented.

This particular register, exposed at coefficient 0x36 and named in commits from Realtek, is of note: unlike most registers, which seem to control detailed amplifier parameters not in scope of the HDA specification, it controls audio routing which could just as easily have been defined using standard HDA mixer and selector widgets.

Specifically, it selects between two sources for the input pin widget with Node ID (NID) 1Ah: the widget's signal can come either from an audio jack (on my laptop, a Dell XPS 13 9350, it's the headphone jack, but comments in Realtek commits indicate that it might be a Line In on some machines) or from the PC Beep line (which is itself multiplexed between the codec's internal beep generator and external PCBEEP pin, depending on if the beep generator is enabled via verbs on NID 01h). Additionally, it can mix (with optional amplification) that signal onto the 21h and/or 14h output pins.

The register's reset value is 0x3717, corresponding to PC Beep on 1Ah that is then amplified and mixed into both the headphones and the speakers. Not only does this violate the HDA specification, which says that "[a vendor defined
Unfortunately, there are lots of ways to get this register configuration wrong. Linux, it seems, has gone through most of them. For one, the register resets after S3 suspend: judging by existing code, this isn't the case for all vendor registers, and it's led to some fixes that improve behavior on cold boot but don't last after suspend. Other fixes have successfully switched the 1Ah input away from PC Beep but have failed to disable both loopback paths. On my machine, this means that the headphone input is amplified and looped back to the headphone output, which uses the exact same pins! As you might expect, this causes terrible headphone noise, the character of which is controlled by the 1Ah boost control. (If you've seen instructions online to fix XPS 13 headphone noise by changing "Headphone Mic Boost" in ALSA, now you know why.)

The information here has been obtained through black-box reverse engineering of the ALC256 codec's behavior and is not guaranteed to be correct. It likely also applies for the ALC255, ALC257, ALC235, and ALC236, since those codecs seem to be close relatives of the ALC256. (They all share one initialization function.) Additionally, other codecs like the ALC225 and ALC285 also have this register, judging by existing fixups in `patch_realtek.c`, but specific data (e.g. node IDs, bit positions, pin mappings) for those codecs may differ from what I've described here.

--- linux-4.15.0.orig/Documentation/speculation.txt
+++ linux-4.15.0/Documentation/speculation.txt
@@ -0,0 +1,90 @@
This document explains potential effects of speculation, and how undesirable effects can be mitigated portably using common APIs.
+
+==========
+Speculation
+
+To improve performance and minimize average latencies, many contemporary CPUs employ speculative execution techniques such as branch prediction, performing work which may be discarded at a later stage.
+
+Typically speculative execution cannot be observed from architectural state, such as the contents of registers. However, in some cases it is possible to observe its impact on microarchitectural state, such as the presence or absence of data in caches. Such state may form side-channels which can be observed to extract secret information.
+
+For example, in the presence of branch prediction, it is possible for bounds checks to be ignored by code which is speculatively executed. Consider the
+following code:
+
+int load_array(int *array, unsigned int index)
+{
+    if (index >= MAX_ARRAY_ELEMS)
+        return 0;
+    else
+        return array[index];
+}
+
+Which, on arm64, may be compiled to an assembly sequence such as:
+
+CMP <index>, #MAX_ARRAY_ELEMS
+B.LT less
+MOV <returnval>, #0
+RET
+  less:
+LDR <returnval>, [<array>, <index>]
+RET
+
+It is possible that a CPU mis-predicts the conditional branch, and
+speculatively loads array[index], even if index >= MAX_ARRAY_ELEMS. This
+value will subsequently be discarded, but the speculated load may affect
+microarchitectural state which can be subsequently measured.
+
+More complex sequences involving multiple dependent memory accesses may
+result in sensitive information being leaked. Consider the following
+code, building on the prior example:
+
+int load_dependent_arrays(int *arr1, int *arr2, int index)
+{
+    int val1, val2,
+    +val1 = load_array(arr1, index);
+    +val2 = load_array(arr2, val1);
+    +
+    +return val2;
+}
+
+Under speculation, the first call to load_array() may return the value
+of an out-of-bounds address, while the second call will influence
+microarchitectural state dependent on this value. This may provide an
+arbitrary read primitive.
+
+====================================
+Mitigating speculation side-channels
+====================================
The kernel provides a generic API to ensure that bounds checks are respected even under speculation. Architectures which are affected by speculation-based side-channels are expected to implement these primitives.

The array_index_nospec() helper in <linux/nospec.h> can be used to prevent information from being leaked via side-channels.

A call to array_index_nospec(index, size) returns a sanitized index value that is bounded to \([0, size)\) even under cpu speculation conditions.

This can be used to protect the earlier load_array() example:

```c
int load_array(int *array, unsigned int index)
{
    if (index >= MAX_ARRAY_ELEMS)
        return 0;
    else {
        index = array_index_nospec(index, MAX_ARRAY_ELEMS);
        return array[index];
    }
}
```

--- linux-4.15.0.orig/Documentation/sphinx/kerneldoc.py
+++ linux-4.15.0/Documentation/sphinx/kerneldoc.py
@@ -36,9 +36,20 @@
 from docutils import nodes, statemachine
 from docutils.statemachine import ViewList
-from docutils.parsers.rst import directives
-from sphinx.util.compat import Directive
-from sphinx.ext.autodoc import AutodocReporter
+from docutils.parsers.rst import directives, Directive
+
+# AutodocReporter is only good up to Sphinx 1.7
+#
+import sphinx
+
+Use_SSI = sphinx.__version__[:3] >= '1.7'
+if Use_SSI:
+    from sphinx.util.docutils import switch_source_input
+else:
+    from sphinx.ext.autodoc import AutodocReporter
+
+__version__ = '1.0'
cmd += [filename]

try:
    - env.app.verbose('calling kernel-doc \%s' % (' '.join(cmd)))
    + kernellog.verbose(env.app, 'calling kernel-doc \%s' % (' '.join(cmd)))
    
    p = subprocess.Popen(cmd, stdout=subprocess.PIPE, stderr=subprocess.PIPE)
    out, err = p.communicate()

if p.returncode != 0:
    sys.stderr.write(err)
    - env.app.warn('kernel-doc \%s failed with return code %d' % (' '.join(cmd), p.returncode))
    + kernellog.warn(env.app, 'kernel-doc \%s failed with return code %d' % (' '.join(cmd), p.returncode))
    
    return [nodes.error(None, nodes.paragraph(text = "kernel-doc missing"))]

elif env.config.kerneldoc_verbosity > 0:
    sys.stderr.write(err)

node = nodes.section()

- buf = self.state.memo.title_styles, self.state.memo.section_level, self.state.memo.reporter
+ self.do_parse(result, node)
+
+ return node.children
+
+ except Exception as e:  # pylint: disable=W0703
+     kernellog.warn(env.app, 'kernel-doc \%s\' processing failed with: %s' % (' '.join(cmd), str(e)))
+     return [nodes.error(None, nodes.paragraph(text = "kernel-doc missing"))]
+
+ def do_parse(self, result, node):
+     if Use_SSI:
+         with switch_source_input(self.state, result):
+             self.state.nested_parse(result, 0, node, match_titles=1)
+     else:
+         save = self.state.memo.title_styles, self.state.memo.section_level, self.state.memo.reporter
+         self.state.memo.reporter = AutodocReporter(result, self.state.memo.reporter)
+         self.state.memo.title_styles, self.state.memo.section_level = [], 0
+         try:
+             self.state.nested_parse(result, 0, node, match_titles=1)
+         finally:
+             self.state.memo.title_styles, self.state.memo.section_level, self.state.memo.reporter = buf
return node.children
self.state.memo.title_styles, self.state.memo.section_level, self.state.memo.reporter = save

except Exception as e:  # pylint: disable=W0703
    env.app.warn('kernel-doc %s\ processing failed with: %s' %
    (' '.join(cmd), str(e)))
    return [nodes.error(None, nodes.paragraph(text = "kernel-doc missing"))]

def setup(app):
    app.add_config_value('kerneldoc_bin', None, 'env')
    --- linux-4.15.0.orig/Documentation/sphinx/kernellog.py
    +++ linux-4.15.0/Documentation/sphinx/kernellog.py
    @@ -0,0 +1,28 @@
    +# SPDX-License-Identifier: GPL-2.0
    +#
    +# Sphinx has deprecated its older logging interface, but the replacement
    +# only goes back to 1.6. So here's a wrapper layer to keep around for
    +# as long as we support 1.4.
    +#
    +import sphinx
    +
    +# sphinx.__version__[:3] >= '1.6':
    + UseLogging = True
    + from sphinx.util import logging
    + logger = logging.getLogger('kerneldoc')
    +else:
    + UseLogging = False
    +
    +def warn(app, message):
    + if UseLogging:
    + logger.warning(message)
    + else:
    + app.warn(message)
    +
    +def verbose(app, message):
    + if UseLogging:
    + logger.verbose(message)
    + else:
    + app.verbose(message)
    +
    --- linux-4.15.0.orig/Documentation/sphinx/kfigure.py
    +++ linux-4.15.0/Documentation/sphinx/kfigure.py
    @@ -60,6 +60,8 @@
    from sphinx.util.nodes import clean_astext
    from six import iteritems
    +import kernellog

from sphinx.util.nodes import clean_astext
from six import iteritems

+import kernellog
PY3 = sys.version_info[0] == 3

if PY3:
    @ @ -171,20 +173,20 @@
        This function is called once, when the builder is initiated.
        
        global dot_cmd, convert_cmd  # pylint: disable=W0603
        -    app.verbose("kfigure: check installed tools ...")
        +    kernellog.verbose(app, "kfigure: check installed tools ...")

        dot_cmd = which('dot')
        convert_cmd = which('convert')

        if dot_cmd:
            -    app.verbose("use dot(1) from: " + dot_cmd)
            +    kernellog.verbose(app, "use dot(1) from: " + dot_cmd)
        else:
            -    app.warn("dot(1) not found, for better output quality install "
            -    "graphviz from http://www.graphviz.org")
            +    kernellog.warn(app, "dot(1) not found, for better output quality install "
            +    "graphviz from http://www.graphviz.org")
            if convert_cmd:
                -    app.verbose("use convert(1) from: " + convert_cmd)
                +    kernellog.verbose(app, "use convert(1) from: " + convert_cmd)
            else:
                -    app.warn(
                +    kernellog.warn(app,
                "convert(1) not found, for SVG to PDF conversion install "
                "ImageMagick (https://www.imagemagick.org")

        @ @ -220,12 +222,13 @@

        # in kernel builds, use 'make SPHINXOPTS=-v' to see verbose messages

        -    app.verbose('assert best format for: ' + img_node['uri'])
        +    kernellog.verbose(app, 'assert best format for: ' + img_node['uri'])

        if in_ext == '.dot':

            if not dot_cmd:
                -    app.verbose("dot from graphviz not available / include DOT raw.")
                +    kernellog.verbose(app, 
                +    "dot from graphviz not available / include DOT raw.")
                img_node.replace_self(file2literal(src_fname))

                elif translator.builder.format == 'latex':
        @ @ -252,7 +255,8 @@
if translator.builder.format == 'latex':
    if convert_cmd is None:
        - app.verbose("no SVG to PDF conversion available / include SVG raw.")
+       kernellog.verbose(app,
+                         "no SVG to PDF conversion available / include SVG raw.")
        img_node.replace_self(file2literal(src_fname))
    else:
        dst_fname = path.join(translator.builder.outdir, fname + '.pdf')
@@ -265,18 +269,19 @@
    _name = dst_fname[len(translator.builder.outdir) + 1:]
    if isNewer(dst_fname, src_fname):
        - app.verbose("convert: {out}/%s already exists and is newer" % _name)
+       kernellog.verbose(app,
+                          "convert: {out}/%s already exists and is newer" % _name)
    else:
        ok = False
        mkdir(path.dirname(dst_fname))

    if in_ext == '.dot':
        - app.verbose('convert DOT to: {out}/' + _name)
+       kernellog.verbose(app, 'convert DOT to: {out}/' + _name)
        ok = dot2format(app, src_fname, dst_fname)
    elif in_ext == '.svg':
        - app.verbose('convert SVG to: {out}/' + _name)
+       kernellog.verbose(app, 'convert SVG to: {out}/' + _name)
        ok = svg2pdf(app, src_fname, dst_fname)

    if not ok:
@@ -305,7 +310,8 @@
        with open(out_fname, "w") as out:
            exit_code = subprocess.call(cmd, stdout = out)
            if exit_code != 0:
-            app.warn("Error #%d when calling: %s" % (exit_code, " ".join(cmd)))
+            kernellog.warn(app,
+                            "Error #%d when calling: %s" % (exit_code, " ".join(cmd)))
            return bool(exit_code == 0)

    def svg2pdf(app, svg_fname, pdf_fname):
@@ -322,7 +328,7 @@
        # use stdout and stderr from parent
        exit_code = subprocess.call(cmd)
        if exit_code != 0:
-        app.warn("Error #%d when calling: %s" % (exit_code, " ".join(cmd)))
+        kernellog.warn(app, "Error #%d when calling: %s" % (exit_code, " ".join(cmd)))
        return bool(exit_code == 0)
return bool(exit_code == 0)

@@ -415,15 +421,15 @@
    app = self.builder.app
    srclang = node.get('srclang')

-app.verbose(visit kernel-render node lang: "%s" % (srclang))
+kernellog.verbose(app, 'visit kernel-render node lang: "%s" % (srclang))

    tmp_ext = RENDER_MARKUP_EXT.get(srclang, None)
    if tmp_ext is None:
        - app.verbose('kernel-render node lang: "%s" unknow / include raw.' % (srclang))
+        kernellog.warn(app, 'kernel-render node lang: "%s" unknow / include raw.' % (srclang))
        return

    if not dot_cmd and tmp_ext == '.dot':
        - app.verbose("dot from graphviz not available / include raw.")
+        kernellog.verbose(app, "dot from graphviz not available / include raw.")
        return

    literal_block = node[0]
--- linux-4.15.0.orig/Documentation/sphinx/parse-headers.pl
+++ linux-4.15.0/Documentation/sphinx/parse-headers.pl
@@ -1,4 +1,4 @@
-#!/usr/bin/perl
+#!/usr/bin/env perl
use strict;
use Text::Tabs;
use Getopt::Long;
--- linux-4.15.0.orig/Documentation/sysctl/fs.txt
+++ linux-4.15.0/Documentation/sysctl/fs.txt
@@ -34,7 +34,9 @@
- overflowgid
- pipe-user-pages-hard
- pipe-user-pages-soft
+ protected_fifos
- protected_hardlinks
+ protected_regular
- protected_symlinks
- suid_dumpable
- super-max
@@ -182,6 +184,24 @@
+protected_fifos:
+
=====================================================================

+protected_fifos:
+The intent of this protection is to avoid unintentional writes to
+an attacker-controlled FIFO, where a program expected to create a regular
+file.
+
+When set to "0", writing to FIFOs is unrestricted.
+
+When set to "1" don't allow O_CREAT open on FIFOs that we don't own
+in world writable sticky directories, unless they are owned by the
+owner of the directory.
+
+When set to "2" it also applies to group writable sticky directories.
+
+This protection is based on the restrictions in Openwall.
+
+==============================================================
+
+protected_hardlinks:

A long-standing class of security issues is the hardlink-based
@@ -202,6 +222,22 @@

==============================================================
+
+protected_regular:
+
+This protection is similar to protected_fifos, but it
+avoids writes to an attacker-controlled regular file, where a program
+expected to create one.
+
+When set to "0", writing to regular files is unrestricted.
+
+When set to "1" don't allow O_CREAT open on regular files that we
+don't own in world writable sticky directories, unless they are
+owned by the owner of the directory.
+
+When set to "2" it also applies to group writable sticky directories.
+
+==============================================================
+
+protected_symlinks:

A long-standing class of security issues is the symlink-based
--- linux-4.15.0.orig/Documentation=sysctl/net.txt
+++ linux-4.15.0/Documentation=sysctl/net.txt
@@ -91,6 +91,14 @@
0 - disable JIT kallsyms export (default value)
1 - enable JIT kallsyms export for privileged users only
+bpf_jit_limit
+-----------
+
+This enforces a global limit for memory allocations to the BPF JIT
+compiler in order to reject unprivileged JIT requests once it has
+been surpassed. bpf_jit_limit contains the value of the global limit
+in bytes.
+
dev_weight
-----------

--- linux-4.15.0.orig/Documentation/target/tcm_mod_builder.py
+++ linux-4.15.0/Documentation/target/tcm_mod_builder.py
@@ -1,4 +1,4 @@
-#!/usr/bin/python
+#!/usr/bin/env python
+# The TCM v4 multi-protocol fabric module generation script for drivers/target/$NEW_MOD
#
+# Copyright (c) 2010 Rising Tide Systems
--- linux-4.15.0.orig/Documentation/trace/postprocess/decode_msr.py
+++ linux-4.15.0/Documentation/trace/postprocess/decode_msr.py
@@ -1,4 +1,4 @@
-#!/usr/bin/python
+#!/usr/bin/env python
+# add symbolic names to read_msr / write_msr in trace
# decode_msr msr-index.h < trace
import sys
--- linux-4.15.0.orig/Documentation/trace/postprocess/trace-pagealloc-postprocess.pl
+++ linux-4.15.0/Documentation/trace/postprocess/trace-pagealloc-postprocess.pl
@@ -1,4 +1,4 @@
-#!/usr/bin/perl
+#!/usr/bin/env perl
+# This is a POC (proof of concept or piece of crap, take your pick) for reading the
# text representation of trace output related to page allocation. It makes an attempt
# to extract some high-level information on what is going on. The accuracy of the parser
--- linux-4.15.0.orig/Documentation/trace/postprocess/trace-vmscan-postprocess.pl
+++ linux-4.15.0/Documentation/trace/postprocess/trace-vmscan-postprocess.pl
@@ -1,4 +1,4 @@
-#!/usr/bin/perl
+#!/usr/bin/env perl
+# This is a POC for reading the text representation of trace output related to
# page reclaim. It makes an attempt to extract some high-level information on
# what is going on. The accuracy of the parser may vary
--- linux-4.15.0.orig/Documentation/userspace-api/index.rst
+++ linux-4.15.0/Documentation/userspace-api/index.rst
@@ -19,6 +19,7 @@
no_new_privs
seccomp_filter
Speculation Control

Quite some CPUs have speculation-related misfeatures which are in fact vulnerabilities causing data leaks in various forms even across privilege domains.

The kernel provides mitigation for such vulnerabilities in various forms. Some of these mitigations are compile-time configurable and some can be supplied on the kernel command line.

There is also a class of mitigations which are very expensive, but they can be restricted to a certain set of processes or tasks in controlled environments. The mechanism to control these mitigations is via :manpage:`prctl(2)`.

There are two prctl options which are related to this:

+ * PR_GET_SPECULATION_CTRL
+ * PR_SET_SPECULATION_CTRL

PR_GET_SPECULATION_CTRL
-----------------------

PR_GET_SPECULATION_CTRL returns the state of the speculation misfeature which is selected with arg2 of prctl(2). The return value uses bits 0-3 with the following meaning:

<table>
<thead>
<tr>
<th>Bit</th>
<th>Define</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>PR_SPEC_PRCTL</td>
<td>Mitigation can be controlled per task by</td>
</tr>
<tr>
<td>1</td>
<td>PR_SPEC_ENABLE</td>
<td>The speculation feature is enabled, mitigation is disabled.</td>
</tr>
<tr>
<td>2</td>
<td>PR_SPEC_DISABLE</td>
<td>The speculation feature is disabled, mitigation is enabled.</td>
</tr>
<tr>
<td>3</td>
<td>PR_SPEC_FORCE_DISABLE</td>
<td>Same as PR_SPEC_DISABLE, but cannot be undone. A</td>
</tr>
</tbody>
</table>

.. only:: subproject and html

---

---

---

+++ linux-4.15.0/Documentation/userspace-api/spec_ctrl.rst
@ @ -0,0 +1,105 @@
subsequent prctl(..., PR_SPEC_ENABLE) will fail.

If all bits are 0 the CPU is not affected by the speculation misfeature.

If PR_SPEC_PRCTL is set, then the per-task control of the mitigation is available. If not set, prctl(PR_SET_SPECULATION_CTRL) for the speculation misfeature will fail.

.. _set_spec_ctrl:

PR_SET_SPECULATION_CTRL

PR_SET_SPECULATION_CTRL allows to control the speculation misfeature, which is selected by arg2 of :manpage:`prctl(2)` per task. arg3 is used to hand in the control value, i.e. either PR_SPEC_ENABLE or PR_SPEC_DISABLE or PR_SPEC_FORCE_DISABLE.

Common error codes

<table>
<thead>
<tr>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINVAL</td>
<td>The prctl is not implemented by the architecture or unused prctl(2) arguments are not 0.</td>
</tr>
<tr>
<td>ENODEV</td>
<td>arg2 is selecting a not supported speculation misfeature.</td>
</tr>
</tbody>
</table>

PR_SET_SPECULATION_CTRL error codes

<table>
<thead>
<tr>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Success</td>
</tr>
<tr>
<td>ERANGE</td>
<td>arg3 is incorrect, i.e. it's neither PR_SPEC_ENABLE nor PR_SPEC_DISABLE nor PR_SPEC_FORCE_DISABLE.</td>
</tr>
<tr>
<td>ENXIO</td>
<td>Control of the selected speculation misfeature is not possible. See PR_GET_SPECULATION_CTRL.</td>
</tr>
<tr>
<td>EPERM</td>
<td>Speculation was disabled with PR_SPEC_FORCE_DISABLE and caller tried to enable it again.</td>
</tr>
</tbody>
</table>

Speculation misfeature controls
PR_SPEC_STORE_BYPASS: Speculative Store Bypass

Invocations:
- prctl(PR_GET_SPECULATION_CTRL, PR_SPEC_STORE_BYPASS, 0, 0, 0);
- prctl(PR_SET_SPECULATION_CTRL, PR_SPEC_STORE_BYPASS, PR_SPEC_ENABLE, 0, 0);
- prctl(PR_SET_SPECULATION_CTRL, PR_SPEC_STORE_BYPASS, PR_SPEC_DISABLE, 0, 0);
- prctl(PR_SET_SPECULATION_CTRL, PR_SPEC_STORE_BYPASS, PR_SPEC_FORCE_DISABLE, 0, 0);

PR_SPEC_INDIR_BRANCH: Indirect Branch Speculation in User Processes
(Mitigate Spectre V2 style attacks against user processes)

Invocations:
- prctl(PR_GET_SPECULATION_CTRL, PR_SPEC_INDIRECT_BRANCH, 0, 0, 0);
- prctl(PR_SET_SPECULATION_CTRL, PR_SPEC_INDIRECT_BRANCH, PR_SPEC_ENABLE, 0, 0);
- prctl(PR_SET_SPECULATION_CTRL, PR_SPEC_INDIRECT_BRANCH, PR_SPEC_DISABLE, 0, 0);
- prctl(PR_SET_SPECULATION_CTRL, PR_SPEC_INDIRECT_BRANCH, PR_SPEC_FORCE_DISABLE, 0, 0);

Vendor drivers are expected to be fully asynchronous in this respect or provide their own internal resource protection.

The callbacks in the mdev_parent_ops structure are as follows:

- open: open callback of mediated device

- VM ioctls: These query and set attributes that affect an entire virtual machine, for example memory layout. In addition a VM ioctl is used to create virtual cpus (vcpus).
  - create virtual cpus (vcpus) and devices.
    - Only run VM ioctls from the same process (address space) that was used to create the VM.

- device ioctls: These query and set attributes that control the operation
of a single device.

device ioctls must be issued from the same process (address space) that was used to create the VM.

2. File descriptors
-------------------

open("/dev/kvm") obtains a handle to the kvm subsystem; this handle can be used to issue system ioctls. A KVM_CREATE_VM ioctl on this handle will create a VM file descriptor which can be used to issue VM -ioctls. A KVM_CREATE_VCPU ioctl on a VM fd will create a virtual cpu -and return a file descriptor pointing to it. Finally, ioctls on a vcpu -fd can be used to control the vcpu, including the important task of -actually running guest code.

+ioctls. A KVM_CREATE_VCPU or KVM_CREATE_DEVICE ioctl on a VM fd will +create a virtual cpu or device and return a file descriptor pointing to +the new resource. Finally, ioctls on a vcpu or device fd can be used +to control the vcpu or device. For vcpus, this includes the important +task of actually running guest code.

In general file descriptors can be migrated among processes by means of fork() and the SCM_RIGHTS facility of unix domain socket. These

-4.3 KVM_GET_MSR_INDEX_LIST
+4.3 KVM_GET_MSR_INDEX_LIST, KVM_GET_MSR_FEATURE_INDEX_LIST

-Capability: basic
+Capability: basic, KVM_CAP_GET_MSR_FEATURES for KVM_GET_MSR_FEATURE_INDEX_LIST
Architectures: x86
-Type: system ioctl
Parameters: struct kvm_msr_list (in/out)
Returns: 0 on success; -1 on error
Errors:
+ EFAULT: the msr index list cannot be read from or written to
E2BIG: the msr index list is to be to fit in the array specified by the user.

-Todo: This ioctl returns the guest msrs that are supported. The list varies
-by kvm version and host processor, but does not change otherwise. The
-user fills in the size of the indices array in nmsrs, and in return
-kvm adjusts nmsrs to reflect the actual number of msrs and fills in
-the indices array with their numbers.
+The user fills in the size of the indices array in nmsrs, and in return
+kvm adjusts nmsrs to reflect the actual number of msrs and fills in the
+indices array with their numbers.
+
+KVM_GET_MSR_INDEX_LIST returns the guest msrs that are supported. The list
+varies by kvm version and host processor, but does not change otherwise.

Note: if kvm indicates supports MCE (KVM_CAP_MCE), then the MCE bank MSRs are
not returned in the MSR list, as different vcpus can have a different number
of banks, as set via the KVM_X86_SETUP_MCE ioctl.

+KVM_GET_MSR_FEATURE_INDEX_LIST returns the list of MSRs that can be passed
+to the KVM_GET_MSRS system ioctl. This lets userspace probe host capabilities
+and processor features that are exposed via MSRs (e.g., VMX capabilities).
+This list also varies by kvm version and host processor, but does not change
+otherwise.
+
4.4 KVM_CHECK_EXTENSION

@@ -475,14 +489,22 @@

4.18 KVM_GET_MSRS

-Capability: basic
+Capability: basic (vcpu), KVM_CAP_GET_MSR_FEATURES (system)
Architectures: x86
-Type: vcpu ioctl
+Type: system ioctl, vcpu ioctl
Parameters: struct kvm_msrs (in/out)
-Returns: 0 on success, -1 on error
+Returns: number of msrs successfully returned;
+ -1 on error
+
+When used as a system ioctl:
+Reads the values of MSR-based features that are available for the VM. This
+is similar to KVM_GET_SUPPORTED_CPUID, but it returns MSR indices and values.
+The list of msr-based features can be obtained using KVM_GET_MSR_FEATURE_INDEX_LIST
+in a system ioctl.

+When used as a vcpu ioctl:
Reads model-specific registers from the vcpu. Supported msr indices can
-be obtained using KVM_GET_MSR_INDEX_LIST.
+be obtained using KVM_GET_MSR_INDEX_LIST in a system ioctl.
### struct kvm_msr

```c
struct kvm_msr {
    __u32 nmsrs; /* number of msrs in entries */
    @@ -1841,6 +1863,7 @@
        PPC | KVM_REG_PPC_DBSR         | 32
       PPC | KVM_REG_PPC_TIDR            | 64
       PPC | KVM_REG_PPC_PSSCR           | 64
+  PPC | KVM_REG_PPC_DEC_EXPIRY      | 64
       PPC | KVM_REG_PPC_TM_GPR0         | 64
            ...
       PPC | KVM_REG_PPC_TM_GPR31        | 64
@@ -1943,6 +1966,9 @@
    ARM 64-bit FP registers have the following id bit patterns:
        0x4030 0000 0012 0 <regno:12>
+ARM firmware pseudo-registers have the following bit pattern:
+  0x4030 0000 0014 <regno:16>
+  
+arm64 registers are mapped using the lower 32 bits. The upper 16 of
that is the register group type, or coprocessor number:
@@ -1959,6 +1985,9 @@
    arm64 system registers have the following id bit patterns:
        0x6030 0000 0013 <op0:2> <op1:3> <crn:4> <crm:4> <op2:3>
+arm64 firmware pseudo-registers have the following bit pattern:
+  0x6030 0000 0014 <regno:16>
+ 
MIPS registers are mapped using the lower 32 bits. The upper 16 of that is
the register group type:
@@ -2493,7 +2522,8 @@
    and execute guest code when KVM_RUN is called.
- KVM_ARM_VCPU_EL1_32BIT: Starts the CPU in a 32bit mode.
- Depends on KVM_CAP_ARM_EL1_32BIT (arm64 only).
-- KVM_ARM_VCPU_PSCI_0_2: Emulate PSCI v0.2 for the CPU.
+ KVM_ARM_VCPU_PSCI_0_2: Emulate PSCI v0.2 (or a future revision
+     backward compatible with v0.2) for the CPU.
    + Depends on KVM_CAP_ARM_PSCI_0_2.
    - KVM_ARM_VCPU_PMU_V3: Emulate PMUv3 for the CPU.
    + Depends on KVM_CAP_ARM_PMU_V3.
@@ -3766,9 +3796,11 @@
    #define KVM_EXIT_HYPERV_SYNIC       1
    #define KVM_EXIT_HYPERV_HCALL       2
    __u32 type;
+    __u32 pad1;
    union {
        struct {
            __u32 msr;
```
KVM implements the PSCI (Power State Coordination Interface) specification in order to provide services such as CPU on/off, reset and power-off to the guest.

The PSCI specification is regularly updated to provide new features, and KVM implements these updates if they make sense from a virtualization point of view.

This means that a guest booted on two different versions of KVM can observe two different "firmware" revisions. This could cause issues if a given guest is tied to a particular PSCI revision (unlikely), or if a migration causes a different PSCI version to be exposed out of the blue to an unsuspecting guest.

In order to remedy this situation, KVM exposes a set of "firmware pseudo-registers" that can be manipulated using the GET/SET_ONE_REG interface. These registers can be saved/restored by userspace, and set to a convenient value if required.

The following register is defined:

`KVM_REG_ARM_PSCI_VERSION`:

- Only valid if the vcpu has the KVM_ARM_VCPU_PSCI_0_2 feature set (and thus has already been initialized)
- Returns the current PSCI version on GET_ONE_REG (defaulting to the highest PSCI version implemented by KVM and compatible with v0.2)
- Allows any PSCI version implemented by KVM and compatible with v0.2 to be set with SET_ONE_REG
- Affects the whole VM (even if the register view is per-vcpu)
per-cpu warps are expected in kvmclock.

--- linux-4.15.0.org/Documentation/virtual/kvm/devices/vm.txt
+++ linux-4.15.0/Documentation/virtual/kvm/devices/vm.txt
@@ -141,7 +141,8 @@
    u8 pcc[16];           # valid with Message-Security-Assist-Extension 4
    u8 pno[16];           # valid with Message-Security-Assist-Extension 5
    u8 kma[16];           # valid with Message-Security-Assist-Extension 8
   - u8 reserved[1808];    # reserved for future instructions
   + u8 kdsa[16];          # valid with Message-Security-Assist-Extension 9
   + u8 reserved[1792];    # reserved for future instructions
;
Parameters: address of a buffer to load the subfunction blocks from.

--- linux-4.15.0.org/Documentation/virtual/kvm/locking.txt
+++ linux-4.15.0/Documentation/virtual/kvm/locking.txt
@@ -15,8 +15,6 @@
On x86, vcpu->mutex is taken outside kvm->arch.hyperv.hv_lock.

-For spinlocks, kvm_lock is taken outside kvm->mmu_lock.

- Everything else is a leaf: no other lock is taken inside the critical sections.

@@ -169,7 +167,7 @@
------------
Name: kvm_lock
- Type: spinlock_t
+ Type: mutex
Arch: any
Protects: - vm_list

--- linux-4.15.0.org/Documentation/virtual/kvm/mmu.txt
+++ linux-4.15.0/Documentation/virtual/kvm/mmu.txt
@@ -152,8 +152,8 @@
shadow pages) so role.quadrant takes values in the range 0..3. Each quadrant maps 1GB virtual address space.
role.access:
- Inherited guest access permissions in the form uwx. Note execute
- permission is positive, not negative.
+ Inherited guest access permissions from the parent ptes in the form uwx.
+ Note execute permission is positive, not negative.
role.invalid:
The page is invalid and should not be used. It is a root page that is currently pinned (by a cpu hardware register pointing to it); once it is

--- linux-4.15.0.org/Documentation/virtual/kvm/msr.txt
when asynchronous page faults are enabled on the vcpu 0 when
disabled. Bit 1 is 1 if asynchronous page faults can be injected
when vcpu is in cpl == 0. Bit 2 is 1 if asynchronous page faults
are delivered to L1 as #PF vmexits.
+are delivered to L1 as #PF vmexits. Bit 2 can be set only if
+KVM_FEATURE_ASYNC_PF_VMEXIT is present in CPUID.

First 4 byte of 64 byte memory location will be written to by
the hypervisor at the time of asynchronous page fault (APF)
--- linux-4.15.0.org/Documentation/x86/conf.py
+++ linux-4.15.0/Documentation/x86/conf.py
@@ -0,0 +1,10 @@
+# -*- coding: utf-8; mode: python -*-
+
+project = "X86 architecture specific documentation"
+
+tags.add("subproject")
+
+latex_documents = [
+   ('index', 'x86.tex', project,
+    'The kernel development community', 'manual'),
+]
--- linux-4.15.0.org/Documentation/x86/index.rst
+++ linux-4.15.0/Documentation/x86/index.rst
@@ -0,0 +1,9 @@
+==========================
+x86 architecture specifics
+==========================
+
+.. toctree::
+   :maxdepth: 1
+
+   mds
+   tsx_async_abort
+--- linux-4.15.0.org/Documentation/x86/mds.rst
+++ linux-4.15.0/Documentation/x86/mds.rst
@@ -0,0 +1,193 @@
+Microarchitectural Data Sampling (MDS) mitigation
+=================================================================================================
+
+.. _mds:
+
+Overview
+--------
+
+Microarchitectural Data Sampling (MDS) is a family of side channel attacks
on internal buffers in Intel CPUs. The variants are:

- Microarchitectural Store Buffer Data Sampling (MSBDS) (CVE-2018-12126)
- Microarchitectural Fill Buffer Data Sampling (MFBDS) (CVE-2018-12130)
- Microarchitectural Load Port Data Sampling (MLPDS) (CVE-2018-12127)
- Microarchitectural Data Sampling Uncacheable Memory (MDSUM) (CVE-2019-11091)

MSBDS leaks Store Buffer Entries which can be speculatively forwarded to a dependent load (store-to-load forwarding) as an optimization. The forward can also happen to a faulting or assisting load operation for a different memory address, which can be exploited under certain conditions. Store buffers are partitioned between Hyper-Threads so cross thread forwarding is not possible. But if a thread enters or exits a sleep state the store buffer is repartitioned which can expose data from one thread to the other.

MFBDS leaks Fill Buffer Entries. Fill buffers are used internally to manage L1 miss situations and to hold data which is returned or sent in response to a memory or I/O operation. Fill buffers can forward data to a load operation and also write data to the cache. When the fill buffer is deallocated it can retain the stale data of the preceding operations which can then be forwarded to a faulting or assisting load operation, which can be exploited under certain conditions. Fill buffers are shared between Hyper-Threads so cross thread leakage is possible.

MLPDS leaks Load Port Data. Load ports are used to perform load operations from memory or I/O. The received data is then forwarded to the register file or a subsequent operation. In some implementations the Load Port can contain stale data from a previous operation which can be forwarded to faulting or assisting loads under certain conditions, which again can be exploited eventually. Load ports are shared between Hyper-Threads so cross thread leakage is possible.

MDSUM is a special case of MSBDS, MFBDS and MLPDS. An uncacheable load from memory that takes a fault or assist can leave data in a microarchitectural structure that may later be observed using one of the same methods used by MSBDS, MFBDS or MLPDS.

Exposure assumptions

---------------------

It is assumed that attack code resides in user space or in a guest with one exception. The rationale behind this assumption is that the code construct needed for exploiting MDS requires:

- to control the load to trigger a fault or assist
- to have a disclosure gadget which exposes the speculatively accessed data for consumption through a side channel.
The existence of such a construct in the kernel cannot be excluded with 100% certainty, but the complexity involved makes it extremly unlikely.

There is one exception, which is untrusted BPF. The functionality of untrusted BPF is limited, but it needs to be thoroughly investigated whether it can be used to create such a construct.

Mitigation strategy
-------------------

All variants have the same mitigation strategy at least for the single CPU thread case (SMT off): Force the CPU to clear the affected buffers.

This is achieved by using the otherwise unused and obsolete VERW instruction in combination with a microcode update. The microcode clears the affected CPU buffers when the VERW instruction is executed.

For virtualization there are two ways to achieve CPU buffer clearing. Either the modified VERW instruction or via the L1D Flush command. The latter is issued when L1TF mitigation is enabled so the extra VERW can be avoided. If the CPU is not affected by L1TF then VERW needs to be issued.

If the VERW instruction with the supplied segment selector argument is executed on a CPU without the microcode update there is no side effect other than a small number of pointlessly wasted CPU cycles.

This does not protect against cross Hyper-Thread attacks except for MSBDS which is only exploitable cross Hyper-thread when one of the Hyper-Threads enters a C-state.

The kernel provides a function to invoke the buffer clearing:

    mds_clear_cpu_buffers()

The mitigation is invoked on kernel/userspace, hypervisor/guest and C-state (idle) transitions.

As a special quirk to address virtualization scenarios where the host has the microcode updated, but the hypervisor does not (yet) expose the MD_CLEAR CPUID bit to guests, the kernel issues the VERW instruction in the hope that it might actually clear the buffers. The state is reflected accordingly.
According to current knowledge additional mitigations inside the kernel itself are not required because the necessary gadgets to expose the leaked data cannot be controlled in a way which allows exploitation from malicious user space or VM guests.

Kernel internal mitigation modes

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>Mitigation is disabled. Either the CPU is not affected or mds=off is supplied on the kernel command line</td>
</tr>
<tr>
<td>full</td>
<td>Mitigation is enabled. CPU is affected and MD_CLEAR is advertised in CPUID.</td>
</tr>
<tr>
<td>vmwerv</td>
<td>Mitigation is enabled. CPU is affected and MD_CLEAR is not advertised in CPUID. That is mainly for virtualization scenarios where the host has the updated microcode but the hypervisor does not expose MD_CLEAR in CPUID. It's a best effort approach without guarantee.</td>
</tr>
</tbody>
</table>

If the CPU is affected and mds=off is not supplied on the kernel command line then the kernel selects the appropriate mitigation mode depending on the availability of the MD_CLEAR CPUID bit.

Mitigation points

1. Return to user space

   When transitioning from kernel to user space the CPU buffers are flushed on affected CPUs when the mitigation is not disabled on the kernel command line. The mitigation is enabled through the static key mds_user_clear.

   The mitigation is invoked in prepare_exit_to_usermode() which covers all but one of the kernel to user space transitions. The exception is when we return from a Non Maskable Interrupt (NMI), which is handled directly in do_nmi().

   (The reason that NMI is special is that prepare_exit_to_usermode() can enable IRQs. In NMI context, NMIs are blocked, and we don't want to enable IRQs with NMIs blocked.)
C-State transition

When a CPU goes idle and enters a C-State the CPU buffers need to be cleared on affected CPUs when SMT is active. This addresses the repartitioning of the store buffer when one of the Hyper-Threads enters a C-State.

When SMT is inactive, i.e. either the CPU does not support it or all sibling threads are offline CPU buffer clearing is not required.

The idle clearing is enabled on CPUs which are only affected by MSBDS and not by any other MDS variant. The other MDS variants cannot be protected against cross Hyper-Thread attacks because the Fill Buffer and the Load Ports are shared. So on CPUs affected by other variants, the idle clearing would be a window dressing exercise and is therefore not activated.

The invocation is controlled by the static key mds_idle_clear which is switched depending on the chosen mitigation mode and the SMT state of the system.

The buffer clear is only invoked before entering the C-State to prevent that stale data from the idling CPU from spilling to the Hyper-Thread sibling after the store buffer got repartitioned and all entries are available to the non idle sibling.

When coming out of idle the store buffer is partitioned again so each sibling has half of it available. The back from idle CPU could be then speculatively exposed to contents of the sibling. The buffers are flushed either on exit to user space or on VMENTER so malicious code in user space or the guest cannot speculatively access them.

The mitigation is hooked into all variants of halt()/mwait(), but does not cover the legacy ACPI IO-Port mechanism because the ACPI idle driver has been superseded by the intel_idle driver around 2010 and is preferred on all affected CPUs which are expected to gain the MD_CLEAR functionality in microcode. Aside of that the IO-Port mechanism is a legacy interface which is only used on older systems which are either not affected or do not receive microcode updates anymore.
Overview
--------

TSX Async Abort (TAA) is a side channel attack on internal buffers in some
Intel processors similar to Microarchitectural Data Sampling (MDS). In this
+case certain loads may speculatively pass invalid data to dependent operations
+when an asynchronous abort condition is pending in a Transactional
+Synchronization Extensions (TSX) transaction. This includes loads with no
+fault or assist condition. Such loads may speculatively expose stale data from
+the same uarch data structures as in MDS, with same scope of exposure i.e.
+same-thread and cross-thread. This issue affects all current processors that
+support TSX.

Mitigation strategy
-------------------

a) TSX disable - one of the mitigations is to disable TSX. A new MSR
+IA32_TSX_CTRL will be available in future and current processors after
+microcode update which can be used to disable TSX. In addition, it
+controls the enumeration of the TSX feature bits (RTM and HLE) in CPUID.
+b) Clear CPU buffers - similar to MDS, clearing the CPU buffers mitigates this
+vulnerability. More details on this approach can be found in

Kernel internal mitigation modes
--------------------------------

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>Mitigation is disabled. Either the CPU is not affected or tsx_async_abort=off is supplied on the kernel command line.</td>
</tr>
<tr>
<td>tsx disabled</td>
<td>Mitigation is enabled. TSX feature is disabled by default at bootup on processors that support TSX control.</td>
</tr>
<tr>
<td>verw</td>
<td>Mitigation is enabled. CPU is affected and MD_CLEAR is advertised in CPUID.</td>
</tr>
<tr>
<td>ucode needed</td>
<td>Mitigation is enabled. CPU is affected and MD_CLEAR is not advertised in CPUID. That is mainly for virtualization scenarios where the host has the updated microcode but the hypervisor does not expose MD_CLEAR in CPUID. It's a best effort approach without guarantee.</td>
</tr>
</tbody>
</table>

If the CPU is affected and the "tsx_async_abort" kernel command line parameter is
If not provided then the kernel selects an appropriate mitigation depending on the status of RTM and MD_CLEAR CPUID bits.

Below tables indicate the impact of tsx=on|off|auto cmdline options on state of TAA mitigation, VERW behavior and TSX feature for various combinations of MSR_IA32_ARCH_CAPABILITIES bits.

### 1. "tsx=off"

<table>
<thead>
<tr>
<th>MSR_IA32_ARCH_CAPABILITIES bits</th>
<th>TAA_NO</th>
<th>MDS_NO</th>
<th>TSX_CTRL_MSR</th>
<th>TSX state</th>
<th>VERW can clear</th>
<th>TAA mitigation after bootup</th>
<th>TAA mitigation CPU buffers</th>
<th>tsx_async_abort=off</th>
<th>tsx_async_abort=full</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0</td>
<td>HW default</td>
<td>Yes</td>
<td>Same as MDS</td>
<td>Same as MDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 1</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 0</td>
<td>HW default</td>
<td>No</td>
<td>Need ucode update</td>
<td>Need ucode update</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 1</td>
<td>Disabled</td>
<td>Yes</td>
<td>TSX disabled</td>
<td>TSX disabled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 X 1</td>
<td>Disabled</td>
<td>X</td>
<td>None needed</td>
<td>None needed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2. "tsx=on"

<table>
<thead>
<tr>
<th>MSR_IA32_ARCH_CAPABILITIES bits</th>
<th>TAA_NO</th>
<th>MDS_NO</th>
<th>TSX_CTRL_MSR</th>
<th>TSX state</th>
<th>VERW can clear</th>
<th>TAA mitigation after bootup</th>
<th>TAA mitigation CPU buffers</th>
<th>tsx_async_abort=off</th>
<th>tsx_async_abort=full</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0</td>
<td>HW default</td>
<td>Yes</td>
<td>Same as MDS</td>
<td>Same as MDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 1</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 0</td>
<td>HW default</td>
<td>No</td>
<td>Need ucode update</td>
<td>Need ucode update</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 1</td>
<td>Enabled</td>
<td>Yes</td>
<td>None</td>
<td>Same as MDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 X 1</td>
<td>Enabled</td>
<td>X</td>
<td>None needed</td>
<td>None needed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3. "tsx=auto"

<table>
<thead>
<tr>
<th>MSR_IA32_ARCH_CAPABILITIES bits</th>
<th>TAA_NO</th>
<th>MDS_NO</th>
<th>TSX_CTRL_MSR</th>
<th>TSX state</th>
<th>VERW can clear</th>
<th>TAA mitigation after bootup</th>
<th>TAA mitigation CPU buffers</th>
<th>tsx_async_abort=off</th>
<th>tsx_async_abort=full</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0</td>
<td>HW default</td>
<td>Yes</td>
<td>Same as MDS</td>
<td>Same as MDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 1</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td>Invalid case</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 0</td>
<td>HW default</td>
<td>No</td>
<td>Need ucode update</td>
<td>Need ucode update</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 1</td>
<td>Enabled</td>
<td>Yes</td>
<td>None</td>
<td>Same as MDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 X 1</td>
<td>Enabled</td>
<td>X</td>
<td>None needed</td>
<td>None needed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the tables, TSX_CTRL_MSR is a new bit in MSR_IA32_ARCH_CAPABILITIES that indicates whether MSR_IA32_TSX_CTRL is supported.

There are two control bits in IA32_TSX_CTRL MSR:

Bit 0: When set it disables the Restricted Transactional Memory (RTM) sub-feature of TSX (will force all transactions to abort on the XBEGIN instruction).

Bit 1: When set it disables the enumeration of the RTM and HLE feature (i.e. it will make CPUID(EAX=7).EBX[bit4] and CPUID(EAX=7).EBX[bit11] read as 0).
Virtual memory map with 5 level page tables:

- 0000000000000000 - 00ffffffffffffff (=56 bits) user space, different per mm
- hole caused by [56:63] sign extension
- ff00000000000000 - ff0ffffffffffffff (=52 bits) guard hole, reserved for hypervisor
- f1000000000000000 - f18ffffffffffffff (=55 bits) direct mapping of all phys. memory
- f9000000000000000 - f9ffffffffffffff (=52 bits) LDT remap for PTI
- ffa00000000000000 - ffd1ffffffffffffff (=54 bits) vmalloc/ioremap space (128000 TB)
- ffd20000000000000 - ffd3ffffffffffffff (=49 bits) hole
- ffd40000000000000 - ffd5ffffffffffffff (=49 bits) virtual memory map (512TB)
- unused hole ...
- ffd00000000000000 - fffecccccccccc (53 bits) kasan shadow memory (8PB)
- unused hole ...
- vaddr_end for KASLR

- fffecccccccccc - fffe7ffffffffffffff (=39 bits) cpu_entry_area mapping
- unused hole ...
- fffecccccccccc - fffe7ffffffffffffff (=39 bits) %esp fixup stacks
- unused hole ...
- fffecccccccccc - fffe7ffffffffffffff (=64 GB) EFI region mapping space
- unused hole ...
- fffecccccccccc - fffe7ffffffffffffff (=512 MB) kernel text mapping, from phys 0
- fffecccccccccc - fffe7ffffffffffffff (1520 MB) module mapping space
- [fixmap start] - fffecccccccccc - fffe7ffffffffffffff (variable)
- fffecccccccccc - fffe7ffffffffffffff (kernel-internal fixmap range)
- fffecccccccccc - fffe7ffffffffffffff (4 kB) legacy vsyscall ABI
- fffecccccccccc - fffe7ffffffffffffff (=2 MB) unused hole
+ Negative addresses such as "-23 TB" are absolute addresses in bytes, counted down
+ from the top of the 64-bit address space. It's easier to understand the layout
+ when seen both in absolute addresses and in distance-from-top notation.
+ For example 0xffffffff0000000000 == -23 TB, it's 23 TB lower than the top of the
+ 64-bit address space (ffffffffffffff).
+ Note that as we get closer to the top of the address space, the notation changes
+ from TB to GB and then MB/KB.
+ - "16M TB" might look weird at first sight, but it's an easier to visualize size
+ notation than "16 EB", which few will recognize at first sight as 16 exabytes.
It also shows it nicely how incredibly large 64-bit address space is.

---

<table>
<thead>
<tr>
<th>Start addr</th>
<th>Offset</th>
<th>End addr</th>
<th>Size</th>
<th>VM area description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000000000000000</td>
<td>0</td>
<td>0000000000000000</td>
<td>128 TB</td>
<td>user-space virtual memory, different per mm</td>
</tr>
<tr>
<td>0000800000000000</td>
<td>+128 TB</td>
<td>ffff7fffffffff</td>
<td>~16M TB</td>
<td>huge, almost 64 bits wide hole of non-canonical virtual memory addresses up to the -128 TB</td>
</tr>
</tbody>
</table>

Kernel-space virtual memory, shared between all processes:

<table>
<thead>
<tr>
<th>Start addr</th>
<th>Offset</th>
<th>End addr</th>
<th>Size</th>
<th>VM area description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ffff800000000000</td>
<td>-128 TB</td>
<td>ffff87ffffffffff</td>
<td>8 TB</td>
<td>guard hole, also reserved for hypervisor</td>
</tr>
<tr>
<td>+ała</td>
<td>-23 TB</td>
<td>fffe900000000000</td>
<td>0.5 TB</td>
<td>LDT remap for PTI</td>
</tr>
<tr>
<td>+aleza</td>
<td>-120 TB</td>
<td>ffff887fffffffff</td>
<td>0.5 TB</td>
<td>LDT remap for PTI</td>
</tr>
<tr>
<td>+aleza</td>
<td>-119.5 TB</td>
<td>ffffc87fffffffff</td>
<td>64 TB</td>
<td>direct mapping of all physical memory (page_offset_base)</td>
</tr>
<tr>
<td>1TB</td>
<td>555</td>
<td>ffffc800000000000</td>
<td>64 TB</td>
<td>virtual memory map (vmemmap_base)</td>
</tr>
<tr>
<td>1TB</td>
<td>21</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>20</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>19</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>18</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>17</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>16</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>15</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>14</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>13</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>12</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>11</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>10</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>9</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>8</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>7</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>6</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>5</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>4</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>3</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>2</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>1</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>1TB</td>
<td>0</td>
<td>ffffa000000000000</td>
<td>1TB</td>
<td>... unused hole</td>
</tr>
</tbody>
</table>

Identical layout to the 56-bit one from here on:
### Complete virtual memory map with 5-level page tables

<table>
<thead>
<tr>
<th>Start addr</th>
<th>Offset</th>
<th>End addr</th>
<th>Size</th>
<th>VM area description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000000000000000</td>
<td>0</td>
<td>00ffffffffffffff</td>
<td>64 PB</td>
<td>user-space virtual memory, different per mm</td>
</tr>
<tr>
<td>0000800000000000</td>
<td>+64 PB</td>
<td>ffff7fffffffff</td>
<td>~16K PB</td>
<td>... huge, still almost 64 bits wide hole of non-canonical</td>
</tr>
<tr>
<td>ff00000000000000</td>
<td>-64 PB</td>
<td>ff0fffffffffff</td>
<td>4 PB</td>
<td>... guard hole, also reserved for hypervisor</td>
</tr>
<tr>
<td>ff10000000000000</td>
<td>-60 PB</td>
<td>ff10ffffffffff</td>
<td>0.25 PB</td>
<td>LDT remap for PTI</td>
</tr>
<tr>
<td>ff11000000000000</td>
<td>-59.75 PB</td>
<td>ff90fffffffff</td>
<td>32 PB</td>
<td>direct mapping of all physical memory (page_offset_base)</td>
</tr>
<tr>
<td>ff91000000000000</td>
<td>-27.75 PB</td>
<td>ff9fffffffffff</td>
<td>3.75 PB</td>
<td>... unused hole</td>
</tr>
</tbody>
</table>

### Notes:

- With 56-bit addresses, user-space memory gets expanded by a factor of 512x.
- From 0.125 PB to 64 PB. All kernel mappings shift down to the -64 PT starting offset and many of the regions expand to support the much larger physical memory supported.
<table>
<thead>
<tr>
<th>Address</th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x0000000000000000</td>
<td>-24 PB</td>
<td>vmalloc/iremap space (vmalloc_base)</td>
</tr>
<tr>
<td>0x0000000000000100</td>
<td>-11.5 PB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000000200</td>
<td>-11 PB</td>
<td>virtual memory map (vmmmap_base)</td>
</tr>
<tr>
<td>0x0000000000000300</td>
<td>-10.5 PB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000000400</td>
<td>-8.25 PB</td>
<td>KASAN shadow memory</td>
</tr>
<tr>
<td>0x0000000000000500</td>
<td>-4 TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000000600</td>
<td>-2 TB</td>
<td>vaddr_end for KASLR</td>
</tr>
<tr>
<td>0x0000000000000700</td>
<td>0.5 TB</td>
<td>cpu_entry_area mapping</td>
</tr>
<tr>
<td>0x0000000000000800</td>
<td>-1.5 TB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000000900</td>
<td>-1 TB</td>
<td>%esp fixup stacks</td>
</tr>
<tr>
<td>0x0000000000000a00</td>
<td>-512 GB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000000b00</td>
<td>68 GB</td>
<td>EFI region mapping space</td>
</tr>
<tr>
<td>0x0000000000000c00</td>
<td>4 GB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000000d00</td>
<td>2 GB</td>
<td>kernel text mapping, mapped to physical address 0</td>
</tr>
<tr>
<td>0x0000000000000e00</td>
<td>2048 MB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000000f00</td>
<td>1536 MB</td>
<td>module mapping space</td>
</tr>
<tr>
<td>0x0000000000001000</td>
<td>16 MB</td>
<td>... unused hole</td>
</tr>
<tr>
<td>0x0000000000001100</td>
<td>10 MB</td>
<td>... legacy vsyscall ABI</td>
</tr>
<tr>
<td>0x0000000000001200</td>
<td>2 MB</td>
<td>... unused hole</td>
</tr>
</tbody>
</table>

Architecture defines a 64-bit virtual address. Implementations can support less. Currently supported are 48- and 57-bit virtual addresses. Bits 63

---

AMD SEATTLE DEVICE TREE SUPPORT

+ AMD MP2 I2C DRIVER
+ AMD SEATTLE DEVICE TREE SUPPORT
Open Source Used In 5GaaS Edge AC-4  9736

M:Brijesh Singh <brijeshkumar.singh@amd.com>
M:Suravee Suthikulpinit <suravee.suthikulpinit@amd.com>
@@ -2486,6 +2494,19 @@
F:include/uapi/linux/audit.h
F:kernel/audit*

+AUFS (advanced multi layered unification filesystem) FILESYSTEM
+M:“J. R. Okajima” <hooanon05g@gmail.com>
+L:linux-unionfs@vger.kernel.org
+L:aufs-users@lists.sourceforge.net (members only)
+W:http://aufs.sourceforge.net
+T:git://github.com/sfjro/aufs4-linux.git
+S:Supported
+F:Documentation/filesystems/aufs/
+F:Documentation/ABI/testing/debugfs-aufs
+F:Documentation/ABI/testing/sysfs-aufs
+F:fs/aufs/
+F:include/uapi/linux/aufs_type.h
+
AUXILIARY DISPLAY DRIVERS
M:Miguel Ojeda Sandonis <miguel.ojeda.sandonis@gmail.com>
W:http://miguelojeda.es/auxdisplay.htm
@@ -3485,6 +3506,15 @@
+S:Supported
+F:drivers/infiniband/hw/usnic/

+CLANG/LLVM BUILD SUPPORT
+L:clang-built-linux@googlegroups.com
+W:https://clangbuiltlinux.github.io/
+B:https://github.com/ClangBuiltLinux/linux/issues
+C:irc://chat.freenode.net/clangbuiltlinux
+S:Supported
+K:\b(?i:clang|llvm)\b
+F:Documentation/kbuild/llvm.rst
+
CLEANCACHE API
M:Konrad Rzeszutek Wilk <konrad.wilk@oracle.com>
L:linux-kernel@vger.kernel.org
@@ -6340,6 +6370,13 @@
+S:Maintained
+F:drivers/net/ethernet/hisilicon/hns3/

+HISILICON LPC BUS DRIVER
+M:john.garry@huawei.com
+W:http://www.hisilicon.com
+S:Maintained
+F:drivers/bus/hisi_lpc.c
+F:Documentation/devicetree/bindings/arm/hisilicon/hisilicon-low-pin-count.txt
HISILICON NETWORK SUBSYSTEM DRIVER
M: Yisen Zhuang <yisen.zhuang@huawei.com>
M: Salil Mehta <salil.mehta@huawei.com>
@@ -6964,6 +7001,12 @@
F: sound/soc/intel/boards/broadwell.c
F: sound/soc/intel/haswell/

+ INTEL ATOMISP2 DUMMY / POWER-MANAGEMENT DRIVER
+ M: Hans de Goede <hdegoede@redhat.com>
+ L: platform-driver-x86@vger.kernel.org
+ S: Maintained
+ F: drivers/platform/x86/intel_atomisp2_pm.c
+
+ INTEL C600 SERIES SAS CONTROLLER DRIVER
M: Intel SCU Linux support <intel-linux-scu@intel.com>
M: Artur Paszkiewicz <artur.paszkiewicz@intel.com>
@@ -6978,7 +7021,7 @@
M: Rodrigo Vivi <rodrigo.vivi@intel.com>
L: intel-gfx@lists.freedesktop.org
W: https://01.org/linuxgraphics/
-B: https://01.org/linuxgraphics/documentation/how-report-bugs
+B: https://gitlab.freedesktop.org/drm/intel/-/wikis/How-to-file-i915-bugs
C: irc://chat.freenode.net/intel-gfx
Q: http://patchwork.freedesktop.org/project/intel-gfx/
T: git git://anongit.freedesktop.org/drm-intel
@@ -9107,6 +9150,7 @@
M: Paul Burton <paul.burton@mips.com>
L: linux-mips@linux-mips.org
S: Supported
+F: Documentation/devicetree/bindings/power/mti,mips-cpc.txt
F: arch/mips/generic/
F: arch/mips/tools/generic-board-config.sh
@@ -9816,6 +9860,18 @@
S: Supported
F: tools/objtool/

+ OCXL (Open Coherent Accelerator Processor Interface OpenCAPI) DRIVER
+ M: Frederic Barrat <fbarrat@linux.vnet.ibm.com>
+ M: Andrew Donnellan <andrew.donnellan@au1.ibm.com>
+ L: linuxppc-dev@lists.ozlabs.org
+ S: Supported
+ F: arch/powerpc/platforms/powermv/ocxl.c
+ F: arch/powerpc/include/asm/pnv-ocxl.h
+ F: drivers/misc/ocxl/
+ F: include/misc/ocxl*
+ F: include/uapi/misc/ocxl.h
OMAP AUDIO SUPPORT
M: Peter Ujfalusi <peter.ujfalusi@ti.com>
M: Jarkko Nikula <jarkko.nikula@bitmer.com>
@@ -11301,6 +11357,13 @@
S: Supported
F: drivers/net/wireless/ath/ath9k/

QUALCOMM CAMERA CONTROL INTERFACE DRIVER
M: Todor Tomov <todor.tomov@linaro.org>
L: linux-i2c@vger.kernel.org
S: Maintained
+F: Documentation/devicetree/bindings/i2c/i2c-qcom-cci.txt
+F: drivers/i2c/busses/i2c-qcom-cci.c
+
QUALCOMM CAMERA SUBSYSTEM DRIVER
M: Todor Tomov <todor.tomov@linaro.org>
L: linux-media@vger.kernel.org
@@ -11872,6 +11935,18 @@
S: Supported
F: drivers/s390/crypto/

S390 VFIO AP DRIVER
M: Tony Krowiak <akrowiak@linux.ibm.com>
M: Pierre Morel <pmorel@linux.ibm.com>
M: Halil Pasic <pasic@linux.ibm.com>
L: linux-s390@vger.kernel.org
+S: Supported
+F: drivers/s390/crypto/vfio_ap_drv.c
+F: drivers/s390/crypto/vfio_ap_private.h
+F: drivers/s390/crypto/vfio_ap_ops.c
+F: Documentation/s390/vfio-ap.txt
+
S390 ZFCP DRIVER
M: Steffen Maier <maier@linux.vnet.ibm.com>
M: Benjamin Block <bblock@linux.vnet.ibm.com>
@@ -12614,6 +12689,15 @@
S: Supported
F: drivers/media/pci/solo6x10/

SOFTWARE DELEGATED EXCEPTION INTERFACE (SDEI)
M: James Morse <james.morse@arm.com>
L: linux-arm-kernel@lists.infradead.org
+S: Maintained
+F: Documentation/devicetree/bindings/arm/firmware/sdei.txt
+F: drivers/firmware/arm_sdei.c
SOFTWARE RAID (Multiple Disks) SUPPORT
M: Shaohua Li <shli@kernel.org>
L: linux-raid@vger.kernel.org
@@ -12836,6 +12920,7 @@
STABLE BRANCH
M: Greg Kroah-Hartman <gregkh@linuxfoundation.org>
+M: Sasha Levin <sashal@kernel.org>
L: stable@vger.kernel.org
S: Supported
F: Documentation/process/stable-kernel-rules.rst
@@ -14089,13 +14174,6 @@
S: Maintained
F: drivers/net/usb/dm9601.c

-USB DIAMOND RIO500 DRIVER
-M: Cesar Miquel <miquel@df.uba.ar>
-L: rio500-users@lists.sourceforge.net
-S: Maintained
-F: drivers/usb/misc/rio500*
-
USB EHCI DRIVER
M: Alan Stern <stern@rowland.harvard.edu>
L: linux-usb@vger.kernel.org
--- linux-4.15.0.orig/Makefile
+++ linux-4.15.0/Makefile
@@ -1,7 +1,7 @@
# SPDX-License-Identifier: GPL-2.0
VERSION = 4
PATCHLEVEL = 15
-SUBLEVEL = 0
+SUBLEVEL = 18
EXTRAVERSION =
NAME = Fearless Coyote

@@ -176,6 +176,20 @@
 KBUILD_CHECKSRC = 0
endif

+# Call message checker as part of the C compilation
+##
+# Use 'make D=1' to enable checking
+# Use 'make D=2' to create the message catalog
+
+ifdef D
+ ifdef "$(origin D)", "command line"
+   KBUILD_KMSG_CHECK = $D
+ endif
+ endif
+ifdef KBUILD_KMSG_CHECK
+ KBUILD_KMSG_CHECK = 0
+endif
+
# Use make M=dir to specify directory of external module to build
# Old syntax make ... SUBDIRS=$PWD is still supported
# Setting the environment variable KBUILD_EXTMOD take precedence
@@ -224,10 +238,12 @@ cscope gtags TAGS tags help% %docs check% coccicheck \
      $(version_h) headers_% archheaders archscripts \
      kernelversion %src-pkg
+no-sync-config-targets := $(no-dot-config-targets) install %install

    -config-targets := 0
    -mixed-targets := 0
    -dot-config := 1
+    config-targets := 0
+    mixed-targets := 0
+    dot-config := 1
+    may-sync-config := 1

 ifndef ($(filter $(no-dot-config-targets), $(MAKECMDGOALS))),
     ifeq ($(filter-out $(no-dot-config-targets), $(MAKECMDGOALS)),)
@@ -235,6 +251,16 @@
         endif
     endif
     ifndef ($(filter $(no-sync-config-targets), $(MAKECMDGOALS)),)
+        ifeq ($(filter-out $(no-sync-config-targets), $(MAKECMDGOALS)),)
+            may-sync-config := 0
+        endif
+    endif
+    ifndef ($(KBUILD_EXTMOD),)
+        may-sync-config := 0
+    endif
+    ifndef ($(KBUILD_EXTMOD),)
        ifeq ($(filter config %config,$(MAKECMDGOALS)),)
            config-targets := 1
@@ -277,19 +303,7 @@
KERNELVERSION = $(VERSION)$if $(PATCHLEVEL)$.$(PATCHLEVEL)$if $(SUBLEVEL)$.$(SUBLEVEL))$EXTRAVERSION
export VERSION PATCHLEVEL SUBLEVEL KERNELRELEASE KERNELVERSION

-# SUBARCH tells the usermode build what the underlying arch is. That is set
-# first, and if a usermode build is happening, the "ARCH=um" on the command
-# line overrides the setting of ARCH below. If a native build is happening,
-# then ARCH is assigned, getting whatever value it gets normally, and
-# SUBARCH is subsequently ignored.
-
-#SUBARCH := $(shell uname -m | sed -e s/i.86/x86/ -e s/x86_64/x86/\n- -e s/arm.*/arm/ -e s/sa110/arm/\n- -e s/390x/s390/ -e s/parisc64/parisc/ \n- -e s/ppc.*/powerpc/ -e s/mips.*/mips/ \n- -e s/sh[234].*/sh/ -e s/aarch64.*/arm64/ \n- -e s/riscv.*/riscv/)
+include scripts/subarch.include

# Cross compiling and selecting different set of gcc/bin-utils
# ---------------------------------------------------------------------------
@@ -355,9 +369,9 @@
else if [-x /bin/bash ]; then echo /bin/bash; \nelse echo sh; fi ; fi)

-HOST_LFS_CFLAGS := $(shell getconf LFS_CFLAGS)
-HOST_LFS_LDFLAGS := $(shell getconf LFS_LDFLAGS)
-HOST_LFS_LIBS := $(shell getconf LFS_LIBS)
+HOST_LFS_CFLAGS := $(shell getconf LFS_CFLAGS 2>/dev/null)
+HOST_LFS_LDFLAGS := $(shell getconf LFS_LDFLAGS 2>/dev/null)
+HOST_LFS_LIBS := $(shell getconf LFS_LIBS 2>/dev/null)

HOSTCC       = gcc
HOSTCXX      = g++
@@ -380,13 +394,14 @@
AWK= awk
GENKSYMS= scripts/genksyms/genksyms
INSTALLKERNEL  := installkernel
-DEPMOD		= /sbin/depmod
+DEPMOD		= depmod
PERL		= perl
PYTHON		= python
CHECK		= sparse

CHECKFLAGS     := -D__linux__ -Dlinux -D__STDC__ -Dunix -D__unix__ \n-Wbitwise -Wno-return-void $(CF)
+KMSG_CHECK	= $(srctree)/scripts/kmsg-doc
NOSTDINC_FLAGS  =
CFLAGS_MODULE   =
AFLAGS_MODULE   =
AFLAGS_KERNEL=
LDFLAGS_vmlinux =

+# Prefer linux-backports-modules
+ifneq ($(KBUILD_SRC),)
+ifneq ($(shell if test -e $(KBUILD_OUTPUT)/ubuntu-build; then echo yes; fi),yes)
+UBUNTUINCLUDE := -I/usr/src/linux-headers-lbm-$ (KERNELRELEASE)
+endif
+endif
+
# Use USERINCLUDE when you must reference the UAPI directories only.
USERINCLUDE := \ 
-I$(srctree)/arch/$ (SRCARCH)/include/uapi \ 
@ @ -406,17 +428,21 @@
# Use LINUXINCLUDE when you must reference the include/ directory.
# Needed to be compatible with the O= option
LINUXINCLUDE := \ 
+$(UBUNTUINCLUDE) \ 
-I$(srctree)/arch/$ (SRCARCH)/include \ 
-I$(objtree)/arch/$ (SRCARCH)/include/generated \ 
$(if $(KBUILD_SRC), -I$(srctree)/include) \ 
-I$(objtree)/include \ 
$(USERINCNCLUDE)

+# UBUNTU: Include our third party driver stuff too
+LINUXINCLUDE += -Iubuntu/include $(if $(KBUILD_SRC),-I$(srctree)/ubuntu/include)
+
KBUILD_AFLAGS := -D__ASSEMBLY__
KBUILD_CFLAGS := -Wall -Wundef -Wstrict-prototypes -Wno-trigraphs \ 
-fno-strict-aliasing -fno-common -fshort-wchar \ 
-Werror-implicit-function-declaration \ 
-Wno-format-security \ 
+ -Werror=return-type -Wno-format-security \ 
-std=gnu89
KBUILD_CPPFLAGS := -D__KERNEL__
KBUILD_AFLAGS_KERNEL :=
@@ -425,6 +451,7 @@
KBUILD_CFLAGS_MODULE := -DMODULE
KBUILD_LDFLAGS_MODULE := -T $(srctree)/scripts/module-common.lds
GCC_PLUGINS_CFLAGS :=
+CLANG_FLAGS :=

export ARCH SRCARCH CONFIG_SHELL HOSTCC HOSTCFLAGS CROSS_COMPILE AS LD CC
export CPP AR NM STRIP OBJCOPY OBJDUMP HOSTLDFLAGS HOST_LOADLIBES
@@ -432,8 +459,10 @@
export HOSTCXX HOSTCXXFLAGS LDFLAGS_MODULE CHECK CHECKFLAGS
export KBUILD_CPPFLAGS NOSTDINC_FLAGS LINUXINCLUDE OBJCOPYFLAGS LDFLAGS
-export KBUILD_CFLAGS CFLAGS_KERNEL CFLAGS_MODULE CFLAGS_KASAN CFLAGS_UBSAN
+export KBUILD_CFLAGS CFLAGS_KERNEL CFLAGS_MODULE
+export CFLAGS_KASAN CFLAGS_KASAN_NOSANITIZE CFLAGS_UBSAN
export KBUILD_AFLAGS AFLAGS_KERNEL AFLAGS_MODULE
+export KBUILD_AFLAGS_MODULE KBUILD_CFLAGS_MODULE KBUILD_LDFLAGS_MODULE
export KBUILD_ARFLAGS
@@ -476,15 +505,31 @@
ifeq ($(cc-name),clang)
ifneq ($(CROSS_COMPILE),)
-CLANG_TARGET := --target=$(notdir $(CROSS_COMPILE:%-=%))
-GCC_TOOLCHAIN := $(realpath $(dir $(shell which $(LD)))/..)
+CLANG_FLAGS += --target=$(notdir $(CROSS_COMPILE:%-=%))
+GCC_TOOLCHAIN_DIR := $(dir $(shell which $(CROSS_COMPILE)elfedit))
+CLANG_FLAGS += --prefix=$(GCC_TOOLCHAIN_DIR)$(notdir $(CROSS_COMPILE))
+GCC_TOOLCHAIN := $(realpath $(GCC_TOOLCHAIN_DIR)/..)
endif
ifneq ($(GCC_TOOLCHAIN),)
-CLANG_GCC_TC := --gcc-toolchain=$(GCC_TOOLCHAIN)
+CLANG_FLAGS += --gcc-toolchain=$(GCC_TOOLCHAIN)
endif
- KBUILD_CFLAGS += $(CLANG_TARGET) $(CLANG_GCC_TC)
- KBUILD_AFLAGS += $(CLANG_TARGET) $(CLANG_GCC_TC)
+ifneq ($(LLVM_IAS),1)
+CLANG_FLAGS += -no-integrated-as
+CLANG_FLAGS += -Werror=unknown-warning-option
+KBUILD_CFLAGS += $(CLANG_FLAGS)
+KBUILD_AFLAGS += $(CLANG_FLAGS)
+export CLANG_FLAGS
+endif
+
+RETPOLINE_CFLAGS_GCC := -mindirect-branch=thunk-extern -mindirect-branch-register
+RETPOLINE_VDSO_CFLAGS_GCC := -mindirect-branch=thunk-inline -mindirect-branch-register
+RETPOLINE_CFLAGS_CLANG := -mretpoline-external-thunk
+RETPOLINE_VDSO_CFLAGS_CLANG := -mretpoline
+RETPOLINE_CFLAGS := $(call cc-option,$(RETPOLINE_CFLAGS_GCC),$(call cc-option,$(RETPOLINE_CFLAGS_CLANG)))
+RETPOLINE_VDSO_CFLAGS := $(call cc-option,$(RETPOLINE_VDSO_CFLAGS_GCC),$(call cc-option,$(RETPOLINE_VDSO_CFLAGS_CLANG)))
+export RETPOLINE_CFLAGS
+export RETPOLINE_VDSO_CFLAGS
ifeq ($(config-targets),1)
# ================================================================

KBUILD_BUILTIN := 1

# If we have only "make modules", don't compile built-in objects.
-# When we're building modules with modversions, we need to consider
-# the built-in objects during the descend as well, in order to
-# make sure the checksums are up to date before we record them.
-
ifeq ($(MAKECMDGOALS),modules)
- KBUILD_BUILTIN := $(if $(CONFIG_MODVERSIONS),1)
+ KBUILD_BUILTIN :=
endif

# If we have "make <whatever> modules", compile modules
@ @ -557,7 +598,7 @@

# Objects we will link into vmlinux / subdirs we need to visit
init-y:= init/
-drivers-y:= drivers/ sound/ firmware/
+drivers-y:= drivers/ sound/ firmware/ ubuntu/
net-y:= net/
libs-y:= lib/
core-y:= usr/
@ @ -568,23 +609,27 @@
# Read in config
-include include/config/auto.conf

-ifeq ($(KBUILD_EXTMOD),)
+ifeq ($(may-sync-config),1)
# Read in dependencies to all Kconfig* files, make sure to run
# oldconfig if changes are detected.
-include include/config/auto.conf.cmd
+$(KCONFIG_CONFIG): ;
+%/auto.conf %/auto.conf.cmd %/tristate.conf: $(KCONFIG_CONFIG)
$(Q)$(MAKE) -f $(srctree)/Makefile silentoldconfig
else

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PHONY += include/config/auto.conf

include/config/auto.conf:
@@ -596,7 +641,7 @@
    echo >&2 ;							/
    /bin/false)
\endif # KBUILD_EXTMOD
+endif # may-sync-config

else
# Dummy target needed, because used as prerequisite
@@ -633,23 +678,18 @@
    KBUILD_CFLAGS	+= $(call cc-disable-warning, format-truncation)
    KBUILD_CFLAGS	+= $(call cc-disable-warning, format-overflow)
    KBUILD_CFLAGS	+= $(call cc-disable-warning, int-in-bool-context)
+KBUILD_CFLAGS	+= $(call cc-disable-warning, address-of-packed-member)
+KBUILD_CFLAGS	+= $(call cc-disable-warning, attribute-alias)

ifdef CONFIG_CC_OPTIMIZE_FOR_SIZE
    -KBUILD_CFLAGS += $(call cc-option,-Oz,-Os)
    -KBUILD_CFLAGS += $(call cc-disable-warning, maybe-uninitialized,)
-else
-ifdef CONFIG_PROFILE_ALL_BRANCHES
-    -KBUILD_CFLAGS += -O2 $(call cc-disable-warning, maybe-uninitialized,)
+KBUILD_CFLAGS   += -Os
else
KBUILD_CFLAGS   += -O2
endif
\endif
-
-KBUILD_CFLAGS += $(call cc-ifversion, -lt, 0409, \
- $(call cc-disable-warning, maybe-uninitialized,))

# Tell gcc to never replace conditional load with a non-conditional one
KBUILD_CFLAGS += $(call cc-option,--param=allow-store-data-races=0)
+KBUILD_CFLAGS += $(call cc-option,-fno-allow-store-data-races)

# check for 'asm goto'
ifeq ($(call shell-cached,$(CONFIG_SHELL) $(srctree)/scripts/gcc-goto.sh $(CC) $(KBUILD_CFLAGS)), y)
\endif 
\endif 
@@ -698,10 +738,8 @@
ifeq ($(cc-name),clang)
KBUILD_CPPFLAGS += $(call cc-option,-Qunused-arguments,)
-KBUILD_CFLAGS += $(call cc-disable-warning, unused-variable)
KBUILD_CFLAGS += $(call cc-disable-warning, format-invalid-specifier)
-KBUILD_CFLAGS += $(call cc-disable-warning, gnu)
# Quiet clang warning: comparison of unsigned expression < 0 is always false
KBUILD_CFLAGS += $(call cc-disable-warning, tautological-compare)
# CLANG uses a _MergedGlobals as optimization, but this breaks modpost, as the
@@ -709,16 +747,13 @@
# See modpost pattern 2
KBUILD_CFLAGS += $(call cc-option, -mno-global-merge,)
KBUILD_CFLAGS += $(call cc-option, -fcatch-undefined-behavior)
-KBUILD_CFLAGS += $(call cc-option, -no-integrated-as)
-KBUILD_AFLAGS += $(call cc-option, -no-integrated-as)
-else
+endif

# These warnings generated too much noise in a regular build.
# Use make W=1 to enable them (see scripts/Makefile.extrawarn)
KBUILD_CFLAGS += $(call cc-disable-warning, unused-but-set-variable)
-KBUILD_CFLAGS += $(call cc-disable-warning, unused-const-variable)
-endif
+KBUILD_CFLAGS += $(call cc-disable-warning, unused-const-variable)
ifdef CONFIG_FRAME_POINTER
KBUILD_CFLAGS+= -fno-omit-frame-pointer -fno-optimize-sibling-calls
else
@@ -740,8 +775,11 @@
else
KBUILD_CFLAGS+= -g
endif
+ifneq ($(LLVM_IAS),1)
KBUILD_AFLAGS+= -Wa,gdwarf-2
endif
+endif
+
ifdef CONFIG_DEBUG_INFO_DWARF4
KBUILD_CFLAGS+= $(call cc-option, -gdwarf-4,)
endif
@@ -755,6 +793,13 @@
ifndef CC_FLAGS_FTRACE
CC_FLAGS_FTRACE := -pg
endif
+ifdef CONFIG_FTRACE_MCOUNT_RECORD
+  # gcc 5 supports generating the mcount tables directly
+  ifeq ($(call cc-option-yn,-mrecord-mcount),y)
+    CC_FLAGS_FTRACE += -mrecord-mcount
+    export CC_USING_RECORD_MCOUNT := 1

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+ endif
+endif
export CC_FLAGS_FTRACE
ifdef CONFIG_HAVE_FENTRY
CC_USING_FENTRY := $(call cc-option, -mfentry -DCC_USING_FENTRY)
@@ -789,9 +834,32 @@
# disable pointer signed / unsigned warnings in gcc 4.0
KBUILD_CFLAGS += $(call cc-disable-warning, pointer-sign)

+# disable stringop warnings in gcc 8+
+KBUILD_CFLAGS += $(call cc-disable-warning, stringop-truncation)
+
+# We'll want to enable this eventually, but it's not going away for 5.7 at least
+KBUILD_CFLAGS += $(call cc-disable-warning, zero-length-bounds)
+KBUILD_CFLAGS += $(call cc-disable-warning, array-bounds)
+KBUILD_CFLAGS += $(call cc-disable-warning, stringop-overflow)
+
+# Another good warning that we'll want to enable eventually
+KBUILD_CFLAGS += $(call cc-disable-warning, restrict)
+
+# Enabled with W=2, disabled by default as noisy
+KBUILD_CFLAGS += $(call cc-disable-warning, maybe-uninitialized)
+
# disable invalid "can't wrap" optimizations for signed / pointers
KBUILD_CFLAGS += $(call cc-option,-fno-strict-overflow)

+# clang sets -fmerge-all-constants by default as optimization, but this
+# is non-conforming behavior for C and in fact breaks the kernel, so we
+ need to disable it here generally.
+KBUILD_CFLAGS += $(call cc-option,-fno-merge-all-constants)
+
+# for gcc -fno-merge-all-constants disables everything, but it is fine
+# to have actual conforming behavior enabled.
+KBUILD_CFLAGS += $(call cc-option,-fmerge-constants)
+
# Make sure -fstack-check isn't enabled (like gentoo apparently did)
KBUILD_CFLAGS += $(call cc-option,-fno-stack-check,)
@@ -813,6 +881,9 @@
# Require designated initializers for all marked structures
KBUILD_CFLAGS += $(call cc-option,-Werror=designated-init)

+# change __FILE__ to the relative path from the srctree
+KBUILD_CFLAGS += $(call cc-option,-fmacro-prefix-map=$(srctree)/=)
+
# use the deterministic mode of AR if available
KBUILD_ARFLAGS := $(call ar-option,D)
@@ -922,22 +993,20 @@
endif
export mod_sign_cmd

+HOST_LIBELF_LIBS = $(shell pkg-config libelf --libs 2>/dev/null || echo -lelf)
+
ifdef CONFIG_STACK_VALIDATION
 has_libelf := $(call try-run,
-echo "int main() {}" | $(HOSTCC) -xc -o /dev/null -lelf -,1,0)
+echo "int main() {}" | $(HOSTCC) -xc -o /dev/null $(HOST_LIBELF_LIBS) -,1,0)
 ifeq ($(has_libelf),1)
 objtool_target := tools/objtool FORCE
 else
- ifdef CONFIG_UNWINDER_ORC
- $(error "Cannot generate ORC metadata for CONFIG_UNWINDER_ORC=y, please install libelf-dev, libelf-devel or elfutils-libelf-devel")
- else
- $(warning "Cannot use CONFIG_STACK_VALIDATION=y, please install libelf-dev, libelf-devel or elfutils-libelf-devel")
- endif
- SKIP_STACK_VALIDATION := 1
- export SKIP_STACK_VALIDATION
endif
endif

+PHONY += prepare0

ifeq ($(KBUILD_EXTMOD),)
core-y+= kernel/ certs/ mm/ fs/ ipc/ security/ crypto/ block/
@@ -1032,8 +1101,7 @@
# archprepare is used in arch Makefiles and when processed asm symlink,
# version.h and scripts_basic is processed / created.
-# Listed in dependency order
-PHONY += prepare archprepare prepare0 prepare1 prepare2 prepare3
+PHONY += prepare archprepare prepare1 prepare2 prepare3

# prepare3 is used to check if we are building in a separate output directory,
# and if so do:
@@ -1076,6 +1144,14 @@
 PHONY += prepare-objtool
 prepare-objtool: $(objtool_target)
 +ifeq ($(SKIP_STACK_VALIDATION),1)
+ifdef CONFIG_UNWINDER_ORC
+@echo "error: Cannot generate ORC metadata for CONFIG_UNWINDER_ORC=y, please install libelf-dev, libelf-devel or elfutils-libelf-devel" >&2
+@false

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+else
+@echo "warning: Cannot use CONFIG_STACK_VALIDATION=y, please install libelf-dev, libelf-devel or
elfutils-libelf-devel" >&2
+endif
+endif

# Check for CONFIG flags that require compiler support. Abort the build
# after .config has been processed, but before the kernel build starts.
@@ -1165,6 +1241,7 @@
 $(error Headers not exportable for the $(SRCARCH) architecture))
 $(Q)$(MAKE) $(hdr-inst)=include/uapi dst=include
 $(Q)$(MAKE) $(hdr-inst)=arch/$$(SRCARCH)/include/uapi $(hdr-dst)
+$(Q)$(MAKE) $(hdr-inst)=ubuntu/include dst=include oldheaders=

 PHONY += headers_check_all
headers_check_all: headers_install_all
@@ -1174,6 +1251,7 @@
 $(Q)$(MAKE) $(hdr-inst)=include/uapi dst=include HDRCHECK=1
 $(Q)$(MAKE) $(hdr-inst)=arch/$$(SRCARCH)/include/uapi $(hdr-dst) HDRCHECK=1
+$(Q)$(MAKE) $(hdr-inst)=ubuntu/include dst=include oldheaders= HDRCHECK=1

# KERNEL SELFTEST
@@ -1203,6 +1281,13 @@
 all: modules

+## When we're building modules with modversions, we need to consider
+## the built-in objects during the descend as well, in order to
+## make sure the checksums are up to date before we record them.
+ifdef CONFIG_MODVERSIONS
+ KBUILD_BUILTIN := 1
+endif
+
# Build modules
# # A module can be listed more than once in obj-m resulting in
@@ -1490,9 +1575,6 @@
 # We are always building modules
 KBUILD_MODULES := 1
 PHONY += $(objtree)/Module.symvers
-$(objtree)/Module.symvers:
module-dirs := $(addprefix _module_, $(KBUILD_EXTMOD))
PHONY += $(module-dirs) modules
-$(module-dirs): crmodverdir $(objtree)/Module.symvers
+$($(module-dirs)): prepare $(objtree)/Module.symvers
$$(Q)$$(MAKE) $(build)=$$(patsubst _module_,%,,$$)

modules: $(module-dirs)
@@ -1545,7 +1627,8 @@

# Dummies...
PHONY += prepare scripts
-prepare: ;
+prepare:
+$$cmd_crmodverdir"
scripts: ;
endif # KBUILD_EXTMOD

@@ -1671,17 +1754,14 @@

# Modules
/*: prepare scripts FORCE
-$$cmd_crmodverdir"
$$Q$$$(MAKE) KBUILD_MODULES=$$(if $$CONFIG_MODULES,1) \ 
$$(build)=$$(build-dir)
# Make sure the latest headers are built for Documentation
Documentation/samples/: headers_install
%/: prepare scripts FORCE
-$$cmd_crmodverdir"
$$Q$$$(MAKE) KBUILD_MODULES=$$(if $$CONFIG_MODULES,1) \ 
$$(build)=$$(build-dir)
%.ko: prepare scripts FORCE
-$$cmd_crmodverdir"
$$Q$$$(MAKE) KBUILD_MODULES=$$(if $$CONFIG_MODULES,1) \ 
$$(build)=$$(build-dir) $(@:.ko=.o)
$$Q$$$(MAKE) -f $$src/tree/scripts/Makefile.modpost
--- linux-4.15.0.orig/Ubuntu.md
+++ linux-4.15.0/Ubuntu.md
@@ -0,0 +1,8 @@
+Name: linux
+Version: 4.15.0
+Series: 18.04 (bionic)
+Description:
+  This is the source code for the Ubuntu linux kernel for the 18.04 series. This
+  source tree is used to produce the flavours: generic, generic-lpae, lowlatency.
+  This kernel is configured to support the widest range of desktop, laptop and
+  server configurations.
--- linux-4.15.0.orig/arch/Kconfig
+++ linux-4.15.0/arch/Kconfig
@@ -13,6 +13,9 @@
 config HAVEIMA_KEXEC
 bool

+config HOTPLUG_SMT
+bool
+config OPROFILE
+tristate "OPROFILE system profiling"
depends on PROFILING
@@ -333,6 +336,16 @@
 config HAVE_RCU_TABLE_INVALIDATE
 bool
+config ARCH_WANT_IRQS_OFF_ACTIVATE_MM
+bool
+help
+ Temporary select until all architectures can be converted to have
+ irqs disabled over activate_mm. Architectures that do IPI based TLB
+ shootdowns should enable this.
+ config ARCH_HAVE_NMI_SAFE_CMPXCHG
 bool

@@ -959,4 +972,12 @@
 against various use-after-free conditions that can be used in
 security flaw exploits.

+config HAVEARCH_COMPILER_H
+bool
+help
+ An architecture can select this if it provides an
+ asm/compiler.h header that should be included after
+ linux/compiler-*.h in order to override macro definitions that those
+ headers generally provide.
+ source "kernel/gcov/Kconfig"
--- linux-4.15.0.orig/arch/alpha/defconfig
+++ linux-4.15.0/arch/alpha/defconfig
@@ -36,7 +36,6 @@
 CONFIG_SCSI=y
 CONFIG_BLK_DEV_SD=y
 CONFIG_BLK_DEV_SR=y

--- linux-4.15.0.orig/arch/Kconfig
+++ linux-4.15.0/arch/Kconfig
@@ -13,6 +13,9 @@
 config HAVEIMA_KEXEC
 bool

+config HOTPLUG_SMT
+bool
+config OPROFILE
+tristate "OPROFILE system profiling"
depends on PROFILING
@@ -333,6 +336,16 @@
 config HAVE_RCU_TABLE_INVALIDATE
 bool
+config ARCH_WANT_IRQS_OFF_ACTIVATE_MM
+bool
+help
+ Temporary select until all architectures can be converted to have
+ irqs disabled over activate_mm. Architectures that do IPI based TLB
+ shootdowns should enable this.
+ config ARCH_HAVE_NMI_SAFE_CMPXCHG
 bool

@@ -959,4 +972,12 @@
 against various use-after-free conditions that can be used in
 security flaw exploits.

+config HAVEARCH_COMPILER_H
+bool
+help
+ An architecture can select this if it provides an
+ asm/compiler.h header that should be included after
+ linux/compiler-*.h in order to override macro definitions that those
+ headers generally provide.
+ source "kernel/gcov/Kconfig"
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_SCSI_AIC7XXX=m
CONFIG_AIC7XXX_CMDS_PER_DEVICE=253
# CONFIG_AIC7XXX_DEBUG_ENABLE is not set
--- linux-4.15.0.orig/arch/alpha/include/asm/futex.h
+++ linux-4.15.0/arch/alpha/include/asm/futex.h
@@ -20,8 +20,8 @@
  "3:	.subsection 2n"
  "4:br1bun"
  ".previous\n"
-EXC(1b,3b,%1,$31)\n-EXC(2b,3b,%1,$31)\n+EXC(1b,3b,$31,%1)\n+EXC(2b,3b,$31,%1)\n:"=\&r" (oldval), "=\&r"(ret)\n:"r" (uaddr), "r"(oparg)\n:"memory")
@@ -82,8 +82,8 @@
 "3:.subsection 2n"
 "4:br1bun"
 ".previous\n"
-EXC(1b,3b,%0,$31)\n-EXC(2b,3b,%0,$31)\n+EXC(1b,3b,$31,%0)\n+EXC(2b,3b,$31,%0)\n:"=\&r" (oldval), "=\&r"(cmp)\n:"r"(uaddr), "r"((long)(int)oldval), "r"(newval)\n:"memory");
--- linux-4.15.0.orig/arch/alpha/include/asm/io.h
+++ linux-4.15.0/arch/alpha/include/asm/io.h
@@ -71,7 +71,7 @@
 return (void *) (address + IDENT_ADDR);
 }
#else
-static inline unsigned long virt_to_phys(void *address)
+static inline unsigned long virt_to_phys(volatile void *address)
 {
  return (unsigned long)address - IDENT_ADDR;
 }
@@ -71,7 +71,7 @@
 return (void *) (address + IDENT_ADDR);
 }
#endif USE_48_BIT_KSEG
-static inline unsigned long virt_to_phys( void * address)
+static inline unsigned long virt_to_phys( volatile void * address)
 {unsigned long phys = (unsigned long)address;
extern unsigned long __direct_map_base;
extern unsigned long __direct_map_size;

- static inline unsigned long __deprecated virt_to_bus(void *address)
+ static inline unsigned long __deprecated virt_to_bus(volatile void *address)
  {
    unsigned long phys = virt_to_phys(address);
    unsigned long bus = phys + __direct_map_base;
    @@ -327,14 +327,18 @@
    #if IO_CONCAT(__IO_PREFIX, trivial_io_bw)
    extern inline unsigned int ioread8(void __iomem *addr)
      {
        -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread8)(addr);
        +unsigned int ret;
        +mb();
        +ret = IO_CONCAT(__IO_PREFIX, ioread8)(addr);
        mb();
        return ret;
      }
    extern inline unsigned int ioread16(void __iomem *addr)
      {
        -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread16)(addr);
        +unsigned int ret;
        +mb();
        +ret = IO_CONCAT(__IO_PREFIX, ioread16)(addr);
        mb();
        return ret;
      }
    @@ -420,14 +426,18 @@
    #if IO_CONCAT(__IO_PREFIX, trivial_io_lq)
    extern inline unsigned int ioread32(void __iomem *addr)
      {
        -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread32)(addr);
        +unsigned int ret;
        +mb();
        +ret = IO_CONCAT(__IO_PREFIX, ioread32)(addr);
        mb();
        return ret;
      }
    @@ -112,7 +112,7 @@
    extern inline unsigned long __direct_map_base;
    extern unsigned long __direct_map_size;

    - static inline unsigned long __deprecated virt_to_bus(void *address)
    + static inline unsigned long __deprecated virt_to_bus(volatile void *address)
    { 
      unsigned long phys = virt_to_phys(address);
      unsigned long bus = phys + __direct_map_base;
      @@ -327,14 +327,18 @@
      #if IO_CONCAT(__IO_PREFIX, trivial_io_bw)
      extern inline unsigned int ioread8(void __iomem *addr)
        { 
          -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread8)(addr);
          +unsigned int ret;
          +mb();
          +ret = IO_CONCAT(__IO_PREFIX, ioread8)(addr);
          mb();
          return ret;
        }
      extern inline unsigned int ioread16(void __iomem *addr)
        { 
          -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread16)(addr);
          +unsigned int ret;
          +mb();
          +ret = IO_CONCAT(__IO_PREFIX, ioread16)(addr);
          mb();
          return ret;
        }
      @@ -420,14 +426,18 @@
      #if IO_CONCAT(__IO_PREFIX, trivial_io_lq)
      extern inline unsigned int ioread32(void __iomem *addr)
        { 
          -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread32)(addr);
          +unsigned int ret;
          +mb();
          +ret = IO_CONCAT(__IO_PREFIX, ioread32)(addr);
          mb();
          return ret;
        }
      @@ -112,7 +112,7 @@
      extern inline unsigned long __direct_map_base;
      extern unsigned long __direct_map_size;
      
      - static inline unsigned long __deprecated virt_to_bus(void *address)
      + static inline unsigned long __deprecated virt_to_bus(volatile void *address)
      { 
        unsigned long phys = virt_to_phys(address);
        unsigned long bus = phys + __direct_map_base;
        @@ -327,14 +327,18 @@
        #if IO_CONCAT(__IO_PREFIX, trivial_io_bw)
        extern inline unsigned int ioread8(void __iomem *addr)
          { 
            -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread8)(addr);
            +unsigned int ret;
            +mb();
            +ret = IO_CONCAT(__IO_PREFIX, ioread8)(addr);
            mb();
            return ret;
          }
        extern inline unsigned int ioread16(void __iomem *addr)
          { 
            -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread16)(addr);
            +unsigned int ret;
            +mb();
            +ret = IO_CONCAT(__IO_PREFIX, ioread16)(addr);
            mb();
            return ret;
          }
        @@ -420,14 +426,18 @@
        #if IO_CONCAT(__IO_PREFIX, trivial_io_lq)
        extern inline unsigned int ioread32(void __iomem *addr)
          { 
            -unsigned int ret = IO_CONCAT(__IO_PREFIX, ioread32)(addr);
            +unsigned int ret;
            +mb();
            +ret = IO_CONCAT(__IO_PREFIX, ioread32)(addr);
            mb();
            return ret;
          }
      ```
+ret = __raw_readb(addr);
mb();
return ret;
}

extern inline u16 readw(const volatile void __iomem *addr)
{
- u16 ret = __raw_readw(addr);
+ u16 ret;
+ mb();
+ ret = __raw_readw(addr);
mb();
return ret;
}
@@ -468,14 +478,18 @@

extern inline u32 readl(const volatile void __iomem *addr)
{
- u32 ret = __raw_readl(addr);
+ u32 ret;
+ mb();
+ ret = __raw_readl(addr);
mb();
return ret;
}

extern inline u64 readq(const volatile void __iomem *addr)
{
- u64 ret = __raw_readq(addr);
+ u64 ret;
+ mb();
+ ret = __raw_readq(addr);
mb();
return ret;
}
@@ -493,10 +507,10 @@

#endif

-#define ioread16be(p) be16_to_cpu(ioread16(p))
-#define ioread32be(p) be32_to_cpu(ioread32(p))
-#define iowrite16be(v,p) iowrite16(cpu_to_be16(v), (p))
-#define iowrite32be(v,p) iowrite32(cpu_to_be32(v), (p))
+#define ioread16be(p) swab16(ioread16(p))
+#define ioread32be(p) swab32(ioread32(p))
+#define iowrite16be(v,p) iowrite16(swab16(v), (p))
+#define iowrite32be(v,p) iowrite32(swab32(v), (p))
#define inb_pinb
#define inw_pinw
@@ -504,14 +518,44 @@
#define outb_poutb
#define outw_poutw
#define outl_poutl
-#define readb_relaxed(addr) __raw_readb(addr)
-#define readw_relaxed(addr) __raw_readw(addr)
-#define readl_relaxed(addr) __raw_readl(addr)
-#define readq_relaxed(addr) __raw_readq(addr)
-#define writeb_relaxed(b, addr) __raw_writeb(b, addr)
-#define writew_relaxed(b, addr) __raw_writew(b, addr)
-#define writel_relaxed(b, addr) __raw_writel(b, addr)
-#define writeq_relaxed(b, addr) __raw_writeq(b, addr)
+
+extern u8 readb_relaxed(const volatile void __iomem *addr);
+extern u16 readw_relaxed(const volatile void __iomem *addr);
+extern u32 readl_relaxed(const volatile void __iomem *addr);
+extern u64 readq_relaxed(const volatile void __iomem *addr);
+
+#if IO_CONCAT(__IO_PREFIX,trivial_io_bw)
+extern inline u8 readb_relaxed(const volatile void __iomem *addr)
+{
+  mb();
+  return __raw_readb(addr);
+}
+
+extern inline u16 readw_relaxed(const volatile void __iomem *addr)
+{
+  mb();
+  return __raw_readw(addr);
+}
+#endif

+#if IO_CONCAT(__IO_PREFIX,trivial_io_lq)
+extern inline u32 readl_relaxed(const volatile void __iomem *addr)
+{
+  mb();
+  return __raw_readl(addr);
+}
+
+extern inline u64 readq_relaxed(const volatile void __iomem *addr)
+{
+  mb();
+  return __raw_readq(addr);
+}
+#endif

+
+#define writeb_relaxed
+#define writew_relaxed
+#define writel_relaxed
+#define writeq_relaxed

#define mmiowb()

--- linux-4.15.0.orig/arch/alpha/include/asm/irq.h
+++ linux-4.15.0/arch/alpha/include/asm/irq.h
@@ -56,15 +56,15 @@
   #elif defined(CONFIG_ALPHA_DP264) || 
       defined(CONFIG_ALPHA_LYNX) || 
-      defined(CONFIG_ALPHA_SHARK) || 
-      defined(CONFIG_ALPHA_EIGER)
+      defined(CONFIG_ALPHA_SHARK)
 # define NR_IRQS64

 #elif defined(CONFIG_ALPHA_TITAN)
 #define NR_IRQS80

 #elif defined(CONFIG_ALPHA_RAWHIDE) || 
-#defined(CONFIG_ALPHA_TAKARA)
+    #defined(CONFIG_ALPHA_TAKARA) || 
+    #defined(CONFIG_ALPHA_EIGER)
 # define NR_IRQS128

 #elif defined(CONFIG_ALPHA_WILDFIRE)
--- linux-4.15.0.orig/arch/alpha/include/asm/termios.h
+++ linux-4.15.0/arch/alpha/include/asm/termios.h
@@ -73,9 +73,15 @@
 )
 #define user_termios_to_kernel_termios(k, u) 
 -copy_from_user(k, u, sizeof(struct termios))
+copy_from_user(k, u, sizeof(struct termios2))

 #define kernel_termios_to_user_termios(u, k) 
 +copy_to_user(u, k, sizeof(struct termios2))
+
+#define user_termios_to_kernel_termios_1(k, u) 
+copy_from_user(k, u, sizeof(struct termios))
+
+#define kernel_termios_to_user_termios_1(u, k) 
+copy_to_user(u, k, sizeof(struct termios))

 #endif /* _ALPHA_TERMIOS_H */
--- linux-4.15.0.orig/arch/alpha/include/asm/uaccess.h
Address valid if:
* "addr" doesn't have any high-bits set
* AND "size" doesn't have any high-bits set
* AND "addr+size" doesn't have any high-bits set
* OR we are in kernel mode.

```
#define __access_ok(addr, size) ({
    unsigned long __ao_a = (addr), __ao_b = (size);
    unsigned long __ao_end = __ao_a + __ao_b - !!__ao_b;
    (get_fs().seg & (__ao_a | __ao_b | __ao_end)) == 0; })
```

Atomic exchange.
* Since it can be used to implement critical sections
* it must clobber "memory" (also for interrupts in UP).

```
static inline unsigned long
{
    unsigned long ret, tmp, addr64;
    __asm__ __volatile__ ("andnot %4,7,%3\n"    "insbl %1,%4,%1\n"    @ @ -43,6 +48,7 @ @
    { unsigned long ret, tmp, addr64;
        __asm__ __volatile__ ("andnot %4,7,%3\n"    "inswl %1,%4,%1\n"    @ @ -67,6 +73,7 @ @
```

Open Source Used In 5GaaS Edge AC-4 9757
unsigned long dummy;

+smp_mb();
__asm__ __volatile__(
"1:ldl_l %0,%4
"bis $31,%3,%1
@@ -87,6 +94,7 @@
{
unsigned long dummy;

+smp_mb();
__asm__ __volatile__(
"1:ldq_l %0,%4
"bis $31,%3,%1
@@ -128,10 +136,12 @@
* store NEW in MEM. Return the initial value in MEM. Success is
* indicated by comparing RETURN with OLD.
* - * The memory barrier should be placed in SMP only when we actually
- * make the change. If we don't change anything (so if the returned
- * prev is equal to old) then we aren't acquiring anything new and
- * we don't need any memory barrier as far I can tell.
+ * The leading and the trailing memory barriers guarantee that these
+ * operations are fully ordered.
+ *
+ * The trailing memory barrier is placed in SMP unconditionally, in
+ * order to guarantee that dependency ordering is preserved when a
+ * dependency is headed by an unsuccessful operation.
*/

static inline unsigned long
@@ -139,6 +149,7 @@
{
unsigned long prev, tmp, cmp, addr64;

+smp_mb();
__asm__ __volatile__(
"andnot%5,7,%4\n"
"insb%1,%5,%1\n"
@@ -150,8 +161,8 @@
"or%1,%2,%2\n"
"stq_c%2,0(%4)\n"
"beq%2,3\n"
-__ASM__MB
"2:u"
+__ASM__MB
".subsection 2n"
{unsigned long prev, tmp, cmp, addr64;

+smp_mb();
__asm__ __volatile__(
"andnot %5,7,%4\n"
"inswl 1,%5,%1\n"
@@ -166,6 +177,7 @@
{
    cmp_mb();
    __asm__ __volatile__(
        "andnot %5,7,%4\n"
@@ -177,8 +189,8 @@
        "or %1,%2,%2\n"
        "stq_c %2,%(4)\n"
        "beq %2,3f\n"
    -__ASM__MB
    "2:\n"
    +__ASM__MB
    ".subsection 2\n"
    "3:br1b\n"
    ".previous"
    @@ -193,6 +205,7 @@
{
    unsigned long prev, cmp;

    +smp_mb();
    __asm__ __volatile__(
        "1:ldq 1,%0,%5\n"
        "cmpeq %0,%3,%1\n"
        "mov %4,%1\n"
@@ -200,8 +213,8 @@
        "stl_c %1,%2\n"
        "beq %1,3f\n"
    -__ASM__MB
    "2:\n"
    +__ASM__MB
    ".subsection 2\n"
    "3:br1b\n"
    ".previous"
    @@ -216,6 +229,7 @@
{
    unsigned long prev, cmp;

    +smp_mb();
    __asm__ __volatile__(
        "1:ldl 1,%0,%5\n"
        "cmpeq %0,%3,%1\n"
        "mov %4,%1\n"
"stq_c %1,%2\n"
"beq %1,3f\n"
-__ASM__MB
"2:\n"
+__ASM__MB
".subsection 2\n"
"3:\br 1b\n"
".previous"
--- linux-4.15.0.orig/arch/alpha/include/uapi/asm/ioctls.h
+++ linux-4.15.0/arch/alpha/include/uapi/asm/ioctls.h
@@ -32,6 +32,11 @@
#define TCXONC		_IOC('t', 30)
#define TCFLSH_IO('t', 31)

+#define TCGETS2_IOR('T', 42, struct termios2)
+#define TCSETS2_IOW('T', 43, struct termios2)
+#define TCSETSW2_IOW('T', 44, struct termios2)
+#define TCSETSF2_IOW('T', 45, struct termios2)
+
#define TIOCSWINSZ_IOW('t', 103, struct winsize)
#define TIOCGWINSZ_IOR('t', 104, struct winsize)
#define TIOCSTART_IO('t', 110)/* start output, like ^Q */
--- linux-4.15.0.orig/arch/alpha/include/uapi/asm/termbits.h
+++ linux-4.15.0/arch/alpha/include/uapi/asm/termbits.h
@@ -26,6 +26,19 @@
speed_t c_ospeed;/* output speed */

/* Alpha has identical termios and termios2 */
+
+struct termios2 {
+   tcflag_t c_iflag;/* input mode flags */
+   tcflag_t c_oflag;/* output mode flags */
+   tcflag_t c_cflag;/* control mode flags */
+   tcflag_t c_lflag;/* local mode flags */
+   cc_t c_cc[NCCS];/* control characters */
+   cc_t c_line;/* line discipline (= c_cc[19]) */
+   speed_t c_ispeed;/* input speed */
+   speed_t c_ospeed;/* output speed */
+};
+
/* Alpha has matching termios and ktermios */

struct ktermios {
   @@ -148,6 +161,7 @@
#define B3000000 00034
#define B3500000 00035
#define B4000000 00036

---
+#define BOTHER  00037

#define CSIZE00001400
#define CS5000000000
@ @ -165.6 +179.9 @ @
#define CMSPAR 010000000000/* mark or space (stick) parity */
#define CRTSCTS 020000000000/* flow control */

+#define CIBAUD07600000
+#define IBSHIFT16
+
/* c_lflag bits */
#define ISIG     0x00000080
#define ICANON   0x00000100
--- linux-4.15.0.orig/arch/alpha/kernel/console.c
+++ linux-4.15.0/arch/alpha/kernel/console.c
@ @ -21.6 +21.7 @ @
struct pci_controller *pci_vga_hose;
static struct resource alpha_vga = {
 .name = "alpha-vga+",
 .flags = IORESOURCE_IO,
 .start = 0x3C0,
 .end = 0x3DF
};
--- linux-4.15.0.orig/arch/alpha/kernel/io.c
+++ linux-4.15.0/arch/alpha/kernel/io.c
@ @ -16.21 +16.27 @ @
unsigned int ioread8(void __iomem *addr)
{
 -unsigned int ret = IO_CONCAT(__IO_PREFIX,ioread8)(addr);
 +unsigned int ret;
 +mb();
 +ret = IO_CONCAT(__IO_PREFIX,ioread8)(addr);
 mb();
 return ret;
 }

unsigned int ioread16(void __iomem *addr)
{
 -unsigned int ret = IO_CONCAT(__IO_PREFIX,ioread16)(addr);
 +unsigned int ret;
 +mb();
 +ret = IO_CONCAT(__IO_PREFIX,ioread16)(addr);
 mb();
 return ret;
 }
unsigned int ioread32(void __iomem *addr)
{
    -unsigned int ret = IO_CONCAT(__IO_PREFIX,ioread32)(addr);
    +unsigned int ret;
    +mb();
    +ret = IO_CONCAT(__IO_PREFIX,ioread32)(addr);
    mb();
    return ret;
}
@@ -148,28 +154,36 @@

u8 readb(const volatile void __iomem *addr)
{
    -u8 ret = __raw_readb(addr);
    +u8 ret;
    +mb();
    +ret = __raw_readb(addr);
    mb();
    return ret;
}

u16 readw(const volatile void __iomem *addr)
{
    -u16 ret = __raw_readw(addr);
    +u16 ret;
    +mb();
    +ret = __raw_readw(addr);
    mb();
    return ret;
}

u32 readl(const volatile void __iomem *addr)
{
    -u32 ret = __raw_readl(addr);
    +u32 ret;
    +mb();
    +ret = __raw_readl(addr);
    mb();
    return ret;
}

u64 readq(const volatile void __iomem *addr)
{
    -u64 ret = __raw_readq(addr);
    +u64 ret;
    +mb();
    +ret = __raw_readq(addr);
    mb();
return ret;
}
EXPORT_SYMBOL(writel);
EXPORT_SYMBOL(writeq);

+/
+ * The _relaxed functions must be ordered w.r.t. each other, but they don't
+ * have to be ordered w.r.t. other memory accesses.
+ */
+u8 readb_relaxed(const volatile void __iomem *addr)
+{
+mb();
+return __raw_readb(addr);
+
+u16 readw_relaxed(const volatile void __iomem *addr)
+{
+mb();
+return __raw_readw(addr);
+
+u32 readl_relaxed(const volatile void __iomem *addr)
+{
+mb();
+return __raw_readl(addr);
+
+u64 readq_relaxed(const volatile void __iomem *addr)
+{
+mb();
+return __raw_readq(addr);
+
+EXPORT_SYMBOL(readb_relaxed);
+EXPORT_SYMBOL(readw_relaxed);
+EXPORT_SYMBOL(readl_relaxed);
+EXPORT_SYMBOL(readq_relaxed);

/*
 * Read COUNT 8-bit bytes from port PORT into memory starting at SRC.
--- linux-4.15.0.orig/arch/alpha/kernel/osf_sys.c
+++ linux-4.15.0/arch/alpha/kernel/osf_sys.c
@@ -530,24 +530,19 @@
SYSCALL_DEFINE1(osf_utsname, char __user *, name)
{
  int error;
+char tmp[5 * 32];
down_read(&uts_sem);
-error = -EFAULT;
-if (copy_to_user(name + 0, utsname()->sysname, 32))
-goto out;
-if (copy_to_user(name + 32, utsname()->nodename, 32))
-goto out;
-if (copy_to_user(name + 64, utsname()->release, 32))
-goto out;
-if (copy_to_user(name + 96, utsname()->version, 32))
-goto out;
-if (copy_to_user(name + 128, utsname()->machine, 32))
-goto out;
+memcpy(tmp + 0 * 32, utsname()->sysname, 32);
+memcpy(tmp + 1 * 32, utsname()->nodename, 32);
+memcpy(tmp + 2 * 32, utsname()->release, 32);
+memcpy(tmp + 3 * 32, utsname()->version, 32);
+memcpy(tmp + 4 * 32, utsname()->machine, 32);
+up_read(&uts_sem);

-error = 0;
-out:
-up_read(&uts_sem);
-return error;
+if (copy_to_user(name, tmp, sizeof(tmp)))
+return -EFAULT;
+return 0;
}

SYSCALL_DEFINE0(getpagesize)
@@ -567,18 +562,21 @@
{
    int len, err = 0;
    char *kname;
    +char tmp[32];

    -if (namelen > 32)
    +if (namelen < 0 || namelen > 32)
    namelen = 32;

down_read(&uts_sem);
    kname = utsname()->domainname;
    len = strnlen(kname, namelen);
    -if (copy_to_user(name, kname, min(len + 1, namelen)))
    -err = -EFAULT;
    +len = min(len + 1, namelen);
    +memcpy(tmp, kname, len);
    up_read(&uts_sem);
-return err;
+if (copy_to_user(name, tmp, len))
+return -EFAULT;
+return 0;
}

/*
@@ -739,13 +737,14 @@
};
unsigned long offset;
const char *res;
-\tlong len, err = -EINVAL;
+\tlong len;
+\tchar tmp[__NEW_UTS_LEN + 1];

offset = command-1;
if (offset >= ARRAY_SIZE(sysinfo_table)) {
 /* Digital UNIX has a few unpublished interfaces here */
 printk("sysinfo(%d)", command);
 goto out;
+return -EINVAL;
}

down_read(&uts_sem);
@@ -753,13 +752,11 @@
 len = strlen(res)+1;
 if ((unsigned long)len > (unsigned long)count)
 len = count;
-\tif (copy_to_user(buf, res, len))
-\t\t\terror = -EFAULT;
-\telse
-\t\terror = 0;
-\tmemcpy(tmp, res, len);
+memcpy(tmp, res, len);
 up_read(&uts_sem);
- \t\tout:
- \t\t\treturn err;
+\tif (copy_to_user(buf, tmp, len))
+\t\t\treturn -EFAULT;
+\t\treturn 0;
}

SYSCALL_DEFINE5(osf_getsysinfo, unsigned long, op, void __user *, buffer,
@@ -964,8 +961,8 @@
 put_tv32(struct timeval32 __user *, struct timeval *)
 {
 return copy_to_user(o, &(struct timeval32){
-\t\t.tv_sec = o->tv_sec,
- tv_usec = o->tv_usec,
+ tv_sec = i->tv_sec,
+ tv_usec = i->tv_usec,
    sizeof(struct timeval32));
}

@@ -1183,13 +1180,10 @@
 SYSCALL_DEFINE4(osf_wait4, pid_t, pid, int __user *, ustatus, int, options,
 struct rusage32 __user *, ur)
 {
- unsigned int status = 0;
 struct rusage r;
- long err = kernel_wait4(pid, &status, options, &r);
+ long err = kernel_wait4(pid, ustatus, options, &r);
 if (err <= 0)
   return err;
- if (put_user(status, ustatus))
- return -EFAULT;
 if (!ur)
   return err;
 if (put_tv32(&ur->ru_utime, &r.ru_utime))
--- linux-4.15.0.orig/arch/alpha/kernel/pci_impl.h
+++ linux-4.15.0/arch/alpha/kernel/pci_impl.h
@@ -144,7 +144,8 @@
 
 #if defined(CONFIG_ALPHA_SRM) &&
- (defined(CONFIG_ALPHA_CIA) || defined(CONFIG_ALPHA_LCA))
+ (defined(CONFIG_ALPHA_CIA) || defined(CONFIG_ALPHA_LCA) ||
+ defined(CONFIG_ALPHA_AVANTI))
 # define NEED_SRM_SAVE_RESTORE
 #else
 # undef NEED_SRM_SAVE_RESTORE
--- linux-4.15.0.orig/arch/alpha/kernel/process.c
+++ linux-4.15.0/arch/alpha/kernel/process.c
@@ -269,12 +269,13 @@
 application calling fork. */
 if (clone_flags & CLONE_SETTLS)
   childti->pcb.unique = regs->r20;
+else
+ regs->r20 = 0;/* OSF/1 has some strange fork() semantics. */
   childti->pcb.usp = usp ?: rdusp();
 *childregs = *regs;
 childregs->r0 = 0;
 childregs->r19 = 0;
 childregs->r20 = 1;/* OSF/1 has some strange fork() semantics. */
- regs->r20 = 0;
 stack = ((struct switch_stack *) regs) - 1;

*childstack = *stack;
childstack->r26 = (unsigned long) ret_from_fork;
--- linux-4.15.0.orig/arch/alpha/kernel/smp.c
+++ linux-4.15.0/arch/alpha/kernel/smp.c
@@ -585,7 +585,7 @@
smp_send_stop(void)
{
    cpumask_t to_whom;
-    cpumask_copy(&to_whom, cpu_possible_mask);
+    cpumask_copy(&to_whom, cpu_online_mask);
    cpumask_clear_cpu(smp_processor_id(), &to_whom);
    #ifdef DEBUG_IPI_MSG
    if (hard_smp_processor_id() != boot_cpu_id)
--- linux-4.15.0.orig/arch/alpha/kernel/traps.c
+++ linux-4.15.0/arch/alpha/kernel/traps.c
@@ -160,11 +160,16 @@
for(i=0; i < kstack_depth_to_print; i++) {
    if (((long) stack & (THREAD_SIZE-1)) == 0)
        break;
-    if (i & ((i % 4) == 0))
-        printk("\n ");
-    printk("%016lx", *stack++);
+    if ((i % 4) == 0) {
+        if (i)
+            pr_cont("\n");
+        printk(" ");
+    } else {
+        pr_cont(" ");
+    }
+    pr_cont("%016lx", *stack++);
} {
    printk("\n");
    pr_cont("\n");
dik_show_trace(sp);
}
--- linux-4.15.0.orig/arch/alpha/mm/fault.c
+++ linux-4.15.0/arch/alpha/mm/fault.c
@@ -78,7 +78,7 @@
#define dpf_reg(r)																																																																																																																																																																																																																																																																																																																																																																				
asmlinkage void
do_page_fault(unsigned long address, unsigned long mmcsr,
--- linux-4.15.0.orig/arch/arc/Kconfig
+++ linux-4.15.0/arch/arc/Kconfig
@@ -21,6 +21,7 @@
select GENERIC_IRQ_SHOW
select GENERIC_PCI_IOMAP
select GENERIC_PENDING_IRQ if SMP
+select GENERIC_SCHED_CLOCK
select GENERIC_SMP_IDLE_THREAD
select HAVE_ARCH_KGDB
select HAVE_ARCH_TRACEHOOK
@@ -45,6 +46,9 @@
select HAVE_KERNEL_GZIP
select HAVE_KERNEL_LZMA
+config ARCH_HAS_CACHE_LINE_SIZE
def_bool y
+
config MIGHT_HAVE_PCI
bool
@@ -106,7 +110,7 @@
choice
prompt "ARC Instruction Set"
-default ISA_ARCOMPACT
+default ISA_ARCV2

config ISA_ARCOMPACT
bool "ARCompact ISA"
@@ -193,7 +197,6 @@
choice
prompt "ARC Instruction Set"
-default ISA_ARCOMPACT
+default ISA_ARCV2

config ARC_SMP_HALT_ON_RESET
bool "Enable Halt-on-reset boot mode"
-default y if ARC_UBOOT_SUPPORT
help
In SMP configuration cores can be configured as Halt-on-reset
or they could all start at same time. For Halt-on-reset, non
@@ -408,12 +411,20 @@

config ARC_HAS_ACCL_REGS
bool "Reg Pair ACCL::ACCH (FPU and/or MPY > 6)"
-default n
+default y
help
Depending on the configuration, CPU can contain accumulator reg-pair
(also referred to as r58:r59). These can also be used by gcc as GPR so
kernel needs to save/restore per process
+config ARC_IRQ_NO_AUTOSAVE
+bool "Disable hardware autosave regfile on interrupts"
+default n
+help
  + On HS cores, taken interrupt auto saves the regfile on stack.
  + This is programmable and can be optionally disabled in which case
  + software INTERRUPT_PROLOGUE/EPILGUE do the needed work
+endif # ISA_ARCV2

endmenu  # "ARC CPU Configuration"
@@ -487,7 +498,6 @@
config ARC_EMUL_UNALIGNED
  bool "Emulate unaligned memory access (userspace only)"
-  default N
select SYSCTL_ARCH_UNALIGN_NO_WARN
select SYSCTL_ARCH_UNALIGN_ALLOW
depends on ISA_ARCOMPACT
@@ -534,18 +544,6 @@
endif

-config ARC_UBOOT_SUPPORT
-bool "Support uboot arg Handling"
-default n
-help
-  - ARC Linux by default checks for uboot provided args as pointers to
-  - external cmdline or DTB. This however breaks in absence of uboot,
-  - when booting from Metaware debugger directly, as the registers are
-  - not zeroed out on reset by mdb and/or ARCV2 based cores. The bogus
-  - registers look like uboot args to kernel which then chokes.
-  - So only enable the uboot arg checking/processing if users are sure
-  - of uboot being in play.
-  -
-config ARC_BUILTIN_DTB_NAME
  string "Built in DTB"
help
--- linux-4.15.0.orig/arch/arc/Makefile
+++ linux-4.15.0/arch/arc/Makefile
@@ -6,34 +6,12 @@
# published by the Free Software Foundation.
#

-ifeq ($(CROSS_COMPILE),)
-ifndef CONFIG_CPU_BIG_ENDIAN
-  CROSS_COMPILE := arc-linux-
-else
-  CROSS_COMPILE := arceb-linux-

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-endif
-endif
+KBUILD_DEFCONFIG := nsim_hs_defconfig

- KBUILD_DEFCONFIG := nsim_700_defconfig
-
- cflags-y+= -fno-common -pipe -fno-built-in -D__linux__
+ cflags-y+= -fno-common -pipe -fno-built-in -mmedium-calls -D__linux__
 cflags-$(CONFIG_ISA_ARCOMPACT) += -mA7
 cflags-$(CONFIG_ISA_ARCV2) += -mcpu=archs

-is_700 = $(shell $(CC) -dM -E - < /dev/null | grep -q "ARC700" && echo 1 || echo 0)
- ifdef CONFIG_ISA_ARCOMPACT
- ifeq ($(is_700), 0)
- $(error Toolchain not configured for ARCompact builds)
- endif
- endif
- ifdef CONFIG_ISA_ARCV2
- ifeq ($(is_700), 1)
- $(error Toolchain not configured for ARCv2 builds)
- endif
- endif

ifdef CONFIG_ARC_CURR_IN_REG
# For a global register definition, make sure it gets passed to every file
# We had a customer reported bug where some code built in kernel was NOT using
@@ -87,7 +65,7 @@
# --build-id w/o "-marclinux". Default arc-elf32-ld is OK
 ldflags-$(upto_gcc44) += -marclinux

-LIBGCC := $(shell $(CC) $(cflags-y) --print-libgcc-file-name)
+LIBGCC := $(shell $(CC) $(cflags-y) --print-libgcc-file-name)

# Modules with short calls might break for calls into builtin-kernel
KBUILD_CFLAGS_MODULE += -mlong-calls -mno-millicode
@@ -121,14 +99,9 @@

boot := arch/arc/boot

-#default target for make without any arguments.
- KBUILD_IMAGE := $(boot)/bootImage
-
-all: bootImage
- bootImage: vmlinux
-
- boot_targets += ulmage ulmage.bin ulmage.gz
+boot_targets := ulmage ulmage.bin ulmage.gz ulmage.lzma

+PHONY += $(boot_targets)
$(boot_targets): vmlinux
$(Q)$(MAKE) $(build)=$(boot) $(boot)/$@

@@ -140,16 +113,3 @@
archclean:
$(Q)$(MAKE) $(clean)=$(boot)
-
-# Hacks to enable final link due to absence of link-time branch relexation
-# and gcc choosing optimal(shorter) branches at -O3
-#
-# vineetg Feb 2010: -mlong-calls switched off for overall kernel build
-# However lib/decompress_inflate.o (.init.text) calls
-# zlib_inflate_workspacesize (.text) causing relocation errors.
-# Thus forcing all exten calls in this file to be long calls
-export CFLAGS_decompress_inflate.o = -mmedium-calls
-export CFLAGS_initramfs.o = -mmedium-calls
-ifdef CONFIG_SMP
-export CFLAGS_core.o = -mmedium-calls
-endif
--- linux-4.15.0.orig/arch/arc/boot/dts/axs10x_mb.dtsi
+++ linux-4.15.0/arch/arc/boot/dts/axs10x_mb.dtsi
@@ -9,6 +9,10 @@
    	{
    		aliases {
    			emac = &gmac;
    	};
    +
    axs10x_mb {
      compatible = "simple-bus";
      #address-cells = <1>;
      @ @ -68,7 +72,7 @@
    };
snps,pbl = < 32 >;
+snps,multicast-filter-bins = <256>;
clocks = <&apbclk>;
clock-names = "stmmaceth";
max-speed = <100>;
resets = <&creg_rst 5>;
reset-names = "stmmaceth";
+mac-address = [00 00 00 00 00 00]; /* Filled in by U-Boot */
};

ehci@0x40000 {
--- linux-4.15.0.orig/arch/arc/boot/dts/hsdk.dts
+++ linux-4.15.0/arch/arc/boot/dts/hsdk.dts
@@ -25,6 +25,10 @@
bootargs = "earlycon=uart8250,mmio32,0xf0005000,115200n8 console=ttyS0,115200n8 debug print-fatal-signals=1";
};
+aliases {
+ ethernet = &gmac;
+};
+ cpus {
#address-cells = <1>;
#size-cells = <0>;
@@ -79,6 +83,8 @@
arcpct: pct {
 compatible = "snps,archs-pct";
 +interrupt-parent = <&cpu_intc>;
 +interrupts = <20>;
 };"TIMER0 with interrupt for clockevent */
@@ -163,25 +169,30 @@
#clock-cells = <0>;
}
- ethernet@8000 {
+ gmac: ethernet@8000 {
#interrupt-cells = <1>;
 compatible = "snps,dwmac";
 reg = <0x8000 0x2000>;
 interrupts = <10>;
 interrupt-names = "macirq";
-phy-mode = "rgmii";
+phy-mode = "rgmii-id";
 snps,pbl = <32>;
}
+snps.multicast-filter-bins = <256>;
clocks = <&gmacclk>;
clock-names = "stmmaceth";
phy-handle = <&phy0>;
resets = <&cgu_rst HSDK_ETH_RESET>;
reset-names = "stmmaceth";
+mac-address = [00 00 00 00 00 00]; /* Filled in by U-Boot */
+tx-fifo-depth = <4096>;
+rx-fifo-depth = <4096>;

mdio {
#address-cells = <1>;
#size-cells = <0>;
compatible = "snps,dwmac-mdio";
-phy0: ethernet-phy@0 {
+phy0: ethernet-phy@0 [ /* Micrel KSZ9031 */
  reg = <0>;
  ti.rx-internal-delay = <DP83867_RGMIIDCTL_2_00_NS>;
  ti.tx-internal-delay = <DP83867_RGMIIDCTL_2_00_NS>;
--- linux-4.15.0.orig/arch/arc/configs/axs101_defconfig
+++ linux-4.15.0/arch/arc/configs/axs101_defconfig
@@ -1,5 +1,4 @@
CONFIG_DEFAULT_HOSTNAME="ARCLinux"
-# CONFIG_SWAP is not set
CONFIG_SYSVIPC=y
CONFIG_POSIX_MQUEUE=y
# CONFIG_CROSS_MEMORY_ATTACH is not set
@@ -11,12 +10,12 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../arc_initramfs/"
+CONFIG_INITRAMFS_SOURCE="../arc_initramfs/"
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
# CONFIG_VM_EVENT COUNTERS is not set
# CONFIG_SLUB_DEBUG is not set
# CONFIG_COMPAT_BRK is not set
+CONFIG_ISA_ARCOMPACT=y
CONFIG_MODULES=y
CONFIG_MODULE_FORCE_LOAD=y
CONFIG_MODULE_UNLOAD=y
@@ -100,6 +99,7 @@
CONFIG_NTFS_FS=y
CONFIG_TMPFS=y
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
CONFIG-NLS_CODEPAGE_437=y
CONFIG_NLS_ISO8859_1=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
--- linux-4.15.0.orig/arch/arc/configs/axs103_defconfig
+++ linux-4.15.0/arch/arc/configs/axs103_defconfig
@@ -1,5 +1,4 @@
CONFIG_DEFAULT_HOSTNAME="ARCLinux"
-# CONFIG_SWAP is not set
CONFIG_SYSVIPC=y
CONFIG_POSIX_MQUEUE=y
# CONFIG_CROSS_MEMORY_ATTACH is not set
@@ -11,7 +10,6 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../../arc_initramfs_hs/"
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
# CONFIG_VM_EVENT_COUNTERS is not set
@@ -99,6 +97,7 @@
CONFIG_NTFS_FS=y
CONFIG_TMPFS=y
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
CONFIG_NLS_CODEPAGE_437=y
CONFIG_NLS_ISO8859_1=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
--- linux-4.15.0.orig/arch/arc/configs/axs103_smp_defconfig
+++ linux-4.15.0/arch/arc/configs/axs103_smp_defconfig
@@ -1,5 +1,4 @@
CONFIG_DEFAULT_HOSTNAME="ARCLinux"
-# CONFIG_SWAP is not set
CONFIG_SYSVIPC=y
CONFIG_POSIX_MQUEUE=y
# CONFIG_CROSS_MEMORY_ATTACH is not set
@@ -11,7 +10,6 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../../arc_initramfs_hs/"
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
# CONFIG_VM_EVENT_COUNTERS is not set
@@ -102,6 +100,7 @@
CONFIG_NTFS_FS=y
CONFIG_TMPFS=y
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
CONFIG_NLS_CODEPAGE_437=y
CONFIG_NLS_ISO8859_1=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
--- linux-4.15.0.orig/arch/arc/configs/haps_hs_defconfig
+++ linux-4.15.0/arch/arc/configs/haps_hs_defconfig
@@ -11,7 +11,6 @@
    # CONFIG_UTS_NS is not set
    # CONFIG_PID_NS is not set
  CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../../arc_initramfs_hs/"
  CONFIG_EXPERT=y
  CONFIG_PERF_EVENTS=y
# CONFIG_COMPAT_BRK is not set
--- linux-4.15.0.orig/arch/arc/configs/haps_hs_smp_defconfig
+++ linux-4.15.0/arch/arc/configs/haps_hs_smp_defconfig
@@ -11,7 +11,6 @@
    # CONFIG_UTS_NS is not set
    # CONFIG_PID_NS is not set
  CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../../arc_initramfs_hs/"
  CONFIG_EMBEDDED=y
  CONFIG_PERF_EVENTS=y
  # CONFIG_VM_EVENT_COUNTERS is not set
--- linux-4.15.0.orig/arch/arc/configs/hsdk_defconfig
+++ linux-4.15.0/arch/arc/configs/hsdk_defconfig
@@ -9,7 +9,7 @@
    # CONFIG_UTS_NS is not set
    # CONFIG_PID_NS is not set
  CONFIG_BLK_DEV_INITRD=y
+CONFIG_BLK_DEV_RAM=y
  CONFIG_EMBEDDED=y
  CONFIG_PERF_EVENTS=y
# CONFIG_VM_EVENT_COUNTERS is not set
--- linux-4.15.0.orig/arch/arc/configs/nps_defconfig
+++ linux-4.15.0/arch/arc/configs/nps_defconfig
@@ -15,6 +15,7 @@
      CONFIG_EMBEDDED=y
    CONFIG_PERF_EVENTS=y
  # CONFIG_VM_EVENT_COUNTERS is not set
      @ @ -68,6 +68,7 @@
    CONFIG_VFAT_FS=y
    CONFIG_TMPFS=y
    CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
    CONFIG_NLS_CODEPAGE_437=y
    CONFIG_NLS_ISO8859_1=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
--- linux-4.15.0.orig/arch/arc/configs/nps_defconfig
+++ linux-4.15.0/arch/arc/configs/nps_defconfig
@@ -15,6 +15,7 @@
      CONFIG_EMBEDDED=y
    CONFIG_PERF_EVENTS=y
# CONFIG_COMPAT_BRK is not set
+CONFIG_ISA_ARCOMPACT=y
--- linux-4.15.0.orig/arch/arc/configs/nps_defconfig
+++ linux-4.15.0/arch/arc/configs/nps_defconfig
@@ -15,6 +15,7 @@
CONFIG_KPROBES=y
CONFIG_MODULES=y
CONFIG_MODULE_FORCE_LOAD=y
# CONFIG_ARC_HAS_LLSC is not set
CONFIG_ARC_KVADDR_SIZE=402
CONFIG_ARC_EMUL_UNALIGNED=y
-CONFIG_ARC_U_BOOT_SUPPORT=y
CONFIG_PREEMPT=y
CONFIG_NET=y
CONFIG_UNIX=y
# CONFIG_MISC_FILESYSTEMS is not set
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
CONFIG_ROOT_NFS=y
CONFIG_DEBUG_INFO=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
--- linux-4.15.0.orig/arch/arc/configs/nsim_700_defconfig
+++ linux-4.15.0/arch/arc/configs/nsim_700_defconfig
@@ -11,12 +11,12 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../arc_initramfs"
CONFIG_KALLSYMS_ALL=y
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
# CONFIG_SLUB_DEBUG is not set
# CONFIG_COMPAT_BRK is not set
+CONFIG_ISA_ARCOMPACT=y
CONFIG_KPROBES=y
CONFIG_MODULES=y
# CONFIG_LBDAF is not set
--- linux-4.15.0.orig/arch/arc/configs/nsim_hs_defconfig
+++ linux-4.15.0/arch/arc/configs/nsim_hs_defconfig
@@ -9,7 +9,6 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="/../arc_initramfs_hs"
CONFIG_KALLSYMS_ALL=y
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
--- linux-4.15.0.orig/arch/arc/configs/nsim_hs_smp_defconfig
+++ linux-4.15.0/arch/arc/configs/nsim_hs_smp_defconfig
@@ -9,7 +9,6 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../arc_initramfs/"
CONFIG_KALLSYMS_ALL=y
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
--- linux-4.15.0.orig/arch/arc/configs/nsimosci_defconfig
+++ linux-4.15.0/arch/arc/configs/nsimosci_defconfig
@@ -11,12 +11,12 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../arc_initramfs/"
CONFIG_KALLSYMS_ALL=y
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
# CONFIG_SLUB_DEBUG is not set
# CONFIG_COMPAT_BRK is not set
+CONFIG_ISA_ARCOMPACT=y
CONFIG_KPROBES=y
CONFIG_MODULES=y
# CONFIG_LBDAF is not set
# CONFIG_ENABLE_WARN_DEPRECATED is not set
# CONFIG_ENABLE_MUST_CHECK is not set
--- linux-4.15.0.orig/arch/arc/configs/nsimosci_hs_defconfig
+++ linux-4.15.0/arch/arc/configs/nsimosci_hs_defconfig
@@ -11,7 +11,6 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../arc_initramfs_hs/"
CONFIG_KALLSYMS_ALL=y
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
@@ -69,5 +68,6 @@
CONFIG_TMPFS=y
# CONFIG_MISC_FILESYSTEMS is not set
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
# CONFIG_ENABLE_MUST_CHECK is not set
--- linux-4.15.0.orig/arch/arc/configs/nsimosci_hs_defconfig
+++ linux-4.15.0/arch/arc/configs/nsimosci_hs_defconfig
@@ -11,7 +11,6 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="../arc_initramfs_hs/"
CONFIG_KALLSYMS_ALL=y
CONFIG_EMBEDDED=y
CONFIG_PERF_EVENTS=y
@@ -69,5 +68,6 @@
CONFIG_TMPFS=y
# CONFIG_MISC_FILESYSTEMS is not set
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
# CONFIG_ENABLE_MUST_CHECK is not set
--- linux-4.15.0.orig/arch/arc/configs/nsimosci_hs_smp_defconfig
+++ linux-4.15.0/arch/arc/configs/nsimosci_hs_smp_defconfig
@@ -9,7 +9,6 @@
# CONFIG_UTS_NS is not set
# CONFIG_PID_NS is not set
CONFIG_BLK_DEV_INITRD=y
-CONFIG_INITRAMFS_SOURCE="./arc_initramfs_hs"
CONFIG_PERF_EVENTS=y
# CONFIG_COMPAT_BRK is not set
CONFIG_KPROBES=y
@@ -80,6 +79,7 @@
CONFIG_TMPFS=y
# CONFIG_MISC_FILESYSTEMS is not set
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
# CONFIG_ENABLE_MUST_CHECK is not set
CONFIG_FTRACE=y
--- linux-4.15.0.orig/arch/arc/configs/tb10x_defconfig
+++ linux-4.15.0/arch/arc/configs/tb10x_defconfig
@@ -19,6 +19,7 @@
# CONFIG_AIO is not set
CONFIG_EMBEDDED=y
# CONFIG_COMPAT_BRK is not set
+CONFIG_ISA_ARCOMPACT=y
CONFIG_SLAB=y
CONFIG_MODULES=y
CONFIG_MODULE_FORCE_LOAD=y
--- linux-4.15.0.orig/arch/arc/configs/vdk_hs38_defconfig
+++ linux-4.15.0/arch/arc/configs/vdk_hs38_defconfig
@@ -14,7 +14,6 @@
CONFIG_ARC_PLAT_AXS10X=y
CONFIG_AXS103=y
-CONFIG_ARC_UBOOT_SUPPORT=y
CONFIG_ARC_BUILTIN_DTB_NAME="vdk_hs38"
CONFIG_PREEMPT=y
CONFIG_NET=y
@@ -88,6 +87,7 @@
CONFIG_TMPFS=y
CONFIG_JFFS2_FS=y
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
CONFIG-NLS_CODEPAGE_437=y
CONFIG-NLS_ISO8859_1=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
--- linux-4.15.0.orig/arch/arc/configs/vdk_hs38_smp_defconfig
+++ linux-4.15.0/arch/arc/configs/vdk_hs38_smp_defconfig
@@ -16,8 +16,6 @@
CONFIG_ISA_ARCV2=y
CONFIG_SMP=y
# CONFIG_ARC_TIMERS_64BIT is not set
-# CONFIG_ARC_SMP_HALT_ON_RESET is not set
-CONFIG_ARC_UBOOT_SUPPORT=y
CONFIG_ARC_BUILTIN_DTB_NAME="vdk_hs38_smp"
CONFIG_PREEMPT=y
CONFIG_NET=y
@@ -92,6 +90,7 @@
CONFIG_TMPFS=y
CONFIG_JFFS2_FS=y
CONFIG_NFS_FS=y
+CONFIG_NFS_V3_ACL=y
CONFIG_NLS_CODEPAGE_437=y
CONFIG_NLS_ISO8859_1=y
# CONFIG_ENABLE_WARN_DEPRECATED is not set
--- linux-4.15.0.orig/arch/arc/include/asm/arcregs.h
+++ linux-4.15.0/arch/arc/include/asm/arcregs.h
@@ -151,6 +151,14 @@
#endif
};
+struct bcr_uarch_build_arcv2 {
+  #ifdef CONFIG_CPU_BIG_ENDIAN
+    unsigned int pad:8, prod:8, maj:8, min:8;
+  #else
+    unsigned int min:8, maj:8, prod:8, pad:8;
+  #endif
+};
+
+struct bcr_mpy {
+  #ifdef CONFIG_CPU_BIG_ENDIAN
+    unsigned int pad:8, x1616:8, dsp:4, cycles:2, type:2, ver:8;
+  #endif
+
struct bcr_uarch_build_arcv2 {
+  #ifdef CONFIG_CPU_BIG_ENDIAN
+    unsigned int pad:8, prod:8, maj:8, min:8;
+  #else
+    unsigned int min:8, maj:8, prod:8, pad:8;
+  #endif
+};
+
+struct bcr_mpy {
+  #ifdef CONFIG_CPU_BIG_ENDIAN
+    unsigned int pad:8, x1616:8, dsp:4, cycles:2, type:2, ver:8;
+  #endif
+};

/*
* __ffs: Similar to ffs, but zero based (0-31)
  */
-static inline __attribute__ ((const)) int __ffs(unsigned long word)
+static inline __attribute__ ((const)) unsigned long __ffs(unsigned long word)
{
    if (!word)
        return word;
    @@ -400,9 +400,9 @@
    /*
     * __ffs: Similar to ffs, but zero based (0-31)
     */
     -static inline __attribute__ ((const)) int __ffs(unsigned long x)
     +static inline __attribute__ ((const)) unsigned long __ffs(unsigned long x)
     {
          -int n;
          +unsigned long n;

     asm volatile(
     "ffs.f%0, %1\n   /* 0:31; 31(Z) if src 0 */
     --- linux-4.15.0.orig/arch/arc/include/asm/bug.h
     +++ linux-4.15.0/arch/arc/include/asm/bug.h
     @@ -23,7 +23,8 @@
     #define BUG()	do {								
        pr_warn("BUG: failure at %s:%d/%s()!
        -dump_stack();
        +barrier_before_unreachable();
        +__builtin_trap();
        } while (0)
     #define HAVE_ARCH_BUG
     --- linux-4.15.0.orig/arch/arc/include/asm/cache.h
     +++ linux-4.15.0/arch/arc/include/asm/cache.h
     @@ -48,7 +48,20 @@
          )
     /* Largest line length for either L1 or L2 is 128 bytes */
     +#define ARCH_DMA_MINALIGN 128
     +#define SMP_CACHE_BYTES128
     +#define cache_line_size()SMP_CACHE_BYTES
     +#define ARCH_DMA_MINALIGNSMP_CACHE_BYTES
     +
     +/*
     + * Make sure slab-allocated buffers are 64-bit aligned when atomic64_t uses
     + * ARCv2 64-bit atomics (LLOCKD/SCONDD). This guarantees runtime 64-bit
     + * alignment for any atomic64_t embedded in buffer.
     + * Default ARCH_SLAB_MINALIGN is __alignof__(long long) which has a relaxed
     + * value of 4 (and not 8) in ARC ABI.

+ */
+ #if defined(CONFIG_ARC_HAS_LL64) && defined(CONFIG_ARC_HAS_LLSC)
+ #define ARCH_SLAB_MINALIGN8
+ #endif

extern void arc_cache_init(void);
extern char *arc_cache_mumbojumbo(int cpu_id, char *buf, int len);
@@ -111,7 +124,9 @@
/* IO coherency related Auxiliary registers */
#define ARC_REG_IO_COH_ENABLE 0x500
#define ARC_IO_COH_ENABLE_BIT BIT(0)
#define ARC_REG_IO_COH_PARTIAL 0x501
#define ARC_IO_COH_PARTIAL_BIT BIT(0)
#define ARC_REG_IO_COH_AP0_BASE 0x508
#define ARC_REG_IO_COH_AP0_SIZE 0x509

--- linux-4.15.0.orig/arch/arc/include/asm/cmpxchg.h
+++ linux-4.15.0/arch/arc/include/asm/cmpxchg.h
@@ -92,8 +92,11 @@
#endif /* CONFIG_ARC_HAS_LLSC */

-#define cmpxchg(ptr, o, n) ((typeof(*(ptr)))__cmpxchg((ptr), 
- (unsigned long)(o), (unsigned long)(n)))
+#define cmpxchg(ptr, o, n) ({
+ (typeof(*(ptr)))__cmpxchg((ptr),
+ (unsigned long)(o),
+ (unsigned long)(n));
+ })

/*
* atomic_cmpxchg is same as cmpxchg
@@ -198,8 +201,11 @@
 return __xchg_bad_pointer();
 }

-#define xchg(ptr, with) ((typeof(*(ptr)))__xchg((unsigned long)(with), (ptr), 
- sizeof(*(ptr)))
+#define xchg(ptr, with) ({
+ (typeof(*(ptr)))__xchg((unsigned long)(with),
+ (ptr),
+ sizeof(*(ptr));
+ })

#endif /* CONFIG_ARC_PLAT_EZNPS */

--- linux-4.15.0.orig/arch/arc/include/asm/delay.h
+++ linux-4.15.0/arch/arc/include/asm/delay.h
@@ -17,8 +17,11 @@
#ifndef __ASM_ARC_UDELAY_H
#define __ASM_ARC_UDELAY_H
+#include <asm-generic/types.h>
#include <asm/param.h> /* HZ */
+extern unsigned long loops_per_jiffy;
+
static inline void __delay(unsigned long loops)
{
    __asm__ __volatile__ ("
--- linux-4.15.0.orig/arch/arc/include/asm/elf.h
+++ linux-4.15.0/arch/arc/include/asm/elf.h
@@ -26,7 +26,7 @@
#define  R_ARC_32_PCREL		0x31
/*to set parameters in the core dumps */
-#define ELF_ARCH		EM_ARCOMPACT
+#define ELF_ARCH		EM_ARC_INUSE
#define ELF_CLASS		ELFCLASS32

#endif CONFIG_CPU_BIG_ENDIAN
--- linux-4.15.0.orig/arch/arc/include/asm/entry-arcv2.h
+++ linux-4.15.0/arch/arc/include/asm/entry-arcv2.h
@@ -17,6 +17,33 @@
; ; Now manually save: r12, sp, fp, gp, r25

+#ifdef CONFIG_ARC_IRQ_NO_AUTOSAVE
+.ifnc \called_from, exception
+st.as	 r9, [sp, -10]	; save r9 in it's final stack slot
+subsp, sp, 12; skip JLI, LDI, EI
+
+PUSHlp_count
+PUSHAXlp_start
+PUSHAXlp_end
+PUSHblink
+
+PUSHr11
+PUSHr10
+
+subsp, sp, 4; skip r9
+
+PUSHr8
+PUSHr7
+PUSHr6
PUSH r5
PUSH r4
PUSH r3
PUSH r2
PUSH r1
PUSH r0
+.endif
+#endif
+
#ifdef CONFIG_ARC_HAS_ACCL_REGS
PUSH r59
PUSH r58
//@ -86.6 +113.33 @@
POPr59
#endif

+#ifdef CONFIG_ARC_IRQ_NO_AUTOSAVE
+.ifnc \called_from, exception
+POPr0
+POPr1
+POPr2
+POPr3
+POPr4
+POPr5
+POPr6
+POPr7
+POPr8
+POPr9
+POPr10
+POPr11
+
+POPrlink
+POPAXlp_end
+POPAXlp_start
+
+POPr9
+movlp_count, r9
+
+addsp, sp, 12; skip JLI, LDI, EI
+ld.asr9, [sp, -10]; reload r9 which got clobbered
+.endif
+#endif
+
.endm

/*---------------------------------------------------------------*/
--- linux-4.15.0.orig/arch/arc/include/asm/io.h
+++ linux-4.15.0/arch/arc/include/asm/io.h
```c
#include <linux/types.h>
#include <asm/byteorder.h>
#include <asm/page.h>
#include <asm/unaligned.h>

#ifdef CONFIG_ISA_ARCV2
#include <asm/barrier.h>
#endif

return w;
}

/**
 * {read,write}s{b,w,l}() repeatedly access the same IO address in
 * native endianness in 8-, 16-, 32-bit chunks {into,from} memory,
 * @count times
 */
#define __raw_readsx(t,f) 
static inline void __raw_reads##f(const volatile void __iomem *addr,
    void *ptr, unsigned int count)
{
    bool is_aligned = ((unsigned long)ptr % ((t) / 8)) == 0;
    u##t *buf = ptr;

    if (!count)
        return;

    /* Some ARC CPU's don't support unaligned accesses */
    if (is_aligned) {
        do {
            u##t x = __raw_read##f(addr);
            *buf++ = x;
        } while (--count);
    } else {
        do {
            u##t x = __raw_read##f(addr);
            put_unaligned(x, buf++);
        } while (--count);
    }
}

#define __raw_readsb __raw_readsb
#define __raw_readsw __raw_readsw
#define __raw_readsl __raw_readsl
```
```c
#define __raw_writeb __raw_writeb
static inline void __raw_writeb(u8 b, volatile __iomem *addr)
{
    @@ -126,6 +163,35 @@
}

#define __raw_writesx(t,f)
+static inline void __raw_writes##f(volatile void __iomem *addr, 
+    const void *ptr, unsigned int count)
+{
+    bool is_aligned = ((unsigned long)ptr % ((t) / 8)) == 0;
+    const u##t *buf = ptr;
+    
+    if (!count)
+        return;
+
+    /* Some ARC CPU’s don’t support unaligned accesses */
+    if (is_aligned) {
+        do {
+            __raw_write##f(*buf++, addr);
+        } while (--count);
+    } else {
+        do {
+            __raw_write##f(get_unaligned(buf++), addr);
+        } while (--count);
+    }
+
+#define __raw_writesb __raw_writesb
+__raw_writesx(8, b)
+#define __raw_writesw __raw_writesw
+__raw_writesx(16, w)
+#define __rawWritesl __raw_writesl
+__raw_writesx(32, l)
+
/*
 * MMIO can also get buffered/optimized in micro-arch, so barriers needed
 * Based on ARM model for the typical use case
 @ @ -141,10 +207,16 @@
 #define readb(c)(
     { u8 __v = readb_relaxed(c); __iormb(); __v; })
 #define readw(c)(
     { u16 __v = readw_relaxed(c); __iormb(); __v; })
 #define readl(c)(
     { u32 __v = readl_relaxed(c); __iormb(); __v; })
+#define readsb(p,d,l)(
     { __raw_readsb(p,d,l); __iormb(); })
+#define readsw(p,d,l)(
     { __raw_readsw(p,d,l); __iormb(); })
+#define reads1(p,d,l)(
     { __raw_readsl(p,d,l); __iormb(); })

#define writeb(v,c)(
     { __iowmb(); writeb_relaxed(v,c); })
```

#define writew(v,c)({ __iowmb(); writew_relaxed(v,c); })
#define writewl(v,c)({ __iowmb(); writel_relaxed(v,c); })
+#define writesb(p,d,l){ __iowmb(); __raw_writesb(p,d,l); }
+#define writesw(p,d,l){ __iowmb(); __raw_writesw(p,d,l); }
+#define writel(p,d,l){ __iowmb(); __raw_writesl(p,d,l); }

/*
   * Relaxed API for drivers which can handle barrier ordering themselves
--- linux-4.15.0.orig/arch/arc/include/asm/linkage.h
+++ linux-4.15.0/arch/arc/include/asm/linkage.h
@@ -14,6 +14,8 @@
 ifdef __ASSEMBLY__
 
 #define ASM_NL /* use `''' to mark new line in macro */
+#define __ALIGN .align 4
+#define __ALIGN_STR __stringify(__ALIGN)

/* annotation for data we want in DCCM - if enabled in .config */
 .macro ARCFP_DATA nm
--- linux-4.15.0.orig/arch/arc/include/asm/mach_desc.h
+++ linux-4.15.0/arch/arc/include/asm/mach_desc.h
@@ -34,9 +34,7 @@
 const char*name;
 const char**dt_compat;
 void(*init_early)(void);
-#ifdef CONFIG_SMP
 void(*init_per_cpu)(unsigned int);
-#endif
 void(*init_machine)(void);
 void(*init_late)(void);

--- linux-4.15.0.orig/arch/arc/include/asm/page.h
+++ linux-4.15.0/arch/arc/include/asm/page.h
@@ -13,6 +13,7 @@
 ifndef __ASSEMBLY__
 #define clear_page(paddr) memset((paddr), 0, PAGE_SIZE)
+#define copy_user_page(to, from, vaddr, pg) copy_page(to, from)
#define copy_page(to, from) memcpy((to), (from), PAGE_SIZE)
 struct vm_area_struct;
 @ @ -105,7 +106,7 @ @
 #define virt_addr_valid(kaddr) pfn_valid(virt_to_pfn(kaddr))

 /* Default Permissions for stack/heaps pages (Non Executable) */
-#define VM_DATA_DEFAULT_FLAGS (VM_READ | VM_WRITE | VM_MAYREAD | VM_MAYWRITE)
+#define VM_DATA_DEFAULT_FLAGS (VM_READ | VM_WRITE | VM_MAYREAD | VM_MAYWRITE | VM_MAYEXEC)
#define WANT_PAGE_VIRTUAL  1

--- linux-4.15.0.orig/arch/arc/include/asm/perf_event.h
+++ linux-4.15.0/arch/arc/include/asm/perf_event.h
@@ -103,7 +103,8 @@
 /* counts condition */
    [PERF_COUNT_HW_INSTRUCTIONS] = "iall",
   -[PERF_COUNT_HW_BRANCH_INSTRUCTIONS] = "ijmp", /* Excludes ZOL jumps */
-#ifdef CONFIG_ISA_ARCV2
+    /* All jump instructions that are taken */
+[PERF_COUNT_HW_BRANCH_INSTRUCTIONS] = "ijmptak",
   [PERF_COUNT_ARC_BPOK]         = "bpok",  /* NP-NT, PT-T, PNT-NT */
    #ifdef CONFIG_ISA_ARCV2
[PERF_COUNT_HW_BRANCH_MISSES] = "bpmp",
--- linux-4.15.0.orig/arch/arc/include/asm/pgtable.h
+++ linux-4.15.0/arch/arc/include/asm/pgtable.h
@@ -379,7 -379,7 @@
 /* Decode a PTE containing swap "identifier "into constituents */
#define __swp_type(pte_lookalike) (((pte_lookalike).val) & 0x1f)
-#define __swp_offset(pte_lookalike) (pte_lookalike).val << 13
+#define __swp_offset(pte_lookalike) (pte_lookalike).val >> 13
 /* NOPS, to keep generic kernel happy */
#define __pte_to_swp_entry(pte) ((swp_entry_t) { pte_val(pte) })
--- linux-4.15.0.orig/arch/arc/include/asm/uaccess.h
+++ linux-4.15.0/arch/arc/include/asm/uaccess.h
@@ -207,7 -207,7 @@
 /* NOPs, to keep generic kernel happy */
#define __pte_to_swp_entry(pte)((swp_entry_t) { pte_val(pte) })
--- linux-4.15.0.orig/arch/arc/include/asm/uaccess.h
+++ linux-4.15.0/arch/arc/include/asm/uaccess.h
@@ -433,7 -433,7 @@
 /* NOPs, to keep generic kernel happy */
#define __pte_to_swp_entry(pte)((swp_entry_t) { pte_val(pte) })
--- linux-4.15.0.orig/arch/arc/include/asm/uaccess.h
+++ linux-4.15.0/arch/arc/include/asm/uaccess.h
@@ -653,7 -653,7 @@
".previous

return n;
}
t非凡 | 003,7 +433,7 @@
*/
    ": &r (tmp), "+r" (to), "+r" (from)
      :
        "lp_count", ".lp_start", ".lp_end", "memory");
      +": "lp_count", "memory")

return n;
}
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: "+r"(d_char), "+r"(res)
: "i"(0)
-: "lp_count", "lp_start", "lp_end", "memory");
+: "lp_count", "memory");

return res;
}
@@ -686,7 +686,7 @@
  
  : "+r"(res), "+r"(dst), "+r"(src), "=r"(val)
  : "g"(-EFAULT), "r"(count)
-: "lp_count", "lp_start", "lp_end", "memory");
+: "lp_count", "memory");

return res;
}
--- linux-4.15.0.orig/arch/arc/include/uapi/asm/sigcontext.h
+++ linux-4.15.0/arch/arc/include/uapi/asm/sigcontext.h
@@ -18,6 +18,7 @@
/*

 struct sigcontext {
 struct user_regs_struct regs;
+#endif /* __ASM_ARC_SIGCONTEXT_H */
--- linux-4.15.0.orig/arch/arc/kernel/entry-arcv2.S
+++ linux-4.15.0/arch/arc/kernel/entry-arcv2.S
@@ -209,7 +209,9 @@
 
 debug_marker_l1:
-  bbit1.nt r0, STATUS_DE_BIT, .Lintr_ret_to_delay_slot
+  bbit1.nt r0, STATUS_DE_BIT, .Lintr_ret_to_delay_slot
+  btst tr0, STATUS_DE_BIT  ; Z flag set if bit clear
+  bnez .Lintr_ret_to_delay_slot  ; branch if STATUS_DE_BIT set

 #ifdef /* __ASM_ARC_SIGCONTEXT_H */
--- linux-4.15.0.orig/arch/arc/kernel/entry.S
+++ linux-4.15.0/arch/arc/kernel/entry.S
@@ -169,7 +169,7 @@
 
 ; Do the Sys Call as we normally would.
 ; Validate the Sys Call number
-cmp r8, NR_syscalls
+cmp r8, NR_syscalls - 1
 mov.hi r0, -ENOSYS

bhi tracesys_exit

@@ -252,7 +252,7 @@
;============ Normal syscall case
-cmp r8, NR_syscalls
+cmp r8, NR_syscalls - 1
mov.hi r0, -ENOSYS
bhi .Lret_from_system_call

--- linux-4.15.0.orig/arch/arc/kernel/head.S
+++ linux-4.15.0/arch/arc/kernel/head.S
@@ -17,6 +17,7 @@
#include <asm/entry.h>
#include <asm/arcregs.h>
#include <asm/cache.h>
+#include <asm/irqflags.h>

.macro CPU_EARLY_SETUP

@@ -47,6 +48,15 @@
sr r5, [ARC_REG_DC_CTRL]
1:
+
+#ifdef CONFIG_ARC_ARCV2
+; Unaligned access is disabled at reset, so re-enable early as
+; gcc 7.3.1 (ARC GNU 2018.03) onwards generates unaligned access
+; by default
+lrr5, [status32]
+bsetr5, r5, STATUS_AD_BIT
+kflagr5
+#endif
.endm

.section .init.text, "ax", @progbits
@@ -90,15 +100,14 @@
st.ab 0, [r5, 4]
1:

-#ifdef CONFIG_ARC_U_BOOT_SUPPORT
 ; Uboot - kernel ABI
 ; r0 = [0] No uboot interaction, [1] cmdline in r2, [2] DTB in r2
- ; r1 = magic number (board identity, unused as of now
+ ; r1 = magic number (always zero as of now)
 ; r2 = pointer to uboot provided cmdline or external DTB in mem
- ; These are handled later in setup_arch()
+; These are handled later in handle_uboot_args()
str0, [@uboot_tag]
+st  r1, [@uboot_magic]
str2, [@uboot_arg]
-#endif

; setup "current" tsk and optionally cache it in dedicated r25
movr9, @init_task
--- linux-4.15.0.orig/arch/arc/kernel/intc-arcv2.c
+++ linux-4.15.0/arch/arc/kernel/intc-arcv2.c
@@ -49,11 +49,13 @@
*(unsigned int *)&ictrl = 0;
+#ifndef CONFIG_ARC_IRQ_NO_AUTOSAVE
ictrl.save_nr_gpr_pairs = 6; /* r0 to r11 (r12 saved manually) */
ictrl.save_blink = 1;
ictrl.save_lp_regs = 1; /* LP_COUNT, LP_START, LP_END */
ictrl.save_u_to_u = 0; /* user ctxt saved on kernel stack */
ictrl.save_idx_regs = 1; /* JLI, LDI, EI */
+#endif

WRITE_AUX(AUX_IRQ_CTRL, ictrl);
--- linux-4.15.0.orig/arch/arc/kernel/irq.c
+++ linux-4.15.0/arch/arc/kernel/irq.c
@@ -31,10 +31,10 @@
/* a SMP H/w block could do IPI IRQ request here */
if (plat_smp_ops.init_per_cpu)
plat_smp_ops.init_per_cpu(smp_processor_id());
+endif

if (machine_desc->init_per_cpu)
machine_desc->init_per_cpu(smp_processor_id());
-#endif
}

/*
--- linux-4.15.0.orig/arch/arc/kernel/mcip.c
+++ linux-4.15.0/arch/arc/kernel/mcip.c
@@ -22,10 +22,79 @@
static char smp_cpuinfo_buf[128];

+/*
+ * Set mask to halt GFRC if any online core in SMP cluster is halted.
+ * Only works for ARC HS v3.0+, on earlier versions has no effect.
+ */

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+static void mcip_update_gfrc_halt_mask(int cpu)
+
+struct bcr_generic gfrc;
+unsigned long flags;
+u32 gfrc_halt_mask;
+
+READ_BCR(ARC_REG_GFRC_BUILD, gfrc);
+
+/
+ * CMD_GFRC_SET_CORE and CMD_GFRC_READ_CORE commands were added in
+ * GFRC 0x3 version.
+ */
+if (gfrc.ver < 0x3)
+return;
+
+raw_spin_lock_irqsave(&mcip_lock, flags);
+
+__mcip_cmd(CMD_GFRC_READ_CORE, 0);
+gfrc_halt_mask = read_aux_reg(ARC_REG_MCIP_READBACK);
+gfrc_halt_mask |= BIT(cpu);
+
+__mcip_cmd_data(CMD_GFRC_SET_CORE, 0, gfrc_halt_mask);
+
+raw_spin_unlock_irqrestore(&mcip_lock, flags);
+
+static void mcip_update_debug_halt_mask(int cpu)
+
+u32 mcip_mask = 0;
+unsigned long flags;
+
+raw_spin_lock_irqsave(&mcip_lock, flags);
+
+/*
+ * mcip_mask is same for CMD_DEBUG_SET_SELECT and CMD_DEBUG_SET_MASK
+ * commands. So read it once instead of reading both CMD_DEBUG_READ_MASK
+ * and CMD_DEBUG_READ_SELECT.
+ */
+__mcip_cmd(CMD_DEBUG_READ_SELECT, 0);
+mcip_mask = read_aux_reg(ARC_REG_MCIP_READBACK);
+
+mcip_mask |= BIT(cpu);
+
+__mcip_cmd_data(CMD_DEBUG_SET_SELECT, 0, mcip_mask);
+/
+ * Parameter specified halt cause:
+ * STATUS32[H]/actionpoint/breakpoint/self-halt
+ * We choose all of them (0xF).
+ */
static void mcip_setup_per_cpu(int cpu)
{
    struct mcip_bcr mp;

    READ_BCR(ARC_REG_MCIP_BCR, mp);

    smp_ipi_irq_setup(cpu, IPI_IRQ);
    smp_ipi_irq_setup(cpu, SOFTIRQ_IRQ);

    /* Update GFRC halt mask as new CPU came online */
    if (mp.gfrc)
        mcip_update_gfrc_halt_mask(cpu);

    /* Update MCIP debug mask as new CPU came online */
    if (mp.dbg)
        mcip_update_debug_halt_mask(cpu);
}

static void mcip_ipi_send(int cpu)
{
    struct plat_smp_ops plat_smp_ops = { /* loop thru all available h/w condition indexes */
        .loop = for (j = 0; j < cc_bcr.c; j++) { /* See if it has been mapped to a perf event_id */
            write_aux_reg(ARC_REG_CC_INDEX, j);
            -cc_name.indiv.word0 = read_aux_reg(ARC_REG_CC_NAME0);
            -cc_name.indiv.word1 = le32_to_cpu(read_aux_reg(ARC_REG_CC_NAME1));
            +cc_name.indiv.word0 = le32_to_cpu(read_aux_reg(ARC_REG_CC_NAME0));
            +cc_name.indiv.word1 = le32_to_cpu(read_aux_reg(ARC_REG_CC_NAME1));
        }
    }
for (i = 0; i < ARRAY_SIZE(arc_pmu_ev_hw_map); i++) {
--- linux-4.15.0.orig/arch/arc/kernel/process.c
+++ linux-4.15.0/arch/arc/kernel/process.c
@@ -47,7 +47,8 @@
SYSCALL_DEFINE3(arc_usr_cmpxchg, int *, uaddr, int, expected, int, new)
{
    struct pt_regs *regs = current_pt_regs();
    -int uval = -EFAULT;
+    u32 uval;
+    int ret;

    /*
     * This is only for old cores lacking LLOCK/SCOND, which by definition
@@ -60,23 +61,47 @@
     * Z indicates to userspace if operation succeeded */
    regs->status32 &= ~STATUS_Z_MASK;

    -if (!access_ok(VERIFY_WRITE, uaddr, sizeof(int)))
-    return -EFAULT;
+    ret = access_ok(VERIFY_WRITE, uaddr, sizeof(*uaddr));
+    if (!ret)
+        goto fail;
+again:
+    preempt_disable();

    -if (__get_user(uval, uaddr))
-    goto done;
+    ret = __get_user(uval, uaddr);
+    if (ret)
+        goto fault;

    -if (uval == expected) {
-        if (!__put_user(new, uaddr))
-            regs->status32 |= STATUS_Z_MASK;
-    }
+    if (uval != expected)
+        goto out;

    -done:
-    preempt_enable();
+    ret = __put_user(new, uaddr);
+    if (ret)
+        goto fault;

+    regs->status32 |= STATUS_Z_MASK;
+}
+out:
+preempt_enable();  
return uval;  
+
+fault:  
+preempt_enable();  
+
+if (unlikely(ret != -EFAULT))  
+ goto fail;  
+
+down_read(&current->mm->mmap_sem);  
+ret = fixup_user_fault(current, current->mm, (unsigned long) uaddr,  
+FAULT_FLAG_WRITE, NULL);  
+up_read(&current->mm->mmap_sem);  
+
+if (likely(!ret))  
+ goto again;  
+
+fail:  
+force_sig(SIGSEGV, current);  
+return ret;  
}

#ifdef CONFIG_ISA_ARCV2
@@ -216,6 +241,26 @@
task_thread_info(current)->thr_ptr;  
}

+
+/*
+ * setup usermode thread pointer #1:
+ * when child is picked by scheduler, __switch_to() uses @c_callee to
+ * populate usermode callee regs: this works (despite being in a kernel
+ * function) since special return path for child __ret_from_fork()
+ * ensures those regs are not clobbered all the way to RTIE to usermode
+ */
c_callee->r25 = task_thread_info(p)->thr_ptr;  
+
+ifndef CONFIG_ARC_CURR_IN_REG
+/*
+ * setup usermode thread pointer #2:
+ * however for this special use of r25 in kernel, __switch_to() sets
+ * r25 for kernel needs and only in the final return path is usermode
+ * r25 setup, from pt_regs->user_r25. So set that up as well
+ */
c_regs->user_r25 = c_callee->r25;
+endif
+
return 0;  

--- linux-4.15.0.orig/arch/arc/kernel/setup.c
+++ linux-4.15.0/arch/arc/kernel/setup.c
@@ -15,6 +15,7 @@
 #include <linux/clocksource.h>
 #include <linux/console.h>
 #include <linux/module.h>
+#include <linux/sizes.h>
 #include <linux/cpu.h>
 #include <linux/of_fdt.h>
 #include <linux/of.h>
@@ -35,6 +36,7 @@
 /* Part of U-boot ABI: see head.S */
 int __initdata uboot_tag;
 +int __initdata uboot_magic;
 char __initdata *uboot_arg;

 const struct machine_desc *machine_desc;
@@ -196,13 +198,29 @@
 if (cpu->core.family >= 0x54) {
 -unsigned int exec_ctrl;
 -READ_BCR(AUX_EXEC_CTRL, exec_ctrl);
 -cpu->extn.dual_enb = !(exec_ctrl & 1);
 +struct bcr_uarch_build_arcv2 uarch;
 -/* dual issue always present for this core */
 -cpu->extn.dual = 1;
 +/*
 + * The first 0x54 core (uarch maj:min 0:1 or 0:2) was
 + * dual issue only (HS4x). But next uarch rev (1:0)
 + * allows it to be configured for single issue (HS3x)
 + * Ensure we fiddle with dual issue only on HS4x
 + */
 +READ_BCR(ARC_REG_MICRO_ARCH_BCR, uarch);
 +
 +if (uarch.prod == 4) {
 +unsigned int exec_ctrl;
 +
 +/* dual issue hardware always present */
 +cpu->extn.dual = 1;
 +
 +READ_BCR(AUX_EXEC_CTRL, exec_ctrl);
 +

/* dual issue hardware enabled? */
cpu->extn.dual_enb = !(exec_ctrl & 1);
+
+
}
}

@@ -389,12 +407,12 @@
if ((unsigned int)__arc_dccm_base != cpu->dccm.base_addr)
panic("Linux built with incorrect DCCM Base address\n");
-
-if (CONFIG_ARC_DCCM_SZ != cpu->dccm.sz)
+if (CONFIG_ARC_DCCM_SZ * SZ_1K != cpu->dccm.sz)
panic("Linux built with incorrect DCCM Size\n");
#endif

#ifdef CONFIG_ARC_HAS_ICCM
-
-if (CONFIG_ARC_ICCM_SZ != cpu->iccm.sz)
+if (CONFIG_ARC_ICCM_SZ * SZ_1K != cpu->iccm.sz)
panic("Linux built with incorrect ICCM Size\n");
#endif

@@ -449,43 +467,85 @@
arb_chk_core_config();

-static inline int is_kernel(unsigned long addr)
+static inline bool uboot_arg_invalid(unsigned long addr)
{
    -if (addr >= (unsigned long)_stext && addr <= (unsigned long)_end)
+/* Check that it is a untranslated address (although MMU is not enabled
+ yet, it being a high address ensures this is not by fluke)
+ */
+if (addr < PAGE_OFFSET)
+return true;
+
+/* Check that address doesn’t clobber resident kernel image */
+return addr >= (unsigned long)_stext && addr <= (unsigned long)_end;
}

-void __init setup_arch(char **cmdline_p)
+#define IGNORE_ARGS"Ignore U-boot args: "
+
+/* uboot_tag values for U-boot - kernel ABI revision 0; see head.S */
+#define UBOOT_TAG_NONE	0
+define UBOOT_TAG_CMDLINE1
+define UBOOT_TAG_DTB2
+/* We always pass 0 as magic from U-boot */
+define UBOOT_MAGIC_VALUE0
+
+void __init handle_uboot_args(void)
{
-#ifdef CONFIG_ARC_UBOOT_SUPPORT
-/* make sure that uboot passed pointer to cmdline/dtb is valid */
-#if (uboot_tag && is_kernel((unsigned long)uboot_arg))
-panic("Invalid uboot arg\n");
-
-/* See if u-boot passed an external Device Tree blob */
-machine_desc = setup_machine_fdt(uboot_arg); /* uboot_tag == 2 */
-#if (!machine_desc)
-    /* No, so try the embedded one */
+    bool use_embedded_dtb = true;
+    bool append_cmdline = false;
+
+    /* check that we know this tag */
+    #if (uboot_tag != UBOOT_TAG_NONE &&
+         uboot_tag != UBOOT_TAG_CMDLINE &&
+         uboot_tag != UBOOT_TAG_DTB) {
+        pr_warn(IGNORE_ARGS "invalid uboot tag: '%08x'", uboot_tag);
+        goto ignore_uboot_args;
+    }
+
+    #if (uboot_magic != UBOOT_MAGIC_VALUE) {
+        pr_warn(IGNORE_ARGS "non zero uboot magic\n");
+        goto ignore_uboot_args;
+    }
+
+    #if (uboot_tag != UBOOT_TAG_NONE &&
+         uboot_arg_invalid((unsigned long)uboot_arg)) {
+        pr_warn(IGNORE_ARGS "invalid uboot arg: '%px\n", uboot_arg);
+        goto ignore_uboot_args;
+    }
+
+    /* see if U-boot passed an external Device Tree blob */
+    #if (uboot_tag == UBOOT_TAG_DTB) {
+        machine_desc = setup_machine_fdt((void *)uboot_arg);
+        /* external Device Tree blob is invalid - use embedded one */
+        use_embedded_dtb = !machine_desc;
+    }
if (uboot_tag == UBOOT_TAG_CMDLINE)
append_cmdline = true;
+
ignore_uboot_args:
+
if (use_embedded_dtb) {
machine_desc = setup_machine_fdt(__dtb_start);
if (!machine_desc)
panic("Embedded DT invalid
");
++}

/*
 * If we are here, it is established that @uboot_arg didn't
 * point to DT blob. Instead if u-boot says it is cmdline,
 * append to embedded DT cmdline.
 * setup_machine_fdt() would have populated @boot_command_line
 */
-if (uboot_tag == 1) {
-/* Ensure a whitespace between the 2 cmdlines */
-strlcat(boot_command_line, " ", COMMAND_LINE_SIZE);
-strlcat(boot_command_line, uboot_arg,
-COMMAND_LINE_SIZE);
-}
+/*
 * NOTE: @boot_command_line is populated by setup_machine_fdt() so this
 * append processing can only happen after.
 */
+if (append_cmdline) {
+/* Ensure a whitespace between the 2 cmdlines */
+strlcat(boot_command_line, " ", COMMAND_LINE_SIZE);
+strlcat(boot_command_line, uboot_arg, COMMAND_LINE_SIZE);
+}
+}
+
+void __init setup_arch(char **cmdline_p)
+{
+handle_uboot_args();

/*/ Save unparsed command line copy for /proc/cmdline */
*cmdline_p = boot_command_line;
--- linux-4.15.0.orig/arch/arc/kernel/signal.c
+++ linux-4.15.0/arch/arc/kernel/signal.c
@@ -64,6 +64,41 @@
 unsigned int sigret_magic;
 
 static int save_arcv2_regs(struct sigcontext *mctx, struct pt_regs *regs)
+int err = 0;
+#ifndef CONFIG_ISA_ARCOMPACT
+struct user_regs_arcv2 v2abi;
+
+v2abi.r30 = regs->r30;
+#ifdef CONFIG_ARC_HAS_ACCL_REGS
+v2abi.r58 = regs->r58;
+v2abi.r59 = regs->r59;
+#else
+v2abi.r58 = v2abi.r59 = 0;
+#endif
+err = __copy_to_user(&mctx->v2abi, &v2abi, sizeof(v2abi));
+#endif
+return err;
+
+static int restore_arcv2_regs(struct sigcontext *mctx, struct pt_regs *regs)
+{
+    int err = 0;
+    struct user_regs_arcv2 v2abi;
+
+    err = __copy_from_user(&v2abi, &mctx->v2abi, sizeof(v2abi));
+    regs->r30 = v2abi.r30;
+    #ifdef CONFIG_ARC_HAS_ACCL_REGS
+        regs->r58 = v2abi.r58;
+        regs->r59 = v2abi.r59;
+    #endif
+    return err;
+}
+
+static int stash_usr_regs(struct rt_sigframe __user *sf, struct pt_regs *regs, sigset_t *set)
@@ -97,9 +132,13 @@
    err = __copy_to_user(&(sf->uc.uc_mcontext.regs.scratch), &uregs.scratch, sizeof(sf->uc.uc_mcontext.regs.scratch));
+
    #if (is_isa_arcv2())
    err |= save_arcv2_regs(&sf->uc.uc_mcontext, regs);
+    err |= __copy_to_user(&sf->uc.uc_sigmask, set, sizeof(sigset_t));
    
    -return err;
    +return err ? -EFAULT : 0;
static int restore_usr_regs(struct pt_regs *regs, struct rt_sigframe __user *sf)
{
  static int restore_usr_regs(struct pt_regs *regs, struct rt_sigframe __user *sf)
@@ -112,8 +151,12 @@
error |= __copy_from_user(&uregs.scratch,
&sf->uc.uc_mcontext.regs.scratch),
sizeof(sf->uc.uc_mcontext.regs.scratch));
+
+  if (is_isa_arcv2())
+    error |= restore_arcv2_regs(&sf->uc.uc_mcontext, regs);
+
+  if (error)
+    return error;
+  return -EFAULT;

  set_current_blocked(&set);
  regs->bta = uregs.scratch.bta;
  --- linux-4.15.0.orig/arch/arc/kernel/smp.c
+++ linux-4.15.0/arch/arc/kernel/smp.c
@@ -24,6 +24,7 @@
#include <linux/reboot.h>
#include <linux/irqdomain.h>
#include <linux/export.h>
+#include <linux/of_fdt.h>

#include <asm/processor.h>
#include <asm/setup.h>
@@ -47,6 +48,42 @@
{

+  static int __init arc_get_cpu_map(const char *name, struct cpumask *cpumask)
+  {
+    unsigned long dt_root = of_get_flat_dt_root();
+    const char *buf;
+    +    buf = of_get_flat_dt_prop(dt_root, name, NULL);
+    +    if (!buf)
+    +      return -EINVAL;
+    +    if (cpulist_parse(buf, cpumask))
+    +      return -EINVAL;
+    +    return 0;
+  }
+  /* Read from DeviceTree and setup cpu possible mask. If there is no
+ "possible-cpus" property in DeviceTree pretend all [0..NR_CPUS-1] exist.
+ */
+static void __init arc_init_cpu_possible(void)
 +{
 +struct cpumask cpumask;
 +
 +if (arc_get_cpu_map("possible-cpus", &cpumask)) {
 +pr_warn("Failed to get possible-cpus from dtb, pretending all %u cpus exist\n", NR_CPUS);
 +
 +cpumask_setall(&cpumask);
 +}
 +
 +if (!cpumask_test_cpu(0, &cpumask))
 +panic("Master cpu (cpu[0]) is missed in cpu possible mask!");
 +
 +init_cpu_possible(&cpumask);
 +}
 +
 /*
 * Called from setup_arch() before calling setup_processor()
 * @@ -58,10 +95,7 @@
 */
 void __init smp_init_cpus(void)
 {
 -unsigned int i;
 -
 -for (i = 0; i < NR_CPUS; i++)
 -set_cpu_possible(i, true);
 +arc_init_cpu_possible();
 
 if (plat_smp_ops.init_early_smp)
 plat_smp_ops.init_early_smp();
 @@ -70,16 +104,12 @@
 /* called from init ( ) => process 1 */
 void __init smp_prepare_cpus(unsigned int max_cpus)
 {
 -int i;
 -
 /*
 * if platform didn't set the present map already, do it now
 * boot cpu is set to present already by init/main.c
 */
 -if (num_present_cpus() <= 1) {
 -for (i = 0; i < max_cpus; i++)
 -set_cpu_present(i, true);
 -}
```c
if (num_present_cpus() <= 1)
    init_cpu_present(cpu_possible_mask);
}

void __init smp_cpus_done(unsigned int max_cpus)
--- linux-4.15.0.orig/arch/arc/kernel/stacktrace.c
+++ linux-4.15.0/arch/arc/kernel/stacktrace.c
@@ -41,15 +41,15 @@
#endif CONFIG_ARC_DW2_UNWIND

- static void seed_unwind_frame_info(struct task_struct *tsk,
-        struct pt_regs *regs,
-        struct unwind_frame_info *frame_info)
+ static int seed_unwind_frame_info(struct task_struct *tsk, struct pt_regs *regs,
+        struct unwind_frame_info *frame_info)
{
  /*
   * synchronous unwinding (e.g. dump_stack)
   * - uses current values of SP and friends
   */
  -if (tsk == NULL && regs == NULL) {
+if (regs == NULL && (tsk == NULL || tsk == current)) {
    unsigned long fp, sp, blink, ret;
    frame_info->task = current;

@@ -68,11 +68,15 @@
        frame_info->call_frame = 0;
    } else if (regs == NULL) {
  /*
-   * Asynchronous unwinding of sleeping task
-   * - Gets SP etc from task's pt_regs (saved bottom of kernel
-   *    mode stack of task)
+   * Asynchronous unwinding of a likely sleeping task
+   * - first ensure it is actually sleeping
+   * - if so, it will be in __switch_to, kernel mode SP of task
+   *    is safe-kept and BLINK at a well known location in there
+   */
+if (tsk->state == TASK_RUNNING)
+    return -1;
+    frame_info->task = tsk;

    frame_info->regs.r27 = TSK_K_FP(tsk);
```

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frame_info->call_frame = 0;
}
+
+return 0;
}

#endif
@@ -115,11 +121,12 @@
int (*consumer_fn) (unsigned int, void *), void *arg)
{
#ifdef CONFIG_ARC_DW2_UNWIND
-    int ret = 0;
+    int ret = 0, cnt = 0;
    unsigned int address;
    struct unwind_frame_info frame_info;

    -seed_unwind_frame_info(tsk, regs, &frame_info);
+    if (seed_unwind_frame_info(tsk, regs, &frame_info))
+        return 0;

    while (1) {
        address = UNW_PC(&frame_info);
@@ -135,6 +142,11 @@
            break;

        frame_info.regs.r63 = frame_info.regs.r31;
        +
        +if (cnt++ > 128) {
            printk("unwinder looping too long, aborting \n");
            +return 0;
            +}
        }
    }

    return address;/* return the last address it saw */
--- linux-4.15.0.orig/arch/arc/kernel/troubleshoot.c
+++ linux-4.15.0/arch/arc/kernel/troubleshoot.c
@@ -19,6 +19,8 @@
#include <asm/arcregs.h>
#include <asm/irqflags.h>

+#define ARC_PATH_MAX256
+
/*
 * Common routine to print scratch regs (r0-r12) or callee regs (r13-r25)
 * -Prints 3 regs per line and a CR.
 @@ -59,11 +61,12 @@
 print_reg_file(&(cregs->r13), 13);
}
static void print_task_path_n_nm(struct task_struct *tsk, char *buf)
{
    char *path_nm = NULL;
    struct mm_struct *mm;
    struct file *exe_file;
    char buf[ARC_PATH_MAX];

    mm = get_task_mm(tsk);
    if (!mm)
        mmput(mm);

    if (exe_file) {
        path_nm = file_path(exe_file, buf, ARC_PATH_MAX-1);
        fput(exe_file);
    }

    pr_info("Path: %s
", !IS_ERR(path_nm) ? path_nm : "?");
}

static void show_faulting_vma(unsigned long address, char *buf)
{
    struct vm_area_struct *vma;
    struct inode *inode;
    unsigned long ino = 0;
    dev_t dev = 0;
    char *nm = buf;

    if (vma && (vma->vm_start <= address)) {
        struct file *file = vma->vm_file;
        char buf[ARC_PATH_MAX];
        char *nm = "?";
        if (file) {
            nm = file_path(file, buf, ARC_PATH_MAX-1);
            inode = file_inode(vma->vm_file);
            dev = inode->i_sb->s_dev;
            ino = inode->i_ino;

            // cannot use print_vma_addr() yet as it does not check for
            // !IS_ERR(vma)
            print_vma_addr(vma, buf, PAGE_SIZE - 1);
            pr_info("%s
", !IS_ERR(vma) ? vma : "?");
            if (vma & (vma->vm_start < address)) {
                struct file *file = vma->vm_file;
                char buf[ARC_PATH_MAX];
                char *nm = "?";
                if (file) {
                    nm = file_path(file, buf, PAGE_SIZE - 1);
                    nm = file_path(file, buf, ARC_PATH_MAX-1);
                    inode = file_inode(vma->vm_file);
                    dev = inode->i_sb->s_dev;
                    ino = inode->i_ino;
                }
            }
        }
    }
}
struct task_struct *tsk = current;
struct callee_regs *cregs;
char *buf;
unsigned long sz;

buf = (char *)__get_free_page(GFP_KERNEL);
if (!buf)
  return;
+
+ /*
+ * generic code calls us with preemption disabled, but some calls
+ * here could sleep, so re-enable to avoid lockdep splat
+ */
+ preempt_enable();

-print_task_path_n_nm(tsk, buf);
+print_task_path_n_nm(tsk);
show_regs_print_info(KERN_INFO);

show_evr_verbose(regs);

(void *)regs->blink, (void *)regs->ret);

if (user_mode(regs))
  -show_faulting_vma(regs->ret, buf); /* faulting code, not data */
+show_faulting_vma(regs->ret); /* faulting code, not data */

pr_info("[STAT32]: 0x%08lx", regs->status32);

if (cregs)
  showcallee_regs(cregs);

-free_page((unsigned long)buf);
+preempt_disable();
}

void show_kernel_fault_diag(const char *str, struct pt_regs *regs,
--- linux-4.15.0.orig/arch/arc/kernel/unwind.c
+++ linux-4.15.0/arch/arc/kernel/unwind.c
@@ -185,11 +185,6 @@
    MAX_DMA_ADDRESS);
 }

-static void *unw_hdr_alloc(unsigned long sz)
-{
-    kmalloc(sz, GFP_KERNEL);
-    }

static void init_unwind_table(struct unwind_table *table, const char *name,
    const void *core_start, unsigned long core_size,
    const void *init_start, unsigned long init_size,
@@ -370,6 +365,10 @@
}
#ifdef CONFIG_MODULES
+static void *unw_hdr_alloc(unsigned long sz)
+{
+    return kmalloc(sz, GFP_KERNEL);
+}

static struct unwind_table *last_table;

--- linux-4.15.0.orig/arch/arc/kernel/vmlinux.lds.S
+++ linux-4.15.0/arch/arc/kernel/vmlinux.lds.S
@@ -92,6 +92,8 @@
 CPUIDLE_TEXT
 LOCK_TEXT
 KPROBES_TEXT
+IRQENTRY_TEXT
+SOFTIRQENTRY_TEXT
 *(.fixup)
 *(.gnu.warning)
 }
--- linux-4.15.0.orig/arch/arc/lib/memcpy-archs.S
+++ linux-4.15.0/arch/arc/lib/memcpy-archs.S
@@ -25,15 +25,11 @@
 #endif
 #ifdef CONFIG_ARC_HAS_LL64
-# define PREFETCH_READ(RX) prefetch [RX, 56]
-# define PREFETCH_WRITE(RX) prefetchw [RX, 64]
 # define LOADX(DST,RX) ldd.ab DST, [RX, 8]
 # define STOREX(SRC,RX) std.ab SRC, [RX, 8]
 # define ZOLSHFT5
 # define ZOLAND0x1F
# else
-# define PREFETCH_READ(RX) prefetch [RX, 28]
-# define PREFETCH_WRITE(RX) prefetchw [RX, 32]
 # define LOADX(DST,RX) ldd.ab DST, [RX, 4]
 # define STOREX(SRC,RX) std.ab SRC, [RX, 4]
 # define ZOLSHFT4
 @@ -41,8 +37,6 @@
 #endif

 ENTRY_CFI(memcpy)
-prefetch [r1]: Prefetch the read location
-prefetchw [r0]: Prefetch the write location
mov.f0, r2
;; if size is zero
jz.d[blink]
@@ -72,8 +66,6 @@
lpnz@._Lcopy32_64bytes
;; LOOP START
LOADX (r6, r1)
-PREFETCH_READ (r1)
-PREFETCH_WRITE (r3)
LOADX (r8, r1)
LOADX (r10, r1)
LOADX (r4, r1)
@@ -117,9 +109,7 @@
lpnz@._Lcopy8bytes_1
;; LOOP START
ld.abr6, [r1, 4]
-prefetch [r1, 28]:Prefetch the next read location
ld.abr8, [r1,4]
-prefetchw [r3, 32]:Prefetch the next write location

SHIFT_1(r7, r6, 24)
orl7, r7, r5
@@ -162,9 +152,7 @@
lpnz@._Lcopy8bytes_2
;; LOOP START
ld.abr6, [r1, 4]
-prefetch [r1, 28]:Prefetch the next read location
ld.abr8, [r1,4]
-prefetchw [r3, 32]:Prefetch the next write location

SHIFT_1(r7, r6, 16)
orl7, r7, r5
@@ -204,9 +192,7 @@
lpnz@._Lcopy8bytes_3
;; LOOP START
ld.abr6, [r1, 4]
-prefetch [r1, 28]:Prefetch the next read location
ld.abr8, [r1,4]
-prefetchw [r3, 32]:Prefetch the next write location

SHIFT_1(r7, r6, 8)
orl7, r7, r5
--- linux-4.15.0.orig/arch/arc/lib/memset-archs.S
+++ linux-4.15.0/arch/arc/lib/memset-archs.S
@@ -7,11 +7,39 @@
*/
#include <linux/linkage.h>
+#include <asm/cache.h>

-#undef PREALLOC_NOT_AVAIL
+/
+ * The memset implementation below is optimized to use prefetchw and prealloc
+ * instruction in case of CPU with 64B L1 data cache line (L1_CACHE_SHIFT == 6)
+ * If you want to implement optimized memset for other possible L1 data cache
+ * line lengths (32B and 128B) you should rewrite code carefully checking
+ * we don't call any prefetchw/prealloc instruction for L1 cache lines which
+ * don't belongs to memset area.
+ */
+
+#if L1_CACHE_SHIFT == 6
+
+.macro PREALLOC_INSTR reg, off
+prealloc [eg, \off]
+.endm
+
+.macro PREFETCHW_INSTR reg, off
+pfetchw [eg, \off]
+.endm
+
+#else
+
+.macro PREALLOC_INSTR
+.endm
+
+.macro PREFETCHW_INSTR
+.endm
+
+#endif

ENTRY_CFI(memset)
-prefetchw [r0]; Prefetch the write location
+PREFETCHW_INSTR r0, 0; Fetch the first write location
mov.f0, r2
;;;;; if size is zero
jz.d[blink]
@ @ -48,11 +76,8 @ @

lpnz@.Lset64bytes
;;;;; LOOP START
-#ifdef PREALLOC_NOT_AVAIL
-prefetchw [r3, 64];Prefetch the next write location
-#else
-prealloc [r3, 64]
-#endif
+PREALLOC_INSTRr3, 64; alloc next line w/o fetching
+
+#ifdef CONFIG_ARC_HAS_LL64
std.abr4, [r3, 8]
std.abr4, [r3, 8]
@@ -85,7 +110,6 @@
lsr.flp_count, r2, 5 ; Last remaining max 124 bytes
lpnz.Lset32bytes
:: LOOP START
-prefetchw [r3, 32]; Prefetch the next write location
+#ifdef CONFIG_ARC_HAS_LL64
std.abr4, [r3, 8]
std.abr4, [r3, 8]
--- linux-4.15.0.orig/arch/arc/mm/cache.c
+++ linux-4.15.0/arch/arc/mm/cache.c
@@ -1035,7 +1035,7 @@
void flush_cache_page(struct vm_area_struct *vma, unsigned long u_vaddr,
                                  unsigned long pfn)
{
-unsigned int paddr = pfn << PAGE_SHIFT;
+phys_addr_t paddr = pfn << PAGE_SHIFT;

u_vaddr &= PAGE_MASK;

@@ -1055,8 +1055,9 @@
unsigned long u_vaddr)
{
/* TBD: do we really need to clear the kernel mapping */
-__flush_dcache_page(page_address(page), u_vaddr);
-__flush_dcache_page(page_address(page), page_address(page));
+__flush_dcache_page((phys_addr_t)page_address(page), u_vaddr);
+__flush_dcache_page((phys_addr_t)page_address(page),
+      (phys_addr_t)page_address(page));

}
@@ -1117,7 +1118,7 @@
clear_page(to);
clear_bit(PG_dc_clean, &page->flags);
}
-
+EXPORT_SYMBOL(clear_user_page);

/******************************************************************************
* Explicit Cache flush request from user space via syscall
@@ -1157,6 +1158,20 @@
slc_entire_op(OP_FLUSH_N_INV);
/*
  * If IOC was already enabled (due to bootloader) it technically needs to
  * be reconfigured with aperture base,size corresponding to Linux memory map
  * which will certainly be different than uboot's. But disabling and
  * reenabling IOC when DMA might be potentially active is tricky business.
  * To avoid random memory issues later, just panic here and ask user to
  * upgrade bootloader to one which doesn't enable IOC
  */
  
  if (read_aux_reg(ARC_REG_IO_COH_ENABLE) & ARC_IO_COH_ENABLE_BIT)
    panic("IOC already enabled, please upgrade bootloader!
");
  
  if (!ioc_enable)
    return;
  
  /* currently IOC Aperture covers entire DDR
  * TBD: fix for PGU + 1GB of low mem
  * TBD: fix for PAE
  */
  write_aux_reg(ARC_REG_IO_COH_PARTIAL, 1);
  write_aux_reg(ARC_REG_IO_COH_ENABLE, 1);

  /* Re-enable L1 dcache */
  __dc_enable();
  if (is_isa_arcv2() & !l2_line_sz && !slc_enable)
    arc_slc_disable();
  
  if (is_isa_arcv2() & ioc_enable)
    arc_ioc_setup();

  if (is_isa_arcv2() & ioc_enable) {
    -- linux-4.15.0.orig/arch/arc/mm/fault.c
    +++ linux-4.15.0/arch/arc/mm/fault.c
    @@ -139,12 +139,17 @@
    */
    fault = handle_mm_fault(vma, address, flags);
    
    /* If Pagefault was interrupted by SIGKILL, exit page fault "early" */
    if (unlikely(fatal_signal_pending(current))) { 
      -if ((fault & VM_FAULT_ERROR) & !(fault & VM_FAULT_RETRY))
      */

-up_read(&mm->mmap_sem);
-if (user_mode(regs))
+
+/*
+ * if fault retry, mmap_sem already relinquished by core mm
+ * so OK to return to user mode (with signal handled first)
+ */
+if (fault & VM_FAULT_RETRY) {
+if (!user_mode(regs))
+goto no_context;
return;
+}
}

perf_sw_event(PERF_COUNT_SW_PAGE_FAULTS, 1, regs, address);
--- linux-4.15.0.orig/arch/arc/mm/init.c
+++ linux-4.15.0/arch/arc/mm/init.c
@@ -138,7 +138,8 @@
*/

memblock_add_node(low_mem_start, low_mem_sz, 0);
-memblock_reserve(low_mem_start, __pa(_end) - low_mem_start);
+memblock_reserve(CONFIG_LINUX_LINK_BASE,
+ *)__pa(_end) - CONFIG_LINUX_LINK_BASE);

#ifdef CONFIG_BLK_DEV_INITRD
if (initrd_start)
--- linux-4.15.0.orig/arch/arc/mm/tlb.c
+++ linux-4.15.0/arch/arc/mm/tlb.c
@@ -911,9 +911,11 @@
struct pt_regs *regs)
 {
 struct cpuinfo_arc_mmu *mmu = &cpuinfo_arc700[smp_processor_id()].mmu;
-unsigned int pd0[mmu->ways];
 unsigned long flags;
-int set;
+int set, n_ways = mmu->ways;
+	unsigned int pd0[4];

 local_irq_save(flags);

 @@ -921,9 +923,10 @@
 for (set = 0; set < mmu->sets; set++) {
 int is_valid, way;
 +unsigned int pd0[4];
/* read out all the ways of current set */
- for (way = 0, is_valid = 0; way < mmu->ways; way++) {
  + for (way = 0, is_valid = 0; way < n_ways; way++) {
      write_aux_reg(ARC_REG_TLBINDEX,
                   SET_WAY_TO_IDX(mmu, set, way));
      write_aux_reg(ARC_REG_TLBCOMMAND, TLBRead);
      continue;
  }

  /* Scan the set for duplicate ways: needs a nested loop */
- for (way = 0; way < mmu->ways - 1; way++) {
  + for (way = 0; way < n_ways - 1; way++) {
    if (!pd0[way])
      continue;

    - for (n = way + 1; n < mmu->ways; n++) {
      + for (n = way + 1; n < n_ways; n++) {
        if (pd0[way] != pd0[n])
          continue;

--- linux-4.15.0.orig/arch/arc/plat-eznps/Kconfig
+++ linux-4.15.0/arch/arc/plat-eznps/Kconfig
@@ -6,8 +6,9 @@
  menuconfig ARC_PLAT_EZNPS
     bool "EZchip" ARC dev platform"
     + depends on ISA_ARCOMPACT
        select CPU_BIG_ENDIAN
       - select CLKSRC_NPS
       + select CLKSRC_NPS if !PHYS_ADDR_T_64BIT
         select EZNPS_GIC
         select EZCHIP_NPS_MANAGEMENT_ENET if ETHERNET
       help
--- linux-4.15.0.orig/arch/arc/plat-eznps/include/plat/ctop.h
+++ linux-4.15.0/arch/arc/plat-eznps/include/plat/ctop.h
@@ -21,6 +21,7 @@
 #error "Incorrect ctop.h include"
 #endif

+#include <linux/types.h>
#include <soc/nps/common.h>

/*/ core auxiliary registers */
@@ -42,7 +43,6 @@
#define CTOP_AUX_DPC(CTOP_AUX_BASE + 0x02C)
#define CTOP_AUX_LPC(CTOP_AUX_BASE + 0x030)
#define CTOP_AUX_EFLAGS(CTOP_AUX_BASE + 0x080)
-#define CTOP_AUX_IACK(CTOP_AUX_BASE + 0x088)
#define CTOP_AUX_GPA1(CTOP_AUX_BASE + 0x08C)
#define CTOP_AUX_UDMC(CTOP_AUX_BASE + 0x300)

@@ -143,6 +143,15 @@
};

/* AUX registers definition */
+struct nps_host_reg_aux_dpc {
+union {
++struct {
+++ u32 ien:1, men:1, hen:1, reserved:29;
++;}
+u32 value;
+};
+};
+
+struct nps_host_reg_aux_udmc {
union {
struct {
--- linux-4.15.0.orig/arch/arc/plat-eznps/mtm.c
+++ linux-4.15.0/arch/arc/plat-eznps/mtm.c
@@ -15,6 +15,8 @@
*/

#include <linux/smp.h>
+#include <linux/init.h>
+#include <linux/kernel.h>
#include <linux/io.h>
#include <linux/log2.h>
#include <asm/arcregs.h>
@@ -157,10 +159,10 @@
/* Verify and set the value of the mtm hs counter */
static int __init set_mtm_hs_ctr(char *ctr_str)
{
     long hs_ctr;
     int hs-testid;
     int ret;

     -ret = kstrtold(ctr_str, 0, &hs_ctr);
     +ret = kstrtoint(ctr_str, 0, &hs_ctr);

     if (ret || hs_ctr > MT_HS_CNT_MAX || hs_ctr < MT_HS_CNT_MIN) {
         pr_err("** Invalid @nps_mtm_hs_ctr [\%d] needs to be [\%d:\%d] (incl)\n",
--- linux-4.15.0.orig/arch/arc/plat-hsdk/Kconfig
menuconfig ARC_SOC_HSDK
bool "ARC HS Development Kit SOC"
+depends on ISA_ARCV2
+select ARC_HAS_ACCL_REGS
+select ARC_IRQ_NO_AUTOSAVE
select CLK_HSDK
+select RESET_CONTROLLER
select RESET_HSDK
--- linux-4.15.0.orig/arch/arc/plat-hsdk/platform.c
+++ linux-4.15.0/arch/arc/plat-hsdk/platform.c
@@ -42,6 +42,66 @@
#define HSDK_GPIO_INTC (ARC_PERIPHERAL_BASE + 0x3000)
+
+static void __init hsdk_enable_gpio_intc_wire(void)
+{
+/*
+ * Peripherals on CPU Card are wired to cpu intc via intermediate
+ * DW APB GPIO blocks (mainly for debouncing)
+ * +
+ * [ -----------]
+ * [ | snps,archs-intc |]
+ * [ -----------]
+ * [ | snps,archs-idu-intc |
+ * [ -----------]
+ * [ | [eth] [USB] [... other peripherals]
+ * [ ]
+ * [ -----------]
+ * [ | snps,dw-apb-intc ]
+ * [ -----------]
+ * [ | [Bt] [HAPS] [... other peripherals]
+ * [ ]
+ * Current implementation of "irq-dw-apb-ictl" driver doesn't work well
+ * with stacked INTCs. In particular problem happens if its master INTC
+ * not yet instantiated. See discussion here -
+ * So setup the first gpio block as a passive pass thru and hide it from
+ * DT hardware topology - connect intc directly to cpu intc
The GPIO "wire" needs to be init nevertheless (here)

One side adv is that peripheral interrupt handling avoids one nested intc ISR hop

According to HSDK User's Manual [1], "Table 2 Interrupt Mapping"
we have the following GPIO input lines used as sources of interrupt:
- GPIO[0] - Bluetooth interrupt of RS9113 module
- GPIO[2] - HAPS interrupt (on HapsTrak 3 connector)
- GPIO[3] - Audio codec (MAX9880A) interrupt
- GPIO[8-23] - Available on Arduino and PMOD_x headers
For now there's no use of Arduino and PMOD_x headers in Linux
use-case so we only enable lines 0, 2 and 3.


```
#define GPIO_INTEN   (HSDK_GPIO_INTC + 0x30)
#define GPIO_INTMASK (HSDK_GPIO_INTC + 0x34)
#define GPIO_INTTYPE_LEVEL (HSDK_GPIO_INTC + 0x38)
#define GPIO_INT_POLARITY  (HSDK_GPIO_INTC + 0x3c)
#define GPIO_INT_CONNECTED_MASK 0x0d

iowrite32(0xffffffff, (void __iomem *) GPIO_INTMASK);
iowrite32(~GPIO_INT_CONNECTED_MASK, (void __iomem *) GPIO_INTMASK);
iowrite32(0x00000000, (void __iomem *) GPIO_INTTYPE_LEVEL);
iowrite32(0xffffffff, (void __iomem *) GPIO_INT_POLARITY);
iowrite32(GPIO_INT_CONNECTED_MASK, (void __iomem *) GPIO_INTEN);
```

static void __init hsdk_init_early(void)
{
    /*
     * minimum possible div-by-2.
     */
    iowrite32(SDIO_UHS_REG_EXT_DIV_2, (void __iomem *) SDIO_UHS_REG_EXT);
    +
    +hsdk_enable_gpio_intc_wire();
}

static const char *hsdk_compat[] __initconst = {
    /*
     * -62,6 +122,8 @ @
     * HAVE_FTRACE_MCOUNT_RECORD if (!XIP_KERNEL)
     * HAVE_FUNCTION_GRAPH_TRACER if (!THUMB2_KERNEL)
     * HAVE_FUNCTION_TRACER if (!XIP_KERNEL)
     */

--- linux-4.15.0.orig/arch/arm/Kconfig
+++ linux-4.15.0/arch/arm/Kconfig
@@ -66,6 +66,7 @@
    select HAVE_FTRACE_MCOUNT_RECORD if (!XIP_KERNEL)
    select HAVE_FUNCTION_GRAPH_TRACER if (!THUMB2_KERNEL)
    select HAVE_FUNCTION_TRACER if (!XIPKERNEL)
+select HAVE_FUTEX_CMPXCHG if FUTEX
select HAVE_GCC_PLUGINS
select HAVE_GENERIC_DMA_COHERENT
select HAVE_HW_BREAKPOINT if (PERF_EVENTS && (CPU_V6 || CPU_V6K || CPU_V7))
@@ -594,7 +595,9 @@
select HAVE_S3C_RTC if RTC_CLASS
select MULTI_IRQ_HANDLER
select NEED_MACH_IO_H
+select S3C2410_WATCHDOG
select SAMSUNG_ATAGS
+select WATCHDOG
help
    Samsung S3C2410, S3C2412, S3C2413, S3C2416, S3C2440, S3C2442, S3C2443
    and S3C2450 SoCs based systems, such as the Simtec Electronics BAST
@@ -1439,6 +1442,7 @@
config HOTPLUG_CPU
bool "Support for hot-pluggable CPUs"
depends on SMP
+select GENERIC_IRQ_MIGRATION
help
    Say Y here to experiment with turning CPUs off and on. CPUs
can be controlled through /sys/devices/system/cpu.
@@ -1524,12 +1528,10 @@
bool "Compile the kernel in Thumb-2 mode" if !CPU_THUMBONLY
depends on (CPU_V7 || CPU_V7M) && !CPU_V6 && !CPU_V6K
default y if CPU_THUMBONLY
-select ARM_ASM_UNIFIED
select ARM_UNWIND
help
    By enabling this option, the kernel will be compiled in
    - Thumb-2 mode. A compiler/assembler that understand the unified
    - ARM-Thumb syntax is needed.
    + Thumb-2 mode.
    
    If unsure, say N.
@@ -1564,9 +1566,6 @@
Unless you are sure your tools don't have this problem, say Y.

-config ARM_ASM_UNIFIED
-boothelp
-confign ARM_PATCH_IDIV
bool "Runtime patch udiv/sdiv instructions into __aeabi_{u}idiv()"
depends on CPU_32v7 && !XIP_KERNEL
@@ -1586,8 +1585,9 @@
code to do integer division.
config AEABI
-bool "Use the ARM EABI to compile the kernel" if !CPU_V7 && !CPU_V7M && !CPU_V6 && !CPU_V6K
-default CPU_V7 || CPU_V7M || CPU_V6 || CPU_V6K
+bool "Use the ARM EABI to compile the kernel" if !CPU_V7 && !CPU_V7M && !CPU_V6 && !CPU_V6K && !CC_IS_CLANG
+default CPU_V7 || CPU_V7M || CPU_V6 || CPU_V6K || CC_IS_CLANG
help
  This option allows for the kernel to be compiled using the latest
  ARM ABI (aka EABI). This is only useful if you are using a user
  @@ -2012,7 +2012,7 @@
config KEXEC
bool "Kexec system call (EXPERIMENTAL)"
depends on (!SMP || PM_SLEEP_SMP)
  -depends on !CPU_V7M
+depends on MMU
select KEXEC_CORE
help
  kexec is a system call that implements the ability to shutdown your
  @@ -2204,6 +2204,7 @@
source "drivers/Kconfig"
+source "ubuntu/Kconfig"

source "drivers/firmware/Kconfig"
+source "ubuntu/Kconfig"

source "fs/Kconfig"

--- linux-4.15.0.orig/arch/arm/Kconfig.debug
+++ linux-4.15.0/arch/arm/Kconfig.debug
@@ -1035,14 +1035,21 @@
      Say Y here if you want kernel low-level debugging support
      on SOCFPGA(Cyclone 5 and Arria 5) based platforms.

-config DEBUG_SOCPFGA_UART1
+config DEBUG_SOCPFGA_ARRIA10_UART1
  depends on ARCH_SOCFPGA
-bool "Use SOCPFGA UART1 for low-level debug"
+bool "Use SOCPFGA Arria10 UART1 for low-level debug"
select DEBUG_UART_8250
help
  Say Y here if you want kernel low-level debugging support
  on SOCPFGA(Arria 10) based platforms.

+config DEBUG_SOCPFGA_CYCLONE5_UART1
+depends on ARCH_SOCFPGA
+bool "Use SOCPFGA Cyclone 5 UART1 for low-level debug"
+select DEBUG_UART_8250
+help
+ Say Y here if you want kernel low-level debugging support
+ on SOCFPGA (Cyclone 5 and Arria 5) based platforms.

config DEBUG_SUN9I_UART0
bool "Kernel low-level debugging messages via sun9i UART0"
@@ -1388,21 +1395,21 @@
depends on ARCH_OMAP2PLUS

config DEBUG_IMX_UART_PORT
-int "i.MX Debug UART Port Selection" if DEBUG_IMX1_UART || 
-DEBUG_IMX25_UART || 
-DEBUG_IMX21_IMX27_UART || 
-DEBUG_IMX31_UART || 
-DEBUG_IMX35_UART || 
-DEBUG_IMX50_UART || 
-DEBUG_IMX51_UART || 
-DEBUG_IMX53_UART || 
-DEBUG_IMX6Q_UART || 
-DEBUG_IMX6SL_UART || 
-DEBUG_IMX6SX_UART || 
-DEBUG_IMX6UL_UART || 
-DEBUG_IMX7D_UART
-int "i.MX Debug UART Port Selection"
+depends on DEBUG_IMX1_UART || 
+ DEBUG_IMX25_UART || 
+ DEBUG_IMX21_IMX27_UART || 
+ DEBUG_IMX31_UART || 
+ DEBUG_IMX35_UART || 
+ DEBUG_IMX50_UART || 
+ DEBUG_IMX51_UART || 
+ DEBUG_IMX53_UART || 
+ DEBUG_IMX6Q_UART || 
+ DEBUG_IMX6SL_UART || 
+ DEBUG_IMX6SX_UART || 
+ DEBUG_IMX6UL_UART || 
+ DEBUG_IMX7D_UART
default 1
-depends on ARCH_MXC
help
Choose UART port on which kernel low-level debug messages
should be output.
@@ -1600,7 +1607,8 @@
default 0xfe800000 if ARCH_IOP32X
default 0xff690000 if DEBUG_RK32_UART2
default 0xffc02000 if DEBUG_SOCFPGA_UART0
-default 0xffc02100 if DEBUG_SOCFPGA_UART1
+default 0xffc02100 if DEBUG_SOCFPGA_ARRIA10_UART1
+default 0xffc03000 if DEBUG_SOCFPGA_CYCLONE5_UART1
default 0xffd82340 if ARCH_IOP13XX
default 0xffe40000 if DEBUG_RCAR_GEN1_SCIF0
default 0xffe642000 if DEBUG_RCAR_GEN1_SCIF2
@@ -1706,7 +1714,8 @@
default 0xffe20000 if DEBUG_SIRFATLAS7_UART0
@ @ -1755,9 +1764,9 @@
depends on DEBUG_LL_UART_8250 || DEBUG_UART_8250
depends on DEBUG_UART_8250_SHIFT >= 2
default y if DEBUG_PICOXCELL_UART ||
-DEBUG_SOCFPGA_UART0 || DEBUG_SOCFPGA_UART1 ||
-DEBUG_KEYSTONE_UART0 || DEBUG_KEYSTONE_UART1 ||
-DEBUG_ALPINE_UART0 || DEBUG_DAVINCI_DMx_UART0 || DEBUG_DAVINCI_DA8XX_UART1 ||
-DEBUG_BCM_KONA_UART || DEBUG_RK32_UART2
--- linux-4.15.0.orig/arch/arm/Makefile
+++ linux-4.15.0/arch/arm/Makefile
@ @ -106,7 +106,7 @@
tune-y := $(tune-y)
ifeq ($ (CONFIG_AEABI),y)
-CFLAGS_ABI:=-mabi=aapcs-linux -mno-thumb-interwork -mfpu=vfp
+CFLAGS_ABI:=-mabi=aapcs-linux -mfpu=vfp
else
CFLAGS_ABI:=$(call cc-option,-mapcs-32,-mabi=apcs-gnu) $(call cc-option,-mno-thumb-interwork,)
endif
@@ -115,9 +115,11 @@
CFLAGS_ABI+=-funwind-tables
endif

+# Accept old syntax despite ".syntax unified"
+AFLAGS_NOWARN:=$(call cc-option,-Wa$(comma)-mno-warn-deprecated,-Wa$(comma)-W)
+ifeq ($ (CONFIG_THUMB2_KERNEL),y)
AFLAGS_AUTOIT:=$(call cc-option,-Wa$(comma)-implicit-it=always,-Wa$(comma)-mauto-it)
-AFLAGS_NOWARN:=$(call cc-option,-Wa$(comma)-mno-warn-deprecated,-Wa$(comma)-W)

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CFLAGS_ISA:=-mthumb $(AFLAGS_AUTOIT) $(AFLAGS_NOWARN)
AFLAGS_ISA:=$(CFLAGS_ISA) -Wa$(comma)-mthumb
# Work around buggy relocation from gas if requested:
@@ -125,7 +127,7 @@
KBUILD_CFLAGS_MODULE+=-fno-optimize-sibling-calls
endif
else
-CFLAGS_ISA:=$(call cc-option,-marm,)
+CFLAGS_ISA:=$(call cc-option,-marm,) $(AFLAGS_NOWARN)
AFLAGS_ISA:=$(CFLAGS_ISA)
endif

--- linux-4.15.0.orig/arch/arm/boot/compressed/Makefile
+++ linux-4.15.0/arch/arm/boot/compressed/Makefile
@@ -87,6 +87,8 @@
$(addprefix $(obj)/,$(libfdt_hdrs))
ifeq ($(CONFIG_ARM_ATAG_DTB_COMPAT),y)
+CFLAGS_REMOVE_atags_to_fdt.o += -Wframe-larger-than=${CONFIG_FRAME_WARN}
+CFLAGS_atags_to_fdt.o += -Wframe-larger-than=1280
OBJ+= $(libfdt_objs) atags_to_fdt.o
endif

@@ -113,15 +115,13 @@
CFLAGS_fdt_rw.o := $(nossp_flags)
CFLAGS_fdt_wip.o := $(nossp_flags)
-ccflags-y := -fpic -mno-single-pic-base -fno-builtin -IS(obj)
+CFLAGS_fdt_wip.o := $(call cc-option,-mno-single-pic-base,) -fno-builtin -IS(obj)
asflags-y := -DZIMAGE

# Supply kernel BSS size to the decompressor via a linker symbol.
-KBSS_SZ = $(shell $(CROSS_COMPILE)nm $@ | \ 
- perl -e 'while (<>) { \ 
- $$bss_start=hex($$1) if /^\([\[:xdigit:]]]\)+ B __bss_start$$/; \ 
- $$bss_end=hex($$1) if /^\([\[:xdigit:]]\)+ B __bss_stop$$/; \ 
- }; printf "%d\n", $$bss_end - $$bss_start;}')
+KBSS_SZ = $(shell echo $(shell $@ | \ 
+ perl -e 'while (<>) { \ 
+ \$bss_start=hex($$1) if /^\([\[:xdigit:]]\)+ B __bss_start$$/; \ 
+ \$bss_end=hex($$1) if /^\([\[:xdigit:]]\)+ B __bss_stop$$/; \ 
+ }; printf "%d\n", \$bss_end - \$bss_start;')
LDFLAGS_vmlinux = --defsym _kernel_bss_size=$(KBSS_SZ)
# Supply ZRELADDR to the decompressor via a linker symbol.
ifneq ($(CONFIG_AUTO_ZRELADDR),y)
@@ -165,7 +165,7 @@
# The .data section is already discarded by the linker script so no need
# to bother about it here.
check_for_bad_syms = 
-bad_syms=$(shell $(CROSS_COMPILE)nm $@ | \ 
- perl -e 'while (<>) { \ 
- \$bss_start=hex($$1) if /^\([\[:xdigit:]]\)+ B __bss_start$$/; \ 
- \$bss_end=hex($$1) if /^\([\[:xdigit:]]\)+ B __bss_stop$$/; \ 
- }; printf "%d\n", $$bss_end - $$bss_start;}')
endif

+bad_syms=$S(NM) $@ | sed -n 's/^[^8]{8} [bc] (\^\$\$1/p') \&\& \n[-z "$S$bad_syms"] || 
( echo "following symbols must have non local/private scope:" >&2; 
 echo "$S$bad_syms" >&2; rm -f $@; false )

--- linux-4.15.0.orig/arch/arm/boot/compressed/head.S
+++ linux-4.15.0/arch/arm/boot/compressed/head.S
@@ -29,19 +29,19 @@
#if defined(CONFIG_DEBUG_ICEDCC)

#if defined(CONFIG_CPU_V6) || defined(CONFIG_CPU_V6K) || defined(CONFIG_CPU_V7)
-.macro loadsp, rb, tmp
+.macro loadsp, rb, tmp1, tmp2
.endm
.macro writeb, ch, rb
mcr p14, 0, \ch, c0, c5, 0
.endm
#if defined(CONFIG_CPU_XSCALE)
-.macro loadsp, rb, tmp
+.macro loadsp, rb, tmp1, tmp2
.endm
.macro writeb, ch, rb
mcr p14, 0, \ch, c8, c0, 0
@endif
#else
-.macro loadsp, rb, tmp
+.macro loadsp, rb, tmp1, tmp2
.endm
.macro writeb, ch, rb
mcr p14, 0, \ch, c1, c0, 0
@@ -57,7 +57,7 @@
@endif
#endif

#if defined(CONFIG_ARCH_SA1100)
-.macro loadsp, rb, tmp
+.macro loadsp, rb, tmp1, tmp2
mov\rb, #0x80000000@ physical base address
#ifdef CONFIG_DEBUG_LL_SER3
add\rb, \rb, #0x00050000@ Ser3
@@ @ -66,8 +66,8 @@
#endif
.endm
#else
-.macro loadsp,rb, tmp
-.addruart \rb, \tmp
+.macro loadsp,rb, tmp1, tmp2
+.addruart \rb, \tmp1, \tmp2
.endm
#endif
#endif
@@ -561,8 +561,6 @@
| bl decompress_kernel |
| bl cache_clean_flush |
| bl cache_off |
-movr1, r7@ restore architecture number |
-movr2, r8@ restore atags pointer |

#ifdef CONFIG_ARM_VIRT_EXT
mrsr0, spsr@ Get saved CPU boot mode |
@@ -1092,9 +1090,9 @@
__armv7_mmu_cache_off:
mrcp15, 0, r0, c1, c0
#endif CONFIG_MMU |
-bicr0, r0, #0x000d |
+bicr0, r0, #0x0005 |
#else |
-bicr0, r0, #0x000c |
+bicr0, r0, #0x0004 |
#endif |
#ifdef CONFIG_MMU |
mrcp15, 0, r0, c1, c0@ turn MMU and cache off |
movr12, lr |
@@ -1297,7 +1295,7 @@
b1b |
@@ -1314,8 +1312,8 @@
@ putc corrupts {r0, r1, r2, r3} |
putc: |
movr2, r0 |
+loadspr3, r1, r0 |
movr0, #0 |
-loadspr3, r1 |
b2b |

@ memdump corrupts {r0, r1, r2, r3, r10, r11, r12, lr} |
@@ -1365,6 +1363,8 @@
__enter_kernel:
movr0, #0@ must be 0 |
+movr1, r7@ restore architecture number |
+movr2, r8@ restore atags pointer |
ARM(movpc, r4)@ call kernel
M_CLASS(addr4, r4, #1) @ enter in Thumb mode for M class
THUMB(bx r4) @ entry point is always ARM for A/R classes
@ @ -1395.7 +1395.21 @@

@ Preserve return value of efi_entry() in r4
mov r4, r0
-bcache_clean_flush
+
+ @ our cache maintenance code relies on CP15 barrier instructions
+ @ but since we arrived here with the MMU and caches configured
+ @ by UEFI, we must check that the CP15BEN bit is set in SCTLR.
+ @ Note that this bit is RAO/WI on v6 and earlier, so the ISB in
+ @ the enable path will be executed on v7+ only.
+ nrcc15, 0, r1, c1, c0, 0 @ read SCTLR
+ tstr1, #1 << 5 @ CP15BEN bit set?
+ bne 0f
+ orrr1, r1, #1 << 5 @ CP15 barrier instructions
+ nrcc15, 0, r1, c1, c0, 0 @ write SCTLR
+ ARM(.inst 0xf57ff06f @ v7+ isb)
+ THUMB(isb)
+
+0: bcache_clean_flush
bcache_off

@ Set parameters for booting zImage according to boot protocol
--- linux-4.15.0.orig/arch/arm/boot/compressed/libfdt_env.h
+++ linux-4.15.0/arch/arm/boot/compressed/libfdt_env.h
@@ -2,10 +2,14 @@
    #ifndef _ARM_LIBFDT_ENV_H
    #define _ARM_LIBFDT_ENV_H
    
+    #include <linux/limits.h>
+    #include <linux/types.h>
+    #include <linux/string.h>
+    #include <asm/byteorder.h>
+
+    #define INT32_MAX S32_MAX
+    #define UINT32_MAX U32_MAX

typedef __be16 fdt16_t;
typedef __be32 fdt32_t;
typedef __be64 fdt64_t;
--- linux-4.15.0.orig/arch/arm/boot/compressed/vmlinux.lds.S
+++ linux-4.15.0/arch/arm/boot/compressed/vmlinux.lds.S
@@ -46,7 +46,7 @@
}
 .table : ALIGN(4) {
   _table_start = .;
- LONG(ZIMAGE_MAGIC(2))
+ LONG(ZIMAGE_MAGIC(4))
   LONG(ZIMAGE_MAGIC(0x5a534c4b))
   LONG(ZIMAGE_MAGIC(__piggy_size_addr - _start))
   LONG(ZIMAGE_MAGIC(kernel_bss_size))
--- linux-4.15.0.orig/arch/arm/boot/dts/am335x-boneblack-common.dts
+++ linux-4.15.0/arch/arm/boot/dts/am335x-boneblack-common.dts
@@ -131,6 +131,11 @@
    memory@80000000 {
      device_type = "memory";
      reg = <0x80000000 0x20000000>; /* 512 MB */
+    };
+
+  clk_mcasp0_fixed: clk_mcasp0_fixed {
+    clock-cells = <0>;
+    compatible = "fixed-clock";
--- linux-4.15.0.orig/arch/arm/boot/dts/am335x-cm-t335.dts
+++ linux-4.15.0/arch/arm/boot/dts/am335x-cm-t335.dts
@@ -552,7 +552,7 @@
      status = "okay";
      pinctrl-names = "default";
      pinctrl-0 = <&spi0_pins>;
-    ti,pindir-d0-out-d1-in = <1>;
+    ti,pindir-d0-out-d1-in;
/* WLS1271 WiFi */
+  wlc0: wlc0@1 {
+    compatible = "ti.wl1271";
--- linux-4.15.0.orig/arch/arm/boot/dts/am335x-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/am335x-evm.dts
@@ -57,6 +57,24 @@
      enable-active-high;
    };

+/* TPS79501 */
+  v1_8d_reg: fixedregulator-v1_8d {
+    compatible = "regulator-fixed";
+    regulator-name = "v1_8d";
+    vin-supply = <&vbat>;
+    regulator-min-microvolt = <1800000>;
+    regulator-max-microvolt = <1800000>;
+    };
+  +/* TPS79501 */
+  v3_3d_reg: fixedregulator-v3_3d {
+    compatible = "regulator-fixed";
+regulator-name = "v3_3d";
+vin-supply = <&vbat>;
+regulator-min-microvolt = <3300000>;
+regulator-max-microvolt = <3300000>;
+
+matrix_keypad: matrix_keypad0 {
  compatible = "gpio-matrix-keypad";
  debounce-delay-ms = <5>;
  status = "okay";
};
+
/* Regulators */
-AVDD-supply = <&vaux2_reg>;
-IOVDD-supply = <&vaux2_reg>;
-DRVDD-supply = <&vaux2_reg>;
-DVDD-supply = <&vbat>;
+AVDD-supply = <&v3_3d_reg>;
+IOVDD-supply = <&v3_3d_reg>;
+DRVDD-supply = <&v3_3d_reg>;
+DVDD-supply = <&v1_8d_reg>;
};
+
@@ -706,6 +724,7 @@
pinctrl-0 = <&cpsw_default>;
pinctrl-1 = <&cpsw_sleep>;
status = "okay";
+slaves = <1>;
};
+
&davinci_mdio {
  @ @ -713,15 +732,14 @@
pinctrl-0 = <&davinci_mdio_default>;
pinctrl-1 = <&davinci_mdio_sleep>;
status = "okay";
-};
-
-&cpsw_emac0 {
  -phy_id = <&davinci_mdio>, <0>;
  -phy-mode = "rgmii-txid";
  +ethphy0: ethernet-phy@0 {
    +reg = <0>;
    +};
  +};
-
-
-&cpsw_emac1 {
  -phy_id = <&davinci_mdio>, <1>;
-}
+&cpsw_emac0 {
+  phy-handle = <&ethphy0>;
  phy-mode = "rgmii-txid";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/am335x-evmsk.dts
+++ linux-4.15.0/arch/arm/boot/dts/am335x-evmsk.dts
@@ -73,6 +73,24 @@
     enable-active-high;
};

+/* TPS79518 */
+v1_8d_reg: fixedregulator-v1_8d {
+  compatible = "regulator-fixed";
+  regulator-name = "v1_8d";
+  vin-supply = <&vbat>;
+  regulator-min-microvolt = <1800000>;
+  regulator-max-microvolt = <1800000>;
+};
+/
+/* TPS78633 */
+v3_3d_reg: fixedregulator-v3_3d {
+  compatible = "regulator-fixed";
+  regulator-name = "v3_3d";
+  vin-supply = <&vbat>;
+  regulator-min-microvolt = <3300000>;
+  regulator-max-microvolt = <3300000>;
+};
+
+leds {
  pinctrl-names = "default";
  pinctrl-0 = <&user_leds_s0>;
@@ -493,10 +511,10 @@
     status = "okay";

  /* Regulators */
-    AVDD-supply = <&vaux2_reg>;
-    IOVDD-supply = <&vaux2_reg>;
-    DRVDD-supply = <&vaux2_reg>;
-    DVDD-supply = <&vbat>;
+    AVDD-supply = <&v3_3d_reg>;
+    IOVDD-supply = <&v3_3d_reg>;
+    DRVDD-supply = <&v3_3d_reg>;
+    DVDD-supply = <&v1_8d_reg>;
};

--- linux-4.15.0.orig/arch/arm/boot/dts/am335x-pcm-953.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/am335x-pcm-953.dtsi
@@ -197,7 +197,7 @@
bus-width = <4>;
pinctrl-names = "default";
pinctrl-0 = <&mmc1_pins>;
-cd-gpios = <&gpio0 6 GPIO_ACTIVE_HIGH>;
+cd-gpios = <&gpio0 6 GPIO_ACTIVE_LOW>;
status = "okay";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/am335x-wega.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/am335x-wega.dtsi
@@ -157,7 +157,7 @@
bus-width = <4>;
pinctrl-names = "default";
pinctrl-0 = <&mmc1_pins>;
-cd-gpios = <&gpio0 6 GPIO_ACTIVE_HIGH>;
+cd-gpios = <&gpio0 6 GPIO_ACTIVE_LOW>;
status = "okay";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/am33xx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/am33xx.dtsi
@@ -38,6 +38,9 @@
ethernet1 = &cpsw_emac1;
spi0 = &spi0;
spi1 = &spi1;
+mmc0 = &mmc1;
+mmc1 = &mmc2;
+mmc2 = &mmc3;
};
cpus {
--- linux-4.15.0.orig/arch/arm/boot/dts/am3517.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/am3517.dtsi
@@ -87,6 +87,11 @@
};
};

/* Table Table 5-79 of the TRM shows 480ab000 is reserved */
+&usb_otg_hs {
+status = "disabled";
+};
+
&iva {
status = "disabled";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/am4372.dtsi
+ti,hwmods = "dss_dispc";
clocks = &disp_clk;
clock-names = "fck";
+
+max-memory-bandwidth = <230000000>;
};

rfbi: rfbi@4832a800 {
--- linux-4.15.0.orig/arch/arm/boot/dts/am437x-gp-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/am437x-gp-evm.dts
@@ -83,7 +83,7 @@
};

lcd0: display {
-compatible = "osddisplays,osd057T0559-34ts", "panel-dpi";
+compatible = "osddisplays,osd070t1718-19ts", "panel-dpi";
label = "lcd";
panel-timing {
--- linux-4.15.0.orig/arch/arm/boot/dts/am437x-sk-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/am437x-sk-evm.dts
@@ -535,6 +535,8 @@
+touchscreen-size-x = <480>;
touchscreen-size-y = <272>;
+
+wakeup-source;
};

tlv320aic3106: tlv320aic3106@1b {
--- linux-4.15.0.orig/arch/arm/boot/dts/am43x-epos-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/am43x-epos-evm.dts
@@ -45,7 +45,7 @@
};

tlvd: display {
-compatible = "osddisplays,osd057T0559-34ts", "panel-dpi";
+compatible = "osddisplays,osd070t1718-19ts", "panel-dpi";
label = "lvd";
panel-timing {
@@ -588,7 +588,7 @@
status = "okay";
pinctrl-names = "default";
pinctrl-0 = &i2c0_pins;
clock-frequency = <40000000>;

+clock-frequency = <1000000>;

tps65218: tps65218@24 {
  reg = <0x24>;
  @ @ -837.6 +837.7 @@
pinctrl-names = "default", "sleep";
pinctrl-0 = <&spi0_pins_default>;
pinctrl-1 = <&spi0_pins_sleep>;
+ti,pindir-d0-out-d1-in;
};

&spi1 {
  @ @ -844.6 +845.7 @@
pinctrl-names = "default", "sleep";
pinctrl-0 = <&spi1_pins_default>;
pinctrl-1 = <&spi1_pins_sleep>;
+ti,pindir-d0-out-d1-in;
};

&usb2_phy1 {

+++
};

&pcie1_rc {
  status = "okay";
-gpios = <&gpio3 23 GPIO_ACTIVE_HIGH>;
+gpios = <&gpio5 18 GPIO_ACTIVE_HIGH>;
};

&pcie1_ep {

+++
};

+main_12v0: fixedregulator-main_12v0 {
+/* main supply */
+compatible = "regulator-fixed";
+regulator-name = "main_12v0";
+regulator-min-microvolt = <12000000>;
+regulator-max-microvolt = <12000000>;
+regulator-always-on;
+regulator-boot-on;
+};

+evm_5v0: fixedregulator-evm_5v0 {
vdd_3v3: fixedregulator-vdd_3v3 {
compatible = "regulator-fixed";
regulator-name = "vdd_3v3";

--- linux-4.15.0.orig/arch/arm/boot/dts/am57xx-idk-common.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/am57xx-idk-common.dtsi
@@ -405,6 +405,7 @@
vqmmc-supply = <&ldo1_reg>;
bus-width = <4>;
cd-gpios = <&gpio6 27 GPIO_ACTIVE_LOW>; /* gpio 219 */
+no-1-8-v;
};

&mmc2 {
--- linux-4.15.0.orig/arch/arm/boot/dts/arm-realview-eb-mp.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/arm-realview-eb-mp.dtsi
@@ -150,11 +150,6 @@
interrupts = <0 8 IRQ_TYPE_LEVEL_HIGH>;
}

-&charlcd {
-interrupt-parent = <&intc>;
-interrupts = <0 IRQ_TYPE_LEVEL_HIGH>;
-};
-
-&serial0 {
interrupt-parent = <&intc>;
interrupts = <0 4 IRQ_TYPE_LEVEL_HIGH>;
--- linux-4.15.0.orig/arch/arm/boot/dts/arm-realview-eb.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/arm-realview-eb.dtsi
@@ -334,7 +334,7 @@
clock-names = "uartclk", "apb_pclk";
};

-ssp: ssp@1000d000 {
+ssp: spi@1000d000 {
compatible = "arm.pl022", "arm.primecell";
reg = <0x1000d000 0x1000>;
clocks = <&sspclock>, <&pelk>;
/* The voltage to the MMC card is hardwired at 3.3V */
vmmc: regulator-vmmc {
    compatible = "regulator-fixed";
    regulator-name = "vmmc";
    regulator-min-microvolt = <3300000>;
    regulator-boot-on;
};

-veth: regulator-veth {
    compatible = "regulator-fixed";
    regulator-name = "veth";
    regulator-min-microvolt = <3300000>;
    clock-names = "apb_pclk";
};

/* The voltage to the MMC card is hardwired at 3.3V */
vmmc: fixedregulator@0 {
    vmmc: regulator-vmmc {
        compatible = "regulator-fixed";
        regulator-name = "vmmc";
        regulator-min-microvolt = <3300000>;
        regulator-boot-on;
    };

-veth: fixedregulator@0 {
    veth: regulator-veth {
        compatible = "regulator-fixed";
        regulator-name = "veth";
        regulator-min-microvolt = <3300000>;
        regulator-boot-on;
    };

-pb1176_ssp: ssp@1010b000 {
    pb1176_ssp: spi@1010b000 {
        compatible = "arm.pl022", "arm.primecell";
        reg = <0x1010b000 0x1000>;
        interrupt-parent = <&intc_dc1176>;
};
regulator-min-microvolt = <3300000>;  
@@ -480,7 +480,7 @@
clock-names = "uartclk", "apb_pclk";
};

-ssp@1000d000 {
+spi@1000d000 {
compatible = "arm,pl022", "arm,primecell";
reg = <0x1000d000 0x1000>;
interrupt-parent = <&intc_pb11mp>;
--- linux-4.15.0.org/arch/arm/boot/dts/arm-realview-pbx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/arm-realview-pbx.dtsi
@@ -43,7 +43,7 @@
};
/* The voltage to the MMC card is hardwired at 3.3V */
-vmmc: fixedregulator@0 {
+veth: fixedregulator@0 {
compatible = "regulator-fixed";
regulator-name = "vmmc";
regulator-min-microvolt = <3300000>;
@@ -51,7 +51,7 @@
regulator-boot-on;
       }

-veth: fixedregulator@0 {
+veth: fixedregulator@0 {
compatible = "regulator-fixed";
regulator-name = "veth";
regulator-min-microvolt = <3300000>;
@@ -318,7 +318,7 @@
clock-names = "uartclk", "apb_pclk";
};

-ssp: ssp@1000d000 {
+ssp: spi@1000d000 {
compatible = "arm,pl022", "arm,primecell";
reg = <0x1000d000 0x1000>;
clocks = <&sspclk>, <&pelk>;
@@ -539,4 +539,3 @@
};
};

--- linux-4.15.0.org/arch/arm/boot/dts/armada-385-synology-ds116.dts
+++ linux-4.15.0/arch/arm/boot/dts/armada-385-synology-ds116.dts
@@ -170,7 +170,7 @@
3700 5
3900 6
4000 7;
cooling-cells = <2>;
+cooling-cells = <2>;
];

gpio-leds {
--- linux-4.15.0.orig/arch/arm/boot/dts/armada-385-turris-omnia.dts
+++ linux-4.15.0/arch/arm/boot/dts/armada-385-turris-omnia.dts
@@ -269,6 +269,7 @@
status = "okay";
compatible = "ethernet-phy-id0141.0DD1", "ethernet-phy-ieee802.3-c22";
reg = <1>;
+marvell,reg-init = <3 18 0 0x4985>;

/* irq is connected to &pcawan pin 7 */
};
--- linux-4.15.0.orig/arch/arm/boot/dts/armada-388-clearfog.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/armada-388-clearfog.dtsi
@@ -89,7 +89,7 @@
 &clearfog_sdhci_cd_pins>
 pinctrl-names = "default";
 status = "okay";
-vmmc = <&reg_3p3v>;
+vmmc-supply = <&reg_3p3v>;
wp-inverted;
};
--- linux-4.15.0.orig/arch/arm/boot/dts/armada-38x.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/armada-38x.dtsi
@@ -579,7 +579,7 @@
thermal: thermal@e8078 {
compatible = "marvell,armada380-thermal";
-reg = <0xe4078 0x4>, <0xe4074 0x4>;
+reg = <0xe4078 0x4>, <0xe4070 0x8>;
status = "okay";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/armada-xp-98dx3236.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/armada-xp-98dx3236.dtsi
@@ -303,11 +303,6 @@
-reg = <0x11000 0x4>;
+reg = <0x11000 0x100>;
};

thermal: thermal@e8078 {
...
&mpic {
    reg = <0x20a00 0x2d0>, <0x21070 0x58>;
}

@ @ -360,3 +355,11 @ @
status = "disabled";
}

+&uart0 {
+compatible = "marvell,armada-38x-uart";
+
+
+&uart1 {
+compatible = "marvell,armada-38x-uart";
+
+--- linux-4.15.0.orig/arch/arm/boot/dts/aspeed-ast2500-evb.dts
+++ linux-4.15.0/arch/arm/boot/dts/aspeed-ast2500-evb.dts
@@ -16,7 +16,7 @@
    bootargs = "console=ttyS4,115200 earlyprintk";
};

-memory {
+memory@80000000 {
    reg = <0x80000000 0x20000000>;
};
};

--- linux-4.15.0.orig/arch/arm/boot/dts/aspeed-g4.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/aspeed-g4.dtsi
@@ -255,7 +255,7 @@
    status = "disabled";
};

-i2c: i2c@1e78a000 {
+i2c: bus@1e78a000 {
    compatible = "simple-bus";
    #address-cells = <1>;
    #size-cells = <1>;
    --- linux-4.15.0.orig/arch/arm/boot/dts/aspeed-g5.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/aspeed-g5.dtsi
@@ @ -216,7 +216,7 @@
    compatible = "aspeed,ast2500-gpio";
    reg = <0x1e780000 0x1000>;
    interrupts = <20>;
    -gpio-ranges = <&pinctrl 0 0 220>;
    +gpio-ranges = <&pinctrl 0 0 232>;
    interrupt-controller;

--- Open Source Used In 5GaaS Edge AC-4 9834 ---
@@ -335,7 +335,7 @@
     status = "disabled";
 };

-i2c: i2c@1e78a000 {
 +i2c: bus@1e78a000 {
     compatible = "simple-bus";
     #address-cells = <1>;
     #size-cells = <1>;
--- linux-4.15.0.orig/arch/arm/boot/dts/at91-sama5d27_som1.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/at91-sama5d27_som1.dtsi
@@ -67,8 +67,8 @@
     phy-mode = "rmii";

-ethernet-phy@0 {
+-ethernet-phy@7 {
     -reg = <0x0>;
     +reg = <0x7>;
     interrupt-parent = <&pioA>;
     interrupts = <PIN_PD31 IRQ_TYPE_LEVEL_LOW>;
     pinctrl-names = "default";
--- linux-4.15.0.orig/arch/arm/boot/dts/at91-sama5d27_som1_ek.dts
+++ linux-4.15.0/arch/arm/boot/dts/at91-sama5d27_som1_ek.dts
@@ -106,7 +106,6 @@
     phy-mode = "rmii";
     pinctrl-names = "default";
     pinctrl-0 = <&pinctrl_macb0_default>;
--- linux-4.15.0.orig/arch/arm/boot/dts/at91-sama5d3_xplained.dts
+++ linux-4.15.0/arch/arm/boot/dts/at91-sama5d3_xplained.dts
@@ -231,6 +231,11 @@
     #atmel,pins =
     <AT91_PIOE 9 AT91_PERIPH_GPIO AT91_PINCTRL_DEGLITCH>;// PE9, conflicts with A9 */
 };
++pinctrl_usb_default: usb_default {
++atmel,pins =
++<AT91_PIOE 3 AT91_PERIPH_GPIO AT91_PINCTRL_NONE
+ AT91_PIOE 4 AT91_PERIPH_GPIO AT91_PINCTRL_NONE>;
+};
};
&pioE 3 GPIO_ACTIVE_LOW
&pioE 4 GPIO_ACTIVE_LOW
>
+pinctrl-names = "default";
+pinctrl-0 = <&pinctrl_usb_default>;
status = "okay";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/at91-sama5d4_xplained.dts
+++ linux-4.15.0/arch/arm/boot/dts/at91-sama5d4_xplained.dts
@@ -248,6 +253,8 @@
&pioE 3 GPIO_ACTIVE_LOW
&pioE 4 GPIO_ACTIVE_LOW
>
+pinctrl-names = "default";
+pinctrl-0 = <&pinctrl_usb_default>;
status = "okay";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/at91-tse850-3.dts
+++ linux-4.15.0/arch/arm/boot/dts/at91-tse850-3.dts
@@ -246,7 +246,7 @@
};

eeprom@50 {
	compatible = "nxp,24c02", "atmel,24c02";

+compatible = "nxp,se97b", "atmel,24c02";
reg = <0x50>;
pagesize = <16>;
};
--- linux-4.15.0.orig/arch/arm/boot/dts/at91sam9g25.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/at91sam9g25.dtsi
@@ -21,7 +21,7 @@
atmel_mux-mask = <
 /* A B C */
 0xffffffff 0xffe0399f 0xc000001c /* pioA */
- 0x0007ffff 0x8000fe3f 0x00000000 /* pioB */
+ 0x0007ffff 0x00047e3f 0x00000000 /* pioB */
 0x80000000 0x07c0ffff 0xb83ffff /* pioC */
 0x003fffff 0x003f8000 0x00000000 /* pioD */
>;
--- linux-4.15.0.orig/arch/arm/boot/dts/at91sam9g45.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/at91sam9g45.dtsi
@@ -566,7 +566,7 @@
};
};

-uart1 {
+usart1 {
   pinctrl_usart1: usart1-0 {
      atmel_pins =
         <AT91_PIOB 4 AT91_PERIPH_A AT91_PINCTRL_PULL_UP/>/* PB4 periph A with pullup */
--- linux-4.15.0.orig/arch/arm/boot/dts/at91sam9rl.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/at91sam9rl.dtsi
@@ -274,23 +274,26 @@
      atmel_adc-use-res = "highres";

 trigger0 {
-      -trigger-name = "timer-counter-0";
+      +trigger-name = "external-rising";
      trigger-value = <0x1>;
      +trigger-external;
    };
+    
 trigger1 {
-      -trigger-name = "timer-counter-1";
-      trigger-value = <0x3>;
+      +trigger-name = "external-falling";
+      trigger-value = <0x2>;
+      +trigger-external;
    };

 trigger2 {
-      -trigger-name = "timer-counter-2";
-trigger-value = <0x5>;
+trigger-name = "external-any";
+trigger-value = <0x3>;
+trigger-external;
}

trigger3 {
-trigger-name = "external";
-trigger-value = <0x13>;
-trigger-external;
+trigger-name = "continuous";
+trigger-value = <0x6>;
};
};

--- linux-4.15.0.orig/arch/arm/boot/dts/at91sam9x5cm.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/at91sam9x5cm.dtsi
@@ -88,7 +88,7 @@
rootfs@800000 {
label = "rootfs";
-reg = <0x800000 0x1f800000>;
+reg = <0x800000 0x0f800000>;
};
};
};
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm-cygnus.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm-cygnus.dtsi
@@ -69,7 +69,7 @@
timer@20200 {
compatible = "arm,cortex-a9-global-timer";
reg = <0x202000 0x100>;
-interrupts = <GIC_PPI 11 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_PPI 11 IRQ_TYPE_EDGE_RISING>;
clocks = <&periph_clk>;
};
@@ -165,8 +165,8 @@
mdio: mdio@18002000 {
compatible = "brcm,iproc-mdio";
reg = <0x18002000 0x8>;
-#size-cells = <1>;
-#address-cells = <0>;
+#size-cells = <0>;
+#address-cells = <1>;
status = "disabled";

gphy0: ethernet-phy@0 {
reg = <0x18008000 0x100>
#address-cells = <1>
#size-cells = <0>
-interrupts = <GIC_SPI 85 IRQ_TYPE_NONE>
+interrupts = <GIC_SPI 85 IRQ_TYPE_LEVEL_HIGH>
clock-frequency = <100000>
status = "disabled"
}

reg = <0x1800b000 0x100>
#address-cells = <1>
#size-cells = <0>
-interrupts = <GIC_SPI 86 IRQ_TYPE_NONE>
+interrupts = <GIC_SPI 86 IRQ_TYPE_LEVEL_HIGH>
clock-frequency = <100000>
status = "disabled"
}

#interrupt-cells = <1>
interrupt-map-mask = <0 0 0 0>
-interrupt-map = <0 0 0 0 &gic GIC_SPI 100 IRQ_TYPE_NONE>
+interrupt-map = <0 0 0 0 &gic GIC_SPI 100 IRQ_TYPE_LEVEL_HIGH>

linux,pci-domain = <0>

compatible = "brcm,iproc-msi"
msi-controller
interrupt-parent = <&gic>
-interrupts = <GIC_SPI 96 IRQ_TYPE_NONE>,
 - <GIC_SPI 97 IRQ_TYPE_NONE>,
 - <GIC_SPI 98 IRQ_TYPE_NONE>,
 - <GIC_SPI 99 IRQ_TYPE_NONE>
+interrupts = <GIC_SPI 96 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 97 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 98 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 99 IRQ_TYPE_LEVEL_HIGH>
}

#interrupt-cells = <1>
interrupt-map-mask = <0 0 0 0>
-interrupt-map = <0 0 0 0 &gic GIC_SPI 106 IRQ_TYPE_NONE>
+interrupt-map = <0 0 0 0 &gic GIC_SPI 106 IRQ_TYPE_LEVEL_HIGH>
linux,pci-domain = <1>;

@@ -313,10 +313,10 @@
compatible = "brcm,iproc-msi";
msi-controller;
interrupt-parent = <&gic>;
-interrupts = <GIC_SPI 102 IRQ_TYPE_NONE>,
-   <GIC_SPI 103 IRQ_TYPE_NONE>,
-   <GIC_SPI 104 IRQ_TYPE_NONE>,
-   <GIC_SPI 105 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 102 IRQ_TYPE_LEVEL_HIGH>,
+   <GIC_SPI 103 IRQ_TYPE_LEVEL_HIGH>,
+   <GIC_SPI 104 IRQ_TYPE_LEVEL_HIGH>,
+   <GIC_SPI 105 IRQ_TYPE_LEVEL_HIGH>; 
};
};

@@ -446,7 +446,7 @@
status = "disabled";
};

-nand: nand@18046000 {
+nand_controller: nand-controller@18046000 {
compatible = "brcm,nand-iproc", "brcm,brcmnand-v6.1";
reg = <0x18046000 0x600>, <0xf8105408 0x600>,
   <0x18046f00 0x20>;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm-hr2.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm-hr2.dtsi
@@ -75,7 +75,7 @@
timer@20200 {
compatible = "arm,cortex-a9-global-timer";
reg = <0x202000 0x100>;
-interrupts = <GIC_PPI 11 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_PPI 11 IRQ_TYPE_EDGE_RISING>;
   clocks = <&periph_clk>;
};

@@ -83,7 +83,7 @@
compatible = "arm,cortex-a9-twd-timer";
reg = <0x206000 0x20>;
-interrupts = <GIC_PPI 13 (GIC_CPU_MASK_SIMPLE(1) |
- IRQ_TYPE_LEVEL_HIGH)>;
+IRQ_TYPE_EDGE_RISING)>;
   clocks = <&periph_clk>;
};

@@ -91,7 +91,7 @@
compatible = "arm,cortex-a9-twd-timer";
reg = <0x206000 0x20>;
interrupts = <GIC_PPI 13 (GIC_CPU_MASK_SIMPLE(1) |
   IRQ_TYPE_LEVEL_HIGH)>;
+IRQ_TYPE_EDGE_RISING)>;
   clocks = <&periph_clk>;
};

@@ -91,7 +91,7 @@
compatible = "arm,cortex-a9-twd-timer";
reg = <0x206000 0x20>;
interrupts = <GIC_PPI 13 (GIC_CPU_MASK_SIMPLE(1) |
   IRQ_TYPE_LEVEL_HIGH)>;
+IRQ_TYPE_EDGE_RISING)>;
   clocks = <&periph_clk>;
};

@@ -91,7 +91,7 @@
compatible = "arm,cortex-a9-twd-timer";
reg = <0x206000 0x20>;
interrupts = <GIC_PPI 13 (GIC_CPU_MASK_SIMPLE(1) |
   IRQ_TYPE_LEVEL_HIGH)>;
+IRQ_TYPE_EDGE_RISING)>;
   clocks = <&periph_clk>;
};
compatible = "arm.cortex-a9-twd-wdt";
reg = <0x20620 0x20>;
interrupts = <GIC_PPI 14 (GIC_CPU_MASK_SIMPLE(1) |
- IRQ_TYPE_LEVEL_HIGH)>;
+ IRQ_TYPE_EDGE_RISING)>
; clocks = <&periph_clk>;
}

@@ -216,8 +216,8 @@
reg = <0x33000 0x14>;
};

-qspi: qspi@27200 {
- compatible = "brcm,spi-bcm-qspi", "brcm,spi-nsp-qspi";
+qspi: spi@27200 {
+ compatible = "brcm,spi-nsp-qspi", "brcm,spi-bcm-qspi";
 reg = <0x027200 0x184>,
  <0x027000 0x124>,
  <0x11c408 0x004>,
@@ -264,7 +264,7 @@
reg = <0x38000 0x50>;
#address-cells = <1>;
#size-cells = <0>;
-interrupts = <GIC_SPI 95 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 95 IRQ_TYPE_LEVEL_HIGH>;
 clock-frequency = <100000>;
};

@@ -279,7 +279,7 @@
reg = <0x3b000 0x50>;
#address-cells = <1>;
#size-cells = <0>;
-interrupts = <GIC_SPI 96 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 96 IRQ_TYPE_LEVEL_HIGH>;
 clock-frequency = <100000>;
};

};

@@ -300,7 +300,7 @@
#interrupt-cells = <1>;
 interrupt-map-mask = <0 0 0 0>
- interrupt-map = <0 0 0 0 &gic GIC_SPI 186 IRQ_TYPE_NONE>;
+ interrupt-map = <0 0 0 0 &gic GIC_SPI 186 IRQ_TYPE_LEVEL_HIGH>;

 linux,pci-domain = <0>

@@ -322,10 +322,10 @@
compatible = "brcm,iproc-msi";

msi-controller;
interrupt-parent = <&gic>;
-interrupts = <GIC_SPI 182 IRQ_TYPE_NONE>,
 - <GIC_SPI 183 IRQ_TYPE_NONE>,
 - <GIC_SPI 184 IRQ_TYPE_NONE>,
 - <GIC_SPI 185 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 182 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 183 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 184 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 185 IRQ_TYPE_LEVEL_HIGH>
);

brcm,pcie-msi-inten;
);

@@ -336,7 +336,7 @@

#interrupt-cells = <1>;
interrupt-map-mask = <0 0 0 0>;
-interrupt-map = <0 0 0 0 &gic GIC_SPI 192 IRQ_TYPE_NONE>;
+interrupt-map = <0 0 0 0 &gic GIC_SPI 192 IRQ_TYPE_LEVEL_HIGH>;

linux,pci-domain = <1>;

@@ -358,10 +358,10 @@
compatible = "brcm,iproc-msi";
msi-controller;
interrupt-parent = <&gic>;
-interrupts = <GIC_SPI 188 IRQ_TYPE_NONE>,
 - <GIC_SPI 189 IRQ_TYPE_NONE>,
 - <GIC_SPI 190 IRQ_TYPE_NONE>,
 - <GIC_SPI 191 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 188 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 189 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 190 IRQ_TYPE_LEVEL_HIGH>,
 + <GIC_SPI 191 IRQ_TYPE_LEVEL_HIGH>;

brcm,pcie-msi-inten;
);

--- linux-4.15.0.orig/arch/arm/boot/dts/bcm-nsp.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm-nsp.dtsi
@@ -249,17 +249,17 @@

status = "disabled";
};

-mailbox: mailbox@25000 {
+mailbox: mailbox@25000 {
compatible = "brcm,iproc-fa2-mbox";
-reg = <0x25000 0x445>;
-interrupts = <GIC_SPI 150 IRQ_TYPE_LEVEL_HIGH>;

---
+reg = \(<0x25c00 0x400>\);
+interrupts = \(<\text{GIC\_SPI}\ 151 \text{IRQ\_TYPE\_LEVEL\_HIGH}>\);
#mbox-cells = <1>;
brcm,rx-status-len = <32>;
brcm,use-bcm-hdr;
dma-coherent;
}

-nand: nand@26000 {
+nand_controller: nand-controller@26000 {
-compatible = "brcm,nand-iproc", "brcm.brcmnand-v6.1";
-reg = <0x026000 0x600>,
-<0x11b408 0x600>,
@@ -273,8 +273,8 @@
brcm,nand-has-wp;
}

-qspi: qspi@27200 {
-compatible = "brcm.spi-bcm-qspi", "brcm.spi-nsp-qspi";
+qspi: spi@27200 {
+compatible = "brcm.spi-nsp-qspi", "brcm.spi-bcm-qspi";
-reg = <0x027200 0x184>,
-<0x027000 0x124>,
-<0x11c408 0x004>,
@@ -391,7 +391,7 @@
reg = <0x38000 0x50>;
#address-cells = <1>;
#size-cells = <0>;
-interrupts = <\text{GIC\_SPI}\ 89 \text{IRQ\_TYPE\_NONE}>;
+interrupts = <\text{GIC\_SPI}\ 89 \text{IRQ\_TYPE\_LEVEL\_HIGH}>;
-clock-frequency = <100000>;
dma-coherent;
status = "disabled";
@@ -496,7 +496,7 @@

#interrupt-cells = <1>;
interrupt-map-mask = <0 0 0 0>;
-interrupt-map = <0 0 0 0 &gic \text{GIC\_SPI}\ 131 \text{IRQ\_TYPE\_NONE}>;
+interrupt-map = <0 0 0 0 &gic \text{GIC\_SPI}\ 131 \text{IRQ\_TYPE\_LEVEL\_HIGH}>;

linux,pci-domain = <0>;
@@ -519,10 +519,10 @@
compatible = "brcm,iproc-msi";
msi-controller;
interrupt-parent = &gic;
-interrupts = <\text{GIC\_SPI}\ 127 \text{IRQ\_TYPE\_NONE}>,
- \(<\text{GIC\_SPI}\ 128 \text{IRQ\_TYPE\_NONE}>\),
- <GIC_SPI 129 IRQ_TYPE_NONE>,
- <GIC_SPI 130 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 127 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 128 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 129 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 130 IRQ_TYPE_LEVEL_HIGH>;
brcm,pcie-msi-inten;
];
];
@@ -533,7 +533,7 @@

#interrupt-cells = <1>;
interrupt-map-mask = <0 0 0 0>;
-interrupt-map = <0 0 0 0 &gic GIC_SPI 137 IRQ_TYPE_NONE>;
+interrupt-map = <0 0 0 0 &gic GIC_SPI 137 IRQ_TYPE_LEVEL_HIGH>;

linux,pci-domain = <1>;

@@ -556,10 +556,10 @@
compatible = "brcm,iproc-msi";
msi-controller;
interrupt-parent = <&gic>;
-interrupts = <GIC_SPI 133 IRQ_TYPE_NONE>,
 -  <GIC_SPI 134 IRQ_TYPE_NONE>,
 -  <GIC_SPI 135IRQ_TYPE_NONE>,
 -  <GIC_SPI 136IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 133 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 134 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 135 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 136 IRQ_TYPE_LEVEL_HIGH>;
brcm,pcie-msi-inten;
];
];
@@ -570,7 +570,7 @@

#interrupt-cells = <1>;
interrupt-map-mask = <0 0 0 0>;
-interrupt-map = <0 0 0 0 &gic GIC_SPI 143 IRQ_TYPE_NONE>;
+interrupt-map = <0 0 0 0 &gic GIC_SPI 143 IRQ_TYPE_LEVEL_HIGH>;

linux,pci-domain = <2>;

@@ -593,10 +593,10 @@
compatible = "brcm,iproc-msi";
msi-controller;
interrupt-parent = <&gic>;
-interrupts = <GIC_SPI 139 IRQ_TYPE_NONE>,
 -  <GIC_SPI 140 IRQ_TYPE_NONE>,
 -  <GIC_SPI 141 IRQ_TYPE_NONE>,
 -  <GIC_SPI 142 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 139 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 140 IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 141IRQ_TYPE_LEVEL_HIGH>,
 +  <GIC_SPI 142 IRQ_TYPE_LEVEL_HIGH>;
brcm,pcie-msi-inten;
];
- `<GIC_SPI 141 IRQ_TYPE_NONE>`,
- `<GIC_SPI 142 IRQ_TYPE_NONE>;
+interrupts = `<GIC_SPI 139 IRQ_TYPE_LEVEL_HIGH>`,
+ `<GIC_SPI 140 IRQ_TYPE_LEVEL_HIGH>`,
+ `<GIC_SPI 141 IRQ_TYPE_LEVEL_HIGH>`,
+ `<GIC_SPI 142 IRQ_TYPE_LEVEL_HIGH>);

brcm,pcie-msi-inten;
};
};
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm2835-rpi-b-rev2.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm2835-rpi-b-rev2.dts
@@ -93,7 +93,7 @@

&hdmi {
-hpd-gpios = `<&gpio 46 GPIO_ACTIVE_LOW>);
+hpd-gpios = `<&gpio 46 GPIO_ACTIVE_HIGH>);
};

&uart0 {
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm2835-rpi-zero-w.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm2835-rpi-zero-w.dts
@@ -25,7 +25,7 @@

leds {
    act {
-t-gpios = `<&gpio 47 GPIO_ACTIVE_HIGH>);
+gpios = `<&gpio 47 GPIO_ACTIVE_LOW>);
    };
    }

@@ -118,6 +118,7 @@

&sdhci {
    #address-cells = <1>;
    #size-cells = <0>;
+    pinctrl-names = "default";
    pinctrl-0 = `<&emmc_gpio34 &gpclk2_gpio43>);
    mmc-pwrseq = `<&wifi_pwrseq>;
    non-removable;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm2836.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm2836.dtsi
@@ -9,7 +9,7 @@
    <0x40000000 0x40000000 0x00001000>;
    dma-ranges = `<0xc0000000 0x00000000 0x3f000000>;
    
-local_intc: local_intc {
+local_intc: local_intc@40000000 {
        compatible = "brcm,bcm2836-l1-intc";
reg = <0x40000000 0x100>
interrupt-controller;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm2837.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm2837.dtsi
@@ -8,7 +8,7 @@
<0x40000000 0x40000000 0x00001000>
dma-ranges = <0xc0000000 0x00000000 0x3f000000>

-local_intc: local_intc {
+local_intc: local_intc@40000000 {
 compatible = "brcm,bcm2836-l1-intc";
 reg = <0x40000000 0x100>
 interrupt-controller;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm283x.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm283x.dtsi
@@ -38,7 +38,7 @@
trips {
 cpu-crit {
-temperature= <80000>
+temperature= <90000>
 hysteresis= <0>
 type= "critical"
 }
 @@ -251,7 +251,7 @@
 jtag_gpio4: jtag_gpio4 {
 brcm,pins = <4 5 6 12 13>
- brcm,function = <BCM2835_FSEL_ALT4>
+ brcm,function = <BCM2835_FSEL_ALT5>
 }
 jtag_gpio22: jtag_gpio22 {
 brcm,pins = <22 23 24 25 26 27>
 @@ -396,8 +396,8 @@
 i2s: i2s@7e203000 {
 compatible = "brcm,bcm2835-i2s"
-reg = <0x7e203000 0x20>,
- 0x7e101098 0x02>
+reg = <0x7e203000 0x24>
+clocks = &clocks BCM2835_CLOCK_PCM>

dmas = &dma 2,
<&dma 3>
 @@ -454,6 +454,7 @@
 "dsi0_ddr2",
 "dsi0_ddr";
status = "disabled";
);

thermal: thermal@7e212000 {
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm5301x.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm5301x.dtsi
@@ -357,15 +357,15 @@
    #+#size-cells = <1>;
    #+#address-cells = <0>;
 +  #size-cells = <0>;
+  #+#address-cells = <1>;
    status = "disabled";
};

i2c0: i2c@18009000 {
    compatible = "brcm,iproc-i2c";
    reg = <0x18009000 0x50>;
    -interrupts = <GIC_SPI 121 IRQ_TYPE_NONE>;
    +interrupts = <GIC_SPI 121 IRQ_TYPE_LEVEL_HIGH>;
    #address-cells = <1>;
    #size-cells = <0>;
    clock-frequency = <100000>;
    @ @ -426,33 +426,33 @ @
};

spi@18029200 {
    -compatible = "brcm,spi-bcm-qspi", "brcm,spi-nsp-qspi";
    +compatible = "brcm,spi-nsp-qspi", "brcm,spi-bcm-qspi";
    reg = <0x18029200 0x184>,
      <0x18029000 0x124>,
      <0x1811b408 0x004>,
      <0x180293a0 0x01c>;
    reg-names = "mspi", "bspi", "intr_regs", "intr_status_reg";
    -interrupts = <GIC_SPI 72 IRQ_TYPE_LEVEL_HIGH>,
    +interrupts = <GIC_SPI 77 IRQ_TYPE_LEVEL_HIGH>,
    + <GIC_SPI 78 IRQ_TYPE_LEVEL_HIGH>,
    + <GIC_SPI 72 IRQ_TYPE_LEVEL_HIGH>,
    <GIC_SPI 73 IRQ_TYPE_LEVEL_HIGH>,
    <GIC_SPI 74 IRQ_TYPE_LEVEL_HIGH>,
    <GIC_SPI 75 IRQ_TYPE_LEVEL_HIGH>,
    - <GIC_SPI 76 IRQ_TYPE_LEVEL_HIGH>,
    - <GIC_SPI 77 IRQ_TYPE_LEVEL_HIGH>,
    - <GIC_SPI 78 IRQ_TYPE_LEVEL_HIGH>;
    -interrupt-names = "spi_lr_fullness_reached",
    + <GIC_SPI 76 IRQ_TYPE_LEVEL_HIGH>;
}


+interrupt-names = "mspi_done",
+ "mspi_halted",
+ "spi_lr_fullness_reached",
"spi_lr_session_aborted",
"spi_lr_impatient",
"spi_lr_session_done",
- "spi_lr_overhead",
- "mspi_done",
- "mspi_halted";
+ "spi_lr_overread";
clocks = <&iprocmed>;
clock-names = "iprocmed";
num-cs = <2>;
#address-cells = <1>;
#size-cells = <0>;

-spi_nor: spi-nor@0 {
+spi_nor: flash@0 {
compatible = "jedec,spi-nor";
reg = <0>;
spi-max-frequency = <20000000>;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm63138.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm63138.dtsi
@@ -106,21 +106,23 @@
global_timer: timer@1e200 {
compatible = "arm,cortex-a9-global-timer";
reg = <0x1e200 0x20>;
-interrupts = <GIC_PPI 11 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_PPI 11 IRQ_TYPE_EDGE_RISING>;
clocks = <&axi_clk>;
};

local_timer: local-timer@1e600 {
compatible = "arm,cortex-a9-twd-timer";
reg = <0x1e600 0x20>;
-interrupts = <GIC_PPI 13 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_PPI 13 (GIC_CPU_MASK_SIMPLE(2) | IRQ_TYPE_EDGE_RISING)>;
clocks = <&axi_clk>;
};

twd_watchdog: watchdog@1e620 {
compatible = "arm,cortex-a9-twd-wdt";
reg = <0x1e620 0x20>;
-interrupts = <GIC_PPI 14 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_PPI 14 (GIC_CPU_MASK_SIMPLE(2) | IRQ_TYPE_LEVEL_HIGH)>;
};
armpll: armpll {
@@ -158,7 +160,7 @@
 serial0: serial@600 {
 compatible = "bcm,bcm6345-uart";
 reg = <0x600 0x1b>;
-@ @ -167,20 +169,20 @@
 serial1: serial@620 {
 compatible = "bcm,bcm6345-uart";
 reg = <0x620 0x1b>;
-interrupts = <GIC_SPI 32 0>;
 +interrupts = <GIC_SPI 32 IRQ_TYPE_LEVEL_HIGH>;
 clocks = <&periph_clk>;
 clock-names = "periph";
 status = "disabled";
@@ -167,20 +169,20 @@
 serial1: serial@620 {
 compatible = "bcm,bcm6345-uart";
 reg = <0x620 0x1b>;
-interrupts = <GIC_SPI 33 0>;
 +interrupts = <GIC_SPI 33 IRQ_TYPE_LEVEL_HIGH>;
 clocks = <&periph_clk>;
 clock-names = "periph";
 status = "disabled";
};

-nand: nand@2000 {
+nand_controller: nand-controller@2000 {
 #address-cells = <1>;
 #size-cells = <0>;
 compatible = "brcm,nand-bcm63138", "brcm,brcmnand-v7.0", "brcm,brcmnand";
 reg = <0x2000 0x600>, <0xf0 0x10>;
 reg-names = "nand", "nand-int-base";
 status = "disabled";
-interrupts = <GIC_SPI 38 0>;
 +interrupts = <GIC_SPI 38 IRQ_TYPE_LEVEL_HIGH>;
 interrupt-names = "nand";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/bcm7445-bcm97445svmb.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm7445-bcm97445svmb.dts
@@ -14,10 +14,10 @@

};

-&nand {
+-&nand_controller {
 status = "okay";

-nandcs@1 {
+nand@1 {
 compatible = "bcm,nandcs";

reg = <1>

nand-ecc-step-size = <512>

--- linux-4.15.0.orig/arch/arm/boot/dts/bcm7445.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/bcm7445.dtsi
@@ -150,7 +150,7 @@
      reg-names = "aon-ctrl", "aon-sram"
    }

-nand: nand@3e2800 {
+nand_controller: nand-controller@3e2800 {
    status = "disabled";
    #address-cells = <1>;
    #size-cells = <0>;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm911360_entphn.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm911360_entphn.dts
@@ -84,8 +84,8 @@
status = "okay";
    }

-&nand {
-  nandcs@1 {
+&nand_controller {
+  nand@1 {
+      compatible = "brcm,nandcs";
+      reg = <0>;
+      nand-on-flash-bbt;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm958300k.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm958300k.dts
@@ -60,8 +60,8 @@
status = "okay";
    }

-&nand {
-  nandcs@1 {
+&nand_controller {
+  nand@1 {
+      compatible = "brcm,nandcs";
+      reg = <0>;
+      nand-on-flash-bbt;
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm958305k.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm958305k.dts
@@ -68,8 +68,8 @@
status = "okay";
    }

-&nand {
-  nandcs@1 {
+&nand_controller {
+  nand@1 {
+      compatible = "brcm,nandcs";
+      reg = <0>;
+      nand-on-flash-bbt;

+nand@1 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
    --- linux-4.15.0.orig/arch/arm/boot/dts/bcm958522er.dts
    +++ linux-4.15.0/arch/arm/boot/dts/bcm958522er.dts
    @@ -74,8 +74,8 @@
    status = "okay";
};

-&nand {
-  nandcs@0 {
+&nand_controller {
  +nand@0 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
    --- linux-4.15.0.orig/arch/arm/boot/dts/bcm958525er.dts
    +++ linux-4.15.0/arch/arm/boot/dts/bcm958525er.dts
    @@ -74,8 +74,8 @@
    status = "okay";
  };

-&nand {
-  nandcs@0 {
+&nand_controller {
  +nand@0 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
    --- linux-4.15.0.orig/arch/arm/boot/dts/bcm958525xmc.dts
    +++ linux-4.15.0/arch/arm/boot/dts/bcm958525xmc.dts
    @@ -90,8 +90,8 @@
    };}

-&nand {
-  nandcs@0 {
+&nand_controller {
  +nand@0 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
    --- linux-4.15.0.orig/arch/arm/boot/dts/bcm958622hr.dts
    +++ linux-4.15.0/arch/arm/boot/dts/bcm958622hr.dts
    @@ -78,8 +78,8 @@
    status = "okay";
  };
-&nand {
  -nandcs@0 {
  +&nand_controller {
  +nand@0 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
    --- linux-4.15.0.orig/arch/arm/boot/dts/bcm958623hr.dts
    +++ linux-4.15.0/arch/arm/boot/dts/bcm958623hr.dts
    @@ -78,8 +78,8 @@
    status = "okay";
  }
}

-memory {
  device_type = "memory";
  -reg = <0x60000000 0x80000000>;
  +reg = <0x60000000 0x20000000>;
}

-gpio-restart {
  @@ -76,8 +76,8 @@
  status = "okay";
}

-&nand {
  -nandcs@0 {
  +&nand_controller {
  +nand@0 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
    --- linux-4.15.0.orig/arch/arm/boot/dts/bcm958625hr.dts
    +++ linux-4.15.0/arch/arm/boot/dts/bcm958625hr.dts
    @@ -69,8 +69,8 @@
    status = "okay";
  }
}

--- linux-4.15.0.orig/arch/arm/boot/dts/bcm958623hr.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm958623hr.dts
@@ -78,8 +78,8 @@
status = "okay";
}

- &nand {
  - nandcs@0 {
    + &nand_controller {
      + nand@0 {
        compatible = "brcm,nandcs";
        reg = <0>;
        nand-on-flash-bbt;
      }
      nand-ecc-strength = <4>;
    }
  }
  nand@0 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
  }
}
--- linux-4.15.0.orig/arch/arm/boot/dts/bcm963138dvt.dts
+++ linux-4.15.0/arch/arm/boot/dts/bcm963138dvt.dts
@@ -30,10 +30,10 @@
  status = "okay";
};

-&nand {
  + &nand_controller {
    status = "okay";
  }
  nandcs@0 {
    nand@0 {
      compatible = "brcm,nandcs";
      reg = <0>;
      nand-on-flash-bbt;
    }
  }
  nand@0 {
    compatible = "brcm,nandcs";
    reg = <0>;
    nand-on-flash-bbt;
  }
}
--- linux-4.15.0.orig/arch/arm/boot/dts/da850-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/da850-evm.dts
@@ -169,7 +169,7 @@
  sound {
    compatible = "simple-audio-card";
    - simple-audio-card.name = "DA850/OMAP-L138 EVM";
+  + simple-audio-card.name = "DA850-OMAPL138 EVM";
    simple-audio-card.widgets =
      "Line", "Line In",
      "Line", "Line Out";
--- linux-4.15.0.orig/arch/arm/boot/dts/da850-lcdk.dts
+++ linux-4.15.0/arch/arm/boot/dts/da850-lcdk.dts
@@ -39,9 +39,39 @@
{
    vcc_5vd: fixedregulator-vcc_5vd {
        compatible = "regulator-fixed";
        regulator-name = "vcc_5vd";
-       regulator-min-microvolt = <5000000>;
+       regulator-min-microvolt = <5000000>;
        regulator-max-microvolt = <5000000>;
        regulator-boot-on;
    };
+
    vcc_3v3d: fixedregulator-vcc_3v3d {
        /* TPS650250 - VDCDC1 */
        compatible = "regulator-fixed";
        regulator-name = "vcc_3v3d";
        regulator-min-microvolt = <3300000>;
        regulator-max-microvolt = <3300000>;
        vin-supply = <&vcc_5vd>;
        regulator-always-on;
        regulator-boot-on;
    };
+
    vcc_1v8d: fixedregulator-vcc_1v8d {
        /* TPS650250 - VDCDC2 */
        compatible = "regulator-fixed";
        regulator-name = "vcc_1v8d";
        regulator-min-microvolt = <1800000>;
        regulator-max-microvolt = <1800000>;
        vin-supply = <&vcc_5vd>;
        regulator-always-on;
        regulator-boot-on;
    };
+
    sound {
        compatible = "simple-audio-card";
-s      simple-audio-card,name = "DA850/OMAP-L138 LCDK";
+      simple-audio-card,name = "DA850-OMAPL138 LCDK";
        simple-audio-card,widgets =
            "Line", "Line In",
            "Line", "Line Out";
@@ -212,6 +242,12 @@
            "ti,tlv320aic3106";
            reg = <0x18>;
            status = "okay";
+        /* Regulators */
+IOVDD-supply = <&vcc_3v3d>;
+AVDD-supply = <&vcc_3v3d>;
+DRVDD-supply = <&vcc_3v3d>;
+DVDD-supply = <&vcc_1v8d>;
};
};

--- linux-4.15.0.orig/arch/arm/boot/dts/da850.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/da850.dtsi
@@ -46,8 +46,6 @@
  pmx_core: pinmux@14120 {
    compatible = "pinctrl-single";
    reg = <0x14120 0x50>;
-     #address-cells = <1>;
-     #size-cells = <0>;
 #pinctrl-cells = <2>;
   pinctrl-single,bit-per-mux;
   pinctrl-single,register-width = <32>;
@@ -532,11 +530,7 @@
   gpio-controller;
   #gpio-cells = <2>;
   reg = <0x226000 0x1000>;
-     interrupts = <42 IRQ_TYPE_EDGE_BOTH
-                  43 IRQ_TYPE_EDGE_BOTH 44 IRQ_TYPE_EDGE_BOTH
-                  45 IRQ_TYPE_EDGE_BOTH 46 IRQ_TYPE_EDGE_BOTH
-                  47 IRQ_TYPE_EDGE_BOTH 48 IRQ_TYPE_EDGE_BOTH
-                  49 IRQ_TYPE_EDGE_BOTH 50 IRQ_TYPE_EDGE_BOTH>;
+     interrupts = <42 43 44 45 46 47 48 49 50>;
   ti,ngpio = <144>;
   ti,davinci-gpio-unbanked = <0>;
   status = "disabled";
--- linux-4.15.0.orig/arch/arm/boot/dts/dm8148-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/dm8148-evm.dts
@@ -10,7 +10,7 @@
 / {
   model = "DM8148 EVM";
   -compatible = "ti,dm8148-evm", "ti,dm8148";
+compatible = "ti,dm8148-evm", "ti,dm8148", "ti,dm814";

   memory@80000000 {
     device_type = "memory";
--- linux-4.15.0.orig/arch/arm/boot/dts/dm8148-t410.dts
+++ linux-4.15.0/arch/arm/boot/dts/dm8148-t410.dts
@@ -9,7 +9,7 @@
 / {
   model = "HP t410 Smart Zero Client";
- compatible = "hp,t410", "ti, dm8148";
+ compatible = "hp,t410", "ti, dm8148", "ti, dm814";

memory@80000000 {
    device_type = "memory";
    --- linux-4.15.0.orig/arch/arm/boot/dts/dm8168-evm.dts
    +++ linux-4.15.0/arch/arm/boot/dts/dm8168-evm.dts
    @ @ -10,7 +10,7 @@

    / {
        model = "DM8168 EVM";
        - compatible = "ti, dm8168-evm", "ti, dm8168";
        + compatible = "ti, dm8168-evm", "ti, dm8168", "ti, dm816";
        
        memory@80000000 {
            device_type = "memory";
            --- linux-4.15.0.orig/arch/arm/boot/dts/dove-cubox.dts
            +++ linux-4.15.0/arch/arm/boot/dts/dove-cubox.dts
            @ @ -87,7 +87,7 @@
            status = "okay";
            clock-frequency = <100000>;

            - si5351: clock-generator {
                + si5351: clock-generator@60 {
                    compatible = "silabs, si5351a-msop";
                    reg = <0x60>;
                    #address-cells = <1>;
                    --- linux-4.15.0.orig/arch/arm/boot/dts/dove.dtsi
                    +++ linux-4.15.0/arch/arm/boot/dts/dove.dtsi
                    @ @ -155,7 +155,7 @@
                    0xffffe000 MBUS_ID(0x03, 0x01) 0 0x00000800 /* CESA SRAM 2k */
                    0xffffffff MBUS_ID(0x0d, 0x00) 0 0x00000800>; /* PMU SRAM 2k */

            - spi0: spi-ctrl@10600 {
                + spi0: spi@10600 {
                    compatible = "marvell, orion-spi";
                    #address-cells = <1>;
                    #size-cells = <0>;
                    @ @ -168,7 +168,7 @@
                    status = "disabled";
                }

            - i2c: i2c-ctrl@11000 {
                + i2c: i2c@11000 {
                    compatible = "marvell, mv64xxx-i2c";
                    reg = <0x11000 0x20>;
                    #address-cells = <1>;
                    @ @ -218,7 +218,7 @@
status = "disabled";
};

-spi1: spi-ctrl@14600 {
+spi1: spi@14600 {
  compatible = "marvell,orion-spi";
  #address-cells = <1>;
  #size-cells = <0>;
  --- linux-4.15.0.orig/arch/arm/boot/dts/dra62x-j5eco-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/dra62x-j5eco-evm.dts
@@ -10,7 +10,7 @@
/model = "DRA62x J5 Eco EVM";
-compatible = "ti,dra62x-j5eco-evm", "ti,dra62x", "ti,dm8148";
+compatible = "ti,dra62x-j5eco-evm", "ti,dra62x", "ti,dm8148", "ti,dm814";

memory@80000000 {
  device_type = "memory";
  --- linux-4.15.0.orig/arch/arm/boot/dts/dra7.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/dra7.dtsi
@@ -137,6 +137,7 @@
#address-cells = <1>;
#size-cells = <1>;
 ranges = <0x0 0x0 0x0 0xc0000000>;
+dma-ranges = <0x80000000 0x0 0x80000000 0x80000000>;
 ti,hwmods = "l3_main_1", "l3_main_2";
 reg = <0x0 0x44000000 0x0 0x1000000>,
       <0x0 0x45000000 0x0 0x1000000>;
@@ -288,6 +289,7 @@
#address-cells = <1>;
 ranges = <0x51000000 0x51000000 0x3000
 0x0 0x20000000 0x10000000>;
+dma-ranges;
/**
 * To enable PCI endpoint mode, disable the pcie1_rc
 * node and enable pcie1_ep mode.
@@ -314,6 +316,7 @@
 <0 0 0 2 &pcie1_intc 2>,
 <0 0 0 3 &pcie1_intc 3>,
 <0 0 0 4 &pcie1_intc 4>;
+ti,syscon-unaligned-access = <&scm_conf1 0x14 1>;
 status = "disabled";
 pcie1_intc: interrupt-controller {
 interrupt-controller;
@@ -333,7 +336,7 @@
 ti,hwmods = "pcie1";
 phys = <&pcie1_phy>;

phy-names = "pcie-phy0";
-ti.syscon-unaligned-access = <&scm_conf1 0x14 2>;
+ti.syscon-unaligned-access = <&scm_conf1 0x14 1>;
status = "disabled";
};
};
@@ -344,6 +347,7 @@
 0x51800000 0x51800000 0x3000
 0x0 0x30000000 0x10000000>;
+dma-ranges;
status = "disabled";

pcie@51800000 {
  compatible = "ti,dra7-pcie";
  @ @ -367,6 +371,7 @@
  <0 0 0 2 &pcie2_intc 2>,
  <0 0 0 3 &pcie2_intc 3>,
  <0 0 0 4 &pcie2_intc 4>;
+ti.syscon-unaligned-access = <&scm_conf1 0x14 2>;

pcie2_intc: interrupt-controller {
  interrupt-controller;
  #address-cells = <0>;
  @ @ -1547,6 +1552,7 @@
  dr_mode = "otg";
  snps.dis_u3_susphy_quirk;
  snps.dis_u2_susphy_quirk;
+snps.dis_metastability_quirk;
};
}
@@ -1852,7 +1858,7 @@
};
}

-dcan1: can@481cc000 {
+dcan1: can@4ae3c000 {
  compatible = "ti,dra7-d_can";
  ti.hwmods = "dcan1";
  reg = <0x4ae3c000 0x2000>;
  @ @ -1862,7 +1868,7 @@
  status = "disabled";
};

-dcan2: can@481d0000 {
+dcan2: can@48480000 {
  compatible = "ti,dra7-d_can";
  ti.hwmods = "dcan2";
  reg = <0x48480000 0x2000>;
--- linux-4.15.0.orig/arch/arm/boot/dts/dra71-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/dra71-evm.dts
@@ -24,13 +24,13 @@
 regulator-name = "vddshv8";
 regulator-min-microvolt = <1800000>;
 -regulator-max-microvolt = <3000000>;
+regulator-max-microvolt = <3300000>;
 regulator-boot-on;
 vin-supply = <&evm_5v0>;

gpios = <&gpio7 11 GPIO_ACTIVE_HIGH>;
states = <1800000 0x0
- 3000000 0x1>;
+ 3300000 0x1>;
};

evm_1v8_sw: fixedregulator-evm_1v8 {
--- linux-4.15.0.orig/arch/arm/boot/dts/dra74x-mmc-iodelay.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/dra74x-mmc-iodelay.dtsi
@@ -32,7 +32,7 @@
 -* Datamanual Revisions:
 -*
-- * AM572x Silicon Revision 2.0: SPRS953B, Revised November 2016
+- * AM572x Silicon Revision 2.0: SPRS953F, Revised May 2019
+ * AM572x Silicon Revision 1.1: SPRS915R, Revised November 2016
 *
 */
@@ -229,45 +229,45 @@
mmc3_pins_default: mmc3_pins_default {
pinctrl-single.pins = <
- DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_clk,mmc3_clk *//
- DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_cmd,mmc3_cmd *//
- DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat0,mmc3_dat0 *//
- DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat1,mmc3_dat1 *//
- DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat2,mmc3_dat2 *//
- DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat3,mmc3_dat3 *//
+ DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_clk,mmc3_clk */
+ DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_cmd,mmc3_cmd */
+ DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat0,mmc3_dat0 */
+ DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat1,mmc3_dat1 */
+ DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*

mmc3_dat2.mmc3_dat2 */
+DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat3.mmc3_dat3 */
>
);

mmc3_pins_hs: mmc3_pins_hs {
pinctrl-single,pins = <
-DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_clk.mmc3_clk */
-DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_cmd.mmc3_cmd */
-DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat0.mmc3_dat0 */
-DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat1.mmc3_dat1 */
-DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat2.mmc3_dat2 */
-DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat3.mmc3_dat3 */
+
-DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
-DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
-DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
-DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
-DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
-DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_clk.mmc3_clk */
+DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_cmd.mmc3_cmd */
+DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat0.mmc3_dat0 */
+DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat1.mmc3_dat1 */
+DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat2.mmc3_dat2 */
+DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat3.mmc3_dat3 */
>;
};

mmc3_pins_sdr12: mmc3_pins_sdr12 {
pinctrl-single,pins = <
-DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_clk.mmc3_clk */
-DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_cmd.mmc3_cmd */
-DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat0.mmc3_dat0 */
-DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat1.mmc3_dat1 */
-DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat2.mmc3_dat2 */
-DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat3.mmc3_dat3 */
+DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_clk.mmc3_clk */
+DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_cmd.mmc3_cmd */
+DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat0.mmc3_dat0 */
+DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat1.mmc3_dat1 */
+DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*
mmc3_dat2.mmc3_dat2 */
+DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /*

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mmc3_dat3.mmc3_dat3 */
>
];

mmc3_pins_sdr25: mmc3_pins_sdr25 {
pinctrl-single,pins = <
   -DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_clk.mmc3_clk */
   -DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_cmd.mmc3_cmd */
   -DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat0.mmc3_dat0 */
   -DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat1.mmc3_dat1 */
   -DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat2.mmc3_dat2 */
   -DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MUX_MODE0)) /* mmc3_dat3.mmc3_dat3 */
   +DRA7XX_CORE_IOPAD(0x377c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /* mmc3_clk.mmc3_clk */
   +DRA7XX_CORE_IOPAD(0x3780, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /* mmc3_cmd.mmc3_cmd */
   +DRA7XX_CORE_IOPAD(0x3784, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /* mmc3_dat0.mmc3_dat0 */
   +DRA7XX_CORE_IOPAD(0x3788, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /* mmc3_dat1.mmc3_dat1 */
   +DRA7XX_CORE_IOPAD(0x378c, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /* mmc3_dat2.mmc3_dat2 */
   +DRA7XX_CORE_IOPAD(0x3790, (PIN_INPUT_PULLUP | MODE_SELECT | MUX_MODE0)) /* mmc3_dat3.mmc3_dat3 */
>
];

--- linux-4.15.0.orig/arch/arm/boot/dts/dra76-evm.dts
+++ linux-4.15.0/arch/arm/boot/dts/dra76-evm.dts
@@ -148,6 +148,7 @@
          compatible = "ti,tps65917 ";
    reg = <0x58 >;
    ti.system-power-controller;
+    ti.palmas-override-powerhold;
    interrupt-controller;
    #interrupt-cells = <2 >;

--- linux-4.15.0.orig/arch/arm/boot/dts/dra76x.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/dra76x.dtsi
@@ -17,3 +17,8 @@
  &crossbar_mpu {
    ti.irqs-skip = <10 67 68 133 139 140 >;
  }
+  +&mmc3 {
+    /* dra76x is not affected by i887 */
+    max-frequency = <96000000 >;
+  };


--- linux-4.15.0.orig/arch/arm/boot/dts/emev2.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/emev2.dtsi
@@ -31,13 +31,13 @@
    #address-cells = <1>;
    #size-cells = <0>;

-cpu@0 {
+cpu0: cpu@0 {
    device_type = "cpu";
    compatible = "arm,cortex-a9";
    reg = <0>;
    clock-frequency = <533000000>;
}
-cpu@1 {
+cpu1: cpu@1 {
    device_type = "cpu";
    compatible = "arm,cortex-a9";
    reg = <1>;
    @ @ -57,6 +57,7 @@
    compatible = "arm,cortex-a9-pmu";
    interrupts = <GIC_SPI 120 IRQ_TYPE_LEVEL_HIGH>,
                  <GIC_SPI 121 IRQ_TYPE_LEVEL_HIGH>;
+    interrupt-affinity = <&cpu0>, <&cpu1>;
}

clocks@e0110000 {
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos3250-artik5.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos3250-artik5.dtsi
@@ -71,7 +71,7 @@
    s2mps14_pmic@66 {
        compatible = "samsung,s2mps14-pmic";
        interrupt-parent = <&gpx3>;
-       interrupts = <7 IRQ_TYPE_NONE>;
+       interrupts = <7 IRQ_TYPE_LEVEL_LOW>;
        reg = <0x66>;
    }
    s2mps14_osc: clocks {
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos3250-monk.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos3250-monk.dts
@@ -191,7 +191,7 @@
    s2mps14_pmic@66 {
        compatible = "samsung,s2mps14-pmic";
        interrupt-parent = <&gpx0>;
-       interrupts = <7 IRQ_TYPE_NONE>;
+       interrupts = <7 IRQ_TYPE_LEVEL_LOW>;
        reg = <0x66>;
        wakeup-source;
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos3250-rinato.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos3250-rinato.dts
@@ -252,7 +252,7 @@
s2mps14_pmic@66 {
    compatible = "samsung,s2mps14-pmic";
    interrupt-parent = <&gpx0>;
-   interrupts = <7 IRQ_TYPE_NONE>;
+   interrupts = <7 IRQ_TYPE_LEVEL_LOW>;
    reg = <0x66>;
    wakeup-source;

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos3250.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos3250.dtsi
@@ -82,6 +82,22 @@
    compatible = "arm,cortex-a7";
    reg = <1>;
    clock-frequency = <1000000000>;
+   clocks = <&cmu CLK_ARM_CLK>;
+   clock-names = "cpu";
+   #cooling-cells = <2>;
+   +
+   operating-points = <
+   1000000 1150000
+   900000 1112500
+   800000 1075000
+   700000 1037500
+   600000 1000000
+   500000 962500
+   400000 925000
+   300000 887500
+   200000 850000
+   100000 850000
+>
+};
+]
+];
@
@ -156,6 +172,9 @
interrupt-controller;
#interrupt-cells = <3>;
interrupt-parent = <&gic>;
+clock-names = "clkout8";
+clocks = <&cmu CLK_FIN_PLL>;
+#clock-cells = <1>;
+];

mipi_phy: video-phy {
@@ -340,7 +359,7 @
[}
hsotg: hsotg@12480000 {
    -compatible = "snps,dwc2";
    +compatible = "samsung,s3c6400-hsotg", "snps,dwc2";
    reg = <0x12480000 0x200000>;
    interrupts = <GIC_SPI 141 IRQ_TYPE_LEVEL_HIGH>;
    clocks = <&cmu CLK_USBOTG>;
    --- linux-4.15.0.orig/arch/arm/boot/dts/exynos4210-origen.dts
    +++ linux-4.15.0/arch/arm/boot/dts/exynos4210-origen.dts
    @@ -152,6 +152,8 @@
    reg = <0x66>;
    interrupt-parent = <&gpx0>;
    interrupts = <4 IRQ_TYPE_NONE>, <3 IRQ_TYPE_NONE>;
    +pinctrl-names = "default";
    +pinctrl-0 = <&max8997_irq>;

    max8997,pmic-buck1-dvs-voltage = <1350000>;
    max8997,pmic-buck2-dvs-voltage = <1100000>;
    @@ -289,6 +291,13 @@
    };
};

+&pinctrl_1 {
    +max8997_irq: max8997-irq {
    +samsung,pins = "gpx0-3", "gpx0-4";
    +samsung,pin-pud = <EXYNOS_PIN_PULL_NONE>;
    +};
    +};
    +
    &sdhci_0 {
    bus-width = <4>;
    pinctrl-0 = <&sd0_clk &sd0_cmd &sd0_bus4 &sd0_cd>;
    --- linux-4.15.0.orig/arch/arm/boot/dts/exynos4210.dtsi
    +++ linux-4.15.0/arch/arm/boot/dts/exynos4210.dtsi
    @@ -52,8 +52,19 @@
    400000975000
    200000950000
    >;
    -cooling-min-level = <4>;
    -cooling-max-level = <2>;
    +#cooling-cells = <2>; /* min followed by max */
};

@@ -61,6 +59,19 @@
    device_type = "cpu";
    compatible = "arm, cortex-a9";
    reg = <0x901>;
    +clocks = <&clock CLK_ARM_CLK>;
+clock-names = "cpu";
+clock-latency = <160000>;
+
+operating-points = <
+1200000 1250000
+1000000 1150000
+80000001075000
+500000975000
+400000975000
+200000950000
+>;

+cooling-cells = <2>; /* min followed by max */
};
};

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos4412-odroid-common.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos4412-odroid-common.dtsi
@@ -58,7 +58,7 @@
};

emmc_pwrseq: pwrseq {
 +pinctrl-0 = <&sd1_cd>;
 +pinctrl-0 = <&emmc_rstn>;
 pinctrl-names = "default";
 compatible = "mmc-pwrseq-emmc";
 reset-gpios = <&gpk1 12 GPIO_ACTIVE_LOW>;
 @ @ -58,7 +58,7 @@
 cpu0-supply = <&buck2_reg>;
};

-/* RSTN signal for eMMC */
-&sd1_cd {
-    -samsung,pin-pud = <EXYNOS_PIN_PULL_NONE>;
-    -samsung,pin-driv = <EXYNOS4_PIN_DRV_LV1>;
-};
-
- &pinctrl_1 {
- gpio_power_key: power_key {
-    samsung.pins = "gpx1-3";
- @ @ -182.6 +176.11 @
-    samsung.pins = "gpx3-7";
-    samsung.pin-pud = <EXYNOS_PIN_PULL_DOWN>;
-    };
+
+ &emmc_rstn: emmc-rstn {
+    samsung.pins = "gpkl-2";
+    samsung.pin-pud = <EXYNOS_PIN_PULL_NONE>;
+    );

@ @ -264,7 +263,7 @@
max77686: pmic@9 {
compliant = "maxim,max77686";
interrupt-parent = <&gpx3>;
-interrupts = <2 IRQ_TYPE_NONE>;
+interrupts = <2 IRQ_TYPE_LEVEL_LOW>;
pinctrl-names = "default";
pinctrl-0 = <&max77686_irq>;
reg = <0x09>;
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos4412-trats2.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos4412-trats2.dts
@@ -173,7 +173,7 @@
max77693@66 {
compatible = "maxim,max77693";
interrupt-parent = <&gpx1>;
-interrupts = <5 IRQ_TYPE_EDGE_FALLING>;
+interrupts = <5 IRQ_TYPE_LEVEL_LOW>;
reg = <0x66>;

regulators {
@@ -219,7 +219,7 @@
max77693-fuel-gauge@36 {
compatible = "maxim,max17047";
interrupt-parent = <&gpx2>;
-interrupts = <3 IRQ_TYPE_EDGE_FALLING>;
+interrupts = <3 IRQ_TYPE_LEVEL_LOW>;
reg = <0x36>;
maxim,over-heat-temp = <700>;
@@ -454,7 +454,7 @@
reg = <0>;
vdd3-supply = <&lcd_vdd3_reg>;
vcv-supply = <&ldo25_reg>;
-reset-gpios = <&gpy4 5 GPIO_ACTIVE_HIGH>;
+reset-gpios = <&gpf2 1 GPIO_ACTIVE_HIGH>;
power-on-delay= <50>;
reset-delay = <100>;
init-delay = <100>;
@@ -676,7 +676,7 @@
max77686: max77686_pmic@9 {
compatible = "maxim,max77686";
interrupt-parent = <&gpx0>;
-interrupts = <7 IRQ_TYPE_NONE>;
+interrupts = <7 IRQ_TYPE_LEVEL_LOW>;
reg = <0x09>;
#clock-cells = <1>;

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos4412.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos4412.dts
@@ -45,8 +45,6 @@
clocks = <&clock CLK_ARM_CLK>;
clock-names = "cpu";
operating-points-v2 = <&cpu0_opp_table>;
 -cooling-min-level = <13>;
 -cooling-max-level = <7>;
 #cooling-cells = <2>; /* min followed by max */
};

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5250-arndale.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos5250-arndale.dts
@@ -152,9 +152,11 @@
};

&hdmi {
 +pinctrl-names = "default";
 +pinctrl-0 = <&hdmi_hpd>;
 status = "okay";
 -ddc = <&i2c_2>;
 -hpd-gpios = <&gpx3 7 GPIO_ACTIVE_LOW>;
 +ddc = <&i2c_ddc>;
 +hpd-gpios = <&gpx3 7 GPIO_ACTIVE_HIGH>;
 vdd_osc-supply = <&ldo10_reg>;
 vdd_pll-supply = <&ldo8_reg>;
 vdd-supply = <&ldo8_reg>;
 @ @ -171.6 +173.8 @ @
 reg = <0x66>;
 interrupt-parent = <&gpx3>;
 interrupts = <2 IRQ_TYPE_LEVEL_LOW>;
 +pinctrl-names = "default";
 +pinctrl-0 = <&s5m8767_irq>;

 vinh1-supply = <&main_dc_reg>;
 vinh2-supply = <&main_dc_reg>;
 @ @ -455.13 +459.6 @ @
};
};

-&i2c_2 {
 -status = "okay";
 /* used by HDMI DDC */
 -samsung,i2c-sda-delay = <100>;
 -samsung,i2c-max-bus-freq = <66000>;
-};
&i2c_3 {
    status = "okay";
}

@ @ -538,6 +535,13 @@
cap-sd-highspeed;
}

+&pinctrl_0 {
    +s5m8767_irq: s5m8767-irq {
        +samsung,pins = "gpx3-2";
        +samsung,pin-pud = <EXYNOS_PIN_PULL_NONE>;
    };
    +};

+&rtc {
    status = "okay";
}

@@ -550,3 +554,22 @@
    status = "okay";
    samsung,exynos-sataphy-i2c-phandle = <&sata_phy_i2c>;
};
+
+&soc {
    +/
    /*
    */
    /* For unknown reasons HDMI-DDC does not work with Exynos I2C
    */
    /* controllers. Lets use software I2C over GPIO pins as a workaround.
    */
    + */
+i2c_ddc: i2c-gpio {
    +pinctrl-names = "default";
    +pinctrl-0 = <&i2c2_gpio_bus>;
    +status = "okay";
    +compatible = "i2c-gpio";
    +gpios = <&gpa0 6 0 /* sda */
    + &gpa0 7 0 /* scl */
    +>
    +i2c-gpio,delay-us = <2>;
    +#address-cells = <1>;
    +#size-cells = <0>;
    +};
    +};

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5250-pinctrl.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos5250-pinctrl.dtsi
@@ -228,6 +228,12 @@
samsung,pin-drv = <EXYNOS4_PIN_DRV_LV1>;
};

+i2c2_gpio_bus: i2c-gpio-bus{
samsung.pins = "gpa0-6", "gpa0-7";
samsung.pin-pud = <EXYNOS_PIN_PULL_NONE>;
samsung.pin-drv = <EXYNOS4_PIN_DRV_LV1>;
+
+ uart2_data: uart2-data {
  samsung.pins = "gpa1-0", "gpa1-1";
samsung.pin-function = <EXYNOS_PIN_FUNC_2>;
  @@ -596,6 +602,11 @@
samsung.pin-pud = <EXYNOS_PIN_PULL_NONE>;
samsung.pin-drv = <EXYNOS4_PIN_DRV_LV1>;
};
+
+ hdmi_hp: hdmi-hpd {
  samsung.pins = "gpx3-7";
samsung.pin-pud = <EXYNOS_PIN_PULL_NONE>;
};
+
& pinctrl_1 {
  --- linux-4.15.0.orig/arch/arm/boot/dts/exynos5250-smdk5250.dts
  +++ linux-4.15.0/arch/arm/boot/dts/exynos5250-smdk5250.dts
  @@ -135,7 +135,7 @@
    compatible = "maxim,max77686";
    reg = <0x09>;
    interrupt-parent = <&gpx3>;
    -interrupts = <2 IRQ_TYPE_NONE>;
    +interrupts = <2 IRQ_TYPE_LEVEL_LOW>;
    pinctrl-names = "default";
    pinctrl-0 = <&max77686_irq>;
    wakeup-source;
  --- linux-4.15.0.orig/arch/arm/boot/dts/exynos5250-snow-common.dtsi
  +++ linux-4.15.0/arch/arm/boot/dts/exynos5250-snow-common.dtsi
  @@ -284,7 +284,7 @@
    max77686: max77686@9 {
      compatible = "maxim,max77686";
      interrupt-parent = <&gpx3>;
      -interrupts = <2 IRQ_TYPE_NONE>;
      +interrupts = <2 IRQ_TYPE_LEVEL_LOW>;
      pinctrl-names = "default";
      pinctrl-0 = <&max77686_irq>;
      wakeup-source;
  --- linux-4.15.0.orig/arch/arm/boot/dts/exynos5250-snow-rev5.dts
  +++ linux-4.15.0/arch/arm/boot/dts/exynos5250-snow-rev5.dts
  @@ -23,6 +23,14 @@
    samsung.model = "Snow-I2S-MAX98090";
samsung.audio-codec = <&max98090>;
}
+cpu {
+sound-dai = <&i2s0 0>;
+
+}
+
+codec {
+sound-dai = <&max98090 0>, <&hdmi>;
+
+}
+
@@ -34,6 +42,9 @@

interrupt-parent = <&gpx0>;
pinctrl-names = "default";
pinctrl-0 = <&max98090_irq>;
clocks = <&pmu_system_controller 0>;
clock-names = "mclk";
#sound-dai-cells = <1>;
};
};

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5250-spring.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos5250-spring.dts
@@ -111,7 +111,7 @@

compatible = "samsung,s5m8767-pmic";
reg = <0x66>;
interrupt-parent = <&gpx3>;
-interrupts = <2 IRQ_TYPE_NONE>;
+interrupts = <2 IRQ_TYPE_LEVEL_LOW>;
pinctrl-names = "default";
pinctrl-0 = <&s5m8767_irq &s5m8767_dvs &s5m8767_ds>;
wakeup-source;
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5250.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos5250.dtsi
@@ -57,38 +57,106 @@
device_type = "cpu";
compatible = "arm,cortex-a15";
reg = <0>;
-clock-frequency = <1700000000>;
clocks = <&clock CLK_ARM_CLK>;
clock-names = "cpu";
-clock-latency = <140000>;
-}
-operating-points = <
-1700000000
-1600000000
-1500000000
-1400000000
-1300000000
-1200000000
-1300000 1150000
-1200000 1125000
-1100000 1100000
-1000000 1075000
- 900000 1050000
- 800000 1025000
- 700000 1012500
- 600000 1000000
- 500000 975000
- 400000 950000
- 300000 937500
- 200000 925000
->;
-cooling-min-level = <15>;
cooling-max-level = <9>;
+operating-points-v2 = <&cpu0_opp_table>;
#cooling-cells = <2>; /* min followed by max */
};
cpu@1 {
  device_type = "cpu";
  compatible = "arm,cortex-a15";
  reg = <1>;
  -clock-frequency = <1700000000>;
  +clocks = <&clock CLK_ARM_CLK>;
  +clock-names = "cpu";
  +operating-points-v2 = <&cpu0_opp_table>;
  +#cooling-cells = <2>; /* min followed by max */
  +}:
  +};
  +
  +cpu0_opp_table: opp_table0 {
    +compatible = "operating-points-v2";
    +opp-shared;
    +
    +opp-200000000 {
      +opp-hz = /bits/ 64 <200000000>;
      +opp-microvolt = <925000>;
      +clock-latency-ns = <140000>;
    +};
    +opp-300000000 {
      +opp-hz = /bits/ 64 <300000000>;
      +opp-microvolt = <937500>;
      +clock-latency-ns = <140000>;
    +};
    +opp-400000000 {
      +opp-hz = /bits/ 64 <400000000>;
      +opp-microvolt = <950000>;
      +clock-latency-ns = <140000>;
    +};
```plaintext
+opp-hz = /bits/ 64 <1400000000>
+opp-microvolt = <1200000>
+clock-latency-ns = <140000>
+
+opp-1500000000 {
  +opp-hz = /bits/ 64 <1500000000>
  +opp-microvolt = <1225000>
  +clock-latency-ns = <140000>
  +
}
+opp-1600000000 {
  +opp-hz = /bits/ 64 <1600000000>
  +opp-microvolt = <1250000>
  +clock-latency-ns = <140000>
  +
}
+opp-1700000000 {
  +opp-hz = /bits/ 64 <1700000000>
  +opp-microvolt = <1300000>
  +clock-latency-ns = <140000>
  +
}
}
@@ -648,7 +716,7 @@
power-domains = <&pd_gsc>
clocks = <&clock CLK_GSCL0>
clock-names = "gscl"
-iommu = <&sysmmu_gsc0>
+iommu = <&sysmmu_gsc0>
+iommus = <&sysmmu_gsc0>
;

gsc_1: gsc@13e10000 {
@@ -658,7 +726,7 @@
power-domains = <&pd_gsc>
clocks = <&clock CLK_GSCL1>
clock-names = "gscl"
-iommu = <&sysmmu_gsc1>
+iommu = <&sysmmu_gsc1>
+iommus = <&sysmmu_gsc1>
;

gsc_2: gsc@13e20000 {
@@ -668,7 +736,7 @@
power-domains = <&pd_gsc>
clocks = <&clock CLK_GSCL2>
clock-names = "gscl"
-iommu = <&sysmmu_gsc2>
+iommu = <&sysmmu_gsc2>
+iommus = <&sysmmu_gsc2>
;

gsc_3: gsc@13e30000 {
```
power-domains = <&pd_gsc>;
clocks = <&clock CLK_GSCL3>;
clock-names = "gscl";
-iommu = <&sysmmu_gsc3>;
+iommus = <&sysmmu_gsc3>;
};

hdmi: hdmi@14530000 {
};

wakeup-interrupt-controller {
compatible = "samsung,exynos4210-wakeup-eint";
interrupt-parent = <&gic>;
-interrupts = <GIC_SPI 32 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 48 IRQ_TYPE_LEVEL_HIGH>;
};

regulator-name = "vddq_lcd";
regulator-min-microvolt = <1800000>;
regulator-max-microvolt = <1800000>;
+/* Supplies also GPK and GPJ */
+regulator-always-on;
};

ldo8_reg: LDO8 {
@@ -629,11 +631,11 @@
};

&usbdrd_dwc3_0 {
-dr_mode = "host";
+dr_mode = "peripheral";
};

&usbdrd_dwc3_1 {
-dr_mode = "peripheral";
+dr_mode = "host";
};

&usbdrd3_0 {
};
interrupt-controller;
#interrupt-cells = <2>;
};
+
+usb3_1_oc: usb3-1-oc {
+samsung.pins = "gpk2-4", "gpk2-5";
+samsung.pin-function = <EXYNOS_PIN_FUNC_2>;
+samsung.pin-pud = <EXYNOS_PIN_PULL_UP>;
+samsung.pin-driv = <EXYNOS5420_PIN_DRV_LV1>;
+};
+
+usb3_1_vbusctrl: usb3-1-vbusctrl {
+samsung.pins = "gpk2-6", "gpk2-7";
+samsung.pin-function = <EXYNOS_PIN_FUNC_2>;
+samsung.pin-pud = <EXYNOS_PIN_PULL_DOWN>;
+samsung.pin-driv = <EXYNOS5420_PIN_DRV_LV1>;
+};
+
+usb3_0_oc: usb3-0-oc {
+samsung.pins = "gpk3-0", "gpk3-1";
+samsung.pin-function = <EXYNOS_PIN_FUNC_2>;
+samsung.pin-pud = <EXYNOS_PIN_PULL_UP>;
+samsung.pin-driv = <EXYNOS5420_PIN_DRV_LV1>;
+};
+
+usb3_0_vbusctrl: usb3-0-vbusctrl {
+samsung.pins = "gpk3-2", "gpk3-3";
+samsung.pin-function = <EXYNOS_PIN_FUNC_2>;
+samsung.pin-pud = <EXYNOS_PIN_PULL_DOWN>;
+samsung.pin-driv = <EXYNOS5420_PIN_DRV_LV1>;
+};

&pinctrl_2 {
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5410.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos5410.dtsi
@@ -333,7 +333,6 @@
 &rtc {
 clocks = <<clock CLK_RTC>>;
 clock-names = "rtc";
-interrupt-parent = <<pmu_system_controller>>;
 status = "disabled";
 }
@@ -382,6 +381,8 @@
 &usbdrd3_0 {
 clocks = <<clock CLK_USB300>>;
 clock-names = "usbdrd30";

+pinctrl-names = "default";
+pinctrl-0 = <&usb3_0_oc>, <&usb3_0_vbusctrl>;
};

&usbdrd_phy0 {
@@ -393,6 +394,8 @@
&usbdrd3_1 {
clocks = <&clock CLK_USBD301>;
clock-names = "usbdrd30";
+pinctrl-names = "default";
+pinctrl-0 = <&usb3_1_oc>, <&usb3_1_vbusctrl>;
};

&usbdrd_dwc3_1 {
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5420-arndale-octa.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos5420-arndale-octa.dts
@@ -87,7 +87,7 @@
interrupt-parent = <&gpx3>;
-interrupts = <2 IRQ_TYPE_EDGE_FALLING>;
+pinterrupts = <2 IRQ_TYPE_LEVEL_LOW>;
pinctrl-names = "default";
pinctrl-0 = <&s2mps11_irq>;
@@ -109,6 +109,7 @@
regulator-name = "PVDD_APIO_1V8";
regulator-min-microvolt = <1800000>;
regulator-max-microvolt = <1800000>;
+regulator-always-on;
};

ldo3_reg: LDO3 {
@@ -147,6 +148,7 @@
regulator-name = "PVDD_ABB_1V8";
regulator-min-microvolt = <1800000>;
regulator-max-microvolt = <1800000>;
+regulator-always-on;
};

ldo9_reg: LDO9 {
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5420-cpus.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos5420-cpus.dtsi
@@ -33,8 +33,6 @@
clock-frequency = <1800000000>;
cci-control-port = <&cci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
-cooling-min-level = <0>;

- cooling-max-level = <11>;
#cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
}
};
@@ -46,8 +44,6 @@
clock-frequency = <1800000000>;
cci-control-port = <&cci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
-cooling-min-level = <0>;
-cooling-max-level = <11>;
#cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
};
@@ -59,8 +55,6 @@
clock-frequency = <1800000000>;
cci-control-port = <&cci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
-cooling-min-level = <0>;
-cooling-max-level = <11>;
#cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
};
@@ -72,8 +66,6 @@
clock-frequency = <1800000000>;
cci-control-port = <&cci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
-cooling-min-level = <0>;
-cooling-max-level = <11>;
#cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
};
@@ -86,8 +78,6 @@
clock-frequency = <1000000000>;
cci-control-port = <&cci_control0>;
operating-points-v2 = <&cluster_a7_opp_table>;
-cooling-min-level = <0>;
-cooling-max-level = <7>;
#cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <539>;
};
@@ -99,8 +89,6 @@
clock-frequency = <1000000000>;
cci-control-port = <&cci_control0>;
operating-points-v2 = <&cluster_a7_opp_table>;
-cooling-min-level = <0>;
-cooling-max-level = <7>;
#cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <539>;
};
clock-frequency = <1000000000>
cci-control-port = &cci_control0;
operating-points-v2 = &cluster_a7 opp_table;
cooling-min-level = <0>
cooling-max-level = <7>
#cooling-cells = <2> /* min followed by max */
capacity-dmips-mhz = <539>
};

@ @ -125.8 +111.6 @ @
clock-frequency = <1000000000>
cci-control-port = &cci_control0;
operating-points-v2 = &cluster_a7 opp_table;
cooling-min-level = <0>
cooling-max-level = <7>
#cooling-cells = <2> /* min followed by max */
capacity-dmips-mhz = <539>
};

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5420-peach-pit.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos5420-peach-pit.dts
@@ -31,7 +31,7 @@
 aliases {
 /* Assign 20 so we don't get confused w/ builtin ones */
 -i2c20 = "spi@12d40000/cros-ec@0/i2c-tunnel";
+ i2c20 = &i2c_tunnel;
 }

 backlight: backlight {
 @ @ -301.6 +301.7 @ @
 regulator-name = "vdd_1v35";
 regulator-min-microvolt = <1350000>
 regulator-max-microvolt = <1350000>
 +regulator-always-on;
 regulator-boot-on;
 regulator-state-mem {
 regulator-on-in-suspend;
 @ @ -322.6 +323.7 @ @
 regulator-name = "vdd_2v";
 regulator-min-microvolt = <2000000>
 regulator-max-microvolt = <2000000>
 +regulator-always-on;
 regulator-boot-on;
 regulator-state-mem {
 regulator-on-in-suspend;
 @ @ -332.6 +334.7 @ @
 regulator-name = "vdd_1v8";
regulator-min-microvolt = <1800000>;  
regulator-max-microvolt = <1800000>;  
+regulator-always-on;  
regulator-boot-on;  
regulator-state-mem {  
regulator-on-in-suspend;  
@@ -426,6 +429,7 @@  
regulator-name = "vdd_ldo10";  
regulator-min-microvolt = <1800000>;  
regulator-max-microvolt = <1800000>;  
+regulator-always-on;  
regulator-state-mem {  
regulator-off-in-suspend;  
};  
@@ -956,7 +960,7 @@  
samsung_spi-feedback-delay = <1>;  
};  

-i2c-tunnel {  
+i2c_tunnel: i2c-tunnel {  
compatible = "google,cros-ec-i2c-tunnel";  
#address-cells = <1>;  
#size-cells = <0>;  
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5422-cpus.dtsi  
+++ linux-4.15.0/arch/arm/boot/dts/exynos5422-cpus.dtsi  
@@ -32,8 +32,6 @@  
clock-frequency = <1000000000>;  
cci-control-port = <&cci_control0>;  
operating-points-v2 = <&cluster_a7_opp_table>;  
-cooling-min-level = <0>;  
-cooling-max-level = <11>;  
#cooling-cells = <2>; /* min followed by max */  
capacity-dmips-mhz = <539>;  
};  
@@ -45,8 +43,6 @@  
clock-frequency = <1000000000>;  
cci-control-port = <&cci_control0>;  
operating-points-v2 = <&cluster_a7_opp_table>;  
-cooling-min-level = <0>;  
-cooling-max-level = <11>;  
#cooling-cells = <2>; /* min followed by max */  
capacity-dmips-mhz = <539>;  
};  
@@ -58,8 +54,6 @@  
clock-frequency = <1000000000>;  
cci-control-port = <&cci_control0>;  
operating-points-v2 = <&cluster_a7_opp_table>;  
-cooling-min-level = <0>;
- cooling-max-level = <11>;
# cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <539>;
];
@@ -71,8 +65,6 @@
clock-frequency = <1000000000>;
ccci-control-port = <&ccci_control0>;
operating-points-v2 = <&cluster_a7_opp_table>;
- cooling-min-level = <0>;
- cooling-max-level = <11>;
# cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <539>;
];
@@ -85,8 +77,6 @@
clock-frequency = <1800000000>;
ccci-control-port = <&ccci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
- cooling-min-level = <0>;
- cooling-max-level = <15>;
# cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
];
@@ -98,8 +88,6 @@
clock-frequency = <1800000000>;
ccci-control-port = <&ccci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
- cooling-min-level = <0>;
- cooling-max-level = <15>;
# cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
];
@@ -111,8 +99,6 @@
clock-frequency = <1800000000>;
ccci-control-port = <&ccci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
- cooling-min-level = <0>;
- cooling-max-level = <15>;
# cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
];
@@ -124,8 +110,6 @@
clock-frequency = <1800000000>;
ccci-control-port = <&ccci_control1>;
operating-points-v2 = <&cluster_a15_opp_table>;
- cooling-min-level = <0>;
- cooling-max-level = <15>;
# cooling-cells = <2>; /* min followed by max */
capacity-dmips-mhz = <1024>;
];
interrupt-parent = <&gpx0>;
-interrupts = <4 IRQ_TYPE_EDGE_FALLING>;
+interrupts = <4 IRQ_TYPE_LEVEL_LOW>;
pinctrl-names = "default";
pinctrl-0 = <&s2mps11_irq>;

ldo13_reg: LDO13 {
    regulator-name = "vddq_mmc2";
    -regulator-min-microvolt = <2800000>;
    +regulator-min-microvolt = <1800000>;
    regulator-max-microvolt = <2800000>;
};

buck8_reg: BUCK8 {
    regulator-name = "vdd_1.8v_ldo";
    regulator-min-microvolt = <800000>;
    -regulator-max-microvolt = <1500000>;
    +regulator-max-microvolt = <2000000>;
    regulator-always-on;
    regulator-boot-on;
};
"IN12", "Headphone Jack",
"Speakers", "SPKL",
"Speakers", "SPKR";

--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5422-odroidxu4.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos5422-odroidxu4.dts
@@ -26,7 +26,7 @@
 label = "blue:heartbeat";
pwms = <&pwm 2 2000000 0>;
pwm-names = "pwm2";
-max_brightness = <255>;
+max-brightness = <255>;
linux,default-trigger = "heartbeat";
};
};
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos54xx-odroidxu-leds.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/exynos54xx-odroidxu-leds.dtsi
@@ -25,7 +25,7 @@
 * Green LED is much brighter than the others
 * so limit its max brightness
 */
-max_brightness = <127>;
+max-brightness = <127>;
linux,default-trigger = "mmc0";
};

@@ -33,7 +33,7 @@
 label = "blue:heartbeat";
pwms = <&pwm 2 2000000 0>;
pwm-names = "pwm2";
-max_brightness = <255>;
+max-brightness = <255>;
linux,default-trigger = "heartbeat";
};
};
--- linux-4.15.0.orig/arch/arm/boot/dts/exynos5800-peach-pi.dts
+++ linux-4.15.0/arch/arm/boot/dts/exynos5800-peach-pi.dts
@@ -29,7 +29,7 @@
 aliases {
 /* Assign 20 so we don't get confused w/ builtin ones */
 -i2c20 = "/spi@12d40000/cros-ec@0/i2c-tunnel";
+i2c20 = &i2c_tunnel;
};

backlight: backlight {
@@ -301,6 +301,7 @@
 regulator-name = "vdd_1v35";

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regulator-min-microvolt = <1350000>;
regulator-max-microvolt = <1350000>;
+regulator-always-on;
regulator-boot-on;
regulator-state-mem {
regulator-on-in-suspend;
@@ -322,6 +323,7 @@
regulator-name = "vdd_2v";
regulator-min-microvolt = <2000000>;
regulator-max-microvolt = <2000000>;
+regulator-always-on;
regulator-boot-on;
regulator-state-mem {
regulator-on-in-suspend;
@@ -332,6 +334,7 @@
regulator-name = "vdd_1v8";
regulator-min-microvolt = <1800000>;
regulator-max-microvolt = <1800000>;
+regulator-always-on;
regulator-boot-on;
regulator-state-mem {
regulator-on-in-suspend;
@@ -426,6 +429,7 @@
regulator-name = "vdd_ldo10";
regulator-min-microvolt = <1800000>;
regulator-max-microvolt = <1800000>;
+regulator-always-on;
regulator-boot-on;
regulator-state-mem {
regulator-off-in-suspend;
};
@@ -925,7 +929,7 @@
samsung.spi-feedback-delay = <1>;
};

-i2c-tunnel {
+i2c_tunnel: i2c-tunnel {
compatible = "google,cros-ec-i2c-tunnel";
#address-cells = <1>;
#size-cells = <0>;
--- linux-4.15.0.orig/arch/arm/boot/dts/gemini-dlink-dir-685.dts
+++ linux-4.15.0/arch/arm/boot/dts/gemini-dlink-dir-685.dts
@@ -128,20 +128,16 @@
read-only:
};
/*
- * Between the boot loader and the rootfs is the kernel
- * in a custom Storlink format flashed from the boot
- * menu. The rootfs is in squashfs format.
This firmware image contains the kernel catenated with the squashfs root filesystem. For some reason this is called "upgrade" on the vendor system.

*/
-partition@1800c0 {
-label = "rootfs";
-reg = <0x001800c0 0x01dbff40>;
-read-only;
};
-partition@1f40000 {
+partition@40000 {
-label = "upgrade";
-reg = <0x01f40000 0x00040000>;
+reg = <0x00040000 0x01f40000>;
-read-only;
};
+/* RGDB, Residential Gateway Database? */
 partition@1f80000 {
-label = "rgdb";
-reg = <0x01f80000 0x00040000>;
--- linux-4.15.0.orig/arch/arm/boot/dts/gemini-sq201.dts
+++ linux-4.15.0/arch/arm/boot/dts/gemini-sq201.dts
@@ -20,7 +20,7 @@
};
 chosen {
-bootargs = "console=ttyS0,115200n8";
+bootargs = "console=ttyS0,115200n8 root=/dev/mtdblock2 rw rootfstype=squashfs,jffs2 rootwait";
 stdout-path = &uart0;
};
@@ -71,37 +71,10 @@
/* 16MB of flash */
-reg = <0x30000000 0x01000000>;
-partition@0 {
-label = "RedBoot";
-reg = <0x00000000 0x00120000>;
-read-only;
-};
-partition@120000 {
-label = "Kernel";
-reg = <0x00120000 0x00200000>;
-};
-partition@320000 {
-label = "Ramdisk";
-reg = <0x00320000 0x00600000>;
-};

-partition@920000 {
-label = "Application";
-reg = <0x00920000 0x00600000>;
-};
-partition@f20000 {
-label = "VCTL";
-reg = <0x00f20000 0x00020000>;
-read-only;
-};
-partition@f40000 {
-label = "CurConf";
-reg = <0x00f40000 0x000a0000>;
-read-only;
-};
-partition@fe0000 {
-label = "FIS directory";
-reg = <0x00fe0000 0x00020000>;
-read-only;
+partitions {
+compatible = "redboot-fis";
+/* Eraseblock at 0xfe0000 */
+fis-index-block = <0x1fc>;
};
};

--- linux-4.15.0.orig/arch/arm/boot/dts/gemini.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/gemini.dtsi
@@ -281,6 +281,7 @@
clock-names = "PCLK", "PCICLK";
pinctrl-names = "default";
pinctrl-0 = <&pci_default_pins>;
+device_type = "pci";
#address-cells = <3>;
#size-cells = <2>;
#interrupt-cells = <1>;
--- linux-4.15.0.orig/arch/arm/boot/dts/imx27-phytec-phycard-s-rdk.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx27-phytec-phycard-s-rdk.dts
@@ -81,8 +81,8 @@
imx27-phytec-phycard-s-rdk {
pinctrl_i2c1: i2c1grp {
  fsl,pins = <
-MX27_PAD_I2C2_SDA___I2C2_SDA 0x0
-MX27_PAD_I2C2_SCL___I2C2_SCL 0x0
+MX27_PAD_I2C_DATA___I2C_DATA 0x0
+MX27_PAD_I2C_CLK___I2C_CLK 0x0
>;
--- linux-4.15.0.orig/arch/arm/boot/dts/imx50-evk.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx50-evk.dts
@@ -65,7 +65,7 @@
    MX50_PAD_CSPI_MISO__CSPI_MISO	0x00
    MX50_PAD_CSPI_MOSI__CSPI_MOSI	0x00
    MX50_PAD_CSPI_SS0__GPIO4_11	0xc4
-MX50_PAD_ECSPI1_MOSI__CSPI_SS1	0xf4
+MX50_PAD_ECSPI1_MOSI__GPIO4_13	0x84
>

--- linux-4.15.0.orig/arch/arm/boot/dts/imx50.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx50.dtsi
@@ -441,7 +441,7 @@
    interrupts = <6>;
    clocks = &clks IMX5_CLK_SDMA_GATE>,
    - &clks IMX5_CLK_SDMA_GATE>;
+ &clks IMX5_CLK_AHB>;
    clock-names = "ipg", "ahb";
    #dma-cells = <3>;
    fsl,sdma-ram-script-name = "imx/sdma/sdma-imx50.bin";
--- linux-4.15.0.orig/arch/arm/boot/dts/imx51-zii-rdu1.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx51-zii-rdu1.dts
@@ -489,7 +489,7 @@
>

ds1341: rtc@68 {
    -compatible = "maxim,ds1341";
    +compatible = "dallas,ds1341";
    reg = <0x68>;
};

@ @ -516,7 +516,7 @@
}

touchscreen@20 {
    -compatible = "syna,rmi4_i2c";
    +compatible = "syna,rmi4-i2c";
    reg = <0x20>;
    pinctrl-names = "default";
    pinctrl-0 = &pinctrl_ts;
@ @ -534,8 +534,8 @@

rmi4-f11@11 {
    reg = <0x11>;
    -touch-inverted-y;
    -touch-swapped-x-y;
+touchscreen-inverted-y;
+touchscreen-swapped-x-y;
syna,sensor-type = <1>;
};
};
@@ -752,7 +752,7 @@
pinctrl_ts: tsgrp {
    fsl,pins = <
        -MX51_PAD_CSI1_D8__GPIO3_12x85
+        MX51_PAD_CSI1_D8__GPIO3_12x04
        MX51_PAD_CSI1_D9__GPIO3_130x85
    >;
    };
--- linux-4.15.0.orig/arch/arm/boot/dts/imx51.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx51.dtsi
@@ -476,7 +476,7 @@
    reg = <0x83fb0000 0x4000>;
    interrupts = <6>;
    clocks = <&clks IMX5_CLK_SDMA_GATE>,
-        <&clks IMX5_CLK_SDMA_GATE>;
+        <&clks IMX5_CLK_AHB>;
    clock-names = "ipg", "ahb";
    #dma-cells = <3>;
    fsl,sdma-ram-script-name = "imx/sdma/sdma-imx51.bin";
--- linux-4.15.0.orig/arch/arm/boot/dts/imx53-ppd.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx53-ppd.dts
@@ -547,8 +547,6 @@
    status = "okay";

    port@2 {
-        reg = <2>;
-    }

    lvds0_out: endpoint {
        remote-endpoint = <&panel_in_lvds0>;
    };
--- linux-4.15.0.orig/arch/arm/boot/dts/imx53-qsb-common.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx53-qsb-common.dtsi
@@ -130,6 +130,17 @@
    };

    /* CPU rated to 1GHz, not 1.2GHz as per the default settings */
+    operating-points = <
+        /* kHz   uV */
+        166666  850000
+        400000  900000
+        166666  850000
+        400000  900000
+
+
+&esdhc1 {
+  pinctrl-names = "default";
+  pinctrl-0 = <&pinctrl_esdhc1>;
+
+++ linux-4.15.0/arch/arm/boot/dts/imx53-voipac-dmm-668.dtsi
@@ -17,12 +17,8 @@
+  memory@70000000 {
 device_type = "memory";
-    reg = <0x70000000 0x20000000>;
-  };
-  -
-  -memory@b0000000 {
-     device_type = "memory";
-    reg = <0xb0000000 0x20000000>;
+    reg = <0x70000000 0x20000000>,
+      <0xb0000000 0x20000000>;
+  };
+
++ linux-4.15.0/arch/arm/boot/dts/imx53-voipac-dmm-668.dtsi
@@ -473,6 +473,10 @@
  remote-endpoint = <&ipu_di0_lvds0>;
 };
 };
+  +port@2 {
+    reg = <2>;
+  };
+};
+
++ linux-4.15.0/arch/arm/boot/dts/imx53.dtsi
@@ -488,6 +492,10 @@
  remote-endpoint = <&ipu_di1_lvds1>;
 };
 };
+  +port@2 {
+    reg = <2>;
+  };
+};

++ linux-4.15.0.orig/arch/arm/boot/dts/imx53.dtsi
@@ -473,6 +473,10 @@
  remote-endpoint = <&ipu_di0_lvds0>;
 };
 };
+  +port@2 {
+    reg = <2>;
+  };
+};

++ linux-4.15.0.orig/arch/arm/boot/dts/imx53-voipac-dmm-668.dtsi
@@ -17,12 +17,8 @@
+  memory@70000000 {
 device_type = "memory";
-    reg = <0x70000000 0x20000000>;
-  };
-  -
-  -memory@b0000000 {
-     device_type = "memory";
-    reg = <0xb0000000 0x20000000>;
+    reg = <0x70000000 0x20000000>,
+      <0xb0000000 0x20000000>;
+  };

--- linux-4.15.0.orig/arch/arm/boot/dts/imx53.dtsi
@@ -676,7 +684,7 @@
reg = <0x63fb0000 0x4000>
interrupts = <6>

- <&clks IMX5_CLK_SDMA_GATE>
+ <&clks IMX5_CLK_SDMA_GATE>
+ <&clks IMX5_CLK_AHB>

clock-names = "ipg", "ahb"

dma-cells = <3>

fsl,sdma-ram-script-name = "imx/sdma/sdma-imx53.bin"
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6dl-icore-rqs.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx6dl-icore-rqs.dts
@@ -42,7 +42,7 @@

--- linux-4.15.0.orig/arch/arm/boot/dts/imx6dl.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6dl.dtsi
@@ -39,6 +39,7 @@

396000 1175000
>

device_type = "cpu"

reg = <1>

next-level-cache = <&L2>
+operating-points = <
+/* kHz  uV */
+996000 1250000
+792000 1175000
+396000 1150000
+>
+fsl,soc-operating-points = <
+/* ARM kHz  SOC-PU uV */
+9960001175000
+7920001175000
+3960001175000
+>
+clock-latency = <61036>; /* two CLK32 periods */
+clocks = <&clks IMX6QDL_CLK_ARM>,
  + <&clks IMX6QDL_CLK_PLL2_PFD2_396M>,
  + <&clks IMX6QDL_CLK_STEP>,
  + <&clks IMX6QDL_CLK_PLL1_SW>,
  + <&clks IMX6QDL_CLK_PLL1_SYS>;
+clock-names = "arm", "pll2_pfd2_396m", "step",
  + "pll1_sw", "pll1_sys";
+arm-supply = <&reg_arm>;
+pu-supply = <&reg_pu>;
+soc-supply = <&reg_soc>;
};

--- linux-4.15.0.orig/arch/arm/boot/dts/imx6q-b450v3.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx6q-b450v3.dts
@@ -65,13 +65,6 @@
};

-&clks {
-  assigned-clocks = <&clks IMX6QDL_CLK_LDB_DI0_SEL>,
-    <&clks IMX6QDL_CLK_LDB_DI1_SEL>;
-  assigned-clock-parents = <&clks IMX6QDL_CLK_PLL3_USB_OTG>,
-    <&clks IMX6QDL_CLK_PLL3_USB_OTG>;
-};
-
-&ldb {
  status = "okay";

--- linux-4.15.0.orig/arch/arm/boot/dts/imx6q-b650v3.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx6q-b650v3.dts
@@ -65,13 +65,6 @@
};

-&clks {
-  assigned-clocks = <&clks IMX6QDL_CLK_LDB_DI0_SEL>,
-    <&clks IMX6QDL_CLK_LDB_DI1_SEL>;
-  assigned-clock-parents = <&clks IMX6QDL_CLK_PLL3_USB_OTG>,
-    <&clks IMX6QDL_CLK_PLL3_USB_OTG>;
-};
-
-&ldb {
  status = "okay";

--- linux-4.15.0.orig/arch/arm/boot/dts/imx6q-b850v3.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx6q-b850v3.dts
@@ -53,17 +53,6 @@
};

-&clks {
-  assigned-clocks = <&clks IMX6QDL_CLK_LDB_DI0_SEL>,
-    <&clks IMX6QDL_CLK_LDB_DI1_SEL>;
-  assigned-clock-parents = <&clks IMX6QDL_CLK_PLL3_USB_OTG>,
-    <&clks IMX6QDL_CLK_PLL3_USB_OTG>;
-};
-
-&ldb {
  status = "okay";

--- linux-4.15.0.orig/arch/arm/boot/dts/imx6q-b850v3.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx6q-b850v3.dts
@@ -53,17 +53,6 @@
};

-&clks {
-  assigned-clocks = <&clks IMX6QDL_CLK_LDB_DI0_SEL>,
-    <&clks IMX6QDL_CLK_LDB_DI1_SEL>;
-  assigned-clock-parents = <&clks IMX6QDL_CLK_PLL3_USB_OTG>,
-    <&clks IMX6QDL_CLK_PLL3_USB_OTG>;
-};
-
-&ldb {
  status = "okay";
--

-\&clks 
-\assigned-clocks = \&clks IMX6QDL_CLK_LDB_DI0_SEL>,
- \&clks IMX6QDL_CLK_LDB_DI1_SEL>,
- \&clks IMX6QDL_CLK_IPU1_DI0_PRE_SEL>,
- \&clks IMX6QDL_CLK_IPU2_DI0_PRE_SEL>
-\assigned-clock-parents = \&clks IMX6QDL_CLK_PLL5_VIDEO_DIV>,
- \&clks IMX6QDL_CLK_PLL5_VIDEO_DIV>,
- \&clks IMX6QDL_CLK_PLL2_PFD2_396M>
- \&clks IMX6QDL_CLK_PLL2_PFD2_396M>
-};
-
-\&ldb 
fsI,dual-channel;
status = "okay"
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6q-bx50v3.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6q-bx50v3.dtsi
@@ -92,6 +92,56 @@
mux-int-port = <1>
mux-ext-port = <4>
};
+
+\aliases 
+\mdio-gpio0 = \&mdio0;
+
+\mdio0: \mdio-gpio 
+compatible = "virtual,mdio-gpio";
+\gpios = \&gpio2 5 GPIO_ACTIVE_HIGH>, /* mdc */
+\&gpio2 7 GPIO_ACTIVE_HIGH>; /* mdio */
+
+#address-cells = <1>
+#size-cells = <0>
+
+\switch@0 
+compatible = "marvell,mv88e6085"; /* 88e6240*/
+#address-cells = <1>
+#size-cells = <0>
+\reg = <0>
+
+\switch_ports: ports 
+#address-cells = <1>
+#size-cells = <0>
+
+
+\mdio 

+/#address-cells = <1>;
+/#size-cells = <0>;
+
+switchphy0: switchphy@0 {
  +reg = <0>;
  +};
+
+switchphy1: switchphy@1 {
  +reg = <1>;
  +};
+
+switchphy2: switchphy@2 {
  +reg = <2>;
  +};
+
+switchphy3: switchphy@3 {
  +reg = <3>;
  +};
+
+switchphy4: switchphy@4 {
  +reg = <4>;
  +};
+
&ecspi5 {
  @@ -326,3 +376,30 @@
tcxo-clock-frequency = <26000000>;
  +};
  +
  +&pcie {
  +/* Synopsys, Inc. Device */
  +pci_root: root@0,0 {
  +compatible = "pci16c3,abcd";
  +reg = <0x00000000 0 0 0 0>;
  +
  +#address-cells = <3>;
  +#size-cells = <2>;
  +#interrupt-cells = <1>;
  +};
  +
  +&clks {
  +assigned-clocks = <&clks IMX6QDL_CLK_LDB_DI0_SEL>,
  +  <&clks IMX6QDL_CLK_LDB_DI1_SEL>,
  +};
+ \<&clks IMX6QDL_CLK_IPU1 DI0_PRE_SEL\>,  
+ \<&clks IMX6QDL_CLK_IPU1 DI1_PRE_SEL\>,  
+ \<&clks IMX6QDL_CLK_IPU2 DI0_PRE_SEL\>,  
+ \<&clks IMX6QDL_CLK_IPU2 DI1_PRE_SEL\>;  
+ assigned-clock-parents = \<&clks IMX6QDL_CLK_PLL5 VIDEO_DIV\>,  
+ \<&clks IMX6QDL_CLK_PLL5 VIDEO_DIV\>,  
+ \<&clks IMX6QDL_CLK_PLL2 PFD0 352M\>,  
+ \<&clks IMX6QDL_CLK_PLL2 PFD0 352M\>,  
+ \<&clks IMX6QDL_CLK_PLL2 PFD0 352M\>,  
+ \<&clks IMX6QDL_CLK_PLL2 PFD0 352M\>;  
+};  
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6q-cm-fx6.dts  
+++ linux-4.15.0/arch/arm/boot/dts/imx6q-cm-fx6.dts  
@@ -187,6 +187,72 @@  
+ &cpu1 {  
+ /*  
+ * Although the imx6q fuse indicates that 1.2GHz operation is possible,  
+ * the module behaves unstable at this frequency. Hence, remove the  
+ * 1.2GHz operation point here.  
+ */  
+ operating-points = <  
+ /* kHz uV */  
+ 9960001250000  
+ 8520001250000  
+ 7920001175000  
+ 396000975000  
+>;  
+ fsl,soc-operating-points = <  
+ /* ARM kHzSOC-PU uV */  
+ 9960001250000  
+ 8520001250000  
+ 7920001175000  
+ 3960001175000  
+>;  
+ };  
+ &cpu2 {  
+ /*  
+ * Although the imx6q fuse indicates that 1.2GHz operation is possible,  
+ * the module behaves unstable at this frequency. Hence, remove the  
+ * 1.2GHz operation point here.  
+ */  
+ operating-points = <  
+ /* kHzuV */  
+ 9960001250000

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+8520001250000
+7920001175000
+396000975000
+>
+fsl,soc-operating-points = <
+ /* ARM kHz SOC-PU uV */
+9960001250000
+8520001250000
+7920001175000
+3960001175000
+>
+
+&cpu3 {
+/
+% Although the imx6q fuse indicates that 1.2GHz operation is possible,
+% the module behaves unstable at this frequency. Hence, remove the
+% 1.2GHz operation point here.
+ */
+operating-points = <
+ /* kHz uV */
+9960001250000
+8520001250000
+7920001175000
+3960001175000
+>
+
+fsl,soc-operating-points = <
+ /* ARM kHz SOC-PU uV */
+9960001250000
+8520001250000
+7920001175000
+3960001175000
+>
+
+&ecspi1 {
+cs-gpios = <&gpio2 30 GPIO_ACTIVE_HIGH>, <&gpio3 19 GPIO_ACTIVE_HIGH>;
pinctrl-names = "default";
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6q.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6q.dtsi
@@ -44,6 +44,7 @@
+clock-latency = <61036>; /* two CLK32 periods */
+#cooling-cells = <2>;
clocks = <&clks IMX6QDL_CLK_ARM>,
<&clks IMX6QDL_CLK_PLL2_PFD2_396M>,
<&clks IMX6QDL_CLK_STEP>,

soc-supply = <&reg_soc>;
;
-cpu@1 {
+cpu1: cpu@1 {
  compatible = "arm,cortex-a9";
  device_type = "cpu";
  reg = <1>;
  next-level-cache = <&L2>;
  +operating-points = <
    +/* kHz  uV */
    +1200000 1275000
    +996000  1250000
    +852000  1250000
    +792000  1175000
    +396000  975000
  >;
  +fsl,soc-operating-points = <
  +/* ARM kHz  SOC-PU uV */
  +1200000 1275000
  +996000125000
  +852000125000
  +7920001175000
  +3960001175000
  >;
  +clock-latency = <61036>; /* two CLK32 periods */
  +clocks = <&clks IMX6QDL_CLK_ARM>,
    +<&clks IMX6QDL_CLK_PLL2_PFD2_396M>,
    +<&clks IMX6QDL_CLK_STEP>,
    +<&clks IMX6QDL_CLK_PLL1_SW>,
    +<&clks IMX6QDL_CLK_PLL1_SYS>;
  +clock-names = "arm", "pll2_pfd2_396m", "step",
    +"pll1_sw", "pll1 sys";
  +arm-supply = <&reg_arm>;
  +pu-supply = <&reg_pu>;
  +soc-supply = <&reg_soc>;
};

-cpu@2 {
+cpu2: cpu@2 {
  compatible = "arm,cortex-a9";
  device_type = "cpu";
  reg = <2>;
  next-level-cache = <&L2>;
  +operating-points = <
    +/* kHz  uV */
    +1200000 1275000
  >;

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+996000 1250000
+852000 1250000
+792000 1175000
+396000 975000
+
+fsi,soc-operating-points = <
+/* ARM kHz SOC-PU uV */
+1200000 1275000
+9960001250000
+8520001250000
+7920001175000
+3960001175000
+
+clock-latency = <61036>; /* two CLK32 periods */
+clocks = <&clks IMX6QDL_CLK_ARM>,
+<&clks IMX6QDL_CLK_PLL2_PFD2_396M>,
+<&clks IMX6QDL_CLK_STEP>,
+<&clks IMX6QDL_CLK_PLL1_SW>,
+<&clks IMX6QDL_CLK_PLL1_SYS>;
+clock-names = "arm", "pll2_pfd2_396m", "step",
+    "pll1_sw", "pll1_sys";
+arm-supply = <&reg_arm>;
+pu-supply = <&reg_pu>;
+soc-supply = <&reg_soc>;
};

-cpu@3 {
+cpu3: cpu@3 {
    compatible = "arm,cortex-a9";
    device_type = "cpu";
    reg = <3>;
    next-level-cache = <&L2>;
    +operating-points = <
    +/* kHz   uV */
    +1200000 1275000
    +996000 1250000
    +852000 1250000
    +792000 1175000
    +396000 975000
    +>
    +fsi,soc-operating-points = <
    +/* ARM kHz SOC-PU uV */
    +1200000 1275000
    +9960001250000
    +8520001250000
    +7920001175000
    +3960001175000
    +>;
}
+clock-latency = \(<61036>\); /* two CLK32 periods */
+clocks = \(<&clks IMX6Q_CLK_ARM>,
+ <&clks IMX6Q_CLK_PLL2_PFD2_396M>,
+ <&clks IMX6Q_CLK_STEP>,
+ <&clks IMX6Q_CLK_PLL1_SW>,
+ <&clks IMX6Q_CLK_PLL1_SYS>; 
+clock-names = "arm", "pll2_pfd2_396m", "step",
+ "pll1_sw", "pll1_sys";
+arm-supply = \(<&reg_arm>\);
+pu-supply = \(<&reg_pu>\);
+soc-supply = \(<&reg_soc>\);
};
);
}

@@ -96,7 +178,7 @@
clocks = \(<&clks IMX6Q_CLK_ECSPI5>,
 &<clks IMX6Q_CLK_ECSPI5>; 
+clock-names = "ipg", "per";
-dmas = \(<&sdma 11 7 1>, <&sdma 12 7 2>; 
+dmas = \(<&sdma 11 8 1>, <&sdma 12 8 2>; 
+dma-names = "rx", "tx";
status = "disabled";
};
@@ -126,6 +208,7 @@
 &<clks IMX6QDL_CLK_GPU2D_CORE>; 
+clock-names = "bus", "core";
+power-domains = \(<&pd_pu>\);
+#cooling-cells = \(<2>\);
};

ipu2: ipu@2800000 {

/* VDD_AUD_1P8: Audio codec */
reg_aud_1p8v: ldo3 {
 -regulator-name = "vdd1p8a";
 +regulator-name = "vdd1p8a";
 regulator-min-microvolt = \(<1800000>\);
 regulator-max-microvolt = \(<1800000>\);
 regulator-boot-on;
 --- linux-4.15.0.org/arch/arm/boot/dts/imx6qdl-gw52xx.dtsi
 +++ linux-4.15.0/arch/arm/boot/dts/imx6qdl-gw52xx.dtsi
 @@ -278,7 +278,7 @@
 +// SPDX-License-Identifier: GPL-2.0+
 +*/
 + * Copyright (C) 2018 Jacopo Mondi <jacopo@jmondi.org>
+ *
+
+\#include "imx6qdl-icore.dtsi"
+
+&iomuxc {
+  &pinctrl_enet: enetgrp {
+    fsl.pins = <
+      MX6QDL_PAD_ENET_CRS_DV__ENET_RX_EN 0x1b0b0
+      MX6QDL_PAD_GPIO_16__ENET_REF_CLK 0x4001b0b0
+      MX6QDL_PAD_ENET_TX_EN__ENET_TX_EN 0x1b0b0
+      MX6QDL_PAD_ENET_RXD1__ENET_RX_DATA1 0x1b0b0
+      MX6QDL_PAD_ENET_RXD0__ENET_RX_DATA0 0x1b0b0
+      MX6QDL_PAD_ENET_TXD1__ENET_TX_DATA1 0x1b0b0
+      MX6QDL_PAD_ENET_TXD0__ENET_TX_DATA0 0x1b0b0
+      MX6QDL_PAD_ENET_MDC__ENET_MDC 0x1b0b0
+      MX6QDL_PAD_ENET_MDIO__ENET_MDIO 0x1b0b0
+      MX6QDL_PAD_GPIO_17__GPIO7_IO12 0x1b0b0
+    >;
+  };
+};
+
+&fec {
+  &pinctrl-names = "default";
+  &pinctrl-0 = &pinctrl_enet;
+  &phy-reset-gpios = &gpio7 12 GPIO_ACTIVE_LOW;
+  &clocks = &clks IMX6QDL_CLK_ENET,
+            &clks IMX6QDL_CLK_ENET,
+            &clks IMX6QDL_CLK_ENET_REF;
+  &phy-mode = "rmii";
+  &status = "okay";
+};
+
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6qdl-icore-rqs.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6qdl-icore-rqs.dtsi
@@ -294,7 +294,7 @@
   &pinctrl-1 = &pinctrl_usdhc3_200mhz;
   &pinctrl-2 = &pinctrl_usdhc3_200mhz;
   &vmcc-supply = &reg_sd3_vmmc;
@@ -294,7 +294,7 @@
   &pinctrl-1 = &pinctrl_usdhc4_100mhz;
   &pinctrl-2 = &pinctrl_usdhc4_200mhz;
   &vmcc-supply = &reg_sd4_vmmc;
@@ -294,7 +294,7 @@
   &pinctrl-1 = &pinctrl_usdhc4_100mhz;
   &pinctrl-2 = &pinctrl_usdhc4_200mhz;
   &vmcc-supply = &reg_sd4_vmmc;
@@ -294,7 +294,7 @@
   &pinctrl-1 = &pinctrl_usdhc4_100mhz;
   &pinctrl-2 = &pinctrl_usdhc4_200mhz;
   &vmcc-supply = &reg_sd4_vmmc;
no-1-8-v;
non-removable;
status = "okay";
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6qdl-phytec-pfla02.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6qdl-phytec-pfla02.dtsi
@@ -89,6 +89,7 @@
pinctrl-names = "default";
pinctrl-0 = <&pinctrl_enet>;
phy-mode = "rgmii";
+phy-reset-duration = <10>; /* in msecs */
phy-reset-gpios = <&gpio3 23 GPIO_ACTIVE_LOW>;
phy-supply = <&vdd_eth_io_reg>;
status = "disabled";
@@ -305,8 +306,8 @@
 fsl.pins = <
 MX6QDL_PAD_EIM_D24__UART3_TX_DATA	0x1b0b1
 MX6QDL_PAD_EIM_D25__UART3_RX_DATA	0x1b0b1
- -MX6QDL_PAD_EIM_D30__UART3_RTS_B		0x1b0b1
- -MX6QDL_PAD_EIM_D31__UART3_CTS_B		0x1b0b1
+ MX6QDL_PAD_EIM_D31__UART3_RTS_B		0x1b0b1
+ MX6QDL_PAD_EIM_D30__UART3_CTS_B		0x1b0b1
 >;
};

@@ -393,6 +394,7 @@
 &uart3 {
pinctrl-names = "default";
pinctrl-0 = <&pinctrl_uart3>;
+uart-has-rtscs;
status = "disabled";
};

@@ -422,6 +424,7 @@
pinctrl-0 = <&pinctrl_usdhc2>;
cd-gpios = <&gpio1 4 GPIO_ACTIVE_LOW>;
wp-gpios = <&gpio1 2 GPIO_ACTIVE_HIGH>;
+vmmc-supply = <&vdd_sd1_reg>;
status = "disabled";
};

@@ -431,5 +434,6 @@
   &pinctrl_usdhc3_cdwp>;
cd-gpios = <&gpio1 27 GPIO_ACTIVE_LOW>;
wp-gpios = <&gpio1 29 GPIO_ACTIVE_HIGH>;
+vmmc-supply = <&vdd_sd0_reg>;
status = "disabled";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6qdl-sabresd.dtsi
vin-supply = <&sw1c_reg>;

&&reg_vdd1p1 {
  vin-supply = <&vgen5_reg>;
  +
}
&&reg_vdd2p5 {
  vin-supply = <&vgen5_reg>;
  +
}
&snvs_poweroff {
  status = "okay";
};
---
+++ linux-4.15.0/arch/arm/boot/dts/imx6qdl-wandboard-revc1.dtsi
@@ -17,7 +17,6 @@

imx6qdl-wandboard {
  pinctrl_hog: hoggrp {
    fsl,pins = <
      -MX6QDL_PAD_GPIO_0__CCM_CLKO10x130b0/* GPIO_0_CLKO */
      MX6QDL_PAD_GPIO_2__GPIO1_IO020x80000000/* uSDHC1 CD */
      MX6QDL_PAD_EIM_DA9__GPIO3_IO09x80000000/* uSDHC3 CD */
      MX6QDL_PAD_EIM_EB1__GPIO2_IO290x0f0b0/* WL_REF_ON */
    }
  }
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6qdl-wandboard-revd1.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6qdl-wandboard-revd1.dtsi
@@ -142,7 +142,6 @@
imx6qdl-wandboard {
    pinctrl_hog: hoggrp {
        fsl,pins = <
-MX6QDL_PAD_GPIO_0__CCM_CLKO1 0x130b0
+MX6QDL_PAD_GPIO_0__CCM_CLKO1 0x130b0
MX6QDL_PAD_EIM_D22__USB_OTG_PWR 0x80000000/* USB Power Enable */
+MX6QDL_PAD_GPIO_2__GPIO1_IO02 0x80000000/* USDHIC1 CD */
+MX6QDL_PAD_EIM_DA9__GPIO3_IO09 0x80000000/* uSDHC3 CD */
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6qdl-wandboard.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6qdl-wandboard.dtsi
@@ -83,6 +83,8 @@
    status = "okay";
    codec: sgtl5000@a {
        +pinctrl-names = "default";
+        +pinctrl-0 = <&pinctrl_mclk>;
        compatible = "fsl.sgtl5000";
        reg = <0x0a>;
        clocks = <&clks IMX6QDL_CLK_CKO>;
@@ -142,6 +144,12 @@
    >=;
    +
    +pinctrl_spdif: spdifgrp {
+        fsl,pins = <
+MX6QDL_PAD_GPIO_0__CCM_CLKO10x130b0
+>
+};
+;
+  pinctrl_spdif: spdifgrp {
+    fsl,pins = <
+    MX6QDL_PAD_GPIO_0__CCM_CLKO10x130b0
+++ linux-4.15.0/arch/arm/boot/dts/imx6qdl-zii-rdu2.dtsi
@@ -587,7 +587,7 @@
    bus-width = <4>;
    cd-gpios = <&gpio2 2 GPIO_ACTIVE_LOW>;
        -wp-gpios = <&gpio2 3 GPIO_ACTIVE_HIGH>;
        +disable-wp;
        vmmc-supply = <&reg_3p3v_sd>;
        vqmmc-supply = <&reg_3p3v>;
    status = "okay";
@@ -598,7 +598,7 @@
    bus-width = <4>;
    cd-gpios = <&gpio2 0 GPIO_ACTIVE_LOW>;

wp-gpios = <&gpio2 1 GPIO_ACTIVE_HIGH>;
+disable-wp;
vmmc-supply = <&reg_3p3v_sd>;
vqmmc-supply = <&reg_3p3v>;
status = "okay";
@@ -644,7 +644,7 @@
dsa.member = <0 0>;
eeprom-length = <512>;
interrupt-parent = <&gpio6>;
-interrupts = <3 IRQ_TYPE_EDGE_FALLING>;
+interrupts = <3 IRQ_TYPE_LEVEL_LOW>;
interrupt-controller;
#interrupt-cells = <2>;

@@ -729,6 +729,7 @@
MX6QDL_PAD_SD2_DAT1__SD2_DATA1 0x17059
MX6QDL_PAD_SD2_DAT2__SD2_DATA2 0x17059
MX6QDL_PAD_SD2_DAT3__SD2_DATA3 0x17059
- MX6QDL_PAD_NANDF_D3__GPIO2_IO03 0x40010040
-MX6QDL_PAD_NANDF_D2__GPIO2_IO02 0x40010040
>@ -1002,7 +1003,6 @@
};

@@ -1015,7 +1015,6 @@
MX6QDL_PAD_SD3_DAT1__SD3_DATA1 0x17059
MX6QDL_PAD_SD3_DAT2__SD3_DATA2 0x17059
MX6QDL_PAD_SD3_DAT3__SD3_DATA3 0x17059
- MX6QDL_PAD_NANDF_D1__GPIO2_IO01 0x40010040
-MX6QDL_PAD_NANDF_D0__GPIO2_IO00 0x40010040
>;
@@ -167,6 +168,7 @@
<&clks IMX6QDL_CLK_GPU2D_CORE>;
  clock-names = "bus", "core";
  power-domains = <&pd_pu>;
+  #cooling-cells = <2>;
  
  timer@a00600 {
@@ -632,7 +634,7 @@
  <0 54 IRQ_TYPE_LEVEL_HIGH>,
  <0 127 IRQ_TYPE_LEVEL_HIGH>;
-
-regulator-1p1 {
+reg_vdd1p1: regulator-1p1 {
  compatible = "fsl,anatop-regulator";
  regulator-name = "vdd1p1";
  regulator-min-microvolt = <1000000>;
@@ -647,7 +649,7 @@
  anatop-enable-bit = <0>;
  }
-
-regulator-3p0 {
+reg_vdd3p0: regulator-3p0 {
  compatible = "fsl,anatop-regulator";
  regulator-name = "vdd3p0";
  regulator-min-microvolt = <2800000>;
@@ -662,7 +664,7 @@
  anatop-enable-bit = <0>;
  }
-
-regulator-2p5 {
+reg_vdd2p5: regulator-2p5 {
  compatible = "fsl,anatop-regulator";
  regulator-name = "vdd2p5";
  regulator-min-microvolt = <2250000>;
@@ -735,6 +737,7 @@
  fsl,tempmon = <&anatop>;
  fsl,tempmon-data = <&ocotp>;
  clocks = <&clks IMX6QDL_CLK_PLL3_USB_OTG>;
+  #thermal-sensor-cells = <0>;
  
  usbphy1: usbphy@20c9000 {
@@ -909,7 +912,7 @@
  compatible = "fsl,imx6q-sdma", "fsl,imx35-sdma";
  reg = <0x020ec000 0x4000>;
  interrupts = <0 2 IRQ_TYPE_LEVEL_HIGH>;
  -clocks = <&clks IMX6QDL_CLK_SDMA>,
  

+clocks = <&clks IMX6QDL_CLK_IPG>,
   <&clks IMX6QDL_CLK_SDMA>;
clock-names = "ipg", "ahb";
#dma-cells = <3>;
@@ -1017,9 +1020,8 @@
fec: ethernet@2188000 {
    compatible = "fsl,imx6q-fec";
    reg = <0x02188000 0x4000>;
-interrupts-extended =
-<&intc 0 118 IRQ_TYPE_LEVEL_HIGH>,
-<&intc 0 119 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <0 118 IRQ_TYPE_LEVEL_HIGH>,
+     <0 119 IRQ_TYPE_LEVEL_HIGH>;
    clocks = <&clks IMX6QDL_CLK_ENET>,
            <&clks IMX6QDL_CLK_ENET>,
            <&clks IMX6QDL_CLK_ENET_REF>;
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6qp.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6qp.dtsi
@@ -115,7 +115,6 @@};
     &fec {
    /delete-property/interrupts-extended;
    interrupts = <0 118 IRQ_TYPE_LEVEL_HIGH>,
-         <0 119 IRQ_TYPE_LEVEL_HIGH>;
+         <0 119 IRQ_TYPE_LEVEL_HIGH>;
    };}
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6sl.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6sl.dtsi
@@ -65,6 +65,7 @@
    >;
clock-latency = <61036>; /* two CLK32 periods */
+cooling-cells = <2>;
clocks = <&clks IMX6SL_CLK_ARM>, <&clks IMX6SL_CLK_PLL2_PFD2>,
       <&clks IMX6SL_CLK_STEP>, <&clks IMX6SL_CLK_PLL1_SW>,
       <&clks IMX6SL_CLK_PLL1_SYS>;
@@ -718,7 +719,7 @@
    reg = <0x020ec000 0x4000>;
    interrupts = <0 2 IRQ_TYPE_LEVEL_HIGH>;
    clocks = <&clks IMX6SL_CLK_SDMA>;
- &clks IMX6SL_CLK_SDMA>;
+ &clks IMX6SL_CLK_AHB>;
    clock-names = "ipg", "ahb";
    #dma-cells = <3>;
 /* imx6sl reuses imx6q sdma firmware */
@@ -902,8 +903,10 @@
};
rngb: rngb@21b4000 {
+compatible = "fsl.imx6sl-rngb", "fsl.imx25-rngb";
reg = <0x021b4000 0x4000>;
interrupts = <0 5 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6SL_CLK_DUMMY>;
}

weim: weim@21b8000 {
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6sx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6sx.dtsi
@@ -83,6 +83,7 @@
198000	117500
>; clock-latency = <61036>; /* two CLK32 periods */
+#cooling-cells = <2>;
clocks = <&clks IMX6SX_CLK_ARM>,
<&clks IMX6SX_CLK_PLL2_PFD2>,
<&clks IMX6SX_CLK_STEP>,
@@ -442,7 +443,7 @@
}
gpt: gpt@2098000 {
-compatible = "fsl.imx6sx-gpt", "fsl.imx31-gpt";
+compatible = "fsl.imx6sx-gpt", "fsl.imx6dl-gpt";
reg = <0x02098000 0x4000>;
interrupts = <GIC_SPI 55 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6SX_CLK_GPT_BUS>,
@@ -767,7 +768,7 @@
compatible = "fsl.imx6sx-sdma", "fsl.imx6q-sdma";
reg = <0x020ec000 0x4000>;
interrupts = <GIC_SPI 2 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6SX_CLK_SDMA>,
+clocks = <&clks IMX6SX_CLK_IPG>,
<&clks IMX6SX_CLK_SDMA>;
clock-names = "ipg", "ahb";
#dma-cells = <3>;
@@ -1316,7 +1317,7 @@
0x82000000 0x08000000 0x08000000 0 0x00f00000>;
bus-range = <0x00 0xff>;
nl-num-lanes = <1>;
-interrupts = <GIC_SPI 123 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 120 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6SX_CLK_PCIE_REF_125M>,
<&clks IMX6SX_CLK_PCIE_AXI>,
--- linux-4.15.0.orig/arch/arm/boot/dts/imx6ul.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx6ul.dtsi
@@ -66,6 +66,7 @@

device_type = "cpu";
reg = <0>;
clock-latency = <61036>; /* two CLK32 periods */
+#cooling-cells = <2>;
operating-points = <
/* kHz	uV */
528000	1175000
@@ -95,6 +96,8 @@
  "pll1_bypass_src", "osc";
arm-supply = <&reg_arm>;
soc-supply = <&reg_soc>;
+nvmem-cells = <&cpu_speed_grade>;
+nvmem-cell-names = "speed_grade";
};
}
@@ -342,7 +345,7 @@
pwm1: pwm@2080000 {
compatible = "fsl,imx6ul-pwm", "fsl,imx27-pwm";
reg = <0x02080000 0x4000>;
-interrupts = <GIC_SPI 115 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 83 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6UL_CLK_PWM1>,
<&clks IMX6UL_CLK_PWM1>;
clock-names = "ipg", "per";
@@ -353,7 +356,7 @@
pwm2: pwm@2084000 {
compatible = "fsl,imx6ul-pwm", "fsl,imx27-pwm";
reg = <0x02084000 0x4000>;
-interrupts = <GIC_SPI 116 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 84 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6UL_CLK_PWM2>,
<&clks IMX6UL_CLK_PWM2>;
clock-names = "ipg", "per";
@@ -364,7 +367,7 @@
pwm3: pwm@2088000 {
compatible = "fsl,imx6ul-pwm", "fsl,imx27-pwm";
reg = <0x02088000 0x4000>;
-interrupts = <GIC_SPI 117 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 85 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6UL_CLK_PWM3>,
<&clks IMX6UL_CLK_PWM3>;
clock-names = "ipg", "per";
@@ -375,7 +378,7 @@
pwm4: pwm@208c000 {
compatible = "fsl,imx6ul-pwm", "fsl,imx27-pwm";
reg = <0x0208c000 0x4000>;
-interrupts = <GIC_SPI 118 IRQ_TYPE_LEVEL_HIGH>;
interrupts = <GIC_SPI 86 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX6UL_CLK_PWM4>, <&clks IMX6UL_CLK_PWM4>;
clock-names = "ipg", "per";
@@ -689,7 +692,7 @@
 "fsl.imx35-sdma";
 reg = <0x020ec000 0x4000>;
interrupts = <GIC_SPI 2 IRQ_TYPE_LEVEL_HIGH>;
-clock = <&clks IMX6UL_CLK_SDMA>, +clock = <&clks IMX6UL_CLK_IPG>, <&clks IMX6UL_CLK_SDMA>;
clock-names = "ipg", "ahb";
#dma-cells = <3>;
@@ -883,6 +886,10 @@
tempmon_temp_grade: temp-grade@20 {
reg = <0x204>;
}
+cpu_speed_grade: speed-grade@10 {
+reg = <0x104>;
+}
):
lcdif: lcdif@21c8000 {
--- linux-4.15.0.orig/arch/arm/boot/dts/imx7d-cl-som-imx7.dts
+++ linux-4.15.0/arch/arm/boot/dts/imx7d-cl-som-imx7.dts
@@ -43,7 +43,7 @@
<&clks IMX7D_ENET1_TIME_ROOT_CLK>;
assigned-clock-parents = <&clks IMX7D_PLL_ENET_MAIN_100M_CLK>;
assigned-clock-rates = <0>, <100000000>;
-phy-mode = "rgmii";
+phy-mode = "rgmii-id";
phy-handle = <&ethphy0>;
fsl.magic-packet;
status = "okay";
@@ -69,7 +69,7 @@
<&clks IMX7D_ENET2_TIME_ROOT_CLK>;
assigned-clock-parents = <&clks IMX7D_PLL_ENET_MAIN_100M_CLK>;
assigned-clock-rates = <0>, <100000000>;
-phy-mode = "rgmii";
+phy-mode = "rgmii-id";
phy-handle = <&ethphy1>;
fsl.magic-packet;
status = "okay";
@@ -213,37 +213,37 @@
	iomuxc {
pinctrl_enet1: enet1grp {
fsl.pins = <
-MX7D_PAD_SD2_CD_B__ENET1_MDI00x3
-MX7D_PAD_SD2_WP__ENET1_MDC0x3
-MX7D_PAD_ENET1_RGMII_TXC__ENET1_RGMII_TXC0x1
-MX7D_PAD_ENET1_RGMII_TD0__ENET1_RGMII_TD00x1
-MX7D_PAD_ENET1_RGMII_TD1__ENET1_RGMII_TD10x1
-MX7D_PAD_ENET1_RGMII_TD2__ENET1_RGMII_TD20x1
-MX7D_PAD_ENET1_RGMII_TD3__ENET1_RGMII_TD30x1
-MX7D_PAD_ENET1_RGMII_TX_CTL__ENET1_RGMII_TX_CTL0x1
-MX7D_PAD_ENET1_RGMII_RXC__ENET1_RGMII_RXC0x1
-MX7D_PAD_ENET1_RGMII_RD0__ENET1_RGMII_RD00x1
-MX7D_PAD_ENET1_RGMII_RD1__ENET1_RGMII_RD10x1
-MX7D_PAD_ENET1_RGMII_RD2__ENET1_RGMII_RD20x1
-MX7D_PAD_ENET1_RGMII_RD3__ENET1_RGMII_RD30x1
-MX7D_PAD_ENET1_RGMII_RX_CTL__ENET1_RGMII_RX_CTL0x1
+MX7D_PAD_SD2_CD_B__ENET1_MDI00x30
+MX7D_PAD_SD2_WP__ENET1_MDC0x30
+MX7D_PAD_ENET1_RGMII_TXC__ENET1_RGMII_TXC0x11
+MX7D_PAD_ENET1_RGMII_TD0__ENET1_RGMII_TD00x11
+MX7D_PAD_ENET1_RGMII_TD1__ENET1_RGMII_TD10x11
+MX7D_PAD_ENET1_RGMII_TD2__ENET1_RGMII_TD20x11
+MX7D_PAD_ENET1_RGMII_TD3__ENET1_RGMII_TD30x11
+MX7D_PAD_ENET1_RGMII_TX_CTL__ENET1_RGMII_TX_CTL0x11
+MX7D_PAD_ENET1_RGMII_RXC__ENET1_RGMII_RXC0x11
+MX7D_PAD_ENET1_RGMII_RD0__ENET1_RGMII_RD00x11
+MX7D_PAD_ENET1_RGMII_RD1__ENET1_RGMII_RD10x11
+MX7D_PAD_ENET1_RGMII_RD2__ENET1_RGMII_RD20x11
+MX7D_PAD_ENET1_RGMII_RD3__ENET1_RGMII_RD30x11
+MX7D_PAD_ENET1_RGMII_RX_CTL__ENET1_RGMII_RX_CTL0x11

pinctrl_enet2: enet2grp {
  fsl_pins = <
  -MX7D_PAD_EPDC_GDSP__ENET2_RGMII_TXC0x1
  -MX7D_PAD_EPDC_SDCE2__ENET2_RGMII_TD00x1
  -MX7D_PAD_EPDC_SDCE3__ENET2_RGMII_TD10x1
  -MX7D_PAD_EPDC_GDCLK__ENET2_RGMII_TD20x1
  -MX7D_PAD_EPDC_GDOE__ENET2_RGMII_TD30x1
  -MX7D_PAD_EPDC_GDRI__ENET2_RGMII_TX_CTL0x1
  -MX7D_PAD_EPDC_SDCE1__ENET2_RGMII_RXC0x1
  -MX7D_PAD_EPDC_SDCLK__ENET2_RGMII_RD00x1
  -MX7D_PAD_EPDC(SDL__ENET2_RGMII_RD10x1
  -MX7D_PAD_EPDC_SDOE__ENET2_RGMII_RD20x1
  -MX7D_PAD_EPDC_SDSHR__ENET2_RGMII_RD30x1
  -MX7D_PAD_EPDC_SDCE0__ENET2_RGMII_RX_CTL0x1
  +MX7D_PAD_EPDC_GDSP__ENET2_RGMII_TXC0x11
  +MX7D_PAD_EPDC_SDCE2__ENET2_RGMII_TD00x11
  +MX7D_PAD_EPDC_SDCE3__ENET2_RGMII_TD10x11

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-reg_usb_otg2_vbus: regulator-usb-otg1-vbus {
+reg_usb_otg2_vbus: regulator-usb-otg2-vbus {
compatible = "regulator-fixed";
regulator-name = "usb_otg2_vbus";
regulator-min-microvolt = <5000000>;
--- linux-4.15.0.orig/arch/arm/boot/dts/imx7d.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx7d.dtsi
@@ -47,12 +47,9 @@
"/ {
 cpus {
 cpu0: cpu@0 {
-"operating-points = <
+"operating-points-v2 = <&cpu0_opp_table>;
   #cooling-cells = <2>;
 })

cpu1: cpu@1 {
@@ -60,6 +57,25 @@
 device_type = "cpu";
 reg = <1>;
 clock-frequency = <996000000>;
+"operating-points-v2 = <&cpu0_opp_table>;
+#cooling-cells = <2>;
 }

cpu0_opp_table: opp-table {
+compatible = "operating-points-v2";
+opp-shared;
+opponent-792000000 {
+"opp-hz = /bits/ 64 <792000000>;
+"opp-microvolt = <975000>;
+"clock-latency-ns = <150000>;
+};
+opponent-996000000 {
+"opp-hz = /bits/ 64 <996000000>;
+"opp-microvolt = <1075000>;
+"clock-latency-ns = <150000>;
+"opp-suspend;
};
}
interrupt-names = "msi";
interrupt-cells = <1>;
interrupt-map-mask = <0 0 0x7>;
-interrupt-map = <0 0 0 1 &intc GIC_SPI 122 IRQ_TYPE_LEVEL_HIGH>,
-<0 0 0 2 &intc GIC_SPI 123 IRQ_TYPE_LEVEL_HIGH>,
-<0 0 0 3 &intc GIC_SPI 124 IRQ_TYPE_LEVEL_HIGH>,
-<0 0 0 4 &intc GIC_SPI 125 IRQ_TYPE_LEVEL_HIGH>;
+/*
+ * Reference manual lists pci irqs incorrectly
+ * Real hardware ordering is same as imx6: D+MSI, C, B, A
+ */
+interrupt-map = <0 0 0 1 &intc GIC_SPI 125 IRQ_TYPE_LEVEL_HIGH>,
+<0 0 0 2 &intc GIC_SPI 124 IRQ_TYPE_LEVEL_HIGH>,
+<0 0 0 3 &intc GIC_SPI 123 IRQ_TYPE_LEVEL_HIGH>,
+<0 0 0 4 &intc GIC_SPI 122 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX7D_PCIE_CTRL_ROOT_CLK>,
<&clks IMX7D_PCIE_PHY_ROOT_CLK>;
--- linux-4.15.0.orig/arch/arm/boot/dts/imx7s-colibri.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx7s-colibri.dtsi
@@ -48,3 +48,7 @@
reg = <0x80000000 0x10000000>;
};
};
+
+&gpmi {
+status = "okay";
+};
--- linux-4.15.0.orig/arch/arm/boot/dts/imx7s.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/imx7s.dtsi
@@ -450,7 +450,7 @@
compatible = "fsl,imx7d-gpt", "fsl,imx6sx-gpt";
reg = <0x302d0000 0x10000>;
interrupts = <GIC_SPI 55 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX7D_CLK_DUMMY>,
+clocks = <&clks IMX7D_GPT1_ROOT_CLK>,
<&clks IMX7D_GPT1_ROOT_CLK>;
clock-names = "ipg", "per";
};
@@ -459,7 +459,7 @@
compatible = "fsl,imx7d-gpt", "fsl,imx6sx-gpt";
reg = <0x302e0000 0x10000>;
interrupts = <GIC_SPI 54 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clks IMX7D_CLK_DUMMY>,
+clocks = <&clks IMX7D_GPT2_ROOT_CLK>,
<&clks IMX7D_GPT2_ROOT_CLK>;
clock-names = "ipg", "per";
status = "disabled";
@@ -469,7 +469,7 @@
    compatible = "fsl,imx7d-gpt", "fsl,imx6sx-gpt";
    reg = <0x302f0000 0x100000>
    interrupts = <GIC_SPI 53 IRQ_TYPE_LEVEL_HIGH>
    -clocks = <&clks IMX7D_CLK_DUMMY>,
    +clocks = <&clks IMX7D_GPT3_ROOT_CLK>,
    <&clks IMX7D_GPT3_ROOT_CLK>
    clock-names = "ipg", "per";
status = "disabled";
@@ -479,7 +479,7 @@
    compatible = "fsl,imx7d-gpt", "fsl,imx6sx-gpt";
    reg = <0x30300000 0x100000>
    interrupts = <GIC_SPI 52 IRQ_TYPE_LEVEL_HIGH>
    -clocks = <&clks IMX7D_CLK_DUMMY>,
    +clocks = <&clks IMX7D_GPT4_ROOT_CLK>,
    <&clks IMX7D_GPT4_ROOT_CLK>
    clock-names = "ipg", "per";
status = "disabled";
@@ -997,8 +997,8 @@
    compatible = "fsl,imx7d-sdma", "fsl,imx35-sdma";
    reg = <0x30bd0000 0x100000>
    interrupts = <GIC_SPI 2 IRQ_TYPE_LEVEL_HIGH>
    -clocks = <&clks IMX7D_SDMA_CORE_CLK>,
    - <&clks IMX7D_AHB_CHANNEL_ROOT_CLK>
    +clocks = <&clks IMX7D_IPG_ROOT_CLK>,
    + <&clks IMX7D_SDMA_CORE_CLK>
    clock-names = "ipg", "ahb";
    #dma-cells = <3>;
    fsl.sdma-ram-script-name = "imx/sdma/sdma-imx7d.bin";
--- linux-4.15.0.orig/arch/arm/boot/dts/iwg20d-q7-common.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/iwg20d-q7-common.dtsi
@@ -36,7 +36,7 @@
    regulator-min-microvolt = <1800000>
    regulator-max-microvolt = <3300000>
    gpios = <&gpio2 14 GPIO_ACTIVE_LOW>
- &gpio1 13 GPIO_ACTIVE_LOW>
+ gpios = &gpio1 14 GPIO_ACTIVE_HIGH
+ &gpio1 13 GPIO_ACTIVE_HIGH>
gpio-fan.speed-map = <0 0 6000 1
                     3000 1
                     6000 2>
--- linux-4.15.0.orig/arch/arm/boot/dts/logicpd-som-lv.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/logicpd-som-lv.dtsi
@@ -26,7 +26,7 @@
gpio = &gpio1 3 0;   /* gpio_3 */
startup-delay-us = <700000>
enable-active-high;
-vin-supply = &vmmc2>
+vvin-supply = &vaux3>
};
/* HS USB Host PHY on PORT 1 */
@@ -98,6 +98,8 @@
}&i2c1 {
  +pinctrl-names = "default";
  +pinctrl-0 = &i2c1_pins;
  clock-frequency = <2600000>

  twl: twl@48 {   
    @ @ -107.21 +109.26 @@
    twl_audio: audio {
      compatible = "ti,twl4030-audio";
      codec {
        +ti,hs_extmute_gpio = &gpio2 25 GPIO_ACTIVE_HIGH>
      }
    }
  }
}

&i2c2 {
  +pinctrl-names = "default";
  +pinctrl-0 = &i2c2_pins;
  clock-frequency = <4000000>
}

&i2c3 {
  +pinctrl-names = "default";
  +pinctrl-0 = &i2c3_pins;
  clock-frequency = <4000000>
}
&mmc3 {
interrupts-extended = &<intc 94 &omap3_pmx_core2 0x46>;
+interrupts-extended = &<intc 94 &omap3_pmx_core 0x136>;
pinctrl-0 = &<&mmc3_pins &wl127x_gpio>;
pinctrl-names = "default";
vmmc-supply = &<&wl12xx_vmmc>;
}>;
}

+i2c1_pins: pinmux_i2c1_pins {
pinctrl-single,pins = <
+OMAP3_CORE1_IOPAD(0x21ba, PIN_INPUT | MUX_MODE0) /* i2c1_scl.i2c1_scl */
+OMAP3_CORE1_IOPAD(0x21bc, PIN_INPUT | MUX_MODE0) /* i2c1_sda.i2c1_sda */
+OMAP3_CORE1_IOPAD(0x20ba, PIN_OUTPUT | MUX_MODE4) /* gpmc_ncs6_gpio_57 */
>;
+}
};

&omap3_pmx_wkup {
@@ -229,10 +242,22 @@
}

wl127x_gpio: pinmux_wl127x_gpio_pin {
pinctrl-single,pins = <
-OMAP3_WKUP_IOPAD(0x2a0c, PIN_INPUT | MUX_MODE4) /* sys_boot0_gpio_2 */
+OMAP3_WKUP_IOPAD(0x2a0a, PIN_INPUT | MUX_MODE4) /* sys_boot0_gpio_2 */
OMAP3_WKUP_IOPAD(0x2a0c, PIN_OUTPUT | MUX_MODE4) /* sys_boot1_gpio_3 */
>;
+}
};

+i2c2_pins: pinmux_i2c2_pins {
pinctrl-single,pins = <
+OMAP3_CORE1_IOPAD(0x21be, PIN_INPUT | MUX_MODE0) /* i2c2_scl */
+OMAP3_CORE1_IOPAD(0x21c0, PIN_INPUT | MUX_MODE0) /* i2c2_sda */
>;
+}
};

+i2c3_pins: pinmux_i2c3_pins {
pinctrl-single,pins = <
+OMAP3_CORE1_IOPAD(0x21c2, PIN_INPUT | MUX_MODE0) /* i2c3_scl */
+OMAP3_CORE1_IOPAD(0x21c4, PIN_INPUT | MUX_MODE0) /* i2c3_sda */
>;
+}
};

&omap3_pmx_core2 {
@@ -264,6 +289,11 @@
#include "twl4030.dtsi"
#include "twl4030_omap3.dtsi"
+&vaux3 {
  +regulator-min-microvolt = <2800000>;
  +regulator-max-microvolt = <2800000>;
  +};
+
&twl {
  twl_power: power {
    compatible = "ti,twl4030-power-idle-osc-off", "ti,twl4030-power-idle";
    --- linux-4.15.0.orig/arch/arm/boot/dts/logicpd-torpedo-som.dtsi
    +++ linux-4.15.0/arch/arm/boot/dts/logicpd-torpedo-som.dtsi
    @ @ -104,6 +104,8 @@
  };
+
&i2c1 {
  +pinctrl-names = "default";
  +pinctrl-0 = <&i2c1_pins>;
  clock-frequency = <2600000>;

twl: twl@48 {
    @@ -119,10 +121,14 @@
  };
+
&i2c2 {
  +pinctrl-names = "default";
  +pinctrl-0 = <&i2c2_pins>;
  clock-frequency = <400000>;
  };
+
&i2c3 {
  +pinctrl-names = "default";
  +pinctrl-0 = <&i2c3_pins>;
  clock-frequency = <400000>;
  at24@50 {
    compatible = "atmel,24c64";
    @@ -211,6 +217,24 @@
      OMAP3_CORE1_IOPAD(0x21b8, PIN_INPUT | MUX_MODE0)/* hsusb0_data7.hsusb0_data7 */
    >;
  };
  +i2c1_pins: pinmux_i2c1_pins {
    +pinctrl-single.pins = <
      +OMAP3_CORE1_IOPAD(0x21ba, PIN_INPUT | MUX_MODE0) /* i2c1_scl.i2c1_scl */
      +OMAP3_CORE1_IOPAD(0x21bc, PIN_INPUT | MUX_MODE0) /* i2c1_sda.i2c1_sda */
    >;
  };
  +i2c2_pins: pinmux_i2c2_pins {
    +pinctrl-single.pins = <
      +OMAP3_CORE1_IOPAD(0x21ba, PIN_INPUT | MUX_MODE0) /* i2c2_scl */
    >;
+OMAP3_CORE1_IOPAD(0x21c0, PIN_INPUT | MUX_MODE0)/* i2c2_sda */ +
+};
+i2c3_pins: pinmux_i2c3_pins {
+pinctrl-single.pins = <
+OMAP3_CORE1_IOPAD(0x21c2, PIN_INPUT | MUX_MODE0)/* i2c3_scl */
+OMAP3_CORE1_IOPAD(0x21c4, PIN_INPUT | MUX_MODE0)/* i2c3_sda */
+>;
+};
};

&uart2 {
@@ -246,3 +270,7 @@
&twl_gpio {
 ti,use-leds;
};
+
+&twl_keypad {
+status = "disabled";
+};
--- linux-4.15.0.orig/arch/arm/boot/dts/lpc3250-ea3250.dts
+++ linux-4.15.0/arch/arm/boot/dts/lpc3250-ea3250.dts
@@ -156,8 +156,8 @@
uda1380: uda1380@18 {
 compatible = "nxp,uda1380";
 reg = <0x18>;
-power-gpio = <&gpio 0x59 0>;
-reset-gpio = <&gpio 0x51 0>;
+power-gpio = <&gpio 3 10 0>;
+reset-gpio = <&gpio 3 2 0>;
 dac-clk = "wspll";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/lpc3250-phy3250.dts
+++ linux-4.15.0/arch/arm/boot/dts/lpc3250-phy3250.dts
@@ -81,8 +81,8 @@
uda1380: uda1380@18 {
 compatible = "regulator-fixed";
 regulator-name = "sd_reg";
-regulator-min-microvolt = <1800000>;
-regulator-max-microvolt = <1800000>;
+regulator-min-microvolt = <3300000>;
+regulator-max-microvolt = <3300000>;
 gpio = <&gpio 5 5 0>;
 enable-active-high;
};
@@ -81,8 +81,8 @@
uda1380: uda1380@18 {
compatible = "nxp.uda1380";
reg = <0x18>;
-power-gpio = <&gpio 0x59 0>;
-reset-gpio = <&gpio 0x51 0>;
+power-gpio = <&gpio 0x51 0>;
+reset-gpio = <&gpio 0x51 0>;
dac-clk = "wspll";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/lpc32xx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/lpc32xx.dtsi
@@ -139,11 +139,11 @@
};

clcd: clcd@31040000 {
	-compatible = "arm.pl110", "arm.primecell";
+compatible = "arm.pl111", "arm.primecell";
reg = <0x31040000 0x1000>;
interrupts = <14 IRQ_TYPE_LEVEL_HIGH>;
-clocks = <&clk LPC32XX_CLK_LCD>;
+clocks = <&clk LPC32XX_CLK_LCD>, <&clk LPC32XX_CLK_LCD>;
-clock-names = "apb_pclk";
+clock-names = "clcdclk", "apb_pclk";
status = "disabled";
};

@@ -179,7 +179,7 @@
* ssp0 and spi1 are shared pins;
* enable one in your board dts, as needed.
 */
-ssp0: ssp@20084000 {
+ssp0: spi@20084000 {
compatible = "arm.pl022", "arm.primecell";
reg = <0x20084000 0x1000>;
interrupts = <20 IRQ_TYPE_LEVEL_HIGH>;
@@ -199,7 +199,7 @@
* ssp1 and spi2 are shared pins;
* enable one in your board dts, as needed.
 */
-ssp1: ssp@2008c000 {
+ssp1: spi@2008c000 {
compatible = "arm.pl022", "arm.primecell";
reg = <0x2008c000 0x1000>;
interrupts = <21 IRQ_TYPE_LEVEL_HIGH>;
@@ -230,7 +230,7 @@
status = "disabled";
};
- i2s1: i2s@2009C000 {
+ i2s1: i2s@2009c000 {
  compatible = "nxp,lpc3220-i2s";
  reg = <0x2009C000 0x1000>;
};
@@ -273,7 +273,7 @@
  status = "disabled";
};

-i2c1: i2c@400A0000 {
+ i2c1: i2c@400a0000 {
  compatible = "nxp,pnx-i2c";
  reg = <0x400A0000 0x100>;
  interrupt-parent = <&sic1>;
@@ -284,7 +284,7 @@
  clocks = <&clk LPC32XX_CLK_I2C1>;
};

-i2c2: i2c@400A8000 {
+ i2c2: i2c@400a8000 {
  compatible = "nxp,pnx-i2c";
  reg = <0x400A8000 0x100>;
  interrupt-parent = <&sic1>;
@@ -295,7 +295,7 @@
  clocks = <&clk LPC32XX_CLK_I2C2>;
};

-m pwm: mpwm@400E8000 {
+mpwm: mpwm@400e8000 {
  compatible = "nxp,lpc3220-motor-pwm";
  reg = <0x400E8000 0x78>;
  status = "disabled";
@@ -323,9 +323,6 @@
  clocks = <&xtal_32k>, <&xtal>;
  clock-names = "xtal_32K", "xtal";
-  assigned-clocks = <&clk LPC32XX_CLK_HCLK_PLL>;
-  assigned-clock-rates = <208000000>;
};
};

@ @ -394,7 +391,7 @@
 #gpio-cells = <3>; /* bank, pin, flags */
};

-timer4: timer@4002C000 {
+timer4: timer@4002c000 {

compatible = "nxp.lpc3220-timer";
reg = <0x4002C000 0x1000>;
interrupts = <3 IRQ_TYPE_LEVEL_LOW>;
@@ -412,7 +409,7 @@
status = "disabled";
}

-watchdog: watchdog@4003C000 {
+watchdog: watchdog@4003c000 {
compatible = "nxp.pnx4008-wdt";
reg = <0x4003C000 0x1000>;
clocks = <&clk LPC32XX_CLK_WDOG>;
@@ -451,7 +448,7 @@
status = "disabled";
}

timer1: timer@4004C000 {
+timer1: timer@4004c000 {
compatible = "nxp.lpc3220-timer";
reg = <0x4004C000 0x1000>;
interrupts = <17 IRQ_TYPE_LEVEL_LOW>;
@@ -462,7 +459,9 @@
key: key@40050000 {
compatible = "nxp.lpc3220-key";
reg = <0x40050000 0x1000>;
-interrupts = <54 IRQ_TYPE_LEVEL_HIGH>;
+clocks = <&clk LPC32XX_CLK_KEY>;
+interrupt-parent = <&sic1>;
+interrupts = <22 IRQ_TYPE_LEVEL_HIGH>
status = "disabled";
}
@@ -475,7 +474,7 @@
status = "disabled";
}

-pwm1: pwm@4005C000 {
+pwm1: pwm@4005c000 {
compatible = "nxp.lpc3220-pwm";
reg = <0x4005C000 0x4>;
clocks = <&clk LPC32XX_CLK_PWM1>;
@@ -484,7 +483,7 @@
status = "disabled";
}
-pwm2: pwm@4005C004 {
+pwm2: pwm@4005c004 {
compatible = "nxp.lpc3220-pwm";
reg = <0x4005C004 0x4>
clocks = <&clk LPC32XX_CLK_PWM2>

--- linux-4.15.0.orig/arch/arm/boot/dts/ls1021a-twr.dts
+++ linux-4.15.0/arch/arm/boot/dts/ls1021a-twr.dts
@@ -143,7 +143,7 @@
};

&enet0 {
-tbi-handle = <&tbi1>
+  tbi-handle = <&tbi0>;
  phy-handle = <&sgmii_phy2>
  phy-connection-type = "sgmii"
  status = "okay"
@@ -222,6 +222,13 @@
  sgmii_phy2: ethernet-phy@2 {
    reg = <0x2>
  }
+  tbi0: tbi-phy@1f {
+    reg = <0x1f>
+    device_type = "tbi-phy"
+  }
+
+
+&mdio1 {
  tbi1: tbi-phy@1f {
    reg = <0x1f>
    device_type = "tbi-phy"
--- linux-4.15.0.orig/arch/arm/boot/dts/ls1021a.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/ls1021a.dtsi
@@ -84,6 +84,7 @@
    device_type = "cpu"
    reg = <0xf01>
    clocks = <&clockgen 1 0>
+    #cooling-cells = <2>
    
    
    
@@ -155,7 +156,7 @@
};
esdhc: esdhc@1560000 {
  -compatible = "fsl,esdhc"
+  compatible = "fsl,ls1021a-esdhc", "fsl,esdhc"
    reg = <0x0 0x1560000 0x0 0x10000>
    interrupts = <GIC_SPI 94 IRQ_TYPE_LEVEL_HIGH>
    clock-frequency = <0>
@@ -568,6 +569,15 @@
    reg = <0x0 0x2d24000 0x0 0x4000>

+mdio1: mdio@2d64000 {
+compatible = "gianfar";
+device_type = "mdio";
+#address-cells = <1>;
+#size-cells = <0>;
+reg = <0x0 0x2d64000 0x0 0x4000>,
+       <0x0 0x2d50030 0x0 0x4>;
+};
+
+ptp_clock@2d10e00 {
compatible = "fsl,etsec-ptp";
reg = <0x0 0x2d10e00 0x0 0xb0>;
--- linux-4.15.0.orig/arch/arm/boot/dts/meson8.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/meson8.dtsi
@@ -129,7 +129,7 @@
&aobus {
    pmu: pmu@e0 {
    compatible = "amlogic,meson8-pmu", "syscon";
-   reg = <0xe0 0x8>;
+   reg = <0xe0 0x18>;
    };
}

pinctrl_aobus: pinctrl@84 {
@@ -184,7 +184,7 @@
#clock-cells = <1>;
#reset-cells = <1>;
compatible = "amlogic,meson8-clkc";
- reg = <0x8000 0x4>, <0x4000 0x460>;
+ reg = <0x8000 0x4>, <0x4000 0x400>;
};

analog_top: analog-top@81a8 {
@@ -147,7 +147,7 @@
#clock-cells = <1>;
#reset-cells = <1>;
compatible = "amlogic,meson8b-clkc";
- reg = <0x8000 0x4>, <0x4000 0x460>;
+ reg = <0x8000 0x4>, <0x4000 0x400>;
};

reset: reset-controller@4404 {
--- linux-4.15.0.orig/arch/arm/boot/dts/meson8b.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/meson8b.dtsi
@@ -176,7 +176,7 @@
#clock-cells = <1>;
#reset-cells = <1>;
compatible = "amlogic,meson8b-clkc";
- reg = <0x8000 0x4>, <0x4000 0x460>;
+ reg = <0x8000 0x4>, <0x4000 0x400>;
};

--- linux-4.15.0.orig/arch/arm/boot/dts/mmp2.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/mmp2.dtsi
@@ -180,7 +180,7 @@
}}
clocks = <&soc_clocks MMP2_CLK_GPIO>;
resets = <&soc_clocks MMP2_CLK_GPIO>;
interrupt-controller;
-#interrupt-cells = <1>;
+#interrupt-cells = <2>;
ranges;

gcb0: gpio@d4019000 {
  @ @ -220,12 +220,15 @ @
  status = "disabled";
};

twi2: i2c@d4025000 {
  compatible = "mrv1,mmp-twsii";
  -reg = <0xd4025000 0x1000>;
  -interrupts = <58>;
  +reg = <0xd4031000 0x1000>;
  +interrupt-parent = <&intcmux17>;
  +interrupts = <0>;
  clocks = <&soc_clocks MMP2_CLK_TWSI1>;
  resets = <&soc_clocks MMP2_CLK_TWSI1>;
  +#address-cells = <1>;
  +#size-cells = <0>;
  status = "disabled";
};

cpcap_adc: adc {
  compatible = "motorola,mapphone-cpcap-adc";
  @@ -92,7 +94,7 @@
  interrupts-extended = <
    &cpcap 15 0 &cpcap 14 0 &cpcap 28 0 &cpcap 19 0
    &cpcap 18 0 &cpcap 17 0 &cpcap 16 0 &cpcap 49 0
    &cpcap 48 1
    +&cpcap 48 0
  >;
--- linux-4.15.0.orig/arch/arm/boot/dts/motorola-cpcap-mapphone.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/motorola-cpcap-mapphone.dtsi
@@ -16,8 +16,10 @@
  #interrupt-cells = <2>;
  #address-cells = <1>;
  #size-cells = <0>;
  -spi-max-frequency = <3000000>;
  +spi-max-frequency = <9600000>;
  spi-cs-high;
  +spi-cpol;
  +spi-cpha;

interrupt-names =
  "id_ground", "id_float", "se0conn", "vbusvld",
--- linux-4.15.0.orig/arch/arm/boot/dts/mt2701.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/mt2701.dtsi
@@ -604,6 +604,7 @@
    compatible = "mediatek,mt2701-hifsys", "syscon";
    reg = <0 x1a000000 0 0x1000>;
    #clock-cells = <1>;
+    #reset-cells = <1>;
    
};

usb0: usb@1a1c0000 {
    @ @ -688,6 +689,7 @ @
    compatible = "mediatek,mt2701-ethsys", "syscon";
    reg = <0 x1b000000 0 0x1000>;
    #clock-cells = <1>;
+    #reset-cells = <1>;
};

eth: ethernet@1b100000 {
    @@ -688,6 +689,7 @@
        compatible = "mediatek,mt7623-ethsys", "syscon";
        reg = <0 x1b000000 0 0x1000>;
        #clock-cells = <1>;
+        #reset-cells = <1>;
    };

    compatible = "mediatek,mt7623";
    interrupt-parent = <&sysirq>;
+    #address-cells = <2>;
+    #size-cells = <2>;

    cpu_opp_table: opp_table {
        compatible = "operating-points-v2";
        @ @ -97,6 +98,7 @ @
        compatible = "arm,cortex-a7";
        reg = <0x1>;
        operating-points-v2 = <&cpu_opp_table>;
+        cooling-cells = <2>;
        clock-frequency = <1300000000>;
    };

    @@ -105,6 +107,7 @@
        compatible = "arm,cortex-a7";
        reg = <0x2>;
        operating-points-v2 = <&cpu_opp_table>;

+#cooling-cells = <2>;
clock-frequency = <1300000000>;
};

@@ -113,6 +116,7 @@
compatible = "arm,cortex-a7";
reg = <0x3>;
operating-points-v2 = <&cpu_opp_table>;
+#cooling-cells = <2>;
clock-frequency = <1300000000>;
};
};
@@ -758,6 +762,7 @@
"syscon";
reg = <0 0xb000000 0 0x1000>;
#clock-cells = <1>;
+#reset-cells = <1>;
};

eth: ethernet@1b100000 { 
--- linux-4.15.0.orig/arch/arm/boot/dts/mt7623n-bananapi-bpi-r2.dts
+++ linux-4.15.0/arch/arm/boot/dts/mt7623n-bananapi-bpi-r2.dts
@@ -39,6 +39,24 @@
};
};

+reg_3p3v: regulator-3p3v {
+compatible = "regulator-fixed";
+regulator-name = "fixed-3.3V";
+regulator-min-microvolt = <3300000>;
+regulator-max-microvolt = <3300000>;
+regulator-boot-on;
+regulator-always-on;
+};
+
+reg_5v: regulator-5v {
+compatible = "regulator-fixed";
+regulator-name = "fixed-5V";
+regulator-min-microvolt = <5000000>;
+regulator-max-microvolt = <5000000>;
+regulator-boot-on;
+regulator-always-on;
+};
+
+gpio_keys {
compatible = "gpio-keys";
pinctrl-names = "default";
@@ -82,6 +100,7 @@

memory@80000000 {
+device_type = "memory";
reg = <0x80000000 0x40000000>;
}

fixed-link {
    speed = <1000>;
    full-duplex;
    +pause;
}

bus-width = <4>;
max-frequency = <50000000>;
cap-sd-highspeed;
    -cd-gpios = <&pio 261 0>;
    +cd-gpios = <&pio 261 GPIO_ACTIVE_LOW>;
vmmc-supply = <&mt6323_vmch_reg>;
vqmmc-supply = <&mt6323_vio18_reg>;
}

vusb33-supply = <&reg_3p3v>;
vbus-supply = <&reg_5v>;
status = "okay";
}

&usb2 {
    -vusb33-supply = <&mt6323_vusb_reg>;
    +vusb33-supply = <&reg_3p3v>;
    +vbus-supply = <&reg_5v>;
    status = "okay";
}

--- linux-4.15.0.orig/arch/arm/boot/dts/mt7623n-rfb.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/mt7623n-rfb.dtsi
@@ -47,6 +47,7 @@
}

memory@80000000 {
+device_type = "memory";
reg = <0 0x80000000 0 0x40000000>;
}

--- linux-4.15.0.orig/arch/arm/boot/dts/omap3-gta04.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/omap3-gta04.dtsi
@@ -28,6 +28,7 @@
    display0 = &lcd;
+    display1 = &tv0;
};

gpio-keys {
@@ -71,7 +72,7 @@
    #sound-dai-cells = <0>;
};

-spi_lcd {
+spi_lcd: spi_lcd {
    compatible = "spi-gpio";
    #address-cells = <0x1>;
    #size-cells = <0x0>;
@@ -124,7 +125,7 @@
};

tv0: connector {
    -compatible = "svideo-connector";
    +compatible = "composite-video-connector";
    label = "tv";

    port {
@@ -136,7 +137,7 @@

tv_amp: opa362 {
    compatible = "ti,opa362";
    -enable-gpios = <&gpio1 23 GPIO_ACTIVE_HIGH>;
+enable-gpios = <&gpio1 23 GPIO_ACTIVE_HIGH>;/* GPIO_23 to enable video out amplifier */

    ports {
        #address-cells = <1>;
@@ -275,6 +276,13 @@
        OMAP3_CORE1_IOPAD(0x2134, PIN_INPUT_PULLUP | MUX_MODE4) /* gpio112 */
    }
+    +penirq_pins: pinmux_penirq_pins {
+        pinctrl-single,pins = <
+        */ here we could enable to wakeup the cpu from suspend by a pen touch */
+reg = <0>;  
  venc_out: endpoint {  
    remote-endpoint = <&opa_in>;  
    -ti,channels = <2>;  
    +ti,channels = <1>;  
    ti,invert-polarity;  
    };  
  };  
 @@ -588,22 +615,22 @@

 bootloaders@80000 {  
   label = "U-Boot";  
   -reg = <0x80000 0x1e0000>;  
   +reg = <0x80000 0x1c0000>;  
   };  

 -bootloaders_env@260000 {  
   +bootloaders_env@240000 {  
     label = "U-Boot Env";  
     -reg = <0x260000 0x20000>;  
     +reg = <0x240000 0x40000>;  
     };  

 kernel@280000 {  
   label = "Kernel";  
   -reg = <0x280000 0x400000>;  
   +reg = <0x280000 0x600000>;  
   };  

 -filesystem@680000 {  
   +filesystem@880000 {  
     label = "File System";  
     -reg = <0x680000 0xf980000>;  
     +reg = <0x880000 0>; /* 0 = MTDPART_SIZ_FULL */  
     };  
   };  

 --- linux-4.15.0.orig/arch/arm/boot/dts/omap3-n900.dts
 +++ linux-4.15.0/arch/arm/boot/dts/omap3-n900.dts
 @@ -156,6 +156,12 @@
   pwms = <&pwm9 0 26316 0>; /* 38000 Hz */
   };  

 +rom_rng: rng {  
   +compatible = "nokia,n900-rom-rng";  
   +clocks = <&rng_ick>;  
   +clock-names = "ick";
   +};
/* controlled (enabled/disabled) directly by bcm2048 and w1251 */
vctcxo: vctcxo {
    compatible = "fixed-clock";

--- linux-4.15.0.orig/arch/arm/boot/dts/omap3-n950-n9.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/omap3-n950-n9.dtsi
@@ -369,6 +369,19 @@
    #size-cells = <1>;
    reg = <0 0x20000>;
    /* These timings are based on CONFIG_OMAP_GPMC_DEBUG=y reported
+    * bootloader set values when booted with v4.19 using both N950
+    * and N9 devices (OneNAND Manufacturer: Samsung):
+    *
+    * gpmc cs0 before gpmc_cs_program_settings:
+    * cs0 GPMC_CS_CONFIG1: 0xfd001202
+    * cs0 GPMC_CS_CONFIG2: 0x00181800
+    * cs0 GPMC_CS_CONFIG3: 0x00030300
+    * cs0 GPMC_CS_CONFIG4: 0x18001804
+    * cs0 GPMC_CS_CONFIG5: 0x03171d1d
+    * cs0 GPMC_CS_CONFIG6: 0x97080000
+    */
gpmc,sync-read;
gpmc,sync-write;
gpmc,burst-length = <16>;
@@ .378,26 +391,27 @@
gpmc,device-width = <2>;
gpmc,mux-add-data = <2>;
gpmc,cs-on-ns = <0>;
-gpmc,cs-rd-off-ns = <87>;
-gpmc,cs-wr-off-ns = <87>;
+gpmc,cs-rd-off-ns = <122>;
+gpmc,cs-wr-off-ns = <122>;
gpmc,adv-on-ns = <0>;
-gpmc,adv-rd-off-ns = <10>;
-gpmc,adv-wr-off-ns = <10>;
-gpmc,oe-on-ns = <15>;
-gpmc,oe-off-ns = <87>;
+gpmc,adv-rd-off-ns = <15>;
+gpmc,adv-wr-off-ns = <15>;
+gpmc,oe-on-ns = <20>;
+gpmc,oe-off-ns = <122>;
gpmc,we-on-ns = <0>;
-gpmc,we-off-ns = <87>;
-gpmc,rd-cycle-ns = <112>;
-gpmc,wr-cycle-ns = <112>;
-gpmc,access-ns = <81>;

---
+gpmc,we-off-ns = <122>;
+gpmc,rd-cycle-ns = <148>;
+gpmc,wr-cycle-ns = <148>;
+gpmc,access-ns = <117>;
gpmc,page-burst-access-ns = <15>;
gpmc,.bus-turnaround-ns = <0>;
gpmc,cycle2cycle-delay-ns = <0>;
gpmc,wait-monitoring-ns = <0>;
-gpmc,clk-activation-ns = <5>;
-gpmc,wr-data-mux-bus-ns = <30>;
-gpmc,wr-access-ns = <81>;
gpmc,wait-monitoring-ns = <0>;
+gpmc,clk-activation-ns = <10>;
+gpmc,wr-data-mux-bus-ns = <40>;
+gpmc,wr-access-ns = <117>;
+gpmc,Sync-clk-ps = <15000>; /* TBC; Where this value came? */

/*
 MTD partition table corresponding to Nokia's MeeGo 1.2
--- linux-4.15.0.orig/arch/arm/boot/dts/omap3-pandora-common.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/omap3-pandora-common.dtsi
@@ -222,6 +222,17 @@
gpio = <&gpio6 4 GPIO_ACTIVE_HIGH>;/* GPIO_164 */
};

+/* wl1251 wifi+bt module */
wlan_en: fixed-regulator-wg7210_en {
+compatible = "regulator-fixed";
 regulator-name = "vwlan";
 regulator-min-microvolt = <1800000>;
 regulator-max-microvolt = <1800000>;
 startup-delay-us = <50000>;
 enable-active-high;
gpio = <&gpio1 23 GPIO_ACTIVE_HIGH>;
}
+/* wg7210 (wifi+bt module) 32k clock buffer */
wg7210_32k: fixed-regulator-wg7210_32k {
 compatible = "regulator-fixed";
 @@ -515,9 +526,30 @@
 /*wp-gpios = <&gpio4 31 GPIO_ACTIVE_HIGH>;/*@* GPIO_127 */
};

-/* mmc3 is probed using pdata-quirks to pass wl1251 card data */
&mmc3 {
 status = "disabled";
 vmmc-supply = <&wlan_en>;

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+bus-width = <4>;
+non-removable;
+ti_non-removable;
+cap-power-off-card;
+
+pinctrl-names = "default";
+pinctrl-0 =<&mmc3_pins>;
+
+#address-cells = <1>;
+#size-cells = <0>;
+
+wlan: wifi@1 {
+compatible = "ti,wl1251";
+
+reg = <1>;
+
+interrupt-parent = <&gpio1>;
+interrupts = <21 IRQ_TYPE_LEVEL_HIGH>/<"_GPIO_21ルド>/
+
+ti,wl1251-has-eeprom;
+};
};

/* bluetooth*/
--- linux-4.15.0.orig/arch/arm/boot/dts/omap3-tao3530.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/omap3-tao3530.dtsi
@@ -225,7 +225,7 @@
pinctrl-0 =<&mmc1_pins>;
 vmmc-supply =<&vmmc1>;
 vqmmc-supply =<&vsim>;
-cd-gpios =<&twl_gpio 0 GPIO_ACTIVE_HIGH>;
+cd-gpios =<&twl_gpio 0 GPIO_ACTIVE_LOW>;
 bus-width =<8>;
);

--- linux-4.15.0.orig/arch/arm/boot/dts/omap3.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/omap3.dtsi
@@ -23,6 +23,9 @@
i2c0 = &i2c1;
i2c1 = &i2c2;
i2c2 = &i2c3;
+mmc0 = &mmc1;
+mmc1 = &mmc2;
+mmc2 = &mmc3;
 serial0 = &uart1;
 serial1 = &uart2;
 serial2 = &uart3;
nand@1,0 {
  compatible = "ti omap2-nand";
  -reg = <0 0 4> ; /* CS0, offset 0, IO size 4 */
  +reg = <1 0 4> ; /* CS1, offset 0, IO size 4 */
  interrupt-parent = <&gpmc> ;
  interrupts = <0 IRQ_TYPE_NONE> ; /* fifoevent */
    <1 IRQ_TYPE_NONE> ; /* termcount */
}

vbat: fixedregulator-vbat {
  regulator-boot-on;
  +startup-delay-us = <25000>;
}

mmc3 {
  mmc0 = &mmc1;
  mmc1 = &mmc2;
  mmc2 = &mmc3;
  mmc3 = &mmc4;
  +mmc0 = &mmc1;
  +mmc1 = &mmc2;
  +mmc2 = &mmc3;
  +mmc3 = &mmc4;
  +mmc4 = &mmc5;
  i2c1 = &i2c2;
  i2c2 = &i2c3;
  i2c3 = &i2c4;
  serial0 = &uart1;
  serial1 = &uart2;
  serial2 = &uart3;
  @ @ -157.7 +162.7 @@
cm2: cm2@8000 {
compatible = "ti.omap4-cm2";
-reg = <0x8000 0x3000>;
+reg = <0x8000 0x2000>;
}

cm2_clocks: clocks {
#address-cells = <1>;
@@ -241,7 +246,7 @@
}

prm: prm@6000 {
compatible = "ti.omap4-prm";
-reg = <0x6000 0x3000>;
+reg = <0x6000 0x2000>;
interrupts = <GIC_SPI 11 IRQ_TYPE_LEVEL_HIGH>;
}

prm_clocks: clocks {
--- linux-4.15.0.orig/arch/arm/boot/dts/omap443x.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/omap443x.dtsi
@@ -35,10 +35,12 @@
};

ocp {
+/* 4430 has only gpio_86 tshut and no talert interrupt */
bandgap: bandgap@4a002260 {
reg = <0x4a002260 0x4
 0x4a00232C 0x4>;
compatible = "ti.omap4430-bandgap";
+gpios = <&gpio3 22 GPIO_ACTIVE_HIGH>;
#thermal-sensor-cells = <0>;
};
--- linux-4.15.0.orig/arch/arm/boot/dts/omap5-board-common.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/omap5-board-common.dtsi
@@ -33,14 +33,6 @@
regulator-max-microvolt = <5000000>;
}
-vddds_1v8_main: fixedregulator-vddds_1v8_main {
-compatible = "regulator-fixed";
-regulator-name = "vddds_1v8_main";
-vin-supply = <&smps7_reg>;
-regulator-min-microvolt = <1800000>;
-regulator-max-microvolt = <1800000>;
-}
-vmmcsd_fixed: fixedregulator-mmcsd {
compatible = "regulator-fixed";
regulator-name = "vmmcsd_fixed";
palmas_sys_nirq_pins: pinmux_palmas_sys_nirq_pins {
  pinctrl-single.pins = <
  -OMAP5_IOPAD(0x068, PIN_INPUT_PULLUP | MUX_MODE0) /* sys_nirq1 */
  +/* sys_nirq1 is pulled down as the SoC is inverting it for GIC */
  +OMAP5_IOPAD(0x068, PIN_INPUT_PULLUP | MUX_MODE0)
>
};

palmas: palmas@48 {
  compatible = "ti.palmas";
  -interrupts = <GIC_SPI 7 IRQ_TYPE_NONE>; /* IRQ_SYS_1N */
  +/* sys_nirq/ext_sys_irq pins get inverted at mpuss wakeupgen */
  +interrupts = <GIC_SPI 7 IRQ_TYPE_LEVEL_LOW>
  reg = <0x48>
  interrupt-controller;
  #interrupt-cells = <2>
  @ @ -488,6 +482,7 @@
  regulator-boot-on;
};

+vdds_1v8_main:
  smps7_reg: smps7 {
  /* VDDS_1v8_OMAP over VDDS_1v8_MAIN */
  regulator-name = "smps7";
  @ @ -651,7 +646,8 @@
  pinctrl-names = "default";
  pinctrl-0 = <&twl6040_pins>;

  -interrupts = <GIC_SPI 119 IRQ_TYPE_NONE>; /* IRQ_SYS_2N cascaded to gic */
  +/* sys_nirq/ext_sys_irq pins get inverted at mpuss wakeupgen */
  +interrupts = <GIC_SPI 119 IRQ_TYPE_LEVEL_LOW>

  /* audpwron gpio defined in the board specific dts */

  @ @ -700,6 +696,11 @@
  vbus-supply = <&smps10_out1_reg>
};

+&dwc3 {
  +extcon = <&extcon_usb3>
  +dr_mode = "otg"
  +
  +&mcspi1 {
OMAP5_IOPAD(0x0042, PIN_INPUT_PULLDOWN | MUX_MODE6) /* llib_wakereqin.gpio1_wk15 */
>
+	+palmas_sys_nirq_pins: pinmux_palmas_sys_nirq_pins {
+  pinctrl-single,pins = <
+  /* sys_nirq1 is pulled down as the SoC is inverting it for GIC */
+  OMAP5_IOPAD(0x068, PIN_INPUT_PULLUP | MUX_MODE0)
+  >;
+  +};
+
};

&omap5_pmx_core {
  @@ -414,8 +421,11 @@

  palmas: palmas@48 {
    compatible = "ti.palmas";
    -interrupts = <GIC_SPI 7 IRQ_TYPE_NONE>; /* IRQ_SYS_1N */
    reg = <0x48>;
    +pinctrl-0 = <&palmas_sys_nirq_pins>;
    +pinctrl-names = "default";
    +/* sys_nirq/ext_sys_irq pins get inverted at mpuss wakeupgen */
    +interrupts = <GIC_SPI 7 IRQ_TYPE_LEVEL_LOW>;
    interrupt-controller;
    #interrupt-cells = <2>;
    ti.system-power-controller;

  };
ranges = <0 0 0 0xc0000000>;
+dma-ranges = <0x80000000 0x0 0x80000000 0x80000000>;
ti,hwmods = "l3_main_1", "l3_main_2", "l3_main_3";
reg = <0 0x44000000 0x2000>,
  <0 0x44800000 0x3000>,
--- linux-4.15.0.orig/arch/arm/boot/dts/orion5x-linkstation.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/orion5x-linkstation.dtsi
@@ -156,7 +156,7 @@
 &i2c {
   status = "okay";
   -rtc {
   +rtc@32 {
      compatible = "ricoh,rs5c372a";
      reg = <0x32>;
    }
--- linux-4.15.0.orig/arch/arm/boot/dts/owl-s500.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/owl-s500.dtsi
@@ -85,21 +85,21 @@
   twd_timer: timer@b0020600 {
      compatible = "arm,cortex-a9-twd-timer";
      reg = <0xb0020600 0x20>;
-    -interrupts = <GIC_PPI 0 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_EDGE_RISING)>;
+    +interrupts = <GIC_PPI 13 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_EDGE_RISING)>;
      status = "disabled";
    }

    twd_wdt: wdt@b0020620 {
      compatible = "arm,cortex-a9-twd-wdt";
      reg = <0xb0020620 0xe0>;
-    -interrupts = <GIC_PPI 3 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_EDGE_RISING)>;
+    +interrupts = <GIC_PPI 14 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_EDGE_RISING)>;
      status = "disabled";
    }
--- linux-4.15.0.orig/arch/arm/boot/dts/ox810se.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/ox810se.dtsi
@@ -322,8 +322,8 @@
interrupt-controller;
reg = <0 0x200>;

#interrupt-cells = <1>;
-valid-mask = <0xFFFFFFFF>
-clear-mask = <0>
+valid-mask = <0xffffffff>
+clear-mask = <0xffffffff>
};

timer0: timer@200 {
--- linux-4.15.0.orig/arch/arm/boot/dts/ox820.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/ox820.dtsi
@@ -239,8 +239,8 @@
reg = <0 0x200>
interrupts = <GIC_SPI 5 IRQ_TYPE_LEVEL_HIGH>
#interrupt-cells = <1>;
-valid-mask = <0xFFFFFFFF>
-clear-mask = <0>
+valid-mask = <0xffffffff>
+clear-mask = <0xffffffff>
};

timer0: timer@200 {
--- linux-4.15.0.orig/arch/arm/boot/dts/picoxcell-pc3x2.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/picoxcell-pc3x2.dtsi
@@ -54,18 +54,21 @@
emac: gem@30000 {
compatible = "cadence,gem"
reg = <0x30000 0x10000>
+interrupt-parent = <&vic0>
interrupts = <31>
};

dmac1: dmac@40000 {
compatible = "snps,dw-dmac"
reg = <0x40000 0x10000>
+interrupt-parent = <&vic0>
interrupts = <25>
};

dmac2: dmac@50000 {
compatible = "snps,dw-dmac"
reg = <0x50000 0x10000>
+interrupt-parent = <&vic0>
interrupts = <26>
};
@@ -243,6 +246,7 @@
axi2pico@00000000 {
compatible = "picochip,axi2pico-pc3x2";
reg = <0xc0000000 0x10000>;  
+interrupt-parent = <&vic0>;  
interrupts = <13 14 15 16 17 18 19 20 21>;  
};  
};  
--- linux-4.15.0.orig/arch/arm/boot/dts/pxa25x.dtsi  
+++ linux-4.15.0/arch/arm/boot/dts/pxa25x.dtsi  
@@ -80,6 +80,10 @@  
#pwm-cells = <1>;  
clocks = <&clks CLK_PWM1>;  
};  
+rtc@40900000 {  
+clocks = <&clks CLK_OSC32k768>;  
+};  
};  

timer@40a00000 {  
--- linux-4.15.0.orig/arch/arm/boot/dts/pxa27x.dtsi  
+++ linux-4.15.0/arch/arm/boot/dts/pxa27x.dtsi  
@@ -35,7 +35,7 @@  
clocks = <&clks CLK_NONE>;  
};  
-pxa27x_ohci: usb@4c000000 {  
+usb0: usb@4c000000 {  
compatible = "marvell,pxa-ohci";  
reg = <0x4c000000 0x10000>;  
interrupts = <3>;  
@@ -71,7 +71,7 @@  
clocks = <&clks CLK_PWM1>;  
};  
-pwri2c: i2c@40f000180 {  
+pwri2c: i2c@40f00180 {  
compatible = "mrvl,pxa-i2c";  
reg = <0x40f000180 0x24>;  
interrupts = <6>;  
@@ -113,6 +113,10 @@  
status = "disabled";  
};  
+rtc@40900000 {  
+clocks = <&clks CLK_OSC32k768>;  
+};  
};
clocks {
--- linux-4.15.0.orig/arch/arm/boot/dts/pxa2xx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/pxa2xx.dtsi
@@ -117,13 +117,6 @@
status = "disabled";
};

-usb0: ohci@4c000000 {
- compatible = "marvell,pxa-ohci";
- reg = <0x4c000000 0x10000>;
- interrupts = <3>;
- status = "disabled";
-};
-
mmc0: mmc@41100000 {
 compatible = "marvell,pxa-mmc";
 reg = <0x41100000 0x1000>;
--- linux-4.15.0.orig/arch/arm/boot/dts/pxa3xx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/pxa3xx.dtsi
@@ -189,7 +189,7 @@
status = "disabled";
};

-pxa3xx_ohci: usb@4c000000 {
+usb0: usb@4c000000 {
 compatible = "marvell,pxa-ohci";
 reg = <0x4c000000 0x10000>;
 interrupts = <3>;
--- linux-4.15.0.orig/arch/arm/boot/dts/qcom-apq8064-arrow-sd-600eval.dts
+++ linux-4.15.0/arch/arm/boot/dts/qcom-apq8064-arrow-sd-600eval.dts
@@ -387,6 +387,11 @@
hpd-gpio = <&tlmm_pinmux 72 GPIO_ACTIVE_HIGH>;

ports {
+port@0 {
+endpoint {
+remote-endpoint = <&mdp_dtv_out>;
+};
+};
port@1 {
 endpoint {
 remote-endpoint = <&hdmi_con>;
--- linux-4.15.0.orig/arch/arm/boot/dts/qcom-apq8064.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/qcom-apq8064.dtsi
@@ -1115,7 +1115,7 @@
};

gpu: adreno-3xx@4300000 {
- compatible = "qcom,adreno-3xx";
+ compatible = "qcom,adreno-320.2", "qcom,adreno";
 reg = <0x04300000 0x200000>;
 reg-names = "kgsl_3d0_reg_memory";
 interrupts = <GIC_SPI 80 0>;
@@ -1130,7 +1130,6 @@
<&mmcc GFX3D_AHB_CLK>,
<&mmcc GFX3D_AXI_CLK>,
<&mmcc MMSS_IMEM_AHB_CLK>;
-qcom,chipid = <0x03020002>;

iommus = <&gfx3d 0
     &gfx3d 1
@@ -1229,9 +1228,9 @@
<&mmcc DSI1_BYTE_CLK>,
<&mmcc DSI_PIXEL_CLK>,
<&mmcc DSI1_ESC_CLK>;
-clock-names = "iface_clk", "bus_clk", "core_mmss_clk",
-"src_clk", "byte_clk", "pixel_clk",
-"core_clk";
+clock-names = "iface", "bus", "core_mmss",
+"src", "byte", "pixel",
+"core";

assigned-clocks = <&mmcc DSI1_BYTE_SRC>,
<&mmcc DSI1_ESC_SRC>,
--- linux-4.15.0.orig/arch/arm/boot/dts/qcom-ipq4019.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/qcom-ipq4019.dtsi
@@ -234,7 +234,7 @@
saw0: regulator@b089000 {
     compatible = "qcom,saw2";
     -
+reg = <0x0b009000 0x1000>, <0x0b009000 0x1000>;
+reg = <0x0b009000 0x1000>, <0x0b009000 0x1000>;
     regulator;
     }

--- linux-4.15.0.orig/arch/arm/boot/dts/qcom-msm8974-lge-nexus5-hammerhead.dts
+++ linux-4.15.0/arch/arm/boot/dts/qcom-msm8974-lge-nexus5-hammerhead.dts
@@ -189,6 +189,8 @@
regulator-max-microvolt = <2950000>;
regulator-boot-on;
+regulator-system-load = <2000000>;
+regulator-allow-set-load;
};
--- linux-4.15.0.orig/arch/arm/boot/dts/qcom-msm8974-sony-xperia-honami.dts
+++ linux-4.15.0/arch/arm/boot/dts/qcom-msm8974-sony-xperia-honami.dts
@@ -456,5 +456,15 @@
 qcom,ovp = <29>;
 qcom,num-strings = <2>;
 }
+
 +lpg {
 +status = "okay";
 +
 +qcom,power-source = <1>;
 +
 +rgb {
 +led-sources = <7 6 5>;
 +}
 +
 +};
 +};
 ];
);

--- linux-4.15.0.orig/arch/arm/boot/dts/qcom-pm8941.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/qcom-pm8941.dtsi
@@ -176,6 +176,12 @@
 #address-cells = <1>;
 #size-cells = <0>;
+
 +lpg {
 +compatible = "qcom.pm8941-lpg";
 +
 +status = "disabled";
 +}
 +
 +pm8941_wled: wled@d800 {
 compatible = "qcom.pm8941-wled";
 reg = <0xd800>;
--- linux-4.15.0.orig/arch/arm/boot/dts/r8a73a4.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/r8a73a4.dtsi
@@ -134,7 +134,14 @@
 cmt1: timer@e6130000 {
 compatible = "renesas,cmt-48-r8a73a4", "renesas,cmt-48-gen2";
 reg = <0xe6130000 0x01004>;
-interrupts = <GIC_SPI 120 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 120 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 121 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 122 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 123 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 124 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 125 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 126 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 127 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 128 IRQ_TYPE_LEVEL_HIGH>,

clocks = <&mstp3_clks R8A73A4_CLK_CMT1>
;  
clock-names = "fck";

power-domains = <&pd_c5>;

--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7740.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/r8a7740.dtsi
@@ -467,7 +467,7 @@
cpg_clocks: cpg_clocks@e6150000 {
    compatible = "renesas,r8a7740-cpg-clocks";
    reg = <0xe6150000 0x10000>;
    -clocks = <&extal1_clk>, <&extalr_clk>
+    clocks = <&extal1_clk>, <&extal2_clk>, <&extalr_clk>

    #clock-cells = <1>
    clock-output-names = "system", "pllc0", "pllc1",
                   "pllc2", "r",

--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7743.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/r8a7743.dtsi
@@ -510,9 +510,7 @@
       #address-cells = <1>
       #size-cells = <0>
-       compatible = "renesas,iic-r8a7743",
-       "renesas,rcar-gen2-iic",
-       "renesas,rmobile-iic"
+       compatible = "renesas,iic-r8a7743"
       reg = <0x60b0000 0x425>
       interrupts = <GIC_SPI 173 IRQ_TYPE_LEVEL_HIGH>
       clocks = <&cpg CPG_MOD 926>

--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7779-marzen.dts
+++ linux-4.15.0/arch/arm/boot/dts/r8a7779-marzen.dts
@@ -136,7 +136,7 @@
       status = "okay";

    clocks = <&mstp1_clks R8A7779_CLK_DU>, <&x3_clk>
       -clock-names = "du", "dclkin.0"
+clock-names = "du.0", "dclkin.0"

    ports {

      port@0 {

        --- linux-4.15.0.orig/arch/arm/boot/dts/r8a7779.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/r8a7779.dtsi
@@ -71,6 +71,14 @@
          @ @ -71.6 +71.14 @ @
          <0xf0000100 0x100>
        }
+
        +timer@f000200 {
          compatible = "arm,cortex-a9-global-timer";
          +reg = <0xf0000200 0x100>
          +interrupts = <GIC_PPI 11

--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7779-marleng.dts
+(GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_EDGE_RISING);
clocks = <&cpg_clocks R8A7779_CLK_ZS>;
+

timer@f0000600 {
compatible = "arm,cortex-a9-twd-timer";
reg = <0xf0000600 0x2000>;
@@ -347,7 +355,7 @@
sata: sata@fc600000 {
compatible = "renesas,sata-r8a7779", "renesas,rcar-sata";
-reg = <0xfc600000 0x200000>;
+reg = <0xfc600000 0x200000>;
interrupts = <GIC_SPI 100 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&mstp1clks R8A7779_CLK_SATA>;
power-domains = <&sysc R8A7779_PD_ALWAYS_ON>;
@@ -428,6 +436,7 @@
reg = <0xfff80000 0x40000>;
interrupts = <GIC_SPI 31 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&mstp1clks R8A7779_CLK_DU>;
+clock-names = "du.0";
power-domains = <&sysc R8A7779_PD_ALWAYS_ON>;
status = "disabled";
--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7790.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/r8a7790.dtsi
@@ -168,7 +168,7 @@
trips {
  cpu-crit {
-temperature= <115000>;
+temperature= <95000>;
hysteresis= <0>;
type= "critical";
};
@@ -933,7 +933,7 @@
sata0: sata@ee300000 {
compatible = "renesas,sata-r8a7790", "renesas,rcar-gen2-sata";
-reg = <0 xee300000 0x20000>;
+reg = <0 xee300000 0x20000>;
interrupts = <GIC_SPI 105 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&cpg CPG_MOD 815>;
power-domains = <&sysc R8A7790_PD_ALWAYS_ON>;
@@ -943,7 +943,7 @@
sata1: sata@ee500000 {
compatible = "renesas,sata-r8a7790", "renesas,rcar-gen2-sata";

--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7790.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/r8a7790.dtsi
@@ -168,7 +168,7 @@
trips {
  cpu-crit {
-temperature= <115000>;
+temperature= <95000>;
hysteresis= <0>;
type= "critical";
};
@@ -933,7 +933,7 @@
sata0: sata@ee300000 {
compatible = "renesas,sata-r8a7790", "renesas,rcar-gen2-sata";
-reg = <0 xee300000 0x20000>;
+reg = <0 xee300000 0x20000>;
interrupts = <GIC_SPI 105 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&cpg CPG_MOD 815>;
power-domains = <&sysc R8A7790_PD_ALWAYS_ON>;
@@ -943,7 +943,7 @@
sata1: sata@ee500000 {
compatible = "renesas,sata-r8a7790", "renesas,rcar-gen2-sata";
-reg = <0x0ee500000 0x200000>;
+reg = <0x0ee500000 0x200000>;
interrupts = <GIC_SPI 106 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&cpg CPG_MOD 814>;
power-domains = <&sysc R8A7790_PD_ALWAYS_ON>;
--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7791-koelsch.dts
+++ linux-4.15.0/arch/arm/boot/dts/r8a7791-koelsch.dts
@@ -278,6 +278,12 @@
};
};
+	cec_clock: cec-clock {
+compatible = "fixed-clock";
+#clock-cells = <0>;
+clock-frequency = <12000000>;
+};
+
hdmi-out {
compatible = "hdmi-connector";
type = "a";
@@ -640,12 +646,6 @@
};
}
-
-cec_clock: cec-clock {
-compatible = "fixed-clock";
-#clock-cells = <0>;
-clock-frequency = <12000000>;
-};
-
-
hdmi@39 {
compatible = "adi,adv7511w";
reg = <0x39>;
--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7791-porter.dts
+++ linux-4.15.0/arch/arm/boot/dts/r8a7791-porter.dts
@@ -425,7 +425,7 @@
"dclkin.0", "dclkin.1";

ports {
-port@1 {
+port@0 {
endpoint {
remote-endpoint = <&adv7511_in>;
};
--- linux-4.15.0.orig/arch/arm/boot/dts/r8a7791.dttsi
+++ linux-4.15.0/arch/arm/boot/dts/r8a7791.dttsi
@@ -92,7 +92,7 @@
trips {
  cpu-crit {
    -temperature= <115000>;
    +temperature= <95000>;
    hysteresis= <0>;
    type= "critical";
  }
  @ @ -988,7 +988,7 @@
}

sata0: sata@ee300000 {
  compatible = "renesas,sata-r8a7791", "renesas,rcar-gen2-sata";
  -reg = <0 0xee300000 0 0x20000>;
  +reg = <0 0xee300000 0 0x200000>;
  interrupts = <GIC_SPI 105 IRQ_TYPE_LEVEL_HIGH>;
  clocks = <&cpg CPG_MOD 815>;
  power-domains = <&sysc R8A7791_PD_ALWAYS_ON>;
  @ @ -998,7 +998,7 @@
}

sata1: sata@ee500000 {
  compatible = "renesas,sata-r8a7791", "renesas,rcar-gen2-sata";
  -reg = <0 0xee500000 0 0x20000>;
  +reg = <0 0xee500000 0 0x200000>;
  interrupts = <GIC_SPI 106 IRQ_TYPE_LEVEL_HIGH>;
  clocks = <&cpg CPG_MOD 814>;
  power-domains = <&sysc R8A7791_PD_ALWAYS_ON>;
  --- linux-4.15.0.orig/arch/arm/boot/dts/r8a7793-gose.dts
  +++ linux-4.15.0/arch/arm/boot/dts/r8a7793-gose.dts
  @@ -560,7 +560,7 @@
  reg = <0x20>;
  remote = <&vin1>;

  -port {
    +ports {
      #address-cells = <1>;
      #size-cells = <0>;

      @ @ -620,7 +620,7 @@
      interrupts = <2 IRQ_TYPE_LEVEL_LOW>;
      default-input = <0>;

    -port {
      +ports {
        #address-cells = <1>;
        #size-cells = <0>;

        --- linux-4.15.0.orig/arch/arm/boot/dts/r8a7793.dtsi
        +++ linux-4.15.0/arch/arm/boot/dts/r8a7793.dtsi
        @@ -89,7 +89,7 @@
trips {
  cpu-crit {
  -temperature= <115000>;
  +temperature= <95000>;
  hysteresis= <0>;
  type= "critical";
  }
  --- linux-4.15.0.orig/arch/arm/boot/dts/rk3036-kylin.dts
  +++ linux-4.15.0/arch/arm/boot/dts/rk3036-kylin.dts
  @@ -429,7 +429,7 @@
  }
  --- linux-4.15.0.orig/arch/arm/boot/dts/rk3036.dtsi
  +++ linux-4.15.0/arch/arm/boot/dts/rk3036.dtsi
  @@ -166,7 +166,7 @@
  assigned-clocks = <&cru SCLK_GPU>;
  assigned-clock-rates = <100000000>;
  clocks = <&cru SCLK_GPU>, <&cru SCLK_GPU>;
  -clock-names = "core", "bus";
  +clock-names = "bus", "core";
  resets = <&cru SRST_GPU>;
  status = "disabled";
  }
  @@ -280,7 +280,7 @@
  max-frequency = <37500000>;
  clocks = <&cru HCLK_SDIO>, <&cru SCLK_SDIO>,
           <&cru SCLK_SDIO_DRV>, <&cru SCLK_SDIO_SAMPLE>;
  -clock-names = "biu", "ciu", "ciu_drv", "ciu_sample";
  +clock-names = "biu", "ciu", "ciu-drive", "ciu-sample";
  fifo-depth = <0x100>;
  interrupts = <GIC_SPI 15 IRQ_TYPE_LEVEL_HIGH>;
  resets = <&cru SRST_SDIO>;
  @@ -298,7 +298,7 @@
  max-frequency = <37500000>;
  clocks = <&cru HCLK_EMMC>, <&cru SCLK_EMMC>,
           <&cru SCLK_EMMC_DRV>, <&cru SCLK_EMMC_SAMPLE>;
  -clock-names = "biu", "ciu", "ciu_drv", "ciu_sample";
  +clock-names = "biu", "ciu", "ciu-drive", "ciu-sample";
  default-sample-phase = <158>;
  disable-wp;
  dmas = <&pdma 12>;

@@ -769,7 +769,7 @@
 /* no rts / cts for uart2 */
 }

-spi {
+spi {
    spi-pins {
        spi_txd:spi-txd {
            rockchip,pins = <1 29 RK_FUNC_3 &pcfg_pull_default>;
        }
    }
--- linux-4.15.0.orig/arch/arm/boot/dts/rk3188-radxarock.dts
+++ linux-4.15.0/arch/arm/boot/dts/rk3188-radxarock.dts
@@ -130,6 +130,8 @@
 regulator-min-microvolt = <3300000>;
 regulator-max-microvolt = <3300000>;
  gpio = <&gpio3 RK_PA1 GPIO_ACTIVE_LOW>;
+    pinctrl-names = "default";
+    pinctrl-0 = <&sdmmc_pwr>;
  startup-delay-us = <100000>;
  vin-supply = <&vcc_io>;
};
@@ -352,6 +354,12 @@
 sd0 {
+    sdmmc_pwr: sdmmc-pwr {
+        rockchip,pins = <RK_GPIO3 1 RK_FUNC_GPIO &pcfg_pull_none>;
+    }
+};
+}
+usb {
    host_vbus_drv: host-vbus-drv {
        rockchip,pins = <0 3 RK_FUNC_GPIO &pcfg_pull_none>;
--- linux-4.15.0.orig/arch/arm/boot/dts/rk3188.dtsi
+++ linux-4.15.0/arch/arm/boot/dtsi/rk3188.dtsi
@@ -110,16 +110,16 @@
     clocks = <&cru SCLK_TIMER3>, <&cru PCLK_TIMER3>;
 }; clock_names = "timer", "pclk";
+    clocks = <&cru PCLK_TIMER3>, <&cru SCLK_TIMER3>;
+    clock_names = "pclk", "timer";
};

    timer6: timer@200380a0 {
        compatible = "rockchip,rk3188-timer", "rockchip,rk3288-timer";
        reg = <0x20000e000 0x20>
        interrupts = <GIC_SPI 46 IRQ_TYPE_LEVEL_HIGH>;
        -clocks = <&cru SCLK_TIMER3>, <&cru PCLK_TIMER3>;
        -clock_names = "timer", "pclk";
        +clocks = <&cru PCLK_TIMER3>, <&cru SCLK_TIMER3>;
        +clock_names = "pclk", "timer";
    }:

    timer6: timer@200380a0 {
interrupts = <GIC_SPI 64 IRQ_TYPE_LEVEL_HIGH>;  
clocks = <&cru SCLK_TIMER6>, <&cru PCLK_TIMER0>;  
clock-names = "timer", "pclk";  
+clocks = <&cru PCLK_TIMER0>, <&cru SCLK_TIMER6>;  
+clock-names = "pclk", "timer";  
};

i2s0: i2s@1011a000 {
--- linux-4.15.0.orig/arch/arm/boot/dts/rk3228-evb.dts  
+++ linux-4.15.0/arch/arm/boot/dts/rk3228-evb.dts  
@@ -84,7 +84,7 @@  
  #address-cells = <1>;  
  #size-cells = <0>;  
-phy: phy@0 {  
+phy: ethernet-phy@0 {  
    compatible = "ethernet-phy-id1234.d400", "ethernet-phy-ieee802.3-c22";  
    reg = <0>;  
    clocks = <&cru SCLK_MAC_PHY>;  
--- linux-4.15.0.orig/arch/arm/boot/dts/rk322x.dtsi  
+++ linux-4.15.0/arch/arm/boot/dts/rk322x.dtsi  
@@ -574,7 +574,7 @@  
          "pp1",  
          "ppmmu1";  
    clocks = <&cru ACLK_GPU>, <&cru ACLK_GPU>;  
--- linux-4.15.0.orig/arch/arm/boot/dts/rk3228-evb.dts  
+++ linux-4.15.0/arch/arm/boot/dts/rk3228-evb.dts  
@@ -621,7 +621,7 @@  
    interrupts = <GIC_SPI 12 IRQ_TYPE_LEVEL_HIGH>;  
    clocks = <&cru HCLK_SDMMC>, <&cru SCLK_SDMMC>,  
      <&cru SCLK_SDMMC_DRV>, <&cru SCLK_SDMMC_SAMPLE>;  
-    clock-names = "biu", "ciu", "ciu_drv", "ciu_sample";  
+    clock-names = "biu", "ciu", "ciu-drive", "ciu-sample";  
    fifo-depth = <0x100>;  
    pinctrl-names = "default";  
    pinctrl-0 = <&sdmmc_clk &sdmmc_cmd &sdmmc_bus4>;  
--- linux-4.15.0.orig/arch/arm/boot/dts/rk3228-evb.dts  
+++ linux-4.15.0/arch/arm/boot/dts/rk3228-evb.dts  
@@ -634,7 +634,7 @@  
    interrupts = <GIC_SPI 13 IRQ_TYPE_LEVEL_HIGH>;  
    clocks = <&cru HCLK_SDIO>, <&cru SCLK_SDIO>,  
      <&cru SCLK_SDIO_DRV>, <&cru SCLK_SDIO_SAMPLE>;  
-    clock-names = "biu", "ciu", "ciu_drv", "ciu_sample";  
+    clock-names = "biu", "ciu", "ciu-drive", "ciu-sample";  
    fifo-depth = <0x100>;  
    pinctrl-names = "default";  
    pinctrl-0 = <&sdio_clk &sdio_cmd &sdio_bus4>;}
max-frequency = <37500000>

clocks = <&cru HCLK_EMMC>, <&cru SCLK_EMMC>,
<&cru SCLK_EMMC_DRV>, <&cru SCLK_EMMC_SAMPLE>
-clock-names = "biu", "ciu", "ciu_drv", "ciu_sample";
+clock-names = "biu", "ciu", "ciu-drive", "ciu-sample";
bus-width = <8>
default-sample-phase = <158>
fifo-depth = <0x100>

-spi-0 {
+spi0 {
spi0_clk: spi0-clk {
rockchip.pins = <0 9 RK_FUNC_2 &pcfg_pull_up>
};
@@ -989,7 +989,7 @@
}:
};

-spi-1 {
+spi1 {
spi1_clk: spi1-clk {
rockchip.pins = <0 23 RK_FUNC_2 &pcfg_pull_up>
};
--- linux-4.15.0.orig/arch/arm/boot/dts/rk3288-phycore-som.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/rk3288-phycore-som.dtsi
@@ -110,26 +110,6 @@
}:
};

-&cpu0 {
-cpu0-supply = <&vdd_cpu>
-counter-point = <
-/* KHz   uV */
-18000001400000
-16080001350000
-151200001300000
-141600001200000
-120000001100000
-100800001050000
- 81600001000000
- 6960000 950000
- 600000 900000
- 408000 900000
- 312000 900000

---
vcc_flash: flash-regulator {
  compatible = "regulator-fixed";
  -regulator-name = "vcc_sys";
  +regulator-name = "vce_flash";
  regulator-min-microvolt = <1800000>;
  regulator-max-microvolt = <1800000>;
  startup-delay-us = <150>;
  --- linux-4.15.0.orig/arch/arm/boot/dts/rk3288-veyron-minnie.dts
  +++ linux-4.15.0/arch/arm/boot/dts/rk3288-veyron-minnie.dts
  @@ -125,10 +125,6 @@
    power-supply = <&backlight_regulator>;
  }
}

-i2c2 {
  status = "disabled";
  --- linux-4.15.0.orig/arch/arm/boot/dts/rk3288-veyron-mickey.dts
  +++ linux-4.15.0/arch/arm/boot/dts/rk3288-veyron-mickey.dts
  @@ -161,10 +161,6 @@
    }
}

-emmc {
-  /delete-property/mmc-hs200-1_8v;
-}
-
-emmc {
-  /delete-property/mmc-hs200-1_8v;
-}
-
-gpio_keys {
  pinctrl-0 = <&pwr_key_l &ap_lid_int_l &volum_down_l &volum_up_l>:
  --- linux-4.15.0.orig/arch/arm/boot/dts/rk3288-veyron.dtsi
  +++ linux-4.15.0/arch/arm/boot/dts/rk3288-veyron.dtsi
  @@ -47,7 +47,11 @@
#include "rk3288.dtsi"

/ {
  -memory@0 {
  /*
  * The default coreboot on veyron devices ignores memory@0 nodes
  * and would instead create another memory node.
  */
  +memory {
    device_type = "memory";
    reg = <0x0 0x0 0x0 0x80000000>;
  }
  --- linux-4.15.0.orig/arch/arm/boot/dts/rk3288.dtsi
  +++ linux-4.15.0/arch/arm/boot/dts/rk3288.dtsi
  @@ -213,14 +213,15 @@
    <GIC_PPI 11 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_LEVEL_HIGH)>,
    <GIC_PPI 10 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_LEVEL_HIGH)>
    ;
     clock-frequency = <240000000>;
    +arm,no-tick-in-suspend;
  }

  timer: timer@ff810000 {
    compatible = "rockchip,rk3288-timer";
    reg = <0x0 0xff810000 0x0 0x20>;
    interrupts = <GIC_SPI 72 IRQ_TYPE_LEVEL_HIGH>;
    -clocks = <&xin24m>, <&cru PCLK TIMER>;
    -clock-names = "timer", "pclk";
    +clocks = <&cru PCLK TIMER>, <&xin24m>;
    +clock-names = "pclk", "timer";
  }

  display-subsystem {
  @@ -744,7 +745,7 @@
    */
    -pd_vio@RK3288_PD_VIO {
      +power-domain@RK3288_PD_VIO {
        reg = <RK3288_PD_VIO>;
        clocks = <&cru ACLK_IEP>,
        <&cru ACLK ISP>,
        @@ -786,7 +787,7 @@
          */
          -pd_hevc@RK3288_PD_HEVC {
            +power-domain@RK3288_PD_HEVC {
              reg = <RK3288_PD_HEVC>;
          */
          */
clocks = <&cru ACLK_HEVC>,
<&cru SCLK_HEVC_CABAC>,
@@ -800,7 +801,7 @@
* (video endecoder & decoder) clocks that on the
* ACLK_VCODEC_NIU and HCLK_VCODEC_NIU (NOC).
*/

-power-domain@RK3288_PD_VIDEO {
+power-domain@RK3288_PD_VIDEO {
  reg = <RK3288_PD_VIDEO>;
  clocks = <&cru ACLK_VCODEC>,
  <&cru HCLK_VCODEC>;
@@ -811,7 +812,7 @@
* Note: ACLK_GPU is the GPU clock,
* and on the ACLK_GPU_NIU (NOC).
*/

-power-domain@RK3288_PD_GPU {
+power-domain@RK3288_PD_GPU {
  reg = <RK3288_PD_GPU>;
  clocks = <&cru ACLK_GPU>;
  pm_qos = <&qos_gpu_r>,
@@ -927,6 +928,7 @@
  compatible = "rockchip,rk3288-i2s", "rockchip,rk3066-i2s";
  reg = <0x0 0xff890000 0x0 0x10000>;
  +#sound-dai-cells = <0>;
  interrupts = <GIC_SPI 53 IRQ_TYPE_LEVEL_HIGH>;
  #address-cells = <1>;
  #size-cells = <0>;
  @@ -1176,6 +1178,7 @@
  compatible = "rockchip,rk3288-dw-hdmi";
  reg = <0x0 0xff980000 0x0 0x20000>;
  reg-io-width = <4>;
  +#sound-dai-cells = <0>;
  rockchip,grf = <&grf>;
  interrupts = <GIC_SPI 103 IRQ_TYPE_LEVEL_HIGH>;
  clocks = <&cru PCLK_HDMI_CTRL>, <&cru SCLK_HDMI_HDCP>, <&cru SCLK_HDMI_CEC>;
@@ -1233,27 +1236,27 @@
  gpu_opp_table: gpu-opp-table {
    compatible = "operating-points-v2";

    -opp@100000000 {
+opp-100000000 {
      opp-hz = /bits/ 64 <100000000>;
      opp-microvolt = <950000>;
    }
    -opp@200000000 {
+opp-200000000 {
      opp-hz = /bits/ 64 <200000000>;
    }
    -opp@300000000 {
+opp-300000000 {
      opp-hz = /bits/ 64 <300000000>;
    }
    -opp@400000000 {
+opp-400000000 {
      opp-hz = /bits/ 64 <400000000>;
    }
    -opp@500000000 {
+opp-500000000 {
      opp-hz = /bits/ 64 <500000000>;
    }
    -opp@600000000 {
+opp-600000000 {
      opp-hz = /bits/ 64 <600000000>;
    }
    -opp@700000000 {
+opp-700000000 {
      opp-hz = /bits/ 64 <700000000>;
    }
    -opp@800000000 {
+opp-800000000 {
      opp-hz = /bits/ 64 <800000000>;
    }
    -opp@900000000 {
+opp-900000000 {
      opp-hz = /bits/ 64 <900000000>;
    }
    -opp@1000000000 {
+opp-1000000000 {
      opp-hz = /bits/ 64 <1000000000>;
      opp-microvolt = <950000>;
    }
    -opp@2000000000 {
+opp-2000000000 {
      opp-hz = /bits/ 64 <2000000000>;
      opp-microvolt = <950000>;
    }
    -opp@3000000000 {
+opp-3000000000 {
      opp-hz = /bits/ 64 <3000000000>;
      opp-microvolt = <950000>;
    }
    -opp@4000000000 {
+opp-4000000000 {
      opp-hz = /bits/ 64 <4000000000>;
      opp-microvolt = <950000>;
    }
    -opp@5000000000 {
+opp-5000000000 {
      opp-hz = /bits/ 64 <5000000000>;
      opp-microvolt = <950000>;
    }
    -opp@6000000000 {
+opp-6000000000 {
      opp-hz = /bits/ 64 <6000000000>;
      opp-microvolt = <950000>;
    }
    -opp@7000000000 {
+opp-7000000000 {
      opp-hz = /bits/ 64 <7000000000>;
      opp-microvolt = <950000>;
    }
    -opp@8000000000 {
+opp-8000000000 {
      opp-hz = /bits/ 64 <8000000000>;
      opp-microvolt = <950000>;
    }
    -opp@9000000000 {
+opp-9000000000 {
      opp-hz = /bits/ 64 <9000000000>;
      opp-microvolt = <950000>;
    }
    -opp@10000000000 {
+opp-10000000000 {
      opp-hz = /bits/ 64 <10000000000>;
      opp-microvolt = <950000>;
    }
opp-microvolt = <950000>;
};
-opp@300000000 {
  +opp-300000000 {
  opp-hz = /bits/ 64 <300000000>;
  opp-microvolt = <1000000>;
  }
-opp@400000000 {
  +opp-400000000 {
  opp-hz = /bits/ 64 <400000000>;
  opp-microvolt = <1100000>;
  }
-opp@500000000 {
  +opp-500000000 {
  opp-hz = /bits/ 64 <500000000>;
  opp-microvolt = <1200000>;
  }
-opp@600000000 {
  +opp-600000000 {
  opp-hz = /bits/ 64 <600000000>;
  opp-microvolt = <1250000>;
  }
@@ -1512,7 +1515,7 @@
  drive-strength = <12>;
  }

-sleep {
  +suspend {
  global_pwroff: global-pwroff {
    rockchip.pins = <0 0 RK_FUNC_1 &pcfg_pull_none>;
  }
  --- linux-4.15.0.orig/arch/arm/boot/dts/rk3xxx.dtsi
++  linux-4.15.0/arch/arm/boot/dts/rk3xxx.dtsi
@@ -121,7 +121,7 @@
    compatible = "arm,mali-400";
    reg = <0x10090000 0x10000>;
    clocks = <&cru ACLK_GPU>, <&cru ACLK_GPU>;
    -clock-names = "core", "bus";
    +clock-names = "bus", "core";
    assigned-clocks = <&cru ACLK_GPU>;
    assigned-clock-rates = <100000000>;
    resets = <&cru SRST_GPU>;
  --- linux-4.15.0.orig/arch/arm/boot/dts/rv1108.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/rv1108.dtsi
@@ -104,7 +104,7 @@
    arm-pmu {
    compatible = "arm,cortex-a7-pmu";
interrupts = <GIC_SPI 67 IRQ_TYPE_LEVEL_HIGH>
+interrupts = <GIC_SPI 76 IRQ_TYPE_LEVEL_HIGH>
};

timer {
@@ -579,7 +579,7 @@
compatible = "rockchip,gpio-bank";
reg = <0x20030000 0x100>;
interrupts = <GIC_SPI 40 IRQ_TYPE_LEVEL_HIGH>
-clocks = <&xin24m>;
+clocks = <&cru PCLK_GPIO0_PMU>;

gpio-controller;
#gpio-cells = <2>;
@@ -592,7 +592,7 @@
compatible = "rockchip,gpio-bank";
reg = <0x10310000 0x100>;
interrupts = <GIC_SPI 41 IRQ_TYPE_LEVEL_HIGH>
-clocks = <&xin24m>;
+clocks = <&cru PCLK_GPIO1>;

gpio-controller;
#gpio-cells = <2>;
@@ -605,7 +605,7 @@
compatible = "rockchip,gpio-bank";
reg = <0x10320000 0x100>;
interrupts = <GIC_SPI 42 IRQ_TYPE_LEVEL_HIGH>
-clocks = <&xin24m>;
+clocks = <&cru PCLK_GPIO2>;

gpio-controller;
#gpio-cells = <2>;
@@ -618,7 +618,7 @@
compatible = "rockchip,gpio-bank";
reg = <0x10330000 0x100>;
interrupts = <GIC_SPI 43 IRQ_TYPE_LEVEL_HIGH>
-clocks = <&xin24m>;
+clocks = <&cru PCLK_GPIO3>;

gpio-controller;
#gpio-cells = <2>;
--- linux-4.15.0.orig/arch/arm/boot/dts/s3c6410-mini6410.dts
+++ linux-4.15.0/arch/arm/boot/dts/s3c6410-mini6410.dts
@@ -167,6 +167,10 @@
};

+&clocks {

+clocks = <&fin_pll>; 
+}
+
&sdhci0 {
    pinctrl-names = "default";
    pinctrl-0 = <&sd0_clk>, <&sd0_cmd>, <&sd0_cd>, <&sd0_bus4>;
}

--- linux-4.15.0.orig/arch/arm/boot/dts/s3c6410-smdk6410.dts
+++ linux-4.15.0/arch/arm/boot/dts/s3c6410-smdk6410.dts
@@ -71,6 +71,10 @@
};
};

+&clocks {
+clocks = <&fin_pll>;
+}
+
&sdhci0 {
    pinctrl-names = "default";
    pinctrl-0 = <&sd0_clk>, <&sd0_cmd>, <&sd0_cd>, <&sd0_bus4>;
}

--- linux-4.15.0.orig/arch/arm/boot/dts/s5pv210.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/s5pv210.dtsi
@@ -101,19 +101,16 @@
};

clocks: clock-controller@e0100000 {
    -compatible = "samsung,s5pv210-clock", "simple-bus";
+compatible = "samsung,s5pv210-clock";
    reg = <0xe0100000 0x10000>;
    clock-names = "xxti", "xusbxti";
    clocks = <&xxti>, <&xusbxti>;
    #clock-cells = <1>;
-    #address-cells = <1>;
-    #size-cells = <1>;
-    ranges;
+}

-pmu_syscon: syscon@e0108000 {
    -compatible = "samsung-s5pv210-pmu", "syscon";
    -reg = <0xe0108000 0x8000>;
-}
+pmu_syscon: syscon@e0108000 {
+compatible = "samsung-s5pv210-pmu", "syscon";
+reg = <0xe0108000 0x8000>;
+}

pinctrl0: pinctrl@e0200000 {
@@ -129,35 +126,28 @@
};
amba {
	#address-cells = <1>;
	#size-cells = <1>;
	compatible = "simple-bus";
	-ranges;
-
-
-pdma0: dma@e0900000 {
-compatible = "arm,pl330", "arm,primecell";
-reg = <0xe0900000 0x1000>;
-interrupt-parent = <&vic0>;
-interrupts = <19>;
-clocks = <&clocks CLK_PDMA0>;
-clock-names = "apb_pclk";
-#dma-cells = <1>;
-#dma-channels = <8>;
-#dma-requests = <32>;
-};
+pdma0: dma@e0900000 {
+compatible = "arm,pl330", "arm,primecell";
+reg = <0xe0900000 0x1000>;
+interrupt-parent = <&vic0>;
+interrupts = <19>;
+clocks = <&clocks CLK_PDMA0>;
+clock-names = "apb_pclk";
+#dma-cells = <1>;
+#dma-channels = <8>;
+#dma-requests = <32>;
+};

-pdma1: dma@e0a00000 {
-compatible = "arm,pl330", "arm,primecell";
-reg = <0xe0a00000 0x1000>;
-interrupt-parent = <&vic0>;
-interrupts = <20>;
-clocks = <&clocks CLK_PDMA1>;
-clock-names = "apb_pclk";
-#dma-cells = <1>;
-#dma-channels = <8>;
-#dma-requests = <32>;
-};
+pdma1: dma@e0a00000 {
+compatible = "arm,pl330", "arm,primecell";
+reg = <0xe0a00000 0x1000>;
+interrupt-parent = <&vic0>;
+interrupts = <20>;
+clocks = <&clocks CLK_PDMA1>;


+clock-names = "apb_pclk";
+#dma-cells = <1>;
+#dma-channels = <8>;
+#dma-requests = <32>;
};

spi0: spi@e1300000 {
  @ @ -230,43 +220,36 @@
  status = "disabled";
};

-audio-subsystem {
  -compatible = "samsung,s5pv210-audss", "simple-bus";
  -#address-cells = <1>;
  -#size-cells = <1>;
  -ranges;
  -
  -clk_audss: clock-controller@eee10000 {
    -compatible = "samsung,s5pv210-audss-clock";
    -reg = <0xeee10000 0x1000>;
    -clock-names = "hclk", "xxti",
    -"fout_epll",
    -"sclk_audio0";
    -clocks = <&clocks DOUT_HCLKP>, <&xxti>,
    -<&clocks FOUT_EPLL>,
    -<&clocks SCLK_AUDIO0>;
    -#clock-cells = <1>;
    -};
  +clk_audss: clock-controller@eee10000 {
    +compatible = "samsung,s5pv210-audss-clock";
    +reg = <0xeee10000 0x1000>;
    +clock-names = "hclk", "xxti",
    +  "fout_epll",
    +  "sclk_audio0";
    +clocks = <&clocks DOUT_HCLKP>, <&xxti>,
    + <&clocks FOUT_EPLL>,
    + <&clocks SCLK_AUDIO0>;
    +#clock-cells = <1>;
    +};

-i2s0: i2s@eee30000 {
  -compatible = "samsung,s5pv210-i2s";
  -reg = <0xeee30000 0x1000>;
  -interrupt-parent = <&vic2>;
  -interrupts = <16>;
  -dma-names = "rx", "tx", "tx-sec";
  -dmas = <&pdma1 9>, <&pdma1 10>, <&pdma1 11>;
  -clock-names = "iis",
"i2s_opclk0",
"i2s_opclk1";
-clocks = <&clk_audss CLK_I2S>,
<&clk_audss CLK_I2S>,
<&clk_audss CLK_DOUT_AUD_BUS>;
samsung,idma-addr = <0xc0010000>;
pinctrl-names = "default";
pinctrl-0 = <&i2s0_bus>;
#sound-dai-cells = <0>;
-status = "disabled";
};
+i2s0: i2s@eee30000 {
+compatible = "samsung,s5pv210-i2s";
+reg = <0xee300000 0x1000>;
+interrupt-parent = <&vic2>;
+interrupts = <16>;
+dma-names = "rx", "tx", "tx-sec";
+dmas = <&pdma1 9>, <&pdma1 10>, <&pdma1 11>;
+clock-names = "iis",
+  "i2s_opclk0",
+  "i2s_opclk1";
+clocks = <&clk_audss CLK_I2S>,
+ <&clk_audss CLK_I2S>,
+ <&clk_audss CLK_DOUT_AUD_BUS>;
samsung,idma-addr = <0xc0010000>;
pinctrl-names = "default";
pinctrl-0 = <&i2s0_bus>;
#sound-dai-cells = <0>;
+status = "disabled";
};
i2s1: i2s@e2100000 {
    @ @ -463,6 +446,7 @ @
compatible = "samsung,exynos4210-ohci";
reg = <0xec300000 0x100>;
interrupts = <23>;
+interrupt-parent = <&vic1>;
clocks = <&clocks CLK_USB_HOST>;
clock-names = "usbhost";
#address-cells = <1>;
--- linux-4.15.0.orig/arch/arm/boot/dts/sama5d2-pinfunc.h
+++ linux-4.15.0/arch/arm/boot/dts/sama5d2-pinfunc.h
@ @ -518,7 +518,7 @ @
#define PIN_PC9__GPIOINMUX_PIN(PIN_PC9, 0, 0)
#define PIN_PC9__FIQPINMUX_PIN(PIN_PC9, 1, 3)
#define PIN_PC9__GTSUCOMPINMUX_PIN(PIN_PC9, 2, 1)
+#define PIN_PC9__ISC_D0PINMUX_PIN(PIN_PC9, 2, 1)
+##define PIN_PC9__ISC_D0PINMUX_PIN(PIN_PC9, 3, 1)
#define PIN_PC9_TIOA4 PINMUX_PIN(PIN_PC9, 4, 2)
#define PIN_PC10_GPIOPINMUX_PIN(PIN_PC10, 0, 0)

--- linux-4.15.0.orig/arch/arm/boot/dts/sama5d2.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sama5d2.dtsi
@@ -308,7 +308,7 @@
 0x1 0x0 0x60000000 0x10000000
 0x2 0x0 0x70000000 0x10000000;
-clocks = <&mck>;
+clocks = <&h32ck>;
 status = "disabled";

 nand_controller: nand-controller {
  @@ -1243,6 +1243,7 @@
  clocks = <&securam_clk>;
  #address-cells = <1>;
  #size-cells = <1>;
  +no-memory-wc;
  ranges = <0 0xf8044000 0x1420>;
  };

  @@ -1293,7 +1294,7 @@
 can0: can@f8054000 {
  compatible = "bosch.m_can";
  -reg = <0xf8054000 0x4000>, <0x210000 0x4000>;
+reg = <0xf8054000 0x4000>, <0x210000 0x1c00>;
  reg-names = "m_can", "message_ram";
  interrupts = <56 IRQ_TYPE_LEVEL_HIGH 7>,
                <64 IRQ_TYPE_LEVEL_HIGH 7>;
  @@ -1484,7 +1485,7 @@
 can1: can@fc050000 {
  compatible = "bosch.m_can";
  -reg = <0xfc050000 0x4000>, <0x210000 0x4000>;
+reg = <0xfc050000 0x4000>, <0x210000 0x3800>;
  reg-names = "m_can", "message_ram";
  interrupts = <57 IRQ_TYPE_LEVEL_HIGH 7>,
                <65 IRQ_TYPE_LEVEL_HIGH 7>;
  @@ -1494,7 +1495,7 @@
 assigned-clocks = <&can1_gclk>;
 assigned-clock-parents = <&utmi>;
 assigned-clock-rates = <40000000>;
-bosch,mram-cfg = <0x1100 0 0 64 0 0 32 32>;
+bosch,mram-cfg = <0x1c00 0 0 64 0 0 32 32>;
 status = "disabled";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/sama5d3.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sama5d3.dtsi
@@ -1185,49 +1185,49 @@
    #clock-cells = <0>;
    reg = <12>;
    -atmel,clk-output-range = <0 66000000>;
    +atmel,clk-output-range = <0 83000000>;
    
-usart0_clk: usart0_clk {
    #clock-cells = <0>;
    reg = <12>;
    -atmel,clk-output-range = <0 66000000>;
    +atmel,clk-output-range = <0 83000000>;
    
-usart1_clk: usart1_clk {
    #clock-cells = <0>;
    reg = <13>;
    -atmel,clk-output-range = <0 66000000>;
    +atmel,clk-output-range = <0 83000000>;
    
-usart2_clk: usart2_clk {
    #clock-cells = <0>;
    reg = <14>;
    -atmel,clk-output-range = <0 66000000>;
    +atmel,clk-output-range = <0 83000000>;
    
-usart3_clk: usart3_clk {
    #clock-cells = <0>;
    reg = <15>;
    -atmel,clk-output-range = <0 66000000>;
    +atmel,clk-output-range = <0 83000000>;
    
-uart0_clk: uart0_clk {
    #clock-cells = <0>;
    reg = <16>;
    -atmel,clk-output-range = <0 66000000>;
    +atmel,clk-output-range = <0 83000000>;
    
-twii0_clk: twi0_clk {
    reg = <18>;
    #clock-cells = <0>;
    -atmel,clk-output-range = <0 16625000>;
    +atmel,clk-output-range = <0 41500000>;
    
-twii1_clk: twi1_clk {
    #clock-cells = <0>;
    
-twii1_clk: twi1_clk {
    #clock-cells = <0>;

reg = <19>
-atmel,clk-output-range = <0 16625000>
+atmel,clk-output-range = <0 41500000>
};

twi2_clk: twi2_clk {
    #clock-cells = <0>
    reg = <20>
    -atmel,clk-output-range = <0 16625000>
    +atmel,clk-output-range = <0 41500000>
};

mci0_clk: mci0_clk {
    #clock-cells = <0>
    reg = <20>
    -atmel,clk-output-range = <0 16625000>
    +atmel,clk-output-range = <0 41500000>
};

spi0_clk: spi0_clk {
    #clock-cells = <0>
    reg = <24>
    -atmel,clk-output-range = <0 133000000>
    +atmel,clk-output-range = <0 166000000>
};

spi1_clk: spi1_clk {
    #clock-cells = <0>
    reg = <25>
    -atmel,clk-output-range = <0 133000000>
    +atmel,clk-output-range = <0 166000000>
};

tcb0_clk: tcb0_clk {
    #clock-cells = <0>
    reg = <26>
    -atmel,clk-output-range = <0 133000000>
    +atmel,clk-output-range = <0 166000000>
};

pwm_clk: pwm_clk {
    #clock-cells = <0>
    reg = <29>
    -atmel,clk-output-range = <0 66000000>
    +atmel,clk-output-range = <0 83000000>
};

dma0_clk: dma0_clk {
    #clock-cells = <0>
    reg = <30>
    -atmel,clk-output-range = <0 66000000>
    +atmel,clk-output-range = <0 83000000>
};

ssc0_clk: ssc0_clk {
    #clock-cells = <0>
reg = <38>
-atmel,clk-output-range = <0 66000000>
+atmel,clk-output-range = <0 83000000>
};

ssc1_clk: ssc1_clk {
    #clock-cells = <0>
    reg = <39>
    -atmel,clk-output-range = <0 66000000>
    +atmel,clk-output-range = <0 83000000>
};

sha_clk: sha_clk {
    --- linux-4.15.0.orig/arch/arm/boot/dts/sama5d3_can.dtsi
    +++ linux-4.15.0/arch/arm/boot/dts/sama5d3_can.dtsi
    @@ -37,13 +37,13 @@
    can0_clk: can0_clk {
        #clock-cells = <0>
        reg = <40>
        -atmel,clk-output-range = <0 66000000>
        +atmel,clk-output-range = <0 83000000>
    };

    can1_clk: can1_clk {
        #clock-cells = <0>
        reg = <41>
        -atmel,clk-output-range = <0 66000000>
        +atmel,clk-output-range = <0 83000000>
    };

    --- linux-4.15.0.orig/arch/arm/boot/dts/sama5d3_emac.dtsi
    +++ linux-4.15.0/arch/arm/boot/dts/sama5d3_emac.dtsi
    @@ -41,7 +41,7 @@
}

macb1: ethernet@f802c000 {
    -compatible = "cdns,at91sam9260-macb", "cdns,macb"
    +compatible = "atmel,sama5d3-macb", "cdns,at91sam9260-macb", "cdns,macb"
    reg = <0xf802c000 0x100>
    interrupts = <35 IRQ_TYPE_LEVEL_HIGH 3>
    pinctrl-names = "default"
    --- linux-4.15.0.orig/arch/arm/boot/dts/sama5d3_tcb1.dtsi
    +++ linux-4.15.0/arch/arm/boot/dts/sama5d3_tcb1.dtsi
    @@ -23,6 +23,7 @@
    tcb1_clk: tcb1_clk {
        #clock-cells = <0>
        reg = <27>;
+atmel,clk-output-range = <0 166000000>
};

};

};
--- linux-4.15.0.orig/arch/arm/boot/dts/sama5d3_uart.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sama5d3_uart.dtsi
@@ -42,13 +42,13 @@
uart0_clk: uart0_clk {
    #clock-cells = <0>
    reg = <16>
-    atmel,clk-output-range = <0 66000000>
+    atmel,clk-output-range = <0 83000000>
};

uart1_clk: uart1_clk {
    #clock-cells = <0>
    reg = <17>
-    atmel,clk-output-range = <0 66000000>
+    atmel,clk-output-range = <0 83000000>
};

};
--- linux-4.15.0.orig/arch/arm/boot/dts/sama5d4.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sama5d4.dtsi
@@ -1365,7 +1365,7 @@
pinctrl@fc06a000 {
    #address-cells = <1>
    #size-cells = <1>
-    compatible = "atmel,at91sam9x5-pinctrl", "atmel,at91rm9200-pinctrl", "simple-bus"
+    compatible = "atmel,sama5d3-pinctrl", "atmel,at91sam9x5-pinctrl", "simple-bus"
    ranges = <0xfc068000 0xfc068000 0x100
               0xffffffff 0x3ffcfe7c 0x1c010101 /* pioA */
               0x7fffffff 0xfffccc3a 0x3f00cc3a /* pioB */
-               0xffffffff 0x0003ff00 0x8002a800 0x00000000 /* pioD */
+               0xb003ff00 0x8002a800 0x00000000 /* pioD */
               0xffffffff 0x7ffffffff 0x76fff1bf /* pioE */
        >;

--- linux-4.15.0.orig/arch/arm/boot/dts/sh73a0.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sh73a0.dtsi
@@ -22,7 +22,7 @@
    #address-cells = <1>
    #size-cells = <0>

--- linux-4.15.0.orig/arch/arm/boot/dts/sh73a0.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sh73a0.dtsi
@@ -22,7 +22,7 @@
    #address-cells = <1>
    #size-cells = <0>;
-cpu@0 {
+cpu0: cpu@0 {
   device_type = "cpu";
   compatible = "arm,cortex-a9";
   reg = <0>;
   power-domains = <&pd_a2sl>;
   next-level-cache = <&L2>;
};
-cpu@1 {
+cpu1: cpu@1 {
   device_type = "cpu";
   compatible = "arm,cortex-a9";
   reg = <1>;
   compatible = "arm,cortex-a9-pmu";
   interrupts = <GIC_SPI 55 IRQ_TYPE_LEVEL_HIGH>,
                <GIC_SPI 56 IRQ_TYPE_LEVEL_HIGH>;
   interrupt-affinity = <&cpu0>, <&cpu1>;
};

cmt1: timer@e6138000 {
--- linux-4.15.0.orig/arch/arm/boot/dts/socfpga.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/socfpga.dtsi
@@ -706,7 +706,7 @@
};

-L2: l2-cache@ffef000 {
+L2: cache-controller@ffef000 {
   compatible = "arm,pl310-cache";
   reg = <0xffef000 0x1000>;
   interrupts = <0 38 0x04>;
   @& @.744,13 +744,13 @&
   nand0: nand@ff900000 {
      #address-cells = <0x1>;
      #size-cells = <0x1>;
      -compatible = "denali.denali-nand-dt";
      +compatible = "altr,socfpga-denali-nand";
      reg = <0xff900000 0x100000>,
          <0xffb80000 0x100000>;
      reg-names = "nand_data", "denali_reg";
      interrupts = <0x0 0x90 0x4>;
      dma-mask = <0xffffffff>;
      -clocks = <&nand_clk>;
      +clocks = <&nand_x_clk>;
      status = "disabled";
};
timer@ffiec600 {
    compatible = "arm,cortex-a9-twd-timer";
    reg = <0xffec600 0x1000>;
    -interrupts = <1 13 0xf04>;
    +interrupts = <1 13 0xf01>;
    clocks = <&mpu_periph_clk>;
};

--- linux-4.15.0.orig/arch/arm/boot/dts/socfpga_arria10.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/socfpga_arria10.dtsi
@@ -593,8 +593,7 @@
    #size-cells = <0>;
    reg = <0xffda5000 0x100>;
    interrupts = <0 102 4>;
-   -num-chipselect = <4>;
+   -num-chipselect = <4>;
    -bus-num = <0>;
    +bus-num = <0>;
    /*32bit_access;*/
    tx-dma-channel = <&pdma 16>;
    rx-dma-channel = <&pdma 17>;
@@ -602,12 +601,12 @@
    status = "disabled";
};

-sdr: sdr@ffc25000 {
+L2: cache-controller@fffff000 {
    compatible = "arm,pl310-cache";
    reg = <0xfffff000 0x1000>;
    interrupts = <0 18 IRQ_TYPE_LEVEL_HIGH>;
@@ -633,7 +632,7 @@
    nand: nand@ffb90000 {
        #address-cells = <1>;
        #size-cells = <1>;
-       -compatible = "denali.denali-nand-dt", "altr,sofpapa-denali-nand";
+       -compatible = "altr,sofpapa-denali-nand";
        reg = <0xfffb90000 0x72000>;
          <0xfffb80000 0x10000>;
        reg-names = "nand_data", "denali_reg";
@@ -780,7 +779,7 @@
timer3: timer3@ffd00100 {

---
compatible = "snps,dw-apb-timer";
interrupts = <0 118 IRQ_TYPE_LEVEL_HIGH>;
-reg = <0xffd01000 0x100>;
+reg = <0xffd00100 0x100>;
clocks = <&i4_sys_free_clk>;
clock-names = "timer";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/socfpga_cyclone5_de0_sockit.dts
+++ linux-4.15.0/arch/arm/boot/dts/socfpga_cyclone5_de0_sockit.dts
@@ -88,7 +88,7 @@
status = "okay";
clock-frequency = <100000>;

-adxl345: adxl345@0 {
+adxl345: adxl345@53 {
compatible = "adi,adxl345";
reg = <0x53>;

--- linux-4.15.0.orig/arch/arm/boot/dts/spear1310-evb.dts
+++ linux-4.15.0/arch/arm/boot/dts/spear1310-evb.dts
@@ -349,7 +349,7 @@
status = "okay";
um-cs = <3>;
-cs-gpios = <&gpio1 7 0>, <&spics 0>, <&spics 1>;
+cs-gpios = <&gpio1 7 0>, <&spics 0 0>, <&spics 1 0>;
stmpe610@0 {
compatible = "st,stmpe610";
--- linux-4.15.0.orig/arch/arm/boot/dts/spear1340.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/spear1340.dtsi
@@ -142,8 +142,8 @@
reg = <0xb4100000 0x1000>
interrupts = <0 105 0x4>
status = "disabled";
-dmas = <&dwdma0 0x600 0 0 1>, /* 0xC << 11 */
-<&dwdma0 0x680 0 1 0>; /* 0xD << 7 */
+dmas = <&dwdma0 12 0 1>,
+<&dwdma0 13 1 0>;
dma-names = "tx", "rx";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/spear13xx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/spear13xx.dtsi
@@ -100,7 +100,7 @@
reg = <0xb2800000 0x1000>
interrupts = <0 29 0x4>
status = "disabled";
dma-names = "data";
};

@@ -290,8 +290,8 @@
#size-cells = <0>;
interrupts = <0 31 0x4>;
status = "disabled";
-dmas = <&dwdma0 0x2000 0 0 0>, /* 0x4 << 11 */
-dmas = <&dwdma0 0x0280 0 0 0>;  /* 0x5 << 7 */
+dmas = <&dwdma0 4 0 0>,
+dmas = <&dwdma0 5 0 0>;
dma-names = "tx", "rx";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/spear3xx.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/spear3xx.dtsi
@@ -53,7 +53,7 @@
};
gmac: eth@e0800000 {
-compatible = "st,spear600-gmac";
+compatible = "snps,dwmac-3.40a";
reg = <0xe0800000 0x8000>;
interrupts = <23 22>;
interrupt-names = "macirq", "eth_wake_irq";
--- linux-4.15.0.orig/arch/arm/boot/dts/spear600.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/spear600.dtsi
@@ -194,6 +194,7 @@
};
rtc: rtc@fc900000 {
-compatible = "st,spear600-rtc";
-reg = <0xfc900000 0x1000>;
+interrupt-parent = <&vic0>;
interrupts = <10>;
status = "disabled";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/ste-dbx5x0.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/ste-dbx5x0.dtsi
@@ -197,7 +197,7 @@
}<0xa0410100 0x100>;
};
-scu@a04100000 {
+scu@a0410000 {
-compatible = "arm,cortex-a9-scu";
-reg = <0xa0410000 0x100>;
};
@@ -878,7 +878,7 @@
 power-domains = <&pm_domains DOMAIN_VAPE>;
 }

-ssp@8002000 {
-+spi@8002000 {
 compatible = "arm,pl022", "arm,primecell";
 reg = <0x80002000 0x1000>;
 interrupts = <GIC_SPI 14 IRQ_TYPE_LEVEL_HIGH>;
@@ -892,7 +892,7 @@
 power-domains = <&pm_domains DOMAIN_VAPE>;
 }

-ssp@8003000 {
-+spi@8003000 {
 compatible = "arm,pl022", "arm,primecell";
 reg = <0x80003000 0x1000>;
 interrupts = <GIC_SPI 52 IRQ_TYPE_LEVEL_HIGH>;
--- linux-4.15.0.orig/arch/arm/boot/dts/ste-href-family-pinctrl.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/ste-href-family-pinctrl.dtsi
@@ -607,16 +607,20 @@
 mcde {
 lcd_default_mode: lcd_default {
-+default_mux {
+	+default_mux1 {
 /* Mux in VSI0 and all the data lines */
 function = "lcd";
 groups =
 "lcdvsi0_a_1", /* VSI0 for LCD */
 "lcd_d0_d7_a_1", /* Data lines */
 "lcd_d8_d11_a_1", /* TV-out */
-"lcdaclk_b_1", /* Clock line for TV-out */
-"lcdvsi1_a_1"; /* VS11 for HDMI */
+"lcdaclk_b_1", /* Clock line for TV-out */
+};
+default_mux2 {
+function = "lcda";
+groups =
+"lcdaclk_b_1"; /* Clock line for TV-out */
+};
 default_cfg1 {
 pins =
 "GPIO68_E1", /* VSI0 */
--- linux-4.15.0.orig/arch/arm/boot/dts/ste-hrefprev60.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/ste-hrefprev60.dtsi
@@ -57,7 +57,7 @@
};
};
/* On the first generation boards, this SSP/SPI port was connected
 * to the AB8500.
--- linux-4.15.0.orig/arch/arm/boot/dts/ste-nomadik-stn8815.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/ste-nomadik-stn8815.dtsi
@@ -750,19 +750,20 @@
reg = <0x10120000 0x1000>;       
interrupt-names = "combined";    
interrupts = <14>;               
+interrupt-parent = <&vica>;      
clocks = <&clcdclk>, <&helkeclcd>;  
clock-names = "clcdclk", "apb_pclk";
status = "disabled";              
};

-vica: intc@10140000 {           
+vica: interrupt-controller@10140000 {
compatible = "arm,versatile-vic";
interrupt-controller;
#interrupt-cells = <1>;
reg = <0x10140000 0x20>;       
};

-vicb: intc@10140020 {          
+vicb: interrupt-controller@10140020 {
compatible = "arm,versatile-vic";
interrupt-controller;
#interrupt-cells = <1>;
--- linux-4.15.0.orig/arch/arm/boot/dts/ste-snowball.dts
+++ linux-4.15.0/arch/arm/boot/dts/ste-snowball.dts
@@ -376,7 +376,7 @@
pinctrl-1 = <&i2c3_sleep_mode>;   
};

-ssp@80002000 {              
+spi@80002000 {              
pinctrl-names = "default";
pinctrl-0 = <&ssp0_snowball_mode>;   
};
--- linux-4.15.0.orig/arch/arm/boot/dts/ste-u300.dts
+++ linux-4.15.0/arch/arm/boot/dts/ste-u300.dts
@@ -442,7 +442,7 @@
dma-names = "rx";
};
-spi: ssp@0006000 {
  +spi: spi@0006000 {
    compatible = "arm,pl022", "arm,primecell";
    reg = <0xc0006000 0x1000>;
    interrupt-parent = <&vica>;
--- linux-4.15.0.orig/arch/arm/boot/dts/stih407-pinctrl.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/stih407-pinctrl.dtsi
@@ -52,7 +52,7 @@
    st,syscfg = <&syscfg_sbc>;
    reg = <0x0961f080 0x4>;
    reg-names = "irqmux";
-    interrupts = <GIC_SPI 188 IRQ_TYPE_NONE>;
+    interrupts = <GIC_SPI 188 IRQ_TYPE_LEVEL_HIGH>;
    interrupt-names = "irqmux";
    ranges = <0 0x09610000 0x6000>;

@@ -376,7 +376,7 @@
    st,syscfg = <&syscfg_front>;
    reg = <0x0920f080 0x4>;
    reg-names = "irqmux";
-    interrupts = <GIC_SPI 189 IRQ_TYPE_NONE>;
+    interrupts = <GIC_SPI 189 IRQ_TYPE_LEVEL_HIGH>;
    interrupt-names = "irqmux";
    ranges = <0 0x09200000 0x10000>;

@@ -936,7 +936,7 @@
    st,syscfg = <&syscfg_front>;
    reg = <0x0921f080 0x4>;
    reg-names = "irqmux";
-    interrupts = <GIC_SPI 190 IRQ_TYPE_NONE>;
+    interrupts = <GIC_SPI 190 IRQ_TYPE_LEVEL_HIGH>;
    interrupt-names = "irqmux";
    ranges = <0 0x09210000 0x10000>;

@@ -969,7 +969,7 @@
    st,syscfg = <&syscfg_rear>;
    reg = <0x0922f080 0x4>;
    reg-names = "irqmux";
-    interrupts = <GIC_SPI 191 IRQ_TYPE_NONE>;
+    interrupts = <GIC_SPI 191 IRQ_TYPE_LEVEL_HIGH>;
    interrupt-names = "irqmux";
    ranges = <0 0x09220000 0x6000>;

@@ -1164,7 +1164,7 @@
    st,syscfg = <&syscfg_flash>;
    reg = <0x0923f080 0x4>;
    reg-names = "irqmux";
-    interrupts = <GIC_SPI 192 IRQ_TYPE_NONE>;
interrupts = <GIC_SPI 192 IRQ_TYPE_LEVEL_HIGH>
interrupt-names = "irqmux"
ranges = <0x09230000 0x3000>

--- linux-4.15.0.orig/arch/arm/boot/dts/stih407.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/stih407.dtsi
@@ -8,6 +8,7 @@
*/
#include "stih407-clock.dtsi"
#include "stih407-family.dtsi"
+#include <dt-bindings/gpio/gpio.h>
/
{
  soc {
    sti-display-subsystem {
      @@ -122.7 +123.7 @@
      <&clk_s_d2_quadfs 0>,
      <&clk_s_d2_quadfs 1>;
      hdmi,hpd-gpio = <&pio5 3>;
      +hdmi,hpd-gpio = <&pio5 3 GPIO_ACTIVE_LOW>
      reset-names = "hdmi"
      resets = <&softreset STIH407_HDMI_TX_PHY_SOFTRESET>
      ddc = <&hdmiddc>;
      --- linux-4.15.0.orig/arch/arm/boot/dts/stih410.dtsi
      +++ linux-4.15.0/arch/arm/boot/dts/stih410.dtsi
      @ @ -9.6 +9.7 @@
      #include "stih410-clock.dtsi"
      #include "stih407-family.dtsi"
      #include "stih410-pinctrl.dtsi"
      +#include <dt-bindings/gpio/gpio.h>
      /
      aliases {
        bdisp0 = &bdisp0;
        @ @ -40.7 +41.7 @@
        ohci0: usb@9a03c00 {
        compatible = "st,ohci-300x"
        reg = <0x9a03c00 0x100>
        -interrupts = <GIC_SPI 180 IRQ_TYPE_NONE>
        +interrupts = <GIC_SPI 180 IRQ_TYPE_LEVEL_HIGH>
        clocks = <&clk_s_c0_flexgen CLK_TX_ICN_DISP_0>,
        <&clk_s_c0_flexgen CLK_RX_ICN_DISP_0>
        resets = <&powerdown STIH407_USB2_PORT0_POWERDOWN>,
        @ @ -55.7 +56.7 @@
        ehci0: usb@9a03e00 {
        compatible = "st,ehci-300x"
        reg = <0x9a03e00 0x100>
        -interrupts = <GIC_SPI 151 IRQ_TYPE_NONE>
        +interrupts = <GIC_SPI 151 IRQ_TYPE_LEVEL_HIGH>;
pinctrl-names = "default";
pinctrl-0 = <&pinctrl_usb0>;
clocks = <&clk_s_c0_flexgen CLK_TX_ICN_DISP_0>,
@@ -72,7 +73,7 @@
ohci1: usb@9a83c00 {
 compatible = "st,st-ohci-300x";
 reg = <0x9a83c00 0x100>;
-interrupts = <GIC_SPI 181 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 181 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&clk_s_c0_flexgen CLK_TX_ICN_DISP_0>,
 <&clk_s_c0_flexgen CLK_RX_ICN_DISP_0>;
 resets = <&powerdown STIH407_USB2_PORT1_POWERDOWN>,
 @@ -87,7 +88,7 @@
ehci1: usb@9a83e00 {
 compatible = "st,st-ehci-300x";
 reg = <0x9a83e00 0x100>;
-interrupts = <GIC_SPI 153 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 153 IRQ_TYPE_LEVEL_HIGH>;
pinctrl-names = "default";
pinctrl-0 = <&pinctrl_usb1>;
clocks = <&clk_s_c0_flexgen CLK_TX_ICN_DISP_0>,
@@ -197,7 +198,7 @@
compatible = "st,stih407-hdmi";
 reg = <0x8d04000 0x1000>;
 reg-names = "hdmi-reg";
-interrupts = <GIC_SPI 106 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 106 IRQ_TYPE_LEVEL_HIGH>;
interrupt-names = "irq";
clock-names = "pix",
 "tmds",
 @@ -213,7 +214,7 @@
 <&clk_s_d2_quadfs 0>,
 <&clk_s_d2_quadfs 1>;

-hdmi,hpd-gpio = <&pio5 3>;
+hdmi,hpd-gpio = <&pio5 3 GPIO_ACTIVE_LOW>;
reset-names = "hdmi";
resets = <&softreset STIH407_HDMI_TX_PHY_SOFTRESET>;
ddc = <&hdmiddc>;
@@ -249,7 +250,7 @@
bbdisp0:bdisp@9f10000 {
 compatible = "st,stih407-bdisp";
 reg = <0x9f10000 0x1000>;
-interrupts = <GIC_SPI 38 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 38 IRQ_TYPE_LEVEL_HIGH>;
clock-names = "bdisp";
clocks = <&clk_s_c0_flexgen CLK_IC_BDISP_0>;
};
compatible = "st,st-hva";
reg = <0x8c85000 0x400>, <0x6000000 0x40000>;
reg-names = "hva_registers", "hva_esram";
-interrupts = <GIC_SPI 58 IRQ_TYPE_NONE>,
  <GIC_SPI 59 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 58 IRQ_TYPE_LEVEL_HIGH>,
  <GIC_SPI 59 IRQ_TYPE_LEVEL_HIGH>;
clock-names = "clk_hva";
clocks = &clk_s_c0_flexgen CLK_HVA;
};

reg = <0x94a087c 0x64>;
clocks = &clk_sysin;
clock-names = "cec-clk";
-interrupts = <GIC_SPI 140 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 140 IRQ_TYPE_LEVEL_HIGH>;
interrupt-names = "cec-irq";
pinctrl-names = "default";
pinctrl-0 = &pinctrl_cec0_default;
+vdda-supply = <&vdda>;
vref-supply = <&vdda>;
status = "okay";
adcl: adc@0 {
    --- linux-4.15.0.orig/arch/arm/boot/dts/sun4i-a10-inet9f-rev03.dts
    +++ linux-4.15.0/arch/arm/boot/dts/sun4i-a10-inet9f-rev03.dts
    @@ -63,8 +63,6 @@
        compatible = "gpio-keys-polled";
pinctrl-names = "default";
pinctrl-0 = <&key_pins_inet9f>;
-        #address-cells = <1>;
-        #size-cells = <0>;
poll-interval = <20>;
}

left-joystick-left {
    --- linux-4.15.0.orig/arch/arm/boot/dts/sun4i-a10-pcduino.dts
    +++ linux-4.15.0/arch/arm/boot/dts/sun4i-a10-pcduino.dts
    @@ -76,8 +76,6 @@
        gpio-keys {
            compatible = "gpio-keys";
            -#address-cells = <1>;
            -#size-cells = <0>;
        }
        back {
            label = "Key Back";
            --- linux-4.15.0.orig/arch/arm/boot/dts/sun4i-a10.dtsi
            +++ linux-4.15.0/arch/arm/boot/dts/sun4i-a10.dtsi
            @@ -76,7 +76,7 @@
                allwinner,pipeline = "de_fe0-de_be0-lcd0-hdmi";
                clocks = <&ccu CLK_AHB_LCD0>, <&ccu CLK_AHB_HDMIO>,
                    <&ccu CLK_AHB_DEBE0>, <&ccu CLK_AHB_DEFE0>,
                    <&ccu CLK_DEBE0>, <&ccu CLK_DEFE0>,
                    <&ccu CLK_TCONO_CH1>, <&ccu CLK_HDMI>,
                    <&ccu CLK_DRAM_DEFE0>, <&ccu CLK_DRAM_DEBE0>;
                status = "disabled";
            @@ -88,7 +88,7 @@
                allwinner,pipeline = "de_fe0-de_be0-lcd0";
                clocks = <&ccu CLK_AHB_LCD0>, <&ccu CLK_AHB_HDMIO>,
                    <&ccu CLK_AHB_DEBE0>, <&ccu CLK_AHB_DEFE0>,
                    <&ccu CLK_DEBE0>, <&ccu CLK_DEFE0>,
                    <&ccu CLK_TCON0_CH0>, <&ccu CLK_DRAM_DEFE0>, <&ccu CLK_DRAM_DEBE0>;
                status = "disabled";
            ];
            @@ -99,7 +99,7 @@
            allwinner,pipeline = "de_fe0-de_be0-lcd0-tve0";
clocks = <&ccu CLK_AHB_TVE0>, <&ccu CLK_AHB_LCD0>,
<&ccu CLK_AHB_DE_BE0>, <&ccu CLK_AHB_DE_FE0>,
- <&ccu CLK_DE_BE0>, <&ccu CLK_AHB_DE_FE0>,
+ <&ccu CLK_DE_BE0>, <&ccu CLK/thumb/FE0>,
<&ccu CLK_TCON0_CH1>, <&ccu CLK_DRAM_TVE0>,
<&ccu CLK_DRAM_DE_FE0>, <&ccu CLK_DRAM_DE_BE0>;  
status = "disabled";
@@ -145,7 +145,7 @@
trips {
   cpu_alert0: cpu-alert0 {  
      /* milliCelsius */  
         -temperature = <850000>;  
         +temperature = <85000>;  
         hysteresis = <2000>;  
         type = "passive";  
@@ -532,8 +532,6 @@
 hdmi_out: port@1 {  
      #address-cells = <1>;  
      #size-cells = <0>;  
      reg = <1>;  
      };  
      };  
--- linux-4.15.0.orig/arch/arm/boot/dts/sun5i-a10s.dtsi
+++
+++ linux-4.15.0/arch/arm/boot/dts/sun5i-a10s.dtsi
@ @ -104,8 +104,6 @@
};

 hdmi_out: port@1 {  
      #address-cells = <1>;  
      #size-cells = <0>;  
      reg = <1>;  
      };  
      };  
--- linux-4.15.0.orig/arch/arm/boot/dts/sun5i-reference-design-tablet.dtsi
+++
+++ linux-4.15.0/arch/arm/boot/dts/sun5i-reference-design-tablet.dtsi
@ @ -92,7 +92,8 @@
* /
 clock-frequency = <400000>;  

-touchscreen: touchscreen {
+touchscreen: touchscreen@40 {
 +reg = <0x40>;  
 interrupt-parent = <&pio>;  
 interrupts = <6 11 IRQ_TYPE_EDGE_FALLING>; /* EINT11 (PG11) */
 pinctrl-names = "default";
reg = <0x68>
interrupt-parent = <&nmi_intc>
interrupts = <0 IRQ_TYPE_LEVEL_LOW>
+eldoin-supply = <&reg_dcdc1>
+x-powers,drive-vbus-en
);
);

@@ -193,7 +195,28 @@
#include "axp22x.dtsi"

+&reg_aldo1 {
+regulator-min-microvolt = <3300000>
+regulator-max-microvolt = <3300000>
+regulator-name = "vcc-wifi"
+}:
+
+&reg_aldo2 {
+regulator-always-on;
+regulator-min-microvolt = <2500000>
+regulator-max-microvolt = <2500000>
+regulator-name = "vcc-gmac"
+}:
+
+&reg_aldo3 {
+regulator-always-on;
+regulator-min-microvolt = <3000000>
+regulator-max-microvolt = <3000000>
+regulator-name = "avcc"
+}:
+
-&reg_dc5ldo {
+regulator-always-on;
regulator-min-microvolt = <700000>
regulator-max-microvolt = <1320000>
regulator-name = "vdd-cpus"
@@ -233,6 +256,40 @@
regulator-name = "vcc-dram"
);

+&reg_dldo1 {
+regulator-min-microvolt = <3000000>
+regulator-max-microvolt = <3000000>
+regulator-name = "vcc-mac"
+}:
+
+&reg_dldo2 {


+regulator-min-microvolt = <2800000>;
+regulator-max-microvolt = <2800000>;
+regulator-name = "avdd-csi";
+};
+
+&reg_dldo3 {
+regulator-always-on;
+regulator-min-microvolt = <3300000>;
+regulator-max-microvolt = <3300000>;
+regulator-name = "vcc-pb";
+};
+
+&reg_eldo1 {
+regulator-min-microvolt = <1800000>;
+regulator-max-microvolt = <1800000>;
+regulator-name = "vdd-csi";
+status = "okay";
+};
+
+&reg_ldo_io1 {
+regulator-always-on;
+regulator-min-microvolt = <1800000>;
+regulator-max-microvolt = <1800000>;
+regulator-name = "vcc-pm-cpus";
+status = "okay";
+};
+
&uart0 {
 pinctrl-names = "default";
 pinctrl-0 = <&uart0_pins_a>;
 --- linux-4.15.0.orig/arch/arm/boot/dts/sun7i-a20.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sun7i-a20.dtsi
@@ -172,7 +172,7 @@
pmu {
 -compatible = "arm,cortex-a7-pmu", "arm,cortex-a15-pmu";
 +compatible = "arm,cortex-a7-pmu";
 interrupts = <GIC_SPI 120 IRQ_TYPE_LEVEL_HIGH>,
 <GIC_SPI 121 IRQ_TYPE_LEVEL_HIGH>;
 };}
@@ -611,8 +611,6 @@

hdmi_out: port@1 {
 #address-cells = <1>;
-#size-cells = <0>;
-reg = <1>;

--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-a23-a33.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-a23-a33.dts
@@ -133,6 +133,21 @
#dma-cells = <1>;
]
+			compatible = "allwinner,sun4i-a10-nand";
+			reg = <0x01c03000 0x1000>;
+			interrupts = <GIC_SPI 70 IRQ_TYPE_LEVEL_HIGH>;
+		
clocks = <&ccu CLK_BUS_NAND>, <&ccu CLK_NAND>;
+		
clock-names = "ahb", "mod";
+			resets = <&ccu RST_BUS_NAND>;
+		
timeout-names = "default";
+			pinctrl-names = "default";
+			pinctrl-0 = <&nand_pins &nand_pins_cs0 &nand_pins_rb0>;
+			status = "disabled";
+			#address-cells = <1>;
+			#size-cells = <0>;
+		};
+	}
+
-#address-cells = <1>;
-#size-cells = <0>;
-
-mmc0: mmc@1c0f000 {
-compatible = "allwinner,sun7i-a20-mmc";
-reg = <0x01c0f000 0x1000>;
-@@ -188,19 +203,6 @@
-status = "disabled";
+#address-cells = <1>;
+#size-cells = <0>;
-}
-
-nfc: nand@1c03000 {
-compatible = "allwinner,sun4i-a10-nand";
-reg = <0x01c03000 0x1000>;
-interrupts = <GIC_SPI 70 IRQ_TYPE_LEVEL_HIGH>;
-clocks = <&ccu CLK_BUS_NAND>, <&ccu CLK_NAND>;
-clock-names = "ahb", "mod";
-resets = <&ccu RST_BUS_NAND>;
-reset-names = "ahb";
-status = "disabled";
-#address-cells = <1>;
-#size-cells = <0>;
-};
-
usb_otg: usb@1c19000 {
--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-a83t-bananapi-m3.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-a83t-bananapi-m3.dts
-
&reg_dldo3 {
  regulator-always-on;
  -regulator-min-microvolt = <2500000>;
  -regulator-max-microvolt = <2500000>;
  +regulator-min-microvolt = <3300000>;
  +regulator-max-microvolt = <3300000>;
  regulator-name = "vcc-pd";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-a83t-cubietruck-plus.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-a83t-cubietruck-plus.dts
@@ -89,7 +89,7 @@
    initial-mode = <1>; /* initialize in HUB mode */
    disabled-ports = <1>;
    intn-gpios = <&pio 7 5 GPIO_ACTIVE_HIGH>; /* PH5 */
-    reset-gpios = <&pio 4 16 GPIO_ACTIVE_HIGH>; /* PE16 */
+    reset-gpios = <&pio 4 16 GPIO_ACTIVE_LOW>; /* PE16 */
    connect-gpios = <&pio 4 17 GPIO_ACTIVE_HIGH>; /* PE17 */
    refclk-frequency = <19200000>;
};

--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-a83t-tbs-a711.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-a83t-tbs-a711.dts
@@ -120,6 +120,7 @@
    vqmmc-supply = <&reg_dldo1>;
    non-removable;
    wakeup-source;
+    keep-power-in-suspend;
    status = "okay";

  brcmf: wifi@1 {
    @@ -256,8 +257,8 @@
  }

  &reg_dldo3 {
-    regulator-min-microvolt = <2800000>;
-    regulator-max-microvolt = <2800000>;
+    regulator-min-microvolt = <1800000>;
+    regulator-max-microvolt = <1800000>;
    regulator-name = "vdd-csi";
  };

--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-h3-bananapi-m2-plus.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-h3-bananapi-m2-plus.dts
@@ -126,7 +126,7 @@
  external_mdio {
    ext_rgmii_phy: ethernet-phy@1 {
      @@ -126,7 +126,7 @@
    }

    &reg_dldo3 {
-      regulator-min-microvolt = <2800000>;
-      regulator-max-microvolt = <2800000>;
+      regulator-min-microvolt = <1800000>;
+      regulator-max-microvolt = <1800000>;
      regulator-name = "vdd-csi";
    };

    --- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-h3-bananapi-m2-plus.dts
    +++ linux-4.15.0/arch/arm/boot/dts/sun8i-h3-bananapi-m2-plus.dts
    @@ -126,7 +126,7 @@
    }
    external_mdio {
      ext_rgmii_phy: ethernet-phy@1 {
compatible = "ethernet-phy-ieee802.3-c22";
-reg = <0>;
+reg = <1>;
};
};

--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-h3-beelink-x2.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-h3-beelink-x2.dts
@@ -53,7 +53,7 @@
 aliases {
 serial0 = &uart0;
-/* ethernet0 is the H3 emac, defined in sun8i-h3.dts */
+ethernet0 = &emac;
 ethernet1 = &sdiowifi;
 };

 @ @ -79.6 +79.8 @@
 wifi_pwrseq: wifi_pwrseq {
 compatible = "mmc-pwrseq-simple";
 reset-gpios = <&r_pio 0 7 GPIO_ACTIVE_LOW>; /* PL7 */
+clocks = <&rtc 1>;
+clock-names = "ext_clock";
};

 sound_spdif {
 @ @ -128.6 +130.8 @@
 pinctrl-names = "default";
 pinctrl-0 = <&mmc1_pins_a>;
 vmmc-supply = <&reg_vcc3v3>;
+vmqmmc-supply = <&reg_vcc3v3>;
+mmc-pwrseq = <&wifi_pwrseq>;
 bus-width = <4>;
 non-removable;
 status = "okay";
 --- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-h3-orangepi-pc-plus.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-h3-orangepi-pc-plus.dts
@@ -53,11 +53,6 @@
 };}

-&emac {
-/* LEDs changed to active high on the plus */
-/delete-property/ allwinner,leds-active-low;
-};
-
- &mmc1 {
 pinctrl-names = "default";

pinctrl-0 = <&mmc1_pins_a>;
--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-h3-orangepi-plus2e.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-h3-orangepi-plus2e.dts
@@ -67,7 +67,7 @@
pinctrl-0 = <&emac_rgmii_pins>;
 phy-supply = <&reg_gmac_3v3>;
 phy-handle = <&ext_rgmii_phy>;
-phy-mode = "rgmii";
+phy-mode = "rgmii-id";
 status = "okay";
};

--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-h3.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-h3.dtsi
@@ -53,25 +53,34 @@
reg = <0>;
};

-cpu@1 {
+cpu1: cpu@1 {
  compatible = "arm,cortex-a7";
  device_type = "cpu";
  reg = <1>;
};

-cpu@2 {
+cpu2: cpu@2 {
  compatible = "arm,cortex-a7";
  device_type = "cpu";
  reg = <2>;
};

-cpu@3 {
+cpu3: cpu@3 {
  compatible = "arm,cortex-a7";
  device_type = "cpu";
  reg = <3>;
};

+pmu {
+compatible = "arm,cortex-a7-pmu";
+interrupts = <GIC_SPI 120 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 121 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 122 IRQ_TYPE_LEVEL_HIGH>,
+ <GIC_SPI 123 IRQ_TYPE_LEVEL_HIGH>;
+interrupt-affinity = <&cpu0>, <&cpu1>, <&cpu2>, <&cpu3>;
+};

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timer {
    compatible = "arm,armv7-timer";
    interrupts = <GIC_PPI 13 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_LEVEL_LOW)>,
    --- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-r16-bananapi-m2m.dts
    +++ linux-4.15.0/arch/arm/boot/dts/sun8i-r16-bananapi-m2m.dts
	@@ -103,13 +103,13 @@
        
        &cpu0_opp_table {
            -opp@1104000000 {
                +opp@1104000000 {
                    opp-hz = /bits/ 64 <1104000000>;
                    opp-microvolt = <1320000>;
                    clock-latency-ns = <244144>; /* 8 32k periods */
                }
            }
            -opp@1200000000 {
                +opp@1200000000 {
                    opp-hz = /bits/ 64 <1200000000>;
                    opp-microvolt = <1320000>;
                    clock-latency-ns = <244144>; /* 8 32k periods */
                }
            }
            --- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-r40-bananapi-m2-ultra.dts
            +++ linux-4.15.0/arch/arm/boot/dts/sun8i-r40-bananapi-m2-ultra.dts
            @@ -123,9 +123,9 @@
        }
        &reg_dcdc1 {
            regulator-always-on;
            -regulator-min-microvolt = <3000000>;
            -regulator-max-microvolt = <3000000>;
            -regulator-name = "vcc-3v0";
            +regulator-min-microvolt = <3300000>;
            +regulator-max-microvolt = <3300000>;
            +regulator-name = "vcc-3v3";
        }
        &reg_dcdc2 {
            --- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-reference-design-tablet.dtsi
            +++ linux-4.15.0/arch/arm/boot/dts/sun8i-reference-design-tablet.dtsi
            @@ -69,7 +69,8 @@
        */
        clock-frequency = <400000>;
        -touchscreen: touchscreen@0 {
            +touchscreen: touchscreen@40 {
                +reg = <0x40>;
                interrupt-parent = <&pio>;
                interrupts = <1 5 IRQ_TYPE_EDGE_FALLING>; /* PB5 */
pinctrl-names = "default";
--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-v3s-licheepi-zero.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-v3s-licheepi-zero.dts
@@ -78,7 +78,7 @@
};

&mmc0 {
-  pinctrl-0 = <&mmc0_pins_a>;
+  pinctrl-0 = <&mmc0_pins>;
  pinctrl-names = "default";
  broken-cd;
  bus-width = <4>;
@@ -87,7 +87,7 @@
};

&uart0 {
-  pinctrl-0 = <&uart0_pins_a>;
+  pinctrl-0 = <&uart0_pb_pins>;
  pinctrl-names = "default";
  status = "okay";
};
--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-v3s.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-v3s.dtsi
@@ -292,17 +292,17 @@
interrupt-controller;
#interrupt-cells = <3>;

-i2c0_pins: i2c0 {
+i2c0_pins: i2c0-pins {
pins = "PB6", "PB7";
  function = "i2c0";
};

-uart0_pins_a: uart0@0 {
+uart0_pb_pins: uart0-pb-pins {
pins = "PB8", "PB9";
  function = "uart0";
};

-mmcm0_pins_a: mmcm0@0 {
+mmcm0_pins: mmcm0-pins {
pins = "PF0", "PF1", "PF2", "PF3",
  "PF4", "PF5";
  function = "mmcm0";
@@ -310,7 +310,7 @@
bias-pull-up;
};
-mmc1_pins: mmc1 {
+mmc1_pins: mmc1-pins {
pins = "PG0", "PG1", "PG2", "PG3",
    "PG4", "PG5";
function = "mmc1";
@@ -318,7 +318,7 @@
bias-pull-up;
};

-spi0_pins: spi0 {
+spi0_pins: spi0-pins {
pins = "PC0", "PC1", "PC2", "PC3";
function = "spi0";
};
@@ -419,7 +419,7 @@
gic: interrupt-controller@1c81000 {
compatible = "arm,cortex-a7-gic", "arm,cortex-a15-gic";
reg = <0x01c81000 0x1000>,
    <0x01c82000 0x1000>,
    <0x01c84000 0x2000>,
    <0x01c86000 0x2000>;
interrupt-controller;
--- linux-4.15.0.orig/arch/arm/boot/dts/sun8i-v40-bananapi-m2-berry.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun8i-v40-bananapi-m2-berry.dts
@@ -90,7 +90,7 @@
&i2c0 {
    status = "okay";

-axp22x: pmic@68 {
+axp22x: pmic@34 {
compatible = "x-powers,axp221";
reg = <0x34>;
interrupt-parent = <&nmi_intc>;
--- linux-4.15.0.orig/arch/arm/boot/dts/sun9i-a80-optimus.dts
+++ linux-4.15.0/arch/arm/boot/dts/sun9i-a80-optimus.dts
@@ -82,7 +82,7 @@
reg_usb1_vbus: usb1-vbus {
-compatible = "regulator-fixed";
-pinctrl-names = "default";
+regulator-name = "usb1-vbus";
regulator-min-microvolt = <5000000>;
regulator-max-microvolt = <5000000>;
enable-active-high;
@@ -91,7 +91,7 @@
reg_usb3_vbus: usb3-vbus {
compatible = "regulator-fixed";
-pinctrl-names = "default";
+regulator-name = "usb3-vbus";
regulator-min-microvolt = <5000000>
regulator-max-microvolt = <5000000>
enable-active-high;
--- linux-4.15.0.orig/arch/arm/boot/dts/sun9i-a80.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sun9i-a80.dtsi
@@ -721,7 +721,7 @@

--- linux-4.15.0.orig/arch/arm/boot/dts/sunxi-h3-h5.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/sunxi-h3-h5.dtsi
@@ -674,7 +674,7 @@

--- linux-4.15.0.orig/arch/arm/boot/dts/tegra20-paz00.dts
+++ linux-4.15.0/arch/arm/boot/dts/tegra20-paz00.dts
@@ -524,10 +524,10 @@

--- linux-4.15.0.orig/arch/arm/boot/dts/tegra20-tamonten.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/tegra20-tamonten.dtsi
@@ -185,8 +185,9 @@

gpio-keys {
  compatible = "gpio-keys";

  -power {
    -label = "Power";
    +wakeup {
      +label = "Wakeup";
      gpios = <&gpio TEGRA_GPIO(J, 7) GPIO_ACTIVE_LOW>;
      -linux,code = <KEY_POWER>;
      +linux,code = <KEY_WAKEUP>;
      wakeup-source;
    }
  }

  --- linux-4.15.0.orig/arch/arm/boot/dts/tegra20-tamonten.dtsi
  +++ linux-4.15.0/arch/arm/boot/dts/tegra20-tamonten.dtsi
  @@ -185,8 +185,9 @@
  nvidia,pins = "ata", "atb", "ate", "atd", "ate",

"cdev1", "cdev2", "dap1", "dtb", "gma",
"gmb", "gmc", "gmd", "gme", "gpu7",
-"gpv", "i2cp", "pta", "rm", "slxa",
-"slxk", "spia", "spib", "uac";
+"gpv", "i2cp", "irrx", "irtx", "pta",
+"rm", "slxa", "slxk", "spia", "spib",
+"uac";
nvidia,pull = <TEGRA_PIN_PULL_NONE>;
nvidia,tristate = <TEGRA_PIN_DISABLE>;
};
@@ -211,7 +212,7 @@
conf_ddc {
  nvidia,pins = "ddc", "dta", "dtd", "kbca",
  "kbcb", "kbcc", "kbcd", "kbce", "kbcf",
-  "sdc";
+  "sdc", "uad", "uca";
  nvidia,pull = <TEGRA_PIN_PULL_UP>;
  nvidia,tristate = <TEGRA_PIN_DISABLE>;
};
@@ -221,10 +222,9 @@
  "lvp0", "owe", "sdb";
  nvidia,tristate = <TEGRA_PIN_ENABLE>;
};
-conf_irrx {
  -nvidia,pins = "irrx", "irtx", "sdd", "spic",
  -"spie", "spih", "uaa", "uab", "uad",
  -"uca", "uch";
+conf_sdd {
+  +nvidia,pins = "sdd", "spic", "spie", "spih",
+  +"uua", "uab", "uch";
+  nvidia,pull = <TEGRA_PIN_PULL_UP>;
+  nvidia,tristate = <TEGRA_PIN_ENABLE>;
};
--- linux-4.15.0.orig/arch/arm/boot/dts/tegra30-apalis.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/tegra30-apalis.dtsi
@@ -166,14 +166,14 @@
  /* Apalis MMC1 */
  sdmmc3_clk_pa6 {
-    nvidia,pins = "sdmmc3_clk_pa6",
-      "sdmmc3_cmd_pa7";
+    nvidia,pins = "sdmmc3_clk_pa6";
+      "sdmmc3_cmd_pa7";
  nvidia,function = "sdmmc3";
  nvidia,pull = <TEGRA_PIN_PULL_NONE>;
  nvidia,tristate = <TEGRA_PIN_DISABLE>;
};
  sdmmc3_dat0_pb7 {
-    nvidia,pins = "sdmmc3_dat0_pb7",

nvidia.pins = "sdmmc3_cmd_pa7",
+    "sdmmc3_dat0_pb7",
    "sdmmc3_dat1_pb6",
    "sdmmc3_dat2_pb5",
    "sdmmc3_dat3_pb4",

--- linux-4.15.0.orig/arch/arm/boot/dts/tegra30-cardhu.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/tegra30-cardhu.dtsi
@@ -206,6 +206,7 @@
  #address-cells = <1>;
  #size-cells = <0>;
  reg = <0x70>;
+    reset-gpio = <&gpio TEGRA_GPIO(BB, 0) GPIO_ACTIVE_LOW>;
};
);

--- linux-4.15.0.orig/arch/arm/boot/dts/tegra30.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/tegra30.dtsi
@@ -840,7 +840,7 @@
  nvidia,xcvr-setup = <51>;
-    nvidia.xcvr-setup-use-fuses;
+    nvidia,xcvr-setup-use-fuses;
  nvidia,xcvr-lsfslew = <1>;
  nvidia,xcvr-lsrslew = <1>;
  nvidia,xcvr-hsslew = <32>;
@@ -877,7 +877,7 @@
  nvidia,elastic-limit = <16>;
  nvidia,term-range-adj = <6>;
  nvidia,xcvr-setup = <51>;
-    nvidia.xcvr-setup-use-fuses;
+    nvidia,xcvr-setup-use-fuses;
  nvidia,xcvr-lsfslew = <2>;
  nvidia,xcvr-lsrslew = <2>;
  nvidia,xcvr-hsslew = <32>;
@@ -913,7 +913,7 @@
  nvidia,elastic-limit = <16>;
  nvidia,term-range-adj = <6>;
  nvidia,xcvr-setup = <51>;
-    nvidia.xcvr-setup-use-fuses;
+    nvidia,xcvr-setup-use-fuses;
  nvidia,xcvr-lsfslew = <2>;
  nvidia,xcvr-lsrslew = <2>;
  nvidia,xcvr-hsslew = <32>;
--- linux-4.15.0.orig/arch/arm/boot/dts/versatile-ab.dts
+++ linux-4.15.0/arch/arm/boot/dts/versatile-ab.dts
@@ -155,16 +155,15 @@
  #size-cells = <1>;

--- linux-4.15.0.orig/arch/arm/boot/dts/tegra30.dtsi
+++ linux-4.15.0/arch/arm/boot/dts/tegra30.dtsi
@@ -840,7 +840,7 @@
  nvidia,elastic-limit = <16>;
  nvidia,term-range-adj = <6>;
  nvidia,xcvr-setup = <51>;
-    nvidia.xcvr-setup-use-fuses;
+    nvidia,xcvr-setup-use-fuses;
  nvidia,xcvr-lsfslew = <2>;
  nvidia,xcvr-lsrslew = <2>;
  nvidia,xcvr-hsslew = <32>;
@@ -913,7 +913,7 @@
  nvidia,elastic-limit = <16>;
  nvidia,term-range-adj = <6>;
  nvidia,xcvr-setup = <51>;
-    nvidia.xcvr-setup-use-fuses;
+    nvidia,xcvr-setup-use-fuses;
  nvidia,xcvr-lsfslew = <2>;
  nvidia,xcvr-lsrslew = <2>;
  nvidia,xcvr-hsslew = <32>;
--- linux-4.15.0.orig/arch/arm/boot/dts/versatile-ab.dts
+++ linux-4.15.0/arch/arm/boot/dts/versatile-ab.dts
@@ -155,16 +155,15 @@
  #size-cells = <1>;


ranges;

-vic: intc@10140000 {
+vic: interrupt-controller@10140000 {
  compatible = "arm,versatile-vic";
  interrupt-controller;
  #interrupt-cells = <1>;
  reg = <0x10140000 0x1000>;
  -clear-mask = <0xffffffff>;
  valid-mask = <0xffffffff>;
};

-sic: intc@10003000 {
+sic: interrupt-controller@10003000 {
  compatible = "arm,versatile-sic";
  interrupt-controller;
  #interrupt-cells = <1>;
  @ @ -304,7 +303,7 @ @
  clock-names = "apb_pclk";
};

-ssp@101f4000 {
+spi@101f4000 {
  compatible = "arm,pl022", "arm,primecell";
  reg = <0x101f4000 0x1000>;
  interrupts = <11>;
  --- linux-4.15.0.orig/arch/arm/boot/dts/versatile-pb.dts
  +++ linux-4.15.0/arch/arm/boot/dts/versatile-pb.dts
  @@ -7,7 +7,7 @@
  amba {
 /* The Versatile PB is using more SIC IRQ lines than the AB */
-sic: intc@10003000 {
+sic: interrupt-controller@10003000 {
  clear-mask = <0xffffffff>;
/*
 * Valid interrupt lines mask according to
 --- linux-4.15.0.orig/arch/arm/boot/dts/vfxxx.dtsi
 +++ linux-4.15.0/arch/arm/boot/dts/vfxxx.dtsi
 @@ -527,7 +527,7 @@
 };

 ocotp: ocotp@400a5000 {
-compatible = "fsl,vf610-ocotp";
+compatible = "fsl,vf610-ocotp", "syscon";
  reg = <0x400a5000 0x1000>;
  clocks = <&clks VF610_CLK_OCOTP>;
};
--- linux-4.15.0.orig/arch/arm/boot/dts/zynq-zc702.dts
+++ linux-4.15.0/arch/arm/boot/dts/zynq-zc702.dts
@@ -183,17 +183,17 @@
  #address-cells = <1>;
  #size-cells = <0>;
  reg = <7>;
- hwmon@52 {
-   hwmon@34 {
-      compatible = "ti,ucd9248";
-      -reg = <52>;
+ hwmon@34 {
+      compatible = "ti,ucd9248";
+      reg = <0x34>;
   }
- hwmon@53 {
-   hwmon@35 {
-      compatible = "ti,ucd9248";
-      -reg = <53>;
+ hwmon@35 {
+      compatible = "ti,ucd9248";
+      reg = <0x35>;
   }
- hwmon@54 {
-   hwmon@36 {
-      compatible = "ti,ucd9248";
-      -reg = <54>;
+ hwmon@36 {
+      compatible = "ti,ucd9248";
+      reg = <0x36>;
   }
  ...
--- linux-4.15.0.orig/arch/arm/common/bl_switcher_dummy_if.c
+++ linux-4.15.0/arch/arm/common/bl_switcher_dummy_if.c
@@ -57,3 +57,7 @@
&bl_switcher_fops
\}
 module_misc_device(bL_switcher_device);
+ MODULE_AUTHOR("Nicolas Pitre <nico@linaro.org>");
+ MODULE_LICENSE("GPL v2");
+ MODULE_DESCRIPTION("big.LITTLE switcher dummy user interface");
--- linux-4.15.0.orig/arch/arm/common/mcpm_entry.c
+++ linux-4.15.0/arch/arm/common/mcpm_entry.c
@@ -379,7 +379,7 @@
 unsigned int cluster = MPIDR_AFFINITY_LEVEL(mpidr, 1);
 phys_reset_t phys_reset;
- mcpm_set_entry_vector(cpu, cluster, cpu_resume);
+ mcpm_set_entry_vector(cpu, cluster, cpu_resume_no_hyp);
 setup_mm_for_reboot();

 __mcpm_cpu_going_down(cpu, cluster);
--- linux-4.15.0.orig/arch/arm/configs/badge4_defconfig
CONFIG_QCOM_SMSM=y
+CONFIG_RPMSG=y
+CONFIG_RPMSG_QCOM_SMD=y
+CONFIG_RPMSG=y
CONFIG_QCOM_WCNSS_CTRL=m
CONFIG_ROCKCHIP_PM_DOMAINS=y
CONFIG_COMMON_CLK_QCOM=y
@@ -849,6 +852,7 @@
CONFIG_MSM_GCC_8660=y
CONFIG_MSM_MMCC_8960=y
CONFIG_MSM_MMCC_8974=y
+CONFIG_HWSPINLOCK=y
CONFIG_HWSPINLOCK_QCOM=y
CONFIG_ROCKCHIP_IOMUXU=y
CONFIG_TEGRA_IOMUXU_GART=y
--- linux-4.15.0.orig/arch/arm/configs/pxa_defconfig
+++ linux-4.15.0/arch/arm/configs/pxa_defconfig
@@ -589,7 +589,6 @@
CONFIG_USB_SERIAL_OMNINET=m
CONFIG_USB_EMI62=m
CONFIG_USB_EMI26=m
-CONFIG_USB_RIO500=m
CONFIG_USB_LEGOTOWER=m
CONFIG_USB_LCD=m
CONFIG_USB_CYTHERM=m
--- linux-4.15.0.orig/arch/arm/configs/rpc_defconfig
+++ linux-4.15.0/arch/arm/configs/rpc_defconfig
@@ -32,7 +32,6 @@
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=m
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_CHR_DEV_SCH=m
CONFIG_SCSI_CONSTANTS=y
--- linux-4.15.0.orig/arch/arm/configs/s3c2410_defconfig
+++ linux-4.15.0/arch/arm/configs/s3c2410_defconfig
@@ -334,7 +333,6 @@
CONFIG_USB_EMI26=m
CONFIG_USB_ADUTUX=m

---
CONFIG_USB_SEVSEG=m
-CONFIG_USB_RIO500=m
CONFIG_USB_LEGOTOWER=m
CONFIG_USB_LCD=m
CONFIG_USB_CYPRESS_CY7C63=m
--- linux-4.15.0.orig/arch/arm/configs/socfpga_defconfig
+++ linux-4.15.0/arch/arm/configs/socfpga_defconfig
@@ -57,6 +57,7 @@
 CONFIG_MTD_NAND=y
 CONFIG_MTD_NAND_DENALI_DT=y
 CONFIG_MTD_SPI_NOR=y
+# CONFIG_MTD_SPI_NOR_USE_4K_SECTORS is not set
 CONFIG_SPI_CADENCE_QUADSPI=y
 CONFIG_OF_OVERLAY=y
 CONFIG_OF_CONFIGFS=y
--- linux-4.15.0.orig/arch/arm/configs/spitz_defconfig
+++ linux-4.15.0/arch/arm/configs/spitz_defconfig
@@ -191,7 +191,6 @@
 CONFIG_USB_SERIAL_OMNINET=m
 CONFIG_USB_EMI62=m
 CONFIG_USB_EMI26=m
-CONFIG_USB_RIO500=m
 CONFIG_USB_LEGOTOWER=m
 CONFIG_USB_LCD=m
 CONFIG_USB_CYTHERM=m
--- linux-4.15.0.orig/arch/arm/crypto/Makefile
+++ linux-4.15.0/arch/arm/crypto/Makefile
@@ -54,6 +54,7 @@
 crc32-arm-ce-y:= crc32-ce-core.o crc32-ce-glue.o
 chacha20-neon-y := chacha20-neon-core.o chacha20-neon-glue.o
+ifdef REGENERATE_ARM_CRYPTO
 quiet_cmd_perl = PERL    $@
       cmd_perl = $(PERL) $(<) > $(@)
@@ -62,5 +63,6 @@
 $(src)/sha512-core.S_shipped: $(src)/sha512-armv4.pl
 $(call cmd,perl)
+endif

$.PRECIOUS: $(obj)/sha256-core.S $(obj)/sha512-core.S
--- linux-4.15.0.orig/arch/arm/crypto/aes-neonbs-glue.c
+++ linux-4.15.0/arch/arm/crypto/aes-neonbs-glue.c
@@ -280,6 +280,8 @@
 int err;

 err = skcipher_walk_virt(&walk, req, true);
+if (err)
+return err;

crypto_cipher_encrypt_one(ctx->tweak_tfm, walk.iv, walk.iv);

--- linux-4.15.0.orig/arch/arm/crypto/crc32-ce-glue.c
+++ linux-4.15.0/arch/arm/crypto/crc32-ce-glue.c
@@ -188,6 +188,7 @@
 .base.cra_name		= "crc32",
 .base.cra_driver_name	= "crc32-arm-ce",
 .base.cra_priority	= 200,
+.base.cra_flags		= CRYPTO_ALG_OPTIONAL_KEY,
 .base.cra_blocksize	= 1,
 .base.cra_module	= THIS_MODULE,
 }, {
@@ -203,6 +204,7 @@
 .base.cra_name		= "crc32c",
 .base.cra_driver_name	= "crc32c-arm-ce",
 .base.cra_priority	= 200,
+.base.cra_flags		= CRYPTO_ALG_OPTIONAL_KEY,
 .base.cra_blocksize	= 1,
 .base.cra_module	= THIS_MODULE,
 } };
@@ -234,7 +236,7 @@
 ARRAY_SIZE(crc32_pmull_algs));
}

-static const struct cpu_feature crc32_cpu_feature[] = {
+static const struct __maybe_unused cpu_feature crc32_cpu_feature[] = {
 { cpu_feature(CRC32) }, { cpu_feature(PMULL) }, [ ]
};
MODULE_DEVICE_TABLE(cpu, crc32_cpu_feature);

--- linux-4.15.0.orig/arch/arm/crypto/crct10dif-ce-core.S
+++ linux-4.15.0/arch/arm/crypto/crct10dif-ce-core.S
@@ -124,10 +124,10 @@
 vext.8q10, qzr, q0, #4

 // receive the initial 64B data, xor the initial crc value
 -vld1.64{q0-q1}, [arg2,.128]!
 -vld1.64{q2-q3}, [arg2,.128]!
 -vld1.64{q4-q5}, [arg2,.128]!
 -vld1.64{q6-q7}, [arg2,.128]!
+ vld1.64{q0-q1}, [arg2]!
+ vld1.64{q2-q3}, [arg2]!
+ vld1.64{q4-q5}, [arg2]!
+ vld1.64{q6-q7}, [arg2]!
 CPU_LE(vrev64.8q0, q0)
 CPU_LE(vrev64.8q1, q1)
CPU_LE(vrev64,8q2, q2)
@@ -167,7 +167,7 @@
_\_fold_64_B_loop:

.macro fold64, reg1, reg2
-vld1.64[q11-q12], [arg2, :128]!
+vld1.64[q11-q12], [arg2]!

vmull.p64q8, \_reg1\_v(h, d21
vmull.p64qreg1, \_reg1\_v(l, d20
@@ -238,7 +238,7 @@
vmull.p64q7, d15, d21
veor.8q7, q7, q8

-vld1.64[q0], [arg2, :128]!
+vld1.64[q0], [arg2]!
CPU_LE(vrev64,8q0, q0)
vswpd0, d1
veor.8q7, q7, q0
@@ -335,7 +335,7 @@
vmov.i8q0, #0
vmovs3, arg1_low32// get the initial crc value

-vld1.64[q7], [arg2, :128]!
+vld1.64[q7], [arg2]!
CPU_LE(vrev64,8q7, q7)
vswpd14, d15
veor.8q7, q7, q0
--- linux-4.15.0.orig/arch/arm/crypto/crct10dif-ce-glue.c
+++ linux-4.15.0/arch/arm/crypto/crct10dif-ce-glue.c
@@ -35,26 +35,15 @@
  unsigned int length)
{
  u16 *crc = shash_desc_ctx(desc);
-unsigned int l;

-#if (!may_use_simd()) {
-  *crc = crc_t10dif_generic(*crc, data, length);
+#if (length >= CRC_T10DIF_PMULL_CHUNK_SIZE && may_use_simd()) {
+  kernel_neon_begin();
+  *crc = crc_t10dif_pmull(*crc, data, length);
+  kernel_neon_end();
  } else {
-  if (unlikely((u32)data % CRC_T10DIF_PMULL_CHUNK_SIZE)) {
-    l = min_t(u32, length, CRC_T10DIF_PMULL_CHUNK_SIZE -
-      ((u32)data % CRC_T10DIF_PMULL_CHUNK_SIZE));
-    *crc = crc_t10dif_generic(*crc, data, l);
+  kernel_neon_begin();
+  *crc = crc_t10dif_pmull(*crc, data, length);
+  kernel_neon_end();
  } else {
-    if (unlikely((u32)data % CRC_T10DIF_PMULL_CHUNK_SIZE)) {
-      l = min_t(u32, length, CRC_T10DIF_PMULL_CHUNK_SIZE -
-        ((u32)data % CRC_T10DIF_PMULL_CHUNK_SIZE));
-        *crc = crc_t10dif_generic(*crc, data, l);
+  kernel_neon_end();
+  *crc = crc_t10dif_pmull(*crc, data, length);
+  kernel_neon_end();
  } else {
    *crc = crc_t10dif_generic(*crc, data, l);
  }
length -= l;
data += l;
}
if (length > 0) {
kernel_neon_begin();
*crc = crc_t10dif_pmul(*crc, data, length);
kernel_neon_end();
}
*crc = crc_t10dif_Generic(*crc, data, length);
}
return 0;
}
--- linux-4.15.0.orig/arch/arm/crypto/sha256-armv4.pl
+++ linux-4.15.0/arch/arm/crypto/sha256-armv4.pl
@@ -205,10 +205,11 @@
.sha256_block_data_order:
.typesha256_block_data_order,%function
sha256_block_data_order:
+sha256_block_data_order:
#if __ARM_ARCH__<7
subr3,pc,#8 @ sha256_block_data_order
#else
-adr r3,sha256_block_data_order
+adr r3,.Lsha256_block_data_order
#endif
#if __ARM_MAX_ARCH__>=7 && !defined(__KERNEL__)
ldr r12,.LOPENSSL_armcap
--- linux-4.15.0.orig/arch/arm/crypto/sha256-core.S_shipped
+++ linux-4.15.0/arch/arm/crypto/sha256-core.S_shipped
@@ -86,10 +86,11 @@
.sha256_block_data_order:
.typesha256_block_data_order,%function
sha256_block_data_order:
+sha256_block_data_order:
#if __ARM_ARCH__<7
subr3,pc,#8 @ sha256_block_data_order
#else
-adr r3,sha256_block_data_order
+adr r3,.Lsha256_block_data_order
#endif
#if __ARM_MAX_ARCH__>=7 && !defined(__KERNEL__)
ldr r12,.LOPENSSL_armcap
--- linux-4.15.0.orig/arch/arm/crypto/sha512-armv4.pl
+++ linux-4.15.0/arch/arm/crypto/sha512-armv4.pl
@@ -267,10 +267,11 @@
.global sha512_block_data_order
.types sha512_block_data_order,%function
sha512_block_data_order:
+sha512_block_data_order:
#if __ARM_ARCH__<7
subr3, pc, #8 @ sha512_block_data_order
#else
-adr3,sha512_block_data_order
+adr3,Lsha512_block_data_order
#endif
#if __ARM_MAX_ARCH__>=7 && !defined(__KERNEL__)
ldrr12, LOPENSSL_armcap
--- linux-4.15.0.orig/arch/arm/crypto/sha512-core.S_shipped
+++ linux-4.15.0/arch/arm/crypto/sha512-core.S_shipped
@@ -134,10 +134,11 @@
 .global sha512_block_data_order
 .types sha512_block_data_order,%function
sha512_block_data_order:
+sha512_block_data_order:
#if __ARM_ARCH__<7
subr3, pc, #8 @ sha512_block_data_order
#else
-adr3,sha512_block_data_order
+adr3,Lsha512_block_data_order
#endif
#if __ARM_MAX_ARCH__>=7 && !defined(__KERNEL__)
ldrr12, LOPENSSL_armcap
--- linux-4.15.0.orig/arch/arm/firmware/trusted_foundations.c
+++ linux-4.15.0/arch/arm/firmware/trusted_foundations.c
@@ -31,21 +31,25 @@
 static unsigned long cpu_boot_addr;

-static void __naked tf_generic_smc(u32 type, u32 arg1, u32 arg2)
+static void tf_generic_smc(u32 type, u32 arg1, u32 arg2)
{ 
+register u32 r0 asm("r0") = type;
+register u32 r1 asm("r1") = arg1;
+register u32 r2 asm("r2") = arg2;
+asm volatile( 
-".arch_extension	sec
-"stmfd	sp!, {r4 - r11, lr}" 
+"stmfd	sp!, {r4 - r11}
__asmeq("%0", "r0") 
__asmeq("%1", "r1")
__asmeq("%2", "r2")
"movr3, #0"

---
"movr4, #0\n"
"smc\n"
-"ldmfdfsp!, \{r4 - r11, pc\}"
+"ldmfdfsp!, \{r4 - r11\} \n"
:
-: "r" (type), "r" (arg1), "r" (arg2)
-: "memory";
+: "r" (r0), "r" (r1), "r" (r2)
+: "memory", "r3", "r12", "lr";
}

static int tf_set_cpu_boot_addr(int cpu, unsigned long boot_addr)
--- linux-4.15.0.orig/arch/arm/include/asm/assembler.h
+++ linux-4.15.0/arch/arm/include/asm/assembler.h
@@ -21,11 +21,11 @@
 #endif
 #include <asm/ptrace.h>
-#include <asm/domain.h>
+#include <asm/uaccess-asm.h>
 #include <asm/opcodes-virt.h>
 #include <asm/asm-offsets.h>
 #include <asm/page.h>
 #include <asm/thread_info.h>
+#include <asm/uaccess-asm.h>

#define IOMEM(x)	(x)
@@ -374,9 +374,9 @@
 .macro	usraccoff, instr, reg, ptr, inc, off, cond, abort, t=TUSER()
 9999:
 .if	
c
-\instr\cond\()b\()	\reg, \[\ptr, #\off\]
+\instr\()b\t\cond\().w \reg, \[\ptr, #\off\]
 .elseif\nc
-\instr\cond\()	\reg, \[\ptr, #\off\]
+\instr\cond\().w \reg, \[\ptr, #\off\]
 .else
 .error"Unsupported inc macro argument"
 .endif
@@ -415,9 +415,9 @@
 .rept	\rept
 9999:
 .if\nc
-\instr\cond\(\()t\ \reg, \[\ptr\], \#\inc
+\instr\(\()b\t\cond \reg, \[\ptr\], \#\inc
 .elseif\nc
-\instr\cond\(\()t\ \reg, \[\ptr\], \#\inc
+\instr\cond\(\)\t\reg, \[\ptr\], \#\inc

```c
#define isb(x) __asm__ __volatile__ ("mcr p15, 0, %0, c7, c5, 4" : "r" (0) : "memory")
#define dmb(x) __asm__ __volatile__ ("": : "memory")
#endif

#ifndef CSDB
#define CSDB
#endif
#ifndef csdb
#define csdb()
#endif

#ifdef CONFIG_ARM_HEAVY_MB
extern void (*soc_mb)(void);
extern void arm_heavy_mb(void);
#endif
#define __smp_rmb() __smp_mb()
#define __smp_wmb() dmb(ishst)

#ifdef CONFIG_CPU_SPECTRE
static inline unsigned long array_index_mask_nospec(unsigned long idx,
    unsigned long sz)
{
    unsigned long mask;

    asm volatile(
        "cmp %1, %2
        sbc %0, %1, %1"
    CSDB
    : "=r" (mask)
    : "r" (idx), "Ir" (sz)
    : "cc";

    return mask;
}
#define array_index_mask_nospec array_index_mask_nospec
#endif

#include <asm-generic/barrier.h>
#endif /* !__ASSEMBLY__ */
```

-#ifdef CONFIG_MMU
extern void check_writebuffer_bugs(void);

-#define check_bugs() check_writebuffer_bugs()
+#ifdef CONFIG_MMU
+extern void check_bugs(void);
+extern void check_other_bugs(void);
#else
#define check_bugs() do { } while (0)
+#define check_other_bugs() do { } while (0)
#endif
#endif

--- linux-4.15.0.orig/arch/arm/include/asm/cp15.h
+++ linux-4.15.0/arch/arm/include/asm/cp15.h
@@ -65,6 +65,11 @@
#define __write_sysreg(v, r, w, c, t)\tasm volatile(w " " c : : "r" ((t)(v)))
#define write_sysreg(v, ...)_write_sysreg(v, __VA_ARGS__)

+#define BPIALL				__ACCESS_CP15(c7, 0, c5, 6)
+#define ICIALLU				__ACCESS_CP15(c7, 0, c5, 0)
+
+#define CNTVCT				__ACCESS_CP15_64(1, c14)
+
extern unsigned long cr_alignment; /* defined in entry-armv.S */

static inline unsigned long get_cr(void)
--- linux-4.15.0.orig/arch/arm/include/asm/cputype.h
+++ linux-4.15.0/arch/arm/include/asm/cputype.h
@@ -77,8 +77,16 @@
#define ARM_CPU_PART_CORTEX_A12		0x4100c0d0
#define ARM_CPU_PART_CORTEX_A17		0x4100c0e0
#define ARM_CPU_PART_CORTEX_A15		0x4100c0f0
+#define ARM_CPU_PART_CORTEX_A53		0x4100d030
+#define ARM_CPU_PART_CORTEX_A57		0x4100d070
+#define ARM_CPU_PART_CORTEX_A72		0x4100d080
+#define ARM_CPU_PART_CORTEX_A73		0x4100d090
+#define ARM_CPU_PART_CORTEX_A75		0x4100d0a0
#define ARM_CPU_PART_MASK		0xff00fff0
/* Broadcom cores */
+#define ARM_CPU_PART_BRAHMA_B15		0x420000f0
+
/* DEC implemented cores */
#define ARM_CPU_PART_SA1100		0x4400a110
@@ -99,6 +107,7 @@
#define ARM_CPU_PART_SCORPION		0x510002d0

+/* Broadcom cores */
+#define ARM_CPU_PART_BRAHMA_B150x420000f0
+
/* DEC implemented cores */
#define ARM_CPU_PART_SA1100x4400a110

@@ -99,6 +107,7 @@
#define ARM_CPU_PART_SCORPION0x510002d0
extern unsigned int processor_id;
+struct proc_info_list *lookup_processor(u32 midr);

#ifdef CONFIG_CPU_CP15
#define read_cpuid(reg)
--- linux-4.15.0.orig/arch/arm/include/asm/ftrace.h
+++ linux-4.15.0/arch/arm/include/asm/ftrace.h
@@ -19,6 +19,9 @@
#ifdef CONFIG_OLD_MCOUNT
bool old_mcount;
#endif
+#ifdef CONFIG_ARM_MODULE_PLTS
+struct module *mod;
+#endif
};

static inline unsigned long ftrace_call_adjust(unsigned long addr)
--- linux-4.15.0.orig/arch/arm/include/asm/futex.h
+++ linux-4.15.0/arch/arm/include/asm/futex.h
@@ -163,8 +163,13 @@
 preempt_enable();
#endif
-if (!ret)
-    *oval = oldval;
+/*
+ * Store unconditionally. If ret != 0 the extra store is the least
+ * of the worries but GCC cannot figure out that __futex_atomic_op()
+ * is either setting ret to -EFAULT or storing the old value in
+ * oldval which results in a uninitialized warning at the call site.
+ */
+*oval = oldval;
return ret;
}
--- linux-4.15.0.orig/arch/arm/include/asm/hardirq.h
+++ linux-4.15.0/arch/arm/include/asm/hardirq.h
@@ -6,6 +6,7 @@
#include <linux/threads.h>
#include <asm/irq.h>
+#define NR_IPI	7
typedef struct {
--- linux-4.15.0.orig/arch/arm/include/asm/insn.h
+++ linux-4.15.0/arch/arm/include/asm/insn.h
@ @ -6,6 +6,7 @@
#include <linux/threads.h>
#include <asm/irq.h>

+/* number of IPIs _not_ including IPI_CPU_BACKTRACE */
#define NR_IPI7
typedef struct {
--- linux-4.15.0.orig/arch/arm/include/asm/insn.h
+++ linux-4.15.0/arch/arm/include/asm/insn.h
unsigned long
-__arm_gen_branch(unsigned long pc, unsigned long addr, bool link);
+__arm_gen_branch(unsigned long pc, unsigned long addr, bool link, bool warn);

static inline unsigned long
arm_gen_branch(unsigned long pc, unsigned long addr)
{
-return __arm_gen_branch(pc, addr, false);
+return __arm_gen_branch(pc, addr, false, true);
}

static inline unsigned long
-arm_gen_branch_link(unsigned long pc, unsigned long addr)
+arm_gen_branch_link(unsigned long pc, unsigned long addr, bool warn)
{
-return __arm_gen_branch(pc, addr, true);
+return __arm_gen_branch(pc, addr, true, warn);
}

#endif
--- linux-4.15.0.orig/arch/arm/include/asm/irq.h
+++ linux-4.15.0/arch/arm/include/asm/irq.h
@@ -25,7 +25,6 @@
#ifndef __ASSEMBLY__
struct irqaction;
struct pt_regs;
-extern void migrate_irqs(void);

extern void asm_do_IRQ(unsigned int, struct pt_regs *);
void handle_IRQ(unsigned int, struct pt_regs *);
--- linux-4.15.0.orig/arch/arm/include/asm/kexec-internal.h
+++ linux-4.15.0/arch/arm/include/asm/kexec-internal.h
@@ -0,0 +1,12 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ARM_KEXEC_INTERNAL_H
+struct kexec_relocate_data {
+unsigned long kexec_start_address;
+unsigned long kexec_indirection_page;
+unsigned long kexec_mach_type;
+unsigned long kexec_r2;
+};
+
+#endif
#define KGDB_MAX_NO_CPUS1
#define BUFMAX400
-#define NUMREGBYTES(DBG_MAX_REG_NUM << 2)
+#define NUMREGBYTES(GDB_MAX_REGS << 2)
#define NUMCRITREGBYTES(32 << 2)

#define _R0
--- linux-4.15.0.orig/arch/arm/include/asm/kprobes.h
+++ linux-4.15.0/arch/arm/include/asm/kprobes.h
@@ -54,20 +54,20 @@
    unsigned long val, void *data);

/* optinsn template addresses */
extern __visible kprobe_opcode_t optprobe_template_entry;
extern __visible kprobe_opcode_t optprobe_template_val;
extern __visible kprobe_opcode_t optprobe_template_call;
extern __visible kprobe_opcode_t optprobe_template_end;
extern __visible kprobe_opcode_t optprobe_template_sub_sp;
extern __visible kprobe_opcode_t optprobe_template_add_sp;
extern __visible kprobe_opcode_t optprobe_template_restore_begin;
extern __visible kprobe_opcode_t optprobe_template_restore_orig_insn;
extern __visible kprobe_opcode_t optprobe_template_restore_end;
extern __visible kprobe_opcode_t optprobe_template_restore_end[];
extern __visible kprobe_opcode_t optprobe_template_restore_end[];
extern __visible kprobe_opcode_t optprobe_template_restore_end[];
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extern __visible kprobe_opcode_t optprobe_template_restore_end[];
extern __visible kprobe_opcode_t optprobe_template_restore_end[];
extern __visible kprobe_opcode_t optprobe_template_restore_end[];
extern __visible kprobe_opcode_t optprobe_template_restore_end[];
extern __visible kprobe_opcode_t optprobe_templateRestore_begin[];
extern __visible kprobe_opcode_t optprobe_templateRestore_orig_insn[];
extern __visible kprobe_opcode_t optprobeTemplateRestore_end[];

#define MAX_OPTIMIZED_LENGTH
#define MAX_OPTINSN_SIZE
-((unsigned long)&optprobe_template_end -
 - (unsigned long)&optprobe_template_entry)
+((unsigned long)optprobe_template_end -
 + (unsigned long)optprobe_template_entry)
#define RELATIVEJUMP_SIZE

struct arch_optimized_insn {
--- linux-4.15.0.orig/arch/arm/include/asm/kvm_asm.h
+++ linux-4.15.0/arch/arm/include/asm/kvm_asm.h
@@ -61,8 +61,6 @@
 struct arch_optimized_insn {
extern char __kvm_hyp_init[];
extern char __kvm_hyp_init_end[];

-extern char __kvm_hyp_vector[];
-
extern void __kvm_flush_vm_context(void);
extern void __kvm_tlb_flush_vmid_ipa(struct kvm *kvm, phys_addr_t ipa);
extern void __kvm_tlb_flush_vmid(struct kvm *kvm);
--- linux-4.15.0.orig/arch/arm/include/asm/kvm_emulate.h
+++ linux-4.15.0/arch/arm/include/asm/kvm_emulate.h
@@ -43,6 +43,11 @@
unsigned long *vcpu_spsr(struct kvm_vcpu *vcpu);

+static inline unsigned long host_spsr_to_spsr32(unsigned long spsr)
+{
+    return spsr;
+}
+
static inline unsigned long vcpu_get_reg(struct kvm_vcpu *vcpu,
     u8 reg_num)
{
    return kvm_vcpu_get_hsr(vcpu) & HSR_SSE;
}

+static inline bool kvm_vcpu_dabt_issf(const struct kvm_vcpu *vcpu)
+{
+    return false;
+}
+
static inline int kvm_vcpu_dabt_get_rd(struct kvm_vcpu *vcpu)
{
    return (kvm_vcpu_get_hsr(vcpu) & HSR_SRT_MASK) >> HSR_SRT_SHIFT;
}

-static inline bool kvm_vcpu_dabt_iss1tw(struct kvm_vcpu *vcpu)
+static inline bool kvm_vcpu_abt_iss1tw(const struct kvm_vcpu *vcpu)
{ return kvm_vcpu_get_hsr(vcpu) & HSR_DABT_S1PTW;
}
@@ -211,16 +221,21 @@
@@ -211,16 +221,21 @@

-static inline u8 kvm_vcpu_trap_get_class(struct kvm_vcpu *vcpu)
+static inline u8 kvm_vcpu_trap_get_class(const struct kvm_vcpu *vcpu)
{ return kvm_vcpu_get_hsr(vcpu) & HSR_DABT_S1PTW;
}


return kvm_vcpu_get_hsr(vcpu) >> HSR_EC_SHIFT;
}

- static inline bool kvm_vcpu_trap_is_iabt(struct kvm_vcpu *vcpu)
+ static inline bool kvm_vcpu_trap_is_iabt(const struct kvm_vcpu *vcpu)
{
return kvm_vcpu_trap_get_class(vcpu) == HSR_EC_IABT;
}

+ static inline bool kvm_vcpu_trap_is_exec_fault(const struct kvm_vcpu *vcpu)
{
+ return kvm_vcpu_trap_is_iabt(vcpu) && !kvm_vcpu_abt_iss1tw(vcpu);
+
+ static inline u8 kvm_vcpu_trap_get_fault(struct kvm_vcpu *vcpu)
{
return kvm_vcpu_get_hsr(vcpu) & HSR_FSC;
}

--- linux-4.15.0.orig/arch/arm/include/asm/kvm_host.h
+++ linux-4.15.0/arch/arm/include/asm/kvm_host.h
@@ -21,6 +21,7 @@
#include <linux/types.h>
#include <linux/kvm_types.h>
+#include <asm/cputype.h>
#include <asm/kvm.h>
#include <asm/kvm_asm.h>
#include <asm/kvm_mmio.h>
@@ -47,6 +48,7 @@
#define KVM_REQ_SLEEP
KVM_ARCH_REQ_FLAGS(0, KVM_REQUEST_WAIT | KVM_REQUEST_NO_WAKEUP)
#define KVM_REQ_IRQ_PENDING	KVM_ARCH_REQ(1)
+#define KVM_REQ_VCPU_RESET	KVM_ARCH_REQ(2)

u32 *kvm_vcpu_reg(struct kvm_vcpu *vcpu, u8 reg_num, u32 mode);
int __attribute_const__ kvm_target_cpu(void);
@@ -75,6 +77,9 @@
/* Interrupt controller */
struct vgic_distvgic;
int max_vcpus;
+
+/* Mandated version of PSCI */
+u32 psci_version;
};

#define KVM_NR_MEM_OBJS 40
@@ -141,6 +146,13 @@
typedef struct kvm_cpu_context kvm_cpu_context_t;

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struct vcpu_reset_state {
    unsigned long pc;
    unsigned long r0;
    bool be;
    bool reset;
};

struct kvm_vcpu_arch {
    struct kvm_cpu_context ctxt;
    struct vcpu_reset_state reset_state;

    /* Detect first run of a vcpu */
    bool has_run_once;
};

int handle_exit(struct kvm_vcpu *vcpu, struct kvm_run *run, int exception_index);

+static inline void handle_exit_early(struct kvm_vcpu *vcpu, struct kvm_run *run, int exception_index) {}

+static inline void __cpu_init_hyp_mode(phys_addr_t pgd_ptr,
    unsigned long hyp_stack_ptr,
    unsigned long vector_ptr)

+static inline void kvm_fpsimd_flush_cpu_state(void) {}

+static inline void kvm_arm_vhe_guest_enter(void) {}
+static inline void kvm_arm_vhe_guest_exit(void) {}

+static inline bool kvm_arm_harden_branch_predictor(void) {
    switch(read_cpuid_part()) {
#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
    case ARM_CPU_PART_BRAHMA_B15:
    case ARM_CPU_PART_CORTEX_A12:
    case ARM_CPU_PART_CORTEX_A15:
    case ARM_CPU_PART_CORTEX_A17:
        return true;
#endif
    default:
        return false;
    }
}
+return false;
+}
+
+#define KVM_SSBD_UNKNOWN		-1
+#define KVM_SSBD_FORCE_DISABLE		0
+#define KVM_SSBD_KERNEL		1
+#define KVM_SSBD_FORCE_ENABLE		2
+#define KVM_SSBD_MITIGATED		3
+
+static inline int kvm_arm_have_ssbd(void)
+{
+  /* No way to detect it yet, pretend it is not there. */
+  return KVM_SSBD_UNKNOWN;
+}
+
#endif /* __ARM_KVM_HOST_H__ */

--- linux-4.15.0.orig/arch/arm/include/asm/kvm_mmio.h
+++ linux-4.15.0/arch/arm/include/asm/kvm_mmio.h
@@ -26,6 +26,8 @@
struct kvm_decode {
  unsigned long rt;
  bool sign_extend;
+  /* Not used on 32-bit arm */
+  bool sixty_four;
};

void kvm_mmio_write_buf(void *buf, unsigned int len, unsigned long data);
--- linux-4.15.0.orig/arch/arm/include/asm/kvm_mmu.h
+++ linux-4.15.0/arch/arm/include/asm/kvm_mmu.h
@@ -28,6 +28,13 @@
*/
#define kern_hyp_va(kva) (kva)

/* Contrary to arm64, there is no need to generate a PC-relative address */
+#define hyp_symbol_addr(s) \
+(*typeof(s) *addr = &(s);) \
+addr;
+
/*
 * KVM_MMU_CACHE_MIN_PAGES is the number of stage2 page table translation levels.
 */
@@ -221,6 +228,69 @@ return 8;
}
/* We are not in the kvm->srcu critical section most of the time, so we take
the SRCU read lock here. Since we copy the data from the user page, we
can immediately drop the lock again.
*/

static inline int kvm_read_guest_lock(struct kvm *kvm,
    gpa_t gpa, void *data, unsigned long len)
{
    int srcu_idx = srcu_read_lock(&kvm->srcu);
    int ret = kvm_read_guest(kvm, gpa, data, len);
    srcu_read_unlock(&kvm->srcu, srcu_idx);
    return ret;
}

static inline int kvm_write_guest_lock(struct kvm *kvm, gpa_t gpa,
    const void *data, unsigned long len)
{
    int srcu_idx = srcu_read_lock(&kvm->srcu);
    int ret = kvm_write_guest(kvm, gpa, data, len);
    srcu_read_unlock(&kvm->srcu, srcu_idx);
    return ret;
}

static inline void *kvm_get_hyp_vector(void)
{
    switch(read_cpuid_part()) {
    #ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
        case ARM_CPU_PART_CORTEX_A12:
        case ARM_CPU_PART_CORTEX_A17:
        {
            extern char __kvm_hyp_vector_bp_inv[];
            return kvm_ksym_ref(__kvm_hyp_vector_bp_inv);
        }
        case ARM_CPU_PART_BRAHMA_B15:
        case ARM_CPU_PART_CORTEX_A15:
        {
            extern char __kvm_hyp_vector_ic_inv[];
            return kvm_ksym_ref(__kvm_hyp_vector_ic_inv);
        }
        #endif
    default:
    {
        extern char __kvm_hyp_vector[];
    }
+return kvm_ksym_ref(__kvm_hyp_vector);
+
+#endif /* __ASSEMBLY__ */

#endif /* __ARM_KVM_MMU_H__ */
--- linux-4.15.0.orig/arch/arm/include/asm/module.h
+++ linux-4.15.0/arch/arm/include/asm/module.h
@@ -19,8 +19,18 @@

#define PLT_ENT_STRIDE L1_CACHE_BYTES
#define PLT_ENT_COUNT (PLT_ENT_STRIDE / sizeof(u32))
#define PLT_ENT_SIZE (sizeof(struct plt_entries) / PLT_ENT_COUNT)
+
+struct plt_entries {
+u32 ldr[PLT_ENT_COUNT];
+u32 lit[PLT_ENT_COUNT];
+};
+
+struct mod_plt_sec {
+struct elf32_shdr* plt;
+struct plt_entries* plt_ent;
+int plt_count;
+};
+
--- linux-4.15.0.orig/arch/arm/include/asm/percpu.h
+++ linux-4.15.0/arch/arm/include/asm/percpu.h
 @@ -16,6 +16,8 @@
 ifndef _ASM_ARM_PERCPU_H_
 endif

+##include <asm/thread_info.h>
* Same as asm-generic/percpu.h, except that we store the per cpu offset
* in the TPIDRPRW. TPIDRPRW only exists on V6K and V7
--- linux-4.15.0.orig/arch/arm/include/asm/pgtable-2level.h
+++ linux-4.15.0/arch/arm/include/asm/pgtable-2level.h
@@ -10,7 +10,7 @@
#ifndef _ASM_PGTABLE_2LEVEL_H
#define _ASM_PGTABLE_2LEVEL_H

-#define __PAGETABLE_PMD_FOLDED
+#define __PAGETABLE_PMD_FOLDED 1

/*
 * Hardware-wise, we have a two level page table structure, where the first
--- linux-4.15.0.orig/arch/arm/include/asm/proc-fns.h
+++ linux-4.15.0/arch/arm/include/asm/proc-fns.h
@@ -23,7 +23,7 @@
/*
 * Don't change this structure - ASM code relies on it.
 */
-extern struct processor {
+struct processor {
 /* MISC
 * get data abort address/flags
 */
@@ -37,6 +37,10 @@
} processor;

/*
 + * Check for processor bugs
 + */
+void (*check_bugs)(void);
+/*
 + * Disable any processor specifics
 + */
 void (*proc_fins)(void);
@@ -75,9 +79,13 @@
 unsigned int suspend_size;
 void (*do_suspend)(void *);
 void (*do_resume)(void *);
-} processor;
+};

#endif MULTI_CPU
+static inline void init_proc_vtable(const struct processor *p)
+{  
+  
+  extern void cpu_proc_init(void);


extern void cpu_proc_fin(void);
extern int cpu_do_idle(void);
@@ -94,17 +102,50 @@
extern void cpu_do_suspend(void *);
extern void cpu_do_resume(void *);
#else
-#define cpu_proc_init			processor._proc_init
-#define cpu_proc_fin			processor._proc_fin
-#define cpu_reset			processor.reset
-#define cpu_do_idle			processor._do_idle
-#define cpu_dcache_clean_area		processor.dcache_clean_area
-#define cpu_set_pte_ext			processor.set_pte_ext
-#define cpu_do_switch_mm		processor.switch_mm
+
-/* These three are private to arch/arm/kernel/suspend.c */
-#define cpu_do_suspendprocessor.do_suspend
-#define cpu_doResumeprocessor.do_resume
+extern struct processor processor;
+#if defined(CONFIG_BIG_LITTLE) && defined(CONFIG_HARDEN_BRANCH_PREDICTOR)
+##include <linux/smp.h>
+/*
+ * This can't be a per-cpu variable because we need to access it before
+ * per-cpu has been initialised. We have a couple of functions that are
+ * called in a pre-emptible context, and so can't use smp_processor_id()
+ * there, hence PROC_TABLE(). We insist in init_proc_vtable() that the
+ * function pointers for these are identical across all CPUs.
+ */
+extern struct processor *cpu_vtable[];
+##define PROC_VTABLE(f)cpu_vtable[smp_processor_id()]->f
+##define PROC_TABLE(f)cpu_vtable[0]->f
+static inline void init_proc_vtable(const struct processor *p)
+{
+unsigned int cpu = smp_processor_id();
+*cpu_vtable[cpu] = *p;
+WARN_ONCE(cpu_vtable[cpu]->dcache_clean_area !=
+ cpu_vtable[0]->dcache_clean_area);
+WARN_ONCE(cpu_vtable[cpu]->set_pte_ext !=
+ cpu_vtable[0]->set_pte_ext);
+}
+##else
+##define PROC_VTABLE(f)processor.f
+##define PROC_TABLE(f)processor.f
+static inline void init_proc_vtable(const struct processor *p)
+{
+processor = *p;
+}
+##endif
+}
+\define cpu_proc_initPROC_VTABLE(_proc_init)
+\define cpu_check_bugsPROC_VTABLE(check_bugs)
+\define cpu_proc_finPROC_VTABLE(_proc_fin)
+\define cpu_resetPROC_VTABLE(reset)
+\define cpu_do_idlePROC_VTABLE(_do_idle)
+\define cpu_dcache_clean_areaPROC_TABLE(dcache_clean_area)
+\define cpu_set_pte_extPROC_TABLE(set_pte_ext)
+\define cpu_do_switch_mmPROC_VTABLE(switch_mm)
+
+/* These two are private to arch/arm/kernel/suspend.c */
+\define cpu_do_suspendPROC_VTABLE(do_suspend)
+\define cpu_do_resumePROC_VTABLE(do_resume)
#endif

extern void cpu_resume(void);
--- linux-4.15.0.orig/arch/arm/include/asm/processor.h
+++ linux-4.15.0/arch/arm/include/asm/processor.h
@@ -85,7 +85,11 @@
unsigned long get_wchan(struct task_struct *p);

#if LINUX_ARM_ARCH_ == 6 || defined(CONFIG_ARM_ERRATA_754327)
+\define cpu_relax()smp_mb()
+\define cpu_relax()\n+do {\n+smp_mb();\n+__asm__ __volatile__("nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop; nop;");\n+} while (0)
#else
\define cpu_relax()barrier()
@end

--- linux-4.15.0.orig/arch/arm/include/asm/suspend.h
+++ linux-4.15.0/arch/arm/include/asm/suspend.h
@@ -10,6 +10,7 @@
}

extern void cpu_resume(void);
+extern void cpu_resume_no_hyp(void);
extern void cpu_resume_arm(void);
extern int cpu_suspend(unsigned long, int (*)(unsigned long));

--- linux-4.15.0.orig/arch/arm/include/asm/system_misc.h
+++ linux-4.15.0/arch/arm/include/asm/system_misc.h
@@ -8,6 +8,7 @@
#include <linux/linkage.h>
#include <linux/irqflags.h>
#include <linux/reboot.h>
+#include <linux/percpu.h>
extern void cpu_init(void);

@@ -15,6 +16,20 @@
extern void (*arm_pm_restart)(enum reboot_mode reboot_mode, const char *cmd);
extern void (*arm_pm_idle)(void);

+#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+typedef void (*harden_branch_predictor_fn_t)(void);
+DECLARE_PER_CPU(harden_branch_predictor_fn_t, harden_branch_predictor_fn);
+static inline void harden_branch_predictor(void)
+{
+harden_branch_predictor_fn_t fn = per_cpu(harden_branch_predictor_fn,
+ smp_processor_id());
+if (fn)
+fn();
+}
+#else
+#define harden_branch_predictor() do { } while (0)
+#endif

#define UDBG_UNDEFINED (1 << 0)
#define UDBG_SYSCALL (1 << 1)
#define UDBG_BADABORT (1 << 2)
--- linux-4.15.0.orig/arch/arm/include/asm/thread_info.h
+++ linux-4.15.0/arch/arm/include/asm/thread_info.h
@@ -124,10 +124,10 @@
struct user_vfp;
struct user_vfp_exc;

-extern int vfp_preserve_user_clear_hwstate(struct user_vfp __user *,
- struct user_vfp_exc __user *);
-extern int vfp_restore_user_hwstate(struct user_vfp __user *,
- struct user_vfp_exc __user *);
+extern int vfp_preserve_user_clear_hwstate(struct user_vfp *,
+ struct user_vfp_exc *);
+extern int vfp_restore_user_hwstate(struct user_vfp *,
+ struct user_vfp_exc *);
#endif

/*
--- linux-4.15.0.orig/arch/arm/include/asm/tlb.h
+++ linux-4.15.0/arch/arm/include/asm/tlb.h
@@ -280,6 +280,14 @@
 tlb_add_flush(tlb, addr);
 }

+static inline void
+tlb_flush_pmd_range(struct mmu_gather *tlb, unsigned long address,
unsigned long size)
{
    tlb_add_flush(tlb, address);
    tlb_add_flush(tlb, address + size - PMD_SIZE);
}

#define pte_free_tlb(tlb, ptep, addr)__pte_free_tlb(tlb, ptep, addr)
#define pmd_free_tlb(tlb, pmdp, addr)__pmd_free_tlb(tlb, pmdp, addr)
#define pud_free_tlb(tlb, pudp, addr)pud_free((tlb)->mm, pudp)

--- linux-4.15.0.orig/arch/arm/include/asm/uaccess-asm.h
+++ linux-4.15.0/arch/arm/include/asm/uaccess-asm.h
@@ -0,0 +1,117 @@
+/* SPDX-License-Identifier: GPL-2.0-only */
+
+#ifndef __ASM_UACCESS_ASM_H__
+#define __ASM_UACCESS_ASM_H__
+
+#include <asm/asm-offsets.h>
+#include <asm/domain.h>
+#include <asm/memory.h>
+#include <asm/thread_info.h>
+
+.macro csdb
+#ifdef CONFIG_THUMB2_KERNEL
+.inst.w 0xf3af8014
+#else
+.inst 0xe320f014
+#endif
+.endm

+.macro check_uaccess, addr:req, size:req, limit:req, tmp:req, bad:req
+#ifndef CONFIG_CPU_USE_DOMAINS
+adds\tmp, \addr, \size - 1
+sbcse\tmp, \tmp, \limit
+bcs\bad
+#ifdef CONFIG_CPU_SPECTRE
+movcs\addr, #0
+csdb
+#endif
+#endif
+.endm

+.macro uaccess_mask_range_ptr, addr:req, size:req, limit:req, tmp:req
+#ifdef CONFIG_CPU_SPECTRE
+sub\tmp, \limit, #1
+subs\tmp, \tmp, \addr@ \tmp = limit - 1 - addr
+addhs\tmp, \tmp, \size@ \tmp = limit - (addr + size) }
+movl\addr, #0@ if (tmp < 0) addr = NULL
+csdb
+#endif
+.endm
+
+.macrouaccess_disable, tmp, isb=1
+#ifdef CONFIG_CPU_SW_DOMAIN_PAN
+/*
+ * Whenever we re-enter userspace, the domains should always be
+ * set appropriately.
+ */
+mov\tmp, #DACR_UACCESS_DISABLE
+mc15p, 0, \tmp, c3, c0, 0@ Set domain register
+.if isb
+instr_sync
+.endif
+#endif
+.endm
+
+.macrouaccess_enable, tmp, isb=1
+#ifdef CONFIG_CPU_SW_DOMAIN_PAN
+/*
+ * Whenever we re-enter userspace, the domains should always be
+ * set appropriately.
+ */
+mov\tmp, #DACR_UACCESS_DISABLE
+mc15p, 0, \tmp, c3, c0, 0
+.if isb
+instr_sync
+.endif
+#endif
+.endm
+
+#if defined(CONFIG_CPU_SW_DOMAIN_PAN) || defined(CONFIG_CPU_USE_DOMAINS)
+#define DACR(x...)x
+#else
+#define DACR(x...)x
+#endif
+
+ /* Save the address limit on entry to a privileged exception.
+ */
+/*
+ * If we are using the DACR for kernel access by the user accessors
+ * (CONFIG_CPU_USE_DOMAINS=y), always reset the DACR kernel domain
+ * back to client mode, whether or not \disable is set.
+ */
+/*
+ * If we are using SW PAN, set the DACR user domain to no access
+ * if \disable is set.
+ */
+.macro uaccess_entry, tsk, tmp0, tmp1, tmp2, disable
+ldr tmp1, [tsk, #TI_ADDR_LIMIT]
+mov tmp2, #TASK_SIZE
+str tmp2, [tsk, #TI_ADDR_LIMIT]
+ DACR(mrcp15, 0, \tmp0, c3, c0, 0)
+ DACR(strtmp0, [sp, #SVC_DACR])
+strtmp1, [sp, #SVC_ADDR_LIMIT]
+.if disable && IS_ENABLED(CONFIG_CPU_SW_DOMAIN_PAN)
+/* kernel=client, user=no access */
+mov\tmp2, #DACR_UACCESS_DISABLE
+mrcp15, 0, \tmp2, c3, c0, 0
+instr_sync
+.elseif IS_ENABLED(CONFIG_CPU_USE_DOMAINS)
+/* kernel=client */
+bic\tmp2, \tmp0, #domain_mask(DOMAIN_KERNEL)
+or\tmp2, \tmp2, #domain_val(DOMAIN_KERNEL, DOMAIN_CLIENT)
+mrcp15, 0, \tmp2, c3, c0, 0
+instr_sync
+.endif
+.endm
+
+/* Restore the user access state previously saved by uaccess_entry */
+.macro uaccess_exit, tsk, tmp0, tmp1
+ldr tmp1, [sp, #SVC_ADDR_LIMIT]
+ DACR(ldr tmp0, [sp, #SVC_DACR])
+str tmp1, [tsk, #TI_ADDR_LIMIT]
+ DACR(mcr\tmp0, c3, c0, 0)
+.endm
+
+#undef DACR
+
+#endif /* __ASM_UACCESS_ASM_H__ */
--- linux-4.15.0.orig/arch/arm/include/asm/uaccess.h
+++ linux-4.15.0/arch/arm/include/asm/uaccess.h
@@ -69,6 +69,14 @@
 static inline void set_fs(mm_segment_t fs)
 { current_thread_info()->addr_limit = fs;
 +
+/*
+ * Prevent a mispredicted conditional call to set_fs from forwarding
+ * the wrong address limit to access_ok under speculation.
+ */
+dsb(nsh);
+isb();
+ modify_domain(DOMAIN_KERNEL, fs ? DOMAIN_CLIENT : DOMAIN_MANAGER);
flag; })

/*
+ * This is a type: either unsigned long, if the argument fits into
+ * that type, or otherwise unsigned long long.
+ */
+#define __inttype(x) 
+ typeof獬(__builtin_choose_expr(sizeof(x) > sizeof(0UL), 0ULL, 0UL))
+
+/*
+ * Sanitise a uaccess pointer such that it becomes NULL if addr+size
+ * is above the current addr_limit.
+ */
+#define uaccess_mask_range_ptr(ptr, size)
+((typeof獬(ptr))uaccess_mask_range_ptr(ptr, size))
+static inline void __user *__uaccess_mask_range_ptr(const void __user *ptr,
+ size_t size)
+{
+void __user *safe_ptr = (void __user *)ptr;
+unsigned long tmp;
+
+asm volatile(
+"sub\%1, \%3, #1\n"
+"subs\%1, \%1, \%0\n"
+"addhs\%1, \%1, \%1\n"
+"subhss\%1, \%1, \%2\n"
+"movlo\%0, \%0\n"
+: "+r\" (safe_ptr), "+&r\" (tmp)
+: "r\" (size), "+r\" (current_thread_info()->addr_limit)
+: "cc\");
+
+csdb();
+return safe_ptr;
+
+/*
+ * Single-value transfer routines. They automatically use the right
+ * size if we just have the right pointer type. Note that the functions
+ * which read from user space (*get_*) need to take care not to leak
+ @ @ -153,7 +194,7 @ @
+\}
+unsigned long __limit = current_thread_info()->addr_limit - 1;
+register const typeof*((p)) __user *__p asm("r0") = (p);
+register typeof(x) __r2 asm("r2");
+register __inttype(x) __r2 asm("r2");
+
register unsigned long __l asm("r1") = __limit;
register int __e asm("r0");
unsigned int __ua_flags = uaccess_save_and_enable();
@@ -243,6 +284,16 @@
#define user_addr_max() 
(uaccess_kernel() ? ~0UL : get_fs())

+ifdef CONFIG_CPU_SPECTRE
+/*
+ * When mitigating Spectre variant 1, it is not worth fixing the non-
+ * verifying accessors, because we need to add verification of the
+ * address space there. Force these to use the standard get_user()
+ * version instead.
+ */
+#define __get_user(x, ptr) get_user(x, ptr)
+else
+
;/*
 * The "__xxx" versions of the user access functions do not verify the
 * address space - it must have been done previously with a separate
 @@ -259,12 +310,6 @@
____gu_err;
})

-#define __get_user_error(x, ptr, err)
-({
-__get_user_err((x), (ptr), err);
-(void) 0;
-})
-
-#define __get_user_err(x, ptr, err)
do {
unsigned long __gu_addr = (unsigned long)(ptr);
@@ -304,6 +349,13 @@
#define __get_user_asm_byte(x, addr, err) __get_user_asm(x, addr, err, ldrb)

+#if __LINUX_ARM_ARCH__ >= 6
 +
 +#define __get_user_asm_half(x, addr, err)
 +#else
 +
 +#ifndef __ARMEB__
 +#define __get_user_asm_half(x, __gu_addr, err)
(}@ @ -322,8 +374,11 @@
+#else
+
+ifndef __ARMEB__
+#define __put_user_asm_half(x, __pu_addr, err)\(\{
@@ -410,6 +474,8 @@
})
#endif

+#endif /* __LINUX_ARM_ARCH__ >= 6 */
+
+#define __put_user_asm_word(x, __pu_addr, err)\(__put_user_asm(x, __pu_addr, err, str)\)
@@ -442,6 +508,7 @@
: "r" (x), "i" (-EFAULT)\:
: "cc")

+#endif /* !CONFIG_CPU_SPECTRE */

#ifdef CONFIG_MMU
extern unsigned long __must_check
--- linux-4.15.0.orig/arch/arm/include/asm/unified.h
+++ linux-4.15.0/arch/arm/include/asm/unified.h
@@ -20,8 +20,10 @@
#ifndef __ASM_UNIFIED_H
#define __ASM_UNIFIED_H

#if defined(__ASSEMBLY__) && defined(CONFIG_ARM_ASM_UNIFIED)
+if defined(__ASSEMBLY__) synonym unified
+else
+ __asm__(".syntax unified");
#endif

#ifdef CONFIG_CPU_V7M
@@ -64,77 +66,4 @@
#endif /* CONFIG_THUMB2_KERNEL */

-#ifdef CONFIG_ARM_ASM_UNIFIED
- -
- */
- /* If the unified assembly syntax isn't used (in ARM mode), these
-  macros expand to an empty string
- */
-#endif __ASSEMBLY__
- .macro, cond
- .endm
- .macroitt, cond
- .endm
- .macroite, cond
- .endm
- .macroittt, cond
- .endm
- .macroitte, cond
- .endm
- .macroitett, cond
- .endm
- .macroittee, cond
- .endm
- .macroitttt, cond
- .endm
- .macroittte, cond
- .endm
- .macroitttet, cond
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- .macroittee, cond
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- .macroitte, cond
- .endm
- .macroitte, cond
- .endm
- .macroitteet, cond
- .endm
- .macroittee, cond
- .endm
- .macroitteet, cond
- .endm
- .macroittee, cond
- .endm
- #else/* !__ASSEMBLY__ */
- __asm__(
- ".macroit, cond\n"
- ".endm\n"
- ".macroitt, cond\n"
- ".endm\n"
- ".macroitte, cond\n"
- ".endm\n"
- ".macroitett, cond\n"
- ".endm\n"
- ".macroittee, cond\n"
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- ".macroittee, cond\n"
- ".endm\n"
- ".macroitteet, cond\n"
- ".endm\n"
- ".macroittee, cond\n"
- ".endm\n"
-
 /*--------------------------------------------------------------------------
 * (0 -> msp; 1 -> psp). Bits [1:0] are fixed to 0b01.
 *--------------------------------------------------------------------------*/

#define EXC_RET_STACK_MASK		0x00000004
#define EXC_RET_THREADMODE_PROCESSSTACK		(3 << 2)

/* Cache related definitions */

 /*--------------------------------------------------------------------------
 * Cache related definitions */
 /*--------------------------------------------------------------------------*/

void arm_install_vdso(struct mm_struct *mm, unsigned long addr);

-extern char vdso_start, vdso_end;
-extern unsigned int vdso_total_pages;

/* CONFIG_VDSO */

 /*--------------------------------------------------------------------------
 * may not have MVFR regs
 *--------------------------------------------------------------------------*/

ldrtmp, =elf_hwcaps @
ldrtmp, [tmp, #0]
tsttmp, #HWCAP_VFPD32
-lldclnlp11, cr0, [base],#32*4 @ FLDMIA D ase!, {d16-d31}
+lldclnlp11, cr0, [base],#32*4 @ FLDMIA D ase!, {d16-d31}
addeq\base, \base, #32*4  @ step over unused register space
#else
VFPFMXR\tmp, MVFR0  @ Media and VFP Feature Register 0
and\tmp, \tmp, #MVFR0_A_SIMD_MASK  @ A_SIMD field
cmp\tmp, #2  @ 32 x 64bit registers?
ldceql\p11, cr0, [\base],#32*4  @ FLDMIAD \base!, {d16-d31}
+ldceql\p11, cr0, [\base],#32*4  @ FLDMIAD \base!, {d16-d31}
adne\base, \base, #32*4  @ step over unused register space
#endif
#endif
@@ -53,13 +53,13 @@
ldr\tmp, =elf_hwcap  @ may not have MVFR regs
ldr\tmp, [\tmp, #0]
tst\tmp, #HWCAP_VFPD32
-stcnel\p11, cr0, [\base],#32*4  @ FSTMIAD \base!, {d16-d31}
+stclne\p11, cr0, [\base],#32*4  @ FSTMIAD \base!, {d16-d31}
addeq\base, \base, #32*4  @ step over unused register space
#else
VFPFMXR\tmp, MVFR0  @ Media and VFP Feature Register 0
and\tmp, \tmp, #MVFR0_A_SIMD_MASK  @ A_SIMD field
cmp\tmp, #2  @ 32 x 64bit registers?
-stcanel\p11, cr0, [\base],#32*4  @ FSTMIAD \base!, {d16-d31}
+stclne\p11, cr0, [\base],#32*4  @ FSTMIAD \base!, {d16-d31}
addeq\base, \base, #32*4  @ step over unused register space
#endif
#endif
--- linux-4.15.0.orig/arch/arm/include/uapi/asm/kvm.h
+++ linux-4.15.0/arch/arm/include/uapi/asm/kvm.h
@@ -186,6 +186,12 @@
#define KVM_REG_ARM_VFP_FPINST0x1009
#define KVM_REG_ARM_VFP_FPINST20x100A

+/* KVM-as-firmware specific pseudo-registers */
+﻿#define KVM_REG_ARM_FW(0x0014 << KVM_REG_ARM_COPROC_SHIFT)
+﻿#define KVM_REG_ARM_FW_REG(r)(KVM_REG_ARM | KVM_REG_SIZE_U64 |
+ KVM_REG_ARM_FW | ((r) & 0xffff))
+﻿#define KVM_REG_ARM_PSCI_VERSIONKVM_REG_ARM_FW_REG(0)
+
+/* Device Control API: ARM VGIC */
+﻿#define KVM_DEV_ARM_VGIC_GRP_ADDR	0
+﻿#define KVM_DEV_ARM_VGIC_GRP_DIST_REGS	1
--- linux-4.15.0.orig/arch/arm/kernel/Makefile
+++ linux-4.15.0/arch/arm/kernel/Makefile
@@ -17,10 +17,14 @@
 # Object file lists.
 obj-y:= elf.o entry-common.o irq.o opcodes.o \\n - process.o ptrace.o reboot.o return_address.o \\n
+ process.o ptrace.o reboot.o \ 
  setup.o signal.o sigreturn_codes.o \ 
  stacktrace.o sys_arm.o time.o traps.o

+ifneq ($(CONFIG_ARM_UNWIND),y)
+obj-$(CONFIG_FRAME_POINTER)+= return_address.o
+endif
+
+ obj-$(CONFIG_ATAGS)+= atags_parse.o
 obj-$(CONFIG_ATAGS_PROC)+= atags_proc.o
 obj-$(CONFIG_DEPRECATED_PARAM_STRUCT) += atags_compat.o
 @ @ .31,6 +35,7 @@
 obj-y+= entry-armv.o
 endif

+obj-$(CONFIG_MMU)+= bugs.o
 obj-$(CONFIG_CPU_IDLE)+= cpuidle.o
 obj-$(CONFIG_ISA_DMA_API)+= dma.o
 obj-$(CONFIG_FIQ)+= fiq.o fiqasm.o
 --- linux-4.15.0.orig/arch/arm/kernel/asm-offsets.c
 +++ linux-4.15.0/arch/arm/kernel/asm-offsets.c
 @ @ -18,6 +18,7 @@
 #include <linux/kvm_host.h>
 #endif
 #include <asm/cacheflush.h>
 +#include <asm/kexec-internal.h>
 #include <asm/glue-df.h>
 #include <asm/glue-pf.h>
 #include <asm/mach/arch.h>
 @ @ -29,6 +30,7 @@
 #include <asm/vdso_datapage.h>
 #include <asm/hardware/cache-l2x0.h>
 #include <linux/kbuild.h>
 +#include <linux/arm-smccc.h>
 #include "signal.h"

 /*
 @ @ -169,6 +171,8 @@
 DEFINE(SLEEP_SAVE_SP_PHYS,offsetof(struct sleep_save_sp, save_ptr_stash_phys));
 DEFINE(SLEEP_SAVE_SP_VIRT,offsetof(struct sleep_save_sp, save_ptr_stash));
 #endif
 + DEFINE(ARM_SMCCC_QUIRK_ID_OFFS,offsetof(struct arm_smccc_quirk, id));
 + DEFINE(ARM_SMCCC_QUIRK_STATE_OFFS,offsetof(struct arm_smccc_quirk, state));
 BLANK();
 DEFINE(DMA_BIDIRECTIONAL,DMA_BIDIRECTIONAL);
 DEFINE(DMA_TO_DEVICE,DMA_TO_DEVICE);
 @ @ -198,5 +202,9 @@
 DEFINE(MPU_RGN_DRSR,offsetof(struct mpu_rgn, drsr));
DEFINE(MPU_RGN_DRACR, offsetof(struct mpu_rgn, dracr));

+ DEFINE(KEXEC_START_ADDR, offsetof(struct kexec_relocate_data, kexec_start_address));
+ DEFINE(KEXEC_INDIR_PAGE, offsetof(struct kexec_relocate_data, kexec_indirection_page));
+ DEFINE(KEXEC_MACH_TYPE, offsetof(struct kexec_relocate_data, kexec_mach_type));
+ DEFINE(KEXEC_R2, offsetof(struct kexec_relocate_data, kexec_r2));
    return 0;
}
--- linux-4.15.0.orig/arch/arm/kernel/bugs.c
+++ linux-4.15.0/arch/arm/kernel/bugs.c
@@ -0,0 +1,18 @@
+// SPDX-Identifier: GPL-2.0
+#include <linux/init.h>
+#include <asm/bugs.h>
+#include <asm/proc-fns.h>
+
+void check_other_bugs(void)
+{
+    +ifdef MULTI_CPU
+    +if (cpu_check_bugs)
+    +cpu_check_bugs();
+    +#endif
+    +}
+
+void __init check_bugs(void)
+{
+    +check_writebuffer_bugs();
+    +check_other_bugs();
+    +}
--- linux-4.15.0.orig/arch/arm/kernel/entry-armv.S
+++ linux-4.15.0/arch/arm/kernel/entry-armv.S
@@ -30,6 +30,7 @@
#include <asm/unistd.h>
#include <asm/tls.h>
#include <asm/system_info.h>
+include <asm/uaccess-asm.h>
#include "entry-header.S"
#include <asm/entry-macro-multi.S>
@@ -186,15 +187,7 @@
      stmia r7, {r2 - r6}
      get_thread_info tsk
-    ldr r0, [tsk, #TI_ADDR_LIMIT]
-    movr1, #TASK_SIZE
-    str r1, [tsk, #TI_ADDR_LIMIT]
-    str r0, [sp, #SVC_ADDR_LIMIT]
-
-uaccess_save r0
- if \uaccess
- uaccess_disable r0
- endif
+uaccess_entry tsk, r0, r1, r2, \uaccess

.if \trace
#ifdef CONFIG_TRACE_IRQFLAGS
--- linux-4.15.0.org/arch/arm/kernel/entry-common.S
+++ linux-4.15.0/arch/arm/kernel/entry-common.S
@@ -46,6 +46,7 @@
 * features make this path too inefficient.
 */
ret_fast_syscall:
+__ret_fast_syscall:
UNWIND(.fnstart)
UNWIND(.cantunwind)
disable_irq_notrace@ disable interrupts
@@ -75,6 +76,7 @@
 * r0 first to avoid needing to save registers around each C function call.
 */
ret_fast_syscall:
+__ret_fast_syscall:
UNWIND(.fnstart)
UNWIND(.cantunwind)
str	 r0, [sp, #S_R0 + S_OFF]! @ save returned r0
@@ -241,9 +243,7 @@
tst	 r10, #_TIF_SYSCALL_WORK@ are we tracing syscalls?
  bne__sys_trace
- cmp	 scno, #NR_syscalls@ check upper syscall limit
- badr0, ret_fast_syscall@ return address
- ldrccpc, [tbl, scno, lsl #2]@ call sys_* routine
+ invoke_syscall tbl, scno, r10, __ret_fast_syscall

cmpscno, #NR_syscalls@ check upper syscall limit
-badr1, ret_fast_syscall@ return address
-ldrcpc, [tbl, scno, lsl #2]@ call sys_* routine
+invoke_syscall tbl, scno, r10, __ret_fast_syscall

2:cmpscno, #(_ARM_NR_BASE - __NR_SYSCALL_BASE)
@@ -277,27 +277,20 @@
movr1, scno
addr0, sp, #S_OFF
blsyscall_trace_enter
-
-badr1, __sys_trace_return@ return address
-movscno, r0@ syscall number (possibly new)
-addr1, sp, #S_R0 + S_OFF@ pointer to regs
-cmpscno, #NR_syscalls@ check upper syscall limit
-ldmcciar1, {r0 - r6}@ have to reload r0 - r6
-stmcciasp, {r4, r5}@ and update the stack args
ldrcpc, [tbl, scn, lsl #2]@ call sys_* routine
+movscno, r0
+invoke_syscall tbl, scn, r10, __sys_trace_return, reload=1
cmpscno, #-1@ skip the syscall?
bne2b
addsp, sp, #S_OFF@ restore stack
-bret_slow_syscall

-__sys_trace_return:
-str0, [sp, #S_R0 + S_OFF]@ save returned r0
+__sys_trace_return_nosave:
+enable_irq_notrace
movr0, sp
blysyscall_trace_exit
bret_slow_syscall

-__sys_trace_return_nosave:
-enable_irq_notrace
+__sys_trace_return:
+str0, [sp, #S_R0 + S_OFF]@ save returned r0
movr0, sp
blysyscall_trace_exit
bret_slow_syscall
@@ -362,6 +355,10 @@
bicscno, r0, #__NR_OABI_SYSCALL_BASE
cmpscno, #__NR_syscall - __NR_SYSCALL_BASE
cmpnscno, #NR_syscalls@ check range
+#ifdef CONFIG_CPU_SPECTRE
+movhsscnco, #0
+csdb
+#endif
stmloiasp, {r5, r6}@ shuffle args
movlor0, r1
movlor1, r2
--- linux-4.15.0.org/abrarm/kernel/entry-header.S
+++ linux-4.15.0/archarm/kernel/entry-header.S
@@ -6,6 +6,7 @@
#include <asm/asm-offsets.h>
#include <asm/errno.h>
#include <asm/thread_info.h>
+###include <asm/uaccess-asm.h>
#include <asm/v7m.h>

@ Bad Abort numbers
@@ -127,7 +128,8 @@>
*/
.macro v7m_exception_slow_exit ret_r0
cpsid
-ldr\r, =EXC_RET_THREADMODE_PROCESSSTACK
+ldr\r, =exc_ret
+ldr\r, [lr]

@ read original r12, sp, lr, pc and xPSR
addr12, sp, #S_IP
@@ @ -216,9 +218,7 @@
blne	trace_hardirqs_off
@endif
-ldr1, [sp, #SVC_ADDR_LIMIT]
-uaccess_restore
-str1, [tsk, #TI_ADDR_LIMIT]
+uaccess_exit tsk, r0, r1

#ifndef CONFIG_THUMB2_KERNEL
@ ARM mode SVC restore
@@ @ -262,9 +262,7 @@
@ on the stack remains correct).
@
.macro svc_exit_via_fiq
-ldr\r, [sp, #SVC_ADDR_LIMIT]
-uaccess_restore
-str1, [tsk, #TI_ADDR_LIMIT]
+uaccess_exit tsk, r0, r1
#ifndef CONFIG_THUMB2_KERNEL
@ ARM mode restore
movr0, sp
@@ @ -378,6 +376,31 @@
#endif
.endm

.macro invoke_syscall, table, nr, tmp, ret, reload=0
#ifdef CONFIG_CPU_SPECTRE
+mov\tmp, \nr
+cmp\tmp, #NR_syscalls@ check upper syscall limit
+movcs\tmp, #0
+csdb
+bad\r, \ret@ return address
.+if\reload
+addr1, sp, #S_R0 + S_OFF@ pointer to regs
+ldmcciar1, {r0 - r6}@ reload r0-r6
+stmcciasp, {r4, r5}@ update stack arguments
+.endif
+ldrcpec, [{table, \tmp, lsl #2}@ call sys_* routine
+#else
+cmp\nr, #NR_syscalls@ check upper syscall limit
+bad\r, \ret@ return address


```c
/*
 * These are the registers used in the syscall handler, and allow us to
 * have in theory up to 7 arguments to a function - r0 to r6.
--- linux-4.15.0.orig/arch/arm/kernel/entry-v7m.S
+++ linux-4.15.0/arch/arm/kernel/entry-v7m.S
@@ -146,3 +146,7 @@
 .rept CONFIG_CPU_V7M_NUM_IRQ
 .long __irq_entry @ External Interrupts
 .endr
+ .align 2
+ .globl exc_ret
+ exc_ret:
+ .space 4
--- linux-4.15.0.orig/arch/arm/kernel/ftrace.c
+++ linux-4.15.0/arch/arm/kernel/ftrace.c
@@ -96,9 +96,10 @@
 return 0;
 }

-static unsigned long ftrace_call_replace(unsigned long pc, unsigned long addr)
+static unsigned long ftrace_call_replace(unsigned long pc, unsigned long addr,
+ bool warn)
 { }
-return arm_gen_branch_link(pc, addr);
+return arm_gen_branch_link(pc, addr, warn);
 }

 static int ftrace_modify_code(unsigned long pc, unsigned long old,
 @@ -137,14 +138,14 @@
 int ret;

 pc = (unsigned long)&ftrace_call;
-new = ftrace_call_replace(pc, (unsigned long)func);
+new = ftrace_call_replace(pc, (unsigned long)func, true);

 ret = ftrace_modify_code(pc, 0, new, false);

 #ifdef CONFIG_DYNAMIC_FTRACE_WITH_REGS
 if (!ret) {
 ```
pc = (unsigned long)&ftrace_regs_call;
-new = ftrace_call_replace(pc, (unsigned long)func);
+new = ftrace_call_replace(pc, (unsigned long)func, true);

ret = ftrace_modify_code(pc, 0, new, false);
}
@@ -153,7 +154,7 @@
#ifdef CONFIG_OLD_MCOUNT
if (!ret) {
 pc = (unsigned long)&ftrace_call_old;
-new = ftrace_call_replace(pc, (unsigned long)func);
+new = ftrace_call_replace(pc, (unsigned long)func, true);

ret = ftrace_modify_code(pc, 0, new, false);
}
@@ -166,10 +167,22 @@
{
 unsigned long new, old;
 unsigned long ip = rec->ip;
+unsigned long aaddr = adjust_address(rec, addr);
+struct module *mod = NULL;
+
+#ifdef CONFIG_ARM_MODULE_PTLS
+mod = rec->arch.mod;
+#endif

old = ftrace_nop_replace(rec);

-old = ftrace_call_replace(ip, adjust_address(rec, old_addr));
+old = ftrace_call_replace(ip, adjust_address(rec, old_addr), true);
-new = ftrace_call_replace(ip, adjust_address(rec, addr));
+new = ftrace_call_replace(ip, adjust_address(rec, addr), true);

return ftrace_modify_code(rec->ip, old, new, true);
}
@@ -182,9 +195,9 @@
unsigned long new, old;
 unsigned long ip = rec->ip;
-old = ftrace_call_replace(ip, adjust_address(rec, old_addr));
+old = ftrace_call_replace(ip, adjust_address(rec, old_addr), true);
-old = ftrace_call_replace(ip, adjust_address(rec, old_addr));
+old = ftrace_call_replace(ip, adjust_address(rec, old_addr), true);

-new = ftrace_call_replace(ip, adjust_address(rec, addr));
+new = ftrace_call_replace(ip, adjust_address(rec, addr), true);
return ftrace_modify_code(rec->ip, old, new, true);
}
@@ -194,12 +207,29 @@
int ftrace_make_nop(struct module *mod,
    struct dyn_ftrace *rec, unsigned long addr)
{
    unsigned long aaddr = adjust_address(rec, addr);
    unsigned long ip = rec->ip;
    unsigned long old;
    unsigned long new;
    int ret;

-old = ftrace_call_replace(ip, adjust_address(rec, addr));
+#ifdef CONFIG_ARM_MODULE_PLTS
+/* mod is only supplied during module loading */
+if (!mod)
+    mod = rec->arch.mod;
+else
+    rec->arch.mod = mod;
+endif
+
+old = ftrace_call_replace(ip, aaddr,
+    !IS_ENABLED(CONFIG_ARM_MODULE_PLTS) || !mod);
+#elseif CONFIG_ARM_MODULE_PLTS
+if ('old' && mod) {
+    aaddr = get_module_plt(mod, ip, aaddr);
+    old = ftrace_call_replace(ip, aaddr, true);
+}
+endif
+
+new = ftrace_nop_replace(rec);
+ret = ftrace_modify_code(ip, old, new, true);

@@ -207,7 +237,7 @@
if (ret == -EINVAL && addr == MCOUNT_ADDR) {
    rec->arch.old_mcount = true;

-old = ftrace_call_replace(ip, adjust_address(rec, addr));
+old = ftrace_call_replace(ip, adjust_address(rec, addr), true);
new = ftrace_nop_replace(rec);
ret = ftrace_modify_code(ip, old, new, true);
}
@@ -227,9 +257,7 @@
    unsigned long frame_pointer)
{
    unsigned long return_hooker = (unsigned long) &return_to_handler;
-

unsigned long old;
-int err;

if (unlikely(atomic_read(&current->tracing_graph_pause)))
return;
@@ -237,21 +265,8 @@
old = *parent;
*parent = return_hooker;

-trace.func = self_addr;
-trace.depth = current->curr_ret_stack + 1;
-
-/* Only trace if the calling function expects to */
-if (!ftrace_graph_entry(&trace)) {
  *parent = old;
  return;
  -}
  -
  -err = ftrace_push_return_trace(old, self_addr, &trace.depth,
  - frame_pointer, NULL);
  -if (err == -EBUSY) {
  +if (function_graph_enter(old, self_addr, frame_pointer, NULL))
  +*parent = old;
  +return;
  -}
  -}

#define CONFIG_DYNAMIC_FTRACE
--- linux-4.15.0.orig/arch/arm/kernel/head-common.S
+++ linux-4.15.0/arch/arm/kernel/head-common.S
@@ -144,6 +144,9 @@

#ifdef CONFIG_DYNAMIC_FTRACE
   .size __mmap_switched_data, . - __mmap_switched_data

+__FINIT
+.text
+
/*
 * This provides a C-API version of __lookup_processor_type
 */
@@ -155,9 +158,6 @@
lldfdsp!, {r4 - r6, r9, pc}
ENDPROC(lookup_processor_type)

-__FINIT
-.text
-
/*
* Read processor ID register (CP#15, CR0), and look up in the linker-built
  * supported processor list. Note that we can't use the absolute addresses
--- linux-4.15.0.orig/arch/arm/kernel/head.S
+++ linux-4.15.0/arch/arm/kernel/head.S
@@ -675,11 +675,7 @@
bcc1b
bxlr
#else
-#ifdef CONFIG_CPU_ENDIAN_BE8
-moveqr0, #0x00004000@ set bit 22, mov to mvn instruction
-#else
-moveqr0, #0x400000@ set bit 22, mov to mvn instruction
-#endif
 b2f
1:ldr, [r7, r3]
#endif CONFIG_CPU_ENDIAN_BE8
@@ -688,7 +684,7 @@
tstip, #0x000f0000@ check the rotation field
 orrneip, ip, r6, isl #24 @ mask in offset bits 31-24
 biceqip, ip, #0x00004000 @ clear bit 22
-orreqip, ip, r0 @ mask in offset bits 7-0
+orreqip, ip, r0, ror #8 @ mask in offset bits 7-0
#else
 bicip, ip, #0x000000ff
 tstip, #0xf000@ check the rotation field
--- linux-4.15.0.orig/arch/arm/kernel/hw_breakpoint.c
+++ linux-4.15.0/arch/arm/kernel/hw_breakpoint.c
@@ -688,26 +688,68 @@
arch_install_hw_breakpoint(bp);
}

+/*
+ * Arm32 hardware does not always report a watchpoint hit address that matches
+ * one of the watchpoints set. It can also report an address "near" the
+ * watchpoint if a single instruction access both watched and unwatched
+ * addresses. There is no straight-forward way, short of disassembling the
+ * offending instruction, to map that address back to the watchpoint. This
+ * function computes the distance of the memory access from the watchpoint as a
+ * heuristic for the likelyhood that a given access triggered the watchpoint.
+ *
+ * See this same function in the arm64 platform code, which has the same
+ * problem.
+ *
+ * The function returns the distance of the address from the bytes watched by
+ * the watchpoint. In case of an exact match, it returns 0.
+ */
+static u32 get_distance_from_watchpoint(unsigned long addr, u32 val,
+struct arch_hw_breakpoint_ctrl *ctrl)
+{  
+u32 wp_low, wp_high;  
+u32 lens, lene;  
+  
+ lens = __ffs(ctrl->len);  
+ lene = __fls(ctrl->len);  
+  
+ wp_low = val + lens;  
+ wp_high = val + lene;  
+  
+ if (addr < wp_low)  
+ return wp_low - addr;  
+ else if (addr > wp_high)  
+ return addr - wp_high;  
+ else  
+ return 0;  
+}  
+  
+static int watchpoint_fault_on_uaccess(struct pt_regs *regs,  
+ struct arch_hw_breakpoint *info)  
+{  
+return !user_mode(regs) && info->ctrl.privilege == ARM_BREAKPOINT_USER;  
+}  
+  
+static void watchpoint_handler(unsigned long addr, unsigned int fsr,  
+ struct pt_regs *regs)  
+{  
-int i, access;  
-u32 val, ctrl_reg, alignment_mask;  
-int i, access, closest_match = 0;  
-u32 min_dist = -1, dist;  
-u32 val, ctrl_reg;  
struct perf_event *wp, **slots;  
struct arch_hw_breakpoint *info;  
struct arch_hw_breakpoint_ctrl ctrl;  

slots = this_cpu_ptr(wp_on_reg);  

+/*  
+ * Find all watchpoints that match the reported address. If no exact  
+ * match is found. Attribute the hit to the closest watchpoint.  
+ */  
+rcu_read_lock();  
for (i = 0; i < core_num_wrps; ++i) {  
-rcu_read_lock();  
-  
wp = slots[i];  
-  
if (wp == NULL)  
-}  
-rcu_read_unlock();  
rcu_read_unlock();  
}  
}
-goto unlock;
+continue;

-info = counter_arch_bp(wp);
/*
 * The DFAR is an unknown value on debug architectures prior
 * to 7.1. Since we only allow a single watchpoint on these
 @@ -716,50 +758,69 @@
 */
if (debug_arch < ARM_DEBUG_ARCH_V7_1) {
  BUG_ON(i > 0);
+  info = counter_arch_bp(wp);
  info->trigger = wp->attr.bp_addr;
} else {
-  if (info->ctrl.len == ARM_BREAKPOINT_LEN_8)
-    alignment_mask = 0x7;
-  else
-    alignment_mask = 0x3;
-  /* Check if the watchpoint value matches. */
-  val = read_wb_reg(ARM_BASE_WVR + i);
-  if (val != (addr & ~alignment_mask))
-    goto unlock;
-  /* Possible match, check the byte address select. */
-  ctrl_reg = read_wb_reg(ARM_BASE_WCR + i);
-  decode_ctrl_reg(ctrl_reg, &ctrl);
-  if (!((1 << (addr & alignment_mask)) & ctrl.len))
-    goto unlock;
-  /* Check that the access type matches. */
  if (debug_exception_updates_fsr()) {
    access = (fsr & ARM_FSR_ACCESS_MASK) ?
      HW_BREAKPOINT_W : HW_BREAKPOINT_R;
    if (!((access & hw_breakpoint_type(wp))))
      goto unlock;
    +continue;
  }
+  val = read_wb_reg(ARM_BASE_WVR + i);
+  ctrl_reg = read_wb_reg(ARM_BASE_WCR + i);
+  decode_ctrl_reg(ctrl_reg, &ctrl);
+  dist = get_distance_from_watchpoint(addr, val, &ctrl);
+  if (dist < min_dist) {
+    min_dist = dist;
+    closest_match = i;
+  }
+/* Is this an exact match? */
if (dist != 0)
    continue;
/* We have a winner. */
info = counter_arch_bp(wp);
info->trigger = addr;
}

pr_debug("watchpoint fired: address = 0x%x\n", info->trigger);
/*
 * If we triggered a user watchpoint from a uaccess routine,
 * then handle the stepping ourselves since userspace really
 * can't help us with this.
 */
if (watchpoint_fault_on_uaccess(regs, info))
    goto step;

perf_bp_event(wp, regs);

/*
 * If no overflow handler is present, insert a temporary
 * mismatch breakpoint so we can single-step over the
 * watchpoint trigger.
 * Defer stepping to the overflow handler if one is installed.
 * Otherwise, insert a temporary mismatch breakpoint so that
 * we can single-step over the watchpoint trigger.
 */
if (!is_default_overflow_handler(wp))
    continue;
step:
    enable_single_step(wp, instruction_pointer(regs));

if (min_dist > 0 && min_dist != -1) {
    /* No exact match found. */
    wp = slots[closest_match];
    info = counter_arch_bp(wp);
    info->trigger = addr;
    pr_debug("watchpoint fired: address = 0x%x\n", info->trigger);
    perf_bp_event(wp, regs);
    if (is_default_overflow_handler(wp))
        enable_single_step(wp, instruction_pointer(regs));
    -unlock:
    -rcu_read_unlock();
}
+rcu_read_unlock();
}

static void watchpoint_single_step_handler(unsigned long pc)
@@ -830,7 +891,7 @@
    info->trigger = addr;
    pr_debug("breakpoint fired: address = 0x%x\n", addr);
    perf_bp_event(bp, regs);
-    if (!bp->overflow_handler)
+    if (is_default_overflow_handler(bp))
        enable_single_step(bp, addr);
    goto unlock;
}
--- linux-4.15.0.orig/arch/arm/kernel/hyp-stub.S
+++ linux-4.15.0/arch/arm/kernel/hyp-stub.S
@@ -159,10 +159,9 @@
#if !defined(ZIMAGE) && defined(CONFIG_ARM_ARCH_TIMER)
    @ make CNTP_* and CNTPCT accessible from PL1
    mrp15, 0, r7, c0, c1, 1 @ ID_PFR1
    -lsr7, #16
-    -andr7, #0xf
-    -cmp7, #1
-    -bne1f
+    -ubfxr7, r7, #16, #4
+    -teqr7, #0
+    -beq1f
    mrp15, 4, r7, c14, c1, 0 @ CNTHCTL
    orrr7, r7, #3 @ PL1PCEN | PL1PCTEN
    mrp15, 4, r7, c14, c1, 0 @ CNTHCTL
    @ @ -159,10 +159,9 @@
    @ Check whether GICv3 system registers are available
    mrp15, 0, r7, c0, c1, 1 @ ID_PFR1
    ubfxr7, r7, #28, #4
-    -cmpr7, #1
-    -bne2f
+    -teqr7, #0
+    -beq2f

    @ Enable system register accesses
    mrp15, 4, r7, c12, c9, 5 @ ICC_HSRE
--- linux-4.15.0.orig/arch/arm/kernel/insn.c
+++ linux-4.15.0/arch/arm/kernel/insn.c
@@ -3,8 +3,9 @@
 #include <linux/kernel.h>
 #include <asm/opcodes.h>

- static unsigned long
- __arm_gen_branch_thumb2(unsigned long pc, unsigned long addr, bool link)
+static unsigned long __arm_gen_branch_thumb2(unsigned long pc,
+    unsigned long addr, bool link,
+    bool warn)
{
    unsigned long s, j1, j2, i1, i2, imm10, imm11;
    unsigned long first, second;
    @@ -12,7 +13,7 @@
        offset = (long)addr - (long)(pc + 4);
        if (offset < -16777216 || offset > 16777214) {
            -WARN_ON_ONCE(1);
            +WARN_ON_ONCE(warn);
            return 0;
        }
    }
    @@ -33,8 +34,8 @@
        return __opcode_thumb32-compose(first, second);
    }

    -static unsigned long
    -__arm_gen_branch_arm(unsigned long pc, unsigned long addr, bool link)
    +static unsigned long __arm_gen_branch_arm(unsigned long pc, unsigned long addr,
    +    bool link, bool warn)
    {
        unsigned long opcode = 0xea000000;
        long offset;
        @@ -44,7 +45,7 @@
            offset = (long)addr - (long)(pc + 8);
            if (unlikely(offset < -33554432 || offset > 33554428)) {
                -WARN_ON_ONCE(1);
                +WARN_ON_ONCE(warn);
                return 0;
            }
        }
        @@ -54,10 +55,10 @@
        }

        unsigned long
        -__arm_gen_branch(unsigned long pc, unsigned long addr, bool link)
        +__arm_gen_branch(unsigned long pc, unsigned long addr, bool link, bool warn)
        {
            if (IS_ENABLED(CONFIG_THUMB2_KERNEL))
                -return __arm_gen_branch_thumb2(pc, addr, link);
                +return __arm_gen_branch_thumb2(pc, addr, link, warn);
            else
                -return __arm_gen_branch_arm(pc, addr, link);
                +return __arm_gen_branch_arm(pc, addr, link, warn);
```c
#include <linux/smp.h>
#include <linux/init.h>
#include <linux/seq_file.h>
#include <linux/ratelimit.h>
#include <linux/errno.h>
#include <linux/list.h>
#include <linux/kallsyms.h>

return nr_irqs;
}
#endif

#ifdef CONFIG_HOTPLUG_CPU
static bool migrate_one_irq(struct irq_desc *desc)
{
    struct irq_data *d = irq_desc_get_irq_data(desc);
    struct irq_data *d = irq_desc_get_irq_data(desc);
    const struct cpumask *affinity = irq_data_get_affinity_mask(d);
    struct irq_chip *c;
    bool ret = false;
    /*
     * If this is a per-CPU interrupt, or the affinity does not
     * include this CPU, then we have nothing to do.
     */
    if (irqd_is_per_cpu(d) || !cpumask_test_cpu(smp_processor_id(), affinity))
        return false;
    if (cpumask_any_and(affinity, cpu_online_mask) >= nr_cpu_ids) {
        affinity = cpu_online_mask;
        ret = true;
    }
    c = irq_data_get_irq_chip(d);
    if (!c->irq_set_affinity)
        pr_debug("IRQ%u: unable to set affinity\n", d->irq);
    else if (c->irq_set_affinity(d, affinity, false) == IRQ_SET_MASK_OK && ret)
        cpumask_copy(irq_data_get_affinity_mask(d), affinity);
    return ret;
}
#endif

/*
 * The current CPU has been marked offline. Migrate IRQs off this CPU.
 * If the affinity settings do not allow other CPUs, force them onto any
```
void migrate_irqs(void)
{
    unsigned int i;
    struct irq_desc *desc;
    unsigned long flags;

    local_irq_save(flags);

    for_each_irq_desc(i, desc) {
        bool affinity_broken;

        raw_spin_lock(&desc->lock);
        affinity_broken = migrate_one_irq(desc);
        raw_spin_unlock(&desc->lock);

        if (affinity_broken)
            pr_warn_ratelimited("IRQ%i no longer affine to CPU%i\n", i, smp_processor_id());
    }

    local_irq_restore(flags);
}

--- linux-4.15.0.orig/arch/arm/kernel/machine_kexec.c
+++ linux-4.15.0/arch/arm/kernel/machine_kexec.c
@@ -15,6 +15,7 @@
 #include <asm/pgalloc.h>
 #include <asm/mmu_context.h>
 #include <asm/cacheflush.h>
+#include <asm/kexec-internal.h>
 #include <asm/fncpy.h>
 #include <asm/mach-types.h>
 #include <asm/smp_plat.h>
 @@ -24,11 +25,6 @@
 extern void relocate_new_kernel(void);
 extern const unsigned int relocate_new_kernel_size;

-extern unsigned long kexec_start_address;
-extern unsigned long kexec_indirection_page;
-extern unsigned long kexec_mach_type;
-extern unsigned long kexec_boot_atags;
-
 static atomic_t waiting_for_crash_ipi;
set_cpu_online(smp_processor_id(), false);
atomic_dec(&waiting_for_crash_ipi);
-while (1)
+
+while (1) {
    cpu_relax();
+    wfe();
+}
+
+void crash_smp_send_stop(void)
+{
+static int cpus_stopped;
+unsigned long msecs;
+
+if (cpus_stopped)
+return;
+
+atomic_set(&waiting_for_crash_ipi, num_online_cpus() - 1);
+smmp_call_function(machine_crash_nonpanic_core, NULL, false);
+msecs = 1000; /* Wait at most a second for the other cpus to stop */
+
+while ((atomic_read(&waiting_for_crash_ipi) > 0) && msecs) {
+    mdelay(1);
+    msecs--;
+}
+
+if (atomic_read(&waiting_for_crash_ipi) > 0)
+pr_warn("Non-crashing CPUs did not react to IPI\n");
+
+cpus_stopped = 1;
}

void machine_kexec_mask_interrupts(void)

void machine_crash_shutdown(struct pt_regs *regs)
{
-unsigned long msecs;
-
-local_irq_disable();
-
-atomic_set(&waiting_for_crash_ipi, num_online_cpus() - 1);
-smmp_call_function(machine_crash_nonpanic_core, NULL, false);
-msecs = 1000; /* Wait at most a second for the other cpus to stop */
-while ((atomic_read(&waiting_for_crash_ipi) > 0) && msecs) {
-mdelay(1);
msecs--;
-
-if (atomic_read(&waiting_for_crash_ipi) > 0)
-pr_warn("Non-crashing CPUs did not react to IPI\n");
crash_smp_send_stop();
crash_save_cpu(regs, smp_processor_id());
machine_kexec_mask_interrupts();
void machine_kexec(struct kimage *image)
{
unsigned long page_list, reboot_entry_phys;
+struct kexec_relocate_data *data;
void (*reboot_entry)(void);
void *reboot_code_buffer;

reboot_code_buffer = page_address(image->control_code_page);

-/* Prepare parameters for reboot_code_buffer*/
-set_kernel_text_rw();
-kexec_start_address = image->start;
-kexec_indirection_page = page_list;
-kexec_mach_type = machine_arch_type;
-kexec_boot_atags = image->arch.kernel_r2;
-
-/* copy our kernel relocation code to the control code page */
reboot_entry = fncpy(reboot_code_buffer,
   &relocate_new_kernel,
   relocate_new_kernel_size);

+data = reboot_code_buffer + relocate_new_kernel_size;
+data->kexec_start_address = image->start;
+data->kexec_indirection_page = page_list;
+data->kexec_mach_type = machine_arch_type;
+data->kexec_r2 = image->arch.kernel_r2;
+
-/* get the identity mapping physical address for the reboot code */
reboot_entry_phys = virt_to_idmap(reboot_entry);

--- linux-4.15.0.orig/arch/arm/kernel/module-plts.c
+++ linux-4.15.0/arch/arm/kernel/module-plts.c
@@ -7,6 +7,7 @@
*/

#include <linux/elf.h>
```c
#include <linux/ftrace.h>
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/sort.h>
#include <asm/cache.h>
#include <asm/opcodes.h>

#define PLT_ENT_STRIDE L1_CACHE_BYTES
#define PLT_ENT_COUNT (PLT_ENT_STRIDE / sizeof(u32))
#define PLT_ENT_SIZE (sizeof(struct plt_entries) / PLT_ENT_COUNT)

#ifdef CONFIG_THUMB2_KERNEL
#define PLT_ENT_LDR __opcode_to_mem_thumb32(0xf8dff000 | 
                                 (PLT_ENT_STRIDE - 4))
#endif

static const u32 fixed_plts[] = {
#ifdef CONFIG_DYNAMIC_FTRACE
  FTRACE_ADDR,
  MCTOUNT_ADDR,
#endif
};

static bool in_init(const struct module *mod, unsigned long loc)
{
    return loc - (u32)mod->init_layout.base < mod->init_layout.size;
}

static void prealloc_fixed(struct mod_plt_sec *pltsec, struct plt_entries *plt)
{
    int i;
    if (!ARRAY_SIZE(fixed_plts) || pltsec->plt_count)
        return;
    pltsec->plt_count = ARRAY_SIZE(fixed_plts);
    for (i = 0; i < ARRAY_SIZE(plt->ldr); ++i)
        plt->ldr[i] = PLT_ENT_LDR;
    BUILD_BUG_ON(sizeof(fixed_plts) > sizeof(plt->lit));
    memcpy(plt->lit, fixed_plts, sizeof(fixed_plts));
}
```
u32 get_module_plt(struct module *mod, unsigned long loc, Elf32_Addr val)
{
    struct mod_plt_sec *pltsec = !in_init(mod, loc) ? &mod->arch.core :
        &mod->arch.init;
    struct plt_entries *plt;
    int idx;
+
    /* cache the address, ELF header is available only during module load */
    if (!pltsec->plt_ent)
        pltsec->plt_ent = (struct plt_entries *)pltsec->plt->sh_addr;
    plt = pltsec->plt_ent;
-
    struct plt_entries *plt = (struct plt_entries *)pltsec->plt->sh_addr;
    -int idx = 0;
    +realloc_fixed(pltsec, plt);
    +
    for (idx = 0; idx < ARRAY_SIZE(fixed_plts); ++idx)
        if (plt->lit[idx] == val)
            return (u32)&plt->ldr[idx];
    +idx = 0;
    /*
     * Look for an existing entry pointing to 'val'. Given that the
     * relocations are sorted, this will be the last entry we allocated.
     */
    int module_frob_arch_sections(Elf_Ehdr *ehdr, Elf_Shdr *sechdrs,
        char *secstrings, struct module *mod)
    {
        unsigned long core_plts = 0;
        unsigned long init_plts = 0;
        unsigned long core_plts = ARRAY_SIZE(fixed_plts);
        unsigned long init_plts = ARRAY_SIZE(fixed_plts);
        Elf32_Shdr *s, *sechdrs_end = sechdrs + ehdr->e_shnum;
        Elf32_Sym *syms = NULL;
        @ @ -247,6 +272,7 @ @
        mod->arch.core.plt->sh_size = round_up(core_plts * PLT_ENT_SIZE,
            sizeof(struct plt_entries));
        mod->arch.core.plt_count = 0;
        +mod->arch.core.plt_ent = NULL;
    }
    @ @ -191,8 +216,8 @ @
    mod->arch.init.plt->sh_type = SHT_NOBITS;
    mod->arch.init.plt->sh_flags = SHF_EXECDSTRING | SHF_ALLOC;
mod->arch.init.plt_ent = NULL;

pr_debug("%s: plt=%x, init.plt=%x\n", __func__,
    mod->arch.core.plt->sh_size, mod->arch.init.plt->sh_size);
--- linux-4.15.0.orig/arch/arm/kernel/patch.c
+++ linux-4.15.0/arch/arm/kernel/patch.c
@@ -16,7 +16,7 @@
    unsigned int insn;
};

-static DEFINE_SPINLOCK(patch_lock);
+static DEFINE_RAW_SPINLOCK(patch_lock);

static void __kprobes *patch_map(void *addr, int fixmap, unsigned long *flags)
@@ -33,7 +33,7 @@
    return addr;

    if (flags)
-    spin_lock_irqsave(&patch_lock, *flags);
+    raw_spin_lock_irqsave(&patch_lock, *flags);
    else
-    __acquire(&patch_lock);
+    __acquire(&patch_lock);

    @@ -48,7 +48,7 @@
    clear_fixmap(fixmap);

    if (flags)
-    spin_unlock_irqrestore(&patch_lock, *flags);
+    raw_spin_unlock_irqrestore(&patch_lock, *flags);
    else
-    __release(&patch_lock);
+    __release(&patch_lock);
}
--- linux-4.15.0.orig/arch/arm/kernel/ptrace.c
+++ linux-4.15.0/arch/arm/kernel/ptrace.c
@@ -228,8 +228,8 @@

    if (flags)
-    spin_lock_irqsave(&patch_lock, *flags);
+    raw_spin_lock_irqsave(&patch_lock, *flags);
    else
-    __acquire(&patch_lock);
+    __acquire(&patch_lock);

    --- linux-4.15.0.orig/arch/arm/kernel/relocate_kernel.S
+++ linux-4.15.0/arch/arm/kernel/relocate_kernel.S
@@ -228,8 +228,8 @@

    --- linux-4.15.0.orig/arch/arm/kernel/relocate_kernel.S
+++ linux-4.15.0/arch/arm/kernel/relocate_kernel.S

ENTRY(relocate_new_kernel)

-ldr0,kexec_indirection_page
-ldr1,kexec_start_address
+adr7, relocate_new_kernel_end
+ldr0, [r7, #KEXEC_INDIR_PAGE]
+ldr1, [r7, #KEXEC_START_ADDR]

/*
 * If there is no indirection page (we are doing crashdumps)
 @@ -57,34 +59,16 @@
2:
/* Jump to relocated kernel */
 -mov lr,r1
 -mov r0,#0
 -ldr r1,kexec_mach_type
 -ldr r2,kexec_boot_atags
 - ARM(ret lr)
 - THUMB(bx lr)
 -
 -align
 -
 -.globl kexec_start_address
 -kexec_start_address:
 -.long0x0
 -
 -.globl kexec_indirection_page
 -kexec_indirection_page:
 -.long0x0
 -
 -.globl kexec_mach_type
 -kexec_mach_type:
 -.long0x0
 -
-//* phy addr of the atags for the new kernel */
 -globl kexec_boot_atags
 -kexec_boot_atags:
 -.long0x0

+movlr, r1
+movr0, #0
+ldr1, [r7, #KEXEC_MACH_TYPE]
+ldr2, [r7, #KEXEC_R2]
+ ARM(retlr)
+ THUMB(bx lr)

ENDPROC(relocate_new_kernel)

+.align 3
relocate_new_kernel_end:

.globl relocate_new_kernel_size
--- linux-4.15.0.orig/arch/arm/kernel/return_address.c
+++ linux-4.15.0/arch/arm/kernel/return_address.c
@@ -10,8 +10,6 @@*/
#include <linux/export.h>
#include <linux/ftrace.h>
-#if defined(CONFIG_FRAME_POINTER) && !defined(CONFIG_ARM_UNWIND)
#include <asm/stacktrace.h>
@@ -56,6 +54,4 @@
return NULL;
}
-#endif /* if defined(CONFIG_FRAME_POINTER) && !defined(CONFIG_ARM_UNWIND) */
-
EXPORT_SYMBOL_GPL(return_address);
--- linux-4.15.0.orig/arch/arm/kernel/setup.c
+++ linux-4.15.0/arch/arm/kernel/setup.c
@@ -115,6 +115,11 @@
#ifdef MULTI_CPU
struct processor processor __ro_after_init;
+#if defined(CONFIG_BIG_LITTLE) && defined(CONFIG_HARDEN_BRANCH_PREDICTOR)
+struct processor *cpu_vtable[NR_CPUS] = {
+ [0] = &processor,
+ [1];
+ #endif
+ #endif
#ifdef MULTI_TLB
struct cpu_tlb_fns cpu_tlb __ro_after_init;
@@ -542,9 +547,11 @@
/* In Thumb-2, msr with an immediate value is not allowed.
*/
#ifdef CONFIG_THUMB2_KERNEL
-#define PLC"r"
+#define PLC_l"l"
+#define PLC_r"r"
#else
-#define PLC"I"
+#define PLC_l"I"
+#define PLC_r"I"
#endif

/*
 @ @ -566,15 +573,15 @@
 "msrpsr_c, %9"
 :
 : "r" (stk),
 - PLC (PSR_F_BIT | PSR_I_BIT | IRQ_MODE),
 + PLC_r (PSR_F_BIT | PSR_I_BIT | IRQ_MODE),
   "I" (offsetof(struct stack, irq[0])),
 - PLC (PSR_F_BIT | PSR_I_BIT | ABT_MODE),
 + PLC_r (PSR_F_BIT | PSR_I_BIT | ABT_MODE),
   "I" (offsetof(struct stack, abt[0])),
 - PLC (PSR_F_BIT | PSR_I_BIT | UND_MODE),
 + PLC_r (PSR_F_BIT | PSR_I_BIT | UND_MODE),
   "I" (offsetof(struct stack, und[0])),
 - PLC (PSR_F_BIT | PSR_I_BIT | FIQ_MODE),
 + PLC_r (PSR_F_BIT | PSR_I_BIT | FIQ_MODE),
   "I" (offsetof(struct stack, fiq[0])),
 - PLC (PSR_F_BIT | PSR_I_BIT | SVC_MODE)
 + PLC_l (PSR_F_BIT | PSR_I_BIT | SVC_MODE)
 : "r14";
#endif
}

static void __init setup_processor(void)
/+*
+ * locate processor in the list of supported processor types. The linker
+ * builds this table for us from the entries in arch/arm/mm/proc-* .S
+ */
+struct proc_info_list *lookup_processor(u32 midr)
{
-struct proc_info_list *list;
+struct proc_info_list *list = lookup_processor_type(midr);

- *
- * locate processor in the list of supported processor
- * types. The linker builds this table for us from the
- * entries in arch/arm/mm/proc-*.S
- */
-list = lookup_processor_type(read_cpuid_id());
if (list) {
-pr_err("CPU configuration botched (ID %08x), unable to continue.
, - read_cpuid_id());
-while (1);
+pr_err("CPU%u: configuration botched (ID %08x), CPU halted
, + smp_processor_id(), midr);
+while (1)
+/* can’t use cpu_relax() here as it may require MMU setup */;
}
+return list;
+}
+
+static void __init setup_processor(void)
+{
+unsigned int midr = read_cpuid_id();
+struct proc_info_list *list = lookup_processor(midr);
+
+cpu_name = list->cpu_name;
+__cpu_architecture = __get_cpu_architecture();

-#ifdef MULTI_CPU
-processor = *list->proc;
-#endif
+init_proc_vtable(list->proc);
#ifdef MULTI_TLB
cpu_tlb = *list->tlb;
#endif
@@ -700,7 +712,7 @@
#endif
pr_info("CPU: %s [%08x] revision %d (ARMv%s), cr=%08lx\n",
-cpu_name, read_cpuid_id(), read_cpuid_id() & 15,
+list->cpu_name, midr, midr & 15,
proc_arch[cpu_architecture()], get_cr());

snprintf(init_utsname()->machine, __NEW_UTS_LEN + 1, "%s%c",
--- linux-4.15.0.orig/arch/arm/kernel/signal.c
+++ linux-4.15.0/arch/arm/kernel/signal.c
@@ -77,8 +77,6 @@
kframe->magic = IWMMXT_MAGIC;
kframe->size = IWMMXT_STORAGE_SIZE;
iwmmxt_task_copy(current_thread_info(), &kframe->storage);
-
err = __copy_to_user(frame, kframe, sizeof(*frame));
} else {

/*
 * For bug-compatibility with older kernels, some space
@@ -86,10 +84,14 @@
 * Set the magic and size appropriately so that properly
 * written userspace can skip it reliably:
 */
-__put_user_error(DUMMY_MAGIC, &frame->magic, err);
-__put_user_error(IWMMXT_STORAGE_SIZE, &frame->size, err);
+*kframe = (struct iwmmxt_sigframe) {
+  .magic = DUMMY_MAGIC,
+  .size = IWMMXT_STORAGE_SIZE,
+};

+err = __copy_to_user(frame, kframe, sizeof(*kframe));
+
return err;
}

@@ -135,37 +137,34 @@
static int preserve_vfp_context(struct vfp_sigframe __user *frame)
{
-const unsigned long magic = VFP_MAGIC;
-const unsigned long size = VFP_STORAGE_SIZE;
+struct vfp_sigframe kframe;
  int err = 0;

-__put_user_error(magic, &frame->magic, err);
-__put_user_error(size, &frame->size, err);
+memset(&kframe, 0, sizeof(kframe));
+kframe.magic = VFP_MAGIC;
+kframe.size = VFP_STORAGE_SIZE;

+err = vfp_preserve_user_clear_hwstate(&kframe.ufp, &kframe.ufp_exc);
if (err)
  return -EFAULT;
+
return err;

-return vfp_preserve_user_clear_hwstate(&frame->ufp, &frame->ufp_exc);
+return __copy_to_user(frame, &kframe, sizeof(kframe));
}

static int restore_vfp_context(char __user **auxp)
{
-struct vfp_sigframe __user *frame =
- (struct vfp_sigframe __user *)auxp;
- unsigned long magic;
- unsigned long size;
- int err = 0;
-
- __get_user_error(magic, &frame->magic, err);
- __get_user_error(size, &frame->size, err);
+ struct vfp_sigframe frame;
+ int err;

+ err = __copy_from_user(&frame, *auxp, sizeof(frame));
if (err)
- return -EFAULT;
- if (magic != VFP_MAGIC || size != VFP_STORAGE_SIZE)
-+ return err;
+ if (frame.magic != VFP_MAGIC || frame.size != VFP_STORAGE_SIZE)
return -EINVAL;

- *auxp += size;
- return vfp_restore_user_hwstate(&frame->ufp, &frame->ufp_exc);
+ *auxp += sizeof(frame);
+ return vfp_restore_user_hwstate(&frame.ufp, &frame.ufp_exc);
} }

@end
@@ -176,6 +175,7 @@

static int restore_sigframe(struct pt_regs *regs, struct sigframe __user *sf) {
    struct sigcontext context;
    char __user *aux;
    sigset_t set;
    int err;
    @@ -184,23 +184,26 @@
    if (err == 0)
        set_current_blocked(&set);

- __get_user_error(regs->ARM_r0, &sf->uc.uc_mcontext.arm_r0, err);
- __get_user_error(regs->ARM_r1, &sf->uc.uc_mcontext.arm_r1, err);
- __get_user_error(regs->ARM_r2, &sf->uc.uc_mcontext.arm_r2, err);
- __get_user_error(regs->ARM_r3, &sf->uc.uc_mcontext.arm_r3, err);
- __get_user_error(regs->ARM_r4, &sf->uc.uc_mcontext.arm_r4, err);
- __get_user_error(regs->ARM_r5, &sf->uc.uc_mcontext.arm_r5, err);
- __get_user_error(regs->ARM_r6, &sf->uc.uc_mcontext.arm_r6, err);
- __get_user_error(regs->ARM_r7, &sf->uc.uc_mcontext.arm_r7, err);
- __get_user_error(regs->ARM_r8, &sf->uc.uc_mcontext.arm_r8, err);
- __get_user_error(regs->ARM_r9, &sf->uc.uc_mcontext.arm_r9, err);
__get_user_error(regs->ARM_r10, &sf->uc.uc_mcontext.arm_r10, err);
__get_user_error(regs->ARM_fp, &sf->uc.uc_mcontext.arm_fp, err);
__get_user_error(regs->ARM_ip, &sf->uc.uc_mcontext.arm_ip, err);
__get_user_error(regs->ARM_sp, &sf->uc.uc_mcontext.arm_sp, err);
__get_user_error(regs->ARM_lr, &sf->uc.uc_mcontext.arm_lr, err);
__get_user_error(regs->ARM_pc, &sf->uc.uc_mcontext.arm_pc, err);
__get_user_error(regs->ARM_cpsr, &sf->uc.uc_mcontext.arm_cpsr, err);
err |= __copy_from_user(&context, &sf->uc.uc_mcontext, sizeof(context));
if (err == 0) {
    regs->ARM_r0 = context.arm_r0;
    regs->ARM_r1 = context.arm_r1;
    regs->ARM_r2 = context.arm_r2;
    regs->ARM_r3 = context.arm_r3;
    regs->ARM_r4 = context.arm_r4;
    regs->ARM_r5 = context.arm_r5;
    regs->ARM_r6 = context.arm_r6;
    regs->ARM_r7 = context.arm_r7;
    regs->ARM_r8 = context.arm_r8;
    regs->ARM_r9 = context.arm_r9;
    regs->ARM_r10 = context.arm_r10;
    regs->ARM_fp = context.arm_fp;
    regs->ARM_ip = context.arm_ip;
    regs->ARM_sp = context.arm_sp;
    regs->ARM_lr = context.arm_lr;
    regs->ARM_pc = context.arm_pc;
    regs->ARM_cpsr = context.arm_cpsr;
}
err |= !valid_user_regs(regs);

setup_sigframe(struct sigframe __user *sf, struct pt_regs *regs, sigset_t *set)
{
    struct aux_sigframe __user *aux;
    struct sigcontext context;
    int err = 0;

    __put_user_error(regs->ARM_r0, &sf->uc.uc_mcontext.arm_r0, err);
    __put_user_error(regs->ARM_r1, &sf->uc.uc_mcontext.arm_r1, err);
    __put_user_error(regs->ARM_r2, &sf->uc.uc_mcontext.arm_r2, err);
    __put_user_error(regs->ARM_r3, &sf->uc.uc_mcontext.arm_r3, err);
    __put_user_error(regs->ARM_r4, &sf->uc.uc_mcontext.arm_r4, err);
    __put_user_error(regs->ARM_r5, &sf->uc.uc_mcontext.arm_r5, err);
    __put_user_error(regs->ARM_r6, &sf->uc.uc_mcontext.arm_r6, err);
    __put_user_error(regs->ARM_r7, &sf->uc.uc_mcontext.arm_r7, err);
    __put_user_error(regs->ARM_r8, &sf->uc.uc_mcontext.arm_r8, err);
    __put_user_error(regs->ARM_r9, &sf->uc.uc_mcontext.arm_r9, err);
    __put_user_error(regs->ARM_r10, &sf->uc.uc_mcontext.arm_r10, err);
- __put_user_error(regs->ARM_fp, &sf->uc.uc_mcontext.arm_fp, err);
- __put_user_error(regs->ARM_ip, &sf->uc.uc_mcontext.arm_ip, err);
- __put_user_error(regs->ARM_sp, &sf->uc.uc_mcontext.arm_sp, err);
- __put_user_error(regs->ARM_lr, &sf->uc.uc_mcontext.arm_lr, err);
- __put_user_error(regs->ARM_pc, &sf->uc.uc_mcontext.arm_pc, err);
- __put_user_error(regs->ARM_cpsr, &sf->uc.uc_mcontext.arm_cpsr, err);
-
- __put_user_error(current->thread.trap_no, &sf->uc.uc_mcontext.trap_no, err);
- __put_user_error(current->thread.error_code, &sf->uc.uc_mcontext.error_code, err);
- __put_user_error(current->thread.address, &sf->uc.uc_mcontext.fault_address, err);
- __put_user_error(set->sig[0], &sf->uc.uc_mcontext.oldmask, err);
+context = (struct sigcontext) {
+  .arm_r0        = regs->ARM_r0,
+  .arm_r1        = regs->ARM_r1,
+  .arm_r2        = regs->ARM_r2,
+  .arm_r3        = regs->ARM_r3,
+  .arm_r4        = regs->ARM_r4,
+  .arm_r5        = regs->ARM_r5,
+  .arm_r6        = regs->ARM_r6,
+  .arm_r7        = regs->ARM_r7,
+  .arm_r8        = regs->ARM_r8,
+  .arm_r9        = regs->ARM_r9,
+  .arm_r10       = regs->ARM_r10,
+  .arm_fp        = regs->ARM_fp,
+  .arm_ip        = regs->ARM_ip,
+  .arm_sp        = regs->ARM_sp,
+  .arm_lr        = regs->ARM_lr,
+  .arm_pc        = regs->ARM_pc,
+  .arm_cpsr      = regs->ARM_cpsr,
+  .trap_no       = current->thread.trap_no,
+  .error_code    = current->thread.error_code,
+  .fault_address = current->thread.address,
+  .oldmask       = set->sig[0],
+};
+
+err |= __copy_to_user(&sf->uc.uc_mcontext, &context, sizeof(context));

err |= __copy_to_user(&sf->uc.uc_sigmask, set, sizeof(*set));

@@ -328,7 +336,7 @@
if (err == 0)
  err |= preserve_vfp_context(&aux->vfp);
@end
- __put_user_error(0, &aux->end_magic, err);
+err |= __put_user(0, &aux->end_magic);

return err;
/*
 * Set uc.uc_flags to a value which sc.trap_no would never have.
 */
-__put_user_error(0x5ac3c35a, &frame->uc.uc_flags, err);
+err = __put_user(0x5ac3c35a, &frame->uc.uc_flags);

err |= setup_sigframe(frame, regs, set);
if (err == 0)
@@ -511,8 +519,8 @@
@@ -682,18 +690,20 @@

addr = page_address(page);

+/* Poison the entire page */
+memset32(addr, __opcode_to_mem_arm(0xe7fddef1),
+ PAGE_SIZE / sizeof(u32));
+
+/* Give the signal return code some randomness */
+offset = 0x200 + (get_random_int() & 0x7fc);
signal_return_offset = offset;

-/*
- * Copy signal return handlers into the vector page, and
- * set sigreturn to be a pointer to these.
- */
+/* Copy signal return handlers into the page */
memcpy(addr + offset, sigreturn_codes, sizeof(sigreturn_codes));

-ptr = (unsigned long)addr + offset;
-flush_icache_range(ptr, ptr + sizeof(sigreturn_codes));
+/* Flush out all instructions in this page */
+ptr = (unsigned long)addr;
+flush_icache_range(ptr, ptr + PAGE_SIZE);

return page;
}
--- linux-4.15.0.orig/arch/arm/kernel/sleep.S
+++ linux-4.15.0/arch/arm/kernel/sleep.S
@@ -120,6 +120,14 @@
 .text
 .align
 
+#ifdef CONFIG_MCPM
+.arm
+THUMB(thumb)
+ENTRY(cpu_resume_no_hyp)
+ARM_BE8(setend be)@ ensure we are in BE mode
+bno_hyp
+#endif
+
+#ifdef CONFIG_MMU
.arm
ENTRY(cpu_resume_arm)
@@ -135,6 +143,7 @@
bl __hyp_stub_install_secondary
@endif
safe_svcmode_maskall r1
+no_hyp:
movr1, #0
ALT_SMP(mrc p15, 0, r0, c0, c0, 5)
ALT_UP_B(1f)
@@ -164,6 +173,9 @@
#ifdef CONFIG_MMU
ENDPROC(cpu_resume_arm)
@endif
+#ifdef CONFIG_MCPM
+ENDPROC(cpu_resume_no_hyp)
+#endif

.align 2
_sleep_save_sp:
--- linux-4.15.0.orig/arch/arm/kernel/smccc-call.S
+++ linux-4.15.0/arch/arm/kernel/smccc-call.S
@@ -12,7 +12,9 @@
 */
 #include <linux/linkage.h>
 +#include <asm/arm-smccc.h>

 +#include <asm/asm-offsets.h>
 #include <asm/opcodes-sec.h>
 #include <asm/opcodes-virt.h>
 #include <asm/unwind.h>
@@ -36,7 +38,14 @@
UNWIND(save(r4-r7))
ldmr12, [r4-r7]
\in\str
-pop{r4-r7}
+ldr4, [sp, #36]
+cmpr4, #0
+beq1f// No quirk structure
+ldr r5, [r4, #ARM_SMCCC_QUIRK_ID_OFFS]
+cmp r5, #ARM_SMCCC_QUIRK_QCOM_A6
+bnel1f// No quirk present
+str6, [r4, #ARM_SMCCC_QUIRK_STATE_OFFS]
+1:pop{r4-r7}
ldrr12, [sp, #(4 * 4)]
stmr12, [r0-r3]
bxr
--- linux-4.15.0.orig/arch/arm/kernel/smp.c
+++ linux-4.15.0/arch/arm/kernel/smp.c
@@ -31,6 +31,7 @@
#include <linux/irq_work.h>
#include <linux/atomic.h>
+#include <asm/bugs.h>
#include <asm/smp.h>
#include <asm/cacheflush.h>
#include <asm/cpu.h>
@@ -41,6 +42,7 @@
#include <asm/mmu_context.h>
#include <asm/pgtable.h>
#include <asm/pgalloc.h>
+#include <asm/procinfo.h>
#include <asm/processor.h>
#include <asm/sections.h>
#include <asm/TLBflush.h>
@@ -74,6 +76,10 @@
IPI_CPU_STOP,
IPI_IRQ_WORK,
IPI_COMPLETION,
+/*
+ * CPU_BACKTRACE is special and not included in NR_IPI
+ * or tracable with trace_ipi_*
+ */
IPI_CPU_BACKTRACE,
/*
 * SGI8-15 can be reserved by secure firmware, and thus may
@@ -101,6 +107,30 @@
#endif
}
+if defined(CONFIG_BIG_LITTLE) && defined(CONFIG_HARDEN_BRANCH_PREDICTOR)
+static int secondary_biglittle_prepare(unsigned int cpu)
+{
+if (!cpu_vtable[cpu])
+cpu_vtable[cpu] = kzalloc(sizeof(*cpu_vtable[cpu]), GFP_KERNEL);
+return cpu_vtable[cpu] ? 0 : -ENOMEM;
+
+static void secondary_biglittle_init(void)
+{
+init_proc_vtable(lookup_processor(read_cpuid_id())->proc);
+}
+#else
+static int secondary_biglittle_prepare(unsigned int cpu)
+{
+0;
+}
+
+static void secondary_biglittle_init(void)
+{
+}
+#endif
+
int __cpu_up(unsigned int cpu, struct task_struct *idle)
{
int ret;
@@ -108,6 +138,10 @@
if (!smp_ops.smp_boot_secondary)
return -ENOSYS;
+ret = secondary_biglittle_prepare(cpu);
+if (ret)
+return ret;
+
/*
 * We need to tell the secondary core where to find
 * its stack and the page tables.
@@ -224,7 +258,7 @@
 _IRQs();
+irq_migrate_all_off_this_cpu();

/*
 * Flush user cache and TLB mappings, and then remove this CPU
@@ -359,6 +393,8 @@
struct mm_struct *mm = &init_mm;
unsigned int cpu;

+secondary_biglittle_init();
+
/ *
* The identity mapping is uncached (strongly ordered), so
* switch away from it before attempting any exclusive accesses.
@@ -402,6 +438,9 @@
* before we continue - which happens after __cpu_up returns.
 */
set_cpu_online(cpu, true);
+
+check_other_bugs();
+
+complete(&cpu_running);

local_irq_enable();
@@ -567,8 +606,10 @@
local_fiq_disable();
local_irq_disable();

-while (1)
+while (1) {
    cpu_relax();
    wfe();
+}
}

static DEFINE_PER_CPU(struct completion *, cpu_completion);
@@ -687,6 +728,21 @@
pr_warn("SMP: failed to stop secondary CPUs\n");
}

+/* In case panic() and panic() called at the same time on CPU1 and CPU2,
+ * and CPU 1 calls panic_smp_self_stop() before crash_smp_send_stop()
+ * CPU1 can’t receive the ipi irqs from CPU2, CPU1 will be always online,
+ * kdump fails. So split out the panic_smp_self_stop() and add
+ * set_cpu_online(smp_processor_id(), false).
+ */
+void panic_smp_self_stop(void)
+{
+pr_debug("CPU %u will stop doing anything useful since another CPU has panicked\n", 
+    smp_processor_id());
+set_cpu_online(smp_processor_id(), false);
+while (1)
+cpu_relax();
+}
static void raise_nmi(cpumask_t *mask)
{
    -smp_cross_call(mask, IPI_CPU_BACKTRACE);
    +__smp_cross_call(mask, IPI_CPU_BACKTRACE);
}

void arch_trigger_cpumask_backtrace(const cpumask_t *mask, bool exclude_self)
--- linux-4.15.0.orig/arch/arm/kernel/stacktrace.c
+++ linux-4.15.0/arch/arm/kernel/stacktrace.c
@@ -20,6 +20,19 @@
 * A simple function epilogue looks like this:
 * ldm sp, {fp, sp, pc}
 * +
 * When compiled with clang, pc and sp are not pushed. A simple function
 * prologue looks like this when built with clang:
 * +
 * stmdb {..., fp, lr}
 * addfp, sp, #x
 * subsp, sp, #y
 * +
 * A simple function epilogue looks like this when built with clang:
 * +
 * subsp, fp, #x
 * ldm {..., fp, pc}
 * +
 *
 * Note that with framepointer enabled, even the leaf functions have the same
 * prologue and epilogue, therefore we can ignore the LR value in this case.
 */
@@ -32,6 +45,16 @@
    low = frame->sp;
    high = ALIGN(low, THREAD_SIZE);

+#ifdef CONFIG_CC_IS_CLANG
+/* check current frame pointer is within bounds */
+if (fp < low + 4 || fp > high - 4)
+    return -EINVAL;
++frame->sp = frame->fp;
++frame->fp = *(unsigned long *)(fp);
++frame->pc = frame->lr;
++frame->lr = *(unsigned long *)(fp + 4);
/* check current frame pointer is within bounds */
if (fp < low + 12 || fp > high - 4)
    return -EINVAL;
#endif

frame->fp = *(unsigned long *)(fp - 12);
frame->sp = *(unsigned long *)(fp - 8);
frame->pc = *(unsigned long *)(fp - 4);
#endif

return 0;
}

--- linux-4.15.0.orig/arch/arm/kernel/suspend.c
+++ linux-4.15.0/arch/arm/kernel/suspend.c
@@ -1,8 +1,10 @@

// SPDX-License-Identifier: GPL-2.0
#include <linux/ftrace.h>
#include <linux/init.h>
#include <linux/slab.h>
#include <linux/mm_types.h>
+include <asm/bugs.h>
#include <asm/cacheflush.h>
#include <asm/idmap.h>
#include <asm/pgalloc.h>
@@ -26,16 +28,27 @@
return -EINVAL;

/*
 *
+ * Function graph tracer state gets inconsistent when the kernel
+ * calls functions that never return (aka suspend finishers) hence
+ * disable graph tracing during their execution.
+ */
+pause_graph_tracing();
+
+/*
 *
+ * Provide a temporary page table with an identity mapping for
+ * the MMU-enable code, required for resuming. On successful
+ * resume (indicated by a zero return code), we need to switch
+ * back to the correct page tables.
+ */
ret = __cpu_suspend(arg, fn, __mpidr);
+
+unpause_graph_tracing();
+
+if (ret == 0) {
    cpu_switch_mm(mm->pgd, mm);
    local_flush_bp_all();

local_flush_tlb_all();
+check_other_bugs();
}

return ret;
@@ -44,7 +57,13 @@
int cpu_suspend(unsigned long arg, int (*fn)(unsigned long))
{
    u32 __mpidr = cpu_logical_map(smp_processor_id());
-    return __cpu_suspend(arg, fn, __mpidr);
+    int ret;
+
+    pause_graph_tracing();
+    ret = __cpu_suspend(arg, fn, __mpidr);
+    unpause_graph_tracing();
+
+    return ret;
}
#define idmap_pgd NULL
#endif
--- linux-4.15.0.orig/arch/arm/kernel/sys_oabi-compat.c
+++ linux-4.15.0/arch/arm/kernel/sys_oabi-compat.c
@@ -277,6 +277,7 @@
int maxevents, int timeout)
{
    struct epoll_event *kbuf;
+    struct oabi_epoll_event e;
    mm_segment_t fs;
    long ret, err, i;

@@ -295,8 +296,11 @@
    set_fs(fs);
    err = 0;
    for (i = 0; i < ret; i++) {
-        __put_user_error(kbuf[i].events, &events->events, err);
-        __put_user_error(kbuf[i].data, &events->data, err);
+        e.events = kbuf[i].events;
+        e.data = kbuf[i].data;
+        err = __copy_to_user(events, &e, sizeof(e));
+        if (err)
+            break;
+    events++;
    }
    kfree(kbuf);
@@ -329,9 +333,11 @@
    return -ENOMEM;
    err = 0;
    for (i = 0; i < nsops; i++) {
__get_user_error(sops[i].sem_num, &tsops->sem_num, err);
__get_user_error(sops[i].sem_op, &tsops->sem_op, err);
__get_user_error(sops[i].sem_flg, &tsops->sem_flg, err);
+struct oabi_sembuf osb;
+err |= __copy_from_user(&osb, tsops, sizeof(osb));
sops[i].sem_num = osb.sem_num;
sops[i].sem_op = osb.sem_op;
sops[i].sem_flg = osb.sem_flg;
tsops++;
}
if (timeout) {
--- linux-4.15.0.orig/arch/arm/kernel/traps.c
+++ linux-4.15.0/arch/arm/kernel/traps.c
@@ -19,6 +19,7 @@
#include <linux/uaccess.h>
#include <linux/hardirq.h>
#include <linux/kdebug.h>
+#include <linux/kprobes.h>
#include <linux/module.h>
#include <linux/kexec.h>
#include <linux/bug.h>
@@ -417,7 +418,8 @@
raw-spin-unlock-irqrestore(&undef_lock, flags);
}

-static int call_undef_hook(struct pt_regs *regs, unsigned int instr)
+static nokprobe_inline
+int call_undef_hook(struct pt_regs *regs, unsigned int instr)
{
 struct undef_hook *hook;
 unsigned long flags;
@@ -490,6 +492,7 @@
arm_notify_die("Oops - undefined instruction", regs, &info, 0, 6);
}
+NOKPROBE_SYMBOL(do_undefinstr)

/*
 * Handle FIQ similarly to NMI on x86 systems.
--- linux-4.15.0.orig/arch/arm/kernel/unwind.c
+++ linux-4.15.0/arch/arm/kernel/unwind.c
@@ -93,7 +93,7 @@
static const struct unwind_idx *__origin_unwind_idx;
extern const struct unwind_idx __stop_unwind_idx[];

-static DEFINE_SPINLOCK(unwind_lock);
+static DEFINE_RAW_SPINLOCK(unwind_lock);
static LIST_HEAD(unwind_tables);
/* Convert a prel31 symbol to an absolute address */
@@ -201,7 +201,7 @@
/* module unwind tables */
struct unwind_table *table;

-spin_lock_irqsave(&unwind_lock, flags);
+raw_spin_lock_irqsave(&unwind_lock, flags);
list_for_each_entry(table, &unwind_tables, list) {
    if (addr >= table->begin_addr &&
        addr < table->end_addr) {
@@ -213,7 +213,7 @@
    break;
    }
    }
-spin_unlock_irqrestore(&unwind_lock, flags);
+raw_spin_unlock_irqrestore(&unwind_lock, flags);
}

pr_debug("%s: idx = %p\n", __func__, idx);
@@ -529,9 +529,9 @@
tab->begin_addr = text_addr;
tab->end_addr = text_addr + text_size;

-spin_lock_irqsave(&unwind_lock, flags);
+raw_spin_lock_irqsave(&unwind_lock, flags);
list_add_tail(&tab->list, &unwind_tables);
-spin_unlock_irqrestore(&unwind_lock, flags);
+raw_spin_unlock_irqrestore(&unwind_lock, flags);
}

return tab;
}@@ -543,9 +543,9 @@
if (!tab)
    return;

-spin_lock_irqsave(&unwind_lock, flags);
+raw_spin_lock_irqsave(&unwind_lock, flags);
list_del(&tab->list, &unwind_tables);
-spin_unlock_irqrestore(&unwind_lock, flags);
+raw_spin_unlock_irqrestore(&unwind_lock, flags);

kfree(tab);
}
static struct page **vdso_text_pagelist;

+extern char vdso_start[], vdso_end[];
+
/\* Total number of pages needed for the data and text portions of the VDSO. */
unsigned int vdso_total_pages __ro_after_init;

@@ -102,6 +104,8 @@
*/
np = of_find_compatible_node(NULL, NULL, "arm,armv7-timer");
if (!np)
+np = of_find_compatible_node(NULL, NULL, "arm,armv8-timer");
+if (!np)
goto out_put;

if (of_property_read_bool(np, "arm.cpu-registers-not-fw-configured"))
@@ -197,13 +201,12 @@
unsigned int text_pages;
int i;

-if (memcmp(&vdso_start, "\177ELF", 4)) {
+if (memcmp(vdso_start, "\177ELF", 4)) {
 pr_err("VDSO is not a valid ELF object!
return -ENOEXEC;
}

text_pages = (&vdso_end - &vdso_start) >> PAGE_SHIFT;
-pr_debug("vdso: %i text pages at base %p\n", text_pages, &vdso_start);
+text_pages = (vdso_end - vdso_start) >> PAGE_SHIFT;

/\* Allocate the VDSO text pagelist */
vds...
return 0;
}
--- linux-4.15.0.orig/arch/arm/kvm/coproc.c
+++ linux-4.15.0/arch/arm/kvm/coproc.c
@@ -574,13 +574,22 @@

static void reset_coproc_regs(struct kvm_vcpu *vcpu,
-      const struct coproc_reg *table, size_t num)
+      const struct coproc_reg *table, size_t num,
+      unsigned long *bmap)
{
  unsigned long i;

  for (i = 0; i < num; i++)
    if (table[i].reset)
      if (table[i].reset) {
        int reg = table[i].reg;
+        table[i].reset(vcpu, &table[i]);
        if (reg > 0 && reg < NR_CP15_REGS) {
          set_bit(reg, bmap);
          if (table[i].is_64bit)
            set_bit(reg + 1, bmap);
        }
+      }
+    }
}

static struct coproc_params decode_32bit_hsr(struct kvm_vcpu *vcpu)
@@ -1355,17 +1364,15 @@
{
  size_t num;
  const struct coproc_reg *table;
-  /* Catch someone adding a register without putting in reset entry. */
-  memset(vcpu->arch.ctxt.cp15, 0x42, sizeof(vcpu->arch.ctxt.cp15));
+  DECLARE_BITMAP(bmap, NR_CP15_REGS) = { 0, };

  /* Generic chip reset first (so target could override). */
  -reset_coproc_regs(vcpu, cp15_regs, ARRAY_SIZE(cp15_regs));
  +reset_coproc_regs(vcpu, cp15_regs, ARRAY_SIZE(cp15_regs), bmap);

  table = get_target_table(vcpu->arch.target, &num);
  -reset_coproc_regs(vcpu, table, num);
  +reset_coproc_regs(vcpu, table, num, bmap);

  for (num = 1; num < NR_CP15_REGS; num++)
  -if (vcpu_cp15(vcpu, num) == 0x42424242)
-panic("Didn't reset vcpu_cp15(vcpu, %zi)", num);
+WARN(!test_bit(num, bmap),
     "Didn't reset vcpu_cp15(vcpu, %zi)", num);
}

--- linux-4.15.0.orig/arch/arm/kvm/guest.c
+++ linux-4.15.0/arch/arm/kvm/guest.c
@@ -22,6 +22,7 @@
 #include <linux/module.h>
 #include <linux/vmalloc.h>
 #include <linux/fs.h>
+#include <kvm/arm_psci.h>
 #include <asm/cputype.h>
 #include <linux/uaccess.h>
 #include <asm/kvm.h>
@@ -176,6 +177,7 @@
 unsigned long kvm_arm_num_regs(struct kvm_vcpu *vcpu)
 {
     return num_core_regs() + kvm_arm_num_coproc_regs(vcpu)
+#kvm_arm_get_fw_num_regs(vcpu)
     + NUM_TIMER_REGS;
 }
@@ -196,6 +198,11 @@
 uindices++;
 }

+ret = kvm_arm_copy_fw_reg_indices(vcpu, uindices);
+if (ret)
+    return ret;
+uindices += kvm_arm_get_fw_num_regs(vcpu);
+ret = copy_timer_indices(vcpu, uindices);
+if (ret)
+    return ret;
@@ -214,6 +221,9 @@
 if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_CORE)
     return get_core_reg(vcpu, reg);
+
+if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_FW)
+    return kvm_arm_get_fw_reg(vcpu, reg);
+    if (is_timer_reg(reg->id))
+        return get_timer_reg(vcpu, reg);
@@ -230,6 +240,9 @@
 if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_CORE)
     return set_core_reg(vcpu, reg);
+if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_FW)
+return kvm_arm_set_fw_reg(vcpu, reg);
+
+if (is_timer_reg(reg->id))
+return set_timer_reg(vcpu, reg);

--- linux-4.15.0.orig/arch/arm/kvm/handle_exit.c
+++ linux-4.15.0/arch/arm/kvm/handle_exit.c
@@ -21,7 +21,7 @@
#include <asm/kvm_emulate.h>
#include <asm/kvm_coproc.h>
#include <asm/kvm_mmu.h>
-#include <asm/kvm_psci.h>
+#include <kvm/arm_psci.h>
#include <trace/events/kvm.h>

#include "trace.h"
@@ -36,9 +36,9 @@
kvm_vcpu_hvc_get_imm(vcpu));
vcpu->stat.hvc_exit_stat++;

-ret = kvm_psci_call(vcpu);
+ret = kvm_hvc_call_handler(vcpu);
if (ret < 0) {
-kvm_inject_undefined(vcpu);
+vcpu_set_reg(vcpu, 0, ~0UL);
return 1;
}

@@ -47,7 +47,16 @@
static int handle_smc(struct kvm_vcpu *vcpu, struct kvm_run *run)
{
-kvm_inject_undefined(vcpu);
+/*
+ * "If an SMC instruction executed at Non-secure EL1 is
+ * trapped to EL2 because HCR_EL2.TSC is 1, the exception is a
+ * Trap exception, not a Secure Monitor Call exception [...]"
+ * We need to advance the PC after the trap, as it would
+ * otherwise return to the same address...
+ */
+vcpu_set_reg(vcpu, 0, ~0UL);
+kvm_skip_instr(vcpu, kvm_vcpu_trap_il_is32bit(vcpu));
return 1;
}
+++ linux-4.15.0/arch/arm/kvm/hyp/Makefile
@@ -7,6 +7,8 @@
KVM=../.././../virt/kvm

+CFLAGS_ARMV7VE := $(call cc-option, -march=armv7ve)
+obj-$(CONFIG_KVM_ARM_HOST) += $(KVM)/arm/hyp/vgic-v2-sr.o
obj-$(CONFIG_KVM_ARM_HOST) += $(KVM)/arm/hyp/vgic-v3-sr.o
obj-$(CONFIG_KVM_ARM_HOST) += $(KVM)/arm/hyp/timer-sr.o
@@ -15,7 +17,10 @@
obj-$(CONFIG_KVM_ARM_HOST) += cp15-sr.o
obj-$(CONFIG_KVM_ARM_HOST) += vfp.o
obj-$(CONFIG_KVM_ARM_HOST) += banked-sr.o
+CFLAGS_banked-sr.o += $(CFLAGS_ARMV7VE)
+
obj-$(CONFIG_KVM_ARM_HOST) += entry.o
obj-$(CONFIG_KVM_ARM_HOST) += hyp-entry.o
obj-$(CONFIG_KVM_ARM_HOST) += switch.o
+CFLAGS_switch.o += $(CFLAGS_ARMV7VE)
obj-$(CONFIG_KVM_ARM_HOST) += s2-setup.o
--- linux-4.15.0.orig/arch/arm/kvm/hyp/banked-sr.c
+++ linux-4.15.0/arch/arm/kvm/hyp/banked-sr.c
@@ -20,6 +20,10 @@
#include <asm/kvm_hyp.h>

+ /*
+ * gcc before 4.9 doesn’t understand -march=armv7ve, so we have to
+ * trick the assembler.
+ */
+ _asm__(".arch_extension virt");

void __hyp_text __banked_save_state(struct kvm_cpu_context *ctxt)
--- linux-4.15.0.orig/arch/arm/kvm/hyp/hyp-entry.S
+++ linux-4.15.0/arch/arm/kvm/hyp/hyp-entry.S
@@ @ -16,6 +16,7 @@
* Foundation, 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA.
*/
+
+#include <linux/arm-smccc.h>
#include <linux/linkage.h>
#include <asm/kvm_arm.h>
#include <asm/kvm_asm.h>
@@ @ -71,6 +72,90 @@
W(b)hyp_irq
W(b)hyp_fiq
+ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+align 5
+__kvm_hyp_vector_ic_inv:
+global __kvm_hyp_vector_ic_inv
+
+/
+ * We encode the exception entry in the bottom 3 bits of
+ * SP, and we have to guarantee to be 8 bytes aligned.
+ */
+W(add)sp, sp, #1/* Reset  7 */
+W(add)sp, sp, #1/* Undef  6 */
+W(add)sp, sp, #1/* Syscall  5 */
+W(add)sp, sp, #1/* Prefetch abort  4 */
+W(add)sp, sp, #1/* Data abort  3 */
+W(add)sp, sp, #1/* HVC  2 */
+W(add)sp, sp, #1/* IRQ  1 */
+W(nop)/* FIQ  0 */
+
+isb
+
+decode_vectors
+
+align 5
+__kvm_hyp_vector_bp_inv:
+global __kvm_hyp_vector_bp_inv
+
+/
+ * We encode the exception entry in the bottom 3 bits of
+ * SP, and we have to guarantee to be 8 bytes aligned.
+ */
+W(add)sp, sp, #1/* Reset  7 */
+W(add)sp, sp, #1/* Undef  6 */
+W(add)sp, sp, #1/* Syscall  5 */
+W(add)sp, sp, #1/* Prefetch abort  4 */
+W(add)sp, sp, #1/* Data abort  3 */
+W(add)sp, sp, #1/* HVC  2 */
+W(add)sp, sp, #1/* IRQ  1 */
+W(nop)/* FIQ  0 */
+
+isb
+
+decode_vectors:
+
+ifdef CONFIG_THUMB2_KERNEL
+/
+ * Yet another silly hack: Use VPIDR as a temp register.
* Thumb2 is really a pain, as SP cannot be used with most
* of the bitwise instructions. The vect_br macro ensures
* things gets cleaned-up.
+ */
+ mcr15, 4, r0, c0, c0, 0/* VPIDR */
+ movr0, sp
+ andr0, r0, #7
+ subsp, sp, r0
+ push{r1, r2}
+ movr1, r0
+ mcr15, 4, r0, c0, c0, 0/* VPIDR */
+ mcr15, 0, r2, c0, c0, 0/* MIDR */
+ mcr15, 4, r2, c0, c0, 0/* VPIDR */
+#endif
+
+ .macro vect_br val, targ
+ ARM(eorsp, sp, #val)
+ ARM(tstsp, #7)
+ ARM(eornesp, sp, #val)
+ THUMB(cmpr1, #val)
+ THUMB(popeq{r1, r2})
+ beq\targ
+.endm
+
+ vect_br0, hyp_fiq
+ vect_br1, hyp_irq
+ vect_br2, hyp_hvc
+ vect_br3, hyp_dabt
+ vect_br4, hyp_pabt
+ vect_br5, hyp_svc
+ vect_br6, hyp_undef
+ vect_br7, hyp_reset
+#endif
+
+ .macro invalid_vector label, cause
+ .align
+ \label:movr0, #cause
+ @@ -118,7 +203,7 @@
+ lsr r2, r2, #16
+ and r2, r2, #0xff
+ cmp r2, #0
- bneguest_trap@ Guest called HVC
+ bneguest_hvc_trap@ Guest called HVC
+
+ /*
+ * Getting here means host called HVC, we shift parameters and branch
bxip

l:
    push {lr}
+/
    /* Pushing r2 here is just a way of keeping the stack aligned to
    + * 8 bytes on any path that can trigger a HYP exception. Here,
    + * we may well be about to jump into the guest, and the guest
    + * exit would otherwise be badly decoded by our fancy
    + * "decode-exception-without-a-branch" code...
    + */
    push {r2, lr}
movlr, r0
movr0, r1
    @ @ -159,7 +251,21 @ @
    THUMB(orrlr, #1)
    blxlr @ Call the HYP function

    pop {lr}
+p op{r2, lr}
+eret
+
guest_hvc_trap:
+movwr2, #:lower16:ARM_SMCCC_ARCH_WORKAROUND_1
+movrt2, #:upper16:ARM_SMCCC_ARCH_WORKAROUND_1
+lchr0, [sp] @ Guest’s r0
+teq0, r2
+bneguest_trap
+addsp, sp, #12
+@ Returns:
+@ r0 = 0
+@ r1 = HSR value (perfectly predictable)
+@ r2 = ARM_SMCCC_ARCH_WORKAROUND_1
+movr0, #0
eret

guest_trap:
--- linux-4.15.0.orig/arch/arm/kvm/reset.c
+++ linux-4.15.0/arch/arm/kvm/reset.c
@@ -26,6 +26,7 @@
#include <asm/cputype.h>
#include <asm/kvm_arm.h>
#include <asm/kvm_coproc.h>
+#include <asm/kvm_emulate.h>

+#include <kvm/arm_arch_timer.h>
/* Reset CP15 registers */
kvm_reset_coproc(vcpu);

+/*
+ * Additional reset state handling that PSCI may have imposed on us.
+ * Must be done after all the sys_reg reset.
+ */
+if (READ_ONCE(vcpu->arch.reset_state.reset)) {
+unsigned long target_pc = vcpu->arch.reset_state.pc;
+
+/* Gracefully handle Thumb2 entry point */
+if (target_pc & 1) {
+target_pc &= ~1UL;
+vcpu_set_thumb(vcpu);
+}
+
+/* Propagate caller endianness */
+if (vcpu->arch.reset_state.be)
+kvm_vcpu_set_be(vcpu);
+
+vcpu_pc(vcpu) = target_pc;
+vcpu_set_reg(vcpu, 0, vcpu->arch.reset_state.r0);
+
+vcpu->arch.reset_state.reset = false;
+}
+
/* Reset arch_timer context */
return kvm_timer_vcpu_reset(vcpu);
}

ifeq ($($CONFIG_KERNEL_MODE_NEON),y)
- NEON_FLAGS := -mfloat-abi=softfp -mfpu=neon
+ NEON_FLAGS := -march=armv7-a -mfloat-abi=softfp -mfpu=neon
+CFLAGS_xor-neon.o += $(NEON_FLAGS)
+obj-$($CONFIG_XOR_BLOCKS)+= xor-neon.o
endif

ENTRY(name)
UNWIND(.fnstart)
andsip, r1, #3
-strneb r1, [ip] @ assert word-aligned
+strbne r1, [ip] @ assert word-aligned
movr2, #1
and3, r0, #31 @ Get bit offset
movr0, r0, lsr #5
@@ -32,7 +32,7 @@
ENTRY(name)
UNWIND(fnstart)
andsip, r1, #3
-strneb r1, [ip] @ assert word-aligned
+strbne r1, [ip] @ assert word-aligned
movr2, #1
and3, r0, #31 @ Get bit offset
movr0, r0, lsr #5
@@ -62,7 +62,7 @@
ENTRY(name)
UNWIND(fnstart)
andsip, r1, #3
-strneb r1, [ip] @ assert word-aligned
+strbne r1, [ip] @ assert word-aligned
and2, r0, #31
movr0, r0, lsr #5
movr3, #1
@@ -89,7 +89,7 @@
ENTRY(name)
UNWIND(fnstart)
andsip, r1, #3
-strneb r1, [ip] @ assert word-aligned
+strbne r1, [ip] @ assert word-aligned
and3, r0, #31
movr0, r0, lsr #5
save_and_disable_irqs ip
--- linux-4.15.0.orig/arch/arm/lib/copy_from_user.S
+++ linux-4.15.0/arch/arm/lib/copy_from_user.S
@@ -90,12 +90,17 @@
text
ENTRY(arm_copy_from_user)
+#ifdef CONFIG_CPU_SPECTRE
+get_thread_info r3
+ldr3, [r3, #TL_ADDR_LIMIT]
+uaccess_mask_range_ptr r1, r2, r3, ip
+#endif

#include "copy_template.S"

ENDPROC(arm_copy_from_user)
 ENTRY(__copy_to_user_std)
WEAK(arm_copy_to_user)
+#ifdef CONFIG_CPU_SPECTRE
+get_thread_info r3
+ldr3, [r3, #TI_ADDR_LIMIT]
+uaccess_mask_range_ptr r0, r2, r3, ip
+#endif

#include "copy_template.S"

@@ -108,4 +113,3 @@
rsbr0, r0, r2
copy_abort_end
.popsection
-
ENTRY(__get_user_2)
check_uaccess r0, 2, r1, r2, __get_user_bad
+#ifdef __LINUX_ARM_ARCH__ >= 6
+
+2: TUSER(ldrh)r2, [r0]
+
+#else
+
+#ifdef CONFIG_CPU_USE_DOMAINS
rb.reqip
2:ldbrt2, [r0], #1
@@ -55,9 +62,13 @@
#else
orrr2, rb, r2, lsl #8
#endif
+

+endif /* __LINUX_ARM_ARCH__ >= 6 */
+
mov r0, #0

retlr

ENDPROC(__get_user_2)

_ASM_NOKPROBE(__get_user_2)

ENTRY(__get_user_4)
check_uaccess r0, 4, r1, r2, __get_user_bad
@@ -65,6 +76,7 @@
mov r0, #0

retlr

ENDPROC(__get_user_4)

_ASM_NOKPROBE(__get_user_4)

ENTRY(__get_user_8)
check_uaccess r0, 8, r1, r2, __get_user_bad8
@@ -78,6 +90,7 @@
mov r0, #0

retlr

ENDPROC(__get_user_8)

_ASM_NOKPROBE(__get_user_8)

#ifdef __ARMEB__

ENTRY(__get_user_32t_8)
@@ -91,6 +104,7 @@
mov r0, #0

retlr

ENDPROC(__get_user_32t_8)

_ASM_NOKPROBE(__get_user_32t_8)

ENTRY(__get_user_64t_1)
check_uaccess r0, 1, r1, r2, __get_user_bad8
@@ -98,6 +112,7 @@
mov r0, #0

retlr

ENDPROC(__get_user_64t_1)

_ASM_NOKPROBE(__get_user_64t_1)

ENTRY(__get_user_64t_2)
check_uaccess r0, 2, r1, r2, __get_user_bad8
@@ -114,6 +129,7 @@
mov r0, #0

retlr

ENDPROC(__get_user_64t_2)

_ASM_NOKPROBE(__get_user_64t_2)

ENTRY(__get_user_64t_4)
check_uaccess r0, 4, r1, r2, __get_user_bad8
@@ -121,6 +137,7 @@
 mov	 r0, #0
 ret	 lr
ENDPROC(__get_user_64t_4)
+__ASM_NOKPROBE(__get_user_64t_4)
#endif

__get_user_bad8:
@@ -131,11 +148,15 @@
 ret	 lr
ENDPROC(__get_user_bad)
ENDPROC(__get_user_bad8)
+__ASM_NOKPROBE(__get_user_bad)
+__ASM_NOKPROBE(__get_user_bad8)

.pushsection __ex_table, "a"
.long 1b, __get_user_bad
.long 2b, __get_user_bad
+#.if __LINUX_ARM_ARCH__ < 6
.long 3b, __get_user_bad
+.endif
.long 4b, __get_user_bad
.long 5b, __get_user_bad8
.long 6b, __get_user_bad8
--- linux-4.15.0.orig/arch/arm/lib/putuser.S
+++ linux-4.15.0/arch/arm/lib/putuser.S
@@ -41,16 +41,13 @@
ENTRY(__put_user_2)
check_uaccess r0, 2, r1, ip, __put_user_bad
movip, r2, lsr #8
+.ifndef CONFIG_THUMB2_KERNEL
+.ifndef __ARMEB__
-2: TUSER(strb)r2, [r0]
-3: TUSER(strb)ip, [r0, #1]
+.if __LINUX_ARM_ARCH__ < 6
+  +2: TUSER(strh)r2, [r0]
+  +
+.else
-2: TUSER(strb)ip, [r0]
-3: TUSER(strb)r2, [r0, #1]
+.endif
-.else/* !CONFIG_THUMB2_KERNEL */
+  +movip, r2, lsr #8
+.ifndef __ARMEB__

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2: TUSER(strb)r2, [r0], #1
3: TUSER(strb)ip, [r0]
@@ -58,7 +55,8 @@
2: TUSER(strb)ip, [r0], #1
3: TUSER(strb)r2, [r0]
#endif
{-#endif/* CONFIG_THUMB2_KERNEL */
+
+#endif /* __LINUX_ARM_ARCH__ >= 6 */
movr0, #0
retr
ENDPROC(__put_user_2)
@@ -91,7 +89,9 @@
 .pushsection __ex_table, "a"
 .long 1b, __put_user_bad
 .long2b, __put_user_bad
+#if __LINUX_ARM_ARCH__ < 6
 .long3b, __put_user_bad
+#endif
 .long4b, __put_user_bad
 .long5b, __put_user_bad
 .long6b, __put_user_bad
--- linux-4.15.0.orig/arch/arm/lib/uaccess_with_memcpy.c
+++ linux-4.15.0/arch/arm/lib/uaccess_with_memcpy.c
@@ -152,7 +152,8 @@
 n = __copy_to_user_std(to, from, n);
 uaccess_restore(ua_flags);
 } else {
-+n = __copy_to_user_memcpy(to, from, n);
 } return n;
 }
--- linux-4.15.0.orig/arch/arm/lib/xor-neon.c
+++ linux-4.15.0/arch/arm/lib/xor-neon.c
@@ -14,7 +14,7 @@

 #ifndef __ARM_NEON__
-#error You should compile this file with '-mfloat-abi=softfp -mfpu=neon'
+#error You should compile this file with '-march=armv7-a -mfloat-abi=softfp -mfpu=neon'
#endif

/*
--- linux-4.15.0.orig/arch/arm/mach-at91/pm.c
+++ linux-4.15.0/arch/arm/mach-at91/pm.c
@@ -456,13 +456,13 @@
sram_pool = gen_pool_get(&pdev->dev, NULL);
if (!sram_pool) {
    pr_warn("%s: sram pool unavailable!\n", __func__);
    return;
    +goto out_put_device;
}

sram_base = gen_pool_alloc(sram_pool, at91_pm_suspend_in_sram_sz);
if (!sram_base) {
    pr_warn("%s: unable to alloc sram!\n", __func__);
    return;
    +goto out_put_device;
}

sram_pbase = gen_pool_virt_to_phys(sram_pool, sram_base);
@@ -470,12 +470,17 @@
at91_pm_suspend_in_sram_sz, false);
if (!at91_suspend_sram_fn) {
    pr_warn("SRAM: Could not map\n");
    -return;
    +goto out_put_device;
}

/* Copy the pm suspend handler to SRAM */
at91_suspend_sram_fn = fncpy(at91_suspend_sram_fn,
&at91_pm_suspend_in_sram, at91_pm_suspend_in_sram_sz);
+return;
+out_put_device:
+put_device(&pdev->dev);
+return;
}

static void __init at91_pm_backup_init(void)
@@ -511,13 +516,13 @@
np = of_find_compatible_node(NULL, NULL, "atmel,sama5d2-securam");
if (!np)
    -goto securam_fail;
    +goto securam_fail_no_ref_dev;

    pdev = of_find_device_by_node(np);
    of_node_put(np);
    if (!pdev) {
        pr_warn("%s: failed to find securam device!\n", __func__);
        -goto securam_fail;
        +goto securam_fail_no_ref_dev;
    }
sram_pool = gen_pool_get(&pdev->dev, NULL);
@@ -542,6 +547,8 @@
iounmap(pm_data.shdwc);
securam_fail:
+put_device(&pdev->dev);
+securam_fail_no_ref_dev:
iounmap(pm_data.sfrbu);
pm_data.sfrbu = NULL;

--- linux-4.15.0.orig/arch/arm/mach-cns3xxx/pcie.c
+++ linux-4.15.0/arch/arm/mach-cns3xxx/pcie.c
@@ -83,7 +83,7 @@
 } else /* remote PCI bus */
 base = cnspci->cfg1_regs + ((busno & 0xf) << 20);

-return base + (where & 0xffc) + (devfn << 12);
+return base + where + (devfn << 12);
 }

static int cns3xxx_pci_read_config(struct pci_bus *bus, unsigned int devfn,
--- linux-4.15.0.orig/arch/arm/mach-davinci/board-da830-evm.c
+++ linux-4.15.0/arch/arm/mach-davinci/board-da830-evm.c
@@ -205,12 +205,17 @@
-1
};

+#define DA830_MMCSD_WP_PIN		GPIO_TO_PIN(2, 1)
+#define DA830_MMCSD_CD_PIN		GPIO_TO_PIN(2, 2)
+
static struct gpiod_lookup_table mmc_gpios_table = {
 .dev_id = "da830-mmc.0",
 .table = {
 /* gpio chip 1 contains gpio range 32-63 */
-GPIO_LOOKUP("davinci_gpio.1", 2, "cd", GPIO_ACTIVE_LOW),
-GPIO_LOOKUP("davinci_gpio.1", 1, "wp", GPIO_ACTIVE_LOW),
+GPIO_LOOKUP("davinci_gpio.0", DA830_MMCSD_CD_PIN, "cd",
 + GPIO_ACTIVE_LOW),
+GPIO_LOOKUP("davinci_gpio.0", DA830_MMCSD_WP_PIN, "wp",
 + GPIO_ACTIVE_LOW),
 },
};

--- linux-4.15.0.orig/arch/arm/mach-davinci/board-da850-evm.c
+++ linux-4.15.0/arch/arm/mach-davinci/board-da850-evm.c
@@ -763,12 +763,17 @@
+#define DA850_MMCSD_CD_PIN		GPIO_TO_PIN(4, 0)
+#define DA850_MMCSD_WP_PIN		GPIO_TO_PIN(4, 1)
+
+static struct gpiod_lookup_table mmc_gpios_table = {
+    .dev_id = "da830-mmc.0",
+    .table = {
+        /* gpio chip 2 contains gpio range 64-95 */
+        -GPIO_LOOKUP("davinci_gpio.2", 0, "cd", GPIO_ACTIVE_LOW),
+        -GPIO_LOOKUP("davinci_gpio.2", 1, "wp", GPIO_ACTIVE_LOW),
+        +GPIO_LOOKUP("davinci_gpio.0", DA850_MMCSD_CD_PIN, "cd",
+            +GPIO_ACTIVE_LOW),
+        +GPIO_LOOKUP("davinci_gpio.0", DA850_MMCSD_WP_PIN, "wp",
+            +GPIO_ACTIVE_HIGH),
+    },
+};
@
@@ -1459,6 +1464,8 @@
if (ret)
    pr_warn("%s: dsp/rproc registration failed: %d\n",
        __func__, ret);
    +
    +regulator_has_full_constraints();
    }

#ifdef CONFIG_SERIAL_8250_CONSOLE
--- linux-4.15.0.orig/arch/arm/mach-davinci/board-dm355-evm.c
+++ linux-4.15.0/arch/arm/mach-davinci/board-dm355-evm.c
@@ -18,6 +18,7 @@
#include <linux/i2c.h>
#include <linux/gpio.h>
#include <linux/clk.h>
+#include <linux/dm9000.h>
#include <linux/video/2.h>
#include <media/i2c/tvp514x.h>
#include <linux/spi/spi.h>
@@ -168,11 +169,16 @@
+static struct dm9000_plat_data dm335evm_dm9000_platdata;
+static struct platform_device dm355evm_dm9000 = {
+    .name = "dm9000",
+    .id = -1,
+    .resource= dm355evm_dm9000_rsrc,
+    .num_resources= ARRAY_SIZE(dm355evm_dm9000_rsrc),
+};

+static struct dm9000_plat_data dm335evm_dm9000_platdata;
+static struct platform_device dm355evm_dm9000 = {
+    .name = "dm9000",
+    .id = -1,
+    .resource = dm355evm_dm9000_rsrc,
+    .num_resources = ARRAY_SIZE(dm355evm_dm9000_rsrc),
+};
+.dev= {
+.platform_data = &dm335evm_dm9000_platdata,
+},
};

static struct tvp514x_platform_data tvp5146_pdata = {
--- linux-4.15.0.orig/arch/arm/mach-davinci/board-dm646x-evm.c
+++ linux-4.15.0/arch/arm/mach-davinci/board-dm646x-evm.c
@@ -534,11 +534,12 @@
 .set_clock = set_vpif_clock,
 .subdevinfo = dm646x_vpif_subdev,
 .subdev_count = ARRAY_SIZE(dm646x_vpif_subdev),
+ .i2c_adapter_id = 1,
 .chan_config[0] = {
 .outputs = dm6467_ch0_outputs,
 .output_count = ARRAY_SIZE(dm6467_ch0_outputs),
 },
-.card_name = "DM646x EVM",
+.card_name = "DM646x EVM Video Display",
};

/**
@@ -676,6 +677,7 @@
 .setup_input_channel_mode = setup_vpif_input_channel_mode,
 .subdev_info = vpif_capture_sdev_info,
 .subdev_count = ARRAY_SIZE(vpif_capture_sdev_info),
+ .i2c_adapter_id = 1,
 .chan_config[0] = {
 .inputs = dm6467_ch0_inputs,
 .input_count = ARRAY_SIZE(dm6467_ch0_inputs),
@@ -696,6 +698,7 @@
 .fid_pol = 0,
 },
 },
+.card_name = "DM646x EVM Video Capture",
};

static void __init evm_init_video(void)
--- linux-4.15.0.orig/arch/arm/mach-davinci/board-omapl138-hawk.c
+++ linux-4.15.0/arch/arm/mach-davinci/board-omapl138-hawk.c
@@ -123,12 +123,16 @@
 -1
};

+#define DA850_HAWK_MMCSD_CD_PIN	GPIO_TO_PIN(3, 12)
+#define DA850_HAWK_MMCSD_WP_PIN	GPIO_TO_PIN(3, 13)
+
 static struct gpiod_lookup_table mmc_gpios_table = {


.dev_id = "da830-mmc.0",
.table = {
-/* CD: gpio3_12: gpio60: chip 1 contains gpio range 32-63*/
-GPIO_LOOKUP("davinci_gpio.1", 28, "cd", GPIO_ACTIVE_LOW),
-GPIO_LOOKUP("davinci_gpio.1", 29, "wp", GPIO_ACTIVE_LOW),
+GPIO_LOOKUP("davinci_gpio.0", DA850_HAWK_MMCSD_CD_PIN, "cd",
+    GPIO_ACTIVE_LOW),
+GPIO_LOOKUP("davinci_gpio.0", DA850_HAWK_MMCSD_WP_PIN, "wp",
+    GPIO_ACTIVE_LOW),
},
};

--- linux-4.15.0.orig/arch/arm/mach-davinci/devices-da8xx.c
+++ linux-4.15.0/arch/arm/mach-davinci/devices-da8xx.c
@@ -699,6 +699,9 @@
 .id		= 0,
 .num_resources = ARRAY_SIZE(da8xx_lcdc_resources),
 .resource = da8xx_lcdc_resources,
+ .dev		= {
+ .coherent_dma_mask = DMA_BIT_MASK(32),
+ }
};

int __init da8xx_register_lcdc(struct da8xx_lcdc_platform_data *pdata)
@@ -715,6 +718,46 @@
 },
 { /* interrupt */
 .start= IRQ_DA8XX_GPIO0,
+ .end= IRQ_DA8XX_GPIO0,
+ .flags= IORESOURCE_IRQ,
+ },
+{ 
+ .start= IRQ_DA8XX_GPIO1,
+ .end= IRQ_DA8XX_GPIO1,
+ .flags= IORESOURCE_IRQ,
+ },
+{ 
+ .start= IRQ_DA8XX_GPIO2,
+ .end= IRQ_DA8XX_GPIO2,
+ .flags= IORESOURCE_IRQ,
+ },
+{ 
+ .start= IRQ_DA8XX_GPIO3,
+ .end= IRQ_DA8XX_GPIO3,
+ .flags= IORESOURCE_IRQ,
+ },
+{ 
+ .start= IRQ_DA8XX_GPIO4,
+{ .start= IRQ_DA8XX_GPIO4, .end= IRQ_DA8XX_GPIO4, .flags= IORESOURCE_IRQ, }.
+{ .start= IRQ_DA8XX_GPIO5, .end= IRQ_DA8XX_GPIO5, .flags= IORESOURCE_IRQ, }.
+{ .start= IRQ_DA8XX_GPIO6, .end= IRQ_DA8XX_GPIO6, .flags= IORESOURCE_IRQ, }.
+{ .start= IRQ_DA8XX_GPIO7, .end= IRQ_DA8XX_GPIO7, .flags= IORESOURCE_IRQ, }.
+{ .start= IRQ_DA8XX_GPIO8, .end= IRQ_DA8XX_GPIO8, .flags= IORESOURCE_IRQ, }.

--- linux-4.15.0.orig/arch/arm/mach-davinci/dm355.c
+++ linux-4.15.0/arch/arm/mach-davinci/dm355.c
@@ -889,6 +889,36 @@}
 },

{"interrupt"/
 .start= IRQ_DM355_GPIOBNK0, .end= IRQ_DM355_GPIOBNK0, .flags= IORESOURCE_IRQ, }.
+{ .start= IRQ_DM355_GPIOBNK1, .end= IRQ_DM355_GPIOBNK1, .flags= IORESOURCE_IRQ, }.
+{ .start= IRQ_DM355_GPIOBNK2, .end= IRQ_DM355_GPIOBNK2, .flags= IORESOURCE_IRQ, }.
+{ .start= IRQ_DM355_GPIOBNK3, .end= IRQ_DM355_GPIOBNK3, .flags= IORESOURCE_IRQ, }.
+ .start= IRQ_DM355_GPIOBNK4,
+ .end= IRQ_DM355_GPIOBNK4,
+ .flags= IORESOURCE_IRQ,
+ },
+
+ .start= IRQ_DM355_GPIOBNK5,
+ .end= IRQ_DM355_GPIOBNK5,
+ .flags= IORESOURCE_IRQ,
+ },
+
+ .start= IRQ_DM355_GPIOBNK6,
+ .end= IRQ_DM355_GPIOBNK6,
+ .flags= IORESOURCE_IRQ,
+ },

--- linux-4.15.0.orig/arch/arm/mach-davinci/dm365.c
+++ linux-4.15.0/arch/arm/mach-davinci/dm365.c
@@ -700,6 +700,41 @@
 },
 {
 /* interrupt */
+.start= IRQ_DM365_GPIO0,
+.end= IRQ_DM365_GPIO0,
+.flags= IORESOURCE_IRQ,
+ },
+
+.start= IRQ_DM365_GPIO1,
+.end= IRQ_DM365_GPIO1,
+.flags= IORESOURCE_IRQ,
+ },
+
+.start= IRQ_DM365_GPIO2,
+.end= IRQ_DM365_GPIO2,
+.flags= IORESOURCE_IRQ,
+ },
+
+.start= IRQ_DM365_GPIO3,
+.end= IRQ_DM365_GPIO3,
+.flags= IORESOURCE_IRQ,
+ },
+
+.start= IRQ_DM365_GPIO4,
+.end= IRQ_DM365_GPIO4,
+.flags= IORESOURCE_IRQ,
+ },
+
+.start= IRQ_DM365_GPIO5,
+.end= IRQ_DM365_GPIO5,
+.flags= IORESOURCE_IRQ,
+ }.
static const struct dma_slave_map dm365_edma_map[] = {
    { "davinci-mcbsp.0", "tx", EDMA_FILTER_PARAM(0, 2) },
    { "davinci-mcbsp.0", "rx", EDMA_FILTER_PARAM(0, 3) },
    { "davinci-mcbsp", "tx", EDMA_FILTER_PARAM(0, 2) },
    { "davinci-mcbsp", "rx", EDMA_FILTER_PARAM(0, 3) },
    { "davinci_voicecodec", "tx", EDMA_FILTER_PARAM(0, 2) },
    { "davinci_voicecodec", "rx", EDMA_FILTER_PARAM(0, 3) },
    { "spi_davinci.2", "tx", EDMA_FILTER_PARAM(0, 10) },
};
.flags = IORESOURCE_IRQ,
},
--- linux-4.15.0.orig/arch/arm/mach-davinci/dm646x.c
+++ linux-4.15.0/arch/arm/mach-davinci/dm646x.c
@@ -495,7 +495,8 @@
 [IRQ_DM646X_MCASP0TXINT] = 7,
 [IRQ_DM646X_MCASP0RXINT] = 7,
 [IRQ_DM646X_RESERVED_3] = 7,
-[IRQ_DM646X_MCASP1TXINT] = 7, /* clockevent */
+[IRQ_DM646X_MCASP1TXINT] = 7,
+[IRQ_TINT0_TINT12] = 7,    /* clockevent */
 [IRQ_TINT0_TINT34] = 7,    /* clocksource */
 [IRQ_TINT1_TINT12] = 7,    /* DSP timer */
 [IRQ_TINT1_TINT34] = 7,    /* system tick */
@@ -758,6 +759,16 @@
 },
 /* interrupt */
 .start= IRQ_DM646X_GPIOBNK0,
+.end= IRQ_DM646X_GPIOBNK0,
+.flags= IORESOURCE_IRQ,
+},
+
+.start= IRQ_DM646X_GPIOBNK1,
+.end= IRQ_DM646X_GPIOBNK1,
+.flags= IORESOURCE_IRQ,
+},
+
+.start= IRQ_DM646X_GPIOBNK2,
+.end= IRQ_DM646X_GPIOBNK2,
+.flags= IORESOURCE_IRQ,
},
--- linux-4.15.0.orig/arch/arm/mach-davinci/sleep.S
+++ linux-4.15.0/arch/arm/mach-davinci/sleep.S
@@ -37,6 +37,7 @@
 #define DEEPSLEEP_SLEEPENABLE_BIT BIT(31)
 .text
+.arch armv5te
/*
 * Move DaVinci into deep sleep state
 */
--- linux-4.15.0.orig/arch/arm/mach-exynos/firmware.c
+++ linux-4.15.0/arch/arm/mach-exynos/firmware.c
@@ -200,6 +200,7 @@
 return;

 addr = of_get_address(nd, 0, NULL, NULL);
+of_node_put(nd);
if (!addr) {
    pr_err("%s: No address specified.
", __func__);
    return;
}

--- linux-4.15.0.orig/arch/arm/mach-exynos/pm.c
+++ linux-4.15.0/arch/arm/mach-exynos/pm.c
@@ -275,11 +275,7 @@
goto fail;
call_firmware_op(cpu_boot, 1);
-
-if (soc_is_exynos3250())
-dsb_sev();
-else
-    arch_send_wakeup_iпи_mask(cpumask_of(1));
+    dsb_sev();
 } }
 fail:
--- linux-4.15.0.orig/arch/arm/mach-exynos/suspend.c
+++ linux-4.15.0/arch/arm/mach-exynos/suspend.c
@@ -209,6 +209,7 @@
     return -ENOMEM;
 }

@@ -439,8 +440,27 @@
 static void exynos5420_prepare_pm_resume(void)
 {
     unsigned int mpidr, cluster;
     +mpidr = read_cpuid_mpidr();
     +cluster = MPIDR_AFFINITY_LEVEL(mpidr, 1);
     +
     if (IS_ENABLED(CONFIG_EXYNOS5420_MCPM))
     WARN_ON(mcpm_cpu_powered_up());
     +if (IS_ENABLED(CONFIG_HW_PERF_EVENTS) && cluster != 0) {
     +/*
     + * When system is resumed on the LITTLE/KFC core (cluster 1),
     + * the DSCR is not properly updated until the power is turned
     + * on also for the cluster 0. Enable it for a while to
     + * propagate the SPNIDEN and SPIDEN signals from Secure JTAG
     + * block and avoid undefined instruction issue on CP14 reset.
     + */

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static void exynos5420_pm_resume(void)
@@ -644,8 +664,10 @@
    if (WARN_ON(!of_find_property(np, "interrupt-controller", NULL))) {
        pr_warn("Outdated DT detected, suspend/resume will NOT work\n");
        of_node_put(np);
    }
    +of_node_put(np);

    pm_data = (const struct exynos_pm_data *) match->data;

    --- linux-4.15.0.orig/arch/arm/mach-footbridge/cats-pci.c
    +++ linux-4.15.0/arch/arm/mach-footbridge/cats-pci.c
    @@ -15,14 +15,14 @@
    /* cats host-specific stuff */
    -static int irqmap_cats[] __initdata = { IRQ_PCI, IRQ_IN0, IRQ_IN1, IRQ_IN3 }; 
    +static int irqmap_cats[] = { IRQ_PCI, IRQ_IN0, IRQ_IN1, IRQ_IN3 }; 

    static u8 cats_no_swizzle(struct pci_dev *dev, u8 *pin)
    {
        return 0;
    }

    -static int __init cats_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
    +static int cats_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
    {
        if (dev->irq >= 255)
            return -1; /* not a valid interrupt. */
    --- linux-4.15.0.orig/arch/arm/mach-footbridge/dc21285.c
    +++ linux-4.15.0/arch/arm/mach-footbridge/dc21285.c
    @@ -69,15 +69,15 @@
    if (addr)
        switch (size) {
        case 1:
            -asm("ldrb%0, [%1, %2]"
            +asm volatile("ldrb%0, [%1, %2]"
                : "=r" (v) : "r" (addr), "r" (where) : "cc");
            break;
case 2:
+asm volatile("ldr%0, [%1, %2]"
  : "=r" (v) : "r" (addr), "r" (where) : "cc");
break;
case 4:
+asm volatile("ldr%0, [%1, %2]"
  : "=r" (v) : "r" (addr), "r" (where) : "cc");
break;
}
@@ -103,17 +103,17 @@
if (addr)
  switch (size) {
  case 1:
-asm("strb%0, [%1, %2]"
+asm volatile("strb%0, [%1, %2]"
  : "r" (value), "r" (addr), "r" (where)
  : "cc");
break;
case 2:
-asm("strh%0, [%1, %2]"
+asm volatile("strh%0, [%1, %2]"
  : "r" (value), "r" (addr), "r" (where)
  : "cc");
break;
case 4:
-asm("str%0, [%1, %2]"
+asm volatile("str%0, [%1, %2]"
  : "r" (value), "r" (addr), "r" (where)
  : "cc");
break;
--- linux-4.15.0.orig/arch/arm/mach-footbridge/ebsa285-pci.c
+++ linux-4.15.0/arch/arm/mach-footbridge/ebsa285-pci.c
@@ -14,9 +14,9 @@
#include <asm/mach/pci.h>
#include <asm/mach-types.h>

-static int irqmap_ebsa285[] __initdata = { IRQ_IN3, IRQ_IN1, IRQ_IN0, IRQ_PCI };
+static int irqmap_ebsa285[] = { IRQ_IN3, IRQ_IN1, IRQ_IN0, IRQ_PCI };:

-static int __init ebsa285_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
+static int ebsa285_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
{
  if (dev->vendor == PCI_VENDOR_ID_CONTAQ &&
    dev->device == PCI_DEVICE_ID_CONTAQ_82C693)
* We now use the slot ID instead of the device identifiers to select
* which interrupt is routed where.
*/

-static int __init netwinder_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
+static int netwinder_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
{
    switch (slot) {
    case 0: /* host bridge */
    }
}

-include <asm/mach/pci.h>
+include <asm/mach-types.h>

-static int irqmap_personal_server[] __initdata = {
+static int irqmap_personal_server[] = {
    IRQ_IN0, IRQ_IN1, IRQ_IN2, IRQ_IN3, 0, 0, 0,
    IRQ_DOORBELLHOST, IRQ_DMA1, IRQ_DMA2, IRQ_PCI
};

-static int __init personal_server_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
+static int personal_server_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
{
    unsigned char line;

    -include <asm/mach/pci.h>
    +include <asm/mach-types.h>

    plus_sec := $(call as-instr,,arch_extension sec,+sec)
    --- linux-4.15.0.orig/arch/arm/mach-highbank/Makefile
    +++ linux-4.15.0/arch/arm/mach-highbank/Makefile
    @ @ -1,3 +1,5 @@
    +KBUILD_CFLAGS += -I$(srctree)/arch/arm/mach-highbank/include
    +
    obj-y:= highbank.o system.o smc.o

    struct device_node *node;

    node = of_find_compatible_node(NULL, NULL, "hisilicon,sysctrl");
    -if (node) {
    -ctrl_base = of_iomap(node, 0);
    -id = HI3620_CTRL;
    -return 0;
    +if (!node) {
    +id = ERROR_CTRL;
    +return -ENOENT;
id = ERROR_CTRL;
return -ENOENT;
+
+ctrl_base = of_iomap(node, 0);
+of_node_put(node);
+if (!ctrl_base) {
+id = ERROR_CTRL;
+return -ENOMEM;
+}
+
+id = HI3620_CTRL;
+return 0;
}

void hi3xxx_set_cpu(int cpu, bool enable)
@@ -173,11 +180,15 @@
struct device_node *np;

np = of_find_compatible_node(NULL, NULL, "hisilicon,cpuctrl");
-if (np) {
-ctrl_base = of_iomap(np, 0);
-return true;
-}
-return false;
+if (!np)
+return false;
+
+ctrl_base = of_iomap(np, 0);
+of_node_put(np);
+if (!ctrl_base)
+return false;
+
+return true;
}

void hix5hd2_set_cpu(int cpu, bool enable)
@@ -219,10 +230,10 @@

if (!ctrl_base) {
np = of_find_compatible_node(NULL, NULL, "hisilicon,hip01-sysctrl");
-if (np) {
-ctrl_base = of_iomap(np, 0);
-return true;
-else
-BUG();
+BUG_ON(!np);
+ctrl_base = of_iomap(np, 0);
+of_node_put(np);
if (enable) {
--- linux-4.15.0.orig/arch/arm/mach-imx/Makefile
+++ linux-4.15.0/arch/arm/mach-imx/Makefile
@@ -87,6 +87,10 @@
obj-$(CONFIG_SOC_IMX6) += suspend-imx6.o
obj-$(CONFIG_SOC_IMX53) += suspend-imx53.o
endif
+ifeq ($(CONFIG_ARM_CPU_SUSPEND),y)
+AFLAGS_resume-imx6.o :=-Wa,-march=armv7-a
+obj-$(CONFIG_SOC_IMX6) += resume-imx6.o
+endif
obj-$(CONFIG_SOC_IMX6) += pm-imx6.o

obj-$(CONFIG_SOC_IMX1) += mach-imx1.o
--- linux-4.15.0.orig/arch/arm/mach-imx/common.h
+++ linux-4.15.0/arch/arm/mach-imx/common.h
@@ -111,17 +111,17 @@
int imx_cpu_kill(unsigned int cpu);

#ifdef CONFIG_SUSPEND
-void v7_cpu_resume(void);
void imx53_suspend(void __iomem *ocram_vbase);
extern const u32 imx53_suspend_sz;
void imx6_suspend(void __iomem *ocram_vbase);
#else
-static inline void v7_cpu_resume(void) {}
static inline void imx53_suspend(void __iomem *ocram_vbase) {}
static const u32 imx53_suspend_sz;
static inline void imx6_suspend(void __iomem *ocram_vbase) {}
#endif

+void v7_cpu_resume(void);
+
void imx6_pm_ccm_init(const char *ccm_compat);
void imx6q_pm_init(void);
void imx6dl_pm_init(void);
--- linux-4.15.0.orig/arch/arm/mach-imx/cpuidle-imx6q.c
+++ linux-4.15.0/arch/arm/mach-imx/cpuidle-imx6q.c
@@ -16,30 +16,23 @@
#include "cpuidle.h"
#include "hardware.h"

-static atomic_t master = ATOMIC_INIT(0);
-static DEFINE_SPINLOCK(master_lock);
+static int num_idle_cpus = 0;


static DEFINE_SPINLOCK(cpuidle_lock);

static int imx6q_enter_wait(struct cpuidle_device *dev,
    struct cpuidle_driver *drv, int index)
{
    -if (atomic_inc_return(&master) == num_online_cpus()) {
    -/ *
    - * With this lock, we prevent other cpu to exit and enter
    - * this function again and become the master.
    - */
    -if (!spin_trylock(&master_lock))
    -goto idle;
    +spin_lock(&cpuidle_lock);
    +if (++num_idle_cpus == num_online_cpus())
    +imx6_set_lpm(WAIT_UNCLOCKED);
    -cpu_do_idle();
    -imx6_set_lpm(WAIT_CLOCKED);
    -spin_unlock(&master_lock);
    -goto done;
    -}
    +spin_unlock(&cpuidle_lock);
    
    -idle:
    cpu_do_idle();
    -done:
    -atomic_dec(&master);
    +
    +spin_lock(&cpuidle_lock);
    +if (num_idle_cpus-- == num_online_cpus())
    +imx6_set_lpm(WAIT_CLOCKED);
    +spin_unlock(&cpuidle_lock);
    
    return index;
}
--- linux-4.15.0.orig/arch/arm/mach-imx/cpuidle-imx6sx.c
+++ linux-4.15.0/arch/arm/mach-imx/cpuidle-imx6sx.c
@@ -15,6 +15,7 @@
 #include "common.h"
 #include "cpuidle.h"
 +#include "hardware.h"

 static int imx6sx_idle_finish(unsigned long val)
{
    @ @ -108,7 +109,7 @@
    * except for power up sw2iso which need to be
    * larger than LDO ramp up time.
    */
-imx_gpc_set_arm_power_up_timing(2, 1);
+imx_gpc_set_arm_power_up_timing(cpu_is_imx6sx() ? 0xf : 0x2, 1);
imx_gpc_set_arm_power_down_timing(1, 1);

return cpuidle_register(&imx6sx_cpuidle_driver, NULL);
--- linux-4.15.0.orig/arch/arm/mach-imx/pm-imx5.c
+++ linux-4.15.0/arch/arm/mach-imx/pm-imx5.c
@@ -301,14 +301,14 @@
if (!ocram_pool) {
    pr_warn("%s: ocram pool unavailable\n", __func__);
    ret = -ENODEV;
    -goto put_node;
+    goto put_device;
}

ocram_base = gen_pool_alloc(ocram_pool, size);
if (!ocram_base) {
    pr_warn("%s: unable to alloc ocram\n", __func__);
    ret = -ENOMEM;
    -goto put_node;
+    goto put_device;
}

phys = gen_pool_virt_to_phys(ocram_pool, ocram_base);
@@ -318,6 +318,8 @@
if (virt_out)
    *virt_out = virt;

+put_device:
+put_device(&pdev->dev);
put_node:
of_node_put(node);

--- linux-4.15.0.orig/arch/arm/mach-imx/pm-imx6.c
+++ linux-4.15.0/arch/arm/mach-imx/pm-imx6.c
@@ -15,6 +15,7 @@
#include <linux/io.h>
#include <linux/irq.h>
#include <linux/genalloc.h>
+#include <linux/irqchip/arm-gic.h>
#include <linux/mfd/syscon.h>
#include <linux/mfd/syscon/imx6q-iomuxc-gpr.h>
#include <linux/of.h>
@@ -483,14 +484,14 @@
if (!ocram_pool) {
    pr_warn("%s: ocram pool unavailable\n", __func__);
    ret = -ENODEV;
    -goto put_node;
ocram_base = gen_pool_alloc(ocram_pool, MX6Q_SUSPEND_OCRAM_SIZE);
if (!ocram_base) {
    pr_warn("%s: unable to alloc ocram!\n", __func__);
    ret = -ENOMEM;
    -goto put_node;
    +goto put_device;
}

ocram_pbase = gen_pool_virt_to_phys(ocram_pool, ocram_base);
@@ -513,7 +514,7 @@
ret = imx6_pm_get_base(&pm_info->mmdc_base, socdata->mmdc_compat);
if (ret) {
    pr_warn("%s: failed to get mmdc base %d!\n", __func__, ret);
    -goto put_node;
    +goto put_device;
}

ret = imx6_pm_get_base(&pm_info->src_base, socdata->src_compat);
@@ -560,7 +561,7 @@ &imx6_suspend,
MX6Q_SUSPEND_OCRAM_SIZE - sizeof(*pm_info));
    -goto put_node;
    +goto put_device;

pl310_cache_map_failed:
iounmap(pm_info->gpc_base.vbase);
    @ @ -570,6 +571,8 @@
iounmap(pm_info->src_base.vbase);
src_map_failed:
iounmap(pm_info->mmdc_base.vbase);
+put_device:
+put_device(&pdev->dev);
put_node:
of_node_put(node);

@@ -604,6 +607,29 @@
IMX6Q_GPR1_GINT);
}

+static void imx6_pm_stby_poweroff(void)
+{
+    gic_cpu_if_down(0);
+    imx6_set_lpm(STOP_POWER_OFF);
+    imx6q_suspend_finish(0);
mdelay(1000);
+
+pr_emerg("Unable to poweroff system\n");
+
+static int imx6_pm_stby_poweroff_probe(void)
+{
+  if (pm_power_off) {
+    pr_warn("%s: pm_power_off already claimed %p %pf?\n", __func__, pm_power_off, pm_power_off);
+    return -EBUSY;
+  }
+
+  pm_power_off = imx6_pm_stby_poweroff;
+  return 0;
+}
+
+pm_power_off = imx6_pm_stby_poweroff;
+return 0;
+
+void __init imx6_pm_ccm_init(const char *ccm_compat)
+{
+  struct device_node *np;
+  val = readl_relaxed(ccm_base + CLPCR);
+  val &= ~BM_CLPCR_LPM;
+  writel_relaxed(val, ccm_base + CLPCR);
+  if (of_property_read_bool(np, "fsl,pmic-stby-poweroff"))
+    imx6_pm_stby_poweroff_probe();
+}

void __init imx6q_pm_init(void)
--- linux-4.15.0.orig/arch/arm/mach-imx/resume-imx6.S
+++ linux-4.15.0/arch/arm/mach-imx/resume-imx6.S
@@ -0,0 +1,24 @@
+/* SPDX-License-Identifier: GPL-2.0-or-later */
+/*
+ * Copyright 2014 Freescale Semiconductor, Inc.
+ */
+
+/* The following code must assume it is running from physical address
+ * where absolute virtual addresses to the data section have to be
+ * turned into relative ones.
+ */
+
+ENTRY(v7_cpu_resume)
+blv7_invalidate_1l
+#ifdef CONFIG_CACHE_L2X0
+bl2c310_early_resume
+#endif
+bcpu_resume
+ENDPROC(v7_cpu_resume)

--- linux-4.15.0.orig/arch/arm/mach-imx/suspend-imx53.S
+++ linux-4.15.0/arch/arm/mach-imx/suspend-imx53.S
@@ -33,11 +33,11 @@
*                              ^
*                              ^
*                      imx53_suspend code
-*              PM_INFO structure(imx53_suspend_info)
+*              PM_INFO structure(imx5_cpu_suspend_info)
* ================ low address ================
*/

-/* Offsets of members of struct imx53_suspend_info */
+/* Offsets of members of struct imx5_cpu_suspend_info */
#define SUSPEND_INFO_MX53_M4IF_V_OFFSET		0x0
#define SUSPEND_INFO_MX53_IOMUXC_V_OFFSET	0x4
#define SUSPEND_INFO_MX53_IO_COUNT_OFFSET	0x8
--- linux-4.15.0.orig/arch/arm/mach-imx/suspend-imx6.S
+++ linux-4.15.0/arch/arm/mach-imx/suspend-imx6.S
@@ -73,6 +73,7 @@
#define MX6Q_CCM_CCR	0x0

.align 3
+.arm

.macro sync_l2_cache
@
retlr
ENDPROC(imx6_suspend)
-/*
-* The following code must assume it is running from physical address
-* where absolute virtual addresses to the data section have to be
-* turned into relative ones.
-* */
-
-ENTRY(v7_cpu_resume)
--- linux-4.15.0.orig/arch/arm/mach-integrator/Kconfig
+++ linux-4.15.0/arch/arm/mach-integrator/Kconfig
@@ -3,6 +3,8 @@
depends on ARCH_MULTI_V4T || ARCH_MULTI_V5 || ARCH_MULTI_V6
select ARM_AMBA
select COMMON_CLK_VERSATILE
+select CMA
+select DMA_CMA
select HAVE_TCM
select ICST
select MFD_SYSCON
@@ -34,14 +36,13 @@
select ARM_VIC
select GPIO_PL061
select GPIOLIB
+select REGULATOR
+select REGULATOR_FIXED_VOLTAGE
help
  The IM-PD1 is an add-on logic module for the Integrator which
  allows ARM(R) Ltd PrimeCells to be developed and evaluated.
  The IM-PD1 can be found on the Integrator/PP2 platform.
-
- To compile this driver as a module, choose M here: the
- module will be called impd1.
-
-config INTEGRATOR_CM7TDMI
bool "Integrator/CM7TDMI core module"
depends on ARCH_INTEGRATOR_AP
--- linux-4.15.0.orig/arch/arm/mach-integrator/impd1.c
+++ linux-4.15.0/arch/arm/mach-integrator/impd1.c
@@ -393,7 +393,11 @@
sizeof(*lookup) + 3 * sizeof(struct gpiod_lookup),
    GFP_KERNEL);
chipname = devm_kstrdup(&dev->dev, devname, GFP_KERNEL);
-mmciname = kasprintf(GFP_KERNEL, "Im%x:00700", dev->id);
+mmciname = devm_kasprintf(&dev->dev, GFP_KERNEL,
  + "Im%x:00700", dev->id);
+if (!lookup || !chipname || !mmciname)
+return -ENOMEM;
+lookup->dev_id = mmciname;
/*
* Offsets on GPIO block 1:
--- linux-4.15.0.orig/arch/arm/mach-iop13xx/setup.c
+++ linux-4.15.0/arch/arm/mach-iop13xx/setup.c
@@ -300,7 +300,7 @@
  
  
-static u64 iop13xx_adma_dmamask = DMA_BIT_MASK(64);
+-static u64 iop13xx_adma_dmamask = DMA_BIT_MASK(32);
 static struct iop_adma_platform_data iop13xx_adma_0_data = {
    .hw_id = 0,
    .pool_size = PAGE_SIZE,
 @@ -324,7 +324,7 @@
         .resource = iop13xx_adma_0_resources,
         .dev = {
             .dma_mask = &iop13xx_adma_dmamask,
-            .coherent_dma_mask = DMA_BIT_MASK(64),
+-            .coherent_dma_mask = DMA_BIT_MASK(32),
             .platform_data = (void *) &iop13xx_adma_0_data,
         },
     }
@@ -336,7 +336,7 @@
         .resource = iop13xx_adma_1_resources,
         .dev = {
             .dma_mask = &iop13xx_adma_dmamask,
-            .coherent_dma_mask = DMA_BIT_MASK(64),
+-            .coherent_dma_mask = DMA_BIT_MASK(32),
             .platform_data = (void *) &iop13xx_adma_1_data,
         },
     }
@@ -348,7 +348,7 @@
         .resource = iop13xx_adma_2_resources,
         .dev = {
             .dma_mask = &iop13xx_adma_dmamask,
-            .coherent_dma_mask = DMA_BIT_MASK(64),
+-            .coherent_dma_mask = DMA_BIT_MASK(32),
             .platform_data = (void *) &iop13xx_adma_2_data,
         },
     
--- linux-4.15.0.orig/arch/arm/mach-iop13xx/tpmi.c
+++ linux-4.15.0/arch/arm/mach-iop13xx/tpmi.c
@@ -152,7 +152,7 @@
     }
 
-   u64 iop13xx_tpmi_mask = DMA_BIT_MASK(64);
+-   u64 iop13xx_tpmi_mask = DMA_BIT_MASK(32);
 static struct platform_device iop13xx_tpmi_0_device = {
.name = "iop-tpmi",
.id = 0,
@@ -160,7 +160,7 @@
.resource = iop13xx_tpmi_0_resources,
.dev = {
    .dma_mask = &iop13xx_tpmi_mask,
-   .coherent_dma_mask = DMA_BIT_MASK(64),
+   .coherent_dma_mask = DMA_BIT_MASK(32),
    },
};
@@ -171,7 +171,7 @@
.resource = iop13xx_tpmi_1_resources,
.dev = {
    .dma_mask = &iop13xx_tpmi_mask,
-   .coherent_dma_mask = DMA_BIT_MASK(64),
+   .coherent_dma_mask = DMA_BIT_MASK(32),
    },
};
@@ -182,7 +182,7 @@
.resource = iop13xx_tpmi_2_resources,
.dev = {
    .dma_mask = &iop13xx_tpmi_mask,
-   .coherent_dma_mask = DMA_BIT_MASK(64),
+   .coherent_dma_mask = DMA_BIT_MASK(32),
    },
};
@@ -193,7 +193,7 @@
.resource = iop13xx_tpmi_3_resources,
.dev = {
    .dma_mask = &iop13xx_tpmi_mask,
-   .coherent_dma_mask = DMA_BIT_MASK(64),
+   .coherent_dma_mask = DMA_BIT_MASK(32),
    },
};

--- linux-4.15.0.orig/arch/arm/mach-iop32x/n2100.c
+++ linux-4.15.0/arch/arm/mach-iop32x/n2100.c
@@ -75,8 +75,7 @@
/*
 * N2100 PCI.
 */
-static int __init
+static int n2100_pci_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
 {
int irq;

--- linux-4.15.0.orig/arch/arm/mach-keystone/keystone.c
+++ linux-4.15.0/arch/arm/mach-keystone/keystone.c
@@ -65,7 +65,7 @@
 static long long __init keystone_pv_fixup(void)
 {
  long long offset;
- phys_addr_t mem_start, mem_end;
+ u64 mem_start, mem_end;
  mem_start = memblock_start_of_DRAM();
  mem_end = memblock_end_of_DRAM();
  if (mem_start < KEYSTONE_HIGH_PHYS_START ||
@@ -78,7 +78,7 @@
  pr_crit("Invalid address space for memory (%08llx-%08llx)n",
- (u64)mem_start, (u64)mem_end);
+ mem_start, mem_end);
  return 0;
 }

--- linux-4.15.0.orig/arch/arm/mach-keystone/pm_domain.c
+++ linux-4.15.0/arch/arm/mach-keystone/pm_domain.c
@@ -29,6 +29,7 @@
 static struct pm_clk_notifier_block platform_domain_notifier = {
 .pm_domain = &keystone_pm_domain,
+.con_ids = { NULL },
 }; static const struct of_device_id of_keystone_table[] = {
--- linux-4.15.0.orig/arch/arm/mach-ks8695/board-acs5k.c
+++ linux-4.15.0/arch/arm/mach-ks8695/board-acs5k.c
@@ -100,7 +100,7 @@
 },
};

- static void acs5k_i2c_init(void)
-+ static void __init acs5k_i2c_init(void)
{ /* The gpio interface */
  gpiod_add_lookup_table(&acs5k_i2c_gpiod_table);
  
--- linux-4.15.0.orig/arch/arm/mach-mmp/cputype.h
+++ linux-4.15.0/arch/arm/mach-mmp/cputype.h
@@ -44,10 +44,12 @@
 #define cpu_is_pxa910()(0)
 #endif
ifdef CONFIG_CPU_MMP2
+if defined(CONFIG_CPU_MMP2) || defined(CONFIG_MACH_MMP2_DT)
static inline int cpu_is_mmp2(void)
{
    return (((read_cpuid_id() >> 8) & 0xff) == 0x58) &&
    ((mmp_chip_id & 0xfff) == 0x410) ||
    (mmp_chip_id & 0xfff) == 0x610);
}
#else
#define cpu_is_mmp2() 0
@end
--- linux-4.15.0.orig/arch/arm/mach-mvebu/Kconfig
+++ linux-4.15.0/arch/arm/mach-mvebu/Kconfig
@@ -42,7 +42,7 @@
depends on ARCH_MULTI_V7
 select ARMADA_370_XP_IRQ
 select ARM_ERRATA_720789
 -select ARM_ERRATA_753970
+select PL310_ERRATA_753970
 select ARM_GIC
 select ARMADA_375_CLK
 select HAVE_ARM_SCU
@@ -58,7 +58,7 @@
 bool "Marvell Armada 380/385 boards"
 depends on ARCH_MULTI_V7
 select ARM_ERRATA_720789
-select ARM_ERRATA_753970
+select PL310_ERRATA_753970
 select ARM_GIC
 select ARM_GLOBAL_TIMER
 select CLKSRC_ARM_GLOBAL_TIMER_SCHED_CLOCK
--- linux-4.15.0.orig/arch/arm/mach-mvebu/pmsu.c
+++ linux-4.15.0/arch/arm/mach-mvebu/pmsu.c
@@ -116,8 +116,8 @@
 PMSU_BOOT_ADDR_REDIRECT_OFFSET(hw_cpu));
 }
-extern unsigned char mvebu_boot_wa_start;
-extern unsigned char mvebu_boot_wa_end;
+extern unsigned char mvebu_boot_wa_start[];
+extern unsigned char mvebu_boot_wa_end[];

 /*
 * This function sets up the boot address workaround needed for SMP
@@ -130,7 +130,7 @@
phys_addr_t resume_addr_reg)
 {
void __iomem *sram_virt_base;
-u32 code_len = &mvebu_boot_wa_end - &mvebu_boot_wa_start;
+u32 code_len = mvebu_boot_wa_end - mvebu_boot_wa_start;

mvebu_mbus_del_window(BOOTROM_BASE, BOOTROM_SIZE);
mvebu_mbus_add_window_by_id(crypto_eng_target, crypto_eng_attribute, 
--- linux-4.15.0.orig/arch/arm/mach-omap1/Makefile
+++ linux-4.15.0/arch/arm/mach-omap1/Makefile
@@ -25,7 +25,7 @@
led-y := leds.o

-usb-fs-$(CONFIG_USB):= usb.o
+usb-fs-$(CONFIG_USB_SUPPORT):= usb.o

obj-y+= $(usb-fs-m) $(usb-fs-y)

# Specific board support
--- linux-4.15.0.orig/arch/arm/mach-omap1/ams-delta-fiq.c
+++ linux-4.15.0/arch/arm/mach-omap1/ams-delta-fiq.c
@@ -58,22 +58,24 @@
 irq_num = gpio_to_irq(irq_num);
 fiq_count = fiq_buffer[FIQ_CNT_INT_00 + gpio];

-while (irq_counter[gpio] < fiq_count) {
-if (gpio != AMS_DELTA_GPIO_PIN_KEYBRD_CLK) {
-struct irq_data *d = irq_get_irq_data(irq_num);
+-if (irq_counter[gpio] < fiq_count &&
+gpio != AMS_DELTA_GPIO_PIN_KEYBRD_CLK) {
+struct irq_data *d = irq_get_irq_data(irq_num);

-/*
- * It looks like handle_edge_irq() that
- * OMAP GPIO edge interrupts default to,
- * expects interrupt already unmasked.
- */
-if (irq_chip && irq_chip->irq_unmask)
+/*
+ * handle_simple_irq() that OMAP GPIO edge
+ * interrupts default to since commit 80ac93c27441
+ * requires interrupt already acked and unmasked.
+ */
+if (irq_chip)
  +if (irq_chip->irq_ack)
  +irq_chip->irq_ack(d);
+if (irq_chip->irq_unmask)
  irq_chip->irq_unmask(d);
}
-generic_handle_irq(irq_num);
irq_counter[gpio]++;
}
for (; irq_counter[gpio] < fiq_count; irq_counter[gpio]++)
+generic_handle_irq(irq_num);
}
return IRQ_HANDLED;
}
--- linux-4.15.0.orig/arch/arm/mach-omap1/board-ams-delta.c
+++ linux-4.15.0/arch/arm/mach-omap1/board-ams-delta.c
@@ -512,6 +512,9 @@
 struct modem_private_data *priv = port->private_data;
 int ret;

+if (!priv)
+return;
+
 if (IS_ERR(priv->regulator))
 return;
--- linux-4.15.0.orig/arch/arm/mach-omap1/clock.c
+++ linux-4.15.0/arch/arm/mach-omap1/clock.c
@@ -1011,17 +1011,17 @@
 return -ENOMEM;
c->dent = d;

-d = debugfs_create_u8("usecount", S_IRUGO, c->dent, (u8 *)&c->usecount);
+d = debugfs_create_ulong("usecount", S_IRUGO, c->dent, &c->usecount);
 if (!d) {
 err = -ENOMEM;
 goto err_out;
 }
-d = debugfs_create_u32("rate", S_IRUGO, c->dent, (u32 *)&c->rate);
+d = debugfs_create_ulong("rate", S_IRUGO, c->dent, &c->rate);
 if (!d) {
 err = -ENOMEM;
 goto err_out;
 }
-d = debugfs_create_x32("flags", S_IRUGO, c->dent, (u32 *)&c->flags);
+d = debugfs_create_x8("flags", S_IRUGO, c->dent, &c->flags);
 if (!d) {
 err = -ENOMEM;
 goto err_out;
 --- linux-4.15.0.orig/arch/arm/mach-omap1/id.c
+++ linux-4.15.0/arch/arm/mach-omap1/id.c
@@ -200,10 +200,10 @@
 printk(KERN_INFO "Unknown OMAP cpu type: 0x%02x\n", cpu_type);
 }
-printk(KERN_INFO "OMAP%04x", omap_revision >> 16);
+pr_info("OMAP%04x", omap_revision >> 16);
if ((omap_revision >> 8) & 0xff)
-printk(KERN_INFO "%x", (omap_revision >> 8) & 0xff);
-printk(KERN_INFO " revision %i handled as %02xx id: %08x%08x\n",
+pr_cont("%x", (omap_revision >> 8) & 0xff);
+pr_cont(" revision %i handled as %02xx id: %08x%08x\n",
        die_rev, omap_revision & 0xff, system_serial_low,
        system_serial_high);
}
--- linux-4.15.0.orig/arch/arm/mach-omap1/include/mach/usb.h
+++ linux-4.15.0/arch/arm/mach-omap1/include/mach/usb.h
@@ -11,7 +11,7 @@
#include <linux/platform_data/usb-omap1.h>
-#if IS_ENABLED(CONFIG_USB)
+#if IS_ENABLED(CONFIG_USB_SUPPORT)
void omap1_usb_init(struct omap_usb_config *pdata);
#else
 static inline void omap1_usb_init(struct omap_usb_config *pdata)
--- linux-4.15.0.orig/arch/arm/mach-omap1/pm.c
+++ linux-4.15.0/arch/arm/mach-omap1/pm.c
@@ -610,11 +610,6 @@
 return IRQ_HANDLED;
 }

-static struct irqaction omap_wakeup_irq = {
- .name= "peripheral wakeup",
- .handler= omap_wakeup_interrupt
-};
-

 static const struct platform_suspend_ops omap_pm_ops = {
     arm_pm_idle = omap1_pm_idle;
-}

 static int __init omap_pm_init(void)
{
-setup_irq(INT_7XX_WAKE_UP_REQ, &omap_wakeup_irq);
+irq = INT_7XX_WAKE_UP_REQ;
else if (cpu_is omap16xx())
-setup_irq(INT_1610_WAKE_UP_REQ, &omap_wakeup_irq);
+irq = INT_1610_WAKE_UP_REQ;
+if (request_irq(irq, omap_wakeup_interrupt, 0, "peripheral wakeup",
+NULL))
+pr_err("Failed to request irq %d (peripheral wakeup)\n", irq);

/* Program new power ramp-up time
 * (0 for most boards since we don’t lower voltage when in deep sleep)
--- linux-4.15.0.orig/arch/arm/mach-omap1/time.c
+++ linux-4.15.0/arch/arm/mach-omap1/time.c
@@ -155,15 +155,11 @@
return IRQ_HANDLED;
}

-struct irqaction omap_mpu_timer1_irq = {
+static struct irqaction omap_mpu_timer1_irq = {
 -.name = "mpu_timer1",
 -.flags = IRQF_TIMER | IRQF_IRQPOLL,
 -.handler = omap_mpu_timer1_interrupt,
-.};
-
static __init void omap_init_mpu_timer(unsigned long rate)
{
-setup_irq(INT_TIMER1, &omap_mpu_timer1_irq);
+if (request_irq(INT_TIMER1, omap_mpu_timer1_interrupt,
+IRQF_TIMER | IRQF_IRQPOLL, "mpu_timer1", NULL))
+pr_err("Failed to request irq %d (mpu_timer1)\n", INT_TIMER1);
 omap_mpu_timer1_start(0, (rate / HZ) - 1, 1);

clockevent_mpu_timer1.cpumask = cpumask_of(0);
--- linux-4.15.0.orig/arch/arm/mach-omap1/timer32k.c
+++ linux-4.15.0/arch/arm/mach-omap1/timer32k.c
@@ -148,15 +148,11 @@
return IRQ_HANDLED;
}

-struct irqaction omap_32k_timer_irq = {
+static struct irqaction omap_32k_timer_irq = {
 -.name = "32KHz timer",
 -.flags = IRQF_TIMER | IRQF_IRQPOLL,
 -.handler = omap_32k_timer_interrupt,
-.};
-
static __init void omap_init_32k_timer(void)
{
-setup_irq(INT_OS_TIMER, &omap_32k_timer_irq);
+if (request_irq(INT_OS_TIMER, omap_32k_timer_interrupt,
irqf_timer IRQF_IRQPOLL, "32KHz timer", NULL))
+pr_err("Failed to request irq %d(32KHz timer)\n", INT_OS_TIMER);

clockevent_32k_timer.cpumask = cpumask_of(0);
clockevents_config_and_register(&clockevent_32k_timer,
--- linux-4.15.0.orig/arch/arm/mach-omap2/board-n8x0.c
+++ linux-4.15.0/arch/arm/mach-omap2/board-n8x0.c
@@ -325,6 +325,7 @@
static void n8x0_mmc_callback(void *data, u8 card_mask)
{
+  ifdef CONFIG_MMC_OMAP
  int bit, *openp, index;

  if (board_is_n800()) {
@@ -342,7 +343,6 @@
else
  *openp = 0;

-  ifdef CONFIG_MMC_OMAP
  omap_mmc_notify_cover_event(mmc_device, index, *openp);
  #else
  pr_warn("MMC: notify cover event not available\n");
--- linux-4.15.0.orig/arch/arm/mach-omap2/cpuidle44xx.c
+++ linux-4.15.0/arch/arm/mach-omap2/cpuidle44xx.c
@@ -152,6 +152,10 @@
      mpss_can_lose_context = (cx->mpu_state == PWRDM_POWER_RET) &&
                           (cx->mpu_logic_state == PWRDM_POWER_OFF);

+/* Enter broadcast mode for periodic timers */
+tick_broadcast_enable();
+
+/* Enter broadcast mode for one-shot timers */
tick_broadcast_enter();

/@
@@ -218,15 +222,6 @@
return index;
}

-/*
- * For each cpu, setup the broadcast timer because local timers
- * stops for the states above C1.
- */
- static void omap_setup_broadcast_timer(void *arg)
-{
-    tick_broadcast_enable();
-}
static struct cpuidle_driver omap4_idle_driver = {
    .name = "omap4_idle",
    .owner = THIS_MODULE,
    .@ @ -319.8 +314.5 @ @
if (!cpu_clkdm[0] || !cpu_clkdm[1])
return -ENODEV;

/* Configure the broadcast timer on each cpu */
on_each_cpu(omap_setup_broadcast_timer, NULL, 1);
-
return cpuidle_register(idle_driver, cpu_online_mask);
}
--- linux-4.15.0.orig/arch/arm/mach-omap2/display.c
+++ linux-4.15.0/arch/arm/mach-omap2/display.c
@@ -84,6 +84,7 @@
    u32 enable_mask, enable_shift;
    u32 pipd_mask, pipd_shift;
    u32 reg;
+int ret;
if (dsi_id == 0) {
enable_mask = OMAP4_DSI1_LANEENABLE_MASK;
@@ -99,7 +100,11 @@
return -ENODEV;
}
-regmap_read(omap4_dsi_mux_syscon, OMAP4_DSIPHY_SYSCON_OFFSET, &reg);
+ret = regmap_read(omap4_dsi_mux_syscon, + OMAP4_DSIPHY_SYSCON_OFFSET, + &reg);
+if (ret)
+return ret;
reg &= ~enable_mask;
reg &= ~pipd_mask;
--- linux-4.15.0.orig/arch/arm/mach-omap2/id.c
+++ linux-4.15.0/arch/arm/mach-omap2/id.c
@@ -199,8 +199,8 @@
pr_info("%s", soc_name);
if ((omap_rev() >> 8) & 0x0f)
    -pr_info("%s", soc_rev);
    -pr_info("\n");
    +pr_cont("%s", soc_rev);
    +pr_cont("\n");
}
#define OMAP3_SHOW_FEATURE(feat)
--- linux-4.15.0.orig/arch/arm/mach-omap2/omap-smp.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap-smp.c
@@ -109,6 +109,45 @@
static inline void omap5_erratum_workaround_801819(void) { }
#endif

+#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+/*
+ * Configure ACR and enable ACTLR[0] (Enable invalidates of BTB with
+ * ICIALLU) to activate the workaround for secondary Core.
+ * NOTE: it is assumed that the primary core's configuration is done
+ * by the boot loader (kernel will detect a misconfiguration and complain
+ * if this is not done).
+ *
+ * In General Purpose(GP) devices, ACR bit settings can only be done
+ * by ROM code in "secure world" using the smc call and there is no
+ * option to update the "firmware" on such devices. This also works for
+ * High security(HS) devices, as a backup option in case the
+ * "update" is not done in the "security firmware".
+ */
+static void omap5_secondary_harden_predictor(void)
+{
+u32 acr, acr_mask;
+
+asm volatile("mrc p15, 0, %0, c1, c0, 1" :="r" (acr));
+
+/*
+ * ACTLR[0] (Enable invalidates of BTB with ICIALLU)
+ */
+acr_mask = BIT(0);
+
+/* Do we already have it done.. if yes, skip expensive smc */
+if (((acr & acr_mask) == acr_mask)
+return;
+
+acr |= acr_mask;
+omap_smc1(OMAP5_DRA7_MON_SET_ACR_INDEX, acr);
+
+pr_debug("%s: ARM ACR setup for CVE_2017_5715 applied on CPU%d\n", __func__, smp_processor_id());
+}
+else
+static inline void omap5_secondary_harden_predictor(void) { }
+#endif
+
+static void omap4_secondary_init(unsigned int cpu)
/*
    @ @ -131.6 +170.8 @@
    set_cntfreq();
*/
/* Configure ACR to disable streaming WA for 801819 */
omap5_erratum_workaround_801819();
+/* Enable ACR to allow for ICUALLU workaround */
+omap5_secondary_harden_predictor();
}

/*
--- linux-4.15.0.orig/arch/arm/mach-omap2/omap-wakeupgen.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap-wakeupgen.c
@@ -50,6 +50,9 @@
#define OMAP4_NR_BANKS4
#define OMAP4_NR_IRQS128

 +#+define SYS_NIRQ1_EXT_SYS_IRQ_1	7
 +#+define SYS_NIRQ2_EXT_SYS_IRQ_2	119

 static void __iomem *wakeupgen_base;
 static void __iomem *sar_base;
 static DEFINE_RAW_SPINLOCK(wakeupgen_lock);
@@ -153,6 +156,37 @@
 irq_chip_unmask_parent(d);
 }

+/*
+ * The sys_irq pins bypass peripheral modules and are wired directly
+ * to MPUSS wakeupgen. They get automatically inverted for GIC.
+ */
+static int wakeupgen_irq_set_type(struct irq_data *d, unsigned int type)
+{
+    bool inverted = false;
+
+    switch (type) { 
+    case IRQ_TYPE_LEVEL_LOW:
+        type &= ~IRQ_TYPE_LEVEL_MASK;
+        type |= IRQ_TYPE_LEVEL_HIGH;
+        inverted = true;
+        break;
+    case IRQ_TYPE_EDGE_FALLING:
+        type &= ~IRQ_TYPE_EDGE_BOTH;
+        type |= IRQ_TYPE_EDGE_RISING;
+        inverted = true;
+        break;
+    default:
+        break;
+    }
+ if (inverted && d->hwirq != SYS_NIRQ1_EXT_SYS_IRQ_1 &&
+    d->hwirq != SYS_NIRQ2_EXT_SYS_IRQ_2)
+     pr_warn("wakeupgen: irq%i polarity inverted in dts\n",
+     d->hwirq);
+ + return irq_chip_set_type_parent(d, type);
+ }
+
+#ifdef CONFIG_HOTPLUG_CPU
static DEFINE_PER_CPU(u32 [MAX_NR_REG_BANKS], irqmasks);

@@ -299,8 +333,6 @@
if (soc_is_dra7xx())
    return;

-    if (!sar_base)
-        sar_base = omap4_get_sar_ram_base();
if (wakeupgen_ops && wakeupgen_ops->save_context)
    wakeupgen_ops->save_context();
}
@@ -448,7 +480,7 @@
.irq_mask		= wakeupgen_mask,
.irq_unmask		= wakeupgen_unmask,
.irq_retrigger	= irq_chip_retrigger_hierarchy,
- .irq_set_type	= irq_chip_set_type_parent,
+ .irq_set_type	= wakeupgen_irq_set_type,
 .flags			= IRQCHIP_SKIP_SET_WAKE | IRQCHIP_MASK_ON_SUSPEND,
 #ifdef CONFIG_SMP
 .irq_set_affinity = irq_chip_set_affinity_parent,
 @@ -598,6 +630,8 @@
 irq_hotplug_init();
 irq_pm_init();

+ sar_base = omap4_get_sar_ram_base();
+ return 0;
+
IRQCHIP_DECLARE(ti_wakeupgen, "ti,omap4-wugen-mpu", wakeupgen_init);
--- linux-4.15.0.orig/arch/arm/mach-omap2/omap4-common.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap4-common.c
@@ -131,6 +131,9 @@
 struct device_node *np;
 struct gen_pool *sram_pool;

+ if (!soc_is_omap44xx() && !soc_is_omap54xx())
+     return 0;
+ }

IRQCHIP_DECLARE(ti_wakeupgen, "ti,omap4-wugen-mpu", wakeupgen_init);
np = of_find_compatible_node(NULL, NULL, "ti,omap4-mpu");
if (!np)
    pr_warn("%s: Unable to allocate sram needed to handle errata I688\n",
--- linux-4.15.0.orig/arch/arm/mach-omap2/omap_device.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap_device.c
@@ -226,10 +226,12 @@
break;
case BUS_NOTIFY_BIND_DRIVER:
    od = to_omap_device(pdev);
    -if (od && (od->_state == OMAPDEVICESTATE_ENABLED) &&
+++ linux-4.15.0/arch/arm/mach-omap2/omap_device.c
@@ -226,10 +226,12 @@
break;
case BUS_NOTIFY_ADD_DEVICE:
--- linux-4.15.0.orig/arch/arm/mach-omap2/omap_hwmod.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap_hwmod.c
@@ -2159,6 +2159,37 @@
}{}
/**
+ * omap_hwmod_fix_mpu_rt_idx - fix up mpu_rt_idx register offsets
+ * @oh: struct omap_hwmod *
+ * @np: struct device_node *
+ * + Fix up module register offsets for modules with mpu_rt_idx.
+ * + Only needed for cpsw with interconnect target module defined
+ * + in device tree while still using legacy hwmod platform data
+ * + for rev, sysc and syss registers.
+ * + Can be removed when all cpsw hwmod platform data has been
+ * + dropped.
+ */
+static void omap_hwmod_fix_mpu_rt_idx(struct omap_hwmod *oh,
+  struct device_node *np,
+  struct resource *res)
+{
+    struct device_node *child = NULL;
+    int error;
+    +child = of_get_next_child(np, child);

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+if (!child)
+return;
+
+error = of_address_to_resource(child, oh->mpu_rt_idx, res);
+if (error)
+pr_err("%s: error mapping mpu_rt_idx: %i\n",
+ __func__, error);
+
+/**
 * omap_hwmod_parse_module_range - map module IO range from device tree
 * @oh: struct omap_hwmod *
 * @np: struct device_node *
 @@ -2218,7 +2249,13 @@
 size = be32_to_cpup(ranges);
 
 pr_debug("omap_hwmod: %s %s at 0x%llx size 0x%llx\n",
 - oh->name, np->name, base, size);
 + oh ? oh->name : "", np->name, base, size);
+
+if (oh && oh->mpu_rt_idx) {
+omap_hwmod_fix_mpu_rt_idx(oh, np, res);
+
+return 0;
+
+}
+
res->start = base;
res->end = base + size - 1;
@@ -2358,7 +2395,7 @@
 /* a stub; implementing this properly requires iclk autoidle usecounting in
 * the clock code. No return value.
 */
-static void __init _setup_iclk_autoidle(struct omap_hwmod *oh)
+static void _setup_iclk_autoidle(struct omap_hwmod *oh)
{
 struct omap_hwmod_ocp_if *os;
 
@@ -2389,9 +2426,9 @@
 /* reset. Returns 0 upon success or a negative error code upon
 * failure.
 */
-static int __init _setup_reset(struct omap_hwmod *oh)
+static int _setup_reset(struct omap_hwmod *oh)
{
 -int r;
 +int r = 0;

 if (oh->_state != _HWMOD_STATE_INITIALIZED)
return -EINVAL;
@@ -2450,7 +2487,7 @@
* No return value.
*/
-static void __init _setup_postsetup(struct omap_hwmod *oh)
+static void _setup_postsetup(struct omap_hwmod *oh)
{ 
  u8 postsetup_state;

--- linux-4.15.0.orig/arch/arm/mach-omap2/omap_hwmod_33xx_43xx_ipblock_data.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap_hwmod_33xx_43xx_ipblock_data.c
@@ -966,7 +966,8 @@
	.sysc_offs	= 0x0010,
-+ .sysc_flags	= (SYSC_HAS_SIDLEMODE | SYSC_HAS_SOFTRESET),
++ .sysc_flags	= SYSC_HAS_SIDLEMODE | SYSC_HAS_SOFTRESET |
++ SYSC_HAS_RESET_STATUS,
+ .idlemodes	= (SIDLE_FORCE | SIDLE_NO | SIDLE_SMART |
+ SIDLE_SMART_WKUP),
 .sysc_fields	= &omap_hwmod_sysc_type2,
--- linux-4.15.0.orig/arch/arm/mach-omap2/omap_hwmod_7xx_data.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap_hwmod_7xx_data.c
@@ -389,7 +389,8 @@
 static struct omap_hwmod_class_sysconfig dra7xx_epwmss_sysc = {
- .rev_offs	= 0x0000,
- .sysc_offs= 0x0010,
- .syss_offs= 0x0014,
- .sysc_flags= (SYSC_HAS_SIDLEMODE | SYSC_HAS_SOFTRESET),
+ .sysc_flags= SYSC_HAS_SIDLEMODE | SYSC_HAS_SOFTRESET |
+ SYSC_HAS_RESET_STATUS,
+ .idlemodes	= (SIDLE_FORCE | SIDLE_NO | SIDLE_SMART) |
+ SIDLE_SMART_WKUP),
 .sysc_fields	= &omap_hwmod_sysc_type2,
--- linux-4.15.0.orig/arch/arm/mach-omap2/omap_hwmod_reset.c
+++ linux-4.15.0/arch/arm/mach-omap2/omap_hwmod_reset.c
@@ -92,11 +92,13 @@
 */
 void omap_hwmod_rtc_unlock(struct omap_hwmod *oh)
{ 
-+local_irq_disable();
+unsigned long flags;
+
+local_irq_save(flags);
omap_rtc_wait_not_busy(oh);
omap_hwmod_write(OMAP_RTC_KICK0_VALUE, oh, OMAP_RTC_KICK0_REG);
omap_hwmod_write(OMAP_RTC_KICK1_VALUE, oh, OMAP_RTC_KICK1_REG);
-local_irq_enable();
+local_irq_restore(flags);
}

/**
 * @ @ -110,9 +112,11 @@ */
 void omap_hwmod_rtc_lock(struct omap_hwmod *oh)
 {
 -local_irq_disable();
 +unsigned long flags;
 +
 +local_irq_save(flags);
 omap_rtc_wait_not_busy(oh);
 omap_hwmod_write(0x0, oh, OMAP_RTC_KICK0_REG);
 omap_hwmod_write(0x0, oh, OMAP_RTC_KICK1_REG);
 -local_irq_enable();
 +local_irq_restore(flags);
 }
 --- linux-4.15.0.orig/arch/arm/mach-omap2/pdata-quirks.c
 +++ linux-4.15.0/arch/arm/mach-omap2/pdata-quirks.c
 @@ -265,14 +265,6 @@
 am35xx_emac_reset();
 }

 static struct platform_device omap3_rom_rng_device = {
 -name = "omap3-rom-rng",
 -id = -1,
 -dev = {
 -platform_data = rx51_secure_rng_call,
 -},
 -};
 -
 static void __init nokia_n900_legacy_init(void)
 {
 hsmmc2_internal_input_clk();
 @@ -288,9 +280,6 @@
 pr_warn("RX-51: Not enabling ARM errata 430973 workaround\n");
 pr_warn("Thumb binaries may crash randomly without this workaround\n");
 }
 -
 -pr_info("RX-51: Registering OMAP3 HWRNG device\n");
 -platform_device_register(&omap3_rom_rng_device);
 }
 }
 @@ -307,108 +296,15 @@
/* omap3pandora legacy devices */
#define PANDORA_WIFI_IRQ_GPIO	21
#define PANDORA_WIFI_NRESET_GPIO	23

static struct platform_device pandora_backlight = {
    .name = "pandora-backlight",
    .id = -1,
};

static struct regulator_consumer_supply pandora_vmmc3_supply[] = {
    REGULATOR_SUPPLY("vmmc", "omap_hsmmc.2"),
};

static struct regulator_init_data pandora_vmmc3 = {
    .constraints = {
        .valid_ops_mask = REGULATOR_CHANGE_STATUS,
    },
    .num_consumer_supplies = ARRAY_SIZE(pandora_vmmc3_supply),
    .consumer_supplies = pandora_vmmc3_supply,
};

static struct fixed_voltage_config pandora_vwlan = {
    .supply_name = "vwlan",
    .microvolts = 1800000, /* 1.8V */
    .gpio = PANDORA_WIFI_NRESET_GPIO,
    .startup_delay = 50000, /* 50ms */
    .enable_high = 1,
    .init_data = &pandora_vmmc3,
};

static struct platform_device pandora_vwlan_device = {
    .name = "reg-fixed-voltage",
    .id = 1,
    .dev = {
        .platform_data = &pandora_vwlan,
    },
};

static void pandora_wl1251_init_card(struct mmc_card *card)
{
    /*
     * We have TI wl1251 attached to MMC3. Pass this information to
     * SDIO core because it can’t be probed by normal methods.
     */
    if (card->type == MMC_TYPE_SDIO || card->type == MMC_TYPE_SD_COMBO) {
        card->quirks |= MMC_QUIRK_NONSTD_SDIO;
        card->cccr.wide_bus = 1;
        card->cis.vendor = 0x104c;
card->cis.device = 0x9066;
card->cis.blksize = 512;
card->cis.max_dtr = 24000000;
card->ocr = 0x80;

-
}-

- static struct omap2_hsmmc_info pandora_mmc3[] = {
  -
  - .mmc = 3,
  - .caps = MMC_CAP_4_BIT_DATA | MMC_CAP_POWER_OFF_CARD,
  - .gpio_cd = -EINVAL,
  - .gpio_wp = -EINVAL,
  - .init_card = pandora_wl1251_init_card,
  -
  -
  - / * Terminator */
  -
  -
  - static void __init pandora_wl1251_init(void)
  -
  -{ struct wl1251_platform_data pandora_wl1251_pdata;
  -
  -  int ret;
  -
  -  memset(&pandora_wl1251_pdata, 0, sizeof(pandora_wl1251_pdata));
  -
  -  pandora_wl1251_pdata.power_gpio = -1;
  -
  -  ret = gpio_request_one(PANDORA_WIFI_IRQ_GPIO, GPIOF_IN, "wl1251 irq");
  -
  -  if (ret < 0)
  -
  -    goto fail;
  -
  -  pandora_wl1251_pdata.irq = gpio_to_irq(PANDORA_WIFI_IRQ_GPIO);
  -
  -  if (pandora_wl1251_pdata.irq < 0)
  -
  -    goto fail_irq;
  -
  -  pandora_wl1251_pdata.use_eeprom = true;
  -
  -  ret = wl1251_set_platform_data(&pandora_wl1251_pdata);
  -
  -  if (ret < 0)
  -
  -    goto fail_irq;
  -
  -  return;
  -
  -  fail_irq:
  -
  -  gpio_free(PANDORA_WIFI_IRQ_GPIO);
  -
  -  fail:
  -
  -  pr_err("wl1251 board initialisation failed\n");
  -
  -}
static void __init omap3_pandora_legacy_init(void)
{
    platform_device_register(&pandora_backlight);
    platform_device_register(&pandora_vwlan_device);
    omap_hsmmc_init(pandora_mmc3);
    omap_hsmmc_late_init(pandora_mmc3);
    pandora_wl1251_init();
}
#endif /* CONFIG_ARCH_OMAP3 */

@@ -558,6 +454,7 @@
    OF_DEV_AUXDATA("ti,davinci_mdio", 0x5c030000, "davinci_mdio.0", NULL),
    OF_DEV_AUXDATA("ti,am3517-emac", 0x5c000000, "davinci_emac.0",
        &am35xx_emac_pdata),
    +OF_DEV_AUXDATA("nokia,n900-rom-rng", 0, NULL, rx51_secure_rng_call),
    /* McBSP modules with sidetone core */
#if IS_ENABLED(CONFIG_SND_OMAP_SOC_MCBSP)
    OF_DEV_AUXDATA("ti,omap3-mcbsp", 0x49022000, "49022000.mcbsp", &mcbsp_pdata),
--- linux-4.15.0.orig/arch/arm/mach-omap2/pm.c
+++ linux-4.15.0/arch/arm/mach-omap2/pm.c
@@ -77,83 +77,6 @@
    return 0;
}

/*
- * This API is to be called during init to set the various voltage
- * domains to the voltage as per the opp table. Typically we boot up
- * at the nominal voltage. So this function finds out the rate of
- * the clock associated with the voltage domain, finds out the correct
- * opp entry and sets the voltage domain to the voltage specified
- * in the opp entry
- */
-static int __init omap2_set_init_voltage(char *vdd_name, char *clk_name,
-    const char *oh_name)
-{
-    struct voltagedomain *voltdm;
-    struct clk *clk;
-    struct dev_pm_opp *opp;
-    unsigned long freq, bootup_volt;
-    struct device *dev;
-    
-    if (!vdd_name || !clk_name || !oh_name) {
-        pr_err("%s: invalid parameters\n", __func__);
-        goto exit;
-    }
-    
-    if (!strcmp(oh_name, "mpu", 3))
-        /*
- * All current OMAPs share voltage rail and clock
- * source, so CPU0 is used to represent the MPU-SS.
- */
-dev = get_cpu_device(0);
-else
-dev = omap_device_get_by_hwmod_name(oh_name);
-
-if (IS_ERR(dev)) {
-pr_err("%s: Unable to get dev pointer for hwmod %s\n", __func__, oh_name);
goto exit;
}
-
-voltdm = voltdm_lookup(vdd_name);
-if (!voltdm) {
-pr_err("%s: unable to get vdd pointer for vdd_%s\n", __func__, vdd_name);
goto exit;
}
-
-clk = clk_get(NULL, clk_name);
-if (IS_ERR(clk)) {
-pr_err("%s: unable to get clk %s\n", __func__, clk_name);
goto exit;
}
-
-freq = clk_get_rate(clk);
-clk_put(clk);
-
-opp = dev_pm_opp_find_freq_ceil(dev, &freq);
-if (IS_ERR(opp)) {
-pr_err("%s: unable to find boot up OPP for vdd_%s\n", __func__, vdd_name);
goto exit;
}
-
-bootup_volt = dev_pm_opp_get_voltage(opp);
-dev_pm_opp_put(opp);
-
-if (!bootup_volt) {
-pr_err("%s: unable to find voltage corresponding to the bootup OPP for vdd_%s\n", __func__, vdd_name);
goto exit;
}
-
-voltdm_scale(voltdm, bootup_volt);
-return 0;
-
-exit:
-pr_err("%s: unable to set vdd_%s\n", __func__, vdd_name);
-return -EINVAL;
-}
-
#endif CONFIG_SUSPEND
static int omap_pm_enter(suspend_state_t suspend_state)
{
@@ -186,7 +109,7 @@
cpu_idle_poll_ctrl(false);
}

-static void omap_pm_finish(void)
+static void omap_pm_wake(void)
{
 if (soc_is_omap34xx())
 omap_prcm_irq_complete();
@@ -196,7 +119,7 @@
 .begin= omap_pm_begin,
 .end= omap_pm_end,
 .enter= omap_pm_enter,
- .finish= omap_pm_finish,
+ .wake= omap_pm_wake,
 .valid= suspend_valid_only_mem,
};
@@ -211,25 +134,6 @@
}
#endif /* CONFIG_SUSPEND */

-static void __init omap3_init_voltages(void)
-{
- if (!soc_is_omap34xx())
- return;
-
- omap2_set_init_voltage("mpu_iva", "dpll1_ck", "mpu");
- omap2_set_init_voltage("core", "l3_ick", "l3_main");
-}
-
- static void __init omap4_init_voltages(void)
-{
- if (!soc_is_omap44xx())
- return;
-
- omap2_set_init_voltage("mpu", "dpll_mpu_ck", "mpu");
- omap2_set_init_voltage("core", "l3_a4divck", "l3_main_1");
- omap2_set_init_voltage("iva", "dpll_iva_m5x2_ck", "iva");
-}
static int __init omap2_common_pm_init(void)
{
    omap_pm_if_init();
    omap4_tw1_init();
    omap_voltage_late_init();

    /* Initialize the voltages */
    omap3_init_voltages();
    omap4_init_voltages();

    /* Smartreflex device init */
    omap_devinit_smartreflex();

--- linux-4.15.0.orig/arch/arm/mach-omap2/powerdomain.c
+++ linux-4.15.0/arch/arm/mach-omap2/powerdomain.c
@@ -188,7 +188,7 @@
     ((prev & OMAP_POWERSTATE_MASK) << 0));
     trace_power_domain_target_rcuidle(pwrdm->name,
        trace_state,
-    smp_processor_id());
+    raw_smp_processor_id());
}
break;
default:
    @ @ -518,7 +518,7 @@
    if (arch_pwrdm && arch_pwrdm->pwrdm_set_next_pwrst) {
        /* Trace the pwrdm desired target state */
        trace_power_domain_target_rcuidle(pwrdm->name, pwrst,
-    smp_processor_id());
+    raw_smp_processor_id());
        /* Program the pwrdm desired target state */
        ret = arch_pwrdm->pwrdm_set_next_pwrst(pwrdm, pwrst);
    }
--- linux-4.15.0.orig/arch/arm/mach-omap2/prm3xxx.c
+++ linux-4.15.0/arch/arm/mach-omap2/prm3xxx.c
@@ -433,7 +433,7 @@
     * No return value.
     */
    static void __init omap3xxx_prm_enable_io_wakeup(void)
-    static void omap3xxx_prm_enable_io_wakeup(void)
+    if (prm_features & PRM_HAS_IO_WAKEUP)
         omap2_prm_set_mod_reg_bits(OMAP3430_EN_IO_MASK, WKUP_MOD,
--- linux-4.15.0.orig/arch/arm/mach-omap2/prm44xx.c
+++ linux-4.15.0/arch/arm/mach-omap2/prm44xx.c

* to occur, WAKEUPENABLE bits must be set in the pad mux registers, and
* omap44xx_prm_reconfigure_io_chain() must be called. No return value.
*/
}

struct dmtimer_clockevent {
    struct clock_event_device dev;
    struct omap_dm_timer timer;
};

static struct dmtimer_clockevent clockevent;

+static struct dmtimer_clockevent *to_dmtimer(struct clock_event_device *clockevent)
+{
    struct dmtimer_clockevent *clkevt =
        +container_of(clockevent, struct dmtimer_clockevent, dev);
    +struct omap_dm_timer *timer = &clkevt->timer;
    +
return timer;
+
#endif CONFIG_SOC_HAS_REALTIME_COUNTER
static unsigned long arch_timer_freq;

static irqreturn_t omap2_gp_timer_interrupt(int irq, void *dev_id)
{
    struct clock_event_device *evt = &clockevent_gpt;
    -
    -__omap_dm_timer_write_status(&clkev, OMAP_TIMER_INT_OVERFLOW);
    +struct dmtimer_clockevent *clkevt = dev_id;
    +struct clock_event_device *evt = &clkevt->dev;
    +struct omap_dm_timer *timer = &clkevt->timer;

    +__omap_dm_timer_write_status(timer, OMAP_TIMER_INT_OVERFLOW);
    evt->event_handler(evt);
    return IRQ_HANDLED;
}

- static struct irqaction omap2_gp_timer_irq = {
  - .name = "gp_timer",
  - .flags = IRQF_TIMER | IRQF_IRQPOLL,
  - .handler = omap2_gp_timer_interrupt,
  -};
-
 static int omap2_gp_timer_set_next_event(unsigned long cycles,
    struct clock_event_device *evt)
{
    -__omap_dm_timer_load_start(&clkev, OMAP_TIMER_CTRL_ST,
    +struct omap_dm_timer *timer = to_dmtimer(evt);
    +
    +__omap_dm_timer_load_start(timer, OMAP_TIMER_CTRL_ST,
        0xffffffff - cycles, OMAP_TIMER_POSTED);

    return 0;
    @ @ -107,22 +117,26 @ @

 static int omap2_gp_timer_shutdown(struct clock_event_device *evt)
{
    -__omap_dm_timer_stop(&clkev, OMAP_TIMER_POSTED, clkev.rate);
    +struct omap_dm_timer *timer = to_dmtimer(evt);
    +
    +__omap_dm_timer_stop(timer, OMAP_TIMER_POSTED, timer->rate);
    +
    return 0;
static int omap2_gp_timer_set_periodic(struct clock_event_device *evt)
{
+struct omap_dm_timer *timer = to_dmtimer(evt);
    u32 period;

-__omap_dm_timer_stop(&clkev, OMAP_TIMER_POSTED, clkev.rate);
+__omap_dm_timer_stop(timer, OMAP_TIMER_POSTED, timer->rate);

-period = clkev.rate / HZ;
+period = timer->rate / HZ;
period -= 1;
/* Looks like we need to first set the load value separately */
-__omap_dm_timer_write(&clkev, OMAP_TIMER_LOAD_REG, 0xffffffff - period,
+__omap_dm_timer_write(timer, OMAP_TIMER_LOAD_REG, 0xffffffff - period,
    OMAP_TIMER_POSTED);
-__omap_dm_timer_load_start(&clkev,
+__omap_dm_timer_load_start(timer,
    OMAP_TIMER_CTRL_AR | OMAP_TIMER_CTRL_ST,
    0xffffffff - period, OMAP_TIMER_POSTED);
return 0;
@@ -136,32 +150,17 @@
omap_hwmod_idle(clockevent_gpt_hwmod);
}

-static void omap_clkevt_unidle(struct clock_event_device *unused)
+static void omap_clkevt_unidle(struct clock_event_device *evt)
{
+struct omap_dm_timer *timer = to_dmtimer(evt);
+if (!clockevent_gpt_hwmod)
+    return;
+omap_hwmod_enable(clockevent_gpt_hwmod);
-__omap_dm_timer_int_enable(&clkev, OMAP_TIMER_INT_OVERFLOW);
+__omap_dm_timer_int_enable(timer, OMAP_TIMER_INT_OVERFLOW);
}

-static struct clock_event_device clockevent_gpt = {
+static struct clock_event_device clockevent_gpt = {
    .features= CLOCK_EVT_FEAT_PERIODIC |
        CLOCK_EVT_FEAT_ONESHOT,
    .rating= 300,
    .set_next_event= omap2_gp_timer_set_next_event,
    .set_state_shutdown= omap2_gp_timer_shutdown,
    .set_state_periodic= omap2_gp_timer_set_periodic,
    .set_state_oneshot= omap2_gp_timer_shutdown,
    .tick_resume= omap2_gp_timer_shutdown,
-static struct property device_disabled = {
    .name = "status",
    .length = sizeof("disabled"),
    .value = "disabled",
};
-
static const struct of_device_id omap_timer_match[] __initconst = {
    {.compatible = "ti,omap2420-timer", },
    {.compatible = "ti,omap3430-timer", },
};

@@ -203,8 +202,17 @@
of_get_property(np, "ti,timer-secure", NULL))
continue;

@if (!of_device_is_compatible(np, "ti,omap-counter32k"))
-    of_add_property(np, &device_disabled);
+    if (!of_device_is_compatible(np, "ti,omap-counter32k")) {
+        struct property *prop;
+        +prop = kzalloc(sizeof(*prop), GFP_KERNEL);
+        if (!prop)
+            return NULL;
+        prop->name = "status";
+        prop->value = "disabled";
+        prop->length = strlen(prop->value);
+        of_add_property(np, prop);
+    }
    return np;
}

@@ -324,47 +332,57 @@
#endif

static void __init omap2_gp_clockevent_init(int gptimer_id,
                                          const char *fck_source,
                                          const char *property)
+static void __init dmtimer_clkevt_init_common(struct dmtimer_clockevent *clkevt,
+                                              int gptimer_id,
+                                              const char *fck_source,
+                                              unsigned int features,
+                                              const struct cpumask *cpumask,
+                                              const char *property,
+                                              int rating, const char *name)
+{struct omap_dm_timer *timer = &clkevt->timer;
 int res;
- clkev.id = gptimer_id;
- clkev.errata = omap_dm_timer_get_errata();
+ timer->id = gptimer_id;
+ timer->errata = omap_dm_timer_get_errata();
+ clkevt->dev.features = features;
+ clkevt->dev.rating = rating;
+ clkevt->dev.set_next_event = omap2_gp_timer_set_next_event;
+ clkevt->dev.set_state_shutdown = omap2_gp_timer_shutdown;
+ clkevt->dev.set_state_periodic = omap2_gp_timer_set_periodic;
+ clkevt->dev.set_state_oneshot = omap2_gp_timer_shutdown;
+ clkevt->dev.tick_resume = omap2_gp_timer_shutdown;

/*
 * For clock-event timers we never read the timer counter and
 * so we are not impacted by errata i103 and i767. Therefore,
 * we can safely ignore this errata for clock-event timers.
 */
- __omap_dm_timer_override_errata(&clkev, OMAP_TIMER_ERRATA_I103_I767);
+ __omap_dm_timer_override_errata(timer, OMAP_TIMER_ERRATA_I103_I767);
-res = omap_dm_timer_init_one(&clkev, fck_source, property,
-     &clockevent_gpt.name, OMAP_TIMER_POSTED);
+ res = omap_dm_timer_init_one(timer, fck_source, property,
+     &clkevt->dev.name, OMAP_TIMER_POSTED);
BUG_ON(res);
- omap2_gp_timer_irq.dev_id = &clkev;
- setup_irq(clkev.irq, &omap2_gp_timer_irq);
+ clkevt->dev.cpumask = cpumask;
+ clkevt->dev_irq = omap_dm_timer_get_irq(timer);

- __omap_dm_timer_int_enable(&clkev, OMAP_TIMER_INT_OVERFLOW);
+ if (request_irq(clkevt->dev_irq, omap2_gp_timer_interrupt,
+     IRQF_TIMER | IRQF_IRQPOLL, name, clkevt))
+     pr_err("Failed to request irq %d (gp_timer)\n", clkevt->dev_irq);

- clockevent_gpt.cpumask = cpu_possible_mask;
- clockevent_gpt irq = omap_dm_timer_get_irq(&clkev);
- clockevents_config_and_register(&clockevent_gpt, clkevt.rate,
-3, /* Timer internal resynch latency */
-0xffffffff);
+ __omap_dm_timer_int_enable(timer, OMAP_TIMER_INT_OVERFLOW);

if (soc_is_am33xx() || soc_is_am43xx()) {
    -clockevent_gpt.suspend = omap_clkevt_idle;
    -clockevent_gpt.resume = omap_clkevt_unidle;
+ clkevt->dev.suspend = omap_clkevt_idle;
+ clkevt->dev.resume = omap_clkevt_unidle;
+clkevt->dev.resume = omap_clkevt_unidle;

clockevent_gpt_hwmod =
    omap_hwmod_lookup(clockevent_gpt.name);
+omap_hwmod_lookup(clkevt->dev.name);
}

-pr_info("OMAP clockevent source: %s at %lu Hz\n", clockevent_gpt.name,
    -clkev.rate);
+pr_info("OMAP clockevent source: %s at %lu Hz\n", clkevt->dev.name,
    +timer->rate);
}

/* Clocksource code */
@@ -472,7 +490,12 @@
{
    omap_clk_init();
    omap_dmtimer_init();
-omap2_gp_clockevent_init(clkev_nr, clkev_src, clkev_prop);
+    dmtimer_clkevt_init_common(&clockevent, clkev_nr, clkev_src,
    +    CLOCK_EVT_FEAT_PERIODIC | CLOCK_EVT_FEAT_ONESHOT,
    +    cpu_possible_mask, clkev_prop, 300, "clockevent");
+clockevents_config_and_register(&clockevent.dev, clockevent.timer.rate,
    +3, /* Timer internal resynch latency */
    +0xffffffff);

    /* Enable the use of clocksource="gp_timer" kernel parameter */
    if (use_gptimer_clksrc || gptimer)
        --- linux-4.15.0.orig/arch/arm/mach-orion5x/Kconfig
        +++ linux-4.15.0/arch/arm/mach-orion5x/Kconfig
            @ @ -58,7 +58,6 @@

        config MACH_DNS323
        bool "D-Link DNS-323"
        -select GENERIC_NET_UTILS
        select I2C_BOARDINFO if I2C
        help
            Say 'Y' here if you want your kernel to support the
            @ @ -66,7 +65,6 @@

        config MACH_TS209
        bool "QNAP TS-109/TS-209"
        -select GENERIC_NET_UTILS
        help
            Say 'Y' here if you want your kernel to support the
            @ @ -101,7 +99,6 @@
config MACH_TS409
bool "QNAP TS-409"
-select GENERIC_NET_UTILS
help
Say 'Y' here if you want your kernel to support the
QNAP TS-409 platform.
--- linux-4.15.0.orig/arch/arm/mach-orion5x/dns323-setup.c
+++ linux-4.15.0/arch/arm/mach-orion5x/dns323-setup.c
@@ -173,10 +173,42 @@
 .phy_addr = MV643XX_ETH_PHY_ADDR(8),
 }

+/* dns323_parse_hex_*() taken from tsx09-common.c; should a common copy of these
+ * functions be kept somewhere?
+ */
+static int __init dns323_parse_hex_nibble(char n)
+{
+if (n >= '0' && n <= '9')
+return n - '0';
+
+if (n >= 'A' && n <= 'F')
+return n - 'A' + 10;
+
+if (n >= 'a' && n <= 'f')
+return n - 'a' + 10;
+
+return -1;
+}
+
+static int __init dns323_parse_hex_byte(const char *b)
+{
+int hi;
+int lo;
+
+hi = dns323_parse_hex_nibble(b[0]);
+lo = dns323_parse_hex_nibble(b[1]);
+
+if (hi < 0 || lo < 0)
+return -1;
+
+return (hi << 4) | lo;
+}
+
+static int __init dns323_read_mac_addr(void)
+{
+u_int8_t addr[6];
+-void __iomem *mac_page;
++int i;
+char *mac_page;

/* MAC address is stored as a regular old string in /dev/mtdblock4
 * (0x007d0000-0x00800000) starting at offset 196480 (0x2ff80).
 @@ -185,8 +217,23 @@
 if (!mac_page)
 return -ENOMEM;
 -if (!mac_pton((__force const char *) mac_page, addr))
 -goto error_fail;
 +/* Sanity check the string we're looking at */
 +for (i = 0; i < 5; i++) {
 +if ((mac_page + (i * 3) + 2) != ':') {
 +goto error_fail;
 +}
 +}
 +
 +for (i = 0; i < 6; i++)
+int byte;
+
+byte = dns323_parse_hex_byte(mac_page + (i * 3));
+if (byte < 0) {
+goto error_fail;
+}
+
+addr[i] = byte;
+
+iounmap(mac_page);

printk("DNS-323: Found ethernet MAC address: %pM
", addr);
--- linux-4.15.0.orig/arch/arm/mach-orion5x/tsx09-common.c
+++ linux-4.15.0/arch/arm/mach-orion5x/tsx09-common.c
@@ -53,12 +53,53 @@
 .phy_addr	= MV643XX_ETH_PHY_ADDR(8),
 };

+static int __init qnap_tsx09_parse_hex_nibble(char n)
+{
+if (n >= '0' && n <= '9')
+return n - '0';
+
+if (n >= 'A' && n <= 'F')
+return n - 'A' + 10;
+
+if (n >= 'a' && n <= 'f')
+return n - 'a' + 10;
+
+return -1;
```c
static int __init qnap_tsx09_parse_hex_byte(const char *b)
{
    int hi;
    int lo;

    hi = qnap_tsx09_parse_hex_nibble(b[0]);
    lo = qnap_tsx09_parse_hex_nibble(b[1]);

    if (hi < 0 || lo < 0)
        return -1;
    return (hi << 4) | lo;
}

static int __init qnap_tsx09_check_mac_addr(const char *addr_str)
{
    u_int8_t addr[6];
    int i;

    if (!mac_pton(addr_str, addr))
        return -1;
    for (i = 0; i < 6; i++) {
        int byte;

        /*
         */
        if (addr_str[(i * 3) + 2] != ((i < 5) ? ':' : '\n'))
            return -1;
        byte = qnap_tsx09_parse_hex_byte(addr_str + (i * 3));
        if (byte < 0)
            return -1;
        addr[i] = byte;
    }

    printk(KERN_INFO "tsx09: found ethernet mac address %pM\n", addr);
}
```

```c
unsigned long addr;
for (addr = mem_base; addr < (mem_base + size); addr += 1024) {
    void __iomem *nor_page;
    int ret = 0;
```
nor_page = ioremap(addr, 1024);
if (nor_page != NULL) {
    ret = qnap_tsx09_check_mac_addr(___force const char *)nor_page);
    iounmap(nor_page);
}

--- linux-4.15.0.orig/arch/arm/mach-pxa/cm-x300.c
+++ linux-4.15.0/arch/arm/mach-pxa/cm-x300.c
@@ -547,7 +547,7 @@
 .exit= cm_x300_u2d_exit,
 }

-static void cm_x300_init_u2d(void)
+static void __init cm_x300_init_u2d(void)
{
  pxa3xx_set_u2d_info(&cm_x300_u2d_platform_data);
}

--- linux-4.15.0.orig/arch/arm/mach-pxa/irq.c
+++ linux-4.15.0/arch/arm/mach-pxa/irq.c
@@ -185,7 +185,7 @@
{
  int i;

-  for (i = 0; i < pxa_internal_irq_nr / 32; i++) {
+  for (i = 0; i < DIV_ROUND_UP(pxa_internal_irq_nr, 32); i++) {
    void __iomem *base = irq_base(i);

    saved_icmr[i] = __raw_readl(base + ICMR);
    @ @ -204,7 +204,7 @ @
  }

-  for (i = 0; i < pxa_internal_irq_nr / 32; i++) {
+  for (i = 0; i < DIV_ROUND_UP(pxa_internal_irq_nr, 32); i++) {
    void __iomem *base = irq_base(i);

    __raw_writeI(saved_icmr[i], base + ICMR);
--- linux-4.15.0.orig/arch/arm/mach-pxa/littleton.c
+++ linux-4.15.0/arch/arm/mach-pxa/littleton.c
@@ -183,7 +183,7 @@
 .lcd_conn	= LCD_COLOR_TFT_16BPP,
 }

-static void littleton_init_lcd(void)
+static void __init littleton_init_lcd(void)
{
  pxa_set_fb_info(NULL, &littleton_lcd_info);
return sprintf(buf, "%d\n", sharpsl_pm.battstat.mainbat_voltage);
}

static DEVICE_ATTR(battery_percentage, 0444, battery_percentage_show, NULL);
static DEVICE_ATTR(battery_voltage, 0444, battery_voltage_show, NULL);
+static DEVICE_ATTR_RO(battery_percentage);
+static DEVICE_ATTR_RO(battery_voltage);

extern void (*apm_get_power_status)(struct apm_power_info *);

static void zeus_register_ohci(void)
{ /* Port 2 is shared between host and client interface. */
UP2OCR = UP2OCR_HXOE | UP2OCR_HXS | UP2OCR_DMPDE | UP2OCR_DPPDE;
select ARM_GLOBAL_TIMER
select CLKSRC_ARM_GLOBAL_TIMER_SCHED_CLOCK
select ZONE_DMA if ARM_LPAE
+select PM

help

Support for Rockchip's Cortex-A9 Single-to-Quad-Core-SoCs containing the RK2928, RK30xx and RK31xx series.

while (1):

idma->state = ~DMA_ST_AB;
-idma_irq(irq);
+disable_irq_nosync(irq);

return IRQ_HANDLED;
}
@@ -174,6 +174,9 @@
DMA_FROM_DEVICE : DMA_TO_DEVICE);

+iomd_writeb(DMA_CR_C, dma_base + CR);
idma->state = DMA_ST_AB;

--- linux-4.15.0.orig/arch/arm/mach-rpc/irq.c
+++ linux-4.15.0/arch/arm/mach-rpc/irq.c
@@ -118,7 +118,7 @@
void __init rpc_init_irq(void)
{
-unsigned int irq, clr, set = 0;
+unsigned int irq, clr, set;

iomd_writeb(0, IOMD_IRQMASKA);
iomd_writeb(0, IOMD_IRQMASKB);
@@ -130,6 +130,7 @@
for (irq = 0; irq < NR_IRQS; irq++) {
clr = IRQ_NOREQUEST;
+set = 0;

if (irq <= 6 || (irq >= 9 && irq <= 15))
clr |= IRQ_NOPROBE;
--- linux-4.15.0.orig/arch/arm/mach-s3c24xx/mach-osiris-dvs.c
+++ linux-4.15.0/arch/arm/mach-s3c24xx/mach-osiris-dvs.c
@@ -70,16 +70,16 @@
switch (val) {
case CPUFREQ_PRECHANGE:
- if (old_dvs & !new_dvs ||
- cur_dvs & !new_dvs) {
-+ if ((old_dvs & & !new_dvs) ||
+ (cur_dvs & & !new_dvs)) {
pr_debug("%s: exiting dvs\n", __func__);
cur_dvs = false;
gpio_set_value(OSIRIS_GPIO_DVS, 1);
}
break;
case CPUFREQ_POSTCHANGE:
- if (!(old_dvs & new_dvs ||
-       !cur_dvs & new_dvs) {
+ if (!(old_dvs & new_dvs) ||
+     (!cur_dvs & new_dvs)) {
  pr_debug("entering dvs\n");
cur_dvs = true;
gpio_set_value(OSIRIS_GPIO_DVS, 0);
--- linux-4.15.0.orig/arch/arm/mach-shmobile/pm-rmobile.c
+++ linux-4.15.0/arch/arm/mach-shmobile/pm-rmobile.c
@@ -330,6 +330,7 @@
pmd = of_get_child_by_name(np, "pm-domains");
  if (!pmd) {
+    iounmap(base);
    pr_warn("%pOF lacks pm-domains node\n", np);
    continue;
  }
--- linux-4.15.0.orig/arch/arm/mach-socfpga/pm.c
+++ linux-4.15.0/arch/arm/mach-socfpga/pm.c
@@ -60,14 +60,14 @@
  if (!ocram_pool) {
+    goto put_device;
    pr_warn("%s: ocram pool unavailable!\n", __func__);;
    ret = -ENODEV;
    goto put_node;
  }

ocram_base = gen_pool_alloc(ocram_pool, socfpga_sdram_self_refresh_sz);
if (!ocram_base) {
  pr_warn("%s: unable to alloc ocram!\n", __func__);
  ret = -ENOMEM;
  goto put_node;
+  goto put_device;
}

ocram_pbase = gen_pool_virt_to_phys(ocram_pool, ocram_base);
@@ -78,7 +78,7 @@
  if (!suspend_ocram_base) {
    pr_warn("%s: __arm_ioremap_exec failed!\n", __func__);
    ret = -ENOMEM;
    goto put_node;
+    goto put_device;
}
/* Copy the code that puts DDR in self refresh to ocram */
@@ -92,6 +92,8 @@
if (!socfpga_sdram_self_refresh_in_ocram)
    ret = -EFAULT;

+put_device:
+put_device(&pdev->dev);
put_node:
of_node_put(np);

--- linux-4.15.0.orig/arch/arm/mach-sunxi/sunxi.c
+++ linux-4.15.0/arch/arm/mach-sunxi/sunxi.c
@@ -66,6 +66,7 @@
    "allwinner,sun8i-h2-plus",
    "allwinner,sun8i-h3",
    "allwinner,sun8i-r40",
+    "allwinner,sun8i-v3",
    "allwinner,sun8i-v3s",
    NULL,
    };
--- linux-4.15.0.orig/arch/arm/mach-tango/pm.c
+++ linux-4.15.0/arch/arm/mach-tango/pm.c
@@ -3,6 +3,7 @@
#include <linux/suspend.h>
#include <asm/suspend.h>
#include "smc.h"
+#include "pm.h"

static int tango_pm_powerdown(unsigned long arg)
{
    @@ -24,10 +25,7 @
        .valid = suspend_valid_only_mem,
    }

-static int __init tango_pm_init(void)
+void __init tango_pm_init(void)

    suspend_set_ops(&tango_pm_ops);
    -return 0;
    }

-late_initcall(tango_pm_init);
--- linux-4.15.0.orig/arch/arm/mach-tango/pm.h
+++ linux-4.15.0/arch/arm/mach-tango/pm.h
@@ -0,0 +1,7 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+"
#ifdef CONFIG_SUSPEND
+void __init tango_pm_init(void);
+#else
+#define tango_pm_init NULL
+#endif
--- linux-4.15.0.orig/arch/arm/mach-tango/setup.c
+++ linux-4.15.0/arch/arm/mach-tango/setup.c
@@ -2,6 +2,7 @@
#include <asm/mach/arch.h>
#include <asm/hardware/cache-l2x0.h>
#include "smc.h"
+include "pm.h"

static void tango_l2c_write(unsigned long val, unsigned int reg)
{
    .dt_compat = tango_dt_compat,
    .l2c_aux_mask = ~0,
    .l2c_write_sec = tango_l2c_write,
+    .init_late = tango_pm_init,
MACHINE_END
--- linux-4.15.0.orig/arch/arm/mach-tegra/reset-handler.S
+++ linux-4.15.0/arch/arm/mach-tegra/reset-handler.S
@@ -56,16 +56,16 @@
    cmp tr6, #TEGRA20
    beq 1f @ @ @
    /* Clear the flow controller flags for this CPU. */
-    cpu_to_csr_reg r1, r0
+    cpu_to_csr_reg r3, r0
    mov32r2, TEGRA_FLOW_CTRL_BASE
    -ldr r1, [r2, r1]
+    ldr r1, [r2, r3]
    /* Clear event & intr flag */
    orrr r1, r1, \n    #FLOW_CTRL_CSR_INTR_FLAG | FLOW_CTRL_CSR_EVENT_FLAG
    movwr0, #0x3FFD@ enable, cluster_switch, immed, bitmaps
    @ & ext flags for CPU power mgnt
    bicr1, r1, r0
    -str r1, [r2]
+    str r1, [r2, r3]
1:

    mov32r9, 0xc09
--- linux-4.15.0.orig/arch/arm/mach-tegra/sleep-tegra30.S
+++ linux-4.15.0/arch/arm/mach-tegra/sleep-tegra30.S
@@ -382,6 +382,14 @@
    pll_locked r1, r0, CLK_RESET_PLLC_BASE
    pll_locked r1, r0, CLK_RESET_PLLX_BASE

+tegra_get_soc_id Tegra_APB_MISC_BASE, r1
+cmpr1, #TEGRA30
+beq1f
+ldr1, [r0, #CLK_RESET_PLLP_BASE]
+bicr1, r1, #(1<<31) @ disable PLLP bypass
+strr1, [r0, #CLK_RESET_PLLP_BASE]
+1:
+
mov32r7, Tegra_TMRUS_BASE
ldrr1, [r7]
addrr1, r1, #LOCK_DELAY
@@ -641,7 +649,10 @@
strr0, [r4, #PMC_PLLP_WB0_OVERRIDE]
/* disable PLLP, PLLA, PLLC and PLLX */
+tegra_get_soc_id Tegra_APB_MISC_BASE, r1
+cmpr1, #TEGRA30
ldrr0, [r5, #CLK_RESET_PLLP_BASE]
orrenr0, r0, #1 << 31) @ enable PLLP bypass on fast cluster
bicr0, r0, #1 << 30)
strr0, [r5, #CLK_RESET_PLLP_BASE]
ldrr0, [r5, #CLK_RESET_PLLA_BASE]
--- linux-4.15.0.orig/arch/arm/mach-tegra/tegra.c
+++ linux-4.15.0/arch/arm/mach-tegra/tegra.c
@@ -108,8 +108,8 @@
.
.
.
}

DT_MACHINE_START(TEGRA_DT, "NVIDIA Tegra SoC (Flattened Device Tree")
-.l2c_aux_val= 0x3c400001,
-.l2c_aux_mask= 0xc20fc3fe,
+.l2c_aux_val= 0x3c400000,
+.l2c_aux_mask= 0xc20fc3ff,
.smp= smp_ops(tegra_smp_ops),
.map_io= tegra_map_common_io,
.init_early= tegra_init_early,
--- linux-4.15.0.orig/arch/arm/mach-vexpress/spc.c
+++ linux-4.15.0/arch/arm/mach-vexpress/spc.c
@@ -551,8 +551,9 @@
static int __init ve_spc_clk_init(void)
{
-int cpu;
+int cpu, cluster;
-struct clk *clk;
+bool init_opp_table[MAX_CLUSTERS] = { false };

if (!info)
return 0; /* Continue only if SPC is initialised */
@@ -578,8 +579,17 @@
 continue;
 }
+		cluster = topology_physical_package_id(cpu_dev->id);
+		if (init_opp_table[cluster])
+		continue;
+
 if (ve_init_opp_table(cpu_dev))
 pr_warn("failed to initialise cpu%d opp table\n", cpu);
+else if (dev_pm_opp_set_sharing_cpus(cpu_dev,
+    topology_core_cpumask(cpu_dev->id)))
+    pr_warn("failed to mark OPPs shared for cpu%d\n", cpu);
+else
+    init_opp_table[cluster] = true;
 }

platform_device_register_simple("vexpress-spc-cpufreq", -1, NULL, 0);
--- linux-4.15.0.orig/arch/arm/mach-zynq/platsmp.c
+++ linux-4.15.0/arch/arm/mach-zynq/platsmp.c
@@ -65,7 +65,7 @@
* 0x4: Jump by mov instruction
* 0x8: Jumping address
*/
-memcpy((__force void *)zero, &zynq_secondary_trampoline,
+memcpy_toio(zero, &zynq_secondary_trampoline,
trampoline_size);
writel(address, zero + trampoline_size);

--- linux-4.15.0.orig/arch/arm/mm/Kconfig
+++ linux-4.15.0/arch/arm/mm/Kconfig
@@ -415,6 +415,7 @@
 select CPU_CP15_MPU if !MMU
 select CPU_HAS_ASID if MMU
 select CPU_PABRT_V7
+select CPU_SPECTRE if MMU
 select CPU_THUMB_CAPABLE
 select CPU_TLB_V7 if MMU

@@ -826,6 +827,28 @@
 help
 Say Y here to disable branch prediction. If unsure, say N.

+config CPU_SPECTRE
+bool
+
+config HARDEN_BRANCH_PREDICTOR
bool "Harden the branch predictor against aliasing attacks" if EXPERT
+ depends on CPU_SPECTRE
+ default y
+ help
+ Speculation attacks against some high-performance processors rely
+ on being able to manipulate the branch predictor for a victim
+ context by executing aliasing branches in the attacker context.
+ Such attacks can be partially mitigated against by clearing
+ internal branch predictor state and limiting the prediction
+ logic in some situations.
+
+ This config option will take CPU-specific actions to harden
+ the branch predictor against aliasing attacks and may rely on
+ specific instruction sequences or control bits being set by
+ the system firmware.
+
+ If unsure, say Y.
+
config TLS_REG_EMUL
bool
select NEED_KUSER_HELPERS
--- linux-4.15.0.orig/arch/arm/mm/Makefile
+++ linux-4.15.0/arch/arm/mm/Makefile
@@ -96,7 +96,7 @@
 obj-$(CONFIG_CPU_FEROCEON)	+= proc-feroceon.o
 obj-$(CONFIG_CPU_V6)	+= proc-v6.o
 obj-$(CONFIG_CPU_V6K)	+= proc-v6.o
-obj-$(CONFIG_CPU_V7)	+= proc-v7.o
+obj-$(CONFIG_CPU_V7)	+= proc-v7.o proc-v7-bugs.o
 obj-$(CONFIG_CPU_V7M)	+= proc-v7m.o

 AFLAGS_proc-v6.o:=-Wa,-march=armv6
--- linux-4.15.0.orig/arch/arm/mm/alignment.c
+++ linux-4.15.0/arch/arm/mm/alignment.c
@@ -768,6 +768,36 @@
 return NULL;
 }

+static int alignment_get_arm(struct pt_regs *regs, u32 *ip, unsigned long *inst)
+{
+ u32 instr = 0;
+ int fault;
+ +
+ if (user_mode(regs))
+ fault = get_user(instr, ip);
+ else
+ fault = probe_kernel_address(ip, instr);
+ +
/*inst = __mem_to_opcode_arm(instr);
+
+return fault;
+
+static int alignment_get_thumb(struct pt_regs *regs, u16 *ip, u16 *inst)
+{
+u16 instr = 0;
+int fault;
+
+if (user_mode(regs))
+fault = get_user(instr, ip);
+else
+fault = probe_kernel_address(ip, instr);
+
+*inst = __mem_to_opcode_thumb16(instr);
+}
+
+static int
+do_alignment(unsigned long addr, unsigned int fsr, struct pt_regs *regs)
+{
+unsigned long instr = 0, instrptr;
+int (*handler)(unsigned long addr, unsigned long instr, struct pt_regs *regs);
+unsigned int type;
+-unsigned int fault;
+u16 tinstr = 0;
+int isize = 4;
+int thumb2_32b = 0;
+int fault;

if (interrupts_enabled(regs))
local_irq_enable();
@@ -787,15 +817,14 @@

if (thumb_mode(regs)) {
u16 *ptr = (u16 *)(instrptr & ~1);
-fault = probe_kernel_address(ptr, tinstr);
-finstr = __mem_to_opcode_thumb16(finstr);
+
+f = alignment_get_thumb(regs, ptr, &tinstr);
if (!fault) {
if (cpu_architecture() >= CPU_ARCH_ARMv7 &&
 IS_T32(tinstr)) {
 /* Thumb-2 32-bit */
-u16 tinst2 = 0;
-fault = probe_kernel_address(ptr + 1, tinst2);
-tinst2 = __mem_to_opcode_thumb16(tinst2);
+u16 tinst2;
+fault = alignment_get_thumb(regs, ptr + 1, &tinst2);
-instr = __opcode_thumb32_compose(tinstr, tinst2);
-thumb2_32b = 1;
} else {
@@ -804,8 +833,7 @@
}
}
}
}
-fault = probe_kernel_address((void *)instrptr, instr);
-instr = __mem_to_opcode_arm(instr);
+fault = alignment_get_arm(regs, (void *)instrptr, &instr);
}

if (fault) {
--- linux-4.15.0.orig/arch/arm/mm/cache-l2x0.c
+++ linux-4.15.0/arch/arm/mm/cache-l2x0.c
@@ -1261,20 +1261,28 @@
ret = of_property_read_u32(np, "prefetch-data", &val);
if (ret == 0) {
-    if (val)
+    if (val) {
        prefetch |= L310_PREFETCH_CTRL_DATA_PREFETCH;
-    } else
+    } else {
+        *aux_val |= L310_PREFETCH_CTRL_DATA_PREFETCH;
+    } else {
+        *aux_mask &= ~L310_PREFETCH_CTRL_DATA_PREFETCH;
+    }
+    }
+    *aux_mask &= ~L310_PREFETCH_CTRL_DATA_PREFETCH;
} else if (ret != -EINVAL) {
    pr_err("L2C-310 OF prefetch-data property value is missing\n");
}
ret = of_property_read_u32(np, "prefetch-instr", &val);
if (ret == 0) {
-    if (val)
+    if (val) {
        prefetch |= L310_PREFETCH_CTRL_INSTR_PREFETCH;
-    } else
+    } else {
+        *aux_val |= L310_PREFETCH_CTRL_INSTR_PREFETCH;
+    } else {
+        *aux_mask &= ~L310_PREFETCH_CTRL_INSTR_PREFETCH;
+    }
+    }
+    *aux_mask &= ~L310_PREFETCH_CTRL_INSTR_PREFETCH;
}
/*aux_mask &= ~L310_PREFETCH_CTRL_INSTR_PREFETCH;
  */ else if (ret != -EINVAL) {
    pr_err("L2C-310 OF prefetch-instr property value is missing\n");
  }
}
--- linux-4.15.0.orig/arch/arm/mm/cache-v7.S
+++ linux-4.15.0/arch/arm/mm/cache-v7.S
@@ -359,14 +359,16 @@
 ALT_UP(W(nop))
 #endif

 mcrne15, 0, r0, c7, c14, 1 @ clean & invalidate D / U line
 +addner0, r0, r2

 tstr1, r3
 bicr1, r1, r3
 mcrne15, 0, r1, c7, c14, 1 @ clean & invalidate D / U line
 -l:
 -mcr15, 0, r0, c7, c6, 1 @ invalidate D / U line
 -addr0, r0, r2
 cmpr0, r1
 +l:
 +mcrlop15, 0, r0, c7, c6, 1 @ invalidate D / U line
 +addlor0, r0, r2
 +cmplor0, r1
 blo1b
 dsb
 ret

 --- linux-4.15.0.orig/arch/arm/mm/cache-v7m.S
 +++ linux-4.15.0/arch/arm/mm/cache-v7m.S
 @@ -73,9 +73,11 @@
 */
 * dccimvac: Invalidate data cache line by MVA to PoC
 */
-.macro dccimvac, rt, tmp
-v7m_cacheop \rt, \tmp, V7M_SCB_DCIMVAC
+.irp    c,,eq,ne,cs,cc,mi,pl,vs,vc,hi,ls,ge,lt,gt,le,hs,lo
+.macro dccimvac\c, rt, tmp
+v7m_cacheop \rt, \tmp, V7M_SCB_DCIMVAC, \c
 .endm
 +enrd

 /*
 * dccimvac: Clean data cache line by MVA to PoU
 @@ -369,14 +371,16 @@
 tstr0, r3
 bicr0, r0, r3
 dccimvacne r0, r3
 +addner0, r0, r2
 subner3, r2, #1 @ restore r3, corrupted by v7m's dccimvac
tstr1, r3
bicr1, r1, r3
dccimvacne r1, r3
-1:
-dcimvac r0, r3
-addr0, r0, r2
cmpr0, r1
+1:
+dcimvaclo r0, r3
+addlor0, r0, r2
+cmplor0, r1
blo1b
dsbst
drs
--- linux-4.15.0.orig/arch/arm/mm/dma-mapping.c
+++ linux-4.15.0/arch/arm/mm/dma-mapping.c
@@ -830,7 +830,7 @@
 void *cpu_addr, dma_addr_t dma_addr, size_t size,
 unsigned long attrs)
 {
-int ret;
+int ret = -ENXIO;
 unsigned long nr_vma_pages = (vma->vm_end - vma->vm_start) >> PAGE_SHIFT;
 unsigned long nr_pages = PAGE_ALIGN(size) >> PAGE_SHIFT;
 unsigned long pfn = dma_to_pfn(dev, dma_addr);
@@ -2408,4 +2408,6 @@
 return;

 arm_teardown_iommu_dma_ops(dev);
+/* Let arch_setup_dma_ops() start again from scratch upon re-probe */
+set_dma_ops(dev, NULL);
+
--- linux-4.15.0.orig/arch/arm/mm/fault.c
+++ linux-4.15.0/arch/arm/mm/fault.c
@@ -164,6 +164,9 @@
 struct siginfo si;

 +if (addr > TASK_SIZE)
+harden_branch_predictor();
+
 ifndef CONFIG_DEBUG_USER
 if (((user_debug & UDBG_SEGV) && (sig == SIGSEGV)) ||
   ((user_debug & UDBG_BUS) && (sig == SIGBUS))) {
@@ -212,7 +215,7 @@
 unsigned int mask = VM_READ | VM_WRITE | VM_EXEC;
-if (fsr & FSR_WRITE)
+if ((fsr & FSR_WRITE) && !(fsr & FSR_CM))
  mask = VM_WRITE;
if (fsr & FSR_LNX_PF)
  mask = VM_EXEC;
@@ -282,7 +285,7 @@
if (user_mode(regs))
  flags |= FAULT_FLAG_USER;
-if (fsr & FSR_WRITE)
+if ((fsr & FSR_WRITE) && !(fsr & FSR_CM))
  flags |= FAULT_FLAG_WRITE;
/
* Fault status register encodings. We steal bit 31 for our own purposes.
*/
#define FSR_LNX_PF(1 << 31)
+#define FSR_CM(1 << 13)
#define FSR_WRITE(1 << 11)
#define FSR_FS4(1 << 10)
#define FSR_FS3_0(15)
--- linux-4.15.0.orig/arch/arm/mm/fault.h
+++ linux-4.15.0/arch/arm/mm/fault.h
@@ -6,6 +6,7 @@
 * Fault status register encodings. We steal bit 31 for our own purposes.
 */
int pfn_valid(unsigned long pfn)
{
  +phys_addr_t addr = __pfn_to_phys(pfn);
  +if (__phys_to_pfn(addr) != pfn)
    return 0;
  +return memblock_is_map_memory(__pfn_to_phys(pfn));
}
EXPORT_SYMBOL(pfn_valid);
@@ -351,7 +356,7 @@
*p++ = 0xe7fddef0;
}

-static inline void
+static inline void __init
  free_memmap(unsigned long start_pfn, unsigned long end_pfn)
  {
    struct page *start_pg, *end_pg;
@@ -712,7 +717,8 @@
if (t->flags & PF_KTHREAD) continue;
for_each_thread(t, s)
- set_section_perms(perms, n, true, s->mm);
+ if (s->mm)
+ set_section_perms(perms, n, true, s->mm);
} set_section_perms(perms, n, true, current->active_mm);
set_section_perms(perms, n, true, &init_mm);
@@ -735,19 +741,28 @@
return 0;
}

+static int kernel_set_to_readonly __read_mostly;
+
void mark_rodata_ro(void)
{
+ kernel_set_to_readonly = 1;
 stop_machine(__mark_rodata_ro, NULL, NULL);
}

void set_kernel_text_rw(void)
{
+ if (!kernel_set_to_readonly)
+ return;
+
 set_section_perms(ro_perms, ARRAY_SIZE(ro_perms), false, current->active_mm);
}

void set_kernel_text_ro(void)
{
+ if (!kernel_set_to_readonly)
+ return;
+
 set_section_perms(ro_perms, ARRAY_SIZE(ro_perms), true, current->active_mm);
}
--- linux-4.15.0.orig/arch/arm/mm/ioremap.c
+++ linux-4.15.0/arch/arm/mm/ioremap.c
@@ -473,7 +473,7 @@
int pci_ioremap_io(unsigned int offset, phys_addr_t phys_addr)
{
- BUG_ON(offset + SZ_64K > IO_SPACE_LIMIT);
+ BUG_ON(offset + SZ_64K - 1 > IO_SPACE_LIMIT);

 return ioremap_page_range(PCI_IO_VIRT_BASE + offset,

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static int mmap_is_legacy(void)
{
    unsigned long gap = rlimit(RLIMIT_STACK);
    unsigned long pad = stack_guard_gap;

    /* Account for stack randomization if necessary */
    if (current->flags & PF_RANDOMIZE)
        pad += (STACK_RND_MASK << PAGE_SHIFT);

    /* Values close to RLIM_INFINITY can overflow. */
    if (gap + pad > gap)
        pad += pad;

    if (gap < MIN_GAP)
        gap = MIN_GAP;
    else if (gap > MAX_GAP)
        gap = MAX_GAP;

    /* gap between mmap and stack */
    return PAGE_ALIGN(TASK_SIZE - gap - rnd);
}
for_each_memblock(memory, reg) {
  if (!memblock_is_nomap(reg)) {
    if (!IS_ALIGNED(reg->base, PMD_SIZE)) {
      phys_addr_t len;
      len = round_up(reg->base, PMD_SIZE) - reg->base;
      memblock_mark_nomap(reg->base, len);
    } break;
  }
}
for_each_memblock(memory, reg) {
  phys_addr_t block_start = reg->base;
  phys_addr_t block_end = reg->base + reg->size;

  if (memblock_is_nomap(reg)) continue;
  if (reg->base < vmalloc_limit) {
    if (block_end > lowmem_limit)
      /* --- linux-4.15.0.orig/arch/arm/mm/proc-macros.S
         +++ linux-4.15.0/arch/arm/mm/proc-macros.S
           @@ -5,6 +5,7 @@
           * VMA_VM_FLAGS
           * VM_EXEC
           */
      #include <linux/const.h>
      #include <asm/asm-offsets.h>
      #include <asm/thread_info.h>
      @ @ -30,7 +31,7 @@
      * act_mm - get current->active_mm
      */
    .macro act_mm, rd
    -bic\rd, sp, #8128
    +bic\rd, sp, #(THREAD_SIZE - 1) & ~63
    bic\rd, \rd, #63
    ldr\rd, [\rd, #TI_TASK]
    .if (TSK_ACTIVE_MM > IMM12_MASK)
    @ @ -273,13 +274,21 @@
    mcrp15, 0, ip, c7, c10, 4@ data write barrier
    .endm

    .macro define_processor_functions name:req, dabort:req, pabort:req, nommu=0, suspend=0
    +.macro define_processor_functions name:req, dabort:req, pabort:req, nommu=0, suspend=0, bugs=0

/*
 * If we are building for big.Little with branch predictor hardening,
 * we need the processor function tables to remain available after boot.
 */

#ifdef CONFIG_BIG_LITTLE && defined(CONFIG_HARDEN_BRANCH_PREDICTOR)

 .section ".rodata"
#endif

.type\name\()_processor_functions, #object
.align 2
ENTRY(\name\()_processor_functions)
.word\dabort
.word\pabort
.word\cpu_\name\()_proc_init
+.word\bugs
.word\cpu_\name\()_proc_fin
.word\cpu_\name\()_reset
.word\cpu_\name\()_do_idle
@@ -308,6 +317,9 @@
 .endif

.size\name\()_processor_functions, . - \name\()_processor_functions
#ifdef CONFIG_BIG_LITTLE && defined(CONFIG_HARDEN_BRANCH_PREDICTOR)
 .previous
#endif
.endm

.macro define_cache_functions name:req
--- linux-4.15.0.orig/arch/arm/mm/proc-v7-2level.S
+++ linux-4.15.0/arch/arm/mm/proc-v7-2level.S
@@ -41,11 +41,6 @@
 * even on Cortex-A8 revisions not affected by 430973.
 * If IBE is not set, the flush BTAC/BTB won't do anything.
 */
-ENTRY(cpu_ca8_switch_mm)
-ifdef CONFIG_MMU
-movr2, #0
-mcrp15, 0, r2, c7, c5, 6 @ flush BTAC/BTB
-endif
ENTRY(cpu_v7_switch_mm)
ifdef CONFIG_MMU
mmidr1, r1 @ get mm->context.id
@@ -66,7 +61,6 @@
 #endif
 bx lr
ENDPROC(cpu_v7_switch_mm)
-ENTRY(cpu_ca8_switch_mm)
endif

/*
*cpu_v7_set_pte_ext(ptep, pte)
--- linux-4.15.0.orig/arch/arm/mm/proc-v7-bugs.c
+++ linux-4.15.0/arch/arm/mm/proc-v7-bugs.c
@@ -0,0 +1,161 @@
+// SPDX-License-Identifier: GPL-2.0
+#include <linux/arm-smccc.h>
+#include <linux/kernel.h>
+#include <linux/psci.h>
+#include <linux/smp.h>
+
+#include <asm/cp15.h>
+#include <asm/cputype.h>
+#include <asm/proc-fns.h>
+#include <asm/system_misc.h>
+
+#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+DEFINE_PER_CPU(harden_branch_predictor_fn_t, harden_branch_predictor_fn);
+
+extern void cpu_v7_iciallu_switch_mm(phys_addr_t pgd_phys, struct mm_struct *mm);
+extern void cpu_v7_bpiall_switch_mm(phys_addr_t pgd_phys, struct mm_struct *mm);
+extern void cpu_v7_smc_switch_mm(phys_addr_t pgd_phys, struct mm_struct *mm);
+extern void cpu_v7_hvc_switch_mm(phys_addr_t pgd_phys, struct mm_struct *mm);
+
+static void harden_branch_predictor_bpiall(void)
+{
+    write_sysreg(0, BPIALL);
+}
+
+static void harden_branch_predictor_iciallu(void)
+{
+    write_sysreg(0, ICIALLU);
+}
+
+static void __maybe_unused call_smc_arch_workaround_1(void)
+{
+    arm_smccc_1_1_smc(ARM_SMCCC_ARCH_WORKAROUND_1, NULL);
+}
+
+static void __maybe_unused call_hvc_arch_workaround_1(void)
+{
+    arm_smccc_1_1_hvc(ARM_SMCCC_ARCH_WORKAROUND_1, NULL);
+}
+
+static void cpu_v7_spectre_init(void)
+{
+    const char *spectre_v2_method = NULL;
+    int cpu = smp_processor_id();
+}
+if (per_cpu(harden_branch_predictor_fn, cpu))
+return;
+
+switch (read_cpuid_part()) {
+    case ARM_CPU_PART_CORTEX_A8:
+    case ARM_CPU_PART_CORTEX_A9:
+    case ARM_CPU_PART_CORTEX_A12:
+    case ARM_CPU_PART_CORTEX_A17:
+    case ARM_CPU_PART_CORTEX_A73:
+    case ARM_CPU_PART_CORTEX_A75:
+        per_cpu(harden_branch_predictor_fn, cpu) =
+            harden_branch_predictor_bpiall;
+        spectre_v2_method = "BP1ALL";
+        break;
+
+    case ARM_CPU_PART_CORTEX_A15:
+    case ARM_CPU_PART_BRAHMA_B15:
+        per_cpu(harden_branch_predictor_fn, cpu) =
+            harden_branch_predictor_iciallu;
+        spectre_v2_method = "IC1ALLU";
+        break;
+
+    #ifdef CONFIG_ARM_PSCI
+    default:
+        /* Other ARM CPUs require no workaround */
+        if (read_cpuid_implementor() == ARM_CPU_IMP_ARM)
+            break;
+        /* fallthrough */
+    #endif
+    /* Cortex A57/A72 require firmware workaround */
+    case ARM_CPU_PART_CORTEX_A57:
+    case ARM_CPU_PART_CORTEX_A72: {
+        struct arm_smccc_res res;
+        if (psci_ops.smccc_version == SMCCC_VERSION_1_0)
+            break;
+        switch (psci_ops.conduit) {
+            case PSCI_CONDUIT_HVC:
+                arm_smccc_1_1_hvc(ARM_SMCCC_ARCH_FEATURES_FUNC_ID,
+                    ARM_SMCCC_ARCH_WORKAROUND_1, &res);
+                if ((int)res.a0 != 0)
+                    break;
+                per_cpu(harden_branch_predictor_fn, cpu) =
+                    call_hvc_arch_workaround_1;
+                cpu_do_switch_mm = cpu_v7_hvc_switch_mm;
+                spectre_v2_method = "hypervisor");
+                break;
+        }
+    }
case PSCI_CONDUIT_SMC:
    arm_smccc_1_1_smc(ARM_SMCCC_ARCH_FEATURES_FUNC_ID, &res);
    if ((int)res.a0 != 0)
        break;
    per_cpu(harden_branch_predictor_fn, cpu) =
        call_smc_arch_workaround_1;
    cpu_do_switch_mm = cpu_v7_smc_switch_mm;
    spectre_v2_method = "firmware";
    break;
    
default:
    break;
#endif

if (spectre_v2_method)
    pr_info("CPU%u: Spectre v2: using %s workaround\n", smp_processor_id(), spectre_v2_method);
#else
static void cpu_v7_spectre_init(void)
{
#endif

static __maybe_unused bool cpu_v7_check_auxcr_set(bool *warned, u32 mask, const char *msg)
{
    u32 aux_cr;
    
    asm("mrc p15, 0, %0, c1, c0, 1" : "r" (aux_cr));
    
    if ((aux_cr & mask) != mask) {
        if (!*warned)
            pr_err("CPU%u: %s", smp_processor_id(), msg);
        *warned = true;
        return false;
    }
    return true;
}

static DEFINE_PER_CPU(bool, spectre_warned);

static bool check_spectre_auxcr(bool *warned, u32 bit) 
{
+return IS_ENABLED(CONFIG_HARDEN_BRANCH_PREDICTOR) &&
+cpu_v7_check_auxcr_set(warned, bit,
+  "Spectre v2: firmware did not set auxiliary control register IBE bit, system vulnerable\n");
+
+void cpu_v7_ca8_ibe(void)
+{
+  if (check_spectre_auxcr(this_cpu_ptr(&spectre_warned), BIT(6)))
+    cpu_v7_spectre_init();
+}
+
+void cpu_v7_ca15_ibe(void)
+{
+  if (check_spectre_auxcr(this_cpu_ptr(&spectre_warned), BIT(0)))
+    cpu_v7_spectre_init();
+}
+
+void cpu_v7_bugs_init(void)
+{
+  cpu_v7_spectre_init();
+}

--- linux-4.15.0.orig/arch/arm/mm/proc-v7.S
+++ linux-4.15.0/arch/arm/mm/proc-v7.S
@@ -9,6 +9,7 @@
*  This is the "shell" of the ARMv7 processor support.
 */
+#include <linux/arm-smccc.h>
#include <linux/init.h>
#include <linux/linkage.h>
#include <asm/assembler.h>
@@ -93,6 +94,37 @@

ENTRY(cpu_v7_dcache_clean_area)

+#ifdef CONFIG_ARM_PSCI
+.arch_extension sec
+ENTRY(cpu_v7_smc_switch_mm)
+stmfdsp!, [r0 - r3]
+movw0, #:lower16:ARM_SMCCC_ARCH_WORKAROUND_1
+movtr0, #:upper16:ARM_SMCCC_ARCH_WORKAROUND_1
+smc#0
+ldmfdsp!, [r0 - r3]
+bcpu_v7_switch_mm
+ENDPROC(cpu_v7_smc_switch_mm)
+.arch_extension virt
+ENTRY(cpu_v7_hvc_switch_mm)
+stmfdsp!, [r0 - r3]
+movwr0, #:lower16:ARM_SMCCC_ARCH_WORKAROUND_1
+movt0, #:upper16:ARM_SMCCC_ARCH_WORKAROUND_1
+hvc#0
+ldmfds!, {r0 - r3}
+bcpu_v7_switch_mm
+ENDPROC(cpu_v7_hvc_switch_mm)
+#endif
+ENTRY(cpu_v7_icialllu_switch_mm)
+mvr3, #0
+mcrp15, 0, r3, c7, c5, 0 @ ICIALLU
+bcpu_v7_switch_mm
+ENDPROC(cpu_v7_icialllu_switch_mm)
+ENTRY(cpu_v7_bpiall_switch_mm)
+mvr3, #0
+mcrp15, 0, r3, c7, c5, 6@ flush BTAC/BTB
+bcpu_v7_switch_mm
+ENDPROC(cpu_v7_bpiall_switch_mm)
+
-stringcpu_v7_name, "ARMv7 Processor"
.align
@@ -158,31 +190,6 @@
ENDPROC(cpu_v7_do_resume)
)#endif
-
-/*
- * Cortex-A8
- */
-globl_equ cpu_ca8_proc_init,cpu_v7_proc_init
-globl_equ cpu_ca8_proc_fin,cpu_v7_proc_fin
-globl_equ cpu_ca8_reset,cpu_v7_reset
-globl_equ cpu_ca8_do_idle,cpu_v7_do_idle
-globl_equ cpu_ca8_dcache_clean_area, cpu_v7_dcache_clean_area
-globl_equ cpu_ca8_set_pte_ext,cpu_v7_set_pte_ext
-globl_equ cpu_ca8_suspend_size,cpu_v7_suspend_size
ifndef CONFIG_ARM_CPU_SUSPEND
-globl_equ cpu_ca8_do_suspend,cpu_v7_do_suspend
-globl_equ cpu_ca8_do_resume,cpu_v7_do_resume
+#endif
-
-/*
- * Cortex-A9 processor functions
- */
-globl_equ cpu_ca9mp_proc_init,cpu_v7_proc_init
-globl_equ cpu_ca9mp_proc_fin,cpu_v7_proc_fin
-globl_equ cpu_ca9mp_reset,cpu_v7_reset
-globl_equ cpu_ca9mp_do_idle,cpu_v7_do_idle
-globl_equ cpu_ca9mp_dcache_clean_area, cpu_v7_dcache_clean_area

- globl_equcpu_ca9mp_switch_mm,cpu_v7_switch_mm
- globl_equcpu_ca9mp_set_pte_ext,cpu_v7_set_pte_ext
globlcpu_ca9mp_suspend_size
.globl cpu_ca9mp_suspend_size
.globl_equ cpu_ca9mp_set_pte_ext, cpu_v7_set_pte_ext
.globl_equ cpu_ca9mp_suspend_size, cpu_v7_suspend_size + 4 * 2
#ifdef CONFIG_ARM_CPU_SUSPEND
@@ -546,12 +553,79 @@
__INITDATA
+ .weak cpu_v7_bugs_init
+ @ define struct processor (see <asm/proc-fns.h> and proc-macros.S)
-define_processor_functions v7, dabort=v7_early_abort, pabort=v7_pabort, suspend=1
+define_processor_functions v7, dabort=v7_early_abort, pabort=v7_pabort, suspend=1, bugs=cpu_v7_bugs_init
+ +#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+ @ generic v7 bpiall on context switch
+globl_equ cpu_v7_bpiall_proc_init,cpu_v7_proc_init
+globl_equ cpu_v7_bpiall_proc_fin,cpu_v7_proc_fin
+globl_equ cpu_v7_bpiall_reset,cpu_v7_reset
+globl_equ cpu_v7_bpiall_do_idle,cpu_v7_do_idle
+globl_equ cpu_v7_bpiall_dcache_clean_area, cpu_v7_dcache_clean_area
+globl_equ cpu_v7_bpiall_set_pte_ext,cpu_v7_set_pte_ext
+globl_equ cpu_v7_bpiall_suspend_size,cpu_v7_suspend_size
+#ifdef CONFIG_ARM_CPU_SUSPEND
+globl_equ cpu_v7_bpiall_do_suspend,cpu_v7_do_suspend
+globl_equ cpu_v7_bpiall_do_resume,cpu_v7_do_resume
+endif
+define_processor_functions v7_bpiall, dabort=v7_early_abort, pabort=v7_pabort, suspend=1,
bugs=cpu_v7_bugs_init
+ +#define HARDENED_BPIALL_PROCESSOR_FUNCTIONS v7_bpiall_processor_functions
+ +#else
+ +#define HARDENED_BPIALL_PROCESSOR_FUNCTIONS v7_processor_functions
+ +#endif
+ 
+ #ifndef CONFIG_ARM_LPAE
-define_processor_functions ca8, dabort=v7_early_abort, pabort=v7_pabort, suspend=1
-define_processor_functions ca9mp, dabort=v7_early_abort, pabort=v7_pabort, suspend=1
+ @ Cortex-A8 - always needs bpiall switch_mm implementation
+globl_equ cpu_ca8_proc_init,cpu_v7_proc_init
+globl_equ cpu_ca8_proc_fin,cpu_v7_proc_fin
+globl_equ cpu_ca8_reset,cpu_v7_reset
+globl_equ cpu_ca8_do_idle,cpu_v7_do_idle
+globl_equ cpu_ca8_dcache_clean_area, cpu_v7_dcache_clean_area
+globl_equ cpu_ca8_set_pte_ext,cpu_v7_set_pte_ext
+globl_equ cpu_ca8_switch_mm,cpu_v7_bpiall_switch_mm
+globl_equ cpu_ca8_suspend_size,cpu_v7_suspend_size
```c
#ifdef CONFIG_ARM_CPU_SUSPEND
  	globl_equ cpu_ca8_do_suspend, cpu_v7_do_suspend
  	globl_equ cpu_ca8_do_resume, cpu_v7_do_resume
#endif

define_processor_functions ca8, dabort=v7_early_abort, pabort=v7_pabort, suspend=1, bugs=cpu_v7_ca8_ibe
+
+	@ Cortex-A9 - needs more registers preserved across suspend/resume
+ @ and bpiall switch_mm for hardening
  	globl_equ cpu_ca9mp_proc_init, cpu_v7_proc_init
  	globl_equ cpu_ca9mp_proc_fin, cpu_v7_proc_fin
  	globl_equ cpu_ca9mp_reset, cpu_v7_reset
  	globl_equ cpu_ca9mp_do_idle, cpu_v7_do_idle
  	globl_equ cpu_ca9mp_dcache_clean_area, cpu_v7_dcache_clean_area
#endif CONFIG_HARDEN_BRANCH_PREDICTOR
  	globl_equ cpu_ca9mp_switch_mm, cpu_v7_switch_mm
+ #else
  	globl_equ cpu_ca9mp_switch_mm, cpu_v7_switch_mm
+ #endif
  	globl_equ cpu_ca9mp_set_pte_ext, cpu_v7_set_pte_ext
define_processor_functions ca9mp, dabort=v7_early_abort, pabort=v7_pabort, suspend=1, bugs=cpu_v7_bugs_init
+ #endif

+
+ @ Cortex-A15 - needs iciallu switch_mm for hardening
  	globl_equ cpu_ca15_proc_init, cpu_v7_proc_init
  	globl_equ cpu_ca15_proc_fin, cpu_v7_proc_fin
  	globl_equ cpu_ca15_reset, cpu_v7_reset
  	globl_equ cpu_ca15_do_idle, cpu_v7_do_idle
  	globl_equ cpu_ca15_dcache_clean_area, cpu_v7_dcache_clean_area
endif CONFIG_HARDEN_BRANCH_PREDICTOR
  	globl_equ cpu_ca15_switch_mm, cpu_v7_iciallu_switch_mm
+ #else
  	globl_equ cpu_ca15_switch_mm, cpu_v7_switch_mm
+ #endif
  	globl_equ cpu_ca15_set_pte_ext, cpu_v7_set_pte_ext
  	globl_equ cpu_ca15_suspend_size, cpu_v7_suspend_size
  	globl_equ cpu_ca15_do_suspend, cpu_v7_do_suspend
  	globl_equ cpu_ca15_do_resume, cpu_v7_do_resume
define_processor_functions ca15, dabort=v7_early_abort, pabort=v7_pabort, suspend=1, bugs=cpu_v7_ca15_ibe
+ ifdef CONFIG_CPU_PJ4B
define_processor_functions pj4b, dabort=v7_early_abort, pabort=v7_pabort, suspend=1
+ #endif

@@ -658,7 +732,7 @@
  
__v7_ca12mp_proc_info:
  .long 0x410fc0d0
  .long 0xffffffff

-__v7_proc __v7_ca12mp_proc_info, __v7_ca12mp_setup
  +__v7_proc __v7_ca12mp_proc_info, __v7_ca12mp_setup, proc_fns = HARDENED_BPIALL_PROCESSOR_FUNCTIONS
```
.size __v7_ca12mp_proc_info, __v7_ca12mp_proc_info

/*
@@ -668,7 +742,7 @@
__v7_ca15mp_proc_info:
     .long 0x410fc0f0
     .long 0xff0ffff0
-     __v7_proc __v7_ca15mp_proc_info, __v7_ca15mp_setup
+     __v7_proc __v7_ca15mp_proc_info, __v7_ca15mp_setup, proc_fns = ca15_processor_functions
 .size __v7_ca15mp_proc_info, __v7_ca15mp_proc_info

/*
@@ -678,7 +752,7 @@
__v7_b15mp_proc_info:
     .long 0x420f00f0
     .long 0xff0ffff0
-     __v7_proc __v7_b15mp_proc_info, __v7_b15mp_setup
+     __v7_proc __v7_b15mp_proc_info, __v7_b15mp_setup, proc_fns = ca15_processor_functions
 .size __v7_b15mp_proc_info, __v7_b15mp_proc_info

/*
@@ -688,9 +762,25 @@
__v7_ca17mp_proc_info:
     .long 0x410fc0e0
     .long 0xff0ffff0
-     __v7_proc __v7_ca17mp_proc_info, __v7_ca17mp_setup
+     __v7_proc __v7_ca17mp_proc_info, __v7_ca17mp_setup, proc_fns = HARDENED_BPIALL_PROCESSOR_FUNCTIONS
 .size __v7_ca17mp_proc_info, __v7_ca17mp_proc_info

+/* ARM Ltd. Cortex A73 processor */
+ .type __v7_ca73_proc_info, #object
+     __v7_ca73_proc_info:
+     .long 0x410fd090
+     .long 0xff0ffff0
+     __v7_proc __v7_ca73_proc_info, __v7_setup, proc_fns = HARDENED_BPIALL_PROCESSOR_FUNCTIONS
+ .size __v7_ca73_proc_info, __v7_ca73_proc_info
+
+/* ARM Ltd. Cortex A75 processor */
+ .type __v7_ca75_proc_info, #object
+     __v7_ca75_proc_info:
+     .long 0x410fd0a0
+     .long 0xff0ffff0
+     __v7_proc __v7_ca75_proc_info, __v7_setup, proc_fns = HARDENED_BPIALL_PROCESSOR_FUNCTIONS
+ .size __v7_ca75_proc_info, __v7_ca75_proc_info
+
/*
* Qualcomm Inc. Krait processors.
--- linux-4.15.0.orig/arch/arm/mm/proc-v7m.S
+++ linux-4.15.0/arch/arm/mm/proc-v7m.S
@@ -135,10 +135,12 @@
ds
mov	6, lr		@ save LR
ldr	sp, =init_thread_union + THREAD_START_SP
-stmiaa	sp, {r0-r3, r12}
cpsie
svc	#0
1: cpsidi
+ldr0, =exc_ret
+orr, lr, #EXC_RET_THREADMODE_PROCESSSTACK
+strl, [r0]
ldmiasp. {r0-r3, r12}
str5, [r12, #11 * 4]@ restore the original SVC vector entry
movr, r6@ restore LR
--- linux-4.15.0.orig/arch/arm/net/bpf_jit_32.c
+++ linux-4.15.0/arch/arm/net/bpf_jit_32.c
@@ -25,8 +25,6 @@
#include "bpf_jit_32.h"

-int bpf_jit_enable __read_mostly;
-
/*
 * eBPF prog stack layout:
 *
@@ -40,6 +38,10 @@
 *                        +-----+
 *                        |RSVD | JIT scratchpad
 * current ARM_SP =>      +-----+ <= (BPF_FP - STACK_SIZE + SCRATCH_SIZE)
+ *                        | ... | caller-saved registers
+ *                        +-----+
+ *                        | ... | arguments passed on stack
+ * ARM_SP during call => +-----|
+ *                        | ... |
+ *                        | ... | Function call stack
+ *                        |
@ @ -67,6 +69,12 @@
*
* When popping registers off the stack at the end of a BPF function, we
* reference them via the current ARM_FP register.
*+
+ * Some eBPF operations are implemented via a call to a helper function.
+ * Such calls are "invisible" in the eBPF code, so it is up to the calling
+ * program to preserve any caller-saved ARM registers during the call. The
+ * JIT emits code to push and pop those registers onto the stack, immediately
#define CALLEE_MASK (1 << ARM_R4 | 1 << ARM_R5 | 1 << ARM_R6 |  \
1 << ARM_R7 | 1 << ARM_R8 | 1 << ARM_R10 |  \
@ @ -74.6 +82.8 @@
#define CALLEE_PUSH_MASK (CALLEE_MASK | 1 << ARM_LR)
#define CALLEE_POP_MASK (CALLEE_MASK | 1 << ARM_PC)

+#define CALLER_MASK (1 << ARM_R0 | 1 << ARM_R1 | 1 << ARM_R2 | 1 << ARM_R3)
+
#define STACK_OFFSET(k)(k)
#define TMP_REG_1 (MAX_BPF_JIT_REG + 0) /* TEMP Register 1 */
#define TMP_REG_2 (MAX_BPF_JIT_REG + 1) /* TEMP Register 2 */
@ @ -364.6 +374.7 @@

static inline void emit_udivmod(u8 rd, u8 rm, u8 rn, struct jit_ctx *ctx, u8 op)
{
+  const int exclude_mask = BIT(ARM_R0) | BIT(ARM_R1);
const u8 *tmp = bpf2a32[TMP_REG_1];
s32 jmp_offset;

@@ -403,11 +414,17 @@
emit(ARM_MOV_R(ARM_R0, rm), ctx);
}

/* Push caller-saved registers on stack */
+emit(ARM_PUSH(CALLER_MASK & ~exclude_mask), ctx);
+
/* Call appropriate function */
emit_mov_i(ARM_IP, op == BPF_DIV ?
  (u32)jit_udiv32 : (u32)jit_mod32, ctx);
emit_blx_r(ARM_IP, ctx);

/* Restore caller-saved registers from stack */
+emit(ARM_POP(CALLER_MASK & ~exclude_mask), ctx);
+
/* Save return value */
if (rd != ARM_R0)
emit(ARM_MOV_R(rd, ARM_R0), ctx);
@@ -718,7 +735,7 @@
}

/* dst = dst >> src */
- static inline void emit_a32_lsr_r64(const u8 dst[], const u8 src[], bool dstk,
+ static inline void emit_a32_rsh_r64(const u8 dst[], const u8 src[], bool dstk,
    bool sstk, struct jit_ctx *ctx) {
    const u8 *tmp = bpf2a32[TMP_REG_1];
    const u8 *tmp2 = bpf2a32[TMP_REG_2];
emit(ARM_LDR_I(rm, ARM_SP, STACK_VAR(dst_hi)), ctx);
}

/* Do LSH operation */
+/* Do RSH operation */
emit(ARM_RSB_I(ARM_IP, rt, 32), ctx);
emit(ARM_SUBS_I(tmp2[0], rt, 32), ctx);
emit(ARM_MOV_SR(ARM_LR, rd, SRTYPE_LSR, rt), ctx);
}@ -784,7 +801,7 @@

/* dst = dst >> val */
static inline void emit_a32_lsr_i64(const u8 dst[], bool dstk,
    const u32 val, struct jit_ctx *ctx) {
    const u8 *tmp = bpf2a32[TMP_REG_1];
    const u8 *tmp2 = bpf2a32[TMP_REG_2];
    if (val < 32) {
        if (val == 0) {
            /* An immediate value of 0 encodes a shift amount of 32
             * for LSR. To shift by 0, don't do anything.
             * + */
            +} else if (val < 32) {
                emit(ARM_MOV_SI(tmp2[1], rd, SRTYPE_LSR, val), ctx);
                emit(ARM_ORR_SI(rd, tmp2[1], rm, SRTYPE_ASL, 32 - val), ctx);
                emit(ARM_MOV_SI(rm, rm, SRTYPE_ASR, val), ctx);
                @@ -831,7 +852,11 @@
        }
    } else if (val < 32) {
        emit(ARM_MOV_SI(tmp2[1], rd, SRTYPE_LSR, val), ctx);
        emit(ARM_ORR_SI(rd, tmp2[1], rm, SRTYPE_ASL, 32 - val), ctx);
        emit(ARM_MOV_SI(rd, rm, SRTYPE_ASR, val), ctx);
        @@ -915,7 +940,7 @@
    }
}

/* Do ARSH operation */
推动 (val < 32) {
  if (val == 0) {
    /* An immediate value of 0 encodes a shift amount of 32
     * for ASR. To shift by 0, don't do anything.
     * + */
    +} else if (val < 32) {
        emit(ARM_MOV_SI(tmp2[1], rd, SRTYPE_LSR, val), ctx);
        emit(ARM_ORR_SI(rd, tmp2[1], rm, SRTYPE_ASL, 32 - val), ctx);
        emit(ARM_MOV_SI(rd, rm, SRTYPE_ASR, val), ctx);
        @@ -915,7 +940,7 @@
    }
}

/* dst = *(size*)(src + off) */
static inline void emit_ldx_r(const u8 dst[], const u8 src, bool dstk,
s32 off, struct jit_ctx *ctx, const u8 sz){
const u8 *tmp = bpf2a32[TMP_REG_1];
+const u8 *tmp = bpf2a32[TMP_REG_2];
const u8 *rd = dstk ? tmp : dst;
u8 rm = src;
s32 off_max;
@@ -1340,7 +1365,7 @@
case BPF_ALU64 | BPF_RSH | BPF_K:
   if (unlikely(imm > 63))
      return -EINVAL;
-   emit_a32_lsr_i64(dst, dstk, imm, ctx);
+   emit_a32_rsh_i64(dst, dstk, imm, ctx);
   break;
/* dst = dst << src */
case BPF_ALU64 | BPF_LSH | BPF_X:
   @ @ -1348,7 +1373,7 @ @
   break;
/* dst = dst >> src */
case BPF_ALU64 | BPF_RSH | BPF_X:
-   emit_a32_lsr_r64(dst, src, dstk, sstk, ctx);
+   emit_a32_rsh_r64(dst, src, dstk, sstk, ctx);
   break;
/* dst = dst >> src (signed) */
case BPF_ALU64 | BPF_ARSH | BPF_X:
   @ @ -1938,7 +1963,7 @ @
   /* there are 2 passes here */
bpf_jit_dump(prog->len, image_size, 2, ctx.target);

   set_memory_ro((unsigned long)header, header->pages);
+   bpf_jit_binary_lock_ro(header);
   prog->bpf_func = (void *)ctx.target;
   prog->jited = 1;
   prog->jited_len = image_size;
--- linux-4.15.0.orig/arch/arm/plat-iop/adma.c
+++ linux-4.15.0/arch/arm/plat-iop/adma.c
@@ -143,7 +143,7 @@
   .resource = iop3xx_dma_0_resources,
   .dev = {
   .dma_mask = &iop3xx_adma_dmamask,
-   .coherent_dma_mask = DMA_BIT_MASK(64),
+   .coherent_dma_mask = DMA_BIT_MASK(32),
   .platform_data = (void *)&iop3xx_dma_0_data,
   },
   @ @ -155,7 +155,7 @@
   .resource = iop3xx_dma_1_resources,
   .dev = {
   .dma_mask = &iop3xx_adma_dmamask,
-   .coherent_dma_mask = DMA_BIT_MASK(64),

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coherent_dma_mask = DMA_BIT_MASK(32),
.platform_data = (void *) &iop3xx_dma_1_data,
},
};
@@ -167,7 +167,7 @@
.resource = iop3xx_aau_resources,
.dev = {
.dma_mask = &iop3xx_adma_dmamask,
.coherent_dma_mask = DMA_BIT_MASK(64),
+coherent_dma_mask = DMA_BIT_MASK(32),
.platform_data = (void *) &iop3xx_aau_data,
},
};
--- linux-4.15.0.orig/arch/arm/plat-omap/dmtimer.c
+++ linux-4.15.0/arch/arm/plat-omap/dmtimer.c
@@ -888,11 +888,8 @@
timer->irq = irq->start;
timer->pdev = pdev;

/* Skip pm_runtime_enable for OMAP1 */
-if (!((timer->capability & OMAP_TIMER_NEEDS_RESET)) {
- pm_runtime_enable(dev);
- pm_runtime_irq_safe(dev);
-}
+pm_runtime_enable(dev);
+pm_runtime_irq_safe(dev);

if (!timer->reserved) {
 ret = pm_runtime_get_sync(dev);
--- linux-4.15.0.orig/arch/arm/plat-omap/include/plat/sram.h
+++ linux-4.15.0/arch/arm/plat-omap/include/plat/sram.h
@@ -5,13 +5,4 @@
 unsigned long skip, int cached);
 void omap_sram_reset(void);

-extern void *omap_sram_push_address(unsigned long size);
-
-/* Macro to push a function to the internal SRAM, using the fncpy API */
-#define omap_sram_push(funcp, size) (\/\n- typeof(&funcp) _res = NULL;\n- void * _sram_address = omap_sram_push_address(size);\n- if (_sram_address)\n- _res = fncpy(_sram_address, &funcp, size);\n- _res;\n-)}
+extern void *omap_sram_push(void *funcp, unsigned long size);
--- linux-4.15.0.orig/arch/arm/plat-omap/sram.c
+++ linux-4.15.0/arch/arm/plat-omap/sram.c
#include <asm/fncpy.h>
#include <asm/tlb.h>
#include <asm/cacheflush.h>
#include <asm/set_memory.h>
#include <asm/mach/map.h>

/* Note that fncpy requires the returned address to be aligned
   to an 8-byte boundary.
*/

-void *omap_sram_push_address(unsigned long size)
+static void *omap_sram_push_address(unsigned long size)
{
  unsigned long available, new_ceil = (unsigned long)omap_sram_ceil;

  return (void *)omap_sram_ceil;
}

+void *omap_sram_push(void *funcp, unsigned long size)
+{
  void *sram;
  unsigned long base;
  int pages;
  void *dst = NULL;

  sram = omap_sram_push_address(size);
  if (!sram)
    return NULL;
  base = (unsigned long)sram & PAGE_MASK;
  pages = PAGE_ALIGN(size) / PAGE_SIZE;
  +set_memory_rw(base, pages);
  +dst = fncpy(sram, funcp, size);
  +set_memory_ro(base, pages);
  +set_memory_x(base, pages);
  +return dst;
+}
+
/*
 * The SRAM context is lost during off-idle and stack
 * needs to be reset.
 */
void __init omap_map_sram(unsigned long start, unsigned long size,
    unsigned long skip, int cached)
{
    unsigned long base;
    int pages;

    if (size == 0)
        return;

    base = (unsigned long)omap_sram_base;
    pages = PAGE_ALIGN(omap_sram_size) / PAGE_SIZE;
    set_memory_ro(base, pages);
    set_memory_x(base, pages);
}

void __init orion_ge00_switch_init(struct dsa_chip_data *d)
{
    struct mdio_board_info *bd;
    unsigned int i;

    if (!IS_BUILTIN(CONFIG_PHYLIB))
        return;

    for (i = 0; i < ARRAY_SIZE(d->port_names); i++)
        if (!strcmp(d->port_names[i], "cpu"))
            d->netdev[i] = &orion_ge00.dev;
break;
+
+
-bd = &orion_ge00_switch_board_info;
-bd->bus_id = orion_ge00_mvmdio_bus_name;
-bd->mdio_addr = d->sw_addr;
-d->netdev[i] = &orion_ge00.dev;
-strcpy(bd->modalias, "mv88e6085");
-bd->platform_data = d;
+orion_ge00_switch_board_info.mdio_addr = d->sw_addr;
+orion_ge00_switch_board_info.platform_data = d;

mdiobus_register_board_info(&orion_ge00_switch_board_info, 1);
}
@@ -623,7 +622,7 @@
 .resource	= orion_xor0_shared_resources,
 .dev            = {
  .dma_mask       = &orion_xor_dma_mask,
-  .coherent_dma_mask = DMA_BIT_MASK(64),
+  .coherent_dma_mask = DMA_BIT_MASK(32),
  .platform_data  = &orion_xor0_pdata,
 },
@@ -684,7 +683,7 @@
 .resource	= orion_xor1_shared_resources,
 .dev            = {
  .dma_mask       = &orion_xor_dma_mask,
-  .coherent_dma_mask = DMA_BIT_MASK(64),
+  .coherent_dma_mask = DMA_BIT_MASK(32),
  .platform_data  = &orion_xor1_pdata,
 },
--- linux-4.15.0.orig/arch/arm/plat-pxa/ssp.c
+++ linux-4.15.0/arch/arm/plat-pxa/ssp.c
@@ -230,25 +230,16 @@
 static int pxa_ssp_remove(struct platform_device *pdev)
 {
  -struct resource *res;
 struct ssp_device *ssp;

  ssp = platform_get_drvdata(pdev);
  if (ssp == NULL)
   return -ENODEV;
-  iounmap(ssp->mmio_base);
-
-res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
-release_mem_region(res->start, resource_size(res));
-
-clk_put(ssp->clk);
-
mutex_lock(&ssp_lock);
list_del(&ssp->node);
mutex_unlock(&ssp_lock);
-
-kfree(ssp);
return 0;
}

--- linux-4.15.0.orig/arch/arm/plat-samsung/Kconfig
+++ linux-4.15.0/arch/arm/plat-samsung/Kconfig
@@ -242,6 +242,7 @@
bool "Samsung PM Suspend debug"
depends on PM && DEBUG_KERNEL
depends on DEBUG_EXYNOS_UART || DEBUG_S3C24XX_UART || DEBUG_S3C2410_UART
+depends on DEBUG_LL && MMU
help
 Say Y here if you want verbose debugging from the PM Suspend and
 Resume code. See <file:Documentation/arm/Samsung-S3C24XX/Suspend.txt>
@@ -258,7 +259,7 @@
config SAMSUNG_PM_CHECK
 bool "S3C2410 PM Suspend Memory CRC"
 -depends on PM
 +depends on PM && (PLAT_S3C24XX || ARCH_S3C64XX || ARCH_S5PV210)
 select CRC32
 help
  Enable the PM code's memory area checksum over sleep. This option
--- linux-4.15.0.orig/arch/arm/plat-samsung/watchdog-reset.c
+++ linux-4.15.0/arch/arm/plat-samsung/watchdog-reset.c
@@ -67,6 +67,7 @@
#ifdef CONFIG_OF
 static const struct of_device_id s3c2410_wdt_match[] = {
 { .compatible = "samsung,s3c2410-wdt" },
+{ .compatible = "samsung,s3c6410-wdt" },
 { },
};

--- linux-4.15.0.orig/arch/arm/probes/kprobes/core.c
+++ linux-4.15.0/arch/arm/probes/kprobes/core.c
@@ -291,8 +291,8 @@
 break;
 case KPROBE_REENTER:
 /* A nested probe was hit in FIQ, it is a BUG */

pr_warn("Unrecoverable kprobe detected at %p\n", p->addr);
+pr_warn("Unrecoverable kprobe detected\n");
+dump_kprobe(p);
/* fall through */
default:
/* impossible cases */
--- linux-4.15.0.orig/arch/arm/probes/kprobes/opt-arm.c
+++ linux-4.15.0/arch/arm/probes/kprobes/opt-arm.c
@@ -98,21 +98,21 @@
    "optprobe_template_end:\n");

#define TMPL_VAL_IDX
-((unsigned long *)&optprobe_template_val - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_val - (unsigned long *)optprobe_template_entry)
#define TMPL_CALL_IDX
-((unsigned long *)&optprobe_template_call - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_call - (unsigned long *)optprobe_template_entry)
#define TMPL_END_IDX
-((unsigned long *)&optprobe_template_end - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_end - (unsigned long *)optprobe_template_entry)
#define TMPL_ADD_SP
-((unsigned long *)&optprobe_template_add_sp - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_add_sp - (unsigned long *)optprobe_template_entry)
#define TMPL_SUB_SP
-((unsigned long *)&optprobe_template_sub_sp - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_sub_sp - (unsigned long *)optprobe_template_entry)
#define TMPL_RESTORE_BEGIN
-((unsigned long *)&optprobe_template_restore_begin - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_restore_begin - (unsigned long *)optprobe_template_entry)
#define TMPL_RESTORE_ORIGN_INSN
-((unsigned long *)&optprobe_template_restore_orig_insn - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_restore_orig_insn - (unsigned long *)optprobe_template_entry)
#define TMPL_RESTORE_END
-((unsigned long *)&optprobe_template_restore_end - (unsigned long *)&optprobe_template_entry)
+((unsigned long *)optprobe_template_restore_end - (unsigned long *)optprobe_template_entry)

/*
 * ARM can always optimize an instruction when using ARM ISA, except
 @@ -165,13 +165,14 @@
 {
 unsigned long flags;
 struct kprobe *p = &op->kp;
-struct kprobe_ctlblk *kcb = get_kprobe_ctlblk();
+struct kprobe_ctlblk *kcb;

/* Save skipped registers */
regs->ARM_pc = (unsigned long)op->kp.addr;
regs->ARM_ORIG_r0 = ~0UL;

local_irq_save(flags);
+kcb = get_kprobe_ctlblk();

if (kprobe_running()) {
    kprobes_inc_nmissed_count(&op->kp);
    @ @ -191,6 +192,7 @ @
}

local_irq_restore(flags);
}
+NOKPROBE_SYMBOL(optimized_callback)

int arch_prepare_optimized_kprobe(struct optimized_kprobe *op, struct kprobe *orig)
{
    @@ -245,7 +247,7 @@
    /* Copy arch-dep-instance from template. */
    -memcpy(code, &optprobe_template_entry,
    +memcpy(code, (unsigned long *)optprobe_template_entry,
    TMPL_END_IDX * sizeof(kprobe_opcode_t));

    /* Adjust buffer according to instruction. */
    --- linux-4.15.0.orig/arch/arm/probes/kprobes/test-core.c
    +++ linux-4.15.0/arch/arm/probes/kprobes/test-core.c
    @ @ -1460,7 +1460,6 @@
    print_registers(&result_regs);

    if (mem) {
        -pr_err("current_stack=%p\n", current_stack);
        pr_err("expected_memory:\n");
        print_memory(expected_memory, mem_size);
        pr_err("result_memory:\n");
        --- linux-4.15.0.orig/arch/arm/probes/kprobes/test-thumb.c
        +++ linux-4.15.0/arch/arm/probes/kprobes/test-thumb.c
        @ @ -444,21 +444,21 @@
        "3:mvnr0, r0\n"
        "2: nop\n"
        -TEST_RX("tbh[pc, r",7, (9f-(1f+4))>>1, "]",
        +TEST_RX("tbh[pc, r",7, (9f-(1f+4))>>1, ", lsl #1]",
        "9:\n"
        ".short(2f-1b-4)>>1\n"
        ".short(3f-1b-4)>>1\n"
        "3:mvnr0, r0\n"
        "2: nop\n")
-TEST_RX("tbh[pc, r",12, ((9f-(1f+4))>>1)+1,"],"
+TEST_RX("tbh[pc, r",12, ((9f-(1f+4))>>1)+1,"], lsl #1]
"9:\n"
".short(2f-1b-4)>>1\n"
".short(3f-1b-4)>>1\n"
"3:mvnr0, r0\n"
"2:nop\n"

-TEST_RRX("tbh[r",19f, ", r",14,1,"],"
+TEST_RRX("tbh[r",19f, ", r",14,1,"], lsl #1]
"9:\n"
".short(2f-1b-4)>>1\n"
".short(3f-1b-4)>>1\n"
@@ -471,10 +471,10 @@
TEST_UNSUPPORTED("strexb r0, r1, [r2]")
TEST_UNSUPPORTED("strexf r0, r1, [r2]")
-TEST_UNSUPPORTED("strexdr r0, r1, [r2]")
+TEST_UNSUPPORTED("strexdr r0, r1, r2, [r2]")
TEST_UNSUPPORTED("ldrexb r0, [r1]")
TEST_UNSUPPORTED("ldrexf r0, [r1]")
-TEST_UNSUPPORTED("ldrexdr r0, [r1]")
+TEST_UNSUPPORTED("ldrexdr r0, [r1]")

TEST_GROUP("Data-processing (shifted register) and (modified immediate)"

--- linux-4.15.0.orig/arch/arm/probes/uprobes/core.c
+++ linux-4.15.0/arch/arm/probes/uprobes/core.c
@@ -207,7 +207,7 @@
static struct undef_hook uprobes_arm_break_hook = {
                   .instr_mask = 0x0fffffff,
                   .instr_val = (UPROBE_SWBP_ARM_INSN & 0x0fffffff),
-               .cpsr_mask = MODE_MASK,
+               .cpsr_mask = (PSR_T_BIT | MODE_MASK),
                   .cpsr_val = USR_MODE,
                   .fn = uprobe_trap_handler,
};
@@ -215,7 +215,7 @@
static struct undef_hook uprobes_arm_ss_hook = {
                   .instr_mask = 0x0fffffff,
                   .instr_val = (UPROBE_SS_ARM_INSN & 0x0fffffff),
-               .cpsr_mask = MODE_MASK,
+               .cpsr_mask = (PSR_T_BIT | MODE_MASK),
                   .cpsr_val = USR_MODE,
                   .fn = uprobe_trap_handler,
};
--- linux-4.15.0.orig/arch/arm/vdso/Makefile
+++ linux-4.15.0/arch/arm/vdso/Makefile
```c
#include <linux/time.h>
-#include <asm/arch_timer.h>
#include <asm/barrier.h>
#include <asm/bug.h>
+#include <asm/cp15.h>
#include <asm/page.h>
#include <asm/unistd.h>
#include <asm/vdso_datapage.h>
//@ -123,7 +123,8 @@

u64 cycle_now;
u64 nsec;

cycle_delta = (cycle_now - vdata->cs_cycle_last) & vdata->cs_mask;

--- linux-4.15.0.orig/arch/arm/vfp/vfpmodule.c
+++ linux-4.15.0/arch/arm/vfp/vfpmodule.c
//@ -554,12 +554,11 @@

* Save the current VFP state into the provided structures and prepare
* for entry into a new function (signal handler).
*/
-int vfp_preserve_user_clear_hwstate(struct user_vfp __user *ufp,
-    struct user_vfp_exc __user *ufp_exc)
+int vfp_preserve_user_clear_hwstate(struct user_vfp *ufp,
+    struct user_vfp_exc *ufp_exc)
{
    struct thread_info *thread = current_thread_info();
    struct vfp_hard_struct *hwstate = &thread->vfpstate.hard;
    -int err = 0;
    /* Ensure that the saved hwstate is up-to-date. */
    vfp_sync_hwstate(thread);
    @ @ -568,22 +567,19 @@
    * Copy the floating point registers. There can be unused
    * registers see asm/hwcap.h for details.
    */
    -err |= __copy_to_user(&ufp->fpregs, &hwstate->fpregs,
    -    sizeof(hwstate->fpregs));
    +memcpy(&ufp->fpregs, &hwstate->fpregs, sizeof(hwstate->fpregs));
    +
    /*
    * Copy the status and control register.
    */
    -__put_user_error(hwstate->fpscr, &ufp->fpscr, err);
    +ufp->fpscr = hwstate->fpscr;
```
/*
* Copy the exception registers.
*/
-__put_user_error(hwstate->fpexc, &ufp_exc->fpexc, err);
-__put_user_error(hwstate->fpinst, &ufp_exc->fpinst, err);
-__put_user_error(hwstate->fpinst2, &ufp_exc->fpinst2, err);
-
-if (err)
-return -EFAULT;
+ufp_exc->fpexc = hwstate->fpexc;
+ufp_exc->fpinst = hwstate->fpinst;
+ufp_exc->fpinst2 = hwstate->fpinst2;

/* Ensure that VFP is disabled. */
vfp_flush_hwstate(thread);
@@ -597,13 +593,11 @@
}
/* Sanitise and restore the current VFP state from the provided structures. */
-int vfp_restore_user_hwstate(struct user_vfp __user *ufp,
-struct user_vfp_exc __user *ufp_exc)
+int vfp_restore_user_hwstate(struct user_vfp *ufp, struct user_vfp_exc *ufp_exc)
{
 struct thread_info *thread = current_thread_info();
 struct vfp_hard_struct *hwstate = &thread->vfpstate.hard;
 unsigned long fpexc;
-int err = 0;

/* Disable VFP to avoid corrupting the new thread state. */
vfp_flush_hwstate(thread);
@@ -612,17 +606,16 @@
 * Copy the floating point registers. There can be unused
 * registers see asm/hwcap.h for details.
 */
-err |= __copy_from_user(&hwstate->fpregs, &ufp->fpregs,
-sizeof(hwstate->fpregs));
+memcpy(&hwstate->fpregs, &ufp->fpregs, sizeof(hwstate->fpregs));
 /*
 * Copy the status and control register.
 */
-__get_user_error(hwstate->fpscr, &ufp->fpscr, err);
+hwstate->fpscr = ufp->fpscr;

/*
 * Sanitise and restore the exception registers.
 */
-__get_user_error(fpexc, &ufp_exc->fpexc, err);
+fpexc = ufp_exc->fpexc;

/* Ensure the VFP is enabled. */
fexc |= FPEXC_EN;
@@ -631,10 +624,10 @@
fpexc &= ~(FPEXC_EX | FPEXC_FP2V);
hwstate->fpexc = fpexc;

-__get_user_error(hwstate->fpinst, &ufp_exc->fpinst, err);
-__get_user_error(hwstate->fpinst2, &ufp_exc->fpinst2, err);
+hwstate->fpinst = ufp_exc->fpinst;
+hwstate->fpinst2 = ufp_exc->fpinst2;

-return err ? -EFAULT : 0;
+return 0;
}

/*
@@ -648,7 +641,7 @@
*/

static int vfp_dying_cpu(unsigned int cpu)
{
-vfp_force_reload(cpu, current_thread_info());
+vfp_current_hw_state[cpu] = NULL;
return 0;
}

--- linux-4.15.0.orig/arch/arm/xen/efi.c
+++ linux-4.15.0/arch/arm/xen/efi.c
@@ -31,7 +31,9 @@
efi.get_variable             = xen_efi_get_variable;
efi.get_next_variable        = xen_efi_get_next_variable;
efi.set_variable             = xen_efi_set_variable;
+efi.set_variable_nonblocking = xen_efi_set_variable;
efi.query_variable_info      = xen_efi_query_variable_info;
+efi.query_variable_info_nonblocking = xen_efi_query_variable_info;
efi.update_capsule           = xen_efi_update_capsule;
efi.query_capsule_caps       = xen_efi_query_capsule_caps;
efi.get_next_high_mono_count = xen_efi_get_next_high_mono_count;
--- linux-4.15.0.orig/arch/arm/xen/enlighten.c
+++ linux-4.15.0/arch/arm/xen/enlighten.c
@@ -392,8 +392,6 @@
return -ENOMEM;
}
gnttab_init();
-if (!xen_initial_domain())
-xenbus_probe(NULL);
/*
 * Making sure board specific code will not set up ops for
--- linux-4.15.0.orig/arch/arm/xen/p2m.c
+++ linux-4.15.0/arch/arm/xen/p2m.c
@@ -91,10 +91,39 @@
int i;

for (i = 0; i < count; i++) {
+struct gnttab_unmap_grant_ref unmmap;
+int rc;
+
+if (map_ops[i].status)
+continue;
-set_phys_to_machine(map_ops[i].host_addr >> XEN_PAGE_SHIFT,
- map_ops[i].dev_bus_addr >> XEN_PAGE_SHIFT);
+if (likely(set_phys_to_machine(map_ops[i].host_addr >> XEN_PAGE_SHIFT,
+ map_ops[i].dev_bus_addr >> XEN_PAGE_SHIFT)))
+continue;
+
+/*
+ * Signal an error for this slot. This in turn requires
+ * immediate unmapping.
+ */
+map_ops[i].status = GNTST_general_error;
+unmap.host_addr = map_ops[i].host_addr,
+unmap.handle = map_ops[i].handle;
+map_ops[i].handle = ~0;
+if (map_ops[i].flags & GNTMAP_device_map)
+unmap.dev_bus_addr = map_ops[i].dev_bus_addr;
+else
+unmap.dev_bus_addr = 0;
+
+/*
+ * Pre-populate the status field, to be recognizable in
+ * the log message below.
+ */
+unmap.status = 1;
+
+rc = HYPERVISOR_grant_table_op(GNTTABOP_unmap_grant_ref,
+ &unmap, 1);
+if (rc || unmmap.status != GNTST_okay)
+pr_err_once("gnttab unmap failed: rc=%d st=%d\n",
+ rc, unmmap.status);
}

return 0;
--- linux-4.15.0.orig/arch/arm64/Kconfig
+++ linux-4.15.0/arch/arm64/Kconfig
select ACPI_REduced_HARDWARE_ONLY if ACPI
select ACPI_MCFG if ACPI
select ACPI_SPCR_TABLE if ACPI
+select ACPI_PPTT if ACPI
select ARCH_CLOCKSOURCE_DATA
select ARCH_HAS_DEBUG_VIRTUAL
select ARCH_HAS_DEVMEM_IS_ALLOWED
@ @ -66.6 +67.7 @@
select GENERIC_CLOCKEVENTS
select GENERIC_CLOCKEVENTS_BROADCAST
select GENERIC_CPU_AutoproBE
+select GENERIC_CPU_VULNERABILITIES
select GENERIC_EARLY_IOREMAPPING
select GENERIC_IDLE_POLL_SETUP
select GENERIC_IRQ_PROBE
@ @ -452.12 +454.40 @@
config ARM64_ERRATUM_843419
bool "Cortex-A53: 843419: A load or store might access an incorrect address"
default y
-select ARM64_MODULE_CMODEL_LARGE if MODULES
+select ARM64_MODULE_PLTS if MODULES
help
  This option links the kernel with ‘--fix-cortex-a53-843419’ and
  - builds modules using the large memory model in order to avoid the use
  - of the ADRP instruction, which can cause a subsequent memory access
  - to use an incorrect address on Cortex-A53 parts up to r0p4.
+ enables PLT support to replace certain ADRP instructions, which can
  + cause subsequent memory accesses to use an incorrect address on
  + Cortex-A53 parts up to r0p4.
+
+ If unsure, say Y.
+
+config ARM64_ERRATUM_1024718
+bool "Cortex-A55: 1024718: Update of DBM/AP bits without break before make might result in incorrect update"
+default y
+help
  + This option adds work around for Arm Cortex-A55 Erratum 1024718.
  +
  + Affected Cortex-A55 cores (all revisions) could cause incorrect
  + update of the hardware dirty bit when the DBM/AP bits are updated
  + without a break-before-make. The work around is to disable the usage
  + of hardware DBM locally on the affected cores. CPUs not affected by
  + erratum will continue to use the feature.
  +
  + If unsure, say Y.
+
+config ARM64_ERRATUM_1024718
+bool "Cortex-A55: 1024718: Update of DBM/AP bits without break before make might result in incorrect update"
+default y
+help
+ This option adds work around for Arm Cortex-A55 Erratum 1024718.
+
+ Affected Cortex-A55 cores (r0p0, r0p1, r1p0) could cause incorrect
+ update of the hardware dirty bit when the DBM/AP bits are updated
+ without a break-before-make. The work around is to disable the usage
+ of hardware DBM locally on the affected cores. CPUs not affected by
+ erratum will continue to use the feature.

    If unsure, say Y.

@@ -522,20 +552,13 @@
config QCOM_FALKOR_ERRATUM_1003
bool "Falkor E1003: Incorrect translation due to ASID change"
default y
-select ARM64_PAN if ARM64_SW_TTBR0_PAN
+ and BADDR are changed together in TTBRx_EL1. Since we keep the ASID
+ in TTBR1_EL1, this situation only occurs in the entry trampoline and
+ then only for entries in the walk cache, since the leaf translation
+ is unchanged. Work around the erratum by invalidating the walk cache
+ entries for the trampoline before entering the kernel proper.

config QCOM_FALKOR_ERRATUM_1009
bool "Falkor E1009: Prematurely complete a DSB after a TLBI"
@@ -723,7 +746,6 @@

config HOLES_IN_ZONE
def bool y
-depends on NUMA

source kernel/Kconfig.preempt
source kernel/Kconfig.hz
@@ -830,6 +852,7 @@
config FORCE_MAX_ZONEORDER
int
default "14" if (ARM64_64K_PAGES && TRANSPARENT_HUGEPAGE)
+default "13" if (ARCH_THUNDER && ARM64_4K_PAGES)
default "12" if (ARM64_16K_PAGES && TRANSPARENT_HUGEPAGE)
default "11"
help
@@ -850,6 +873,44 @@
    However for 4K, we choose a higher default value, 11 as opposed to 10, giving us
    4M allocations matching the default size used by generic code.

+config UNMAP_KERNEL_AT_EL0
+bool "Unmap kernel when running in userspace (aka "KAISER")" if EXPERT
+default y
+help
+ Speculation attacks against some high-performance processors can
+ be used to bypass MMU permission checks and leak kernel data to
+ userspace. This can be defended against by unmapping the kernel
+ when running in userspace, mapping it back in on exception entry
+ via a trampoline page in the vector table.
+
+ If unsure, say Y.
+
+config HARDEN_BRANCH_PREDICTOR
+bool "Harden the branch predictor against aliasing attacks" if EXPERT
+default y
+help
+ Speculation attacks against some high-performance processors rely on
+ being able to manipulate the branch predictor for a victim context by
+ executing aliasing branches in the attacker context. Such attacks
+ can be partially mitigated against by clearing internal branch
+ predictor state and limiting the prediction logic in some situations.
+
+ This config option will take CPU-specific actions to harden the
+ branch predictor against aliasing attacks and may rely on specific
+ instruction sequences or control bits being set by the system
+ firmware.
+
+ If unsure, say Y.
+
+config ARM64_SSBD
+bool "Speculative Store Bypass Disable" if EXPERT
+default y
+help
+ This enables mitigation of the bypassing of previous stores
+ by speculative loads.
+
+ If unsure, say Y.
+ menuconfig ARMV8_DEPRECATED
bool "Emulate deprecated/obsolete ARMv8 instructions"
depends on COMPAT
@@ -1021,6 +1082,22 @@
operations if DC CVAP is not supported (following the behaviour of
DC CVAP itself if the system does not define a point of persistence).

+config ARM64_RAS_EXTN
+bool "Enable support for RAS CPU Extensions"
+default y
+help
+ CPUs that support the Reliability, Availability and Serviceability
+ (RAS) Extensions, part of ARMv8.2 are able to track faults and
+ errors, classify them and report them to software.
+ On CPUs with these extensions system software can use additional
  barriers to determine if faults are pending and read the
  classification from a new set of registers.
+ Selecting this feature will allow the kernel to use these barriers
  and access the new registers if the system supports the extension.
+ Platform RAS features may additionally depend on firmware support.
+ endmenu

config ARM64_SVE
@@ -1034,12 +1111,8 @@
To enable use of this extension on CPUs that implement it, say Y.

-config ARM64_MODULE_CMODEL_LARGE
-bool
-
-config ARM64_MODULE_PLTS
bool
-select ARM64_MODULE_CMODEL_LARGE
select HAVE_MOD_ARCH_SPECIFIC

config RELOCATABLE
@@ -1073,12 +1146,12 @@
If unsure, say N.

config RANDOMIZE_MODULE_REGION_FULL
-bool "Randomize the module region independently from the core kernel"
+bool "Randomize the module region over a 4 GB range"
depends on RANDOMIZE_BASE
default y
help
- Randomizes the location of the module region without considering the
- location of the core kernel. This way, it is impossible for modules
+ Randomizes the location of the module region inside a 4 GB window
+ covering the core kernel. This way, it is less likely for modules
to leak information about the location of core kernel data structures
but it does imply that function calls between modules and the core
kernel will need to be resolved via veneers in the module PLT.
@@ -1123,6 +1196,7 @@
bool "UEFI runtime support"
depends on OF && !CPU_BIG_ENDIAN
depends on KERNEL_MODE_NEON
+select ARCH_SUPPORTS_ACPI
select LIBFDT
select UCS2_STRING
select EFI_PARAMS_FROM_FDT
@@ -1208,6 +1282,8 @@
source "drivers/Kconfig"
+source "ubuntu/Kconfig"
+
source "drivers/firmware/Kconfig"
source "drivers/acpi/Kconfig"
--- linux-4.15.0.orig/arch/arm64/Kconfig.platforms
+++ linux-4.15.0/arch/arm64/Kconfig.platforms
@@ -46,6 +46,7 @@
config ARCH_BERLIN
bool "Marvell Berlin SoC Family"
select DW_APB_ICTL.
+select DW_APB_TIMER_OF
select GPIOLIB
select PINCTRL
help
@@ -150,6 +151,7 @@
select PM
select ROCKCHIP_TIMER
help
This enables support for the ARMv8 based Rockchip chipsets,
--- linux-4.15.0.orig/arch/arm64/Makefile
+++ linux-4.15.0/arch/arm64/Makefile
@@ -10,7 +10,7 @@
#  # Copyright (C) 1995-2001 by Russell King
-LDFLAGS_vmlinux:=p --no-undefined -X
+LDFLAGS_vmlinux:=--no-undefined -X -z norelro
CPPFLAGS_vmlinux.lds = -DTEXT_OFFSET=$(TEXT_OFFSET)
GZFLAGS:=--9

@@ -18,7 +18,7 @@
# Pass --no-apply-dynamic-relocs to restore pre-binutils-2.27 behaviour
# for relative relocations, since this leads to better Image compression
# with the relocation offsets always being zero.
-LDFLAGS_vmlinux		+= -pie -shared -Bsymbolic \ 
+LDFLAGS_vmlinux		+= -shared -Bsymbolic -z notext \ 
$(call ld-option, --no-apply-dynamic-relocs)
endif

@@ -51,7 +51,7 @@
KBUILD_CFLAGS	+= -mgeneral-regs-only $(lseinstr) $(brokengasinst)
KBUILD_CFLAGS+= -fno-asynchronous-unwind-tables
-KBUILD_CFLAGS+= $(call cc-option, -mpc-relative-literal-loads)
+KBUILD_CFLAGS+= $(call cc-disable-warning, psabi)
KBUILD_AFLAGS	+= $(lseinstr) $(brokengasinst)

KBUILD_CFLAGS+= $(call cc-option,-mabi=lp64)
@@ -77,10 +77,6 @@
CHECKFLAGS	+= -D__aarch64__ -m64

-ifeq ($(CONFIG_ARM64_MODULE_CMODEL_LARGE), y)
-KBUILD_CFLAGS_MODULE+= -mcmodel=large
-endif
-
+ifeq ($(CONFIG_ARM64_MODULE_PLTS),y)
KBUILD_LDFLAGS_MODULE+= -T $(srctree)/arch/arm64/kernel/module.lds
endif
@@ -151,6 +147,7 @@
prepare: vdso_prepare
vdso_prepare: prepare0
$(Q)$(MAKE) $(build)=arch/arm64/kernel/vdso include/generated/vdso-offsets.h
+endif
define archhelp
  echo ' Image.gz - Compressed kernel image (arch/$ARCH/boot/Image.gz)'
--- linux-4.15.0.orig/arch/arm64/boot/Makefile
+++ linux-4.15.0/arch/arm64/boot/Makefile
@@ -16,7 +16,7 @@
OBJCOPYFLAGS_Image :=-O binary -R .note -R .note.gnu.build-id -R .comment -S
-targets := Image Image.gz
+targets := Image Image.bz2 Image.gz Image.lz4 Image.lzma Image.lzo

$(obj)/Image: vmlinux FORCE
$(call if_changed,objcopy)
--- linux-4.15.0.orig/arch/arm64/boot/dts/allwinner/sun50i-a64-bananapi-m64.dts
+++ linux-4.15.0/arch/arm64/boot/dts/allwinner/sun50i-a64-bananapi-m64.dts
@@ -73,7 +73,7 @@
 &emac {
pinctrl-names = "default";
pinctrl-0 = &rgmii_pins;
-phy-mode = "rgmii";
+phy-mode = "rgmii-id";
 phy-handle = &ext_rgmii_phy;
 phy-supply = &reg_dc1sw;
 status = "okay";
--- linux-4.15.0.orig/arch/arm64/boot/dts/allwinner/sun50i-a64-nanopi-a64.dts
+++ linux-4.15.0/arch/arm64/boot/dts/allwinner/sun50i-a64-nanopi-a64.dts
@@ -126,9 +126,9 @@
 &reg_dcdc1 {
 regulator-always-on;
-regulator-min-microvolt = <3000000>;
-regulator-max-microvolt = <3000000>;
-regulator-name = "vcc-3v";
+regulator-min-microvolt = <3300000>;
+regulator-max-microvolt = <3300000>;
+regulator-name = "vcc-3v3";
 };

&reg_dcdc2 {
--- linux-4.15.0.orig/arch/arm64/boot/dts/allwinner/sun50i-a64-olinuxino.dts
+++ linux-4.15.0/arch/arm64/boot/dts/allwinner/sun50i-a64-olinuxino.dts
@@ -120,10 +120,14 @@
/* DCDC3 is polyphased with DCDC2 */

/*
 * The board uses DDR3L DRAM chips. 1.36V is the closest to the nominal
+ * 1.35V that the PMIC can drive.
+ */
&reg_dcdc5 {
  regulator-always-on;
  -regulator-min-microvolt = <1500000>;
  -regulator-max-microvolt = <1500000>;
  +regulator-min-microvolt = <1360000>;
  +regulator-max-microvolt = <1360000>;
  regulator-name = "vcc-ddr3";
};
---
--- linux-4.15.0.orig/arch/arm64/boot/dts/allwinner/sun50i-a64-pine64-plus.dts
+++ linux-4.15.0/arch/arm64/boot/dts/allwinner/sun50i-a64-pine64-plus.dts
@@ -52,7 +52,7 @@
 &emac {
   pinctrl-names = "default";
   pinctrl-0 = <&rgmii_pins>;
-   phy-mode = "rgmii";
+   phy-mode = "rgmii-txid";
   phy-handle = <&ext_rgmii_phy>;
   status = "okay";
 };  
@@ -63,3 +63,12 @@
     reg = <1>;
 };  
+  
+ &reg_dc1sw {
+/*
+ * Ethernet PHY needs 30ms to properly power up and some more
+ * to initialize. 100ms should be plenty of time to finish
+ * whole process.
+ */
+  regulator-enable-ramp-delay = <100000>;
+};
---
--- linux-4.15.0.orig/arch/arm64/boot/dts/allwinner/sun50i-a64-sopine-baseboard.dts
+++ linux-4.15.0/arch/arm64/boot/dts/allwinner/sun50i-a64-sopine-baseboard.dts
@@ -113,6 +113,12 @@
 };  
 &reg_dc1sw {
+/*
+ * Ethernet PHY needs 30ms to properly power up and some more
+ * to initialize. 100ms should be plenty of time to finish
+ * whole process.
+ */
+  regulator-enable-ramp-delay = <100000>;
+};

gpio-controller;
#gpio-cells = <3>;
interrupt-controller;

--- linux-4.15.0.orig/arch/arm64/boot/dts/allwinner/sun50i-h5-orangepi-pc2.dts
+++ linux-4.15.0/arch/arm64/boot/dts/allwinner/sun50i-h5-orangepi-pc2.dts
@@ -142,7 +142,7 @@
 pinctrl-0 = <&emac_rgmii_pins>;
 phy-supply = <&reg_gmac_3v3>;
 phy-handle = <&ext_rgmii_phy>;
-phy-mode = "rgmii";
+phy-mode = "rgmii-id";
 status = "okay";
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/allwinner/sun50i-h5-orangepi-prime.dts
+++ linux-4.15.0/arch/arm64/boot/dts/allwinner/sun50i-h5-orangepi-prime.dts
@@ -149,7 +149,7 @@
 pinctrl-0 = <&emac_rgmii_pins>;
 phy-supply = <&reg_gmac_3v3>;
 phy-handle = <&ext_rgmii_phy>;
-phy-mode = "rgmii";
+phy-mode = "rgmii-id";
 status = "okay";
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/altera/socfpga_stratix10.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/altera/socfpga_stratix10.dtsi
@@ -58,10 +58,10 @@
 pmu {
 compatible = "arm,armv8-pmuv3";
 -interrupts = <0 120 8>,
-  <0 121 8>,
-  <0 122 8>,
-  <0 123 8>;
+interrupts = <0 170 4>,
+  <0 171 4>,
+  <0 172 4>,
+  <0 173 4>;
 interrupt-affinity = <&cpu0>,
   <&cpu1>,
   <&cpu2>,
@@ -268,7 +268,7 @@
 sysmgr: sysmgr@ffd12000 {
 compatible = "altr,sys-mgr", "syscon";
 -reg = <0ffd12000 0x1000>;
+reg = <0ffd12000 0x228>;}
/* Local timer */

--- linux-4.15.0.orig/arch/arm64/boot/dts/amd/amd-seattle-soc.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amd/amd-seattle-soc.dtsi
@@ -107,7 +107,7 @@
clock-names = "uartclk", "apb_pclk";
};

-spi0: ssp@e1020000 {
+spi0: spi@e1020000 {
    status = "disabled";
    compatible = "arm,pl022", "arm,primecell";
    reg = <0 0xe1020000 0 0x1000>;
@@ -117,7 +117,7 @@
clock-names = "apb_pclk";
};

-spi1: ssp@e1030000 {
+spi1: spi@e1030000 {
    status = "disabled";
    compatible = "arm,pl022", "arm,primecell";
    reg = <0 0xe1030000 0 0x1000>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gx-p23x-q20x.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gx-p23x-q20x.dtsi
@@ -142,6 +142,7 @@
};

&&hdmi_tx_tmds_port {
@@ -236,3 +237,7 @@
pinctrl-0 = <&uart_ao_a_pins>, <&hdmi_i2c_pins>;
pinctrl-names = "default";
+&usb0 {
+    status = "okay";
+};
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gx.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gx.dtsi
@@ -72,6 +72,12 @@
no-map;
};

/* Alternate 3 MiB reserved for ARM Trusted Firmware (BL31) */
secmon_reserved_alt: secmon@5000000 {
  reg = <0x0 0x05000000 0x0 0x300000>;
  no-map;
  *
}
+ linux.cma {
  compatible = "shared-dma-pool";
  reusable;
  --- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxbb-nanopi-k2.dts
  +++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxbb-nanopi-k2.dts
  @@ -180,7 +180,7 @@
  pinctrl-names = "default";
  }
-
-&pinctrl_aobus {
  +&gpio_ao {
    gpio-line-names = "UART TX", "UART RX", "Power Control", "Power Key In",
    "VCCK En", "CON1 Header Pin31",
    "I2S Header Pin6", "IR In", "I2S Header Pin7",
    @@ -190,7 +190,7 @@
    ";
  }
-
-&pinctrl_periphs {
  +&gpio {
    gpio-line-names = /* Bank GPIOZ */
    "Eth MDIO", "Eth MDC", "Eth RGMII RX Clk",
    "Eth RX DV", "Eth RX D0", "Eth RX D1", "Eth RX D2",
    --- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxbb-odroidc2.dts
    +++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxbb-odroidc2.dts
    @@ -191,7 +191,7 @@
    pinctrl-names = "default";
  }
-
-&pinctrl_aobus {
  +&gpio_ao {
    gpio-line-names = "UART TX", "UART RX", "VCCK En", "TF 3V3/1V8 En",
    "USB HUB nRESET", "USB OTG Power En",
    "J7 Header Pin2", "IR In", "J7 Header Pin4",
    @@ -201,7 +201,7 @@
    ";
  }
-
-&pinctrl_periphs {
  +&gpio {
    gpio-line-names = /* Bank GPIOZ */
    "Eth MDIO", "Eth MDC", "Eth RGMII RX Clk",
    "Eth RX DV", "Eth RX D0", "Eth RX D1", "Eth RX D2",
pinctrl-names = "default", "clk-gate";

bus-width = <8>;
-max-frequency = <200000000>;
+max-frequency = <100000000>;
non-removable;
disable-wp;
cap-mmc-highspeed;
@@ -278,7 +278,7 @@
	max-frequency = <100000000>;

@ @ -297,7 +297,7 @ @
}

@ @ -307,7 +307,7 @ @
}

&usb0_phy {
-@status = "okay";
+@status = "disabled";

phy-supply = <&usb_otg_pwr>;
};

@ @ -307,7 +307,7 @ @
}

&usb0 {
-@status = "okay";
+@status = "disabled";

};

&usb1 {
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxbb.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxbb.dtsi
@@ -425,7 +425,7 @@

};

-spi_pins: spi {
+spi_pins: spi-pins {

mux {

groups = "spi_miso",
"spi_mosi",
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl-mali.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl-mali.dtsi
@@ -7,7 +7,7 @@

};

@ @ -7,7 +7,7 @ @
}

&apb {

mali: gpu@c0000 {
-@compatible = "amlogic.meson-gxbb-mali", "arm.mali-450";
+@compatible = "amlogic.meson-gxl-mali", "arm.mali-450";

reg = <0x0 0xc0000 0x0 0x40000>;
interrupts = <GIC_SPI 160 IRQ_TYPE_LEVEL_HIGH>,

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<GIC_SPI 161 IRQ_TYPE_LEVEL_HIGH>,
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-khadas-vim.dts
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-khadas-vim.dts
@@ -33,11 +33,9 @@
gpio-keys-polled {
    compatible = "gpio-keys-polled";
    #address-cells = <1>;
    #size-cells = <0>;
    poll-interval = <100>;

    -button@0 { 
        +power-button { 
            label = "power";
            linux,code = <KEY_POWER>;
            gpios = <&gpio_ao GPIOAO_2 GPIO_ACTIVE_LOW>;
            status = "okay";
            pinctrl-0 = <&hdmi_hpd_pins>, <&hdmi_i2c_pins>;
            pinctrl-names = "default";
            +hdmi-supply = <&hdmi_5v>;
        }
    }

    &hdmi_tx_tmds_port { 
        status = "okay";
        pinctrl-names = "default";
        &hdmi_5v {
            +hdmi-supply = <&hdmi_5v>;
        }
    }

    -&pinctrl_aobus {
        +&gpio_ao {
            gpio-line-names = "UART TX", "UART RX", "Power Key In";
            status = "okay";
            pinctrl-names = "default";
            &hdmi_5v {
                +hdmi-supply = <&hdmi_5v>;
            }
        }
    }

    -&pinctrl_periph {
        +&gpio {
            gpio-line-names = /* Bank GPIOZ */
            status = "okay";
        }
    }

--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-libretech-cc.dts
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-libretech-cc.dts
@@ -14,7 +14,7 @@

/ {
    compatible = "libretech.cc", "amlogic,s905x", "amlogic.meson-gxl";
-model = "Libre Technology CC";
+model = "Libre Computer Board AML-S905X-CC";

aliases {
serial0 = &uart_AO;
@@ -143,6 +143,7 @@
status = "okay";
pinctrl-0 = <&hdmi_hpd_pins>, <&hdmi_i2c_pins>;
pinctrl-names = "default";
+hdmisupply = <&hdmi_5v>;
};

&hdmi_tx_tmds_port {
@@ -151,7 +152,7 @@
};
};

-&pinctrl_aobus {
+&gpio_ao {
gpio-line-names = "UART TX",
"UART RX",
"Blue LED",
@@ -166,7 +167,7 @@
"7J1 Header Pin15"; 
};

-&pinctrl_periphs {
+&gpio {
gpio-line-names = /* Bank GPIOZ */

@@ -222,9 +223,6 @@
bus-width = <4>;
cap-sd-highspeed;
-sd-uhs-sdr12;
-sd-uhs-sdr25;
-sd-uhs-sdr50;
max-frequency = <100000000>;
disable-wp;

@@ -246,7 +244,6 @@
cap-mmc-highspeed;
mmc-ddr-3_3v;
max-frequency = <50000000>;
-non-removable;
disable-wp;
mmc-pwrseq = <&emmc_pwrseq>;
@ @ -259.3 +256.15 @@
pinctrl-0 = <&uart_ao_a_pins>;
pinctrl-names = "default";
};
+
+&usb0 {
  +status = "okay";
+};
+
+&usb2_phy0 {
+/
+  + * even though the schematics don't show it:
+  + * HDMI_5V is also used as supply for the USB VBUS.
+  */
+  +phy-supply = <&hdmi_5v>;
+};
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-nexbox-a95x.dts
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-nexbox-a95x.dts
@@ -251,3 +251,7 @@
pinctrl-0 = <&uart_ao_a_pins>;
pinctrl-names = "default";
};
+
+&usb0 {
  +status = "okay";
+};
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-p212.dts
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-p212.dts
@@ -88,6 +88,7 @@
  status = "okay";
pinctrl-0 = <&hdmi_hpd_pins>, <&hdmi_i2c_pins>;
pinctrl-names = "default";
+hdmi-supply = <&hdmi_5v>;
};
+
+&usb0 {
  +status = "okay";
+};
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-p212.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-p212.dtsi
@@ -173,3 +173,14 @@
pinctrl-0 = <&uart_ao_a_pins>;
pinctrl-names = "default";
};

&hdmi_tx_tmds_port {
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-p212.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl-s905x-p212.dtsi
@@ -173,3 +173,14 @@
pinctrl-0 = <&uart_ao_a_pins>;
pinctrl-names = "default";
};
+
+&usb0 {
  +status = "okay";
+};
+}

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+&apb {
+usb2_phy0: phy@78000 {
+compatible = "amlogic.meson-gxl-usb2-phy";
+#phy-cells = <0>;
+reg = <0x0 0x78000 0x0 0x20>;
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl.dtsi
@@ -50,15 +50,68 @@
| {
| compatible = "amlogic.meson-gxl";

-reserved-memory {
-/* Alternate 3 MiB reserved for ARM Trusted Firmware (BL31) */
-secmont_reservd_alt: secmont@5000000 {
-reg = <0x0 0x05000000 0x0 0x300000>;
-no-map;
+soc {
+usb0: usb@c9000000 {
+status = "disabled";
+compatible = "amlogic.meson-gxl-dwc3";
+#address-cells = <2>;
+#size-cells = <2>;
+ranges;
+
clocks = <&clkc CLKID_USB>;
+clock-names = "usb_general";
+resets = <&reset RESET_USB_OTG>;
+reset-names = "usb_otg";
+
dwc3: dwc3@c9000000 {
+compatible = "snps,dwc3";
+reg = <0x0 0xc9000000 0x0 0x100000>;
+interrupts = <GIC_SPI 30 IRQ_TYPE_LEVEL_HIGH>;
+dr_mode = "host";
+maximum-speed = "high-speed";
+snps,dis_u2_susphy_quirk;
+phys = <&usb3_phy>, <&usb2_phy0>, <&usb2_phy1>;
+};

};
}

+&usb2_phy0 {
+/*
+ * HDMI_5V is also used as supply for the USB VBUS.
+ */
+phy-supply = <&hdmi_5v>;
+};

--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl.dtsi
@@ -50,15 +50,68 @@
| {
| compatible = "amlogic.meson-gxl";

-reserved-memory {
-/* Alternate 3 MiB reserved for ARM Trusted Firmware (BL31) */
-secmont_reservd_alt: secmont@5000000 {
-reg = <0x0 0x05000000 0x0 0x300000>;
-no-map;
+soc {
+usb0: usb@c9000000 {
+status = "disabled";
+compatible = "amlogic.meson-gxl-dwc3";
+#address-cells = <2>;
+#size-cells = <2>;
+ranges;
+
clocks = <&clkc CLKID_USB>;
+clock-names = "usb_general";
+resets = <&reset RESET_USB_OTG>;
+reset-names = "usb_otg";
+
dwc3: dwc3@c9000000 {
+compatible = "snps,dwc3";
+reg = <0x0 0xc9000000 0x0 0x100000>;
+interrupts = <GIC_SPI 30 IRQ_TYPE_LEVEL_HIGH>;
+dr_mode = "host";
+maximum-speed = "high-speed";
+snps,dis_u2_susphy_quirk;
+phys = <&usb3_phy>, <&usb2_phy0>, <&usb2_phy1>;
+};

};
}

+&apb {
+usb2_phy0: phy@78000 {
+compatible = "amlogic.meson-gxl-usb2-phy";
+#phy-cells = <0>;
+reg = <0x0 0x78000 0x0 0x20>;

--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxl.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxl.dtsi
@@ -50,15 +50,68 @@
| {
| compatible = "amlogic.meson-gxl";

-reserved-memory {
-/* Alternate 3 MiB reserved for ARM Trusted Firmware (BL31) */
-secmont_reservd_alt: secmont@5000000 {
-reg = <0x0 0x05000000 0x0 0x300000>;
-no-map;
+soc {
+usb0: usb@c9000000 {
+status = "disabled";
+compatible = "amlogic.meson-gxl-dwc3";
+#address-cells = <2>;
+#size-cells = <2>;
+ranges;
+
clocks = <&clkc CLKID_USB>;
+clock-names = "usb_general";
+resets = <&reset RESET_USB_OTG>;
+reset-names = "usb_otg";
+
dwc3: dwc3@c9000000 {
+compatible = "snps,dwc3";
+reg = <0x0 0xc9000000 0x0 0x100000>;
+interrupts = <GIC_SPI 30 IRQ_TYPE_LEVEL_HIGH>;
+dr_mode = "host";
+maximum-speed = "high-speed";
+snps,dis_u2_susphy_quirk;
+phys = <&usb3_phy>, <&usb2_phy0>, <&usb2_phy1>;
+};

};
}
+clocks = <&clkc CLKID_USB>;
+clock-names = "phy";
+resets = <&reset RESET_USB_OTG>;
+reset-names = "phy";
+status = "okay";
+};
+
+usb2_phy1: phy@78020 {
+compatible = "amlogic,meson-gxl-usb2-phy";
+#phy-cells = <0>;
+reg = <0x0 0x78020 0x0 0x20>;
+clocks = <&clkc CLKID_USB>;
+clock-names = "phy";
+resets = <&reset RESET_USB_OTG>;
+reset-names = "phy";
+status = "okay";
+};
+
+usb3_phy: phy@78080 {
+compatible = "amlogic,meson-gxl-usb3-phy";
+#phy-cells = <0>;
+reg = <0x0 0x78080 0x0 0x20>;
+interrupts = <GIC_SPI 16 IRQ_TYPE_LEVEL_HIGH>;
+clocks = <&clkc CLKID_USB>, <&clkc_AO CLKID_AO_CEC_32K>;
+clock-names = "phy", "peripheral";
+resets = <&reset RESET_USB_OTG>, <&reset RESET_USB_OTG>;
+reset-names = "phy", "peripheral";
+status = "okay";
+};
+

&ethmac {
reg = <0x0 0xc9410000 0x0 0x10000
0x0 0xc8834540 0x0 0x4>;

};
+

+&hwrng {
+clocks = <&clkc CLKID_RNG0>;
+clock-names = "core";
+};
+
+&i2c_A {
+clocks = <&clkc CLKID_I2C>;
};


-spi_pins: spi {
  +spi_pins: spi-pins {
    mux {
      groups = "spi_miso",
      "spi_mosi",
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxm-khadas-vim2.dts
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxm-khadas-vim2.dts
@@ -19,7 +19,6 @@

    aliases {
      serial0 = &uart_AO;
-    serial1 = &uart_A;
-    serial2 = &uart_AO_B;
    }

@@ -66,11 +65,9 @@

    gpio-keys-polled {
      compatible = "gpio-keys-polled";
-    #address-cells = <1>;
-    #size-cells = <0>;
    poll-interval = <100>;

    -button@0 {
        +power-button {
            label = "power";
            linux,code = <KEY_POWER>;
            gpios = <&gpioAo GPIOAO_2 GPIO_ACTIVE_LOW>;
@@ -236,7 +236,6 @@

        status = "okay";
        pinctrl-0 = <&hdmi_hpd_pins>, <&hdmi_i2c_pins>;
        pinctrl-names = "default";
-    +hdmi-supply = <&hdmi_5v>;
    }

    &hdmi_tx_tmds_port {
@@ -366,15 +366,24 @@

        #size-cells = <1>;
        compatible = "winbond,w25q16", "jedec.spi-nor";
        reg = <0>;
        -spi-max-frequency = <3000000>;
-    +spi-max-frequency = <104000000>;
    }
    }

/* This one is connected to the Bluetooth module */
&uart_A {
  status = "okay";
  -pinctrl-0 = <&uart_a_pins>;
  +pinctrl-0 = <&uart_a_pins>, <&uart_a_cts_rts_pins>;
  pinctrl-names = "default";
  +uart-has-rtscts;
  +
  +bluetooth {
    +compatible = "brcm,bcm43438-bt";
    +shutdown-gpios = <&gpio GPIOX_17 GPIO_ACTIVE_HIGH>;
    +max-speed = <2000000>;
    +clocks = <&wifi32k>;
    +clock-names = "lpo";
  }
  ;
};
/* This is brought out on the Linux_RX (18) and Linux_TX (19) pins: */
@@ -398,3 +405,7 @@
status = "okay";
 vref-supply = <&vddio_ao18>;
  ];
+ +&usb0 {
+   status = "okay";
+   +};
--- linux-4.15.0.orig/arch/arm64/boot/dts/amlogic/meson-gxm.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/amlogic/meson-gxm.dtsi
@@ -117,6 +117,19 @@
};
+
+&apb {
+  +usb2_phy2: phy@78040 {
+    +compatible = "amlogic,meson-gxl-usb2-phy";
+    +#phy-cells = <0>;
+    +reg = <0x0 0x078040 0x0 0x20>;
+    +clocks = <&clkc CLKID_USB>;
+    +clock-names = "phy";
+    +resets = <&reset RESET_USB_OTG>;
+    +reset-names = "phy";
+    +status = "okay";
+    +};
+  +
+  &clkc_AO {
+    compatible = "amlogic,meson-gxm-aoclkc", "amlogic,meson-gx-aoclkc";
+  };
@@ -137,3 +150,7 @@
&hdmi_tx
compatible = "amlogic,meson-gxm-dw-hdmi", "amlogic,meson-gx-dw-hdmi";
);
+
+&dwc3
+phys = <&usb3_phy>, <&usb2_phy0>, <&usb2_phy1>, <&usb2_phy2>;
+);
--- linux-4.15.0.orig/arch/arm64/boot/dts/arm/juno-base.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/arm/juno-base.dtsi
@@ -5,7 +5,6 @@

/*
 * Devices shared by all Juno boards
 */
-dma-ranges = <0 0 0 0x100 0>;

memtimer: timer@2a810000 {
compatible = "arm,armv7-timer-mem";
@@ -514,13 +513,13 @@
clocks {
compatible = "arm,scpi-clocks";

-scpi_dvfs: scpi-dvfs {
+scpi_dvfs: clocks-0 {
compatible = "arm,scpi-dvfs-clocks";
#clock-cells = <1>;
clock-indices = <0>, <1>, <2>;
clock-output-names = "atlclk", "aplclk", "gpuclk";
};
-scpi_clk: scpi-clk {
+scpi_clk: clocks-1 {
compatible = "arm,scpi-variable-clocks";
#clock-cells = <1>;
clock-indices = <3>;
@@ -528,7 +527,7 @@
};
);

-scpi_devpd: scpi-power-domains {
+scpi_devpd: power-controller {
compatible = "arm,scpi-power-domains";
num-domains = <2>;
#power-domain-cells = <1>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/arm/juno-clocks.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/arm/juno-clocks.dtsi
@@ -8,10 +8,10 @@

/* SoC fixed clocks */
-soc_uartclk: refclk7273800hz {
+soc_uartclk: refclk7372800hz {
  compatible = "fixed-clock";
  #clock-cells = <0>;
  -clock-frequency = <7273800>;
  +clock-frequency = <7372800>;
  clock-output-names = "juno:uartclk";
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/broadcom/northstar2/ns2.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/northstar2/ns2.dtsi
@@ -118,7 +118,7 @@
#interrupt-cells = <1>;
 interrupt-map-mask = <0 0 0 0>;
-interrupt-map = <0 0 0 0 &gic 0 GIC_SPI 281 IRQ_TYPE_NONE>;
+interrupt-map = <0 0 0 0 &gic 0 GIC_SPI 281 IRQ_TYPE_LEVEL_HIGH>;

 linux,pci-domain = <0>;
@@ -149,7 +149,7 @@
#interrupt-cells = <1>;
 interrupt-map-mask = <0 0 0 0>;
-interrupt-map = <0 0 0 0 &gic 0 GIC_SPI 305 IRQ_TYPE_NONE>;
+interrupt-map = <0 0 0 0 &gic 0 GIC_SPI 305 IRQ_TYPE_LEVEL_HIGH>;

 linux,pci-domain = <4>;
@@ -566,7 +566,7 @@
 reg = <0x66080000 0x100>;
 #address-cells = <1>;
 #size-cells = <0>;
-interrupts = <GIC_SPI 394 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 394 IRQ_TYPE_LEVEL_HIGH>;
 clock-frequency = <100000>;
 status = "disabled";
};
@@ -594,7 +594,7 @@
 reg = <0x660b0000 0x100>;
 #address-cells = <1>;
 #size-cells = <0>;
-interrupts = <GIC_SPI 395 IRQ_TYPE_NONE>;
+interrupts = <GIC_SPI 395 IRQ_TYPE_LEVEL_HIGH>;
 clock-frequency = <100000>;
 status = "disabled";
};
@@ -639,7 +639,7 @@
status = "disabled";
};

-ssp0: ssp@66180000 {
+ssp0: ssi@66180000 {
compatible = "arm,pl022", "arm,primecell";
reg = <0x66180000 0x1000>gic_spi_irq R_TYPE_LEVEL_HIGH);@@ -650,7 +650,7 @@
status = "disabled";
}:

-ssp1: ssp@66190000 {
+ssp1: spi@66190000 {
compatible = "arm,pl022", "arm,primecell";
reg = <0x66190000 0x1000>gic_spi_irq R_TYPE_LEVEL_HIGH);@@ -745,7 +745,7 @@
};

qspi: spi@66470200 {
-compatible = "brcm.spi-bcm-qspi", "brcm.spi-ns2-qspi";
+compatible = "brcm.spi-ns2-qspi", "brcm.spi-bcm-qspi";
reg = <0x66470200 0x184>,
<0x66470000 0x124>,
<0x67017408 0x004>,
--- linux-4.15.0.org/arch/arm64/boot/dts/broadcom/stingray/bcm958742-base.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/stingray/bcm958742-base.dtsi
@@ -166,7 +166,7 @@
&i2c1 {
status = "okay";

-pcf8574: pcf8574@20 {
+pcf8574: pcf8574@27 {
compatible = "nxp.pcf8574a";
gpio-controller;
#gpio-cells = <2>;
--- linux-4.15.0.org/arch/arm64/boot/dts/broadcom/stingray/bcm958742k.dts
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/stingray/bcm958742k.dts
@@ -43,6 +43,10 @@
enet-phy-lane-swap;
}

+&sdio0 {
+mmc-ddr-1_8v;
+};
+
+&uart2 {

status = "okay";
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/broadcom/stingray/bcm958742t.dts
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/stingray/bcm958742t.dts
@@ -42,3 +42,7 @@
&gphy0 {
enet-phy-lane-swap;
};
+
+&sdio0 {
+mmc-ddr-1_8v;
+};
--- linux-4.15.0.orig/arch/arm64/boot/dts/broadcom/stingray-pinctrl.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/stingray-pinctrl.dtsi
@@ -42,13 +42,14 @@
   compatible = "pinctrl-single";
   #address-cells = <1>;
   #size-cells = <1>;
   pinctrl-single,register-width = <32>;
   pinctrl-single,function-mask = <0xf>;
   pinctrl-single,gpio-range = <
   &range 0 154 MODE_GPIO
   &range 0  91 MODE_GPIO
   &range 95 60 MODE_GPIO
 >;
 range: gpio-range {
   #pinctrl-single,gpio-range-cells = <3>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/broadcom/stingray-sata.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/stingray-sata.dtsi
@@ -36,11 +36,11 @@
   range: gpio-range {
   #pinctrl-single,gpio-range-cells = <3>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/broadcom/stingray-sata.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/stingray-sata.dtsi
@@ -36,11 +36,11 @@
   range: gpio-range {
   #pinctrl-single,gpio-range-cells = <3>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/broadcom/stingray-sata.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/broadcom/stingray-sata.dtsi
@@ -36,11 +36,11 @@
   range: gpio-range {
   #pinctrl-single,gpio-range-cells = <3>;
   reg-names = "ahci";
   interrupts = <GIC_SPI 339 IRQ_TYPE_LEVEL_HIGH>;
   &intc0 {
     reg = <0x00000000 0x1000>;
     reg-names = "ahci";
     interrupts = <GIC_SPI 321 IRQ_TYPE_LEVEL_HIGH>;
   };
   #address-cells = <1>;
   #size-cells = <0>;
   status = "disabled";
@@ -52,9 +52,9 @@
			reg = <0x00212100 0x1000>;
+reg = <0x00002100 0x1000>;
reg-names = "phy";
#address-cells = <1>;
#size-cells = <0>;
@@ -66,11 +66,11 @@
			reg = <0x00310000 0x1000>;
+reg = <0x00010000 0x1000>;
reg-names = "ahci";
-interrupts = <GIC_SPI 347 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 323 IRQ_TYPE_LEVEL_HIGH>;
#address-cells = <1>;
#size-cells = <0>;
status = "disabled";
@@ -82,9 +82,9 @@
			reg = <0x00120000 0x1000>;
+reg = <0x00020000 0x1000>;

@sata1: ahci@310000 {
+@sata1: ahci@10000 {
compatible = "brcm,iproc-ahci", "generic-ahci";
-reg = <0x00310000 0x1000>;
+reg = <0x00010000 0x1000>;
reg-names = "ahci";
-interrupts = <GIC_SPI 347 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 323 IRQ_TYPE_LEVEL_HIGH>;
#address-cells = <1>;
#size-cells = <0>;
status = "disabled";
@@ -82,9 +82,9 @@
};
}

@sata2: ahci@120000 {
+@sata2: ahci@20000 {
compatible = "brcm,iproc-ahci", "generic-ahci";
-reg = <0x00120000 0x1000>;
+reg = <0x00020000 0x1000>;

---

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reg-names = "ahci";
-interrupts = <GIC_SPI 333 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 325 IRQ_TYPE_LEVEL_HIGH>;
#address-cells = <1>;
#size-cells = <0>;
status = "disabled";
@@ -112,9 +112,9 @@
};
);

-sata_phy2: sata_phy@122100 {
+sata_phy2: sata_phy@22100 {
compatible = "brcm,iproc-sr-sata-phy";
-reg = <0x00122100 0x1000>;
+reg = <0x00022100 0x1000>;
reg-names = "phy";
#address-cells = <1>;
#size-cells = <0>;
@@ -126,11 +126,11 @@
};
};

-sata3: ahci@130000 {
+sata3: ahci@30000 {
compatible = "brcm,iproc-ahci", "generic-ahci";
-reg = <0x00130000 0x1000>;
+reg = <0x00030000 0x1000>;
reg-names = "ahci";
-interrupts = <GIC_SPI 335 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 327 IRQ_TYPE_LEVEL_HIGH>;
#address-cells = <1>;
#size-cells = <0>;
status = "disabled";
@@ -142,9 +142,9 @@
};
};

-sata_phy3: sata_phy@132100 {
+sata_phy3: sata_phy@32100 {
compatible = "brcm,iproc-sr-sata-phy";
-reg = <0x00132100 0x1000>;
+reg = <0x00032100 0x1000>;
reg-names = "phy";
#address-cells = <1>;
#size-cells = <0>;
@@ -156,11 +156,11 @@
};
};
-sata4: ahci@330000 {
  +sata4: ahci@100000 {
    compatible = "brcm.iproc-ahci", "generic-ahci";
    -reg = <0x00330000 0x1000>;
    +reg = <0x00100000 0x1000>;
    reg-names = "ahci";
    -interrupts = <GIC_SPI 351 IRQ_TYPE_LEVEL_HIGH>;
    +interrupts = <GIC_SPI 329 IRQ_TYPE_LEVEL_HIGH>;
    #address-cells = <1>;
    #size-cells = <0>;
    status = "disabled";
    @@ -172,9 +172,9 @@
  }
}

-sata_phy4: sata_phy@332100 {
  +sata_phy4: sata_phy@102100 {
    compatible = "brcm.iproc-sr-sata-phy";
    -reg = <0x00332100 0x1000>;
    +reg = <0x00102100 0x1000>;
    reg-names = "phy";
    #address-cells = <1>;
    #size-cells = <0>;
    @@ -186,11 +186,11 @@
  }
}

-sata5: ahci@400000 {
  +sata5: ahci@110000 {
    compatible = "brcm.iproc-ahci", "generic-ahci";
    -reg = <0x00400000 0x1000>;
    +reg = <0x00110000 0x1000>;
    reg-names = "ahci";
    -interrupts = <GIC_SPI 353 IRQ_TYPE_LEVEL_HIGH>;
    +interrupts = <GIC_SPI 331 IRQ_TYPE_LEVEL_HIGH>;
    #address-cells = <1>;
    #size-cells = <0>;
    status = "disabled";
    @@ -202,9 +202,9 @@
  }
}

-sata_phy5: sata_phy@402100 {
  +sata_phy5: sata_phy@112100 {
    compatible = "brcm.iproc-sr-sata-phy";
    -reg = <0x00402100 0x1000>;
    +reg = <0x00112100 0x1000>;

reg-names = "phy";
#address-cells = <1>;
#size-cells = <0>;
@@ -216,11 +216,11 @@
};
};

-sata6: ahci@410000 {
+sata6: ahci@120000 {
compatible = "brcm,iproc-ahci", "generic-ahci";
-reg = <0x00410000 0x1000>;
+reg = <0x00120000 0x1000>;
reg-names = "ahci";
-interrupts = <GIC_SPI 355 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 333 IRQ_TYPE_LEVEL_HIGH>;
#address-cells = <1>;
#size-cells = <0>;
status = "disabled";
@@ -232,9 +232,9 @@
};
};

-sata_phy6: sata_phy@412100 {
+sata_phy6: sata_phy@122100 {
compatible = "brcm,iproc-sr-sata-phy";
-reg = <0x00412100 0x1000>;
+reg = <0x00122100 0x1000>;
reg-names = "phy";
#address-cells = <1>;
#size-cells = <0>;
@@ -246,11 +246,11 @@
};
};

-sata7: ahci@420000 {
+sata7: ahci@130000 {
compatible = "brcm,iproc-ahci", "generic-ahci";
-reg = <0x00420000 0x1000>;
+reg = <0x00130000 0x1000>;
reg-names = "ahci";
-interrupts = <GIC_SPI 357 IRQ_TYPE_LEVEL_HIGH>;
+interrupts = <GIC_SPI 335 IRQ_TYPE_LEVEL_HIGH>;
#address-cells = <1>;
#size-cells = <0>;
status = "disabled";
@@ -262,9 +262,9 @@
};
};
status = "disabled";

-ssp1: ssp@190000 {
+ssp1: spi@190000 {
compatible = "arm,p022", "arm,primecell";
reg = <0x00190000 0x1000>;
interrupts = <GIC_SPI 188 IRQ_TYPE_LEVEL_HIGH>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/cavium/thunder2-99xx.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/cavium/thunder2-99xx.dtsi
@@ -98,7 +98,7 @@
clock-output-names = "clk125mhz";
};

-pci {
+pcie@30000000 {
compatible = "pci-host-ecam-generic";
device_type = "pci";
#interrupt-cells = <1>;
@@ -118,6 +118,7 @@
ranges =
<0x02000000 0x40000000 0x40000000 0x20000000
0x43000000 0x40 0x00000000 0x40 0x00000000 0x20 0x00000000>;+
bus-range = <0xff>;
interrupt-map-mask = <0 0 0 7>;
interrupt-map =
*/ addr pin ic icaddr icintr */
--- linux-4.15.0.orig/arch/arm64/boot/dts/exynos/exynos5433-tm2-common.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/exynos/exynos5433-tm2-common.dtsi
@@ -343,7 +343,7 @@
s2mps13-pmic@66 {
compatible = "samsung,s2mps13-pmic";
interrupt-parent = <&gpa0>;
-interrupts = <7 IRQ_TYPE_NONE>;
+interrupts = <7 IRQ_TYPE_LEVEL_LOW>;
reg = <0x66>;
samsung,s2mps11-wrstbi-ground;
--- linux-4.15.0.orig/arch/arm64/boot/dts/exynos/exynos7-espresso.dts
+++ linux-4.15.0/arch/arm64/boot/dts/exynos/exynos7-espresso.dts
@@ -88,7 +88,7 @@
s2mps15_pmic@66 {
compatible = "samsung,s2mps15-pmic";
reg = <0x66>;
-interrupts = <2 IRQ_TYPE_NONE>;
+interrupts = <2 IRQ_TYPE_LEVEL_LOW>;
interrupt-parent = <&gpa0>:
pinctrl-names = "default";
pinctrl-0 = &pmic_irq;
@@ -155,6 +155,7 @@
regulator-min-microvolt = <700000>;
regulator-max-microvolt = <1150000>;
regulator-enable-ramp-delay = <125>;
+regulator-always-on;
};

ldo8_reg: LDO8 {
--- linux-4.15.0.orig/arch/arm64/boot/dts/exynos/exynos7.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/exynos/exynos7.dtsi
@@ -65,8 +65,10 @@
};

psci {
- compatible = "arm,psci-0.2";
+ compatible = "arm,psci";
 method = "smc";
+ccpu_off = <0x84000002>;
+ccpu_on = <0xC4000003>;
};

soc: soc {
@@ -92,7 +94,7 @@
};

reg = <0x11001000 0x1000>,
@@ -499,13 +501,6 @@
reg = <0x105c0000 0x5000>;
};

-reboot: syscon-reboot {
- compatible = "syscon-reboot";
- regmap = &pmu_system_controller;
- offset = <0x0400>;
- mask = <0x1>;
- 
- rtc: rtc@10590000 {
- compatible = "samsung,s3c6410-rtc";
- reg = <0x10590000 0x100>;
- @@ -641,3 +636,4 @@

#include "exynos7-pinctrl.dtsi"
+#include "arm/exynos-syscon-restart.dtsi"
--- linux-4.15.0.orig/arch/arm64/boot/dts/freescale/fsl-ls1012a.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/freescale/fsl-ls1012a.dtsi
@@ -164,6 +164,7 @@
 ranges = <0x0 0x00 0x1700000 0x100000>;
 reg = <0x00 0x1700000 0x0 0x100000>;
 interrupts = <GIC_SPI 75 IRQ_TYPE_LEVEL_HIGH>;
+dma-coherent;

sec_jr0: jr@10000 {
 compatible = "fsl,sec-v5.4-job-ring",
@@ -355,7 +356,7 @@
 status = "disabled";
 }

-dspi: dspi@2100000 {
+dspi: spi@2100000 {
 compatible = "fsl,ls1012a-dspi", "fsl,ls1021a-v1.0-dspi";
 #address-cells = <1>;
 #size-cells = <0>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/freescale/fsl-ls1043-post.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/freescale/fsl-ls1043-post.dtsi
@@ -21,6 +21,8 @@
&fman0 {
+ fsl,erratum-a050385;
+ /* these aliases provide the FMan ports mapping */
 enet0: ethernet@e0000 {
 }
--- linux-4.15.0.orig/arch/arm64/boot/dts/freescale/fsl-ls1043a-rdb.dts
+++ linux-4.15.0/arch/arm64/boot/dts/freescale/fsl-ls1043a-rdb.dts
@@ -155,12 +155,12 @@
 ethernet@e4000 {
 phy-handle = <&rgmii_phy1>;
-phy-connection-type = "rgmii-txid";
+phy-connection-type = "rgmii-id";
 }

 ethernet@e6000 {
 phy-handle = <&rgmii_phy2>;
-phy-connection-type = "rgmii-txid";
+phy-connection-type = "rgmii-id";

ethernet@e8000 {

--- linux-4.15.0.orig/arch/arm64/boot/dts/freescale/fsl-ls1043a.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/freescale/fsl-ls1043a.dtsi
@@ -219,6 +219,7 @@
ranges = <0x0 0x00 0x1700000 0x100000>;  
reg = <0x00 0x1700000 0x0 0x100000>;  
interrupts = <0 75 0x4>;  
+dma-coherent;

sec_jr0: jr@10000 {
compatible = "fsl,sec-v5.4-job-ring",  
@@ -266,7 +267,7 @@
interrupts = <0 43 0x4>;  
}

-qspi: quadspi@1550000 {
+qspi: spi@1550000 {
compatible = "fsl,ls1043a-qspi", "fsl,ls1021a-qspi";
#address-cells = <1>;  
#size-cells = <0>;  
@@ -395,7 +396,7 @@
ranges = <0x0 0x5 0x00000000 0x800000>;  
}

dspi0: dspi@2100000 {
+dspi0: spi@2100000 {
compatible = "fsl,ls1043a-dspi", "fsl,ls1021a-v1.0-dspi";
#address-cells = <1>;  
#size-cells = <0>;  
@@ -408,7 +409,7 @@
status = "disabled";
}

dspi1: dspi@2110000 {
+dspi1: spi@2110000 {
compatible = "fsl,ls1043a-dspi", "fsl,ls1021a-v1.0-dspi";
#address-cells = <1>;  
#size-cells = <0>;  
--- linux-4.15.0.orig/arch/arm64/boot/dts/freescale/fsl-ls1046a-rdb.dts
+++ linux-4.15.0/arch/arm64/boot/dts/freescale/fsl-ls1046a-rdb.dts
@@ -94,12 +94,12 @@
reg = <0x4c>;  
}

eeprom@52 {
+eeprom@56 {

compatible = "atmel,24c512";
reg = <0x52>;
}

-eprom@57 {
+eprom@53 {
compatible = "atmel,24c512";
reg = <0x53>;
}
@@ -162,12 +162,12 @@
&fman0 {
  ethernet@e4000 {
    phy-handle = <&rgmii_phy1>;
    -phy-connection-type = "rgmii";
    +phy-connection-type = "rgmii-id";
    }
  ethernet@e6000 {
    phy-handle = <&rgmii_phy2>;
    -phy-connection-type = "rgmii";
    +phy-connection-type = "rgmii-id";
    }
  ethernet@e8000 {
    --- linux-4.15.0.orig/arch/arm64/boot/dts/freescale/fsl-ls1046a.dtsi
    +++ linux-4.15.0/arch/arm64/boot/dts/freescale/fsl-ls1046a.dtsi
    @@ -203,7 +203,7 @@
      interrupts = <GIC_SPI 43 IRQ_TYPE_LEVEL_HIGH>;
    }

    -qspi: quadspi@1550000 {
    +qspi: spi@1550000 {
      compatible = "fsl,ls1021a-qspi";
      #address-cells = <1>;
      #size-cells = <0>;
      @@ -244,6 +244,7 @@
      ranges = <0x0 0x0 0x1700000 0x100000>;
      reg = <0x0 0x1700000 0x0 0x100000>;
      interrupts = <GIC_SPI 75 IRQ_TYPE_LEVEL_HIGH>;
      +dma-coherent;

    sec_jr0: jr@10000 {
      compatible = "fsl,sec-v5.4-job-ring";
      @@ -304,7 +305,7 @@
    dcfg: dcfg@1ee0000 {
      compatible = "fsl,ls1046a-dcfg", "syscon";
      -reg = <0x0 0x1ee0000 0x0 0x10000>;

+reg = <0x0 0x1ee0000 0x0 0x1000>;  
big-endian;  
};  

@@ -393,7 +394,7 @@  
};  
};  

-dspi: dspi@2100000 {  
+dspi: spi@2100000 {  
compatible = "fsl,ls1021a-v1.0-dspi";  
#address-cells = <1>;  
#size-cells = <0>;  
--- linux-4.15.0.orig/arch/arm64/boot/dts/freescale/fsl-ls208xa.dtsi  
+++ linux-4.15.0/arch/arm64/boot/dts/freescale/fsl-ls208xa.dtsi  
@@ -505,7 +505,7 @@  
mmu-masters = <&fsl_mc 0x300 0>;  
};  

-dspi: dspi@2100000 {  
+dspi: spi@2100000 {  
status = "disabled";  
compatible = "fsl,ls2080a-dspi", "fsl,ls2085a-dspi";  
#address-cells = <1>;  
@@ -515,7 +515,6 @@  
clocks = <&clockgen 4 3>;  
clock-names = "dspi";  
spi-num-chipselects = <5>;  
-bus-num = <0>;  
};  

esdhc: esdhc@2140000 {  
@@ -631,7 +630,7 @@  
3 0 0x5 0x20000000 0x00010000>;  
};  

-qspi: quadspi@20c0000 {  
+qspi: spi@20c0000 {  
status = "disabled";  
compatible = "fsl,ls2080a-qspi", "fsl,ls1021a-qspi";  
#address-cells = <1>;  
--- linux-4.15.0.orig/arch/arm64/boot/dts/hisilicon/hi3660-hikey960.dts  
+++ linux-4.15.0/arch/arm64/boot/dts/hisilicon/hi3660-hikey960.dts  
@@ -529,6 +529,17 @@  
status = "ok";  
compatible = "adi,adv7533";  
reg = <0x39>;  
+adi,dsi-lanes = <4>;  

+ports {
+  #address-cells = <1>;
+  #size-cells = <0>;
+  port@0 {
+    reg = <0>;
+  };
+  port@1 {
+    reg = <1>;
+  };
+};
+
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/hisilicon/hi6220-hikey.dts
+++ linux-4.15.0/arch/arm64/boot/dts/hisilicon/hi6220-hikey.dts
@@ -118,6 +118,7 @@
    reset-gpios = <&gpio0 5 GPIO_ACTIVE_LOW>;
    clocks = <&pmic>;
    clock-names = "ext_clock";
+    post-power-on-delay-ms = <10>;
    power-off-delay-us = <10>;
};

@@ -512,7 +513,7 @@
    reg = <0x39>;
    interrupt-parent = <&gpio1>;
    interrupts = <1 2>;
-    pd-gpio = <&gpio0 4 0>;
+    pd-gpios = <&gpio0 4 0>;
    adi,dsi-lanes = <4>;
    #sound-dai-cells = <0>;

--- linux-4.15.0.orig/arch/arm64/boot/dts/lg/lg1312.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/lg/lg1312.dtsi
@@ -168,14 +168,14 @@
    clock-names = "apb_pclk";
    status="disabled";
};
-    spi0: ssp@fe800000 {
+    spi0: spi@fe800000 {
        compatible = "arm.pl022", "arm.primecell";
        reg = <0x0 0xfe800000 0x1000>;
        interrupts = <GIC_SPI 3 IRQ_TYPE_LEVEL_HIGH>;
        clocks = <&clk_bus>;
        clock-names = "apb_pclk";
    }; 
-    spi1: ssp@fe900000 {
+    spi1: spi@fe900000 {
        ...
compatible = "arm.pl022", "arm.primecell";
reg = <0x0 0xfe900000 0x1000>;
interrupts = <GIC_SPI 4 IRQ_TYPE_LEVEL_HIGH>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/lg/lg1313.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/lg/lg1313.dtsi
@@ -168,14 +168,14 @@
clock-names = "apb_pclk";
status="disabled";
};
-spi0: ssp@fe800000 {
+spi0: spi@fe800000 {
compatible = "arm.pl022", "arm.primecell";
reg = <0x0 0xfe800000 0x1000>;
interrupts = <GIC_SPI 3 IRQ_TYPE_LEVEL_HIGH>;
@@ -52,6 +52,16 @@
model = "Globalscale Marvell ESPRESSoBin Board";
compatible = "globalscale,espressobin", "marvell,armada3720", "marvell,armada3710";
+aliases {
+ethernet0 = &eth0;
+ eth0; /* for dsa slave device */
+ethernet1 = &switch0port1;
+ethernet2 = &switch0port2;
+ethernet3 = &switch0port3;
+serial0 = &uart0;
+serial1 = &uart1;
+}

 chosen {
 stdout-path = "serial0:115200n8";
@@ -136,25 +146,25 @@
 #address-cells = <1>;
 #size-cells = <0>;
-port@0 {
+switch0port0: port@0 {
 reg = <0>;

label = "cpu";
ethernet = <&eth0>;
};

-port@1 {
+switch0port1: port@1 {
  reg = <1>;
  label = "wan";
  phy-handle = <&switch0phy0>;
};

-port@2 {
+switch0port2: port@2 {
  reg = <2>;
  label = "lan0";
  phy-handle = <&switch0phy1>;
};

-port@3 {
+switch0port3: port@3 {
  reg = <3>;
  label = "lan1";
  phy-handle = <&switch0phy2>;

--- linux-4.15.0.orig/arch/arm64/boot/dts/marvell/armada-37xx.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/marvell/armada-37xx.dtsi
@@ -135,7 +135,7 @@
  reg = <0x12000 0x200>;
+reg = <0x12000 0x18>;
  clocks = <&xtalclk>;
  interrupts =
  <GIC_SPI 11 IRQ_TYPE_LEVEL_HIGH>,
@@ -157,7 +157,8 @@
};

uart0: serial@12000 {
  compatible = "marvell,armada-3700-uart";
-  reg = <0x12000 0x200>;
+  reg = <0x12000 0x18>;
  clocks = <&xtalclk>;
};

nb_periph_clk: nb-periph-clk@13000 {
-  compatible = "marvell,armada-3700-periph-clock-nb";
+  compatible = "marvell,armada-3700-periph-clock-nb",
    "syscon";
  reg = <0x13000 0x100>;
  clocks = <&tbg 0>, <&tbg 1>, <&tbg 2>, <&tbg 3>, <&xtalclk>;
@@ -363,8 +364,15 @@
  #interrupt-cells = <1>;
  msi-parent = <&pcie0>;
  msi-controller;
ranges = <0x82000000 0xe8000000 /* Port 0 MEM */
- 0x81000000 0xe9000000 /* Port 0 IO */
+ /*
+ * The 128 MiB address range [0xe8000000-0xf0000000] is
+ * dedicated for PCIe and can be assigned to 8 windows
+ * with size a power of two. Use one 64 KiB window for
+ * IO at the end and the remaining seven windows
+ * (totaling 127 MiB) for MEM.
+ */
+ ranges = <0x82000000 0xe8000000 /* Port 0 MEM */
+ 0x81000000 0xefff0000 /* Port 0 IO */
interrupt-map-mask = <0 0 0 7>;
interrupt-map = <0 0 0 1 &pcie_intc 0>,
<0 0 0 2 &pcie_intc 1>
--- linux-4.15.0.orig/arch/arm64/boot/dts/marvell/armada-7040-db.dts
+++ linux-4.15.0/arch/arm64/boot/dts/marvell/armada-7040-db.dts
@@ -61,6 +61,12 @@
reg = <0x00x0 0x0 0x80000000>;
}
+aliases {
+ ethernet0 = &cpm_eth0;
+ ethernet1 = &cpm_eth1;
+ ethernet2 = &cpm_eth2;
+ }
+
+cpm_reg_usb3_0_vbus: cpm-usb3-0-vbus {
+ compatible = "regulator-fixed";
+ regulator-name = "usb3h0-vbus";
+ --- linux-4.15.0.orig/arch/arm64/boot/dts/marvell/armada-8040-db.dts
+++ linux-4.15.0/arch/arm64/boot/dts/marvell/armada-8040-db.dts
@@ -61,6 +61,13 @@
reg = <0x0 0x0 0x80000000>;
}
+aliases {
+ ethernet0 = &cpm_eth0;
+ ethernet1 = &cpm_eth2;
+ ethernet2 = &cps_eth0;
+ ethernet3 = &cps_eth1;
+ }
+
+cpm_reg_usb3_0_vbus: cpm-usb3-0-vbus {
+ compatible = "regulator-fixed";
+ regulator-name = "cpm-usb3h0-vbus";
+ --- linux-4.15.0.orig/arch/arm64/boot/dts/marvell/armada-8040-mcbin.dts
+++ linux-4.15.0/arch/arm64/boot/dts/marvell/armada-8040-mcbin.dts
@@ -61,6 +61,13 @@
reg = <0x0 0x0 0x80000000>;
}

reg = <0x0 0x0 0x0 0x80000000>
;

+aliases {
+ethernet0 = &cpm_eth0;
+ethernet1 = &cps_eth0;
+ethernet2 = &cps_eth1;
+};
+
/* Regulator labels correspond with schematics */
v_3_3: regulator-3-3v {
compatible = "regulator-fixed";
--- linux-4.15.0.orig/arch/arm64/boot/dts/marvell/armada-ap806.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/marvell/armada-ap806.dtsi
@@ -65,6 +65,23 @@
method = "acpi";
};

+reserved-memory {
+#address-cells = <2>;
+#size-cells = <2>;
+ranges;
+
+/*
+ * This area matches the mapping done with a
+ * mainline U-Boot, and should be updated by the
+ * bootloader.
+ */
+
+psci-area@4000000 {
+reg = <0x0 0x4000000 0x0 0x200000>;
+no-map;
+};
+
+ap806 {
+#address-cells = <2>;
#size-cells = <2>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/mediatek/mt7622-rfb1.dts
+++ linux-4.15.0/arch/arm64/boot/dts/mediatek/mt7622-rfb1.dts
@@ -13,8 +13,13 @@
model = "MediaTek MT7622 RFB1 board";
compatible = "mediatek,mt7622-rfb1", "mediatek,mt7622";

+aliases {
+serial0 = &uart0;
+};
+
chosen {
- bootargs = "console=ttyS0,115200n1";
+ stdout-path = "serial0:115200n8";
+ bootargs = "earlycon=uart8250,mmio32,0x11002000 swiotlb=512";
};

memory {
--- linux-4.15.0.orig/arch/arm64/boot/dts/mediatek/mt8173.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/mediatek/mt8173.dtsi
@@ -81,6 +81,7 @@
reg = <0x0000>
 enable-method = "psci"
 cpu-idle-states = <&CPU_SLEEP_0>
+ #cooling-cells = <2>
};

cpu1: cpu@1 {
 @@ -97,6 +98,7 @@
reg = <0x1000>
 enable-method = "psci"
 cpu-idle-states = <&CPU_SLEEP_0>
+ #cooling-cells = <2>
};

cpu3: cpu@101 {
 @@ -129,21 +131,21 @@
cpu_on = <0x84000003>
};

-clock26m: oscillator@0 {
+clock26m: oscillator0 {
 compatible = "fixed-clock"
#clock-cells = <0>
 clock-frequency = <26000000>
 clock-output-names = "clk26m"
};

-clock32k: oscillator@1 {
+clock32k: oscillator1 {
 compatible = "fixed-clock"
#clock-cells = <0>
 clock-frequency = <32000>
 clock-output-names = "clk32k"
};

-cpum_ck: oscillator@2 {
+cpum_ck: oscillator2 {
 compatible = "fixed-clock";
#clock-cells = <0>;
clock-frequency = <0>;
@@ -159,19 +161,19 @@
sustainable-power = <1500>; /* milliwatts */

trips {
    -threshold: trip-point@0 {
        +threshold: trip-point0 {
            temperature = <68000>;
            hysteresis = <2000>;
            type = "passive";
        };
    }
    -target: trip-point@1 {
        +target: trip-point1 {
            temperature = <85000>;
            hysteresis = <2000>;
            type = "passive";
        };
    }
    -cpu_crit: cpu_crit@0 {
        +cpu_crit: cpu_crit0 {
            temperature = <115000>;
            hysteresis = <2000>;
            type = "critical";
            @@ -179,12 +181,12 @@
        };
    }

    cooling-maps {
        -map@0 {
            +map0 {
                trip = <&target>;
                cooling-device = <&cpu0 0 0>;
                contribution = <3072>;
            };
            -map@1 {
                +map1 {
                    trip = <&target>;
                    cooling-device = <&cpu2 0 0>;
                    contribution = <1024>;
                    @@ -197,7 +199,7 @@
                    #address-cells = <2>;
                    #size-cells = <2>;
                    ranges:
                    -vpu_dma_reserved: vpu_dma_mem_region {
                        +vpu_dma_reserved: vpu_dma_mem_region@b7000000 {
                            compatible = "shared-dma-pool";
                            reg = <0 0xb7000000 0 0x500000>;
                        };
                    };
                }
            }
        }
    }
}
alignment = <0x1000>
@@ -249,7 +251,7 @@
reg = <0 0x10005000 0 0x1000>
};

-pio: pinctrl@0x10005000 {
+pio: pinctrl@0x1000b000 {
compatible = "mediatek,mt8173-pinctrl";
reg = <0 0x1000b000 0 0x1000>
mediatek,pctl-regmap = <&syscfg_pctl_a>
@@ -447,7 +449,7 @@
status = "disabled";
};

-gic: interrupt-controller@10220000 {
+gic: interrupt-controller@10221000 {
compatible = "arm,gic-400";
#interrupt-cells = <3>
interrupt-parent = <&gic>
@@ -1023,7 +1025,7 @@
<&mmsys CLK_MM_DSI1_DIGITAL>,
<&mipi_tx1>
clock-names = "engine", "digital", "hs";
-phy = <&mipi_tx1>
+phys = <&mipi_tx1>
phy-names = "dphy"
status = "disabled"
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/nvidia/tegra186-p3310.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/nvidia/tegra186-p3310.dtsi
@@ -46,7 +46,7 @@
compatible = "ethernet-phy-ieee802.3-c22"
reg = <0x0>
interrupt-parent = <&gpio>
-interrupts = <TEGRA_MAIN_GPIO(M, 5) IRQ_TYPE_LEVEL_HIGH>
+interrupts = <TEGRA_MAIN_GPIO(M, 5) IRQ_TYPE_LEVEL_LOW>
};
};
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/nvidia/tegra210-p2180.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/nvidia/tegra210-p2180.dtsi
@@ -282,6 +282,7 @@
status = "okay"
bus-width = <8>
non-removable;
+vqmmc-supply = <&vdd_1v8>
};
clocks {
    @ -307.7 +308.8 @
    regulator-max-microvolt = <1320000>;
    enable-gpios = <&pmic 6 GPIO_ACTIVE_HIGH>;
    regulator-ramp-delay = <80>;
    -regulator-enable-ramp-delay = <1000>;
    +regulator-enable-ramp-delay = <2000>;
    +regulator-settling-time-us = <160>;
};
};
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/nvidia/tegra210-p2597.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/nvidia/tegra210-p2597.dtsi
@@ -1584,7 +1584,7 @@
    regulator-min-microvolt = <5000000>;
    regulator-max-microvolt = <5000000>;
    -gpio = <&exp1 12 GPIO_ACTIVE_LOW>;
+++ linux-4.15.0/arch/arm64/boot/dts/nvidia/tegra210.dtsi
@@ -810,6 +810,7 @@
    <&tegra_car 128>, /* hda2hdmi */
    <&tegra_car 111>; /* hda2codec_2x */
    reset-names = "hda", "hda2hdmi", "hda2codec_2x";
    +power-domains = <&pd_sor>;
    status = "disabled";
};
@@ -1103,7 +1104,7 @@
compatible = "nvidia,tegra210-agic";
#interrupt-cells = <3>;
interrupt-controller;
    -reg = <0x702f9000 0x2000>,
    +reg = <0x702f9000 0x1000>,
        <0x702fa000 0x2000>;
interrupts = <GIC_SPI 102 (GIC_CPU_MASK_SIMPLE(4) | IRQ_TYPE_LEVEL_HIGH)>;
clocks = <&tegra_car TEGRA210_CLK_APE>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/apq8016-sbc-pmic-pins.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/qcom/apq8016-sbc-pmic-pins.dtsi
@@ -32,16 +32,15 @@
};

&&pm8916_mpps {
wcns@a21b000 {
status = "okay";
}
+
camera_vdddo_1v8: fixedregulator@0 {
+compatible = "regulator-fixed";
+regulator-name = "camera_vdddo";
+regulator-min-microvolt = <1800000>;
+regulator-max-microvolt = <1800000>;
+regulator-always-on;
+};
+
camera_vdda_2v8: fixedregulator@1 {
+compatible = "regulator-fixed";
+regulator-name = "camera_vdda";
+regulator-min-microvolt = <2800000>;
+regulator-max-microvolt = <2800000>;
+regulator-always-on;
+};
+
camera_vddd_1v5: fixedregulator@2 {
+compatible = "regulator-fixed";
+regulator-name = "camera_vddd";
+regulator-min-microvolt = <1500000>;
+regulator-max-microvolt = <1500000>;
+regulator-always-on;
+};
+
ci@1b0c000 {
+status = "ok";
+
camera_rear@3b {
+compatible = "ovti,ov5645";
+reg = <0x3b>;
+enable-gpios = <&msmgpio 34 GPIO_ACTIVE_HIGH>;
+reset-gpios = <&msmgpio 35 GPIO_ACTIVE_LOW>;
+pinctrl-names = "default";
+pinctrl-0 = <&camera_rear_default>;
+
clocks = <&gcc GCC_CAMSS_MCLK0_CLK>;
clock-names = "xclk";
clock-frequency = <23880000>;
+
vdddo-supply = <&camera_vdddo_1v8>;
vdda-supply = <&camera_vdda_2v8>;
vddd-supply = <&camera_vddd_1v5>;
+}
+status = "disabled";
+
+port {
+ov5645_ep: endpoint {
+clock-lanes = <1>;
+data-lanes = <0 2>;
+remote-endpoint = <&csiphy0_ep>;
+};
+};
+};
+
+camera_front@3a {
+compatible = "ovti,ov5645";
+reg = <0x3a>;
+
+enable-gpios = <&msmgpio 33 GPIO_ACTIVE_HIGH>;
+reset-gpios = <&msmgpio 28 GPIO_ACTIVE_LOW>;
+pinctrl-names = "default";
+pinctrl-0 = <&camera_front_default>;
+
+clocks = <&gcc GCC_CAMSS_MCLK1_CLK>;
+clock-names = "xclk";
+clock-frequency = <23880000>;
+
+vdddo-supply = <&camera_vdddo_1v8>;
+vdda-supply = <&camera_vdda_2v8>;
+vddd-supply = <&camera_vddd_1v5>;
+
+status = "disabled";
+
+port {
+ov5645_2_ep: endpoint {
+clock-lanes = <1>;
+data-lanes = <0 2>;
+remote-endpoint = <&csiphy1_ep>;
+};
+};
+};
+
+camss@1b00000 {
+status = "ok";
+
+ports {
+#address-cells = <1>;
+#size-cells = <0>;
+port@0 {
+reg = <0>;
+csiphy0_ep: endpoint {

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clock-lanes = <1>;
data-lanes = <0 2>;
remote-endpoint = <&ov5645_ep>;
status = "disabled";

port@1 {
  reg = <1>;
csiphy1_ep: endpoint {
    clock-lanes = <1>;
data-lanes = <0 2>;
    remote-endpoint = <&ov5645_2_ep>;
    status = "disabled";
  };
}

usb2513 {
  regulator-min-microvolt = <1750000>;
  regulator-max-microvolt = <3337000>;
  regulator-allow-set-load;
  regulator-system-load = <200000>;
};

l11 {
  regulator-min-microvolt = <1750000>;
  regulator-max-microvolt = <3337000>;
  regulator-allow-set-load;
  regulator-system-load = <200000>;
};

l12 {
  pm8994_mpps {
    pm8994_mpp2_wifi_led: mpp2-wifi-led-active {
      pins = "mpp2";
      function = "sink";
      output-low;
      qcom,dtest = <1>;
    };
    pm8994_mpp4_BT_led: mpp4-wifi-led-active {
      pins = "mpp4";
      function = "sink";
    };
  }
};
+ output-low;
+ qcom,dtest = <2>;
+ *);
+ *};
+ &pmi8994_mpps {
+ pmi8994_mpp2_userled4: mpp2-userled4 {
+ pins = "mpp2";
+ function = "sink";
+ + output-low;
+ qcom,dtest = <4>;
+ *};
+ *};

--- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/apq8096-db820c.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/qcom/apq8096-db820c.dtsi
@@ -284,6 +284,8 @@
 l21 {
 regulator-min-microvolt = <2950000>;
 regulator-max-microvolt = <2950000>;
+ regulator-allow-set-load;
+ regulator-system-load = <200000>;
 }; l22 {
 regulator-min-microvolt = <3300000>;
@@ -326,4 +328,78 @@
 }; };
 ]; ]; ]; ]; ];
+ &spmi_bus {
+ pmic@1 {
+ lpg {
+ status = "okay";
+ + qcom,dtest = <1 2>,
+ + <2 2>,
+ + <0 0>,
+ + <0 0>,
+ + <0 0>,
+ + <0 0>;
+ + pinctrl-names = "default";
+ pinctrl-0 = <&pm8994_mpp2_wifi_led>, <&pm8994_mpp4_bt_led>;
+ + wifi-led {
+led-sources = <1>;
+linux.default-trigger = "phy0tx";
+default-state = "off";
+
+bt-led {
+led-sources = <2>;
+linux.default-trigger = "hci0-power";
+default-state = "off";
+}
+
+pmic@3 {
+lpg@b100 {
+qcom.power-source = <1>;
+
+qcom.dtest = <0 0>,
+  <0 0>,
+  <0 0>,
+  <4 1>;
+
+pinctrl-names = "default";
+pinctrl-0 = <&pmi8994_mpp2_userled4>;
+
+status = "okay";
+
+user0 {
+led-sources = <2>;
+
+label = "db820c:green:user0";
+default-state = "on";
+linux.default-trigger = "heartbeat";
+}
+
+user1 {
+led-sources = <1>;
+
+label = "db820c:green:user1";
+}
+
+user2 {
+led-sources = <3>;
+
+label = "db820c:green:user2";
+}
+
+user3 {
led-sources = <4>
label = "db820c:green:user3"
qcom,dtest = <4 1>
};
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/ipq8074-hk01.dts
+++ linux-4.15.0/arch/arm64/boot/dts/qcom/ipq8074-hk01.dts
@@ -27,7 +27,7 @@
stdout-path = "serial0"
];

-memory {
+memory@40000000 {
  device_type = "memory";
  reg = <0x0 0x40000000 0x0 0x20000000>;
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/msm8916-pins.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/qcom/msm8916-pins.dtsi
@@ -542,7 +542,7 @@
pins = "gpio63", "gpio64", "gpio65", "gpio66",
       "gpio67", "gpio68";
  drive-strength = <8>
+bias-disable;
- bias-pull-none;
};
};
cdc_pdm_lines_sus: pdm_lines_off {
@@ -555,7 +555,7 @@
pins = "gpio63", "gpio64", "gpio65", "gpio66",
       "gpio67", "gpio68";
  drive-strength = <2>
+bias-disable;
- bias-pull-down;
};
};
@@ -571,7 +571,7 @@
pins = "gpio113", "gpio114", "gpio115",
       "gpio116";
  drive-strength = <8>
+bias-disable;
- bias-pull-none;
};
};
pinconf {
  pins = "gpio110";
drive-strength = <8>;
 .bias-pull-none;
  +bias-disable;
};

pinconf {
  pins = "gpio116";
drive-strength = <8>;
 .bias-pull-none;
  +bias-disable;
};

ext_mclk_tlmm_lines_sus: mclk_lines_off {
  pins = "gpio112", "gpio117", "gpio118", "gpio119";
drive-strength = <8>;
  .bias-pull-none;
  .bias-disable;
};

ext_sec_tlmm_lines_sus: tlmm_lines_off {
  pins = "gpio29", "gpio30";
drive-strength = <16>;
  .bias-disable;
};

cci_lines {
  cci0_default: cci0_default {
    pinmux {
      function = "cci_i2c";
      pins = "gpio29", "gpio30";
    }
    pinconf {
      pins = "gpio29", "gpio30";
      drive-strength = <16>;
      bias-disable;
    }
  }
  +camera_front_default: camera_front_default {

+pinmux_pwdn {
+function = "gpio";
+pins = "gpio33";
+};
+pinconf_pwdn {
+pins = "gpio33";
+drive-strength = <16>;
+bias-disable;
+};
+
+pinmux_rst {
+function = "gpio";
+pins = "gpio28";
+};
+pinconf_rst {
+pins = "gpio28";
+drive-strength = <16>;
+bias-disable;
+};
+
+pinmux_mclk1 {
+function = "cam_mclk1";
+pins = "gpio27";
+};
+pinconf_mclk1 {
+pins = "gpio27";
+drive-strength = <16>;
+bias-disable;
+};
+
+camera_rear_default: camera_rear_default {
+pinmux_pwdn {
+function = "gpio";
+pins = "gpio34";
+};
+pinconf_pwdn {
+pins = "gpio34";
+drive-strength = <16>;
+bias-disable;
+};
+
+pinmux_rst {
+function = "gpio";
+pins = "gpio35";
+};
+pinconf_rst {
+pins = "gpio35";
+drive-strength = <16>;
+bias-disable;
+};
+
+pinmux_mclk0 {
+function = "cam_mclk0";
+pins = "gpio26";
+};
+pinconf_mclk0 {
+pins = "gpio26";
+drive-strength = <16>;
+bias-disable;
+};
+};
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/msm8916.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/qcom/msm8916.dtsi
@@ -15,6 +15,7 @@
#include <dt-bindings/clock/qcom,gcc-msm8916.h>
#include <dt-bindings/reset/qcom,gcc-msm8916.h>
#include <dt-bindings/clock/qcom,rpmcc.h>
+#include <dt-bindings/thermal/thermal.h>

/ {
    model = "Qualcomm Technologies, Inc. MSM8916";
    @ @ -63,7 +64,7 @@
    no-map;
};

reserved@8668000 {
+reserved@86680000 {
    reg = <0x0 0x86680000 0x0 0x80000>; no-map;
};
@@ -76,7 +77,7 @@
    qcom,client-id = <1>;
};

-rfsa@867e00000 {
+rfsa@867e0000 {
    reg = <0x0 0x867e0000 0x0 0x20000>; no-map;
};
@@ -113,6 +114,14 @@
    next-level-cache = <&L2_0>;
    enable-method = "psci";
    cpu-idle-states = <&CPU_SPC>;
+clocks = <&apcs 0>;

CPU1: cpu@1 {
    next-level-cache = &L2_0;
    enable-method = "psci";
    cpu-idle-states = &CPU_SPC;
    clocks = &apcs 0;
    clock-latency = <200000>;
    cpu-supply = &pm8916_spmi_s2;
    operating-points-v2 = &cpu_opp_table;
    /* cooling options */
    cooling-min-level = <0>;
    cooling-max-level = <7>;
    #cooling-cells = <2>;
};

CPU2: cpu@2 {
    next-level-cache = &L2_0;
    enable-method = "psci";
    cpu-idle-states = &CPU_SPC;
    clocks = &apcs 0;
    clock-latency = <200000>;
    cpu-supply = &pm8916_spmi_s2;
    operating-points-v2 = &cpu_opp_table;
    /* cooling options */
    cooling-min-level = <0>;
    cooling-max-level = <7>;
    #cooling-cells = <2>;
};

CPU3: cpu@3 {
    next-level-cache = &L2_0;
    enable-method = "psci";
    cpu-idle-states = &CPU_SPC;
    clocks = &apcs 0;
    clock-latency = <200000>;
    cpu-supply = &pm8916_spmi_s2;
    operating-points-v2 = &cpu_opp_table;
+/* cooling options */
+cooling-min-level = <0>;
+cooling-max-level = <7>;
+#cooling-cells = <2>;
};

L2_0: l2-cache {
@@ -164,6 +197,21 @@
method = "smc";
};

+/*
+ * The CPR driver reads the initial voltage settings in efuse
+ * and populates OPPs.
+ */
+cpu_opp_table: opp_table0 {
+compatible = "operating-points-v2";
+opp-shared;
+
+opp00 {
+opp-hz = /bits/ 64 <200000000>;
+opp-microvolt = <1050000>;
+clock-latency-ns = <200000>;
+};
+};
+
+pmu {
compatible = "arm,cortex-a53-pmu";
interrupts = <GIC PPI 7 GIC_CPU MASK SIMPLE(4)>;
@@ -188,6 +236,13 @@
type = "critical";
};
};
+
+cooling-maps {
+map0 {
+trip = <&cpu_alert0>;
+cooling-device = <&CPU0 THERMAL NO LIMIT THERMAL NO LIMIT>;
+};
+};
};

cpu-thermal1 {
@@ -208,6 +263,13 @@
type = "critical";
};
};
+
+cooling-maps {
+map0 {
+trip = <&cpu_alert1>;
+cooling-device = <&CPU0 THERMAL_NO_LIMIT THERMAL_NO_LIMIT>;
+};
+};
};
@@ -326,9 +388,18 @@
status = "disabled";
};

-apcs: syscon@b011000 {
-compatible = "syscon";
-reg = <0xb011000 0x1000>;
+a53pll: clock@b016000 {
+compatible = "qcom,msm8916-a53pll";
+reg = <0xb016000 0x40>;
+#clock-cells = <0>;
+};
+
+apcs: mailbox@b011000 {
+compatible = "qcom,msm8916-apcs-kpss-global", "syscon";
+reg = <0xb011000 0x1000>;
+#mbox-cells = <1>;
+clocks = <&a53pll>;
+#clock-cells = <0>;
};

blsp1_uart2: serial@78b0000 {
@@ -727,6 +798,13 @@
clock-names = "iface", "bus";
qcom,iommu-secure-id = <17>;

+// vfe:
+iommu-ctx@3000 {
+compatible = "qcom,msm-iommu-v1-sec";
+reg = <0x3000 0x1000>;
+interrupts = <GIC_SPI 70 IRQ_TYPE_LEVEL_HIGH>;
+};
+
+// mdp_0:
+iommu-ctx@4000 {
+compatible = "qcom,msm-iommu-v1-ns";
@@ -823,7 +901,7 @@
reg-names = "mdp_phys";
interrupt-parent = <&mdss>;
-interrupts = <0 0>;
+interrupts = <0>;

clocks = <&gcc GCC_MDSS_AHB_CLK>,
<&gcc GCC_MDSS_AXI_CLK>,
@@ -855,7 +933,7 @@
reg-names = "dsi_ctrl";

interrupt-parent = <&mdss>;
-interrupts = <4 0>;
+interrupts = <4>;

assigned-clocks = <&gcc BYTE0_CLK_SRC>,
<&gcc PCLK0_CLK_SRC>;
@@ -906,6 +984,7 @@
"dsi_phy_regulator";

#clock-cells = <1>;
+##phy-cells = <0>;

clocks = <&gcc GCC_MDSS_AHB_CLK>;
clock-names = "iface_clk";
@@ -1136,14 +1215,131 @@
port@0 {
  reg = <0>;
  -etf_out: endpoint {
+etf_in: endpoint {
    slave-mode;
    remote-endpoint = <&funnel0_out>;
  };
  };
port@1 {
  reg = <0>;
  -etf_in: endpoint {
+etf_out: endpoint {
    remote-endpoint = <&replicator_in>;
  };
  };
  @@ -1330,6 +1409,131 @@
compatible = "venus-encoder";
  };
  +
  +uqfprom: eeprom@58000 {
    +compatible = "qcom,qfprom msm8916";
    +reg = <0x580000x7000>;}
+); +
+cpr@b018000 {
+compatible = "qcom,cpr";
+reg = <0xb018000 0x1000>;
+interrupts = <0 15 1>, <0 16 1>, <0 17 1>;
+vdd-mux-supply = <&pm8916_l3>;
+acc-syscon = <&tcsr>;
+eeprom = <&uqfprom>;
+
+qcom,cpr-ref-clk = <19200>;
+qcom,cpr-timer-delay-us = <5000>;
+qcom,cpr-timer-cons-up = <0>;
+qcom,cpr-timer-cons-down = <2>;
+qcom,cpr-up-threshold = <0>;
+qcom,cpr-down-threshold = <2>;
+qcom,cpr-idle-clocks = <15>;
+qcom,cpr-gcnt-us = <1>;
+qcom,vdd-apc-step-up-limit = <1>;
+qcom,vdd-apc-step-down-limit = <1>;
+qcom,cpr-cpus = <&CPU0 &CPU1 &CPU2 &CPU3>;
+}; +
+cci: cci@1b0c000 {
+compatible = "qcom,cci-v1.0.8";
+#address-cells = <1>;
+#size-cells = <0>;
+reg = <0xb0c000 0x1000>;
+interrupts = <GIC_SPI 50 IRQ_TYPE_EDGE_RISING>;
+clocks = <&gcc GCC_CAMSS_TOP_AHB_CLK>,
+<&gcc GCC_CAMSS_CCI_AHB_CLK>,
+<&gcc GCC_CAMSS_CCI_CLK>,
+<&gcc GCC_CAMSS_AHB_CLK>;
+clock-names = "camss_top_ahb",
+"cci_ahb",
+"cci",
+"camss_ahb";
+pinctrl-names = "default";
+pinctrl-0 = <&cci0_default>;
+status = "disabled";
+}; +
+camss: camss@1b00000 {
+compatible = "qcom,msm8916-camss";
+reg = <0xb0ac00 0x200>,
+<0xb00030 0x4>,
+<0xb0b000 0x200>,
+<0xb00038 0x4>,

+<0x1b08000 0x100>,
+<0x1b02800 0x100>,
+<0x1b0a000 0x500>,
+<0x1b00020 0x10>,
+<0x1b10000 0x1000>;
+reg-names = "csiphy0",
+"csiphy0_clk_mux",
+"csiphy1",
+"csiphy1_clk_mux",
+"csid0",
+"csid1",
+"ispif",
+"csi_clk_mux",
+"vfe0";
+interrupts = <GIC_SPI 78 0>,
+<GIC_SPI 79 0>,
+<GIC_SPI 51 0>,
+<GIC_SPI 52 0>,
+<GIC_SPI 55 0>,
+<GIC_SPI 57 0>;
+interrupt-names = "csiphy0",
+"csiphy1",
+"csid0",
+"csid1",
+"ispif",
+"vfe0";
+power-domains = <&gcc VFE_GDSC>;
+clocks = <&gcc GCC_CAMSS_TOP_AHB_CLK>,
+<&gcc GCC_CAMSS_ISPIF_AHB_CLK>,
+<&gcc GCC_CAMSS_CSI0PHYTIMER_CLK>,
+<&gcc GCC_CAMSS_CSI1PHYTIMER_CLK>,
+<&gcc GCC_CAMSS_CSI0_AHB_CLK>,
+<&gcc GCC_CAMSS_CSI0_CLK>,
+<&gcc GCC_CAMSS_CSI0PHY_CLK>,
+<&gcc GCC_CAMSS_CSI0PIX_CLK>,
+<&gcc GCC_CAMSS_CSI0RDI_CLK>,
+<&gcc GCC_CAMSS_CSI1_AHB_CLK>,
+<&gcc GCC_CAMSS_CSI1_CLK>,
+<&gcc GCC_CAMSS_CSI1PHY_CLK>,
+<&gcc GCC_CAMSS_CSI1PIX_CLK>,
+<&gcc GCC_CAMSS_CSI1RDI_CLK>,
+<&gcc GCC_CAMSS_CSI1_AHB_CLK>,
+<&gcc GCC_CAMSS_CSI1_RDI_CLK>,
+<&gcc GCC_CAMSS_CSI1_PHY_CLK>,
+<&gcc GCC_CAMSS_CSI1_PIX_CLK>,
+<&gcc GCC_CAMSS_CSI1RDI_CLK>,
+<&gcc GCC_CAMSS_AHB_CLK>,
+<&gcc GCC_CAMSS_VFE0_CLK>,
+<&gcc GCC_CAMSS_VFE1_AHB_CLK>,
+<&gcc GCC_CAMSS_VFE_AXI_CLK>;
"csiphy0_timer",
"csiphy1_timer",
"csi0_ahb",
"csi0",
"csi0_phy",
"csi0_pix",
"csi0_rdi",
"csi1_ahb",
"csi1",
"csi1_phy",
"csi1_pix",
"csi1_rdi",
"camss_ahb",
"camss_vfe_vfe",
"camss_csi_vfe",
"iface",
"bus";
+vdda-supply = <&pm8916_l2>;
+iommus = <&apps_iommu 3>;
+status = "disabled";
+ports {
+#address-cells = <1>;
+#size-cells = <0>;
+};
+}
];

smd {
@@ -1435,8 +1639,8 @@
#address-cells = <1>;
#size-cells = <0>;

-qcom.ipc-1 = <&apcs 0 13>;
-qcom.ipc-6 = <&apcs 0 19>;
+qcom/ipc-1 = <&apcs 8 13>;
+qcom/ipc-3 = <&apcs 8 19>;

apps_smms: apps@0 {
  reg = <0>;
  --- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/msm8996-pins.dtsi
  +++ linux-4.15.0/arch/arm64/boot/dts/qcom/msm8996-pins.dtsi
  @ @ -495.4 +495.18 @ @
  bias-disable;
  ];
};
+
cci_lines {
+cci0_default: cci0_default {
+pinnmux {
+function = "cci_i2c";
+pins = "gpio17", "gpio18";
+};
+pinconf {
+pins = "gpio17", "gpio18";
+drive-strength = <16>;
+bias-disable;
+};
+};
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/msm8996.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/qcom/msm8996.dtsi
@@ -372,7 +372,7 @@
};
intc: interrupt-controller@9bc0000 {
-compatibility = "arm,gic-v3";
+compatible = "qcom,msm8996-gic-v3", "arm,gic-v3";
#interrupt-cells = <3>;
interrupt-controller;
#redistributor-regions = <1>;
@@ -497,8 +497,8 @@
blsp2_spi5: spi@75ba000{
 compatible = "qcom.spi-qup-v2.2.1";
 reg = <0x075ba000 0x600>;
-interrupts = <GIC_SPI 107 IRQ_TYPE_LEVEL_HIGH>;
-clocks = <&gcc GCC_BLSP2_QUP5_SPI_APPS_CLK>,
+interrupts = <GIC_SPI 106 IRQ_TYPE_LEVEL_HIGH>;
+clocks = <&gcc GCC_BLSP2_QUP6_SPI_APPS_CLK>,
 <&gcc GCC_BLSP2_AHB_CLK>;
 clock-names = "core", "iface";
 pinctrl-names = "default", "sleep";
@@ -801,6 +801,8 @@
 interrupts = <0 138 0>;
 phys = <&hsusb_phy2>;
 phy-names = "usb2-phy";
+snps.dis_u2_susphy_quirk;
+snps.dis_enblslpm_quirk;
};
}

@@ -830,6 +832,8 @@
 interrupts = <0 131 0>;
 phys = <&hsusb_phy1>, <&ssusb_phy_0>;
 phy-names = "usb2-phy", "usb3-phy";
+snps.dis_u2_susphy_quirk;

+snps.dis_enblslpm_quirk;
];
];

@@ -998,6 +1002,26 @@
"bus_slave";
];
];
+
+cci: cci@a0c000 {
+compatible = "qcom,cci-v1.4.0";
+#address-cells = <1>;
+#size-cells = <0>;
+reg = <0xa0c000 0x1000>;
+interrupts = <GIC_SPI 295 IRQ_TYPE_EDGE_RISING>;
+power-domains = <&mmcc CAMSS_GDSC>;
+clocks = <&mmcc CAMSS_TOP_AHB_CLK>,
+<&mmcc CAMSS_CCI_AHB_CLK>,
+<&mmcc CAMSS_CCI_CLK>,
+<&mmcc CAMSS_AHB_CLK>;
+clock-names = "camss_top_ahb",
+"cci_ahb",
+"cci",
+"camss_ahb";
+pinctrl-names = "default";
+pinctrl-0 = <&cci0_default>;
+status = "disabled";
+
};
]

adsp-pil {
--- linux-4.15.0.orig/arch/arm64/boot/dts/qcom/pm8916.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/qcom/pm8916.dtsi
@@ -97,9 +97,17 @@
#address-cells = <1>;
#size-cells = <0>;

+pm8916_pwm: pwm@bc00 {
+compatible = "qcom,pm8916-pwm";
+
+#pwm-cells = <2>;
+
+status = "disabled";
+
};
+

          wcd_codec: codec@f000 {
            compatible = "qcom,pm8916-wcd-analog-codec";
-            reg = <0xf000 0x200>;
+

reg = <0xf000>
reg-names = "pmic-codec-core"
clocks = <&gcc GCC_CODEC_DIGCODEC_CLK>
clock-names = "mclk"

};

+regulators {
+compatible = "qcom,pm8916-regulators"
+#address-cells = <1>
+#size-cells = <1>
+
+s1@1400 {
+reg = <0x1400 0x300>
+status = "disabled"
+}
+
+pm8916_spmi_s2: s2@1700 {
+reg = <0x1700 0x300>
+status = "ok"
+regulator-min-microvolt = <1050000>
+regulator-max-microvolt = <1350000>
+regulator-always-on
+
+s3@1a00 {
+reg = <0x1a00 0x300>
+status = "disabled"
+}
+
+s4@1d00 {
+reg = <0x1d00 0x300>
+status = "disabled"
+}
+
+l1@4000 {
+reg = <0x4000 0x100>
+status = "disabled"
+}
+
+l2@4100 {
+reg = <0x4100 0x100>
+status = "disabled"
+}
+
+l3@4200 {
+reg = <0x4200 0x100>
status = "disabled";
+};
+
+14@4300 {
+reg = <0x4300 0x100>;
+status = "disabled";
+};
+
+15@4400 {
+reg = <0x4400 0x100>;
+status = "disabled";
+};
+
+16@4500 {
+reg = <0x4500 0x100>;
+status = "disabled";
+};
+
+17@4600 {
+reg = <0x4600 0x100>;
+status = "disabled";
+};
+
+18@4700 {
+reg = <0x4700 0x100>;
+status = "disabled";
+};
+
+19@4800 {
+reg = <0x4800 0x100>;
+status = "disabled";
+};
+
+110@4900 {
+reg = <0x4900 0x100>;
+status = "disabled";
+};
+
+111@4a00 {
+reg = <0x4a00 0x100>;
+status = "disabled";
+};
+
+112@4b00 {
+reg = <0x4b00 0x100>;
+status = "disabled";
+};
+
@@ -26,6 +26,17 @@
+<2 0xc8 0 IRQ_TYPE_NONE>,
+<2 0xc9 0 IRQ_TYPE_NONE>;
+			compatible = "qcom,pm8994-mpp";
+reg = <0xa000>;
+gpio-controller;
+#gpio-cells = <2>;
+interrupts = <0 0xa0 0 IRQ_TYPE_NONE>,
+  <0 0xa1 0 IRQ_TYPE_NONE>,
+  <0 0xa2 0 IRQ_TYPE_NONE>,
+  <0 0xa3 0 IRQ_TYPE_NONE>;
+		};
+	}
+pmic@3 {
+@@ -33,5 +44,11 @@
+reg = <0x3 SPMI_USID>;
+#address-cells = <1>;
+#size-cells = <0>;
+  +
+lpg@b100 {
+compatible = "qcom,pmi8994-lpg";
+  +
+status = "disabled";
+  +};
+};
+};

--- linux-4.15.0.orig/arch/arm64/boot/dts/renesas/r8a7796.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/renesas/r8a7796.dtsi
@@ -953,6 +953,9 @@
<&cpg CPG_CORE R8A7796_CLK_S3D1>,
<&scif_clk>;
  clock-names = "fck", "brg_int", "scif_clk";
  +dmas = <&dmac1 0x13>, <&dmac1 0x12>,
  + <&dmac2 0x13>, <&dmac2 0x12>;
  +dma-names = "tx", "rx", "tx", "rx";
  power-domains = <&sysc R8A7796_PD_ALWAYS_ON>;
resets = <&cpg 310>;
  status = "disabled";
--- linux-4.15.0.orig/arch/arm64/boot/dts/renesas/salvator-common.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/renesas/salvator-common.dtsi
@@ -93,20 +93,12 @@

regulator-always-on;
-rsnd_ak4613: sound {
-compatible = "simple-audio-card";
+sound_card: sound {
+compatible = "audio-graph-card";

-sound_card,format = "left_j";
-sound_card,bitclock-master = &sndcpu;
-sound_card,frame-master = &sndcpu;
+label = "rcar-sound";

-sndcpu: simple-audio-card,cpu {
+sound_card = &rcar_sound;
-
-
-sndcodec: simple-audio-card,codec {
+sound_card = &ak4613;
-
+\dais = &rsnd_port0;
+}

vbus0_usb2: regulator-vbus0-usb2 {
@@ -263,6 +255,7 @@
reg = <0>;
interrupt-parent = &gpio2;
interrupts = <11 IRQ_TYPE_LEVEL_LOW>;
+reset-gpios = &gpio2 10 GPIO_ACTIVE_LOW>;
}
}
@@ -320,6 +313,12 @@
asahi-kasei,out4-single-end;
asahi-kasei,out5-single-end;
asahi-kasei,out6-single-end;
+
+\port {
+ak4613_endpoint: endpoint {
+remote-endpoint = &rsnd_endpoint0;
+}
+
+}

cs2000: clk_multiplier@4f {
@@ -543,10 +542,18 @@
<&audio_clk_c>,
<&cpg CPG_CORE CPG_AUDIO_CLK_I>;

-rcar_sound,dai {
-dai0 {

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-playback = <&ssi0 &src0 &dvc0>
-capture = <&ssi1 &src1 &dvc1>

+ports {
  +rsnd_port0: port@0 {
    +rsnd_endpoint0: endpoint {
      +remote-endpoint = <&ak4613_endpoint>; +
      +dai-format = "left_j";
      +bitclock-master = <&rsnd_endpoint0>; +
      +frame-master = <&rsnd_endpoint0>; +
      +playback = <&ssi0 &src0 &dvc0>; +
      +capture = <&ssi1 &src1 &dvc1>; +
    }
  }
};
;
;
--- linux-4.15.0.orig/arch/arm64/boot/dts/renesas/ulcb.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/renesas/ulcb.dtsi
@@ -400,6 +400,7 @@
  bus-width = <8>;
  mmc-hs200-1_8v;
  non-removable;
  +full-pwr-cycle-in-suspend;
  status = "okay";
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3328-evb.dts
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3328-evb.dts
@@ -123,13 +123,13 @@
  assigned-clock-rate = <50000000>;
  assigned-clocks = <&cru SCLK_MAC2PHY>;
  assigned-clock-parents = <&cru SCLK_MAC2PHY_SRC>;
-  +status = "okay";
};

&i2c1 {
  status = "okay";

  -rk805: rk805@18 {
    +rk805: pmic@18 {
      compatible = "rockchip,rk805";
      reg = <0x18>;
      interrupt-parent = <&gpio2>;
-      --- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3328-rock64.dts
-      +++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3328-rock64.dts
-      @@ -77,17 +77,18 @@
pinctrl-0 = <&usb30_host_drv>;
regulator-name = "vcc_host_5v";
regulator-always-on;
+regulator-boot-on;
vin-supply = <&vcc_sys>;
};

vcc_host1_5v: vcc_otg_5v: vcc-host1-5v-regulator {
compatible = "regulator-fixed";
-enable-active-high;
-gpio = <&gpio0 RK_PD3 GPIO_ACTIVE_HIGH>;
+gpio = <&gpio0 RK_PA2 GPIO_ACTIVE_LOW>;
pinctrl-names = "default";
pinctrl-0 = <&usb20_host_drv>;
regulator-name = "vcc_host1_5v";
regulator-always-on;
+regulator-boot-on;
vin-supply = <&vcc_sys>;
};

@@ -138,18 +139,19 @@
phy-mode = "rgmii";
pinctrl-names = "default";
intrrupt-parent = <&gpio2>;
@@ -276,7 +278,7 @@
usb2 {
usb20_host_drv: usb20-host-drv {
-rockchip.pins = <0 RK_PD3 RK_FUNC_GPIO &pcfg_pull_none>;
}
+rockchip,pins = <0 RK_PA2 RK_FUNC_GPIO &pcfg_pull_none>
];
};

--- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3328.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3328.dtsi
@@ -289,13 +289,13 @@
  #address-cells = <1>
  #size-cells = <0>

-pd_hevc@RK3328_PD_HEVC {
+power-domain@RK3328_PD_HEVC {
  reg = <RK3328_PD_HEVC>
};
-pd_video@RK3328_PD_VIDEO {
+power-domain@RK3328_PD_VIDEO {
  reg = <RK3328_PD_VIDEO>
};
-pd_vpu@RK3328_PD_VPU {
+power-domain@RK3328_PD_VPU {
  reg = <RK3328_PD_VPU>
};
@@ -331,7 +331,7 @@
  reg = <0x0 0xff120000 0x0 0x100>
  interrupts = <GIC_SPI 56 IRQ_TYPE_LEVEL_HIGH>
  clocks = <&cru SCLK_UART1>, <&cru PCLK_UART1>
-  clock-names = "sclk_uart", "pclk_uart"
+  clock-names = "baudclk", "apb_pclk"
  dma = <&dmac 4>, <&dmac 5>
  #dma-cells = <2>
  pinctrl-names = "default"
@@ -683,8 +683,9 @@
  reg = <0x0 0xff120000 0x0 0x100>
  interrupts = <GIC_SPI 12 IRQ_TYPE_LEVEL_HIGH>
  clocks = <&cru HCLK_SDMMC>, <&cru SCLK_SDMMC>,
-    <&cru SCLK_SDMMC_DRV>, <&cru SCLK_SDMMC_SAMPLE>
+    <&cru SCLK_SDMMC_DRV>, <&cru SCLK_SDMMC_SAMPLE>
    -clock-names = "biu", "ciu", "ciu_drv", "ciu_sample"
+    clock-names = "biu", "ciu", "ciu-drive", "ciu-sample"
    fifo-depth = <0x100>
    +max-frequency = <150000000>
    status = "disabled"
};

@@ -694,8 +695,9 @@
  reg = <0x0 0xff120000 0x0 0x100>
  interrupts = <GIC_SPI 13 IRQ_TYPE_LEVEL_HIGH>
  clocks = <&cru HCLK_SDIO>, <&cru SCLK_SDIO>,
-    <&cru SCLK_SDIO_DRV>, <&cru SCLK_SDIO_SAMPLE>
+    <&cru SCLK_SDIO_DRV>, <&cru SCLK_SDIO_SAMPLE>
    -clock-names = "biu", "ciu", "ciu_drv", "ciu_sample"

interrupts = <GIC_SPI 14 IRQ_TYPE_LEVEL_HIGH>;
clocks = <&cru HCLK_EMMC>, <&cru SCLK_EMMC>, 
     <&cru SCLK_EMMC_DRV>, <&cru SCLK_EMMC_SAMPLE>;
clock-names = "biu", "ciu", "ciu_drv", "ciu_sample";
+clock-names = "biu", "ciu", "ciu-drive", "ciu-sample";
fifo-depth = <0x100>;
+max-frequency = <150000000>;
status = "disabled";
};
@
@@ -705,8 +707,9 @@
@@ -1059,8 +1062,8 @@

uart0 {
    uart0_xfer: uart0-xfer {
        -rockchip.pins = <1 RK_PB1 1 &pcfg_pull_up>,
        -<1 RK_PB0 1 &pcfg_pull_none>;
        +rockchip.pins = <1 RK_PB1 1 &pcfg_pull_none>,
        +<1 RK_PB0 1 &pcfg_pull_up>;
    }
    uart0_cts: uart0-cts {
        @@ -1078,8 +1081,8 @@

uart1 {
    uart1_xfer: uart1-xfer {
        -rockchip.pins = <3 RK_PA4 4 &pcfg_pull_up>,
        -<3 RK_PA6 4 &pcfg_pull_none>;
        +rockchip.pins = <3 RK_PA4 4 &pcfg_pull_none>,
        +<3 RK_PA6 4 &pcfg_pull_up>;
    }
    uart1_cts: uart1-cts {
        @@ -1097,15 +1100,15 @@

uart2-0 {
    uart2m0_xfer: uart2m0-xfer {
        -rockchip.pins = <1 RK_PA0 2 &pcfg_pull_up>,
        -<1 RK_PA1 2 &pcfg_pull_none>;
        +rockchip.pins = <1 RK_PA0 2 &pcfg_pull_none>,
        +<1 RK_PA1 2 &pcfg_pull_up>;
    };
uart2-1 {
  uart2m1_xfer: uart2m1-xfer {
    -rockchip.pins = <2 RK_PA0 1 &pcfg_pull_up>,
    -<2 RK_PA1 1 &pcfg_pull_none>; 
    +rockchip.pins = <2 RK_PA0 1 &pcfg_pull_none>,
    +<2 RK_PA1 1 &pcfg_pull_up>; 
  };
}

@@ -1333,11 +1336,11 @@

sdmmc0 {
  sdmmc0_clk: sdmmc0-clk {
    -rockchip.pins = <1 RK_PA6 1 &pcfg_pull_none_4ma>; 
    +rockchip.pins = <1 RK_PA6 1 &pcfg_pull_none_8ma>; 
  };
  sdmmc0_cmd: sdmmc0-cmd {
    -rockchip.pins = <1 RK_PA4 1 &pcfg_pull_up_4ma>; 
    +rockchip.pins = <1 RK_PA4 1 &pcfg_pull_up_8ma>; 
  };
  sdmmc0_dectn: sdmmc0-dectn {
    @@ -1349,14 +1352,14 @@
  };
  sdmmc0_bus1: sdmmc0-bus1 {
    -rockchip.pins = <1 RK_PA0 1 &pcfg_pull_up_4ma>; 
    +rockchip.pins = <1 RK_PA0 1 &pcfg_pull_up_8ma>; 
  };
  sdmmc0_bus4: sdmmc0-bus4 {
    -rockchip.pins = <1 RK_PA0 1 &pcfg_pull_up_4ma>, 
    -<1 RK_PA1 1 &pcfg_pull_up_4ma>, 
    -<1 RK_PA2 1 &pcfg_pull_up_4ma>, 
    -<1 RK_PA3 1 &pcfg_pull_up_4ma>; 
    +rockchip.pins = <1 RK_PA0 1 &pcfg_pull_up_8ma>, 
    +<1 RK_PA1 1 &pcfg_pull_up_8ma>, 
    +<1 RK_PA2 1 &pcfg_pull_up_8ma>, 
    +<1 RK_PA3 1 &pcfg_pull_up_8ma>; 
  };
  sdmmc0_gpio: sdmmc0-gpio {
    @@ -1530,50 +1533,50 @@
  };
  rgmiim1_pins: rgmiim1-pins {
    rgmiim1_pins: rgmiim1-pins {
      rockchip.pins =

/* mac_txclk */
-<1 RK_PB4 2 &pcfg_pull_none_12ma>,
+<1 RK_PB4 2 &pcfg_pull_none_8ma>,
/* mac_rxclk */
-<1 RK_PB5 2 &pcfg_pull_none_2ma>,
+<1 RK_PB5 2 &pcfg_pull_none_4ma>,
/* mac_mdio */
-<1 RK_PC3 2 &pcfg_pull_none_2ma>,
+<1 RK_PC3 2 &pcfg_pull_none_4ma>,
/* mac_txen */
-<1 RK_PD1 2 &pcfg_pull_none_12ma>,
+<1 RK_PD1 2 &pcfg_pull_none_8ma>,
/* mac_clk */
-<1 RK_PC5 2 &pcfg_pull_none_2ma>,
+<1 RK_PC5 2 &pcfg_pull_none_4ma>,
/* mac_rxdv */
-<1 RK_PC6 2 &pcfg_pull_none_2ma>,
+<1 RK_PC6 2 &pcfg_pull_none_4ma>,
/* mac_mdc */
-<1 RK_PC7 2 &pcfg_pull_none_2ma>,
+<1 RK_PC7 2 &pcfg_pull_none_4ma>,
/* mac_rxd1 */
-<1 RK_PB2 2 &pcfg_pull_none_2ma>,
+<1 RK_PB2 2 &pcfg_pull_none_4ma>,
/* mac_rxd0 */
-<1 RK_PB3 2 &pcfg_pull_none_2ma>,
+<1 RK_PB3 2 &pcfg_pull_none_4ma>,
/* mac_txd1 */
-<1 RK_PB0 2 &pcfg_pull_none_12ma>,
+<1 RK_PB0 2 &pcfg_pull_none_8ma>,
/* mac_txd0 */
-<1 RK_PB1 2 &pcfg_pull_none_12ma>,
+<1 RK_PB1 2 &pcfg_pull_none_8ma>,
/* mac_rxd3 */
-<1 RK_PB6 2 &pcfg_pull_none_2ma>,
+<1 RK_PB6 2 &pcfg_pull_none_4ma>,
/* mac_rxd2 */
-<1 RK_PB7 2 &pcfg_pull_none_2ma>,
+<1 RK_PB7 2 &pcfg_pull_none_4ma>,
/* mac_txd3 */
-<1 RK_PC0 2 &pcfg_pull_none_12ma>,
+<1 RK_PC0 2 &pcfg_pull_none_8ma>,
/* mac_txd2 */
-<1 RK_PC1 2 &pcfg_pull_none_12ma>,
+<1 RK_PC1 2 &pcfg_pull_none_8ma>,
/* mac_txclk */
-<0 RK_PB0 1 &pcfg_pull_none>,

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/* mac_txen */
-<0 RK_PB4 1 &pcfg_pull_none>,
+<0 RK_PB4 1 &pcfg_pull_none_8ma>,
/* mac_clk */
-<0 RK_PD0 1 &pcfg_pull_none>,
+<0 RK_PD0 1 &pcfg_pull_none_4ma>,
/* mac_txd1 */
-<0 RK_PC0 1 &pcfg_pull_none>,
+<0 RK_PC0 1 &pcfg_pull_none_8ma>,
/* mac_txd0 */
-<0 RK_PC1 1 &pcfg_pull_none>,
+<0 RK_PC1 1 &pcfg_pull_none_8ma>,
/* mac_txd3 */
-<0 RK_PC7 1 &pcfg_pull_none>,
+<0 RK_PC7 1 &pcfg_pull_none_8ma>,
/* mac_txd2 */
-<0 RK_PC6 1 &pcfg_pull_none>,
+<0 RK_PC6 1 &pcfg_pull_none_8ma>
};

rmiim1_pins: rmiim1-pins {
--- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3368.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3368.dtsi
@@ -257,7 +257,7 @@
 max-frequency = <150000000>;  
clocks = <&cru HCLK_SDIO0>, <&cru SCLK_SDIO0>,
 <&cru SCLK_SDIO0_DRV>, <&cru SCLK_SDIO0_SAMPLE>;
-clock-names = "biu", "ciu", "ciu_driv", "ciu_sample";
+clock-names = "biu", "ciu", "ciu-drive", "ciu-sample";
 fifo-depth = <0x100>;
 interrupts = <GIC_SPI 33 IRQ_TYPE_LEVEL_HIGH>;
 resets = <&cru SRST_SDIO0>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3399-gru.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3399-gru.dtsi
@@ -406,8 +406,9 @@
 wlan_pd_n: wlan-pd-n {
 compatible = "regulator-fixed";
 regulator-name = "wlan_pd_n";
+pinctrl-names = "default";
+pinctrl-0 = <&wlan_module_reset_l>;

-/* Note the wlan_module_reset_l pinctrl */
+enable-active-high:
 gpio = <&gpio1 11 GPIO_ACTIVE_HIGH>;

 @@ -941,12 +942,6 @@
 pinctrl-0 = <
&ap_pwoff/* AP will auto-assert this when in S3 */
&clk_32k/* This pin is always 32k on gru boards */
-
-/*
- * We want this driven low ASAP; firmware should help us, but
- * we can help ourselves too.
- */
-\&wlan_module_reset_l
>

pcfg_output_low: pcfg-output-low {
    @ @ -1126,12 +1121,7 @@
};

wlan_module_reset_l: wlan-module-reset-l {
    /*
    * We want this driven low ASAP (As {Soon,Strongly} As
    * Possible), to avoid leakage through the powered-down
    * WiFi.
    */
    -rockchip,pins = <1 11 RK_FUNC_GPIO &pcfg_output_low>
+rockchip,pins = <1 11 RK_FUNC_GPIO &pcfg_pull_none>
};

bt_host_wake_l: bt-host-wake-l {
    --- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3399-puma-haikou.dts
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3399-puma-haikou.dts
    @ @ -130,7 +130,7 @@
};

&pcie0 {
    -ep-gpios = <&gpio4 RK_PC6 GPIO_ACTIVE_LOW>
+ep-gpios = <&gpio4 RK_PC6 GPIO_ACTIVE_HIGH>
    num-lanes = <4>
    pinctrl-names = "default"
    pinctrl-0 = <&pcie_clkreqn_cpm>
    --- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3399-puma.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3399-puma.dtsi
    @ @ -138,7 +138,7 @@
}

vcc5v0_host: vcc5v0-host-regulator {
    compatible = "regulator-fixed"
    -gpio = <&gpio4 RK_PA3 GPIO_ACTIVE_HIGH>
+gpio = <&gpio4 RK_PA3 GPIO_ACTIVE_LOW>
    enable-active-low;
    pinctrl-names = "default"
    pinctrl-0 = <&vcc5v0_host_en>
    @ @ -193,7 +193,7 @@
phy-mode = "rgmii";
pinctrl-names = "default";
pinctrl-0 = <&rgmii_pins>;
-snps,reset-gpio = <&gpio3 RK_PC0 GPIO_ACTIVE_HIGH>;
+snps,reset-gpio = <&gpio3 RK_PC0 GPIO_ACTIVE_LOW>;
snps,reset-active-low;
snps,reset-delays-us = <0 10000 50000>;
tx_delay = <0x10>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3399-sapphire.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3399-sapphire.dtsi
@@ -113,6 +113,19 @@
vcc3v0_sd: vcc3v0-sd {
+compatible = "regulator-fixed";
+enable-active-high;
+gpio = <&gpio0 RK_PA1 GPIO_ACTIVE_HIGH>;
+pinctrl-names = "default";
+pinctrl-0 = <&sdmmc0_pwr_h>;
+regulator-always-on;
+regulator-max-microvolt = <3000000>;
+regulator-min-microvolt = <3000000>;
+regulator-name = "vcc3v0_sd";
+vin-supply = <&vcc1v8>;
+}
+

vcc3v3_sys: vcc3v3-sys {
compatible = "regulator-fixed";
regulator-name = "vcc3v3_sys";
@@ -136,7 +149,7 @@
vcc5v0_host: vcc5v0-host-regulator {
compatible = "regulator-fixed";
enable-active-high;
-gpio = <&gpio1 RK_PD1 GPIO_ACTIVE_HIGH>;
+gpio = <&gpio4 RK_PD1 GPIO_ACTIVE_HIGH>;
pinctrl-names = "default";
pinctrl-0 = <&vcc5v0_host_en>;
regulator-name = "vcc5v0_host";
@@ -315,7 +328,7 @@
regulator-always-on;
regulator-boot-on;
regulator-min-microvolt = <1800000>;
-regulator-max-microvolt = <3000000>;
+regulator-max-microvolt = <3300000>;
regulator-state-mem {
regulator-on-in-suspend;
regulator-suspend-microvolt = <3000000>;

--- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3399-sapphire.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3399-sapphire.dtsi
@ @ -113,6 +113,19 @@
vin-supply = <&vcc1v8>;
};
@ @ -457,7 +470,7 @ @
assigned-clocks = &cru SCLK_PCIEPHY_REF;
assigned-clock-parents = &cru SCLK_PCIEPHY_REF100M;
assigned-clock-rates = <100000000>;
-ep-gpios = &gpio3 RK_PB5 GPIO_ACTIVE_HIGH;
+ep-gpios = &gpio2 RK_PA4 GPIO_ACTIVE_HIGH;
num-lanes = <4>;
pinctrl-names = "default";
pinctrl-0 = &pcie_clkreqn_cpm;
@ @ -490,6 +503,13 @@
};
);

+sd {
+sdmmc0_pwr_h: sdmmc0-pwr-h {
+rockchip.pins =
+<RK_GPIO0 RK_PA1 RK_FUNC_GPIO &pcfg_pull_none>;
+};
+};
+
usb2 {
 vcc5v0_host_en: vcc5v0-host-en {
 rockchip.pins =
 @ @ -537,6 +557,7 @@
};

&sdmmc {
+broken-cd;
bus-width = <4>;
cap-mm-highspeed;
cap-sd-highspeed;
@ @ -545,6 +566,7 @@
max-frequency = <150000000>;
pinctrl-names = "default";
pinctrl-0 = &sdmmc_clk &sdmmc_cmd &sdmmc_cd &sdmmc_bus4>;
+vmmc-supply = &vcc3v0_sd>;
vqmmc-supply = &vcc_sdio>;
status = "okay";
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/rockchip/rk3399.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/rockchip/rk3399.dtsi
@@ -66,6 +66,9 @@
i2c6 = &i2c6;
i2c7 = &i2c7;
i2c8 = &i2c8;
+mmc0 = &sdio0;
+mmc1 = &sdmmc;
+mmc2 = &sdhci;
serial0 = &uart0;
serial1 = &uart1;
serial2 = &uart2;
@@ -228,6 +231,7 @@
reg = <0x0 0x18000000 0x0 0x2000000>,
     <0x0 0xfd000000 0x0 0x1000000>;
reg-names = "axi-base", "apb-base";
+device_type = "pci";
#address-cells = <3>;
#interrupt-cells = <2>;
#size-cells = <2>;
@@ -246,7 +250,6 @@
      <0 0 0 2 &pcie0_intc 1>,
      <0 0 0 3 &pcie0_intc 2>,
      <0 0 0 4 &pcie0_intc 3>;
-linux,pci-domain = <0>;
max-link-speed = <1>;
msi-map = <0x0 &its 0x0 0x1000>;
phys = <&pcie_phy 0>, <&pcie_phy 1>,
@@ -336,6 +339,7 @@
      phys = <&emmc_phy>;
phy-names = "phy_arasan";
power-domains = <&power RK3399_PD_EMMC>;
+disable-cqe-dcmd;
status = "disabled";
}
@@ -402,7 +406,7 @@
      "bus_clk", "grf_clk";
status = "disabled";
-usbdrd_dwc3_0: dwc3 {
+usbdrd_dwc3_0: usb@fe800000 {
   compatible = "snp,sdw3";
   reg = <0x0 0xfe800000 0x0 0x100000>;
   interrupts = <GIC_SPI 105 IRQ_TYPE_LEVEL_HIGH 0>;
@@ -430,7 +434,7 @@
      "bus_clk", "grf_clk";
status = "disabled";
-usbdrd_dwc3_1: dwc3 {
+usbdrd_dwc3_1: usb@fe900000 {
   compatible = "snp,sdw3";
   reg = <0x0 0xfe900000 0x0 0x100000>;
   interrupts = <GIC_SPI 110 IRQ_TYPE_LEVEL_HIGH 0>;
@@ -1706,10 +1710,10 @@
gpu: gpu@ff9a0000 {
   compatible = "rockchip,rock3399-mali", "arm,arm-t860";
reg = <0x0 0xff9a0000 0x0 0x10000>
-interrupts = <GIC_SPI 19 IRQ_TYPE_LEVEL_HIGH 0>,
- <GIC_SPI 20 IRQ_TYPE_LEVEL_HIGH 0>,
- <GIC_SPI 21 IRQ_TYPE_LEVEL_HIGH 0>
-interrupt-names = "gpu", "job", "mmu"
+interrupts = <GIC_SPI 20 IRQ_TYPE_LEVEL_HIGH 0>,
+ <GIC_SPI 21 IRQ_TYPE_LEVEL_HIGH 0>,
+ <GIC_SPI 19 IRQ_TYPE_LEVEL_HIGH 0>
+interrupt-names = "job", "mmu", "gpu"
clocks = <&cru ACLK_GPU>
power-domains = <&power RK3399_PD_GPU>
status = "disabled"
@@ -2086,7 +2090,7 @@
};
};

-sleep {
+suspend {
ap_pwroff: ap-pwroff {
rockchip.pins = <1 5 RK_FUNC_1 &pcfg_pull_none>
};
--- linux-4.15.0.orig/arch/arm64/boot/dts/socionext/uniphier-ld11.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/socionext/uniphier-ld11.dtsi
@@ -329,7 +329,7 @@
mmc-ddr-1_8v;
mmc-hs200-1_8v;
mmc-pwrseq = <&emmc_pwrseq>
-cdns.phy-input-delay-legacy = <4>
+cdns.phy-input-delay-legacy = <9>
cdns.phy-input-delay-mmc-highspeed = <2>
cdns.phy-input-delay-mmc-ddr = <3>
cdns.phy-dll-delay-sdclk = <21>
--- linux-4.15.0.orig/arch/arm64/boot/dts/socionext/uniphier-ld20.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/socionext/uniphier-ld20.dtsi
@@ -59,6 +59,7 @@
clocks = <&sys_clk 32>
enable-method = "psci"
operating-points-v2 = <&cluster0_opp>
+#cooling-cells = <2>
};

cpu2: cpu@100 {
@@ -78,6 +79,7 @@
clocks = <&sys_clk 33>
enable-method = "psci"
operating-points-v2 = <&cluster1_opp>
+#cooling-cells = <2>
};
@@ -434,7 +436,7 @@
 mmc-ddr-1_8v;
 mmc-hs200-1_8v;
 mmc-pwrseq = <&emmc_pwrseq>;
-    cdns,phy-input-delay-legacy = <4>;
+    cdns,phy-input-delay-legacy = <9>;
    cdns,phy-input-delay-mmc-highspeed = <2>;
    cdns,phy-input-delay-mmc-ddr = <3>;
    cdns,phy-dll-delay-sdclk = <21>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/socionext/uniphier-pxs3.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/socionext/uniphier-pxs3.dtsi
@@ -335,7 +335,7 @@
 mmc-ddr-1_8v;
 mmc-hs200-1_8v;
 mmc-pwrseq = <&emmc_pwrseq>;
-    cdns,phy-input-delay-legacy = <4>;
+    cdns,phy-input-delay-legacy = <9>;
    cdns,phy-input-delay-mmc-highspeed = <2>;
    cdns,phy-input-delay-mmc-ddr = <3>;
    cdns,phy-dll-delay-sdclk = <21>;
--- linux-4.15.0.orig/arch/arm64/boot/dts/xilinx/zynqmp.dtsi
+++ linux-4.15.0/arch/arm64/boot/dts/xilinx/zynqmp.dtsi
@@ -410,7 +410,7 @@
 i2c0: i2c@ff020000 {
    -compatible = "cdns,i2c-r1p14", "cdns,i2c-r1p10";
    +compatible = "cdns,i2c-r1p14";
    status = "disabled";
    interrupt-parent = <&gic>;
    interrupts = <0 17 4>;
@@ -420,7 +420,7 @@
 i2c1: i2c@ff030000 {
    -compatible = "cdns,i2c-r1p14", "cdns,i2c-r1p10";
    +compatible = "cdns,i2c-r1p14";
    status = "disabled";
    interrupt-parent = <&gic>;
    interrupts = <0 18 4>;
--- linux-4.15.0.orig/arch/arm64/configs/defconfig
+++ linux-4.15.0/arch/arm64/configs/defconfig
@@ -98,6 +98,12 @@
 CONFIG_WQ_POWER_EFFICIENT_DEFAULT=y
 CONFIG_ARM_CPUIDLE=y
 CONFIG_CPU_FREQ=y

+CONFIG_CPU_FREQ_GOV_ATTR_SET=y
+CONFIG_CPU_FREQ_GOV_COMMON=y
+CONFIG_CPU_FREQ_DEFAULT_GOV_ONDEMAND=y
+CONFIG_CPU_FREQ_GOV_POWERSAVE=y
+CONFIG_CPU_FREQ_GOV_USERSPACE=y
+CONFIG_CPU_FREQ_DEFAULT_GOV_ONDEMAND=y
CONFIG_CPUFREQ_DT=y
CONFIG_ARM_BIG_LITTLE_CPUFREQ=y
CONFIG_ARM_SCPI_CPUFREQ=y
@@ -137,6 +143,8 @@
    CONFIG_VLAN_8021Q_GVRP=y
    CONFIG_VLAN_8021Q_MVRP=y
+CONFIG_QRTR=m
+CONFIG_QRTR_SMD=m
CONFIG_BPF_JIT=y
CONFIG_BT=m
CONFIG_BT_HIDP=m
@@ -146,6 +154,7 @@
    # CONFIG_BT_DEBUGFS is not set
    CONFIG_BT_HCIUART=m
    CONFIG_BT_HCIUART_LL=y
+CONFIG_BT_QCOMSMD=m
CONFIG_CFG80211=m
CONFIG_MAC80211=m
CONFIG_MAC80211_LEDS=y
@@ -226,6 +235,7 @@
    CONFIG_USB_NET_SMSC95XX=m
    CONFIG_USB_NET_PLUSB=m
    CONFIG_USB_NET_MCS7830=m
+CONFIG_WCN36XX=m
    CONFIG_BRCMFMAC=m
    CONFIG_WL18XX=m
    CONFIG_WLCORE_SDIO=m
@@ -275,6 +285,7 @@
    CONFIG_I2C_MESON=y
    CONFIG_I2C_MV64XXX=y
    CONFIG_I2C_QCOM_CCI=m
CONFIG_I2C_PXA=y
+CONFIG_I2C_QCOM_CCI=m
CONFIG_I2C_QUP=y
CONFIG_I2C_RK3X=y
CONFIG_I2C_SH_MOBILE=y
@@ -311,6 +322,9 @@
    CONFIG_GPIO_PCA953X=y
    CONFIG_GPIO_PCA953X_IRQ=y
    CONFIG_GPIO_MAX77620=y
+CONFIG_POWER_AVS=y
+CONFIG_ROCKCHIP_IODOMAIN=y
+CONFIG_QCOM_CPR=y
CONFIG_POWER_RESET_MSM=y
CONFIG_POWER_RESET_XGENE=y
CONFIG_POWER_RESET_SYSCON=y
@@ -322,10 +336,12 @@
CONFIG_THERMAL_GOV_POWER_ALLOCATOR=y
CONFIG_CPU_THERMAL=y
CONFIG_THERMAL_EMULATION=y
+CONFIG_BCM2835_THERMAL=m
CONFIG_BRCMSTB_THERMAL=m
CONFIG_EXYNOS_THERMAL=y
CONFIG_RCAR_GEN3_THERMAL=y
CONFIG_ROCKCHIP_THERMAL=m
+CONFIG_QCOM_TSENS=y
CONFIG_WATCHDOG=y
CONFIG_S3C2410_WATCHDOG=y
CONFIG_MESON_GXBB_WATCHDOG=m
@@ -358,8 +374,6 @@
CONFIG_REGULATOR_S2MPS11=y
CONFIG_MEDIA_SUPPORT=m
CONFIG_MEDIA_CAMERA_SUPPORT=y
-CONFIG_MEDIA_ANALOG_TV_SUPPORT=y
-CONFIG_MEDIA_DIGITAL_TV_SUPPORT=y
CONFIG_MEDIA_CONTROLLER=y
CONFIG_MEDIA_RC_SUPPORT=y
CONFIG_RC_CORE=m
@@ -374,6 +388,11 @@
CONFIG_VIDEO_SAMSUNG_EXYNOS_GSC=m
CONFIG_VIDEO_RENESAS_FCP=m
CONFIG_VIDEO_RENESAS_VSP1=m
+CONFIG_VIDEO_QCOM_VENUS=m
+CONFIG_V4L2_PLATFORM_DRIVERS=y
+CONFIG_VIDEO_QCOM_CAMSS=m
+# CONFIG_MEDIA_SUBDRV_AUTOSELECT is not set
+CONFIG_VIDEO_OV5645=m
CONFIG_DRM=m
CONFIG_DRM_NOUVEAU=m
CONFIG_DRM_EXYNOS=m
@@ -395,6 +414,7 @@
CONFIG_DRM_TEGRA=m
CONFIG_DRM_PANEL_SIMPLE=m
CONFIG_DRM_I2C_ADV7511=m
+CONFIG_DRM_I2C_ADV7511_AUDIO=y
CONFIG_DRM_VC4=m
CONFIG_DRM_HISI_HIBMC=m
CONFIG_DRM_HISI_KIRIN=m
@@ -412,9 +432,13 @@
CONFIG_SND=y

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CONFIG_SND_SOC=y
CONFIG_SND_BCM2835_SOC_I2S=m
+CONFIG_SND_SOC_QCOM=m
+CONFIG_SND_SOC_APQ8016_SBC=m
CONFIG_SND_SOC_SAMSUNG=y
CONFIG_SND_SOC_RCAR=m
CONFIG_SND_SOC_AK4613=m
+CONFIG_SND_SOC_MSM8916_WCD_ANALOG=m
+CONFIG_SND_SOC_MSM8916_WCD_DIGITAL=m
CONFIG_SND_SIMPLE_CARD=y
CONFIG_USB=y
CONFIG_USB_OTG=y
@@ -469,10 +493,13 @@
CONFIG_LEDS_CLASS=y
CONFIG_LEDS_GPIO=y
CONFIG_LEDS_PWM=y
+CONFIG_LEDS_QCOM_LPG=m
CONFIG_LEDS_SYSCON=y
CONFIG_LEDS_TRIGGER_HEARTBEAT=y
CONFIG_LEDS_TRIGGER_CPU=y
CONFIG_LEDS_TRIGGER_DEFAULT_ON=y
+CONFIG_LEDS_TRIGGER_PANIC=y
+CONFIG_LEDS_TRIGGER_DISK=y
CONFIG_EDAC=y
CONFIG_RTC_CLASS=y
CONFIG_RTC_DRV_MAX77686=y
@@ -521,16 +548,22 @@
CONFIG_PLATFORM_MHU=y
CONFIG_BCM2835_MBOX=y
CONFIG_HI6220_MBOX=y
+CONFIG_QCOM_APCS_IPC=y
CONFIG_ROCKCHIP_IOMMU=y
CONFIG_ARM_SMMU=y
CONFIG_ARM_SMMU_V3=y
CONFIG_QCOM_IOCTL=y
+CONFIG_QCOM_SPIM_PROC=m
+CONFIG_QCOM_DSP_PROC=m
+CONFIG_QCOM_Q6V5_PROC=m
+CONFIG_QCOM_WCNSS_PROC=m
CONFIG_RPM_QCOM_QCOM_SMD=y
CONFIG_RASPBERRYPI_POWER=y
CONFIG_QCOM_SMEM=y
CONFIG_QCOM_SMD_RPM=y
CONFIG_QCOM_SMP2P=y
CONFIG_QCOM_SMM=y
+CONFIG_QCOM_WCNSS_CTRL=y
CONFIG_ROCKCHIP_PM_DOMAINS=y
CONFIG_ARCH_TEGRA_132_SOC=y
CONFIG_ARCH_Tegra_210_SOC=y
@@ -558,6 +591,7 @@
 CONFIG_PHY_Tegra_XUSB=y
 CONFIG_QCOM_L2_PMU=y
 CONFIG_QCOM_L3_PMU=y
+CONFIG_QCOM_QFPROM=y
 CONFIG_TEE=y
 CONFIG_OPTEE=y
 CONFIG_ARM_SCPI_PROTOCOL=y
--- linux-4.15.0.orig/arch/arm64/crypto/Makefile
+++ linux-4.15.0/arch/arm64/crypto/Makefile
@@ -58,6 +58,7 @@
 $(obj)/aes-glue-%.o: $(src)/aes-glue.c FORCE
 $(call if_changed_rule,cc_o_c)
+ifdef REGENERATE_ARM64_CRYPTO
 quiet_cmd_perlasm = PERLASM $@
     cmd_perlasm = $(PERL) $(<) void $(@)
+endif

$(src)/sha512-core.S_shipped: $(src)/sha512-armv8.pl
$(call cmd,perlasm)
+endif

.PRECIOUS: $(obj)/sha256-core.S $(obj)/sha512-core.S
--- linux-4.15.0.orig/arch/arm64/crypto/aes-ce-ccm-core.S
+++ linux-4.15.0/arch/arm64/crypto/aes-ce-ccm-core.S
@@ -74,12 +74,13 @@
 beq	10f
 extv0.16b, v0.16b, v0.16b, #1/* rotate out the mac bytes */
 b7b
-8:movw7, w8
+8:cbzw8, 91f
+movw7, w8
addw8, w8, #16
9:extv1.16b, v1.16b, v1.16b, #1
addsw7, w7, #1
bne9b
-ecorv0.16b, v0.16b, v1.16b
+91:ecorv0.16b, v0.16b, v1.16b
st1{v0.16b}, [x0]
10:strw8, [x3]
ret
--- linux-4.15.0.orig/arch/arm64/crypto/aes-ce-ccm-glue.c
+++ linux-4.15.0/arch/arm64/crypto/aes-ce-ccm-glue.c
@@ -123,7 +123,7 @@
 abytes -= added;
while (abytes > AES_BLOCK_SIZE) {
+while (abytes >= AES_BLOCK_SIZE) {
    __aes_arm64_encrypt(key->key_enc, mac, mac,
        num_rounds(key));
    crypto_xor(mac, in, AES_BLOCK_SIZE);
@@ -137,8 +137,6 @@
        num_rounds(key));
    crypto_xor(mac, in, abytes);
    *macp = abytes;
-} else {
-*macp = 0;
    }
}
}
--- linux-4.15.0.orig/arch/arm64/crypto/aes-neonbs-core.S
+++ linux-4.15.0/arch/arm64/crypto/aes-neonbs-core.S
@@ -940,7 +940,7 @@
8:next_ctrv0
cbnzx4, 99b
-0:st1 {v0.16b}, [x5]
+st1 {v0.16b}, [x5]
ldpx29, x30, [sp], #16
ret
@@ -948,6 +948,9 @@
* If we are handling the tail of the input (x6 != NULL), return the
* final keystream block back to the caller.
*/
+0:cbzx6, 8b
+st1 {v0.16b}, [x6]
+b8b
1:cbzx6, 8b
st1 {v1.16b}, [x6]
 b8b
--- linux-4.15.0.orig/arch/arm64/crypto/aes-neonbs-glue.c
+++ linux-4.15.0/arch/arm64/crypto/aes-neonbs-glue.c
@@ -307,6 +307,8 @@
int err;
    err = skcipher_walk_virt(&walk, req, true);
+if (err)
+return err;
kernel_neon_begin();
--- linux-4.15.0.orig/arch/arm64/crypto/crc32-ce-glue.c
+++ linux-4.15.0/arch/arm64/crypto/crc32-ce-glue.c
@@ -185,6 +185,7 @@
    .base.cra_priority = 200,
    .base.cra_driver_name = "crc32-arm64-ce",
    .base.cra_module = THIS_MODULE,
+    .base.cra_flags = CRYPTO_ALG_OPTIONAL_KEY,
    .base.cra_blocksize = 1,
    {,
        .base.cra_name = "crc32c",
--- linux-4.15.0.orig/arch/arm64/crypto/crct10dif-ce-glue.c
+++ linux-4.15.0/arch/arm64/crypto/crct10dif-ce-glue.c
@@ -36,26 +36,13 @@
    if (unlikely((u64)data % CRC_T10DIF_PMULL_CHUNK_SIZE)) {
        l = min_t(u32, length, CRC_T10DIF_PMULL_CHUNK_SIZE -
                   ((u64)data % CRC_T10DIF_PMULL_CHUNK_SIZE));
        -*crc = crc_t10dif_generic(*crc, data, l);
        -length -= l;
        -data += l;
    }
    -*crc = crc_t10dif_generic(*crc, data, length);
    -length -= l;
    -*crc = crc_t10dif_generic(*crc, data, length);
    -length -= l;
    -data += l;
    -}
    -}
    -if (length > 0) {
    -if (may_use_simd()) {
        -kernel_neon_begin();
        -*crc = crc_t10dif_pmull(*crc, data, length);
        -kernel_neon_end();
    -} else {
        -*crc = crc_t10dif_generic(*crc, data, length);
    -}
    +if (length >= CRC_T10DIF_PMULL_CHUNK_SIZE && may_use_simd()) {
        +kernel_neon_begin();
        +*crc = crc_t10dif_pmull(*crc, data, length);
        +kernel_neon_end();

} else {
    *crc = crc_t10dif_generic(*crc, data, length);
}

return 0;
--- linux-4.15.0.orig/arch/arm64/crypto/sha1-ce-glue.c
+++ linux-4.15.0/arch/arm64/crypto/sha1-ce-glue.c
@@ -21,6 +21,7 @@
 MODULE_DESCRIPTION("SHA1 secure hash using ARMv8 Crypto Extensions");
 MODULE_AUTHOR("Ard Biesheuvel <ard.biesheuvel@linaro.org>");
 MODULE_LICENSE("GPL v2");
+MODULE_ALIAS_CRYPTO("sha1");

 struct sha1_ce_state {
    struct sha1_statesst;
    @@ -54,7 +55,7 @@
    unsigned int len, u8 *out)
 {
    struct sha1_ce_state *sctx = shash_desc_ctx(desc);
-   bool finalize = !sctx->sst.count && !(len % SHA1_BLOCK_SIZE);
+   bool finalize = !sctx->sst.count && !(len % SHA1_BLOCK_SIZE) && len;

    if (!may_use_simd())
        return crypto_sha1_finup(desc, data, len, out);
--- linux-4.15.0.orig/arch/arm64/crypto/sha2-ce-glue.c
+++ linux-4.15.0/arch/arm64/crypto/sha2-ce-glue.c
@@ -21,6 +21,8 @@
 MODULE_DESCRIPTION("SHA-224/SHA-256 secure hash using ARMv8 Crypto Extensions");
 MODULE_AUTHOR("Ard Biesheuvel <ard.biesheuvel@linaro.org>");
 MODULE_LICENSE("GPL v2");
+MODULE_ALIAS_CRYPTO("sha224");
+MODULE_ALIAS_CRYPTO("sha256");

 struct sha256_ce_state {
    struct sha256_statesst;
    @@ -59,7 +61,7 @@
    unsigned int len, u8 *out)
 {
    struct sha256_ce_state *sctx = shash_desc_ctx(desc);
-   bool finalize = !sctx->sst.count && !(len % SHA256_BLOCK_SIZE);
+   bool finalize = !sctx->sst.count && !(len % SHA256_BLOCK_SIZE) && len;

    if (!may_use_simd()) {
        if (len)
#define _ASM_ACPI_H

+#include <linux/efi.h>
#include <linux/memblock.h>
#include <linux/psci.h>

#include <asm/cputype.h>
+include <asm/io.h>
#include <asm/smp_plat.h>
#include <asm/tlbflush.h>

@@ -29,18 +31,22 @@
/* Basic configuration for ACPI */
#ifdef CONFIG_ACPI
+pgprot_t __acpi_get_mem_attribute(phys_addr_t addr);
+
/* ACPI table mapping after acpi_permanent_mmap is set */
static inline void __iomem *acpi_os_ioremap(acpi_physical_address phys,
      acpi_size size)
{  
+/* For normal memory we already have a cacheable mapping. */
+if (memblock_is_map_memory(phys))
+return (void __iomem *)__phys_to_virt(phys);
+
+/*
- * EFI's reserve_regions() call adds memory with the WB attribute
- * to memblock via early_init_dt_add_memory_arch().
- * We should still honor the memory's attribute here because
- * crash dump kernel possibly excludes some ACPI (reclaim)
- * regions from memblock list.
+/
-if (!memblock_is_memory(phys))
-return ioremap(phys, size);
-
-return ioremap_cache(phys, size);
+return __ioremap(phys, size, __acpi_get_mem_attribute(phys));
}
#define acpi_os_ioremap acpi_os_ioremap

@@ -86,6 +92,10 @@
}

struct acpi_madt_generic_interrupt *acpi_cpu_get_madt_gicc(int cpu);
+static inline u32 get_acpi_id_for_cpu(unsigned int cpu)
+{
+return acpi_cpu_get_madt_gicc(cpu)->uid;
+}
static inline void arch_fix_phys_package_id(int num, u32 slot) {
}
void __init acpi_init_cpus(void);
@@ -125,7 +135,10 @@
 * for compatibility.
 */
#define acpi_disable_cmcff 1
-void arch_apei_get_mem_attribute(phys_addr_t addr);
+static inline void arch_apei_get_mem_attribute(phys_addr_t addr)
+{
+ return __acpi_get_mem_attribute(addr);
+}
#endif /* CONFIG_ACPI_APEI */

#ifdef CONFIG_ACPI_NUMA
--- linux-4.15.0.orig/arch/arm64/include/asm/alternative.h
+++ linux-4.15.0/arch/arm64/include/asm/alternative.h
@@ -5,6 +5,8 @@
#include <asm/cpucaps.h>
#include <asm/insn.h>
+#define ARM64_CB_PATCH ARM64_NCAPS
+
#ifndef __ASSEMBLY__
#include <linux/init.h>
@@ -12,6 +14,8 @@
#include <linux/stddef.h>
#include <linux/stringify.h>
+extern int alternatives_applied;
+
 struct alt_instr {
 s32 orig_offset;/* offset to original instruction */
 s32 alt_offset;/* offset to replacement instruction */
@@ -20,16 +24,26 @@
 u8  alt_len;/* size of new instruction(s), <= orig_len */
};
+typedef void (*alternative_cb_t)(struct alt_instr *alt,
+talent, __le32 *origptr, __le32 *updptr, int nr_inst);
+
 void __init apply_alternatives_all(void);
 void apply_alternatives(void *start, size_t length);

{-#define ALTINSTR_ENTRY(feature) \ 
+#{define ALTINSTR_ENTRY(feature) \ 
".word 661b - .
*/
".word 663f - \n"/* new instruction */ \
".hword " __stringify(feature) "n"/* feature bit */ \
".byte 662b-661b\n"/* source len */ \
".byte 664f-663f\n"/* replacement len */ 

#define ALTINSTR_ENTRY_CB(feature, cb) \
+".word 661b - \n"/* label */ \
+".word " __stringify(cb) "n"/* callback */ \
+".word " __stringify(feature) "n"/* feature bit */ \
+".byte 662b-661b\n"/* source len */ \
+".byte 664f-663f\n"/* replacement len */ 
+ */ 
* alternative assembly primitive: 
* 
@ @ -43.6 +57.8 @@ 
* but most assemblers die if insn1 or insn2 have a .inst. This should 
* be fixed in a binutils release posterior to 2.25.51.0.2 (anything 
* containing commit 4e4d08cf7399b606 or c1baaddf8861). 
+ * 
+ * Alternatives with callbacks do not generate replacement instructions. 
*/ 
#define __ALTERNATIVE_CFG(oldinstr, newinstr, feature, cfg_enabled)\ 
".if " __stringify(cfg_enabled)" == 1\n@@ -52,18 +68,32 @@ 
".pushsection .altinstructions,"a"
".altinstructions,\"a\"\nALTINSTR_ENTRY(feature)\n..popsection\n\n-".pushsection .altinstr_replacement, \"a\"\n+..subsection 1\n663:\nnewinstr \n664:\n-..popsection\n\n-".org \n-".org 
+".org 
+.previous\n+.endif\n+
#define __ALTERNATIVE_CFG_CB(oldinstr, feature, cfg_enabled, cb)\ 
+.if " __stringify(cfg_enabled)" == 1\n661:\n+oldinstr \n+"662:\n+.pushsection .altinstructions, \"a\"\n+ALTINSTR_ENTRY_CB(feature, cb)\n+.popsection\n
/*663:\n\n".endif

#define _ALTERNATIVE_CFG(oldinstr, newinstr, feature, cfg, ...)	__ALTERNATIVE_CFG(oldinstr, newinstr, feature, IS_ENABLED(cfg))

+#define ALTERNATIVE_CB(oldinstr, cb)
+__ALTERNATIVE_CFG_CB(oldinstr, ARM64_CB_PATCH, 1, cb)
#else
#include <asm/assembler.h>
@@ -82,11 +112,11 @@
662:.pushsection .altinstructions, "a"
altinstruction_entry 661b, 663f, \cap, 662b-661b, 664f-663f
 .popsection
 -.pushsection .altinstr_replacement, "ax"
+.subsection 1
663:insn2
-664:.popsection
-.org. - (662b-661b)
+664:.org. - (662b-661b)
 .org. - (664b-663b)
+.previous
 .endif
 .endm

@@ -125,20 +155,28 @@
 .pushsection .altinstructions, "a"
altinstruction_entry 663f, 661f, \cap, 664f-663f, 662f-661f
 .popsection
 -.pushsection .altinstr_replacement, "ax"
+.subsection 1
 .align 2/* So GAS knows label 661 is suitably aligned */
661:
 .endm

+.macro alternative_cb cb
+.set .Lasm_alt_mode, 0
+.pushsection .altinstructions, "a"
+altinstruction_entry 661f, \cb, ARM64_CB_PATCH, 662f-661f, 0
+.popsection
+661:
+.endm
+
/*
 * Provide the other half of the alternative code sequence.
 */
.macro alternative_else
662:
.if .Lasm_alt_mode==0
.pushsection .altinstr_replacement, "ax"
+subsection 1
.else
.popsection
+.previous
.endif
663:
.endm
@@ -148,11 +186,18 @@

.macro alternative_endif
664:
-.if .Lasm_alt_mode==0
-.popsection
-.endif
.org	. - (664b-663b) + (662b-661b)
.org	. - (662b-661b) + (664b-663b)
+.if .Lasm_alt_mode==0
+.previous
+.endif
+.endm
+
+/*
+ * Callback-based alternative epilogue
+ */
+.macro alternative_cb_end
+662:
.endm

/*
@@ -171,7 +216,7 @@

.user_alt, label, oldinstr, newinstr, cond
9999:alternative_insn "oldinstr", "newinstr", \cond
- _ASM_EXTABLE 9999b, \label
+ _asm_extable 9999b, \label
.endm

/*
--- linux-4.15.0.orig/arch/arm64/include/asm/arch_timer.h
+++ linux-4.15.0/arch/arm64/include/asm/arch_timer.h
@@ -148,18 +148,47 @@
 isb();
}
+/*
+ * Ensure that reads of the counter are treated the same as memory reads
+ * for the purposes of ordering by subsequent memory barriers.
+ *
+ * This insanity brought to you by speculative system register reads,
+ * out-of-order memory accesses, sequence locks and Thomas Gleixner.
+ *
+ */
+#define arch_counter_enforce_ordering(val) do {
+        u64 tmp, _val = (val);
+        asm volatile(
+                    "eor %0, %1, %1
+                  
+                    add %0, sp, %0
+                  
+                    ldr xzr, [%0]
+        :
+                  "=r" (tmp)
+                  : "r" (_val));
+        } while (0)
+
static inline u64 arch_counter_get_cntpct(void)
{
    u64 cnt;
    isb();
    return arch_timer_reg_read_stable(cntpct_el0);
}

static inline u64 arch_counter_get_cntvct(void)
{
    u64 cnt;
    isb();
    return arch_timer_reg_read_stable(cntvct_el0);
}

+#undef arch_counter_enforce_ordering
+
static inline int arch_timer_arch_init(void)
{
    return 0;
}

--- linux-4.15.0.orig/arch/arm64/include/asm/asm-uaccess.h
+++ linux-4.15.0/arch/arm64/include/asm/asm-uaccess.h
#include <asm/alternative.h>
#include <asm/kernel-pgtable.h>
+#include <asm/mmu.h>
#include <asm/sysreg.h>
#include <asm/assembler.h>

ifdef CONFIG_ARM64_SW_TTBR0_PAN
.macro __uaccess_ttbr0_disable, tmp1
mrs\tmp1, ttbr1_el1// swapper_pg_dir
+bic\tmp1, \tmp1, #TTBR_ASID_MASK
add\tmp1, \tmp1, #SWAPPER_DIR_SIZE// reserved_ttbr0 at the end of swapper_pg_dir
msr\ttbr0_el1, \tmp1// set reserved TTBR0_EL1
isb
+sub\tmp1, \tmp1, #SWAPPER_DIR_SIZE
+msr\ttbr1_el1, \tmp1// set reserved ASID
+isb
.endm

-macro __uaccess_ttbr0_enable, tmp1
+macro __uaccess_ttbr0_enable, tmp1, tmp2
get_thread_info \tmp1
ldr\tmp1, [\tmp1, #TSK_TI_TTBR0]// load saved TTBR0_EL1
+mrs\tmp2, ttbr1_el1
+extr \tmp2, \tmp2, \tmp1, #48
+ror \tmp2, \tmp2, #16
+msr\ttbr1_el1, \tmp2// set the active ASID
+isb
msr\ttbr0_el1, \tmp1// set the non-PAN TTBR0_EL1
isb
.endm

-macro uaccess_ttbr0_disable, tmp1
+macro uaccess_ttbr0_disable, tmp1, tmp2
alternative_if_not ARM64_HAS_PAN
+save_and_disable_irq \tmp2// avoid preemption
__uaccess_ttbr0_disable \tmp1
+restore_irq \tmp2
alternative_else_nop_endif
.endm

-macro uaccess_ttbr0_enable, tmp1, tmp2
+macro uaccess_ttbr0_enable, tmp1, tmp3
alternative_if_not ARM64_HAS_PAN
-save_and_disable_irq \tmp2// avoid preemption
-__uaccess_ttbr0_enable \tmp1
- restore_irq \tmp2
+ save_and_disable_irq \tmp3// avoid preemption
+ __uaccess_ttbr0_enable \tmp1, \tmp2
+ restore_irq \tmp3
alternative_else_nop_endif
.endm
#else
- .macro uaccess_ttbr0_disable, tmp1
+ .macro uaccess_ttbr0_disable, tmp1, tmp2
.endm
- .macro uaccess_ttbr0_enable, tmp1, tmp2
+ .macro uaccess_ttbr0_enable, tmp1, tmp2, tmp3
.endm
#endif
/*
 * These macros are no-ops when UAO is present.
 */
- .macro uaccess_disable_not_uao, tmp1
- uaccess_ttbr0_disable \tmp1
+ .macro uaccess_disable_not_uao, tmp1, tmp2
+ uaccess_ttbr0_disable \tmp1, \tmp2
alternative_if ARM64_ALT_PAN_NOT_UAO
SET_PSTATE_PAN(1)
alternative_else_nop_endif
.endm
- .macro uaccess_enable_not_uao, tmp1, tmp2
- uaccess_ttbr0_enable \tmp1, \tmp2
+ .macro uaccess_enable_not_uao, tmp1, tmp2, tmp3
+ uaccess_ttbr0_enable \tmp1, \tmp2, \tmp3
alternative_if ARM64_ALT_PAN_NOT_UAO
SET_PSTATE_PAN(0)
alternative_else_nop_endif
--- linux-4.15.0.orig/arch/arm64/include/asm/assembler.h
+++ linux-4.15.0/arch/arm64/include/asm/assembler.h
@@ -25,8 +25,35 @@
#include <asm/asm-offsets.h>
#include <asm/cpufeature.h>
+include <asm/cputype.h>
#include <asm/debug-monitors.h>
-include <asm/mmucx_context.h>
#include <asm/page.h>
#include <asm/pgtable-hwdef.h>
#include <asm/ptrace.h>
@@ -25,8 +25,35 @@
/ *
+ * RAS Error Synchronization barrier
+ */
+.macro esb
+##ifdef CONFIG_ARM64_RAS_EXTN
+hint 	#16
+##else
+nop
+#endif
+.endm
+
+ /*
+ * Value prediction barrier
+ */
+.macrosdb
+hint#20
+.endm
+
+ /*
+ * Sanitise a 64-bit bounded index wrt speculation, returning zero if out
+ */
+.macromask_nospec64, idx, limit, tmp
+sub\tmp, \idx, \limit
+bic\tmp, \tmp, \idx
+and\idx, \idx, \tmp, asr #63
+cscdb
+.endm
+
+ /*
* NOP sequence
*/
.macronops, num
@@ -255,7 +284,11 @@
#else
adr_l\dst, \sym
#endif
+alternative_if_not ARM64_HAS_VIRT_HOST_EXTN
mrs\tmp, tpidr_el1
+alternative_else
+mrs\tmp, tpidr_el2
+alternative_endif
add\dst, \dst, \tmp
+.endm

@@ -266,7 +299,11 @@
/*
 * ldr_this_cpu dst, sym, tmp
 * adr_l dst, \sym
 * +alternative_if_not ARM64_HAS_VIRT_HOST_EXTN
 * mrs\tmp, tpidr_el1
 * +alternative_else
 * +mrs\tmp, tpidr_el2
 * +alternative endif
 * ldr\dst, [\dst, \tmp]
 * .endm

@@ -360,27 +397,33 @@*/
 * size:size of the region
 * Corrupts:kaddr, size, tmp1, tmp2
 * */
+.macro __dcache_op_workaround_clean_cache, op, kaddr
+alternative_if_not ARM64_WORKAROUND_CLEAN_CACHE
+dc\op, \kaddr
+alternative_else
+dccvac, \kaddr
+alternative endif
+.endm
+
+.macro dcache_by_line_op op, domain, kaddr, size, tmp1, tmp2
 dc=cache_line_size \tmp1, \tmp2
 add\size, \kaddr, \size
 sub\tmp2, \tmp1, #1
 bic\kaddr, \kaddr, \tmp2
9998:
 -if(\op == cvau || \op == cvac)
-alternative_if_not ARM64_WORKAROUND_CLEAN_CACHE
-dc\op, \kaddr
-alternative_else
-dccvac, \kaddr
-alternative endif
 -elseif(\op == cvap)
-alternative_if ARM64_HAS_DCPOP
-sys 3, c7, c12, 1, \kaddr// dc cvap
-alternative_else
-dccvac, \kaddr
-alternative endif
 +ifc\op, cvau
 +__dcache_op_workaround_clean_cache \op, \kaddr
 +else
 +ifc\op, cvac
 +__dcache_op_workaround_clean_cache \op, \kaddr
 +else
 +ifc\op, cvap
+sys3, c7, c12, 1, \kaddr// dc cvap
  .else
dc\op, \kaddr
  .endif
+.endif
+.endif
add\kaddr, \kaddr, \tmp1
cmp\kaddr, \size
b.lo9999b
@@ -477,39 +520,8 @@
mrs\rd, sp_el0
  .endm

/*
 * Errata workaround prior to TTBR0_EL1 update
 * *
 * val:TTBR value with new BADDR, preserved
 * tmp0:temporary register, clobbered
 * tmp1:other temporary register, clobbered
 * */
-#ifdef CONFIG_QCOM_FALKOR_ERRATUM_1003
-alternative_if ARM64_WORKAROUND_QCOM_FALKOR_E1003
-#mrs\tmp0, ttbr0_el1
-#mov\tmp1, #FALKOR_RESERVED_ASID
-#bfi\tmp0, \val, #0, #48 // reserved ASID + old BADDR
-#msr\ttbr0_el1, \tmp0
-#isb
-#bfi\tmp0, \val, #0, #48 // reserved ASID + new BADDR
-#msr\ttbr0_el1, \tmp0
-#isb
-alternative_else_nop_endif
-#endif
-..endm
-
-/*
 * Errata workaround post TTBR0_EL1 update.
 * */
-..macro\tpte_to_phys, phys, pte
-#and\phys, \pte, #(((1 << (48 - PAGE_SHIFT)) - 1) << PAGE_SHIFT)
### Check the MIDR_EL1 of the current CPU for a given model and a range of
### variant/revision. See asm/cputype.h for the macros used below.

```asm
.macro cpu_midr_match model, rv_min, rv_max, res, tmp1, tmp2, tmp3
    mrs res, midr_el1
    mov_q tmp1, (MIDR_REVISION_MASK | MIDR_VARIANT_MASK)
    mov_q tmp2, MIDR_CPU_MODEL_MASK
    and tmp3, res, tmp2 // Extract model
    and tmp1, res, tmp1 // rev & variant
    mov_q tmp2, model
    cmp tmp3, tmp2
    cset res, eq
    cbz res, .Ldone@ // Model matches ?
    if (rv_min != 0) // Skip min check if rv_min == 0
        mov_q tmp3, rv_min
        cmp tmp1, tmp3
        cset res, ge
    endif
    if ((rv_min != rv_max) || rv_min == 0)
        mov_q tmp2, rv_max
        cmp tmp1, tmp2
        cset tmp2, le
        and res, res, tmp2
    endif
.Ldone@:
.endm
```

---

__ASSEMBLER_H__
+++ linux-4.15.0/arch/arm64/include/asm/atomic_ll_sc.h
@@ -37,7 +37,7 @@
 * (the optimize attribute silently ignores these options).
 */

-#define ATOMIC_OP(op, asm_op)
+#define ATOMIC_OP(op, asm_op, constraint)
 __LL_SC_INLINE void __LL_SC_PREFIX(atomic_##op(int i, atomic_t *v))
 |
@@ -51,11 +51,11 @@
 	cbnz	%w1, 1b"
 : "=&r" (result), "=&r" (tmp), "+Q" (v->counter)
 -: "Ir" (i))
+: #constraint "r" (i))
 |
 __LL_SC_EXPORT(atomic_##op);

-#define ATOMIC_OP_RETURN(name, mb, acq, rel, cl, op, asm_op)
+#define ATOMIC_OP_RETURN(name, mb, acq, rel, cl, op, asm_op, constraint)
 __LL_SC_INLINE int __LL_SC_PREFIX(atomic_##op##_return##name(int i, atomic_t *v))
 |
@@ -70,14 +70,14 @@
 	cbnz	%w1, 1b"
 : "=&r" (result), "=&r" (tmp), "+Q" (v->counter)
 -: "Ir" (i))
+: #constraint "r" (i))
 |
 : cl);
 |
 return result;
 |
 __LL_SC_EXPORT(atomic_##op##_return##name);

-#define ATOMIC_FETCH_OP(name, mb, acq, rel, cl, op, asm_op)
+#define ATOMIC_FETCH_OP(name, mb, acq, rel, cl, op, asm_op, constraint)
 __LL_SC_INLINE int __LL_SC_PREFIX(atomic_fetch_##op##name(int i, atomic_t *v))
 |
@@ -92,7 +92,7 @@
 	cbnz	%w1, 1b"
 : "=&r" (result), "=&r" (tmp), "+Q" (v->counter)
 -: "Ir" (i))
+: #constraint "r" (i))
 |
 : cl);
 |

---

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return result;

@@ -110,8 +110,8 @@
 ATOMIC_FETCH_OP (_acquire, , a, , "memory", __VA_ARGS__);
 ATOMIC_FETCH_OP (_release, , l, "memory", __VA_ARGS__);

-ATOMIC_OPS(add, add)
-ATOMIC_OPS(sub, sub)
+ATOMIC_OPS(add, add, I)
+ATOMIC_OPS(sub, sub, J)

#undef ATOMIC_OPS
#define ATOMIC_OPS(...)
@@ -121,17 +121,17 @@
 ATOMIC_FETCH_OP (_acquire, , a, , "memory", __VA_ARGS__);
 ATOMIC_FETCH_OP (_release, , l, "memory", __VA_ARGS__);

-ATOMIC_OPS(and, and)
-ATOMIC_OPS(andnot, bic)
-ATOMIC_OPS(or, orr)
-ATOMIC_OPS(xor, eor)
+ATOMIC_OPS(and, and, )
+ATOMIC_OPS(andnot, bic, )
+ATOMIC_OPS(or, orr, )
+ATOMIC_OPS(xor, eor, )

#undef ATOMIC_OPS
#undef ATOMIC_FETCH_OP
#undef ATOMIC_OP_RETURN
#undef ATOMIC_OP

-#define ATOMIC64_OP(op, asm_op)
+#define ATOMIC64_OP_RETURN(name, mb, acq, rel, cl, op, asm_op, constraint)
 __LL_SC_INLINE void
 __LL_SC_PREFIX(atomic64_##op(long i, atomic64_t *v))
 {;
@@ -145,11 +145,11 @@
  : "=&r" (result), "=&r" (tmp), "+Q" (v->counter)
  : #constraint "r" (i));
 }
 __LL_SC_EXPORT(atomic64_##op);

-#define ATOMIC64_OP_Return(name, mb, acq, rel, cl, op, asm_op)
+#define ATOMIC64_OP_RETURN(name, mb, acq, rel, cl, op, asm_op, constraint)
 __LL_SC_INLINE long

__LL_SC_PREFIX(atomic64_##op##_return##name(long i, atomic64_t *v))
{
  "cbnz%w1, 1b
  
  "r" (result), "+Q" (v->counter)
-: "Ir" (i)
+: #constraint "r" (i)
  : cl);
  return result;
}
__LL_SC_EXPORT(atomic64_##op##_return##name);

#define ATOMIC64_FETCH_OP(name, mb, acq, rel, cl, op, asm_op)
 +define ATOMIC64_FETCH_OP(name, mb, acq, rel, cl, op, asm_op, constraint)
__LL_SC_INLINE long
__LL_SC_PREFIX(atomic64_fetch_##op##name(long i, atomic64_t *v))
{
  "cbnz%w2, 1b
  "r" (result), "val" (val), "+Q" (v->counter)
-: "Ir" (i)
+: #constraint "r" (i)
  : cl);
  return result;
@@ -186,7 +186,7 @@
  "cbnz%w2, 1b
  "r" (result), "val" (val), "+Q" (v->counter)
-: "Ir" (i)
+: #constraint "r" (i)
  : cl);
  return result;
@@ -204,8 +204,8 @@
 ATOMIC64_FETCH_OP (_acquire,, a,  , "memory", __VA_ARGS__)
 ATOMIC64_FETCH_OP (_release,,  , l, "memory", __VA_ARGS__)

-ATOMIC64_OPS(add, add)
-ATOMIC64_OPS(sub, sub)
+ATOMIC64_OPS(add, add, I)
+ATOMIC64_OPS(sub, sub, J)

#undef ATOMIC64_OPS
#define ATOMIC64_OPS(...)
@@ -215,10 +215,10 @@
 ATOMIC64_FETCH_OP (_acquire,, a,  , "memory", __VA_ARGS__)
 ATOMIC64_FETCH_OP (_release,,  , l, "memory", __VA_ARGS__)

-ATOMIC64_OPS(and, and)
-ATOMIC64_OPS(andnot, bic)
-ATOMIC64_OPS(or, orr)
-ATOMIC64_OPS(xor, eor)
+ATOMIC64_OPS(and, and, L)
+ATOMIC64_OPS(andnot, bic, )
+ATOMIC64_OPS(or, orr, L)
+ATOMIC64_OPS(xor, eor, L)

#undef ATOMIC64_OPS
#undef ATOMIC64_FETCH_OP
@@ -248,48 +248,54 @@
}}
__LL_SC_EXPORT(atomic64_dec_if_positive);

-#define __CMPXCHG_CASE(w, sz, name, mb, acq, rel, cl)
-__LL_SC_INLINE unsigned long
-__LL_SC_PREFIX(__cmpxchg_case_##name(volatile void *ptr,\
- unsigned long old,\
- unsigned long new))
+
+#define __CMPXCHG_CASE(w, sfx, name, sz, mb, acq, rel, cl, constraint)
+__LL_SC_INLINE u##sz
+__LL_SC_PREFIX(__cmpxchg_case_##name##sz(volatile void *ptr,\
+ unsigned long old,\
+ u##sz new))
{\
-unsigned long tmp, oldval;
+unsigned long tmp;
+u##sz oldval;
\
asm volatile(
"prfm
pstl1strm, %[v]n"
-"1:ld" #acq "xr" #sz "t\%" #w "[oldval], %[v]n"
+"1:ld" #acq "xr" #sfx "t\%" #w "[oldval], %[v]n"
"eor\%" #w "[tmp], %" #w "[oldval], %" #w "[old]n"
"cbnz\%" #w "[tmp], 2f\n"
-"st" #rel "xr" #sz "t%w[tmp], %" #w "[new], %[v]n"
+"st" #rel "xr" #sfx "t%w[tmp], %" #w "[new], %[v]n"
"cbnz%w[tmp], 1b\n"
"" #mb "\n"
"2:"\
: [tmp] "=&r" (tmp), [oldval] "=&r" (oldval),
- [v] "+Q" (*(unsigned long *)ptr)
- [old] "Lr" (old), [new] "r" (new)
+ [v] "+Q" (*u##sz *)ptr)
+: [old] #constraint "r" (old), [new] "r" (new):
: cl);
\
return oldval;
}\
-__LL_SC_EXPORT(__cmpxchg_case_##name);
+__LL_SC_EXPORT(__cmpxchg_case_##name##sz);
- __CMPXCHG_CASE(w, b, 1, , , )
- __CMPXCHG_CASE(w, h, 2, , , )
- __CMPXCHG_CASE(w, 4, , , )
- __CMPXCHG_CASE(, 8, , , )
- __CMPXCHG_CASE(w, b, acq_1, a, , "memory")
- __CMPXCHG_CASE(w, h, acq_2, a, , "memory")
- __CMPXCHG_CASE(w, , acq_4, a, , "memory")
- __CMPXCHG_CASE(, , acq_8, a, , "memory")
- __CMPXCHG_CASE(w, b, rel_1, , l, "memory")
- __CMPXCHG_CASE(w, h, rel_2, , l, "memory")
- __CMPXCHG_CASE(w, , rel_4, , l, "memory")
- __CMPXCHG_CASE(, , rel_8, , l, "memory")
- __CMPXCHG_CASE(w, b, mb_1, dmb ish, , l, "memory")
- __CMPXCHG_CASE(w, h, mb_2, dmb ish, , l, "memory")
- __CMPXCHG_CASE(w, , mb_4, dmb ish, , l, "memory")
- __CMPXCHG_CASE(, , mb_8, dmb ish, , l, "memory")

+/*
+ * Earlier versions of GCC (no later than 8.1.0) appear to incorrectly
+ * handle the 'K' constraint for the value 4294967295 - thus we use no
+ * constraint for 32 bit operations.
+ */
+ __CMPXCHG_CASE(w, b, 8, , , )
+ __CMPXCHG_CASE(w, h, 16, , , )
+ __CMPXCHG_CASE(w, , 32, , , )
+ __CMPXCHG_CASE(, , 64, , , L)
+ __CMPXCHG_CASE(w, b, acq_, 8, a, , "memory", )
+ __CMPXCHG_CASE(w, h, acq_, 16, a, , "memory", )
+ __CMPXCHG_CASE(w, , acq_, 32, a, , "memory", )
+ __CMPXCHG_CASE(, , acq_, 64, a, , "memory", L)
+ __CMPXCHG_CASE(w, b, rel_, 8, , l, "memory", )
+ __CMPXCHG_CASE(w, h, rel_, 16, , l, "memory", )
+ __CMPXCHG_CASE(w, , rel_, 32, , l, "memory", )
+ __CMPXCHG_CASE(, , rel_, 64, , l, "memory", L)
+ __CMPXCHG_CASE(w, b, mb_, 8, dmb ish, , l, "memory", )
+ __CMPXCHG_CASE(w, h, mb_, 16, dmb ish, , l, "memory", )
+ __CMPXCHG_CASE(w, , mb_, 32, dmb ish, , l, "memory", )
+ __CMPXCHG_CASE(, , mb_, 64, dmb ish, , l, "memory", L)

#undef __CMPXCHG_CASE

--- linux-4.15.0.orig/arch/arm64/include/asm/atomic_lse.h
+++ linux-4.15.0/arch/arm64/include/asm/atomic_lse.h
@@ -117,7 +117,7 @@
/* LSE atomics */
"mvn%w[i], %w[i]\n"
"stclr%w[i], %[v]\n"
: [i] "+r" (w0), [v] "+Q" (v->counter)
+ [i] "+&r" (w0), [v] "+Q" (v->counter)
/// Open Source Used In 5GaaS Edge AC-4

@@ -135,7 +135,7 @@
      "mvn w[i], w[i]n"
 "ldclr " mb " w[i], w[i], v"
-: [i] "+r" (w0), [v] "+Q" (v->counter)
+: [i] "+&r" (w0), [v] "+Q" (v->counter)
   : "r" (x1)
   : __LL_SC_CLOBBERS);
}

@@ -161,7 +161,7 @@
      "neg w[i], w[i]n"
 "stadd w[i], v"
-: [i] "+r" (w0), [v] "+Q" (v->counter)
+: [i] "+&r" (w0), [v] "+Q" (v->counter)
   : "r" (x1)
   : __LL_SC_CLOBBERS, #cl);

@@ -180,7 +180,7 @@
      "neg w[i], w[i]n"
 "ldadd " mb " w[i], w30, v"
 "add w[i], w30"
-: [i] "+r" (w0), [v] "+Q" (v->counter)
+: [i] "+&r" (w0), [v] "+Q" (v->counter)
   : "r" (x1)
   : __LL_SC_CLOBBERS, #cl);

@@ -207,7 +207,7 @@
      "neg w[i], w[i]n"
 "ldadd " mb " w[i], w[i], v"
-: [i] "+r" (w0), [v] "+Q" (v->counter)
+: [i] "+&r" (w0), [v] "+Q" (v->counter)
   : "r" (x1)
   : __LL_SC_CLOBBERS, #cl);

@@ -314,7 +314,7 @@
      "mvn i, i"
 "stclr i, v"
-: [i] "+r" (x0), [v] "+Q" (v->counter)
+: [i] "+&r" (x0), [v] "+Q" (v->counter)
   : "r" (x1)
   : __LL_SC_CLOBBERS);

}
@ -332,7 +332,7 @
/* LSE atomics */
"mvn%[i], %[i]n"
"ldclr" #mb "%[i], %[i], %[v]"
-: [i] "+r" (x0), [v] "+P" (v->counter)
+: [i] "+&r" (x0), [v] "+Q" (v->counter)
: "r" (x1)
:_LL_SC_CLOBBERS, ##cl);}
\n@ -358,7 +358,7 @@
/* LSE atomics */
"neg%[i], %[i]n"
"stadd%[i], %[i], %[v]"
-: [i] "+r" (x0), [v] "+P" (v->counter)
+: [i] "+&r" (x0), [v] "+Q" (v->counter)
: "r" (x1)
:_LL_SC_CLOBBERS);
} \n
@ -377,7 +377,7 @@
/* LSE atomics */
"neg%[i], %[i]n"
"ldadd" #mb "%[i], x30, %[v]n"
"add%[i], %[i], x30"
-: [i] "+r" (x0), [v] "+P" (v->counter)
+: [i] "+&r" (x0), [v] "+Q" (v->counter)
: "r" (x1)
:_LL_SC_CLOBBERS, ##cl);
\n@ -404,7 +404,7 @@
/* LSE atomics */
"neg%[i], %[i]n"
"ldadd" #mb "%[i], %[i], %[v]"
-: [i] "+r" (x0), [v] "+P" (v->counter)
+: [i] "+&r" (x0), [v] "+Q" (v->counter)
: "r" (x1)
:_LL_SC_CLOBBERS, ##cl);
\n@ -435,7 +435,7 @@
"subx30, x30, %[ret]n"
"cbnzx30, lbn"
"2:"
-: [ret] "+r" (x0), [v] "+P" (v->counter)
+: [ret] "+&r" (x0), [v] "+Q" (v->counter)
:
:_LL_SC_CLOBBERS, "cc", "memory");
\n@ -446,22 +446,22 @@
#define _LL_SC_CMPXCHG(op)__LL_SC_CALL(__cmpxchg_case_##op)
#define __CMPXCHG_CASE(w, sz, name, mb, cl...)
-#define __CMPXCHG_CASE(w, sfx, name, sz, mb, cl...)
+static inline u##sz __cmpxchg_case_##name##sz(volatile void *ptr, 
+    unsigned long old, 
+    u##sz new)
{
    register u##sz x2 asm("x2") = new;

    asm volatile( "mov " #w "30, %" [old]n"
                 "cas" #mb #sz "vt" #w "30, %" [new], %[v]n" 
                 "mov %" #w "30"
                 : [ret] "r" (x0), [v] "Q" (*(unsigned long *)ptr)
                 : [old] "r" (x1), [new] "r" (x2)
     @@ -470,22 +470,22 @@
     return x0;
 }

-__CMPXCHG_CASE(w, b, 1, )
-__CMPXCHG_CASE(w, h, 2, )
-__CMPXCHG_CASE(w, , 4, )
-__CMPXCHG_CASE(x, , 8, )
-__CMPXCHG_CASE(w, b, acq_1, a, "memory")
-__CMPXCHG_CASE(w, h, acq_2, a, "memory")
-__CMPXCHG_CASE(w, , acq_4, a, "memory")
-__CMPXCHG_CASE(x, , acq_8, a, "memory")
-__CMPXCHG_CASE(w, b, rel_1, l, "memory")
-__CMPXCHG_CASE(w, h, rel_2, l, "memory")
-__CMPXCHG_CASE(w, , rel_4, l, "memory")
-__CMPXCHG_CASE(x, , rel_8, l, "memory")
-__CMPXCHG_CASE(w, b, mb_1, al, "memory")
-__CMPXCHG_CASE(w, h, mb_2, al, "memory")
-__CMPXCHG_CASE(w, , mb_4, al, "memory")
-__CMPXCHG_CASE(x, , mb_8, al, "memory")
+__CMPXCHG_CASE(w, b, 8, )
+__CMPXCHG_CASE(w, h,     , 16,   )
+__CMPXCHG_CASE(w, ,     , 32,   )
+__CMPXCHG_CASE(x, ,     , 64,   )
+__CMPXCHG_CASE(w, b, acq_, 8, a, "memory")
+__CMPXCHG_CASE(w, h, acq_, 16, a, "memory")
+__CMPXCHG_CASE(w, , acq_, 32, a, "memory")
+__CMPXCHG_CASE(x, , acq_, 64, a, "memory")
+__CMPXCHG_CASE(w, b, rel_, 8, l, "memory")
+__CMPXCHG_CASE(w, h, rel_, 16, l, "memory")
+__CMPXCHG_CASE(w, , rel_, 32, l, "memory")
+__CMPXCHG_CASE(x, , rel_, 64, l, "memory")
+__CMPXCHG_CASE(w, b, mb_, 8, al, "memory")
+__CMPXCHG_CASE(w, h, mb_, 16, al, "memory")
+__CMPXCHG_CASE(w, , mb_, 32, al, "memory")
+__CMPXCHG_CASE(x, , mb_, 64, al, "memory")

#undef __LL_SC_CMPXCHG
#undef __CMPXCHG_CASE
@@ -516,7 +516,7 @@
  "eor%[old1], %[old1], %[oldval1]
  "eor%[old2], %[old2], %[oldval2]\n
-: [old1] "+r" (x0), [old2] "+r" (x1),
+: [old1] "+&r" (x0), [old2] "+&r" (x1),
[vl] "+Q" (*((unsigned long *)ptr))
: [new1] "r" (x2), [new2] "r" (x3), [ptr] "r" (x4),\n  [oldval1] "r" (oldval1), [oldval2] "r" (oldval2)\n--- linux-4.15.0.orig/arch/arm64/include/asm/barrier.h
+++ linux-4.15.0/arch/arm64/include/asm/barrier.h
@@ -32,6 +32,7 @@
 #define dsb(opt) asm volatile("dsb " #opt : : : "memory")

 #define psb_csnc() asm volatile("hint #17" : : : "memory")
+#define csdb() asm volatile("hint #20" : : : "memory")

 #define mb() dsb(sy)
 #define rmb() dsb(ld)
 @@ -40,6 +41,27 @@
 #define dma_rmb() dmb(oshld)
 #define dma_wmb() dmb(oshst)

 +/*
 +  * Generate a mask for array_index__nospec() that is ~0UL when 0 <= idx < sz
 +  * and 0 otherwise.
 +  */
+  */
+  */
+  */
+#define array_index_mask_nospec(array_index_mask_nospec
+static inline unsigned long array_index_mask_nospec(unsigned long idx,
+  unsigned long sz)
unsigned long mask;
asm volatile(
"cmp %1, %2\n"
"sbc %0, xzr, xzr\n"
: "=r" (mask)
: "r" (idx), "Ir" (sz)
: "cc");
csdb();
return mask;
}
define __smp_mb() dmb(ish)
define __smp_rmb() dmb(ishld)
define __smp_wmb() dmb(ishst)
define CTR_L1IP_SHIFT 14
define CTR_L1IP_MASK 3
#define CTR_DMINLINE_SHIFT 16
#define CTR_IMINLINE_SHIFT 0
#define CTR_CWG_SHIFT 24
#define CTR_CWG_MASK 15
#define CTR_CACHE_MINLINE_MASK
(0xf << CTR_DMINLINE_SHIFT | 0xf << CTR_IMINLINE_SHIFT)
define CTR_L1IP(ctr)(((ctr) >> CTR_L1IP_SHIFT) & CTR_L1IP_MASK)
define ICACHE_POLICY_VPIPT 0

{__uint128_t tmp;
u64 sum;
int n = ihl; /* we want it signed */

tmp = *(const __uint128_t *)iph;
iph += 16;
-ihl -= 4;
+n -= 4;
tmp += ((tmp >> 64) | (tmp << 64));
sum = tmp >> 64;
do {
    sum += *((const u32 *)iph);
    iph += 4;
} while (--ihl);
+
} while (--n > 0);

sum += ((sum >> 32) | (sum << 32));
return csum_fold(__force u32)(sum >> 32));
--- linux-4.15.0.orig/arch/arm64/include/asm/cmpxchg.h
+++ linux-4.15.0/arch/arm64/include/asm/cmpxchg.h
@@ -29,63 +29,63 @@
	} while (--ihl);
	} while (--n > 0);
    sum += ((sum >> 32) | (sum << 32));
  return csum_fold((__force u32)(sum >> 32));
*/
#define __XCHG_CASE(w, sz, name, mb, nop_lse, acq, acq_lse, rel, cl)	\
static inline unsigned long __xchg_case_##name(unsigned long x,\
					       volatile void *ptr)	\
{									\
    unsigned long ret, tmp;						\
    									\
    asm volatile(ARM64_LSE_ATOMIC_INSN(				\
        /* LL/SC */							\"
        "prfm pstl1strm, %2\n"							\"
        "1:ld" #acq "xr" #sz "t\%" #w "0, %2\n\"
        "st" #rel "xr" #sz "t\%w1, %" #w "3, %2\n\"
        "cbnz\%w1, 1b\n"
        "" #mb,\n        "" #nop_lse,\n        "" #acq_lse,\n        "" #acq,\n        "" #rel,\n        "" #cl,\n        

        /* LSE atomics */
        "swp" #acq_lse #rel #sz "t\%" #w "3, %" #w "0, %2\n\"
        __nops(3)\n        "" #nop_lse,\n        ": "=&r" (ret), ":=&r" (tmp), "+Q" (*ptr)\n        "" #acq,\n        "" #rel,\n        "" #cl,\n        
        return ret;\n    )\n
#define __XCHG_CASE(w, sfx, name, sz, mb, nop_lse, acq, acq_lse, rel, cl)
+static inline u##sz __xchg_case_##name##sz(u##sz x, volatile void *ptr)\
+{										\
    u##sz ret;\n    unsigned long tmp;\n    										\
    asm volatile(ARM64_LSE_ATOMIC_INSN(				\
        /* LL/SC */							\"
        "prfm pstl1strm, %2\n"							\"
        "1:ld" #acq "xr" #sfx "t\%" #w "0, %2\n\"
        "st" #rel "xr" #sfx "t\%w1, %" #w "3, %2\n\"
        "cbnz\%w1, 1b\n"
        "" #mb,\n        "" #nop_lse,\n        "" #acq_lse,\n        "" #acq,\n        "" #rel,\n        "" #cl,\n        
        /* LSE atomics */
        "swp" #acq_lse #rel #sz "t\%" #w "3, %" #w "0, %2\n\"
        __nops(3)\n        "" #nop_lse,\n        ": "=&r" (ret), ":=&r" (tmp), "+Q" (*ptr)\n        "" #acq,\n        "" #rel,\n        "" #cl,\n        
        return ret;\n    )\n
+"" #mb, 
+"/ LSE atomics */
+"swp" #acq_lse #rel #sfx "\%" #w "3, %" #w "0, %2\n"
+__nops(3)
+'"" #nop_lse)'
+; "=\&r" (ret), "=\&r" (tmp), "+Q" (*(@#sz *)ptr)
+; "r" (x)
+; cl);'
+}'
+return ret;'
}

-__XCHG_CASE(w, b, 1, , , , , )
-__XCHG_CASE(w, h, 2, , , , , )
-__XCHG_CASE(w, 4, , , , , )
-__XCHG_CASE( , 8, , , , , )
-__XCHG_CASE(w, b, acq_1, , a, a, "memory")
-__XCHG_CASE(w, h, acq_2, , a, a, "memory")
-__XCHG_CASE( , acq_4, , a, a, "memory")
-__XCHG_CASE(w, b, rel_1, , , l, "memory")
-__XCHG_CASE(w, h, rel_2, , , l, "memory")
-__XCHG_CASE(w, , rel_4, , , l, "memory")
-__XCHG_CASE( , rel_8, , , l, "memory")
-__XCHG_CASE(w, b, mb_1, dmb ish, nop, , a, l, "memory")
-__XCHG_CASE(w, h, mb_2, dmb ish, nop, , a, l, "memory")
-__XCHG_CASE(w, , mb_4, dmb ish, nop, , a, l, "memory")
-__XCHG_CASE( , mb_8, dmb ish, nop, , a, l, "memory")
+__XCHG_CASE(w, b, 8, , , , , )
+__XCHG_CASE(w, h, 16, , , , , )
+__XCHG_CASE(w, , 32, , , , , )
+__XCHG_CASE( , 64, , , , , )
+__XCHG_CASE(w, b, acq, 8, , a, a, "memory")
+__XCHG_CASE(w, h, acq, 16, , a, a, "memory")
+__XCHG_CASE( , acq, 32, , a, a, "memory")
+__XCHG_CASE(w, b, rel, 8, , , l, "memory")
+__XCHG_CASE(w, h, rel, 16, , , l, "memory")
+__XCHG_CASE(w, , rel, 32, , , l, "memory")
+__XCHG_CASE( , rel, 64, , , l, "memory")
+__XCHG_CASE(w, b, mb, 8, dmb ish, nop, , a, l, "memory")
+__XCHG_CASE(w, h, mb, 16, dmb ish, nop, , a, l, "memory")
+__XCHG_CASE(w, , mb, 32, dmb ish, nop, , a, l, "memory")
+__XCHG_CASE( , mb, 64, dmb ish, nop, , a, l, "memory")

#undef __XCHG_CASE

#define __XCHG_GEN(sfx)
-static inline unsigned long __xchg##sfx(unsigned long x,\n+static __always_inline unsigned long __xchg##sfx(unsigned long x,\nvolatile void *ptr,\nint size)\n scarcswitch (size) {\ncase 1:\n-\treturn __xchg_case##sfx##_1(x, ptr);\n+\treturn __xchg_case##sfx##_8(x, ptr);\ncase 2:\n-\treturn __xchg_case##sfx##_2(x, ptr);\n+\treturn __xchg_case##sfx##_16(x, ptr);\ncase 4:\n-\treturn __xchg_case##sfx##_4(x, ptr);\n+\treturn __xchg_case##sfx##_32(x, ptr);\ncase 8:\n-\treturn __xchg_case##sfx##_8(x, ptr);\n+\treturn __xchg_case##sfx##_64(x, ptr);\ndefault:\n BUILD_BUG();\n}\n@@ -115,20 +115,20 @@\n#define xchg(...) __xchg_wrapper( _mb, __VA_ARGS__)\n
#define __CMPXCHG_GEN(sfx)\n-\n+static inline unsigned long __cmpxchg##sfx(volatile void *ptr,\nunsigned long old,\nunsigned long new,\nint size)\n scarcswitch (size) {\ncase 1:\n-\treturn __cmpxchg_case##sfx##_1(ptr, (u8)old, new);\n+\treturn __cmpxchg_case##sfx##_8(ptr, (u8)old, new);\ncase 2:\n-\treturn __cmpxchg_case##sfx##_2(ptr, (u16)old, new);\n+\treturn __cmpxchg_case##sfx##_16(ptr, (u16)old, new);\ncase 4:\n-\treturn __cmpxchg_case##sfx##_4(ptr, old, new);\n+\treturn __cmpxchg_case##sfx##_32(ptr, old, new);\ncase 8:\n-\treturn __cmpxchg_case##sfx##_8(ptr, old, new);\n+\treturn __cmpxchg_case##sfx##_64(ptr, old, new);\ndefault:\n BUILD_BUG();\n}\n@@ -222,14 +222,16 @@
#define __CMPWAIT_CASE(w, sz, name)
static inline void __cmpwait_case_##name(void *ptr, unsigned long val)
{
    unsigned long tmp;
    asm volatile("ldxr" #sz "@%r" #w "[tmp], %[v]n\"
                 +"sevl\"
                 +"wfe\n"
                 +"ldxr" #sfx "@%r" #w "[tmp], %[v]n\"
                 +"eor" #w "[tmp], %" #w "[tmp], %" #w "[val]n\"
                 +"cbnz" #w "[tmp], 1f\n                 +"wfe\n"
@@ -238,27 +240,27 @@
                 : [val] "r" (val));
}

-__CMPWAIT_CASE(w, b, 1);
-__CMPWAIT_CASE(w, h, 2);
-__CMPWAIT_CASE(w, , 4);
-__CMPWAIT_CASE(, , 8);
+__CMPWAIT_CASE(w, b, 8);
+__CMPWAIT_CASE(w, h, 16);
+__CMPWAIT_CASE(w, , 32);
+__CMPWAIT_CASE(, , 64);

#undef __CMPWAIT_CASE

#define __CMPWAIT_GEN(sfx)
static inline void __cmpwait##sfx(void *ptr, unsigned long val, int size)
{
    switch (size) {
    case 1:
        return __cmpwait_case##sfx##_1(ptr, (u8)val);
    case 2:
        return __cmpwait_case##sfx##_2(ptr, (u16)val);
    case 4:
        return __cmpwait_case##sfx##_4(ptr, (u32)val);
    case 8:
        return __cmpwait_case##sfx##_8(ptr, (u64)val);
    case 16:
        return __cmpwait_case##sfx##_16(ptr, (u64)val);
    case 32:
        return __cmpwait_case##sfx##_32(ptr, (u64)val);
    case 64:
        return __cmpwait_case##sfx##_64(ptr, (u64)val);
    case 128:
        return __cmpwait_case##sfx##_128(ptr, (u64)val);
    case 256:
        return __cmpwait_case##sfx##_256(ptr, (u64)val);
    case 512:
        return __cmpwait_case##sfx##_512(ptr, (u64)val);
    case 1024:
        return __cmpwait_case##sfx##_1024(ptr, (u64)val);
    case 2048:
        return __cmpwait_case##sfx##_2048(ptr, (u64)val);
    case 4096:
        return __cmpwait_case##sfx##_4096(ptr, (u64)val);
    case 8192:
        return __cmpwait_case##sfx##_8192(ptr, (u64)val);
    case 16384:
        return __cmpwait_case##sfx##_16384(ptr, (u64)val);
    case 32768:
        return __cmpwait_case##sfx##_32768(ptr, (u64)val);
    case 65536:
        return __cmpwait_case##sfx##_65536(ptr, (u64)val);
    case 131072:
        return __cmpwait_case##sfx##_131072(ptr, (u64)val);
    case 262144:
        return __cmpwait_case##sfx##_262144(ptr, (u64)val);
    case 524288:
        return __cmpwait_case##sfx##_524288(ptr, (u64)val);
    case 1048576:
        return __cmpwait_case##sfx##_1048576(ptr, (u64)val);
    case 2097152:
        return __cmpwait_case##sfx##_2097152(ptr, (u64)val);
    case 4194304:
        return __cmpwait_case##sfx##_4194304(ptr, (u64)val);
    case 8388608:
        return __cmpwait_case##sfx##_8388608(ptr, (u64)val);
    case 16777216:
        return __cmpwait_case##sfx##_16777216(ptr, (u64)val);
    case 33554432:
        return __cmpwait_case##sfx##_33554432(ptr, (u64)val);
    case 67108864:
        return __cmpwait_case##sfx##_67108864(ptr, (u64)val);
    case 134217728:
        return __cmpwait_case##sfx##_134217728(ptr, (u64)val);
    case 268435456:
        return __cmpwait_case##sfx##_268435456(ptr, (u64)val);
    case 536870912:
        return __cmpwait_case##sfx##_536870912(ptr, (u64)val);
    case 1073741824:
        return __cmpwait_case##sfx##_1073741824(ptr, (u64)val);
    case 2147483648:
        return __cmpwait_case##sfx##_2147483648(ptr, (u64)val);
    case 4294967296:
        return __cmpwait_case##sfx##_4294967296(ptr, (u64)val);
    case 8589934592:
        return __cmpwait_case##sfx##_8589934592(ptr, (u64)val);
    case 17179869184:
        return __cmpwait_case##sfx##_17179869184(ptr, (u64)val);
    case 34359738368:
        return __cmpwait_case##sfx##_34359738368(ptr, (u64)val);
    case 68719476736:
        return __cmpwait_case##sfx##_68719476736(ptr, (u64)val);
    case 137438953472:
        return __cmpwait_case##sfx##_137438953472(ptr, (u64)val);
    case 274877906944:
        return __cmpwait_case##sfx##_274877906944(ptr, (u64)val);
    case 549755813888:
        return __cmpwait_case##sfx##_549755813888(ptr, (u64)val);
    case 1099511627776:
        return __cmpwait_case##sfx##_1099511627776(ptr, (u64)val);
    case 2199023255552:
        return __cmpwait_case##sfx##_2199023255552(ptr, (u64)val);
    case 4398046511104:
        return __cmpwait_case##sfx##_4398046511104(ptr, (u64)val);
    case 8796093022208:
        return __cmpwait_case##sfx##_8796093022208(ptr, (u64)val);
    case 17592186044416:
        return __cmpwait_case##sfx##_17592186044416(ptr, (u64)val);
    case 35184372088832:
        return __cmpwait_case##sfx##_35184372088832(ptr, (u64)val);
    case 70368744177664:
        return __cmpwait_case##sfx##_70368744177664(ptr, (u64)val);
    case 140737488355328:
        return __cmpwait_case##sfx##_140737488355328(ptr, (u64)val);
    case 281474976710656:
        return __cmpwait_case##sfx##_281474976710656(ptr, (u64)val);
    case 562949953421312:
        return __cmpwait_case##sfx##_562949953421312(ptr, (u64)val);
    case 1125899906842624:
        return __cmpwait_case##sfx##_1125899906842624(ptr, (u64)val);
    case 2251799813685248:
        return __cmpwait_case##sfx##_2251799813685248(ptr, (u64)val);
    case 4503599627370496:
        return __cmpwait_case##sfx##_4503599627370496(ptr, (u64)val);
    case 9007199254740992:
        return __cmpwait_case##sfx##_9007199254740992(ptr, (u64)val);
    default:
        return 0;
    }
}

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case 4:
- return __cmpwait_case##sfx##_4(ptr, val);
+ return __cmpwait_case##sfx##_32(ptr, val);

case 8:
- return __cmpwait_case##sfx##_8(ptr, val);
+ return __cmpwait_case##sfx##_64(ptr, val);

default:
    BUILD_BUG();
}

--- linux-4.15.0.orig/arch/arm64/include/asm/compat.h
+++ linux-4.15.0/arch/arm64/include/asm/compat.h
@@ -234,6 +234,7 @@
{

#define compat_user_stack_pointer() (user_stack_pointer(task_pt_regs(current)))
+#define COMPAT_MINSIGSTKSZ 2048

static inline void __user *arch_compat_alloc_user_space(long len)
{
    --- linux-4.15.0.orig/arch/arm64/include/asm/cpucaps.h
+++ linux-4.15.0/arch/arm64/include/asm/cpucaps.h
@@ -41,7 +41,13 @@
#define ARM64_WORKAROUND_CAVIUM_30115 20
#define ARM64_HAS_DCPOP 21
#define ARM64_SVE 22
+#define ARM64_UNMAP_KERNEL_AT_EL0 23
+#define ARM64_HARDEN_BRANCH_PREDICTOR 24
+#define ARM64_HAS_RAS_EXTN 25
+#define ARM64_SSBD 26
+#define ARM64_MISMATCHED_CACHE_TYPE 27
+#define ARM64_SSBS 28

-#define ARM64_NCAPS 23
+#define ARM64_NCAPS 29

#endif /* __ASM_CPUCAPS_H */
--- linux-4.15.0.orig/arch/arm64/include/asm/cpufeature.h
+++ linux-4.15.0/arch/arm64/include/asm/cpufeature.h
@@ -10,6 +10,7 @@

#include <asm/cpucaps.h>
#include <asm/cputype.h>
#include <asm/fpsimd.h>
#include <asm/hwcap.h>
#include <asm/sigcontext.h>
@@ -46,9 +47,10 @@

*/
enum ftr_type {
- FTR_EXACT, /* Use a predefined safe value */
- FTR_LOWER_SAFE, /* Smaller value is safe */
- FTR_HIGHER_SAFE, /* Bigger value is safe */
+ FTR_EXACT, /* Use a predefined safe value */
+ FTR_LOWER_SAFE, /* Smaller value is safe */
+ FTR_HIGHER_SAFE, /* Bigger value is safe */
+ FTR_HIGHER_OR_ZERO_SAFE, /* Bigger value is safe, but 0 is biggest */
};

#define FTR_STRICT true /* SANITY check strict matching required */
@@ -89,24 +91,227 @@
extern struct arm64_ftr_reg arm64_ftr_reg_ctrl0;

-/* scope of capability check */
-enum {
- SCOPE_SYSTEM,
- SCOPE_LOCAL_CPU,
-};
+/*
+ * CPU capabilities:
+
+ * We use arm64_cpu_capabilities to represent system features, errata work
+ * arounds (both used internally by kernel and tracked in cpu_hwcaps) and
+ * ELF HWCAPs (which are exposed to user).
+ *
+ * To support systems with heterogeneous CPUs, we need to make sure that we
+ * detect the capabilities correctly on the system and take appropriate
+ * measures to ensure there are no incompatibilities.
+ *
+ * This comment tries to explain how we treat the capabilities.
+ * Each capability has the following list of attributes :
+ *
+ * 1) Scope of Detection : The system detects a given capability by
+ * performing some checks at runtime. This could be, e.g, checking the
+ * value of a field in CPU ID feature register or checking the cpu
+ * model. The capability provides a call back ( @matches() ) to
+ * perform the check. Scope defines how the checks should be performed.
+ * There are three cases:
+ *
+ a) SCOPE_LOCAL_CPU: check all the CPUs and "detect" if at least one
+ matches. This implies, we have to run the check on all the
+ booting CPUs, until the system decides that state of the
+ capability is finalised. (See section 2 below)
+ *Or
+ b) SCOPE_SYSTEM: check all the CPUs and "detect" if all the CPUs
matches. This implies, we run the check only once, when the
system decides to finalise the state of the capability. If the
capability relies on a field in one of the CPU ID feature
registers, we use the sanitised value of the register from the
CPU feature infrastructure to make the decision.
+ * Or
+ * c) SCOPE_BOOT_CPU: Check only on the primary boot CPU to detect the
feature. This category is for features that are "finalised"
(or used) by the kernel very early even before the SMP cpus
are brought up.
+ *
+ * The process of detection is usually denoted by "update" capability
state in the code.
+ *
+ * 2) Finalise the state : The kernel should finalise the state of a
capability at some point during its execution and take necessary
actions if any. Usually, this is done, after all the boot-time
enabled CPUs are brought up by the kernel, so that it can make
better decision based on the available set of CPUs. However, there
are some special cases, where the action is taken during the early
boot by the primary boot CPU. (e.g, running the kernel at EL2 with
Virtualisation Host Extensions). The kernel usually disallows any
changes to the state of a capability once it finalises the capability
and takes any action, as it may be impossible to execute the actions
safely. A CPU brought up after a capability is "finalised" is
referred to as "Late CPU" w.r.t the capability. e.g, all secondary
CPUs are treated "late CPUs" for capabilities determined by the boot
CPU.
+ *
+ * At the moment there are two passes of finalising the capabilities.
+ * a) Boot CPU scope capabilities - Finalised by primary boot CPU via
setup_boot_cpu_capabilities().
+ * b) Everything except (a) - Run via setup_system_capabilities().
+ *
+ * 3) Verification: When a CPU is brought online (e.g, by user or by the
kernel), the kernel should make sure that it is safe to use the CPU,
by verifying that the CPU is compliant with the state of the
capabilities finalised already. This happens via :
+ *
+ *secondary_start_kernel()-> check_local_cpu_capabilities()
+ *
+ * As explained in (2) above, capabilities could be finalised at
different points in the execution. Each newly booted CPU is verified
against the capabilities that have been finalised by the time it
boots.
+ *
+ *a) SCOPE_BOOT_CPU : All CPUs are verified against the capability
except for the primary boot CPU.
+ b) SCOPE_LOCAL_CPU, SCOPE_SYSTEM: All CPUs hotplugged on by the user after the kernel boot are verified against the capability.
+ If there is a conflict, the kernel takes an action, based on the severity (e.g., a CPU could be prevented from booting or cause a kernel panic). The CPU is allowed to "affect" the state of the capability, if it has not been finalised already. See section 5 for more details on conflicts.

+ 4) Action: As mentioned in (2), the kernel can take an action for each detected capability, on all CPUs on the system. Appropriate actions include, turning on an architectural feature, modifying the control registers (e.g., SCTLR, TCR etc.) or patching the kernel via alternatives. The kernel patching is batched and performed at later point. The actions are always initiated only after the capability is finalised. This is usually denoted by "enabling" the capability.
+ The actions are initiated as follows:
+ a) Action is triggered on all online CPUs, after the capability is finalised, invoked within the stop_machine() context from enable_cpu_capabilities().
+ b) Any late CPU, brought up after (1), the action is triggered via:
+ check_local_cpu_capabilities() -> verify_local_cpu_capabilities() +
+ 5) Conflicts: Based on the state of the capability on a late CPU vs. the system state, we could have the following combinations:
+ Two separate flag bits are defined to indicate whether each kind of conflict can be allowed:
+ ARM64_CPUCAP_OPTIONAL_FOR_LATE_CPU - Case(a) is allowed
+ ARM64_CPUCAP_PERMITTED_FOR_LATE_CPU - Case(b) is allowed
+ Case (a) is not permitted for a capability that the system requires all CPUs to have in order for the capability to be enabled. This is typical for capabilities that represent enhanced functionality.
+ Case (b) is not permitted for a capability that must be enabled during boot if any CPU in the system requires it in order to run
safely. This is typical for erratum work arounds that cannot be
enabled after the corresponding capability is finalised.

In some non-typical cases either both (a) and (b), or neither,
should be permitted. This can be described by including neither
or both flags in the capability's type field.

 Decide how the capability is detected.
 On any local CPU vs System wide vs the primary boot CPU

 The capability is detected on the Boot CPU and is used by kernel
during early boot. i.e, the capability should be "detected" and
"enabled" as early as possibly on all booting CPUs.

 Is it permitted for a late CPU to have this capability when system
hasn't already enabled it ?

 Is it safe for a late CPU to miss this capability when system has it */

 CPU errata workarounds that need to be enabled at boot time if one or
more CPUs in the system requires it. When one of these capabilities
has been enabled, it is safe to allow any CPU to boot that doesn't
require the workaround. However, it is not safe if a "late" CPU
requires a workaround and the system hasn't enabled it already.

 CPU errata workarounds that need to be enabled at boot time if one or
more CPUs in the system requires it. When one of these capabilities
has been enabled, it is safe to allow any CPU to boot that doesn't
require the workaround. However, it is not safe if a "late" CPU
requires a workaround and the system hasn't enabled it already.

 CPU errata workarounds that need to be enabled at boot time if one or
more CPUs in the system requires it. When one of these capabilities
has been enabled, it is safe to allow any CPU to boot that doesn't
require the workaround. However, it is not safe if a "late" CPU
requires a workaround and the system hasn't enabled it already.
+*/
+ * CPU feature detected at boot time based on system-wide value of a
+ * feature. It is safe for a late CPU to have this feature even though
+ * the system hasn't enabled it, although the feature will not be used
+ * by Linux in this case. If the system has enabled this feature already,
+ * then every late CPU must have it.
+ */
+#define ARM64_CPUCAP_SYSTEM_FEATURE
+ (ARM64_CPUCAP_SCOPE_SYSTEM | ARM64_CPUCAP_PERMITTED_FOR_LATE_CPU)
+/*
+ * CPU feature detected at boot time based on feature of one or more CPUs.
+ * All possible conflicts for a late CPU are ignored.
+ */
+#define ARM64_CPUCAP_WEAK_LOCAL_CPUFEATURE
+ (ARM64_CPUCAP_SCOPE_LOCAL_CPU
+ ARM64_CPUCAP_OPTIONALFOR_LATE_CPU
+ ARM64_CPUCAP_PERMITTEDFOR_LATE_CPU)
+
+/*
+ * CPU feature detected at boot time, on one or more CPUs. A late CPU
+ * is not allowed to have the capability when the system doesn't have it.
+ * It is Ok for a late CPU to miss the feature.
+ */
+#define ARM64_CPUCAP_BOOT_RESTRICTED_CPU_LOCALFEATURE
+ (ARM64_CPUCAP_SCOPE_LOCAL_CPU
+ ARM64_CPUCAP_OPTIONALFOR_LATE_CPU)
+
+/*
+ * CPU feature used early in the boot based on the boot CPU. All secondary
+ * CPUs must match the state of the capability as detected by the boot CPU.
+ */
+#define ARM64_CPUCAP_STRICT_BOOT_CPUFEATURE ARM64_CPUCAP_SCOPE_BOOT_CPU

struct arm64_cpu_capabilities {
    const char *desc;
    u16 capability;
    -int def_scope; /* default scope */
    +u16 type;
    bool (*matches)(const struct arm64_cpu_capabilities *caps, int scope);
    -int (*enable)(void *); /* Called on all active CPUs */
    +*/
    + * Take the appropriate actions to enable this capability for this CPU.
    + * For each successfully booted CPU, this method is called for each
    + * globally detected capability.
    + */
    +void (*cpu_enable)(const struct arm64_cpu_capabilities *cap);
    union {
        struct { /* To be used for erratum handling only */
            ...
struct {
    /* Feature register checking */
    u32 sys_reg;
    u8 field_pos;
} @@ -118,6 +323,23 @@
};

+static inline int cpucap_default_scope(const struct arm64_cpu_capabilities *cap)
+{
+    return cap->type & ARM64_CPUCAP_SCOPE_MASK;
+}
+
+static inline bool
+cpucap_late_cpu_optional(const struct arm64_cpu_capabilities *cap)
+{
+    return !!((cap->type & ARM64_CPUCAP_OPTIONAL_FOR_LATE_CPU);
+}
+
+static inline bool
+cpucap_late_cpu_permitted(const struct arm64_cpu_capabilities *cap)
+{
+    return !!((cap->type & ARM64_CPUCAP_PERMITTED_FOR_LATE_CPU);
+}
+
extern DECLARE_BITMAP(cpu_hwcaps, ARM64_NCAPS);
extern struct static_key_false cpu_hwcap_keys[ARM64_NCAPS];
extern struct static_key_false arm64_const_caps_ready;
@@ -236,15 +458,8 @@
}

void __init setup_cpu_features(void);
-
-void update_cpu_capabilities(const struct arm64_cpu_capabilities *caps,
-    const char *info);
-void enable_cpu_capabilities(const struct arm64_cpu_capabilities *caps);
-void check_local_cpu_capabilities(void);
-
-void update_cpu_errata_workarounds(void);
-void __init enable_errata_workarounds(void);
-void verify_local_cpu_errata_workarounds(void);
-
u64 read_sanitised_ftr_reg(u32 id);
+static inline int arm64_get_ssbd_state(void)
+{
+    #ifdef CONFIG_ARM64_SSBD
+    extern int ssbd_state;
+    return ssbd_state;
+    #else
+    return ARM64_SSBD_UNKNOWN;
+    #endif
+}
+
+void arm64_set_ssbd_mitigation(bool state);
+
+#endif /* __ASSEMBLY__ */

--- linux-4.15.0.orig/arch/arm64/include/asm/cputype.h
+++ linux-4.15.0/arch/arm64/include/asm/cputype.h
@@ -75,32 +75,57 @@
#define ARM_CPU_IMP_CAVIUM	 0x43
#define ARM_CPU_IMP_BRCM	 0x42
#define ARM_CPU_IMP_QCOM	 0x51
+#define ARM_CPU_IMP_NVIDIA	 0x4E
+#define ARM_CPU_IMP_HISI	 0x48
#define ARM_CPU_PART_AEM_V8	 0xD0F
#define ARM_CPU_PART_FOUNDATION	 0xD00
+#define ARM_CPU_PART_CORTEX_A55	 0xD05
#define ARM_CPU_PART_CORTEX_A57	 0xD07
+#define ARM_CPU_PART_CORTEX_A72	 0xD08
#define ARM_CPU_PART_CORTEX_A53	 0xD03
#define ARM_CPU_PART_CORTEX_A73	 0xD09
+#define ARM_CPU_PART_CORTEX_A75	 0xD0A
+#define ARM_CPU_PART_CORTEX_A35	 0xD04
+#define ARM_CPU_PART_CORTEX_A55	 0xD05

#define APM_CPU_PART_POTENZA	 0x000
#define CAVIUM_CPU_PART_THUNDERX 0x0A1
#define CAVIUM_CPU_PART_THUNDERX_81XX 0x0A2
#define CAVIUM_CPU_PART_THUNDERX_83XX 0x0A3
+#define CAVIUM_CPU_PART_THUNDERX2 0x0AF
#define BRCM_CPU_PART_VULCAN 0x516
#define QCOM_CPU_PART_FALKOR_V1 0x800
#define QCOM_CPU_PART_FALKOR 0xC00
+#define QCOM_CPU_PART_KRYO 0x200
+#define NVIDIA_CPU_PART_DENVER 0x003
+#define NVIDIA_CPU_PART_CARMEL 0x004
+
+#define HISI_CPU_PART_TSV110 0xD01

#define MIDR_CORTEX_A53 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A53)
+#define MIDR_CORTEX_A55 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A55)
#define MIDR_CORTEX_A57 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A57)
+#define MIDR_CORTEX_A72 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A72)
#define MIDR_CORTEX_A73 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A73)
+#define MIDR_CORTEX_A75 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A75)
+#define MIDR_CORTEX_A35 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A35)
+#define MIDR_CORTEX_A55 MIDR_CPU_MODEL(ARM_CPU_IMP_ARM, ARM_CPU_PART_CORTEX_A55)
#define MIDR_THUNDERX MIDR_CPU_MODEL(ARM_CPU_IMP_CAVIUM, CAVIUM_CPU_PART_THUNDERX)
#define MIDR_THUNDERX_81XX MIDR_CPU_MODEL(ARM_CPU_IMP_CAVIUM, CAVIUM_CPU_PART_THUNDERX_81XX)
#define MIDR_THUNDERX_83XX MIDR_CPU_MODEL(ARM_CPU_IMP_CAVIUM, CAVIUM_CPU_PART_THUNDERX_83XX)
+#define MIDR_CAVIUM_THUNDERX2 MIDR_CPU_MODEL(ARM_CPU_IMP_CAVIUM, CAVIUM_CPU_PART_THUNDERX2)
+#define MIDR_BRCM_VULCAN MIDR_CPU_MODEL(ARM_CPU_IMP_BRCM, BRCM_CPU_PART_VULCAN)
#define MIDR_QCOM_FALKOR_V1 MIDR_CPU_MODEL(ARM_CPU_IMP_QCOM, QCOM_CPU_PART_FALKOR_V1)
#define MIDR_QCOM_FALKOR MIDR_CPU_MODEL(ARM_CPU_IMP_QCOM, QCOM_CPU_PART_FALKOR)
+#define MIDR_QCOM_KRYO MIDR_CPU_MODEL(ARM_CPU_IMP_QCOM, QCOM_CPU_PART_KRYO)
+#define MIDR_NVIDIA_DENVER MIDR_CPU_MODEL(ARM_CPU_IMP_NVIDIA,
NVIDIA_CPU_PART_DENVER)
+#define MIDR_NVIDIA_CARMEL MIDR_CPU_MODEL(ARM_CPU_IMP_NVIDIA,
NVIDIA_CPU_PART_CARMEL)
+#define MIDR_HISI_TSV110 MIDR_CPU_MODEL(ARM_CPU_IMP_HISI, HISI_CPU_PART_TSV110)

#ifndef __ASSEMBLY__

@@ -109,6 +134,45 @@
#define read_cpuid(reg)read_sysreg_s(SYS_## reg)

/*
+ * Represent a range of MIDR values for a given CPU model and a
+ * range of variant/revision values.
+ *
+ * @model- CPU model as defined by MIDR_CPU_MODEL
+ * @rv_min- Minimum value for the revision/variant as defined by
+ * MIDR_CPU_VAR_REV
+ * @rv_max- Maximum value for the variant/revision for the range.
+ */
+struct midr_range {
+u32 model;
+u32 rv_min;
+u32 rv_max;
+};
+
+#define MIDR_RANGE(m, v_min, r_min, v_max, r_max)
+{
+.model = m,
+.rv_min = MIDR_CPU_VAR_REV(v_min, r_min),
+.rv_max = MIDR_CPU_VAR_REV(v_max, r_max),
+}
+
+#define MIDR_ALL_VERSIONS(m) MIDR_RANGE(m, 0, 0, 0xf, 0xf)
+
static inline bool is_midr_in_range(u32 midr, struct midr_range const *range)
{
+MIDR_IS_CPU_MODEL_RANGE(midr, range->model, 
+range->rv_min, range->rv_max);
+}
+
+static inline bool
+is_midr_in_range_list(u32 midr, struct midr_range const *ranges)
+{
+while (ranges->model)
+if (is_midr_in_range(midr, ranges++))
+return true;
+return false;
+}
The CPU ID never changes at run time, so we might as well tell the compiler that it's constant. Use this function to read the CPU ID rather than directly reading processor_id or read_cpuid() directly.

```c
void user_rewind_single_step(struct task_struct *task);
void user_fastforward_single_step(struct task_struct *task);
+void user_regs_reset_single_step(struct user_pt_regs *regs,
  struct task_struct *task);

void kernel_enable_single_step(struct pt_regs *regs);
void kernel_disable_single_step(void);
```

The following functions are used to manage the TTBR0_EL1 register:

```c
if (mm != current->active_mm) {
  cpu_switch_mm(mm->pgd, mm);
  uaccess_ttbr0_enable();
  post_ttbr_update_workaround();
} else {
  /* Update the current thread's saved ttbr0 since it is */
  /* restored as part of a return from exception. Set */
  /* the hardware TTBR0_EL1 using cpu_switch_mm() */
  /* directly to enable potential errata workarounds. */
  /* restored as part of a return from exception. Enable */
  /* access to the valid TTBR0_EL1 and invoke the errata */
  /* workaround directly since there is no return from */
  /* exception when invoking the EFI run-time services. */
  update_saved_ttbr0(current, mm);
  -cpu_switch_mm(mm->pgd, mm);
  +uaccess_ttbr0_enable();
  +post_ttbr_update_workaround();
} else {
```
/*
* Defer the switch to the current thread's TTBR0_EL1
* until uaccess_enable(). Restore the current
* thread's saved tbr0 corresponding to its active_mm
*/

-cpu_set_reserved_tbr0();
+uaccess_tbr0_disable();
update_saved_tbr0(current, current->active_mm);

--- linux-4.15.0.orig/arch/arm64/include/asm/esr.h
+++ linux-4.15.0/arch/arm64/include/asm/esr.h
@@ -86,6 +86,18 @@
#define ESR_ELx_WNR_SHIFT	(6)
#define ESR_ELx_WNR(UL(1) << ESR_ELx_WNR_SHIFT)

+/* Asynchronous Error Type */
+#define ESR_ELx_IDS_SHIFT	(24)
+#define ESR_ELx_IDS(UL(1) << ESR_ELx_IDS_SHIFT)
+#define ESR_ELx_AET_SHIFT	(10)
+#define ESR_ELx_AET(UL(0x7) << ESR_ELx_AET_SHIFT)
+
+#define ESR_ELx_AET_UC(UL(0) << ESR_ELx_AET_SHIFT)
+#define ESR_ELx_AET_UEU(UL(1) << ESR_ELx_AET_SHIFT)
+#define ESR_ELx_AET_UEO(UL(2) << ESR_ELx_AET_SHIFT)
+#define ESR_ELx_AET_UER(UL(3) << ESR_ELx_AET_SHIFT)
+#define ESR_ELx_AET_CE(UL(6) << ESR_ELx_AET_SHIFT)
+
/* Shared ISS field definitions for Data/Instruction aborts */
#define ESR_ELx_SET_SHIFT	(11)
#define ESR_ELx_SET_MASK	(UL(3) << ESR_ELx_SET_SHIFT)
@@ -100,6 +112,7 @@
#define ESR_ELx_FSC		(0x3F)
#define ESR_ELx_FSC_TYPE	(0x3C)
#define ESR_ELx_FSC_EXTABT	(0x10)
+#define ESR_ELx_FSC_SERROR	(0x11)
#define ESR_ELx_FSC_ACCESS	(0x08)
#define ESR_ELx_FSC_FAULT	(0x04)
#define ESR_ELx_FSC_PERM	(0x0C)
@@ -127,6 +140,13 @@
#define ESR_ELx_WFx_ISS_WFE	(UL(1) << 0)
#define ESR_ELx_xVC_IMM_MASK	((1UL << 16) - 1)

+/* DISR_EL1_IDS(UL(1) << 24)
+*/
+* DISR_EL1 and ESR_ELx share the bottom 13 bits, but the RES0 bits may mean
+* different things in the future...
+*/
+\#define DISR_EL1_ESR_MASK(ESR_ELx_AET | ESR_ELx_EA | ESR_ELx_FSC)
+
+/* ESR value templates for specific events */

/* BRK instruction trap from AArch64 state */
--- linux-4.15.0.org/arch/arm64/include/asm/exception.h
+++ linux-4.15.0/arch/arm64/include/asm/exception.h
@@ -18,6 +18,8 @@
+#ifndef __ASM_EXCEPTION_H
+#define __ASM_EXCEPTION_H
+#include <asm/esr.h>
+
#include <linux/interrupt.h>
#define __exception __attribute__((section(".exception.text")))
@@ -27,4 +29,16 @@
#define __exception_irq_entry __exception
#endif

+static inline u32 disr_to_esr(u64 disr)
+
+{ unsigned int esr = ESR_ELx_EC_SERROR << ESR_ELx_EC_SHIFT;
+ +if ((disr & DISR_EL1_IDS) == 0)
+ esr |= (disr & DISR_EL1_ESR_MASK);
+else
+ esr |= (disr & ESR_ELx_ISS_MASK);
+ +
+return esr;
+}
+
+#endif /* __ASM_EXCEPTION_H */
--- linux-4.15.0.orig/arch/arm64/include/asm/fixmap.h
+++ linux-4.15.0/arch/arm64/include/asm/fixmap.h
@@ -58,6 +58,11 @@

#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+  FIX_ENTRY_TRAMP_DATA,
+  FIX_ENTRY_TRAMP_TEXT,
+  #define TRAMP_VALIAS (__fix_to_virt(FIX_ENTRY_TRAMP_TEXT))
+#endif /* CONFIG_UNMAP_KERNEL_AT_EL0 */
@endf/* CONFIG_ACPI_APEI_GHES */

+}
extern void sve_load_state(void const *state, u32 const *pfpsr,
    unsigned long vq_minus_1);
extern unsigned int sve_get_vl(void);
extern int sve_kernel_enable(void *);
+struct arm64_cpu_capabilities;
+extern void sve_kernel_enable(const struct arm64_cpu_capabilities *__unused);

extern int __ro_after_init sve_max_vl;

--- linux-4.15.0.orig/arch/arm64/include/asm/ftrace.h
+++ linux-4.15.0/arch/arm64/include/asm/ftrace.h
@@ -56,6 +56,19 @@
{
    return is_compat_task();
}
+
+#define ARCH_HAS_SYSCALL_MATCH_SYM_NAME
+
+static inline bool arch_syscall_match_sym_name(const char *sym,
+    const char *name)
+{
+ /*
+  * Since all syscall functions have __arm64_ prefix, we must skip it.
+  * However, as we described above, we decided to ignore compat
+  * sysscalls, so we don't care about __arm64_compat_ prefix here.
+  */
+  return !strcmp(sym + 8, name);
+}
#endif /* ifndef __ASSEMBLY__ */

#include <asm/errno.h>

+#define FUTEX_MAX_LOOPS 128 /* What's the largest number you can think of? */
+
#define __futex_atomic_op(insn, ret, oldval, uaddr, tmp, oparg)
    do {
    unsigned int loops = FUTEX_MAX_LOOPS;
    asm volatile("\n    uaccess_enable();\n    asm volatile("\n
"prfm\tprfm\n"1:ldxr\t%w1, %2\n
insn "n"
-"2:stlxr\tw3, %w0, %2\n"-cbnz\tw3, 1b\n
-dmbish\n"
+"2:stlxr\tw0, %w3, %2\n"+cbz\tw0, 3f\n
insn 
-"2:stlxr\tw3, %w0, %2\n"-cbnz\tw3, 1b\n
+"mov\tw0, %w7\n"
3:\n
+dmbish\n"
","\n".pushsection \.fixup,"ax\n"
".align2\n"-"4:mov\tw0, %w5\n"+"4:mov\tw0, %w6\n
"b3b\n"
",".popsection\n"
_ASM_EXTABLE(1b, 4b)\n_ASM_EXTABLE(2b, 4b)\n-": "=&r" (ret), "+Q" (uaddr), "+r" (tmp)\n-": r" (oparg), "Ir" (-EFAULT)\n+": "=&r" (ret), "+Q" (uaddr), "+r" (tmp),
+": +r" (loops)\n+": +r" (oparg), "Ir" (-EFAULT), "Ir" (-EAGAIN)\n
: "memory";}\n
uaccess_disable();\n
} while (0)\n
static inline int
-arch_futex_atomic_op_inuser(int op, int oparg, int *oval, u32 __user *uaddr)\n+arch_futex_atomic_op_inuser(int op, int oparg, int *oval, u32 __user *uaddr)\n{
int oldval = 0, ret, tmp;
+u32 __user *uaddr = __uaccess_mask_ptr(uaddr);

pagefault_disable();\n
switch (op) {\n    case FUTEX_OP_SET: \n    -__futex_atomic_op("mov\tw0, %w4", \n    +__futex_atomic_op("mov\tw3, %w5", \n    ret, oldval, uaddr, tmp, oparg); \n    break; \n    case FUTEX_OP_ADD: \n    -__futex_atomic_op("add\tw0, %w1, %w4", \n    +__futex_atomic_op("add\tw3, %w1, %w5", \n}
    ret, oldval, uaddr, tmp, oparg);
break;
case FUTEX_OP_OR:
    __futex_atomic_op("orr %w0, %w1, %w4",
    __futex_atomic_op("orr %w3, %w1, %w5",
    ret, oldval, uaddr, tmp, oparg);
break;
case FUTEX_OP_ANDN:
    __futex_atomic_op("and %w0, %w1, %w4",
    __futex_atomic_op("and %w3, %w1, %w5",
    ret, oldval, uaddr, tmp, ~oparg);
break;
case FUTEX_OP_XOR:
    __futex_atomic_op("eor %w0, %w1, %w4",
    __futex_atomic_op("eor %w3, %w1, %w5",
    ret, oldval, uaddr, tmp, oparg);
break;
default:

static inline int
    -futex_atomic_cmpxchg_inatomic(u32 *uval, u32 __user *uaddr,
    +futex_atomic_cmpxchg_inatomic(u32 *uval, u32 __user * _uaddr,
    u32 oldval, u32 newval)
    {
    int ret = 0;
    unsigned int loops = FUTEX_MAX_LOOPS;
    u32 val, tmp;
    +u32 __user *uaddr;

    -if (!access_ok(VERIFY_WRITE, uaddr, sizeof(u32))
    +if (!access_ok(VERIFY_WRITE, _uaddr, sizeof(u32)))
    return -EFAULT;

    +uaddr = __uaccess_mask_ptr(_uaddr);
    uaccess_enable();
    asm volatile("// futex_atomic_cmpxchg_inatomic\n"
    "prfm pstl1strm, %2\n"
    "1:ldxr %w1, %2\n"
    "-"sub%w3, %w1, %w4\n"
    "-"cbnz%w3, 3f\n"
    "2:stlxr%w3, %w5, %2\n"
    "-"cbnz%w3, 1b\n"
    "-"dmb\n"
    +"sub%w3, %w1, %w5\n"
    +"cbnz%w3, 4f\n"
    +"2:stlxr%w3, %w6, %2\n"
"cbz\%w3, 3f\n"
"sub\%w4, \%w4, \%w3\n"
"cbnz\%w4, 1b\n"
"mov\%w0, \%w8\n"
"3:\n"
"dmbish\n"
"4:\n"
".pushsection .fixup,\"ax\"\n"
"4:mov\%w0, \%w6\n"
"b3b\n"
"5:mov\%w0, \%w7\n"
"b4b\n"
".popsection\n"
-__ASM_EXTABLE(1b, 4b)
-__ASM_EXTABLE(2b, 4b)
-: "+r" (ret), "=&r" (val), "+Q" (*uaddr), "=&r" (tmp)
-: "r" (oldval), "r" (newval), "Ir" (-EFAULT)
+__ASM_EXTABLE(1b, 5b)
+__ASM_EXTABLE(2b, 5b)
+: "+r" (ret), "=&r" (val), "+Q" (*uaddr), "=&r" (tmp), "+r" (loops)
+: "r" (oldval), "r" (newval), "Ir" (-EFAULT), "Ir" (-EAGAIN)
 : "memory"
);
uaccess_disable();

*uval = val;
+if (!ret)
+*uval = val;
+
return ret;
}

--- linux-4.15.0.orig/arch/arm64/include/asm/hardirq.h
+++ linux-4.15.0/arch/arm64/include/asm/hardirq.h
@@ -17,8 +17,12 @@

#include <linux/cache.h>
+#include <linux/percpu.h>
#include <linux/threads.h>
+#include <asm/barrier.h>
#include <asm/irq.h>
+#include <asm/kvm_arm.h>
+#include <asm/sysreg.h>

#define NR_IPI 7

@@ -37,6 +41,33 @@

#define __ASM_HARDIRQ_H

#include <linux/cache.h>
+#include <linux/percpu.h>
#include <linux/threads.h>
+#include <asm/barrier.h>
#include <asm/irq.h>
+#include <asm/kvm_arm.h>
+#include <asm/sysreg.h>

#define NR_IPI7

@@ -37,6 +41,33 @@
#define __ARCH_IRQ_EXIT_IRQS_DISABLED 1

+struct nmi_ctx {
+u64 hcr;
+};
+
+DECLARE_PER_CPU(struct nmi_ctx, nmi_contexts);
+
+#define arch_nmi_enter() \
+do {} \
+if (is_kernel_in_hyp_mode()) { \
+struct nmi_ctx *nmi_ctx = this_cpu_ptr(&nmi_contexts); \
+nmi_ctx->hcr = read_sysreg(hcr_el2); \
+if (!(nmi_ctx->hcr & HCR_TGE)) { \
+write_sysreg(nmi_ctx->hcr | HCR_TGE, hcr_el2); \
+isb(); \
+} \
+} \
+} while (0)
+
+#define arch_nmi_exit() \
+do {} \
+if (is_kernel_in_hyp_mode()) { \
+struct nmi_ctx *nmi_ctx = this_cpu_ptr(&nmi_contexts); \
+if (!(nmi_ctx->hcr & HCR_TGE)) \
+write_sysreg(nmi_ctx->hcr, hcr_el2); \
+} \
+} while (0)
+
+static inline void ack_bad_irq(unsigned int irq)
{
    extern unsigned long irq_err_count;

    enum aarch64_insn_register state,
    enum aarch64_insn_size_type size,
    enum aarch64_insn_ldst_type type);
+u32 aarch64_insn_gen_ldadd(enum aarch64_insn_register result,
    enum aarch64_insn_register address,
#include <asm/io.h>

/* IO barriers */

#define __iormb()
#define __iowmb()
#define mmiowb()

#define readb(c)  ({ u8  __v = readb_relaxed(c); __iormb(); __v; })
#define readw(c)  ({ u16 __v = readw_relaxed(c); __iormb(); __v; })
#define readl(c)  ({ u32 __v = readl_relaxed(c); __iormb(); __v; })
#define readq(c)  ({ u64 __v = readq_relaxed(c); __iormb(); __v; })

#define writeb(v,c)((__iowmb(); writeb_relaxed((v),(c)); ))
#define writew(v,c)((__iowmb(); writew_relaxed((v),(c)); ))

/*
 * io{read,write}{16,32,64}be() macros
*/
#define ioread16be(p)((__u16 __v = be16_to_cpu((__force __be16)__raw_readw(p)); __iormb(); __v; )
#define ioread32be(p)((__u32 __v = be32_to_cpu((__force __be32)__raw_readl(p)); __iormb(); __v; )
#define ioread64be(p)((__u64 __v = be64_to_cpu((__force __be64)__raw_readq(p)); __iormb(); __v; )
#define iowrite16be(v,p)((__iowmb(); __raw_writew((__force __u16)cpu_to_be16(v), p); )
#define iowrite32be(v,p)((__iowmb(); __raw_writel((__force __u32)cpu_to_be32(v), p); )

static __always_inline bool arch_static_branch(struct static_key *key, bool branch) {
    asm goto("1: nop\n\t"

static __always_inline bool arch_static_branch_jump(struct static_key *key, bool branch) {
    asm goto("1: b %l[1][yes]\n\t"

/* Hyp Configuration Register (HCR) bits */
#define HCR_API(UL(1) << 41)
#define HCR_APK(UL(1) << 40)
#define HCR_TEA(UL(1) << 37)
#define HCR_TERR(UL(1) << 36)
#define HCR_E2H(UL(1) << 34)
#define HCR_ID(UL(1) << 33)
#define HCR_CD(UL(1) << 32)
* IMO: Override CPSR.I and enable signaling with VI
* FMO: Override CPSR.F and enable signaling with VF
* SWIO: Turn set/way invalidates into set/way clean+invalidate
* PTW: Take a stage2 fault if a stage1 walk steps in device memory
/
#define HCR_GUEST_FLAGS (HCR_TSC | HCR_TSW | HCR_TWE | HCR_TWI | HCR_VM | |
| HCR_TVM | HCR_BSU_IS | HCR_FB | HCR_TAC | |
- HCR_AMO | HCR_SWIO | HCR_TIDCP | HCR_RW)
+			 HCR_AMO | HCR_SWIO | HCR_TIDCP | HCR_RW | HCR_PTW)
#define HCR_VIRT_EXCP_MASK (HCR_VSE | HCR_VI | HCR_VF)
#define HCR_INT_OVERRIDE   (HCR_FMO | HCR_IMO)
+#define HCR_HOST_NVHE_FLAGS (HCR_RW | HCR_API | HCR_APK)
#difn HCR_HOST_VHE_FLAGS (HCR_RW | HCR_TGE | HCR_E2H)
/* TCR_EL2 Registers bits */
@@ -99,7 +105,7 @@
| TCR_EL2_ORGN0_MASK | TCR_EL2_IRGN0_MASK | TCR_EL2_T0SZ_MASK)
/* VTCR_EL2 Registers bits */
-#define VTCR_EL2_RES1(1 << 31)
+#define VTCR_EL2_RES1(1U << 31)
#define VTCR_EL2_HD(1 << 22)
#define VTCR_EL2_HA(1 << 21)
#define VTCR_EL2_PS_MASKTCR_EL2_PS_MASK
@@ -189,6 +195,7 @@
#define CPTR_EL2_DEFAULT CPTR_EL2_RES1
/* Hyp Debug Configuration Register bits */
+#define MDCR_EL2_TTRF(1 << 19)
#define MDCR_EL2_TPMS(1 << 14)
#define MDCR_EL2_E2PB_MASK(UL(0x3))
#define MDCR_EL2_E2PB_SHIFT(UL(12))
--- linux-4.15.0.orig/arch/arm64/include/asm/kvm_asm.h
+++ linux-4.15.0/arch/arm64/include/asm/kvm_asm.h
@@ -33,6 +33,10 @@
#define KVM_ARM64_DEBUG_DIRTY_SHIFT	0
#define KVM_ARM64_DEBUG_DIRTY		(1 << KVM_ARM64_DEBUG_DIRTY_SHIFT)
+#define VCPU_WORKAROUND_2_FLAG_SHIFT	0
+#define VCPU_WORKAROUND_2_FLAG		(_AC(1, UL) << VCPU_WORKAROUND_2_FLAG_SHIFT)
+
/* Translate a kernel address of @sym into its equivalent linear mapping */
#define kvm_ksym_ref(sym) 
({
void *val = &sym;

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extern u32 __init_stage2_translation(void);

+/* Home-grown __this_cpu_{ptr,read} variants that always work at HYP */
+#define __hyp_this_cpu_ptr(sym)
+({
+void *__ptr = hyp_symbol_addr(sym);
+__ptr += read_sysreg(tpidr_el2);
+ (typeof(&sym))__ptr;
+ })
+
+#define __hyp_this_cpu_read(sym)
+({
+__hyp_this_cpu_ptr(sym);
+ })
+
+#define __KVM_EXTABLE(from, to)
+".pushsection__kvm_ex_table, "a"
+.align3
+.long(" #from " - .), (" #to " - .)
+.popsection"
+
+#define __kvm_at(at_op, addr)
+( { 
+int __kvm_at_err = 0;
+asm volatile(
+"mrs%1, spsr_el2"
+"mrs%2, elr_el2"
+"1:at	"at_op", %3
"isb"
"2:	mov%w0, %4"
:"+r" (__kvm_at_err), "=&r" (spsr), "=&r" (elr)
:"r" (addr), "i" (-EFAULT));
+ __kvm_at_err;
+ })
+
+#else /* __ASSEMBLY__ */
+.macro hyp_adr_this_cpu reg, sym, tmp
+adr_l	 reg, sym
+asm volatile(
+"msr_el2, %1"
+"mov%w0, %4"
+":2:mrspsr_el2, %1"
+"msrelr_el2, %2"
+"mov%w0, %4"
+":9"
+"__KVM_EXTABLE(1b, 2b)"
+":+r" (__kvm_at_err), "=-r" (spsr), "=-r" (elr)
+":i" (addr), "i" (-EFAULT));
+ __kvm_at_err;
+ }
+ .macro hyp_adr_this_cpu]()
+asm volatile(
+"mrs	reg, tpidr_el2"
+":9"
+"mov%w0, %4"
+":2:mrspsr_el2, %1"
+"msrelr_el2, %2"
+"mov%w0, %4"
+":9"
+"__KVM_EXTABLE(1b, 2b)"
+":+r" (__kvm_at_err), "=-r" (spsr), "=-r" (elr)
+":i" (addr), "i" (-EFAULT));
+ __kvm_at_err;
+ })
+ .macro hyp_adr_this_cpu()
+add\%reg, \%reg, \%tmp
+.endm
+
+.macro hyp_ldr_this_cpu reg, sym, tmp
+adr\%reg, \%sym
+mrs\tmp, tpidr_el2
+ldr\%reg, [\%reg, \%tmp]
+.endm
+
+.macro get_host_ctxt reg, tmp
+hyp_adr_this_cpu \%reg, kvm_host_cpu_state, \%tmp
+.endm
+
+.macro get_vcpu_ptr vcpu, ctxt
+get_host_ctxt \%ctxt, \%vcpu
+ldr\%vcpu, [\%ctxt, #HOST_CONTEXT_VCPU]
+kern_hyp_val\vcpu
+.endm
+
+/*
+ * KVM extable for unexpected exceptions.
+ * In the same format _asm_extable, but output to a different section so that
+ * it can be mapped to EL2. The KVM version is not sorted. The caller must
+ * ensure:
+ * x18 has the hypervisor value to allow any Shadow-Call-Stack instrumented
+ * code to write to it, and that SPSR_EL2 and ELR_EL2 are restored by the fixup.
+ */
+.macro _kvm_extable, from, to
+.pushsection __kvm_ex_table, "a"
+.align3
+.long (from - .), (to - .)
+.popsection
+.endm
+
#endif /* __ARM_KVM_ASM_H__ */

--- linux-4.15.0.orig/arch/arm64/include/asm/kvm_emulate.h
+++ linux-4.15.0/arch/arm64/include/asm/kvm_emulate.h
@@ -45,11 +45,23 @@
void kvm_inject_dabt32(struct kvm_vcpu *vcpu, unsigned long addr);
void kvm_inject_pabt32(struct kvm_vcpu *vcpu, unsigned long addr);

+static inline bool vcpu_el1_is_32bit(struct kvm_vcpu *vcpu)
+{
+if(vcpu->arch.hcr_el2 & HCR_RW);
+}
static inline void vcpu_reset_hcr(struct kvm_vcpu *vcpu) {
    vcpu->arch.hcr_el2 = HCR_GUEST_FLAGS;
    if (is_kernel_in_hyp_mode())
        vcpu->arch.hcr_el2 |= HCR_E2H;
    if (cpus_have_const_cap(ARM64_HAS_RAS_EXTN)) {
        /* route synchronous external abort exceptions to EL2 */
        vcpu->arch.hcr_el2 |= HCR_TEA;
        /* trap error record accesses */
        vcpu->arch.hcr_el2 |= HCR_TERR;
    } else if (test_bit(KVM_ARM_VCPU_EL1_32BIT, vcpu->arch.features))
        vcpu->arch.hcr_el2 &= ~HCR_RW;
}

+static inline void vcpu_set_vsesr(struct kvm_vcpu *vcpu, u64 vsesr) {
    +vcpu->arch.vsesr_el2 = vsesr;
}
+
static inline unsigned long *vcpu_pc(const struct kvm_vcpu *vcpu) {
    return (unsigned long *)&vcpu_gp_regs(vcpu)->regs.pc;
}

+/*
* The layout of SPSR for an AArch32 state is different when observed from an
* AArch64 SPSR_ELx or an AArch32 SPSR_. This function generates the AArch32
* view given an AArch64 view.
* +
* + In ARM DDI 0487E.a see:
* +
* + - The AArch64 view (SPSR_EL2) in section C5.2.18, page C5-426
* + - The AArch32 view (SPSR_abt) in section G8.2.126, page G8-6256
* + - The AArch32 view (SPSR_und) in section G8.2.132, page G8-6280
* +
* + Which show the following differences:
* +
* + | Bit | AA64 | AA32 | Notes                      |
* + | +-----+------+------+---------------|
* + | 24   | DIT  | J    | J is RES0 in ARMv8 |
* + | 21   | SS   | DIT  | SS doesn't exist in AArch32 |
static inline unsigned long host_spsr_to_spsr32(unsigned long spsr)
{
    const unsigned long overlap = BIT(24) | BIT(21);
    unsigned long dit = !(spsr & PSR_AA32_DIT_BIT);

    spsr &= ~overlap;
    spsr |= dit << 21;
    return spsr;
}

static inline bool vcpu_mode_priv(const struct kvm_vcpu *vcpu)
{
    u32 mode;
    return ((phys_addr_t)vcpu->arch.fault.hpfar_el2 & HPFAR_MASK) << 8;
}

static inline u64 kvm_vcpu_get_disr(const struct kvm_vcpu *vcpu)
{
    return vcpu->arch.fault.disr_el1;
}

static inline u32 kvm_vcpu_hvc_get_imm(const struct kvm_vcpu *vcpu)
{
    return kvm_vcpu_get_hsr(vcpu) & ESR_ELx_xVC_IMM_MASK;
}

static inline bool kvm_vcpu_dabt_issf(const struct kvm_vcpu *vcpu)
{
    return !!(kvm_vcpu_get_hsr(vcpu) & ESR_ELx_SF);
}

static inline int kvm_vcpu_dabt_get_rd(const struct kvm_vcpu *vcpu)
{
    return (kvm_vcpu_get_hsr(vcpu) & ESR_ELx_SRT_MASK) >> ESR_ELx_SRT_SHIFT;
}

static inline bool kvm_vcpu_abt_iss1tw(const struct kvm_vcpu *vcpu)
{
    return !!(kvm_vcpu_get_hsr(vcpu) & ESR_ELx_S1PTW);
static inline bool kvm_vcpu_dabt_iswrite(const struct kvm_vcpu *vcpu) {
    return !(kvm_vcpu_get_hsr(vcpu) & ESR_ELx_WNR) ||
            -kvm_vcpu_dabt_iss1tw(vcpu); /* AF/DBM update */
            +kvm_vcpu_abt_iss1tw(vcpu); /* AF/DBM update */
}

static inline bool kvm_vcpu_dabt_is_cm(const struct kvm_vcpu *vcpu) {
    return kvm_vcpu_trap_get_class(vcpu) == ESR_ELx_EC_IABT_LOW;
}

+static inline bool kvm_vcpu_trap_is_exec_fault(const struct kvm_vcpu *vcpu) {
    return kvm_vcpu_trap_is_iabt(vcpu) && !kvm_vcpu_abt_iss1tw(vcpu);
}

static inline u8 kvm_vcpu_trap_get_fault(const struct kvm_vcpu *vcpu) {
    return kvm_vcpu_get_hsr(vcpu) & ESR_ELx_FSC;
}

--- linux-4.15.0.orig/arch/arm64/include/asm/kvm_host.h
+++ linux-4.15.0/arch/arm64/include/asm/kvm_host.h
@@ -25,6 +25,7 @@
#include <linux/types.h>
#include <linux/kvm_types.h>
#include <asm/cpufeature.h>
+include <asm/daifflags.h>
#include <asm/fpsimd.h>
#include <asm/kvm.h>
#include <asm/kvm_asm.h>
@@ -46,6 +47,7 @@
#define KVM_REQ_SLEEP \%
KVM_ARCH_REQ_FLAGS(0, KVM_REQUEST_WAIT | KVM_REQUEST_NO_WAKEUP) \%
#define KVM_REQ_IRQ_PENDINGKVM_ARCH_REQ(1) \%
+define KVM_REQ_VCPU_RESETKVM_ARCH_REQ(2)

int __attribute_const__ kvm_target_cpu(void);
int kvm_reset_vcpu(struct kvm_vcpu *vcpu);
@@ -72,6 +74,9 @@
/* Interrupt controller */
struct vgic_dist vgic;
+
+/* Mandated version of PSCI */
+u32 psci_version;
};
#define KVM_NR_MEM_OBJS 40
@@ -89,6 +94,7 @@
 u32 esr_el2;/* Hyp Syndrom Register */
 u64 far_el2;/* Hyp Fault Address Register */
 u64 hpfar_el2;/* Hyp IPA Fault Address Register */
+u64 disr_el1;/* Deferred [SError] Status Register */
 ];

 /* Performance Monitors Registers */
 PMCR_EL0;/* Control Register */
@@ -156,6 +163,7 @@
#define c2_TTBR1(TTBR1_EL1 * 2;/* Translation Table Base Register 1 */
#define c2_TTBR1_high(c2_TTBR1 + 1;/* TTBR1 top 32 bits */
#define c2_TTBCR(TCR_EL1 * 2;/* Translation Table Base Control R. */
+#define c2_TTBCR2(c2_TTBCR + 1;/* Translation Table Base Control R. 2 */
#define c3_DACR(DACR32_EL2 * 2;/* Domain Access Control Register */
#define c5_DFSR(ESR_EL1 * 2;/* Data Fault Status Register */
#define c5_IFSR(IFSR32_EL2 * 2;/* Instruction Fault Status Register */
@@ -192,10 +201,19 @@
 u64 sys_regs[NR_SYS_REGS];
 u32 copro[NR_COPRO_REGS];
 ];
+struct kvm_vcpu *__hyp_running_vcpu;
];

typedef struct kvm_cpu_context kvm_cpu_context_t:
+struct vcpu_reset_state {
+unsigned long pc;
+unsigned long r0;
+bool b;
+}
+bool reset;
+
+struct kvm_vcpu_arch {
+    struct kvm_cpu_context ctxt;
+
+    @ @ -206.6 +224.9 @@
+    /* Exception Information */
+    struct kvm_vcpu_fault_info fault;
+
+    /* State of various workarounds, see kvm_asm.h for bit assignment */
+    u64 workaround_flags;
+
+    /* Guest debug state */
+    u64 debug_flags;
+
+    @ @ -277.6 +298.12 @@
+
+    /* Detect first run of a vcpu */
+    bool has_run_once;
+
+    /* Virtual SError ESR to restore when HCR_EL2.VSE is set */
+    u64 vsesr_el2;
+
+    /* Additional reset state */
+    struct vcpu_reset_state reset_state;
+};

#define vcpu_gp_regs(v) (&(v)->arch.ctxt.gp_regs)
@@ -285,8 +312,12 @@
 * CP14 and CP15 live in the same array, as they are backed by the
 * same system registers.
 * /
-#define vcpu_cp14(v,r)((v)->arch.ctxt.copro[(r)])
-#define vcpu_cp15(v,r)((v)->arch.ctxt.copro[(r)])
+#define CPx_BIAS_ENABLED(CONFIG_CPU_BIG_ENDIAN)
+
+#define vcpu_cp14(v,r)((v)->arch.ctxt.copro[(r) ^ CPx_BIAS])
+#define vcpu_cp15(v,r)((v)->arch.ctxt.copro[(r) ^ CPx_BIAS])

#ifdef CONFIG_CPU_BIG_ENDIAN
#define vcpu_cp15_64_high(v,r)vcpu_cp15((v),(r))
@@ -340,16 +369,25 @@
     int handle_exit(struct kvm_vcpu *vcpu, struct kvm_run *run,
                     int exception_index);
+void handle_exit_early(struct kvm_vcpu *vcpu, struct kvm_run *run,
                     int exception_index);
int kvm_perf_init(void);
int kvm_perf_teardown(void);

struct kvm_vcpu *kvm_mpidr_to_vcpu(struct kvm *kvm, unsigned long mpidr);

+void __kvm_set_tpidr_el2(u64 tpidr_el2);
+DECLARE_PER_CPU(kvm_cpu_context_t, kvm_host_cpu_state);
+
+void __kvm_enable_ssbs(void);
+
static inline void __cpu_init_hyp_mode(phys_addr_t pgd_ptr,
    unsigned long hyp_stack_ptr,
    unsigned long vector_ptr)
{
    u64 tpidr_el2;
    
    /*
    * Call initialization code, and switch to the full blown HYP code.
    * If the cpucaps haven't been finalized yet, something has gone very
    @@ -358,6 +396,25 @@
    */
    BUG_ON(!static_branch_likely(&arm64_const_caps_ready));
    __kvm_call_hyp((void *)pgd_ptr, hyp_stack_ptr, vector_ptr);
    +
    +/*
    + * Calculate the raw per-cpu offset without a translation from the
    + * kernel's mapping to the linear mapping, and store it in tpidr_el2
    + * so that we can use adr_l to access per-cpu variables in EL2.
    + */
    +tpidr_el2 = (u64)this_cpu_ptr(&kvm_host_cpu_state)
    + (u64)kvm_ksym_ref(kvm_host_cpu_state);
    +
    +kvm_call_hyp(__kvm_set_tpidr_el2, tpidr_el2);
    +
    +/*
    + * Disabling SSBD on a non-VHE system requires us to enable SSBS
    + * at EL2.
    + */
    +if (!has_vhe() && this_cpu_has_cap(ARM64_SSBS) &&
        arm64_get_ssbd_state() == ARM64_SSBD_FORCE_DISABLE) {
        +kvm_call_hyp(__kvm_enable_ssbs);
    +}
}

static inline void kvm_arch_hardware_unsetup(void) {}

@@ -396,4 +453,42 @@
sve_flush_cpu_state();


+static inline void kvm_arm_vhe_guest_enter(void)
+{
+local_daif_mask();
+
+static inline void kvm_arm_vhe_guest_exit(void)
+{
+local_daif_restore(DAIF_PROCCTX_NOIRQ);
+
+static inline bool kvm_arm_harden_branch_predictor(void)
+{
+return cpus_have_const_cap(ARM64_HARDEN_BRANCH_PREDICTOR);
+
+#define KVM_SSBD_UNKNOWN	-1
+#define KVM_SSBD_FORCE_DISABLE	0
+#define KVM_SSBD_KERNEL	1
+#define KVM_SSBD_FORCE_ENABLE	2
+#define KVM_SSBD_MITIGATED	3
+
+static inline int kvm_arm_have_ssbd(void)
+{
+switch (arm64_get_ssbd_state()) {
+case ARM64_SSBD_FORCE_DISABLE:
+return KVM_SSBD_FORCE_DISABLE;
+case ARM64_SSBD_KERNEL:
+return KVM_SSBD_KERNEL;
+case ARM64_SSBD_FORCE_ENABLE:
+return KVM_SSBD_FORCE_ENABLE;
+case ARM64_SSBD_MITIGATED:
+return KVM_SSBD_MITIGATED;
+case ARM64_SSBD_UNKNOWN:
+default:
+return KVM_SSBD_UNKNOWN;
+
+} #endif /* __ARM64_KVM_HOST_H__ */
--- linux-4.15.0.orig/arch/arm64/include/asm/kvm_mmio.h
+++ linux-4.15.0/arch/arm64/include/asm/kvm_mmio.h
@@ -21,13 +21,11 @@
#include <linux/kvm_host.h>
#include <asm/kvm_arm.h>
/*
- This is annoying. The mmio code requires this, even if we don't
- need any decoding. To be fixed.
- */

struct kvm_decode {
    unsigned long rt;
    bool sign_extend;
    /* Width of the register accessed by the faulting instruction is 64-bits */
    bool sixty_four;
};

void kvm_mmio_write_buf(void *buf, unsigned int len, unsigned long data);
--- linux-4.15.0.orig/arch/arm64/include/asm/kvm_mmu.h
+++ linux-4.15.0/arch/arm64/include/asm/kvm_mmu.h
@@ -131,6 +131,26 @@
#define kern_hyp_va(v) \((typeof(v))(__kern_hyp_va((unsigned long)(v))))

/*
 * Obtain the PC-relative address of a kernel symbol
 * s: symbol
 * *
 * The goal of this macro is to return a symbol's address based on a
 * PC-relative computation, as opposed to loading the VA from a
 * constant pool or something similar. This works well for HYP, as an
 * absolute VA is guaranteed to be wrong. Only use this if trying to
 * obtain the address of a symbol (i.e. not something you obtained by
 * following a pointer).
 * */
+#define hyp_symbol_addr(s)\n+(\{
+ typeof(s) *addr;\n+ asm("adrp %0, %1\n"
+ "add %0, %0, :lo12:%1\n"
+ : "%r" (addr) : "S" (&s));\n+addr;\n+)\n+
+/*
 * We currently only support a 40bit IPA.
 */
#define KVM_PHYS_SHIFT(40)
@ @ -276,6 +296,11 @ @
return __cpu_uses_extended_idmap();
}

+/*
 * Can't use pgd_populate here, because the extended idmap adds an extra level
 * above CONFIG_PGTABLE_LEVELS (which is 2 or 3 if we're using the extended
 * idmap), and pgd_populate is only available if CONFIG_PGTABLE_LEVELS = 4.
static inline void __kvm_extend_hypmap(pgd_t *boot_hyp_pgd, pgd_t *hyp_pgd, pgd_t *merged_hyp_pgd, ...

return (cpu_id_feature_extract_unsigned_field(reg, ID_AA64MMFR1_VMIDBITS_SHIFT) == 2) ? 16 : 8; }

+/*
 + * We are not in the kvm->srcu critical section most of the time, so we take
 + * the SRCU read lock here. Since we copy the data from the user page, we
 + * can immediately drop the lock again.
 + */
+static inline int kvm_read_guest_lock(struct kvm *kvm, ...
+
+int srcu_idx = srcu_read_lock(&kvm->srcu);
+int ret = kvm_read_guest(kvm, gpa, data, len);
+
+srcu_read_unlock(&kvm->srcu, srcu_idx);
+
+return ret;
+}
+
+static inline int kvm_write_guest_lock(struct kvm *kvm, gpa_t gpa, ...
+
+int srcu_idx = srcu_read_lock(&kvm->srcu);
+int ret = kvm_write_guest(kvm, gpa, data, len);
+
+srcu_read_unlock(&kvm->srcu, srcu_idx);
+
+return ret;
+}
+
+#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+#include <asm/mmu.h>
+
+static inline void *kvm_get_hyp_vector(void) {
+
+struct bp_hardening_data *data = arm64_get_bp_hardening_data();
+void *vect = kvm_ksym_ref(__kvm_hyp_vector);
+
+if (data->fn) {
+vect = __bp_harden_hyp_vecs_start +
+    data->hyp_vectors_slot * SZ_2K;
+
+if (!has_vhe())
vect = lm_alias(vect);
+
+return vect;
+
+static inline int kvm_map_vectors(void)
+{
+return create_hyp_mappings(kvm_ksym_ref(__bp_harden_hyp_vecs_start),
+    kvm_ksym_ref(__bp_harden_hyp_vecs_end),
+    PAGE_HYP_EXEC);
+}
+
+#ifdef CONFIG_ARM64_SSBD
+DECLARE_PER_CPU_READ_MOSTLY(u64, arm64_ssbd_callback_required);
+
+static inline int hyp_map_aux_data(void)
+{
+    int cpu, err;
+    
+    for_each_possible_cpu(cpu) {
+        u64 *ptr;
+        
+        ptr = per_cpu_ptr(&arm64_ssbd_callback_required, cpu);
+        err = create_hyp_mappings(ptr, ptr + 1, PAGE_HYP);
+        if (err)
+            return err;
+        
+        return 0;
+    }
+}
+else
+static inline int hyp_map_aux_data(void)
+{ 
+    return 0;
+}
+#endif
+}

KASAN requires 1/8th of the kernel virtual address space for the shadow region. KASAN can bloat the stack significantly, so double the (minimum) stack size when KASAN is in use.

* stack size when KASAN is in use, and then double it again if KASAN_EXTRA is on.

#ifdef CONFIG_KASAN
#define KASAN_SHADOW_SIZE (UL(1) << (VA_BITS - 3))
#endif

#ifdef CONFIG_KASAN_EXTRA
#define KASAN_THREAD_SHIFT 2
#else
#define KASAN_THREAD_SHIFT 1
#endif

#else
#define KASAN_SHADOW_SIZE 0
#define KASAN_THREAD_SHIFT 0
#endif

#define MMCF_AARCH320x1 /* mm context flag for AArch32 executables */
#define USER_ASID_BIT 48
#define USER_ASID_FLAG (UL(1) << USER_ASID_BIT)
#define TTBR_ASID_MASK (UL(0xffff) << 48)

typedef struct {
    atomic64_t id;
} ASID(mm);

#define ASID(mm) ((mm)->context.id.counter & 0xffff)

static inline bool arm64_kernel_unmapped_at_el0(void)
{
    return IS_ENABLED(CONFIG_UNMAP_KERNEL_AT_EL0) &&
           cpus_have_const_cap(ARM64_UNMAP_KERNEL_AT_EL0);
}

typedef void (*bp_hardening_cb_t)(void);
+struct bp_hardening_data {
+int bp_hyp_vectors_slot;
+bp_hardening_cb_t fn;
+};
+
+#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+extern char __bp_harden_hyp_vecs_start[], __bp_harden_hyp_vecs_end[];
+
+DECLARE_PER_CPU_READ_MOSTLY(struct bp_hardening_data, bp_hardening_data);
+
+static inline struct bp_hardening_data *arm64_get_bp_hardening_data(void)
+{
+return this_cpu_ptr(&bp_hardening_data);
+}
+
+static inline void arm64_apply_bp_hardening(void)
+{
+struct bp_hardening_data *d;
+
+if (!cpus_have_const_cap(ARM64_HARDEN_BRANCH_PREDICTOR))
+return;
+
+d = arm64_get_bp_hardening_data();
+if (d->fn)
+d->fn();
+}
+#else
+static inline struct bp_hardening_data *arm64_get_bp_hardening_data(void)
+{
+return NULL;
+}
+
+static inline void arm64_apply_bp_hardening(void) { }
+#endif /* CONFIG_HARDEN_BRANCH_PREDICTOR */
+
extern void paging_init(void);
extern void bootmem_init(void);
extern void __iomem *early_io_map(phys_addr_t phys, unsigned long virt);
@@ -41,4 +89,5 @@
extern void *fixmap_remap_fdt(phys_addr_t dt_phys);
extern void mark_linear_text_alias_ro(void);

+#endif /* !__ASSEMBLY__ */
#endif

--- linux-4.15.0.orig/arch/arm64/include/asm/mmu_context.h
+++ linux-4.15.0/arch/arm64/include/asm/mmu_context.h
@@ -41,4 +89,5 @@

No significant changes detected.
extern u64 module_alloc_base;
#else
--- linux-4.15.0.orig/arch/arm64/include/asm/numa.h
+++ linux-4.15.0/arch/arm64/include/asm/numa.h
@@ -25,6 +25,9 @@
 /* Returns a pointer to the cpumask of CPUs on Node 'node'. */
 static inline const struct cpumask *cpumask_of_node(int node)
 {
-if (node == NUMA_NO_NODE)
+if (node == NUMA_NO_NODE)
+return cpu_all_mask;
+
+return node_to_cpumask_map[node];
 }
#endif
--- linux-4.15.0.orig/arch/arm64/include/asm/percpu.h
+++ linux-4.15.0/arch/arm64/include/asm/percpu.h
@@ -16,11 +16,15 @@
 #ifndef __ASM_PERCPU_H
 #define __ASM_PERCPU_H
 #include <asm/alternative.h>
-#include <asm/stack_pointer.h>
+static inline void set_my_cpu_offset(unsigned long off)
+{
+-asm volatile("msr tpidr_el1, %0" :: "r" (off) : "memory");
+asm volatile(ALTERNATIVE("msr tpidr_el1, %0",
+ "msr tpidr_el2, %0",
+ ARM64_HAS_VIRT_HOST_EXTN)
+:: "r" (off) : "memory");
+
+static inline unsigned long __my_cpu_offset(void)
+{ @ @ -31.7 +35.10 @ @
+ * We want to allow caching the value, so avoid using volatile and
+ * instead use a fake stack read to hazard against barrier().
+ */
+asm("mrs %0, tpidr_el1" : "%r" (off)):
+asm(ALTERNATIVE("mrs %0, tpidr_el1",
+ "mrs %0, tpidr_el2",
+ ARM64_HAS_VIRT_HOST_EXTN)
+:: "%r" (off) :
+"Q" (*((const unsigned long *)&current_stack_pointer));

 return off;
 @ @ -86.6 +93.7 @ @
 : [val] "Ir" (val));\nbreak;\n
default:
+ret = 0;
BUILD_BUG();
}
\ 
@@ -115,6 +123,7 @@
ret = READ_ONCE(*(u64 *)ptr);
break;
default:
+ret = 0;
BUILD_BUG();
}

@@ -184,6 +193,7 @@
 : [val] "r" (val));
break;
default:
+ret = 0;
BUILD_BUG();
}

--- linux-4.15.0.orig/arch/arm64/include/asm/pgtable-hwdef.h
+++ linux-4.15.0/arch/arm64/include/asm/pgtable-hwdef.h
@@ -272,6 +272,7 @@
#define TCR_TG1_4K(UL(2) << TCR_TG1_SHIFT)
#define TCR_TG1_64K(UL(3) << TCR_TG1_SHIFT)

+#define TCR_A1(UL(1) << 22)
#define TCR_ASID16(UL(1) << 36)
#define TCR_TBI0(UL(1) << 37)
#define TCR_HA(UL(1) << 39)
--- linux-4.15.0.orig/arch/arm64/include/asm/pgtable-prot.h
+++ linux-4.15.0/arch/arm64/include/asm/pgtable-prot.h
@@ -34,47 +34,54 @@
#include <asm/pgtable-types.h>

-#define PROT_DEFAULT(PTE_TYPE_PAGE | PTE_AF | PTE_SHARED)
-#define PROT_SECT_DEFAULT(PMD_TYPE_SECT | PMD_SECT_AF | PMD_SECT_S)
+#define _PROT_DEFAULT(PTE_TYPE_PAGE | PTE_AF | PTE_SHARED)
+#define _PROT_SECT_DEFAULT(PMD_TYPE_SECT | PMD_SECT_AF | PMD_SECT_S)

-#define PROT_DEVICE_nGnRnE(PROT_DEFAULT | PTE_PXN | PTE_UXN | PTE_DIRTY | PTE_WRITE | PTE_ATTRINDEX(MT_DEVICE_nGnRnE))
-#define PROT_DEVICE_nGnRE(PROT_DEFAULT | PTE_PXN | PTE_UXN | PTE_DIRTY | PTE_WRITE | PTE_ATTRINDEX(MT_DEVICE_nGnRE))
-#define PROT_NORMAL_NC(PROT_DEFAULT | PTE_PXN | PTE_UXN | PTE_DIRTY | PTE_WRITE | PTE_ATTRINDEX(MT_NORMAL_NC))
#define PAGE_NONE 
		__pgprot(((_PAGE_DEFAULT) & ~PTE_VALID) | PTE_PROT_NONE | PTE_RDONLY | PTE_PXN | PTE_UXN)

#define PAGE_SHARED 
		__pgprot(_PAGE_DEFAULT | PTE_USER | PTE_NG | PTE_PXN | PTE_UXN | PTE_WRITE)

#define PAGE_SHARED_EXEC 
		__pgprot(_PAGE_DEFAULT | PTE_USER | PTE_NG | PTE_PXN | PTE_UXN | PTE_WRITE)

+#define PAGE_KERNEL 
		__pgprot(PROT_NORMAL)

+#define PAGE_KERNEL_RO 
		__pgprot((PROT_NORMAL & ~PTE_WRITE) | PTE_RDONLY)

+#define PAGE_KERNEL_ROX 
		__pgprot((PROT_NORMAL & ~(PTE_WRITE | PTE_PXN)) | PTE_RDONLY)

+#define PAGE_KERNEL_EXEC 
		__pgprot(PROT_NORMAL & ~PTE_PXN)

+#define PAGE_KERNEL_EXEC_CONT 
		__pgprot((PROT_NORMAL & ~PTE_PXN) | PTE_CONT)

+#define PAGE_HYP 
		__pgprot(_HYP_PAGE_DEFAULT | PTE_HYP | PTE_HYP_XN)

+#define PAGE_HYP_EXEC 
		__pgprot(_HYP_PAGE_DEFAULT | PTE_HYP | PTE_RDONLY)

+#define PAGE_HYP_RO 
		__pgprot(_HYP_PAGE_DEFAULT | PTE_HYP | PTE_RDONLY | PTE_HYP_XN)

+#define PAGE_HYP_DEVICE 
		__pgprot(_PROT_DEFAULT | PTE_ATTRINDX(MT_DEVICE_nGnRE) | PTE_HYP | PTE_HYP_XN)

+#define PAGE_S2 
		__pgprot(_PROT_DEFAULT | PTE_S2_MEMATTR(MT_S2_NORMAL) | PTE_S2_RDONLY)

+#define PAGE_S2_DEVICE 
		__pgprot(_PROT_DEFAULT | PTE_S2_MEMATTR(MT_S2_DEVICE_nGnRE) | PTE_S2_RDONLY | PTE_UXN)

+#define PAGE_NONE 
		__pgprot(((_PAGE_DEFAULT) & ~PTE_VALID) | PTE_PROT_NONE | PTE_RDONLY | PTE_NG | PTE_PXN | PTE_UXN)

+#*/ shared+writable pages are clean by default, hence PTE_RDONLY|PTE_WRITE */

+#define PAGE_SHARED 
		__pgprot(_PAGE_DEFAULT | PTE_USER | PTE_RDONLY | PTE_NG | PTE_PXN | PTE_UXN | PTE_WRITE)

+#define PAGE_SHARED_EXEC 
		__pgprot(_PAGE_DEFAULT | PTE_USER | PTE_RDONLY | PTE_NG | PTE_PXN | PTE_UXN | PTE_WRITE)

#define PAGE_READONLY 
		__pgprot(_PAGE_DEFAULT | PTE_USER | PTE_RDONLY | PTE_NG | PTE_PXN | PTE_UXN)

#define PAGE_READONLY_EXEC 
		__pgprot(_PAGE_DEFAULT | PTE_USER | PTE_RDONLY | PTE_NG | PTE_PXN)

-#define PAGE_EXECONLY 
		__pgprot(_PAGE_DEFAULT | PTE_RDONLY | PTE_NG | PTE_PXN)

#define __P000 PAGE_NONE
#define __P001 PAGE_READONLY
#define __P010 PAGE_READONLY
#define __P011 PAGE_READONLY
+  #define __P100 PAGE_READONLY_EXEC
#define __P101 PAGE_READONLY_EXEC
#define __P110 PAGE_READONLY_EXEC
#define __P111 PAGE_READONLY_EXEC
@@ -83,7 +90,7 @@

#define __S001 PAGE_READONLY
#define __S010 PAGE_SHARED
#define __S011 PAGE_SHARED
-#define __S100 PAGE_EXECONLY
+#define __S100 PAGE_READONLY_EXEC
#define __S101 PAGE_READONLY_EXEC
#define __S110 PAGE_SHARED_EXEC
#define __S111 PAGE_SHARED_EXEC
--- linux-4.15.0.orig/arch/arm64/include/asm/pgtable.h
+++ linux-4.15.0/arch/arm64/include/asm/pgtable.h
@@ -92,14 +92,8 @@
#define pte_dirty(pte) (pte_sw_dirty(pte) || pte_hw_dirty(pte))

#define pte_valid(pte) (!!((pte_val(pte) & PTE_VALID))
-/*
-* Execute-only user mappings do not have the PTE_USER bit set. All valid
-* kernel mappings have the PTE_UXN bit set.
-*/
#define pte_valid_not_user(pte) 
-((pte_val(pte) & (PTE_VALID | PTE_USER | PTE_UXN)) == (PTE_VALID | PTE_UXN))
-#define pte_valid_young(pte)  
-((pte_val(pte) & (PTE_VALID | PTE_AF)) == (PTE_VALID | PTE_AF))
+	((pte_val(pte) & (PTE_VALID | PTE_USER)) == PTE_VALID)
#define pte_valid_user(pte) 
((pte_val(pte) & (PTE_VALID | PTE_USER)) == (PTE_VALID | PTE_USER))

@@ -107,14 +101,17 @@
* Could the pte be present in the TLB? We must check mm_tlb_flush_pending
* so that we don't erroneously return false for pages that have been
* remapped as PROT_NONE but are yet to be flushed from the TLB.
+ * Note that we can't make any assumptions based on the state of the access
+ * flag, since ptep_clear_flush_young() elides a DSB when invalidating the
+ * TLB.
+*/
#define pte_accessible(mm, pte) \ 
-((mm_tlb_flush_pending(mm) ? pte_present(pte) : pte_valid_young(pte))
+(mm_tlb_flush_pending(mm) ? pte_present(pte) : pte_valid(pte))

/ *
* pte_access_permitted() is true for valid user mappings (subject to the
-* write permission check) other than user execute-only which do not have the
-* PTE_USER bit set. PROT_NONE mappings do not have the PTE_VALID bit set.
+ * write permission check). PROT_NONE mappings do not have the PTE_VALID bit
+ * set.
+*/
#define pte_access_permitted(pte, write) \ 
(pte_valid_user(pte) && (!write || pte_write(pte))}
@@ -135,13 +132,6 @@
return pte;

---
-static inline pte_t pte_wrprotect(pte_t pte)
{
-pte = clear_pte_bit(pte, __pgprot(PTE_WRITE));
-pte = set_pte_bit(pte, __pgprot(PTE_RDONLY));
-return pte;
-
static inline pte_t pte_mkwrite(pte_t pte)
{
 pte = set_pte_bit(pte, __pgprot(PTE_WRITE));
@@ -167,6 +157,20 @@
 return pte;
 }

+static inline pte_t pte_wrprotect(pte_t pte)
+{
+/*
+ * If hardware-dirty (PTE_WRITE/DBM bit set and PTE_RDONLY
+ * clear), set the PTE_DIRTY bit.
+ */
+if (pte_hw_dirty(pte))
+pte = pte_mkdirty(pte);
+
+pte = clear_pte_bit(pte, __pgprot(PTE_WRITE));
+pte = set_pte_bit(pte, __pgprot(PTE_RDONLY));
+return pte;
+}
+
static inline pte_t pte_mkold(pte_t pte)
{
 return clear_pte_bit(pte, __pgprot(PTE_AF));
@@ -258,23 +262,6 @@
 set_pte(ptep, pte);
 }

-#define __HAVE_ARCH_PTE_SAME
-static inline int pte_same(pte_t pte_a, pte_t pte_b)
-{
-pteval_t lhs, rhs;
-    
-lhs = pte_val(pte_a);
-rhs = pte_val(pte_b);
-    
-if (pte_present(pte_a))
-lhs &= ~PTE_RDONLY;
-
if (pte_present(pte_b))
    rhs &= ~PTE_RDONLY;
    return (lhs == rhs);
}
/
* Huge pte definitions.
*/
@@ -363,6 +350,7 @@
#define pud_write(pud) pte_write(pud_pte(pud))
#define pud_pfn(pud)((pud_val(pud) & PUD_MASK) & PHYS_MASK) >> PAGE_SHIFT)
+#define pfn_pud(pfn,prot)(__pud(((phys_addr_t)(pfn) << PAGE_SHIFT) | pgprot_val(prot)))

#define set_pmd_at(mm, addr, pmdp, pmd)set_ppte_at(mm, addr, (pte_t *)pmdp, pmd_ppte(pmd))

@@ -393,8 +381,8 @@
PMD_TYPE_SECT)
#if defined(CONFIG_ARM64_64K_PAGES) || CONFIG_PGTABLE_LEVELS < 3
    -#define pud_sect(pud)(0)
    -#define pud_table(pud)(1)
+static inline bool pud_sect(pud_t pud) { return false; }
+static inline bool pud_table(pud_t pud) { return true; }
#else
    #define pud_sect(pud)((pud_val(pud) & PUD_TYPE_MASK) == PUD_TYPE_SECT)
@@ -419,6 +407,8 @@
    return pmd_val(pmd) & PHYS_MASK & (s32)PAGE_MASK;
    }
+static inline void pte_unmap(pte_t *pte) {
+    
+    /* Find an entry in the third-level page table. */
    #define pte_index(addr) (((addr) >> PAGE_SHIFT) & (PTRS_PER_PTE - 1))

@@ -427,7 +417,6 @@

    #define pte_offset_map(dir,addr) pte_offset_kernel((dir), (addr))
    #define pte_offset_map_nested(dir,addr) pte_offset_kernel((dir), (addr))
    -#define pte_unmap(pte) do { } while (0)
    #define pte_unmap_nested(pte) do { } while (0)

    #define pte_set_fixmap(addr)((pte_t *)set_fixmap_offset(FIX_PTE, addr))
@@ -660,12 +649,6 @@
pte = READ_ONCE(*ptep);
do {
old_pte = pte;

- /* If hardware-dirty (PTE_WRITE/DBM bit set and PTE_RDONLY
- clear), set the PTE_DIRTY bit.
- */
- if (pte_hw_dirty(pte))
- pte = pte_mkdirty(pte);
- pte = pte_wrprotect(pte);
- pte_val(pte) = cmpxchg_relaxed(&pte_val(*ptep),
- pte_val(old_pte), pte_val(pte));
@@ -683,6 +666,7 @@

extern pgd_t swapper_pg_dir[PTRS_PER_PGD];
extern pgd_t idmap_pg_dir[PTRS_PER_PGD];
+extern pgd_t tramp_pg_dir[PTRS_PER_PGD];

/*
 * Encode and decode a swap entry:
--- linux-4.15.0.orig/arch/arm64/include/asm/proc-fns.h
+++ linux-4.15.0/arch/arm64/include/asm/proc-fns.h
@@ -35,12 +35,6 @@
#include <asm/memory.h>

#define cpu_switch_mm(pgd,mm)
-do {
-BUG_ON(pgd == swapper_pg_dir);
-cpu_do_switch_mm(virt_to_phys(pgd),mm);
-} while (0)
-
- #endif /* __ASSEMBLY__ */
#endif /* __KERNEL__ */
#endif /* __ASM_PROCFNS_H */
--- linux-4.15.0.orig/arch/arm64/include/asm/processor.h
+++ linux-4.15.0/arch/arm64/include/asm/processor.h
@@ -21,6 +21,9 @@
#define TASK_SIZE_64(UL(1) << VA_BITS)

+#define KERNEL_DSUL(-1)
+#define USER_DS(TASK_SIZE_64 - 1)
+
- #ifndef __ASSEMBLY__
+ /*
+ @ @ -34.6 +37.7 @ @
+ #include <linux/string.h>
#include <asm/alternative.h>
+#include <asm/cpufeature.h>
#include <asm/fpsimd.h>
#include <asm/hw_breakpoint.h>
#include <asm/ls6.h>
@@ -46,7 +50,15 @@
 * TASK_UNMAPPED_BASE - the lower boundary of the mmap VM area.
 */
#endif CONFIG_COMPAT
+#ifdef CONFIG_ARM64_64K_PAGES
+/*
 + * With CONFIG_ARM64_64K_PAGES enabled, the last page is occupied
 + * by the compat vectors page.
 + */
#define TASK_SIZE_32UL(0x100000000)
+else
+#define TASK_SIZE_32(UL(0x100000000) - PAGE_SIZE)
+#endif /* CONFIG_ARM64_64K_PAGES */
#define TASK_SIZE(test_thread_flag(TIF_32BIT) ? \n TASK_SIZE_32 : TASK_SIZE_64)
#define TASK_SIZE_OF(tsk)(test_tsk_thread_flag(tsk, TIF_32BIT) ? \n @@ -139,11 +151,25 @@
 regs->pc = pc;
 }

+static inline void set_ssbs_bit(struct pt_regs *regs)
+{
+ regs->pstate |= PSR_SSBS_BIT;
+}
+
+static inline void set_compat_ssbs_bit(struct pt_regs *regs)
+{
+ regs->pstate |= PSR_AA32_SSBS_BIT;
+}
+
 static inline void start_thread(struct pt_regs *regs, unsigned long pc,
 unsigned long sp)
 {
 start_thread_common(regs, pc);
 regs->pstate = PSR_MODE_EL0t;
 +
+if (arm64_get_ssd_state() != ARM64_SSDD_FORCE_ENABLE)
+set_ssbs_bit(regs);
+regs->sp = sp;
 }
@@ -160,6 +186,9 @@
regs->pstate |= COMPAT_PSR_E_BIT;
#endif

+if (arm64_get_ssbd_state() != ARM64_SSBD_FORCE_ENABLE)
+set_compat_ssbs_bit(regs);
+
+regs->compat_sp = sp;
+
@endif
@@ -214,8 +243,9 @@
#endif
-int cpu_enable_pan(void *__unused);
-int cpu_enable_cache_maint_trap(void *__unused);
+void cpu_enable_pan(const struct arm64_cpu_capabilities *__unused);
+void cpu_enable_cache_maint_trap(const struct arm64_cpu_capabilities *__unused);
+void cpu_clear_disr(const struct arm64_cpu_capabilities *__unused);

/* Userspace interface for PR_SVE_[SET,GET]_VL prctl(): */
#define SVE_SET_VL(arg)sve_set_current_vl(arg)
--- linux-4.15.0.orig/arch/arm64/include/asm/ptrace.h
+++ linux-4.15.0/arch/arm64/include/asm/ptrace.h
@@ -35,7 +35,38 @@
#define COMPAT_PTRACE_GETHBPREGS	29
#define COMPAT_PTRACE_SETBPREGS30

-/* AArch32 CPSR bits */
+/* SPSR_ELx bits for exceptions taken from AArch32 */
+#define PSR_AA32_MODE_MASK 0x0000001f
+#define PSR_AA32_MODE_USR 0x00000010
+#define PSR_AA32_MODE_FIQ 0x00000011
+#define PSR_AA32_MODE_IRQ 0x00000012
+#define PSR_AA32_MODE_SVC 0x00000013
+#define PSR_AA32_MODE_ABT 0x00000017
+#define PSR_AA32_MODE_HYP 0x0000001a
+#define PSR_AA32_MODE_UND 0x0000001b
+#define PSR_AA32_MODE_SYS 0x0000001f
+#define PSR_AA32_T_BIT 0x00000020
+#define PSR_AA32_F_BIT 0x00000040
+#define PSR_AA32_I_BIT 0x00000080
+#define PSR_AA32_A_BIT 0x00000100
+#define PSR_AA32_E_BIT 0x00000200
+#define PSR_AA32_SSBS_BIT 0x00000080
+#define PSR_AA32_DIT_BIT 0x01000000
+#define PSR_AA32_Q_BIT 0x08000000
+#define PSR_AA32_V_BIT 0x10000000
+#define PSR_AA32_C_BIT 0x20000000

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 Cho include PSR_AA32_Z_BIT #define PSR_AA32_Z_BIT 0x40000000
+ defined PSR_AA32_N_BIT #define PSR_AA32_N_BIT 0x80000000
+#define PSR_AA32_IT_MASK #define PSR_AA32_IT_MASK 0x0600fc00 /* If-Then execution state mask */
+#define PSR_AA32_GE_MASK #define PSR_AA32_GE_MASK 0x000f0000
+
+ ifndef CONFIG_CPU_BIG_ENDIAN
+#define PSR_AA32_ENDSTATE #define PSR_AA32_ENDSTATE PSR_AA32_E_BIT
+ else
+#define PSR_AA32_ENDSTATE0
+ endif
+
+ /* AArch32 CPSR bits, as seen in AArch32 */
#define COMPAT_PSR_MODE_MASK #define COMPAT_PSR_MODE_MASK 0x0000001f
#define COMPAT_PSR_MODE_USR #define COMPAT_PSR_MODE_USR 0x00000010
#define COMPAT_PSR_MODE_FIQ #define COMPAT_PSR_MODE_FIQ 0x00000011
@@ -50,6 +81,7 @@
#define COMPAT_PSR_I_BIT #define COMPAT_PSR_I_BIT 0x00000080
#define COMPAT_PSR_A_BIT #define COMPAT_PSR_A_BIT 0x00000100
#define COMPAT_PSR_E_BIT #define COMPAT_PSR_E_BIT 0x00000200
+ #define COMPAT_PSR_DIT_BIT #define COMPAT_PSR_DIT_BIT 0x00200000
#define COMPAT_PSR_J_BIT #define COMPAT_PSR_J_BIT 0x01000000
#define COMPAT_PSR_Q_BIT #define COMPAT_PSR_Q_BIT 0x08000000
#define COMPAT_PSR_V_BIT #define COMPAT_PSR_V_BIT 0x10000000
@@ -111,6 +143,30 @@
#define compat_sp_fiq regs[29]
#define compat_lr_fiqregs[30]

+static inline unsigned long compat_psr_to_pstate(const unsigned long psr)
+
+{ unsigned long pstate;
++ pstate = psr & ~COMPAT_PSR_DIT_BIT;
++ if (psr & COMPAT_PSR_DIT_BIT)
++ pstate |= PSR_AA32_DIT_BIT;
++ return pstate;
+}
+
+static inline unsigned long pstate_to_compat_psr(const unsigned long pstate)
+
+{ unsigned long psr;
++ psr = pstate & ~PSR_AA32_DIT_BIT;
++ if (pstate & PSR_AA32_DIT_BIT)
++ psr |= COMPAT_PSR_DIT_BIT;
++}
/* This struct defines the way the registers are stored on the stack during an
* exception. Note that sizeof(struct pt_regs) has to be a multiple of 16 (for
* exception entry point)
+++ linux-4.15.0/arch/arm64/include/asm/xen.h
@@ -0,0 +1,57 @@
+// SPDX-License-Identifier: GPL-2.0
+// Copyright (C) 2017 Arm Ltd.
+#ifndef __ASM_SDEI_H
+#define __ASM_SDEI_H
+
/* Values for sdei_exit_mode */
+#define SDEI_EXIT_HVC  0
+#define SDEI_EXIT_SMC  1
+
#ifndef __ASSEMBLY__
+
#include <linux/linkage.h>
#include <linux/preempt.h>
#include <linux/types.h>
+
#include <asm/virt.h>
+
extern unsigned long sdei_exit_mode;
+
/* Software Delegated Exception entry point from firmware*/
asmlinkage void __sdei_asm_handler(unsigned long event_num, unsigned long arg,
+unsigned long pc, unsigned long pstate);
+
/* and its CONFIG_UNMAP_KERNEL_AT_EL0 trampoline */
asmlinkage void __sdei_asm_entry_trampoline(unsigned long event_num,
+unsigned long pc,
+unsigned long pstate);
+
/* The above entry point does the minimum to call C code. This function does
* anything else, before calling the driver.
*/
+struct sdei_registered_event;
asmlinkage unsigned long __sdei_handler(struct pt_regs *regs,
+struct sdei_registered_event *arg);
+unsigned long sdei_arch_get_entry_point(int conduit);
+#define sdei_arch_get_entry_point(x)sdei_arch_get_entry_point(x)
+
+bool __on_sdei_stack(unsigned long sp);
+static inline bool on_sdei_stack(unsigned long sp)
+
{+
+if (!IS_ENABLED(CONFIG_VMAP_STACK))
+return false;
+if (!IS_ENABLED(CONFIG_ARM_SDE_INTERFACE))
+return false;
+if (in_nmi())
+return __on_sdei_stack(sp);
+
+return false;
+
+}

+#endif /* __ASSEMBLY__ */
+#endif	/* __ASM_SDEI_H */
--- linux-4.15.0.orig/arch/arm64/include/asm/sections.h
+++ linux-4.15.0/arch/arm64/include/asm/sections.h
@@ -28,5 +28,6 @@
extern char __inittext_begin[], __inittext_end[];
extern char __irqentry_text_start[], __irqentry_text_end[];
extern char __mmuoff_data_start[], __mmuoff_data_end[];
+extern char __entry_tramp_text_start[], __entry_tramp_text_end[];

#endif /* __ASM_SECTIONS_H */
--- linux-4.15.0.orig/arch/arm64/include/asm/simd.h
+++ linux-4.15.0/arch/arm64/include/asm/simd.h
@@ -29,20 +29,15 @@
static __must_check inline bool may_use_simd(void)
{
/*
- * The raw_cpu_read() is racy if called with preemption enabled.
- * This is not a bug: kernel_neon_busy is only set when
- * preemption is disabled, so we cannot migrate to another CPU
- * while it is set, nor can we migrate to a CPU where it is set.
- * So, if we find it clear on some CPU then we're guaranteed to
- * find it clear on any CPU we could migrate to.
- *
- * If we are in between kernel_neon_begin()...kernel_neon_end(),
- * the flag will be set, but preemption is also disabled, so we
- * can't migrate to another CPU and spuriously see it become
- * false.
+ * kernel_neon_busy is only set while preemption is disabled,
+ * and is clear whenever preemption is enabled. Since
+ * this_cpu_read() is atomic w.r.t. preemption, kernel_neon_busy
+ * cannot change under our feet -- if it's set we cannot be
return !in_irq() && !irqs_disabled() && !in_nmi() &
-!raw_cpu_read(kernel_neon_busy);
+!this_cpu_read(kernel_neon_busy);
}

#define /* ! CONFIG_KERNEL_MODE_NEON */
--- linux-4.15.0.orig/arch/arm64/include/asm/spinlock.h
+++ linux-4.15.0/arch/arm64/include/asm/spinlock.h
@@ -87,8 +87,8 @@
"cbnz\%w1, 1f\n"
"add\%w1, \%w0, \%3\n"
"casa\%w0, \%w1, \%2\n"
-"and\%w1, \%w1, \#0xffff\n"
-"eor\%w1, \%w1, \%w0. lsr \#16\n"
+"sub\%w1, \%w1, \%3\n"
+"eor\%w1, \%w1, \%w0\n"
"1:"
: ":=&r" (lockval), ":=&r" (tmp), "+Q" (*lock)
: ":I" (1 << TICKET_SHIFT)
--- linux-4.15.0.orig/arch/arm64/include/asm/stacktrace.h
+++ linux-4.15.0/arch/arm64/include/asm/stacktrace.h
@@ -22,12 +22,13 @@
#include <asm/memory.h>
#include <asm/ptrace.h>
+#include <asm/sdei.h>

struct stackframe {
unsigned long fp;
unsigned long pc;
#ifdef CONFIG_FUNCTION_GRAPH_TRACER
-unsigned int graph;
+int graph;
#else
#endif
};

return true;
if (on_overflow_stack(sp))
return true;
+if (on_sdei_stack(sp))
+return true;

return false;
}
#include <linux/stringify.h>

/*
@@ -59,7 +60,9 @@
#ifndef CONFIG_BROKEN_GAS_INST
#ifdef __ASSEMBLY__
-#define __emit_inst(x)			.inst (x)
+#define __emit_inst(x)			.inst(x)
#else
#define __emit_inst(x) ".inst " __stringify((x)) "\n\t"
#endif
@@ -85,11 +88,14 @@
#define REG_PSTATE_PAN_IMM		sys_reg(0, 0, 4, 0, 4)
#define REG_PSTATE_UAO_IMM		sys_reg(0, 0, 4, 0, 3)
+#define REG_PSTATE_SSBS_IMM		sys_reg(0, 3, 4, 0, 1)
#define SET_PSTATE_PAN(x) __emit_inst(0xd5000000 | REG_PSTATE_PAN_IMM |	\( (!!x)<<8 | 0x1f)
#define SET_PSTATE_UAO(x) __emit_inst(0xd5000000 | REG_PSTATE_UAO_IMM |	\( (!!x)<<8 | 0x1f)
+#define SET_PSTATE_SSBS(x) __emit_inst(0xd5000000 | REG_PSTATE_SSBS_IMM |	\+ ( (!!x)<<8 | 0x1f)
#define SYS_DC_ISW			sys_insn(1, 0, 7, 6, 2)
#define SYS_DC_CSW			sys_insn(1, 0, 7, 10, 2)
@@ -175,6 +181,16 @@
#define SYS_AFSR0_EL1			sys_reg(3, 0, 5, 1, 0)
#define SYS_AFSR1_EL1			sys_reg(3, 0, 5, 1, 1)
#define SYS_ESR_EL1			sys_reg(3, 0, 5, 2, 0)
+
+#define SYS_ERRIDR_EL1			sys_reg(3, 0, 5, 3, 0)
+#define SYS_ERRSELR_EL1			sys_reg(3, 0, 5, 3, 1)
+#define SYS_ERXFR_EL1			sys_reg(3, 0, 5, 4, 0)
+#define SYS_ERXCTRL_EL1			sys_reg(3, 0, 5, 4, 1)
+#define SYS_ERXSTATUS_EL1			sys_reg(3, 0, 5, 4, 2)
+#define SYS_ERXADDR_EL1			sys_reg(3, 0, 5, 4, 3)
+#define SYS_ERXMISC0_EL1			sys_reg(3, 0, 5, 5, 0)
+#define SYS_ERXMISC1_EL1			sys_reg(3, 0, 5, 5, 1)
+
#define SYS_FAR_EL1			sys_reg(3, 0, 6, 0, 0)
#define SYS_PAR_EL1			sys_reg(3, 0, 7, 4, 0)
@@ -278,6 +294,7 @@
#define SYS_AMAIR_EL1			sys_reg(3, 0, 10, 3, 0)

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#define SYS_VBAR_EL1 sys_reg(3, 0, 12, 0, 0)
+#define SYS_DISR_EL1 sys_reg(3, 0, 12, 1, 1)

#define SYS_ICC_IAR0_EL1 sys_reg(3, 0, 12, 8, 0)
#define SYS_ICC_EOIR0_EL1 sys_reg(3, 0, 12, 8, 1)
@@ -353,8 +370,10 @@
#define SYS_DACR32_EL2 sys_reg(3, 4, 3, 0, 0)
#define SYS_IFSR32_EL2 sys_reg(3, 4, 5, 0, 1)
+#define SYS_VSESR_EL2 sys_reg(3, 4, 5, 2, 3)
#define SYS_FPEXC32_EL2 sys_reg(3, 4, 5, 3, 0)

+#define SYS_VDISR_EL2 sys_reg(3, 4, 12, 1, 1)
#define __SYS__AP0Rx_EL2(x) sys_reg(3, 4, 12, 8, x)
#define SYS_ICH_AP0R0_EL2 __SYS__AP0Rx_EL2(0)
#define SYS_ICH_AP0R1_EL2 __SYS__AP0Rx_EL2(1)
@@ -397,28 +416,91 @@
#define SYS_ICH_LR15_EL2 __SYS__LR8_EL2(7)
/* Common SCTLR_ELx flags. */
+#define SCTLR_ELx_DSSBS(1UL << 44)
#define SCTLR_ELx_EE (1 << 25)
+#define SCTLR_ELx_IESB(1 << 21)
+#define SCTLR_ELx_WXN(1 << 19)
#define SCTLR_ELx_I(1 << 12)
#define SCTLR_ELx_SA(1 << 3)
#define SCTLR_ELx_C(1 << 2)
#define SCTLR_ELx_A(1 << 1)
#define SCTLR_ELx_M1

+#define SCTLR_ELx_FLAGS(SCTLR_ELx_M | SCTLR_ELx_A | SCTLR_ELx_C | \ 
+ SCTLR_ELx_SA | SCTLR_ELx_I | SCTLR_ELx_IESB)
+
+ /* SCTLR_EL2 specific flags. */
#define SCTLR_EL2_RES1((1 << 4) | (1 << 5) | (1 << 11) | (1 << 16) | \ 
(1 << 18) | (1 << 22) | (1 << 23) | (1 << 28) | \ 
(1 << 29))
+#define SCTLR_EL2_RES0((1 << 6) | (1 << 7) | (1 << 8) | (1 << 9) | \ 
+ (1 << 10) | (1 << 13) | (1 << 14) | (1 << 15) | \ 
+ (1 << 17) | (1 << 20) | (1 << 24) | (1 << 26) | \ 
+ (1 << 27) | (1 << 30) | (1 << 31) | \ 
+ (0xffffffffUL << 32))
+
+#ifdef CONFIG_CPU_BIG_ENDIAN
+define ENDIAN_SET_EL2SCTLR_ELx_EE
+define ENDIAN_CLEAR_EL20
+else
+// define ENDIAN_SET_EL20
+/#define ENDIAN_CLEAEL20SCTLR_ELx_EE
+/endif

+// define SCTLR_ELx_FLAGS(SCTLR_ELx_M | SCTLR_ELx_A | SCTLR_ELx_C | \n - SCTLR_ELx_SA | SCTLR_ELx_I)
]+/* SCTLR_EL2 value used for the hyp-stub */
+// define SCTLR_EL2_SET(SCTLR_ELx_IESB | ENDIAN_SET_EL2 | SCTLR_EL2_RES1)
+// define SCTLR_EL2_CLEAR(SCTLR_ELx_M | SCTLR_ELx_A | SCTLR_ELx_C | \n + SCTLR_ELx_SA | SCTLR_ELx_I | SCTLR_ELx_WXN | \n + SCTLR_ELx_DSSBS | ENDIAN_CLEAEL2 | SCTLR_EL2_RES0)
+
+if (SCTLR_EL2_SET ^ SCTLR_EL2_CLEAR) != 0xffffffffffffffff
+#error "Inconsistent SCTLR_EL2 set/clear bits"
+endif

/* SCTLR_EL1 specific flags. */
#define SCTLR_EL1_UCI(1 << 26)
+// define SCTLR_EL1_E0E(1 << 24)
+// define SCTLR_EL1_SPAN(1 << 23)
+// define SCTLR_EL1_NTWE(1 << 18)
+// define SCTLR_EL1_NTWI(1 << 16)
+// define SCTLR_EL1_UCT(1 << 15)
+// define SCTLR_EL1_DZE(1 << 14)
+// define SCTLR_EL1_UMA(1 << 9)
+// define SCTLR_EL1_SED(1 << 8)
+// define SCTLR_EL1_ITD(1 << 7)
+// define SCTLR_EL1_CI5BEN(1 << 5)
+// define SCTLR_EL1_SA0(1 << 4)
+
+// define SCTLR_EL1_RES1((1 << 11) | (1 << 20) | (1 << 22) | (1 << 28) | \n + (1 << 29))
+// define SCTLR_EL1_RES0 ((1 << 6) | (1 << 10) | (1 << 13) | (1 << 17) | \n + (1 << 27) | (1 << 30) | (1 << 31) | \n + (0xffffffffUL << 32))
+
+ ifdef CONFIG_CPU_BIG_ENDIAN
+// define ENDIAN_SET_EL1(SCTLR_EL1_E0E | SCTLR_ELx_EE)
+// define ENDIAN_CLEAEL10
+else
+// define ENDIAN_SET_EL10
+// define ENDIAN_CLEAEL10(SCTLR_EL1_E0E | SCTLR_ELx_EE)
+endif
+
+// define SCTLR_EL1_SET(SCTLR_ELx_M | SCTLR_ELx_C | SCTLR_ELx_SA | \n + SCTLR_EL1_SA0 | SCTLR_EL1_SED | SCTLR_ELx_I | \n + SCTLR_EL1_DZE | SCTLR_EL1_UCT | SCTLR_EL1_NTWI | \n + SCTLR_EL1_NTWE | SCTLR_ELx_IESB | SCTLR_EL1_SPAN |
#define ID_AA64MMFR0_TGRAN64_SHIFT 24
#define ID_AA64MMFR1_VMIDBITS_162

/* id_a64mmfr2 */
+#define ID_AA64MMFR2_AT_SHIFT 32
#define ID_AA64MMFR2_LVA_SHIFT 16
#define ID_AA64MMFR2_IESB_SHIFT 12
#define ID_AA64MMFR2_LSM_SHIFT 8

#else
+
#include <linux/build_bug.h>
#include <linux/types.h>
asm(
    @ @ -634.6 +730.17 @@
asm volatile("msr_s __stringify(r) ", &x0" : "rZ" (__val));
} while (0)

+/*
 * Modify bits in a sysreg. Bits in the clear mask are zeroed, then bits in the
 * set mask are set. Other bits are left as-is.
 * +*/
+#define sysreg_clear_set(sysreg, clear, set) do {
+  __u64 __scs_val = read_sysreg(sysreg);
+  __u64 __scs_new = (__scs_val & ~(u64)(clear)) | (set);
+  if (__scs_new != __scs_val)
+    write_sysreg(__scs_new, sysreg);
+} while (0)
+
static inline void config_sctlr_el1(u32 clear, u32 set)
{
  __u32 val;
  --- linux-4.15.0.orig/arch/arm64/include/asm/thread_info.h
  +++ linux-4.15.0/arch/arm64/include/asm/thread_info.h
  @ @ -96.6 +96.7 @@
  #define TIF_32BIT22/* 32bit process */
  #define TIF_SVE23/* Scalable Vector Extension in use */
  #define TIF_SVE_VL_INHERIT24/* Inherit sve_vl_onexec across exec */
  +#define TIF_SSBD25/* Wants SSB mitigation */

  #define _TIF_SIGPENDING(1 << TIF_SIGPENDING)
  #define _TIF_NEED_RESCHED(1 << TIF_NEED_RESCHED)
  --- linux-4.15.0.orig/arch/arm64/include/asm/tlb.h
  +++ linux-4.15.0/arch/arm64/include/asm/tlb.h
  @ @ -33.6 +33.8 @@

#define tlb_remove_entry(tlb, entry) tlb_remove_page(tlb, entry)
#endif /* CONFIG_HAVE_RCU_TABLE_FREE */

+static void tlb_flush(struct mmu_gather *tlb);
+
#include <asm-generic/tlb.h>

static inline void tlb_flush(struct mmu_gather *tlb)
--- linux-4.15.0.orig/arch/arm64/include/asm/tlbflush.h
+++ linux-4.15.0/arch/arm64/include/asm/tlbflush.h
@@ -23,6 +23,7 @@
#include <linux/sched.h>
#include <asm/cputype.h>
+-#include <asm/mmu.h>

/*
 * Raw TLBI operations.
 @@ -54,6 +55,11 @@
#define __tlbi(op, ...)		__TLBI_N(op, ##__VA_ARGS__, 1, 0)
+
+-define __tlbi_user(op, arg) do {
+  if (arm64_kernel_unmapped_at_el0())
+    __tlbi(op, (arg) | USER_ASID_FLAG);
+} while (0)
+
/*
 * TLB Management
 *=-------------------
 @@ -115,6 +121,7 @@
 dsb(ishst);
 __tlbi(aside1is, asid);
+__tlbi_user(aside1is, asid);
 dsb(ish);
 }

 @@ -125,6 +132,7 @@
 dsb(ishst);
 __tlbi(vale1is, addr);
+__tlbi_user(vale1is, addr);
 dsb(ish);
 }

 @@ -151,10 +159,13 @@
dsb(ishst);
for (addr = start; addr < end; addr += 1 << (PAGE_SHIFT - 12)) {
  if (last_level)
    __tlbi(vale1is, addr);
  else
    __tlbi_user(vale1is, addr);
} else {
  __tlbi(vae1is, addr);
  __tlbi_user(vae1is, addr);
}
}

dsb(ish);
}

@@ -194,6 +205,7 @@
unsigned long addr = uaddr >> 12 | (ASID(mm) << 48);

-__tlbi(vae1is, addr);
+__tlbi_user(vae1is, addr);

dsb(ish);
}

--- linux-4.15.0.orig/arch/arm64/include/asm/topology.h
+++ linux-4.15.0/arch/arm64/include/asm/topology.h
@@ -7,14 +7,16 @@
 struct cpu_topology {
   int thread_id;
   int core_id;
-  int cluster_id;
+  int package_id;
+  int llc_id;
   cpumask_t thread_sibling;
   cpumask_t core_sibling;
+  cpumask_t llc_siblings;
   
};

 extern struct cpu_topology cpu_topology[NR_CPUS];

#define topology_physical_package_id(cpu) (cpu_topology[cpu].cluster_id)

#define topology_physical_package_id(cpu) (cpu_topology[cpu].package_id)
#define topology_core_id(cpu) (cpu_topology[cpu].core_id)
#define topology_core_cpumask(cpu) (&cpu_topology[cpu].core_sibling)
#define topology_sibling_cpumask(cpu) (&cpu_topology[cpu].thread_sibling)

--- linux-4.15.0.orig/arch/arm64/include/asm/traps.h
+++ linux-4.15.0/arch/arm64/include/asm/traps.h
@@ -19,6 +19,7 @@
 #define __ASM_TRAP_H

#define __ASM_TRAP_H
```c
#include <linux/list.h>
#include <asm/esr.h>
#include <asm/sections.h>

struct pt_regs;
@@ -66,4 +67,57 @@
return ptr >= (unsigned long)&__entry_text_start && 
    ptr < (unsigned long)&__entry_text_end;
}
+
+/*
+ * CPUs with the RAS extensions have an Implementation-Defined-Syndrome bit
+ * to indicate whether this ESR has a RAS encoding. CPUs without this feature
+ * have a ISS-Valid bit in the same position.
+ * If this bit is set, we know its not a RAS SError.
+ * If its clear, we need to know if the CPU supports RAS. Uncategorized RAS
+ * errors share the same encoding as an all-zeros encoding from a CPU that
+ * doesn't support RAS.
+ */
+static inline bool arm64_is_ras_serror(u32 esr)
+{
+    WARN_ON(preemptible());
+
+    if (esr & ESR_ELx_IDS)
+        return false;
+    if (this_cpu_has_cap(ARM64_HAS_RAS_EXTN))
+        return true;
+    else
+        return false;
+}
+
+/*
+ * Return the AET bits from a RAS SError's ESR.
+ *
+ * It is implementation defined whether Uncategorized errors are containable.
+ * We treat them as Uncontainable.
+ * Non-RAS SError's are reported as Uncontained/Uncategorized.
+ */
+static inline u32 arm64_ras_serror_get_severity(u32 esr)
+{
+    u32 aet = esr & ESR_ELx_AET;
+
+    if (!arm64_is_ras_serror(esr)) {
+        /* Not a RAS error, we can't interpret the ESR. */
+        return ESR_ELx_AET_UC;
+    }
+
+```
/*
 * AET is RES0 if 'the value returned in the DFSC field is not
 * [ESR_ELx_FSC_SERROR]'
 */

if ((esr & ESR_ELx_FSC) != ESR_ELx_FSC_SERROR) {
    /* No severity information : Uncategorized */
    return ESR_ELx_AET_UC;
}

return aet;

bool arm64_is_fatal_ras_serror(struct pt_regs *regs, unsigned int esr);
void __noretur

--- linux-4.15.0.orig/arch/arm64/include/asm/uaccess.h
+++ linux-4.15.0/arch/arm64/include/asm/uaccess.h
@@ -35,16 +35,20 @@

#define KERNEL_DS (-1UL)
#define get_ds () (KERNEL_DS)

#define USER_DS	TASK_SIZE_64
#define get_fs () (current_thread_info()->addr_limit)

static inline void set_fs(mm_segment_t fs)
{
    current_thread_info()->addr_limit = fs;

    /* Prevent a mispredicted conditional call to set_fs from forwarding
     * the wrong address limit to access_ok under speculation.
     */
    dsb(nsh);
    isb();
    
    /* On user-mode return, check fs is correct */
    set_thread_flag(TIF_FSCHECK);

    Returns 1 if the range is valid, 0 otherwise.
    *
    * This is equivalent to the following test:
    * (u65)addr + (u65)size <= current->addr_limit
    * -
    * This needs 65-bit arithmetic.
+ * (u65)addr + (u65)size <= (u65)current->addr_limit + 1
+ */
-#define __range_ok(addr, size)
-({
-unsigned long __addr = (unsigned long)(addr);
-unsigned long flag, roksum;
-__chk_user_ptr(addr);
-asm("adds %1, %1, %3; ccmp %1, %4, #2, cc; cset %0, ls"
-: "=&r" (flag), "=&r" (roksum)
-: "1" (__addr), "Ir" (size),
-: "cc";
-flag;
-})
+static inline unsigned long __range_ok(unsigned long addr, unsigned long size)
+	unsigned long limit = current_thread_info()->addr_limit;
+	__chk_user_ptr(addr);
+	asm volatile(
+	// A + B <= C + 1 for all A,B,C, in four easy steps:
+	// 1: X = A + B; X' = X % 2^64
+	"adds %0, %0, %2"
+	// 2: Set C = 0 if X > 2^64, to guarantee X' > C in step 4
+	"csel %1, xzr, %1, hi"
+	// 3: Set X' = ~0 if X >= 2^64. For X == 2^64, this decrements X'
+	// to compensate for the carry flag being set in step 4. For
+	// X > 2^64, X' merely has to remain nonzero, which it does.
+	"csinv %0, %0, xzr, cc\n"
+	// 4: For X < 2^64, this gives us X' - C - 1 <= 0, where the -1
+	// comes from the carry in being clear. Otherwise, we are
+	// testing X' - C == 0, subject to the previous adjustments.
+	"sbcsxzr, %0, %1\n"
+	"cset %0, l\n"
+:
+	"Ir" (addr), "Ir" (limit) : "Ir" (size) : "cc");
+
+return addr;
+}

/*
 * When dealing with data aborts, watchpoints, or instruction traps we may end
 @@ -90,7 +104,7 @@
 */
 #define untagged_addr(addr)sign_extend64(addr, 55)

-#define access_ok(type, addr, size)__range_ok(addr, size)
+#define access_ok(type, addr, size)__range_ok((unsigned long)(addr), size)
 #define user_addr_maxget_fs
```c
#define _ASM_EXTABLE(from, to)\ @@ -105,17 +119,23 @@
#define CONFIG_ARM64_SW_TTBR0_PAN
static inline void __uaccess_ttbr0_disable(void)
{
    unsigned long ttbr;
    unsigned long flags, ttbr;
+    local_irq_save(flags);
+    ttbr = read_sysreg(ttbr1_el1);
+    ttbr &= ~TTBR_ASID_MASK;
/* reserved_ttbr0 placed at the end of swapper_pg_dir */
-    ttbr = read_sysreg(ttbr1_el1) + SWAPPER_DIR_SIZE;
-    write_sysreg(ttbr, ttbr0_el1);
+    write_sysreg(ttbr + SWAPPER_DIR_SIZE, ttbr0_el1);
+    isb();
+    /* Set reserved ASID */
+    write_sysreg(ttbr, ttbr1_el1);
+    isb();
+    local_irq_restore(flags);
}

static inline void __uaccess_ttbr0_enable(void)
{
    unsigned long flags;
    unsigned long flags, ttbr0, ttbr1;
    /* Disable interrupts to avoid preemption between reading the 'ttbr0'
     * roll-over and an update of 'ttbr0' */
    local_irq_save(flags);
-    write_sysreg(current_thread_info()->ttbr0, ttbr0_el1);
+    ttbr0 = READ_ONCE(current_thread_info()->ttbr0);
+    /* Restore active ASID */
+    ttbr1 = read_sysreg(ttbr1_el1);
+    ttbr1 &= ~TTBR_ASID_MASK; /* safety measure */
+    ttbr1 |= ttbr0 & TTBR_ASID_MASK;
+    write_sysreg(ttbr1, ttbr1_el1);
+    isb();
+    /* Restore user page table */
+    write_sysreg(ttbr0, ttbr0_el1);
    isb();
    local_irq_restore(flags);
```
+static inline void __uaccess_disable_hw_pan(void)
+{
+\asm(ALTERNATIVE("nop", SET_PSTATE_PAN(0), ARM64_HAS_PAN,
+\CONFIG_ARM64_PAN));
+}
+
+static inline void __uaccess_enable_hw_pan(void)
+{
+\asm(ALTERNATIVE("nop", SET_PSTATE_PAN(1), ARM64_HAS_PAN,
+\CONFIG_ARM64_PAN));
+}
+
+#define __uaccess_disable(alt)
+do {
+\if (!uaccess_ttbr0_disable())
+/*
+ * Sanitise a uaccess pointer such that it becomes NULL if above the
+ * current addr_limit.
+ */
++#define uaccess_mask_ptr(ptr) (__typeof__(ptr))__uaccess_mask_ptr(ptr)
+static inline void __user *__uaccess_mask_ptr(const void __user *ptr)
+{
+\void __user *safe_ptr;
+\asm volatile(\n+\"bics\ txzr, %1, %2\n+\tcssel\ %0, %1, xzr, eq\n+\): =&r (safe_ptr)
+\if (tuaccess_ttb0_disable())
+@ @ -193,6 +235,26 @ @
+
+ /* The "__xxx" versions of the user access functions do not verify the address
+ * space - it must have been done previously with a separate "access_ok()"
+ * call.
+ @ @ -244,28 +306,33 @ @


(x) = (_force __typeof__(*(ptr)))__gu_val;
} while (0)

#define __get_user(x, ptr)
+
#define __get_user_check(x, ptr, err)
{


-#define __get_user_error(x, ptr, err)

-
#define get_user(x, ptr)
+
#define get_user__get_user


#define __put_user_asm(instr, alt_instr, reg, x, addr, err, feature)
asm volatile(

"1:"ALTERNATIVE(instr " " reg "1, [%2]n",
@@ -308,43 +375,63 @@

uaccess_disable_not_uao();
} while (0)
```c
#define __put_user_check(x, ptr, err) ({
        int __pu_err = 0;
        __put_user_err((x), (ptr), __pu_err);
        __pu_err;
        __typeof__((*(ptr)) __user *)__p = (ptr);
        might_fault();
        if (access_ok(VERIFY_WRITE, __p, sizeof(*__p))) {
            __p = uaccess_mask_ptr(__p);
            __put_user_err((x), __p, (err));
        } else { err = -EFAULT; }
    })

#define __put_user(x, ptr) ({
    __put_user_check((x), (ptr), (err)); (void)0;
})

#define __put_user_error(x, ptr, err) ({
    __put_user_err((x), (ptr), (err));
    __put_user_check((x), (ptr), (err)); (void)0;
})

#define _must_check __arch_copy_from_user(void *to, const void __user *from, unsigned long n);
#define raw_copy_from_user(to, from, n) ({
    __arch_copy_from_user((to), __uaccess_mask_ptr(from), (n));
})

#define _must_check __arch_copy_to_user(void __user *to, const void *from, unsigned long n);
#define raw_copy_to_user __arch_copy_to_user
#define raw_copy_in_user(void __user *to, const void __user *from, unsigned long n);
```
-extern unsigned long __must_check __clear_user(void __user *addr, unsigned long n);
+#define raw_copy_to_user(to, from, n)\ 
+({
+ __arch_copy_to_user(__uaccess_mask_ptr(to), (from), (n));\ 
+})
+
+extern unsigned long __must_check __arch_copy_in_user(void __user *to, const void __user *from, unsigned long n);
+#define raw_copy_in_user(to, from, n)\ 
+({
+ __arch_copy_in_user(__uaccess_mask_ptr(to),
+ __uaccess_mask_ptr(from), (n));\ 
+})
+
+#define INLINE_COPY_TO_USER
+#define INLINE_COPY_FROM_USER
-
-#define INLINE_COPY_TO_USER
-#define INLINE_COPY_FROM_USER
-
-#define __must_check clear_user(void __user *to, unsigned long n)
+extern unsigned long __must_check __arch_clear_user(void __user *to, unsigned long n);
+
+static inline unsigned long __must_check __clear_user(void __user *to, unsigned long n)
{
    if (access_ok(VERIFY_WRITE, to, n))
        n = __clear_user(to, n);
    n = __arch_clear_user(__uaccess_mask_ptr(to), n);
    return n;
}
+#define clear_user __clear_user

extern long strncpy_from_user(char *dest, const char __user *src, long count);

@@ -358,7 +445,7 @@
static inline int __copy_from_user_flushcache(void *dst, const void __user *src, unsigned size)
{
    kasan_check_write(dst, size);
-    return __copy_user_flushcache(dst, src, size);
+    return __copy_user_flushcache(dst, __uaccess_mask_ptr(src), size);
}
#endif

--- linux-4.15.0.orig/arch/arm64/include/asm/vdso_datapage.h
+++ linux-4.15.0/arch/arm64/include/asm/vdso_datapage.h
@@ -38,6 +38,7 @@
 __u32 tz_minuteswest;/* Whacky timezone stuff */
 __u32 tz_dsttime;
 __u32 use_syscall;
+ __u32 hrtimer_res;
};
static inline unsigned long load_unaligned_zeropad(const void *addr) {
    unsigned long ret, offset;
    unsigned long ret, tmp;

    /* Load word from unaligned pointer addr */
    asm(
        "2:\n"
        ".pushsection .fixup,"ax\"n"
        ".align 2n"
        ".3:and%1, %2, #0x7n"
        ".bic%2, %2, #0x7n"
        ".ldr%0, [%2]n"
        "+3:bic%1, %2, #0x7n"
        "+ldr%0, [%1]n"
        "+and%1, %2, #0x7n"
        "lsl%1, %1, #0x3n"
    #ifndef __AARCH64EB__
        ".lsr%0, %0, %1n"
    @ @ -84,7 +84,7 @@
        "b2bn"
    ".popsectionn"
    __ASM_EXTABLE(1b, 3b)
    : "=&r" (ret), "=&r" (offset)
    +: "=&r" (ret), ";=\&r" (tmp)
    : "r" (addr), "Q" (*(unsigned long *)addr));
    return ret;
    --- linux-4.15.0.orig/arch/arm64/include/uapi/asm/hwcap.h
    +++ linux-4.15.0/arch/arm64/include/uapi/asm/hwcap.h
    @@ -43,5 +43,11 @@
    #define HWCAP_HSUMDPP(1 << 20)
    #define HWCAP_SHA512(1 << 21)
    #define HWCAP_SVE(1 << 22)
        +#define HWCAP_HSUMDFHM(1 << 23)
        +#define HWCAP_HSUMDFH(1 << 24)
        +#define HWCAP_USCAT(1 << 25)
        +#define HWCAP_ILRCP(1 << 26)
        +#define HWCAP_Flagm(1 << 27)
        +#define HWCAP_SBS(1 << 28)
    #endif /* _UAPI__ASM_HWCAP_H */
    --- linux-4.15.0.orig/arch/arm64/include/uapi/asm/kvm.h
    +++ linux-4.15.0/arch/arm64/include/uapi/asm/kvm.h
+/* KVM-as-firmware specific pseudo-registers */
+#define KVM_REG_ARM_FW(0x0014 << KVM_REG_ARM_COPROC_SHIFT)
+#define KVM_REG_ARM_FW_REG(r)(KVM_REG_ARM_FW | KVM_REG_SIZE_U64 | ((r) & 0xffff))
+#define KVM_REG_ARM_PSCI_VERSION KVM_REG_ARM_FW_REG(0)
+
+/* Device Control API: ARM VGIC */
+#define KDEV_ARM_VGIC_GRP_ADDR 0
+#define KDEV_ARM_VGIC_GRP_DIST_REGS 1

--- linux-4.15.0.orig/arch/arm64/include/uapi/asm/ptrace.h
+++ linux-4.15.0/arch/arm64/include/uapi/asm/ptrace.h
@@ -46,6 +46,7 @@
#define PSR_I_BIT 0x00000080
#define PSR_A_BIT 0x00000100
#define PSR_D_BIT 0x00000200
+#define PSR_SSBS_BIT 0x00001000
#define PSR_PAN_BIT 0x00400000
#define PSR_UAO_BIT 0x00800000
@@ -64,8 +65,6 @@
#ifndef __ASSEMBLY__
-#include <linux/prctl.h>
-
-* User structures for general purpose, floating point and debug registers.*
*/
@@ -112,10 +111,10 @@
-/* Common SVE_PT_* flags:
-* These must be kept in sync with prctl interface in <linux/prctl.h>*
*/
@@ -130,7 +129,7 @@
/* Offset from the start of struct user_sve_header to the register data */
#define SVE_PT_REGS_OFFSET
-((sizeof(struct sve_context) + (SVE_VQ_BYTES - 1))
+((sizeof(struct user_sve_header) + (SVE_VQ_BYTES - 1))
/SVE_VQ_BYTES * SVE_VQ_BYTES)

/*
--- linux-4.15.0.orig/arch/arm64/kernel/Makefile
+++ linux-4.15.0/arch/arm64/kernel/Makefile
@@ -52,6 +52,12 @@
 arm64-obj-$(CONFIG_ARM64_RELOC_TEST) += arm64-reloc-test.o
 arm64-reloc-test-y := reloc_test_core.o reloc_test_syms.o
 arm64-obj-$(CONFIG_CRASH_DUMP) += crash_dump.o
 +arm64-obj-$(CONFIG_ARM_SDE_INTERFACE) += sdei.o
 +arm64-obj-$(CONFIG_ARM64_SSBD) += ssbd.o
 +
 +ifeq ($(CONFIG_KVM),y)
 +arm64-obj-$(CONFIG_HARDEN_BRANCH_PREDICTOR) += bpi.o
 +endif

 obj-y += $(arm64-obj-y) vdsol/ probes/
 obj-m += $(arm64-obj-m)
--- linux-4.15.0.orig/arch/arm64/kernel/acpi.c
+++ linux-4.15.0/arch/arm64/kernel/acpi.c
@@ -18,6 +18,7 @@
 #include <linux/acpi.h>
 #include <linux/bootmem.h>
 #include <linux/cpumask.h>
+#include <linux/efi.h>
 #include <linux/efi-bgrt.h>
 #include <linux/init.h>
 #include <linux/irq.h>
@@ -29,13 +30,9 @@
 
 #include <asm/cputype.h>
 #include <asm/cpu_ops.h>
+#include <asm/pgtable.h>
 #include <asm/smp_plat.h>

 -ifndef CONFIG_ACPI_APEI
 -# include <linux/efi.h>
 -# include <asm/pgtable.h>
 -#endif
-
- int acpi_noirq = 1;/* skip ACPI IRQ initialization */
- int acpi_disabled = 1;
- EXPORT_SYMBOL(acpi_disabled);
@@ -117,7 +114,7 @@
/* Whether HVC must be used instead of SMC as the PSCI conduit */

bool __init acpi_psci_use_hvc(void)
+bool acpi_psci_use_hvc(void)
{
    return acpi_gbl_FADT.arm_boot_flags & ACPI_FADT_PSCI_USE_HVC;
}

if (table->revision < 5 ||
    (table->revision == 5 && fadt->minor_revision < 1)) {
    pr_err("Unsupported FADT revision %d.%d, should be 5.1+\n",
+    pr_err(FW_BUG "Unsupported FADT revision %d.%d, should be 5.1+\n",
        table->revision, fadt->minor_revision);
    -ret = -EINVAL;
    -goto out;
    +
    +if (!fadt->arm_boot_flags) {
    +ret = -EINVAL;
    +goto out;
    +}
    +pr_err("FADT has ARM boot flags set, assuming 5.1\n");
    }

if (!(fadt->flags & ACPI_FADT_HW_REDUCED)) {
    @ @ -239,8 +240,7 @@
    }

#else CONFIG_ACPI_APEI

{-#ifdef CONFIG_ACPI_APEI

-pgprot_t arch_apei_get_mem_attribute(phys_addr_t addr)
+pgprot_t __acpi_get_mem_attribute(phys_addr_t addr)
{
 /*
 * According to "Table 8 Map: EFI memory types to AArch64 memory
 @ @ -261,4 +261,3 @@
 return __pgprot(PROT_NORMAL_NC);
 return __pgprot(PROT_DEVICE_nGnRnE);
 }

-#endif
--- linux-4.15.0.orig/arch/arm64/kernel/alternative.c
+++ linux-4.15.0/arch/arm64/kernel/alternative.c
@@ -32,6 +32,8 @@
#define ALT_ORIG_PTR(a) __ALT_PTR(a, orig_offset)
#define ALT_REPL_PTR(a) __ALT_PTR(a, alt_offset)

+int alternatives_applied;
struct alt_region {
    struct alt_instr *begin;
    struct alt_instr *end;
}

static bool branch_insn_requires_update(struct alt_instr *alt, unsigned long pc) {
    unsigned long replptr;

    if (kernel_text_address(pc))
        return 1;

    replptr = (unsigned long)ALT_REPL_PTR(alt);
    if (pc >= replptr && pc <= (replptr + alt->alt_len))
        return 0;

    /*
     * Branching into *another* alternate sequence is doomed, and
     * we're not even trying to fix it up.
     */
    BUG();
    return !(pc >= replptr && pc <= (replptr + alt->alt_len));
}

#define align_down(x, a) ((unsigned long)(x) & ~(((unsigned long)(a)) - 1))

static void patch_alternative(struct alt_instr *alt, __le32 *origptr, __le32 *updptr, int nr_inst) {
    __le32 *replptr;
    int i;

    replptr = ALT_REPL_PTR(alt);
    for (i = 0; i < nr_inst; i++) {
        u32 insn;
        insn = get_alt_insn(alt, origptr + i, replptr + i);
        updptr[i] = cpu_to_le32(insn);
    }
}

static void __apply_alternatives(void *alt_region, bool use_linear_alias) {
    // Code continues here...
}
struct alt_instr *alt;
struct alt_region *region = alt_region;
- __le32 *origptr, *replptr, *updptr;
+ __le32 *origptr, *updptr;
+ alternative_cb_t alt_cb;

for (alt = region->begin; alt < region->end; alt++) {
- u32 insn;
- int i, nr_inst;
+ int nr_inst;

- if (!cpus_have_cap(alt->cpufeature))
+ /* Use ARM64_CB_PATCH as an unconditional patch */
+ if (alt->cpufeature < ARM64_CB_PATCH &&
+ !cpus_have_cap(alt->cpufeature))
continue;

- BUG_ON(alt->alt_len != alt->orig_len);
+ if (alt->cpufeature == ARM64_CB_PATCH)
+ BUG_ON(alt->alt_len != 0);
+ else
+ BUG_ON(alt->alt_len != alt->orig_len);

pr_info_once("patching kernel code\n");

origptr = ALT_ORIG_PTR(alt);
- replptr = ALT_REPL_PTR(alt);
+ updptr = use_linear_alias ? lm_alias(origptr) : origptr;
- nr_inst = alt->alt_len / sizeof(insn);
+ nr_inst = alt->orig_len / AARCH64_INSN_SIZE;

- for (i = 0; i < nr_inst; i++) {
- insn = get_alt_insn(alt, origptr + i, replptr + i);
- updptr[i] = cpu_to_le32(insn);
- }
+ if (alt->cpufeature < ARM64_CB_PATCH)
+ alt_cb = patch_alternative;
+ else
+ alt_cb = ALT_REPL_PTR(alt);
+ alt_cb(alt, origptr, updptr, nr_inst);

flush_icache_range((uintptr_t)origptr,
                    (uintptr_t)(origptr + nr_inst));
@@ -143,7 +154,6 @@
*/
static int __apply_alternatives_multi_stop(void *unused)
{
static int patched = 0;
struct alt_region region = {
  .begin= (struct alt_instr *)__alt_instructions,
  .end= (struct alt_instr *)__alt_instructions_end,
@@ -151,14 +161,14 @@
/* We always have a CPU 0 at this point (__init) */
if (smp_processor_id()) {
  -while (!READ_ONCE(patched))
  +while (!READ_ONCE(alternatives_applied))
    cpu_relax();
    isb();
} else {
  -BUG_ON(patched);
  +BUG_ON(alternatives_applied);
  __apply_alternatives(&region, true);
/* Barriers provided by the cache flushing */
  -WRITE_ONCE(patched, 1);
  +WRITE_ONCE(alternatives_applied, 1);
}
return 0;
--- linux-4.15.0.orig/arch/arm64/kernel/arm64ksyms.c
+++ linux-4.15.0/arch/arm64/kernel/arm64ksyms.c
@@ -37,27 +37,30 @@
/* user mem (segment) */
 EXPORT_SYMBOL(__arch_copy_from_user);
 EXPORT_SYMBOL(__arch_copy_to_user);
-EXPORT_SYMBOL(__clear_user);
-EXPORT_SYMBOL(raw_copy_in_user);
+EXPORT_SYMBOL(__arch_clear_user);
+EXPORT_SYMBOL(__arch_copy_in_user);

/* physical memory */
EXPORT_SYMBOL(memstart_addr);

/* string / mem functions */
+#ifndef CONFIG_KASAN
EXPORT_SYMBOL(strchr);
EXPORT_SYMBOL(strchr);
EXPORT_SYMBOL(strcmp);
EXPORT_SYMBOL(strncmp);
EXPORT_SYMBOL(strlen);
EXPORT_SYMBOL(strnlen);
+EXPORT_SYMBOL(memcmp);
+EXPORT_SYMBOL(memchr);
+endif
+
EXPORT_SYMBOL(memset);
EXPORT_SYMBOL(memcpy);
EXPORT_SYMBOL(memmove);
EXPORT_SYMBOL(__memset);
EXPORT_SYMBOL(__memcpy);
EXPORT_SYMBOL(__memmove);
EXPORT_SYMBOL(memchr);
EXPORT_SYMBOL(memcmp);

/* atomic bitops */
EXPORT_SYMBOL(set_bit);
@@ -75,3 +78,11 @@
/* arm-smccc */
EXPORT_SYMBOL(__arm_smccc_smc);
EXPORT_SYMBOL(__arm_smccc_hvc);
+
+/* tishift.S */
+extern long long __ashlti3(long long a, int b);
+EXPORT_SYMBOL(__ashlti3);
+extern long long __ashrti3(long long a, int b);
+EXPORT_SYMBOL(__ashrti3);
+extern long long __lshrti3(long long a, int b);
+EXPORT_SYMBOL(__lshrti3);
--- linux-4.15.0.orig/arch/arm64/kernel/armv8_deprecated.c
+++ linux-4.15.0/arch/arm64/kernel/armv8_deprecated.c
@@ -178,6 +178,9 @@
struct insn_emulation *insn;

insn = kzalloc(sizeof(*insn), GFP_KERNEL);
+if (!insn)
+ return;
+ insn->ops = ops;
 insn->min = INSN_UNDEF;
@@ -598,7 +603,7 @@
/* Thumb mode */
Open Source Used In 5GaaS Edge AC-4  10365

- instr_mask= 0x0000fff7,
+ instr_mask= 0xffffffff,
  instr_val= 0x0000b650,
  pstate_mask= (COMPAT_PSR_T_BIT | COMPAT_PSR_MODE_MASK),
  pstate_val= (COMPAT_PSR_T_BIT | COMPAT_PSR_MODE_USR),
--- linux-4.15.0.orig/arch/arm64/kernel/asm-offsets.c
+++ linux-4.15.0/arch/arm64/kernel/asm-offsets.c
@@ -18,12 +18,14 @@
 * along with this program. If not, see <http://www.gnu.org/licenses/>.
 */

+##include <linux/arm_sdei.h>
#include <linux/sched.h>
#include <linux/mm.h>
#include <linux/dma-mapping.h>
#include <linux/kvm_host.h>
#include <linux/suspend.h>
#include <asm/cpufeature.h>
+##include <asm/fixmap.h>
#include <asm/thread_info.h>
#include <asm/memory.h>
#include <asm/smp_plat.h>
@@ -94,7 +96,7 @@
 DEFINE(CLOCK_REALTIME,	CLOCK_REALTIME);
 DEFINE(CLOCK_MONOTONIC,	CLOCK_MONOTONIC);
 DEFINE(CLOCK_MONOTONIC_RAW,	CLOCK_MONOTONIC_RAW);
- DEFINE(CLOCK_REALTIME_RES,	MONOTONIC_RES_NSEC);
+ DEFINE(CLOCK_REALTIME_RES,	offsetof(struct vdso_data, hrtimer_res));
 DEFINE(CLOCK_REALTIME_COARSE,	CLOCK_REALTIME_COARSE);
 DEFINE(CLOCK_MONOTONIC_COARSE,	CLOCK_MONOTONIC_COARSE);
 DEFINE(CLOCK_COARSE_RES,	LOW_RES_NSEC);
@@ -130,11 +132,14 @@
 BLANK();

#define CONFIG_KVM_ARM_HOST
+ DEFINE(VCPU_CONTEXT,offsetof(struct kvm_vcpu, archctxt));
+ DEFINE(VCPU_FAULT_DISR,offsetof(struct kvm_vcpu, arch.fault.disr_el1));
+ DEFINE(VCPU_WORKAROUND_FLAGS,offsetof(struct kvm_vcpu, arch.workaround_flags));
 DEFINE(CPU_GP_REGS,offsetof(struct kvm_cpu_context, gp_regs));
 DEFINE(CPU_USER_PT_REGS,offsetof(struct kvm_regs, regs));
 DEFINE(CPU_FP_REGS,offsetof(struct kvm_regs, fp_regs));
 DEFINE(VCPU_FPEXC32_EL2,offsetof(struct kvm_vcpu, archctxt.sys_regs[FPEXC32_EL2]));
 DEFINE(VCPU_HOST_CONTEXT,offsetof(struct kvm_vcpu, arch.host_cpu_context));
+ DEFINE(HOST_CONTEXT_VCPU,offsetof(struct kvm_cpu_context, __hyp_running_vcpu));
#endif

#define CONFIG_CPU_PM
+ DEFINE(CPU_SUSPEND_SZ,sizeof(struct cpu_suspend_ctx));
@@ -148,11 +153,18 @@
 DEFINE(ARM_SMCCC_RES_X2_OFFS,offsetof(struct arm_smccc_res, a2));
DEFINE(ARM_SMCCC_QUIRK_ID_OFFS, offsetof(struct arm_smccc_quirk, id));
DEFINE(ARM_SMCCC_QUIRK_STATE_OFFS, offsetof(struct arm_smccc_quirk, state));

BLANK();
DEFINE(HIBERN_PBE_ORIG, offsetof(struct pbe, orig_address));
DEFINE(HIBERN_PBE_ADDR, offsetof(struct pbe, address));
DEFINE(HIBERN_PBE_NEXT, offsetof(struct pbe, next));
DEFINE(ARM64_FTR_SYSVAL, offsetof(struct arm64_ftr_reg, sys_val));
BLANK();
+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
  DEFINE(TRAMP_VALIAS, TRAMP_VALIAS);
+#endif
+#ifdef CONFIG_ARM_SDE_INTERFACE
  DEFINE(SDEI_EVENT_INTREGS, offsetof(struct sdei_registered_event, interrupted_regs));
  DEFINE(SDEI_EVENT_PRIORITY, offsetof(struct sdei_registered_event, priority));
+#endif
  return 0;
}

--- linux-4.15.0.orig/arch/arm64/kernel/bpi.S
+++ linux-4.15.0/arch/arm64/kernel/bpi.S
@@ -0,0 +1,68 @@
+/*
+ * Contains CPU specific branch predictor invalidation sequences
+ *
+ * Copyright (C) 2018 ARM Ltd.
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License version 2 as
+ * published by the Free Software Foundation.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
++#include <linux/linkage.h>
+/#include <linux/arm-smccc.h>
+
+.*macro ventry target
+.*rept 31
+.*nop
+.*endr
+.*b target
+.*endm
+ .macro vectors target
+ ventry \target + 0x000
+ ventry \target + 0x080
+ ventry \target + 0x100
+ ventry \target + 0x180
+
+ ventry \target + 0x200
+ ventry \target + 0x280
+ ventry \target + 0x300
+ ventry \target + 0x380
+
+ ventry \target + 0x400
+ ventry \target + 0x480
+ ventry \target + 0x500
+ ventry \target + 0x580
+
+ ventry \target + 0x600
+ ventry \target + 0x680
+ ventry \target + 0x700
+ ventry \target + 0x780
+.endm
+
+.align 11
+ENTRY(__bp_harden_hyp_vecs_start)
+rept 4
+vectors __kvm_hyp_vector
+.endr
+ENTRY(__bp_harden_hyp_vecs_end)
+
+
+ENTRY(__smccc_workaround_1_smc_start)
+subsp, sp, #%(8 * 4)
+stpx2, x3, [sp, #%(8 * 0)]
+stpx0, x1, [sp, #%(8 * 2)]
+movw0, #ARM_SMCCC_ARCH_WORKAROUND_1
+smc#0
+ldpx2, x3, [sp, #%(8 * 0)]
+ldpx0, x1, [sp, #%(8 * 2)]
+addsp, sp, #%(8 * 4)
+ENTRY(__smccc_workaround_1_smc_end)
--- linux-4.15.0.orig/arch/arm64/kernel/cacheinfo.c
+++ linux-4.15.0/arch/arm64/kernel/cacheinfo.c
@@ -17,6 +17,7 @@
* along with this program. If not, see <http://www.gnu.org/licenses/>.
* /
+
+#include <linux/acpi.h>
#include <linux/cacheinfo.h>
#include <linux/of.h>

static int __init_cache_level(unsigned int cpu)
+int init_cache_level(unsigned int cpu)
{
-unsigned int ctype, level, leaves, of_level;
+unsigned int ctype, level, leaves, fw_level;
struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);

for (level = 1, leaves = 0; level <= MAX_CACHE_LEVEL; level++) {
@@ -59,15 +60,19 @@
-  leaves += (ctype == CACHE_TYPE_SEPARATE) ? 2 : 1;
+
+  leaves += (fw_level - level);
+  level = fw_level;
}

-of_level = of_find_last_cache_level(cpu);
-if (level < of_level) {
+if (acpi_disabled)
+  fw_level = of_find_last_cache_level(cpu);
+else
+  fw_level = acpi_find_last_cache_level(cpu);
+}
+if (level < fw_level) {
 /*
  * some external caches not specified in CLIDR_EL1
  * the information may be available in the device tree
  * only unified external caches are considered here
  */
-leaves += (of_level - level);
-level = of_level;
+leaves += (fw_level - level);
+level = fw_level;
}

this_cpu_ci->num_levels = level;
@@ -75,7 +80,7 @@
return 0;
}

-static int __populate_cache_leaves(unsigned int cpu)
+int populate_cache_leaves(unsigned int cpu)
{
unsigned int level, idx;
enum cache_type type;
@@ -94,6 +99,3 @@

 return 0;
 }
-
-DEFINE_SMP_CALL_CACHE_FUNCTION(init_cache_level)
-DEFINE_SMP_CALL_CACHE_FUNCTION(populate_cache_leaves)
--- linux-4.15.0.orig/arch/arm64/kernel/cpu-reset.S
+++ linux-4.15.0/arch/arm64/kernel/cpu-reset.S
@@ -16,7 +16,7 @@
 #include <asm/virt.h>

 .text
-.pushsection .idmap.text, "ax"
+.pushsection .idmap.text, "awx"

 /*
 * __cpu_soft_restart(el2_switch, entry, arg0, arg1, arg2) - Helper for
--- linux-4.15.0.orig/arch/arm64/kernel/cpu_errata.c
+++ linux-4.15.0/arch/arm64/kernel/cpu_errata.c
@@ -16,49 +16,582 @@
 * along with this program. If not, see <http://www.gnu.org/licenses/>.
 */
#
+#include <linux/arm-smccc.h>
+#include <linux/psci.h>
#include <linux/types.h>
+#include <linux/cpu.h>
#include <asm/cpu.h>
#include <asm/cputype.h>
#include <asm/cpufeature.h>
+#include <asm/smp_plat.h>

 static bool __maybe_unused
 is_affected_midr_range(const struct arm64_cpu_capabilities *entry, int scope)
 {__
 +u32 midr = read_cpuid_id();
 +
 +WARN_ON(scope != SCOPE_LOCAL_CPU || preemptible());
 +return is_midr_in_range(midr, &entry->midr_range);
 +}
 +
 +static bool __maybe_unused
 +is_affected_midr_range_list(const struct arm64_cpu_capabilities *entry,
 +int scope)
 +{
 WARN_ON(scope != SCOPE_LOCAL_CPU || preemptible());
 -return MIDR_IS_CPU_MODEL_RANGE(read_cpuid_id(), entry->midr_model,
entry->midr_range_min,
- entry->midr_range_max);
+return is_midr_in_range_list(read_cpuid_id(), entry->midr_range_list);
+
+static bool __maybe_unused
+is_kryo_midr(const struct arm64_cpu_capabilities *entry, int scope)
+{
+u32 model;
+
+WARN_ON(scope != SCOPE_LOCAL_CPU || preemptible());
+
+model = read_cpuid_id();
+model &= MIDR_IMPLEMENTOR_MASK | (0xf00 << MIDR_PARTNUM_SHIFT) |
+MIDR_ARCHITECTURE_MASK;
+
+return model == entry->midr_range.model;
}

static bool
-has_mismatched_cache_line_size(const struct arm64_cpu_capabilities *entry,
-int scope)
+has_mismatched_cache_type(const struct arm64_cpu_capabilities *entry,
+ int scope)
{
+u64 mask = CTR_CACHE_MINLINE_MASK;
+
+/* Skip matching the min line sizes for cache type check */
+if (entry->capability == ARM64_MISMATCHED_CACHE_TYPE)
+mask ^= arm64_ftr_reg_ctrel0.strict_mask;
+
+WARN_ON(scope != SCOPE_LOCAL_CPU || preemptible());
-has (read_cpuid_cachetype() & arm64_ftr_reg_ctrel0.strict_mask) !=
+-(arm64_ftr_reg_ctrel0.sys_val & arm64_ftr_reg_ctrel0.strict_mask);
+return (read_cpuid_cachetype() & mask) !=
+ (arm64_ftr_reg_ctrel0.sys_val & mask);
}

-static int cpu_enable_trap_ctr_access(void *__unused)
+static void
+cpu_enable_trap_ctr_access(const struct arm64_cpu_capabilities *__unused)
{
/* Clear SCTLR_EL1.UCT */
config_sctlr_el1(SCTLR_EL1_UCT, 0);
+
+##include <asm/mmu_context.h>
+##include <asm/cacheflush.h>
+DEFINE_PER_CPU_READ_MOSTLY(struct bp_hardening_data, bp_hardening_data);
+
+#ifdef CONFIG_KVM
+extern char __smccc_workaround_1_smc_start[];
+extern char __smccc_workaround_1_smc_end[];
+
+static void __copy_hyp_vect_bpi(int slot, const char *hyp_vecs_start,
+const char *hyp_vecs_end)
+{
+void *dst = lm_alias(__bp_harden_hyp_vecs_start + slot * SZ_2K);
+int i;
+
+for (i = 0; i < SZ_2K; i += 0x80)
+memcpy(dst + i, hyp_vecs_start, hyp_vecs_end - hyp_vecs_start);
+
+flush_icache_range((uintptr_t)dst, (uintptr_t)dst + SZ_2K);
+}
+
+static void install_bp_hardening_cb(bp_hardening_cb_t fn,
+    const char *hyp_vecs_start,
+    const char *hyp_vecs_end)
+{
+static int last_slot = -1;
+static DEFINE_SPINLOCK(bp_lock);
+int cpu, slot = -1;
+
+spin_lock(&bp_lock);
+for_each_possible_cpu(cpu) {
+if (per_cpu(bp_hardening_data.fn, cpu) == fn) {
+slot = per_cpu(bp_hardening_data.hyp_vectors_slot, cpu);
+break;
+}
+}
+
+if (slot == -1) {
+last_slot++;
+BUG_ON((__bp_harden_hyp_vecs_end - __bp_harden_hyp_vecs_start)
+    / SZ_2K) <= last_slot);
+slot = last_slot;
+__copy_hyp_vect_bpi(slot, hyp_vecs_start, hyp_vecs_end);
+}
+
+__this_cpu_write(bp_hardening_data.hyp_vectors_slot, slot);
+__this_cpu_write(bp_hardening_data.fn, fn);
+spin_unlock(&bp_lock);
+}
+#else
+ #define __smccc_workaround_1_smc_start NULL
+ #define __smccc_workaround_1_smc_end NULL
+
+ static void install_bp_hardening_cb(bp_hardening_cb_t fn,
+    const char *hyp_vecs_start,
+    const char *hyp_vecs_end)
+ {
+    __this_cpu_write(bp_hardening_data.fn, fn);
+ }
+ #endif /* CONFIG_KVM */
+
+ #include <uapi/linux/psci.h>
+ #include <linux/arm-smccc.h>
+ #include <linux/psci.h>
+
+ static void call_smc_arch_workaround_1(void)
+ {
+    arm_smccc_1_1_smc(ARM_SMCCC_ARCH_WORKAROUND_1, NULL);
+ }
+
+ static void call_hvc_arch_workaround_1(void)
+ {
+    arm_smccc_1_1_hvc(ARM_SMCCC_ARCH_WORKAROUND_1, NULL);
+ }
+
+ static void qcom_link_stack_sanitization(void)
+ {
+    u64 tmp;
+    
+    asm volatile("mov %0, x30
+        .rept 16
+        "bl . + 4"n
+        ".endr"
+        "movx30, %0n"
+        : "=&r" (tmp));
+ }
+
+ static bool __nospectre_v2;
+ static int __init parse_nospectre_v2(char *str)
+ {
+    __nospectre_v2 = true;
+    return 0;
+ }
+ early_param("nospectre_v2", parse_nospectre_v2);
+
+ /*-1: No workaround
+ + 0: No workaround required
+ */
+ * 1: Workaround installed
+ */
+static int detect_harden_bp_fw(void)
+{
+bp_hardening_cb_t cb;
+void *smccc_start, *smccc_end;
+struct arm_smccc_res res;
+u32 midr = read_cpuid_id();
+
+if (psci_ops.smccc_version == SMCCC_VERSION_1_0)
+return -1;
+
+switch (psci_ops.conduit) {
+case PSCI_CONDUIT_HVC:
+arm_smccc_1_1_hvc(ARM_SMCCC_ARCH_FEATURES_FUNC_ID,
+ ARM_SMCCC_ARCH_WORKAROUND_1, &res);
+switch ((int)res.a0) {
+case 1:
+/* Firmware says we're just fine */
+return 0;
+case 0:
+cb = call_hvc_arch_workaround_1;
+/* This is a guest, no need to patch KVM vectors */
+smccc_start = NULL;
+smccc_end = NULL;
+break;
+default:
+return -1;
+}
+break;
+
case PSCI_CONDUIT_SMC:
+arm_smccc_1_1_smc(ARM_SMCCC_ARCH_FEATURES_FUNC_ID,
+ ARM_SMCCC_ARCH_WORKAROUND_1, &res);
+switch ((int)res.a0) {
+case 1:
+/* Firmware says we're just fine */
+return 0;
+case 0:
+cb = call_smc_arch_workaround_1;
+smccc_start = __smccc_workaround_1_smc_start;
+smccc_end = __smccc_workaround_1_smc_end;
+break;
+default:
+return -1;
+}
+break;

  +default:
  +return -1;
  +}
  +
  +if (((midr & MIDR_CPU_MODEL_MASK) == MIDR_QCOM_FALKOR) ||
  +    ((midr & MIDR_CPU_MODEL_MASK) == MIDR_QCOM_FALKOR_V1))
  +cb = qcom_link_stack_sanitization;
  +
  +if (IS_ENABLED(CONFIG_HARDEN_BRANCH_PREDICTOR))
  +install_bp_hardening_cb(cb, smccc_start, smccc_end);
  +
  +return 1;
  +}
  +
  +DEFINE_PER_CPU_READ_MOSTLY(u64, arm64_ssbd_callback_required);
  +
  +int ssbd_state __read_mostly = ARM64_SSBD_KERNEL;
  +static bool __ssb_safe = true;
  +
  +static const struct ssbd_options {
  +  const char *str;
  +  int		state;
  +} ssbd_options[]} = {
  +{ "force-on",ARM64_SSBD_FORCE_ENABLE, },
  +{ "force-off",ARM64_SSBD_FORCE_DISABLE, },
  +{ "kernel",ARM64_SSBD_KERNEL, },
  +};
  +
  +static int __init ssbd_cfg(char *buf)
  +{*
  +int i;
  +
  +if (!buf || !buf[0])
  +return -EINVAL;
  +
  +for (i = 0; i < ARRAY_SIZE(ssbd_options); i++) {
  +int len = strlen(ssbd_options[i].str);
  +
  +if (strcmp(buf, ssbd_options[i].str, len))
  +continue;
  +
  +ssbd_state = ssbd_options[i].state;
  +return 0;
  +}
  +
  +return -EINVAL;
  +}
  +early_param("ssbd", ssbd_cfg);
+void __init arm64_update_smccc_conduit(struct alt_instr *alt,
+   __le32 *origptr, __le32 *updptr,
+   int nr_inst)
+{
+u32 insn;
+
+BUG_ON(nr_inst != 1);
+
+switch (psci_ops.conduit) {
+case PSCI_CONDUIT_HVC:
+    insn = aarch64_insn_get_hvc_value();
+    break;
+case PSCI_CONDUIT_SMC:
+    insn = aarch64_insn_get_smc_value();
+    break;
+default:
+    return;
+}
+
+*updptr = cpu_to_le32(insn);
+
+
+void __init arm64_enable_wa2_handling(struct alt_instr *alt,
+   __le32 *origptr, __le32 *updptr,
+   int nr_inst)
+{
+BUG_ON(nr_inst != 1);
+
+/*
+ * Only allow mitigation on EL1 entry/exit and guest
+ * ARCH_WORKAROUND_2 handling if the SSBD state allows it to
+ * be flipped.
+ */
+if (arm64_get_ssbd_state() == ARM64_SSBD_KERNEL)
+  *updptr = cpu_to_le32(aarch64_insn_gen_nop());
+}

#define MIDR_RANGE(model, min, max) \  
  .def_scope = SCOPE_LOCAL_CPU, \  
  .matches = is_affected_midr_range, \  
  .midr_model = model, \  
  .midr_range_min = min, \  
  .midr_range_max = max  

#define MIDR_ALL_VERSIONS(model) \  
  .def_scope = SCOPE_LOCAL_CPU, \  
  .matches = is_affected_midr_range, \  
  .midr_model = model, \
- .midr_range_min = 0, \
- .midr_range_max = (MIDR_VARIANT_MASK | MIDR_REVISION_MASK)
+void arm64_set_ssbd_mitigation(bool state)
+{
+if (!IS_ENABLED(CONFIG_ARM64_SSBD)) {
+pr_info_once("SSBD disabled by kernel configuration\n");
+return;
+}
+
+if (this_cpu_has_cap(ARM64_SSBS)) {
+if (state)
+asm volatile(SET_PSTATE_SSBS(0));
+else
+asm volatile(SET_PSTATE_SSBS(1));
+return;
+}
+
+switch (psci_ops.conduit) {
+case PSCI_CONDUIT_HVC:
+arm_smccc_1_1_hvc(ARM_SMCCC_ARCH_WORKAROUND_2, state, NULL);
+break;
+
+case PSCI_CONDUIT_SMC:
+arm_smccc_1_1_smc(ARM_SMCCC_ARCH_WORKAROUND_2, state, NULL);
+break;
+
+default:
+WARN_ON_ONCE(1);
+break;
+}
+
+static bool has_ssbd_mitigation(const struct arm64_cpu_capabilities *entry,
+    int scope)
+{
+    struct arm_smccc_res res;
+    bool required = true;
+    s32 val;
+    bool this_cpu_safe = false;
+    
+    WARN_ON(scope != SCOPE_LOCAL_CPU || preemptible());
+    
+    if (cpu_mitigations_off())
+        ssbd_state = ARM64_SSBBD_FORCE_DISABLE;
+    
+    /* delay setting __ssb_safe until we get a firmware response */
+    if (is_midr_in_range_list(read_cpuid_id(), entry->midr_range_list))
+        this_cpu_safe = true;
+    
+    return required || this_cpu_safe || !is_midr_in_range_list(entry)
+        || !arm_smccc_is_ssb_tested(entry, NULL, NULL);
+}
+}
+ if (this_cpu_has_cap(ARM64_SSBS)) {
+ if (!this_cpu_safe)
+ __ssb_safe = false;
+ required = false;
+ goto out_printmsg;
+ }
+
+ if (psci_ops.smccc_version == SMCCC_VERSION_1_0) {
+ ssbd_state = ARM64_SSBD_UNKNOWN;
+ if (!this_cpu_safe)
+ __ssb_safe = false;
+ return false;
+ }
+
+ switch (psci_ops.conduit) {
+ case PSCI_CONDUIT_HVC:
+ arm_smccc_1_1_hvc(ARM_SMCCC_ARCHFEATURES_FUNC_ID,
+ ARM_SMCCC_ARCH_WORKAROUND_2, &res);
+ break;
+ 
+ case PSCI_CONDUIT_SMC:
+ arm_smccc_1_1_smc(ARM_SMCCC_ARCHFEATURES_FUNC_ID,
+ ARM_SMCCC_ARCH_WORKAROUND_2, &res);
+ break;
+ 
+ default:
+ ssbd_state = ARM64_SSBD_UNKNOWN;
+ if (!this_cpu_safe)
+ __ssb_safe = false;
+ return false;
+ }
+
+ val = (s32)res.a0;
+
+ switch (val) {
+ case SMCCC_RET_NOT_SUPPORTED:
+ ssbd_state = ARM64_SSBD_UNKNOWN;
+ if (!this_cpu_safe)
+ __ssb_safe = false;
+ return false;
+ /* machines with mixed mitigation requirements must not return this */
+ case SMCCC_RET_NOT_REQUIRED:
+ pr_info_once("%s mitigation not required\n", entry->desc);
+ ssbd_state = ARM64_SSBD_MITIGATED;
+ return false;
+ /*
+case SMCCC_RET_SUCCESS:
 + __ssb_safe = false;
 + required = true;
 + break;
 +
 +case 1: /* Mitigation not required on this CPU */
 + required = false;
 + break;
 +
 +default:
 + WARN_ON(1);
 + if (!this_cpu_safe)
 + __ssb_safe = false;
 + return false;
 + }
 +
 +switch (ssbd_state) {
 +case ARM64_SSBD_FORCE_DISABLE:
 + arm64_set_ssbd_mitigation(false);
 + required = false;
 + break;
 +
 +case ARM64_SSBDKERNEL:
 + if (required) {
 + __this_cpu_write(arm64_ssbd_callback_required, 1);
 + arm64_set_ssbd_mitigation(true);
 + } 
 + break;
 +
 +case ARM64_SSBD_FORCE_ENABLE:
 + arm64_set_ssbd_mitigation(true);
 + required = true;
 + break;
 +
 +default:
 + WARN_ON(1);
 + break;
 + }
 +
 +out_printf:
 + switch (ssbd_state) {
 + case ARM64_SSBD_FORCE_DISABLE:
 + pr_info_once("%s disabled from command-line
", entry->desc);
 + break;
 +
 +case ARM64_SSBD_FORCE_ENABLE:
 + pr_info_once("%s forced from command-line
", entry->desc);
 + break;
+}
+return required;
+
+/* known invulnerable cores */
+static const struct midr_range arm64_ssb_cpus[] = {
+MIDR_ALL_VERSIONS(MIDR_CORTEX_A35),
+MIDR_ALL_VERSIONS(MIDR_CORTEX_A53),
+MIDR_ALL_VERSIONS(MIDR_CORTEX_A55),
+{"},
+};
+
+#define CAP_MIDR_RANGE(model, v_min, r_min, r_max)
+.matches = is_affected_midr_range,
+.midr_range = MIDR_RANGE(model, v_min, r_min, r_max)
+
+#define CAP_MIDR_ALL_VERSIONS(model)
+.matches = is_affected_midr_range,
+.midr_range = MIDR_ALL_VERSIONS(model)
+
+#define MIDR_FIXED(rev, revidr_mask)
+.fixed_revs = (struct arm64_midr_revidr[]){{ (rev), (revidr_mask) }, {}}
+
+#define ERRATA_MIDR_RANGE(model, v_min, r_min, v_max, r_max)
+.type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
+CAP_MIDR_RANGE(model, v_min, r_min, v_max, r_max)
+
+#define CAP_MIDR_RANGE_LIST(midr_list)
+.matches = is_affected_midr_range_list,
+.midr_range_list = list
+
+/* Errata affecting a range of revisions of given model variant */
+#define ERRATA_MIDR_REV_RANGE(m, var, r_min, r_max)
+ERRATA_MIDR_RANGE(m, var, r_min, var, r_max)
+
+/* Errata affecting a single variant/revision of a model */
+#define ERRATA_MIDR_REV(model, var, rev)
+ERRATA_MIDR_RANGE(model, var, rev, var)
+
+/* Errata affecting all variants/revisions of a given a model */
+#define ERRATA_MIDR_ALL_VERSIONS(model)
+.type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
+CAP_MIDR_ALL_VERSIONS(model)
+
+/* Errata affecting a list of midr ranges, with same work around */
+#define ERRATA_MIDR_RANGE_LIST(midr_list)
+.type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
CAP_MIDR_RANGE_LIST(midr_list)
+
+ /* Track overall mitigation state. We are only mitigated if all cores are ok */
+static bool __hardenbp_enab = true;
+static bool __spectrev2_safe = true;
+
+ /* List of CPUs that do not need any Spectre-v2 mitigation at all.
+ */
+static const struct midr_range spectre_v2_safe_list[] = {
+  MIDR_ALL_VERSIONS(MIDR_CORTEX_A35),
+  MIDR_ALL_VERSIONS(MIDR_CORTEX_A53),
+  MIDR_ALL_VERSIONS(MIDR_CORTEX_A55),
+  { /* sentinel */ }
+};
+
+ /* Track overall bp hardening for all heterogeneous cores in the machine.
+ * We are only considered "safe" if all booted cores are known safe.
+ */
+static bool __maybe_unused
+check_branch_predictor(const struct arm64_cpu_capabilities *entry, int scope)
+{
+  int need_wa;
+
+  WARN_ON(scope != SCOPE_LOCAL_CPU || preemptible());
+
+  /* If the CPU has CSV2 set, we're safe */
+  if (cpuid_feature_extract_unsigned_field(read_cpuid(ID_AA64PFR0_EL1),
+      ID_AA64PFR0_CSV2_SHIFT))
+    return false;
+
+  /* Alternatively, we have a list of unaffected CPUs */
+  if (is_midr_in_range_list(read_cpuid_id(), spectre_v2_safe_list))
+    return false;
+
+  /* Fallback to firmware detection */
+  need_wa = detect_harden_bp_fw();
+  if (!need_wa)
+    return false;
+
+  __spectrev2_safe = false;
+
+  if (!IS_ENABLED(CONFIG_HARDEN_BRANCH_PREDICTOR)) {
+    pr_warn_once("spectrev2 mitigation disabled by kernel configuration\n");
+    __hardenbp_enab = false;
+    return false;
+  }
ifdef(CONFIG_ARM64_ERRATUM_826319) || 
+/* forced off */
+if (__nospectre_v2 || cpu_mitigations_off()) {
+pr_info_once("spectrev2 mitigation disabled by command line option
");
+__hardenhp_enab = false;
+return false;
+}
+
+if (need_wa < 0) {
+pr_warn_once("ARM_SMCCW_ARCH_WORKAROUND_1 missing from firmware\n");
+__hardenhp_enab = false;
+}
+
+return (need_wa > 0);
+}
+
+static void
+cpu_enable_branch_predictor_hardening(const struct arm64_cpu_capabilities *cap)
+{
+cap->matches(cap, SCOPE_LOCAL_CPU);
+}
+
+static const __maybe_unused struct midr_range tx2_family_cpus[] = {
+MIDR_ALL_VERSIONS(MIDR_BRCM_VULCAN),
+MIDR_ALL_VERSIONS(MIDR_CAVIUM_THUNDERX2),
+{} ,
+};
+
+static bool __maybe_unused
+needs_tx2_tvm_workaround(const struct arm64_cpu_capabilities *entry,
+int scope)
+{
+int i;
+
+if (!is_affected_midr_range_list(entry, scope) ||
+ !is_hyp_mode_available())
+return false;
+
+for_each_possible_cpu(i) {
+if (MPIDR_AFFINITY_LEVEL(cpu_logical_map(i), 0) != 0)
+return true;
+}
+
+return false;
+}
+
const struct arm64_cpu_capabilities arm64_errata[] = {
#if defined(CONFIG_ARM64_ERRATUM_826319) || 

Cortex-A53 r0p[012] */
 .desc = "ARM errata 826319, 827319, 824069",
 .capability = ARM64_WORKAROUND_CLEAN_CACHE,
 -MIDR_RANGE(MIDR_CORTEX_A53, 0x00, 0x02),
 -enable = cpu_enable_cache_maint_trap,
 +ERRATA_MIDR_REV_RANGE(MIDR_CORTEX_A53, 0, 0, 2),
 +.cpu_enable = cpu_enable_cache_maint_trap,
 },
#endif
#ifdef CONFIG_ARM64_ERRATUM_819472
 @@ -77,8 +610,8 @@
/* Cortex-A53 r0p[01] */
 .desc = "ARM errata 819472",
 .capability = ARM64_WORKAROUND_CLEAN_CACHE,
 -MIDR_RANGE(MIDR_CORTEX_A53, 0x00, 0x01),
 -enable = cpu_enable_cache_maint_trap,
 +ERRATA_MIDR_REV_RANGE(MIDR_CORTEX_A53, 0, 0, 1),
 +.cpu_enable = cpu_enable_cache_maint_trap,
 },
#endif
#ifdef CONFIG_ARM64_ERRATUM_832075
@@ -86,9 +619,9 @@
/* Cortex-A57 r0p0 - r1p2 */
 .desc = "ARM erratum 832075",
 .capability = ARM64_WORKAROUND_DEVICE_LOAD_ACQUIRE,
 -MIDR_RANGE(MIDR_CORTEX_A57,
 - MIDR_CPU_VAR_REV(0, 0),
 - MIDR_CPU_VAR_REV(1, 2)),
 +ERRATA_MIDR_RANGE(MIDR_CORTEX_A57,
 + 0, 0,
 + 1, 2),
 },
#endif
#ifdef CONFIG_ARM64_ERRATUM_834220
 @@ -96,9 +629,9 @@
/* Cortex-A57 r0p0 - r1p2 */
 .desc = "ARM erratum 834220",
 .capability = ARM64_WORKAROUND_834220,
 -MIDR_RANGE(MIDR_CORTEX_A57,
 - MIDR_CPU_VAR_REV(0, 0),
 - MIDR_CPU_VAR_REV(1, 2)),
 +ERRATA_MIDR_RANGE(MIDR_CORTEX_A57,
 + 0, 0,
 + 1, 2),
 },
#endif
#ifdef CONFIG_ARM64_ERRATUM_845719
/* Cortex-A53 r0p[01234] */
.desc = "ARM erratum 845719",
capability = ARM64_WORKAROUND_845719,
-MIDR_RANGE(MIDR_CORTEX_A53, 0x00, 0x04),
+ERRATA_MIDR_REV_RANGE(MIDR_CORTEX_A53, 0, 0, 4),
},
#endif
#ifdef CONFIG_CAVIUM_ERRATUM_23154
/* Cavium ThunderX, pass 1.x */
.desc = "Cavium erratum 23154",
capability = ARM64_WORKAROUND_CAVIUM_23154,
-MIDR_RANGE(MIDR_THUNDERX, 0x00, 0x01),
+ERRATA_MIDR_REV_RANGE(MIDR_THUNDERX, 0, 0, 1),
},
#endif
#ifdef CONFIG_CAVIUM_ERRATUM_27456
/* Cavium ThunderX, T88 pass 1.0 */
.desc = "Cavium erratum 27456",
capability = ARM64_WORKAROUND_CAVIUM_27456,
-MIDR_RANGE(MIDR_THUNDERX, (1 << MIDR_VARIANT_SHIFT) | 2),
+ERRATA_MIDR_RANGE(MIDR_THUNDERX, 0, 0, 1),
},
#endif
#ifdef CONFIG_CAVIUM_ERRATUM_30115
/* Cavium ThunderX, T88 pass 1.0 */
.desc = "Cavium erratum 30115",
capability = ARM64_WORKAROUND_CAVIUM_30115,
-MIDR_RANGE(MIDR_THUNDERX, 0x0000, 0x0000),
+ERRATA_MIDR_RANGE(MIDR_THUNDERX_81XX, 0, 0, 1),
},
#endif
#ifdef CONFIG_CAVIUM_ERRATUM_30115
/* Cavium ThunderX, T88 pass 1.0 */
.desc = "Cavium erratum 30115",
capability = ARM64_WORKAROUND_CAVIUM_30115,
-MIDR_RANGE(MIDR_THUNDERX, 0x0000, 0x0000),
+ERRATA_MIDR_RANGE(MIDR_THUNDERX_81XX, 0, 0, 1),
},
#endif
{ /* Cavium ThunderX, T81 pass 1.0 - 1.2 */
  .desc = "Cavium erratum 30115",
  .capability = ARM64_WORKAROUND_CAVIUM_30115,
  -MIDR_RANGE(MIDR_THUNDERX_81XX, 0x00, 0x02),
  +ERRATA_MIDR_REV_RANGE(MIDR_THUNDERX_81XX, 0, 0, 2),
},
{ /* Cavium ThunderX, T83 pass 1.0 */
  .desc = "Cavium erratum 30115",
  .capability = ARM64_WORKAROUND_CAVIUM_30115,
  -MIDR_RANGE(MIDR_THUNDERX_83XX, 0x00, 0x00),
  +ERRATA_MIDR_REV(MIDR_THUNDERX_83XX, 0, 0),
},
#endif
{ .desc = "Mismatched cache line size",
  .capability = ARM64_MISMATCHED_CACHE_LINE_SIZE,
  -.matches = has_mismatched_cache_line_size,
  -.def_scope = SCOPE_LOCAL_CPU,
  -.enable = cpu_enable_trap_ctr_access,
  +.matches = has_mismatched_cache_type,
  +.type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
  +.cpu_enable = cpu_enable_trap_ctr_access,
  +},
+{.
  +.desc = "Mismatched cache type",
  +.capability = ARM64_MISMATCHED_CACHE_TYPE,
  +.matches = has_mismatched_cache_type,
  +.type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
  +.cpu_enable = cpu_enable_trap_ctr_access,
},
#ifdef CONFIG_QCOM_FALKOR_ERRATUM_1003
{ .desc = "Qualcomm Technologies Falkor erratum 1003",
  .capability = ARM64_WORKAROUND_QCOM_FALKOR_E1003,
  -MIDR_RANGE(MIDR_QCOM_FALKOR_V1,
    - MIDR_CPU_VAR_REV(0, 0),
    - MIDR_CPU_VAR_REV(0, 0)),
  +ERRATA_MIDR_REV(MIDR_QCOM_FALKOR_V1, 0, 0),
  +},
+{.
  +.desc = "Qualcomm Technologies Kryo erratum 1003",
  +.capability = ARM64_WORKAROUND_QCOM_FALKOR_E1003,
  +.type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
  +.midr_range.model = MIDR_QCOM_KRYO,
  +.matches = is_kryo_midr,
},

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#ifndef CONFIG_QCOM_FALKOR_ERRATUM_1009
{
    .desc = "Qualcomm Technologies Falkor erratum 1009",
    .capability = ARM64_WORKAROUND_REPEAT_TLBI,
    -MIDR_RANGE(MIDR_QCOM_FALKOR_V1,
        -MIDR_CPU_VAR_REV(0, 0),
        -MIDR_CPU_VAR_REV(0, 0)),
    +ERRATA_MIDR_REV(MIDR_QCOM_FALKOR_V1, 0, 0),
},
#endif

#ifdef CONFIG_ARM64_ERRATUM_858921
@@ -184,39 +728,66 @@
/* Cortex-A73 all versions */
    .desc = "ARM erratum 858921",
    .capability = ARM64_WORKAROUND_858921,
    -MIDR_ALL_VERSIONS(MIDR_CORTEX_A73),
    +ERRATA_MIDR_ALL_VERSIONS(MIDR_CORTEX_A73),
},
#endif

+#ifdef CONFIG_CAVIUM_TX2_ERRATUM_219
+{
+    .desc = "Cavium ThunderX2 erratum 219 (KVM guest sysreg trapping)",
+    .capability = ARM64_WORKAROUND_CAVIUM_TX2_219_TVM,
+    +ERRATA_MIDR_RANGE_LIST(tx2_family_cpus),
+    +matches = needs_tx2_tvm_workaround,
+},
+#endif

+{  
+    .desc = "Branch predictor hardening",
+    .capability = ARM64_HARDEN_BRANCH_PREDICTOR,
+    .type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
+    .matches = check_branch_predictor,
+    .cpu_enable = cpu_enable_branch_predictor_hardening,
+},
+
+{  
+    .desc = "Speculative Store Bypass Disable",
+    .type = ARM64_CPUCAP_LOCAL_CPU_ERRATUM,
+    .capability = ARM64_SSBD,
+    .matches = has_ssbd_mitigation,
+    .midr_range_list = arm64/ssb_cpus,
+},
{
}

-/*
- * The CPU Errata work arounds are detected and applied at boot time
-*/
- * and the related information is freed soon after. If the new CPU requires
- * an errata not detected at boot, fail this CPU.
- */

-void verify_local_cpu_errata_workarounds(void)
+ssize_t cpu_show_spectre_v1(struct device *dev, struct device_attribute *attr,
   + char *buf)
+
-void update_cpu_errata_workarounds(void)
+ssize_t cpu_show_spectre_v2(struct device *dev, struct device_attribute *attr,
   + char *buf)
+
-void __init enable_errata_workarounds(void)
+ssize_t cpu_show_spec_store_bypass(struct device *dev,
   +struct device_attribute *attr, char *buf)
+
-void __init enable_errata_workarounds(void)
+ssize_t cpu_show_spec_store_bypass(struct device *dev,
   +struct device_attribute *attr, char *buf)
+
-void __init enable_errata_workarounds(void)
+ssize_t cpu_show_spec_store_bypass(struct device *dev,
   +struct device_attribute *attr, char *buf)
+
-void __init enable_errata_workarounds(void)
+ssize_t cpu_show_spec_store_bypass(struct device *dev,
   +struct device_attribute *attr, char *buf)
+
-void __init enable_errata_workarounds(void)
+ssize_t cpu_show_spec_store_bypass(struct device *dev,
   +struct device_attribute *attr, char *buf)
+
-void __init enable_errata_workarounds(void)
+ssize_t cpu_show_spec_store_bypass(struct device *dev,
   +struct device_attribute *attr, char *buf)
+
+ "Mitigation: Speculative Store Bypass disabled via prctl\n";
+ }
+ 
+ return snprintf(buf, "Vulnerable\n");
} 
--- linux-4.15.0.orig/arch/arm64/kernel/cpu_ops.c
+++ linux-4.15.0/arch/arm64/kernel/cpu_ops.c
@@ -85,6 +85,7 @@
pr_err("%pOF: missing enable-method property\n", dn);
}
+of_node_put(dn);
} else {
enable_method = acpi_get_enable_method(cpu);
if (!enable_method) {
--- linux-4.15.0.orig/arch/arm64/kernel/cpufeature.c
+++ linux-4.15.0/arch/arm64/kernel/cpufeature.c
@@ -24,6 +24,7 @@
 #include <asm/cpu.h>
 #include <asm/cpufeature.h>
 #include <asm/cpu_ops.h>
@@ -41,9 +42,7 @@
#define COMPAT_ELF_HWCAP_DEFAULT	
(COMPAT_HWCAP_HALF|COMPAT_HWCAP_THUMB\n
- COMPAT_HWCAP_FAST_MULT|COMPAT_HWCAP_EDSP\n
- COMPAT_HWCAP_TLS|COMPAT_HWCAP_VFP|COMPAT_HWCAP_VFPv3|COMPAT_HWCAP_VFPv4|COMPAT_HWCAP_NEON|COMPAT_HWCAP_IDIV\n
+ COMPAT_HWCAP_TLS|COMPAT_HWCAP_VFPv3|COMPAT_HWCAP_VFPv4|COMPAT_HWCAP_NEON|COMPAT_HWCAP_IDIV\n
COMPAT_HWCAP_LPAE)
unsigned int compat_elf_hwcaps __read_mostly = COMPAT_ELF_HWCAP_DEFAULT;
unsigned int compat_elf_hwcaps2 __read_mostly;
@@ -123,6 +122,8 @@
* sync with the documentation of the CPU feature register ABI.
*/
static const struct arm64_ftr_bits ftr_id_aa64isar0[] = {
+ARM64_FTR_BITS(FTR_VISIBLE, FTR STRICT, FTR LOWER_SAFE, ID_AA64ISAR0 TS SHIFT, 4, 0),
+ARM64_FTR_BITS(FTR_VISIBLE, FTR STRICT, FTR LOWER_SAFE, ID_AA64ISAR0 FHM SHIFT, 4, 0),
ARM64_FTR_BITS(FTR_VISIBLE, FTR STRICT, FTR LOWER_SAFE, ID_AA64ISAR0 TP SHIFT, 4, 0),
ARM64_FTR_BITS(FTR_VISIBLE, FTR STRICT, FTR LOWER_SAFE, ID_AA64ISAR0 SM4 SHIFT, 4, 0),
ARM64_FTR_BITS(FTR_VISIBLE, FTR STRICT, FTR LOWER_SAFE, ID_AA64ISAR0 SM3 SHIFT, 4, 0),
@@ -145,23 +146,39 @@
};
static const struct arm64_ftr_bits ftr_id_aa64pfr0[] = {
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE, ID_AA64PFR0_CSV3_SHIFT, 4, 0),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE, ID_AA64PFR0_CSV2_SHIFT, 4, 0),
+ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_DIT_SHIFT, 4, 0),
ARM64_FTR_BITS(FTR_VISIBLE_IF_IS_ENABLED(CONFIG_ARM64_SVE),
  FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_SVE_SHIFT, 4, 0),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_RAS_SHIFT, 4, 0),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_GIC_SHIFT, 4, 0),
S_ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_ASIMD_SHIFT, 4, ID_AA64PFR0_ASIMD_NI),
S_ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_FP_SHIFT, 4, ID_AA64PFR0_FP_NI),
-/* Linux doesn't care about the EL3 */
ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE, ID_AA64PFR0_EL3_SHIFT, 4, 0),
-ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_EL2_SHIFT, 4, 0),
-ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_EL1_SHIFT, 4, ID_AA64PFR0_EL1_64BIT_ONLY),
-ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR0_EL0_SHIFT, 4, ID_AA64PFR0_EL0_64BIT_ONLY),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE, ID_AA64PFR0_EL2_SHIFT, 4, 0),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE, ID_AA64PFR0_EL1_SHIFT, 4, ID_AA64PFR0_EL1_64BIT_ONLY),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE, ID_AA64PFR0_EL0_SHIFT, 4, ID_AA64PFR0_EL0_64BIT_ONLY),
+ARM64_FTR_END,
+);

static const struct arm64_ftr_bits ftr_id_aa64pfr1[] = {
+ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64PFR1_SSBS_SHIFT, 4, ID_AA64PFR1_SSBS_PSTATE_NI),
ARM64_FTR_END,
};

static const struct arm64_ftr_bits ftr_id_aa64mmfr0[] = {
-S_ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64MMFR0_TGRAN4_SHIFT, 4, ID_AA64MMFR0_TGRAN4_NI),
-S_ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64MMFR0_TGRAN64_SHIFT, 4, ID_AA64MMFR0_TGRAN64_NI),
-ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, ID_AA64MMFR0_TGRAN16_SHIFT, 4, ID_AA64MMFR0_TGRAN16_NI),
+/*
+ * We already refuse to boot CPUs that don't support our configured
+ * page size, so we can only detect mismatches for a page size other
+ * than the one we're currently using. Unfortunately, SoCs like this
+ * exist in the wild so, even though we don't like it, we'll have to go
+ * along with it and treat them as non-strict.
+ */
+S_ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE,
  ID_AA64MMFR0_TGRAN4_SHIFT, 4, ID_AA64MMFR0_TGRAN4_NI),
+S_ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE,
  ID_AA64MMFR0_TGRAN64_SHIFT, 4, ID_AA64MMFR0_TGRAN64_NI),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE,
  ID_AA64MMFR0_TGRAN16_SHIFT, 4, ID_AA64MMFR0_TGRAN16_NI),
+ ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE,
  ID_AA64MMFR0_BIGENDEL0_SHIFT, 4, 0),
/* Linux shouldn't care about secure memory */
ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_LOWER_SAFE,
  ID-AA64MMFR0_SNSMEM_SHIFT, 4, 0),
@@ -186,6 +203,7 @@
};
static const struct arm64_ftr_bits ftr_id_aa64mmfr2[] = {
+ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_EXACT, 31, 1, 1),	/* RES1 */
  ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_HIGHER_SAFE, 24, 4, 0),	/* CWG */
  ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_LOWER_SAFE, 20, 4, 0),	/* ERG */
  ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_LOWER_SAFE, 16, 4, 1),	/* DminLine */
+ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_HIGHER_OR_ZERO_SAFE, 24, 4, 0),	/* CWG */
+ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_HIGHER_OR_ZERO_SAFE, 20, 4, 0),	/* ERG */
+ARM64_FTR_BITS(FTR_VISIBLE, FTR_STRICT, FTR_LOWER_SAFE, CTR_DMINLINE_SHIFT, 4, 1),
  /* Linux can handle differing I-cache policies. Userspace JITs will
   * make use of *minLine.
   * If we have differing I-cache policies, report it as the weakest - VIPT.
   */
  ARM64_FTR_BITS(FTR_VISIBLE, FTR_NONSTRICT, FTR_EXACT, 14, 2, ICACHE_POLICY_VIPT),
-ARM64_FTR_BITS(FTR_VISIBLE, FTR_NONSTRICT, FTR_LOWER_SAFE, 0, 4, 0),
*/
ARM64_FTR_BITS(FTR_Visible, FTR_STRICT, FTR_LOWER_SAFE, CTR_IMINLINE_SHIFT, 4, 0),

ARM64_FTR_END;

@@ -237,7 +257,6 @@
 * of support.
 */
 S_ARM64_FTR_BITS(FTR_HIDDEN, FTR_NONSTRICT, FTR_EXACT, ID_AA64DFR0_PMUVER_SHIFT, 4, 0),
-ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_EXACT, ID_AA64DFR0_TRACEVER_SHIFT, 4, 0),
+ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_EXACT, ID_AA64DFR0_DEBUGVER_SHIFT, 4, 0x6),
 ARM64_FTR_END,
 ];
@@ -279,7 +298,7 @@
};

static const struct arm64_ftr_bits ftr_id_dfr0[] = {
-ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, 28, 4, 0),
+/* [31:28] TraceFilt */
 S_ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, 24, 4, 0xf),	/* PerfMon */
 ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, 20, 4, 0),
 ARM64_FTR_BITS(FTR_HIDDEN, FTR_STRICT, FTR_LOWER_SAFE, 16, 4, 0),
@@ -361,7 +380,7 @@
 /* Op1 = 0, CRn = 0, CRm = 4 */
 ARM64_FTR_REG(SYS_ID_AA64PFR0_EL1, ftr_id_aa64pfr0),
-ARM64_FTR_REG(SYS_ID_AA64PFR1_EL1, ftr_raz),
+ARM64_FTR_REG(SYS_ID_AA64PFR1_EL1, ftr_id_aa64pfr1),
 ARM64_FTR_REG(SYS_ID_AA64ZFR0_EL1, ftr_raz),
 /* Op1 = 0, CRn = 0, CRm = 5 */
@@ -439,6 +458,10 @@
 case FTR_LOWER_SAFE:
 ret = new < cur ? new : cur;
 break;
+case FTR_HIGHER_OR_ZERO_SAFE:
+if (!cur || !new)
+break;
+/* Fallthrough */
 case FTR_HIGHER_SAFE:
 ret = new > cur ? new : cur;
 break;
@@ -500,6 +523,9 @@

reg->user_mask = user_mask;
}

+extern const struct arm64_cpu_capabilities arm64_errata[];
`+static void __init setup_boot_cpu_capabilities(void);
+
void __init init_cpu_features(struct cpuinfo_arm64 *info)
{
    /* Before we start using the tables, make sure it is sorted */
    init_cpu_ftr_reg(SYS_ZCR_EL1, info->reg_zcr);
    sve_init_vq_map();
    
    /* Detect and enable early CPU capabilities based on the boot CPU,
     * after we have initialised the CPU feature infrastructure.
     */
    setup_boot_cpu_capabilities();
}

static void update_cpu_ftr_reg(struct arm64_ftr_reg *reg, u64 new)
{
    ftr_new = arm64_ftr_safe_value(ftrp, ftr_new, ftr_cur);
    reg->sys_val = arm64_ftr_set_value(ftrp, reg->sys_val, ftr_new);
}

static int check_update_ftr_reg(u32 sys_id, int cpu, u64 val, u64 boot)
{
    taint |= check_update_ftr_reg(SYS_ID_AA64MMFR2_EL1, cpu,
        info->reg_id_aa64mmfr2, boot->reg_id_aa64mmfr2);
}

-static bool runs_at_el2(const struct arm64_cpu_capabilities *entry, int __unused)
{-
    return is_kernel_in_hyp_mode();
-}
static bool __meltdown_safe = true;
static int __kpti_forced; /* 0: not forced, >0: forced on, <0: forced off */
+
static bool unmap_kernel_at_el0(const struct arm64_cpu_capabilities *entry,
+int scope)
+{
+ /* List of CPUs that are not vulnerable and don't need KPTI */
+static const struct midr_range kpti_safe_list[] = {
+ MIDR_ALL_VERSIONS(MIDR_CAVIUM_THUNDERX2),
+ MIDR_ALL_VERSIONS(MIDR_BRCM_VULCAN),
+ MIDR_ALL_VERSIONS(MIDR_CORTEX_A35),
+ MIDR_ALL_VERSIONS(MIDR_CORTEX_A53),
+ MIDR_ALL_VERSIONS(MIDR_CORTEX_A55),
+ MIDR_ALL_VERSIONS(MIDR_CORTEX_A57),
+ MIDR_ALL_VERSIONS(MIDR_CORTEX_A72),
+ MIDR_ALL_VERSIONS(MIDR_CORTEX_A73),
+ MIDR_ALL_VERSIONS(MIDR_HISI_TSV110),
+ /* sentinel */
+};
+char const *str = "kpti command line option";
+bool meltdown_safe;
+
meltdown_safe = is_midr_in_range_list(read_cpuid_id(), kpti_safe_list);
+
+/* Defer to CPU feature registers */
+if (has_cpuid_feature(entry, scope))
+meltdown_safe = true;
+
+if (!meltdown_safe)
+__meltdown_safe = false;
+
+/* For reasons that aren't entirely clear, enabling KPTI on Cavium
+ * ThunderX leads to apparent I-cache corruption of kernel text, which
+ * ends as well as you might imagine. Don't even try.
+ */
+if (cpus_have_const_cap(ARM64_WORKAROUND_CAVIUM_27456)) {
+ str = "ARM64_WORKAROUND_CAVIUM_27456";
+ __kpti_forced = -1;
+}
+
+/* Useful for KASLR robustness */
+if (IS_ENABLED(CONFIG_RANDOMIZE_BASE) && kaslr_offset() > 0) {
+if (!__kpti_forced) {
+str = "KASLR";
+__kpti_forced = 1;
+}
+
+if (cpu_mitigations_off() && !__kpti_forced) {
+str = "mitigations=off";
+__kpti_forced = -1;
+}
+
+if (!IS_ENABLED(CONFIG_UNMAP_KERNEL_AT_EL0)) {
+pr_info_once("kernel page table isolation disabled by kernel configuration\n");
+return false;
+}
+
+/* Forced? */
+if (__kpti_forced) {
+pr_info_once("kernel page table isolation forced %s by %s\n",
+__kpti_forced > 0 ? "ON" : "OFF", str);
+return __kpti_forced > 0;
+}
+
+return !meltdown_safe;
+}
+
+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+static void
+kpti_install_ng_mappings(const struct arm64_cpu_capabilities *__unused)
+{
+typedef void (kpti_remap_fn)(int, int, phys_addr_t);
+extern kpti_remap_fn idmap_kpti_install_ng_mappings;
+kpti_remap_fn *remap_fn;
+
+static bool kpti_applied = false;
+int cpu = smp_processor_id();
+
+if (kpti_applied)
+return;
+
+remap_fn = (void *)__pa_symbol(idmap_kpti_install_ng_mappings);
+
+cpu_install_idmap();
+remap_fn(cpu, num_online_cpus(), __pa_symbol(swapper_pg_dir));
+cpu_uninstall_idmap();
+
+if (!cpu)
+kpti_applied = true;
+ return;
+ }
+#else
+ static void
+ kpti_install_ng_mappings(const struct arm64_cpu_capabilities *__unused)
+ {
+ }
+ }#endif /* CONFIG_UNMAP_KERNEL_AT_EL0 */
+
+ static int __init parse_kpti(char *str)
+ {
+ bool enabled;
+ int ret = strtobool(str, &enabled);
+ 
+ if (ret)
+ return ret;
+ 
+ __kpti_forced = enabled ? 1 : -1;
+ return 0;
+ }
+ early_param("kpti", parse_kpti);
+
+#ifdef CONFIG_ARM64_VHE
+ static bool runs_at_el2(const struct arm64_cpu_capabilities *entry, int __unused)
+ {
+ is_kernel_in_hyp_mode();
+ }
+ 
+ static void cpu_copy_el2regs(const struct arm64_cpu_capabilities *__unused)
+ {
+ /*
+ * Copy register values that aren't redirected by hardware.
+ *
+ * Before code patching, we only set tpidr_el1, all CPUs need to copy
+ * this value to tpidr_el2 before we patch the code. Once we've done
+ * that, freshly-onlined CPUs will set tpidr_el2, so we don't need to
+ * do anything here.
+ */
+ if (!alternatives_applied)
+ write_sysreg(read_sysreg(tpidr_el1), tpidr_el2);
+ }
+ #endif
+
+#ifdef CONFIG_ARM64_SSBD
+ static int ssbs_emulation_handler(struct pt_regs *regs, u32 instr)
+ {
+ if (user_mode(regs))
+ return 1;
+
+ if (instr & BIT(CRm_shift))
+ regs->pstate |= PSR_SSBS_BIT;
+ else
+ regs->pstate &= ~PSR_SSBS_BIT;
+ +arm64_skip_faulting_instruction(regs, 4);
+ return 0;
+
+ static struct undef_hook ssbs_emulation_hook = {
+ .instr_mask = ~(1U << CRm_shift),
+ .instr_val = 0xd500001f | REG_PSTATE_SSBS_IMM,
+ .fn = ssbs_emulation_handler,
+ }; 
+
+ static void cpu_enable_ssbs(const struct arm64_cpu_capabilities *__unused) {
+ static bool undef_hook_registered = false;
+ static DEFINE_SPINLOCK(hook_lock);
+ 
+ spin_lock(&hook_lock);
+ if (!undef_hook_registered) {
+ register_undef_hook(&ssbs_emulation_hook);
+ undef_hook_registered = true;
+ }
+ spin_unlock(&hook_lock);
+ 
+ if (arm64_get_ssbd_state() == ARM64_SSBD_FORCE_DISABLE) {
+ sysreg_clear_set(sctlr_el1, 0, SCTLR_ELx_DSSBS);
+ arm64_set_ssbd_mitigation(false);
+ } else {
+ arm64_set_ssbd_mitigation(true);
+ }
+ }
+ } #endif /* CONFIG_ARM64_SSBD */
+ 
+ static const struct arm64_cpu_capabilities arm64_features[] = {
+ 
+ .desc = "GIC system register CPU interface",
+ .capability = ARM64_HAS_SYSREG_GIC_CPUIF,
+ .def_scope = SCOPE_SYSTEM,
+ .type = ARM64_CPUCAP_SYSTEM_FEATURE,
+ .matches = has_useable_gicv3_cpuiif,
+ .sys_reg = SYS_ID_AA64PFR0_EL1,
+ .field_pos = ID_AA64PFR0_GIC_SHIFT,
+ @ @ -861,20 +1060,20 @@

{  
desc = "Privileged Access Never",  
capability = ARM64_HAS_PAN,  
.def_scope = SCOPE_SYSTEM,  
.+type = ARM64_CPUCAP_SYSTEM_FEATURE,  
.matches = has_cpuid_feature,  
.sys_reg = SYS_ID_AA64MMFR1_EL1,  
.field_pos = ID_AA64MMFR1_PAN_SHIFT,  
.sign = FTR_UNSIGNED,  
.min_field_value = 1,  
.enable = cpu_enable_pan,  
.+cpu_enable = cpu_enable_pan, 
},
#endif /* CONFIG_ARM64_PAN */
#if defined(CONFIG_ASELSE) && defined(CONFIG_ARM64_ASELSE_ATOMICS)
{  
desc = "LSE atomic instructions",  
capability = ARM64_HAS_ASELSE_ATOMICS,  
.def_scope = SCOPE_SYSTEM,  
.+type = ARM64_CPUCAP_SYSTEMFEATURE,  
.matches = has_cpuid_feature,  
.sys_reg = SYS_ID_AA64ISAR0_EL1,  
.field_pos = ID_AA64ISAR0_ATOMICS_SHIFT,  
@@ -885,14 +1084,14 @@
{  
desc = "Software prefetching using PRFM",  
capability = ARM64_HAS_NO_HW_PREFETCH,  
.def_scope = SCOPE_SYSTEM,  
.+type = ARM64_CPUCAP_WEAK_LOCAL_CPU_FEATURE,  
.matches = has_no_hw_prefetch, 
},
#endif CONFIG_ARM64_UAO
{  
desc = "User Access Override",  
capability = ARM64_HAS_UAO,  
.def_scope = SCOPE_SYSTEM,  
.+type = ARM64_CPUCAP_SYSTEM_FEATURE,  
.matches = has_cpuid_feature,  
.sys_reg = SYS_ID_AA64MMFR2_EL1,  
.field_pos = ID_AA64MMFR2_UAO_SHIFT,  
@@ -906,20 +1105,23 @@
#endif CONFIG_ARM64_PAN
{  
capability = ARM64_ALT_PAN_NOT_UAO,  
.def_scope = SCOPE_SYSTEM,  
.+type = ARM64_CPUCAP_SYSTEM_FEATURE,  
.matches = cpufeature_pan_not_uao, 
},

#endif /* CONFIG_ARM64_PAN */
+#ifdef CONFIG_ARM64_VHE
{
    .desc = "Virtualization Host Extensions",
    .capability = ARM64_HAS_VIRT_HOST_EXTN,
    .def_scope = SCOPE_SYSTEM,
    .type = ARM64_CPUCAP STRICT_BOOT_CPU_FEATURE,
    .matches = runs_at_el2,
    .cpu_enable = cpu_copy_el2regs,
},
+#endif/* CONFIG_ARM64_VHE */
{
    .desc = "32-bit EL0 Support",
    .capability = ARM64_HAS_32BIT_EL0,
    .def_scope = SCOPE_SYSTEM,
    .type = ARM64_CPUCAP_SYSTEM_FEATURE,
    .matches = has_cpuid_feature,
    .sys_reg = SYS_ID_AA64PFR0_EL1,
    .sign = FTR_UNSIGNED,
    @ @ -929,13 +1131,28 @@
    {
        .desc = "Reduced HYP mapping offset",
        .capability = ARM64_HYP_OFFSET_LOW,
        .def_scope = SCOPE_SYSTEM,
        .type = ARM64_CPUCAP_SYSTEM_FEATURE,
        .matches = hyp_offset_low,
    },
    {
        .desc = "Kernel page table isolation (KPTI)",
        .capability = ARM64_UNMAP KERNEL AT EL0,
        .type = ARM64_CPUCAP_BOOT_RESTRICTED_CPU_LOCAL_FEATURE,
        /*
        * The ID feature fields below are used to indicate that
        * the CPU doesn't need KPTI. See unmap_kernel_at_el0 for
        * more details.
        */
        .sys_reg = SYS_ID_AA64PFR0_EL1,
        .field_pos = ID_AA64PFR0 CSV3 SHIFT,
        .min_field_value = 1,
        .matches = unmap_kernel_at_el0,
        .cpu_enable = kpti_install_ng_mappings,
    },
    +{
/* FP/SIMD is not implemented */
    .capability = ARM64_HAS_NO FPSIMD,
    .def_scope = SCOPE_SYSTEM,
    .type = ARM64_CPUCAP_BOOT_RESTRICTED_CPU_LOCAL_FEATURE,
    .min_field_value = 0,
matches = has_no_fpsimd,
},
@@ -943,7 +1160,7 @@
{
    .desc = "Data cache clean to Point of Persistence",
    .capability = ARM64_HAS_DCPOP,
    .def_scope = SCOPE_SYSTEM,
+    .type = ARM64_CPUCAP_SYSTEM_FEATURE,
    .matches = has_cpuid_feature,
    .sys_reg = SYS_ID_AA64ISAR1_EL1,
    .field_pos = ID_AA64ISAR1_DPB_SHIFT,
@@ -954,29 +1171,68 @@
    {
        .desc = "Scalable Vector Extension",
        .capability = ARM64_SVE,
        .def_scope = SCOPE_SYSTEM,
+        .type = ARM64_CPUCAP_SCOPE_SYSTEM,
        .sys_reg = SYS_ID_AA64PFR0_EL1,
        .sign = FTR_UNSIGNED,
        .field_pos = ID_AA64PFR0_SVE_SHIFT,
        .min_field_value = ID_AA64PFR0_SVE,
        .matches = has_cpuid_feature,
        .enable = sve_kernel_enable,
        .cpu_enable = sve_kernel_enable,
    },
#ifdef /* CONFIG_ARM64_SVE */
+    {#ifdef CONFIG_ARM64_RAS_EXTN
+        {
+            .desc = "RAS Extension Support",
+            .capability = ARM64_HAS_RAS_EXTN,
+            .type = ARM64_CPUCAP_SCOPE_SYSTEM,
+            .matches = has_cpuid_feature,
+            .sys_reg = SYS_ID_AA64PFR0_EL1,
+            .sign = FTR_UNSIGNED,
+            .field_pos = ID_AA64PFR0_RAS_SHIFT,
+            .min_field_value = ID_AA64PFR0_RAS_V1,
+            .cpu_enable = cpu_clear_disr,
+        },
+    /* CONFIG_ARM64_RAS_EXTN */
+    #ifdef CONFIG_ARM64_SSBD
+        {
+            .desc = "Speculative Store Bypassing Safe (SSBS)",
+            .capability = ARM64_SSBS,
+            .type = ARM64_CPUCAP_WEAK_LOCAL_CPU_FEATURE,
+            .matches = has_cpuid_feature,
+            .sys_reg = SYS_ID_AA64PFR1_EL1,
+            .field_pos = ID_AA64PFR1_SSBS_SHIFT,
+            .sign = FTR_UNSIGNED,
static const struct arm64_cpu_capabilities arm64_elf_hwcaps[] = {
@ @ -992.22 +1248.55 @@
HWCAP_CAP(SYS_ID_AA64ISAR0_EL1, ID_AA64ISAR0_SM3_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_SM3),
HWCAP_CAP(SYS_ID_AA64ISAR0_EL1, ID_AA64ISAR0_SM4_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_SM4),
HWCAP_CAP(SYS_ID_AA64ISAR0_EL1, ID_AA64ISAR0_DP_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_ATOMDDP),
+HWCAP_CAP(SYS_ID_AA64ISAR0_EL1, ID_AA64ISAR0_FHM_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_ASIMDDP),
+HWCAP_CAP(SYS_ID_AA64ISAR0_EL1, ID_AA64ISAR0_FHM_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_ASIMDFHM),
+HWCAP_CAP(SYS_ID_AA64ISAR0_EL1, ID_AA64ISAR0_TS_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_FLAGM),
HWCAP_CAP(SYS_ID_AA64PFR0_EL1, ID_AA64PFR0_FP_SHIFT, FTR_SIGNED, 0, CAP_HWCAP, HWCAP_FP),
HWCAP_CAP(SYS_ID_AA64PFR0_EL1, ID_AA64PFR0_FP_SHIFT, FTR_SIGNED, 1, CAP_HWCAP, HWCAP_FPHP),
HWCAP_CAP(SYS_ID_AA64PFR0_EL1, ID_AA64PFR0_ASIMD_SHIFT, FTR_SIGNED, 0, CAP_HWCAP, HWCAP_ASIMD),
HWCAP_CAP(SYS_ID_AA64PFR0_EL1, ID_AA64PFR0_ASIMD_SHIFT, FTR_SIGNED, 1, CAP_HWCAP, HWCAP_ASIMDH),
+HWCAP_CAP(SYS_ID_AA64PFR0_EL1, ID_AA64PFR0_DIT_SHIFT, FTR_SIGNED, 1, CAP_HWCAP, HWCAP_DIT),
HWCAP_CAP(SYS_ID_AA64ISAR1_EL1, ID_AA64ISAR1_DPB_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_DCPOP),
HWCAP_CAP(SYS_ID_AA64ISAR1_EL1, ID_AA64ISAR1_JSCVT_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_JSCVT),
HWCAP_CAP(SYS_ID_AA64ISAR1_EL1, ID_AA64ISAR1_FCMA_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_FCMA),
HWCAP_CAP(SYS_ID_AA64ISAR1_EL1, ID_AA64ISAR1_LRCPC_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_LRCPC),
+HWCAP_CAP(SYS_ID_AA64ISAR1_EL1, ID_AA64ISAR1_LRCPC_SHIFT, FTR_UNSIGNED, 2, CAP_HWCAP, HWCAP_ILRCPC),
HWCAP_CAP(SYS_ID_AA64MFR2_EL1, ID_AA64MFR2_AT_SHIFT, FTR_UNSIGNED, 1, CAP_HWCAP, HWCAP_USCAT),
HWCAP_CAP(SYS_ID_AA64PFR1_EL1, ID_AA64PFR1_SSBS_SHIFT, FTR_UNSIGNED, ID_AA64PFR1_SSBS_PSTATE_INSNS, CAP_HWCAP, HWCAP_SSBS),
#ifdef CONFIG_ARM64_SVE
HWCAP_CAP(SYS_ID_AA64PFR0_EL1, ID_AA64PFR0_SVE_SHIFT, FTR_UNSIGNED, ID_AA64PFR0_SVE, CAP_HWCAP, HWCAP_SVE),
#endif
{ },
};

+#endif CONFIG_COMPAT
+static bool compat_has_neon(const struct arm64_cpu_capabilities *cap, int scope)
+{ /*
+ * Check that all of MVFR1_EL1.[SIMDSP, SIMDInt, SIMDLS] are available,
+ * in line with that of arm32 as in vfp_init(). We make sure that the
+ * check is future proof, by making sure value is non-zero.
+ */
+u32 mvfr1;
+  
+  WARN_ON(scope == SCOPE_LOCAL_CPU && preemptible());
+  if (scope == SCOPE_SYSTEM)
+mvfr1 = read_sanitised_ftr_reg(SYS_MVFR1_EL1);
+else
+mvfr1 = read_sysreg_s(SYS_MVFR1_EL1);
return cpuid_feature_extract_unsigned_field(mvfr1, MVFR1_SIMDSP_SHIFT) &&
cpuid_feature_extract_unsigned_field(mvfr1, MVFR1_SIMDINT_SHIFT) &&
cpuid_feature_extract_unsigned_field(mvfr1, MVFR1_SIMDLS_SHIFT);
}
#endif

static const struct arm64_cpu_capabilities compat_elf_hwcaps[] = {
#ifdef CONFIG_COMPAT
HWCAP_CAP_MATCH(compat_has_neon, CAP_COMPAT_HWCAP, COMPAT_HWCAP_NEON),
HWCAP_CAP(SYS_MVFR1_EL1, MVFR1_SIMDFMAC_SHIFT, FTR_UNSIGNED, 1,
CAP_COMPAT_HWCAP, COMPAT_HWCAP_VFPv4),
/* Arm v8 mandates MVFR0.FPDP == {0, 2}. So, piggy back on this for the presence of VFP support */
HWCAP_CAP(SYS_MVFR0_EL1, MVFR0_FPDP_SHIFT, FTR_UNSIGNED, 2, CAP_COMPAT_HWCAP, COMPAT_HWCAP_VFPv3),
HWCAP_CAP(SYS_MVFR0_EL1, MVFR0_FPDP_SHIFT, FTR_UNSIGNED, 2, CAP_COMPAT_HWCAP, COMPAT_HWCAP_VFPv4),
HWCAP_CAP(SYS_ID_ISAR5_EL1, ID_ISAR5_AES_SHIFT, FTR_UNSIGNED, 2, CAP_COMPAT_HWCAP2, COMPAT_HWCAP2_PMULL),
HWCAP_CAP(SYS_ID_ISAR5_EL1, ID_ISAR5_AES_SHIFT, FTR_UNSIGNED, 1, CAP_COMPAT_HWCAP2, COMPAT_HWCAP2_AES),
HWCAP_CAP(SYS_ID_ISAR5_EL1, ID_ISAR5_SHA1_SHIFT, FTR_UNSIGNED, 1, CAP_COMPAT_HWCAP2, COMPAT_HWCAP2_SHA1),
#endif
/* We support emulation of accesses to CPU ID feature registers */
elf_hwcap |= HWCAP_CPUID;
for (; hwcaps->matches; hwcaps++)
  if (hwcaps->matches(hwcaps, cpucap_default_scope(hwcaps)))
    cap_set_elf_hwcap(hwcaps);
}

/* Check if the current CPU has a given feature capability.
 * Should be called from non-preemptible context.
 */
static bool __this_cpu_has_cap(const struct arm64_cpu_capabilities *cap_array,
    unsigned int cap)
{    
    const struct arm64_cpu_capabilities *caps;
    
    if (WARN_ON(preemptible()))
        return false;

    for (caps = cap_array; caps->matches; caps++)
        if (caps->capability == cap &&
            /* This checks if the current CPU has a given feature capability.
             * Should be called from non-preemptible context.
             */
            __this_cpu_has_cap(const struct arm64_cpu_capabilities *cap_array,
                unsigned int cap))
            return false;

    for (caps = cap_array; caps->matches; caps++)
        if (caps->capability == cap &&
            /* This checks if the current CPU has a given feature capability.
             * Should be called from non-preemptible context.
             */
            __this_cpu_has_cap(const struct arm64_cpu_capabilities *cap_array,
                unsigned int cap))
            return false;

    return true;
}
caps->matches(caps, SCOPE_LOCAL_CPU))
+ return true;
+ return false;
+
+ static void __update_cpu_capabilities(const struct arm64_cpu_capabilities *caps,
+ u16 scope_mask, const char *info)
+ {
+ scope_mask &= ARM64_CPUCAP_SCOPE_MASK;
+ for (; caps->matches; caps++) {
+ if (!caps->matches(caps, caps->def_scope))
+ if (!(caps->type & scope_mask) ||
+ !caps->matches(caps, cpucap_default_scope(caps)))
+ continue;
+
+ if (!cpus_have_cap(caps->capability) && caps->desc)
+@@ -1084,31 +1394,131 @@
+ }
+ }
+
+ static void update_cpu_capabilities(u16 scope_mask)
+ {;
+ __update_cpu_capabilities(arm64_errata, scope_mask, "enabling workaround for");
+ __update_cpu_capabilities(arm64_features, scope_mask, "detected: ");
+ }
+
+ static int __enable_cpu_capability(void *arg)
+ {;
+ const struct arm64_cpu_capabilities *cap = arg;
+ +
+ cap->cpu_enable(cap);
+ return 0;
+ +
+ /*
+ * Run through the enabled capabilities and enable() it on all active
+ * CPUs
+ */
+ void __init enable_cpu_capabilities(const struct arm64_cpu_capabilities *caps)
+ static void __init
+ __enable_cpu_capabilities(const struct arm64_cpu_capabilities *caps,
+ u16 scope_mask)
+ {
+ scope_mask &= ARM64_CPUCAP_SCOPE_MASK;
+ for (; caps->matches; caps++) {
+ unsigned int num = caps->capability;
-if (!cpus_have_cap(num))
+if (!((caps->type & scope_mask) || !cpus_have_cap(num))
 continue;

 /* Ensure cpus_have_const_cap(num) works */
 static_branch_enable(&cpu_hwcap_keys[num]);

 -if (caps->enable) {
+if (caps->cpu_enable) {
+/*
+ * Capabilities with SCOPE_BOOT_CPU scope are finalised
+ * before any secondary CPU boots. Thus, each secondary
+ * will enable the capability as appropriate via
+ * check_local_cpu_capabilities(). The only exception is
+ * the boot CPU, for which the capability must be
+ * enabled here. This approach avoids costly
+ * stop_machine() calls for this case.
+ *
+ * Otherwise, use stop_machine() as it schedules the
+ * work allowing us to modify PSTATE, instead of
+ * on_each_cpu() which uses an IPI, giving us a PSTATE
+ * that disappears when we return.
+ */
+if (scope_mask & SCOPE_BOOT_CPU)
+caps->cpu_enable(caps);
+else
+stop_machine(__enable_cpu_capability,
+ (void *)caps, cpu_online_mask);
+}
+}
+}
+
+static void __init enable_cpu_capabilities(u16 scope_mask)
+{
+__enable_cpu_capabilities(arm64_errata, scope_mask);
+__enable_cpu_capabilities(arm64_features, scope_mask);
+}
+
+/*
+ * Run through the list of capabilities to check for conflicts.
+ * If the system has already detected a capability, take necessary
+ * action on this CPU.
+ *
+ * Returns "false" on conflicts.
+ */
+static bool
+__verify_local_cpu_caps(const struct arm64_cpu_capabilities *caps_list,
+u16 scope_mask)
bool cpu_has_cap, system_has_cap;
const struct arm64_cpu_capabilities *caps;

scope_mask &= ARM64_CPU_CAP_SCOPE_MASK;

for (caps = caps_list; caps->matches; caps++) {
    if (!(caps->type & scope_mask))
        continue;
    cpu_has_cap = __this_cpu_has_cap(caps_list, caps->capability);
    system_has_cap = cpus_have_cap(caps->capability);
    if (system_has_cap) {
        /* Check if the new CPU misses an advertised feature,
         * which is not safe to miss.
         */
        if (!cpu_has_cap && !cpucap_late_cpu_optional(caps))
            break;
        /* We have to issue cpu_enable() irrespective of
         * whether the CPU has it or not, as its enabled
         * system wide. It is up to the call back to take
         * appropriate action on this CPU.
         */
        if (caps->cpu_enable)
            caps->cpu_enable(caps);
    } else {
        /* Use stop_machine() as it schedules the work allowing
         * us to modify PSTATE, instead of on_each_cpu() which
         * uses an IPI, giving us a PSTATE that disappears when
         * we return.
         * Check if the CPU has this capability if it isn't
         * safe to have when the system doesn't.
         */
        stop_machine(caps->enable, NULL, cpu_online_mask);
        if (cpu_has_cap && !cpucap_late_cpu_permitted(caps))
            break;
    }
    if (caps->matches) {
        pr_crit("CPU%d: Detected conflict for capability %d (%s), System: %d, CPU: %d\n",
                smp_processor_id(), caps->capability, caps->desc, system_has_cap, cpu_has_cap);
        return false;
    }
}
static bool verify_local_cpu_caps(u16 scope_mask)
{
+return __verify_local_cpu_caps(arm64_errata, scope_mask) &&
+    __verify_local_cpu_caps(arm64_features, scope_mask);
}

static void check_early_cpu_features(void)
{
+verify_cpu_run_el();
verify_cpu_asid_bits();
+
+ * Early features are used by the kernel already. If there
+ * is a conflict, we cannot proceed further.
+ +
+if (!verify_local_cpu_caps(SCOPE_BOOT_CPU))
+    cpu_panic_kernel();
}

static void
@@ -1133,26 +1548,6 @@

static void verify_local_cpu_features(const struct arm64_cpu_capabilities *caps)
{
-    for (; caps->matches; caps++) {
-        if (!cpus_have_cap(caps->capability))
-            continue;
-        */
-        + * If the new CPU misses an advertised feature, we cannot proceed
-        + * further, park the cpu.
-        +/*
-        +if (!caps->matches(caps, SCOPE_LOCAL_CPU)) {
-            pr_crit("CPU%d: missing feature: %s\n", 
-                smp_processor_id(), caps->desc);
-            cpu_die_early();
-        }
-        +if (caps->enable)
-            caps->enable(NULL);

static void verify_sve_features(void)
{
    u64 safe_zcr = read_sanitised_ftr_reg(SYS_ZCR_EL1);
    /* Add checks on other ZCR bits here if necessary */
}

static void verify_local_cpu_capabilities(void)
{
    verify_local_cpu_errata_workarounds();
    verify_local_cpu_features(arm64_features);
    /* The capabilities with SCOPE_BOOT_CPU are checked from
     * check_early_cpu_features(), as they need to be verified
     * on all secondary CPUs.
     */
    if (!verify_local_cpu_caps(SCOPE_ALL & ~SCOPE_BOOT_CPU))
        cpu_die_early();
    verify_local_elf_hwcaps(arm64_elf_hwcaps);
}

if (system_supports_32bit_el0())
    verify_local_cpu_capabilities();

/*
 * If we haven't finalised the system capabilities, this CPU gets
 * a chance to update the errata work arounds.
 * Otherwise, this CPU should verify that it has all the system
 * advertised capabilities.
 */
if (!sys_caps_initialised)
    update_cpu_errata_workarounds();
else
    verify_local_cpu_capabilities();
}

-static void __init setup_feature_capabilities(void)
+static void __init setup_boot_cpu_capabilities(void)
{
 update_cpu_capabilities(arm64_features, "detected feature:");
 enable_cpu_capabilities(arm64_features);
+ /* Detect capabilities with either SCOPE_BOOT_CPU or SCOPE_LOCAL_CPU */
+ update_cpu_capabilities(SCOPE_BOOT_CPU | SCOPE_LOCAL_CPU);
+ /* Enable the SCOPE_BOOT_CPU capabilities alone right away */
+ enable_cpu_capabilities(SCOPE_BOOT_CPU);
}

DEFINE_STATIC_KEY_FALSE(arm64_const_caps_ready);
@@ -1225,25 +1629,6 @@
 static_branch_enable(&arm64_const_caps_ready);
}

-/*
- * Check if the current CPU has a given feature capability.
- * Should be called from non-preemptible context.
- */
-static bool __this_cpu_has_cap(const struct arm64_cpu_capabilities *cap_array,
-                               unsigned int cap)
-{
 const struct arm64_cpu_capabilities *caps;
-
 if (WARN_ON(preemptible()))
-    return false;
-
-    for (caps = cap_array; caps->desc; caps++)
    if (caps->capability == cap && caps->matches)
-        return caps->matches(caps, SCOPE_LOCAL_CPU);
-
-    return false;
-
-} extern const struct arm64_cpu_capabilities arm64_errata[];

 bool this_cpu_has_cap(unsigned int cap)
@@ -1252,14 +1637,24 @@
 __this_cpu_has_cap(arm64_errata, cap));
}

+static void __init setup_system_capabilities(void)
+{
+ /* We have finalised the system-wide safe feature
+     registers, finalise the capabilities that depend
+     on it. Also enable all the available capabilities,
+     that are not enabled already.

+ */
+update_cpu_capabilities(SCOPE_SYSTEM);
+enable_cpu_capabilities(SCOPE_ALL & ~SCOPE_BOOT_CPU);
+}
+
+void __init setup_cpu_features(void)
{
    u32 cgw;
    int cls;

    /* Set the CPU feature capabilities */
    -setup_feature_capabilities();
    -enable_errata_workarounds();
    +setup_system_capabilities();
    mark_const_caps_ready();
    setup_elf_hwcaps(arm64_elf_hwcaps);

    @@ -1387,3 +1782,21 @@
}

core_initcall(enable_mrs_emulation);
+
+void cpu_clear_disr(const struct arm64_cpu_capabilities *__unused)
{+
    /* Firmware may have left a deferred SError in this register. */
    +write_sysreg_s(0, SYS_DISR_EL1);
    +}
+
+ssize_t cpu_show_meltdown(struct device *dev, struct device_attribute *attr,
+    char *buf)
{+
    if (__meltdown_safe)
        return sprintf(buf, "Not affected\n");
+
    if (arm64_kernel_unmapped_at_el0())
        return sprintf(buf, "Mitigation: PTI\n");
+
    return sprintf(buf, "Vulnerable\n");
+}
--- linux-4.15.0.orig/arch/arm64/kernel/cpuinfo.c
+++ linux-4.15.0/arch/arm64/kernel/cpuinfo.c
@@ -76,6 +76,12 @@
 "asimddp",
 "sha512",
 "sve",
+"asimdfhm",
+"dit",
+"uscat",

"ilrcpc",
"flagm",
"ssbs",
NULL
};

--- linux-4.15.0.orig/arch/arm64/kernel/crash_dump.c
+++ linux-4.15.0/arch/arm64/kernel/crash_dump.c
@@ -67,5 +67,7 @@
ssize_t elfcorehdr_read(char *buf, size_t count, u64 *ppos)
 {
  memcpy(buf, phys_to_virt((phys_addr_t)*ppos), count);
  */
+*ppos += count;
+ return count;

 --- linux-4.15.0.orig/arch/arm64/kernel/debug-monitors.c
+++ linux-4.15.0/arch/arm64/kernel/debug-monitors.c
@@ -134,6 +134,7 @@
 
 /*
 * Single step API and exception handling.
+static void clear_regs_spsr_ss(struct pt_regs *regs)
+static void clear_user_regs_spsr_ss(struct user_pt_regs *regs)
 {
  regs->pstate &= ~DBG_SPSR_SS;
+ }
/* EL1 Single Step Handler hooks */
static LIST_HEAD(step_hook);
@@ -386,17 +390,26 @@
* If single step is active for this thread, then set SPSR.SS
* to 1 to avoid returning to the active-pending state.
*/
-if (test_ti_thread_flag(task_thread_info(task), TIF_SINGLESTEP))
+if (test_tsk_thread_flag(task, TIF_SINGLESTEP))
  set_regs_spsr_ss(task_pt_regs(task));
}
NOKPROBE_SYMBOL(user_rewind_single_step);

void user_fastforward_single_step(struct task_struct *task) {
  -if (test_ti_thread_flag(task_thread_info(task), TIF_SINGLESTEP))
  +if (test_tsk_thread_flag(task, TIF_SINGLESTEP))
    clear_regs_spsr_ss(task_pt_regs(task));
}

+void user_regs_reset_single_step(struct user_pt_regs *regs,
+  struct task_struct *task)
+{
+  +if (test_tsk_thread_flag(task, TIF_SINGLESTEP))
+    set_user_regs_spsr_ss(regs);
+  else
+    clear_user_regs_spsr_ss(regs);
+}
+
+ /* Kernel API */
void kernel_enable_single_step(struct pt_regs *regs) {
  --- linux-4.15.0.orig/arch/arm64/kernel/entry-ftrace.S
  +++ linux-4.15.0/arch/arm64/kernel/entry-ftrace.S
  @@ -79,7 +79,6 @@
   .macro mcount_get_lr reg
   ldr\reg, [x29]
   ldr\reg, [\reg, #8]
-   .macro mcount_get_lr_addr reg
-   .endm
-   .macro mcount_get_lr_addr reg
-   .endm
  .macro mcount_get_lr_addr reg
  --- linux-4.15.0.orig/arch/arm64/kernel/entry.S
  +++ linux-4.15.0/arch/arm64/kernel/entry.S
  @@ -18,6 +18,7 @@
   * along with this program. If not, see <http://www.gnu.org/licenses/>.
   */
```c
#pragma include <linux/arm-smccc.h>
#include <linux/init.h>
#include <linux/linkage.h>

@@ -28,6 +29,8 @@
#include <asm/errno.h>
#include <asm/esr.h>
#include <asm/irq.h>
+##include <asm/memory.h>
+##include <asm/mmu.h>
#include <asm/processor.h>
#include <asm/ptrace.h>
#include <asm/thread_info.h>
@@ -69,8 +72,21 @@
#define BAD_FIQ2
#define BAD_ERROR3

.macro kernel_ventry
+.macro kernel_ventry, el, label, regsize = 64
.align 7
+##ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+alternative_if ARM64_UNMAP_KERNEL_AT_EL0
+##ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+.if el == 0
+.if regsize == 64
+msr x30, tpidrro_el0
+msrtpidrro_el0, xzr
+.else
+mov x30, xzr
+.endif
+.endif
+alternative_else_nop endif
+##endif
+
sub sp, sp, #S_FRAME_SIZE
+##ifdef CONFIG_VMAP_STACK
/*
@@ -82,7 +98,7 @@
tbnz x0, #THREAD_SHIFT, 0f
sub x0, sp, x0 // x0" = sp" - x0 = (sp + x0) - sp = x0
sub sp, sp, x0 // sp" = sp" - x0 = (sp + x0) - x0 = sp
-\label
+bel()\el()_\label

0:
/*
@@ -114,7 +130,31 @@
sub sp, sp, x0
msr x0, tpidrro_el0
```

#endif
-b\label
+bel()\ef()\_\label
+.endm
+
+.macro tramp_alias, dst, sym
+mov_q dst, TRAMP_VALIAS
+addvdst, \dst, \(#(\sym -.entry.tramp.text)
+.endm
+
+// This macro corrupts x0-x3. It is the caller's duty
+// to save/restore them if required.
+.macro apply_ssbd, state, targ, tmp1, tmp2
+#ifdef CONFIG_ARM64_SSBD
+alternative_cbarm64_enable_wa2_handling
+b\target
+alternativeCb
+ldr\this_cpu\tmp2, arm64_ssbd_callback_required, \tmp1
+cbz\tmp2, \arg
+ldr\tmp2, [tsk, #TSK_TI_FLAGS]
+tbnz\tmp2, #TIF_SSBD, \arg
+movw0, #ARM_SMCCC_ARCH_WORKAROUND_2
+movw1, #state
+alternative_cbarm64_update_smccc_conduit
+nop// Patched to SMC/HVC #0
+alternativeCb
+#endif
+.endm

.macro kernel_entry, el, regsize = 64
@@ -143,14 +183,22 @@
      ldr\x19, [tsk, #TSK_TI_FLAGS]	// since we can unmask debug
      disable_step_tsk x19, x20	// exceptions when scheduling.
      apply_ssbd 1, 1f, x22, x23
+    +#ifdef CONFIG_ARM64_SSBD
      ldp\x0, \x1, [sp, #16 * 0]
      ldp\x2, \x3, [sp, #16 * 1]
+    +#endif
+    +1:
+        movx29, xzz// fp pointed to user-space
      .else
      addx21, sp, #S_FRAME_SIZE
      get_thread_info tsk
      /* Save the task's original addr_limit and set USER_DS (TASK_SIZE_64) */
      /* Save the task's original addr_limit and set USER_DS */
ldr x20, [tsk, #TSDK_TI_ADDR_LIMIT]
str x20, [sp, #S.ORIG_ADDR_LIMIT]
-movx x20, #TASK_SIZE_64
+movx x20, #USER_DS
str x20, [tsk, #TSDK_TI_ADDR_LIMIT]
/* No need to reset PSTATE.UAO, hardware's already set it to 0 for us */
.endif /* \el == 0 */
@@ -185,7 +233,7 @@
.if \el != 0
mrs x21, ttbr0_el1
-tst x21, #0xffff << 48// Check for the reserved ASID
+ttst x21, #TTBR_ASID_MASK// Check for the reserved ASID
orr x23, x23, #PSR_PAN_BIT// Set the emulated PAN in the saved SPSR
b.eq 1f	// TTBR0 access already disabled
and x23, x23, #~PSR_PAN_BIT// Clear the emulated PAN in the saved SPSR
@@ -248,7 +296,7 @@
tbnz x22, #22, 1f	// Skip re-enabling TTBR0 access if the PSR_PAN_BIT is set
.endif
-__uaccess_ttbr0_enable x0
+__uaccess_ttbr0_enable x0, x1
.if \el == 0
/*
 @@ -257,7 +305,7 @@
 */
-post_ttbr0_update_workaround
+blpost_ttbr0_update_workaround
.endif
1:
@@ -257,7 +305,7 @@
 if \el != 0
ldr x23, [sp, #S.SP]	// load return stack pointer
msrsp_el0, x23
+ttst x22, #PSR_MODE32_BIT// native task?
b.eq 3f
+#ifndef CONFIG_ARM64_ERRATUM_845719
alternative_if ARM64_WORKAROUND_845719
-tbzx x22, #4, 1f
#ifndef CONFIG_PID_IN_CONTEXTIDR
msr x29, contextidr_el1
msrcx_contextidr_el1, x29
#else

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msr contextidr_el1, xzr
#endif
-1:
alternative_else_nop endif
#endif
+3:
+apply_ssbd 0, 5f, x0, x1
+5:
.endif

msr elr_el1, x21 // set up the return data
@@ -302,7 +354,21 @@
ldpx28, x29, [sp, #16 * 14]
ldlr, [sp, #S_1R]
addsp, sp, #S_FRAME_SIZE // restore sp
-eret // return to kernel
+
+.if el == 0
+alternative_insn eret, nop, ARM64_UNMAP_KERNEL_AT_EL0
+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+bne4f
+msrfar_el1, x30
+tramp_aliasx30, tramp_exit_native
+brx30
+4:
+tramp_aliasx30, tramp_exit_compat
+brx30
+#endif
+.else
+eret
+.endif
.endm

_macro irq_stack_entry
@@ -342,6 +408,7 @@
* x7 is reserved for the system call number in 32-bit mode.
*/
wsc_nr.reqw25 // number of system calls
+xsc_nr.reqx25 // number of system calls (zero-extended)
wscno.reqw26 // syscall number
xscno.reqx26 // syscall number (zero-extended)
stbl.reqx27 // syscall table pointer
@@ -367,31 +434,31 @@
.align11
ENTRY(vectors)
-kernel_ventryel1_sync_invalid // Synchronous EL1t
-kernel_ventryel1_irq_invalid // IRQ EL1t

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- kernel_ventryel1_fiq_invalid // FIQ EL1t
- kernel_ventryel1_error_invalid // Error EL1t
-
- kernel_ventryel1_sync // Synchronous EL1h
- kernel_ventryel1_irq // IRQ EL1h
- kernel_ventryel1_fiq_invalid // FIQ EL1h
- kernel_ventryel1_error // Error EL1h
-
- kernel_ventryel0_sync // Synchronous 64-bit EL0
- kernel_ventryel0_irq // IRQ 64-bit EL0
- kernel_ventryel0_fiq_invalid // FIQ 64-bit EL0
- kernel_ventryel0_error // Error 64-bit EL0
+ kernel_ventry1, sync_invalid // Synchronous EL1t
+ kernel_ventry1, irq_invalid // IRQ EL1t
+ kernel_ventry1, fiq_invalid // FIQ EL1t
+ kernel_ventry1, error_invalid // Error EL1t
+
+ kernel_ventry1, sync // Synchronous EL1h
+ kernel_ventry1, irq // IRQ EL1h
+ kernel_ventry1, fiq_invalid // FIQ EL1h
+ kernel_ventry1, error // Error EL1h
+
+ kernel_ventry0, sync // Synchronous 64-bit EL0
+ kernel_ventry0, irq // IRQ 64-bit EL0
+ kernel_ventry0, fiq_invalid // FIQ 64-bit EL0
+ kernel_ventry0, error // Error 64-bit EL0

#define CONFIG_COMPAT
- kernel_ventryel0_sync_compat // Synchronous 32-bit EL0
- kernel_ventryel0_irq_compat // IRQ 32-bit EL0
- kernel_ventryel0_fiq_invalid_compat // FIQ 32-bit EL0
- kernel_ventryel0_error_compat // Error 32-bit EL0
+ kernel_ventry0, sync_compat, 32 // Synchronous 32-bit EL0
+ kernel_ventry0, irq_compat, 32 // IRQ 32-bit EL0
+ kernel_ventry0, fiq_invalid_compat, 32 // FIQ 32-bit EL0
+ kernel_ventry0, error_compat, 32 // Error 32-bit EL0
#else
- kernel_ventryel0_sync_invalid // Synchronous 32-bit EL0
- kernel_ventryel0_irq_invalid // IRQ 32-bit EL0
- kernel_ventryel0_fiq_invalid // FIQ 32-bit EL0
- kernel_ventryel0_error_invalid // Error 32-bit EL0
+ kernel_ventry0, sync_invalid, 32 // Synchronous 32-bit EL0
+ kernel_ventry0, irq_invalid, 32 // IRQ 32-bit EL0
+ kernel_ventry0, fiq_invalid, 32 // FIQ 32-bit EL0
+ kernel_ventry0, error_invalid, 32 // Error 32-bit EL0
#endif
END(vectors)
@@ -528,7 +595,7 @@
inherit_daif pstate=x23, tmp=x2
mov x0, sp
bldo_undefinstr
-ASM_BUG()
+kernel_exit 1
el1_dbg:
/*
 * Debug exception handling
@@ -685,12 +752,15 @@
 * Instruction abort handling
 */
mrsx26, far_el1
-enable_daif
+enable_daif
+#ifdef CONFIG_TRACE_IRQFLAGS
+btrace_hardirqs_off
+#endif
tc_user_exit
mov x0, x26
mov x1, x25
mov x2, sp
-bldo_mem_abort
+bldo_el0_ia_bp_hardening
bret_to_user
el0_fpsimd_acc:
/*
@@ -727,7 +797,10 @@
 * Stack or PC alignment exception handling
 */
mrsx26, far_el1
-enable_daif
+enable_daif
+#ifdef CONFIG_TRACE_IRQFLAGS
+btrace_hardirqs_off
+#endif
tc_user_exit
mov x0, x26
mov x1, x25
@@ -762,7 +835,7 @@
mov x1, x25
mov x2, sp
bldo_debug_exception
-enable_daif
+enable_daif
tc_user_exit
bret_to_user
el0_inv:
@@ -785,6 +858,11 @@
 #endif
 ct_user_exit
+#ifdef CONFIG_HARDEN_BRANCH_PREDICTOR
+tbzx22, #55, 1f
+bldo_el0_irq_bp_hardening
+1:
+#endif
 irq_handler

#ifdef CONFIG_TRACE_IRQFLAGS
@@ -809,7 +887,7 @@
 enable_dbg
 movx0, sp
 bldo_error
-enable_daif
+enable_da_f
 ct_user_exit
 bret_to_user
 ENDPREO(el0_error)
@@ -896,6 +974,7 @@
 b.ne__sys_trace
 cmp wscno, wsc_nr // check upper syscall limit
 bhsni_sys
+mask_nospec64 xscno, xsc_nr, x19 // enforce bounds for syscall number
 ldrx16, [stbl, xscno, isl #3] // address in the syscall table
 blrx16 // call sys_* routine
 bret_fast_syscall
@@ -943,6 +1022,117 @@
 .popsection // .entry.text

+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+/*
 + * Exception vectors trampoline.
 + */
 +.pushsection ".entry.tramp.text", "ax"
 +
 +.macro tramp_map_kernel, tmp
 +msr\tmp, ttbr1_el1
 +sub\tmp, \tmp, #((SWAPPER_DIR_SIZE + RESERVED_TTBR0_SIZE)
 +bic\tmp, \tmp, #USER_ASID_FLAG
 +msrr\tmp, \tmp
 +#ifdef CONFIG_QCOM_FALKOR_ERRATUM_1003
 +alternative_if ARM64_WORKAROUND_QCOM_FALKOR_E1003
 +/* ASID already in \tmp[63:48] */
 +movk\tmp, #:abs_g2_nc:(TRAMP_VALIAS >> 12)
+movk\tmp, #:abs_g1_nc:(TRAMP_VALIAS >> 12)
+/* 2MB boundary containing the vectors, so we nobble the walk cache */
+movk\tmp, #:abs_g0_nc:(TRAMP_VALIAS & ~(SZ_2M - 1)) >> 12)
+isb
+tlbivae1, \tmp
+dsbnsh
+alternative_else_nop_endif
+#endif /* CONFIG_QCOM_FALKOR_ERRATUM_1003 */
+.endm
+
+.macro tramp_unmap_kernel, tmp
+mrs\tmp, tbr1_e11
+add\tmp, \tmp, #(SWAPPER_DIR_SIZE + RESERVED_TTBR0_SIZE)
+orr\tmp, \tmp, #USER_ASID_FLAG
+msrttbr1_e11, \tmp
+/
+ * We avoid running the post_tbr_update_workaround here because
+ * it's only needed by Cavium ThunderX, which requires KPTI to be
+ * disabled.
+ */
+.endm
+
+.macro tramp_ventry, regsize = 64
+.align7
+1:
+.if regsize == 64
+msrtpidro_e10, x30
+// Restored in kernel_ventry
+.endif
+/
+ * Defend against branch aliasing attacks by pushing a dummy
+ * entry onto the return stack and using a RET instruction to
+ * enter the full-fat kernel vectors.
+ */
+bl2f
+b.
+2:
+tramp_map_kernel\x30
+#ifdef CONFIG_RANDOMIZE_BASE
+adr\x30, tramp_vectors + PAGE_SIZE
+alternative_insn isb, nop, ARM64_WORKAROUND_QCOM_FALKOR_E1003
+ldr\x30, [x30]
+#else
+ldr\x30, =vectors
+#endif
+prfmlil1strm, [x30, #(1b - tramp_vectors)]
+msrvtbar_e11, x30
+add\x30, x30, #(1b - tramp_vectors)
+isb

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+ret
+.endm
+
+.macro tramp_exit, regsize = 64
+adr30, tramp_vectors
+msr_vbar_el1, x30
+tramp_unmap_kernel30
+.if regsize == 64
+msr30, far_el1
+.endif
+eret
+.endm
+
+.align11
+ENTRY(tramp_vectors)
+.space0x400
+
+tramp_ventry
+tramp_ventry
+tramp_ventry
+tramp_ventry
+
+tramp_ventry32
+tramp_ventry32
+tramp_ventry32
+tramp_ventry32
+END(tramp_vectors)
+
+ENTRY(tramp_exit_native)
+tramp_exit
+END(tramp_exit_native)
+
+ENTRY(tramp_exit_compat)
+tramp_exit32
+END(tramp_exit_compat)
+
+.ltorg
+.popsection// .entry.tramp.text
+#ifdef CONFIG_RANDOMIZE_BASE
+.pushsection ".rodata", "a"
+.align PAGE_SHIFT
+.globl __entry_tramp_data_start
+__entry_tramp_data_start:
+.quad vectors
+.popsection// .rodata
+#endif /* CONFIG_RANDOMIZE_BASE */
+#endif /* CONFIG_UNMAP_KERNEL_AT_EL0 */
+
/*
 * Special system call wrappers.
 */
@@ -996,3 +1186,180 @@
 bret_to_user
 ENDPROC(ret_from_fork)
 NOKPROBE(ret_from_fork)
+
+#ifdef CONFIG_ARM_SDE_INTERFACE
+
+#include <asm/sdei.h>
+#include <uapi/linux/arm_sdei.h>
+
+.macro sdei_handler_exit exit_mode
+/# On success, this call never returns... */
+cmp exit_mode, #SDEI_EXIT_SMC
+b.ne99f
+smc#0
+b.
+99:hvc#0
+b.
+.endm
+
+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+/
+ * The regular SDEI entry point may have been unmapped along with the rest of
+ * the kernel. This trampoline restores the kernel mapping to make the x1 memory
+ * argument accessible.
+ *
+ * This clobbers x4, __sdei_handler() will restore this from firmware's
+ * copy.
+ */
+.ltorg
+.pushsection ".entry.tramp.text", "ax"
+ENTRY(__sdei_asm_entry_trampoline)
+msrx4, tibr1_e1
+tbxz4, #USER ASID BIT, 1f
+
+tramp_map_kernel tmp=x4
+isb
+movx4, xzr
+
+/#
+ * Use reg->interrupted_regs.addr_limit to remember whether to unmap
+ * the kernel on exit.
+ */
+1: strx4, [x1, #(SDEI_EVENT_INTREGS + S ORIG_ADDR LIMIT)]
ifdef CONFIG_RANDOMIZE_BASE
adrx4, tramp_vectors + PAGE_SIZE
addx4, x4, #lo12:__sdei_asm_trampoline_next_handler
ldr4, [x4]
#else
ldr4,=__sdei_asm_handler
#endif
+brx4
+ENDPROC(__sdei_asm_entry_trampoline)
+NOKPROBE(__sdei_asm_entry_trampoline)+
+
+/*
+ * Make the exit call and restore the original ttbr1_el1
+ *
+ * x0 & x1: setup for the exit API call
+ * x2: exit_mode
+ * x4: struct sdei_registered_event argument from registration time.
+ */
+ENTRY(__sdei_asm_exit_trampoline)
+ldr4, [x4, #(SDEI_EVENT_INTREGS + S_ORIG_ADDR_LIMIT)]
cbnzx4, If
+
+tramp_unmap_kernel tmp=x4
+
+1:sdei_handler_exit exit exit_mode=x2
+ENDPROC(__sdei_asm_exit_trampoline)
+NOKPROBE(__sdei_asm_exit_trampoline)
+.ltorg
+.popsection .entry.tramp.text
+ifdef CONFIGRANDOMIZE_BASE
+pushsection ".rodata", "a"
+__sdei_asm_trampoline_next_handler:
+quad __sdei_asm_handler
+.popsection .rodata
+endif /* CONFIG_RANDOMIZE_BASE */
+endif /* CONFIG_UNMAP_KERNEL_AT_EL0 */
+
+/*
+ * Software Delegated Exception entry point.
+ *
+ * x0: Event number
+ * x1: struct sdei_registered_event argument from registration time.
+ * x2: interrupted PC
+ * x3: interrupted PSTATE
+ * x4: maybe clobbered by the trampoline
+ *
+ * Firmware has preserved x0->x17 for us, we must save/restore the rest to
+ * follow SMC-CC. We save (or retrieve) all the registers as the handler may

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+ * want them.
+ */
+ENTRY(__sdei_asm_handler)
+stp x2, x3, [x1, #SDEI_EVENT_INTREGS + S_PC]
+stp x4, x5, [x1, #SDEI_EVENT_INTREGS + 16 * 2]
+stp x6, x7, [x1, #SDEI_EVENT_INTREGS + 16 * 3]
+stp x8, x9, [x1, #SDEI_EVENT_INTREGS + 16 * 4]
+stp x10, x11, [x1, #SDEI_EVENT_INTREGS + 16 * 5]
+stp x12, x13, [x1, #SDEI_EVENT_INTREGS + 16 * 6]
+stp x14, x15, [x1, #SDEI_EVENT_INTREGS + 16 * 7]
+stp x16, x17, [x1, #SDEI_EVENT_INTREGS + 16 * 8]
+stp x18, x19, [x1, #SDEI_EVENT_INTREGS + 16 * 9]
+stp x20, x21, [x1, #SDEI_EVENT_INTREGS + 16 * 10]
+stp x22, x23, [x1, #SDEI_EVENT_INTREGS + 16 * 11]
+stp x24, x25, [x1, #SDEI_EVENT_INTREGS + 16 * 12]
+stp x26, x27, [x1, #SDEI_EVENT_INTREGS + 16 * 13]
+stp x28, x29, [x1, #SDEI_EVENT_INTREGS + 16 * 14]
+movx4, sp
+stp lr, x4, [x1, #SDEI_EVENT_INTREGS + S_LR]
+ +movx19, x1
+ +#ifdef CONFIG_VMAP_STACK
+ /*
+ * entry.S may have been using sp as a scratch register, find whether
+ * this is a normal or critical event and switch to the appropriate
+ * stack for this CPU.
+ */
+ +#endif
+ +ldrbw4, [x19, #SDEI_EVENT_PRIORITY]
+ cbnzw4, 1f
+ ldr_this_cpu dst=x5, sym=sdei_stack_normal_ptr, tmp=x6
+ b 2f
+ !1: ldr_this_cpu dst=x5, sym=sdei_stack_critical_ptr, tmp=x6
+ !2: movx6, #SDEI_STACK_SIZE
+ addx5, x5, x6
+ movsp, x5
+ +#endif
+ + /*
+ * We may have interrupted userspace, or a guest, or exit-from or
+ * return-to either of these. We can’t trust sp_el0, restore it.
+ */
+ + mrsx28, sp_el0
+ ldr_this_cpu dst=x0, sym=__entry_task, tmp=x1
+ msrs_el0, x0
+ + /* If we interrupted the kernel point to the previous stack/frame. */
+ + and x0, x3, 0xc
+mrs x1, CurrentEL
+cmp x0, x1
+cselx29, x29, xzr, eq / fp, or zero
+cselx4, x2, xzr, eq / elr, or zero
+
+stpx29, x4, [sp, #-16]!
+movx29, sp
+
+addx0, x19, #SDEI_EVENT_INTREGS
+movx1, x19
+bl __sdei_handler
+
+msrsp_el0, x28
+/* restore regs >x17 that we clobbered */
+movx4, x19 // keep x4 for __sdei_asm_exit_trampoline
+ldpx28, x29, [x4, #SDEI_EVENT_INTREGS + 16 * 14]
+ldpx18, x19, [x4, #SDEI_EVENT_INTREGS + 16 * 9]
+ldplr, x1, [x4, #SDEI_EVENT_INTREGS + S_LR]
+movsp, x1
+
+movx1, x0// address to complete_and_resume
+/* x0 = (x0 <= 1) ? EVENT_COMPLETE:EVENT_COMPLETE_AND_RESUME */
+cmpx0, #1
+mov_qx2, SDEI_1_0_FN_SDEI_EVENT_COMPLETE
+mov_qx3, SDEI_1_0_FN_SDEI_EVENT_COMPLETE_AND_RESUME
+cselx0, x2, x3, ls
+
+ldr_lx2, sdei_exit_mode
+
+alternative_if_not ARM64_UNMAP_KERNEL_AT_EL0
+sdei_handler_exit exit_mode=x2
+alternative_else_nop_endif
+
+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+tramp_aliasdst=x5, sym=__sdei_asm_exit_trampoline
+brx5
+#endif
+ENDPROC(__sdei_asm_handler)
+NOKPROBE(__sdei_asm_handler)
+#endif /* CONFIG_ARM_SDE_INTERFACE */

--- linux-4.15.0.orig/arch/arm64/kernel/fpsimd.c
+++ linux-4.15.0/arch/arm64/kernel/fpsimd.c
@@ -40,6 +40,7 @@
#include <linux/sysctl.h>
#include <asm/fpsimd.h>
+include <asm/cpufeature.h>
#include <asm/cputype.h>

#include <asm/fpsimd.h>
+include <asm/cpufeature.h>
+include <asm/cputype.h>
```c
#include <asm/simd.h>
#include <asm/sigcontext.h>
@@ -341,7 +342,7 @@
    return sve_vl_from_vq(bit_to_vq(bit));
 }

#ifdef CONFIG_SYSCTL
+##if defined(CONFIG_ARM64_SVE) && defined(CONFIG_SYSCTL)
static int sve_proc_do_default_vl(struct ctl_table *table, int write,
    void __user *buffer, size_t *lenp,
@@ -396,9 +397,9 @@
    return 0;
 }

-##ifdef CONFIG_SYSCTL */
+##else /* ! (CONFIG_ARM64_SVE && CONFIG_SYSCTL) */
static int __init sve_sysctl_init(void) { return 0; }
-##endif /* ! CONFIG_SYSCTL */
+##endif /* ! (CONFIG_ARM64_SVE && CONFIG_SYSCTL) */

#define ZREG(sve_state, vq, n) ((char *)(sve_state) +
    (SVE_SIG_ZREG_OFFSET(vq, n) - SVE_SIG_REGS_OFFSET))
@@ -479,7 +480,7 @@
     void sve_alloc(struct task_struct *task)
     {
     if (task->thread.sve_state) {
-        memset(task->thread.sve_state, 0, sve_state_size(current));
+        memset(task->thread.sve_state, 0, sve_state_size(task));
         return;
     }
     
@@ -757,12 +758,10 @@
     * Enable SVE for EL1.
     * Intended for use by the cpufeatures code during CPU boot.
     */
-#int sve_kernel_enable(void *__always_unused p)
+void sve_kernel_enable(const struct arm64_cpu_capabilities *__unused)
     {
     write_sysreg(read_sysreg(CPACR_EL1) | CPACR_EL1_ZEN_EL1EN, CPACR_EL1);
     isb();
     -
     -return 0;
     }

     void __init sve_setup(void)
@@ -1018,8 +1017,19 @@
     */
```

---

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void fpsimd_restore_current_state(void)
{
    if (!system_supports_fpsimd())
        /*
         * For the tasks that were created before we detected the absence of
         * FP/SIMD, the TIF_FOREIGN_FPSTATE could be set via fpsimd_thread_switch(),
         * e.g, init. This could be then inherited by the children processes.
         * If we later detect that the system doesn't support FP/SIMD,
         * we must clear the flag for all the tasks to indicate that the
         * FPSTATE is clean (as we can't have one) to avoid looping for ever in
         * do_notify_resume().
         */
    if (!system_supports_fpsimd()) {
        clear_thread_flag(TIF_FOREIGN_FPSTATE);
        return;
    }

    local_bh_disable();
}

void fpsimd_update_current_state(struct fpsimd_state *state)
{
    if (!system_supports_fpsimd())
        return;

    local_bh_disable();

    if (offset < -SZ_128M || offset >= SZ_128M) {
#ifdef CONFIG_ARM64_MODULE_PLTS
    struct plt_entry trampoline;
    struct module *mod;
#endif
    dst = mod->arch.ftrace_trampoline;
    trampoline = get_plt_entry(addr);
    if (!plt_entries_equal(mod->arch.ftrace_trampoline,
        &trampoline)) {
        /*
         * is added in the future, but for now, the pr_err() below
         * deals with a theoretical issue only.
         */
        dst = mod->arch.ftrace_trampoline;
        trampoline = get_plt_entry(addr);
        if (!plt_entries_equal(mod->arch.ftrace_trampoline,
            &trampoline)) {
            /*
             * pr_err() below doesn't work in this case.
             */
        }
    }
}

--- linux-4.15.0.orig/arch/arm64/kernel/ftrace.c
+++ linux-4.15.0/arch/arm64/kernel/ftrace.c
@@ -76,7 +76,7 @@
    if (offset < -SZ_128M || offset >= SZ_128M) {
#ifdef CONFIG_ARM64_MODULE_PLTS
    struct plt_entry trampoline;
+    struct plt_entry trampoline, *dst;
    struct module *mod;

+    dst = mod->arch.ftrace_trampoline;
+    trampoline = get_plt_entry(addr);
+    if (!plt_entries_equal(mod->arch.ftrace_trampoline,
+        &trampoline)) {
+        /*
+         * pr_err() below doesn't work in this case.
+         */
+    }
```
- \&(struct plt_entry){})) \{ 
+if (\!plt_entries_equal(dst, \&trampoline)) \{ 
+if (\!plt_entries_equal(dst, \&\((struct plt_entry){})) \{ 
  pr_err("ftrace: far branches to multiple entry points unsupported inside a single module\n"); 
  return -EINVAL; 
\} 

/* point the trampoline to our ftrace entry point */ 
module_disable_ro(mod); 
-*mod->arch.ftrace_trampoline = trampoline; 
+*dst = trampoline; 
module_enable_ro(mod, true); 

-/* update trampoline before patching in the branch */ 
-\_smp\_wmb(); 
+/* 
+ * Ensure updated trampoline is visible to instruction 
+ * fetch before we patch in the branch. Although the 
+ * architecture doesn't require an IPI in this case, 
+ * Neoverse-N1 erratum #1542419 does require one 
+ * if the TLB maintenance in module_enable_ro() is 
+ * skipped due to rodata_enabled. It doesn't seem worth 
+ * it to make it conditional given that this is 
+ * certainly not a fast-path. 
+ */ 
+\_flush\_icache\_range((unsigned long)\&dst[0], 
+ \((unsigned long)\&dst[1]); 
\} 
-addr = (unsigned long)(void *)mod->arch.ftrace_trampoline; 
+addr = (unsigned long)dst; 
#else /* CONFIG\_ARM64\_MODULE\_PLTS */ 
return -EINVAL; 
#endif /* CONFIG\_ARM64\_MODULE\_PLTS */ 
/** 
@@ -216,8 +225,7 @@
{ 
  unsigned long return_hooker = (unsigned long)\&return_to_handler; 
  unsigned long old; 
-\_struct ftrace_graph_ent trace; 
-\_int err; 

  if (unlikely(atomic_read(\&current->tracing_graph_pause))) 
    return; 
  @@ -229,18 +236,7 @@ 
 */ 
 old = \^parent; 

 -trace.func = self_addr; 
 -trace.depth = current->curr_ret_stack + 1;
- /* Only trace if the calling function expects to */
- if (!ftrace_graph_entry(&trace))
- return;
- 
- err = ftrace_push_return_trace(old, self_addr, &trace.depth,
-     frame_pointer, NULL);
- if (err == -EBUSY)
- return;
- else
+ if (!function_graph_enter(old, self_addr, frame_pointer, NULL))
    *parent = return_hooker;
    }

--- linux-4.15.0.orig/arch/arm64/kernel/head.S
+++ linux-4.15.0/arch/arm64/kernel/head.S
@@ -371,7 +371,7 @@ end early head section, begin head code that is also used for
 * hotplug and needs to have the same protections as the text region
 * /
- .section ".idmap.text","ax"
+ .section ".idmap.text","awx"

 ENTRY(kimage_vaddr)
 .quad		_text - TEXT_OFFSET
@@ -388,17 +388,13 @@
mrs	x0, CurrentEL
 cmp	x0, #CurrentEL_EL2
 b.eq	1f
- mrs	x0, sctlr_el1
-CPU_BE(orrx0, x0, #(3 << 24))// Set the EE and E0E bits for EL1
-CPU_LE(bicx0, x0, #(3 << 24))// Clear the EE and E0E bits for EL1
+mov_qx0, (SCTLR_EL1_RES1 | ENDIAN_SET_EL1)
 msrscntl_el1, x0
 movw0, #BOOT_CPU_MODE_EL1// This cpu booted in EL1
 isb
 ret

-1:mrsx0, sctlr_el2
-CPU_BE(orrx0, x0, #(1 << 25))// Set the EE bit for EL2
-CPU_LE(bicx0, x0, #(1 << 25))// Clear the EE bit for EL2
+1:mov_qx0, (SCTLR_EL2_RES1 | ENDIAN_SET_EL2)
 msrscntl_el2, x0

#ifdef CONFIG_ARM64_VHE
 @@ -414,10 +410,9 @@
 #endif
/* Hyp configuration. */
movx0, #HCR_RW // 64-bit EL1
+mov_qx0, HCR_HOST_NVHE_FLAGS
cbzx2, set_hcr
-orr0, x0, #HCR_TGE // Enable Host Extensions
-orr0, x0, #HCR_E2H
+mov_qx0, HCR_HOST_VHE_FLAGS
set_hcr:
msr_hcr_el2, x0
isb
@@ -443,8 +438,7 @@
/* GICv3 system register access */
mrs0, id_aa64pfr0_el1
ubfx0, x0, #24, #4
-cmpx0, #1
-b.ne3f
+cbzx0, 3f

mrs_sx0, SYS_ICC_SRE_EL2
orr0, x0, #ICC_SRE_EL2_SRE // Set ICC_SRE_EL2.SRE==1
@@ -514,10 +508,7 @@
* requires no configuration, and all non-hyp-specific EL2 setup
* will be done via the _EL1 system register aliases in __cpu_setup.
*/
-/* sctlr_el1 */
-mov0, #0x0800 // Set/clear RES{1,0} bits
-CPU_BE(movk0, #0x33d0, lsl #16) // Set EE and E0E on BE systems
-CPU_LE(movk0, #0x30d0, lsl #16) // Clear EE and E0E on LE systems
+mov_qx0, (SCTLR_EL1_RES1 | ENDIAN_SET_EL1)
msrsctlr_el1, x0

/* Coprocessor traps. */
@@ -585,7 +576,7 @@
* with MMU turned off.
 */
ENTRY(__early_cpu_boot_status)
-.long 0
+.quad 0
.
popsection
@@ -621,6 +612,7 @@
/* Common entry point for secondary CPUs. */
+bl__cpu_secondary_check52bitva
bl__cpu_setup// initialise processor
bl__enable_mmu
ldrx8, __secondary_switched
@@ -695,6 +687,31 @@
ret
ENDPROC(__enable_mmu)

+ENTRY(__cpu_secondary_check52bitva)
+#ifdef CONFIG_ARM64_52BIT_VA
+ldr_lx0, vabits_user
+cmpx0, #52
+b.ne2f
+
+mrs_sx0, SYS_ID_AA64MMFR2_EL1
+andx0, x0, #(0xf << ID_AA64MMFR2_LVA_SHIFT)
+cbnzx0, 2f
+
+adr_lx0, va52mismatch
+movw1, #1
+strbw1, [x0]
+dmbsy
+dcivac, x0// Invalidate potentially stale cache line
+
+update_early_cpu_boot_status CPU_STUCK_IN_KERNEL, x0, x1
+wfe
+wfi
+b1b
+
+#endif
+2:ret
+ENDPROC(__cpu_secondary_check52bitva)
+
__no_granule_support:
/* Indicate that this CPU can't boot and is stuck in the kernel */
update_early_cpu_boot_status CPU_STUCK_IN_KERNEL, x1, x2
@@ -757,6 +774,7 @@
    tlbi	vmalle1		// Remove any stale TLB entries
dsbnsh
+isb

msrctlr_el1, x19// re-enable the MMU
isb
--- linux-4.15.0.orig/arch/arm64/kernel/hibernate.c
+++ linux-4.15.0/arch/arm64/kernel/hibernate.c
@@ -202,6 +202,7 @@
gfp_t mask)
{
    int rc = 0;
+pgd_t *trans_pgd:
pgd_t *pgd;
pud_t *pud;
pmd_t *pmd;
@@ -216,7 +217,13 @@
memcpy((void *)dst, src_start, length);
flush_icache_range(dst, dst + length);

-trans_pgd = allocator(mask);
+trans_pgd = allocator(mask);
+if (!trans_pgd) {
+rc = -ENOMEM;
+goto out;
+
+pgd = pgd_offset(trans_pgd, dst_addr);
if (pgd_none(*pgd)) {
  pud = allocator(mask);
  if (!pud) {
@@ -247,8 +254,7 @@
    pte = pte_offset_kernel(pmd, dst_addr);
    -set_pte(pte, __pte(virt_to_phys((void *)dst) |
    -pgprot_val(PAGE_KERNEL_EXEC));
+    set_pte(pte, pfn_pte(virt_to_pfn(dst), PAGE_KERNEL_EXEC));

/*
 * Load our new page tables. A strict BBM approach requires that we
@@ -300,8 +306,10 @@
dcache_clean_range(__idmap_text_start, __idmap_text_end);

/* Clean kvm setup code to PoC? */
-if (el2_reset_needed())
+if (el2_reset_needed()) {
  dcache_clean_range(__hyp_idmap_text_start, __hyp_idmap_text_end);
+  dcache_clean_range(__hyp_text_start, __hyp_text_end);
+
/* make the crash dump kernel image protected again */
crash_post_resume();
@@ -314,6 +322,17 @@
sleep_cpu = -EINVAL;
__cpu_suspend_exit();
+
+/* Just in case the boot kernel did turn the SSBD
+ * mitigation off behind our back, let's set the state
+ * to what we expect it to be.
+ */
+switch (arm64_get_ssbd_state()) {
+case ARM64_SSBD_FORCE_ENABLE:
+case ARM64_SSBD_KERNEL:
+arm64_set_ssbd_mitigation(true);
+}
+
local_daif_restore(flags);
--- linux-4.15.0.orig/arch/arm64/kernel/hw_breakpoint.c
+++ linux-4.15.0/arch/arm64/kernel/hw_breakpoint.c
@@ -547,14 +547,14 @@
case 0:
 /*Aligned */
 break;
-case 1:
-/* Allow single byte watchpoint. */
-if (info->ctrl.len == ARM_BREAKPOINT_LEN_1)
-break;
-case 2:
-/* Allow halfword watchpoints and breakpoints. */
-if (info->ctrl.len == ARM_BREAKPOINT_LEN_2)
-break;
+case 3:
+/* Allow single byte watchpoint. */
+if (info->ctrl.len == ARM_BREAKPOINT_LEN_1)
+break;
+default:
+return -EINVAL;
+}
@@ -737,6 +737,27 @@
 return 0;
 }

+static int watchpoint_report(struct perf_event *wp, unsigned long addr,
+ struct pt_regs *regs)
+{
+ int step = is_default_overflow_handler(wp);
+ struct arch_hw_breakpoint *info = counter_arch_bp(wp);
+ +
+ info->trigger = addr;
+ +
+ /*
+ * If we triggered a user watchpoint from a uaccess routine, then
+ * handle the stepping ourselves since userspace really can't help
+ * us with this.
+ */
+ return -EINVAL;
+}
+if (!user_mode(regs) && info->ctrl.privilege == AARCH64_BREAKPOINT_EL0)
+step = 1;
+else
+perf_bp_event(wp, regs);
+
+return step;
+}
+
static int watchpoint_handler(unsigned long addr, unsigned int esr,
   struct pt_regs *regs)
{
    @ @ -746,7 +767,6 @@
    u64 val;
    struct perf_event *wp, **slots;
    struct debug_info *debug_info;
    -struct arch_hw_breakpoint *info;
    struct arch_hw_breakpoint_ctrl ctrl;

    slots = this_cpu_ptr(wp_on_reg);
    @ @ -784,25 +804,13 @@
    if (dist != 0)
    continue;

    -info = counter_arch_bp(wp);
    -info->trigger = addr;
    -perf_bp_event(wp, regs);
    -
    /* Do we need to handle the stepping? */
    -if (is_default_overflow_handler(wp))
      -step = 1;
      +step = watchpoint_report(wp, addr, regs);
    }
    -if (min_dist > 0 && min_dist != -1) {
      /* No exact match found. */
      -wp = slots[closest_match];
      -info = counter_arch_bp(wp);
      -info->trigger = addr;
      -perf_bp_event(wp, regs);

      /* Do we need to handle the stepping? */
      -if (is_default_overflow_handler(wp))
        -step = 1;
        -}
      +# No exact match found? */
      +if (min_dist > 0 && min_dist != -1)
        +step = watchpoint_report(slots[closest_match], addr, regs);
        +
        +rcu_read_unlock();
if (!step)
--- linux-4.15.0.orig/arch/arm64/kernel/hyp-stub.S
+++ linux-4.15.0/arch/arm64/kernel/hyp-stub.S
@@ -28,6 +28,8 @@
 #include <asm/virt.h>
 .text
+.pushsection.hyp.text, "ax"
+
 .align 11

 ENTRY(__hyp_stub_vectors)
--- linux-4.15.0.orig/arch/arm64/kernel/image.h
+++ linux-4.15.0/arch/arm64/kernel/image.h
@@ -73,17 +73,11 @@
#ifdef CONFIG_EFI
-__efistub_stext_offset = stext - _text;
--
-/*
- * Prevent the symbol aliases below from being emitted into the kallsyms
- * table, by forcing them to be absolute symbols (which are conveniently
- * ignored by scripts/kallsyms) rather than section relative symbols.
- * The distinction is only relevant for partial linking, and only for symbols
- * that are defined within a section declaration (which is not the case for
- * the definitions below) so the resulting values will be identical.
- * Use ABSOLUTE() to avoid ld.lld treating this as a relative symbol:
+ * https://github.com/ClangBuiltLinux/linux/issues/561
 */
-#define KALLSYMS_HIDE(sym) ABSOLUTE(sym)
+__efistub_stext_offset = ABSOLUTE(stext - _text);

 /*
 * The EFI stub has its own symbol namespace prefixed by __efistub_, to
 * @ @ -94.27 +88.27 @ @
 * linked at. The routines below are all implemented in assembler in a
 * position independent manner
 */
-__efistub_memcmp= KALLSYMS_HIDE(__pi_memcmp);
-__efistub_memchr= KALLSYMS_HIDE(__pi_memchr);
-__efistub_memcpy= KALLSYMS_HIDE(__pi_memcpy);
-__efistub_memmove= KALLSYMS_HIDE(__pi_memmove);
-__efistub_memset= KALLSYMS_HIDE(__pi_memset);
-__efistub_strlen= KALLSYMS_HIDE(__pi_strlen);
-__efistub_strlen= KALLSYMS_HIDE(__pi_strlen);
-__efistub_strcmp= KALLSYMS_HIDE(__pi_strcmp);
__efistub_strcmp = __pi_strcmp;
+__efistub_strcmp = __pi_strcmp;
+__efistub_strlen = __pi_strlen;
+__efistub_strnlen = __pi_strnlen;
+__efistub_strcmp = __pi_strcmp;
+__efistub__text = _text;
+__efistub__end = _end;
+__efistub__edata = _edata;
+__efistub_screen_info = screen_info;

#endif

--- linux-4.15.0.orig/arch/arm64/kernel/insn.c
+++ linux-4.15.0/arch/arm64/kernel/insn.c
@@ -793,6 +793,46 @@
         }
 state);
 }
+u32 aarch64_insn_gen_ldadd(enum aarch64_insn_register result,
+    enum aarch64_insn_register address,
+    enum aarch64_insn_register value,
+    enum aarch64_insn_size_type size)
+{
+u32 insn = aarch64_insn_get_ldadd_value();
+    +switch (size) {
+case AARCH64_INSN_SIZE_32:
case AARCH64InsnSize64:
    break;
default:
    printk("\%s: unimplemented size encoding \%d\n", __func__, size);
    return AARCH64_BREAK_FAULT;
}

insn = aarch64_insn_encode_ldst_size(size, insn);

insn = aarch64_insn_encode_register(AARCH64InsnRegTypeRT, insn, result);

insn = aarch64_insn_encode_register(AARCH64InsnRegTypeRN, insn, address);

return aarch64_insn_encode_register(AARCH64InsnRegTypeRS, insn, value);
}

u32 aarch64_insn_gen_stadd(enum aarch64_insn_register address, enum aarch64_insn_register value, enum aarch64_insn_size_type size)
{
    /* STADD is simply encoded as an alias for LDADD with XZR as *
     * the destination register. *
     * */
    return aarch64_insn_gen_ldadd(AARCH64InsnRegZR, address, value, size);
}

static u32 aarch64_insn_encode_prfm_imm(enum aarch64_insn_prfm_type type, enum aarch64_insn_prfm_target target, enum aarch64_insn_prfm_policy policy,
--- linux-4.15.0.orig/arch/arm64/kernel/irq.c
+++ linux-4.15.0/arch/arm64/kernel/irq.c
@@ -29,9 +29,13 @@
#include <linux/irqchip.h>
#include <linux/seq_file.h>
#include <linux/vmalloc.h>
+#include <asm/vmap_stack.h>

unsigned long irq_err_count;

+/* Only access this in an NMI enter/exit */
+DEFINE_PER_CPU(struct nmi_ctx, nmi_contexts);
+DEFINE_PER_CPU(unsigned long *, irq_stack_ptr);
int arch_show_interrupts(struct seq_file *p, int prec)
@@ -58,17 +62,7 @@
    unsigned long *p;

    for_each_possible_cpu(cpu) {
-    /*
-     * To ensure that VMAP'd stack overflow detection works
-     * correctly, the IRQ stacks need to have the same
-     * alignment as other stacks.
-     */
-    
-    p = __vmalloc_node_range(IRQ_STACK_SIZE, THREAD_ALIGN,
-                   VMALLOC_START, VMALLOC_END,
-                   THREADINFO_GFP, PAGE_KERNEL,
-                   0, cpu_to_node(cpu),
-                   __builtin_return_address(0));
-
+    p = arch_alloc_vmap_stack(IRQ_STACK_SIZE, cpu_to_node(cpu));
    
    per_cpu(irq_stack_ptr, cpu) = p;
    }
    
--- linux-4.15.0.orig/arch/arm64/kernel/kaslr.c
+++ linux-4.15.0/arch/arm64/kernel/kaslr.c
@@ -14,6 +14,7 @@
 #include <linux/sched.h>
 #include <linux/types.h>
+#include <asm/cacheflush.h>
 #include <asm/fixmap.h>
 #include <asm/kernel-pgtable.h>
 #include <asm/memory.h>
@@ -43,7 +44,7 @@
        return ret;
    }

-#include <asm/cacheflush.h>
+#include <asm/cacheflush.h>
 #include <asm/fixmap.h>
 #include <asm/kernel-pgtable.h>
 #include <asm/memory.h>
@@ -87,6 +88,7 @@
    /* we end up running with module randomization disabled.
    */
    module_alloc_base = (u64) _etext - MODULES_VSIZE;
+	__flush_dcache_area(&module_alloc_base, sizeof(module_alloc_base));

    /*
    * Try to map the FDT early. If this fails, we simply bail,
* Check if 'nokaslr' appears on the command line, and
* return 0 if that is the case.
*/
cmdline = get_cmdline(fdt);
str = strstr(cmdline, "nokaslr");
if (str == cmdline || (str > cmdline && *(str - 1) == ' '))
return 0;

/*
* OK, so we are proceeding with KASLR enabled. Calculate a suitable
* kernel image offset from the seed. Let's place the kernel in the
* lower half of the VMALLOC area (VA_BITS - 2).
* middle half of the VMALLOC area (VA_BITS - 2), and stay clear of
* the lower and upper quarters to avoid colliding with other
* allocations.
* Even if we could randomize at page granularity for 16k and 64k pages,
* let's always round to 2 MB so we don't interfere with the ability to
* map using contiguous PTEs
*/
mask = ((1UL << (VA_BITS - 2)) - 1) & ~(SZ_2M - 1);
[offset = seed & mask;
+offset = BIT(VA_BITS - 3) + (seed & mask);

/* use the top 16 bits to randomize the linear region */
memstart_offset_seed = seed >> 48;

/* vmalloc region, since shadow memory is allocated for each
* module at load time, whereas the vmalloc region is shadowed
* by KASAN zero pages. So keep modules out of the vmalloc
* region if KASAN is enabled.
* region if KASAN is enabled, and put the kernel well within
* 4 GB of the module region.
*/
-return offset;
+return offset % SZ_2G;

if (IS_ENABLED(CONFIG_RANDOMIZE_MODULE_REGION_FULL)) {
/*
 * Randomize the module region independently from the core
 * kernel. This prevents modules from leaking any information
 * Randomize the module region over a 4 GB window covering the
 * kernel. This reduces the risk of modules leaking information
 * about the address of the kernel itself, but results in
 * branches between modules and the core kernel that are
 * resolved via PLTs. (Branches between modules will be
 * resolved normally.)
-module_range = VMALLOC_END - VMALLOC_START - MODULES_VSIZE;
-module_alloc_base = VMALLOC_START;
+module_range = SZ_4G - (u64)(_end - _stext);
+module_alloc_base = max((u64)_end + offset - SZ_4G,
+(u64)MODULES_VADDR);
} else {
/*
 * Randomize the module region by setting module_alloc_base to
@@ -180,5 +186,8 @@
module_alloc_base += (module_range * (seed & ((1 << 21) - 1))) >> 21;
module_alloc_base &= PAGE_MASK;

+_flush_dcache_area(&module_alloc_base, sizeof(module_alloc_base));
+_flush_dcache_area(&memstart_offset_seed, sizeof(memstart_offset_seed));
+ return offset;
} }
--- linux-4.15.0.orig/arch/arm64/kernel/kgdb.c
+++ linux-4.15.0/arch/arm64/kernel/kgdb.c
@@ -233,27 +233,33 @@
static int kgdb_brk_fn(struct pt_regs *regs, unsigned int esr)
{
  +if (user_mode(regs))
  +return DBG_HOOK_ERROR;
  +kgdb_handle_exception(1, SIGTRAP, 0, regs);
  -return 0;
  +return DBG_HOOK.Handled;
}
NOKPROBE_SYMBOL(kgdb_brk_fn)

static int kgdb_compiled_brk_fn(struct pt_regs *regs, unsigned int esr)
{
  +if (user_mode(regs))
  +return DBG_HOOK_ERROR;
  +compiled_break = 1;
  kgdb_handle_exception(1, SIGTRAP, 0, regs);

  -return 0;
  +return DBG_HOOK.Handled;
}
NOKPROBE_SYMBOL(kgdb_compiled_brk_fn);

static int kgdb_step_brk_fn(struct pt_regs *regs, unsigned int esr)
{
if (!kgdb_single_step)
+if (user_mode(regs) || !kgdb_single_step)
return DBG_HOOK_ERROR;

-kgdb_handle_exception(1, SIGTRAP, 0, regs);
-return 0;
+kgdb_handle_exception(0, SIGTRAP, 0, regs);
+return DBG_HOOK_HANDLED;
}
NOKPROBE_SYMBOL(kgdb_step_brk_fn);

--- linux-4.15.0.orig/arch/arm64/kernel/machine_kexec.c
+++ linux-4.15.0/arch/arm64/kernel/machine_kexec.c
@@ -185,7 +185,8 @@
 /* Flush the reboot_code_buffer in preparation for its execution. */
 __flush_dcache_area(reboot_code_buffer, arm64_relocate_new_kernel_size);
 flush_icache_range((uintptr_t)reboot_code_buffer,
-   arm64_relocate_new_kernel_size);
+   (uintptr_t)reboot_code_buffer +
+   arm64_relocate_new_kernel_size);

 /* Flush the kimage list and its buffers. */
 kexec_list_flush(kimage);
--- linux-4.15.0.orig/arch/arm64/kernel/module-plts.c
+++ linux-4.15.0/arch/arm64/kernel/module-plts.c
@@ -41,6 +41,47 @@
 return (u64)&plt[i];
 }

+#ifdef CONFIG_ARM64_ERRATUM_843419
+u64 module_emit_veneer_for_adrp(struct module *mod, void *loc, u64 val)
+{
+struct mod_plt_sec *pltsec = !in_init(mod, loc) ? &mod->arch.core :
+ &mod->arch.init;
+struct plt_entry *plt = (struct plt_entry *)pltsec->plt->sh_addr;
+int i = pltsec->plt_num_entries++;
+u32 mov0, mov1, mov2, br;
+int rd;
+
+if (WARN_ON(pltsec->plt_num_entries > pltsec->plt_max_entries))
+return 0;
+
+/* get the destination register of the ADRP instruction */
+rd = aarch64Insn_decode_register(AARCH64_INSN_REGTYPE_RD,
+ le32_to_cpup(__le32_to_cpup(__le32 *loc)));
+
+/* generate the veneer instructions */
+mov0 = aarch64Insn_gen_movewide(rd, (u16)val, 0,
AARCH64_INSN_VARIANT_64BIT,
AARCH64_INSN_MOVEWIDE_INVERSE);
mov1 = aarch64_insn_gen_movewide(rd, (u16)(val >> 16), 16,
AARCH64_INSN_VARIANT_64BIT,
AARCH64_INSN_MOVEWIDE_KEEP);
mov2 = aarch64_insn_gen_movewide(rd, (u16)(val >> 32), 32,
AARCH64_INSN_VARIANT_64BIT,
AARCH64_INSN_MOVEWIDE_KEEP);
br = aarch64_insn_gen_branch_imm((u64)&plt[i].br, (u64)loc + 4,
AARCH64_INSN_BRANCH_NOLINK);
plt[i] = (struct plt_entry){
cpu_to_le32(mov0),
cpu_to_le32(mov1),
cpu_to_le32(mov2),
cpu_to_le32(br)
};
return (u64)&plt[i];
#endif

#define cmp_3way(a,b) ((a) < (b) ? -1 : (a) > (b))

static int cmp_rela(const void *a, const void *b)
@@ -68,16 +109,21 @@
}

static unsigned int count_plts(Elf64_Sym *syms, Elf64_Rela *rela, int num,
- Elf64_Word dstidx)
+ Elf64_Word dstidx, Elf_Shdr *dstsec)
{
unsigned int ret = 0;
Elf64_Sym *s;
int i;

for (i = 0; i < num; i++) {
+u64 min_align;
+
switch (ELF64_R_TYPE(rela[i].r_info)) {
case R_AARCH64_JUMP26:
case R_AARCH64_CALL26:
+if (!IS_ENABLED(CONFIG_RANDOMIZE_BASE))
+break;
+
/*
 * We only have to consider branch targets that resolve
 * to symbols that are defined in a different section.
if (rela[i].r_addend != 0 || !duplicate_rel(rea, i))
    ret++; break;
+case R_AARCH64_ADR_PREL_PG_HI21_NC:
+case R_AARCH64_ADR_PREL_PG_HI21:
+if (!IS_ENABLED(CONFIG_ARM64_ERRATUM_843419))
    +break;
+
+/*
+ * Determine the minimal safe alignment for this ADRP
+ * instruction: the section alignment at which it is
+ * guaranteed not to appear at a vulnerable offset.
+ *
+ * This comes down to finding the least significant zero
+ * bit in bits [11:3] of the section offset, and
+ * increasing the section's alignment so that the
+ * resulting address of this instruction is guaranteed
+ * to equal the offset in that particular bit (as well
+ * as all less significant bits). This ensures that the
+ * address modulo 4 KB != 0xffff or 0xfffc (which would
+ * have all ones in bits [11:3])
+ */
+min_align = 2ULL << ffz(rela[i].r_offset | 0x7);
+
+/*
+ * Allocate veneer space for each ADRP that may appear
+ * at a vulnerable offset nonetheless. At relocation
+ * time, some of these will remain unused since some
+ * ADRP instructions can be patched to ADR instructions
+ * instead.
+ */
+if (min_align > SZ_4K)
    ret++; else
    +dstsec->sh_addralign = max(dstsec->sh_addralign,
    +    min_align);
+break;
}
}
return ret;

if (strncmp(secstrings + dstsec->sh_name, "init", 5) != 0)
core_plts += count_plts(syms, rels, numrels,
-    sechdrs[i].sh_info);
+    sechdrs[i].sh_info, dstsec);
else
init_plts += count_plts(syms, rels, numrels, 
-sechdrs[i].sh_info);
+sechdrs[i].sh_info, dstsec);
}

mod->arch.core.plt->sh_type = SHT_NOBITS;
--- linux-4.15.0.orig/arch/arm64/kernel/module.c
+++ linux-4.15.0/arch/arm64/kernel/module.c
@@ -32,6 +32,7 @@
 void *module_alloc(unsigned long size)
 {
 +u64 module Alloc_end = module Alloc_base + MODULES_VSIZE;
 gfp_t gfp_mask = GFP_KERNEL;
 void *p;

 @@ -39,9 +40,12 @@
 if (IS_ENABLED(CONFIG_ARM64_MODULE_PLOTS))
 gfp_mask |= __GFP_NOWARN;
 
+if (IS_ENABLED(CONFIG_KASAN))
+/* don't exceed the static module region - see below */
+module Alloc_end = MODULES_END;
+ p = __vmalloc_node_range(size, MODULE_ALIGN, module Alloc_base,
- module Alloc_base + MODULES_VSIZE,
- gfp_mask, PAGE_KERNEL_EXEC, 0,
+ module Alloc_end, gfp_mask, PAGE_KERNEL_EXEC, 0,
 NUMA_NO_NODE, __builtin_return_address(0));

 if (!p && IS_ENABLED(CONFIG_ARM64_MODULE_PLOTS) &&
 @@ -55,9 +59,10 @@
 * less likely that the module region gets exhausted, so we
 * can simply omit this fallback in that case.
 */
-p = __vmalloc_node_range(size, MODULE_ALIGN, VMALLOC_START,
-VMALLOC_END, GFP_KERNEL, PAGE_KERNEL_EXEC, 0,
-NUMA_NO_NODE, __builtin_return_address(0));
+p = __vmalloc_node_range(size, MODULE_ALIGN, module Alloc_base,
 +module Alloc_base + SZ_4G, GFP_KERNEL,
 +PAGE_KERNEL_EXEC, 0, NUMA_NO_NODE,
 + __builtin_return_address(0));

 if (p && (kasen_module_alloc(p, size) < 0)) {
 vfree(p);
 @@ -197,6 +202,33 @@
 return 0;
 }

---
+static int reloc_insn_adrp(struct module *mod, __le32 *place, u64 val)
+{
+u32 insn;
+
+if (IS_ENABLED(CONFIG_ARM64_ERRATUM_843419)) ||
+  ((u64)place & 0xfff) < 0xff8)
+  return reloc_insn_imm(RELOC_OP_PAGE, place, val, 12, 21,
+  AARCH64_INSN_IMM_ADR);
+
+/* patch ADRP to ADR if it is in range */
+if (!reloc_insn_imm(RELOC_OP_PREL, place, val & ~0xfff, 0, 21,
+  AARCH64_INSN_IMM_ADR)) {
+insn = le32_to_cpu(*place);
+insn &= ~BIT(31);
+} else {
+/* out of range for ADR -> emit a veneer */
+val = module_emit_veneer_for_adrp(mod, place, val & ~0xfff);
+if (!val)
+return -ENOEXEC;
+insn = aarch64_insn_gen_branch_imm((u64)place, val,
+  AARCH64_INSN_BRANCH_NOLINK);
+}
+
+*place = cpu_to_le32(insn);
+return 0;
+
+
int apply_relocate_add(Elf64_Shdr *sechdrs,
  const char *strtab,
  unsigned int symindex,
@@ -336,14 +368,13 @@
  ovf = reloc_insn_imm(RELOC_OP_PAGE, loc, val, 12, 21,
  AARCH64_INSN_IMM_ADR);
  break;
-#ifndef CONFIG_ARM64_ERRATUM_843419
  case R_AARCH64_ADDR_PREL_PG_HI21_NC:
overflow_check = false;
  case R_AARCH64_ADDR_PREL_PG_HI21:
-ovf = reloc_insn_imm(RELOC_OP_PAGE, loc, val, 12, 21,
-  AARCH64_INSN_IMM_ADR);
-ovf = reloc_insn_adrp(me, loc, val);
+if (ovf && ovf != -ERANGE)
+return ovf;
+break;
-#endif
  case R_AARCH64_ADD_ABS_LO12_NC:
  case R_AARCH64_LDS8ABS_LO12_NC:
  case R_AARCH64_LDS8ABS_LO12_NC:


overflow_check = false;
--- linux-4.15.0.orig/arch/arm64/kernel/module.lds
+++ linux-4.15.0/arch/arm64/kernel/module.lds
@@ -1,5 +1,5 @@
SECTIONS {
-.plt (NOLOAD) : { BYTE(0) }
-.init.plt (NOLOAD) : { BYTE(0) }
-.text.ftrace_trampoline (NOLOAD) : { BYTE(0) }
+.plt 0 (NOLOAD) : { BYTE(0) }
+.init.plt 0 (NOLOAD) : { BYTE(0) }
+.text.ftrace_trampoline 0 (NOLOAD) : { BYTE(0) }
}
--- linux-4.15.0.orig/arch/arm64/kernel/perf_event.c
+++ linux-4.15.0/arch/arm64/kernel/perf_event.c
@@ -669,6 +669,29 @@
raw_spin_unlock_irqrestore(&events->pmu_lock, flags);
}
+
+static void armv8pmu_start(struct arm_pmu *cpu_pmu)
+{
+  unsigned long flags;
+  struct pmu_hw_events *events = this_cpu_ptr(cpu_pmu->hw_events);
+  raw_spin_lock_irqsave(&events->pmu_lock, flags);
+  /* Enable all counters */
+  armv8pmu_pmcr_write(armv8pmu_pmcr_read() | ARMV8_PMU_PMCR_E);
+  raw_spin_unlock_irqrestore(&events->pmu_lock, flags);
+}
+
+static void armv8pmu_stop(struct arm_pmu *cpu_pmu)
+{
+  unsigned long flags;
+  struct pmu_hw_events *events = this_cpu_ptr(cpu_pmu->hw_events);
+  raw_spin_lock_irqsave(&events->pmu_lock, flags);
+  /* Disable all counters */
+  armv8pmu_pmcr_write(armv8pmu_pmcr_read() & ~ARMV8_PMU_PMCR_E);
+  raw_spin_unlock_irqrestore(&events->pmu_lock, flags);
+}

static irqreturn_t armv8pmu_handle_irq(int irq_num, void *dev)
{
  @ @ -695,6 +718,11 @ @
  /*
    regs = get_irq_regs();
  */
  ret
+/*
+ * Stop the PMU while processing the counter overflows
+ * to prevent skews in group events.
+ */
+armv8pmu_stop(cpu_pmu);
+for (idx = 0; idx < cpu_pmu->num_events; ++idx) {
+struct perf_event *event = cpuc->events[idx];
+struct hw_perf_event *hwc;
+@ @ -719,6 +747,7 @@
+if (perf_event_overflow(event, &data, regs))
+cpu_pmu->disable(event);
+}
+armv8pmu_start(cpu_pmu);
+
;/* Handle the pending perf events.
@@ -732,28 +761,6 @@
return IRQ_HANDLED;
}
-
-static void armv8pmu_start(struct arm_pmu *cpu_pmu)
-{
-unsigned long flags;
-struct pmu_hw_events *events = this_cpu_ptr(cpu_pmu->hw_events);
-
-raw_spin_lock_irqsave(&events->pmu_lock, flags);
-/* Enable all counters */
-armv8pmu_pmcr_write(armv8pmu_pmcr_read() | ARMV8_PMU_PMCR_E);
-raw_spin_unlock_irqrestore(&events->pmu_lock, flags);
-}
-
-static void armv8pmu_stop(struct arm_pmu *cpu_pmu)
-{
-unsigned long flags;
-struct pmu_hw_events *events = this_cpu_ptr(cpu_pmu->hw_events);
-
-raw_spin_lock_irqsave(&events->pmu_lock, flags);
-/* Disable all counters */
-armv8pmu_pmcr_write(armv8pmu_pmcr_read() & ~ARMV8_PMU_PMCR_E);
-raw_spin_unlock_irqrestore(&events->pmu_lock, flags);
-}
-
static int armv8pmu_get_event_idx(struct pmu_hw_events *cpuc,
-struct perf_event *event)
{
@@ -818,6 +825,12 @@
return 0;
}
static int armv8pmu_filter_match(struct perf_event *event)
{
  unsigned long evtype = event->hw.config_base & ARMV8_PMU_EVTYPE_EVENT;
  return evtype != ARMV8_PMUV3_PERFCTR_CHAIN;
}

static void armv8pmu_reset(void *info)
{
  struct arm_pmu *cpu_pmu = (struct arm_pmu *)info;
  int pmuver;

  dfr0 = read_sysreg(id_aa64dfr0_el1);
  pmuver = cpuid_feature_extract_field(dfr0,
  ID_AA64DFR0_PMUVER_SHIFT);
  if (pmuver < 1)
    if (pmuver == 0xf || pmuver == 0)
      return;

  probe->present = true;

  cpu_pmu->reset= armv8pmu_reset,
  cpu_pmu->max_period= (1LLU << 32) - 1,
  cpu_pmu->set_event_filter= armv8pmu_set_event_filter;
  cpu_pmu->filter_match= armv8pmu_filter_match;

  return 0;
}

/*
   * Compat (i.e. 32 bit) mode:
   * - PC has been set in the pt_regs struct in kernel_entry,
   * - Handle SP and LR here,
   * - Our handling of compat tasks (PERF_SAMPLE_REGS_ABI_32) is weird, but
we're stuck with it for ABI compatibility reasons.

For a 32-bit consumer inspecting a 32-bit task, then it will look at the first 16 registers (see arch/arm/include/uapi/asm/perf_regs.h).

These correspond directly to a prefix of the registers saved in our 'struct pt_regs', with the exception of the PC, so we copy that down (x15 corresponds to SP_hyp in the architecture).

So far, so good.

The oddity arises when a 64-bit consumer looks at a 32-bit task and asks for registers beyond PERF_REG_ARM_MAX. In this case, we return SP_usr, LR_usr and PC in the positions where the AArch64 SP, LR and PC registers would normally live. The initial idea was to allow a 64-bit unwinder to unwind a 32-bit task and, although it's not clear how well that works in practice, somebody might be relying on it.

At the time we make a sample, we don't know whether the consumer is 32-bit or 64-bit, so we have to cater for both possibilities.

```
if (compat_user_mode(regs)) {
    if ((u32)idx == PERF_REG_ARM64_SP)
        return regs->compat_sp;
    if ((u32)idx == PERF_REG_ARM64_LR)
        return regs->compat_lr;
    if (idx == 15)
        return regs->pc;
}
```

--- linux-4.15.0.orig/arch/arm64/kernel/probes/kprobes.c
+++ linux-4.15.0/arch/arm64/kernel/probes/kprobes.c
@@ -23,7 +23,9 @@
#include <linux/slab.h>
#include <linux/stop_machine.h>
#include <linux/sched/debug.h>
+  #include <linux/set_memory.h>
+  #include <linux/stringify.h>
   #include <linux/vmalloc.h>
   #include <asm/traps.h>
+  #include <asm/ptrace.h>
   #include <asm/cacheflush.h>
@@ -42,10 +44,21 @@
static void __kprobes
    post_kprobe_handler(struct kprobe_ctlblk *, struct pt_regs *);

+static int __kprobes patch_text(kprobe_opcode_t *addr, u32 opcode)
+{
void *addr[1];
+u32 insns[1];
+
+addr[0] = addr;
+insns[0] = opcode;
+
+return aarch64_insn_patch_text(addr, insns, 1);
+
+
static void __kprobes arch_prepare_ss_slot(struct kprobe *p)
{
 /* prepare insn slot */
 -p->ainsn.api.insn[0] = cpu_to_le32(p->opcode);
 +patch_text(p->ainsn.api.insn, p->opcode);

 flush_icache_range((uintptr_t) (p->ainsn.api.insn),
         (uintptr_t) (p->ainsn.api.insn) +
         @ @ -118,15 +131,15 @ @

 return 0;
 }

 -static int __kprobes patch_text(kprobe_opcode_t *addr, u32 opcode)
 +void *alloc_insn_page(void)
 {
 -void *addr[1];
 -u32 insns[1];
 +void *page;

 -addr[0] = (void *)addr;
 -insns[0] = (u32)opcode;
 +page = vmalloc_exec(PAGE_SIZE);
 +if (page)
 +set_memory_ro((unsigned long)page, 1);

 -return aarch64_insn_patch_text(addr, insns, 1);
 +return page;
 }

 /* arm kprobe: install breakpoint in text */
 @ @ -275,7 +288,7 @ @
 break;
 case KPROBE_HIT_SS:
 case KPROBE_REENTER:
 -pr_warn("Unrecoverable kprobe detected at %p\n", p->addr);
 +pr_warn("Unrecoverable kprobe detected\n");
 dump_kprobe(p);
 BUG();
 break;
@@ -445,6 +458,9 @@
    struct kprobe_ctlblk *kcb = get_kprobe_ctlblk();
    int retval;

-+if (user_mode(regs))
-+return DBG_HOOK_ERROR;
+
+/* return error if this is not our step */
    retval = kprobe_ss_hit(kcb, instruction_pointer(regs));

@@ -461,6 +477,9 @@
int __kprobes
    kprobe_breakpoint_handler(struct pt_regs *regs, unsigned int esr)
    {
-+if (user_mode(regs))
-+return DBG_HOOK_ERROR;
+    kprobe_handler(regs);
+    return DBG_HOOK_HANDLED;
    }
@@ -541,13 +560,13 @@
    if (!is_kernel_in_hyp_mode()) {
-          if ((addr >= (unsigned long)__hyp_text_start &&
-               addr < (unsigned long)__hyp_text_end) ||
-               (addr >= (unsigned long)__hyp_idmap_text_start &&
-                addr < (unsigned long)__hyp_idmap_text_end))
-          return true;
+if (!is_kernel_in_hyp_mode()) {
+          -if ((addr >= (unsigned long)__hyp_text_start &&
+               addr < (unsigned long)__hyp_text_end) ||
+               (addr >= (unsigned long)__hyp_idmap_text_start &&
+                addr < (unsigned long)__hyp_idmap_text_end))
+          return true;

    if (!is_kernel_in_hyp_mode()) {
-          -if ((addr >= (unsigned long)__hyp_text_start &&
-               addr < (unsigned long)__hyp_text_end) ||
-               (addr >= (unsigned long)__hyp_idmap_text_start &&
+if ((addr >= (unsigned long)__hyp_idmap_text_start &&
+               addr < (unsigned long)__hyp_idmap_text_end))
          return true;

    --- linux-4.15.0.orig/arch/arm64/kernel/probes/uprobes.c
    +++ linux-4.15.0/arch/arm64/kernel/probes/uprobes.c
@@ -41,7 +41,7 @@
    /* TODO: Currently we do not support AARCH32 instruction probing */
    if (mm->context.flags & MMCF_AARCH32)
-          return -ENOTSUPP;
+          return -EOPNOTSUPP;
    else if (!IS_ALIGNED(addr, AARCH64_INSN_SIZE))
          return -EINVAL;
### linux-4.15.0.orig/arch/arm64/kernel/process.c

```c
--- linux-4.15.0.orig/arch/arm64/kernel/process.c
+++ linux-4.15.0/arch/arm64/kernel/process.c
@@ -62,7 +62,7 @@
 #ifdef CONFIG_CC_STACKPROTECTOR
     #include <linux/stackprotector.h>
     -unsigned long __stack_chk_guard __read_mostly;
+unsigned long __stack_chk_guard __ro_after_init;
     EXPORT_SYMBOL(__stack_chk_guard);
 #endif

@@ -221,8 +221,15 @@
     -print_symbol("pc : %s\n", regs->pc);
     -print_symbol("lr : %s\n", lr);
     +
     +if (!user_mode(regs)) {
     +print_symbol("pc : %s\n", regs->pc);
     +print_symbol("lr : %s\n", lr);
     +} else {
     +printk("pc : %016llx\n", regs->pc);
     +printk("lr : %016llx\n", lr);
     +}
     +
     printk("sp : %016llx\n", sp);

     i = top_reg;
@@ -279,22 +286,27 @@
     fpsimd_release_task(tsk);
 }

/*
- * src and dst may temporarily have aliased sve_state after task_struct
- * is copied. We cannot fix this properly here, because src may have
- * live SVE state and dst's thread_info may not exist yet, so tweaking
- * either src's or dst's TIF_SVE is not safe.
- *
- * The unaliasing is done in copy_thread() instead. This works because
- * dst is not schedulable or traceable until both of these functions
- * have been called.
- */
int arch_dup_task_struct(struct task_struct *dst, struct task_struct *src) {
    if (current->mm)
        fpsimd_preserve_current_state();
    *dst = *src;
```

---
/* We rely on the above assignment to initialize dst's thread_flags: */
+BUILD_BUG_ON(!IS_ENABLED(CONFIG_THREAD_INFO_IN_TASK));
+
+/*
+ * Detach src’s sve_state (if any) from dst so that it does not
+ * get erroneously used or freed prematurely. dst's sve_state
+ * will be allocated on demand later on if dst uses SVE.
+ * For consistency, also clear TIF_SVE here: this could be done
+ * later in copy_process(), but to avoid tripping up future
+ * maintainers it is best not to leave TIF_SVE and sve_state in
+ * an inconsistent state, even temporarily.
+ */
+dst->thread.sve_state = NULL;
clear_tsk_thread_flag(dst, TIF_SVE);
+
} return 0;

memset(&p->thread.cpu_context, 0, sizeof(struct cpu_context));

/*
 * Unalias p->thread.sve_state (if any) from the parent task
 * and disable discard SVE state for p:
 */
clear_tsk_thread_flag(p, TIF_SVE);
p->thread.sve_state = NULL;

/* In case p was allocated the same task_struct pointer as some
 * other recently-exited task, make sure p is disassociated from
 * any cpu that may have run that now-exited task recently.
 */
if (IS_ENABLED(CONFIG_ARM64_UAO) &&
    cpus_have_const_cap(ARM64_HAS_UAO))
childregs->pstate |= PSR_UAO_BIT;
+
+if (arm64_get_ssbd_state() == ARM64_SSBD_FORCE_DISABLE)
+set_ssbs_bit(childregs);
+
p->thread.cpu_context.x19 = stack_start;
p->thread.cpu_context.x20 = stk_sz;
}

static void tls_thread_switch(struct task_struct *next)
{
unsigned long tpidr, tpidro;
-
tls_preserve_current_state();
-
-tpidr = *task_user_tls(next);
-tpidro = is_compat_thread(task_thread_info(next)) ?
-    next->thread.tp_value : 0;
+if (is_compat_thread(task_thread_info(next)))
+    write_sysreg(next->thread.tp_value, tpidro_el0);
+else if (!arm64_kernel_unmapped_at_el0())
+    write_sysreg(0, tpidro_el0);
+
-    write_sysreg(tpidr, tpidr_el0);
-    write_sysreg(tpidro, tpidro_el0);
+    write_sysreg(*task_user_tls(next), tpidr_el0);
}

/* Restore the UAO state depending on next's addr_limit */
@@ -394,6 +401,39 @@
}

/*
 + * Force SSBS state on context-switch, since it may be lost after migrating
 + * from a CPU which treats the bit as RES0 in a heterogeneous system.
 + */
+static void ssbs_thread_switch(struct task_struct *next)
+{
+    struct pt_regs *regs = task_pt_regs(next);
+    
+    /*
+    * Nothing to do for kernel threads, but 'regs' may be junk
+    * (e.g. idle task) so check the flags and bail early.
+    */
+    +if (unlikely(next->flags & PF_KTHREAD))
+        return;
+    
+    /*
+    * If all CPUs implement the SSBS extension, then we just need to
+    * context-switch the PSTATE field.
+    */
+    +if (cpu_have_feature(cpu_feature(SSBS)))
+        return;
+    
+    /*
+    * If the mitigation is enabled, then we leave SSBS clear. */
+    +if ((arm64_get_ssb_state() == ARM64_SSBD_FORCE_ENABLE) ||
+        test_tsk_thread_flag(next, TIF_SSBD))
+        return;
+    
+    /*

Open Source Used In 5GaaS Edge AC-4  10452
if (compat_user_mode(regs))
  set_compat_ssbs_bit(regs);
else if (user_mode(regs))
  set_ssbs_bit(regs);
+
+/*
 * We store our current task in sp_el0, which is clobbered by userspace. Keep a
 * shadow copy so that we can restore this upon entry from userspace.
 *
@@ -421,6 +461,7 @@
 contextidr_thread_switch(next);
 entry_task_switch(next);
 uao_thread_switch(next);
+ssbs_thread_switch(next);
+
/*
 * Complete any pending TLB or cache maintenance on this CPU in case
--- linux-4.15.0.orig/arch/arm64/kernel/psci.c
+++ linux-4.15.0/arch/arm64/kernel/psci.c
@@ -69,7 +69,6 @@
 static void cpu_psci_cpu_die(unsigned int cpu)
 {
 -int ret;
+* There are no known implementations of PSCI actually using the
+* power state field, pass a sensible default for now.
@@ -77,14 +76,13 @@
 u32 state = PSCI_POWER_STATE_TYPE_POWER_DOWN <<
         PSCI_0_2_POWER_STATE_TYPE_SHIFT;
-  ret = psci_ops.cpu_off(state);
-  -pr_crit("unable to power off CPU%u (%d)\n", cpu, ret);
+psci_ops.cpu_off(state);
 }

 static int cpu_psci_cpu_kill(unsigned int cpu)
 {
 -int err, i;
+int err;
 +unsigned long start, end;
 
 if (!psci_ops.affinity_info)
   return 0;
@@ -94,16 +92,18 @@
 * while it is dying. So, try again a few times.
-for (i = 0; i < 10; i++) {
+start = jiffies;
+end = start + msecs_to_jiffies(100);
+do {
err = psci_ops.affinity_info(cpu_logical_map(cpu), 0);
if (err == PSCI_0_2_AFFINITY_LEVEL_OFF) {
-\t\tpr_info("CPU%d killed.\n", cpu);
-\t\tmsleep(10);
-\t\tpinfo("Retrying again to check for CPU kill\n");
-\}
-\} while (time_before(jiffies, end));

pr_warn("CPU%d may not have shut down cleanly (AFFINITY_INFO reports %d)\n", cpu, err);
--- linux-4.15.0.orig/arch/arm64/kernel/ptrace.c
+++ linux-4.15.0/arch/arm64/kernel/ptrace.c
@@ -25,6 +25,7 @@
#include <linux/sched/signal.h>
#include <linux/sched/task_stack.h>
#include <linux/mm.h>
+include <linux/nospec.h>
#include <linux/smp.h>
#include <linux/ptrace.h>
#include <linux/user.h>
@@ -249,15 +250,20 @@
switch (note_type) {
 case NT_ARM_HW_BREAK:
-\tif (idx < ARM_MAX_BRP)
-\t\tbp = tsk->thread.debug.hbp_break[idx];
+\tif (idx >= ARM_MAX_BRP)
+\t\tgoto out;
+\tidx = array_index_nospec(idx, ARM_MAX_BRP);
+\tbp = tsk->thread.debug.hbp_break[idx];
break;
 case NT_ARM_HW_WATCH:
-\tif (idx < ARM_MAX_WRP)
-\t\tbp = tsk->thread.debug.hbp_watch[idx];
+\tif (idx >= ARM_MAX_WRP)
+\t\tgoto out;
idx = array_index_nospec(idx, ARM_MAX_WRP);
bp = tsk->thread.debug.hbp_watch[idx];
break;
}

out:
return bp;
}

switch (note_type) {
  case NT_ARM_HW_BREAK:  
    if (idx < ARM_MAX_BRP) {
      tsk->thread.debug.hbp_break[idx] = bp;
      err = 0;
    }
    +if (idx >= ARM_MAX_BRP)
      goto out;
    +idx = array_index_nospec(idx, ARM_MAX_BRP);
    +tsk->thread.debug.hbp_break[idx] = bp;
    +err = 0;
    break;
  case NT_ARM_HW_WATCH:  
    if (idx < ARM_MAX_WRP) {
      tsk->thread.debug.hbp_watch[idx] = bp;
      err = 0;
    }
    +if (idx >= ARM_MAX_WRP)
      goto out;
    +idx = array_index_nospec(idx, ARM_MAX_WRP);
    +tsk->thread.debug.hbp_watch[idx] = bp;
    +err = 0;
    break;
  }
  out:
  return err;
}

static int fpr_active(struct task_struct *target, const struct user_regset *regset) {
  +if (!system_supports_fpsimd())
    return -ENODEV;
return regset->n;
+
/*
 * TODO: update fp accessors for lazy context switching (sync/flush hwstate)
 */
@@ -639,6 +655,9 @@
 unsigned int pos, unsigned int count,
     void *kbuf, void __user *ubuf)
 {
+  if (!system_supports_fpsimd())
+    return -EINVAL;
+  if (target == current)
    fpsimd_preserve_current_state();

@@ -678,6 +697,9 @@
     ret = __fpr_set(target, regset, pos, count, kbuf, ubuf, 0);
 if (ret)
   return ret;
+  if (!system_supports_fpsimd())
+    return -EINVAL;
+  ret = __fpr_set(target, regset, pos, count, kbuf, ubuf, 0);
  if (ret)
    return ret;
@@ -983,6 +1005,7 @@
 .size            = sizeof(u32),
 .align           = sizeof(u32),
+.active          = fpr_active,
    .get            = fpr_get,
    .set            = fpr_set
 },
@@ -1074,6 +1097,7 @@
 break;
case 16:
    reg = task_pt_regs(target)->pstate;
+    reg = pstate_to_compat_psr(reg);
 break;
case 17:
    reg = task_pt_regs(target)->orig_x0;
@@ -1141,6 +1165,7 @@
    newregs.pc = reg;
 break;
case 16:
+    reg = compat_psr_to_pstate(reg);
    newregs.pstate = reg;
break;
case 17:
    @@ -1169,6 +1194,9 @@
    compat_ulong_t fpscr;
    int ret, vregs_end_pos;
+
    if (!system_supports_fpsimd())
    +return -EINVAL;
    +
    uregs = &target->thread.fpsimd_state.user_fpsimd;
    
    if (target == current)
    @@ -1202,6 +1230,9 @@
    compat_ulong_t fpscr;
    int ret, vregs_end_pos;
+
    if (!system_supports_fpsimd())
    +return -EINVAL;
    +
    uregs = &target->thread.fpsimd_state.user_fpsimd;

    vregs_end_pos = VFP_STATE_SIZE - sizeof(compat_ulong_t);
    @@ -1259,6 +1290,7 @@
    .n = VFP_STATE_SIZE / sizeof(compat_ulong_t),
    .size = sizeof(compat_ulong_t),
    .align = sizeof(compat_ulong_t),
    .active = fpr_active,
    .get = compat_vfp_get,
    .set = compat_vfp_set
    },
    @@ -1458,9 +1490,7 @@
    { int ret;
      u32 kdata;
      -mm_segment_t old_fs = get_fs();

      -set_fs(KERNEL_DS);
      /* Watchpoint */
      if (num < 0) {
        ret = compat_ptrace_hbp_get(NT_ARM_HW_WATCH, tsk, num, &kdata);
        @@ -1471,7 +1501,6 @@
      } else {
        ret = compat_ptrace_hbp_get(NT_ARM_HW_BREAK, tsk, num, &kdata);
      }
      -set_fs(old_fs);

      if (!ret)
        ret = put_user(kdata, data);
int ret;

u32 kdata = 0;

mm_segment_t old_fs = get_fs();

if (num == 0)
    return 0;

if (!ret)
    return ret;

set_fs(KERNEL_DS);

if (num < 0)
    ret = compat_ptrace_hbp_set(NT_ARM_HW_WATCH, tsk, num, &kdata);
else
    ret = compat_ptrace_hbp_set(NT_ARM_HW_BREAK, tsk, num, &kdata);

set_fs(old_fs);

return ret;

/*
 * Bits which are always architecturally RES0 per ARM DDI 0487A.h
 * SPSR_ELx bits which are always architecturally RES0 per ARM DDI 0487D.a.
 * We permit userspace to set SSBS (AArch64 bit 12, AArch32 bit 23) which is
 * not described in ARM DDI 0487D.a.
 * We treat PAN and UAO as RES0 bits, as they are meaningless at EL0, and may
 * be allocated an EL0 meaning in future.
 * Userspace cannot use these until they have an architectural meaning.
 * Note that this follows the SPSR_ELx format, not the AArch32 PSR format.
 * We also reserve IL for the kernel; SS is handled dynamically.
 */
#define SPSR_EL1_AARCH64_RES0_BITS \
    (GENMASK_ULL(63, 32) | GENMASK_ULL(27, 22) | GENMASK_ULL(20, 10) | \
     GENMASK_ULL(5, 5))
#define SPSR_EL1_AARCH32_RES0_BITS \
    (GENMASK_ULL(63, 32) | GENMASK_ULL(24, 22) | GENMASK_ULL(20, 10) | GENMASK_ULL(5, 5))

static int valid_compat_regs(struct user_pt_regs *regs)
{
    /*
     * @ -1329.8 +1760.8 @
     */
int valid_user_regs(struct user_pt_regs *regs, struct task_struct *task)
{
    if (!test_tsk_thread_flag(task, TIF_SINGLESTEP))
        regs->pstate &= ~DBG_SPSR_SS;
/* https://lore.kernel.org/lkml/20191118131525.GA4180@willie-the-truck */
    user_regs_reset_single_step(regs, task);

    if (is_compat_thread(task_thread_info(task)))
        return valid_compat_regs(regs);

--- linux-4.15.0.orig/arch/arm64/kernel/reloc_test_core.c
+++ linux-4.15.0/arch/arm64/kernel/reloc_test_core.c
@@ -28,6 +28,7 @@
asmlinkage u64 signed_movw(void);
asmlinkage u64 unsigned_movw(void);
asmlinkage u64 relative_adrp(void);
+asmlinkage u64 relative_adrp_far(void);
asmlinkage u64 relative_adr(void);
asmlinkage u64 relative_data64(void);
asm linkage u64 relative_data32(void);
@@ -43,9 +44,8 @@
    } "R_AARCH64_ADR_PREL_PG_HI21", relative_adrp, (u64)&sym64_rel },
    { "R_AARCH64_ADR_PREL_PG_HI21", relative_adrp_far, (u64)&memstart_addr },
    { "R_AARCH64_ADR_PREL_LO21", relative_adr, (u64)&sym64_rel },
    { "R_AARCH64_PREL32", relative_data32, (u64)&sym64_rel },
--- linux-4.15.0.orig/arch/arm64/kernel/reloc_test_syms.S
+++ linux-4.15.0/arch/arm64/kernel/reloc_test_syms.S
@@ -43,15 +43,21 @@
ret
ENDPROC(unsigned_movw)

-#ifndef CONFIG_ARM64_ERRATUM_843419
+	.align	12
+space0xf8
ENTRY(relative_adrp)
adrp x0, sym64_rel
addx0, x0, #:lo12:sym64_rel
ret
ENDPROC(relative_adrp)

-#endif
+align12
+space0xffc
+ENTRY(relative_adrp_far)
+adrp x0, memstart_addr
+add x0, x0, #:lo12:memstart_addr
+ret
+ENDPROC(relative_adrp_far)

ENTRY(relative_adr)
adrx0, sym64_rel
--- linux-4.15.0.orig/arch/arm64/kernel/return_address.c
+++ linux-4.15.0/arch/arm64/kernel/return_address.c
@@ -11,6 +11,7 @@
#include <linux/export.h>
#include <linux/ftrace.h>
#include <linux/kprobes.h>

#include <asm/stack_pointer.h>
#include <asm/stacktrace.h>
@@ -32,6 +33,7 @@
return 0;
}
}
+NOKPROBE_SYMBOL(save_return_addr);

void *return_address(unsigned int level)
{
@@ -55,3 +57,4 @@
return NULL;
}
EXPORT_SYMBOL_GPL(return_address);
+NOKPROBE_SYMBOL(return_address);
--- linux-4.15.0.orig/arch/arm64/kernel/sdei.c
+++ linux-4.15.0/arch/arm64/kernel/sdei.c
@@ -0,0 +1,235 @@
+#define pr_fmt(fmt) "sdei: " fmt
+
+#define pr_fmt(fmt) "sdei: " fmt
+
+#include <linux/arm_sdei.h>
+#include <linux/hardirq.h>
+#include <linux/irqflags.h>
+#include <linux/sched/task_stack.h>
+#include <linux/uaccess.h>
+
+#include <asm/alternative.h>
+#include <asm/kprobes.h>
+#include <asm/mm düzeyi>
+include <asm/ptrace.h>
+#include <asm/sections.h>
+#include <asm/sysreg.h>
+#include <asm/vmap_stack.h>
+
+unsigned long sdei_exit_mode;
+
+ /*
+  * VMAP'd stacks checking for stack overflow on exception using sp as a scratch
+  * register, meaning SDEI has to switch to its own stack. We need two stacks as
+  * a critical event may interrupt a normal event that has just taken a
+  * synchronous exception, and is using sp as scratch register. For a critical
+  * event interrupting a normal event, we can't reliably tell if we were on the
+  * sdei stack.
+  * For now, we allocate stacks when the driver is probed.
+  */
+DECLARE_PER_CPU(unsigned long *, sdei_stack_normal_ptr);
+DECLARE_PER_CPU(unsigned long *, sdei_stack_critical_ptr);
+
+#ifdef CONFIG_VMAP_STACK
+DEFINE_PER_CPU(unsigned long *, sdei_stack_normal_ptr);
+DEFINE_PER_CPU(unsigned long *, sdei_stack_critical_ptr);
+#endif
+
+static void _free_sdei_stack(unsigned long * __percpu *ptr, int cpu)
+{
+  unsigned long *p;
+
+  p = per_cpu(*ptr, cpu);
+  if (p) {
+    per_cpu(*ptr, cpu) = NULL;
+    vfree(p);
+  }
+}
+
+static void free_sdei_stacks(void)
+{
+  int cpu;
+
+  for_each_possible_cpu(cpu) {
+    _free_sdei_stack(&sdei_stack_normal_ptr, cpu);
+    _free_sdei_stack(&sdei_stack_critical_ptr, cpu);
+  }
+}
+
+static int _init_sdei_stack(unsigned long * __percpu *ptr, int cpu)
+{
+  unsigned long *p;
+ p = arch_alloc_vmap_stack(SDEI_STACK_SIZE, cpu_to_node(cpu));
+ if (!p)
+ return -ENOMEM;
+ per_cpu(*ptr, cpu) = p;
+ return 0;
+
+static int init_sdei_stacks(void)
+ {
+ int cpu;
+ int err = 0;
+ for_each_possible_cpu(cpu) {
+ err = _init_sdei_stack(&sdei_stack_normal_ptr, cpu);
+ if (err)
+ break;
+ err = _init_sdei_stack(&sdei_stack_critical_ptr, cpu);
+ if (err)
+ break;
+ }
+ if (err)
+ free_sdei_stacks();
+ return err;
+ }
+
+bool _on_sdei_stack(unsigned long sp)
+ {
+ unsigned long low, high;
+ if (!IS_ENABLED(CONFIG_VMAP_STACK))
+ return false;
+ low = (unsigned long)raw_cpu_read(sdei_stack_critical_ptr);
+ high = low + SDEI_STACK_SIZE;
+ if (low <= sp && sp < high)
+ return true;
+ low = (unsigned long)raw_cpu_read(sdei_stack_normal_ptr);
+ high = low + SDEI_STACK_SIZE;
+ return (low <= sp && sp < high);
+ }
unsigned long sdei_arch_get_entry_point(int conduit) {
    /*
    * SDEI works between adjacent exception levels. If we booted at EL1 we
    * assume a hypervisor is marshalling events. If we booted at EL2 and
    * dropped to EL1 because we don’t support VHE, then we can't support
    * SDEI.
    * */
    +if (is_hyp_mode_available() && !is_kernel_in_hyp_mode()) {
        pr_err("Not supported on this hardware/boot configuration\n");
        return 0;
    }
    +
    +if (IS_ENABLED(CONFIG_VMAP_STACK)) {
        if (init_sdei_stacks())
            return 0;
    }
    +
    +sdei_exit_mode = (conduit == CONDUIT_HVC) ? SDEI_EXIT_HVC : SDEI_EXIT_SMC;
    +
    +#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
    +if (arm64_kernel_unmapped_at_el0()) {
        unsigned long offset;
        +offset = (unsigned long)__sdei_asm_entry_trampoline -
        + (unsigned long)__entry_tramp_text_start;
        +return TRAMP_VALIAS + offset;
    } else
    +#endif /* CONFIG_UNMAP_KERNEL_AT_EL0 */
    +return (unsigned long)__sdei_asm_handler;
}

/*
 * __sdei_handler() returns one of:
 *  SDEI_EV_HANDLED - success, return to the interrupted context.
 *  SDEI_EV_FAILED  - failure, return this error code to firmare.
 *  virtual-address - success, return to this address.
 * */
static __kprobes unsigned long __sdei_handler(struct pt_regs *regs,
    struct sdei_registered_event *arg) {
    +u32 mode;
    +int i, err = 0;
    +int clobbered_registers = 4;
    +u64 elr = read_sysreg(elr_el1);
    +u32 kernel_mode = read_sysreg(CurrentEl) | 1 /* SPSel */
    +unsigned long vbar = read_sysreg(vbar_el1);
+if (arm64_kernel_unmapped_at_el0())
clobbered_registers++;
+
+/* Retrieve the missing registers values */
+for (i = 0; i < clobbered_registers; i++) {
+/* from within the handler, this call always succeeds */
+sdei_api_event_context(i, &regs->regs[i]);
+
+
+/*
+ * We didn't take an exception to get here, set PAN. UAO will be cleared
+ * by sdei_event_handler()s set_fs(USER_DS) call.
+ */
+__uaccess_enable_hw_pan();
+
+err = sdei_event_handler(regs, arg);
+if (err)
+return SDEI_EV_FAILED;
+
+if (elr != read_sysreg(elr_el1)) {
+/*
+ * We took a synchronous exception from the SDEI handler.
+ * This could deadlock, and if you interrupt KVM it will
+ * hyp-panic instead.
+ */
+pr_warn("unsafe: exception during handler\n");
+
+mode = regs->pstate & (PSR_MODE32_BIT | PSR_MODE_MASK);
+
+/*
+ * If we interrupted the kernel with interrupts masked, we always go
+ * back to wherever we came from.
+ */
+if (mode == kernel_mode && !interrupts_enabled(regs))
+return SDEI_EV_HANDLED;
+
+/*
+ * Otherwise, we pretend this was an IRQ. This lets user space tasks
+ * receive signals before we return to them, and KVM to invoke it's
+ * world switch to do the same.
+ *
+ * See DDI0487B.a Table D1-7 'Vector offsets from vector table base
+ * address'.
+ */
+if (mode == kernel_mode)
+return vbar + 0x280;
else if (mode & PSR_MODE32_BIT)
+ return vbar + 0x680;
+
+ return vbar + 0x480;
+
+
+ asmlinkage __kprobes notrace unsigned long
+ __sdei_handler(struct pt_regs *regs, struct sdei_registered_event *arg)
+ {
+ unsigned long ret;
+ bool do_nmi_exit = false;
+
+ */
+ /* nmi_enter() deals with printk() re-entrance and use of RCU when
+ * RCU believed this CPU was idle. Because critical events can
+ * interrupt normal events, we may already be in_nmi().
+ */
+ if (!in_nmi()) {
+ nmi_enter();
+ do_nmi_exit = true;
+ }
+
+ ret = __sdei_handler(regs, arg);
+
+ if (do_nmi_exit)
+ nmi_exit();
+
+ return ret;
+
--- linux-4.15.0.orig/arch/arm64/kernel/setup.c
+++ linux-4.15.0/arch/arm64/kernel/setup.c
@@ -64,6 +64,9 @@

#include <asm/xen/hypervisor.h>
#include <asm/mmu_context.h>

+static int num_standard_resources;
+static struct resource *standard_resources;
+
phys_addr_t __fdt_pointer __initdata;

/*
@@ -206,14 +209,19 @@
 struct memblock_region *region;
 struct resource *res;
+unsigned long i = 0;
kernel_code.start  = __pa_symbol(_text);
kernel_code.end   = __pa_symbol(__init_begin - 1);
kernel_data.start = __pa_symbol(_sdata);
kernel_data.end   = __pa_symbol(_end - 1);

+num_standard_resources = memblock.memory.cnt;
+standard_resources = alloc_bootmem_low(num_standard_resources *
+    sizeof(*standard_resources));
+
for_each_memblock(memory, region) {
-    res = alloc_bootmem_low(sizeof(*res));
+    res = &standard_resources[i++];
    if (memblock_is_nomap(region)) {
        res->name  = "reserved";
        res->flags = IORESOURCE_MEM;
@@ -241,6 +249,48 @@
    }
} 

+static int __init reserve_memblock_reserved_regions(void) 
+{
+    phys_addr_t start, end, roundup_end = 0;
+    struct resource *mem;
+    u64 i, mem_idx = 0;
+
+    if (!standard_resources)
+        return 0;
+
+    for_each_reserved_mem_region(i, &start, &end) {
+        if (end <= roundup_end)
+            continue; /* done already */
+        +start = __PFN_to_phys(PFN_DOWN(start));
+        +end = __PFN_to_phys(PFN_UP(end)) - 1;
+        +roundup_end = end;
+        +
+        +while (start > standard_resources[mem_idx].end) {
+            +mem_idx++;
+            +if (mem_idx >= num_standard_resources)
+                +return 0; /* no more 'System RAM' */
+        +}
+        +do {
+            +mem = &standard_resources[mem_idx];
+            +
+            +if (mem->start > end)
+                continue; /* doesn't overlap with memory */
+            +start = max(start, mem->start);
reserve_region_with_split(mem, start,
+ min(end, mem->end),
+ "reserved"),
+
+if (mem->end < end)
+mem_idx++;
+} while (mem->end < end && mem_idx < num_standard_resources);
+
+return 0;
+
+arch_initcall(reserve_memblock_reserved_regions);
+
+u64 __cpu_logical_map[NR_CPUS] = { [0 ... NR_CPUS-1] = INVALID_HWID };
err = get_sigset_t(&set, &sf->uc.uc_sigmask);
if (err == 0) {
    __get_user_error(regs->compat_sp, &sf->uc.uc_mcontext.arm_sp, err);
    __get_user_error(regs->compat_lr, &sf->uc.uc_mcontext.arm_lr, err);
    __get_user_error(regs->pc, &sf->uc.uc_mcontext.arm_pc, err);
    __get_user_error(psr, &sf->uc.uc_mcontext.arm_cpsr, err);
    regs->pstate = compat_psr_to_pstate(psr);
}
/*
 * Avoid compat_sys_sigreturn() restarting.
 */

int err = 0;

__put_user_error(regs->regs[0], &sf->uc.uc_mcontext.arm_r0, err);
__put_user_error(regs->compat_sp, &sf->uc.uc_mcontext.arm_sp, err);
__put_user_error(regs->compat_lr, &sf->uc.uc_mcontext.arm_lr, err);
__put_user_error(regs->pc, &sf->uc.uc_mcontext.arm_pc, err);
__put_user_error(psr, &sf->uc.uc_mcontext.arm_cpsr, err);
__put_user_error((compat_ulong_t)0, &sf->uc.uc_mcontext.trap_no, err);
/* set the compat FSR WnR */

ret
ENDPROC(__cpu_suspend_enter)

#include <linux/acpi.h>
```c
#include <linux/arm_sdei.h>
#include <linux/delay.h>
#include <linux/init.h>
#include <linux/spinlock.h>

IPL_WAKEUP
}

#ifdef CONFIG_ARM64_VHE
-*/
-/* Whether the boot CPU is running in HYP mode or not*/
-static bool boot_cpu_hyp_mode;
-
-static inline void save_boot_cpu_run_el(void)
-{
- boot_cpu_hyp_mode = is_kernel_in_hyp_mode();
-}
-
-static inline bool is_boot_cpu_in_hyp_mode(void)
-{
- return boot_cpu_hyp_mode;
-}
-
-/*
- * Verify that a secondary CPU is running the kernel at the same
- * EL as that of the boot CPU.
- */
-void verify_cpu_run_el(void)
-{
- bool in_el2 = is_kernel_in_hyp_mode();
- bool boot_cpu_el2 = is_boot_cpu_in_hyp_mode();
-
- if (in_el2 ^ boot_cpu_el2) {
- pr_crit("CPU%d: mismatched Exception Level(EL%d) with boot CPU(EL%d)\n", 
- smp_processor_id(),
- in_el2 ? 2 : 1,
- boot_cpu_el2 ? 2 : 1);
- cpu_panic_kernel();
-}
-}
-
- #else
- static inline void save_boot_cpu_run_el(void) {}
- #endif
-
- #ifdef CONFIG_HOTPLUG_CPU
static int op_cpu_kill(unsigned int cpu);
#else

```
static DECLARE_COMPLETION(cpu_running);
bool va52mismatch __ro_after_init;

int __cpu_up(unsigned int cpu, struct task_struct *idle)
{
    if (!cpu_online(cpu)) {
        pr_crit("CPU%u: failed to come online\n", cpu);
        +
        +if (IS_ENABLED(CONFIG_ARM64_52BIT_VA) && va52mismatch)
            +pr_crit("CPU%u: does not support 52-bit VAs\n", cpu);
            +
        ret = -EIO;
    } else {
        pr_err("CPU%u: failed to boot: %d\n", cpu, ret);
        +return ret;
    }
}

secondary_data.task = NULL;
/* This is the secondary CPU boot entry. We're using this CPUs
* idle thread stack, but a set of temporary page tables.
*/
-asmlinkage void secondary_start_kernel(void)
+asmlinkage notrace void secondary_start_kernel(void)
{
    u64 mpidr = read_cpuid_mpidr() & MPIDR_HWID_BITMASK;
    struct mm_struct *mm = &init_mm;
    /*
     * Run the errata work around checks on the boot CPU, once we have
     * initialised the cpu feature infrastructure from
     * cpuinfo_store_boot_cpu() above.
     */
    +update_cpu_errata_workarounds();
}

static u64 __init of_get_cpu_mpidr(struct device_node *dn)
set_cpu_online(cpu, false);

local_daif_mask();
+sdei_mask_local_cpu();

while (1)
cpu_relax();
@@ -853,6 +817,7 @@
atomic_dec(&waiting_for_crash_i pi);

local_irq_disable();
+sdei_mask_local_cpu();

#ifdef CONFIG_HOTPLUG_CPU
if (cpu_ops[cpu]->cpu_die)
@@ -949,11 +914,22 @@
}
#endif

+/*
+ * The number of CPUs online, not counting this CPU (which may not be
+ * fully online and so not counted in num_online_cpus()).
+ */
+static inline unsigned int num_other_online_cpus(void)
+{
+unsigned int this_cpu_online = cpu_online(smp_processor_id());
+
+return num_online_cpus() - this_cpu_online;
+}
+
void smp_send_stop(void)
{
unsigned long timeout;

-@if (num_online_cpus() > 1) {}
+if (num_other_online_cpus()) {
  cpumask_t mask;

  cpumask_copy(&mask, cpu_online_mask);
@@ -966,12 +942,14 @@
/* Wait up to one second for other CPUs to stop */
timeout = USEC_PER_SEC;
-while (num_online_cpus() > 1 && timeout--)
+while (num_other_online_cpus() && timeout--)
  udelay(1);

-@if (num_online_cpus() > 1)
if (num_other_online_cpus())
    pr_warning("SMP: failed to stop secondary CPUs %*pbl\n", 
        cpumask_pr_args(cpu_online_mask));
+
+sdei_mask_local_cpu();
}

#ifdef CONFIG_KEXEC_CORE
@@ -990,13 +968,19 @@
cpus_stopped = 1;

    -if (num_online_cpus() == 1)
+/*
+ * If this cpu is the only one alive at this point in time, online or
+ * not, there are no stop messages to be sent around, so just back out.
+ */
+    +if (num_other_online_cpus() == 0) {
+        sdei_mask_local_cpu();
        return;
+    }

cpumask_copy(&mask, cpu_online_mask);
    cpumask_clear_cpu(smp_processor_id(), &mask);

-atomic_set(&waiting_for_crash_ipi, num_online_cpus() - 1);
+atomic_set(&waiting_for_crash_ipi, num_other_online_cpus());

pr_crit("SMP: stopping secondary CPUs\n");
smp_cross_call(&mask, IPL_CPU_CRASH_STOP);
@@ -1009,6 +993,8 @@
if (atomic_read(&waiting_for_crash_ipi) > 0)
    pr_warning("SMP: failed to stop secondary CPUs %*pbl\n", 
        cpumask_pr_args(&mask));
+
+sdei_mask_local_cpu();
}

bool smp_crash_stop_failed(void)

--- linux-4.15.0.orig/arch/arm64/kernel/ssbd.c
+++ linux-4.15.0/arch/arm64/kernel/ssbd.c
@@ @ -1009,6 +1000,8 @@
+* Copyright (C) 2018 ARM Ltd, All Rights Reserved.
+ */
+
+#include <linux/compat.h>
```c
#include <linux/errno.h>
#include <linux/prctl.h>
#include <linux/sched.h>
#include <linux/sched/task_stack.h>
#include <linux/thread_info.h>
+
#include <asm/compat.h>
#include <asm/cpufeature.h>
+
static void ssbd_ssbs_enable(struct task_struct *task)
+
+u64 val = is_compat_thread(task_thread_info(task)) ?
+ PSR_AA32_SSBS_BIT : PSR_SSBS_BIT;
+
+task_pt_regs(task)->pstate |= val;
+
+
static void ssbd_ssbs_disable(struct task_struct *task)
+
+u64 val = is_compat_thread(task_thread_info(task)) ?
+ PSR_AA32_SSBS_BIT : PSR_SSBS_BIT;
+
+task_pt_regs(task)->pstate &= ~val;
+
+
/*
 * prctl interface for SSBD
 + */
+static int ssbd_prctl_set(struct task_struct *task, unsigned long ctrl)
+
+int state = arm64_get_ssbd_state();
+
+/* Unsupported */
+if (state == ARM64_SSBD_UNKNOWN)
+return -EINVAL;
+
+/* Treat the unaffected/mitigated state separately */
+if (state == ARM64_SSBD_MITIGATED) {
+switch (ctl) {
+case PR_SPEC_ENABLE:
+return -EPERM;
+
+case PR_SPEC_DISABLE:
+case PR_SPEC_FORCE_DISABLE:
+return 0;
+
+}
+
+/*
```

Open Source Used In 5GaaS Edge AC-4 10473
Things are a bit backward here: the arm64 internal API *enables the mitigation* when the userspace API *disables speculation*. So much fun.

```
switch (ctrl) {
  case PR_SPEC_ENABLE:
    /* If speculation is force disabled, enable is not allowed */
    if (state == ARM64_SSBD_FORCE_ENABLE ||
        task_spec_ssb_force_disable(task))
      return -EPERM;
    task_clear_spec_ssb_disable(task);
    clear_tsk_thread_flag(task, TIF_SSBD);
    ssbd_ssbs_enable(task);
    break;
  case PR_SPEC_DISABLE:
    if (state == ARM64_SSBD_FORCE_DISABLE)
      return -EPERM;
    task_set_spec_ssb_disable(task);
    set_tsk_thread_flag(task, TIF_SSBD);
    ssbd_ssbs_disable(task);
    break;
  case PR_SPEC_FORCE_DISABLE:
    if (state == ARM64_SSBD_FORCE_DISABLE)
      return -EPERM;
    task_set_spec_ssb_disable(task);
    task_set_spec_ssb_force_disable(task);
    set_tsk_thread_flag(task, TIF_SSBD);
    ssbd_ssbs_disable(task);
    break;
  default:
    return -ERANGE;
}
return 0;
```

```
int arch_prctl_spec_ctrl_set(struct task_struct *task, unsigned long which,
                             unsigned long ctrl)
{
  switch (which) {
    case PR_SPEC_STORE_BYPASS:
      return ssbd_prctl_set(task, ctrl);
    default:
      return -ENODEV;
  }
  return 0;
}
```

```
static int ssbd_prctl_get(struct task_struct *task)
```
+{ switch (arm64_get_ssbd_state()) { case ARM64_SSBD_UNKNOWN: return -EINVAL; case ARM64_SSBD_FORCE_ENABLE: return PR_SPEC_DISABLE; case ARM64_SSBD_KERNEL: if (task_spec_ssb_force_disable(task)) return PR_SPEC_PRCTL | PR_SPEC_FORCE_DISABLE; if (task_spec_ssb_disable(task)) return PR_SPEC_PRCTL | PR_SPEC_DISABLE; return PR_SPEC_PRCTL | PR_SPEC_ENABLE; case ARM64_SSBD_FORCE_DISABLE: return PR_SPEC_ENABLE; default: return PR_SPEC_NOT_AFFECTED; } } +
+
int arch_prctl_spec_ctrl_get(struct task_struct *task, unsigned long which) {
  switch (which) {
  case PR_SPEC_STORE_BYPASS:
    return ssbd_prctl_get(task); default:
    return -ENODEV;
  }
} +
+
--- linux-4.15.0.orig/arch/arm64/kernel/stacktrace.c
+++ linux-4.15.0/arch/arm64/kernel/stacktrace.c
@@ -18,6 +18,7 @@
 #include <linux/kernel.h>
 #include <linux/export.h>
 #include <linux/ftrace.h>
+  #include <linux/kprobes.h>
 #include <linux/sched.h>
 #include <linux/sched/debug.h>
 #include <linux/sched/task_stack.h>
@@ -59,6 +60,11 @@
 #ifdef CONFIG_FUNCTION_GRAPH_TRACER
 if (tsk->ret_stack &&
   (frame->pc == (unsigned long)return_to_handler)) {
+    if (WARN_ON_ONCE(frame->graph == -1))
+      return -EINVAL;
+    if (frame->graph < -1)
+      frame->graph += FTRACE_NOTRACE_DEPTH;
+  }
*/
* This is a case where function graph tracer has
* modified a return address (LR) in a stack frame
@@ -80,6 +86,7 @@
  return 0;
 }
+NOKPROBE_SYMBOL(unwind_frame);

 void notrace walk_stackframe(struct task_struct *tsk, struct stackframe *frame,
       int (*fn)(struct stackframe *, void *), void *data)
@@ -94,6 +101,7 @@
 break;
 }
+NOKPROBE_SYMBOL(walk_stackframe);

#elifdef CONFIG_STACKTRACE
 struct stack_trace_data {
 --- linux-4.15.0.orig/arch/arm64/kernel/suspend.c
+++ linux-4.15.0/arch/arm64/kernel/suspend.c
@@ -2,6 +2,7 @@
 #include <linux/ftrace.h>
 #include <linux/percpu.h>
 #include <linux/slab.h>
+ #include <linux/uaccess.h>
 #include <asm/alternative.h>
 #include <asm/cacheflush.h>
 #include <asm/cpufeature.h>
@@ -51,8 +52,7 @@
 * PSTATE was not saved over suspend/resume, re-enable any detected
 * features that might not have been set correctly.
 */
 asm(ALTERNATIVE("nop", SET_PSTATE_PAN(1), ARM64_HAS_PAN,
- #include <linux/uaccess.h>
+__uaccess_enable_hw_pan();
 uao_thread_switch(current);

 /*
@@ -62,6 +62,14 @@
 if (hw_breakpoint_restore)
 hw_breakpoint_restore(cpu);
 +
 +/*
 */
+ * On resume, firmware implementing dynamic mitigation will
+ * have turned the mitigation on. If the user has forcefully
+ * disabled it, make sure their wishes are obeyed.
+ */
+if (arm64_get_ssbd_state() == ARM64_SSBD_FORCE_DISABLE)
+arm64_set_ssbd_mitigation(false);
}

/*
--- linux-4.15.0.orig/arch/arm64/kernel/sys.c
+++ linux-4.15.0/arch/arm64/kernel/sys.c
@@ -29,7 +29,7 @@
asmlinkage long sys_mmap(unsigned long addr, unsigned long len,
 unsigned long prot, unsigned long flags,
 - unsigned long fd, off_t off)
+ unsigned long fd, unsigned long off)
{
  if (offset_in_page(off) != 0)
    return -EINVAL;
--- linux-4.15.0.orig/arch/arm64/kernel/time.c
+++ linux-4.15.0/arch/arm64/kernel/time.c
@@ -52,7 +52,7 @@
    frame.fp = regs->regs[29];
    frame.pc = regs->pc;
 #ifdef CONFIG_FUNCTION_GRAPH_TRACER
-    frame.graph = -1; /* no task info */
+    frame.graph = current->curr_ret_stack;
    #endif
    do {
      int ret = unwind_frame(NULL, &frame);
--- linux-4.15.0.orig/arch/arm64/kernel/topology.c
+++ linux-4.15.0/arch/arm64/kernel/topology.c
@@ -11,7 +11,9 @@
 * for more details.
 */

+#include <linux/acpi.h>
#include <linux/arch_topology.h>
+#include <linux/cacheinfo.h>
#include <linux/cpu.h>
#include <linux/cpumask.h>
#include <linux/init.h>
@@ -22,6 +24,7 @@
#include <linux/sched.h>
#include <linux/sched/topology.h>
#include <linux/slab.h>
+#include <linux/smp.h>
#include <linux/string.h>

#include <asm/cpu.h>
@@ -51,7 +54,7 @@
return -1;
}

-static int __init parse_core(struct device_node *core, int cluster_id,
+static int __init parse_core(struct device_node *core, int package_id,
   int core_id)
{
   char name[10];
   leaf = false;
   cpu = get_cpu_for_node(t);
   if (cpu >= 0) {
      -cpu_topology[cpu].cluster_id = cluster_id;
+cpu_topology[cpu].package_id = package_id;
      cpu_topology[cpu].core_id = core_id;
      cpu_topology[cpu].thread_id = i;
   } else {
      @} -89.7 +92.7 @@
      return -EINVAL;
   }
@@ -67,7 +70,7 @@
   if (leaf) {
@@ -89,7 +92,7 @@
   return -EINVAL;
   }
@@ -105,7 +108,7 @@
   pr_err("%pOF: Can't get CPU for leaf core\n", core);
@@ -144,7 +147,7 @@
   bool leaf = true;
   bool has_cores = false;
   struct device_node *c;
@@ -147,7 +147,7 @@
   int i, ret;
   if (leaf) {
      @} -144.7 +147.7 @@
      return -EINVAL;
      pr_err("%pOF: Non-leaf cluster with core %s\n", 
         cluster, name);
      @} -162.7 +165.7 @@
      pr_warn("%pOF: empty cluster\n", cluster);
      if (leaf)
cluster_id++;  
+package_id++;  

return 0;  
}

/* only mark cores described in the DT as possible. */

for_each_possible_cpu(cpu)
-if (cpu_topology[cpu].cluster_id == -1)
+if (cpu_topology[cpu].package_id == -1)
    ret = -EINVAL;

out_map:

const struct cpumask *cpu_coregroup_mask(int cpu)
{
    -return &cpu_topology[cpu].core_sibling;
    +const cpumask_t *core_mask = &cpu_topology[cpu].core_sibling;
    +
    +if (cpu_topology[cpu].llc_id != -1) {
    +    if (cpumask_subset(&cpu_topology[cpu].llc_siblings, core_mask))
    +        core_mask = &cpu_topology[cpu].llc_siblings;
    +}
    +
    +return core_mask;
}

static void update_siblings_masks(unsigned int cpuid)
{
-for_each_possible_cpu(cpu) {
    cpu_topo = &cpu_topology[cpu];

    -if (cpuid_topo->cluster_id != cpu_topo->cluster_id)
    +if (cpuid_topo->llc_id == cpu_topo->llc_id) {
        +cpumask_set_cpu(cpuid, &cpuid_topo->llc_siblings);
    +cpumask_set_cpu(cpuid, &cpu_topo->llc_siblings);
    +}
    +
    +if (cpuid_topo->package_id != cpu_topo->package_id)
        continue;

    cpumask_set_cpu(cpuid, &cpu_topo->core_sibling);
}

struct cpu_topology *cpuid_topo = &cpu_topology[cpuid];

u64 mpidr;
-if (cpuid_topo->cluster_id != -1)
+if (cpuid_topo->package_id != -1)
goto topology_populated;

mpidr = read_cpuid_mpidr();
@@ -258,24 +273,26 @@
if (mpidr & MPIDR_UP_BITMASK)
return;

-/* Create cpu topology mapping based on MPIDR. */
-*
-if (mpidr & MPIDR_MT_BITMASK) {
-/* Multiprocessor system : Multi-threads per core */
-<cpuid_topo->thread_id = MPIDR_AFFINITY_LEVEL(mpidr, 0);
-<cpuid_topo->core_id = MPIDR_AFFINITY_LEVEL(mpidr, 1);
-<cpuid_topo->cluster_id = MPIDR_AFFINITY_LEVEL(mpidr, 2) |
- MPIDR_AFFINITY_LEVEL(mpidr, 3) << 8;
-} else {
-/* Multiprocessor system : Single-thread per core */
-<cpuid_topo->thread_id = -1;
-<cpuid_topo->core_id = MPIDR_AFFINITY_LEVEL(mpidr, 0);
-<cpuid_topo->cluster_id = MPIDR_AFFINITY_LEVEL(mpidr, 1) |
- MPIDR_AFFINITY_LEVEL(mpidr, 2) << 8 |
- MPIDR_AFFINITY_LEVEL(mpidr, 3) << 16;
-}
+/*
+ * This would be the place to create cpu topology based on MPIDR.
+ *
+ * However, it cannot be trusted to depict the actual topology; some
+ * pieces of the architecture enforce an artificial cap on Aff0 values
+ * (e.g. GICv3's ICC_SGI1R_EL1 limits it to 15), leading to an
+ * artificial cycling of Aff1, Aff2 and Aff3 values. IOW, these end up
+ * having absolutely no relationship to the actual underlying system
+ * topology, and cannot be reasonably used as core / package ID.
+ *
+ * If the MT bit is set, Aff0 *could* be used to define a thread ID, but
+ * we still wouldn't be able to obtain a sane core ID. This means we
+ * need to entirely ignore MPIDR for any topology deduction.
+
+ */
+cpuid_topo->thread_id = -1;
+cpuid_topo->core_id = cpuid;
+cpuid_topo->package_id = cpu_to_node(cpuid);

pr_debug("CPU%u: cluster %d core %d thread %d mpidr %#016llx\n",
 - cpuid, cpuid_topo->cluster_id, cpuid_topo->core_id,
 + cpuid, cpuid_topo->package_id, cpuid_topo->core_id,
     cpuid_topo->thread_id, mpidr);

topology_populated:
cpu_topo->thread_id = -1;
cpu_topo->core_id = 0;
-cpu_topo->cluster_id = -1;
+cpu_topo->package_id = -1;
+
+cpu_topo->llc_id = -1;
+cpumask_clear(&cpu_topo->llc_siblings);
+cpumask_set_cpu(cpu, &cpu_topo->llc_siblings);

+cpumask_clear(&cpu_topo->core_sibling);
+cpumask_set_cpu(cpu, &cpu_topo->core_sibling);

+#ifdef CONFIG_ACPI
+/
+ * Propagate the topology information of the processor_topology_node tree to the
+ * cpu_topology array.
+ */
+static int __init parse_acpi_topology(void)
+{
+bool is_threaded;
+int cpu, topology_id;
+
+is_threaded = read_cpuid_mpidr() & MPIDR_MT_BITMASK;
+
+for_each_possible_cpu(cpu) {
+int i, cache_id;
+
+topology_id = find_acpi_cpu_topology(cpu, 0);
+if (topology_id < 0)
+return topology_id;
+
+if (is_threaded) {
+cpu_topology[cpu].thread_id = topology_id;
+topology_id = find_acpi_cpu_topology(cpu, 1);
+cpu_topology[cpu].core_id = topology_id;
+} else {
+cpu_topology[cpu].thread_id = -1;
+cpu_topology[cpu].core_id = topology_id;
+
+topology_id = find_acpi_cpu_topology_package(cpu);
+cpu_topology[cpu].package_id = topology_id;
+
+i = acpi_find_last_cache_level(cpu);
if (i > 0) {
/*
 * this is the only part of cpu_topology that has
 * a direct relationship with the cache topology
 */
cache_id = find_acpi_cpu_cache_topology(cpu, i);
if (cache_id > 0)
cpu_topology[cpu].llc_id = cache_id;
}
return 0;
}
#else
static inline int __init parse_acpi_topology(void)
{
return -EINVAL;
}
#endif
void __init init_cpu_topology(void)
{
reset_cpu_topology();
/* Discard anything that was parsed if we hit an error so we
 * don't use partial information.
 */
@if (of_have_populated_dt() && parse_dt_topology())
+if (!acpi_disabled && parse_acpi_topology())
reset_cpu_topology();
+else if (of_have_populated_dt() && parse_dt_topology())
reset_cpu_topology();
}
--- linux-4.15.0.orig/arch/arm64/kernel/traps.c
+++ linux-4.15.0/arch/arm64/kernel/traps.c
@@ -38,6 +38,7 @@
#include <asm/atomic.h>
#include <asm/bug.h>
+#include <asm/cpufeature.h>
#include <asm/daifflags.h>
#include <asm/debug-monitors.h>
#include <asm/esr.h>
@@ -57,7 +58,7 @@
"Error"
};
-int show_unhandled_signals = 1;
+int show_unhandled_signals = 0;

static void dump_backtrace_entry(unsigned long where)
{
    int skip = 0;

    pr_debug("%s(regs = %p tsk = %p)\n", __func__, regs, tsk);

    if (regs) {
        if (user_mode(regs))
            return;
        skip = 1;
    }
    if (!tsk)
        tsk = current;

    frame.graph = tsk->curr_ret_stack;
    if (!user_mode(regs)) {
        dump_backtrace(regs, tsk);
        dump_instr(KERN_EMERG, regs);
    }
}

void dump_backtrace(struct pt_regs *regs, struct task_struct *tsk)
{

    pr_debug("%s(regs = %p tsk = %p)\n", __func__, regs, tsk);

    if (regs) {
        if (user_mode(regs))
            return;
        skip = 1;
    }
    if (!tsk)
        tsk = current;

    frame.graph = tsk->curr_ret_stack;
    if (!user_mode(regs)) {
        dump_backtrace(regs, tsk);
        dump_instr(KERN_EMERG, regs);
    }
}

if (!user_mode(regs)) {
    dump_backtrace(regs, tsk);
    dump_instr(KERN_EMERG, regs);
    -}

if (!user_mode(regs)) {
    dump_backtrace(regs, tsk);
    dump_instr(KERN_EMERG, regs);
    -}
return ret;
}
@@ -243,7 +247,8 @@
 * If we were single stepping, we want to get the step exception after
 * we return from the trap.
 */
-user_fastforward_single_step(current);
+if (user_mode(regs))
+user_fastforward_single_step(current);
}

static LIST_HEAD(undef_hook);
@@ -275,10 +280,12 @@
 int (*fn)(struct pt_regs *regs, u32 instr) = NULL;
 void __user *pc = (void __user *)instruction_pointer(regs);

 -if (!user_mode(regs))
-  return 1;
-
-  if (compat_thumb_mode(regs)) {
-    if (!user_mode(regs)) {
+if (!user_mode(regs)) {
+    __le32 instr_le;
+    if (probe_kernel_address((__force __le32 *)pc, instr_le))
+      goto exit;
+    instr = le32_to_cpu(instr_le);
+  } else if (compat_thumb_mode(regs)) {
+    /* 16-bit Thumb instruction */
+    __le16 instr_le;
+    if (get_user(instr_le, (__le16 __user *)pc))
@@ -372,12 +379,12 @@
    return;

    force_signal_inject(SIGILL, ILL_ILLOPC, regs, 0);
+   BUG_ON(!user_mode(regs));
  }

 -int cpu_enable_cache_maint_trap(void *__unused)
+void cpu_enable_cache_maint_trap(const struct arm64_cpu_capabilities *__unused)
 {
  config_sctlr_el1(SCTLR_EL1_UCI, 0);
 -return 0;
+
 
 #define __user_cache_maint(insn, address, res)
@@ -526,14 +533,6 @@
 

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-if (show_unhandled_signals_ratelimited()) {
-printf("%s[%d]: syscall %d\n", current->comm,
-task_pid_nr(current), regs->syscallno);
-dump_instr("", regs);
-if (user_mode(regs))
-__show_regs(regs);
-
-return sys_ni_syscall();
}

@@ -595,7 +594,6 @@
handler[reason], smp_processor_id(), esr,
esr_get_class_string(esr));

-die("Oops - bad mode", regs, 0);
local_daif_mask();
panic("bad mode");
}@@ -662,17 +660,58 @@

@endif

-asmlinkage void do_serror(struct pt_regs *regs, unsigned int esr)
+void __noreturn arm64_serror_panic(struct pt_regs *regs, u32 esr)
{ }
-nmi_enter();
-
-console_verbose();

pr_crit("SError Interrupt on CPU%d, code 0x%08x -- %s\n", 
-smp_processor_id(), esr, esr_get_class_string(esr));
-__show_regs(regs);
+if (regs)
+__show_regs(regs);
+
+nmi_panic(regs, "Asynchronous SError Interrupt");
+
+cpu_park_loop();
+unreachable();
+}
+
+bool arm64_is_fatal_ras_serror(struct pt_regs *regs, unsigned int esr)
+{
+u32 aet = arm64_ras_serror_get_severity(esr);
+
+switch (aet) { 
+case ESR_ELx_AET_CE:* corrected error */
+case ESR_ELx_AET_UEO: /* restartable, not yet consumed */
+ *
+ * The CPU can make progress. We may take UEO again as
+ * a more severe error.
+ */
+ return false;
+
+case ESR_ELx_AET_UEU: /* Uncorrected Unrecoverable */
+case ESR_ELx_AET_UER: /* Uncorrected Recoverable */
+ *
+ * The CPU can't make progress. The exception may have
+ * been imprecise.
+ */
+ return true;
+
+case ESR_ELx_AET_UC: /* Uncontainable or Uncategorized error */
+default:
+ *
+ * Error has been silently propagated */
+ arm64_serror_panic(regs, esr);
+}
+}
+
+asmlinkage void do_serror(struct pt_regs *regs, unsigned int esr)
+{
+nmi_enter();
+
+ /* non-RAS errors are not containable */
+ if (!arm64_is_ras_serror(esr) || arm64_is_fatal_ras_serror(regs, esr))
+ arm64_serror_panic(regs, esr);
+
+panic("Asynchronous SError Interrupt");
+nmi_exit();
+

void __pte_error(const char *file, int line, unsigned long val)
--- linux-4.15.0.orig/arch/arm64/kernel/vdso.c
+++ linux-4.15.0/arch/arm64/kernel/vdso.c
@@ -146,8 +146,6 @@
]
}

vdso_pages = (vdso_end - vdso_start) >> PAGE_SHIFT;
-pr_info("vdso: %ld pages (%ld code @ %p, %ld data @ %p)\n",
-vdso_pages + 1, vdso_pages, vdso_start, 1L, vdso_data);

/* Allocate the vDOS pagelist, plus a page for the data. */
vdso_pagelist = kalloc(vdso_pages + 1, sizeof(struct *),
@@ -232,6 +230,9 @@
vdso_data->wtm_clock_sec = tk->wall_to_monotonic.tv_sec;
vdso_data->wtm_clock_nsec= tk->wall_to_monotonic.tv_nsec;

/* Read without the seqlock held by clock_getres() */
+WRITE_ONCE(vdso_data->hrtimer_res, hrtimer_resolution);
+
if (!use_syscall) {
/* tkr_mono.cycle_last == tkr_raw.cycle_last */
vdso_data->cs_cycle_last= tk->tkr_mono.cycle_last;
--- linux-4.15.0.orig/arch/arm64/kernel/vdso/gettimeofday.S
+++ linux-4.15.0/arch/arm64/kernel/vdso/gettimeofday.S
@@ -73,6 +73,13 @@
movn	x_tmp, #0xff00, lsl #48
and	\res, x_tmp, \res
mul\res, \res, \mult
+/*
+ * Fake address dependency from the value computed from the counter
+ * register to subsequent data page accesses so that the sequence
+ * locking also orders the read of the counter.
+ */
+andx_tmp, \res, xzr
+add vdso_data, vdso_data, x_tmp
.endm

/*
@@ -147,12 +154,12 @@
/* w11 = cs_mono_mult, w12 = cs_shift */
ldpw11, w12, [vdso_data, #VDSO_CS_MONO_MULT]
ldpx13, x14, [vdso_data, #VDSO_XTIME_CLK_SEC]
-seqcnt_check fail=1b

get_nsec_per_sec res=x9
lslx9, x9, x12

get_clock_shifted_nsec res=x15, cycle_last=x10, mult=x11
+seqcnt_check fail=1b
get_ts_realtime res_sec=x10, res_nsec=x11, \
clock_nsec=x15, xtime_sec=x13, xtime_nsec=x14, nsec_to_sec=x9
@@ -211,16 +218,16 @@
/* w11 = cs_mono_mult, w12 = cs_shift */
ldpw11, w12, [vdso_data, #VDSO_CS_MONO_MULT]
ldpx13, x14, [vdso_data, #VDSO_XTIME_CLK_SEC]
-seqcnt_check fail=realtime

/* All computations are done with left-shifted nsecs. */
get_nsec_per_sec res=x9
lslx9, x9, x12
get_clock_shifted_nsec res=x15, cycle_last=x10, mult=x11
+seqcnt_check fail=realtime
get_ts_realtime res_sec=x10, res_nsec=x11, 
  clock_nsec=x15, xtime_sec=x13, xtime_nsec=x14, nsec_to_sec=x9
-clock_gettime_return, shift=1
+clock_gettime_return shift=1

ALIGN
monotonic:
@@ -231,7 +238,6 @@
    ldp	w11, w12, [vdso_data, #VDSO_CS_MONO_MULT]
    ldp	x13, x14, [vdso_data, #VDSO_XTIME_CLK_SEC]
    ldp	x3, x4, [vdso_data, #VDSO_WTM_CLK_SEC]
  -seqcnt_check fail=monotonic

  /* All computations are done with left-shifted nsecs. */
    lsl	x4, x4, x12
@@ -239,11 +245,12 @@
    lsl	x9, x9, x12

get_clock_shifted_nsec res=x15, cycle_last=x10, mult=x11
+seqcnt_check fail=monotonic
get_ts_realtime res_sec=x10, res_nsec=x11, 
  clock_nsec=x15, xtime_sec=x13, xtime_nsec=x14, nsec_to_sec=x9

  add_ts sec=x10, nsec=x11, ts_sec=x3, ts_nsec=x4, nsec_to_sec=x9
  -clock_gettime_return, shift=1
+clock_gettime_return shift=1

ALIGN
monotonic_raw:
@@ -253,18 +260,18 @@
    /* w11 = cs_raw_mult, w12 = cs_shift */
    ldpw12, w11, [vdso_data, #VDSO_CS_SHIFT]
    ldp	x13, x14, [vdso_data, #VDSO_RAW_TIME_SEC]
  -seqcnt_check fail=monotonic_raw

  /* All computations are done with left-shifted nsecs. */
    get_nsec_per_sec res=x9
    lsl	x9, x9, x12

get_clock_shifted_nsec res=x15, cycle_last=x10, mult=x11
+seqcnt_check fail=monotonic_raw
get_ts_clock_raw res_sec=x10, res_nsec=x11, 
  clock_nsec=x15, nsec_to_sec=x9

  add_ts sec=x10, nsec=x11, ts_sec=x3, ts_nsec=x4, nsec_to_sec=x9
  -clock_gettime_return, shift=1
+clock_gettime_return shift=1
+clock_gettime_return shift=1

ALIGN
realtime_coarse:
@@ -301,13 +308,14 @@
cmpw0, #CLOCK_MONOTONIC_RAW, #0x4, ne
b.ne1f

-ldr x2, 5f
+adr vdso_data, _vdso_data
+ldr w2, [vdso_data, #CLOCK_REALTIME_RES]
b2f
1:

-compw0, #CLOCK_REALTIME_COARSE
ccmpw0, #CLOCK_MONOTONIC_COARSE, #0x4, ne
b.ne4f
-ldr x2, 6f
+ldr x2, 5f
2:

cbz x1, 3f
stpxzr, x2, [x1]
@@ -321,8 +329,6 @@
svc#0
ret
5:
-.quad CLOCK_REALTIME_RES
-6:
+.quad CLOCK_COARSE_RES
 .cfi_endproc
ENDPROC(__kernel_clock_getres)
--- linux-4.15.0.orig/arch/arm64/kernel/vdso/vdso.lds.S
+++ linux-4.15.0/arch/arm64/kernel/vdso/vdso.lds.S
@@ -39,6 +39,13 @@
 .gnu.version_d: { *(.gnu.version_d) }
 .gnu.version_r: { *(.gnu.version_r) }

+/*
 + * Discard .note.gnu.property sections which are unused and have
 + * different alignment requirement from vDSO note sections.
 + */
+/-DISCARD/: { 
+*(.note.GNU-stack .note.gnu.property)
+}
+.note: { *(.note.*) :text:note

. = ALIGN(16);
@@ -59,7 +66,6 @@
PROVIDE(end = :);
/DISCARD/: { 
- *(.note.GNU-stack)  
*(.data .data.* .gnu.linkonce.d.* .sdata*)  
*(.bss .sbss .dynbss .dynsbss) 
} 
--- linux-4.15.0.orig/arch/arm64/kernel/vmlinux.lds.S 
+++ linux-4.15.0/arch/arm64/kernel/vmlinux.lds.S 
@@ -24,6 +24,13 @@ 
jiffies = jiffies_64;  
+ 
+#define HYPERVISOR_EXTABLE
+ += ALIGN(SZ_8);\  
+VMLINUX_SYMBOL(__start__kvm_ex_table) =.;
+ *__kvm_ex_table\  
+VMLINUX_SYMBOL(__stop__kvm_ex_table) =.;
+ 
+#define HYPERVISOR_TEXT
/\  
* Align to 4 KB so that\  
@ @ -39.6 +46.7 @ @ 
VMLINUX_SYMBOL(__hyp_idmap_text_end) =.;
VMLINUX_SYMBOL(__hyp_text_start) =.;
*(.hyp.text)\  
+HYPERVISOR_EXTABLE\  
VMLINUX_SYMBOL(__hyp_text_end) =.;

#define IDMAP_TEXT
@ @ -57.6 +65.17 @ @ 
#define HIBERNATE_TEXT
#endif 

+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0 
+#define TRAMP_TEXT
 += ALIGN(PAGE_SIZE);\  
+VMLINUX_SYMBOL(__entry_tramp_text_start) =.;
+ *__entry_tramp.text\  
+ += ALIGN(PAGE_SIZE);\  
+VMLINUX_SYMBOL(__entry_tramp_text_end) =.;
+#else 
+#define TRAMP_TEXT
+#endif 
+ /*  
+ * The size of the PE/COFF section that covers the kernel image, which  
+ * runs from stext to _edata, must be a round multiple of the PE/COFF
@ -88,7 +107,8 @
*(.discard)
*(.discard.*)
*(.interp .dynamic)
-*(.dynsym .dynstr .hash)
+*(.dynsym .dynstr .hash .gnu.hash)
+*(.eh_frame)
}

. = KIMAGE_VADDR + TEXT_OFFSET;
@@ -113,6 +133,7 @@
HYPERVISOR_TEXT
IDMAP_TEXT
HIBERNATE_TEXT
+TRAMP_TEXT
*(.fixup)
*(.gnu.warning)
. = ALIGN(16);
@@ -141,9 +162,6 @@
*(.altinstructions)
__alt_instructions_end = .;
} -altinstr_replacement : {
-*(.altinstr_replacement)
-}

. = ALIGN(PAGE_SIZE);
__inittext_end = .;
@@ -164,12 +182,12 @@
PERCPU_SECTION(L1_CACHE_BYTES)

.rela : ALIGN(8) {
+rela.dyn : ALIGN(8) {
+*(.rela .rela*)
}

-__rela_offset= ABSOLUTE(ADDR(.rela) - KIMAGE_VADDR);
-__rela_size= SIZEOF(.rela);
+__rela_offset= ABSOLUTE(ADDR(.rela.dyn) - KIMAGE_VADDR);
+__rela_size= SIZEOF(.rela.dyn);

. = ALIGN(SEGMENT_ALIGN);
__initdata_end = .;
@@ -214,6 +232,11 @@
# endif
+ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+tramp_pg_dir = .;
+. += PAGE_SIZE;
+endif
+
__pecoff_data_size = ABSOLUTE(. - __initdata_begin);
_end = .;

@@ -234,7 +257,10 @@

 ASSERT(__hibernate_exit_text_end - (__hibernate_exit_text_start & ~(SZ_4K - 1)) <= SZ_4K, "Hibernate exit text too big or misaligned")
 #endif
-
+ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+ASSERT((__entry_tramp_text_end - __entry_tramp_text_start) == PAGE_SIZE,
+"Entry trampoline text too big")
+endif

/*
 * If padding is applied before .head.text, virt<->phys conversions will fail.
 */
--- linux-4.15.0.orig/arch/arm64/kvm/debug.c
+++ linux-4.15.0/arch/arm64/kvm/debug.c
@@ -96,6 +96,7 @@

 *  - Debug ROM Address (MDCR_EL2_TDRA)
 *  - OS related registers (MDCR_EL2_TDOSA)
 *  - Statistical profiler (MDCR_EL2_TPMS/MDCR_EL2_E2PB)
+ *  - Self-hosted Trace Filter controls (MDCR_EL2_TTRF)
 *
 * Additionally, KVM only traps guest accesses to the debug registers if
 * the guest is not actively using them (see the KVM_ARM64_DEBUG_DIRTY
@@ -108,6 +109,7 @@
 void kvm_arm_setup_debug(struct kvm_vcpu *vcpu)
 {
     bool trap_debug = !(vcpu->arch.debug_flags & KVM_ARM64_DEBUG_DIRTY);
+    unsigned long orig_mdcr_el2 = vcpu->arch.mdr

     trace_kvm_arm_setup_debug(vcpu, vcpu->guest_debug);

@@ -193,6 +196,10 @@

 void kvm_arm_setup_debug(struct kvm_vcpu *vcpu)
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@@ -234,7 +257,10 @@

 ASSERT(__hibernate_exit_text_end - (__hibernate_exit_text_start & ~(SZ_4K - 1)) <= SZ_4K, "Hibernate exit text too big or misaligned")
 #endif
vcpu->arch.mdcr_el2 |= MDCR_EL2_TDA;

/* Write mdcr_el2 changes since vcpu_load on VHE systems */
+if (has_vhe() && orig_mdcr_el2 != vcpu->arch.mdcr_el2)
+wite_sysreg(vcpu->arch.mdcr_el2, mdcr_el2);
+
+trace_kvm_arm_set_dreg32(“MDCR_EL2”, vcpu->arch.mdcr_el2);
+trace_kvm_arm_set_dreg32(“MDSCR_EL1”, vcpu_sys_reg(vcpu, MDSCR_EL1));
}
--- linux-4.15.0.orig/arch/arm64/kvm/guest.c
+++ linux-4.15.0/arch/arm64/kvm/guest.c
@@ -25,6 +25,7 @@
#include <linux/module.h>
#include <linux/vmalloc.h>
#include <linux/fs.h>
+#include <kvm/arm_psci.h>
#include <asm/cputype.h>
#include <linux/uaccess.h>
#include <asm/kvm.h>
@@ -56,6 +57,45 @@
return id & ~(KVM_REG_ARCH_MASK | KVM_REG_SIZE_MASK | KVM_REG_ARM_CORE);
}

+static int validate_core_offset(const struct kvm_one_reg *reg)
+{
+u64 off = core_reg_offset_from_id(reg->id);
+int size;
+switch (off) {
+case KVM_REG_ARM_CORE_REG(regs.regs[0]) ...
+    KVM_REG_ARM_CORE_REG(regs.regs[30]):
+case KVM_REG_ARM_CORE_REG(regs.sp):
+case KVM_REG_ARM_CORE_REG(regs.pc):
+case KVM_REG_ARM_CORE_REG(regs.pstate):
+case KVM_REG_ARM_CORE_REG(sp_el1):
+case KVM_REG_ARM_CORE_REG(elr_el1):
+case KVM_REG_ARM_CORE_REG(spsr[0]) ...
+    KVM_REG_ARM_CORE_REG(spsr[KVM_NR_SPSR - 1]):
+    size = sizeof(__u64);
+    break;
+
+    KVM_REG_ARM_CORE_REG(fp_regs.vregs[0]) ...
+    KVM_REG_ARM_CORE_REG(fp_regs.vregs[31]):
+    size = sizeof(__uint128_t);
+    break;
+
+    KVM_REG_ARM_CORE_REG(fp_regs.fpsr):
+}
size = sizeof(__u32);
break;
+
default:
+return -EINVAL;
+
+if (KVM_REG_SIZE(reg->id) == size &&
+ IS_ALIGNED(off, size / sizeof(__u32)))
+return 0;
+
+return -EINVAL;
+
static int get_core_reg(struct kvm_vcpu *vcpu, const struct kvm_one_reg *reg)
{
/*
@@ -75,6 +115,9 @@
    (off + (KVM_REG_SIZE(reg->id) / sizeof(__u32))) >= nr_regs)
 return -ENOENT;
+
+if (validate_core_offset(reg))
+return -EINVAL;
+
+ if (copy_to_user(uaddr, ((u32 *)regs) + off, KVM_REG_SIZE(reg->id)))
+return -EFAULT;
@@ -97,6 +140,9 @@
 (off + (KVM_REG_SIZE(reg->id) / sizeof(__u32))) >= nr_regs)
 return -ENOENT;
+
+if (validate_core_offset(reg))
+return -EINVAL;
+
+ if (KVM_REG_SIZE(reg->id) > sizeof(tmp))
+return -EINVAL;
@@ -106,17 +152,25 @@
 
if (off == KVM_REG_ARM_CORE_REG(regs.pstate)) {
-  u32 mode = (*(u32 *)valp) & COMPAT_PSR_MODE_MASK;
+  u64 mode = (*(u64 *)valp) & COMPAT_PSR_MODE_MASK;
  switch (mode) {
    case COMPAT_PSR_MODE_USR:
+      if (!system_supports_32bit_el0())
+    return -EINVAL;
+    break;

case COMPAT_PSR_MODE_FIQ:
case COMPAT_PSR_MODE_IRQ:
case COMPAT_PSR_MODE_SVC:
case COMPAT_PSR_MODE_ABT:
case COMPAT_PSR_MODE_UND:
+if (!vcpu_el1_is_32bit(vcpu))
+return -EINVAL;
+break;
case PSR_MODE_EL0t:
case PSR_MODE_EL1t:
case PSR_MODE_EL1h:
+if (vcpu_el1_is_32bit(vcpu))
+return -EINVAL;
break;
default:
err = -EINVAL;
@@ -205,7 +259,7 @@
unsigned long kvm_arm_num_regs(struct kvm_vcpu *vcpu)
{
    return num_core_regs() + kvm_arm_num_sys_reg_descs(vcpu)
-        + NUM_TIMER_REGS;
++ kvm_arm_get_fw_num_regs(vcpu) + NUM_TIMER_REGS;
}
/**
@@ -225,6 +279,11 @@
    uindices++;
 }

+ret = kvm_arm_copy_fw_reg_indices(vcpu, uindices);
+if (ret)
+return ret;
+uindices += kvm_arm_get_fw_num_regs(vcpu);
+ret = copy_timer_indices(vcpu, uindices);
+if (ret)
+return ret;
@@ -243,6 +302,9 @@
if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_CORE)
    return get_core_reg(vcpu, reg);
+if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_FW)
    +return kvm_arm_get_fw_reg(vcpu, reg);
+if (is_timer_reg(reg->id))
    return get_timer_reg(vcpu, reg);
@@ -259,6 +321,9 @@
if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_CORE)  
return set_core_reg(vcpu, reg);

+if ((reg->id & KVM_REG_ARM_COPROC_MASK) == KVM_REG_ARM_FW)  
+return kvm_arm_set_fw_reg(vcpu, reg);
+
+if (is_timer_reg(reg->id))  
return set_timer_reg(vcpu, reg);

--- linux-4.15.0.orig/arch/arm64/kvm/handle_exit.c  
+++ linux-4.15.0/arch/arm64/kvm/handle_exit.c  
@@ -22,19 +22,28 @@  
#include <linux/kvm.h>  
#include <linux/kvm_host.h>  
+
+#include <kvm/arm_psci.h>  
+  
+#include <asm/esr.h>  
+#include <asm/exception.h>  
+#include <asm/kvm_asm.h>  
+#include <asm/kvm_coproc.h>  
+#include <asm/kvm_emulate.h>  
+#include <asm/kvm_mmu.h>  
+#include <asm/kvm_psci.h>  
+#include <asm/debug-monitors.h>  
+#include <asm/traps.h>  
+
+#define CREATE_TRACE_POINTS  
#include "trace.h"  

typedef int (*exit_handle_fn)(struct kvm_vcpu *, struct kvm_run *);

+static void kvm_handle_guest_serror(struct kvm_vcpu *vcpu, u32 esr)  
+{
+  if (!arm64_is_ras_serror(esr) || arm64_is_fatal_ras_serror(NULL, esr))  
+kvm_inject_vabt(vcpu);
+}
+
+static int handle_hvc(struct kvm_vcpu *vcpu, struct kvm_run *run)  
+{
  int ret;
@@ -43,7 +52,7 @@  
    kvm_vcpu_hvc_get_imm(vcpu));  
  vcpu->stat.hvc_exit_stat++;  

  -ret = kvm_psci_call(vcpu);
+ret = kvm_hvc_call_handler(vcpu);  
  if (ret < 0) {  

static int handle_smc(struct kvm_vcpu *vcpu, struct kvm_run *run)
{
    /*
     * "If an SMC instruction executed at Non-secure EL1 is
     * trapped to EL2 because HCR_EL2.TSC is 1, the exception is a
     * Trap exception, not a Secure Monitor Call exception [...]
     *"
     *
     * We need to advance the PC after the trap, as it would
     * otherwise return to the same address...
     */
    vcpu_set_reg(vcpu, 0, ~0UL);
+kvm_skipInstr(vcpu, kvm_vcpu_trap_il_is32bit(vcpu));
    return 1;
}

/* For exit types that need handling before we can be preempted */
void handle_exit_early(struct kvm_vcpu *vcpu, struct kvm_run *run,
		       int exception_index)
{+	if (ARM_SERROR_PENDING(exception_index)) {
+		if (this_cpu_has_cap(ARM64_HAS_RAS_EXTN)) {
+			u64 disr = kvm_vcpu_get_disr(vcpu);
+		}
+	}
+	if (ARM_SERROR_PENDING(exception_index)) {
+		if (this_cpu_has_cap(ARM64_HAS_RAS_EXTN)) {
+		u64 disr = kvm_vcpu_get_disr(vcpu);
+	
+kvm_handle_guest_serror(vcpu, disr_to_esr(disr));
+} else {
+kvm_inject_vabt(vcpu);
+
+return;
+}
+
+exception_index = ARM_EXCEPTION_CODE(exception_index);
+
+if (exception_index == ARM_EXCEPTION_EL1_SERROR)
+kvm_handle_guest_serror(vcpu, kvm_vcpu_get_hsr(vcpu));
+}

--- linux-4.15.0.orig/arch/arm64/kvm/hyp-init.S
+++ linux-4.15.0/arch/arm64/kvm/hyp-init.S
@@ -122,6 +122,10 @@
 kern_hyp_vax2
 msvbar_el2, x2

+/* copy tpidr_el1 into tpidr_el2 for use by HYP */
+mrsx1, tpidr_el1
+msrtpidr_el2, x1
+
+ /* Hello, World! */
eret
ENDPROC(__kvm_hyp_init)
@@ -143,11 +147,15 @@
 1:	cmp	x0, #HVC_RESET_VECTORS
 b.ne	1f
 reset:
+ /*
+ * Reset kvm back to the hyp stub. Do not clobber x0-x4 in
+ * case we coming via HVC_SOFT_RESTART.
+ * Set the HVC_RESET_VECTORS return code before entering the common
+ * path so that we do not clobber x0-x2 in case we are coming via
+ * HVC_SOFT_RESTART.
+ */
+ movx0, xzr
+reset:
+ /*
+ * Reset kvm back to the hyp stub. */
mrsx5, sctlr_el2
ldrx6, =SCTLR_ELx_FLAGS
bicx5, x5, x6// Clear SCTL_M and etc
@@ -158,7 +166,6 @@
 /* Install stub vectors */
 adr_lx5, __hyp_stub_vectors
msrvbar_el2, x5
-movx0, xzr
eret

1:/* Bad stub call */
--- linux-4.15.0.orig/arch/arm64/kvm/hyp/entry.S
+++ linux-4.15.0/arch/arm64/kvm/hyp/entry.S
@@ -17,6 +17,7 @@
#include <linux/linkage.h>
+#include <asm/alternative.h>
#include <asm/asm-offsets.h>
#include <asm/assembler.h>
#include <asm/fpsimdmacros.h>
@@ -62,9 +63,15 @@
// Store the host regs
save_callee_saved_regs x1

-// Store the host_ctxt for use at exit time
-strx1, [sp, #-16]!
+// Now the host state is stored if we have a pending RAS SError it must
+// affect the host. If any asynchronous exception is pending we defer
+// the guest entry.
+mrst1, isr_el1
+cbz1, 1f
+movx0, #ARM_EXCEPTION_IRQ
+ret

+1:
addx18, x0, #VCPU_CONTEXT

// Restore guest regs x0-x17
@@ -118,12 +125,22 @@
// Store the guest regs x19-x29, lr
save_callee_saved_regs x1

-// Restore the host_ctxt from the stack
-drx2, [sp], #16
+get_host_ctxt2, x3

// Now restore the host regs
restore_callee_saved_regs x2

+alternative_if ARM64_HAS_RAS_EXTN
+// If we have the RAS extensions we can consume a pending error
+// without an unmask-SError and isb.
+esb
This is our single instruction exception window. A pending SError is guaranteed to occur at the earliest when we unmask it, and at the latest just after the ISB.

// Threaten me not, oh Evil one! For I speak with @ @ -134,23 +151,29 @@
movx5, x0

dbsy// Synchronize against in-flight ld/st
+nop
msrdaifcrl, #4// Unmask aborts
+alternative_endif

// This is our single instruction exception window. A pending SError is guaranteed to occur at the earliest when we unmask it, and at the latest just after the ISB.

-abort_guest_exit_start:
isb

-abort_guest_exit_end:
+msrdaifcrl, #4// Mask aborts
+ret
+
+_kvm_extable_abort_guest_exit_start, 9997f
+_kvm_extable_abort_guest_exit_end, 9997f
+9997:
+msrdaifcrl, #4// Mask aborts
+movx0, #(1 << ARM_EXIT_WITH_SERROR_BIT)

-// If the exception took place, restore the EL1 exception context so that we can report some information.
-// Merge the exception code with the SError pending bit.
-tbzx0, #ARM_EXIT_WITH_SERROR_BIT, 1f
+// restore the EL1 exception context so that we can report some information. Merge the exception code with the SError pending bit.
msrelr_el2, x2
msresr_el2, x3
msrpsr_el2, x4
@@ -159,6 +182,10 @@
ENDPROC(__guest_exit)
ENTRY(__fpsimd_guest_restore)
+// x0: esr
+// x1: vcpu
+// x2-x29,lr: vcpu regs
+// vcpu x0-x1 on the stack
stp2, x3, [sp, #-16]!
stp4, lr, [sp, #-16]!

@@ -173,7 +200,7 @@
alternative_endif
isb

-mrsx3, tpidr_el2
+movx3, x1

ldrx0, [x3, #VCPU_HOST_CONTEXT]
kern_hyp_va x0
--- linux-4.15.0.orig/arch/arm64/kvm/hyp/hyp-entry.S
+++ linux-4.15.0/arch/arm64/kvm/hyp/hyp-entry.S
@@ @ -15,6 +15,7 @@
* along with this program. If not, see <http://www.gnu.org/licenses/>.
*/

+#include <linux/arm-smccc.h>
#include <linux/linkage.h>

#include <asm/alternative.h>
@@ -24,6 +25,30 @@
#include <asm/kvm_asm.h>
#include <asm/kvm_nmu.h>

+.macro save_caller_saved_regs_vect
+stpx0, x1, [sp, #-16]!
+stpx2, x3, [sp, #-16]!
+stpx4, x5, [sp, #-16]!
+stpx6, x7, [sp, #-16]!
+stpx8, x9, [sp, #-16]!
+stpx10, x11, [sp, #-16]!
+stpx12, x13, [sp, #-16]!
+stpx14, x15, [sp, #-16]!
+stpx16, x17, [sp, #-16]!
+.endm
+
+.macro restore_caller_saved_regs_vect
+ldpx16, x17, [sp], #16
+ldpx14, x15, [sp], #16
+ldpx12, x13, [sp], #16

Open Source Used In 5GaaS Edge AC-4 10501
el1_sync:// Guest trapped into EL2
stp0, x1, [sp, #-16]!

-alternative_if_not ARM64_HAS_VIRT_HOST_EXTN
-mrsx1, esr_el2
-alternative_else
-mrsx1, esr_el1
-alternative_endif
-lsr0, x1, #ESR_ELx_EC_SHIFT
-
+mrsx0, esr_el2
+lsr0, x0, #ESR_ELx_EC_SHIFT
cmpx0, #ESR_ELx_EC_HVC64
+ccmpx0, #ESR_ELx_EC_HVC32, #4, ne
b.ne el1_trap

-mrsx1, vttbr_el2// If vttbr is valid, the 64bit guest
-cbnzx1, el1_trap// called HVC
+mrsx1, vttbr_el2// If vttbr is valid, the guest
+cbnzx1, el1_hvc_guest// called HVC

/* Here, we're pretty sure the host called HVC. */
ldp0, x1, [sp], #16
@@ -100,9 +121,64 @@

eret

+el1_hvc_guest:
+/*
+ * Fastest possible path for ARM_SMCCC_ARCH_WORKAROUND_1.
+ * The workaround has already been applied on the host,
+ * so let's quickly get back to the guest. We don't bother
+ * restoring x1, as it can be clobbered anyway.
+ */
+ldr0, x1, [sp]// Guest's x0
+eorw1, w1, #ARM_SMCCC_ARCH_WORKAROUND_1
+cbzw1, wa_epilogue
+
+/* ARM_SMCCC_ARCH_WORKAROUND_2 handling */
+eorw1, w1, #(ARM_SMCCC_ARCH_WORKAROUND_1 ^
+ ARM_SMCCC_ARCH_WORKAROUND_2)
+cbnzw1, el1_trap
+
+#ifdef CONFIG_ARM64_SSBD
+alternative_cbrm64_enable_wa2_handling
+bwa2_end
+alternative_cb_end
+get_vcpu_ptrx2, x0
+ldrx0, [x2, #VCPU_WORKAROUND_FLAGS]
+
+// Sanitize the argument and update the guest flags
+ldrx1, [sp, #8] // Guest's x1
+clzw1, w1 // Murphy's device:
+lsrw1, w1, #5 // w1 = !!w1 without using
+eorw1, w1, #1 // the flags...
+bfx0, x1, #VCPU_WORKAROUND_2_FLAG_SHIFT, #1
+strx0, [x2, #VCPU_WORKAROUND_FLAGS]
+
+/* Check that we actually need to perform the call */
+hyp_ldr_this_cpu x0, arm64_ssbd_callback_required, x2
+cbxz0, wa2_end
+
+movw0, #ARM_SMCCC_ARCH_WORKAROUND_2
+smc#0
+
+/* Don't leak data from the SMC call */
+movx3, xzr
+wa2_end:
+movx2, xzr
+movx1, xzr
+#endif
+
+wa_epilogue:
+movx0, xzr
+addsp, sp, #16
+eret
+
e11_trap:
+get_vcpu_ptrx1, x0
+
+mrwx0, esr_el2
+lsrx0, x0, #ESR_ELx_EC_SHIFT
/*
 x0: ESR_EC
+ * x1: vcpu pointer
+ */
+
+ /*
+ @@ -116,42 +192,39 @@
b.eq__fpsimd_guest_restore
alternative_else_nop_endif
+
-mrsx1, tpidr_el2
movx0, #ARM_EXCEPTION_TRAP
b__guest_exit
+
+el1_irq:
+stp x0, x1, [sp, #-16]!
+ -mrsx1, tpidr_el2
+ +get_vcpu_ptr x1, x0
+movx0, #ARM_EXCEPTION_IRQ
+b__guest_exit
+
+el1_error:
+stp x0, x1, [sp, #-16]!
+ -mrsx1, tpidr_el2
+ +get_vcpu_ptr x1, x0
+movx0, #ARM_EXCEPTION_EL1_SERROR
+ b__guest_exit
+
+el2_sync:
+ +save_caller_saved_regs_vect
+ +stp x29, x30, [sp, #-16]!
+ +blkvm_unexpected_el2_exception
+ +ldp x29, x30, [sp], #16
+ +restore_caller_saved_regs_vect
+ +
+ +eret
+
+el2_error:
+ -/*
+ - * Only two possibilities:
+ - * 1) Either we come from the exit path, having just unmasked
+ - * PSTATE.A: change the return code to an EL2 fault, and
+ - * carry on, as we're already in a sane state to handle it.
+ - * 2) Or we come from anywhere else, and that's a bug: we panic.
+ - *
+ - * For (1), x0 contains the original return code and x1 doesn't
+ - * contain anything meaningful at that stage. We can reuse them
+ - * as temp registers.
+ - * For (2), who cares?
+ - */
-mr0, elr_el2
-adrl, abort_guest_exit_start
-cmp0, x1
-adrl, abort_guest_exit_end
-ccmp0, x1, #4, ne
-b.ne__hyp_panic
-mov0, #(1 << ARM_EXIT_WITH_SERROR_BIT)
+save_caller_saved_regs_vect
+stp x29, x30, [sp, #-16]!
+
+blkvm_unexpected_el2_exception
+
+ldp x29, x30, [sp, #16
+restore_caller_saved_regs_vect
+
eret

ENTRY(__hyp_do_panic)
@@ -163,6 +236,11 @@
eret
ENDPROC(__hyp_do_panic)

+ENTRY(__hyp_panic)
+get_host_ctxt x0, x1
+bhyp_panic
+ENDPROC(__hyp_panic)
+
.macro invalid_vector label, target = __hyp_panic
.align2
\label:
@@ -175,7 +253,6 @@
invalid_vector2t_irq_invalid
invalid_vector2t_fiq_invalid
invalid_vector2t_error_invalid
-invalid_vector2h_sync_invalid
invalid_vector2h_irq_invalid
invalid_vector2h_fiq_invalid
invalid_vector1h_sync_invalid
@@ -192,7 +269,7 @@
ventry2t_fiq_invalid// FIQ EL2t
ventry2t_error_invalid// Error EL2t

-ventry2h_sync_invalid// Synchronous EL2h
+ventry2_sync// Synchronous EL2h
ventry2h_irq_invalid// IRQ EL2h
ventry2h_fiq_invalid// FIQ EL2h
ventry2h_error// Error EL2h
--- linux-4.15.0.orig/arch/arm64/kvm/hyp/switch.c
+++ linux-4.15.0/arch/arm64/kvm/hyp/switch.c
@@ -15,15 +15,23 @@
* along with this program. If not, see <http://www.gnu.org/licenses/>.
*/

+#include <linux/arm-smccc.h>
#include <linux/types.h>
#include <linux/jump_label.h>
+#include <uapi/linux/psci.h>

+#include <kvm/arm_psci.h>
+
+#include <asm/extable.h>
#include <asm/kvm_asm.h>
#include <asm/kvm_emulate.h>
#include <asm/kvm_hyp.h>
#include <asm/fpsimd.h>
#include <asm/debug-monitors.h>

+extern struct exception_table_entry __start___kvm_ex_table;
+extern struct exception_table_entry __stop___kvm_ex_table;
+
static bool __hyp_text __fpsimd_enabled_nvhe(void)
{
    return !(read_sysreg(cptr_el2) & CPTR_EL2_TFP);
@@ -52,7 +60,7 @@
    val &= ~(CPACR_EL1_FPEN | CPACR_EL1_ZEN);
    write_sysreg(val, cpacr_el1);
-	write_sysreg(__kvm_hyp_vector, vbar_el1);
+	write_sysreg(kvm_get_hyp_vector(), vbar_el1);
}

static void __hyp_text __activate_traps_nvhe(void)
@@ -93,6 +101,9 @@
    write_sysreg(val, hcr_el2);
+
+if (cpus_have_const_cap(ARM64_HAS_RAS_EXTN) && (val & HCR_VSE))
+write_sysreg_s(vcpu->arch.vsesr_el2, SYS_VSESР_EL2);
+
/* Trap on AArch32 cp15 c15 accesses (EL1 or EL0) */
write_sysreg(1 << 15, hstr_el2);
/*
@@ -130,7 +141,7 @@
    mdcr_el2 |= MDCR_EL2_E2PB_MASK << MDCR_EL2_E2PB_SHIFT;
    write_sysreg(mdcr_el2, mdcr_el2);

- write_sysreg(HCR_RW, hcr_el2);
+ write_sysreg(HCR_HOST_NVHE_FLAGS, hcr_el2);
 write_sysreg(CPTR_EL2_DEFAULT, cptr_el2);
 }

@@ -219,10 +230,10 @@
 * saved the guest context yet, and we may return early...
 */
 par = read_sysreg(par_el1);
-asm volatile("at s1e1r, %0" : : "r" (far));
 -isb();
 -
-tmp = read_sysreg(par_el1);
+if (!__kvm_at("s1e1r", far))
+tmp = read_sysreg(par_el1);
+else
+tmp = 1; /* back to the guest */
+write_sysreg(par, par_el1);

if (unlikely(tmp & 1))
 @@ -235,11 +246,12 @@
 static bool __hyp_text __populate_fault_info(struct kvm_vcpu *vcpu)
 { }
-u64 esr = read_sysreg_el2(esr);
-u8 ec = ESR_ELx_EC(esr);
+u8 ec;
+u64 esr;
 u64 hpfar, far;

-vcpu->arch.fault.esr_el2 = esr;
+esr = vcpu->arch.fault.esr_el2;
+ec = ESR_ELx_EC(esr);

if (ec != ESR_ELx_EC_DABT_LOW && ec != ESR_ELx_EC_IABT_LOW)
 return true;
 @@ -297,6 +309,39 @@
 }
 }

+static inline bool __hyp_text __needs_ssbd_off(struct kvm_vcpu *vcpu)
 +{
+if (!cpus_have_const_cap(ARM64_SSBD))
+false;
+ +
+return !(vcpu->arch.workaround_flags & VCPU_WORKAROUND_2_FLAG);
+}
+static void __hyp_text __set_guest_arch_workaround_state(struct kvm_vcpu *vcpu)
+{
+  +#ifdef CONFIG_ARM64_SSBD
+  +#/
+  +  * The host runs with the workaround always present. If the
+  +  * guest wants it disabled, so be it...
+  +  */
+  +if (__needs_ssbd_off(vcpu) &&
+    __hyp_this_cpu_read(arm64_ssbd_callback_required))
+  +arm_smccc_1_1_smc(ARM_SMCCC_ARCH_WORKAROUND_2, 0, NULL);
+  +#endif
+}
+
+static void __hyp_text __set_host_arch_workaround_state(struct kvm_vcpu *vcpu)
+{
+  +#ifdef CONFIG_ARM64_SSBD
+  +#/
+  +  * If the guest has disabled the workaround, bring it back on.
+  +  */
+  +if (__needs_ssbd_off(vcpu) &&
+    __hyp_this_cpu_read(arm64_ssbd_callback_required))
+  +arm_smccc_1_1_smc(ARM_SMCCC_ARCH_WORKAROUND_2, 1, NULL);
+  +#endif
+}
+
+int __hyp_text __kvm_vcpu_run(struct kvm_vcpu *vcpu)
+{
+  struct kvm_cpu_context *host_ctxt;
+  @@ -305,9 +350,9 @@
+  u64 exit_code;
+  vcpu = kern_hyp_va(vcpu);
+  -write_sysreg(vcpu, tpidr_el2);
+
+  host_ctxt = kern_hyp_va(vcpu->arch.host_cpu_context);
+  +host_ctxt->__hyp_running_vcpu = vcpu;
+  guest_ctxt = &vcpu->arch.ctxt;
+  __sysreg_save_host_state(host_ctxt);
+  @@ -327,11 +372,15 @@
+  __sysreg_restore_guest_state(guest_ctxt);
+  __debug_restore_state(vcpu, kern_hyp_va(vcpu->arch.debug_ptr), guest_ctxt);
+  +__set_guest_arch_workaround_state(vcpu);
+  +/
+  /* Jump in the fire! */
  again:
  exit_code = __guest_enter(vcpu, host_ctxt);
/* And we're baaack! */

+if (ARM_EXCEPTION_CODE(exit_code) != ARM_EXCEPTION_IRQ)
+vcpu->arch.fault.esr_el2 = read_sysreg_el2(esr);
/*
 * We're using the raw exception code in order to only process
 * the trap if no SError is pending. We will come back to the
 @ @ -349,7 +398,7 @@
 kvm_vcpu_trap_get_fault_type(vcpu) == FSC_FAULT &&
 kvm_vcpu_dabt_isvalid(vcpu) &&
 !kvm_vcpu_dabt_isextabt(vcpu) &&
-!kvm_vcpu_dabt_iss1tw(vcpu);
+!kvm_vcpu_abt_iss1tw(vcpu);

if (valid) {
  int ret = __vgic_v2_perform_cpuif_access(vcpu);
  @ @ -393,6 +442,8 @@
 /* 0 falls through to be handled out of EL2 */
 }

+__set_host_arch_workaround_state(vcpu);
+
+fp_enabled = __fpsimd_enabled();

__sysreg_save_guest_state(guest_ctxt);
@@ -422,7 +473,8 @@
 static const char __hyp_panic_string[] = "HYP panic:\nPS:%08llx PC:%016llx ESR:%08llx
 HPFAR:%016llx PAR:%016llx\nVCPU:%p"
;
-static void __hyp_text __hyp_call_panic_nvhe(u64 spsr, u64 elr, u64 par)
+static void __hyp_text __hyp_call_panic_nvhe(u64 spsr, u64 elr, u64 par,
+    struct kvm_vcpu *vcpu)
{ }

unsigned long str_va;
@@ -431,40 +483,37 @@
 * making sure it is a kernel address and not a PC-relative
 * reference.
 */
-asm volatile("ldr %0, =__hyp_panic_string" : =r (str_va));
+asm volatile("ldr %0, =%1" : =r (str_va) : "S" (__hyp_panic_string));

__hyp_do_panic(str_va,
    spsr, elr,
    read_sysreg(esr_el2), read_sysreg_el2(far),
    - read_sysreg(hpfar_el2), par,
    - (void *)read_sysreg(tpidr_el2));
read_sysreg(hpfar_el2), par, vcpu);
}

static void __hyp_text __hyp_call_panic_vhe(u64 spsr, u64 elr, u64 par,
    struct kvm_vcpu *vcpu)
{
panic(__hyp_panic_string,
    spsr, elr,
    read_sysreg_el2(esr), read_sysreg_el2(far),
    read_sysreg(hpfar_el2), par,
    (void *)read_sysreg(tpidr_el2));
    read_sysreg(hpfar_el2), par, vcpu);
}

static hyp_alternate_select(__hyp_call_panic,
    __hyp_call_panic_nvhe, __hyp_call_panic_vhe,
    ARM64_HAS_VIRT_HOST_EXTN);

void __hyp_text __noreturn __hyp_panic(void)
    struct kvm_cpu_context *host_ctxt)
{
struct kvm_vcpu *vcpu = NULL;

u64 spsr = read_sysreg_el2(spsr);
u64 elr = read_sysreg_el2(elr);
u64 par = read_sysreg(par_el1);

if (read_sysreg(vttbr_el2)) {
    struct kvm_vcpu *vcpu;
    struct kvm_cpu_context *host_ctxt;
    vcpu = (struct kvm_vcpu *)read_sysreg(tpidr_el2);
    host_ctxt = kern_hyp_va(vcpu->arch.host_cpu_context);
    +vcpu = host_ctxt->__hyp_running_vcpu;
    __timer_disable_traps(vcpu);
    __deactivate_traps(vcpu);
    __deactivate_vm(vcpu);
    @@ -472,7 +521,34 @@
}

/* Call panic for real */
    __hyp_call_panic()(spsr, elr, par);
    __hyp_call_panic()(spsr, elr, par, vcpu);

unreachable();
}
asmlinkage void __hyp_text kvm_unexpected_el2_exception(void) {
    unsigned long addr, fixup;
    struct kvm_cpu_context *host_ctxt;
    struct exception_table_entry *entry, *end;
    unsigned long elr_el2 = read_sysreg(elr_el2);
    +
    +entry = hyp_symbol_addr(__start___kvm_ex_table);
    +end = hyp_symbol_addr(__stop___kvm_ex_table);
    +host_ctxt = __hyp_this_cpu_ptr(kvm_host_cpu_state);
    +
    +while (entry < end) {
        +addr = (unsigned long)&entry->insn + entry->insn;
        +fixup = (unsigned long)&entry->fixup + entry->fixup;
        +
        +if (addr != elr_el2) {
            +entry++;
            +continue;
        +}
        +
        +write_sysreg(fixup, elr_el2);
        +return;
    +}
    +
    +hyp_panic(host_ctxt);
}

--- linux-4.15.0.orig/arch/arm64/kvm/hyp/sysreg-sr.c
+++ linux-4.15.0/arch/arm64/kvm/hyp/sysreg-sr.c
@@ -27,8 +27,8 @@
     */
     * Non-VHE: Both host and guest must save everything.
     *
     * VHE: Host must save tpidr*_el[01], actlr_el1, mdscr_el1, sp0, pc,
     * pstate, and guest must save everything.
     * VHE: Host must save tpidr*_el0, actlr_el1, mdscr_el1, sp_el0,
     * and guest must save everything.
     */

static void __hyp_text __sysreg_save_common_state(struct kvm_cpu_context *ctxt) {
    ctxt->sys_regs[ACTLR_EL1]= read_sysreg(actlr_el1);
    ctxt->sys_regs[TPIDR_EL0]= read_sysreg(tpidr_el0);
    ctxt->sys_regs[TPIDRRO_EL0]= read_sysreg(tpidro_el0);
    ctxt->sys_regs[TPIDR_EL1]= read_sysreg(tpidr_el1);
    ctxt->sys_regs[MDSCR_EL1]= read_sysreg(mdscr_el1);
    ctxt->gp_regs.regs.sp= read_sysreg(sp_el0);
    ctxt->gp_regs.regs.pc= read_sysreg_el2(elr);
    ctxt->gp_regs.regs.pstate= read_sysreg_el2(spsr);
static void __hyp_text __sysreg_save_state(struct kvm_cpu_context *ctxt)
@@ -62,10 +59,16 @@
txt->sys_regs[AMAIR_EL1] = read_sysreg_el1(amair);
txt->sys_regs[CNTKCTL_EL1] = read_sysreg_el1(cntkctl);
txt->sys_regs[PAR_EL1] = read_sysreg(par_el1);
+ctxt->sys_regs[TPIDR_EL1] = read_sysreg(tpidr_el1);
ctxt->gp_regs.sp_el1 = read_sysreg(sp_el1);
txt->gp_regs.elr_el1 = read_sysreg_el1(elr);
txt->gp_regs.spsr[KVM_SPSR_EL1] = read_sysreg_el1(spsr);
+ctxt->gp_regs.regs.pc = read_sysreg_el2(elr);
+ctxt->gp_regs.regs.pstate = read_sysreg_el2(spsr);
+
+if (cpus_have_const_cap(ARM64_HAS_RAS_EXTN))
+ txt->sys_regs[DISR_EL1] = read_sysreg_s(SYS_VDISR_EL2);
}

static hyp_alternate_select(__sysreg_call_save_host_state,
@@ -89,11 +92,8 @@
write_sysreg(ctxt->sys_regs[ACTLR_EL1], actlr_el1);
write_sysreg(ctxt->sys_regs[TPIDR_EL0], tpidr_el0);
write_sysreg(ctxt->sys_regs[TPIDRRO_EL0], tpidro_el0);
-write_sysreg(ctxt->sys_regs[TPIDR_EL1], tpidr_el1);
write_sysreg(ctxt->sys_regs[MDSCR_EL1], mdscr_el1);
write_sysreg(ctxt->gp_regsregs.sp, sp_el0);
-write_sysreg_el2(ctxt->gp_regsregs.pc, elr);
-write_sysreg_el2(ctxt->gp_regsregs.pstate, spsr);
}

static void __hyp_text __sysreg_restore_state(struct kvm_cpu_context *ctxt)
@@ -115,10 +115,16 @@
write_sysreg(ctxt->sys_regs[ACTLR_EL1], actlr_el1);
write_sysreg(ctxt->sys_regs[TPIDR_EL0], tpidr_el0);
write_sysreg(ctxt->sys_regs[TPIDRRO_EL0], tpidro_el0);
+write_sysreg(ctxt->sys_regs[TPIDR_EL1], tpidr_el1);
write_sysreg(ctxt->sys_regs[MDSCR_EL1], mdscr_el1);
write_sysreg(ctxt->gp_regsregs.sp, sp_el0);
+write_sysreg_el2(ctxt->gp_regsregs.pc, elr);
+write_sysreg_el2(ctxt->gp_regsregs.pstate, spsr);
+
+if (cpus_have_const_cap(ARM64_HAS_RAS_EXTN))
+ txt->sys_regs[DISR_EL1] = read_sysreg_s(SYS_VDISR_EL2);
}
static hyp_alternate_select(__sysreg_call_restore_host_state,
@@ -183,3 +189,19 @@
if (vcpu->arch.debug_flags & KVM_ARM64_DEBUG_DIRTY)
write_sysreg(sysreg[DBGVCR32_EL2], dbgvcr32_el2);
}
+
+void __hyp_text __kvm_set_tpidr_el2(u64 tpidr_el2)
+{
+asm("msr tpidr_el2, %0": "r" (tpidr_el2));
+}
+
+void __hyp_text __kvm_enable_ssbs(void)
+{
+u64 tmp;
+
+asm volatile(
+"mrs%0, sctlr_el2\n"
+"orr%0, %0, %1\n"
+"msrctlr_el2, %0"
+.: "=&r" (tmp) : 'L' (SCTLR_ELx_DSSBS));
+}
--- linux-4.15.0.orig/arch/arm64/kvm/hyp/tlb.c
+++ linux-4.15.0/arch/arm64/kvm/hyp/tlb.c
@@ -17,11 +17,15 @@
#include <asm/kvm_hyp.h>
#include <asm/tlbflush.h>
+#include <linux/irqflags.h>

static void __hyp_text __tlb_switch_to_guest_vhe(struct kvm *kvm)
static void __hyp_text __tlb_switch_to_guest_vhe(struct kvm *kvm,
+ unsigned long *flags)
{
    u64 val;

    +local_irq_save(*flags);
    +
    /*
     * With VHE enabled, we have HCR_EL2.(E2H,TGE) = {1,1}, and
     * most TLB operations target EL2/EL0. In order to affect the
     @@ -36,7 +40,8 @@
     isb();
     }

     -static void __hyp_text __tlb_switch_to_guest_nvhe(struct kvm *kvm)
     +static void __hyp_text __tlb_switch_to_guest_nvhe(struct kvm *kvm,
+    unsigned long *flags)
     {
write_sysreg(kvm->arch.vttbr, vttbr_el2);

isb();
@@ -47,7 +52,8 @@
  __tlb_switch_to_guest_vhe,
  ARM64_HAS_VIRT_HOST_EXTN);

+static void __hyp_text __tlb_switch_to_host_vhe(struct kvm *kvm, unsigned long flags)
  {
  /* We're done with the TLB operation, let's restore the host's
   @@ -55,9 +61,12 @@
   */
   write_sysreg(0, vttbr_el2);
   write_sysreg(HCR_HOST_VHE_FLAGS, hcr_el2);
+  isb();
+  local_irq_restore(flags);
  }

+static void __hyp_text __tlb_switch_to_host_nvhe(struct kvm *kvm, unsigned long flags)
  {
  write_sysreg(0, vttbr_el2);
  }  
@@ -69,11 +78,13 @@

  void __hyp_text __kvm_tlb_flush_vmid_ipa(struct kvm *kvm, phys_addr_t ipa)
  {
  +unsigned long flags;
  +
  dsb(ishst);

  /* Switch to requested VMID */
  kvm = kern_hyp_va(kvm);
  __tlb_switch_to_guest(kvm);
  __tlb_switch_to_guest(kvm, &flags);

  /*
   * We could do so much better if we had the VA as well.
   @@ -116,36 +127,39 @@
   if (!has_vhe() && icache_is_vpipt())
  __flush_icache_all();

  __tlb_switch_to_host(kvm);
  __tlb_switch_to_host(kvm, flags);
  }
void __hyp_text __kvm_tlb_flush_vmid(struct kvm *kvm)
{
    unsigned long flags;
    dsb(ishst);

    /* Switch to requested VMID */
    kvm = kern_hyp_va(kvm);
    __tlb_switch_to_guest()(kvm);
    __tlb_switch_to_guest()(kvm, &flags);
    __tlbi(vmalls12e1is);
    dsb(ish);
    isb();

    __tlb_switch_to_host()(kvm);
    __tlb_switch_to_host()(kvm, flags);
}

void __hyp_text __kvm_tlb_flush_local_vmid(struct kvm_vcpu *vcpu)
{
    struct kvm *kvm = kern_hyp_va(kern_hyp_va(vcpu)->kvm);
    unsigned long flags;

    /* Switch to requested VMID */
    __tlb_switch_to_guest()(kvm);
    __tlb_switch_to_guest()(kvm, &flags);
    __tlbi(vmalle1);
    dsb(nsh);
    isb();

    __tlb_switch_to_host()(kvm);
    __tlb_switch_to_host()(kvm, flags);
}

void __hyp_text __kvm_flush_vm_context(void)
--- linux-4.15.0.orig/arch/arm64/kvm/inject_fault.c
+++ linux-4.15.0/arch/arm64/kvm/inject_fault.c
@@ -164,14 +164,25 @@
    inject_undef64(vcpu);
}
+static void pend_guest_serror(struct kvm_vcpu *vcpu, u64 esr)
+{
+    vcpu_set_vsesr(vcpu, esr);
+    vcpu_set_hcr(vcpu, vcpu_get_hcr(vcpu) | HCR_VSE);
void kvm_inject_vabt(struct kvm_vcpu *vcpu)
{
    -vcpu_set_hcr(vcpu, vcpu_get_hcr(vcpu) | HCR_VSE);
    +pend_guest_serror(vcpu, ESR_ELx_ISV);
}

int kvm_reset_vcpu(struct kvm_vcpu *vcpu)
{
    const struct kvm_regs *cpu_reset;
    +int ret = -EINVAL;

    + * Note: This function can be called from two paths: The KVM_ARM_VCPU_INIT
    + * ioctl or as part of handling a request issued by another VCPU in the PSCI
    + * handling code. In the first case, the VCPU will not be loaded, and in the
    + * second case the VCPU will be loaded. Because this function operates purely
    + * on the memory-backed valus of system registers, we want to do a full put if
    + * we were loaded (handling a request) and load the values back at the end of
    + * the function. Otherwise we leave the state alone. In both cases, we
    + * disable preemption around the vcpu reset as we would otherwise race with
    + * preempt notifiers which also call put/load.
    */
    // linux-4.15.0.orig/arch/arm64/kvm/reset.c
    // linux-4.15.0/arch/arm64/kvm/reset.c
    @@ -31,6 +31,7 @@
    #include <asm/kvm_arm.h>
    #include <asm/kvm.asm.h>
    #include <asm/kvm_coproc.h>
    +#include <asm/kvm_emulate.h>
    #include <asm/kvm_mmu.h>

    /*
    @@ -95,16 +96,36 @@
    * This function finds the right table above and sets the registers on
    * the virtual CPU struct to their architecturally defined reset
    * values.
    */

bool loaded;
+
+/* Reset PMU outside of the non-preemptible section */
+kvm_pmu_vcpu_reset(vcpu);
+
+preempt_disable();
+loaded = (vcpu->cpu != -1);
+if (loaded)
+kvm_arch_vcpu_put(vcpu);

switch (vcpu->arch.target) {
    default:
        if (test_bit(KVM_ARM_VCPU_EL1_32BIT, vcpu->arch.features)) {
            if (!cpu_has_32bit_el1())
                return -EINVAL;
        } else {
            cpu_reset = &default_regs_reset32;
        }
    else {
        cpu_reset = &default_regs_reset;
        goto out;
    }
    cpu_reset = &default_regs_reset;
    /* Reset system registers */
    kvm_reset_sys_regs(vcpu);

    /* Reset PMU */
    kvm_pmu_vcpu_reset(vcpu);
+
+ /* Additional reset state handling that PSCI may have imposed on us.
+ * Must be done after all the sys_reg reset.
+ */
+if (vcpu->arch.reset_state.reset) {
    unsigned long target_pc = vcpu->arch.reset_state.pc;
    
    /* Gracefully handle Thumb2 entry point */
    if (vcpu_mode_is_32bit(vcpu) & target_pc & 1) {
        target_pc &= ~1UL;
        vcpu_set_thumb(vcpu);
    }
    
    /* Propagate caller endianness */
    if (vcpu->arch.reset_state.be)
        kvm_vcpu_set_be(vcpu);
    
    /*vcpu_pc(vcpu) = target_pc;
    vcpu_set_reg(vcpu, 0, vcpu->arch.reset_state.r0);
    */
    vcpu->arch.reset_state.reset = false;
}
/* Default workaround setup is enabled (if supported) */
+if (kvm_arm_have_ssbd() == KVM_SSBD_KERNEL)
+vcpu->arch.workaround_flags |= VCPU_WORKAROUND_2_FLAG;

/* Reset timer */
-return kvm_timer_vcpu_reset(vcpu);
+ret = kvm_timer_vcpu_reset(vcpu);
+out:
+if (loaded)
+kvm_arch_vcpu_load(vcpu, smp_processor_id());
+preempt_enable();
+return ret;
}
--- linux-4.15.0.orig/arch/arm64/kvm/sys_regs.c
+++ linux-4.15.0/arch/arm64/kvm/sys_regs.c
@@ -279,14 +279,14 @@
 struct sys_reg_params *p,
 const struct sys_reg_desc *rd)
 { 
- u64 *dbg_reg = &vcpu->arch.vcpu_debug_state.dbg_bvr[rd->reg];
+ u64 *dbg_reg = &vcpu->arch.vcpu_debug_state.dbg_bvr[rd->CRm];
 if (p->is_write)
 reg_to_dbg(vcpu, p, dbg_reg);
 else
 dbg_to_reg(vcpu, p, dbg_reg);
-
+trace_trap_reg(__func__, rd->CRm, p->is_write, *dbg_reg);
 return true;
 }
@@ -294,7 +294,7 @@
 static int set_bvr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd,
 const struct kvm_one_reg *reg, void __user *uaddr)
 { 
- u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bvr[rd->reg];
+ u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bvr[rd->CRm];
 if (copy_from_user(r, uaddr, KVM_REG_SIZE(reg->id)) != 0)
 return -EFAULT;
@@ -304,7 +304,7 @@
 static int get_bvr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd,
 const struct kvm_one_reg *reg, void __user *uaddr)
 { 
- u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bvr[rd->reg];
+ u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bvr[rd->CRm];

if (copy_to_user(uaddr, r, KVM_REG_SIZE(reg->id)) != 0)
    return -EFAULT;

static void reset_bvr(struct kvm_vcpu *vcpu,
        const struct sys_reg_desc *rd)
{
    vcpu->arch.vcpu_debug_state.dbg_bvr[rd->id] = rd->val;
    vcpu->arch.vcpu_debug_state.dbg_bvr[rd->CRm] = rd->val;
}

static bool trap_bcr(struct kvm_vcpu *vcpu,
        struct sys_reg_params *p,
        const struct sys_reg_desc *rd)
{
    u64 *dbg_reg = &vcpu->arch.vcpu_debug_state.dbg_bcr[rd->id];
    u64 *dbg_reg = &vcpu->arch.vcpu_debug_state.dbg_bcr[rd->CRm];

    if (p->is_write)
        reg_to_dbg(vcpu, p, dbg_reg);
    else
        dbg_to_reg(vcpu, p, dbg_reg);

    trace_trap_reg(__func__, rd->id, p->is_write, *dbg_reg);
    trace_trap_reg(__func__, rd->CRm, p->is_write, *dbg_reg);

    return true;
}

static int set_bcr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd,
        const struct kvm_one_reg *reg, void __user *uaddr)
{
    u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bcr[rd->id];
    u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bcr[rd->CRm];

    if (copy_from_user(r, uaddr, KVM_REG_SIZE(reg->id)) != 0)
        return -EFAULT;

static int get_bcr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd,
        const struct kvm_one_reg *reg, void __user *uaddr)
{
    u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bcr[rd->id];
    u64 *r = &vcpu->arch.vcpu_debug_state.dbg_bcr[rd->CRm];

    if (copy_to_user(uaddr, r, KVM_REG_SIZE(reg->id)) != 0)
        return -EFAULT;

static void reset_bcr(struct kvm_vcpu *vcpu,
        const struct sys_reg_desc *rd)
static bool trap_wvr(struct kvm_vcpu *vcpu, 
    struct sys_reg_params *p, 
    const struct sys_reg_desc *rd) 
{
    u64 *dbg_reg = &vcpu->arch.vcpu_debug_state.dbg_wvr[rd->reg];
    if (p->is_write)
        reg_to_dbg(vcpu, p, dbg_reg);
    else
        dbg_to_reg(vcpu, p, dbg_reg);

    trace_trap_reg(__func__, rd->reg, p->is_write,
                    vcpu->arch.vcpu_debug_state.dbg_wvr[rd->reg]);

    return true;
}

static int set_wvr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd, 
    const struct kvm_one_reg *reg, void __user *uaddr) 
{
    __u64 *r = &vcpu->arch.vcpu_debug_state.dbg_wvr[rd->reg];
    if (copy_from_user(r, uaddr, KVM_REG_SIZE(reg->id)) != 0)
        return -EFAULT;

    trace_trap_reg(__func__, rd->reg, rd->is_write,
                   vcpu->arch.vcpu_debug_state.dbg_wvr[rd->reg]);

    return 0;
}

static int get_wvr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd, 
    const struct kvm_one_reg *reg, void __user *uaddr) 
{
    __u64 *r = &vcpu->arch.vcpu_debug_state.dbg_wvr[rd->reg];
    if (copy_to_user(uaddr, r, KVM_REG_SIZE(reg->id)) != 0)
        return -EFAULT;

    trace_trap_reg(__func__, rd->reg, rd->is_write,
                   vcpu->arch.vcpu_debug_state.dbg_wvr[rd->reg]);

    return 0;
}

static void reset_wvr(struct kvm_vcpu *vcpu, 
    const struct sys_reg_desc *rd) 
{
    vcpu->arch.vcpu_debug_state.dbg_wvr[rd->reg] = rd->val;
    vcpu->arch.vcpu_debug_state.dbg_wvr[rd->CRm] = rd->val;
}
static bool trap_wcr(struct kvm_vcpu *vcpu,
    struct sys_reg_params *p,
    const struct sys_reg_desc *rd)
{
    u64 *dbg_reg = &vcpu->arch.vcpu_debug_state.dbg_wcr[rd->reg];
    +u64 *dbg_reg = &vcpu->arch.vcpu_debug_state.dbg_wcr[rd->CRm];

    if (p->is_write)
        reg_to_dbg(vcpu, p, dbg_reg);
    else
        dbg_to_reg(vcpu, p, dbg_reg);

    -trace_trap_reg(__func__, rd->reg, p->is_write, *dbg_reg);
    +trace_trap_reg(__func__, rd->CRm, p->is_write, *dbg_reg);

    return true;
}

@@ -422,7 +422,7 @@
static int set_wcr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd,
    const struct kvm_one_reg *reg, void __user *uaddr)
{
    __u64 *r = &vcpu->arch.vcpu_debug_state.dbg_wcr[rd->reg];
    +__u64 *r = &vcpu->arch.vcpu_debug_state.dbg_wcr[rd->CRm];

    if (copy_from_user(r, uaddr, KVM_REG_SIZE(reg->id)) != 0)
        return -EFAULT;
@@ -432,7 +432,7 @@
static int get_wcr(struct kvm_vcpu *vcpu, const struct sys_reg_desc *rd,
    const struct kvm_one_reg *reg, void __user *uaddr)
{
    __u64 *r = &vcpu->arch.vcpu_debug_state.dbg_wcr[rd->reg];
    +__u64 *r = &vcpu->arch.vcpu_debug_state.dbg_wcr[rd->CRm];

    if (copy_to_user(uaddr, r, KVM_REG_SIZE(reg->id)) != 0)
        return -EFAULT;
@@ -442,7 +442,7 @@
static void reset_wcr(struct kvm_vcpu *vcpu,
    const struct sys_reg_desc *rd)
{
    -vcpu->arch.vcpu_debug_state.dbg_wcr[rd->reg] = rd->val;
    +vcpu->arch.vcpu_debug_state.dbg_wcr[rd->CRm] = rd->val;
}

static void reset_amair_el1(struct kvm_vcpu *vcpu, const struct sys_reg_desc *r)
@@ -471,6 +471,10 @@
{
u64 pmcr, val;

+/* No PMU available, PMCR_EL0 may UNDEF... */+
+if (!kvm_arm_support_pmu_v3())
+return;
+
+pmcr = read_sysreg(pmcr_el0);
+/
+* Writable bits of PMCR_EL0 (ARMV8_PMU_PMCR_MASK) are reset to UNKNOWN
@@ -478,7 +482,7 @@
val = ((pmcr & ~ARMV8_PMU_PMCR_MASK)
       | (ARMV8_PMU_PMCR_MASK & 0xdecafbad)) & (~ARMV8_PMU_PMCR_E);
-vcpu_sys_reg(vcpu, PMCR_EL0) = val;
+vcpu_sys_reg(vcpu, r->reg) = val;
}

static bool check_pmu_access_disabled(struct kvm_vcpu *vcpu, u64 flags)
@@ -820,13 +824,13 @@
  trap_bcr, reset_bcr, 0, 0, get_bcr, set_bcr },
  trap_wcr, reset_wcr, 0, 0, get_wcr, set_wcr }
+
  trap_wcr, reset_wcr, 0, 0, get_wcr, set_wcr }

/* Macro to expand the PMEVCNTRn_EL0 register */
#define PMU_PMEVCNTR_EL0(n)}@ -1159.6 +1163.16 @@
  { SYS_DESC(SYS_ERRIDR_EL1), trap_raz_wi },
  { SYS_DESC(SYS_ERRSELR_EL1), trap_raz_wi },
  { SYS_DESC(SYS_ERRXFR_EL1), trap_raz_wi },
  { SYS_DESC(SYS_ERRXCTLR_EL1), trap_raz_wi },
  { SYS_DESC(SYS_ERRXSTATUS_EL1), trap_raz_wi },
  { SYS_DESC(SYS_ERRXADDR_EL1), trap_raz_wi },
  { SYS_DESC(SYS_ERRXMISC0_EL1), trap_raz_wi },
/* Silly macro to expand the DBG{BCR,BVR,WCR,WVR}_{n}\n  { SYS_DESC(SYS_AFSGR0_EL1), access_vm_reg, reset_unknown, AFSR0_EL1 },
  { SYS_DESC(SYS_AFSGR1_EL1), access_vm_reg, reset_unknown, AFSR1_EL1 },
  { SYS_DESC(SYS_ESR_EL1), access_vm_reg, reset_unknown, ESR_EL1 },
+  +{ SYS_DESC(SYS_ERRIDR_EL1), trap_raz_wi },
+  +{ SYS_DESC(SYS_ERRSELR_EL1), trap_raz_wi },
+  +{ SYS_DESC(SYS_ERRXFR_EL1), trap_raz_wi },
+  +{ SYS_DESC(SYS_ERRXCTLR_EL1), trap_raz_wi },
+  +{ SYS_DESC(SYS_ERRXSTATUS_EL1), trap_raz_wi },
+  +{ SYS_DESC(SYS_ERRXADDR_EL1), trap_raz_wi },
+  +{ SYS_DESC(SYS_ERRXMISC0_EL1), trap_raz_wi },

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{ SYS_DESC(SYS_ERXMISC1_EL1), trap_raz_wi },
+{ SYS_DESC(SYS_FAR_EL1), access_vm_reg, reset_unknown, FAR_EL1 },
{ SYS_DESC(SYS_PAR_EL1), NULL, reset Unknown, PAR_EL1 }

@@ -1169,6 +1183,7 @@
{ SYS_DESC(SYS_AMAIR_EL1), access_vm_reg, reset_amair_el1, AMAIR_EL1 },

{ SYS_DESC(SYS_VBAR_EL1), NULL, reset_val, VBAR_EL1, 0 },
+{ SYS_DESC(SYS_DISR_EL1), NULL, reset_val, DISR_EL1, 0 },

{ SYS_DESC(SYS_ICC_IAR0_EL1), write_to_read_only },
{ SYS_DESC(SYS_ICC_EOIR0_EL1), read_from_write_only },
@@ -1188,7 +1203,7 @@
{ SYS_DESC(SYS_CSSELR_EL1), NULL, reset_unknown, CSSELR_EL1 },

-{ SYS_DESC(SYS_PMCR_EL0), access_pmcr, reset_pmcr, },
+{ SYS_DESC(SYS_PMCR_EL0), access_pmcr, reset_pmcr, PMCR_EL0 },
{ SYS_DESC(SYS_PMCTENSET_EL0), access_pmcten, reset_known, PMCTENSET_EL0 },
{ SYS_DESC(SYS_PMCTENCLR_EL0), access_pmcten, NULL, PMCTENSET_EL0 },
{ SYS_DESC(SYS_PMOVSLR_EL0), access_pmovs, NULL, PMOVSET_EL0 },
@@ -1285,7 +1300,7 @@
{ SYS_DESC(SYS_DACR32_EL2), NULL, reset_unknown, DACR32_EL2 },
{ SYS_DESC(SYS_IFSR32_EL2), NULL, reset_unknown, IFSR32_EL2 },
-{ SYS_DESC(SYS_FPEXC32_EL2), NULL, reset_val, FPEXC32_EL2, 0x70 },
+{ SYS_DESC(SYS_FPEXC32_EL2), NULL, reset_val, FPEXC32_EL2, 0x700 },
}

static bool trap_dbgidr(struct kvm_vcpu *vcpu,
@@ -1384,9 +1399,9 @@
{ Op1( 0), CRn( 0), CRm( 1), Op2( 0), trap_raz_wi },
DBG_BCR_BVR_WCR_WVR(1),
/* DBGDCCINT */
-{ Op1( 0), CRn( 0), CRm( 2), Op2( 0), trap_debug32 },
+{ Op1( 0), CRn( 0), CRm( 2), Op2( 0), trap_debug32, NULL, cp14_DBGDCCINT },
/* DBGDSCRext */
-{ Op1( 0), CRn( 0), CRm( 2), Op2( 0), trap_debug32 },
+{ Op1( 0), CRn( 0), CRm( 2), Op2( 0), trap_debug32, NULL, cp14_DBGDSCRext },
DBG_BCR_BVR_WCR_WVR(2),
/* DBGDTR[RT]Xint */
{ Op1( 0), CRn( 0), CRm( 3), Op2( 0), trap_raz_wi },
@@ -1401,7 +1416,7 @@
{ Op1( 0), CRn( 0), CRm( 6), Op2( 0), trap_raz_wi },
DBG_BCR_BVR_WCR_WVR(6),
/* DBGVCR */
-{ Op1( 0), CRn( 0), CRm( 7), Op2( 0), trap_debug32 },
static void reset_sys_reg_descs(struct kvm_vcpu *vcpu,
   const struct sys_reg_desc *table, size_t num,
   unsigned long *bmap)
{
    unsigned long i;
    for (i = 0; i < num; i++)
      if (table[i].reset) {
        int reg = table[i].reg;
        table[i].reset(vcpu, &table[i]);
        if (reg > 0 && reg < NR_SYS_REGS)
          set_bit(reg, bmap);
      }
}

/**
 @@ -1991,8 +2013,11 @@
 if ((id & KVM_REG_ARM_COPROC_MASK) != KVM_REG_ARM64_SYSREG)
 return NULL;

 +if (!index_to_params(id, &params))
 +return NULL;
 +
 table = get_target_table(vcpu->arch.target, true, &num);
 -r = find_reg_by_id(id, &params, table, num);
 +r = find_reg(&params, table, num);
 if (!r)
   r = find_reg(&params, sys_reg_descs, ARRAY_SIZE(sys_reg_descs));

 @@ -2399,17 +2424,17 @@
size_t num;
const struct sys_reg_desc *table;

/* Catch someone adding a register without putting in reset entry. */
memset(&vcpu->arch.ctxt.sys_regs, 0x42, sizeof(vcpu->arch.ctxt.sys_regs));

DECLARE_BITMAP(bmap, NR_SYS_REGS) = { 0, };

/* Generic chip reset first (so target could override). */
reset_sys_reg_descs(vcpu, sys_reg_descs, ARRAY_SIZE(sys_reg_descs));
reset_sys_reg_descs(vcpu, sys_reg_descs, ARRAY_SIZE(sys_reg_descs), bmap);

table = get_target_table(vcpu->arch.target, true, &num);
reset_sys_reg_descs(vcpu, table, num);
reset_sys_reg_descs(vcpu, table, num, bmap);

for (num = 1; num < NR_SYS_REGS; num++) {
  if (vcpu_sys_reg(vcpu, num) == 0x4242424242424242)
    panic("Didn't reset vcpu_sys_reg(%zi)", num);
  if (WARN(!test_bit(num, bmap),
    "Didn't reset vcpu_sys_reg(%zi)/\n", num))
    break;
}

--- linux-4.15.0.orig/arch/arm64/lib/clear_user.S
+++ linux-4.15.0/arch/arm64/lib/clear_user.S
@@ -21,7 +21,7 @@

/* Prototype: int __clear_user(void *addr, size_t sz)
 */
/* Prototype: int __arch_clear_user(void *addr, size_t sz)
 * Purpose : clear some user memory
 * Params : addr - user memory address to clear
 * sz - number of bytes to clear
@@ -29,8 +29,8 @@
/*
 * Alignment fixed up by hardware.
 */
-ENTRY(__clear_user)
-__uaccess_enable_not_uao x2, x3
+ENTRY(__arch_clear_user)
+__uaccess_enable_not_uao x2, x3, x4
movx2, x1 // save the size for fixup return
subx1, x1, #8
b.mi2f
@@ -50,12 +50,13 @@
b.mi5f
uao_user_alternative 9f, strb, sttrb, wzr, x0, 0
5:movx0, #0
-__uaccess_disable_not_uao x2
+__uaccess_disable_not_uao x2, x3
ret
-ENDPROC(__clear_user)
+ENDPROC(__arch_clear_user)

.section .fixup,"ax"
.align2
9:movx0, x2 // return the original size
+__uaccess_disable_not_uao x2, x3
ret
.previous
--- linux-4.15.0.orig/arch/arm64/lib/copy_from_user.S
+++ linux-4.15.0/arch/arm64/lib/copy_from_user.S
@@ -64,10 +64,10 @@
end:reqx5
ENTRY(__arch_copy_from_user)
-__uaccess_enable_not_uao x3, x4
+__uaccess_enable_not_uao x3, x4, x5
addend, x0, x2
#include "copy_template.S"
-__uaccess_disable_not_uao x3
+__uaccess_disable_not_uao x3, x4
movx0, #0 // Nothing to copy
ret
ENDPROC(__arch_copy_from_user)
@@ -75,5 +75,6 @@
 .section .fixup,"ax"
 .align2
9998:subx0, end, dst // bytes not copied
+__uaccess_disable_not_uao x3, x4
ret
.previous
--- linux-4.15.0.orig/arch/arm64/lib/memchr.S
+++ linux-4.15.0/arch/arm64/lib/memchr.S
@@ -30,7 +30,7 @@
 * Returns:
 * x0 - address of first occurrence of 'c' or 0
 */
-ENTRY(memchr)
+-WEAK(memchr)
  and	w1, w1, #0xff
 1:subs x2, x2, #1
  b.mi2f
--- linux-4.15.0.orig/arch/arm64/lib/memcmp.S
+++ linux-4.15.0/arch/arm64/lib/memcmp.S
@@ -58,7 +58,7 @@
 limit_wd.reqx12
 mask.reqx13

-ENTRY(memcmp)
+-WEAK(memcmp)
  cbz limit, .Lret0
  eortmp1, src1, src2
  tstmp1, #7
--- linux-4.15.0.orig/arch/arm64/lib/memcpy.S
+++ linux-4.15.0/arch/arm64/lib/memcpy.S
@@ -68,9 +68,8 @@
 stp ptr, \regB, \[egC\], \val
 .endm
 -.weak memcpy
 ENTRY(__memcpy)
-ENTRY(memcpy)
+-WEAK(memcpy)
 #include "copy_template.S"
 ret
 ENDPIPROC(memcpy)
--- linux-4.15.0.orig/arch/arm64/lib/memmove.S
+++ linux-4.15.0/arch/arm64/lib/memmove.S
@@ -57,9 +57,8 @@
 D_l.reqx13
 D_h.reqx14

-.weak memmove
 ENTRY(__memmove)
-ENTRY(memmove)
+-WEAK(memmove)
 cmp dstin, src
  b.lo __memcpy
  addtmp1, src, count
@@ -64,7 +64,7 @@
		.req	x14
endloop		.req	x15

-ENTRY(strncmp)
+WEAK(strncmp)
cbzlimit, .Lret0
cortmp1, src1, src2
movzeroones, #REP8_01
--- linux-4.15.0.orig/arch/arm64/lib/strnlen.S
+++ linux-4.15.0/arch/arm64/lib/strnlen.S
@ @ -59.7 +59.7 @@
#define REP8_7f 0x7f7f7f7f7f7f7f7f
#define REP8_80 0x8080808080808080

-ENTRY(strnlen)
+WEAK(strnlen)
cbzlimit, .Lhit_limit
movzeroones, #REP8_01
bicsrc, srcin, #15
--- linux-4.15.0.orig/arch/arm64/lib/strrchr.S
+++ linux-4.15.0/arch/arm64/lib/strrchr.S
@ @ -29.7 +29.7 @@
* Returns:
*x0 - address of last occurrence of 'c' or 0
*/
-ENTRY(strrchr)
+WEAK(strrchr)
movx3, #0
andw1, w1, #0xff
1:ldrbw2, [x0], #1
--- linux-4.15.0.orig/arch/arm64/lib/tishift.S
+++ linux-4.15.0/arch/arm64/lib/tishift.S
@ @ -1.17 +1.6 @@
*/
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+ */

#include <linux/linkage.h>
--- linux-4.15.0.orig/arch/arm64/mm/cache.S
+++ linux-4.15.0/arch/arm64/mm/cache.S
@@ -49,7 +49,7 @@
 *
 Entry(__flush_cache_user_range)
 -uaccess_ttb0_enable x2, x3
+uaccess_ttb0_enable x2, x3, x4
dcache_line_size x2, x3
subx3, x2, #1
bicx4, x0, x3
@@ -72,7 +72,7 @@
 isb
 movx0, #0
1:
- -uaccess_ttb0_disable x1
+uaccess_ttb0_disable x1, x2
 ret
 9:
 movx0, #-EFAULT
@@ -181,6 +181,9 @@
 *
 Entry(__clean_dcache_area_pop)
 +alternative_if_not ARM64_HAS_DCPOP
+b__clean_dcache_area_poc
+alternative_else_nop_endif
 dcache_by_line_op cvap, sy, x0, x1, x2, x3
ret
ENDPIPROC(__clean_dcache_area_pop)
--- linux-4.15.0.orig/arch/arm64/mm/context.c
+++ linux-4.15.0/arch/arm64/mm/context.c
@@ -39,7 +39,16 @@
#define ASID_MASK (~GENMASK(asid_bits - 1, 0))
#define ASID_FIRST_VERSION (1UL << asid_bits)
-#define NUM_USER_ASIDS ASID_FIRST_VERSION
+ +#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+    +#define NUM_USER_ASIDS (ASID_FIRST_VERSION >> 1)
+  +#define asid2idx(asid) (((asid) & ~ASID_MASK) >> 1)
+  +#define idx2asid(idx) (((idx) << 1) & ~ASID_MASK)
+  +#else
/* Get the ASIDBits supported by the current CPU */
static u32 get_cpu_asid_bits(void)
@@ -79,13 +88,6 @@
}

static void set_reserved_asid_bits(void)
-{
-if (IS_ENABLED(CONFIG_QCOM_FALKOR_ERRATUM_1003) &&
-cpus_have Const cap(ARM64_WORKAROUND_QCOM_FALKOR_E1003))
-__set_bit(FALKOR_RESERVED_ASID, asid_map);
-}
-
static void flush_context(unsigned int cpu)
{
int i;
@@ -94,8 +96,6 @@
/* Update the list of reserved ASIDs and the ASID bitmap. */
bitmap_clear(asid_map, 0, NUM_USER_ASIDS);

-set_reserved_asid_bits();
-
for_each_possible_cpu(i) {
 asid = atomic64_xchg_relaxed(&per_cpu(active_asids, i), 0);
/*
@@ -107,7 +107,7 @@
 */
if (asid == 0)
 asid = per_cpu(reserved_asids, i);
-__set_bit(asid & ~ASID_MASK, asid_map);
+__set_bit(asid2idx(asid), asid_map);
 per_cpu(reserved_asids, i) = asid;
}

@@ -162,16 +162,16 @@
 * We had a valid ASID in a previous life, so try to re-use
 * it if possible.
 */
-asid &~ ASID_MASK;
-if (!__test_and_set_bit(asid, asid_map))
+if (!__test_and_set_bit(asid2idx(asid), asid_map))
 return newasid;
/ * Allocate a free ASID. If we can't find one, take a note of the *
/ - * currently active ASIDs and mark the TLBs as requiring flushes.
/ - * We always count from ASID #1, as we use ASID #0 when setting a
/ - * reserved TTBR0 for the init_mm.
+ * currently active ASIDs and mark the TLBs as requiring flushes. We
+ * always count from ASID #2 (index 1), as we use ASID #0 when setting
+ * a reserved TTBR0 for the init_mm and we allocate ASIDs in even/odd
+ * pairs.
+ */
+ asid = find_next_zero_bit(asid_map, NUM_USER_ASIDS, cur_idx);
+ if (asid != NUM_USER_ASIDS)
+ @@ -188,32 +188,35 @@
+ set_asid:
+__set_bit(asid, asid_map);
+cur_idx = asid;
+-return asid | generation;
+return idx2asid(asid) | generation;
+
+ void check_and_switch_context(struct mm_struct *mm, unsigned int cpu)
+{
+ unsigned long flags;
+ -u64 asid;
+ +u64 asid, old_active_asid;
+
+ asid = atomic64_read(&mm->context.id);
+
+ /*
+  * The memory ordering here is subtle.
+  * - * If our ASID matches the current generation, then we update
+  * - our active_asids entry with a relaxed xchg. Racing with a
+  * - concurrent rollover means that either:
+  * + * If our active_asids is non-zero and the ASID matches the current
+  * + * generation, then we update the active_asids entry with a relaxed
+  * + * cmpxchg. Racing with a concurrent rollover means that either:
+  * *
+  * - * - We get a zero back from the xchg and end up waiting on the
+  * + * - We get a zero back from the cmpxchg and end up waiting on the
+  * + * lock. Taking the lock synchronises with the rollover and so
+  * + * we are forced to see the updated generation.
+  * *
+  * - * - We get a valid ASID back from the xchg, which means the
+  * + * - We get a valid ASID back from the cmpxchg, which means the
+  * + * relaxed xchg in flush_context will treat us as reserved
+  * + * because atomic RmWs are totally ordered for a given location.
+ */
if (!((asid ^ atomic64_read(&asid_generation)) >> asid_bits)
&& atomic64_xchg_relaxed(&per_cpu(active_asids, cpu), asid))
+old_active_asid = atomic64_read(&per_cpu(active_asids, cpu));
+if (old_active_asid &&
  !((asid ^ atomic64_read(&asid_generation)) >> asid_bits) &&
  atomic64_cmplxchg_relaxed(&per_cpu(active_asids, cpu),
  old_active_asid, asid))
goto switch_mm_fastpath;

raw_spin_lock_irqsave(&cpu_asid_lock, flags);
@@ -231,6 +234,9 @@
raw_spin_unlock_irqrestore(&cpu_asid_lock, flags);

switch_mm_fastpath:
+
+arm64_apply_bp_hardening();
+
/*
 * Defer TTBR0_EL1 setting for user threads to uaccess_enable() when
 * emulating PAN.
@@ -239,6 +245,15 @@
cpu_switch_mm(mm->pgd, mm);
 }

/* Errata workaround post TTBRx_EL1 update. */
+asmlinkage void post_ttbr_update_workaround(void)
+{
+asm(ALTERNATIVE("nop; nop; nop",
+"ic iallu; dsb nsh; isb",
+ARM64_WORKAROUND_CAVIUM_27456,
+CONFIG_CAVIUM_ERRATUM_27456));
+}
+
+static int asids_init(void)
+{
+asid_bits = get_cpu_asid_bits();
@@ -254,8 +269,6 @@
panic("Failed to allocate bitmap for %lu ASIDs\n",
 NUM_USER_ASIDS);

-set_reserved_asid_bits();
-
-pr_info("ASID allocator initialised with %lu entries\n", NUM_USER_ASIDS);
return 0;
+
}
size >> PAGE_SHIFT); return NULL;

- if (!coherent)
-  __dma_flush_area(page_to_virt(page), iosize);
-
addr = dma_common_contiguous_remap(page, size, VM_USERMAP,
    prot,
    __builtin_return_address(0));
- if (!addr) {
+ if (addr) {
+ if (!coherent)
+  __dma_flush_area(page_to_virt(page), iosize);
+ memset(addr, 0, size);
+ } else {
+ iommu_dma_unmap_page(dev, *handle, iosize, 0, attrs);
+ dma_release_from_contiguous(dev, page,
    size >> PAGE_SHIFT);
+ @ @ -708.6 +709.11 @ @
if (dma_mmap_from_dev_coherent(dev, vma, cpu_addr, size, &ret))
return ret;

+ if (!is_vmalloc_addr(cpu_addr)) {
+ unsigned long pfn = page_to_pfn(virt_to_page(cpu_addr));
+ return __swiotlb_mmap_pfn(vma, pfn, size);
+ }
+ if (attrs & DMA_ATTR_FORCE_CONTIGUOUS) {
*/
  * DMA_ATTR_FORCE_CONTIGUOUS allocations are always remapped,
  @@ -731.6 +737.11 @@
unsigned int count = PAGE_ALIGN(size) >> PAGE_SHIFT;
struct vm_struct *area = find_vm_area(cpu_addr);

+ if (!is_vmalloc_addr(cpu_addr)) {
+ struct page *page = virt_to_page(cpu_addr);
+ return __swiotlb_get_sgttable_page(sgt, page, size);
+ }
+ if (attrs & DMA_ATTR_FORCE_CONTIGUOUS) {
*/
  * DMA_ATTR_FORCE_CONTIGUOUS allocations are always remapped,
-if (addr < USER_DS && system_uses_ttbr0_pan())
+if (addr < TASK_SIZE && system_uses_ttbr0_pan())
return fsc_type == ESR_ELx_FSC_FAULT &&
(regs->pstate & PSR_PAN_BIT);

@@ -388,7 +388,7 @@
struct task_struct *tsk;
struct mm_struct *mm;
int fault, sig, code, major = 0;
-unsigned long vm_flags = VM_READ | VM_WRITE;
+unsigned long vm_flags = VM_READ | VM_WRITE | VM_EXEC;
unsigned int mm_flags = FAULT_FLAG_ALLOW_RETRY | FAULT_FLAG_KILLABLE;

if (notify_page_fault(regs, esr))
@@ -414,7 +414,7 @@
mm_flags |= FAULT_FLAG_WRITE;
}

-if (addr < USER_DS && is_permission_fault(esr, regs, addr)) {
+if (addr < TASK_SIZE && is_permission_fault(esr, regs, addr)) {
/* regs->orig_addr_limit may be 0 if we entered from EL0 */
if (regs->orig_addr_limit == KERNEL_DS)
die("Accessing user space memory with fs=KERNEL_DS", regs, esr);
@@ -707,6 +707,29 @@
arm64_notify_die("", regs, &info, esr);
}

+asmlinkage void __exception do_el0_irq_bp_hardening(void)
+{
+/* PC has already been checked in entry.S */
+arm64_apply_bp_hardening();
+}
+
+asmlinkage void __exception do_el0_ia_bp_hardening(unsigned long addr,
+ unsigned int esr,
+ struct pt_regs *regs)
+{
+/*
+ * We've taken an instruction abort from userspace and not yet
+ * re-enabled IRQs. If the address is a kernel address, apply
+ * BP hardening prior to enabling IRQs and pre-emption.
+ */
+if (addr > TASK_SIZE)
+arm64_apply_bp_hardening();
+local_irq_enable();
+do_mem_abort(addr, esr, regs);
+}
asm linkage void __exception do_sp_pc_abort(unsigned long addr,  
    unsigned int esr,  
    struct pt_regs *regs)
@@ -714,6 +737,12 @@
    struct siginfo info;
    struct task_struct *tsk = current;

    +if (user_mode(regs)) {
    +if (instruction_pointer(regs) > TASK_SIZE)
    +arm64_apply_bp_hardening();
    +local_irq_enable();
    +}
    +
    if (show_unhandled_signals && unhandled_signal(tsk, SIGBUS))
    pr_info_ratelimited("%s[%d]: %s exception: pc=%p sp=%p\n",
        tsk->comm, task_pid_nr(tsk),
@@ -758,11 +787,12 @@
        debug_fault_info[nr].name= name;
    }

    -asm linkage int __exception do_debug_exception(unsigned long addr,  
    +asm linkage int __exception do_debug_exception(unsigned long addr_if_watchpoint,  
        unsigned int esr,  
        struct pt_regs *regs)
    {
        const struct fault_info *inf = debug_fault_info + DBG_ESR_EVT(esr);
    +unsigned long pc = instruction_pointer(regs);
        struct siginfo info;
        int rv;

@@ -773,16 +803,19 @@
    if (interrupts_enabled(regs))
        trace_hardirqs_off();

    -if (!inf->fn(addr, esr, regs)) {
    +if (user_mode(regs) && pc > TASK_SIZE)
    +arm64_apply_bp_hardening();
    +
    +if (!inf->fn(addr_if_watchpoint, esr, regs)) {
        rv = 1;
    } else {
        pr_alert("Unhandled debug exception: %s (0x%08x) at 0x%016lx\n",
            -inf->name, esr, addr);
    + inf->name, esr, pc);
        info.si_signo = inf->sig;
info.si_errno = 0;
info.si_code = inf->code;
-info.si_addr = (void __user *)addr;
+info.si_addr = (void __user *)pc;
arm64_notify_die("", regs, &info, 0);
r = 0;
}
@@ -795,7 +828,7 @@
NOKPROBE_SYMBOL(do_debug_exception);

#ifdef CONFIG_ARM64_PAN
-int cpu_enable_pan(void *__unused)
+void cpu_enable_pan(const struct arm64_cpu_capabilities *__unused)
{
 *
 */
 * We modify PSTATE. This won't work from irq context as the PSTATE
@@ -805,6 +838,5 @@
config_sctlr_el1(SCTRL_EL1_SPAN, 0);
asm(SET_PSTATE_PAN(1));
-return 0;
}
#endif /* CONFIG_ARM64_PAN */
--- linux-4.15.0.orig/arch/arm64/mm/hugetlbpage.c
+++ linux-4.15.0/arch/arm64/mm/hugetlbpage.c
@@ -118,11 +118,14 @@
/*
 * If HW_AFDBM is enabled, then the HW could turn on
- * the dirty bit for any page in the set, so check
- * them all. All hugetlb entries are already young.
+ * the dirty or accessed bit for any page in the set,
+ * so check them all.
 */
if (pte_dirty(pte))
orig_pte = pte_mkdirty(orig_pte);
+
+if (pte_young(pte))
+orig_pte = pte_mkyoung(orig_pte);
}
if (valid)
@@ -217,6 +220,8 @@
pte = (pte_t *)pud;
} else if (sz == (PAGE_SIZE * CONT_PTES)) {
pmd_t *pmd = pmd_alloc(mm, pud, addr);
+if (!pmd)
+return NULL;
WARN_ON(addr & (sz - 1));
/*
  @ @ -347,10 +352,13 @ @
if (!pte_same(orig_pte, pte))
changed = 1;

  -/* Make sure we don't lose the dirty state */
  +/* Make sure we don't lose the dirty or young state */
  if (pte_dirty(orig_pte))
pte = pte_mkdirty(pte);

+if (pte_young(orig_pte))
+pte = pte_mkyoung(pte);
+
hugeprot = pte_pgprot(pte);
for (i = 0; i < ncontig; i++, ptep++, addr += pgsize, pfn += dpfn)
  set_pte_at(vma->vm_mm, addr, ptep, pfn_pte(pfn, hugeprot));
--- linux-4.15.0.orig/arch/arm64/mm/init.c
+++ linux-4.15.0/arch/arm64/mm/init.c
@@ -287,7 +287,11 @@
#ifdef CONFIG_HAVE_ARCH_PFN_VALID
int pfn_valid(unsigned long pfn)
{
-  return memblock_is_map_memory(pfn << PAGE_SHIFT);
+  phys_addr_t addr = pfn << PAGE_SHIFT;
+  
+  if ((addr >> PAGE_SHIFT) != pfn)
  +return 0;
  +return memblock_is_map_memory(addr);
}
EXPORT_SYMBOL(pfn_valid);
#endif
@@ -443,7 +447,7 @@
 */
if (memstart_offset_seed > 0 && range >= ARM64_MEMSTART_ALIGN) {
  -range = range / ARM64_MEMSTART_ALIGN + 1;
  +range /= ARM64_MEMSTART_ALIGN;
memstart_addr -= ARM64_MEMSTART_ALIGN *
  ((range * memstart_offset_seed) >> 16);
}
@@ -651,11 +655,13 @@
BUILD_BUG_ON(TASK_SIZE_32		> TASK_SIZE_64);
#endif
+#ifdef CONFIG_SPARSEMEM_VMEMMAP
/*
*/

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* Make sure we chose the upper bound of sizeof(struct page)
  - * correctly.
  + * correctly when sizing the VMEMMAP array.
  */
BUILD_BUG_ON(sizeof(struct page) > (1 << STRUCT_PAGE_MAX_SHIFT));
#endif

if (PAGE_SIZE >= 16384 && get_num_physpages() <= 128) {
  extern int sysctl_overcommit_memory;
  --- linux-4.15.0.orig/arch/arm64/mm/kasan_init.c
  +++ linux-4.15.0/arch/arm64/mm/kasan_init.c
  @@ -203,7 +203,7 @@
    clear_pgds(KASAN_SHADOW_START, KASAN_SHADOW_END);
    kasan_map_populate((unsigned long)kasan_mem_to_shadow(start),
            (unsigned long)kasan_mem_to_shadow(end),
            - pfn_to_nid(virt_to_pfn(lm_alias(_text))));
    + early_pfn_to_nid(virt_to_pfn(lm_alias(_text))));
    kasan_populate_zero_shadow((void *)KASAN_SHADOW_START, (void *)mod_shadow_start);
    @ @ -223,7 +223,7 @@
    kasan_map_populate((unsigned long)kasan_mem_to_shadow(start),
            (unsigned long)kasan_mem_to_shadow(end),
            - pfn_to_nid(virt_to_pfn(start)));
    + early_pfn_to_nid(virt_to_pfn(start)));
    }

    /*
    --- linux-4.15.0.orig/arch/arm64/mm/mmap.c
    +++ linux-4.15.0/arch/arm64/mm/mmap.c
    @@ -65,7 +65,11 @@
            unsigned long gap = rlimit(RLIMIT_STACK);
            -unsigned long pad = (STACK_RND_MASK << PAGE_SHIFT) + stack_guard_gap;
            +unsigned long pad = stack_guard_gap;
            +
            +/* Account for stack randomization if necessary */
            +if (current->flags & PF_RANDOMIZE)
            +pad += (STACK_RND_MASK << PAGE_SHIFT);
            */
            Values close to RLIM_INFINITY can overflow. */
            if (gap + pad > gap)
            --- linux-4.15.0.orig/arch/arm64/mm/mmu.c
            +++ linux-4.15.0/arch/arm64/mm/mmu.c
            @@ -107,7 +107,7 @@
            * The following mapping attributes may be updated in live
* kernel mappings without the need for break-before-make.
 */
- static const pteval_t mask = PTE_PXN | PTE_RDONLY | PTE_WRITE;
+ static const pteval_t mask = PTE_PXN | PTE_RDONLY | PTE_WRITE | PTE_NG;

/* creating or taking down mappings is always safe */
if (old == 0 || new == 0)
@@ -117,6 +117,10 @@
if ((old | new) & PTE_CONT)
      return false;

+/* Transitioning from Non-Global to Global is unsafe */
+if (old & ~new & PTE_NG)
+  return false;
+
+ return ((old ^ new) & ~mask) == 0;
+
@@ -525,6 +529,35 @@
early_param("rodata", parse_rodata);

+#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
+static int __init map_entry_trampoline(void)
+
+ { 
+   pgprot_t prot = rodata_enabled ? PAGE_KERNEL_ROX : PAGE_KERNEL_EXEC;
+   phys_addr_t pa_start = __pa_symbol(__entry_tramp_text_start);
+   
+   /* The trampoline is always mapped and can therefore be global */
+   pgprot_val(prot) &= ~PTE_NG;
+   
+   /* Map only the text into the trampoline page table */
+   memset(tramp_pg_dir, 0, PGD_SIZE);
+   __create_pgd_mapping(tramp_pg_dir, pa_start, TRAMP_VALIAS, PAGE_SIZE,
+     prot, pgd_pgttable_alloc, 0);
+   
+   /* Map both the text and data into the kernel page table */
+   __set_fixmap(FIX_ENTRY_TRAMP_TEXT, pa_start, prot);
+   if (IS_ENABLED(CONFIG_RANDOMIZE_BASE)) {
+     extern char __entry_tramp_data_start[];
+     
+     __set_fixmap(FIX_ENTRY_TRAMP_DATA,
+       __pa_symbol(__entry_tramp_data_start),
+       PAGE_KERNEL_RO);
+   }
+   
+   return 0;
+ }
+core_initcall(map_entry_trampoline);
+#endif
+
/*
 * Create fine-grained mappings for the kernel.
 */
@@ -570,8 +603,8 @@
/* entry instead.
 */
BUG_ON(!IS_ENABLED(CONFIG_ARM64_16K_PAGES));
-set_pud(pud_set_fixmap_offset(pgd, FIXADDR_START),
-__pud(__pa_symbol(bm_pmd) | PUD_TYPE_TABLE));
+pud_populate(&init_mm, pud_set_fixmap_offset(pgd, FIXADDR_START),
+lm_alias(bm_pmd));
pud_clear_fixmap();
} else {
BUG();
@@ -686,7 +719,7 @@
if (!p)
return -ENOMEM;
-set_pmd(pmd, __pmd(__pa(p) | PROT_SECT_NORMAL));
+pmd_set_huge(pmd, __pa(p), __pgprot(PROT_SECT_NORMAL));
} else
vmemmap_verify((pte_t *)pmd, node, addr, next);
} while (addr = next, addr != end);
@@ -868,26 +901,49 @@
int __init arch_ioremap_pud_supported(void)
{
-/* only 4k granule supports level 1 block mappings */
-return IS_ENABLED(CONFIG_ARM64_4K_PAGES);
+/*
+ * Only 4k granule supports level 1 block mappings.
+ * SW table walks can't handle removal of intermediate entries.
+ */
+return IS_ENABLED(CONFIG_ARM64_4K_PAGES) &&
+ !IS_ENABLED(CONFIG_ARM64_PTDUMP_DEBUGFS);
}

int __init arch_ioremap_pmd_supported(void)
{
-/* See arch_ioremap_pud_supported() */
-return !IS_ENABLED(CONFIG_ARM64_PTDUMP_DEBUGFS);
+int pud_set_huge(pud_t *pud, phys_addr_t phys, pgprot_t prot)
int pud_set_huge(pud_t *pudp, phys_addr_t phys, pgprot_t prot) {
    pgprot_t sect_prot = __pgprot(PUD_TYPE_SECT |
    pgprot_val(mk_sect_prot(prot)));
    pud_t new_pud = pfn_pud(__phys_to_pfn(phys), sect_prot);
    /* Only allow permission changes for now */
    if (!pgattr_change_is_safe(READ_ONCE(pud_val(*pudp)),
        pud_val(new_pud)))
        return 0;
    BUG_ON(phys & ~PUD_MASK);
    set_pud(pudp, __pud(phys | PUD_TYPE_SECT | pgprot_val(mk_sect_prot(prot))));
    return 1;
}

int pud_free_pmd_page(pud_t *pud, unsigned long addr) {
    return pud_none(*pud);
}

int pmd_free_pte_page(pmd_t *pmd, unsigned long addr) {
    return pmd_none(*pmd);
}

@@ -906,3 +962,13 @@
pmd_clear(pmd);
    return 1;
}
+
+int pud_free_pmd_page(pud_t *pud, unsigned long addr) {
+    return pud_none(*pud);
+}
+
+int pmd_free_pmd_page(pmd_t *pmd, unsigned long addr) {
+    return pmdnone(*pmd);
+}
+
+int pud_set_huge(pud_t *pudp, phys_addr_t phys, pgprot_t prot) {
+    pgprot_t sect_prot = __pgprot(PUD_TYPE_SECT |
+    pgprot_val(mk_sect_prot(prot)));
+    pud_t new_pud = pfn_pud(__phys_to_pfn(phys), sect_prot);
+    /* Only allow permission changes for now */
+    if (!pgattr_change_is_safe(READ_ONCE(pud_val(*pudp)),
+        pud_val(new_pud)))
+        return 0;
+    BUG_ON(phys & ~PUD_MASK);
+    set_pud(pudp, new_pud);
+    return 1;
+}

-int pmd_set_huge(pmd_t *pmd, phys_addr_t phys, pgprot_t prot) {
+int pmd_set_huge(pmd_t *pmdp, phys_addr_t phys, pgprot_t prot) {
    pgprot_t sect_prot = __pgprot(PMD_TYPE_SECT |
    pgprot_val(mk_sect_prot(prot)));
    pmd_t new_pmd = pfn_pmd(__phys_to_pfn(phys), sect_prot);
    /* Only allow permission changes for now */
    if (!pgattr_change_is_safe(READ_ONCE(pmd_val(*pmdp)),
        pmd_val(new_pmd)))
        return 0;
    BUG_ON(phys & ~PMD_MASK);
    set_pmd(pmdp, new_pmd);
    return 1;
}
const struct cpumask *cpumask_of_node(int node)
{
  if (WARN_ON(node >= nr_node_ids))
    return cpu_none_mask;
  if (WARN_ON(node == NUMA_NO_NODE))
    return cpu_all_mask;
  if (WARN_ON(node < 0 || node >= nr_node_ids))
    return cpu_none_mask;

  if (WARN_ON(node_to_cpumask_map[node] == NULL))
    return cpu_none_mask;

  if (WARN_ON(node_to_cpumask_map[node] == NULL))
    return cpu_none_mask;

  if (WARN_ON(node < 0 || node >= nr_node_ids))
    return cpu_none_mask;

  return cpu_all_mask;
}

if (WARN_ON(node_to_cpumask_map[node] == NULL))
  return cpu_none_mask;

/* Forced off on command line. */
pr_info("NUMA disabled\n");
pr_info("Faking a node at [mem %#018Lx-%#018Lx]\n", 0LLU, PFN_PHYS(max_pfn) - 1);
+memblock_start_of_DRAM(), memblock_end_of_DRAM() - 1);

for_each_memblock(memory, mblk) {
  ret = numa_add_memblk(0, mblk->base, mblk->base + mblk->size);

  mrsx2, tpidr_el0
  mrsx3, tpidro_el0
  mrsx4, contextidr_el1
  -mrsx5, cpacr_el1
  -mrsx6, tcr_el1
  -mrsx7, vbar_el1
  -mrsx8, mdscr_el1
  -mrsx9, oslsr_el1
  -mrsx10, sctlr_el1
  -mrsx11, tpidr_el1
  -mrsx12, sp_el0
  +mrsx5, osdlr_el1
  +mrsx6, cpacr_el1
  +mrsx7, tcr_el1
  +mrsx8, vbar_el1
  +mrsx9, mdscr_el1
  +mrsx10, oslsr_el1
  +mrsx11, sctlr_el1
  +alternative_if_not ARM64_HAS_VIRT_HOST_EXTN
  +mrsx12, tpidr_el1
+alternative_else
+mr sx12, tpidr_el2
+alternative_endif
+mr sx13, sp_el0
stp x2, x3, [x0]
st px4, xzr, [x0, #16]
st px5, x6, [x0, #32]
st px7, x8, [x0, #48]
st px9, x10, [x0, #64]
st px11, x12, [x0, #80]
+stp x4, x5, [x0, #16]
+stp x6, x7, [x0, #32]
+stp x8, x9, [x0, #48]
+stp x10, x11, [x0, #64]
+stp x12, x13, [x0, #80]
ret
ENDPROC(cpu_do_suspend)

@@ -86,7 +91,7 @@
 */
 * x0: Address of context pointer
 */
-pushsection ".idmap.text", "ax"
+.pushsection ".idmap.text", "awx"
ENTRY(cpu_do_resume)
ldpx2, x3, [x0]
ldpx4, x5, [x0, #16]
@@ -100,8 +105,8 @@
msr cpacr_el1, x6

/* Don't change t0sz here, mask those bits when restoring */
- mr sx5, tcr_el1
- bfix8, x5, TCR_T0SZ_OFFSET, TCR_TxSZ_WIDTH
+mr sx7, tcr_el1
+bfix8, x7, TCR_T0SZ_OFFSET, TCR_TxSZ_WIDTH

msr tcr el1, x8
msrvbar el1, x9
@@ -116,14 +121,24 @@
msrmdscr_el1, x10

msrsctrlr_el1, x12
+alternative_if_not ARM64_HAS_VIRT_HOST_EXTN
msrtpidr_el1, x13
+alternative_else
+msrtpidr_el2, x13
+alternative_endif
msr sp_el0, x14
/*
 * Restore oslr_el1 by writing oslar_el1
 */
+msroslr_el1, x5
ubfx11, x11, #1, #1
msroslar_el1, x11
reset_pmuserenr_el0 x0 // Disable PMU access from EL0
+
+alternative_if ARM64_HAS_RAS_EXTN
+msr_sSYS_DISR_EL1, xzr
+alternative_else_nop_endif
+
isb
ret
ENDPROC(cpu_do_resume)
@@ -138,16 +153,30 @@
-* pgd_phys - physical address of new TTB
 */
ENTRY(cpu_do_switch_mm)
-pre_ttb0_update_workaround x0, x2, x3
+msrs2, tbr1_el1
mmidx1, x1 // get mm->context.id
-bfix0, x1, #48, #16 // set the ASID
-mstrttbr0_el1, x0 // set TTBR0
+#ifdef CONFIG_ARM64_SW_TTBR0_PAN
+bfix0, x1, #48, #16 // set the ASID field in TTBR0
+#endif
+bfix2, x1, #48, #16 // set the ASID
+mstrttbr1_el1, x2 // in TTBR1 (since TCR.A1 is set)
isb
-post_ttb0_update_workaround
-ret
+mstrttbr0_el1, x0 // now update TTBR0
+isb
+bpost_ttb_update_workaround // Back to C code...
ENDPROC(cpu_do_switch_mm)

.pushsection ".idmap.text", "ax"
+.pushsection ".idmap.text", "awx"
+
+.macro __idmap_cpu_set_reserved_ttbr1, tmp1, tmp2
+adrp\tmp1, empty_zero_page
+mstrttbr1_el1, \tmp1
+isb
+tlbivmalle1
+dsbnsh
+isb
+.endm
/*
 * void idmap_cpu_replace_ttbr1(phys_addr_t new_pgd)
 * 
 @@ -157,13 +186,7 @@
 ENTRY(idmap_cpu_replace_ttbr1)
 save_and_disable_daif flags=x2

 -adrpx1, empty_zero_page
 -msrttbr1_el1, x1
 -isb
 -
 -tlibvmalle1
 -dsbnsh
 -isb
 +__idmap_cpu_set_reserved_ttbr1 x1, x3

 msrttbr1_el1, x0
 isb
 @@ -174,13 +197,211 @@
 ENDPROC(idmap_cpu_replace_ttbr1)
 .popsection

 +#ifdef CONFIG_UNMAP_KERNEL_AT_EL0
 +.pushsection ".idmap.text", "awx"
 +
 +.macro __idmap_kpti_get_pgtable_ent, type
 +dccvac, cur_	ype(p// Ensure any existing dirty
 +dmbsy// lines are written back before
 +ldr	type, [cur_	ype(p// loading the entry
 +tbz	type, #0, skip_	ype// Skip invalid and
 +tbz	type, #11, skip_	ype// non-global entries
 +.endm
 +
 +.macro __idmap_kpti_put_pgtable_ent_ng, type
 +orr	type, #PTE_NG// Same bit for blocks and pages
 +str	type, [cur_	ype(p// Update the entry and ensure
 +dmbsy// that it is visible to all
 +dccvac, cur_	ype(p// CPUs.
 +.endm
 +
 +/*
 + * void __kpti_install_ng_mappings(int cpu, int num_cpus, phys_addr_t swapper)
 + *
 + * Called exactly once from stop_machine context by each CPU found during boot.
 + */
 +__idmap_kpti_flag:
 +.long 1
ENTRY(idmap_kpti_install_ng_mappings)
cpu.reqw0
num_cpus.reqw1
swapper_pa.reqw2
swapper_ttb.reqw3
flag_ptr.reqw4
cur_pgdp.reqw5
end_pgdp.reqw6
pgd.reqw7
cur_pudp.reqw8
end_pudp.reqw9
pudp.reqw10
cur_pmdp.reqw11
end_pmdp.reqw12
pmdp.reqw13
cur_ptep.reqw14
end_ptep.reqw15
pte.reqw16
+

mrs swapper_ttb, ttbr1_el1
adr flag_ptr, __idmap_kpti_flag
+
cbnzcpu, __idmap_kpti_secondary
+
/* We're the boot CPU. Wait for the others to catch up */
sevl
+1:wfe
+ldaxrw18, [flag_ptr]
eorw18, w18, num_cpus
cbnzw18, 1b
+
/* We need to walk swapper, so turn off the MMU. */
+pre_disable_mmu_workaround
mrxs18, sctlr_el1
bicx18, x18, #SCTLR_ELx_M
msrctlr_el1, x18
isb
+
/* Everybody is enjoying the idmap, so we can rewrite swapper. */
/* PGD */
movcur_pgdp, swapper_pa
addend_pgdp, cur_pgdp, #(PTRS_PER_PGD * 8)
do_pgdp:__idmap_kpti_get_ptable_entpgd
+tbzpgd, #1, walk_puds
+next_pgdp:
+__idmap_kpti_put_ptable_ent_ngpgd
+skip_pgdp:
+addcur_pgdp, cur_pgdp, #8
+cmpcur_pgd, end_pgd
+b.nedo_pgd
+
+/* Publish the updated tables and nuke all the TLBs */
+dsbsy
tlvivmalle1is
dsbsibish
+isb
+
+/* We're done: fire up the MMU again */
mrsx18, sctlr_el1
+orrx18, x18, #SCTLR_ELx_M
+msrsctlr_el1, x18
+isb
+
+/*
+ * Invalidate the local I-cache so that any instructions fetched
+ * speculatively from the PoC are discarded, since they may have
+ * been dynamically patched at the PoU.
+ */
ticiallu
dsbsnsh
+isb
+
+/* Set the flag to zero to indicate that we're all done */
+strwzr, [flag_ptr]
+ret
+
+/* PUD */
walk_puds:
+.if CONFIG_PGTABLE_LEVELS > 3
+pte_to_physcur_pudp, pgd
+addend_pudp, cur_pudp, #(PTRS_PER_PUD * 8)
do_pud: __idmap_kpti_get_pgtable_entpud
tbnzpud, #1, walk_pmds
+next_pud:
+__idmap_kpti_put_pgtable_ent_ngpud
+skip_pud:
+addcur_pudp, cur_pudp, 8
cmpcur_pudp, end_pudp
+b.nedo_pud
+bnext_pgd
+.else /* CONFIG_PGTABLE_LEVELS <= 3 */
movpud, pgd
+bwalk_pmds
+next_pud:
+bnext_pgd
+.endif
+/# PMD */
+walk_pmds:
+.if CONFIG_PGTABLE_LEVELS > 2
+pte_to_physcur_pmdp, pud
+addend_pmdp, cur_pmdp, #(PTRS_PER_PMD * 8)
+do_pmd:__idmap_kpti_get_pgtable_entpmd
+tbzpmd, #1, walk_ptes
+next_pmd:
+__idmap_kpti_put_pgtable_ent_ngpmd
+skip_pmd:
+addcur_pmdp, cur_pmdp, #8
+cmpcur_pmdp, end_pmdp
+b.nedo_pmd
+bnex_pud
+.else /* CONFIG_PGTABLE_LEVELS <= 2 */
+movpmd, pud
+bwalk_ptes
+next_pmd:
+bnex_pud
+.endif
+
+/# PTE */
+walk_ptes:
+pte_to_physcur_pstep, pmd
+addend_pstep, cur_pstep, #(PTRS_PER_PTE * 8)
+do_pstep:__idmap_kpti_get_pgtable_entpste
+__idmap_kpti_put_pgtable_ent_ngpste
+skip_pste:
+addcur_pstep, cur_pstep, #8
+cmpcur_pstep, end_pstep
+b.nedo_pste
+bnex_pmd
+
+/# Secondary CPUs end up here */
+__idmap_kpti_secondary:
+/# Uninstall swapper before surgery begins */
+__idmap_cpu_set_reserved_ttbr1 x18, x17
+
+/# Increment the flag to let the boot CPU we're ready */
+1:ldxrw18, [flag_ptr]
+addw18, w18, #1
+stxrw17, w18, [flag_ptr]
+cbnzw17, 1b
+
+/# Wait for the boot CPU to finish messing around with swapper */
+sevl
+1:wfe
+ldxrw18, [flag_ptr]
cbnzw18, 1b
+
+/* All done, act like nothing happened */
+msrttbr1_el1, swapper_ttb
+isb
+ret
+
+unreqcpu
+unreqnum_cpus
+unreqswapper_pa
+unreqswapper_ttb
+unreqflag_ptr
+unreqcur_pgd
+unreqend_pgd
+unreqpgd
+unreqcur_pudp
+unreqend_pudp
+unreqpud
+unreqcur_pmdp
+unreqend_pmdp
+unreqpmd
+unreqcur_ptep
+unreqend_ptep
+unreqpte
+ENDPROC(idmap_kpti_install_ng_mappings)
+.popsection
+#endif
+
/*
* Initialise the processor for turning the MMU on. Return in x0 the
* value of the SCTLR_EL1 register.
*/
.-pushsection ".idmap.text", "ax"
+.pushsection ".idmap.text", "awx"
ENTRY(__cpu_setup)
tlbivmalle1// Invalidate local TLB
dsbns
@@ -214,17 +435,13 @@
/*
* Prepare SCTLR
*/
-adrx5, crval
-ldpw5, w6, [x5]
-mrsx0, sctlr_el1
-bicx0, x0, x5// clear bits
set bits
+mov_qx0, SCTLR_EL1_SET
/*
 * Set/prepare TCR and TTBR. We use 512GB (39-bit) address range for
 * both user and kernel.
 */
ldrx10, =TCR_TxSZ(VA_BITS) | TCR_CACHE_FLAGS | TCR_SMP_FLAGS | \
-TCR_TG_FLAGS | TCR_ASID16 | TCR_TB10
+TCR_TG_FLAGS | TCR_ASID16 | TCR_TB10 | TCR_A1
 accepted
+// set bits
-tcr_set_idmap_t0sz10, x9
/*
 @@ -242,6 +459,11 @@
 cbzx9, 2f
 cmpx9, #2
 b,lt1f
 +#ifdef CONFIG_ARM64_ERRATUM_1024718
 +/* Disable hardware DBM on Cortex-A55 all versions */
 +cpu_midr_match MIDR_CORTEX_A55, MIDR_CPU_VAR_REV(0, 0), MIDR_CPU_VAR_REV(0xf, 0xf), x1,
 x2, x3, x4
 +cbnzx1, 1f
 +#endif
 orrx10, x10, #TCR_HD// hardware Dirty flag update
 1: orrx10, x10, #TCR_HA// hardware Access flag update
 2:
 @@ -249,21 +471,3 @@
 msr_tcr_el1, x10
 ret// return to head.S
 ENDP(__cpu_setup)
 -
 -/*
 - * We set the desired value explicitly, including those of the
 - * reserved bits. The values of bits EE & E0E were set early in
 - * el2_setup, which are left untouched below.
 - *
 - * n n T
 - * U E WT UD US IHBS
 - * CE0 XWHW CZ ME TEEA S
 - * .... IEE .... NEAI TE1 ..AD DEN0 ACAM
 - * 0011 0... 1101 ..0. ..0. 10...0. .... < hardware reserved
 - * .... 1... 01.1 11.1 ..01 0.01 1101 < software settings
 - */
 -.typecrval, #object
 -crval:
 -.word0xfcffffff// clear
 -.word0x34d5d91d// set
 -.popsection
 --- linux-4.15.0.orig/arch/arm64/net/bpf_jit.h
+++ linux-4.15.0/arch/arm64/net/bpf_jit.h
@@ -100,11 +100,9 @@
#define A64_STXR(sf, Rt, Rn, Rs) \
     A64_LSX(sf, Rt, Rn, Rs, STORE_EX)

-/* Prefetch */
-#define A64_PRFM(Rn, type, target, policy) \
-aarch64_insn_gen_prefetch(Rn, AARCH64_INSN_PRFM_TYPE_##type, \
-     AARCH64_INSN_PRFM_TARGET_##target, \
-     AARCH64_INSN_PRFM_POLICY_##policy)
+/* LSE atomics */
+#define A64_STADD(sf, Rn, Rs) \
+aarch64_insn_gen_stadd(Rn, Rs, A64_SIZE(sf))

/* Add/subtract (immediate) */
#define A64_ADDSUB_IMM(sf, Rd, Rn, imm12, type) \
--- linux-4.15.0.orig/arch/arm64/net/bpf_jit_comp.c
+++ linux-4.15.0/arch/arm64/net/bpf_jit_comp.c
@@ -31,8 +31,6 @@
#include "bpf_jit.h"

-int bpf_jit_enable __read_mostly;
-
#define TMP_REG_1 (MAX_BPF_JIT_REG + 0)
#define TMP_REG_2 (MAX_BPF_JIT_REG + 1)
#define TCALL_CNT (MAX_BPF_JIT_REG + 2)
@@ -238,8 +236,9 @@

/* if (tail_call_cnt > MAX_TAIL_CALL_CNT)
 */
emit_a64_mov_i64(tmp, off, ctx);
emit(A64_LDR32(tmp, r2, tmp), ctx);
+emit(A64_MOV(0, r3, r3), ctx);
emit(A64_CMP(0, r3, tmp), ctx);
-emit(A64_B_(A64_COND_GE, jmp_offset), ctx);
+emit(A64_B_(A64_COND_CS, jmp_offset), ctx);
emit(A64_ADD_I(1, tcc, tcc, 1), ctx);
/* prog = array->ptrs[index];
 */
emit_a64_mov_i64(tmp, MAX_TAIL_CALL_CNT, ctx);
emit(A64_CMP(1, tcc, tmp), ctx);
-emit(A64_B_(A64_COND_GT, jmp_offset), ctx);
+emit(A64_B_(A64_COND_HI, jmp_offset), ctx);
emit(A64_ADD_I(1, tcc, tcc, 1), ctx);

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const int i = insn - ctx->prog->insnsi;
const bool is64 = BPF_CLASS(code) == BPF_ALU64;
const bool isdw = BPF_SIZE(code) == BPF_DW;
-u8 jmp_cond;
+u8 jmp_cond, reg;
s32 jmp_offset;

#define check_imm(bits, imm) do {
				\@@ -705,19 +704,28 @@
break;
}
break;
+
/* STX XADD: lock *(u32 *)(dst + off) += src */
case BPF_STX | BPF_XADD | BPF_W:
/* STX XADD: lock *(u64 *)(dst + off) += src */
case BPF_STX | BPF_XADD | BPF_DW:
-emit_a64_mov_i(1, tmp, off, ctx);
-emit(A64_ADD(1, tmp, tmp, dst), ctx);
-emit(A64_PRFM(tmp, PST, L1, STRM), ctx);
-emit(A64_LDXR(isdw, tmp2, tmp), ctx);
-emit(A64_ADD(isdw, tmp2, tmp2, src), ctx);
-emit(A64_STXR(isdw, tmp2, tmp, tmp3), ctx);
-jmp_offset = -3;
-check_imm19(jmp_offset);
-emit(A64_CBNZ(0, tmp3, jmp_offset), ctx);
+if (!off) {
+reg = dst;
+} else {
+emit_a64_mov_i(1, tmp, off, ctx);
+emit(A64_ADD(1, tmp, tmp, dst), ctx);
+reg = tmp;
+}
+if (cpus_have_cap(ARM64_HAS_LSE_ATOMICS)) {
+emit(A64_STADD(isdw, reg, src), ctx);
+} else {
+emit(A64_LDXR(isdw, tmp2, reg), ctx);
+emit(A64_ADD(isdw, tmp2, tmp2, src), ctx);
+emit(A64_STXR(isdw, tmp2, reg, tmp3), ctx);
+jmp_offset = -3;
+check_imm19(jmp_offset);
+emit(A64_CBNZ(0, tmp3, jmp_offset), ctx);
+}
break;

/* R0 = ntohx(*(size *)((struct sk_buff *)R6)->data + imm) */
--- linux-4.15.0.orig/arch/arm64/xen/hypercall.S
+++ linux-4.15.0/arch/arm64/xen/hypercall.S
@@ -101,12 +101,12 @@
 * need the explicit uaccess_enable/disable if the TTBR0 PAN emulation
 * is enabled (it implies that hardware UAO and PAN disabled).
 */
-	uaccess_ttbr0_enable x6, x7
+	uaccess_ttbr0_enable x6, x7, x8
hvc XEN_IMM

/*
* Disable userspace access from kernel once the hyp call completed.
*/
-	uaccess_ttbr0_disable x6
+	uaccess_ttbr0_disable x6, x7
ret
ENDPROC(privcmd_call);
--- linux-4.15.0.orig/arch/cris/include/arch-v10/arch/bug.h
+++ linux-4.15.0/arch/cris/include/arch-v10/arch/bug.h
@@ -44,18 +44,25 @@
/*
* not be used like this with newer versions of gcc.
*/
#define BUG()  
+do {
    __asm__ __volatile__ ("clear.d ["__stringify(BUG_MAGIC)"]%ut"
        "movu.w "__stringify(__LINE__)",%r0%ut"
        "jump 0%ut"
        ".section .rodata\n"
    ".previous"
+      ".previous")
    +unreachable();
+} while (0)
#endif

#else
/* This just causes an oops. */
-#define BUG() (*(int *)0 = 0)
+#define BUG() (*(int *)0 = 0)
+do {
+  barrier_before_unreachable();
+  __builtin_trap();
+} while (0)
#endif

--- linux-4.15.0.orig/arch/frv/include/asm/pgtable.h
+++ linux-4.15.0/arch/frv/include/asm/pgtable.h
@@ -124,14 +124,14 @@
#define PGDIR_MASK (~(PGDIR_SIZE - 1))
#define PTRS_PER_PGD64

#define __PAGETABLE_PUD_FOLDED
+define __PAGETABLE_PUD_FOLDED1
#define PUD_SHIFT 26
#define PTRS_PER_PUD 1
#define PUD_SIZE (1UL << PUD_SHIFT)
#define PUD_MASK (~(PUD_SIZE - 1))
#define PUE_SIZE 256

-define __PAGETABLE_PMD_FOLDED
+define __PAGETABLE_PMD_FOLDED1
#define PMD_SHIFT 26
#define PMD_SIZE (1UL << PMD_SHIFT)
#define PMD_MASK (~(PMD_SIZE - 1))

--- linux-4.15.0.orig/arch/h8300/Makefile
+++ linux-4.15.0/arch/h8300/Makefile
@@ -23,7 +23,7 @@
LDFLAGS += $(ldflags-y)
ifeq ($(CROSS_COMPILE),)
-CROSS_COMPILE := h8300-unknown-linux-
+CROSS_COMPILE := $(call cc-cross-prefix, h8300-unknown-linux- h8300-linux-)
endif
core-y += arch/$(ARCH)/kernel/ arch/$(ARCH)/mm/
--- linux-4.15.0.orig/arch/h8300/include/asm/byteorder.h
+++ linux-4.15.0/arch/h8300/include/asm/byteorder.h
@@ -2,7 +2,6 @@
 ifndef __H8300_BYTEORDER_H__
 #include <linux/byteorder/big_endian.h>
 ifndef __H8300_BYTEORDER_H__
-#define __BIG_ENDIAN __ORDER_BIG_ENDIAN__
+#define __BIG_ENDIAN __ORDER_BIG_ENDIAN__
 #include <linux/byteorder/big_endian.h>
@end

@end

 OFFSET(TI_FLAGS, thread_info, flags);
 OFFSET(TI_CPU, thread_info, cpu);
 OFFSET(TI_PRE, thread_info, preempt_count);
+ifdef CONFIG_PREEMPTION
+DEFINE(TI_PRE_COUNT, offsetof(struct thread_info, preempt_count));
+endif

 return 0;
--- linux-4.15.0.orig/arch/hexagon/include/asm/atomic.h
+++ linux-4.15.0/arch/hexagon/include/asm/atomic.h
@@ -105,7 +105,7 @@
     "%0 = #op "(%0,%2):u"
  "memw_locked(%1,P3)=%0:u"
  "if !P3 jump 1b;\n"
+"if (!P3) jump 1b;\n"
  : ":=&r" (output)\n  : "r" (&v->counter), ":r" (i)\n  : "memory", ":p3"\n@@ -121,7 +121,7 @@
     "%0 = #op "(%0,%2):u"
  "memw_locked(%1,P3)=%0:u"
  "if !P3 jump 1b;\n"
+"if (!P3) jump 1b;\n"
  : ":=&r" (output)\n  : "r" (&v->counter), ":r" (i)\n  : "memory", ":p3"\n@@ -138,7 +138,7 @@
     "%1 = #op "(%0,%3):u"
  "memwLocked(%2,P3)=%1:u"
  "if !P3 jump 1b;\n"
+"if (!P3) jump 1b;\n"
  : ":=&r" (output), ":=&r" (val)\n  : "r" (&v->counter), ":r" (i)\n  : "memory", ":p3"\n@@ -187,7 +187,7 @@
  "memw_locked(%2, p3) = %1;"
  "{"
  "if !P3 jump 1b;"
+"if (!P3) jump 1b;"
  "}"
  ":=\&r" (__oldval), ":=\&r" (tmp)\n--- linux-4.15.0.orig/arch/hexagon/include/asm/bitops.h
+++ linux-4.15.0/arch/hexagon/include/asm/bitops.h
@@ -52,7 +52,7 @@
     R12 = memw_locked(R10);
  { P0 = tstbit(R12,R11); R12 = clrbit(R12,R11); }
  "memw_locked(R10,P1) = R12;\n"
-"{if !P1 jump 1b; %0 = mux(P0,#1,#0);}\n"
+"{if (!P1) jump 1b; %0 = mux(P0,#1,#0);}\n"
  : "=\&r" (oldval)\n
"r" (addr), "r" (nr)

": "r10", "r11", "r12", "p0", "p1", "memory"
@@ -76,7 +76,7 @@
"1：R12 = memw_locked(R10);
" { P0 = tstbit(R12,R11); R12 = setbit(R12,R11); }\n"memw_locked(R10,P1) = R12;\n"-{if !P1 jump 1b; %0 = mux(P0,#1,#0);}\n"{if (!P1) jump 1b; %0 = mux(P0,#1,#0);}\n": "=&r" (oldval)

": "r" (addr), "r" (nr)

": "r10", "r11", "r12", "p0", "p1", "memory"
@@ -102,7 +102,7 @@
"1：R12 = memw_locked(R10);
" { P0 = tstbit(R12,R11); R12 = togglebit(R12,R11); }\n"memw_locked(R10,P1) = R12;\n"-{if !P1 jump 1b; %0 = mux(P0,#1,#0);}\n"{if (!P1) jump 1b; %0 = mux(P0,#1,#0);}\n": "=&r" (oldval)

": "r" (addr), "r" (nr)

": "r10", "r11", "r12", "p0", "p1", "memory"
@@ -211,7 +211,7 @@
* This is defined the same way as ffs.
* Note fls(0) = 0, fls(1) = 1, fls(0x80000000) = 32.
*/
-static inline long fls(int x)
+static inline int fls(int x)
{
    int r;

    @ @ -232,12 +232,12 @ @
    * the libc and compiler builtin ffs routines, therefore
    * differs in spirit from the above ffz (man ffs).
    */
-static inline long ffs(int x)
+static inline int ffs(int x)
{
    int r;

    asm("{ P0 = cmp.eq(%1,#0); %0 = ct0(%1); }\n"-{ if P0 %0 = #0; if !P0 %0 = add(%0,#1);}\n"{ if (P0) %0 = #0; if (!P0) %0 = add(%0,#1);}\n": "=&r" (r)
    :
    "r" (x)
    :
    "p0");
--- linux-4.15.0.orig/arch/hexagon/include/asm/cmpxchg.h
+++ linux-4.15.0/arch/hexagon/include/asm/cmpxchg.h
@@ -44,7 +44,7 @@
 __asm__ __volatile__ (
"1: %0 = memw_locked(%1); // * load into retval */
"memw_locked(%1,P0) = %2; // * store into memory */
-"if !P0 jump 1b;\n"
+"if (!P0) jump 1b;\n"
: "=\&r" (retval)
: "r" (ptr), "r" (x)
: "memory", "p0"
--- linux-4.15.0.orig/arch/hexagon/include/asm/futex.h
+++ linux-4.15.0/arch/hexagon/include/asm/futex.h
@@ -16,7 +16,7 @@
   if !p2 new jump:NT 3f
   %1 = #0;\n"
"3:\n"
-.section .fixup,"ax"\n@@ -84,10 +84,10 @@
"1: %1 = memw_locked(%3)\n"
  \n"  p2 = cmp.eq(%1,%4)\n"  if !p2.new jump:NT 3f\n"  if (!p2.new) jump:NT 3f\n"  }\n"
"2: memw_locked(%3,p2) = %5\n"
  }\n"
-.section .fixup,"ax"\n"4: %0 = #%6\n"
--- linux-4.15.0.orig/arch/hexagon/include/asm/io.h
+++ linux-4.15.0/arch/hexagon/include/asm/io.h
@@ -186,16 +186,10 @@
#define mmiowb()
/*
 * Need an mtype somewhere in here, for cache type deals?
 * This is probably too long for an inline.
 */
-void __iomem *ioremap_nocache(unsigned long phys_addr, unsigned long size);
+void __iomem *ioremap(unsigned long phys_addr, unsigned long size);
+#define ioremap_nocache ioremap
+#define ioremap_uc(X, Y) ioremap((X), (Y))

-static inline void __iomem *ioremap(unsigned long phys_addr, unsigned long size)
-{
-return ioremap_nocache(phys_addr, size);
-

static inline void iounmap(volatile void __iomem *addr)
{
    memcpy((void *) dst, src, count);
}

+static inline void memset_io(volatile void __iomem *addr, int value,
+     size_t size)
+
+memset((void __force *)addr, value, size);
+
+#define PCI_IO_ADDR(volatile void __iomem *)
/*
   --- linux-4.15.0.orig/arch/hexagon/include/asm/spinlock.h
+++ linux-4.15.0/arch/hexagon/include/asm/spinlock.h
@@ -216,6 +210,12 @@
    memcpy((void *) dst, src, count);
 }

+static inline void memset_io(volatile void __iomem *addr, int value,
+     size_t size)
+{
+    memset((void __force *)addr, value, size);
+}
+
+#define PCI_IO_ADDR(volatile void __iomem *)

__asm__ __volatile__(
    "1:R6 = memw_locked(%0);\n"
    " { P3 = cmp.ge(R6,#0); R6 = add(R6,#1);}\n"
    "if !P3 jump 1b; }\n"
+
"
    "memw_locked(%0,P3) = R6;\n"
    "if !P3 jump 1b; }\n"
+
"
:
    : "r" (&lock->lock)
    : "memory", "r6", "p3"
@@ -60,7 +60,7 @@
    "1:R6 = memw_locked(%0);\n"
    "R6 = add(R6,#-1);\n"
    "memw_locked(%0,P3) = R6;\n"
    "if !P3 jump 1b;\n"
+
"
:
    : "r" (&lock->lock)
    : "memory", "r6", "p3"
@@ -75,7 +75,7 @@
    __asm__ __volatile__(
        "R6 = memw_locked(%1);\n"
        " { %0 = #0; P3 = cmp.ge(R6,#0); R6 = add(R6,#1);}\n"
    "if !P3 jump 1f; }\n"
+
"
    "memw_locked(%1,P3) = R6;\n"
"{ %0 = P3 }\n"
"1:\n"
@@ -92,9 +92,9 @@
 __asm__ __volatile__(
 "1:R6 = memw_locked(%0);\n"
 "{ %0 = #0; P3 = cmp.eq(R6,#0); R6 = #-1;}\n"
-"{ if !P3 jump 1b; }\n"
+"{ if (!P3) jump 1b; }\n"
 "memw_locked(%0,P3) = R6;\n"
-"{ if !P3 jump 1b; }\n"
+"{ if (!P3) jump 1b; }\n"

 : "r" (&lock->lock)
 : "memory", "r6", "p3"
@@ -131,9 +131,9 @@
 __asm__ __volatile__(
 "R6 = memw_locked(%1);\n"
 "{ %0 = #0; P3 = cmp.eq(R6,#0); R6 = #-1;}\n"
-"{ if !P3 jump 1b; R6 = #1; }\n"
+"{ if (!P3) jump 1b; R6 = #1; }\n"
 "memw_locked(%1,P3) = R6;\n"
-"{ if !P3 jump 1b; }\n"
+"{ if (!P3) jump 1b; }\n"

 : "r" (&lock->lock)
 : "memory", "r6", "p3"
@@ -153,7 +153,7 @@
 __asm__ __volatile__(
 "R6 = memw_locked(%1);\n"
 "P3 = cmp.eq(R6,#0);\n"
-"{ if !P3 jump 1f; R6 = #1; %0 = #0; }\n"
+"{ if (!P3) jump 1f; R6 = #1; %0 = #0; }\n"
 "memw_locked(%0,P3) = R6;\n"
-"{ if !P3 jump 1b; }\n"
+"{ if (!P3) jump 1b; }\n"

 : "r" (&lock->lock)
 : "memory", "r6", "p3"
@@ -169,7 +169,7 @@
 __asm__ __volatile__(
 "R6 = memw_locked(%1);\n"
 "P3 = cmp.eq(R6,#0);\n"
-"{ if !P3 jump 1f; R6 = #1; %0 = #0; }\n"
+"{ if (!P3) jump 1f; R6 = #1; %0 = #0; }\n"
 "memw_locked(%1,P3) = R6;\n"
-"{ if !P3 jump 1b; }\n"
+"{ if (!P3) jump 1b; }\n"

 : "r" (&lock->lock)
 : "memory", "r6", "p3"
else
gen_pool_add(coherent_pool,
-pfn_to_virt(max_low_pfn),
+(unsigned long)pfn_to_virt(max_low_pfn),
hexagon_coherent_pool_size, -1);
}

--- linux-4.15.0.orig/arch/hexagon/kernel/hexagon_ksyms.c
+++ linux-4.15.0/arch/hexagon/kernel/hexagon_ksyms.c
@@ -33,7 +33,7 @@
EXPORT_SYMBOL(__vmsetie);
EXPORT_SYMBOL(__vmyield);
EXPORT_SYMBOL(empty_zero_page);
-EXPORT_SYMBOL(ioremap_nocache);
+-EXPORT_SYMBOL(ioremap);
EXPORT_SYMBOL(memcpy);
EXPORT_SYMBOL(memset);

--- linux-4.15.0.orig/arch/hexagon/kernel/stacktrace.c
+++ linux-4.15.0/arch/hexagon/kernel/stacktrace.c
@@ -24,8 +24,6 @@
#include <linux/thread_info.h>
#include <linux/module.h>
-
-register unsigned long current_frame_pointer asm("r30");
-
 struct stackframe {
 unsigned long fp;
 unsigned long rets;
@@ -43,7 +41,7 @@
 low = (unsigned long)task_stack_page(current);
 high = low + THREAD_SIZE;
 -fp = current_frame_pointer;
+-fp = (unsigned long)__builtin_frame_address(0);
 while (fp >= low && fp <= (high - sizeof(*frame))) {
  frame = (struct stackframe *)fp;
 --- linux-4.15.0.orig/arch/hexagon/kernel/vm_entry.S
+++ linux-4.15.0/arch/hexagon/kernel/vm_entry.S
@@ @ -382,7 +382,7 @@
 R26.L = #LO(do_work_pending);
 R0 = #VM_INT_DISABLE;
 } 
-if P0 jump check_work_pending
+if (P0) jump check_work_pending
 { 
  R0 = R25;
callr R24
--- linux-4.15.0.orig/arch/hexagon/kernel/vmlinux.lds.S
+++ linux-4.15.0/arch/hexagon/kernel/vmlinux.lds.S
@@ -71,13 +71,8 @@
 _end = ;

 /DISCARD/ : {  
 -EXIT_TEXT  
 -EXIT_DATA  
 -EXIT_CALL  
 -}
-
-STABS_DEBUG
-DWARF_DEBUG
+
+DISCARDS
 }  
--- linux-4.15.0.orig/arch/hexagon/lib/checksum.c
+++ linux-4.15.0/arch/hexagon/lib/checksum.c
@@ -199,3 +199,4 @@
 memcpys(dst, src, len);
 return csum_partial(dst, len, sum);
 }
+EXPORT_SYMBOL(csum_partial_copy_nocheck);
--- linux-4.15.0.orig/arch/hexagon/mm/ioremap.c
+++ linux-4.15.0/arch/hexagon/mm/ioremap.c
@@ -22,7 +22,7 @@
 include <linux/vmalloc.h>
 include <linux/mm.h>

 -void __iomem *ioremap_nocache(unsigned long phys_addr, unsigned long size)
+void __iomem *ioremap(unsigned long phys_addr, unsigned long size)
 {  
 unsigned long last_addr, addr;
 unsigned long offset = phys_addr & ~PAGE_MASK;
--- linux-4.15.0.orig/arch/ia64/Kconfig
+++ linux-4.15.0/arch/ia64/Kconfig
@@ -16,6 +16,7 @@
 select PCI if (!IA64_HP_SIM)
 select ACPI if (!IA64_HP_SIM)
 +select ARCH_SUPPORTS_ACPI if (!IA64_HP_SIM)
 select ACPI_SYSTEM_POWER_STATES_SUPPORT if ACPI
 select ARCH_MIGHT_HAVE_ACPI_PDC if ACPI
 select HAVE_UNSTABLE_SCHED_CLOCK
--- linux-4.15.0.orig/arch/ia64/configs/zx1_defconfig
+++ linux-4.15.0/arch/ia64/configs/zx1_defconfig
```c
CONFIG_CHR_DEV_ST=y
CONFIG_CHR_DEV_OSTST=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_LOGGING=y
--- linux-4.15.0.orig/arch/ia64/include/asm/bug.h
+++ linux-4.15.0/arch/ia64/include/asm/bug.h
@@ -36,7 +36,6 @@
 CONFIG_CHR_DEV_ST=y
 CONFIG_CHR_DEV_OSTST=y
 CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=y
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_LOGGING=y
--- linux-4.15.0.orig/arch/ia64/include/asm/ptrace.h
+++ linux-4.15.0/arch/ia64/include/asm/ptrace.h
@@ -54,8 +54,7 @@
 static inline unsigned long user_stack_pointer(struct pt_regs *regs)
 {
-/* FIXME: should this be bspstore + nr_dirty regs? */
- return regs->ar_bspstore;
+ return regs->r12;
 }
 static inline int is_syscall_success(struct pt_regs *regs)
@@ -79,11 +78,6 @@
 unsigned long __ip = instruction_pointer(regs);
 (__ip & ~3UL) + ((__ip & 3UL) << 2);
 })
-/*
- * Why not default? Because user_stack_pointer() on ia64 gives register
- * stack backing store instead...
- */
-#define current_user_stack_pointer() (current_pt_regs()->r12)
+
/* given a pointer to a task_struct, return the user's pt_regs */
# define task_pt_regs(t)((struct pt_regs *) ((char *) (t) + IA64_STK_OFFSET)) - 1)
--- linux-4.15.0.orig/arch/ia64/include/asm/syscall.h
```

---
Open Source Used In 5GaaS Edge AC-4 10564
static inline long syscall_get_error(struct task_struct *task,  
    struct pt_regs *regs)  
{
    -return regs->r10 == -1 ? regs->r8:0;  
+return regs->r10 == -1 ? -regs->r8:0;  
}  

static inline long syscall_get_return_value(struct task_struct *task,  
--- linux-4.15.0.orig/arch/ia64/include/asm/tlb.h  
+++ linux-4.15.0/arch/ia64/include/asm/tlb.h  
@@ -269,6 +269,16 @@  
tlb->end_addr = address + PAGE_SIZE;  
}  
+static inline void  
+tlb_flush_pmd_range(struct mmu_gather *tlb, unsigned long address,  
+    unsigned long size)  
+{
+    if (tlb->start_addr > address)  
+        tlb->start_addr = address;  
+    if (tlb->end_addr < address + size)  
+        tlb->end_addr = address + size;  
+}  
+  
+#define tlb_migrate_finish(mm)
+    platform_tlb_migrate_finish(mm)

#define tlb_start_vma(tlb, vma)
    do { } while (0)
--- linux-4.15.0.orig/arch/ia64/kernel/Makefile  
+++ linux-4.15.0/arch/ia64/kernel/Makefile  
@@ -43,7 +43,7 @@  
    obj-$(CONFIG_INTEL_IOMMU) += pci-dma.o  
    obj-$(CONFIG_SWIOTLB) += pci-swiotlb.o  
    -obj-$(CONFIG_BINFMT_ELF) += elfcore.o  
    +obj-$(CONFIG_ELF_CORE) += elfcore.o  

    # fp_emulate() expects f2-f5,f16-f31 to contain the user-level state.
    CFLAGS_traps.o += -mfixed-range=f2-f5,f16-f31  
--- linux-4.15.0.orig/arch/ia64/kernel/err_inject.c  
+++ linux-4.15.0/arch/ia64/kernel/err_inject.c  
@@ -59,7 +59,7 @@  
    char *buf)\  
    {
        cpu = dev->id;\  
    -return sprintf(buf, "\%lx\n", name[cpu]);\  
+return sprintf(buf, "\%llx\n", name[cpu]);\  

```c
#define store(name)
@@ -86,9 +86,9 @@
#ifdef ERR_INJ_DEBUG
printk(KERN_DEBUG "pal_mc_err_inject for cpu%d:\n", cpu);
-printf(KERN_DEBUG "err_type_info=%lx,\n", err_type_info[cpu]);
-printf(KERN_DEBUG "err_struct_info=%lx,\n", err_struct_info[cpu]);
-printf(KERN_DEBUG "err_data_buffer=%lx, %lx, %lx,\n",
+printf(KERN_DEBUG "err_type_info=%llx,\n", err_type_info[cpu]);
+printf(KERN_DEBUG "err_struct_info=%llx,\n", err_struct_info[cpu]);
+printf(KERN_DEBUG "err_data_buffer=%llx, %llx, %llx,\n",
    err_data_buffer[cpu].data1,
    err_data_buffer[cpu].data2,
    err_data_buffer[cpu].data3);
@@ -117,8 +117,8 @@
#ifdef ERR_INJ_DEBUG
printk(KERN_DEBUG "Returns: status=%d,\n", (int)status[cpu]);
-printf(KERN_DEBUG "capapbilities=%lx,\n", capabilities[cpu]);
-printf(KERN_DEBUG "resources=%lx\n", resources[cpu]);
+printf(KERN_DEBUG "capabilities=%llx,\n", capabilities[cpu]);
+printf(KERN_DEBUG "resources=%llx\n", resources[cpu]);
#endif
return size;
@@ -131,7 +131,7 @@
char *buf)
{
    unsigned int cpu=dev->id;
    -return sprintf(buf, "%lx\n", phys_addr[cpu]);
+return sprintf(buf, "%llx\n", phys_addr[cpu]);
}

static ssize_t
@@ -142,10 +142,10 @@
u64 virt_addr=simple_strtoull(buf, NULL, 16);
    int ret;
    -ret = get_user_pages(virt_addr, 1, FOLL_WRITE, NULL, NULL);
+ret = get_user_pages_fast(virt_addr, 1, FOLL_WRITE, NULL);
    if (ret<=0) {
#ifdef ERR_INJ_DEBUG
        printk("Virtual address %lx is not existing.\n", virt_addr);
+        printk("Virtual address %llx is not existing.\n", virt_addr);
#endif
        return -EINVAL;
    }
```

unsigned int cpu = dev->id;

return sprintf(buf, "%lx, %lx, %lx\n",
err_data_buffer[cpu].data1,
err_data_buffer[cpu].data2,
err_data_buffer[cpu].data3);

int ret;

#ifdef ERR_INJ_DEBUG
printk("write err_data_buffer=[%lx,%lx,%lx] on cpu%d\n",
err_data_buffer[cpu].data1,
err_data_buffer[cpu].data2,
err_data_buffer[cpu].data3,
 cerebral);  
#endif
ret = sscanf(buf, "%lx, %lx, %lx",
&err_data_buffer[cpu].data1,
&err_data_buffer[cpu].data2,
&err_data_buffer[cpu].data3);

/*
 * At this point the target function has been tricked into
 * returning into our trampoline. Lookup the associated instance
 * and then:
 * - call the handler function
 * - cleanup by marking the instance as unused
 * - long jump back to the original return address
 */

int __kprobes trampoline_probe_handler(struct kprobe *p, struct pt_regs *regs)
{
    struct kretprobe_instance *ri = NULL;
    struct hlist_head *head, empty_rp;
    struct hlist_node *tmp;
    unsigned long flags, orig_ret_address = 0;
    unsigned long trampoline_address =
    ((struct fnptr *)kretprobe_trampoline)->ip;
-INIT_HLIST_HEAD(&empty_rp);
-kretprobe_hash_lock(current, &head, &flags);
-
/!
- * It is possible to have multiple instances associated with a given
- * task either because an multiple functions in the call path
- * have a return probe installed on them, and/or more than one return
- * return probe was registered for a target function.
- *
- * We can handle this because:
- * - instances are always inserted at the head of the list
- * - when multiple return probes are registered for the same
- * function, the first instance's ret_addr will point to the
- * real return address, and all the rest will point to
- * kretprobe_trampoline
- */
-hlist_for_each_entry_safe(ri, tmp, head, hlist) {
  -if (ri->task != current)
  /!* another task is sharing our hash bucket */
  -continue;
  -
  -orig_ret_address = (unsigned long)ri->ret_addr;
  -if (orig_ret_address != trampoline_address)
  /!
  - * This is the real return address. Any other
  - * instances associated with this task are for
  - * other calls deeper on the call stack
  - */
  -break;
  -}
  -
  -regs->cr_iip = orig_ret_address;
  -
  -hlist_for_each_entry_safe(ri, tmp, head, hlist) {
  -if (ri->task != current)
  /!* another task is sharing our hash bucket */
  -continue;
  -
  -if (ri->rp && ri->rp->handler)
  -ri->rp->handler(ri, regs);
  -
  -orig_ret_address = (unsigned long)ri->ret_addr;
  -recycle_rp_inst(ri, &empty_rp);
  -
  -if (orig_ret_address != trampoline_address)
  /!
  - * This is the real return address. Any other
- * instances associated with this task are for
- * other calls deeper on the call stack
- */
-break;
-
-kretprobe_assert(ri, orig_ret_address, trampoline_address);
-
-reset_current_kprobe();
-kretprobe_hash_unlock(current, &flags);
-preempt_enable_no_resched();
-
-hlist_for_each_entry_safe(ri, tmp, &empty_rp, hlist) {
-hlist_del(&ri->hlist);
-kfree(ri);
-}
+regs->cr_iip = __kretprobe_trampoline_handler(regs, kretprobe_trampoline, NULL);
/*
 * By returning a non-zero value, we are telling
 * kprobe_handler() that we don’t want the post_handler
 @@ -503,6 +426,7 @@
 struct pt_regs *regs)
 {
 ri->ret_addr = (kprobe_opcode_t *)regs->b0;
+ri->fp = NULL;
 
 /* Replace the return addr with trampoline addr */
 regs->b0 = ((struct fnptr *)kretprobe_trampoline)->ip;
--- linux-4.15.0.orig/arch/ia64/kernel/mca.c
+++ linux-4.15.0/arch/ia64/kernel/mca.c
@@ -1860,7 +1860,7 @@
data = mca_bootmem();
 first_time = 0;
 } else
-data = (void *)__get_free_pages(GFP_KERNEL,
+data = (void *)__get_free_pages(GFP_ATOMIC,
 get_order(sz));
 if (!data)
 panic("Could not allocate MCA memory for cpu %d\n",
--- linux-4.15.0.orig/arch/ia64/kernel/mca_drv.c
+++ linux-4.15.0/arch/ia64/kernel/mca_drv.c
@@ -343,7 +343,7 @@
sect_min_size = sal_log_sect_min_sizes[0];
-for (i = 1; i < sizeof sal_log_sect_min_sizes/sizeof(size_t); i++)
+for (i = 1; i < ARRAY_SIZE(sal_log_sect_min_sizes); i++)
 if (sect_min_size > sal_log_sect_min_sizes[i])
 /* 2 */

sect_min_size = sal_log_sect_min_sizes[i];

--- linux-4.15.0.orig/arch/ia64/kernel/module.c
+++ linux-4.15.0/arch/ia64/kernel/module.c
@@ -913,8 +913,12 @@
 void
 module_arch_cleanup (struct module *mod)
 {
- if (mod->arch.init_unw_table)
+ if (mod->arch.init_unw_table) {
 unw_remove_unwind_table(mod->arch.init_unw_table);
- if (mod->arch.core_unw_table)
+ mod->arch.init_unw_table = NULL;
+ }
+ if (mod->arch.core_unw_table) {
 unw_remove_unwind_table(mod->arch.core_unw_table);
+ mod->arch.core_unw_table = NULL;
+ }
 }
 --- linux-4.15.0.orig/arch/ia64/kernel/perfmon.c
+++ linux-4.15.0/arch/ia64/kernel/perfmon.c
@@ -2278,17 +2278,15 @@
 /* allocate vma */
 -vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);
+ vma = vm_area_alloc(mm);
 if (!vma) {
 DPRINT(("Cannot allocate vma\n"));
 goto error_kmem;
- } INIT_LIST_HEAD(&vma->anon_vma_chain);
 }
 */
* partially initialize the vma for the sampling buffer */
- vma->vm_mm = mm;
 vma->vm_file = get_file(filp);
 vma->vm_flags = VM_READ|VM_MAYREAD|VM_DONTEXPAND|VM_DONTDUMP;
 vma->vm_page_prot = PAGE_READONLY; /* XXX may need to change */
@@ -2346,7 +2344,7 @@
 return 0;
 error:
 -kmem_cache_free(vm_area_cachep, vma);
+ vm_area_free(vma);
 error_kmem:
 pfm_rvfree(smpl_buf, size);
struct syscall_get_set_args *args = data;
struct pt_regs *pt = args->regs;
unsigned long *krbs, cfm, ndirty;
+unsigned long *krbs, cfm, ndirty, nlocals, nouts;
int i, count;

if (unw_unwind_to_user(info) < 0)
    return;

/*
 * We get here via a few paths:
 * - break instruction: cfm is shared with caller.
 * - syscall args are in out= regs, locals are non-empty.
 * - epsinstruction: cfm is set by br.call
 * - locals don't exist.
 * For both cases arguments are reachable in cfm.sof - cfm.sol.
 * CFM: [ ... | sor: 17..14 | sol : 13..7 | sof : 6..0 ]
 */
cfm = pt->cr_ifs;
+nlocals = (cfm >> 7) & 0x7f; /* aka sol */
+nouts = (cfm & 0x7f) - nlocals; /* aka sof - sol */
krbs = (unsigned long *)info->task + IA64_RBS_OFFSET/8;
ndirty = ia64_rse_num_regs(krbs, krbs + (pt->loadrs >> 19));

count = 0;
if (in_syscall(pt))
    -count = min_t(int, args->n, cfm & 0x7f);
    +count = min_t(int, args->n, nouts);

/* Iterate over outs. */
for (i = 0; i < count; i++) {
    +int j = ndirty + nlocals + i + args->i;
    if (args->rw)
        -*ia64_rse_skip_regs(krbs, ndirty + i + args->i) =
            -args->args[i];
        +*ia64_rse_skip_regs(krbs, j) = args->args[i];
        else
            -args->args[i] = *ia64_rse_skip_regs(krbs,
                -ndirty + i + args->i);
            +args->args[i] = *ia64_rse_skip_regs(krbs, j);
    }
if (!args->rw) {
--- linux-4.15.0.orig/arch/ia64/kernel/signal.c
+++ linux-4.15.0/arch/ia64/kernel/signal.c
@@ -283,36 +283,6 @@
}

static long
-force_sigsegv_info (int sig, void __user *addr)
-{
-unsigned long flags;
-struct siginfo si;
-
-if (sig == SIGSEGV) {
-/*
- * Acquiring siglock around the sa_handler-update is almost
- * certainly overkill, but this isn’t a
- * performance-critical path and I’d rather play it safe
- * here than having to debug a nasty race if and when
- * something changes in kernel/signal.c that would make it
- * no longer safe to modify sa_handler without holding the
- * lock.
- */
- spin_lock_irqsave(&current->sighand->siglock, flags);
- current->sighand->action[sig - 1].sa.sa_handler = SIG_DFL;
- spin_unlock_irqrestore(&current->sighand->siglock, flags);
-}
-si.si_signo = SIGSEGV;
-si.si_errno = 0;
-si.si_code = SI_KERNEL;
-si.si_pid = task_pid_vnr(current);
-si.si_uid = from_kuid_munged(current_user_ns(), current_uid());
-si.si_addr = addr;
-force_sig_info(SIGSEGV, &si, current);
-return 1;
-
-setup_frame(struct ksignal *ksig, sigset_t *set, struct sigscratch *scr)
{
 extern char __kernel_sigtramp[];
@@ -345,15 +315,18 @@
 * instead so we will die with SIGSEGV.
 */
 check_sp = (new_sp - sizeof(*frame)) & -STACK_ALIGN;
-if (!likely(on_sig_stack(check_sp)))
-return force_sigsegv_info(ksig->sig, (void __user *)
- check_sp);
+if (!likely(on_sig_stack(check_sp))) {

+force_sigsegv(ksig->sig, current);
+return 1;
+
}  
}

frame = (void __user *) ((new_sp - sizeof(*frame)) & -STACK_ALIGN);

-if (!access_ok(VERIFY_WRITE, frame, sizeof(*frame)))
-return force_sigsegv_info(ksig->sig, frame);
+if (!access_ok(VERIFY_WRITE, frame, sizeof(*frame))) {
+force_sigsegv(ksig->sig, current);
+return 1;
+
}

err  = __put_user(ksig->sig, &frame->arg0);
err |= __put_user(&frame->info, &frame->arg1);
@@ -367,8 +340,10 @@
err |= __save_altstack(&frame->sc.sc_stack, scr->pt.r12);
err |= setup_sigcontext(&frame->sc, set, scr);

 -if (unlikely(err))
-return force_sigsegv_info(ksig->sig, frame);
+if (unlikely(err)) {
+force_sigsegv(ksig->sig, current);
+return 1;
+
}

scr->pt.r12 = (unsigned long) frame - 16;/* new stack pointer */
scr->pt.ar_fpsr = FPSR_DEFAULT;/* reset fpsr for signal handler */
--- linux-4.15.0.orig/arch/ia64/mm/discontig.c
+++ linux-4.15.0/arch/ia64/mm/discontig.c
@@ -100,7 +100,7 @@
* compute_pernodesize - compute size of pernode data
* @node: the node id.
 */
-static int __meminit early_nr_cpus_node(int node)
+static int early_nr_cpus_node(int node)
{
  int cpu, n = 0;

 @@ -115,7 +115,7 @@
 * compute_pernodesize - compute size of pernode data
 * @node: the node id.
 */
-static unsigned long __meminit compute_pernodesize(int node)
+static unsigned long compute_pernodesize(int node)
{
  unsigned long pernodesize = 0, cpus;
static void __meminit scatter_node_data(void)
{  
    pg_data_t **dst;
    int node;
    
    /* the problem. When the process attempts to write to the register backing store  
     * for the first time, it will get a SEGFAULT in this case.  
     */
    vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);  
    if (vma) {
        INIT_LIST_HEAD(&vma->anon_vma_chain);
        vma->vm_mm = current->mm;
        vma->vm_start = current->thread.rbs_bot & PAGE_MASK;
        vma->vm_end = vma->vm_start + PAGE_SIZE;
        vma->vm_flags = VM_DATA_DEFAULT_FLAGS|VM_GROWSUP|VM_ACCOUNT;
        down_write(&current->mm->mmap_sem);
        if (insert_vm_struct(current->mm, vma)) {
            up_write(&current->mm->mmap_sem);
            kmem_cache_free(vm_area_cachep, vma);
            return;
        }
    }
    up_write(&current->mm->mmap_sem);
    
    /* map NaT-page at address zero to speed up speculative dereferencing of NULL: */
    if (!(current->personality & MMAP_PAGE_ZERO)) {
        vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);
        vma = vm_area_alloc(current->mm);
        if (vma) {
            INIT_LIST_HEAD(&vma->anon_vma_chain);
            vma->vm_mm = current->mm;
            vma->vm_end = PAGE_SIZE;
            vma->vm_page_prot = __pgprot(pgprot_val(PAGE_READONLY) | _PAGE_MA_NAT);
            vma->vm_flags = VM_READ | VM_MAYREAD | VM_IO |
            down_write(&current->mm->mmap_sem);
            if (insert_vm_struct(current->mm, vma)) {


```
up_write(&current->mm->mmap_sem);
-kmem_cache_free(vm_area_cachep, vma);
+vm_area_free(vma);
return;
}
up_write(&current->mm->mmap_sem);
--- linux-4.15.0.orig/arch/ia64/mm/numa.c
+++ linux-4.15.0/arch/ia64/mm/numa.c
@@ -49,6 +49,7 @@
return (i < num_node_memblks) ? node_memblk[i].nid : (num_node_memblks ? -1 : 0);
}
+EXPORT_SYMBOL(paddr_to_nid);

#if defined(CONFIG_SPARSEMEM) && defined(CONFIG_NUMA)
/*
--- linux-4.15.0.orig/arch/ia64/scripts/unwcheck.py
+++ linux-4.15.0/arch/ia64/scripts/unwcheck.py
@@ -1,4 +1,4 @@
-#!/usr/bin/python
+#!/usr/bin/env python
+#!usr/bin/python
+#!/usr/bin/env python
# SPDX-License-Identifier: GPL-2.0
#
# Usage: unwcheck.py FILE
--- linux-4.15.0.orig/arch/m68k/Makefile
+++ linux-4.15.0/arch/m68k/Makefile
@@ -58,7 +58,10 @@
cpuflags-=$(CONFIG_M5206):=$(call cc-option,-mcpu=5206,-m5200)
 KBUILD_AFLAGS += $(cpuflags-y)
-KBUILD_CFLAGS += $(cpuflags-y) -pipe
+KBUILD_CFLAGS += $(cpuflags-y)
+
+KBUILD_CFLAGS += -pipe -ffreestanding
+
ifdef CONFIG_MMU
# without -fno-strength-reduce the 53c7xx.c driver fails ;-;
KBUILD_CFLAGS += -fno-strength-reduce -ffixed-a2
--- linux-4.15.0.orig/arch/m68k/amiga/cia.c
+++ linux-4.15.0/arch/m68k/amiga/cia.c
@@ -88,10 +88,19 @@
 struct ciabase *base = dev_id;
 int mach_irq;
 unsigned char ints;
+unsigned long flags;

+/* Interrupts get disabled while the timer irq flag is cleared and
+ * the timer interrupt serviced.


mach_irq = base->cia_irq;
+local_irq_save(flags);
ints = cia_set_irq(base, CIA_ICR_ALL);
amiga_custom.intreq = base->int_mask;
+if (ints & 1)
+generic_handle_irq(mach_irq);
+local_irq_restore(flags);
+mach_irq++, ints >>= 1;
for (; ints; mach_irq++, ints >>= 1) {
    if (ints & 1)
        generic_handle_irq(mach_irq);
    local_irq_save(flags);
    timer_routine = dev_id;
    unsigned long flags;
    @ @ -344,7 +344,7 @@
    st_mfp.tim_ct_cd = (st_mfp.tim_ct_cd & 0xf0) | 0x6;

    /* request timer D dispatch handler */
    -static irqreturn_t mfptimer_handler(int irq, void *dev_id)
    +static irqreturn_t mfp_timer_d_handler(int irq, void *dev_id)
        {
        struct mfptimerbase *base = dev_id;
        int mach_irq;
        @ @ -344,7 +344,7 @@
    st_mfp.tim_ct_cd = (st_mfp.tim_ct_cd & 0xf0) | 0x6;

    /* request timer D dispatch handler */
    -static irqreturn_t mfptimer_handler(int irq, void *dev_id)
    +static irqreturn_t mfp_timer_c_handler(int irq, void *dev_id)
        {
        struct mfptimerbase *base = dev_id;
        int mach_irq;
        @ @ -344,7 +344,7 @@
    st_mfp.tim_ct_cd = (st_mfp.tim_ct_cd & 0xf0) | 0x6;

    /* request timer D dispatch handler */
    -static irqreturn_t mfptimer_handler(int irq, void *dev_id)
    +static irqreturn_t mfp_timer_c_handler(int irq, void *dev_id)
        {
        struct mfptimerbase *base = dev_id;
        int mach_irq;
        @ @ -344,7 +344,7 @@
    st_mfp.tim_ct_cd = (st_mfp.tim_ct_cd & 0xf0) | 0x6;
void __init
atari_sched_init(irq_handler_t timer_routine)
{
    /* start timer C, div = 1:100 */
    st_mfp.tim_ct_cd = (st_mfp.tim_ct_cd & 15) | 0x60;
    /* install interrupt service routine for MFP Timer C */
    if (request_irq(IRQ_MFP_TIMC, timer_routine, 0, "timer", timer_routine))
        pr_err("Couldn't register timer interrupt\n");
}

--- linux-4.15.0.orig/arch/m68k/bvme6000/config.c
+++ linux-4.15.0/arch/m68k/bvme6000/config.c
@@ -45,11 +45,6 @@
extern void bvme6000_reset (void);
void bvme6000_set_vectors (void);

-/* Save tick handler routine pointer, will point to xtime_update() in
- * kernel/timer/timekeeping.c, called via bvme6000_process_int() */
- static irq_handler_t tick_handler;
-
-int __init bvme6000_parse_bootinfo(const struct bi_record *bi)
{
    static irqreturn_t bvme6000_timer_int (int irq, void *dev_id)
    {
        + irq_handler_t timer_routine = dev_id;
        + unsigned long flags;
        + volatile RtcPtr_t rtc = (RtcPtr_t)BVME_RTC_BASE;
        + unsigned char msr = rtc->msr & 0xc0;
        + unsigned char msr;
        + local_irq_save(flags);
        + msr = rtc->msr & 0xc0;
        + rtc->msr = msr | 0x20; /* Ack the interrupt */
        + timer_routine(0, NULL);
        + local_irq_restore(flags);
        - return tick_handler(irq, dev_id);
        + return IRQ_HANDLED;
    }
rtc->msr = 0; /* Ensure timer registers accessible */

tick_handler = timer_routine;
if (request_irq(BVME_IRQ_RTC, bvme6000_timer_int, 0,
    "timer", bvme6000_timer_int))
    if (request_irq(BVME_IRQ_RTC, bvme6000_timer_int, 0, "timer",
        timer_routine))
    panic ("Couldn't register timer int");

rtc->t1cr_omr = 0x04; /* Mode 2, ext clk */

#ifdef MCFFEC_BASE1
  .id = 1,
  .num_resources = ARRAY_SIZE(mcf_fec1_resources),
  .resource = mcf_fec1_resources,
  .dev.platform_data = FEC_PDATA,
  +.dev = {
    +.dma_mask = &mcf_fec1.dev.coherent_dma_mask,
    +.coherent_dma_mask = DMA_BIT_MASK(32),
    +.platform_data = FEC_PDATA,
  +}
};
#endif /* MCFFEC_BASE1 */

#ifdef CONFIG_FEC
  /* Keep a virtual mapping to IO/config space active */
  iospace = (unsigned long) ioremap(PCI_IO_PA, PCI_IO_SIZE);
*/
-if (iospace == 0)
+if (iospace == 0) {
+pci_free_host_bridge(bridge);
return -ENODEV;
+}
pr_info("Coldfire: PCI IO/config window mapped to 0x%lx
,(u32) iospace);

--- linux-4.15.0.orig/arch/m68k/configs/amiga_defconfig
+++ linux-4.15.0/arch/m68k/configs/amiga_defconfig
@@ -341,7 +341,6 @@
CONFIG_CHR_DEV_ST=m
CONFIG_CHR_DEV_OSST=m
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SAS_ATTRS=m
--- linux-4.15.0.orig/arch/m68k/configs/apollo_defconfig
+++ linux-4.15.0/arch/m68k/configs/apollo_defconfig
@@ -328,7 +328,6 @@
CONFIG_CHR_DEV_ST=m
CONFIG_CHR_DEV_OSST=m
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SAS_ATTRS=m
--- linux-4.15.0.orig/arch/m68k/configs/atari_defconfig
+++ linux-4.15.0/arch/m68k/configs/atari_defconfig
@@ -336,7 +336,6 @@
CONFIG_CHR_DEV_ST=m
CONFIG_CHR_DEV_OSST=m
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SAS_ATTRS=m
--- linux-4.15.0.orig/arch/m68k/configs/bvme6000_defconfig
+++ linux-4.15.0/arch/m68k/configs/bvme6000_defconfig
@@ -326,7 +326,6 @@
CONFIG_CHR_DEV_ST=m
CONFIG_CHR_DEV_OSST=m
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SAS_ATTRS=m

--- linux-4.15.0.orig/arch/m68k/configs/hp300_defconfig
+++ linux-4.15.0/arch/m68k/configs/hp300_defconfig
@@ -328,7 +328,6 @@
 CONFIG_BLK_DEV_SR=y
 -CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
--- linux-4.15.0.orig/arch/m68k/configs/mac_defconfig
+++ linux-4.15.0/arch/m68k/configs/mac_defconfig
@@ -335,7 +335,6 @@
 CONFIG_BLK_DEV_SR=y
 -CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
--- linux-4.15.0.orig/arch/m68k/configs/multi_defconfig
+++ linux-4.15.0/arch/m68k/configs/multi_defconfig
@@ -358,7 +358,6 @@
 CONFIG_BLK_DEV_SR=y
 -CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
--- linux-4.15.0.orig/arch/m68k/configs/mvme147_defconfig
+++ linux-4.15.0/arch/m68k/configs/mvme147_defconfig
@@ -325,7 +325,6 @@
 CONFIG_BLK_DEV_SR=y
 -CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
--- linux-4.15.0.orig/arch/m68k/configs/mvme16x_defconfig
+++ linux-4.15.0/arch/m68k/configs/mvme16x_defconfig
@@ -326,7 +326,6 @@
 CONFIG_BLK_DEV_SR=y
 -CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_BLK_DEV_SR=y
 CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SAS_ATTRS=m
--- linux-4.15.0.orig/arch/m68k/configs/q40_defconfig
+++ linux-4.15.0/arch/m68k/configs/q40_defconfig
@@ -333,7 +333,6 @@
 CONFIG_CHR_DEV_ST=m
 CONFIG_CHR_DEV_OSST=m
 CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=m
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_SAS_ATTRS=m
--- linux-4.15.0.orig/arch/m68k/configs/sun3_defconfig
+++ linux-4.15.0/arch/m68k/configs/sun3_defconfig
@@ -323,7 +323,6 @@
 CONFIG_CHR_DEV_ST=m
 CONFIG_CHR_DEV_OSST=m
 CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=m
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_SAS_ATTRS=m
--- linux-4.15.0.orig/arch/m68k/configs/sun3x_defconfig
+++ linux-4.15.0/arch/m68k/configs/sun3x_defconfig
@@ -323,7 +323,6 @@
 CONFIG_CHR_DEV_ST=m
 CONFIG_CHR_DEV_OSST=m
 CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=m
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_SAS_ATTRS=m
--- linux-4.15.0.orig/arch/m68k/emu/nfeth.c
+++ linux-4.15.0/arch/m68k/emu/nfeth.c
@@ -258,8 +258,8 @@
 for (i = 0; i < MAX_UNIT; i++) {
 if (nfeth_dev[i]) {
-\t\tunregister_netdev(nfeth_dev[0]);
-\t\tfree_netdev(nfeth_dev[0]);
+\t\tunregister_netdev(nfeth_dev[i]);
+\t\tfree_netdev(nfeth_dev[i]);
 }
 } 
free_irq(nfEtherIRQ, nfeth_interrupt);
--- linux-4.15.0.orig/arch/m68k/hp300/time.c
+++ linux-4.15.0/arch/m68k/hp300/time.c
@@ -38,13 +38,19 @@
static irqreturn_t hp300_tick(int irq, void *dev_id)
{
    irq_handler_t timer_routine = dev_id;
    unsigned long flags;
    unsigned long tmp;
    irq_handler_t vector = dev_id;
    local_irq_save(flags);
    in_8(CLOCKBASE + CLKSR);
    asm volatile("movpw %1@(5),%0" : "=d" (tmp) : "a" (CLOCKBASE));
    timer_routine(0, NULL);
    local_irq_restore(flags);
    /* Turn off the network and SCSI leds */
    blinken_leds(0, 0xe0);
    return vector(irq, NULL);
    return IRQ_HANDLED;
}

u32 hp300_gettimeoffset(void)
{
    --- linux-4.15.0.orig/arch/m68k/include/asm/bug.h
    +++ linux-4.15.0/arch/m68k/include/asm/bug.h
    @@ -8,16 +8,19 @@
    #ifndef CONFIG_SUN3
    #define BUG() do {
        pr_crit("kernel BUG at %s:%d!
", __FILE__, __LINE__); 
        barrier_before_unreachable();
        __builtin_trap();
    } while (0)
    #else
    #define BUG() do {
        pr_crit("kernel BUG at %s:%d!
", __FILE__, __LINE__); 
        barrier_before_unreachable();
        panic("BUG!");
    } while (0)
    #endif
    #else
    #define BUG() do {
        barrier_before_unreachable();
        __builtin_trap();
    } while (0)
    endif
    #else
    #define BUG() do {
        barrier_before_unreachable();
        __builtin_trap();
    } while (0)
    endif
    --- linux-4.15.0.orig/arch/m68k/include/asm/m53xxacr.h
    +++ linux-4.15.0/arch/m68k/include/asm/m53xxacr.h
    @@ -89,9 +89,9 @@
    * coherency though in all cases. And for copyback caches we will need
    * to push cached data as well.
*\n-#define CACHE_INIT CACR_CINVA
-#define CACHE_INVALIDATE CACR_CINVA
-#define CACHE_INVALIDATED CACR_CINVA
+##define CACHE_INIT (CACHE_MODE + CACR_CINVA - CACR_EC)
+##define CACHE_INVALIDATE (CACHE_MODE + CACR_CINVA)
+##define CACHE_INVALIDATED (CACHE_MODE + CACR_CINVA)

#define ACR0_MODE ((CONFIG_RAMBASE & 0xff000000) + \n(0x000f0000) + \n--- linux-4.15.0.orig/arch/m68k/include/asm/mac_via.h
+++ linux-4.15.0/arch/m68k/include/asm/mac_via.h
@@ -257,6 +257,7 @@
 struct irq_desc;

 +extern void via_l2_flush(int writeback);
 extern void via_register_interrupts(void);
 extern void via_irq_enable(int);
 extern void via_irq_disable(int);
--- linux-4.15.0.orig/arch/m68k/include/asm/mcf_pgalloc.h
+++ linux-4.15.0/arch/m68k/include/asm/mcf_pgalloc.h
@@ -44,6 +44,7 @@
 static inline void __pte_free_tlb(struct mmu_gather *tlb, pgtable_t page,
     unsigned long address)
 {
+pgtable_page_dtor(page);
 __free_page(page);
 }
@@ -74,8 +75,9 @@
 return page;
 }

-extern inline void pte_free(struct mm_struct *mm, struct page *page)
+static inline void pte_free(struct mm_struct *mm, struct page *page)
 {pntable_page_dtor(page);
 __free_page(page);
 }

--- linux-4.15.0.orig/arch/m68k/include/asm/pgtable_mm.h
+++ linux-4.15.0/arch/m68k/include/asm/pgtable_mm.h
@@ -55,12 +55,12 @@
 */

#ifdef CONFIG_SUN3
#define PTRS_PER_PTE 16
-#define __PAGETABLE_PMD_FOLDED
+endif

#define PTRS_PER_PTE 16
-#define __PAGETABLE_PMD_FOLDED
+endif

--- linux-4.15.0.orig/arch/m68k/include/asm/pgtable_mm.h
+++ linux-4.15.0/arch/m68k/include/asm/pgtable_mm.h
@@ -55,12 +55,12 @@
 */

#define PTRS_PER_PTE 16
-#define __PAGETABLE_PMD_FOLDED
+endif

--- linux-4.15.0.orig/arch/m68k/include/asm/pgtable_mm.h
+++ linux-4.15.0/arch/m68k/include/asm/pgtable_mm.h
@@ -55,12 +55,12 @@
 */

#define PTRS_PER_PTE 16
-#define __PAGETABLE_PMD_FOLDED
+endif

+defined __PAGETABLE_PMD_FOLDED 1
#define PTRS_PER_PMD 1
#define PTRS_PER_PGD 2048
#if defined(CONFIG_COLDFIRE)
#define PTRS_PER_PTE 512
#elif defined(__PAGETABLE_PMD_FOLDED)
#define PTRS_PER_PMD1
#define PTRS_PER_PGD1024
#else
--- linux-4.15.0.orig/arch/m68k/include/asm/raw_io.h
+++ linux-4.15.0/arch/m68k/include/asm/raw_io.h
@@ -31,21 +31,21 @@
 */
#define in_8(addr)\
- ({ u8 __v = (*(__force volatile u8 *) (addr)); __v; })
+ ({ u8 __v = (*(__force volatile u8 *) (unsigned long)(addr)); __v; })
#define in_be16(addr)\
- ({ u16 __v = (*(__force volatile u16 *) (addr)); __v; })
+ ({ u16 __v = (*(__force volatile u16 *) (unsigned long)(addr)); __v; })
#define in_be32(addr)\
- ({ u32 __v = (*(__force volatile u32 *) (addr)); __v; })
+ ({ u32 __v = (*(__force volatile u32 *) (unsigned long)(addr)); __v; })
#define in_le16(addr)\
- ({ u16 __v = le16_to_cpu(*(__force volatile __le16 *) (addr)); __v; })
+ ({ u16 __v = le16_to_cpu(*(__force volatile __le16 *) (unsigned long)(addr)); __v; })
#define in_le32(addr)\
- ({ u32 __v = le32_to_cpu(*(__force volatile __le32 *) (addr)); __v; })
+ ({ u32 __v = le32_to_cpu(*(__force volatile __le32 *) (unsigned long)(addr)); __v; })
#endif in_8(addr) \
- ( { u8 __v = (*(__force volatile u8 *) (addr)); __v; })
+ ( { u8 __v = (*(__force volatile u8 *) (unsigned long)(addr)); __v; })
#define out_8(addr,b) (void)((*(__force volatile u8 *) (addr)) = (b))
-#define out_be16(addr,w) (void)(((*force volatile u16 *) (addr)) = (w))
-#define out_be32(addr,l) (void)(((*force volatile u32 *) (addr)) = (l))
-#define out_le16(addr,w) (void)(((*force volatile __le16 *) (addr)) = cpu_to_le16(w))
-#define out_le32(addr,l) (void)(((*force volatile __le32 *) (addr)) = cpu_to_le32(l))
+#define out_8(addr,b) (void)(((*force volatile u8 *) (unsigned long)(addr)) = (b))
+#define out_be16(addr,w) (void)(((*force volatile u16 *) (unsigned long)(addr)) = (w))
+#define out_be32(addr,l) (void)(((*force volatile u32 *) (unsigned long)(addr)) = (l))
+#define out_le16(addr,w) (void)(((*force volatile __le16 *) (unsigned long)(addr)) = cpu_to_le16(w))
+#define out_le32(addr,l) (void)(((*force volatile __le32 *) (unsigned long)(addr)) = cpu_to_le32(l))
#endif out_8(addr,b) (void)(((*force volatile u8 *) (addr)) = (b))
#endif out_be16(addr,w) (void)(((*force volatile u16 *) (addr)) = (w))
#endif out_be32(addr,l) (void)(((*force volatile u32 *) (addr)) = (l))
#endif out_le16(addr,w) (void)(((*force volatile __le16 *) (addr)) = cpu_to_le16(w))
#endif out_le32(addr,l) (void)(((*force volatile __le32 *) (addr)) = cpu_to_le32(l))
#define raw_inb in_8
#define raw_inw in_be16
--- linux-4.15.0.orig/arch/m68k/kernel/signal.c
+++ linux-4.15.0/arch/m68k/kernel/signal.c
@@ -448,7 +448,7 @@
#define raw_inb in_8
#define raw_inw in_be16
--- linux-4.15.0.orig/arch/m68k/kernel/signal.c
+++ linux-4.15.0/arch/m68k/kernel/signal.c
@@ -448,7 +448,7 @@

if (CPU_IS_060 ? sc->sc_fpstate[2] : sc->sc_fpstate[0]) {
    fpu_version = sc->sc_fpstate[0];
    -if (CPU_IS_020_OR_030 &&
        +if (CPU_IS_020_OR_030 && !regs->stkadj &&
            regs->vector >= (VEC_FPBRUC * 4) &&
            regs->vector <= (VEC_FPNAN * 4)) {
        /* Clear pending exception in 68882 idle frame */
        @ @ -511,7 +511,7 @@
    if (!CPU_IS_060 || CPU_IS_COLDFIRE))
        context_size = fpstate[1];
    fpu_version = fpstate[0];
    -if (CPU_IS_020_OR_030 &&
        +if (CPU_IS_020_OR_030 && !regs->stkadj &&
            regs->vector >= (VEC_FPBRUC * 4) &&
            regs->vector <= (VEC_FPNAN * 4)) {
        /* Clear pending exception in 68882 idle frame */
        @ @ -765,18 +765,24 @@
        return 0;
    }
}
+static inline struct pt_regs *rte_regs(struct pt_regs *regs)
+{
+    +return (void *)regs + regs->stkadj;
+}
+
static void setup_sigcontext(struct sigcontext *sc, struct pt_regs *regs,
                           unsigned long mask)
{
    +struct pt_regs *tregs = rte_regs(regs);
    sc->sc_mask = mask;
    sc->sc_usp = rdusp();
    sc->sc_d0 = regs->d0;
    sc->sc_d1 = regs->d1;
    sc->sc_a0 = regs->a0;
    sc->sc_a1 = regs->a1;
    -sc->sc_sr = regs->sr;
    -sc->sc_pc = regs->pc;
    -sc->sc_formatvec = regs->format << 12 | regs->vector;
    +sc->sc_sr = tregs->sr;
    +sc->sc_pc = tregs->pc;
    +sc->sc_formatvec = tregs->format << 12 | tregs->vector;
    save_a5_state(sc, regs);
    save_fpu_state(sc, regs);
    }
    @ @ -784,6 +790,7 @@
    static inline int rt_setup_ucontext(struct ucontext __user *uc, struct pt_regs *regs)
    {
        struct switch_stack *sw = (struct switch_stack *)regs - 1;


+struct pt_regs *tregs = rte_regs(regs);
+greg_t __user *gregs = uc->uc_mcontext.gregs;
+int err = 0;

@@ -804,9 +811,9 @@
                     err |= __put_user(sw->a5, &gregs[13]);
                     err |= __put_user(sw->a6, &gregs[14]);
                     err |= __put_user(r dus p(), &gregs[15]);
-                    err |= __put_user(regs->pc, &gregs[16]);
-                    err |= __put_user(regs->sr, &gregs[17]);
-                    err |= __put_user((regs->format << 12) | regs->vector, &uc->uc_formatvec);
+                    err |= __put_user(tregs->pc, &gregs[16]);
+                    err |= __put_user(tregs->sr, &gregs[17]);
+                    err |= __put_user((tregs->format << 12) | tregs->vector, &uc->uc_formatvec);
                     err |= rt_save_fpu_state(uc, regs);
                     return err;
                 }
@@ -823,13 +830,14 @@
 struct pt_regs *regs)
 {
     struct sigframe __user *frame;
-    int fsize = frame_extra_sizes(regs->format);
+    struct pt_regs *tregs = rte_regs(regs);
+    int fsize = frame_extra_sizes(tregs->format);
     struct sigcontext context;
     int err = 0, sig = ksig->sig;

     if (fsize < 0) {
         pr_debug("setup_frame: Unknown frame format %#x\n",
-                 regs->format);
+                 tregs->format);
         return -EFAULT;
     }

@@ -840,7 +848,27 @@
                     err |= __put_user(sig, &frame->sig);
                     -err |= __put_user(regs->vector, &frame->code);
                     +err |= __put_user(tregs->vector, &frame->code);
                     err |= __put_user(&frame->sc, &frame->psc);

     if (_NSIG_WORDS > 1)
@@ -866,33 +874,27 @@
push_cache ((unsigned long) &frame->retcode);

     /*
          - * Set up registers for signal handler. All the state we are about
/* to destroy is successfully copied to sigframe. */
-wrusp ((unsigned long) frame);
-regs->pc = (unsigned long) ksig->ka.sa.sa_handler;
-adjustformat(regs);
-
-/*
 * This is subtle; if we build more than one sigframe, all but the
 * first one will see frame format 0 and have fsize == 0, so we won't
 * screw stkadj.
 */
-if (fsize)
+if (fsize) {
    regs->stkadj = fsize;
-
-/* Prepare to skip over the extra stuff in the exception frame. */
-if (regs->stkadj) {
    -struct pt_regs *tregs =
     -((struct pt_regs *)((ulong)regs + regs->stkadj));
+    tregs = rte_regs(regs);
    pr_debug("Performing stackadjust=\%04lx\n", regs->stkadj);
-/* This must be copied with decreasing addresses to
-    handle overlaps. */
-    tregs->vector = 0;
-    tregs->format = 0;
-    tregs->pc = regs->pc;
-    tregs->sr = regs->sr;
+    +
+    */
+    * Set up registers for signal handler. All the state we are about
+    * to destroy is successfully copied to sigframe.
+ */
+wrusp ((unsigned long) frame);
+regs->pc = (unsigned long) ksig->ka.sa.sa_handler;
+adjustformat(regs);
+
+return 0;
}

@@ -900,7 +902,8 @@

-struct pt_regs *regs)
{
 struct rt_sigframe __user *frame;
-    int fsize = frame_extra_sizes(regs->format);
+    tregs = rte_regs(regs);
+    int fsize = frame_extra_sizes(tregs->format);
    int err = 0, sig = ksig->sig;
if (fsiz<0) {
push_cache ((unsigned long) &frame->retcode);

/*
 * Set up registers for signal handler. All the state we are about
 * to destroy is successfully copied to sigframe.
 */
-wrusp ((unsigned long) frame);
-reg->pc = (unsigned long) ksig->ka.sa.sa_handler;
-adjustformat(regs);
-
-/*
 * This is subtle; if we build more than one sigframe, all but the
 * first one will see frame format 0 and have fsiz == 0, so we won't
 * screw stkadj.
 */
-if (fsiz)
+if (fsiz) {
regs->stkadj = fsiz;
-
-/* Prepare to skip over the extra stuff in the exception frame. */
-if (regs->stkadj) {
-struct pt_regs *tregs =
-(struct pt_regs *)((ulong)regs + regs->stkadj);
+tregs = rte_regs(regs);
pr_debug("Performing stackadjust=\%4lx\n", regs->stkadj);
-/* This must be copied with decreasing addresses to
 - handle overlaps. */
 tregs->vector = 0;
tregs->format = 0;
-tregs->pc = regs->pc;
tregs->sr = regs->sr;
}
+
+/*
 + * Set up registers for signal handler. All the state we are about
 + * to destroy is successfully copied to sigframe.
 + */
+wrusp ((unsigned long) frame);
+tregs->pc = (unsigned long) ksig->ka.sa.sa_handler;
+adjustformat(regs);
return 0;
}

--- linux-4.15.0.orig/arch/m68k/kernel/uboot.c
+++ linux-4.15.0/arch/m68k/kernel/uboot.c
Open Source Used In 5GaaS Edge AC-4 10588
parse_uboot_commandline(commandp, len);
- commandp[size - 1] = 0;
+ commandp[len - 1] = 0;
}
--- linux-4.15.0.orig/arch/m68k/mac/config.c
+++ linux-4.15.0/arch/m68k/mac/config.c
@@ -102,5 +102,5 @@
-
to
+commandp[len - 1] = 0;
}
@@ -61,7 +61,6 @@
extern void iop_init(void);
extern void via_init(void);
extern void via_init_clock(irq_handler_t func);
-extern void via_flush_cache(void);
-extern void oss_init(void);
-extern void psc_init(void);
-extern void baboon_init(void);
@@ -132,21 +131,6 @@
return unknown;
}

/*
 * Flip into 24bit mode for an instant - flushes the L2 cache card. We
 * have to disable interrupts for this. Our IRQ handlers will crap
 * themselves if they take an IRQ in 24bit mode!
 */
-
-static void mac_cache_card_flush(int writeback)
-{  
-unsigned long flags;
-
-local_irq_save(flags);
-via_flush_cache();
-local_irq_restore(flags);
-}

void __init config_mac(void)
{
if (!MACH_IS_MAC)
@@ -179,9 +163,8 @@
* not.
 */

-if (macintosh_config->ident == MAC_MODEL_IICI
- || macintosh_config->ident == MAC_MODEL_IIFX)
-mach_l2_flush = mac_cache_card_flush;
+if (macintosh_config->ident == MAC_MODEL_IICI)
+mach_l2_flush = via_l2_flush;
```c
struct resource swim_rsrc = {
    .flags = IORESOURCE_MEM,
    .start = (resource_size_t)swim_base,
    .end   = (resource_size_t)swim_base + 0x2000,
};

platform_device_register_simple("swim", -1, &swim_rsrc, 1);

--- linux-4.15.0.orig/arch/m68k/mac/iop.c
+++ linux-4.15.0/arch/m68k/mac/iop.c
@@ -183,7 +183,7 @@
 static __inline__ void iop_start(volatile struct mac_iop *iop)
 {
     iop->status_ctrl = IOP_RUN | IOP_AUTOINC;
 }

 static __inline__ void iop_stop(volatile struct mac_iop *iop)
 {
     iop->status_ctrl &= ~IOP_RUN;
     iop->status_ctrl = IOP_AUTOINC;
 }

 static __inline__ void iop_bypass(volatile struct mac_iop *iop)
 {
     iop->status_ctrl |= IOP_BYPASS;
 }

 static __inline__ void iop_interrupt(volatile struct mac_iop *iop)
 {
     iop->status_ctrl |= IOP_IRQ;
 }

 static __inline__ void iop_alive(volatile struct mac_iop *iop)
 {
     if (iop_base[IOP_NUM_SCC] == (struct mac_iop *) SCC_IOP_BASE_QUADRA) {
         iop_base[IOP_NUM_SCC] = SCC_IOP_BASE_QUADRA;
         iop_base[IOP_NUM_SCC]->status_ctrl = 0x87;
         iop_scc_present = 1;
     } else {
         iop_base[IOP_NUM_SCC] = NULL;
     }
 }
```
iop_base[IOP_NUM_ISM] = (struct mac_iop *) ISM_IOP_BASE_QUADRA;

-iop_base[IOP_NUM_ISM]->status_ctrl = 0;
+io_stop(iop_base[IOP_NUM_ISM]);
iop_ism_present = 1;
} else {
    iop_base[IOP_NUM_ISM] = NULL;
}

msg->status = IOP_MSGSTATUS_UNUSED;
msg = msg->next;

if (msg) iop_do_send(msg);

/*
 @@ -416,7 +410,8 @@
 msg->status = IOP_MSGSTATUS_UNUSED;
 msg = msg->next;
 iop_send_queue[iop_num][chan] = msg;
-if (msg) iop_do_send(msg);
+if (msg && iop_readb(iop, IOP_ADDR_SEND_STATE + chan) == IOP_MSG_IDLE)
 +iop_do_send(msg);
 */

if (!q = iop_send_queue[iop_num][chan]) {
    iop_send_queue[iop_num][chan] = msg;
    +iop_do_send(msg);
} else {
    while (q->next) q = q->next;
    q->next = msg;
}

/*
 @@ -490,16 +485,12 @@
 if (!(q = iop_send_queue[iop_num][chan])) {
     iop_send_queue[iop_num][chan] = msg;
     +iop_do_send(msg);
 } else {
     while (q->next) q = q->next;
     q->next = msg;
 }

-if (iop_readb(iop_base[iop_num],
-    IOP_ADDR_SEND_STATE + chan) == IOP_MSG_IDLE) {
-    iop_do_send(msg);
 -}
-
return 0;
}
-#define MAC_CLOCK_HIGH(MAC_CLOCK_TICK>>8)
-
-/*
 * On Macs with a genuine VIA chip there is no way to mask an individual slot
 * interrupt. This limitation also seems to apply to VIA clone logic cores in
 * Quadra-like ASICs. (RBV and OSS machines don't have this limitation.)
 */
@@ -268,22 +258,6 @@
}
/
- * Start the 100 Hz clock
- */
-
-void __init via_init_clock(irq_handler_t func)
{-
-via1[vACR] |= 0x40;
-via1[vT1LL] = MAC_CLOCK_LOW;
-via1[vT1LH] = MAC_CLOCK_HIGH;
-via1[vT1CL] = MAC_CLOCK_LOW;
-via1[vT1CH] = MAC_CLOCK_HIGH;
-
-if (request_irq(IRQ_MAC_TIMER_1, func, 0, "timer", func))
-pr_err("Couldn't register %s interrupt\n", "timer");
-{}
-
-/*
 * Debugging dump, used in various places to see what's going on.
 */
@@ -311,37 +285,18 @@
}
/
- * This is always executed with interrupts disabled.
- *
- * TBI: get time offset between scheduling timer ticks
- */
-
-u32 mac_gettimeoffset(void)
-{
-unsigned long ticks, offset = 0;
-
-/ * read VIA1 timer 2 current value */
-ticks = via1[vT1CL] | (via1[vT1CH] << 8);
-/ * The probability of underflow is less than 2% */
-if (ticks > MAC_CLOCK_TICK - MAC_CLOCK_TICK / 50)
-/ * Check for pending timer interrupt in VIA1 IFR */
-if (via1[vIFR] & 0x40) offset = TICK_SIZE;
-
ticks = MAC_CLOCK_TICK - ticks;
-ticks = ticks * 10000L / MAC_CLOCK_TICK;
-
return (ticks + offset) * 1000;
-
-/*
* Flush the L2 cache on Macs that have it by flipping
* the system into 24-bit mode for an instant.
*/
-
-void via_flush_cache(void)
+void via_l2_flush(int writeback)
{
+unsigned long flags;
+
+local_irq_save(flags);
+via2[gBufB] &= ~VIA2B_vMode32;
+via2[gBufB] |= VIA2B_vMode32;
+local_irq_restore(flags);
+
/*
@@ -436,6 +391,8 @@
* via6522.c :-), disable/pending masks added.
*/
+
#define VIA_TIMER_1_INT BIT(6)
+
void via1_irq(struct irq_desc *desc)
{
+int irq_num;
+@@ -445,6 +402,21 @@
+if (!events)
+return;
+
+irq_num = IRQ_MAC_TIMER_1;
+irq_bit = VIA_TIMER_1_INT;
+if (events & irq_bit) {
+unsigned long flags;
+
+local_irq_save(flags);
+via1[vIFR] = irq_bit;
+generic_handle_irq(irq_num);
+local_irq_restore(flags);
+}
+events &= ~irq_bit;
+if (!events)
+    return;
+
+    irq_num = VIA1_SOURCE_BASE;
+    irq_bit = 1;
+    do {
+        @@ -601,3 +573,56 @@
+            return via2[gIFR] & (1 << IRQ_IDX(IRQ_MAC_SCSIDRQ));
+    }
+
+    EXPORT_SYMBOL(via2_scsi_drq_pending);
+
+ /* timer and clock source */
+
+#define VIA_CLOCK_FREQ 783360 /* VIA "phase 2" clock in Hz */
+#define VIA_TIMER_INTERVAL (1000000 / HZ) /* microseconds per jiffy */
+#define VIA_TIMER_CYCLES (VIA_CLOCK_FREQ / HZ) /* clock cycles per jiffy */
+
+#define VIA_TC ((VIA_TIMER_CYCLES - 2) /* including 0 and -1 */
+    +define VIA_TC_LOW (VIA_TC & 0xFF)
+    +define VIA_TC_HIGH (VIA_TC >> 8)
+
+    +void __init via_init_clock(irq_handler_t timer_routine)
+    +{
+        if (request_irq(IRQ_MAC_TIMER_1, timer_routine, 0, "timer", NULL)) {
+            pr_err("Couldn't register %s interrupt\n", "timer");
+            return;
+        }
+
+        via1[vT1LL] = VIA_TC_LOW;
+        via1[vT1LH] = VIA_TC_HIGH;
+        via1[vT1CL] = VIA_TC_LOW;
+        via1[vT1CH] = VIA_TC_HIGH;
+        via1[vACR] |= 0x40;
+    }
+
+    +u32 mac_gettimeoffset(void)
+    +{
+        unsigned long flags;
+        u8 count_high;
+        u16 count, offset = 0;
+        +
+    */
+        + Timer counter wrap-around is detected with the timer interrupt flag
+        + but reading the counter low byte (vT1CL) would reset the flag.
+        + Also, accessing both counter registers is essentially a data race.
+        + These problems are avoided by ignoring the low byte. Clock accuracy
/* is 256 times worse (error can reach 0.327 ms) but CPU overhead is
   reduced by avoiding slow VIA register accesses.
   */

local_irq_save(flags);
count_high = via1[vT1CH];
if (count_high == 0xFF)
count_high = 0;
if (count_high > 0 && (via1[vIFR] & VIA_TIMER_1_INT))
offset = VIA_TIMER_CYCLES;
local_irq_restore(flags);

++count = count_high << 8;
count = VIA_TIMER_CYCLES - count + offset;

return ((count * VIA_TIMER_INTERVAL) / VIA_TIMER_CYCLES) * 1000;
}
--- linux-4.15.0.orig/arch/m68k/mm/kmap.c
+++ linux-4.15.0/arch/m68k/mm/kmap.c
@@ -89,7 +89,8 @@
for (p = &iolist ; (tmp = *p) ; p = &tmp->next) {
if (tmp->addr == addr) {
  *p = tmp->next;
-__iounmap(tmp->addr, tmp->size);
+/* remove gap added in get_io_area() */
+__iounmap(tmp->addr, tmp->size - IO_SIZE);
kfree(tmp);
return;
}
--- linux-4.15.0.orig/arch/m68k/mvme147/config.c
+++ linux-4.15.0/arch/m68k/mvme147/config.c
@@ -46,11 +46,6 @@
static int bcd2int (unsigned char b);

-/* Save tick handler routine pointer, will point to xtime_update() in
- * kernel/time/timekeeping.c, called via mvme147_process_int() */
-
-irq_handler_t tick_handler;
-
int __init mvme147_parse_bootinfo(const struct bi_record *bi)
{
@@ -106,16 +101,23 @@
static irqreturn_t mvme147_timer_int (int irq, void *dev_id)
{
unsigned long flags;
+
+local_irq_save(flags);
m147_pcc->t1_int_cntrl = PCC_TIMER_INT_CLR;
m147_pcc->t1_int_cntrl = PCC_INT_ENAB|PCC_LEVEL_TIMER1;
- return tick_handler(irq, dev_id);
+timer_routine(0, NULL);
+local_irq_restore(flags);
+
+return IRQ_HANDLED;
}

void mvme147_sched_init (irq_handler_t timer_routine)
{
-  tick_handler = timer_routine;
-  if (request_irq(PCC_IRQ_TIMER1, mvme147_timer_int, 0, "timer 1", NULL))
-    pr_err("Couldn't register timer interrupt\n");

/* Init the clock with a value */
--- linux-4.15.0.orig/arch/m68k/mvme16x/config.c
+++ linux-4.15.0/arch/m68k/mvme16x/config.c
@@ -51,11 +51,6 @@
 int bcd2int (unsigned char b);

-/* Save tick handler routine pointer, will point to xtime_update() in
- * kernel/time/timekeeping.c, called via mvme16x_process_int() */
- static irq_handler_t tick_handler;
-

unsigned short mvme16x_config;
EXPORT_SYMBOL(mvme16x_config);
@@ -354,8 +349,15 @@
 static irqreturn_t mvme16x_timer_int (int irq, void *dev_id)
{
- *(volatile unsigned char *)0xfff4201b |= 8;
- return tick_handler(irq, dev_id);
+irq_handler_t timer_routine = dev_id;
+*local_irq_save(flags);
+*(volatile unsigned char *)0xfff4201b |= 8;
+timer_routine(0, NULL);
local_irq_restore(flags);
+
+return IRQ_HANDLED;
}

void mvme16x_sched_init (irq_handler_t timer_routine)
@@ -363,14 +365,13 @@
    uint16_t brdno = be16_to_cpu(mvme_bdid.brdno);
    int irq;

-    tick_handler = timer_routine;
+      
    /* Using PCCchip2 or MC2 chip tick timer 1 */
    *(volatile unsigned long *)0xfff42008 = 0;
    *(volatile unsigned long *)0xfff42004 = 10000; /* 10ms */
    *(volatile unsigned char *)0xfff42017 |= 3;
    *(volatile unsigned char *)0xfff4201b = 0x16;
-    if (request_irq(MVME16x_IRQ_TIMER, mvme16x_timer_int, 0, "timer", mvme16x_timer_int))
+    if (request_irq(MVME16x_IRQ_TIMER, mvme16x_timer_int, 0, "timer",
                    timer_routine))
        panic ("Couldn't register timer int");

        if (brdno == 0x0162 || brdno == 0x172)
        --- linux-4.15.0.orig/arch/m68k/q40/config.c
+++ linux-4.15.0/arch/m68k/q40/config.c
@@ -303,6 +303,7 @@
        int tmp = Q40_RTC_CTRL;

-    pll->pll_ctrl = 0;
+    pll->pll_value = tmp & Q40_RTC_PLL_MASK;
    if (tmp & Q40_RTC_PLL_SIGN)
        pll->pll_value = -pll->pll_value;
        --- linux-4.15.0.orig/arch/m68k/q40/q40ints.c
+++ linux-4.15.0/arch/m68k/q40/q40ints.c
@@ -127,10 +127,10 @@
        sound_ticks = ticks << 1;
    }

-    static irq_handler_t q40_timer_routine;
-    
-    static irqreturn_t q40_timer_int (int irq, void * dev)
+    static irqreturn_t q40_timer_int(int irq, void *dev_id)
+    { 
          +irq_handler_t timer_routine = dev_id;
          +
          ql_ticks = ql_ticks ? 0 : 1;
          if (sound_ticks) {
+          

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unsigned char sval = (sound_ticks & 1) ? 128 - SVOL : 128 + SVOL;
*DAC_RIGHT = sval;
}

- if (!ql_ticks)
- q40_timer_routine(irq, dev);
+ if (!ql_ticks) {
+ unsigned long flags;
+ + local_irq_save(flags);
+ + timer_routine(0, NULL);
+ + local_irq_restore(flags);
+ }
return IRQ_HANDLED;
}

@@ -139,8 +139,13 @@

@if (!ql_ticks)
-q40_timer_routine(irq, dev);
+if (!ql_ticks) {
+ unsigned long flags;
+ + local_irq_save(flags);
+ + timer_routine(0, NULL);
+ + local_irq_restore(flags);
+ }
return IRQ_HANDLED;
}

@@ -148,11 +153,9 @@

int timer_irq;

-q40_timer_routine = timer_routine;
+ q40_timer_routine = timer_routine;
timer_irq = Q40_IRQ_FRAME;

- if (request_irq(timer_irq, q40_timer_int, 0,
- "timer", q40_timer_int))
+ if (request_irq(timer_irq, q40_timer_int, 0, "timer", timer_routine))
panic("Couldn't register timer int");

master_outb(-1, FRAME_CLEAR_REG);
--- linux-4.15.0.orig/arch/m68k/sun3/sun3ints.c
+++ linux-4.15.0/arch/m68k/sun3/sun3ints.c
@@ -61,8 +61,10 @@
static irqreturn_t sun3_int5(int irq, void *dev_id)
{
+ unsigned long flags;
+ unsigned int cnt;

+ local_irq_save(flags);

#ifdef CONFIG_SUN3
   intersil_clear();
#endif
@@ -76,6 +78,7 @@
cnt = kstat_irqs_cpu(irq, 0);
   if (!(cnt % 20))
   sun3_leds(led_pattern[cnt % 160 / 20]);
+ local_irq_restore(flags);
return IRQ_HANDLED;
}

--- linux-4.15.0.orig/arch/m68k/sun3x/time.c
+++ linux-4.15.0/arch/m68k/sun3x/time.c
@@ -78,15 +78,19 @@
{
    void (*vector)(int, void *, struct pt_regs *) = dev_id;
+    irq_handler_t timer_routine = dev_id;
+    unsigned long flags;

-    /* Clear the pending interrupt - pulse the enable line low */
-    disable_irq(5);
-    enable_irq(5);
+    local_irq_save(flags);
+    /* Clear the pending interrupt - pulse the enable line low */
+    disable_irq(5);
+    enable_irq(5);
+    timer_routine(0, NULL);
+    local_irq_restore(flags);

-    vector(irq, NULL, regs);
+    return IRQ_HANDLED;
}

# endif

--- linux-4.15.0.orig/arch/microblaze/Kconfig.platform
+++ linux-4.15.0/arch/microblaze/Kconfig.platform
@@ -20,6 +20,7 @@
config OPT_LIB_ASM
    bool "Optimized lib function ASM"
    depends on OPT_LIB_FUNCTION && (XILINX_MICROBLAZE0_USE_BARREL = 1)
+    depends on CPU_BIG_ENDIAN
    default n
    help
    Allows turn on optimized library function (memcpy and memmove).
--- linux-4.15.0.orig/arch/microblaze/Makefile
+++ linux-4.15.0/arch/microblaze/Makefile
@@ -36,16 +36,21 @@
CPUFLAGS-$(CONFIG_XILINX_MICROBLAZE0_USE_DIV) += -mno-xl-soft-div
CPUFLAGS-$(CONFIG_XILINX_MICROBLAZE0_USE_BARREL) += -mxl-barrel-shift
CPUFLAGS-$(CONFIG_XILINX_MICROBLAZE0_USE_PCMP_INSTR) += -mxl-pattern-compare
-CPUFLAGS-$(CONFIG_BIG_ENDIAN) += -nbig-endian
-CPUFLAGS-$(CONFIG_LITTLE_ENDIAN) += -mlittle-endian
+
+ifdef CONFIG_CPU_BIG_ENDIAN
+KBUILD_CFLAGS += -mbig-endian
+KBUILD_AFLAGS += -mbig-endian
+LD += -EL
+else
+KBUILD_CFLAGS += -mlittle-endian
+KBUILD_AFLAGS += -mlittle-endian
+LD += -EL
+endif

CPUFLAGS-1 += $(call cc-option,-mcpu=v$(CPU_VER))

# r31 holds current when in kernel mode
-KBUILD_CFLAGS += -ffixed-r31 $(CPUFLAGS-1) $(CPUFLAGS-2)
-
-LDFLAGS:=
-LDFLAGS_vmlinux:=
+KBUILD_CFLAGS += -ffixed-r31 $(CPUFLAGS-y) $(CPUFLAGS-1) $(CPUFLAGS-2)

head-y := arch/microblaze/kernel/head.o
libs-y += arch/microblaze/lib/
@@ -78,19 +83,21 @@
linux.bin linux.bin.gz linux.bin.ub: vmlinux
$(Q)$(MAKE) $(build)=$(boot) $(boot)/$@
+@echo 'Kernel: $(boot)/$@ is ready' ' (#'`cat .version`')'

simpleImage.%.: vmlinux
-$Q$(MAKE) $(build)=$(boot) $(boot)/$@
+$Q$(MAKE) $(build)=$(boot) $(addprefix $(boot)/$@., ub unstrip strip)
+@echo 'Kernel: $(boot)/$@ is ready' ' (#'`cat .version`')'

define archhelp
 echo '* linux.bin   - Create raw binary'
 echo '  linux.bin.gz - Create compressed raw binary'
 echo '  linux.bin.ub - Create U-Boot wrapped raw binary'
 - echo '  simpleImage.<dt> - ELF image with $(arch)/boot/dts/<dt>.dts linked in'
 - echo '    - stripped elf with fdt blob'
 - echo '  simpleImage.<dt>.unstrip - full ELF image with fdt blob'
 - echo '    * _defconfig - Select default config from arch/microblaze/configs'
 - echo
 + echo '  simpleImage.<dt> - Create the following images with <dt>.dtb linked in'
 + echo '    simpleImage.<dt> : raw image'
 + echo '    simpleImage.<dt>.ub : raw image with U-Boot header'
 + echo '    simpleImage.<dt>.unstrip: ELF (identical to vmlinux)'
 + echo '    simpleImage.<dt>.strip : stripped ELF'
echo 'Targets with <dt> embed a device tree blob inside the image'
echo 'These targets support board with firmware that does not'
echo 'support passing a device tree directly. Replace <dt> with the'

--- linux-4.15.0.orig/arch/microblaze/boot/Makefile
+++ linux-4.15.0/arch/microblaze/boot/Makefile
@@ -3,36 +3,33 @@
# arch/microblaze/boot/Makefile
#
-targets := linux.bin linux.bin.gz linux.bin.ub simpleImage.\
+targets := linux.bin linux.bin.gz linux.bin.ub simpleImage.\

OBJCOPYFLAGS := -R .note -R .comment -R .note.gnu.build-id -O binary

$(obj)/linux.bin: vmlinux FORCE
$(call if_changed, objcopy)
-@echo 'Kernel: $@ is ready' ' (#'`cat .version`')'

$(obj)/linux.bin.gz: $(obj)/linux.bin FORCE
$(call if_changed, gzip)
-@echo 'Kernel: $@ is ready' ' (#'`cat .version`')'

$(obj)/linux.bin.ub: $(obj)/linux.bin FORCE
$(call if_changed, uimage)
-@echo 'Kernel: $@ is ready' ' (#'`cat .version`')'

-(obj)/simpleImage.%: vmlinux FORCE
-(call if_changed, cp, .unstrip)
-$(call if_changed, objcopy)
+$(obj)/simpleImage.$(DTB): vmlinux FORCE
+$(call if_changed, objcopy)

+$(obj)/simpleImage.$(DTB).ub: $(obj)/simpleImage.$(DTB) FORCE
+$(call if_changed, uimage)
-@echo 'Kernel: $@ is ready' ' (#'`cat .version`')'

-clean-files += simpleImage.\*.unstrip linux.bin.ub

UIMAGE_LOADADDR = $(CONFIG_KERNEL_BASE_ADDR)

-$(obj)/simpleImage.%: vmlinux FORCE
-$(call if_changed, cp, .unstrip)
+$(call if_changed, cp, .unstrip)
+$(obj)/simpleImage.$(DTB): vmlinux FORCE
+$(call if_changed, objcopy)
+
+$(obj)/simpleImage.$(DTB).ub: $(obj)/simpleImage.$(DTB) FORCE
+$(call if_changed, objcopy)
+$(call if_changed, strip)
-@echo 'Kernel: $@ is ready' ' (#'`cat .version`')'

-clean-files += simpleImage.\*.unstrip linux.bin.ub
#include <asm-generic/4level-fixup.h>

#define __PAGETABLE_PMD_FOLDED 1

#ifdef __KERNEL__

#define CACHE_LOOP_LIMITS(start, end, cache_line_length, cache_size) do {
  int align = ~(cache_line_length - 1);
  -end = min(start + cache_size, end);
  +if (start < UINT_MAX - cache_size)
    end = min(start + cache_size, end);
  start &= align;
} while (0)

void prepare_ftrace_return(unsigned long *parent, unsigned long self_addr) {
  unsigned long old;
  -int faulted, err;
  -struct ftrace_graph_ent trace;
  +int faulted;
  unsigned long return_hooker = (unsigned long)
    &return_to_handler;

  -err = ftrace_push_return_trace(old, self_addr, &trace.depth, 0, NULL);
  -if (err == -EBUSY) {
    +if (function_graph_enter(old, self_addr, 0, NULL))
      *parent = old;

```
-return;
-
-trace_func = self_addr;
-/* Only trace if the calling function expects to */
-if (!ftrace_graph_entry(&trace)) {
- current->curr_ret_stack--;
- *parent = old;
- }
} #endif /* CONFIG_FUNCTION_GRAPH_TRACER */

--- linux-4.15.0.orig/arch/microblaze/lib/fastcopy.S
+++ linux-4.15.0/arch/microblaze/lib/fastcopy.S
@@ -29,10 +29,6 @@
*between mem locations with size of xfer spec'd in bytes
*/

-#ifdef __MICROBLAZEEL__
-#error Microblaze LE not support ASM optimized lib func. Disable OPT_LIB_ASM.
-#endif

- #include <linux/linkage.h>
 .text
 .globl memcpy
--- linux-4.15.0.orig/arch/mips/Kconfig
+++ linux-4.15.0/arch/mips/Kconfig
@@ -29,6 +29,7 @@
select GENERIC_SMP_IDLE_THREAD
select GENERIC_TIME_VSYSCALL
select HANDLE_DOMAIN_IRQ
+select HAVE_ARCH_COMPILER_H
select HAVE_ARCH_JUMP_LABEL
select HAVE_ARCH_KGDB
select HAVE_ARCH_MMAP_RND_BITS if MMU
@@ -119,12 +120,12 @@
select SYS_SUPPORTS_MULTITHREADING
select SYS_SUPPORTS_RELOCATABLE
select SYS_SUPPORTS_SMARTMIPS
- select USB_EHCI_BIG_ENDIAN_DESC if BIG_ENDIAN
- select USB_EHCI_BIG_ENDIAN_MMIO if BIG_ENDIAN
- select USB_OHCI_BIG_ENDIAN_DESC if BIG_ENDIAN
- select USB_OHCI_BIG_ENDIAN_MMIO if BIG_ENDIAN
- select USB_UHCI_BIG_ENDIAN_DESC if BIG_ENDIAN
- select USB_UHCI_BIG_ENDIAN_MMIO if BIG_ENDIAN
+ select USB_EHCI_BIG_ENDIAN_DESC if CPU_BIG_ENDIAN
+ select USB_EHCI_BIG_ENDIAN_MMIO if CPU_BIG_ENDIAN
+ select USB_OHCI_BIG_ENDIAN_DESC if CPU_BIG_ENDIAN

+select USB_OHCI_BIG_ENDIAN_MMIO if CPU_BIG_ENDIAN
+select USB_UHCI_BIG_ENDIAN_DESC if CPU_BIG_ENDIAN
+select USB_UHCI_BIG_ENDIAN_MMIO if CPU_BIG_ENDIAN
select USE_OF

help
Select this to build a kernel which aims to support multiple boards,
@@ -793,6 +794,7 @@
select SYS_SUPPORTS_BIG_ENDIAN
select SYS_SUPPORTS_HIGHMEM
select SYS_SUPPORTS_LITTLE_ENDIAN
+select ZONE_DMA32 if 64BIT

config SIBYTE_SENTOSA
bool "Sibyte BCM91250E-Sentosa"
@@ -836,6 +838,7 @@
select I8253
select I8259
select ISA
+select MIPS_L1_CACHE_SHIFT_6
select SWAP_IO_SPACE if CPU_BIG_ENDIAN
select SYS_HAS_CPU_R4X00
select SYS_HAS_CPU_R5000
@@ -3150,6 +3153,7 @@
config MIPS32_N32
bool "Kernel support for n32 binaries"
depends on 64BIT
+select ARCH_WANT_COMPAT_IPC_PARSE_VERSION
select COMPAT
select MIPS32_COMPAT
select SYSVIPC_COMPAT if SYSVIPC
--- linux-4.15.0.orig/arch/mips/Makefile
+++ linux-4.15.0/arch/mips/Makefile
@@ -16,6 +16,7 @@
KBUILD_DEFCONFIG := 32r2el_defconfig
+KBUILD_DTBS := dtbs
#
# Select the object file format to substitute into the linker script.
@@ -155,15 +156,11 @@
cflags-$(CONFIG_CPU_VR41XX)	+= -march=r4100 -Wa,--trap
cflags-$(CONFIG_CPU_R4X00)	+= -march=r4600 -Wa,--trap
cflags-$(CONFIG_CPU_TX49XX)	+= -march=r4600 -Wa,--trap
-cflags-$(CONFIG_CPU_MIPS32_R1)	+= $(call cc-option,-march=mips32,-mips32 -U_MIPS_ISA -D_MIPS_ISA=_MIPS_ISA_MIPS32)\
--Wa,-mips32 -Wa,--trap
-cflags-$(CONFIG_CPU_MIPS32_R2)	+= $(call cc-option,-march=mips32r2,-mips32r2 -U_MIPS_ISA -
D_MIPS_IsA=_MIPS_IsA_MIPS32) \ 
-Wa,-mips32r2 -Wa,-trap 
+cflags-$(CONFIG_CPU_MIPS32_R1)+= -march=mips32 -Wa,-trap 
+cflags-$(CONFIG_CPU_MIPS32_R2)+= -march=mips32r2 -Wa,-trap 
+cflags-$(CONFIG_CPU_MIPS32_R6)+= -march=mips32r6 -Wa,-trap -modd-spreg 
-cflags-$(CONFIG_CPU_MIPS64_R1)+=$(call cc-option,-march=mips64,-mips64 -U_MIPS_IsA - 
D_MIPS_IsA=_MIPS_IsA_MIPS64a) \ 
-Wa,-mips64 -Wa,-trap 
-cflags-$(CONFIG_CPU_MIPS64_R2)+=$(call cc-option,-march=mips64r2,-mips64r2 -U_MIPS_IsA - 
D_MIPS_IsA=_MIPS_IsA_MIPS64a) \ 
-Wa,-mips64r2 -Wa,-trap 
+cflags-$(CONFIG_CPU_MIPS64_R1)+= -march=mips64 -Wa,-trap 
+cflags-$(CONFIG_CPU_MIPS64_R2)+= -march=mips64r2 -Wa,-trap 
+cflags-$(CONFIG_CPU_MIPS64_R6)+= -march=mips64r6 -Wa,-trap 
+cflags-$(CONFIG_CPU_R5000)+= -march=r5000 -Wa,-trap 
+cflags-$(CONFIG_CPU_R5432)+= $(call cc-option,-march=r5400,-march=r5000) \ 
@@ -283,12 +280,23 @@ 
endif 
endif 

+## When linking a 32-bit executable the LLVM linker cannot cope with a 
+## 32-bit load address that has been sign-extended to 64 bits. Simply 
+## remove the upper 32 bits then, as it is safe to do so with other 
+## linkers. 
+ifdef CONFIG_64BIT 
+load-ld			= $(load-y) 
+else 
+load-lld			= $(subst 0xffffffff,0x,$(load-y)) 
+endif 
+
+ KBUILD_AFLAGS+= $(cflags-y) 
+ KBUILD_CFLAGS+= $(cflags-y) 
- KBUILD_CPPFLAGS += -DVMLINUX_LOAD_ADDRESS=$(load-y) 
+ KBUILD_CPPFLAGS += -DVMLINUX_LOAD_ADDRESS=$(load-y) -DLINKER_LOAD_ADDRESS=$(load-ld) 
+ KBUILD_CPPFLAGS += -DDATAOFFSET=$(if $(dataoffset-y),$(dataoffset-y),0) 
+
+ bootvars-y= VMLINUX_LOAD_ADDRESS=$(load-y) \ 
+  LINKER_LOAD_ADDRESS=$(lload-y) \ 
+  VMLINUX_ENTRY_ADDRESS=$(entry-y) \ 
+  PLATFORM="$(platform-y)" \ 
+  ITS_INPUTS="$(its-y)" 
@@ -307,7 +315,7 @@ 
ifdef CONFIG_MIPS 
CHECKFLAGS += $(shell $(CC) $(KBUILD_CFLAGS) -dM -E -x c /dev/null | 
-egrep -vw '__GNUC_(|MINOR_|PATCHLEVEL_)_' | 
+egrep -vw '__GNUC_(MINOR_|PATCHLEVEL_)?_' | 

sed -e "s/^\#define .*/-D'/'" -e "s/ /'='/" -e "s/\(\)/&&/g'"
ifdef CONFIG_64BIT
CHECKFLAGS+= -m64
@@ -381,7 +389,7 @@
vmlinux.64: vmlinux
$(call cmd,64)
-all:$(all-y)
+all:$(all-y) $(KBUILD_DTBS)

# boot
$(boot-y): $(vmlinux-32) FORCE
--- linux-4.15.0.orig/arch/mips/Makefile.postlink
+++ linux-4.15.0/arch/mips/Makefile.postlink
@@ -12,7 +12,7 @@
include scripts/Kbuild.include
CMD_RELOCS = arch/mips/boot/tools/relocs
-quiet_cmd_relocs = RELOCS $@
+quiet_cmd_relocs = RELOCS $@
    cmd_relocs = $(CMD_RELOCS) $@

# `@true` prevents complaint when there is nothing to be done
--- linux-4.15.0.orig/arch/mips/alchemy/board-xxs1500.c
+++ linux-4.15.0/arch/mips/alchemy/board-xxs1500.c
@@ -30,6 +30,7 @@
#include <asm/au1000.h>
#include <asm/mach-au1x00/gpio-au1000.h>
#include <prom.h>
const char *get_system_type(void)
--- linux-4.15.0.orig/arch/mips/alchemy/common/clock.c
+++ linux-4.15.0/arch/mips/alchemy/common/clock.c
@@ -152,6 +152,7 @@
    
    struct clk_init_data id;
    struct clk_hw *h;
+    struct clk *clk;

    h = kzalloc(sizeof(*h), GFP_KERNEL);
    if (!h)
@@ -164,7 +165,13 @@
        id.ops = &alchemy_clkops_cpu;
        h->init = &id;

        -return clk_register(NULL, h);
+clk = clk_register(NULL, h);
+if (IS_ERR(clk)) {
+pr_err("failed to register clock\n");
+kfree(h);
+}
+
+return clk;
}

/* AUXPLLs ***********************************************************/

--- linux-4.15.0.orig/arch/mips/ath25/board.c
+++ linux-4.15.0/arch/mips/ath25/board.c
@@ -135,6 +135,8 @@
{
}

board_data = kzalloc(BOARD_CONFIG_BUFSZ, GFP_KERNEL);
+if (!board_data)
+goto error;

ath25_board.config = (struct ath25_boarddata *)board_data;
memcpy_fromio(board_data, bcfg, 0x100);
if (broken_boarddata) {
--- linux-4.15.0.orig/arch/mips/ath79/common.c
+++ linux-4.15.0/arch/mips/ath79/common.c
@@ -58,7 +58,7 @@
 void __iomem *flush_reg = ath79_ddr_wb_flush_base + reg;
 +void __iomem *flush_reg = ath79_ddr_wb_flush_base + (reg * 4);

 /* Flush the DDR write buffer. */
 __raw_writel(0x1, flush_reg);
--- linux-4.15.0.orig/arch/mips/ath79/mach-pb44.c
+++ linux-4.15.0/arch/mips/ath79/mach-pb44.c
@@ -34,7 +34,7 @@
#define PB44_KEYS_DEBOUNCE_INTERVAL(3 * PB44_KEYS_POLL_INTERVAL)

static struct gpiod_lookup_table pb44_i2c_gpiod_table = {
 -.dev_id = "i2c-gpio",
+.dev_id = "i2c-gpio.0",
 .table = {
 GPIO_LOOKUP_IDX("ath79-gpio", PB44_GPIO_I2C_SDA, NULL, 0, GPIO_ACTIVE_HIGH | GPIO_OPEN_DRAIN),
--- linux-4.15.0.orig/arch/mips/ath79/setup.c
+++ linux-4.15.0/arch/mips/ath79/setup.c
@@ -40,6 +40,7 @@
 static void ath79_restart(char *command)
local_irq_disable();
ath79_device_reset_set(AR71XX_RESET_FULL_CHIP);
for (;;)
if (cpu_wait)
--- linux-4.15.0.orig/arch/mips/bcm47xx/Kconfig
+++ linux-4.15.0/arch/mips/bcm47xx/Kconfig
@@ -27,6 +27,7 @@
select BCMA
select BCMA_HOST_SOC
select BCMA_DRIVER_MIPS
+select BCMA_DRIVER_PCI if PCI
select BCMA_DRIVER_PCI_HOSTMODE if PCI
select BCMA_DRIVER_GPIO
default y
--- linux-4.15.0.orig/arch/mips/bcm47xx/setup.c
+++ linux-4.15.0/arch/mips/bcm47xx/setup.c
@@ -173,6 +173,31 @@
pm_power_off = bcm47xx_machine_halt;
}

+if(CONFIG_BCM47XX_BCMA
+static struct device * __init bcm47xx_setup_device(void)
+{
+struct device *dev;
+int err;
+
+dev = kzalloc(sizeof(*dev), GFP_KERNEL);
+if (!dev)
+return NULL;
+
+err = dev_set_name(dev, "bcm47xx_soc");
+if (err) {
++pr_err("Failed to set SoC device name: %d\n", err);
+kfree(dev);
+return NULL;
++
++err = dma_coerce_mask_and_coherent(dev, DMA_BIT_MASK(32));
+if (err)
++pr_err("Failed to set SoC DMA mask: %d\n", err);
++
++return dev;
++
+}
+
+/*
+ * This finishes bus initialization doing things that were not possible without

* kmalloc. Make sure to call it late enough (after mm_init).
@@ -183,6 +208,10 @@
if (bcm47xx_bus_type == BCM47XX_BUS_TYPE_BCMA) {
    int err;
+		bcm47xx_bus.bcma.dev = bcm47xx_setup_device();
+	if (!bcm47xx_bus.bcma.dev)
+			panic("Failed to setup SoC device\n");
+
    err = bcma_host_soc_init(&bcm47xx_bus.bcma);
    if (err)
        panic("Failed to initialize BCMA bus (err %d)", err);
@@ -235,6 +264,8 @@
#endif
#ifdef CONFIG_BCM47XX_BCMA
    case BCM47XX_BUS_TYPE_BCMA:
+		if (device_register(bcm47xx_bus.bcma.dev))
+			pr_err("Failed to register SoC device\n");
    bcma_bus_register(&bcm47xx_bus.bcma.bus);
    break;
#endif
--- linux-4.15.0.orig/arch/mips/bcm47xx/workarounds.c
+++ linux-4.15.0/arch/mips/bcm47xx/workarounds.c
@@ -5,9 +5,8 @@
#include <bcm47xx_board.h>
#include <bcm47xx.h>
-
+static void __init bcm47xx_workarounds_enable_usb_power(int usb_power)
{ 
+const int usb_power = 12;
int err;

    err = gpio_request_one(usb_power, GPIOF_OUT_INIT_HIGH, "usb_power");
@@ -23,7 +22,10 @@
switch (board) {
  case BCM47XX_BOARD_NETGEAR_WNR3500L:
  -bcm47xx_workarounds_netgear_wnr3500l();
  +bcm47xx_workarounds_enable_usb_power(12);
  +break;
  +case BCM47XX_BOARD_NETGEAR_WNDR3400_V3:
  +bcm47xx_workarounds_enable_usb_power(21);
  +break;
  default:
  /* No workaround(s) needed */
  --- linux-4.15.0.orig/arch/mips/bcm63xx/Makefile
  +++ linux-4.15.0/arch/mips/bcm63xx/Makefile
@@ -1,8 +1,8 @@
# SPDX-License-Identifier: GPL-2.0
obj-y+= clk.o cpu.o cs.o gpio.o irq.o nvram.o prom.o reset.o \ 
  - setup.o timer.o dev-dsp.o dev-enet.o dev-flash.o \ 
  - dev-pcmcia.o dev-rng.o dev-spi.o dev-hsspi.o dev-uart.o \ 
  - dev-wdt.o dev-usb-usbd.o
+   setup.o timer.o dev-enet.o dev-flash.o dev-pcmcia.o \ 
+   dev-rng.o dev-spi.o dev-hsspi.o dev-uart.o dev-wdt.o 
+   dev-usb-usbd.o
obj-$(CONFIG_EARLY_PRINTK) += early_printk.o

obj-y+= boards/
--- linux-4.15.0.orig/arch/mips/bcm63xx/boards/board_bcm963xx.c
+++ linux-4.15.0/arch/mips/bcm63xx/boards/board_bcm963xx.c
@@ -23,7 +23,6 @@
        
    #include <bcm63xx_nvram.h>
    #include <bcm63xx_dev_pci.h>
-   #include <bcm63xx_dev_dsp.h>
    #include <bcm63xx_dev_enet.h>
    #include <bcm63xx_dev_pci.h>
-   #include <bcm63xx_dev_dsp.h>
    #include <bcm63xx_dev_flash.h>
    #include <bcm63xx_dev_hsspi.h>
    #include <bcm63xx_dev_pcmcia.h>
@@ -289,14 +288,6 @@
        .has_pccard		= 1,
        .has_ehci0= 1,
        
-.has_dsp= 1,
-   .dsp = {
-.gpio_rst= 6,
-.gpio_int= 34,
-.cs= 2,
-.ext_irq= 2,
-}.

-.leds = {
   .name= "adsl-fail",
@@ -401,14 +392,6 @@
        .has_ohci0 = 1,
        
-.has_dsp= 1,
-   .dsp = {
-.gpio_rst= 6,
-.gpio_int= 34,
-.ext_irq= 2,
-.cs= 2,
-}.

.leds = {
    .name = "adsl-fail",
    .value = -898.9 +881.6,
    .data = &board.usbd;
}

if (board.has_usbd)
    bcm63xx_usbd_register(&board.usbd);

if (board.has_dsp)
    bcm63xx_dsp_register(&board.dsp);

/* Generate MAC address for WLAN and register our SPROM,
 * do this after registering enet devices
 */
--- linux-4.15.0.orig/arch/mips/bcm63xx/dev-enet.c
+++ linux-4.15.0/arch/mips/bcm63xx/dev-enet.c
@@ -70,6 +70,8 @@
 static int shared_device_registered;
+
+static u64 enet_dmamask = DMA_BIT_MASK(32);
+
 static struct resource enet0_res[] = {
    .start = -1, /* filled at runtime */
    .resource = enet0_res,
    .dev = {
        .platform_data = &enet0_pd,
        .resource = enet0_res,
        .dev = {
            .platform_data = &enet0_pd,
            .resource = enet0_res,
            .dev = {
                .platform_data = &enet0_pd,
                .resource = enet0_res,
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                                                                                                                                                .dev = {
                                                                                                                                                .platform_data = &enet0_pd,
                                                                                                                                                .resource = enet0_res,
.coherent_dma_mask = DMA_BIT_MASK(32),
],
};

--- linux-4.15.0.orig/arch/mips/bcm63xx/prom.c
+++ linux-4.15.0/arch/mips/bcm63xx/prom.c
@@ -84,7 +84,7 @@
 * Here we will start up CPU1 in the background and ask it to
 * reconfigure itself then go back to sleep.
 */
-memcpy((void *)0xa0000200, &bmips_smp_movevec, 0x20);
+memcpy((void *)0xa0000200, bmips_smp_movevec, 0x20);
 __sync();
set_c0_cause(C_SW0);
cpumask_set_cpu(1, &bmips_booted_mask);
--- linux-4.15.0.orig/arch/mips/bcm63xx/reset.c
+++ linux-4.15.0/arch/mips/bcm63xx/reset.c
@@ -120,7 +120,7 @@
#define BCM6368_RESET_DSL0
#define BCM6368_RESET_SAR_SOFTRESET_6368_SAR_MASK
#define BCM6368_RESET_EPHY_SOFTRESET_6368_EPHY_MASK
-#define BCM6368_RESET_ENETSW0
+#define BCM6368_RESET_ENETSW0
+#define BCM6368_RESET_ENETSW_SOFTRESET_6368_ENETSW_MASK
#define BCM6368_RESET_PCM_SOFTRESET_6368_PCM_MASK
#define BCM6368_RESET_MPI_SOFTRESET_6368_MPI_MASK
#define BCM6368_RESET_PCIE0
--- linux-4.15.0.orig/arch/mips/boot/Makefile
+++ linux-4.15.0/arch/mips/boot/Makefile
@@ -118,14 +118,17 @@
itb_addr_cells = 2
endif
+targets += vmlinux.its.S
+
qu...
--- linux-4.15.0.orig/arch/mips/boot/compressed/Makefile
+++ linux-4.15.0/arch/mips/boot/compressed/Makefile
@@ -29,8 +29,11 @@
-DBOOT_HEAP_SIZE=$(BOOT_HEAP_SIZE) \n-DKERNEL_ENTRY=$(VMLINUX_ENTRY_ADDRESS)
+# Prevents link failures: __sanitizer_cov_trace_pc() is not linked in.
+KCOV_INSTRUMENT:= n
+
+ # decompressor objects (linked with vmlinuz)
-vmlinuzobjs-y := $(obj)/head.o $(obj)/decompress.o $(obj)/string.o
+vmlinuzobjs-y := $(obj)/head.o $(obj)/decompress.o $(obj)/string.o $(obj)/bswapsi.o

ifdef CONFIG_DEBUG_ZBOOT
vmlinuzobjs-$(CONFIG_DEBUG_ZBOOT) += $(obj)/dbg.o
@@ -44,7 +47,7 @@

ifdef CONFIG_KERNEL_XZ
-vmlinuzobjs-y += $(obj)/ashldi3.o $(obj)/bswapsi.o
+vmlinuzobjs-y += $(obj)/ashldi3.o
+extra-y += ashldi3.c bswapsi.c
$(obj)/ashldi3.o $(obj)/bswapsi.o: KBUILD_CFLAGS += -I$(srctree)/arch/mips/lib
@@ -75,6 +78,8 @@
$(obj)/piggy.o: $(obj)/dummy.o $(obj)/vmlinux.bin.z FORCE
$(call if_changed,objcopy)

+HOSTCFLAGS_calc_vmlinuz_load_addr.o += $(LINUXINCLUDE)
+
+ # Calculate the load address of the compressed kernel image
+hostprogs-y := calc_vmlinuz_load_addr

@@ -82,7 +87,7 @@
VMLINUZ_LOAD_ADDRESS := $(zload-y)
else
VMLINUZ_LOAD_ADDRESS = $(shell $(obj)/calc_vmlinuz_load_addr \n-$($(obj)/vmlinux.bin $(VMLINUZ_LOAD_ADDRESS)))
+$($(obj)/vmlinux.bin $(LINKER_LOAD_ADDRESS))
endif
UIMAGE_LOADADDR = $(VMLINUZ_LOAD_ADDRESS)

@@ -133,4 +138,8 @@
vmlinux.bin FORCE
$(call if_changed,uimage,none)

-clean-files := $(objtree)/vmlinux $(objtree)/vmlinux.[32,ecoff,bin,srec]
+clean-files += $(objtree)/vmlinux
+clean-files += $(objtree)/vmlinuz.32
+clean-files += $(objtree)/vmlinuz.ecoff
+clean-files += $(objtree)/vmlinuz.bin
+clean-files += $(objtree)/vmlinuz.srec
--- linux-4.15.0.orig/arch/mips/boot/compressed/calc_vmlinuz_load_addr.c
+++ linux-4.15.0/arch/mips/boot/compressed/calc_vmlinuz_load_addr.c
@@ -13,6 +13,7 @@
#include <stdint.h>
#include <stdio.h>
#include <stdlib.h>
+#include <linux/sizes.h>
int main(int argc, char *argv[])
{
@@ -45,11 +46,11 @@
vmlinuz_load_addr = vmlinux_load_addr + vmlinux_size;
/*
- * Align with 16 bytes: "greater than that used for any standard data
- * types by a MIPS compiler." -- See MIPS Run Linux (Second Edition).
+ * Align with 64KB: KEXEC needs load sections to be aligned to PAGE_SIZE,
+ * which may be as large as 64KB depending on the kernel configuration.
 */
-vmlinuz_load_addr += (16 - vmlinux_size % 16);
+vmlinuz_load_addr += (SZ_64K - vmlinux_size % SZ_64K);
printf("0x%llx\n", vmlinuz_load_addr);
--- linux-4.15.0.orig/arch/mips/boot/compressed/decompress.c
+++ linux-4.15.0/arch/mips/boot/compressed/decompress.c
@@ -11,12 +11,15 @@
/*
- * option) any later version.
+ * these two variables specify the free mem region
 * option) any later version.
 */
+#define DISABLE_BRANCH_PROFILING
+
#include <linux/types.h>
#include <linux/kernel.h>
#include <linux/string.h>
#include <linux/libfdt.h>

#include <asm/addrspace.h>
+#include <asm/unaligned.h>
/*
 * These two variables specify the free mem region
 @@ -124,7 +127,7 @@
dth_size = fdt_totalsize((void *)&__appended_dtb);

/* last four bytes is always image size in little endian */
-image_size = le32_to_cpup((void *)&__image_end - 4);
+image_size = get_unaligned_le32((void *)&__image_end - 4);

/* copy dtb to where the booted kernel will expect it */
memcpy((void *)VMLINUX_LOAD_ADDRESS_ULL + image_size,
--- linux-4.15.0.org/arch/mips/boot/compressed/uart-16550.c
+++ linux-4.15.0/arch/mips/boot/compressed/uart-16550.c
@@ -18,9 +18,9 @@
#define PORT(offset) (CKSEG1ADDR(AR7_REGS_UART0) + (4 * offset))
@endif

-#if defined(CONFIG_MACH_JZ4740) || defined(CONFIG_MACH_JZ4780)
-#include <asm/mach-jz4740/base.h>
-#define PORT(offset) (CKSEG1ADDR(JZ4740_UART0_BASE_ADDR) + (4 * offset))
+#ifdef CONFIG_MACH_INGENIC
+#define INGENIC_UART0_BASE_ADDR	0x10030000
+#define PORT(offset) (CKSEG1ADDR(INGENIC_UART0_BASE_ADDR) + (4 * offset))
+#endif

#if defined(CONFIG_CPU_XLR)
--- linux-4.15.0.org/arch/mips/boot/dts/img/boston.dts
+++ linux-4.15.0/arch/mips/boot/dts/img/boston.dts
@@ -51,6 +51,8 @@
ranges = <0x02000000 0 0x40000000
+bus-range = <0x00 0xff>
0x40000000 0 0x40000000>

+bus-range = <0x00 0xff>
+ interrupt-map-mask = <0 0 0 7>
+ interrupt-map = <0 0 0 1 &pci0_intc 1>,
+ <0 0 0 2 &pci0_intc 2>,
+ @ @ -79.6 +81.8 @ @
ranges = <0x02000000 0 0x20000000
+0x20000000 0 0x20000000>

+bus-range = <0x00 0xff>
+ interrupt-map-mask = <0 0 0 7>
+ interrupt-map = <0 0 0 1 &pci1_intc 1>,
+ <0 0 0 2 &pci1_intc 2>,
+ @ @ -107.6 +111.8 @ @
ranges = <0x02000000 0 0x16000000
+0x16000000 0 0x1000000>

+bus-range = <0x00 0xff>;
interrupt-map-mask = <0 0 0 7>;
interrupt-map = <0 0 0 1 &pci2_intc 1>,
<0 0 0 2 &pci2_intc 2>,
@@ -135,6 +141,12 @@
#size-cells = <2>;
#interrupt-cells = <1>;
+
+eg20t_phub@2,0,0 {
+compatible = "pci8086,8801";
+reg = <0x00020000 0 0 0 0>;
+intel,eg20t-prefetch = <0>;
+};
+
+eg20t_mac@2,0,1 {
compatible = "pci8086,8802";
reg = <0x00020100 0 0 0 0>;
--- linux-4.15.0.orig/arch/mips/boot/dts/ingenic/ci20.dts
+++ linux-4.15.0/arch/mips/boot/dts/ingenic/ci20.dts
@@ -54,7 +54,7 @@
status = "okay";
    pinctrl-names = "default";
    -pinctrl-0 = <&pins_uart2>;
    +pinctrl-0 = <&pins_uart3>;
};

&uart4 {
    @@ -174,9 +174,9 @@
bias-disable;
};

    -pins_uart2: uart2 {
    -function = "uart2";
    -groups = "uart2-data", "uart2-hwflow";
    +pins_uart3: uart3 {
    +function = "uart3";
    +groups = "uart3-data", "uart3-hwflow";
    bias-disable;
    };

--- linux-4.15.0.orig/arch/mips/boot/dts/qca/ar9331.dtsi
+++ linux-4.15.0/arch/mips/boot/dts/qca/ar9331.dtsi
@@ -99,7 +99,7 @@
miscintc: interrupt-controller@18060010 {
compatible = "qca,ar7240-misc-intc";
-reg = <0x18060010 0x4>;

+reg = <0x18060010 0x8>

interrupt-parent = <&cpuintc>
interrupts = <6>
--- linux-4.15.0.orig/arch/mips/boot/dts/xilfpga/Makefile
+++ linux-4.15.0/arch/mips/boot/dts/xilfpga/Makefile
@@ -1,4 +1,2 @@
# SPDX-License-Identifier: GPL-2.0
dtb-$(CONFIG_FIT_IMAGE_FDT_XILFPGA)+= nexys4ddr.dtb
-
-obj-y+= $(patsubst %.dtb, %.dtb.o, $(dtb-y))
--- linux-4.15.0.orig/arch/mips/cavium-octeon/executive/cvmx-cmd-queue.c
+++ linux-4.15.0/arch/mips/cavium-octeon/executive/cvmx-cmd-queue.c
@@ -266,7 +266,7 @@
 } else {
   union cvmx_pko_mem_debug8 debug8;
   debug8.u64 = cvmx_read_csr(CVMX_PKO_MEM_DEBUG8);
-  return debug8.cn58xx.doorbell;
+  return debug8.cn50xx.doorbell;
 } case CVMX_CMD_QUEUE_ZIP:
 case CVMX_CMD_QUEUE_DFA:
--- linux-4.15.0.orig/arch/mips/cavium-octeon/executive/cvmx-helper.c
+++ linux-4.15.0/arch/mips/cavium-octeon/executive/cvmx-helper.c
@@ -67,7 +67,7 @@
   void (*cvmx_override_ipd_port_setup) (int ipd_port);
 /* Port count per interface */
 -static int interface_port_count[5];
+static int interface_port_count[9];

 /**
  * Return the number of interfaces the chip has. Each interface
  @ @ -286,7 +286,8 @@
 case 3:
   return CVMX_HELPER_INTERFACE_MODE_LOOP;
 case 4:
-  return CVMX_HELPER_INTERFACE_MODE_RGMII;
+  /* TODO: Implement support for AGL (RGMII). */
+  return CVMX_HELPER_INTERFACE_MODE_DISABLED;
 default:
   return CVMX_HELPER_INTERFACE_MODE_DISABLED;
 }
cd = kzalloc(sizeof(*cd), GFP_KERNEL);
+if (!cd)
+return -ENOMEM;
+
+cd->host_data = host_data;
cd->bit = hw;

parent_irq = irq_of_parse_and_map(ciu_node, 0);
if (!parent_irq) {
-pr_err("ERROR: Couldn't acquire parent_irq for %s\n.",
+pr_err("ERROR: Couldn't acquire parent_irq for %s\n",
  ciu_node->name);
  return -EINVAL;
}

host_data = kzalloc(sizeof(*host_data), GFP_KERNEL);
+if (!host_data)
+return -ENOMEM;

raw_spin_lock_init(&host_data->lock);

addr = of_get_address(ciu_node, 0, NULL, NULL);
if (!addr) {
-pr_err("ERROR: Couldn't acquire reg(0) %s\n.", ciu_node->name);
+pr_err("ERROR: Couldn't acquire reg(0) %s\n", ciu_node->name);
  return -EINVAL;
}

host_data->raw_reg = (u64)phys_to_virt(
  @ @ -2289,7 +2294,7 @ @

addr = of_get_address(ciu_node, 1, NULL, NULL);
if (!addr) {
-pr_err("ERROR: Couldn't acquire reg(1) %s\n.", ciu_node->name);
+pr_err("ERROR: Couldn't acquire reg(1) %s\n", ciu_node->name);
  return -EINVAL;
}

host_data->en_reg = (u64)phys_to_virt(
  @ @ -2297,7 +2302,7 @ @

r = of_property_read_u32(ciu_node, "cavium,max-bits", &val);
if (r) {
-pr_err("ERROR: Couldn't read cavium,max-bits from %s\n.",
+pr_err("ERROR: Couldn't read cavium,max-bits from %s\n",
  ciu_node->name);
  return r;
}
@@ -2307,7 +2312,7 @@
&octeon_irq_domain_cib_ops,
  host_data);
if (!cib_domain) {
  -pr_err("ERROR: Couldn’t irq_domain_add_linear()
.");
  +pr_err("ERROR: Couldn’t irq_domain_add_linear()
");
  return -ENOMEM;
}

--- linux-4.15.0.orig/arch/mips/cavium-octeon/octeon-platform.c
+++ linux-4.15.0/arch/mips/cavium-octeon/octeon-platform.c
@@ -322,6 +322,7 @@
return 0;

pd = of_find_device_by_node(ehci_node);
+of_node_put(ehci_node);
if (!pd)
  return 0;

@@ -384,6 +385,7 @@
return 0;

pd = of_find_device_by_node(ohci_node);
+of_node_put(ohci_node);
if (!pd)
  return 0;

@@ -499,7 +501,7 @@
if (phy_addr >= 256 && alt_phy > 0) {
  const struct fdt_property *phy_prop;
  struct fdt_property *alt_prop;
-  u32 phy_handle_name;
+  fdt32_t phy_handle_name;
  +fdt32_t phy_handle_name;

  /* Use the alt phy node instead.*/
phy_prop = fdt_get_property(initial_boot_params, eth, "phy-handle", NULL);
--- linux-4.15.0.orig/arch/mips/cavium-octeon/octeon-usb.c
+++ linux-4.15.0/arch/mips/cavium-octeon/octeon-usb.c
@@ -517,6 +517,7 @@
res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
if (res == NULL) {
  +put_device(&pdev->dev);
  dev_err(&pdev->dev, "No memory resources\n");
  return -ENXIO;
}
base = devm_ioremap_resource(&pdev->dev, res);
-if (IS_ERR(base))
+if (IS_ERR(base)) {
+put_device(&pdev->dev);
return PTR_ERR(base);
+}

mutex_lock(&dwc3_octeon_clocks_mutex);
dwc3_octeon_clocks_start(&pdev->dev, (u64)base);
--- linux-4.15.0.orig/arch/mips/configs/ath79_defconfig
+++ linux-4.15.0/arch/mips/configs/ath79_defconfig
@@ -72,6 +72,7 @@
# CONFIG_SERIAL_8250_PCI is not set
CONFIG_SERIAL_8250_NR_UARTS=1
CONFIG_SERIAL_8250_RUNTIME_UARTS=1
+CONFIG_SERIAL_OF_PLATFORM=y
CONFIG_SERIAL_AR933X=y
CONFIG_SERIAL_AR933X_CONSOLE=y
# CONFIG_HW_RANDOM is not set
--- linux-4.15.0.orig/arch/mips/configs/bigsur_defconfig
+++ linux-4.15.0/arch/mips/configs/bigsur_defconfig
@@ -123,7 +123,6 @@
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
CONFIG_CHR_DEV_SCH=m
CONFIG_ATA=y
--- linux-4.15.0.orig/arch/mips/configs/cavium_octeon_defconfig
+++ linux-4.15.0/arch/mips/configs/cavium_octeon_defconfig
@@ -140,6 +140,7 @@
CONFIG_RTC_DRV_DS1307=y
CONFIG_STAGING=y
CONFIG_OCTEON_ETH=y
+CONFIG_OCTEON_USB=y
# CONFIG_IOMMU_SUPPORT is not set
CONFIG_RAS=y
CONFIG_EXT4_FS=y
--- linux-4.15.0.orig/arch/mips/configs/fuloong2e_defconfig
+++ linux-4.15.0/arch/mips/configs/fuloong2e_defconfig
@@ -111,7 +111,6 @@
CONFIG_ATA_OVER_ETH=m
CONFIG_BLK_DEV_SD=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y

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# CONFIG_SCSI_LOWLEVEL is not set
--- linux-4.15.0.orig/arch/mips/configs/ip27_defconfig
+++ linux-4.15.0/arch/mips/configs/ip27_defconfig
@@ -107,7 +107,6 @@
 CONFIG_BLK_DEV_SD=y
 CONFIG_CHR_DEV_ST=y
 CONFIG_BLK_DEV_SR=m
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=m
 CONFIG_CHR_DEV_SCH=m
 CONFIG_SCSI_CONSTANTS=y
--- linux-4.15.0.orig/arch/mips/configs/ip32_defconfig
+++ linux-4.15.0/arch/mips/configs/ip32_defconfig
@@ -54,7 +54,6 @@
 CONFIG_SCSI=y
 CONFIG_BLK_DEV_SD=y
 CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=m
 CONFIG_SCSI_MULTI_LUN=y
 CONFIG_SCSI_CONSTANTS=y
--- linux-4.15.0.orig/arch/mips/configs/jazz_defconfig
+++ linux-4.15.0/arch/mips/configs/jazz_defconfig
@@ -206,7 +206,6 @@
 CONFIG_BLK_DEV_SD=y
 CONFIG_CHR_DEV_ST=m
 CONFIG_BLK_DEV_SR=m
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_SCAN_ASYNC=y
 CONFIG_SCSI_FC_ATTRS=y
--- linux-4.15.0.orig/arch/mips/configs/loongson3_defconfig
+++ linux-4.15.0/arch/mips/configs/loongson3_defconfig
@@ -250,7 +250,7 @@
 CONFIG_MEDIA_USB_SUPPORT=y
 CONFIG_USB_VIDEO_CLASS=m
 CONFIG_DRM=y
-CONFIG_DRM_RADEON=y
+CONFIG_DRM_RADEON=m
 CONFIG_FB_RADEON=y
 CONFIG_LCD_CLASS_DEVICE=y
 CONFIG_LCD_PLATFORM=m
--- linux-4.15.0.orig/arch/mips/configs/malta_defconfig
+++ linux-4.15.0/arch/mips/configs/malta_defconfig
@@ -245,7 +245,6 @@
 CONFIG_CHR_DEV_ST=m
 CONFIG_CHR_DEV_OSST=m
 CONFIG_BLK_DEV_SR=y

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-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_LOGGING=y
--- linux-4.15.0.orig/arch/mips/configs/malta_kvm_defconfig
+++ linux-4.15.0/arch/mips/configs/malta_kvm_defconfig
@@ -252,7 +252,6 @@
  CONFIG_CHR_DEV_ST=m
  CONFIG_CHR_DEV_OSST=m
  CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
  CONFIG_SCSI_MULTI_LUN=y
CONFIG_SCSI_CONSTANTS=y
--- linux-4.15.0.orig/arch/mips/configs/malta_kvm_guest_defconfig
+++ linux-4.15.0/arch/mips/configs/malta_kvm_guest_defconfig
@@ -254,7 +254,6 @@
  CONFIG_CHR_DEV_ST=m
  CONFIG_CHR_DEV_OSST=m
  CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
  CONFIG_SCSI_MULTI_LUN=y
CONFIG_SCSI_CONSTANTS=y
--- linux-4.15.0.orig/arch/mips/configs/maltaup_xpa_defconfig
+++ linux-4.15.0/arch/mips/configs/maltaup_xpa_defconfig
@@ -250,7 +250,6 @@
  CONFIG_CHR_DEV_ST=m
  CONFIG_CHR_DEV_OSST=m
  CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=m
  CONFIG_SCSI_CONSTANTS=y
  CONFIG_SCSI_LOGGING=y
--- linux-4.15.0.orig/arch/mips/configs/mtx1_defconfig
+++ linux-4.15.0/arch/mips/configs/mtx1_defconfig
@@ -623,7 +623,6 @@
  CONFIG_USB_EMI62=m
  CONFIG_USB_EMI26=m
  CONFIG_USB_ADUTUX=m
-CONFIG_USB_RIO500=m
CONFIG_USB_LEGOTOWER=m
  CONFIG_USB_CYPRESS_CY7C63=m
--- linux-4.15.0.orig/arch/mips/configs/rm200_defconfig
+++ linux-4.15.0/arch/mips/configs/rm200_defconfig
@@ -218,7 +218,6 @@
  CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=m
CONFIG_BLK_DEV_SR=m
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SCAN_ASYNC=y
CONFIG_SCSI_FC_ATTRS=y
@@ -344,7 +343,6 @@
CONFIG_USB_SERIAL_CYBERJACK=m
CONFIG_USB_SERIAL_XIRCOM=m
-CONFIG_USB_SERIAL_OMNINET=m
+CONFIG_USB_RIO500=m
CONFIG_USB_LEGOTOWER=m
CONFIG_USB_LCD=m
CONFIG_USB_CYTHERM=m
--- linux-4.15.0.orig/arch/mips/fw/sni/sniprom.c
+++ linux-4.15.0/arch/mips/fw/sni/sniprom.c
@@ -42,7 +42,7 @@
/* O32 stack has to be 8-byte aligned. */
static u64 o32_stk[4096];
-#define O32_STK &o32_stk[sizeof(o32_stk)]
+#define O32_STK (&o32_stk[ARRAY_SIZE(o32_stk)])
#define __PROM_O32(fun, arg) fun arg __asm__(#fun); __asm__(#fun " = call_o32")
--- linux-4.15.0.orig/arch/mips/generic/Platform
+++ linux-4.15.0/arch/mips/generic/Platform
@@ -16,3 +16,4 @@
its-y := vmlinux.its.S
its-$(CONFIG_FIT_IMAGE_FDT_BOSTON) += board-boston.its.S
its-$(CONFIG_FIT_IMAGE_FDT_NI169445) += board-ni169445.its.S
+its-$(CONFIG_FIT_IMAGE_FDT_XILFPGA) += board-xilfpga.its.S
--- linux-4.15.0.orig/arch/mips/generic/board-boston.its.S
+++ linux-4.15.0/arch/mips/generic/board-boston.its.S
@@ -1,22 +1,22 @@
/
images {
- fdt@boston {
-+ fdt-boston {
+ description = "img.boston Device Tree";
data = /incbin/("boot/dts/img/boston.dtb");
type = "flat_dt";
arch = "mips";
compression = "none";
-hash@0 {
+hash {
 algo = "sha1";
};
configurations {
- conf@boston {
+ conf-boston {
    description = "Boston Linux kernel";
    - kernel = "kernel@0";
    - fdt = "fdt@boston";
+ kernel = "kernel";
+ fdt = "fdt-boston";
};
};
};
--- linux-4.15.0.orig/arch/mips/generic/board-ni169445.its.S
+++ linux-4.15.0/arch/mips/generic/board-ni169445.its.S
@@ -1,22 +1,22 @@
/ {
    images {
- fdt@ni169445 {
+ fdt-ni169445 {
        description = "NI 169445 device tree";
        data = /incbin("boot/dts/ni/169445.dtb");
        type = "flat_dt";
        arch = "mips";
        compression = "none";
- hash@0 {
+ hash {
            algo = "sha1";
        };
    };
};
};

configurations {
- conf@ni169445 {
+ conf-ni169445 {
    description = "NI 169445 Linux Kernel";
    - kernel = "kernel@0";
    - fdt = "fdt@ni169445";
+ kernel = "kernel";
+ fdt = "fdt-ni169445";
};
};
};
--- linux-4.15.0.orig/arch/mips/generic/init.c
+++ linux-4.15.0/arch/mips/generic/init.c
@@ -204,6 +204,7 @@
    "mti.cpu-interrupt-controller");
if (!cpu_has_veic && !intc_node)
mips_cpu_irq_init();
+of_node_put(intc_node);

irqchip_init();
}
--- linux-4.15.0.orig/arch/mips/generic/irq.c
+++ linux-4.15.0/arch/mips/generic/irq.c
@@ -22,10 +22,10 @@
{
    int mips_cpu_fdc_irq;

    -if (cpu_has_veic)
    -panic("Unimplemented!");
    -else if (mips_gic_present())
    +if (mips_gic_present())
    mips_cpu_fdc_irq = gic_get_c0_fdc_int();
    +else if (cpu_has_veic)
    +panic("Unimplemented!");
    else if (cp0_fdc_irq >= 0)
    mips_cpu_fdc_irq = MIPS_CPU_IRQ_BASE + cp0_fdc_irq;
    else
@@ -38,10 +38,10 @@
{
    int mips_cpu_perf_irq;

    -if (cpu_has_veic)
    -panic("Unimplemented!");
    -else if (mips_gic_present())
    +if (mips_gic_present())
    mips_cpu_perf_irq = gic_get_c0_perfcount_int();
    +else if (cpu_has_veic)
    +panic("Unimplemented!");
    else if (cp0_perfcount_irq >= 0)
    mips_cpu_perf_irq = MIPS_CPU_IRQ_BASE + cp0_perfcount_irq;
    else
@@ -54,10 +54,10 @@
{
    int mips_cpu_timer_irq;

    -if (cpu_has_veic)
    -panic("Unimplemented!");
    -else if (mips_gic_present())
    +if (mips_gic_present())
    mips_cpu_timer_irq = gic_get_c0_compare_int();
    +else if (cpu_has_veic)
    +panic("Unimplemented!");
    else
mips_cpu_timer_irq = MIPS_CPU_IRQ_BASE + cp0_compare_irq;

--- linux-4.15.0.orig/arch/mips/generic/vmlinux.its.S
+++ linux-4.15.0/arch/mips/generic/vmlinux.its.S
@@ -6,7 +6,7 @@
#address-cells = <ADDR_CELLS>;

images {
-    kernel@0 {
+    kernel {
        description = KERNEL_NAME;
        data = /incbin/(VMLINUX_BINARY);
        type = "kernel";
@@ -15,18 +15,18 @@
            compression = VMLINUX_COMPRESSION;
            load = /bits/ ADDR_BITS <VMLINUX_LOAD_ADDRESS>;
            entry = /bits/ ADDR_BITS <VMLINUX_ENTRY_ADDRESS>;
-        hash@0 {
+        hash {
            algo = "sha1";
        };
        };
    };

    configurations {
@@ -425,7 +425,7 @@
            result;
            
            -if (kernel_uses_llsc && R10000_LLSC_WARN) {
+            if (kernel_uses_llsc) {
                temp;
                __asm__ __volatile__(
                --- linux-4.15.0.orig/arch/mips/include/asm/bmips.h
+++ linux-4.15.0/arch/mips/include/asm/bmips.h
@@ -75,11 +75,11 @@
 #endif
 }

-extern char bmips_reset_nmi_vec;
-extern char bmips_reset_nmi_vec_end;
-extern char bmips_smp_movevec;
-extern char bmips_smp_int_vec;
-extern char bmips_smp_int_vec_end;
+extern char bmips_reset_nmi_vec[];
+extern char bmips_reset_nmi_vec_end[];
+extern char bmips_smp_movevec[];
+extern char bmips_smp_int_vec[];
+extern char bmips_smp_int_vec_end[];

 extern int bmips_smp_enabled;
 extern int bmips_cpu_offset;
--- linux-4.15.0.orig/arch/mips/include/asm/cmpxchg.h
+++ linux-4.15.0/arch/mips/include/asm/cmpxchg.h
@@ -73,8 +73,8 @@
 extern unsigned long __xchg_small(volatile void *ptr, unsigned long val,
 unsigned int size);

-static inline unsigned long __xchg(volatile void *ptr, unsigned long x,
-   int size)
+static __always_inline
+unsigned long __xchg(volatile void *ptr, unsigned long x, int size)
{
  switch (size) {
  case 1:
@@ -146,8 +146,9 @@
 extern unsigned long __cmpxchg_small(volatile void *ptr, unsigned long old,
   unsigned long new, unsigned int size);

-static inline unsigned long __cmpxchg(volatile void *ptr, unsigned long old,
-   unsigned long new, unsigned int size)
+static __always_inline
+unsigned long __cmpxchg(volatile void *ptr, unsigned long old,
+   unsigned long new, unsigned int size)
{
  switch (size) {
  case 1:
--- linux-4.15.0.orig/arch/mips/include/asm/compat.h
+++ linux-4.15.0/arch/mips/include/asm/compat.h
@@ -86,7 +86,6 @@
 compat_off_tl_len;
s321_sysid;
compat_pid_tl_pid;
- short __unused;
s32pad[4];
};

--- linux-4.15.0.orig/arch/mips/include/asm/compiler.h
+++ linux-4.15.0/arch/mips/include/asm/compiler.h
@@ -8,6 +8,41 @@
#ifndef _ASM_COMPILER_H
#define _ASM_COMPILER_H
+
+ /* With GCC 4.5 onwards we can use __builtin_unreachable to indicate to the
+ * compiler that a particular code path will never be hit. This allows it to be
+ * optimised out of the generated binary.
+ *
+ * Unfortunately at least GCC 4.6.3 through 7.3.0 inclusive suffer from a bug
+ * that can lead to instructions from beyond an unreachable statement being
+ * incorrectly reordered into earlier delay slots if the unreachable statement
+ * is the only content of a case in a switch statement. This can lead to
+ * seemingly random behaviour, such as invalid memory accesses from incorrectly
+ * reordered loads or stores. See this potential GCC fix for details:
+ *
+ *
+ * It is unclear whether GCC 8 onwards suffer from the same issue - nothing
+ * relevant is mentioned in GCC 8 release notes and nothing obviously relevant
+ * stands out in GCC commit logs, but these newer GCC versions generate very
+ * different code for the testcase which doesn't exhibit the bug.
+ *
+ * GCC also handles stack allocation suboptimally when calling noreturn
+ * functions or calling __builtin_unreachable():
+ *
+ *   https://gcc.gnu.org/bugzilla/show_bug.cgi?id=82365
+ *
+ * We work around both of these issues by placing a volatile asm statement,
+ * which GCC is prevented from reordering past, prior to __builtin_unreachable
+ * calls.
+ *
+ * The .insn statement is required to ensure that any branches to the
+ * statement, which sadly must be kept due to the asm statement, are known to
+ * be branches to code and satisfy linker requirements for microMIPS kernels.
+ */
+#undef barrier_before_unreachable
+#define barrier_before_unreachable() asm volatile(".insn")
+
#if __GNUC__ > 3 || (__GNUC__ == 3 && __GNUC_MINOR__ >= 4)
#define GCC_IMM_ASM() "n"
#define GCC_REG_ACCUM "$0"
--- linux-4.15.0.orig/arch/mips/include/asm/cpu-features.h
+++ linux-4.15.0/arch/mips/include/asm/cpu-features.h
@@ -11,6 +11,7 @@
#include <asm/cpu.h>
#include <asm/cpu-info.h>
#include <asm/isa-rev.h>
#include <cpu-feature-overrides.h>

/*
 @ @ -348,6 +349,22 @@
#define cpu_has_dsp3(cpu_data[0].ases & MIPS_ASE_DSP3)
#endif

ifndef cpu_has_loongson_mmi
define cpu_has_loongson_mmi__ase(MIPS_ASE_LOONGSON_MMI)
#endif
+
ifndef cpu_has_loongson_cam
define cpu_has_loongson_cam__ase(MIPS_ASE_LOONGSON_CAM)
#endif
+
ifndef cpu_has_loongson_ext
define cpu_has_loongson_ext__ase(MIPS_ASE_LOONGSON_EXT)
#endif
+
ifndef cpu_has_loongson_ext2
define cpu_has_loongson_ext2__ase(MIPS_ASE_LOONGSON_EXT2)
#endif
+
ifndef cpu_has_mipsmt
define cpu_has_mipsmt(cpu_data[0].ases & MIPS_ASE_MIPSMT)
#endif
@@ -493,7 +510,7 @@
#define cpu_has_perf(cpu_data[0].options & MIPS_CPU_PERF)
#endif

-ifdef CONFIG_SMP) && defined(__mips_isa_rev) && (__mips_isa_rev >= 6)
+ifdef CONFIG_SMP) && (MIPS_ISA_REV >= 6)
/*
 * Some systems share FTLB RAMs between threads within a core (siblings in
 * kernel parlance). This means that FTLB entries may become invalid at almost
 @ @ -525,7 +542,7 @@
#define cpu_has_shared_ftlb_entries \
(current_cpu_data.options & MIPS_CPU_SHARED_FTLB_ENTRIES)
#endif
-endif /* SMP && __mips_isa_rev >= 6 */
#define __ASM_DIV64_H

-#include <asm-generic/div64.h>
-
-#if BITS_PER_LONG == 64
+#include <asm/bitsperlong.h>

-#include <linux/types.h>
+#if BITS_PER_LONG == 32

/*
 * No traps on overflows for any of these...
*/

-#define __div64_32(n, base)
-{
+#define do_div64_32(res, high, low, base) ({
unsigned long __cf, __tmp, __tmp2, __i;
unsigned long __quot32, __mod32;
-unsigned long __high, __low;
unsigned long long __n;

-__high = *__n >> 32;
-__low = __n;

-asm__{
 ".setpush\n"
 ".setnoat\n"
@@ -51,18 +44,48 @@
 ".subu\%0, %0, %z6\n"
 \"addiu\%2, %2, 1\n"
 "3:\n"
 "-"bnez\%4, 0b\n"
 -\" srl\%5, %1, 0x1f\n"
 +\" bnez\%4, 0b\n"
 +\" srl\%5, %1, 0x1f\n"
 ".setpop\n"
 : \"=&r\" (__mod32), \"=&r\" (__tmp),\n \"=&r\" (__quot32), \"=&r\" (__cf),\n \"=&r\" (__i), \"=&r\" (__tmp2)\n-
 :JR (base), \"0\" (__high), \"1\" (__low));
 +: JR (base), \"0\" (high), \"1\" (low));

-(__n) = __quot32;
+(res) = __quot32;
 __mod32;
})

-#endif /* BITS_PER_LONG == 64 */
```c
#pragma __div64_32(n, base) ({
    unsigned long __upper, __low, __high, __radix;
    unsigned long long __quot;
    unsigned long __div;
    unsigned long __mod;

    __div = (__n);
    __radix = (base);

    __high = __div >> 32;
    __low = __div;

    if (__high < __radix) {
        __upper = __high;
        __high = 0;
    } else {
        __upper = __high % __radix;
        __high /= __radix;
    }

    __mod = do_div64_32(__low, __upper, __low, __radix);

    __quot = __high;
    __quot = __quot << 32 | __low;
    (*n) = __quot;
    __mod;
})
```

#include <asm-generic/div64.h>

--- linux-4.15.0.orig/arch/mips/include/asm/hugetlb.h
+++ linux-4.15.0/arch/mips/include/asm/hugetlb.h
@@ -67,7 +67,13 @@
 static inline void huge_ptep_clear_flush(struct vm_area_struct *vma,
     unsigned long addr, pte_t *ptep)
 {           
-    flush_tlb_page(vma, addr & huge_page_mask(hstate_vma(vma)));
+    /* clear the huge pte entry firstly, so that the other smp threads will
+     * not get old pte entry after finishing flush_tlb_page and before
+     * setting new huge pte entry
+     */
+    huge_ptep_get_and_clear(vma->vm_mm, addr, ptep);
+    flush_tlb_page(vma, addr);
 }
static inline int huge_pte_none(pte_t pte)
--- linux-4.15.0.orig/arch/mips/include/asm/io.h
+++ linux-4.15.0/arch/mips/include/asm/io.h
@@ -60,21 +60,11 @@
 /* instruction, so the lower 16 bits must be zero. Should be true on
 * on any sane architecture; generic code does not use this assumption.
 */
-extern const unsigned long mips_io_port_base;
+extern unsigned long mips_io_port_base;

/*
- * Gcc will generate code to load the value of mips_io_port_base after each
- * function call which may be fairly wasteful in some cases. So we don't
- * play quite by the book. We tell gcc mips_io_port_base is a long variable
- * which solves the code generation issue. Now we need to violate the
- * aliasing rules a little to make initialization possible and finally we
- * will need the barrier() to fight side effects of the aliasing chat.
- * This trickery will eventually collapse under gcc's optimizer. Oh well.
- */
static inline void set_io_port_base(unsigned long base)
{
- * (unsigned long *) &mips_io_port_base = base;
- barrier();
+ mips_io_port_base = base;
}

/*
 @@ -141,14 +131,14 @@
 /*
 * ISA I/O bus memory addresses are 1:1 with the physical address.
 */
-static inline unsigned long isa_virt_to_bus(volatile void * address)
+static inline unsigned long isa_virt_to_bus(volatile void *address)
{
- return (unsigned long)address - PAGE_OFFSET;
+ return virt_to_phys(address);
}

-static inline void * isa_bus_to_virt(unsigned long address)
+static inline void *isa_bus_to_virt(unsigned long address)
{
- return (void *)(address + PAGE_OFFSET);
+ return phys_to_virt(address);
}

#define isa_page_to_bus page_to_phys
@@ -307,7 +297,7 @@

#open source used in 5gas edge AC-4 10633
#if defined(CONFIG_CPU_CAVIUM_OCTEON) || defined(CONFIG_LOONGSON3_ENHANCEMENT)
#define war_io_reorder_wmb() wmb()
#else
-#define war_io_reorder_wmb() do {} while (0)
+#define war_io_reorder_wmb() barrier()
#endif

#define __BUILD_MEMORY_SINGLE(pfx, bwlq, type, irq)
@@ -377,6 +367,8 @@
BUG();
\
/* prevent prefetching of coherent DMA data prematurely */
+rmb();
return pfx##ioswab##bwlq(__mem, __val);
}
@@ -412,6 +404,8 @@
slow;
\
/* prevent prefetching of coherent DMA data prematurely */
+rmb();
return pfx##ioswab##bwlq(__addr, __val);
}
--- linux-4.15.0.orig/arch/mips/include/asm/isa-rev.h
+++ linux-4.15.0/arch/mips/include/asm/isa-rev.h
@@ -0,0 +1,24 @@
/* SPDX-License-Identifier: GPL-2.0 */
/*
 * Copyright (C) 2018 MIPS Tech, LLC
 * Author: Matt Redfearn <matt.redfearn@mips.com>
 * +
+#ifndef __MIPS_ASM_ISA_REV_H__
+#define __MIPS_ASM_ISA_REV_H__
+
/* The ISA revision level. This is 0 for MIPS I to V and N for
 MIPS{32,64}rN.
 */
+
/* If the compiler has defined __mips_isa_rev, believe it. */
+#ifndef __mips_isa_rev
+#define MIPS_ISA_REV __mips_isa_rev
+#endif
++
/* The compiler hasn't defined the isa rev so assume it's MIPS I - V (0) */
/* Define MIPS ISA Revision */
#define MIPS_ISA_REV 0
#endif
+
+#endif /* __MIPS_ASM_ISA_REV_H__ */
--- linux-4.15.0.orig/arch/mips/include/asm/jump_label.h
+++ linux-4.15.0/arch/mips/include/asm/jump_label.h
@@ -21,15 +21,15 @@
#endif
#ifdef CONFIG_CPU_MICROMIPS
-#define NOP_INSN "nop32"
+#define B_INSN "b32"
#else
-#define NOP_INSN "nop"
+#define B_INSN "b"
#endif

static __always_inline bool arch_static_branch(struct static_key *key, bool branch) {
-asm_volatile_goto("1:\t" NOP_INSN "\n"
-"nop\n"
+asm_volatile_goto("1:\t" B_INSN " 2\n"
+"2:\tnop\n"
 ".pushsection __jump_table, "aw"
 WORD_INSN " 1b, %l[l_yes], %0
 ".popsection

--- linux-4.15.0.orig/arch/mips/include/asm/kexec.h
+++ linux-4.15.0/arch/mips/include/asm/kexec.h
@@ -12,11 +12,11 @@
#include <asm/stacktrace.h>
/* Maximum physical address we can use pages from */
-#define KEXEC_SOURCE_MEMORY_LIMIT (0x20000000)
+#define KEXEC_SOURCE_MEMORY_LIMIT (-1UL)
/* Maximum address we can reach in physical address mode */
-#define KEXEC_DESTINATION_MEMORY_LIMIT (0x20000000)
+#define KEXEC_DESTINATION_MEMORY_LIMIT (-1UL)
/* Maximum address we can use for the control code buffer */
-#define KEXEC_CONTROL_MEMORY_LIMIT (0x20000000)
+#define KEXEC_CONTROL_MEMORY_LIMIT (-1UL)
/* Reserve 3*4096 bytes for board-specific info */
#define KEXEC_CONTROL_PAGE_SIZE (4096 + 3*4096)

--- linux-4.15.0.orig/arch/mips/include/asm/kvm_host.h
+++ linux-4.15.0/arch/mips/include/asm/kvm_host.h
@@ -274,8 +274,12 @@
#define MIPS3_PG_SHIFT		6
```c
#define MIPS3_PG_FRAME 0x3fffffc0

#if defined(CONFIG_64BIT)
#define VPN2_MASK GENMASK(cpu_vmbits - 1, 13)
#else
#define VPN2_MASK 0xffffe000
#endif
#define KVM_ENTRYHI_ASID cpu_asid_mask(&boot_cpu_data)
#define TLB_IS_GLOBAL(x)((x).tlb_lo[0] & (x).tlb_lo[1] & ENTRYLO_G)
#define TLB_VPN2(x)((x).tlb_hi & VPN2_MASK)
#define TLB_ASID(x)((x).tlb_hi & KVM_ENTRYHI_ASID)
@@ -1132,7 +1136,7 @@
static inline void kvm_arch_sync_events(struct kvm *kvm) {}
static inline void kvm_arch_free_memslot(struct kvm *kvm, struct kvm_memory_slot *free, struct kvm_memory_slot *dont) {}
static inline void kvm_arch_memslots_updated(struct kvm *kvm, struct kvm_memslots *slots) {}
static inline void kvm_arch_sched_in(struct kvm_vcpu *vcpu, int cpu) {}
static inline void kvm_arch_vcpu_blocking(struct kvm_vcpu *vcpu) {}
static inline void kvm_arch_vcpu_unblocking(struct kvm_vcpu *vcpu) {}
--- linux-4.15.0.orig/arch/mips/include/asm/mach-ath79/ar71xx_regs.h
+++ linux-4.15.0/arch/mips/include/asm/mach-ath79/ar71xx_regs.h
@@ -167,7 +167,7 @@
#define AR71XX_AHB_DIV_MASK 0x7
#define AR724X_PLL_REG_PCIE_CONFIG 0x10
#define AR724X_PLL_FB_SHIFT 0
#define AR724X_PLL_FB_MASK 0x3ff
--- linux-4.15.0.orig/arch/mips/include/asm/mach-ath79/ar933x_uart.h
+++ linux-4.15.0/arch/mips/include/asm/mach-ath79/ar933x_uart.h
@@ -27,8 +27,8 @@
#define AR933X_UART_CS_PARITY_NONE 0
#define AR933X_UART_CS_PARITY_ODD 2
#define AR933X_UART_CS_PARITY_EVEN 3
--- linux-4.15.0.orig/arch/mips/include/asm/mach-ath79/ath79.h
+++ linux-4.15.0/arch/mips/include/asm/mach-ath79/ath79.h
@@ -134,6 +134,7 @@
```

Open Source Used In 5GaaS Edge AC-4 10636
static inline void ath79_reset_wr(unsigned reg, u32 val) {
    __raw_writel(val, ath79_reset_base + reg);
    *(void) __raw_readl(ath79_reset_base + reg); /* flush */
}

static inline u32 ath79_reset_rr(unsigned reg)
--- linux-4.15.0.orig/arch/mips/include/asm/mach-bcm63xx/board_bcm963xx.h
+++ linux-4.15.0/arch/mips/include/asm/mach-bcm63xx/board_bcm963xx.h
@@ -7,7 +7,6 @@
#include <linux/leds.h>
#include <bcm63xx_dev_enet.h>
#include <bcm63xx_dev_usb_usbd.h>
-#include <bcm63xx_dev_dsp.h>

/* flash mapping */
@@ -31,7 +30,6 @@
unsigned int has_ohci0:1;
unsigned int has_ehci0:1;
unsigned int has_usbd:1;
-unsigned int has_dsp:1;
unsigned int has_uart0:1;
unsigned int has_uart1:1;

@@ -43,9 +41,6 @@
/* USB config */
struct bcm63xx_usbd_platform_data usbd;

-/* DSP config */
-struct bcm63xx_dsp_platform_data dsp;

/* GPIO LEDs */
struct gpio_led leds[5];

--- linux-4.15.0.orig/arch/mips/include/asm/mach-jz4740/jz4740_mmc.h
+++ linux-4.15.0/arch/mips/include/asm/mach-jz4740/jz4740_mmc.h
@@ -4,8 +4,6 @@
struct jz4740_mmc_platform_data {
    int gpio_power;
    -int gpio_card_detect;
    -int gpio_read_only;
    unsigned card_detect_active_low:1;
    unsigned read_only_active_low:1;
    unsigned power_active_low:1;
    --- linux-4.15.0.orig/arch/mips/include/asm/mach-loongson64/irq.h
+++ linux-4.15.0/arch/mips/include/asm/mach-loongson64/irq.h
@@ -4,8 +4,6 @@
@ @ -10,7 +10,7 @ @
#define MIPS_CPU_IRQ_BASE 56

#define LOONGSON_UART_IRQ  (MIPS_CPU_IRQ_BASE + 2) /* UART */
-#define LOONGSON_HT1_IRQ    (MIPS_CPU_IRQ_BASE + 3) /* HT1 */
+#define LOONGSON_BRIDGE_IRQ (MIPS_CPU_IRQ_BASE + 3) /* CASCADE */
#define LOONGSON_TIMER_IRQ  (MIPS_CPU_IRQ_BASE + 7) /* CPU Timer */

#define LOONGSON_HT1_CFG_BASE loongson_sysconf.ht_control_base
--- linux-4.15.0.orig/arch/mips/include/asm/mach-loongson64/mmzone.h
+++ linux-4.15.0/arch/mips/include/asm/mach-loongson64/mmzone.h
@@ -21,6 +21,7 @@
#define NODE3_ADDRSPACE_OFFSET 0x300000000000UL

#define pa_to_nid(addr)  (((addr) & 0xf00000000000) >> NODE_ADDRSPACE_SHIFT)
+#define nid_to_addrbase(nid) ((nid) << NODE_ADDRSPACE_SHIFT)

#define LEVELS_PER_SLICE 128
--- linux-4.15.0.orig/arch/mips/include/asm/machine.h
+++ linux-4.15.0/arch/mips/include/asm/machine.h
@@ -52,7 +52,7 @@
if (!mach->matches)
    return NULL;

-#for (match = mach->matches; match->compatible; match++) {
+for (match = mach->matches; match->compatible[0]; match++) {
    if (fdt_node_check_compatible(fdt, 0, match->compatible) == 0)
        return match;
    }
--- linux-4.15.0.orig/arch/mips/include/asm/mips-gic.h
+++ linux-4.15.0/arch/mips/include/asm/mips-gic.h
@@ -315,6 +315,36 @@
} /*
 + * mips_gic_vx_map_reg() - Return GIC_Vx_<intr>_MAP register offset
 + * @intr: A GIC local interrupt
 + *
 + * Determine the index of the GIC_VL_<intr>_MAP or GIC_VO_<intr>_MAP register
 + * within the block of GIC map registers. This is almost the same as the order
 + * of interrupts in the pending & mask registers, as used by enum
 + * mips_gic_local_interrupt, but moves the FDC interrupt & thus offsets the
 + * interrupts after it...
 + *
 + * Return: The map register index corresponding to @intr.
 + *
 + * The return value is suitable for use with the (read|write)_gic_v[lo]_map

---
+ * accessor functions.
+ */
+static inline unsigned int
+mips_gic_vx_map_reg(enum mips_gic_local_interrupt intr)
+{
+    /* WD, Compare & Timer are 1:1 */
+    if (intr <= GIC_LOCAL_INT_TIMER)
+        return intr;
+    /* FDC moves to after Timer... */
+    if (intr == GIC_LOCAL_INT_FDC)
+        return GIC_LOCAL_INT_TIMER + 1;
+    /* As a result everything else is offset by 1 */
+    return intr + 1;
+
+/**
+ * gic_get_c0_compare_int() - Return cp0 count/compare interrupt virq
+ *
+ * Determine the virq number to use for the coprocessor 0 count/compare
--- linux-4.15.0.orig/arch/mips/include/asm/mipsregs.h
+++ linux-4.15.0/arch/mips/include/asm/mipsregs.h
@@ -737,7 +737,7 @@
/* MAAR bit definitions */
#define MIPS_MAAR_VH	(_U64CAST_(1) << 63)
-#define MIPS_MAAR_ADDR	((BIT_ULL(BITS_PER_LONG - 12) - 1) << 12)
+#define MIPS_MAAR_ADDR	GENMASK_ULL(55, 12)
#define MIPS_MAAR_ADDR_SHIFT	12
#define MIPS_MAAR_S	(_ULCAST_(1) << 1)
#define MIPS_MAAR_VL	(_ULCAST_(1) << 0)
--- linux-4.15.0.orig/arch/mips/include/asm/mmu.h
+++ linux-4.15.0/arch/mips/include/asm/mmu.h
@@ -7,7 +7,7 @@
#include <linux/wait.h>
typedef struct {
    -unsigned long asid[NR_CPUS];
    +u64 asid[NR_CPUS];
    void *vdso;
    atomic_t fp_mode_switching;

--- linux-4.15.0.orig/arch/mips/include/asm/mmu_context.h
+++ linux-4.15.0/arch/mips/include/asm/mmu_context.h
@@ -75,14 +75,14 @@
/* All unused by hardware upper bits will be considered
 * as a software asid extension.
static unsigned long asid_version_mask(unsigned int cpu)
{
    unsigned long asid_mask = cpu_asid_mask(&cpu_data[cpu]);

    return ~(asid_mask | (asid_mask - 1));
}

static unsigned long asid_first_version(unsigned int cpu)
{
    return ~asid_version_mask(cpu) + 1;
}

static inline void
get_new_mmu_context(struct mm_struct *mm, unsigned long cpu)
{
    unsigned long asid = asid_cache(cpu);
    u64 asid = asid_cache(cpu);
    if (!((asid += cpu_asid_inc()) & cpu_asid_mask(&cpu_data[cpu]))) {
        if (cpu_has_vtag_icache)
            flush_icache_all();
        local_flush_tlb_all(); /* start new asid cycle */
        if (!asid) /* fix version if needed */
            asid = asid_first_version(cpu);
    }

    cpu_context(cpu, mm) = asid_cache(cpu) = asid;
}

--- linux-4.15.0.orig/arch/mips/include/asm/mmzone.h
+++ linux-4.15.0/arch/mips/include/asm/mmzone.h
@@ -7,7 +7,18 @@
#define _ASM_MMZONE_H_

#include <asm/page.h>
-#include <mmzone.h>
+ +#ifdef CONFIG_NEED_MULTIPLE_NODES
+   #include <mmzone.h>
+   +#endif
+   +
+   +#ifndef pa_to_nid
+   +#define pa_to_nid(addr) 0
+   +#endif
+   +
+   +#ifndef nid_to_addrbase

#define nid_to_addrbase(nid) 0
#endif

#ifdef CONFIG_DISCONTIGMEM

--- linux-4.15.0.orig/arch/mips/include/asm/netlogic/xlr/fmn.h
+++ linux-4.15.0/arch/mips/include/asm/netlogic/xlr/fmn.h
@@ -301,8 +301,6 @@
     for (i = 0; i < 8; i++) {
         nlm_msgsnd(dest);
         status = nlm_read_c2_status0();
-        if ((status & 0x2) == 1)
-            pr_info("Send pending fail!\n");
        if ((status & 0x4) == 0)
            return 0;
    }
--- linux-4.15.0.orig/arch/mips/include/asm/octeon/cvmx-pko.h
+++ linux-4.15.0/arch/mips/include/asm/octeon/cvmx-pko.h
@@ -611,7 +611,7 @@
     pko_reg_read_idx.s.index = cvmx_pko_get_base_queue(port_num);
     cvmx_write_csr(CVMX_PKO_REG_READIDX, pko_reg_read_idx.u64);
     debug8.u64 = cvmx_read_csr(CVMX_PKO_MEM_DEBUG8);
-    status->doorbell = debug8.cn58xx.doorbell;
+    status->doorbell = debug8.cn50xx.doorbell;
    }
    }

--- linux-4.15.0.orig/arch/mips/include/asm/pgtable-64.h
+++ linux-4.15.0/arch/mips/include/asm/pgtable-64.h
@@ -18,10 +18,12 @@
 #include <asm/fixmap.h>
#define __ARCH_USE_5LEVEL_HACK
-#__if defined(CONFIG_PAGE_SIZE_64KB) && !defined(CONFIG_MIPS_VA_BITS_48)
+__if CONFIG_PGTABLE_LEVELS == 2
 #include <asm-generic/pgtable-nopmd.h>
-#__elif !defined(CONFIG_PAGE_SIZE_4KB) && defined(CONFIG_MIPS_VA_BITS_48))
+__elif CONFIG_PGTABLE_LEVELS == 3
 #include <asm-generic/pgtable-nopud.h>
+__else
+__include <asm-generic/5level-fixup.h>
#endif
/*
@@ -216,6 +218,9 @@
     return pgd_val(pgd);
 }
+#define pgd_phys(pgd) virt_to_phys((void *)pgd_val(pgd))
+define pgd_page(pgd) (pfn_to_page(pgd_phys(pgd) >> PAGE_SHIFT))
+
static inline pud_t *pud_offset(pgd_t *pgd, unsigned long address)
{
    return (pud_t *)pgd_page_vaddr(*pgd) + pud_index(address);
}
---

static inline pud_t *pud_offset(pgd_t *pgd, unsigned long address)
{
    return (pud_t *)pgd_page_vaddr(*pgd) + pud_index(address);
}

vdsoc_randomize_size	(TASK_IS_32BIT_ADDR ? SZ_1M : SZ_64M)
+
extern unsigned long mips_stack_top(void);
#define STACK_TOP		mips_stack_top()

#define NUM_DSP_REGS   6
typedef __u32 dspreg_t;
+typedef unsigned long dspreg_t;

struct mips_dsp_state {
    dspreg_t dspr[NUM_DSP_REGS];
}

#define KSTK_ESP(tsk) (task_pt_regs(tsk)->regs[29])
#define KSTK_STATUS(tsk) (task_pt_regs(tsk)->cp0_status)

+#ifndef CONFIG_CPU_LOONGSON3
+/
+ * Loongson-3's SFB (Store-Fill-Buffer) may buffer writes indefinitely when a
+ * tight read loop is executed, because reads take priority over writes & the
+ * hardware (incorrectly) doesn't ensure that writes will eventually occur.
+ *
+ * Since spin loops of any kind should have a cpu_relax() in them, force an SFB
+ * flush from cpu_relax() such that any pending writes will become visible as
+ * expected.
+ */
+#define cpu_relax() smp_mb()
+#else
+#define cpu_relax() barrier()
+#endif

/*
 * Return_address is a replacement for __builtin_return_address(count)
--- linux-4.15.0.orig/arch/mips/include/asm/r4kcache.h
+++ linux-4.15.0/arch/mips/include/asm/r4kcache.h
@@ -20,6 +20,7 @@
#include <asm/cpu-features.h>
#include <asm/cpu-type.h>
#include <asm/mipsmtregs.h>
+#include <asm/mmzone.h>
#include <linux/uaccess.h> /* for uaccess_kernel() */
extern void (*r4k_blast_dcache)(void);
@@ -747,4 +748,25 @@
#define __BUILD_BLAST_CACHE_RANGE(inv_d, dcache, Hit_Invalidate_D, , )
#define __BUILD_BLAST_CACHE_RANGE(inv_s, scache, Hit_Invalidate_SD, , )

+/* Currently, this is very specific to Loongson-3 */
+#define __BUILD_BLAST_CACHE_NODE(pfx, desc, indexop, hitop, lsize)
+static inline void blast_##pfx##cache##lsize##_node(long node)
+{
+    unsigned long start = CAC_BASE | nid_to_addrbase(node);
+    unsigned long end = start + current_cpu_data.desc.waysize;
+    unsigned long ws_inc = 1UL << current_cpu_data.desc.waybit;
+    unsigned long ws_end = current_cpu_data.desc.ways <<

current_cpu_data.desc.waybit;
unsigned long ws, addr;
+
+for (ws = 0; ws < ws_end; ws += ws_inc)
+for (addr = start; addr < end; addr += lsize * 32)
+cache##lsize##_unroll32(addr, indexop);
+
+__BUILD_BLAST_CACHE_NODE(s, scache, Index_Writeback_Inv_SD, Hit_Writeback_Inv_SD, 16)
+__BUILD_BLAST_CACHE_NODE(s, scache, Index_Writeback_Inv_SD, Hit_Writeback_Inv_SD, 32)
+__BUILD_BLAST_CACHE_NODE(s, scache, Index_Writeback_Inv_SD, Hit_Writeback_Inv_SD, 64)
+__BUILD_BLAST_CACHE_NODE(s, scache, Index_Writeback_Inv_SD, Hit_Writeback_Inv_SD, 128)
+
#endif /* _ASM_R4KCACHE_H */
--- linux-4.15.0.orig/arch/mips/include/asm/smp.h
+++ linux-4.15.0/arch/mips/include/asm/smp.h
@@ -25,7 +25,17 @@
 extern cpumask_t cpu_core_map[];
 extern cpumask_t cpu_foreign_map[];

-#define raw_smp_processor_id() (current_thread_info()->cpu)
+static inline int raw_smp_processor_id(void)
+{
+  #if defined(__VDSO__)
+    extern int vdso_smp_processor_id(void)
+    +#compiletime_error("VDSO should not call smp_processor_id()");
+    #else
+    +#return current_thread_info()->cpu;
+  +#endif
+  +}
+  +#define raw_smp_processor_id raw_smp_processor_id

/* Map from cpu id to sequential logical cpu number. This will only
not be idempotent when cpus failed to come on-line.*/
--- linux-4.15.0.orig/arch/mips/include/asm/syscall.h
+++ linux-4.15.0/arch/mips/include/asm/syscall.h
@@ -73,7 +73,7 @@
 #ifdef CONFIG_64BIT
 case 4: case 5: case 6: case 7:
 #ifdef CONFIG_MIPS32_O32
-  if (test_thread_flag(TIF_32BIT_REGS))
+  if (test_tsk_thread_flag(task, TIF_32BIT_REGS))
     return get_user(*arg, (int *)usp + n);
   else
     #endif
--- linux-4.15.0.orig/arch/mips/include/asm/thread_info.h
+++ linux-4.15.0/arch/mips/include/asm/thread_info.h
@@ -52,8 +52,26 @@
#define init_thread_info	(init_thread_union.thread_info)
#define init_stack		(init_thread_union.stack)

-/* How to get the thread information struct from C. */
+/*
+ * A pointer to the struct thread_info for the currently executing thread is
+ * held in register $28/$gp.
+ * We declare __current_thread_info as a global register variable rather than a
+ * local register variable within current_thread_info() because clang doesn't
+ * support explicit local register variables.
+ *
+ * When building the VDSO we take care not to declare the global register
+ * variable because this causes GCC to not preserve the value of $28/$gp in
+ * functions that change its value (which is common in the PIC VDSO when
+ * accessing the GOT). Since the VDSO shouldn't be accessing
+ * __current_thread_info anyway we declare it extern in order to cause a link
+ * failure if it's referenced.
+ */
+#endif __VDSO__
+extern struct thread_info *__current_thread_info;
+#else
+
+static inline struct thread_info *current_thread_info(void)
+
+static inline struct thread_info *current_thread_info(void)
{|}
might_fault();
__asm__ __volatile__(
@@ -674,7 +681,7 @@
"move	%0, $6"
: "=r" (res)
: "r" (addr), "r" (size)
@@ -369,8 +369,8 @@
mm_ext_op = 0x02c,
mm_pool32axf_op = 0x03c,
mm_srl32_op = 0x040,
+mm_srlv32_op = 0x050,
mm_sra_op = 0x080,
-mm_srlv32_op = 0x090,
-mm_rotl_op = 0x0c0,
-mm_lwxs_op = 0x118,
-mm_addu32_op = 0x150,
--- linux-4.15.0.orig/arch/mips/jazz/jazzdma.c
+++ linux-4.15.0/arch/mips/jazz/jazzdma.c
@@ -72,14 +72,15 @@
get_order(VDMA_PGTBL_SIZE));
BUG_ON(!pgtbl);
dma_cache_wback_inv((unsigned long)pgtbl, VDMA_PGTBL_SIZE);
-pgtbl = (VDMA_PGTBL_ENTRY *)KSEG1ADDR(pgtbl);
+pgtbl = (VDMA_PGTBL_ENTRY *)CKSEG1ADDR((unsigned long)pgtbl);

/*
 * Clear the R4030 translation table
 */
vdma_pgtbl_init();

-r4030_write_reg32(JAZZ_R4030_TRSTBL_BASE, CPHYSADDR(pgtbl));
+r4030_write_reg32(JAZZ_R4030_TRSTBL_BASE,  
+ CPHYSADDR((unsigned long)pgtbl));
r4030_write_reg32(JAZZ_R4030_TRSTBL_LIM, VDMA_PGTBL_SIZE);
r4030_write_reg32(JAZZ_R4030_TRSTBL_INV, 0);

--- linux-4.15.0.orig/arch/mips/jz4740/Platform
+++ linux-4.15.0/arch/mips/jz4740/Platform
@@ -1,4 +1,4 @@
platform-$(CONFIG_MACH_INGENIC)	+= jz4740/
cflags-$(CONFIG_MACH_INGENIC)	+= -I$(srctree)/arch/mips/include/asm/mach-jz4740
load-$(CONFIG_MACH_INGENIC)	+= 0xffffffff80010000
-zload-$(CONFIG_MACH_INGENIC)	+= 0xffffffff80600000
+zload-$(CONFIG_MACH_INGENIC)	+= 0xffffffff81000000
--- linux-4.15.0.orig/arch/mips/jz4740/board-qi_lb60.c
+++ linux-4.15.0/arch/mips/jz4740/board-qi_lb60.c
@@ -42,7 +42,6 @@
#include "clock.h"

/* GPIOs */
-#define QI_LB60_GPIO_SD_CD		JZ_GPIO_PORTD(0)
+#define QI_LB60_GPIO_SD_CD		JZ_GPIO_PORTD(0)

#define QI_LB60_GPIO_SD_VCC_EN_NJZ_GPIO_PORTD(2)

#define QI_LB60_GPIO_KEYOUT(x)(JZ_GPIO_PORTC(10) + (x))

static struct jz4740_mmc_platform_data qi_lb60_mmc_pdata = {
    .gpio_card_detect= QI_LB60_GPIO_SD_CD,  
-    .gpio_read_only= -1,
-    .gpio_power= QI_LB60_GPIO_SD_VCC_EN_NJZ_GPIO_PORTD(2),
-    .power_active_low= 1,
};

+static struct gpiod_lookup_table qi_lb60_mmc_gpio_table = {
+    .dev_id = "jz4740-mmc.0",
+    .table = {
+        GPIO_LOOKUP("GPIOD", 0, "cd", GPIO_ACTIVE_HIGH),
+    },
+};
/* beeper */
static struct pwm_lookup qi_lb60_pwm_lookup[] = {
    PWM_LOOKUP("jz4740-pwm", 4, "pwm-beeper", NULL, 0,
@ @ -456,27 +461,27 @@
static struct pinctrl_map pin_map[] __initdata = {
/* NAND pin configuration */
PIN_MAP_MUX_GROUP_DEFAULT("jz4740-nand",
-10010000.jz4740-pinctrl", "nand", "nand-cs1"),
+"10010000.pin-controller", "nand-cs1", "nand"),

/* fbdev pin configuration */
PIN_MAP_MUX_GROUP("jz4740-fb", PINCTRL_STATE_DEFAULT,
-10010000.jz4740-pinctrl", "lcd", "lcd-8bit"),
+"10010000.pin-controller", "lcd-8bit", "lcd"),
PIN_MAP_MUX_GROUP("jz4740-fb", PINCTRL_STATE_SLEEP,
-10010000.jz4740-pinctrl", "lcd", "lcd-no-pins"),
+"10010000.pin-controller", "lcd-no-pins", "lcd"),

/* MMC pin configuration */
PIN_MAP_MUX_GROUP_DEFAULT("jz4740-mmc.0",
-10010000.jz4740-pinctrl", "mmc", "mmc-1bit"),
+"10010000.pin-controller", "mmc-1bit", "mmc"),
PIN_MAP_MUX_GROUP_DEFAULT("jz4740-mmc.0",
-10010000.jz4740-pinctrl", "mmc", "mmc-4bit"),
+"10010000.pin-controller", "mmc-4bit", "mmc"),
PIN_MAP_CONFIGS_PIN_DEFAULT("jz4740-mmc.0",
-10010000.jz4740-pinctrl", "PD0", pin_cfg_bias_disable),
+"10010000.pin-controller", "PD0", pin_cfg_bias_disable),
PIN_MAP_CONFIGS_PIN_DEFAULT("jz4740-mmc.0",
-10010000.jz4740-pinctrl", "PD2", pin_cfg_bias_disable),
+"10010000.pin-controller", "PD2", pin_cfg_bias_disable),

/* PWM pin configuration */
PIN_MAP_MUX_GROUP_DEFAULT("jz4740-pwm",
-10010000.jz4740-pinctrl", "pwm4", "pwm4"),
+"10010000.pin-controller", "pwm4", "pwm4"),
}

@gpiod_add_lookup_table(&qi_lb60_gpio_table);
gpiod_add_lookup_table(&qi_lb60_nand_gpio_table);
+gpiod_add_lookup_table(&qi_lb60_mem_gpio_table);
spi_register_board_info(qi_lb60_spi_board_info,
ARRAY_SIZE(qi_lb60_spi_board_info));
--- linux-4.15.0.orig/arch/mips/kernel/cacheinfo.c
+++ linux-4.15.0/arch/mips/kernel/cacheinfo.c
@@ -28,7 +28,7 @@
leaf++;							
while (0)
}

static int __init_cache_level(unsigned int cpu)
+int init_cache_level(unsigned int cpu)
{
    struct cpuinfo_mips *c = &current_cpu_data;
    struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
@@ -61,27 +61,51 @@
    return 0;
 }

static int __populate_cache_leaves(unsigned int cpu)
+static void fill_cpumask_siblings(int cpu, cpumask_t *cpu_map)
+{
+    int cpu1;
+    +for_each_possible_cpu(cpu1)
+    +if (cpus_are_siblings(cpu, cpu1))
+    +cpumask_set_cpu(cpu1, cpu_map);
+} +
+
+static void fill_cpumask_cluster(int cpu, cpumask_t *cpu_map)
+{
+    int cpu1;
+    int cluster = cpu_cluster(&cpu_data[cpu]);
+    +for_each_possible_cpu(cpu1)
+    +if (cpu_cluster(&cpu_data[cpu1]) == cluster)
+    +cpumask_set_cpu(cpu1, cpu_map);
+}+
+
+int populate_cache_leaves(unsigned int cpu)
{
    struct cpuinfo_mips *c = &current_cpu_data;
    struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
    struct cacheinfo *this_leaf = this_cpu_ci->info_list;
    if (c->icache.waysize) {
        /* L1 caches are per core */
        +fill_cpumask_siblings(cpu, &this_leaf->shared_cpu_map);
        populate_cache(dcache, this_leaf, 1, CACHE_TYPE_DATA);
        +fill_cpumask_siblings(cpu, &this_leaf->shared_cpu_map);
populate_cache(icache, this_leaf, 1, CACHE_TYPE_INST);
} else {
    populate_cache(dcache, this_leaf, 1, CACHE_TYPE_UNIFIED);
}

-if (c->scache.waysize)
+if (c->scache.waysize) {
    /* L2 cache is per cluster */
    fill_cpumask_cluster(cpu, &this_leaf->shared_cpu_map);
    populate_cache(scache, this_leaf, 2, CACHE_TYPE_UNIFIED);
+
}

if (c->tcache.waysize)
    populate_cache(tcache, this_leaf, 3, CACHE_TYPE_UNIFIED);

+this_cpu_ci->cpu_map_populated = true;
+
return 0;
}
-
-DEFINE_SMP_CALL_CACHE_FUNCTION(init_cache_level)
-DEFINE_SMP_CALL_CACHE_FUNCTION(populate_cache_leaves)
--- linux-4.15.0.orig/arch/mips/kernel/cmpxchg.c
+++ linux-4.15.0/arch/mips/kernel/cmpxchg.c
@@ -54,10 +54,9 @@
 unsigned long __cmpxchg_small(volatile void *ptr, unsigned long old,
                                 unsigned long new, unsigned int size)
 {
- u32 mask, old32, new32, load32;
+ u32 mask, old32, new32, load32, load;
 volatile u32 *ptr32;
 unsigned int shift;
- u8 load;

 /* Check that ptr is naturally aligned */
 WARN_ON((unsigned long)ptr & (size - 1));
--- linux-4.15.0.orig/arch/mips/kernel/cps-vec.S
+++ linux-4.15.0/arch/mips/kernel/cps-vec.S
@@ -388,15 +388,16 @@
 #ifdef defined(CONFIG_MIPS_MT)

 -.setpush
 -.setMIPS_ISA_LEVEL_RAW
 -.setmt
-
 /* If the core doesn't support MT then return */
 has_mtt0, 5f
/* Enter VPE configuration state */
.setpush
.setMIPS_IsA_LEVEL_RAW
.setmt
dvpe
.setpop
+ PTR_LA t1, 1f
jr.hb t1
nop
@@ -422,6 +423,10 @@
mtc0t0, CP0_VPECONTROL
ehb

.setpush
.setMIPS_IsA_LEVEL_RAW
.setmt
+
/* Skip the VPE if its TC is not halted */
mftc0t0, CP0_TCHALT
beqz t0, 2f
@@ -495,6 +500,8 @@
ehb
evpe

.setpop
+
/* Check whether this VPE is meant to be running */
li t0, 1
slt0, t0, a1
@@ -509,7 +516,7 @@
1: jr.hbt0
nop

-2:.setpop
+2:

#ifndef /* CONFIG_MIPS_MT_SMP */
--- linux-4.15.0.orig/arch/mips/kernel/cpu-probe.c
+++ linux-4.15.0/arch/mips/kernel/cpu-probe.c
@@ -1478,6 +1478,8 @@
__cpu_name[cpu] = "ICT Loongson-3";
set_elf_platform(cpu, "loongson3a");
set_isa(c, MIPS_CPU_ISA_M64R1);
+c->ases |= (MIPS_ASE_LOONGSON_MMI | MIPS_ASE_LOONGSON_CAM |
+MIPS_ASE_LOONGSON_EXT);

---
break;
case PRID_REV_LOONGSON3B_R1:
case PRID_REV_LOONGSON3B_R2:
	__cpu_name[cpu] = "ICT Loongson-3";
set_elf_platform(cpu, "loongson3b");
set_isa(c, MIPS_CPU_ISA_M64R1);
+c->ases |= (MIPS_ASE_LOONGSON_MMI | MIPS_ASE_LOONGSON_CAM |
+MIPS_ASE_LOONGSON_EXT);
budget:}
@@ -1485,6 +1487,8 @@
decode_configs(c);
c->options |= MIPS_CPU_FTLB | MIPS_CPU_TLBINV | MIPS_CPU_LDPTE;
c->writecombine = _CACHE_UNCACHED_ACCELERATED;
+c->ases |= (MIPS_ASE_LOONGSON_MMI | MIPS_ASE_LOONGSON_CAM |
+MIPS_ASE_LOONGSON_EXT | MIPS_ASE_LOONGSON_EXT2);
budget:}
default:
panic("Unknown Loongson Processor ID!");
--- linux-4.15.0.orig/arch/mips/kernel/crash.c
+++ linux-4.15.0/arch/mips/kernel/crash.c
@@ -36,6 +36,9 @@
if (!cpu_online(cpu))
return;
+/* We won't be sent IPIs any more. */
+set_cpu_online(cpu, false);
+
local_irq_disable();
if (!cpumask_test_cpu(cpu, &cpus_in_crash))
crash_save_cpu(regs, cpu);
--- linux-4.15.0.orig/arch/mips/kernel/ftrace.c
+++ linux-4.15.0/arch/mips/kernel/ftrace.c
@@ -322,7 +322,6 @@
unsigned long fp)
{
unsigned long old_parent_ra;
-struct ftrace_graph_ent trace;
unsigned long return_hooker = (unsigned long)
 &return_to_handler;
int faulted, insns;
@@ -369,12 +368,6 @@
if (unlikely(faulted))
goto out;

-if (ftrace_push_return_trace(old_parent_ra, self_ra, &trace.depth, fp,
- NULL) == -EBUSY) {
-*parent_ra_addr = old_parent_ra;
-return;
-}
-
/*
 * Get the recorded ip of the current mcount calling site in the
 * __mcount_loc section, which will be used to filter the function
@@ -382,13 +375,10 @@
*/

insns = core_kernel_text(self_ra) ? 2 : MCOUNT_OFFSET_INSNS + 1;
-trace.func = self_ra - (MCOUNT_INSN_SIZE * insns);
+self_ra -= (MCOUNT_INSN_SIZE * insns);

-/* Only trace if the calling function expects to */
-if (!ftrace_graph_entry(&trace)) {
-    current->curr_ret_stack--;
+if (function_graph_enter(old_parent_ra, self_ra, fp, NULL))
    *parent_ra_addr = old_parent_ra;
-}
-return;

out:
    ftrace_graph_stop();
--- linux-4.15.0.orig/arch/mips/kernel/genex.S
+++ linux-4.15.0/arch/mips/kernel/genex.S
@@ @ -381,20 +381,20 @@
          ..
          .endm

-macro __build_clear_fpe
+CLI
+TRACE_IRQS_OFF
 .setpush
 /* gas fails to assemble cfc1 for some archs (octeon).*\ 
 .setmips1
 SET_HARDFLOAT
 cfc1a1, fcr31
 .setpop
 -CLI
 -TRACE_IRQS_OFF
 .endm

-macro __build_clear_msa_fpe
 -cfcmssaa1, MSA_CSR
 CLI
 TRACE_IRQS_OFF
+cfcmsaa1, MSA_CSR
 .endm
static int __init init_pit_clocksource(void)
{
    -if (num_possible_cpus() > 1) /* PIT does not scale! */
    +if (num_possible_cpus() > 1 || /* PIT does not scale! */
        !clockevent_state_periodic(&i8253_clockevent))
        return 0;

    return clocksource_i8253_init();
}

for (i = 0; i < NR_IRQS; i++)
    irq_set_noprobe(i);
    @ @ -62,8 +63,7 @@
arch_init_irq();

for each_possible_cpu(i) {
    -int irq_pages = IRQ_STACK_SIZE / PAGE_SIZE;
    -void *s = (void *)__get_free_pages(GFP_KERNEL, irq_pages);
    +void *s = (void *)__get_free_pages(GFP_KERNEL, order);

    irq_stack[i] = s;
    pr_debug("CPU%d IRQ stack at 0x%p - 0x%p\n", i,

    include <asm/processor.h>
    #include <asm/sigcontext.h>
    #include <linux/uaccess.h>
    +#include <asm/irq_regs.h>

    static struct hard_trap_info {
        unsigned char tt;	/* Trap type code for MIPS R3xxx and R4xxx */
            @ @ -214,7 +215,7 @@
        old_fs = get_fs();
    set_fs(get_ds());

    unsigned int order = get_order(IRQ_STACK_SIZE);

    for (i = 0; i < NR_IRQS; i++)
        irq_set_noprobe(i);
        @ @ -62,8 +63,7 @@
arch_init_irq();

    for each_possible_cpu(i) {
        -int irq_pages = IRQ_STACK_SIZE / PAGE_SIZE;
        -void *s = (void *)__get_free_pages(GFP_KERNEL, irq_pages);
        +void *s = (void *)__get_free_pages(GFP_KERNEL, order);

        irq_stack[i] = s;
        pr_debug("CPU%d IRQ stack at 0x%p - 0x%p\n", i,

        include <asm/processor.h>
        #include <asm/sigcontext.h>
        #include <linux/uaccess.h>
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        static struct hard_trap_info {
            unsigned char tt;/* Trap type code for MIPS R3xxx and R4xxx */
                @ @ -214,7 +215,7 @@
            old_fs = get_fs();
        set_fs(get_ds());

        unsigned int order = get_order(IRQ_STACK_SIZE);

        for (i = 0; i < NR_IRQS; i++)
            irq_set_noprobe(i);
            @ @ -62,8 +63,7 @@
arch_init_irq();

        for each_possible_cpu(i) {
            -int irq_pages = IRQ_STACK_SIZE / PAGE_SIZE;
            -void *s = (void *)__get_free_pages(GFP_KERNEL, irq_pages);
            +void *s = (void *)__get_free_pages(GFP_KERNEL, order);

            irq_stack[i] = s;
            pr_debug("CPU%d IRQ stack at 0x%p - 0x%p\n", i,

            include <asm/processor.h>
            #include <asm/sigcontext.h>
            #include <linux/uaccess.h>
            +#include <asm/irq_regs.h>

            static struct hard_trap_info {
                unsigned char tt;/* Trap type code for MIPS R3xxx and R4xxx */
                    @ @ -214,7 +215,7 @@
                old_fs = get_fs();
            set_fs(get_ds());

            unsigned int order = get_order(IRQ_STACK_SIZE);

            for (i = 0; i < NR_IRQS; i++)
                irq_set_noprobe(i);
                @ @ -62,8 +63,7 @@
arch_init_irq();

            for each_possible_cpu(i) {
                -int irq_pages = IRQ_STACK_SIZE / PAGE_SIZE;
                -void *s = (void *)__get_free_pages(GFP_KERNEL, irq_pages);
                +void *s = (void *)__get_free_pages(GFP_KERNEL, order);

                irq_stack[i] = s;
                pr_debug("CPU%d IRQ stack at 0x%p - 0x%p\n", i,

                include <asm/processor.h>
                #include <asm/sigcontext.h>
                #include <linux/uaccess.h>
                +#include <asm/irq_regs.h>

                static struct hard_trap_info {
                    unsigned char tt;/* Trap type code for MIPS R3xxx and R4xxx */
                        @ @ -214,7 +215,7 @@
                    old_fs = get_fs();
                set_fs(get_ds());

                    unsigned int order = get_order(IRQ_STACK_SIZE);

                    for (i = 0; i < NR_IRQS; i++)
                        irq_set_noprobe(i);
                        @ @ -62,8 +63,7 @@
arch_init_irq();

                    for each_possible_cpu(i) {
                        -int irq_pages = IRQ_STACK_SIZE / PAGE_SIZE;
                        -void *s = (void *)__get_free_pages(GFP_KERNEL, irq_pages);
                        +void *s = (void *)__get_free_pages(GFP_KERNEL, order);

                        irq_stack[i] = s;
                        pr_debug("CPU%d IRQ stack at 0x%p - 0x%p\n", i,
-kgdb_nmicallback(raw_smp_processor_id(), NULL);
+kgdb_nmicallback(raw_smp_processor_id(), get_irq_regs());

set_fs(old_fs);
}
--- linux-4.15.0.orig/arch/mips/kernel/machine_kexec.c
+++ linux-4.15.0/arch/mips/kernel/machine_kexec.c
@@ -118,6 +118,9 @@
*ptr = (unsigned long) phys_to_virt(*ptr);
}
+/* Mark offline BEFORE disabling local irq. */
+set_cpu_online(smp_processor_id(), false);
+
/*
 * we do not want to be bothered.
 */
--- linux-4.15.0.orig/arch/mips/kernel/mcount.S
+++ linux-4.15.0/arch/mips/kernel/mcount.S
@@ -119,10 +119,20 @@
EXPORT_SYMBOL(_mcount)
PTR_LA t1, ftrace_stub
PTR_L t2, ftrace_trace_function /* Prepare t2 for (1) */
-bnet1, t2, static_trace
+beq t1, t2, fgraph_trace
+MCOUNT_SAVE_REGS
+
+move a0, ra /* arg1: self return address */
+jalr t2 /* (1) call *ftrace_trace_function */
+move al, AT /* arg2: parent's return address */
+
+MCOUNT_RESTORE_REGS
+
+fgraph_trace:
+#ifdef CONFIG_FUNCTION_GRAPH_TRACER
+PTR_LA t1, ftrace_stub
+PTR_L t3, ftrace_graph_return
+bnet1, t3, ftrace_graph_caller
+nop
@@ -131,24 +141,11 @@
bnet1, t3, ftrace_graph_caller
+nop
#endif
-bftrace_stub
-#ifdef CONFIG_32BIT
- addiu sp, sp, 8
-else
-  nop
-endif

-static_trace:
-MCOUNT_SAVE_REGS
-
-movea0, ra/* arg1: self return address */
-jalrt2/* (1) call *frtrace_trace_function */
-  movea1, AT/* arg2: parent's return address */

-MCOUNT_RESTORE_REGS

#ifdef CONFIG_32BIT
addiu sp, sp, 8
#endif
+
.globl ftrace_stub
ftrace_stub:
RETURN_BACK
--- linux-4.15.0.orig/arch/mips/kernel/mips-cm.c
+++ linux-4.15.0/arch/mips/kernel/mips-cm.c
@@ -123,9 +123,9 @@
"COH_RD_ERR", "MMIO_WR_ERR", "MMIO_RD_ERR", "0x07",
 "0x08", "0x09", "0x0a", "0x0b",
 "0x0c", "0x0d", "0x0e", "0x0f",
-"0x10", "0x11", "0x12", "0x13",
-"0x14", "0x15", "0x16", "INTVN_WR_ERR",
-"INTVN_RD_ERR", "0x19", "0x1a", "0x1b",
+"0x10", "INTVN_WR_ERR", "INTVN_RD_ERR", "0x13",
+"0x14", "0x15", "0x16", "0x17",
+"0x18", "0x19", "0x1a", "0x1b",
 "0x1c", "0x1d", "0x1e", "0x1f"
};

@@ -457,5 +457,5 @@
 */ reprime cause register */
-  write_gcr_error_cause(0);
+  write_gcr_error_cause(cm_error);
}
--- linux-4.15.0.orig/arch/mips/kernel/mips-cpc.c
+++ linux-4.15.0/arch/mips/kernel/mips-cpc.c
@@ -10,6 +10,8 @@
 #include <linux/errno.h>
 #include <linux/percpu.h>
 +include <linux/of.h>
#include <linux/of_address.h>
#include <linux/spinlock.h>

#include <asm/mips-cps.h>
@@ -22,6 +24,17 @@

phys_addr_t __weak mips_cpc_default_phys_base(void)
{
+struct device_node *cpc_node;
+struct resource res;
+int err;
+
+cpc_node = of_find_compatible_node(of_root, NULL, "mti,mips-cpc");
+if (cpc_node) {
+err = of_address_to_resource(cpc_node, 0, &res);
+if (!err)
+return res.start;
+
+return 0;
}

--- linux-4.15.0.orig/arch/mips/kernel/proc.c
+++ linux-4.15.0/arch/mips/kernel/proc.c
@@ -124,6 +124,10 @@

if (cpu_has_eva)	seq_printf(m, "%s", " eva");
if (cpu_has_htw)	seq_printf(m, "%s", " htw");
if (cpu_has_xpa)	seq_printf(m, "%s", " xpa");
+if (cpu_has_loongson_mmi)	seq_printf(m, "%s", " loongson-mmi");
+if (cpu_has_loongson_cam)	seq_printf(m, "%s", " loongson-cam");
+if (cpu_has_loongson_ext)	seq_printf(m, "%s", " loongson-ext");
+if (cpu_has_loongson_ext2)	seq_printf(m, "%s", " loongson-ext2");
seq_printf(m, "\n");

if (cpu_has_mmips) {
--- linux-4.15.0.orig/arch/mips/kernel/process.c
+++ linux-4.15.0/arch/mips/kernel/process.c
@@ -29,7 +29,9 @@

#include <linux/kallsyms.h>
#include <linux/random.h>
#include <linux/prctl.h>
+#include <linux/nmi.h>

+include <asm/abi.h>
#include <asm/asm.h>
#include <asm/bootinfo.h>
#include <asm/cpu.h>
@@ -37,6 +39,7 @@
static int get_frame_info(struct mips_frame_info *info)
{
    bool is_mmips = IS_ENABLED(CONFIG_CPU_MICROMIPS);
    union mips_instruction insn, *ip, *ip_end;
    union mips_instruction insn, *ip;
    const unsigned int max_insns = 128;
    unsigned int last_insn_size = 0;
    unsigned int i;
    if (!ip)
        goto err;
    goto err;
    -ip_end = (void *)ip + info->func_size;
    -for (i = 0; i < max_insns && ip < ip_end; i++) {
    +for (i = 0; i < max_insns; i++) {
        ip = (void *)ip + last_insn_size;
        +if (is_mmips && mm_insn_16bit(ip->halfword[0])) {
            insn.word = ip->halfword[0] << 16;
            last_insn_size = 2;
            return pc;
        }
    }
    +unsigned long mips_stack_top(void)
    +{
        +unsigned long top = TASK_SIZE & PAGE_MASK;
        +
        +/* One page for branch delay slot "emulation" */
        +top -= PAGE_SIZE;
        +
        +/* Space for the VDSO, data page & GIC user page */
        +top -= PAGE_ALIGN(current->thread.abi->vdso->size);
        +top -= PAGE_SIZE;
        +top -= mips_gic_present() ? PAGE_SIZE : 0;
        +
        +/* Space for cache colour alignment */
        +if (cpu_has_dc_aliases)
            +top -= shm_align_mask + 1;
/* Space to randomize the VDSO base */
+if (current->flags & PF_RANDOMIZE)
+top -= VDSO_RANDOMIZE_SIZE;
+
+return top;
+
/*
 * Don't forget that the stack pointer must be aligned on a 8 bytes
 * boundary for 32-bits ABI and 16 bytes for 64-bits ABI.
@@ -655,28 +680,42 @@
return sp & ALMASK;
}

-static void arch_dump_stack(void *info)
-static DEFINE_PER_CPU(call_single_data_t, backtrace_csd);
-static struct cpumask backtrace_csd_busy;
+
+static DEFINE_PER_CPU(call_single_data_t, backtrace_csd);
+static struct cpumask backtrace_csd_busy;
+
+static void handle_backtrace(void *info)
{
-struct pt_regs *regs;
+nmi_cpu_backtrace(get_irq_regs());
+cpumask_clear_cpu(smp_processor_id(), &backtrace_csd_busy);
+}

-reg = get_irq_regs();
+static void raise_backtrace(cpumask_t *mask)
+{
+call_single_data_t *csd;
+int cpu;

-if (regs)
-show_regs(regs);
+for_each_cpu(cpu, mask) {
+/*
+ * If we previously sent an IPI to the target CPU & it hasn't
+ * cleared its bit in the busy cpumask then it didn't handle
+ * our previous IPI & it's not safe for us to reuse the
+ * call_single_data_t.
+ */
+if (cpumask_test_and_set_cpu(cpu, &backtrace_csd_busy)) {
+pr_warn("Unable to send backtrace IPI to CPU%u - perhaps it hung?n", 
+cpu);
+continue;
+
-dump_stack();

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void arch_trigger_cpumask_backtrace(const cpumask_t *mask, bool exclude_self)
{
    long this_cpu = get_cpu();
    -
    if (cpumask_test_cpu(this_cpu, mask) && !exclude_self)
        dump_stack();
    -
    -smp_call_function_many(mask, arch_dump_stack, NULL, 1);
    -
    -put_cpu();
    +nmi_trigger_cpumask_backtrace(mask, exclude_self, raise_backtrace);
}

int mips_get_process_fp_mode(struct task_struct *task)
@@ -721,6 +760,10 @@
if (value & ~known_bits)
    return -EOPNOTSUPPP;

+/* Setting FRE without FR is not supported. */
+if ((value & (PR_FP_MODE_FR | PR_FP_MODE_FRE)) == PR_FP_MODE_FRE)
+    return -EOPNOTSUPP;
+
+/* Avoid inadvertently triggering emulation */
+
if ((value & PR_FP_MODE_FR) && raw_cpu_has_fpu &&
    !(raw_current_cpu_data.fpu_id & MIPS_FPIR_F64))
--- linux-4.15.0.orig/arch/mips/kernel/prom.c
+++ linux-4.15.0/arch/mips/kernel/prom.c
@@ -41,7 +41,19 @@
#define CONFIG_USE_OF
void __init early_init_dt_add_memory_arch(u64 base, u64 size)
{
-    return add_memory_region(base, size, BOOT_MEM_RAM);
+    if (base >= PHYS_ADDR_MAX) {
+        pr_warn("Trying to add an invalid memory region, skipped\n");
+        return;
+    }
+    /* Truncate the passed memory region instead of type casting */
+    if (base + size - 1 >= PHYS_ADDR_MAX || base + size < base) {
+        pr_warn("Truncate memory region %llx @ %llx to size %llx\n",
+            size, base, PHYS_ADDR_MAX - base);
+        size = PHYS_ADDR_MAX - base;

add_memory_region(base, size, BOOT_MEM_RAM);

void * __init early_init_dt_alloc_memory_arch(u64 size, u64 align)
--- linux-4.15.0.orig/arch/mips/kernel/ptrace.c
+++ linux-4.15.0/arch/mips/kernel/ptrace.c
@@ -463,7 +463,7 @@
/*
 * Copy the floating-point context to the supplied NT_PRFPREG buffer.
 * Choose the appropriate helper for general registers, and then copy
- * the FCSR register separately.
+ * the FCSR and FIR registers separately.
 */
static int fpr_get(struct task_struct *target,
  const struct user_regset *regset,
@@ -471,6 +471,7 @@
    void *kbuf, void __user *ubuf)
{
  const int fcr31_pos = NUM_FPU_REGS * sizeof(elf_fpreg_t);
+  const int fir_pos = fcr31_pos + sizeof(u32);
  int err;

  if (sizeof(target->thread.fpu.fpr[0]) == sizeof(elf_fpreg_t))
@@ -483,6 +484,12 @@
    &target->thread.fpu.fcr31,
    fcr31_pos, fcr31_pos + sizeof(u32));
+  if (err)
+    return err;
+  +err = user_regset_copyout(&pos, &count, &kbuf, &ubuf,
+    &boot_cpu_data.fpu_id,
+    fir_pos, fir_pos + sizeof(u32));

  return err;
}
@@ -531,7 +538,8 @@
/*
 * Copy the supplied NT_PRFPREG buffer to the floating-point context.
 * Choose the appropriate helper for general registers, and then copy
- * the FCSR register separately.
+ * the FCSR register separately. Ignore the incoming FIR register
+ * contents though, as the register is read-only.
 */
  +err = user_regset_copyout(&pos, &count, &kbuf, &ubuf,
    &boot_cpu_data.fpu_id,
    fir_pos, fir_pos + sizeof(u32));

  return err;
}
const void *kbuf, const void __user *ubuf)
{
    const int fcr31_pos = NUM_FPU_REGS * sizeof(elf_fpreg_t);
    const int fir_pos = fcr31_pos + sizeof(u32);
    u32 fcr31;
    int err;

    ptrace_setfcr31(target, fcr31);
}

    if (count > 0)
        err = user_regset_copyin_ignore(&pos, &count, &kbuf, &ubuf,
            fir_pos,
            fir_pos + sizeof(u32));
    return err;
}

fregs = get_fpu_regs(child);

#ifdef CONFIG_32BIT
    if (test_thread_flag(TIF_32BIT_FPREGS)) {
    tmp = get_fpr32(&fregs[addr - FPR_BASE], 0);
    break;
    }
#endif
    if (test_tsk_thread_flag(child, TIF_32BIT_FPREGS)) {
        * The odd registers are actually the high
        * order bits of the values stored in the even
    break;
    }
    if (test_thread_flag(TIF_32BIT_FPREGS)) {
        tmp = get_fpr64(&fregs[addr - FPR_BASE], 0);
        break;
    }
    case PC:
        tmp = regs->cp0_epc;
    goto out;
}
    dregs = __get_dsp_regs(child);
    tmp = (unsigned long) (dregs[addr - DSP_BASE]);
    break;
    case DSP_CONTROL:
    goto out;
init_fp_ctx(child);
#endif CONFIG_32BIT
-#ifdef CONFIG_32BIT
-+if (test_thread_flag(TIF_32BIT_FPREGS)) {
-+if (test_tsk_thread_flag(child, TIF_32BIT_FPREGS)) {
/*
 * The odd registers are actually the high
 * order bits of the values stored in the even
--- linux-4.15.0.orig/arch/mips/kernel/ptrace32.c
+++ linux-4.15.0/arch/mips/kernel/ptrace32.c
@@ -99,7 +99,7 @@
 break;
 }
 fregs = get_fpu_regs(child);
-+if (test_thread_flag(TIF_32BIT_FPREGS)) {
-+if (test_tsk_thread_flag(child, TIF_32BIT_FPREGS)) {
/*
 * The odd registers are actually the high
 * order bits of the values stored in the even
@@ -109,7 +109,7 @@
 addr & 1);
 break;
 }
-tmp = get_fpr32(&fregs[addr - FPR_BASE], 0);
+tmp = get_fpr64(&fregs[addr - FPR_BASE], 0);
 break;
 case PC:
 tmp = regs->cp0_epc;
@@ -142,7 +142,7 @@
 goto out;
 }
 dregs = __get_dsp_regs(child);
-+tmp = (unsigned long) (dregs[addr - DSP_BASE]);
-+tmp = dregs[addr - DSP_BASE];
 break;
 } case DSP_CONTROL:
@@ -212,7 +212,7 @@
 sizeof(child->thread.fpu));
 child->thread.fpu.fcr31 = 0;
 }
-+if (test_thread_flag(TIF_32BIT_FPREGS)) {
-+if (test_tsk_thread_flag(child, TIF_32BIT_FPREGS)) {
/*
 * The odd registers are actually the high
 * order bits of the values stored in the even
--- linux-4.15.0.orig/arch/mips/kernel/relocate.c
+++ linux-4.15.0/arch/mips/kernel/relocate.c
static inline __init unsigned long rotate_xor(unsigned long hash,
    const void *area, size_t size)
{
    -size_t i;
    -unsigned long *ptr = (unsigned long *)area;
    +const typeof(hash) *ptr = PTR_ALIGN(area, sizeof(hash));
    +size_t diff, i;
    +
    +diff = (void *)ptr - area;
    +if (unlikely(size < diff + sizeof(hash)))
      +return hash;
    +
    +size = ALIGN_DOWN(size - diff, sizeof(hash));

    for (i = 0; i < size / sizeof(hash); i++) {
        /* Rotate by odd number of bits and XOR. */
        --- linux-4.15.0.orig/arch/mips/kernel/scall64-o32.S
        +++ linux-4.15.0/arch/mips/kernel/scall64-o32.S
        @@ -125,7 +125,7 @@
        subu t1, v0,  __NR_O32_Linux
        movea1, v0
        bnez t1, 1f /* __NR_syscall at offset 0 */
        -lw a1, PT_R4(sp) /* Arg1 for __NR_syscall case */
        +ld a1, PT_R4(sp) /* Arg1 for __NR_syscall case */
        .setpop

        1:jal syscall_trace_enter
        --- linux-4.15.0.orig/arch/mips/kernel/setup.c
        +++ linux-4.15.0/arch/mips/kernel/setup.c
        @@ -75,7 +75,7 @@
        * mips_io_port_base is the begin of the address space to which x86 style
        * I/O ports are mapped.
        */
        -const unsigned long mips_io_port_base = -1;
        +unsigned long mips_io_port_base = -1;
        EXPORT_SYMBOL(mips_io_port_base);

        static struct resource code_resource = { .name = "Kernel code", };
        @@ -375,6 +375,7 @@
        unsigned long reserved_end;
        unsigned long mapstart = ~0UL;
        unsigned long bootloader_size;
        +phys_addr_t ramstart = (phys_addr_t)ULLONG_MAX;
        bool bootloader_valid = false;
        int i;

        @@ -395,7 +396,8 @@
max_low_pfn = 0;

/*
 - * Find the highest page frame number we have available.
 + * Find the highest page frame number we have available
 + * and the lowest used RAM address
 */
for (i = 0; i < boot_mem_map.nr_map; i++) {
unsigned long start, end;
@@ -407,6 +409,8 @@
end = PFN_DOWN(boot_mem_map.map[i].addr
+ boot_mem_map.map[i].size);

+ramstart = min(ramstart, boot_mem_map.map[i].addr);
+
#ifndef CONFIG_HIGHMEM
/*
 * Skip highmem here so we get an accurate max_low_pfn if low
@@ -436,6 +440,13 @@
mapstart = max(reserved_end, start);
}
+/*
 + * Reserve any memory between the start of RAM and PHYS_OFFSET
 + */
+if (ramstart > PHYS_OFFSET)
+add_memory_region(PHYS_OFFSET, ramstart - PHYS_OFFSET,
+ BOOT_MEM_RESERVED);
+
if (min_low_pfn >= max_low_pfn)
panic("Incorrect memory mapping !!!");
if (min_low_pfn > ARCH_PFN_OFFSET) {
@@ -664,9 +675,6 @@
add_memory_region(start, size, BOOT_MEM_RAM);

-if (start && start > PHYS_OFFSET)
-add_memory_region(PHYS_OFFSET, start - PHYS_OFFSET,
-BOOT_MEM_RESERVED);
return 0;
}
early_param("mem", early_parse_mem);
@@ -904,7 +912,17 @@
BOOTMEM_DEFAULT);
#endif
device_tree_init();
+*/
In order to reduce the possibility of kernel panic when failed to get IO TLB memory under CONFIG_SWIOTLB, it is better to allocate low memory as small as possible before plat_swiotlb_setup(), so make sparse_init() using top-down allocation.

```c
memblock_set_bottom_up(false);
sparse_init();
memblock_set_bottom_up(true);
plat_swiotlb_setup();
```

dma_contiguous_reserve(PFN_PHYS(max_low_pfn));

--- linux-4.15.0.orig/arch/mips/kernel/smp-bmips.c
+++ linux-4.15.0/arch/mips/kernel/smp-bmips.c
@@ -168,11 +168,11 @@
   }
   return;
 
-if (request_irq(IPI0_IRQ, bmips_ipi_interrupt, IRQF_PERCPU,
      "smp_ipi0", NULL))
+if (request_irq(IPI0_IRQ, bmips_ipi_interrupt,
            IRQF_PERCPU | IRQF_NO_SUSPEND, "smp_ipi0", NULL))
     panic("Can't request IPI0 interrupt");
-if (request_irq(IPI1_IRQ, bmips_ipi_interrupt, IRQF_PERCPU,
      "smp_ipi1", NULL))
+if (request_irq(IPI1_IRQ, bmips_ipi_interrupt,
            IRQF_PERCPU | IRQF_NO_SUSPEND, "smp_ipi1", NULL))
     panic("Can't request IPI1 interrupt");
 }

@ @ -240,6 +240,8 @@
 */
 static void bmips_init_secondary(void)
 {
+bmips_cpu_setup();
 +
 switch (current_cpu_type()) {
 case CPU_BMIPS4350:
 case CPU_BMIPS4380:
 @ @ -457,10 +459,10 @@
 static inline void bmips_nmi_handler_setup(void)
 {
-bmips_wr_vec(BMIPS_NMI_RESET_VEC, &bmips_reset_nmi_vec,
   &bmips_reset_nmi_vec_end);
-bmips_wr_vec(BMIPS_WARM_RESTART_VEC, &bmips_smp_int_vec,
   &bmips_smp_int_vec_end);
+bmips_wr_vec(BMIPS_NMI_RESET_VEC, bmips_reset_nmi_vec,
+bmips_reset_nmi_vec_end);
+bmips_wr_vec(BMIPS_WARM_RESTART_VEC, bmips_smp_int_vec,
+bmips_smp_int_vec_end);
}

struct reset_vec_info {
  @ @ -572,7 +574,7 @ @
  */
}

-void __init bmips_cpu_setup(void)
+void bmips_cpu_setup(void)
{
  void __iomem __maybe_unused *cbr = BMIPS_GET_CBR();
  u32 __maybe_unused cfg;
  --- linux-4.15.0.orig/arch/mips/kernel/time.c
  +++ linux-4.15.0/arch/mips/kernel/time.c
  @ @ -22,12 +22,77 @ @
  #include <linux/smp.h>
  #include <linux/spinlock.h>
  #include <linux/export.h>
  +#include <linux/cpufreq.h>
  +#include <linux/delay.h>

  #include <asm/cpu-features.h>
  #include <asm/cpu-type.h>
  #include <asm/div64.h>
  #include <asm/time.h>

  +#ifdef CONFIG_CPU_FREQ
  +
  +#include <asm/cpu-features.h>
  +#include <asm/cpu-type.h>
  +#include <asm/div64.h>
  +#include <asm/time.h>

  +#ifdef CONFIG_CPU_FREQ
  +
  +static DEFINE_PER_CPU(unsigned long, pcp_lpj_ref);
  +static DEFINE_PER_CPU(unsigned long, pcp_lpj_ref_freq);
  +static unsigned long glb_lpj_ref;
  +static unsigned long glb_lpj_ref_freq;
  +
  +static int cpufreq_callback(struct notifier_block *nb,
  +  unsigned long val, void *data)
  +{
  +  int cpu;
  +  struct cpufreq_freqs *freq = data;
  +  +
  +  /*
  +  * Skip lpj numbers adjustment if the CPU-freq transition is safe for
  +  * the loops delay. (Is this possible?)
  +  */
  +  +if (freq->flags & CPUFREQ_CONST_LOOPS)
  +  return NOTIFY_OK;
/* Save the initial values of the lpjes for future scaling. */
+if (!glb_lpj_ref) {
+  glb_lpj_ref = boot_cpu_data.udelay_val;
+  glb_lpj_ref_freq = freq->old;
+
+for_each_online_cpu(cpu) {
+  per_cpu(pcp_lpj_ref, cpu) =
+    cpu_data[cpu].udelay_val;
+  per_cpu(pcp_lpj_ref_freq, cpu) = freq->old;
+}
+
+cpu = freq->cpu;
+/
+  * Adjust global lpj variable and per-CPU udelay_val number in
+  * accordance with the new CPU frequency.
+  */
+if ((val == CPUFREQ_PRECHANGE && freq->old < freq->new) ||
+    (val == CPUFREQ_POSTCHANGE && freq->old > freq->new)) {
+  loops_per_jiffy = cpufreq_scale(glb_lpj_ref,
+  glb_lpj_ref_freq,
+  freq->new);
+
+cpu_data[cpu].udelay_val = cpufreq_scale(per_cpu(pcp_lpj_ref, cpu),
+  per_cpu(pcp_lpj_ref_freq, cpu), freq->new);
+}
+
+return NOTIFY_OK;
+}
+
+static struct notifier_block cpufreq_notifier = {
+  .notifier_call  = cpufreq_callback,
+};
+
+static int __init register_cpufreq_notifier(void)
+{
+  return cpufreq_register_notifier(&cpufreq_notifier,
+    CPUFREQ_TRANSITION_NOTIFIER);
+}
+core_initcall(register_cpufreq_notifier);
+
+#endif /* CONFIG_CPU_FREQ */
+
/*
  * forward reference
  */
--- linux-4.15.0.orig/arch/mips/kernel/topology.c
for_each_present_cpu(i) {
    struct cpu *c = &per_cpu(cpu_devices, i);

    -c->hotpluggable = 1;
    +c->hotpluggable = !!i;
    ret = register_cpu(c, i);
    if (ret)
        printk(KERN_WARNING "topology_init: register_cpu %d ")

void show_regs(struct pt_regs *regs)
{
    __show_regs((struct pt_regs *)regs);
    +dump_stack();
}

void show_registers(struct pt_regs *regs)
@@ -2122,6 +2123,7 @@
    change_c0_status(ST0_CU|ST0_MX|ST0_RE|ST0_FR|ST0_BEV|ST0_TS|ST0_KX|ST0_SX|ST0_UX,
    status_set);
    +back_to_back_c0_hazard();
}

unsigned int hwrena;
--- linux-4.15.0.orig/arch/mips/kernel/uprobes.c
+++ linux-4.15.0/arch/mips/kernel/uprobes.c
@@ -112,9 +112,6 @@
    /*
    aup->resume_epc = regs->cp0_epc + 4;
    if (insn_has_delay_slot((union mips_instruction) aup->insn[0])) {
    -unsigned long epc;
    -epc = regs->cp0_epc;
    __compute_return_epc_for_insn(regs,
        (union mips_instruction) aup->insn[0]);
    aup->resume_epc = regs->cp0_epc;
    --- linux-4.15.0.orig/arch/mips/kernel/vdso.c
+++ linux-4.15.0/arch/mips/kernel/vdso.c
@@ -13,13 +13,16 @@
    #include <linux/kernel.h>
    +#include <linux/mm.h>

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+\#include <linux/random.h>
#include <linux/sched.h>
#include <linux/slab.h>
#include <linux/timekeeper_internal.h>

#include <asm/abi.h>
#include <asm/mips-cps.h>
+\#include <asm/page.h>
#include <asm/vdso.h>

/* Kernel-provided data used by the VDSO. */
@@ -95,6 +98,21 @@
{}
{}

+static unsigned long vdso_base(void)
+{
+unsigned long base;
+
+/* Skip the delay slot emulation page */
+base = STACK_TOP + PAGE_SIZE;
+
+if (current->flags & PF_RANDOMIZE) {
+base += get_random_int() & (VDSO_RANDOMIZE_SIZE - 1);
+base = PAGE_ALIGN(base);
+}
+
+return base;
+}
+
int arch_setup_additional_pages(struct linux_binprm *bprm, int uses_interp)
{
struct mips_vdso_image *image = current->thread.abi->vdso;
@@ -108,8 +126,8 @@
/* Map delay slot emulation page */
base = mmap_region(NULL, STACK_TOP, PAGE_SIZE,
   VM_READ|VM_WRITE|VM_EXEC|
   VM_MAYREAD|VM_MAYWRITE|VM_MAYEXEC,
+ VM_READ | VM_EXEC |
+ VM_MAYREAD | VM_MAYWRITE | VM_MAYEXEC,
   0, NULL);
if (IS_ERR_VALUE(base)) {
    ret = base;
@@ -128,12 +146,30 @@
    vvar_size = gic_size + PAGE_SIZE;
    size = vvar_size + image->size;


-base = get_unmapped_area(NULL, 0, size, 0, 0);
+/*
+ * Find a region that's large enough for us to perform the
+ * colour-matching alignment below.
+ */
+if (cpu_has_dc_aliases)
+size += shm_align_mask + 1;
+
+base = get_unmapped_area(NULL, vdso_base(), size, 0, 0);
if (IS_ERR_VALUE(base)) {
    ret = base;
goto out;
}

+/*
+ * If we suffer from dcache aliasing, ensure that the VDSO data page
+ * mapping is coloured the same as the kernel's mapping of that memory.
+ * This ensures that when the kernel updates the VDSO data userland
+ * will observe it without requiring cache invalidations.
+ */
+if (cpu_has_dc_aliases) {
    base = __ALIGN_MASK(base, shm_align_mask);
    base += ((unsigned long)&vdso_data - gic_size) & shm_align_mask;
}

data_addr = base + gic_size;
vdso_addr = data_addr + PAGE_SIZE;

--- linux-4.15.0.orig/arch/mips/kernel/vmlinux.lds.S
+++ linux-4.15.0/arch/mips/kernel/vmlinux.lds.S
@@ -50,7 +50,7 @@
/* . = 0xa800000000300000; */
 . = 0xffffffff80300000;
 #endif
- . = VMLINUX_LOAD_ADDRESS;
+ . = LINKER_LOAD_ADDRESS;
 /* read-only */
 .text = :/* Text and read-only data */
.text : {
 @@ -93,6 +93,7 @@
 INIT_TASK_DATA(THREAD_SIZE)
 NOSAVE_DATA
+PAGE_ALIGNED_DATA(PAGE_SIZE)
 CACHELINE_ALIGNED_DATA(1 << CONFIG_MIPS_L1_CACHE_SHIFT)
 READ_MOSTLY_DATA(1 << CONFIG_MIPS_L1_CACHE_SHIFT)
 DATA_DATA
 @@ -140,6 +141,13 @@

PERCPU_SECTION(1 << CONFIG_MIPS_L1_CACHE_SHIFT)
#endif

#ifdef CONFIG_MIPS_ELF_APPENDED_DTB

.appended_dtb : AT(ADDR(.appended_dtb) - LOAD_OFFSET) {
+*(.appended_dtb)
+KEEP(*(.appended_dtb))
+}
#endif

#ifdef CONFIG_RELOCATABLE
_. = ALIGN(4);
#endif

@@ -164,11 +172,6 @@
__appended_dtb = .;
/* leave space for appended DTB */
. += 0x100000;
-#elif defined(CONFIG_MIPS_ELF_APPENDED_DTB)
- .appended_dtb : AT(ADDR(.appended_dtb) - LOAD_OFFSET) {
- *(.appended_dtb)
- KEEP(*(.appended_dtb))
- }
#endif

/* Align to 64K in attempt to eliminate holes before the
--- linux-4.15.0.orig/arch/mips/kernel/vpe.c
+++ linux-4.15.0/arch/mips/kernel/vpe.c
@@ -134,7 +134,7 @@
{
 list_del(&v->list);
 if (v->load_addr)
- release_progmem(v);
+ release_progmem(v->load_addr);
 kfree(v);
}

--- linux-4.15.0.orig/arch/mips/kvm/mips.c
+++ linux-4.15.0/arch/mips/kvm/mips.c
@@ -45,7 +45,7 @@
 { "cache", VCPU_STAT(cache_exits), KVM_STAT_VCPU },
 { "signal", VCPU_STAT(signal_exits), KVM_STAT_VCPU },
 { "interrupt", VCPU_STAT(int_exits), KVM_STAT_VCPU },
- { "cop_unsuable", VCPU_STAT(cop_unusable_exits), KVM_STAT_VCPU },
+ { "cop_unusable", VCPU_STAT(cop_unusable_exits), KVM_STAT_VCPU },
 { "tlbmod", VCPU_STAT(tlbmod_exits), KVM_STAT_VCPU },
 { "tlbmiss_ld", VCPU_STAT(tlbmiss_ld_exits), KVM_STAT_VCPU },
 { "tlbmiss_st", VCPU_STAT(tlbmiss_st_exits), KVM_STAT_VCPU },
@@ -131,6 +131,8 @@
int kvm_arch_init_vm(struct kvm *kvm, unsigned long type)
{
    switch (type) {
    +case KVM_VM_MIPS_AUTO:
    +    break;
    #ifdef CONFIG_KVM_MIPS_VZ
    case KVM_VM_MIPS_VZ:
    #else
        @@ -1078,6 +1080,9 @@
        case KVM_CAP_MAX_VCPUS:
            r = KVM_MAX_VCPUS;
        break;
        +case KVM_CAP_MAX_VCPU_ID:
        +    r = KVM_MAX_VCPU_ID;
        +    break;
    case KVM_CAP_MIPS_FPU:
        /* We don't handle systems with inconsistent cpu_has_fpu */
        r = !!raw_cpu_has_fpu;
        --- linux-4.15.0.orig/arch/mips/lantiq/Kconfig
        +++ linux-4.15.0/arch/mips/lantiq/Kconfig
        @@ -13,6 +13,8 @@
        config SOC_AMAZON_SE
            bool "Amazon SE"
        select SOC_TYPE_XWAY
        +select MFD_SYSCON
        +select MFD_CORE

        config SOC_XWAY
            bool "XWAY"
        --- linux-4.15.0.orig/arch/mips/lantiq/irq.c
        +++ linux-4.15.0/arch/mips/lantiq/irq.c
        @@ -156,8 +156,9 @@
            if (edge)
                irq_set_handler(d->hwirq, handle_edge_irq);

        -ltq_eiu_w32(ltq_eiu_r32(LTQ_EIU_EXIN_C) |
            -(val << (i * 4)), LTQ_EIU_EXIN_C);
        +ltq_eiu_w32((ltq_eiu_r32(LTQ_EIU_EXIN_C) &
            + (~7 << (i * 4)))) | (val << (i * 4)),
            + LTQ_EIU_EXIN_C);
    }
}

@@ -224,9 +225,11 @@
    .irq_set_type = ltq_eiu_settype,
    }

    -static void ltq_hw_irqdispatch(int module)
```c
+static void ltq_hw_irq_handler(struct irq_desc *desc)
{
+int module = irq_desc_get_irq(desc) - 2;
+u32 irq;
+int hwirq;

    irq = ltq_icu_r32(module, LTQ_ICU_IM0_IOSR);
    if (irq == 0)
        @@ -237,57 +240,15 @@
            /* other bits might be bogus */
            irq = __fls(irq);
        -do_IRQ((int)irq + MIPS_CPU_IRQ_CASCADE + (INT_NUM_IM_OFFSET * module));
        +hwirq = irq + MIPS_CPU_IRQ_CASCADE + (INT_NUM_IM_OFFSET * module);
        +generic_handle_irq(irq_linear_revmap(ltq_domain, hwirq));

        /* if this is a EBU irq, we need to ack it or get a deadlock */
        -if ((irq == LTQ_ICU_EBU_IRQ) && (module == 0) && LTQ_EBU_PCC_ISTAT)
            +if (irq == LTQ_ICU_EBU_IRQ && !module && LTQ_EBU_PCC_ISTAT != 0)
                ltq_ebu_w32(ltq_ebu_r32(LTQ_EBU_PCC_ISTAT) | 0x10,
                            LTQ_EBU_PCC_ISTAT);
    }

#define DEFINE_HWx_IRQDISPATCH(x)
    -static void ltq_hw ## x ## _irqdispatch(void)
    {
        ltq_hw_irqdispatch(x);
    }

DEFINE_HWx_IRQDISPATCH(0)
DEFINE_HWx_IRQDISPATCH(1)
DEFINE_HWx_IRQDISPATCH(2)
DEFINE_HWx_IRQDISPATCH(3)
DEFINE_HWx_IRQDISPATCH(4)

-#if MIPS_CPU_TIMER_IRQ == 7
    -static void ltq_hw5_irqdispatch(void)
    -{
        -do_IRQHandler(MIPS_CPU_TIMER_IRQ);
    }
    +#else
    -DEFINE_HWx_IRQDISPATCH(5)
    +#endif

-#static void ltq_hw_irq_handler(struct irq_desc *desc)
    -{
        -ltq_hw_irqdispatch(irq_desc_get_irq(desc) - 2);
    }
-```

asmlinkage void plat_irq_dispatch(void)
{
    unsigned int pending = read_c0_status() & read_c0_cause() & ST0_IM;
    int irq;
    
    if (!pending) {
        spurious_interrupt();
        return;
    }
    
    pending >>= CAUSEB_IP;
    while (pending) {
        irq = fls(pending) - 1;
        do_IRQ(MIPS_CPU_IRQ_BASE + irq);
        pending &= ~BIT(irq);
    }
}

static int icu_map(struct irq_domain *d, unsigned int irq, irq_hw_number_t hw)
{
    struct irq_chip *chip = &ltq_irq_type;
    for (i = 0; i < MAX_IM; i++)
        irq_set_chained_handler(i + 2, ltq_hw_irq_handler);
    
    if (cpu_has_vint) {
        pr_info("Setting up vectored interrupts\n");
        set_vi_handler(2, ltq_hw0_irqdispatch);
        set_vi_handler(3, ltq_hw1_irqdispatch);
        set_vi_handler(4, ltq_hw2_irqdispatch);
        set_vi_handler(5, ltq_hw3_irqdispatch);
        set_vi_handler(6, ltq_hw4_irqdispatch);
        set_vi_handler(7, ltq_hw5_irqdispatch);
    }
    
    ltq_domain = irq_domain_add_linear(node,
            (MAX_IM * INT_NUM_IM_OFFSET) + MIPS_CPU_IRQ_CASCADE,
            &irq_domain_ops, 0);

#ifndef CONFIG_MIPS_MT_SMP
    set_c0_status(IE_IRQ0 | IE_IRQ1 | IE_IRQ2 |
            IE_IRQ3 | IE_IRQ4 | IE_IRQ5);
#else
    set_c0_status(IE_SW0 | IE_SW1 | IE_IRQ0 | IE_IRQ1 |
            IE_IRQ2 | IE_IRQ3 | IE_IRQ4 | IE_IRQ5);
#endif

/* tell oprofile which irq to use */
ltq_perfcount_irq = irq_create_mapping(ltq_domain, LTQ_PERF_IRQ);

--- linux-4.15.0.orig/arch/mips/lantiq/xway/sysctrl.c
+++ linux-4.15.0/arch/mips/lantiq/xway/sysctrl.c
@@ -549,9 +549,9 @@
 clkdev_add_static(ltq_ar9_cpu_hz(), ltq_ar9_fpi_hz(),
 ltq_ar9_fpi_hz()), CLOCK_250M);
 clkdev_add_pmu("1f203018.usb2-phy", "phy", 1, 0, PMU_USB0_P);
-clkdev_add_pmu("1e101000.usb", "otg", 1, 0, PMU_USB0);
+clkdev_add_pmu("1e101000.usb", "otg", 1, 0, PMU_USB0 | PMU_AHBM);
 clkdev_add_pmu("1f203034.usb2-phy", "phy", 1, 0, PMU_USB1_P);
-clkdev_add_pmu("1e106000.usb", "otg", 1, 0, PMU_USB1);
+clkdev_add_pmu("1e106000.usb", "otg", 1, 0, PMU_USB1 | PMU_AHBM);
 clkdev_add_pmu("1f203018.usb2-phy", "ctrl", 1, 0, PMU_USB0);
 clkdev_add_pmu("1e103000.etop", "switch", 1, 0, PMU_SWITCH);
 clkdev_add_pmu("1e103000.sdio", NULL, 1, 0, PMU_SDIO);
 clkdev_add_pmu("1e103100.deu", NULL, 1, 0, PMU_DEU);
@@ -560,7 +560,7 @@
 } else {
 clkdev_add_static(ltq_danube_cpu_hz(), ltq_danube_fpi_hz(),
 ltq_danube_fpi_hz(), ltq_danube_pp32_hz());
-clkdev_add_pmu("1f203018.usb2-phy", "ctrl", 1, 0, PMU_USB0);
+clkdev_add_pmu("1e101000.usb", "otg", 1, 0, PMU_USB0 | PMU_AHBM);
 clkdev_add_pmu("1f203018.usb2-phy", "phy", 1, 0, PMU_USB0_P);
 clkdev_add_pmu("1e103000.sdio", NULL, 1, 0, PMU_SDIO);
 clkdev_add_pmu("1e103100.deu", NULL, 1, 0, PMU_DEU);
--- linux-4.15.0.orig/arch/mips/lib/memset.S
+++ linux-4.15.0/arch/mips/lib/memset.S
@@ -195,6 +195,7 @@
 #endif
 #else
 PTR_SUBU	t0, $0, a2
+movea2, zero/* No remaining longs */
 PTR_ADDIUt0, 1
 STORE_BYTE(0)
 STORE_BYTE(1)
@@ -219,7 +220,7 @@
 1:PTR_ADDIUa0, 1/* fill bytewise */
 R10KCBARRIER(0(ra))
bnet1, a0, 1b
-sba1, -1(a0)
+EX(sb, a1, -1(a0), .Lsmall_fixup@)

 2:jr/* done */
 movea2, zero
@@ -231,7 +232,7 @@
 #ifdef CONFIG_CPU_MIPSR6
 .Lbyte_fixup@:

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.-PTR_SUBUa2, S0, t0
+PTR_SUBUa2, t0
jr a
  PTR_ADDIUa2, 1
#endif /* CONFIG_CPU_MIPS6 */
@@ -252,13 +253,20 @@
  PTR_L t0, TI_TASK($28)
  andia2, STORMASK
  LONG_L t0, THREAD_BUADDR(t0)
-  LONG_ADDUa2, t1
+  LONG_ADDUa2, a0
  jr a
  LONG_SUBUa2, t0

.Llast_fixup@:
  jr a
-  andiv1, a2, STORMASK
+  nop
+
+.Lsmall_fixup@:
+  .set reorder
+  PTR_SUBUa2, t1, a0
+  PTR_ADDIUa2, 1
+  jr a
+  .set noreorder
.
.endm

--- linux-4.15.0.orig/arch/mips/lib/mips-atomic.c
+++ linux-4.15.0/arch/mips/lib/mips-atomic.c
@@ -37,7 +37,7 @@
    /* no inputs */
    : "memory";
-  preempt_disable();
+  preempt_disable_notrace();

   __asm__ __volatile__ (
      ".setpush\n"
@@ -53,7 +53,7 @@
    : /* no inputs */
    : "memory";

-  preempt_enable();
+  preempt_enable_notrace();
  )
EXPORT_SYMBOL(arch_local_irq_disable);
unsigned long flags;

-preempt_disable();
+preempt_disable_notrace();

__asm__ __volatile__ (
".set
push
"
@@ -78,7 +78,7 @@
"memory");

-preempt_enable();
+preempt_enable_notrace();

return flags;
}
@@ -88,7 +88,7 @@
unsigned long __tmp1;

-preempt_disable();
+preempt_disable_notrace();

__asm__ __volatile__ (
".set
push
"
@@ -106,7 +106,7 @@
"memory");

-preempt_enable();
+preempt_enable_notrace();
}

EXPORT_SYMBOL(arch_local_irq_restore);

--- linux-4.15.0.orig/arch/mips/lib/multi3.c
+++ linux-4.15.0/arch/mips/lib/multi3.c
@@ -4,12 +4,12 @@
#include "libgcc.h"
/*
 - * GCC 7 suboptimally generates __multi3 calls for mips64r6, so for that
 - * specific case only we'll implement it here.
 + * GCC 7 & older can suboptimally generate __multi3 calls for mips64r6, so for
 + * that specific case only we implement that intrinsic here.
 *
 * See https://gcc.gnu.org/bugzilla/show_bug.cgi?id=82981
 */
/* multiply 64-bit values, low 64-bits returned */
static inline long long notrace dmulu(long long a, long long b)
--- linux-4.15.0.orig/arch/mips/loongson64/Platform
+++ linux-4.15.0/arch/mips/loongson64/Platform
@@ -43,6 +43,10 @@
    $(call cc-option,-march=mips64r2,-mips64r2 -U_MIPS_ISA -D_MIPS_ISA=_MIPS_ISA_MIPS64)
endif

+# Some -march= flags enable MMI instructions, and GCC complains about that
+# support being enabled alongside -msoft-float. Thus explicitly disable MMI.
+cflags-y += $(call cc-option,-mno-loongson-mmi)
+
# Loongson Machines' Support
#
--- linux-4.15.0.orig/arch/mips/loongson64/common/cs5536/cs5536_ohci.c
+++ linux-4.15.0/arch/mips/loongson64/common/cs5536/cs5536_ohci.c
@@ -138,7 +138,7 @@
    break;
case PCI_OHCI_INT_REG:
    _rdmsr(DIVIL_MSR_REG(PIC_YSEL_LOW), &hi, &lo);
-    if ((lo & 0x00000f00) == CS5536_USB_INTR)
+    if (((lo >> PIC_YSEL_LOW_USB_SHIFT) & 0xf) == CS5536_USB_INTR)
        conf_data = 1;
    break;
default:
    --- linux-4.15.0.orig/arch/mips/loongson64/common/reset.c
+++ linux-4.15.0/arch/mips/loongson64/common/reset.c
@@ -59,7 +59,12 @@
{*
    #ifndef CONFIG_LEFI_FIRMWARE_INTERFACE
    mach_prepare_shutdown();
-    unreachable();
+    +/*
+    + * It needs a wait loop here, but mips/kernel/reset.c already calls
+    +a generic delay loop, machine_hang(), so simply return.
+    +*/
+    +return;
    #else
    void (*fw_poweroff)(void) = (void *)loongson_sysconf.poweroff_addr;
    --- linux-4.15.0.orig/arch/mips/loongson64/common/serial.c
+++ linux-4.15.0/arch/mips/loongson64/common/serial.c
static void __init serial_exit(void)
{
    platform_device_unregister(&uart8250_device);
}

--- linux-4.15.0.orig/arch/mips/loongson64/lemote-2f/irq.c
+++ linux-4.15.0/arch/mips/loongson64/lemote-2f/irq.c
@@ -103,7 +103,7 @@
static struct irqaction cascade_irqaction = {
    .handler = no_action,
    .name = "cascade",
    .flags = IRQF_NO_THREAD,
+    .flags = IRQF_NO_THREAD | IRQF_NO_SUSPEND,
    .}
}

void __init mach_init_irq(void)
--- linux-4.15.0.orig/arch/mips/loongson64/loongson-3/irq.c
+++ linux-4.15.0/arch/mips/loongson64/loongson-3/irq.c
@@ -96,51 +96,8 @@
static inline void mask_loongson_irq(struct irq_data *d)
{
-    clear_c0_status(0x100 << (d->irq - MIPS_CPU_IRQ_BASE));
-    irq_disable_hazard();
-
-    /* Workaround: UART IRQ may deliver to any core */
-    if (d->irq == LOONGSON_UART_IRQ) {
-        int cpu = smp_processor_id();
-        int node_id = cpu_logical_map(cpu) / loongson_sysconf.cores_per_node;
-        int core_id = cpu_logical_map(cpu) % loongson_sysconf.cores_per_node;
-        u64 intenclr_addr = smp_group[node_id] |
-            (u64)&LOONGSON_INT_ROUTER_INTENCLR);
-        u64 introuter_lpc_addr = smp_group[node_id] |
-            (u64)&LOONGSON_INT_ROUTER_LPC);
-
* (volatile u32 *)intenclr_addr = 1 << 10;
-*(volatile u8 *)introuter_lpc_addr = 0x10 + (1<<core_id);
-}
-
-
-static inline void unmask_loongson_irq(struct irq_data *d)
-{
-/* Workaround: UART IRQ may deliver to any core */
-if (d->irq == LOONGSON_UART_IRQ) {
-int cpu = smp_processor_id();
-int node_id = cpu_logical_map(cpu) / loongson_sysconf.cores_per_node;
-int core_id = cpu_logical_map(cpu) % loongson_sysconf.cores_per_node;
-u64 intenset_addr = smp_group[node_id] |
-(u64)(&LOONGSON_INT_ROUTER_INTENSET);
-u64 introuter_lpc_addr = smp_group[node_id] |
-(u64)(&LOONGSON_INT_ROUTER_LPC);
-
-*(volatile u32 *)intenset_addr = 1 << 10;
-*(volatile u8 *)introuter_lpc_addr = 0x10 + (1<<core_id);
-} 
-
-irq_enable_hazard();
-}
+
 static inline void mask_loongson_irq(struct irq_data *d) { }
 static inline void unmask_loongson_irq(struct irq_data *d) { }

 /* For MIPS IRQs which shared by all cores */
 static struct irq_chip loongson_irq_chip = {
 @ @ -183,12 +140,11 @ @
 chip->irq_set_affinity = plat_set_irq_affinity;

 irq_set_chip_and_handler(LOONGSON_UART_IRQ,
 &loongson_irq_chip, handle_level_irq);
-
-/* setup HT1 irq */
-setup_irq(LOONGSON_HT1_IRQ, &cascade_irqaction);
-+loongson_irq_chip, handle_percpu_irq);
-irq_set_chip_and_handler(LOONGSON_BRIDGE_IRQ,
-+loongson_irq_chip, handle_percpu_irq);

-set_c0_status(STATUSF_IP2 | STATUSF_IP6);
+set_c0_status(STATUSF_IP2 | STATUSF_IP3 | STATUSF_IP6);
}

#ifdef CONFIG_HOTPLUG_CPU
--- linux-4.15.0.orig/arch/mips/loongson64/loongson-3/platform.c
+++ linux-4.15.0/arch/mips/loongson64/loongson-3/platform.c
@@ -31,6 +31,9 @@
pdev = kzalloc(sizeof(struct platform_device), GFP_KERNEL);
+ if (!pdev)
+ return -ENOMEM;
+ pdev->name = loongson_sysconf.sensors[i].name;
pdev->id = loongson_sysconf.sensors[i].id;
pdev->dev.platform_data = &loongson_sysconf.sensors[i];
--- linux-4.15.0.orig/arch/mips/math-emu/dsemul.c
+++ linux-4.15.0/arch/mips/math-emu/dsemul.c
@@ -214,8 +214,9 @@
{
int isa16 = get_isa16_mode(regs->cp0_epc);
mips_instruction break_math;
-struct emuframe __user *fr;
- int err, fr_idx;
+ unsigned long fr_uaddr;
 + struct emuframe fr;
 + int fr_idx, ret;

 /* NOP is easy */
 if (ir == 0)
@@ -250,27 +251,31 @@
 fr_idx = alloc_emuframe();
 if (fr_idx == BD_EMUFRAME_NONE)
 return SIGBUS;
-fr = &dsemul_page()[fr_idx];

 /* Retrieve the appropriately encoded break instruction */
break_math = BREAK_MATH(isa16);

 /* Write the instructions to the frame */
 if (isa16) {
- err = __put_user(ir >> 16,
- (u16 __user *)&fr->emul));
- err |= __put_user(ir & 0xffff,
- (u16 __user*)((long)&fr->emul) + 2));
- err |= __put_user(break_math >> 16,
- (u16 __user *)&fr->badinst));
- err |= __put_user(break_math & 0xffff,
- (u16 __user*)((long)&fr->badinst) + 2));
+ union mips_instruction_emul = {
+ .halfword = { ir >> 16, ir }
+ +};
+ union mips_instruction_badinst = {
+ .halfword = { break_math >> 16, break_math }
+ +};
+fr.emul = _emul.word;
+fr.badinst = _badinst.word;
} else {
-err = __put_user(ir, &fr->emul);
-err |= __put_user(break_math, &fr->badinst);
+fr.emul = ir;
+fr.badinst = break_math;
}

-if (unlikely(err)) {
  /* Write the frame to user memory */
+fr_uaddr = (unsigned long)&dsemul_page()[fr_idx];
+ret = access_process_vm(current, fr_uaddr, &fr, sizeof(fr),
+FOLL_FORCE | FOLL_WRITE);
+if (unlikely(ret != sizeof(fr))) {
  MIPS_FPU_EMU_INC_STATS(errors);
  free_emuframe(fr_idx, current->mm);
  return SIGBUS;
  @ @ -282,10 +287,7 @@
  atomic_set(&(current->thread.bd_emu_frame, fr_idx);

  /* Change user register context to execute the frame */
-regs->cp0_epc = (unsigned long)&fr->emul | isa16;
-  
-/* Ensure the icache observes our newly written frame */
-flush_cache_sigtramp((unsigned long)&fr->emul);
+-regs->cp0_epc = fr_uaddr | isa16;

  return 0;
  }
}
--- linux-4.15.0.orig/arch/mips/mm/c-r3k.c
+++ linux-4.15.0/arch/mips/mm/c-r3k.c
@@ -245,7 +245,7 @@
pmd_t *pmdp;
 pte_t *ptep;

-pr_debug("cpage[%08lx,%08lx]n",
+pr_debug("cpage[%08llx,%08lx]n",
   cpu_context(smp_processor_id(), mm), addr);

/* No ASID => no such page in the cache. */
--- linux-4.15.0.orig/arch/mips/mm/c-r4k.c
+++ linux-4.15.0/arch/mips/mm/c-r4k.c
@@ -459,11 +459,28 @@
r4k_blast_scache = blast_scache128;
}

-
+static void (*r4k_blast_scache_node)(long node);
+
+static void r4k_blast_scache_node_setup(void)
+{
+  unsigned long sc_lsize = cpu_scache_line_size();
+
+  if (current_cpu_type() != CPU_LOONGSON3)
+    r4k_blast_scache_node = (void *)cache_noop;
+  else if (sc_lsize == 16)
+    r4k_blast_scache_node = blast_scache16_node;
+  else if (sc_lsize == 32)
+    r4k_blast_scache_node = blast_scache32_node;
+  else if (sc_lsize == 64)
+    r4k_blast_scache_node = blast_scache64_node;
+  else if (sc_lsize == 128)
+    r4k_blast_scache_node = blast_scache128_node;
+}
+
+static inline void local_r4k___flush_cache_all(void * args)
+
{ switch (current_cpu_type()) {
  case CPU_LOONGSON2:
  case CPU_LOONGSON3:
  case CPU_R4000SC:
  case CPU_R4000MC:
  case CPU_R4400SC:
@@ -480,6 +497,11 @@
    break;
+
  case CPU_LOONGSON3:  /* Use get_ebase_cpunum() for both NUMA=y/n */
    r4k_blast_scache_node(get_ebase_cpunum() >> 2);
    break;
+
  case CPU_BMIIPS5000:
    r4k_blast_scache();
    __sync__();
@@ -835,14 +857,19 @@ static void r4k_dma_cache_wback_inv(unsigned long addr, unsigned long size)

    /* Catch bad driver code */
    -BUG_ON(size == 0);
    +if (WARN_ON(size == 0))
    +return;

    preempt_disable();
    if (cpu_has_inclusive_pcaches) {


if (size >= scache_size)
  r4k_blast_scache();
else
  if (size >= scache_size) {
    if (current_cpu_type() != CPU_LOONGSON3)
      r4k_blast_scache();
    else
      r4k_blast_scache_node(pa_to_nid(addr));
  } else {
    blast_scache_range(addr, addr + size);
  }
preempt_enable();
__sync();
return;

if (size >= dcache_size) {
  if (!r4k_op_needs_ipi(R4K_INDEX) && size >= dcache_size) {
    r4k_blast_dcache();
  } else {
    R4600_HIT_CACHEOP_WAR_IMPL;
  }
}
static void r4k_dma_cache_inv(unsigned long addr, unsigned long size)
{
  /* Catch bad driver code */
  -BUG_ON(size == 0);
  if (WARN_ON(size == 0))
    return;

  preempt_disable();
  if (cpu_has_inclusive_pcache) {
    if (size >= scache_size)
      r4k_blast_scache();
    else {
      if (size >= scache_size) {
        if (current_cpu_type() != CPU_LOONGSON3)
          r4k_blast_scache();
        else
          r4k_blast_scache_node(pa_to_nid(addr));
      } else {
        /* Either no secondary cache or the available caches don't have the
         * subset property so we have to flush the primary caches
         * explicitly
         * If we would need IPI to perform an INDEX-type operation, then
         * we have to use the HIT-type alternative as IPI cannot be used
         * here due to interrupts possibly being disabled.
         */
      }
      R4600_HIT_CACHEOP_WAR_IMPL;
    }
  }
  @ @ -851,9 +878,12 @ @
  /*
   * Either no secondary cache or the available caches don't have the
   * subset property so we have to flush the primary caches
   * explicitly.
   * If we would need IPI to perform an INDEX-type operation, then
   * we have to use the HIT-type alternative as IPI cannot be used
   * here due to interrupts possibly being disabled.
   */
  -if (size >= dcache_size) {
  +if (!r4k_op_needs_ipi(R4K_INDEX) && size >= dcache_size) {
    r4k_blast_dcache();
  } else {
    R4600_HIT_CACHEOP_WAR_IMPL;
  }
  @ @ -868,13 +898,17 @ @
  static void r4k_dma_cache_inv(unsigned long addr, unsigned long size)
  {
    /* Catch bad driver code */
    -BUG_ON(size == 0);
    +if (WARN_ON(size == 0))
    +return;

    preempt_disable();
    if (cpu_has_inclusive_pcache) {
      if (size >= scache_size)
        r4k_blast_scache();
      else {
        if (size >= scache_size) {
          if (current_cpu_type() != CPU_LOONGSON3)
            r4k_blast_scache();
          else
            r4k_blast_scache_node(pa_to_nid(addr));
        } else {
          /* Either no secondary cache or the available caches don't have the
           * subset property so we have to flush the primary caches
           * explicitly.
           * If we would need IPI to perform an INDEX-type operation, then
           * we have to use the HIT-type alternative as IPI cannot be used
           * here due to interrupts possibly being disabled.
           */
        }
        R4600_HIT_CACHEOP_WAR_IMPL;
      }
    }
    @ @ -851,9 +878,12 @ @
    /*
     * Either no secondary cache or the available caches don't have the
     * subset property so we have to flush the primary caches
     * explicitly.
     * If we would need IPI to perform an INDEX-type operation, then
     * we have to use the HIT-type alternative as IPI cannot be used
     * here due to interrupts possibly being disabled.
     */
    -if (size >= dcache_size) {
    +if (!r4k_op_needs_ipi(R4K_INDEX) && size >= dcache_size) {
      r4k_blast_dcache();
    } else {
      R4600_HIT_CACHEOP_WAR_IMPL;
    }
    @ @ -868,13 +898,17 @ @
    static void r4k_dma_cache_inv(unsigned long addr, unsigned long size)
    {
      /* Catch bad driver code */
      -BUG_ON(size == 0);
      +if (WARN_ON(size == 0))
      +return;

      preempt_disable();
      if (cpu_has_inclusive_pcache) {
        if (size >= scache_size)
          r4k_blast_scache();
        else {
          if (size >= scache_size) {
            if (current_cpu_type() != CPU_LOONGSON3)
              r4k_blast_scache();
            else
              r4k_blast_scache_node(pa_to_nid(addr));
          } else {
            /* Either no secondary cache or the available caches don't have the
             * subset property so we have to flush the primary caches
             * explicitly.
             * If we would need IPI to perform an INDEX-type operation, then
             * we have to use the HIT-type alternative as IPI cannot be used
             * here due to interrupts possibly being disabled.
             */
          }
          R4600_HIT_CACHEOP_WAR_IMPL;
        }
      }
    } /* End of r4k_dma_cache_inv() */
/*
 * There is no clearly documented alignment requirement
 * for the cache instruction on MIPS processors and
 * return;
 */

- if (size >= dcache_size) {
+ if (!r4k_op_needs_ipi(R4K_INDEX) && size >= dcache_size) {
  r4k_blast_dcache();
  } else {
R4600_HIT_CACHEOP_WAR_IMPL;
  return 1;
}

- static void __init loongson2_sc_init(void)
+ static void loongson2_sc_init(void)
{
  struct cpuinfo_mips *c = &current_cpu_data;

  printk("MIPS secondary cache %ldkB, %s, linesize %d bytes.\n",
    scache_size >> 10,
    way_string[c->scache.ways], c->scache.linesz);
+
+ if (current_cpu_type() == CPU_BMIPS5000)
+ c->options |= MIPS_CPU_INCLUSIVE_CACHES;
} +

#else
 if (!(c->scache.flags & MIPS_CACHE_NOT_PRESENT))
  panic("Dunno how to handle MIPS32 / MIPS64 second level cache");
#endif

 /**
  *<Entry>
  *<Exit>
  */

--- linux-4.15.0.orig/arch/mips/mm/ioremap.c
+++ linux-4.15.0/arch/mips/mm/ioremap.c
@@ -9,6 +9,7 @@
#include <linux/export.h>
#include <asm/addrspace.h>
#include <asm/byteorder.h>
+ #include <linux/ioport.h>
 #ifdef CONFIG_EVA
 r4k_blast_dcache_user_page_setup();
 r4k_blast_icache_user_page_setup();
--- linux-4.15.0.orig/arch/mips/mm/ioremap.c
+++ linux-4.15.0/arch/mips/mm/ioremap.c
@@ @ -9,6 +9,7 @@
 #include <linux/export.h>
 #include <asm/addrspace.h>
 #include <asm/byteorder.h>
+ #include <linux/ioport.h>
```c
#include <linux/sched.h>
#include <linux/slab.h>
#include <linux/vmalloc.h>

@@ -98,6 +99,20 @@
 return error;
 }

+static int __ioremap_check_ram(unsigned long start_pfn, unsigned long nr_pages,
+    void *arg)
+{
+unsigned long i;
+
+for (i = 0; i < nr_pages; i++) {
+if (pfn_valid(start_pfn + i) &&
+    !PageReserved(pfn_to_page(start_pfn + i)))
+    return 1;
+}
+
+return 0;
+
/*
 * Generic mapping function (not visible outside):
 */
@@ -116,8 +131,8 @@
 void __iomem *__ioremap(phys_addr_t phys_addr, phys_addr_t size, unsigned long flags)
 {
+unsigned long offset, pfn, last_pfn;
 struct vm_struct * area;
-unsigned long offset;
 phys_addr_t last_addr;
 void * addr;

 @@ -137,18 +152,16 @@
 return (void __iomem *) CKSEG1ADDR(phys_addr);

/*
- * Don't allow anybody to remap normal RAM that we're using.
+ * Don't allow anybody to remap RAM that may be allocated by the page
+ * allocator, since that could lead to races & data clobbering.
 */
-if (phys_addr < virt_to_phys(high_memory)) {
-char *t_addr, *t_end;
-struct page *page;
-
-    t_addr = __va(phys_addr);
-    t_end = t_addr + (size - 1);
```
for(page = virt_to_page(t_addr); page <= virt_to_page(t_end); page++)
    if(!PageReserved(page))
        return NULL;

    pfnt PFN_DOWN(phys_addr);
    last_pfn = PFN_DOWN(last_addr);
    if (walk_system_ram_range(pfn, last_pfn - pfn + 1, NULL,
                               __ioremap_check_ram) == 1)
        WARN_ONCE(1, "ioremap on RAM at %pa - %pa
                                      ++%pa
",
                   &phys_addr, &last_addr);
    return NULL;

/*
--- linux-4.15.0.orig/arch/mips/mm/mmap.c
+++ linux-4.15.0/arch/mips/mm/mmap.c
@@ -21,8 +21,9 @@
EXfPORT_SYMBOL(shm_align_mask);

/* gap between mmap and stack */
#define MIN_GAP (128*1024*1024UL)
#define MAX_GAP ((TASK_SIZE)/6*5)
#define STACK_RND_MASK (0x7ff >> (PAGE_SHIFT - 12))

static int mmap_is_legacy(void)
{
    unsigned long gap = rlimit(RLIMIT_STACK);
    unsigned long pad = stack_guard_gap;
    +/
    /* Account for stack randomization if necessary */
    +if (current->flags & PF_RANDOMIZE)
    +pad += (STACK_RND_MASK << PAGE_SHIFT);
    +
    /* Values close to RLIM_INFINITY can overflow. */
    +if (gap + pad > gap)
    +gap += pad;

    if (gap < MIN_GAP)
        gap = MIN_GAP;
    @@ -203,6 +213,11 @@

    int __virt_addr_valid(const volatile void *kaddr)
    

unsigned long vaddr = (unsigned long)kaddr;
+
+if ((vaddr < PAGE_OFFSET) || (vaddr >= MAP_BASE))
+return 0;
+
return pfn_valid(PFN_DOWN(virt_to_phys(kaddr)));
}
EXPORT_SYMBOL_GPL(__virt_addr_valid);
--- linux-4.15.0.orig/arch/mips/mm/tlb-r4k.c
+++ linux-4.15.0/arch/mips/mm/tlb-r4k.c
@@ -424,6 +424,7 @@
}}
return mask == PM_HUGE_MASK;
}
+EXPORT_SYMBOL(has_transparent_hugepage);

#endif /* CONFIG_TRANSPARENT_HUGEPAGE */
--- linux-4.15.0.orig/arch/mips/mm/tlbex.c
+++ linux-4.15.0/arch/mips/mm/tlbex.c
@@ -388,6 +388,7 @@
static void build_restore_work_registers(u32 **p)
 {
     if (scratch_reg >= 0) {
         uasm_i_ehb(p);
-    UASM_i_MFC0(p, 1, c0_kscratch(), scratch_reg);
     return;
  }
@@ -633,7 +634,7 @@
return;
}
- if (cpu_has_rixi && _PAGE_NO_EXEC) {
+ if (cpu_has_rixi && !!_PAGE_NO_EXEC) {
     if (fill_includes_sw_bits) {
         UASM_i_ROTR(p, reg, reg, ilog2(_PAGE_GLOBAL));
     } else {
@@ -657,6 +658,13 @@
     int restore_scratch)
 {
     if (restore_scratch) {
+      /*
+      * Ensure the MFC0 below observes the value written to the
+      * KScratch register by the prior MTC0.
+      */
+     if (scratch_reg >= 0)
+        uasm_i_ehb(p);
+     

/* Reset default page size */
if (PM_DEFAULT_MASK >> 16) {
    uasm_i_lui(p, tmp, PM_DEFAULT_MASK >> 16);
    @@ -923,6 +931,10 @@
} 
if (mode != not_refill && check_for_high_segbits) {
    uasm_i_large_segbits_fault(l, *p);
+    +if (mode == refill Scratch && scratch_reg >= 0)
+    +uasm_i_ehb(p);
+    +
*/
* We get here if we are an xsseg address, or if we are
* an xuseg address above (PGDIR_SHIFT+PGDIR_BITS) boundary.
@ @ -1259,6 +1271,7 @@
UASM_i_MTC0(p, odd, C0_ENTRYLO1); /* load it */

if (c0_scratch_reg >= 0) {
    +uasm_i_ehb(p);
    UASM_i_MFC0(p, scratch, c0_kscratch(), c0_scratch_reg);
    build_tlb_write_entry(p, l, r, tlb_random);
    uasm_i_leave(l, *p);
    @@ -1471,6 +1484,7 @@

static void setup_pw(void)
{
    +unsigned int pwctl;
    unsigned long pgd_i, pgd_w;
    #ifndef __PAGETABLE_PMD_FOLDED
    unsigned long pmd_i, pmd_w;
    @ @ -1497,6 +1511,7 @@

    pte_i = ilog2(_PAGE_GLOBAL);
    pte_w = 0;
    +pwctl = 1 << 30; /* Set PWDirExt */

    #ifndef __PAGETABLE_PMD_FOLDED
    write_c0_pwfield(pgd_i << 24 | pmd_i << 12 | pt_i << 6 | pte_i);
    @ @ -1507,8 +1522,9 @@
    #endif

    #ifndef CONFIG_MIPS_HUGE_TLB_SUPPORT
    -write_c0_pwctl(1 << 6 | psn);
    +pwctl |= (1 << 6 | psn);
    #endif
    +write_c0_pwctl(pwctl);
    write_c0_kpgd(swapper_pg_dir);
    kscratch_used_mask |= (1 << 7); /* KScratch6 is used for KPGD */

uasm_i_dinsm(&p, a0, 0, 29, 64 - 29);
uasm_i_tlbl_goaround1(&l, p);
UASM_i_SLL(&p, a0, a0, 11);
} else {
    /* PGD in c0_KScratch */
    uasm_i_jr(&p, 31);
    if (cpu_has_ldpte)
UASM_i_MTC0(&p, a0, C0_CONTEXT);
    else
UASM_i_MTC0(&p, a0, C0_PWBASE);
}
#endif
#if defined CONFIG_SMP

UASM_i_LA_mostly(&p, a2, pgdc);
UASM_i_SW(&p, a0, uasm_rel_lo(pgdc), a2);
#endif /* SMP */

/* if pgd_reg is allocated, save PGD also to scratch register */
-if (pgd_reg != -1)
+if (pgd_reg != -1) {
        UASM_i_MTC0(&p, a0, c0_kscratch(), pgd_reg);
    else
+        uasm_i_jr(&p, 31);
+        uasm_i_ehb(&p);
+    } else {
+        uasm_i_jr(&p, 31);
+    }
#ifend

if (p >= tlbmiss_handler_setup_pgd_end)
    panic("tlbmiss_handler_setup_pgd space exceeded");
--- linux-4.15.0.orig/arch/mips/mti-malta/malta-dtshim.c
+++ linux-4.15.0/arch/mips/mti-malta/malta-dtshim.c
@@ -26,7 +26,7 @@
#define ROCIT_CONFIG_GEN1_MEMMAP_SHIFT 8
#define ROCIT_CONFIG_GEN1_MEMMAP_MASK (0xf << 8)

-static unsigned char fdt_buf[16 << 10] __initdata;


+static unsigned char fdt_buf[16 << 10] __initdata __aligned(8);

/* determined physical memory size, not overridden by command line args */
extern unsigned long physical_memsize;
--- linux-4.15.0.orig/arch/mips/mti-malta/malta-platform.c
+++ linux-4.15.0/arch/mips/mti-malta/malta-platform.c
@@ -47,7 +47,8 @@ .mapbase= 0x1f000900,/*/ The CBUS UART */
 .irq= MIPS_CPU_IRQ_BASE + MIPSCPU_INT_MB2,
 .uartclk= 3686400,/*/ Twice the usual clk! */
- .iotype= UPIO_MEM32,
+ .iotype= IS_ENABLED(CONFIG_CPU_BIG_ENDIAN) ?
+ UPIO_MEM32BE : UPIO_MEM32,
 .flags= CBUS_UART_FLAGS,
 .regshift= 3,
 },
--- linux-4.15.0.orig/arch/mips/net/bpf_jit.c
+++ linux-4.15.0/arch/mips/net/bpf_jit.c
@@ -662,6 +662,11 @@
 ((int)K < 0 ? ((int)K >= SKF_LL_OFF ? func##_negative : func) : \
 func##_positive)
+
+static bool is_bad_offset(int b_off)
+{
+ +return b_off > 0x1ffff || b_off < -0x20000;
+ +
+ static int build_body(struct jit_ctx *ctx)
+ {
+ const struct bpf_prog *prog = ctx->skf;
+ @ @ -728,7 +733,10 @@
 /* Load return register on DS for failures */
 emit_reg_move(r_ret, r_zero, ctx);
 /* Return with error */
-emit_b(b_imm(prog->len, ctx), ctx);
+if (is_bad_offset(b_off))
 +return -E2BIG;
 +emit_b(b_off, ctx);
 emit_nop(ctx);
 break;
 case BPF_LD | BPF_W | BPF_IND:
 @@ -775,8 +783,10 @@
 emit_jalr(MIPS_R_RA, r_s0, ctx);
 emit_reg_move(MIPS_R_A0, r_skb, ctx); /* delay slot */
 /* Check the error value */
-emit_bcond(MIPS_COND_NE, r_ret, 0,
- b_imm(prog->len, ctx), ctx);
+emit_bcond(MIPS_COND_NE, r_ret, 0,
+ b_imm(prog->len, ctx), ctx);
+b_off = b_imm(prog->len, ctx);
+if (is_bad_offset(b_off))
+return -E2BIG;
+emit_bcond(MIPS_COND_NE, r_ret, 0, b_off, ctx);
emit_reg_move(r_ret, r_zero, ctx);
/* We are good */
/* X < P[1:K] & 0xf */
@@ -855,8 +865,10 @@
/* A /= X */
ctx->flags |= SEEN_X | SEEN_A;
/* Check if r_X is zero */
-emit_bcond(MIPS_COND_EQ, r_X, r_zero,
- b_imm(prog->len, ctx), ctx);
+emit_bcond(MIPS_COND_EQ, r_X, r_zero, b_off, ctx);
emit_load_imm(r_ret, 0, ctx); /* delay slot */
emit_div(r_A, r_X, ctx);
break;
@@ -864,8 +876,10 @@
/* A %= X */
ctx->flags |= SEEN_X | SEEN_A;
/* Check if r_X is zero */
-emit_bcond(MIPS_COND_EQ, r_X, r_zero,
- b_imm(prog->len, ctx), ctx);
+emit_bcond(MIPS_COND_EQ, r_X, r_zero, b_off, ctx);
emit_load_imm(r_ret, 0, ctx); /* delay slot */
emit_mod(r_A, r_X, ctx);
break;
@@ -926,7 +940,10 @@
break;
case BPF_JMP | BPF_JA:
/* pc += K */
-emit_b(b_imm(i + k + 1, ctx), ctx);
+emit_b(b_imm(i + k + 1, ctx), ctx);
+if (is_bad_offset(b_off))
+return -E2BIG;
+emit_bcond(MIPS_COND_EQ, r_X, r_zero, b_off, ctx);
emit_load_imm(r_ret, 0, ctx); /* delay slot */
emit_mod(r_A, r_X, ctx);
break;
@@ -1056,12 +1073,16 @@
break;
case BPF_RET | BPF_A:
/* pc += K */
-emit_b(b_imm(i + k + 1, ctx), ctx);
+emit_b(b_imm(i + k + 1, ctx), ctx);
+if (is_bad_offset(b_off))
+return -E2BIG;
+emit_bcond(MIPS_COND_EQ, r_X, r_zero, b_off, ctx);
emit_load_imm(r_ret, 0, ctx); /* delay slot */
emit_nop(ctx);
break;
case BPF_JMP | BPF_JEQ | BPF_K:
@@ -1056,12 +1073,16 @@
break;
case BPF_RET | BPF_A:
ctx->flags |= SEEN_A;
-if (i != prog->len - 1)
+if (i != prog->len - 1) {
  /*
   * If this is not the last instruction
   * then jump to the epilogue
   */
  -emit_b(b_imm(prog->len, ctx), ctx);
  +b_off = b_imm(prog->len, ctx);
  +if (is_bad_offset(b_off))
    +return -E2BIG;
  +emit_b(b_off, ctx);
  +}
emit_reg_move(r_ret, r_A, ctx); /* delay slot */
break;
case BPF_RET | BPF_K:
  @ @ -1075,7 +1096,10 @@
  * If this is not the last instruction
  * then jump to the epilogue
  */
  -emit_b(b_imm(prog->len, ctx), ctx);
  +b_off = b_imm(prog->len, ctx);
  +if (is_bad_offset(b_off))
    +return -E2BIG;
  +emit_b(b_off, ctx);
emit_nop(ctx);
} break;
@@ -1133,8 +1157,10 @@
/* Load *dev pointer */
emit_load_ptr(r_s0, r_skb, off, ctx);
/* error (0) in the delay slot */
-emit_bcond(MIPS_COND_EQ, r_s0, r_zero, b_imm(prog->len, ctx), ctx);
- b_imm(prog->len, ctx), ctx);
+if (is_bad_offset(b_off))
  +return -E2BIG;
+emit_bcond(MIPS_COND_EQ, r_s0, r_zero, b_off, ctx);
emit_reg_move(r_ret, r_zero, ctx);
if (code == (BPF_ANC | SKF_AD_IFINDEX)) {
  BUILD_BUG_ON(FIELD_SIZEOF(struct net_device, ifindex) != 4);
  @ @ -1207,8 +1233,6 @@
  return 0;
}

-int bpf_jit_enable __read_mostly;
-
-void bpf_jit_compile(struct bpf_prog *fp)
{  
struct jit_ctx ctx;  
@@ -1246,7 +1270,10 @@  
/* Generate the actual JIT code */  
build_prologue(&ctx);  
-build_body(&ctx);  
+if (build_body(&ctx)) {  
+module_memfree(ctx.target);  
+goto out;  
+}  
build_epilogue(&ctx);  

/* Update the icache */  
--- linux-4.15.0.orig/arch/mips/net/ebpf_jit.c  
+++ linux-4.15.0/arch/mips/net/ebpf_jit.c  
@@ -177,8 +177,6 @@  
(ctx->idx * 4) - 4;  
}  
-int bpf_jit_enable __read_mostly;  
-  
enum which_ebpf_reg {  
  src_reg,  
  src_reg_no_fp,  
@@ -348,12 +346,15 @@  
    Emit push pop instruction to push R0 to stack. */  
    emit_pop(ctx, R0);  
+enum reg_val_type td;  
    if (dest_reg == MIPS_R_RA) {  
+td = get_reg_val_type(ctx, prog->len, BPF_REG_0);  
+if (td == REG_64BIT || td == REG_32BIT_ZERO_EX)  
+emit_instr(ctx, sll, r0, r0, 0);  
+}  
 if (ctx->flags & EBPF_SAVE_RA) {  
.emit instr(ctx, ld, MIPS_R_RA, store_offset, MIPS_R_SP);  
@@ -611,6 +612,7 @@  
static int emit_bpf_tail_call(struct jit_ctx *ctx, int this_idx)  
{  
  int off, b_off;  
}
+int tcc_reg;

cxt->flags |= EBPF_SEEN_TC;
/*
@@ -623,14 +625,14 @@
b_off = b_imm(this_idx + 1, ctx);
emit_instr(ctx, bne, MIPS_R_AT, MIPS_R_ZERO, b_off);
/*
- * if (--TCC < 0)
+ * if (TCC-- < 0)
 *     goto out;
 */
/* Delay slot */
-emit_instr(ctx, daddiu, MIPS_R_T5,
- (ctx->flags & EBPF_TCC_IN_V1) ? MIPS_R_V1 : MIPS_R_S4, -1);
+emit_instr(ctx, daddiu, MIPS_R_T5, tcc_reg, -1);
 b_off = b_imm(this_idx + 1, ctx);
-emit_instr(ctx, bltz, MIPS_R_T5, b_off);
+emit_instr(ctx, bltz, tcc_reg, b_off);
/*
 * prog = array->ptrs[index];
 * if (prog == NULL)
 @@ -1968,7 +1970,7 @@
/* Update the icache */
flush_icache_range((unsigned long)ctx.target,
- (unsigned long)(ctx.target + ctx.idx * sizeof(u32)));
+ (unsigned long)&ctx.target[ctx.idx]);

if (bpf_jit_enable > 1)
/* Dump JIT code */
--- linux-4.15.0.orig/arch/mips/pci/msi-octeon.c
+++ linux-4.15.0/arch/mips/pci/msi-octeon.c
@@ -369,7 +369,9 @@
int irq;
struct irq_chip *msi;

-if (octeon_dma_bar_type == OCTEON_DMA_BAR_TYPE_PCIE) {
+if (octeon_dma_bar_type == OCTEON_DMA_BAR_TYPE_INVALID) {
+return 0;
+} else if (octeon_dma_bar_type == OCTEON_DMA_BAR_TYPE_PCIE) {
msi_rcv_reg[0] = CVMX_PEXP_NPEI_MSI_RCV0;
msi_rcv_reg[1] = CVMX_PEXP_NPEI_MSI_RCV1;
msi_rcv_reg[2] = CVMX_PEXP_NPEI_MSI_RCV2;
--- linux-4.15.0.orig/arch/mips/pci/pci-legacy.c
+++ linux-4.15.0/arch/mips/pci/pci-legacy.c
@@ -127,8 +127,12 @@
if (pci_has_flag(PCI_PROBE_ONLY)) {
    pci_bus_claim_resources(bus);
} else {
    struct pci_bus *child;
    pci_bus_size_bridges(bus);
    pci_bus_assign_resources(bus);
    list_for_each_entry(child, &bus->children, node)
        pcie_bus_configure_settings(child);
    pci_bus_add_devices(bus);
}

@@ -165,8 +169,13 @@
    res = hose->mem_resource;
    break;
}
-if (res != NULL)
    of_pci_range_to_resource(&range, node, res);
+if (res != NULL) {
    res->name = node->full_name;
    res->flags = range.flags;
    res->start = range.cpu_addr;
+    res->end = range.cpu_addr + range.size - 1;
    res->parent = res->child = res->sibling = NULL;
    
    -- linux-4.15.0.orig/arch/mips/pci/pci-mt7620.c
+++ linux-4.15.0/arch/mips/pci/pci-mt7620.c
@@ -33,6 +33,7 @@
#define RALINK_GPIOMODE		0x60
#define PPLL_CFG1		0x9c
+#define PPLL_LD		BIT(23)
#define PPLL_DRV		0xa0
#define PDRV_SW_SET		BIT(31)
@@ -242,8 +243,8 @@
    rt_sysc_m32(0, RALINK_PCIE0_CLK_EN, RALINK_CLKCFG1);
    mdelay(100);

-if(!(rt_sysc_r32(PPLL_CFG1) & PDRV_SW_SET)) {
    dev_err(&pdev->dev, "MT7620 PPLL unlock\n");
+if(!(rt_sysc_r32(PPLL_CFG1) & PPLL_LD)) {
    dev_err(&pdev->dev, "pcie PLL not locked, aborting init\n");
    reset_control_assert(rstpcie0);
    rt_sysc_m32(RALINK_PCIE0_CLK_EN, 0, RALINK_CLKCFG1);
return -1;
--- linux-4.15.0.orig/arch/mips/pci/pci-octeon.c
+++ linux-4.15.0/arch/mips/pci/pci-octeon.c
@@ -572,6 +572,11 @@
 if (octeon_has_feature(OCTEON_FEATURE_PCIE))
 return 0;

 +if (!octeon_is_pci_host()) {
 +pr_notice("Not in host mode, PCI Controller not initialized\n");
 +return 0;
 +}
 +/* Point pcibios_map_irq() to the PCI version of it */
 octeon_pcibios_map_irq = octeon_pci_pcibios_map_irq;
@@ -583,11 +588,6 @@
 else
 octeon_dma_bar_type = OCTEON_DMA_BAR_TYPE_BIG;

 -if (!octeon_is_pci_host()) {
 -pr_notice("Not in host mode, PCI Controller not initialized\n");
 -return 0;
 -}
 -/* PCI I/O and PCI MEM values */
 set_io_port_base(OCTEON_PCI_IOSPACE_BASE);
 ioport_resource.start = 0;
--- linux-4.15.0.orig/arch/mips/pci/pci-rt2880.c
+++ linux-4.15.0/arch/mips/pci/pci-rt2880.c
@@ -183,7 +183,6 @@
 int pcibios_map_irq(const struct pci_dev *dev, u8 slot, u8 pin)
 {
 -u16 cmd;
 int irq = -1;

 if (dev->bus->number != 0)
 @@ -191,8 +190,6 @@
 switch (PCI_SLOT(dev->devfn)) {
 case 0x00:
 -rt2880_pci_write_u32(PCI_BASE_ADDRESS_0, 0x08000000);
 -(void) rt2880_pci_read_u32(PCI_BASE_ADDRESS_0);
 break;
 case 0x11:
 irq = RT288X_CPU_IRQ_PCI;
@@ -204,16 +201,6 @@
 break;
int pcibios_plat_dev_init(struct pci_dev *dev)
{
    static bool slot0_init;
    
    /*
     * Nobody seems to initialize slot 0, but this platform requires it, so
     * do it once when some other slot is being enabled. The PCI subsystem
     * should configure other slots properly, so no need to do anything
     * special for those.
     * */
    if (!slot0_init && dev->bus->number == 0) {
        u16 cmd;
        u32 bar0;
        +
        +slot0_init = true;
        +
        +pci_bus_write_config_dword(dev->bus, 0, PCI_BASE_ADDRESS_0,
            +0x08000000);
        +pci_bus_read_config_dword(dev->bus, 0, PCI_BASE_ADDRESS_0,
            +&bar0);
        +
        +pci_bus_read_config_word(dev->bus, 0, PCI_COMMAND, &cmd);
        +cmd |= PCI_COMMAND_MASTER | PCI_COMMAND_IO | PCI_COMMAND_MEMORY;
        +pci_bus_write_config_word(dev->bus, 0, PCI_COMMAND, cmd);
        +}
    +
    return 0;
}

--- linux-4.15.0.orig/arch/mips/pci/pci.c
+++ linux-4.15.0/arch/mips/pci/pci.c
phys_addr_t size = resource_size(rsrc);

*start = fixup_bigphys_addr(rsrc->start, size);
-*end = rsrc->start + size;
+*end = rsrc->start + size - 1;
}

--- linux-4.15.0.orig/arch/mips/pistachio/Platform
+++ linux-4.15.0/arch/mips/pistachio/Platform
@@ -6,3 +6,4 @@
-I$(srctree)/arch/mips/include/asm/mach-pistachio
load-S$(CONFIG_MACH_PISTACHIO)+= 0xffffffff80400000
zload-S$(CONFIG_MACH_PISTACHIO)+= 0xffffffff81000000
+all-S$(CONFIG_MACH_PISTACHIO):= ulimage.gz
--- linux-4.15.0.orig/arch/mips/ralink/Kconfig
+++ linux-4.15.0/arch/mips/ralink/Kconfig
@@ -38,6 +38,7 @@
config SOC_MT7620
bool "MT7620/8"
+select CPU_MIPSR2_IRQ_VI
select HW_HAS_PCI

config SOC_MT7621
--- linux-4.15.0.orig/arch/mips/ralink/mt7620.c
+++ linux-4.15.0/arch/mips/ralink/mt7620.c
@@ -84,7 +84,7 @@
};
static struct rt2880_pmx_func nd_sd_grp[] = {
  FUNC("nand", MT7620_GPIO_MODE_NAND, 45, 15),
-  FUNC("sd", MT7620_GPIO_MODE_SD, 45, 15)
+  FUNC("sd", MT7620_GPIO_MODE_SD, 47, 13)
};

static struct rt2880_pmx_group mt7620a_pinmux_data[] = {
--- linux-4.15.0.orig/arch/mips/ralink/mt7621.c
+++ linux-4.15.0/arch/mips/ralink/mt7621.c
@@ -170,6 +170,28 @@
u32 n1;
  u32 rev;

+/* Early detection of CMP support */
+  mips_cm_probe();
+  mips_cpc_probe();
+  +if (mips_cps_numiocu(0)) {
+  +/*
+  +  * mips_cm_probe() wipes out bootloader
+  */
+}
+ * config for CM regions and we have to configure them
+ * again. This SoC cannot talk to pamibus devices
+ * without proper iocu region set up.
+ *
+ * FIXME: it would be better to do this with values
+ * from DT, but we need this very early because
+ * without this we cannot talk to pretty much anything
+ * including serial.
+ */
+write_gcr_reg0_base(MT7621_PALMBUS_BASE);
+write_gcr_reg0_mask(~MT7621_PALMBUS_SIZE | CM_GCR_REGn_MASK_CMTGT_IOC0);
+__sync();
+
+n0 = __raw_readl(sysc + SYSC_REG_CHIP_NAME0);
n1 = __raw_readl(sysc + SYSC_REG_CHIP_NAME1);

@@ -194,26 +216,6 @@
rt2880_pinmux_data = mt7621_pinmux_data;

-/* Early detection of CMP support */
-mips_cm_probe();
-mips_cpc_probe();
-
-if (mips_cps_numiocu(0)) {
-/*
-* mips_cm_probe() wipes out bootloader
-* config for CM regions and we have to configure them
-* again. This SoC cannot talk to pamibus devices
-* without proper iocu region set up.
-*
-* FIXME: it would be better to do this with values
-* from DT, but we need this very early because
-* without this we cannot talk to pretty much anything
-* including serial.
-* */
-write_gcr_reg0_base(MT7621_PALMBUS_BASE);
-write_gcr_reg0_mask(~MT7621_PALMBUS_SIZE | CM_GCR_REGn_MASK_CMTGT_IOC0);
-}

if (!register_cps_smp_ops())
    return;
--- linux-4.15.0.orig/arch/mips/ralink/of.c
+++ linux-4.15.0/arch/mips/ralink/of.c
@@ -10,6 +10,7 @@
```
#include <linux/io.h>
#include <linux/clk.h>
+#include <linux/export.h>
#include <linux/init.h>
#include <linux/sizes.h>
#include <linux/of_fdt.h>
@@ -27,6 +28,7 @@
__iomem void *rt_sysc_membase;
__iomem void *rt_memc_membase;
+EXPORT_SYMBOL_GPL(rt_sysc_membase);

__iomem void *plat_of_remap_node(const char *node)
{
--- linux-4.15.0.orig/arch/mips/ralink/reset.c
+++ linux-4.15.0/arch/mips/ralink/reset.c
@@ -96,16 +96,9 @@
 unreachable();
 }   

-local_irq_disable();
-irr_disable();
-static void ralink_halt(void)  
-{
-    local_irq_disable();
-    unreachable();
-}
- 
-static int __init mips_reboot_setup(void)
{
    _machine_restart = ralink_restart;
    _machine_halt = ralink_halt;

    return 0;
}
--- linux-4.15.0.orig/arch/mips/sni/a20r.c
+++ linux-4.15.0/arch/mips/sni/a20r.c
@@ -143,7 +143,10 @@
 },
]
-
-static u32 a20r_ack_hwint(void)
+/*
+ * Trigger chipset to update CPU's CAUSE IP field
+ */
+static u32 a20r_update_cause_ip(void)
{
    u32 status = read_c0_status;
```

int irq;

clear_c0_status(IE_IRQ0);
-status = a20r_ack_hwint();
+status = a20r_update_cause_ip();
cause = read_c0_cause();

irq = ffs(((cause & status) >> 8) & 0xf8);
if (likely(irq > 0))
do_IRQ(SNI_A20R_IRQ_BASE + irq - 1);
+
+a20r_update_cause_ip();
set_c0_status(IE_IRQ0);
}

--- linux-4.15.0.orig/arch/mips/txx9/generic/setup.c
+++ linux-4.15.0/arch/mips/txx9/generic/setup.c
@@ -959,12 +959,11 @@
goto exit_put;
err = sysfs_create_bin_file(&dev->dev.kobj, &dev->bindata_attr);
if (err) {
-device_unregister(&dev->dev);
iounmap(dev->base);
-kfree(dev);
+device_unregister(&dev->dev);
} return;
exit_put:
+iounmap(dev->base);
put_device(&dev->dev);
-return;
}
--- linux-4.15.0.orig/arch/mips/txx9/rbtx4939/setup.c
+++ linux-4.15.0/arch/mips/txx9/rbtx4939/setup.c
@@ -186,7 +186,7 @@
#define RBTX4939_MAX_7SEGLED8

-#if IS_ENABLED(CONFIG_LEDS_CLASS)
+#if IS_BUILTIN(CONFIG_LEDS_CLASS)
static u8 led_val[RBTX4939_MAX_7SEGLED8];
struct rbtx4939_led_data {
struct led_classdev cdev;
@@ -261,7 +261,7 @@
static void __rbtx4939_7segled_putc(unsigned int pos, unsigned char val)
-#if IS_ENABLED(CONFIG_LEDS_CLASS)
+#if IS_BUILTIN(CONFIG_LEDS_CLASS)
unsigned long flags;
local_irq_save(flags);
/* bit7: reserved for LED class */
--- linux-4.15.0.orig/arch/mips/vdso/Makefile
+++ linux-4.15.0/arch/mips/vdso/Makefile
@@ -7,7 +7,10 @@
$(filter -I%.$(KBUILD_CFLAGS)) \ 
$(filter -E%.$(KBUILD_CFLAGS)) \ 
$(filter -mmicromips,.$(KBUILD_CFLAGS)) \ 
-$(filter -march=%,$(KBUILD_CFLAGS)) \ 
+$(filter -march=%,$(KBUILD_CFLAGS)) \ 
+$(filter -m%-float,$(KBUILD_CFLAGS)) \ 
+$(filter -mno-loongson-%,$(KBUILD_CFLAGS)) \ 
+D_VDSO_

cflags-vdso := $(ccflags-vdso) \ 
$(filter -W%,$(filter-out -Wa$(comma)%,$(KBUILD_CFLAGS))) \ 
-O2 -g -IPIC -no-strict-aliasing -no-common -no-builtin -G 0 \ 
@@ -121,7 +124,7 @@
$(call cmd,force_checksrc)
$(call if_changed_rule,cc_o_c)

-$(obj)/vdso-o32.lds: KBUILD_CPPFLAGS := -mabi=32
+$($(obj)/vdso-o32.lds: KBUILD_CPPFLAGS := $(ccflags-vdso) -mabi=32
$(obj)/vdso-o32.lds: $(src)/vdso.lds.S FORCE
$($(call if_changed_dep,cpp_lds_S)

@@ -161,7 +164,7 @@
$(call cmd,force_checksrc)
$(call if_changed_rule,cc_o_c)

-$(obj)/vdso-n32.lds: KBUILD_CPPFLAGS := -mabi=n32
+$($(obj)/vdso-n32.lds: KBUILD_CPPFLAGS := $(ccflags-vdso) -mabi=n32
$(obj)/vdso-n32.lds: $(src)/vdso.lds.S FORCE
$($(call if_changed_dep,cpp_lds_S)

--- linux-4.15.0.orig/arch/mips/vdso/genvdso.c
+++ linux-4.15.0/arch/mips/vdso/genvdso.c
@@ -126,6 +126,7 @@
if (fstat(fd, &stat) != 0) {
 fprintf(stderr, "%s: Failed to stat '%s': %s\n", program_name,
 path, strerror(errno));
+close(fd);
 return NULL;
 }

@@ -134,6 +135,7 @@
if (addr == MAP_FAILED) {
    fprintf(stderr, "%s: Failed to map '%s': %s\n", program_name, path, strerror(errno));
    close(fd);
    return NULL;
}

@@ -143,6 +145,7 @@
if (memcmp(ehdr->e_ident, ELFMAG, SELFMAG) != 0) {
    fprintf(stderr, "%s: '%s' is not an ELF file\n", program_name, path);
    close(fd);
    return NULL;
}

@@ -154,6 +157,7 @@
default:
    fprintf(stderr, "%s: '%s' has invalid ELF class\n", program_name, path);
    close(fd);
    return NULL;
}

@@ -165,6 +169,7 @@
default:
    fprintf(stderr, "%s: '%s' has invalid ELF data order\n", program_name, path);
    close(fd);
    return NULL;
}

@@ -172,15 +177,18 @@
fprintf(stderr, "%s: '%s' has invalid ELF machine (expected EM_MIPS)\n", program_name, path);
    close(fd);
    return NULL;
} else if (swap_uint16(ehdr->e_type) != ET_DYN) {
    fprintf(stderr, "%s: '%s' has invalid ELF type (expected ET_DYN)\n", program_name, path);
    close(fd);
    return NULL;
}

*_size = stat.st_size;
    close(fd);
    return addr;
/* Calculate and write symbol offsets to <output file> */
if (!get_symbols(dbg_vdso_path, dbg_vdso)) {
    unlink(out_path);
+    fclose(out_file);
    return EXIT_FAILURE;
}

fprintf(out_file, "};\n\n\nreturn EXIT_SUCCESS;
}
--- linux-4.15.0.orig/arch/mips/vdso/gettimeofday.c
+++ linux-4.15.0/arch/mips/vdso/gettimeofday.c
@@ -18,6 +18,12 @@
#include <asm/unistd.h>
#include <asm/vdso.h>
+#if MIPS_ISA_REV < 6
+#define VDSO_SYSCALL_CLOBBERS "hi", "lo",
+#else
+#define VDSO_SYSCALL_CLOBBERS
+#endif
+#ifdef CONFIG_MIPS_CLOCK_VSYSCALL
+
+static __always_inline long gettimeofday_fallback(struct timeval *_tv,
@@ -34,7 +40,9 @@
: "=r" (ret), "=r" (error)
 : "r" (tv), "r" (tz), "r" (nr)
 : "$1", "$3", "$8", "$9", "$10", "$11", "$12", "$13",
- "$14", "$15", "$24", "$25", "hi", "lo", "memory");
+ "$14", "$15", "$24", "$25",
+ VDSO_SYSCALL_CLOBBERS
+ "memory");

return error ? -ret : ret;
}
@@ -55,7 +63,9 @@
: "=r" (ret), "=r" (error)
 : "r" (clkid), "r" (ts), "r" (nr)
 : "$1", "$3", "$8", "$9", "$10", "$11", "$12", "$13",
- "$14", "$15", "$24", "$25", "hi", "lo", "memory");
+ "$14", "$15", "$24", "$25",
+ VDSO_SYSCALL_CLOBBERS
+ "memory");

return error ? -ret : ret;
}
static inline void __iomem *get_gic(const union mips_vdso_data *data)
{
    return (void __iomem *)data - PAGE_SIZE;
}

static inline unsigned long arch_local_save_flags(void)
{
    return RDCTL(CTL_FSTATUS);
}

info.si_signo = SIGSEGV;
info.si_errno = 0;
-info.si_code = 0;
+info.si_code = SEGV_MAPERR;
info.si_addr = (void *) regs->pc;
force_sig_info(SIGSEGV, &info, current);
return;
static inline void arch_local_irq_restore(unsigned long flags)  
{  
-WRCTL(CTL_STATUS, flags);  
+WRCTL(CTL_FSTATUS, flags);  
}  

static inline void arch_local_irq_disable(void)  
--- linux-4.15.0.orig/arch/nios2/include/asm/registers.h  
+++ linux-4.15.0/arch/nios2/include/asm/registers.h  
@@ -24,7 +24,7 @@  
#endif  
/* control register numbers */  
-#define CTL_STATUS 0  
+#define CTL_FSTATUS 0  
#define CTL_ESTATUS 1  
#define CTL_BSTATUS 2  
#define CTL_IENABLE 3  
--- linux-4.15.0.orig/arch/nios2/kernel/nios2_ksyms.c  
+++ linux-4.15.0/arch/nios2/kernel/nios2_ksyms.c  
@@ -9,12 +9,20 @@  
#include <linux/export.h>  
#include <linux/string.h>  
+  
#include <asm/cacheflush.h>  
+  
#include <asm/pgtable.h>  
+  
/*@ -31.7 +31.7 @*/  
* string functions */  

EXPORT_SYMBOL(memcpy);  
EXPORT_SYMBOL(memset);  
EXPORT_SYMBOL(memmove);  
+/* memory management */  
+  
+EXPORT_SYMBOL(empty_zero_page);  
+EXPORT_SYMBOL(flush_icache_range);  
+  
/*  
* libgcc functions - functions that are used internally by the  
* compiler... (prototypes are not correct though, but that  
* @@ -31.3 +39.7 @@  
DECLARE_EXPORT(__umoddi3);  
DECLARE_EXPORT(__umodsi3);  
DECLARE_EXPORT(__multid3);  
+DECLARE_EXPORT(__ucmpdi2);  
*/
+DECLARE_EXPORT(__lshrdi3);
+DECLARE_EXPORT(__ashldi3);
+DECLARE_EXPORT(__ashrdi3);

--- linux-4.15.0.orig/arch/openrisc/include/asm/barrier.h
+++ linux-4.15.0/arch/openrisc/include/asm/barrier.h
@@ -0,0 +1,9 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef __ASM_BARRIER_H
+#define __ASM_BARRIER_H
+
+#define mb() asm volatile ("l.msync" ::: "memory")
+
+#include <asm-generic/barrier.h>
+
+#endif /* __ASM_BARRIER_H */

--- linux-4.15.0.orig/arch/openrisc/include/asm/uaccess.h
+++ linux-4.15.0/arch/openrisc/include/asm/uaccess.h
@@ -58,8 +58,12 @@
/* Ensure that addr is below task's addr_limit */
#define access_ok(type, addr, size) \
	__range_ok((unsigned long)addr, (unsigned long)size)
+
#define access_ok(type, addr, size)  
({ 									\ 
+unsigned long __ao_addr = (unsigned long)(addr);\ 
+unsigned long __ao_size = (unsigned long)(size);\ 
+__range_ok(__ao_addr, __ao_size);\ 
+})

/*
 * These are the main single-value transfer routines. They automatically
- occured. in fact they never do. if you need them use
 * values saved on stack (for SPR_EPC, SPR_ESR) or content
 * of r4 (for SPR_EEAR). for details look at EXCEPTION_HANDLE()
- in 'arch/or32/kernel/head.S'
+ in 'arch/openrisc/kernel/head.S'
*/

/* ==============[ exceptions] ===== */

l.addi r3,r1,0  // pt_regs
/* r4 set be EXCEPTION_HANDLE */  // effective address of fault

/*
- * __PHX__: TODO
- *
- * all this can be written much simpler. look at
- * DTLB miss handler in the CONFIG_GUARD_PROTECTED_CORE part
- */

#ifndef CONFIG_OPENRISC_NO_SPR_SR_DSX
l.lwz  r6,PT_PC(r3)  // address of an offending insn
l.lwz  r6,0(r6)  // instruction that caused pf
@@ -314,7 +308,7 @@
#else
  
- l.lwz  r6,PT_SR(r3)  // SR
+  l.mfspr r6,r0,SPR_SR  // SR
     l.andi  r6,r6,SPR_SR_DSX  // check for delay slot exception
     l.sfne  r6,r0  // exception happened in delay slot
     l.bnf  7f
@@ -557,6 +551,7 @@
     l.bnf1f// ext irq enabled, all ok.
     l.nop
     +#ifdef CONFIG_PRINTK
+  l.addi  r1,r1,-0x8
+  l.movhi r3,hi(42f)
+  l.orir3,r3,lo(42f)
@@ -570,6 +565,7 @@
 .string "\n\rESR interrupt bug: in _external_irq_handler (ESR %x)\n\r"
 .align 4
 .previous
 +#endif
+#endif
  
  l.orir4,r4,SPR_SR_IEE// fix the bug
 //l.swPT_SR(r1),r4
@@ -1176,13 +1172,13 @@
  l.movhir29,hi(sys_clone)
  l.orir29,r29,lo(sys_clone)
  l.j_fork_save_extra_regs_and_call
  - l.addir7,r1,0
  + l.nop
ENTRY(__sys_fork)
  l.movhir29,hi(sys_fork)
  l.orir29,r29,lo(sys_fork)
  l.j_fork_save_extra_regs_and_call
  - l.addir3,r1,0
  + l.nop
ENTRY(sys_rt_sigreturn)
l.jal_sys_rt_sigreturn
--- linux-4.15.0.orig/arch/openrisc/kernel/head.S
+++ linux-4.15.0/arch/openrisc/kernel/head.S
@@ -210,8 +210,7 @@
 * r4 - EEAR exception EA
 * r10 - currentpointing to current_thread_info struct
 * r12 - syscall 0, since we didn't come from syscall
- * r13 - tempit actually contains new SR, not needed anymore
- * r31 - handleraddress of the handler we'll jump to
+ * r30 - handleraddress of the handler we'll jump to
 * handler has to save remaining registers to the exception
 * ksp frame *before* tainting them!
 @@ -244,6 +243,7 @@ /* r1 is KSP, r30 is __pa(KSP) */
tophys (r30,r1); l.sw PT_GPR12(r30),r12; /* r4 use for tmp before EA */
l.mfspr r12,r0,SPR_EPCR_BASE;
l.sw PT_PC(r30),r12;
l.mfspr r12,r0,SPR_ESR_BASE;
@@ -263,7 +263,10 @@ /* r12 == 1 if we come from syscall */
 CLEAR_GPR(r12);
 /* ----- turn on MMU ----- */
- l.ori r30,r0,(EXCEPTION_SR);
+ /* Carry DSX into exception SR */
+ l.mfspr r30,r0,SPR_SR;
+ l.andi r30,r30,SPR_SR_DSX;
+ l.ori r30,r30,(EXCEPTION_SR);
 l.mtspr r0,r30,SPR_ESR_BASE; /* r30:EA address of handler */
LOAD_SYMBOL_2_GPR(r30,handler);
@@ -1725,7 +1728,7 @@
 /* .data section should be page aligned
- *(look into arch/or32/kernel/vmlinux.lds)
+ *(look into arch/openrisc/kernel/vmlinux.lds.S)
 /*
 .section .data,"aw"
 .align8192
--- linux-4.15.0.orig/arch/openrisc/kernel/setup.c
+++ linux-4.15.0/arch/openrisc/kernel/setup.c
@@ -281,6 +281,8 @@ pr_cont("%lu.%02lu BogoMIPS (lpj=%lu)\n",
 loops_per_jiffy / (500000 / HZ),
 (loops_per_jiffy / (5000 / HZ)) % 100, loops_per_jiffy);
+ of_node_put(cpu);
}

void __init setup_arch(char **cmdline_p)
--- linux-4.15.0.orig/arch/openrisc/kernel/stacktrace.c
+++ linux-4.15.0/arch/openrisc/kernel/stacktrace.c
@@ -13,6 +13,7 @@
#include <linux/export.h>
#include <linux/sched.h>
#include <linux/sched/debug.h>
+#include <linux/sched/task_stack.h>
#include <linux/stacktrace.h>

#include <asm/processor.h>
@@ -68,12 +69,25 @@
{
unsigned long *sp = NULL;

+if (!try_get_task_stack(tsk))
+return;
+
if (tsk == current)
  sp = (unsigned long *)&sp;
-else
-  sp = (unsigned long *) KSTK_ESP(tsk);
+else {
+  unsigned long ksp;
+  /* Locate stack from kernel context */
+  ksp = task_thread_info(tsk)->ksp;
+  ksp += STACK_FRAME_OVERHEAD; /* redzone */
+  ksp += sizeof(struct pt_regs);
+  +sp = (unsigned long *) ksp;
+}
unwind_stack(trace, sp, save_stack_address_nosched);
+
+put_task_stack(tsk);
}
EXPORT_SYMBOL_GPL(save_stack_trace_tsk);

--- linux-4.15.0.orig/arch/openrisc/kernel/traps.c
+++ linux-4.15.0/arch/openrisc/kernel/traps.c
@@ -266,12 +266,12 @@
siginfo_t info;

unwind_stack(trace, sp, save_stack_address_nosched);
+
+put_task_stack(tsk);
}
EXPORT_SYMBOL_GPL(save_stack_trace_tsk);
if (user_mode(regs)) {
    /* Send a SIGSEGV */
    info.si_signo = SIGSEGV;
    /* Send a SIGBUS */
    +info.si_signo = SIGBUS;
    info.si_errno = 0;
    /* info.si_code has been set above */
    -info.si_addr = (void *)address;
    -force_sig_info(SIGSEGV, &info, current);
    +info.si_code = BUS_ADRALN;
    +info.si_addr = (void __user *)address;
    +force_sig_info(SIGBUS, &info, current);
} else {
    printk("KERNEL: Unaligned Access 0x%.8lx\n", address);
    show_registers(regs);
    @ @ -318,7 +318,7 @@
    return 0;
}
#endif

--- linux-4.15.0.orig/arch/openrisc/mm/cache.c
+++ linux-4.15.0/arch/openrisc/mm/cache.c
@@ -20,7 +20,7 @@
#include <asm/cacheflush.h>
#include <asm/tlbflush.h>
-static void cache_loop(struct page *page, const unsigned int reg)
+static __always_inline void cache_loop(struct page *page, const unsigned int reg)
{
    unsigned long paddr = page_to_pfn(page) << PAGE_SHIFT;
    unsigned long line = paddr & ~(L1_CACHE_BYTES - 1);
--- linux-4.15.0.orig/arch/parisc/Kconfig
+++ linux-4.15.0/arch/parisc/Kconfig
@@ -199,7 +199,7 @@
     If you configure the kernel to include many drivers built-in instead
--- linux-4.15.0.orig/arch/parisc/Makefile
+++ linux-4.15.0/arch/parisc/Makefile
KBUILD_CFLAGS_KERNEL += -mlong-calls
endif

+# Without this, "ld -r" results in .text sections that are too big (> 0x40000)
+# for branches to reach stubs. And multiple .text sections trigger a warning
+# when creating the sysfs module information section.
+ifndef CONFIG_64BIT
+KBUILD_CFLAGS_MODULE += -ffunction-sections
+endif
+
# select which processor to optimise for

cflags-$(CONFIG_PA7000) += -march=1.1 -mschedule=7100
cflags-$(CONFIG_PA7200) += -march=1.1 -mschedule=7200
--- linux-4.15.0.orig/arch/parisc/boot/compressed/head.S
+++ linux-4.15.0/arch/parisc/boot/compressed/head.S
@@ -22,7 +22,7 @@
 __HEAD

ENTRY(startup)
- .level LEVEL
+ .level PA_ASM_LEVEL

#define PSW_W_SM	0x200
#define PSW_W_BIT	 36
@@ -63,7 +63,7 @@
 load32BOOTADDR(decompress_kernel),%r3

#ifndef CONFIG_64BIT
- .level LEVEL
+ .level PA_ASM_LEVEL

ssmPSW_W_SM, %r0/* set W-bit */
depdi0, 31, 32, %r3
@endef
@@ -72,7 +72,7 @@
startup_continue:  
#endif CONFIG_64BIT
- .level LEVEL
+ .level PA_ASM_LEVEL

rsmPSW_W_SM, %r0/* clear W-bit */
@endef

--- linux-4.15.0.orig/arch/parisc/boot/compressed/vmlinux.lds.S
+++ linux-4.15.0/arch/parisc/boot/compressed/vmlinux.lds.S
@@ -40,8 +40,8 @@
  
 #ifdef CONFIG_64BIT
- .level LEVEL
+ .level PA_ASM_LEVEL

_startcode_end = .;

--- linux-4.15.0.orig/arch/parisc/boot/compressed/vmlinux.lds.S
+++ linux-4.15.0/arch/parisc/boot/compressed/vmlinux.lds.S
@@ -40,8 +40,8 @@
  
 #ifdef CONFIG_64BIT
- .level LEVEL
+ .level PA_ASM_LEVEL

_startcode_end = .;
/* bootloader code and data starts behind area of extracted kernel */
. = (SZ_end - SZparisc_kernel_start + KERNEL_BINARY_TEXT_START);
+/* bootloader code and data starts at least behind area of extracted kernel */
+. = MAX(ABSOLUTE(.), (SZ_end - SZparisc_kernel_start + KERNEL_BINARY_TEXT_START));

/* align on next page boundary */
. = ALIGN(4096);
--- linux-4.15.0.orig/arch/parisc/include/asm/assembly.h
+++ linux-4.15.0/arch/parisc/include/asm/assembly.h
@@ -59,14 +59,14 @@
#define LDCW		ldcw,co
#define BL		b,l
# ifdef CONFIG_64BIT
-# define LEVEL		2.0w
+# define PA_ASM_LEVEL	2.0w
 # else
-# define LEVEL		2.0
+# define PA_ASM_LEVEL	2.0
 # endif
 #else
#define LDCW		ldcw
#define BL		bl
-#define LEVEL		1.1
+#define PA_ASM_LEVEL	1.1
#endif

#ifdef __ASSEMBLY__
--- linux-4.15.0.orig/arch/parisc/include/asm/atomic.h
+++ linux-4.15.0/arch/parisc/include/asm/atomic.h
@@ -258,6 +258,8 @@
atomic64_set_release(v, i)	atomic64_set((v), (i))
+
static __inline__ s64
atomic64_read(const atomic64_t *v)
{
-/* SPDX-License-Identifier: GPL-2.0 */
+FIXME __ASM_BARRIER_H
+FIXME __ASM_BARRIER_H
+
+#ifndef __ASSEMBLY__

The synchronize caches instruction executes as a nop on systems in which all memory references are performed in order. */

#define synchronize_caches() __asm__ __volatile__ ("sync" : : "memory")

#if defined(CONFIG_SMP)
#define mb() do { synchronize_caches(); } while (0)
#define wmb()mb()
#define dma_mb()mb()
#define dma_wmb()mb()
#else
#define mb()barrier()
#define wmb()barrier()
#define dma_mb()barrier()
#define dma_wmb()barrier()
#endif

#define __smp_mb()mb()
#define __smp_wmb()mb()

#define __smp_store_release(p, v) do {
   typeof(p) __p = (p);
   union { typeof(*p) __val; char __c[1]; } __u =
   { .__val = (__force typeof(*p)) (v) };
   compiletime_assert_atomic_type(*p);
   switch (sizeof(*p)) {
   case 1:
      asm volatile("stb,ma %0,0(%1)" : : "r"(*(__u8 *)__u.__c), "r"(__p) : "memory");
      break;
   case 2:
      asm volatile("sth,ma %0,0(%1)" : : "r"(*(__u16 *)__u.__c), "r"(__p) : "memory");
      break;
   case 4:
      asm volatile("stw,ma %0,0(%1)" : : "r"(*(__u32 *)__u.__c), "r"(__p) : "memory");
      break;
   case 8:
      if (IS_ENABLED(CONFIG_64BIT))
      asm volatile("std,ma %0,0(%1)" : : "r"(*(__u64 *)__u.__c), "r"(__p) :}
+ "memory"; \\
+ break; \\
+ } \\
+ while (0) \\
+ +#define __smp_load_acquire(p) \\
+ ({ \\
+ union { typeof(*p) __val; char __c[1]; } __u; \\
+ typeof(p) __p = (p); \\
+ compiletime_assert_atomic_type(*p); \\
+ switch (sizeof(*p)) { \\
+ case 1: \\
+ asm volatile("ldb,ma 0(%1),%0" \\
+ : "r"(*(__u8 *)__u.__c) : "r"(__p) \\
+ : "memory"; \\
+ break; \\
+ case 2: \\
+ asm volatile("ldh,ma 0(%1),%0" \\
+ : "r"(*(__u16 *)__u.__c) : "r"(__p) \\
+ : "memory"; \\
+ break; \\
+ case 4: \\
+ asm volatile("ldw,ma 0(%1),%0" \\
+ : "r"(*(__u32 *)__u.__c) : "r"(__p) \\
+ : "memory"; \\
+ break; \\
+ case 8: \\
+ if (IS_ENABLED(CONFIG_64BIT)) \\
+ asm volatile("ldd,ma 0(%1),%0" \\
+ : "r"(*(__u64 *)__u.__c) : "r"(__p) \\
+ : "memory"; \\
+ break; \\
+ } \\
+ __u.__val; \\
+ }) \\
+ #include <asm-generic/barrier.h> \\
+ +
+ +#endif /* !__ASSEMBLY__ */ \\
+ +#endif /* __ASM_BARRIER_H */
--- linux-4.15.0.orig/arch/parisc/include/asm/cacheflush.h
+++ linux-4.15.0/arch/parisc/include/asm/cacheflush.h
@@ -26,6 +26,7 @@
 void flush_kernel_icache_range_asm(unsigned long, unsigned long); 
 void flush_user_dcache_range_asm(unsigned long, unsigned long); 
 void flush_kernel_dcache_range_asm(unsigned long, unsigned long); 
+void purge_kernel_dcache_range_asm(unsigned long, unsigned long); 
 void flush_kernel_dcache_page_asm(void *); 
 void flush_kernel_icache_page(void *);
--- linux-4.15.0.orig/arch/parisc/include/asm/cmpxchg.h
+++ linux-4.15.0/arch/parisc/include/asm/cmpxchg.h
@@ -44,8 +44,14 @@
 **if (((unsigned long)p & 0xf) == 0)
 **return __ldcw(p);
 */
-#define xchg(ptr, x) \ 
-((_typeof__(*(ptr)))__xchg((unsigned long)(x), (ptr), sizeof(*(ptr))))
+#define xchg(ptr, x) \ 
+((_typeof__(*(ptr)))__xchg((unsigned long)(x), (ptr), sizeof(*(ptr))))
+({
+__typeof__(*(ptr)) __ret;
+__typeof__(*(ptr)) _x_ = (x);
+__ret = (__typeof__(*(ptr)))
+__xchg((unsigned long)_x_, (ptr), sizeof(*(ptr)));
+__ret;
+})

/* bug catcher for when unsupported size is used - won't link */
extern void __cmpxchg_called_with_bad_pointer(void);
@ @ -54.6 +60.7 @@
extern unsigned long __cmpxchg_u32(volatile unsigned int *m, unsigned int old,
unsigned int new_);
extern u64 __cmpxchg_u64(volatile u64 *ptr, u64 old, u64 new_);
+extern u8 __cmpxchg_u8(volatile u8 *ptr, u8 old, u8 new_);
/* don't worry...optimizer will get rid of most of this */
static inline unsigned long
@@ -65,6 +72,7 @@
#endif
} 
{"cmpxchgCalledWithBadPointer();
 return old;
--- linux-4.15.0.orig/arch/parisc/include/asm/page.h
+++ linux-4.15.0/arch/parisc/include/asm/page.h
@ @ -179,7 +179,7 @@
#include <asm-generic/getorder.h>
#include <asm/pdc.h>

-#define PAGE0 ((struct zeropage *)__PAGE_OFFSET)
+#define PAGE0 ((struct zeropage *)absolute_pointer(__PAGE_OFFSET))

/* DEFINITION OF THE ZERO-PAGE (PAGE0) */
/* based on work by Jason Eckhardt (jason@equator.com) */
--- linux-4.15.0.orig/arch/parisc/include/asm/pgtable.h
+++ linux-4.15.0/arch/parisc/include/asm/pgtable.h
@@ -117,7 +117,7 @@
 #if CONFIG_PGTABLE_LEVELS == 3
 #define BITS_PER_PMD PAGE_SHIFT + PMD_ORDER - BITS_PER_PMD_ENTRY)
 #else
-#define __PAGETABLE_PMD_FOLDED
+#define __PAGETABLE_PMD_FOLDED 1
 #define BITS_PER_PMD 0
 #define PTRS_PER_PMD 1UL << BITS_PER_PMD)
 --- linux-4.15.0.orig/arch/parisc/include/asm/processor.h
@@ -316,6 +316,8 @@
#define parisc_requires_coherency() 0
 #endif
+extern int running_on_qemu;
+
 #endif /* __ASSEMBLY__ */

 #endif /* __ASM_PARISC_PROCESSOR_H */
 --- linux-4.15.0.orig/arch/parisc/include/asm/ptrace.h
+++ linux-4.15.0/arch/parisc/include/asm/ptrace.h
@@ -22,7 +22,7 @@
 static inline unsigned long regs_return_value(struct pt_regs *regs)
 { }
-return regs->gr[20];
+return regs->gr[28];
 }
 #endif
 --- linux-4.15.0.orig/arch/parisc/include/asm/spinlock.h
+++ linux-4.15.0/arch/parisc/include/asm/spinlock.h
@@ -20,7 +20,6 @@
 { }
 volatile unsigned int *a;

-__ldcw(x);
+a = __ldcw_align(x);
 while (__ldcw(a) == 0)
 while (*a == 0)
-@ @ -30,17 +29,16 @@
+local_irq_disable();
 } else
 cpu_relax();
 -mb();

```c
#define arch_spin_lock_flags arch_spin_lock_flags

static inline void arch_spin_unlock(arch_spinlock_t *x)
{
    volatile unsigned int *a;
    -mb();
    +
    a = __ldcw_align(x);
    -*a = 1;
    mb();
    +*a = 1;
}

static inline int arch_spin_trylock(arch_spinlock_t *x)
{
    volatile unsigned int *a;
    int ret;

    -mb();
    a = __ldcw_align(x);
    ret = __ldcw(a) != 0;
    -mb();

    return ret;
}
--- linux-4.15.0.orig/arch/parisc/kernel/cache.c
+++ linux-4.15.0/arch/parisc/kernel/cache.c
@@ -465,10 +465,10 @@
     unsigned long flags, size;
     unsigned long flags;

     if (size >= parisc_tlb_flush_threshold) {
        if (IS_ENABLED(CONFIG_SMP) && !arch_irqs_disabled() &&
        end - start >= parisc_tlb_flush_threshold) {
            flush_tlb_all();
            return 1;
        }
    }
    @@ -539,13 +539,12 @@
 struct vm_area_struct *vma;
 pgd_t *pgd;

 /* Flush the TLB to avoid speculation if coherency is required. */
-#if (parisc_requires_coherency())
+if (parisc_requires_coherency())
     -flush_tlb_all();
     +flush_tlb_all();
```

/* Flushing the whole cache on each cpu takes forever on rp3440, etc. So, avoid it if the mm isn't too big. */
-if (mm->total_size(mm) >= parisc_cache_flush_threshold) {
+if ((!IS_ENABLED(CONFIG_SMP) || !arch_irqs_disabled()) &&
  + mm->total_size(mm) >= parisc_cache_flush_threshold) {
+if (mm->context) 
+flush_tlb_all();
flush_cache_all();
return;
}
@@ -553,9 +552,9 @@
if (mm->context == mfsp(3)) {
 for (vma = mm->mmap; vma; vma = vma->vm_next) {
    flush_user_dcache_range_asm(vma->vm_start, vma->vm_end);
-    if ((vma->vm_flags & VM_EXEC) == 0)
-    continue;
-    flush_user_icache_range_asm(vma->vm_start, vma->vm_end);
+    if (vma->vm_flags & VM_EXEC)
+    flush_user_icache_range_asm(vma->vm_start, vma->vm_end);
+    flush_tlb_range(vma, vma->vm_start, vma->vm_end);
} 
return;
}
@@ -573,6 +572,8 @@
pfn = pte_pfn(*ptep);
if (!pfn_valid(pfn))
continue;
+if (unlikely(mm->context))
+flush_tlb_page(vma, addr);
__flush_cache_page(vma, addr, PFN_PHYS(pfn));
}
}
@@ -581,30 +582,45 @@
void flush_cache_range(struct vm_area_struct *vma,
 unsigned long start, unsigned long end) {
-BUG_ON(!vma->vm_mm->context);
-
-/* Flush the TLB to avoid speculation if coherency is required. */
-#if (parisc_requires_coherency())
-flush_tlb_range(vma, start, end);
+pgd_t *pgd;
+unsigned long addr;

-#if ((end - start) >= parisc_cache_flush_threshold
-  || vma->vm_mm->context != mfsp(3)) {
+if ((!IS_ENABLED(CONFIG_SMP) || !arch_irqs_disabled()) &&

+    end - start >= parisc_cache_flush_threshold) { 
+if (vma->vm_mm->context) 
+flush_tlb_range(vma, start, end); 
flush_cache_all(); 
    return; 
} 

-flush_user_dcache_range_asm(start, end); 
-if (vma->vm_flags & VM_EXEC) 
-flush_user_icache_range_asm(start, end); 
+if (vma->vm_mm->context == mfsp(3)) { 
+flush_user_dcache_range_asm(start, end); 
+flush_user_icache_range_asm(start, end); 
+flush_tlb_range(vma, start, end); 
+return; 
+} 
+
+pgd = vma->vm_mm->pgd; 
+for (addr = vma->vm_start; addr < vma->vm_end; addr += PAGE_SIZE) { 
+unsigned long pfn; 
+pte_t *ptep = get_ptep(pgd, addr); 
+if (!ptep) 
+continue; 
+pfn = pte_pfn(*ptep); 
+if (pfm_valid(pfn)) { 
+if (unlikely(vma->vm_mm->context)) 
+flush_tlb_page(vma, addr); 
+__flush_cache_page(vma, addr, PFN_PHYS(pfn)); 
+} 
+} 
+
void 
flush_cache_page(struct vm_area_struct *vma, unsigned long vmaddr, unsigned long pfn) 
{
-BUG_ON(!vma->vm_mm->context); 

if (pfm_valid(pfn)) { 
-if (parisc_requires_coherency()) 
+if (likely(vma->vm_mm->context)) 
flush_tlb_page(vma, vmaddr); 
__flush_cache_page(vma, vmaddr, PFN_PHYS(pfn)); 
} 
@@ -613,21 +629,33 @@
void flush_kernel_vmap_range(void *vaddr, int size) 
{
unsigned long start = (unsigned long)vaddr;

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/* index might be out of bounds for bc[] */
+if (index >= 6)
+return 0;
+
+id = PCI_SLOT(pdev->devfn) | (PCI_FUNC(pdev->devfn) << 5);
{return (modpath->bc[index] == id);
}

static void walk_native_bus(unsigned long io_io_low, unsigned long io_io_high,
struct device *parent);

void walk_lower_bus(struct parisc_device *dev)
+void __init walk_lower_bus(struct parisc_device *dev)
{
unsigned long io_io_low, io_io_high;

* devices which are not physically connected (such as extra serial &
* keyboard ports). This problem is not yet solved.
*/
-static void walk_native_bus(unsigned long io_io_low, unsigned long io_io_high,
-struct device *parent)
+static void __init walk_native_bus(unsigned long io_io_low,
+unsigned long io_io_high, struct device *parent)
{
int i, devices_found = 0;
unsigned long hpa = io_io_low;

print_pa_hwpath(dev, hw_path);
-printf(KERN_INFO "%d. %s at 0x%p [\%s] \%d, 0x%x, 0x%.3x, 0x%.5x \%
++count, dev->name, (void*) dev->hpa.start, hw_path, dev->id.hw_type,
+printf(KERN_INFO "%d. %s at %p [\%s] \%d, 0x%x, 0x%.3x, 0x%.5x \%
+++count, dev->name, &dev->hpa.start, hw_path, dev->id.hw_type,
dev->id.hversion_rev, dev->id.hversion, dev->id.sversion);

if (dev->num_addrs) {
--- linux-4.15.0.orig/arch/parisc/kernel/entry.S
+++ linux-4.15.0/arch/parisc/kernel/entry.S
@@ -185,7 +185,7 @@
vb,n	0(%r3)
nop
.word	0	/* checksum (will be patched) */
@@ -482,6 +482,8 @@
 .macro tlb_unlock0 spc,tmp
 #ifdef CONFIG_SMP
 or,COND(=)%r0,spc,%r0
+sync
+or,COND(=)%r0,spc,%r0
 stw \spc,0(tmp)
 #endif
 .endm
--- linux-4.15.0.orig/arch/parisc/kernel/ftrace.c
+++ linux-4.15.0/arch/parisc/kernel/ftrace.c
@@ -30,7 +30,6 @@
 unsigned long self_addr)
 {
     unsigned long old;
-struct ftrace_graph_ent trace;
 extern int parisc_return_to_handler;

     if (unlikely(ftrace_graph_is_dead()))
@@ -41,19 +40,9 @@
 old = *parent;

     -trace.func = self_addr;
-     -trace.depth = current->curr_ret_stack + 1;
-     -
-     -/* Only trace if the calling function expects to */
-     -if (!ftrace_graph_entry(&trace))
-         -return;
-     -
-     -    if (ftrace_push_return_trace(old, self_addr, &trace.depth,
-     -        0, NULL) == -EBUSY)
-         -return;
-     -
-     -        /* activate parisc_return_to_handler() as return point */
-     -        *parent = (unsigned long) &parisc_return_to_handler;
-     -+if (!function_graph_enter(old, self_addr, 0, NULL))
-     -+/* activate parisc_return_to_handler() as return point */
-+        *parent = (unsigned long) &parisc_return_to_handler;
+}
 #endif /* CONFIG_FUNCTION_GRAPH_TRACER */

--- linux-4.15.0.orig/arch/parisc/kernel/head.S
+++ linux-4.15.0/arch/parisc/kernel/head.S
@@ -22,7 +22,7 @@
 #include <linux/linkage.h>
 #include <linux/init.h>

-.level LEVEL
+.level PA_ASM_LEVEL

.__INITDATA
ENTRY(boot_args)
@@ -254,7 +254,7 @@
 ldo %PA(fault_vector_11)(%r10),%r10

 sis_pa20:
-.level LEVEL /* restore 1.1 || 2.0w */
+.level PA_ASM_LEVEL /* restore 1.1 || 2.0w */
 #endif /*!CONFIG_64BIT*/
 load32PA(fault_vector_20),%r10

 --- linux-4.15.0.orig/arch/parisc/kernel/hpmc.S
+++ linux-4.15.0/arch/parisc/kernel/hpmc.S
@@ -84,7 +84,8 @@
 .text
 .import intr_save, code
-.ENTRY_CFI(os_hpmc)
+.align 16
+.ENTRY(os_hpmc)
 .os_hpmc:

 /*
 @@ -300,12 +301,14 @@
 b .
 nop
-.ENDPROC_CFI(os_hpmc)
+.align 16/* make function length multiple of 16 bytes */
 .os_hpmc_end:

.__INITRODATA
+.globl os_hpmc_size
 .align 4
-.export os_hpmc_size
+.type os_hpmc_size, @object
+.size os_hpmc_size, 4
 os_hpmc_size:
.word .os_hpmc_end-.os_hpmc
union irq_stack_union {
    unsigned long stack[IRQ_STACK_SIZE/sizeof(unsigned long)];
};
int running_on_qemu __read_mostly;
+EXPORT_SYMBOL(running_on_qemu);

void __cpuidle arch_cpu_idle_dead(void)
{
    @ @ -209,12 +210,6 @@

    static int __init parisc_idle_init(void)
    {
        -const char *marker;
        -
    	/* check QEMU/SeaBIOS marker in PAGE0 */
    	-marker = (char *) &PAGE0->pad0;
    	-running_on_qemu = (memcmp(marker, "SeaBIOS", 8) == 0);
    -
    if (!running_on_qemu)
        cpu_idle_poll_ctrl(1);

    --- linux-4.15.0.orig/arch/parisc/kernel/ptrace.c
    +++ linux-4.15.0/arch/parisc/kernel/ptrace.c
    @ @ -171,6 +171,9 @@
    if ((addr & (sizeof(unsigned long)-1)) ||
        addr >= sizeof(struct pt_regs))
    break;
    +if (addr == PT_IAOQ0 || addr == PT_IAOQ1) {
    +data |= 3; /* ensure userspace privilege */
    +}
    if ((addr >= PT_GR1 && addr <= PT_GR31) ||
        addr == PT_IAOQ0 || addr == PT_IAOQ1 ||
        (addr >= PT_FR0 && addr <= PT_FR31 + 4))
    @ @ -232,16 +235,18 @@

    static compat_ulong_t translate_usr_offset(compat_ulong_t offset)
    {
        -if (offset < 0)
        -return sizeof(struct pt_regs);
        -else if (offset <= 32*4)/* gr[0..31] */
        -return offset * 2 + 4;
-else if (offset <= 32*4+32*8) /* gr[0..31] + fr[0..31] */
-return offset + 32*4;

-else if (offset < sizeof(struct pt_regs)/2 + 32*4)
-return offset * 2 + 4 - 32*8;
+compat_ulong_t pos;
+
+if (offset < 32*4) /* gr[0..31] */
+pos = offset * 2 + 4;
+else if (offset < 32*4+32*8) /* fr[0] ... fr[31] */
+pos = (offset - 32*4) + PT_FR0;
+else if (offset < sizeof(struct pt_regs)/2 + 32*4) /* sr[0] ... ipsw */
+pos = (offset - 32*4 - 32*8) * 2 + PT_SR0 + 4;
else
-return sizeof(struct pt_regs);
+pos = sizeof(struct pt_regs);
+
+return pos;
}

long compat_arch_ptrace(struct task_struct *child, compat_long_t request,
@@ -285,9 +290,12 @@
 addr = translate_usr_offset(addr);
 if (addr >= sizeof(struct pt_regs))
 break;
+if (addr == PT_IAOQ0+4 || addr == PT_IAOQ1+4) {
+data |= 3; /* ensure userspace privilege */
+}
 if (addr >= PT_FR0 && addr <= PT_FR31 + 4) {
 /* Special case, fp regs are 64 bits anyway */
-*(__u64 *) ((char *) task_regs(child) + addr) = data;
+*(__u32 *) ((char *) task_regs(child) + addr) = data;
 ret = 0;
 }
else if ((addr >= PT_GR1+4 && addr <= PT_GR31+4)) ||
@@ -312,15 +320,29 @@
}

long do_syscall_trace_enter(struct pt_regs *regs)
{
 -if (test_thread_flag(TIF_SYSCALL_TRACE) &&
- tracehook_report_syscall_entry(regs)) {
 +if (test_thread_flag(TIF_SYSCALL_TRACE)) {
 +int rc = tracehook_report_syscall_entry(regs);
 +
+/*
+ * Tracing decided this syscall should not happen or the
+ * debugger stored an invalid system call number. Skip
+ * the system call and the system call restart handling.
+ * As tracesys_next does not set %r28 to -ENOSYS
+ */
+}
+ * when %r20 is set to -1, initialize it here.
+ */
+ -regs->gr[20] = -1UL;
+ -goto out;
+ +regs->gr[28] = -ENOSYS;
+ +
+ +if (rc) {
+ + /*
+ + * A nonzero return code from
+ + * tracehook_report_syscall_entry() tells us
+ + * to prevent the syscall execution. Skip
+ + * the syscall call and the syscall restart handling.
+ + *
+ + * Note that the tracer may also just change
+ + * regs->gr[20] to an invalid syscall number,
+ + * that is handled by tracesys_next.
+ + */
+ + +regs->gr[20] = -1UL;
+ +return -1;
+ +}
+ }
+ }
+ /* Do the secure computing check after ptrace. */
+ @ @ -344,7 +366,6 @@
+ regs->gr[24] & 0xffffffff,
+ regs->gr[23] & 0xffffffff);
+ -out:
+ */
+ /*
+ * Sign extend the syscall number to 64bit since it may have been
+ * modified by a compat ptrace call
+ @ @ -487,7 +508,8 @@
+ return;
+ case RI(iaoq[0]):
+ case RI(iaoq[1]):
+ -regs->iaoq[num - RI(iaoq[0])] = val;
+ /* set 2 lowest bits to ensure userspace privilege: */
+ +regs->iaoq[num - RI(iaoq[0])] = val | 3;
+ return;
+ case RI(sar):regs->sar = val;
+ return;
+ --- linux-4.15.0.orig/arch/parisc/kernel/setup.c
+ +++ linux-4.15.0/arch/parisc/kernel/setup.c
+ @@ -406,6 +406,9 @@
+ int ret, cpunum;
+ struct pdc_coproc_cfg coproc_cfg;
+ */
+ /* check QEMU/SeaBIOS marker in PAGE0 */
+running_on_qemu = (memcmp(&PAGE0->pad0, "SeaBIOS", 8) == 0);
+
cpunum = smp_processor_id();

init_cpu_topology();
--- linux-4.15.0.orig/arch/parisc/kernel/signal.c
+++ linux-4.15.0/arch/parisc/kernel/signal.c
@@ -239,6 +239,12 @@

#ifdef CONFIG_64BIT
+if (is_compat_task()) {
+    /* The gcc alloca implementation leaves garbage in the upper 32 bits of sp */
+    usp = (compat_uint_t)usp;
+}
+#endif
/*FIXME: frame_size parameter is unused, remove it. */
frame = get_sigframe(&ksig->ka, usp, sizeof(*frame));

--- linux-4.15.0.orig/arch/parisc/kernel/smp.c
+++ linux-4.15.0/arch/parisc/kernel/smp.c
@@ -418,8 +418,7 @@
}
#endif CONFIG_PROC_FS
-int __init
-setup_profiling_timer(unsigned int multiplier)
+int setup_profiling_timer(unsigned int multiplier)
{
    return -EINVAL;
}
--- linux-4.15.0.orig/arch/parisc/kernel/syscall.S
+++ linux-4.15.0/arch/parisc/kernel/syscall.S
@@ -48,7 +48,7 @@
*/
#define KILL_INSNS BREAK 0,0

-.level LEVEL
+.level PA_ASM_LEVEL

.text

@@ -629,11 +629,12 @@

stw %r1, 4(%sr2,%r20)
#endif
/* The load and store could fail */
-1:ldw,ma0(%r26), %r28

+1: ldw0(%r26), %r28
sub,<,%r28, %r25, %r0
-2: stw,ma%r24, 0(%r26)
+2: stw%r24, 0(%r26)
/* Free lock */
-stw,ma%r20, 0(%sr2,%r20)
+sync
+stw%r20, 0(%sr2,%r20)
#if ENABLE_LWS_DEBUG
/* Clear thread register indicator */
stw%r0, 4(%sr2,%r20)
@ @ -647,6 +648,7 @ @
3:
/* Error occurred on load or store */
/* Free lock */
+sync
stw%r20, 0(%sr2,%r20)
#if ENABLE_LWS_DEBUG
stw%r0, 4(%sr2,%r20)
@ @ -796,30 +798,30 @ @
ldo1(%r0),%r28

/* 8bit CAS */
-13: ldb,ma0(%r26), %r29
+13: ldb0(%r26), %r29
sub,=,%r29, %r25, %r0
b,ncas2_end
-14: stb,ma%r24, 0(%r26)
+14: stb%r24, 0(%r26)
bcas2_end
copy%r0, %r28
nop
nop

/* 16bit CAS */
-15: ldh,ma0(%r26), %r29
+15: ldh0(%r26), %r29
sub,=,%r29, %r25, %r0
b,ncas2_end
-16: sth,ma%r24, 0(%r26)
+16: sth%r24, 0(%r26)
bcas2_end
copy%r0, %r28
nop
nop

/* 32bit CAS */
-17: ldw,ma0(%r26), %r29
+17: ldw0(%r26), %r29
sub.=%r29, %r25, %r0
b_ncas2_end
-18: stw, ma%r24, 0(%r26)
+18: stw%r24, 0(%r26)
bcas2_end
copy%r0, %r28
nop
@@ -827,10 +829,10 @@
/* 64bit CAS */
#define CONFIG_64BIT
-19: ldd, ma0(%r26), %r29
+19: ldd0(%r26), %r29
sub.*=%r29, %r25, %r0
b_ncas2_end
-20: std, ma%r24, 0(%r26)
+20: std%r24, 0(%r26)
copy%r0, %r28
#else
/* Compare first word */
@@ -848,7 +850,8 @@
cas2_end:
/* Free lock */
-stw, ma%r20, 0(%sr2,%r20)
+sync
+stw%r20, 0(%sr2,%r20)
/* Enable interrupts */
ssmPSW_SM_I, %r0
/* Return to userspace, set no error */
@@ -858,6 +861,7 @@
22:
/* Error occurred on load or store */
/* Free lock */
+sync
stw%r20, 0(%sr2,%r20)
ssmPSW_SM_I, %r0
ldo1(%r0),%r28
--- linux-4.15.0.orig/arch/parisc/kernel/time.c
+++ linux-4.15.0/arch/parisc/kernel/time.c
@@ -76,10 +76,10 @@
next_tick = cpuinfo->it_value;
/* Calculate how many ticks have elapsed. */
+now = mfctl(16);
do {
++ticks_elapsed:
next_tick += cpt;
-now = mfctl(16);
} while (next_tick - now > cpt);

/* Store (in CR16 cycles) up to when we are accounting right now. */
@@ -103,16 +103,17 @@
* if one or the other wrapped. If "now" is "bigger" we'll end up
* with a very large unsigned number.
*/
-while (next_tick - mfctl(16) > cpt)
+now = mfctl(16);
+while (next_tick - now > cpt)
next_tick += cpt;

/* Program the IT when to deliver the next interrupt.
* Only bottom 32-bits of next_tick are writable in CR16!
* Timer interrupt will be delivered at least a few hundred cycles
- * after the IT fires, so if we are too close (<= 500 cycles) to the
+ * after the IT fires, so if we are too close (<= 8000 cycles) to the
* next cycle, simply skip it.
*/
-if (next_tick - mfctl(16) <= 500)
+if (next_tick - now <= 8000)
next_tick += cpt;
mtctl(next_tick, 16);

@@ -204,7 +205,7 @@
device_initcall(rtc_init);
#endif

-void read_persistent_clock(struct timespec *ts)
+void read_persistent_clock64(struct timespec64 *ts)
{
static struct pdc_tod tod_data;
if (pdc_tod_read(&tod_data) == 0) {
@@ -248,7 +249,7 @@
* different sockets, so mark them unstable and lower rating on
* multi-socket SMP systems.
*/
-if (num_online_cpus() > 1) {
+if (num_online_cpus() > 1 && !running_on_qemu) {
    int cpu;
    unsigned long cpu0_loc;
    cpu0_loc = per_cpu(cpu_data, 0).cpu_loc;
--- linux-4.15.0.orig/arch/parisc/kernel/traps.c
+++ linux-4.15.0/arch/parisc/kernel/traps.c
@@ -836,7 +836,8 @@
if (pdc_instr(&instr) == PDC_OK)
ivap[0] = instr;

"/* Compute Checksum for HPMC handler */
+/* Setup IVA and compute checksum for HPMC handler */
+ivap[6] = (u32)__pa(os_hpmc);
length = os_hpmc_size;
ivap[7] = length;

--- linux-4.15.0.orig/arch/parisc/lib/bitops.c
+++ linux-4.15.0/arch/parisc/lib/bitops.c
@@ -79,3 +79,15 @@
_atomic_spin_unlock_irqrestore(ptr, flags);
return (unsigned long)prev;
}
+
+u8 __cmpxchg_u8(volatile u8 *ptr, u8 old, u8 new)
+{
+unsigned long flags;
+u8 prev;
+
+_atomic_spin_lock_irqsave(ptr, flags);
+if ((prev = *ptr) == old)
+*ptr = new;
+_atomic_spin_unlock_irqrestore(ptr, flags);
+return prev;
+
++ linux-4.15.0/arch/parisc/math-emu/cnv_float.h
+++ linux-4.15.0/arch/parisc/math-emu/cnv_float.h
@@ -60,19 +60,19 @@
    ((exponent < (SGL_P - 1)) ?
        (Sall(sgl_value) << (SGL_EXP_LENGTH + 1 + exponent)) : FALSE)
#define Int_isinexact_to_sgl(int_value)
    ((int_value << 33 - SGL_EXP_LENGTH) != 0)
#define Sgl_roundnearest_from_int(int_value,sgl_value)
    if (int_value & 1<<(SGL_EXP_LENGTH - 2)) /* round bit */
        (Sall(sgl_value)++)
#define Dint_isinexact_to_sgl(dint_valueA,dint_valueB)
    (((Dintp1(dint_valueA) << 33 - SGL_EXP_LENGTH) != 0) || Dintp2(dint_valueB))
#define Sgl_roundnearest_from_dint(dint_valueA,dint_valueB,sgl_value)
    if (Dintp1(dint_valueA) & 1<<(SGL_EXP_LENGTH - 2)) 
        Sall(sgl_value)++
#define Dint_isinexact_to_sgl(dint_valueA,dint_valueB,sogl_value)
#define Dint_isinexact_to_dbl(dint_value) \  
--- linux-4.15.0.orig/arch/parisc/mm/init.c  
+++ linux-4.15.0/arch/parisc/mm/init.c  
@@ -495,12 +495,8 @@  
    if (address >= end_paddr) {
        if (force)  
            break;
      -else  
+    if (address >= end_paddr)
    +break;
    
    set_pte(pg_table, pte);
    
@@ -612,7 +608,7 @@  
    high_memory = __va((max_pfn << PAGE_SHIFT));
    -set_max_mapnr(page_to_pfn(virt_to_page(high_memory - 1)) + 1);
    +set_max_mapnr(max_low_pfn);
    free_all_bootmem();
    
    #ifdef CONFIG_PA11  
@@ -629,7 +625,12 @@  
    #endif  
    mem_init_print_info(NULL);
    -#ifdef CONFIG_DEBUG_KERNEL /* double-sanity-check paranoia */  
+    +#if 0
+        /*  
+         * Do not expose the virtual kernel memory layout to userspace.  
+         * But keep code for debugging purposes.  
+         */  
+        printk("virtual kernel memory layout:\n"  
+               "    vmalloc : 0x%px - 0x%px (%4ld MB)\n"  
+               "    memory : 0x%px - 0x%px (%4ld MB)\n"  
--- linux-4.15.0.orig/arch/parisc/mm/ioremap.c  
+++ linux-4.15.0/arch/parisc/mm/ioremap.c  
@@ -3,7 +3,7 @@  
 * arch/parisc/mm/ioremap.c
addr = (void __iomem *) area->addr;
if (ioremap_page_range((unsigned long)addr, (unsigned long)addr + size,
    phys_addr, pgprot)) {
    vfree(addr);
    vunmap(addr);
    return NULL;
}

EXPORT_SYMBOL(__ioremap);

EXPORT_SYMBOL(iounmap);

--- linux-4.15.0.orig/arch/powerpc/Kconfig
+++/ linux-4.15.0/arch/powerpc/Kconfig
@@ -142,6 +142,7 @@
 select ARCH_HAS_PMEM_API                if PPC64
 select ARCH_HAS_SCALED_CPUTIMEif VIRT_CPU_ACCOUNTING_NATIVE
 select ARCH_HAS_SG_CHAIN
+select ARCH_HAS STRICT_KERNEL_RWXif (PPC32 && !HIBERNATION)
 select ARCH_HAS_TICK_BROADCASTif GENERIC_CLOCKEVENTS_BROADCAST
 select ARCH_HAS_UACCESS_FLUSHCACHEinif PPC64
 select ARCH_HAS UBSAN_SANITIZE_ALL
@@ -149,11 +150,15 @@
 select ARCH_HAVE_NMI_SAFE_CMPXCHG
 select ARCH_MIGHT_HAVE_PC_PARPORT
 select ARCH_MIGHT_HAVE_PC_SERIO
+select ARCH_OPTIONAL_KERNEL_RWXif ARCH_HAS STRICT_KERNEL_RWX
 select ARCH_SUPPORTED ATOMIC RMW
 select ARCH_SUPPORTED DEFERRED STRUCT PAGE INIT
select ARCH_USE_BUILTIN_BSWAP
select ARCH_USE_CMPXCHG_LOCKREF if PPC64
select ARCH_WANT_IPC_PARSE_VERSION
+select ARCH_WANT_IRQS_OFF_ACTIVATE_MM
select ARCH_WEAK_RELEASE_ACQUIRE
select BINfmt_elf
select Buildtime_extable_sort
@@ -166,7 +169,7 @@
select GENERIC_CLOCKEVENTS_BROADCAST if SMP
select GENERIC_CMOS_UPDATE
select GENERIC_CPU_AUTOPROBE
- select GENERIC_CPU_VULNERABILITIES if PPC_BOOK3S_64
+ select GENERIC_CPU_VULNERABILITIES if PPC_BARRIER_NOSPEC
select GENERIC_IRQ_SHOW
select GENERIC_IRQ_SHOW_LEVEL
select GENERIC_SMP_IDLE_THREAD
@@ -180,8 +183,6 @@
select HAVE_ARCH_MMAP_RND_COMPAT_BITS if COMPAT
select HAVE_ARCH_SECCOMP_FILTER
select HAVE_ARCH_TRACEHOOK
- select ARCH_HAS_STRICT_KERNEL_RWX if ((PPC_BOOK3S_64 || PPC32) && !RELOCATABLE && !HIBERNATION)
- select ARCH_OPTIONAL_KERNEL_RWX if ARCH_HAS_STRICT_KERNEL_RWX
select HAVE_CBPF_JIT if !PPC64
select HAVE_CONTEXT_TRACKING if PPC64
select HAVE_DEBUG_KMEMLEAK
@@ -209,7 +210,7 @@
select HAVE_MEMBLOCK_NODE_MAP
select HAVE_MOD_ARCH_SPECIFIC
select HAVE_NMI if PERF_EVENTS || (PPC64 && PPC_BOOK3S)
- select HAVE_HARDLOCKUP_DETECTOR_ARCH if (PPC64 && PPC_BOOK3S)
+ select HAVE_HARDLOCKUP_DETECTOR_ARCH if PPC64 && PPC_BOOK3S && SMP
select HAVE_OPROFILE
select HAVE_OPTPROBES if PPC64
select HAVE_PERF_EVENTS
@@ -227,6 +229,7 @@
select HAVE_PERF_USER_STACK_DUMP
select HAVE_RCU_TABLE_FREE if SMP
select HAVE_REGS_AND_STACK_ACCESS_API
+ select HAVE_RELIABLE_STACKTRACE if PPC64 && CPU_LITTLE_ENDIAN
select HAVE_SYSCALL_TRACEPOINTS
select HAVE_VIRT_CPU_ACCOUNTING
select HAVE_IRQ_TIME_ACCOUNTING
@@ -277,6 +279,7 @@
select MODULES_USE_ELF_RELA
select NO_BOOTMEM
select OF
+ select OF_DMA_DEFAULT_COHERENT if !NOT_COHERENT_CACHE

---

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select OF_EARLY_FLATTREE
select OF_RESERVED_MEM
select OLD_SIGACTION if PPC32
@@ -238,6 +241,11 @@
# Please keep this list sorted alphabetically.
#
+
+config PPC_BARRIER_NOSPEC
+  bool
+  default y
+  depends on PPC_BOOK3S_64 || PPC_FSL_BOOK3E
+
+config GENERIC_CSUM
def_bool n
@@ -730,7 +738,7 @@
config PPC_256K_PAGES
bool "256k page size"
  -depends on 44x && !STDBINUTILS
  +depends on 44x && !STDBINUTILS && !PPC_47x
  help
    Make the page size 256k.
@@ -1022,6 +1030,19 @@
source "drivers/rapidio/Kconfig"
+
+config PPC_RTAS_FILTER
+  bool "Enable filtering of RTAS syscalls"
+  default y
+  depends on PPC_RTAS
+  help
+    The RTAS syscall API has security issues that could be used to
+    compromise system integrity. This option enforces restrictions on the
+    RTAS calls and arguments passed by userspace programs to mitigate
+    these issues.
+    
+    Say Y unless you know what you are doing and the filter is causing
+    problems for you.
+    
+    endmenu

config NONSTATIC_KERNEL
@@ -1215,6 +1236,8 @@
source "drivers/Kconfig"

source "ubuntu/Kconfig"
source "fs/Kconfig"
source "lib/Kconfig"

--- linux-4.15.0.orig/arch/powerpc/Kconfig.debug
+++ linux-4.15.0/arch/powerpc/Kconfig.debug
@@ -122,6 +122,14 @@
to say Y here, unless you're building for a memory-constrained system.
+config XMON_DEFAULT_RO_MODE
+bool "Restrict xmon to read-only operations by default"
+depends on XMON
+default y
+help
+ Operate xmon in read-only mode. The cmdline options 'xmon=rw' and 'xmon=ro' override this default.
+
config DEBUGGER
bool
depends on KGDB || XMON
@@ -349,6 +357,7 @@
config FAIL_IOMMU
bool "Fault-injection capability for IOMMU"
depends on FAULT_INJECTION
+depends on PCI || IBMVIO
help
 Provide fault-injection capability for IOMMU. Each device can be selectively enabled via the fail_iommu property.
--- linux-4.15.0.orig/arch/powerpc/Makefile
+++ linux-4.15.0/arch/powerpc/Makefile
@@ -86,11 +86,13 @@
endif
ifdef CONFIG_PPC64
+ifndef CONFIG_CC_IS_CLANG
+endif
endif
endif

ifdef CONFIG_PPC64
+ifndef CONFIG_CC_IS_CLANG
endif
endif
endif

cflags-$(CONFIG_CPU_BIG_ENDIAN)+=$(call cc-option,-mabi=elfv1)
cflags-$(CONFIG_CPU_BIG_ENDIAN)+=$(call cc-option,-mcall-aixdesc)
aflags-$(CONFIG_CPU_BIG_ENDIAN)+=$(call cc-option,-mabi=elfv1)
aflags-$(CONFIG_CPU_LITTLE_ENDIAN)+=-mabi=elfv2
endif
+endif

cflags-$(CONFIG_CPU_LITTLE_ENDIAN)+=-mlittle-endian
cflags-$(CONFIG_CPU_BIG_ENDIAN)+=$(call cc-option,-mbig-endian)
@@ -130,6 +132,7 @@
CFLAGS-$(CONFIG_PPC64):= $(call cc-option,-mtraceback=no)
+ifndef CONFIG_CC_IS_CLANG
ifeq ($(CONFIG_CPU_LITTLE_ENDIAN),y)
CFLAGS-$(CONFIG_PPC64)+= $(call cc-option,-mabi=elfv2,$(call cc-option,-mcall-aixdesc))
AFLAGS-$(CONFIG_PPC64)+= $(call cc-option,-mabi=elfv2)
@@ -138,9 +141,17 @@
CFLAGS-$(CONFIG_PPC64)+= $(call cc-option,-mabi=elfv1)
endif
+endif
CFLAGS-$(CONFIG_PPC64)+= $(call cc-option,-mcmodel=medium,$(call cc-option,-mminimal-toc))
CFLAGS-$(CONFIG_PPC64)+= $(call cc-option,-mno-pointers-to-nested-functions)
-# Clang unconditionally reserves r2 on ppc32 and does not support the flag
+## https://bugs.llvm.org/show_bug.cgi?id=39555
+CFLAGS-$(CONFIG_PPC32):= $(call cc-option,-ffixed-r2 $(MULTIPLEWORD))
+CFLAGS-$(CONFIG_PPC32):= $(call cc-option,-ffixed-r2)
+
+CFLAGS-$(CONFIG_PPC32)+= $(call cc-option,-mno-sched-epilog)
+CFLAGS-$(CONFIG_PPC32)+= $(call cc-option,-mno-sched-epilog)
+## https://bugs.llvm.org/show_bug.cgi?id=39556
+CFLAGS-$(CONFIG_PPC32)+= $(call cc-option, $(MULTIPLEWORD))
+
ifeq ($(CONFIG_PPC_BOOK3S_64),y)
CFLAGS-$(CONFIG_GENERIC_CPU) += $(call cc-option,-mtune=power7,-mtune=power4)
@@ -236,12 +247,22 @@
# Work around a gcc code-gen bug with -fno-omit-frame-pointer.
ifeq ($(CONFIG_FUNCTION_TRACER),y)
-KBUILD_CFLAGS+= -mno-sched-epilog
+## Work around gcc code-gen bugs with -pg / -fno-omit-frame-pointer in gcc <= 4.8
+## https://gcc.gnu.org/bugzilla/show_bug.cgi?id=44199
+## https://gcc.gnu.org/bugzilla/show_bug.cgi?id=52828
+ifneq ($(cc-name),clang)
+KBUILD_CFLAGS+= $(call cc-ifversion, -lt, 0409, -mno-sched-epilog)
+endif
endif

cpu-as=$(CONFIG_4xx)= -Wa,-m405

cpu-as=$(CONFIG_ALTIVEC)= $(call as-option,-Wa$(comma)-malitevec)
-cpu-as=$(CONFIG_E200)= -Wa,-me200
+
+## When using '-many -mpower4' gas will first try and find a matching power4
+## mnemonic and failing that it will allow any valid mnemonic that GAS knows
+## about. GCC will pass -many to GAS when assembling, clang does not.
+cpu-as=$(CONFIG_PPC_BOOK3S_64)= -Wa,-mpower4 -Wa,-many
+cpu-as=$(CONFIG_PPC_E500MC)= $(call as-option,-Wa$(comma)-me500mc)
KBUILD_AFLAGS += $(cpu-as-y)
KBUILD_CFLAGS += $(cpu-as-y)
@@ -279,7 +300,7 @@
 all: zImage

# With make 3.82 we cannot mix normal and wildcard targets
-BOOT_TARGETS1 := zImage zImage.initrd uImage
+BOOT_TARGETS1 := zImage zImage.initrd uImage vmlinux.strip
BOOT_TARGETS2 := zImage% dtbImage% treeImage.% cuImage.% simpleImage.% uImage.%

PHONY += $(BOOT_TARGETS1) $(BOOT_TARGETS2)
@@ -380,7 +401,9 @@
ifeq ($(CONFIG_PPC64),y)
$(Q)$(MAKE) $(build)=arch/$(ARCH)/kernel/vdso64 $@
endif
+ifdef CONFIG_VDSO32
$(Q)$(MAKE) $(build)=arch/$(ARCH)/kernel/vdso32 $@
+endif

archclean:
$(Q)$($MAKE) $(clean)=$(boot)
@@ -391,36 +414,9 @@
# to stdout and these checks are run even on install targets.
TOUT:= .tmp_gas_check

-# Check gcc and binutils versions:
-# - gcc-3.4 and binutils-2.14 are a fatal combination
-# - Require gcc 4.0 or above on 64-bit
-# - gcc-4.2.0 has issues compiling modules on 64-bit
+# Check toolchain versions:
+# - gcc-4.6 is the minimum kernel-wide version so nothing required.
checkbin:
-@if test "$(cc-name)" != "clang" \n-    && test "$(cc-version)" = "0304" ; then \n-    -if !/bin/echo mftb 5 | $(AS) -v -mppc -many -o $(TOUT) >/dev/null 2>&1 ; then \n-    -echo 'n *** Please upgrade your binutils or downgrade your gcc'; \n-    -false; \n-    -fi ; \n-    -fi
-@if test "$(cc-name)" != "clang" \n-    && test "$(cc-version)" = "0400" \n-    && test "x$(CONFIG_PPC64)" = "xy" ; then \n-        echo -n "Sorry, GCC v4.0 or above is required to build "; \n-        echo "the 64-bit powerpc kernel." ; \n-        false ; \n-    fi

-@if test "$(cc-name)" != "clang" \
-   && test "$(cc-fullversion)" = "040200" \
-   && test "x${CONFIG_MODULES}${CONFIG_PPC64}" = "xyy" ; then \
-echo -n "*** GCC-4.2.0 cannot compile the 64-bit powerpc ' ; \
-echo 'kernel with modules enabled.' ; \
-echo -n "*** Please use a different GCC version or ' ; \
-echo 'disable kernel modules'; \
-false ; \
-fi
@if test "x${CONFIG_CPU_LITTLE_ENDIAN}" = "xy" \
   && $(LD) --version | head -1 | grep ' 2.24$' >/dev/null ; then \
echo -n '*** binutils 2.24 miscompiles weak symbols ' ; \
--- linux-4.15.0.orig/arch/powerpc/boot/4xx.c 
+++ linux-4.15.0/arch/powerpc/boot/4xx.c 
@ @ -232.7 +232.7 @@
dpath = 8; /* 64 bits */

/* get address pins (rows) */
- val = SDRAM0_READ(DDR0_42);
+val = SDRAM0_READ(DDR0_42);

row = DDR_GET_VAL(val, DDR_APIN, DDR_APIN_SHIFT);
if (row > max_row)
--- linux-4.15.0.orig/arch/powerpc/boot/Makefile 
+++ linux-4.15.0/arch/powerpc/boot/Makefile 
@ @ -24.8 +24.8 @@
compress-$(CONFIG_KERNEL_XZ) := CONFIG_KERNEL_XZ

BOOTCFLAGS := -Wall -Wundef -Wstrict-prototypes -Wno-trigraphs \
 -fno-strict-aliasing -Os -mssoft-float -pipe \
 -fomit-frame-pointer -fno-builtin -fPIC -nostdinc \
+ -fno-strict-aliasing -Os -mssoft-float -mno-altivec -mno-vsx \
+ -pipe -fomit-frame-pointer -fno-builtin -fPIC -nostdinc \
-D$(compress-y)

BOOTCC := $(CC)
@ @ -49.6 +49.11 @@

BOOTAFLAGS:=-D__ASSEMBLY__ $(BOOTCFLAGS) -traditional -nostdinc

+ifeq ($(cc-name),clang)
+BOOTCFLAGS += $(CLANG_FLAGS)
+BOOTAFLAGS += $(CLANG_FLAGS)
+endif
+
 ifdef CONFIG_DEBUG_INFO
 BOOTCFLAGS+= -g
 endif

libfdt := fdt.c fdt_ro.c fdt_wip.c fdt_sw.c fdt_rw.c fdt_strerror.c
libfdtheader := fdt.h libfdt.h libfdt_internal.h

src-wlib-$(CONFIG_PPC_MPC52xx) += mpc52xx-psc.c

ifdef CONFIG_PPC64_BOOT_WRAPPER
src-wlib-$(CONFIG_PPC64_BOOT_WRAPPER) += opal-calls.S
endif

/* write back */
-i.seek(fd, (long) 0, SEEK_SET);
+i = i.seek(fd, (long) 0, SEEK_SET);
+if (i < 0) {
+    perror("i.seek");
+    exit(1);
+}

-rela = 7
-relacount = 0x6ffffff9

-put_16(E_PHNUM, np + 2);

/* A procedure descriptor used when booting this as a COFF file.
 * When making COFF, this comes first in the link and we're
 * linked at 0x500000.
 * @ @ -23,6 +23,8 @@
 .globl _zimage_start_opd
 _zimage_start_opd:
.long 0x500000, 0, 0, 0
+.text
+b_zimage_start

#ifdef __powerpc64__
  .balign 8
@@ -48,7 +50,6 @@
#endif

.weak zimage_start
.globl zimage_start
__zimage_start:
.globl zimage_start_lib
__zimage_start_lib:
--- linux-4.15.0.orig/arch/powerpc/boot/devtree.c
+++ linux-4.15.0/arch/powerpc/boot/devtree.c
@@ -17,6 +17,7 @@
#include "string.h"
#include "stdio.h"
#include "ops.h"
+#include "of.h"

void dt_fixup_memory(u64 start, u64 size)
{
    if (getprop(root, "#address-cells", &naddr, sizeof(naddr)) < 0)
        naddr = 2;
    +else
        naddr = be32_to_cpu(naddr);
    if (naddr < 1 || naddr > 2)
        fatal("Can't cope with #address-cells == %d in /\n\r", naddr);

    if (getprop(root, "#size-cells", &nsize, sizeof(nsize)) < 0)
        nsize = 1;
    +else
        nsize = be32_to_cpu(nsize);
    if (nsize < 1 || nsize > 2)
        fatal("Can't cope with #size-cells == %d in /\n\r", nsize);

    i = 0;
    if (naddr == 2)
        -memreg[i++] = start >> 32;
        -memreg[i++] = start & 0xffffffff;
        +memreg[i++] = cpu_to_be32(start >> 32);
        +memreg[i++] = cpu_to_be32(start & 0xffffffff);
    if (nsize == 2)
        -memreg[i++] = size >> 32;
memreg[i++] = size & 0xffffffff;
+memreg[i++] = cpu_to_be32(size >> 32);
+memreg[i++] = cpu_to_be32(size & 0xffffffff);

memory = finddevice("/memory");
if (! memory) {
    printf("Memory <- <0x%x", memreg[0]);
    +printf("<0x%x", cpu_to_be32(memreg[0]));
    for (i = 1; i < (naddr + nsize); i++)
        -printf("0x%x", memreg[i]);
        +printf("0x%x", be32_to_cpu(memreg[i]));
    printf("\n\r\t> (%ldMB)\n\r", (unsigned long)(size >> 20));
}

setprop(memory, "reg", memreg, (naddr + nsize)*sizeof(u32));
@@ -69,10 +74,10 @@
printf("CPU bus-frequency <- 0x%x (%dMHz)\n\r", bus, MHZ(bus));

while ((devp = find_node_by_devtype(devp, "cpu"))) {
    -setprop_val(devp, "clock-frequency", cpu);
    -setprop_val(devp, "timebase-frequency", tb);
    +setprop_val(devp, "clock-frequency", cpu_to_be32(cpu));
    +setprop_val(devp, "timebase-frequency", cpu_to_be32(tb));
    if (bus > 0)
        -setprop_val(devp, "bus-frequency", bus);
        +setprop_val(devp, "bus-frequency", cpu_to_be32(bus));
}

timebase_period_ns = 1000000000 / tb;
@@ -84,7 +89,7 @@

if (devp) {
    printf("%s: clock-frequency <- %x (%dMHz)\n\r", path, freq, MHZ(freq));
    -setprop_val(devp, "clock-frequency", freq);
    +setprop_val(devp, "clock-frequency", cpu_to_be32(freq));
}

@@ -137,8 +142,12 @@

if (devp) {
    printf("%s: clock-frequency <- %x (%dMHz)\n\r", path, freq, MHZ(freq));
    -setprop_val(devp, "clock-frequency", freq);
    +setprop_val(devp, "clock-frequency", cpu_to_be32(freq));
}

@@ -176,3 +181,12 @@

if (getprop(node, ":address-cells", naddr, 4) != 4)
    -*naddr = 2;
    +else
    +*naddr = be32_to_cpu(*naddr);

if (getprop(node, ":size-cells", nsize, 4) != 4)
*nsize = 1;
+else
+nsize = be32_to_cpu(*nsize);
}

static void copy_val(u32 *dest, u32 *src, int naddr)
@@ -167,9 +176,9 @@
 int i, carry = 0;

 for (i = MAX_ADDR_CELLS - 1; i >= MAX_ADDR_CELLS - naddr; i--) {
- u64 tmp = (u64)reg[i] + add[i] + carry;
+ u64 tmp = (u64)be32_to_cpu(reg[i]) + be32_to_cpu(add[i]) + carry;
 carry = tmp >> 32;
-reg[i] = (u32)tmp;
+reg[i] = cpu_to_be32((u32)tmp);
 }

 return !carry;
@@ -184,18 +193,18 @@
 u32 end;

 for (i = 0; i < MAX_ADDR_CELLS; i++) {
- if (reg[i] < range[i])
+ if (be32_to_cpu(reg[i]) < be32_to_cpu(range[i]))
 return 0;
- if (reg[i] > range[i])
+ if (be32_to_cpu(reg[i]) > be32_to_cpu(range[i]))
 break;
 }

 for (i = 0; i < MAX_ADDR_CELLS; i++) {
- end = range[i] + rangesize[i];
+ end = be32_to_cpu(range[i]) + be32_to_cpu(rangesize[i]);

- if (reg[i] < end)
+ if (be32_to_cpu(reg[i]) < end)
 break;
- if (reg[i] > end)
+ if (be32_to_cpu(reg[i]) > end)
 return 0;
 }

@@ -244,7 +253,6 @@
 return 0;

 dt_get_reg_format(parent, &naddr, &nsize);
- if (nsize > 2)
return 0;

@@ -256,10 +264,10 @@
copy_val(last_addr, prop_buf + offset, naddr);

-ret_size = prop_buf[offset + naddr];
+ret_size = be32_to_cpu(prop_buf[offset + naddr]);
if (nsize == 2) {
  ret_size <<= 32;
-ret_size |= prop_buf[offset + naddr + 1];
+ret_size |= be32_to_cpu(prop_buf[offset + naddr + 1]);
}
for (;;) {
  @@ -282,7 +290,6 @@
  offset = find_range(last_addr, prop_buf, prev_naddr,
      naddr, prev_nsize, buflen / 4);
  -
  if (offset < 0)
    return 0;
  @@ -300,8 +307,7 @@
  if (naddr > 2)
    return 0;
    -ret_addr = ((u64)last_addr[2] << 32) | last_addr[3];
-  +ret_addr = ((u64)be32_to_cpu(last_addr[2]) << 32) | be32_to_cpu(last_addr[3]);
  if (sizeof(void *) == 4 &&
    (ret_addr >= 0x100000000ULL || ret_size > 0x100000000ULL ||
     ret_addr + ret_size > 0x100000000ULL))
  @@ -354,11 +360,14 @@
  int dt_get_virtual_reg(void *node, void **addr, int nres)
  {
    unsigned long xaddr;
    -int n;
    +int n, i;

    n = getprop(node, "virtual-reg", addr, nres * 4);
    -if (n > 0)
    +if (n > 0) {
      +for (i = 0; i < n/4; i++)
      +((u32 *)addr)[i] = be32_to_cpu(((u32 *)addr)[i]);
      return n / 4;
    +}
for (n = 0; n < nres; n++) {
    if (!dt_xlate_reg(node, n, &xaddr, NULL))
        --- linux-4.15.0.orig/arch/powerpc/boot/dts/bamboo.dts
+++ linux-4.15.0/arch/powerpc/boot/dts/bamboo.dts
@@ -268,8 +268,10 @@
    /* Outbound ranges, one memory and one IO,
        * later cannot be changed. Chip supports a second
        * IO range but we don't use it for now
    + * The chip also supports a larger memory range but
    + * it's not naturally aligned, so our code will break
    */
-ranges = <0x02000000 0x00000000 0xa0000000 0x00000000 0x40000000 0x02000000 0x00000000
++ranges = <0x02000000 0x00000000 0xa0000000 0x00000000 0xa0000000 0x00000000 0x20000000
 0x02000000 0x00000000 0x00000000 0x00000000 0xe0000000 0x00000000 0x01000000
 0x01000000 0x00000000 0x00000000 0x00000000 0xe8000000 0x00000000 0x00010000>;

--- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/p1010si-post.dtsi
+++ linux-4.15.0/arch/powerpc/boot/dts/fsl/p1010si-post.dtsi
@@ -122,7 +122,15 @@
};

/include/ "pq3-i2c-0.dtsi"
+i2c@3000 { 
    +fsl,i2c-erratum-a004447; 
    +};
    +
/include/ "pq3-i2c-1.dtsi"
+i2c@3100 { 
    +fsl,i2c-erratum-a004447; 
    +};
    +
/include/ "pq3-duart-0.dtsi"
/include/ "pq3-espi-0.dtsi"
spi0: spi@7000 { 
--- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/p2041si-post.dtsi
+++ linux-4.15.0/arch/powerpc/boot/dts/fsl/p2041si-post.dtsi
@@ -389,7 +389,23 @@
};

/include/ "qoriq-i2c-0.dtsi"
+i2c@118000 { 
    +fsl,i2c-erratum-a004447; 
    +};
    +
i2c@118100 { 
    +fsl,i2c-erratum-a004447; 
    +};
    +
`/include/ "qoriq-i2c-1.dtsi"
+i2c@119000 {
+  fsl,i2c-erratum-a004447;
+};
+
i2c@119100 {
+  fsl,i2c-erratum-a004447;
+};

`/include/ "qoriq-duart-0.dtsi"
`/include/ "qoriq-duart-1.dtsi"
`/include/ "qoriq-gpio-0.dtsi"

--- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-0-best-effort.dtsi
+++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-0-best-effort.dtsi
@@ -63,6 +63,7 @@
     fsl,erratum-a011043; /* must ignore read errors */

 pcsphy0: ethernet-phy@0 {
   reg = <0x0>;
--- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-0.dtsi
+++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-0.dtsi
@@ @ -60,6 +60,7 @@
     fsl,erratum-a011043; /* must ignore read errors */

 pcsphy6: ethernet-phy@0 {
   reg = <0x0>;
--- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-1-best-effort.dtsi
+++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-1-best-effort.dtsi
@@ @ -63,6 +63,7 @@
     fsl,erratum-a011043; /* must ignore read errors */

 pcsphy1: ethernet-phy@0 {
   reg = <0x0>;
--- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-1.dtsi
+++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-10g-1.dtsi
@@ @ -60,6 +60,7 @@
     fsl,erratum-a011043; /* must ignore read errors */

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+fsl.erratum-a011043; /* must ignore read errors */

pcsphy7: ethernet-phy@0 {
    reg = <0x0>;
    --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-0.dtsi
    +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-0.dtsi
    @ @ -.59,6 +59,7 @@
    #size-cells = <0>;
    compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
    reg = <0xe1000 0x1000>;
    +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy0: ethernet-phy@0 {
    reg = <0x0>;
    --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-1.dtsi
    +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-1.dtsi
    @ @ -.59,6 +59,7 @@
    #size-cells = <0>;
    compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
    reg = <0xe3000 0x1000>;
    +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy1: ethernet-phy@0 {
    reg = <0x0>;
    --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-2.dtsi
    +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-2.dtsi
    @ @ -.59,6 +59,7 @@
    #size-cells = <0>;
    compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
    reg = <0xe5000 0x1000>;
    +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy2: ethernet-phy@0 {
    reg = <0x0>;
    --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-3.dtsi
    +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-3.dtsi
    @ @ -.59,6 +59,7 @@
    #size-cells = <0>;
    compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
    reg = <0xe7000 0x1000>;
    +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy3: ethernet-phy@0 {
    reg = <0x0>;
    --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-4.dtsi
    +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-0-1g-4.dtsi
    @ @ -.59,6 +59,7 @@
    #size-cells = <0>;
}
compatible = "fsl.fman-memac-mdio", "fsl.fman-xmdio";
reg = <0xe9000 0x1000>;
+fsl.erratum-a011043; /* must ignore read errors */

pcsphy4: ethernet-phy@0 {
  reg = <0x0>;
  ...
+++
  reg = <0xeb000 0x1000>
  +		fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy5: ethernet-phy@0 {
  reg = <0x0>;
  ...
+++
  reg = <0xf1000 0x1000>
  +		fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy14: ethernet-phy@0 {
  reg = <0x0>;
  ...
+++
  reg = <0xf3000 0x1000>
  +		fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy15: ethernet-phy@0 {
  reg = <0x0>;
  ...
+++
  reg = <0xe1000 0x1000>
  +		fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy8: ethernet-phy@0 {
  reg = <0x0>;
  ...
+++
  reg = <0xe1000 0x1000>
  +		fsl.erratum-a011043; /* must ignore read errors */
}
#size-cells = <0>;
compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
reg = <0xe3000 0x1000>;
fsl.erratum-a011043; /* must ignore read errors */

pcsphy9: ethernet-phy@0 {
  reg = <0x0>;
  --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-2.dtsi
  +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-2.dtsi
  @ @ -59.6 +59.7 @ @
  #size-cells = <0>;
  compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
  reg = <0xe5000 0x1000>;
  +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy10: ethernet-phy@0 {
  reg = <0x0>;
  --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-3.dtsi
  +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-3.dtsi
  @ @ -59.6 +59.7 @ @
  #size-cells = <0>;
  compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
  reg = <0xe7000 0x1000>;
  +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy11: ethernet-phy@0 {
  reg = <0x0>;
  --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-4.dtsi
  +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-4.dtsi
  @ @ -59.6 +59.7 @ @
  #size-cells = <0>;
  compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
  reg = <0xe9000 0x1000>;
  +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy12: ethernet-phy@0 {
  reg = <0x0>;
  --- linux-4.15.0.orig/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-5.dtsi
  +++ linux-4.15.0/arch/powerpc/boot/dts/fsl/qoriq-fman3-1-1g-5.dtsi
  @ @ -59.6 +59.7 @ @
  #size-cells = <0>;
  compatible = "fsl,fman-memac-mdio", "fsl,fman-xmdio";
  reg = <0xeb000 0x1000>;
  +fsl.erratum-a011043; /* must ignore read errors */
}

pcsphy13: ethernet-phy@0 {
  reg = <0x0>;
}
fm1mac3: ethernet@e4000 {
  phy-handle = <&sgmii_aqr_phy3>;
  -phy-connection-type = "sgmii-2500";
  +phy-connection-type = "2500base-x";
  sleep = <&rcpm 0x20000000>;
};

--- linux-4.15.0.orig/arch/powerpc/boot/libfdt_env.h
+++ linux-4.15.0/arch/powerpc/boot/libfdt_env.h
@@ -5,6 +5,10 @@
#include <types.h>
#include <string.h>
+#define INT_MAX			((int)(~0U>>1))
+#define UINT32_MAX			((u32)~0U)
+#define INT32_MAX			((s32)(UINT32_MAX >> 1))
+
#include "of.h"

typedef u32 uint32_t;
--- linux-4.15.0.orig/arch/powerpc/boot/ns16550.c
+++ linux-4.15.0/arch/powerpc/boot/ns16550.c
@@ -15,6 +15,7 @@
#include "stdio.h"
#include "io.h"
#include "ops.h"
+  #include "of.h"

#define UART_DLL	0	/* Out: Divisor Latch Low */
#define UART_DLM	1	/* Out: Divisor Latch High */
@@ -58,16 +59,20 @@
int n;
  u32 reg_offset;

-#define UART_DLL0/* Out: Divisor Latch Low */
-#define UART_DLM1/* Out: Divisor Latch High */
@@ -58,16 +59,20 @@
int n;
  u32 reg_offset;

-#define UART_DLL0/* Out: Divisor Latch Low */
-#define UART_DLM1/* Out: Divisor Latch High */
@@ -58,16 +59,20 @@
int n;
  u32 reg_offset;

  *if (dt_get_virtual_reg(devp, (void **)reg_base, 1) < 1)
+if (dt_get_virtual_reg(devp, (void **)reg_base, 1) < 1) {
    printf("virt reg parse fail...\r\n");
    return -1;
  }
+
  n = getprop(devp, "reg-offset", &reg_offset, sizeof(reg_offset));
  if (n == sizeof(reg_offset))
    -reg_base += reg_offset;
+reg_base += be32_to_cpu(reg_offset);
n = getprop(devp, "reg-shift", &reg_shift, sizeof(reg_shift));
if (n != sizeof(reg_shift))
    reg_shift = 0;
+else
+reg_shift = be32_to_cpu(reg_shift);
    scdp->open = ns16550_open;
    scdp->putc = ns16550_putchar;
--- linux-4.15.0.orig/arch/powerpc/boot/opal.c
+++ linux-4.15.0/arch/powerpc/boot/opal.c
@@ -13,8 +13,6 @@
#include <libfdt.h>
#include ../include/asm/opal-api.h
-#ifdef CONFIG_PPC64_BOOT_WRAPPER
-    /* Global OPAL struct used by opal-call.S */
struct opal {
    u64 base;
    @ @ -101,9 +99,3 @@

return 0;
}
#else
-int opal_console_init(void *devp, struct serial_console_data *scdp)
-{  
-return -1;
-}  
-#endif /* __powerpc64__ */
--- linux-4.15.0.orig/arch/powerpc/boot/serial.c
+++ linux-4.15.0/arch/powerpc/boot/serial.c
@@ -129,7 +129,7 @@
    dt_is_compatible(devp, "fsl,cpm2-scc-uart") ||
    dt_is_compatible(devp, "fsl,cpm2-smc-uart")
rc = cpm_console_init(devp, &serial_cd);
-#ifdef CONFIG_PPC_MPC52XX
+#ifdef CONFIG_PPC_MPC52XX
else if (dt_is_compatible(devp, "fsl,mpc5200-psc-uart"))
    rc = mpc5200_psc_console_init(devp, &serial_cd);
#endif
--- linux-4.15.0.orig/arch/powerpc/boot/xz_config.h
+++ linux-4.15.0/arch/powerpc/boot/xz_config.h
@@ -20,10 +20,30 @@
#ifdef __LITTLE_ENDIAN__
#define get_le32(p) (*((uint32_t *) (p)))
+#define cpu_to_be32(x) swab32(x)
+static inline u32 be32_to_cpup(const u32 *p)
+{
+    return swab32p(u32 *)p;
+}
#else
#define get_le32(p) swab32p(p)
#define cpu_to_be32(x) (x)
+static inline u32 be32_to_cpup(const u32 *p)
+{
+    return *p;
+}
#endif

+static inline uint32_t get_unaligned_be32(const void *p)
+{
+    return be32_to_cpup(p);
+}
+
+static inline void put_unaligned_be32(u32 val, void *p)
+{
+    *((u32 *)p) = cpu_to_be32(val);
+}
+
#define memeq(a, b, size) (memcmp(a, b, size) == 0)
#define memzero(buf, size) memset(buf, 0, size)

--- linux-4.15.0.orig/arch/powerpc/configs/85xx-hw.config
+++ linux-4.15.0/arch/powerpc/configs/85xx-hw.config
@@ -2,7 +2,6 @@
CONFIG_AT803X_PHY=y
(CONFIG_ATA=y
CONFIG_BLK_DEV_SD=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_BLK_DEV_SR=y
CONFIG_BROADCOM_PHY=y
CONFIG_C293_PCIE=y
--- linux-4.15.0.orig/arch/powerpc/configs/amigaone_defconfig
+++ linux-4.15.0/arch/powerpc/configs/amigaone_defconfig
@@ -48,7 +48,6 @@
CONFIG_BLK_DEV_SD=y
.CONFIG_CHR_DEV_ST=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_BLK_DEV_SR=y
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_SYM53C8XX_2=y
--- linux-4.15.0.orig/arch/powerpc/configs/chrp32_defconfig
+++ linux-4.15.0/arch/powerpc/configs/chrp32_defconfig
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SYM53C8XX_2=y
--- linux-4.15.0.orig/arch/powerpc/configs/g5_defconfig
+++ linux-4.15.0/arch/powerpc/configs/g5_defconfig
@@ -63,7 +63,6 @@
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SPI_ATTRS=y
--- linux-4.15.0.orig/arch/powerpc/configs/maple_defconfig
+++ linux-4.15.0/arch/powerpc/configs/maple_defconfig
@@ -42,7 +42,6 @@
# CONFIG_SCSI_PROC_FS is not set
CONFIG_BLK_DEV_SD=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_IPR=y
CONFIG_ATA=y
--- linux-4.15.0.orig/arch/powerpc/configs/pasemi_defconfig
+++ linux-4.15.0/arch/powerpc/configs/pasemi_defconfig
@@ -61,7 +61,6 @@
CONFIG_CHR_DEV_ST=y
CONFIG_CHR_DEV_OSST=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_CHR_DEV_SCH=y
CONFIG_SCSI_CONSTANTS=y
@@ -111,7 +110,6 @@
CONFIG_FB_NVIDIA_I2C=y
CONFIG_FB_RADEON=y
# CONFIG_LCD_CLASS_DEVICE is not set
-CONFIG_VGACON_SOFT_SCROLLBACK=y
CONFIG_LOGO=y
CONFIG_SOUND=y
CONFIG_SND=y
--- linux-4.15.0.orig/arch/powerpc/configs/pmac32_defconfig
+++ linux-4.15.0/arch/powerpc/configs/pmac32_defconfig
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_FC_ATTRS=y
--- linux-4.15.0.orig/arch/powerpc/configs/powernv_defconfig
+++ linux-4.15.0/arch/powerpc/configs/powernv_defconfig
@@ -104,7 +104,6 @@
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=m
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_FC_ATTRS=y
--- linux-4.15.0.orig/arch/powerpc/configs/ppc64_defconfig
+++ linux-4.15.0/arch/powerpc/configs/ppc64_defconfig
@@ -94,7 +94,6 @@
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=m
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_FC_ATTRS=y
--- linux-4.15.0.orig/arch/powerpc/configs/ppc64e_defconfig
+++ linux-4.15.0/arch/powerpc/configs/ppc64e_defconfig
@@ -61,7 +61,6 @@
CONFIG_BLK_DEV_SD=y
CONFIG_CHR_DEV_ST=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_FC_ATTRS=y
--- linux-4.15.0.orig/arch/powerpc/configs/ppc6xx_defconfig
+++ linux-4.15.0/arch/powerpc/configs/ppc6xx_defconfig
@@ -375,7 +375,6 @@
CONFIG_CHR_DEV_ST=m
CONFIG_CHR_DEV_OSST=m
CONFIG_BLK_DEV_SR=m
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_CHR_DEV_SCH=m
CONFIG_SCSI_ENCLOSURE=m
CONFIG_FB_SM501=m
CONFIG_FB_IBM_GXT4500=y
CONFIG_LCD_PLATFORM=m
-CONFIG_VGACON_SOFT_SCROLLBACK=y
CONFIG_FRAMEBUFFER_CONSOLE=y
CONFIG_FRAMEBUFFER_CONSOLE_ROTATION=y
CONFIG_LOGO=y
--- linux-4.15.0.orig/arch/powerpc/configs/pseries_defconfig
+++ linux-4.15.0/arch/powerpc/configs/pseries_defconfig
@@ -98,7 +98,6 @@
 CONFIG_BLK_DEV_SD=y
 CONFIG_CHR_DEV_ST=m
 CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=y
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_FC_ATTRS=y
--- linux-4.15.0.orig/arch/powerpc/configs/skiroot_defconfig
+++ linux-4.15.0/arch/powerpc/configs/skiroot_defconfig
@@ -77,7 +77,6 @@
# CONFIG_CXL is not set
CONFIG_BLK_DEV_SD=m
CONFIG_BLK_DEV_SR=m
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=m
 CONFIG_SCSI_CONSTANTS=y
 CONFIG_SCSI_SCAN_ASYNC=y
@@ -195,6 +194,7 @@
 CONFIG_MSDOS_FS=m
 CONFIG_VFAT_FS=m
 CONFIG_PROC_KCORE=y
+CONFIG_HUGETLBFS=y
 CONFIG_TMPFS=y
 CONFIG_TMPFS_POSIX_ACL=y
# CONFIG_MISC_FILESYSTEMS is not set
--- linux-4.15.0.orig/arch/powerpc/crypto/crc32c-vpmsum_glue.c
+++ linux-4.15.0/arch/powerpc/crypto/crc32c-vpmsum_glue.c
@@ -141,6 +141,7 @@
 .cra_name		= "crc32c",
 .cra_driver_name	= "crc32c-vpmsum",
 .cra_priority		= 200,
+.cra_flags= CRYPTO_ALG_OPTIONAL_KEY,
 .cra_blocksize= CHKSUM_BLOCK_SIZE,
 .cra_ctxsize= sizeof(u32),
 .cra_module		= THIS_MODULE,
--- linux-4.15.0.orig/arch/powerpc/include/asm/archrandom.h
+++ linux-4.15.0/arch/powerpc/include/asm/archrandom.h
unsigned long val;
int rc;

-rc = arch_get_random_long(&val);
+rc = arch_get_random_seed_long(&val);
if (rc)
*val = val;

--- linux-4.15.0.orig/arch/powerpc/include/asm/asm-prototypes.h
+++ linux-4.15.0/arch/powerpc/include/asm/asm-prototypes.h
@@ -126,4 +126,25 @@
void _mcount(void);
unsigned long prepare_ftrace_return(unsigned long parent, unsigned long ip);

+void pnv_power9_force_smt4_catch(void);
+void pnv_power9_force_smt4_release(void);
+
+/* Transaction memory related */
+void tm_enable(void);
+void tm_disable(void);
+void tm_abort(uint8_t cause);
+
+struct kvm_vcpu;
+void _kvmppc_restore_tm_pr(struct kvm_vcpu *vcpu, u64 guest_msr);
+void _kvmppc_save_tm_pr(struct kvm_vcpu *vcpu, u64 guest_msr);
+
+/* Patch sites */
+extern s32 patch__call_flush_count_cache;
+extern s32 patch__flush_count_cache_return;
+extern s32 patch__flush_link_stack_return;
+extern s32 patch__call_kvm_flush_link_stack;
+
+extern long flush_count_cache;
+extern long kvm_flush_link_stack;
+
#endif /* _ASM_POWERPC_ASM_PROTOTYPES_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/barrier.h
+++ linux-4.15.0/arch/powerpc/include/asm/barrier.h
@@ -35,12 +35,15 @@
#define rmb() __asm__ __volatile__ ("sync" : : : "memory")
#define wmb() __asm__ __volatile__ ("sync" : : "memory")

-#ifdef __SUBARCH_HAS_LWSYNC
+/* The sub-arch has lwsync */
+#if defined(__powerpc64__) || defined(CONFIG_PPC_E500MC)
 # define SMPWMB LWSYNC
 #else

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/* clang defines this macro for a builtin, which will not work with runtime patching */
#undef __lwsync
#define __lwsync() __asm__ __volatile__ (stringify_in_c(LWSYNC) : ::"memory"
#define dma_rmb() __lwsync()
#define dma_wmb() __asm__ __volatile__ (stringify_in_c(SMPWMB) : ::"memory"
@@ -75,6 +78,27 @@
								
#ifdef CONFIG_PPC_BOOK3S_64
+#define NOSPEC_BARRIER_SLOT  nop
+#else defined(CONFIG_PPC_FSL_BOOK3E)
++#define NOSPEC_BARRIER_SLOT  nop; nop
+#endif
+
+#ifdef CONFIG_PPC_BARRIER_NOSPEC
+  /*
+   * Prevent execution of subsequent instructions until preceding branches have
+   * been fully resolved and are no longer executing speculatively.
+   */
+#define barrier_nospec_asm NOSPEC_BARRIER_FIXUP_SECTION; NOSPEC_BARRIER_SLOT
+
+// This also acts as a compiler barrier due to the memory clobber.
+#define barrier_nospec() asm (stringify_in_c(barrier_nospec_asm) ::: "memory")
+
+#else /* !CONFIG_PPC_BARRIER_NOSPEC */
+#define barrier_nospec_asm
+#define barrier_nospec()
+#endif /* CONFIG_PPC_BARRIER_NOSPEC */
+
#include <asm-generic/barrier.h>

#endif /* _ASM_POWERPC_BARRIER_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/bitops.h
+++/ linux-4.15.0/arch/powerpc/include/asm/bitops.h
@@ -220,15 +220,34 @@

 static __inline__ int fls(unsigned int x)
 {
-  return 32 - __builtin_clz(x);
+  int lz;
+  
+  if (__builtin_constant_p(x))
+    return x ? 32 - __builtin_clz(x) : 0;
+asmt("cntlzw %0,%1":"=r" (lz) ;"r" (x));


+return 32 - lz;
}

#include <asm-generic/bitops/builtin-__fls.h>

+/
+ * 64-bit can do this using one cntlzd (count leading zeroes doubleword)
+ * instruction; for 32-bit we use the generic version, which does two
+ * 32-bit fls calls.
+ */
+#ifdef CONFIG_PPC64
static __inline__ int fls64(__u64 x)
{
-int lz;
+
+if (__builtin_constant_p(x))
+return x ? 64 - __builtin_clzll(x) : 0;
+asm("cntlzd \%0,\%1" : "=r" (lz) : "r" (x));
+return 64 - lz;
}
+#else
+#include <asm-generic/bitops/fls64.h>
+#endif

+#ifdef CONFIG_PPC64
unsigned int __arch_hweight8(unsigned int w);
--- linux-4.15.0.orig/arch/powerpc/include/asm/book3s/32/pgtable.h
+++ linux-4.15.0/arch/powerpc/include/asm/book3s/32/pgtable.h
@@ -234,15 +234,18 @@

-static inline void __ptep_set_access_flags(struct mm_struct *mm,
+static inline void __ptep_set_access_flags(struct vm_area_struct *vma,
     pte_t *ptep, pte_t entry,
-     unsigned long address)
+     unsigned long address,
+     int psize)
{
     unsigned long set = pte_val(entry) &
         (_PAGE_DIRTY | _PAGE_ACCESSED | _PAGE_RW | _PAGE_EXEC);
     unsigned long clr = ~pte_val(entry) & _PAGE_RO;

     pte_update(ptep, clr, set);
+     }
+     +flush_tlb_page(vma, address);
+}
#define __HAVE_ARCH_PTE_SAME
@@ -414,9 +417,9 @@
if (pte_val(*ptep) & _PAGE_HASHPTE)
flush_hash_entry(mm, ptep, addr);
__asm__ __volatile__(`\n-stw%U0%X0 %2,%0\n
+stw%X0 %2,%0\n
eieio\n
-stw%U0%X0 %L2,%1"
+stw%X1 %L2,%1"
:"=m" (*ptep),"=m" (*((unsigned char *)ptep+4))
:"r" (pte) : "memory");

--- linux-4.15.0.orig/arch/powerpc/include/asm/book3s/64/hash-4k.h
+++ linux-4.15.0/arch/powerpc/include/asm/book3s/64/hash-4k.h
@@ -108,6 +108,12 @@
extern int hash__has_transparent_hugepage(void);
@endif

+static inline pmd_t hash__pmd_mkdevmap(pmd_t pmd)
+{
+BUG();
+return pmd;
+}
+
#endif /* !_ASSEMBLY_ */

#endif /* !__ASSEMBLY__ */

--- linux-4.15.0.orig/arch/powerpc/include/asm/book3s/64/hash-64k.h
+++ linux-4.15.0/arch/powerpc/include/asm/book3s/64/hash-64k.h
@@ -181,7 +181,7 @@
*/
static inline int hash__pmd_trans_huge(pmd_t pmd)
{
-return !!((pmd_val(pmd) & (_PAGE_PTE | H_PAGE_THP_HUGE)) ==
+return !!((pmd_val(pmd) & (_PAGE_PTE | H_PAGE_THP_HUGE | _PAGE_DEVMAP)) ==
 (_PAGE_PTE | H_PAGE_THP_HUGE));
}

@@ -209,6 +209,12 @@
untigned long addr, pmd_t *pmdp);
extern int hash__has_transparent_hugepage(void);
@endif /* CONFIG_TRANSPARENT_HUGEPAGE */
+
+static inline pmd_t hash__pmd_mkdevmap(pmd_t pmd)
+{
+return __pmd(pmd_val(pmd) | (_PAGE_PTE | H_PAGE_THP_HUGE | _PAGE_DEVMAP));

+} 
+
#endif/* __ASSEMBLY__ */

#ifndef __ASSEMBLY__ *

static inline bool gigantic_page_supported(void) 
{
+/*
+ * We used gigantic page reservation with hypervisor assist in some case.
+ * We cannot use runtime allocation of gigantic pages in those platforms
+ * This is hash translation mode LPARs.
+ */
+if (firmware_has_feature(FW_FEATURE_LPAR) && !radix_enabled())
+return false;
+
return true;
}
#endif

--- linux-4.15.0.orig/arch/powerpc/include/asm/book3s/64/kup-radix.h
+++ linux-4.15.0/arch/powerpc/include/asm/book3s/64/kup-radix.h
@@ -0,0 +1,23 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_POWERPC_BOOK3S_64_KUP_RADIX_H
+#define _ASM_POWERPC_BOOK3S_64_KUP_RADIX_H
+#include <linux/jump_label.h>
+
+DECLARE_STATIC_KEY_FALSE(uaccess_flush_key);
+
+/* Prototype for function defined in exceptions-64s.S */
+void do_uaccess_flush(void);
+
+static __always_inline void allow_user_access(void __user *to, const void __user *from,
+     unsigned long size)
+{
+}
+
+static inline void prevent_user_access(void __user *to, const void __user *from,
+     unsigned long size)
+{
+    if (static_branch_unlikely(&uaccess_flush_key))
+        do_uaccess_flush();
+}
+
+#endif /* _ASM_POWERPC_BOOK3S_64_KUP_RADIX_H */
/* Number of bits in the mm_cpumask */
atomic_t active_cpus;

/* Number of users of the external (Nest) MMU */
atomic_t copros;

/* NPU NMMU context */
struct npu_context *npu_context;

#include <linux/slab.h>
#include <linux/cpumask.h>
#include <linux/kmemleak.h>
#include <linux/percpu.h>

struct vmemmap_backing {
    void *data;
    size_t size;
    struct page *page;
    unsigned int flags;
} vmemmap_backing;

static inline pgd_t *pgd_alloc(struct mm_struct *mm)
{
    pgd_t *pgd;
    if (radix_enabled())
        return radix__pgd_alloc(mm);
    return kmem_cache_alloc(PGT_CACHE(PGD_INDEX_SIZE),
        pgtable_gfp_flags(mm, GFP_KERNEL));
    memset(pgd, 0, PGD_TABLE_SIZE);
    return pgd;
}

static inline void pgd_free(struct mm_struct *mm, pgd_t *pgd)
#define _PAGE_PTE 0x4000000000000000ULL /* distinguishes PTEs from pointers */
#define _PAGE_PRESENT 0x8000000000000000ULL /* pte contains a translation */
+/
* We need to mark a pmd pte invalid while splitting. We can do that by clearing
* the _PAGE_PRESENT bit. But then that will be taken as a swap pte. In order to
* differentiate between two use a SW field when invalidating.
* We do that temporary invalidate for regular pte entry in ptep_set_access_flags
* This is used only when _PAGE_PRESENT is cleared.
+ */
+#define _PAGE_INVALID_RPAGE_SW0

/*
 * Top and bottom bits of RPN which can be used by hash
@@ -102,7 +112,7 @@
*/
define _HPAGE_CHG_MASK (PTE_RPN_MASK | _PAGE_HPTEFLAGS | _PAGE_DIRTY | 
_PAGE_ACCESSED | H_PAGE_THP_HUGE | _PAGE_PTE | 
- _PAGE_SOFT_DIRTY)
+ _PAGE_SOFT_DIRTY | _PAGE_DEVMAP)
/*
 * user access blocked by key
 */
@@ -120,7 +130,7 @@
*/
define _PAGE_CHG_MASK (PTE_RPN_MASK | _PAGE_HPTEFLAGS | _PAGE_DIRTY | 
_PAGE_ACCESSED | _PAGE_SPECIAL | _PAGE_PTE | 
- _PAGE_SOFT_DIRTY)
+ _PAGE_SOFT_DIRTY | _PAGE_DEVMAP)
/*
 * Mask of bits returned by pte_pgprot()
 */
@@ -544,7 +554,13 @@
static inline int pte_present(pte_t pte)
{
- return !!(pte_raw(pte) & cpu_to_be64(_PAGE_PRESENT));
+ */
+ * A pte is considerent present if _PAGE_PRESENT is set.
+ * We also need to consider the pte present which is marked
+ * invalid during ptep_set_access_flags. Hence we look for _PAGE_INVALID
+ * if we find _PAGE_PRESENT cleared.
+ */
+ return !!(pte_raw(pte) & cpu_to_be64(_PAGE_PRESENT | _PAGE_INVALID));
}
/*
 * Conversion functions: convert a page and protection to a page entry,
static inline void __ptep_set_access_flags(struct mm_struct *mm, pte_t *ptep, pte_t entry, unsigned long address) {
    if (radix_enabled())
        return radix__ptep_set_access_flags(mm, ptep, entry, address);
    return hash__ptep_set_access_flags(ptep, entry);
}

#define pud_page_vaddr(pud) __va(pud_val(pud) & ~PUD_MASKED_BITS)
#define pgd_page_vaddr(pgd) __va(pgd_val(pgd) & ~PGD_MASKED_BITS)

+#define pgdir_index(address) (((address) >> (PGDIR_SHIFT)) & (PTRS_PER_PGD - 1))
+#define pud_index(address) (((address) >> (PUD_SHIFT)) & (PTRS_PER_PUD - 1))
+#define pmd_index(address) (((address) >> (PMD_SHIFT)) & (PTRS_PER_PMD - 1))
+#define pte_index(address) (((address) >> (PAGE_SHIFT)) & (PTRS_PER_PTE - 1))
+static inline unsigned long pgdir_index(unsigned long address) {
    return (address >> PGDIR_SHIFT) & (PTRS_PER_PGD - 1);
}
+static inline unsigned long pud_index(unsigned long address) {
    return (address >> PUD_SHIFT) & (PTRS_PER_PUD - 1);
}
+static inline unsigned long pmd_index(unsigned long address) {
    return (address >> PMD_SHIFT) & (PTRS_PER_PMD - 1);
}
+static inline unsigned long pte_index(unsigned long address) {
    return (address >> PAGE_SHIFT) & (PTRS_PER_PTE - 1);
}

/*
 * Find an entry in a page-table-directory. We combine the address region

static inline pmd_t pmd_mkdevmap(pmd_t pmd)
{
    return __pmd(pmd_val(pmd) | (_PAGE_PTE | _PAGE_DEVMAP));
+    if (radix_enabled())
+        return radix__pmd_mkdevmap(pmd);
+    return hash__pmd_mkdevmap(pmd);
}

static inline int pmd_devmap(pmd_t pmd)
{ 
    extern void radix__mark_initmem_nx(void);
    #endif
    +extern void radix__ptep_set_access_flags(struct vm_area_struct *vma, pte_t *ptep,
        + pte_t entry, unsigned long address,
        + int psize);
    +
    static inline unsigned long __radix_pte_update(pte_t *ptep, unsigned long clr,
        unsigned long set)
    {
        return __pte(old_pte);
    }

    /*
     * Set the dirty and/or accessed bits atomically in a linux PTE, this
     * function doesn't need to invalidate tlb.
     * */
    -static inline void radix__ptep_set_access_flags(struct mm_struct *mm,
        -pte_t *ptep, pte_t entry,
        -unsigned long address)
    -{ 
        -
        -unsigned long set = pte_val(entry) & (_PAGE_DIRTY | _PAGE_ACCESSED | 
            -_PAGE_RW | _PAGE_EXEC);
        -
        -if (cpu_has_feature(CPU_FTR_POWER9_DD1)) {
            -
            -unsigned long old_pte, new_pte;
            -
            -old_pte = __radix_pte_update(ptep, ~0, 0);
            -/*
             * new value of pte
            - */
        }
new_pte = old_pte | set;
-radix__flush_tlb_pte_p9_dd1(old_pte, mm, address);
-
-__radix_pte_update(pte, 0, new_pte);
-} else
-__radix_pte_update(pte, 0, set);
-asm volatile("ptesync" : : "memory");
-
-
static inline int radix__pte_same(pte_t pte_a, pte_t pte_b)
{
return ((pte_raw(pte_a) ^ pte_raw(pte_b)) == 0);
}

+static inline pmd_t radix__pmd_mkdevmap(pmd_t pmd)
+{
+return __pmd(pmd_val(pmd) | (_PAGE_PTE | _PAGE_DEVMAP));
+}
+
+extern int __meminit radix__vmemmap_create_mapping(unsigned long start,

 unsigned long page_size,
 unsigned long phys);
--- linux-4.15.0.orig/arch/powerpc/include/asm/book3s/64/slice.h
+++ linux-4.15.0/arch/powerpc/include/asm/book3s/64/slice.h
@@ -0,0 +1,27 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_POWERPC_BOOK3S_64_SLICE_H
+#define _ASM_POWERPC_BOOK3S_64_SLICE_H
+
+#ifdef CONFIG_PPC_MM_SLICES
+
+#define SLICE_LOW_SHIFT		28
+#define SLICE_LOW_TOP		(0x100000000ul)
+#define SLICE_NUM_LOW		(SLICE_LOW_TOP >> SLICE_LOW_SHIFT)
+#define GET_LOW_SLICE_INDEX(addr)	((addr) >> SLICE_LOW_SHIFT)
+
+#define SLICE_HIGH_SHIFT	40
+#define SLICE_NUM_HIGH		(H_PGTABLE_RANGE >> SLICE_HIGH_SHIFT)
+#define GET_HIGH_SLICE_INDEX(addr)	((addr) >> SLICE_HIGH_SHIFT)
+
+#else /* CONFIG_PPC_MM_SLICES */
+
+#define get_slice_psize(mm, addr)	((mm)->context.user_psize)
+#define slice_set_user_psize(mm, psize)
+do {
+(mm)->context.user_psize = (psize);
+(mm)->context.sllp = SLB_VSID_USER | mmu_psize_defs[(psize)].sllp; 

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+} while (0)
+
+#endif /* CONFIG_PPC_MM_SLICES */
+
+#endif /* _ASM_POWERPC_BOOK3S_64_SLICE_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/cache.h
+++ linux-4.15.0/arch/powerpc/include/asm/cache.h
@@ -9,11 +9,14 @@
#if defined(CONFIG_PPC_8xx) || defined(CONFIG_403GCX)
#define L1_CACHE_SHIFT	4
#define MAX_COPY_PREFETCH	1
+#define IFETCH_ALIGN_SHIFT	2
#endif /* _ASM_POWERPC_BOOK3S_64_SLICE_H */
"""
++
+++ linux-4.15.0/arch/powerpc/include/asm/cache.h
@@ -9,11 +9,14 @@
#if defined(CONFIG_PPC_8xx) || defined(CONFIG_403GCX)
#define L1_CACHE_SHIFT	4
#define MAX_COPY_PREFETCH	1
+#define IFETCH_ALIGN_SHIFT	2
#endif /* _ASM_POWERPC_BOOK3S_64_SLICE_H */
""
""
--- linux-4.15.0.orig/arch/powerpc/include/asm/code-patching-asm.h
+++ linux-4.15.0/arch/powerpc/include/asm/code-patching-asm.h
@@ -0,0 +1,18 @@
""
""
+/* SPDX-License-Identifier: GPL-2.0+ */
+/*
+ * Copyright 2018, Michael Ellerman, IBM Corporation.
+ */
+#=ndef _ASM_POWERPC_CODE_PATCHING_ASM_H
+=#define _ASM_POWERPC_CODE_PATCHING_ASM_H
+ +
+AGMA Define a "site" that can be patched */
+.macro patch_site label name
+.pushsection ".rodata"
+.balign 4
+.global \name
+.\name:
+.4byte \label - .
+.popsection
+.endm
+
+#endif /* _ASM_POWERPC_CODE_PATCHING_ASM_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/code-patching.h
+++ linux-4.15.0/arch/powerpc/include/asm/code-patching.h
@@ -31,8 +31,12 @@
 unsigned long target, int flags);
 int patch_branch(unsigned int *addr, unsigned long target, int flags);
int patch_instruction(unsigned int *addr, unsigned int instr);
+int raw_patch_instruction(unsigned int *addr, unsigned int instr);
+int patch_instruction_site(s32 *addr, unsigned int instr);
+int patch_branch_site(s32 *site, unsigned long target, int flags);

int instr_is_relative_branch(unsigned int instr);
+int instr_is_relative_link_branch(unsigned int instr);
int instr_is_branch_to_addr(const unsigned int *instr, unsigned long addr);
unsigned long branch_target(const unsigned int *instr);
unsigned long translate_branch(const unsigned int *dest,
@@ @ -47,7 +51,7 @@
#ifndef
#define OP_RT_RA_MASK	0xffff0000UL
-#define LIS_R2		0x3c020000UL
+#define LIS_R2		0x3c400000UL
#define ADDIS_R2_R12	0x3c4c0000UL
#define ADDI_R2_R2	0x38420000UL

--- linux-4.15.0.orig/arch/powerpc/include/asm/cpu_has_feature.h
+++ linux-4.15.0/arch/powerpc/include/asm/cpu_has_feature.h
@@ -7,7 +7,7 @@
#include <linux/bug.h>
#include <asm/cputable.h>

-static inline bool early_cpu_has_feature(unsigned long feature)
+static __always_inline bool early_cpu_has_feature(unsigned long feature)
 {
   return !!((CPU_FTRS_ALWAYS & feature) ||
           (CPU_FTRS_POSSIBLE & cur_cpu_spec->cpu_features & feature));
@@ @ -46,7 +46,7 @@
return static_branch_likely(&cpu_feature_keys[i]);
 }
#else
-static inline bool cpu_has_feature(unsigned long feature)
+static __always_inline bool cpu_has_feature(unsigned long feature)
 { return early_cpu_has_feature(feature); }

--- linux-4.15.0.orig/arch/powerpc/include/asm/cputable.h
+++ linux-4.15.0/arch/powerpc/include/asm/cputable.h
@@ @ -45,6 +45,7 @@
 extern int machine_check_e200(struct pt_regs *regs);
 extern int machine_check_47x(struct pt_regs *regs);
 int machine_check_8xx(struct pt_regs *regs);
+int machine_check_83xx(struct pt_regs *regs);

 extern void cpu_down_flush_e500v2(void);
extern void cpu_down_flush_e500mc(void);
@@ -143,41 +144,48 @@
/* CPU kernel features */

/* Retain the 32b definitions all use bottom half of word */
+/* Definitions for features that we have on both 32-bit and 64-bit chips */
#define CPU_FTR_COHERENT_ICACHEASM_CONST(0x00000001)
-#define CPU_FTR_L2CRASM CONST(0x00000002)
-#define CPU_FTR_SPEC7450ASM CONST(0x00000004)
-#define CPU_FTR_ALTIVECASM CONST(0x00000008)
-#define CPU_FTR_TAUSM CONST(0x00000010)
-#define CPU_FTR_CAN_DOZEASM CONST(0x00000020)
-#define CPU_FTR_USE_TBASM CONST(0x00000040)
-#define CPU_FTR_L2CSRASM CONST(0x00000080)
-#define CPU_FTR_601ASM CONST(0x000000100)
-#define CPU_FTR_DBELLASM CONST(0x000000200)
-#define CPU_FTR_CAN_NAPASM CONST(0x000000400)
-#define CPU_FTR_L3CRASM CONST(0x000000800)
-#define CPU_FTR_L3_DISABLE_NAPASM CONST(0x000001000)
-#define CPU_FTR_NAP_DISABLE_L2_PRASM CONST(0x000002000)
-#define CPU_FTR_DUAL_PLL_750FXASM CONST(0x000004000)
-#define CPU_FTR_NO_DPMASM CONST(0x000008000)
-#define CPU_FTR_476_DD2ASM CONST(0x000010000)
-#define CPU_FTR_NEED_COHERENTASM CONST(0x000020000)
-#define CPU_FTR_NO_BTICASM CONST(0x000040000)
-#define CPU_FTR_DEBUG_LVL_EXCASM CONST(0x000080000)
-#define CPU_FTR_NODSISRALIGNASM CONST(0x000100000)
-#define CPU_FTR_PPC_LEASM CONST(0x000200000)
-#define CPU_FTR_REAL_LEASM CONST(0x000400000)
-#define CPU_FTR_FPU_UNAVAILABLEASM CONST(0x000800000)
-#define CPU_FTR_LWSYNCASM CONST(0x001000000)
-#define CPU_FTR_SPECASM CONST(0x002000000)
-#define CPU_FTR_NEED_PAIRED_STWCXASM CONST(0x004000000)
-#define CPU_FTR_LWSYNCSASM CONST(0x008000000)
-#define CPU_FTR_NOEXECUTEASM CONST(0x010000000)
+#define CPU_FTR_ALTIVECASM CONST(0x00000002)
+#define CPU_FTR_DBELLASM CONST(0x00000004)
+#define CPU_FTR_CAN_NAPASM CONST(0x00000008)
+#define CPU_FTR_DEBUG_LVL_EXCASM CONST(0x00000010)
+#define CPU_FTR_NODSISRALIGNASM CONST(0x00000020)
+#define CPU_FTR_LWSYNCASM CONST(0x00000080)
+#define CPU_FTR_NOEXECUTEASM CONST(0x00000100)
+#define CPU_FTR_LWSYNCSASM CONST(0x00000200)
+#define CPU_FTR_FPU_UNAVAILABLEASM CONST(0x00000400)
+#define CPU_FTR_LWSYNCASM CONST(0x00000800)
+#define CPU_FTR_NOEXECUTEASM CONST(0x00000100)
+#define CPU_FTR_EMB_HVASM CONST(0x00000200)
+//#define CPU_FTR_EMB_HVASM CONST(0x00000200)
/* Definitions for features that only exist on 32-bit chips */
#define CONFIG_PPC32
#ifdef CONFIG_PPC32
#define CPU_FTR_601_ASM_CONST(0x00010000)
#define CPU_FTR_L2CRASM_CONST(0x00002000)
#define CPU_FTR_SPEC7450_ASM_CONST(0x00004000)
#define CPU_FTR_TAU_ASM_CONST(0x00008000)
#define CPU_FTR_CAN_DOZE_ASM_CONST(0x00010000)
#define CPU_FTR_USE_RTC_ASM_CONST(0x00020000)
#define CPU_FTR_L3CR_ASM_CONST(0x00040000)
#define CPU_FTR_L3_DISABLE_NAP_ASM_CONST(0x00080000)
#define CPU_FTR_NAP_DISABLE_L2_PR_ASM_CONST(0x00100000)
#define CPU_FTR_DUAL_PLL_750FX_ASM_CONST(0x00200000)
#define CPU_FTR_NO_DPM_ASM_CONST(0x00400000)
#define CPU_FTR_476_DD2_ASM_CONST(0x00800000)
#define CPU_FTR_NEED_COHERENT_ASM_CONST(0x01000000)
#define CPU_FTR_PPC_LE_ASM_CONST(0x01000000)
#define CPU_FTR_UNIFIED_ID_CACHE_ASM_CONST(0x02000000)
#define CPU_FTR_SPE_ASM_CONST(0x04000000)
#define CPU_FTR_NEED_PAIRED_STWCX_ASM_CONST(0x08000000)
#define CPU_FTR_INDEXED_DCR_ASM_CONST(0x10000000)
#define CPU_FTR_INDEXED_DCR_ASM_CONST(0x20000000)
#endif

 ifdef __powerpc64__
 @@ -186,37 +194,41 @@
 #define CPU_FTR_HVMODELONGLONG_ASM_CONST(0x0000000100000000)
 #endif

 /* Add the 64-bit processor unique features in the top half of the word;
 * Definitions for the 64-bit processor unique features;
 * on 32-bit, make the names available but defined to be 0.
 */
 ifdef __powerpc64__
 @@ -186,37 +194,41 @@
 #define LONG_ASM_CONST(x)0
 #endif

#define CPU_FTR_HVMODELONGLONG_ASM_CONST(0x0000000100000000)
#define CPU_FTR_ARCH_201ONGLONG_ASM_CONST(0x0000000200000000)
#define CPU_FTR_ARCH_206ONGLONG_ASM_CONST(0x0000000400000000)
#define CPU_FTR_ARCH_207SONGLONG_ASM_CONST(0x0000000800000000)
#define CPU_FTR_ARCH_300ONGLONG_ASM_CONST(0x0000001000000000)
#define CPU_FTR_MMCRALONGLONG_ASM_CONST(0x0000002000000000)
#define CPU_FTR_CTRLONGLONG_ASM_CONST(0x0000000400000000)
#define CPU_FTR_SMTONGLONG_ASM_CONST(0x0000000800000000)
#define CPU_FTR_PAUSE_ZERONGLONG_ASM_CONST(0x0000010000000000)
#define CPU_FTR_PURRONGLONG_ASM_CONST(0x0000020000000000)

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#define CPU_FTR_CELL_TB_BUG_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_SPURR_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_DSCR_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_VSX_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_SAO_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_CP_USE_DCBTZ_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_UNALIGNED_LD_STD_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_ASM_SYM_MTM_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_STCX_CHECKS_ADDRESS_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_POPCNT_TBL_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_POPCNT_TDLG_LONG_ASM_CONST(0x0000000000000000)

/* Free
   LONG_ASM_CONST(0x0000000000000000) */

#define CPU_FTR_VMX_COPY_LONG_ASM_CONST(0x0000000000000000)
#define CPU_FTR_TMLONG_LONG_ASM_CONST(0x0800000000000000)
#define CPU_FTR_CFASTLONG_LONG_ASM_CONST(0x0100000000000000)
#define CPU_FTR_HAS_PPRLONG_LONG_ASM_CONST(0x0200000000000000)
#define CPU_FTR_DAWR_LONG_ASM_CONST(0x0400000000000000)
#define CPU_FTR_DABRXLONG_LONG_ASM_CONST(0x0800000000000000)
#define CPU_FTR_PMAO_BUG_LONG_ASM_CONST(0x1000000000000000)
#define CPU_FTR_POWER9_DD1_LONG_ASM_CONST(0x4000000000000000)
#define CPU_FTR_POWER9_DD2_LL_LONG_ASM_CONST(0x8000000000000000)
#define CPU_FTR_REAL_LE_LONG_ASM_CONST(0x0000000000000100)
#define CPU_FTR_HVMODELONG_LONG_ASM_CONST(0x0000000000000200)
#define CPU_FTR_ARCH_201LONG_ASM_CONST(0x0000000000000400)
#define CPU_FTR_ARCH_206LONG_ASM_CONST(0x0000000000000800)
#define CPU_FTR_ARCH_207SLONG_ASM_CONST(0x0000000000010000)
#define CPU_FTR_ARCH_300LONG_ASM_CONST(0x0000000000020000)
#define CPU_FTR_MMCRLONG_ASM_CONST(0x0000000000040000)
#define CPU_FTR_CTRL_LONG_ASM_CONST(0x0000000000080000)
#define CPU_FTR_SMTLONG_ASM_CONST(0x0000000000100000)
#define CPU_FTR_PAUSE_ZERO_LONG_ASM_CONST(0x0000000000200000)
#define CPU_FTR_PURRELONGLONG_ASM_CONST(0x0000000000400000)
#define CPU_FTR_CELL_TB_BUG_LONG_ASM_CONST(0x0000000000800000)
#define CPU_FTR_SPURR_LONG_ASM_CONST(0x0000000001000000)
#define CPU_FTR_DSCR_LONG_ASM_CONST(0x0000000002000000)
#define CPU_FTR_VSX_LONG_ASM_CONST(0x0000000004000000)
#define CPU_FTR_SAO_LONG_ASM_CONST(0x0000000008000000)
#define CPU_FTR_CP_USE_DCBTZ_LONG_ASM_CONST(0x0000000010000000)
#define CPU_FTR_UNALIGNED_LD_STD_LONG_ASM_CONST(0x0000000020000000)
#define CPU_FTR_ASYM_SMT_LONG_ASM_CONST(0x0000000040000000)
#define CPU_FTR_STCX_CHECKS_ADDRESS_LONG_ASM_CONST(0x0000000080000000)
#define CPU_FTR_POPCNTB_LONG_ASM_CONST(0x0000000100000000)
#define CPU_FTR_POPCNTD_LONG_ASM_CONST(0x0000000200000000)
#define CPU_FTR_VMX_COPY_LONG_ASM_CONST(0x0000000800000000)
#define CPU_FTR_TM_LONG_ASM_CONST(0x0000010000000000)
#define CPU_FTR_CFAR_LONG_ASM_CONST(0x0000020000000000)
#define CPU_FTR_HAS_PPR_LONG_ASM_CONST(0x0000040000000000)
#define CPU_FTR_DAWR_LONG_ASM_CONST(0x0000080000000000)
#define CPU_FTR_DABRXLONG_LONG_ASM_CONST(0x0000100000000000)
#define CPU_FTR_PMAO_BUG_LONG_ASM_CONST(0x0000200000000000)
#define CPU_FTR_POWER9_DD1_LONG_ASM_CONST(0x0000400000000000)
#define CPU_FTR_POWER9_DD2_LL_LONG_ASM_CONST(0x0000800000000000)

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+#define CPU_FTR_DABRXLONG_ASM_CONST(0x0000010000000000)
+#define CPU_FTR_PMAO_BUGLONG_ASM_CONST(0x0000020000000000)
+#define CPU_FTR_POWER9_DD1LONG_ASM_CONST(0x0000040000000000)
+#define CPU_FTR_P9_TM_HV_ASSISTLONG_ASM_CONST(0x0000100000000000)
+#define CPU_FTR_P9_TM_XER_SO_BUGLONG_ASM_CONST(0x0000200000000000)
+#define CPU_FTR_P9_TLBIE_STQ_BUGLONG_ASM_CONST(0x0000400000000000)
+#define CPU_FTR_P9_TIDRLONG_ASM_CONST(0x0000800000000000)

#ifndef __ASSEMBLY__
@@ -297,21 +309,19 @@
#endif
#define CPU_FTRS_PPC601(CPU_FTR_COMMON | CPU_FTR_601 | 
    CPU_FTR_COHERENT_ICACHE | CPU_FTR_UNIFIED_ID_CACHE)
#define CPU_FTRS_603(CPU_FTR_COMMON | 
    CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | 
+CPU_FTR_COHERENT_ICACHE | CPU_FTR_UNIFIED_ID_CACHE | CPU_FTR_USE_RTC)
+#define CPU_FTRS_603(CPU_FTR_COMMON | CPU_FTR_MAYBE_CAN_DOZE | 
    CPU_FTR_MAYBE_CAN_NAP | CPU_FTR_PPC_LE)
#define CPU_FTRS_604(CPU_FTR_COMMON | 
    CPU_FTR_USE_TB | CPU_FTR_PPC_LE)
+#define CPU_FTRS_604(CPU_FTR_COMMON | CPU_FTR_MAYBE_CAN_NAP | CPU_FTR_PPC_LE)
#define CPU_FTRS_740_NOTAU(CPU_FTR_COMMON | 
    CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | CPU_FTR_L2CR | 
+CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_L2CR | 
    CPU_FTR_MAYBE_CAN_NAP | CPU_FTR_PPC_LE)
#define CPU_FTRS_740(CPU_FTR_COMMON | 
    CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | CPU_FTR_L2CR | 
+CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_L2CR | 
    CPU_FTR_TAU | CPU_FTR_MAYBE_CAN_NAP | 
    CPU_FTR_PPC_LE)
#define CPU_FTRS_750(CPU_FTR_COMMON | 
    CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | CPU_FTR_L2CR | 
+CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_L2CR | 
    CPU_FTR_TAU | CPU_FTR_MAYBE_CAN_NAP | 
    CPU_FTR_PPC_LE)
#define CPU_FTRS_750CL(CPU_FTRS_750)
@@ -320,125 +330,117 @@
#define CPU_FTRS_750FX(CPU_FTRS_750 | CPU_FTR_DUAL_PLL_750FX)
#define CPU_FTRS_750GX(CPU_FTRS_750FX)
#define CPU_FTRS_7400_NOTAU(CPU_FTR_COMMON | 
    CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | CPU_FTR_L2CR | 
+CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_L2CR | 
    CPU_FTR_TAU | CPU_FTR_MAYBE_CAN_NAP | 
    CPU_FTR_PPC_LE)
#define CPU_FTRS_7400(CPU_FTR_COMMON | 
    CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | CPU_FTR_L2CR | 
+CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_L2CR | 
    CPU_FTR_TAU | CPU_FTR_MAYBE_CAN_NAP | 
    CPU_FTR_PPC_LE)
- CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_L3CR | CPU_FTR_TAU | CPU_FTR_ALTIVEC_COMP | CPU_FTR_MAYBE_CAN_NAP | CPU_FTR_PPC_LE)
#define CPU_FTRS_7450_20(CPU_FTR_COMMON) 
- CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP |
+ CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | CPU_FTR_SPEC7450 |
  CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7450_21(CPU_FTR_COMMON) 
- CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP |
+ CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | CPU_FTR_SPEC7450 |
  CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7450_23(CPU_FTR_COMMON) 
- CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP |
+ CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | CPU_FTR_SPEC7450 |
  CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7455_1(CPU_FTR_COMMON)
- CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP |
+ CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | CPU_FTR_SPEC7450 |
  CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7455_20(CPU_FTR_COMMON) 
- CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP |
+ CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | CPU_FTR_SPEC7450 |
  CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7455(CPU_FTR_COMMON)
- CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP |
+ CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | CPU_FTR_SPEC7450 |
  CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7447_10(CPU_FTR_COMMON)
- CPU_FTR_USE_TB | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP |
+ CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | CPU_FTR_SPEC7450 |
  CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7447_11(CPU_FTR_COMMON)
CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_7447A(CPU_FTR_COMMON | \n- CPU_FTR_USE_TB | \n    CPU_FTR_MAYBE_CAN_NAP | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | \n    CPU_FTR_SPEC7450 | CPU_FTR_NAP_DISABLE_L2_PR | \n    CPU_FTR_NEED_COHERENT | CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#endif CPU_FTRS_7448(CPU_FTR_COMMON | \n- CPU_FTR_USE_TB | \n    CPU_FTR_MAYBE_CAN_NAP | CPU_FTR_L2CR | CPU_FTR_ALTIVEC_COMP | \n    CPU_FTR_SPEC7450 | CPU_FTR_NAP_DISABLE_L2_PR | \n    CPU_FTR_PPC_LE | CPU_FTR_NEED_PAIRED_STWCX)
#define CPU_FTRS_82XX(CPU_FTR_COMMON | \n- CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB)
#define CPU_FTRS_82XX(CPU_FTR_COMMON | CPU_FTR_MAYBE_CAN_DOZE)
#define CPU_FTRS_G2_LE(CPU_FTR_COMMON | CPU_FTR_MAYBE_CAN_DOZE | \n- CPU_FTR_USE_TB | CPU_FTR_MAYBE_CAN_NAP) + CPU_FTR_MAYBE_CAN_NAP)
#define CPU_FTRS_E300(CPU_FTR_MAYBE_CAN_DOZE | \n- CPU_FTR_USE_TB | CPU_FTR_MAYBE_CAN_NAP) + CPU_FTR_MAYBE_CAN_NAP | \n    CPU_FTR_COMMON) #define CPU_FTRS_E300C2(CPU_FTR_MAYBE_CAN_DOZE | \n- CPU_FTR_USE_TB | CPU_FTR_MAYBE_CAN_NAP) + CPU_FTR_MAYBE_CAN_NAP | \n    CPU_FTR_COMMON | CPU_FTR_FPU_UNAVAILABLE)
#define CPU_FTRS_CLASSIC32(CPU_FTR_COMMON | CPU_FTR_USE_TB)
#define CPU_FTRS_8XX(CPU_FTR_USE_TB | CPU_FTR_NOEXECUTE)
#define CPU_FTRS_40X(CPU_FTR_USE_TB | CPU_FTR_NODSISRALIGN | CPU_FTR_NOEXECUTE)
#define CPU_FTRS_44X(CPU_FTR_USE_TB | CPU_FTR_NODSISRALIGN | CPU_FTR_NOEXECUTE)
#define CPU_FTRS_440x6(CPU_FTR_USE_TB | CPU_FTR_NODSISRALIGN | CPU_FTR_NOEXECUTE | \n    CPU_FTR_INDEXED_DCR)
#define CPU_FTRS_47X(CPU_FTRS_440x6)
#define CPU_FTRS_E200(CPU_FTR_USE_TB | CPU_FTR_SPE_COMP | \n+define CPU_FTRS_E200(CPU_FTR_SPE_COMP | \n    CPU_FTR_NODSISRALIGN | CPU_FTR_COHERENT_ICACHE | \n    CPU_FTR_UNIFIED_ID_CACHE | CPU_FTR_NOEXECUTE | \n    CPU_FTR_DEBUG_LVL_EXC)
#define CPU_FTRS_E500(CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | \n+define CPU_FTRS_E500(CPU_FTR_MAYBE_CAN_DOZE | \n    CPU_FTR_SPE_COMP | CPU_FTR_MAYBE_CAN_NAP | CPU_FTR_NODSISRALIGN | \n    CPU_FTR_NOEXECUTE)
#define CPU_FTRS_E500_2(CPU_FTR_MAYBE_CAN_DOZE | CPU_FTR_USE_TB | \n+define CPU_FTRS_E500_2(CPU_FTR_MAYBE_CAN_DOZE |
CPU_FTR_SPE_COMP | CPU_FTR_MAYBE_CAN_NAP | 
CPU_FTR_NODISRALIGN | CPU_FTR_NOEXECUTE)
-#define CPU_FTRS_E500MC(CPU_FTR_USE_TB | CPU_FTR_NODISRALIGN | 
- CPU_FTR_L2CSR | CPU_FTR_LWSYNC | CPU_FTR_NOEXECUTE | 
+#define CPU_FTRS_E500MC(CPU_FTR_NODISRALIGN | 
+ CPU_FTR_LWSYNC | CPU_FTR_NOEXECUTE | 
CPU_FTR_DBELL | CPU_FTR_DEBUG_LVL_EXC | CPU_FTR_EMB_HV)
/*
* e5500/e6500 erratum A-006958 is a timebase bug that can use the
* same workaround as CPU_FTR_CELL_TB_BUG.
*/
-#define CPU_FTRS_E5500(CPU_FTR_USE_TB | CPU_FTR_NODISRALIGN | 
- CPU_FTR_L2CSR | CPU_FTR_LWSYNC | CPU_FTR_NOEXECUTE | 
+#define CPU_FTRS_E5500(CPU_FTR_NODISRALIGN | 
+ CPU_FTR_LWSYNC | CPU_FTR_NOEXECUTE | 
CPU_FTR_DBELL | CPU_FTR_POPCNTB | CPU_FTR_POPCNTD | 
CPU_FTR_DEBUG_LVL_EXC | CPU_FTR_EMB_HV | CPU_FTR_CELL_TB_BUG)
-#define CPU_FTRS_E6500(CPU_FTR_USE_TB | CPU_FTR_NODISRALIGN | 
- CPU_FTR_L2CSR | CPU_FTR_LWSYNC | CPU_FTR_NOEXECUTE | 
+#define CPU_FTRS_E6500(CPU_FTR_NODISRALIGN | 
+ CPU_FTR_LWSYNC | CPU_FTR_NOEXECUTE | 
CPU_FTR_DBELL | CPU_FTR_POPCNTB | CPU_FTR_POPCNTD | 
CPU_FTR_DEBUG_LVL_EXC | CPU_FTR_EMB_HV | CPU_FTR_ALTIVEC_COMP | 
CPU_FTR_CELL_TB_BUG | CPU_FTR_SMT)
-#define CPU_FTRS_GENERIC_32(CPU_FTR_COMMON | CPU_FTR_NODISRALIGN)
/* 64-bit CPUs */
-#define CPU_FTRS_POWER4(CPU_FTR_USE_TB | CPU_FTR_LWSYNC | 
- CPU_FTR_LWSYNC | 
CPU_FTR_PPCAS_ARCH_V2 | CPU_FTR_CTRL | 
CPU_FTR_MMCRA | CPU_FTR_CP_USE_DCBTZ | 
CPU_FTR_STCX_CHECKS_ADDRESS)
-#define CPU_FTRS_PPC970(CPU_FTR_USE_TB | CPU_FTR_LWSYNC | 
+ CPU_FTR_LWSYNC | 
CPU_FTR_PPCAS_ARCH_V2 | CPU_FTR_CTRL | CPU_FTR_ARCH_201 | 
CPU_FTR_ALTIVEC_COMP | CPU_FTR_CAN_NAP | CPU_FTR_MMCRA | 
CPU_FTR_CP_USE_DCBTZ | CPU_FTR_STCX_CHECKS_ADDRESS | 
CPU_FTR_HVMODE | CPU_FTR_DABRX)
-#define CPU_FTRS_POWER5 (CPU_FTR_USE_TB | CPU_FTR_LWSYNC | 
+ CPU_FTR_LWSYNC | 
CPU_FTR_PPCAS_ARCH_V2 | CPU_FTR_CTRL | 
CPU_FTR_MMCRA | CPU_FTR_SMT | 
CPU_FTR_COHERENT_ICACHE | CPU_FTR_PURR | 
CPU_FTR_STCX_CHECKS_ADDRESS | CPU_FTR_POPCNTB | CPU_FTR_DABRX)
-#define CPU_FTRS_POWER6 (CPU_FTR_USE_TB | CPU_FTR_LWSYNC | 
+ CPU_FTR_LWSYNC | 
CPU_FTR_PPCAS_ARCH_V2 | CPU_FTR_CTRL |
CPU_FTR_COHERENT_ICACHE |
@@ -446,7 +448,7 @@
CPU_FTR_DSCR | CPU_FTR_UNALIGNED_LD_STD |
CPU_FTR_STCX_CHECKS_ADDRESS | CPU_FTR_POPCNTB | CPU_FTR_CFAR |
CPU_FTR_DABRX)
#define CPU_FTRS_POWER7 (CPU_FTR_USE_TB | CPU_FTR_LWSYNC |
CPU_FTR_PPCAS_ARCH_V2 | CPU_FTR_CTRL | CPU_FTR_ARCH_206 |
CPU_FTR_MMCRA | CPU_FTR_SMT |
CPU_FTR_COHERENT_ICACHE |
@@ -455,7 +457,7 @@
CPU_FTR_STCX_CHECKS_ADDRESS | CPU_FTR_POPCNTB | CPU_FTR_POPCNTD |
CPU_FTR_CFAR | CPU_FTR_HVMODE |
CPU_FTR_VMX_COPY | CPU_FTR_HAS_PPR | CPU_FTR_DABRX)
#define CPU_FTRS_POWER8 (CPU_FTR_LWSYNC | 
CPU_FTR_PPCAS_ARCH_V2 | CPU_FTR_CTRL | CPU_FTR_ARCH_206 | 
CPU_FTR_MMCRA | CPU_FTR_SMT |
CPU_FTR_COHERENT_ICACHE |
@@ -467,7 +469,7 @@
CPU_FTR_ARCH_207S | CPU_FTR_TM_COMP)
#define CPU_FTRS_POWER8E (CPU_FTRS_POWER8 | CPU_FTR_PMAO_BUG)
#define CPU_FTRS_POWER8_DD1 (CPU_FTRS_POWER8 & ~CPU_FTR_DBELL)
#define CPU_FTRS_POWER9 (CPU_FTR_USE_TB | CPU_FTR_LWSYNC |
CPU_FTR_PPCAS_ARCH_V2 | CPU_FTR_CTRL | CPU_FTR_ARCH_206 |
CPU_FTR_MMCRA | CPU_FTR_SMT |
CPU_FTR_COHERENT_ICACHE |
@@ -476,20 +478,23 @@
CPU_FTR_ARCH_207S | CPU_FTR_TM_COMP)
#define CPU_FTRS_ATM |
#define CPU_FTRS_PA6T (CPU_FTR_USE_TB | CPU_FTR_LWSYNC |
+enum {
   CPU_FTRS_7447 | CPU_FTRS_7447A | CPU_FTRS_82XX | CPU_FTRS_G2_LE | CPU_FTRS_E300 | CPU_FTRS_E300C2 | CPU_FTRS_CLASSIC32 |
-#else
-    CPU_FTRS_GENERIC_32 |
-#endif
-#ifdef CONFIG_PPC_8xx
-    CPU_FTRS_8XX &
--- linux-4.15.0.org/arch/powerpc/include/asm/cputhreads.h
+++ linux-4.15.0/arch/powerpc/include/asm/cputhreads.h
@ @ -3.6 +3.7 @@
#define _ASM_POWERPC_CPUTHREADS_H

#else
    CPU_FTRS_G2_LE & CPU_FTRS_E300 & CPU_FTRS_E300C2 & CPU_FTRS_CLASSIC32 &
-#else
-    CPU_FTRS_GENERIC_32 &
-#endif
-#ifdef CONFIG_PPC_8xx
-    CPU_FTRS_8XX &
--- linux-4.15.0.org/arch/powerpc/include/as...
```c
#define mfdcr(rn) ({unsigned int rval;
if (__builtin_constant_p(rn) && rn < 1024)
-asm volatile("mfdcr %0," __stringify(rn)
- : ="r" (rval));
+asm volatile("mfdcr %0, %1" : ="r" (rval)
+ : "n" (rn));
else if (likely(cpu_has_feature(CPU_FTR_INDEXED_DCR)))
rval = mfdcrx(rn);
else
@@ -65,8 +65,8 @@
#define mtdcr(rn, v) do {
if (__builtin_constant_p(rn) && rn < 1024)
-asm volatile("mtdcr %0,%1"
- : ="r" (v));
+asm volatile("mtdcr %0, %1"
+ : "n" (rn), "r" (v));
else if (likely(cpu_has_feature(CPU_FTR_INDEXED_DCR)))
mtdcrx(rn, v);
else
@@ -76,8 +76,8 @@
#define EX_R3	EX_DAR
```

```c
#define STF_ENTRY_BARRIER_SLOT	STF_ENTRY_BARRIER_FIXUP_SECTION;	nop;
#define STF_EXIT_BARRIER_SLOT	STF_EXIT_BARRIER_FIXUP_SECTION;	nop;
#define ENTRY_FLUSH_SLOT	ENTRY_FLUSH_FIXUP_SECTION;	nop;
```

```c
/*
#define EX_R3EX_DAR
```

```c
+#define STF_ENTRY_BARRIER_SLOT
+STF_ENTRY_BARRIER_FIXUP_SECTION;
+nop;
+nop;
+nop
+
+#define STF_EXIT_BARRIER_SLOT
+STF_EXIT_BARRIER_FIXUP_SECTION;
+nop;
+nop;
+nop;
+nop;
+nop;
+nop
+
+#define ENTRY_FLUSH_SLOT
+ENTRY_FLUSH_FIXUP_SECTION;
+nop;
+nop;
+nop;
+nop;
+nop;
+nop;
+nop;
```
+ /*
+ * r10 must be free to use, r13 must be pac
+ */
+
+#define INTERRUPT_TO_KERNEL
+STF_ENTRY_BARRIER_SLOT
+ENTRY_FLUSH_SLOT
+
/*
* Macros for annotating the expected destination of (h)rfd
*
@@ -90,16 +118,19 @@
rfd
#define RFI_TO_USER
+STF_EXIT_BARRIER_SLOT
RFI_FLUSH_SLOT
rfid
brfi_flush_fallback

#define RFI_TO_USER_OR_KERNEL
+STF_EXIT_BARRIER_SLOT
RFI_FLUSH_SLOT
rfid
brfi_flush_fallback

#define RFI_TO_GUEST
+STF_EXIT_BARRIER_SLOT
RFI_FLUSH_SLOT
rfid
brfi_flush_fallback

#define HRFI_TO_USER
+STF_EXIT_BARRIER_SLOT
HRFI_FLUSH_SLOT
hrfid
bhrfi_flush_fallback

#define HRFI_TO_USER_OR_KERNEL
+STF_EXIT_BARRIER_SLOT
HRFI_FLUSH_SLOT
hrfid
bhrfi_flush_fallback

#define HRFI_TO_GUEST
+STF_EXIT_BARRIER_SLOT

RFI_FLUSH_SLOT;
hrfid;
bhrfi_flush_fallback

#define HRFI_TO_UNKNOWN
+STF_EXIT_BARRIER_SLOT;
RFI_FLUSH_SLOT;
hrfid;
bhrfi_flush_fallback
@@ -254,6 +289,7 @@
# define __EXCEPTION_PROLOG_1(area, extra, vec)\nOPT_SAVE_REG_TO_PACA(area+EX_PPR, r9, CPU_FTR_HAS_PPR)\nOPT_SAVE_REG_TO_PACA(area+EX_CFAR, r10, CPU_FTR_CFAR)\n+INTERRUPT_TO_KERNEL:\nSAVE_CTR(r10, area)\nmfcrr9;\nextra(vec)@@ -621,6 +657,10 @@
EXCEPTION_PROLOG_1(PACA_EXGEN, SOFTEN_TEST_HV, vec)\nEXCEPTION_RELON_PROLOG_PSERIES_1(label, EXC_HV)

+#define MASKABLE_RELON_EXCEPTION_PSERIES_OOL(vec, label)               \n+   EXCEPTION_PROLOG_1(PACA_EXGEN, SOFTEN_NOTEST_PR, vec); \n+   EXCEPTION_PROLOG_PSERIES_1(label, EXC_STD) \n+
/*
 * Our exception common code can be passed various "additions"
 * to specify the behaviour of interrupts, whether to kick the
 --- linux-4.15.0.orig/arch/powerpc/include/asm/fadump.h
+++ linux-4.15.0/arch/powerpc/include/asm/fadump.h
@@ -195,15 +195,12 @@
struct cpumask{online_mask;
};

-/* Crash memory ranges */
-# define INIT_CRASHMEM_RANGES(INIT_MEMBLOCK_REGIONS + 2) -
- struct fad_crash_memory_ranges {
- unsigned long long base;
- unsigned long long size;
- }
;

-extern int is_fadump_boot_memory_area(u64 addr, ulong size);
+extern int is_fadump_memory_area(u64 addr, ulong size);
 extern int early_init_dt_scan_fw_dump(unsigned long node, const char *uname, int depth, void *data);
 extern int fadump_reserve_mem(void);
 --- linux-4.15.0.orig/arch/powerpc/include/asm/feature-fixups.h
+++ linux-4.15.0/arch/powerpc/include/asm/feature-fixups.h
@@ -187,6 +187,11 @@
 .popsection;
 
+#define STF_ENTRY_BARRIER_FIXUP_SECTION
+#953:\
 +.pushsection __stf_entry_barrier_fixup,"a";\n +.align 2;\n +#954:\n +FTR_ENTRY_OFFSET 953b-954b;\n +.popsection;
 +
+#define STF_EXIT_BARRIER_FIXUP_SECTION
+#955:\
 +.pushsection __stf_exit_barrier_fixup,"a";\n +.align 2;\n +#956:\n +FTR_ENTRY_OFFSET 955b-956b;\n +.popsection;
 +
+#define UACCESS_FLUSH_FIXUP_SECTION
+#959:\
 +.pushsection __uaccess_flush_fixup,"a";\n +.align 2;\n +#960:\n +FTR_ENTRY_OFFSET 959b-960b;\n +.popsection;
 +
+#define ENTRY_FLUSH_FIXUP_SECTION
+#957:\
 +.pushsection __entry_flush_fixup,"a";\n +.align 2;\n +#958:\n +FTR_ENTRY_OFFSET 957b-958b;\n +.popsection;
 +
+#define RFI_FLUSH_FIXUP_SECTION
+951:\
 .pushsection __rfi_flush_fixup,"a";\n @@ -195,11 +227,38 @@
 .popsection;
 
+#define NOSPEC_BARRIER_FIXUP_SECTION
+#953:\
 +.pushsection __barrier_nospec_fixup,"a";\n +.align 2;\n
+954:\
+FTR_ENTRY_OFFSET 953b-954b;\n+ .popsection;
+
+#define START_BTB_FLUSH_SECTION
+955:\
+
+#define END_BTB_FLUSH_SECTION
+956:\
+.pushsection __btb_flush_fixup,"a";\n+.align 2;\n+957:\n+FTR_ENTRY_OFFSET 955b-957b;\n+FTR_ENTRY_OFFSET 956b-957b;\n+.popsection;

#ifndef __ASSEMBLY__
#include <linux/types.h>

+extern long stf_barrier_fallback;
+extern long entry_flush_fallback;
+extern long __start___stf_entry_barrier_fixup, __stop___stf_entry_barrier_fixup;
+extern long __start___stf_exit_barrier_fixup, __stop___stf_exit_barrier_fixup;
+extern long __start___uaccess_flush_fixup, __stop___uaccess_flush_fixup;
+extern long __start___entry_flush_fixup, __stop___entry_flush_fixup;
extern long __start___rfi_flush_fixup, __stop___rfi_flush_fixup;
+extern long __start___barrier_nospec_fixup, __stop___barrier_nospec_fixup;
+extern long __start___btb_flush_fixup, __stop___btb_flush_fixup;

void apply_feature_fixups(void);
void setup_feature_keys(void);
--- linux-4.15.0.orig/arch/powerpc/include/asm/futex.h
+++ linux-4.15.0/arch/powerpc/include/asm/futex.h
@@ -35,6 +35,7 @@
{
    int oldval = 0, ret;

+allow_write_to_user(uaddr, sizeof(*uaddr));
    pagefault_disable();

    switch (op) {
@@ -59,9 +60,9 @@
    pagefault_enable();

    -if (!ret)
++*oval = oldval;
+*oval = oldval;
+prevent_write_to_user(uaddr, sizeof(*uaddr));
+allow_write_to_user(uaddr, sizeof(*uaddr));
    __asm__ __volatile__ (  
        PPC_ATOMIC_ENTRY_BARRIER  
)  
    "1: lwaxr %1,0,%3 # futex_atomic_cmpxchg_inatomic\n"
@@ -95,6 +97,7 @@
    : "cc", "memory");
    *uval = prev;
+prevent_write_to_user(uaddr, sizeof(*uaddr));
    return ret;
}
- ptep_set_access_flags(vma, addr, ptep, pte, dirty);
- return 1;
- }else
- return ptep_set_access_flags(vma, addr, ptep, pte, dirty);
- }else
+ extern int huge_ptep_set_access_flags(struct vm_area_struct *vma,
+     unsigned long addr, pte_t *ptep,
+     pte_t pte, int dirty);

static inline pte_t huge_ptep_get(pte_t *ptep)
{
    /* Flag values used in H_REGISTER_PROC_TBL hcall */
    #define PROC_TABLE_OP_MASK 0x18

    #define PACA_IRQ_EE_EDGE   0x10 /* BookE only */
    #define PACA_IRQ_HMI       0x20
    #define PACA_IRQ_EE_EDGE0x10 /* BookE only */
    #define PACA_IRQ_HMI0x20

    #if 0/*
     * flags for paca->irq_soft_mask
     *
     */
    #define IRQS_ENABLED        0
    #define IRQS_DISABLED       1 /* local_irq_disable() interrupts */
    #define IRQS_PMI_DISABLED   2
    #define IRQS_ALL_DISABLED   (IRQS_DISABLED | IRQS_PMI_DISABLED)
    
    #endif /* CONFIG_PPC64 */
    
    #ifndef __ASSEMBLY__

--- linux-4.15.0.orig/arch/powerpc/include/asm/io.h

--- linux-4.15.0.orig/arch/powerpc/include/asm/hvcall.h

+++ linux-4.15.0/arch/powerpc/include/asm/hvcall.h
@@ -337,10 +337,15 @@
    #define H_CPU_CHAR_L1D_FLUSH_ORI30 (1ull << 61) // IBM bit 2
    #define H_CPU_CHAR_L1D_FLUSH_TRIG2 (1ull << 60) // IBM bit 3
    #define H_CPU_CHAR_L1D_THREAD_PRIV (1ull << 59) // IBM bit 4
-    +#define H_CPU_CHAR_BRANCH_HINTS_HONORED (1ull << 58) // IBM bit 5
-    +#define H_CPU_CHAR_THREAD_RECONFIG_CTRL (1ull << 57) // IBM bit 6
-    +#define H_CPU_CHAR_COUNT_CACHE_DISABLED (1ull << 56) // IBM bit 7
-    +#define H_CPU_CHAR_BCCTR_FLUSH_ASSIST (1ull << 54) // IBM bit 9
+    +#define H_CPU_CHAR_BEHAV_FLUSH_COUNT_CACHE (1ull << 58) // IBM bit 5

    #define H_CPU_BEHAV_FAVOUR_SECURITY (1ull << 63) // IBM bit 0
    #define H_CPU_BEHAV_L1D_FLUSH_PR (1ull << 62) // IBM bit 1
    #define H_CPU_BEHAV_BNDS_CHK_SPEC_BAR (1ull << 61) // IBM bit 2
    +#define H_CPU_BEHAV_FLUSH_COUNT_CACHE (1ull << 58) // IBM bit 5

--- linux-4.15.0.orig/arch/powerpc/include/asm/hw_irq.h

+++ linux-4.15.0/arch/powerpc/include/asm/hw_irq.h
@@ -28,6 +28,14 @@
    #define PACA_IRQ_HMI        0x20
    /* flags for paca->irq_soft_mask */
    #define IRQS_ENABLED        0
-    +#define IRQS_DISABLED       1 /* local_irq_disable() interrupts */
-    +#define IRQS_PMI_DISABLED   2
-    +#define IRQS_ALL_DISABLED   (IRQS_DISABLED | IRQS_PMI_DISABLED)
+    +#define H_CPU_CHAR_BEHAV_FLUSH_COUNT_CACHE (1ull << 58) // IBM bit 5

    #endif /* CONFIG_PPC64 */
    
    #ifndef __ASSEMBLY__

--- linux-4.15.0.orig/arch/powerpc/include/asm/io.h

--- linux-4.15.0.orig/arch/powerpc/include/asm/hvcall.h

+++ linux-4.15.0/arch/powerpc/include/asm/hvcall.h
@@ -337,10 +337,15 @@
    #define H_CPU_CHAR_L1D_FLUSH_ORI30 (1ull << 61) // IBM bit 2
    #define H_CPU_CHAR_L1D_FLUSH_TRIG2 (1ull << 60) // IBM bit 3
    #define H_CPU_CHAR_L1D_THREAD_PRIV (1ull << 59) // IBM bit 4
-    +#define H_CPU_CHAR_BRANCH_HINTS_HONORED (1ull << 58) // IBM bit 5
-    +#define H_CPU_CHAR_THREAD_RECONFIG_CTRL (1ull << 57) // IBM bit 6
-    +#define H_CPU_CHAR_COUNT_CACHE_DISABLED (1ull << 56) // IBM bit 7
-    +#define H_CPU_CHAR_BCCTR_FLUSH_ASSIST (1ull << 54) // IBM bit 9
+    +#define H_CPU_CHAR_BEHAV_FLUSH_COUNT_CACHE (1ull << 58) // IBM bit 5

    #define H_CPU_BEHAV_FAVOUR_SECURITY (1ull << 63) // IBM bit 0
    #define H_CPU_BEHAV_L1D_FLUSH_PR (1ull << 62) // IBM bit 1
    #define H_CPU_BEHAV_BNDS_CHK_SPEC_BAR (1ull << 61) // IBM bit 2
    +#define H_CPU_BEHAV_FLUSH_COUNT_CACHE (1ull << 58) // IBM bit 5

    /* Flag values used in H_REGISTER_PROC_TBL hcall */
    #define PROC_TABLE_OP_MASK 0x18

    --- linux-4.15.0.orig/arch/powerpc/include/asm/hw_irq.h

+++ linux-4.15.0/arch/powerpc/include/asm/hw_irq.h
@@ -28,6 +28,14 @@
    #define PACA_IRQ_EE_EDGE   0x10 /* BookE only */
    #define PACA_IRQ_HMI       0x20
    /* flags for paca->irq_soft_mask */
    #define IRQS_ENABLED        0
-    +#define IRQS_DISABLED       1 /* local_irq_disable() interrupts */
-    +#define IRQS_PMI_DISABLED   2
-    +#define IRQS_ALL_DISABLED   (IRQS_DISABLED | IRQS_PMI_DISABLED)
+    +#define H_CPU_CHAR_BEHAV_FLUSH_COUNT_CACHE (1ull << 58) // IBM bit 5

    #endif /* CONFIG_PPC64 */
    
    #ifndef __ASSEMBLY__

--- linux-4.15.0.orig/arch/powerpc/include/asm/io.h
their hooks, a bitfield is reserved for use by the platform near the
top of MMIO addresses (not PIO, those have to cope the hard way).

- * This bit field is 12 bits and is at the top of the IO virtual
- * addresses PCI_IO_INDIRECT_TOKEN_MASK.
+ * The highest address in the kernel virtual space are:

- * The kernel virtual space is thus:
+ * d0003fffffffffff# with Hash MMU
+ * c00fffffffffff# with Radix MMU

- * 0xD000000000000000: vmalloc
- * 0xD000080000000000: PCI PHB IO space
- * 0xD000080000000000: ioremap
- * 0xD0000fffffffff: end of ioremap region

- * Since the top 4 bits are reserved as the region ID, we use thus
- * the next 12 bits and keep 4 bits available for the future if the
- * virtual address space is ever to be extended.
+ * The top 4 bits are reserved as the region ID on hash, leaving us 8 bits
+ * that can be used for the field.

- * The direct IO mapping operations will then mask off those bits
- * before doing the actual access, though that only happen when

#define PCI_IO_INDIRECT_MMIO

-#define PCI_IO_IND_TOKEN_MASK 0x0fff000000000000ul
-#define PCI_IO_IND_TOKEN_SHIFT 48
+#define PCI_IO_IND_TOKEN_SHIFT 52
+#define PCI_IO_IND_TOKEN_MASK (0xfful << PCI_IO_IND_TOKEN_SHIFT)
#define PCI_FIX_ADDR(addr)
						((PCI_IO_ADDR)(((unsigned long)(addr)) & ~PCI_IO_IND_TOKEN_MASK))
#define PCI_GET_ADDR_TOKEN(addr)

--- linux-4.15.0.orig/arch/powerpc/include/asm/irq_work.h
+++ linux-4.15.0/arch/powerpc/include/asm/irq_work.h
@@ -6,5 +6,6 @@
{
    return true;
}
+extern void arch_irq_work_raise(void);

#endif /* _ASM_POWERPC_IRQ_WORK_H */
@@ -73,6 +73,8 @@
    master to copy new code to 0 */
 extern int crashing_cpu;
 extern void crash_send_ipi(void (*crash_ipi_callback)(struct pt_regs *));
+extern void crash_ipi_callback(struct pt_regs *);
+extern int crash_wake_offline;

 struct kimage;
 struct pt_regs;
@@ -138,6 +140,12 @@
 return false;
 }
+
+static inline void crash_ipi_callback(struct pt_regs *regs) { }
+
+static inline void crash_send_ipi(void (*crash_ipi_callback)(struct pt_regs *))
+{
+{}
+}
+
+#endif /* CONFIG_KEXEC_CORE */
+endif /* !ASSEMBLY__ */
+endif /* __KERNEL__ */
--- linux-4.15.0.orig/arch/powerpc/include/asm/kup.h
+++ linux-4.15.0/arch/powerpc/include/asm/kup.h
@@ -0,0 +1,40 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_POWERPC_KUP_H_
+#define _ASM_POWERPC_KUP_H_
+
+#ifndef __ASSEMBLY__
+
+#include <asm/pgtable.h>
+
+#ifdef CONFIG_PPC64
+#include <asm/book3s/64/kup-radix.h>
+#else
+static inline void allow_user_access(void __user *to, const void __user *from,
+    unsigned long size) { }
+static inline void prevent_user_access(void __user *to, const void __user *from,
+    unsigned long size) { }
+#endif /* CONFIG_PPC64 */
+
+static inline void allow_read_from_user(const void __user *from, unsigned long size)
+{ allow_user_access(NULL, from, size); }
+static inline void allow_write_to_user(void __user *to, unsigned long size)
+{
+allow_user_access(to, NULL, size);
+
+static inline void prevent_read_from_user(const void __user *from, unsigned long size)
+{
+prevent_user_access(NULL, from, size);
+
+static inline void prevent_write_to_user(void __user *to, unsigned long size)
+{
+prevent_user_access(to, NULL, size);
+
+#endif /* !_ASSEMBLY_ */
+
+#endif /* _ASM_POWERPC_KUP_H_* */
--- linux-4.15.0.orig/arch/powerpc/include/asm/kvm_asm.h
+++ linux-4.15.0/arch/powerpc/include/asm/kvm_asm.h
@@ -108,6 +108,8 @@
/* book3s_hv */

+#define BOOK3S_INTERRUPT_HV_SOFTPATCH0x1500
+
/*
 * Special trap used to indicate to host that this is a
 * passthrough interrupt that could not be handled
@@ -161,4 +163,7 @@
#define KVM_INST_FETCH_FAILED -1
+
/* Extract PO and XOP opcode fields */
+#define PO_XOP_OPCODE_MASK 0xfc0007fe
+
+#endif /* _POWERPC_KVM_ASM_H_* */
--- linux-4.15.0.orig/arch/powerpc/include/asm/kvm_book3s.h
+++ linux-4.15.0/arch/powerpc/include/asm/kvm_book3s.h
@@ -241,6 +241,10 @@
esign long mask);
 extern void kvmppc_set_fscr(struct kvm_vcpu *vcpu, u64 fscr);
+
 extern int kvmhv_p9_tm_emulation_early(struct kvm_vcpu *vcpu);
 extern int kvmhv_p9_tm_emulation(struct kvm_vcpu *vcpu);
 extern void kvmhv_emulate_tm_rollback(struct kvm_vcpu *vcpu);
+ extern void kvmppc_entry_trampoline(void);
 extern void kvmppc_hv_entry_trampoline(void);
extern u32 kvmppc_alignment_dsisr(struct kvm_vcpu *vcpu, unsigned int inst);

--- linux-4.15.0.orig/arch/powerpc/include/asm/kvm_book3s_64.h
+++ linux-4.15.0/arch/powerpc/include/asm/kvm_book3s_64.h
@@ -122,13 +122,13 @@
lphi = (l >> 16) & 0xf;
switch ((l >> 12) & 0xf) {
    case 0:
-       return !lphi ? 24 : -1; /* 16MB */
+       return !lphi ? 24 : 0; /* 16MB */
        break;
    case 1:
        return 16; /* 64kB */
    break;
    case 3:
-       return !lphi ? 34 : -1; /* 16GB */
+       return !lphi ? 34 : 0; /* 16GB */
        break;
    case 7:
        return (16 << 8) + 12; /* 64kB in 4kB */
-    @ @ -140,7 +140,7 @@
+    return (24 << 8) + 12; /* 16MB in 4kB */
        break;
    }
-   return -1;
+   return 0;
}

static inline int kvmppc_hpte_base_page_shift(unsigned long h, unsigned long l)
@@ -159,7 +159,11 @@
static inline unsigned long kvmppc_actual_pgsz(unsigned long v, unsigned long r)
{
-   return 1ul << kvmppc_hpte_actual_page_shift(v, r);
+   int shift = kvmppc_hpte_actual_page_shift(v, r);
+   if (shift)
+      return 1ul << shift;
+   return 0;
}

static inline int kvmppc_pgsize_lp_encoding(int base_shift, int actual_shift)
@@ -232,7 +232,7 @@
va_low ^= v >> (SID_SHIFT_1T - 16);
va_low &= 0x7ff;

-   if (b_pgshift == 12) {
+   if (b_pgshift <= 12) {
      if (a_pgshift > 12) 

sllp = (a_pgshift == 16) ? 5 : 4;
rb |= sllp << 5; /* AP field */
@@ -468,6 +472,49 @@
 set_bit_le(i, map);
 }

+static inline u64 sanitize_msr(u64 msr)
+{
+  msr &= ~MSR_HV;
+  msr |= MSR_ME;
+  return msr;
+}
+
+#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+static inline void copy_from_checkpoint(struct kvm_vcpu *vcpu)
+{
+  vcpu->arch.cr  = vcpu->arch.cr_tm;
+  vcpu->arch.xer = vcpu->arch.xer_tm;
+  vcpu->arch.lr  = vcpu->arch.lr_tm;
+  vcpu->arch.ctr = vcpu->arch.ctr_tm;
+  vcpu->arch.amr = vcpu->arch.amr_tm;
+  vcpu->arch.ppr = vcpu->arch.ppr_tm;
+  vcpu->arch.dscr = vcpu->arch.dscr_tm;
+  vcpu->arch.tar = vcpu->arch.tar_tm;
+  memcpy(vcpu->arch.gpr, vcpu->arch.gpr_tm,
+          sizeof(vcpu->arch.gpr));
+  vcpu->arch.fp  = vcpu->arch.fp_tm;
+  vcpu->arch.vr  = vcpu->arch.vr_tm;
+  vcpu->arch.vrsave = vcpu->arch.vrsave_tm;
+}
+
+static inline void copy_to_checkpoint(struct kvm_vcpu *vcpu)
+{
+  vcpu->arch.cr_tm  = vcpu->arch.cr;
+  vcpu->arch.xer_tm = vcpu->arch.xer;
+  vcpu->arch.lr_tm  = vcpu->arch.lr;
+  vcpu->arch.ctr_tm = vcpu->arch.ctr;
+  vcpu->arch.amr_tm = vcpu->arch.amr;
+  vcpu->arch.ppr_tm = vcpu->arch.ppr;
+  vcpu->arch.dscr_tm = vcpu->arch.dscr;
+  vcpu->arch.tar_tm = vcpu->arch.tar;
+  memcpy(vcpu->arch.gpr_tm, vcpu->arch.gpr,
+         sizeof(vcpu->arch.gpr));
+  vcpu->arch.fp_tm  = vcpu->arch.fp;
+  vcpu->arch.vr_tm  = vcpu->arch.vr;
+  vcpu->arch.vrsave_tm = vcpu->arch.vrsave;
+}
+#endif /* CONFIG_PPC_TRANSACTIONAL_MEM */
+ #endif /* CONFIG_KVM_BOOK3S_HV_POSSIBLE */

#endif /* __ASM_KVM_BOOK3S_64_H__ */
--- linux-4.15.0.orig/arch/powerpc/include/asm/kvm_book3s_asm.h
+++ linux-4.15.0/arch/powerpc/include/asm/kvm_book3s_asm.h
@@ -119,6 +119,7 @@
    u8 host_ipi;
    u8 ptid; /* thread number within subcore when split */
    u8 tid; /* thread number within whole core */
+    u8 fake_suspend;
    struct kvm_vcpu *kvm_vcpu;
    struct kvmppc_vcore *kvm_vcore;
    void __iomem *xicx_phys;
--- linux-4.15.0.orig/arch/powerpc/include/asm/kvm_host.h
+++ linux-4.15.0/arch/powerpc/include/asm/kvm_host.h
@@ -294,6 +294,7 @@
    struct list_head spapr_tce_tables;
    struct list_head rtas_tokens;
+    struct mutex rtas_token_lock;
    DECLARE_BITMAP(enabled_hcalls, MAX_HCALL_OPCODE/4 + 1);
#endif
#ifdef CONFIG_PPC_BOOK3S_64
struct list_head spapr_tce_tables;
struct list_head rtas_tokens;
+struct mutex rtas_token_lock;
DECLARE_BITMAP(enabled_hcalls, MAX_HCALL_OPCODE/4 + 1);
#endif
#ifdef CONFIG_KVM_MPIC
@@ -610,6 +611,7 @@
    u64 tfiar;
    u64 texasr;
    u64 tfiar;
+    u64 orig_texasr;

    u32 cr_tm;
    u64 xer_tm;
@@ -690,6 +692,7 @@
    u8 mmio_vsx_offset;
    u8 mmio_vsx_copy_type;
    u8 mmio_vsx_tx_sx_enabled;
+    u8 mmio_vmx_copy_nums;
    u8 osi_needed;
    u8 osi_enabled;
    u8 papr_enabled;
@@ -800,6 +803,7 @@
#define KVM_MMIO_REG_QPR	0x0040
#define KVM_MMIO_REG_FQPR	0x0060
#define KVM_MMIO_REG_VSX	0x0080
+#define KVM_MMIO_REG_VMX	0x00c0
#define __KVM_HAVE_ARCH_WQP
#define __KVM_HAVE_CREATE_DEVICE

static inline void kvm_arch_hardware_disable(void) {}
static inline void kvm_arch_hardware_unsetup(void) {}
static inline void kvm_arch_sync_events(struct kvm *kvm) {}
static inline void kvm_arch_memslots_updated(struct kvm *kvm, struct kvm_memslots *slots) {}
static inline void kvm_arch_memslots_updated(struct kvm *kvm, u64 gen) {}
static inline void kvm_arch_flush_shadow_all(struct kvm *kvm) {}
static inline void kvm_arch_sched_in(struct kvm_vcpu *vcpu, int cpu) {}
static inline void kvm_arch_exit(void) {}

extern int kvmppc_handle_vsx_load(struct kvm_run *run, struct kvm_vcpu *vcpu,
unsigned int rt, unsigned int bytes,
int is_default_endian, int mmio_sign_extend);
extern int kvmppc_handle_load128_by2x64(struct kvm_run *run,		struct kvm_vcpu *vcpu, unsigned int rt, int is_default_endian);
extern int kvmppc_handle_store128_by2x64(struct kvm_run *run,		struct kvm_vcpu *vcpu, unsigned int rs, int is_default_endian);
extern int kvmppc_handle_store(struct kvm_run *run, struct kvm_vcpu *vcpu,
u64 val, unsigned int bytes,
int is_default_endian);

- static inline void kvmppc_set_host_ipi(int cpu, u8 host_ipi)
+ /*
+ * To avoid the need to unnecessarily exit fully to the host kernel, an IPI to
+ * a CPU thread that's running/napping inside of a guest is by default regarded
+ * as a request to wake the CPU (if needed) and continue execution within the
+ * guest, potentially to process new state like externally-generated
+ * interrupts or IPIs sent from within the guest itself (e.g. H_PROD/H_IPI).
+ *
+ * To force an exit to the host kernel, kvmppc_set_host_ipi() must be called
+ * prior to issuing the IPI to set the corresponding 'host_ipi' flag in the
+ * target CPU's PACA. To avoid unnecessary exits to the host, this flag should
+ * be immediately cleared via kvmppc_clear_host_ipi() by the IPI handler on
+ * the receiving side prior to processing the IPI work.
+ *
+ * NOTE:
+ *
+ * We currently issue an smp_mb() at the beginning of kvmppc_set_host_ipi().
+ * This is to guard against sequences such as the following:
+ *
+ * CPU
+ * X: smp_mucked_ipt_set_message():
+ * X: smp_mb()
X: message[RESCHEDULE] = 1
X: doorbell_global_ipi(42):
X: kvmppc_set_host_ipi(42)
X: ppc_msgsnd_sync()/smp_mb()
X: ppc_msgsnd() -> 42
42: doorbell_exception(): // from CPU X
42: ppc_msgsync()
105: smp_muxed_ipi_set_message():
105: smb_mb()

// STORE DEFERRED DUE TO RE-ORDERING
--105: message[CALL_FUNCTION] = 1
| 105: doorbell_global_ipi(42):
| 105: kvmppc_set_host_ipi(42)
| 42: kvmppc_clear_host_ipi(42)
| 42: smp_ipi_demux_relaxed()
| 42: // returns to executing guest
| // RE-ORDERED STORE COMPLETES
| ->105: message[CALL_FUNCTION] = 1
| 105: ppc_msgsnd_sync()/smp_mb()
| 105: ppc_msgsnd() -> 42
| 42: local_paca->kvm_hstate.host_ipi == 0 // IPI ignored
| 105: // hangs waiting on 42 to process messages/call_single_queue

We also issue an smp_mb() at the end of kvmppc_clear_host_ipi(). This is
to guard against sequences such as the following (as well as to create
a read-side pairing with the barrier in kvmppc_set_host_ipi()):

CPU
X: smp_muxed_ipi_set_message():
X: smb_mb()
X: message[RESCHEDULE] = 1
X: doorbell_global_ipi(42):
X: kvmppc_set_host_ipi(42)
X: ppc_msgsnd_sync()/smp_mb()
X: ppc_msgsnd() -> 42
42: doorbell_exception(): // from CPU X
42: ppc_msgsync()

// STORE DEFERRED DUE TO RE-ORDERING
-- 42: kvmppc_clear_host_ipi(42)
| 42: smp_ipi_demux_relaxed()
| 105: smp_muxed_ipi_set_message():
| 105: smb_mb()
| 105: message[CALL_FUNCTION] = 1
| 105: doorbell_global_ipi(42):
| 105: kvmppc_set_host_ipi(42)
| // RE-ORDERED STORE COMPLETES
| -> 42: kvmppc_clear_host_ipi(42)
| 42: // returns to executing guest
+ * 105:  ppc_msgsnd_sync()/smp_mb()
+ * 105:  ppc_msgsnd() -> 42
+ * 42:  local_paca->kvm_hstate.host_ipi == 0 // IPI ignored
+ * 105: // hangs waiting on 42 to process messages/call_single_queue
+ */
+static inline void kvmppc_set_host_ipi(int cpu)
+{
- paca[cpu].kvm_hstate.host_ipi = host_ipi;
+/*
+ * order stores of IPI messages vs. setting of host_ipi flag
+ *
+ * pairs with the barrier in kvmppc_clear_host_ipi()
+ */
+ smp_mb();
+ paca[cpu].kvm_hstate.host_ipi = 1;
+}
+
+static inline void kvmppc_clear_host_ipi(int cpu)
+{
+ paca[cpu].kvm_hstate.host_ipi = 0;
+/*
+ * order clearing of host_ipi flag vs. processing of IPI messages
+ *
+ * pairs with the barrier in kvmppc_set_host_ipi()
+ */
+ smp_mb();
+
static inline void kvmppc_fast_vcpu_kick(struct kvm_vcpu *vcpu)
@@ -483,7 +578,10 @@
return 0;
}
-
-static inline void kvmppc_set_host_ipi(int cpu, u8 host_ipi)
+static inline void kvmppc_set_host_ipi(int cpu)
+{}
+
+static inline void kvmppc_clear_host_ipi(int cpu)
+{}

static inline void kvmppc_fast_vcpu_kick(struct kvm_vcpu *vcpu)
--- linux-4.15.0.orig/arch/powerpc/include/asm/machdep.h
+++ linux-4.15.0/arch/powerpc/include/asm/machdep.h
@@ -71,6 +71,9 @@

int(*pcibios_root_bridge_prepare)(struct pci_host_bridge *
bridge);
+/* finds all the pci_controllers present at boot */
+void (*discover_phbs)(void);
+
/* To setup PHBs when using automatic OF platform driver for PCI */
int(*pci_setup_phb)(struct pci_controller *host);

--- linux-4.15.0.orig/arch/powerpc/include/asm/mmu-8xx.h
+++ linux-4.15.0/arch/powerpc/include/asm/mmu-8xx.h
@@ -169,6 +169,12 @@
unsigned int id;
unsigned int active;
unsigned long vds0_base;
+#ifdef CONFIG_PPC_MM_SLICES
+u16 user_psize; /*!< page size index */
+u64 low_slices_psize; /*!< page size encodings */
+unsigned char high_slices_psize[0];
+unsigned long slb_addr_limit;
+#endif
} mm_context_t;

#define PHYS_IMMR_BASE (mfspr(SPRN_IMMR) & 0xfff80000)
--- linux-4.15.0.orig/arch/powerpc/include/asm/mmu_context.h
+++ linux-4.15.0/arch/powerpc/include/asm/mmu_context.h
@@ -35,9 +35,9 @@
extern struct mm_iommu_table_group_mem_t *mm_iommu_find(struct mm_struct *mm,
unsigned long ua, unsigned long entries);
extern long mm_iommu_ua_to_hpa(struct mm_iommu_table_group_mem_t *mem,
-unsigned long ua, unsigned long *hpa);
+unsigned long ua, unsigned int pageshift, unsigned long *hpa);
extern long mm_iommu_ua_to_hpa_rm(struct mm_iommu_table_group_mem_t *mem,
-unsigned long ua, unsigned long *hpa);
+unsigned long ua, unsigned int pageshift, unsigned long *hpa);
extern long mm_iommu_mapped_inc(struct mm_iommu_table_group_mem_t *mem);
extern void mm_iommu_mapped_dec(struct mm_iommu_table_group_mem_t *mem);
#endif
@@ -92,15 +92,23 @@
static inline void mm_context_add_copro(struct mm_struct *mm)
{
/*
 - * On hash, should only be called once over the lifetime of
 - * the context, as we can't decrement the active cpus count
 - * and flush properly for the time being.
 + * If any copro is in use, increment the active CPU count
 + * in order to force TLB invalidations to be global as to
 + * propagate to the Nest MMU.
 */
-inc_mm_active_cpus(mm);
+if (atomic_inc_return(&mm->context.copros) == 1)
+inc_mm_active_cpus(mm);
static inline void mm_context_remove_copro(struct mm_struct *mm)
{
    int c;
    
    c = atomic_dec_if_positive(&mm->context.copros);
    
    /* Detect imbalance between add and remove */
    WARN_ON(c < 0);
    
    /* Need to broadcast a global flush of the full mm before
    * decrementing active_cpus count, as the next TLBI may be
    @ @ -111,7 +119,7 @ @
    * for the time being. Invalidations will remain global if
    * used on hash.
    */
    -if (radix_enabled()) {
        if (c == 0 && radix_enabled()) {
            flush_all_mm(mm);
            dec_mm_active_cpus(mm);
        }
    @ @ -147,7 +155,7 @ @
    */

    static inline void activate_mm(struct mm_struct *prev, struct mm_struct *next)
    {
        switch_mm_irqs_off(prev, next, current);
    }

    /* We don't currently use enter_lazy_tlb() for anything */
    --- linux-4.15.0.orig/arch/powerpc/include/asm/mpic.h
    +++ linux-4.15.0/arch/powerpc/include/asm/mpic.h
    @@ -393,7 +393,14 @@
    #define MPIC_REGSET_TSI108 MPIC_REGSET(1) /* Tsi108/109 PIC */

    /* Get the version of primary MPIC */
    +#ifdef CONFIG_MPIC
    extern u32 fsl_mpic_primary_get_version(void);
    +#else
    +static inline u32 fsl_mpic_primary_get_version(void)
    +{
    +    return 0;
    +}
    +#endif

    /* Allocate the controller structure and setup the linux irq descs
* for the range if interrupts passed in. No HW initialization is
--- linux-4.15.0.orig/arch/powerpc/include/asm/nmi.h
+++ linux-4.15.0/arch/powerpc/include/asm/nmi.h
@@ -4,10 +4,6 @@
#ifndef CONFIG_PPC_WATCHDOG
extern void arch_touch_nmi_watchdog(void);
-extern void arch_trigger_cpumask_backtrace(const cpumask_t *mask,
-   bool exclude_self);
-#define arch_trigger_cpumask_backtrace arch_trigger_cpumask_backtrace
-
#else
 static inline void arch_touch_nmi_watchdog(void) {}
#endif
--- linux-4.15.0.orig/arch/powerpc/include/asm/nohash/32/pgtable.h
+++ linux-4.15.0/arch/powerpc/include/asm/nohash/32/pgtable.h
@@ -276,15 +276,18 @@
}
 static inline void __ptep_set_access_flags(struct mm_struct *mm,
 static inline void __ptep_set_access_flags(struct vm_area_struct *vma,
     pte_t *ptep, pte_t entry,
     unsigned long address)
{
     unsigned long set = pte_val(entry) &
         (_PAGE_DIRTY | _PAGE_ACCESSED | _PAGE_RW | _PAGE_EXEC);
     unsigned long clr = ~pte_val(entry) & _PAGE_RO;

     pte_update(ptep, clr, set);
     +
     +flush_tlb_page(vma, address);
 }

#define __HAVE_ARCH_PTE_SAME
--- linux-4.15.0.orig/arch/powerpc/include/asm/nohash/32/slice.h
+++ linux-4.15.0/arch/powerpc/include/asm/nohash/32/slice.h
@@ -0,0 +1,18 @@
 /* SPDX-License-Identifier: GPL-2.0 */
 */
 ifndef _ASMPOWERPC_NOHASH_32_SLICE_H
 define _ASMPOWERPC_NOHASH_32_SLICE_H
 +
 ifndef CONFIG_PPC_MM_SLICES
 +
 define SLICE_LOW_SHIFT28
 +
 define SLICE_LOW_TOP(0x10000000ull)
+#define SLICE_NUM_LOW((SLICE_LOW_TOP >> SLICE_LOW_SHIFT))
+#define GET_LOW_SLICE_INDEX(addr)((addr) >> SLICE_LOW_SHIFT)
+
+#define SLICE_HIGH_SHIFT0
+#define SLICE_NUM_HIG0ul
+#define GET_HIGH_SLICE_INDEX(addr)(addr & 0)
+
+endif /* CONFIG_PPC_MM_SLICES */
+
+endif /*_ASM_POWERPC_NOHASH_32_SLICE_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/nohash/64/pgtable.h
+++ linux-4.15.0/arch/powerpc/include/asm/nohash/64/pgtable.h
@@ -284,9 +284,10 @@
/* Set the dirty and/or accessed bits atomically in a linux PTE, this
* function doesn't need to flush the hash entry
 */
-static inline void __ptep_set_access_flags(struct mm_struct *mm,
+static inline void __ptep_set_access_flags(struct vm_area_struct *vma,
    pte_t *ptep, pte_t entry,
-    unsigned long address)
+    unsigned long address,
+    int psize)
{
    unsigned long bits = pte_val(entry) &
        (_PAGE_DIRTY | _PAGE_ACCESSED | _PAGE_RW | _PAGE_EXEC);
@@ -308,6 +309,8 @@
        *ptep = __pte(old | bits);
    #endif
    +
    +flush_tlb_page(vma, address);
}

#define __HAVE_ARCH_PTE_SAME
--- linux-4.15.0.orig/arch/powerpc/include/asm/nohash/64/slice.h
+++ linux-4.15.0/arch/powerpc/include/asm/nohash/64/slice.h
@@ -0,0 +1,12 @@
+
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_POWERPC_NOHASH_64_SLICE_H
+#define _ASM_POWERPC_NOHASH_64_SLICE_H
+
+#ifdef CONFIG_PPC_64K_PAGES
+#define get_slice_psize(mm, addr)MMU_PAGE_64K
+#else /* CONFIG_PPC_64K_PAGES */
+#define get_slice_psize(mm, addr)MMU_PAGE_4K
+#endif /* !CONFIG_PPC_64K_PAGES */
+"
flush_hash_entry(mm, ptep, addr);
#endif
__asm__ __volatile__("-		stw%U0%X0 %2,%0
+		stw%X0 %2,%0

eieio
-		stw%U0%X0 %L2,%1
+		stw%X1 %L2,%1"
: "=m" (*ptep), "=m" (*((unsigned char *)ptep+4))
: "r" (pte) : "memory";

#define QUIESCE_HOLD1 /* Spin all calls at entry */
#define QUIESCE_REJECT2 /* Fail all calls with OPAL_BUSY */
#define QUIESCE_LOCK_BREAK3 /* Set to ignore locks. */
#define QUIESCE_RESUME4 /* Un-quiesce */
#define QUIESCE_RESUME_FAST_REBOOT5 /* Un-quiesce, fast reboot */

/* Device tree flags */

enum {
    OPAL_REBOOT_NORMAL= 0,
    OPAL_REBOOT_PLATFORM_ERROR= 1,
+OPAL_REBOOT_FULL_IPL= 2,
};

/* Argument to OPAL_PCI_TCE_KILL */
--- linux-4.15.0.orig/arch/powerpc/include/asm/opal.h
+++ linux-4.15.0/arch/powerpc/include/asm/opal.h
@ @ -21.6 +21.9 @@
/* We calculate number of sg entries based on PAGE_SIZE */
#define SG_ENTRIES_PER_NODE ((PAGE_SIZE - 16) / sizeof(struct opal_sg_entry))

+/* Default time to sleep or delay between OPAL_BUSY/OPAL_BUSY_EVENT loops */
+#define OPAL_BUSY_DELAY_MS10
+
+/* /sys/firmware/opal */
extern struct kobject *opal_kobj;

@@ -34,6 +37,12 @@
uint64_t opal_npu_map_lpar(uint64_t phb_id, uint64_t bdf, uint64_t lparid,
uint64_t lpcr);
+int64_t opal_npu_spa_setup(uint64_t phb_id, uint32_t bdfn,
+uint64_t addr, uint64_t PE_mask);
+int64_t opal_npu_spa_clear_cache(uint64_t phb_id, uint32_t bdfn,
+uint64_t PE_handle);
+int64_t opal_npu_tl_set(uint64_t phb_id, uint32_t bdfn, long cap,
+uint64_t rate_phys, uint32_t size);
+int64_t opal_npu_map_lpar(uint64_t phb_id, uint64_t bdf, uint64_t lparid,
uint64_t lpcr);
+int64_t opal_npu_spa_setup(uint64_t phb_id, uint32_t bdfn,
+uint64_t addr, uint64_t PE_mask);
+int64_t opal_npu_spa_clear_cache(uint64_t phb_id, uint32_t bdfn,
+uint64_t PE_handle);
+int64_t opal_npu_tl_set(uint64_t phb_id, uint32_t bdfn, long cap,
+uint64_t rate_phys, uint32_t size);
int64_t opal_console_write(int64_t term_number, __be64 *length,
	const uint8_t *buffer);
int64_t opal_console_read(int64_t term_number, __be64 *length,
	const uint8_t *buffer);
@@ -198,6 +207,8 @@
int64_t opal_slw_set_reg(uint64_t cpu_pir, uint64_t sprn, uint64_t val);
int64_t opal_config_cpu_idle_state(uint64_t state, uint64_t flag);
int64_t opal_pci_set_phb_cxl_mode(uint64_t phb_id, uint64_t mode, uint64_t pe_number);
+int64_t opal_pci_get_pbcq_tunnel_bar(uint64_t phb_id, uint64_t *addr);
+int64_t opal_pci_set_pbcq_tunnel_bar(uint64_t phb_id, uint64_t addr);
int64_t opal_ipmi_send(uint64_t interface, struct opal_ipmi_msg *msg,
uint64_t msg_len);
int64_t opal_ipmi_recv(uint64_t interface, struct opal_ipmi_msg *msg,
@@ -263,7 +274,7 @@
int opal_get_power_shift_ratio(u32 handle, int token, u32 *psr);
int opal_set_power_shift_ratio(u32 handle, int token, u32 psr);
int opal_sensor_group_clear(u32 group_hndl, int token);
+int opal_nx_coproc_init(uint32_t chip_id, uint32_t ct);
s64 opal_signal_system_reset(s32 cpu);
+s64 opal_quiesce(u64 shutdown_type, s32 cpu);

/* Internal functions */
extern int early_init_dt_scan_opal(unsigned long node, const char *uname,
--- linux-4.15.0.orig/arch/powerpc/include/asm/paca.h
+++ linux-4.15.0/arch/powerpc/include/asm/paca.h
@@ -32,6 +32,7 @@
#include <asm/accounting.h>
#include <asm/hmi.h>
#include <asm/cpuidle.h>
+#include <asm/atomic.h>

register struct paca_struct *local_paca asm("r13");

@@ -49,6 +50,9 @@
#define get_lppaca() (get_paca()->lppaca_ptr)
#define get_slb_shadow() (get_paca()->slb_shadow_ptr)

+/* Maximum number of threads per core. */
+#define MAX_SMT8 
+
 struct task_struct;

/*
@@ -159,6 +163,7 @@
 u64 saved_r1; /* r1 save for RTAS calls or PM */
 u64 saved_msr; /* MSR saved here by enter_rtas */
 u16 trap_save; /* Used when bad stack is encountered */
+u8 irq_soft_mask; /* mask for irq soft masking */
 u8 soft_enabled; /* irq soft-enable flag */
 u8 irq_happened; /* irq happened while soft-disabled */
 u8 io_sync; /* writel() needs spin_unlock sync */
@@ -177,6 +182,8 @@
 u8 thread_mask;
 /* Mask to denote subcore sibling threads */
 u8 subcore_sibling_mask;
+/* Flag to request this thread not to stop */
+atomic_t dont_stop;
+
 /* Pointer to an array which contains pointer
 to the sibling threads' paca.
@@ -239,8 +246,7 @@
*/ 
 u64 exrfi[EX_SIZE] __aligned(0x80);
 void *rfi_flush_fallback_area;
 -u64 l1d_flush_congruence;
 -u64 l1d_flush_sets;
+u64 l1d_flush_size;
#endif

--- linux-4.15.0.orig/arch/powerpc/include/asm/page.h
+++ linux-4.15.0/arch/powerpc/include/asm/page.h
@@ -344,5 +344,6 @@
#include <asm-generic/memory_model.h>
#endif /* __ASSEMBLY__ */
+#include <asm/slice.h>
#endif /* _ASM_POWERPC_PAGE_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/page_64.h
+++ linux-4.15.0/arch/powerpc/include/asm/page_64.h
@@ -86,65 +86,6 @@
#include <asm-generic/memory_model.h>
#endif /* __ASSEMBLY__ */
-#ifdef CONFIG_PPC_MM_SLICES
-
-#define SLICE_LOW_SHIFT	28
-#define SLICE_HIGH_SHIFT	40
-
-#define SLICE_LOW_TOP	(0x100000000ul)
-#define SLICE_NUM_LOW	(SLICE_LOW_TOP >> SLICE_LOW_SHIFT)
-#define SLICE_NUM_HIGH	(H_PGTABLE_RANGE >> SLICE_HIGH_SHIFT)
-
-#define GET_LOW_SLICE_INDEX(addr)	((addr) >> SLICE_LOW_SHIFT)
-#define GET_HIGH_SLICE_INDEX(addr)	((addr) >> SLICE_HIGH_SHIFT)
-
-#ifndef __ASSEMBLY__
-struct mm_struct;
-
-extern unsigned long slice_get_unmapped_area(unsigned long addr,
-    unsigned long len,
-    unsigned long flags,
-    unsigned int psize,
-    int topdown);
-
-extern unsigned int get_slice_psize(struct mm_struct *mm,
-    unsigned long addr);
-
-extern void slice_set_user_psize(struct mm_struct *mm,
-    unsigned int psize);
-
-extern void slice_set_range_psize(struct mm_struct *mm,
-    unsigned long start,
-    unsigned long len,
-    unsigned int psize);
-
-#endif /* __ASSEMBLY__ */
-#else
-#define slice_init()
-#ifdef CONFIG_PPC_BOOK3S_64
-#define get_slice_psize(mm, addr)((mm)->context.user_psize)
-#define slice_set_user_psize(mm, psize)\n- do {\n- (mm)->context.user_psize = (psize);\n- (mm)->context.sllp = SLB_VSID_USER | mmu_psize_defsl[(psize)].sllp; \n- } while (0)
-#else /* !CONFIG_PPC_BOOK3S_64 */
-#define get_slice_psize(mm, addr)(MMU_PAGE_64K
-#define slice_set_user_psize(mm, psize)do { BUG(); } while(0)
-#endif /* CONFIG_PPC.Book3S */
-
-#define slice_set_range_psize(mm, start, len, psize)\n- do {slice_set_user_psize((mm), (psize))\n- } while (0)
-#endif /* CONFIG_PPC.MM_SLICES */
-
-#ifdef CONFIG_HUGETLB_PAGE
-
-#ifdef CONFIG_PPC.MM_SLICES
-#define HAVE_ARCH_HUGETLB_UNMAPPED_AREA
-#endif
-
-#endif /* !CONFIG_HUGETLB_PAGE */
-
-#define VM_DATA_DEFAULT_FLAGS\n- (is_32bit_task()) ? __\n- VM_DATA_DEFAULT_FLAGS32 : VM_DATA_DEFAULT_FLAGS64)
--- linux-4.15.0.orig/arch/powerpc/include/asm/pci-bridge.h
+++ linux-4.15.0/arch/powerpc/include/asm/pci-bridge.h
@@ -129,6 +129,7 @@
#endif /* CONFIG_PPC64 */

void *private_data;
+struct npu *npu;
];

/* These are used for config access before all the PCI probing
@@ -197,8 +198,6 @@
structiommu_table_group *table_group;/* for phb's or bridges */

intpci_ext_config_space;/* for pci devices */
-
-struct pci_dev *pcidev;/* back-pointer to the pci device */
#endif CONFIG_EEH
struct eeh_dev *edev;/* eeh device */
#endif
--- linux-4.15.0.orig/arch/powerpc/include/asm/pci.h
+++ linux-4.15.0/arch/powerpc/include/asm/pci.h
@@ -144,5 +144,8 @@
extern struct pci_dev *pnv_pci_get_gpu_dev(struct pci_dev *npdev);
extern struct pci_dev *pnv_pci_get_npu_dev(struct pci_dev *gpdev, int index);
+extern int pnv_npu2_init(struct pci_controller *hose);
+extern int pnv_npu2_map_lpar_dev(struct pci_dev *gpdev, unsigned int lparid,
+unsigned long msr);
#endif /* __ASM_POWERPC_PCI_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/percpu.h
+++ linux-4.15.0/arch/powerpc/include/asm/percpu.h
@@ -10,8 +10,6 @@
#ifdef CONFIG_SMP
-#include <asm/paca.h>
-
-#define __my_cpu_offset local_paca->data_offset
#endif /* CONFIG_SMP */
@@ -19,4 +17,6 @@
#include <asm-generic/percpu.h>
#include <asm/paca.h>
#include <asm/processor.h>/ For TASK_SIZE */
#include <asm/mmu.h>
#include <asm/page.h>
+#include <asm/tlbflush.h>

struct mm_struct;

--- linux-4.15.0.orig/arch/powerpc/include/asm/pnv-ocxl.h
+++ linux-4.15.0/arch/powerpc/include/asm/pnv-ocxl.h
@@ -0,0 +1,36 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
```c
#ifndef _ASM_PNV_OCXL_H
#define _ASM_PNV_OCXL_H

#include <linux/pci.h>

#define PNV_OCXL_TL_MAX_TEMPLATE 63
#define PNV_OCXL_TL_BITS_PER_RATE 4
#define PNV_OCXL_TL_RATE_BUF_SIZE ((PNV_OCXL_TL_MAX_TEMPLATE+1) * PNV_OCXL_TL_BITS_PER_RATE / 8)

extern int pnv_ocxl_get_actag(struct pci_dev *dev, u16 *base, u16 *enabled, 
    u16 *supported);
extern int pnv_ocxl_get_pasid_count(struct pci_dev *dev, int *count);

extern int pnv_ocxl_get_tl_cap(struct pci_dev *dev, long *cap, 
    char *rate_buf, int rate_buf_size);
extern int pnv_ocxl_set_tl_conf(struct pci_dev *dev, long cap, 
    uint64_t rate_buf_phys, int rate_buf_size);

textern int pnv_ocxl_get_xsl_irq(struct pci_dev *dev, int *hewire);
textern void pnv_ocxl_unmap_xsl_regs(void __iomem *dsisr, void __iomem *dar, 
    void __iomem *tfc, void __iomem *pe_handle);

textern int pnv_ocxl_map_xsl_regs(struct pci_dev *dev, void __iomem **dsisr, 
    void __iomem **dar, void __iomem **tfc, 
    void __iomem **pe_handle);

extern int pnv_ocxl_spa_setup(struct pci_dev *dev, void *spa_mem, int PE_mask, 
    void **platform_data);
textern void pnv_ocxl_spa_release(void *platform_data);
extern int pnv_ocxl_spa_remove_pe_from_cache(void *platform_data, int pe_handle);

textern int pnv_ocxl_alloc_xive_irq(u32 *irq, u64 *trigger_addr);
extern void pnv_ocxl_free_xive_irq(u32 irq);

#endif /* _ASM_PNV_OCXL_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/pnv-pci.h
+++ linux-4.15.0/arch/powerpc/include/asm/pnv-pci.h
@@ -29,6 +29,12 @@
textern int pnv_pci_set_p2p(struct pci_dev *initiator, struct pci_dev *target, 
    u64 desc);

textern int pnv_pci_enable_tunnel(struct pci_dev *dev, uint64_t *asnind);
textern int pnv_pci_disable_tunnel(struct pci_dev *dev);

textern int pnv_pci_set_tunnel_bar(struct pci_dev *dev, uint64_t addr, 
    int enable);

textern int pnv_pci_get_as_notify_info(struct task_struct *task, u32 *lpid, 
    u32 *pid, u32 *tid);
int pnv_phb_to_cxl_mode(struct pci_dev *dev, uint64_t mode);
```
int pnv_cxl_ioda_msi_setup(struct pci_dev *dev, unsigned int hwrirq,
    unsigned int virq);

--- linux-4.15.0.orig/arch/powerpc/include/asm/powerv.h
+++ linux-4.15.0/arch/powerpc/include/asm/powerv.h
@@ -15,7 +15,7 @@
 extern void powernv_set_nmmu_ptcr(unsigned long ptcrc);
 extern struct npu_context *pnv_npu2_init_context(struct pci_dev *gpdev,
    unsigned long flags,
-struct npu_context *(*cb)(struct npu_context *, void *),
+void (*cb)(struct npu_context *, void *),
    void *priv);
 extern void pnv_npu2_destroy_context(struct npu_context *context,
    struct pci_dev *gpdev);
@@ -23,6 +23,8 @@
 unsigned long *flags, unsigned long *status,
 int count);

+void pnv_program_cpu_hotplug_lpcr(unsigned int cpu, u64 lpcr_val);
+void pnv_tm_init(void);
#else
 static inline void powernv_set_nmmu_ptcr(unsigned long ptcrc) { }
@@ -40,6 +42,7 @@
 } static inline void pnv_tm_init(void) { }
+static inline void pnv_power9_force_smt4(void) { }
#endif /* _ASM_POWERNV_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/ppc-opcode.h
+++ linux-4.15.0/arch/powerpc/include/asm/ppc-opcode.h
@@ -156,6 +156,12 @@
+/* VMX Vector Load Instructions */
+#define OP_31_XOP_LVX 103
+
+/* VMX Vector Store Instructions */
+#define OP_31_XOP_STVX 231
+#define OP_LWZ 32
+#define OP_STFS 52
+#define OP_STFSU 53
@@ -226,6 +232,7 @@
 #define PPC_INST_MSGSYNC 0x7c0006ec
 #define PPC_INST_MSGSNDP 0x7c00011c

+/* VMX Vector Load Instructions */
+#define OP_31_XOP_LFDX 599
+#define OP_31_XOP_LFDUX631
/* The following stops all load and store data streams associated with stream * ID (ie. streams created explicitly). The embedded and server mnemonics for * dcbt are different so we use machine "power4" here explicitly. +* dcbt are different so this must only be used for server. */

#define DCBT_STOP_ALL_STREAM_IDS(scratch)\
   .machine push ;
   .machine "power4" ;
   .lis scratch,0x60000000@h;\
   .dcbt 0,scratch,0b01010;\
   .machine pop

#define DCBT_BOOK3S_STOP_ALL_STREAM_IDS(scratch)\
   .lis scratch,0x60000000@h;\
   .dcbt 0,scratch,0b01010

/*
* toreal/fromreal/tophys/tovirt macros. 32-bit BookE makes them *
*XXX bogus, I think */
stringify_in_c(.long (_target) - . ;)
stringify_in_c(.previous)

#ifdef CONFIG_PPC_FSL_BOOK3E
#define BTB_FLUSH(reg)\
   .lis reg,BUCSR_INIT@h;\
   .ori reg,reg,BUCSR_INIT@l;\
   .mtspr SPRN_BUCSR,reg;\
   .isync;
#else
#endif /* CONFIG_PPC_FSL_BOOK3E */

#endif /* _ASM_POWERPC_PPC_ASM_H */
* @bus_addr: The 'translated' bus address of the region.
* @len: The length in bytes of the region.
* @offset: The offset from the start of memory of the region.
+ * @dma_mask: Device dma_mask.
* @ioid: The IOID of the device who owns this region
* @chunk_list: Opaque variable used by the ioc page manager.
* @region_ops: struct ps3_dma_region_ops - dma region operations
@@ -83,6 +83,7 @@

enum ps3_dma_region_type region_type;
unsigned long len;
unsigned long offset;
+u64 dma_mask;

/* driver variables (set by ps3_dma_region_create) */
unsigned long bus_addr;
--- linux-4.15.0.orig/arch/powerpc/include/asm/reg.h
+++ linux-4.15.0/arch/powerpc/include/asm/reg.h
@@ -116,11 +116,16 @@
#define MSR_TS_S	__MASK(MSR_TS_S_LG)	/*  Transaction Suspended */
#define MSR_TS_T	__MASK(MSR_TS_T_LG)	/*  Transaction Transactional */
#define MSR_TS_MASK	(MSR_TS_T | MSR_TS_S)   /* Transaction State bits */
-#define MSR_TM_ACTIVE(x) (((x) & MSR_TS_MASK) != 0) /* Transaction active? */
+#define MSR_TM_ACTIVE(x) (((x) & MSR_TS_MASK) != 0) /* Transaction active? */
+    #ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+    #define MSR_TM_ACTIVE(x) (((x) & MSR_TS_MASK) != 0) /* Transaction active? */
+    +#else
+    +#define MSR_TM_ACTIVE(x) 0
+    +#endif
+    
+    #if defined(CONFIG_PPC_BOOK3S_64)
+    #define MSR_64BITMSR_SF
+    
+    #endif

#define PSSCR_SD0x00400000 /* Status Disable */
#define PSSCR_PLL0xf000000000000000 /* Power-saving Level Status */
#define PSSCR_GUEST_VIS0xf000000000000000 /* Guest-visible PSSCR fields */
+    #define PSSCR_FAKE_SUSPEND0x00000400 /* Fake-suspend bit (P9 DD2.2) */
+    #define PSSCR_FAKE_SUSPEND_LG10 /* Fake-suspend bit position */

/* Floating Point Status and Control Register (FPSCR) Fields */
#define FPSCR_FX	0x80000000	/* FPU exception summary */
#define SPRN_TFIAR	0x81	/* Transaction Failure Inst Addr */
#define SPRN_TEXTURES0x82/* Transaction EXception & Summary */
```c
#define SPRN_TEXASRU 0x83 /* Upper 32 */
#define TEXASR_ABORT__MASK(63-31) /* terminated by tabort or treclaim */
#define TEXASR_SUSP__MASK(63-32) /* tx failed in suspended state */
#define TEXASR_HV__MASK(63-34) /* MSR[HV] when failure occurred */
#define TEXASR_PR__MASK(63-35) /* MSR[PR] when failure occurred */
#define TEXASR_FS__MASK(63-36) /* TEXASR Failure Summary */
#define TEXASR_EXACT__MASK(63-37) /* TFIAR value is exact */
#define SPRN_TFHAR0x80 /* Transaction Failure Handler Addr */
#define SPRN_TIDR144 /* Thread ID register */
#define SPRN_CTRLF0x088
#define SPRN_LPID0x13F /* Logical Partition Identifier */
#define SPRN_TFHAR 0x80 /* Transaction Failure Handler Addr */
#define SPRN_TIDR 144 /* Thread ID register */
#define SPRN_CTRLF 0x088
#define LPID_RSVD 0x3ff /* Reserved LPID for parnt switching */
#define SPRN_HMER 0x150 /* Hardware m? error recovery */
#define SPRN_HMEER 0x151 /* Hardware m? enable error recovery */
#define HMER_DEBUG_TRIG (1ul << (63 - 17)) /* Debug trigger */
#define HMEER_DEBUG_TRIG (1ul << (63 - 17)) /* Debug trigger */
#define SRR1_PROGTRAP 0x00020000 /* Trap */
#define SRR1_PROGADDR 0x00010000 /* SRR0 contains subsequent addr */
#define SRR1_MCE_MCP 0x00080000 /* Machine check signal caused interrupt */
#define SRR1_PROGTRAP0x00020000 /* Trap */
#define SRR1_PROGADDR0x00010000 /* SRR0 contains subsequent addr */
#define SRR1_MCE_MCP 0x00080000 /* Machine check signal caused interrupt */
#define SRR1_PROGTRAP0x00020000 /* Trap */
#define SRR1_PROGADDR0x00010000 /* SRR0 contains subsequent addr */
#define SRR1_MCE_MCP 0x00080000 /* Machine check signal caused interrupt */
#define SRR1_PROGTRAP0x00020000 /* Trap */
#define SRR1_PROGADDR0x00010000 /* SRR0 contains subsequent addr */
```

---

Open Source Used In 5GaaS Edge AC-4 10812
#define MSR_KERNEL (MSR_ | MSR_64BIT)
#define MSR_USER32 (MSR_ | MSR_PR | MSR_EE)
#define MSR_USER64 (MSR_USER32 | MSR_64BIT)
--- linux-4.15.0.orig/arch/powerpc/include/asm/security_features.h
+++ linux-4.15.0/arch/powerpc/include/asm/security_features.h
@@ -0,0 +1,102 @@
+/* SPDX-License-Identifier: GPL-2.0+ */
+/*
 + * Security related feature bit definitions.
 + *
 + * Copyright 2018, Michael Ellerman, IBM Corporation.
 + */
+
+#endif
+extern unsigned long powerpc_security_features;
+extern bool rfi_flush;
+
+/* These are bit flags */
+enum stf_barrier_type {
+STF_BARRIER_NONE = 0x1,
+STF_BARRIER_FALLBACK = 0x2,
+STF_BARRIER_EIEIO = 0x4,
+STF_BARRIER_SYNC_ORI = 0x8,
+};
+
+void setup_stf_barrier(void);
+void do_stf_barrier_fixups(enum stf_barrier_type types);
+void setup_count_cache_flush(void);
+
+static inline void security_ftr_set(unsigned long feature)
+{
+    powerpc_security_features |= feature;
+}
+
+static inline void security_ftr_clear(unsigned long feature)
+{
+    powerpc_security_features &= ~feature;
+}
+
+static inline bool security_ftr_enabled(unsigned long feature)
+{
+    return !!(powerpc_security_features & feature);
+}
Various features indicating support for Spectre/Meltdown mitigations:

- The L1-D cache can be flushed with ori r30,r30,0
- The L1-D cache can be flushed with mtspr 882,r0 (aka SPRN_TRIG2)
- ori r31,r31,0 acts as a speculation barrier
- Entries in L1-D are private to a SMT thread
- Indirect branch prediction cache disabled
- bcct 2,0,0 triggers a hardware assisted count cache flush
- Features indicating need for Spectre/Meltdown mitigations
- The L1-D cache should be flushed on MSR[HV] 1->0 transition (hypervisor to guest)
- The L1-D cache should be flushed on MSR[PR] 0->1 transition (kernel to userspace)
- A speculation barrier should be used for bounds checks (Spectre variant 1)
- Firmware configuration indicates user favours security over performance
- Software required to flush count cache on context switch
- Software required to flush link stack on context switch
- The L1-D cache should be flushed when entering the kernel
- The L1-D cache should be flushed after user accesses from the kernel
#define SEC_FTR_L1D_FLUSH_UACCESS 0x0000000000008000ull
+
+// Features enabled by default
+#define SEC_FTR_DEFAULT
+(SEC_FTR_L1D_FLUSH_HV | 
+ SEC_FTR_L1D_FLUSH_PR | 
+ SEC_FTR_BNDS_CHK_SPEC_BAR | 
+ SEC_FTR_L1D_FLUSH_ENTRY | 
+ SEC_FTR_L1D_FLUSH_UACCESS | 
+ SEC_FTR_FAVOUR_SECURITY)
+
+#endif /* _ASM PowerPC_SECURITY_FEATURES_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/setjmp.h
+++ linux-4.15.0/arch/powerpc/include/asm/setjmp.h
@@ -12,7 +12,9 @@
#define JMP_BUF_LEN 23
-extern long setjmp(long *);
-extern void longjmp(long *, long);
+typedef long jmp_buf[JMP_BUF_LEN];
+
+extern int setjmp(jmp_buf env) __attribute__((returns_twice));
+extern void longjmp(jmp_buf env, int val) __attribute__((noreturn));

#endif /* _ASM PowerPC_SETJMP_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/setup.h
+++ linux-4.15.0/arch/powerpc/include/asm/setup.h
@@ -9,6 +9,7 @@
 extern unsigned int rtas_data;
 extern unsigned long long memory_limit;
 +extern bool init_mem_is_free;
 extern unsigned long klimit;
 extern void *zalloc_maybe_bootmem(size_t size, gfp_t mask);

 @ @ -49,8 +50,34 @@
 L1D_FLUSH_MTTRIG= 0x8,
 ];

-void __init setup_rfi_flush(enum l1d_flush_type, bool enable);
+void setup_rfi_flush(enum l1d_flush_type, bool enable);
+void setup_entry_flush(bool enable);
+void setup_uaccess_flush(bool enable);
 void do_rfi_flush_fixups(enum l1d_flush_type types);
 +#ifdef CONFIG_PPC_BARRIER_NOSPEC
+void setup_barrier_nospec(void);
+#else

Open Source Used In 5GasS Edge AC-4 10815
--- linux-4.15.0.orig/arch/powerpc/include/asm/sfp-machine.h
+++ linux-4.15.0/arch/powerpc/include/asm/sfp-machine.h
@@ -213,30 +213,18 @@

 /* respectively. The result is placed in HIGH_SUM and LOW_SUM. Overflow
 * (i.e. carry out) is not stored anywhere, and is lost.
 */
-#define add_ssaaaa(sh, sl, ah, al, bh, bl) \
+define add_ssaaaa(sh, sl, ah, al, bh, bl) \
   do {
      
      if (__builtin_constant_p (bh) && (bh) == 0) \
-       __asm__ "{a%I4|add%I4c} %1,%3,%4
          {aze|addze} %0,%2"
-       : "=r" ((USItype)(sh))\n-       : 
-       : 
-       : 
-       : "rI" ((USItype)(bl))\n-      }
-    else if (__builtin_constant_p (bh) && (bh) ==~(USItype) 0) \
-      __asm__ "{a%I4|add%I4c} %1,%3,%4\n        {ame|addme} %0,%2"
-      : "=r" ((USItype)(sh))\n-      : 
-      : 
-      : "rI" ((USItype)(bl))\n+      __asm__ "{add%I4c %1,%3,%4\n        addze %0,%2"
+      : 
+      : 
+      : 
+      : "rI" ((USItype)(bl))\n+      }
   

else if (__builtin_constant_p (bh) && (bh) == ~(USItype) 0)
+ __asm__ ("add%I4c %1, %3, %4
\n\taddme %0, %2"
+ : "=r" (sh), "=&r" (sl) : "r" (ah), "%r" (al), "rI" (bl));
else
- __asm__ ("{a%I5[add%I5c] %1, %3, %4}n\t{aeladdde} %0, %2, %3"
- : ":=\r" ((USItype)(sh)),
- ":="&r" ((USItype)(sl))
- : "%r" ((USItype)(ah)),
- : "r" ((USItype)(bh)),
- : "%r" ((USItype)(al)),
- : "rI" ((USItype)(bl)))
+ __asm__ ("add%I5c %1, %3, %4
\n\tadde %0, %2"
+ : "=r" (sh), "=&r" (sl)
+ : "%r" (ah), "r" (bh), "%r" (al), "rI" (bl));
} while (0)

/* sub_ddmmss is used in op-2.h and udivmodti4.c and should be equivalent to
@@ -248,44 +236,24 @@
* and LOW_DIFFERENCE. Overflow (i.e. carry out) is not stored anywhere,
* and is lost.
*/
-#define sub_ddmmss(sh, sl, ah, al, bh, bl)
+#define sub_ddmmss(sh, sl, ah, al, bh, bl) \
do {
+ if (_builtin_constant_p (ah) && (ah) == 0)
- __asm__ ("{sf%I3|subf%I3c} %1, %4, %3
- \n\t{sfze|subfze} %0, %2"
- : ":=\r" ((USItype)(sh)),
- : ":="&r" ((USItype)(sl))
- : "$r" ((USItype)(bh)),
- : "$rI" ((USItype)(al)),
- : "$r" ((USItype)(bl)))
- else if (_builtin_constant_p (ah) && (ah) ==~(USItype) 0)
- __asm__ ("{sf%I3|subf%I3c} %1, %4, %3
- \n\t{sfme|subfme} %0, %2"
- : ":=\r" ((USItype)(sh)),
- : ":="&r" ((USItype)(sl))
- : "$r" ((USItype)(bh)),
- : "$rI" ((USItype)(al)),
- : "$r" ((USItype)(bl)))
+ __asm__ ("subf%I3c %1, %4, %3
\n\tsubfze %0, %2"
+ : "sr" (sh), ":=&r" (sl) : "$r" (bh), "$rI" (al), "$r" (bl));
else if (_builtin_constant_p (ah) && (ah) ==~(USItype) 0)
+ __asm__ ("subf%I3c %1, %4, %3
\n\tsubfme %0, %2"
+ : "sr" (sh), ":=&r" (sl) : "$r" (bh), "$rI" (al), "$r" (bl));
else if (_builtin_constant_p (bh) && (bh) == 0)
- __asm__ ("{sf%I3|subf%I3c} %1, %4, %3
- \n\t{ame|addme} %0, %2"
- : ":=\r" ((USItype)(sh)),
- : ":="&r" ((USItype)(sl))
- ":=\r" ((USItype)(sh)),
- : ":="&r" ((USItype)(sl))
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- "r" ((USItype)(ah))
- "rl" ((USItype)(al))
- "r" ((USItype)(bl))
- else if (__builtin_constant_p (bh) && (bh) == ~(USItype) 0)
  - __asm__ ("{sf%I3|subf%I3c} %1,\#0\{aze\|addze\} %0,\#2"
    : "=r" ((USItype)(sh))
    : "=&r" ((USItype)(sl))
    : "r" ((USItype)(ah)),
      "rI" ((USItype)(al)),
      "r" ((USItype)(bl)))
+ else if (__builtin_constant_p (bh) && (bh) == ~(USItype) 0)
  + __asm__ ("subf%I3c %1,\#0\{aze\|addze\} %0,\#2"
    : "=r" (sh), "=&r" (sl) : "r" (ah), "rl" (al), "r" (bl));
+ else if (__builtin_constant_p (bh) && (bh) == ~(USItype) 0)
  + __asm__ ("subf%I3c %1,\#0\{aze\|addze\} %0,\#2"
    : "=r" (sh), "=&r" (sl) : "r" (ah), "rl" (al), "r" (bl));
else
  - __asm__ ("{sf%I4|subf%I4c} %1,%5,%4\{sfe\|subfe\} %0,\#3,\#2"
    : "=r" ((USItype)(sh))
    : "=&r" ((USItype)(sl))
    : "r" ((USItype)(ah)),
      "r" ((USItype)(bh)),
      "rI" ((USItype)(al)),
      "r" ((USItype)(bl)))
+ __asm__ ("subf%I4c %1,%5,%4\{sfe\|subfe\} %0,\#3,\#2"
    : "=r" (sh), "=&r" (sl)
    : "r" (ah), "r" (bh), "rl" (al), "r" (bl));
} while (0)

/*@ asm fragments for mul and div */
@@ -294,13 +262,10 @@
* UWtype integers MULTIPLIER and MULTIPLICAND, and generates a two UWtype
* word product in HIGH_PROD and LOW_PROD.
*/
-#define umul_ppmm(ph, pl, m0, m1)
+#define umul_ppmm(ph, pl, m0, m1) __asm__ ("mulhwu %0,%1,%2"
  : "=r" ((USItype)(ph))
  : "r" ((USItype)(m0)),
    "r" ((USItype)(m1)));
(pl) = __m0 * __m1;
} while (0)

@@ -.312.9 +277.10 @@
* significant bit of DENOMINATOR must be 1, then the pre-processor symbol
* UDIV_NEEDS_NORMALIZATION is defined to 1.

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#define udiv_qrnnd(q, r, n1, n0, d) 
    do {
        UWtype __d1, __d0, __q1, __q0, __r1, __r0, __m;
        __d1 = __ll_highpart (d);
        __d0 = __ll_lowpart (d);
        if (__r1 < __m) {
            __q1--, __r1 += (d);
            if (__r1 >= (d)) /* we didn't get carry when adding to __r1 */
                if (__r1 < __m) __q1--, __r1 += (d);
        } else if (__r1 >= (d)) /* i.e. we didn't get carry when adding to __r1 */
            if (__r1 < __m) __q1--, __r1 += (d);
    }

--- linux-4.15.0.orig/arch/powerpc/include/asm/slice.h
+++ linux-4.15.0/arch/powerpc/include/asm/slice.h
@@ -0,0 +1,42 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_POWERPC_SLICE_H
+#define _ASM_POWERPC_SLICE_H
+#ifdef CONFIG_PPC_BOOK3S_64
+#include <asm/book3s/64/slice.h>
+#elif defined(CONFIG_PPC64)
+#include <asm/nohash/64/slice.h>
+#elif defined(CONFIG_PPC_MMU_NOHASH)
+#include <asm/nohash/32/slice.h>
+#endif
+#ifdef CONFIG_PPC_MM_SLICES
+
+#ifdef CONFIG_HUGETLB_PAGE
+#define HAVE_ARCH_HUGETLB_UNMAPPED_AREA
+#endif
+#define HAVE_ARCH_UNMAPPED_AREA
+#define HAVE_ARCH_UNMAPPED_AREA_TOPDOWN
+
+#ifndef __ASSEMBLY__

+struct mm_struct;
+
+unsigned long slice_get_unmapped_area(unsigned long addr, unsigned long len,
+    unsigned long flags, unsigned int psize,
+ int topdown);
+
+unsigned int get_slice_psize(struct mm_struct *mm, unsigned long addr);
+
+void slice_set_user_psize(struct mm_struct *mm, unsigned int psize);
+void slice_set_range_psize(struct mm_struct *mm, unsigned long start,
+ unsigned long len, unsigned int psize);
+#endif /* __ASSEMBLY__ */
+
+#else /* CONFIG_PPC_MM_SLICES */
+
+#define slice_set_range_psize(mm, start, len, psize)
+    slice_set_user_psize((mm), (psize))
+
+#endif /* CONFIG_PPC_MM_SLICES */
+
+#endif /* _ASM_POWERPC_SLICE_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/smp.h
+++ linux-4.15.0/arch/powerpc/include/asm/smp.h
@@ -30,6 +30,7 @@
#include <asm/percpu.h>
extern int boot_cpuid;
+extern int boot_hw_cpuid;
 extern int spinning_secondaries;

 extern void cpu_die(void);
--- linux-4.15.0.orig/arch/powerpc/include/asm/spinlock.h
+++ linux-4.15.0/arch/powerpc/include/asm/spinlock.h
@@ -19,6 +19,7 @@
*
    * (the type definitions are in asm/spinlock_types.h)
 */
+#include <linux/jump_label.h>
#include <linux/irqflags.h>
#ifdef CONFIG_PPC64
#include <asm/paca.h>
--- linux-4.15.0.orig/arch/powerpc/include/asm/switch_to.h
+++ linux-4.15.0/arch/powerpc/include/asm/switch_to.h
@@ -95,6 +95,5 @@
 extern int set_thread_uses_vas(void);

 extern int set_thread_tidr(struct task_struct *t);
-extern void clear_thread_tidr(struct task_struct *t);

#endif /* _ASM_POWERPC_SWITCH_TO_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/synch.h
+++ linux-4.15.0/arch/powerpc/include/asm/synch.h
@@ -6,10 +6,6 @@
```c
#include <linux/stringify.h>
#include <asm/feature-fixups.h>

#ifdef (__powerpc64__) || defined(CONFIG_PPC_E500MC)
#define __SUBARCH_HAS_LWSYNC
#endif

#ifndef __ASSEMBLY__
extern unsigned int __start___lwsync_fixup, __stop___lwsync_fixup;
extern void do_lwsync_fixups(unsigned long value, void *fixup_start,
--- linux-4.15.0.orig/arch/powerpc/include/asm/systbl.h
+++ linux-4.15.0/arch/powerpc/include/asm/systbl.h
@@ -389,3 +389,6 @@
COMPAT_SYS_SPU(pwritev2)
SYSCALL(kexec_file_load)
SYSCALL(statx)
+SYSCALL(pkey_alloc)
+SYSCALL(pkey_free)
+SYSCALL(pkey_mprotect)
--- linux-4.15.0.orig/arch/powerpc/include/asm/time.h
+++ linux-4.15.0/arch/powerpc/include/asm/time.h
@@ -46,7 +46,7 @@
/* Accessor functions for the timebase (RTC on 601) registers. */
/* If one day CONFIG_POWER is added just define __USE_RTC as 1 */
#endif
#define CONFIG_6xx
-#define __USE_RTC() (!cpu_has_feature(CPU_FTR_USE_TB))
+#define __USE_RTC() (cpu_has_feature(CPU_FTR_USE_RTC))
#else
#define __USE_RTC() 0
#endif
```

```c
extern void sysfs_remove_device_from_node(struct device *dev, int nid);
extern int numa_update_cpu_topology(bool cpus_locked);

+static inline void update_numa_cpu_lookup_table(unsigned int cpu, int node)
+{
+ numa_cpu_lookup_table[cpu] = node;
+} +

static inline int early_cpu_to_node(int cpu)
{
 int nid;
 @@ -76,12 +81,16 @@
 ```
#ifdef CONFIG_NUMA &

#ifdef CONFIG_PPC_SPLPAR

#else

#endif /* CONFIG_NUMA &

#if defined(CONFIG_HOTPLUG_CPU) || defined(CONFIG_NEED_MULTIPLE_NODES)

-#ifdef CONFIG_PPC_SPLPAR

#endif /* CONFIG_HOTPLUG_CPU &

-#ifdef CONFIG_NEED_MULTIPLE_NODES */

+#include <asm-generic/topology.h>

#if define CONFIG_SMP

#define topology_sibling_cpumask(cpu)(per_cpu(cpu_sibling_map, cpu))

#define topology_core_cpumask(cpu)(per_cpu(cpu_core_map, cpu))

#define topology_core_id(cpu)(cpu_to_core_id(cpu))

@end of define CONFIG_SMP

--- linux-4.15.0.orig/arch/powerpc/include/asm/uaccess.h

+++ linux-4.15.0/arch/powerpc/include/asm/uaccess.h

@ -7,6 +7,7 @@

#include <asm/processor.h>

#include <asm/page.h>
#include <asm/extable.h>
+#include <asm/kup.h>

/**
 * The fs value determines whether argument validity checking should be
 @ @ -54.7 +55.7 @@
 #endif

#define access_ok(type, addr, size)\
- (__chk_user_ptr(addr),
+ (__chk_user_ptr(addr), (void)(type),
   __access_ok((__force unsigned long)(addr), (size), get_fs()))

/**
 @ @ -.82.9 +83.14 @@
 __put_user_check((__typeof__(*(ptr)))(x), (ptr), sizeof(*ptr))

#define __get_user(x, ptr)\
- __get_user_nocheck((x), (ptr), sizeof(*ptr))
+ __get_user_nocheck((x), (ptr), sizeof(*ptr), true)
#define __put_user(x, ptr)\
- __put_user_nocheck((__typeof__(*(ptr)))(x), (ptr), sizeof(*ptr))
+ __put_user_nocheck((__typeof__(*(ptr)))(x), (ptr), sizeof(*ptr), true)
+ 
+#define __get_user_allowed(x, ptr)\
+ __get_user_nocheck((x), (ptr), sizeof(*ptr), false)
+#define __put_user_allowed(x, ptr)\
+ __put_user_nocheck((__typeof__(*(ptr)))(x), (ptr), sizeof(*ptr), false)

#define __get_user_inatomic(x, ptr)\
 __get_user_nosleep((x), (ptr), sizeof(*ptr))
 @ @ -129.7 +135.7 @@
 : "r" (x), "b" (addr), "i" (-EFAULT), "0" (err)
 #endif /* __powerpc64 */

-#define __put_user_size(x, ptr, size, retval)\
+#define __put_user_size_allowed(x, ptr, size, retval)\
 do {\
   retval = 0;\
   switch (size) {\
   @ @ -141.14 +147.28 @@
   |\
 } while (0)

-#define __put_user_nocheck(x, ptr, size)\
+#define __put_user_size(x, ptr, size, retval)\
+do {\
+ allow_write_to_user(ptr, size);


+__put_user_size_allowed(x, ptr, size, retval);
+prevent_write_to_user(ptr, size);
+} while (0)
+
+#define __put_user_nocheck(x, ptr, size, do_allow)
+({
+long __pu_err;
+__typeof__(*(ptr)) __user *__pu_addr = (ptr);
+__typeof__(*(ptr)) __pu_val = (x);
+__typeof__(size) __pu_size = (size);
+if (!is_kernel_addr((unsigned long)__pu_addr))
+might_fault();
-__chk_user_ptr(ptr);
-__put_user_size((x), __pu_addr, (size), __pu_err);
+__chk_user_ptr(__pu_addr);
+if (do_allow)
+__put_user_size(__pu_val, __pu_addr, __pu_size, __pu_err);
+else
+__put_user_size_allowed(__pu_val, __pu_addr, __pu_size, __pu_err);
+
+__pu_err;
})
@@ -156,9 +176,13 @@
({
+long __pu_err = -EFAULT;
+__typeof__(*(ptr)) __user *__pu_addr = (ptr);
+__typeof__(*(ptr)) __pu_val = (x);
+__typeof__(size) __pu_size = (size);
+if (access_ok(VERIFY_WRITE, __pu_addr, size))
+__put_user_size((x), __pu_addr, __pu_size, __pu_err);
+if (access_ok(VERIFY_WRITE, __pu_addr, __pu_size))
+__put_user_size(__pu_val, __pu_addr, __pu_size, __pu_err);
+
+__pu_err;
})
@@ -166,8 +190,12 @@
({
+long __pu_err;
+__typeof__(*(ptr)) __user *__pu_addr = (ptr);
-__chk_user_ptr(ptr);
-__put_user_size((x), __pu_addr, (size), __pu_err);
+__typeof__(*(ptr)) __pu_val = (x);
+__typeof__(size) __pu_size = (size);
+if (access_ok(VERIFY_WRITE, __pu_addr, size))
+__put_user_size((x), __pu_addr, __pu_size, __pu_err);
+if (access_ok(VERIFY_WRITE, __pu_addr, __pu_size))
+__put_user_size(__pu_val, __pu_addr, __pu_size, __pu_err);
+
+__pu_err;
})
+\__chk_user_ptr(__pu_addr);\}
+\__put_user_size(__pu_val, __pu_addr, __pu_size, __pu_err); \
+\__pu_err;\}
)
@@ -225,7 +253,7 @@
: "b" (addr), "i" (-EFAULT), "0" (err))
#endif /* __powerpc64__ */

-#define __get_user_size(x, ptr, size, retval)			\+
+#define __get_user_size_allowed(x, ptr, size, retval)		\+
do {\+
    retval = 0;\+
    __chk_user_ptr(ptr);\+
@@ -240,39 +268,69 @@
}	\+
} while (0)

-#define __get_user_nocheck(x, ptr, size)			\+
+#define __get_user_size(x, ptr, size, retval)			\+
do {\+
    allow_read_from_user(ptr, size);\+
    __get_user_size_allowed(x, ptr, size, retval);\+
    prevent_read_from_user(ptr, size);\+
    } while (0)
+
+/*
+ * This is a type: either unsigned long, if the argument fits into
+ * that type, or otherwise unsigned long long.
+ */
+#define __long_type(x) \+	__typeof__(__builtin_choose_expr(sizeof(x) > sizeof(0UL), 0ULL, 0UL))
+
+#define __get_user_nocheck(x, ptr, size, do_allow)			\+	({
    long __gu_err;\+
    unsigned long __gu_val;\+
    const __typeof__(*(ptr)) __user *__gu_addr = (ptr);\+
    __chk_user_ptr(ptr);\+
    __long_type(*(ptr)) __user *__gu_addr = (ptr);\+
    __typeof__(size) __gu_size = (size);\+
    __chk_user_ptr(__gu_addr);\+
    if (!is_kernel_addr((unsigned long)__gu_addr))
    might_fault();\+


- __get_user_size(__gu_val, __gu_addr, (size), __gu_err);
+ barrier_nospec();
+ if (do_allow)
 + __get_user_size(__gu_val, __gu_addr, __gu_size, __gu_err);
+ else
 + __get_user_size_allowed(__gu_val, __gu_addr, __gu_size, __gu_err);
(x) = (__typeof__(*(ptr)))__gu_val;

#define __get_user_check(x, ptr, size)
{(}
long __gu_err = -EFAULT;
unsigned long __gu_val = 0;
const __typeof__(*(ptr)) __user *__gu_addr = (ptr);
+ __long_type(*(ptr)) __gu_val = 0;
+ __typeof__(*(ptr)) __user *__gu_addr = (ptr);
+ __typeof__(size) __gu_size = (size);
+
might_fault();
+ if (access_ok(VERIFY_READ, __gu_addr, (size)))
- __get_user_size(__gu_val, __gu_addr, (size), __gu_err);
+ if (access_ok(VERIFY_READ, __gu_addr, __gu_size)) {
+ barrier_nospec();
+ __get_user_size(__gu_val, __gu_addr, __gu_size, __gu_err);
(}(x) = (__force __typeof__(*(ptr)))__gu_val;
+
#define __get_user_nosleep(x, ptr, size)
{(}
long __gu_err;
unsigned long __gu_val;
const __typeof__(*(ptr)) __user *__gu_addr = (ptr);
- __chk_user_ptr(ptr);
- __get_user_size(__gu_val, __gu_addr, (size), __gu_err);
+ __long_type(*(ptr)) __gu_val;
+ __typeof__(*(ptr)) __user *__gu_addr = (ptr);
+ __typeof__(size) __gu_size = (size);
+
+ __chk_user_ptr(__gu_addr);
+ barrier_nospec();
+ __get_user_size(__gu_val, __gu_addr, __gu_size, __gu_err);
(x) = (__force __typeof__(*(ptr)))__gu_val;
+}
static inline unsigned long raw_copy_in_user(void __user *to, const void __user *from, unsigned long n) {
    return __copy_tofrom_user(to, from, n);
    unsigned long ret;
    barrier_nospec();
    allow_user_access(to, from, n);
    ret = __copy_tofrom_user(to, from, n);
    prevent_user_access(to, from, n);
    return ret;
}
#endif /* __powerpc64__ */

static inline unsigned long raw_copy_from_user(void *to, const void __user *from, unsigned long n) {
    unsigned long ret;
    if (__builtin_constant_p(n) && (n <= 8)) {
        unsigned long ret = 1;
        switch (n) {
            case 1:
                barrier_nospec();
                __get_user_size(*(u8 *)to, from, 1, ret);
                break;
            case 2:
                barrier_nospec();
                __get_user_size(*(u16 *)to, from, 2, ret);
                break;
            case 4:
                barrier_nospec();
                __get_user_size(*(u32 *)to, from, 4, ret);
                break;
            case 8:
                barrier_nospec();
                __get_user_size(*(u64 *)to, from, 8, ret);
                break;
        }
    }
    return 0;
}
return __copy_tofrom_user((__force void __user *)to, from, n);
+barrier_nospec();
+allow_read_from_user(from, n);
+ret = __copy_tofrom_user((__force void __user *)to, from, n);
+prevent_read_from_user(from, n);
+return ret;
}

-static inline unsigned long raw_copy_to_user(void __user *to,
-const void *from, unsigned long n)
+static inline unsigned long
+raw_copy_to_user_allowed(void __user *to, const void *from, unsigned long n)
{
  if (__builtin_constant_p(n) && (n <= 8)) {
    unsigned long ret = 1;

    switch (n) {
      case 1:
        -__put_user_size(*(u8 *)from, (u8 __user *)to, 1, ret);
        +__put_user_size_allowed(*(u8 *)from, (u8 __user *)to, 1, ret);
        break;
      case 2:
        -__put_user_size(*(u16 *)from, (u16 __user *)to, 2, ret);
        +__put_user_size_allowed(*(u16 *)from, (u16 __user *)to, 2, ret);
        break;
      case 4:
        -__put_user_size(*(u32 *)from, (u32 __user *)to, 4, ret);
        +__put_user_size_allowed(*(u32 *)from, (u32 __user *)to, 4, ret);
        break;
      case 8:
        -__put_user_size(*(u64 *)from, (u64 __user *)to, 8, ret);
        +__put_user_size_allowed(*(u64 *)from, (u64 __user *)to, 8, ret);
        break;
    }
    if (ret == 0)
      return __copy_tofrom_user(to, (__force const void __user *)from, n);
  }

-extern unsigned long __clear_user(void __user *addr, unsigned long size);
+static inline unsigned long
+raw_copy_to_user(void __user *to, const void *from, unsigned long n)
+
+unsigned long ret;
+
+allow_write_to_user(to, n);
+ret = raw_copy_to_user_allowed(to, from, n);
+prevent_write_to_user(to, n);
static inline unsigned long clear_user(void __user *addr, unsigned long size) {
    unsigned long ret = size;
    might_fault();
    if (likely(access_ok(VERIFY_WRITE, addr, size)))
        return __clear_user(addr, size);
    return ret;
}

static inline unsigned long __clear_user(void __user *addr, unsigned long size) {
    return clear_user(addr, size);
}

extern long strncpy_from_user(char *dst, const char __user *src, long count);
@ @ -362,4 +455,13 @@
extern void memcpy_page_flushcache(char *to, struct page *page, size_t offset, size_t len);

+#define user_access_begin(type, ptr, len) access_ok(type, ptr, len)
+#define user_access_end()  prevent_user_access(NULL, NULL, ~0ul)
+
+#define unsafe_op_wrap(op, err) do { if (unlikely(op)) goto err; } while (0)
+#define unsafe_get_user(x, p, e) unsafe_op_wrap(__get_user_allowed(x, p), e)
+#define unsafe_put_user(x, p, e) unsafe_op_wrap(__put_user_allowed(x, p), e)
+#define unsafe_copy_to_user(d, s, l, e) \
+unsafe_op_wrap(raw_copy_to_user_allowed(d, s, l), e)
+
#endif /* _ARCH_POWERPC_UACCESS_H */
--- linux-4.15.0.orig/arch/powerpc/include/asm/unistd.h
+++ linux-4.15.0/arch/powerpc/include/asm/unistd.h
@@ -12,14 +12,10 @@
#include <uapi/asm/unistd.h>

#define NR_syscalls84
#define NR_syscalls387
#define __NR__exit __NR_exit

-#define __IGNORE_pkey_mprotect
-#define __IGNORE_pkey_alloc
-#define __IGNORE_pkey_free

#ifndef __ASSEMBLY__

#include <linux/types.h>
--- linux-4.15.0.orig/arch/powerpc/include/asm/vdso_datapage.h
+++ linux-4.15.0/arch/powerpc/include/asm/vdso_datapage.h
@@ -82,10 +82,11 @@
__u32 icache_block_size;/* L1 i-cache block size */
__u32 dcache_log_block_size;/* L1 d-cache log block size */
__u32 icache_log_block_size;/* L1 i-cache log block size */
-__s32 wtom_clock_sec;/* Wall to monotonic clock */
-__s32 wtom_clock_nsec;
+__u32 stamp_sec_fraction; /* fractional seconds of stamp_xtime */
+__s32 wtom_clock_nsec;/* Wall to monotonic clock nsec */
+__s64 wtom_clock_sec;/* Wall to monotonic clock sec */
+struct timespec stamp_xtime; /* xtime as at tb_orig_stamp */
+__u32 hrtimer_res; /* hrtimer resolution */
+__u32 syscall_map_64[SYSCALL_MAP_SIZE]; /* map of syscalls */
+__u32 syscall_map_32[SYSCALL_MAP_SIZE]; /* map of syscalls */
};
@@ -107,6 +108,7 @@

__s32 wtom_clock_nsec;
struct timespec stamp_xtime; /* xtime as at tb_orig_stamp */
__u32 stamp_sec_fraction; /* fractional seconds of stamp_xtime */
+__u32 hrtimer_res; /* hrtimer resolution */
+__u32 syscall_map_32[SYSCALL_MAP_SIZE]; /* map of syscalls */
+__u32 syscall_map_32[SYSCALL_MAP_SIZE]; /* map of syscalls */

--- linux-4.15.0.orig/arch/powerpc/include/uapi/asm/errno.h
+++ linux-4.15.0/arch/powerpc/include/uapi/asm/errno.h
@@ -2,6 +2,7 @@
#ifndef _ASM_POWERPC_ERRNO_H
#define _ASM_POWERPC_ERRNO_H
+#undef EDEADLOCK
#include <asm-generic/errno.h>
+#undef EDEADLOCK

#define _ASM_POWERPC_ERRNO_H

+#undef EDEADLOCK

#include <asm-generic/errno.h>

+#undef EDEADLOCK
--- linux-4.15.0.orig/arch/powerpc/include/uapi/asm/kvm.h
+++ linux-4.15.0/arch/powerpc/include/uapi/asm/kvm.h
#define KVM_PPC_CPU_CHAR_BR_HINT_HONOURED(1ULL << 58)
#define KVM_PPC_CPU_CHAR_MTTRIG_THR_RECONF(1ULL << 57)
#define KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS(1ULL << 56)
+#define KVM_PPC_CPU_CHAR_BCCTR_FLUSH_ASSIST(1ull << 54)
#define KVM_PPC_CPU_BEHAV_FAVOUR_SECURITY(1ULL << 63)
#define KVM_PPC_CPU_BEHAV_L1D_FLUSH_PR(1ULL << 62)
#define KVM_PPC_CPU_BEHAV_BNDS_CHK_SPEC_BAR(1ULL << 61)
+#define KVM_PPC_CPU_BEHAV_FLUSH_COUNT_CACHE(1ull << 58)
/* Per-vcpu XICS interrupt controller state */
#define KVM_REG_PPC_ICP_STATE(KVM_REG_PPC | KVM_REG_SIZE_U64 | 0x8c)
@@ -463,10 +463,12 @@

/* Transactional Memory checkpointed state:
 * This is all GPRs, all VSX regs and a subset of SPRs
 */
--- linux-4.15.0.orig/arch/powerpc/include/uapi/asm/unistd.h
+++ linux-4.15.0/arch/powerpc/include/uapi/asm/unistd.h
@@ -395,5 +395,8 @@
#define __NR_pwritev2	381
#define __NR_kexec_file_load	382
#define __NR_statx	383
+#define __NR_pkey_alloc	384
+#define __NR_pkey_free	385
+#define __NR_pkey_mprotect	386

@endif /* _UAPI_ASM_POWERPC_UNISTD_H_ */
--- linux-4.15.0.orig/arch/powerpc/kernel/Makefile
+++ linux-4.15.0/arch/powerpc/kernel/Makefile
@@ -45,6 +45,7 @@

OFFSET(PACATOC, paca_struct, kernel_toc);
OFFSET(PACAKBASE, paca_struct, kernelbase);
OFFSET(PACAKMSR, paca_struct, kernel_msr);
OFFSET(PACAIRQSOFTMASK, paca_struct, irq_soft_mask);
OFFSET(PACASOFTIRQEN, paca_struct, soft_enabled);
OFFSET(PACAIRQHAPPENED, paca_struct, irq_happened);
#ifdef CONFIG_PPC_BOOK3S
@@ -239,8 +240,7 @@
OFFSET(PACA_IN_NMI, paca_struct, in_nmi);
OFFSET(PACA_RFI_FLUSH_FALLBACK_AREA, paca_struct, rfi_flush_fallback_area);
OFFSET(PACA_EXRFI, paca_struct, exrfi);
-OFFSET(PACA_L1D_FLUSH_CONGRUENCE, paca_struct, l1d_flush_congruence);
-OFFSET(PACA_L1D_FLUSH_SETS, paca_struct, l1d_flush_sets);
+OFFSET(PACA_L1D_FLUSH_SIZE, paca_struct, l1d_flush_size);
@endef
OFFSET(PACAHWCPUID, paca_struct, hw_cpu_id);
@@ -374,6 +374,7 @@
OFFSET(WTOM_CLOCK_NSEC, vdso_data, wtom_clock_nsec);
OFFSET(STAMP_XTIME, vdso_data, stamp_xtime);
OFFSET(STAMP_SEC_FRAC, vdso_data, stamp_sec_fraction);
+OFFSET(CLOCK_HRTIMER_RES, vdso_data, hrtimer_res);
OFFSET(CFG_ICACHE_BLOCKSZ, vdso_data, icache_block_size);
OFFSET(CFG_DCACHE_BLOCKSZ, vdso_data, dcache_block_size);
@@ -402,7 +403,6 @@
DEFINE(CLOCK_REALTIME, CLOCK_REALTIME);
DEFINE(CLOCK_MONOTONIC, CLOCK_MONOTONIC);
DEFINE(NSEC_PER_SEC, NSEC_PER_SEC);
-DEFINE(CLOCK_REALTIME_RES, MONOTONIC_RES_NSEC);
#endif
OFFSET(VCPU_TFHAR, kvm_vcpu, arch.tfhar);
OFFSET(VCPU_TFIAR, kvm_vcpu, arch.tfiar);
OFFSET(VCPU_TEXASR, kvm_vcpu, arch.texasr);
+OFFSET(VCPU_ORIG_TEXASR, kvm_vcpu, arch.orig_texasr);
OFFSET(VCPU_GPR_TM, kvm_vcpu, arch.gpr_tm);
OFFSET(VCPU_FPRS_TM, kvm_vcpu, arch.fp_tm.fpr);
OFFSET(VCPU_VRS_TM, kvm_vcpu, arch.vr_tm.vr);
@@ -648,6 +649,7 @@
HSTATE_FIELD(HSTATE_HOST_IPI, host_ipi);
HSTATE_FIELD(HSTATE_PTID, ptid);
HSTATE_FIELD(HSTATE_TID, tid);
+HSTATE_FIELD(HSTATE_FAKE_SUSPEND, fake_suspend);
HSTATE_FIELD(HSTATE_MMCRO, host_mmcr[0]);
HSTATE_FIELD(HSTATE_MMCRI, host_mmcr[1]);
HSTATE_FIELD(HSTATE_MMCRA, host_mmcr[2]);
@@ -754,6 +756,7 @@
OFFSET(PACA_SUBCORE_SIBLING_MASK, paca_struct, subcore_sibling_mask);
OFFSET(PACA_SIBLING_PACA_PTRS, paca_struct, thread_sibling_pacas);
OFFSET(PACA_REQ_PSSCR, paca_struct, requested_psscr);
OFFSET(PACA_DONT_STOP, paca_struct, dont_stop);
#define STOP_SPR(x, f)OFFSET(x, paca_struct, stop_sprs.f)
STOP_SPR(STOP_PID, pid);
STOP_SPR(STOP_LDBAR, ldbar);
--- linux-4.15.0.orig/arch/powerpc/kernel/cacheinfo.c
+++ linux-4.15.0/arch/powerpc/kernel/cacheinfo.c
@@ -865,4 +865,25 @@
if (cache)
cache_cpu_clear(cache, cpu_id);
}
+
+void cacheinfo_teardown(void)
+{
+unsigned int cpu;
+
+lockdep_assert_cpus_held();
+
+for_each_online_cpu(cpu)
+cacheinfo_cpu_offline(cpu);
+}
+
+void cacheinfo_rebuild(void)
+{
+unsigned int cpu;
+
+lockdep_assert_cpus_held();
+
+for_each_online_cpu(cpu)
+cacheinfo_cpu_online(cpu);
+}
+
+#endif /* (CONFIG_PPC_PSERIES && CONFIG_SUSPEND) || CONFIG_HOTPLUG_CPU */
--- linux-4.15.0.orig/arch/powerpc/kernel/cacheinfo.h
+++ linux-4.15.0/arch/powerpc/kernel/cacheinfo.h
@@ -6,4 +6,8 @@
extern void cacheinfo_cpu_online(unsigned int cpu_id);
extern void cacheinfo_cpu_offline(unsigned int cpu_id);
+/* Allow migration/suspend to tear down and rebuild the hierarchy. */
+extern void cacheinfo_teardown(void);
+extern void cacheinfo_rebuild(void);
+
+#endif /* _PPC_CACHEINFO_H */
--- linux-4.15.0.orig/arch/powerpc/kernel/cpu_setup_6xx.S
+++ linux-4.15.0/arch/powerpc/kernel/cpu_setup_6xx.S

@@ -226,7 +226,7 @@
    beq1f
END_FTR_SECTION_IFSET(CPU_FTR_L3CR)
lwz6,CPU_SPEC_FEATURES(r4)
-andi.r0,r6,CPU_FTR_L3_DISABLE_NAP
+andis.r0,r6,CPU_FTR_L3_DISABLE_NAP@h
    beq1f
    li7,CPU_FTR_CAN_NAP
    andc6,r6,r7
--- linux-4.15.0.orig/arch/powerpc/kernel/cpu_setup_fsl_booke.S
+++ linux-4.15.0/arch/powerpc/kernel/cpu_setup_fsl_booke.S
@@ -162,7 +162,7 @@
* the feature on the primary core, avoid doing it on the
* secondary core.
 */
-andis.r6, r3, CPU_FTR_EMB_HV@h
+andi.r6, r3, CPU_FTR_EMB_HV
    beq2f
    rlwinm3, r3, 0, ~CPU_FTR_EMB_HV
    stw3, CPU_SPEC_FEATURES(r4)
--- linux-4.15.0.orig/arch/powerpc/kernel/cpu_setup_power.S
+++ linux-4.15.0/arch/powerpc/kernel/cpu_setup_power.S
@@ -28,6 +28,7 @@
    beqlr
    li0,0
    mtsprSPRN_LPID,r0
+    mtsprSPRN_PCR,r0
    mfspr3,SPRN_LPCR
    li4,(LPCR_LPES1 >> LPCR_LPES_SH)
    bl__init_LPCR_ISA206
@@ -42,6 +43,7 @@
    beqlr
    li0,0
    mtsprSPRN_LPID,r0
+    mtsprSPRN_PCR,r0
    mfsprr3,SPRN_LPCR
    li4,(LPCR_LPES1 >> LPCR_LPES_SH)
    bl__init_LPCR_ISA206
@@ -59,6 +61,7 @@
    beqlr
    li0,0
    mtsprSPRN_LPID,r0
+    mtsprSPRN_PCR,r0
    mfsprr3,SPRN_LPCR
    li4,(LPCR_LPES1 >> LPCR_LPES_SH)
    bl__init_LPCR_ISA206
@@ -81,6 +84,7 @@
    beqlr
    li0,0
    mtsprSPRN_LPID,r0
+    mtsprSPRN_PCR,r0
    mfsprr3,SPRN_LPCR
    orir3, r3, LPCR_PECEDH
    li4,0 /* LPES = 0 */
    beqlr
lir0,0
mtspr SPRN_LPID, r0
+ mtspr SPRN_PCR, r0
mfspr r3, SPRN_LPCR
orir3, r3, LPCR_PECEDH
lir4,0 /* LPES = 0 */ @ @ -103.6 +107.7 @ @
mtspr SPRN_PSSCR, r0
mtspr SPRN_LPID, r0
mtspr SPRN_PID, r0
+ mtspr SPRN_PCR, r0
mfspr r3, SPRN_LPCR
LOAD_REG_IMMEDIATE(r4, LPCR_PECEDH | LPCR_PECE_HVEE | LPCR_HVICE | LPCR_HEIC)
or3, r3, r4 @ @ -128.6 +133.7 @ @
mtspr SPRN_PSSCR, r0
mtspr SPRN_LPID, r0
mtspr SPRN_PID, r0
+ mtspr SPRN_PCR, r0
mfspr r3, SPRN_LPCR
LOAD_REG_IMMEDIATE(r4, LPCR_PECEDH | LPCR_PECE_HVEE | LPCR_HVICE | LPCR_HEIC)
or3, r3, r4 @ @ -183.7 +189.7 @ @

__init_FSCR:
mfspr r3, SPRN_FSCR                   
-orir3,r3,FSCR_TAR|FSCR_DSCR|FSCR_EBB
+orir3,r3,FSCR_TAR|FSCR_EBB
mtspr SPRN_FSCR, r3
blr

--- linux-4.15.0.orig/arch/powerpc/kernel/cputable.c
+++ linux-4.15.0/arch/powerpc/kernel/cputable.c
@@ -567,11 +567,30 @@
 .machine_check_early= __machine_check_early_realmode_p9,
 .platform= "power9",
 },
-/*! Power9 DD 2.1 or later (see DD2.0 above) */
+/*! Power9 DD 2.1 */
+pvr_mask= 0xffffeefef,
+pvr_value= 0x004e0201,
+.cpu_name= "POWER9 (raw)",
+.cpu_features= CPU_FTRS_POWER9_DD2_1,
+.cpu_user_features= COMMON_USER_POWER9,
+.cpu_user_features2= COMMON_USER2_POWER9,
+.mmu_features= MMU_FTRS_POWER9,
+.icache_bsize= 128,
+.dcache_bsize= 128,
+.num_pmcs= 6,
+.pmc_type= PPC_PMC_IBM,
+.oprofile_cpu_type= "ppc64/power9",
+.oprofile_type= PPC_OPROFILE_INVALID,
+.cpu_setup= __setup_cpu_power9,
+.cpu_restore= __restore_cpu_power9,
+.machine_check_early= __machine_check_early_realmode_p9,
+.platform= "power9",
+
+*/ Power9 DD2.2 or later */
.pvr_mask= 0xffff0000,
.pvr_value= 0x004e0000,
.cpu_name= "POWER9 (raw)",
.cpu_features= CPU_FTRS_POWER9_DD2_1,
.cpu_features= CPU_FTRS_POWER9_DD2_2,
.cpu_user_features= COMMON_USER_POWER9,
.cpu_user_features2= COMMON_USER2_POWER9,
.mmu_features= MMU_FTRS_POWER9,
@@ -1205,6 +1224,7 @@
.machine_check= machine_check_generic,
.platform= "ppc603",
},
+#ifdef CONFIG_PPC_83xx
+/* e300c1 (a 603e core, plus some) on 83xx */
.pvr_mask= 0x7fff0000,
.pvr_value= 0x00830000,
@@ -1215,7 +1235,7 @@
.icache_bsize= 32,
.dcache_bsize= 32,
.cpu_setup= __setup_cpu_603,
.machine_check= machine_check_83xx,
.platform= "ppc603",
},
+/* e300c2 (an e300c1 core, plus some, minus FPU) on 83xx */
@@ -1229,7 +1249,7 @@
.icache_bsize= 32,
.dcache_bsize= 32,
.cpu_setup= __setup_cpu_603,
.machine_check= machine_check_83xx,
.platform= "ppc603",
},
+/* e300c3 (e300c1, plus one IU, half cache size) on 83xx */
@@ -1243,7 +1263,7 @@
.icache_bsize= 32,
- .machine_check= machine_check_generic,
+ .machine_check= machine_check_83xx,
   .num_pmcs= 4,
   .oprofile_cpu_type= "ppc/e300",
   .oprofile_type= PPC_OPROFILE_FSL_EMB,
@@ -1260,12 +1280,13 @@
   .icache_bsize= 32,
   .dcache_bsize= 32,
   .cpu_setup= __setup_cpu_603,
- .machine_check= machine_check_generic,
+ .machine_check= machine_check_83xx,
   .num_pmcs= 4,
   .oprofile_cpu_type= "ppc/e300",
   .oprofile_type= PPC_OPROFILE_FSL_EMB,
{ /* default match, we assume split I/D cache & TB (non-601)... */
   .pvr_mask= 0x00000000,
   .pvr_value= 0x00000000,
@@ -2250,11 +2271,13 @@
   * oprofile_cpu_type already has a value, then we are
   * possibly overriding a real PVR with a logical one,
   * and, in that case, keep the current value for
- * oprofile_cpu_type.
+ * oprofile_cpu_type. Furthermore, let's ensure that the
+ * fix for the PMAO bug is enabled on compatibility mode.
+ */
   if (old.oprofile_cpu_type != NULL) {
     t->oprofile_cpu_type = old.oprofile_cpu_type;
     t->oprofile_type = old.oprofile_type;
+     t->cpu_features |= old.cpu_features & CPU_FTR_PMAO_BUG;
   }
}

--- linux-4.15.0.orig/arch/powerpc/kernel/crash.c
+++ linux-4.15.0/arch/powerpc/kernel/crash.c
@@ -44,6 +44,14 @@
#define REAL_MODE_TIMEOUT10000

static int time_to_dump;
+/*
+ * crash_wake_offline should be set to 1 by platforms that intend to wake
+ * up offline cpus prior to jumping to a kdump kernel. Currently powernv
+ * sets it to 1, since we want to avoid things from happening when an
+ * offline CPU wakes up due to something like an HMI (malfunction error),
+ * which propagates to all threads.
+ */

+int crash_wake_offline;

#define CRASH_HANDLER_MAX 3
/* List of shutdown handles */
@@ -63,15 +71,12 @@
#ifdef CONFIG_SMP

static atomic_t cpus_in_crash;
-static void crash_ipi_callback(struct pt_regs *regs)
+void crash_ipi_callback(struct pt_regs *regs)
{  
static cpumask_t cpus_state_saved = CPU_MASK_NONE;

int cpu = smp_processor_id();

-if (!cpu_online(cpu))
-  return;
-
  hard_irq_disable();
if (!cpumask_test_cpu(cpu, &cpus_state_saved)) {
  crash_save_cpu(regs, cpu);
@@ -109,6 +114,9 @@
  printk(KERN_EMERG "Sending IPI to other CPUs\n");

  +if (crash_wake_offline)
  +ncpus = num_present_cpus() - 1;
  +
  crash_send_ipi(crash_ipi_callback);
  smp_wmb();

--- linux-4.15.0.orig/arch/powerpc/kernel/dbell.c
+++ linux-4.15.0/arch/powerpc/kernel/dbell.c
@@ -36,7 +36,7 @@
{
  u32 tag = get_hard_smp_processor_id(cpu);

-kvmppc_set_host_ipi(cpu, 1);
+  kvmppc_set_host_ipi(cpu);
/* Order previous accesses vs. msgsnd, which is treated as a store */
ppc_msgsnd_sync();
  ppc_msgsnd(PPC_DBELL_MSGTYPE, 0, tag);
@@ -51,7 +51,7 @@
{
  u32 tag = cpu_thread_in_core(cpu);

-kvmppc_set_host_ipi(cpu, 1);
+  kvmppc_set_host_ipi(cpu);

/* Order previous accesses vs. msgsnd, which is treated as a store */
ppc_msgsnd_sync();
ppc_msgsnd(PPC_DBELL_MMSGTYPE, 0, tag);
@@ -86,7 +86,7 @@
may_hard_irq_enable();

-kvmppc_set_host_ipi(smp_processor_id(), 0);
+kvmppc_clear_host_ipi(smp_processor_id());
__this_cpu_inc(irq_stat.doorbell_irqs);

smp_ipi_demux_relaxed(); /* already performed the barrier */
--- linux-4.15.0.orig/arch/powerpc/kernel/dma-iommu.c
+++ linux-4.15.0/arch/powerpc/kernel/dma-iommu.c
@@ -100,7 +100,8 @@
if (!tbl)
    return 0;

-mask = 1ULL < (fls_long(tbl->it_offset + tbl->it_size) - 1);
+mask = 1ULL << (fls_long(tbl->it_offset + tbl->it_size) +
+    tbl->it_page_shift - 1);
    mask += mask - 1;
return mask;
--- linux-4.15.0.orig/arch/powerpc/kernel/dt_cpu_ftrs.c
+++ linux-4.15.0/arch/powerpc/kernel/dt_cpu_ftrs.c
@@ -54,8 +54,7 @@
};
#define CPU_FTRS_BASE
- (CPU_FTR_USE_TB | 
- CPU_FTR_LWSYNC | 
+ (CPU_FTR_LWSYNC | 
    CPU_FTR_FPU_UNAVAILABLE | 
    CPU_FTR_NODISRALIGN |
    CPU_FTR_NOEXECUTE | 
@@ -86,6 +85,7 @@
static struct {
    u64 lpcr;
    +u64 lpcr_clear;
    u64 hfscr;
    u64 fscr;
} system_registers;
@@ -115,6 +115,8 @@
static void __restore_cpu_cpufeatures(void)
{
+u64 lpcr;
+
/*
 * LPCR is restored by the power on engine already. It can be changed
 * after early init e.g., by radix enable, and we have no unified API
 */
@@ -127,11 +129,14 @@
 * The best we can do to accommodate secondary boot and idle restore
 * for now is "or" LPCR with existing.
 */
-
-mtspr(SPRN_LPCR, system_registers.lpcr | mfspr(SPRN_LPCR));
+lpcr = mfspr(SPRN_LPCR);
+lpcr |= system_registers.lpcr;
+lpcr &= ~system_registers.lpcr_clear;
+mtspr(SPRN_LPCR, lpcr);
if (hv_mode) {
    mtspr(SPRN_LPID, 0);
    mtspr(SPRN_HFSCR, system_registers.hfscr);
+    mtspr(SPRN_PCR, 0);
} }
mtspr(SPRN_FSCR, system_registers.fscr);

@@ -351,8 +356,9 @@
{
    u64 lpcr;
+
+system_registers.lpcr_clear |= (LPCR_ISL | LPCR_UPRT | LPCR_HR);
    lpcr = mfspr(SPRN_LPCR);
-    lpcr &= ~LPCR_ISL;
+    lpcr &= ~(LPCR_ISL | LPCR_UPRT | LPCR_HR);
    mtspr(SPRN_LPCR, lpcr);

cur_cpu_spec->mmu_features |= MMU_FTRS_HASH_BASE;
@@ -378,6 +384,14 @@
{
    u64 lpcr;
+
+/*
+ * Linux relies on FSCR[DSCR] being clear, so that we can take the
+ * facility unavailable interrupt and track the task's usage of DSCR.
+ * See facility_unavailable_exception().
+ * Clear the bit here so that feat_enable() doesn't set it.
+ */
+ f->fscr_bit_nr = -1;
+ feat_enable(f);

    lpcr = mfspr(SPRN_LPCR);
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[@ -618,6 +632,8 @@]
{
    "virtual-page-class-key-protection", feat_enable, 0),
    "transactional-memory", feat_enable_tm, CPU_FTR_TM},
    "transactional-memory-v3", feat_enable_tm, 0),
+{"tm-suspend-hypervisor-assist", feat_enable, CPU_FTR_P9_TM_HV_ASSIST},
+{"tm-suspend-xer-so-bug", feat_enable, CPU_FTR_P9_TM_XER_SO_BUG},
    "idle-nap", feat_enable_idle_nap, 0},
    "transactional-interrupt-dsisr", feat_enable_align_dsisr, 0},
    "idle-stop", feat_enable_idle_stop, 0},
@@ -698,8 +714,10 @@
    m = &dt_cpu_feature_match_table[i];
    if (!strcmp(f->name, m->name)) {
        known = true;
-    if (m->enable(f))
+    if (m->enable(f)) {
        +cur_cpu_spec->cpu_features |= m->cpu_ftr_bit_mask;
        break;
        +}

        pr_info("not enabling: %s (disabled or unsupported by kernel)\n", 
            f->name);
@@ -707,17 +725,12 @@
    }
    }

    -if (!known & enable_unknown) {
-    -if (!feat_try_enable_unknown(f)) {
-        -pr_info("not enabling: %s (unknown and unsupported by kernel)\n", 
-            f->name);
-        -return false;
-    }
+    if (!known & (!enable_unknown || !feat_try_enable_unknown(f))) {
+        pr_info("not enabling: %s (unknown and unsupported by kernel)\n", 
            f->name);
+        return false;
    }
    
    if (m->cpu_ftr_bit_mask)
        cur_cpu_spec->cpu_features |= m->cpu_ftr_bit_mask;
    
    if (known)
        pr_debug("enabling: %s\n", f->name);
    else
@@ -726,9 +739,35 @@
        return true;
    }

+/*
+ * Handle POWER9 broadcast tlbie invalidation issue using
+ * cpu feature flag.
+ */
+
+static __init void update_tlbie_feature_flag(unsigned long pvr)
+{
+  if (PVR_VER(pvr) == PVR_POWER9) {
+    /*
+     * Set the tlbie feature flag for anything below
+     * Nimbus DD 2.3 and Cumulus DD 1.3
+     */
+    if ((pvr & 0xe000) == 0) {
+      /* Nimbus */
+      if ((pvr & 0xfff) < 0x203)
+        cur_cpu_spec->cpu_features |= CPU_FTR_P9_TLBIE_STQ_BUG;
+    } else if ((pvr & 0xc000) == 0) {
+      /* Cumulus */
+      if ((pvr & 0xfff) < 0x103)
+        cur_cpu_spec->cpu_features |= CPU_FTR_P9_TLBIE_STQ_BUG;
+    } else {
+      WARN_ONCE(1, "Unknown PVR");
+      cur_cpu_spec->cpu_features |= CPU_FTR_P9_TLBIE_STQ_BUG;
+    }
+  }
+
+static __init void cpufeatures_cpu_quirks(void)
+{
-  int version = mfspr(SPRN_PVR);
+  unsigned long version = mfspr(SPRN_PVR);
+  /* Not all quirks can be derived from the cpufeatures device tree.
+     @@ -737,6 +776,15 @@
+     cur_cpu_spec->cpu_features |= CPU_FTR_POWER9_DD1;
+     else if ((version & 0xffffefff) == 0x004e0201)
+       cur_cpu_spec->cpu_features |= CPU_FTR_POWER9_DD2_1;
+     else if ((version & 0xffffefff) == 0x004e0000) {
+       cur_cpu_spec->cpu_features |= CPU_FTR_P9_TIDR;
+     } +
+     update_tlbie_feature_flag(version);
+  }
+
+static void __init cpufeatures_setup_finished(void)
cur_cpu_spec->cpu_features |= CPU_FTR_HVMODE;
}

/* Make sure powerpc_base_platform is non-NULL */
+powerpc_base_platform = cur_cpu_spec->platform;
+
+system_registers.lpcr = mfspr(SPRN_LPCR);
+system_registers.hfscr = mfspr(SPRN_HFSCR);
+system_registers.fscr = mfspr(SPRN_FSCR);
--- linux-4.15.0.orig/arch/powerpc/kernel/eeh.c
+++ linux-4.15.0/arch/powerpc/kernel/eeh.c
@@ -169,6 +169,11 @@
    char buffer[128];

 +if (!pdn) {
+  pr_warn("EEH: Note: No error log for absent device.\n");
+  return 0;
+}
+
+  n += scnprintf(buf+n, len-n, "%04x:%02x:%02x.%01x\n",
  pdn->phb->global_number, pdn->busno,
  PCI_SLOT(pdn->devfn), PCI_FUNC(pdn->devfn));
@@ -356,10 +361,16 @@
    ptep = find_init_mm_pte(token, &hugepage_shift);
    if (!ptep)
      return token;
+  -WARN_ON(hugepage_shift);
+  -pa = pte_pfn(*ptep) << PAGE_SHIFT;

 -return pa | (token & (PAGE_SIZE-1));
 +pa = pte_pfn(*ptep);
 +
 +/* On radix we can do hugepage mappings for io, so handle that */
 +if (!hugepage_shift)
+  hugepage_shift = PAGE_SHIFT;
+
 +pa <<= PAGE_SHIFT;
 +pa |= token & ((1ul << hugepage_shift) - 1);
+return pa;
}

rc = 1;
if (pe->state & EEH_PE_ISOLATED) {
  pe->check_count++;
-if (pe->check_count % EEH_MAX_FAILURES == 0) {
+if (pe->check_count == EEH_MAX_FAILURES) {
  dn = pci_device_to_OF_node(dev);
  if (dn)
    location = of_get_property(dn, "ibm,loc-code",
               --- linux-4.15.0.orig/arch/powerpc/kernel/eeh_driver.c
               +++ linux-4.15.0/arch/powerpc/kernel/eeh_driver.c
               @@ -207,18 +207,18 @@

     if (!dev || eeh_dev_removed(edev) || eeh_pe_passed(edev->pe))
       return NULL;
       +
       +device_lock(&dev->dev);
       dev->error_state = pci_channel_io_frozen;

       driver = eeh_pcid_get(dev);
       -if (!driver) return NULL;
       +if (!driver) goto out_no_dev;

       eeh_disable_irq(dev);

       if (!driver->err_handler ||
         !driver->err_handler->error_detected) {
         eeh_pcid_put(dev);
         -return NULL;
         -}
         + !driver->err_handler->error_detected)
         +goto out;

       rc = driver->err_handler->error_detected(dev, pci_channel_io_frozen);

       @@ -227,7 +227,10 @@
       if (*res == PCI_ERS_RESULT_NONE) *res = rc;

       edev->in_error = true;
       +out:
       eeh_pcid_put(dev);
       +out_no_dev:
       +device_unlock(&dev->dev);
       return NULL;
     }

    @@ -250,15 +253,14 @@
    if (!dev || eeh_dev_removed(edev) || eeh_pe_passed(edev->pe))
      return NULL;
      +device_lock(&dev->dev);
      driver = eeh_pcid_get(dev);
-if (!driver) return NULL;
+if (!driver) goto out_no_dev;

if (!driver->err_handler)
  !driver->err_handler->mmio_enabled
- (edev->mode & EEH_DEV_NO_HANDLER)) {
  -eeh_pcid_put(dev);
  -return NULL;
  -}
+    (edev->mode & EEH_DEV_NO_HANDLER))
+goto out;

rc = driver->err_handler->mmio_enabled(dev);

@@ -266,7 +268,10 @@
if (rc == PCI_ERS_RESULT_NEED_RESET) *res = rc;
if (*res == PCI_ERS_RESULT_NONE) *res = rc;

+out:
  eeh_pcid_put(dev);
+out_no_dev:
+device_unlock(&dev->dev);
return NULL;
}

@@ -289,20 +294,20 @@
if (!dev || eeh_dev_removed(edev) || eeh_pe_passed(edev->pe))
  return NULL;
+    +device_lock(&dev->dev);
  dev->error_state = pci_channel_io_normal;

  driver = eeh_pcid_get(dev);
-if (!driver) return NULL;
+if (!driver) goto out_no_dev;

  eeh_enable_irq(dev);

if (!driver->err_handler)
  !driver->err_handler->slot_reset
    (edev->mode & EEH_DEV_NO_HANDLER)) {
    (!edev->in_error)) {
    -eeh_pcid_put(dev);
    -return NULL;
    -}
+    (!edev->in_error))
+goto out;
rc = driver->err_handler->slot_reset(dev);
if (*res == PCI_ERS_RESULT_NONE) ||
rc == PCI_ERS_RESULT_NEED_RESET) *res = rc;

+out:
eeht_pcid_put(dev);
+out_no_dev:
+device_unlock(&dev->dev);
return NULL;
}

if (!dev || eeh_dev_removed(edev) || eeh_pe_passed(edev->pe))
return NULL;
+
+device_lock(&dev->dev);
dev->error_state = pci_channel_io_normal:

driver = eeh_pcid_get(dev);
-!driver) return NULL;
+if (!driver) goto out_no_dev;

was_in_error = edev->in_error;
edev->in_error = false;
@@ -374,13 +384,15 @@
  !driver->err_handler->resume ||
    (edev->mode & EEH_DEV_NO_HANDLER) || !was_in_error) {
      edev->mode &= ~EEH_DEV_NO_HANDLER;
-eeht_pcid_put(dev);
-return NULL;
+goto out;
  }

driver->err_handler->resume(dev);

+out:
eeht_pcid_put(dev);
+out_no_dev:
+device_unlock(&dev->dev);
return NULL;
}
if (!dev || eeh_dev_removed(edev) || eeh_pe_passed(edev->pe))
    return NULL;
+    device_lock(&dev->dev);
    dev->error_state = pci_channel_io_perm_failure;

driver = eeh_pci_get(dev);
-if (!driver) return NULL;
+if (!driver) goto out_no_dev;

eeh_disable_irq(dev);

if (!driver->err_handler ||
    !driver->err_handler->error_detected) {
    -eeh_pci_put(dev);
    -return NULL;
    -}
+    !driver->err_handler->error_detected)
+    goto out;

driver->err_handler->error_detected(dev, pci_channel_io_perm_failure);

+out:
    eeh_pci_put(dev);
+out_no_dev:
    +device_unlock(&dev->dev);
    return NULL;
}

@@ -435,9 +450,11 @@

driver = eeh_pci_get(dev);
if (driver) {
    -eeh_pci_put(dev);
    -if (driver->err_handler)
    +if (driver->err_handler) {
    +    eeh_pci_put(dev);
    +    }
    +    eeh_pci_put(dev);
    }

#ifdef CONFIG_PPC_POWERNV
@@ -474,17 +491,19 @@
    if (eeh_dev_removed(edev))
        return NULL;

    -driver = eeh_pci_get(dev);

```
-if (driver) {
  -eeh_pci_put(dev);
  -if (removed & &
      - eeh_pe_passed(edev->pe))
    -return NULL;
  -if (removed & &
      - driver->err_handler & &
      - driver->err_handler->error_detected & &
      - driver->err_handler->slot_reset)
    +if (removed) {
      +if (eeh_pe_passed(edev->pe))
        return NULL;
      +driver = eeh_pci_get(dev);
      +if (driver) {
        +if (driver->err_handler & &
            + driver->err_handler->error_detected & &
            + driver->err_handler->slot_reset) {
          +eeh_pci_put(dev);
          +return NULL;
        +}
        +eeh_pci_put(dev);
      +}
  }
}

/* Remove it from PCI subsystem */
@@ -501,12 +520,6 @@
pci_iov_remove_virtfn(edev->physfn, pdn->vf_index);
edev->pdev = NULL;
- */
- * We have to set the VF PE number to invalid one, which is
- * required to plug the VF successfully.
- */
-pdn->pe_number = IODA_INVALID_PE;
#endif
if (rmv_data)
  list_add(&edev->rmv_list, &rmv_data->edev_list);
--- linux-4.15.0.orig/arch/powerpc/kernel/eeh_pe.c
+++ linux-4.15.0/arch/powerpc/kernel/eeh_pe.c
@@ -381,7 +381,7 @@
while (parent) {
  if (!((parent->type & EEH_PE_INVALID))
    break;
-parent->type &= ~(EEH_PE_INVALID | EEH_PE_KEEP);
+parent->type &= ~EEH_PE_INVALID;
  parent = parent->parent;
}
@@ -807,7 +807,8 @@
ee Ops->write_config(pdn, 15*4, 4, edev->config_space[15]);
/* PCI Command: 0x4 */
-eeh_ops->write_config(pdn, PCI_COMMAND, 4, edev->config_space[1]);
+eeh_ops->write_config(pdn, PCI_COMMAND, 4, edev->config_space[1] |
+        PCI_COMMAND_MEMORY | PCI_COMMAND_MASTER);
/* Check the PCIe link is ready */
ee Bridge_check_link(edev);
--- linux-4.15.0.orig/arch/powerpc/kernel/entry_32.S
+++ linux-4.15.0/arch/powerpc/kernel/entry_32.S
@@ -33,6 +33,7 @@
+        #include <asm/barrier.h>
+
+/* MSR_KERNEL is > 0x10000 on 4xx/Book-E since it include MSR_CE. */
@@ -358,6 +359,15 @@
ori r10,r10,sys_call_table@
slwi r0,r0,2
bge- 66f
+barrier_nospec_asm
+/*
+ * Prevent the load of the handler below (based on the user-passed
+ * system call number) being speculatively executed until the test
+ * against NR_syscalls and branch to .66f above has
+ * committed.
+ */
+
+lwzx r10,r10,r0/* Fetch system call handler [ptr] */
+mtlr10
+addir9,r1,STACK_FRAME_OVERHEAD
+mtcrr10
+lwzr10,_LINK(r11)
+mtlr10
+/* Clear the exception_marker on the stack to avoid confusing stacktrace */
+lir10, 0
+stwr10, 8(r11)
+REST_GPR(10, r11)
+#ifdef CONFIG_PPC_8xx_PERF_EVENT
+mspr	SPRN_NRI, r0
+*/
@@ -963,6 +976,9 @@

mtcrf0xFF,r10
mtlrr11

/* Clear the exception_marker on the stack to avoid confusing stacktrace */
+li10, 0
+stwr10, 8(r1)
/
/*
 * Once we put values in SRR0 and SRR1, we are in a state
 * where exceptions are not recoverable, since taking an
 @@ -1002,6 +1018,9 @@
 mtlrr11
 lwzr10,_CCR(r1)
 mtcrf0xff,r10
/* Clear the exception_marker on the stack to avoid confusing stacktrace */
+li10, 0
+stwr10, 8(r1)
REST_2GPRS(9, r1)
.globl exc_exit_restart
exc_exit_restart:
--- linux-4.15.0.orig/arch/powerpc/kernel/entry_64.S
+++ linux-4.15.0/arch/powerpc/kernel/entry_64.S
@@ -25,6 +25,7 @@
 #include <asm/page.h>
 #include <asm/mmu.h>
 #include <asm/thread_info.h>
+#include <asm/code-patching-asm.h>
 #include <asm/ppc_asm.h>
 #include <asm/asm-offsets.h>
 #include <asm/cputable.h>
 @@ -36,6 +37,7 @@
 #include <asm/context_tracking.h>
 #include <asm/tm.h>
 #include <asm/ppc-opcode.h>
+#include <asm/barrier.h>
 #include <asm/export.h>
 #ifdef CONFIG_PPC_BOOK3S
 #include <asm/exception-64s.h>
 @@ -76,6 +78,11 @@
 stdr0,GPR0(r1)
 stdr10,GPR1(r1)
 beq2f/* if from kernel mode */
+#ifdef CONFIG_PPC_FSL_BOOK3E
 +START_BTB_FLUSH_SECTION
 +BTB_FLUSH(r10)
 +END_BTB_FLUSH_SECTION
 +#endif
 ACCOUNT_CPU_USER_ENTRY(r13, r10, r11)
 2:stdr2,GPR2(r1)
std  r3, GPR3(r1)
@@ -179,6 +186,15 @@
clrlid r8, r8, 32
15:

slwir0, r0, 4
+
+barrier_nospec_asm
+/*
+ * Prevent the load of the handler below (based on the user-passed
+ * system call number) being speculatively executed until the test
+ * against NR_syscalls and branch to .Lsyscall_enosys above has
+ * committed.
+ */
+
+
ldxr12, r11, r0 /* Fetch system call handler [ptr] */
mtctr r12
bcctl /* Call handler */
@@ -487,6 +503,63 @@
li r3, 0
b .Lsyscall_exit

+#ifdef CONFIG_PPC_BOOK3S_64
+
+#define FLUSH_COUNT_CACHE
+1: nop;
+/*patch_site 1b, patch__call_flush_count_cache
+
+#define BCCTR_FLUSH long 0x4c400420
+
+.macro nops number
+.rept \number
+nop
+.endr
+.endm
+
+.balign 32
+.global flush_count_cache
+flush_count_cache:
+/* Save LR into r9 */
+mfli r9
+
+// Flush the link stack
+.rept 64
+bl+4
+.endr
+b1f
+nops6

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+ .balign 32
+ /* Restore LR */
+ 1: mtlr r9
+ +
+ /* If we're just flushing the link stack, return here */
+ 3: nop
+ patch_site 3b patch__flush_link_stack_return
+ +
+ lir9, 0x7fff
+ mtcrr9
+ +
+ BCCTR_FLUSH
+ +
+ 2: nop
+ patch_site 2b patch__flush_count_cache_return
+ +
+ nops3
+ +
+.rept 278
+.balign 32
+ BCCTR_FLUSH
+ nops7
+.endr
+
+ blr
+ #else
+ #define FLUSH_COUNT_CACHE
+ #endif /* CONFIG_PPC_BOOK3S_64 */
+
/*
* This routine switches between two different tasks. The process
* state of one is saved on its kernel stack. Then the state
* saved on its kernel stack. Then the state
* @ @ -518,6 +591,8 @@
* strd23, _CCR(r1)
* stdr1, KSP(r3)/* Set old stack pointer */

+ FLUSH_COUNT_CACHE
+
*/

/*
* On SMP kernels, care must be taken because a task may be
* scheduled off CPUx and on to CPUy. Memory ordering must be
* @ @ -546,7 +621,7 @@
/* Cancel all explicit user streams as they will have no use after context
* switch and will stop the HW from creating streams itself
*/
- DCBT_STOP_ALL_STREAM_IDS(r6)
+ DCBT_BOOK3S_STOP_ALL_STREAM_IDS(r6)
addi r6, r4, -THREAD/* Convert THREAD to 'current' */ 
@@ -597,6 +672,7 @@
  * actually hit this code path.
  */

+isync
slbier6
slbier6/* Workaround POWER5 < DD2.1 issue */
slbnter7,r0
@@ -915,6 +991,13 @@
ldr2,NIP(r1)
mtspr SPRN_SRR0,r2

+/*
+  * Leaving a stale exception_marker on the stack can confuse
+  * the reliable stack unwinder later on. Clear it.
+  */
+li r2,0
+std r2,STACK_FRAME_OVERHEAD-16(r1)
+
li r2,0
str2,STACK_FRAME_OVERHEAD-16(r1)
+
ldr0,GPR0(r1)
ldr2,GPR2(r1)
ldr3,GPR3(r1)
@@ -939,9 +1022,13 @@
beq 1f
rlwinm r7,r7,0,~PACA_IRQ_HARD_DIS
stb r7,PACAIRQHAPPENED(r13)
-1: li r0,0
-stbr0,PACASOFTIRQEN(r13);
-TRACE_DISABLE_INTS
+1: tdneir7,0
+EMIT_BUG_ENTRY 1b,__FILE__,__LINE__,__BUGFLAG_WARNING
+#endif
b.Ldo_restore

/*
--- linux-4.15.0.orig/arch/powerpc/kernel/exceptions-64e.S
+++ linux-4.15.0/arch/powerpc/kernel/exceptions-64e.S
@@ -295,7 +295,8 @@
andi.r10,r11,MSR_PR;/* save stack pointer */ \
beq1f/* branch around if supervisor */ \
ldr1,PACAKSAVE(r13);/* get kernel stack coming from usr */

-1:cmpdi1,r1,0;/* check if SP makes sense */
+1:type##_BTB_FLUSH\n+cmpdi1,r1,0;/* check if SP makes sense */
bge-cr1,exc_##n##_bad_stack;/* bad stack (TODO: out of line) */
mfspr10.SPRN_##type##_SRR0;/* read SRR0 before touching stack */

@@ -327,6 +328,30 @@
#define SPRN_MC_SRR0 SPRN_MCSR0
#define SPRN_MC_SRR1 SPRN_MCSR1

+ifdef CONFIG_PPC_FSL_BOOK3E
+define GEN_BTB_FLUSH\n+START_BTB_FLUSH_SECTION\n+beq 1f;
+BTB_FLUSH(r10)\n+1:\n+END_BTB_FLUSH_SECTION
+
+define CRIT_BTB_FLUSH\n+START_BTB_FLUSH_SECTION\n+BTB_FLUSH(r10)\n+END_BTB_FLUSH_SECTION
+
+define DBG_BTB_FLUSH CRIT_BTB_FLUSH
+define MC_BTB_FLUSH CRIT_BTB_FLUSH
+define GDBELL_BTB_FLUSH GEN_BTB_FLUSH
+else
+define GEN_BTB_FLUSH
+define CRIT_BTB_FLUSH
+define DBG_BTB_FLUSH
+define MC_BTB_FLUSH
+define GDBELL_BTB_FLUSH
+endif
+
+define NORMAL_EXCEPTION_PROLOG(n, intnum, addition) EXCEPTION_PROLOG(n, intnum, GEN##_GEN(n))

--- linux-4.15.0.orig/arch/powerpc/kernel/exceptions-64s.S
+++ linux-4.15.0/arch/powerpc/kernel/exceptions-64s.S
@@ -139,6 +139,21 @@

bpnv_powersave_wakeup
#endif

+/*
+ * Set IRQS_ALL_DISABLED unconditionally so arch_irqs_disabled does
+ * the right thing. We do not want to reconcile because that goes
+ * through irq tracing which we don't want in NMI.
+ */
+ * Save PACAIRQHAPPENED because some code will do a hard disable
+ * (e.g., xmon). So we want to restore this back to where it was
+ * when we return. DAR is unused in the stack, so save it there.
+ */
+#define ADD_RECONCILE_NMI
+lir10,IRQS_ALL_DISABLED;
+stbr10,PACAIRQSOFTMASK(r13);
+lbrz10,PACAIRQHAPPENED(r13);
+std10,_DAR(r1)
+
EXC_COMMON_BEGIN(system_reset_common)
/*
 * Increment pacar->in_nmi then enable MSR_RI. SLB or MCE will be able
@@ -157,16 +172,56 @@
subi r1,r1,INT_FRAME_SIZE
EXCEPTION_COMMON_NORET_STACK(PACA_EXNMI, 0x100,
  system_reset, system_reset_exception,
  -ADD_NVGPRS;ADD_RECONCILE)
  +ADD_NVGPRS;ADD_RECONCILE_NMI)
+	/* This (and MCE) can be simplified with mtmsrd L=1 */
+/* Clear MSR_RI before setting SRR0 and SRR1. */
+lir0,MSR_RI
+mfmsrr9
+andcr9,r9,r0
+mtmsrdr9,1
/

- * The stack is no longer in use, decrement in_nmi.
+ * MSR_RI is clear, now we can decrement paca->in_nmi.
  */
lhr10,PACA_IN_NMI(r13)
subr10,r10,1
sthr10,PACA_IN_NMI(r13)

-#ret_from_except
+/*
+ * Restore soft mask settings.
+ */
+ldr10,_DAR(r1)
+stbr10,PACAIRQHAPPENED(r13)
+ldr10,SOFTE(r1)
+stbr10,PACAIRQSOFTMASK(r13)
+
+/*
+ * Keep below code in synch with MACHINE_CHECK_HANDLER_WINDUP.
+ * Should share common bits...
+ */
+/* Move original SRR0 and SRR1 into the respective regs */
+ldr9,_MSR(r1)
+mtsprSPRN_SRR1,r9
+ldr3,_NIP(r1)
+mtsprSPRN_SRR0,r3
+ldr9,_CTR(r1)
+mtctr9
+ldr9,_XER(r1)
+mtxerr9
+ldr9,_LINK(r1)
+mtlrr9
+REST_GPR(0, r1)
+REST_8GPRS(2, r1)
+REST_GPR(10, r1)
+ldr11,_CCR(r1)
+mtcrr11
+REST_GPR(11, r1)
+REST_2GPRS(12, r1)
+/* restore original r1. */
+ldr1,GPR1(r1)
+RFI_TO_USER_OR_KERNEL

#elif CONFIG_PPC_PSERIES
/*
@@ -466,6 +521,10 @@
RFI_TO_USER_OR_KERNEL
9:
/* Deliver the machine check to host kernel in V mode. */
+BEGIN_FTR_SECTION
+ldr10,ORIG_GPR3(r1)
+mtsprSPRN_CFAR,r10
+END_FTR_SECTION_IFSET(CPU_FTR_CFAR)
MACHINE_CHECK_HANDLER_WINDUP
bmachine_check_pSeries

@@ -482,7 +541,7 @@
b1b

-EXC_REAL(data_access, 0x300, 0x80)
+EXC_REAL_OOL(data_access, 0x300, 0x80)
EXC_VIRT(data_access, 0x4300, 0x80, 0x300)
TRAMP_KVM_SKIP(PACA_EXGEN, 0x300)

@@ -514,13 +573,16 @@
EXC_REAL_BEGIN(data_access_slb, 0x380, 0x80)
SET_SCRATCH0(r13)
 EXCEPTION_PROLOG_0(PACA_EXSLB)
+b tramp_data_access_slb
+EXC_REAL_END(data_access_slb, 0x380, 0x80)
+
+TRAMP_REAL_BEGIN(tramp_data_access_slb)
EXCEPTION_PROLOG_1(PACA_EXSLB, KVMTEST_PR, 0x380)
mrr12,r3/* save r3 */
mfspr3,SPRN_DAR
mfspr11,SPRN_SRR1
crset4*cr6+eq
BRANCH_TO_COMMON(r10, slb_miss_common)
-EXC_REAL_END(data_access_slb, 0x380, 0x80)

EXC_VIRT_BEGIN(data_access_slb, 0x4380, 0x80)
SET_SCRATCH0(r13)
@@ -535,7 +597,7 @@
TRAMP_KVM_SKIP(PACA_EXSLB, 0x380)

-EXC_REAL(instruction_access, 0x400, 0x80)
+EXC_REAL_OOL(instruction_access, 0x400, 0x80)
EXC_VIRT(instruction_access, 0x4400, 0x80, 0x400)
TRAMP_KVM(PACA_EXGEN, 0x400)

@@ -558,13 +620,16 @@
EXC_REAL_BEGIN(instruction_access_slb, 0x480, 0x80)
SET_SCRATCH0(r13)
EXCEPTION_PROLOG_0(PACA_EXSLB)
+b tramp_instruction_access_slb
+EXC_REAL_END(instruction_access_slb, 0x480, 0x80)
+
+TRAMP_REAL_BEGIN(tramp_instruction_access_slb)
EXCEPTION_PROLOG_1(PACA_EXSLB, KVMTEST_PR, 0x480)
mrr12,r3/* save r3 */
mfspr3,SPRN_SRR0/* SRR0 is faulting address */
mfspr11,SPRN_SRR1
crclr4*cr6+eq
BRANCH_TO_COMMON(r10, slb_miss_common)
-EXC_REAL_END(instruction_access_slb, 0x480, 0x80)

EXC_VIRT_BEGIN(instruction_access_slb, 0x4480, 0x80)
SET_SCRATCH0(r13)
@@ -629,14 +694,11 @@
bnecr4,1f/* returning to kernel */

-.machinepush
-.machine"power4"

-
mtcrf0x80,r9
mtcrf0x08,r9/* MSR[PR] indication is in cr4 */
mtcrf0x04,r9/* MSR[RI] indication is in cr5 */
mtcrf0x02,r9/* I/D indication is in cr6 */
mtcrf0x01,r9/* slb_allocate uses cr0 and cr7 */

.RESTORE_CTR(r9, PACA_EXSLB)
.RESTORE_PPR_PACA(PACA_EXSLB, r9)

b.#* prevent speculative execution */
1:

- .machinepush
- .machine"power4"

mtcrf0x80,r9
mtcrf0x08,r9/* MSR[PR] indication is in cr4 */
mtcrf0x04,r9/* MSR[RI] indication is in cr5 */
mtcrf0x02,r9/* I/D indication is in cr6 */
mtcrf0x01,r9/* slb_allocate uses cr0 and cr7 */
- .machinepop

.RESTORE_CTR(r9, PACA_EXSLB)
.RESTORE_PPR_PACA(PACA_EXSLB, r9)

ldr3, PACA_EXSLB+EX_DAR(r13)
strdr3, _DAR(r1)

beqcr6, 2f
-lir10, 0x480/* fix trap number for I-SLB miss */
+lir10, 0x481/* fix trap number for I-SLB miss */
strdr10, _TRAP(r1)
2:blsave_nvgrs
addir3, r1, STACK_FRAME_OVERHEAD

#ifndef

-EXC_REAL_MASKABLE(decrementer, 0x900, 0x80)
-EXC_VIRT_MASKABLE(decrementer, 0x4900, 0x80, 0x900)
+EXC_REAL_OOL_MASKABLE(decrementer, 0x900, 0x80)
+EXC_VIRT_OOL_MASKABLE(decrementer, 0x4900, 0x80, 0x900)
TRAMP_KVM(PACA_EXGEN, 0x900)
EXC_COMMON_ASYNC(decrementer_common, 0x900, timer_interrupt)

-EXC_REAL_HV(hdecrementer, 0x980, 0x80)
-EXC_VIRT_HV(hdecrementer, 0x4980, 0x80, 0x980)
+EXC_REAL_OOL_HV(hdecrementer, 0x980, 0x80)
+EXC_VIRT_OOL_HV(hdecrementer, 0x4980, 0x80, 0x980)
TRAMP_KVM_HV(PACA_EXGEN, 0x980)
EXC_COMMON(hdecrementer_common, 0x980, hdec_interrupt)

@@ -903,6 +962,7 @@
mtctr\tr13;\nGET_PACA(r13);\nstd10,PACA_EXGEN+EX_R10(r13);\n+INTERRUPT_TO_KERNEL;\nKVMTEST_PR(0xc00); /* uses r10, branch to do_kvm_0xc00_system_call */\nHMT_MEDIUM;\nmfctr9;
@@ -911,7 +971,8 @@
#define SYSCALL_KVMTEST							\nHMT_MEDIUM;\nmrr9,r13;\n-GET_PACA(r13);\n+GET_PACA(r13);\n+INTERRUPT_TO_KERNEL;
#endif

#define LOAD_SYSCALL_HANDLER(reg)\n@@ -1066,7 +1127,7 @@
EXCEPTION_PROLOG_COMMON_2(PACA_EXGEN)
EXCEPTION_PROLOG_COMMON_3(0xe60)
addir3,r1,STACK_FRAME_OVERHEAD
-BRANCH_LINK_TO_FAR(hmi_exception_realmode) /* Function call ABI */
+BRANCH_LINK_TO_FAR(DOTSYM(hmi_exception_realmode)) /* Function call ABI */
cmpdir0,r3,0

/* Windup the stack. */
@@ -1261,13 +1322,11 @@
#ifdef CONFIG_PPC_DENORMALISATION
mfspr10,SPRN_HSRR1
-mfspr11,SPRN_HSRR0/* save HSRR0 */
andis.r10,r10,(HSRR1_DENORM)@h /* denorm? */
-addir11,r11,-4/* HSRR0 is next instruction */
bne+denorm_assist
#endif

-KVMTEST_PR(0x1500)
+KVMTEST_HV(0x1500)
EXCEPTION_PROLOG_PSERIES_1(denorm_common, EXC_HV)
EXC_REAL_END(denorm_exception_hv, 0x1500, 0x100)

@@ -1279,7 +1338,7 @@
EXC_VIRT_NONE(0x5500, 0x100)
#endif

-TRAMP_KVM_SKIP(PACA_EXGEN, 0x1500)
+TRAMP_KVM_HV(PACA_EXGEN, 0x1500)

#ifdef CONFIG_PPC_DENORMALISATION
TRAMP_REAL_BEGIN(denorm_assist)
@@ -1329,6 +1388,8 @@
	mfspr	tr11,SPRN_HSRR0
+subi	tr11,tr11,4
mtsprSPRN_HSRR0,r11
mctfr0x80,r9
ldr9,PACA_EXGEN+EX_R9(r13)
@@ -1449,90 +1510,109 @@
std	tr9,PACA_EXRFI+EX_R9(r13)
std	tr10,PACA_EXRFI+EX_R10(r13)
std	tr11,PACA_EXRFI+EX_R11(r13)
std	tr12,PACA_EXRFI+EX_R12(r13)
std	tr13,PACA_EXRFI+EX_R13(r13)
-mfcttr9
+sync
+lfspr,PACA_EXRFI+EX_R9(r13)
+lfspr,PACA_EXRFI+EX_R10(r13)
+ori31,31,0
+rept 14
+b1f
+1:
+.endr
+blr
+
+/*/ Clobbers r10, r11, ctr */
+.macro L1D_DISPLACEMENT_FLUSH
ldr10,PACA_RFI_FLUSH_FALLBACK_AREA(r13)
-ldr11,PACA_L1D_FLUSH_SETS(r13)
-ldr12,PACA_L1D_FLUSH_CONGRUENCE(r13)
-/*
- * The load addresses are at staggered offsets within cachelines,
- * which suits some pipelines better (on others it should not
- * hurt).
- */
-adddir12,r12,8
+ldr11,PACA_L1D_FLUSH_SIZE(r13)
+srdir11,r11,(7 + 3) /* 128 byte lines, unrolled 8x */
mtctr11
-DCBT_STOP_ALL_STREAM_IDS(r11) /* Stop prefetch streams */
+DCBT_BOOK3S_STOP_ALL_STREAM_IDS(r11) /* Stop prefetch streams */

/* order ld/st prior to dcbt stop all streams with flushing */
sync
-1:li r8,0
-.rept8 /* 8-way set associative */
-ldxr11,r10,r8
-adddr8,r8,r12
-xorr11,r11,r11// Ensure r11 is 0 even if fallback area is not
-adddr8,r8,r11// Add 0, this creates a dependency on the ldx
-.endr
-adddir10,r10,128 /* 128 byte cache line */
+
+/*
+ * The load addresses are at staggered offsets within cachelines,
+ * which suits some pipelines better (on others it should not
+ * hurt).
+ */
+1:
+ldr11,(0x80 + 8)*0(r10)
+ldr11,(0x80 + 8)*1(r10)
+ldr11,(0x80 + 8)*2(r10)
+ldr11,(0x80 + 8)*3(r10)
+ldr11,(0x80 + 8)*4(r10)
+ldr11,(0x80 + 8)*5(r10)
+ldr11,(0x80 + 8)*6(r10)
+ldr11,(0x80 + 8)*7(r10)
+adddir10,r10,0x80*8
bdnz1b
+.endm

+TRAMP_REAL_BEGIN(entry_flush_fallback)
+stdr9,PACA_EXRFI+EX_R9(r13)
+stdr10,PACA_EXRFI+EX_R10(r13)
+stdr11,PACA_EXRFI+EX_R11(r13)
+mtctr9
+L1D_DISPLACEMENT_FLUSH
+mtctr9
+ldr9,PACA_EXRFI+EX_R9(r13)
+ldr10,PACA_EXRFI+EX_R10(r13)
+ldr11,PACA_EXRFI+EX_R11(r13)
+blr
+
+TRAMP_REAL_BEGIN(hrfi_flush_fallback)
+SET_SCRATCH0(r13);
+GET_PACA(r13);
+stdr1,PACA_EXPRFI+EX_R12(r13)
+ldr1,PACAKSAVE(r13)
+stdr9,PACA_EXPRFI+EX_R9(r13)
+stdr10,PACA_EXPRFI+EX_R10(r13)
+stdr11,PACA_EXPRFI+EX_R11(r13)
+mfctr9
+L1D_DISPLACEMENT_FLUSH
mtctr9
ldr9,PACA_EXPRFI+EX_R9(r13)
ldr10,PACA_EXPRFI+EX_R10(r13)
ldr11,PACA_EXPRFI+EX_R11(r13)
-ldr12,PACA_EXPRFI+EX_R12(r13)
-ldr8,PACA_EXPRFI+EX_R13(r13)
+ldr1,PACA_EXPRFI+EX_R12(r13)
GET_SCRATCH0(r13);
rfid

TRAMP_REAL_BEGIN(hrfi_flush_fallback)
SET_SCRATCH0(r13);
GET_PACA(r13);
+stdr1,PACA_EXPRFI+EX_R12(r13)
+ldr1,PACAKSAVE(r13)
stdr9,PACA_EXPRFI+EX_R9(r13)
stdr10,PACA_EXPRFI+EX_R10(r13)
stdr11,PACA_EXPRFI+EX_R11(r13)
-stdr12,PACA_EXPRFI+EX_R12(r13)
-stdr8,PACA_EXPRFI+EX_R13(r13)
mfctr9
-ldr10,PACA_RFI_FLUSH_FALLBACK_AREA(r13)
-ldr11,PACA_L1D_FLUSH_SETS(r13)
-ldr12,PACA_L1D_FLUSH_CONGRUENCE(r13)
-/*
- * The load addresses are at staggered offsets within cachelines,
- * which suits some pipelines better (on others it should not
- * hurt).
- */
-addr12,r12,8
-mtctr11
-DCBT_STOP_ALL_STREAM_IDS(r11) /* Stop prefetch streams */
-/*
- */ order ld/st prior to debt stop all streams with flushing */
-sync
-1:li8,0
- .rept8 /* 8-way set associative */
  - ldxr11,r10,r8
  - addr8,r8,r12
  - xorrr11,r11,r11 // Ensure r11 is 0 even if fallback area is not
  - addr8,r8,r11 // Add 0, this creates a dependency on the ldx
  - .endr
  - addr10,r10,128 /* 128 byte cache line */
  - bdnz1b

  +L1D_DISPLACEMENT_FLUSH
  mtctr9
  ldr9,PACA_EXRFI+EX_R9(r13)
  ldr10,PACA_EXRFI+EX_R10(r13)
  ldr11,PACA_EXRFI+EX_R11(r13)
  -ldr12,PACA_EXRFI+EX_R12(r13)
  -ldr8,PACA_EXRFI+EX_R13(r13)
  +ldr1,PACA_EXRFI+EX_R12(r13)
  GET_SCRATCH0(r13);
  hrfid

  +USE_TEXT_SECTION()
  +
  +_GLOBAL(do_uaccess_flush)
  +UACCESS_FLUSH_FIXUP_SECTION
  +nop
  +nop
  +nop
  +blr
  +L1D_DISPLACEMENT_FLUSH
  +blr
  +_ASM_NOKPROBE_SYMBOL(do_uaccess_flush)
  +EXPORT_SYMBOL(do_uaccess_flush)

  /*
   * Real mode exceptions actually use this too, but alternate
   * instruction code patches (which end up in the common .text area)
   * @ @ -1673,7 +1753,7 @ @
   * addrdir3,r1,STACK_FRAME_OVERHEAD
   * bldo_page_fault
   * cmpdir3,0
   * -beq+12f
   * +beq+ret_from_except_lite
   * bsave_nvgrps
   * mrr5,r3
   * addrdir3,r1,STACK_FRAME_OVERHEAD
   * @ @ -1688,7 +1768,12 @ @
   * ld r5,_DSISR(r1)
   * addi r3,r1,STACK_FRAME_OVERHEAD

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do_break
-12: bl ret_from_except_lite
+ /*
+ * do_break() may have changed the NV GPRS while handling a breakpoint.
+ * If so, we need to restore them with their updated values. Don't use
+ * ret_from_except_lite here.
+ */
+ b ret_from_except

#ifdef CONFIG_PPC_BOOK3S_64
--- linux-4.15.0.orig/arch/powerpc/kernel/fadump.c
+++ linux-4.15.0/arch/powerpc/kernel/fadump.c
@@ -47,8 +47,10 @@
static const struct fadump_mem_struct *fdm_active;

static DEFINE_MUTEX(fadump_mutex);
-struct fad_crash_memory_ranges crash_memory_ranges[INIT_CRASHMEM_RANGES];
+struct fad_crash_memory_ranges *crash_memory_ranges;
+int crash_memory_ranges_size;
int crash_mem_ranges;
+int max_crash_mem_ranges;

/* Scan the Firmware Assisted dump configuration details. */
int __init early_init_dt_scan_fw_dump(unsigned long node,
@@ -115,13 +117,19 @@
/*
* If fadump is registered, check if the memory provided
- * falls within boot memory area.
+ * falls within boot memory area and reserved memory area.
*/
-int is_fadump_boot_memory_area(u64 addr, ulong size)
+int is_fadump_memory_area(u64 addr, ulong size)
{  
+u64 d_start = fw_dump.reserve_dump_area_start;
+u64 d_end = d_start + fw_dump.reserve_dump_area_size;
+  
+  if (!fw_dump.dump_registered)
+    return 0;
+  
+  if (((addr + size) > d_start) && (addr <= d_end))
+    return 1;
+  
+  return (addr + size) > RMA_START && addr <= fw_dump.boot_memory_size;
}
@@ -843,38 +851,88 @@
return 0;
}

-static inline void fadump_add_crash_memory(unsigned long long base,
  unsigned long long end)
+static void free_crash_memory_ranges(void)
+
+kfree(crash_memory_ranges);
+crash_memory_ranges = NULL;
+crash_memory_ranges_size = 0;
+max_crash_mem_ranges = 0;
+
+ /*
+ * Allocate or reallocate crash memory ranges array in incremental units
+ * of PAGE_SIZE.
+ */
+static int allocate_crash_memory_ranges(void)
+
+struct fad_crash_memory_ranges *new_array;
+u64 new_size;
+
+new_size = crash_memory_ranges_size + PAGE_SIZE;
+pr_debug("Allocating %llu bytes of memory for crash memory ranges\n",
 + new_size);
+
+new_array = krealloc(crash_memory_ranges, new_size, GFP_KERNEL);
+if (new_array == NULL) {
+pr_err("Insufficient memory for setting up crash memory ranges\n");
+free_crash_memory_ranges();
+return -ENOMEM;
+}
+
+crash_memory_ranges = new_array;
+crash_memory_ranges_size = new_size;
+max_crash_mem_ranges = (new_size /
+sizeof(struct fad_crash_memory_ranges));
+return 0;
+}
+
+static inline int fadump_add_crash_memory(unsigned long long base,
  unsigned long long end)
{
 if (base == end)
 -return;
 +return 0;
 +
 +if (crash_mem_ranges == max_crash_mem_ranges) {
int ret;
+
+ret = allocate_crash_memory_ranges();
+if (ret)
+return ret;
+
pr_debug("crash_memory_range[%d] [%#016llx-%#016llx]. %#llx bytes\n", crash_mem_ranges, base, end - 1, (end - base));
crash_memory_ranges[crash_mem_ranges].base = base;
crash_memory_ranges[crash_mem_ranges].size = end - base;
crash_mem_ranges++;
+return 0;
+
static void fadump_exclude_reserved_area(unsigned long long start,
+static int fadump_exclude_reserved_area(unsigned long long start,
unsigned long long end)
{
unsigned long long ra_start, ra_end;
+int ret = 0;
+ret = fadump_add_crash_memory(ra_end, end);

ra_start = fw_dump.reserve_dump_area_start;
ra_end = ra_start + fw_dump.reserve_dump_area_size;

if ((ra_start < end) && (ra_end > start)) {
    if ((start < ra_start) && (end > ra_end)) {
        fadump_add_crash_memory(start, ra_start);
        fadump_add_crash_memory(ra_end, end);
        +ret = fadump_add_crash_memory(start, ra_start);
        if (ret)
            return ret;
        +ret = fadump_add_crash_memory(ra_end, end);
    } else if (start < ra_start) {
        fadump_add_crash_memory(start, ra_start);
        +ret = fadump_add_crash_memory(ra_end, end);
    } else if (ra_end < end) {
        fadump_add_crash_memory(ra_end, end);
        +ret = fadump_add_crash_memory(ra_end, end);
    }
} else if (start < ra_start) {
    fadump_add_crash_memory(start, ra_start);
    +ret = fadump_add_crash_memory(ra_end, end);
} else if (ra_end < end) {
    fadump_add_crash_memory(ra_end, end);
    +ret = fadump_add_crash_memory(ra_end, end);
} else
    fadump_add_crash_memory(start, end);
+ret = fadump_add_crash_memory(start, end);
+return ret;
}
static int fadump_init_elfcore_header(char *bufp)
@@ -914,10 +972,11 @@
 * Traverse through memblock structure and setup crash memory ranges. These
 * ranges will be used create PT_LOAD program headers in elfcore header.
 *
-static void fadump_setup_crash_memory_ranges(void)
+static int fadump_setup_crash_memory_ranges(void)
 {
 struct memblock_region *reg;
 unsigned long long start, end;
+int ret;

 pr_debug("Setup crash memory ranges.\n");
crash_mem_ranges = 0;
@@ -928,7 +987,9 @@
 * specified during fadump registration. We need to create a separate
 * program header for this chunk with the correct offset.
 *
-fadump_add_crash_memory(RMA_START, fw_dump.boot_memory_size);
+ret = fadump_add_crash_memory(RMA_START, fw_dump.boot_memory_size);
+if (ret)
+return ret;

 for_each_memblock(memory, reg) {
 start = (unsigned long long)reg->base;
@@ -948,8 +1009,12 @@
+ret = fadump_exclude_reserved_area(start, end);
+if (ret)
+return ret;
 }

 /* add this range excluding the reserved dump area. */
-fadump_exclude_reserved_area(start, end);
+ret = fadump_exclude_reserved_area(start, end);
+if (ret)
+return ret;
 }

 /*
@@ -1072,6 +1137,7 @@
 { unsigned long addr;
 void *vaddr;
+int ret;

 /*
@@ -1080,7 +1146,9 @@
 */
 /* If no memory is reserved then we can not register for firmware-
@@ -1080,7 +1146,9 @@
if (!fw_dump.reserve_dump_area_size)
return -ENODEV;

-fadump_setup_crash_memory_ranges();
+ret = fadump_setup_crash_memory_ranges();
+if (ret)
+return ret;

addr = be64_to_cpu(fdm.rmr_region.destination_address) + be64_to_cpu(fdm.rmr_region.source_len);
/* Initialize fadump crash info header. */
@@ -1155,6 +1223,10 @@
init_fadump_mem_struct(&fdm,
be64_to_cpu(fdm_active->cpu_state_data.destination_address));
fadump_invalidate_dump(&fdm);
+} else if (fw_dump.dump_registered) {
+/* Un-register Firmware-assisted dump if it was registered. */
+fadump_unregister_dump(&fdm);
+free_crash_memory_ranges();
+
+-/* The following gets the stack set up with the regs */
+-/* pointing to the real addr of the kernel stack. This is */
+-/* all done to support the C function call below which sets */
+-/* up the htab. This is done because we have relocated the */
+-/* kernel but are still running in real mode. */
+-LOAD_REG_ADDR(r3,init_thread_union)
+-
+-/* set up a stack pointer */
+LOAD_REG_ADDR(r3,init_thread_union)
LOAD_REG_IMMEDIATE(r1,THREAD_SIZE)
addr1,r3,r1
lir0,0
/* Restore parameters passed from prom_init/kexec */

mtr3,r31

-# early_setup/* also sets r13 and SPRG_PACA */
+LOAD_REG_ADDR(r12, DOTSYM(early_setup))
+mtctr12
+bctrl/* also sets r13 and SPRG_PACA */

LOAD_REG_ADDR(r3, start_here_common)
ldr4,PACAKMSR(r13)
@ @ -976,6 +972,7 @@

RFI
b./* prevent speculative execution */

+.previous
/* This is where all platforms converge execution */

start_here_common:
--- linux-4.15.0.orig/arch/powerpc/kernel/head_8xx.S
+++ linux-4.15.0/arch/powerpc/kernel/head_8xx.S
@@ -301,7 +301,7 @@
/* On the MPC8xx, this is a software emulation interrupt. It occurs
* for all unimplemented and illegal instructions.
*/
-EXCEPTION(0x1000, SoftEmu, program_check_exception, EXC_XFER_STD)
+EXCEPTION(0x1000, SoftEmu, emulation_assist_interrupt, EXC_XFER_STD)

. = 0x1100
/*
@@ -398,11 +398,9 @@
#if defined (CONFIG_HUGETLB_PAGE) && defined (CONFIG_PPC_4K_PAGES)
rlwimi r10, r11, 1, MI_SPS16K
#endif
-#ifdef CONFIG_SWAP
-rlwimr11, r10, 32-5, _PAGE_PRESENT
+#rlwimr11, r10, 32-11, _PAGE_PRESENT
andr11, r11, r10
rlwimr10, r11, 0, _PAGE_PRESENT
-#endif
li r11, RPN_PATTERN
/* The Linux PTE won't go exactly into the MMU TLB.
* Software indicator bits 20-23 and 28 must be clear.
@@ -528,11 +526,9 @@
* r11 = ((r10 & PRESENT) & ((r10 & ACCESSED) >> 5));
* r10 = (r10 & ~PRESENT) | r11;
*/
-#ifdef CONFIG_SWAP

Open Source Used In 5GaaS Edge AC-4 10869
-rlwinmr11, r10, 32-5, _PAGE_PRESENT
+rlwinmr11, r10, 32-11, _PAGE_PRESENT
andr11, r11, r10
rlwimi10, r11, 0, _PAGE_PRESENT
-#endif

/* The Linux PTE won't go exactly into the MMU TLB.
 * Software indicator bits 22 and 28 must be clear.
 * Software indicator bits 24, 25, 26, and 27 must be
@example -955,11 +951,12 @@

/* set up the PTE pointers for the Abatron bdiGDB.
*/
tovirt(r6,r6)
lisr5, abatron_pteptrs@h
orir5, r5, abatron_pteptrs@l
-stw5, 0xf0(r0) /* Must match your Abatron config file */
+stw5, 0xf0(0) /* Must match your Abatron config file */
tophys(r5,r5)
+lisr6, swapper_pg_dir@h
+orir6, r6, swapper_pg_dir@l
stwr6, 0(r5)

/* Now turn on the MMU for real! */
--- linux-4.15.0.orig/arch/powerpc/kernel/head_booke.h
+++ linux-4.15.0/arch/powerpc/kernel/head_booke.h
@@ -32,6 +32,16 @@
*/
#define THREAD_NORMSAVE(offset)(THREAD_NORMSAVES + (offset * 4))

+ifdef CONFIG_PPC_FSL_BOOK3E
+define BOOKE_CLEAR_BTB(reg)\
+START_BTB_FLUSH_SECTION\
+BTB_FLUSH(reg)\
+END_BTB_FLUSH_SECTION
+else
+define BOOKE_CLEAR_BTB(reg)
+endif
+
#define NORMAL_EXCEPTION_PROLOG(intno)  
msptr SPRTN_SPRG_WSRRATCH0, r10; /* save one register */  
mfspr10, SPRTN_SPRG_THREAD;  
@example -43,6 +53,7 @@
andi.r11, r11, MSR_PR; /* check whether user or kernel */  
mrr11, r1;  
beq1f;  
+BOOKE_CLEAR_BTB(r11)\n/* if from user, start at top of this thread's kernel stack */  

lwz r11, THREAD_INFO-THREAD(r11); \
ALLOC_STACK_FRAME(r11, THREAD_SIZE); \
@@ -128,6 +139,7 @@
stw r9, _CCR(r8); /* save CR on stack */
mfspr r11, exc_level_srr1; /* check whether user or kernel */
DO_KVMOOOKIE_INTERRUPT_##intno exc_level_srr1; \
+BOOKE_CLEAR_BTB(r10)\nandi. r11,r11,MSR_PR; \
mfspr r11, SPRN_SPRG_THREAD; /* if from user, start at top of */
lwz r11, THREAD_INFO-THREAD(r11); /* this thread's kernel stack */
--- linux-4.15.0.orig/arch/powerpc/kernel/head_fsl_booke.S
+++ linux-4.15.0/arch/powerpc/kernel/head_fsl_booke.S
@@ -452,6 +452,13 @@
mfcr r13
stw r13, THREAD_NORMSAVE(3)(r10)
DO_KVMOOKIE_INTERRUPT_DTLB_MISS SPRN_SRR1
+START_BTB_FLUSH_SECTION
+mfspr r11, SPRN_SRR1
+andi. r10,r11,MSR_PR
+beq 1f
+BTB.Flush(r10)
+1:
+END_BTB_FLUSH_SECTION
mfspr r10, SPRN_DEAR/* Get faulting address */

/* If we are faulting a kernel address, we have to use the
@@ -546,6 +553,14 @@
mcrr r13
stw r13, THREAD_NORMSAVE(3)(r10)
DO_KVMOOKIE_INTERRUPT_ITLB_MISS SPRN_SRR1
+START_BTB_FLUSH_SECTION
+mfspr r11, SPRN_SRR1
+andi. r10,r11,MSR_PR
+beq 1f
+BTB.Flush(r10)
+1:
+END_BTB_FLUSH_SECTION
+mfspr r10, SPRN_SRR0/* Get faulting address */

/* If we are faulting a kernel address, we have to use the
--- linux-4.15.0.orig/arch/powerpc/kernel/hw_breakpoint.c
+++ linux-4.15.0/arch/powerpc/kernel/hw_breakpoint.c
@@ -175,8 +175,8 @@
if (cpu_has_feature(CPU_FTR_DAWR)) {
    length_max = 512 ; /* 64 doublewords */
/* DAWR region can't cross 512 boundary */
-if ((bp->attr.bp_addr >> 10) !=
- ((bp->attr.bp_addr + bp->attr.bp_len - 1) >> 10))
+if ((bp->attr.bp_addr >> 9) !=
+  ((bp->attr.bp_addr + bp->attr.bp_len - 1) >> 9))
return -EINVAL;
}
if (info->len >
--- linux-4.15.0.orig/arch/powerpc/kernel/idle_book3s.S
+++ linux-4.15.0/arch/powerpc/kernel/idle_book3s.S
@@ -144,7 +144,9 @@
  mtspr	SPRN_MMCR1, r4

  ldr3, STOP_MMCR2(r13)
+ldr4, PACA_SPRG_VDSO(r13)
  mtsprSPRN_MMCR2, r3
+lmtsprSPRN_SPRG3, r4
  blr

 /*
 @@ -166,6 +168,12 @@
 bne-core_idle_lock_held
 blr

+/* Reuse some unused pt_regs slots for AMR/IAMR/UAMOR/UAMOR */
+#define PNV_POWERSAVE_AMR_TRAP
+#define PNV_POWERSAVE_IAMR_DAR
+#define PNV_POWERSAVE_UAMOR_DSISR
+#define PNV_POWERSAVE_AMORRESULT
+
/*
 * Pass requested state in r3:
 *  r3 - PNV_THREAD_NAP/SLEEP/WINKLE in POWER8
 @@ -196,6 +204,20 @@
 /* Continue saving state */
 SAVE_GPR(2, r1)
 SAVE_NVGPRS(r1)
+
BEGIN_FTR_SECTION
+mfspr4, SPRN_AMR
+mfspr5, SPRN_IAMR
+mfspr6, SPRN_UAMOR
+stderr4, PNV_POWERSAVE_AMR(r1)
+stderr5, PNV_POWERSAVE_IAMR(r1)
+stderr6, PNV_POWERSAVE_UAMOR(r1)
+BEGIN_FTR_SECTION_NESTED(42)
+mfspr7, SPRN_AMOR
+stderr7, PNV_POWERSAVE_AMOR(r1)
+END_FTR_SECTION_NESTED_IFSET(CPU_FTR_HVMODE, 42)
+END_FTR_SECTION_IFSET(CPU_FTR_ARCH_207S)
+ mfcrr5
stdr5, _CCR(r1)
stdr1, PACA1(r13)
@@ -339,6 +361,7 @@
bne .Lhandle_esl_ec_set
PPC_STOP
lir3,0 /* Since we didn't lose state, return 0 */
+stdr3, PACA_REQ_PSSCR(r13)

/*. pnv_wakeup_noloss() expects r12 to contain the SRR1 value so
@@ -429,11 +452,29 @@
*/
_GLOBAL(power9_idle_stop)
+BEGIN_FTR_SECTION
+lwzr5, PACA_DONT_STOP(r13)
+cmpwir5, 0
+bne1f
stdr3, PACA_REQ_PSSCR(r13)
+sync
+lwzr5, PACA_DONT_STOP(r13)
+cmpwir5, 0
+bne1f
+END_FTR_SECTION_IFSET(CPU_FTR_P9_TM_XER_SO_BUG)
mtspr SPRN_PSSCR,r3
LOAD_REG_ADDR(r4,power_enter_stop)
bpnv_powersave_common
/* No return */
+1:
+/*
+ * We get here when TM / thread reconfiguration bug workaround
+ * code wants to get the CPU into SMT4 mode, and therefore
+ */
+lir3, 0
+stdr3, PACA_REQ_PSSCR(r13)
+blr/* return 0 for wakeup cause / SRR1 value */

/*. On waking up from stop 0,1,2 with ESL=1 on POWER9 DD1,
@@ -584,6 +625,8 @@
mfspr5, SPRN_PSSCR
rdicl r5,r5,4,60
ALT_FTR_SECTION_END_NESTED_IFSET(CPU_FTR_POWER9_DD1, 71)
lir0, 0/* clear requested_psscr to say we're awake */
+stdr0, PACA_REQ_PSSCR(r13)
cmpdcr4,r5,r4
bgecr4,pnv_wakeup_th_loss /* returns to caller */

@@ -834,6 +877,8 @@
mtsprSPRN_PTCR,r4
ldr4,_RPR(r1)
mtsprSPRN_RPR,r4
+ldr4,_AMOR(r1)
+mtsprSPRN_AMOR,r4
END_FTR_SECTION_IFSET(CPU_FTR_ARCH_300)

ldr4,_TSCR(r1)
@@ -932,6 +977,25 @@
END_FTR_SECTION_IFSET(CPU_FTR_HVMODE)
REST_NVGRS(r1)
REST_GPR(2, r1)
+
+BEGIN_FTR_SECTION
+/* These regs were saved in pnv_powersave_common() */
+ldr4, PNV_POWERSAVE_AMR(r1)
+ldr5, PNV_POWERSAVE_IAMR(r1)
+ldr6, PNV_POWERSAVE_UAMOR(r1)
+mtsprSPRN_AMR, r4
+mtsprSPRN_IAMR, r5
+mtsprSPRN_UAMOR, r6
+BEGIN_FTR_SECTION_NESTED(42)
+ldr7, PNV_POWERSAVE_AMOR(r1)
+mtsprSPRN_AMOR, r7
+END_FTR_SECTION_NESTED_IFSET(CPU_FTR_HVMODE, 42)
+/
+ * We don't need an isync here after restoring IAMR because the upcoming
+ * mtmsrd is execution synchronizing.
+ */
+END_FTR_SECTION_IFSET(CPU_FTR_ARCH_207S)
+
ldr4,PACAKMSR(r13)
ldr5,_LINK(r1)
ldr6,_CCR(r1)
--- linux-4.15.0.orig/arch/powerpc/kernel/iommu.c
+++ linux-4.15.0/arch/powerpc/kernel/iommu.c
@@ -785,9 +785,9 @@
vaddr = page_address(page) + offset;
uaddr = (unsigned long)vaddr;
-npages = iommu_num_pages(uaddr, size, IOMMU_PAGE_SIZE(tbl));

if (tbl) {
+npages = iommu_num_pages(uaddr, size, IOMMU_PAGE_SIZE(tbl));
align = 0;
if (tbl->it_page_shift < PAGE_SHIFT && size >= PAGE_SIZE &&
    ((unsigned long)vaddr & ~PAGE_MASK) == 0)
@@ -1055,7 +1055,7 @@
spin_lock_irqsave(&tbl->large_pool.lock, flags);
for (i = 0; i < tbl->nr_pools; i++)
    spin_lock(&tbl->pools[i].lock);
+spin_lock_nest_lock(&tbl->pools[i].lock, &tbl->large_pool.lock);

if (tbl->it_offset == 0)
    clear_bit(0, tbl->it_map);
@@ -1084,7 +1084,7 @@
spin_lock_irqsave(&tbl->large_pool.lock, flags);
for (i = 0; i < tbl->nr_pools; i++)
    spin_lock(&tbl->pools[i].lock);
+spin_lock_nest_lock(&tbl->pools[i].lock, &tbl->large_pool.lock);
memset(tbl->it_map, 0, sz);

--- linux-4.15.0.orig/arch/powerpc/kernel/irq.c
+++ linux-4.15.0/arch/powerpc/kernel/irq.c
@@ -475,6 +475,14 @@
 */
 WARN_ON(!arch_irqs_disabled());

+/*
+ * Interrupts must always be hard disabled before irq_happened is
+ * modified (to prevent lost update in case of interrupt between
+ * load and store).
+ */
+__hard_irq_disable();
+local_paca->irq_happened |= PACA_IRQ_HARD_DIS;
+ /* Indicate in the PACA that we have an interrupt to replay */
local_paca->irq_happened |= PACA_IRQ_EE;
} }@@ -598,8 +606,6 @@
trace_irq_entry(regs);

-check_stack_overflow();
-
+ /* Query the platform PIC for the interrupt & ack it.
 *@@ -631,6 +637,8 @@
irqtp = hardirq_ctx[raw_smp_processor_id()];
sirqtp = softirq_ctx[raw_smp_processor_id()];

+check_stack_overflow();
+
/* Already there? */
if (unlikely(curtp == irqtp || curtp == sirqtp)) {
    __do_irq(regs);
--- linux-4.15.0.orig/arch/powerpc/kernel/kprobes.c
+++ linux-4.15.0/arch/powerpc/kernel/kprobes.c
@@ -277,6 +277,10 @@
if (user_mode(regs))
return 0;

+if (!IS_ENABLED(CONFIG_BOOKE) &&
++ (!regs->msr & MSR_IR) || !(regs->msr & MSR_DR))
+return 0;
+
/*
 * We don't want to be preempted for the entire
 * duration of kprobe processing
@@ -455,29 +459,33 @@
}]

kretprobe_assert(ri, orig_ret_address, trampoline_address);
-regs->nip = orig_ret_address;
+
/*
- * Make LR point to the orig_ret_address.
- * When the 'nop' inside the kretprobe_trampoline
- * is optimized, we can do a 'blr' after executing the
- * detour buffer code.
- * We get here through one of two paths:
- * 1. by taking a trap -> kprobe_handler() -> here
- * 2. by optprobe branch -> optimized_callback() -> opt_pre_handler() -> here
- *
- * When going back through (1), we need regs->nip to be setup properly
- * as it is used to determine the return address from the trap.
- * For (2), since nip is not honoured with optprobes, we instead setup
- * the link register properly so that the subsequent 'blr' in
- * kretprobe_trampoline jumps back to the right instruction.
- *
- *
+ * For nip, we should set the address to the previous instruction since
+ * we end up emulating it in kprobe_handler(), which increments the nip
+ * again.
+ */
+regs->nip = orig_ret_address - 4;
regs->link = orig_ret_address;
-reset_current_kprobe();
kretprobe_hash_unlock(current, &flags);
-preempt_enable_no_resched();

hlist_for_each_entry_safe(ri, tmp, &empty_rp, hlist) {
  hlist_del(&ri->hlist);
kfree(ri);
}
/*
 * By returning a non-zero value, we are telling
 * kprobe_handler() that we don't want the post_handler
 * to run (and have re-enabled preemption)
 */
+return 0;
}
NOKPROBE_SYMBOL(trampoline_probe_handler);

--- linux-4.15.0.orig/arch/powerpc/kernel/kvm.c
+++ linux-4.15.0/arch/powerpc/kernel/kvm.c
@@ -22,6 +22,7 @@
#include <linux/kvm_host.h>
#include <linux/init.h>
#include <linux/export.h>
+#include <linux/kmemleak.h>
#include <linux/kvm_para.h>
#include <linux/slab.h>
#include <linux/of.h>
@@ -712,6 +713,12 @@
static __init void kvm_free_tmp(void)
{
+/*
+ * Inform kmemleak about the hole in the .bss section since the
+ * corresponding pages will be unmapped with DEBUG_PAGEALLOC=y.
+ */
+ kmemleak_free_part(&kvm_tmp[kvm_tmp_index],
+ ARRAY_SIZE(kvm_tmp) - kvm_tmp_index);
+ free_reserved_area(&kvm_tmp[kvm_tmp_index],
+ &kvm_tmp[ARRAY_SIZE(kvm_tmp)], -1, NULL);
}
--- linux-4.15.0.orig/arch/powerpc/kernel/legacy_serial.c
+++ linux-4.15.0/arch/powerpc/kernel/legacy_serial.c
@@ -372,6 +372,8 @@
/* Now find out if one of these is out firmware console */
path = of_get_property(of_chosen, "linux,stdout-path", NULL);
+if (path == NULL)
+path = of_get_property(of_chosen, "stdout-path", NULL);
if (path != NULL) {
    stdout = of_find_node_by_path(path);
    if (stdout)
        /* We are getting a weird phandle from OF ... */
        /* ... So use the full path instead */
    name = of_get_property(of_chosen, "linux,stdout-path", NULL);
+if (name == NULL)
+    name = of_get_property(of_chosen, "stdout-path", NULL);
if (name == NULL) {
    -DBG(" no linux,stdout-path !
    ");
    +DBG(" no stdout-path !
    ");
    return -ENODEV;
}
prom_stdout = of_find_node_by_path(name);
--- linux-4.15.0.orig/arch/powerpc/kernel/machine_kexec.c
+++ linux-4.15.0/arch/powerpc/kernel/machine_kexec.c
@@ -113,11 +113,12 @@
void __init reserve_crashkernel(void)
{
    -unsigned long long crash_size, crash_base;
    +unsigned long long crash_size, crash_base, total_mem_sz;
    int ret;

+total_mem_sz = memory_limit ? memory_limit : memblock_phys_mem_size();
/* use common parsing */
    -ret = parse_crashkernel(boot_command_line, memblock_phys_mem_size(),
    +ret = parse_crashkernel(boot_command_line, total_mem_sz,
        &crash_size, &crash_base);
    if (ret == 0 && crash_size > 0) {
        crashk_res.start = crash_base;
        @@ -176,6 +177,7 @@
/* Crash kernel trumps memory limit */
    if (memory_limit && memory_limit <= crashk_res.end) {
        memory_limit = crashk_res.end + 1;
        +total_mem_sz = memory_limit;
        printk("Adjusted memory limit for crashkernel, now 0x%lx\n",
            memory_limit);
    }
    @@ -184,9 +186,14 @@
    "for crashkernel (System RAM: %ldMB)\n",
        (unsigned long)(crash_size >> 20),
        (unsigned long)(crashk_res.start >> 20),
        -(unsigned long)(memblock_phys_mem_size() >> 20));
+(unsigned long)(total_mem.sz >> 20));

-memblock_reserve(crashk_res.start, crash_size);
+if (!memblock_is_region_memory(crashk_res.start, crash_size) ||
    memblock_reserve(crashk_res.start, crash_size)) {
    pr_err("Failed to reserve memory for crashkernel!\n");
    crashk_res.start = crashk_res.end = 0;
    return;
}

int overlaps_crashkernel(unsigned long start, unsigned long size)
--- linux-4.15.0.orig/arch/powerpc/kernel/machine_kexec_file_64.c
+++ linux-4.15.0/arch/powerpc/kernel/machine_kexec_file_64.c
@@ -43,7 +43,7 @@
/* We don't support crash kernels yet. */
if (image->type == KEXEC_TYPE_CRASH)
-    return -ENOTSUPP;
+    return -EOPNOTSUPP;

for (i = 0; i < ARRAY_SIZE(kexec_file_loaders); i++) {
    fops = kexec_file_loaders[i];
--- linux-4.15.0.orig/arch/powerpc/kernel/mce.c
+++ linux-4.15.0/arch/powerpc/kernel/mce.c
@@ -45,6 +45,7 @@
    mce_ue_event_queue);

static void machine_check_process_queued_event(struct irq_work *work);
+static void machine_check_ue_irq_work(struct irq_work *work);
void machine_check_ue_event(struct machine_check_event *evt);
static void machine_process_ue_event(struct work_struct *work);

@@ -52,6 +53,10 @@
    .func = machine_check_process_queued_event,
};

+static struct irq_work mce_ue_event_irq_work = {
+    .func = machine_check_ue_irq_work,
+};
+ DECLARE_WORK(mce_ue_event_work, machine_process_ue_event);

static void mce_set_error_info(struct machine_check_event *mce,
@@ -208,6 +213,10 @@
    get_mce_event(NULL, true);
}
+static void machine_check_ue_irq_work(struct irq_work *work) +{ +schedule_work(&mce_ue_event_work); +} /* Queue up the MCE event which then can be handled later. @ @ -225,7 +234,7 @@ memcpy(this_cpu_ptr(&mce_ue_event_queue[index]), evt, sizeof(*evt)); /* Queue work to process this event later. */ -schedule_work(&mce_ue_event_work); +irq_work_queue(&mce_ue_event_irq_work); } /* Possible meanings for HMER_DEBUG_TRIG bit being set on POWER9 */ +static enum { +DTRIG UNKNOWN, +DTRIG VECTOR CI, /* need to emulate vector CI load instr */ +DTRIG SUSPEND_ESCAPE, /* need to escape from TM suspend mode */ +} hmer_debug_trig_function; + +static int init_debug_trig_function(void) +{ +int pvr; +struct device_node *cpun; +struct property *prop = NULL; +const char *str; +/* First look in the device tree */ +preempt_disable(); +cpun = of_get_cpu_node(smp_processor_id(), NULL); +if (cpun) { +of_property_for_each_string(cpun, "ibm,hmi-special-triggers", +prop, str) { +if (strchr(str, "bit17-vector-ci-load") == 0) +hmer_debug_trig_function = DTRIG VECTOR CI; +else if (strchr(str, "bit17-tm-suspend-escape") == 0) +hmer_debug_trig_function = DTRIG SUSPEND_ESCAPE; +} +of_node_put(cpun); +}
+preempt_enable();
+
+/* If we found the property, don't look at PVR */
+if (prop)
+goto out;
+
+pvr = mfspr(SPRN_PVR);
+/* Check for POWER9 Nimbus (scale-out) */
+if ((PVR_VER(pvr) == PVR_POWER9) && (pvr & 0xe000) == 0) {
+/* DD2.2 and later */
+if ((pvr & 0xffff) >= 0x202)
+hmer_debug_trig_function = DTRIG_SUSPEND_ESCAPE;
+/* DD2.0 and DD2.1 - used for vector CI load emulation */
+else if ((pvr & 0xffff) >= 0x200)
+hmer_debug_trig_function = DTRIG_VECTOR_CI;
+}
+
+out:
+switch (hmer_debug_trig_function) {
+case DTRIG_VECTOR_CI:
+pr_debug("HMI debug trigger used for vector CI load\n");
+break;
+case DTRIG_SUSPEND_ESCAPE:
+pr_debug("HMI debug trigger used for TM suspend escape\n");
+break;
+default:
+break;
+}
+return 0;
+
+#ifdef CONFIG_PPC_BOOK3S_64
+/* Workaround for P9 vector CI loads (see p9_hmi_special_emu) */
+if (pvr_version_is(PVR_POWER9)) {
unsigned long hmer = mfspr(SPRN_HMER);

/* Do we have the debug bit set */
if (hmer & PPC_BIT(17)) {
    hmer &= ~PPC_BIT(17);
    mtspr(SPRN_HMER, hmer);
}

/* HMER_DEBUG_TRIG bit is used for various workarounds on P9 */
if (!((hmer & HMER_DEBUG_TRIG)
    && hmer_debug_trig_function != DTRIG_UNKNOWN))
    return -1;

hmer &= ~HMER_DEBUG_TRIG;

/* HMER is a write-AND register */
mtspr(SPRN_HMER, ~HMER_DEBUG_TRIG);

switch (hmer_debug_trig_function) {
    case DTRIG_VECTOR_CI:
        /* Now to avoid problems with soft-disable we
         * only do the emulation if we are coming from
         * host user space
         */
        if (regs && user_mode(regs))
            ret = local_paca->hmi_p9_special_emu = 1;
        break;

    default:
        break;
}

#endif /* CONFIG_PPC_BOOK3S_64 */
/*
 * See if any other HMI causes remain to be handled
 */
if (hmer & mfspr(SPRN_HMEER))
return -1;
+
return ret;
+
+/*
 * Return values:
 */
+long hmi_exception_realmode(struct pt_regs *regs) {
+int ret;
+
+__this_cpu_inc(irq_stat.hmi_exceptions);
+
+ret = hmi_handle_debugtrig(regs);
+if (ret >= 0)
+return ret;
+
wait_for_subcore_guest_exit();

--- linux-4.15.0.orig/arch/powerpc/kernel/mce_power.c
+++ linux-4.15.0/arch/powerpc/kernel/mce_power.c
@@ -39,7 +39,8 @@
static unsigned long addr_to_pfn(struct pt_regs *regs, unsigned long addr)
{
    pte_t *ptep;
    unsigned long flags;
-  unsigned int shift;
+  unsigned long pfn, flags;
    struct mm_struct *mm;
    if (user_mode(regs))
        mm = &init_mm;
@@ -48,14 +49,23 @@
        local_irq_save(flags);
-    if (mm == current->mm)
-        ptep = find_current_mm_pte(mm->pgd, addr, NULL, NULL);
-    else
-        ptep = find_init_mm_pte(addr, NULL);
+    ptep = __find_linux_pte(mm->pgd, addr, NULL, &shift);
+    if (!ptep || pte_special(*ptep)) {
+        pfn = ULONG_MAX;
+    }
+    +if (!ptep || pte_special(*ptep)) {
+        pfn = ULONG_MAX;

goto out;
+
+if (shift <= PAGE_SHIFT)
+pfn = pte_pfn(*ptep);
+else {
+unsigned long rpnmask = (1ul << shift) - PAGE_SIZE;
+pfn = pte_pfn(__pte(pte_val(*ptep) | (addr & rpnmask)));
+
+out:
+local_irq_restore(flags);
- if (!ptep || pte_special(*ptep))
- return ULONG_MAX;
- return pte_pfn(*ptep);
+ return pfn;
}

static void flush_tlb_206(unsigned int num_sets, unsigned int action)
@@ -206,6 +216,13 @@

static void flush_erat(void)
{
-#ifdef CONFIG_PPC_BOOK3S_64
+if (!early_cpu_has_feature(CPU_FTR_ARCH_300)) {
+flush_and_reload_slb();
+return;
+}
+#endif
+/* PPC_INVALIDATE_ERAT can only be used on ISA v3 and newer */
asm volatile(PPC_INVALIDATE_ERAT : : :"memory");
}

@@ -451,7 +468,7 @@
MCE_INITIATOR_CPU, MCE_SEV_ERROR_SYNC, },
{ 0, false, 0, 0, 0, 0 } );

-static int mce_find_instr_ea_and_pfn(struct pt_regs *regs, uint64_t *addr,
-static int mce_find_instr_ea_and_phys(struct pt_regs *regs, uint64_t *addr,
+static int mce_find_instr_ea_and_phys(struct pt_regs *regs, uint64_t *addr,
+uint64_t *phys_addr)
{
/*
@@ -552,7 +569,6 @@
if (pfn != ULONG_MAX) {
 *phys_addr =
 (pfn << PAGE_SHIFT);
-handled = 1;
}
if (get_paca()->in_mce < MAX_MCE_DEPTH)
-    if (!mce_find_instr_ea_and_pfn(regs, addr,
-        phys_addr))
-        handled = 1;
+    mce_find_instr_ea_and_phys(regs, addr,
+        phys_addr);
}  
found = 1;
}

-- linux-4.15.0.orig/arch/powerpc/kernel/misc_64.S
+++ linux-4.15.0/arch/powerpc/kernel/misc_64.S
@@ -86,7 +86,7 @@
subfr8,r6,r4/* compute length */
addr8,r8,r5/* ensure we get enough */
lwz9,DCACHEL1LOGBLOCKSIZE(r10)/* Get log-2 of cache block size */
-srwr8,r8,r9/* compute line count */
+srdr8,r8,r9/* compute line count */
bqtrl/* nothing to do? */
mtctr8
1:dcbst0,r6 
@@ -102,7 +102,7 @@
subfr8,r6,r4/* compute length */
addr8,r8,r5
lwz9,ICACHEL1LOGBLOCKSIZE(r10)/* Get log-2 of Icache block size */
-srwr8,r8,r9/* compute line count */
+srdr8,r8,r9/* compute line count */
bqtrl/* nothing to do? */
mtctr8
2:icbi0,r6 
@@ -134,7 +134,7 @@
subfr8,r6,r4/* compute length */
addr8,r8,r5/* ensure we get enough */
lwz9,DCACHEL1LOGBLOCKSIZE(r10)/* Get log-2 of dcache block size */
-srwr8,r8,r9/* compute line count */
+srdr8,r8,r9/* compute line count */
```c
+sr8,r8,r9 /* compute line count */
beqlr /* nothing to do? */
mtctr
0: dbst, r6
@@ -190,7 +190,7 @@
subf, r8, r6, r4 /* compute length */
addr, r8, r5 /* ensure we get enough */
lwz, r9, DCACHE1(LOGBLOCKSIZE(r10)) /* Get log-2 of dcache block size */
-srw, r8, r9 /* compute line count */
+sr8, r8, r9 /* compute line count */
beqlr /* nothing to do? */
sync

isync
--- linux-4.15.0.orig/arch/powerpc/kernel/module.c
+++ linux-4.15.0/arch/powerpc/kernel/module.c
@@ -72,7 +72,15 @@
do_feature_fixups(powerpe_firmware_features,
 (void *)sect->sh_addr,
 (void *)sect->sh_addr + sect->sh_size);
-#endif
+#endif /* CONFIG_PPC64 */
+
+#ifdef CONFIG_PPC_BARRIER_NOSPEC
+sect = find_section(hdr, sechdrs, "__spec_barrier_fixup");
+if (sect != NULL)
+do_barrier_nospec_fixups_range(barrier_nospec_enabled,
+ (void *)sect->sh_addr,
+ (void *)sect->sh_addr + sect->sh_size);
+#endif /* CONFIG_PPC_BARRIER_NOSPEC */

sect = find_section(hdr, sechdrs, "__lwsync_fixup");
if (sect != NULL)
--- linux-4.15.0.orig/arch/powerpc/kernel/module_64.c
+++ linux-4.15.0/arch/powerpc/kernel/module_64.c
@@ -487,12 +487,22 @@
 restore r2. */
static int restore_r2(u32 *instruction, struct module *me)
{
- if (is_early_mcount_callsite(instruction - 1))
+ u32 *prev_insn = instruction - 1;
+ if (is_early_mcount_callsite(prev_insn))
+ return 1;
+ /*
+ * Make sure the branch isn't a sibling call. Sibling calls aren't
+ * "link" branches and they don't return, so they don't need the r2
+ * restore afterwards.
```
+ */
+if (!(linstr_is_relative_link_branch(*prev_insn))
    return 1;

if (*instruction != PPC_INST_NOP) {
  pr_err("%s: Expect noop after relocate, got %08x\n",
      me->name, *instruction);
  return 0;
}
/* ld r2,R2_STACK_OFFSET(r1) */
@@ -614,7 +624,8 @@
case R_PPC_REL24:
    /* FIXME: Handle weak symbols here --RR */
    -if (sym->st_shndx == SHN_UNDEF) {
    +if (sym->st_shndx == SHN_UNDEF ||
        sym->st_shndx == SHN_LIVEPATCH) {
        /* External: go via stub */
        value = stub_for_addr(sechdrs, value, me);
        if (!value)
          return -ENOEXEC;
      }
    /* 32 bits relative (used by relative exception tables) */
    -*(u32*)location = value - (unsigned long)location;
    +*(u32*)location = value;
    break;
    /* If found, replace it with:
    *addis r2, r12, (.TOC.-func)@ha
    */
    ((uint32_t *)location)[0] = 0x3c4c0000 + PPC_HA(value);
    ((uint32_t *)location)[1] = 0x38420000 + PPC_LO(value);
    --- linux-4.15.0.orig/arch/powerpc/kernel/msi.c
+++ linux-4.15.0/arch/powerpc/kernel/msi.c
@@ -34,5 +34,10 @@
{
 struct pci_controller *phb = pci_bus_to_host(dev->bus);

 -phb->controller_ops.teardown_msi_irqs(dev);
+/*
+ * We can be called even when arch_setup_msi_irqs() returns -ENOSYS,
+ * so check the pointer again.
+ */
+if (phb->controller_ops.teardown_msi_irqs)
+phb->controller_ops.teardown_msi_irqs(dev);
}
--- linux-4.15.0.orig/arch/powerpc/kernel/nvram_64.c
+++ linux-4.15.0/arch/powerpc/kernel/nvram_64.c
@@ -566,8 +566,6 @@
 nvram_pstore_info.buf = oops_data;
 nvram_pstore_info.bufsize = oops_data_sz;

 -spin_lock_init(&nvram_pstore_info.buf_lock);
-
 rc = pstore_register(&nvram_pstore_info);
 if (rc && (rc != -EPERM))
 /* Print error only when pstore.backend == nvram */
--- linux-4.15.0.orig/arch/powerpc/kernel/paca.c
+++ linux-4.15.0/arch/powerpc/kernel/paca.c
@@ -207,6 +207,7 @@
{
 u64 limit;
 int cpu;
+unsigned int nr_cpus;

 limit = ppc64_rma_size;

@@ -219,20 +220,32 @@
 limit = min(0x10000000ULL, limit);
 #endif

-paca_size = PAGE_ALIGN(sizeof(struct paca_struct) * nr_cpu_ids);
+/*
+ * Always align up the nr_cpu_ids to SMT threads and allocate
+ * the pacas. This will help us to prepare for a situation where
+ * boot cpu id > nr_cpus_id. We will use the last nthreads
+ * slots (nthreads == threads per core) to accommodate a core
+ * that contains boot cpu thread.
+ *
+ * Do not change nr_cpu_ids value here. Let us do that in
+ * early_init_dt_scan_cpus() where we know exact value
+ * of threads per core.
+ */
+nr_cpus = _ALIGN_UP(nr_cpu_ids, MAX_SMT);
+paca_size = PAGE_ALIGN(sizeof(struct paca_struct) * nr_cpus);

    pacas = __va(memblock_alloc_base(paca_size, PAGE_SIZE, limit));
    memset(paca, 0, paca_size);

    printk(KERN_DEBUG "Allocated %u bytes for %u pacas at %p\n",
            pacas, nr_cpu_ids, pacas);
    allocate_lppacas(nr_cpu_ids, limit);
    allocate_lppacas(nr_cpus, limit);

    allocate_slb_shadows(nr_cpu_ids, limit);
    allocate_slb_shadows(nr_cpus, limit);

    /* Can't use for_each_*_cpu, as they aren't functional yet */
    -for (cpu = 0; cpu < nr_cpu_ids; cpu++)
    +for (cpu = 0; cpu < nr_cpus; cpu++)
        initialise_paca(&paca[cpu], cpu);
    }

--- Linux-4.15.0.orig/arch/powerpc/kernel/pci-common.c
+++ Linux-4.15.0/arch/powerpc/kernel/pci-common.c
@@ -331,6 +331,7 @@
             return NULL;
         }
+       EXPORT_SYMBOL(pci_find_hose_for_OF_device);

/#
 * Reads the interrupt pin to determine if interrupt is use by card.
@@ -1648,6 +1649,7 @@
             return pci_bus_find_capability(fake_pci_bus(hose, bus), devfn, cap);
         }
+       EXPORT_SYMBOL_GPL(early_find_capability);

 struct device_node *pcibios_get_phb_of_node(struct pci_bus *bus)
@@ -1740,3 +1742,13 @@
             }
+       DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MOTOROLA, PCI_ANY_ID,
+                                   fixup_hide_host_resource_fsl);
+       DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_FREESCALE, PCI_ANY_ID,
+                                   fixup_hide_host_resource_fsl);
static int __init discover_phbs(void)
{
    if (ppc_md.discover_phbs)
        ppc_md.discover_phbs();
    return 0;
}

core_initcall(discover_phbs);

--- linux-4.15.0.orig/arch/powerpc/kernel/pci_32.c
+++ linux-4.15.0/arch/powerpc/kernel/pci_32.c
@@ -11,6 +11,7 @@
#include <linux/sched.h>
#include <linux/errno.h>
#include <linux/bootmem.h>
+#include <linux/syscalls.h>
#include <linux/irq.h>
#include <linux/list.h>
#include <linux/of.h>
--- linux-4.15.0.orig/arch/powerpc/kernel/pci_dn.c
+++ linux-4.15.0/arch/powerpc/kernel/pci_dn.c
@@ -261,9 +261,22 @@
continue;

#include <linux/sched.h>
#include <linux/syscalls.h>
#include <linux/irq.h>
#include <linux/list.h>
#include <linux/of.h>

ifdef CONFIG_EEH
-/* Release EEH device for theVF */
+/*
+ * Release EEH device for the VF. The PCI core
+ * has already torn down the pci_dev for this VF, but
+ * we're responsible to removing the eeh_dev since it
+ * has the same lifetime as the pci_dn that spawned it.
+ */
+eeh_rmv_from_parent_pe(edev);
+
ifdef CONFIG_EEH
-/* Release EEH state for this VF. */
+-* Release EEH state for this VF. The PCI core
+ * has already torn down the pci_dev for this VF, but
+ * we're responsible to removing the eeh_dev since it
+ * has the same lifetime as the pci_dn that spawned it.
+ */
edev = pdn_to_eeh_dev(pdn);
if (edev) {
+/*
+ * We allocate pci_dn's for the totalvfs count,
+ * but only only the vfs that were activated
+ * have a configured PE.
+ */
+if (edev->pe)
+eeh_rmv_from_parent_pe(edev);
+
+pdn->edev = NULL;
+kfree(edev);
}
if (addr0 & 0x02000000) {
  flags = IORESOURCE_MEM | PCI_BASE_ADDRESS_SPACE_MEMORY;
  flags |= (addr0 >> 22) & PCI_BASE_ADDRESS_MEM_TYPE_64;
  +if (flags & PCI_BASE_ADDRESS_MEM_TYPE_64)
  +flags |= IORESOURCE_MEM_64;
  flags |= (addr0 >> 28) & PCI_BASE_ADDRESS_MEM_TYPE_1M;
  if (addr0 & 0x40000000)
    flags |= IORESOURCE_PREFETCH
@@ -45,6 +45,8 @@
if (addrs) {
    pr_debug("    parse addresses (%d bytes) @ %p
", proplen, addrs);
for (; proplen >= 20; proplen -= 20, addrs += 5) {
  flags = pci_parse_of_flags(of_read_number(addrs, 1), 0);
  continue;
}
static bool tm_active_with_fp(struct task_struct *tsk)
{
    return msr_tm_active(tsk->thread.regs->msr) &&
    (tsk->thread.ckpt_regs.msr & MSR_FP);
}

static bool tm_active_with_altivec(struct task_struct *tsk)
{
    return msr_tm_active(tsk->thread.regs->msr) &&
    (tsk->thread.ckpt_regs.msr & MSR_VEC);
}
#endif /* CONFIG_PPC_TRANSACTIONAL_MEM */

bool strict_msr_control;
@@ -177,7 +157,7 @@
    save_fpu(tsk);
    msr = tsk->thread.regs->msr;
    msr &= ~MSR_FP;
-    msr &= ~(MSR_FP|MSR_FE0|MSR_FE1);
+    msr &= ~(MSR_FP|MSR_FE0|MSR_FE1);
#endif CONFIG_VSX
if (cpu_has_feature(CPU_FTR_VSX))
    msr &= ~MSR_VSX;
@@ -244,7 +224,8 @@
    if (!msr_tm_active(cpumsr) && msr_tm_active(current->thread.regs->msr))
        __giveup_fpu(current);
    }@
+    if (!MSR_TM_ACTIVE(cpumsr) &&
+        MSR_TM_ACTIVE(current->thread.regs->msr))
    return;
    __giveup_fpu(current);
}@

static int restore_fp(struct task_struct *tsk)
{
    if (tsk->thread.load_fp || tm_active_with_fp(tsk))
        load_fp_state(&current->thread.fp_state);
    current->thread.load_fp++;
    return 1;
static int restore_altivec(struct task_struct *tsk)
{
    -if (cpu_has_feature(CPU_FTR_ALTIVEC) &&
        (tsk->thread.load_vec || tm_active_with_altivec(tsk))) {
        load_vr_state(&tsk->thread.vr_state);
        tsk->thread.used_vr = 1;
        tsk->thread.load_vec++;
        @ @ -394,7 +375,8 @@
        * giveup as this would save to the 'live' structure not the
        * checkpointed structure.
        */
    -if(!msr_tm_active(cpumsr) && msr_tm_active(current->thread.regs->msr))
    +if (!MSR_TM_ACTIVE(cpumsr) &&
        MSR_TM_ACTIVE(current->thread.regs->msr))
        return;
    __giveup_altivec(current);
}

check_if_tm_restore_required(tsk);

usermsr = tsk->thread.regs->msr;
if (!tsk->thread.regs)
    return;

+check_if_tm_restore_required(tsk);
+
usermsr = tsk->thread.regs->msr;

if ((usermsr & msr_all_available) == 0)
    return;

msr_check_and_set(msr_all_available);
-check_if_tm_restore_required(tsk);

WARN_ON((usermsr & MSR_VSX) && !(usermsr & MSR_FP) && (usermsr & MSR_VEC));
unsigned long msr;

@if (!msr_tm_active(regs->msr) &&
+if (!MSR_TM_ACTIVE(regs->msr) &&
!current->thread.load_fp && !loadvec(current->thread))
return;

@@ -587,12 +570,11 @@
if (tsk->thread.regs) {
    preempt_disable();
    BUG_ON(tsk != current);
    -save_all(tsk);
    #ifdef CONFIG_SPE
    if (tsk->thread.regs->msr & MSR_SPE)
        tsk->thread.spefscr = mfspr(SPRN_SPEFSCR);
    #endif
    +save_all(tsk);
    preempt_enable();
 }
@@ -1137,7 +1119,7 @@
    mtspr(SPRN_TAR, new_thread->tar);
 }

@if (cpu_has_feature(CPU_FTR_ARCH_300) &&
+if (cpu_has_feature(CPU_FTR_P9_TIDR) &&
    old_thread->tidr != new_thread->tidr)
    mtspr(SPRN_TIDR, new_thread->tidr);
#endif
@@ -1477,101 +1459,42 @@
}

#ifdef CONFIG_PPC64
-static DEFINE_SPINLOCK(vas_thread_id_lock);
-static DEFINE_IDA(vas_thread_ida);
-
-/*
- * We need to assign a unique thread id to each thread in a process.
-*/
-/**
+ * Assign a TIDR (thread ID) for task @t and set it in the thread
+ * structure. For now, we only support setting TIDR for 'current' task.
+ *
- * This thread id, referred to as TIDR, and separate from the Linux's tgid,
- * is intended to be used to direct an ASB_Notify from the hardware to the
- * thread, when a suitable event occurs in the system.
+ * Since the TID value is a truncated form of it PID, it is possible
+ * (but unlikely) for 2 threads to have the same TID. In the unlikely event
+ * that 2 threads share the same TID and are waiting, one of the following
+ * cases will happen:
*  
- * One such event is a "paste" instruction in the context of Fast Thread
- * Wakeup (aka Core-to-core wake up in the Virtual Accelerator Switchboard
- * (VAS) in POWER9.
+ * 1. The correct thread is running, the wrong thread is not
+ * In this situation, the correct thread is woken and proceeds to pass its
+ * condition check.
*  
- * To get a unique TIDR per process we could simply reuse task_pid_nr() but
- * the problem is that task_pid_nr() is not yet available copy_thread() is
- * called. Fixing that would require changing more intrusive arch-neutral
- * code in code path in copy_process()?
+ * 2. Neither threads are running
+ * In this situation, neither thread will be woken. When scheduled, the waiting
+ * threads will execute either a wait, which will return immediately, followed
+ * by a condition check, which will pass for the correct thread and fail
+ * for the wrong thread, or they will execute the condition check immediately.
*  
- * Further, to assign unique TIDRs within each process, we need an atomic
- * field (or an IDR) in task_struct, which again intrudes into the arch-
- * neutral code. So try to assign globally unique TIDRs for now.
+ * 3. The wrong thread is running, the correct thread is not
+ * The wrong thread will be woken, but will fail its condition check and
+ * re-execute wait. The correct thread, when scheduled, will execute either
+ * its condition check (which will pass), or wait, which returns immediately
+ * when called the first time after the thread is scheduled, followed by its
+ * condition check (which will pass).
*  
- * NOTE: TIDR 0 indicates that the thread does not need a TIDR value.
- * For now, only threads that expect to be notified by the VAS
- * hardware need a TIDR value and we assign values > 0 for those.
- * /
-#define MAX_THREAD_CONTEXT	((1 << 16) - 1)
-
static int assign_thread_tidr(void)
-{  
-int index;
-int err;
-
-again:
-if (!ida_pre_get(&vas_thread_ida, GFP_KERNEL))
-return -ENOMEM;
-
-spin_lock(&vas_thread_id_lock);
-err = ida_get_new_above(&vas_thread_ida, 1, &index);
-spin_unlock(&vas_thread_id_lock);
-
if (err == -EAGAIN)
goto again;
else if (err)
return err;
-
if (index > MAX_THREAD_CONTEXT) {
spin_lock(&vas_thread_id_lock);
ida_remove(&vas_thread_ida, index);
spin_unlock(&vas_thread_id_lock);
return -ENOMEM;
}
-
return index;
-
static void free_thread_tidr(int id)
{
spin_lock(&vas_thread_id_lock);
ida_remove(&vas_thread_ida, id);
spin_unlock(&vas_thread_id_lock);
}
-
/*
 * Clear any TIDR value assigned to this thread.
 */
void clear_thread_tidr(struct task_struct *t)
{
if (!t->thread.tidr)
return;
-
if (!cpu_has_feature(CPU_FTR_ARCH_300))
Warn_on_once(1);
return;
-
mtspr(SPRN_TIDR, 0);
free_thread_tidr(t->thread.tidr);
t->thread.tidr = 0;
-
void arch_release_task_struct(struct task_struct *t)
{
-clear_thread_tidr(t);
-
/*
 * Assign a unique TIDR (thread id) for task @t and set it in the thread
 * structure. For now, we only support setting TIDR for 'current' task.
 */
4. Both threads are running
+ Both threads will be woken. The wrong thread will fail it's condition check
+ and execute another wait, while the correct thread will pass it's condition
+ check.
+
+ @t: the task to set the thread ID for
*/
int set_thread_tidr(struct task_struct *t)
{
    int rc;
    -
    -if (!cpu_has_feature(CPU_FTR_ARCH_300))
    +if (!cpu_has_feature(CPU_FTR_P9_TIDR))
        return -EINVAL;
    
    if (t != current)
        @ -1580,15 +1503,12 @@
        if (t->thread.tidr)
            return 0;

        -rc = assign_thread_tidr();
        -if (rc < 0)
            -return rc;
        -
        -t->thread.tidr = rc;
        +t->thread.tidr = (u16)task_pid_nr(t);
        mtspr(SPRN_TIDR, t->thread.tidr);

        return 0;
    }
    +EXPORT_SYMBOL_GPL(set_thread_tidr);
}
@endif /* CONFIG_PPC64 */
#if defined(CONFIG_44x) && defined(CONFIG_PPC_FPU)
-static inline void identical_pvr_fixup(unsigned long node)
+static __init void identical_pvr_fixup(unsigned long node)
 {
 unsigned int pvr;
 const char *model = of_get_flat_dt_prop(node, "model", NULL);
 @ @ -303,6 +303,29 @ @
 }
}

+/*
+ * Adjust the logical id of a boot cpu to fall under nr_cpu_ids. Map it to
+ * last core slot in the allocated paca array.
+ *
+ * e.g. on SMT=8 system, kernel booted with nr_cpus=1 and boot cpu = 33,
+ * align nr_cpu_ids to MAX_SMT value 8. Allocate paca array to hold up-to
+ * MAX_SMT=8 cpus. Since boot cpu 33 is greater than nr_cpus (8), adjust
+ * its logical id so that new id becomes less than nr_cpu_ids. Make sure
+ * that boot cpu's new logical id is aligned to its thread id and falls
+ * under last nthreads slots available in paca array. In this case the
+ * boot cpu 33 is adjusted to new boot cpu id 1.
+ *
+ */
+
+static inline void adjust_boot_cpuid(int nthreads, int phys_id)
+{ 
+ boot_hw_cpuid = phys_id;
+ if (boot_cpuid >= nr_cpu_ids) {
+ boot_cpuid = (boot_cpuid % nthreads) + (nr_cpu_ids - nthreads);
+ pr_info("Adjusted logical boot cpu id: logical %d physical %d\n", 
+ boot_cpuid, phys_id);
+ }
+ }
+
+static int __init early_init_dt_scan_cpus(unsigned long node,
+ const char *uname, int depth,
+ void *data)
@@ -326,6 +349,18 @@
 nthreads = len / sizeof(int);

+#elifdef CONFIG_SMP
+/*
+ * Now that we know threads per core lets align nr_cpu_ids to
+ * correct SMT value.
+ */
+if (nr_cpu_ids % nthreads) {
+ nr_cpu_ids = _ALIGN_UP(nr_cpu_ids, nthreads);
+ pr_info("Aligned nr_cpus to SMT=%d, nr_cpu_ids = %d\n", 

nthreads, nr_cpu_ids);
+

/*
 * Now see if any of these threads match our boot cpu.
 * NOTE: This must match the parsing done in smp_setup_cpu_maps.
 * @ @ -364.7 +399.9 @@
 * DBG("boot cpu: logical %d physical %d\n", found,
 *     be32_to_cpu(intserv[found_thread]));
boot_cpuid = found;
-set_hard_smp_processor_id(found, be32_to_cpu(intserv[found_thread]));
+adjust_boot_cpuid(nthreads, be32_to_cpu(intserv[found_thread]));
+set_hard_smp_processor_id(boot_cpuid, be32_to_cpu(intserv[found_thread]));
*/

/*
 * PAPR defines "logical" PVR values for cpus that
 * @ @ -691.11 +728.28 @@
 * static void tm_init(void) { }
 */
#endif /* CONFIG_PPC_TRANSACTIONAL_MEM */

+#ifdef CONFIG_PPC64
+static void __init save_fscr_to_task(void)
+{
+ /*
+ * Ensure the init_task (pid 0, aka swapper) uses the value of FSCR we
+ * have configured via the device tree features or via __init_FSCR().
+ * That value will then be propagated to pid 1 (init) and all future
+ * processes.
+ */
+if (early_cpu_has_feature(CPU_FTR_ARCH_207S))
+init_task.thread.fscr = mfspr(SPRN_FSCR);
+}
+#else
+static inline void save_fscr_to_task(void) {};
+#endif
+
void __init early_init_devtree(void *params)
{
phys_addr_t limit;

-DBG(" -> early_init_devtree(%p)\n", params);
+DBG(" -> early_init_devtree(%px)\n", params);

/* Too early to BUG_ON(), do it by hand */
if (!early_init_dt_verify(params))
memblock_allow_resize();
memblock_dump_all();

-DBG("Phys. mem: %llx", memblock_phys_mem_size());
+DBG("Phys. mem: %llx", (unsigned long long)memblock_phys_mem_size());

/* We may need to relocate the flat tree, do it now.
 * FIXME .. and the initrd too? */
BUG();
}

+save_fscr_to_task();
+
#if defined(CONFIG_SMP) && defined(CONFIG_PPC64)
/* We'll later wait for secondaries to check in; there are
 * NCPUS-1 non-boot CPUs :-) */
--- linux-4.15.0.orig/arch/powerpc/kernel/prom_init.c
+++ linux-4.15.0/arch/powerpc/kernel/prom_init.c
@@ -334,6 +334,7 @@
call_prom("write", 3, 1, prom.stdout, buf+i, size);
}

+__printf(1, 2)
static void __init prom_printf(const char *format, ...)
{
    const char *p, *q, *s;
@@ -1148,7 +1149,7 @@
cores = DIV_ROUND_UP(NR_CPUS, prom_count_smt_threads());
+prom_printf("Max number of cores passed to firmware: %u (NR_CPUS = %d)\n",
    cores, NR_CPUS);
ibm_architecture_vec.vec5.max_cpus = cpu_to_be32(cores);
@@ -1230,7 +1231,7 @@
    if (align)
        base = _ALIGN_UP(base, align);
-+prom_debug("alloc_up(%x, %x)\n", size, align);
    if (ram_top == 0)
        prom_panic("alloc_up() called with mem not initialized\n");
@@ -1241,7 +1242,7 @@
for( (base + size) <= alloc_top;
       base = _ALIGN_UP( (base + 0x100000), align) ) {
    prom_debug( "   trying: 0x%lx\n", base);
+prom_debug(" trying: 0x%lx\n", base);
    addr = (unsigned long)prom_claim( base, size, 0);
    if (addr != PROM_ERROR && addr != 0)
        break;
@@ -1253,12 +1254,12 @@
    return 0;
alloc_bottom = addr + size;

-prom_debug(" -%lx\n", addr);
-prom_debug(" alloc_bottom : %lx", alloc_bottom);
-prom_debug(" alloc_top : %lx", alloc_top);
-prom_debug(" alloc_top_hi : %lx", alloc_top_high);
-prom_debug(" rmo_top : %lx", rmo_top);
-prom_debug(" ram_top : %lx", ram_top);
+prom_debug(" -> %lx\n", addr);
+prom_debug(" alloc_bottom : %lx\n", alloc_bottom);
+prom_debug(" alloc_top : %lx\n", alloc_top);
+prom_debug(" alloc_top_hi : %lx\n", alloc_top_high);
+prom_debug(" rmo_top : %lx\n", rmo_top);
+prom_debug(" ram_top : %lx\n", ram_top);

    return addr;
}
@@ -1273,7 +1274,7 @@
{
    unsigned long base, addr = 0;

-prom_debug("alloc_down(%lx, %lx, %s)\n", size, align,
+prom_debug("%s(%lx, %lx, %s)\n", __func__, size, align,
    highmem ? "(high)" : "(low)");
    if (ram_top == 0)
        prom_panic("alloc_down() called with mem not initialized\n");
@@ -1301,7 +1302,7 @@
    base = _ALIGN_DOWN(alloc_top - size, align);
for( ; base > alloc_bottom;
    base = _ALIGN_DOWN( base - 0x100000, align) ) {
-prom_debug(" trying: 0x%lx\n", base);
+prom_debug(" trying: 0x%lx\n", base);
    addr = (unsigned long)prom_claim( base, size, 0);
    if (addr != PROM_ERROR && addr != 0)
        break;
@@ -1312,12 +1313,12 @@
alloc_top = addr;

bail:
- prom_debug(" -> %x\n", addr);
- prom_debug(" alloc_bottom : %x\n", alloc_bottom);
- prom_debug(" alloc_top : %x\n", alloc_top);
- prom_debug(" alloc_top_hi : %x\n", alloc_top_high);
- prom_debug(" rmo_top : %x\n", rmo_top);
- prom_debug(" ram_top : %x\n", ram_top);
+ prom_debug(" -> %lx\n", addr);
+ prom_debug(" alloc_bottom : %lx\n", alloc_bottom);
+ prom_debug(" alloc_top : %lx\n", alloc_top);
+ prom_debug(" alloc_top_hi : %lx\n", alloc_top_high);
+ prom_debug(" rmo_top : %lx\n", rmo_top);
+ prom_debug(" ram_top : %lx\n", ram_top);

return addr;
}

@@ -1443,7 +1444,7 @@

if (size == 0)
    continue;
- prom_debug(" %x %x\n", base, size);
+ prom_debug(" %lx %lx\n", base, size);
    if (base == 0 && (of_platform & PLATFORM_LPAR))
        rmo_top = size;
    if ((base + size) > ram_top)
@@ -1463,12 +1464,12 @@

if (prom_memory_limit) {
    if (prom_memory_limit <= alloc_bottom) {
- prom_printf("Ignoring mem=%x <= alloc_bottom.\n", prom_memory_limit);
+ prom_printf("Ignoring mem=%lx <= alloc_bottom.\n", prom_memory_limit);
        prom_memory_limit = 0;
    } else if (prom_memory_limit >= ram_top) {
- prom_printf("Ignoring mem=%x >= ram_top.\n", prom_memory_limit);
+ prom_printf("Ignoring mem=%lx >= ram_top.\n", prom_memory_limit);
        prom_memory_limit = 0;
    } else {
        ram_top = prom_memory_limit;
@@ -1500,12 +1501,13 @@
        alloc_bottom = PAGE_ALIGN(prom_initrd_end);

        prom_printf("memory layout at init:\n");
- prom_printf(" memory_limit : %x (16 MB aligned)\n", prom_memory_limit);
- prom_printf(" alloc_bottom : %x\n", alloc_bottom);
- prom_printf(" alloc_top : %x\n", alloc_top);
+ prom_printf(" memory_limit : %lx (16 MB aligned)\n", prom_memory_limit);
+ prom_printf(" alloc_bottom : %lx\n", alloc_bottom);
+ prom_printf(" alloc_top : %lx\n", alloc_top);

-prom_printf(" alloc_top_hi : %x
", alloc_top_high);
-prom_printf(" rmo_top      : %x
", rmo_top);
-prom_printf(" ram_top      : %x
", ram_top);
+prom_printf(" memory_limit : %lx (16 MB aligned)
",
 +    prom_memory_limit);
+prom_printf(" alloc_bottom : %lx
", alloc_bottom);
+prom_printf(" alloc_top    : %lx
", alloc_top);
+prom_printf(" alloc_top_hi : %lx
", alloc_top_high);
+prom_printf(" rmo_top      : %lx
", rmo_top);
+prom_printf(" ram_top      : %lx
", ram_top);
}

static void __init prom_close_stdin(void)
@@ -1566,7 +1568,7 @@
return;
}

-prompt_printf("instantiating opal at 0x%x...", base);
+prompt_printf("instantiating opal at 0x%llx...", base);

if (call_prom_ret("call-method", 4, 3, rets,
 ADDR("load-opal-runtime"),
@@ -1582,10 +1584,10 @@
reserve_mem(base, size);

-prompt_debug("opal base     = 0x%x
", base);
-prompt_debug("opal align    = 0x%x
", align);
-prompt_debug("opal entry    = 0x%x
", entry);
-prompt_debug("opal size     = 0x%x
", (long)size);
+prompt_debug("opal base     = 0x%llx
", base);
+prompt_debug("opal align    = 0x%llx
", align);
+prompt_debug("opal entry    = 0x%llx
", entry);
+prompt_debug("opal size     = 0x%llx
", size);

prom_setprop(opal_node, "/ibm,opal", "opal-base-address",
 &base, sizeof(base));
@@ -1662,7 +1664,7 @@
prom_debug("rtas base     = 0x%x
", base);
prom_debug("rtas entry    = 0x%x
", entry);
-prompt_debug("rtas size     = 0x%x
", (long)size);
+prompt_debug("rtas size     = 0x%x
", size);

prom_debug("prom_instantiate_rtas: end...
");
}
@@ -1720,7 +1722,7 @@
if (base == 0)
prom_panic("Could not allocate memory for sml\n");

-prom_printf("instantiating sml at 0x%x...", base);
+prom_printf("instantiating sml at 0x%llx...", base);

memset((void *)base, 0, size);

@@ -1739,8 +1741,8 @@
      prom_setprop( ibmvtpm_node, "/vdevice/vtpm", "linux,sml-size",
                     &size, sizeof(size));

-      prom_debug("sml base     = 0x%x\n", base);
-      prom_debug("sml size     = 0x%x\n", (long)size);
+      prom_debug("sml base     = 0x%llx\n", base);
+      prom_debug("sml size     = 0x%x\n", size);

      prom_debug("prom_instantiate_sml: end...\n");
  }
@@ -1841,7 +1843,7 @@
      prom_getprop(node, "reg", &reg, sizeof(reg));
      cpu_no = be32_to_cpu(reg);
-prom_debug("cpu hw idx = %lu\n", cpu_no);
+prom_debug("cpu hw idx = %u\n", cpu_no);

/* Init the acknowledge var which will be reset by *
 the secondary cpu when it awakens from its OF
@@ -1971,7 +1973,7 @@
 if (cpu_no != prom.cpu) {
 /* Primary Thread of non-boot cpu or any thread */
 -prom_printf("starting cpu hw idx %lu... ", cpu_no);
+prom_printf("starting cpu hw idx %u... ", cpu_no);
 call_prom("start-cpu", 3, 0, node,
 secondary_hold, cpu_no);
@@ -1982,11 +1984,11 @@
 if (*acknowledge == cpu_no)
 prom_printf("done\n");
 else
- prom_printf("failed: %x\n", *acknowledge);
+ prom_printf("failed: %lx\n", *acknowledge);
 } #ifdef CONFIG_SMP
 else
- prom_printf("boot cpu hw idx %lu\n", cpu_no);
+ prom_printf("boot cpu hw idx %u\n", cpu_no);
 #endif /* CONFIG_SMP */
 }
@@ -2264,7 +2266,7 @@
 while ((*mem_start + needed) > *mem_end) {
 unsigned long room, chunk;

- prom_debug("Chunk exhausted, claiming more at %x...\n", 
+ prom_debug("Chunk exhausted, claiming more at %lx...\n", 
 alloc_bottom);
 room = alloc_top - alloc_bottom;
 if (room > DEVTREE_CHUNK_SIZE)
@@ -2490,7 +2492,7 @@
 room = alloc_top - alloc_bottom - 0x4000;
 if (room > DEVTREE_CHUNK_SIZE)
 room = DEVTREE_CHUNK_SIZE;
- prom_debug("starting device tree allocs at %x\n", alloc_bottom);
+ prom_debug("starting device tree allocs at %lx\n", alloc_bottom);

 /* Now try to claim that */
 mem_start = (unsigned long) alloc_up(room, PAGE_SIZE);
@@ -2553,7 +2555,7 @@
int i;
prom_printf("reserved memory map:\n");
for (i = 0; i < mem_reserve_cnt; i++)
  -prom_printf("%x - %x\n",
+prom_printf("%lx - %lx\n",
        be64_to_cpu(mem_reserve_map[i].base),
        be64_to_cpu(mem_reserve_map[i].size));
}
@@ -2563,9 +2565,9 @@*/
mem_reserve_cnt = MEM_reserve_MAP_SIZE;

-prom_printf("Device tree strings 0x%x -> 0x%x\n",
+prom_printf("Device tree strings 0x%lx -> 0x%lx\n",
    dt_string_start, dt_string_end);
-prom_printf("Device tree struct 0x%x -> 0x%x\n",
+prom_printf("Device tree struct 0x%lx -> 0x%lx\n",
    dt_struct_start, dt_struct_end);
}
@@ -2997,7 +2999,7 @@
prom_getprop(cpu_pkg, "reg", &rval, sizeof(rval));
prom.cpu = be32_to_cpu(rval);

-prom_debug("Booting CPU hw index = %lu\n", prom.cpu);
+prom_debug("Booting CPU hw index = %d\n", prom.cpu);
}
static void __init prom_check_initrd(unsigned long r3, unsigned long r4)
@@ -3019,8 +3021,8 @@
reserve_mem(prom_initrd_start, 
    prom_initrd_end - prom_initrd_start);
-prom_debug("initrd_start=0x%x\n", prom_initrd_start);
+prom_debug("initrd_start=0x%lx\n", prom_initrd_start);
@@ -3273,7 +3275,7 @@/* Don't print anything after quiesce under OPAL, it crashes OFW */
if (of_platform != PLATFORM_OPAL) {
    prom_printf("Booting Linux via __start() @ 0x%lx ...
", kbase);
    -prom_debug("->dt_header_start=0x%x\n", hdr);
+prom_debug("->dt_header_start=0x%lx\n", hdr);
} #endif /* CONFIG_BLK_DEV_INITRD */
/* Cope with all registers */
int ptrace_get_reg(struct task_struct *task, int regno, unsigned long *data)
{
    unsigned int regs_max;
    +
    if ((task->thread.regs == NULL) || !data)
        return -EIO;

    if (regno == PT_DSCR)
        return get_user_dscr(task, data);

    if (regno < (sizeof(struct pt_regs) / sizeof(unsigned long))) {
        regs_max = sizeof(struct pt_regs) / sizeof(unsigned long);
        +if (regno < regs_max) {
            regno = array_index_nospec(regno, regs_max);
            *data = ((unsigned long *)task->thread.regs)[regno];
            return 0;
        }
    }
    return set_user_dscr(task, data);

    if (regno <= PT_MAX_PUT_REG) {
        +regno = array_index_nospec(regno, PT_MAX_PUT_REG + 1);
        ((unsigned long *)task->thread.regs)[regno] = data;
        return 0;
    }

    /*
     * Copy out only the low-order word of vrsave.
     */
    union {
        elf_vrreg_t reg;
        u32 word;
    }
    @ @ -555,8 +562,10 @@
vrsave.word = target->thread.vrsave;

+start = 33 * sizeof(vector128);
+end = start + sizeof(vrsave);
ret = user_regset_copyout(&pos, &count, &kbuf, &ubuf, &vrsave,
- 33 * sizeof(vector128), -1);
+ start, end);
}

return ret;
@@ -594,6 +603,7 @@
/*
 * We use only the first word of vrsave.
 */
+int start, end;
union {
  elf_vrreg_t reg;
  u32 word;
+ @ @ -594,6 +603,7 @ @
/*
 * Create a new breakpoint request if one doesn't exist already */
hw_breakpoint_init(&attr);
attr.bp_addr = hw_brk.address;
+attr.bp_len = 8;
arch_bp_generic_fields(hw_brk.type,
  &attr.bp_type);

--- linux-4.15.0.orig/arch/powerpc/kernel/rtas.c
+++ linux-4.15.0/arch/powerpc/kernel/rtas.c
@@ -874,15 +874,17 @@
return 0;

for_each_cpu(cpu, cpus) {
+struct device *dev = get_cpu_device(cpu);
+ switch (state) {


case DOWN:
- cpuret = cpu_down(cpu);
+ cpuret = device_offline(dev);
  break;
  
case UP:
- cpuret = cpu_up(cpu);
+ cpuret = device_online(dev);
  break;
  
- if (cpuret) {
+ if (cpuret < 0) {
    pr_debug("%s: cpu_%s for cpu#%d returned %d.\n", 
      __func__,
      (state == UP) ? "up" : "down"),
    @ @ -971,6 +973,8 @ @
    data.token = rtas_token("ibm,suspend-me");
    data.complete = &done;

    +lock_device_hotplug();
    +
    /* All present CPUs must be online */
    cpumask_andnot(offline_mask, cpu_present_mask, cpu_online_mask);
    cpuret = rtas_online_cpus_mask(offline_mask);
    @ @ -980,6 +984,7 @ @
    goto out;
  }

+cpu_hotplug_disable();
  stop_topology_update();

  /* Call function on all CPUs. One of us will make the */
  @ @ -994,6 +999,7 @ @
  printk(KERN_ERR "Error doing global join\n");

  start_topology_update();
  +cpu_hotplug_enable();

  /* Take down CPUs not online prior to suspend */
  cpuret = rtas_offline_cpus_mask(offline_mask);
  @ @ -1002,6 +1008,7 @ @
  __func__);
  out:
+unlock_device_hotplug();
  free_cpumask_var(offline_mask);
  return atomic_read(&data.error);
  
  @ @ -1049,6 +1056,147 @ @
return NULL;
}

+ifndef CONFIG_PPC_RTAS_FILTER
+
+/*
+ * The sys_rtas syscall, as originally designed, allows root to pass
+ * arbitrary physical addresses to RTAS calls. A number of RTAS calls
+ * can be abused to write to arbitrary memory and do other things that
+ * are potentially harmful to system integrity, and thus should only
+ * be used inside the kernel and not exposed to userspace.
+ *
+ * All known legitimate users of the sys_rtas syscall will only ever
+ * pass addresses that fall within the RMO buffer, and use a known
+ * subset of RTAS calls.
+ *
+ * Accordingly, we filter RTAS requests to check that the call is
+ * permitted, and that provided pointers fall within the RMO buffer.
+ * The rtas_filters list contains an entry for each permitted call,
+ * with the indexes of the parameters which are expected to contain
+ * addresses and sizes of buffers allocated inside the RMO buffer.
+ */
++++
++struct rtas_filter {
++const char *name;
++int token;
++/* Indexes into the args buffer, -1 if not used */
++int buf_idx1;
++int size_idx1;
++int buf_idx2;
++int size_idx2;
++
++int fixed_size;
++};
++
++static struct rtas_filter rtas_filters[] __ro_after_init = {
++{ "ibm,activate-firmware", -1, -1, -1, -1, -1 },
++{ "ibm,configure-connector", -1, 0, -1, 1, -1, 4096 },/* Special cased */
++{ "display-character", -1, -1, -1, -1, -1 },
++{ "ibm,display-message", -1, 0, -1, -1, -1 },
++{ "ibm,errinjct", -1, 2, -1, -1, -1, 1024 },
++{ "ibm,close-errinjct", -1, -1, -1, -1, -1 },
++{ "ibm,get-indices", -1, -1, -1, -1, -1 },
++{ "ibm,open-errinjct", -1, -1, -1, -1, -1 },
++{ "ibm,get-config-addr-info2", -1, -1, -1, -1, -1 },
++{ "ibm,get-dynamic-sensor-state", -1, 1, -1, -1, -1 },
++{ "ibm,get-indices", -1, 2, 3, -1, -1 },
++{ "ibm,activatesensor-state", -1, -1, -1, -1, -1 },
++{ "ibm,activatesensor-state", -1, -1, -1, -1, -1 },
++{ "ibm,get-dynamic-sensor-state", -1, 1, -1, -1, -1 },
++{ "ibm,get-indices", -1, 2, 3, -1, -1 },
++{ "ibm,activatesensor-state", -1, -1, -1, -1, -1 },
++{ "ibm,get-indices", -1, 2, -1, -1, -1 },
++}
static bool in_rmo_buf(u32 base, u32 end) {
  return base >= rtas_rmo_buf &&
  base < (rtas_rmo_buf + RTAS_RMOBUF_MAX) &&
  base <= end &&
  end >= rtas_rmo_buf &&
  end < (rtas_rmo_buf + RTAS_RMOBUF_MAX);
}

static bool block_rtas_call(int token, int nargs, 
  struct rtas_args *args) {

  int i;

  for (i = 0; i < ARRAY_SIZE(rtas_filters); i++) {
    struct rtas_filter *f = &rtas_filters[i];
    u32 base, size, end;
    +
    +if (token != f->token)
      continue;
    +
    +if (f->buf_idx1 != -1) {
      base = be32_to_cpu(args->args[f->buf_idx1]);
      +if (f->size_idx1 != -1)
        size = be32_to_cpu(args->args[f->size_idx1]);
      +else if (f->fixed_size)
        size = f->fixed_size;
    +else
      size = 1;
+ end = base + size - 1;
+ if (!in_rmo_buf(base, end))
+ goto err;
+ }
+
+ if (f->buf_idx2 != -1) {
+ base = be32_to_cpu(args->args[f->buf_idx2]);
+ if (f->size_idx2 != -1)
+ size = be32_to_cpu(args->args[f->size_idx2]);
+ else if (f->fixed_size)
+ size = f->fixed_size;
+ else
+ size = 1;
+ end = base + size - 1;
+ }
+ /*
+ * Special case for ibm,configure-connector where the
+ * address can be 0
+ */
+ if (!strcmp(f->name, "ibm,configure-connector") &&
+ base == 0)
+ return false;
+ }
+ if (!in_rmo_buf(base, end))
+ goto err;
+ }
+ return false;
+
+ return false;
+
+ /*
+ pr_err_ratelimited("sys_rtas: RTAS call blocked - exploit attempt?
+
+ pr_err_ratelimited("sys_rtas: token=0x%x, nargs=%d (called by %s)\n",
+ token, nargs, current->comm);
+ return true;
+ }
+ }
+ #else
+ static bool block_rtas_call(int token, int nargs,
+ struct rtas_args *args)
+ {
+ return false;
+ }
+ #endif /* CONFIG_PPC_RTAS_FILTER */
asmlinkage int ppc_rtas(struct rtas_args __user *uargs)
{
    args.rets = &args.args[nargs];
    memset(args.rets, 0, nret * sizeof(rtas_arg_t));

    if (block_rtas_call(token, nargs, &args))
        return -EINVAL;

    /* Need to handle ibm,suspend_me call specially */
    if (token == ibm_suspend_me_token) {
        unsigned long rtas_region = RTAS_INSTANTIATE_MAX;
        u32 base, size, entry;
        int no_base, no_size, no_entry;
        #ifdef CONFIG_PPC_RTAS_FILTER
            int i;
        #endif

        /* Get RTAS dev node and fill up our "rtas" structure with infos
         * about it.
        
        #ifdef CONFIG_RTAS_ERROR_LOGGING
            rtas_last_error_token = rtas_token("rtas-last-error");
        #endif
        
        #ifdef CONFIG_PPC_RTAS_FILTER
            for (i = 0; i < ARRAY_SIZE(rtas_filters); i++) {
                rtas_filters[i].token = rtas_token(rtas_filters[i].name);
            }
        #endif
    }

    int __init early_init_dt_scan_rtas(unsigned long node,
        --- linux-4.15.0.orig/arch/powerpc/kernel/rtasd.c
        +++ linux-4.15.0/arch/powerpc/kernel/rtasd.c
        @ @ -274,27 +274,16 @ @
    }

    #ifdef CONFIG_PPC_PSERIES
        -static s32 prrn_update_scope;
        -
        -static void prrn_work_fn(struct work_struct *work)
        +static void handle_prrn_event(s32 scope)
    { /*
For PRRN, we must pass the negative of the scope value in the RTAS event.

```c
-pseries_devicetree_update(-prrn_update_scope);
+pseries_devicetree_update(-scope);
numa_update_cpu_topology(false);
```

```c
-static DECLARE_WORK(prrn_work, prrn_work_fn);
-
-static void prrn_schedule_update(u32 scope)
-{
-    flush_work(&prrn_work);
-    prrn_update_scope = scope;
-    schedule_work(&prrn_work);
-}
-
-static void handle_rtas_event(const struct rtas_error_log *log)
{
    if (rtas_error_type(log) != RTAS_TYPE_PRRN || !prrn_is_enabled())
        prrn_schedule_update(rtas_error_extended_log_length(log));
    +handle_prrn_event(rtas_error_extended_log_length(log));
}
```

```
#else
--- linux-4.15.0.orig/arch/powerpc/kernel/security.c
+++ linux-4.15.0/arch/powerpc/kernel/security.c
@@ -0,0 +1,498 @@
+// SPDX-License-Identifier: GPL-2.0+
+/
+// Security related flags and so on.
+/
+// Copyright 2018, Michael Ellerman, IBM Corporation.
+
+include <linux/cpu.h>
+include <linux/kernel.h>
+include <linux/device.h>
+include <linux/seq_buf.h>
+
+include <asm/asm-prototypes.h>
+include <asm/code-patching.h>
+include <asm/debugfs.h>
+include <asm/security_features.h>
+include <asm/setup.h>
```
+ unsigned long powerpc_security_features __read_mostly = SEC_FTR_DEFAULT;
+
+enum count_cache_flush_type {
+COUNT_CACHE_FLUSH_NONE = 0x1,
+COUNT_CACHE_FLUSH_SW = 0x2,
+COUNT_CACHE_FLUSH_HW = 0x4,
+};
+static enum count_cache_flush_type count_cache_flush_type = COUNT_CACHE_FLUSH_NONE;
+static bool link_stack_flush_enabled;
+
+bool barrier_nospec_enabled;
+static bool no_nospec;
+static bool btb_flush_enabled;
+#if defined(CONFIG_PPC_FSL_BOOK3E) || defined(CONFIG_PPC_BOOK3S_64)
+static bool no_spectrev2;
+#endif
+
+static void enable_barrier_nospec(bool enable)
+{
+barrier_nospec_enabled = enable;
+do_barrier_nospec_fixups(enable);
+}
+
+void setup_barrier_nospec(void)
+{
+bool enable;
+
+/*
+ * It would make sense to check SEC_FTR_SPEC_BAR_ORI31 below as well.
+ * But there's a good reason not to. The two flags we check below are
+ * both are enabled by default in the kernel, so if the hcall is not
+ * functional they will be enabled.
+ * On a system where the host firmware has been updated (so the ori
+ * functions as a barrier), but on which the hypervisor (KVM/Qemu) has
+ * not been updated, we would like to enable the barrier. Dropping the
+ * check for SEC_FTR_SPEC_BAR_ORI31 achieves that. The only downside is
+ * we potentially enable the barrier on systems where the host firmware
+ * is not updated, but that's harmless as it's a no-op.
+ */
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) &&
+security_ftr_enabled(SEC_FTR_BNDS_CHK_SPEC_BAR);
+
+if (!no_nospec && !cpu_mitigations_off())
+enable_barrier_nospec(enable);
+}
static int __init handle_nospectre_v1(char *p)
{
    no_nospec = true;
    return 0;
}
early_param("nospectre_v1", handle_nospectre_v1);

#ifdef CONFIG_DEBUG_FS
static int barrier_nospec_set(void *data, u64 val)
{
    switch (val) {
    case 0:
    case 1:
        break;
    default:
        return -EINVAL;
    }
    if (!!val == !!barrier_nospec_enabled)
        return 0;
    enable_barrier_nospec (!!val);
    return 0;
}

static int barrier_nospec_get(void *data, u64 *val)
{
    *val = barrier_nospec_enabled ? 1 : 0;
    return 0;
}

DEFINE_SIMPLE_ATTRIBUTE(fops_barrier_nospec,
    barrier_nospec_get, barrier_nospec_set, "%llu\n")

static __init int barrier_nospec_debugfs_init(void)
{
    debugfs_create_file("barrier_nospec", 0600, powerpc_debugfs_root, NULL,
        &fops_barrier_nospec);
    return 0;
}
device_initcall(barrier_nospec_debugfs_init);
#endif /* CONFIG_DEBUG_FS */

#if defined(CONFIG_PPC_FSL_BOOK3E) || defined(CONFIG_PPC_BOOK3S_64)
static int __init handle_nospectre_v2(char *p)
+no_spectrev2 = true;
+
+return 0;
+
+}
+early_param("nospectre_v2", handle_nospectre_v2);
+}
+endif /* CONFIG_PPC_FSL_BOOK3E || CONFIG_PPC_BOOK3S_64 */
+
+#ifdef CONFIG_PPC_FSL_BOOK3E
+void setup_spectre_v2(void)
+{
+    if (no_spectrev2 || cpu_mitigations_off())
+        do_btb_flush_fixups();
+    else
+        btb_flush_enabled = true;
+}
+endif /* CONFIG_PPC_FSL_BOOK3E */
+
+#ifdef CONFIG_PPC_BOOK3S_64
+ssize_t cpu_show_meltdown(struct device *dev, struct device_attribute *attr, char *buf)
+{
+    bool thread_priv;
+
+    thread_priv = security_ftr_enabled(SEC_FTR_L1D_THREAD_PRIV);
+    if (rfi_flush) {
+        struct seq_buf s;
+        seq_buf_init(&s, buf, PAGE_SIZE - 1);
+        seq_buf_printf(&s, "Mitigation: RFI Flush");
+        if (thread_priv)
+            seq_buf_printf(&s, ", L1D private per thread");
+        seq_buf_printf(&s, 
";"
+        return s.len;
+    }
+    if (thread_priv)
+        return sprintf(buf, "Vulnerable: L1D private per thread\n");
+    if (!security_ftr_enabled(SEC_FTR_L1D_FLUSH_HV) &&
+        !security_ftr_enabled(SEC_FTR_L1D_FLUSH_PR))
+        return sprintf(buf, "Not affected\n");
+    return sprintf(buf, "Vulnerable\n");
+}
+
+ssize_t cpu_show_l1tf(struct device *dev, struct device_attribute *attr, char *buf)
return cpu_show_meltdown(dev, attr, buf);
}
#endif

ssize_t cpu_show_spectre_v1(struct device *dev, struct device_attribute *attr, char *buf)
{
struct seq_buf s;
+seq_buf_init(&s, buf, PAGE_SIZE - 1);
+
+if (security_ftr_enabled(SEC_FTR_BNDS_CHK_SPEC_BAR)) {
+if (barrier_nospec_enabled)
+seq_buf_printf(&s, "Mitigation: __user pointer sanitization");
+else
+seq_buf_printf(&s, "Vulnerable");
+
+if (security_ftr_enabled(SEC_FTR_SPEC_BAR_ORI31))
+seq_buf_printf(&s, ", ori31 speculation barrier enabled");
+
+seq_buf_printf(&s, "\n");
+} else
+seq_buf_printf(&s, "Not affected\n");
+
+return s.len;
+
+
ssize_t cpu_show_spectre_v2(struct device *dev, struct device_attribute *attr, char *buf)
{
struct seq_buf s;
+bool bcs, ccd;
+
+seq_buf_init(&s, buf, PAGE_SIZE - 1);
+
+bcs = security_ftr_enabled(SEC_FTR_BCCTRL_SERIALISED);
+ccd = security_ftr_enabled(SEC_FTR_COUNT_CACHE_DISABLED);
+
+if (bcs || ccd) {
+seq_buf_printf(&s, "Mitigation: ");
+
+if (bcs)
+seq_buf_printf(&s, "Indirect branch serialisation (kernel only)\n");
+
+if (ccd)
+seq_buf_printf(&s, ", ");
+
+if (ccd)
+seq_buf_printf(&s, "Indirect branch cache disabled");
if (link_stack_flush_enabled)
    seq_buf_printf(&s, ", Software link stack flush");
+
+} else if (count_cache_flush_type != COUNT_CACHE_FLUSH_NONE) {
+    seq_buf_printf(&s, "Mitigation: Software count cache flush");
+
+} else if (count_cache_flush_type == COUNT_CACHE_FLUSH_HW)
+    seq_buf_printf(&s, " (hardware accelerated)");
+
+} else if (link_stack_flush_enabled)
+    seq_buf_printf(&s, ", Software link stack flush");
+
+} else if (btb_flush_enabled) {
+    seq_buf_printf(&s, "Mitigation: Branch predictor state flush");
+} else {
+    seq_buf_printf(&s, "Vulnerable");
+}
+
+seq_buf_printf(&s, ";");
+
+return s.len;
+
 +#ifdef CONFIG_PPC_BOOK3S_64
+/*
+ * Store-forwarding barrier support.
+ */
+
+static enum stf_barrier_type stf_enabled_flush_types;
+static bool no_stf_barrier;
+bool stf_barrier;
+
+static int __init handle_no_stf_barrier(char *p)
+{
+    pr_info("stf-barrier: disabled on command line.");
+    no_stf_barrier = true;
+    return 0;
+}
+
+early_param("no_stf_barrier", handle_no_stf_barrier);
+
+/* This is the generic flag used by other architectures */
+static int __init handle_ssbd(char *p)
+{
+    if (!p || strcmp(p, "auto", 5) == 0 || strcmp(p, "on", 2) == 0 ) {
+        /* Until firmware tells us, we have the barrier with auto */
+        return 0;
+    }
+} else if (strncmp(p, "off", 3) == 0) {
+handle_no_stf_barrier(NULL);
+return 0;
+} else
+return 1;
+
+return 0;
+}
+early_param("spec_store_bypass_disable", handle_ssbd);
+
+/* This is the generic flag used by other architectures */
+static int __init handle_no_ssbd(char *p)
+{
+handle_no_stf_barrier(NULL);
+return 0;
+}
+early_param("nospec_store_bypass_disable", handle_no_ssbd);
+
+static void stf_barrier_enable(bool enable)
+{
+if (enable)
+do_stf_barrier_fixups(stf_enabled_flush_types);
+else
+do_stf_barrier_fixups(STF_BARRIER_NONE);
+
+stf_barrier = enable;
+}
+
+void setup_stf_barrier(void)
+{
+enum stf_barrier_type type;
+bool enable, hv;
+
+hv = cpu_has_feature(CPU_FTR_HVMODE);
+
+/* Default to fallback in case fw-features are not available */
+if (cpu_has_feature(CPU_FTR_ARCH_300))
+type = STF_BARRIER_EIEIO;
+else if (cpu_has_feature(CPU_FTR_ARCH_207S))
+type = STF_BARRIER_SYNC_ORI;
+else if (cpu_has_feature(CPU_FTR_ARCH_206))
+type = STF_BARRIER_FALLBACK;
+else
+type = STF_BARRIER_NONE;
+
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) &&
+(security_ftr_enabled(SEC_FTR_L1D_FLUSH_PR) ||
+ (security_ftr_enabled(SEC_FTR_L1D_FLUSH_HV) && hv));
if (type == STF_BARRIER_FALLBACK) {
    pr_info("stf-barrier: fallback barrier available\n");
} else if (type == STF_BARRIER_SYNC_ORI) {
    pr_info("stf-barrier: hwsync barrier available\n");
} else if (type == STF_BARRIER_EIEIO) {
    pr_info("stf-barrier: eieio barrier available\n");
}

stf_enabled_flush_types = type;

if (!no_stf_barrier && !cpu_mitigations_off())
    stf_barrier_enable(enable);

ssize_t cpu_show_spec_store_bypass(struct device *dev, struct device_attribute *attr, char *buf)
{
    if (stf_barrier && stf_enabled_flush_types != STF_BARRIER_NONE) {
        const char *type;
        switch (stf_enabled_flush_types) {
        case STF_BARRIER_EIEIO:
            type = "eieio";
            break;
        case STF_BARRIER_SYNC_ORI:
            type = "hwsync";
            break;
        case STF_BARRIER_FALLBACK:
            type = "fallback";
            break;
        default:
            type = "unknown";
            break;
        }
        return sprintf(buf, "Mitigation: Kernel entry/exit barrier (%s)\n", type);
    }

    if (!security_ftr_enabled(SEC_FTR_L1D_FLUSH_HV) &&
        !security_ftr_enabled(SEC_FTR_L1D_FLUSH_PR))
        return sprintf(buf, "Not affected\n");

    return sprintf(buf, "Vulnerable\n");
}

#ifdef CONFIG_DEBUG_FS
static int stf_barrier_set(void *data, u64 val)
{
    bool enable;

    if (val == 1)
+enable = true;
+else if (val == 0)
+enable = false;
+else
+return -EINVAL;
+
+/* Only do anything if we're changing state */
+if (enable != stf_barrier)
+stf_barrier_enable(enable);
+
+return 0;
+
+static int stf_barrier_get(void *data, u64 *val)
+{
+*val = stf_barrier ? 1 : 0;
+return 0;
+}
+
+#define SIMPLE_ATTRIBUTE(fops_stf_barrier, stf_barrier_get, stf_barrier_set, "%llu\n")
+
+static __init int stf_barrier_debugfs_init(void)
+{
+debugfs_create_file("stf_barrier", 0600, powerpc_debugfs_root, NULL, &fops_stf_barrier);
+return 0;
+}
+
+device_initcall(stf_barrier_debugfs_init);
+
+#endif /* CONFIG_DEBUG_FS */
+
+static void no_count_cache_flush(void)
+{
+count_cache_flush_type = COUNT_CACHE_FLUSH_NONE;
+pr_info("count-cache-flush: software flush disabled.\n");
+}
+
+static void toggle_count_cache_flush(bool enable)
+{
+if (!security_ftr_enabled(SEC_FTR_FLUSH_COUNT_CACHE) &&
+!security_ftr_enabled(SEC_FTR_FLUSH_LINK_STACK))
+enable = false;
+
+if (!enable) {
+patch_instruction_site(&patch__call_flush_count_cache, PPC_INST_NOP);
+#ifdef CONFIG_KVM_BOOK3S_HV_POSSIBLE
+patch_instruction_site(&patch__call_kvm_flush_link_stack, PPC_INST_NOP);
+#endif
+pr_info("link-stack-flush: software flush disabled.\n");
+link_stack_flush_enabled = false;
+}
void setup_count_cache_flush(void)
{
  bool enable = true;

  if (no_spectrev2 || cpu_mitigations_off()) {
    if (security_ftr_enabled(SEC_FTR_BCCTRL_SERIALISED) ||
        security_ftr_enabled(SEC_FTR_COUNT_CACHE_DISABLED))
      pr_warn("Spectre v2 mitigations not fully under software control, can't disable\n");
    +
    enable = false;
    +
  }
  +

  /*
   
   */

  if (!security_ftr_enabled(SEC_FTR_FTR_FLUSH_COUNT_CACHE)) {
    patch_instruction_site(&patch__flush_link_stack_return, PPC_INST_BLR);
    no_count_cache_flush();
    +
    return;
  +
  }

  if (!security_ftr_enabled(SEC_FTR_BCCTR_FLUSH_ASSIST)) {
    count_cache_flush_type = COUNT_CACHE_FLUSH_HW;
    pr_info("count-cache-flush: hardware assisted flush sequence enabled\n");
    +
  }
  +

  // If we just need to flush the link stack, patch an early return
  +
  if (!security_ftr_enabled(SEC_FTR_BCCTR_FLUSH_ASSIST)) {
    count_cache_flush_type = COUNT_CACHE_FLUSH_HW;
    pr_info("count-cache-flush: hardware assisted flush sequence enabled\n");
    +
  }
  +

  if (no_count_cache_flush()) {
  +
    return;
  +
  }

  pr_info("link-stack-flush: software flush enabled.\n");
  +
  link_stack_flush_enabled = true;
  +

  // If we just need to flush the link stack, patch an early return
  +
  if (!security_ftr_enabled(SEC_FTR_FTR_FLUSH_COUNT_CACHE)) {
    +
    patch_instruction_site(&patch__flush_link_stack_return, PPC_INST_BLR);
    no_count_cache_flush();
    +
    return;
  }

  if (!security_ftr_enabled(SEC_FTR_BCCTR_FLUSH_ASSIST)) {
    count_cache_flush_type = COUNT_CACHE_FLUSH_HW;
    pr_info("count-cache-flush: hardware assisted flush sequence enabled\n");
    +
  }
  +

  +
  // This enables the branch from _switch to flush_count_cache
  +
  patch_branch_site(&patch__call_flush_count_cache,
  +
    (u64)&flush_count_cache, BRANCH_SET_LINK);
  +
  +
  +
  #ifdef CONFIG_KVM_BOOK3S_HV_POSSIBLE
  +
  // This enables the branch from guest_exit_cont to kvm_flush_link_stack
  +
  patch_branch_site(&patch__call_kvm_flush_link_stack,
  +
    (u64)&kvm_flush_link_stack, BRANCH_SET_LINK);
  +
  +#endif
  +

  pr_info("link-stack-flush: software flush enabled.\n");
  +
  link_stack_flush_enabled = true;
  +

  // If we just need to flush the link stack, patch an early return
  +
  if (!security_ftr_enabled(SEC_FTR_FTR_FLUSH_COUNT_CACHE)) {
    +
    patch_instruction_site(&patch__flush_link_stack_return, PPC_INST_BLR);
    no_count_cache_flush();
    +
    return;
  }

  if (!security_ftr_enabled(SEC_FTR_BCCTR_FLUSH_ASSIST)) {
    count_cache_flush_type = COUNT_CACHE_FLUSH_HW;
    pr_info("count-cache-flush: hardware assisted flush sequence enabled\n");
    +
  }
  +

  +
}}
+ * There's no firmware feature flag/hypervisor bit to tell us we need to
+ * flush the link stack on context switch. So we set it here if we see
+ * either of the Spectre v2 mitigations that aim to protect userspace.
+ */
+if (security_ftr_enabled(SEC_FTR_COUNT_CACHE_DISABLED) ||
+ security_ftr_enabled(SEC_FTR_FLUSH_COUNT_CACHE))
+security_ftr_set(SEC_FTR_FLUSH_LINK_STACK);
+
+toggle_count_cache_flush(enable);
+
+#ifdef CONFIG_DEBUG_FS
+static int count_cache_flush_set(void *data, u64 val)
+{
+bool enable;
+
+if (val == 1)
+enable = true;
+else if (val == 0)
+enable = false;
+else
+return -EINVAL;
+
+toggle_count_cache_flush(enable);
+
+return 0;
+}
+
+static int count_cache_flush_get(void *data, u64 *val)
+{
+if (count_cache_flush_type == COUNT_CACHE_FLUSH_NONE)
+*val = 0;
+else
+*val = 1;
+
+return 0;
+}
+
+DEFINE_SIMPLE_ATTRIBUTE(fops_count_cache_flush, count_cache_flush_get,
+ count_cache_flush_set, "%llu\n");
+
+static __init int count_cache_flush_debugfs_init(void)
+{
+debugfs_create_file("count_cache_flush", 0600, powerpc_debugfs_root,
+ NULL, &fops_count_cache_flush);
+return 0;
+}
+
device_initcall(count_cache_flush_debugfs_init);
int boot_cpuid = -1;
+int boot_hw_cpuid = -1;
EXPORT_SYMBOL_GPL(boot_cpuid);

/*
@@ -462,6 +463,7 @@
struct device_node *dn = NULL;
 int cpu = 0;
 int nthreads = 1;
 +bool boot_cpu_added = false;
 DBG("smp_setup_cpu_maps()/\n");
 @@ -488,6 +490,24 @@
 }

 nthreads = len / sizeof(int);
+/**
+ * If boot cpu hasn't been added to paca and there are only
+ * last nthreads slots available in paca array then wait
+ * for boot cpu to show up.
+ */
+if (!boot_cpu_added && (cpu + nthreads) >= nr_cpu_ids) {
+ int found = 0;
+ +DBG("Holding last nthreads paca slots for boot cpu\n");
+for (j = 0; j < nthreads && cpu < nr_cpu_ids; j++) {
+ if (boot_hw_cpuid == be32_to_cpu(intserv[j])) {
+ found = 1;
+ break;
+ }
+ }
+if (!found)
+continue;
+}

 for (j = 0; j < nthreads && cpu < nr_cpu_ids; j++) {
 bool avail;
 @@ -503,6 +523,11 @@
 set_cpu_present(cpu, avail);
 set_hard_smp_processor_id(cpu, be32_to_cpu(intserv[j]));

set_cpu_possible(cpu, true);
+if (boot_hw_cpuid == be32_to_cpu(intserv[j])) {
+DBG("Boot cpu %d (hard id %d) added to pac\n",
+    cpu, be32_to_cpu(intserv[j]));
+boot_cpu_added = true;
+
+}
cpu++;
}

#ifdef CONFIG_PPC64
if (!radix_enabled())
init_mm.context.slb_addr_limit = DEFAULT_MAP_WINDOW_USER64;
+elif defined(CONFIG_PPC_8xx)
+init_mm.context.slb_addr_limit = DEFAULT_MAP_WINDOW;
#else
#error "context.addr_limit not initialized."
#endif

if (ppc_md.setup_arch)
ppc_md.setup_arch();

+setup_barrier_nospec();
+setup_spectre_v2();
+
+paging_init();

/* Initialize the MMU context management stuff. */
--- linux-4.15.0.orig/arch/powerpc/kernel/setup_64.c
+++ linux-4.15.0/arch/powerpc/kernel/setup_64.c
@@ -241,13 +241,19 @@
}

/*
 - * Fixup HFSCR:TM based on CPU features. The bit is set by our
 - * early asm init because at that point we haven't updated our
 - * CPU features from firmware and device-tree. Here we have,
 - * so let's do it.
 - */
-if (cpu_has_feature(CPU_FTR_HVMODE) && !cpu_has_feature(CPU_FTR_TM_COMP))
- mtspr(SPRN_HFSCR, mfspr(SPRN_HFSCR) & ~HFSCR_TM);
+ * Set HFSCR:TM based on CPU features:
+ * In the special case of TM no suspend (P9N DD2.1), Linux is
+ * told TM is off via the dt-ftrs but told to (partially) use
+ * it via OPAL_REINIT_CPUS_TM_SUSPEND_DISABLED. So HFSCR(TM]
+ * will be off from dt-ftrs but we need to turn it on for the
+ * no suspend case.
+ */
+if (cpu_has_feature(CPU_FTR_HVMODE)) {
+if (cpu_has_feature(CPU_FTR_TM_COMP))
+ mtspr(SPRN_HFSCR, mfspr(SPRN_HFSCR) | HFSCR_TM);
+else
+ mtspr(SPRN_HFSCR, mfspr(SPRN_HFSCR) & ~HFSCR_TM);
+
/* Set IR and DR in PACA MSR */
get_paca()->kernel_msr = MSR_KERNEL;
@@ -483,6 +489,8 @@
lsizep = of_get_property(np, propnames[3], NULL);
if (bsizep == NULL)
 bsizep = lsizep;
+if (lsizep == NULL)
 +lsizep = bsizep;
if (lsizep != NULL)
lsize = be32_to_cpu(*lsizep);
if (bsizep != NULL)
@@ -807,7 +815,13 @@
static enum lldd_flush_type enabled_flush_types;
static void *lldd_flush_fallback_area;
static bool no_rfi_flush;
+static bool no_entry_flush;
+static bool no_uaccess_flush;
bool rfi_flush;
+bool entry_flush;
+bool uaccess_flush;
+DEFINE_STATIC_KEY_FALSE(uaccess_flush_key);
+EXPORT_SYMBOL(uaccess_flush_key);

static int __init handle_no_rfi_flush(char *p)
{
@@ -817,6 +831,22 @@
}
early_param("no_rfi_flush", handle_no_rfi_flush);

+static int __init handle_no_entry_flush(char *p)
+{
+ pr_info("entry-flush: disabled on command line.");
+ no_entry_flush = true;
+ return 0;
+ }
+early_param("no_entry_flush", handle_no_entry_flush);
+
+static int __init handle_no_uaccess_flush(char *p)
+{
+ pr_info("uaccess-flush: disabled on command line.");
+ no_uaccess_flush = true;
+return 0;
+
/*
 * The RFI flush is not KPTI, but because users will see doco that says to use
 * nopti we hijack that option here to also disable the RFI flush.
@@ -839,9 +869,6 @@

void rfi_flush_enable(bool enable)
{
    if (rfi_flush == enable)
        return;
    
    if (enable) {
        do_rfi_flush_fixups(enabled_flush_types);
        on_each_cpu(do_nothing, NULL, 1);
@@ -851,12 +878,53 @@
        rfi_flush = enable;
    }
}

-static void init_fallback_flush(void)
+void entry_flush_enable(bool enable)
+{
+    if (enable) {
+        do_entry_flush_fixups(enabled_flush_types);
+        on_each_cpu(do_nothing, NULL, 1);
+    } else {
+        do_entry_flush_fixups(L1D_FLUSH_NONE);
+    }
+    entry_flush = enable;
+}

+void uaccess_flush_enable(bool enable)
+{
+    if (enable) {
+        do_uaccess_flush_fixups(enabled_flush_types);
+        static_branch_enable(&uaccess_flush_key);
+        on_each_cpu(do_nothing, NULL, 1);
+    } else {
+        static_branch_disable(&uaccess_flush_key);
+        do_uaccess_flush_fixups(L1D_FLUSH_NONE);
+    }
+    uaccess_flush = enable;
+}
static void __ref init_fallback_flush(void)
{
  u64 l1d_size, limit;
  int cpu;

  /* Only allocate the fallback flush area once (at boot time). */
  if (l1d_flush_fallback_area)
    return;
  else
  {
    l1d_size = ppc64_caches.l1d.size;
    /*
    * If there is no d-cache-size property in the device tree, l1d_size
    * could be zero. That leads to the loop in the asm wrapping around to
    * 2^64-1, and then walking off the end of the fallback area and
    * eventually causing a page fault which is fatal. Just default to
    * something vaguely sane.
    */
    if (!l1d_size)
      l1d_size = (64 * 1024);
    limit = min(safe_stack_limit(), ppc64_rma_size);
  }

  memset(l1d_flush_fallback_area, 0, l1d_size * 2);
  for_each_possible_cpu(cpu) {
    /*
    * The fallback flush is currently coded for 8-way
    * associativity. Different associativity is possible, but it
    * will be treated as 8-way and may not evict the lines as
    * effectively.
    * 128 byte lines are mandatory.
    */
    u64 c = l1d_size / 8;
    pac[cpu].rfi_flush_fallback_area = l1d_flush_fallback_area;
    pac[cpu].l1d_flush_congruence = c;
    pac[cpu].l1d_flush_sets = c / 128;
    pac[cpu].l1d_flush_size = l1d_size;
  }

  void __init setup_rfi_flush(enum l1d_flush_type types, bool enable)
  {
if (types & L1D_FLUSH_FALLBACK) {
    pr_info("rfi-flush: Using fallback displacement flush\n");
    pr_info("rfi-flush: fallback displacement flush available\n");
    init_fallback_flush();
}

if (types & L1D_FLUSH_ORI)
    pr_info("rfi-flush: Using ori type flush\n");
    pr_info("rfi-flush: ori type flush available\n");

if (types & L1D_FLUSH_MTTRIG)
    pr_info("rfi-flush: Using mttrig type flush\n");
    pr_info("rfi-flush: mttrig type flush available\n");

enabled_flush_types = types;

- if (!no_rfi_flush)
+ if (!cpu_mitigations_off() && !no_rfi_flush)
    rfi_flush_enable(enable);
}

+ void setup_entry_flush(bool enable)
{ +
+ if (cpu_mitigations_off())
+ return;
+
+ if (!no_entry_flush)
+ entry_flush_enable(enable);
} +
+
+ void setup_uaccess_flush(bool enable)
+{
+ if (cpu_mitigations_off())
+ return;
+
+ if (!no_uaccess_flush)
+ uaccess_flush_enable(enable);
} +
+
#ifdef CONFIG_DEBUG_FS
static int rfi_flush_set(void *data, u64 val)
{ +
+ bool enable;
+
if (val == 1)
    - rfi_flush_enable(true);
+ enable = true;
else if (val == 0)
-rfi_flush_enable(false);
+enable = false;
else
return -EINVAL;

/\ Only do anything if we're changing state */
+if (enable != rfi_flush)
+rfi_flush_enable(enable);
+
return 0;
}

@
-924,19 +1005,65 @

DEFINE_SIMPLE_ATTRIBUTE(fops_rfi_flush, rfi_flush_get, rfi_flush_set, "%llu\n");

-static __init int rfi_flush_debugfs_init(void)
+static int entry_flush_set(void *data, u64 val)
{
-debugfs_create_file("rfi_flush", 0600, powerpc_debugfs_root, NULL, &fops_rfi_flush);
+bool enable;
+
+if (val == 1)
+enable = true;
+else if (val == 0)
+enable = false;
+else
+return -EINVAL;
+
 Only do anything if we're changing state */
+if (enable != entry_flush)
+entry_flush_enable(enable);
+
+return 0;
+
 DEFINE_SIMPLE_ATTRIBUTE(fops_entry_flush, entry_flush_get, entry_flush_set, "%llu\n");

-static __init int rfi_flush_debugfs_init(void)
+static int uaccess_flush_set(void *data, u64 val)
+
-size_t cpu_show_meltdown(struct device *dev, struct device_attribute *attr, char *buf)
{ 
  if (rfi_flush)
  -return sprintf(buf, "Mitigation: RFI Flush\n");
  +bool enable;
  +
  +if (val == 1)
  +enable = true;
  +else if (val == 0)
  +enable = false;
  +else
  +return -EINVAL;

  -return sprintf(buf, "Vulnerable\n");
  /* Only do anything if we're changing state */
  +if (enable != uaccess_flush)
  +uaccess_flush_enable(enable);
  +
  +return 0;
}
+
+static int uaccess_flush_get(void *data, u64 *val)
+{
  +*val = uaccess_flush ? 1 : 0;
  +return 0;
  +}
  +
  +DEFINE_SIMPLE_ATTRIBUTE(fops_uaccess_flush, uaccess_flush_get, uaccess_flush_set, "%llu\n");
  +
  +static __init int rfi_flush_debugfs_init(void)
  +{
  +debugfs_create_file("rfi_flush", 0600, powerpc_debugfs_root, NULL, &fops_rfi_flush);
  +debugfs_create_file("entry_flush", 0600, powerpc_debugfs_root, NULL, &fops_entry_flush);
  +debugfs_create_file("uaccess_flush", 0600, powerpc_debugfs_root, NULL, &fops_uaccess_flush);
  +return 0;
  +}
  +device_initcall(rfi_flush_debugfs_init);
  +#endif
  #endif /* CONFIG_PPC_BOOK3S_64 */
  --- linux-4.15.0.orig/arch/powerpc/kernel/signal.c
  +++ linux-4.15.0/arch/powerpc/kernel/signal.c
  @@ -193,14 +193,27 @@
  * normal/non-checkpointed stack pointer.
  */

  +unsigned long ret = tsk->thread.regs->gpr[1];
  +
  +#ifdef CONFIG_PPCTransactional_MEM
  BUG_ON(tsk != current);
if (MSR_TM_ACTIVE(tsk->thread.regs->msr)) {
  preempt_disable();
  tm_reclaim_current(TM_CAUSE_SIGNAL);
if (MSR_TM_TRANSACTIONAL(tsk->thread.regs->msr))
    return tsk->thread.ckpt_regs.gpr[1];
+  ret = tsk->thread.ckpt_regs.gpr[1];
+
+  /*
+    * If we treclaim, we must clear the current thread's TM bits
+    * before re-enabling preemption. Otherwise we might be
+    * preempted and have the live MSR[TS] changed behind our back
+    * (tm_recheckpoint_new_task() would recheckpoint). Besides, we
+    * enter the signal handler in non-transactional state.
+    */
+  tsk->thread.regs->msr &= ~MSR_TS_MASK;
+  preempt_enable();
} #endif
-  return tsk->thread.regs->gpr[1];
+  return ret;
}

--- linux-4.15.0.orig/arch/powerpc/kernel/signal_32.c
+++ linux-4.15.0/arch/powerpc/kernel/signal_32.c
@@ -488,19 +488,11 @@
*/
static int save_tm_user_regs(struct pt_regs *regs,
    struct mcontext __user *frame,
    struct mcontext __user *tm_frame, int sigret)
-
-unsigned long msr = regs->msr;
-
-WARN_ON(tm_suspend_disabled);
-
- /* Remove TM bits from thread's MSR. The MSR in the sigcontext
-    * just indicates to userland that we were doing a transaction, but we
-    * don't want to return in transactional state. This also ensures
-    * that flush_fp_to_thread won't set TIF_RESTORE_TM again.
-    */
-  -regs->msr &= ~MSR_TS_MASK;
-
- /* Save both sets of general registers */
if (save_general_regs(&current->thread.ckpt_regs, frame)
   || save_general_regs(regs, tm_frame))
  @ @ -843,7 +835,23 @ @
/* If TM bits are set to the reserved value, it's an invalid context */
if (MSR_TM_RESV(msr_hi))
return 1;
/* Pull in the MSR TM bits from the user context */
+
+/*
+ * Disabling preemption, since it is unsafe to be preempted
+ * with MSR[TS] set without recheckpointing.
+ */
+preempt_disable();
+
+/* CAUTION:
+ * After regs->MSR[TS] being updated, make sure that get_user(),
+ * put_user() or similar functions are *not* called. These
+ * functions can generate page faults which will cause the process
+ * to be de-scheduled with MSR[TS] set but without calling
+ * tm_recheckpoint(). This can cause a bug.
+ *
+ * Pull in the MSR TM bits from the user context
+ */
+regs->msr = (regs->msr & ~MSR_TS_MASK) | (msr_hi & MSR_TS_MASK);
/* Now, recheckpoint. This loads up all of the checkpointed (older)
* registers, including FP and V[S]Rs. After recheckpointing, the
@@ -868,6 +876,8 @@}
#endif
preempt_enable();
+
return 0;
}
#endif
@@ -959,6 +969,10 @@
int sigret;
unsigned long tramp;
struct pt_regs *regs = tsk->thread.regs;
+#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/* Save the thread's msr before get_tm_stackpointer() changes it */
+unsigned long msr = regs->msr;
+#endif
BUG_ON(tsk != current);
@@ -991,13 +1005,13 @@
ifdef CONFIG_PPC_TRANSACTIONAL_MEM
tm_frame = &rt_sf->uc_transact.uc_mcontext;
-if (MSR_TM_ACTIVE(regs->msr)) {
+if (MSR_TM_ACTIVE(msr)) {
if (__put_user((unsigned long)&rt_sf->uc_transact,
    &rt_sf->uc.uc_link) ||
    __put_user((unsigned long)tm_frame,
    &rt_sf->uc_transact.uc_regs))
goto badframe;
-if (save_tm_user_regs(regs, frame, tm_frame, sigret))
+if (save_tm_user_regs(regs, frame, tm_frame, sigret, msr))
goto badframe;
} else
@@ -1238,6 +1252,9 @@
goto bad;

if (MSR_TM_ACTIVE(msr_hi<<32)) {
+/* Trying to start TM on non TM system */
+if (!cpu_has_feature(CPU_FTR_TM))
+goto bad;
/* We only recheckpoint on return if we're
 * transaction.
 */
@@ -1401,6 +1418,10 @@
 int sigret;
 unsigned long tramp;
 struct pt_regs *regs = tsk->thread.regs;
+ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/* Save the thread's msr before get_tm_stackpointer() changes it */
+unsigned long msr = regs->msr;
+endif

BUG_ON(tsk != current);

@@ -1434,9 +1455,9 @@
#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
 tm_mctx = &frame->mctx_transact;
-if (MSR_TM_ACTIVE(regs->msr)) {
+if (MSR_TM_ACTIVE(msr)) {
 if (save_tm_user_regs(regs, &frame->mctx, &frame->mctx_transact,
    -    sigret))
+    sigret, msr))
goto badframe;
} else
--- linux-4.15.0.orig/arch/powerpc/kernel/signal_64.c
+++ linux-4.15.0/arch/powerpc/kernel/signal_64.c
@@ -192,7 +192,8 @@
static long setup_tm_sigcontexts(struct sigcontext __user *sc,
struct sigcontext __user *tm_sc,
struct task_struct *tsk,
- int signr, sigset_t *set, unsigned long handler)
+ int signr, sigset_t *set, unsigned long handler,
+ unsigned long msr)
{
/* When CONFIG_ALTIVEC is set, we _always_ setup v_regs even if the
* process never used altivec yet (MSR_VEC is zero in pt_regs of
@@ -207,21 +208,19 @@
elf_vrreg_t __user *tm_v_regs = sigcontext_vmx_regs(tm_sc);
#endif
struct pt_regs *regs = tsk->thread.regs;
-unsigned long msr = tsk->thread.ckpt_regs.msr;
long err = 0;

BUG_ON(tsk != current);

-BUG_ON(!MSR_TM_ACTIVE(regs->msr));
+BUG_ON(!MSR_TM_ACTIVE(msr));

WARN_ON(tm_suspend_disabled);

-/* Remove TM bits from thread's MSR. The MSR in the sigcontext
- * just indicates to userland that we were doing a transaction, but we
- * don't want to return in transactional state. This also ensures
- * that flush_fp_to_thread won't set TIF_RESTORE_TM again.
+/* Restore checkpointed FP, VEC, and VSX bits from ckpt_regs as
+ * it contains the correct FP, VEC, VSX state after we treclaimed
+ * the transaction and giveup_all() was called on reclaiming.
+ */
-reg->msr &= ~MSR_TS_MASK;
+msr |= tsk->thread.ckpt_regs.msr & (MSR_FP | MSR_VEC | MSR_VSX);

#ifdef CONFIG_ALTIVEC
err |= __put_user(v_regs, &sc->v_regs);
@@ -457,20 +456,6 @@
if (MSR_TM_RESV(msr))
    return -EINVAL;

-/* pull in MSR TS bits from user context */
-reg->msr = (regs->msr & ~MSR_TS_MASK) | (msr & MSR_TS_MASK);
-
-/*
- * Ensure that TM is enabled in regs->msr before we leave the signal
- * handler. It could be the case that (a) user disabled the TM bit
- * through the manipulation of the MSR bits in uc_mcontext or (b) the
- * TM bit was disabled because a sufficient number of context switches
- * happened whilst in the signal handler and load_tm overflowed,
- * disabling the TM bit. In either case we can end up with an illegal
- * TM state leading to a TM Bad Thing when we return to userspace.
- */
-reg->msr |= MSR_TM;
-
/* pull in MSR LE from user context */
-reg->msr = (reg->msr & ~MSR_LE) | (msr & MSR_LE);

@@ -488,8 +473,10 @@
err |= __get_user(tsk->thread.ckpt_regs.ccr,
 &sc->gp_regs[PT_CCR]);
+/* Don't allow userspace to set the trap value */
+reg->trap = 0;
+
/* These regs are not checkpointed; they can go in `reg`. */
-ev |= __get_user(reg->trap, &sc->gp_regs[PT_TRAP]);
-err |= __get_user(reg->dar, &sc->gp_regs[PT_DAR]);
-ev |= __get_user(reg->dsisr, &sc->gp_regs[PT_DISR]);
-ev |= __get_user(reg->result, &sc->gp_regs[PT_RESULT]);
@@ -562,6 +549,34 @@
tm_enable();
/* Make sure the transaction is marked as failed */
tsk->thread.tm_texasr |= TEXASR_FS;
+
+/*
+ * Disabling preemption, since it is unsafe to be preempted
+ * with MSR[TS] set without recheckpointing.
+ */
+preempt_disable();
+
+/* pull in MSR TS bits from user context */
+reg->msr = (reg->msr & ~MSR_TS_MASK) | (msr & MSR_TS_MASK);
+
+/*
+ * Ensure that TM is enabled in reg->msr before we leave the signal
+ * handler. It could be the case that (a) user disabled the TM bit
+ * through the manipulation of the MSR bits in uc_mcontext or (b) the
+ * TM bit was disabled because a sufficient number of context switches
+ * happened whilst in the signal handler and load_tm overflowed,
+ * disabling the TM bit. In either case we can end up with an illegal
+ * TM state leading to a TM Bad Thing when we return to userspace.
+ */
+/* CAUTION:
+ * After reg->MSR[TS] being updated, make sure that get_user(),
+ * put_user() or similar functions are *not* called. These
+ * functions can generate page faults which will cause the process
+ * to be de-scheduled with MSR[TS] set but without calling
+ * tm_recheckpoint(). This can cause a bug.
+ */
+regs->msr |= MSR_TM;
+
+ /* This loads the checkpointed FP/VEC state, if used */
tm_recheckpoint(&tsk->thread);

@@ -575,6 +590,8 @@
regs->msr |= MSR_VEC;
}

+preempt_enable();
+
return err;
}
#endif
@@ -730,17 +747,35 @@
if (MSR_TM_ACTIVE(msr)) {
 /* We recheckpoint on return. */
 struct ucontext __user *uc_transact;
+
+/* Trying to start TM on non TM system */
+if (!cpu_has_feature(CPU_FTR_TM))
+goto badframe;
+
+if (__get_user(uc_transact, &uc->uc_link))
+goto badframe;
if (restore_tm_sigcontexts(current, &uc->uc_mcontext,
    &uc_transact->uc_mcontext))
    goto badframe;
-
-else
-/* Fall through, for non-TM restore */
+} else
#endif
-if (restore_sigcontext(current, NULL, 1, &uc->uc_mcontext))
-goto badframe;
+
+{ /*
+ * Fall through, for non-TM restore
+ *
+ * Unset MSR[TS] on the thread regs since MSR from user
+ * context does not have MSR active, and recheckpoint was
+ * not called since restore_tm_sigcontexts() was not called
+ * also.
+ *
+ * If not unsetting it, the code can RFID to userspace with
+ * MSR[TS] set, but without CPU in the proper state,
+ * causing a TM bad thing.
+ */
+current->thread.regs->msr &= ~MSR_TS_MASK;
+if (restore_sigcontext(current, NULL, 1, &uc->uc_mcontext))
+goto badframe;
+
if (restore_allstack(&uc->uc_stack))
goto badframe;
@@ -765,6 +800,10 @@
unsigned long newsp = 0;
long err = 0;
struct pt_regs *regs = tsk->thread.regs;
+#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/* Save the thread's msr before get_tm_stackpointer() changes it */
+unsigned long msr = regs->msr;
+#endif
BUG_ON(tsk != current);
@@ -782,7 +821,7 @@
errr |= __put_user(0, &frame->uc.uc_flags);
errr |= __save_allstack(&frame->uc.uc_stack, regs->gpr[1]);
#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
-if (MSR_TM_ACTIVE(regs->msr)) {
+if (MSR_TM_ACTIVE(msr)) {
/* The ucontext_t passed to userland points to the second
 * ucontext_t (for transactional state) with its uc_link ptr.
 */
@@ -790,7 +829,8 @@
errr |= setup_tm_sigcontexts(&frame->uc.uc_mcontext,
 &frame->uc_transact.uc_mcontext,
 tsk, ksig->sig, NULL,
- (unsigned long)ksig->ka.sa.sa_handler);
+ (unsigned long)ksig->ka.sa.sa_handler,
+ msr);
} else
#endif
{--- linux-4.15.0.orig/arch/powerpc/kernel/smp.c
+++ linux-4.15.0/arch/powerpc/kernel/smp.c
@@ -543,24 +543,91 @@
#ifdef CONFIG_KEXEC_CORE
void crash_send_ipi(void (*crash_ipi_callback)(struct pt_regs *))
{
+int cpu;
+smp_send_nmi_ipi(NMI_IPI_ALL_OTHERS, crash_ipi_callback, 1000000);
+if (kdump_in_progress() && crash_wait_offline) {
+for_each_present_cpu(cpu) {
+if (cpu_online(cpu))
+continue;
+/
+ * crash_ipl_callback will wait for
+ * all cpus, including offline CPUs.
+ * We don’t care about nmi_ipl_function.
+ * Offline cpus will jump straight into
+ * crash_ipl_callback, we can skip the
+ * entire NMI dance and waiting for
+ * cpus to clear pending mask, etc.
+ */
+do_smp_send_nmi_ipl(cpu);
+}
+}
#endif

+#ifdef CONFIG_NMI_IPI
+static void nmi_stop_this_cpu(struct pt_regs *regs)
+{
+ /*
+ * This is a special case because it never returns, so the NMI IPI
+ * handling would never mark it as done, which makes any later
+ * smp_send_nmi_ipl() call spin forever. Mark it done now.
+ *
+ * IRQs are already hard disabled by the smp_handle_nmi_ipl.
+ */
+set_cpu_online(smp_processor_id(), false);
+
+nmi_ipl_lock();
+nmi_ipl_busy_count--;
+nmi_ipl_unlock();
+
+spin_begin();
+while (1)
+spin_cpu_relax();
+}
+
+void smp_send_stop(void)
+{
+smp_send_nmi_ipl(NMI_IPI_ALL_OTHERS, nmi_stop_this_cpu, 1000000);
+}
+
+#else /* CONFIG_NMI_IPI */
+
+static void stop_this_cpu(void *dummy)
{ /* Remove this CPU */
+hard_irq_disable();
+
+/*
+ * Offlining CPUs in stop_this_cpu can result in scheduler warnings,
+ * (see commit de6e5d38417e), but printk_safe_flush_on_panic() wants
+ * to know other CPUs are offline before it breaks locks to flush
+ * printk buffers, in case we panic()ed while holding the lock.
+ */
set_cpu_online(smp_processor_id(), false);
-
-local_irq_disable();
+spin_begin();
while (1)
-;
+spin_cpu_relax();
}

void smp_send_stop(void)
{
+static bool stopped = false;
+
+/*
+ * Prevent waiting on csd lock from a previous smp_send_stop.
+ * This is racy, but in general callers try to do the right
+ * thing and only fire off one smp_send_stop (e.g., see
+ * kernel/panic.c)
+ */
+if (stopped)
+return;
+
+stopped = true;
+
+smp_call_function(stop_this_cpu, NULL, 0);
}
#endif /* CONFIG_NMI_IPI */

struct thread_info *current_set[NR_CPUS];

@@ -985,6 +1052,9 @@
vdso_getcpu_init();
#endif
+set_numa_node(numa_cpu_lookup_table[cpu]);
+set_numa_mem(local_memory_node(numa_cpu_lookup_table[cpu]));
+
/ * Update topology CPU masks */
add_cpu_to_masks(cpu);

@@ -995,9 +1065,6 @@
 if (!cpumask_equal(cpu_l2_cache_mask(cpu), cpu_sibling_mask(cpu)))
     shared_caches = true;

-set_numa_node(numa_cpu_lookup_table[cpu]);
-set_numa_mem(local_memory_node(numa_cpu_lookup_table[cpu]));
-
    smp_wmb();
    notify_cpu_starting(cpu);
    set_cpu_online(cpu, true);
--- linux-4.15.0.orig/arch/powerpc/kernel/stacktrace.c
+++ linux-4.15.0/arch/powerpc/kernel/stacktrace.c
@@ -2,7 +2,7 @@
 * Stack trace utility
 *
 * Copyright 2008 Christoph Hellwig, IBM Corp.
-
+* Copyright 2018 SUSE Linux GmbH
 *
+  * This program is free software; you can redistribute it and/or
+  * modify it under the terms of the GNU General Public License
@@ -11,11 +81,116 @@
*/

#include <linux/export.h>
+#include <linux/kallsyms.h>
+#include <linux/module.h>
#include <linux/sched.h>
#include <linux/sched/debug.h>
+#include <linux/sched/task_stack.h>
#include <linux/stacktrace.h>
#include <asm/ptrace.h>
#include <asm/processor.h>
+#include <linux/ftrace.h>
+#include <asm/kprobes.h>

/*
 * Save stack-backtrace addresses into a stack_trace buffer.
@@ -76,3 +81,115 @@
save_context_stack(trace, regs->gpr[1], current, 0);
 }
EXPORT_SYMBOL_GPL(save_stack_trace_regs);
+
+#ifndef CONFIG_HAVE_RELIABLE_STACKTRACE
+int
+save_stack_trace_tsk_reliable(struct task_struct *tsk,
+struct stack_trace *trace)
+
+unsigned long sp;
+unsigned long stack_page = (unsigned long)task_stack_page(tsk);
+unsigned long stack_end;
+int graph_idx = 0;
+
+/*
+ * The last frame (unwinding first) may not yet have saved
+ * its LR onto the stack.
+ */
+int firstframe = 1;
+
+if (tsk == current)
+sp = current_stack_pointer();
+else
+sp = tsk->thread.ksp;
+
+stack_end = stack_page + THREAD_SIZE;
+if (!lis_idle_task(tsk)) {
+/*
+ * For user tasks, this is the SP value loaded on
+ * kernel entry, see "PACKSAVE(r13)" in _switch() and
+ * system_call_common()/EXCEPTION_PROLOG_COMMON()
+ *
+ * Likewise for non-swapper kernel threads,
+ * this also happens to be the top of the stack
+ * as setup by copy_thread().
+ *
+ * Note that stack backlinks are not properly setup by
+ * copy_thread() and thus, a forked task() will have
+ * an unreliable stack trace until it's been
+ * _switch()'ed to for the first time.
+ */
+stack_end -= STACK_FRAME_OVERHEAD + sizeof(struct pt_regs);
+}
+} else {
+/*
+ * idle tasks have a custom stack layout,
+ * c.f. cpu_idle_thread_init().
+ */
+stack_end -= STACK_FRAME_OVERHEAD;
+}
+
+if (sp < stack_page + sizeof(struct thread_struct) ||
+sp > stack_end - STACK_FRAME_MIN_SIZE) { return 1;
+}
for (;;) {
    unsigned long *stack = (unsigned long *) sp;
    unsigned long newsp, ip;
+
    /* sanity check: ABI requires SP to be aligned 16 bytes. */
    if (sp & 0xF)
        return 1;
+
    /* Mark stacktraces with exception frames as unreliable. */
    if (sp <= stack_end - STACK_INT_FRAME_SIZE &&
        stack[STACK_FRAME_MARKER] == STACK_FRAME_REGS_MARKER) {
        return 1;
    }
+
    newsp = stack[0];
    /* Stack grows downwards; unwinder may only go up. */
    if (newsp <= sp)
        return 1;
+
    if (newsp != stack_end &&
        newsp > stack_end - STACK_FRAME_MIN_SIZE) {
        return 1; /* invalid backlink, too far up. */
    }
+
    /* Examine the saved LR: it must point into kernel code. */
    ip = stack[STACK_FRAME_LR_SAVE];
    if (!firstframe && !__kernel_text_address(ip))
        return 1;
    firstframe = 0;
+
    /* FIXME: IMHO these tests do not belong in
    * arch-dependent code, they are generic.
    */
    ip = ftrace_graph_ret_addr(tsk, &graph_idx, ip, NULL);
    +
    /* Mark stacktraces with kretprobed functions on them
    * as unreliable.
    */
    if (ip == (unsigned long)kretprobe_trampoline)
        return 1;
+
    if (!trace->skip)
        trace->entries[trace->nr_entries++] = ip;
    else
        trace->skip--;
+}
if (newsp == stack_end)
    break;
+
if (trace->nr_entries >= trace->max_entries)
    return -E2BIG;
+
sp = newsp;
+
return 0;
+
EXPORT_SYMBOL_GPL(save_stack_trace_tsk_reliable);
+
#ifndef CONFIG_HAVE_RELIABLE_STACKTRACE
--- linux-4.15.0.orig/arch/powerpc/kernel/swsusp_32.S
+++ linux-4.15.0/arch/powerpc/kernel/swsusp_32.S
@@ -24,11 +24,19 @@
#define SL_IBAT20x48
#define SL_DBAT30x50
#define SL_IBAT30x58
+#define SL_TB0x60
+#define SL_R20x68
+#define SL_CR0x6c
+#define SL_LR0x70
+#define SL_R120x74/* r12 to r31 */
+#define SL_DBAT40x60
+#define SL_IBAT40x68
+#define SL_DBAT50x70
+#define SL_IBAT50x78
+#define SL_DBAT60x80
+#define SL_IBAT60x88
+#define SL_DBAT70x90
+#define SL_IBAT70x98
+#define SL_TB0xa0
+#define SL_R20xa8
+#define SL_CR0xac
+#define SL_LR0xb0
+#define SL_R120xb4/* r12 to r31 */
+#define SL_SIZE(SL_R12 + 80)

.section .data
@ @ -113,6 +121,41 @@
mfibtlr4,3
stwr4,SL_IBAT3+4(r11)
+
BEGIN_MMU_FTR_SECTION
+mfspr4,SPRN_DBAT4U
+stwr4,SL_DBAT4(r11)
+mfspr4,SPRN_DBAT4L
+stwr4,SL_DBAT4+4(r11)
+mfsprr4,SPRN_DBAT5U
+stwr4,SL_DBAT5(r11)
+mfsprr4,SPRN_DBAT5L
+stwr4,SL_DBAT5+4(r11)
+mfsprr4,SPRN_DBAT6U
+stwr4,SL_DBAT6(r11)
+mfsprr4,SPRN_DBAT6L
+stwr4,SL_DBAT6+4(r11)
+mfsprr4,SPRN_DBAT7U
+stwr4,SL_DBAT7(r11)
+mfsprr4,SPRN_DBAT7L
+stwr4,SL_DBAT7+4(r11)
+mfsprr4,SPRN_IBAT4U
+stwr4,SL_IBAT4(r11)
+mfsprr4,SPRN_IBAT4L
+stwr4,SL_IBAT4+4(r11)
+mfsprr4,SPRN_IBAT5U
+stwr4,SL_IBAT5(r11)
+mfsprr4,SPRN_IBAT5L
+stwr4,SL_IBAT5+4(r11)
+mfsprr4,SPRN_IBAT6U
+stwr4,SL_IBAT6(r11)
+mfsprr4,SPRN_IBAT6L
+stwr4,SL_IBAT6+4(r11)
+mfsprr4,SPRN_IBAT7U
+stwr4,SL_IBAT7(r11)
+mfsprr4,SPRN_IBAT7L
+stwr4,SL_IBAT7+4(r11)
+END_MMU_FTR_SECTION_IFSET(MMU_FTR_USE_HIGH_BATS)
+
#if 0
/* Backup various CPU config stuffs */
bl__save_cpu_setup
@@ -278,27 +321,41 @@
mtibatu	3,r4
lwzr4,SL_IBAT3+4(r11)
mtibat3,r4
-#endif
-
BEGIN_MMU_FTR_SECTION
-lir4,0
+lwzr4,SL_DBAT4(r11)
mtsprPRN_DBAT4U,r4
+lwzr4,SL_DBAT4+4(r11)
mtsprPRN_DBAT4L,r4
+lwzr4,SL_DBAT5(r11)
mtsprPRN_DBAT5U,r4
+lwzr4,SL_DBAT5+4(r11)
static DEFINE_PER_CPU(struct cpu, cpu_devices);

- /* SMT snooze delay stuff, 64-bit only for now */
- */
-
- #ifdef CONFIG_PPC64

- /* Time in microseconds we delay before sleeping in the idle loop */
- static DEFINE_PER_CPU(long, smt_snooze_delay) = { 100 }; 
- */
+ /* Snooze delay has not been hooked up since 3fa8cad82b94 ("powerpc/pseries/cpuidle:
+ * smt-snooze-delay cleanup.") and has been broken even longer. As was foretold in
+ * 2014:
"ppc64_util currently utilises it. Once we fix ppc64_util, propose to clean up the kernel code."

powerpc-utils stopped using it as of 1.3.8. At some point in the future this code should be removed.

```
static ssize_t store_smt_snooze_delay(struct device *dev,
    struct device_attribute *attr,
    const char *buf,
    size_t count)
{
    struct cpu *cpu = container_of(dev, struct cpu, dev);
    ssize_t ret;
    long snooze;
    
    ret = sscanf(buf, "%ld", &snooze);
    if (ret != 1)
        return -EINVAL;
    per_cpu(smt_snooze_delay, cpu->dev.id) = snooze;
    pr_warn_once("%s (%d) stored to unsupported smt_snooze_delay, which has no effect.
", current->comm, current->pid);
    return count;
}

static DEVICE_ATTR(smt_snooze_delay, 0644, show_smt_snooze_delay,

static int __init setup_smt_snooze_delay(char *str)
{
    unsigned int cpu;
    long snooze;
    
    if (!cpu_has_feature(CPU_FTR_SMT))
        return 0;
    /*
       /*
       return count;
    
    per_cpu(smt_snooze_delay, cpu->dev.id) = snooze;
    pr_warn_once("%s (%d) stored to unsupported smt_snooze_delay, which has no effect.
", current->comm, current->pid);
    pr_warn_once("%s (%d) read from unsupported smt_snooze_delay
", current->comm, current->pid);
    return count;
}

static DEVICEATTR(smt_snooze_delay, 0644, show_smt_snooze_delay,

static int __init setup_smt_snooze_delay(char *str)
{
    unsigned int cpu;
    long snooze;
    
    if (!cpu_has_feature(CPU_FTR_SMT))
        return 0;
    /*
       /*
       return count;
    
    per_cpu(smt_snooze_delay, cpu->dev.id) = snooze;
    pr_warn_once("%s (%d) stored to unsupported smt_snooze_delay, which has no effect.
", current->comm, current->pid);
    pr_warn_once("%s (%d) read from unsupported smt_snooze_delay
", current->comm, current->pid);
    return count;
}
return 1;
-
snooze = simple_strtol(str, NULL, 10);
-for_each_possible_cpu(cpu)
-per_cpu(smt_snooze_delay, cpu) = snooze;
-
+pr_warn("smt-snooze-delay command line option has no effect\n");
return 1;
}
__setup("smt-snooze-delay=", setup_smt_snooze_delay);
--- linux-4.15.0.orig/arch/powerpc/kernel/tau_6xx.c
+++ linux-4.15.0/arch/powerpc/kernel/tau_6xx.c
@@ -38,8 +38,6 @@
 struct timer_list tau_timer;
-
-#undef DEBUG
-
/* TODO: put these in a /proc interface, with some sanity checks, and maybe
 * dynamic adjustment to minimize # of interrupts */
/* configurable values for step size and how much to expand the window when
@@ -72,47 +70,33 @@
 void TAUupdate(int cpu)
 {
-unsigned thrm;
-+
-#ifdef DEBUG
-printk("TAUupdate ");
-#endif
+u32 thrm;
+u32 bits = THRM1_TIV | THRM1_TIN | THRM1_V;

/* if both thresholds are crossed, the step_sizes cancel out
 * and the window winds up getting expanded twice. */
-if((thrm = mfspr(SPRN_THRM1)) & THRM1_TIV){ /* is valid? */
-    if(thrm & THRM1_TIN){ /* crossed low threshold */
-        if (tau[cpu].low >= step_size){
-            tau[cpu].low -= step_size;
-            tau[cpu].high -= (step_size - window_expand);
-        }
-        tau[cpu].grew = 1;
-    #ifdef DEBUG
-        printk("low threshold crossed ");
-    #endif
+thrm = mfspr(SPRN_THRM1);
+if ((thrm & bits) == bits) {
+    mtspr(SPRN_THRM1, 0);
if (tau[cpu].low >= step_size) {
    tau[cpu].low -= step_size;
    tau[cpu].high -= (step_size - window_expand);
}

tau[cpu].grew = 1;
pr_debug("%s: low threshold crossed\n", __func__);
}

if((thrm = mfspr(SPRN_THRM2)) & THRM1_TIV) { /* is valid? */
    if(thrm & THRM1_TIN) { /* crossed high threshold */
        if (tau[cpu].high <= 127-step_size){
            tau[cpu].low += (step_size - window_expand);
            tau[cpu].high += step_size;
        }
        tau[cpu].grew = 1;
        printk("high threshold crossed ");
    }
}

#ifdef DEBUG
    printk("grew = %d\n", tau[cpu].grew);
#endif

#ifndef CONFIG_TAU_INT /* tau_timeout will do this if not using interrupts */
set_thresholds(cpu);
#endif

#endif CONFIG_TAU_INT /* tau_timeout will do this if not using interrupts */

static void tau_timeout(void * info)
{
    int cpu;
    unsigned long flags;
    int size;
    int shrink;
    int shrink;
-/* disabling interrupts *should* be okay */
-local_irq_save(flags);
cpu = smp_processor_id();

#ifndef CONFIG_TAU_INT
TAUupdate(cpu);
#endif

+/* Stop thermal sensor comparisons and interrupts */
+mtspr(SPRN_THRM3, 0);
+
size = tau[cpu].high - tau[cpu].low;
if (size > min_window && ! tau[cpu].grew) {
    /* do an exponential shrink of half the amount currently over size */
    set_thresholds(cpu);
-
        /* Do the enable every time, since otherwise a bunch of (relatively)
        * complex sleep code needs to be added. One mtspr every time
        * tau_timeout is called is probably not a big deal.
        */
        *
        * Enable thermal sensor and set up sample interval timer
        * need 20 us to do the compare.. until a nice `cpu_speed` function
        * call is implemented, just assume a 500 mhz clock. It doesn't really
        * matter if we take too long for a compare since it's all interrupt
        * driven anyway.
        *
        * use a extra long time.. (60 us @ 500 mhz)
        +/* Restart thermal sensor comparisons and interrupts.
        + * The "PowerPC 740 and PowerPC 750 Microprocessor Datasheet"
        + * recommends that "the maximum value be set in THRM3 under all
        + * conditions."
        */
        -mtspr(SPRN_THRM3, THRM3_SITV(500*60) | THRM3_E);
        -
        -local_irq_restore(flags);
        +mtspr(SPRN_THRM3, THRM3_SITV(0x1fff) | THRM3_E);
    }
}

static void tau_timeout_smp(struct timer_list *unused)
--- linux-4.15.0.orig/arch/powerpc/kernel/time.c
+++ linux-4.15.0/arch/powerpc/kernel/time.c
@@ -241,7 +241,7 @@
    * Accumulate stolen time by scanning the dispatch trace log.
    * Called on entry from user mode.
void accumulate_stolen_time(void)
+
+void notrace accumulate_stolen_time(void)
{
  u64 sst, ust;
  u8 save_soft_enabled = local_paca->soft_enabled;
  vdso_data->wtom_clock_nsec = tk->wall_to_monotonic.tv_nsec;
  vdso_data->stamp_xtime = xt;
  vdso_data->stamp_sec_fraction = frac_sec;
  vdso_data->hrtimer_res = hrtimer_resolution;
  smp_wmb();
  ++(vdso_data->tb_update_count);
}

clockevents_config_and_register(dec, ppc_tb_freq, 2, decrementer_max);
+
+printk_once(KERN_DEBUG "clockevent: %s mult[%x] shift[%d] cpu[%d]%n",
             dec->name, dec->mult, dec->shift, cpu);
-
clockevents_register_device(dec);
+
/* Set values for KVM, see kvm_emulate_dec() */
+decrementer_clockevent.mult = dec->mult;
+decrementer_clockevent.shift = dec->shift;
}

static void enable_large_decrementer(void)
{
  clockevents_register_device(dec);
  /* Set values for KVM, see kvm_emulate_dec() */
  decrementer_clockevent.mult = dec->mult;
  decrementer_clockevent.shift = dec->shift;
}

static __init init_decrementer_clockevent(void)
{
  int cpu = smp_processor_id();
  clockevents_calc_mult_shift(&decrementer_clockevent, ppc_tb_freq, 4);
  
  decrementer_clockevent.max_delta_ns =
  clockevent_delta2ns(decrementer_max, &decrementer_clockevent);
  decrementer_clockevent.max_delta_ticks = decrementer_max;
  decrementer_clockevent.min_delta_ns =
  clockevent_delta2ns(2, &decrementer_clockevent);
  decrementer_clockevent.min_delta_ticks = 2;
  
  register_decrementer_clockevent(cpu);
  +register_decrementer_clockevent(smp_processor_id());
}
void secondary_cpu_time_init(void)
--- linux-4.15.0.org/arch/powerpc/kernel/tm.S
+++ linux-4.15.0/arch/powerpc/kernel/tm.S
@@ -163,13 +163,27 @@
    std	 r1, PACATMSCRATCH(r13)
    ldr r1, PACAR1(r13)

-/* Store the PPR in r11 and reset to decent value */
-stdr11, GPR11(r1)/
+/* Temporary stash */
+
+/*
+ * Move the saved user r1 to the kernel stack in case PACATMSCRATCH is
+ * clobbered by an exception once we turn on MSR_RI below.
+ */
+lstdr11, PACATMSCRATCH(r13)
+stdr11, GPR1(r1)
+
+/*
+ * Store r13 away so we can free up the scratch SPR for the SLB fault
+ * handler (needed once we start accessing the thread_struct).
+ */
+GET_SCRATCH0(r11)
+stdr11, GPR13(r1)
+
/* Reset MSR RI so we can take SLB faults again */
lir11, MSR_RI
mtmsdr11, 1

+/* Store the PPR in r11 and reset to decent value */
mfsprr11, SPRN_PPR
HMT_MEDIUM

@@ -194,11 +208,11 @@
    SAVE_GPR(8, r7)/
    SAVE_GPR(9, r7)/
    SAVE_GPR(10, r7)/
-ldr3, PACATMSCRATCH(r13)/
+ldr3, GPR1(r1)/
    ldr4, GPR7(r1)/
    ldr5, GPR11(r1)/
    ldr6, GPR12(r1)/
-GET_SCRATCH0(8)/
+ldr8, GPR13(r1)/
    stdr3, GPR1(r7)
    stdr4, GPR7(r7)
    stdr5, GPR11(r7)
--- linux-4.15.0.org/arch/powerpc/kernel/trace/ftrace.c
unsigned long prepare_ftrace_return(unsigned long parent, unsigned long ip) {
    struct ftrace_graph_ent trace;
    unsigned long return_hooker;

    if (unlikely(ftrace_graph_is_dead()))
        goto out;

    if (ftrace_push_return_trace(parent, ip, &trace.depth, 0,
        NULL) == -EBUSY)
        goto out;

    parent = return_hooker;
    out:
    return parent;
}

raw_local_irq_restore(flags);

+/*
+ * system_reset_exception handles debugger, crash dump, panic, for 0x100
+ */
+if (TRAP(regs) == 0x100)
+return;
+
crash_fadump(regs, "die oops");

if (kexec_should_crash(current))
    crash_fadump(regs, "die oops");

if (debugger(regs))
return;

/*
 * system_reset_exception handles debugger, crash dump, panic, for 0x100
 * *
 *+ if (TRAP(regs) != 0x100) {
+ if (debugger(regs))
+ return;
+ }
 *
flags = oops_begin(regs);
if (__die(str, regs, err))
@@ -337,7 +348,7 @@
* No debugger or crash dump registered, print logs then
* panic.
*/
-__die("System Reset", regs, SIGABRT);
+die("System Reset", regs, SIGABRT);

mdelay(2*MSEC_PER_SEC); /* Wait a little while for others to print */
add_taint(TAINT_DIE, LOCKDEP_NOW_UNRELIABLE);
@@ -347,11 +358,14 @@
#ifdef CONFIG_PPC_BOOK3S_64
BUG_ON(get_paca()->in_nmi == 0);
if (get_paca()->in_nmi > 1)
- nmi_panic(regs, "Unrecoverable nested System Reset");
+ die("Unrecoverable nested System Reset", regs, SIGABRT);
#endif
/* Must die if the interrupt is not recoverable */
-if (! (regs->msr & MSR_RI))
- nmi_panic(regs, "Unrecoverable System Reset");
+ if (! (regs->msr & MSR_RI)) {
+/* For the reason explained in die_mce, nmi_exit before die */
+ nmi_exit();
+ die("Unrecoverable System Reset", regs, SIGABRT);
+ }

if (!nested)
nmi_exit();
@@ -684,11 +698,16 @@
if (check_io_access(regs))
goto bail;

+ if (!nested)
+ nmi_exit();
+ die("Machine check", regs, SIGBUS);
/* Must die if the interrupt is not recoverable */
if (!(regs->msr & MSR_RI))
    -nmi_panic(regs, "Unrecoverable Machine check");
    +die("Unrecoverable Machine check", regs, SIGBUS);
    +
    +return;

bail:
if (!nested)
@@ -705,7 +724,7 @@
{
    unsigned int ra, rb, t, i, sel, instr, rc;
    const void __user *addr;
    -u8 vbuf[16], *vdst;
    +u8 vbuf[16] __aligned(16), *vdst;
    unsigned long ea, msr, msr_mask;
    bool swap;

    @@ -1468,8 +1487,8 @@

    void StackOverflow(struct pt_regs *regs)
    {
    -printk(KERN_CRIT "Kernel stack overflow in process %p, r1=%lx\n",
    -    current, regs->gpr[1]);
    +pr_crit("Kernel stack overflow in process %s[%d], r1=%lx\n",
    +current->comm, task_pid_nr(current), regs->gpr[1]);
    debugger(regs);
    show_regs(regs);
    panic("kernel stack overflow");
    @@ -1571,6 +1590,22 @@
        value = mfspr(SPRN_FSCR);

        status = value >> 56;
        +if ((hv || status >= 2) &&
        +    (status < ARRAY_SIZE(facility_strings)) &&
        +    facility_strings[status])
        +facility = facility_strings[status];
        +
        +/* We should not have taken this interrupt in kernel */
        +if (!user_mode(regs)) {
        +    pr_emerg("Facility '%s' unavailable (%d) exception in kernel mode at %lx\n",
        +        facility, status, regs->nip);
        +    die("Unexpected facility unavailable exception", regs, SIGABRT);
        +}
        +
        +/* We restore the interrupt state now */
        +if (!arch_irq_disabled_regs(regs))

local_irq_enable();

if (status == FSCR_DSCR_LG) {
/*
 * User is accessing the DSCR register using the problem
@@ -1637,25 +1672,11 @@
 return;
 }

-if ((hv || status >= 2) &&
 - (status < ARRAY_SIZE(facility_strings)) &&
 - facility_strings[status])
-facility = facility_strings[status];
-
-/* We restore the interrupt state now */
-if (!arch_irq_disabled_regs(regs))
-local_irq_enable();
-
pr_err_ratelimited("%sFacility '%s' unavailable (%d), exception at 0x%lx, MSR=%lx\n",
 hv ? "Hypervisor " : ",", facility, status, regs->nip, regs->msr);

out:
-if (user_mode(regs)) {
-_exception(SIGILL, regs, ILL_ILLOPC, regs->nip);
-return;
-}
-
-die("Unexpected facility unavailable exception", regs, SIGABRT);
+_exception(SIGILL, regs, ILL_ILLOPC, regs->nip);
}
#endif

--- linux-4.15.0.orig/arch/powerpc/kernel/vdso.c
+++ linux-4.15.0/arch/powerpc/kernel/vdso.c
@@ -99,26 +99,28 @@
 CPU_FTR_COHERENT_ICACHE, CPU_FTR_COHERENT_ICACHE,
 "__kernel_sync_dicache", "__kernel_sync_dicache_p5"
 },
+#{ifdef CONFIG_PPC32
 {
-CPU_FTR_USE_TB, 0,
+CPU_FTR_USE_RTC, CPU_FTR_USE_RTC,
 "__kernel_gettimeofday", NULL
 },
{
-CPU_FTR_USE_TB, 0,
+CPU_FTR_USE_RTC, CPU_FTR_USE_RTC,
 "__kernel_clock_gettime", NULL
,
},
{
-CPU_FTR_USE_TB, 0,
+CPU_FTR_USE_RTC, CPU_FTR_USE_RTC,
"__kernel_clock_getres", NULL
},
{
-CPU_FTR_USE_TB, 0,
+CPU_FTR_USE_RTC, CPU_FTR_USE_RTC,
"__kernel_get_tbfreq", NULL
},
{
-CPU_FTR_USE_TB, 0,
+CPU_FTR_USE_RTC, CPU_FTR_USE_RTC,
"__kernel_time", NULL
},
+#endif
};

/*
@@ -704,7 +706,7 @@
    node = cpu_to_node(cpu);
    WARN_ON_ONCE(node > 0xffff);

-val = (cpu & 0xfff) | ((node & 0xffff) << 16);
+val = (cpu & 0xffff) | ((node & 0xffff) << 16);
    mtspr(SPRN_SPRG_VDSO_WRITE, val);
    get_paca()->sprg_vdso = val;

--- linux-4.15.0.orig/arch/powerpc/kernel/vdso32/datapage.S
+++ linux-4.15.0/arch/powerpc/kernel/vdso32/datapage.S
@@ -37,6 +37,7 @@
    mtlr0
    addir3, r3, __kernel_datapage_offset-data_page_branch
    lwzr0,0(r3)
+ .cfi_restore lr
    addr3,r0,r3
    blr
   .cfi_endproc
--- linux-4.15.0.orig/arch/powerpc/kernel/vdso32/gettimeofday.S
+++ linux-4.15.0/arch/powerpc/kernel/vdso32/gettimeofday.S
@@ -98,7 +98,7 @@
 * can be used, r7 contains NSEC_PER_SEC.
 */

-lwzr5,WTOM_CLOCK_SEC(r9)
+lwzr5,(WTOM_CLOCK_SEC+LOPART)(r9)
lwzr6,WTOM_CLOCK_NSEC(r9)
/* We now have our offset in r5,r6. We create a fake dependency
@@ -139,6 +139,7 @@
*/
99:
li0,___NR_clock_gettime
+ .cfi_restore lr
sc
blr
.cfi_endproc
@@ -159,12 +160,15 @@
crorc0*4+eq,cr0*4+eq,cr1*4+eq
bne	cr0,99f
+mflr12
+ .cfi_register lr,r12
+bl__get_datapage@local/* get data page */
+lwrz5, CLOCK_HRTIMER_RES(r3)
+mflr12
+li3,0
cmplcr0,r4,0
crcLcr0*4+so
beqlr
-lirs5,CLOCK_REALTIME_RES@h
-orir5,r5,CLOCK_REALTIME_RES@l
stwr3,TSPC32_TV_SEC(r4)
stwr5,TSPC32_TV_NSEC(r4)
blr
--- linux-4.15.0.orig/arch/powerpc/kernel/vdso64/cacheflush.S
+++ linux-4.15.0/arch/powerpc/kernel/vdso64/cacheflush.S
@@ -39,7 +39,7 @@
subfr8,r6,r4/* compute length */
addr8,r8,r5/* ensure we get enough */
lwrz9,CFG_DCACHE_LOGBLOCKSZ(r10)
-srw.r8,r8,r9/* compute line count */
+srd.r8,r8,r9/* compute line count */
crcLcr0*4+so
beqlr/* nothing to do? */
mtctr8
@@ -56,7 +56,7 @@
subfr8,r6,r4/* compute length */
addr8,r8,r5
lwrz9,CFG_ICACHE_LOGBLOCKSZ(r10)
-srw.r8,r8,r9/* compute line count */
+srd.r8,r8,r9/* compute line count */
crcLcr0*4+so
beqlr/* nothing to do? */
mtctr8
addi r3, r3, __kernel_datapage_offset-data_page_branch
lwz r0,0(r3)
+ .cfi_restore lr
addr3,r0,r3
blr
 .cfi_endproc

/* We now have our result in r6,r9. We create a fake dependency */
@@ -124,6 +124,7 @
99:
lir0,___NR_clock_gettime
 + .cfi_restore lr
sc
blr
 .cfi_endproc
@@ -144,12 +145,15 @
crorcr0*4+eq,cr0*4+eq,cr1*4+eqnbcr0,99f
+mlirr12
+ + .cfi_register lr,r12
+blV_LOCAL_FUNC(__get_datapage)
+lwzr5, CLOCK_HRTIMER_RES(r3)
+mlirr12
lir3,0
cmpldi4r0,r4,0
crc1cr0*4+so
bqlr
-lisr5,CLOCK_REALTIME_RES@h
-orir5,r5,CLOCK_REALTIME_RES@l
std3,TSPC64_TV_SEC(r4)
std5,TSPC64_TV_NSEC(r4)
blr
--- linux-4.15.0.orig/arch/powerpc/kernel/vmlinux.lds.S
#ifdef CONFIG_PPC64
 . = ALIGN(8);
+__stf_entry_barrier_fixup : AT(ADDR(__stf_entry_barrier_fixup) - LOAD_OFFSET) {
+__start___stf_entry_barrier_fixup = .;
+*(__stf_entry_barrier_fixup)
+__stop___stf_entry_barrier_fixup = .;
+}
+
+. = ALIGN(8);
+__uaccess_flush_fixup : AT(ADDR(__uaccess_flush_fixup) - LOAD_OFFSET) {
+__start___uaccess_flush_fixup = .;
+*(__uaccess_flush_fixup)
+__stop___uaccess_flush_fixup = .;
+}
+
+. = ALIGN(8);
+__entry_flush_fixup : AT(ADDR(__entry_flush_fixup) - LOAD_OFFSET) {
+__start___entry_flush_fixup = .;
+*(__entry_flush_fixup)
+__stop___entry_flush_fixup = .;
+}
+
+. = ALIGN(8);
+__stf_exit_barrier_fixup : AT(ADDR(__stf_exit_barrier_fixup) - LOAD_OFFSET) {
+__start___stf_exit_barrier_fixup = .;
+*(__stf_exit_barrier_fixup)
+__stop___stf_exit_barrier_fixup = .;
+}
+
+. = ALIGN(8);
+__rfi_flush_fixup : AT(ADDR(__rfi_flush_fixup) - LOAD_OFFSET) {
+__start___rfi_flush_fixup = .;
+*(__rfi_flush_fixup)
+__stop___rfi_flush_fixup = .;
}
#endif
+#endif /* CONFIG_PPC64 */
+
+#ifdef CONFIG_PPC_BARRIER_NOSPEC
 . = ALIGN(8);
+__spec_barrier_fixup : AT(ADDR(__spec_barrier_fixup) - LOAD_OFFSET) {
+__start___barrier_nospec_fixup = .;
+*(__barrier_nospec_fixup)
+__stop___barrier_nospec_fixup = .;
+}
+
+. = ALIGN(8);
+__rfi_flush_fixup : AT(ADDR(__rfi_flush_fixup) - LOAD_OFFSET) {
+__start___rfi_flush_fixup = .;
+*(__rfi_flush_fixup)
+__stop___rfi_flush_fixup = .;
}
#endif

typedef struct __spec_btbflush_fixup {
+__start__btb_flush_fixup = .;
+*(__btb_flush_fixup)
+__stop__btb_flush_fixup = .;
+}
#endif

EXCEPTION_TABLE(0)

NOTES :kernel :notes
@@ -286,6 +331,12 @@
    *(.branch_lt)
}

#ifdef CONFIG_DEBUG_INFO_BTF
    .BTF : AT(ADDR(.BTF) - LOAD_OFFSET) {
    *(.BTF)
+}
#endif

+.opd : AT(ADDR(.opd) - LOAD_OFFSET) {
    *(.opd)
}
--- linux-4.15.0.orig/arch/powerpc/kernel/watchdog.c
+++ linux-4.15.0/arch/powerpc/kernel/watchdog.c
@@ -44,7 +44,7 @@
static u64 wd_timer_period_ms __read_mostly; /* interval between heartbeat */

-static DEFINE_PER_CPU(struct timer_list, wd_timer);
+static DEFINE_PER_CPU(struct hrtimer, wd_hrtimer);
static DEFINE_PER_CPU(u64, wd_timer_tb);

/*
@@ -256,21 +256,21 @@
nmi_exit();
}

-static void wd_timer_reset(unsigned int cpu, struct timer_list *t)
-{
-    t->expires = jiffies + msecs_to_jiffies(wd_timer_period_ms);
-    if (wd_timer_period_ms > 1000)
-        add_timer_on(t, cpu);
-    __round_jiffies_up(t->expires, cpu);
-}

Open Source Used In 5GaaS Edge AC-4  10962
static void wd_timer_fn(struct timer_list *t)  
static enum hrtimer_restart watchdog_timer_fn(struct hrtimer *hrtimer)  
{
    int cpu = smp_processor_id();

    +if (!watchdog_enabled & NMI_WATCHDOG_ENABLED))  
+return HRTIMER_NORESTART;
    +
    +if (!cpumask_test_cpu(cpu, &watchdog_cpumask))  
+return HRTIMER_NORESTART;
    +
    watchdog_timer_interrupt(cpu);

    -wd_timer_reset(cpu, t);
    +hrtimer_forward_now(hrtimer, ms_to_ktime(wd_timer_period_ms));
    +
    +return HRTIMER_RESTART;
}

void arch_touch_nmi_watchdog(void)  
@@ -286,37 +286,22 @@
{
    
    EXPORT_SYMBOL(arch_touch_nmi_watchdog);

    -static void start_watchdog_timer_on(unsigned int cpu)  
    -{
    -struct timer_list *t = per_cpu_ptr(&wd_timer, cpu);
    -
    -per_cpu(wd_timer_tb, cpu) = get_tb();
    -
    -timer_setup(t, wd_timer_fn, TIMER_PINNED);
    -wd_timer_reset(cpu, t);
    -}
    -
    -static void stop_watchdog_timer_on(unsigned int cpu)  
    -{
    -struct timer_list *t = per_cpu_ptr(&wd_timer, cpu);
    -
    -del_timer_sync(t);
    -}
    -
    -static int start_wd_on_cpu(unsigned int cpu)  
    +static void start_watchdog(void *arg)  
    {  
        +struct hrtimer *hrtimer = this_cpu_ptr(&wd_hrtimer);
        +int cpu = smp_processor_id();
        unsigned long flags;
if (cpumask_test_cpu(cpu, &wd_cpus_enabled)) {
    WARN_ON(1);
    return 0;
    +return;
}

if (!(watchdog_enabled & NMI_WATCHDOG_ENABLED))
    -return 0;
    +return;

if (!cpumask_test_cpu(cpu, &watchdog_cpumask))
    -return 0;
    +return;

wd_smp_lock(&flags);
cpumask_set_cpu(cpu, &wd_cpus_enabled);
    @@ -326,27 +311,40 @@
    }
wd_smp_unlock(&flags):

    -start_watchdog_timer_on(cpu);
    +this_cpu_ptr(&wd_timer_tb) = get_tb();

    -return 0;
    +hrtimer_init(hrtimer, CLOCK_MONOTONIC, HRTIMER_MODE_REL);
    +hrtimer->function = watchdog_timer_fn;
    +hrtimer_start(hrtimer, ms_to_ktime(wd_timer_period_ms),
    +    HRTIMER_MODE_REL_PINNED);
    }

    -static int stop_wd_on_cpu(unsigned int cpu)
    +static int start_watchdog_on_cpu(unsigned int cpu)
    {
    +smp_call_function_single(cpu, start_watchdog, NULL, true);
    +}
    +
    +static void stop_watchdog(void *arg)
    +{
    +struct hrtimer *hrtimer = this_cpu_ptr(&wd_hrtimer);
    +int cpu = smp_processor_id();
    +unsigned long flags;

    if (!cpumask_test_cpu(cpu, &wd_cpus_enabled))
        -return 0; /* Can happen in CPU unplug case */
        +return; /* Can happen in CPU unplug case */

        -stop_watchdog_timer_on(cpu);
hrtimer_cancel(hrtimer);

wd_smp_lock(&flags);
cpumask_clear_cpu(cpu, &wd_cpus_enabled);
wd_smp_unlock(&flags);

wd_smp_clear_cpu_pending(cpu, get_tb());
+

-return 0;
+static int stop_watchdog_on_cpu(unsigned int cpu)
+
+return smp_call_function_single(cpu, stop_watchdog, NULL, true);
}

static void watchdog_calc_timeouts(void)
@@ -365,7 +363,7 @@
int cpu;

for_each_cpu(cpu, &wd_cpus_enabled)
-stop_wd_on_cpu(cpu);
+stop_watchdog_on_cpu(cpu);
}

void watchdog_nmi_start(void)
@@ -374,7 +372,7 @@
-watchdog_calc_timeouts();
for_each_cpu_and(cpu, cpu_online_mask, &watchdog_cpumask)
-stop_wd_on_cpu(cpu);
+start_watchdog_on_cpu(cpu);
}

/*
@@ -386,32 +384,11 @@
err = cpuhp_setup_state_nocalls(CPUHP_AP_ONLINE_DYN,
"powerpc/watchdog:online",
-stop_wd_on_cpu, stop_wd_on_cpu);
+start_watchdog_on_cpu,
+stop_watchdog_on_cpu);
if (err < 0) {
 pr_warn("Watchdog could not be initialized");
 return err;
}
return 0;
-
static void handle_backtrace_ipi(struct pt_regs *regs)
{
  nmi_cpu_backtrace(regs);
}

static void raise_backtrace_ipi(cpumask_t *mask)
{
  unsigned int cpu;
  for_each_cpu(cpu, mask) {
    if (cpu == smp_processor_id())
      handle_backtrace_ipi(NULL);
    else
      smp_send_nmi_ipi(cpu, handle_backtrace_ipi, 1000000);
  }
}

void arch_trigger_cpumask_backtrace(const cpumask_t *mask, bool exclude_self)
{
  nmi_trigger_cpumask_backtrace(mask, exclude_self, raise_backtrace_ipi);
}

--- linux-4.15.0.orig/arch/powerpc/kvm/Kconfig
+++ linux-4.15.0/arch/powerpc/kvm/Kconfig
@@ -68,7 +68,7 @@
select KVM_BOOK3S_64_HANDLER
select KVM
select KVM_BOOK3S_PR_POSSIBLE if !KVM_BOOK3S_HV_POSSIBLE
+select SPAPR_TCE_IOMMU if IOMMU_SUPPORT && (PPC_PSERIES || PPC_POWERNV)
---help---
Support running unmodified book3s_64 and book3s_32 guest kernels
in virtual machines on book3s_64 host processors.
--- linux-4.15.0.orig/arch/powerpc/kvm/Makefile
+++ linux-4.15.0/arch/powerpc/kvm/Makefile
@@ -63,6 +63,9 @@
book3s_64_mmu.o 
book3s_32_mmu.o
+kvm-book3s_64-builtin-objs-$(CONFIG_KVM_BOOK3S_64_HANDLER) += \n+tm.o 
+ifdef CONFIG_KVM_BOOK3S_PR_POSSIBLE
kvm-book3s_64-builtin-objs-$(CONFIG_KVM_BOOK3S_64_HANDLER) += \nbook3s_rmhandlers.o
@@ -74,9 +77,15 @@
book3s_64_mmu_hv.o 
book3s_64_mmu.radix.o

+kvm-hv-$(CONFIG_PPC_TRANSACTIONAL_MEM) += \ 
+book3s_hv_tm.o 
+ 
kvm-book3s_64-built-in-xics-objs-$(CONFIG_KVM_XICS) := \ 
book3s_hv_rm_xics.o book3s_hv_rm_xive.o 

+kvm-book3s_64-built-in-tm-objs-$(CONFIG_PPC_TRANSACTIONAL_MEM) += \ 
+book3s_hv_tm_builtin.o 
+ 
ifdef CONFIG_KVM_BOOK3S_HV_POSSIBLE 
kvm-book3s_64-built-in-objs-$(CONFIG_KVM_BOOK3S_64_HANDLER) += \ 
book3s_hv_lmi.o 
@@ -84,6 +93,7 @@
book3s_hv_rm_mmu.o 
book3s_hv_ras.o 
book3s_hv_builtin.o 
+$($(kvm-book3s_64-built-in-tm-objs-y) \ 
$(kvm-book3s_64-built-in-xics-objs-y) 
endif 

--- linux-4.15.0.orig/arch/powerpc/kvm/book3s.c 
+++ linux-4.15.0/arch/powerpc/kvm/book3s.c 
@@ -40,7 +40,7 @@
#include "book3s.h" 
#include "trace.h" 

-#define VCPU_STAT(x) offsetof(struct kvm_vcpu, stat.x), KVM_STAT_VCPU 
+#define VCPU_STAT(x, ...) offsetof(struct kvm_vcpu, stat.x), KVM_STAT_VCPU, ## __VA_ARGS__ 

/* #define EXIT_DEBUG */ 

@@ -79,8 +79,11 @@
{
 if (vcpu->arch.hflags & BOOK3S_HFLAG_SPLIT_HACK) { 
 ulong pc = kvmppc_get_pc(vcpu); 
+ulong lr = kvmppc_get_lr(vcpu); 
 if ((pc & SPLIT_HACK_MASK) == SPLIT_HACK_OFFS) 
 kvmppc_set_pc(vcpu, pc & ~SPLIT_HACK_MASK); 
+if ((lr & SPLIT_HACK_MASK) == SPLIT_HACK_OFFS) 
+kvmppc_set_lr(vcpu, lr & ~SPLIT_HACK_MASK); 
 vcpu->arch.hflags &= ~BOOK3S_HFLAG_SPLIT_HACK; 
 } 
 } 
@@ -836,6 +839,7 @@
endif CONFIG_PPC64 
INIT_LIST_HEAD_RCU(&kvm->arch.sparc_tce_tables); 
INIT_LIST_HEAD(&kvm->arch.rtas_tokens); 
+mutex_init(&kvm->arch.rtas_token_lock);
return kvm->arch.kvm_ops->init_vm(kvm);
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_64_mmu_hv.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_64_mmu_hv.c
@@ -356,7 +356,7 @@
 unsigned long pp, key;
 unsigned long v, orig_v, gr;
 __be64 *hptep;
-#ifdef index
+  #ifdef index
    -int index;
    +long int index;
    int virtmode = vcpu->arch.shregs.msr & (data ? MSR_DR : MSR_IR);

    if (kvm_is_radix(vcpu->kvm))
      @ @ -.742,12 +742,15 @@
      srcu_idx = srcu_read_lock(&kvm->srcu);
      slots = kvm_memslots(kvm);
      kvm_for_each_memslot(memslot, slots) { /* Mutual exclusion with kvm_unmap_hva_range etc. */
+        spin_lock(&kvm->mmu_lock);
        /*
         * This assumes it is acceptable to lose reference and
         * change bits across a reset.
         */
        memset(memslot->arch.rmap, 0,
               memslot->npages * sizeof(*memslot->arch.rmap));
+        spin_unlock(&kvm->mmu_lock);
      }
      srcu_read_unlock(&kvm->srcu, srcu_idx);
      } @ @ -.1269,6 +1272,11 @@
/* Nothing to do */
  goto out;

+if (cpu_has_feature(CPU_FTR_ARCH_300)) {
+    rpte = be64_to_cpu(hptep[1]);
+    vpte = hpte_new_to_old_v(vpte, rpte);
+}
+/* Unmap */
    rev = &old->rev[idx];
    guest_rpte = rev->guest_rpte;
    @ @ -.1298,7 +1306,6 @@

/* Reload PTE after unmap */
    vpte = be64_to_cpu(hptep[0]);
    BUG_ON(vpte & HPTE_V_VALID);
BUG_ON(!(vpte & HPTE_V_ABSENT));

@@ -1307,6 +1314,12 @@
go to out;

rpte = be64_to_cpu(hptep[1]);
+
+if (cpu_has_feature(CPU_FTR_ARCH_300)) {
+    vpte = hpte_new_to_old_v(vpte, rpte);
+    rpte = hpte_new_to_old_r(rpte);
+}
+
pshift = kvmppc_hpte_base_page_shift(vpte, rpte);
avpn = HPTE_V_AVPN_VAL(vpte) & ~((1ul << pshift) - 1) >> 23);
pteg = idx / HPTES_PER_GROUP;
@@ -1337,17 +1350,17 @@
}
new_pteg = hash & new_hash_mask;
-if (vpte & HPTE_V_SECONDARY) {
-    BUG_ON(~pteg != (hash & old_hash_mask));
-    new_pteg = ~new_pteg;
-} else {
-    BUG_ON(pteg != (hash & old_hash_mask));
-}
+if (vpte & HPTE_V_SECONDARY)
+    new_pteg = ~hash & new_hash_mask;

new_idx = new_pteg * HPTES_PER_GROUP + (idx % HPTES_PER_GROUP);
new_hptep = (__be64 *)(new->virt + (new_idx << 4));

replace_vpte = be64_to_cpu(new_hptep[0]);
+if (cpu_has_feature(CPU_FTR_ARCH_300)) {
+    unsigned long replace_rpte = be64_to_cpu(new_hptep[1]);
+    replace_vpte = hpte_new_to_old_v(replace_vpte, replace_rpte);
+}

if (replace_vpte & (HPTE_V_VALID | HPTE_V_ABSENT)) {
    BUG_ON(new->order >= old->order);
@@ -1363,6 +1376,11 @@ /* Discard the previous HPTE */
}

+if (cpu_has_feature(CPU_FTR_ARCH_300)) {
+    rpte = hpte_old_to_new_r(vpte, rpte);
+    vpte = hpte_old_to_new_v(vpte);
+}
new_hptep[1] = cpu_to_be64(rpte);
new->rev[new_idx].guest_rpte = guest_rpte;
/* No need for a barrier, since new HPT isn't active */
@@ -1380,12 +1398,6 @@
unsigned long i;
int rc;

-/* resize_hpt_rehash_hpte() doesn't handle the new-format HPTEs
- * that POWER9 uses, and could well hit a BUG_ON on POWER9.
- */
-if (cpu_has_feature(CPU_FTR_ARCH_300))
-return -EIO;
for (i = 0; i < kvmppc_hpt_npte(&kvm->arch.hpt); i++) {
  rc = resize_hpt_rehash_hpte(resize, i);
if (rc != 0)
@@ -1416,6 +1428,9 @@
synchronize_srcu_expedited(&kvm->srcu);
+	if (cpu_has_feature(CPU_FTR_ARCH_300))
+kvmppc_setup_partition_table(kvm);
+resize_hpt_debug(resize, "resize_hpt_pivot() done\n");
}

--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_64_mmu_radix.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_64_mmu_radix.c
@@ -157,6 +157,9 @@
asm volatile("ptesync": : :"memory");
asm volatile(PPC_TLBIE_5(%0, %1, 0, 0, 1)
    : :"r" (addr), "r" (kvm->arch.lpid) :"memory");
+if (cpu_has_feature(CPU_FTR_P9_TLBIE_STQ_BUG))
+asm volatile(PPC_TLBIE_5(%0, %1, 0, 0, 1)
+    : :"r" (addr), "r" (kvm->arch.lpid) :"memory");
asm volatile("ptesync": : :"memory");
}

@@ -195,6 +198,12 @@
kmem_cache_free(kvm_pte_cache, ptep);
}

+/* Like pmd_huge() and pmd_large(), but works regardless of config options */
+static inline int pmd_is_leaf(pmd_t pmd)
+{
+  return !(pmd_val(pmd) & _PAGE_PTE);
+}
static int kvmppc_create_pte(struct kvm *kvm, pte_t pte, unsigned long gpa,  
   unsigned int level, unsigned long mmu_seq) 
{
    else 
    new_pmd = pmd_alloc_one(kvm->mm, gpa);

    -if (level == 0 && !(pmd && pmd_present(*pmd)))
    +if (level == 0 && !(pmd && pmd_present(*pmd) && !pmd_is_leaf(*pmd)))
    new_ptep = kvmppc_pte_alloc();

    /* Check if we might have been invalidated; let the guest retry if so */
    new_pmd = NULL;
} 
  pmd = pmd_offset(pud, gpa);
  -if (pmd_large(*pmd)) {
    -/* Someone else has instantiated a large page here; retry */
    -ret = -EAGAIN;
    -goto out_unlock;
  -} 
  -if (level == 1 && !pmd_none(*pmd)) {
    +if (pmd_is_leaf(*pmd)) {
      unsigned long lgpa = gpa & PMD_MASK;
      +
      +/*
      + * If we raced with another CPU which has just put
      + * a 2MB pte in after we saw a pte page, try again.
      + */
      +if (level == 0 && !new_ptep) {
        +ret = -EAGAIN;
        +goto out_unlock;
      +} 
      +/* Valid 2MB page here already, remove it */
      +old = kvmppc_radix_update_pte(kvm, pmdp_ptep(pmd),
      +  ~0UL, 0, lgpa, PMD_SHIFT);
      +kvmppc_radix_tlbie_page(kvm, lgpa, PMD_SHIFT);
      +if (old & _PAGE_DIRTY) {
        +unsigned long gfn = lgpa >> PAGE_SHIFT;
        +struct kvm_memory_slot *memslot;
        +memslot = gfn_to_memslot(kvm, gfn);
        +if (memslot && memslot->dirty_bitmap)
        +  kvmppc_update_dirty_map(memslot,
        +    gfn, PMD_SIZE);
        +} 
      +} 
      +} else if (level == 1 && !pmd_none(*pmd)) {
      /*
      */
      * There's a page table page here, but we wanted
* to install a large page. Tell the caller and let
@@ -412,28 +439,24 @@
} else {
    page = pages[0];
    pfn = page_to_pfn(page);
    if (PageHuge(page)) {
        page = compound_head(page);
        pte_size <<= compound_order(page);
        if (PageCompound(page)) {
            pte_size <<= compound_order(compound_head(page));
        } /* See if we can insert a 2MB large-page PTE here */
        if (pte_size >= PMD_SIZE &&
            (gpa & PMD_MASK & PAGE_MASK) ==
            (hva & PMD_MASK & PAGE_MASK)) {
            level = 1;
            pfn &= ~((PMD_SIZE >> PAGE_SHIFT) - 1);
        }
    } /* See if we can provide write access */
    if (writing) {
        pgflags |= _PAGE_WRITE;
    }/*
    - * We assume gup_fast has set dirty on the host PTE.
    - */
    pgflags |= _PAGE_WRITE;
} else {
    local_irq_save(flags);
    ptep = find_current_mm_pte(current->mm->pgd,
        hva, NULL, NULL);
    if (ptep && pte_write(*ptep) && pte_dirty(*ptep))
        pgflags |= _PAGE_WRITE;
    local_irq_restore(flags);
    @ @ -459,18 +482,15 @@
    pte = pfu_ppte(pfn, __pgprot(pgflags));
    ret = kvmppc_create_pte(kvm, pte, gpa, level, mmu_seq);
} /* We drop pages[0] here, not page because page might
    * have been set to the head page of a compound, but
    * we have to drop the reference on the correct tail
    * page to match the get inside gup()
- */
- put_page(pages[0]);
+ if (ret && (pgflags & _PAGE_WRITE))
+ set_page_dirty_lock(page);
+ put_page(page);
+
+ if (ret == 0 || ret == -EAGAIN)
+ ret = RESUME_GUEST;
return ret;
}

@@ -489,10 +509,10 @@
  gpa, shift);
kvmpcc_radix_tlbie_page(kvm, gpa, shift);
if ((old & _PAGE_DIRTY) && memslot->dirty_bitmap) {
- unsigned long npages = 1;
+ unsigned long psize = PAGE_SIZE;
  if (shift)
- npages = 1ul << (shift - PAGE_SHIFT);
- kvmppc_update_dirty_map(memslot, gfn, npages);
+ psize = 1ul << shift;
+ kvmppc_update_dirty_map(memslot, gfn, psize);
}
}
return 0;
@@ -573,7 +593,7 @@
  if (npages) {
    set_dirty_bits(map, i, npages);
- i = j + npages;
+ j = i + npages;
  }
}
return 0;
@@ -644,7 +664,7 @@
  continue;
pmd = pmd_offset(pud, 0);
for (im = 0; im < PTRS_PER_PMD; ++im, ++pmd) {
- if (pmd_huge(*pmd)) {
+ if (pmd_is_leaf(*pmd)) {
    pmd_clear(pmd);
    continue;
  }
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_64_vio.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_64_vio.c
@@ -134,7 +134,6 @@
  continue;
kref_put(&stit->kref, kvm_spapr_tce_liobn_put);
-return;
}
}
}
@@ -404,7 +403,7 @@
long ret;

if (WARN_ON_ONCE(iommu_tce_xchg(tbl, entry, &hpa, &dir)))
-return H_HARDWARE;
+return H_TOO_HARD;

if (dir == DMA_NONE)
return H_SUCCESS;
@@ -433,16 +432,16 @@
/* This only handles v2 IOMMU type, v1 is handled via ioctl() */
return H_TOO_HARD;

-if (WARN_ON_ONCE(mm_iommu_ua_to_hpa(mem, ua, &hpa)))
-return H_HARDWARE;
+if (WARN_ON_ONCE(mm_iommu_ua_to_hpa(mem, ua, tbl->it_page_shift, &hpa)))
+return H_TOO_HARD;

if (mm_iommu_mapped_inc(mem))
-return H_CLOSED;
+return H_TOO_HARD;

ret = iommu_tce_xchg(tbl, entry, &hpa, &dir);
if (WARN_ON_ONCE(ret)) {
  mm_iommu_mapped_dec(mem);
-return H_HARDWARE;
+return H_TOO_HARD;
}

if (dir != DMA_NONE)
@@ -566,8 +565,10 @@
if (kvmppc_gpa_to_ua(vcpu->kvm,
  tce & ~(TCE_PCI_READ | TCE_PCI_WRITE),
-&ua, NULL))
-return H_PARAMETER;
+&ua, NULL)) {
+ret = H_PARAMETER;
+goto unlock_exit;
+
}
ret = kvmppc_tce_iommu_map(vcpu->kvm,
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_64_vio_hv.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_64_vio_hv.c
@@ -262,15 +262,16 @@
     if (!mem)
        return H_TOO_HARD;
-	-if (WARN_ON_ONCE_RM(mm_iommu_ua_to_hpa_rm(mem, ua, &hpa)))
+if (WARN_ON_ONCE_RM(mm_iommu_ua_to_hpa_rm(mem, ua, tbl->it_page_shift, &hpa)))
    +return H_TOO_HARD;

     pua = (void *) vmalloc_to_phys(pua);
     if (WARN_ON_ONCE_RM(!pua))
        return H_HARDWARE;

     if (WARN_ON_ONCE_RM(mm_iommu_mapped_inc(mem)))
        -return H_CLOSED;
+    return H_TOO_HARD;

     ret = iommu_tce_xchg_rm(tbl, entry, &hpa, &dir);
     if (ret) {
@@ -431,7 +432,8 @@
         mem = mm_iommu_lookup_rm(vcpu->kvm->mm, ua, IOMMU_PAGE_SIZE_4K);
         if (mem)
             -prereg = mm_iommu_ua_to_hpa_rm(mem, ua, &tces) == 0;
+             prereg = mm_iommu_ua_to_hpa_rm(mem, ua,
+             IOMMU_PAGE_SHIFT_4K, &tces) == 0;
         }

     if (!prereg) {
@@ -446,7 +448,7 @@
         rmap = (void *) vmalloc_to_phys(rmap);
         if (WARN_ON_ONCE_RM(!rmap))
             -return H_HARDWARE;
+         return H_TOO_HARD;

 /*
 * Synchronize with the MMU notifier callbacks in
@@ -473,8 +475,10 @@
     ua = 0;
     if (kvmppc_gpa_to_ua(vcpu->kvm,
         tce & ~(TCE_PCI_READ | TCE_PCI_WRITE),
         &ua, NULL))
         -return H_PARAMETER;
list_for_each_entry_lockless(stit, &stt->iommu_tables, next) {
    ret = kvmppc_rm_tce_iommu_map(vcpu->kvm,
    -- linux-4.15.0.orig/arch/powerpc/kvm/book3s_hv.c
    +++ linux-4.15.0/arch/powerpc/kvm/book3s_hv.c
    @@ -46,6 +46,7 @@
    #include <linux/compiler.h>
    #include <linux/of.h>

    +#include <asm/trace.h>
    #include <asm/reg.h>
    #include <asm/ppc-opcode.h>
    #include <asm/asm-prototypes.h>
    @ @ -103,6 +104,10 @@
    module_param(indep_threads_mode, bool, S_IRUGO | S_IWUSR);
    MODULE_PARM_DESC(indep_threads_mode, "Independent-threads mode (only on POWER9)");

    +static bool one_vm_per_core;
    +module_param(one_vm_per_core, bool, S_IRUGO | S_IWUSR);
    +MODULE_PARM_DESC(one_vm_per_core, "Only run vCPUs from the same VM on a core (requires
    +
    +#ifdef CONFIG_KVM_XICS
    static struct kernel_param_ops module_param_ops = {
        .set = param_set_int,
        @ @ -118,6 +123,9 @@
    MODULE_PARM_DESC(h_ipi_redirect, "Redirect H_IPI wakeup to a free host core");
    #endif

    +/* If set, the threads on each CPU core have to be in the same MMU mode */
    +static bool no_mixing_hpt_and_radix;
    +
    static void kvmppc_end_cede(struct kvm_vcpu *vcpu);
    static int kvmppc_hv_setup_htab_rma(struct kvm_vcpu *vcpu);

    @ @ -398,12 +406,7 @@

    static struct kvm_vcpu *kvmppc_find_vcpu(struct kvm *kvm, int id)
    {
        -struct kvm_vcpu *ret;
        -
        -mutex_lock(&kvm->lock);
        -ret = kvm_get_vcpu_by_id(kvm, id);
        -mutex_unlock(&kvm->lock);

        ret = H_PARAMETER;
        goto unlock_exit;
    +}
- return ret;
+ return kvm_get_vcpu_by_id(kvm, id);
}

static void init_vpa(struct kvm_vcpu *vcpu, struct lppaca *vpa)
@@ -1005,8 +1008,6 @@
 struct kvm *kvm = vcpu->kvm;
 struct kvm_vcpu *tvcpu;

- if (!cpu_has_feature(CPU_FTR_ARCH_300))
- return EMULATE_FAIL;
 if (kvmppc_get_last_inst(vcpu, INST_GENERIC, &inst) != EMULATE_DONE)
 return RESUME_GUEST;
 if (get_op(inst) != 31)
 @@ -1056,6 +1057,7 @@
 return RESUME_GUEST;
 }

+/* Called with vcpu->arch.vcore->lock held */
 static int kvmppc_handle_exit_hv(struct kvm_run *run, struct kvm_vcpu *vcpu,
+ struct task_struct *tsk)
{ 
@@ -1176,7 +1178,10 @@
 swab32(vcpu->arch.emul_inst) :
 vcpu->arch.emul_inst;
 if (vcpu->guest_debug & KVM_GUESTDBG_USE_SW_BP) {
+ /* Need vcore unlocked to call kvmppc_get_last_inst */
+ spin_unlock(&vcpu->arch.vcore->lock);
  r = kvmppc_emulate_debug_inst(run, vcpu);
+ spin_lock(&vcpu->arch.vcore->lock);
 } else {
  kvmppc_core_queue_program(vcpu, SRR1_PROGILL);
  r = RESUME_GUEST;
@@ -1191,13 +1196,31 @@
 */
 case BOOK3S_INTERRUPT_H_FAC_UNAVAIL:
  r = EMULATE_FAIL;
- if (((vcpu->arch.hfscr >> 56) == FSCR_MSGP_LG))
+ if (((vcpu->arch.hfscr >> 56) == FSCR_MSGP_LG) & &
+ cpu_has_feature(CPU_FTR_ARCH_300)) {
+ /* Need vcore unlocked to call kvmppc_get_last_inst */
+ spin_unlock(&vcpu->arch.vcore->lock);
  r = kvmppc_emulate_doorbell_instr(vcpu);
+ spin_lock(&vcpu->arch.vcore->lock);
+ }
  if (r == EMULATE_FAIL) {
  kvmppc_core_queue_program(vcpu, SRR1_PROGILL);
  r = RESUME_GUEST;
} break;
+
+#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+case BOOK3S_INTERRUPT_HV_SOFTPATCH:
+/*
+ * This occurs for various TM-related instructions that
+ * we need to emulate on POWER9 DD2.2. We have already
+ * handled the cases where the guest was in real-suspend
+ * mode and was transitioning to transactional state.
+ */
+r = kvmhv_p9_tm_emulation(vcpu);
+break;
+#endif
+
+case BOOK3S_INTERRUPT_HV_RM_HARD:
+r = RESUME_PASSTHROUGH;
break;
@@ -1258,7 +1281,6 @@
struct kvmppc_vcore *vc = vcpu->arch.vcore;

u64 mask;
-mutex_lock(&kvm->lock);
spin_lock(&vc->lock);
/*
 * If ILE (interrupt little-endian) has changed, update the
@@ -1298,7 +1320,6 @@
mask &= 0xFFFFFFFF;
vc->lpcr = (vc->lpcr & ~mask) | (new_lpcr & mask);
spin_unlock(&vc->lock);
-mutex_unlock(&kvm->lock);
}

static int kvmppc_get_one_reg_hv(struct kvm_vcpu *vcpu, u64 id, 
@@ -1363,7 +1384,14 @@
*val = get_reg_val(id, vcpu->arch.pspb);
break;
case KVM_REG_PPC_DPDES:
-*val = get_reg_val(id, vcpu->arch.vcore->dpdes);
+/*
+ * On POWER9, where we are emulating msgsndp etc.,
+ * we return 1 bit for each vcpu, which can come from
+ * either vcore->dpdes or doorbell_request.
+ */
+*val = get_reg_val(id, vcpu->arch.vcore->dpdes |
+ vcpu->arch.doorbell_request);
break;
case KVM_REG_PPC_VTB:
    *val = get_reg_val(id, vcpu->arch.vcore->vtb);
@@ -1497,6 +1525,10 @@
case KVM_REG_PPC_ARCH_COMPAT:
    *val = get_reg_val(id, vcpu->arch.vcore->arch_compat);
    break;
+    case KVM_REG_PPC_DEC_EXPIRY:
+        *val = get_reg_val(id, vcpu->arch.dec_expires +
+                           vcpu->arch.vcore->tb_offset);
+        break;
    default:
        r = -EINVAL;
    break;
@@ -1724,6 +1756,10 @@
case KVM_REG_PPC_ARCH_COMPAT:
    r = kvmppc_set_arch_compat(vcpu, set_reg_val(id, *val));
    break;
+    case KVM_REG_PPC_DEC_EXPIRY:
+        vcpu->arch.dec_expires = set_reg_val(id, *val) -
+                                  vcpu->arch.vcore->tb_offset;
+        break;
    default:
        r = -EINVAL;
    break;
@@ -1962,7 +1998,9 @@
        * turn off the HFSCR bit, which causes those instructions to trap.
        */
    vcpu->arch.hfscr = mfspr(SPRN_HFSCR);
-    if (!cpu_has_feature(CPU_FTR_TM))
+    if (cpu_has_feature(CPU_FTR_P9_TM_HV_ASSIST))
+        vcpu->arch.hfscr |= HFSCR_TM;
+    else if (!cpu_has_feature(CPU_FTR_TM_COMP))
    vcpu->arch.hfscr &= ~HFSCR_TM;
    if (cpu_has_feature(CPU_FTR_ARCH_300))
    vcpu->arch.hfscr &= ~HFSCR_MSGP;
@@ -1989,7 +2027,7 @@
        mutex_unlock(&kvm->lock);

    if (!vcore)
-        goto free_vcpu;
+        goto uninit_vcpu;

    spin_lock(&vcore->lock);
    ++vcore->num_threads;
@@ -2006,6 +2044,8 @@
    return vcpu;
uninit_vcpu:
+kvm_vcpu_uninit(vcpu);
free_vcpu:
kmem_cache_free(kvm_vcpu_cache, vcpu);
out:
@@ -2226,6 +2266,7 @@
tpaca = &paca[cpu];
tpaca->kvm_hstate.kvm_vcpu = vcpu;
tpaca->kvm_hstate.ptid = cpu - vc->pcpu;
+tpaca->kvm_hstate.fake_suspend = 0;
/* Order stores to hstate.kvm_vcpu etc. before store to kvm_vcore */
smp_wmb();
tpaca->kvm_hstate.kvm_vcore = vc;
@@ -2378,8 +2419,8 @@
static bool subcore_config_ok(int n_subcores, int n_threads)
{
/*
- * POWER9 "SMT4" cores are permanently in what is effectively a 4-way split-core
- * mode, with one thread per subcore.
+ * POWER9 "SMT4" cores are permanently in what is effectively a 4-way
+ * split-core mode, with one thread per subcore.
 */
if (cpu_has_feature(CPU_FTR_ARCH_300))
    return n_subcores <= 4 && n_threads == 1;
@@ -2415,8 +2456,12 @@
if (!cpu_has_feature(CPU_FTR_ARCH_207S))
    return false;
-/* POWER9 currently requires all threads to be in the same MMU mode */
-if (cpu_has_feature(CPU_FTR_ARCH_300) &&
+/* In one_vm_per_core mode, require all vcores to be from the same vm */
+if (one_vm_per_core && vc->kvm != cip->vc[0]->kvm)
+    return false;
+
+/* Some POWER9 chips require all threads to be in the same MMU mode */
+if (no_mixing_hpt_and_radix &&
     kvm_is_radix(vc->kvm) != kvm_is_radix(cip->vc[0]->kvm))
    return false;
@@ -2479,7 +2524,7 @@
if (!spin_trylock(&pvc->lock))
    continue;
prepare_threads(pvc);
-if (!pvc->n_runnable) {
+if (!pvc->n_runnable || !pvc->kvm->arch.mmu_ready) {
    list_del_init(&pvc->preempt_list);
    if (pvc->runner == NULL) {
        pvc->vcore_state = VCORE_INACTIVE;
spin_unlock(&lp->lock);

static bool recheck_signals(struct core_info *cip)
+static bool recheck_signals_and_mmu(struct core_info *cip)
{
    int sub, i;
    struct kvm_vcpu *vcpu;
    +struct kvmppc_vcore *vc;

    -for (sub = 0; sub < cip->n_subcores; ++sub)
    +for (sub = 0; sub < cip->n_subcores; ++sub) {
        vc = cip->vc[sub];
        +if (!vc->kvm->arch.mmu_ready)
            +return true;
        for_each_runnable_thread(i, vcpu, vc)
        if (signal_pending(vcpu->arch.run_task))
            return true;
    }
    return false;
}

/*
 * threads are offline. Also check if the number of threads in this
 * guest are greater than the current system threads per guest.
 * On POWER9, we need to be not in independent-threads mode if
 * - * this is a HPT guest on a radix host.
 * + * this is a HPT guest on a radix host machine where the
 * + * CPU threads may not be in different MMU modes.
 */
-hpt_on_radix = radix_enabled() && !kvm_is_radix(vc->kvm);
+hpt_on_radix = no_mixing_hpt_and_radix && radix_enabled() &&
+!kvm_is_radix(vc->kvm);
if (((controlled_threads > 1) &&
    ((vc->num_threads > threads_per_subcore) || !on_primary_thread())) ||
    (hpt_on_radix && vc->kvm->arch.threads_indep)) {
    local_irq_disable();
    hard_irq_disable();
    if (lazy_irq_pending() || need_resched())
        -recheck_signals(&core_info) || !vc->kvm->arch.mmu_ready) {
            +recheck_signals_and_mmu(&core_info)) {
        local_irq_enable();
        vc->vcore_state = VCORE_INACTIVE;
    /* Unlock all except the primary vcore */
    @ @ -2862,23 +2914,22 @ @
for (sub = 0; sub < core_info.n_subcores; ++sub)  
spin_unlock(&core_info.vc[sub]->lock);

+guest_enter_irqoff();  
+  
+srcu_idx = srcu_read_lock(&vc->kvm->srcu);  
+  
/*  
* Interrupts will be enabled once we get into the guest,  
* so tell lockdep that we're about to enable interrupts.  
*/  
trace_hardirqs_on();

-guest_enter();  
-  
-srcu_idx = srcu_read_lock(&vc->kvm->srcu);  
-  
trap = __kvmppc_vcore_entry();

-srcu_read_unlock(&vc->kvm->srcu, srcu_idx);  
+trace_hardirqs_off();  

-guest_exit();  
+srcu_read_unlock(&vc->kvm->srcu, srcu_idx);

-trace_hardirqs_off();  
set_irq_happened(trap);

spin_lock(&vc->lock);  
@@ -2920,6 +2971,7 @@  
kvmppc_set_host_core(pcpu);

local_irq_enable();  
+guest_exit();

/* Let secondaries go back to the offline loop */  
for (i = 0; i < controlled_threads; ++i) {
@@ -2934,13 +2986,14 @@  
/* make sure updates to secondary vcpu structs are visible now */  
smp_mb();

+preempt_enable();  
+  
for (sub = 0; sub < core_info.n_subcores; ++sub) {
  pvc = core_info.vc[sub];
  post_guest_process(pvc, pvc == vc);
}
spin_lock(&vc->lock);
-preempt_enable();

out:
vc->vcore_state = VCORE_INACTIVE;
@@ -3647,15 +3700,17 @@
goto up_out;

psize = vma_kernel_pagesize(vma);
-porder = __ilog2(psize);

up_read(&current->mm->mmap_sem);

/* We can handle 4k, 64k or 16M pages in the VRMA */
-err = -EINVAL;
-if (!((psize == 0x1000 || psize == 0x10000 ||
-   psize == 0x1000000))
-goto out_srcu;
+if (psize >= 0x1000000)
+psize = 0x1000000;
+else if (psize >= 0x10000)
+psize = 0x10000;
+else
+psize = 0x1000;
+porder = __ilog2(psize);

senc = slb_pgsze_encoding(psize);
kvm->arch.vrma_slb_v = senc | SLB_VSID_B_1T |
@@ -3686,12 +3741,15 @@
/* Must be called with kvm->lock held and mmu_ready = 0 and no vcpus running */
int kvmppc_switch_mmu_to_hpt(struct kvm *kvm)
{
+kvmppc_rmap_reset(kvm);
+kvm->arch.process_table = 0;
+/* Mutual exclusion with kvm_unmap_hva_range etc. */
+spin_lock(&kvm->mmu_lock);
+kvm->arch.radix = 0;
+spin_unlock(&kvm->mmu_lock);
+kvmppc_free_radix(kvm);
+kvmppc_update_lpcr(kvm, LPCR_VPM1, LPCR_VPM1 | LPCR_UPRT | LPCR_GTSE | LPCR_HR);
-kvmppc_rmap_reset(kvm);
-kvm->arch.radix = 0;
-kvm->arch.process_table = 0;
+return 0;
}

@@ -3704,10 +3762,14 @@
if (err)
return err;

+kvmppc_rmap_reset(kvm);
+/* Mutual exclusion with kvm_unmap_hva_range etc. */
+spin_lock(&kvm->mmu_lock);
+kvm->arch.radix = 1;
+spin_unlock(&kvm->mmu_lock);
+spin_lock(kvm);
+kvmppc_free_hpt(kvm);
+kvmppc_update_lpcr(kvm, LPCR_UPRT | LPCR_GTSE | LPCR_HR,
   LPCR_VPM1 | LPCR_UPRT | LPCR_GTSE | LPCR_HR);
-kvm->arch.radix = 1;
return 0;
}

@@ -4432,6 +4494,8 @@
pr_err("KVM-HV: Cannot determine method for accessing XICSn");
return -ENODEV;
}
+/* presence of intc confirmed - node can be dropped again */
+of_node_put(np);
}
#endif

@@ -4448,6 +4512,19 @@
if (kvmppc_radix_possible())
r = kvmppc_radix_init();
+
+/*
+ * POWER9 chips before version 2.02 can't have some threads in
+ * HPT mode and some in radix mode on the same core.
+ */
+if (cpu_has_feature(CPU_FTR_ARCH_300)) {
+unsigned int pvr = mfspr(SPRN_PVR);
+if ((pvr >> 16) == PVR_POWER9 &&
+    ((pvr & 0xe000) == 0 && (pvr & 0xfff) < 0x202) ||
+    ((pvr & 0xe000) == 0x2000 && (pvr & 0xfff) < 0x101))
+no_mixing_hpt_and_radix = true;
+}
+
return r;
}

--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_hv_ras.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_hv_ras.c
@@ -268,17 +268,19 @@
  secondary threads to proceed.

- All secondary threads will eventually call opal hmi handler on
  their exit path.
+ *
+ * Returns 1 if the timebase offset should be applied, 0 if not.
*/

long kvmppc_realmode_hmi_handler(void)
{
    int ptid = local_paca->kvm_hstate.ptid;
    bool resync_req;

    /* This is only called on primary thread. */
    BUG_ON(ptid != 0);
    __this_cpu_inc(irq_stat.hmi_exceptions);

    if (hmi_handle_debugtrig(NULL) >= 0)
        return 1;

    /* By now primary thread has already completed guest->host
       partition switch but haven't signaled secondaries yet.
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_hv_rm_mmu.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_hv_rm_mmu.c
@@ -470,9 +470,18 @@
for (i = 0; i < npages; ++i) {
    asm volatile("ppc_tlbie_5(%0,%1,0,0,0) : :
                     "r" (rbvalues[i]), "r" (kvm->arch.lpid));
-trace_tlbie(kvm->arch.lpid, 0, rbvalues[i],
-kvm->arch.lpid, 0, 0, 0);
 } 

+if (cpu_has_feature(CPU_FTR_P9_TLBIE_STQ_BUG)) {
+    /* Need the extra ptesync to make sure we don't
+       re-order the tlbie
+     */
+     asm volatile("ptesync": :"memory");
+     asm volatile("ppc_tlbie_5(%0,%1,0,0,0) : :
+                     "r" (rbvalues[0]), "r" (kvm->arch.lpid));
+   }
+asm volatile("eieio; tlbsync; ptesync": : "memory");
kvm->arch.tlbie_lock = 0;
} else {
    for (i = 0; i < npages; ++i) {
        asm volatile("ppc_tlbiel(%0,%1,0,0,0) : :
                     "r" (rbvalues[i]), "r" (0));
    }
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_hv_rm_xics.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_hv_rm_xics.c
@@ -61,7 +61,7 @@
hcpu = hcore << threads_shift;
kvmppc_host_rm_ops_hv->rm_core[hcore].rm_data = vcpu;
smp_muxed_ipi_set_message(hcpu, PPC_MSG_RM_HOST_ACTION);
-kvmppc_set_host_ipi(hcpu, 1);
+kvmppc_set_host_ipi(hcpu);
smp_mb();
kvmhv_rm_send_ipi(hcpu);
}
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_hv_rmhandlers.S
+++ linux-4.15.0/arch/powerpc/kvm/book3s_hv_rmhandlers.S
@@ -18,6 +18,7 @@
*/

#include <asm/ppc_asm.h>
+#include <asm/code-patching-asm.h>
#include <asm/kvm_asm.h>
#include <asm/reg.h>
#include <asm/mmu.h>
@@ -39,8 +40,6 @@
END_FTR_SECTION_IFCLR(CPU_FTR_ARCH_300)

#define VCPU_GPRS_TM(reg) (((reg) * ULONG_SIZE) + VCPU_GPR_TM)
-/* Values in HSTATE_NAPPING(r13) */
#define NAPPING_CEDE1
#define NAPPING_NOVCPU2
@@ -56,6 +55,8 @@
#define STACK_SLOT_DAWR(SFS-56)
#define STACK_SLOT_DAWRX(SFS-64)
#define STACK_SLOT_HFSCR(SFS-72)
+#define STACK_SLOT_AMR(SFS-80)
+#define STACK_SLOT_UAMOR(SFS-88)

/*
 * Call kvmppc_hv_entry in real mode.
@@ -320,7 +321,6 @@
stw	tr12, STACK_SLOT_TRAP(r1)
bl	kvmhv_commence_exit
nop

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-lwzr12, STACK_SLOT_TRAP(r1)
bkvmhv_switch_to_host

/*
@@ -617,13 +617,6 @@
lbzr0, KVM_RADIX(r9)
cmpwicr7, r0, 0

-/* Clear out SLB if hash */
-bnecri7, 2f
-lir6,0
-slbmter6, r6
-slbia
-ptesync
-2:
/*
 * POWER7/POWER8 host -> guest partition switch code.
 * We don't have to lock against concurrent tlbies,
@@ -738,19 +731,6 @@
10:cmpdir4, 0
beq kvmppc_primary_no_guest
kvmppc_got_guest:
-
-/* Load up guest SLB entries (N.B. slb_max will be 0 for radix) */
-lwzr5, VCPU_SLB_MAX(r4)
-cmpwir5, 0
-beq9f
-mtctr5
-addir6, r4, VCPU_SLB
-1:ldr8, VCPU_SLB_E(r6)
-ldr9, VCPU_SLB_V(r6)
-slbmter9, r8
-addir6, r6, VCPU_SLB_SIZE
-bdnz1b
-9:
/* Increment yield count if they have a VPA */
ldr3, VCPU_VPA(r4)
cmpdir3, 0
@@ -778,11 +758,9 @@
mfsprrr5, SPRN_TIDR
mfsprrr6, SPRN_PSSCR
mfsprrr7, SPRN_PID
-mfsprrr8, SPRN_IAMR
stdr5, STACK_SLOT_TID(r1)
stdr6, STACK_SLOT_PSSCR(r1)
stdr7, STACK_SLOT_PID(r1)
-stdr8, STACK_SLOT_IAMR(r1)
mfsprrr5, SPRN_HFSCR
std, STACK_SLOT_HFSCR(r1)
END_FTR_SECTION_IFSET(CPU_FTR_ARCH_300)
@@ -790,11 +768,18 @@
mfspr5, SPRN_CIABR
mfspr6, SPRN_DAWR
mfspr7, SPRN_DAWRX
+mfspr8, SPRN_IAMR
std5, STACK_SLOT_CIABR(r1)
std6, STACK_SLOT_DAWR(r1)
std7, STACK SLOT_DAWRX(r1)
+std8, STACK SLOT_IAMR(r1)
END_FTR_SECTION_IFSET(CPU_FTR_ARCH_207S)

+mfspr5, SPRN_AMR
+std5, STACK SLOT_AMR(r1)
+mfspr6, SPRN_UAMOR
+std6, STACK SLOT_UAMOR(r1)
+
BEGIN_FTR_SECTION
/* Set partition DABR */
/* Do this before re-enabling PMU to avoid P7 DABR corruption bug */
@@ -806,12 +791,21 @@
END_FTR_SECTION_IFCLR(CPU_FTR_ARCH_207S)
#endif CONFIG_PPC TRANSACTIONAL_MEM
/gif
+ /* Branch around the call if both CPU_FTR_TM and
+ * CPU_FTR_P9_TM_HV_ASSIST are off.
+ */
BEGIN_FTR_SECTION
+b91f
+END_FTR SECTION(CPU_FTR_TM | CPU_FTR_P9_TM_HV_ASSIST, 0)
/gif
* NOTE THAT THIS TRASHES ALL NON-VOLATILE REGISTERS INCLUDING CR
*/
-bklvmppc_restore_tm
-END_FTR SECTION IFSET(CPU_FTR_TM)
+mr r3, r4
+ld r4, VCPU_MSR(r3)
+bklvmppc_restore_tm_hv
+ldr4, HSTATE_KVM_VCPU(r13)
+91:
#endif

/* Load guest PMU registers */
@@ -934,11 +928,14 @@
mtsprSPRN_ACOP, r6
mtsprSPRN_CSIGR, r7
mtspr SPRN_TACR, r8
+nop
FTR_SECTION_ELSE
/* POWER9-only registers */
ldr5, VCPU_TID(r4)
ldr6, VCPU_PSSCR(r4)
+lbsr8, HSTATE_FAKE_SUSPEND(r13)
ori6, r6, PSSCR_EC@h /* This makes stop trap to HV */
+rldimir6, r8, PSSCR_FAKE_SUSPEND_LG, 63 - PSSCR_FAKE_SUSPEND_LG
ldr7, VCPU_HFSCR(r4)
mtsprSPRN_TIDR, r5
mtsprSPRN_PSSCR, r6
@@ -1018,6 +1015,29 @@
cmpdir3, 512/* 1 microsecond */
blthdec soon
+/* For hash guest, clear out and reload the SLB */
+ldr6, VCPU_KVM(r4)
+lbsr0, KVM_RADIX(r6)
+cmpwir0, 0
+bne9f
+lir6, 0
+slbmter6, r6
+slbia
+ptesync
+
+/* Load up guest SLB entries (N.B. slb_max will be 0 for radix) */
+lwr5, VCPU_SLB_MAX(r4)
+cmpwir5, 0
+beq9f
+mtctr5
+addr6, r4, VCPU_SLB
+1:ldr8, VCPU_SLB_E(r6)
+ldr9, VCPU_SLB_V(r6)
+slbmter9, r8
+addr6, r6, VCPU_SLB_SIZE
+bdnz1b
+9:
+
#ifdef CONFIG_KVM_XICS
/* We are entering the guest on that thread, push VCPU to XIVE */
ldr10, HSTATE_XIVE_TIMA_PHYS(r13)
@@ -1172,6 +1192,7 @@

secondary too late:
lir12, 0
+stwr12, STACK_SLOT_TRAP(r1)
cmpdir4, 0
beq11f
stw12, VCPU_TRAP(r4)
@@ -1193,7 +1214,7 @@
addir3, r4, VCPU_TB_RMEXIT
blkvmhv_accumulate_time
#endif
-guest_exit_cont
+guest_bypass

/***************************************************************************/
*                                                                            *
@@ -1322,6 +1343,12 @@
std3, VCPU_CTR(r9)
std4, VCPU_XER(r9)
+#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/* For softpatch interrupt, go off and do TM instruction emulation */
+cmpwir12, BOOK3S_INTERRUPT_HV_SOFTPATCH
+beqkvmppc_tm_emul
+#endif
+
/* If this is a page table miss then see if it's theirs or ours */
cmpwir12, BOOK3S_INTERRUPT_H_DATA_STORAGE
beqkvmppc_hdsi
@@ -1423,6 +1450,26 @@
bltdeliver_guest_interrupt

guest_exit_cont;/* r9 = vcpu, r12 = trap, r13 = paca */
+/* Save more register state */
+mfddar6
+mfdsisrr7
+stdr6, VCPU_DAR(r9)
+stwr7, VCPU_DSISR(r9)
+/* don't overwrite fault_dar/fault_dsisr if HDSI */
+cmpwir12,BOOK3S_INTERRUPT_H_DATA_STORAGE
+beqmct
+stdr6, VCPU_FAULT_DAR(r9)
+stwr7, VCPU_FAULT_DSISR(r9)
+
+/* See if it is a machine check */
+cmpwir12, BOOK3S_INTERRUPT_MACHINE_CHECK
+beqmachine_check_realmode
+mc_cont:
+#ifdef CONFIG_KVM_BOOK3S_HV_EXIT_TIMING
+addir3, r9, VCPU_TB_RMEXIT
+mrr4, r9
+blkvmhv_accumulate_time
+#endif
ifdef CONFIG_KVM_XICS
/* We are exiting, pull the VP from the XIVE */
lwzr0, VCPU_XIVE_PUSHED(r9)
@@ -1460,55 +1507,17 @@
eieio
1:
#endif /* CONFIG_KVM_XICS */
"/* Save more register state */
mfdr6
-mfdsisr7
-stdr6, VCPU_DAR(r9)
-stwr7, VCPU_DSISR(r9)
"/* don't overwrite fault_dar/fault_dsisr if HDSI */
-cmpwir12, BOOK3S_INTERRUPT_H_DATA_STORAGE
-beqmc_cont
-stdr6, VCPU_FAULT_DAR(r9)
-stwr7, VCPU_FAULT_DSISR(r9)
-
"/* See if it is a machine check */
-cmpwir12, BOOK3S_INTERRUPT_MACHINE_CHECK
-beqmachine_check_realmode
-#ifdef CONFIG_KVM_BOOK3S_HV_EXIT_TIMING
-edit3, r9, VCPU_TB_RMEXIT
-mrr4, r9
-blkvmhv_accumulate_time
#endif

-mr r3, r12
"/* Increment exit count, poke other threads to exit */
-blkvmhv_commence_exit
-nop
-ldr9, HSTATE_KVM_VCPU(r13)
-lwzr12, VCPU_TRAP(r9)
-
"/* Stop others sending VCPU interrupts to this physical CPU */
-lier0, -1
-stwr0, VCPU_CPU(r9)
-stwr0, VCPU_THREAD_CPU(r9)
/+/* Possibly flush the link stack here. */
+n1:nop
+patch_site 1b patch__call_kvm_flush_link_stack

"/* Save guest CTRL register, set runlatch to 1 */
-mfspr6, SPRN_CTRLF
-stwr6, VCPU_CTRL(r9)
-andi.r0,r6,1
-bne4f
-orir6,r6,1
-mtsprSPRN_CTRLLT,r6
-4:
/* Check if we are running hash or radix and store it in cr2 */
/* For hash guest, read the guest SLB and save it away */
ldr5, VCPU_KVM(r9)
lbzr0, KVM_RADIX(r5)
-cmpwicr2,r0,0
-
/* Read the guest SLB and save it away */
li5, 0
-bnecr2, 3/* for radix, save 0 entries */
+cnpwir0, 0
+bne3/* for radix, save 0 entries */
lwzr0, VCPU_SLB_NR(r9)/* number of entries in SLB */
mtctr0
li6,0
@@ -1524,8 +1533,52 @@
addi5,r5,1
2:addir6,r6,1
bdnzlb
/* Finally clear out the SLB */
+li0,0
+slbmet0,r0
+slbia
+plesync
3:stwr5,VCPU_SLB_MAX(r9)

/* load host SLB entries */
+BEGIN_MMU_FTR_SECTION
+b0f
+END_MMU_FTR_SECTION_IFSET(MMU_FTR_TYPE_RADIX)
+ldr8,PACA_SLBSHADOWPTR(r13)
+
+.reptSLB_NUM_BOLTED
+li3, SLBSHADOW_SAVEAREA
+LDX_BEr5, r8, r3
+addir3, r3, 8
+LDX_BEr6, r8, r3
+andis.r7,r5,SLB_ESID_V@h
+beq1f
+slbmet6,r5
+1:addir8,r8,16
+.endr
+0:
+
guest_bypass:
+stwr12, STACK_SLOT_TRAP(r1)

---
+mr r3, r12
+/* Increment exit count, poke other threads to exit */
+blkvmhv_commence_exit
+nop
+ldr9, HSTATE_KVM_VCPU(r13)
+
+/* Stop others sending VCPU interrupts to this physical CPU */
+lrir0, -1
+stwr0, VCPU_CPU(r9)
+stwr0, VCPU_THREAD_CPU(r9)
+
+/* Save guest CTRL register, set runlatch to 1 */
+mfspr6,SPRN_CTRLF
+stwr6, VCPU_CTRL(r9)
+andi.r0,r6,1
+bne4f
+orir6,r6,1
+mtsprSPRN_CTRLT,r6
+4:
+
+/
+/* Save the guest PURR/SPURR */
+@@ -1618,22 +1671,25 @@
mtsprSPRN_PSPB, r0
+mtsprSPRN_WORT, r0
-BEGIN_FTR_SECTION
+mtsprSPRN_IAMR, r0
+mtsprSPRN_TSCCR, r0
+/
+/* Set MMCRS to 1<<31 to freeze and disable the SPMC counters */
+lrir0, 1
+sluir0, r0, 31
+mtsprSPRN_MMCRS, r0
-END_FTR_SECTION_IFCLR(CPU_FTR_ARCH_300)
-8:
+
-/* Save and reset AMR and UAMOR before turning on the MMU */
+-/* Save and restore AMR, IAMR and UAMOR before turning on the MMU */
+ldr8, STACK_SLOT_IAMR(r1)
+mtsprSPRN_IAMR, r8
+
+-8:/
+/* Power7 jumps back in here */
mfspr5,SPRN_AMR
-mfspr5,SPRN_UAMOR
+stdr5, VCPU_AMR(r9)
+stdr6, VCPU_UAMOR(r9)
+lrir6,0
+mtsprSPRN_AMR,r6
+ldr5,STACK_SLOT_AMR(r1)
+ldr6, STACK_SLOT_UAMOR(r1)
+mtsprSPRN_AMR, r5
mtsprSPRN_UAMOR, r6

/* Switch DSCR back to host value */
@@ -1677,12 +1733,21 @@
blkvmppc_save_fp

#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/
+ * Branch around the call if both CPU_FTR_TM and
+ * CPU_FTR_P9_TM_HV_ASSIST are off.
+ */
BEGIN_FTR_SECTION
+b91f
+END_FTR_SECTION(CPU_FTR_TM | CPU_FTR_P9_TM_HV_ASSIST, 0)
/*
 * NOTE THAT THIS TRASHES ALL NON-VOLATILE REGISTERS INCLUDING CR
 */
-blkvmppc_save_tm
-END_FTR_SECTION_IFSET(CPU_FTR_TM)
+mr r3, r9
+ld r4, VCPU_MSR(r3)
+blkvmppc_save_tm_mv
+ldr9, HSTATE_KVM_VCPU(r13)
+91:
#endif

/* Increment yield count if they have a VPA */
@@ -1789,11 +1854,9 @@
ldr5, STACK_SLOT_TID(r1)
ldr6, STACK_SLOT_PSSCR(r1)
ldr7, STACK_SLOT_PID(r1)
-lldr8, STACK_SLOT_IAMR(r1)
mtsprSPRN_TIDR, r5
mtsprSPRN_PSSCR, r6
mtsprSPRN_PID, r7
-_mtsprSPRN_IAMR, r8
END_FTR_SECTION_IFSET(CPU_FTR_ARCH_300)

#ifdef CONFIG_PPC_RADIX_MMU
@@ -1803,7 +1866,7 @@
ldr5, VCPU_KVM(r9)
lbkr0, KVM_RADIX(r5)
cmpwicr2, r0, 0
-becqr2, 3f
+becqr2, 4f

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/* Radix: Handle the case where the guest used an illegal PID */
LOAD_REG_ADDR(r4, mmu_base_pid)
@@ -1839,19 +1902,14 @@
BEGIN_FTR_SECTION
PPC_INVALIDATE_ERAT
END_FTR_SECTION_IFSET(CPU_FTR_POWER9_DD1)
-b4f
+4:
#endif /* CONFIG_PPC_RADIX_MMU */

-/* Hash: clear out SLB */
-3:li5,0
-\slbmter5,r5
-\slbia
-\ ptesync
-4:
-/*
- * POWER7/POWER8 guest -> host partition switch code.
- * We don't have to lock against tlbies but we do
- * have to coordinate the hardware threads.
-+ * Here STACK_SLOT_TRAP(r1) contains the trap number.
-*/
kvmhv_switch_to_host:
/* Secondary threads wait for primary to do partition switch */
@@ -1904,20 +1962,21 @@
END_FTR_SECTION_IFSET(CPU_FTR_ARCH_207S)

/* If HMI, call kvmppc_realmode_hmi_handler() */
+lwzr12, STACK_SLOT_TRAP(r1)
cmpwir12, BOOK3S_INTERRUPT_HMI
bnc27f
blkvmppc_realmode_hmi_handler
nop
-\lir12, BOOK3S_INTERRUPT_HMI
+cmpdir3, 0
-/*
- * At this point kvmppc_realmode_hmi_handler would have resync-ed
- * the TB. Hence it is not required to subtract guest timebase
- * offset from timebase. So, skip it.
-+ * At this point kvmppc_realmode_hmi_handler may have resync-ed
-+ * the TB, and if it has, we must not subtract the guest timebase
-+ * offset from the timebase. So, skip it.
- *
- * Also, do not call kvmppc_subcore_exit_guest() because it has
- * been invoked as part of kvmppc_realmode_hmi_handler().
-*/
-b30f
+beq30f
27:
/* Subtract timebase offset from timebase */
@@ -1961,10 +2020,8 @@
    lwz	 r8, KVM_SPLIT_DO_RESTORE(r3)
    cmpwi	 r8, 0
    beq	 47f
-    stw	 r12, STACK_SLOT_TRAP(r1)
    bl	 kvmhv_p9_restore_lpcr
    nop
-    lwz	 r12, STACK_SLOT_TRAP(r1)
    b48f
47:
    END_FTR_SECTION_IFSET(CPU_FTR_ARCH_300)
@@ -1972,23 +2029,6 @@
    mtspr	 SPRN_LPCR,r8
    isync
    48:
-/* load host SLB entries */
-    BEGIN_MMU_FTR_SECTION
-    b0f
-    END_MMU_FTR_SECTION_IFSET(MMU_FTR_TYPE_RADIX)
-    ldr8,PACA_SLBSHADOWPTR(r13)
-    -.reptSLB_NUM_BOLTED
-    -lir3, SLBSHADOW_SAVEAREA
-    -LDX_BEr5, r8, r3
-    -addr3, r3, 8
-    -LDX_BEr6, r8, r3
-    -andis,r7,r5,SLB_ESID_V@h
-    -beq1f
-    -slbmier6,r5
-    -1:addr8,r8,16
-    -.endr
-0:
    #ifdef CONFIG_KVM_BOOK3S_HV_EXIT_TIMING
    /* Finish timing, if we have a vcpu */
    ldr4, HSTATE_KVM_VCPU(r13)
    @@ -2002,11 +2042,71 @@
lr0, KVM_GUEST_MODE_NONE
    stbr0, HSTATE_IN_GUEST(r13)
+    lwzr12, STACK_SLOT_TRAP(r1)/* return trap # in r12 */
    ldr0, SFS+PPC_LR_STKOFF(r1)
    addir1, r1, SFS
    mtlr0
    blr
+.align 32
+.global kvm_flush_link_stack
+kvm_flush_link_stack:
+/* Save LR into r0 */
+mflr0
+
+/* Flush the link stack. On Power8 it's up to 32 entries in size. */
+.rept 32
+bl+4
+.endr
+
+/* And on Power9 it's up to 64. */
+BEGIN_FTR_SECTION
+.rept 32
+bl+4
+.endr
+END_FTR_SECTION_IFSET(CPU_FTR_ARCH_300)
+
+/* Restore LR */
+mflr0
+blr
+
+#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/*
+ * Softpatch interrupt for transactional memory emulation cases
+ * on POWER9 DD2.2. This is early in the guest exit path - we
+ * haven't saved registers or done a treclaim yet.
+ */
+kvmppc_tm_emul:
+/* Save instruction image in HEIR */
+mfspr3, SPRN_HEIR
+stw3, VCPU_HEIR(r9)
+
+/*
+ * The cases we want to handle here are those where the guest
+ * is in real suspend mode and is trying to transition to
+ * transactional mode.
+ */
+lbr0, HSTATE_FAKE_SUSPEND(r13)
+cmpwir0, 0/* keep exiting guest if in fake suspend */
+bneguest_exit_cont
+rdicl r11, 64 - MSR_TS_S_LG, 62
+cmpwir3, 1/* or if not in suspend state */
+bneguest_exit_cont
+
+/* Call C code to do the emulation */
+mr3, r9
+blkvmhv_p9_tm_emulation_early
+nop
+ldr9, HSTATE_KVM_VCPU(r13)
+ldr12, BOOK3S_INTERRUPT_HV_SOFTPATCH
+cmpwir3, 0
+beq guest_exit_cont /* continue exiting if not handled */
+ldr10, VCPU_PC(r9)
+ldr11, VCPU_MSR(r9)
+bfast_interrupt_c_return /* go back to guest if handled */
+#endif /* CONFIG_PPC_TRANSACTIONAL_MEM */
+
/*
 * Check whether an HDSI is an HPTE not found fault or something else.
 * If it is an HPTE not found fault that is due to the guest accessing
@@ -2540,13 +2640,20 @@
 blkvmppc_save_fp

 #ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/*
+ * Branch around the call if both CPU_FTR_TM and
+ * CPU_FTR_P9_TM_HV_ASSIST are off.
+ */
+BEGIN_FTR_SECTION
+b91f
+END_FTR_SECTION(CPU_FTR_TM | CPU_FTR_P9_TM_HV_ASSIST, 0)
+/*
+ * NOTE THAT THIS TRASHES ALL NON-VOLATILE REGISTERS INCLUDING CR
+ */
-ldr9, HSTATE_KVM_VCPU(r13)
-bclkvmppc_save_tm
-END_FTR_SECTION_IFSET(CPU_FTR_TM)
+ldr3, HSTATE_KVM_VCPU(r13)
+ldr r4, VCPU_MSR(r3)
+blkvmppc_save_tm_hv
+91:
+#endif
+
@@ -2653,12 +2760,21 @@
+#endif

 #ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+/*
+ * Branch around the call if both CPU_FTR_TM and
+ * CPU_FTR_P9_TM_HV_ASSIST are off.
+ */
+BEGIN_FTR_SECTION
+b91f

+END_FTR_SECTION(CPU_FTR_TM | CPU_FTR_P9_TM_HV_ASSIST, 0)
/*
 * NOTE THAT THIS TRASHES ALL NON-VOLATILE REGISTERS INCLUDING CR
 */
-blkvmppc_restore_tm
-END_FTR_SECTION_IFSET(CPU_FTR_TM)
+mr r3, r4
+ld r4, VCPU_MSR(r3)
+blkvmppc_restore_tm_hv
+ldr4, HSTATE_KVM_VCPU(r13)
+-91:
#endif
/* load up FP state */
@@ -2953,13 +3069,25 @@
#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
/*
 * Save transactional state and TM-related registers.
- * Called with r9 pointing to the vcpu struct.
+ * Called with r3 pointing to the vcpu struct and r4 containing
+ * the guest MSR value.
 * This can modify all checkpointed registers, but
- * restores r1, r2 and r9 (vcpu pointer) before exit.
+ * restores r1 and r2 before exit.
 */
-kvmppc_save_tm:
+kvmppc_save_tm_hv:
+/* See if we need to handle fake suspend mode */
+BEGIN_FTR_SECTION
+blkvmppc_save_tm
+END_FTR_SECTION_IFCLR(CPU_FTR_P9_TM_HV_ASSIST)
+
+lbzr0, HSTATE_FAKE_SUSPEND(r13) /* Were we fake suspended? */
+cmpwir0, 0
+beqkvmppc_save_tm
+
+/* The following code handles the fake_suspend = 1 case */
mflr0
stdr0, PPC_LR_STKOFF(r1)
+stdur1, -PPC_MIN_STKFRM(r1)

/* Turn on TM. */
mfmsr8
@@ -2967,54 +3095,30 @@
rdlirmr8, r0, MSR_TM_LG, 63-MSR_TM_LG
mtmsdr8

-ldr5, VCPU_MSR(r9)
-rdicl r5, r5, 64 - MSR_TS_S_LG, 62
-bleqf/* TM not active in guest. */
+rdicl r8, r8, 64 - MSR_TS_S_LG, 62 /* Did we actually hrfd? */
+beq4f
+BEGIN_FTR_SECTION
+blpnuv_power9_force_smt4_catch
+END_FTR_SECTION_IFSET(CPU_FTR_P9_TM_XER_SO_BUG)
+nop

stdr1, HSTATE_HOST_R1(r13)
-lir3, TM_CAUSE_KVM_RESCHED

-/* Clear the MSR RI since r1, r13 are all going to be foobar. */
+/* Clear the MSR RI since r1, r13 may be foobar. */
lir5, 0
mtmsrdr5, 1

-/* All GPRs are volatile at this point. */
+/* We have to treclaim here because that's the only way to do S->N */
+lir3, TM_CAUSE_KVM_RESCHED
TRECLAIM(R3)

-/* Temporarily store r13 and r9 so we have some regs to play with */
-SET_SCRATCH0(r13)
+/*
+ * We were in fake suspend, so we are not going to save the
+ * register state as the guest checkpointed state (since
+ * we already have it), therefore we can now use any volatile GPR.
+ */
+/* Reload PACA pointer, stack pointer and TOC. */
GET_PACA(r13)
-stdr9, PACATMSCRATCH(r13)
-ldr9, HSTATE_KVM_VCPU(r13)
-
-/* Get a few more GPRs free. */
-stdr29, VCPU_GPRS_TM(29)(r9)
-stdr30, VCPU_GPRS_TM(30)(r9)
-stdr31, VCPU_GPRS_TM(31)(r9)
-
-/* Save away PPR and DSCR soon so don't run with user values. */
-mfspr31, SPRN_PPR
-HMT_MEDIUM
-mfspr30, SPRN_DSCR
-ldr29, HSTATE_DSCR(r13)
-mtsprSPRN_DSCR, r29
-
-/* Save all but r9, r13 & r29-r31 */
-reg = 0
.rept29
.if (reg != 9) && (reg != 13)
  stdreg, VCPU_GPRS_TM(reg)(r9)
.endif
.reg = reg + 1
.endr
/* ... now save r13 */
GET_SCRATCH0(r4)
stdr4, VCPU_GPRS_TM(13)(r9)
/* ... and save r9 */
ldr4, PACATMSCRATCH(r13)
stdr4, VCPU_GPRS_TM(9)(r9)
/* Reload stack pointer and TOC. */
ldr1, HSTATE_HOST_R1(r13)
ldr2, PACATOC(r13)
@@ -3022,170 +3126,92 @@
li5, MSR_RI
mtmsrdr5, 1
/* Save away checkpinted SPRs. */
stdr31, VCPU_PPR_TM(r9)
stdr30, VCPU_DSCR_TM(r9)
mflr5
mfcrr6
mfcctr7
mfspr8, SPRN_AMR
mfspr10, SPRN_TAR
mfxerr11
stdr5, VCPU_LR_TM(r9)
stwr6, VCPU_CR_TM(r9)
stdr7, VCPU_CTR_TM(r9)
stdr8, VCPU_AMR_TM(r9)
stdr10, VCPU_TAR_TM(r9)
stdr11, VCPU_XER_TM(r9)
+HMT_MEDIUM
+ldr6, HSTATE_DSCR(r13)
+mtsprSPRN_DSCR, r6
+BEGIN_FTR_SECTION_NESTED(96)
+blpnv_power9_force_smt4_release
+END_FTR_SECTION_NESTED(CPU_FTR_P9_TM_XER_SO_BUG, CPU_FTR_P9_TM_XER_SO_BUG, 96)
+nop
/* Restore r12 as trap number. */
 lwzr12, VCPU_TRAP(r9)
4:
+ mfspr3, SPRN_PSSCR
/* PSSCR_FAKE_SUSPEND is a write-only bit, but clear it anyway */
+li r0, PSSCR_FAKE_SUSPEND
+andcr3, r3, r0
+mtspr SPRN_PSSCR, r3

-/* Save FP/VSX. */
-addi3, r9, VCPU_FPRS_TM
-blstore_fp_state
-addi3, r9, VCPU_VRS_TM
-blstore_vr_state
-mfspr6, SPRN_VRSAVE
-stwr6, VCPU_VRSAVE_TM(r9)
-1:
-/*
- * We need to save these SPRs after the treclaim so that the software
- * error code is recorded correctly in the TEXASR. Also the user may
- * change these outside of a transaction, so they must always be
- * context switched.
- */
+/* Don't save TEXASR, use value from last exit in real suspend state */
+ldr9, HSTATE_KVM_VCPU(r13)
mfspr5, SPRN_TFHAR
mfspr6, SPRN_TFIAR
-mfspr7, SPRN_TEXASR
stdr5, VCPU_TFHAR(r9)
stdr6, VCPU_TFIAR(r9)
-stdr7, VCPU_TEXASR(r9)

+addi1, r1, PPC_MIN_STKFRM
ldr0, PPC_LR_STKOFF(r1)
mtlr0
blr

/*
 * Restore transactional state and TM-related registers.
- * Called with r4 pointing to the vcpu struct.
+ * Called with r3 pointing to the vcpu struct
+ * and r4 containing the guest MSR value.
 * This potentially modifies all checkpointed registers.
- * It restores r1, r2, r4 from the PACA.
+ * It restores r1 and r2 from the PACA.
*/
-kvmppc_restore_tm:
+kvmppc_restore_tm_hv:
+/*
+ * If we are doing TM emulation for the guest on a POWER9 DD2,
+ * then we don't actually do a trechkpt -- we either set up
+ * fake-suspend mode, or emulate a TM rollback.
+ */
+BEGIN_FTR_SECTION
+bknvppc_restore_tm
+END_FTR_SECTION_IFCLR(CPU_FTR_P9_TM_HV_ASSIST)
mfftr0
std0, PPC_LR_STKOFF(r1)

-/* Turn on TM/FP/VSX/VMX so we can restore them. */
+lir0, 0
+stbr0, HSTATE_FAKE_SUSPEND(r13)
+
+/* Turn on TM so we can restore TM SPRs */
mfmsrr5
-lir6, MSR_TM >> 32
-sdir6, r6, 32
-orr5, r5, r6
-orir5, r5, MSR_FP
-orisr5, r5, (MSR_VEC | MSR_VSX)@h
+lir0, 1
+rldimr5, r0, MSR_TM_LG, 63-MSR_TM_LG
mtmsrd5

/ *
* The user may change these outside of a transaction, so they must
* always be context switched.
*/
-ldr5, VCPU_TFHAR(r4)
-ldr6, VCPU_TFIAR(r4)
-ldr7, VCPU_TEXASR(r4)
+ldr5, VCPU_TFHAR(r3)
+ldr6, VCPU_TFIAR(r3)
+ldr7, VCPU_TEXASR(r3)
mtsprSPRN_TFHAR, r5
mtsprSPRN_TFIAR, r6
mtsprSPRN_TEXASR, r7

-ldr5, VCPU_MSR(r4)
-rldicl. r5, r5, 64 - MSR_TS_S_LG, 62
+rldicl. r5, r4, 64 - MSR_TS_S_LG, 62
beqlr/* TM not active in guest */
-stdr1, HSTATE_HOST_R1(r13)

-/* Make sure the failure summary is set, otherwise we'll program check
- * when we trechkpt. It's possible that this might have been not set
- * on a kvmppc_set_one_reg() call but we shouldn't let this crash the
- * host.
- */
+/* Make sure the failure summary is set */
# Load up the checkpointed state for the guest.

- * We need to do this early as it will blow away any GPRs, VSRs and some SPRs.

- */

- mrr31, r4
- addi3, r31, VCPU_FPRS_TM
- bload_fp_state
- addi3, r31, VCPU_VRS_TM
- bload_vr_state
- mrr4, r31
- lwzr7, VCPU_VRSAVE_TM(r4)
- mtsprSPRN_VRSAVE, r7

- ldr5, VCPU_LR_TM(r4)
- lwzr6, VCPU_CR_TM(r4)
- ldr7, VCPU_CTR_TM(r4)
- ldr8, VCPU_AMR_TM(r4)
- ldr9, VCPU_TAR_TM(r4)
- ldr10, VCPU_XER_TM(r4)
- mtlrr5
- mtcr6
- mtctr7
- mtsprSPRN_AMR, r8
- mtsprSPRN_TAR, r9
- mtxerr10
- */

- * Load up PPR and DSCR values but don’t put them in the actual SPRs
- * till the last moment to avoid running with userspace PPR and DSCR for too long.
- */

- ldr29, VCPU_DSCR_TM(r4)
- ldr30, VCPU_PPR_TM(r4)

- stdr2, PACATMSCRATCH(r13) /* Save TOC */

- */ Clear the MSR RI since r1, r13 are all going to be foobar. */

- lir5, 0
- mtsmsdr5, 1

- */ Load GPRs r0-r28 */

- reg = 0
- .rept29
ldreg, VCPU_GPRS_TM(reg)(r31)
-reg = reg + 1
.endr

mtsprSPRN_DSCR, r29
mtsprSPRN_PPR, r30

/* Load final GPRs */
ld29, VCPU_GPRS_TM(29)(r31)
ld30, VCPU_GPRS_TM(30)(r31)
ld31, VCPU_GPRS_TM(31)(r31)

/* TM checkpointed state is now setup. All GPRs are now volatile. */
TRECHKPT

/* Now let's get back the state we need. */
HMT_MEDIUM
GET_PACA(r13)
ldr29, HSTATE_DSCR(r13)
mtsprSPRN_DSCR, r29
ldr4, HSTATE_KVM_VCPU(r13)
ldr1, HSTATE_HOST_R1(r13)
ldr2, PACATMSCRATCH(r13)

/* Set the MSR RI since we have our registers back. */
lr5, MSR RI
mtmsrdr5, 1

ldr0, PPC_LR_STKOFF(r1)
+cmpwir5, 1/* check for suspended state */
bgt10f
+stbr5, HSTATE_FAKE_SUSPEND(r13)
+bf1/* and return */
+10:stdur1, -PPC_MIN_STKFRM(r1)
+/* guest is in transactional state, so simulate rollback */
+blkvmhv_emulate_tm_rollback
+nop
+addr1, r1, PPC_MIN_STKFRM
+9:ldr0, PPC_LR_STKOFF(r1)
mtlrr0
blr
-#endif
+##endif /* CONFIG_PPC_TRANSACTIONAL_MEM */

/*
 * We come here if we get any exception or interrupt while we are
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_hv_tm.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_hv_tm.c
@@ -0,0 +1,234 @@
+/*
+ * Copyright 2017 Paul Mackerras, IBM Corp. <paulus@au1.ibm.com>
+*
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License, version 2, as
+ * published by the Free Software Foundation.
+ */
+
+#define pr_fmt(fmt) KBUILD_MODNAME ": " fmt
+
+#include <linux/kvm_host.h>
+
+#include <asm/kvm_ppc.h>
+#include <asm/kvm_book3s.h>
+#include <asm/kvm_book3s_64.h>
+#include <asm/reg.h>
+#include <asm/ppc-opcode.h>
+
+static void emulate_tx_failure(struct kvm_vcpu *vcpu, u64 failure_cause)
+{
+u64 texasr, tfiar;
+u64 msr = vcpu->arch.shregs.msr;
+
+tfiar = vcpu->arch.pc & ~0x3ull;
+texasr = (failure_cause << 56) | TEXASR_ABORT | TEXASR_FS | TEXASR_EXACT;
+if (MSR_TM_SUSPENDED(vcpu->arch.shregs.msr))
+texasr |= TEXASR_SUSP;
+if (msr & MSR_PR) {
+texasr |= TEXASR_PR;
+tfiar |= 1;
+}
+vcpu->arch.tfiar = tfiar;
+/* Preserve ROT and TL fields of existing TEXASR */
+vcpu->arch.texasr = (vcpu->arch.texasr & 0x3ffffff) | texasr;
+}
+
+/*
+ * This gets called on a softpatch interrupt on POWER9 DD2.2 processors.
+ * We expect to find a TM-related instruction to be emulated. The
+ * instruction image is in vcpu->arch.emul_inst. If the guest was in
+ * TM suspended or transactional state, the checkpointed state has been
+ * reclaimed and is in the vcpu struct. The CPU is in virtual mode in
+ * host context.
+ */
+int kvmhv_p9_tm_emulation(struct kvm_vcpu *vcpu)
+{
+u32 instr = vcpu->arch.emul_inst;

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```c
+u64 msr = vcpu->arch.shregs.msr;
+u64 newmsr, bescr;
+int ra, rs;
+
+/*
+ * rfid, rfebb, and mtmsrd encode bit 31 = 0 since it's a reserved bit
+ * in these instructions, so masking bit 31 out doesn't change these
+ * instructions. For treclaim., tsr., and trechkpt. instructions if bit
+ * 31 = 0 then they are per ISA invalid forms, however P9 UM, in section
+ * 4.6.10 Book II Invalid Forms, informs specifically that ignoring bit
+ * 31 is an acceptable way to handle these invalid forms that have
+ * bit 31 = 0. Moreover, for emulation purposes both forms (w/ and wo/
+ * bit 31 set) can generate a softpatch interrupt. Hence both forms
+ * are handled below for these instructions so they behave the same way.
+ */
+switch (instr & PO_XOP_OPCODE_MASK) {
+case PPC_INST_RFID:
+/* XXX do we need to check for PR=0 here? */
+newmsr = vcpu->arch.shregs.srr1;
+/* should only get here for Sx -> T1 transition */
+WARN_ON_ONCE(!(MSR_TM_SUSPENDED(msr) &&
+              MSR_TM_TRANSACTIONAL(newmsr) &&
+              MSR_TM_TRANSITIONAL(newmsr) &&
+              (newmsr & MSR_TM));
+newmsr = sanitize_msr(newmsr);
+vcpu->arch.shregs.msr = newmsr;
+vcpu->arch.cfar = vcpu->arch.pc - 4;
+vcpu->arch.pc = vcpu->arch.shregs.srr0;
+return RESUME_GUEST;
+
+case PPC_INST_RFEBB:
+if ((msr & MSR_PR) && (vcpu->arch.vcore->pcr & PCR_ARCH_206)) {
+/* generate an illegal instruction interrupt */
+kvmppc_core_queue_program(vcpu, SRR1_PROGILL);
+return RESUME_GUEST;
+}
+/* check EBB facility is available */
+if (!(vcpu->arch.hfsr & HFSCR_EBB)) {
+/* generate an illegal instruction interrupt */
+kvmppc_core_queue_program(vcpu, SRR1_PROGILL);
+return RESUME_GUEST;
+}
+if (((msr & MSR_PR) && !(vcpu->arch.fscr & FSCR_EBB)) {
+/* generate a facility unavailable interrupt */
+vcpu->arch.fscr = (vcpu->arch.fscr & ~(0xffull << 56)) |
+((u64)FSCR_EBB_LG << 56);
+kvmppc_book3s_queue_irqprio(vcpu, BOOK3S_INTERRUPT_FAC_UNAVAIL);
+return RESUME_GUEST;
+}
+```

+bescr = vcpu->arch.bescr;
+/* expect to see a S->T transition requested */
+WARN_ON_ONCE(!!(MSR_TM_SUSPENDED(msr) &&
+    ((bescr >> 30) & 3) == 2));
+if (instr & (1 << 11))
+bescr |= BESCR_GE;
+vcpu->arch.bescr = bescr;
+msr = (msr & ~MSR_TS_MASK) | MSR_TS_T;
+vcpu->arch.shregs.msr = msr;
+vcpu->arch.cfar = vcpu->arch.pc - 4;
+vcpu->arch.pc = vcpu->arch.ebbrr;
+return RESUME_GUEST;
+
case PPC_INST_MTMSRD:
+/* XXX do we need to check for PR=0 here? */
+rs = (instr >> 21) & 0x1f;
+newmsr = kvmppc_get_gpr(vcpu, rs);
+/* check this is a Sx -> T1 transition */
+WARN_ON_ONCE(!(MSR_TM_SUSPENDED(msr) &&
+    MSR_TM_TRANSACTIONAL(newmsr) &&
+    (newmsr & MSR_TM));
+/* mtmsrd doesn't change LE */
+newmsr = (newmsr & ~MSR_LE) | (msr & MSR_LE);
+newmsr = sanitize_msr(newmsr);
+vcpu->arch.shregs.msr = newmsr;
+return RESUME_GUEST;
+
+case PPC_INST_TSR & PO_XOP_OPCODE_MASK):
+/* check for PR=1 and arch 2.06 bit set in PCR */
+if ((msr & MSR_PR) && (vcpu->arch.vcore->pcr & PCR_ARCH_206)) {
+    /* generate an illegal instruction interrupt */
+kvmppc_core_queue_program(vcpu, SRR1_PROGILL);
+    return RESUME_GUEST;
+
+    /* ignore bit 31, see comment above */
+}
+if (!!(vcpu->arch.hfscr & HFSCR_TM)) {
+    /* generate an illegal instruction interrupt */
+kvmppc_core_queue_program(vcpu, SRR1_PROGILL);
+    return RESUME_GUEST;
+}
+if (!!(msr & MSR_TM)) {
    /* generate a facility unavailable interrupt */
+vcpu->arch.fscr = (vcpu->arch.fscr & ~(0xffull << 56)) |
+(u64)FSCR_TM_LG << 56);
+kvmppc_book3s_queue_irqprio(vcpu,
+BOOK3S_INTERRUPT_FAC_UNAVAIL);
return RESUME_GUEST;
+
/* Set CR0 to indicate previous transactional state */
+*vcpu->arch.cr = (vcpu->arch.cr & 0xffffff0) | 
+(msr & MSR_TS_MASK | MSR_TS_S | MSR_TS_T); 
+*/
+
/* L=1 => tresume, L=0 => tsuspend */
+*/
+if (instr & (1 << 21)) {
+if (MSR_TM_SUSPENDED(msr))
+msr = (msr & ~MSR_TS_MASK) | MSR_TS_T;
+} else {
+if (MSR_TM_TRANSACTIONAL(msr))
+msr = (msr & ~MSR_TS_MASK) | MSR_TS_S;
+}
+vcpu->arch.shregs.msr = msr;
+return RESUME_GUEST;
+
/* ignore bit 31, see comment above */
+case (PPC_INST_TRECLAIM & PO_XOP_OPCODE_MASK):
+*/
+check for TM disabled in the HFSCR or MSR */
+if (!vor arch.hfscr & HFSCR_TM)) {
+*/
+generate an illegal instruction interrupt */
+kvmppc_core_queue_program(vcpu, SRR1_PROGILL);
+*/
+return RESUME_GUEST;
+}
+if (!(msr & MSR_TM)) {
+*/
+generate a facility unavailable interrupt */
+vcpu->arch.fscr = (vcpu->arch.fscr & ~(0xffull << 56)) |
+((u64)FSCR_TM_LG << 56);
+kvmppc_book3s_queue_irqprio(vcpu, 
+BOOK3S_INTERRUPT_FAC_UNAVAIL);
+*/
+return RESUME_GUEST;
+}
+*/
+If no transaction active, generate TM bad thing */
+if (!MSR_TM_ACTIVE(msr)) {
+kvmppc_core_queue_program(vcpu, SRR1_PROGTM);
+*/
+return RESUME_GUEST;
+}
+*/
+If failure was not previously recorded, recompute TEXASR */
+if !(vcpu->arch.orig_texasr & TEXASR_FS)) {
+ra = (instr >> 16) & 0x1f;
+if (ra)
+ra = kvmppc_get_gpr(vcpu, ra) & 0xff;
+emulate_tx_failure(vcpu, ra);
+*/
+copy_from_checkpoint(vcpu);
+}
+*/
+Set CR0 to indicate previous transactional state */
vcpu->arch.cr = (vcpu->arch.cr & 0x0fffffff) | 
+((msr & MSR_TS_MASK) >> MSR_TS_S_LG) << 28); 
+vcpu->arch.shregs.msr &= ~MSR_TS_MASK; 
+return RESUME_GUEST; 
+ /* ignore bit 31, see comment above */ 
+case (PPC_INST_TRECHKPT & PO_XOP_OPCODE_MASK): 
+/* XXX do we need to check for PR=0 here? */ 
+/* check for TM disabled in the HFSCR or MSR */ 
+if (!(vcpu->arch.hfscr & HFSCR_TM)) { 
+/* generate an illegal instruction interrupt */ 
+kvmppc_core_queue_program(vcpu, SRR1_PROGILL); 
+return RESUME_GUEST; 
+} 
+if (!(msr & MSR_TM)) { 
+/* generate a facility unavailable interrupt */ 
+vcpu->arch.fscr = (vcpu->arch.fscr & ~(0xffffffff << 56)) | 
+((u64)FSCR_TM_LG << 56); 
+kvmppc_book3s_queue_irqprio(vcpu, 
+BOOK3S_INTERRUPT_FAC_UNAVAIL); 
+return RESUME_GUEST; 
+} 
+/* If transaction active or TEXASR[FS] = 0, bad thing */ 
+if (MSR_TM_ACTIVE(msr) || !(vcpu->arch.texasr & TEXASR_FS)) { 
+kvmppc_core_queue_program(vcpu, SRR1_PROGTM); 
+return RESUME_GUEST; 
+} 
+copy_to_checkpoint(vcpu); 
+ /* Set CR0 to indicate previous transactional state */ 
+vcpu->arch.cr = (vcpu->arch.cr & 0x0fffffff) | 
+((msr & MSR_TS_MASK) >> MSR_TS_S_LG) << 28); 
+vcpu->arch.shregs.msr = msr | MSR_TS_S; 
+return RESUME_GUEST; 
+} 
+ /* What should we do here? We didn't recognize the instruction */ 
+kvmppc_core_queue_program(vcpu, SRR1_PROGILL); 
+pr_warn_ratelimited("Unrecognized TM-related instruction %#x for emulation", instr); 
+return RESUME_GUEST; 
+} 
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_hv_tm_builtin.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_hv_tm_builtin.c
@@ -0,0 +1,121 @@
+/* Copyright 2017 Paul Mackerras, IBM Corp. <paulus@au1.ibm.com>
This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License, version 2, as
published by the Free Software Foundation.
*/

#include <linux/kvm_host.h>

#include <asm/kvm_ppc.h>
#include <asm/kvm_book3s.h>
#include <asm/kvm_book3s_64.h>
#include <asm/reg.h>
#include <asm/ppc-opcode.h>
+
+
/*
 * This handles the cases where the guest is in real suspend mode
 * and we want to get back to the guest without dooming the transaction.
 * The caller has checked that the guest is in real-suspend mode
 * (MSR[TS] = S and the fake-suspend flag is not set).
 */
+
+int kvmhv_p9_tm_emulation_early(struct kvm_vcpu *vcpu)
+{
  u32 instr = vcpu->arch.emul_inst;
  u64 newmsr, msr, bescr;
  int rs;
  +
  +/*
  * rfid, rfebb, and mtmsrd encode bit 31 = 0 since it's a reserved bit
  * in these instructions, so masking bit 31 out doesn't change these
  * instructions. For the tsr. instruction if bit 31 = 0 then it is per
  * ISA an invalid form, however P9 UM, in section 4.6.10 Book II Invalid
  * Forms, informs specifically that ignoring bit 31 is an acceptable way
  * to handle TM-related invalid forms that have bit 31 = 0. Moreover,
  * for emulation purposes both forms (w/ and wo/ bit 31 set) can
  * generate a softpatch interrupt. Hence both forms are handled below
  * for tsr. to make them behave the same way.
  */
  +
  +switch (instr & PO_XOP_OPCODE_MASK) {
    +case PPC_INST_RFDI:
      +/* XXX do we need to check for PR=0 here? */
      +newmsr = vcpu->arch.shregs.srr1;
      +/* should only get here for Sx -> T1 transition */
      +if (!(MSR_TM_TRANSACTIONAL(newmsr) && (newmsr & MSR_TM)))
        +return 0;
      +newmsr = sanitize_msr(newmsr);
      +vcpu->arch.shregs.msr = newmsr;
      +vcpu->arch.cfar = vcpu->arch.pc - 4;
      +vcpu->arch.pc = vcpu->arch.shregs.srr0;
+return 1;
+
+case PPC_INST_RFEBB:
+  /* check for PR=1 and arch 2.06 bit set in PCR */
+  msr = vcpu->arch.shregs.msr;
+  if (((msr & MSR_PR) && (vcpu->arch.vcore->pcr & PCR_ARCH_206))
+      return 0;
+  /* check EBB facility is available */
+  if (!((vcpu->arch hfscr & HFSCR_EBB)
+        ((msr & MSR_PR) && !(mfspr(SPRN_FSCR) & FSCR_EBB))))
+      return 0;
+  bescr = mfspr(SPRN_BESCR);
+  /* expect to see a S->T transition requested */
+  if (((bescr >> 30) & 3) != 2)
+      return 0;
+  bescr &= ~BESCR_GE;
+  if (instr & (1 << 11))
+      bescr |= BESCR_GE;
+  mtspr(SPRN_BESCR, bescr);
+  msr = (msr & ~MSR_TS_MASK) | MSR_TS_T;
+  vcpu->arch.shregs.msr = msr;
+  vcpu->arch.cfar = vcpu->arch.pc - 4;
+  vcpu->arch.pc = mfspr(SPRN_EBBRR);
+  return 1;
+
+case PPC_INST_MTMSRD:
+  /* XXX do we need to check for PR=0 here? */
+  rs = (instr >> 21) & 0x1f;
+  newmsr = kvmppc_get_gpr(vcpu, rs);
+  msr = vcpu->arch.shregs.msr;
+  /* check this is a Sx -> T1 transition */
+  if (!(MSR_TM_TRANSACTIONAL(newmsr) && (newmsr & MSR_TM))
+      return 0;
+  /* mtmsrd doesn't change LE */
+  newmsr = (newmsr & ~MSR_LE) | (msr & MSR_LE);
+  newmsr = sanitize_msr(newmsr);
+  vcpu->arch.shregs.msr = newmsr;
+  return 1;
+
+  /* ignore bit 31, see comment above */
+  case (PPC_INST_TSR & PO_XOP_OPCODE_MASK):
+    /* we know the MSR has the TS field = S (0b01) here */
+    msr = vcpu->arch.shregs.msr;
+    /* check for PR=1 and arch 2.06 bit set in PCR */
+    if (((msr & MSR_PR) && (vcpu->arch.vcore->pcr & PCR_ARCH_206))
+        return 0;
+    /* check for TM disabled in the HFSCR or MSR */
+    if (!((vcpu->arch hfscr & HFSCR_TM) || (msr & MSR_TM))

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return 0;
+/* L=1 => resume => set TS to T (0b10) */
+if (instr & (1 << 21))
+vcpu->arch.shregs.msr = (msr & ~MSR_TS_MASK) | MSR_TS_T;
+/* Set CR0 to 0b0010 */
+vcpu->arch.cr = (vcpu->arch.cr & 0xffff0000) | 0x20000000;
+return 1;
+
+return 0;
+
+/* This is called when we are returning to a guest in TM transactional
+ * state. We roll the guest state back to the checkpointed state.
+ */
+void kvmhv_emulate_tm_rollback(struct kvm_vcpu *vcpu)
+{
+vcpu->arch.shregs.msr &= ~MSR_TS_MASK; /* go to N state */
+vcpu->arch.pc = vcpu->arch.tfhar;
+copy_from_checkpoint(vcpu);
+vcpu->arch.cr = (vcpu->arch.cr & 0xffff0000) | 0xa0000000;
+
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_pr.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_pr.c
@@ -1492,10 +1492,12 @@
er = kvmppc_mmu_init(vcpu);
if (err < 0)
-goto uninit_vcpu;
+goto free_shared_page;

return vcpu;

+free_shared_page:
+free_page((unsigned long)vcpu->arch.shared);
+uninit_vcpu;
+kvm_vcpu_uninit(vcpu);
+free_shadow_vcpu:
--- linux-4.15.0.orig/arch/powerpc/kvm/book3s_rtas.c
+++ linux-4.15.0/arch/powerpc/kvm/book3s_rtas.c
@@ -146,7 +146,7 @@
 struct rtas_token_definition *d, *tmp;
 
-lockdep_assert_held(&kvm->lock);
+lockdep_assert_held(&kvm->arch.rtas_token_lock);

list_for_each_entry_safe(d, tmp, &kvm->arch.rtas_tokens, list) {
    if (rtas_name_matches(d->handler->name, name)) {
        bool found;
        int i;

        lockdep_assert_held(&kvm->arch.rtas_token_lock);
        list_for_each_entry(d, &kvm->arch.rtas_tokens, list) {
            if (d->token == token)
                if (copy_from_user(&args, argp, sizeof(args)))
                    return -EFAULT;
            mutex_lock(&kvm->arch.rtas_token_lock);
            if (args.token)
                rc = rtas_token_define(kvm, args.name, args.token);
            else
                rc = rtas_token_undefine(kvm, args.name);
            mutex_unlock(&kvm->arch.rtas_token_lock);
        }
        return rc;
    }
}

orig_rets = args.rets;
+if (be32_to_cpu(args.nargs) >= ARRAY_SIZE(args.args)) {
    /*
    * Don't overflow our args array: ensure there is room for
    * at least rets[0] (even if the call specifies 0 nret).
    */
    +rc = -EINVAL;
    goto fail;
} args.rets = &args.args[be32_to_cpu(args.nargs)];

mutex_lock(&vcpu->kvm->arch.rtas_token_lock);
mutex_unlock(&vcpu->kvm->arch.rtas_token_lock);
rc = -ENOENT;
list_for_each_entry(d, &vcpu->kvm->arch.rtas_tokens, list) {
    @ @ -256,7 +267,7 @ @
}

-mutex_unlock(&vcpu->kvm->lock);
+mutex_unlock(&vcpu->kvm->arch.rtas_token_lock);

if (rc == 0) {
    args.rets = orig_rets;
    @ @ -270,9 +281,17 @ @
    fail:
    /*
     * We only get here if the guest has called RTAS with a bogus
     * args pointer. That means we can't get to the args, and so we
     * can't fail the RTAS call. So fail right out to userspace,
     * which should kill the guest.
     * args pointer or nargs/nret values that would overflow the
     * array. That means we can't get to the args, and so we can't
     * fail the RTAS call. So fail right out to userspace, which
     * should kill the guest.
     *
     * SLOF should actually pass the hcall return value from the
     * rtas handler call in r3, so enter_rtas could be modified to
     * return a failure indication in r3 and we could return such
     * errors to the guest rather than failing to host userspace.
     * However old guests that don't test for failure could then
     * continue silently after errors, so for now we won't do this.
     */
    return rc;
}
    @ @ -282,8 +301,6 @ @
{
    struct rtas_token_definition *d, *tmp;

    -lockdep_assert_held(&kvm->lock);

    -
    list_for_each_entry_safe(d, tmp, &kvm->arch.rtas_tokens, list) {
        list_del(&d->list);
        kfree(d);
        --- linux-4.15.0.orig/arch/powerpc/kvm/book3s_xive.c
        +++ linux-4.15.0/arch/powerpc/kvm/book3s_xive.c
        @ @ -1001,20 +1001,22 @ @
        /* Mask the VP IPI */
        xive_vm_esb_load(&xc->vp_ipi_data, XIVE_ESB_SET_PQ_01);

        -*- Disable the VP */
- xive_native_disable_vp(xc->vp_id);
-
- /* Free the queues & associated interrupts */
+- /* Free escalations */
+ for (i = 0; i < KVMPPC_XIVE_Q_COUNT; i++) {
+ struct xive_q *q = &xc->queues[i];
+
+ /* Free the escalation irq */
+ if (xc->esc_virq[i]) {
+ free_irq(xc->esc_virq[i], vcpu);
+ irq_dispose_mapping(xc->esc_virq[i]);
+ kfree(xc->esc_virq_names[i]);
+ }
+ /* Free the queue */
+ } }
+ /* Disable the VP */
+xive_native_disable_vp(xc->vp_id);
+
+
+ /* Free the queues */
+ for (i = 0; i < KVMPPC_XIVE_Q_COUNT; i++) {
+ struct xive_q *q = &xc->queues[i];
+ xive_native_disable_queue(xc->vp_id, q, i);
+ if (q->qpage) {
+ free_pages((unsigned long)q->qpage,
+ @ @ -1675,7 +1677,6 @@
+ { xive_vm_esb_load(xd, XIVE_ESB_SET_PQ_01); xive_native_configure_irq(hw_num, 0, MASKED, 0);
+ -xive_cleanup_irq_data(xd);
+ }
+

static void kvmppc_xive_free_sources(struct kvmppc_xive_src_block *sb)
@@ -1689,9 +1690,10 @@
 continue;

 kvmppc_xive_cleanup_irq(state->ipi_number, &state->ipi_data);
+xive_cleanup_irq_data(&state->ipi_data);
 xive_native_free_irq(state->ipi_number);

-/* Pass-through, cleanup too */
+-/* Pass-through, cleanup too but keep IRQ hw data */
+ if (state->pt_number)
+ kvmppc_xive_cleanup_irq(state->pt_number, state->pt_data);

--- linux-4.15.0.orig/arch/powerpc/kvm/booke.c
+++ linux-4.15.0/arch/powerpc/kvm/booke.c
+if defined CONFIG_ALTIVEC
+void kvmppc_core_queue_vec_unavail(struct kvm_vcpu *vcpu)
+{
+kvmppc_booke_queue_irqprio(vcpu, BOOKE_IRQPRIO_ALTIVEC_UNAVAIL);
+}
+#endif
+
void kvmppc_core_queue_dec(struct kvm_vcpu *vcpu)
{
  kvmppc_booke_queue_irqprio(vcpu, BOOKE_IRQPRIO_DECREMENTER);

--- linux-4.15.0.orig/arch/powerpc/kvm/bookehv_interrupts.S
+++ linux-4.15.0/arch/powerpc/kvm/bookehv_interrupts.S
@@ -75,6 +75,10 @@
 PPC_LL r1, VCPU_HOST_STACK(r4)
 PPC_LL r2, HOST_R2(r1)

+START_BTB_FLUSH_SECTION
+BTB_FLUSH(r10)
+END_BTB_FLUSH_SECTION
+
mfspr r10, SPRN_PID
 lwz r8, VCPU_HOST_PID(r4)
 PPC_LL r11, VCPU_SHARED(r4)
--- linux-4.15.0.orig/arch/powerpc/kvm/e500_emulate.c
+++ linux-4.15.0/arch/powerpc/kvm/e500_emulate.c
@@ -277,6 +277,13 @@
 vcpu->arch.pwrmgtcr0 = spr_val;
 break;

+case SPRN_BUCSR:
+/*
 * If we are here, it means that we have already flushed the
 * branch predictor, so just return to guest.
 */
+break;
+
 /* extra exceptions */
 #ifdef CONFIG_SPE_POSSIBLE
 case SPRN_IVOR32:
--- linux-4.15.0.orig/arch/powerpc/kvm/emulate_loadstore.c
+++ linux-4.15.0/arch/powerpc/kvm/emulate_loadstore.c
@@ -58,6 +58,18 @@
 vcpu->arch.pwrmgtcr0 = spr_val;
 break;

+/*
+ * If we are here, it means that we have already flushed the
+ * branch predictor, so just return to guest.
+ */
+break;
+
 /* extra exceptions */
 #ifdef CONFIG_VSX */

---
```c
+#ifdef CONFIG_ALTIVEC
+static bool kvmppc_check_altivec_disabled(struct kvm_vcpu *vcpu)
+{
+    if (!(kvmppc_get_msr(vcpu) & MSR_VEC)) {
+        kvmppc_core_queue_vec_unavail(vcpu);
+        return true;
+    }
+
+    return false;
+} /* CONFIG_ALTIVEC */
+
/*
 * XXX to do:
 * Ifiwax, Ifiwzx
@@ -98,6 +110,7 @@
 vcpu->arch.mmio_vsx_copy_type = KVMPPC_VSX_COPY_NONE;
 vcpu->arch.mmio_sp64_extend = 0;
 vcpu->arch.mmio_sign_extend = 0;
+    vcpu->arch.mmio_vmx_copy_nums = 0;
 switch (get_op(inst)) {
    case 31:
    @@ -459,6 +472,29 @@
        break;
    #endif /* CONFIG_VSX */
    +    #ifdef CONFIG_ALTIVEC
    +    case OP_31_XOP_LVX:
    +        if (kvmppc_check_altivec_disabled(vcpu))
    +            return EMULATE_DONE;
    +        vcpu->arch.vaddr_accessed &= ~0xFULL;
    +        vcpu->arch.paddr_accessed &= ~0xFULL;
    +        vcpu->arch.mmio_vmx_copy_nums = 2;
    +        emulated = kvmppc_handle_load128_by2x64(run, vcpu,
    +            KVM_MMIO_REG_VMX[rt, 1];
    +        break;
    +    #ifdef CONFIG_ALTIVEC
    +    case OP_31_XOP_STVX:
    +        if (kvmppc_check_altivec_disabled(vcpu))
    +            return EMULATE_DONE;
    +        vcpu->arch.vaddr_accessed &= ~0xFULL;
    +        vcpu->arch.paddr_accessed &= ~0xFULL;
    +        vcpu->arch.mmio_vmx_copy_nums = 2;
    +        emulated = kvmppc_handle_store128_by2x64(run, vcpu,
    +            +rs, 1);
```
+break;
+#endif /* CONFIG_ALTIVEC */
+
default:
emulated = EMULATE_FAIL;
break;
--- linux-4.15.0.orig/arch/powerpc/kvm/powerpc.c
+++ linux-4.15.0/arch/powerpc/kvm/powerpc.c
@@ -62,6 +62,11 @@
return !!(v->arch.pending_exceptions) || kvm_request_pending(v);
}

+bool kvm_arch_dy_runnable(struct kvm_vcpu *vcpu)
+
+{ return kvm_arch_vcpu_runnable(vcpu);
+}
+
+bool kvm_arch_vcpu_in_kernel(struct kvm_vcpu *vcpu)
{
    return false;
@@ -544,8 +549,11 @@
    #ifdef CONFIG_PPC_BOOK3S_64
    case KVM_CAP_SPAPR_TCE:
    case KVM_CAP_SPAPR_TCE_64:
-        /* fallthrough */
+        r = !!cpu_has_feature(CPU_FTR_HVMODE);
        break;
    case KVM_CAP_SPAPR_TCE_VFIO:
        r = !cpu_has_feature(CPU_FTR_HVMODE);
        break;
    case KVM_CAP_PPC_RTAS:
    case KVM_CAP_PPC_FIXUP_HCALL:
    case KVM_CAP_PPC_ENABLE_HCALL:
@@ -630,6 +638,9 @@
        case KVM_CAP_MAX_VCPUS:
            r = KVM_MAX_VCPUS;
            break;
+        case KVM_CAP_MAX_VCPU_ID:
+            r = KVM_MAX_VCPU_ID;
+            break;
    #ifdef CONFIG_PPC_BOOK3S_64
    case KVM_CAP_PPC_GET_SMMU_INFO:
        r = 1;
@@ -638,8 +649,7 @@
        /* disable this on POWER9 until code handles new HPTE format */
r = !!hv_enabled && !cpu_has_feature(CPU_FTR_ARCH_300);
+r = !!hv_enabled;
break;
#endif
#endif CONFIG_KVM_BOOK3S_HV_POSSIBLE
@@ -647,10 +657,13 @@
 r = hv_enabled;
 break;
#endif
+ifdef CONFIG_PPC_TRANSACTIONAL_MEM
 case KVM_CAP_PPC_HTM:
 r = hv_enabled &&
- (cur_cpu_spec->cpu_user_features2 & PPC_FEATURE2_HTM_COMP);
+ (!!(cur_cpu_spec->cpu_user_features2 & PPC_FEATURE2_HTM) ||
+ cpu_has_feature(CPU_FTR_P9_TM_HV_ASSIST));
 break;
+endif
 default:
 r = 0;
 break;
@@ -763,7 +776,7 @@
 hrtimer_init(&vcpu->arch.dec_timer, CLOCK_REALTIME, HRTIMER_MODE_ABS);
 vcpu->arch.dec_timer.function = kvmppc_decrementer_wakeup;
 -vcpu->arch.dec_expires = ~(u64)0;
+-vcpu->arch.dec_expires = get_tb();

 #ifdef CONFIG_KVM_EXIT_TIMING
 mutex_init(&vcpu->arch.exit_timing_lock);
@@ -930,6 +943,34 @@
 }
 #endif /* CONFIG_VSX */

+ifdef CONFIG_ALTIVEC
+static inline void kvmppc_set_vmx_dword(struct kvm_vcpu *vcpu,
+u64 gpr)
+{
+int index = vcpu->arch.io_gpr & KVM_MMIO_REG_MASK;
+u32 hi, lo;
+u32 di;
+ +#ifdef __BIG_ENDIAN
+ hi = gpr >> 32;
+ lo = gpr & 0xffffffff;
+ #else
+ lo = gpr >> 32;
+ hi = gpr & 0xffffffff;
+ #endif

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+di = 2 - vcpu->arch.mmio_vmx_copy_nums;/* doubleword index */
+if (di > 1)
+return;
+
+if (vcpu->arch.mmio_host_swabbed)
+di = 1 - di;
+
+VCPU_VSX_VR(vcpu, index).u[di * 2] = hi;
+VCPU_VSX_VR(vcpu, index).u[di * 2 + 1] = lo;
+
}  
#endif /* CONFIG_ALTIVEC */
+
#ifdef CONFIG_PPC_FPU
static inline u64 sp_to_dp(u32 fprs)
{  
	@ @ -1033,6 +1074,11 @@

tvmppc_set_vsr_dword_dump(vcpu, gpr);
break;
#endif
+#ifdef CONFIG_ALTIVEC
+case KVM_MMIO_REG_VMX:
+kvmpc_set_vmx_dword(vcpu, gpr);
+break;
+#endif

default:
BUG();
}
@@ -1312,6 +1358,111 @@

}  
#endif /* CONFIG_VSX */

+#ifdef CONFIG_ALTIVEC
+/* handle quadword load access in two halves */
+int kvmpc_handle_load128_by2x64(struct kvm_run *run, struct kvm_vcpu *vcpu,
+unsigned int rt, int is_default_endian)
+{
+enum emulation_result emulated = EMULATE_DONE;
+
+while (vcpu->arch.mmio_vmx_copy_nums) {
+emulated = __kvmpc_handle_load(run, vcpu, rt, 8,
+is_default_endian, 0);
+
+if (emulated != EMULATE_DONE)
+break;
+
+vcpu->arch.paddr_accessed += run->mmio.len;
+vcpu->arch.mmio_vmx_copy_nums--;
+}  
+return emulated;  
+}  
+}  
+static inline int kvmppc_get_vmx_data(struct kvm_vcpu *vcpu, int rs, u64 *val)  
+{  
+vector128 vrs = VCPU_VSX_VR(vcpu, rs);  
+u32 di;  
+u64 w0, w1;  
+  
+di = 2 - vcpu->arch.mmio_vmx_copy_nums;  /* doubleword index */  
+if (di > 1)  
+return -1;  
++if (vcpu->arch.mmio_host_swabbed)  
+di = 1 - di;  
+  
+w0 = vrs.u[di * 2];  
w1 = vrs.u[di * 2 + 1];  
+  
+ifdef __BIG_ENDIAN  
+*val = (w0 << 32) | w1;  
+#else  
+*val = (w1 << 32) | w0;  
+#endif  
+return 0;  
+}  
+  
+/* handle quadword store in two halves */  
+int kvmppc_handle_store128_by2x64(struct kvm_run *run, struct kvm_vcpu *vcpu,  
+unsigned int rs, int is_default_endian)  
+{  
+u64 val = 0;  
+enum emulation_result emulated = EMULATE_DONE;  
+  
vcpu->arch.io_gpr = rs;  
+  
+while (vcpu->arch.mmio_vmx_copy_nums) {  
+if (kvmppc_get_vmx_data(vcpu, rs, &val) == -1)  
+return EMULATE_FAIL;  
+  
+emulated = kvmppc_handle_store(run, vcpu, val, 8,  
+is_default_endian);  
+if (emulated != EMULATE_DONE)  
+break;  
+  
vcpu->arch.paddr_accessed += run->mmio.len;
+vcpu->arch.mmio_vmx_copy_nums--; 
+
+return emulated; 
+
+
+static int kvmppc_emulate_mmio_vmx_loadstore(struct kvm_vcpu *vcpu, 
+struct kvm_run *run) 
+{ 
+enum emulation_result emulated = EMULATE_FAIL; 
+int r; 
+
+vcpu->arch.paddr_accessed += run->mmio.len; 
+
+if (!vcpu->mmio_is_write) { 
+emulated = kvmppc_handle_load128_by2x64(run, vcpu, 
+vcpu->arch.io_gpr, 1); 
+} else { 
+emulated = kvmppc_handle_store128_by2x64(run, vcpu, 
+vcpu->arch.io_gpr, 1); 
+} 
+
+switch (emulated) { 
+case EMULATE_DO_MMIO: 
+run->exit_reason = KVM_EXIT_MMIO; 
+ r = RESUME_HOST; 
+break; 
+case EMULATE_FAIL: 
+pr_info("KVM: MMIO emulation failed (VMX repeat)\n"); 
+run->exit_reason = KVM_EXIT_INTERNAL_ERROR; 
+run->internal.suberror = KVM_INTERNAL_ERROR_EMULATION; 
+r = RESUME_HOST; 
+break; 
+default: 
+break; 
+} 
+return r; 
+
+#endif /* CONFIG_ALTIVEC */ 
+ 
+int kvm_vcpu_ioctl_get_one_reg(struct kvm_vcpu *vcpu, struct kvm_one_reg *reg) 
+{ 
+int r = 0; 
+ 
+} 
+} 
+#endif
+ifdef CONFIG_ALTIVEC
+if (vcpu->arch.mmio_vmx_copy_nums > 0)
+vcpu->arch.mmio_vmx_copy_nums--;
+
+if (vcpu->arch.mmio_vmx_copy_nums > 0) {
+r = kvmppc_emulate_mmio_vmx_loadstore(vcpu, run);
+if (r == RESUME_HOST) {
+vcpu->mmio_needed = 1;
+return r;
+}
+}
+#endif
}
else if (vcpu->arch.osi_needed) {
u64 *gprs = run->osi.gprs;
int i;
@@ -1793,10 +1956,12 @@
KVM_PPC_CPU_CHAR_L1D_THREAD_PRIV |
KVM_PPC_CPU_CHAR_BR_HINT_HONOURED |
KVM_PPC_CPU_CHAR_MTTRIG_THR_RECONF |
-KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS;
+KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS |
+KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS |
+KVM_PPC_CPU_CHAR_BCCTR_FLUSH_ASSIST;
cp->behaviour_mask = KVM_PPC_CPU_BEHAV_FAVOUR_SECURITY |
KVM_PPC_CPU_BEHAV_L1D_FLUSH_PR |
-KVM_PPC_CPU_BEHAV_BNDS_CHK_SPEC_BAR;
+KVM_PPC_CPU_BEHAV_BNDS_CHK_SPEC_BAR |
+KVM_PPC_CPU_BEHAV_FLUSH_COUNT_CACHE;
}
return 0;
}
@@ -1855,12 +2020,16 @@
if (have_fw_feat(fw_features, "enabled",
"fw-count-cache-disabled"))
cp->character |= KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS;
+if (have_fw_feat(fw_features, "enabled",
+"fw-count-cache-flush-bcctr2,0,0"))
+cp->character |= KVM_PPC_CPU_CHAR_BCCTR_FLUSH_ASSIST;
+cp->character_mask = KVM_PPC_CPU_CHAR_SPEC_BAR_ORI31 |
KVM_PPC_CPU_CHAR_BCCTRL_SERIALISED |
KVM_PPC_CPU_CHAR_L1D_FLUSH_ORI30 |
KVM_PPC_CPU_CHAR_L1D_FLUSH_TRIG2 |
KVM_PPC_CPU_CHAR_L1D_THREAD_PRIV |
-KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS;
+KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS |
+KVM_PPC_CPU CharSet CACHE_DIS;
if (have_fw_feat(fw_features, "enabled",
"speculation-policy-favor-security"))
if (!have_fw_feat(fw_features, "disabled", "needs-spec-barrier-for-bound-checks"))
    cp->behaviour |= KVM_PPC_CPU_BEHAV_BNDS_CHK_SPEC_BAR;
+if (have_fw_feat(fw_features, "enabled", "needs-count-cache-flush-on-context-switch"))
+    cp->behaviour |= KVM_PPC_CPU_BEHAV_FLUSH_COUNT_CACHE;
    cp->behaviour_mask = KVM_PPC_CPU_BEHAV_FAVOUR_SECURITY |
    KVM_PPC_CPU_BEHAV_L1D_FLUSH_PR |
    -KVM_PPC_CPU_BEHAV_BNDS_CHK_SPEC_BAR;
+    KVM_PPC_CPU_BEHAV_BNDS_CHK_SPEC_BAR | 
+    KVM_PPC_CPU_BEHAV_FLUSH_COUNT_CACHE;

of_node_put(fw_features);
}
--- linux-4.15.0.orig/arch/powerpc/kvm/tm.S
+++ linux-4.15.0/arch/powerpc/kvm/tm.S
@@ -0,0 +1,280 @@
+/*
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License, version 2, as
+ * published by the Free Software Foundation.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * Derived from book3s_hv_rmhandlers.S, which is:
+ *
+ * Copyright 2011 Paul Mackerras, IBM Corp. <paulus@au1.ibm.com>
+ *
+ */
+
+#include <asm/reg.h>
+#include <asm/ppc_asm.h>
+#include <asm/asm-offsets.h>
+#include <asm/export.h>
+#include <asm/tm.h>
+#include <asm/cputable.h>
+
+#ifdef CONFIG_PPC_TRANSACTIONAL_MEM
+#define VCPU_GPRS_TM(reg) (((reg) * ULONG_SIZE) + VCPU_GPR_TM)
+
+/*
+ * Save transactional state and TM-related registers.
+ * Called with:
+ * - r3 pointing to the vcpu struct
+ * - r4 points to the MSR with current TS bits:
+ * (For HV KVM, it is VCPU_MSR ; For PR KVM, it is host MSR).
+ * This can modify all checkpointed registers, but
+ * restores r1, r2 before exit.
+ */
+ _GLOBAL(kvmppc_save_tm)
+ mflr0
+ stdr0, PPC_LR_STKOFF(r1)
+ /* Turn on TM. */
+ mfmsr8
+ lir0, 1
+ rldimir8, r0, MSR_TM_LG, 63-MSR_TM_LG
+ mtmsdr8
+ rldicl. r4, r4, 64 - MSR_TS_S_LG, 62
+ beq1f/* TM not active in guest. */
+ stdr1, HSTATE_SCRATCH2(r13)
+ stdr3, HSTATE_SCRATCH1(r13)
+ +#ifdef CONFIG_KVM_BOOK3S_HV_POSSIBLE
+ BEGIN_FTR_SECTION
+ /* Emulation of the treclaim instruction needs TEXASR before treclaim */
+ mfspr6, SPRN_TEXASR
+ stdr6, VCPU_ORIG_TEXASR(r3)
+ END_FTR_SECTION_IFSET(CPU_FTR_P9_TM_HV_ASSIST)
+ +#endif
+ /* Clear the MSR RI since r1, r13 are all going to be foobar. */
+ lir5, 0
+ mtmsdr5, 1
+ lir3, TM_CAUSE_KVM_RESCHED
+ /* All GPRs are volatile at this point. */
+ TRECLAIM(R3)
+ /* Temporarily store r13 and r9 so we have some regs to play with */
+ SET_SCRATCH0(r13)
+ GET_PACA(r13)
+ stdr9, PACATMSCRATCH(r13)
+ ldr9, HSTATE_SCRATCH1(r13)
+ /* Get a few more GPRs free. */
+ stdr29, VCPU_GPRS_TM(29)(r9)
+ stdr30, VCPU_GPRS_TM(30)(r9)
+ stdr31, VCPU_GPRS_TM(31)(r9)
+ /* Save away PPR and DSCR soon so don't run with user values. */
+ mfspr31, SPRN_PPR
+ HMT_MEDIUM
+ mfspr30, SPRN_DSCR
+#ifdef CONFIG_KVM_BOOK3S_HV_POSSIBLE
+ ldr29, HSTATE_DSCR(r13)
+ mtspr SPRN_DSCR, r29
+#endif
+
+ /* Save all but r9, r13 & r29-r31 */
+ reg = 0
+.rept 29
+.if (reg != 9) && (reg != 13)
+ stdreg, VCPU_GPRS_TM(reg)(r9)
+.endif
+ reg = reg + 1
+.endr
+ /* ... now save r13 */
+ GET_SCRATCH0(r4)
+ std4, VCPU_GPRS_TM(13)(r9)
+ /* ... and save r9 */
+ ldr4, PACATMSCRATCH(r13)
+ std4, VCPU_GPRS_TM(9)(r9)
+
+ /* Reload stack pointer and TOC. */
+ ldr1, HSTATE_SCRATCH2(r13)
+ ldr2, PACATOC(r13)
+
+ /* Set MSR RI now we have r1 and r13 back. */
+ lir5, MSR_RI
+ mtmsrdr5, 1
+
+ /* Save away checkpointed SPRs. */
+ stdr31, VCPU_PPR_TM(r9)
+ stdr30, VCPU_DSCR_TM(r9)
+ mfldr5
+ mfcr6
+ mfctr7
+ mfspr8, SPRN_AMR
+ mfspr10, SPRN_TAR
+ mfxerr11
+ std5, VCPU_LR_TM(r9)
+ stwr6, VCPU_CR_TM(r9)
+ std7, VCPU_CTR_TM(r9)
+ std8, VCPU_AMR_TM(r9)
+ std10, VCPU_TAR_TM(r9)
+ std11, VCPU_XER_TM(r9)
+ /* Restore r12 as trap number. */
+ lwzr12, VCPU_TRAP(r9)
+
+ /* Save FP/VSX. */
+ addir3, r9, VCPU_FPRS_TM
+ blstore_fp_state
+ addir3, r9, VCPU_VRS_TM
+ blstore_vr_state
+ mfsprr6, SPRN_VRSAVE
+ stwr6, VCPU_VRSAVE_TM(r9)
+ b: 1:
+ /*
+ * We need to save these SPRs after the treclaim so that the software
+ * error code is recorded correctly in the TExASR. Also the user may
+ * change these outside of a transaction, so they must always be
+ * context switched.
+ */
+ mfsprr7, SPRN_TExASR
+ stdr7, VCPU_TExASR(r9)  +11:
+ mfsprr5, SPRN_TFHAR
+ mfsprr6, SPRN_TFIAR
+ stdr5, VCPU_TFHAR(r9)
+ stdr6, VCPU_TFIAR(r9)
+
+ ldr0, PPC_LR_STKOFF(r1)
+ mtlrr0
+ blr
+
+ /*
+ * Restore transactional state and TM-related registers.
+ * Called with:
+ * - r3 pointing to the vcpu struct.
+ * - r4 is the guest MSR with desired TS bits:
+ *   For HV KVM, it is VCPU_MSR
+ *   For PR KVM, it is provided by caller
+ * This potentially modifies all checkpointed registers.
+ * It restores r1, r2 from the PACA.
+ */
+ _GLOBAL(kvmppc_restore_tm)
+ mfllrr0
+ stdr0, PPC_LR_STKOFF(r1)
+
+ /* Turn on TM/FP/VSX/VMX so we can restore them. */
+ mfsmsrr5
+ lir6, MSR_TM >> 32
+ sldr6, r6, 32
+orr5, r5, r6
+orir5, r5, MSR_FP
+orir5, r5, (MSR_VEC | MSR_VSX)<@h
+mtmsrd5
+
+/*
+ * The user may change these outside of a transaction, so they must
+ * always be context switched.
+ */
+ldr5, VCPU_TFHAR(r3)
+ldr6, VCPU_TFIAR(r3)
+ldr7, VCPU_TEXASR(r3)
+mtsprSPRN_TFHAR, r5
+mtsprSPRN_TFIAR, r6
+mtsprSPRN_TEXASR, r7
+
+mr5r, r4
+rldicl. r5, r5, 64 - MSR_TS_S_LG, 62
+beqlr/* TM not active in guest */
+stdr1, HSTATE_SCRATCH2(r13)
+
+/* Make sure the failure summary is set, otherwise we'll program check
+ * when we trechkpt. It's possible that this might have been not set
+ * on a kvmppc_set_one_reg() call but we shouldn't let this crash the
+ * host.
+ */
+orir7, r7, (TEXASR_FS)<@h
+mtsprSPRN_TEXASR, r7
+
+/*
+ * We need to load up the checkpointed state for the guest.
+ * We need to do this early as it will blow away any GPRs, VSRs and
+ * some SPRs.
+ */
+
+mr331, r3
+addir3, r31, VCPU_FPRS_TM
+bload_fp_state
+addir3, r31, VCPU_VRS_TM
+bload_vr_state
+mr33, r31
+lwzr7, VCPU_VRSAVE_TM(r3)
+mtsprSPRN_VRSAVE, r7
+
+ldr5, VCPU_LR_TM(r3)
+lwzr6, VCPU_CR_TM(r3)
+ldr7, VCPU_CTR_TM(r3)
+ldr8, VCPU_AMR_TM(r3)
# Load up PPR and DSCR values but don't put them in the actual SPRs
# till the last moment to avoid running with userspace PPR and DSCR for
# too long.
#
+ldr9, VCPU_TAR_TM(r3)
+ldr10, VCPU_XER_TM(r3)
+mtlrr5
+mtcrr6
+mtctr7
+mtsprSPRN_AMR, r8
+mtsprSPRN_TAR, r9
+mtxerr10
+
+/*
+ * Load up PPR and DSCR values but don't put them in the actual SPRs
+ * till the last moment to avoid running with userspace PPR and DSCR for
+ * too long.
+ */
+ldr29, VCPU_DSCR_TM(r3)
+ldr30, VCPU_PPR_TM(r3)
+
+stdr2, PACATMSCRATCH(r13) /* Save TOC */
+
+/* Clear the MSR RI since r1, r13 are all going to be foobar. */
+liir5, 0
+mtmsrdr5, 1
+
+/* Load GPRs r0-r28 */
+reg = 0
+.rept29
+ldreg, VCPU_GPRS_TM(reg)(r31)
+reg = reg + 1
+.endr
+
+mtsprSPRN_DSCR, r29
+mtsprSPRN_PPR, r30
+
+/* Load final GPRs */
+ld29, VCPU_GPRS_TM(29)(r31)
+ld30, VCPU_GPRS_TM(30)(r31)
+ld31, VCPU_GPRS_TM(31)(r31)
+
+/* TM checkpointed state is now setup. All GPRs are now volatile. */
+TRECHKPT
+
+/* Now let's get back the state we need. */
+HMT_MEDIUM
+GET_PACA(r13)
+#ifdef CONFIG_KVM_BOOK3S_HV_POSSIBLE
+ldr29, HSTATE_DSCR(r13)
+mtsprSPRN_DSCR, r29
+#endif
+ldr1, HSTATE_SCRATCH2(r13)
+ldr2, PACATMSCRATCH(r13)
+
+/* Set the MSR RI since we have our registers back. */
+lir5, MSR RI
+mtmsrd5, 1
+ldr0, PPC_LR_STKOFF(r1)
+mtlrr0
+blr
+﻿#endif /* CONFIG_PPC_TRANSACTIONAL_MEM */
--- linux-4.15.0.orig/arch/powerpc/kvm/trace.h
+++ linux-4.15.0/arch/powerpc/kvm/trace.h
@@ -6,8 +6,6 @@
  #undef TRACE_SYSTEM
  #define TRACE_SYSTEM kvm
-#define TRACE_INCLUDE_PATH 
-#define TRACE_INCLUDE_FILE trace
+
+/*
+ * Tracepoint for guest mode entry.
+ @ @ -120,4 +118,10 @ @
+ #endif /* _TRACE_KVM_H */
+
+/* This part must be outside protection */
+#undef TRACE_INCLUDE_PATH
+#undef TRACE_INCLUDE_FILE
+ +
++#define TRACE_INCLUDE_PATH .
++#define TRACE_INCLUDE_FILE trace
+
+#include <trace/define_trace.h>
--- linux-4.15.0.orig/arch/powerpc/kvm/trace_booke.h
+++ linux-4.15.0/arch/powerpc/kvm/trace_booke.h
@@ -6,8 +6,6 @@
  #undef TRACE_SYSTEM
  #define TRACE_SYSTEM kvm_booke
-#define TRACE_INCLUDE_PATH 
-#define TRACE_INCLUDE_FILE trace_booke
+
+#define kvm_trace_symbol_exit \
  {0, "CRITICAL"}, \
  @ @ -218,4 +216,11 @ @
 #endif

/* This part must be outside protection */
+
#undef TRACE_INCLUDE_PATH
#undef TRACE_INCLUDE_FILE
+
#define TRACE_INCLUDE_PATH.
#define TRACE_INCLUDE_FILE trace_book
+
#include <trace/define_trace.h>
--- linux-4.15.0.orig/arch/powerpc/kvm/trace_hv.h
+++ linux-4.15.0/arch/powerpc/kvm/trace_hv.h
@@ -9,8 +9,6 @@
#undef TRACE_SYSTEM
#define TRACE_SYSTEM kvm_hv
-#define TRACE_INCLUDE_PATH .
-#define TRACE_INCLUDE_FILE trace_hv

#define kvm_trace_symbol_hcall\  
{H_REMOVE, "H_REMOVE"}, \  
@@ -497,4 +495,11 @@
#endif /* _TRACE_KVM_HV_H */

/* This part must be outside protection */
+
+#undef TRACE_INCLUDE_PATH
+#undef TRACE_INCLUDE_FILE
+
+#define TRACE_INCLUDE_PATH.
+#define TRACE_INCLUDE_FILE trace_hv
+
#include <trace/define_trace.h>
--- linux-4.15.0.orig/arch/powerpc/kvm/trace_pr.h
+++ linux-4.15.0/arch/powerpc/kvm/trace_pr.h
@@ -8,8 -6 @@
#undef TRACE_SYSTEM
#define TRACE_SYSTEM kvm_pr
-#define TRACE_INCLUDE_PATH .
-#define TRACE_INCLUDE_FILE trace_pr

TRACE_EVENT(kvm_book3s_reenter, 
TP_PROTO(int r, struct kvm_vcpu *vcpu),
@@ -272,4 +270,11 @@
#endif /* _TRACE_KVM_H */

/* This part must be outside protection */
+
+#undef TRACE_INCLUDE_PATH
+#undef TRACE_INCLUDE_FILE

```c
#define TRACE_INCLUDE_PATH .
#define TRACE_INCLUDE_FILE trace_pr

#include <trace/define_trace.h>

--- linux-4.15.0.orig/arch/powerpc/lib/Makefile
+++ linux-4.15.0/arch/powerpc/lib/Makefile
@@ -22,9 +22,11 @@
extra-$(CONFIG_PPC64)+= crtsavres.o
endif

+obj-$(CONFIG_PPC_BOOK3S_64) += copyuser_power7.o copypage_power7.o \
+    memcp_power7.o
+
oobj64-y+= copypage_64.o copyuser_64.o mem_64.o hweight_64.o \
-    copyuser_power7.o string_64.o copypage_power7.o memcp_power7.o \
-    memcp_64.o memcmp_64.o pmem.o
+    string_64.o memcmp_64.o memcp_64.o pmem.o

obj64-$(CONFIG_SMP)+= locks.o
obj64-$(CONFIG_ALTIVEC)+= vmx-helper.o
--- linux-4.15.0.orig/arch/powerpc/lib/checksum_wrappers.c
+++ linux-4.15.0/arch/powerpc/lib/checksum_wrappers.c
@@ -29,6 +29,7 @@
    unsigned int csum;
    might_sleep();
+    allow_read_from_user(src, len);

*err_ptr = 0;
@@ -60,6 +61,7 @@
    out;
+    prevent_read_from_user(src, len);
    return (__force __wsum)csum;
}    out:

EXPORT_SYMBOL(csum_and_copy_from_user);
@@ -70,6 +72,7 @@
    unsigned int csum;
    might_sleep();
+    allow_write_to_user(dst, len);

*err_ptr = 0;
@@ -97,6 +100,7 @@
```
```c
out:
+prevent_write_to_user(dst, len);
return (__force __wsum)csum;
}
EXPORT_SYMBOL(csum_and_copy_to_user);
--- linux-4.15.0.orig/arch/powerpc/lib/code-patching.c
+++ linux-4.15.0/arch/powerpc/lib/code-patching.c
@@ -21,21 +21,29 @@
#include <asm/tlbflush.h>
#include <asm/page.h>
#include <asm/code-patching.h>
+include <asm/sections.h>
#include <asm/setup.h>

-static int __patch_instruction(unsigned int *addr, unsigned int instr)
+static int __patch_instruction(unsigned int *exec_addr, unsigned int instr,
+			       unsigned int *patch_addr)
{
int err;

-__put_user_size(instr, addr, 4, err);
+__put_user_size(instr, patch_addr, 4, err);
if (err)
return err;

-asm ("dcbst 0, %0; sync; icbi 0,%0; sync; isync" :: "r" (addr));
+asm ("dcbst 0, %0; sync; icbi 0,%1; sync; isync" :: "r" (patch_addr),
+ "r" (exec_addr));

return 0;
}
+int raw_patch_instruction(unsigned int *addr, unsigned int instr)
+{
+return __patch_instruction(addr, instr, addr);
+}
+#ifdef CONFIG STRICT KERNEL_RWX
static DEFINE_PER_CPU(struct vm_struct *, text_poke_area);
@@ -135,10 +143,10 @@
return 0;
}
+int patch_instruction(unsigned int *addr, unsigned int instr)
+static int do_patch_instruction(unsigned int *addr, unsigned int instr)
```
{  
  int err;
-unsigned int *dest = NULL;
+unsigned int *patch_addr = NULL;
unsigned long flags;
unsigned long text_poke_addr;
unsigned long kaddr = (unsigned long)addr;
@@ -148,8 +156,8 @@
   * when text_poke_area is not ready, but we still need
   * to allow patching. We just do the plain old patching
   */
-  if (!this_cpu_read(*PTRRELOC(&text_poke_area)))
-    return __patch_instruction(addr, instr);
+  if (!this_cpu_read(text_poke_area))
+    return raw_patch_instruction(addr, instr);

  local_irq_save(flags);

@@ -159,17 +167,10 @@
goto out;
}

-dest = (unsigned int *)(text_poke_addr) +
+patch_addr = (unsigned int *)(text_poke_addr) +
((kaddr & ~PAGE_MASK) / sizeof(unsigned int));

-/*
- * We use __put_user_size so that we can handle faults while
- * writing to dest and return err to handle faults gracefully
- */
-__put_user_size(instr, dest, 4, err);
-if (!err)
-asm ("dcbst 0, %0; sync; icbi 0,%0; icbi 0,%1; sync; isync"
-::"r" (dest), "r"(addr));
+__patch_instruction(addr, instr, patch_addr);

 err = unmap_patch_area(text_poke_addr);
 if (err)
@@ -182,12 +183,22 @@
}
#else /* !CONFIG_STRICT_KERNEL_RWX */

-int patch_instruction(unsigned int *addr, unsigned int instr)
+static int do_patch_instruction(unsigned int *addr, unsigned int instr)
{  
  -return __patch_instruction(addr, instr);
+return raw_patch_instruction(addr, instr);
}
+int patch_instruction(unsigned int *addr, unsigned int instr)
+{
+    /* Make sure we aren't patching a freed init section */
+    if (init_mem_is_free && init_section_contains(addr, 4)) {
+        pr_debug("Skipping init section patching addr: 0x%px\n", addr);
+        return 0;
+    }
+    return do_patch_instruction(addr, instr);
+}

NOKPROBE_SYMBOL(patch_instruction);

int patch_branch(unsigned int *addr, unsigned long target, int flags)
@@ -195,6 +206,22 @@
return patch_instruction(addr, create_branch(addr, target, flags));
}

+int patch_branch_site(s32 *site, unsigned long target, int flags)
+{
+    unsigned int *addr;
+    addr = (unsigned int *)((unsigned long)site + *site);
+    return patch_instruction(addr, create_branch(addr, target, flags));
+}
+
+int patch_instruction_site(s32 *site, unsigned int instr)
+{
+    unsigned int *addr;
+    addr = (unsigned int *)((unsigned long)site + *site);
+    return patch_instruction(addr, instr);
+}
+
+bool is_offset_in_branch_range(long offset)
+{
+    /*
+     @@ -302,6 +329,11 @@
+     return instr_is_branch_iform(instr) || instr_is_branch_bform(instr);
+    }
+
+    int instr_is_relative_link_branch(unsigned int instr)
+    {
+        return instr_is_relative_branch(instr) && (instr & BRANCH_SET_LINK);
+    }
+
+    static unsigned long branch_iform_target(const unsigned int *instr)
signed long imm;
--- linux-4.15.0.orig/arch/powerpc/lib/copypage_64.S
+++ linux-4.15.0/arch/powerpc/lib/copypage_64.S
@@ -21,7 +21,9 @@
BEGIN_FTR_SECTION
lisr5,PAGE_SIZE@h
FTR_SECTION_ELSE
+#ifdef CONFIG_PPC_BOOK3S_64
bcopypage_power7
+#endif
ALT_FTR_SECTION_END_IFCLR(CPU_FTR_VMX_COPY)
orir5,r5,PAGE_SIZE@l
BEGIN_FTR_SECTION
--- linux-4.15.0.orig/arch/powerpc/lib/copypage_power7.S
+++ linux-4.15.0/arch/powerpc/lib/copypage_power7.S
@@ -42,8 +42,6 @@
lisr8,0x8000/* GO=1 */
crlldr8,r8,32

-machine push
-machine "power4"
/* setup read stream 0 */
dcbto4,r4,0b01000 /* addr from */
dcbt0,r7,0b01010 /* length and depth from */
@@ -52,7 +50,6 @@
dcbtst0,r10,0b01010 /* length and depth to */
eieio
dcbt0,r8,0b01010/* all streams GO */
-machine pop

#ifdef CONFIG_ALTIVEC
mflr0
--- linux-4.15.0.orig/arch/powerpc/lib/copyuser_64.S
+++ linux-4.15.0/arch/powerpc/lib/copyuser_64.S
@@ -20,11 +20,13 @@
.align7
_GLOBAL_TOC(__copy_tofrom_user)
+#ifdef CONFIG_PPC_BOOK3S_64
BEGIN_FTR_SECTION
nop
FTR_SECTION_ELSE
b__copy_tofrom_user_power7
ALT_FTR_SECTION_END_IFCLR(CPU_FTR_VMX_COPY)
+#endif
_GLOBAL(__copy_tofrom_user_base)
/* first check for a whole page copy on a page boundary */
cmpdirc1,r5,16
--- linux-4.15.0.orig/arch/powerpc/lib/copyuser_power7.S
+++ linux-4.15.0/arch/powerpc/lib/copyuser_power7.S
@@ 312,8 +312,6 @@
lisr8,0x8000/* GO=1 */
crlldr8,r8,32

-.machine push
-.machine "power4"
/* setup read stream 0 */
dcbt0,r6,0b01000 /* addr from */
dcbt0,r7,0b01010 /* length and depth from */
@@ -322,7 +320,6 @@
dcbtst0,r10,0b01010 /* length and depth to */
eieio
dcbt0,r8,0b01010/* all streams GO */
-.machine pop

beqcr1,,Lunwind_stack_nonvmx_copy

--- linux-4.15.0.orig/arch/powerpc/lib/feature-fixups.c
+++ linux-4.15.0/arch/powerpc/lib/feature-fixups.c
@@ -18,11 +18,13 @@
#include <linux/string.h>
#include <linux/init.h>
#include <linux/sched/mm.h>
+##include <linux/stop_machine.h>
#include <asm/cputable.h>
#include <asm/code-patching.h>
#include <asm/page.h>
#include <asm/sections.h>
#include <asm/setup.h>
+##include <asm/security_features.h>
#include <asm/firmware.h>

struct fixup_entry {
@@ -55,14 +57,14 @@
    instr = translate_branch(dest, src);

    /* Branch within the section doesn’t need translating */
-  if (target < alt_start || target >= alt_end) {
+  if (target < alt_start || target > alt_end) {
        instr = translate_branch(dest, src);
        if (!instr) return 1;
      }
patch_instruction(dest, instr);
+raw_patch_instruction(dest, instr);

return 0;
}
@@ -91,7 +93,7 @@
for (; dest < end; dest++)
+raw_patch_instruction(dest, PPC_INST_NOP);
+return 0;
}
@@ -117,6 +119,252 @@
#endif CONFIG_PPC_BOOK3S_64
+void do_stf_entry_barrier_fixups(enum stf_barrier_type types)
+{
+unsigned int instrs[3], *dest;
+long *start, *end;
+int i;
+
+start = PTRRELOC(&__start___stf_entry_barrier_fixup),
+end = PTRRELOC(&__stop___stf_entry_barrier_fixup);
+
instrs[0] = 0x60000000; /* nop */
instrs[1] = 0x60000000; /* nop */
instrs[2] = 0x60000000; /* nop */
+
+i = 0;
+
+for (i = 0; start < end; start++, i++) {
+  dest = (void *)start + *start;
+  pr_devel("patching dest %lx\n", (unsigned long)dest);
+  instrs[i++] = 0x7d4802a6; /* mflr r10		*/
+  instrs[i++] = 0x60000000; /* branch patched below */
+  instrs[i++] = 0x7d4803a6; /* mtlr r10		*/
+  instrs[i++] = 0x60000000; /* nop */
+  instrs[i++] = 0x7e0006ac; /* eieio + bit 6 hint */
+  instrs[i++] = 0x7c0004ac; /* hwsync		*/
+  instrs[i++] = 0xe94d0000; /* ld r10,0(r13)	*/
+  instrs[i++] = 0x63ff0000; /* ori 31,31,0 speculation barrier */
+}
+}
+patch_instruction(dest, instrs[0]);
+
+if (types & STF_BARRIER_FALLBACK)
+    patch_branch(dest + 1, (unsigned long)&stf_barrier_fallback,
+      BRANCH_SET_LINK);
+else
+    patch_instruction(dest + 1, instrs[1]);
+
+    patch_instruction(dest + 2, instrs[2]);
+)
+
+    printk(KERN_DEBUG "stf-barrier: patched %d entry locations (%s barrier)\n", i,
+(types == STF_BARRIER_NONE)       ? "no" :
+(types == STF_BARRIER_FALLBACK)   ? "fallback" :
+(types == STF_BARRIER_EIEIO)      ? "eieio" :
+(types == (STF_BARRIER_SYNC_ORI)) ? "hwsync" :
+          : "unknown");
+}
+
+void do_stf_exit_barrier_fixups(enum stf_barrier_type types)
+{
+    unsigned int instrs[6], *dest;
+    long *start, *end;
+    int i;
+
+    start = PTRRELOC(&__start___stf_exit_barrier_fixup),
+     end = PTRRELOC(&__stop___stf_exit_barrier_fixup);
+
+    instrs[0] = 0x60000000; /* nop */
+    instrs[1] = 0x60000000; /* nop */
+    instrs[2] = 0x60000000; /* nop */
+    instrs[3] = 0x60000000; /* nop */
+    instrs[4] = 0x60000000; /* nop */
+    instrs[5] = 0x60000000; /* nop */
+
+    i = 0;
+
+    if (types & STF_BARRIER_FALLBACK || types & STF_BARRIER_SYNC_ORI) {
+        if (cpu_has_feature(CPU_FTR_HVMODE)) {
+            instrs[i++] = 0x7db14ba6; /* mtspr 0x131, r13 (HSPRG1) */
+            instrs[i++] = 0x7db04aa6; /* mfspr r13, 0x130 (HSPRG0) */
+        } else {
+            instrs[i++] = 0x7db243a6; /* mtsprg 2,r13 */
+            instrs[i++] = 0x7db142a6; /* mfsprg r13,1 */
+        }
+        instrs[i++] = 0x7c0004ac; /* hwsync */
+        instrs[i++] = 0xe9ad0000; /* ld r13,0(r13) */
+        instrs[i++] = 0x63ff0000; /* ori 31,31,0 speculation barrier */
+    }
+if (cpu_has_feature(CPU_FTR_HVMODE)) {
  +instrs[i++] = 0x7db14aa6; /* mfspr r13, 0x131 (HSPRG1) */
  +} else {
  +instrs[i++] = 0x7db242a6; /* mfsprg r13,2 */
  +}
  +} else if (types & STF_BARRIER_EIEIO) {
    +instrs[i++] = 0x7e0006ac; /* eieio + bit 6 hint */
  +}
  +
  +for (i = 0; start < end; start++, i++) {
    +dest = (void *)start + *start;
    +
    +pr_devel("patching dest %lx\n", (unsigned long)dest);
    +
    +patch_instruction(dest, instrs[0]);
    +patch_instruction(dest + 1, instrs[1]);
    +patch_instruction(dest + 2, instrs[2]);
    +patch_instruction(dest + 3, instrs[3]);
    +patch_instruction(dest + 4, instrs[4]);
    +patch_instruction(dest + 5, instrs[5]);
    +}
    +printk(KERN_DEBUG "stf-barrier: patched %d exit locations (%s barrier)\n", i,
    +(types == STF_BARRIER_NONE) ? "no" :
    +(types == STF_BARRIER_FALLBACK) ? "fallback" :
    +(types == STF_BARRIER_EIEIO) ? "eieio" :
    +(types == (STF_BARRIER_SYNC_ORI)) ? "hwsync" :
    +: "unknown");
    +}
    +
    +static int __do_stf_barrier_fixups(void *data)
    +{
      +enum stf_barrier_type *types = data;
      +
      +do_stf_entry_barrier_fixups(*types);
      +do_stf_exit_barrier_fixups(*types);
      +
      +return 0;
      +}
      +
      +void do_stf_barrier_fixups(enum stf_barrier_type types)
      +{
      +/*
      + * The call to the fallback entry flush, and the fallback/sync-ori exit
      + * flush can not be safely patched in/out while other CPUs are executing
      + * them. So call __do_stf_barrier_fixups() on one CPU while all other CPUs
      + * spin in the stop machine core with interrupts hard disabled.
      + */
      +stop_machine(__do_stf_barrier_fixups, &types, NULL);

+
+void do_uaccess_flush_fixups(enum l1d_flush_type types)
+
+{
+unsigned int instrs[4], *dest;
+long *start, *end;
+int i;
+
+start = PTRRELOC(&__start___uaccess_flush_fixup);
+end = PTRRELOC(&__stop___uaccess_flush_fixup);
+
+instrs[0] = 0x60000000; /* nop */
+instrs[1] = 0x60000000; /* nop */
+instrs[2] = 0x60000000; /* nop */
+instrs[3] = 0x4e800020; /* blr */
+
+i = 0;
+
+if (types == L1D_FLUSH_FALLBACK) {
+instrs[3] = 0x60000000; /* nop */
+/* fallthrough to fallback flush */
+
+
+if (types & L1D_FLUSH_ORI) {
+instrs[i++] = 0x63ff0000; /* ori 31,31,0 speculation barrier */
+instrs[i++] = 0x63de0000; /* ori 30,30,0 L1d flush*/
+
+}
+
+if (types & L1D_FLUSH_MTTRIG) {
+instrs[i++] = 0x7c12dba6; /* mtspr TRIG2,r0 (SPR #882) */
+
+for (i = 0; start < end; start++, i++) {
+dest = (void *)start + *start;
+
+pr_devel("patching dest %lx\n", (unsigned long)dest);
+
+patch_instruction(dest, instrs[0]);
+
+patch_instruction((dest + 1), instrs[1]);
+patch_instruction((dest + 2), instrs[2]);
+patch_instruction((dest + 3), instrs[3]);
+
+
+printk(KERN_DEBUG "uaccess-flush: patched %d locations (%s flush)\n", i,
+(types == L1D_FLUSH_NONE) ? "no" :
+(types == L1D_FLUSH_FALLBACK) ? "fallback displacement" :
+(types & L1D_FLUSH_ORI) ? (types & L1D_FLUSH_MTTRIG) ? "ori+mttrig type"
+: "ori type" :
+static int __do_entry_flush_fixups(void *data)
+
+enum l1d_flush_type types = *(enum l1d_flush_type *)data;
+long *start, *end;
+
+start = PTRRELOC(&__start___entry_flush_fixup);
+end = PTRRELOC(&__stop___entry_flush_fixup);
+
+instrs[0] = 0x60000000; /* nop */
+instrs[1] = 0x60000000; /* nop */
+instrs[2] = 0x60000000; /* nop */
+
+i = 0;
+if (types == L1D_FLUSH_FALLBACK) {
+    instrs[i++] = 0x7d4802a6; /* mflr r10 */
+    instrs[i++] = 0x60000000; /* branch patched below */
+    instrs[i++] = 0x7d4803a6; /* mtlr r10 */
+
+    for (i = 0; start < end; start++, i++) {
+        dest = (void *)start + *start;
+        pr_devel("patching dest %lx", (unsigned long)dest);
+        patch_instruction(dest, instrs[0]);
+
+        if (types == L1D_FLUSH_FALLBACK)
+            patch_branch((dest + 1), (unsigned long)&entry_flush_fallback,
+                BRANCH_SET_LINK);
+        else
+            patch_instruction((dest + 1), instrs[1]);
+        patch_instruction((dest + 2), instrs[2]);
+    }
+}
+printk(KERN_DEBUG "entry-flush: patched %d locations (%s flush)\n", i,
+(types == L1D_FLUSH_NONE)    ? "no" :
+(types == L1D_FLUSH_FALLBACK) ? "fallback displacement" :
+(types & L1D_FLUSH_ORI)      ? (types & L1D_FLUSH_MTTRIG)
+? "ori+mttrig type"
+: "ori type" :
+(types & L1D_FLUSH_MTTRIG)    ? "mttrig type"
+: "unknown");
+
+return 0;
+
+}
}

void do_entry_flush_fixups(enum l1d_flush_type types)
+
+/*
+ * The call to the fallback flush can not be safely patched in/out while
+ * other CPUs are executing it. So call __do_entry_flush_fixups() on one
+ * CPU while all other CPUs spin in the stop machine core with interrupts
+ * hard disabled.
+ */
+stop_machine(__do_entry_flush_fixups, &types, NULL);
+
void do_rfi_flush_fixups(enum l1d_flush_type types)
{
unsigned int instrs[3], *dest;
@@ -153,10 +401,110 @@
patch_instruction(dest + 2, instrs[2]);
}

-printk(KERN_DEBUG "rfi-flush: patched %d locations\n", i);
+printk(KERN_DEBUG "rfi-flush: patched %d locations (%s flush)\n", i,
+(types == L1D_FLUSH_NONE)    ? "no" :
+(types == L1D_FLUSH_FALLBACK) ? "fallback displacement" :
+(types & L1D_FLUSH_ORI)      ? (types & L1D_FLUSH_MTTRIG)
+? "ori+mttrig type"
+: "ori type" :
+(types & L1D_FLUSH_MTTRIG)    ? "mttrig type"
+: "unknown");
+
+}
+
+void do_barrier_nospec_fixups_range(bool enable, void *fixup_start, void *fixup_end)
+
+{ }
+unsigned int instr, *dest;
+long *start, *end;
+int i;
#ifdef CONFIG_PPC_BARRIER_NOSPEC
+void do_barrier_nospec_fixups(bool enable)
+{
+    void *start, *end;
+    start = PTRRELOC(&__start___barrier_nospec_fixup),
+    end = PTRRELOC(&__stop___barrier_nospec_fixup);
+    do_barrier_nospec_fixups_range(enable, start, end);
+}
@endef /* CONFIG_PPC_BARRIER_NOSPEC */
+
+#ifdef CONFIG_PPC_FSL_BOOK3E
+void do_barrier_nospec_fixups_range(bool enable, void *fixup_start, void *fixup_end)
+{
+    unsigned int instr[2], *dest;
+    long *start, *end;
+    int i;
+    start = fixup_start;
+    end = fixup_end;
+    instr[0] = PPC_INST_NOP;
+    instr[1] = PPC_INST_NOP;
+    if (enable) {
+        for (i = 0; start < end; start++, i++) {
+            dest = (void *)start + *start;
+            printk(KERN_DEBUG "barrier-nospec: patched %d locations\n", i);
+        }
+    }
+}
@endef /* CONFIG_PPC_FSL_BOOK3E */

```c
+start = fixup_start;
+end = fixup_end;
+
+instr = 0x60000000; /* nop */
+
+if (enable) {
+    pr_info("barrier-nospec: using ORI speculation barrier\n");
+    instr = 0x63ff0000; /* ori 31,31,0 speculation barrier */
+}
+
+for (i = 0; start < end; start++, i++) {
+    dest = (void *)start + *start;
+    printk(KERN_DEBUG "patching dest %lx\n", (unsigned long)dest);
+    patch_instruction(dest, instr);
+}
+
+printk(KERN_DEBUG "barrier-nospec: patched %d locations\n", i);
}```

```c
#endif /* CONFIG_PPC_BOOK3S_64 */
```
+pr_info("barrier-nospec: using isync; sync as speculation barrier\n");
+instr[0] = PPC_INST_ISYNC;
+instr[1] = PPC_INST_SYNC;
+
+for (i = 0; start < end; start++, i++) {
+dest = (void *)start + *start;
+
+pr_devel("patching dest %lx", (unsigned long)dest);
+patch_instruction(dest, instr[0]);
+patch_instruction(dest + 1, instr[1]);
+}
+
+printk(KERN_DEBUG "barrier-nospec: patched %d locations\n", i);
+
+
+static void patch_btb_flush_section(long *curr)
+{
+unsigned int *start, *end;
+
+start = (void *)curr + *curr;
+end = (void *)curr + *(curr + 1);
+for (; start < end; start++) {
+pr_devel("patching dest %lx", (unsigned long)start);
+patch_instruction(start, PPC_INST_NOP);
+}
+
+void do_btb_flush_fixups(void)
+{
+long *start, *end;
+
+start = PTRRELOC(&__start__btb_flush_fixup);
+end = PTRRELOC(&__stop__btb_flush_fixup);
+
+for (; start < end; start += 2)
+patch_btb_flush_section(start);
+}
+
+#endif /* CONFIG_PPC_FSL_BOOK3E */
+
void do_lwsync_fixups(unsigned long value, void *fixup_start, void *fixup_end)
{
long *start, *end;
@@ -170,7 +518,7 @@
for (; start < end; start++) {
dest = (void *)start + *start;
-patch_instruction(dest, PPC_INST_LWSYNC);
}

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+raw_patch_instruction(dest, PPC_INST_LWSYNC);
}
}

@@ -188,7 +536,7 @@
length = (__end_interrupts - _stext) / sizeof(int);

while (length--) {
    -patch_instruction(dest, *src);
+raw_patch_instruction(dest, *src);
    src++;
    dest++;
}
--- linux-4.15.0.orig/arch/powerpc/lib/memcpy_64.S
+++ linux-4.15.0/arch/powerpc/lib/memcpy_64.S
@@ -19,9 +19,11 @@
std
tr3,-STACKFRAMESIZE+STK_REG(R31)(r1)	/* save destination pointer for return value */
#endif
FTR_SECTION_ELSE
+#ifdef CONFIG_PPC_BOOK3S_64
#endif
selftest
b	memcpy_power7
#endif
#ifdef __LITTLE_ENDIAN__
/* dumb little-endian memcpy that will get replaced at runtime */
--- linux-4.15.0.orig/arch/powerpc/lib/memcpy_power7.S
+++ linux-4.15.0/arch/powerpc/lib/memcpy_power7.S
@@ -259,15 +259,12 @@
lis
r8,0x8000	/* GO=1 */
cld
r8,32

-.machine push
-.machine "power4"
dcbt0,r6,0b01000
dcbt0,r7,0b01010
dcbst0,r9,0b01000
dcbst0,r10,0b01010
eieio
dcbt0,r8,0b01010/* GO */
-.machine pop

beqcr1,.Lunwind_stack_nonvmx_copy

--- linux-4.15.0.orig/arch/powerpc/lib/step.c
+++ linux-4.15.0/arch/powerpc/lib/step.c
@@ -12,6 +12,7 @@
#include <linux/kprobes.h>
#include <linux/ptrace.h>
#include <linux/prefetch.h>
+/#include <asm/cpu_has_feature.h>
#include <asm/sskip.h>
#include <asm/processor.h>
#include <linux/uaccess.h>

--- linux-4.15.0.orig/arch/powerpc/lib/string.S
+++ linux-4.15.0/arch/powerpc/lib/string.S
@@ -12,6 +12,7 @@
 #include <asm/errno.h>
 #include <asm/ppc_asm.h>
 #include <asm/export.h>
+#include <asm/cache.h>

 .text

 @@ -23,7 +24,7 @@
 mtctr5
 addi6,r3,-1
 addi4,r4,-1
-.balign 16
+.balign IFETCH_ALIGN_BYTES
 1:lbzur0,1(r4)
 cmpwi0,r0,0
 stbzu0,1(r6)
 @@ -43,7 +44,7 @@
 mtctr5
 addir5,r3,-1
 addir4,r4,-1
-.balign 16
+.balign IFETCH_ALIGN_BYTES
 1:lbzur3,1(r5)
 cmpwi1,r3,0
 lbzur0,1(r4)
 @@ -77,7 +78,7 @@
 beq-2f
 mtctr5
 addir3,r3,-1
-.balign 16
+.balign IFETCH_ALIGN_BYTES
 1:lbzur0,1(r3)
 cmpw0,r0,r4
 bdnzf2,1b
 @@ -87,7 +88,7 @@
 EXPORT_SYMBOL(memchr)

 #ifdef CONFIG_PPC32
- _GLOBAL(__clear_user)
+ _GLOBAL(__arch_clear_user)
        addi r6, r3, -4
        li r3, 0
        li r5, 0
        @@ -127,5 +128,5 @@
EX_TABLE(1b, 91b)
EX_TABLE(8b, 92b)

-EXPORT_SYMBOL(__clear_user)
+EXPORT_SYMBOL(__arch_clear_user)
#endif
--- linux-4.15.0.orig/arch/powerpc/lib/string_64.S
+++ linux-4.15.0/arch/powerpc/lib/string_64.S
@@ -29,7 +29,7 @@
     .section .text

/**
- * __clear_user: - Zero a block of memory in user space, with less checking.
+ * __arch_clear_user: - Zero a block of memory in user space, with less checking.
* @to:   Destination address, in user space.
* @n:    Number of bytes to zero.
* @@ -70,7 +70,7 @@
mr r3, r4
blr

- _GLOBAL_TOC(__clear_user)
+ _GLOBAL_TOC(__arch_clear_user)
cmpdir r4, 32
neg r6, r3
        li r0, 0
        @@ -193,4 +193,4 @@
cmpdir r4, 32
        blt L short_clear
        b L medium_clear
-EXPORT_SYMBOL(__clear_user)
+EXPORT_SYMBOL(__arch_clear_user)
--- linux-4.15.0.orig/arch/powerpc/mm/8xx_mmu.c
+++ linux-4.15.0/arch/powerpc/mm/8xx_mmu.c
@@ -192,7 +192,7 @@
     mtspr(SPRN_M_TW, __pa(pgd) - offset);

 /** Update context */
- mtspr(SPRN_M_CASID, id);
+ mtspr(SPRN_M_CASID, id - 1);
 */ sync */
        mb();
/* Look in secondary table */
if (slot == -1)
  slot = base_hpte_find(ea, psize, true, &v, &r);
+slot = base_hpte_find(ea, psize, false, &v, &r);

/* No entry found */
if (slot == -1)

/* Traverse the linux pagetable structure and dump pages that are in */
/* the hash pagetable. */
-
+for (i = 0; i < PTRS_PER_PGD; i++, pgd++) {
  addr = KERN_VIRT_START + i * PGDIR_SIZE;
  if (!pgd_none(*pgd) && !pgd_huge(*pgd))
    walk_pud(st, pgd, addr);
}

if (radix_enabled())
  st.start_address = PAGE_OFFSET;
+else
+st.start_address = KERN_VIRT_START;
+
/* Traverse kernel page tables */
walk_pagetables(&st);
note_page(&st, 0, 0, 0);
--- linux-4.15.0.orig/arch/powerpc/mm/fault.c
+++ linux-4.15.0/arch/powerpc/mm/fault.c
@@ -22,6 +22,7 @@
#include <linux/errno.h>
#include <linux/string.h>
#include <linux/types.h>
+#include <linux/pagemap.h>
#include <linux/ptrace.h>
#include <linux/mman.h>
#include <linux/mm.h>
@@ -66,15 +67,11 @@}
/* Check whether the instruction at regs->nip is a store using
+ Check whether the instruction inst is a store using
  * an update addressing form which will update r1.
 */
-store_updates_sp(struct pt_regs *regs)
+store_updates_sp(unsigned int inst)
{
-unsigned int inst;
-	if (get_user(inst, (unsigned int __user *)regs->nip))
-    return false;
/* check for 1 in the rA field */
if (((inst >> 16) & 0x1f) != 1)
    return false;
@@ -215,7 +212,9 @@
static bool bad_kernel_fault(bool is_exec, unsigned long error_code,
                              unsigned long address)
{
-    if (is_exec && (error_code & (DSISR_NOEXEC_OR_G | DSISR_KEYFAULT))) {
-        printk_ratelimited(KERN_CRIT "kernel tried to execute"
-"exec-protected page (%lx) -"
"exploit attempt? (uid: %d)\n",
@@ -225,20 +224,24 @@
return is_exec || (address >= TASK_SIZE);
}
static bool bad_stack_expansion(struct pt_regs *regs, unsigned long address,
    struct vm_area_struct *vma, bool store_update_sp)
{
    unsigned int __user *nip = (unsigned int __user *)regs->nip;
    /* get user regs even if this fault is in kernel mode */
    struct pt_regs *uregs = current->thread.regs;
    if (uregs == NULL)
    { /* between the last mapped region and the stack will 
        * expand the stack rather than segfaulting. 
    */
        if (address + 2048 < uregs->gpr[1] && !store_update_sp)
            return true;
    }
    if ((flags & FAULT_FLAG_WRITE) && (flags & FAULT_FLAG_USER) &&
        access_ok(VERIFY_READ, nip, sizeof(*nip))
    { unsigned int inst;
        int res;
        pagefault_disable();
        res = __get_user_inatomic(inst, nip);
        pagefault_enable();
        if (!res)
            return !store_updates_sp(inst);
        *must_retry = true;
    }
    return true;
}

/*
 * N.B. The POWER/Open ABI allows programs to access up to 
 * 288 bytes below the stack pointer.
 * - * The kernel signal delivery code writes up to about 1.5kB 
 * + * The kernel signal delivery code writes a bit over 4kB 
 * + below the stack pointer (r1) before decrementing it.
 * + The exec code can write slightly over 640kB to the stack
 * + before setting the user r1. Thus we allow the stack to
 * + expand to 1MB without further checks.
 */
if (address + 0x100000 < vma->vm_end) {
    unsigned int __user *nip = (unsigned int __user *)regs->nip;
    /* get user regs even if this fault is in kernel mode */
    struct pt_regs *uregs = current->thread.regs;
    if (uregs == NULL)
    { /* between the last mapped region and the stack will 
        * expand the stack rather than segfaulting. 
    */
        if (address + 2048 < uregs->gpr[1] && !store_update_sp)
            return true;
    }
    if (address + SIGFRAME_MAX_SIZE >= uregs->gpr[1])
        return false;
    if ((flags & FAULT_FLAG_WRITE) && (flags & FAULT_FLAG_USER) &&
        access_ok(VERIFY_READ, nip, sizeof(*nip))
    { unsigned int inst;
        int res;
        pagefault_disable();
        res = __get_user_inatomic(inst, nip);
        pagefault_enable();
        if (!res)
            return !store_updates_sp(inst);
        *must_retry = true;
    }
    return true;
}
return false;
}
@@ -390,7 +407,7 @@
int is_user = user_mode(regs);
int is_write = page_fault_is_write(error_code);
int fault, major = 0;
-bool store_update_sp = false;
+bool must_retry = false;

if (notify_page_fault(regs))
    return 0;
@@ -437,9 +454,6 @@
    * can result in fault, which will cause a deadlock when called with
    * mmap_sem held
    */
-    if (is_write && is_user)
-        store_update_sp = store_updates_sp(regs);
-
    if (is_user)
        flags |= FAULT_FLAG_USER;
    if (is_write)
@@ -486,8 +500,17 @@
    return bad_area(regs, address);

    /* The stack is being expanded, check if it's valid */
-    if (unlikely(bad_stack_expansion(regs, address, vma, store_update_sp)))
-        return bad_area(regs, address);
+    if (unlikely(bad_stack_expansion(regs, address, vma, flags,
+        &must_retry))) {
+        if (!must_retry)
+            return bad_area(regs, address);
+        up_read(&mm->mmap_sem);
+        if (fault_in_pages_readable((const char __user *)regs->nip,
+            sizeof(unsigned int)))
+            return bad_area_nosemaphore(regs, address);
+        goto retry;
+    }
+
    /* Try to expand it */
    if (unlikely(expand_stack(vma, address)))
        @ @ -579,21 +602,22 @@
        switch (regs->trap) {
        case 0x300:
        case 0x380:
-            printk(KERN_ALERT "Unable to handle kernel paging request for 
-" data at address 0x%08lx\n", regs->dar);
+            pr_alert("BUG: %s at 0x%08lx\n", 

+ regs->dar < PAGE_SIZE ? "Kernel NULL pointer dereference" : 
+ "Unable to handle kernel data access", regs->dar);
break;
case 0x400:
case 0x480:
-printf(KERN_ALERT "Unable to handle kernel paging request for 
-"instruction fetch
"); 
+pr_alert("BUG: Unable to handle kernel instruction fetch%s", 
+ regs->nip < PAGE_SIZE ? " (NULL pointer?)\n" : "\n");
break;
case 0x600:
-printf(KERN_ALERT "Unable to handle kernel paging request for 
-"unaligned access at address 0x%08lx\n", regs->dar);
+pr_alert("BUG: Unable to handle kernel unaligned access at 0x%08lx\n", 
+ regs->dar);
break;
default:
-printf(KERN_ALERT "Unable to handle kernel paging request for 
-"unknown fault\n");
+pr_alert("BUG: Unable to handle unknown paging fault at 0x%08lx\n", 
+ regs->dar);
break;
}
printf(KERN_ALERT "Faulting instruction address: 0x%08lx\n", 
--- linux-4.15.0.orig/arch/powerpc/mm/hash_native_64.c
+++ linux-4.15.0/arch/powerpc/mm/hash_native_64.c
@@ -104,6 +104,15 @@
return va;
}

static inline void fixup_tlbie(unsigned long vpn, int psize, int apsize, int ssize)
+{
+if (cpu_has_feature(CPU_FTR_P9_TLBIE_STQ_BUG)) {
+/* Need the extra ptesync to ensure we don't reorder tlbie*/ 
+asm volatile("ptesync": :"memory");
+___tlbie(vpn, psize, apsize, ssize);
+}
+}
+
+static inline void __tlbie(unsigned long vpn, int psize, int apsize, int ssize)
{
unsigned long rb;
@ @ -181,6 +190,7 @@
asm volatile("ptesync": :"memory");
} else {
___tlbie(vpn, psize, apsize, ssize);
+fixup_tlbie(vpn, psize, apsize, ssize);
asm volatile("eieio; tlbsync; ptesync": :"memory");


static void native_flush_hash_range(unsigned long number, int local)
{
    unsigned long vpn;
    unsigned long hash, index, hidx, shift, slot;
    struct hash_ppte *hptep;
    unsigned long hpte_v;

    if (lock_tlbie && !use_local)
        fnl_tlbie(vpn, psize, psize, ssize);
    pte_iterate_hashed_end();
}

/*
 * Just do one more with the last used values.
 * /
fixup_tlbie(vpn, psize, psize, ssize);
asm volatile("eieio; tlbsync; ptesync":"memory");

if (lock_tlbie)
--- linux-4.15.0.orig/arch/powerpc/mm/hash_utils_64.c
+++ linux-4.15.0/arch/powerpc/mm/hash_utils_64.c
@@ -36,6 +36,7 @@
 #include <linux/memblock.h>
 #include <linux/context_tracking.h>
 #include <linux/libfdt.h>
 +#include <linux/cpu.h>

 #include <asm/debugfs.h>
 #include <asm/processor.h>
 @@ -292,10 +293,18 @@
     ret = mmu_hash_ops.hpte_insert(hpteg, vpn, paddr, tprot,
         HPTE_V_BOLTED, psize, psize,
         ssize);
-    +if (ret == -1) {
+    +/* Try to remove a non bolted entry */
+    +ret = mmu_hash_ops.hpte_remove(hpteg);
+    +if (ret != -1)
+        ret = mmu_hash_ops.hpte_insert(hpteg, vpn, paddr, tprot,
+            HPTE_V_BOLTED, psize, psize,
+            ssize);
+    +}
    if (ret < 0)
        break;

cond_resched();
#ifdef CONFIG_DEBUG_PAGEALLOC
if (debug_pagealloc_enabled() &&
    (paddr >> PAGE_SHIFT) < linear_map_hash_count)
    #ifdef CONFIG_DEBUG_PAGEALLOC
    htab_address = NULL;
    _SDR1 = 0;
    #endif
    
    */
    + * On POWER9, we need to do a H_REGISTER_PROC_TBL hcall
    + * to inform the hypervisor that we wish to use the HPT.
    + */
    +if (cpu_has_feature(CPU_FTR_ARCH_300))
    +register_process_table(0, 0, 0);
    #ifdef CONFIG_FA_DUMP
    /*
    * If firmware assisted dump is active firmware preserves
    */
    @ @ -1847,10 +1862,16 @ @

    static int hpt_order_set(void *data, u64 val)
    {
        int ret;
        +
        if (!mmu_hash_ops.resize_hpt)
            return -ENODEV;

        -return mmu_hash_ops.resize_hpt(val);
        +cpus_read_lock();
        +ret = mmu_hash_ops.resize_hpt(val);
        +cpus_read_unlock();
        +
        +return ret;
    }

    DEFINE_SIMPLE_ATTRIBUTE(fops_hpt_order, hpt_order_get, hpt_order_set, "%llu\n");
    --- linux-4.15.0.orig/arch/powerpc/mm/hugetlbpage-radix.c
    +++ linux-4.15.0/arch/powerpc/mm/hugetlbpage-radix.c
    @ @ -1,6 +1,7 @@
    // SPDX-License-Identifier: GPL-2.0
    #include <linux/mm.h>
    #include <linux/hugetlb.h>
    +#include <linux/security.h>
    #include <asm/pgtable.h>
    #include <asm/pgalloc.h>
    #include <asm/cacheflush.h>
    @ @ -73,7 +74,7 @@
    if (addr) {
        addr = ALIGN(addr, huge_page_size(h));
vma = find_vma(mm, addr);
- if (high_limit - len >= addr &&
+ if (high_limit - len >= addr && addr >= mmap_min_addr &&
   (!vma || addr + len <= vm_start_gap(vma)))
   return addr;
}
@ @ -83,7 +84,7 @@
*/
info.flags = VM_UNMAPPED_AREA_TOPDOWN;
info.length = len;
- info.low_limit = PAGE_SIZE;
+ info.low_limit = max(PAGE_SIZE, mmap_min_addr);
info.high_limit = mm->mmap_base + (high_limit - DEFAULT_MAP_WINDOW);
info.align_mask = PAGE_MASK & ~huge_page_mask(h);
info.align_offset = 0;
--- linux-4.15.0.orig/arch/powerpc/mm/hugetlbpage.c
+++ linux-4.15.0/arch/powerpc/mm/hugetlbpage.c
@@ -19,6 +19,7 @@
 #include <linux/moduleparam.h>
 #include <linux/swap.h>
 #include <linux/swapops.h>
+ #include <linux/kmemleak.h>
 #include <asm/pgtable.h>
 #include <asm/pgalloc.h>
 #include <asm/tlb.h>
@@ -110,6 +111,8 @@
 for (i = i - 1 ; i >= 0; i--, hpdp--)
 *hpdp = __hugepd(0);
kmem_cache_free(cachep, new);
+ } else {
+ kmemleak_ignore(new);
} }
spin_unlock(&mm->page_table_lock);
return 0;
@@ -155,6 +158,8 @@
 else {
pdshift = PUD_SHIFT;
 pu = pud_alloc(mm, pg, addr);
+ if (!pu)
+ return NULL;
 if (pshift == PUD_SHIFT)
 return (pte_t *)pu;
 else if (pshift > PMD_SHIFT)
@@ -162,6 +167,8 @@
 else {
pdshift = PMD_SHIFT;
pm = pmd_alloc(mm, pu, addr);
+ if (!pm)
+return NULL;
if (pshift == PMD_SHIFT)
/* 16MB hugepage */
return (pte_t *)pm;
@@ -175,11 +182,15 @@
} else {
    pdshift = PUD_SHIFT;
    pu = pud_alloc(mm, pg, addr);
    +if (!pu)
    +return NULL;
    if (pshift >= HUGEPD_PUD_SHIFT) {
        hpdp = (hugepd_t *)pu;
    } else {
    pdshift = PMD_SHIFT;
    pm = pmd_alloc(mm, pu, addr);
    +if (!pm)
    +return NULL;
    hpdp = (hugepd_t *)pm;
    }
@@ -553,9 +564,11 @@
    struct hstate *hstate = hstate_file(file);
    int mmu_psize = shift_to_mmu_psize(huge_page_shift(hstate));

+#ifdef CONFIG_PPC_RADIX_MMU
    if (radix_enabled())
        return radix__hugetlb_get_unmapped_area(file, addr, len,
                                        pgoff, flags);
+#endif
    return slice_get_unmapped_area(addr, len, flags, mmu_psize, 1);
    }
#endif
--- linux-4.15.0.orig/arch/powerpc/mm/mem.c
+++ linux-4.15.0/arch/powerpc/mm/mem.c
@@ -63,6 +63,7 @@
#ifdef CONFIG_HIGHMEM
    pte_t *kmap_pte;
    @ @ -143,6 +144,7 @@
    start, start + size, rc);
    return -EFAULT;
    }
    +flush_inval_dcache_range(start, start + size);
return __add_pages(nid, start_pfn, nr_pages, want_memblock);
}
@@ -171,6 +173,7 @@
/* Remove htab bolted mappings for this section of memory */
start = (unsigned long)__va(start);
+flush_inval_dcache_range(start, start + size);
ret = remove_section_mapping(start, start + size);

/* Ensure all vmalloc mappings are flushed in case they also
@@ -350,6 +353,14 @@
BUILD_BUG_ON(MMU_PAGE_COUNT > 16);

#define CONFIG_SWIOTLB
+/*
+ * Some platforms (e.g. 85xx) limit DMA-able memory way below
+ * 4G. We force memblock to bottom-up mode to ensure that the
+ * memory allocated in swiotlb_init() is DMA-able.
+ * As it's the last memblock allocation, no need to reset it
+ * back to to-down.
+ */
+memblock_set_bottom_up(true);
swiotlb_init(0);
#endif

@@ -403,6 +414,7 @@
{
ppc_md.progress = ppc_printk_progress;
mark_initmem_nx();
+init_mem_is_free = true;
free_initmem_default(POISON_FREE_INITMEM);
}

--- linux-4.15.0.orig/arch/powerpc/mm/mmu_context_book3s64.c
+++ linux-4.15.0/arch/powerpc/mm/mmu_context_book3s64.c
@@ -171,6 +171,7 @@
mem_iommu_init(mm);
#endif
atomic_set(&mm->context.active_cpus, 0);
+atomic_set(&mm->context.copros, 0);

return 0;
}
--- linux-4.15.0.orig/arch/powerpc/mm/mmu_context_iommu.c
+++ linux-4.15.0/arch/powerpc/mm/mmu_context_iommu.c
@@ -19,6 +19,7 @@
#include <linux/hugetlb.h>
#include <linux/swap.h>
#include <asm/mmu_context.h>
+include <asm/pte-walk.h>

static DEFINE_MUTEX(mem_list_mutex);

@@ -27,6 +28,7 @@
 struct rcu_head rcu;
 unsigned long used;
 atomic64_t mapped;
+unsigned int pageshift;
 u64 ua;/* userspace address */
 u64 entries;/* number of entries in hpas[] */
 u64 *hpas;/* vmalloc'ed */
@@ -126,6 +128,9 @@
 struct mm_iommu_table_group_mem_t *mem;
 long i, j, ret = 0, locked_entries = 0;
+unsigned int pageshift;
+unsigned long flags;
+unsigned long cur_ua;
 struct page *page = NULL;

 mutex_lock(&mem_list_mutex);
@@ -160,6 +165,12 @@
 goto unlock_exit;
 }

+/
+ * For a starting point for a maximum page size calculation
+ * we use @ua and @entries natural alignment to allow IOMMU pages
+ * smaller than huge pages but still bigger than PAGE_SIZE.
+ *
+mem->pageshift = __ffs(ua | (entries << PAGE_SHIFT));
 mem->hpas = vzalloc(entries * sizeof(mem->hpas[0]));
 if (!mem->hpas) {
 kfree(mem);
@@ -168,7 +179,8 @@
 }

 for (i = 0; i < entries; ++i) {
- if (1 != get_user_pages_fast(ua + (i << PAGE_SHIFT),
+ if (1 != get_user_pages_fast(ua + (i << PAGE_SHIFT),
+cur_ua = ua + (i << PAGE_SHIFT);
+if (1 != get_user_pages_fast(cur_ua,
 1/* pages */ 1/* iswrite */ 1/* &page */) {
 ret = -EFAULT;
 for (j = 0; j < i; ++j)
@@ -187,7 +199,7 @@
 if (is_migrate_cma_page(page)) {

if (mm_iommu_move_page_from_cma(page))
goto populate;

- if (1 != get_user_pages_fast(ua + (i << PAGE_SHIFT),
+ if (1 != get_user_pages_fast(cur_ua,
1/* pages */, 1/* iswrite */,&page)) {
    ret = -EFAULT;
    @ @ -200.6 +212.24 @@
}

populate:
+ pageshift = PAGE_SHIFT;
+ if (mem->pageshift > PAGE_SHIFT && PageCompound(page)) {
    +pte_t *pte;
    +struct page *head = compound_head(page);
    +unsigned int compshift = compound_order(head);
    +unsigned int pteshift;
    +
    +local_irq_save(flags); /* disables as well */
    +pte = find_linux_pte(mm->pgd, cur_ua, NULL, &pteshift);
    +
    /* Double check it is still the same pinned page */
    +if (pte && pte_page(*pte) == head &&
        + pteshift == compshift + PAGE_SHIFT)
    +pageshift = max_t(unsigned int, pteshift,
        +PAGE_SHIFT);
    +local_irq_restore(flags);
    +
    +mem->pageshift = min(mem->pageshift, pageshift);
    mem->hpas[i] = page_to_pfn(page) << PAGE_SHIFT;
}

EXPORT_SYMBOL_GPL(mm_iommu_find);

long mm_iommu ua to hpa(struct mm_iommu table group_mem_t *mem,
- unsigned long ua, unsigned long *hpa)
+unsigned long ua, unsigned int pageshift, unsigned long *hpa)
{
    const long entry = (ua - mem->ua) >> PAGE_SHIFT;
    u64 *va = &mem->hpas[entry];
    @ @ -358.6 +388.9 @@
    if (entry >= mem->entries)
        return -EFAULT;

    +if (pageshift > mem->pageshift)
        +return -EFAULT;
    +
*hpa = *va | (ua & ~PAGE_MASK);

return 0;
@@ -365,7 +398,7 @@
EXPORT_SYMBOL_GPL(mm_iommu_ua_to_hpa);

long mm_iommu_ua_to_hpa_rm(struct mm_iommu_table_group_mem_t *mem,
-unsigned long ua, unsigned long *hpa)
+unsigned long ua, unsigned int pageshift, unsigned long *hpa)
{
    const long entry = (ua - mem->ua) >> PAGE_SHIFT;
    void *va = &mem->hpas[entry];
@@ -374,6 +407,9 @@
    if (entry >= mem->entries)
        return -EFAULT;
    +if (pageshift > mem->pagesize)
        +return -EFAULT;
    +
    pa = (void *) vmalloc_to_phys(va);
    if (!pa)
        return -EFAULT;
--- linux-4.15.0.orig/arch/powerpc/mm/mmu_context_nohash.c
+++ linux-4.15.0/arch/powerpc/mm/mmu_context_nohash.c
@@ -331,6 +331,20 @@
    {
        pr_hard("initing context for mm @%p\n", mm);

+#ifdef CONFIG_PPC_MM_SLICES
    +if (!mm->context.slb_addr_limit)
        +mm->context.slb_addr_limit = DEFAULT_MAP_WINDOW;
    +
    +/*
    + * We have MMU_NO_CONTEXT set to be ~0. Hence check
    + * explicitly against context.id == 0. This ensures that we properly
    + * initialize context slice details for newly allocated mm's (which will
    + * have id == 0) and don't alter context slice inherited via fork (which
    + * will have id != 0).
    + */
    +if (mm->context.id == 0)
        +slice_set_user_psize(mm, mmu_virtual_psize);
    +#endif
    mm->context.id = MMU_NO_CONTEXT;
    mm->context.active = 0;
    return 0;
@@ -428,8 +442,8 @@
    */


if (mmu_has_feature(MMU_FTR_TYPE_8xx)) {
    -first_context = 0;
    -last_context = 15;
    +first_context = 1;
    +last_context = 16;
    no_selective_tlbil = true;
} else if (mmu_has_feature(MMU_FTR_TYPE_47x)) {
    first_context = 1;
}

static void update_numa_cpu_lookup_table(unsigned int cpu, int node)
{
    numa_cpu_lookup_table[cpu] = node;
}

static void map_cpu_to_node(int cpu, int node)
{
    update_numa_cpu_lookup_table(cpu, node);
}

out_present:
-if (nid < 0 || !node_online(nid))
+if (nid < 0 || !node_possible(nid))
    nid = first_online_node;

map_cpu_to_node(lcpu, nid);

+static void __init find_possible_nodes(void)
+
+struct device_node *rtas;
+u32 numnodes, i;
+
+if (min_common_depth <= 0)
+    return;
+
+rtas = of_find_node_by_path("/rtas");
+if (!rtas)
+    return;
+
+if (of_property_read_u32_index(rtas,
/*ibm,max-associativity-domains",
+min_common_depth, &numnodes))
+goto out;
+for (i = 0; i < numnodes; i++) {
+if (!node_possible(i))
+node_set(i, node_possible_map);
+}
+out:
+of_node_put(rtas);
+
void __init initmem_init(void)
{
int nid, cpu;
@@ -905,12 +926,15 @@
memblock_dump_all();

/*
- * Reduce the possible NUMA nodes to the online NUMA nodes,
- * since we do not support node hotplug. This ensures that we
- * lower the maximum NUMA node ID to what is actually present.
+ * Modify the set of possible NUMA nodes to reflect information
+ * available about the set of online nodes, and the set of nodes
+ * that we expect to make use of for this platform's affinity
+ * calculations.
 */
nodes_and(node_possible_map, node_possible_map, node_online_map);

+find_possible_nodes();
+
for_each_online_node(nid) {
  unsigned long start_pfn, end_pfn;

@@ -957,16 +981,22 @@
}
early_param("numa", early_numa);

-static bool topology_updates_enabled = true;
+/*
+ * The platform can inform us through one of several mechanisms
+ * (post-migration device tree updates, PRRN or VPHN) that the NUMA
+ * assignment of a resource has changed. This controls whether we act
+ * on that. Disabled by default.
+ */
+static bool topology_updates_enabled;
static int __init early_topology_updates(char *p)
{
    if (!p)
        return 0;

    if (!strcmp(p, "off")) {
        pr_info("Disabling topology updates\n");
        topology_updates_enabled = false;
    }
    else if (!strcmp(p, "on")) {
        pr_warn("Caution: enabling topology updates\n");
        topology_updates_enabled = true;
    }

    return 0;
}

switch (rc) {
    case H_FUNCTION:
        printk(KERN_INFO
            "VPHN is not supported. Disabling polling...\n");
        stop_topology_update();
        break;
    ...
}

static inline int find_and_online_cpu_nid(int cpu)
{
    __be32 associativity[VPHN_ASSOC_BUFSIZE] = {0};
    int new_nid;

    /* Use associativity from first thread for all siblings */
    if (vphn_get_associativity(cpu, associativity))
        return cpu_to_node(cpu);
    new_nid = associativity_to_nid(associativity);
    if (new_nid < 0 || !node_possible(new_nid))
        new_nid = first_online_node;

    if (NODE_DATA(new_nid) == NULL) {
        ifdef CONFIG_MEMORY_HOTPLUG
        /*
         * Need to ensure that NODE_DATA is initialized for a node from
         * available memory (see memblock_alloc_try_nid). If unable to
         * init the node, then default to nearest node that has memory
         * installed. Skip onlining a node if the subsystems are not
         * yet initialized.
         */
        ...
+ */
+if (!topology_inited || try_online_node(new_nid))
+new_nid = first_online_node;
+#else
+*/
+ * Default to using the nearest node that has memory installed.
+ * Otherwise, it would be necessary to patch the kernel MM code
+ * to deal with more memoryless-node error conditions.
+ */
+new_nid = first_online_node;
+#endif
+
+return new_nid;
+
+
+/*
* Update the CPU maps and sysfs entries for a single CPU when its NUMA
* characteristics change. This function doesn't perform any locking and is
*/
@@ -1345,7 +1412,6 @@
{
    unsigned int cpu, sibling, changed = 0;
    struct topology_update_data *updates, *ud;
-__be32 associativity[VPHN_ASSOC_BUFSIZE] = {0};
    cpumask_t updated_cpus;
    struct device *dev;
    int weight, new_nid, i = 0;
@@ -1383,11 +1449,7 @@
    continue;
}
-/* Use associativity from first thread for all siblings */
-vphn_get_associativity(cpu, associativity);
-new_nid = associativity_to_nid(associativity);
-if (new_nid < 0 || !node_online(new_nid))
-    new_nid = first_online_node;
+new_nid = find_and_online_cpu_nid(cpu);

    if (new_nid == numa_cpu_lookup_table[cpu]) {
        cpumask_andnot(&cpu_associativity_changes_mask,
@@ -1505,18 +1567,12 @@
        static void reset_topology_timer(void)
        {
            -mod_timer(&topology_timer, jiffies + topology_timer_secs * HZ);
            +if (vphn_enabled)
            +mod_timer(&topology_timer, jiffies + topology_timer_secs * HZ);
        }

        __be32 associativity[VPHN_ASSOC_BUFSIZE] = {0};
        cpumask_t updated_cpus;
        struct device *dev;
        int weight, new_nid, i = 0;
@@ -1383,11 +1449,7 @@
    continue;
}
```c
#ifdef CONFIG_SMP

-static void stage_topology_update(int core_id)
-{
-    cpumask_or(&cpu_associativity_changes_mask,
-              &cpu_associativity_changes_mask, cpu_sibling_mask(core_id));
-    reset_topology_timer();
-}

static int dt_update_callback(struct notifier_block *nb,
                               unsigned long action, void *data)
{
    @ @ -1529.7 +1585.7 @@
    !of_prop_cmp(update->prop->name, "ibm,associativity")
    u32 core_id;
    of_property_read_u32(update->dn, "reg", &core_id);
    stage_topology_update(core_id);
    rc = dlpar_cpu_readd(core_id);
    rc = NOTIFY_OK;
}
break;
@@ -1551,6 +1607,9 @@
{
    int rc = 0;

    +if (!topology_updates_enabled)
    +return 0;
    +
    if (firmware_has_feature(FW_FEATURE_PRRN))
    {
        +if (!prrn_enabled) {
            prrn_enabled = 1;
        @ @ -1580.6 +1639.9 @@
            int rc = 0;

        +if (!topology_updates_enabled)
        +return 0;
        +
        if (prrn_enabled) {
            prrn_enabled = 0;
            ifdef CONFIG_SMP
@@ -1626,11 +1688,13 @@
            kbuf[read_len] = \0';

            -if (!strncmp(kbuf, "on", 2))
            +if (!strncmp(kbuf, "on", 2)) {
```

---

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+topology_updates_enabled = true;
start_topology_update();
-else if (!strncmp(kbuf, "off", 3))
+} else if (!strncmp(kbuf, "off", 3)) {
stop_topology_update();
-else
+topology_updates_enabled = false;
+} else
return -EINVAL;

return count;
@@ -1645,9 +1709,7 @@
static int topology_update_init(void)
{
-/* Do not poll for changes if disabled at boot */
-if (topology_updates_enabled)
-+start_topology_update();
+start_topology_update();

if (vphn_enabled)
topology_schedule_update();
--- linux-4.15.0.orig/arch/powerpc/mm/pgtable-book3s64.c
+++ linux-4.15.0/arch/powerpc/mm/pgtable-book3s64.c
@@ -38,9 +38,12 @@
#endif
changed = !pmd_same(*(pmdp), entry);
if (changed) {
-__ptep_set_access_flags(vma->vm_mm, pmdp_ptep(pmdp),
-+__ptep_set_access_flags(vma, pmdp_ptep(pmdp),
-pmd_pte(entry), address);
-flush_pmd_tlb_range(vma, address, address + HPAGE_PMD_SIZE);
-+/*
+ * We can use MMU_PAGE_2M here, because only radix
+ * path look at the psize.
+ */
-+__ptep_set_access_flags(vma, pmdp_ptep(pmdp),
-+pmd_pte(entry), address, MMU_PAGE_2M);
}
return changed;
}
--- linux-4.15.0.orig/arch/powerpc/mm/pgtable-radix.c
+++ linux-4.15.0/arch/powerpc/mm/pgtable-radix.c
@@ -17,9 +17,11 @@
#include <linux/of_fdt.h>
#include <linux/mm.h>
#include <linux/string_helpers.h>
+#+#+<linux/stop_machine.h>
#include <asm/pgtable.h>
#include <asm/pgalloc.h>
+#include <asm/mmu_context.h>
#include <asm/dma.h>
#include <asm/machdep.h>
#include <asm/mmu.h>
@@ -241,15 +243,15 @@
mapping_size = PAGE_SIZE;

if (split_text_mapping && (mapping_size == PUD_SIZE) &&
- (addr <= __pa_symbol(__init_begin)) &&
- (addr + mapping_size) >= __pa_symbol(_stext)) {
+ (addr < __pa_symbol(__init_begin)) &&
+ (addr + mapping_size) > __pa_symbol(__init_begin)) {
    max_mapping_size = PMD_SIZE;
    goto retry;
}

if (split_text_mapping && (mapping_size == PMD_SIZE) &&
- (addr <= __pa_symbol(__init_begin)) &&
- (addr + mapping_size) >= __pa_symbol(_stext))
+ (addr < __pa_symbol(__init_begin)) &&
+ (addr + mapping_size) > __pa_symbol(__init_begin))
    mapping_size = PAGE_SIZE;

if (mapping_size != previous_size) {
@@ -333,6 +335,22 @@
 "r" (TLBIEL_INVAL_SET_LPID), "r" (0));
 asm volatile("eieio; tlbsync; ptesync" : : : "memory");
 trace_tlbie(0, 0, TLBIEL_INVAL_SET_LPID, 0, 2, 1, 1);
+ +/*
+ * The init_mm context is given the first available (non-zero) PID,
+ * which is the "guard PID" and contains no page table. PIDR should
+ * never be set to zero because that duplicates the kernel address
+ * space at the 0x0... offset (quadrant 0)!
+ *
+ * An arbitrary PID that may later be allocated by the PID allocator
+ * for userspace processes must not be used either, because that
+ * would cause stale user mappings for that PID on CPUs outside of
+ * the TLB invalidation scheme (because it won't be in mm_cpumask).
+ *
+ * So permanently carve out one PID for the purpose of a guard PID.
+ */
+init_mm.context.id = mmu_base_pid;
+mmu_base_pid++; 
}
static void __init radix_init_partition_table(void)
@@ -441,14 +459,6 @@
    mmu_psize_defs[MMU_PAGE_64K].shift = 16;
    mmu_psize_defs[MMU_PAGE_64K].ap = 0x5;

#include <linux/mm.h>

#ifdef CONFIG_SPARSEMEM_VMEMMAP
@@ -459,6 +477,10 @@
    /* map vmemmap using 2M if available */
    mmu_vmemmap_psize = MMU_PAGE_2M;
#endif /* CONFIG_SPARSEMEM_VMEMMAP */

return;
}

#ifdef CONFIG_SPARSEMEM_VMEMMAP
/* vmemmap mapping */
+if (mmu_psize_defs[MMU_PAGE_2M].shift) {
+    /* map vmemmap using 2M if available */
+    mmu_vmemmap_psize = MMU_PAGE_2M;
+} else
+    mmu_vmemmap_psize = mmu_virtual_psize;
#endif

/* initialize page table size */
@@ -536,13 +558,10 @@
radix_init_iamr();
radix_init_ptable();
+/* Switch to the guard PID before turning on MMU */
+radix__switch_mmu_context(NULL, &init_mm);
}

void radix__early_init_mmu_secondary(void)
@@ -595,8 +617,6 @@
radix_init_amor();
+radix__switch_mmu_context(NULL, &init_mm);
}

void radix__mmu_cleanup_all(void)
+struct change_mapping_params {
+pte_t *pte;
+unsigned long start;
+unsigned long end;
+unsigned long aligned_start;
+unsigned long aligned_end;
+};
+
+static int stop_machine_change_mapping(void *data)
+{
+struct change_mapping_params *params =
+(struct change_mapping_params *)data;
+
+if (!data)
+return -1;
+
+spin_unlock(&init_mm.page_table_lock);
+pte_clear(&init_mm, params->aligned_start, params->pte);
+create_physical_mapping(__pa(params->aligned_start), __pa(params->start));
+create_physical_mapping(__pa(params->end), __pa(params->aligned_end));
+spin_lock(&init_mm.page_table_lock);
+return 0;
+}
+
+static void remove_pte_table(pte_t *pte_start, unsigned long addr,
+unsigned long end)
{
@@ -699,6 +742,52 @@
}

+/*
+ * clear the pte and potentially split the mapping helper
+ */
+static void split_kernel_mapping(unsigned long addr, unsigned long end,
+unsigned long size, pte_t *pte)
+{
+unsigned long mask = ~(size - 1);
+unsigned long aligned_start = addr & mask;
+unsigned long aligned_end = addr + size;
+struct change_mapping_params params;
+bool split_region = false;
+
+if ((end - addr) < size) {
/*
 * We're going to clear the PTE, but not flushed
 * the mapping, time to remap and flush. The
 * effects if visible outside the processor or
 * if we are running in code close to the
 * mapping we cleared, we are in trouble.
 */

if (overlaps_kernel_text(aligned_start, addr) ||
  overlaps_kernel_text(end, aligned_end)) {
  /*
   * Hack, just return, don't pte_clear
   */
  WARN_ONCE(1, "Linear mapping %lx-%lx overlaps kernel ":
            "text, not splitting\n", addr, end);
  return;
}

split_region = true;
+
if (split_region) {
  params.pte = pte;
  params.start = addr;
  params.end = end;
  params.aligned_start = addr & ~(size - 1);
  params.aligned_end = min_t(unsigned long, aligned_end,
                           (unsigned long)__va(memblock_end_of_DRAM()));
  stop_machine(stop_machine_change_mapping, &params, NULL);
  return;
}

pte_clear(&init_mm, addr, (pte_t *)pmd);

static void remove_pmd_table(pmd_t *pmd_start, unsigned long addr,
                             unsigned long end) {
  continue;

  if (pmd_huge(*pmd)) {
    -if (!IS_ALIGNED(addr, PMD_SIZE) ||
       !IS_ALIGNED(next, PMD_SIZE)) {
      WARN_ONCE(1, "%s: unaligned range\n", __func__);
      -continue;
    -}
    -
    -pte_clear(&init_mm, addr, (pte_t *)pmd);
    +split_kernel_mapping(addr, end, PMD_SIZE, (pte_t *)pmd);
    

continue;
}

@@ -745,13 +828,7 @@
continue;

if (pud_huge(*pud)) {
- if (!IS_ALIGNED(addr, PUD_SIZE) || !IS_ALIGNED(next, PUD_SIZE)) {
- WARN_ONCE(1, "%s: unaligned range\n", __func__); continue;
- }
-
-pte_clear(&init_mm, addr, (pte_t *)pud);
+split_kernel_mapping(addr, end, PUD_SIZE, (pte_t *)pud);
 continue;
}

@@ -777,13 +854,7 @@
continue;

if (pgd_huge(*pgd)) {
- if (!IS_ALIGNED(addr, PGDIR_SIZE) || !IS_ALIGNED(next, PGDIR_SIZE)) {
- WARN_ONCE(1, "%s: unaligned range\n", __func__); continue;
- }
-
-pte_clear(&init_mm, addr, (pte_t *)pgd);
+split_kernel_mapping(addr, end, PGDIR_SIZE, (pte_t *)pgd);
 continue;
}

@@ -945,3 +1016,33 @@
return 0;
}
@endif /* CONFIG_TRANSPARENT_HUGEPAGE */
+
+void radix__ptep_set_access_flags(struct vm_area_struct *vma, pte_t *ptep, + pte_t entry, unsigned long address, int psize)
+{
+ struct mm_struct *mm = vma->vm_mm;
+unsigned long set = pte_val(entry) & (_PAGE_DIRTY | _PAGE_ACCESSED |
+ _PAGE_RW | _PAGE_EXEC);
+unsigned long change = pte_val(entry) ^ pte_val(*ptep);
+ /*
+ * To avoid NMMU hang while relaxing access, we need mark
+ */
* the pte invalid in between.
+ */
+if (cpu_has_feature(CPU_FTR_POWER9_DD1) ||
    ((change & _PAGE_RW) && atomic_read(&mm->context.copros) > 0)) {
+unsigned long old_pte, new_pte;
+
+old_ppte = __radix_ppte_update(ppte, _PAGE_PRESENT, _PAGE_INVALID);
+*/
+* new value of pte
+*
+new_ppte = old_ppte | set;
+radix__flush_tlb_page_psize(mm, address, psize);
+_radix_ppte_update(ppte, _PAGE_INVALID, new_ppte);
+} else {
+_radix_ppte_update(ppte, 0, set);
+radix__flush_tlb_page_psize(mm, address, psize);
+}
+asm volatile("ptesync" : : : "memory");
+
--- linux-4.15.0.orig/arch/powerpc/mm/pgtable.c
+++ linux-4.15.0/arch/powerpc/mm/pgtable.c
@@ -220,14 +220,53 @@
+entry = set_access_flags_filter(entry, vma, dirty);
+changed = !pte_same(*(ptpe), entry);
+if (changed) {
-+if (!is_vm_hugetlb_page(vma))
-assert_ppte_locked(vma->vm_mm, address);
-_ppte_set_access_flags(vma->vm_mm, ppte, entry, address);
-f_flush_tlb_page(vma, address);
+assert_ppte_locked(vma->vm_mm, address);
+_ppte_set_access_flags(vma, ppte, entry,
+address, mmu_virtual_psize);
+}
+return changed;
+
+#ifdef CONFIG_HUGETLB_PAGE
+extern int huge_ppte_set_access_flags(struct vm_area_struct *vma,
+          unsigned long addr, pte_t *ptpe,
+          pte_t pte, int dirty)
+{
+#ifdef HUGETLB_NEED_PRELOAD
+* The "return 1" forces a call of update_mmu_cache, which will write a
+* TLB entry. Without this, platforms that don't do a write of the TLB
+* entry in the TLB miss handler asm will fault ad infinitum.
+*/
+ppte_set_access_flags(vma, addr, ppte, pte, dirty);
return 1;
#else
int changed, psize;

pte = set_access_flags_filter(pte, vma, dirty);
changed = !pte_same(*ptep, pte);
#if (changed) {

#ifdef CONFIG_PPC_BOOK3S_64
struct hstate *hstate = hstate_file(vma->vm_file);
psize = hstate_get_psize(hstate);
#else
/*
 * Not used on non book3s64 platforms. But 8xx
 * can possibly use tsze derived from hstate.
 */
#endif
#endif /* CONFIG_HUGETLB_PAGE */
#endif

#ifdef CONFIG_DEBUG_VM
assert_pte_locked(struct mm_struct *mm, unsigned long addr)
{  
--- linux-4.15.0.orig/arch/powerpc/mm/pgtable_64.c
+++ linux-4.15.0/arch/powerpc/mm/pgtable_64.c
@@ -483,12 +483,15 @@
if (old & PATB_HR) {
asm volatile(PPC_TLBIE_5(%0,%1,2,0,1) : :
   "r" (TLBIEL_INVAL_SET_LPID), "r" (lpid));
+asm volatile(PPC_TLBIE_5(%0,%1,2,1,1) : :
 +   "r" (TLBIEL_INVAL_SET_LPID), "r" (lpid));
 trace_tlbie(lpid, 0, TLBLIEL_INVAL_SET_LPID, lpid, 2, 0, 1);
} else {
asm volatile(PPC_TLBIE_5(%0,%1,2,0,0) : :
   "r" (TLBIEL_INVAL_SET_LPID), "r" (lpid));
 trace_tlbie(lpid, 0, TLBLIEL_INVAL_SET_LPID, lpid, 2, 0, 0);
}  
+ /* do we need fixup here */
asm volatile("eieio; tlbsync; ptesync" : : "memory");
}
EXPORT_SYMBOL_GPL(mmu_partition_table_set_entry);
--- linux-4.15.0.orig/arch/powerpc/mm/ppc_mmu_32.c
+++ linux-4.15.0/arch/powerpc/mm/ppc_mmu_32.c
@@ -52,7 +52,7 @@
phys_addr_t v_block_mapped(unsigned long va)
 {
  int b;
- for (b = 0; b < 4; ++b)
+ for (b = 0; b < ARRAY_SIZE(bat_addrs); ++b)
  if (va >= bat_addrs[b].start && va < bat_addrs[b].limit)
     return bat_addrs[b].phys + (va - bat_addrs[b].start);
  return 0;
@@ -64,7 +64,7 @@
unsigned long p_block_mapped(phys_addr_t pa)
 {
  int b;
- for (b = 0; b < 4; ++b)
+ for (b = 0; b < ARRAY_SIZE(bat_addrs); ++b)
  if (pa >= bat_addrs[b].phys
       && pa < (bat_addrs[b].limit-bat_addrs[b].start)
       +bat_addrs[b].phys)
--- linux-4.15.0.orig/arch/powerpc/mm/slb.c
+++ linux-4.15.0/arch/powerpc/mm/slb.c
@@ -62,14 +62,14 @@
 */
- p->save_area[index].esid = 0;
  p->save_area[index].vsid = cpu_to_be64(mk_vsid_data(ea, ssize, flags));
- p->save_area[index].esid = cpu_to_be64(mk_esid_data(ea, ssize, index));
+ WRITE_ONCE(p->save_area[index].esid, 0);
+ WRITE_ONCE(p->save_area[index].vsid, cpu_to_be64(mk_vsid_data(ea, ssize, flags)));
+ WRITE_ONCE(p->save_area[index].esid, cpu_to_be64(mk_esid_data(ea, ssize, index)));
}

static inline void slb_shadow_clear(enum slb_index index)
 {
- get_slb_shadow()->save_area[index].esid = 0;
+ WRITE_ONCE(get_slb_shadow()->save_area[index].esid, 0);
 }

static inline void create_shadowed_slbe(unsigned long ea, int ssize,
@@ -315,7 +315,7 @@
 #endif
- get_paca()->stab_rr = SLB_NUM_BOLTED;
+ get_paca()->stab_rr = SLB_NUM_BOLTED - 1;

---
lflags = SLB_VSID_KERNEL | linear_lip;
vflags = SLB_VSID_KERNEL | vmalloc_lip;
--- linux-4.15.0.orig/arch/powerpc/mm/slice.c
+++ linux-4.15.0/arch/powerpc/mm/slice.c
@@ -31,6 +31,7 @@
#include <linux/spinlock.h>
#include <linux/export.h>
#include <linux/hugetlb.h>
+include <linux/security.h>
#include <asm/mman.h>
#include <asm/mmu.h>
#include <asm/copro.h>
@@ -73,10 +74,12 @@
unsigned long end = start + len - 1;
ret->low_slices = 0;
-bitmap_zero(ret->high_slices, SLICE_NUM_HIGH);
+if (SLICE_NUM_HIGH)
+bitmap_zero(ret->high_slices, SLICE_NUM_HIGH);

if (start < SLICE_LOW_TOP) {
-unsigned long mend = min(end, (SLICE_LOW_TOP - 1));
+unsigned long mend = min(end,
+ (unsigned long)(SLICE_LOW_TOP - 1));

ret->low_slices = (1u << (GET_LOW_SLICE_INDEX(mend) + 1))
- (1u << GET_LOW_SLICE_INDEX(start));
@@ -113,11 +116,13 @@
unsigned long start = slice << SLICE_HIGH_SHIFT;
unsigned long end = start + (1ul << SLICE_HIGH_SHIFT);
+
ifdef CONFIG_PPC64
/* Hack, so that each addresses is controlled by exactly one
 * of the high or low area bitmaps, the first high area starts
 * at 4GB, not 0 */
if (start == 0)
start = SLICE_LOW_TOP;
+endif

return !slice_area_is_free(mm, start, end - start);
}
@@ -128,7 +133,8 @@
unsigned long i;
ret->low_slices = 0;
-bitmap_zero(ret->high_slices, SLICE_NUM_HIGH);
+if (SLICE_NUM_HIGH)
+bitmap_zero(ret->high_slices, SLICE_NUM_HIGH);

for (i = 0; i < SLICE_NUM_LOW; i++)
if (!slice_low_has_vma(mm, i))
@@ -151,7 +157,8 @@
 u64 lpsizes;

 ret->low_slices = 0;
-bitmap_zero(ret->high_slices, SLICE_NUM_HIGH);
+if (SLICE_NUM_HIGH)
+bitmap_zero(ret->high_slices, SLICE_NUM_HIGH);

lpsizes = mm->context.low_slices_psize;
for (i = 0; i < SLICE_NUM_LOW; i++)
@@ -180,6 +187,10 @@
 /*
 unsigned long slice_count = GET_HIGH_SLICE_INDEX(mm->context.slb_addr_limit);

+if (!SLICE_NUM_HIGH)
+return (mask.low_slices & available.low_slices) ==
+    mask.low_slices;
+
 bitmap_and(result, mask.high_slices,
     available.high_slices, slice_count);

@@ -189,6 +200,7 @@
 static void slice_flush_segments(void *parm)
{
+    ifdef CONFIG_PPC64
 struct mm_struct *mm = parm;
 unsigned long flags;

@@ -200,6 +212,7 @@
    local_irq_save(flags);
    slb_flush_and_rebolt();
    local_irq_restore(flags);
+    endif
 }

static void slice_convert(struct mm_struct *mm, struct slice_mask mask, int psize)
@@ -325,6 +338,7 @@
 int pshift = max_t(int, mmu_psize_defs[psize].shift, PAGE_SHIFT);
 unsigned long addr, found, prev;
 struct vm_unmapped_area_info info;
+
 unsigned long min_addr = max(PAGE_SIZE, mmap_min_addr);

 info.flags = VM_UNMAPPED_AREA_TOPDOWN;
info.length = len;
@@ -341,7 +355,7 @@
if (high_limit > DEFAULT_MAP_WINDOW)
    addr += mm->context.slb_addr_limit - DEFAULT_MAP_WINDOW;

-while (addr > PAGE_SIZE) {
+while (addr > min_addr) {
    info.high_limit = addr;
    if (!slice_scan_available(addr - 1, available, 0, &addr))
        continue;
@@ -353,8 +367,8 @@
    * Check if we need to reduce the range, or if we can
    * extend it to cover the previous available slice.
    */
-    if (addr < PAGE_SIZE)
-        addr = PAGE_SIZE;
+    if (addr < min_addr)
+        addr = min_addr;
else if (slice_scan_available(addr - 1, available, 0, &prev)) {
    addr = prev;
goto prev_slice;
@@ -388,21 +402,21 @@

static inline void slice_or_mask(struct slice_mask *dst, struct slice_mask *src)
{
-DECLARE_BITMAP(result, SLICE_NUM_HIGH);
-    dst->low_slices |= src->low_slices;
-    bitmap_or(result, dst->high_slices, src->high_slices, SLICE_NUM_HIGH);
-    bitmap_copy(dst->high_slices, result, SLICE_NUM_HIGH);
+    if (!SLICE_NUM_HIGH)
+        return;
+    bitmap_or(dst->high_slices, dst->high_slices, src->high_slices, SLICE_NUM_HIGH);
}

static inline void slice_andnot_mask(struct slice_mask *dst, struct slice_mask *src)
{
-DECLARE_BITMAP(result, SLICE_NUM_HIGH);
-    dst->low_slices &= ~src->low_slices;
-    bitmap_andnot(result, dst->high_slices, src->high_slices, SLICE_NUM_HIGH);
-    bitmap_copy(dst->high_slices, result, SLICE_NUM_HIGH);
+    if (!SLICE_NUM_HIGH)
+        return;
+    bitmap_andnot(dst->high_slices, dst->high_slices, src->high_slices, SLICE_NUM_HIGH);
ifdef CONFIG_PPC_64K_PAGES
  *
  * init different masks
  *
  mask.low_slices = 0;
  bitmap_zero(mask.high_slices, SLICE_NUM_HIGH);

  /* silence stupid warning */
  potential_mask.low_slices = 0;
  bitmap_zero(potential_mask.high_slices, SLICE_NUM_HIGH);

  compat_mask.low_slices = 0;
  bitmap_zero(compat_mask.high_slices, SLICE_NUM_HIGH);

  +
  +if (SLICE_NUM_HIGH) {
      +bitmap_zero(mask.high_slices, SLICE_NUM_HIGH);
      +bitmap_zero(potential_mask.high_slices, SLICE_NUM_HIGH);
      +bitmap_zero(compat_mask.high_slices, SLICE_NUM_HIGH);
  +}

  /* Sanity checks */
  BUG_ON(mm->task_size == 0);
  addr = _ALIGN_UP(addr, page_size);
  slice_dbg(" aligned addr=%lx\n", addr);
  /* Ignore hint if it's too large or overlaps a VMA */
  -if (addr > high_limit - len ||
     !slice_area_is_free(mm, addr))
      addr = 0;
  }
  slice_andnot_mask(&mask, &good_mask);
  slice_andnot_mask(&mask, &compat_mask);
  -if (mask.low_slices || !bitmap_empty(mask.high_slices, SLICE_NUM_HIGH)) {
      +if (mask.low_slices ||
          (SLICE_NUM_HIGH &&
           !bitmap_empty(mask.high_slices, SLICE_NUM_HIGH))) {
        slice_convert(mm, mask, psize);
        if (psize > MMU_PAGE_BASE)
          on_each_cpu(slice_flush_segments, mm, 1);
  --- linux-4.15.0.orig/arch/powerpc/mm/ltb-radix.c
  +++ linux-4.15.0/arch/powerpc/mm/ltb-radix.c
  @@ -53,6 +53,33 @@
  trace_tlbie(0, 0, rb, rs, ric, prs, r);
static inline void _tlbie_pid(unsigned long pid, unsigned long ric)
{
    asm volatile("ptesync": : :"memory");
    __tlbie_pid(pid, ric);
}

/*
 * Workaround the fact that the "ric" argument to __tlbie_pid
 * must be a compile-time contraint to match the "i" constraint
 * in the asm statement.
 */
+switch (ric) {
    +case RIC_FLUSH_TLB:
        +__tlbie_pid(pid, RIC_FLUSH_TLB);
        +break;
    +case RIC_FLUSH_PWC:
        +__tlbie_pid(pid, RIC_FLUSH_PWC);
}
break;
+case RIC_FLUSH_ALL:
+default:
+__tlbie_pid(pid, RIC_FLUSH_ALL);
+
+fixup_tlbie();
asm volatile("eieio; tlb sync; ptesync": :"memory");
}

@@ -137,22 +180,6 @@
asm volatile("ptesync": :"memory");
}

-static inline void __tlbie_va(unsigned long va, unsigned long pid,
-    unsigned long ap, unsigned long ric)
-{
-    unsigned long rb,rs,prs,r;
-    
-    rb = va & ~(PPC_BITMASK(52, 63));
-    rb |= ap << PPC_BITLSHIFT(58);
-    rs = pid << PPC_BITLSHIFT(31);
-    prs = 1; /* process scoped */
-    r = 1; /* raidx format */
-    
-    asm volatile(PPC_TLBIE_5(%0, %4, %3, %2, %1)
-        : : "r"(rb), "i"(r), "i"(prs), "i"(ric), "r"(rs) : "memory");
-    trace_tlbie(0, 0, rb, rs, ric, prs, r);
-}
-
-static inline void __tlbie_va_range(unsigned long start, unsigned long end,
unsigned long pid, unsigned long page_size,
unsigned long psize)
@@ -171,6 +210,7 @@
asm volatile("ptesync": :"memory");
__tlbie_va(va, pid, ap, ric);
+fixup_tlbie();
asm volatile("eieio; tlb sync; ptesync": :"memory");
}

@@ -182,6 +210,7 @@
if (also_pwc)
__tlbie_pid(pid, RIC_FLUSH_PWC);
__tlbie_va_range(start, end, pid, page_size, psize);
+fixup_tlbie();
asm volatile("eieio; tlb sync; ptesync": :"memory");
}
@@ -245,6 +274,16 @@
EXPORT_SYMBOL(radix__local_flush_tlb_page);

+static bool mm_needs_flush_escalation(struct mm_struct *mm)
+{
+/*
+ * P9 nest MMU has issues with the page walk cache
+ * caching PTEs and not flushing them properly when
+ * RIC = 0 for a PID/LPID invalidate
+ */
+return atomic_read(&mm->context.copros) != 0;
+}
+
#ifdef CONFIG_SMP
void radix__flush_tlb_mm(struct mm_struct *mm)
{
@@ -255,9 +294,12 @@
return;
    preempt_disable();
    if (!mm_is_thread_local(mm))
        _tlbie_pid(pid, RIC_FLUSH_TLB);
-else
+    if (!mm_is_thread_local(mm)) {
+        if (mm_needs_flush_escalation(mm))
+            _tlbie_pid(pid, RIC_FLUSH_ALL);
+        else
+            _tlbie_pid(pid, RIC_FLUSH_TLB);
+    } else
        _tlbiel_pid(pid, RIC_FLUSH_TLB);
    preempt_enable();
}@@ -369,10 +411,14 @@
    if (full) {
-        if (local)
+        if (local) {
+            _tlbiel_pid(pid, RIC_FLUSH_TLB);
+        } else {
+            if (mm_needs_flush_escalation(mm))
+                _tlbie_pid(pid, RIC_FLUSH_ALL);
+            else
+                _tlbie_pid(pid, RIC_FLUSH_TLB);
+        }
    }

if (full) {
    if (local)
        _tlbiel_pid(pid, RIC_FLUSH_TLB);
    else
        _tlbie_pid(pid, RIC_FLUSH_TLB);
    } else {
        if (mm_needs_flush_escalation(mm))
            _tlbie_pid(pid, RIC_FLUSH_ALL);
        else
            _tlbie_pid(pid, RIC_FLUSH_TLB);
    }
bool hflush = false;
unsigned long hstart, hend;
if (hflush)
    __tlbie_va_range(hstart, hend, HPAGE_PMD_SIZE, MMU_PAGE_2M);
    fixup_tlbie();
    asm volatile("eieio; tlbsync; ptesync": : :"memory");
}

if (full) {
    if (!local && mm_needs_flush_escalation(mm))
        also_pwc = true;
    if (local)
        _tlbiel_pid(pid, also_pwc ? RIC_FLUSH_ALL : RIC_FLUSH_TLB);
    else
        asm volatile(PPC_TLBIE_5(%0, %4, %3, %2, %1)
            : "r"(rb), "i"(r), "i"(1), "i"(ric), "r"(rs) : "memory");
        /*
         * now flush host entries by passing PRS = 0 and LPID == 0
         */
        asm volatile(PPC_TLBIE_5(%0, %4, %3, %2, %1)
            : "r"(rb), "i"(r), "i"(prs), "i"(ric), "r"(0) : "memory");
        asm volatile("eieio; tlbsync; ptesync": : :"memory");
    }
}

void radix__flush_tlb_pte_p9_dd1(unsigned long old_pte, struct mm_struct *mm,
--- linux-4.15.0.orig/arch/powerpc/mm/tlb_low_64e.S
+++ linux-4.15.0/arch/powerpc/mm/tlb_low_64e.S
@@ -69,6 +69,13 @@
     std
    std
    #ifdef CONFIG_PPC_FSL_BOOK3E
+START_BTB_FLUSH_SECTION
    +mfspr r11, SPRN_SRR1
    +andi. r10,r11,MSR_PR
    +beq 1f
    +BTB_FLUSH(r10)
    +1:
std\tEX_TLB_R7(r12)

TLB_MISS_PROLOG_STATS
--- linux-4.15.0.orig/arch/powerpc/mm/tlb_nohash.c
+++ linux-4.15.0/arch/powerpc/mm/tlb_nohash.c
@@ -500,6 +500,9 @@
 for (psize = 0; psize < MMU_PAGE_COUNT; ++psize) {
 struct mmu_psize_def *def = &mmu_psize_defs[psize];

+if (!def->shift)
+continue;
+
+if (tlb1ps & (1U << (def->shift - 10))) {
+def->flags |= MMU_PAGE_SIZE_DIRECT;
+
--- linux-4.15.0.orig/arch/powerpc/mm/tlb_nohash_low.S
+++ linux-4.15.0/arch/powerpc/mm/tlb_nohash_low.S
@@ -400,7 +400,7 @@
 extern void loadcam_entry(unsigned int index)
 */
 _GLOBAL(loadcam_entry)
-mfrr5
@@ -436,6 +436,10 @@
 */
 _GLOBAL(loadcam_multi)
-mfrr8
+/* Don't switch to AS=1 if already there */
+mfmsrr11
+andi.r11,r11,MSR_IS
+bne10f

/*
 * Set up temporary TLB entry that is the same as what we're
@@ -461,6 +465,7 @@
 mtmsrr6
 isync

+10:
+mr9,r3
+addr10,r3,r4
+2:blloadcam_entry
@@ -469,6 +474,10 @@
mr3,r9

bht2b

/* Don't return to AS=0 if we were in AS=1 at function start */
+andi.r11,r11,MSR_IS
+ bne3f
+
/ * Return to AS=0 and clear the temporary entry */
mfmsr6
rlwinm.r6,r6,0,~(MSR_IS|MSR_DS)
@@ -484,6 +493,7 @@
tlbwe
isync

+3:
mtlrr8
blr
#endif
--- linux-4.15.0.orig/arch/powerpc/net/bpf_jit.h
+++ linux-4.15.0/arch/powerpc/net/bpf_jit.h
@@ -51,6 +51,8 @@
#define PPC_LIS(r, i)PPC_ADDIS(r, 0, i)
#define PPC_STD(r, base, i) PPC_INST_STD | PPC_RS(r) | 
   PPC_RA(base) | ((i) & 0xfffc)
+#define PPC_STDX(r, base, b) PPC_INST_STDX | PPC_RS(r) | 
   PPC_RA(base) | PPC_RB(b))
#define PPC_STDU(r, base, i) PPC_INST_STDU | PPC_RS(r) | 
   PPC_RA(base) | ((i) & 0xfffc))
#define PPC_STW(r, base, i) PPC_INST_STW | PPC_RS(r) | 
   PPC_RA(base) | ((i) & 0xfffc))
#define PPC_LISX(r, a, b) PPC_INST_LISX | PPC_RS(r) | 
   PPC_RT(a) | PPC_RA(base) | PPC_RB(b))
#define PPC_LISU(r, a, i) PPC_INST_LISU | PPC_RS(r) | 
   PPC_RT(a) | PPC_RA(base) | IMM_L(i))
#define PPC_LDX(r, base, b) PPC_INST_LDX | PPC_RT(r) | 
   PPC_RA(base) | PPC_RB(b))
#define PPC_LWZ(r, base, i) PPC_INST_LWZ | PPC_RT(r) | 
   PPC_RA(base) | IMM_L(i))
#define PPC_LHZ(r, base, i) PPC_INST_LHZ | PPC_RT(r) | 
   PPC_RA(base) | IMM_L(i))
#define PPC_BPF_STDCX(s, a, b) PPC_INST_STDCX | PPC_RS(s) | 
   PPC_RT(a) | PPC_RA(base) | PPC_RB(b))

-#ifdef CONFIG_PPC64
-#define PPC_BPF_LL(r, base, i) do { PPC_LD(r, base, i); } while(0)
-#define PPC_BPF_STL(r, base, i) do { PPC_STD(r, base, i); } while(0)
-#define PPC_BPF_STLU(r, base, i) do { PPC_STDU(r, base, i); } while(0)
```c
#define PPC_BPF_STL(r, base, i) do {
  if ((i) % 4) {
    PPC_LI(b2p[TMP_REG_2], (i));
    PPC_STD(r, base, b2p[TMP_REG_2]);
  } else
    PPC_STD(r, base, i);
} while(0)

#define PPC_BPF_STLU(r, base, i) do { PPC_STDU(r, base, i); } while(0)

#define SEEN_FUNC 0x1000 /* might call external helpers */
#define SEEN_STACK 0x2000 /* uses BPF stack */
#define SEEN_SKB 0x4000 /* uses sk_buff */
```

---

```c
#include "bpf_jit32.h"

-int bpf_jit_enable __read_mostly;

static inline void bpf_flush_icache(void *start, void *end)
{
  smp_wmb();
  memset32(area, BREAKPOINT_INSTRUCTION, size/4);
}
```

---

```c
#include "bpf_jit64.h"

-int bpf_jit_enable __read_mostly;

static void bpf_jit_fill_ill_insns(void *area, unsigned int size)
{
  memset32(area, BREAKPOINT_INSTRUCTION, size/4);
}
```

---

```c
static void bpf_jit_emit_func_call(u32 *image, struct codegen_context *ctx, u64 func)
{
```

---

**Open Source Used In 5GaaS Edge AC-4 11088**
unsigned int i, ctx_idx = ctx->idx;
+
+/* Load function address into r12 */
+PPC_LI64(12, func);
+
+/* For bpf-to-bpf function calls, the callee's address is unknown
+ * until the last extra pass. As seen above, we use PPC_LI64() to
+ * load the callee's address, but this may optimize the number of
+ * instructions required based on the nature of the address.
+ *
+ * Since we don’t want the number of instructions emitted to change,
+ * we pad the optimized PPC_LI64() call with NOPs to guarantee that
+ * we always have a five-instruction sequence, which is the maximum
+ * that PPC_LI64() can emit.
+ */
+for (i = ctx->idx - ctx_idx; i < 5; i++)
+PPC_NOP();
+
#endif
+
PPC_MTLR(12);
PPC_BLRL();
}
@@ -242,6 +252,7 @@
*   goto out;
*/

/*
*   for (i = ctx->idx - ctx_idx; i < 5; i++)
+PPC_NOP();
+*/
+PPC_MTLR(12);
PPC_BLRL();
}
@@ -242,6 +252,7 @@
*   goto out;
*/
PPC_LWZ(b2p[TMP_REG_1], b2p_bpf_array, offsetof(struct bpf_array, map.max_entries));
+PPC_RLWINM(b2p_index, b2p_index, 0, 0, 31);
PPC_CMPLW(b2p_index, b2p[TMP_REG_1]);
PPC_BCC(COND_GE, out);

@@ -249,7 +260,7 @@
    if (tail_call_cnt > MAX_TAIL_CALL_CNT)
    * goto out;
    */
-PPC_LD(b2p[TMP_REG_1], 1, bpf_jit_stack_tailcallcnt(ctx));
+PPC_BPF_LL(b2p[TMP_REG_1], 1, bpf_jit_stack_tailcallcnt(ctx));
PPC_CMPLW(b2p[TMP_REG_1], MAX_TAIL_CALL_CNT);
PPC_BCC(COND_GT, out);

@@ -262,7 +273,7 @@
    /* prog = array->ptrs[index]; */
    PPC_MULTI(b2p[TMP_REG_1], b2p_index, 8);
    PPC_ADD(b2p[TMP_REG_1], b2p[MAP_REG_1], b2p_bpf_array);
-PPC_LD(b2p[TMP_REG_1], b2p[MAP_REG_1], offsetof(struct bpf_array, ptrs));
+PPC_BPF_LL(b2p[TMP_REG_1], b2p[MAP_REG_1], offsetof(struct bpf_array, ptrs));

/*
   * if (prog == NULL)
   @@ -272,7 +283,7 @@
   PPC_BCC(COND_EQ, out);

/* goto *(prog->bpf_func + prologue_size); */
-PPC_LD(b2p[MAP_REG_1], b2p[MAP_REG_1], offsetof(struct bpf_prog, bpf_func));
+PPC_BPF_LL(b2p[MAP_REG_1], b2p[MAP_REG_1], offsetof(struct bpf_prog, bpf_func));
#ifdef PPC64_ELF_ABI_v1
/* skip past the function descriptor */
PPC_ADDI(b2p[MAP_REG_1], b2p[MAP_REG_1],
@@ -310,6 +321,7 @@
u64 imm64;
u8 *func;
u32 true_cond;
+u32 tmp_idx;

/*
   * addr[] maps a BPF bytecode address into a real offset from
   @@ -402,12 +414,12 @@
   PPC_LI(b2p[BPF_REG_0], 0);
   PPC_JMP(exit_addr);
   if (BPF_OP(code) == BPF_MOD) {
-PPC_DIVD(b2p[TMP_REG_1], dst_reg, src_reg);
+PPC_DIVDU(b2p[TMP_REG_1], dst_reg, src_reg);
   PPC_MULD(b2p[TMP_REG_1], src_reg, b2p[TMP_REG_1]);
PPC_SUB(dst_reg, dst_reg, b2p[TMP_REG_1]);
} else
-PPC_DIVD(dst_reg, dst_reg, src_reg);
+PPC_DIVDU(dst_reg, dst_reg, src_reg);
break;
case BPF_ALU | BPF_MOD | BPF_K: /* (u32) dst %= (u32) imm */
case BPF_ALU | BPF_DIV | BPF_K: /* (u32) dst /= (u32) imm */
@@ -415,8 +427,14 @@
case BPF_ALU64 | BPF_DIV | BPF_K: /* dst /= imm */
if (imm == 0)
return -EINVAL;
-else if (imm == 1)
-goto bpf_alu32_trunc;
+if (imm == 1) {
+if (imm == 1) {
+if (BPF_OP(code) == BPF_DIV) {
+goto bpf_alu32_trunc;
+} else {
+PPC_LI(dst_reg, 0);
+break;
+}
+}
+
PPC_LI32(b2p[TMP_REG_1], imm);
switch (BPF_CLASS(code)) {
@@ -435,7 +453,7 @@
break;
case BPF_ALU64:
if (BPF_OP(code) == BPF_MOD) {
-PPC_DIVD(b2p[TMP_REG_2], dst_reg,
+PPC_DIVDU(b2p[TMP_REG_2], dst_reg,
    b2p[TMP_REG_1]);
    b2p[TMP_REG_1],
    @ @ -443,7 +461,7 @@
PPC_SUB(dst_reg, dst_reg,
    b2p[TMP_REG_1]);
} else
-PPC_DIVD(dst_reg, dst_reg,
+PPC_DIVDU(dst_reg, dst_reg,
    b2p[TMP_REG_1]);
break;
}
@@ -603,7 +621,7 @@
* the instructions generated will remain the
* same across all passes
*/
-PPC_STD(dst_reg, 1, bpf_jit_stack_local(ctx));
+PPC_BPF_STL(dst_reg, 1, bpf_jit_stack_local(ctx));
PPC_ADDI(b2p[TMP_REG_1], 1, bpf_jit_stack_local(ctx));
PPC_LDBRX(dst_reg, 0, b2p[TMP_REG_1]);
break;
@@ -659,7 +677,7 @@
PPC_LI32(b2p[TMP_REG_1], imm);
src_reg = b2p[TMP_REG_1];
}
-PPC_STD(src_reg, dst_reg, off);
+PPC_BPF_STL(src_reg, dst_reg, off);
break;
/*
@@ -669,11 +687,7 @@
case BPF_STX | BPF_XADD | BPF_W:
 /* Get EA into TMP_REG_1 */
 PPC_ADDI(b2p[TMP_REG_1], dst_reg, off);
-/* error if EA is not word-aligned */
-PPC_ANDI(b2p[TMP_REG_2], b2p[TMP_REG_1], 0x03);
-PPC_BCC_SHORT(COND_EQ, (ctx->idx * 4) + 12);
-PPC_LI(b2p[BPF_REG_0], 0);
-PPC_JMP(exit_addr);
+tmp_idx = ctx->idx * 4;
 /* load value from memory into TMP_REG_2 */
 PPC_BPF_LWARX(b2p[TMP_REG_2], 0, b2p[TMP_REG_1], 0);
 /* add value from src_reg into this */
/* *(u64 *)(dst + off) += src */
case BPF_STX | BPF_XADD | BPF_DW:
 PPC_ADDI(b2p[TMP_REG_1], dst_reg, off);
-/* error if EA is not doubleword-aligned */
-PPC_ANDI(b2p[TMP_REG_2], b2p[TMP_REG_1], 0x07);
-PPC_BCC_SHORT(COND_EQ, (ctx->idx * 4) + (3*4));
-PPC_LI(b2p[BPF_REG_0], 0);
-PPC_JMP(exit_addr);
+PPC_BCC_SHORT(COND_NE, tmp_idx);
 break;
*/ *(u64 *)(dst + off) += src */
 PPC_ADD(b2p[TMP_REG_2], b2p[TMP_REG_2], src_reg);
 PPC_BPF_STDCX(b2p[TMP_REG_2], 0, b2p[TMP_REG_1]);
 PPC_BCC_SHORT(COND_EQ, (ctx->idx * 4) + (7*4));
  tmp_idx = ctx->idx * 4;
 PPC_BPF_LDX(b2p[TMP_REG_2], 0, b2p[TMP_REG_2], src_reg);
 PPC_BPF_STDCX(b2p[TMP_REG_2], 0, b2p[TMP_REG_1]);
 PPC_BPF_LDX(b2p[BPF_REG_0], 0);
 PPC_BCC(COND_NE, exit_addr);
 +PPC_BCC_SHORT(COND_NE, tmp_idx);
 break;

/*@ -726,7 +724,7 @@
 break;
/*@ dst = *(u64 *)(ul) (src + off) */
 case BPF_LDX | BPF_MEM | BPF_DW:
    PPC_LD(dst_reg, src_reg, off);
 +PPC_BPF_LL(dst_reg, src_reg, off);
 break;

/*@ linux-4.15.0.orig/arch/powerpc/perf/core-book3s.c
+++ linux-4.15.0/arch/powerpc/perf/core-book3s.c
@@ -457,6 +457,16 @@
 /* invalid entry */
 continue;

+/*@ BHRB rolling buffer could very much contain the kernel
+ * addresses at this point. Check the privileges before
+ * exporting it to userspace (avoid exposure of regions
+ * where we could have speculative execution)
+ */
+if (perf_paranoid_kernel() && !capable(CAP_SYS_ADMIN) &&
+is_kernel_addr(addr))
+continue;
+
/* Branches are read most recent first (ie. mfbhrb 0 is
 * the most recent branch).
 * There are two types of valid entries:
/*@ -1226,6 +1236,7 @@*/
*/
 write_mmcr0(cpuhw, val);
 mb();
 +isync();
* Disable instruction sampling if it was enabled
@@ -1234,12 +1245,26 @@
    mtspr(SPRN_MMCRA,
    cpuhw->mmcr[2] & ~MMCRA_SAMPLE_ENABLE);
    mb();
+    isync();
    }

    cpuhw->disabled = 1;
    cpuhw->n_added = 0;

    ebb_switch_out(mmcr0);
+    +#ifdef CONFIG_PPC64
+    +/*
+    + * These are readable by userspace, may contain kernel
+    + * addresses and are not switched by context switch, so clear
+    + * them now to avoid leaking anything to userspace in general
+    + * including to another process.
+    + */
+    +#endif
+    }

    local_irq_restore(flags);
-@@ -1820,6 +1845,7 @@
    int n;
    int err;
    struct cpu_hw_events *cpuhw;
+    u64 bhrb_filter;

    if (!ppmu)
        return -ENOENT;
@@ -1916,13 +1942,14 @@
    err = power_check_constraints(cpuhw, events, cflags, n + 1);

    if (has_branch_stack(event)) { 
        -cpuhw->bhrb_filter = ppmu->bhrb_filter_map(
        +bhrb_filter = ppmu->bhrb_filter_map(
            event->attr.branch_sample_type);

        -if (cpuhw->bhrb_filter == -1) { 
        +if (bhrb_filter == -1) {
            put_cpu_var(cpu_hw_events);
            return -EOPNOTSUPP;
        }
} 
+cpuhw->bhrb_filter = bhrb_filter; 
} 

put_cpu_var(cpu_hw_events); 
@@ -2028,7 +2055,17 @@
left += period; 
if (left <= 0) 
left = period; 
-record = siar_valid(regs); 
+ 
+/* 
+ * If address is not requested in the sample via 
+ * PERF_SAMPLE_IP, just record that sample irrespective 
+ * of SIAR valid check. 
+ */ 
+if (event->attr.sample_type & PERF_SAMPLE_IP) 
+record = siar_valid(regs); 
+else 
+record = 1; 
+event->hw.last_period = event->hw.sample_period; 
} 
if (left < 0x80000000LL) 
@@ -2041,6 +2078,17 @@
perf_event_update_userpage(event); 

/* 
+ * Due to hardware limitation, sometimes SIAR could sample a kernel 
+ * address even when freeze on supervisor state (kernel) is set in 
+ * MMCR2. Check attr.exclude_kernel and address to drop the sample in 
+ * these cases. 
+ */ 
+if (event->attr.exclude_kernel && 
+ (event->attr.sample_type & PERF_SAMPLE_IP) && 
+ is_kernel_addr(mfspr(SPRN_SIAR))) 
+record = 0; 
+ 
+/* 
+ * Finally record data if requested. 
+ */ 
+if (record) { 
@@ -2069,6 +2117,10 @@
if (perf_event_overflow(event, &data, regs)) 
power_pmu_stop(event, 0); 
+} else if (period) {
+/* Account for interrupt in case of invalid SIAR */
+if (perf_event_account_interrupt(event))
+power_pmu_stop(event, 0);
}
}

--- linux-4.15.0.orig/arch/powerpc/perf/hv-24x7.c
+++ linux-4.15.0/arch/powerpc/perf/hv-24x7.c
@@ -1413,16 +1413,6 @@
h24x7hw = &get_cpu_var(hv_24x7_hw);
h24x7hw->events[i] = event;
put_cpu_var(h24x7hw);
-/*
-* Clear the event count so we can compute the _change_
-* in the 24x7 raw counter value at the end of the txn.
-*
-* Note that we could alternatively read the 24x7 value
-* now and save its value in event->hw.prev_count. But
-* that would require issuing a hcall, which would then
-* defeat the purpose of using the txn interface.
-*/
-local64_set(&event->count, 0);
}

put_cpu_var(hv_24x7_reqb);
--- linux-4.15.0.orig/arch/powerpc/perf/hv-gpci-requests.h
+++ linux-4.15.0/arch/powerpc/perf/hv-gpci-requests.h
@@ -95,7 +95,7 @@
#define REQUEST_NAME system_performance_capabilities
#define REQUEST_NUM 0x40
+#define REQUEST_IDX_KIND "starting_index=0xffffffffffffffff"
+#define REQUEST_IDX_KIND "starting_index=0xffffffff"
#include I(REQUEST_BEGIN)
REQUEST(__field(0,	1,	perf_collect_privileged)
__field(0x1,	1,	capability_mask)
@@ -223,7 +223,7 @@
#define REQUEST_NAME system_hypervisor_times
#define REQUEST_NUM 0xF0
+#define REQUEST_IDX_KIND "starting_index=0xffffffffffffffff"
+#define REQUEST_IDX_KIND "starting_index=0xffffffff"
#include I(REQUEST_BEGIN)
REQUEST(__count(0,	8,	time_spent_to_dispatch_virtual_processors)
__count(0x8,	8,	time_spent_processing_virtual_processor_timers)
@@ -234,7 +234,7 @@
#define REQUEST_NAME system_tlbie_count_and_time
#define REQUEST_NUM 0xF4
-#define REQUEST_IDKIND "starting_index=0xffffffffffffffff"
+#define REQUEST_IDKIND "starting_index=0xffffffff"
#include IREQUEST_BEGIN
REQUEST(__count(0,8,tlbie_instructions issued)
/*
--- linux-4.15.0.orig/arch/powerpc/perf/hv-gpci.c
+++ linux-4.15.0/arch/powerpc/perf/hv-gpci.c
@@ -168,7 +168,7 @@
*/
count = 0;
for (i = offset; i < offset + length; i++)
-\tcount |= arg->bytes[i] << (i - offset);
+\tcount |= (u64)arg->bytes[i] << ((length - 1 - (i - offset)) * 8);

*value = count;
out:
--- linux-4.15.0.orig/arch/powerpc/perf/imc-pmu.c
+++ linux-4.15.0/arch/powerpc/perf/imc-pmu.c
@@ -482,6 +482,11 @@
 */
* Get the base memory addreses for this cpu.
* /
chip_id = cpu_to_chip_id(event->cpu);
+
+/* Return, if chip_id is not valid */
+if (chip_id < 0)
+\treturn -ENODEV;
+pcni = pmu->mem_info;
+do {
+\tif (pcni->id == chip_id) {
+\t\t@ @ -489,7 +494,7 @@
+\t\tbreak;
+\t}
+pcni++;
+\} while (pcni);
+} while (pcni->vbase != 0);

if (!flag)
\treturn -ENODEV;
@ @ -1132,7 +1137,7 @@

static void cleanup_all_core_imc_memory(void)
{
-\tint i, nr_cores = DIV_ROUND_UP(num_present_cpus(), threads_per_core);
+\tint i, nr_cores = DIV_ROUND_UP(num_possible_cpus(), threads_per_core);
\tstruct imc_mem_info *ptr = core_imc_pmu->mem_info;
\tint size = core_imc_pmu->counter_mem_size;

if (!pmu_ptr->pmu.name)
    return -ENOMEM;

- nr_cores = DIV_ROUND_UP(num_present_cpus(), threads_per_core);
+ nr_cores = DIV_ROUND_UP(num_possible_cpus(), threads_per_core);

pmu_ptr->mem_info = kcalloc(nr_cores, sizeof(struct imc_mem_info),
GFP_KERNEL);

--- linux-4.15.0.orig/arch/powerpc/perf/isa207-common.c
+++ linux-4.15.0/arch/powerpc/perf/isa207-common.c
@@ -150,6 +150,14 @@
    return true;
}

+static unsigned int dc_ic_rld_quad_l1_sel(u64 event)
+{
+    unsigned int cache;
+    
+    cache = (event >> EVENT_CACHE_SEL_SHIFT) & MMCR1_DC_IC_QUAL_MASK;
+    return cache;
+}
+
+static inline u64 isa207_find_source(u64 idx, u32 sub_idx)
+{
+    u64 ret = PERF_MEM_NA;
+    @ @ -228.8 +236.13 @@
+    u64 mmcra = mfspr(SPRN_MMCRA);
+    u64 exp = MMCRA_THR_CTR_EXP(mmcra);
+    u64 mantissa = MMCRA_THR_CTR_MANT(mmcra);
+    u64 sier = mfspr(SPRN_SIER);
+    u64 val = (sier & ISA207_SIER_TYPE_MASK) >> ISA207_SIER_TYPE_SHIFT;
+
+    /*weight = mantissa << (2 * exp);
+    if (val == 0 || val == 7)
+        *weight = 0;
+    else
+        *weight = mantissa << (2 * exp);
+    */

int isa207_get_constraint(u64 event, unsigned long *maskp, unsigned long *valp)
@@ -262,6 +275,15 @@
    mask |= CNST_PMC_MASK(pmc);
    value |= CNST_PMC_VAL(pmc);
+    */
+    /* PMC5 and PMC6 are used to count cycles and instructions and

Open Source Used In 5GaaS Edge AC-4  11098
+ * they do not support most of the constraint bits. Add a check
+ * to exclude PMC5/6 from most of the constraints except for
+ * EBB/BHRB.
+ */
+if (pmc >= 5)
+goto ebb_bhrb;
}

if (pmc <= 4) {

@@ -285,10 +307,10 @@
* have a cache selector of zero. The bank selector (bit 3) is
* irrelevant, as long as the rest of the value is 0.
*/
-if (cache & 0x7)
+if (!cpu_has_feature(CPU_FTR_ARCH_300) && (cache & 0x7))
    return -1;

-} else if (event & EVENT_IS_L1) {
+} else if (cpu_has_feature(CPU_FTR_ARCH_300) || (event & EVENT_IS_L1)) {
    mask  |= CNST_L1_QUAL_MASK;
    value |= CNST_L1_QUAL_VAL(cache);
}
@@ -320,6 +342,7 @@
}
}

+ebb_bhrb:
if (!pmc && ebb)
/* EBB events must specify the PMC */
    return -1;
@@ -338,8 +361,8 @@
* EBB events are pinned & exclusive, so this should never actually
* hit, but we leave it as a fallback in case.
*/
-    mask  |= CNST_EBB_VAL(ebb);
-    value |= CNST_EBB_MASK;
+    mask  |= CNST_EBB_MASK;
+    value |= CNST_EBB_VAL(ebb);

*maskp = mask;
*valp = value;
@@ -391,11 +414,14 @@
/* In continuous sampling mode, update SDAR on TLB miss */
mmcra_sdar_mode(event[i], &mmcra);

-    if (event[i] & EVENT_IS_L1) {
-        cache = event[i] >> EVENT_CACHE_SEL_SHIFT;
-        mmcr1 |= (cache & 1) << MMCR1_IC_QUAL_SHIFT;
-
cache >>= 1;
-mmcrc1 |= (cache & 1) << MMCR1_DC_QUAL_SHIFT;
+if (cpu_has_feature(CPU_FTR_ARCH_300)) {
  +cache = dc_ic_rld_quad_l1_sel(event[i]);
  +mmcrc1 |= (cache) << MMCR1_DC_IC_QUAL_SHIFT;
+} else {
+  +if (event[i] & EVENT_IS_L1) {
  +    +cache = dc_ic_rld_quad_l1_sel(event[i]);
  +    +mmcrc1 |= (cache) << MMCR1_DC_IC_QUAL_SHIFT;
  +  +}
  }

if (is_event_marked(event[i])) {
  --- linux-4.15.0.orig/arch/powerpc/perf/isa207-common.h
  +++ linux-4.15.0/arch/powerpc/perf/isa207-common.h
  @@ -232,8 +232,8 @@
  #define MMCR1_COMBINE_SHIFT(pmc) (35 - ((pmc) - 1))
  #define MMCR1_PMCSEL_SHIFT(pmc) (24 - (((pmc) - 1)) * 8)
  #define MMCR1_FAB_SHIFT 36
-#define MMCR1_DC_QUAL_SHIFT 47
-#define MMCR1_IC_QUAL_SHIFT 46
+#define MMCR1_DC_IC_QUAL_MASK 0x3
+#define MMCR1_DC_IC_QUAL_SHIFT 46
/* MMCR1 Combine bits macro for power9 */
#define p9_MMCR1_COMBINE_SHIFT(pmc) ((pmc - 1) * 2))
  --- linux-4.15.0.orig/arch/powerpc/perf/power8-pmu.c
  +++ linux-4.15.0/arch/powerpc/perf/power8-pmu.c
  @@ -29,6 +29,7 @@
  #define POWER8_MMCRA_IFM1 0x0000000040000000UL
  #define POWER8_MMCRA_IFM2 0x0000000080000000UL
  #define POWER8_MMCRA_IFM3 0x00000000C0000000UL
  +#define POWER8_MMCRA_BHRB_MASK 0x00000000C0000000UL
/* PowerISA v2.07 format attribute structure*/
extern struct attribute_group isa207_pmu_format_group;
@@ -179,6 +180,8 @@
static void power8_config_bhrb(u64 pmu_bhrb_filter)
{
  +pmu_bhrb_filter &= POWER8_MMCRA_BHRB_MASK;
  +/* Enable BHRB filter in PMU */
  mtspr(SPRN_MMCRA, (mfspr(SPRN_MMCRA) | pmu_bhrb_filter));
  }
  --- linux-4.15.0.orig/arch/powerpc/perf/power9-pmu.c
  +++ linux-4.15.0/arch/powerpc/perf/power9-pmu.c
  @@ -100,6 +100,7 @@
#define POWER9_MMCRA_IFM1	0x0000000040000000UL
#define POWER9_MMCRA_IFM2	0x0000000080000000UL
#define POWER9_MMCRA_IFM3	0x00000000C0000000UL
+#define POWER9_MMCRA_BHRB_MASK	0x00000000C0000000UL

/* PowerISA v2.07 format attribute structure*/
extern struct attribute_group isa207_pmu_format_group;
@@ -289,6 +290,8 @@

static void power9_config_bhrb(u64 pmu_bhrb_filter)
{
  pmu_bhrb_filter &= POWER9_MMCRA_BHRB_MASK;
+
  /* Enable BHRB filter in PMU */
  mtspr(SPRN_MMCRA, (mfspr(SPRN_MMCRA) | pmu_bhrb_filter));
}
--- linux-4.15.0.orig/arch/powerpc/platforms/4xx/msi.c
+++ linux-4.15.0/arch/powerpc/platforms/4xx/msi.c
@@ -146,13 +146,19 @@

const u32 *sdr_addr;
dma_addr_t msi_phys;
void *msi_virt;
+int err;

sdr_addr = of_get_property(dev->dev.of_node, "sdr-base", NULL);
if (!sdr_addr)
  return -1;
+return -EINVAL;

- mtdcri(SDR0, *sdr_addr, upper_32_bits(res.start));/*HIGH addr */
- mtdcri(SDR0, *sdr_addr + 1, lower_32_bits(res.start));/* Low addr */
+ msi_data = of_get_property(dev->dev.of_node, "msi-data", NULL);
+ if (!msi_data)
+   return -EINVAL;
+ msi_mask = of_get_property(dev->dev.of_node, "msi-mask", NULL);
+ if (!msi_mask)
+   return -EINVAL;

msi->msi_dev = of_find_node_by_name(NULL, "ppc4xx-msi");
if (!msi->msi_dev)
  return -160,30 +166,30 @@

msi->msi_regs = of_iomap(msi->msi_dev, 0);
if (!msi->msi_regs) {
  -dev_err(&dev->dev, "of_iomap problem failed\n");
  return -ENOMEM;
  +dev_err(&dev->dev, "of_iomap failed\n");
}
err = -ENOMEM;
goto node_put;
}
dev_dbg(&dev->dev, "PCIE-MSI: msi register mapped 0x%x 0x%x\n", (u32) (msi->msi_regs + PEIH_TERMADH), (u32) (msi->msi_regs));

msi_virt = dma_alloc_coherent(&dev->dev, 64, &msi_phys, GFP_KERNEL);
if (!msi_virt)
	return -ENOMEM;
else
	err = -ENOMEM;
goto iounmap;
+
msi->msi_addr_hi = upper_32_bits(msi_phys);
msi->msi_addr_lo = lower_32_bits(msi_phys & 0xffffffff);
dev_dbg(&dev->dev, "PCIE-MSI: msi address high 0x%x, low 0x%x\n", msi->msi_addr_hi, msi->msi_addr_lo);
+mtdcri(SDR0, *sdr_addr, upper_32_bits(res.start));
	/*HIGH addr */
+mtdcri(SDR0, *sdr_addr + 1, lower_32_bits(res.start));
	/* Low addr */
+
/* Program the Interrupt handler Termination addr registers */
out_be32(msi->msi_regs + PEIH_TERMADH, msi->msi_addr_hi);
out_be32(msi->msi_regs + PEIH_TERMADL, msi->msi_addr_lo);

-msi_data = of_get_property(dev->dev.of_node, "msi-data", NULL);
-if (!msi_data)
	return -1;
-msi_mask = of_get_property(dev->dev.of_node, "msi-mask", NULL);
-if (!msi_mask)
	return -1;
/* Program MSI Expected data and Mask bits */
out_be32(msi->msi_regs + PEIH_MSIED, *msi_data);
out_be32(msi->msi_regs + PEIH_MSIMK, *msi_mask);
@@ -191,6 +221,12 @@
dma_free_coherent(&dev->dev, 64, msi_virt, msi_phys);

return 0;
+
+iounmap:
+iounmap(msi->msi_regs);
+node_put:
+of_node_put(msi->msi_dev);
+return err;
}
msi_bitmap_free(&msi->bitmap);
iounmap(msi->msi_regs);
of_node_put(msi->msi_dev);
-kfree(msi);

return 0;
}
@@ -223,9 +234,8 @@
dev_dbg(&dev->dev, "PCIE-MSI: Setting up MSI support...
"
)

- msi = kzalloc(sizeof(struct ppc4xx_msi), GFP_KERNEL);
- if (!msi) {
- dev_dbg(&dev->dev, "No memory for MSI structure\n");
- +msi = devm_kzalloc(&dev->dev, sizeof(*msi), GFP_KERNEL);
+ if (!msi)
+ return -ENOMEM;
}

dev->dev.platform_data = msi;

err = of_address_to_resource(dev->dev.of_node, 0, &res);
if (err) {
 dev_dbg(&dev->dev, "%pOF resource error!\n", dev->dev.of_node);
- goto error_out;
+ return err;
}

msi_irqs = of_irq_count(dev->dev.of_node);
@@ -242,7 +252,7 @@
return -ENODEV;

if (ppc4xx_setup_pcieh_hw(dev, res, msi))
- goto error_out;
+ return err;

err = ppc4xx_msi_init_allocator(dev, msi);
if (err) {
@@ -255,7 +265,7 @@
 phb->controller_ops.setup_msi_irqs = ppc4xx_setup_msi_irqs;
 phb->controller_ops.teardown_msi_irqs = ppc4xx_teardown_msi_irqs;
 }
- return err;
+ return 0;

error_out:
ppc4xx_of_msi_remove(dev);
--- linux-4.15.0.orig/arch/powerpc/platforms/4xx/pci.c
+++ linux-4.15.0/arch/powerpc/platforms/4xx/pci.c
if (mbase == NULL) {
    printk(KERN_ERR "%pOF: Can't map internal config space !",
            port->node);
    -goto done;
    +return;
}

while (attempt && (0 == (in_le32(mbase + PECFG_460SX_DLLSTA)
                || -1252,9 +1252,7 @@)
    +return;
    }
}

static struct ppc4xx_pciex_hwops ppc460sx_pcie_hwops __initdata = {
    --- linux-4.15.0.orig/arch/powerpc/platforms/4xx/uic.c
    +++ linux-4.15.0/arch/powerpc/platforms/4xx/uic.c
    @ @ -158,6 +158,7 @@

    mtdcr(uic->dcrbase + UIC_PR, pr);
    mtdcr(uic->dcrbase + UIC_TR, tr);
    +mtdcr(uic->dcrbase + UIC_SR, ~mask);

    raw_spin_unlock_irqrestore(&uic->lock, flags);

    --- linux-4.15.0.orig/arch/powerpc/platforms/52xx/lite5200_sleep.S
    +++ linux-4.15.0/arch/powerpc/platforms/52xx/lite5200_sleep.S
    @ @ -181,7 +181,7 @@
    udelay: /* r11 - tb_ticks_per_usec, r12 - usecs, overwrites r13 */
    mullwr12, r12, r11
    mftbr13/* start */
    -addr12, r13, r12 /* end */
    +addr12, r13, r12 /* end */
    1:
    mftbr13/* current */
    cmpcr0, r13, r12
    --- linux-4.15.0.orig/arch/powerpc/platforms/83xx/misc.c
    +++ linux-4.15.0/arch/powerpc/platforms/83xx/misc.c
    @ @ -14,6 +14,7 @@
    include <linux/of_platform.h>
    include <linux/pci.h>

    +#include <asm/debug.h>
    +#include <asm/io.h>
```c
#include <asm/hw_irq.h>
#include <asm/ipic.h>

mpc83xx_setup_pci();
}
+
+int machine_check_83xx(struct pt_regs *regs)
+{
+u32 mask = 1 << (31 - IPIC_MCP_WDT);
+
+if (!(regs->msr & SRR1_MCE_MCP) || !(ipic_get_mcp_status() & mask))
+return machine_check_generic(regs);
+ipic_clear_mcp_status(mask);
+
+if (debugger_fault_handler(regs))
+return 1;
+
+die("Watchdog NMI Reset", regs, 0);
+
+return 1;
+
}
--- linux-4.15.0.orig/arch/powerpc/platforms/83xx/suspend-asm.S
+++ linux-4.15.0/arch/powerpc/platforms/83xx/suspend-asm.S
@@ -26,13 +26,13 @@
#define SS_MSR		0x74
#define SS_SDR1		0x78
#define SS_LR		0x7c
-#define SS_SPRG		0x80 /* 4 SPRGs */
-#define SS_DBAT		0x90 /* 8 DBATs */
-#define SS_IBAT		0xd0 /* 8 IBATs */
-#define SS_TB		0x110
-#define SS_CR		0x118
-#define SS_GPREG	0x11c /* r12-r31 */
-#define STATE_SAVE_SIZE 0x16c
+#define SS_SPRG		0x80 /* 8 SPRGs */
+#define SS_DBAT		0xa0 /* 8 DBATs */
+#define SS_IBAT		0xe0 /* 8 IBATs */
+#define SS_TB		0x120
+#define SS_CR		0x128
+#define SS_GPREG	0x12c /* r12-r31 */
+#define STATE_SAVE_SIZE 0x17c

.section .data
.align5
@@ -103,6 +103,16 @@
stwr7, SS_SPRG+12(r3)
stwr8, SS_SDR1(r3)```
mfspr4, SPRN_SPRG4
mfspr5, SPRN_SPRG5
mfspr6, SPRN_SPRG6
mfspr7, SPRN_SPRG7
+m
stw4, SS_SPRG+16(r3)
stw5, SS_SPRG+20(r3)
stw6, SS_SPRG+24(r3)
stw7, SS_SPRG+28(r3)
+
mfspr4, SPRN_DBAT0U
mfspr5, SPRN_DBAT0L
mfspr6, SPRN_DBAT1U
mfspr7, SPRN_DBAT1L
+lwz4, SS_SPRG+16(r3)
lwz5, SS_SPRG+20(r3)
lwz6, SS_SPRG+24(r3)
lwz7, SS_SPRG+28(r3)
+
lwz4, SS_SPRG+0(r3)
lwz5, SS_SPRG+4(r3)
lwz6, SS_SPRG+8(r3)
--- linux-4.15.0.orig/arch/powerpc/platforms/85xx/t1042rdb_diu.c
+++ linux-4.15.0/arch/powerpc/platforms/85xx/t1042rdb_diu.c
@@ -9,8 +9,10 @@
* option) any later version.
*/

#include <linux/init.h>
#include <linux/io.h>
#include <linux/kernel.h>
+#include <linux/module.h>
#include <linux/of.h>
#include <linux/of_address.h>

@@ -150,3 +152,5 @@
}

early_initcall(t1042rdb_diu_init);
config TAU_INT
-bool "Interrupt driven TAU driver (DANGEROUS)"
+bool "Interrupt driven TAU driver (EXPERIMENTAL)"
depends on TAU
---help---
The TAU supports an interrupt driven mode which causes an interrupt
to get notified the temp has exceeded a range. With this option off,
a timer is used to re-check the temperature periodically.

- However, on some cpus it appears that the TAU interrupt hardware
- is buggy and can cause a situation which would lead unexplained hard
- lockups.
-
- Unless you are extending the TAU driver, or enjoy kernel/hardware
- debugging, leave this option off.
+ If in doubt, say N here.

config TAU_AVERAGE
bool "Average high and low temp"
@@ .297.6 +292.7 @@
tristate "Axon DDR2 memory device driver"
depends on PPC_IBM_CELL_BLADE && BLOCK
select DAX
+select FS_DAX_LIMITED
default m
help
It registers one block device per Axon's DDR2 memory bank found

config PPC_RADIX_MMU
bool "Radix MMU Support"
-depends on PPC_BOOK3S_64
+depends on PPC_BOOK3S_64 && HUGETLB_PAGE
select ARCH_HAS_GIGANTIC_PAGE if (MEMORY_ISOLATION && COMPACTION) || CMA
default y
help
@@ -334,6 +334,7 @@
config PPC_MM_SLICES
bool
default y if PPC_BOOK3S_64
+default y if PPC_8xx && HUGETLB_PAGE
default n

cfg config PPC_HAVE_PMU_SUPPORT
--- linux-4.15.0.orig/arch/powerpc/platforms/cell/Kconfig
+++ linux-4.15.0/arch/powerpc/platforms/cell/Kconfig
@@ -46,6 +46,7 @@
tristate "SPU file system"
default m
depends on PPC_CELL
+depends on COREDUMP
select SPU_BASE
help
  The SPU file system is used to access Synergistic Processing
--- linux-4.15.0.orig/arch/powerpc/platforms/cell/spufs/file.c
+++ linux-4.15.0/arch/powerpc/platforms/cell/spufs/file.c
@@ -1988,8 +1988,9 @@
static ssize_t spufs_mbox_info_read(struct file *file, char __user *buf,
  size_t len, loff_t *pos)
{
  -int ret;
  struct spu_context *ctx = file->private_data;
+u32 stat, data;
  +int ret;

  if (!access_ok(VERIFY_WRITE, buf, len))
    return -EFAULT;
@@ -1998,11 +1999,16 @@
  if (ret)
    return ret;
  spin_lock(&ctx->csa.register_lock);
-  ret = __spufs_mbox_info_read(ctx, buf, len, pos);
+  stat = ctx->csa.prob.mb_stat_R;
+  data = ctx->csa.prob.pu_mb_R;
  spin_unlock(&ctx->csa.register_lock);
  spu_release_saved(ctx);

  -return ret;
+ /* EOF if there's no entry in the mbox */
+ if (!(stat & 0x0000ff))
+ return 0;
+ return simple_read_from_buffer(buf, len, pos, &data, sizeof(data));
}

static const struct file_operations spufs_mbox_info_fops = {

size_t len, loff_t *pos)
{
    struct spu_context *ctx = file->private_data;
    u32 stat, data;
    int ret;

    if (!access_ok(VERIFY_WRITE, buf, len))
        return -errno;
    if (ret)
        return ret;
    spin_lock(&ctx->csa.register_lock);
    if (ret)
        return ret;
    ret = __spufs_ibox_info_read(ctx, buf, len, pos);
    stat = ctx->csa.prob.mb_stat_R;
    data = ctx->csa.priv2.puint_mb_R;
    spin_unlock(&ctx->csa.register_lock);
    spu_release_saved(ctx);

    return ret;
}

static const struct file_operations spufs_ibox_info_fops = {
    .llseek  = generic_file_llseek,
};

static size_t spufs_wbox_info_cnt(struct spu_context *ctx)
{
    return (4 - ((ctx->csa.prob.mb_stat_R & 0x00ff00) >> 8)) * sizeof(u32);
}

static ssize_t __spufs_wbox_info_read(struct spu_context *ctx,
                         char __user *buf, size_t len, loff_t *pos)
{
    u32 wbox_stat;
    wbox_stat = ctx->csa.prob.mb_stat_R;
    cnt = 4 - ((wbox_stat & 0x00ff00) >> 8);
    for (i = 0; i < cnt; i++) {
        data[i] = ctx->csa.spu_mailbox_data[i];
    }
size_t len, loff_t *pos)
{
    struct spu_context *ctx = file->private_data;
    int ret;
    u32 data[ARRAY_SIZE(ctx->csa.spu_mailbox_data)];
    int ret, count;

    if (!access_ok(VERIFY_WRITE, buf, len))
        return -EFAULT;

    if (ret)
        return ret;
    spin_lock(&ctx->csa.register_lock);
    ret = __spufs_wbox_info_read(ctx, buf, len, pos);
    count = spufs_wbox_info_cnt(ctx);
    memcpy(&data, &ctx->csa.spu_mailbox_data, sizeof(data));
    spin_unlock(&ctx->csa.register_lock);
    spu_release_saved(ctx);

    return ret;
}

static const struct file_operations spufs_wbox_info_fops = {
    .llseek  = generic_file_llseek,
};

static ssize_t __spufs_dma_info_read(struct spu_context *ctx,
    __user *buf, size_t len, loff_t *pos)
static void spufs_get_dma_info(struct spu_context *ctx,
    struct spu_dma_info *info)
{
    struct spu_dma_info info;
    struct mfc_cq_sr *qp, *spuqp;
    int i;

    info.dma_info_type = ctx->csa.priv2.spu_tag_status_query_RW;
    info.dma_info_mask = ctx->csa.lscsa->tag_mask.slot[0];
    info.dma_info_status = ctx->csa.spu_chnldata_RW[24];
    info.dma_info_stall_and_notify = ctx->csa.spu_chnldata_RW[25];
    info.dma_info_atomic_command_status = ctx->csa.spu_chnldata_RW[27];
    info->dma_info_type = ctx->csa.priv2.spu_tag_status_query_RW;
    info->dma_info_mask = ctx->csa.lscsa->tag_mask.slot[0];
    info->dma_info_status = ctx->csa.spu_chnldata_RW[24];
    info->dma_info_stall_and_notify = ctx->csa.spu_chnldata_RW[25];
+info->dma_info_atomic_command_status = ctx->csa.spu_chnldata_RW[27];
for (i = 0; i < 16; i++) {
    qp = &info->dma_info_command_data[i];
    spuqp = &ctx->csa.priv2.spuq[i];
    +struct mfc_cq_sr *qp = &info->dma_info_command_data[i];
    +struct mfc_cq_sr *spuqp = &ctx->csa.priv2.spuq[i];

    qp->mfc_cq_data0_RW = spuqp->mfc_cq_data0_RW;
    qp->mfc_cq_data1_RW = spuqp->mfc_cq_data1_RW;
    qp->mfc_cq_data2_RW = spuqp->mfc_cq_data2_RW;
    qp->mfc_cq_data3_RW = spuqp->mfc_cq_data3_RW;
} +
+
+static ssize_t __spufs_dma_info_read(struct spu_context *ctx,
+    char __user *buf, size_t len, loff_t *pos)
+{
+    struct spu_dma_info info;
+    +spufs_get_dma_info(ctx, &info);
+    +spufs_get_dma_info(ctx, &info);
+
    return simple_read_from_buffer(buf, len, pos, &info,
    sizeof info);
    @@ -2124,6 +2150,7 @@
    size_t len, loff_t *pos)
    {
        struct spu_context *ctx = file->private_data;
        + struct spu_dma_info info;
        int ret;

        if (!access_ok(VERIFY_WRITE, buf, len))
            @@ -2133,11 +2160,12 @@
            if (ret)
                return ret;
        spin_lock(&ctx->csa.register_lock);
        -ret = __spufs_dma_info_read(ctx, buf, len, pos);
        +spufs_get_dma_info(ctx, &info);
        spin_unlock(&ctx->csa.register_lock);
        spu_release_saved(ctx);

        -return ret;
        +return simple_read_from_buffer(buf, len, pos, &info,
            +sizeof(info));
    }

    static const struct file_operations spufs_dma_info_fops = { 
@@ -2146,13 +2174,31 @@
    .llseek = no_llseek,
static void spufs_get_proxydma_info(struct spu_context *ctx,
    struct spu_proxydma_info *info)
{
    int i;
    
    info->proxydma_info_type = ctx->csa.prob.dma_querytype_RW;
    info->proxydma_info_mask = ctx->csa.prob.dma_querymask_RW;
    info->proxydma_info_status = ctx->csa.prob.dma_tagstatus_R;
    
    for (i = 0; i < 8; i++) {
        struct mfc_cq_sr *qp = &info->proxydma_info_command_data[i];
        struct mfc_cq_sr *puqp = &ctx->csa.priv2.puq[i];
        
        qp->mfc_cq_data0_RW = puqp->mfc_cq_data0_RW;
        qp->mfc_cq_data1_RW = puqp->mfc_cq_data1_RW;
        qp->mfc_cq_data2_RW = puqp->mfc_cq_data2_RW;
        qp->mfc_cq_data3_RW = puqp->mfc_cq_data3_RW;
    }
}

static ssize_t __spufs_proxydma_info_read(struct spu_context *ctx,
    char __user *buf, size_t len, loff_t *pos)
{
    struct spu_proxydma_info info;
    struct mfc_cq_sr *qp, *puqp;
    int ret = sizeof info;
    
    if (len < ret)
        return -EINVAL;
    
    if (!access_ok(VERIFY_WRITE, buf, len))
        return -EFAULT;
    
    info.proxydma_info_type = ctx->csa.prob.dma_querytype_RW;
    info.proxydma_info_mask = ctx->csa.prob.dma_querymask_RW;
    info.proxydma_info_status = ctx->csa.prob.dma_tagstatus_R;
    
    for (i = 0; i < 8; i++) {
        qp = &info.proxydma_info_command_data[i];
        puqp = &ctx->csa.priv2.puq[i];
        
        -qp->mfc_cq_data0_RW = puqp->mfc_cq_data0_RW;
        -qp->mfc_cq_data1_RW = puqp->mfc_cq_data1_RW;
        -qp->mfc_cq_data2_RW = puqp->mfc_cq_data2_RW;
        -qp->mfc_cq_data3_RW = puqp->mfc_cq_data3_RW;
    }
+spufs_get_proxydma_info(ctx, &info);

return simple_read_from_buffer(buf, len, pos, &info, sizeof info);
@@ -2181,17 +2216,19 @@
 size_t len, loff_t *pos)
 {
 struct spu_context *ctx = file->private_data;
+struct spu_proxydma_info info;
 int ret;

 ret = spu_acquire_saved(ctx);
 if (ret)
 return ret;
 spin_lock(&ctx->csa.register_lock);
-ret = __spufs_proxydma_info_read(ctx, buf, len, pos);
+spufs_get_proxydma_info(ctx, &info);
 spin_unlock(&ctx->csa.register_lock);
 spu_release_saved(ctx);

 -return ret;
+return simple_read_from_buffer(buf, len, pos, &info,
+sizeof(info));
 }

 static const struct file_operations spufs_proxydma_info_fops = {
 --- linux-4.15.0.orig/arch/powerpc/platforms/cell/spufs/sched.c
 +++ linux-4.15.0/arch/powerpc/platforms/cell/spufs/sched.c
 @@ -1093,7 +1093,7 @@
 LOAD_INT(c), LOAD_FRAC(c),
 count_active_contexts(),
 atomic_read(&nr_spu_contexts),
- idr_get_cursor(&task_active_pid_ns(current)->idr));
+ idr_get_cursor(&task_active_pid_ns(current)->idr) - 1);
 return 0;
 }

 --- linux-4.15.0.orig/arch/powerpc/platforms/chrp/time.c
 +++ linux-4.15.0/arch/powerpc/platforms/chrp/time.c
 @@ -28,6 +28,8 @@
 #include <asm/sections.h>
 #include <asm/time.h>

 +#include <platforms/chrp/chrp.h>
 +extern spinlock_t rtc_lock;

 #define NVRAM_AS0  0x74
@@ -63,7 +65,7 @@
     return 0;
 }

-int chrp_cmos_clock_read(int addr)
+static int chrp_cmos_clock_read(int addr)
 {
     if (nvram_as1 != 0)
         outb(addr>>8, nvram_as1);
@@ -71,7 +73,7 @@
     return (inb(nvram_data));
 }

-int chrp_cmos_clock_write(unsigned long val, int addr)
+static void chrp_cmos_clock_write(unsigned long val, int addr)
 {
     if (nvram_as1 != 0)
         outb(addr>>8, nvram_as1);
--- linux-4.15.0.orig/arch/powerpc/platforms/embedded6xx/hlwd-pic.c
+++ linux-4.15.0/arch/powerpc/platforms/embedded6xx/hlwd-pic.c
@@ -35,6 +35,8 @@
 */
 #define HW_BROADWAY_ICR		0x00
 #define HW_BROADWAY_IMR		0x04
+#define HW_STARLET_ICR		0x08
+#define HW_STARLET_IMR		0x0c

/*
@@ -74,6 +76,9 @@
     void __iomem *io_base = irq_data_get_irq_chip_data(d);

     setbits32(io_base + HW_BROADWAY_IMR, 1 << irq);
+     /* Make sure the ARM (aka. Starlet) doesn't handle this interrupt. */
+     clrbits32(io_base + HW_STARLET_IMR, 1 << irq);
 }

--- linux-4.15.0.orig/arch/powerpc/platforms/embedded6xx/wii.c
+++ linux-4.15.0/arch/powerpc/platforms/embedded6xx/wii.c
@@ -104,6 +104,10 @@
 /* MEM2 64MB@0x10000000 */
     delta = wii_hole_start + wii_hole_size;
     size = top - delta;
+     if (__map_without_bats)
+         return delta;
for (bl = 128<<10; bl < max_size; bl <<= 1) {
    if (bl * 2 > size)
        break;
}
#define_machine(maple) {
    .name= "Maple",
    .probe= maple_probe,
    .setup_arch= maple_setup_arch,
    .init_IRQ= maple_init_IRQ,
    .pci_irq_fixup= maple_pci_irq_fixup,
    .pci_get_legacy_ide_irq= maple_pci_get_legacy_ide_irq,
    .restart= maple_restart,
    .halt= maple_halt,
    -.get_boot_time= maple_get_boot_time,
    -.set_rtc_time= maple_set_rtc_time,
    -.get_rtc_time= maple_get_rtc_time,
    -.calibrate_decr= generic_calibrate_decr,
    -.progress= maple_progress,
    -.power_save= power4_idle,
-};
#ifdef CONFIG_EDAC
/*
 * Register a platform device for CPC925 memory controller on
 */
#define_machine(maple) {
    .name= "Maple",
    .probe= maple_probe,
    .setup_arch= maple_setup_arch,
    .init_IRQ= maple_init_IRQ,
    .pci_irq_fixup= maple_pci_irq_fixup,
    .pci_get_legacy_ide_irq= maple_pci_get_legacy_ide_irq,
    .restart= maple_restart,
    .halt= maple_halt,
    +.get_boot_time= maple_get_boot_time,
    +.set_rtc_time= maple_set_rtc_time,
    +.get_rtc_time= maple_get_rtc_time,
    +.calibrate_decr= generic_calibrate_decr,
+\t.progress\t	= maple_progress,
+\t.power_save		= power4_idle,
+\t};

--- linux-4.15.0.orig/arch/powerpc/platforms/powermac/bootx_init.c
+++ linux-4.15.0/arch/powerpc/platforms/powermac/bootx_init.c
@@ -468,7 +468,7 @@
 boot_infos_t *bi = (boot_infos_t *) r4;
 unsigned long hdr;
 unsigned long space;
-unsigned long ptr, x;
+unsigned long ptr;
 char *model;
 unsigned long offset = reloc_offset();

 @ @ -562.6 +562.8 @@
 * MMU switched OFF, so this should not be useful anymore.
 */
 if (bi->version < 4) {
+unsigned long x __maybe_unused;
+bootx_printf("Touching pages...
\n");

 /*
 --- linux-4.15.0.orig/arch/powerpc/platforms/powermac/setup.c
+++ linux-4.15.0/arch/powerpc/platforms/powermac/setup.c
@@ -352,6 +352,7 @@
 }
 machine_late_initcall(powermac, pmac_late_init);

+void note_bootable_part(dev_t dev, int part, int goodness);
/*
 * This is __ref because we check for "initializing" before
 * touching any of the __init sensitive things and "initializing"
--- linux-4.15.0.orig/arch/powerpc/platforms/powermac/sleep.S
+++ linux-4.15.0/arch/powerpc/platforms/powermac/sleep.S
@@ -37,10 +37,18 @@
 #define SL_IBAT20x48
 #define SL_DBAT30x50
 #define SL_IBAT30x58
-#define SL_TB0x60
-#define SL_R20x68
-#define SL_CR0x6c
-#define SL_R120x70/* r12 to r31 */
+#define SL_DBAT40x60
+#define SL_IBAT40x68
+#define SL_DBAT50x70
+#define SL_IBAT50x78
+#define SL_DBAT60x80
+\#define SL_IBAT6 0x88
+\#define SL_DBAT7 0x90
+\#define SL_IBAT7 0x98
+\#define SL_TB 0xa0
+\#define SL_R2 0xa8
+\#define SL_CR 0xac
+\#define SL_R12 0xb0 /* r12 to r31 */
#define SL_SIZE (SL_R12 + 80)

.section .text
@@ -125,6 +133,41 @@
mfibatl4,3
stwr4,SL_IBAT3+4(r1)

+BEGIN_MMU_FTR_SECTION
+mfspr4,SPRN_DBAT4U
+stwr4,SL_DBAT4(r1)
+mfspr4,SPRN_DBAT4L
+stwr4,SL_DBAT4+4(r1)
+mfspr4,SPRN_DBAT5U
+stwr4,SL_DBAT5(r1)
+mfspr4,SPRN_DBAT5L
+stwr4,SL_DBAT5+4(r1)
+mfspr4,SPRN_DBAT6U
+stwr4,SL_DBAT6(r1)
+mfspr4,SPRN_DBAT6L
+stwr4,SL_DBAT6+4(r1)
+mfspr4,SPRN_DBAT7U
+stwr4,SL_DBAT7(r1)
+mfspr4,SPRN_DBAT7L
+stwr4,SL_DBAT7+4(r1)
+mfspr4,SPRN_IBAT4U
+stwr4,SL_IBAT4(r1)
+mfspr4,SPRN_IBAT4L
+stwr4,SL_IBAT4+4(r1)
+mfspr4,SPRN_IBAT5U
+stwr4,SL_IBAT5(r1)
+mfspr4,SPRN_IBAT5L
+stwr4,SL_IBAT5+4(r1)
+mfspr4,SPRN_IBAT6U
+stwr4,SL_IBAT6(r1)
+mfspr4,SPRN_IBAT6L
+stwr4,SL_IBAT6+4(r1)
+mfspr4,SPRN_IBAT7U
+stwr4,SL_IBAT7(r1)
+mfspr4,SPRN_IBAT7L
+stwr4,SL_IBAT7+4(r1)
+END_MMU_FTR_SECTION_IFSET(MMU_FTR_USE_HIGH_BATS)
/* Backup various CPU config stuffs */
b__save_cpu_setup

@@ -325,22 +368,37 @@
mtibatl3,r4

BEGIN_MMU_FTR_SECTION
-lir4,0
+lwzr4,SL__DBAT4(r1)
+mtsprPRN_DBAT4U,r4
+lwzr4,SL__DBAT4+4(r1)
+mtsprPRN_DBAT4L,r4
+lwzr4,SL__DBAT5(r1)
+mtsprPRN_DBAT5U,r4
+lwzr4,SL__DBAT5+4(r1)
+mtsprPRN_DBAT5L,r4
+lwzr4,SL__DBAT6(r1)
+mtsprPRN_DBAT6U,r4
+lwzr4,SL__DBAT6+4(r1)
+mtsprPRN_DBAT6L,r4
+lwzr4,SL__DBAT7(r1)
+mtsprPRN_DBAT7U,r4
+lwzr4,SL__DBAT7+4(r1)
+mtsprPRN_DBAT7L,r4
+lwzr4,SL__IBAT4(r1)
+lwzr4,SL__IBAT4+4(r1)
+lwzr4,SL__IBAT4L,r4
+lwzr4,SL__IBAT5(r1)
+mtsprPRN_IBAT4U,r4
+lwzr4,SL__IBAT5+4(r1)
+mtsprPRN_IBAT5L,r4
+lwzr4,SL__IBAT6(r1)
+mtsprPRN_IBAT6U,r4
+lwzr4,SL__IBAT6+4(r1)
+mtsprPRN_IBAT6L,r4
+lwzr4,SL__IBAT7(r1)
+mtsprPRN_IBAT7U,r4
+lwzr4,SL__IBAT7+4(r1)
+mtsprPRN_IBAT7L,r4
END_MMU_FTR_SECTION_IFSET(MMU_FTR_USE_HIGH_BATS)

--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/Makefile
+++ linux-4.15.0/arch/powerpc/platforms/powernv/Makefile
@@ -17,3 +17,4 @@
obj-$(CONFIG_PPC_MEMTRACE)+= memtrace.o
obj-$(CONFIG_PPC_VAS)+= vas.o vas-window.o vas-debug.o
obj-$(CONFIG_PPC_FTW)	+= nx-ftw.o
+obj-$(CONFIG_OCXL_BASE)	+= ocxl.o
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/copy-paste.h
+++ linux-4.15.0/arch/powerpc/platforms/powernv/copy-paste.h
@@ -42,5 +42,6 @@
: "b" (offset), "b" (paste_address)
: "memory", "cr0");

-\treturn (cr >> CR0_SHIFT) & CR0_MASK;
+/* We mask with 0xE to ignore SO */
+\treturn (cr >> CR0_SHIFT) & 0xE;
\}
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/eeh-powernv.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/eeh-powernv.c
@@ -551,8 +551,8 @@
static int pnv_eeh_get_phb_state(struct eeh_pe *pe)
 {
 struct pnv_phb *phb = pe->phb->private_data;
-\t\t\uf8 fstate;
-\t\t\ufbe16 pcierr;
+\t\t\uf8 fstate = 0;
+\t\t\ufbe16 pcierr = 0;
 s64 rc;
 int result = 0;

 @@ -590,8 +590,8 @@
static int pnv_eeh_get_pe_state(struct eeh_pe *pe)
 {
 struct pnv_phb *phb = pe->phb->private_data;
-\t\t\uf8 fstate;
-\t\t\ufbe16 pcierr;
+\t\t\uf8 fstate = 0;
+\t\t\ufbe16 pcierr = 0;
 s64 rc;
 int result;

 --- linux-4.15.0.orig/arch/powerpc/platforms/powernv/idle.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/idle.c
@@ -24,6 +24,7 @@
#include <asm/code-patching.h>
#include <asm/smp.h>
#include <asm/runlatch.h>
+#include <asm/dbell.h>

#include "powernv.h"
#include "subcore.h"
@@ -78,7 +79,7 @@
uint64_t msr_val = MSR_IDLE;
$
uint64_t psscr_val = pnv_deepest_stop_psscr_val;

-foreach_possible_cpu(cpu) {  
+foreach_present_cpu(cpu) {  
uint64_t pir = get_hard_smp_processor_id(cpu);  
uint64_t hsprg0_val = (uint64_t)&paca[cpu];

@@ -387,8 +388,89 @@  

power9_idle_type(pnv_default_stop_val, pnv_default_stop_mask);
}

+ifdef CONFIG_KVM_BOOK3S_HV_POSSIBLE
+/
+ * This is used in working around bugs in thread reconfiguration
+ * on POWER9 (at least up to Nimbus DD2.2) relating to transactional
+ * memory and the way that XER[SO] is checkpointed.
+ * This function forces the core into SMT4 in order by asking
+ * all other threads not to stop, and sending a message to any
+ * that are in a stop state.
+ * Must be called with preemption disabled.
+ *
+ * DO NOT call this unless cpu_has_feature(CPU_FTR_P9_TM_XER_SO_BUG) is
+ * true; otherwise this function will hang the system, due to the
+ * optimization in power9_idle_stop.
+ */
+void pnv_power9_force_smt4_catch(void)
+
+int cpu, cpu0, thr;
+struct paca_struct *tpaca;
+int awake_threads = 1;/* this thread is awake */
+int poke_threads = 0;
+int need_awake = threads_per_core;
+
+cpu = smp_processor_id();
+cpu0 = cpu & ~(threads_per_core - 1);
+tpaca = &paca[cpu0];
+for (thr = 0; thr < threads_per_core; ++thr) {
+if (cpu != cpu0 + thr)
+atomic_inc(&tpaca[thr].dont_stop);
+
+/* order setting dont_stop vs testing requested_psscr */
+mb();
+for (thr = 0; thr < threads_per_core; ++thr) {
+if (!tpaca[thr].requested_psscr)
+++awake_threads;
+else
++poke_threads |= (1 << thr);
+}
/* If at least 3 threads are awake, the core is in SMT4 already */
if (awake_threads < need_awake) {
    /* We have to wake some threads; we'll use msgsnd */
    for (thr = 0; thr < threads_per_core; ++thr) {
        if (poke_threads & (1 << thr)) {
            ppc_msgsnd_sync();
            ppc_msgsnd(PPC_DBELL_MSGTYPE, 0,
               tpaca[thr].hw_cpu_id);
        }
    }
    /* now spin until at least 3 threads are awake */
    do {
        for (thr = 0; thr < threads_per_core; ++thr) {
            if ((poke_threads & (1 << thr)) &&
               !tpaca[thr].requested_psscr) {
                awake_threads;
            }
        }
    } while (awake_threads < need_awake);
}

EXPORT_SYMBOL_GPL(pnv_power9_force_smt4_catch);

void pnv_power9_force_smt4_release(void)
{
    int cpu, cpu0, thr;
    struct paca_struct *tpaca;

    cpu = smp_processor_id();
    cpu0 = cpu & ~(threads_per_core - 1);
    tpaca = &paca[cpu0];

    /* clear all the dont_stop flags */
    for (thr = 0; thr < threads_per_core; ++thr) {
        if (cpu != cpu0 + thr)
            atomic_dec(&tpaca[thr].dont_stop);
    }
}

EXPORT_SYMBOL_GPL(pnv_power9_force_smt4_release);
#endif /* CONFIG_KVM_BOOK3S_HV_POSSIBLE */

#ifdef CONFIG_HOTPLUG_CPU
 static void pnv_program_cpu_hotplug_lpcr(unsigned int cpu, u64 lpcr_val)
{

    /* clear all the dont_stop flags */
    for (thr = 0; thr < threads_per_core; ++thr) {
        if (cpu != cpu0 + thr)
            atomic_dec(&tpaca[thr].dont_stop);
    }

    EXPORT_SYMBOL_GPL(pnv_power9_force_smt4_release);
#endif /* CONFIG_HOTPLUG_CPU */

-static void pnv_program_cpu_hotplug_lpcr(unsigned int cpu, u64 lpcr_val)
{
u64 pir = get_hard_smp_processor_id(cpu);

@@ -411,20 +493,6 @@
{
    unsigned long srr1;
    u32 idle_states = pnv_get_supported_cpuidle_states();
    -u64 lpcr_val;
    -
    -/ *
    -* We don't want to take decrementer interrupts while we are
    -* offline, so clear LPCR:PECE1. We keep PECE2 (and
    -* LPCR_PECE_HVEE on P9) enabled as to let IPIs in.
    -*
    -* If the CPU gets woken up by a special wakeup, ensure that
    -* the SLW engine sets LPCR with decrementer bit cleared, else
    -* the CPU will come back to the kernel due to a spurious
    -* wakeup.
    -* */
    -lpcr_val = mfspr(SPRN_LPCR) & ~(u64)LPCR_PECE1;
    -pnv_program_cpu_hotplug_lpcr(cpu, lpcr_val);

    __ppc64_runlatch_off();

    @@ -456,16 +524,6 @@
    __ppc64_runlatch_on();

    -/ *
    -* Re-enable decrementer interrupts in LPCR.
    -*
    -* Further, we want stop states to be woken up by decrementer
    -* for non-hotplug cases. So program the LPCR via stop api as
    -* well.
    -* */
    -lpcr_val = mfspr(SPRN_LPCR) | (u64)LPCR_PECE1;
    -pnv_program_cpu_hotplug_lpcr(cpu, lpcr_val);
    -
    return srr1;
    }
.eof
    @ @ -741,7 +799,7 @@
    int cpu;

    pr_info("powernv: idle: Saving PACA pointers of all CPUs in their thread sibling PACA\n");
    -for_each_possible_cpu(cpu) {
    +for_each_present_cpu(cpu) {
        int base_cpu = cpu_first_thread_sibling(cpu);
        int idx = cpu_thread_in_core(cpu);
int i;
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/memtrace.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/memtrace.c
@@ -82,19 +82,6 @@
    .open= simple_open,
    }

-static void flush_memory_region(u64 base, u64 size)
-static void memtrace_clear_range(unsigned long start_pfn,
-static void memtrace_offline_pages(u32 nid, u64 start_pfn, u64 nr_pages)
walk_memory_range(start_pfn, end_pfn, (void *)MEM_OFFLINE,
    change_memblock_state);

-/* RCU grace period? */
-flush_memory_region((u64)__va(start_pfn << PAGE_SHIFT),
    nr_pages << PAGE_SHIFT);
-
-lock_device_hotplug();
-remove_memory(nid, start_pfn << PAGE_SHIFT, nr_pages << PAGE_SHIFT);
-unlock_device_hotplug();

return true;
}

static u64 memtrace_alloc_node(u32 nid, u64 size)
{
    u64 start_pfn, end_pfn, nr_pages;
    u64 base_pfn;
    u64 bytes = memory_block_size_bytes();

    if (!NODE_DATA(nid) || !node_spanned_pages(nid))
        return 0;
    @@ -158,10 +157,29 @@
    /* Trace memory needs to be aligned to the size */
    end_pfn = round_down(end_pfn - nr_pages, nr_pages);

    +lock_device_hotplug();
    for (base_pfn = end_pfn; base_pfn > start_pfn; base_pfn -= nr_pages) {
        -if (memtrace_offline_pages(nid, base_pfn, nr_pages) == true)
        +if (memtrace_offline_pages(nid, base_pfn, nr_pages) == true) {
            +/*
            + * Clear the range while we still have a linear
            + * mapping.
            + */
            +memtrace_clear_range(base_pfn, nr_pages);
            +/*
            + * Remove memory in memory block size chunks so that
            + * iomem resources are always split to the same size and
            + * we never try to remove memory that spans two iomem
            + * resources.
            + */
            +end_pfn = base_pfn + nr_pages;
            +for (pfn = base_pfn; pfn < end_pfn; pfn += bytes) PAGE_SHIFT) {
            +remove_memory(nid, pfn << PAGE_SHIFT, bytes);
            +}
            +unlock_device_hotplug();
    }
return base_pfn << PAGE_SHIFT;
+
+unlock_device_hotplug();

return 0;
}
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/npu-dma.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/npu-dma.c
@@ -34,12 +34,41 @@
#define npu_to_phb(x) container_of(x, struct pnv_phb, npu)
/
+ * spinlock to protect initialisation of an npu_context for a particular
+ * mm_struct.
+ */
+static DEFINE_SPINLOCK(npu_context_lock);
+
+/*
+ * When an address shootdown range exceeds this threshold we invalidate the
+ * entire TLB on the GPU for the given PID rather than each specific address in
+ * the range.
+ */
+#endif
+#define ATSD_THRESHOLD (2*1024*1024)
+
+/*
+ * Other types of TCE cache invalidation are not functional in the
+ * hardware.
+ */
static struct pci_dev *get_pci_dev(struct device_node *dn)
{
- return PCI_DN(dn)->pcidev;
+ struct pci_dn *pdn = PCI_DN(dn);
+ struct pci_dev *pdev;
+ 
+ pdev = pci_get_domain_bus_and_slot(pci_domain_nr(pdn->phb->bus),
+ pdn->busno, pdn->devfn);
+ 
+ /*
+ * pci_get_domain_bus_and_slot() increased the reference count of
+ * the PCI device, but callers don't need that actually as the PE
+ * already holds a reference to the device. Since callers aren't
+ * aware of the reference count change, call pci_dev_put() now to
+ * avoid leaks.
+ */
+ if (pdev)
+ pci_dev_put(pdev);
+
/* Given a NPU device get the associated PCI device. */
@@ -277,7 +306,7 @@
    int64_t rc = 0;
    phys_addr_t top = memblock_end_of_DRAM();

-    if (phb->type != PNV_PHB_NPU || !npe->pdev)
+    if (phb->type != PNV_PHB_NPU_NVLINK || !npe->pdev)
        return -EINVAL;

    rc = pnv_npu_unset_window(npe, 0);
@@ -384,6 +413,25 @@
        return gpe;
    }

    /* NPU2 ATS */
    /* Maximum possible number of ATSD MMIO registers per NPU */
+#define NV_NMMU_ATSD_REGS 8
+
    /* An NPU descriptor, valid for POWER9 only */
+    struct npu {
+        int index;
+        __be64 *mmio_atsd_regs[NV_NMMU_ATSD_REGS];
+        unsigned int mmio_atsd_count;
+        
+        /* Bitmask for MMIO register usage */
+        unsigned long mmio_atsd_usage;
+        
+        /* Do we need to explicitly flush the nest mmu? */
+        bool nmmu_flush;
+    }:
+
    /* Maximum number of nvlinks per npu */
+#define NV_MAX_LINKS 6

    bool nmmu_flush;

    /* Callback to stop translation requests on a given GPU */
-    struct npu_context (*)(struct npu_context *, void *)
+    void (*)(struct npu_context *context, void *priv);

    /* */
    * Private pointer passed to the above callback for usage by
void *priv;
;
+struct mmio_atsd_reg {
+struct npu *npu;
+int reg;
+};
+
/*
 * Find a free MMIO ATSD register and mark it in use. Return -ENOSPC
 * if none are available.
 int i;

for (i = 0; i < npu->mmio_atsd_count; i++) {
- if (!test_and_set_bit(i, &npu->mmio_atsd_usage))
 - return i;
+ if (!test_bit(i, &npu->mmio_atsd_usage))
 + if (!test_and_set_bit_lock(i, &npu->mmio_atsd_usage))
 + return i;
}

return -ENOSPC;

static void put_mmio_atsd_reg(struct npu *npu, int reg)
{
- clear_bit(reg, &npu->mmio_atsd_usage);
+ clear_bit_unlock(reg, &npu->mmio_atsd_usage);
}

/* MMIO ATSD register offsets */
#define XTS_ATSD_AVA  1
#define XTS_ATSD_STAT 2

- static int mmio_launch_invalidate(struct npu *npu, unsigned long launch,
- unsigned long va)
+ static void mmio_launch_invalidate(struct mmio_atsd_reg *mmio_atsd_reg,
+ unsigned long launch, unsigned long va)
{
- int mmio_atsd_reg;
- do {
- mmio_atsd_reg = get_mmio_atsd_reg(npu);
- cpu_relax();
- } while (mmio_atsd_reg < 0);
+ struct npu *npu = mmio_atsd_reg->npu;


+int reg = mmio_atsd_reg->reg;

__raw_writeq(cpu_to_be64(va),
-npu->mmio_atsd_regs[mmio_atsd_reg] + XTS_ATSD_AVA);
+mmio_atsd_regs[reg] + XTS_ATSD_AVA);
eieio();
-__raw_writeq(cpu_to_be64(launch), npu->mmio_atsd_regs[mmio_atsd_reg]);
-
-return mmio_atsd_reg;
+__raw_writeq(cpu_to_be64(launch), npu->mmio_atsd_regs[reg]);
}

-static int mmio Invalidate_pid(struct npu *npu, unsigned long pid, bool flush)
+static void mmio Invalidate_pid(struct mmio_atsd_reg mmio_atsd_reg[NV_MAX_NPUS],
+unsigned long pid, bool flush)
{
+int i;
unsigned long launch;

;/* IS set to invalidate matching PID */
-lauch = PPC_BIT(12);
+for (i = 0; i <= max_npu2_index; i++) {
+if (mmio_atsd_reg[i].reg < 0)
+continue;
+
+/* IS set to invalidate matching PID */
+launch = PPC_BIT(12);

;/* PRS set to process-scoped */
-lauch |= PPC_BIT(13);
+/* PRS set to process-scoped */
+launch |= PPC_BIT(13);

;/* AP */
-lauch |= (u64) mmu_get_ap(mmu_virtual_psize) << PPC_BITLSHIFT(17);
+/* AP */
+launch |= (u64)
+mmu_get_ap(mmu_virtual_psize) << PPC_BITLSHIFT(17);

;/* PID */
-lauch |= pid << PPC_BITLSHIFT(38);
+/* PID */
+launch |= pid << PPC_BITLSHIFT(38);

;/* No flush */
-lauch |= !flush << PPC_BITLSHIFT(39);
+/* No flush */
+launch |= !flush << PPC_BITLSHIFT(39);
/* Invalidating the entire process doesn't use a va */
return mmio_launch_invalidate(npu, launch, 0);
/* Invalidating the entire process doesn't use a va */
+mmio_launch_invalidate(&mmio_atsd_reg[i], launch, 0);
+
}
}

static int mmio_invalidate_va(struct npu *npu, unsigned long va,
-unsigned long pid, bool flush)
+static void mmio_invalidate_va(struct mmio_atsd_reg mmio_atsd_reg[NV_MAX_NPUS],
+unsigned long va, unsigned long pid, bool flush)
{
+int i;
unsigned long launch;

/* IS set to invalidate target VA */
-launch = 0;
+for (i = 0; i <= max_npu2_index; i++) {
+if (mmio_atsd_reg[i].reg < 0)
+continue;
+
+/* IS set to invalidate target VA */
+launch = 0;

/* PRS set to process scoped */
-launch |= PPC_BIT(13);
+/* PRS set to process scoped */
+launch |= PPC_BIT(13);

/* AP */
-launch |= (u64) mmu_get_ap(mmu_virtual_psize) << PPC_BITLSHIFT(17);
+/* AP */
+launch |= (u64)
+mmu_get_ap(mmu_virtual_psize) << PPC_BITLSHIFT(17);

/* PID */
-launch |= pid << PPC_BITLSHIFT(38);
+/* PID */
+launch |= pid << PPC_BITLSHIFT(38);

/* No flush */
-launch |= !flush << PPC_BITLSHIFT(39);
+/* No flush */
+launch |= !flush << PPC_BITLSHIFT(39);

-return mmio_launch_invalidate(npu, launch, va);
+mmio_launch_invalidate(&mmio_atsd_reg[i], launch, va);


```c
#define mn_to_npu_context(x) container_of(x, struct npu_context, mn)

-struct mmio_atsd_reg {
    -struct npu *npu;
    -int reg;
};
-
static void mmio_invalidate_wait(
    -struct mmio_atsd_reg mmio_atsd_reg[NV_MAX_NPUS], bool flush)
+struct mmio_atsd_reg mmio_atsd_reg[NV_MAX_NPUS])
{  
struct npu *npu;
    int i, reg;
    @ @ .519.16 +577.68 @@
    reg = mmio_atsd_reg[i].reg;
    while (__raw_readq(npu->mmio_atsd_regs[reg] + XTS_ATSD_STAT))
        cpu_relax();
+}
+
-put_mmio_atsd_reg(npu, reg);
+
/*
 * Acquires all the address translation shootdown (ATSD) registers required to
 * launch an ATSD on all links this npu_context is active on.
 * */
+static void acquire_atsd_reg(struct npu_context *npu_context,
+struct mmio_atsd_reg mmio_atsd_reg[NV_MAX_NPUS])
+{
+    int i, j;
+    struct npu *npu;
+    struct pci_dev *npdev;
+    +for (i = 0; i <= max_npu2_index; i++) {
+        +mmio_atsd_reg[i].reg = -1;
+    +for (j = 0; j < NV_MAX_LINKS; j++) {
+        +/*
+         * There are no ordering requirements with respect to
+         * the setup of struct npu_context, but to ensure
+         * consistent behaviour we need to ensure npdev[][] is
+         * only read once.
+         */
+        +npdev = READ_ONCE(npu_context->npdev[i][j]);
+        +if (!npdev)
+            +continue;
+        +
```

---

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npu = pci_bus_to_host(npdev->bus)->npu;
if (!npu)
+continue;
+
+mmio_atsd_reg[i].npu = npu;
+mmio_atsd_reg[i].reg = get_mmio_atsd_reg(npu);
+while (mmio_atsd_reg[i].reg < 0) {
+mmio_atsd_reg[i].reg = get_mmio_atsd_reg(npu);
+cpu_relax();
+
+break;
+
+
+/*
+ * Release previously acquired ATSD registers. To avoid deadlocks the registers
+ * must be released in the same order they were acquired above in
+ * acquire_atsd_reg.
+ */
+static void release_atsd_reg(struct mmio_atsd_reg mmio_atsd_reg[NV_MAX_NPUS])
+{
+int i;
+
+for (i = 0; i <= max_npu2_index; i++) {
/*
- * The GPU requires two flush ATSDs to ensure all entries have
- * been flushed. We use PID 0 as it will never be used for a
- * process on the GPU.
+ * We can't rely on npu_context->npdev[][][] being the same here
+ * as when acquire_atsd_reg() was called, hence we use the
+ * values stored in mmio_atsd_reg during the acquire phase
+ * rather than re-reading npdev[][][].
+ */
-if (flush)
-mmmio_invalidate_pid(npu, 0, true);
+if (mmio_atsd_reg[i].reg < 0)
+continue;
+
+put_mmio_atsd_reg(mmio_atsd_reg[i].npu, mmio_atsd_reg[i].reg);
}
}

static void mmmio_invalidate(struct npu_context *npu_context, int va,
unsined long address, bool flush)
{
-int i, j;

struct npu *npu;
struct pnv_phb *nphb;
struct pci_dev *npdev;

struct mmio_atsd_reg mmio_atsd_reg[NV_MAX_NPUS];
unsigned long pid = npu_context->mm->context.id;

@@ -558,37 +664,25 @@
 * Loop over all the NPUs this process is active on and launch
 * an invalidate.
 */
-for (i = 0; i <= max_npu2_index; i++) {
-    mmio_atsd_reg[i].reg = -1;
-    for (j = 0; j < NV_MAX_LINKS; j++) {
-        npdev = npu_context->npdev[i][j];
-        if (!npdev)
-            continue;
-        nphb = pci_bus_to_host(npdev->bus)->private_data;
-        npu = &nphb->npu;
-        mmio_atsd_reg[i].npu = npu;
+        acquire_atsd_reg(npu_context, mmio_atsd_reg);
+        if (va)
+            mmio_invalidate_va(mmio_atsd_reg, address, pid, flush);
+        else
+            mmio_invalidate_pid(mmio_atsd_reg, pid, flush);
-        if (va)
-            mmio_atsd_reg[i].reg =
-                mmio_invalidate_va(npu, address, pid, flush);
-        else
-            mmio_atsd_reg[i].reg =
-                mmio_invalidate_pid(npu, pid, flush);
-        /*
-         * The NPU hardware forwards the shootdown to all GPUs
-         * so we only have to launch one shootdown per NPU.
-         */
-        break;
-    }
+        mmio_invalidate_wait(mmio_atsd_reg);
+    if (flush) {
+        /*
+         * The GPU requires two flush ATSDs to ensure all entries have
+         * been flushed. We use PID 0 as it will never be used for a
+         * process on the GPU.
+         */
+        mmio_invalidate_pid(mmio_atsd_reg, 0, true);
-}
+mmio_invalidate_wait(mmio_atsd_reg);
+mmio_invalidate_pid(mmio_atsd_reg, 0, true);
+mmio_invalidate_wait(mmio_atsd_reg);
}
-
-mmio_invalidate_wait(mmio_atsd_reg, flush);
-if (flush)
-/* Wait for the flush to complete */
-mmio_invalidate_wait(mmio_atsd_reg, false);
+release_atsd_reg(mmio_atsd_reg);
}

static void pnv_npu2_mn_release(struct mmu_notifier *mn,
@@ -624,11 +718,19 @@
struct npu_context *npu_context = mn_to_npu_context(mn);
unsigned long address;

-for (address = start; address < end; address += PAGE_SIZE)
-mmio_invalidate(npu_context, 1, address, false);
+if (end - start > ATSD_THRESHOLD) {
+/*
+ * Just invalidate the entire PID if the address range is too
+ * large.
+ */
+mmio_invalidate(npu_context, 0, 0, true);
+} else {
+for (address = start; address < end; address += PAGE_SIZE)
+mmio_invalidate(npu_context, 1, address, false);
+
-/* Do the flush only on the final address == end */
-mmio_invalidate(npu_context, 1, address, true);
-+/* Do the flush only on the final address == end */
+mmio_invalidate(npu_context, 1, address, true);
+
}
}

static const struct mmu_notifier_ops nv_nmmu_notifier_ops = {
@@ -649,20 +751,21 @@
* Returns an error if there no contexts are currently available or a
* npu_context which should be passed to pnv_npu2_handle_fault().
*
- * mmap_sem must be held in write mode.
+ * mmap_sem must be held in write mode and must not be called from interrupt
+ * context.
+ */
struct npu_context *pnv_npu2_init_context(struct pci_dev *gpdev,
unsigned long flags,
@@ -718,19 +821,20 @@
-struct npu_context *pnv_npu2_init_context(struct pci_dev *gpdev,
 unsigned long flags,
-struct npu_context *pnv_npu2_init_context(struct pci_dev *gpdev,
 unsigned long flags,
-struct npu_context *(*cb)(struct npu_context *, void *)
+*(cb)(struct npu_context *, void *)
,
void (*cb)(struct npu_context *, void *),
void *priv)
{
  int rc;
  u32 nvlink_index;
  struct device_node *nvlink_dn;
  struct mm_struct *mm = current->mm;
  -struct pnv_phb *nphb;
  struct npu *npu;
  struct npu_context *npu_context;
  +struct pci_controller *hose;

  /*
   * At present we don't support GPUs connected to multiple NPUs and I'm
   * @ @ -670,13 +773,19 @ @
   */
  struct pci_dev *npdev = pnv_pci_get_npu_dev(gpdev, 0);

  -if (!firmware_has_feature(FW_FEATURE_OPAL))
    -return ERR_PTR(-ENODEV);
  -
  if (!npdev)
    /* No nvlink associated with this GPU device */
    return ERR_PTR(-ENODEV);
  
  -if (flags & ~(MSR_DR | MSR_PR | MSR_HV))
    -return ERR_PTR(-EINVAL);
  +
  +nvlink_dn = of_parse_phandle(npdev->dev.of_node, "ibm,nvlink", 0);
  +if (WARN_ON(of_property_read_u32(nvlink_dn, "ibm,npu-link-index",
             +&nvlink_index)))
    +return ERR_PTR(-ENODEV);
  +
  +if (!mm || mm->context.id == 0) {
    /*
     * Kernel thread contexts are not supported and context id 0 is
     * @ @ -685,47 +794,66 @ @
     */
    return ERR_PTR(-EINVAL);
  }

  +nphb = pci_bus_to_host(npdev->bus)->private_data;
  -nphb = &nphb->npu;
  -
  -/*
  - * Setup the NPU context table for a particular GPU. These need to be
  - * per-GPU as we need the tables to filter ATSDs when there are no
  - * active contexts on a particular GPU.
- rc = opal_npu_init_context(nphb->opal_id, mm->context.id, flags,
- PCI_DEVID(gpdev->bus->number, gpdev->devfn));
- if (rc < 0)
- return ERR_PTR(-ENOSPC);
+ those = pci_bus_to_host(npdev->bus);
+ npu = hose->npu;
+ if (!npu)
+ return ERR_PTR(-ENODEV);

/*
 * We store the npu pci device so we can more easily get at the
 * associated npus.
 */
+spin_lock(&npu_context_lock);

npu_context = mm->context.npu_context;
+if (npu_context) {
+if (npu_context->release_cb != cb ||
+npu_context->priv != priv) {
+spin_unlock(&npu_context_lock);
+return ERR_PTR(-EINVAL);
+}
+
+WARN_ON(!kref_get_unless_zero(&npu_context->kref));
+}
+spin_unlock(&npu_context_lock);
+
if (!npu_context) {
+/*
+ * We can set up these fields without holding the
+ * npu_context_lock as the npu_context hasn't been returned to
+ * the caller meaning it can't be destroyed. Parallel allocation
+ * is protected against by mmap_sem.
+ */
+rc = -ENOMEM;
+npu_context = kzalloc(sizeof(struct npu_context), GFP_KERNEL);
- if (!npu_context)
- return ERR_PTR(-ENOMEM);
+if (npu_context) {
+kref_init(&npu_context->kref);
+npu_context->mm = mm;
+npu_context->mn.ops = &nv_nmmu_notifier_ops;
+rc = __mmu_notifier_register(&npu_context->mn, mm);
+}
+
+if (rc) {
+kfree(npu_context);
+return ERR_PTR(rc);

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mm->context.npu_context = npu_context;
-npu_context->mm = mm;
-npu_context->mn.ops = &nv_nmmu_notifier_ops;
-__mmu_notifier_register(&npu_context->mn, mm);
-kref_init(&npu_context->kref);
} else {
-kref_get(&npu_context->kref);
}

npu_context->release_cb = cb;
npu_context->priv = priv;
vlink_dn = of_parse_phandle(npdev->dev.of_node, "ibm,nvlink", 0);
-if (WARN_ON(of_property_read_u32(nvlink_dn, "ibm,npu-link-index","nlink_index")))
-return ERR_PTR(-ENODEV);
-npu_context->npdev[npu->index][nlink_index] = npdev;

-if (!nphb->npu.nmmu_flush) {
+ /*
+ * npdev is a pci_dev pointer setup by the PCI code. We assign it to
+ * npdev[1][1] to indicate to the mmu notifiers that an invalidation
+ * should also be sent over this nvlink. The notifiers don't use any
+ * other fields in npu_context, so we just need to ensure that when they
+ * deference npu_context->npdev[1][1] it is either a valid pointer or
+ * NULL.
+ */
+ WRITE_ONCE(npu_context->npdev[npu->index][nlink_index], npdev);
+ +if (!npu->nmmu_flush) {
/*
 * If we're not explicitly flushing ourselves we need to mark
 * the thread for global flushes
 @@ -748,37 +876,49 @@
 mm_context_remove_copro(npu_context->mm);

 npu_context->mm->context.npu_context = NULL;
-mmu_notifier_unregister(&npu_context->mn,
-npu_context->mn);
-
-kfree(npu_context);
}

+ /*
+ * Destroy a context on the given GPU. May free the npu_context if it is no
+ * longer active on any GPUs. Must not be called from interrupt context.
+ */
void pnv_npu2_destroy_context(struct npu_context *npu_context, 
struct pci_dev *gpdev)
{
    struct pnv_phb *nphb;
    int removed;
    struct npu *npu;
    struct pci_dev *npdev = pnv_pci_get_npu_dev(gpdev, 0);
    struct device_node *nvlink_dn;
    u32 nvlink_index;
    struct pci_controller *hose;

    if (WARN_ON(!npdev))
        return;

    if (!firmware_has_feature(FW_FEATURE_OPAL))
        hose = pci_bus_to_host(npdev->bus);
    npu = hose->npu;
    if (!npu)
        return;

    nphb = pci_bus_to_host(npdev->bus)->private_data;
    npu = &nphb->npu;
    nvlink_dn = of_parse_phandle(npdev->dev.of_node, "ibm,nvlink", 0);
    if (WARN_ON(of_property_read_u32(nvlink_dn, "ibm,npu-link-index", 
          &nvlink_index)))
        return;
    npu_context->npdev[npu->index][nvlink_index] = NULL;
    opal_npu_destroy_context(nphb->opal_id, npu_context->mm->context.id, 
            -PCI_DEVID(gpdev->bus->number, gpdev->devfn));
    kref_put(&npu_context->kref, pnv_npu2_release_context);
    WRITE_ONCE(npu_context->npdev[npu->index][nvlink_index], NULL);
    spin_lock(&npu_context_lock);
    removed = kref_put(&npu_context->kref, pnv_npu2_release_context);
    spin_unlock(&npu_context_lock);
    /*
     * We need to do this outside of pnv_npu2_release_context so that it is
     * outside the spinlock as mmu_notifier_destroy uses SRCU.
     */
    if (removed) {
        mmu_notifier_unregister(&npu_context->mn,
                npu_context->mm);
        kfree(npu_context);
    }
}
EXPORT_SYMBOL(pnv_npu2_destroy_context);
u64 rc = 0, result = 0;
int i, is_write;
struct page *page[1];
+const char __user *u;
+char c;

/* mmap_sem should be held so the struct_mm must be present */
struct mm_struct *mm = context->mm;

-if (!firmware_has_feature(FW_FEATURE_OPAL))
-return -ENODEV;
-WARN_ON(!rwsem_is_locked(&mm->mmap_sem));

for (i = 0; i < count; i++) {
@@ -806,18 +945,17 @@
is_write ? FOLL_WRITE : 0,
page, NULL, NULL);

-/*
-* To support virtualised environments we will have to do an
-* access to the page to ensure it gets faulted into the
-* hypervisor. For the moment virtualisation is not supported in
-* other areas so leave the access out.
-* */
-if (rc != 1) {
-status[i] = rc;
-result = -EFAULT;
-continue;
-}

+/* Make sure partition scoped tree gets a pte */
+u = page_address(page[0]);
+if (__get_user(c, u))
+result = -EFAULT;
+
+status[i] = 0;
+put_page(page[0]);
}@@ -826,42 +964,93 @@}
EXPORT_SYMBOL(pnv_npu2_handle_fault);

-int pnv_npu2_init(struct pnv_phb *phb)
+int pnv_npu2_init(struct pci_controller *hose)
unsigned int i;
unsigned long long mmio_atsd;
-struct device_node *dn;
-struct pci_dev *gpdev;
static int npu_index;
-unsigned long long rc = 0;
-
- phb->npu.nmmu_flush =
- of_property_read_bool(phb->hose->dn, "ibm,nmmu-flush");
- for_each_child_of_node(phb->hose->dn, dn) {
  - gpdev = pnv_pci_get_gpu_dev(get_pci_dev(dn));
  - if (gpdev) {
    - rc = opal_npu_map_lpar(phb->opal_id,
      - PCI DEVID(gpdev->bus->number, gpdev->devfn),
      - 0, 0);
    - if (rc)
      - dev_err(&gpdev->dev,
        - "Error %lld mapping device to LPAR\n",
        - rc);
      - }
    - }
  - struct npu *npu;
  + int ret;
  -
    - for (i = 0; !of_property_read_u64_index(phb->hose->dn, "ibm,mmio-atsd",
      - i, &mmio_atsd); i++)
      - phb->npu.mmio_atsd_regs[i] = ioremap(mmio_atsd, 32);
    -
      - pr_info("NPU%lld: Found %d MMIO ATSD registers", phb->opal_id, i);
    - phb->npu.mmio_atsd_count = i;
    - phb->npu.mmio_atsd_usage = 0;
    + npu = kzalloc(sizeof(*npu), GFP_KERNEL);
    + if (!npu)
      + return -ENOMEM;
    + npu->nmmu_flush = of_property_read_bool(hose->dn, "ibm,nmmu-flush");
    +
    + for (i = 0; i < ARRAY_SIZE(npu->mmio_atsd_regs) &&
      + !of_property_read_u64_index(hose->dn, "ibm,mmio-atsd",
      + i, &mmio_atsd); i++)
      + npu->mmio_atsd_regs[i] = ioremap(mmio_atsd, 32);
    +
      + pr_info("NPU%d: Found %d MMIO ATSD registers", hose->global_number, i);
    + npu->mmio_atsd_count = i;
    + npu->mmio_atsd_usage = 0;
    + npu_index++;
    - if (WARN_ON(npu_index >= NV_MAX_NPUS))
      - return -ENOSPC;
+if (WARN_ON(npu_index >= NV_MAX_NPUS)) {
  +ret = -ENOSPC;
  +goto fail_exit;
+}
max_npu2_index = npu_index;
-phb->npu.index = npu_index;
+npu->index = npu_index;
+hose->npu = npu;

  return 0;
+
+fail_exit:
  +for (i = 0; i < npu->mmio_atsd_count; ++i)
  +iounmap(npu->mmio_atsd_regs[i]);
  +
  +kfree(npu);
  +
  +return ret;
+}
+
+int pnv_npu2_map_lpar_dev(struct pci_dev *gpdev, unsigned int lparid,
+unsigned long msr)
+{
  +int ret;
  +struct pci_dev *npdev = pnv_pci_get_npu_dev(gpdev, 0);
  +struct pci_controller *hose;
  +struct pnv_phb *nphb;
  +
  +if (!npdev)
  +return -ENODEV;
  +
  +hose = pci_bus_to_host(npdev->bus);
  +nphb = hose->private_data;
  +
  +dev_dbg(&gpdev->dev, "Map LPAR opalid=%llu lparid=%u\n",
  +nphb->opal_id, lparid);
  +/*
  + * Currently we only support radix and non-zero LPCR only makes sense
  + * for hash tables so skiboot expects the LPCR parameter to be a zero.
  + */
  +ret = opal_npu_map_lpar(nphb->opal_id,
  +PCI_DEVID(gpdev->bus->number, gpdev->devfn), lparid,
  +0 /* LPCR bits */);
  +if (ret) {
  +dev_err(&gpdev->dev, "Error %d mapping device to LPAR\n", ret);
  +return ret;
  +}
dev_dbg(&gpdev->dev, "init context opalid=%llu msr=%lx\n",
+ nphb->opal_id, msr);
+ ret = opal_npu_init_context(nphb->opal_id, 0/*__unused*/, msr,
+ PCI_DEVID(gpdev->bus->number, gpdev->devfn));
+ if (ret < 0)
+ dev_err(&gpdev->dev, "Failed to init context: %d\n", ret);
+ else
+ ret = 0;
+ return 0;
+}
+EXPORT_SYMBOL_GPL(pnv_npu2_map_lpar_dev);
+
+void pnv_npu2_map_lpar(struct pnv_ioda_pe *gpe, unsigned long msr)
+{
+ struct pci_dev *gpdev;
+ +
+ list_for_each_entry(gpdev, &gpe->pbus->devices, bus_list)
+ pnv_npu2_map_lpar_dev(gpdev, 0, msr);
+ }
+--- linux-4.15.0.orig/arch/powerpc/platforms/powervr/ocxl.c
+++ linux-4.15.0/arch/powerpc/platforms/powervr/ocxl.c
@@ -0,0 +1,515 @@
+# SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+include <asm/pnv-ocxl.h>
+include <asm/opal.h>
+include <asm/xive.h>
+include <misc/ocxl-config.h>
+include "pci.h"
++#define PNV_OCXL_TL_P9_RECV_CAP		0x000000000000000Full
+#define PNV_OCXL_ACTAG_MAX		64
+/* PASIDs are 20-bit, but on P9, NPU can only handle 15 bits */
+#define PNV_OCXL_PASID_BITS15
+#define PNV_OCXL_PASID_MAX((1 << PNV_OCXL_PASID_BITS) - 1)
+ +#define AFU_PRESENT (1 << 31)
+#define AFU_INDEX_MASK 0x3F000000
+#define AFU_INDEX_SHIFT 24
+#define ACTAG_MASK 0xFFF
+ struct actag_range {
+ u16 start;
+ u16 count;
+ }
+ +
+struct npu_link {
+struct list_head list;
+int domain;
+int bus;
+int dev;
+u16 fn_desired_actags[8];
+struct actag_range fn_actags[8];
+bool assignment_done;
+};
+static struct list_head links_list = LIST_HEAD_INIT(links_list);
+static DEFINE_MUTEX(links_list_lock);
+
+/
+ * opencapi actags handling:
+ *
+ * When sending commands, the opencapi device references the memory
+ * context it's targeting with an 'actag', which is really an alias
+ * for a (BDF, pasid) combination. When it receives a command, the NPU
+ * must do a lookup of the actag to identify the memory context. The
+ * hardware supports a finite number of actags per link (64 for
+ * POWER9).
+ *
+ * The device can carry multiple functions, and each function can have
+ * multiple AFUs. Each AFU advertises in its config space the number
+ * of desired actags. The host must configure in the config space of
+ * the AFU how many actags the AFU is really allowed to use (which can
+ * be less than what the AFU desires).
+ *
+ * When a PCI function is probed by the driver, it has no visibility
+ * about the other PCI functions and how many actags they'd like,
+ * which makes it impossible to distribute actags fairly among AFUs.
+ *
+ * Unfortunately, the only way to know how many actags a function
+ * desires is by looking at the data for each AFU in the config space
+ * and add them up. Similarly, the only way to know how many actags
+ * all the functions of the physical device desire is by adding the
+ * previously computed function counts. Then we can match that against
+ * what the hardware supports.
+ *
+ * To get a comprehensive view, we use a 'pci fixup': at the end of
+ * PCI enumeration, each function counts how many actags its AFUs
+ * desire and we save it in a 'npu_link' structure, shared between all
+ * the PCI functions of a same device. Therefore, when the first
+ * function is probed by the driver, we can get an idea of the total
+ * count of desired actags for the device, and assign the actags to
+ * the AFUs, by pro-rating if needed.
+ */
+static int find_dvsec_from_pos(struct pci_dev *dev, int dvsec_id, int pos)
+{
+  int vsec = pos;
+  u16 vendor, id;
+  
+  while ((vsec = pci_find_next_ext_capability(dev, vsec, 
+    OCXL_EXT_CAP_ID_DVSEC))) {
+    pci_read_config_word(dev, vsec + OCXL_DVSEC_VENDOR_OFFSET, 
+      &vendor);
+    pci_read_config_word(dev, vsec + OCXL_DVSEC_ID_OFFSET, &id);
+    if (vendor == PCI_VENDOR_ID_IBM && id == dvsec_id)
+      return vsec;
+  }
+  return 0;
+}
+
+static int find_dvsec_afu_ctrl(struct pci_dev *dev, u8 afu_idx)
+{
+  int vsec = 0;
+  u8 idx;
+  
+  while ((vsec = find_dvsec_from_pos(dev, OCXL_DVSEC_AFU_CTRL_ID, 
+    vsec))) {
+    pci_read_config_byte(dev, vsec + OCXL_DVSEC_AFU_CTRL_AFU_IDX, 
+      &idx);
+    if (idx == afu_idx)
+      return vsec;
+  }
+  return 0;
+}
+
+static int get_max_afu_index(struct pci_dev *dev, int *afu_idx)
+{
+  int pos;
+  u32 val;
+  
+  pos = find_dvsec_from_pos(dev, OCXL_DVSEC_FUNC_ID, 0);
+  if (!pos)
+    return -ESRCH;
+  pci_read_config_dword(dev, pos + OCXL_DVSEC_FUNC_OFF_INDEX, &val);
+  if (val & AFU_PRESENT)
+    *afu_idx = (val & AFU_INDEX_MASK) >> AFU_INDEX_SHIFT;
+  else
+    *afu_idx = -1;
+  return 0;
+}
static int get_actag_count(struct pci_dev *dev, int afu_idx, int *actag)
{
    int pos;
    u16 actag_sup;
    pos = find_dvsec_afu_ctrl(dev, afu_idx);
    if (!pos)
        return -ESRCH;
    pci_read_config_word(dev, pos + OCXL_DVSEC_AFU_CTRL_ACTAG_SUP, &actag_sup);
    *actag = actag_sup & ACTAG_MASK;
    return 0;
}

static struct npu_link *find_link(struct pci_dev *dev)
{
    struct npu_link *link;
    list_for_each_entry(link, &links_list, list) {
        /* The functions of a device all share the same link */
        if (link->domain == pci_domain_nr(dev->bus) &&
            link->bus == dev->bus->number &&
            link->dev == PCI_SLOT(dev->devfn)) {
            return link;
        }
    }
    /* link doesn't exist yet. Allocate one */
    link = kzalloc(sizeof(struct npu_link), GFP_KERNEL);
    if (!link)
        return NULL;
    link->domain = pci_domain_nr(dev->bus);
    link->bus = dev->bus->number;
    link->dev = PCI_SLOT(dev->devfn);
    list_add(&link->list, &links_list);
    return link;
}

static void pnv_ocxl_fixup_actag(struct pci_dev *dev)
{
    struct pci_controller *hose = pci_bus_to_host(dev->bus);
    struct pnv_phb *phb = hose->private_data;
    struct npu_link *link;
    int rc, afu_idx = -1, i, actag;
    if (!machine_is(powernv))
+return;
+
+if (phb->type != PNV_PHB_NPU_OCAPI)
+return;
+
+mutex_lock(&links_list_lock);
+
+link = find_link(dev);
+if (!link) {
+dev_warn(&dev->dev, "couldn't update actag information\n");
+mutex_unlock(&links_list_lock);
+return;
+
+/*
+ * Check how many actags are desired for the AFUs under that
+ * function and add it to the count for the link
+ */
+rc = get_max_afu_index(dev, &afu_idx);
+if (rc) {
+/* Most likely an invalid config space */
+dev_dbg(&dev->dev, "couldn't find AFU information\n");
+afu_idx = -1;
+}
+
+link->fn_desired_actags[PCI_FUNC(dev->devfn)] = 0;
+for (i = 0; i <= afu_idx; i++) {
+/*
+ * AFU index 'holes' are allowed. So don't fail if we
+ * can't read the actag info for an index
+ */
+rc = get_actag_count(dev, i, &actag);
+if (rc)
+continue;
+link->fn_desired_actags[PCI_FUNC(dev->devfn)] += actag;
+}
+dev_dbg(&dev->dev, "total actags for function: %d\n",
+link->fn_desired_actags[PCI_FUNC(dev->devfn)]);
+
+mutex_unlock(&links_list_lock);
+}
+DECLARE_PCI_FIXUP_HEADER(PCI_ANY_ID, PCI_ANY_ID, pnv_ocxl_fixup_actag);
+
+static u16 assign_fn_actags(u16 desired, u16 total)
+{
+u16 count;
+
+if (total <= PNV_OCXL_ACTAG_MAX)
count = desired;
else
count = PNV OCXL ACTAG MAX * desired / total;
+
return count;
+
static void assign_actags(struct npu_link *link)
+
{
+u16 actag_count, range_start = 0, total_desired = 0;
+int i;
+
+for (i = 0; i < 8; i++)
+total_desired += link->fn_desired_actags[i];
+
+for (i = 0; i < 8; i++) {
+if (link->fn_desired_actags[i]) {
+actag_count = assign_fn_actags(
+link->fn_desired_actags[i],
+total_desired);
+link->fn_actags[i].start = range_start;
+link->fn_actags[i].count = actag_count;
+range_start += actag_count;
+WARN_ON(range_start >= PNV OCXL ACTAG MAX);
+}
+pr_debug("link %x:%x:%x fct %d actags: start=%d count=%d (desired=%d)\n",
+link->domain, link->bus, link->dev, i,
+link->fn_actags[i].start, link->fn_actags[i].count,
+link->fn_desired_actags[i]);
+
+link->assignment_done = true;
+
+int pnv_ocxl_get_actag(struct pci_dev *dev, u16 *base, u16 *enabled,
+u16 *supported)
+
{ struct npu_link *link;
+
+mutex_lock(&links_list_lock);
+
+link = find_link(dev);
+if (!link) {
+dev_err(&dev->dev, "actag information not found\n");
+mutex_unlock(&links_list_lock);
+return -ENODEV;
+
+/
+ * On p9, we only have 64 actags per link, so they must be
* shared by all the functions of the same adapter. We counted
* the desired actag counts during PCI enumeration, so that we
* can allocate a pro-rated number of actags to each function.
+ */
+if (!link->assignment_done)
+assign_actags(link);
+ /*base = link->fn_actags[PCI_FUNC(dev->devfn)].start;
+ *enabled = link->fn_actags[PCI_FUNC(dev->devfn)].count;
+ *supported = link->fn_desired_actags[PCI_FUNC(dev->devfn)];
+ +mutex_unlock(&links_list_lock);
+return 0;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_get_actag);
+
+int pnv_ocxl_get_pasid_count(struct pci_dev *dev, int *count)
+{
+struct npu_link *link;
+int i, rc = -EINVAL;
+
+/*
+ * The number of PASIDs (process address space ID) which can
+ * be used by a function depends on how many functions exist
+ * on the device. The NPU needs to be configured to know how
+ * many bits are available to PASIDs and how many are to be
+ * used by the function BDF identifier.
+ */
+ * We only support one AFU-carrying function for now.
+ */
+mutex_lock(&links_list_lock);
+
+link = find_link(dev);
+if (!link) {
+dev_err(&dev->dev, "actag information not found
");
+mutex_unlock(&links_list_lock);
+return -ENODEV;
+}

+for (i = 0; i < 8; i++)
+if (link->fn_desired_acttags[i] && (i == PCI_FUNC(dev->devfn))) {
+rc = PNV_OCXL_PASID_MAX;
+break;
+}
+
+mutex_unlock(&links_list_lock);
+dev_dbg(&dev->dev, "%d PASIDs available for function\n",
static void set_templ_rate(unsigned int templ, unsigned int rate, char *buf) {
    WARN_ON(templ > PNV_OCXL_TL_MAX_TEMPLATE);
    int shift, idx;
    idx = (PNV_OCXL_TL_MAX_TEMPLATE - templ) / 2;
    shift = 4 * (1 - ((PNV_OCXL_TL_MAX_TEMPLATE - templ) % 2));
    buf[idx] |= rate << shift;
}

int pnv_ocxl_get_tl_cap(struct pci_dev *dev, long *cap,
                        char *rate_buf, int rate_buf_size) {
    if (rate_buf_size != PNV_OCXL_TL_RATE_BUF_SIZE)
        return -EINVAL;
    memset(rate_buf, 0, rate_buf_size);
    set_templ_rate(2, 1, rate_buf);
    *cap = PNV_OCXL_TL_P9_RECV_CAP;
    return 0;
}

int pnv_ocxl_set_tl_conf(struct pci_dev *dev, long cap,
                          uint64_t rate_buf_phys, int rate_buf_size) {
    struct pci_controller *hose = pci_bus_to_host(dev->bus);
    struct pnv_phb *phb = hose->private_data;
    int rc;
    if (rate_buf_size != PNV_OCXL_TL_RATE_BUF_SIZE)
        return -EINVAL;
    memset(rate_buf, 0, rate_buf_size);
    set_templ_rate(2, 1, rate_buf);
    *cap = PNV_OCXL_TL_P9_RECV_CAP;
    return 0;
}

+rc = opal_npu_tl_set(phb->opal_id, dev->devfn, cap,  
+rate_buf_phys, rate_buf_size);
+if (rc) {
+dev_err(&dev->dev, "Can't configure host TL: \%d\n", rc);
+return -EINVAL;
+}
+return 0;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_set_tl_conf);
+
+int pnv_ocxl_get_xsl_irq(struct pci_dev *dev, int *hwirq)
+{
+int rc;
+
+rc = of_property_read_u32(dev->dev.of_node, "ibm,opal-xsl-irq", hwirq);
+if (rc) {
+dev_err(&dev->dev,  
+"Can't get translation interrupt for device\n");
+return rc;
+}
+return 0;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_get_xsl_irq);
+
+void pnv_ocxl_unmap_xsl_regs(void __iomem *dsisr, void __iomem *dar,  
+void __iomem *tfc, void __iomem *pe_handle)
+{
+iounmap(dsisr);
+iounmap(dar);
+iounmap(tfc);
+iounmap(pe_handle);
+}
+EXPORT_SYMBOL_GPL(pnv_ocxl_unmap_xsl_regs);
+
+int pnv_ocxl_map_xsl_regs(struct pci_dev *dev, void __iomem **dsisr,  
+void __iomem **dar, void __iomem **tfc,  
+void __iomem **pe_handle)
+{
+u64 reg;
+int i, j, rc = 0;
+void __iomem *regs[4];
+
+/*
+ * opal stores the mmio addresses of the DSISR, DAR, TFC and  
+ * PE_HANDLE registers in a device tree property, in that  
+ * order  
+ */
+for (i = 0; i < 4; i++) {
+rc = opal_npu_tl_set(phb->opal_id, dev->devfn, cap,  
+rate_buf_phys, rate_buf_size);
+if (rc) {
+dev_err(&dev->dev, "Can't configure host TL: \%d\n", rc);
+return -EINVAL;
+}
+return 0;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_set_tl_conf);
+
+int pnv_ocxl_get_xsl_irq(struct pci_dev *dev, int *hwirq)
+{
+int rc;
+
+rc = of_property_read_u32(dev->dev.of_node, "ibm,opal-xsl-irq", hwirq);
+if (rc) {
+dev_err(&dev->dev,  
+"Can't get translation interrupt for device\n");
+return rc;
+}
+return 0;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_get_xsl_irq);
+
+void pnv_ocxl_unmap_xsl_regs(void __iomem *dsisr, void __iomem *dar,  
+void __iomem *tfc, void __iomem *pe_handle)
+{
+iounmap(dsisr);
+iounmap(dar);
+iounmap(tfc);
+iounmap(pe_handle);
+}
+EXPORT_SYMBOL_GPL(pnv_ocxl_unmap_xsl_regs);
+
+int pnv_ocxl_map_xsl_regs(struct pci_dev *dev, void __iomem **dsisr,  
+void __iomem **dar, void __iomem **tfc,  
+void __iomem **pe_handle)
+{
+u64 reg;
+int i, j, rc = 0;
+void __iomem *regs[4];
+
+/*
+ * opal stores the mmio addresses of the DSISR, DAR, TFC and  
+ * PE_HANDLE registers in a device tree property, in that  
+ * order  
+ */
+for (i = 0; i < 4; i++) {
  
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rc = of_property_read_u64_index(dev->dev.of_node, "ibm,opal-xsl-mmio", i, &reg);
if (rc)
+break;
regs[i] = ioremap(reg, 8);
if (!regs[i]) {
+rc = -EINVAL;
+break;
+
+if (rc) {
+dev_err(&dev->dev, "Can't map translation mmio registers\n");
+for (j = i - 1; j >= 0; j--)
+iounmap(regs[j]);
+} else {
+*dsisr = regs[0];
+*dar = regs[1];
+*tfc = regs[2];
+*pe_handle = regs[3];
+}
+return rc;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_map_xsl_regs);
+
+struct spa_data {
+u64 phb_opal_id;
+u32 bdfn;
+};
+
+int pnv_ocxl_spa_setup(struct pci_dev *dev, void *spa_mem, int PE_mask, void **platform_data)
+{
+struct pci_controller *hose = pci_bus_to_host(dev->bus);
+struct pnv_phb *phb = hose->private_data;
+struct spa_data *data;
+u32 bdfn;
+int rc;
+
data = kzalloc(sizeof(*data), GFP_KERNEL);
+if (!data)
+return -ENOMEM;
+
bdfn = (dev->bus->number << 8) | dev->devfn;
+rc = opal_npu_sp_setup(phb->opal_id, bdfn, virt_to_phys(spa_mem), PE_mask);
+if (rc) {
+dev_err(&dev->dev, "Can't setup Shared Process Area: %d\n", rc);
+kfree(data);
+}
+return rc;
+
+data->phb_opal_id = phb->opal_id;
+data->bdfn = bdfn;
+*platform_data = (void *) data;
+return 0;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_spa_setup);
+
+void pnv_ocxl_spa_release(void *platform_data)
+{
+struct spa_data *data = (struct spa_data *) platform_data;
+int rc;
+
+rc = opal_npu_spa_setup(data->phb_opal_id, data->bdfn, 0, 0);
+WARN_ON(rc);
+kfree(data);
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_spa_release);
+
+int pnv_ocxl_spa_remove_pe_from_cache(void *platform_data, int pe_handle)
+{
+struct spa_data *data = (struct spa_data *) platform_data;
+int rc;
+
+rc = opal_npu_spa_clear_cache(data->phb_opal_id, data->bdfn, pe_handle);
+return rc;
+
+EXPORT_SYMBOL_GPL(pnv_ocxl_spa_remove_pe_from_cache);
+
+int pnv_ocxl_alloc_xive_irq(u32 *irq, u64 *trigger_addr)
+{
+__be64 flags, trigger_page;
+s64 rc;
+u32 hwirq;
+
+hwirq = xive_native_alloc_irq();
+if (!hwirq)
+return -ENOENT;
+
+rc = opal_xive_get_irq_info(hwirq, &flags, NULL, NULL, &trigger_page, NULL, NULL);
+if (rc || !trigger_page) {
+xive_native_free_irq(hwirq);
+return -ENOENT;
+}
+*irq = hwirq;
+*trigger_addr = be64_to_cpu(trigger_page);
+return 0;
+
+}
+EXPORT_SYMBOL_GPL(pnv_ocxl_alloc_xive_irq);
+
+void pnv_ocxl_free_xive_irq(u32 irq)
+{
+xive_native_free_irq(irq);
+}
+EXPORT_SYMBOL_GPL(pnv_ocxl_free_xive_irq);

--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-dump.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-dump.c
@@ -319,15 +319,14 @@
return count;
}

-static struct dump_obj *create_dump_obj(uint32_t id, size_t size,
-uint32_t type)
+static void create_dump_obj(uint32_t id, size_t size, uint32_t type)
{
struct dump_obj *dump;
int rc;

dump = kzalloc(sizeof(*dump), GFP_KERNEL);
if (!dump)
- return NULL;
+ return;

dump->kobj.kset = dump_kset;

@@ -347,34 +346,51 @@
rc = kobject_add(&dump->kobj, NULL, "0x%x-0x%x", type, id);
if (rc) {
  kobject_put(&dump->kobj);
- return NULL;
+ return;
}

+/*
+ * As soon as the sysfs file for this dump is created/activated there is
+ * a chance the opal_errd daemon (or any userspace) might read and
+ * acknowledge the dump before kobject_uevent() is called. If that
+ * happens then there is a potential race between
+ * dump_ack_store->kobject_put() and kobject_uevent() which leads to a
+ * use-after-free of a kernfs object resulting in a kernel crash.
+ *
+ * To avoid that, we need to take a reference on behalf of the bin file,
+ * so that our reference remains valid while we call kobject_uevent().
+*/
We then drop our reference before exiting the function, leaving the bin file to drop the last reference (if it hasn’t already).
*/

/* Take a reference for the bin file */
kobject_get(&dump->kobj);
rc = sysfs_create_bin_file(&dump->kobj, &dump->dump_attr);
-if (rc) {
+if (rc == 0) {
+kobject_uevent(&dump->kobj, KOBJ_ADD);
+
+pr_info("%s: New platform dump. ID = 0x%x Size %u\n",
+__func__, dump->id, dump->size);
+} else {
+/* Drop reference count taken for bin file */
kobject_put(&dump->kobj);
-return NULL;
}

-pr_info("%s: New platform dump. ID = 0x%x Size %u\n",
-__func__, dump->id, dump->size);
-
-kobject_uevent(&dump->kobj, KOBJ_ADD);
-
-return dump;
+/* Drop our reference */
+kobject_put(&dump->kobj);
+return;
}

static irqreturn_t process_dump(int irq, void *data)
{
-int rc;
-uint32_t dump_id, dump_size, dump_type;
-struct dump_obj *dump;
-char name[22];
-struct kobject *kobj;

-rc = dump_read_info(&dump_id, &dump_size, &dump_type);
-if (rc != OPAL_SUCCESS)
+-return rc;
+return IRQ_HANDLED;

-sprintf(name, "0x%0x-0x%0x", dump_type, dump_id);

@@ -386,12 +402,10 @@
-if (kobj) {
+/* Drop reference added by kset_find_obj() */
kobject_put(kobj);
return 0;
+return IRQ_HANDLED;
}

dump = create_dump_obj(dump_id, dump_size, dump_type);
-if (!dump)
-return -1;
+create_dump_obj(dump_id, dump_size, dump_type);

return IRQ_HANDLED;
}
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-elog.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-elog.c
@@ -183,14 +183,14 @@
return count;
}

- static struct elog_obj *create_elog_obj(uint64_t id, size_t size, uint64_t type)
+ static void create_elog_obj(uint64_t id, size_t size, uint64_t type)
{
 struct elog_obj *elog;
 int rc;

elog = kzalloc(sizeof(*elog), GFP_KERNEL);
 if (!elog)
- return NULL;
+ return;
 elog->kobj.kset = elog_kset;

@@ -223,18 +223,37 @@
 rc = kobject_add(&elog->kobj, NULL, "0x%llx", id);
 if (rc) {
 kobject_put(&elog->kobj);
- return NULL;
+ return;
 }

+/*
 + * As soon as the sysfs file for this elog is created/activated there is
 + * a chance the opal_errd daemon (or any userspace) might read and
 + * acknowledge the elog before kobject_uevent() is called. If that
 + * happens then there is a potential race between
 + * elog_ack_store->kobject_put() and kobject_uevent() which leads to a
 + * use-after-free of a kernfs object resulting in a kernel crash.
 + *
 + * To avoid that, we need to take a reference on behalf of the bin file,
+ * so that our reference remains valid while we call kobject_uevent().
+ * We then drop our reference before exiting the function, leaving the
+ * bin file to drop the last reference (if it hasn't already).
+ */
+
+ /** Take a reference for the bin file */
+ kobject_get(&elog->kobj);
rc = sysfs_create_bin_file(&elog->kobj, &elog->raw_attr);
-if (rc) {
+if (rc == 0) {
+kobject_uevent(&elog->kobj, KOBJ_ADD);
+} else {
+/** Drop the reference taken for the bin file */
+kobject_put(&elog->kobj);
-return NULL;
}

-kobject_uevent(&elog->kobj, KOBJ_ADD);
+/** Drop our reference */
+kobject_put(&elog->kobj);

-return elog;
+return;
}

static irqreturn_t elog_event(int irq, void *data)
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-imc.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-imc.c
@@ -53,7 +53,7 @@
 nr_chips))
goto error;

-pmu_ptr->mem_info = kcalloc(nr_chips, sizeof(struct imc_mem_info),
+pmu_ptr->mem_info = kcalloc(nr_chips + 1, sizeof(struct imc_mem_info),
 GFP_KERNEL);
if (!pmu_ptr->mem_info)
goto error;
@@ -87,6 +87,10 @@
 struct imc_pmu *pmu_ptr;
 u32 offset;

+/** Return for unknown domain */
+if (domain < 0)
+return -EINVAL;
+/** memory for pmu */
+pmu_ptr = kzalloc(sizeof(struct imc_pmu), GFP_KERNEL);
if (!pmu_ptr)
const struct cpumask *l_cpumask;

get_online_cpus();
-for_each_online_node(nid) {
+for_each_node_with_cpus(nid) {
    l_cpumask = cpumask_of_node(nid);
    cpu = cpumask_first(l_cpumask);
    cpu = cpumask_first_and(l_cpumask, cpu_online_mask);
    if (cpu >= nr_cpu_ids)
        continue;
    opal_imc_counters_stop(OPAL_IMC_COUNTERS_NEST,
        get_hard_smp_processor_id(cpu));
}

--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-irqchip.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-irqchip.c
@@ -177,7 +177,7 @@
    if (!opal_irqs[i])
        continue;

    -if (in_interrupt())
+if (in_interrupt() || irqs_disabled())
        disable_irq_nosync(opal_irqs[i]);
    else
        free_irq(opal_irqs[i], NULL);

--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-msglog.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-msglog.c
@@ -98,7 +98,7 @@
}
static struct bin_attribute opal_msglog_attr = {
    .attr = {.name = "msglog", .mode = 0444},
    .read = opal_msglog_read
};

--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-nvram.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-nvram.c
@@ -11,7 +11,7 @@
#define DEBUG

+#include <linux/delay.h>
#include <linux/kernel.h>
#include <linux/init.h>
#include <linux/of.h>
@@ -43,6 +43,10 @@
    return count;

+/*
+ * This can be called in the panic path with interrupts off, so use
+ * mdelay in that case.
+ */

static ssize_t opal_nvram_write(char *buf, size_t count, loff_t *index)
{
    s64 rc = OPAL_BUSY;
    @@ -56,9 +61,23 @@
        while (rc == OPAL_BUSY || rc == OPAL_BUSY_EVENT) {
            rc = opal_write_nvram(__pa(buf), count, off);
            -if (rc == OPAL_BUSY_EVENT)
            +if (rc == OPAL_BUSY_EVENT) {
            +    if (in_interrupt() || irqs_disabled())
                +    mdelay(OPAL_BUSY_DELAY_MS);
            +    else
                +    msleep(OPAL_BUSY_DELAY_MS);
            +}
            else if (rc == OPAL_BUSY) {
                +    if (in_interrupt() || irqs_disabled())
                    +    mdelay(OPAL_BUSY_DELAY_MS);
                +    else
                    +    msleep(OPAL_BUSY_DELAY_MS);
            +}
        }
    +if (rc)
    +    return -EIO;
    +
    *index += count;
    return count;
}
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-rtc.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-rtc.c
@@ -48,10 +48,12 @@
        while (rc == OPAL_BUSY || rc == OPAL_BUSY_EVENT) {
            rc = opal_rtc_read(&__y_m_d, &__h_m_s_ms);
            -if (rc == OPAL_BUSY_EVENT)
            +if (rc == OPAL_BUSY_EVENT) {
                +    mdelay(OPAL_BUSY_DELAY_MS);
            +}
            else if (rc == OPAL_BUSY) {
                +    mdelay(10);
            +}
        }
    +else if (rc == OPAL_BUSY) {
    +    msleep(OPAL_BUSY_DELAY_MS);
    +}
if (rc != OPAL_SUCCESS) 
  return 0;

--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal-wrappers.S
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal-wrappers.S
@@ -301,7 +301,7 @
    OPAL_CALL(opal_xive_donate_page, OPAL_XIVE_DONATE_PAGE);
    OPAL_CALL(opal_xive_alloc_vp_block, OPAL_XIVE_ALLOCATE_VP_BLOCK);
    OPAL_CALL(opal_xive_free_vp_block, OPAL_XIVE_FREE_VP_BLOCK);
-   OPAL_CALL(opal_xive_allocate_irq, OPAL_XIVE_ALLOCATE_IRQ);
+   OPAL_CALL(opal_xive_allocate_irq_raw, OPAL_XIVE_ALLOCATE_IRQ);
    OPAL_CALL(opal_xive_free_irq, OPAL_XIVE_FREE_IRQ);
    OPAL_CALL(opal_xive_get_vp_info, OPAL_XIVE_GET_VP_INFO);
    OPAL_CALL(opal_xive_set_vp_info, OPAL_XIVE_SET_VP_INFO);
@@ -320,3 +320,10 @
    OPAL_CALL(opal_get_power_shift_ratio, OPAL_GET_POWER_SHIFT_RATIO);
    OPAL_CALL(opal_set_power_shift_ratio, OPAL_SET_POWER_SHIFT_RATIO);
    OPAL_CALL(opal_sensor_group_clear, OPAL_SENSOR_GROUP_CLEAR);
+   OPAL_CALL(opal_quiesce, OPAL_QUIESCE);
+   OPAL_CALL(opal_npu_spa_setup, OPAL_NPU_SPA_SETUP);
+   OPAL_CALL(opal_npu_spa_clear_cache, OPAL_NPU_SPACLEAR_CACHE);
+   OPAL_CALL(opal_pci_get_pbcq_tunnel_bar, OPAL_PCI_GET_PBCQ_TUNNEL_BAR);
+   OPAL_CALL(opal_pci_set_pbcq_tunnel_bar, OPAL_PCI_SET_PBCQ_TUNNEL_BAR);
+   OPAL_CALL(opal_nx_coproc_init, OPAL_NX_COPROC_INIT);
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/opal.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/opal.c
@@ -388,7 +388,7 @
  /* Closed or other error drop */
  if (rc != OPAL_SUCCESS && rc != OPAL_BUSY &&
        rc != OPAL_BUSY_EVENT) {
-    written = total_len;
+    written += total_len;
    break;
  }
if (rc == OPAL_SUCCESS) {
@@ -500,9 +500,12 @@
  * opal to trigger checkstop explicitly for error analysis.
  * The FSP PRD component would have already got notified
  * about this error through other channels.
+  * 4. We are running on a newer skiboot that by default does
+     not cause a checkstop, drops us back to the kernel to
+     extract context and state at the time of the error.
+/

-ppc_md.restart(NULL);
+panic(msg);
int opal_machine_check(struct pt_regs *regs)
@@ -617,7 +620,10 @@
    bin_attr->size);
}

-static BIN_ATTR_RO(symbol_map, 0);
+static struct bin_attribute symbol_map_attr = {
+  .attr = {.name = "symbol_map", .mode = 0400},
+  .read = symbol_map_read
+};

static void opal_export_symmap(void)
{
@@ -634,10 +640,10 @@
    return;

    /* Setup attributes */
    -bin_attr_symbol_map.private = __va(be64_to_cpu(syms[0]));
    -bin_attr_symbol_map.size = be64_to_cpu(syms[1]);
    +symbol_map_attr.private = __va(be64_to_cpu(syms[0]));
    +symbol_map_attr.size = be64_to_cpu(syms[1]);

    -rc = sysfs_create_bin_file(opal_kobj, &bin_attr_symbol_map);
    +rc = sysfs_create_bin_file(opal_kobj, &symbol_map_attr);
    if (rc)
        pr_warn("Error %d creating OPAL symbols file\n", rc);
}

EXPORT_SYMBOL_GPL(opal_check_token);
/* Convert a region of vmalloc memory to an opal sg list */
struct opal_sg_list *opal_vmalloc_to_sg_list(void *vmalloc_addr,
@@ -1039,3 +1046,5 @@
    EXPORT_SYMBOL_GPL(opal_int_set_mfrr);
    EXPORT_SYMBOL_GPL(opal_int_eoi);
    EXPORT_SYMBOL_GPL(opal_error_code);
    +/* Export the below symbol for NX compression */
    +EXPORT_SYMBOL_GPL(opal_nx_coproc_init);
    --- linux-4.15.0.orig/arch/powerpc/platforms/powernv/pci-cxl.c
    +++ linux-4.15.0/arch/powerpc/platforms/powernv/pci-cxl.c
    @@ -16,14 +16,6 @@

    #include "pci.h"
struct device_node *pnv_pci_get_phb_node(struct pci_dev *dev)
{
    struct pci_controller *hose = pci_bus_to_host(dev->bus);

    return of_node_get(hose->dn);
}

EXPORT_SYMBOL(pnv_pci_get_phb_node);

int pnv_phb_to_cxl_mode(struct pci_dev *dev, uint64_t mode)
{
    struct pci_controller *hose = pci_bus_to_host(dev->bus);

    --- linux-4.15.0.orig/arch/powerpc/platforms/powernv/pci-ioda.c
    +++ linux-4.15.0/arch/powerpc/platforms/powernv/pci-ioda.c
    @@ -54,7 +54,8 @@
    #define POWERNV_IOMMU_DEFAULT_LEVELS1
    #define POWERNV_IOMMU_MAX_LEVELS5

    static const char * const pnv_phb_names[] = { "IODA1", "IODA2", "NPU" };
    +static const char * const pnv_phb_names[] = { "IODA1", "IODA2", "NPU_NVLINK",
    + "NPU_OCAPI" };
    static void pnv_pci_ioda2_table_free_pages(struct iommu_table *tbl);

    void pe_level_printk(const struct pnv_ioda_pe *pe, const char *level, @ @ @-598,8 @ @ @
    static int pnv_ioda_get_pe_state(struct pnv_phb *phb, int pe_no)
    {
        struct pnv_ioda_pe *slave, *pe;
        -u8 fstate, state;
        +__be16 pcierr;
        +u8 fstate = 0, state;
        +__be16 pcierr = 0;
        s64 rc;

        /* Sanity check on PE number */
        @ @ -924,7 +925,7 @ @ @
        * Configure PELTV. NPUs don't have a PELTV table so skip
        * configuration on them.
        */
        -if (phb->type != PNV_PHB_NPU)
        +if (phb->type != PNV_PHB_NPU_NVLINK && phb->type != PNV_PHB_NPU_OCAPI)
          pnv_ioda_set_peltv(phb, pe, true);

        /* Setup reverse map */
        @ @ -1072,7 +1073,6 @ @ @
        * At some point we want to remove the PDN completely anyways
        */
        pci_dev_get(dev);
- pdn->pcidev = dev;
pdn->pe_number = pe->pe_number;
pe->flags = PNV_IODA_PE_DEV;
pe->pdev = dev;
@@ -1119,7 +1119,6 @@
 continue;

 pe->device_count++;
 - pdn->pcidev = dev;
pdn->pe_number = pe->pe_number;
if ((pe->flags & PNV_IODA_PE_BUS_ALL) && dev->subordinate)
 pnv_ioda_setup_same_PE(dev->subordinate, pe);
@@ -1234,7 +1233,6 @@
pci_dev_get(npu_pdev);
npu_pdn = pci_find_pdn(npu_pdev);
rid = npu_pdev->bus->number << 8 | npu_pdn->devfn;
- npu_pdn->pcidev = npu_pdev;
npu_pdn->pe_number = pe_num;
phb->ioda.pe_rmap[rid] = pe->pe_number;
@@ -1270,19 +1268,35 @@
static void pnv_pci_ioda_setup_PEs(void)
 {
 - struct pci_controller *hose, *tmp;
 + struct pci_controller *hose;
 struct pnv_phb *phb;
 + struct pci_bus *bus;
 + struct pci_dev *pdev;
 + struct pnv_ioda_pe *pe;

 - list_for_each_entry_safe(hose, tmp, &hose_list, list_node) {
 - list_for_each_entry(hose, &hose_list, list_node) {
 phb = hose->private_data;
 - if (phb->type == PNV_PHB_NPU) {
 - if (phb->type == PNV_PHB_NPU_NVLINK) {
 /* PE#0 is needed for error reporting */
 pnv_ioda_reserve_pe(phb, 0);
 pnv_ioda_setup_npu_PEs(hose->bus);
 if (phb->model == PNV_PHB_MODEL_NPU2)
 - pnv_npu2_init(phb);
 + WARN_ON_ONCE(pnv_npu2_init(hose));
 +}
 + if (phb->type == PNV_PHB_NPU_OCAPI) {
 + bus = hose->bus;
 + list_for_each_entry(pdev, &bus->devices, bus_list)
 + pnv_ioda_setup_dev_PE(pdev);
 +}
list_for_each_entry(hose, &hose_list, list_node) {
    phb = hose->private_data;
    if (phb->type != PNV_PHB_IODA2)
        continue;
    list_for_each_entry(pe, &phb->ioda.pe_list, list)
        pnv_npu2_map_lpar(pe, MSR_DR | MSR_PR | MSR_HV);
}

#ifdef CONFIG_PCI_IOV
@@ -1541,6 +1555,10 @@
    /* Reserve PE for each VF */
    for (vf_index = 0; vf_index < num_vfs; vf_index++) {
        int vf_devfn = pci_iov_virtfn_devfn(pdev, vf_index);
        int vf_bus = pci_iov_virtfn_bus(pdev, vf_index);
        struct pci_dn *vf_pdn;
        if (pdn->m64_single_mode)
            pe_num = pdn->pe_num_map[vf_index];
        else
            /* -1553,13 +1571,11 @@
            pe->pbus = NULL;
            pe->parent_dev = pdev;
            pe->mve_number = -1;
            -pe->rid = (pci_iov_virtfn_bus(pdev, vf_index) << 8) |
            -pci_iov_virtfn_devfn(pdev, vf_index);
            +pe->rid = (vf_bus << 8) | vf_devfn;
        pe_info(pe, "VF %04d:%02d:%02d.%d associated with PE#%x\n",
            hose->global_number, pdev->bus->number,
            -PCI SLOT(pci_iov_virtfn_devfn(pdev, vf_index)),
            -PCI FUNC(pci_iov_virtfn_devfn(pdev, vf_index)), pe_num);
            +PCI SLOT(vf_devfn), PCI FUNC(vf_devfn), pe_num);
        if (pnv_ioda_configure_pe(phb, pe)) {
            /* XXX What do we do here ? */
            @@ -1573,6 +1589,15 @@
            list_add_tail(&pe->list, &phb->ioda.pe_list);
            mutex_unlock(&phb->ioda.pe_list_mutex);
            +#define associate this pe to it's pdn */
            +list_for_each_entry(vf_pdn, &pdn->parent->child_list, list) {
                if (vf_pdn->busno == vf_bus &
                    vf_pdn->devfn == vf_devfn) {
                    vf_pdn->pe_number = pe_num;
            }
break;
+
+pnv_pci_ioda2_setup_dma_pe(phb, pe);
}
}

@@ -2640,7 +2665,7 @@
hose = pci_bus_to_host(pdev->bus);
phb = hose->private_data;
-if (phb->type != PNV_PHB_NPU)
+if (phb->type != PNV_PHB_NPU_NVLINK)
    return 0;

*ptmppe = &phb->ioda.pe_array[pdn->pe_number];
@@ -2668,14 +2693,23 @@
static long pnv_pci_ioda2_npu_set_window(struct iommu_table_group *table_group,
    int num, struct iommu_table *tbl)
{
+    struct pnv_ioda_pe *npe = gpe_table_group_to_npe(table_group);
+    int num2 = (num == 0) ? 1 : 0;
    long ret = pnv_pci_ioda2_set_window(table_group, num, tbl);
    if (ret)
        return ret;

-ret = pnv_npu_set_window(gpe_table_group_to_npe(table_group), num, tbl);
-if (ret)
+if (table_group->tables[num2])
+    pnv_npu_unset_window(npe, num2);
+    ret = pnv_npu_set_window(npe, num, tbl);
+    if (ret) {
+        pnv_pci_ioda2_unset_window(table_group, num);
+        if (table_group->tables[num2])
+            pnv_npu_set_window(npe, num2,
+                table_group->tables[num2]);
+    }

    return ret;
}
@@ -2684,12 +2718,24 @@
struct iommu_table_group *table_group,
    int num)
{
+    struct pnv_ioda_pe *npe = gpe_table_group_to_npe(table_group);
+    int num2 = (num == 0) ? 1 : 0;

long ret = pnv_pci_ioda2_unset_window(table_group, num);

if (ret)
    return ret;

-return pnv_npu_unset_window(gpe_table_group_to_npe(table_group), num);
+if (!npe->table_group.tables[num])
 +return 0;
 +
 +ret = pnv_npu_unset_window(npe, num);
 +if (ret)
 +    return ret;
 +
 +if (table_group->tables[num2])
 +ret = pnv_npu_set_window(npe, num2, table_group->tables[num2]);
 +
+return ret;
}

static void pnv_ioda2_npu_take_ownership(struct iommu_table_group *table_group)
@@ -2724,7 +2770,7 @@
    list_for_each_entry_safe(hose, tmp, &hose_list, list_node) {
        phb = hose->private_data;

-    if (phb->type != PNV_PHB_NPU)
+    if (phb->type != PNV_PHB_NPU_NVLINK)
        continue;

    list_for_each_entry(pe, &phb->ioda.pe_list, list) {
@@ -2805,7 +2851,7 @@
        level_shift = entries_shift + 3;
        level_shift = max_t(unsigned, level_shift, PAGE_SHIFT);

-    if ((level_shift - 3) * levels + page_shift >= 60)
+    if ((level_shift - 3) * levels + page_shift >= 55)
        return -EINVAL;

    /* Allocate TCE table */
@@ -3304,12 +3350,49 @@
 #endif /* CONFIG_DEBUG_FS */
 }

+static void pnv_pci_enable_bridge(struct pci_bus *bus)
+{
+    struct pci_dev *dev = bus->self;
+    struct pci_bus *child;
+    
+    /* Empty bus ? bail */
+if (list_empty(&bus->devices))
+return;
+
+/*
+ * If there’s a bridge associated with that bus enable it. This works
+ * around races in the generic code if the enabling is done during
+ * parallel probing. This can be removed once those races have been
+ * fixed.
+ */
+if (dev) {
+    int rc = pci_enable_device(dev);
+    if (rc)
+        dev_err(&dev->dev, "Error enabling bridge (%d)n", rc);
+    pci_set_master(dev);
+}
+
+/* Perform the same to child busses */
+list_for_each_entry(child, &bus->children, node)
+    pnv_pci_enable_bridge(child);
+
+static void pnv_pci_enable_bridges(void)
+{
+    struct pci_controller *hose;
+
+    list_for_each_entry(hose, &hose_list, list_node)
+        pnv_pci_enable_bridge(hose->bus);
+
+static void pnv_pci_ioda_fixup(void)
+{
+    pnv_pci_ioda_setup_PEs();
+    pnv_pci_ioda_setup_iommu_api();
+    pnv_pci_ioda_create_dbgfs();
+
+    pnv_pci_enable_bridges();
+
+    ifdef CONFIG_EEH
+    pnv_eeh_post_init();
+    endif
+    @ @ -3608.7 +3691.6 @@
+    WARN_ON(pe->table_group.group);
+}

-pnv_pci_ioda2_table_free_pages(tbl);
+iommu_tce_table_put(tbl);
+}
static const struct pci_controller_ops pnv_npu_ocapi_ioda_controller_ops = {
    .enable_device_hook = pnv_pci_enable_device_hook,
    .window_alignment = pnv_pci_window_alignment,
    .reset_secondary_bus = pnv_pci_reset_secondary_bus,
    .shutdown = pnv_pci_ioda_shutdown,
};

#ifdef CONFIG_CXL_BASE
const struct pci_controller_ops pnv_cxl_cx4_ioda_controller_ops = {
    .dma_dev_setup = pnv_pci_dma_dev_setup,
};
#endif

void __init pnv_pci_init_npu_phb(struct device_node *np) {
    -pnv_pci_init_ioda_phb(np, 0, PNV_PHB_NPU);
    +pnv_pci_init_ioda_phb(np, 0, PNV_PHB_NPU_NVLINK);
    +}
    +
    +void __init pnv_pci_init_npu2_opencapi_phb(struct device_node *np)
    +{
    +pnv_pci_init_ioda_phb(np, 0, PNV_PHB_NPU_OCAPI);
    +}
    +
    +static void pnv_npu2_opencapi_cfg_size_fixup(struct pci_dev *dev)
    +{
    +struct pci_controller *hose = pci_bus_to_host(dev->bus);
    +struct pnv_phb *phb = hose->private_data;
+ if (!machine_is(powernv))
+ return;
+ if (phb->type == PNV_PHB_NPU_OCAPI)
+ dev->cfg_size = PCI_CFG_SPACE_EXP_SIZE;
} 
+DECLARE_PCI_FIXUP_EARLY(PCI_ANY_ID, PCI_ANY_ID, pnv_npu2_opencapi_cfg_size_fixup);

void __init pnv_pci_init_ioda_hub(struct device_node *np)
{

#include <linux/io.h>
#include <linux/msi.h>
#include <linux/iommu.h>
+#include <linux/sched/mm.h>
#include <asm/sections.h>
#include <asm/io.h>
@@ -38,6 +39,7 @@
#include "pci.h"

static DEFINE_MUTEX(p2p_mutex);
+static DEFINE_MUTEX(tunnel_mutex);

int pnv_pci_get_slot_id(struct device_node *np, uint64_t *id)
{  
@@ -978,16 +980,12 @@
struct pnv_phb *phb = hose->private_data;
-#ifdef CONFIG_PCI_IOV
 struct pnv_ioda_pe *pe;
-        struct pci_dn *pdn;
 /* Fix the VF pdn PE number */
 if (pdev->is_virtfn) {

-pdn = pci_get_pdn(pdev);
-WARN_ON(pdn->pe_number != IODA_INVALID_PE);
list_for_each_entry(pe, &phb->ioda.pe_list, list) {
  if (pe->rid == ((pdev->bus->number << 8) |
      (pdev->devfn & 0xff))) {
    -pdn->pe_number = pe->pe_number;
    pe->pdev = pdev;
    break;
  }
}
EXPORT_SYMBOL_GPL(pnv_pci_set_p2p);

+struct device_node *pnv_pci_get_phb_node(struct pci_dev *dev) {
  +struct pci_controller *hose = pci_bus_to_host(dev->bus);
  +return of_node_get(hose->dn);
  +}
+EXPORT_SYMBOL(pnv_pci_get_phb_node);
+
+int pnv_pci_enable_tunnel(struct pci_dev *dev, u64 *asnind) {
  +struct device_node *np;
  +const __be32 *prop;
  +struct pnv_ioda_pe *pe;
  +uint16_t window_id;
  +int rc;
  +
  +if (!radix_enabled())
  +return -ENXIO;
  +
  +if (!(np = pnv_pci_get_phb_node(dev)))
  +return -ENXIO;
  +
  +prop = of_get_property(np, "ibm,phb-indications", NULL);
  +of_node_put(np);
  +
  +if (!prop || !prop[1])
  +return -ENXIO;
  +
  +asnind = (u64)be32_to_cpu(prop[1]);
  +pe = pnv_ioda_get_pe(dev);
  +if (!pe)
  +return -ENODEV;
  +
  /* Increase real window size to accept as_notify messages. */
  +window_id = (pe->pe_number << 1) + 1;
+rc = opal_pci_map_pe_dma_window_real(pe->phb->opal_id, pe->pe_number,
+    window_id, pe->tce_bypass_base,
+    (uint64_t)1 << 48);
+return opal_error_code(rc);
+}
+EXPORT_SYMBOL_GPL(pnv_pci_enable_tunnel);
+
+int pnv_pci_disable_tunnel(struct pci_dev *dev)
+{
+    struct pnv_ioda_pe *pe;
+    pe = pnv_ioda_get_pe(dev);
+    if (!pe)
+        return -ENODEV;
+    /* Restore default real window size. */
+    pnv_pci_ioda2_set_bypass(pe, true);
+    return 0;
+}
+EXPORT_SYMBOL_GPL(pnv_pci_disable_tunnel);
+
+int pnv_pci_set_tunnel_bar(struct pci_dev *dev, u64 addr, int enable)
+{
+    __be64 val;
+    struct pci_controller *hose;
+    struct pnv_phb *phb;
+    u64 tunnel_bar;
+    int rc;
+    hose = pci_bus_to_host(dev->bus);
+    phb = hose->private_data;
+    mutex_lock(&tunnel_mutex);
+    rc = opal_pci_get_pbcq_tunnel_bar(phb->opal_id, &val);
+    if (rc != OPAL_SUCCESS) {
+        rc = -EIO;
+        goto out;
+    }
+    tunnel_bar = be64_to_cpu(val);
+    if (enable) {
+        /* Only one device per PHB can use atomics.
+         * Our policy is first-come, first-served.
+*/
+if (tunnel_bar) {
+if (tunnel_bar != addr)
+rc = -EBUSY;
+else
+rc = 0; /* Setting same address twice is ok */
goto out;
+}
+} else {
+*/
+* The device that owns atomics and wants to release
+* them must pass the same address with enable == 0.
+*/
+if (tunnel_bar != addr) {
+rc = -EPERM;
goto out;
+}
+addr = 0x0ULL;
+}
+rc = opal_pci_set_pbcq_tunnel_bar(phb->opal_id, addr);
+rc = opal_error_code(rc);
+out:
+mutex_unlock(&tunnel_mutex);
+return rc;
+}
+EXPORT_SYMBOL_GPL(pnv_pci_set_tunnel_bar);
+
+if (task == NULL)
+return -EINVAL;
+mm = get_task_mm(task);
+if (mm == NULL)
+return -EINVAL;
+*pid = mm->context.id;
+mmput(mm);
+*tid = task->thread.tidr;
+*lpid = mfspr(SPRN_LPID);
+return 0;
+}
+EXPORT_SYMBOL_GPL(pnv_pci_get_as_notify_info);
void pnv_pci_shutdown(void)
{
    struct pci_controller *hose;
    if (!firmware_has_feature(FW_FEATURE_OPAL))
        return;

    #ifdef CONFIG_PCIEPORTBUS
    /* On PowerNV PCIe devices are (currently) managed in cooperation
     * with firmware. This isn't *strictly* required, but there's enough
     * assumptions baked into both firmware and the platform code that
     * it's unwise to allow the portbus services to be used.
     *
     * We need to fix this eventually, but for now set this flag to disable
     * the portbus driver. The AER service isn't required since that AER
     * events are handled via EEH. The pciehp hotplug driver can't work
     * without kernel changes (and portbus binding breaks pnv_php). The
     * other services also require some thinking about how we're going
     * to integrate them.
     */
    #endif
    pcie_ports_disabled = true;
    
    /* Look for IODA IO-Hubs. */
    for_each_compatible_node(np, NULL, "ibm,ioda-hub") {
        pnv_pci_init_ioda_hub(np);
        for_each_compatible_node(np, NULL, "ibm,ioda2-npu2-phb")
            pnv_pci_init_npu2_opencapi_phb(np);
        
        /* Look for NPU2 OpenCAPI PHBs */
        +for_each_compatible_node(np, NULL, "ibm,ioda2-npu2-opencapi-phb")
        +pnv_pci_init_npu2_opencapi_phb(np);
        
        /* Configure IOMMU DMA hooks */
        set_pci_dma_ops(&dma_iommu_ops);
    }
    
    --- linux-4.15.0.orig/arch/powerpc/platforms/powernv/pci.h
    +++ linux-4.15.0/arch/powerpc/platforms/powernv/pci.h
    @ @ -8,13 +8,11 @@

    struct pci_dn;

    -/* Maximum possible number of ATSD MMIO registers per NPU */
    -#define NV_NMMU_ATSD_REGS 8
enum pnv_phb_type {
    PNV_PHB_IODA1 = 0,
    PNV_PHB_IODA2 = 1,
    PNV_PHB_NPU = 2,
    PNV_PHB_IODA1 = 0,
    PNV_PHB_IODA2 = 1,
    PNV_PHB_NPU_NVLINK = 2,
    PNV_PHB_NPU_OCAPI = 3,
};

/* Precise PHB model for error management */
@@ -180,22 +178,10 @@
unsigned int diag_data_size;
     u8*diag_data;

-/* Nvlink2 data */
-struct npu {
-    int index;
-    __be64 *mmio_atsd_regs[NV_NMMU_ATSD_REGS];
-    unsigned int mmio_atsd_count;
-
-/* Bitmask for MMIO register usage */
-unsigned long mmio_atsd_usage;
-
-/* Do we need to explicitly flush the nest mmu? */
-bool nmmu_flush;
-} npu;
-
#ifdef CONFIG_CXL_BASE
struct cxl_afu *cxl_afu;
#endif

+int p2p_target_count;
};
@@ -227,6 +213,8 @@
extern void pnv_pci_init_ioda_hub(struct device_node *np);
extern void pnv_pci_init_ioda2_phb(struct device_node *np);
extern void pnv_pci_init_npu_phb(struct device_node *np);
+extern void pnv_pci_init_npu2_opencapi_phb(struct device_node *np);
+extern void pnv_npu2_map_lpar(struct pnv_ioda_pe *gpe, unsigned long msr);
extern void pnv_pci_reset_secondary_bus(struct pci_dev *dev);
extern int pnv_eeh_phb_reset(struct pci_controller *hose, int option);
@@ -258,7 +246,6 @@
extern long pnv_npu_unset_window(struct pnv_ioda_pe *npe, int num);
extern void pnv_npu_take_ownership(struct pnv_ioda_pe *npe);
extern void pnv_npu_release_ownership(struct pnv_ioda_pe *npe);
extern int pnv_npu2_init(struct pnv_phb *phb);

/* cxl functions */
extern bool pnv_cxl_enable_device_hook(struct pci_dev *dev);
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/setup.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/setup.c
@@ -38,53 +38,116 @@
#include <asm/smp.h>
#include <asm/tm.h>
#include <asm/setup.h>
+static bool fw_feature_is(const char *state, const char *name,
+ struct device_node *fw_features)
+{
+ struct device_node *np;
+ bool rc = false;
+ np = of_get_child_by_name(fw_features, name);
+ if (np) {
+ rc = of_property_read_bool(np, state);
+ of_node_put(np);
+ }
+ return rc;
+}
+
+static void init_fw_feat_flags(struct device_node *np)
+{
+ if (fw_feature_is("enabled", "inst-spec-barrier-ori31,31,0", np))
+ security_ftr_set(SEC_FTR_SPEC_BAR_ORI31);
+ if (fw_feature_is("enabled", "fw-bcctrl-serialized", np))
+ security_ftr_set(SEC_FTR_BCCTRL_SERIALIZED);
+ if (fw_feature_is("enabled", "inst-l1d-flush-ori30,30,0", np))
+ security_ftr_set(SEC_FTR_L1D_FLUSH_ORI30);
+ if (fw_feature_is("enabled", "inst-l1d-flush-trig2", np))
+ security_ftr_set(SEC_FTR_L1D_FLUSH_TRIG2);
+ if (fw_feature_is("enabled", "fw-l1d-thread-split", np))
+ security_ftr_set(SEC_FTR_L1D_THREAD_PRIV);
+if (fw_feature_is("enabled", "fw-count-cache-disabled", np))
+security_ftr_set(SEC_FTR_COUNT_CACHE_DISABLED);
+
+if (fw_feature_is("enabled", "fw-count-cache-flush-bcctr2,0,0", np))
+security_ftr_set(SEC_FTR_BCCTR_FLUSH_ASSIST);
+
+if (fw_feature_is("enabled", "needs-count-cache-flush-on-context-switch", np))
+security_ftr_set(SEC_FTR_FLUSH_COUNT_CACHE);
+
+/*
+ * The features below are enabled by default, so we instead look to see
+ * if firmware has *disabled* them, and clear them if so.
+ */
+if (fw_feature_is("disabled", "speculation-policy-favor-security", np))
+security_ftr_clear(SEC_FTR_FAVOUR_SECURITY);
+
+if (fw_feature_is("disabled", "needs-l1d-flush-msr-pr-0-to-1", np))
+security_ftr_clear(SEC_FTR_L1D_FLUSH_PR);
+
+if (fw_feature_is("disabled", "needs-l1d-flush-msr-hv-1-to-0", np))
+security_ftr_clear(SEC_FTR_L1D_FLUSH_HV);
+
+if (fw_feature_is("disabled", "needs-spec-barrier-for-bound-checks", np))
+security_ftr_clear(SEC_FTR_BNDS_CHK_SPEC_BAR);
+
+
static void pnv_setup_rfi_flush(void)
{
struct device_node *np, *fw_features;
enum l1d_flush_type type;
-int enable;
+bool enable;

 /* Default to fallback in case fw-features are not available */
type = L1D_FLUSH_FALLBACK;
-enable = 1;

np = of_find_node_by_name(NULL, "ibm,opal");
fw_features = of_get_child_by_name(np, "fw-features");
of_node_put(np);

if (fw_features) {
-np = of_get_child_by_name(fw_features, "inst-l1d-flush-trig2");
-if (np && of_property_read_bool(np, "enabled"))
-type = L1D_FLUSH_MTTRIG;
+init_fw_feat_flags(fw_features);
+of_node_put(fw_features);
-of_node_put(np);
+if (security_ftr_enabled(SEC_FTR_L1D_FLUSH_TRIG2))
+type = L1D_FLUSH_MTTRIG;

-np = of_get_child_by_name(fw_features, "inst-l1d-flush-ori30,30,0");
-if (np && of_property_read_bool(np, "enabled"))
+if (security_ftr_enabled(SEC_FTR_L1D_FLUSH_ORI30))
type = L1D_FLUSH_ORI;
+

-of_node_put(np);
-
-/* Enable unless firmware says NOT to */
-enable = 2;
-np = of_get_child_by_name(fw_features, "needs-l1d-flush-msr-hv-1-to-0");
-if (np && of_property_read_bool(np, "disabled"))
-enable--;
-
-of_node_put(np);
-
-np = of_get_child_by_name(fw_features, "needs-l1d-flush-msr-pr-0-to-1");
-if (np && of_property_read_bool(np, "disabled"))
-enable--;
-
-of_node_put(np);
-of_node_put(fw_features);
+/
+ * If we are non-Power9 bare metal, we don't need to flush on kernel
+ * entry or after user access: they fix a P9 specific vulnerability.
+ */
+if (!pvr_version_is(PVR_POWER9)) {
+security_ftr_clear(SEC_FTR_L1D_FLUSH_ENTRY);
+security_ftr_clear(SEC_FTR_L1D_FLUSH_UACCESS);
+

-setup_rfi_flush(type, enable > 0);
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) &&
+ (security_ftr_enabled(SEC_FTR_L1D_FLUSH_PR) ||
+ security_ftr_enabled(SEC_FTR_L1D_FLUSH_HV));
+
+setup_rfi_flush(type, enable);
+setup_count_cache_flush();
+
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) &&
+ security_ftr_enabled(SEC_FTR_L1D_FLUSH_ENTRY);
+setup_entry_flush(enable);
+
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) &&
+ security_ftr_enabled(SEC_FTR_L1D_FLUSH_UACCESS);
+setup_uaccess_flush(enable);
}

static void __init pnv_setup_arch(void)
@@ -92,6 +155,7 @@
set_arch_panic_timeout(10, ARCH_PANIC_TIMEOUT);

pnv_setup_rfi_flush();
+setup_stf_barrier();

/* Initialize SMP */
pnv_smp_init();
@@ -177,17 +241,41 @@
static void  __noreturn pnv_restart(char *cmd)
{
- long rc = OPAL_BUSY;
+long rc;

pnv_prepare_going_down();

-while (rc == OPAL_BUSY || rc == OPAL_BUSY_EVENT) {
-rc = opal_cec_reboot();
-if (rc == OPAL_BUSY_EVENT)
-opal_poll_events(NULL);
+do {
+if (!cmd)
+rc = opal_cec_reboot();
+else if (strcmp(cmd, "full") == 0)
+rc = opal_cec_reboot2(OPAL_REBOOT_FULL_IPL, NULL);
+else
+rc = OPAL_UNSUPPORTED;
+
+if (rc == OPAL_BUSY || rc == OPAL_BUSY_EVENT) {
+/* Opal is busy wait for some time and retry */
+opal_poll_events(NULL);
+mdelay(10);
-}
+
+} elseif (cmd &
+} /* Unknown error while issuing reboot */
+if (rc == OPAL_UNSUPPORTED)
+pr_err("Unsupported '%s' reboot\n", cmd);
+else
+pr_err("Unable to issue '%s' reboot. Err=%ld\n", cmd, rc);
+pr_info("Forcing a cec-reboot\n");
cmd = NULL;
+rc = OPAL_BUSY;
+
+} else if (rc != OPAL_SUCCESS) {
+/* Unknown error while issuing cec-reboot */
+pr_err("Unable to reboot. Err=%ld\n", rc);
+}
+
+} while (rc == OPAL_BUSY || rc == OPAL_BUSY_EVENT);
+
for (;;)  
opal_poll_events(NULL);
}
@@ -322,15 +410,7 @@  
#ifdef CONFIG_MEMORY_HOTPLUG_SPARSE  
static unsigned long pnv_memory_block_size(void)
{
  /*
  * We map the kernel linear region with 1GB large pages on radix. For
  * memory hot unplug to work our memory block size must be at least
  * this size.
  * */
  -if (radix_enabled())
  -return 1UL * 1024 * 1024 * 1024;
  -else
  -return 256UL * 1024 * 1024;
  +return 256UL * 1024 * 1024;
  }
#endif  
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/smp.c  
+++ linux-4.15.0/arch/powerpc/platforms/powernv/smp.c  
@@ -37,6 +37,9 @@  
 #include <asm/kvm_ppc.h>
 #include <asm/ppc-opcode.h>
 #include <asm/cpuidle.h>
+#include <asm/kexec.h>
+include <asm/reg.h>
+include <asm/powernv.h>

 #include "powernv.h"

@@ -44,7 +47,7 @@  
 #include <asm/udbg.h>
 #define DBG(fmt...) udbg_printf(fmt)
 #else
-#define DBG(fmt...)
+#define DBG(fmt...)
+    } while (0)
static void pnv_smp_setup_cpu(int cpu)
@@ -147,22 +150,27 @@
    return 0;
 }

+static void pnv_flush_interrupts(void)
+{
+    +if (cpu_has_feature(CPU_FTR_ARCH_300)) {
+        +if (xive_enabled())
+            +xive_flush_interrupt();
+    +else
+        +icp_opal_flush_interrupt();
+    +} else {
+        +icp_native_flush_interrupt();
+    +}
+}
+
+static void pnv_smp_cpu_kill_self(void)
{
+    unsigned long srr1, unexpected_mask, wmask;
+    unsigned int cpu;
-    unsigned long srr1, wmask;
+    u64 lpcr_val;
/* Standard hot unplug procedure */
-/*
- * This hard disables local interurpts, ensuring we have no lazy
- * irqs pending.
- */
-WARN_ON(irqs_disabled());
-hard_irq_disable();
-WARN_ON(lazy_irq_pending());

    idle_task_exit();
    -current->active_mm = NULL; /* for sanity */
    cpu = smp_processor_id();
    DBG("CPU%d offline\n", cpu);
    generic_set_cpu_dead(cpu);
@@ -172,6 +180,40 @@
    if (cpu_has_feature(CPU_FTR_ARCH_207S))
        wmask = SRR1_WAKE_MASK_P8;

+/*
+ * This turns the irq soft-disabled state we're called with, into a
+ * hard-disabled state with pending irq_happened interrupts cleared.
+ *
+ * PACA_IRQ_DEC   - Decrementer should be ignored.
+ * PACA_IRQ_HMI   - Can be ignored, processing is done in real mode.
+ * PACA_IRQ_DBELL, EE, PMI - Unexpected.
+ */

+hard_irq_disable();
+if (generic_check_cpu_restart(cpu))
+goto out;
+
+unexpected_mask = ~(PACA_IRQ_DEC | PACA_IRQ_HMI | PACA_IRQ_HARD_DIS);
+if (local_paca->irq_happened & unexpected_mask) {
+if (local_paca->irq_happened & PACA_IRQ_EE)
+pnv_flush_interrups();
+DBG("CPU%d Unexpected exit while offline irq_happened=%lx\n",
+cpu, local_paca->irq_happened);
+}
+local_paca->irq_happened = PACA_IRQ_HARD_DIS;
+
+ */
+ * We don't want to take decrementer interrupts while we are
+ * offline, so clear LPCR:PECE1. We keep PECE2 (and
+ * LPCR_PECE_HVEE on P9) enabled so as to let IPIs in.
+ *
+ * If the CPU gets woken up by a special wakeup, ensure that
+ * the SLW engine sets LPCR with decrementer bit cleared, else
+ * the CPU will come back to the kernel due to a spurious
+ * wakeup.
+ */
+lpcr_val = mfspr(SPRN_LPCR) & ~(u64)LPCR_PECE1;
+pnv_program_cpu_hotplug_lpcr(cpu, lpcr_val);
+
while (!generic_check_cpu_restart(cpu)) {
/*
 * Clear IPI flag, since we don't handle IPIs while
@@ -180,10 +222,11 @@
 * for coming online, which are handled via
 * generic_check_cpu_restart() calls.
 */
-kvmppc_set_host_ipi(cpu, 0);
+WARN_ON_ONCE(!irqs_disabled());

srr1 = pnv_cpu_offline(cpu);

+WARN_ON_ONCE(!irqs_disabled());

WARN_ON(lazy_irq_pending());

/*
@@ -199,19 +242,36 @@
 */
if (((srr1 & wmask) == SRR1_WAKEEEE) ||
   ((srr1 & wmask) == SRR1_WAKEHVI)) {
  if (cpu_has_feature(CPU_FTR_ARCH_300)) {
    if (xive_enabled())
      xive_flush_interrupt();
    else
      icp_opal_flush_interrupt();
  } else
    icp_native_flush_interrupt();
  } else if ((srr1 & wmask) == SRR1_WAKEHDBELL) {
    unsigned long msg = PPC_DBELL_TYPE(PPC_DBELL_SERVER);
    asm volatile(PPC_MSGCLR(%0) : : "r" (msg));
  } else if ((srr1 & wmask) == SRR1_WAKERESET) {
    irq_set_pending_from_srr1(srr1);
    /* Does not return */
  }
  smp_mb();

  /*
   * For kdump kernels, we process theipi and jump to
   * crash_ipi_callback
   */
  if (kdump_in_progress()) {
    /*
     * If we got to this point, we've not used
     * NMI's, otherwise we would have gone
     * via the SRR1_WAKERESET path. We are
     * using regular IPI's for waking up offline
     * threads.
     */
    struct pt_regs regs;
    +ppc_save_regs(&regs);
    +crash_ipi_callback(&regs);
    /* Does not return */
    }
  +}
  if (cpu_core_split_required())
    continue;

  @ -221,6 +281,16 @

/*
 * Re-enable decrementer interrupts in LPCR.
Further, we want stop states to be woken up by decremter
for non-hotplug cases. So program the LPCR via stop api as
well.
*/
lpcr_val = mfspr(SPRN_LPCR) | (u64)LPCR_PECE1;
pnv_program_cpu_hotplug_lpcr(cpu, lpcr_val);
out:
DBG("CPU%d coming online..\n", cpu);
}@@ -309,7 +379,16 @@
int64_t rc;

if (cpu >= 0) {
    rc = opal_signal_system_reset(get_hard_smp_processor_id(cpu));
+    h = get_hard_smp_processor_id(cpu);
    +
+    if (opal_check_token(OPAL_QUIESCE))
+        opal_quiesce(QUIESCE_HOLD, h);
    +
+    rc = opal_signal_system_reset(h);
    +
+    if (opal_check_token(OPAL_QUIESCE))
+        opal_quiesce(QUIESCE_RESUME, h);
    +
    if (rc != OPAL_SUCCESS)
        return 0;
    return 1;
@@ -318,6 +397,8 @@
    if (opal_check_token(OPAL_QUIESCE))
        opal_quiesce(QUIESCE_HOLD, -1);
    
    /* We do not use broadcasts (yet), because it's not clear
   @@ -333,6 +414,10 @@
 
    success = false;
    }
+    +
+    if (opal_check_token(OPAL_QUIESCE))
        opal_quiesce(QUIESCE_RESUME, -1);
+    +
    if (success)
        return 1;

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ifdef CONFIG_HOTPLUG_CPU
ppc_md.cpu_die = pnv_smp_cpu_kill_self;
+ifdef CONFIG_KEXEC_CORE
+crash_wake_offline = 1;
+endif
#endif
}
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/vas-debug.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/vas-debug.c
@@ -179,6 +179,7 @@
{
struct dentry *d;

+vas_init_dbgdir();
if (!vas_debugfs)
return;

@@ -201,8 +202,18 @@
 vinst->dbgdir = NULL;
 }

+/*
+ * Set up the "root" VAS debugfs dir. Return if we already set it up
+ * (or failed to) in an earlier instance of VAS.
+ */
void vas_init_dbgdir(void)
{
 static bool first_time = true;
+if (!first_time)
+return;
+first_time = false;
vas_debugfs = debugfs_create_dir("vas", NULL);
if (IS_ERR(vas_debugfs))
vas_debugfs = NULL;
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/vas-window.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/vas-window.c
@@ -1063,16 +1063,16 @@
 rc = PTR_ERR(txwin->paste_kaddr);
goto free_window;
 }
+ * CP_ABORT for this thread.
+ */
+rc = set_thread_uses_vas();
+if (rc)
+goto free_window;
}

-/*
- * Now that we have a send window, ensure context switch issues
- * CP_ABORT for this thread.
- */
-rc = -EINVAL;
-if (set_thread_uses_vas() < 0)
-goto free_window;
- set_vinst_win(vinst, txwin);

return txwin;
--- linux-4.15.0.orig/arch/powerpc/platforms/powernv/vas.c
+++ linux-4.15.0/arch/powerpc/platforms/powernv/vas.c
@@ -160,8 +160,6 @@
int found = 0;
 struct device_node *dn;

-vas_init_dbgdir();
-
 platform_driver_register(&vas_driver);

 for_each_compatible_node(dn, NULL, "ibm,vas") {
@@ -169,8 +167,10 @@
 found++;
 }

-if (!found)
+if (!found) {
+platform_driver_unregister(&vas_driver);
 return -ENODEV;
+}

 pr_devel("Found %d instances\n", found);

--- linux-4.15.0.orig/arch/powerpc/platforms/ps3/mm.c
+++ linux-4.15.0/arch/powerpc/platforms/ps3/mm.c
@@ -18,6 +18,7 @@
* Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
*/

+#include <linux/dma-mapping.h>
\#include <linux/kernel.h>
\#include <linux/export.h>
\#include <linux/memblock.h>
@@ -212,13 +213,14 @@
{
    int result;

    -DBG("%s:%d: map.vas_id = %llu", __func__, __LINE__, map.vas_id);
    
    if (map.vas_id) {
        result = lv1_select_virtual_address_space(0);
        -BUG_ON(result);
        -result = lv1_destruct_virtual_address_space(map.vas_id);
        -BUG_ON(result);
        +result += lv1_destruct_virtual_address_space(map.vas_id);
        +
        +if (result) {
            +lv1_panic(0);
            +}
        +
        map.vas_id = 0;
    }

@@ -316,19 +318,20 @@
    int result;

    if (!r->destroy) {
        -pr_info("%s:%d: Not destroying high region: %llxh %llxh\n",
        -__func__, __LINE__, r->base, r->size);
        return;
    }

    -DBG("%s:%d: r->base = %llxh", __func__, __LINE__, r->base);
    
    if (r->base) {
        result = lv1_release_memory(r->base);
        -BUG_ON(result);
        +
        +if (result) {
            +lv1_panic(0);
            +}
        +
        r->size = r->base = r->offset = 0;
        map.total = map.rm.size;
    }

    +ps3_mm_set_repository_highmem(NULL);
}
enum ps3_dma_region_type region_type, void *addr, unsigned long len) {
    unsigned long lpar_addr;
    +int result;

    lpar_addr = addr ? ps3_mm_phys_to_lpar(__pa(addr)) : 0;

    r->offset -= map.r1.offset;
    r->len = len ? len : __ALIGN_UP(map.total, 1 << r->page_size);

    +dev->core.dma_mask = &r->dma_mask;
    +result = dma_set_mask_and_coherent(&dev->core, DMA_BIT_MASK(32));
    +if (result < 0) {
        +dev_err(&dev->core, "%s:%d: dma_set_mask_and_coherent failed: %d
", __func__, __LINE__, result);
        +return result;
    +}
    +
    switch (dev->dev_type) {
    case PS3_DEVICE_TYPE_SB:
        +r->region_ops = (USE_DYNAMIC_DMA)
        --- linux-4.15.0.orig/arch/powerpc/platforms/ps3/os-area.c
        +++ linux-4.15.0/arch/powerpc/platforms/ps3/os-area.c
        @@ -664,7 +664,7 @@
        db_set_64(db, &os_area_db_id_rtc_diff, saved_params.rtc_diff);

        count = os_area_flash_write(db, sizeof(struct os_area_db), pos);
        -if (count < sizeof(struct os_area_db)) {
        +if (count < sizeof(struct os_area_db)) {
            pr_debug("%s: os_area_flash_write failed %zd\n", __func__,
            count);
            error = count < 0 ? count : -EIO;
            --- linux-4.15.0.orig/arch/powerpc/platforms/pseries/cmm.c
            +++ linux-4.15.0/arch/powerpc/platforms/pseries/cmm.c
            @@ -425,6 +425,10 @@
              .dev_name = "cmm",
            ];

        +static void cmm_release_device(struct device *dev)
        +{
        +}
        +
        /**
* cmm_sysfs_register - Register with sysfs
*
@@ -440,6 +444,7 @@
dev->id = 0;
dev->bus = &cmm_subsys;
+dev->release = cmm_release_device;

if (((rc = device_register(dev)))
goto subsys_unregister;
--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/dlpar.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/dlpar.c
@@ -63,6 +63,10 @@
name = (char *)ccwa + be32_to_cpu(ccwa->name_offset);
prop->name = kstrdup(name, GFP_KERNEL);
+if (!prop->name) {
+    dlpar_free_cc_property(prop);
+    return NULL;
+}

prop->length = be32_to_cpu(ccwa->prop_length);
value = (char *)ccwa + be32_to_cpu(ccwa->prop_offset);
@@ -128,7 +132,6 @@
#define NEXT_PROPERTY  3
#define PREV_PARENT 4
#define MORE_MEMORY 5
-#define CALL_AGAIN-2
#define ERR_CFG_USE -9003

struct device_node *dlpar_configure_connector(__be32 drc_index,
@@ -169,6 +172,9 @@
spin_unlock(&rtas_data_buf_lock);

+if (rtas_busy_delay(rc))
+continue;
+
 switch (rc) {
   case COMPLETE:
   break;
@@ -217,9 +223,6 @@
   last_dn = last_dn->parent;
   break;

-/* CALL_AGAIN:
-   break;
-*/

---
case MORE_MEMORY:
  case ERR_CFG_USE:
  default:
@@ -272,6 +275,8 @@
    if (rc)
    return rc;

+++-of_node_put(dn);
+ return 0;
 }

--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/dtl.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/dtl.c
@@ -149,7 +149,7 @@
-	((u32 *)dtl->buf)[1] = DISPATCH_LOG_BYTES;
+((u32 *)dtl->buf)[1] = cpu_to_be32(DISPATCH_LOG_BYTES);

 hwcpu = get_hard_smp_processor_id(dtl->cpu);
 addr = __pa(dtl->buf);
@@ -184,7 +184,7 @@
 static u64 dtl_current_index(struct dtl *dtl)
 {
- return lppaca_of(dtl->cpu).dtl_idx;
+ return be64_to_cpu(lppaca_of(dtl->cpu).dtl_idx);
 } 
 #endif /* CONFIG_VIRT_CPU_ACCOUNTING_NATIVE */

--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/hotplug-cpu.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/hotplug-cpu.c
@@ -36,6 +36,7 @@
 
 #include <asm/plpar_wrappers.h>
 
+##include <asm/topology.h>

 BUG_ON(rtas_stop_self_token == RTAS_UNKNOWN_SERVICE);

-printk("cpu %u (hwid %u) Ready to die...
",
- smp_processor_id(), hard_smp_processor_id());
rtas_call_unlocked(&args, rtas_stop_self_token, 0, 1, NULL);

panic("Alas, I survived.");
@@ -331,6 +329,7 @@
BUG_ON(cpu_online(cpu));
set_cpu_present(cpu, false);
set_hard_smp_processor_id(cpu, -1);
+update_numa_cpu_lookup_table(cpu, -1);
break;
}
if (cpu >= nr_cpu_ids)
@@ -799,6 +798,25 @@
return rc;
}

+int dlpar_cpu_readd(int cpu)
+{
+struct device_node *dn;
+struct device *dev;
+u32 drc_index;
+int rc;
+
+dev = get_cpu_device(cpu);
+dn = dev->of_node;
+
+rc = of_property_read_u32(dn, "ibm,my-drc-index", &drc_index);
+
+rc = dlpar_cpu_remove_by_index(drc_index);
+if (!rc)
+rc = dlpar_cpu_add(drc_index);
+
+return rc;
+}
+
int dlpar_cpu(struct pseries_hp_errorlog *hp_elog)
{
    u32 count, drc_index;
    --- linux-4.15.0.orig/arch/powerpc/platforms/pseries/hotplug-memory.c
    +++ linux-4.15.0/arch/powerpc/platforms/pseries/hotplug-memory.c
    @@ -30,7 +30,7 @@
    unsigned long pseries_memory_block_size(void)
    {
        struct device_node *np;
        unsigned int memblock_size = MIN_MEMORY_BLOCK_SIZE;
        +u64 memblock_size = MIN_MEMORY_BLOCK_SIZE;
        struct resource r;
np = of_find_node_by_path("/ibm,dynamic-reconfiguration-memory");
@@ -295,6 +295,7 @@
    aa_index = find_aa_index(dr_node, ala_prop, lmb_assoc);

    +of_node_put(dr_node);
    dlpar_free_cc_nodes(lmb_node);
    return aa_index;

    @@ -441,15 +442,20 @@
    phys_addr = lmb->base_addr;

    #ifdef CONFIG_FA_DUMP
    /* Don't hot-remove memory that falls in fadump boot memory area */
    -if (is_fadump_boot_memory_area(phys_addr, block_sz))
    +/*
    + * Don't hot-remove memory that falls in fadump boot memory area
    + * and memory that is reserved for capturing old kernel memory.
    + */
    +if (is_fadump_memory_area(phys_addr, block_sz))
      return false;
    #endif

    for (i = 0; i < scns_per_block; i++) {
      pfn = PFN_DOWN(phys_addr);
      -if (!pfn_present(pfn))
      +if (!pfn_present(pfn)) {
        phys_addr += MIN_MEMORY_BLOCK_SIZE;
        continue;
      }
      rc &is_mem_section_removable(pfn, PAGES_PER_SECTION);
      phys_addr += MIN_MEMORY_BLOCK_SIZE;
      @@ -784,7 +790,7 @@
      nid = memory_add_physaddr_to_nid(lmb->base_addr);

      /* Add the memory */
      -rc = add_memory(nid, lmb->base_addr, block_sz);
      +rc = __add_memory(nid, lmb->base_addr, block_sz);
      if (rc) {
        dlpar_remove_device_tree_lmb(lmb);
        return rc;
      }
      if (!memblock_size)
        return -EINVAL;
      +if (!pr->old_prop)
        return 0;
p = (__be32 *) pr->old_prop->value;
if (!p)
    return -EINVAL;

int hvc_put_chars(uint32_t vtermno, const char *buf, int count)

int ret = 0;
long tcenum_start = tcenum, npages_start = npages;

int rc = plpar_tce_put((u64)tbl->it_index, (u64)tcenum << 12, tce);
if (unlikely(rc == H_NOT_ENOUGH_RESOURCES))
    ret = (int)rc;
- tce_free_pSeriesLP(tbl, tcenum, npages, uaddr, direction, attrs);

static void tce_free_pSeriesLP(unsigned long liobn, long tcenum, long npages)
{
    u64 rc;

    while (npages--)
    {
        -rc = plpar_tce_put((u64)liobn, (u64)tcenum << 12, 0);
        +rc = plpar_tce_put((u64)liobn, (u64)tcenum << 12, 0);
    }

    return rc;
}
if (rc && printk_ratelimit()) {
    printk("tce_free_pSeriesLP: plpar_tce_put failed. rc=%lld
", rc);
    printk("\tindex   = 0x%llx
", (u64)tbl->it_index);
    printk("tcenum  = 0x%llx
", (u64)tcenum);
    dump_stack();
}
@@ -320,7 +322,7 @@
    u64 rc;

    if (!firmware_has_feature(FW_FEATURE_MULTITCE))
-    return tce_free_pSeriesLP(tbl, tcenum, npages);
+    return tce_free_pSeriesLP(tbl->it_index, tcenum, npages);
    rc = plpar_tce_stuff((u64)tbl->it_index, (u64)tcenum << 12, 0, npages);
@@ -435,6 +437,19 @@
    u64 rc = 0;
    long l, limit;

    +if (!firmware_has_feature(FW_FEATURE_MULTITCE)) {
    +    unsigned long tceshift = be32_to_cpu(maprange->tce_shift);
    +    unsigned long dmastart = (start_pfn << PAGE_SHIFT) +
    +                                be64_to_cpu(maprange->dma_base);
    +    unsigned long tcenum = dmastart >> tceshift;
    +    unsigned long npages = num_pfn << PAGE_SHIFT >> tceshift;
    +    void *uaddr = __va(start_pfn << PAGE_SHIFT);
    +}
    +
    local_irq_disable();/* to protect tcep and the page behind it */
    tcep = __this_cpu_read(tce_page);
@@ -645,7 +660,6 @@
    iommu_table_setparms(pci->phb, dn, tbl);
    tbl->it_ops = &iommu_table_pseries_ops;
    iommu_init_table(tbl, pci->phb->node);
-    iommu_register_group(pci->table_group, pci_domain_nr(bus), 0);
    /* Divide the rest (1.75GB) among the children */
    pci->phb->dma_window_size = 0x80000000ul;
    @ @ -756,10 +770,7 @@
    iommu_table_setparms(phb, dn, tbl);
    tbl->it_ops = &iommu_table_pseries_ops;
    iommu_init_table(tbl, phb->node);
/*
-iommu_register_group(PCI_DN(dn)->table_group,
-pci_domain_nr(phb->bus), 0);
set_iommu_table_base(&dev->dev, tbl);
-iommu_add_device(&dev->dev);
return;
}

@@ -770,11 +781,10 @@
while (dn && PCI_DN(dn) && PCI_DN(dn)->table_group == NULL)
    dn = dn->parent;

-if (dn && PCI_DN(dn)) {
+if (dn && PCI_DN(dn))
    set_iommu_table_base(&dev->dev, PCI_DN(dn)->table_group->tables[0]);
-    iommu_add_device(&dev->dev);
+    } else
     printk(KERN_WARNING "iommu: Device %s has no iommu table\n",
             pci_name(dev));
}
@@ -964,6 +974,37 @@
static LIST_HEAD(failed_ddw_pdn_list);

+static phys_addr_t ddw_memory_hotplug_max(void)
+{
+    phys_addr_t max_addr = memory_hotplug_max();
+    struct device_node *memory;
+    
+    for_each_node_by_type(memory, "memory") {
+        unsigned long start, size;
+        int ranges, n_mem_addr_cells, n_mem_size_cells, len;
+        const __be32 *memcell_buf;
+        
+        memcell_buf = of_get_property(memory, "reg", &len);
+        if (!memcell_buf || len <= 0)
+            continue;
+        
+        n_mem_addr_cells = of_n_addr_cells(memory);
+        n_mem_size_cells = of_n_size_cells(memory);
+        
+        /* ranges in cell */
+        ranges = (len >> 2) / (n_mem_addr_cells + n_mem_size_cells);
+        
+        start = of_read_number(memcell_buf, n_mem_addr_cells);
+        memcell_buf += n_mem_addr_cells;
+        size = of_read_number(memcell_buf, n_mem_size_cells);
*
```c
+memcell_buf += n_mem_size_cells;
+
+max_addr = max_t(phys_addr_t, max_addr, start + size);
+}
+
+return max_addr;
+}
+
/*
 * If the PE supports dynamic dma windows, and there is space for a table
 * that can map all pages in a linear offset, then setup such a table,
 @@ -1053,7 +1094,7 @@
 }
 /* verify the window * number of ptes will map the partition */
 /* check largest block * page size > max memory hotplug addr */
-max_addr = memory_hotplug_max();
+%max_addr = ddw_memory_hotplug_max();
 if (query.largest_available_block < (max_addr >> page_shift)) {
 dev_dbg(&dev->dev, "can't map partition max 0x%llx with %u 
 "
   "%llu-sized pages\n", max_addr, query.largest_available_block,
--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/lpar.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/lpar.c
@@ -48,6 +48,7 @@
 #include <asm/kexec.h>
 #include <asm/fadump.h>
 #include <asm/asm-prototypes.h>
+#include <asm/debugfs.h>
 #include "pseries.h"
 
@@ -643,7 +644,10 @@
 return 0;
 }

-/* Must be called in user context */
+/*
+ * Must be called in process context. The caller must hold the
+ * cpus_lock.
+ */
 static int pseries_lpar_resize_hpt(unsigned long shift)
 {
 struct hpt_resize_state state = {
@@ -699,7 +703,8 @@
 t1 = ktime_get();
-rc = stop_machine(pseries_lpar_resize_hpt_commit, &state, NULL);
+rc = stop_machine_cpuslocked(pseries_lpar_resize_hpt_commit,
```
t2 = ktime_get();

return 0;
}

/* Actually only used for radix, so far */
static int pseries_lpar_register_process_table(unsigned long base,
unsigned long page_size, unsigned long table_size)
{
    long rc;
    unsigned long flags = PROC_TABLE_NEW;
    unsigned long flags = 0;
    if (table_size)
        flags |= PROC_TABLE_NEW;
    if (radix_enabled())
        flags |= PROC_TABLE_RADIX | PROC_TABLE_GTSE;
    else
        flags |= PROC_TABLE_HPT_SLB;
    for (;;) {
        rc = plpar_hcall_norets(H_REGISTER_PROC_TBL, flags, base,
            page_size, table_size);
        if (firmware_has_feature(FW_FEATURE_HPT_RESIZE))
            mmu_hash_ops.resize_hpt = pseries_lpar_resize_hpt;
        return 0;
    }
    machine_device_initcall(pseries, reserve_vrma_context_id);
    +
    +#ifdef CONFIG_DEBUG_FS
    +#* debugfs file interface for vpa data */
    +static ssize_t vpa_file_read(struct file *filp, char __user *buf, size_t len,
    +  loff_t *pos)
    +{
        int cpu = (long)filp->private_data;
        +struct lppaca *lppaca = &lppaca_of(cpu);
        +
        +return simple_read_from_buffer(buf, len, pos, lppaca,
        +sizeof(struct lppaca));
static const struct file_operations vpa_fops = {
  .open = simple_open,
  .read = vpa_file_read,
  .llseek = default_llseek,
};

static int __init vpa_debugfs_init(void)
{
  char name[16];
  long i;
  struct dentry *vpa_dir;

  if (!firmware_has_feature(FW_FEATURE_SPLPAR))
    return 0;

  vpa_dir = debugfs_create_dir("vpa", powerpc_debugfs_root);
  if (!vpa_dir) {
    pr_warn("%s: can't create vpa root dir\n", __func__);
    return -ENOMEM;
  }

  /* set up the per-cpu vpa file*/
  for_each_possible_cpu(i) {
    struct dentry *d;

    sprintf(name, "cpu-%ld", i);

    d = debugfs_create_file(name, 0400, vpa_dir, (void *)i,
      &vpa_fops);
    if (!d) {
      pr_warn("%s: can't create per-cpu vpa file\n", __func__);
      return -ENOMEM;
    }
  }

  return 0;
}

machine_arch_initcall(pseries, vpa_debugfs_init);

#endif /* CONFIG_DEBUG_FS */

--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/mobility.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/mobility.c
@@ -9,8 +9,10 @@
 * 2 as published by the Free Software Foundation.
 */
static struct kobject *mobility_kobj;

prop_data += vd;
}
+
+cond_resched();
}
+
+cond_resched();
} while (rtas_rc == 1);

of_node_put(dn);
@@ -316,8 +323,12 @@
add_dt_node(phandle, drc_index);
break;
}
+
+cond_resched();
}
+
+cond_resched();
} while (rc == 1);

kfree(rtas_buf);
@@ -343,11 +354,31 @@
if (rc)
printk(KERN_ERR "Post-mobility activate-fw failed: %d\n", rc);
+
/*
+ * We don't want CPUs to go online/offline while the device
+ * tree is being updated.
+ */
+cpus_read_lock();
+
+/*
+ * It's common for the destination firmware to replace cache
+ * nodes. Release all of the cacheinfo hierarchy's references
+ * before updating the device tree.
+ */
+cacheinfo_teardown();
+
rc = pseries_devicetree_update(MIGRATION_SCOPE);
if (rc)
printk(KERN_ERR "Post-mobility device tree update "
"failed: %dn", rc);
+
+cacheinfo_rebuild();
+
+cpus_read_unlock();
+
+/* Possibly switch to a new RFI flush type */
+pseries_setup_rfi_flush();
+
return;
}
+dn = of_find_all_nodes(dn);
+if (!dn)
+break;
+nvdn = of_parse_phandle(dn, "ibm,nvlink", 0);
+if (!nvdn)
+continue;
+if (!of_device_is_compatible(nvdn, "ibm,npu-link"))
+continue;
+if (!of_device_is_compatible(nvdn->parent,
+"ibm,power9-npu"))
+continue;
+WARN_ON_ONCE(pnv_npu2_init(hose));
+break;
+

/*
--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/pci_dlpar.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/pci_dlpar.c
@@ -66,6 +66,7 @@
int remove_phb_dynamic(struct pci_controller *phb)
 {
 struct pci_bus *b = phb->bus;
+struct pci_host_bridge *host_bridge = to_pci_host_bridge(b->bridge);
 struct resource *res;
 int rc, i;

@@ -92,7 +93,8 @@
int remove_phb_dynamic(struct pci_controller *phb)
 */
 phb->bus = NULL;
 pci_remove_bus(b);
-device_unregister(b->bridge);
+host_bridge->bus = NULL;
+device_unregister(&host_bridge->dev);

/* Now release the IO resource */
if (res->flags & IORESOURCE_IO)
--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/pseries.h
+++ linux-4.15.0/arch/powerpc/platforms/pseries/pseries.h
@@ -100,4 +100,6 @@
int dlpar_workqueue_init(void);

+void pseries_setup_rfi_flush(void);
+}
+#endif /* _PSERIES_PSERIES_H */
--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/ras.c
/*
+ Enable the hotplug interrupt late because processing them may touch other
+ devices or systems (e.g. hugepages) that have not been initialized at the
+ subsys stage.
+ */
+int __init init_ras_hotplug_IRQ(void)
+{
+struct device_node *np;
+
+/* Hotplug Events */
+np = of_find_node_by_path("/event-sources/hot-plug-events");
+if (np != NULL) {
+if (dlpar_workqueue_init() == 0)
+request_event_sources_irqs(np, ras_hotplug_interrupt,
+    "RAS_HOTPLUG");
+of_node_put(np);
+}
+
+/* EPOW Events */
+np = of_find_node_by_path("/event-sources/epow-events");
+if (np != NULL) {
+case EPOW_SHUTDOWN_ON_UPS:
+if (np != NULL) {
+case EPOW_SHUTDOWN_ON_UPS:
pr_emerg("Loss of system power detected. System is running on"
" UPS/battery. Check RTAS error log for details\n");
-orderly_poweroff(true);
break;

case EPOW_SHUTDOWN_LOSS_OF_CRITICAL_FUNCTIONS:
@@ -312,10 +324,11 @@
 /*
 * Some versions of FWNMI place the buffer inside the 4kB page starting at
 * 0x7000. Other versions place it inside the rtas buffer. We check both.
 + * Minimum size of the buffer is 16 bytes.
 */
#define VALID_FWNMI_BUFFER(A) \
 -(((A) >= 0x7000) && ((A) < 0x7ff0)) || \
 -(((A) >= rtas.base) && ((A) < (rtas.base + rtas.size - 16)))
 + ((A) >= 0x7000) && ((A) <= 0x8000 - 16)) || \
 +((A) >= rtas.base) && ((A) <= (rtas.base + rtas.size - 16)))

 /*
 * Get the error information for errors coming through the
 @@ -347,7 +360,7 @@
 }

 savep = __va(regs->gpr[3]);
 -regs->gpr[3] = savep[0];/* restore original r3 */
 +regs->gpr[3] = be64_to_cpu(savep[0]);/* restore original r3 */

 /* If it isn't an extended log we can use the per cpu 64bit buffer */
 h = (struct rtas_error_log *)&savep[1];
@@ -358,7 +371,7 @@
 int len, error_log_length;

 error_log_length = 8 + rtas_error_extended_log_length(h);
 -len = max_t(int, error_log_length, RTAS_ERROR_LOG_MAX);
 +len = min_t(int, error_log_length, RTAS_ERROR_LOG_MAX);
 memset(global_mce_data_buf, 0, RTAS_ERROR_LOG_MAX);
 memcpy(global_mce_data_buf, h, len);

 errhdr = (struct rtas_error_log *)global_mce_data_buf;
--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/rng.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/rng.c
@@ -40,6 +40,7 @@
 ppc_md.get_random_seed = pseries_get_random_long;

 +of_node_put(dn);
 return 0;
 }

 machine_subsys_initcall(pseries, rng_init);
* low power mode by ceding processor to hypervisor
*/

+if (!prep_irq_for_idle())
+return;
+
/* Indicate to hypervisor that we are idle. */
get_lppaca()-idle = 1;

*/

-static void pseries_setup_rfi_flush(void)
+static void init_cpu_char_feature_flags(struct h_cpu_char_result *result)
+{
+/*
+ * The features below are disabled by default, so we instead look to see
+ * if firmware has *enabled* them, and set them if so.
+ */
+if (result->character & H_CPU_CHAR_SPEC_BAR_ORI31)
+security_ftr_set(SEC_FTR_SPEC_BAR_ORI31);
+
+if (result->character & H_CPU_CHAR_BCCTRL_SERIALISED)
+security_ftr_set(SEC_FTR_BCCTRL_SERIALISED);
+
+if (result->character & H_CPU_CHAR_L1D_FLUSH_ORI30)
+security_ftr_set(SEC_FTR_L1D_FLUSH_ORI30);
+
+if (result->character & H_CPU_CHAR_L1D_FLUSH_TRIG2)
+security_ftr_set(SEC_FTR_L1D_FLUSH_TRIG2);
+
+if (result->character & H_CPU_CHAR_L1D_THREAD_PRIV)
+security_ftr_set(SEC_FTR_L1D_THREAD_PRIV);
+
+if (result->character & H_CPU_CHAR_COUNT_CACHE_DISABLED)
+security_ftr_set(SEC_FTR_COUNT_CACHE_DISABLED);
+ if (result->character & H_CPU_CHAR_BCCTR_FLUSH_ASSIST)
+ security_ftr_set(SEC_FTR_BCCTR_FLUSH_ASSIST);
+ if (result->behaviour & H_CPU_BEHAV_FLUSH_COUNT_CACHE)
+ security_ftr_set(SEC_FTR_FLUSH_COUNT_CACHE);

+ /*
+ * The features below are enabled by default, so we instead look to see
+ * if firmware has *disabled* them, and clear them if so.
+ */
+ if (!result->behaviour & H_CPU_BEHAV_FAVOUR_SECURITY)
+ security_ftr_clear(SEC_FTR_FAVOUR_SECURITY);
+ if (!result->behaviour & H_CPU_BEHAV_L1D_FLUSH_PR)
+ security_ftr_clear(SEC_FTR_L1D_FLUSH_PR);
+ if (!result->behaviour & H_CPU_BEHAV_BNDS_CHK_SPEC_BAR)
+ security_ftr_clear(SEC_FTR_BNDS_CHK_SPEC_BAR);
}

+ void pseries_setup_rfi_flush(void)
+ {
+ struct h_cpu_char_result result;
+ enum l1d_flush_type types;
+ bool enable;
+ long rc;

+ /* Enable by default */
+ enable = true;
+ /*
+ * Set features to the defaults assumed by init_cpu_char_feature_flags()
+ * so it can set/clear again any features that might have changed after
+ * migration, and in case the hypercall fails and it is not even called.
+ */
+ powerpc_security_features = SEC_FTR_DEFAULT;

+ rc = plpar_get_cpu_characteristics(&result);
+ if (rc == H_SUCCESS) {
+ types = L1D_FLUSH_NONE;
+ if (rc == H_SUCCESS)
+ init_cpu_char_feature_flags(&result);

+ if (result.character & H_CPU_CHAR_L1D_FLUSH_TRIG2)
+ types |= L1D_FLUSH_MTTRIG;
+ if (result.character & H_CPU_CHAR_L1D_FLUSH_ORI30)
+ types |= L1D_FLUSH_ORI;
/* Use fallback if nothing set in hcall */
-if (types == L1D_FLUSH_NONE)
-types = L1D_FLUSH_FALLBACK;
-
-if (!(result.behaviour & H_CPU_BEHAV_L1D_FLUSH_PR))
-enable = false;
-} else {
/* Default to fallback if case hcall is not available */
-types = L1D_FLUSH_FALLBACK;
-}
+/
+ * We’re the guest so this doesn't apply to us, clear it to simplify
+ * handling of it elsewhere.
+ */
+security_ftr_clear(SEC_FTR_L1D_FLUSH_HV);
+
types = L1D_FLUSH_FALLBACK;
+
+if (security_ftr_enabled(SEC_FTR_L1D_FLUSH_TRIG2))
+types |= L1D_FLUSH_MTTRIG;
+
+if (security_ftr_enabled(SEC_FTR_L1D_FLUSH_ORI30))
+types |= L1D_FLUSH_ORI;
+
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) && 
+ security_ftr_enabled(SEC_FTR_L1D_FLUSH_PR);

setup_rfi_flush(types, enable);
+setup_count_cache_flush();
+
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) &&
+ security_ftr_enabled(SEC_FTR_L1D_FLUSH_ENTRY);
+setup_entry_flush(enable);
+
+enable = security_ftr_enabled(SEC_FTR_FAVOUR_SECURITY) &&
+ security_ftr_enabled(SEC_FTR_L1D_FLUSH_UACCESS);
+setup_uaccess_flush(enable);
}

static void __init pSeries_setup_arch(void)
@@ -510,6 +572,7 @@
 fwnmi_init();

 pseries_setup_rfi_flush();
+setup_stf_barrier();

 /* By default, only probe PCI (can be overridden by rtas_pci) */
 pci_add_flags(PCI_PROBE_ONLY);
--- linux-4.15.0.orig/arch/powerpc/platforms/pseries/suspend.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/suspend.c
@@ -26,7 +26,6 @@
 #include <asm/mmu.h>
 #include <asm/rtas.h>
 #include <asm/topology.h>
-#include '../../kernel/cacheinfo.h'
 static u64 stream_id;
 static struct device suspend_dev;
@@ -91,9 +90,7 @@
 */
 -cacheinfo_cpu_offline(smp_processor_id());
 post_mobility_fixup();
-cacheinfo_cpu_online(smp_processor_id());
 }

 /**
 @@ -224,7 +221,6 @@
 static const struct platform_suspend_ops pseries_suspend_ops = {
 .valid= suspend_valid_only_mem,
 -.begin= pseries_suspend_begin,
@@ -151,7 +151,7 @@
 *kref_init(&tbl->it_kref);
 +of_parse_dma_window(dev->dev.of_node, dma_window,
 &tbl->it_index, &offset, &size);

 --- linux-4.15.0.orig/arch/powerpc/platforms/pseries/vio.c
+++ linux-4.15.0/arch/powerpc/platforms/pseries/vio.c
@@ -1195,6 +1195,8 @@
 if (tbl == NULL)
 return NULL;

 +kref_init(&tbl->it_kref);
 +of_parse_dma_window(dev->dev.of_node, dma_window,
 &tbl->it_index, &offset, &size);

 --- linux-4.15.0.orig/arch/powerpc/sysdev/axonram.c
+++ linux-4.15.0/arch/powerpc/sysdev/axonram.c
@@ -151,7 +151,7 @@
 resource_size_t offset = pgoff * PAGE_SIZE;

 *kaddr = (void *) bank->io_addr + offset;
-*pfn = phys_to_pfn_t(bank->ph_addr + offset, PFN_DEV);
+*pfn = phys_to_pfn_t(bank->ph_addr + offset, PFN_DEV|PFN_SPECIAL);
 return (bank->size - offset) / PAGE_SIZE;

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int i;

for (i = 0; i < min(32, NR_CPUS); ++i, cpumask >>= 1)
for (i = 0; i < min(32, NR_CPUS) && cpu_possible(i); ++i, cpumask >>= 1)
  mask |= (cpumask & 1) << get_hard_smp_processor_id(i);
return mask;

/* IO map the message register block. */
of_address_to_resource(np, 0, &rsrc);
-msgr_block_addr = ioremap(rsrc.start, rsrc.end - rsrc.start);
+msgr_block_addr = devm_ioremap(&dev->dev, rsrc.start, resource_size(&rsrc));
if (!msgr_block_addr) {
  dev_err(&dev->dev, "Failed to iomap MPIC message registers");
  return -EFAULT;
}

static void icp_native_cause_ipi(int cpu)
{
-kvmppc_set_host_ipi(cpu, 1);
+kvmppe_set_host_ipi(cpu);
  icp_native_set_qirr(cpu, IPI_PRIORITY);
}

if (vec == XICS_IPI) {
  /* Clear pending IPI */
int cpu = smp_processor_id();
-kvmppc_set_host_ipi(cpu, 0);
+kvmppc_clear_host_ipi(cpu);
icp_native_set_qirr(cpu, 0xff);
} else {
    pr_err("XICS: hw interrupt 0x%x to offline cpu, disabling\n",
    int cpu = smp_processor_id();

-kvmppc_set_host_ipi(cpu, 0);
+kvmppc_clear_host_ipi(cpu);
icp_native_set_qirr(cpu, 0xff);

return smp_ipi_demux();
--- linux-4.15.0.orig/arch/powerpc/sysdev/xics/icp-opal.c
+++ linux-4.15.0/arch/powerpc/sysdev/xics/icp-opal.c
@@ -205,7 +205,7 @@
    int cpu = smp_processor_id();

-kvmppc_set_host_ipi(cpu, 0);
+kvmppc_set_host_ipi(cpu);
opal_int_set_mfrr(hw_cpu, IPI_PRIORITY);
}
@@ -138,7 +138,7 @@
    int cpu = smp_processor_id();

-kvmppc_set_host_ipi(cpu, 1);
+kvmppc_set_host_ipi(cpu);
opal_int_set_mfrr(get_hard_smp_processor_id(cpu), 0xff);

return smp_ipi_demux();
@@ -161,7 +161,7 @@
if (vec == XICS_IPI) {
    /* Clear pending IPI */
    int cpu = smp_processor_id();
-kvmppc_set_host_ipi(cpu, 0);
+kvmppc_clear_host_ipi(cpu);
opal_int_set_mfrr(get_hard_smp_processor_id(cpu), 0xff);
} else {
    pr_err("XICS: hw interrupt 0x%x to offline cpu, ",
--- linux-4.15.0.orig/arch/powerpc/sysdev/xive/common.c
+++ linux-4.15.0/arch/powerpc/sysdev/xive/common.c
@@ -23,6 +23,7 @@
#include <linux/slab.h>
#include <linux/spinlock.h>
#include <linux/msi.h>
+#include <linux/vmalloc.h>

#include <asm/prom.h>
#include <asm/io.h>
@@ -72,13 +73,6 @@
/* Xive state for each CPU */
static DEFINE_PER_CPU(struct xive_cpu *, xive_cpu);

-/*
- * A "disabled" interrupt should never fire, to catch problems
- * we set its logical number to this
- */
-#define XIVE_BAD_IRQ		0x7fffffff
-#define XIVE_MAX_IRQ		(XIVE_BAD_IRQ - 1)
-
-/* An invalid CPU target */
#define XIVE_INVALID_TARGET(-1)

@@ -482,7 +476,7 @@
* Now go through the entire mask until we find a valid
* target.
 */
-#for (;;) {
+do {
/*
 * We re-check online as the fallback case passes us
 * an untested affinity mask
@@ -490,12 +484,11 @@
if (cpu_online(cpu) && xive_try_pick_target(cpu))
return cpu;
cpu = cpumask_next(cpu, mask);
-if (cpu == first)
-break;
/* Wrap around */
-if (cpu >= nr_cpu_ids)
cpu = cpumask_first(mask);
} while (cpu != first);
+return -1;
}

@@ -940,12 +933,16 @@
void xive_cleanup_irq_data(struct xive_irq_data *xd)
{
    if (xd->eoi_mmio) {
+unmap_kernel_range((unsigned long)xd->eoi_mmio, 
+  1u << xd->esb_shift); 
+iounmap(xd->eoi_mmio); 
+if (xd->eoi_mmio == xd->trig_mmio) 
+  xd->trig_mmio = NULL; 
+  xd->eoi_mmio = NULL; 
+} 
+if (xd->trig_mmio) { 
+  +unmap_kernel_range((unsigned long)xd->trig_mmio, 
+    +  1u << xd->esb_shift); 
+  +iounmap(xd->trig_mmio); 
+  xd->trig_mmio = NULL; 
+} 
@@ -968,6 +965,15 @@
xd->target = XIVE_INVALID_TARGET; 
irq_set_handler_data(virq, xd); 

+/* 
+ * Turn OFF by default the interrupt being mapped. A side 
+ * effect of this check is the mapping the ESB page of the 
+ * interrupt in the Linux address space. This prevents page 
+ * fault issues in the crash handler which masks all 
+ * interrupts. 
+ */ 
+  +xive_esb_read(xd, XIVE_ESB_SET_PQ_01); 
+  +return 0; 
+} 
@@ -1009,12 +1015,13 @@
{ 
+  +struct xive_cpu *xc = __this_cpu_read(xive_cpu); 
+  +-DBG_VERBOSE("IPI eoi: irq=%d [0x%lx] (HW IRQ 0x%x) pending=%02x\n", 
+    +d->irq, irqd_to_hwirq(d), xc->hw_ipi, xc->pending_prio); 
+  -
+  /* Handle possible race with unplug and drop stale IPIs */ 
if (!xc) 
  return; 
+  ++DBG_VERBOSER("IPI eoi: irq=%d [0x%lx] (HW IRQ 0x%x) pending=%02x\n", 
+    +d->irq, irqd_to_hwirq(d), xc->hw_ipi, xc->pending_prio); 
+  +xive_do_source_eoi(xc->hw_ipi, &xc->ipi_data); 
+  xive_do_queue_eoi(xc); 
} 
@@ -1064,7 +1071,7 @@
 xc = per_cpu(xive_cpu, cpu);
/* Check if we are already setup */
-if (xc->hw_ipi != 0)
+if (xc->hw_ipi != XIVE_BAD_IRQ)
     return 0;

/* Grab an IPI from the backend, this will populate xc->hw_ipi */
@@ -1101,7 +1108,7 @@
/* Disable the IPI and free the IRQ data */

/* Already cleaned up ? */
-if (xc->hw_ipi == 0)
+if (xc->hw_ipi == XIVE_BAD_IRQ)
     return;

/* Mask the IPI */
@@ -1257,6 +1264,7 @@
     if (np)
         xc->chip_id = of_get_ibm_chip_id(np);
         of_node_put(np);
+     xc->hw_ipi = XIVE_BAD_IRQ;
     per_cpu(xive_cpu, cpu) = xc;
 }
--- linux-4.15.0.orig/arch/powerpc/sysdev/xive/native.c
+++ linux-4.15.0/arch/powerpc/sysdev/xive/native.c
@@ -22,6 +22,7 @@
 #include <linux/delay.h>
 #include <linux/cpumask.h>
 #include <linux/mm.h>
+  #include <linux/kmemleak.h>
 
 #include <asm/prom.h>
 #include <asm/io.h>
@@ -234,6 +235,17 @@
     return of_device_is_compatible(node, "ibm,opal-xive-vc");
 }

+static s64 opal_xive_allocate_irq(u32 chip_id)
+{
+    s64 irq = opal_xive_allocate_irq_raw(chip_id);
+    +/*
+     * Old versions of skiboot can incorrectly return 0xffffffff to
+     * indicate no space, fix it up here.
+     */
+    +return irq == 0xffffffff ? OPAL_Resource : irq;
+}
+ #ifdef CONFIG_SMP
static int xive_native_get_ipi(unsigned int cpu, struct xive_cpu *xc)
{
  @@ -299,7 +311,7 @@
s64 rc;

    /* Free the IPI */
    -if (!xc->hw_ipi)
+if (xc->hw_ipi == XIVE_BAD_IRQ)
      return;
    for (;;) {
      rc = opal_xive_free_irq(xc->hw_ipi);
      @@ -307,7 +319,7 @@
        msleep(1);
        continue;
    }
    -xc->hw_ipi = 0;
    +xc->hw_ipi = XIVE_BAD_IRQ;
    break;
  }
}
@@ -388,6 +400,10 @@
      if (xive_pool_vps == XIVE_INVALID_VP)
        return;

    +/* Check if pool VP already active, if it is, pull it */
    +if (in_be32(xive_tima + TM_QW2_HV_POOL + TM_WORD2) & TM_QW2W2_VP)
      in_be64(xive_tima + TM_SPC_PULL_POOL_CTX);
    +
    +/* Enable the pool VP */
    vp = xive_pool_vps + cpu;
    pr_debug("CPU %d setting up pool VP 0x%x\n", cpu, vp);
    @@ -615,6 +631,7 @@
      pr_err("Failed to allocate provisioning page\n");
      return false;
  }
  +kmemleak_ignore(p);
  opal_xive_donate_page(chip, __pa(p));
}
return true;
--- linux-4.15.0.orig/arch/powerpc/sysdev/xive/spapr.c
+++ linux-4.15.0/arch/powerpc/sysdev/xive/spapr.c
@@ -293,20 +293,28 @@
    --- linux-4.15.0.orig/arch/powerpc/sysdev/xive/spapr.c
    +++ linux-4.15.0/arch/powerpc/sysdev/xive/spapr.c
    @@ -293,20 +293,28 @@
    data->eshb_shift = esb_shift;
    data->trig_page = trig_page;

    +data->hw_irq = hw_irq;
+ /*
+ * No chip-id for the sPAPR backend. This has an impact how we
+ * pick a target. See xive_pick_irq_target().
+ */
+ data->src_chip = XIVE_INVALID_CHIP_ID;
+
+ /*
+ * When the H_INT_ESB flag is set, the H_INT_ESB hcall should
+ * be used for interrupt management. Skip the remapping of the
+ * ESB pages which are not available.
+ */
+ if (data->flags & XIVE_IRQ_FLAG_H_INT_ESB)
+ return 0;
+
+ data->eoi_mmio = ioremap(data->eoi_page, 1u << data->esb_shift);
+ if (!data->eoi_mmio) {
+ pr_err("Failed to map EOI page for irq 0x%x\n", hw_irq);
+ return -ENOMEM;
+ }
- data->hw_irq = hw_irq;
-
/* Full function page supports trigger */
if (flags & XIVE_SRC_TRIGGER) {
 data->trig_mmio = data->eoi_mmio;
@@ -356,7 +364,8 @@
 rc = plpar_int_get_queue_info(0, target, prio, &esn_page, &esn_size);
 if (rc) {
- pr_err("Error %ld getting queue info prio %d\n", rc, prio);
+ pr_err("Error %ld getting queue info CPU %d prio %d\n", rc,
+ target, prio);
 rc = -EIO;
 goto fail;
 }@@ -356,7 +364,8 @@
 /* Configure and enable the queue in HW */
 rc = plpar_int_set_queue_config(flags, target, prio, qpage_phys, order);
 if (rc) {
- pr_err("Error %ld setting queue for prio %d\n", rc, prio);
+ pr_err("Error %ld setting queue for CPU %d prio %d\n", rc,
+ target, prio);
 rc = -EIO;
 } else {
 q->qpage = qpage;
@@ -389,8 +399,8 @@
 if (IS_ERR(qpage))

return PTR_ERR(qpage);

-return xive_spapr_configure_queue(cpu, q, prio, qpage,
- xive_queue_shift);
+return xive_spapr_configure_queue(get_hard_smp_processor_id(cpu),
+ q, prio, qpage, xive_queue_shift);
}

static void xive_spapr_cleanup_queue(unsigned int cpu, struct xive_cpu *xc,
@@ -399,10 +409,12 @@
struct xive_q *q = &xc->queue[prio];
unsigned int alloc_order;
long rc;
+int hw_cpu = get_hard_smp_processor_id(cpu);
+-rc = plpar_int_set_queue_config(0, cpu, prio, 0, 0);
+rc = plpar_int_set_queue_config(0, hw_cpu, prio, 0, 0);
if (rc)
-pr_err("Error %ld setting queue for prio %d\n", rc, prio);
+pr_err("Error %ld setting queue for CPU %d prio %d\n", rc,
+ hw_cpu, prio);

alloc_order = xive_alloc_order(xive_queue_shift);
free_pages((unsigned long)q->qpage, alloc_order);
@@ -431,11 +443,11 @@

static void xive_spapr_put_ipi(unsigned int cpu, struct xive_cpu *xc)
{
-if (!xc->hw_ipi)
+if (xc->hw_ipi == XIVE_BAD_IRQ)
    return;

    xive_irq_bitmap_free(xc->hw_ipi);
- xc->hw_ipi = 0;
+ xc->hw_ipi = XIVE_BAD_IRQ;
}
#endif /* CONFIG_SMP */

--- linux-4.15.0.orig/arch/powerpc/sysdev/xive/xive-internal.h
+++ linux-4.15.0/arch/powerpc/sysdev/xive/xive-internal.h
@@ -9,6 +9,13 @@
 #ifndef __XIVE_INTERNAL_H
 #define __XIVE_INTERNAL_H

+#ifdef __XIVE_INTERNAL_H
 #define __XIVE_INTERNAL_H
+
+/*
+ * A "disabled" interrupt should never fire, to catch problems
+ * we set its logical number to this
+ */
+*/

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+\#define XIVE_BAD_IRQ	0x7fffffff
+\#define XIVE_MAX_IRQ(XIVE_BAD_IRQ - 1)
+
/* Each CPU carry one of these with various per-CPU state */
struct xive_cpu {
    #ifdef CONFIG_SMP
--- linux-4.15.0.orig/arch/powerpc/tools/relocs_check.sh
+++ linux-4.15.0/arch/powerpc/tools/relocs_check.sh
@@ -23,7 +23,7 @@
vmlinux="$2"

bad_relocs=$(
-"$objdump" -R "$vmlinux" |
+"$objdump" -R "$vmlinux" |
    # Only look at relocation lines.
    grep -E '\<R_\>' |
    # These relocations are okay
--- linux-4.15.0.orig/arch/powerpc/tools/unrel_branch_check.sh
+++ linux-4.15.0/arch/powerpc/tools/unrel_branch_check.sh
@@ -18,14 +18,14 @@

end_intr=0x$(
-"$objdump" -R "$vmlinux" -d --start-address=0xc0000000000000000 |
+"$objdump" -R "$vmlinux" -d --start-address=0xc0000000000000000 |
    --stop-address=0xc0000000000000000 |
    grep '\<_end_interrupts>:' |
    awk '{print $1}'
)

BRANCHES=$(\n-"$objdump" -R "$vmlinux" -D --start-address=0xc0000000000000000 |
+"$objdump" -R "$vmlinux" -D --start-address=0xc0000000000000000 |
    --stop-address=$[end_intr] |
    grep -e "^[0-9a-f]*:[[:space:]]*([0-9a-f][0-9a-f][[:space:]]{4})[[[:space:]]*b" |
    grep -v '\<_start_initialization_multiplatform>:' |
--- linux-4.15.0.orig/arch/powerpc/xmon/Makefile
+++ linux-4.15.0/arch/powerpc/xmon/Makefile
@@ -1,7 +1,7 @@

# SPDX-License-Identifier: GPL-2.0
# Makefile for xmon

-subdir-ccflags-$(CONFIG_PPC_WERROR) := -Werror
+subdir-ccflags-$(CONFIG_PPC_WERROR) += -Werror

GCOV_PROFILE := n
UBSAN_SANITIZE := n
@@ -10,6 +10,12 @@
ORIG_CFLAGS := $(KBUILD_CFLAGS)
KBUILD_CFLAGS = $(subst -mno-sched-epilog,,$(subst $(CC_FLAGS_FTRACE),,$(ORIG_CFLAGS)))

+ifdef CONFIG_CC_IS_CLANG
+## clang stores addresses on the stack causing the frame size to blow
+## out. See https://github.com/ClangBuiltLinux/linux/issues/252
+KBUILD_CFLAGS += -Wframe-larger-than=4096
+endif
+
ccflags-$(CONFIG_PPC64) := $(NO_MINIMAL_TOC)

obj-y+= xmon.o nonstdio.o spr_access.o
--- linux-4.15.0.orig/arch/powerpc/xmon/nonstdio.c
+++ linux-4.15.0/arch/powerpc/xmon/nonstdio.c
@@ -182,7 +182,7 @@
if (n && rc == 0) {
/* No udbg hooks, fallback to printk() - dangerous */
-printk("%s", xmon_outbuf);
+pr_cont("%s", xmon_outbuf);
} }

--- linux-4.15.0.orig/arch/powerpc/xmon/ppc-dis.c
+++ linux-4.15.0/arch/powerpc/xmon/ppc-dis.c
@@ -162,7 +162,7 @@
dialect |= (PPC_OPCODE_POWER5 | PPC_OPCODE_POWER6 | PPC_OPCODE_POWER7 |
PPC_OPCODE_POWER8 | PPC_OPCODE_POWER9 | PPC_OPCODE_HTM |
PPC_OPCODE_ALTIVEC | PPC_OPCODE_ALTIVEC2 |
 PPC_OPCODE_VSX | PPC_OPCODE_VSX3),
+| PPC_OPCODE_VSX | PPC_OPCODE_VSX3);

 /* Get the major opcode of the insn. */
opcode = NULL;
--- linux-4.15.0.orig/arch/powerpc/xmon/xmon.c
+++ linux-4.15.0/arch/powerpc/xmon/xmon.c
@@ -79,8 +79,12 @@
#define xmon_owner 0
#define xmon_is_ro 0
#define xmon_on IS_ENABLED(CONFIG_XMON_DEFAULT)
+ifdef CONFIG_PPC_PSERIES
+static int set_indicator_token = RTAS_UNKNOWN_SERVICE;
+endif

/* Get the major opcode of the insn. */
opcode = NULL;
--- linux-4.15.0.orig/arch/powerpc/xmon/xmon.c
+++ linux-4.15.0/arch/powerpc/xmon/xmon.c
@@ -79,8 +79,12 @@
#define xmon_owner 0
#define xmon_is_ro 0
#define xmon_on IS_ENABLED(CONFIG_XMON_DEFAULT)
+ifdef CONFIG_PPC_PSERIES
+static int set_indicator_token = RTAS_UNKNOWN_SERVICE;
+endif

static unsigned long in_xmon __read_mostly = 0;
static int xmon_on = IS_ENABLED(CONFIG_XMON_DEFAULT);
static bool xmon_is_ro = IS_ENABLED(CONFIG_XMON_DEFAULT_RO_MODE);

static unsigned long adrs;
static int size = 1;
@@ -191,6 +195,8 @@
static void dump_tlb_book3e(void);
#endif
+static void clear_all_bpt(void);
+
 ifdef CONFIG_PPC64
 #define REG"%.16lx"
 else
@@ -203,6 +209,8 @@
#define GETWORD(v)(((v)[0] << 24) + ((v)[1] << 16) + ((v)[2] << 8) + (v)[3])
#endif
+static const char *xmon_ro_msg = "Operation disabled: xmon in read-only mode\n";
+
 static char *help_string = "\n Commands:\n bshow breakpoints\n @ @ -284,10 +292,26 @@
 " Ushow uptime information\n"
 " ?help\n"
 " # nlimit output to n lines per page (for dp, dpa, dl)\n"
 -" zreboot\n"
-" zhalt\n"
+" zreboot\n"
+" zhalt\n"
 ;

+static bool xmon_is_locked_down(void)
+{
+ /*
+ * Upstream has an integrity level of lockdown and a confidentiality
+ * level, and xmon_is_locked_down() checks both to determine what
+ * level of xmon restriction to enforce. For the Ubuntu backport we
+ * don't have this dual-level approach, and we only need to enforce
+ * the integrity level. This makes xmon read-only but returns 'false'
+ * from xmon_is_locked_down().
+ */
+if (!xmon_is_ro)
+xmon_is_ro = kernel_is_locked_down("xmon write access");
+
+return false;
+}
+
 static struct pt_regs *xmon_regs;

 static inline void sync(void)
#ifdef CONFIG_PPC_PSERIES
/* Since this can't be a module, args should end up below 4GB. */
static struct rtas_args args;
-int token;

/*
 * At this point we have got all the cpus we can into
 * If we did try to take rtas.lock there would be a
 * real possibility of deadlock.
 */
-token = rtas_token("set-indicator");
-if (token == RTAS_UNKNOWN_SERVICE)
+if (set_indicator_token == RTAS_UNKNOWN_SERVICE)
  return;

-rtas_call_unlocked(&args, token, 3, 1, NULL, SURVEILLANCE_TOKEN, 0, 0);
+rtras_call_unlocked(&args, set_indicator_token, 3, 1, NULL,
+   SURVEILLANCE_TOKEN, 0, 0);

#endif /* CONFIG_PPC_PSERIES */
}

return false;
}
-#endif /* CONFIG_SMP */
+#else /* CONFIG_SMP */
+static inline void get_output_lock(void) {}
+static inline void release_output_lock(void) {}
+#endif

static inline int unrecoverable_excp(struct pt_regs *regs)
{
 int cmd = 0;
 struct bpt *bp;
 long recurse_jmp[JMP_BUF_LEN];
+bool locked_down;
 unsigned long offset;
 unsigned long flags;
 #ifdef CONFIG_SMP
 @@ -467,8 +494,12 @@
    local_irq_save(flags);
    hard_irq_disable();

    -tracing_enabled = tracing_is_on();
    

-tracing_off();
+locked_down = xmon_is_locked_down();
+
+if (!fromipi) {
+tracing_enabled = tracing_is_on();
+tracing_off();
+}

bp = in_breakpoint_table(regs->nip, &offset);
if (bp != NULL) {
@@ -518,7 +549,8 @@
if (!fromipi) {
get_output_lock();
-excprint(regs);
+if (!locked_down)
+excprint(regs);
if (bp) {
printf("cpu 0x%x stopped at breakpoint 0x%lx (",
 cpu, BP_NUM(bp));
@@ -570,10 +602,14 @@
}
remove_bpts();
disable_surveillance();
-/* for breakpoint or single step, print the current instr. */
-if (bp || TRAP(regs) == 0xd00)
-ppc_inst_dump(regs->nip, 1, 0);
-printf("enter ? for help\n");
+
+if (!locked_down) {
+/* for breakpoint or single step, print curr insn */
+if (bp || TRAP(regs) == 0xd00)
+ppc_inst_dump(regs->nip, 1, 0);
+printf("enter ? for help\n");
+}
+}
mb();
xmon_gate = 1;
barrier();
@@ -597,8 +633,9 @@
spin_cpu_relax();
touch_nmi_watchdog();
} else {
-cmd = cmds(regs);
-if (cmd != 0) {
+if (!locked_down)
+cmd = cmds(regs);
+if (locked_down || cmd != 0) {

/* exiting xmon */
insert_bpts();
xmon_gate = 0;
@@ -635,13 +672,16 @@
    "can't continue\n");
remove_bpts();
disable_surveillance();
*/ for breakpoint or single step, print the current instr. */
-if (bp || TRAP(regs) == 0xd00)
-ppc_inst_dump(regs->nip, 1, 0);
-printf("enter ? for help\n");
+if (!locked_down)
+{ /* for breakpoint or single step, print current insn */
+if (bp || TRAP(regs) == 0xd00)
+ppc_inst_dump(regs->nip, 1, 0);
+printf("enter ? for help\n");
+}
}

-cmd = cmds(regs);
+if (!locked_down)
+cmd = cmds(regs);

insert_bpts();
in_xmon = 0;
@@ -670,7 +710,10 @@
 }
 }
#endif
-insert_cpu_bpts();
+if (locked_down)
+clear_all_bpt();
+else
+insert_cpu_bpts();

touch_nmi_watchdog();
local_irq_restore(flags);
@@ -980,6 +1023,10 @@
 memlocate();
 break;
case 'z':
+if (xmon_is_ro) {
+printf(xmon_ro_msg);
+break;
+}
memzcan();
break;
case 'r':
@@ -1033,6 +1080,10 @@
    set_lpp_cmd();
    break;
  case 'b':
+   if (xmon_is_ro) {
+     printf(xmon_ro_msg);
+     break;
+   }
    bpt_cmds();
    break;
  case 'C':
@@ -1046,6 +1097,10 @@
    bootcmds();
    break;
  case 'p':
+   if (xmon_is_ro) {
+     printf(xmon_ro_msg);
+     break;
+   }
    procall();
    break;
  case 'P':
@@ -1754,6 +1809,11 @@
    static void
    write_spr(int n, unsigned long val)
    {
+   if (xmon_is_ro) {
+     printf(xmon_ro_msg);
+     return;
+   }
+   if (setjmp(bus_error_jmp) == 0) {
    catch_spr_faults = 1;
    sync();
@@ -1853,15 +1913,14 @@
    printf("pidr = %.16lx_tidr = %.16lx\n",
    mfspr(SPRN_PID), mfspr(SPRN_TIDR));
-    printf("asdr = %.16lx psscr = %.16lx\n",
-    mfspr(SPRN_ASDR), hv ? mfspr(SPRN_PSSCR)
-    : mfspr(SPRN_PSSCR_PR));
+    mfspr(SPRN_PSSCR_PR));
+    printf("psscr = %.16lx\n",
+    hv ? mfspr(SPRN_PSSCR) : mfspr(SPRN_PSSCR_PR));
    if (!hv)
    return;
-    printf("ptcr = %.16lx\n", 

- mfspr(SPRN_PTCR);
+ printf("ptcr  = %.16lx  asdr  = %.16lx\n",
+ mfspr(SPRN_PTCR), mfspr(SPRN_ASDR));
# endif

@@ -1993,6 +2052,12 @@
 char *p, *q;

 n = 0;
+ if (xmon_is_ro) {
+ printf(xmon_ro_msg);
+ return n;
+ }
+
+ if (setjmp(bus_error_jmp) == 0) {
+ catch_memory_errors = 1;
+ sync();
@@ -2377,8 +2442,6 @@
 printf(" slb_cache[%d]:        = 0x%016lx\n", i, p->slb_cache[i]);

 DUMP(p, rfi_flush_fallback_area, "px");
- DUMP(p, l1d_flush_congruence, "llx");
- DUMP(p, l1d_flush_sets, "llx");
+ DUMP(p, dscr_default, "llx");
# endif

 DUMP(p, dscr_default, "llx");
 ifdef CONFIG_PPC_BOOK3E
@@ -2464,13 +2527,16 @@
 static void dump_one_xive(int cpu)
 {
 unsigned int hwid = get_hard_smp_processor_id(cpu);
+ bool hv = cpu_has_feature(CPU_FTR_HVMODE);

- opal_xive_dump(XIVE_DUMP_TM_HYP, hwid);
- opal_xive_dump(XIVE_DUMP_TM_POOL, hwid);
- opal_xive_dump(XIVE_DUMP_TM_OS, hwid);
- opal_xive_dump(XIVE_DUMP_TM_USER, hwid);
- opal_xive_dump(XIVE_DUMP_VP, hwid);
- opal_xive_dump(XIVE_DUMP_EMU_STATE, hwid);
+ if (hv) {
+ opal_xive_dump(XIVE_DUMP_TM_HYP, hwid);
+ opal_xive_dump(XIVE_DUMP_TM_POOL, hwid);
+ opal_xive_dump(XIVE_DUMP_TM_OS, hwid);
+ opal_xive_dump(XIVE_DUMP_TM_USER, hwid);
+ opal_xive_dump(XIVE_DUMP_VP, hwid);
+ opal_xive_dump(XIVE_DUMP_EMU_STATE, hwid);
+ }

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if (setjmp(bus_error_jmp) != 0) {
    catch_memory_errors = 0;
    scanhex((void *) &mcount);
    switch (cmd) {
    case 'm':
        if (xmon_is_ro) {
            printf(xmon_ro_msg);
            break;
        }
        memmove((void *)__dest, (void *)__msrc, mcount);
        break;
    case 's':
        if (xmon_is_ro) {
            printf(xmon_ro_msg);
            break;
        }
        memset((void *)__dest, mval, mcount);
        break;
    case 'd':
        __debugger_iabr_match = xmon_iabr_match;
        __debugger_break_match = xmon_break_match;
        __debugger_fault_handler = xmon_fault_handler;
        +#ifdef CONFIG_PPC_PSERIES
        */
        + * Get the token here to avoid trying to get a lock
        + * during the crash, causing a deadlock.
        + */
        +set_indicator_token = rtas_token("set-indicator");
        +#endif
        } else {
        __debugger = NULL;
        __debugger_ipi = NULL;
    } else {
        #ifdef CONFIG_MAGIC_SYSRQ
        static void sysrq_handle_xmon(int key)
{  
+if (xmon_is_locked_down()) {  
+clear_all_bpt();  
+xmon_init(0);  
+return;  
+}  
/* ensure xmon is enabled */  
xmon_init(1);  
debugger(get_irq_regs());  
@@ -3650,12 +3737,39 @@  
device_initcall(setup_xmon_sysrq);  
#endif /* CONFIG_MAGIC_SYSRQ */

+static void clear_all_bpt(void)  
+{  
+int i;  
+  
+/* clear/unpatch all breakpoints */  
+remove_bpts();  
+remove_cpu_bpts();  
+  
+/* Disable all breakpoints */  
+for (i = 0; i < NBPTS; ++i)  
+bpts[i].enabled = 0;  
+  
+/* Clear any data or iabr breakpoints */  
+if (iabr || dabr.enabled) {  
+iabr = NULL;  
+dabr.enabled = 0;  
+}  
+}  
+
+#ifdef CONFIG_DEBUG_FS  
static int xmon_dbgfs_set(void *data, u64 val)  
{  
xmon_on = !!val;  
xmon_init(xmon_on);  

+/* make sure all breakpoints removed when disabling */  
+if (!xmon_on) {  
+clear_all_bpt();  
+get_output_lock();  
+printf("xmon: All breakpoints cleared\n");  
+release_output_lock();  
+}  
+  
+return 0;  
}
static int __init early_parse_xmon(char *p)
{
    -if (!p || strncmp(p, "early", 5) == 0) {
    +if (xmon_is_locked_down()) {
        +xmon_init(0);
        +xmon_early = 0;
        +xmon_on = 0;
    } else if (!p || strncmp(p, "early", 5) == 0) {
        /* just "xmon" is equivalent to "xmon=early" */
        xmon_init(1);
        xmon_early = 1;
    } else if (strncmp(p, "on", 2) == 0) {
        xmon_init(1);
        xmon_on = 1;
    } else if (strncmp(p, "rw", 2) == 0) {
        +xmon_init(1);
        +xmon_on = 1;
        +xmon_is_ro = false;
    } else if (strncmp(p, "ro", 2) == 0) {
        +xmon_init(1);
        +xmon_on = 1;
        +xmon_is_ro = true;
    } else if (strncmp(p, "off", 3) == 0)
        xmon_on = 0;
    else
        --- linux-4.15.0.orig/arch/riscv/Makefile
        +++ linux-4.15.0/arch/riscv/Makefile
        @@ -69,4 +69,8 @@

        libs-y += arch/riscv/lib/

        +PHONY += vdso_install
        +vdso_install:
        +$(Q)$MAKE $(build)=arch/riscv/kernel/vdso $@

        all: vmlinuz
        --- linux-4.15.0.orig/arch/riscv/include/asm/asm-prototypes.h
        +++ linux-4.15.0/arch/riscv/include/asm/asm-prototypes.h
        @@ -0,0 +1,7 @@
        /* SPDX-License-Identifier: GPL-2.0 */
        +#ifndef _ASM_RISCV_PROTOTYPES_H
        +
        +#include <linux/ftrace.h>
        +#include <asm-generic/asm-prototypes.h>

    } else if (strncmp(p, "on", 2) == 0) {
        xmon_init(1);
        xmon_on = 1;
    } else if (strncmp(p, "rw", 2) == 0) {
        +xmon_init(1);
        +xmon_on = 1;
        +xmon_is_ro = false;
    } else if (strncmp(p, "ro", 2) == 0) {
        +xmon_init(1);
        +xmon_on = 1;
        +xmon_is_ro = true;
    } else if (strncmp(p, "off", 3) == 0)
        xmon_on = 0;
    else
        --- linux-4.15.0.orig/arch/riscv/Makefile
        +++ linux-4.15.0/arch/riscv/Makefile
        @@ -69,4 +69,8 @@

        libs-y += arch/riscv/lib/

        +PHONY += vdso_install
        +vdso_install:
        +$(Q)$MAKE $(build)=arch/riscv/kernel/vdso $@

        all: vmlinuz
        --- linux-4.15.0.orig/arch/riscv/include/asm/asm-prototypes.h
        +++ linux-4.15.0/arch/riscv/include/asm/asm-prototypes.h
        @@ -0,0 +1,7 @@
        /* SPDX-License-Identifier: GPL-2.0 */
        +#ifndef _ASM_RISCV_PROTOTYPES_H
        +
        +#include <linux/ftrace.h>
        +#include <asm-generic/asm-prototypes.h>
The AQ/RL pair provides a RCpc critical section, but there's not really any way we can take advantage of that here because the ordering is only enforced on that one lock. Thus, we're just doing a full fence.

Since we allow writeX to be called from preemptive regions we need at least an "o" in the predecessor set to ensure device writes are visible before the task is marked as available for scheduling on a new hart. While I don't see any concrete reason we need a full IO fence, it seems safer to just upgrade this in order to avoid any IO crossing a scheduling boundary. In both instances the scheduler pairs this with an mb(), so nothing is necessary on the new hart.

-#define smp_mb__after_spinlock() RISCV_FENCE(rw,rw)
+#define smp_mb__after_spinlock() RISCV_FENCE(iorw,iorw)

#include <asm-generic/barrier.h>

-define virt_addr_valid(vaddr) (pfn_valid(virt_to_pfn(vaddr)))
+#define virt_addr_valid(vaddr) {
+  unsigned long _addr = (unsigned long)vaddr;
+  (unsigned long)(_addr) >= PAGE_OFFSET && pfn_valid(virt_to_pfn(_addr));
+}
```c
#define VM_DATA_DEFAULT_FLAGS (VM_READ | VM_WRITE |
VM_MAYREAD | VM_MAYWRITE | VM_MAYEXEC)
--- linux-4.15.0.orig/arch/riscv/include/asm/pgtable-bits.h
+++ linux-4.15.0/arch/riscv/include/asm/pgtable-bits.h
@@ -35,6 +35,12 @@
#define _PAGE_SPECIAL _PAGE_SOFT
#define _PAGE_TABLE _PAGE_PRESENT

+/*
+ * _PAGE_PROT_NONE is set on not-present pages (and ignored by the hardware) to
+ * distinguish them from swapped out pages
+ */
+define _PAGE_PROT_NONE _PAGE_READ
+
#define _PAGE_PFN_SHIFT 10

/* Set of bits to preserve across pte_modify() */
--- linux-4.15.0.orig/arch/riscv/include/asm/pgtable.h
+++ linux-4.15.0/arch/riscv/include/asm/pgtable.h
@@ -44,7 +44,7 @@
/* Page protection bits */
#define _PAGE_BASE (_PAGE_PRESENT | _PAGE_ACCESSED | _PAGE_USER)

#define PAGE_NONE __pgprot(0)
+#define PAGE_NONE __pgprot(_PAGE_PROT_NONE)
#define PAGE_READ __pgprot(_PAGE_BASE | _PAGE_READ)
#define PAGE_WRITE __pgprot(_PAGE_BASE | _PAGE_READ | _PAGE_WRITE)
#define PAGE_EXEC __pgprot(_PAGE_BASE | _PAGE_READ | _PAGE_WRITE)
@@ -98,7 +98,7 @@
static inline int pmd_present(pmd_t pmd)
{
- return (pmd_val(pmd) & _PAGE_PRESENT);
+ return (pmd_val(pmd) & (_PAGE_PRESENT | _PAGE_PROT_NONE));
}

static inline int pmd_none(pmd_t pmd)
@@ -178,7 +178,7 @@
static inline int pte_present(pte_t pte)
{
- return (pte_val(pte) & _PAGE_PRESENT);
+ return (pte_val(pte) & (_PAGE_PRESENT | _PAGE_PROT_NONE));
}

static inline int pte_none(pte_t pte)
@@ -380,7 +380,7 @@
```
* Format of swap PTE:
  *bit  0: _PAGE_PRESENT (zero)
  - *bit  1: reserved for future use (zero)
  + *bit  1: _PAGE_PROT_NONE (zero)
  *bits  2 to 6: swap type
  *bits 7 to XLEN-1: swap offset
  */
--- linux-4.15.0.orig/arch/riscv/include/asm/processor.h
+++ linux-4.15.0/arch/riscv/include/asm/processor.h
@@ -22,7 +22,7 @@
 * This decides where the kernel will search for a free chunk of vm
 * space during mmap's.
 */
-#define TASK_UNMAPPED_BASE PAGE_ALIGN(TASK_SIZE >> 1)
+#define TASK_UNMAPPED_BASE PAGE_ALIGN(TASK_SIZE / 3)
#define STACK_TOPTASK_SIZE
#define STACK_TOP_MAXSTACK_TOP
--- linux-4.15.0.orig/arch/riscv/include/asm/spinlock.h
+++ linux-4.15.0/arch/riscv/include/asm/spinlock.h
@@ -17,6 +17,7 @@
 #include <linux/kernel.h>
 #include <asm/current.h>
+#include <asm/fence.h>
/*
 * Simple spin lock operations. These provide no fairness guarantees.
 @ @ -28,10 +29,7 @@

 static inline void arch_spin_unlock(arch_spinlock_t *lock)
 {__asm__ __volatile__ {
  __asm__ __volatile__ {
  "amoswap.w.rl x0, x0, %0"
  : "A" (lock->lock)
  : "memory";}
  +smp_store_release(&lock->lock, 0);
 }

 static inline int arch_spin_trylock(arch_spinlock_t *lock)
 @ @ -39,7 +37,8 @@
 int tmp = 1, busy;

 __asm__ __volatile__ {
  "amoswap.w.aq %0, %2, %1"
  +"amoswap.w %0, %2, %1\n"
  +RISCV_ACQUIRE_BARRIER
"="r" (busy), "+A" (lock->lock)
"r" (tmp)
"memory")
@@ -68,8 +67,9 @@
"1:	lr.w	%1, %0
"bltz%1, 1b"n"
"addi%1, %1, 1n"
"sc.w.aq%1, %1, %0n"
+"sc.w%1, %1, %0n"
"bnez%1, 1b"n"
+RISCV_ACQUIRE_BARRIER
: "+A" (lock->lock), "+=r" (tmp)
:: "memory")
{
}
@@ -82,8 +82,9 @@
"1:	lr.w	%1, %0
"bnez%1, 1b"n"
"li%1, -1n"
"sc.w.aq%1, %1, %0n"
+"sc.w%1, %1, %0n"
"bnez%1, 1b"n"
+RISCV_ACQUIRE_BARRIER
: "+A" (lock->lock), "+=r" (tmp)
:: "memory")
{
}
@@ -96,8 +97,9 @@
"1:	lr.w	%1, %0
"bltz%1, 1f"n"
"addi%1, %1, 1n"
"sc.w.aq%1, %1, %0n"
+"sc.w%1, %1, %0n"
"bnez%1, 1b"n"
+RISCV_ACQUIRE_BARRIER
: "+A" (lock->lock), "+=r" (busy)
:: "memory")
{
}
@@ -113,8 +115,9 @@
"1:	lr.w	%1, %0n"
"bltz%1, 1f"n"
"addi%1, %1, 1n"
"sc.w.aq%1, %1, %0n"
+"sc.w%1, %1, %0n"
"bnez%1, 1b"n"
+RISCV_ACQUIRE_BARRIER
: "+A" (lock->lock), "+=r" (busy)
:: "memory")
{
}
static inline void arch_read_unlock(arch_rwlock_t *lock)
{
    __asm__ __volatile__(
        "amoadd.w rl x0, %1, %0"
    : "A" (lock->lock)
    : "r" (-1)
    : "memory";
}

static inline void arch_write_unlock(arch_rwlock_t *lock)
{
    __asm__ __volatile__(
        "amoswap.w rl x0, x0, %0"
    : "A" (lock->lock)
    :: "memory";
    smp_store_release(&lock->lock, 0);
}

#endif /* _ASM_RISCV_SPINLOCK_H */
--- linux-4.15.0.orig/arch/riscv/include/asm/switch_to.h
+++ linux-4.15.0/arch/riscv/include/asm/switch_to.h
@@ -23,7 +23,7 @@

static inline void __fstate_clean(struct pt_regs *regs)
{
    regs->sstatus |= (regs->sstatus & ~(SR_FS)) | SR_FS_CLEAN;
+regs->sstatus = (regs->sstatus & ~SR_FS) | SR_FS_CLEAN;
}

static inline void syscall_set_arguments(struct task_struct *task,
if (i == 0) {
    regs->orig_a0 = args[0];
    args++;
    i++;
    n--;
}
memcpy(&regs->a1 + i * sizeof(regs->a1), args, n * sizeof(regs->a0));
} else {
    i--;
}
memcpy(&regs->a1 + i, args, n * sizeof(regs->a1));
}
*/

".balign 4\n"
"4:\n"
"li %0, %6\n"
"jump 2b, %1\n"
".previous\n"
".section __ex_table,"a"
".balign "RISCV_SZPTR "\n"
".previous\n"
".section __ex_table,"a"
".align 16
The code snippet above includes checks for thread information allocation and vector size definitions. It also contains assembly code fragments for different sections of the assembly file.
struct device_node *node,
    enum cache_type type, unsigned int level)
{
    this_leaf->of_node = node;
    this_leaf->level = level;
    this_leaf->type = type;
    /* not a sector cache */
    @@ -32,7 +31,7 @@
        | CACHE_WRITE_ALLOCATE;
    }

-static int __init_cache_level(unsigned int cpu)
+int init_cache_level(unsigned int cpu)
{
    struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
    struct device_node *np = of_cpu_device_node_get(cpu);
    @@ -68,7 +67,7 @@
        return 0;
    }

-static int __populate_cache_leaves(unsigned int cpu)
+int populate_cache_leaves(unsigned int cpu)
{
    struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
    struct cacheinfo *this_leaf = this_cpu_ci->info_list;
    @@ -100,6 +99,3 @@
        return 0;
    }

    -DEFINE_SMP_CALL_CACHE_FUNCTION(init_cache_level)
    -DEFINE_SMP_CALL_CACHE_FUNCTION(populate_cache_leaves)
--- linux-4.15.0.orig/arch/riscv/kernel/entry.S
+++ linux-4.15.0/arch/riscv/kernel/entry.S
@@ -442,6 +442,7 @@

 .section ".rodata"
+.align LGREG
    /* Exception vector table */
    ENTRY(excp_vect_table)
    RISCV_PTR do_trap_insn_misaligned
--- linux-4.15.0.orig/arch/riscv/kernel/irq.c
+++ linux-4.15.0/arch/riscv/kernel/irq.c
@@ -16,10 +16,6 @@
 #include <linux/irqchip.h>
 #include <linux/irqdomain.h>

-#ifdef CONFIG_RISCV_INTC
-#include <linux/irqchip/irq-riscv-intc.h>
-#endif

 void __init init_IRQ(void)
 {
 irqchip_init();
--- linux-4.15.0.orig/arch/riscv/kernel/module.c
+++ linux-4.15.0/arch/riscv/kernel/module.c
@@ -16,6 +16,10 @@
 #include <linux/err.h>
 #include <linux/errno.h>
 #include <linux/moduleloader.h>
+#include <linux/vmalloc.h>
+#include <linux/sizes.h>
+#include <asm/pgtable.h>
+#include <asm/sections.h>

 static int apply_r_riscv_64_rela(struct module *me, u32 *location, Elf_Addr v)
 {
 @@ -215,3 +219,15 @@
 return 0;
 }
 +
 +#if defined(CONFIG_MMU) && defined(CONFIG_64BIT)
 +#define VMALLOC_MODULE_START \
 + max(PFN_ALIGN((unsigned long)&_end - SZ_2G), VMALLOC_START)
 +#define VMALLOC_END, GFP_KERNEL,
 + PAGE_KERNEL_EXEC, 0, NUMA_NO_NODE,
 + __builtin_return_address(0));
 +
 } +
 +#endif
 --- linux-4.15.0.orig/arch/riscv/kernel/ptrace.c
+++ linux-4.15.0/arch/riscv/kernel/ptrace.c
@@ -50,7 +50,7 @@
 struct pt_regs *regs;

 regs = task_pt_regs(target);
-ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf, &regs, 0, -1);

+ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf, regs, 0., -1);
return ret;
}

@@ -120,6 +120,6 @@

#ifdef CONFIG_HAVE_SYSCALL_TRACEPOINTS
if (test_thread_flag(TIF_SYSCALL_TRACEPOINT))
    trace_sys_exit(regs, regs->regs[0]);
+trace_sys_exit(regs, regs_return_value(regs));
#endif
}

--- linux-4.15.0.orig/arch/riscv/kernel/setup.c
+++ linux-4.15.0/arch/riscv/kernel/setup.c
@@ -19,6 +19,7 @@
 */

+#include <linux/bootmem.h>
#include <linux/init.h>
#include <linux/mem.h>
#include <linux/memblock.h>
@@ -67,15 +68,8 @@
#endif CONFIG_BLK_DEV_INITRD
static void __init setup_initrd(void)
{
    extern char __initramfs_start[];
    extern unsigned long __initramfs_size;
    unsigned long size;
    if (__initramfs_size > 0) {
        -initrd_start = (unsigned long)&__initramfs_start;
        -initrd_end = initrd_start + __initramfs_size;
    -}
    if (initrd_start >= initrd_end) {
        printk(KERN_INFO "initrd not found or empty");
goto disable;
    @ @ -194,7 +188,8 @@
BUG_ON(mem_size == 0);

    set_max_mapnr(PFN_DOWN(mem_size));
    -max_low_pfn = pfn_base + PFN_DOWN(mem_size);
+max_low_pfn = memblock_end_of_DRAM();
    +max_pfn = max_low_pfn;

#ifdef CONFIG_BLK_DEV_INITRD
    setup_initrd();
```
--- linux-4.15.0.orig/arch/riscv/kernel/stacktrace.c
+++ linux-4.15.0/arch/riscv/kernel/stacktrace.c
@@ -69,7 +69,7 @@

#if !CONFIG_FRAME_POINTER
-void notrace walk_stackframe(struct task_struct *task,
+void walk_stackframe(struct task_struct *task,
   struct pt_regs *regs, bool (*fn)(unsigned long, void *), void *arg)
{
   unsigned long sp, pc;
--- linux-4.15.0.orig/arch/riscv/kernel/time.c
+++ linux-4.15.0/arch/riscv/kernel/time.c
@@ -12,6 +12,7 @@
  * GNU General Public License for more details.
 */

+#include <linux/of_clk.h>
#include <linux/clocksource.h>
#include <linux/clockchips.h>
#include <linux/delay.h>
@@ -57,5 +58,6 @@
lpj_fine = riscv_timebase / HZ;

+of_clk_init(NULL);
init_clockevent();
}
--- linux-4.15.0.orig/arch/riscv/kernel/vdso/Makefile
+++ linux-4.15.0/arch/riscv/kernel/vdso/Makefile
@@ -30,15 +30,15 @@
$(call if_changed,vdsold)
# We also create a special relocatable object that should mirror the symbol
-# table and layout of the linked DSO. With ld -R we can then refer to
-# these symbols in the kernel code rather than hand-coded addresses.
+# table and layout of the linked DSO. With ld --just-symbols we can then
+# refer to these symbols in the kernel code rather than hand-coded addresses.
SYSCFLAGS_vdso.so.dbg = -shared -s -Wl,-soname=linux-vdso.so.1 \
   $(call cc-ldoption, -Wl$(comma)--hash-style=both)
$(obj)/vdso-dummy.o: $(src)/vdso.lds $(obj)/tt_sigreturn.o FORCE
$(call if_changed,vdsold)

-LDFLAGS_vdso-syms.o := -r -R
+LDFLAGS_vdso-syms.o := -r --just-symbols
$(obj)/vdso-syms.o: $(obj)/vdso-dummy.o FORCE
$(call if_changed,ld)

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@@ -52,10 +52,11 @@
+      cmd_vdsold = $(CC) $(KBUILD_CFLAGS) $(call cc-option, -no-pie) -nostdlib -nostartfiles
+                     $(SYSCFLAGS_$(@F)) \ 
+                     -Wl,-T,$(filter-out FORCE,$^) -o $@.tmp && 
+                     $(patsubst %, -G __vdso_%, $(vdso-syms)) $@.tmp $@ && 
+                     rm $@.tmp

# install commands for the unstripped file
quiet_cmd_vdso_install = INSTALL $@
--- linux-4.15.0.orig/arch/riscv/lib/delay.c
+++ linux-4.15.0/arch/riscv/lib/delay.c
@@ -88,7 +88,7 @@
 void udelay(unsigned long usecs)
 {
-   unsigned long ucycles = usecs * lpj_fine * UDELAY_MULT;
+   u64 ucycles = (u64)usecs * lpj_fine * UDELAY_MULT;
   +u64 ucycles = (u64)usecs * lpj_fine * UDELAY_MULT;

   if (unlikely(usecs > MAX_UDELAY_US)) {
     __delay((u64)usecs * riscv_timebase / 1000000ULL);
--- linux-4.15.0.orig/arch/riscv/mm/fault.c
+++ linux-4.15.0/arch/riscv/mm/fault.c
@@ -277,6 +278,18 @@

tpe_k = pte_offset_kernel(pmd_k, addr);
if (!pte_present(*pte_k))
   goto no_context;
+
+*/
+ * The kernel assumes that TLBs don't cache invalid
+ * entries, but in RISC-V, SFENCE.VMA specifies an
+ * ordering constraint, not a cache flush; it is
+ * necessary even after writing invalid entries.
Relying on flush_tlb_fix_spurious_fault would suffice, but the extra traps reduce performance. So, eagerly SFENCE.VMA.}

```c
local_flush_tlb_page(addr);
return;
}
```
If unsure, say Y.

+config KERNEL_NOBP
+def_bool n
+prompt "Enable modified branch prediction for the kernel by default"
+help
+ If this option is selected the kernel will switch to a modified
+ branch prediction mode if the firmware interface is available.
+ The modified branch prediction mode improves the behaviour in
+ regard to speculative execution.
+
+ With the option enabled the kernel parameter "nobp=0" or "nospec"
+ can be used to run the kernel in the normal branch prediction mode.
+
+ With the option disabled the modified branch prediction mode is
+ enabled with the "nobp=1" kernel parameter.
+
+ If unsure, say N.
+
+config EXPOLINE
+def_bool n
+prompt "Avoid speculative indirect branches in the kernel"
+help
+ Compile the kernel with the expoline compiler options to guard
+ against kernel-to-user data leaks by avoiding speculative indirect
+ branches.
+ Requires a compiler with -mindirect-branch=thunk support for full
+ protection. The kernel may run slower.
+
+ If unsure, say N.
+
+choice
+prompt "Expoline default"
+depends on EXPOLINE
+default EXPOLINE_FULL
+
+config EXPOLINE_OFF
+bool "spectre_v2=off"
+
+config EXPOLINE_AUTO
+bool "spectre_v2=auto"
+
+config EXPOLINE_FULL
+bool "spectre_v2=on"
+
+endchoice
+
To compile this driver as a module, choose M here: the module will be called vfio_ccw.

+config VFIO_AP
+def_tristate n
+prompt "VFIO support for AP devices"
+depends on S390_AP_IOMMU &amp; VFIO_MDEV_DEVICE &amp; KVM
+help
+This driver grants access to Adjunct Processor (AP) devices
+via the VFIO mediated device interface.
+
+To compile this driver as a module, choose M here: the module
+will be called vfio_ap.
+
endmenu

menu "Dump support"
@@ -836,7 +893,7 @@
config APPLDATA_BASE
def_bool n
prompt "Linux - VM Monitor Stream, base infrastructure"
-depends on PROC_FS
+depends on PROC_SYSCTL
+help
+This provides a kernel interface for creating and updating z/VM APPLDATA monitor records. The monitor records are updated at certain time
@@ -922,3 +979,11 @@
the KVM hypervisor.
+
endmenu
+
+config KMSG_IDS
+def_bool y
+prompt "Kernel message numbers"
+help
+Select this option if you want to include a message number to the
+prefix for kernel messages issued by the s390 architecture and
driver code. See "Documentation/s390/kmsg.txt" for more details.
--- linux-4.15.0.orig/arch/s390/Makefile
+++ linux-4.15.0/arch/s390/Makefile
@@ -62,7 +62,7 @@
    endif

    # new style option for packed stacks
-ifeq ($(call cc-option-yn,-mpacked-stack),y)
+ifeq ($(call cc-option-yn,-mpacked-stack -mbackchain -msoft-float),y)
cflags-$(CONFIG_PACK_STACK) += -mpacked-stack -D__PACK_STACK
aflags-$(CONFIG_PACK_STACK) += -D__PACK_STACK
endif
@@ -78,6 +78,16 @@
cflags-$(CONFIG_WARN_DYNAMIC_STACK) += -mwarn-dynamicstack
endif

+ifdef CONFIG_EXPOLINE
+  ifeq ($(call cc-option-yn,$(CC_FLAGS_MARCH) -mindirect-branch=thunk),y)
+    CC_FLAGS_EXPOLINE := -mindirect-branch=thunk
+    CC_FLAGS_EXPOLINE += -mfunction-return=thunk
+    export CC_FLAGS_EXPOLINE
+    cflags-y += $(CC_FLAGS_EXPOLINE) -DCC_USING_EXPOLINE
+  endif
+endif
+
+ifdef CONFIG_FUNCTION_TRACER
# make use of hotpatch feature if the compiler supports it
cc_hotpatch := -mhotpatch=0,3
@@ -111,7 +121,7 @@
all: image bzImage

-install: vmlinux
+install:
$q$(MAKE) $build=$(boot) $@

image bzImage: vmlinux
--- linux-4.15.0.orig/arch/s390/boot/Makefile
+++ linux-4.15.0/arch/s390/boot/Makefile
@@ -22,6 +22,6 @@
$(obj)/compressed/vmlinux: FORCE
$q$(MAKE) $build=$(obj)/compressed $@

-install: $(CONFIGURE) $(obj)/bzImage
+install:
  sh -x $(srctree)/$(obj)/install.sh $(KERNELRELEASE) $(obj)/bzImage \\
    System.map "$($(INSTALL_PATH))"
--- linux-4.15.0.orig/arch/s390/boot/compressed/Makefile
+++ linux-4.15.0/arch/s390/boot/compressed/Makefile
@@ -25,7 +25,7 @@
OBJECTS += $(obj)/head.o $(obj)/misc.o $(obj)/piggy.o

LDLFLAGS_vmlinux := --oformat $(LD_BFD) -e startup -T
-$(obj)/vmlinux: $(obj)/vmlinux.lds $(OBJECTS)
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+$\langle$obj$\rangle$/vmlinux: $\langle$obj$\rangle$/vmlinux.lds $\langle$OBJECTS$\rangle$ FORCE
$\langle$call if changed.ld$\rangle$

sed-sizes := -e 's/^[0-9a-fA-F]*\(|\[0-9a-fA-F]*\) . \|\(_\_bss_start\|\_\_end\)$$/#define SZ\2 0x\1/p'
@ @ -55,17 +55,17 @ @
suffix-$\langle$CONFIG KERNEL LZO$\rangle$ := lzo
suffix-$\langle$CONFIG KERNEL XZ$\rangle$ := xz

-$\langle$obj$\rangle$/vmlinux.bin.gz: $(vmlinux.bin.all-y)
+$\langle$call if changed.gz$\rangle$
-$\langle$obj$\rangle$/vmlinux.bin.gz: $(vmlinux.bin.all-y) FORCE
+$\langle$call if changed.gz$\rangle$

-$\langle$obj$\rangle$/vmlinux.bin.bz2: $(vmlinux.bin.all-y)
+$\langle$call if changed.bzip2$\rangle$
-$\langle$obj$\rangle$/vmlinux.bin.bz2: $(vmlinux.bin.all-y) FORCE
+$\langle$call if changed.bzip2$\rangle$

-$\langle$obj$\rangle$/vmlinux.bin.lz4: $(vmlinux.bin.all-y)
+$\langle$call if changed.lz4$\rangle$
-$\langle$obj$\rangle$/vmlinux.bin.lzma: $(vmlinux.bin.all-y)
+$\langle$call if changed.lzma$\rangle$

-$\langle$obj$\rangle$/vmlinux.bin.lzo: $(vmlinux.bin.all-y)
+$\langle$call if changed.lzo$\rangle$
-$\langle$obj$\rangle$/vmlinux.bin.lzo: $(vmlinux.bin.all-y) FORCE
+$\langle$call if changed.lzo$\rangle$

-$\langle$obj$\rangle$/vmlinux.bin.xz: $(vmlinux.bin.all-y)
+$\langle$call if changed.xzkern$\rangle$
+$\langle$call if changed.gzip$\rangle$
+$\langle$call if changed.bzip2$\rangle$
+$\langle$call if changed.lz4$\rangle$
+$\langle$call if changed.lzma$\rangle$
+$\langle$call if changed.lzo$\rangle$
+$\langle$call if changed.xz$\rangle$

LDFLAGS_piggy.o := -r --format binary --oformat $(LD_BFD) -T
--- linux-4.15.0.orig/arch/s390/crypto/aes_s390.c
+++ linux-4.15.0/arch/s390/crypto/aes_s390.c
@@ -27,14 +27,14 @@

#include <linux/module.h>
#include <linux/cpufeature.h>
#include <linux/init.h>
-#include <linux/spinlock.h>
+#include <linux/mutex.h>

#include <asm/cpacf.h>

static u8 *ctrblk;
-#static DEFINE_SPINLOCK(ctrblk_lock);
+static DEFINE_MUTEX(ctrblk_lock);

static cpacf_mask_t km_functions, kmc_functions, kmctr_functions,
   kma_functions;
@ @ -329,7 +329,7 @ @
static struct crypto_alg ecb_aes_alg = {
  .cra_name="ecb(aes)",
  .cra_driver_name="ecb-aes-s390",
  .cra_priority=400,/* combo: aes + ecb */
  .cra_flags=CRYPTO_ALG_TYPE_BLKCIPHER | CRYPTO_ALG_NEED_FALLOUT,
  .cra_blocksize=AES_BLOCK_SIZE,
},
@ -426,7 +426,7 @@
static struct crypto_alg cbc_aes_alg = {
  .cra_name="cbc(aes)",
  .cra_driver_name="cbc-aes-s390",
  .cra_priority=400,/* combo: aes + cbc */
  .cra_flags=CRYPTO_ALG_TYPE_BLKCIPHER | CRYPTO_ALG_NEED_FALLOUT,
  .cra_blocksize=AES_BLOCK_SIZE,
},
@@ -426,7 +426,7 @@
static struct crypto_alg xts_aes_alg = {
  .cra_name="xts(aes)",
  .cra_driver_name="xts-aes-s390",
  .cra_priority=400,/* combo: aes + xts */
  .cra_flags=CRYPTO_ALG_TYPE_BLKCIPHER | CRYPTO_ALG_NEED_FALLOUT,
  .cra_blocksize=AES_BLOCK_SIZE,
},
@@ -698,7 +704,7 @@
unsigned int n, nbytes;

int ret, locked;

-locked = spin_trylock(&ctrblk_lock);
+locked = mutex_trylock(&ctrblk_lock);

ret = blkcipher_walk_virt_block(desc, walk, AES_BLOCK_SIZE);
while ((nbytes = walk->nbytes) >= AES_BLOCK_SIZE) {
@@ -716,7 +722,7 @@

ret = blkcipher_walk_done(desc, walk, nbytes - n);
}
if (locked)
-spin_unlock(&ctrblk_lock);
+mutex_unlock(&ctrblk_lock);
/*
 * final block may be < AES_BLOCK_SIZE, copy only nbytes
 */
@@ -763,7 +769,7 @@
static struct crypto_alg ctr_aes_alg = {
 .cra_name = "ctr(aes)",
 .cra_driver_name = "ctr-aes-s390",
-.cra_priority = 400, /* combo: aes + ctr */
+.cra_priority = 402, /* ecb-aes-s390 + 1 */
 .cra_flags = CRYPTO_ALG_TYPE_BLKCIIPHER | CRYPTO_ALG_NEED_FALLBACK,
 .cra_blocksize = 1,
@@ -826,19 +832,45 @@
return 0;
}

-static void gcm_sg_walk_start(struct gcm_sg_walk *gw, struct scatterlist *sg,
- unsigned int len)
+static void gcm_walk_start(struct gcm_sg_walk *gw, struct scatterlist *sg,
+ unsigned int len)
{
memset(gw, 0, sizeof(*gw));
gw->walk_bytes_remain = len;
scatterwalk_start(&gw->walk, sg);
}

-static int gcm_sg_walk_go(struct gcm_sg_walk *gw, unsigned int minbytesneeded)
+static inline unsigned int _gcm_sg_clamp_and_map(struct gcm_sg_walk *gw)
+{
+struct scatterlist *nextsg;
+gw->walk_bytes = scatterwalk_clamp(&gw->walk, gw->walk_bytes_remain);
+while (!gw->walk_bytes) {
+nextsg = sg_next(gw->walk.sg);
+if (!nextsg)
+return 0;
+scatterwalk_start(&gw->walk, nextsg);
+gw->walk_bytes = scatterwalk_clamp(&gw->walk,
+ gw->walk_bytes_remain);
+
+gw->walk_ptr = scatterwalk_map(&gw->walk);
+return gw->walk_bytes;
+
+static inline void _gcm_sg_unmap_and_advance(struct gcm_sg_walk *gw,
+ unsigned int nbytes)
+
+{    
+gw->walk_bytes_remain -= nbytes;
+scatterwalk_unmap(&gw->walk);
+scatterwalk_advance(&gw->walk, nbytes);
+scatterwalk_done(&gw->walk, 0, gw->walk_bytes_remain);
+gw->walk_ptr = NULL;
+
+}
+
+static int gcm_in_walk_go(struct gcm_sg_walk *gw, unsigned int minbytesneeded)
+{    
+    int n;

    "/* minbytesneeded <= AES_BLOCK_SIZE */
    if (gw->buf_bytes && gw->buf_bytes >= minbytesneeded) {
        gw->ptr = gw->buf;
        gw->nbytes = gw->buf_bytes;
        goto out;
    }    
    gw->walk_bytes = scatterwalk_clamp(&gw->walk, gw->walk_bytes_remain);
    if (!gw->walk_bytes) {
        scatterwalk_start(&gw->walk, sg_next(gw->walk.sg));
        gw->walk_bytes = scatterwalk_clamp(&gw->walk,
            gw->walk_bytes_remain);
        if (!_gcm_sg_clamp_and_map(gw)) {
            gw->ptr = NULL;
            gw->nbytes = 0;
            goto out;
        }
        gw->walk_ptr = scatterwalk_map(&gw->walk);
    }
    if (!gw->buf_bytes && gw->walk_bytes >= minbytesneeded) {
        gw->ptr = gw->walk_ptr;
        n = min(gw->walk_bytes, AES_BLOCK_SIZE - gw->buf_bytes);
        memcpy(gw->buf + gw->buf_bytes, gw->walk_ptr, n);
        goto out;
    }
    
}
gw->buf_bytes += n;
-gw->walk_bytes_remain -= n;
-scatterwalk_unmap(&gw->walk);
-scatterwalk_advance(&gw->walk, n);
-scatterwalk_done(&gw->walk, 0, gw->walk_bytes_remain);
-
+_gcm_sg_unmap_and_advance(gw, n);
if (gw->buf_bytes >= minbytesneeded) {
    gw->ptr = gw->buf;
    gw->nbytes = gw->buf_bytes;
    goto out;
}
-
gw->walk_bytes = scatterwalk_clamp(&gw->walk,
    gw->walk_bytes_remain);
-if (!gw->walk_bytes) {
    scatterwalk_start(&gw->walk, sg_next(gw->walk.sg));
    gw->walk_bytes = scatterwalk_clamp(&gw->walk,
        gw->walk_bytes_remain);
+if(!_gcm_sg_clamp_and_map(gw)) {
    gw->ptr = NULL;
    gw->nbytes = 0;
    goto out;
}
 gw->walk_ptr = scatterwalk_map(&gw->walk);
}
out:
return gw->nbytes;
}

-static void gcm_sg_walk_done(struct gcm_sg_walk *gw, unsigned int bytesdone)
+static int gcm_out_walk_go(struct gcm_sg_walk *gw, unsigned int minbytesneeded)
{
    int n;
+if (gw->walk_bytes_remain == 0) {
    gw->ptr = NULL;
    gw->nbytes = 0;
    goto out;
    +}
    +if(!_gcm_sg_clamp_and_map(gw)) {
    gw->ptr = NULL;
    gw->nbytes = 0;
    goto out;
    +}
    +if (gw->walk_bytes >= minbytesneeded) {
+gw->ptr = gw->walk_ptr;
+gw->nbytes = gw->walk_bytes;
+goto out;
+
+scatterwalk_unmap(&gw->walk);
+gw->walk_ptr = NULL;
+
+gw->ptr = gw->buf;
+gw->nbytes = sizeof(gw->buf);
+
+out:
+return gw->nbytes;
+
+static int gcm_in_walk_done(struct gcm_sg_walk *gw, unsigned int bytesdone)
+{
+if (gw->ptr == NULL)
+ return;
+
+return 0;
+
+} else {
+
+int n = gw->buf_bytes - bytesdone;
+if (n > 0) {
+ memmove(gw->buf, gw->buf + bytesdone, n);
+ gw->buf_bytes -= n;
+ } else
+ gw->buf_bytes = 0;
+ } else {
- gw->walk_bytes_remain -= bytesdone;
- scatterwalk_unmap(&gw->walk);
- scatterwalk_advance(&gw->walk, bytesdone);
- scatterwalk_done(&gw->walk, 0, gw->walk_bytes_remain);
- }
+ } else
+ _gcm_sg_unmap_and_advance(gw, bytesdone);
+
+return bytesdone;
+

+static int gcm_out_walk_done(struct gcm_sg_walk *gw, unsigned int bytesdone)
+{
+ int i, n;
+ if (gw->ptr == NULL)
+ return 0;
+}
+if (gw->ptr == gw->buf) {
+for (i = 0; i < bytesdone; i += n) {
+if (!_gcm_sg_clamp_and_map(gw))
+return i;
+n = min(gw->walk_bytes, bytesdone - i);
+memcpy(gw->walk_ptr, gw->buf + i, n);
+_gcm_sg_unmap_and_advance(gw, n);
+
} else
+_gcm_sg_unmap_and_advance(gw, bytesdone);
+
+return bytesdone;
}

static int gcm_aes_crypt(struct aead_request *req, unsigned int flags)
@@ -926,7 +995,7 @@
unsigned int pclen = req->cryptlen;
int ret = 0;

-unsigned int len, in_bytes, out_bytes,
+unsigned int n, len, in_bytes, out_bytes,
    min_bytes, bytes, aad_bytes, pc_bytes;
struct gcm_sg_walk gw_in, gw_out;
unsigned char tag[GHASH_DIGEST_SIZE];
@@ -963,14 +1032,14 @@
*(u32 *)(param.j0 + ivsize) = 1;
memcpy(param.k, ctx->key, ctx->key_len);
-gcm_sg_walk_start(&gw_in, req->src, len);
-gcm_sg_walk_start(&gw_out, req->dst, len);
+gcm_walk_start(&gw_in, req->src, len);
+gcm_walk_start(&gw_out, req->dst, len);

do {
    min_bytes = min_t(unsigned int,
        aadlen > 0 ? aadlen : pclen, AES_BLOCK_SIZE);
-    in_bytes = gcm_sg_walk_go(&gw_in, min_bytes);
-    out_bytes = gcm_sg_walk_go(&gw_out, min_bytes);
+    in_bytes = gcm_in_walk_go(&gw_in, min_bytes);
+    out_bytes = gcm_out_walk_go(&gw_out, min_bytes);
    bytes = min(in_bytes, out_bytes);

    if (aadlen + pclen <= bytes) {
@@ -997,8 +1066,11 @@
gw_in.ptr + aad_bytes, pc_bytes,
gw_in.ptr, aad_bytes);
gcm_sg_walk_done(&gw_in, aad_bytes + pc_bytes);
gcm_sg_walk_done(&gw_out, aad_bytes + pc_bytes);
+n = aad_bytes + pc_bytes;
+if (gcm_in_walk_done(&gw_in, n) != n)
+return -ENOMEM;
+if (gcm_out_walk_done(&gw_out, n) != n)
+return -ENOMEM;
aadlen -= aad_bytes;
pclen -= pc_bytes;
} while (aadlen + pclen > 0);
static struct crypto_alg *aes_s390_algs_ptr[5];
static int aes_s390_algs_num;
+static struct aead_alg *aes_s390_aead_alg;

static int aes_s390_register_alg(struct crypto_alg *alg)
{
    if (ctrblk)
        free_page((unsigned long) ctrblk);

-crypto_unregister_aead(&gcm_aes_aead);
+if (aes_s390_aead_alg)
    crypto_unregister_aead(aes_s390_aead_alg);
}
static int __init aes_s390_init(void)
{    ret = crypto_register_aead(&gcm_aes_aead);
    if (ret)
        goto out_err;
+aes_s390_aead_alg = &gcm_aes_aead;
}

return 0;
--- linux-4.15.0.orig/arch/s390/crypto/arch_random.c
+++ linux-4.15.0/arch/s390/crypto/arch_random.c
@@ -2,14 +2,37 @@
/*
 * s390 arch random implementation.
 *
- * Copyright IBM Corp. 2017
- * Author(s): Harald Freudenberger <freude@de.ibm.com>
+ * Copyright IBM Corp. 2017, 2018
+ * Author(s): Harald Freudenberger
+ *
+ * The s390_arch_random_generate() function may be called from random.c

in interrupt context. So this implementation does the best to be very
fast. There is a buffer of random data which is asynchronously checked
and filled by a workqueue thread.
* If there are enough bytes in the buffer the s390_arch_random_generate()
* just delivers these bytes. Otherwise false is returned until the
* worker thread refills the buffer.
* The worker fills the rng buffer by pulling fresh entropy from the
* high quality (but slow) true hardware random generator. This entropy
* is then spread over the buffer with an pseudo random generator PRNG.
* As the arch_get_random_seed_long() fetches 8 bytes and the calling
* function add_interrupt_randomness() counts this as 1 bit entropy the
* distribution needs to make sure there is in fact 1 bit entropy contained
* in 8 bytes of the buffer. The current values pull 32 byte entropy
* and scatter this into a 2048 byte buffer. So 8 byte in the buffer
* will contain 1 bit of entropy.
* The worker thread is rescheduled based on the charge level of the
* buffer but at least with 500 ms delay to avoid too much CPU consumption.
* So the max. amount of rng data delivered via arch_get_random_seed is
* limited to 4k bytes per second.
*/

#include <linux/kernel.h>
#include <linux/atomic.h>
#include <linux/random.h>
#include <linux/slab.h>
#include <linux/static_key.h>
#include <linux/workqueue.h>
#include <asm/cpacf.h>

DEFINE_STATIC_KEY_FALSE(s390_arch_random_available);
@@ -17,11 +40,87 @@
atomic64_t s390_arch_random_counter = ATOMIC64_INIT(0);
EXPORT_SYMBOL(s390_arch_random_counter);

#define ARCH_REFILL_TICKS (HZ/2)
#define ARCH_PRNG_SEED_SIZE 32
#define ARCH_RNG_BUF_SIZE 2048
+
+static DEFINE_SPINLOCK(arch_rng_lock);
+static u8 *arch_rng_buf;
+static unsigned int arch_rng_buf_idx;
+
+static void arch_rng_refill_buffer(struct work_struct *);
+static DECLARE_DELAYED_WORK(arch_rng_work, arch_rng_refill_buffer);
+
+bool s390_arch_random_generate(u8 *buf, unsigned int nbytes)
+{
+ /* max hunk is ARCH_RNG_BUF_SIZE */
+if (nbytes > ARCH_RNG_BUF_SIZE)
+return false;
+
+/* lock rng buffer */
+if (!spin_trylock(&arch_rng_lock))
+return false;
+
+/* try to resolve the requested amount of bytes from the buffer */
+arch_rng_buf_idx -= nbytes;
+if (arch_rng_buf_idx < ARCH_RNG_BUF_SIZE) {
+memcpy(buf, arch_rng_buf + arch_rng_buf_idx, nbytes);
+atomic64_add(nbytes, &s390_arch_random_counter);
+spin_unlock(&arch_rng_lock);
+return true;
+
+/* not enough bytes in rng buffer, refill is done asynchronously */
+spin_unlock(&arch_rng_lock);
+
+return false;
+
+} EXPORT_SYMBOL(s390_arch_random_generate);
+
+static void arch_rng_refill_buffer(struct work_struct *unused)
+{
+unsigned int delay = ARCH_REFILL_TICKS;
+
+spin_lock(&arch_rng_lock);
+if (arch_rng_buf_idx > ARCH_RNG_BUF_SIZE) {
+/* buffer is exhausted and needs refill */
+u8 seed[ARCH_PRNG_SEED_SIZE];
+u8 prng_wa[240];
+/* fetch ARCH_PRNG_SEED_SIZE bytes of entropy */
+cpacf_trng(NULL, 0, seed, sizeof(seed));
+/* blow this entropy up to ARCH_RNG_BUF_SIZE with PRNG */
+memset(prng_wa, 0, sizeof(prng_wa));
+cpacf_prno(CPACF_PRNO_SHA512_DRNG_SEED,
+   &prng_wa, NULL, 0, seed, sizeof(seed));
+cpacf_prno(CPACF_PRNO_SHA512_DRNG_GEN,
+   &prng_wa, arch_rng_buf, ARCH_RNG_BUF_SIZE, NULL, 0);
+arch_rng_buf_idx = ARCH_RNG_BUF_SIZE;
+}
+delay += (ARCH_REFILL_TICKS * arch_rng_buf_idx) / ARCH_RNG_BUF_SIZE;
+spin_unlock(&arch_rng_lock);
+
+/* kick next check */
+queue_delayed_work(system_long_wq, &arch_rng_work, delay);
+}
static int __init s390_arch_random_init(void)
{
  /* check if subfunction CPACF_PRNO_TRNG is available */
  if (cpacf_query_func(CPACF_PRNO, CPACF_PRNO_TRNG))
  /* all the needed PRNO subfunctions available? */
  if (cpacf_query_func(CPACF_PRNO, CPACF_PRNO_TRNG) &&
      cpacf_query_func(CPACF_PRNO, CPACF_PRNO_SHA512_DRNG_GEN)) {
    /* alloc arch random working buffer */
    arch_rng_buf = kmalloc(ARCH_RNG_BUF_SIZE, GFP_KERNEL);
    if (!arch_rng_buf)
      return -ENOMEM;
    /* kick worker queue job to fill the random buffer */
    queue_delayed_work(system_long_wq,
      &arch_rng_work, ARCH_REFILL_TICKS);
    /* enable arch random to the outside world */
    static_branch_enable(&s390_arch_random_available);
  }
  return 0;
}

--- linux-4.15.0.orig/arch/s390/crypto/crc32-vx.c
+++ linux-4.15.0/arch/s390/crypto/crc32-vx.c
@@ -239,6 +239,7 @@
    .cra_name = "crc32",
    .cra_driver_name = "crc32-vx",
    .cra_priority = 200,
+    .cra_flags = CRYPTO_ALG_OPTIONAL_KEY,
    .cra_blocksize = CRC32_BLOCK_SIZE,
    .cra_ctxsize = sizeof(struct crc_ctx),
    .cra_module = THIS_MODULE,
    @ @ -239,6 +239,7 @@
    .cra_name = "crc32be",
    .cra_driver_name = "crc32be-vx",
    .cra_priority = 200,
+    .cra_flags = CRYPTO_ALG_OPTIONAL_KEY,
    .cra_blocksize = CRC32_BLOCK_SIZE,
    .cra_ctxsize = sizeof(struct crc_ctx),
    .cra_module = THIS_MODULE,
    @ @ -259,6 +260,7 @@
    .cra_name = "crc32c",
    .cra_driver_name = "crc32c-vx",
    .cra_priority = 200,
+    .cra_flags = CRYPTO_ALG_OPTIONAL_KEY,
    .cra_blocksize = CRC32_BLOCK_SIZE,
.cra_ctxsize = sizeof(struct crc_ctx),
.cra_module = THIS_MODULE,
--- linux-4.15.0.orig/arch/s390/crypto/crc32be-vx.S
+++ linux-4.15.0/arch/s390/crypto/crc32be-vx.S
@@ -13,6 +13,7 @@
 */

#include <linux/linkage.h>
+#include <asm/nospec-insn.h>
#include <asm/vx-insn.h>

/* Vector register range containing CRC-32 constants */
@@ -67,6 +68,8 @@

.text
/*
* The CRC-32 function(s) use these calling conventions:
@@ -203,6 +206,6 @@

.Ldone:
VLGVF%r2,%v2,3
-br%r14
+BR_EX%r14

.previous
--- linux-4.15.0.orig/arch/s390/crypto/crc32le-vx.S
+++ linux-4.15.0/arch/s390/crypto/crc32le-vx.S
@@ -14,6 +14,7 @@
 */

#include <linux/linkage.h>
+#include <asm/nospec-insn.h>
#include <asm/vx-insn.h>

/* Vector register range containing CRC-32 constants */
@@ -264,6 +266,6 @@

.text

@@ -264,6 +266,6 @@
static u8 *ctrblk;
-static DEFINE_SPINLOCK(ctrblk_lock);
+static DEFINE_MUTEX(ctrblk_lock);

static cpacf_mask_t km_functions, kmc_functions, kmctr_functions;

unsigned int n, nbytes;
int ret, locked;

-locked = spin_trylock(&ctrblk_lock);
+locked = mutex_trylock(&ctrblk_lock);

ret = blkcipher_walk_virt_block(desc, walk, DES_BLOCK_SIZE);
while ((nbytes = walk->nbytes) >= DES_BLOCK_SIZE) {
    @ @ -404,7 +405,7 @@
    ret = blkcipher_walk_done(desc, walk, nbytes - n);
}
if (locked)
    spin_unlock(&ctrblk_lock);
+mutex_unlock(&ctrblk_lock);

/* final block may be < DES_BLOCK_SIZE, copy only nbytes */
if (nbytes) {
    cpacf_kmctr(fc, ctxt->key, buf, walk->src.virt.addr,
    --- linux-4.15.0.orig/arch/s390/crypto/paes_s390.c
    +++ linux-4.15.0/arch/s390/crypto/paes_s390.c
    @ @ -138,7 +138,7 @@
    static struct crypto_alg ecb_paes_alg = {


.cra_name="ecb(paes)",
.cra_driver_name="ecb-paes-s390",
-.cra_priority=400,/ combo: aes + ecb */
+.cra_priority=401,/ combo: aes + ecb + 1 */
cra_flags=CRYPTO_ALG_TYPE_BLK_CIPHER,
craBlockSize=AES_BLOCK_SIZE,
craCtxSize=sizeof(struct s390_paes_ctx),
@ @ -208,7 +208,7 @@
walk->dst.virt.addr, walk->src.virt.addr, n);

if (k)
ret = blkcipher_walk_done(desc, walk, nbytes - k);
-if (n < k) {
+if (k < n) {
if (__cbc_paes_set_key(ctx) != 0)
return blkcipher_walk_done(desc, walk, -EIO);
memcpy(param.key, ctx->pk.protkey, MAXPROTKEYSIZE);
@ @ -241,7 +241,7 @@
static struct crypto_alg cbc_paes_alg = {
 .cra_name="cbc(paes)",
 .cra_driver_name="cbc-paes-s390",
-.cra_priority=400,/ combo: aes + cbc */
+.cra_priority=402,/ ecb-paes-s390 + 1 */
cra_flags=CRYPTO_ALG_TYPE_BLK_CIPHER,
craBlockSize=AES_BLOCK_SIZE,
craCtxSize=sizeof(struct s390_paes_ctx),
@@ -377,7 +377,7 @@
static struct crypto_alg xts_paes_alg = {
 .cra_name="xts(paes)",
 .cra_driver_name="xts-paes-s390",
-.cra_priority=400,/ combo: aes + xts */
+.cra_priority=402,/ ecb-paes-s390 + 1 */
cra_flags=CRYPTO_ALG_TYPE_BLK_CIPHER,
craBlockSize=AES_BLOCK_SIZE,
craCtxSize=sizeof(struct s390_pxts_ctx),
@@ -523,7 +523,7 @@
static struct crypto_alg ctr_paes_alg = {
 .cra_name="ctr(paes)",
 .cra_driver_name="ctr-paes-s390",
-.cra_priority=400,/ combo: aes + ctr */
+.cra_priority=402,/ ecb-paes-s390 + 1 */
cra_flags=CRYPTO_ALG_TYPE_BLK_CIPHER,
craBlockSize=1,
craCtxSize=sizeof(struct s390_paes_ctx),
--- linux-4.15.0.orig/arch/s390/hypfs/inode.c
+++ linux-4.15.0/arch/s390/hypfs/inode.c
@@ -269,7 +269,7 @@
static int hypfs_fill_super(struct super_block *sb, void *data, int silent) {

struct inode *root_inode;
-struct dentry *root_dentry;
+struct dentry *root_dentry, *update_file;
int rc = 0;
struct hypfs_sb_info *sbi;

rc = hypfs_diag_create_files(root_dentry);
if (rc)
    return rc;
-sbi->update_file = hypfs_create_update_file(root_dentry);
-if (IS_ERR(sbi->update_file))
-    return PTR_ERR(sbi->update_file);
+update_file = hypfs_create_update_file(root_dentry);
+if (IS_ERR(update_file))
+    return PTR_ERR(update_file);
+sbi->update_file = update_file;
hypfs_update_update(sb);
pr_info("Hypervisor filesystem mounted\n");
return 0;
@@ -320,7 +321,7 @@
if (sb->s_root)
    hypfs_delete_tree(sb->s_root);
-if (sb_info->update_file)
+if (sb_info && sb_info->update_file)
    hypfs_remove(sb_info->update_file);
kfree(sb->s_fs_info);
sb->s_fs_info = NULL;
--- linux-4.15.0.orig/arch/s390/include/asm/alternative-asm.h
+++ linux-4.15.0/arch/s390/include/asm/alternative-asm.h
@@ -0,0 +1,108 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_S390_ALTERNATIVE_ASM_H
+#define _ASM_S390_ALTERNATIVE_ASM_H
+
+/* Check the length of an instruction sequence. The length may not be larger
+ * than 254 bytes and it has to be divisible by 2.
+ */
+.macro alt_len_check start,end
+  .if ( \end - \start ) > 254
+    .error "cpu alternatives does not support instructions blocks > 254 bytes\n"
+  .endif
+  .if ( \end - \start ) % 2
+    .error "cpu alternatives instructions length is odd\n"
+.*
+.*
+.*
+./
+.*
+.*
+.*
+.*
+.*
+.*
+.*
+.*
+.*
+.*
+ * in case @newinstr is longer than @oldinstr.
+ */
+.macro ALTERNATIVE oldinstr, newinstr, feature
+.pushsection .altinstr_replacement,"ax"
+770:newinstr
+771:.popsection
+772:oldinstr
+773:alt_len_check 770b, 771b
+alt_len_check 772b, 773b
+alt_pad ( ( 771b - 770b ) - ( 773b - 772b ) )
+774:.pushsection .altinstructions,"a"
+alt_entry 772b, 774b, 770b, 771b, \feature
+.popsection
+.endm
+
+ /*
+ * Define an alternative between two instructions. If @feature is
+ * present, early code in apply_alternatives() replaces @oldinstr with
+ * @newinstr. ".skip" directive takes care of proper instruction padding
+ * in case @newinstr is longer than @oldinstr.
+ */
+.macro ALTERNATIVE_2 oldinstr, newinstr1, feature1, newinstr2, feature2
+.pushsection .altinstr_replacement,"ax"
+770:newinstr1
+771:newinstr2
+772:.popsection
+773:oldinstr
+774:alt_len_check 770b, 771b
+alt_len_check 771b, 772b
+alt_len_check 773b, 774b
+if ( 771b - 770b > 772b - 771b )
+alt_pad ( ( 771b - 770b ) - ( 774b - 773b ) )
+else
+alt_pad ( ( 772b - 771b ) - ( 774b - 773b ) )
+.endif
+775:.pushsection .altinstructions,"a"
+alt_entry 773b, 775b, 770b, 771b, \feature1
+alt_entry 773b, 775b, 771b, 772b, \feature2
+.popsection
+.endm
+
+#endif /* __ASSEMBLY__ */
+
+#endif /* _ASM_S390_ALTERNATIVE_ASM_H */
--- linux-4.15.0.orig/arch/s390/include/asm/ap.h
+++ linux-4.15.0/arch/s390/include/asm/ap.h
@@ -20,9 +20,9 @@
*/

typedef unsigned int ap_qid_t;

#define AP_MKQID(_card, _queue) ((((_card) & 63) << 8 | ((_queue) & 255))
#define AP_QID_CARD(_qid) (((_qid) >> 8) & 63)
#define AP_QID_QUEUE(_qid) ((_qid) & 255)
#define AP_MKQID(_card, _queue) (((_card) & 0xff) << 8 | ((_queue) & 0xff))
#define AP_QID_CARD(_qid) (((_qid) >> 8) & 0xff)
#define AP_QID_QUEUE(_qid) ((_qid) & 0xff)

/**
 * struct ap_queue_status - Holds the AP queue status.
 */

++
* @qid: The AP queue number
* @info: Pointer to queue descriptor
*/

static inline struct ap_queue_status ap_tapq(ap_qid_t qid, unsigned long *info)
{
	register unsigned long reg0 asm("0") = qid;
	register struct ap_queue_status reg1 asm("1");
	register unsigned long reg2 asm("2");
	+

asm volatile(".long 0xb2af0000" /* PQAP(TAPQ) */
  :="d" (reg1), "=d" (reg2)
  : "d" (reg0)
  : "cc");
if (info)
  *info = reg2;
return reg1;
+
+/**
 * ap_test_queue(): Test adjunct processor queue.
 * @qid: The AP queue number
 * @tbit: Test facilities bit
 * @info: Pointer to queue status structure
 * '+
 * Returns AP queue status structure.
 */
 struct ap_queue_status ap_test_queue(ap_qid_t qid,
  int tbit,
  unsigned long *info);
static inline struct ap_queue_status ap_test_queue(ap_qid_t qid,
    int tbit,
    unsigned long *info)
{
  if (tbit)
    qid |= 1UL << 23; /* set T bit*/
  return ap_tapq(qid, info);
+
+/**
 * ap_pqap_rapq(): Reset adjunct processor queue.
 * @qid: The AP queue number
 * '+
 * Returns AP queue status structure.
 */
 static inline struct ap_queue_status ap_rapq(ap_qid_t qid)
{
  register unsigned long reg0 asm("0") = qid | (1UL << 24);
  register struct ap_queue_status reg1 asm("1");
  asm volatile(
    ".long 0xb2af0000" /* PQAP(RAPQ) */
    :="d" (reg1)
    : "d" (reg0)
    : "cc");
  return reg1;
+}
+/**
+ * ap_pqap_zapq(): Reset and zeroize adjunct processor queue.
+ * @qid: The AP queue number
+ *
+ * Returns AP queue status structure.
+ */
+static inline struct ap_queue_status ap_zapq(ap_qid_t qid)
+{
+ register unsigned long reg0 asm("0") = qid | (2UL << 24);
+ register struct ap_queue_status reg1 asm("1");
+
+asm volatile(
+".long 0xb2af0000" /* PQAP(ZAPQ) */
+":="="d" (reg1)
+:"d" (reg0)
+:"=cc";
+return reg1;
+}
+
+/**
+ * struct ap_config_info - convenience struct for AP crypto
+ * config info as returned by the ap_qci() function.
+ */
+struct ap_config_info {
+ unsigned int apsc : 1; /* S bit */
+ unsigned int apxa : 1; /* N bit */
+ @ @ -69,55 +160,204 @ @
+ unsigned char Nd; /* max # of Domains - 1 */
+ unsigned char _reserved3[10];
+ unsigned int apm[8]; /* AP ID mask */
+ unsigned int aqm[8]; /* AP queue mask */
+ unsigned int adm[8]; /* AP domain mask */
+ unsigned int aqm[8]; /* AP (usage) queue mask */
+ unsigned int adm[8]; /* AP (control) domain mask */
+ unsigned char _reserved4[16];
+} __aligned(8);
+
-/*
- * ap_query_configuration(): Fetch cryptographic config info
- */
-/**
- * ap_qci(): Get AP configuration data
- *
- * Returns the ap configuration info fetched via PQAP(QCI).
- * On success 0 is returned, on failure a negative errno
- * is returned, e.g. if the PQAP(QCI) instruction is not
- * available, the return value will be -EOPNOTSUPP.
- * Returns 0 on success, or -EOPNOTSUPP.
-register unsigned long reg0 asm("0") = 4UL << 24;
+register unsigned long reg1 asm("1") = -EOPNOTSUPP;
+register struct ap_config_info *reg2 asm("2") = config;
+
+asm volatile(
+".long 0xb2af0000n" /* PQAP(QCI) */
+"0: ln %0,0
" +"1:"
+EX_TABLE(0b, 1b)
+: "d" (reg1)
+: "d" (reg0), "d" (reg2)
+: "cc", "memory");
+
+return reg1;
+}
/*
 * struct ap_qirq_ctrl - convenient struct for easy invocation
 - * of the ap_queue_irq_ctrl() function. This struct is passed
 - * as GR1 parameter to the PQAP(AQIC) instruction. For details
 - * please see the AR documentation.
 + * of the ap_aqic() function. This struct is passed as GR1
 + * parameter to the PQAP(AQIC) instruction. For details please
 + * see the AR documentation.
 */
struct ap_qirq_ctrl {
unsigned int _res1 : 8;
 -unsigned int zone : 8; /* zone info */
 -unsigned int ir : 1; /* ir flag: enable (1) or disable (0) irq */
 +unsigned int zone : 8; /* zone info */
 +unsigned int ir : 1; /* ir flag: enable (1) or disable (0) irq */
 unsigned int _res2 : 4;
 -unsigned int gisc : 3; /* guest isc field */
 +unsigned int gisc : 3; /* guest isc field */
 unsigned int _res3 : 6;
 -unsigned int gf : 2; /* gisa format */
 +unsigned int gf : 2; /* gisa format */
 unsigned int _res4 : 1;
 -unsigned int gisa : 27; /* gisa origin */
 +unsigned int gisa : 27; /* gisa origin */
 unsigned int _res5 : 1;
 -unsigned int isc : 3; /* irq sub class */
 +unsigned int isc : 3; /* irq sub class */
};
/**
- * ap_queue_irq_ctrl(): Control interruption on a AP queue.
+ * ap_aqic(): Control interruption for a specific AP.
* @qid: The AP queue number
- * @qirqctrl: struct ap_qirq_ctrl, see above
+ * @qirqctrl: struct ap_qirq_ctrl (64 bit value)
* @ind: The notification indicator byte
* 
* Returns AP queue status.
+ */
+static inline struct ap_queue_status ap_aqic(ap_qid_t qid,
+    struct ap_qirq_ctrl qirqctrl,
+    void *ind)
+{
+  register unsigned long reg0 asm ("0") = qid | (3UL << 24);
+  register union {
+    unsigned long value;
+    struct ap_qirq_ctrl qirqctrl;
+    struct ap_queue_status status;
+  } reg1 asm ("1");
+  register void *reg2 asm ("2") = ind;
+  reg1.qirqctrl = qirqctrl;
+  asm volatile(
+    ".long 0xb2af0000" /* PQAP(AQIC) */
+    "+d" (reg1)
+    "+d" (reg0), "d" (reg2)
+    "+cc");
+  return reg1.status;
+}
+
+/*
+ * union ap_qact_ap_info - used together with the
+ * ap_aqic() function to provide a convenient way
+ * to handle the ap info needed by the qact function.
+ */
+union ap_qact_ap_info {
+  unsigned long val;
+  struct {
+    unsigned int : 3;
+    unsigned int mode : 3;
+    unsigned int : 26;
+    unsigned int cat : 8;
+    unsigned int : 8;
+    unsigned char ver[2];
+}
+/**
+ * ap_qact(): Query AP compatibility type.
+ * @qid: The AP queue number
+ * @apinfo: On input the info about the AP queue. On output the
+ * alternate AP queue info provided by the qact function
+ * in GR2 is stored in.
+ *
+ * Control interruption on the given AP queue.
+ * Just a simple wrapper function for the low level PQAP(AQIC)
+ * instruction available for other kernel modules.
+ */
+struct ap_queue_status ap_queue_irq_ctrl(ap_qid_t qid,
    struct ap_qirq_ctrl qirqctrl,
    void *ind);
+ * Returns AP queue status. Check response_code field for failures.
+ */
+static inline struct ap_queue_status ap_qact(ap_qid_t qid, int ifbit,
    union ap_qact_ap_info *apinfo)
+
+{+register unsigned long reg0 asm("0") = qid | (5UL << 24)
+| (ifbit & 0x01) << 22);
+register union {
+unsigned long value;
+struct ap_queue_status status;
+} reg1 asm("1");
+register unsigned long reg2 asm("2");
+
+reg1.value = apinfo->val;
+
+asm volatile(+".long 0xb2af0000"/* PQAP(QACT) */
+:+"+d" (reg1), ",=d" (reg2)
+:+"d" (reg0)
+:+"cc");
+apinfo->val = reg2;
+return reg1.status;
+}+
+/**
+ * ap_nqap(): Send message to adjunct processor queue.
+ * @qid: The AP queue number
+ * @psmid: The program supplied message identifier
+ * @msg: The message text
+ * @length: The message length
+ *
+ * Returns AP queue status structure.
+ * Condition code 1 on NQAP can't happen because the L bit is 1.
+ * Condition code 2 on NQAP also means the send is incomplete,
+ * because a segment boundary was reached. The NQAP is repeated.
+ */
+static inline struct ap_queue_status ap_nqap(ap_qid_t qid,
+     unsigned long long psmid,
+     void *msg, size_t length)
+{
+    * Returns AP queue status structure.
+ * Condition code 1 on DQAP means the receive has taken place
+ * but only partially. The response is incomplete, hence the
+ * DQAP is repeated.
+ * Condition code 2 on DQAP also means the receive is incomplete,
+ * this time because a segment boundary was reached. Again, the
+ * DQAP is repeated.
+ * Note that gpr2 is used by the DQAP instruction to keep track of
+ * any 'residual' length, in case the instruction gets interrupted.
+ * Hence it gets zeroed before the instruction.
+ */
+static inline struct ap_queue_status ap_dqap(ap_qid_t qid,
+     unsigned long long *psmid,
+     void *msg, size_t length)
+{
register struct ap_queue_status reg1 asm("1");
register unsigned long reg2 asm("2") = 0UL;
register unsigned long reg4 asm("4") = (unsigned long) msg;
register unsigned long reg5 asm("5") = (unsigned long) length;
register unsigned long reg6 asm("6") = 0UL;
register unsigned long reg7 asm("7") = 0UL;
+
+
asm volatile(
"0: .long 0xb2ae0064 /* DQAP */
" + " brc 6,0b"
+ ": +d" (reg0), ":=d" (reg1), "+d" (reg2),
+ "+d" (reg4), "+d" (reg5), "+d" (reg6), "+d" (reg7)
+ ": : "ce", ":memory");
+"*psmid = (((unsigned long long) reg6) << 32) + reg7;
+return reg1;
+
#endif /* _ASM_S390_AP_H_ */
--- linux-4.15.0.orig/arch/s390/include/asm/archrandom.h
+++ linux-4.15.0/arch/s390/include/asm/archrandom.h
@@ -15,16 +15,11 @@
 #include <linux/static_key.h>
 #include <linux/atomic.h>
 DECLARE_STATIC_KEY_FALSE(s390_arch_random_available);
-#include <asm/cpacf.h>
 extern atomic64_t s390_arch_random_counter;
+
-static void s390_arch_random_generate(u8 *buf, unsigned int nbytes)
-{
-    -cpacf_trng(NULL, 0, buf, nbytes);
-    -atomic64_add(nbytes, &s390_arch_random_counter);
-}
+bool s390_arch_random_generate(u8 *buf, unsigned int nbytes);

 static inline bool arch_has_random(void)
 {
- @ @ -51,8 +46,7 @@
 static inline bool arch_get_random_seed_long(unsigned long *v)
 { if (static_branch_likely(&s390_arch_random_available)) {
- s390_arch_random_generate((u8 *)v, sizeof(*v));
- return true;
+ return s390_arch_random_generate((u8 *)v, sizeof(*v));
 } return false;
static inline bool arch_get_random_seed_int(unsigned int *v) {
if (static_branch_likely(&s390_arch_random_available)) {
    -s390_arch_random_generate((u8 *)v, sizeof(*v));
    return true;
} else { // s390_arch_random_not_available
    return false;
}
}
--- linux-4.15.0.orig/arch/s390/include/asm/barrier.h
+++ linux-4.15.0/arch/s390/include/asm/barrier.h
@@ -60,8 +54,7 @@
t	return s390_arch_random_generate((u8 *)v, sizeof(*v));
}
return false;
}
--- linux-4.15.0.orig/arch/s390/include/asm/cpacf.h
+++ linux-4.15.0/arch/s390/include/asm/cpacf.h
@@ -28,6 +28,7 @@
#define CPACF_KMCTR 0xb92d /* MSA4 */

+/**
 + * array_index_mask_nospec - generate a mask for array_idx() that is
 + * ~0UL when the bounds check succeeds and 0 otherwise
 + * @index: array element index
 + * @size: number of elements in array
 + */
+#define array_index_mask_nospec array_index_mask_nospec
+static inline unsigned long array_index_mask_nospec(unsigned long index,
+                                        unsigned long size)
+{
+unsigned long mask;
+	if (__builtin_constant_p(size) && size > 0) {
+asm("clgr%2,%1\n"
+    "slbgr\%0,%0\n"
+    :"=d" (mask) :"d" (size-1), "d" (index) :":cc");
+return mask;
+}
+asm("clgr%1,%2\n"
+    "slbgr\%0,%0\n"
+    :":=d" (mask) :"d" (size), "d" (index) :":cc");
+return ~mask;
+}
+
#include <asm-generic/barrier.h>

#define __ASM_BARRIER_H */
--- linux-4.15.0.orig/arch/s390/include/asm/cpacf.h
+++ linux-4.15.0/arch/s390/include/asm/cpacf.h
@@ -28,6 +28,7 @@
#define CPACF_KMCTR 0xb92d /* MSA4 */
#define CPACF_PRNO 0xb93c	/* MSA5 */
#define CPACF_KMA 0xb929	/* MSA8 */
+#define CPACF_KDSA 0xb93a	/* MSA9 */

/* En/decryption modifier bits
--- linux-4.15.0.orig/arch/s390/include/asm/cpu_mf.h
+++ linux-4.15.0/arch/s390/include/asm/cpu_mf.h
@@ -26,6 +26,8 @@
CPU_MF_INT_SF_PRA|CPU_MF_INT_SF_SACA|
CPU_MF_INT_SF_LSDA)

+#define CPU_MF_SF_RIBM_NOTAV 0x1	/* Sampling unavailable */
+
/* CPU measurement facility support */
static inline int cpum_cf_avail(void)
{
@@ -67,8 +69,9 @@
unsigned long max_sampl_rate; /* 16-23: maximum sampling interval*/
unsigned long tear; /* 24-31: TEAR contents */
unsigned long dear; /* 32-39: DEAR contents */
-unsigned int rsvrd0; /* 40-43: reserved */
-unsigned int cpu_speed; /* 44-47: CPU speed */
+unsigned int rsvrd0:24; /* 40-42: reserved */
+unsigned int ribm:8; /* 43: Reserved by IBM */
+unsigned int cpu_speed; /* 44-47: CPU speed */
unsigned long long rsvrd1; /* 48-55: reserved */
unsigned long long rsvrd2; /* 56-63: reserved */
} __packed;
@@ -113,7 +116,7 @@
struct hws_diag_entry {
unsigned int def:16; /* 0-15  Data Entry Format */
-unsigned int R:14; /* 16-19 and 20-30 reserved */
+unsigned int R:15; /* 16-19 and 20-30 reserved */
unsigned int I:1; /* 31 entry valid or invalid */
u8 data[]; /* Machine-dependent sample data */
} __packed;
@@ -129,7 +132,9 @@
unsigned int f:1;/* 0 - Block Full Indicator */
unsigned int a:1;/* 1 - Alert request control */
unsigned int t:1;/* 2 - Timestamp format */
-unsigned long long:61; /* 3 - 63: Reserved */
+unsigned int :29; /* 3 - 31: Reserved */
+unsigned int bsdes:16; /* 32-47: size of basic SDE */
+unsigned int dsdes:16; /* 48-63: size of diagnostic SDE */
};
unsigned long long flags; /* 0 - 63: All indicators */
enum diag26c_sc {
+DIAG26C_PORT_VNIC = 0x00000024,
+DIAG26C_MAC_SERVICES = 0x00000030
};

enum diag26c_version {
-DIAG26C_VERSION2 = 0x00000002 /* z/VM 5.4.0 */
+DIAG26C_VERSION2 = 0x00000002 /* z/VM 5.4.0 */
+DIAG26C_VERSION6_VM65918 = 0x00020006 /* z/VM 6.4.0 + VM65918 */
};

#define DIAG26C_VNIC_INFO 0x0002

struct diag26c_vnic_req {
+u32 resp_buf_len;
+u32 resp_version;
+u16 req_format;
+u16vlan_id;
+u64sys_name;
+u8res[2];
+u16devno;
+} __packed __aligned(8);
+
#define VNIC_INFO_PROT_L3 1
#define VNIC_INFO_PROT_L2 2
/* Note: this is the bare minimum, use it for uninitialized VNICS only. */

struct diag26c_vnic_resp {
+u32 version;
+u32 entry_cnt;
+/* VNIC info: */
+u32next_entry;
+u64owner;
+u16devno;
+u8status;
+u8type;
+u64lan_owner;
+u64lan_name;
+u64port_name;
+u8port_type;
+u8ext_status:6;
+u8protocol:2;
+u16base_devno;
+u32port_num;


```c
/* 3x device info: */
+u8 dev_info1[28];
+u8 dev_info2[28];
+u8 dev_info3[28];
+} __packed __aligned(8);
+
#define DIAG26C_GET_MAC	0x0000
struct diag26c_mac_req {
    u32 resp_buf_len;
    --- linux-4.15.0.orig/arch/s390/include/asm/eadm.h
    +++ linux-4.15.0/arch/s390/include/asm/eadm.h
    @ @ -4,7 +4,7 @@

    #include <linux/types.h>
    #include <linux/device.h>
    -#include <linux/blkdev.h>
    +#include <linux/blk_types.h>

    struct arqb {
        u64 data;
        --- linux-4.15.0.orig/arch/s390/include/asm/elf.h
        +++ linux-4.15.0/arch/s390/include/asm/elf.h
        @ @ -107.6 +107.10 @@
        #define HWCAP_S390_VXRS_BCD4096
        #define HWCAP_S390_VXRS_EXT8192
        #define HWCAP_S390_GS	16384
        +#define HWCAP_S390_VXRS_EXT2	32768
        +#define HWCAP_S390_VXRS_PDE65536
        +#define HWCAP_S390_SORT131072
        +#define HWCAP_S390_DFLT262144

        /* Internal bits, not exposed via elf */
        #define HWCAP_INT_SIE1UL
        @ @ -252,11 +256,14 @@

        /*
         * Cache aliasing on the latest machines calls for a mapping granularity
         * - * of 512KB. For 64-bit processes use a 512KB alignment and a randomization
         * - * of up to 1GB. For 31-bit processes the virtual address space is limited,
         * - * use no alignment and limit the randomization to 8MB.
         * + * of 512KB for the anonymous mapping base. For 64-bit processes use a
         * + * 512KB alignment and a randomization of up to 1GB. For 31-bit processes
         * + * the virtual address space is limited, use no alignment and limit the
         * + * randomization to 8MB.
         * + * For the additional randomization of the program break use 32MB for
```
+ * 64-bit and 8MB for 31-bit.
+ */
+ static inline void __set_facility(unsigned long nr, void *facilities)
+ {
+ unsigned char *ptr = (unsigned char *) facilities;
+ +
+ if (nr >= MAX_FACILITY_BIT)
+ return;
+ +ptr[nr >> 3] |= 0x80 >> (nr & 7);
+ +}
+ +static inline void __clear_facility(unsigned long nr, void *facilities)
+ {
+ unsigned char *ptr = (unsigned char *) facilities;
+ +
+ if (nr >= MAX_FACILITY_BIT)
+ return;
+ +ptr[nr >> 3] &= ~(0x80 >> (nr & 7));
+ +}
+ +
+ static inline int __test_facility(unsigned long nr, void *facilities)
+ {
+ unsigned char *ptr;
+ return __test_facility(nr, &S390_lowcore.stfle_fac_list);
+ }
+ +static inline unsigned long __stfle_asm(u64 *stfle_fac_list, int size)
+ {
+ register unsigned long reg0 asm("0") = size - 1;
+ +
+ asm volatile(
+ "+.insn s,0xb2b00000,0(%1)" /* stfle */
+ "+:"+d" (reg0)
+ "+:"a" (stfle_fac_list)
+ "+:"memory", "cc");
+ return reg0;
stfle - Store facility list extended
*@stfle_fac_list: array where facility list can be stored
memcpy(stfle_fac_list, &S390_lowcore.stfl_fac_list, 4);
if (S390_lowcore.stfl_fac_list & 0x01000000) {
    /* More facility bits available with stfle */
    asm volatile("insn s,0xb2b00000,0(%1)" /* stfle */
        : "+d" (reg0)
        : "a" (stfle_fac_list)
        : "memory", "cc");
    nr = (reg0 + 1) * 8; /* # bytes stored by stfle */
    nr = __stfle_asm(stfle_fac_list, size);
    nr = min_t(unsigned long, (nr + 1) * 8, size * 8);
}
memset((char *) stfle_fac_list + nr, 0, size * 8 - nr);
preempt_enable();

extern char ftrace_graph_caller_end;
extern unsigned long ftrace_plt;
+extern void *ftrace_func;

struct dyn_arch_ftrace { }

#define JUMP_LABEL_NOP_SIZE 6
#define JUMP_LABEL_NOP_OFFSET 2

+#if __GNUC__ < 9
+#define JUMP_LABEL_STATIC_KEY_CONSTRAINT "X"
+#else
+#define JUMP_LABEL_STATIC_KEY_CONSTRAINT "jdd"
+#endif
+
/*
* We use a brcl 0,2 instruction for jump labels at compile time so it
* can be easily distinguished from a hotpatch generated instruction.
@ -19.9 +25.9 @
asm_volatile_goto("0:brcl 0,"__stringify(JUMP_LABEL_NOP_OFFSET)"n")
return false;
label:
@@ -33,9 +39,9 @@
asm_volatile_goto("0:brc1 15, %l[label]\n"
".pushsection __jump_table, \"aw\n"
".balign 8\n"
-".quad 0b, %l[label], %0\n"
+".quad 0b, %l[label], %0+%1\n"
".popsection\n"
-: : "X" (\&((char *)key)[branch]) : : label);
+: : JUMP_LABEL_STATIC_KEY_CONSTRAINT (key), "i" (branch) : : label);

return false;
label:
--- linux-4.15.0.orig/arch/s390/include/asm/kvm_host.h
+++ linux-4.15.0/arch/s390/include/asm/kvm_host.h
@@ -2,7 +2,7 @@
/*
 * definition for kernel virtual machines on s390
 * *
- * Copyright IBM Corp. 2008, 2009
+ * Copyright IBM Corp. 2008, 2018
 * *
 * Author(s): Carsten Otte <cotte@de.ibm.com>
 */
@@ -30,12 +30,12 @@
#define KVM_USER_MEM_SLOTS 32

/*
-* These seem to be used for allocating ->chip in the routing table,
-* which we don't use. 4096 is an out-of-thin-air value. If we need
-* to look at ->chip later on, we'll need to revisit this.
+* These seem to be used for allocating ->chip in the routing table, which we
+* don't use. 1 is as small as we can get to reduce the needed memory. If we
+* need to look at ->chip later on, we'll need to revisit this.
 */
#define KVM_NR_IRQCHIPS 1
-#define KVM_IRQCHIP_NUM_PINS 4096
+#define KVM_IRQCHIP_NUM_PINS 1
#define KVM_HALT_POLL_NS_DEFAULT 80000
/* s390-specific vcpu->requests bit members */

#define KVM_REQ_ICPT_OPEREXCKVM_ARCH_REQ(2)
#define KVM_REQ_START_MIGRATION KVM_ARCH_REQ(3)
#define KVM_REQ_STOP_MIGRATION KVM_ARCH_REQ(4)
+#define KVM_REQ_VSIE_RESTARTKVM_ARCH_REQ(5)

#define SIGP_CTRL_C 0x80
#define SIGP_CTRL_SCN_MASK 0x3f
@@ -44,6 +44,7 @@
#endif
#define KVM_REQ_ICPT_OPEREXCKVM_ARCH_REQ(2)
#define KVM_REQ_START_MIGRATION KVM_ARCH_REQ(3)
#define KVM_REQ_STOP_MIGRATION KVM_ARCH_REQ(4)
+#define KVM_REQ_VSIE_RESTARTKVM_ARCH_REQ(5)

#define ECA_MVPGI0x01000000
#define ECA_VX0x00020000
#define ECA_PROTEXC10x00002000
+#define ECA_APIE0x00000008
#define ECA_SI0x00000001
__u32 eca; /* 0x004c */
#define ICPT_INST 0x04
@@ -185,6 +186,7 @@
#ifndef __u32eca;
#pragma pack(4)
__u8 reservede4[4]; /* 0x0044 */
__u64 tecmc; /* 0x00e4 */
__u8 reservedf0[12]; /* 0x00f0 */
+#define CRYCB_FORMAT_MASK 0x00000003
+#define CRYCB_FORMAT0 0x00000000
+#define CRYCB_FORMAT1 0x00000001
#define CRYCB_FORMAT2 0x00000003
__u32 crycbd; /* 0x00fc */
@@ -252,6 +254,8 @@
__u8 reserved1c0[8]; /* 0x01c0 */
#define ECD_HOSTREGMGMT 0x20000000
#define ECD_MEF 0x08000000
+#define ECD_ETOKENF 0x02000000
#pragma pack(4)
#define ECD_ECC 0x00200000
__u32 ecd; /* 0x01c8 */
__u8 reserved1cc[18]; /* 0x01cc */
__u64 pp; /* 0x01de */
@@ -317,18 +323,30 @@

u64 deliver_program_int;
u64 deliver_io_int;
u64 exit_wait_state;
+u64 instruction_epsw;
u64 instruction_gs;
u64 instruction_io_other;
+u64 instruction_lpsw;
+u64 instruction_lpswe;
u64 instruction_pfmf;
+u64 instruction_ptff;
u64 instruction_sck;
+u64 instruction_sckpf;
u64 instruction_stdp;
u64 instruction_spx;
u64 instruction_stpx;
u64 instruction_stap;
-u64 instruction_storage_key;
+u64 instruction_iske;
+u64 instruction_ri;
+u64 instruction_rbbe;
+u64 instruction_sske;
u64 instruction_ipte_interlock;
-u64 instruction_stsch;
-u64 instruction_chsc;
u64 instruction_stsi;
u64 instruction_stfl;
+u64 instruction_tb;
+u64 instruction_tpi;
u64 instruction_tprot;
+u64 instruction_tsch;
u64 instruction_sie;
u64 instruction_essa;
u64 instruction_sthyi;
@@ -354,6 +372,7 @@
diagnose_258;
diagnose_308;
diagnose_500;
+u64 diagnose_other;
};

#define PGM_OPERATION	0x01
@@ -670,6 +689,7 @@
struct kvm_s390_cpu_model {
 /* facility mask supported by kvm & hosting machine */
 __u64 fac_mask[S390_ARCH_FAC_LIST_SIZE_U64];
+struct kvm_s390_vm_cpu_subfunc subfuncs;
 /* facility list requested by guest (in dma page) */
 __u64 *fac_list;
u64 cpuid;
@@ -681,6 +701,7 @@
 __u32 crycbd;
 __u8 aes_kw;
 __u8 dea_kw;
+__u8 apie;
};

#define APCB0_MASK_SIZE 1
@@ -787,6 +808,10 @@
void kvm_arch_async_page_present(struct kvm_vcpu *vcpu,
struct kvm_async_pf *work);

+void kvm_arch_crypto_clear_masks(struct kvm *kvm);
+void kvm_arch_crypto_set_masks(struct kvm *kvm, unsigned long *apm,
+    unsigned long *aqm, unsigned long *adm);
+
extern int sie64a(struct kvm_s390_sie_block *, u64 *);
extern char sie_exit;

@@ -797,7 +822,7 @@
static inline void kvm_arch_sched_in(struct kvm_vcpu *vcpu, int cpu) {}
static inline void kvm_arch_free_memslot(struct kvm *kvm,
    struct kvm_memory_slot *free, struct kvm_memory_slot *dont) {}
-static inline void kvm_arch_memslots_updated(struct kvm *kvm, struct kvm_memslots *slots) {}
+static inline void kvm_arch_memslots_updated(struct kvm *kvm, u64 gen) {}
static inline void kvm_arch_flush_shadow_all(struct kvm *kvm) {}
static inline void kvm_arch_flush_shadow_memslot(struct kvm *kvm,
    struct kvm_memory_slot *slot) {}
--- linux-4.15.0.orig/arch/s390/include/asm/lowcore.h
+++ linux-4.15.0/arch/s390/include/asm/lowcore.h
@@ -136,7 +136,11 @@
    __u64	vdso_per_cpu_data;/* 0x03b8 */
    __u64	machine_flags;/* 0x03c0 */
    __u64	gmap;/* 0x03c8 */
-    __u8	pad_0x03d0[0x0e00-0x03d0];/* 0x03d0 */
+    __u8	pad_0x03d0[0x0400-0x03d0];/* 0x03d0 */
+
+    /* br %r1 trampoline */
+    __u16	br_r1_trampoline;/* 0x0400 */
+    __u8	pad_0x0402[0x0f00-0x0402];/* 0x0402 */
+
/*
 * 0xe00 contains the address of the IPL Parameter Information
@@ -151,7 +155,8 @@
    __u8	pad_0x0e20[0x0f00-0x0e20];/* 0x0e20 */
 /* Extended facility list */
-    __u64stfle_fac_list[32];/* 0x0f00 */
+    __u64stfle_fac_list[16];/* 0x0f00 */
+    __u64alt_stfle_fac_list[16];/* 0x0f00 */
    __u64tstfle_fac_list[16];/* 0x0f80 */
-    __u8pad_0x1000[0x11b0-0x1000];/* 0x1000 */
+
/* Pointer to the machine check extended save area */
--- linux-4.15.0.orig/arch/s390/include/asm/mmu.h
+++ linux-4.15.0/arch/s390/include/asm/mmu.h
@@ -24,6 +24,8 @@
    unsigned int use_skey:1;
 /* The mmu context uses CMMA. */

unsigned int use_cmna:1;
+/* The mmu context is for compat task */
+unsigned int compat_mm:1;
] mm_context_t;

#define INIT_MM_CONTEXT(name) \ 
--- linux-4.15.0.orig/arch/s390/include/asm/mmu_context.h
+++ linux-4.15.0/arch/s390/include/asm/mmu_context.h
@@ -25,6 +25,7 @@
 atomic_set(&mm->context.flush_count, 0);
 mm->context.gmap_asce = 0;
 mm->context.flush_mm = 0;
+mm->context.compat_mm = test_thread_flag(TIF_31BIT);
#endif CONFIG_PGSTE
 mm->context.alloc_pgste = page_table_allocate_pgste ||
 test_thread_flag(TIF_PGSTE)) ||
@@ -44,8 +45,6 @@
 mm->context.asce_limit = STACK_TOP_MAX;
 mm->context.asce = __pa(mm->pgd) | _ASCE_TABLE_LENGTH | 
 _ASCE_USER_BITS | _ASCE_TYPE_REGION3;
-/* pgd_alloc() did not account this pud */
-mm_inc_nr_puds(mm);
break;
case -PAGE_SIZE:
/* forked 5-level task, set new asce with new_mm->pgd */
@@ -61,8 +60,6 @@
 /* forked 2-level compat task, set new asce with new mm->pgd */
 mm->context.asce = __pa(mm->pgd) | _ASCE_TABLE_LENGTH | 
 _ASCE_USER_BITS | _ASCE_TYPE_SEGMENT;
-/* pgd_alloc() did not account this pmd */
-mm_inc_nr_pmds(mm);
} 
crst_table_init((unsigned long *) mm->pgd, pgd_entry_type(mm));
return 0;
@@ -92,8 +89,6 @@
{
 int cpu = smp_processor_id();

-if (prev == next)
-return;
S390_lowcore.user_asce = next->context.asce;
cpumask_set_cpu(cpu, &next->context.cpu_attach_mask);
/* Clear previous user-ASCE from CR1 and CR7 */
@@ -105,7 +100,8 @@
__ctl_load(S390_lowcore.vdso_asce, 7, 7);
clear_cpu_flag(CIF_ASCE_SECONDARY);
}
cpumask_clear_cpu(cpu, &prev->context.cpu_attach_mask);
+if (prev != next)
+cpumask_clear_cpu(cpu, &prev->context.cpu_attach_mask);
+
#define finish_arch_post_lock_switch finish_arch_post_lock_switch

--- linux-4.15.0.orig/arch/s390/include/asm/nospec-branch.h
+++ linux-4.15.0/arch/s390/include/asm/nospec-branch.h
@@ -0,0 +1,17 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_S390_EXPOLINE_H
+#define _ASM_S390_EXPOLINE_H
+
+#ifndef __ASSEMBLY__
+
+#include <linux/types.h>
+
+extern int nospec_disable;
+
+void nospec_init_branches(void);
+void nospec_auto_detect(void);
+void nospec_revert(s32 *start, s32 *end);
+
+#endif /* __ASSEMBLY__ */
+
+#endif /* _ASM_S390_EXPOLINE_H */

--- linux-4.15.0.orig/arch/s390/include/asm/nospec-insn.h
+++ linux-4.15.0/arch/s390/include/asm/nospec-insn.h
@@ -0,0 +1,194 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_S390_NOSPEC_ASM_H
+#define _ASM_S390_NOSPEC_ASM_H
+
+#include <asm/alternative-asm.h>
+#include <asm/asm-offsets.h>
+#ifdef __ASSEMBLY__
+
+#ifdef CONFIG_EXPOLINE
+
+_LC_BR_R1 = __LC_BR_R1
+
+/*
+ * The expoline macros are used to create thunks in the same format
+ * as gcc generates them. The 'comdat' section flag makes sure that
+ * the various thunks are merged into a single copy.
+ */
+.
macro __THUNK_PROLOG_NAME name
+.pushsection .text\name,\"axG",@progbits,\name,comdat
+.globl \name

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+.macro __DECODE_RRR expand,rsave,rtarget,ruse
+.set __decode_fail,1
+.irp r1,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r2,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r3,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r4,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r5,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r6,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r7,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r8,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r9,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r10,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r11,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r12,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r13,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r14,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r15,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.expand \r1,\r2,\r3
+.set __decode_fail,0
+.endif
+.endif
+.endif
+.endif
+.endif
+.if __decode_fail == 1
+.error "__DECODE_RRR failed"
+.endif
+.endm
+
+.macro __DECODE_DRR expand,disp,reg,ruse
+.set __decode_fail,1
+.irp r1,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r2,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r3,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r4,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r5,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r6,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r7,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r8,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r9,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r10,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r11,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r12,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r13,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r14,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.irp r15,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
+.expand \disp,\r1,\r2
+.set __decode_fail,0
+.endif
+.endif
+.endif
+.endif
+.endif
+.if __decode_fail == 1
+.error "__DECODE_DRR failed"
+.endif
+.endm
+
+.macro __THUNK_EX_BR reg,ruse
+# Be very careful when adding instructions to this macro!
+# The ALTERNATIVE replacement code has a .+10 which targets
+# the "br \reg" after the code has been patched.
+#ifdef CONFIG_HAVE_MARCH_Z10_FEATURES
+exr10,555f
+j.
+#else
+.ifc \reg,%r1
+ALTERNATIVE "ex %r0,\_LC_BR_R1", ".insn ril,0xc60000000000,0,+.+10", 35
+.j.
+.else
+larl\ruse,555f
+ex0,0(\ruse)
+.j.
+.endif
+#endif
+555:br\reg
+.endm
+
+.macro __THUNK_EX_BC disp,\reg,\ruse
+#ifdef CONFIG_HAVE_MARCH_Z10_FEATURES
+exrl0,556f
+.j.
+#else
+larl\ruse,556f
+ex0,0(\ruse)
+.j.
+#endif
+556:bdisp(\reg)
+.endm
+
+.macro GEN_BR_THUNK reg,\ruse=%r1
+.DECODERR __THUNK_PROLOG_BR,\reg,\ruse
+.THUNK_EX_BR \reg,\ruse
+.THUNK_EPILOG
+.endm
+
+.macro GEN_B_THUNK disp,\reg,\ruse=%r1
+.DECODE_DRR __THUNK_PROLOG_BC,\disp,\reg,\ruse
+.THUNK_EX_BC \disp,\reg,\ruse
+.THUNK_EPILOG
+.endm
+
+.macro BR_EX reg,\ruse=%r1
+557:__DECODE_RR __THUNK_BR,\reg,\ruse
+.pushsection .s390_indirect_branches,"a",@progbits
+.long557b-.
+.popsection
+.endm
+
+.macro B_EX disp,\reg,\ruse=%r1
+558:__DECODE_DRR __THUNK_BC,\disp,\reg,\ruse
+.pushsection .s390_indirect_branches,"a",@progbits
+.long558b-.
+.popsection
+.endm
+
#define VM_DATA_DEFAULT_FLAGS (VM_READ | VM_WRITE | VM_MAYREAD | VM_MAYWRITE | VM_MAYEXEC)

+#define ARCH_ZONE_DMA_BITS 31
+
#include <asm-generic/memory_model.h>
#include <asm-generic/getorder.h>

--- linux-4.15.0.orig/arch/s390/include/asm/pci.h
+++ linux-4.15.0/arch/s390/include/asm/pci.h
@@ -172,7 +172,7 @@
 "CLP"
 int clp_scan_pci_devices(void);
 int clp_rescan_pci_devices(void);
-#int clp_rescan_pci_devices_simple(void);
+int clp_rescan_pci_devices_simple(u32 *fid);
 int clp_add_pci_device(u32, u32, int);
 int clp_enable_fh(struct zpci_dev *, u8);
 int clp_disable_fh(struct zpci_dev *);
 --- linux-4.15.0.orig/arch/s390/include/asm/percpu.h
+++ linux-4.15.0/arch/s390/include/asm/percpu.h
@@ -29,7 +29,7 @@
 typedef typeof(pcp) pcp_op_T__;
 pcp_op_T__ old__, new__, prev__;
 pcp_op_T__ *ptr__;
-#preempt_disable();
+preempt_disable_notrace();
 ptr__ = raw_cpu_ptr(&(pcp));
 prev__ = *ptr__;
 do {
@@ -37,7 +37,7 @@
 new__ = old__ op (val);
 prev__ = cmpxchg(ptr__, old__, new__); 
 } while (prev__ != old__); 
-#preempt_enable();
+preempt_enable_notrace();
+preempt_enable_notrace();
 new__;
})

@@ -68,7 +68,7 @@
 typedef typeof(pcp) pcp_op_T__; 
 pcp_op_T__ val__ = (val);
 pcp_op_T__ old__, *ptr__;
-#preempt_disable();
+preempt_disable_notrace();
 ptr__ = raw_cpu_ptr(&pcp);
 prev__ = *ptr__;
 do {
@@ -37,7 +37,7 @@
 new__ = old__ op (val);
 prev__ = cmpxchg(ptr__, old__, new__);
 } while (prev__ != old__); 
-#preempt_enable();
+preempt_enable_notrace();
+preempt_enable_notrace();
 new__; 
})
ptr__ = raw_cpu_ptr(&pcp);

if ((__builtin_constant_p(val__) &&
    ((szcast)val__ > -129) && ((szcast)val__ < 128)) { 
@ -84,7 +84,7 @@
    : [val__] "d" (val__)
    : "cc")
}

- preempt_enable();
+ preempt_enable_notrace();
}

#define this_cpu_add_4(pcp, val) arch_this_cpu_add(pcp, val, "laa", "asi", int)
@@ -95,14 +95,14 @@
typedef typeof(pcp) pcp_op_T__; 
    : [old__] "d" (old__), [ptr__] "+Q" (*ptr__)
    : [val__] "d" (val__)
    : "cc")
- preempt_enable();
+ preempt_enable_notrace();

# define this_cpu_and_4(pcp, val) arch_this_cpu_and(pcp, val, "lan")
@@ -136,10 +136,10 @@
typedef typeof(pcp) pcp_op_T__; 
    : [old__] "d" (old__), [ptr__] "+Q" (*ptr__)
    : [val__] "d" (val__)
    : "cc")
- preempt_enable();
+ preempt_enable_notrace();

# define this_cpu_and_4(pcp, val) arch_this_cpu_and_4(pcp, val, "lan")
@@ -176,8 +176,8 @@
 typedef typeof(pcp) pcp_op_T__; 
    : [old__] "d" (old__), [ptr__] "+Q" (*ptr__)
    : [val__] "d" (val__)
    : "cc")
- preempt_enable();
+ preempt_enable_notrace();

}
pcp_op_T__ ret__;\npcp_op_T__ *ptr__;\n-preempt_disable();\n+preempt_disable_notrace();\nptr__ = raw_cpu_ptr(&(pcp));\nret__ = cmpxchg(ptr__, oval, nval);\n-preempt_enable();\n+preempt_enable_notrace();\nret__;\n})

@@ -152,10 +152,10 @@
({
 typeof(pcp) *ptr__;\ntypeof(pcp) ret__;\n-preempt_disable();\n+preempt_disable_notrace();\nptr__ = raw_cpu_ptr(&(pcp));\nret__ = xchg(ptr__, nval);\n-preempt_enable();\n+preempt_enable_notrace();\nret__;\n})

@@ -171,11 +171,11 @@
typedef(pcp1) *p1__;\ntypedef(pcp2) *p2__;\nint ret__;\n-preempt_disable();\n+preempt_disable_notrace();\np1__ = raw_cpu_ptr(&pcp1));\np2__ = raw_cpu_ptr(&pcp2));\nret__ = __cmpxchg_double(p1__, p2__, o1__, o2__, n1__, n2__);\n-preempt_enable();\n+preempt_enable_notrace();\nret__;\n})

--- linux-4.15.0.orig/arch/s390/include/asm/pgalloc.h
+++ linux-4.15.0/arch/s390/include/asm/pgalloc.h
@@ -36,11 +36,11 @@
static inline unsigned long pgd_entry_type(struct mm_struct *mm)
 {
 -if (mm->context.asce_limit <= _REGION3_SIZE)
 +if (mm_pmd_folded(mm))
  return _SEGMENT_ENTRY_EMPTY;
 -if (mm->context.asce_limit <= _REGION2_SIZE)
+if (mm_pmd_folded(mm))
  return _SEGMENT_ENTRY_EMPTY;
+if (mm_pud_folded(mm))
    return _REGION3_ENTRY_EMPTY;
-iff (mm->context.asce_limit <= _REGION1_SIZE)
+if (mm_p4d_folded(mm))
    return _REGION2_ENTRY_EMPTY;
return _REGION1_ENTRY_EMPTY;
}
@@ -56,7 +56,12 @@
crst_table_init(table, _REGION2_ENTRY_EMPTY);
return (p4d_t *) table;
}
-#define p4d_free(mm, p4d) crst_table_free(mm, (unsigned long *) p4d)
+
+static inline void p4d_free(struct mm_struct *mm, p4d_t *p4d)
+{
+    +if (!mm_p4d_folded(mm))
+        crst_table_free(mm, (unsigned long *) p4d);
+
static inline pud_t *pud_alloc_one(struct mm_struct *mm, unsigned long address)
{
    crst_table_init(table, _REGION3_ENTRY_EMPTY);
return (pud_t *) table;
}
-#define pud_free(mm, pud) crst_table_free(mm, (unsigned long *) pud)
+
+static inline void pud_free(struct mm_struct *mm, pud_t *pud)
+{
+    +if (!mm_pud_folded(mm))
+        crst_table_free(mm, (unsigned long *) pud);
+
static inline pmd_t *pmd_alloc_one(struct mm_struct *mm, unsigned long vmaddr)
{
    crst_table_free(mm, (unsigned long *) pmd);
}
+if (mm_pmd_folded(mm))
    return;
pgtable_pmd_page_dtor(virt_to_page(pmd));
crst_table_free(mm, (unsigned long *) pmd);
}


_REGION_ENTRY_NOEXEC)

+static inline bool mm_p4d_folded(struct mm_struct *mm)
+{
+return mm->context.asce_limit <= _REGION1_SIZE;
+}
+#define mm_p4d_folded(mm) mm_p4d_folded(mm)
+
+static inline bool mm_pud_folded(struct mm_struct *mm)
+{
+return mm->context.asce_limit <= _REGION2_SIZE;
+}
+#define mm_pud_folded(mm) mm_pud_folded(mm)
+
+static inline bool mm_pmd_folded(struct mm_struct *mm)
+{
+return mm->context.asce_limit <= _REGION3_SIZE;
+}
+#define mm_pmd_folded(mm) mm_pmd_folded(mm)
+
+static inline int mm_has_pgste(struct mm_struct *mm)
+
+#ifdef CONFIG_PGSTE
@@ -1126,8 +1144,6 @@
static inline void set_pte_at(struct mm_struct *mm, unsigned long addr,
    pte_t *ptep, pte_t entry)
{
-if (!MACHINE_HAS_NX)
-pte_val(entry) &= ~_PAGE_NOEXEC;
if (pte_present(entry))
    pte_val(entry) &= ~_PAGE_UNUSED;
if (mm_has_pgste(mm))
@@ -1144,6 +1160,8 @@
    {}
    pte_t __pte;
    pte_val(__pte) = physpage + pgprot_val(pgprot);
+if (!MACHINE_HAS_NX)
+pte_val(__pte) &= ~_PAGE_NOEXEC;
    return pte_mkyoung(__pte);
+
--- linux-4.15.0.orig/arch/s390/include/asm/processor.h
+++ linux-4.15.0/arch/s390/include/asm/processor.h
@@ -91,6 +91,7 @@
extern const struct seq_operations cpuinfo_op;
extern int sysctl_ieee_emulation_warnings;
extern void execve_tail(void);
+extern void __bpon(void);
/ * User space process size: 2GB for 31 bit, 4TB or 8PT for 64 bit.
  @ @ -377,6 +378,9 @ @
memcpy_absolute(&(dest), &__tmp, sizeof(__tmp));
} while (0)

+extern int s390_isolate_bp(void);
+extern int s390_isolate_bp_guest(void);
+
#endif /* __ASSEMBLY__ */
#endif /* __ASM_S390_PROCESSOR_H */
--- linux-4.15.0.orig/arch/s390/include/asm/qdio.h
+++ linux-4.15.0/arch/s390/include/asm/qdio.h
@@ -228,7 +228,7 @@
    * @sbal: absolute SBAL address
    */
struct sl_element {
-  unsigned long sbal;
+  u64 sbal;
} __attribute__ ((packed));

/**
@@ -262,7 +262,6 @@
    void *user;
    }

-#define QDIO_OUTBUF_STATE_FLAG_NONE	0x00
#define QDIO_OUTBUF_STATE_FLAG_PENDING	0x01
#define CHSC_AC1_INITIATE_INPUTQ	0x80
--- linux-4.15.0.orig/arch/s390/include/asm/syscall.h
+++ linux-4.15.0/arch/s390/include/asm/syscall.h
@@ -38,7 +38,17 @@
    }

-#define QDIO_OUTBUF_STATE_FLAG_NONE0x00
+#define QDIO_OUTBUF_STATE_FLAG_PENDING0x01

+#define CHSC_AC1_INITIATE_INPUTQ0x80

static inline long syscall_get_error(struct task_struct *task, struct pt_regs *regs) {
+  unsigned long error = regs->gprs[2];
+  #ifdef CONFIG_COMPAT
+    if (test_tsk_thread_flag(task, TIF_31BIT)) {
+      /*
+       * Sign-extend the value so (int)-EFOO becomes (long)-EFOO
+       * and will match correctly in comparisons.
+       */
+      error = (long)(int)error;
+    }
  return error;
}
static inline long syscall_get_return_value(struct task_struct *task,}
--- linux-4.15.0.orig/arch/s390/include/asm/thread_info.h
+++ linux-4.15.0/arch/s390/include/asm/thread_info.h
@@ -60,6 +60,8 @@
  #define TIF_GUARDED_STORAGE 4 /* load guarded storage control block */
  #define TIF_PATCH_PENDING 5 /* pending live patching update */
  #define TIF_PGSTE 6 /* New mm's will use 4K page tables */
+  #define TIF_ISOLATE_BP 8 /* Run process with isolated BP */
+  #define TIF_ISOLATE_BP_GUEST 9 /* Run KVM guests with isolated BP */

  #define TIF_31BIT 16 /* 32bit process */
  #define TIF_MEMDIE 17 /* is terminating due to OOM killer */
@@ -80,6 +82,8 @@
  #define _TIF_UPROBE_BITUL(TIF_UPROBE)
  #define _TIF_GUARDED_STORAGE_BITUL(TIF_GUARDED_STORAGE)
  #define _TIF_PATCH_PENDING_BITUL(TIF_PATCH_PENDING)
+  #define _TIF_ISOLATE_BP_BITUL(TIF_ISOLATE_BP)
+  #define _TIF_ISOLATE_BP_GUEST_BITUL(TIF_ISOLATE_BP_GUEST)

  #define _TIF_31BIT_BITUL(TIF_31BIT)
  #define _TIF_SINGLE_STEP_BITUL(TIF_SINGLE_STEP)
--- linux-4.15.0.orig/arch/s390/include/asm/timex.h
+++ linux-4.15.0/arch/s390/include/asm/timex.h
@@ -10,8 +10,9 @@
  #ifndef _ASM_S390_TIMEX_H
  #define _ASM_S390_TIMEX_H
  #include <asm/lowcore.h>
+  #include <linux/preempt.h>
  #include <linux/time64.h>
+  #include <asm/lowcore.h>

  /* The value of the TOD clock for 1.1.1970. */
  #define TOD_UNIX_EPOCH 0x7d91048bca000000ULL
@@ -154,7 +155,7 @@
static inline unsigned long long get_tod_clock(void)
{
  unsigned char clk[STORE_CLOCK_EXT_SIZE];
+  char clk[STORE_CLOCK_EXT_SIZE];

  get_tod_clock_ext(clk);
  return *((unsigned long long *)&clk[1]);
@@ -186,15 +187,18 @@
static inline unsigned long long get_tod_clock_monotonic(void)
{
  -return get_tod_clock() - *(unsigned long *) &tod_clock_base[1];
  +unsigned long long tod;
  +
  +preempt_disable_notrace();
  +tod = get_tod_clock() - *(unsigned long *) &tod_clock_base[1];
  +preempt_enable_notrace();
  +return tod;
}

/*
--- linux-4.15.0.orig/arch/s390/include/asm/tlb.h
+++ linux-4.15.0/arch/s390/include/asm/tlb.h
@@ -116,6 +116,20 @@
   return tlb_remove_page(tlb, page);
 }

+static inline void tlb_flush_pmd_range(struct mmu_gather *tlb,
  +unsigned long address, unsigned long size)
  +{
  +/*
  +* the range might exceed the original range that was provided to
  +* tlb_gather_mmu(), so we need to update it despite the fact it is
  +* usually not updated.
  +*/
  +#if (tlb->start > address)
  +#tlb->start = address;
  +#if (tlb->end < address + size)
  +#tlb->end = address + size;
  +#}
  +
  /*
  * pte_free_tlb frees a pte table and clears the CRSTE for the
  * page table from the tlb.
  @@ -136,7 +150,7 @@
  static inline void pmd_free_tlb(struct mmu_gather *tlb, pmd_t *pmd,
unsigned long address)
{
-if (tlb->mm->context.asce_limit <= _REGION3_SIZE)
+if (mm_pmd_folded(tlb->mm))
    return;
    pgtable_pmd_page_dtor(virt_to_page(pmd));
    tlb_remove_table(tlb, pmd);
@@ -152,7 +166,7 @@
static inline void p4d_free_tlb(struct mmu_gather *tlb, p4d_t *p4d,
 unsigned long address)
{
-if (tlb->mm->context.asce_limit <= _REGION1_SIZE)
+if (mm_p4d_folded(tlb->mm))
    return;
    tlb_remove_table(tlb, p4d);
}
@@ -167,7 +181,7 @@
static inline void pud_free_tlb(struct mmu_gather *tlb, pud_t *pud,
 unsigned long address)
{
-if (tlb->mm->context.asce_limit <= _REGION2_SIZE)
+if (mm_pud_folded(tlb->mm))
    return;
    tlb_remove_table(tlb, pud);
}
@@ -177,6 +191,8 @@
#define tlb_remove_tlb_entry(tlb, ptep, addr) do { } while (0)
#define tlb_remove_pmd_tlb_entry(tlb, pmdp, addr) do { } while (0)
#define tlb_migrate_finish(mm) do { } while (0)
+#define tlb_flush_pmd_range(tlb, addr, sz) do { } while (0)
+
#define tlb_remove_huge_tlb_entry(h, tlb, ptep, address)
    tlb_remove_tlb_entry(tlb, ptep, address)\n    tlb_remove_tlb_entry(tlb, ptep, address)

--- linux-4.15.0.orig/arch/s390/include/asm/topology.h
+++ linux-4.15.0/arch/s390/include/asm/topology.h
@@ -68,11 +68,8 @@
#ifdef CONFIG_NUMA
-#define cpu_to_node cpu_to_node
-static inline int cpu_to_node(int cpu)
-{  }
-#define cpu_topology[cpu].node_id;
-}
+extern int __cpu_to_node(int cpu);
+#define cpu_to_node __cpu_to_node

#ifdef CONFIG_NUMA
-
#define cpu_to_node cpu_to_node
-static inline int cpu_to_node(int cpu)
-{
-#return cpu_topology[cpu].node_id;
-}
+extern int __cpu_to_node(int cpu);
+#define cpu_to_node __cpu_to_node

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/* Returns a pointer to the cpumask of CPUs on node 'node'. */
#define cpumask_of_node cpumask_of_node
--- linux-4.15.0.orig/arch/s390/include/asm/uaccess.h
+++ linux-4.15.0/arch/s390/include/asm/uaccess.h
@@ -56,8 +56,10 @@
 unsigned long __must_check
 raw_copy_to_user(void __user *to, const void *from, unsigned long n);

+#ifdef CONFIG_KASAN
#define INLINE_COPY_FROM_USER
#define INLINE_COPY_TO_USER
+#endif

#ifdef CONFIG_HAVE_MARCH_Z10_FEATURES
@@ -82,7 +84,7 @@
 __rc;						\)
 }}

-static inline int __put_user_fn(void *x, void __user *ptr, unsigned long size)
+static __always_inline int __put_user_fn(void *x, void __user *ptr, unsigned long size)
 {
 unsigned long spec = 0x010000UL;
 int rc;
@@ -112,7 +114,7 @@ return rc;
 }

-static inline int __get_user_fn(void *x, const void __user *ptr, unsigned long size)
+static __always_inline int __get_user_fn(void *x, const void __user *ptr, unsigned long size)
 {
 unsigned long spec = 0x01UL;
 int rc;
--- linux-4.15.0.orig/arch/s390/include/asm/vdso.h
+++ linux-4.15.0/arch/s390/include/asm/vdso.h
@@ -36,6 +36,7 @@
 __u32 tk_shift;/* Shift used for xtime_nsec0x60 */
 __u32 ts_dir;/* TOD steering direction0x64 */
 __u64 ts_end;/* TOD steering end0x68 */
+__u32 hrtimer_res;/* hrtimer resolution0x70 */
};

struct vdso_per_cpu_data {
--- linux-4.15.0.orig/arch/s390/include/asm/vx-instr.h
+++ linux-4.15.0/arch/s390/include/asm/vx-instr.h
@@ -363,23 +363,23 @@ .endm
/* VECTOR LOAD MULTIPLE */
.macro VLM vfrom, vto, disp, base
+VX_NUM v1, \vfrom
VX_NUM v3, \vto
GR_NUM b2, \base    /* Base register */
.word 0xE700 | ((v1&15) << 4) | (v3&15)
.word (b2 << 12) | (\disp)
-MRXBOPC 0x36, v1, v3
+MRXBOPC\hint, 0x36, v1, v3
.endm

/* VECTOR STORE MULTIPLE */
.macro VSTM vfrom, vto, disp, base
+VX_NUM v1, \vfrom
VX_NUM v3, \vto
GR_NUM b2, \base    /* Base register */
.word 0xE700 | ((v1&15) << 4) | (v3&15)
.word (b2 << 12) | (\disp)
-MRXBOPC 0x3E, v1, v3
+MRXBOPC\hint, 0x3E, v1, v3
.endm

/* VECTOR PERMUTE */
--- linux-4.15.0.orig/arch/s390/include/uapi/asm/kvm.h
+++ linux-4.15.0/arch/s390/include/uapi/asm/kvm.h
@@ -4,7 +4,7 @@
/* KVM s390 specific structures and definitions */
+- * Copyright IBM Corp. 2008
+ * Copyright IBM Corp. 2008, 2018
+ * Author(s): Carsten Otte <cotte@de.ibm.com>
+ * Christian Borntraeger <borntraeger@de.ibm.com>
@@ -152,7 +152,10 @@
__u8 pcc[16];/* with MSA4 */
__u8 ppno[16];/* with MSA5 */
__u8 kma[16];/* with MSA8 */
-__u8 reserved[1808];
+__u8 kdsa[16];/* with MSA9 */
+__u8 sortl[32];/* with STFLE.150 */
+__u8 dfitcc[32];/* with STFLE.151 */
+__u8 reserved[1728];
};

/* kvm attributes for crypto */
#define KVM_S390_VM_CRYPTO_ENABLE_DEA_KW	1
#define KVM_S390_VM_CRYPTO_DISABLE_AES_KW	2
#define KVM_S390_VM_CRYPTO_DISABLE_DEA_KW	3
+#define KVM_S390_VM_CRYPTO_ENABLE_APIE		4
+#define KVM_S390_VM_CRYPTO_DISABLE_APIE		5

/* kvm attributes for migration mode */
#define KVM_S390_VM_MIGRATION_STOP	0

#define KVM_SYNC_FPRS   (1UL << 8)
#define KVM_SYNC_GSCB   (1UL << 9)
#define KVM_SYNC_BPBC   (1UL << 10)
+#define KVM_SYNC_ETOKEN (1UL << 11)
/* length and alignment of the sdnx as a power of two */
#define SDNXC 8
#define SDNXL (1UL << SDNXC)

struct {
	__u64 reserved1[2];
	__u64 gscb[4];
			__u64 etoken;
			__u64 etoken_extension;
	};
};
};
--- linux-4.15.0.orig/arch/s390/include/uapi/asm/zcrypt.h
+++ linux-4.15.0/arch/s390/include/uapi/asm/zcrypt.h
@@ -32,12 +32,12 @@
/* - length(n_modulus) = inputdatalength */
struct ica_rsa_modexpo {
-char __user *inputdata;
-unsigned int inputdatalength;
-char __user *outputdata;
-unsigned int outputdatalength;
-char __user *b_key;
-char __user *n_modulus;
+char __user *inputdata;
+unsigned int inputdatalength;
+char __user *outputdata;
+unsigned int outputdatalength;
+char __user *b_key;
+char __user *n_modulus;
};
/**
 @@ -55,15 +55,15 @@
* - length(u_mult_inv) = inputdatalength/2 + 8
*/

struct ica_rsa_modexpo_crt {
    char __user *inputdata;
    unsigned int inputdatalength;
    char __user *outputdata;
    unsigned int outputdatalength;
    char __user *bp_key;
    char __user *bq_key;
    char __user *np_prime;
    char __user *nq_prime;
    char __user *u_mult_inv;
    +char __user *inputdata;
    +unsigned int inputdatalength;
    +char __user *outputdata;
    +unsigned int outputdatalength;
    +char __user *bp_key;
    +char __user *bq_key;
    +char __user *np_prime;
    +char __user *nq_prime;
    +char __user *u_mult_inv;
};

/**
 @@ -93,18 +93,18 @@
 unsigned int req_extbl; /* request extension block len */
 unsigned char padx_001[4]; /* reserved */
 unsigned char padx_000[16 - sizeof (char *)];
-unsigned char *req_parmb /* request parm block 'address' */
-unsigned char padx_001[16 - sizeof (char *)];
-unsigned char *req_datab /* request data block 'address' */
-unsigned char padx_002[16 - sizeof (char *)];
-unsigned char *rpl_parmb /* reply parm block 'address' */
-unsigned char padx_003[16 - sizeof (char *)];
-unsigned char *rpl_datab /* reply data block 'address' */
-unsigned char padx_004[16 - sizeof (char *)];
-unsigned char *req_extb /* request extension block 'addr' */
-unsigned char padx_005[16 - sizeof (char *)];
-unsigned char *rpl_extb /* reply extension block 'addr' */
+unsigned char *req_parmb /* request parm block 'address' */
+unsigned char padx_001[16 - sizeof (char *)];
+unsigned char *req_datab /* request data block 'address' */
+unsigned char padx_002[16 - sizeof (char *)];
+unsigned char *rpl_parmb /* reply parm block 'address' */
+unsigned char padx_003[16 - sizeof (char *)];
+unsigned char *rpl_datab /* reply data block 'address' */
unsigned char *req_extb;/* request extension block 'addr'*/
unsigned char *rpl_extb;/* reply extension block 'address'*/
unsigned short ccp_rtcode;/* server return code */
unsigned short ccp_rscode;/* server reason code */
unsigned intmac_data_len;/* Mac Data Length */
unsigned int user_defined;
unsigned short request_ID;
unsigned int request_control_blk_length;
unsigned char *request_control_blk_addr;
unsigned int request_data_length;
unsigned char *request_data_address;
unsigned int reply_control_blk_length;
unsigned char *reply_control_blk_addr;
unsigned int reply_data_length;
unsigned char *reply_data_address;
unsigned short priority_window;
unsigned int status;
}

/* @cprb_len: CPRB header length [0x0020]
 * @cprb_ver_id: CPRB version id. [0x04]
 * @pad_000: Alignment pad bytes
 * @flags: Admin cmd [0x80] or functional cmd [0x00]
 * @func_id: Function id / subtype [0x5434]
 * @source_id: Source id [originator id]
 * @target_id: Target id [usage/ctrl domain id]
 * @ret_code: Return code
 */

/**

Open Source Used In 5GasS Edge AC-4 11294
- * struct zcrypt_device_status
+ * struct zcrypt_device_status_ext
* @hwtype: raw hardware type
- * @qid: 6 bit device index, 8 bit domain
+ * @qid: 8 bit device index, 8 bit domain
* @functions: AP device function bit field 'abcdef'
* a, b, c = reserved
* d = CCA coprocessor
@ @ -214,31 +214,26 @@
* @online: online status
* @reserved: reserved
*/
-struct zcrypt_device_status {
+struct zcrypt_device_status_ext {
  unsigned int hwtype: 8;
-unsigned int qid: 14;
+unsigned int qid: 16;
  unsigned int online: 1;
  unsigned int functions: 6;
-unsigned int reserved: 3;
+unsigned int reserved: 1;
};

#define MAX_ZDEV_CARDIDS 64
#define MAX_ZDEV_DOMAINS 256
+#define MAX_ZDEV_CARDIDS_EXT 256
+#define MAX_ZDEV_DOMAINS_EXT 256

/**
 * Maximum number of zcrypt devices
 */
#define MAX_ZDEV_ENTRIES (MAX_ZDEV_CARDIDS * MAX_ZDEV_DOMAINS)
+/* Maximum number of zcrypt devices */
+#define MAX_ZDEV_ENTRIES_EXT (MAX_ZDEV_CARDIDS_EXT * MAX_ZDEV_DOMAINS_EXT)

/**
 * zcrypt_device_matrix
 * Device matrix of all zcrypt devices
 */
-struct zcrypt_device_matrix {
+struct zcrypt_device_matrix_ext {
  struct zcrypt_device_status device[MAX_ZDEV_ENTRIES];
+/* Device matrix of all zcrypt devices */
  struct zcrypt_device_matrix_ext {
+struct zcrypt_device_status_ext device[MAX_ZDEV_ENTRIES_EXT];
  };

-#define AUTOSELECT ((unsigned int)0xFFFFFFFF)
+#define AUTOSELECT 0xFFFFFFFF

---

Open Source Used In 5GaaS Edge AC-4 11295
```c
#define ZCRYPT_IOCTL_MAGIC 'z'

@@ -270,71 +265,35 @@
 *   ZSENDEP11CPRB
 *     Send an arbitrary EP11 CPRB to an EP11 coprocessor crypto card.
 *
-*   Z90STAT_STATUS_MASK
-*     Return an 64 element array of unsigned chars for the status of
-*     all devices.
+*   ZCRYPT_DEVICE_STATUS
+*     The given struct zcrypt_device_matrix_ext is updated with
+*     status information for each currently known apqn.
+*
+*   ZCRYPT_STATUS_MASK
+*     Return an MAX_ZDEV_CARDIDS_EXT element array of unsigned chars for the
+*     status of all devices.
 * 0x01: PCICA
 * 0x02: PCICC
 * 0x03: PCIXCC_MCL2
 * 0x04: PCIXCC_MCL3
 * 0x05: CEX2C
 * 0x06: CEX2A
-* 0x0d: device is disabled via the proc filesystem
-*
-*   Z90STAT_QDEPTH_MASK
-*     Return an 64 element array of unsigned chars for the queue
-*     depth of all devices.
-*
-*   Z90STAT_PERDEV_REQCNT
-*     Return an 64 element array of unsigned integers for the number
-*     of successfully completed requests per device since the device
-*     was detected and made available.
-*
-*   Z90STAT_REQUESTQ_COUNT
-*     Return an integer count of the number of entries waiting to be
-*     sent to a device.
-*
-*   Z90STAT_PENDINGQ_COUNT
-*     Return an integer count of the number of entries sent to all
-*     devices awaiting the reply.
-*
-*   Z90STAT_TOTALOPEN_COUNT
-*     Return an integer count of the number of open file handles.
-*
-*   Z90STAT_DOMAIN_INDEX
-*     Return the integer value of the Cryptographic Domain.
-*
```
The following ioctl's are deprecated and should be no longer used:

- Z90STAT_TOTALCOUNT
  - Return an integer count of all device types together.

- Z90STAT_PCICACOUNT
  - Return an integer count of all PCICAs.

- Z90STAT_PCICCCOUNT
  - Return an integer count of all PCICCs.

- Z90STAT_PCIXCMCL2COUNT
  - Return an integer count of all MCL2 PCIXCCs.

- Z90STAT_PCIXCMCL3COUNT
  - Return an integer count of all MCL3 PCIXCCs.

- Z90STAT_CEX2CCOUNT
  - Return an integer count of all CEX2Cs.
    + 0x07: CEX3C
    + 0x08: CEX3A
    + 0x0a: CEX4
    + 0x0b: CEX5
    + 0x0c: CEX6
    + 0x0d: device is disabled

- ZCRYPT_QDEPTH_MASK
  - Return an MAX_ZDEV_CARDIDS_EXT element array of unsigned chars for the queue depth of all devices.

- ZCRYPT_PERDEV_REQCNT
  - Return an MAX_ZDEV_CARDIDS_EXT element array of unsigned integers for the number of successfully completed requests per device since the device was detected and made available.

- Z90STAT_CEX2ACOUNT
  - Return an integer count of all CEX2As.

- ICAZ90STATUS
  - Return some device driver status in a ica_z90_status struct
    - This takes an ica_z90_status struct as its arg.

- Z90STAT_PCIXCCCOUNT
  - Return an integer count of all PCIXCCs (MCL2 + MCL3).
    - This is DEPRECATED now that MCL3 PCIXCCs are treated differently from MCL2 PCIXCCs.
/**
 * @def ICARSACRT_IOC(_IOC_READ|_IOC_WRITE, ZCRYPT_IOCTL_MAGIC, 0x06, 0)
 * @def ZSECSENDCPRB_IOC(_IOC_READ|_IOC_WRITE, ZCRYPT_IOCTL_MAGIC, 0x81, 0)
 * @def ZSENDDEP1_CPIC_IOC(_IOC_READ|_IOC_WRITE, ZCRYPT_IOCTL_MAGIC, 0x04, 0)
 * @def ZDEVICE_STATUS_IOC(_IOC_READ|_IOC_WRITE, ZCRYPT_IOCTL_MAGIC, 0x4f, 0)
 
 /* New status calls */
 * @def Z90STAT_TOTALCOUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x40, int)
 * @def Z90STAT_PCICACOUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x41, int)
 * @def Z90STAT_PCICCCOUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x42, int)
 * @def Z90STAT_PCIXCCMCM2COUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x4b, int)
 * @def Z90STAT_PCIXCCMCM3COUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x4c, int)
 * @def Z90STAT_CEX2CCOUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x4d, int)
 * @def Z90STAT_CEX2ACOUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x4e, int)
 * @def ZCRYPT_DEVICE_STATUS_IOR(ZCRYPT_IOCTL_MAGIC, 0x5f, int)
 * @def ZCRYPT_STATUS_MASK_IOR(ZCRYPT_IOCTL_MAGIC, 0x58,
 char[MAX_ZDEV_CARDIDS]]
 * @def ZCRYPT_QDEPTH_MASK_IOR(ZCRYPT_IOCTL_MAGIC, 0x59,
 char[MAX_ZDEV_CARDIDS]]
 * @def ZCRYPT_PERDEV_REQCNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x5a,
 int[MAX_ZDEV_CARDIDS]]
 */
 
 * Only deprecated defines, structs and ioctls below this line.
 */
 
 /* Deprecated: use MAX_ZDEV_CARDIDS_EXT */
 +
 +
 /* Deprecated: use MAX_ZDEV_CARDIDS */
 +
 +
 /* Deprecated: use MAX_ZDEV_DOMAINS */
 +
 +
 /* Deprecated: use MAX_ZDEV_ENTRIES */
 +
 +
 struct zcrypt_device_status {
 	unsigned int hwtype:8;
 	unsigned int qid:14;
 	unsigned int online:1;
 	unsigned int functions:6;
 	unsigned int reserved:3;
 	+
 
 /* Deprecated: use struct zcrypt_device_matrix */
 +
 +
 struct zcrypt_device_matrix {
 	struct zcrypt_device_status [MAX_ZDEV_ENTRIES];
 	+};
 

 Open Source Used In 5GaaS Edge AC-4 11298
/* Deprecated: use ZCRYPT_DEVICE_STATUS */
#define ZDEVICESTATUS _IOC(_IOC_READ|_IOC_WRITE, ZCRYPT_IOCTL_MAGIC, 0x4f, 0)
/* Deprecated: use ZCRYPT_STATUS_MASK */
#define Z90STAT_STATUS_MASK _IOR(ZCRYPT_IOCTL_MAGIC, 0x48, char[64])
/* Deprecated: use ZCRYPT_QDEPTH_MASK */
#define Z90STAT_QDEPTH_MASK _IOR(ZCRYPT_IOCTL_MAGIC, 0x49, char[64])
/* Deprecated: use ZCRYPT_PERDEV_REQCNT */
#define Z90STAT_PERDEV_REQCNT _IOR(ZCRYPT_IOCTL_MAGIC, 0x4a, int[64])

/* Deprecated: use sysfs to query these values */
#define Z90STAT_REQUESTQ_COUNT _IOR(ZCRYPT_IOCTL_MAGIC, 0x44, int)
#define Z90STAT_PENDINGQ_COUNT _IOR(ZCRYPT_IOCTL_MAGIC, 0x45, int)
#define Z90STAT_TOTALOPEN_COUNT _IOR(ZCRYPT_IOCTL_MAGIC, 0x46, int)
#define Z90STAT_DOMAIN_INDEX _IOR(ZCRYPT_IOCTL_MAGIC, 0x47, int)
-
#define Z90STAT_STATUS_MASK _IOR(ZCRYPT_IOCTL_MAGIC, 0x48, char[64])
-
#define Z90STAT_QDEPTH_MASK _IOR(ZCRYPT_IOCTL_MAGIC, 0x49, char[64])
-
#define Z90STAT_PERDEV_REQCNT _IOR(ZCRYPT_IOCTL_MAGIC, 0x4a, int[64])
+
/
*/
+

* The ioctl number ranges 0x40 - 0x42 and 0x4b - 0x4e had been used in the
* past, don't assign new ioctls for these.
* */

#endif /* __ASM_S390_ZCRYPT_H */
--- linux-4.15.0.orig/arch/s390/kernel/Makefile
+++ linux-4.15.0/arch/s390/kernel/Makefile
@@ -29,6 +29,7 @@
#
ifneq ($(CC_FLAGS_MARCH),-march=z900)
CFLAGS_REMOVE_als.o+= $(CC_FLAGS_MARCH)
+CFLAGS_REMOVE_als.o+= $(CC_FLAGS_EXPOLINE)
CFLAGS_als.o+= -march=z900
AFLAGS_REMOVE_head.o+= $(CC_FLAGS_MARCH)
AFLAGS_head.o+= -march=z900
@@ -60,9 +61,13 @@
 obj-y+= sysinfo.o jump_label.o lgr.o os_info.o machine_kexec.o pgm_check.o
 obj-y+= runtime_instr.o cache.o fpu.o dumpstack.o guarded_storage.o sthyi.o
 obj-y+= entry.o repl.o relocate_kernel.o kdebugfs.o alternative.o
+obj-y+= nospec-branch.o
extra-y+= head.o head64.o vmlinux.lds

+obj-$(CONFIG_SYSFS)+= nospec-sysfs.o
+CFLAGS_REMOVE_nospec-branch.o+= $(CC_FLAGS_EXPOLINE)
+
+obj-$(CONFIG_MODULES)+= module.o
obj-$(CONFIG_SMP)+= smp.o
obj-$(CONFIG_SCHED_TOPOLOGY)+= topology.o
@@ -86,3 +91,6 @@
# vdso
obj-y+= vdso64/
obj-$(CONFIG_COMPAT)+= vdso32/
+
+# kernel message catalog
+obj-$(CONFIG_KMSG_IDS)+= kmsg.o
--- linux-4.15.0.orig/arch/s390/kernel/alternative.c
+++ linux-4.15.0/arch/s390/kernel/alternative.c
@@ -2,6 +2,7 @@
#include <linux/module.h>
#include <asm/alternative.h>
#include <asm/facility.h>
+#include <asm/nospec-branch.h>
#define MAX_PATCH_LEN (255 - 1)
@@ -75,7 +76,8 @@
    instr = (u8 *)&a->instr_offset + a->instr_offset;
    replacement = (u8 *)&a->repl_offset + a->repl_offset;

-if (!test_facility(a->facility))
+if (!__test_facility(a->facility,
+    S390_lowcore.alt_stfle_fac_list))
    continue;

if (unlikely(a->instrlen % 2 || a->replacementlen % 2)) {
    --- linux-4.15.0.orig/arch/s390/kernel/asm-offsets.c
+++ linux-4.15.0/arch/s390/kernel/asm-offsets.c
@@ -81,6 +81,7 @@
    OFFSET(__VDSO_TK_SHIFT, vdso_data, tk_shift);
    OFFSET(__VDSO_TS_DIR, vdso_data, ts_dir);
    OFFSET(__VDSO_TS_END, vdso_data, ts_end);
+OFFSET(__VDSO_CLOCK_REALTIME_RES, vdso_data, hrtimer_res);
    OFFSET(__VDSO_ECTG_BASE, vdso_per_cpu_data, ectg_timer_base);
    OFFSET(__VDSO_ECTG_USER, vdso_per_cpu_data, ectg_user_time);
    OFFSET(__VDSO_CPU_NR, vdso_per_cpu_data, cpu_nr);
@@ -92,7 +93,6 @@
    DEFINE(__CLOCK_REALTIME_COARSE, CLOCK_REALTIME_COARSE);
    DEFINE(__CLOCK_MONOTONIC_COARSE, CLOCK_MONOTONIC_COARSE);
    DEFINE(__CLOCK_THREAD_CPUTIME_ID, CLOCK_THREAD_CPUTIME_ID);
-    DEFINE(__CLOCK_REALTIME_RES, MONOTONIC_RES_NSEC);
    DEFINE(__CLOCK_COARSE_RES, LOW_RES_NSEC);
    BLANK();
 /* idle data offsets */
@@ -179,6 +179,7 @@
    OFFSET(__LC_MACHINE_FLAGS, lowcore, machine_flags);
OFFSET(__LC_PREEMPT_COUNT, lowcore, preempt_count);
OFFSET(__LC_GMAP, lowcore, gmap);
OFFSET(__LC_BR_R1, lowcore, br_r1_trampoline);
/* software defined ABI-relevant lowcore locations 0xe00 - 0xe20 */
OFFSET(__LC_DUMP_REIPL, lowcore, ipib);
/* hardware defined lowcore locations 0x1000 - 0x18ff */

--- linux-4.15.0.org/arch/s390/kernel/base.S
+++ linux-4.15.0/arch/s390/kernel/base.S
@@ -9,18 +9,22 @@
#include <linux/linkage.h>
#include <asm/asm-offsets.h>
+    include <asm/nospec-instr.h>
#include <asm/ptrace.h>
#include <asm/sigp.h>

+GEN_BR_THUNK %r9
+GEN_BR_THUNK %r14
 ENTRY(s390_base_mcck_handler)
    basr %r13,0
    0:lg%r15.__LC_PANIC_STACK# load panic stack
    aghi%r15.-STACK_FRAME_OVERHEAD
    larl%r1,s390_base_mcck_handler_fn
     -lg%r1,0(%r1)
    -ltgr%r1,%r1
     +lg%r9,0(%r1)
     +ltgr%r9,%r9
    jzf
     -basr%r14,%r1
     +BASR_EX%r14,%r9
    1:la%r1,4095
    lmg%r0,%r15.__LC_GPREGS_SAVE_AREA-4095(%r1)
    lpswe __LC_MCK_OLD_PSW
@@ -37,10 +41,10 @@
    basr %r13,0
    0:aghi%r15.-STACK_FRAME_OVERHEAD
    larl%r1,s390_base_ext_handler_fn
     -lg%r1,0(%r1)
    -ltgr%r1,%r1
     +lg%r9,0(%r1)
     +ltgr%r9,%r9
    jzf
     -basr%r14,%r1
     +BASR_EX%r14,%r9
    1:lg%r0,%r15.__LC_SAVE_AREA_ASYNC
    ni __LC_EXT_OLD_PSW+1,0xfd# clear wait state bit
    lpswe __LC_EXT_OLD_PSW
basr %r13,0
0:agh %r15,-STACK_FRAME_OVERHEAD
larl %r1,s390_base_pgm_handler_fn
-lg %r1,0,%r1
-ltgr %r1, %r1
+lg %r9,0,%r1
+ltgr %r9, %r9
jz1f
-basr %r14,%r1
+BASR_EX %r14, %r9
img %r0,%r15,__LC_SAVE_AREA_SYNC
lpswe,__LC_PGM_OLD_PSW
1: lpswedisabled_wait_psw-0b(%r13)
@@ -57,10 +61,10 @@
@@ -117,7 +121,7 @@
-larl %r4,.Lcontinue_psw	# Restore PSW flags
-lpswe0(%r4)
 .Lcontinue:
-br %r14
+BR_EX %r14
 .align 16
 .Lrestart_psw:
 .long 0x00080000,0x80000000 + .Lrestart_part2
--- linux-4.15.0.orig/arch/s390/kernel/compat_linux.c
+++ linux-4.15.0/arch/s390/kernel/compat_linux.c
@@ -110,7 +110,7 @@
 COMPAT_SYSCALL_DEFINE1(s390_setgid16, u16, gid)
 {
 -return sys_setgid((gid_t)gid);
+return sys_setgid(low2highgid(gid));
 }

 COMPAT_SYSCALL_DEFINE2(s390_setreuid16, u16, ruid, u16, euid)
 @@ -120,7 +120,7 @@
 COMPAT_SYSCALL_DEFINE1(s390_setuid16, u16, uid)
 {
 -return sys_setuid((uid_t)uid);
+return sys_setuid(low2highuid(uid));
 }

 COMPAT_SYSCALL_DEFINE3(s390_setresuid16, u16, ruid, u16, euid, u16, suid)
@@ -173,12 +173,12 @@
 COMPAT_SYSCALL_DEFINE1(s390_setfsuid16, u16, uid)
 {
 -return sys_setfsuid((uid_t)uid);
+return sys_setfsuid(low2highuid(uid));
 }

 COMPAT_SYSCALL_DEFINE3(s390_setresuid16, u16, ruid, u16, euid, u16, suid)
@@ -173,12 +173,12 @@
 COMPAT_SYSCALL_DEFINE1(s390_setfsuid16, u16, uid)
 {
 -return sys_setfsuid((uid_t)uid);
+return sys_setfsgid(low2highgid(gid));
}

COMPAT_SYSCALL_DEFINE1(s390_setfsgid16, u16, gid)
{
    -return sys_setfsgid((gid_t)gid);
    +return sys_setfsgid(low2highgid(gid));
}

static int groups16_to_user(u16 __user *grouplist, struct group_info *group_info)
--- linux-4.15.0.orig/arch/s390/kernel/compat_signal.c
+++ linux-4.15.0/arch/s390/kernel/compat_signal.c
@@ -379,7 +379,7 @@
     if (put_compat_sigset((compat_sigset_t __user *)frame->sc.oldmask, 
         set, sizeof(compat_sigset_t)))
     return -EFAULT;
    -if (__put_user(ptr_to_compat(&frame->sc), &frame->sc.sregs))
    +if (__put_user(ptr_to_compat(&frame->sregs), &frame->sc.sregs))
     return -EFAULT;

 /* Store registers needed to create the signal frame */
--- linux-4.15.0.orig/arch/s390/kernel/cpcmd.c
+++ linux-4.15.0/arch/s390/kernel/cpcmd.c
@@ -37,10 +37,12 @@
 static int diag8_response(int cmdlen, char *response, int *rlen)
 {
     unsigned long __cmdlen = cmdlen | 0x40000000L;
     unsigned long __rlen = *rlen;
     register unsigned long reg2 asm("2") = (addr_t) cpcmd_buf;
     register unsigned long reg3 asm("3") = (addr_t) response;
     -register unsigned long reg4 asm("4") = cmdlen | 0x40000000L;
     -register unsigned long reg5 asm("5") = *rlen;
     +register unsigned long reg4 asm("4") = __cmdlen;
     +register unsigned long reg5 asm("5") = __rlen;

     asm volatile(
     "diag\%2,\%0,0x8\n"
--- linux-4.15.0.orig/arch/s390/kernel/crash_dump.c
+++ linux-4.15.0/arch/s390/kernel/crash_dump.c
@@ -404,11 +404,13 @@
     if (copy_oldmem_kernel(nt_name, addr + sizeof(note),
         sizeof(nt_name) - 1))
     return NULL;
    -if (strcmp(nt_name, "VMCOREINFO") != 0)
    +if (strcmp(nt_name, VMCOREINFO_NOTE_NAME) != 0)
     return NULL;
     vmcoreinfo = kzalloc_panic(note.n_descsz);
if (copy_oldmem_kernel(vmcoreinfo, addr + 24, note.n_descsz))
{ +kfree(vmcoreinfo);
  return NULL;
}
*size = note.n_descsz;
return vmcoreinfo;
}
@@ -418,15 +420,20 @@ */
static void *nt_vmcoreinfo(void *ptr)
{
  const char *name = VMCOREINFO_NOTE_NAME;
  unsigned long size;
  void *vmcoreinfo;

  vmcoreinfo = os_info_old_entry(OS_INFO_VMCOREINFO, &size);
  -if (!vmcoreinfo)
  -  vmcoreinfo = get_vmcoreinfo_old(&size);
  +if (vmcoreinfo)
  +  return nt_init_name(ptr, 0, vmcoreinfo, size, name);
  +
  +  vmcoreinfo = get_vmcoreinfo_old(&size);
  if (!vmcoreinfo)
    return ptr;
  -  return nt_init_name(ptr, 0, vmcoreinfo, size, "VMCOREINFO");
  +ptr = nt_init_name(ptr, 0, vmcoreinfo, size, name);
  +kfree(vmcoreinfo);
  +return ptr;
}
/*
--- linux-4.15.0.orig/arch/s390/kernel/debug.c
+++ linux-4.15.0/arch/s390/kernel/debug.c
@@ -198,7 +198,9 @@
  -if (!areas)
  goto fail_malloc_areas;
  for (i = 0; i < nr_areas; i++) {
-    areas[i] = kmalloc(pages_per_area * sizeof(debug_entry_t *), GFP_KERNEL);
-    /* GFP_NOWARN to avoid user triggerable WARN, we handle fails */
-    +areas[i] = kmalloc(pages_per_area * sizeof(debug_entry_t *),
+    GFP_KERNEL | __GFP_NOWARN);
+    if (!areas[i])
+      goto fail_malloc_areas2;
  for (j = 0; j < pages_per_area; j++) {
    --- linux-4.15.0.orig/arch/s390/kernel/diag.c
    +++ linux-4.15.0/arch/s390/kernel/diag.c
    @@ -79,7 +79,7 @@
static void *show_diag_stat_start(struct seq_file *m, loff_t *pos)
{
    return *pos <= nr_cpu_ids ? (void *)((unsigned long) *pos + 1) : NULL;
    return *pos <= NR_DIAG_STAT ? (void *)((unsigned long) *pos + 1) : NULL;
}

static void *show_diag_stat_next(struct seq_file *m, void *v, loff_t *pos)
{
    return (void *)((unsigned long) *pos + 1);
}

EXPORT_SYMBOL(diag_stat_inc);

void diag_stat_inc_norecursion(enum diag_stat_enum nr)
{
    this_cpu_inc(diag_stat.counter[nr]);
    trace_s390_diagnose_norecursion(diag_map[nr].code);
}

--- linux-4.15.0.orig/arch/s390/kernel/dis.c
+++ linux-4.15.0/arch/s390/kernel/dis.c
@@ -462,10 +462,11 @@
      ptr += sprintf(ptr, "%%c%i", value);
    else if (operand->flags & OPERAND_VR)
        ptr += sprintf(ptr, "%%v%i", value);
-    else if (operand->flags & OPERAND_PCREL)
-        ptr += sprintf(ptr, "%lx", (signed int) value
+    else if (operand->flags & OPERAND_PCREL) {
+        void *pcrel = (void *)((int)value + addr);
+        ptr += sprintf(ptr, "%px", pcrel);
+    }
    else if (operand->flags & OPERAND_SIGNED)
+    else if (operand->flags & OPERAND_PCREL) {
        +void *pcrel = (void *)(int)value + addr);
      +} else if (operand->flags & OPERAND_PCREL)
        ptr += sprintf(ptr, "%%i", value);
    else
        ptr += sprintf(ptr, "%%u", value);
@@ -537,7 +538,7 @@
    else
        *ptr++ = ‘ ‘;
    addr = regs->psw.addr + start - 32;
-    ptr += sprintf(ptr, "%.016lx: ", addr);
+    ptr += sprintf(ptr, "%px: ", (void *)addr);
    if (start + opsize >= end)
        break;
    for (i = 0; i < opsize; i++)
@@ -557,7 +558,7 @@
    void print_fn_code(unsigned char *code, unsigned long len)
    {
while (len) {
    opsize = insn_length(*code);
    if (opsize > len)
        break;
    ptr += sprintf(ptr, "%p: ", code);
    for (i = 0; i < opsize; i++)
        ptr += sprintf(ptr, "%02x", code[i]);
    *ptr++ = '\t';
}

/* Running under KVM? If not we assume z/VM */
/* Detect known hypervisors */
if (!memcmp(vmms->vm[0].cpi, "\x2\xe5\xd4", 3))
    S390_lowcore.machine_flags |= MACHINE_FLAG_KVM;
else if (!memcmp(vmms->vm[0].cpi, "\xa9\x61\xe5\xd4", 4))
    S390_lowcore.machine_flags |= MACHINE_FLAG_VM;
}

psw_t psw;

psw.mask = PSW_MASK_BASE | PSW_DEFAULT_KEY | PSW_MASK_EA | PSW_MASK_BA;
+if (IS_ENABLED(CONFIG_KASAN))
+psw.mask |= PSW_MASK_DAT;
psw.addr = (unsigned long) s390_base_ext_handler;
S390_lowcore.external_new_psw = psw;
psw.addr = (unsigned long) s390_base_pgm_handler;

{ stfle(S390_lowcore.stfle_fac_list,
            ARRAY_SIZE(S390_lowcore.stfle_fac_list));
    memcpy(S390_lowcore.alt_stfle_fac_list,
            S390_lowcore.stfle_fac_list,
            sizeof(S390_lowcore.alt_stfle_fac_list));
+if (!IS_ENABLED(CONFIG_KERNEL_NOBP))
+__clear_facility(82, S390_lowcore.alt_stfle_fac_list);
static __init void detect_diag9c(void)
--- linux-4.15.0.orig/arch/s390/kernel/entry.S
+++ linux-4.15.0/arch/s390/kernel/entry.S
@@ -26,6 +26,7 @@
#include <asm/setup.h>
#include <asm/nmi.h>
#include <asm/export.h>
+#include <asm/nospec-insn.h>

__PT_R0  = __PT_GPRS
__PT_R1  = __PT_GPRS + 8
@@ -107,6 +108,7 @@
aghi %r15,-(STACK_FRAME_OVERHEAD + __PT_SIZE)
j3f
1:UPDATE_VTIME %r14,%r15,'timer
+BPENTER __TI_flags(%r12),_TIF_ISOLATE_BP
2:lg%r15,__LC_ASYNC_STACK# load async stack
3:la%r11,STACK_FRAME_OVERHEAD(%r15)
.endm
@@ -159,6 +161,72 @@
.tm	 off+addr, \\mask
.endm

+.macro BPOFF
+.pushsection .altinstr_replacement, "ax"
+660:.long 0xb2e8c000
+.popsection
+661:.long 0x47000000
+.pushsection .altinstructions, "a"
+ .long 661b - .
+ .long 660b - .
+.word 82
+.byte 4
+.byte 4
+.popsection
+.endm
+
+.macro BPON
+.pushsection .altinstr_replacement, "ax"
+662:.long 0xb2e8d000
+.popsection
+663:.long 0x47000000
+.pushsection .altinstructions, "a"
+ .long 663b - .
+ .long 662b - .
+.word 82
+.byte 4
+.byte 4
+.popsection
+.endm
+
+.macro BPENTER tif_ptr,tif_mask
+.pushsection .altinstr_replacement, "ax"
+662:.word 0xc004, 0x0000, 0x0000# 6 byte nop
+ .word 0xc004, 0x0000, 0x0000# 6 byte nop
+.popsection
+664:TSTMSK.tif_ptr,\tif_mask
+jz. + 8
+.long 0xb2e8d000
+.pushsection .altinstructions, "a"
+.long 664b - .
+.long 662b - .
+.word 82
+.byte 12
+.byte 12
+.popsection
+.endm
+
+.macro BPEXIT tif_ptr,tif_mask
+TSTMSK.tif_ptr,\tif_mask
+.pushsection .altinstr_replacement, "ax"
+662:jnz. + 8
+.long 0xb2e8d000
+.popsection
+664:jz. + 8
+.long 0xb2e8c000
+.pushsection .altinstructions, "a"
+.long 664b - .
+.long 662b - .
+.word 82
+.byte 8
+.byte 8
+.popsection
+.endm
+
+GEN_BR_THUNK %r9
+GEN_BR_THUNK %r14
+GEN_BR_THUNK %r14,%r11
+
.section .kprobes.text, "ax"
.Ldummy:
/*
@@ -171,6 +239,11 @@
*/

nop0
ENTRY(__bpon)
+globl __bpon
+BPON
+BR_EX%r14
+
/*
 * Scheduler resume function, called by switch_to
 * gpr2 = (task_struct *) prev
@@ -193,9 +266,9 @@
mvc__LC_CURRENT_PID(4,%r0),0(%r3) # store pid of next
lmg%r6,%r15,__SF_GPRS(%r15)# load gprs of next task
TSTMSK__LC_MACHINE_FLAGS,MACHINE_FLAG_LPP
-bzr%r14
+jz0f
.insns,0xb2800000,__LC_LPP# set program parameter
-br%r14
+0:BR_EX%r14

.L__critical_start:

@@ -207,9 +280,11 @@
ENTRY(sie64a)
stmg%r6,%r14,__SF_GPRS(%r15)# save kernel registers
+lg%r12,__LC_CURRENT
stg%r2,__SFEMPTY(%r15)# save control block pointer
stg%r3,__SFEMPTY+8(%r15)# save guest register save area
xc__SFEMPTY+16(8,%r15),__SFEMPTY+16(%r15)# reason code = 0
+mvc__SFEMPTY+24(8,%r15),__TIflags(%r12)# copy thread flags
TSTMSK__LC_CPU_FLAGS_CIF_FPU# load guest fp/vx registers?
jno.Lsie_load_guest_gprs
brasl%r14,load_fpus# load guest fp/vx regs
@@ -226,8 +301,12 @@
TSTMSK__LC_CPU_FLAGS_CIF_FPU
jo.Lsie_skip# exit if fp/vx regs changed
+BEXIT__SFEMPTY+24(%r15),(_TIF_ISOLATE_BP|_TIF_ISOLATE_BP_GUEST)
.Lsie_entry:
sie0(%r14)
+Lsie_exit:
+BPOFF
+BENTER__SFEMPTY+24(%r15),(_TIF_ISOLATE_BP|_TIF_ISOLATE_BP_GUEST)
.Lsie_skip:
ni_SIE_PROG0C+3(%r14),0xfe# no longer in SIE
letlg%c1,%c1,__LC_USER_ASCE# load primary asce
@@ -248,9 +327,15 @@
sie_exit:
lg%r14,__SF_EMPTY+8(%r15)# load guest register save area
stmg%r0,%r13.0(%r14)# save guest gprs 0-13
+xgr%r0,%r0# clear guest registers to
+xgr%r1,%r1# prevent speculative use
+xgr%r2,%r2
+xgr%r3,%r3
+xgr%r4,%r4
+xgr%r5,%r5
lmg%r6,%r14,__SF_GPRS(%r15)# restore kernel registers
lg%r2.__SF_EMPTY+16(%r15)# return exit reason code
-br%r14
+BR_EX%r14
.Lsie_fault:
lghi%r14,-EFAULT
stg%r14.__SF_EMPTY+16(%r15)# set exit reason code
@@ -273,6 +358,7 @@
stpt__LC_SYNC_ENTER_TIMER
.Lsysc_stmg:
stmg%r8,%r15.__LC_SAVE_AREA_SYNC
+BPOFF
lg%r12.__LC_CURRENT
lghi%r13.__TASK_thread
lghi%r14.__PIF_SYSCALL
@@ -281,12 +367,15 @@
la%r11,STACK_FRAME_OVERHEAD(%r15)# pointer to pt_regs
.Lsysc_vtime:
UPDATE_VTIME %r8,%r9.__LC_SYNC_ENTER_TIMER
+BENTER__TI_flags(%r12)._TIF_ISOLATE_BP
stmg%r0,%r7.__PT_R0(%r11)
mvc__PT_R8(64,%r11).__LC_SAVE_AREA_SYNC
mvc__PT_PSW(16,%r11).__LC_SVC_OLD_PSW
mvc__PT_INT_CODE(4,%r11).__LC_SVC_ILC
stg%r14.__PT_FLAGS(%r11)
.Lsysc_do_svc:
+# clear user controlled register to prevent speculative use
+xgr%r0,%r0
# load address of system call table
lg%r10.__THREAD_sysc_table(%r13,%r12)
llgh%r8.__PT_INT_CODE+2(%r11)
@@ -294,9 +383,9 @@
jnz.Lsysc_nr_ok
# svc 0: system call number in %r1
llgfr%r1,%r1# clear high word in r1
+sth%r1.__PT_INT_CODE+2(%r11)
cghi%r1,NR_syscalls
jnL.Lsysc_nr_ok
-st%h%r1.__PT_INT_CODE+2(%r11)
slag%r8,%r1,2
.Lsysc_nr_ok:
xc__SF_BACKCHAIN(8,%r15),__SF_BACKCHAIN(%r15)
@@ -305,7 +394,7 @@
lgf%r9,0(%r8,%r10)# get system call add.
TSTMSK__TI_flags(%r12),__TI_FLAGS
jnz.Lsysc_tracesys
-basr%r14,%r9# call sysxxxx
+BASR_EX%r14,%r9# call sysxxxx
stg%r2,__PT_R2(%r11)# store return value

.Lsysc_return:
@@ -317,6 +406,7 @@
jnz.Lsysc_work# check for work
TSTMSK__LC_CPU_FLAGS__CIF_WORK
jnz.Lsysc_work
+BPEXIT__TI_flags(%r12),__TI_FLAGS
.Lsysc_restore:
lg%r14,__LC_VDSO_PER_CPU
lmg%r0,%r10,__PT_R0(%r11)
@@ -489,7 +579,7 @@
lmg%r3,%r7,__PT_R3(%r11)
stg%r7,STACK_FRAME_OVERHEAD(%r15)
lg%r2,__PT_ORIG_GPR2(%r11)
-basr%r14,%r9# call sysxxx
+BASR_EX%r14,%r9# call sysxxx
stg%r2,__PT_R2(%r11)# store return value
.Lsysc_tracenogo:
TSTMSK__TI_flags(%r12),__TI_TRACE
@@ -513,7 +603,7 @@
lmg%r9,%r10,__PT_R9(%r11)# load gprs
ENTRY(kernel_thread_starter)
l%r2,0(%r10)
-basr%r14,%r9
+BASR_EX%r14,%r9
j.Lsysc_tracenogo

/*
@@ -522,6 +612,7 @@
ENTRY(pgm_check_handler)
stpt__LC_SYNC_ENTER_TIMER
+BPOFF
stmg%r8,%r15__LC_SAVE_AREA_SYNC
lg%r10__LC_LAST_BREAK
lg%r12__LC_CURRENT
@@ -550,6 +641,7 @@
agh%r15-(STACK_FRAME_OVERHEAD + __PT_SIZE)
j4f

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2: UPDATE_VTIME %r14,%r15, LC_SYNC_ENTER_TIMER
+BENTER __TI_flags(%r12), TIF_ISOLATE_BP
lg%r15, LC_KERNEL_STACK
lgr%r14,%r12
agh%r14, TASK_thread # pointer to thread_struct
@@ -561,6 +653,15 @@
4: lgr%r13,%r11
la%r11,STACK_FRAME_OVERHEAD(%r15)
stmg%r0,%r7, PT_R0(%r11)
+%# clear user controlled registers to prevent speculative use
+xgr%r0,%r0
+xgr%r1,%r1
+xgr%r2,%r2
+xgr%r3,%r3
+xgr%r4,%r4
+xgr%r5,%r5
+xgr%r6,%r6
+xgr%r7,%r7
mvc PT_R8(64,%r11), LC_SAVE_AREA_SYNC
stmg%r8,%r9, PT_PSW(%r11)
mvc PT_INT_CODE(4,%r11), LC_PGM_ILC
@@ -582,9 +683,9 @@
nill%r10,0x007f
sll%r10,2
je.Lpgm_return
-lgf%r1,0(%r10,%r1)# load address of handler routine
+lgf%r9,0(%r10,%r1)# load address of handler routine
lgr%r2,%r11# pass pointer to pt_regs
-basr%r14,%r1# branch to interrupt-handler
+BASR_EX%r14,%r9# branch to interrupt-handler
 .Lpgm_return:
LOCKDEP_SYS_EXIT
tm PT_PSW+i(%r11),0x01# returning to user ?
@@ -620,12 +721,23 @@
ENTRY(io_int_handler)
STCK LC_INT_CLOCK
stpt LC_ASYNC_ENTER_TIMER
+BPOFF
stmg%r8,%r15, LC_SAVE_AREA_ASYNC
lg%r12, LC_CURRENT
larl%r13,cleanup_critical
lmg%r8,%r9, LC_IO_OLD_PSW
SWITCH_ASYNC LC_SAVE_AREA_ASYNC, LC_ASYNC_ENTER_TIMER
stmg%r0,%r7, PT_R0(%r11)
+%# clear user controlled registers to prevent speculative use
+xgr%r0,%r0
+xgr%r1,%r1
+xgr%r2,%r2
+xgr%r3,%r3
+xgr%r4,%r4
+xgr%r5,%r5
+xgr%r6,%r6
+xgr%r7,%r7
+xgr%r10,%r10
mvc__PT_R8(64,%r11),__LC_SAVE_AREA_ASYNC
stmg%r8,%r9,__PT_PSW(%r11)
mvc__PT_INT_CODE(12,%r11),__LC_SUBCHANNEL_ID
+++ -660,9 +772,13 +++
lg%r14,__LC_VDSO_PER_CPU
lmg%r0,%r10,__PT_R0(%r11)
mvc__LC_RETURN_PSW(16),__PT_PSW(%r11)
+tm__PT_PSW+1(%r11),0x01# returning to user?
+jno.Lio_exit_kernel
+BEXIT__TI_flags(%r12),__TIF_ISOLATE_BP
.Lio_exit_timer:
stpt__LC_EXIT_TIMER
mvc_VDSO_ECTG_BASE(16,%r14),__LC_EXIT_TIMER
+.Lio_exit_kernel:
lmg%r11,%r15,__PT_R11(%r11)
lpswe__LC_RETURN_PSW
.Lio_done:
@@ -833,12 +949,23 @@
ENTRY(ext_int_handler)
STCK__LC_INT_CLOCK
stpt__LC_ASYNC_ENTER_TIMER
+BPOFF
stmg%r8,%r15,__LC_SAVE_AREA_ASYNC
lg%r12,__LC_CURRENT
larl%r13,cleanup_critical
lmg%r8,%r9,__LC_EXT_OLD_PSW
SWITCH_ASYNC__LC_SAVE_AREA_ASYNC__LC_ASYNC_ENTER_TIMER
stmg%r0,%r7,__PT_R0(%r11)
+# clear user controlled registers to prevent speculative use
+xgr%r0,%r0
+xgr%r1,%r1
+xgr%r2,%r2
+xgr%r3,%r3
+xgr%r4,%r4
+xgr%r5,%r5
+xgr%r6,%r6
+xgr%r7,%r7
+xgr%r10,%r10
mvc__PT_R8(64,%r11),__LC_SAVE_AREA_ASYNC
stmg%r8,%r9,__PT_PSW(%r11)
lghi%r1,__LC_EXT_PARAMS2
@@ -859,6 +986,7 @@
* Load idle PSW. The second "half" of this function is in .Lcleanup_idle.
*/
ENTRY(psw_idle)
+stg%r14,(__SF_GPRS+8*8)(%r15)
stg%r3,.__SF_EMPTY(%r15)
larl%r1,.Lpsw_idle_lpsw+4
stg%r1,.__SF_EMPTY+8(%r15)
@@ -871,11 +999,12 @@
 .Lpsw_idle_stcctm:
 #endif
 oi__LC_CPU_FLAGS+7,._CIF_ENABLED_WAIT
+B Pon
STCK__CLOCK_IDLE_ENTER(%r2)
stpt__TIMER_IDLE_ENTER(%r2)
.Lpsw_idle_lpsw:
lpswe__SF_EMPTY(%r15)
-br%r14
+BR_EX%r14
 .Lpsw_idle_end:

/*
 @@ -889,7 +1018,7 @@
lg%r2__,__LC_CURRENT
 aghi%r2__,__TASK_thread
TSTMSK__LC_CPU_FLAGS,._CIF_FPU
-bor%r14
+jo.Lsave_fpu_regs_exit
stfpc__THREAD_FPU_fpc(%r2)
lg%r3,.__THREAD_FPU_regs(%r2)
TSTMSK__LC_MACHINE_FLAGS,MACHINE_FLAG_VX
 @@ -916,7 +1045,8 @@
 std15,120(%r3)
.Lsave_fpu_regs_done:
oi__LC_CPU_FLAGS+7,._CIF_FPU
-br%r14
+Lsave_fpu_regs_exit:
+BR_EX%r14
 .Lsave_fpu_regs_end:
EXPORT_SYMBOL(save_fpu_regs)

 @@ -934,7 +1064,7 @@
lg%r4__,__LC_CURRENT
 aghi%r4__,__TASK_thread
TSTMSK__LC_CPU_FLAGS,._CIF_FPU
-bnor%r14
+jno.Load_fpu_regs_exit
lfpc__THREAD_FPU_fpc(%r4)
TSTMSK__LC_MACHINE_FLAGS,MACHINE_FLAG_VX

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lg%r4.__THREAD_FPU_regs(%r4)# %r4 <- reg save area
@ @ -961,7 +1091,8 @@
ld15,120(%r4)
.Lload_fpu_regs_done:
Ni__LC_CPU_FLAGS+7,255-_CIF_FPU
-br%r14
+.Lload_fpu_regs_exit:
+BR_EX%r14
.Lload_fpu_regs_end:

.L__critical_end:
@ @ -971,6 +1102,7 @*
*/
ENTRY(mcck_int_handler)
STCK__LC_MCCK_CLOCK
+BPOFF
la%r1,4095# validate r1
spt__LC_CPU_TIMER_SAVE_AREA-4095(%r1)# validate cpu timer
sckc__LC_CLOCK_COMPARATOR# validate comparator
@ @ -1046,6 +1178,16 @@
.Lmcck_skip:
lghi%r14,__LC_GPREGS_SAVE_AREA+64
stmg%r0,%r7,__PT_R0(%r11)
+# clear user controlled registers to prevent speculative use
+xgr%r0,%r0
+xgr%r1,%r1
+xgr%r2,%r2
+xgr%r3,%r3
+xgr%r4,%r4
+xgr%r5,%r5
+xgr%r6,%r6
+xgr%r7,%r7
+xgr%r10,%r10
mvc__PT_R8(64,%r11),0(%r14)
stmg%r8,%r9,__PT_PSW(%r11)
xc__PT_FLAGS(8,%r11),__PT_FLAGS(%r11)
@ @ -1071,6 +1213,7 @@
mvc__LC_RETURN_MCCK_PSW(16),__PT_PSW(%r11)# move return PSW
tm__LC_RETURN_MCCK_PSW+1,0x01# returning to user ?
jno0f
+BPEXIT__TL_FLAGS(%r12),__TIF_ISOLATE_BP
stp__LC_EXIT_TIMER
mvc__VDSO_ECTG_BASE(16,%r14),__LC_EXIT_TIMER
0; Img%r11,%r15,__PT_R11(%r11)
@ @ -1166,7 +1309,7 @@
j0f
clg%r9,BASED(.Lcleanup_table+104)# .Lload_fpu_regs_end
jL.Lcleanup_load_fpu_regs
-0: br %r14
+0: BR_EX %r14,%r11

.align 8
.Lcleanup_table:
@@ -1197,11 +1340,12 @@
clg %r9,BASED(.Lsie_crit_mcck_length)
jh 1f
oi __LC_CPU_FLAGS+7,__CIF_MCCK_GUEST
-1:lgl%r9,__SF_EMPTY(%r15) # get control block pointer
+1: BPENTER __SF_EMPTY+24(%r15),(_TIF_ISOLATE_BP|_TIF_ISOLATE_BP_GUEST)
+lg%r9,__SF_EMPTY(%r15) # get control block pointer
ni __SIE_PROG0C+3(%r9),0xfe # no longer in SIE
lelg%c1,%c1,__LC_USER_ASCE # load primary asce
larl%r9,sie_exit # skip forward to sie_exit
-br%r14
+BR_EX %r14,%r11
#endif

.Lcleanup_system_call:
@@ -1239,6 +1383,7 @@
stg%r15,__LC_SYSTEM_TIMER
0: # update accounting time stamp
mvc__LC_LAST_UPDATE_TIMER(8),__LC_SYNC_ENTER_TIMER
+BPENTER __TI_flags(%r12),_TIF_ISOLATE_BP # set up saved register r11
lg%r15,__LC_KERNEL_STACK
la%r9,STACK_FRAME_OVERHEAD(%r15)
@@ -1254,7 +1411,7 @@
stg%r15,56(%r11)# r15 stack pointer
# set new psw address and exit
larl%r9,.Lsysc_do_svc
-br%r14
+BR_EX %r14,%r11
.Lcleanup_system_call_insn:
.quad system_call
.quad .Lsysc_stmg
@@ -1266,7 +1428,7 @@
.Lcleanup_sysc_tif:
larl%r9,.Lsysc_tif
-br%r14
+BR_EX %r14,%r11
.Lcleanup_sysc_restore:
# check if stpt has been executed
@@ -1283,14 +1428,14 @@
mvc0(64,%r11),__PT_R8(%r9)
lmg%r0,%r7,__PT_R0(%r9)
lmg%r8,%r9,__LC_RETURN_PSW
-br%r14
+BR_EX%r14,%r11
.Lcleanup_sysc_restore_insn:
.quad Lsysc_exit_timer
.quad Lsysc_done - 4

.Lcleanup_io_tif:
larl%r9,.Lio_tif
-br%r14
+BR_EX%r14,%r11

.Lcleanup_io_restore:
# check if stpt has been executed
@@ -1304,7 +1449,7 @@
mvc0(64,%r11),__PT_R8(%r9)
lmg%r0,%r7,__PT_R0(%r9)
lmg%r8,%r9,__LC_RETURN_PSW
-br%r14
+BR_EX%r14,%r11
.Lcleanup_io_restore_insn:
.quad Lio_exit_timer
.quad Lio_done - 4
@@ -1357,17 +1502,17 @@
# prepare return psw
nih%r8,0xfcfd		# clear irq & wait state bits
lg%r9,48(%r11)# return from psw_idle
-br%r14
+BR_EX%r14,%r11
.Lcleanup_idle_insn:
.quad Lpsw_idle_lpsw
.Lcleanup_save_fpu_regs:
larl%r9,save_fpu_regs
-br%r14
+BR_EX%r14,%r11

.Lcleanup_load_fpu_regs:
larl%r9,load_fpu_regs
-br%r14
+BR_EX%r14,%r11

/*
 * Integer constants
@@ -1387,7 +1532,6 @@
.Lsie_crit_mcck_length:
.quad .Lsie_skip - .Lsie_entry
```c
#define SYSCALL(esame,emu)	.long esame
.globlsys_call_table
--- linux-4.15.0.orig/arch/s390/kernel/ftrace.c
+++ linux-4.15.0/arch/s390/kernel/ftrace.c
@@ -57,6 +57,7 @@
	brasl %r0, ftrace_caller # offset 0
 */

+void *ftrace_func __read_mostly = ftrace_stub;
unsigned long ftrace_plt;

static inline void ftrace_generate_orig_insn(struct ftrace_insn *insn)
@@ -166,6 +167,7 @@
*/
unsigned long prepare_ftrace_return(unsigned long parent, unsigned long ip)
{
    struct ftrace_graph_ent trace;
    -if (unlikely(ftrace_graph_is_dead()))
        goto out;
    if (unlikely(atomic_read(&current->tracing_graph_pause)))
        goto out;
    ip -= MCOUNT_INSN_SIZE;
    -trace.func = ip;
    -trace.depth = current->curr_ret_stack + 1;
    /* Only trace if the calling function expects to. */
    -if (!ftrace_graph_entry(&trace))
        goto out;
    -if (ftrace_push_return_trace(parent, ip, &trace.depth, 0,
            NULL) == -EBUSY)
        goto out;
    parent = (unsigned long) return_to_handler;
    if (!function_graph_enter(parent, ip, 0, NULL))
        parent = (unsigned long) return_to_handler;
out:
    return parent;
}
static ssize_t show_idle_time(struct device *dev,
    struct device_attribute *attr, char *buf)
{
    unsigned long long now, idle_time, idle_enter, idle_exit, in_idle;
    struct s390_idle_data *idle = &per_cpu(s390_idle, dev->id);
    unsigned long long now, idle_time, idle_enter, idle_exit;
    unsigned int seq;

do {
    now = get_tod_clock();
    seq = read_seqcount_begin(&idle->seqcount);
    idle_time = READ_ONCE(idle->idle_time);
    idle_enter = READ_ONCE(idle->clock_idle_enter);
    idle_exit = READ_ONCE(idle->clock_idle_exit);
} while (read_seqcount_retry(&idle->seqcount, seq));

idle_time += idle_enter ? ((idle_exit ? : now) - idle_enter) : 0;
in_idle = 0;
now = get_tod_clock();
if (idle_enter) {
    if (idle_exit) {
        in_idle = idle_exit - idle_enter;
    } else if (now > idle_enter) {
        in_idle = now - idle_enter;
    }
}
idle_time += in_idle;
return sprintf(buf, "%llu\n", idle_time >> 12);
}

DEVICE_ATTR(idle_time_us, 0444, show_idle_time, NULL);

unsigned long long arch_cpu_idle_time(int cpu)
{
    struct s390_idle_data *idle = &per_cpu(s390_idle, cpu);
    unsigned long long now, idle_enter, idle_exit;
    unsigned long long now, idle_enter, idle_exit, in_idle;
    unsigned int seq;

do {
    now = get_tod_clock();
    seq = read_seqcount_begin(&idle->seqcount);
    idle_enter = READ_ONCE(idle->clock_idle_enter);
    idle_exit = READ_ONCE(idle->clock_idle_exit);
} while (read_seqcount_retry(&idle->seqcount, seq));

return cputime_to_nsecs(idle_enter ? ((idle_exit ? : now) - idle_enter) : 0);
+in_idle = 0;
+now = get_tod_clock();
+if (idle_enter) {
+if (idle_exit) {
+in_idle = idle_exit - idle_enter;
+} else if (now > idle_enter) {
+in_idle = now - idle_enter;
+}
+
+return cputime_to_nsec(in_idle);
}

void arch_cpu_idle_enter(void)
--- linux-4.15.0.orig/arch/s390/kernel/ipl.c
+++ linux-4.15.0/arch/s390/kernel/ipl.c
@@ -547,6 +547,7 @@
 static void __ipl_run(void *unused)
 {
+__bpon();
 diag308(DIAG308_LOAD_CLEAR, NULL);
 if (MACHINE_IS_VM)
 __cpcmd("IPL", NULL, 0, NULL);
@@ -779,6 +780,7 @@
 /* copy and convert to ebcDIC */
 memcpy(ipb->hdr.loadparm, buf, lp_len);
 ASCEBC(ipb->hdr.loadparm, LOADPARM_LEN);
+ipb->hdr.flags |= DIAG308_FLAGS_LP_VALID;
 return len;
 }

--- linux-4.15.0.orig/arch/s390/kernel/irq.c
+++ linux-4.15.0/arch/s390/kernel/irq.c
@@ -176,10 +176,9 @@
 new -= STACK_FRAME_OVERHEAD;
 ((struct stack_frame *) new)->back_chain = old;
 asm volatile(" la 15.0(%0)\n"
- " bas 14,%2\n"
+ " brasl 14,__do_softirq\n"
 " la 15.0(%1)\n"
- : : "a" (new), "a" (old),
- "a" (__do_softirq)
+ : : "a" (new), "a" (old)
 : 0", "1", "2", "3", "4", "5", "14",
 "cc", "memory" );
} else {
--- linux-4.15.0.orig/arch/s390/kernel/jump_label.c
+++ linux-4.15.0/arch/s390/kernel/jump_label.c

unsigned char *ipe = (unsigned char *)expected;
unsigned char *ipn = (unsigned char *)new;

-pr_emerg("Jump label code mismatch at %pS [%p]n", ipc, ipc);
+pr_emerg("Jump label code mismatch at %pS [%px]n", ipc, ipc);
pr_emerg("Found: %6ph", ipc);
pr_emerg("Expected: %6ph", ipe);
pr_emerg("New: %6ph", ipn);
--- linux-4.15.0.orig/arch/s390/kernel/kmsg.c
+++ linux-4.15.0/arch/s390/kernel/kmsg.c
@@ -0,0 +1,114 @@
+/*
+ * Message printing with message catalog prefixes.
+ *
+ * Copyright IBM Corp. 2012
+ */
+
+#include <linux/kernel.h>
+#include <linux/module.h>
+#include <linux/moduleparam.h>
+#include <linux/jhash.h>
+#include <linux/device.h>
+
+static inline u32 __printk_jhash(const void *key, u32 length)
+{
+u32 a, b, c, len;
+const u8 *k;
+u8 zk[12];
+
+a = b = 0x9e3779b9;
+c = 0;
+for (len = length + 12, k = key; len >= 12; len -= 12, k += 12) {
+if (len >= 24) {
+} else {
+memset(zk, 0, 12);
+memcpy(zk, k, len - 12);
+c += (u32) zk[8] << 8;
+c += (u32) zk[9] << 16;
+c += (u32) zk[10] << 24;
+c += length;
+}
+a -= b + c; a ^= (c>>13);
+b -= a + c; b ^= (a<<8);
+c -= a + b; c ^= (b>>13);
+a -= b + c; a ^= (c>>12);
+b -= a + c; b ^= (a<<16);
+c -= a + b; c ^= (b>>5);
+a -= b + c; a ^= (c>>3);
+b -= a + c; b ^= (a<<10);
+c -= a + b; c ^= (b>>15);
+
+return c;
+
+/**
+ * __jhash_string - calculate the six digit jhash of a string
+ * @str: string to calculate the jhash
+ */
+unsigned long long __jhash_string(const char *str)
+
+
+
+{ return __printk_jhash(str, strlen(str)) & 0xffffff;
+}
+EXPORT_SYMBOL(__jhash_string);
+
+static int __dev_printk_hash(const char *level, const struct device *dev,
+struct va_format *vaf)
+
+
+ { if (!dev)
+ return printk("%s(NULL device *): %pV", level, vaf);
+ };
+ +return printk("%s%s.%06x: %pV", level, dev_driver_string(dev),
+ __printk_jhash(vaf->fmt, strlen(vaf->fmt)) & 0xffffff,
+ vaf);
+
+
+ int dev_printk_hash(const char *level, const struct device *dev,
+ const char *fmt, ...)
+
+ { struct va_format vaf;
+ va_list args;
+ int r;
+ +va_start(args, fmt);
+ +r = __dev_printk_hash(level, dev, &vaf);
+ +va_end(args);
+ +}
+return r;
+
+EXPORT_SYMBOL(dev_printk_hash);
+
+#define define_dev_printk_hash_level(func, kern_level)
+int func(const struct device *dev, const char *fmt, ...);
+
+struct va_format vaf;
+va_list args;
+int r;
+
+va_start(args, fmt);
+
+vaf.fmt = fmt;
+vaf.va = &args;
+
+r = __dev_printk_hash(kern_level, dev, &vaf);
+va_end(args);
+
+return r;
+
+EXPORT_SYMBOL(func);
+
+define_dev_printk_hash_level(dev_emerg_hash, KERN_EMERG);
+define_dev_printk_hash_level(dev_alert_hash, KERN_ALERT);
+define_dev_printk_hash_level(dev_crit_hash, KERN_CRIT);
+define_dev_printk_hash_level(dev_err_hash, KERN_ERR);
+define_dev_printk_hash_level(dev_warn_hash, KERN_WARNING);
+define_dev_printk_hash_level(dev_notice_hash, KERN_NOTICE);
+define_dev_printk_hash_level(_dev_info_hash, KERN_INFO);

--- linux-4.15.0.orig/arch/s390/kernel/mcount.S
+++ linux-4.15.0/arch/s390/kernel/mcount.S
@@ -9,51 +9,69 @@
#include <linux/linkage.h>
#include <asm/asm-offsets.h>
#include <asm/ftrace.h>
+#include <asm/nospec-insn.h>
#include <asm/ptrace.h>
#include <asm/export.h>

+GEN_BR_THUNK %r1
+GEN_BR_THUNK %r14
+
.section .kprobes.text, "ax"

ENTRY(ftrace_stub)
-br%r14
+BR_EX%r14
#define STACK_FRAME_SIZE  (STACK_FRAME_OVERHEAD + __PT_SIZE)
#define STACK_PTREGS  (STACK_FRAME_OVERHEAD)
#define STACK_PTREGS_GPRS  (STACK_PTREGS + __PT_GPRS)
#define STACK_PTREGS_PSW  (STACK_PTREGS + __PT_PSW)
+#ifdef __PACK_STACK
+/* allocate just enough for r14, r15 and backchain */
+#define TRACED_FUNC_FRAME_SIZE 24
+else
+/#define TRACED_FUNC_FRAME_SIZE STACK_FRAME_OVERHEAD
+#endif

ENTRY(_mcount)
-br%r14
+BR_EX%r14

EXPORT_SYMBOL(_mcount)

ENTRY(ftrace_caller)
.globl ftrace_regs_caller
.set ftrace_regs_caller,ftrace_caller
+stg%r14,(__SF_GPRS+8*8)(%r15)# save traced function caller
lgr%r1,%r15
ifdef CC_USING_HOTPATCH
aghi%r0,MCOUNT_RETURN_FIXUP
endif
-aghi%r15,-STACK_FRAME_SIZE
+# allocate stack frame for ftrace_caller to contain traced function
+aghi%r15,-TRACED_FUNC_FRAME_SIZE
stg%r1,__SF_BACKCHAIN(%r15)
+stg%r0,(__SF_GPRS+8*8)(%r15)
+stg%r15,(__SF_GPRS+9*8)(%r15)
+# allocate pt_regs and stack frame for ftrace_trace_function
+aghi%r15,-STACK_FRAME_SIZE
stg%r1,(STACK_PTREGS_GPRS+15*8)(%r15)
+aghi%r1,-TRACED_FUNC_FRAME_SIZE
+stg%r1,__SF_BACKCHAIN(%r15)
+aghi%r0,STACK_PTREGS_PSW+8)(%r15)
stmg%r2,%r14,(STACK_PTREGS_GPRS+2*8)(%r15)
ifdef CONFIG_HAVE_MARCH_Z196_FEATURES
aghik%r2,%r0,-MCOUNT_INSN_SIZE
lgrl%r4,function_trace_op
- lgrl%r1,ftrace_trace_function
+ lgrl%r1,ftrace_func
else
lgr%r2,%r0
agh%r2,-MCOUNT_INSN_SIZE
larl%r4,function_trace_op
The j instruction gets runtime patched to a nop instruction. See ftrace_enable_ftrace_graph_caller.

```
@@ -68,7 +86,7 @@
#endif
lg%r1,(STACK_PTREGS_PSW+8)(%r15)
lg%r1,(STACK_PTREGS_GPRS+2*8)(%r15)
-br%r1
+BR_EX%r1

```

```
--- linux-4.15.0.orig/arch/s390/kernel/module.c
+++ linux-4.15.0/arch/s390/kernel/module.c
@@ -156,7 +158,11 @@
        me->core_layout.size += me->arch.got_size;
        me->arch.plt_offset = me->core_layout.size;
-
+        if (me->arch.plt_size) {
+            if (IS_ENABLED(CONFIG_EXPOLINE) && !nospec_disable)
+                me->arch.plt_size += PLT_ENTRY_SIZE;
+
```

```
#define DEBUGP printk
@@ -156,7 +158,11 @@
        me->arch.got_offset = me->core_layout.size;
        me->core_layout.size += me->arch.got_size;
        me->arch.plt_offset = me->core_layout.size;
-
+        if (me->arch.plt_size) {
+            if (IS_ENABLED(CONFIG_EXPOLINE) && !nospec_disable)
+                me->arch.plt_size += PLT_ENTRY_SIZE;
+
```

```
```
unsigned int *ip;
ip = me->core_layout.base + me->arch.plt_offset + info->plt_offset;
-ip[0] = 0x0d10e310; /* basr 1,0; lg 1,10(1); br 1 */
-ip[1] = 0x100a0004;
-ip[2] = 0x07f10000;
+ip[0] = 0x0d10e310; /* basr 1,0 */
+ip[1] = 0x100a0004; /* lg 1,10(1) */
+if (IS_ENABLED(CONFIG_EXPOLINE) && !nospec_disable) {
  unsigned int *ij;
  +ij = me->core_layout.base +
  +me->arch.plt_size - PLT_ENTRY_SIZE;
  +ip[2] = 0xa7f40000 +
  +(unsigned int)(u16)
  +((unsigned long) ij - 8 -
  + (unsigned long) ip) / 2);
  
} else {
  +ip[2] = 0x07f10000; /* br %r1 */
  
  ip[3] = (unsigned int) (val >> 32);
  ip[4] = (unsigned int) val;
  info->plt_initialized = 1;
  @ @ -418,16 +435,42 @@
    struct module *me)
{
  const Elf_Shdr *s;
  -char *secstrings;
  +char *secstrings, *secname;
  +void *aseg;
  +
  +if (IS_ENABLED(CONFIG_EXPOLINE) &&
  +   !nospec_disable && me->arch.plt_size) {
    unsigned int *ij;
    +
    +ij = me->core_layout.base + me->arch.plt_offset +
    +me->arch.plt_size - PLT_ENTRY_SIZE;
    +if (test_facility(35)) {
      +ij[0] = 0xc6000000; /* exrl %r0,.+10 */
      +ij[1] = 0x0005a7f4/* j . */
      +ij[2] = 0x000007f1/* br %r1 */
      +} else {

secstrings = (void *)hdr + sechdrs[hdr->e_shstrndx].sh_offset;
for (s = sechdrs; s < sechdrs + hdr->e_shnum; s++) {
    if (!strcmp("altinstructions", secstrings + s->sh_name)) {
        /* patch .altinstructions */
        void *aseg = (void *)s->sh_addr;
        apply_alternatives(aseg, aseg + s->sh_size);
    }
    +
    if (IS_ENABLED(CONFIG_EXPOLINE) &&
        (!strncmp("s390_indirect", secname, 14)))
        nospec_revert(aseg, aseg + s->sh_size);
    +
    if (IS_ENABLED(CONFIG_EXPOLINE) &&
        (!strncmp("s390_return", secname, 12)))
        nospec_revert(aseg, aseg + s->sh_size);
}

jump_label_apply_nops(me);
--- linux-4.15.0.orig/arch/s390/kernel/nospec-branch.c
+++ linux-4.15.0/arch/s390/kernel/nospec-branch.c
@@ -0,0 +1,176 @@
+// SPDX-License-Identifier: GPL-2.0
+#include <linux/module.h>
+#include <linux/device.h>
+#include <linux/cpu.h>
+#include <asm/nospec-branch.h>
+
+static int __init nobp_setup_early(char *str)
+{
+    bool enabled;
+    int rc;
+    +rc = kstrtobool(str, &enabled);
+    +if (rc)
+        +return rc;
+    +if (enabled && test_facility(82)) {
+ * The user explicitly requested nobp=1, enable it and
+ * disable the expoline support.
+ */
+ __set_facility(82, S390_lowcore.alt_stfle_fac_list);
+ if (IS_ENABLED(CONFIG_EXPOLINE))
+ nospec_disable = 1;
+ } else {
+ __clear_facility(82, S390_lowcore.alt_stfle_fac_list);
+ }
+ return 0;
+ }
+ early_param("nobp", nobp_setup_early);
+
+ static int __init nospec_setup_early(char *str)
+ {
+ __clear_facility(82, S390_lowcore.alt_stfle_fac_list);
+ return 0;
+ }
+ early_param("nospec", nospec_setup_early);
+
+ static int __init nospec_report(void)
+ {
+ if (test_facility(156))
+ pr_info("Spectre V2 mitigation: etokens\n");
+ if (IS_ENABLED(CC_USING_EXPOLINE) && !nospec_disable)
+ pr_info("Spectre V2 mitigation: execute trampolines\n");
+ if (__test_facility(82, S390_lowcore.alt_stfle_fac_list))
+ pr_info("Spectre V2 mitigation: limited branch prediction\n");
+ return 0;
+ }
+ arch_initcall(nospec_report);
+
+ #ifdef CONFIG_EXPOLINE
+
+ int nospec_disable = IS_ENABLED(CONFIG_EXPOLINE_OFF);
+
+ static int __init nospectre_v2_setup_early(char *str)
+ {
+ nospec_disable = 1;
+ return 0;
+ }
+ early_param("nospectre_v2", nospectre_v2_setup_early);
+
+ void __init nospec_auto_detect(void)
+ {
+ if (test_facility(156) || cpu_mitigations_off()) {
+ */
+ * The machine supports etokens.
/* Disable expolines and disable nobp. */
+if (IS_ENABLED(CC_USING_EXPOLINE))
+nospec_disable = 1;
+__clear_facility(82, S390_lowcore.alt_stfle_fac_list);
+} else if (IS_ENABLED(CC_USING_EXPOLINE)) {
+*/
+ /* The kernel has been compiled with expolines.
+ * Keep expolines enabled and disable nobp.
+ */
+nospec_disable = 0;
+__clear_facility(82, S390_lowcore.alt_stfle_fac_list);
+}
+*/
+
+static int __init spectre_v2_setup_early(char *str)
+{
+if (str && !strncmp(str, "on", 2)) {
+nospec_disable = 0;
+__clear_facility(82, S390_lowcore.alt_stfle_fac_list);
+}
+if (str && !strncmp(str, "off", 3))
+nospec_disable = 1;
+if (str && !strncmp(str, "auto", 4))
+nospec_auto_detect();
+return 0;
+}
+early_param("spectre_v2", spectre_v2_setup_early);
+
+static void __init_or_module __nospec_revert(s32 *start, s32 *end)
+{
+enum { BRCL_EXPOLINE, BRASL_EXPOLINE } type;
+u8 *instr, *thunk, *br;
+u8 insnbuff[6];
+s32 *epo;
+
+/* Second part of the instruction replace is always a nop */
+for (epo = start; epo < end; epo++) {
+instr = (u8 *) epo + *epo;
+if (instr[0] == 0xc0 && (instr[1] & 0x0f) == 0x04)
+type = BRCL_EXPOLINE; /* brcl instruction */
+else if (instr[0] == 0xc0 && (instr[1] & 0x0f) == 0x05)
+type = BRASL_EXPOLINE; /* brasl instruction */
```c
    // else
    // continue;
    thunk = instr + (*(int *)(instr + 2)) * 2;
    if (thunk[0] == 0xc6 && thunk[1] == 0x00)
        /* exrl %r0,<target-br> */
        br = thunk + (*(int *)(thunk + 2)) * 2;
    else if (thunk[0] == 0xc0 && (thunk[1] & 0x0f) == 0x00 &&
        thunk[6] == 0x44 && thunk[7] == 0x00 &&
        (thunk[8] & 0x0f) == 0x00 && thunk[9] == 0x00 &&
        (thunk[1] & 0xf0) == (thunk[8] & 0xf0))
        /* larl %rx,<target-br> + ex %r0,0(%rx) */
        br = thunk + (*(int *)(thunk + 2)) * 2;
    else
        continue;

    memcpy(insnbuf + 2, (char[]) { 0x47, 0x00, 0x07, 0x00 }, 4);
    switch (type) {
    case BRCL_EXPOLINE:
        insnbuf[0] = br[0];
        insnbuf[1] = (instr[1] & 0xf0) | (br[1] & 0x0f);
        if (br[0] == 0x47) {
            /* brcl to b, replace with bc +nop */
            insnbuf[2] = br[2];
            insnbuf[3] = br[3];
        } else {
            /* brcl to br, replace with bcr +nop */
        }
        break;
    case BRASL_EXPOLINE:
        insnbuf[0] = (instr[1] & 0xf0) | (br[1] & 0x0f);
        if (br[0] == 0x47) {
            /* brasl to b, replace with bas +nop */
            insnbuf[0] = 0x4d;
            insnbuf[2] = br[2];
            insnbuf[3] = br[3];
        } else {
            /* brasl to br, replace with basr +nop */
            insnbuf[0] = 0x0d;
        }
        break;
    }
    s390_kernel_write(instr, insnbuf, 6);
    }
    }
```
+void __init_or_module nospec_revert(s32 *start, s32 *end)
+{
+    if (nospec_disable)
+        __nospec_revert(start, end);
+}
+
+extern s32 __nospec_call_start[], __nospec_call_end[];
+extern s32 __nospec_return_start[], __nospec_return_end[];
+void __init nospec_init_branches(void)
+{
+    nospec_revert(__nospec_call_start, __nospec_call_end);
+    nospec_revert(__nospec_return_start, __nospec_return_end);
+}
+
+#endif /* CONFIG_EXPOLINE */
--- linux-4.15.0.orig/arch/s390/kernel/nospec-sysfs.c
+++ linux-4.15.0/arch/s390/kernel/nospec-sysfs.c
@@ -0,0 +1,23 @@
+// SPDX-License-Identifier: GPL-2.0
+#include <linux/device.h>
+#include <linux/cpu.h>
+#include <asm/facility.h>
+#include <asm/nospec-branch.h>
+
ssize_t cpu_show_spectre_v1(struct device *dev,
                      struct device_attribute *attr, char *buf)
+{
+    return sprintf(buf, "Mitigation: __user pointer sanitization\n");
+}
+
ssize_t cpu_show_spectre_v2(struct device *dev,
                      struct device_attribute *attr, char *buf)
+{
+    if (test_facility(156))
+        return sprintf(buf, "Mitigation: etokens\n");
+    if (IS_ENABLED(CC_USING_EXPOLINE) && !nospec_disable)
+        return sprintf(buf, "Mitigation: execute trampolines\n");
+    if (__test_facility(82, S390_lowcore.alt_stfle_fac_list))
+        return sprintf(buf, "Mitigation: limited branch prediction\n");
+    return sprintf(buf, "Vulnerable\n");
+}
--- linux-4.15.0.orig/arch/s390/kernel/perf_cpum Cf.c
+++ linux-4.15.0/arch/s390/kernel/perf_cpum Cf.c
@@ -2,8 +2,8 @@
/*
 * Performance event support for s390x - CPU-measurement Counter Facility
 *
#define KMSG_COMPONENT	"cpum_cf"
#define pr_fmt(fmt)	KMSG_COMPONENT ": " fmt
@@ -88,7 +88,7 @@
    set = CPUMF_CTR_SET_USER;
  else if (event < 128)
    set = CPUMF_CTR_SET_CRYPTO;
-else if (event < 256)
+else if (event < 288)
    set = CPUMF_CTR_SET_EXT;
  else if (event >= 448 && event < 496)
    set = CPUMF_CTR_SET_MT_DIAG;
@@ -112,12 +112,19 @@
   err = -EOPNOTSUPP;
 break;
 case CPUMF_CTR_SET_CRYPTO:
+if (!((cpuhw->info.csvn >= 1 && cpuhw->info.csvn <= 5 &&
    + hwc->config > 79) ||
    + (cpuhw->info.csvn >= 6 && hwc->config > 83))
+err = -EOPNOTSUPP;
+break;
 case CPUMF_CTR_SET_EXT:
 if (cpuhw->info.csvn < 1)
   err = -EOPNOTSUPP;
-else if ((cpuhw->info.csvn == 1 && hwc->config > 159) ||
-         (cpuhw->info.csvn == 2 && hwc->config > 175) ||
-         (cpuhw->info.csvn > 2 && hwc->config > 255))
-        + (cpuhw->info.csvn >= 3 && cpuhw->info.csvn <= 5
-           && hwc->config > 255) ||
-        + (cpuhw->info.csvn >= 6 && hwc->config > 287))
   err = -EOPNOTSUPP;
 break;
 case CPUMF_CTR_SET_MT_DIAG:
@@ -346,6 +353,7 @@
   break;
 case PERF_TYPE_HARDWARE:
+if (is_sampling_event(event))/* No sampling support */
+return -ENOENT;
   ev = attr->config;
 /* Count user space (problem-state) only */
 if (!attr->exclude_user && attr->exclude_kernel) {
@@ -373,7 +382,7 @@
 return -ENOENT;
if (ev > PERF_CPUM_CF_MAX_CTR)
+ return -ENOENT;
+ return -EINVAL;
+ return -EINVAL;

/* Obtain the counter set to which the specified counter belongs */
set = get_counter_set(ev);
--- linux-4.15.0.orig/arch/s390/kernel/perf_cpum_cf_events.c
+++ linux-4.15.0/arch/s390/kernel/perf_cpum_cf_events.c
@@ -30,22 +30,26 @@
CPUMF_EVENT_ATTR(cf_fvn3, L1D_DIR_WRITES, 0x0004);
CPUMF_EVENT_ATTR(cf_fvn3, L1D_PENALTY_CYCLES, 0x0005);
-CPUMF_EVENT_ATTR(cf_svn_generic, PRNG_FUNCTIONS, 0x0040);
-CPUMF_EVENT_ATTR(cf_svn_generic, PRNG_CYCLES, 0x0041);
-CPUMF_EVENT_ATTR(cf_svn_generic, PRNG_BLOCKED_FUNCTIONS, 0x0042);
-CPUMF_EVENT_ATTR(cf_svn_generic, PRNG_BLOCKED_CYCLES, 0x0043);
-CPUMF_EVENT_ATTR(cf_svn_generic, SHA_FUNCTIONS, 0x0044);
-CPUMF_EVENT_ATTR(cf_svn_generic, SHA_CYCLES, 0x0045);
-CPUMF_EVENT_ATTR(cf_svn_generic, SHA_BLOCKED_FUNCTIONS, 0x0046);
-CPUMF_EVENT_ATTR(cf_svn_generic, SHA_BLOCKED_CYCLES, 0x0047);
-CPUMF_EVENT_ATTR(cf_svn_generic, AES_FUNCTIONS, 0x0048);
-CPUMF_EVENT_ATTR(cf_svn_generic, AES_CYCLES, 0x0049);
-CPUMF_EVENT_ATTR(cf_svn_generic, AES_BLOCKED_FUNCTIONS, 0x004a);
-CPUMF_EVENT_ATTR(cf_svn_generic, AES_BLOCKED_CYCLES, 0x004b);
-CPUMF_EVENT_ATTR(cf_svn_generic, DEA_FUNCTIONS, 0x004c);
-CPUMF_EVENT_ATTR(cf_svn_generic, DEA_CYCLES, 0x004d);
-CPUMF_EVENT_ATTR(cf_svn_generic, DEA_BLOCKED_FUNCTIONS, 0x004e);
-CPUMF_EVENT_ATTR(cf_svn_generic, DEA_BLOCKED_CYCLES, 0x004f);
+CPUMF_EVENT_ATTR(cf_svn_12345, PRNG_FUNCTIONS, 0x0040);
+CPUMF_EVENT_ATTR(cf_svn_12345, PRNG_CYCLES, 0x0041);
+CPUMF_EVENT_ATTR(cf_svn_12345, PRNG_BLOCKED_FUNCTIONS, 0x0042);
+CPUMF_EVENT_ATTR(cf_svn_12345, PRNG_BLOCKED_CYCLES, 0x0043);
+CPUMF_EVENT_ATTR(cf_svn_12345, SHA_FUNCTIONS, 0x0044);
+CPUMF_EVENT_ATTR(cf_svn_12345, SHA_CYCLES, 0x0045);
+CPUMF_EVENT_ATTR(cf_svn_12345, SHA_BLOCKED_FUNCTIONS, 0x0046);
+CPUMF_EVENT_ATTR(cf_svn_12345, SHA_BLOCKED_CYCLES, 0x0047);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_FUNCTIONS, 0x0048);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_CYCLES, 0x0049);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_BLOCKED_FUNCTIONS, 0x004a);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_BLOCKED_CYCLES, 0x004b);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_FUNCTIONS, 0x004c);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_CYCLES, 0x004d);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_BLOCKED_FUNCTIONS, 0x004e);
+CPUMF_EVENT_ATTR(cf_svn_12345, AES_BLOCKED_CYCLES, 0x004f);
+CPUMF_EVENT_ATTR(cf_svn_6, ECC_FUNCTION_COUNT, 0x0050);
+CPUMF_EVENT_ATTR(cf_svn_6, ECC_CYCLES_COUNT, 0x0051);
+CPUMF_EVENT_ATTR(cf_svn_6, ECC_BLOCKED_FUNCTION_COUNT, 0x0052);
+CPUMF_EVENT_ATTR(cf_zvn, ECC_BLOCKED_CYCLES_COUNT, 0x0053);
CPUMF_EVENT_ATTR(cf_z10, L1I_L2_SOURCED_WRITES, 0x0080);
CPUMF_EVENT_ATTR(cf_z10, L1D_L2_SOURCED_WRITES, 0x0081);
CPUMF_EVENT_ATTR(cf_z10, L1I_L3_LOCAL_WRITES, 0x0082);
@@ -123,7 +127,7 @@
CPUMF_EVENT_ATTR(cf_zec12, TX_NC_TABORT, 0x00b1);
CPUMF_EVENT_ATTR(cf_zec12, TX_C_TABORT_NO_SPECIAL, 0x00b2);
CPUMF_EVENT_ATTR(cf_zec12, TX_C_TABORT_SPECIAL, 0x00b3);
-CPUMF_EVENT_ATTR(cf_z13, L1D_WRITES_RO_EXCL, 0x0080);
+CPUMF_EVENT_ATTR(cf_z13, L1D_RO_EXCL_WRITES, 0x0080);
CPUMF_EVENT_ATTR(cf_z13, DTLB1_WRITES, 0x0081);
CPUMF_EVENT_ATTR(cf_z13, DTLB1_MISSES, 0x0082);
CPUMF_EVENT_ATTR(cf_z13, DTLB1_HPAGE_WRITES, 0x0083);
@@ -179,7 +183,7 @@
CPUMF_EVENT_ATTR(cf_z14, L1I_L3_LOCAL_WRITES, 0x0082);
CPUMF_EVENT_ATTR(cf_z14, DTLB2_WRITES, 0x0081);
CPUMF_EVENT_ATTR(cf_z14, DTLB2_MISSES, 0x0082);
CPUMF_EVENT_ATTR(cf_z14, DTLB2_HPAGE_WRITES, 0x0083);
@@ -226,13 +230,71 @@
CPUMF_EVENT_ATTR(cf_z14, LAST_HOST_TRANSLATIONS, 0x00e9);
CPUMF_EVENT_ATTR(cf_z14, TX_NC_TABORT, 0x00f3);
CPUMF_EVENT_ATTR(cf_z14, TX_C_TABORT_NO_SPECIAL, 0x00f4);
CPUMF_EVENT_ATTR(cf_z14, TX_C_TABORT_SPECIAL, 0x00f5);
CPUMF_EVENT_ATTR(cf_z14, MT_DIAG_CYCLES_ONE_THR_ACTIVE, 0x01c0);
CPUMF_EVENT_ATTR(cf_z14, MT_DIAG_CYCLES_TWO_THR_ACTIVE, 0x01c1);
+CPUMF_EVENT_ATTR(cf_z15, L1D_RO_EXCL_WRITES, 0x0080);
+CPUMF_EVENT_ATTR(cf_z15, DTLB2_WRITES, 0x0081);
+CPUMF_EVENT_ATTR(cf_z15, DTLB2_MISSES, 0x0082);
+CPUMF_EVENT_ATTR(cf_z15, DTLB2_HPAGE_WRITES, 0x0083);
+CPUMF_EVENT_ATTR(cf_z15, DTLB2_GPAGE_WRITES, 0x0084);
+CPUMF_EVENT_ATTR(cf_z15, L1D_L2D_SOURCED_WRITES, 0x0085);
+CPUMF_EVENT_ATTR(cf_z15, ITLB2_WRITES, 0x0086);
+CPUMF_EVENT_ATTR(cf_z15, ITLB2_MISSES, 0x0087);
+CPUMF_EVENT_ATTR(cf_z15, L1I_L2L_SOURCED_WRITES, 0x0088);
+CPUMF_EVENT_ATTR(cf_z15, TLB2_PTE_WRITES, 0x0089);
+CPUMF_EVENT_ATTR(cf_z15, TLB2_CRSTE_WRITES, 0x008a);
+CPUMF_EVENT_ATTR(cf_z15, TLB2_ENGINES_BUSY, 0x008b);
+CPUMF_EVENT_ATTR(cf_z15, TX_C_TEND, 0x008c);
+CPUMF_EVENT_ATTR(cf_z15, TX_NC_TEND, 0x008d);
+CPUMF_EVENT_ATTR(cf_z15, L1C_TLB2_MISSES, 0x008f);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONCHIP_L3_SOURCED_WRITES, 0x0090);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONCHIP_MEMORY_SOURCED_WRITES, 0x0091);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONCHIP_L3_SOURCED_WRITES_IV, 0x0092);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONCLUSTER_L3_SOURCED_WRITES, 0x0093);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONCLUSTER_MEMORY_SOURCED_WRITES, 0x0094);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONCLUSTER_L3_SOURCED_WRITES_IV, 0x0095);
+CPUMF_EVENT_ATTR(cf_z15, L1D_OFFCLUSTER_L3_SOURCED_WRITES, 0x0096);
+CPUMF_EVENT_ATTR(cf_z15, L1D_OFFCLUSTER_MEMORY_SOURCED_WRITES, 0x0097);
+CPUMF_EVENT_ATTR(cf_z15, L1D_OFFCLUSTER_L3_SOURCED_WRITES_IV, 0x0098);
+CPUMF_EVENT_ATTR(cf_z15, L1D_OFFDRAWER_L3_SOURCED_WRITES, 0x0099);
+CPUMF_EVENT_ATTR(cf_z15, L1D_OFFDRAWER_MEMORY_SOURCED_WRITES, 0x009a);
+CPUMF_EVENT_ATTR(cf_z15, L1D_OFFDRAWER_L3_SOURCED_WRITES_IV, 0x009b);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONDRAWER_L4_SOURCED_WRITES, 0x009c);
+CPUMF_EVENT_ATTR(cf_z15, L1D_OFFDRAWER_L4_SOURCED_WRITES, 0x009d);
+CPUMF_EVENT_ATTR(cf_z15, L1D_ONCHIP_L3_SOURCED_WRITES_RO, 0x009e);
+CPUMF_EVENT_ATTR(cf_z15, L1I_ONCHIP_L3_SOURCED_WRITES, 0x00a2);
+CPUMF_EVENT_ATTR(cf_z15, L1I_ONCHIP_MEMORY_SOURCED_WRITES, 0x00a3);
+CPUMF_EVENT_ATTR(cf_z15, L1I_ONCHIP_L3_SOURCED_WRITES_IV, 0x00a4);
+CPUMF_EVENT_ATTR(cf_z15, L1I_ONCLUSTER_L3_SOURCED_WRITES, 0x00a5);
+CPUMF_EVENT_ATTR(cf_z15, L1I_ONCLUSTER_MEMORY_SOURCED_WRITES, 0x00a6);
+CPUMF_EVENT_ATTR(cf_z15, L1I_ONCLUSTER_L3_SOURCED_WRITES_IV, 0x00a7);
+CPUMF_EVENT_ATTR(cf_z15, L1I_OFFCLUSTER_L3_SOURCED_WRITES, 0x00a8);
+CPUMF_EVENT_ATTR(cf_z15, L1I_OFFCLUSTER_MEMORY_SOURCED_WRITES, 0x00a9);
+CPUMF_EVENT_ATTR(cf_z15, L1I_OFFCLUSTER_L3_SOURCED_WRITES_IV, 0x00aa);
+CPUMF_EVENT_ATTR(cf_z15, L1I_OFFDRAWER_L3_SOURCED_WRITES, 0x00ab);
+CPUMF_EVENT_ATTR(cf_z15, L1I_OFFDRAWER_MEMORY_SOURCED_WRITES, 0x00ac);
+CPUMF_EVENT_ATTR(cf_z15, L1I_OFFDRAWER_L3_SOURCED_WRITES_IV, 0x00ad);
+CPUMF_EVENT_ATTR(cf_z15, L1I_ONDRAWER_L4_SOURCED_WRITES, 0x00ae);
+CPUMF_EVENT_ATTR(cf_z15, L1I_OFFDRAWER_L4_SOURCED_WRITES, 0x00af);
+CPUMF_EVENT_ATTR(cf_z15, BCD_DFP_EXECUTION_SLOTS, 0x00b0);
+CPUMF_EVENT_ATTR(cf_z15, VX_BCD_EXECUTION_SLOTS, 0x00b1);
+CPUMF_EVENT_ATTR(cf_z15, DECIMAL_INSTRUCTIONS, 0x00b2);
+CPUMF_EVENT_ATTR(cf_z15, LAST_HOST_TRANSLATIONS, 0x00b3);
+CPUMF_EVENT_ATTR(cf_z15, TX_NC_TABORT, 0x00b4);
+CPUMF_EVENT_ATTR(cf_z15, TX_C_TABORT_NO_SPECIAL, 0x00b5);
+CPUMF_EVENT_ATTR(cf_z15, TX_C_TABORT_SPECIAL, 0x00b6);
+CPUMF_EVENT_ATTR(cf_z15, DFLT_ACCESS, 0x00b7);
+CPUMF_EVENT_ATTR(cf_z15, DFLT_CYCLES, 0x00b8);
+CPUMF_EVENT_ATTR(cf_z15, DFLT_CC, 0x00b9);
+CPUMF_EVENT_ATTR(cf_z15, DFLT_CCFINISH, 0x00ba);
+CPUMF_EVENT_ATTR(cf_z15, MT_DIAG_CYCLES_ONE_THR_ACTIVE, 0x00c0);
+CPUMF_EVENT_ATTR(cf_z15, MT_DIAG_CYCLES_TWO_THR_ACTIVE, 0x00c1);
+
static struct attribute *cpumcf_fvn1_pmu_event_attr[] __initdata = {
  CPUMF_EVENT_PTR(cf_fvn1, CPU_CYCLES),
  CPUMF_EVENT_PTR(cf_fvn1, INSTRUCTIONS),
  @ @ -261,23 +323,47 @ @
static struct attribute *cpumcf_svn_generic_pmu_event_attr[] __initdata = {
    CPUMF_EVENT_PTR(cf_svn_generic, PRNG_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, PRNG_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_generic, PRNG_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, PRNG_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_generic, SHA_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, SHA_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_generic, SHA_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, SHA_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_generic, DEA_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, DEA_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_generic, DEA_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, DEA_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_generic, AES_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, AES_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_generic, AES_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_generic, AES_BLOCKED_CYCLES),
    NULL,
};

static struct attribute *cpumcf_svn_12345_pmu_event_attr[] __initdata = {
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_BLOCKED_CYCLES),
    NULL,
};

static struct attribute *cpumcf_svn_6_pmu_event_attr[] __initdata = {
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, PRNG_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, SHA_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, DEA_BLOCKED_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_CYCLES),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_BLOCKED_FUNCTIONS),
    CPUMF_EVENT_PTR(cf_svn_12345, AES_BLOCKED_CYCLES),
    NULL,
};
+CPUMF_EVENT_PTR(cf_svn_12345, SHA_BLOCKED_CYCLES),
+CPUMF_EVENT_PTR(cf_svn_12345, DEA_FUNCTIONS),
+CPUMF_EVENT_PTR(cf_svn_12345, DEA_CYCLES),
+CPUMF_EVENT_PTR(cf_svn_12345, DEA_BLOCKED_FUNCTIONS),
+CPUMF_EVENT_PTR(cf_svn_12345, DEA_BLOCKED_CYCLES),
+CPUMF_EVENT_PTR(cf_svn_12345, AES_FUNCTIONS),
+CPUMF_EVENT_PTR(cf_svn_12345, AES_CYCLES),
+CPUMF_EVENT_PTR(cf_svn_12345, AES_BLOCKED_FUNCTIONS),
+CPUMF_EVENT_PTR(cf_svn_12345, AES_BLOCKED_CYCLES),
+CPUMF_EVENT_PTR(cf_svn_6, ECC_FUNCTION_COUNT),
+CPUMF_EVENT_PTR(cf_svn_6, ECC_CYCLES_COUNT),
+CPUMF_EVENT_PTR(cf_svn_6, ECC_BLOCKED_FUNCTION_COUNT),
+CPUMF_EVENT_PTR(cf_svn_6, ECC_BLOCKED_CYCLES_COUNT),
NULL,
}

@@ -371,7 +457,7 @@
};

static struct attribute *cpumcf_z13_pmu_event_attr[] __initdata = {
-CPUMF_EVENT_PTR(cf_z13, L1D_WRITES_RO_EXCL),
+CPUMF_EVENT_PTR(cf_z13, L1D_RO_EXCL_WRITES),
CPUMF_EVENT_PTR(cf_z13, DTLB1_WRITES),
CPUMF_EVENT_PTR(cf_z13, DTLB1_MISSES),
CPUMF_EVENT_PTR(cf_z13, DTLB1_HPAGE_WRITES),
@@ -431,7 +517,7 @@
};

static struct attribute *cpumcf_z14_pmu_event_attr[] __initdata = {
-CPUMF_EVENT_PTR(cf_z14, L1D_WRITES_RO_EXCL),
+CPUMF_EVENT_PTR(cf_z14, L1D_RO_EXCL_WRITES),
CPUMF_EVENT_PTR(cf_z14, DTLB2_WRITES),
CPUMF_EVENT_PTR(cf_z14, DTLB2_MISSES),
CPUMF_EVENT_PTR(cf_z14, DTLB2_HPAGE_WRITES),
@@ -487,6 +573,67 @@
NULL,
};

+static struct attribute *cpumcf_z15_pmu_event_attr[] __initdata = {
+CPUMF_EVENT_PTR(cf_z15, L1D_RO_EXCL_WRITES),
+CPUMF_EVENT_PTR(cf_z15, DTLB2_WRITES),
+CPUMF_EVENT_PTR(cf_z15, DTLB2_MISSES),
+CPUMF_EVENT_PTR(cf_z15, DTLB2_HPAGE_WRITES),
+CPUMF_EVENT_PTR(cf_z15, DTLB2_GPAGE_WRITES),
+CPUMF_EVENT_PTR(cf_z15, ITLB2_WRITES),
+CPUMF_EVENT_PTR(cf_z15, ITLB2_MISSES),
+CPUMF_EVENT_PTR(cf_z15, L1I_L2I_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, TLB2_PTE_WRITES),
+CPUMF_EVENT_PTR(cf_z15, TLB2_CSRTE_WRITES),
+CPUMF_EVENT_PTR(cf_z15, TLB2_ENGINES_BUSY),
+CPUMF_EVENT_PTR(cf_z15, TX_C_TEND),
+CPUMF_EVENT_PTR(cf_z15, TX_NC_TEND),
+CPUMF_EVENT_PTR(cf_z15, L1C_TLB2_MISSES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCHIP_MEMORY_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCHIP_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCLUSTER_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCLUSTER_MEMORY_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCLUSTER_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1D_OFFCLUSTER_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_OFFCHIP_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1D_OFFCHIP_MEMORY_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_OFFCHIP_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1D_OFFCHIP_L3_SOURCED_WRITES_RO),
+CPUMF_EVENT_PTR(cf_z15, L1D_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCHIP_MEMORY_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1D_ONCHIP_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1I_ONCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_ONCHIP_MEMORY_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_ONCHIP_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1I_ONCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_ONCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES_IV),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, L1I_OFFCHIP_L3_SOURCED_WRITES),
+CPUMF_EVENT_PTR(cf_z15, BCD_DFP_EXECUTION_SLOTS),
+CPUMF_EVENT_PTR(cf_z15, VX_BCD_EXECUTION_SLOTS),
+CPUMF_EVENT_PTR(cf_z15, DECIMAL_INSTRUCTIONS),
+CPUMF_EVENT_PTR(cf_z15, LAST_HOST_TRANSLATIONS),
+CPUMF_EVENT_PTR(cf_z15, TX_NC_TABORT),
+CPUMF_EVENT_PTR(cf_z15, TX_C_TABORT_NO_SPECIAL),
+CPUMF_EVENT_PTR(cf_z15, TX_C_TABORT_SPECIAL),
+CPUMF_EVENT_PTR(cf_z15, DFLT_ACCESS),
+CPUMF_EVENT_PTR(cf_z15, DFLT_CYCLES),
+CPUMF_EVENT_PTR(cf_z15, DFLT_CC),
+CPUMF_EVENT_PTR(cf_z15, DFLT_CCFINISH),
+CPUMF_EVENT_PTR(cf_z15, MT_DIAG_CYCLES_ONE_THR_ACTIVE),
+CPUMF_EVENT_PTR(cf_z15, MT_DIAG_CYCLES_TWO_THR_ACTIVE),
static struct attribute_group cpumcf_pmu_events_group = {
    default:
    cfvn = none;
}
-csvn = cpumcfsvn_generic_pmu_event_attr;
+
/* Determine version specific crypto set */
+switch (ci.csvn) {
+case 1 ... 5:
+csvn = cpumcfsvn_12345_pmu_event_attr;
+break;
+case 6:
+csvn = cpumcfsvn_6_pmu_event_attr;
+break;
+default:
+csvn = none;
+
/* Determine model-specific counter set(s) */
get_cpu_id(&cpu_id);
-model = cpumcfz13_pmu_event_attr;
break;
case 0x3906:
+case 0x3907:
+model = cpumcfz14_pmu_event_attr;
+break;
+case 0x8561:
+case 0x8562:
+model = cpumcfz15_pmu_event_attr;
+break;
+default:
+model = none;
break;
--- linux-4.15.0.orig/arch/s390/kernel/perf_cpum_sf.c
+++ linux-4.15.0/arch/s390/kernel/perf_cpum_sf.c
@@ -193,7 +193,7 @@
 unsigned long num_sdb, gfp_t gfp_flags)
 {
     int i, rc;
-unsigned long *new, *tail;
+unsigned long *new, *tail, *tail_prev = NULL;
if (!sfb->sdbt || !sfb->tail)
    return -EINVAL;
@@ -232,6 +232,7 @@
sfb->num_sdbt++;
/* Link current page to tail of chain */
*tail = (unsigned long)(void *) new + 1;
+tail_prev = tail;
tail = new;
}
@@ -241,10 +242,22 @@
    if (rc)
    if (rc) {
      /* Undo last SDBT. An SDBT with no SDB at its first
       * entry but with an SDBT entry instead can not be
       * handled by the interrupt handler code.
       * Avoid this situation.
       */
       +*/
       +if (tail_prev) {
       +sfb->num_sdbt--;
       +free_page((unsigned long) new);
       +tail = tail_prev;
       +}
       break;
       +
       sfb->num_sdb++;
       tail++;    
       +tail_prev = new = NULL;/* Allocated at least one SBD */
       }
/* Link sampling buffer to its origin */
@@ -728,6 +741,12 @@
goto out;
}
+if (si.ribm & CPU_MF_SF_RIBM_NOTAV) {
+    pr_warn("CPU Measurement Facility sampling is temporarily not available\n");
+    err = -EBUSY;
+    goto out;
+    
+/* Always enable basic sampling */
SAMPL_FLAGS(hwc) = PERF_CPUM_SF_BASIC_MODE;
rate = 0;
if (attr->freq) {
+ if (!attr->sample_freq) {
+ err = -EINVAL;
+ goto out;
+ }
rate = freq_to_sample_rate(&si, attr->sample_freq);
rate = hw_limit_rate(&si, rate);
attr->freq = 0;
}@ -1244,18 +1267,28 @@
*/
if (flush_all && done)
break;
-
-/* If an event overflow happened, discard samples by
- * processing any remaining sample-data-blocks.
- */
-if (event_overflow)
-flush_all = 1;
}

/* Account sample overflows in the event hardware structure */
if (sampl_overflow)
OVERFLOW_REG(hwc) = DIV_ROUND_UP(OVERFLOW_REG(hwc) +
sampl_overflow, 1 + num_sdb);
+
+/* Perf_event_overflow() and perf_event_account_interrupt() limit
+ * the interrupt rate to an upper limit. Roughly 1000 samples per
+ * task tick.
+ * Hitting this limit results in a large number
+ * of throttled REF_REPORT_THROTTLE entries and the samples
+ * are dropped.
+ * Slightly increase the interval to avoid hitting this limit.
+ */
+if (event_overflow) {
+SAMPL_RATE(hwc) += DIV_ROUND_UP(SAMPL_RATE(hwc), 10);
+debug_sprintf_event(sfdbg, 1, "%s: rate adjustment %ld\n", 
+ __func__,
+ DIV_ROUND_UP(SAMPL_RATE(hwc), 10));
+}
+if (sampl_overflow || event_overflow)
debug_sprintf_event(sfdbg, 4, "hw_perf_event_update:
  "overflow stats: sample=%lu event=%lu\n", 
}@ -1350,8 +1383,8 @@
idx = aux->empty_mark + 1;

for (i = 0; i < range_scan; i++, idx++) {
  te = aux_sdb_trailer(aux, idx);
  -te->flags = te->flags & ~SDB_TE_BUFFER_FULL_MASK;
  -te->flags = te->flags & ~SDB_TE_ALERT_REQ_MASK;
  +te->flags &= ~(SDB_TE_BUFFER_FULL_MASK |
                  SDB_TE_ALERT_REQ_MASK);
  te->overflow = 0;
}
/* Save the position of empty SDBs */
@@ -1398,8 +1431,7 @@
te = aux_sdb_trailer(aux, alert_index);
do {
  orig_flags = te->flags;
  -orig_overflow = te->overflow;
  -*overflow = orig_overflow;
  +*overflow = orig_overflow = te->overflow;
  if (orig_flags & SDB_TE_BUFFER_FULL_MASK) {
    /* SDB is already set by hardware.
    @@ -1510,6 +1542,7 @@
    perf_aux_output_end(handle, size);
    num_sdb = aux->sfb.num_sdb;
    +num_sdb = aux->sfb.num_sdb;
    while (!done) {
      /* Get an output handle */
      aux = perf_aux_output_begin(handle, cpuhw->event);
      @@ -1585,7 +1618,7 @@
      /* aux_buffer_setup() - Setup AUX buffer for diagnostic mode sampling
      -* @cpu:On which to allocate, -1 means current
      +* @event:Event the buffer is setup for, event->cpu == -1 means current
      * @pages:Array of pointers to buffer pages passed from perf core
      * @nr_pages:Total pages
      * @snapshot:Flag for snapshot mode
      @@ -1597,8 +1630,8 @@
      *
      * Return the private AUX buffer structure if success or NULL if fails.
      */
      -static void *aux_buffer_setup(int cpu, void **pages, int nr_pages,
      -  bool snapshot)
      +static void *aux_buffer_setup(struct perf_event *event, void **pages,
      +  int nr_pages, bool snapshot)
      {
      struct sf_buffer *sfb;
      struct aux_buffer *aux;
      @@ -1621,7 +1654,7 @@
/* Allocate aux_buffer struct for the event */
aux = kmalloc(sizeof(struct aux_buffer), GFP_KERNEL);
if (!aux)
goto no_aux;
sfb = &aux->sfb;

sfdbg = debug_register(KERN_COMPONENT, 2, 1, 80);
if (!sfdbg) {
    pr_err("Registering for s390dbf failed\n");
    return -ENOMEM;
}
dbger_register_view(sfdbg, &debug_sprintf_view);

err = register_external_irq(EXT_IRQ_MEASURE_ALERT,
cpumf_measurement_alert);
if (err) {
    pr_cpumf_err(RS_INIT_FAILURE_ALRT);
    debug_unregister(sfdbg);
    goto out;
}

pr_cpumf_err(RS_INIT_FAILURE_PERF);
unregister_external_irq(EXT_IRQ_MEASURE_ALERT,
cpumf_measurement_alert);
debug_unregister(sfdbg);
out:

return err;

+if (!try_get_task_stack(p))
+return 0;
+
low = task_stack_page(p);
high = (struct stack_frame *) task_pt_regs(p);
sf = (struct stack_frame *) p->thread.ksp;
-if (sf <= low || sf > high)
-return 0;
+if (sf <= low || sf > high) {
+return_address = 0;
+goto out;
+}
for (count = 0; count < 16; count++) {
    sf = (struct stack_frame *) sf->back_chain;
    -if (sf <= low || sf > high)
    -return 0;
    +if (sf <= low || sf > high) {
    +return_address = 0;
    +goto out;
    +}
return_address = sf->gprs[8];
if (!in_sched_functions(return_address))
-return_address;
+goto out;
}
-return 0;
+out:
+put_task_stack(p);
+return return_address;
}
unsigned long first = cpumask_first(cpu_online_mask);

-if (!n)
+if (n == first)
   show_cpu_summary(m, v);
if (!machine_has_cpu_mhz)
   return 0;
@@ -171,6 +173,8 @@
{     
   if (*pos)
*pos = cpumask_next(*pos - 1, cpu_online_mask);
+else
+  *pos = cpumask_first(cpu_online_mask);
   return *pos < nr_cpu_ids ? (void *)*pos + 1 : NULL;
 }
@@ -197,3 +201,21 @@
.child->thread.per_user.end = data;
 } } 
+int s390_isolate_bp(void)
+{     
+if (!test_facility(82))
+return -EOPNOTSUPP;
+set_thread_flag(TIF_ISOLATE_BP);
+return 0;
+}
+EXPORT_SYMBOL(s390_isolate_bp);
+
+int s390_isolate_bp_guest(void)
+{    
+if (!test_facility(82))
+return -EOPNOTSUPP;
+set_thread_flag(TIF_ISOLATE_BP_GUEST);
+return 0;
+}
+EXPORT_SYMBOL(s390_isolate_bp_guest);
--- linux-4.15.0.orig/arch/s390/kernel/ptrace.c
+++ linux-4.15.0/arch/s390/kernel/ptrace.c
@@ -325,6 +325,25 @@
child->thread.per_user.end = data;
 }
+static void fixup_int_code(struct task_struct *child, addr_t data)
+{     
+struct pt_regs *regs = task_pt_regs(child);
+int ilc = regs->int_code >> 16;
+u16 insn;
+
+if (ilc > 6)
+return;
+
+if (ptrace_access_vm(child, regs->psw.addr - (regs->int_code >> 16),
+&insn, sizeof(insn), FOLL_FORCE) != sizeof(insn))
+return;
+
+/* double check that tracee stopped on svc instruction */
+if ((insn >> 8) != 0xa)
+return;
+
+regs->int_code = 0x20000 | (data & 0xffff);
+
} /* Write a word to the user area of a process at location addr. This
* operation does have an additional problem compared to peek_user.
@@ -336,7 +355,9 @@
struct user *dummy = NULL;
addr_t offset;
+
if (addr < (addr_t) &dummy->regs.acrs) {
+struct pt_regs *regs = task_pt_regs(child);
/*
 * psw and gprs are stored on the stack
 */
@@ -354,7 +375,11 @@
/* Invalid addressing mode bits */
return -EINVAL;
}
-(addr_t *)((addr_t) &task_pt_regs(child)->psw + addr) = data;
+
+if (test_pt_regs_flag(regs, PIF_SYSCALL) &&
+addr == offsetof(struct user, regs.gprs[2]))
+fixup_int_code(child, data);
+*(addr_t *)((addr_t) &regs->psw + addr) = data;
}
 else if (addr < (addr_t) (&dummy->regs.orig_gpr2)) {
/*
@@ -720,6 +745,10 @@
regs->psw.mask = (regs->psw.mask & ~PSW_MASK_BA) |
(__u64)(tmp & PSW32_ADDR_AMODE);
] else if (addr < (addr_t) (&dummy->regs.orig_gpr2)) {
/*
@@ -720,6 +745,10 @@
regs->psw.mask = (regs->psw.mask & ~PSW_MASK_BA) |
(__u64)(tmp & PSW32_ADDR_AMODE);
] else {
+if (test_pt_regs_flag(regs, PIF_SYSCALL) &&
+addr == offsetof(struct compat_user, regs.gprs[2]))
+fixup_int_code(child, data);
/* gpr 0-15 */
*(__u32*)((addr_t) &regs->psw + addr*2 + 4) = tmp;
}
@@ -839,40 +868,45 @@
asmlinkage long do_syscall_trace_enter(struct pt_regs *regs)
{
    unsigned long mask = -1UL;
    +long ret = -1;

    /*
     * The sysc_tracesys code in entry.S stored the system
     * call number to gprs[2].
     */
    if (test_thread_flag(TIF_SYSCALL_TRACE) &&
        - (tracehook_report_syscall_entry(regs) ||
        -regs->gprs[2] >= NR_syscalls)) {
        +tracehook_report_syscall_entry(regs)) {
            /*
             * Tracing decided this syscall should not happen or the
             * debugger stored an invalid system call number. Skip
             * the system call and the system call restart handling.
             */
            -clear_pt_regs_flag(regs, PIF_SYSCALL);
            -return -1;
            +goto skip;
        }
    /* Do the secure computing check after ptrace. */
    if (secure_computing(NULL)) {
        /* seccomp failures shouldn't expose any additional code. */
        -return -1;
        +goto skip;
    }
    if (unlikely(test_thread_flag(TIF_SYSCALL_TRACEPOINT)))
        -trace_sys_enter(regs, regs->gprs[2]);
        +trace_sys_enter(regs, regs->int_code & 0xffff);
    if (is_compat_task())
        mask = 0xffffffff;
    -audit_syscall_entry(regs->gprs[2], regs->orig_gpr2 & mask,
        +audit_syscall_entry(regs->int_code & 0xffff, regs->orig_gpr2 & mask,
            regs->gprs[5] & mask);
+if ((signed long)regs->gprs[2] >= NR_syscalls) {
+regs->gprs[2] = -ENOSYS;
+ret = -ENOSYS;
+}
+return regs->gprs[2];
+skip:
+clear_pt_regs_flag(regs, PIF_SYSCALL);
+return ret;
}

asmlinkage void do_syscall_trace_exit(struct pt_regs *regs)
@@ -1257,7 +1291,6 @@
 cb->pc == 1 &
 cb->qc == 0 &
 cb->reserved2 == 0 &
- cb->key == PAGE_DEFAULT_KEY &
 cb->reserved3 == 0 &
 cb->reserved4 == 0 &
 cb->reserved5 == 0 &
@@ -1321,7 +1354,11 @@
 kfree(data);
 return -EINVAL;
 }
-#
+*/
+ * Override access key in any case, since user space should
+ * not be able to set it, nor should it care about it.
+ */
+ri_cb.key = PAGE_DEFAULT_KEY >> 4;
preempt_disable();
if (!target->thread.ri_cb)
target->thread.ri_cb = data;
--- linux-4.15.0.orig/arch/s390/kernel/reipl.S
+++ linux-4.15.0/arch/s390/kernel/reipl.S
@@ -7,8 +7,11 @@
#include <linux/linkage.h>
#include <asm/asm-offsets.h>
+#include <asm/nospec-insn.h>
#include <asm/sigp.h>

+GEN_BR_THUNK %r9
+
+#
# Issue "store status" for the current CPU to its prefix page
# and call passed function afterwards
@@ -67,9 +70,9 @@
st%r4,0(%r1)
\texttt{st\%r5,4(%r1)}
\texttt{stg\%r2,8(%r1)}
\texttt{-lgr\%r1,%r2}
\texttt{+lgr\%r9,%r2}
\texttt{lgr\%r2,%r3}
\texttt{-br\%r1}
\texttt{+BR\_EX\%r9}

\texttt{.section .bss}
\texttt{.align 8}

--- \texttt{linux-4.15.0.orig/arch/s390/kernel/runtime_instr.c}
+++ \texttt{linux-4.15.0/arch/s390/kernel/runtime_instr.c}
@@ -55,7 +55,7 @@
 cb->k = 1;
 cb->ps = 1;
 cb->pc = 1;
-cb->key = PAGE\_DEFAULT\_KEY;
+cblock->key = PAGE\_DEFAULT\_KEY >> 4;
 cb->v = 1;
}

--- \texttt{linux-4.15.0.orig/arch/s390/kernel/setup.c}
+++ \texttt{linux-4.15.0/arch/s390/kernel/setup.c}
@@ -68,6 +68,7 @@
 #include <asm/sysinfo.h>
 #include <asm/numa.h>
 #include <asm/alternative.h>
+#include <asm/nospec-branch.h>
 #include "entry.h"

 /*
 @ -140,7 +141,7 @@
 else if (CONSOLE\_IS\_3270)
 add\_preferred\_console("tty3270", 0, NULL);
 else if (CONSOLE\_IS\_VT220)
- add\_preferred\_console("ttyS", 1, NULL);
+ add\_preferred\_console("ttysclp", 0, NULL);
 else if (CONSOLE\_IS\_HVC)
 add\_preferred\_console("hvc", 0, NULL);
 }
 @ -300,7 +301,7 @@

 void *restart\_stack \_section(.data);

 -static void \_init setup\_lowcore(void)
 +static void \_init setup\_lowcore\_dat\_off(void)
 { 
 struct lowcore *lc;


lc = memblock_virt_alloc_low(sizeof(*lc), sizeof(*lc));
lc->restart_psw.mask = PSW_KERNEL_BITS;
lc->restart_psw.addr = (unsigned long) restart_int_handler;
-lc->external_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_DAT | PSW_MASK_MCHECK;
+lc->external_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_MCHECK;
lc->external_new_psw.addr = (unsigned long) ext_int_handler;
lc->svc_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_DAT | PSW_MASK_IO | PSW_MASK_EXT | PSW_MASK_MCHECK;
+lc->svc_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_IO | PSW_MASK_EXT | PSW_MASK_MCHECK;
lc->svc_new_psw.addr = (unsigned long) system_call;
-lc->program_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_DAT | PSW_MASK_MCHECK;
+lc->program_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_MCHECK;
lc->program_new_psw.addr = (unsigned long) pgm_check_handler;
lc->mcck_new_psw.mask = PSW_KERNEL_BITS;
lc->mcck_new_psw.addr = (unsigned long) mcck_int_handler;
-lc->io_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_DAT | PSW_MASK_MCHECK;
+lc->io_new_psw.mask = PSW_KERNEL_BITS | PSW_MASK_MCHECK;
lc->io_new_psw.addr = (unsigned long) io_int_handler;
lc->clock_comparator = clock_comparator_max;
lc->kernel_stack = ((unsigned long) &init_thread_union)
@ @ .340,7 +338,9 @ @
lc->preempt_count = S390_lowcore.preempt_count;
lc->stfl_fac_list = S390_lowcore.stfl_fac_list;
memcpy(lc->stfl_fac_list, S390_lowcore.stfl_fac_list,
     MAX_FACILITY_BIT/8);
+ sizeof(lc->stfl_fac_list));
+memcpy(lc->alt_stfl_fac_list, S390_lowcore.alt_stfl_fac_list,
     sizeof(lc->alt_stfl_fac_list));
nmi_alloc_boot_cpu(lc);
vds0.alloc_boot_cpu(lc);
lc->sync_enter_timer = S390_lowcore.sync_enter_timer;
@ @ .377,11 +377,22 @ @
lc->spinlock_index = 0;
arch_spin_lock_setup(0);
#endif
+lc->br_r1_trampoline = 0x07f1; /* br %r1 */
set_prefix((u32)(unsigned long) lc);
lowcore_ptr[0] = lc;
}

+static void __init setup_lowcore_dat_on(void)
+{
+__ctl_clear_bit(0, 28);
+S390_lowcore.external_new_psw.mask |= PSW_MASK_DAT;
+S390_lowcore.svc_new_psw.mask |= PSW_MASK_DAT;
+S390_lowcore.program_new_psw.mask |= PSW_MASK_DAT;
+S390_lowcore.io_new_psw.mask |= PSW_MASK_DAT;
+__ctl_set_bit(0, 28);
+
+static struct resource code_resource = {
    .name = "Kernel code",
    .flags = IORESOURCE_BUSY | IORESOURCE_SYSTEM_RAM,

static void reserve_memory_end(void)
+static void __init reserve_memory_end(void)
{
    #ifdef CONFIG_CRASH_DUMP
    if (ipl_info.type == IPL_TYPE_FCP_DUMP &&
        @@ -535,7 +535,7 @@
        /*
           * Make sure that the area behind memory_end is protected
           */
           -static void reserve_memory_end(void)
           +static void __init reserve_memory_end(void)
           }
    #ifdef CONFIG_CRASH_DUMP
    if (OLDMEM_BASE)
    @@ -545,7 +545,7 @@
        /*
           * Make sure that oldmem, where the dump is stored, is protected
           */
           -static void reserve_oldmem(void)
           +static void __init reserve_oldmem(void)
           }
    #ifdef CONFIG_CRASH_DUMP
    if (OLDMEM_BASE)
    @@ -555,7 +555,7 @@
        /*
           * Make sure that oldmem, where the dump is stored, is protected
           */
           -static void remove_oldmem(void)
           +static void __init remove_oldmem(void)
           }
    #ifdef CONFIG_CRASH_DUMP
    if (OLDMEM_BASE)
    @@ -574,7 +574,15 @@
        elf_hwcap |= HWCAP_S390_VXRS_EXT;
    if (test_facility(135))
        elf_hwcap |= HWCAP_S390_VXRS_BCD;
    -}
    +if (test_facility(148))
    +elf_hwcap |= HWCAP_S390_VXRS_EXT2;
    +if (test_facility(152))
    +elf_hwcap |= HWCAP_S390_VXRS_PDE;
+if (test_facility(150))
+elf_hwcap |= HWCAP_S390_SORT;
+if (test_facility(151))
+elf_hwcap |= HWCAP_S390_DFLT;

/*
 * Guarded storage support HWCAP_S390_GS is bit 12.
@@ -815,8 +834,13 @@
 strcpy(elf_platform, "z13");
 break;
 case 0x3906:
+case 0x3907:
 strcpy(elf_platform, "z14");
 break;
+case 0x8561:
+case 0x8562:
+strcpy(elf_platform, "z15");
+break;
 }

/*
@@ -875,6 +914,8 @@
 pr_info("Linux is running under KVM in 64-bit mode\n");
 else if (MACHINE_IS_LPAR)
 pr_info("Linux is running natively in 64-bit mode\n");
+else
+pr_info("Linux is running as a guest in 64-bit mode\n");

/* Have one command line that is parsed and saved in /proc/cmdline */
/* boot_command_line has been already set up in early.c */
@@ -888,6 +928,10 @@
 init_mm.end_data = (unsigned long) &_edata;
 init_mm.brk = (unsigned long) &_end;

+if (IS_ENABLED(CONFIG_EXPOLINE_AUTO))
+nospec_auto_detect();
+parse_early_param();
#else CONFIG_CRASH_DUMP
/* Deactivate elfcorehdr= kernel parameter */
@@ -934,7 +974,7 @@
#endif

setup_resources();
-setup_lowcore();
+setup_lowcore_dat_off();
 smp_fill_possible_mask();
 cpu_detect_mhz_feature();
cpu_init();
@@ -947,11 +976,19 @@
 /*
 paging_init();
 */
+
+ /* After paging_init created the kernel page table, the new PSWs
+ in lowcore can now run with DAT enabled.
+ */
+ setup_lowcore_dat_on();
+
+ /* Setup default console */
conmode_default();
set_preferred_console();
apply_alternative_instructions();
+if (IS_ENABLED(CONFIG_EXPOLINE))
+nospec_init_branches();

/* Setup zfcpdump support */
setup_zfcpdump();
--- linux-4.15.0.orig/arch/s390/kernel/smp.c
+++ linux-4.15.0/arch/s390/kernel/smp.c
@@ -214,6 +214,7 @@
lc->cpu_nr = cpu;
lc->spinlock_lockval = arch_spin_lockval(cpu);
lc->spinlock_index = 0;
+lc->br_r1_trampoline = 0x07f1; /* br %r1 */
if (nmi_alloc_per_cpu(lc))
goto out;
if (vdso_alloc_per_cpu(lc))
@@ -261,12 +262,17 @@
lc->percpu_offset = __per_cpu_offset[cpu];
lc->kernel_asce = S390_lowcore.kernel_asce;
+lc->user_asce = S390_lowcore.kernel_asce;
lc->machine_flags = S390_lowcore.machine_flags;
lc->user_timer = lc->system_timer = lc->steal_timer = 0;
__ctl_store(lc->cregs_save_area, 0, 15);
+lc->cregs_save_area[1] = lc->kernel_asce;
+lc->cregs_save_area[7] = lc->vdso_asce;
save_access_regs((unsigned int *) lc->access_regs_save_area);
memcpy(lc->stfle_fac_list, S390_lowcore.stfle_fac_list,
-     MAX_FACILITY_BIT/8);
+     sizeof(lc->stfle_fac_list));
+memcpy(lc->alt_stfle_fac_list, S390_lowcore.alt_stfle_fac_list,
+     sizeof(lc->alt_stfle_fac_list));
arch_spin_lock_setup(cpu);
mem_assign_absolute(lc->restart_fn, (unsigned long) func);
mem_assign_absolute(lc->restart_data, (unsigned long) data);
mem_assign_absolute(lc->restart_source, source_cpu);
	__bpon();
asm volatile("0: sigp 0,%0,%2# sigp restart to target cpu\n"
"brc2,0b# busy, try again\n"
@@ -368,9 +375,13 @@
*/
void smp_call_ipl_cpu(void (*func)(void *), void *data)
{
+struct lowcore *lc = pcpu_devices->lowcore;
+
+if (pcpu_devices[0].address == stap())
+lc = &S390_lowcore;
+
+pcpu_delegate(&pcpu_devices[0], func, data,
- pcpu_devices->lowcore->panic_stack -
- PANIC_FRAME_OFFSET + PAGE_SIZE);
+ lc->panic_stack - PANIC_FRAME_OFFSET + PAGE_SIZE);
}
int smp_find_processor_id(u16 address)
@@ -393,7 +404,7 @@
return -1;
}

-bool arch_vcpu_is_preempted(int cpu)
+bool notrace arch_vcpu_is_preempted(int cpu)
{
if (test_cpu_flag_of(CIF_ENABLED_WAIT, cpu))
return false;
@@ -393,7 +404,7 @@
}
EXPORT_SYMBOL(arch_vcpu_is_preempted);

-void smp_yield_cpu(int cpu)
+void notrace smp_yield_cpu(int cpu)
{
if (MACHINE_HAS_DIAG9C) {
diag_stat_inc_norecursion(DIAG_STAT_X09C);
@@ -705,39 +716,67 @@
static int smp_add_present_cpu(int cpu);
-static int __smp_rescan_cpus(struct sclp_core_info *info, int sysfs_add)
+static int smp_add_core(struct sclp_core_entry *core, cpumask_t *avail,
+  bool configured, bool early)
{
  struct pcpu *pcpu;
  -cpumask_t avail;
  -int cpu, nr, i, j;
+  int cpu, nr, i;
  u16 address;

  nr = 0;
  -cpumask_xor(&avail, cpu_possible_mask, cpu_present_mask);
-  cpu = cpumask_first(&avail);
+  int cpu, nr, i;
  for (i = 0; (i < info->combined) && (cpu < nr_cpu_ids); i++) {
-    if (sclp.has_core_type && info->core[i].type != boot_core_type)
+    if (sclp.has_core_type && core->type != boot_core_type)
      return nr;
    cpu = cpumask_first(&avail);
    address = core->core_id << smp_cpu_mt_shift;
+    for (i = 0; (i <= smp_cpu_mtid) && (cpu < nr_cpu_ids); i++) {
+      if (pcpu_find_address(cpu_present_mask, address + i))
+        continue;
+    address = info->core[i].core_id << smp_cpu_mt_shift;
-    for (i = 0; (i <= smp_cpu_mtid); i++) {
-      if (pcpu_find_address(cpu_present_mask, address + j))
-        continue;
-      pcpu = pcpu_devices + cpu;
-      pcpu->address = address + j;
-      pcpu->state =
-        !(cpu >= info->configured*(smp_cpu_mtid + 1)) ?
-          CPU_STATE_STANDBY : CPU_STATE_CONFIGURED;
-      -smp_cpu_set_polarization(cpu, POLARIZATION_UNKNOWN);
-      -set_cpu_present(cpu, true);
-      -if (sysfs_add && smp_add_present_cpu(cpu) != 0)
-        -set_cpu_present(cpu, false);
-    -else
-      -nr++;
-      -cpu = cpumask_next(cpu, &avail);
-      -if (cpu >= nr_cpu_ids)
-        pcpu = pcpu_devices + cpu;
+      pcpu->address = address + i;
+      if (configured)
+        pcpu->state = CPU_STATE_CONFIGURED;
+      else
+        pcpu->state = CPU_STATE_STANDBY;
+      -smp_cpu_set_polarization(cpu, POLARIZATION_UNKNOWN);
+      -set_cpu_present(cpu, true);
+      if (!early && smp_add_present_cpu(cpu) != 0)
+set_cpu_present(cpu, false);
+else
+nr++;
+cpumask_clear_cpu(cpu, avail);
+cpu = cpumask_next(cpu, avail);
+}
+return nr;
+}
+
+static int __smp_rescan_cpus(struct sclp_core_info *info, bool early)
+{
+struct sclp_core_entry *core;
+static cpumask_t avail;
+bool configured;
+u16 core_id;
+int nr, i;
+
+nr = 0;
+cpumask_xor(&avail, cpu_possible_mask, cpu_present_mask);
+/*
+ * Add IPL core first (which got logical CPU number 0) to make sure
+ * that all SMT threads get subsequent logical CPU numbers.
+ */
+if (early) {
+core_id = pcpu_devices[0].address >> smp_cpu_mt_shift;
+for (i = 0; i < info->configured; i++) {
+core = &info->core[i];
+if (core->core_id == core_id) {
+nr += smp_add_core(core, &avail, true, early);
+break;
+}
+}
+}
+
+for (i = 0; i < info->combined; i++) {
+configured = i < info->configured;
+nr += smp_add_core(&info->core[i], &avail, configured, early);
+}
+return nr;
+}

@@ -783,7 +822,7 @@
/* Add CPUs present at boot */
get_online_cpus();
-__smp_rescan_cpus(info, 0);
+__smp_rescan_cpus(info, true);
put_online_cpus();
memblock_free_early((unsigned long)info, sizeof(*info));
static void smp_start_secondary(void *cpuvoid)
{
    int cpu = smp_processor_id();
    int cpu = raw_smp_processor_id();

    S390_lowcore.last_update_clock = get_tod_clock();
    S390_lowcore.restart_stack = (unsigned long) restart_stack;

    restore_access_regs(S390_lowcore.access_regs_save_area);
    __ctl_load(S390_lowcore.cregs_save_area, 0, 15);
    __load_psw_mask(PSW_KERNEL_BITS | PSW_MASK_DAT);
    +set_cpu_flag(CIF_ASCE_PRIMARY);
    +set_cpu_flag(CIF_ASCE_SECONDARY);
    cpu_init();
    +rcu_cpu_starting(cpu);
    preempt_disable();
    init_cpu_timer();
    vtime_init();

    /* Upping and downing of CPUs */
    int __cpu_up(unsigned int cpu, struct task_struct *tidle)
    {
        struct pcpu *pcpu;
        int base, i, rc;
        +struct pcpu *pcpu = pcpu_devices + cpu;
        +int rc;

        -pcpu = pcpu_devices + cpu;
        if (pcpu->state != CPU_STATE_CONFIGURED)
            return -EIO;
        -base = smp_get_base_cpu(cpu);
        -for (i = 0; i <= smp_cpu_mtid; i++) {
            -if (base + i < nr_cpu_ids)
                -break;
        }
        -if (i > smp_cpu_mtid &&
            -pcpu_sigp_retry(pcpu_devices + base, SIGP_INITIAL_CPU_RESET, 0) !=
            +if (pcpu_sigp_retry(pcpu, SIGP_INITIAL_CPU_RESET, 0) !=
                +SIGP_CC_ORDER_CODE_ACCEPTED)
                return -EIO;
```c
void __noreturn cpu_die(void)
{
    idle_task_exit();
    __bpon();
    pcpu_sigp_retry(pcpu_devices + smp_processor_id(), SIGP_STOP, 0);
    for (;;) ;
}
```

```c
static int __init s390_smp_init(void)
--- linux-4.15.0.orig/arch/s390/kernel/sthyi.c
+++ linux-4.15.0/arch/s390/kernel/sthyi.c
@@ -183,17 +183,19 @@
static void fill_stsi_mac(struct sthyi_sctns *sctns, struct sysinfo_1_1_1 *sysinfo)
{
    +sclp_ocf_cpc_name_copy(sctns->mac.infmname);
    +if (*(u64 *)sctns->mac.infmname != 0)
    +sctns->mac.infmval1 |= MAC_NAME_VLD;
    +
    if (stsi(sysinfo, 1, 1, 1))
        return;

    -sclp_ocf_cpc_name_copy(sctns->mac.infmname);
```
memcpy(sctns->mac.infmttype, sysinfo->type, sizeof(sctns->mac.infmttype));
memcpy(sctns->mac.infmmanu, sysinfo->manufacturer, sizeof(sctns->mac.infmmanu));
memcpy(sctns->mac.infmpman, sysinfo->plant, sizeof(sctns->mac.infmpman));
memcpy(sctns->mac.infmseq, sysinfo->sequence, sizeof(sctns->mac.infmseq));

-sctns->mac.infmval1 | MAC_ID_VLD | MAC_NAME_VLD;
+sctns->mac.infmval1 | MAC_ID_VLD;

}
brasl %r14, sclp_early_printk
larl %r3, Ldisabled_wait_31
lpso0(%r3)
4:
@@ -267,7 +269,7 @@
/* Return 0 */
lgm %r6, %r15, STACK_FRAME_OVERHEAD + __SF_GPRS(%r15)
lghi %r2, 0
-br %r14
+BR_EX %r14

.section .data..nosave,"aw", @progbits
.align 8
--- linux-4.15.0.orig/arch/s390/kernel/sysinfo.c
+++ linux-4.15.0/arch/s390/kernel/sysinfo.c
@@ -59,6 +59,8 @@
}
EXPORT_SYMBOL(stsi);

+#ifdef CONFIG_PROC_FS
+
static bool convert_ext_name(unsigned char encoding, char *name, size_t len)
{
  switch (encoding) {
@@ -311,6 +313,8 @@
  }
  device_initcall(sysinfo_create_proc);

+#endif /* CONFIG_PROC_FS */
+
/*
 * Service levels interface.
 */
--- linux-4.15.0.orig/arch/s390/kernel/time.c
+++ linux-4.15.0/arch/s390/kernel/time.c
@@ -305,6 +305,7 @@
vdso_data->tk_mult = tk->tkr_mono.mult;
vdso_data->tk_shift = tk->tkr_mono.shift;
+vdso_data->hrtimer_res = hrtimer_resolution;
smp_wmb();
++vdso_data->tb_update_count;
}@@ -348,8 +349,9 @@
static DEFINE_MUTEX(clock_sync_mutex);
static unsigned long clock_sync_flags;
#define CLOCK_SYNC_HAS_STP 0

vdso_data->tk_mult = tk->tkr_mono.mult;
vdso_data->tk_shift = tk->tkr_mono.shift;
++vdso_data->hrtimer_res = hrtimer_resolution;
++vdso_data->tb_update_count;
}@@ -348,8 +349,9 @@
static DEFINE_MUTEX(clock_sync_mutex);
static unsigned long clock_sync_flags;
#define CLOCK_SYNC_HAS_STP 0
/*
 * The get_clock function for the physical clock. It will get the current
 * @ @ -586,6 +588,22 @ @
 * queue_work(time_sync_wq, &stp_work);
 */

+static int __store_stpinfo(void)
+{
+ int rc = chsc_sstpi(stp_page, &stp_info, sizeof(struct stp_sstpi));
+    
+ if (rc)
+     clear_bit(CLOCK_SYNC_STPINFO_VALID, &clock_sync_flags);
+ else
+     set_bit(CLOCK_SYNC_STPINFO_VALID, &clock_sync_flags);
+ return rc;
+
+ static int stpinfo_valid(void)
+ {
+     return stp_online && test_bit(CLOCK_SYNC_STPINFO_VALID, &clock_sync_flags);
+
+ }
+
+ static int stp_sync_clock(void *data)
+ {
+     struct clock_sync_data *sync = data;
+ @ @ -607,8 +625,7 @ @
+ if (rc == 0) {
+     sync->clock_delta = clock_delta;
+     clock_sync_global(clock_delta);
+    -rc = chsc_sstpi(stp_page, &stp_info,
+    -sizeof(struct stp_sstpi));
+    +rc = __store_stpinfo();
+    if (rc == 0 && stp_info.tmd != 2)
+        rc = -EAGAIN;
+    } @ @ -653,7 +670,7 @ @
+     if (rc)
+         goto out_unlock;
+
+    -rc = chsc_sstpi(stp_page, &stp_info, sizeof(struct stp_sstpi));
+    +rc = __store_stpinfo();
+    if (rc || stp_info.c == 0)
+        goto out_unlock;
+}
static DEVICE_ATTR(ctn_id, 0400, stp_ctn_id_show, NULL);
static DEVICE_ATTR(ctn_type, 0400, stp_ctn_type_show, NULL);
+ret = sprintf(buf, "%i\n", (int)(s16) stp_info.dsto);
+mutex_unlock(&stp_work_mutex);
+return ret;
}

static DEVICE_ATTR(dst_offset, 0400, stp_dst_offset_show, NULL);
@@ -724,9 +753,13 @@
      struct device_attribute *attr,
      char *buf)
    {
-      if (!stp_online || !(stp_info.vbits & 0x8000))
-        return -ENODATA;
-      return sprintf(buf, "%i\n", (int)(s16) stp_info.leaps);
+    ssize_t ret = -ENODATA;
+    +mutex_lock(&stp_work_mutex);
+      if (stpinfo_valid() && (stp_info.vbits & 0x8000))
+        ret = sprintf(buf, "%i\n", (int)(s16) stp_info.leaps);
+    mutex_unlock(&stp_work_mutex);
+    return ret;
    }

static DEVICE_ATTR(leap_seconds, 0400, stp_leap_seconds_show, NULL);
@@ -735,9 +768,13 @@
      struct device_attribute *attr,
      char *buf)
    {
-      if (!stp_online)
-        return -ENODATA;
-      return sprintf(buf, "%i\n", (int)(s16) stp_info.stratum);
+    ssize_t ret = -ENODATA;
+    +mutex_lock(&stp_work_mutex);
+      if (stpinfo_valid())
+        ret = sprintf(buf, "%i\n", (int)(s16) stp_info.stratum);
+    mutex_unlock(&stp_work_mutex);
+    return ret;
    }

static DEVICE_ATTR(stratum, 0400, stp_stratum_show, NULL);
@@ -746,9 +783,13 @@
      struct device_attribute *attr,
      char *buf)
    {
-      if (!stp_online || !(stp_info.vbits & 0x8000))
-        return -ENODATA;
-      return sprintf(buf, "%i\n", (int)(s16) stp_info.tto);
+    ssize_t ret = -ENODATA;
+    +mutex_lock(&stp_work_mutex);
+      if (stpinfo_valid())
+        ret = sprintf(buf, "%i\n", (int)(s16) stp_info.tto);
+    mutex_unlock(&stp_work_mutex);
+    return ret;
    }
+mutex_lock(&stp_work_mutex);
+if (stpinfo_valid() & (stp_info.vbits & 0x0800))
+ret = sprintf(buf, "%d", (int) stp_info.tto);
+mutex_unlock(&stp_work_mutex);
+return ret;
}

static DEVICE_ATTR(time_offset, 0400, stp_time_offset_show, NULL);
@@ -757,9 +798,13 @@
struct device_attribute *attr,
char *buf)
{
-if (!stp_online || !(stp_info.vbits & 0x4000))
-return -ENODATA;
-return sprintf(buf, "%d", (int)(s16) stp_info.tzo);
+ssize_t ret = -ENODATA;
+
+mutex_lock(&stp_work_mutex);
+if (stpinfo_valid() & (stp_info.vbits & 0x4000))
+ret = sprintf(buf, "%d", (int)(s16) stp_info.tzo);
+mutex_unlock(&stp_work_mutex);
+return ret;
}

static DEVICE_ATTR(time_zone_offset, 0400,
@@ -769,9 +814,13 @@
struct device_attribute *attr,
char *buf)
{
-if (!stp_online)
-return -ENODATA;
-return sprintf(buf, "%d", stp_info.tmd);
+ssize_t ret = -ENODATA;
+
+mutex_lock(&stp_work_mutex);
+if (stpinfo_valid())
+ret = sprintf(buf, "%d", (int)(s16) stp_info.tzo);
+mutex_unlock(&stp_work_mutex);
+return ret;
}

static DEVICE_ATTR(timing_mode, 0400, stp_timing_mode_show, NULL);
@@ -780,9 +829,13 @@
struct device_attribute *attr,
char *buf)
{
-if (!stp_online)
-
-return -ENODATA;
-return snprintf(buf, "%i\n", stp_info.tst);
+ssize_t ret = -ENODATA;
+
+mutex_lock(&stp_work_mutex);
+if (stpinfo_valid())
+ret = snprintf(buf, "%i\n", stp_info.tst);
+mutex_unlock(&stp_work_mutex);
+return ret;
}

static DEVICE_ATTR(timing_state, 0400, stp_timing_state_show, NULL);
--- linux-4.15.0.orig/arch/s390/kernel/topology.c
+++ linux-4.15.0/arch/s390/kernel/topology.c
@@ -65,6 +65,13 @@
cpus_with_topology;

+int __cpu_to_node(int cpu)
+{
+return cpu_topology[cpu].node_id;
+}
+
+EXPORT_SYMBOL(__cpu_to_node);
+
+static cpumask_t cpu_group_map(struct mask_info *info, unsigned int cpu)
+{
+cpumask_t mask;
+@@ -311,7 +318,8 @@
on_each_cpu(__arch_update_dedicated_flag, NULL, 0);
+for_each_online_cpu(cpu) {
+dev = get_cpu_device(cpu) {
+-kobject_uevent(&dev->kobj, KOBJ_CHANGE);
+if (dev)
+kobject_uevent(&dev->kobj, KOBJ_CHANGE);
+}
+return rc;
+
+}
@@ -404,8 +412,7 @@
+put_online_cpus();
+return rc ? rc : count;
+
-static DEVICE_ATTR(dispatching, 0644, dispatching_show,
-static DEVICE_ATTR_RW(dispatching);

static ssize_t cpu_polarization_show(struct device *dev,
    struct device_attribute *attr, char *buf)
static DEFINE_PER_CPU(unsigned int, diagnose_trace_depth);

void trace_s390_diagnose_norecursion(int diag_nr)
+void notrace trace_s390_diagnose_norecursion(int diag_nr)
{
    unsigned long flags;
    unsigned int *depth;

    arch_uretprobe_is_alive(struct return_instance *ret, enum rp_check ctx,
        struct pt_regs *regs)
    {}
        +if (ctx == RP_CHECK_CHAIN_CALL)
            +return user_stack_pointer(regs) <= ret->stack;
        +else
            +return user_stack_pointer(regs) < ret->stack;
    +}
/* Instruction Emulation */

static void adjust_psw_addr(psw_t *psw, unsigned long len)

vdso_pagelist = vdso64_pagelist;
vdso_pages = vdso64_pages;
#ifdef CONFIG_COMPAT
    -if (is_compat_task()) {
        +if (vma->vm_mm->context.compat_mm) {
            vdso_pagelist = vdso32_pagelist;
            vdso_pages = vdso32_pages;
        }
    }
#endif

vdso_pages = vdso64_pages;
#ifdef CONFIG_COMPAT
    -if (is_compat_task())
        +if (vma->vm_mm->context.compat_mm)
            vdso_pages = vdso32_pages;
#endif
vdso_pages = vdso64_pages;
#ifdef CONFIG_COMPAT
-if (is_compat_task())
+if (mm->context.compat_mm = is_compat_task());
+if (mm->context_compat_mm)
vdso_pages = vdso32_pages;
#endif

/*
--- linux-4.15.0.orig/arch/s390/kernel/vdso32/Makefile
+++ linux-4.15.0/arch/s390/kernel/vdso32/Makefile
@@ -25,15 +25,16 @@
 extra-y += vdso32.lds
 CPPFLAGS_vdso32.lds += -P -C -US(ARCH)

-# Disable gcov profiling and ubsan for VDSO code
+# Disable gcov profiling, ubsan and kasan for VDSO code
 GCOV_PROFILE := n
 UBSAN_SANITIZE := n
+KASAN_SANITIZE := n

 # Force dependency (incbin is bad)
 $(obj)/vdso32_wrapper.o : $(obj)/vdso32.so

 # link rule for the .so file, .lds has to be first
 -$(obj)/vdso32.so.dbg: $(src)/vdso32.lds $(obj-vdso32)
+$(obj)/vdso32.so.dbg: $(src)/vdso32.lds $(obj-vdso32) FORCE
 $(call if_changed,vdso32ld)

 # strip rule for the .so file
 @@ -42,12 +43,12 @@
 $(call if_changed,objcopy)

 # assembly rules for the .S files
 -$(obj-vdso32): %o: %.S
+$(obj-vdso32): %o: %.S FORCE
 $(call if_changed_dep,vdso32as)

 # actual build commands
 quiet_cmd_vdso32ld = VDSO32L $@
 - cmd_vdso32ld = $(CC) $(c_flags) -Wl,-T $^ -o $@
+ cmd_vdso32ld = $(CC) $(c_flags): -Wl,-T $(filter %.lds %o,$^) -o $@
 quiet_cmd_vdso32as = VDSO32A $@
 cmd_vdso32as = $(CC) $(a_flags) -c -o $@ $<

--- linux-4.15.0.org/arch/s390/kernel/vdso64/Makefile
+++ linux-4.15.0/arch/s390/kernel/vdso64/Makefile
@@ -25,15 +25,16 @@
extra-y += vdso64.lds
CPPFLAGS_vdso64.lds += -P -C -U$(ARCH)

-# Disable gcov profiling and ubsan for VDSO code
+# Disable gcov profiling, ubsan and kasan for VDSO code
GCOV_PROFILE := n
UBSAN_SANITIZE := n
+KASAN_SANITIZE := n

# Force dependency (incbin is bad)
$(obj)/vdso64_wrapper.o : $(obj)/vdso64.so

# link rule for the .so file, .lds has to be first
-$(obj)/vdso64.so.dbg: $(src)/vdso64.lds $(obj-vdso64)
+$$(obj)/vdso64.so.dbg: $(src)/vdso64.lds $(obj-vdso64) FORCE
$(call if_changed,vdso64ld)

# strip rule for the .so file
@ @ -42,12 +43,12 @@
$(call if_changed,objcopy)

# assembly rules for the .S files
-$(obj-vdso64): %.o: %.S
+$$(obj-vdso64): %.o: %.S FORCE
$(call if_changed_dep,vdso64as)

# actual build commands
quiet_cmd_vdso64ld = VDSO64L $@
- cmd_vdso64ld = $(CC) $(c_flags) -Wl,-T $^ -o $@
+ cmd_vdso64ld = $(CC) $(c_flags) -Wl,-T $(filter %.lds %.o,$^) -o $@
quiet_cmd_vdso64as = VDSO64A $@
cmd_vdso64as = $(CC) $(a_flags) -c -o $@ $<

--- linux-4.15.0.orig/arch/s390/kernel/vdso64/clock_getres.S
+++ linux-4.15.0/arch/s390/kernel/vdso64/clock_getres.S
@@ -16,12 +16,14 @@
 .type  __kernel_clock_getres,@function
__kernel_clock_getres:
 .cfi_startproc
-  tarl	%r1,4f
+  tarl	%r1,3f
  lg	%r0,0(%r1)
cghi	%r2,__CLOCK_REALTIME_COARSE
  je0f
cghi	%r2,__CLOCK_MONOTONIC_COARSE
  je0f

- larl%r1,3f
+ larl%r1._vdso_data
+ llgf%r0.__VDSO_CLOCK_REALTIME_RES(%r1)
  cghi%r2.__CLOCK_REALTIME
  je0f
  cghi%r2.__CLOCK_MONOTONIC
@@ -35,7 +37,6 @@
  jz2f
  0:ltgr%r3,%r3
  jz1f* res == NULL */
- lgl%r0.0(%r1)
+ lgl%r0,0(%r1)
  xco(8,%r3),0(%r3)/* set tp->tv_sec to zero */
  stg%r0,8(%r3)/* store tp->tv_usec */
  1:lghi%r2,0
@@ -43,7 +44,6 @@
  svc0
  br%r14
-3:.quad __CLOCK_REALTIME_RES
-4:.quad __CLOCK_COARSE_RES
+3:.quad __CLOCK_COARSE_RES
  .cfi_endproc
  .size __kernel_clock_getres,.~-__kernel_clock_getres
--- linux-4.15.0.orig/arch/s390/kernel/vmlinux.lds.S
+++ linux-4.15.0/arch/s390/kernel/vmlinux.lds.S
@@ -123,6 +123,20 @@
*(.altinstr_replacement)
+	/* Table with the patch locations to undo expolines */
+* /
+.nospec_call_table : {
+  +__nospec_call_start = . ;
+  +*(s390_indirect*)
+  +__nospec_call_end = . ;
+  +}
+.nospec_return_table : {
+  +__nospec_return_start = . ;
+  +*(s390_return*)
+  +__nospec_return_end = . ;
+  +}
+ /* early.c uses stsi, which requires page aligned data. */
+ . = ALIGN(PAGE_SIZE);
+ INIT_DATA_SECTION(0x100)
--- linux-4.15.0.orig/arch/s390/kvm/diag.c
+++ linux-4.15.0/arch/s390/kvm/diag.c
case 0x500:
    return __diag_virtio_hypercall(vcpu);
default:
    vcpu->stat.diagnose_other++;
    return -EOPNOTSUPP;
}
+/**
+ * _kvm_s390_logical_to_effective - convert guest logical to effective address
+ * @psw: psw of the guest
+ * @ga: guest logical address
+ *
+ * Convert a guest logical address to an effective address by applying the
+ * rules of the addressing mode defined by bits 31 and 32 of the given PSW
+ * (extended/basic addressing mode).
+ *
+ * Depending on the addressing mode, the upper 40 bits (24 bit addressing
+ * mode), 33 bits (31 bit addressing mode) or no bits (64 bit addressing
+ * mode) of @ga will be zeroed and the remaining bits will be returned.
+ */
+static inline unsigned long _kvm_s390_logical_to_effective(psw_t *psw,
+unsigned long ga)
+{
+  if (psw_bits(*psw).eaba == PSW_BITS_AMODE_64BIT)
+    return ga;
+  if (psw_bits(*psw).eaba == PSW_BITS_AMODE_31BIT)
+    return ga & ((1UL << 31) - 1);
+  return ga & ((1UL << 24) - 1);
+}
+
+/**
+ * kvm_s390_logical_to_effective - convert guest logical to effective address
+ * @vcpu: guest virtual cpu
+ * @ga: guest logical address
+ *
+ * Convert a guest logical address to an effective address by applying the
+ * rules of the addressing mode defined by bits 31 and 32 of the given PSW
+ * (extended/basic addressing mode).
+ *
+ * Depending on the addressing mode, the upper 40 bits (24 bit addressing
+ * mode), 33 bits (31 bit addressing mode) or no bits (64 bit addressing
+ * mode) of @ga will be zeroed and the remaining bits will be returned.
+ */
+static inline unsigned long kvm_s390_logical_to_effective(struct kvm_vcpu *vcpu,
+unsigned long ga)
+{
+  psw_t *psw = &vcpu->arch.sie_block->gpsw;
+  if (psw_bits(*psw).eaba == PSW_BITS_AMODE_64BIT)
+    return ga;
+  if (psw_bits(*psw).eaba == PSW_BITS_AMODE_31BIT)
+    return ga & ((1UL << 31) - 1);
+  return ga & ((1UL << 24) - 1);
+}

/*
--- linux-4.15.0.orig/arch/s390/kvm/interrupt.c
+++ linux-4.15.0/arch/s390/kvm/interrupt.c
@@ -52,13 +86,7 @@
 static inline unsigned long kvm_s390_logical_to_effective(struct kvm_vcpu *vcpu,
                 unsigned long ga)
 {
-  psw_t *psw = &vcpu->arch.sie_block->gpsw;
-  -
-  if (psw_bits(*psw).eaba == PSW_BITS_AMODE_64BIT)
-    return ga;
-  if (psw_bits(*psw).eaba == PSW_BITS_AMODE_31BIT)
-    return ga & ((1UL << 31) - 1);
-  return ga & ((1UL << 24) - 1);
+  return _kvm_s390_logical_to_effective(&vcpu->arch.sie_block->gpsw, ga);
 }

 /*
--- linux-4.15.0.orig/arch/s390/kvm/interrupt.c
+++ linux-4.15.0/arch/s390/kvm/interrupt.c
@@ -170,8 +170,15 @@
 static int ckc_irq_pending(struct kvm_vcpu *vcpu)
 {


-if (vcpu->arch.sie_block->ckc >= kvm_s390_get_tod_clock_fast(vcpu->kvm))
+const u64 now = kvm_s390_get_tod_clock_fast(vcpu->kvm);
+const u64 ckc = vcpu->arch.sie_block->ckc;
+
+if (vcpu->arch.sie_block->gcr[0] & 0x0020000000000000ul) {
+if ((s64)ckc >= (s64)now)
+return 0;
+} else if (ckc >= now) {
return 0;
+}
return ckc_interrupts_enabled(vcpu);
}

static u64 __calculate_sltime(struct kvm_vcpu *vcpu)
{
-const u64 now = kvm_s390_get_tod_clock_fast(vcpu->kvm);
-const u64 ckc = vcpu->arch.sie_block->ckc;
+u64 cputm, sltime = 0;
if (ckc_interrupts_enabled(vcpu)) {
-now = kvm_s390_get_tod_clock_fast(vcpu->kvm);
-sltime = tod_to_ns(vcpu->arch.sie_block->ckc - now);
-/* already expired or overflow? */
-if (!sltime || vcpu->arch.sie_block->ckc <= now)
+if (vcpu->arch.sie_block->gcr[0] & 0x0020000000000000ul) {
+if ((s64)now < (s64)ckc)
+sltime = tod_to_ns((s64)ckc - (s64)now);
+} else if (now < ckc) {
+sltime = tod_to_ns(ckc - now);
+}
+/* already expired */
+if (!sltime)
return 0;
if (cpu_timer_interrupts_enabled(vcpu)) {
+cputm = kvm_s390_get_cpu_timer(vcpu);
@@ -1701,6 +1714,16 @@
 case KVM_S390_MCHK:
 irq->u.mchk.mcic = s390int->parm64;
 break;
+case KVM_S390_INT_PFAULT_INIT:
+irq->u.ext.ext_params = s390int->parm;
+irq->u.ext.ext_params2 = s390int->parm64;
+break;
+case KVM_S390_RESTART:
+case KVM_S390_INT_CLOCK_COMP:
+case KVM_S390_INT_CPU_TIMER:
+break;
+default:
+return -EINVAL;
}
return 0;
}
@@ -1903,7 +1926,7 @@
return -EINVAL;
if (!test_kvm_facility(kvm, 72))
-return -ENOTSUPP;
+-return -EOPNOTSUPP;

mutex_lock(&fi->ais_lock);
ais.simm = fi->simm;
@@ -2206,7 +2229,7 @@
int ret = 0;

if (!test_kvm_facility(kvm, 72))
-return -ENOTSUPP;
+-return -EOPNOTSUPP;

if (copy_from_user(&req, (void __user *)attr->addr, sizeof(req)))
return -EFAULT;
@@ -2286,7 +2309,7 @@
struct kvm_s390_ais_all ais;

if (!test_kvm_facility(kvm, 72))
-return -ENOTSUPP;
+-return -EOPNOTSUPP;

if (copy_from_user(&ais, (void __user *)attr->addr, sizeof(ais)))
return -EFAULT;
--- linux-4.15.0.orig/arch/s390/kvm/kvm-s390.c
+++ linux-4.15.0/arch/s390/kvm/kvm-s390.c
@@ -2,7 +2,7 @@
/*
 * hosting IBM Z kernel virtual machines (s390x)
 * - * Copyright IBM Corp. 2008, 2017
 * + * Copyright IBM Corp. 2008, 2018
 * 
 * Author(s): Carsten Otte <cotte@de.ibm.com>
 * Christian Borntraeger <borntraeger@de.ibm.com>
@@ -40,6 +40,7 @@
#include <asm/sclp.h>
#include <asm/cpacf.h>
```
#include <asm/timex.h>
#include <asm/ap.h>
#include "kvm-s390.h"
#include "gaccess.h"

@@ -87,19 +88,31 @@
{
    "deliver_restart_signal", VCPU_STAT(deliver_restart_signal) },
    "deliver_program_interruption", VCPU_STAT(deliver_program_int) },
    "exit_wait_state", VCPU_STAT(exit_wait_state) },
+#{ "instruction_epsw", VCPU_STAT(instruction_epsw) },
+#{ "instruction_gs", VCPU_STAT(instruction_gs) },
+#{ "instruction_io_other", VCPU_STAT(instruction_io_other) },
+#{ "instruction_lpsw", VCPU_STAT(instruction_lpsw) },
+#{ "instruction_lpswe", VCPU_STAT(instruction_lpswe) },
    "instruction_pfmt", VCPU_STAT(instruction_pfmt) },
+#{ "instruction_ptff", VCPU_STAT(instruction_ptff) },
    "instruction_stidp", VCPU_STAT(instruction_stidp) },
+#{ "instruction_sck", VCPU_STAT(instruction_sck) },
+#{ "instruction_sckpf", VCPU_STAT(instruction_sckpf) },
    "instruction_spix", VCPU_STAT(instruction_spix) },
    "instruction_stpx", VCPU_STAT(instruction_stpx) },
    "instruction_stap", VCPU_STAT(instruction_stap) },
{- "instruction_storage_key", VCPU_STAT(instruction_storage_key) },
+#{ "instruction_iske", VCPU_STAT(instruction_iske) },
+#{ "instruction_ri", VCPU_STAT(instruction_ri) },
    "instruction_rbe", VCPU_STAT(instruction_rbe) },
    "instruction_sske", VCPU_STAT(instruction_sske) },
    "instruction_ipte_interlock", VCPU_STAT(instruction_ipte_interlock) },
{- "instruction_stsch", VCPU_STAT(instruction_stsch) },
{- "instruction_chsc", VCPU_STAT(instruction_chsc) },
    "instruction_essa", VCPU_STAT(instruction_essa) },
    "instruction_stsi", VCPU_STAT(instruction_stsi) },
    "instruction_stfl", VCPU_STAT(instruction_stfl) },
+#{ "instruction_tb", VCPU_STAT(instruction_tb) },
+#{ "instruction_tpi", VCPU_STAT(instruction_tpi) },
    "instruction_tprot", VCPU_STAT(instruction_tprot) },
+#{ "instruction_tsch", VCPU_STAT(instruction_tsch) },
    "instruction_sthyi", VCPU_STAT(instruction_sthyi) },
    "instruction_sie", VCPU_STAT(instruction_sie) },
    "instruction_sigp_sense", VCPU_STAT(instruction_sigp_sense) },
@@ -118,12 +131,13 @@
    "instruction_sigp_cpu_reset", VCPU_STAT(instruction_sigp_cpu_reset) },
    "instruction_sigp_init_cpu_reset", VCPU_STAT(instruction_sigp_init_cpu_reset) },
{- "diagnose_10", VCPU_STAT(diagnose_10) },
{- "diagnose_44", VCPU_STAT(diagnose_44) },
{- "diagnose_9c", VCPU_STAT(diagnose_9c) },
{- "diagnose_258", VCPU_STAT(diagnose_258) },
```
-{ "diagnose_308", VCPU_STAT(diagnose_308) },
- { "diagnose_500", VCPU_STAT(diagnose_500) },
+ { "instruction_diag_10", VCPU_STAT(diagnose_10) },
+ { "instruction_diag_44", VCPU_STAT(diagnose_44) },
+ { "instruction_diag_9c", VCPU_STAT(diagnose_9c) },
+ { "instruction_diag_258", VCPU_STAT(diagnose_258) },
+ { "instruction_diag_308", VCPU_STAT(diagnose_308) },
+ { "instruction_diag_500", VCPU_STAT(diagnose_500) },
+ { "instruction_diag_other", VCPU_STAT(diagnose_other) },
{ NULL }
];

@@ -138,13 +152,33 @@
module_param(nested, int, S_IRUGO);
MODULE_PARM_DESC(nested, "Nested virtualization support");

-/* upper facilities limit for kvm */
-unsigned long kvm_s390_fac_list_mask[16] = { FACILITIES_KVM };

-unsigned long kvm_s390_fac_list_mask_size(void)
+/*
+ * For now we handle at most 16 double words as this is what the s390 base
+ * kernel handles and stores in the prefix page. If we ever need to go beyond
+ * this, this requires changes to code, but the external uapi can stay.
+ */
+ #define SIZE_INTERNAL 16
+
+ +/*
+ * Base feature mask that defines default mask for facilities. Consists of the
+ * defines in FACILITIES_KVM and the non-hypervisor managed bits.
+ */
+ +static unsigned long kvm_s390_fac_base[SIZE_INTERNAL] = { FACILITIES_KVM };
+ +/*
+ * Extended feature mask. Consists of the defines in FACILITIES_KVM_CPUMODEL
+ * and defines the facilities that can be enabled via a cpu model.
+ */
+ +static unsigned long kvm_s390_fac_ext[SIZE_INTERNAL] = { FACILITIES_KVM_CPUMODEL };
+ +
+ +static unsigned long kvm_s390_fac_size(void)
+ {
+ -BUILD_BUG_ON(ARRAY_SIZE(kvm_s390_fac_list_mask) > S390_ARCH_FAC_MASK_SIZE_U64);
+ -return ARRAY_SIZE(kvm_s390_fac_list_mask);
+ +BUILD_BUG_ON(SIZE_INTERNAL > S390_ARCH_FAC_MASK_SIZE_U64);
+ +BUILD_BUG_ON(SIZE_INTERNAL > S390_ARCH_FAC_LIST_SIZE_U64);
+ +BUILD_BUG_ON(SIZE_INTERNAL * sizeof(unsigned long) >
+ +sizeof(S390_lowcore.stfle_fac_list));
+ +
+ +return SIZE_INTERNAL;
static void kvm_gmap_notifier(struct gmap *gmap, unsigned long start, unsigned long end);

+static void kvm_clock_sync_scb(struct kvm_s390_sie_block *scb, u64 delta)
+{
+u8 delta_idx = 0;
+
+/*
+ * The TOD jumps by delta, we have to compensate this by adding
+ * -delta to the epoch.
+ */
+delta = -delta;
+
+/* sign-extension - we're adding to signed values below */
+if ((s64)delta < 0)
+delta_idx = -1;
+
+scb->epoch += delta;
+if (scb->ecd & ECD_MEF)
+scb->epdx += delta_idx;
+if (scb->epoch < delta)
+scb->epdx += 1;
+}
+
+/*
* This callback is executed during stop_machine(). All CPUs are therefore
* temporarily stopped. In order not to change guest behavior, we have to
* @ @ -181,13 +237,17 @@
 unsigned long long *delta = v;

 list_for_each_entry(kvm, &vm_list, vm_list) {
-  kvm->arch.epoch -= *delta;
+  kvm->arch.epoch -= *delta;
+  kvm_for_each_vcpu(i, vcpu, kvm) {
+    vcpu->arch.sie_block->epoch -= *delta;
+    kvm_clock_sync_scb(vcpu->arch.sie_block, *delta);
+    if (i == 0) {
+      kvm->arch.epoch = vcpu->arch.sie_block->epoch;
+      kvm->arch.epdx = vcpu->arch.sie_block->epdx;
+    }
+    if (vcpu->arch.cputm_enabled)
+      vcpu->arch.cputm_start += *delta;
+    if (vcpu->arch.vsie_block)
-      vcpu->arch.vsie_block->epoch -= *delta;
+      vcpu->arch.vsie_block->epoch -= *delta;
+kvm_clock_sync_scb(vcpu->arch.vsie_block,
+   *delta);
}
}
return NOTIFY_OK;
@@ -237,6 +297,22 @@
return cc == 0;
}

+static inline void __insn32_query(unsigned int opcode, u8 query[32])
+{
+    register unsigned long r0 asm("0") = 0; /* query function */
+    register unsigned long r1 asm("1") = (unsigned long) query;
+    
+    asm volatile(
+        /* Parameter regs are ignored */
+        ".insnrf,%[opc] << 16,2,4,6,0n"
+        : "=m" (*query)
+        : "d" (r0), "a" (r1), [opc] "i" (opcode)
+        : "cc");
+
+
+    +#define INSN_SORTL 0xb938
+    +#define INSN_DFLTCC 0xb939
+
+    static void kvm_s390_cpu_feat_init(void)
+    {
    int i;
    @@ -284,6 +360,16 @@
        
        __cpacf_query(CPACF_KMA, (cpacf_mask_t *)
            kvm_s390_available_subfunc.kma);
+
+    if (test_facility(155)) /* MSA9 */
+        __cpacf_query(CPACF_KDSA, (cpacf_mask_t *)
+            kvm_s390_available_subfunc.kdsa);
+
+    if (test_facility(150)) /* SORTL */
+        __insn32_query(INSN_SORTL, kvm_s390_available_subfunc.sortl);
+
+    if (test_facility(151)) /* DFLTCC */
+        __insn32_query(INSN_DFLTCC, kvm_s390_available_subfunc.dfltcc);
+
+    if (MACHINE_HAS_ESOP)
+        allow_cpu_feat(KVM_S390_VM_CPU_FEAT_ESOP);
+/*
@@ -332,19 +418,30 @@*/

    int kvm_arch_init(void *opaque)
int rc;

kvm_s390_dbf = debug_register("kvm-trace", 32, 1, 7 * sizeof(long));
if (!kvm_s390_dbf)
    return -ENOMEM;

if (debug_register_view(kvm_s390_dbf, &debug_sprintf_view)) {
    debug_unregister(kvm_s390_dbf);
    return -ENOMEM;

rc = -ENOMEM;
goto out_debug_unreg;
}

kvm_s390_cpu_feat_init();

/* Register floating interrupt controller interface. */
if (kvm_register_device_ops(&kvm_flic_ops, KVM_DEV_TYPE_FLIC)) {
    rc = kvm_register_device_ops(&kvm_flic_ops, KVM_DEV_TYPE_FLIC);
    if (rc) {
        pr_err("Failed to register FLIC rc=%d\n", rc);
        goto out_debug_unreg;
    }
    return 0;
}

out_debug_unreg:
    debug_unregister(kvm_s390_dbf);
    return rc;

void kvm_arch_exit(void)
			if (test_facility(148)) {
			    set_kvm_facility(kvm->arch.model.fac_mask, 148);
			    set_kvm_facility(kvm->arch.model.fac_list, 148);
			}
			if (test_facility(152)) {
			    set_kvm_facility(kvm->arch.model.fac_mask, 152);
			    set_kvm_facility(kvm->arch.model.fac_list, 152);
		}
		
static void kvm_s390_vcpu_crypto_setup(struct kvm_vcpu *vcpu);

- static int kvm_s390_vm_set_crypto(struct kvm *kvm, struct kvm_device_attr *attr)
+ void kvm_s390_vcpu_crypto_reset_all(struct kvm *kvm)
{
  struct kvm_vcpu *vcpu;
  int i;

  - if (!test_kvm_facility(kvm, 76))
- return -EINVAL;
+ kvm_s390_vcpu_block_all(kvm);
  +
+ kvm_for_each_vcpu(i, vcpu, kvm) {
+   kvm_s390_vcpu_crypto_setup(vcpu);
  +/* recreate the shadow crycb by leaving the VSIE handler */
  +kvm_s390_sync_request(KVM_REQ_VSIE_RESTART, vcpu);
  +}
+}
+}
+kvm_s390_vcpu_unblock_all(kvm);
+
+static int kvm_s390_vm_set_crypto(struct kvm *kvm, struct kvm_device_attr *attr)
+{
  mutex_lock(&kvm->lock);
  switch (attr->attr) {
  case KVM_S390_VM_CRYPTO_ENABLE_AES_KW:
+    if (!test_kvm_facility(kvm, 76)) {
+      mutex_unlock(&kvm->lock);
+      return -EINVAL;
+    }
  get_random_bytes(
kvm->arch.crypto.crycb->aes_wrapping_key_mask,
sizeof(kvm->arch.crypto.crycb->aes_wrapping_key_mask));
@@ -727,6 +847,10 @@
VM_EVENT(kvm, 3, "%s", "ENABLE: AES keywrapping support");
break;
case KVM_S390_VM_CRYPTO_ENABLE_DEA_KW:
+if (!test_kvm_facility(kvm, 76)) {
+mutex_unlock(&kvm->lock);
+return -EINVAL;
+}
get_random_bytes(
  kvm->arch.crypto.crycb->dea_wrapping_key_mask,
sizeof(kvm->arch.crypto.crycb->dea_wrapping_key_mask));
@@ -734,26 +858,45 @@
VM_EVENT(kvm, 3, "%s", "DISABLE: AES keywrapping support");
break;
case KVM_S390_VM_CRYPTO_DISABLE_AES_KW:
+if (!test_kvm_facility(kvm, 76)) {
+mutex_unlock(&kvm->lock);
+return -EINVAL;
+}
kvm->arch.crypto.aes_kw = 0;
memset(kvm->arch.crypto.crycb->aes_wrapping_key_mask, 0,
sizeof(kvm->arch.crypto.crycb->aes_wrapping_key_mask));
VM_EVENT(kvm, 3, "%s", "DISABLE: AES keywrapping support");
break;
case KVM_S390_VM_CRYPTO_DISABLE_DEA_KW:
+if (!test_kvm_facility(kvm, 76)) {
+mutex_unlock(&kvm->lock);
+return -EINVAL;
+}
kvm->arch.crypto.dea_kw = 0;
memset(kvm->arch.crypto.crycb->dea_wrapping_key_mask, 0,
sizeof(kvm->arch.crypto.crycb->dea_wrapping_key_mask));
VM_EVENT(kvm, 3, "%s", "DISABLE: DEA keywrapping support");
break;
+case KVM_S390_VM_CRYPTO_ENABLE_APIE:
+if (!ap_instructions_available()) {
+mutex_unlock(&kvm->lock);
+return -EOPNOTSUPP;
+}
+kvm->arch.crypto.apie = 1;
+break;
+case KVM_S390_VM_CRYPTO_DISABLE_APIE:
+if (!ap_instructions_available()) {
+mutex_unlock(&kvm->lock);
+return -EOPNOTSUPP;
+}
+kvm->arch.crypto.apie = 0;
+break;
default:
mutex_unlock(&kvm->lock);
return -ENXIO;
}

-kvm_for_each_vcpu(i, vcpu, kvm) {
-kvm_s390_vcpu_crypto_setup(vcpu);
-exit_sie(vcpu);
-
+kvm_s390_vcpu_crypto_reset_all(kvm);
mutex_unlock(&kvm->lock);
return 0;
}
@@ -889,12 +1032,9 @@
if (copy_from_user(&gtod, (void __user *)attr->addr, sizeof(gtod)))
return -EFAULT;

-if (test_kvm_facility(kvm, 139))
-kvm_s390_set_tod_clock_ext(kvm, &gtod);
-else if (gtod.epoch_idx == 0)
-kvm_s390_set_tod_clock(kvm, gtod.tod);
-else
+if (!test_kvm_facility(kvm, 139) && gtod.epoch_idx)
return -EINVAL;
+kvm_s390_set_tod_clock(kvm, &gtod);
VM_EVENT(kvm, 3, "SET: TOD extension: 0x%lx, TOD base: 0x%llx",
gtod.epoch_idx, gtod.tod);
@@ -919,13 +1059,14 @@
static int kvm_s390_set_tod_low(struct kvm *kvm, struct kvm_device_attr *attr)
{
-u64 gtod;
+struct kvm_s390_vm_tod_clock gtod = { 0 };

-if (copy_from_user(&gtod, (void __user *)attr->addr, sizeof(gtod)))
+if (copy_from_user(&gtod.tod, (void __user *)attr->addr,
+     sizeof(gtod.tod)))
return -EFAULT;

-kvm_s390_set_tod_clock(kvm, gtod);
-VM_EVENT(kvm, 3, "SET: TOD base: 0x%llx", gtod);
+kvm_s390_set_tod_clock(kvm, &gtod);
+VM_EVENT(kvm, 3, "SET: TOD base: 0x%llx", gtod.tod);
return 0;
}
mutex_lock(&kvm->lock);

if (!atomic_read(&kvm->online_vcpus)) {
    bitmap_copy(kvm->arch.cpu_feat, (unsigned long *) data.feat,
    KVM_S390_VM_CPU_FEAT_NR_BITS);
    ret = 0;
}

return -EINVAL;

mutex_lock(&kvm->lock);

if (!atomic_read(&kvm->online_vcpus)) {
    bitmap_copy(kvm->arch.cpu_feat, (unsigned long *) data.feat,
    KVM_S390_VM_CPU_FEAT_NR_BITS);
    ret = 0;
}

return -EINVAL;

mutex_lock(&kvm->lock);

if (!kvm->created_vcpus) {
    bitmap_copy(kvm->arch.cpu_feat, (unsigned long *) data.feat,
    KVM_S390_VM_CPU_FEAT_NR_BITS);
    ret = 0;
}

return -EINVAL;

mutex_lock(&kvm->lock);

if (!kvm->created_vcpus) {
    bitmap_copy(kvm->arch.cpu_feat, (unsigned long *) data.feat,
    KVM_S390_VM_CPU_FEAT_NR_BITS);
    ret = 0;
}

return -EINVAL;

if (!kvm->created_vcpus) {
    bitmap_copy(kvm->arch.cpu_feat, (unsigned long *) data.feat,
    KVM_S390_VM_CPU_FEAT_NR_BITS);
    ret = 0;
}

return -EINVAL;

mutex_lock(&kvm->lock);

if (kvm->created_vcpus) {
    mutex_unlock(&kvm->lock);
    return -EBUSY;
}

mutex_lock(&kvm->lock);

if (copy_from_user(&kvm->arch.model.subfuncs, (void __user *)attr->addr,
    sizeof(struct kvm_s390_vm_cpu_subfunc))) {
    mutex_unlock(&kvm->lock);
    return -EFAULT;
}

mutex_unlock(&kvm->lock);

if (copy_from_user(&kvm->arch.model.subfuncs, (void __user *)attr->addr,
    sizeof(struct kvm_s390_vm_cpu_subfunc))) {
    mutex_unlock(&kvm->lock);
    return -EFAULT;
}

mutex_unlock(&kvm->lock);

if (copy_from_user(&kvm->arch.model.subfuncs, (void __user *)attr->addr,
    sizeof(struct kvm_s390_vm_cpu_subfunc))) {
    mutex_unlock(&kvm->lock);
    return -EFAULT;
}

mutex_unlock(&kvm->lock);

if (copy_from_user(&kvm->arch.model.subfuncs, (void __user *)attr->addr,
    sizeof(struct kvm_s390_vm_cpu_subfunc))) {
    mutex_unlock(&kvm->lock);
    return -EFAULT;
}'
+ ((unsigned long *) &kvm->arch.model.subfuncs.km)[1];
+ VM_EVENT(kvm, 3, "SET: guest KIMD subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kimd)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.kimd)[1]);
+ VM_EVENT(kvm, 3, "SET: guest KLMD subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.klmd)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.klmd)[1]);
+ VM_EVENT(kvm, 3, "SET: guest PCKMO subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.pckmo)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.pckmo)[1]);
+ VM_EVENT(kvm, 3, "SET: guest KMCTR subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kmctr)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.kmctr)[1]);
+ VM_EVENT(kvm, 3, "SET: guest KMF subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kmf)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.kmf)[1]);
+ VM_EVENT(kvm, 3, "SET: guest KMO subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kmo)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.kmo)[1]);
+ VM_EVENT(kvm, 3, "SET: guest PCC subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.pcc)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.pcc)[1]);
+ VM_EVENT(kvm, 3, "SET: guest PPNO subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.ppno)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.ppno)[1]);
+ VM_EVENT(kvm, 3, "SET: guest KMA subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kma)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.kma)[1]);
+ VM_EVENT(kvm, 3, "SET: guest KDSA subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kdsa)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.kdsa)[1]);
+ VM_EVENT(kvm, 3, "SET: guest SORTL subfunc 0x%16.16lx.%16.16lx.%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[1],
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[2],
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[3]);
+ VM_EVENT(kvm, 3, "SET: guest DFLTCC subfunc 0x%16.16lx.%16.16lx.%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[1],
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[2],
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[3]);
+
+ return 0;
}

static int kvm_s390_set_cpu_model(struct kvm *kvm, struct kvm_device_attr *attr)
@@ -1225,12 +1433,69 @@
static int kvm_s390_get_processor_subfunc(struct kvm *kvm,
# Open Source Used in 5GaaS Edge AC-4

```c
struct kvm_device_attr *attr)
{
-/*
- * Once we can actually configure subfunctions (kernel + hw support),
- * we have to check if they were already set by user space, if so copy
- * them from kvm->arch.
- */
-return -ENXIO;
+if (copy_to_user((void __user *)attr->addr, &kvm->arch.model.subfuncs,
+    sizeof(struct kvm_s390_vm_cpu_subfunc)))
+    return -EFAULT;
+
+VM_EVENT(kvm, 3, "GET: guest PLO    subfunc 0x%16.16lx.%16.16lx.%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.plo)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.plo)[1],
+     ((unsigned long *) &kvm->arch.model.subfuncs.plo)[2],
+     ((unsigned long *) &kvm->arch.model.subfuncs.plo)[3]);
+VM_EVENT(kvm, 3, "GET: guest PTFF   subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.ptff)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.ptff)[1]);
+VM_EVENT(kvm, 3, "GET: guest KMAC   subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmac)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmac)[1]);
+VM_EVENT(kvm, 3, "GET: guest KMC    subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmc)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmc)[1]);
+VM_EVENT(kvm, 3, "GET: guest KM     subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.km)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.km)[1]);
+VM_EVENT(kvm, 3, "GET: guest KIMD   subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.kimd)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.kimd)[1]);
+VM_EVENT(kvm, 3, "GET: guest KLMD   subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.klmd)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.klmd)[1]);
+VM_EVENT(kvm, 3, "GET: guest PCKMO  subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.pckmo)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.pckmo)[1]);
+VM_EVENT(kvm, 3, "GET: guest KMCTR  subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmctr)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmctr)[1]);
+VM_EVENT(kvm, 3, "GET: guest KMF    subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmf)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmf)[1]);
+VM_EVENT(kvm, 3, "GET: guest KMO    subfunc 0x%16.16lx.%16.16lx",
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmo)[0],
+     ((unsigned long *) &kvm->arch.model.subfuncs.kmo)[1]);
+VM_EVENT(kvm, 3, "GET: guest PCC    subfunc 0x%16.16lx.%16.16lx",
```

**Open Source Used in 5GaaS Edge AC-4 11384**
+ ((unsigned long *) &kvm->arch.model.subfuncs.pcc)[0],
+ (unsigned long *) &kvm->arch.model.subfuncs.pcc)[1];
+ VM_EVENT(kvm, 3, "GET: guest PPNO  subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.ppno)[0],
+ (unsigned long *) &kvm->arch.model.subfuncs.ppno)[1]);
+ VM_EVENT(kvm, 3, "GET: guest KMA   subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kma)[0],
+ (unsigned long *) &kvm->arch.model.subfuncs.kma)[1]);
+ VM_EVENT(kvm, 3, "GET: guest KDSA   subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.kdsa)[0],
+ (unsigned long *) &kvm->arch.model.subfuncs.kdsa)[1]);
+ VM_EVENT(kvm, 3, "GET: guest SORTL  subfunc 0x%16.16lx.%16.16lx.%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[1],
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[2],
+ ((unsigned long *) &kvm->arch.model.subfuncs.sortl)[3]);
+ VM_EVENT(kvm, 3, "GET: guest DFLTCC subfunc 0x%16.16lx.%16.16lx.%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[0],
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[1],
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[2],
+ ((unsigned long *) &kvm->arch.model.subfuncs.dfltcc)[3]);
+ return 0;
}

static int kvm_s390_get_machine_subfunc(struct kvm *kvm,
@@ -1239,8 +1504,68 @@
if (copy_to_user((void __user *)attr->addr, &kvm_s390_available_subfunc,
    sizeof(struct kvm_s390_vm_cpu_subfunc))
return -EFAULT;
+
+ VM_EVENT(kvm, 3, "GET: host  PLO    subfunc 0x%16.16lx.%16.16lx.%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm_s390_available_subfunc.plo)[0],
+ ((unsigned long *) &kvm_s390_available_subfunc.plo)[1],
+ ((unsigned long *) &kvm_s390_available_subfunc.plo)[2],
+ ((unsigned long *) &kvm_s390_available_subfunc.plo)[3]);
+ VM_EVENT(kvm, 3, "GET: host  KMAC   subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm_s390_available_subfunc.kmac)[0],
+ (unsigned long *) &kvm_s390_available_subfunc.kmac)[1]);
+ VM_EVENT(kvm, 3, "GET: host  KMC    subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm_s390_available_subfunc.kmc)[0],
+ (unsigned long *) &kvm_s390_available_subfunc.kmc)[1]);
+ VM_EVENT(kvm, 3, "GET: host KM     subfunc 0x%16.16lx.%16.16lx",
+ ((unsigned long *) &kvm_s390_available_subfunc.km)[0],
+ (unsigned long *) &kvm_s390_available_subfunc.km)[1]);
VM_EVENT(kvm, 3, "GET: host KIMD subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.kimd[0],
+ (unsigned long *)&kvm_s390_available_subfunc.kimd[1]);
VM_EVENT(kvm, 3, "GET: host KLMD subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.klmd[0],
+ (unsigned long *)&kvm_s390_available_subfunc.klmd[1]);
VM_EVENT(kvm, 3, "GET: host PCKMO subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.pckmo[0],
+ (unsigned long *)&kvm_s390_available_subfunc.pckmo[1]);
VM_EVENT(kvm, 3, "GET: host KMCTR subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.kmctr[0],
+ (unsigned long *)&kvm_s390_available_subfunc.kmctr[1]);
VM_EVENT(kvm, 3, "GET: host KMF subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.kmf[0],
+ (unsigned long *)&kvm_s390_available_subfunc.kmf[1]);
VM_EVENT(kvm, 3, "GET: host KMO subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.kmo[0],
+ (unsigned long *)&kvm_s390_available_subfunc.kmo[1]);
VM_EVENT(kvm, 3, "GET: host PCC subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.pcc[0],
+ (unsigned long *)&kvm_s390_available_subfunc.pcc[1]);
VM_EVENT(kvm, 3, "GET: host PPNO subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.ppno[0],
+ (unsigned long *)&kvm_s390_available_subfunc.ppno[1]);
VM_EVENT(kvm, 3, "GET: host KMA subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.kma[0],
+ (unsigned long *)&kvm_s390_available_subfunc.kma[1]);
VM_EVENT(kvm, 3, "GET: host KDSA subfunc 0x%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.kdsa[0],
+ (unsigned long *)&kvm_s390_available_subfunc.kdsa[1]);
VM_EVENT(kvm, 3, "GET: host SORTL subfunc 0x%16.16lx.%16.16lx.%16.16lx.
+ (unsigned long *)&kvm_s390_available_subfunc.sortl[0],
+ (unsigned long *)&kvm_s390_available_subfunc.sortl[1],
+ (unsigned long *)&kvm_s390_available_subfunc.sortl[2],
+ (unsigned long *)&kvm_s390_available_subfunc.sortl[3]);
VM_EVENT(kvm, 3, "GET: host DFLTCC subfunc 0x%16.16lx.%16.16lx.%16.16lx.%16.16lx",
+ (unsigned long *)&kvm_s390_available_subfunc.dfltcc[0],
+ (unsigned long *)&kvm_s390_available_subfunc.dfltcc[1],
+ (unsigned long *)&kvm_s390_available_subfunc.dfltcc[2],
+ (unsigned long *)&kvm_s390_available_subfunc.dfltcc[3]);
return 0;
}

static int kvm_s390_get_cpu_model(struct kvm *kvm, struct kvm_device_attr *attr)
{
    int ret = -ENXIO;
    @ @ -1358,10 +1683,9 @ @
case KVM_S390_VM_CPU_PROCESSOR_FEAT:
case KVM_S390_VM_CPU_MACHINE_FEAT:
case KVM_S390_VM_CPU_MACHINE_SUBFUNC:
+case KVM_S390_VM_CPU_PROCESSOR_SUBFUNC:
ret = 0;
break;
-/* configuring subfunctions is not supported yet */
-case KVM_S390_VM_CPU_PROCESSOR_SUBFUNC:
default:
ret = -ENXIO;
break;
@@ -1375,6 +1699,10 @@
case KVM_S390_VM_CRYPTO_DISABLE_DEA_KW:
ret = 0;
break;
+case KVM_S390_VM_CRYPTO_ENABLE_APIE:
+case KVM_S390_VM_CRYPTO_DISABLE_APIE:
+ret = ap_instructions_available() ? 0 : -ENXIO;
+break;
default:
ret = -ENXIO;
break;
@@ -1782,55 +2110,101 @@
return r;
}

-static int kvm_s390_query_ap_config(u8 *config)
-{
-u32 fcn_code = 0x04000000UL;
-u32 cc = 0;
-
-memset(config, 0, 128);
-asm volatile(
-"lgr 0,%1
-"lgr 2,%2
-".long 0xb2af0000
-/* PQAP(QCI) */
-"0: ipm %0
-"srl %0,28
-1:
-EX_TABLE(0b, 1b)
-"+r" (cc)
-": r" (fcn_code), "r" (config)
-": cc", "0", "2", "memory"
-):;
-
-return cc;
-}
-
static int kvm_s390_apxa_installed(void)
{
    u8 config[128];
    int cc;

    if (test_facility(12)) {
        cc = kvm_s390_query_ap_config(config);
        struct ap_config_info info;

        if (cc)
            pr_err("PQAP(QCI) failed with cc=%d", cc);
        else
            return config[0] & 0x40;

        if (ap_instructions_available()) {
            if (ap_qci(&info) == 0)
                return info.apxa;
        }
    }

    return 0;
}

/*
 * The format of the crypto control block (CRYCB) is specified in the 3 low
 * order bits of the CRYCB designation (CRYCBD) field as follows:
 * Format 0: Neither the message security assist extension 3 (MSAX3) nor the
 * AP extended addressing (APXA) facility are installed.
 * Format 1: The APXA facility is not installed but the MSAX3 facility is.
 * Format 2: Both the APXA and MSAX3 facilities are installed
 */
static void kvm_s390_set_crycb_format(struct kvm *kvm)
{
    kvm->arch.crypto.crycbd = (__u32)(unsigned long) kvm->arch.crypto.crycb;

    /* Clear the CRYCB format bits - i.e., set format 0 by default */
    kvm->arch.crypto.crycbd &= ~(CRYCB_FORMAT_MASK);

    /* Check whether MSAX3 is installed */
    if (!test_kvm_facility(kvm, 76))
        return;

    if (kvm_s390_apxa_installed())
        kvm->arch.crypto.crycbd |= CRYCB_FORMAT2;
    else
        kvm->arch.crypto.crycbd |= CRYCB_FORMAT1;
}

+void kvm_arch_crypto_set_masks(struct kvm *kvm, unsigned long *apm,
        unsigned long *aqm, unsigned long *adm)
struct kvm_s390_crypto_cb *crycb = kvm->arch.crypto.crycb;
+
+mutex_lock(&kvm->lock);
+kvm_s390_vcpu_block_all(kvm);
+
+switch (kvm->arch.crypto.crycbd & CRYCB_FORMAT_MASK) {
+case CRYCB_FORMAT2: /* APCB1 use 256 bits */
+    memcpy(crycb->apcb1.apm, apm, 32);
+    VM_EVENT(kvm, 3, "SET CRYCB: apm %016lx %016lx %016lx %016lx",
+             apm[0], apm[1], apm[2], apm[3]);
+    memcpy(crycb->apcb1.aqm, aqm, 32);
+    VM_EVENT(kvm, 3, "SET CRYCB: aqm %016lx %016lx %016lx %016lx",
+              aqm[0], aqm[1], aqm[2], aqm[3]);
+    memcpy(crycb->apcb1.adm, adm, 32);
+    VM_EVENT(kvm, 3, "SET CRYCB: adm %016lx %016lx %016lx %016lx",
+              adm[0], adm[1], adm[2], adm[3]);
+    break;
+case CRYCB_FORMAT1:
+case CRYCB_FORMAT0: /* Fall through both use APCB0 */
+    memcpy(crycb->apcb0.apm, apm, 8);
+    memcpy(crycb->apcb0.aqm, aqm, 2);
+    memcpy(crycb->apcb0.adm, adm, 2);
+    VM_EVENT(kvm, 3, "SET CRYCB: apm %016lx aqm %04x adm %04x",
+              apm[0], *((unsigned short *)aqm),
+              *((unsigned short *)adm));
+    break;
+default:/* Can not happen */
+    break;
+}
+
+/* recreate the shadow crycb for each vcpu */
+kvm_s390_sync_request_broadcast(kvm, KVM_REQ_VSIE_RESTART);
+kvm_s390_vcpu_unblock_all(kvm);
+mutex_unlock(&kvm->lock);
+
+EXPORT_SYMBOL_GPL(kvm_arch_crypto_set_masks);
+
+void kvm_arch_crypto_clear_masks(struct kvm *kvm)
+{
+    mutex_lock(&kvm->lock);
+kvm_s390_vcpu_block_all(kvm);
+
+    memset(&kvm->arch.crypto.crycb->apcb0, 0,
+            sizeof(kvm->arch.crypto.crycb->apcb0));
+    memset(&kvm->arch.crypto.crycb->apcb1, 0,
+            sizeof(kvm->arch.crypto.crycb->apcb1));
VM_EVENT(kvm, 3, "%s", "CLR CRYCB:" +
/* recreate the shadow crycb for each vcpu */
+kvm_s390_sync_request_broadcast(kvm, KVM_REQ_VSIE_RESTART);
+kvm_s390_vcpu Unblock_all(kvm);
+mutex_unlock(&kvm->lock);
+
+EXPORT_SYMBOL_GPL(kvm_arch_crypto_clear_masks);
+
static u64 kvm_s390_get_initial_cpubid(void)
{
    struct cpuid cpuid;
    @@ -1842,12 +2216,12 @@

    static void kvm_s390_crypto_init(struct kvm *kvm)
    {
        if (!test_kvm_facility(kvm, 76))
            return;
        -kvm->arch.crypto.crycb = &kvm->arch.sie_page2->crycb;
        kvm_s390_set_crycb_format(kvm);

        if (!test_kvm_facility(kvm, 76))
            return;
        +
        /* Enable AES/DEA protected key functions by default */
        kvm->arch.crypto.aes_kw = 1;
        kvm->arch.crypto.dea_kw = 1;
        @@ -1897,13 +2271,13 @@
        kvm->arch.sca = (struct bsca_block *) get_zeroed_page(alloca_flags);
        if (!kvm->arch.sca)
            goto out_err;
        -spin_lock(&kvm_lock);
        +mutex_lock(&kvm_lock);
        sca_offset += 16;
        if (sca_offset + sizeof(struct bsca_block) > PAGE_SIZE)
            sca_offset = 0;
        kvm->arch.sca = (struct bsca_block *)
        ((char *) kvm->arch.sca + sca_offset);
        -spin_unlock(&kvm_lock);
        +mutex_unlock(&kvm_lock);

        sprintf(debug_name, "kvm-%u", current->pid);

        @@ -1916,20 +2290,16 @@
        if (!kvm->arch.sie_page2)
            goto out_err;

        /* Populate the facility mask initially. */
memcpy(kvm->arch.model.fac_mask, S390_lowcore.stfle_fac_list,
          sizeof(S390_lowcore.stfle_fac_list));
for (i = 0; i < S390_ARCH_FAC_LIST_SIZE_U64; i++) {
  if (i < kvm_s390_fac_list_mask_size())
    kvm->arch.model.fac_mask[i] &= kvm_s390_fac_list_mask[i];
  else
    kvm->arch.model.fac_mask[i] = 0UL;
}

/* Populate the facility list initially */
kvm->arch.model.fac_list = kvm->arch.sie_page2->fac_list;
memcpy(kvm->arch.model.fac_list, kvm->arch.model.fac_mask,
        S390_ARCH_FAC_LIST_SIZE_BYTE);

for (i = 0; i < kvm_s390_fac_size(); i++) {
  kvm->arch.model.fac_mask[i] = S390_lowcore.stfle_fac_list[i] &
    kvm_s390_fac_base[i] |
    kvm_s390_fac_ext[i];
  kvm->arch.model.fac_list[i] = S390_lowcore.stfle_fac_list[i] &
    kvm_s390_fac_base[i];
}
kvm->arch.model.subfuncs = kvm_s390_available_subfunc;

/* we are always in czam mode - even on pre z14 machines */
set_kvm_facility(kvm->arch.model.fac_mask, 138);

/* we still need the basic sca for the ipte control */
vcpu->arch.sie_block->scaoh = ((__u32)((__u64)sca) >> 32);
vcpu->arch.sie_block->scaol = ((__u32)(__u64)sca);
return;
}
read_lock(&vcpu->kvm->arch.sca_lock);
if (vcpu->kvm->arch.use_esca) {
  @ @ -2209.6 +2580.8 @@
vcpu->run->kvm_valid_regs |= KVM_SYNC_BPBC;
  if (test_kvm_facility(vcpu->kvm, 133))
    vcpu->run->kvm_valid_regs |= KVM_SYNC_GSCB;
  if (test_kvm_facility(vcpu->kvm, 156))
    vcpu->run->kvm_valid_regs |= KVM_SYNC_ETOKEN;
  /* fprs can be synchronized via vrs, even if the guest has no vx. With
   * MACHINE_HAS_VX, (load|store)_fpu_regs() will work with vrs format.
   */
  @ @ -2343.9 +2716.7 @@
  memset(vcpu->arch.sie_block->gcr, 0, 16 * sizeof(__u64));
  vcpu->arch.sie_block->gcr[0] = 0xE0UL;
  vcpu->arch.sie_block->gcr[14] = 0xC2000000UL;
  /* make sure the new fpc will be lazily loaded */
  -save_fpu_regs();
current->thread.fpu.fpc = 0;
+vcpu->run->s.reg.s.fpc = 0;
vcpu->arch.sie_block->gbea = 1;
vcpu->arch.sie_block->pp = 0;
vcpu->arch.sie_block->fpf &= ~FPF_BPBC;
@@ -2361,6 +2732,7 @@
mutex_lock(&vcpu->kvm->lock);
preempt_disable();
vcpu->arch.sie_block->epoch = vcpu->kvm->arch.epoch;
+vcpu->arch.sie_block->epdx = vcpu->kvm->arch.epdx;
preempt_enable();
mutex_unlock(&vcpu->kvm->lock);
if (!kvm_is_ucontrol(vcpu->kvm)) {
@@ -2373,19 +2745,52 @@
vcpu->arch.enabled_gmap = vcpu->arch.gmap;
}

+static bool kvm_has_pckmo_subfunc(struct kvm *kvm, unsigned long nr)
+{
+if (test_bit_inv(nr, (unsigned long *)&kvm->arch.model.subfuncs.pckmo) &&
+ test_bit_inv(nr, (unsigned long *)&kvm_s390_available_subfunc.pckmo))
+return true;
+return false;
+}
+
+static bool kvm_has_pckmo_ecc(struct kvm *kvm)
+{
+/* At least one ECC subfunction must be present */
+return kvm_has_pckmo_subfunc(kvm, 32) ||
+ k vem_has_pckmo_subfunc(kvm, 33) ||
+ k vem_has_pckmo_subfunc(kvm, 34) ||
+ k vem_has_pckmo_subfunc(kvm, 40) ||
+ k vem_has_pckmo_subfunc(kvm, 41);
+
+
+static void kvm_s390_vcpu_crypto_setup(struct kvm_vcpu *vcpu)
+
+if (!kvm_has_pckmo_subfunc(kvm, 32))
+*/
+* If the AP instructions are not being interpreted and the MSAX3
+ * facility is not configured for the guest, there is nothing to set up.
+ */
+if (!vcpu->kvm->arch.crypto.apie && !kvm_is_ucontrol(vcpu->kvm))
+
+vcpu->arch.sie_block->crycbd = vcpu->kvm->arch.crypto.crycbd;
vcpu->arch.sie_block->ecb3 &= ~(ECB3_AES | ECB3_DEA);
+vcpu->arch.sie_block->eca &= ~ECA_APIE;
+vcpu->arch.sie_block->ecd &= ~ECD_ECC;
+
+if (vcpu->kvm->arch.crypto.apie)
+vcpu->arch.sie_block->eca |= ECA_APIE;
-
-if (vcpu->kvm->arch.crypto.aes_kw)
+/* Set up protected key support */
+if (vcpu->kvm->arch.crypto.aes_kw) {

    vcpu->arch.sie_block->ecb3 |= ECB3_AES;
+/* ecc is also wrapped with AES key */
+if (kvm_has_pckmo_ecc(vcpu->kvm))
+vcpu->arch.sie_block->ecd |= ECD_ECC;
+}
+
+if (vcpu->kvm->arch.crypto.dea_kw)
+vcpu->arch.sie_block->ecb3 |= ECB3_DEA;
-
+vcpu->arch.sie_block->crycbd = vcpu->kvm->arch.crypto.crycbd;
}

void kvm_s390_vcpu_unsetup_cmma(struct kvm_vcpu *vcpu)
@@ -2455,7 +2860,8 @@
}

if (test_kvm_facility(vcpu->kvm, 139))
    vcpu->arch.sie_block->ecd |= ECD_MEF;
-
+if (test_kvm_facility(vcpu->kvm, 156))
+vcpu->arch.sie_block->ecd |= ECD_ETOKENF;
    vcpu->arch.sie_block->sdnxo = ((unsigned long) &vcpu->run->s.regs.sdnx) | SDNXC;
    vcpu->arch.sie_block->riccbd = (unsigned long) &vcpu->run->s.regs.riccb;
@@ -2556,18 +2962,25 @@
    exit_sie(vcpu);
}

+bool kvm_s390_vcpu_sie_inhibited(struct kvm_vcpu *vcpu)
+{
+    return atomic_read(&vcpu->arch.sie_block->prog20) &
+        (PROG_BLOCK_SIE | PROG_REQUEST);
+}
+
+static void kvm_s390_vcpu_request_handled(struct kvm_vcpu *vcpu)
+
{ atomic_andnot(PROG_REQUEST, &vcpu->arch.sie_block->prog20);
}

/*/
- * Kick a guest cpu out of SIE and wait until SIE is not running.
+ * Kick a guest cpu out of (v)SIE and wait until (v)SIE is not running.
* If the CPU is not running (e.g. waiting as idle) the function will
  * return immediately. */

```c
void exit_sie(struct kvm_vcpu *vcpu)
{
    atomic_or(CPUSTAT_STOP_INT, &vcpu->arch.sie_block->cpuflags);
    ++kvm_s390_vsie_kick(vcpu);
    while (vcpu->arch.sie_block->prog0c & PROG_IN_SIE)
        cpu_relax();
} @@ -2943,12 +3356,14 @@

/* nothing to do, just clear the request */
kvm_clear_request(KVM_REQ_UNHALT, vcpu);
+/* we left the vsie handler, nothing to do, just clear the request */
+kvm_clear_request(KVM_REQ_VSIE_RESTART, vcpu);

return 0;
}

-void kvm_s390_set_tod_clock_ext(struct kvm *kvm,
-    const struct kvm_s390_vm_tod_clock *gtod)
+void kvm_s390_set_tod_clock(struct kvm *kvm,
  const struct kvm_s390_vm_tod_clock *gtod)
{
    struct kvm_vcpu *vcpu;
    struct kvm_s390_tod_clock_ext htod;
    @@ -2960,10 +3375,12 @@
    get_tod_clock_ext((char *)&htod);
    kvm->arch.epoch = gtod->tod - htod.tod;
    -kvm->arch.epdx = gtod->epoch_idx - htod.epoch_idx;
    -if (kvm->arch.epoch > gtod->tod)
    -    kvm->arch.epdx -= 1;
    +kvm->arch.epdx = 0;
    +if (test_kvm_facility(kvm, 139)) {
    +    kvm->arch.epdx = gtod->epoch_idx - htod.epoch_idx;
    +    if (kvm->arch.epoch > gtod->tod)
    +        kvm->arch.epdx -= 1;
    +}

    kvm_s390_vcpu_block_all(kvm);
    kvm_for_each_vcpu(i, vcpu, kvm) {
        @@ -2976,22 +3393,6 @@
        mutex_unlock(&kvm->lock);
    }
```
-void kvm_s390_set_tod_clock(struct kvm *kvm, u64 tod)
{
-struct kvm_vcpu *vcpu;
-int i;
-
-mutex_lock(&kvm->lock);
-preempt_disable();
-kvm->arch.epoch = tod - get_tod_clock();
-kvm_s390_vcpu_block_all(kvm);
-kvm_for_each_vcpu(i, vcpu, kvm)
	vcpu->arch.sie_block->epoch = kvm->arch.epoch;
-kvm_s390_vcpu_unblock_all(kvm);
-preempt_enable();
-mutex_unlock(&kvm->lock);
-
/**
 * kvm_arch_fault_in_page - fault-in guest page if necessary
 * @vcpu: The corresponding virtual cpu
 * @ @ -3341,6 +3742,7 @ @
 */
preempt_enable();
}
/* SIE will load etoken directly from SDNX and therefore kvm_run */

ekvm_run->kvm_dirty_regs = 0;
}@@ -3369,18 +3771,18 @@
current->thread.fpu.fpc = vcpu->arch.host_fpregs.fpc;
current->thread.fpu.regs = vcpu->arch.host_fpregs.regs;
if (MACHINE_HAS_GS) {
+preempt_disable();
__ctl_set_bit(2, 4);
if (vcpu->arch.gs_enabled)
save_gs_cb(current->thread.gs_cb);
-preempt_disable();
current->thread.gs_cb = vcpu->arch.host_gscb;
restore_gs_cb(vcpu->arch.host_gscb);
+preempt_enable();
if (!vcpu->arch.host_gscb)
__ctl_clear_bit(2, 4);
vcpu->arch.host_gscb = NULL;
+preempt_enable();
}
-/* SIE will save etoken directly into SDNX and therefore kvm_run */
}
int kvm_arch_vcpu_ioctl_run(struct kvm_vcpu *vcpu, struct kvm_run *kvm_run)
@@ -3641,7 +4043,7 @@
const u64 supported_flags = KVM_S390_MEMOP_F_INJECT_EXCEPTION
   | KVM_S390_MEMOP_F_CHECK_ONLY;

@if (mop->flags & ~supported_flags)
+if (mop->flags & ~supported_flags || mop->ar >= NUM_ACRS || !mop->size)
return -EINVAL;

if (mop->size > MEM_OP_MAX_SIZE)
@@ -3713,7 +4115,7 @@
 }
case KVM_S390_INTERRUPT: {
 struct kvm_s390_interrupt s390int;
-struct kvm_s390_irq s390irq;
+struct kvm_s390_irq s390irq = {};

     r = -EFAULT;
     if (copy_from_user(&s390int, argp, sizeof(s390int)))
@@ -3725,7 +4127,7 @@
 }
case KVM_S390_STORE_STATUS:
    idx = srcu_read_lock(&vcpu->kvm->srcu);
-    r = kvm_s390_vcpu_store_status(vcpu, arg);
+    r = kvm_s390_store_status_unloaded(vcpu, arg);
    srcu_read_unlock(&vcpu->kvm->srcu, idx);
    break;
case KVM_S390_SET_INITIAL_PSW: {
@@ -3898,21 +4300,28 @@
 const struct kvm_memory_slot *new,
 enum kvm_mr_change change)
 { }
-/* If the basics of the memslot do not change, we do not want
 - * to update the gmap. Every update causes several unnecessary
 - * segment translation exceptions. This is usually handled just
 - * fine by the normal fault handler + gmap, but it will also
 - * cause faults on the prefix page of running guest CPUs.
 - */
-if (old->userspace_addr == mem->userspace_addr &&
- old->base_gfn * PAGE_SIZE == mem->guest_phys_addr &&
- old->npages * PAGE_SIZE == mem->memory_size)
-return;
+int rc = 0;

-rc = gmap_map_segment(kvm->arch.gmap, mem->userspace_addr,
mem->guest_phys_addr, mem->memory_size);  
+switch (change) {
+    +rc = gmap_unmap_segment(kvm->arch.gmap, old->base_gfn * PAGE_SIZE, 
+    +old->npages * PAGE_SIZE);
+    +break;
+    +case KVM_MR_DELETE:
+        +rc = gmap_unmap_segment(kvm->arch.gmap, old->base_gfn * PAGE_SIZE, 
+        +old->npages * PAGE_SIZE);
+        +if (rc)
+            +break;
+        +/* FALLTHROUGH */
+    +case KVM_MR_MOVE:
+        +rc = gmap_unmap_segment(kvm->arch.gmap, old->base_gfn * PAGE_SIZE, 
+        +old->npages * PAGE_SIZE);
+        +if (rc)
+            +break;
+        +/* FALLTHROUGH */
+    +case KVM_MR_CREATE:
+        +rc = gmap_map_segment(kvm->arch.gmap, mem->userspace_addr, 
+        +      mem->guest_phys_addr, mem->memory_size);
+        +break;
+    +case KVM_MR_FLAGS_ONLY:
+        +break;
+    +default:
+        +WARN(1, "Unknown KVM MR CHANGE: %d\n", change);
+    +}
+if (rc)
+    +pr_warn("failed to commit memory region\n");
+return;
+}
+
+for (i = 0; i < 16; i++)
+    +kvm_s390_fac_list_mask[i] |=
+    +kvm_s390_fac_base[i] |=
+    +S390_lowcore.stfle_fac_list[i] & nonhyp_mask(i);
+
+return kvm_init(NULL, sizeof(struct kvm_vcpu), 0, THIS_MODULE);
+--- linux-4.15.0.orig/arch/s390/kvm/kvm-s390.h
+++ linux-4.15.0/arch/s390/kvm/kvm-s390.h
@@ -268,9 +268,8 @@
 int kvm_s390_store_status_unloaded(struct kvm_vcpu *vcpu, unsigned long addr);
 int kvm_s390_vcpu_store_status(struct kvm_vcpu *vcpu, unsigned long addr);
+int kvm_arch_fault_in_page(struct kvm_vcpu *vcpu, gpa_t gpa, int writable);
+int kvm_s390_store_status_unloaded(struct kvm_vcpu *vcpu, unsigned long addr);
@@ -278,12 +277,11 @@
void kvm_s390_vcpu_stop(struct kvm_vcpu *vcpu);
void kvm_s390_vcpu_block(struct kvm_vcpu *vcpu);
void kvm_s390_vcpu_unblock(struct kvm_vcpu *vcpu);
+bool kvm_s390_vcpu_sie_inhibited(struct kvm_vcpu *vcpu);
void exit_sie(struct kvm_vcpu *vcpu);
void kvm_s390_sync_request(int req, struct kvm_vcpu *vcpu);
int kvm_s390_vcpu_setup_cmma(struct kvm_vcpu *vcpu);
void kvm_s390_vcpu_unsetup_cmma(struct kvm_vcpu *vcpu);
-unsigned long kvm_s390_fac_list_mask_size(void);
-extern unsigned long kvm_s390_fac_list_mask[];
void kvm_s390_set_cpu_timer(struct kvm_vcpu *vcpu, __u64 cputm);
__u64 kvm_s390_get_cpu_timer(struct kvm_vcpu *vcpu);

@@ -397,4 +395,17 @@
{ }
void kvm_s390_reinject_machine_check(struct kvm_vcpu *vcpu,
struct mcck_volatile_info *mcck_info);
+
+/**
+ * kvm_s390_vcpu_crypto_reset_all
+ *
+ * Reset the crypto attributes for each vcpu. This can be done while the vcpus
+ * are running as each vcpu will be removed from SIE before resetting the crypt
+ * attributes and restored to SIE afterward.
+ *
+ * Note: The kvm->lock must be held while calling this function
+ *
+ * @kvm: the KVM guest
+ */
+void kvm_s390_vcpu_crypto_reset_all(struct kvm *kvm);
if (test_kvm_facility(vcpu->kvm, 64)) {
  VCPU_EVENT(vcpu, 3, " match", " ENABLE: RI (lazy)");
  vcpu->arch.sie_block->ecb3 |= ECB3_RI;
  @@ -53,6 +55,8 @@

 static int handle_gs(struct kvm_vcpu *vcpu)
 {
   +vcpu->stat.instruction_gs++;
+   if (test_kvm_facility(vcpu->kvm, 133)) {
     VCPU_EVENT(vcpu, 3, " match", " ENABLE: GS (lazy)");
     preempt_disable();
     @@ -81,9 +85,12 @@
     /* Handle SCK (SET CLOCK) interception */
     static int handle_set_clock(struct kvm_vcpu *vcpu)
     {
     +struct kvm_s390_vm_tod_clock gtod = { 0 };
     int rc;
     u8 ar;
     -u64 op2, val;
+   +u64 op2;
       +vcpu->stat.instruction_sck++;

       if (vcpu->arch.sie_block->gpsw.mask & PSW_MASK_PSTATE)
         return kvm_s390_inject_program_int(vcpu, PGM_PRIVILEGED_OP);
@@ -91,12 +98,12 @@
       op2 = kvm_s390_get_base_disp_s(vcpu, &ar);
       if (op2 & 7) /* Operand must be on a doubleword boundary */
         return kvm_s390_inject_program_int(vcpu, PGM_SPECIFICATION);
     -rc = read_guest(vcpu, op2, &val, sizeof(val));
+   +rc = read_guest(vcpu, op2, ar, &gtod.tod, sizeof(gtod.tod));
     if (rc)
         return kvm_s390_inject_prog_cond(vcpu, rc);

     -VCPU_EVENT(vcpu, 3, "SCK: setting guest TOD to 0x%llx", val);
-   -kvm_s390_set_tod_clock(vcpu->kvm, val);
+VCPU_EVENT(vcpu, 3, "SCK: setting guest TOD to 0x%llx", gtod.tod);
   +kvm_s390_set_tod_clock(vcpu->kvm, &gtod);

   kvm_s390_set_psw_cc(vcpu, 0);
   return 0;
@@ -222,7 +229,6 @@
 }

 -vcpu->stat.instruction_storage_key++;
 rc = kvm_s390_skey_check_enable(vcpu);
if (rc)
    return rc;
@@ -242,6 +248,8 @@
int reg1, reg2;
int rc:

    +vcpu->stat.instruction_iske++;
+    
    if (vcpu->arch.sie_block->gpsw.mask & PSW_MASK_PSTATE)
        return kvm_s390_inject_program_int(vcpu, PGM_PRIVILEGED_OP);

    @ @ -274,6 +282,8 @@
int reg1, reg2;
int rc:

    +vcpu->stat.instruction_rrbe++;
+    
    if (vcpu->arch.sie_block->gpsw.mask & PSW_MASK_PSTATE)
        return kvm_s390_inject_program_int(vcpu, PGM_PRIVILEGED_OP);

    @ @ -312,6 +322,8 @@
gpa_t addr;
int reg1, reg2;
int rc:

    +vcpu->stat.instruction_sske++;
+    
    if (vcpu->arch.sie_block->gpsw.mask & PSW_MASK_PSTATE)
        return kvm_s390_inject_program_int(vcpu, PGM_PRIVILEGED_OP);

    @ @ -392,6 +404,8 @@
    
    u64 addr;
    u8 ar;

    +vcpu->stat.instruction_tpi++;
+    
    addr = kvm_s390_get_base_disp_s(vcpu, &ar);
    if (addr & 3)
        return kvm_s390_inject_program_int(vcpu, PGM_SPECIFICATION);

    @ @ -424,6 +438,8 @@
struct kvm_s390_interrupt_info *inti = NULL;
const u64 isc_mask = 0xffffffffUL << 24; /* all iscs set */

+vcpu->stat.instruction_tsch++;
+
/* a valid schid has at least one bit set */
if (vcpu->run->s.regs.gprs[1])
    inti = kvm_s390_get_io_int(vcpu->kvm, isc_mask,
                           @ @ -527,6 +545,7 @ @
if (vcpu->arch.sie_block->ipa == 0xb235)
    return handle_tsch(vcpu);
/* Handle in userspace. */
+vcpu->stat.instruction_io_other++;
return -EOPNOTSUPP;
} else {
/*
 @@ -592,6 +611,8 @@
  int rc;
  u8 ar;

+vcpu->stat.instruction_lpsw++;
+
if (gpsw->mask & PSW_MASK_PSTATE)
    return kvm_s390_inject_program_int(vcpu, PGM_PRIVILEGED_OP);

 @@ -619,6 +640,8 @@
  int rc;
  u8 ar;

+vcpu->stat.instruction_lpswe++;
+
if (vcpu->arch.sie_block->gpsw.mask & PSW_MASK_PSTATE)
    return kvm_s390_inject_program_int(vcpu, PGM_PRIVILEGED_OP);

 @@ -828,6 +851,8 @@
 {}
 int reg1, reg2;

+vcpu->stat.instruction_epsw++;
+
kvm_s390_get_regs_rre(vcpu, &reg1, &reg2);

/* This basically extracts the mask half of the psw. */
@@ -1332,6 +1357,8 @@
 {}
 u32 value;

+vcpu->stat.instruction_sckpf++;
if (vcpu->arch.sie_block->gpsw.mask & PSW_MASK_PSTATE)
return kvm_s390_inject_program_int(vcpu, PGM_PRIVILEGED_OP);

static int handle_ptff(struct kvm_vcpu *vcpu)
{
    vcpu->stat.instruction_ptff++;
    /* we don't emulate any control instructions yet */
kvm_s390_set_psw_cc(vcpu, 3);
    return 0;
}

/* Copy to APCB FORMAT1 from APCB FORMAT0 */
static int setup_apcb10(struct kvm_vcpu *vcpu, struct kvm_s390_apcb1 *apcb_s,
    unsigned long apcb_o, struct kvm_s390_apcb1 *apcb_h)
{
    struct kvm_s390_apcb0 tmp;

    if (read_guest_real(vcpu, apcb_o, &tmp, sizeof(struct kvm_s390_apcb0)))
    { 
        struct kvm_s390_sie_block *scb_o; /* 0x0218 */
        /* The pinned original scb. Be aware that other VCPUs can modify
         * it while we read from it. Values that are used for conditions or
         * are reused conditionally, should be accessed via READ_ONCE.
         */
        struct kvm_s390_sie_block *scb_o; /* 0x0218 */
        /* the shadow gmap in use by the vsie_page */
        struct gmap *gmap; /* 0x0220 */
        atomic_set(&scb_s->cpuflags, newflags);
        return 0;
    }

    /* the same offset as that in struct sie_page! */
    /* the pinned original scb */
    /* the pinned original scb. Be aware that other VCPUs can modify
    * it while we read from it. Values that are used for conditions or
    * are reused conditionally, should be accessed via READ_ONCE.
    */
    struct kvm_s390_sie_block *scb_o; /* 0x0218 */
    /* the shadow gmap in use by the vsie_page */
    struct gmap *gmap; /* 0x0220 */
    atomic_set(&scb_s->cpuflags, newflags);
    return 0;
}
+return -EFAULT;
+
+apcb_s->apm[0] = apcb_h->apm[0] & tmp.apm[0];
+apcb_s->aqm[0] = apcb_h->aqm[0] & tmp.aqm[0] & 0xffffffff000000000000UL;
+apcb_s->adm[0] = apcb_h->adm[0] & tmp.adm[0] & 0xffffffff000000000000UL;

-/*
+return 0;
+}
+
+/**
+ * setup_apcb00 - Copy to APCB FORMAT0 from APCB FORMAT0
+ * @vcpu: pointer to the virtual CPU
+ * @apcb_s: pointer to start of apcb in the shadow crycb
+ * @apcb_o: pointer to start of original apcb in the guest2
+ * @apcb_h: pointer to start of apcb in the guest1
+ *
+ * Returns 0 and -EFAULT on error reading guest apcb
+ */
+static int setup_apcb00(struct kvm_vcpu *vcpu, unsigned long *apcb_s,
+unsigned long apcb_o, unsigned long *apcb_h)
+{
+if (read_guest_real(vcpu, apcb_o, apcb_s,
+    sizeof(struct kvm_s390_apcb0)))
+    return -EFAULT;
+
+bitmap_and(apcb_s, apcb_s, apcb_h, sizeof(struct kvm_s390_apcb0));
+
+return 0;
+}
+
+/**
+ * setup_apcb11 - Copy the FORMAT1 APCB from the guest to the shadow CRYCB
+ * @vcpu: pointer to the virtual CPU
+ * @apcb_s: pointer to start of apcb in the shadow crycb
+ * @apcb_o: pointer to start of original guest apcb
+ * @apcb_h: pointer to start of apcb in the host
+ *
+ * Returns 0 and -EFAULT on error reading guest apcb
+ */
+static int setup_apcb11(struct kvm_vcpu *vcpu, unsigned long *apcb_s,
+unsigned long apcb_o,
+unsigned long *apcb_h)
+{
+if (read_guest_real(vcpu, apcb_o, apcb_s,
+    sizeof(struct kvm_s390_apcb1)))
+    return -EFAULT;
+}
bitmap_and(apcb_s, apcb_s, apcb_h, sizeof(struct kvm_s390_apcb1));
+
+return 0;
+}
+
+/**
+ * setup_apcb - Create a shadow copy of the apcb.
+ * @vcpu: pointer to the virtual CPU
+ * @crycb_s: pointer to shadow crycb
+ * @crycb_o: pointer to original guest crycb
+ * @crycb_h: pointer to the host crycb
+ * @fmt_o: format of the original guest crycb.
+ * @fmt_h: format of the host crycb.
+ *
+ * Checks the compatibility between the guest and host crycb and calls the
+ * appropriate copy function.
+ *
+ * Return 0 or an error number if the guest and host crycb are incompatible.
+ */
+static int setup_apcb(struct kvm_vcpu *vcpu, struct kvm_s390_crypto_cb *crycb_s, const u32 crycb_o, struct kvm_s390_crypto_cb *crycb_h, int fmt_o, int fmt_h)
+
+switch (fmt_o) {
+case CRYCB_FORMAT2:
+if ((crycb_o & PAGE_MASK) != ((crycb_o + 256) & PAGE_MASK))
+return -EACCES;
+if (fmt_h != CRYCB_FORMAT2)
+return -EINVAL;
+return setup_apcb11(vcpu, (unsigned long *)&crycb_s->apcb1, (unsigned long *)&crycb->apcb1, (unsigned long *)&crycb_h->apcb1);
+case CRYCB_FORMAT1:
+switch (fmt_h) {
+case CRYCB_FORMAT2:
+return setup_apcb10(vcpu, &crycb_s->apcb1, (unsigned long) &crycb->apcb1, (unsigned long) &crycb_h->apcb1);
+case CRYCB_FORMAT1:
+return setup_apcb00(vcpu, (unsigned long *) &crycb_s->apcb0, (unsigned long) &crycb->apcb0, (unsigned long) &crycb_h->apcb0);
+ (unsigned long *) &crycb_h->apcb0);
+}
+break;
+case CRYCB_FORMAT0:
+if (((crycb_o & PAGE_MASK) != ((crycb_o + 32) & PAGE_MASK))
+return -EACCES;
+
+switch (fmt_h) {
+case CRYCB_FORMAT2:
+return setup_apcb10(vcpu, &crycb_s->apcb1,
+    (unsigned long) &crycb->apcb0,
+    &crycb_h->apcb1);
+case CRYCB_FORMAT1:
+case CRYCB_FORMAT0:
+return setup_apcb00(vcpu,
+    (unsigned long *) &crycb_s->apcb0,
+    (unsigned long) &crycb->apcb0,
+    (unsigned long *) &crycb_h->apcb0);
+
+
+return -EINVAL;
+}
+
+/**
+ * shadow_crycb - Create a shadow copy of the crycb block
+ * @vcpu: a pointer to the virtual CPU
+ * @vsie_page: a pointer to internal data used for the vSIE
+ *
+ * Create a shadow copy of the crycb block and setup key wrapping, if
+ * requested for guest 3 and enabled for guest 2.
+ *
+ * We only accept format-1 (no AP in g2), but convert it into format-2
+ * We accept format-1 or format-2, but we convert format-1 into format-2
+ * in the shadow CRYCB.
+ * Using format-2 enables the firmware to choose the right format when
+ * scheduling the SIE.
+ * There is nothing to do for format-0.
+ *
+ * This function centralize the issuing of set_validity_icpt() for all
+ * the subfunctions working on the crycb.
+ *
+ * Returns: - 0 if shadowed or nothing to do
+ * - > 0 if control has to be given to guest 2
+ */
+@@ -140,34 +278,54 @@
+
+struct kvm_s390_sie_block *scb_s = &vsie_page->scb_s;
+struct kvm_s390_sie_block *scb_o = vsie_page->scb_o;
u32 crycb_addr = scb_o->crycbd & 0x7ffffffU;
const uint32_t crycbd_o = READ_ONCE(scb_o->crycbd);
const u32 crycb_addr = crycbd_o & 0x7ffffffU;
unsigned long *b1, *b2;
u8 ecb3_flags;
u32 ecbd_flags;
int api_h;
int key_msk = test_kvm_facility(vcpu->kvm, 76);
int fmt_o = crycbd_o & CRYCB_FORMAT_MASK;
int fmt_h = vcpu->arch.sie_block->crycbd & CRYCB_FORMAT_MASK;
int ret = 0;

scb_s->crycbd = 0;
if (!(scb_o->crycbd & vcpu->arch.sie_block->crycbd & CRYCB_FORMAT1))
  return 0;
/* format-1 is supported with message-security-assist extension 3 */
if (!test_kvm_facility(vcpu->kvm, 76))
  +
apie_h = vcpu->arch.sie_block->eca & ECA_APIE;
if (!apie_h && !key_msk)
  return 0;
if (!crycb_addr)
  return set_validity_icpt(scb_s, 0x0039U);
if (!crycb_addr)
  return set_validity_icpt(scb_s, 0x003CU);
if (fmt_o == CRYCB_FORMAT1)
  if ((crycb_addr & PAGE_MASK) !=
    ((crycb_addr + 128) & PAGE_MASK))
    return set_validity_icpt(scb_s, 0x003CU);
if (apie_h && (scb_o->eca & ECA_APIE)) {
  ret = setup_apcb(vcpu, &vsie_page->crycb, crycb_addr,
    vcpu->kvm->arch.crypto.crycb,
    fmt_o, fmt_h);
  if (ret)
    goto end;
  scb_s->eca |= scb_o->eca & ECA_APIE;
} /* we may only allow it if enabled for guest 2 */
ecb3_flags = scb_o->ecb3 & vcpu->arch.sie_block->ecb3 &
  (ECB3_AES | ECB3_DEA);
if (!ecb3_flags)
  return 0;
if ((crycb_addr & PAGE_MASK) != (crycb_addr + 128) & PAGE_MASK))
  return set_validity_icpt(scb_s, 0x003CU);
else if (!crycb_addr)
return set_validity_icpt(scb_s, 0x0035U);

scb_s->ecb3 |= ecb3_flags;
-scb_s->crycbd = ((__u32)(__u64) &vsie_page->crycb) | CRYCB_FORMAT1 | CRYCB_FORMAT2;
+scb_s->ecd |= ecd_flags;

/* xor both blocks in one run */

b1 = (unsigned long *) vsie_page->crycb.dea_wrapping_key_mask;
@@ -175,6 +333,16 @@
vcpu->kvm->arch.crypto.crycb->dea_wrapping_key_mask;
/* as 56%8 == 0, bitmap_xor won't overwrite any data */
bitmap_xor(b1, b1, b2, BITS_PER_BYTE * 56);
+end:
+switch (ret) {
+case -EINVAL:
+return set_validity_icpt(scb_s, 0x0020U);
+case -EFAULT:
+return set_validity_icpt(scb_s, 0x0035U);
+case -EACCES:
+return set_validity_icpt(scb_s, 0x003CU);
+}
+scb_s->crycbd = ((__u32)(__u64) &vsie_page->crycb) | CRYCB_FORMAT2;
return 0;
}
@@ -183,12 +351,15 @@
{
 struct kvm_s390_sie_block *scb_s = &vsie_page->scb_s;
 struct kvm_s390_sie_block *scb_o = vsie_page->scb_o;
+/* READ_ONCE does not work on bitfields - use a temporary variable */
+const uint32_t __new_ibc = scb_o->ibc;
+const uint32_t new_ibc = READ_ONCE(__new_ibc) & 0x0fffU;
+__u64 min_ibc = (sclp.ibc >> 16) & 0x0fffU;

scb_s->ibc = 0;
/* ibc installed in g2 and requested for g3 */
-if (vcpu->kvm->arch.model.ibc && (scb_o->ibc & 0x0fffU)) {
-    scb_s->ibc = scb_o->ibc & 0x0fffU;
}
if (vcpu->kvm->arch.model.ibc && new_ibc) {
    scb_s->ibc = new_ibc;
}
/* take care of the minimum ibc level of the machine */
if (scb_s->ibc < min_ibc) 
    scb_s->ibc = min_ibc;
@@ -259,6 +430,10 @@
{
    struct kvm_s390_sie_block *scb_o = vsie_page->scb_o;
    struct kvm_s390_sie_block *scb_s = &vsie_page->scb_s;
+/* READ_ONCE does not work on bitfields - use a temporary variable */
+const uint32_t __new_prefix = scb_o->prefix;
+const uint32_t new_prefix = READ_ONCE(__new_prefix);
    const bool wants_tx = READ_ONCE(scb_o->ecb) & ECB_TE;
    bool had_tx = scb_s->ecb & ECB_TE;

    unsigned long new_mso = 0;
    int rc;
    @@ -306,14 +481,14 @@
    scb_s->icpua = scb_o->icpua;
    if (!atomic_read(&scb_s->cpuflags) & CPUSMSTAT_SM))
        -new_mso = scb_o->mso & 0xfffffffffff00000UL;
        +new_mso = READ_ONCE(scb_o->mso) & 0xfffffffffff00000UL;
    /* if the hva of the prefix changes, we have to remap the prefix */
    -if (scb_s->mso != new_mso || scb_s->prefix != scb_o->prefix)
        prefix_unmapped(vsie_page);
    +if (scb_s->mso != new_mso || scb_s->prefix != new_prefix)
    /* SIE will do mso/msl validity and exception checks for us */
        scb_s->msl = scb_o->msl & 0xfffffffffff00000UL;
        scb_s->mso = new_mso;
    -scb_s->prefix = scb_o->prefix;
    +scb_s->prefix = new_prefix;

    /* We have to definetly flush the tlb if this scb never ran */
    if (scb_s->ihcpu != 0xffffU)
        @@ -325,11 +500,11 @@
        if (test_kvm_facility(vcpu->kvm, KVM_S390_VM_CPU_FEAT_ESOP))
            scb_s->ecb |= scb_o->ecb & ECB_HOSTPROTIINT;
        /* transactional execution */
        -if (test_kvm_facility(vcpu->kvm, 73)) {
        +if (test_kvm_facility(vcpu->kvm, 73) && wants_tx) {
        /* remap the prefix is tx is toggled on */
            -if ((scb_o->ecb & ECB_TE) && !had_tx)
            +if (!had_tx)
                prefix_unmapped(vsie_page);
            -scb_s->ecb |= scb_o->ecb & ECB_TE;
            +scb_s->ecb |= ECB_TE;
        }
    /* branch prediction */
if (test_kvm_facility(vcpu->kvm, 82))
@@ -360,6 +535,10 @@
if (test_kvm_facility(vcpu->kvm, 139))
scb_s->ecd |= scb_o->ecd & ECD_MEF;

+/* etoken */
+if (test_kvm_facility(vcpu->kvm, 156))
+scb_s->ecd |= scb_o->ecd & ECD_ETOKENF;
+
prepare_ibc(vcpu, vsie_page);
rc = shadow_crycb(vcpu, vsie_page);
out:
@@ -539,9 +718,9 @@
gpa_t gpa;
int rc = 0;

-gpa = scb_o->scaol & ~0xUL;
+gpa = READ_ONCE(scb_o->scaol) & ~0xUL;
if (test_kvm_cpu_feat(vcpu->kvm, KVM_S390_VM_CPU_FEAT_64BSCAO))
-gpa |= (u64) scb_o->scaoh << 32;
+gpa |= (u64) READ_ONCE(scb_o->scaoh) << 32;
if (gpa) {
if (!(!gpa & ~0x1ffUL))
rc = set_validity_icpt(scb_s, 0x0038U);
@@ -561,9 +740,9 @@
scb_s->scaol = (u32)(u64)hpa;
}

-gpa = scb_o->itdba & ~0xffUL;
+gpa = READ_ONCE(scb_o->itdba) & ~0xffUL;
if (test_kvm_cpu_feat(vcpu->kvm, KVM_S390_VM_CPU_FEAT_64BSCAO))
-gpa |= (u64) scb_o->scaoh << 32;
+gpa |= (u64) READ_ONCE(scb_o->scaoh) << 32;
if (gpa) {
if (!(!gpa & ~0x1ffUL))
rc = set_validity_icpt(scb_s, 0x0080U);
@@ -576,7 +755,7 @@
scb_s->itdba = hpa;
}

-gpa = scb_o->gvrd & ~0x1ffUL;
+gpa = READ_ONCE(scb_o->gvrd) & ~0x1ffUL;
if (gpa && (scb_s->ecb & ECB_TE)) {
-if (!(!gpa & ~0x1ffUL)) {
+if (!(!gpa & ~0x1ffUL)) {
rc = set_validity_icpt(scb_s, 0x0080U);
} goto unpin;
}
@@ -576,7 +755,7 @@
scb_s->gvrd = hpa;
}

-gpa = scb_o->gvrd & ~0x1ffUL;
+gpa = READ_ONCE(scb_o->gvrd) & ~0x1ffUL;
if (gpa && (scb_s->ecb & ECA_VX) && !(scb_s->ecd & ECD_HOSTREGMGMT)) {
if (!(!gpa & ~0x1ffUL)) {
rc = set_validity_icpt(scb_s, 0x1310U);
@@ -594,7 +773,7 @@
scb_s->gvrd = hpa;
}
gpa = scb_o->riccbd & ~0x3fUL;
+gpa = READ_ONCE(scb_o->riccbd) & ~0x3fUL;
if (gpa && (scb_s->ecb3 & ECB3_RI)) {
  if (!(gpa & ~0x1fffUL)) {
    rc = set_validity_icpt(scb_s, 0x0043U);
    goto unpin;
  }  
-}if ((scb_s->ecb & ECB_GS) && !(scb_s->ecd & ECD_HOSTREGMGMT)) {
+	}if (((scb_s->ecb & ECB_GS) && !(scb_s->ecd & ECD_HOSTREGMGMT)) ||
+	    (scb_s->ecd & ECD_ETOKENF)) {
unsigned long sdnxc;
-gpa = scb_o->sdnxo & ~0xfUL;
-sdnxc = scb_o->sdnxo & 0xfUL;
+gpa = READ_ONCE(scb_o->sdnxo) & ~0xfUL;
+sdnxc = READ_ONCE(scb_o->sdnxo) & 0xfUL;
if (!gpa || !(gpa & ~0x1fffUL)) {
  rc = set_validity_icpt(scb_s, 0x10b0U);
  goto unpin;
}  
-}if (fac && test_kvm_facility(vcpu->kvm, 7)) {
+	}if (fac & test_kvm_facility(vcpu->kvm, 7)) {
  retry_vsie_icpt(vsie_page);
  goto unpin;
}  
static int handle_stfle(struct kvm_vcpu *vcpu, struct vsie_page *vsie_page)
{
  struct kvm_s390_sie_block *scb_s = &vsie_page->scb_s;
-  __u32 fac = vsie_page->scb_o->fac & 0x7fffffff8U;
+  __u32 fac = READ_ONCE(vsie_page->scb_o->fac) & 0x7fffffff8U;
if (fac && test_kvm_facility(vcpu->kvm, 7)) {
  retry_vsie_icpt(vsie_page);
  goto unpin;
}  
handle_last_fault(vcpu, vsie_page);

s390_handle_mcck();

srcu_read_unlock(&vcpu->kvm->srcu, vcpu->srcu_idx);
+/* save current guest state of bp isolation override */
+guest_bp_isolation = test_thread_flag(TIF_ISOLATE_BP_GUEST);
+/*
+ * The guest is running with BPBC, so we have to force it on for our
+ * nested guest. This is done by enabling BPBC globally, so the BPBC
+ * control in the SCB (which the nested guest can modify) is simply
+ * ignored.
+ */
+if (test_kvm_facility(vcpu->kvm, 82) &&
+    vcpu->arch.sie_block->fpf & FPF_BPBC)
+    set_thread_flag(TIF_ISOLATE_BP_GUEST);
+
local_irq_disable();
guest_enter_irqoff();
local_irq_enable();

-rc = sie64a(scb_s, vcpu->run->s.regs.gprs);
+/*
+ * Simulate a SIE entry of the VCPU (see sie64a), so VCPU blocking
+ * and VCPU requests also hinder the vSIE from running and lead
+ * to an immediate exit. kvm_s390_vsie_kick() has to be used to
+ * also kick the vSIE.
+ */
+vcpu->arch.sie_block->prog0c |= PROG_IN_SIE;
+barrier();
+if (!kvm_s390_vcpu_sie_inhibited(vcpu))
+    rc = sie64a(scb_s, vcpu->run->s.regs.gprs);
+barrier();
+vcpu->arch.sie_block->prog0c &= ~PROG_IN_SIE;

local_irq_disable();
guest_exit_irqoff();
local_irq_enable();
+
+/* restore guest state for bp isolation override */
+if (!guest_bp_isolation)
+    clear_thread_flag(TIF_ISOLATE_BP_GUEST);
+
+ vcpu->srcu_idx = srcu_read_lock(&vcpu->kvm->srcu);

if (rc == -EINTR) {
    @@ -958,7 +1169,8 @@
    if (rc == -EAGAIN)
    rc = 0;
    if (rc || scb_s->icptcode || signal_pending(current) ||
-      kvm_s390_vcpu_has_irq(vcpu, 0))
+      kvm_s390_vcpu_has_irq(vcpu, 0) ||
+      kvm_s390_vcpu_sie_inhibited(vcpu))
    break;
@@ -977,6 +1189,7 @@
    scb_s->iprcc = PGM_ADDRESSING;
    scb_s->pgmilc = 4;
    scb_s->gpsw.addr = __rewind_psw(scb_s->gpsw, 4);
+   rc = 1;
    }
    return rc;
    }
@@ -1075,7 +1288,8 @@
    if (unlikely(scb_addr & 0x1ffUL))
    return kvm_s390_inject_program_int(vcpu, PGM_SPECIFICATION);

-   if (signal_pending(current) || kvm_s390_vcpu_has_irq(vcpu, 0))
+   if (signal_pending(current) || kvm_s390_vcpu_has_irq(vcpu, 0) ||
+       kvm_s390_vcpu_sie_inhibited(vcpu))
    return 0;

    vsie_page = get_vsie_page(vcpu->kvm, scb_addr);
--- linux-4.15.0.orig/arch/s390/lib/mem.S
+++ linux-4.15.0/arch/s390/lib/mem.S
@@ -7,6 +7,9 @@
  
 #include <linux/linkage.h>
 #include <asm/export.h>
+#include <asm/nospec-insn.h>
+	GEN_BR_THUNK %r14

 /*
 * void *memmove(void *dest, const void *src, size_t n)
@@ -14,7 +17,7 @@
 ENTRY(memmove)
 ltr%r4,%r4
 lgr%r1,%r2
-bzt%r14
+jz.Lmemmove_exit
 aghi%r4,-1
 clgr%r2,%r3
 jnh.Lmemmove_forward
@@ -33,14 +36,15 @@
 .Lmemmove_forward_remainder:
 larl%r5,.Lmemmove_mvc
 ex%r4,0(%r5)
-br%r14
+j.Lmemmove_exit:
+BR_EX%r14


.Lmemmove_reverse:
ic%r0,0(%r4,%r3)
stc%r0,0(%r4,%r1)
brctg%r4,.Lmemmove_reverse
ic%r0,0(%r4,%r3)
stc%r0,0(%r4,%r1)
-br%r14
+BR_EX%r14
_.Lmemmove_mvc:
mvc0(1,%r1),0(%r3)
EXPORT_SYMBOL(memmove)
@@ -62,7 +66,7 @@
*/
ENTRY(memset)
lgr%r4,%r4
-bzr%r14
+jz.Lmemset_exit
lgr%r3,%r3
jnz.Lmemset_fill
aghi%r4,-1
@@ -77,7 +81,8 @@
.Lmemset_clear_remainder:
larl%r3,.Lmemset_xc
ex%r4,0(%r3)
-br%r14
+.Lmemset_exit:
+BR_EX%r14
_.Lmemset_fill:
cghi%r4,1
lgr%r1,%r2
@@ -95,10 +100,10 @@
stc%r3,0(%r1)
larl%r5,.Lmemset_mvc
ex%r4,0(%r5)
-br%r14
+BR_EX%r14
_.Lmemset_fill_exit:
stc%r3,0(%r1)
-br%r14
+BR_EX%r14
_.Lmemset_xc:
xc0(1,%r1),0(%r1)
_.Lmemset_mvc:
@@ -112,7 +117,7 @@
*/
ENTRY(memcpy)
lgr%r4,%r4
-bzr%r14
+jz.Lmemcpy_exit
agh%r4,-1
srlg%r5,%r4,8
ltgr%r5,%r5
@@ -121,7 +126,8 @@
.Lmemcpy_remainder:
lar%r5,.Lmemcpy_mvc
ex%r4,0(%r5)
br%r14
+.Lmemcpy_exit:
+BR_EX%r14
.Lmemcpy_loop:
mvc0(256,%r1),0(%r3)
la%r1,256(%r1)
@@ -142,9 +148,9 @@
.macro __MEMSET bits,bytes,insn
ENTRY(__memset(bits))
lte%r4,%r4
-bzr%r14
+jz.L__memset_exit<bits
cgh%r4,bytes
-jc.L__memset_exit<bits
+jc.L__memset_store<bits
agh%r4,-(%bytes+1)
srlg%r5,%r4,8
ltgr%r5,%r5
@@ -159,10 +165,11 @@
 insn%r3,0(%r1)
lar%r5,.L__memset_mvc<bits
ex%r4,0(%r5)
br%r14
-.L__memset_exit<bits:
+BR_EX%r14
+.L__memset_store<bits:
 insn%r3,0(%r2)
br%r14
+.L__memset_exit<bits:
+BR_EX%r14
.L__memset_mvc<bits:
mvc<bits(1,%r1),0(%r1)
.endm
--- linux-4.15.0.orig/arch/s390/lib/string.c
+++ linux-4.15.0/arch/s390/lib/string.c
@@ -227,14 +227,13 @@
*/
char *strrchr(const char *s, int c)
{
    size_t len = __strend(s) - s;

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```c
+size_t len = __strend(s) - s;

- if (len)
-   do {
-     if (s[len] == (char) c)
-       return (char *) s + len;
-   } while (--len > 0);
- return NULL;
+
do {
+    if (s[len] == (char)c)
+    return (char *)s + len;
+} while (--len >= 0);
+return NULL;
}
EXPORT_SYMBOL(strrchr);

--- linux-4.15.0.orig/arch/s390/lib/uaccess.c
+++ linux-4.15.0/arch/s390/lib/uaccess.c
@@ -64,10 +64,13 @@
{
  mm_segment_t old_fs;
  unsigned long asce, cr;
  +unsigned long flags;

  old_fs = current->thread.mm_segment;
  if (old_fs & 1)
    return old_fs;
+ /* protect against a concurrent page table upgrade */
+ local_irq_save(flags);
  current->thread.mm_segment |= 1;
  asce = S390_lowcore.kernel_asce;
  if (likely(old_fs == USER_DS)) {
@@ -83,6 +86,7 @@
    __ctl_load(asce, 7, 7);
    set_cpu_flag(CIF_ASCE_SECONDARY);
  }
+ local_irq_restore(flags);
  return old_fs;
}
EXPORT_SYMBOL(enable_sacf_uaccess);
--- linux-4.15.0.orig/arch/s390/mm/cmm.c
+++ linux-4.15.0/arch/s390/mm/cmm.c
@@ -306,16 +306,16 @@
}
if (write) {
-    len = *lenp;
-    if (copy_from_user(buf, buffer,
+    -len = *lenp;
+    -if (copy_from_user(buf, buffer,
```
- len > sizeof(buf) ? sizeof(buf) : len))
+  len = min(*lenp, sizeof(buf));
  +  if (copy_from_user(buf, buffer, len))
    return -EFAULT;
-  buf[sizeof(buf) - 1] = \'0\';
  +  buf[len - 1] = \'0\';
  +  cmm_skip_blanks(buf, &p);
  nr = simple_strtoul(p, &p, 0);
  +  cmm_skip_blanks(p, &p);
  seconds = simple_strtoul(p, &p, 0);
  +  cmm_set_timeout(nr, seconds);
  +  *ppos += *lenp;
} else {
  len = sprintf(buf, "%ld %ld\n",
    cmm_timeout_pages, cmm_timeout_seconds);
@@ -323,9 +323,9 @@
len = *lenp;
if (copy_to_user(buffer, buf, len))
  return -EFAULT;
  +  *lenp = len;
  +  *ppos += len;
}
  -  *lenp = len;
  -  *ppos += len;
return 0;
}

--- linux-4.15.0.orig/arch/s390/mm/extmem.c
+++ linux-4.15.0/arch/s390/mm/extmem.c
@@ -80,7 +80,7 @@
struct dcss_segment {
  struct list_head list;
  char dcss_name[8];
  -  char res_name[15];
  +  char res_name[16];
  unsigned long start_addr;
  unsigned long end;
  atomic_t ref_count;
@@ -433,7 +433,7 @@
    memcpy(&seg->res_name, seg->dcss_name, 8);
    EBCASC(seg->res_name, 8);
    seg->res_name[8] = \'0\';
-   strcat(seg->res_name, " (DCSS)\n",
+   strlcat(seg->res_name, " (DCSS)", sizeof(seg->res_name));
    seg->res->name = seg->res_name;
  rc = seg->vm_segtpe;
  if (rc == SEG_TYPE_SC ||
--- linux-4.15.0.orig/arch/s390/mm/fault.c
/*
 * Find out which address space caused the exception.
 * Access register mode is impossible, ignore space == 3.
 */
static inline enum fault_type get_fault_type(struct pt_regs *regs)
{
    if (trans_exc_code == 1) {
        /* access register mode, not used in the kernel */
        return USER_FAULT;
    }
    /* home space exception -> access via kernel ASCE */
    return KERNEL_FAULT;
}
/* No reason to continue if interrupted by SIGKILL. */
if ((fault & VM_FAULT_RETRY) && fatal_signal_pending(current)) {
    fault = VM_FAULT_SIGNAL;
    if (flags & FAULT_FLAG_RETRY_NOWAIT)
        goto out_up;
    goto out;
}
if (unlikely(fault & VM_FAULT_ERROR))
    goto out;
/* Find vma in the parent mm */
vmaddr |= gaddr & ~PMD_MASK;
/* Find vma in the parent mm */
if (!vma)
    continue;
size = min(to - gaddr, PMD_SIZE - (gaddr & ~PMD_MASK));
zap_page_range(vma, vmaddr, size);
}
static inline unsigned long *gmap_table_walk(struct gmap *gmap,
unsigned long gaddr, int level)
{
    const int asce_type = gmap->asce & _ASCE_TYPE_MASK;
    unsigned long *table;
    if ((gmap->asce & _ASCE_TYPE_MASK) + 4 < (level * 4))
return NULL;
if (gmap_is_shadow(gmap) && gmap->removed)
return NULL;
-if (gaddr & (-1UL << (31 + ((gmap->asce & _ASCE_TYPE_MASK) >> 2)*11)))
+  
+  if (asce_type != _ASCE_TYPE_REGION1 &&
+      gaddr & (-1UL << (31 + (asce_type >> 2) * 11)))
return NULL;
+
table = gmap->table;
switch (gmap->asce & _ASCE_TYPE_MASK) {
case _ASCE_TYPE_REGION1:
@@ -1679,6 +1685,7 @@
goto out_free;
} else if (*table & _REGION_ENTRY_ORIGIN) {
rc = -EAGAIN;/* Race with shadow */
+goto out_free;
}
crst_table_init(s_r3t, _REGION3_ENTRY_EMPTY);
/* mark as invalid as long as the parent table is not protected */
--- linux-4.15.0.orig/arch/s390/mm/gup.c
+++ linux-4.15.0/arch/s390/mm/gup.c
@@ -39,7 +39,8 @@
VM_BUG_ON(!pfn_valid(pte_pfn(pte)));
page = pte_page(pte);
head = compound_head(page);
-if (!page_cache_get_speculative(head))
+  || !page_cache_get_speculative(head))
return 0;
if (unlikely(pte_val(pte) != pte_val(*ptep))) {
put_page(head);
@@ -77,7 +78,8 @@
refs++;}
} while (addr += PAGE_SIZE, addr != end);

-if (!page_cache_add_speculative(head, refs)) {
+if (unlikely(WARN_ON_ONCE(page_ref_count(head) < 0))
+  || !page_cache_add_speculative(head, refs)) {
*nr -= refs;
return 0;
}
@@ -151,7 +153,8 @@
refs++;}
} while (addr += PAGE_SIZE, addr != end);

-if (!page_cache_add_speculative(head, refs)) {
+if (unlikely(WARN_ON_ONCE(page_ref_count(head) < 0))
+  || !page_cache_add_speculative(head, refs)) {
*nr -= refs;
return 0;
}
+    || !page_cache_add_speculative(head, refs))) {
+*nr -= refs;
return 0;
+
@@ -280,9 +283,16 @@
{ int nr, ret;
+/*
+ * The FAST_GUP case requires FOLL_WRITE even for pure reads,
+ * because get_user_pages() may need to cause an early COW in
+ * order to avoid confusing the normal COW routines. So only
+ * targets that are already writable are safe to do by just
+ * looking at the page tables.
+ */
+might_sleep();
start &= PAGE_MASK;
-nr = __get_user_pages_fast(start, nr_pages, write, pages);
+nr = __get_user_pages_fast(start, nr_pages, 1, pages);
if (nr == nr_pages)
return nr;

--- linux-4.15.0.orig/arch/s390/mm/hugetlbpage.c
+++ linux-4.15.0/arch/s390/mm/hugetlbpage.c
@@ -2,7 +2,7 @@
 /*
 */
 /* IBM System z Huge TLB Page Support for Kernel.
 *- * Copyright IBM Corp. 2007,2016
+ * Copyright IBM Corp. 2007,2020
 * Author(s): Gerald Schaefer <gerald.schaefer@de.ibm.com>
 */

@@ -11,6 +11,9 @@
#include <linux/mm.h>
#include <linux/hugetlb.h>
+#include <linux/mman.h>
+#include <linux/sched/mm.h>
+#include <linux/security.h>

/*
 * If the bit selected by single-bit bitmask "a" is set within "x", move
@@ -114,7 +117,7 @@
     _PAGE_YOUNG);
 #ifdef CONFIG_MEM_SOFT_DIRTY
 pte_val(pte) |= move_set_bit(rste, _SEGMENT_ENTRY_SOFT_DIRTY,
-    _PAGE_DIRTY);
```c
+ _PAGE_SOFT_DIRTY);
#endif
pte_val(pte) |= move_set_bit(rste, _SEGMENT_ENTRY_NOEXEC,
   _PAGE_NOEXEC);
@@ -133,9 +136,11 @@
   rste &= ~_SEGMENT_ENTRY_NOEXEC;

/* Set correct table type for 2G hugepages */
-if ((pte_val(*ptep) & _REGION_ENTRY_TYPE_MASK) == _REGION_ENTRY_TYPE_R3)
-\t	if (likely(pte_present(pte)))
-\t\t\t\rste |= _REGION3_ENTRY_LARGE;
-\t\t\t\rste |= _REGION_ENTRY_TYPE_R3;
-\t\t\} else if (likely(pte_present(pte)))
-\t\t\rste |= _SEGMENT_ENTRY_LARGE;
-\t\rste_val(*ptep) = rste;
-\} @@ -243,3 +248,98 @@
-return 1;
}
__setup("hugepagesz=", setup_hugepagesz);
+
+static unsigned long hugetlb_get_unmapped_area_bottomup(struct file *file,
+unsigned long addr, unsigned long len,
+unsigned long pgoff, unsigned long flags)
+{
+\struct hstate *h = hstate_file(file);
+\struct vm_unmapped_area_info info;
+\info.flags = 0;
+\info.length = len;
+\info.low_limit = current->mm->mmap_base;
+\info.high_limit = TASK_SIZE;
+\info.align_mask = PAGE_MASK & ~huge_page_mask(h);
+\info.align_offset = 0;
+\return vm_unmapped_area(&info);
+}
+
+static unsigned long hugetlb_get_unmapped_area_topdown(struct file *file,
+unsigned long addr0, unsigned long len,
+unsigned long pgoff, unsigned long flags)
+{
+\struct hstate *h = hstate_file(file);
+\struct vm_unmapped_area_info info;
+\unsigned long addr;
```
+info.flags = VM_UNMAPPED_AREA_TOPDOWN;
+info.length = len;
+info.low_limit = max(PAGE_SIZE, mmap_min_addr);
+info.high_limit = current->mm->mmap_base;
+info.align_mask = PAGE_MASK & ~huge_page_mask(h);
+info.align_offset = 0;
+addr = vm_unmapped_area(&info);
+
+/*
+ * A failed mmap() very likely causes application failure,
+ * so fall back to the bottom-up function here. This scenario
+ * can happen with large stack limits and large mmap()
+ * allocations.
+ */
+if (addr & ~PAGE_MASK) {
+VM_BUG_ON(addr != -ENOMEM);
+info.flags = 0;
+info.low_limit = TASK_UNMAPPED_BASE;
+info.high_limit = TASK_SIZE;
+addr = vm_unmapped_area(&info);
+}
+
+return addr;
+
+unsigned long hugetlb_get_unmapped_area(struct file *file, unsigned long addr,
+unsigned long len, unsigned long pgoff, unsigned long flags)
+{
+struct hstate *h = hstate_file(file);
+struct mm_struct *mm = current->mm;
+struct vm_area_struct *vma;
+int rc;
+
+if (len & ~huge_page_mask(h))
+return -EINVAL;
+if (len > TASK_SIZE - mmap_min_addr)
+return -ENOMEM;
+
+if (flags & MAP_FIXED) {
+if (prepare_hugepage_range(file, addr, len))
+return -EINVAL;
+goto check_asc_limit;
+}
+
+if (addr) {
+addr = ALIGN(addr, huge_page_size(h));
+vma = find_vma(mm, addr);
+if (TASK_SIZE - len >= addr && addr >= mmap_min_addr &&
+ (!vma || addr + len <= vm_start_gap(vma)))
+ goto check_asce_limit;

+}
+
+if (mm->get_unmapped_area == arch_get_unmapped_area)
+ addr = hugetlb_get_unmapped_area_bottomup(file, addr, len,
+ pgoff, flags);
+ else
+ addr = hugetlb_get_unmapped_area_topdown(file, addr, len,
+ pgoff, flags);
+ if (addr & ~PAGE_MASK)
+ return addr;
+
+ check_asce_limit:
+ if (addr + len > current->mm->context.asce_limit &&
+ addr + len <= TASK_SIZE) {
+ rc = crst_table_upgrade(mm, addr + len);
+ if (rc)
+ return (unsigned long) rc;
+ }
+ return addr;
+
--- linux-4.15.0.orig/arch/s390/mm/page-states.c
+++ linux-4.15.0/arch/s390/mm/page-states.c
@@ -271,7 +271,7 @@
 list_for_each(l, &zone->free_area[order].free_list[t]) {
     page = list_entry(l, struct page, lru);
     if (make_stable)
- set_page_stable_dat(page, 0);
+ set_page_stable_dat(page, order);
     else
     set_page_unused(page, order);
 }
-if (current->active_mm == mm)
-set_user_asce(mm);
+# we must change all active ASCEs to avoid the creation of new TLBs */
+if (current->active_mm == mm) {
  +S390_lowcore.user_asce = mm->context.asce;
+if (current->thread.mm_segment == USER_DS) {
  +_ctl_load(S390_lowcore.user_asce, 1, 1);
  + /* we must change all active ASCEs to avoid the creation of new TLBs */
  +if (current->thread.mm_segment == USER_DS) {
    +S390_lowcore.user_asce = mm->context.asce;
    +if (current->thread.mm_segment == USER_DS) {
      +S390_lowcore.user_asce = mm->context.asce;
      +if (current->thread.mm_segment == USER_DS_SACF) {
        +_ctl_load(S390_lowcore.user_asce, 7, 7);
        + /* enable_sacf_uaccess does all or nothing */
        +WARN_ON(!test_cpu_flag(CIF_ASCE_SECONDARY));
        +}
        +}
        __tlb_flush_local();
    }
    mm->context.asce_limit = _REGION1_SIZE;
    mm->context.asce = __pa(mm->pgd) | _ASCE_TABLE_LENGTH |
    _ASCE_USER_BITS | _ASCE_TYPE_REGION2;
    +mm_inc_nr_puds(mm);
    } else {
    crst_table_init(table, _REGION1_ENTRY_EMPTY);
    pgd_populate(mm, (pgd_t *) table, (p4d_t *) pgd);
    --- linux-4.15.0.orig/arch/s390/net/bpf_jit.S
    +++ linux-4.15.0/arch/s390/net/bpf_jit.S
    @ @ -9,6 +9,7 @@
    */
    
    #include <linux/linkage.h>
    +#include <asm/nospec-insn.h>
    #include "bpf_jit.h"
    
    /*
    @ @ -54,7 +55,7 @@
    clg%r3,STK_OFF_HLEN(%r15); /* Offset + SIZE > hlen? */
    jhsk_load_##NAME##_slow:
    LOAD%r14,-SIZE(%r3,%r12); /* Get data from skb */
    -bOFF_OK(%r6); /* Return */
    +B_EXOFF_OK,%r6; /* Return */
    \sk_load_##NAME##_slow:;
    lgr%r2,%r7; /* Arg1 = skb pointer */
    @ @ -64,11 +65,14 @@
    brasl%r14,skb_copy_bits; /* Get data from skb */
    
    ---
LOAD%r14,STK_OFF_TMP(%r15); /* Load from temp buffer */
ltgr%r2,%r2; /* Set cc to (%r2 != 0) */
-br%r6; /* Return */
+BR_EX%r6; /* Return */

sk_load_common(word, 4, llgf) /* r14 = *(u32 *) (skb->data+offset) */
sk_load_common(half, 2, llgh) /* r14 = *(u16 *) (skb->data+offset) */

+GEN_BR_THUNK %r6
+GEN_B_THUNK OFF_OK, %r6
+
/*
 * Load 1 byte from SKB (optimized version)
 */
@ @ -80,7 +84,7 @@
clg%r3,STK_OFF_HLEN(%r15) # Offset >= hlen?
jnlsk_load_byte_slow
llgc%r14,0(%r3,%r12) # Get byte from skb
-bOFF_OK(%r6) # Return OK
+B_EXOFF_OK,%r6 # Return OK

sk_load_byte_slow:
lgr%r2,%r7 # Arg1 = skb pointer
@ @ -90,7 +94,7 @@
brasl%r14,skb_copy_bits # Get data from skb
llgc%r14,STK_OFF_TMP(%r15) # Load result from temp buffer
ltgr%r2,%r2 # Set cc to (%r2 != 0)
-br%r6 # Return cc
+BR_EX%r6 # Return cc

#define sk_negative_common(NAME, SIZE, LOAD)\
sk_load_##NAME##_slow_neg:
@ @ -104,7 +108,7 @@
jzbpf_error:
LOAD%r14,0(%r2); /* Get data from pointer */
xr%r3,%r3; /* Set cc to zero */
-br%r6 /* Return cc */
+BR_EX%r6; /* Return cc */

sk_negative_common(word, 4, llgf)
sk_negative_common(half, 2, llgh)
@ @ -113,4 +117,4 @@
bpf_error:
# force a return 0 from jit handler
ltgr%r15,%r15 # Set condition code
-br%r6
+BR_EX%r6
--- linux-4.15.0.org/arch/s390/net/bpf_jit_comp.c
+++ linux-4.15.0/arch/s390/net/bpf_jit_comp.c
@@ -25,11 +25,11 @@
 #include <linux/bpf.h>
 #include <asm/cacheflush.h>
 #include <asm/dis.h>
+  #include <asm/facility.h>
+  #include <asm/nospec-branch.h>
 #include <asm/set_memory.h>
 #include "bpf_jit.h"

-int bpf_jit_enable __read_mostly;
-struct bpf_jit {
 u32 seen;  /* Flags to remember seen eBPF instructions */
 u32 seen_reg[16];  /* Array to remember which registers are used */
@@ -43,6 +43,8 @@
 int base_ip;  /* Base address for literal pool */
 int ret0_ip;  /* Address of return 0 */
 int exit_ip;  /* Address of exit */
+  int r1_thunk_ip;  /* Address of expoline thunk for 'br %r1' */
+  int r14_thunk_ip;  /* Address of expoline thunk for 'br %r14' */
 int tail_call_start;  /* Tail call start offset */
 int labels[1];  /* Labels for local jumps */
 };
@@ -115,7 +117,7 @@
 {
 u32 r1 = reg2hex[b1];

-if (!jit->seen_reg[r1] && r1 >= 6 && r1 <= 15)
+if (r1 >= 6 && r1 <= 15 && !jit->seen_reg[r1])
  jit->seen_reg[r1] = 1;
 }
@@ -252,6 +254,19 @@
 REG_SET_SEEN(b2);
 +#define EMIT6_PCREL_RILB(op, b, target)
+({
+  int rel = (target - jit->prg) / 2;
+  _EMIT6(op | reg_high(b) << 16 | rel >> 16, rel & 0xffff);
+  REG_SET_SEEN(b);
+})
+
+  #define EMIT6_PCREL_RILB(op, target)
+({
+  int rel = (target - jit->prg) / 2;
+  _EMIT6(op | rel >> 16, rel & 0xffff);
+})

---
```c
#define _EMIT6_IMM(op, imm)
    
unsigned int __imm = (imm); @ @ -471,8 +486,43 @ @
EMIT4(0xb9040000, REG_2, BPF_REG_0);
/* Restore registers */
save_restore_regs(jit, REGS_RESTORE, stack_depth);
+if (IS_ENABLED(CC_USING_EXPOLINE) && !nospec_disable) {
    +jit->r14_thunk_ip = jit->prg;
    +/* Generate __s390_indirect_jump_r14 thunk */
    +if (test_facility(35)) {
        +/* exrl %r0,.+10 */
        +EMIT6_PCREL_RIL(0xc6000000, jit->prg + 10);
        +} else {
        +/* larl %r1,.+14 */
        +EMIT6_PCREL_RILB(0xc0000000, REG_1, jit->prg + 14);
        +/* ex 0,0(%r1) */
        +EMIT4_DISP(0x44000000, REG_0, REG_1, 0);
        +}
    +/* j . */
    +EMIT4_PCREL(0x07fe);
    +}
    /* br %r14 */
    _EMIT2(0x07fc);
+}
+if (IS_ENABLED(CC_USING_EXPOLINE) && !nospec_disable &&
+    (jit->seen & SEEN_FUNC)) {
    +jit->r1_thunk_ip = jit->prg;
    +/* Generate __s390_indirect_jump_r1 thunk */
    +if (test_facility(35)) {
        +/* exrl %r0,.+10 */
        +EMIT6_PCREL_RIL(0xc6000000, jit->prg + 10);
        +/* j . */
        +EMIT4_PCREL(0x07f1);
        +}
    +/* br %r1 */
    +EMIT4_PCREL(0xa7f40000, 0);
    +/* br %r1 */
    +EMIT2(0x07f1);
    +} else {
        +/* ex 0,S390_lowcore.br_r1_tampilkan */
        +EMIT4_DISP(0x44000000, REG_0, REG_0,
                    offsetof(struct lowcore, br_r1_trampoline);
        +/* j . */
        +EMIT4_PCREL(0xa7f40000, 0);
        +}
    +}
}  
```

---

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/*
@@ -542,10 +592,10 @@
EMIT4(0xb9080000, dst_reg, src_reg);
break;
case BPF_ALU | BPF_ADD | BPF_K: /* dst = (u32) dst + (u32) imm */
- if (!imm)
- break;
- /* alfi %dst,imm */
- EMIT6_IMM(0xc20b0000, dst_reg, imm);
+ if (imm != 0) {
+ /* alfi %dst,imm */
+ EMIT6_IMM(0xc20b0000, dst_reg, imm);
+ }
EMIT_ZERO(dst_reg);
break;
case BPF_ALU64 | BPF_ADD | BPF_K: /* dst = dst + imm */
@@ -567,17 +617,22 @@
EMIT4(0xb9090000, dst_reg, src_reg);
break;
case BPF_ALU | BPF_SUB | BPF_K: /* dst = (u32) dst - (u32) imm */
- if (!imm)
- break;
- /* algfi %dst,-imm */
- EMIT6_IMM(0xc2080000, dst_reg, -imm);
+ if (imm != 0) {
+ /* algfi %dst,-imm */
+ EMIT6_IMM(0xc2080000, dst_reg, -imm);
+ }
EMIT_ZERO(dst_reg);
break;
case BPF_ALU64 | BPF_SUB | BPF_K: /* dst = dst - imm */
if (!imm)
break;
- /* algfi %dst,-imm */
- EMIT6_IMM(0xc2080000, dst_reg, -imm);
+ if (imm >= -0x80000000) {
+ /* algfi %dst,0x80000000 */
+ EMIT6_IMM(0xc20a0000, dst_reg, 0x80000000);
+ } else {
+ /* algfi %dst,-imm */
+ EMIT6_IMM(0xc20a0000, dst_reg, -imm);
+ }
break;
/
 */
* BPF_MUL
@@ -592,10 +647,10 @@
EMIT4(0xb90c0000, dst_reg, src_reg);
break;
case BPF_ALU | BPF_MUL | BPF_K: /* dst = (u32) dst * (u32) imm */
  -if (imm == 1)
    -break;
    -/* msfi %r5,imm */
    -EMIT6_IMM(0xc2010000, dst_reg, imm);
    +if (imm != 1) {
      +/* msfi %r5,imm */
      +EMIT6_IMM(0xc2010000, dst_reg, imm);
    +}
    EMIT_ZERO(dst_reg);
    break;
  case BPF_ALU64 | BPF_MUL | BPF_K: /* dst = dst * imm */
    @@ -656,6 +711,8 @@
    if (BPF_OP(insn->code) == BPF_MOD)
      /* lhgi %dst,0 */
      EMIT4_IMM(0xa7090000, dst_reg, 0);
    +else
    +EMIT_ZERO(dst_reg);
    break;
    }
  /* lhi %w0,0 */
    @@ -748,10 +805,10 @@
    EMIT4(0xb9820000, dst_reg, src_reg);
    break;
  case BPF_ALU | BPF_XOR | BPF_K: /* dst = (u32) dst ^ (u32) imm */
    -if (!imm)
    -break;
    -/* xilf %dst,imm */
    -EMIT6_IMM(0xc0070000, dst_reg, imm);
    +if (imm != 0) {
      +/* xilf %dst,imm */
      +EMIT6_IMM(0xc0070000, dst_reg, imm);
    +}
    EMIT_ZERO(dst_reg);
    break;
  case BPF_ALU64 | BPF_XOR | BPF_K: /* dst = dst ^ imm */
    @@ -772,10 +829,10 @@
    EMIT6_DISP_LH(0xeb000000, 0x000d, dst_reg, dst_reg, src_reg, 0);
    break;
  case BPF_ALU | BPF_LSH | BPF_K: /* dst = (u32) dst << (u32) imm */
    -if (imm == 0)
    -break;
    -/* sll %dst,imm(%r0) */
    -EMIT4_DISP(0x89000000, dst_reg, REG_0, imm);
    +if (imm != 0) {
      +/* sll %dst,imm(%r0) */
      +EMIT4_DISP(0x89000000, dst_reg, REG_0, imm);
    +}
EMIT_ZERO(dst_reg);
break;
case BPF_ALU64 | BPF_LSH | BPF_K: /* dst = dst << imm */
@@ -797,10 +854,10 @@
EMIT6_DISP_LH(0xeb000000, 0x000c, dst_reg, dst_reg, src_reg, 0);
break;
case BPF_ALU | BPF_RSH | BPF_K: /* dst = (u32) dst >> (u32) imm */
-    if (imm == 0)
-      break;
-/* srl %dst,imm(%r0) */
-EMIT4_DISP(0x88000000, dst_reg, REG_0, imm);
+    if (imm != 0) {
+      /* srl %dst,imm(%r0) */
+      EMIT4_DISP(0x88000000, dst_reg, REG_0, imm);
+    }
EMIT_ZERO(dst_reg);
break;
case BPF_ALU64 | BPF_RSH | BPF_K: /* dst = dst >> imm */
@@ -832,7 +889,7 @@
break;
case BPF_ALU64 | BPF_NEG: /* dst = -dst */
/* lgr %dst,%dst */
-EMIT4(0xb9130000, dst_reg, dst_reg);
+EMIT4(0xb9030000, dst_reg, dst_reg);
break;
/*
 * BPF_FROM_BE/LE
 @@ -978,8 +1035,13 @@
 /* lg %w1,<d(imm)>(%l) */
 EMIT6_DISP_LH(0xe3000000, 0x0004, REG_W1, REG_0, REG_L,
 EMIT_CONST_U64(func));
-/* basr %r14,%w1 */
-EMIT2(0x0d00, REG_14, REG_W1);
+if (IS_ENABLED(CC_USING_EXPOLINE) && !nospec_disable) {
+  /* brasl %r14,__.s390_indirect_jump_r1 */
+  EMIT6_PCREL_RILB(0xc0050000, REG_14, jit->r1_thunk_ip);
+} else {
+  /* basr %r14,%w1 */
+  EMIT2(0x0d00, REG_14, REG_W1);
+}
/* lgr %b0,%r2: load return value into %b0 */
EMIT4(0xb9040000, BPF_REG_0, REG_2);
if ((jit->seen & SEEN_SKB) &&
@@ -1008,8 +1070,8 @@
 /* llgf %w1,map.max_entries(%b2) */
 EMIT6_DISP_LH(0xe3000000, 0x0004, REG_W1, REG_0, REG_L,
 EMIT_CONST_U64(func));
-/* clgrj %b3,%w1,0xa,label0: if %b3 >= %w1 goto out */


EMIT6_PCREL_LABEL(0xec000000, 0x0065, BPF_REG_3, /* clrj %b3,%w1,0xa,label0: if (u32)%b3 >= (u32)%w1 goto out */ +EMIT6_PCREL_LABEL(0xec000000, 0x0077, BPF_REG_3, REG_W1, 0, 0xa);

/*
@@ -1035,8 +1097,10 @@
*         goto out;
 */

-/* slg %r1,%b3,3: %r1 = index * 8 */
-EMIT6_DISP_LH(0xeb000000, 0x000d, REG_1, BPF_REG_3, REG_0, 3);
/+/* llgfr %r1,%b3: %r1 = (u32) index */
+EMIT4(0xb9160000, REG_1, BPF_REG_3);
/+/* sllg %r1,%r1,3: %r1 *= 8 */
+EMIT6_DISP_LH(0xe0000000, 0x000d, REG_1, REG_1, REG_0, 3);
/* lg %r1,prog(%b2,%r1) */
EMIT6_DISP_LH(0xe000000, 0x0004, REG_1, BPF_REG_2, REG_0, offsetof(struct bpf_array, ptrs));
@@ -1245,8 +1309,13 @@
/* lg %skb_data,data_off(%b6) */
EMIT6_DISP_LH(0xe000000, 0x0004, REG_SKB_DATA, REG_0, BPF_REG_6, offsetof(struct sk_buff, data));
-/* basr %b5,%w1 (%b5 is call saved) */
-EMIT2(0x0d00, BPF_REG_5, REG_W1);
+if (IS_ENABLED(CC_USING_EXPOLINE) && !nospec_disable) {
+    /* brasl %r5,__s390_indirect_jump_r1 */
+    EMIT6_PCREL_RILB(0xc0050000, BPF_REG_5, jit->r1_thunk_ip);
+} else {
+    /* basr %b5,%w1 (%b5 is call saved) */
+    EMIT2(0x0d00, BPF_REG_5, REG_W1);
+}
+
/*
* Note: For fast access we jump directly after the
@@ -1344,6 +1413,7 @@
goto free_addrs;
}
if (bpf_jit_prog(&jit, fp)) {
    bpf_jit_binary_free(header);
    fp = orig_fp;
    goto free_addrs;
}
--- linux-4.15.0.orig/arch/s390/numa/numa.c
+++ linux-4.15.0/arch/s390/numa/numa.c
@@ -54,6 +54,7 @@
{
    return mode->distance ? mode->distance(a, b) : 0;
}
int numa_debug_enabled;

{
    pr_info("NUMA mode: %s\n", mode->name);
    nodes_clear(node_possible_map);

    /* Initially attach all possible CPUs to node 0. */
    cpu_mask_copy(&node_to_cpu_mask_map[0], cpu_possible_mask);
    if (mode->setup)
        mode->setup();
    numa_setup_memory();
}

/*
 * numa_init_early() - Initialization initcall
 *
 * This runs when only one CPU is online and before the first
 * topology update is called for by the scheduler.
 *
 */
static int __init numa_init_early(void)
{
    /* Attach all possible CPUs to node 0 for now. */
    cpu_mask_copy(&node_to_cpu_mask_map[0], cpu_possible_mask);
    return 0;
}
early_initcall(numa_init_early);

/*
 * numa_init_late() - Initialization initcall
 *
 * Register NUMA nodes.
 */
for_each_pci_msi_entry(msi, pdev) {
    rc = -EIO;
    if (hwirq >= msi_vecs)
        break;
    irq = irq_alloc_desc(0); /* Alloc irq on node 0 */
    if (irq < 0)
        return -ENOMEM;
    zpci_rescan(void)
if (zpci_is_enabled())
- clp_rescan_pci_devices_simple();
+ clp_rescan_pci_devices_simple(NULL);
}
--- linux-4.15.0.orig/arch/s390/pci/pci_clp.c
+++ linux-4.15.0/arch/s390/pci/pci_clp.c
@@ -234,12 +234,14 @@
} while (rrb->response.hdr.rsp == CLP_RC_SETPCIFN_BUSY);
- if (!rc && rrb->response.hdr.rsp == CLP_RC_OK)
-   *fh = rrb->response.fh;
- else {
-   +if (rc || rrb->response.hdr.rsp != CLP_RC_OK) {
-      zpci_err("Set PCI FN\n");
-      zpci_err_clp(rrb->response.hdrrsp, rc);
-      rc = -EIO;
-      +}
+   + if (!rc &&& rrb->response.hdr.rsp == CLP_RC_OK) {
+      zdev->fh = rrb->response.fh;
if (!rc && rrb->response.hdrrsp == CLP_RC_SETPCIFN_AlRDY &&
+rrb->response.fh == 0) {
/* Function is already in desired state - update handle */
+rc = clp_rescan_pci_devices_simple(&fid);
}
clp_free_block(rrb);
return rc;
@@ -276,31 +283,21 @@

int clp_enable_fh(struct zpci_dev *zdev, u8 nr_dma_as)
{
- u32 fh = zdev->fh;
-int rc;

-rc = clp_set_pci_fn(&fh, nr_dma_as, CLP_SET_ENABLE_PCI_FN);
-if (rc)
-/* Success -> store enabled handle in zdev */
-zdev->fh = fh;
-
+rc = clp_set_pci_fn(zdev, nr_dma_as, CLP_SET_ENABLE_PCI_FN);
+zpci_dbg(3, "ena fid:%x, fh:%x, rc:%d\n", zdev->fid, zdev->fh, rc);
+return rc;
}

int clp_disable_fh(struct zpci_dev *zdev)
{
- u32 fh = zdev->fh;
-int rc;

if (!zdev_enabled(zdev))
return 0;

+rc = clp_set_pci_fn(&fh, 0, CLP_SET_DISABLE_PCI_FN);
-if (rc)
-/* Success -> store disabled handle in zdev */
-zdev->fh = fh;
-
+rc = clp_set_pci_fn(zdev, 0, CLP_SET_DISABLE_PCI_FN);
+zpci_dbg(3, "dis fid:%x, fh:%x, rc:%d\n", zdev->fid, zdev->fh, rc);
+return rc;
}
@@ -358,10 +355,14 @@

static void __clp_update(struct clp_fh_list_entry *entry, void *data)
{
 struct zpci_dev *zdev;
tw32 *fid = data;

if (!entry->vendor_id)
return;

+if (fid && *fid != entry->fid)
+return;
+
+zdev = get_zdev_by_fid(entry->fid);
if (!zdev)
    return;
@@ -401,7 +402,10 @@
    return rc;
}

-int clp_rescan_pci_devices_simple(void)
+/* Rescan PCI functions and refresh function handles. If fid is non-NULL only
+ * refresh the handle of the function matching @fid
+ */
+int clp_rescan_pci_devices_simple(u32 *fid)
{
    struct clp_req_rsp_list_pci *rrb;
    int rc;
    @@ -410,7 +414,7 @@
    if (!rrb)
        return -ENOMEM;

    rc = clp_list_pci(rrb, fid, __clp_update);
    +rc = clp_list_pci(rrb, fid, __clp_update);
    clp_free_block(rrb);
    return rc;
    @@ -437,7 +441,7 @@
    struct clp_state_data sd = {fid, ZPCI_FN_STATE_RESERVED};
    int rc;

    -rrb = clp_alloc_block(GFP_KERNEL);
    +rrb = clp_alloc_block(GFP_ATOMIC);
    if (!rrb)
        return -ENOMEM;

    --- linux-4.15.0.orig/arch/s390/pci/pci_sysfs.c
    +++ linux-4.15.0/arch/s390/pci/pci_sysfs.c
    @@ -13,6 +13,8 @@
    #include <linux/stat.h>
    #include <linux/pci.h>

    +#include "../../drivers/pci/pci.h"
    +
    #include <asm/sclp.h>
static ssize_t recover_store(struct device *dev, struct device_attribute *attr,
    const char *buf, size_t count)
{
    struct kernfs_node *kn;
    struct pci_dev *pdev = to_pci_dev(dev);
    struct zpci_dev *zdev = to_zpci(pdev);
    int ret;

    if (!device_remove_file_self(dev, attr))
        return count;
    int ret = 0;
    /* Can't use device_remove_self() here as that would lead us to lock
     * the pci_rescan_remove_lock while holding the device' kernfs lock.
     * This would create a possible deadlock with disable_slot() which is
     * not directly protected by the device' kernfs lock but takes it
     * during the device removal which happens under
     * pci_rescan_remove_lock.
     */
    /* This is analogous to sdev_store_delete() in
     * drivers/scsi/scsi_sysfs.c
     */
    kn = sysfs_break_active_protection(&dev->kobj, &attr->attr);
    WARN_ON_ONCE(!kn);
    /* device_remove_file() serializes concurrent calls ignoring all but
     * the first
     */
    device_remove_file(dev, attr);

    /* A concurrent call to recover_store() may slip between
     * sysfs_break_active_protection() and the sysfs file removal.
     * Once it unblocks from pci_lock_rescan_remove() the original pdev
     * will already be removed.
     */
    pci_lock_rescan_remove();
    -pci_stop_and_remove_bus_device(pdev);
    -ret = zpci_disable_device(zdev);
    -if (ret)
        -goto error;
    -ret = zpci_enable_device(zdev);
    -if (ret)
        -goto error;
    -pci_rescan_bus(zdev->bus);
    -pci_unlock_rescan_remove();
- return count;
-
-error:
+if (pdev->is_added) {
+pci_stop_and_remove_bus_device(pdev);
+ret = zpci_disable_device(zdev);
+if (ret)
+goto out;
+
+ret = zpci_enable_device(zdev);
+if (ret)
+goto out;
+pci_rescan_bus(zdev->bus);
+
+out:
pci_unlock_rescan_remove();
-return ret;
+if (kn)
+sysfs_unbreak_active_protection(kn);
+return ret ? ret : count;
}
static DEVICE_ATTR_WO(recover);

--- linux-4.15.0.orig/arch/s390/tools/gen_facilities.c
+++ linux-4.15.0/arch/s390/tools/gen_facilities.c
@@ -4,7 +4,7 @@
 * numbering scheme from the Principles of Operations: most significant bit
 * has bit number 0.
 *
- * Copyright IBM Corp. 2015
+ * Copyright IBM Corp. 2015, 2018
 *
 */

@@ -62,6 +62,13 @@
 }
 },
 {
+*/
+ * FACILITIES_KVM contains the list of facilities that are part
+ * of the default facility mask and list that are passed to the
+ * initial CPU model. If no CPU model is used, this, together
+ * with the non-hypervisor managed bits, is the maximum list of
+ * guest facilities supported by KVM.
+ */
 .name = "FACILITIES_KVM",
 .bits = (int[]){

0, /* N3 instructions */
@@ -86,6 +93,25 @@
131, /* enhanced-SOP 2 and side-effect */
139, /* multiple epoch facility */
146, /* msa extension 8 */
+150, /* enhanced sort */
+151, /* deflate conversion */
+155, /* msa extension 9 */
+1 /* END */
+			}
+			
+			/*
+FACILITIES_KVM_CPUMODEL contains the list of facilities
+that can be enabled by CPU model code if the host supports
+it. These facilities are not passed to the guest without
+CPU model support.
+*/
+	
+.name = "FACILITIES_KVM_CPUMODEL",
+.bits = (int[]){
+12, /* AP Query Configuration Information */
+15, /* AP Facilities Test */
+156, /* etoken facility */
-1 /* END */
+
+	}
},
--- linux-4.15.0.orig/arch/sh/Kconfig
+++ linux-4.15.0/arch/sh/Kconfig
@@ -9,6 +9,7 @@
select HAVE_IDE if HAS_IOPORT_MAP
select HAVE_MEMBLOCK
select HAVE_MEMBLOCK_NODE_MAP
+select NO_BOOTMEM
select ARCH_DISCARD_MEMBLOCK
select HAVE_OPROFILE
select HAVE_GENERIC_DMA_COHERENT
--- linux-4.15.0.orig/arch/sh/boards/Kconfig
+++ linux-4.15.0/arch/sh/boards/Kconfig
@@ -8,27 +8,19 @@
bool

config SH_DEVICE_TREE
-bool "Board Described by Device Tree"
+bool
select OF
select OF_EARLY_FLATTREE
select TIMER_OF
select COMMON_CLK
select GENERIC_CALIBRATE_DELAY
  -help
- Select Board Described by Device Tree to build a kernel that
- does not hard-code any board-specific knowledge but instead uses
- a device tree blob provided by the boot-loader. You must enable
- drivers for any hardware you want to use separately. At this
- time, only boards based on the open-hardware J-Core processors
- have sufficient driver coverage to use this option; do not
- select it if you are using original SuperH hardware.

config SH_JCORE_SOC
  bool "J-Core SoC"
  -depends on SH_DEVICE_TREE && (CPU_SH2 || CPU_J2)
+select SH_DEVICE_TREE
select CLKSRC_JCORE_PIT
select JCORE_AIC
  -default y if CPU_J2
+depends on CPU_J2
  help
    Select this option to include drivers core components of the
    J-Core SoC, including interrupt controllers and timers.

--- linux-4.15.0.orig/arch/sh/boards/mach-landisk/setup.c
+++ linux-4.15.0/arch/sh/boards/mach-landisk/setup.c
@@ -85,6 +85,9 @@
static void __init landisk_setup(char **cmdline_p)
{
 /* I/O port identity mapping */
+__set_io_port_base(0);
+
+ /* LED ON */
+  __raw_writeb(__raw_readb(PA_LED) | 0x03, PA_LED);

--- linux-4.15.0.orig/arch/sh/boards/of-generic.c
+++ linux-4.15.0/arch/sh/boards/of-generic.c
@@ -180,10 +180,10 @@
 struct sh_clk_ops;

-void __init arch_init_clk_ops(struct sh_clk_ops **ops, int idx)
+void __init __weak arch_init_clk_ops(struct sh_clk_ops **ops, int idx)
{ }

-void __init plat_irq_setup(void)
+void __init __weak plat_irq_setup(void)
{ }
config G2_DMA
tristate "G2 Bus DMA support"
-depends on SH_DREAMCAST
-select SH_DMA_API
+depends on SH_DREAMCAST && SH_DMA_API

help
This enables support for the DMA controller for the Dreamcast's
G2 bus. Drivers that want this will generally enable this on

--- linux-4.15.0.orig/arch/sh/drivers/push-switch.c
+++ linux-4.15.0/arch/sh/drivers/push-switch.c
@@ -24,7 +24,7 @@
    return sprintf(buf, "%s\n", psw_info->name);
 }

-#define iounmap	__iounmap
+#define iounmap__iounmap
 +static inline void iounmap(void __iomem *addr)
 +{
 +__iounmap(addr);
 +}

/*
* Convert a physical pointer to a virtual kernel pointer for /dev/mem
--- linux-4.15.0.orig/arch/sh/include/asm/tlb.h
+++ linux-4.15.0/arch/sh/include/asm/tlb.h
@@ -127,6 +127,15 @@
 return tlb_remove_page(tlb, page);
 }

+static inline tlb_flush_pmd_range(struct mmu_gather *tlb, unsigned long address,
+        unsigned long size)
+{
+    if (tlb->start > address)
+        tlb->start = address;
+    if (tlb->end < address + size)
+        tlb->end = address + size;
+    }
+
#define tlb_remove_check_page_size_change tlb_remove_check_page_size_change
static inline void tlb_remove_check_page_size_change(struct mmu_gather *tlb,
        unsigned int page_size)
--- linux-4.15.0.orig/arch/sh/include/asm/uaccess.h
+++ linux-4.15.0/arch/sh/include/asm/uaccess.h
@@ -16,8 +16,11 @@
     if (sum >= addr_limit) flag = true;
 */
-#define __access_ok(addr, size)  
     ((__addr_ok((addr) + (size)))
+#define __access_ok(addr, size)  ({
+    unsigned long __ao_a = (addr), __ao_b = (size);
+    unsigned long __ao_end = __ao_a + __ao_b - !!__ao_b;
+    __ao_end >= __ao_a && __addr_ok(__ao_end); })
+}
+
#define access_ok(type, addr, size)  
     ((__chk_user_ptr(addr),
       __access_ok((unsigned long __force)(addr), (size)))
--- linux-4.15.0.orig/arch/sh/include/cpu-sh2a/cpu/sh7269.h
+++ linux-4.15.0/arch/sh/include/cpu-sh2a/cpu/sh7269.h
@@ -78,8 +78,15 @@
 GPIO_FN_WDTOVF,
 /* CAN */
-GPIO_FN_CTX1, GPIO_FN_CRX1, GPIO_FN_CTX0, GPIO_FN_CTX0_CTX1, 
-GPIO_FN_CRX0, GPIO_FN_CRX0_CRX1, GPIO_FN_CRX0_CRX1_CRX2, 
+GPIO_FN_CTX2, GPIO_FN_CRX2, 
+GPIO_FN_CTX1, GPIO_FN_CRX1, 
+GPIO_FN_CTX0, GPIO_FN_CRX0, 
+GPIO_FN_CTX0_CTX1, GPIO_FN_CRX0_CRX1, 
+GPIO_FN_CTX0_CTX1_CTX2, GPIO_FN_CRX0_CRX1_CRX2,
+GPIO_FNCCTX2_PJ21, GPIO_FNCRX2_PJ20,
+GPIO_FNCCTX1_PJ23, GPIO_FNCRX1_PJ22,
+GPIO_FNCCTX0_CTX1_PJ23, GPIO_FNCRX0_CTX1_PJ22,
+GPIO_FNCCTX0_CTX1_CTX2_PJ21, GPIO_FNCRX0_CTX1_CTX2_PJ20,

/* DMAC */
GPIO_FNTEND0, GPIO_FN_DACK0, GPIO_FN_DREQ0,
--- linux-4.15.0.orig/arch/sh/include/cpu-sh4/cpu/sh7734.h
+++ linux-4.15.0/arch/sh/include/cpu-sh4/cpu/sh7734.h
@@ -134,7 +134,7 @@
GPIO_FNXEX_WAIT1, GPIO_FNSD1_DAT0_A, GPIO_FNXDREQ2, GPIO_FNXCAN1_TX_C,
GPIO_FNET0_LINK_C, GPIO_FNET0_ETXD5_A,
GPIO_FNXEX_WAIT0, GPIO_FNTCLK1_B,
-GPIO_FNRD_WR, GPIO_FNTCLK0,
+GPIO_FNRD_WR, GPIO_FNTCLK0, GPIO_FNCAN_CLK_B, GPIO_FNET0_ETXD4,
GPIO_FNXEX_CS5, GPIO_FNSD1_CMD_A, GPIO_FNXATADIR, GPIO_FNXQSSL_B,
GPIO_FNET0_ETXD3_A,
GPIO_FNXEX_CS4, GPIO_FNSD1_WP_A, GPIO_FNXATAWR, GPIO_FNXQMI_QIO1_B,
--- linux-4.15.0.orig/arch/sh/kernel/cpu/sh2/probe.c
+++ linux-4.15.0/arch/sh/kernel/cpu/sh2/probe.c
@@ -43,7 +43,11 @@

#define CONFIG_CPU_J2)
+#if defined(CONFIG_SMP)
unsigned cpu = hard_smp_processor_id();
+#else
+unsigned cpu = 0;
+#endif

if (cpu == 0) of_scan_flat_dt(scan_cache, NULL);
if (cpu != 0) return;
--- linux-4.15.0.orig/arch/sh/kernel/entry-common.S
+++ linux-4.15.0/arch/sh/kernel/entry-common.S
@@ -203,7 +203,7 @@
mov.l @(OFF_R7,r15), r7 ! arg3
mov.l @(OFF_R3,r15), r3 ! syscall_nr
!
-mov.l12f, r10! Number of syscalls
+mov.l16f, r10! Number of syscalls
cmp/hsr10, r3
bfsyscall_call
mov#-ENOSYS, r0
@@ -255,7 +255,7 @@
mov.l1r8, r8
jsr@8
nop
-bra_restore_all
+braret_from_exception
nop
CFL_ENDPROC

@@ -357,7 +357,7 @@
tst r9, r8
bfsyscall_trace_entry
!
-mov.l 2f, r8	! Number of syscalls
+mov.l 6f, r8	! Number of syscalls
cmp/hs r8, r3
btsyscall_badsys
!
@@ -396,7 +396,7 @@
#if !defined(CONFIG_CPU_SH2)
1:.long TRA
#endif
-2:.long NR_syscalls
+6:.long NR_syscalls
3:.long sys_call_table
7:.long do_syscall_trace_enter
8:.long do_syscall_trace_leave
--- linux-4.15.0.orig/arch/sh/kernel/ftrace.c
+++ linux-4.15.0/arch/sh/kernel/ftrace.c
@@ -321,8 +321,7 @@
void prepare_ftrace_return(unsigned long *parent, unsigned long self_addr)
{
unsigned long old;
-int faulted, err;
-struct ftrace_graph_ent trace;
+int faulted;
unsigned long return_hooker = (unsigned long)&return_to_handler;

if (unlikely(ftrace_graph_is_dead()))
@@ -365,18 +364,7 @@
return;
}

-err = ftrace_push_return_trace(old, self_addr, &trace.depth, 0, NULL);
-if (err == -EBUSY) {
+if (function_graph_enter(old, self_addr, 0, NULL))
  __raw_writel(old, parent);
-return;
-
-trace.func = self_addr;
-
-/* Only trace if the calling function expects to */
if (!ftrace_graph_entry(&trace)) {
    current->curr_ret_stack--;
    __raw_writel(old, parent);
}
#endif /* CONFIG_FUNCTION_GRAPH_TRACER */

--- linux-4.15.0.orig/arch/sh/kernel/hw_breakpoint.c
+++ linux-4.15.0/arch/sh/kernel/hw_breakpoint.c
@@ -161,6 +161,7 @@
     switch (sh_type) {
       case SH_BREAKPOINT_READ:
         *gen_type = HW_BREAKPOINT_R;
+        break;
       case SH_BREAKPOINT_WRITE:
         *gen_type = HW_BREAKPOINT_W;
       break;
--- linux-4.15.0.orig/arch/sh/kernel/setup.c
+++ linux-4.15.0/arch/sh/kernel/setup.c
@@ -11,7 +11,6 @@
     #include <linux/ioport.h>
     #include <linux/init.h>
     #include <linux/utsname.h>
-    #include <linux/bootmem.h>
     #include <linux/console.h>
     #include <linux/root_dev.h>
     #include <linux/utsname.h>
     --- linux-4.15.0.orig/arch/sh/kernel/traps_32.c
+++ linux-4.15.0/arch/sh/kernel/traps_32.c
@@ -609,7 +609,8 @@
     break;
 }

-force_sig_info(SIGFPE, &info, current);
+force_sig_info(info.si_signo, &info, current);
} #endif

--- linux-4.15.0.orig/arch/sh/mm/init.c
+++ linux-4.15.0/arch/sh/mm/init.c
@@ -211,59 +211,15 @@
     NODE_DATA(nid) = __va(phys);
     memset(NODE_DATA(nid), 0, sizeof(struct pglist_data));
     NODE_DATA(nid)->bdata = &bootmem_node_data[nid];
-} #endif

NODE_DATA(nid) = __va(phys);
memset(NODE_DATA(nid), 0, sizeof(struct pglist_data));
-
NODE_DATA(nid)->node_start_pfn = start_pfn;
NODE_DATA(nid)->node_spanned_pages = end_pfn - start_pfn;
}

- static void __init bootmem_init_one_node(unsigned int nid)
  -{
    -unsigned long total_pages, paddr;
    -unsigned long end_pfn;
    -struct pglist_data *p;
    -
    -p = NODE_DATA(nid);
    -
    -/\* Nothing to do.. */
    -if (!p->node_spanned_pages)
      -return;
    -
    -end_pfn = pgdat_end_pfn(p);
    -
    -total_pages = bootmem_bootmap_pages(p->node_spanned_pages);
    -
    -paddr = memblock_alloc(total_pages << PAGE_SHIFT, PAGE_SIZE);
    -if (!paddr)
      -panic("Can't allocate bootmap for nid[%d]\n", nid);
    -
    -init_bootmem_node(p, paddr >> PAGE_SHIFT, p->node_start_pfn, end_pfn);
    -
    -free_bootmem_with_active_regions(nid, end_pfn);
    -
    -/\*
    - * XXX Handle initial reservations for the system memory node
    - * only for the moment, we'll refactor this later for handling
    - * reservations in other nodes.
    - */
    -if (nid == 0) {
      -struct memblock_region *reg;
      -
      -/\* Reserve the sections we're already using. */
      -for_each_memblock(reserved, reg) {
        -reserve_bootmem(reg->base, reg->size, BOOTMEM_DEFAULT);
        -}
      -}
      -
      -sparse_memory_present_with_active_regions(nid);
    -}
    -
    static void __init do_init_bootmem(void)
    { 
      struct memblock_region *reg;
- int i;

/* Add active regions with valid PFNs. */
for_each_memblock(memory, reg) {
@@ -279,9 +235,12 @@
plat_mem_setup();

- for_each_online_node(i)
- bootmem_init_one_node(i);
+ for_each_memblock(memory, reg) {
+ int nid = memblock_get_region_node(reg);

+ memory_present(nid, memblock_region_memory_base_pfn(reg),
+ memblock_region_memory_end_pfn(reg));
+
} sparse_init();
}

@@ -322,7 +281,6 @@
{
unsigned long max_zone_pfns[MAX_NR_ZONES];
unsigned long vaddr, end;
-int nid;

sh_mv.mv_mem_init();

@@ -377,21 +335,7 @@
kmap_coherent_init();

memset(max_zone_pfns, 0, sizeof(max_zone_pfns));
-
- for_each_online_node(nid) {
- pg_data_t *pgdat = NODE_DATA(nid);
- unsigned long low, start_pfn;
- -
- start_pfn = pgdat->bdata->node_min_pfn;
- low = pgdat->bdata->node_low_pfn;
- -
- if (max_zone_pfns[ZONE_NORMAL] < low)
- max_zone_pfns[ZONE_NORMAL] = low;
- -
- printk("Node %u: start_pfn = 0x%x, low = 0x%x\n",
- nid, start_pfn, low);
- -
+ max_zone_pfns[ZONE_NORMAL] = max_low_pfn;
free_area_init_nodes(max_zone_pfns);
void __init setup_bootmem_node(int nid, unsigned long start, unsigned long end) {
    unsigned long bootmap_pages;
    unsigned long start_pfn, end_pfn;

    /* Don't allow bogus node assignment */
    BUG_ON(nid >= MAX_NUMNODES || nid <= 0);

    NODE_DATA(nid)->bdata = &bootmem_node_data[nid];
    NODE_DATA(nid)->node_start_pfn = start_pfn;
    NODE_DATA(nid)->node_spanned_pages = end_pfn - start_pfn;

    /* Reserve the pgdat and bootmap space with the bootmem allocator */
    reserve_bootmem_node(NODE_DATA(nid), start_pfn << PAGE_SHIFT, sizeof(struct pglist_data), BOOTMEM_DEFAULT);
    reserve_bootmem_node(NODE_DATA(nid), start_pfn, PAGE_SIZE, end);

    /* It's up */
    node_set_online(nid);
bool
depends on SPARC64
default y
-select COMPAT_BINFMT_ELF
+select COMPAT_BINFMT_ELF if BINFMT_ELF
select HAVE_UID16
select ARCH_WANT_OLD_COMPAT_IPC
select COMPAT_OLD_SIGACTION
--- linux-4.15.0.orig/arch/sparc/configs/sparc64_defconfig
+++ linux-4.15.0/arch/sparc/configs/sparc64_defconfig
@@ -74,7 +74,6 @@
 CONFIG_SCSI=y
 CONFIG_BLK_DEV_SD=y
 CONFIG_BLK_DEV_SR=m
-CONFIG_BLK_DEV_SR_VENDOR=y
 CONFIG_CHR_DEV_SG=m
 CONFIG_SCSI_MULTI_LUN=y
 CONFIG_SCSI_CONSTANTS=y
--- linux-4.15.0.orig/arch/sparc/crypto/crc32c_glue.c
+++ linux-4.15.0/arch/sparc/crypto/crc32c_glue.c
@@ -133,6 +133,7 @@
  .cra_blocksize		=	CHKSUM_BLOCK_SIZE,
  .cra_ctxsize		=	sizeof(u32),
  .cra_alignmask		=	7,
--- linux-4.15.0.orig/arch/sparc/include/asm/Kbuild
+++ linux-4.15.0/arch/sparc/include/asm/Kbuild
@@ -14,6 +14,7 @@
  generic-y += module.h
+generic-y += msi.h
 generic-y += preempt.h
 generic-y += rwsem.h
 generic-y += serial.h
--- linux-4.15.0.orig/arch/sparc/include/asm/atomic_64.h
+++ linux-4.15.0/arch/sparc/include/asm/atomic_64.h
@@ -83,7 +83,11 @@
 #define atomic64_add_negative(i, v) (atomic64_add_return(i, v) < 0)

 #define atomic_cmpxchg(v, o, n) (cmpxchg(&(v)->counter), (o), (n)))
-#define atomic_xchg(v, new) (xchg(&(v)->counter), new))
static inline int atomic_xchg(atomic_t *v, int new) {
    return xchg(&v->counter, new);
}

static inline int __atomic_add_unless(atomic_t *v, int a, int u) {
    return __xchg(v, atomic_add(v, a) ? 0 : u);
}

#define xchg(ptr,x) ((__typeof__(*(ptr)))__xchg((unsigned long)(x),(ptr),sizeof(*(ptr))))

void __xchg_called_with_bad_pointer(void);

unsigned short  max_cache_id; /* groupings of highest shared cache */
unsigned short proc_id; /* strand (aka HW thread) id */
+signed short proc_id; /* strand (aka HW thread) id */
} cpuinfo_sparc;

DECLARE_PER_CPU(cpuinfo_sparc, __cpu_data);
--- linux-4.15.0.orig/arch/sparc/include/asm/io_64.h
+++ linux-4.15.0/arch/sparc/include/asm/io_64.h
@@ -402,6 +402,7 @@
}{ cpuinfo_sparc;
#define ioremap_nocache(X,Y)ioremap((X),(Y))
+#define ioremap_uc(X,Y)ioremap((X),(Y))
#define ioremap_wu(X,Y)ioremap((X),(Y))
#define ioremap_wt(X,Y)ioremap((X),(Y))

--- linux-4.15.0.orig/arch/sparc/include/asm/parport.h
+++ linux-4.15.0/arch/sparc/include/asm/parport.h
@@ -21,6 +21,7 @@
/*
+#define HAS_DMA

#ifdef CONFIG_PARPORT_PC_FIFO
static DEFINE_SPINLOCK(dma_spin_lock);
#define claim_dma_lock() \
@@ -31,6 +32,7 @@
#define release_dma_lock(__flags) \
spin_unlock_irqrestore(&dma_spin_lock, __flags);
+#endif

static struct sparc_ebus_info {
 struct ebus_dma_info info;
--- linux-4.15.0.orig/arch/sparc/include/asm/pgtable_64.h
+++ linux-4.15.0/arch/sparc/include/asm/pgtable_64.h
@@ -1010,7 +1010,7 @@
pmd_t *pmd);
#define __HAVE_ARCH_PMDP_INVALIDATE
-extern void pmdp_invalidate(struct vm_area_struct *vma, unsigned long address,
+extern pmd_t pmdp_invalidate(struct vm_area_struct *vma, unsigned long address,
   pmd_t *pmdp);

#define __HAVE_ARCH_PGTABLE_DEPOSIT
--- linux-4.15.0.orig/arch/sparc/include/asm/switch_to_64.h
+++ linux-4.15.0/arch/sparc/include/asm/switch_to_64.h
@@ -67,6 +67,7 @@
} while(0)
void synchronize_user_stack(void);
-void fault_in_user_windows(void);
+struct pt_regs;
+void fault_in_user_windows(struct pt_regs *);

#ifndef /* __SPARC64_SWITCH_TO_64_H */
--- linux-4.15.0.orig/arch/sparc/include/uapi/asm/ipcbuf.h
+++ linux-4.15.0/arch/sparc/include/uapi/asm/ipcbuf.h
@@ -15,19 +15,19 @@
 struct ipc64_perm
 {
  __kernel_key_t key;
-__kernel_uid_t uid;
-__kernel_gid_t gid;
-__kernel_uid_t cuid;
-__kernel_gid_t cgid;
+__kernel_uid32_t uid;
+__kernel_gid32_t gid;
+__kernel_uid32_t cuid;
+__kernel_gid32_t cgid;
 #ifndef __arch64__
-unsigned short __pad0;
+#ifndef __arch64__
+unsigned short __pad0;
 #endif
-__kernel_mode_t mode;
-unsigned short __pad1;
-unsigned short seq;
-unsigned long long __unused1;
-unsigned long long __unused2;
+++++++
+__kernel_mode_t mode;
+unsigned short __pad1;
+unsigned short __pad2;
+unsigned long long __unused1;
+unsigned long long __unused2;
};

#endif /* __SPARC_IPCBUF_H */
--- linux-4.15.0.orig/arch/sparc/kernel/ftrace.c
+++ linux-4.15.0/arch/sparc/kernel/ftrace.c
@@ -126,20 +126,11 @@
 unsigned long_frame_pointer)
 {
  unsigned long return_hooker = (unsigned long) &return_to_handler;
-struct ftrace_graph_ent trace;
if (unlikely(atomic_read(&current->tracing_graph_pause)))
    return parent + 8UL;

    trace.func = self_addr;
thrace.depth = current->curr_ret_stack + 1;

    /* Only trace if the calling function expects to */
    if (!ftrace_graph_entry(&trace))
        return parent + 8UL;

    /* Only trace if the calling function expects to */
    if (ftrace_push_return_trace(parent, self_addr, &trace.depth,
        frame_pointer, NULL) == -EBUSY)
        return parent + 8UL;

return return_hooker;
--- linux-4.15.0.orig/arch/sparc/kernel/mdesc.c
+++ linux-4.15.0/arch/sparc/kernel/mdesc.c
@@ -39,6 +39,7 @@
    u32
        data[]; /* node block size */
    u32
        data_sz; /* data block size */
    +char
        data[]; /* data block size */
    +chardata[];
} __attribute__((aligned(16)));

struct mdesc_elem {
    u32
    node_sz; /* node block size */
    node_info->vdev_port.id = *idp;
    node_info->vdev_port.name = kstrdup_const(name, GFP_KERNEL);
    +if (!node_info->vdev_port.name)
        return -1;
    node_info->vdev_port.parent_cfg_hdl = *parent_cfg_hdlp;

    return 0;
--- linux-4.15.0.orig/arch/sparc/kernel/perf_event.c
+++ linux-4.15.0/arch/sparc/kernel/perf_event.c
@@ -24,6 +24,7 @@

static struct mdesc_elem *node_block(struct mdesc_hdr *mdesc)
{
    return (struct mdesc_elem *) (mdesc + 1);
    +return (struct mdesc_elem *) mdesc->data;
}

static void *name_block(struct mdesc_hdr *mdesc)
--- linux-4.15.0.orig/arch/sparc/kernel/perf_event.c
+++ linux-4.15.0/arch/sparc/kernel/perf_event.c
@@ -24,6 +24,7 @@

#include <asm/cpudata.h>
#include <linux/uaccess.h>
#include <linux/atomic.h>
#include <linux/sched/clock.h>
#include <asm/nmi.h>
#include <asm/pcr.h>
#include <asm/cacheflush.h>

s64 period = hwc->sample_period;
int ret = 0;

/* The period may have been changed by PERF_EVENT_IOC_PERIOD */
+if (unlikely(period != hwc->last_period))
+left = period - (hwc->last_period - left);
+
if (unlikely(left <= -period)) {
    left = period;
    local64_set(&hwc->period_left, left);
    sparc_perf_event_update(cp, &cp->hw, cpuc->current_idx[i]);
    cpuc->current_idx[i] = PIC_NO_INDEX;
    +if (cp->hw.state & PERF_HES_STOPPED)
    +cp->hw.state |= PERF_HES_ARCH;
}
}
}
}

out:

enc = perf_event_get_enc(cpuc->events[i]);
cpuc->pcr[0] &= ~mask_for_index(idx);
-if (hwc->state & PERF_HES_STOPPED)
+if (hwc->state & PERF_HES_ARCH) {
    cpuc->pcr[0] |= nop_for_index(idx);
    -else
    +} else {
    cpuc->pcr[0] |= event_encoding(enc, idx);
    +hwc->state = 0;
    +}
}

out:

+if (cp->hw.state & PERF_HES_ARCH)
+continue;
+
sparc_pmu_start(cp, PERF_EF_RELOAD);
}
out:
@@ -1079,6 +1091,8 @@
        event->hw.state = 0;

        sparc_pmu_enable_event(cpuc, &event->hw, idx);
+        +perf_event_update_userpage(event);
}

static void sparc_pmu_stop(struct perf_event *event, int flags)
@@ -1371,9 +1385,9 @@
        cpuc->events[n0] = event->hw.event_base;
        cpuc->current_idx[n0] = PIC_NO_INDEX;

-        event->hw.state = PERF_HES_UPTODATE;
+        event->hw.state = PERF_HES_UPTODATE | PERF_HES_STOPPED;
        if (!(ef_flags & PERF_EF_START))
-            event->hw.state |= PERF_HES_STOPPED;
+            event->hw.state |= PERF_HES_ARCH;

        /*
         * If group events scheduling transaction was started,
@@ -1603,6 +1617,8 @@
         struct perf_sample_data data;
         struct cpu_hw_events *cpuc;
         struct pt_regs *regs;
+        +u64 finish_clock;
+        +u64 start_clock;
         int i;

         if (!atomic_read(&active_events))
@@ -1616,6 +1632,8 @@
             return NOTIFY_DONE;
         }

+        start_clock = sched_clock();
+        +
+        regs = args->regs;

         cpuc = this_cpu_ptr(&cpu_hw_events);
@@ -1654,6 +1672,10 @@
             sparc_pmu_stop(event, 0);
         }

+        finish_clock = sched_clock();
+        +
+perf_sample_event_took(finish_clock - start_clock);
+
+return NOTIFY_STOP;
+
--- linux-4.15.0.orig/arch/sparc/kernel/process_64.c
+++ linux-4.15.0/arch/sparc/kernel/process_64.c
@@ -36,6 +36,7 @@
 #include <linux/sysrq.h>
 #include <linux/nmi.h>
 #include <linux/context_tracking.h>
+#include <linux/signal.h>
 #include <linux/uaccess.h>
 #include <asm/page.h>
@@ -528,7 +529,12 @@
 force_sig_info(SIGBUS, &info, current);
 }

-void fault_in_user_windows(void)
+static const char uwfault32[] = KERN_INFO \
+"%s[%d]: bad register window fault: SP %08lx (orig_sp %08lx) TPC %08lx O7 %08lx\n";
+static const char uwfault64[] = KERN_INFO \
+"%s[%d]: bad register window fault: SP %016lx (orig_sp %016lx) TPC %08lx O7 %016lx\n";
+
+void fault_in_user_windows(struct pt_regs *regs)
{
 struct thread_info *t = current_thread_info();
 unsigned long window;
@@ -541,9 +547,9 @@
 do {
 struct reg_window *rwin = &t->reg_window[window];
 int winsize = sizeof(struct reg_window);
-unsigned long sp;
-unsigned long sp, orig_sp;
+unsigned long sp, orig_sp;

 -sp = t->rwbbuf_stkptrs[window];
 +orig_sp = sp = t->rwbbuf_stkptrs[window];

 if (test_thread_64bit_stack(sp))
 sp += STACK_BIAS;
@@ -554,8 +560,16 @@
 stack_unaligned(sp);

 if (unlikely(copy_to_user((char __user *)sp,
- rwin, winsize))) {
+ rwin, winsize))) {
+if (show_unhandled_signals)
printk_ratelimited(is_compat_task()) ?
  uwfault32 : uwfault64,
  current->comm, current->pid,
  sp, orig_sp,
  regs->tpc,
  regs->u_regs[UREG_I7]);
goto barf;
+
} 
} while (window--);
}
set_thread_wsaved(0);
@ @ -563,8 +577,7 @@

barf:
set_thread_wsaved(window + 1);
-user_exit();
-do_exit(SIGILL);
+force_sig(SIGSEGV, current);
}
asmlinkage long sparc_do_fork(unsigned long clone_flags,
--- linux-4.15.0.orig/arch/sparc/kernel/ptrace_32.c
+++ linux-4.15.0/arch/sparc/kernel/ptrace_32.c
@@ -46,8 +46,7 @@
REGSET_FP,
};

+static int regwindow32_get(struct task_struct *target,
+ const struct pt_regs *regs,
+ u32 *uregs)
+{
+unsigned long reg_window = regs->u_regs[UREG_I6];
+int size = 16 * sizeof(u32);
+ 
+if (target == current) {
+if (copy_from_user(uregs, (void __user *)reg_window, size))
+return -EFAULT;
+} else {
+if (access_process_vm(target, reg_window, uregs, size,
+ FOLL_FORCE) != size)
+return -EFAULT;
+}
+return 0;
+}
+static int regwindow32_set(struct task_struct *target,
+ const struct pt_regs *regs,
+ u32 *uregs)
unsigned long reg_window = regs->u_regs[UREG_I6];
int size = 16 * sizeof(u32);

if (target == current) {
    if (copy_to_user((void __user *)reg_window, uregs, size))
        return -EFAULT;
} else {
    if (access_process_vm(target, reg_window, uregs, size,
                         FOLL_FORCE | FOLL_WRITE) != size)
        return -EFAULT;
}

return 0;

static int genregs32_get(struct task_struct *target,
                         const struct user_regset *regset,
                         unsigned int pos, unsigned int count,
                         void *kbuf, void __user *ubuf)
{
    const struct pt_regs *regs = target->thread.kregs;
    unsigned long __user *reg_window;
    unsigned long *k = kbuf;
    unsigned long __user *u = ubuf;
    unsigned long reg;
    u32 uregs[16];
    int ret;

    if (target == current)
        flush_user_windows();

    pos /= sizeof(reg);
    count /= sizeof(reg);
    ret = user_regset_copyout(&pos, &count, &kbuf, &ubuf,
                               regs->u_regs,
                               0, 16 * sizeof(u32));
    if (ret || !count)
        return ret;

    if (kbuf) {
        for (; count > 0 && pos < 16; count--)
            *k++ = regs->u_regs[pos++];

        reg_window = (unsigned long __user *)regs->u_regs[UREG_I6];
        reg_window -= 16;
        for (; count > 0 && pos < 32; count--) {
            if (get_user(*k++, &reg_window[pos++]))
                return -EFAULT;
        }
    }

    return 0;
}
-} } else { 
- } for (; count > 0 && pos < 16; count--) { 
- if (put_user(regs->u_regs[pos++], u++)) 
- return -EFAULT; } 
- } 
- reg_window = (unsigned long *)__user *) regs->u_regs[UREG_I6]; 
- reg_window -= 16; 
- for (; count > 0 && pos < 32; count--) { 
- if (get_user(reg, &reg_window[pos++]) || 
- put_user(reg, u++)) 
- return -EFAULT; } 
- } 
- while (count > 0) { 
- switch (pos) { 
- case 32: /* PSR */ 
- reg = regs->psr; 
- break; 
- case 33: /* PC */ 
- reg = regs->pc; 
- break; 
- case 34: /* NPC */ 
- reg = regs->npc; 
- break; 
- case 35: /* Y */ 
- reg = regs->y; 
- break; 
- case 36: /* WIM */ 
- case 37: /* TBR */ 
- reg = 0; 
- break; 
- default: goto finish; 
- } 
- if (kbuf) 
- *k++ = reg; 
- else if (put_user(reg, u++)) 
+ if (pos < 32 * sizeof(u32)) { 
+ if (regwindow32_get(target, regs, uregs)) 
return -EFAULT; 
- pos++; 
- count--; 
+ ret = user_regset_copyout(&pos, &count, &kbuf, &ubuf, 
+ uregs, 
+ 16 * sizeof(u32), 32 * sizeof(u32));
+if (ret || !count)
+return ret;
}
-finish:
-pos *= sizeof(reg);
-count *= sizeof(reg);

-return user_regset_copyout_zero(&pos, &count, &kbuf, &ubuf,
-38 * sizeof(reg), -1);
+uregs[0] = regs->psr;
+uregs[1] = regs->pc;
+uregs[2] = regs->npc;
+uregs[3] = regs->y;
+uregs[4] = 0;/* WIM */
+uregs[5] = 0;/* TBR */
+return user_regset_copyout(&pos, &count, &kbuf, &ubuf,
+  uregs,
+  32 * sizeof(u32), 38 * sizeof(u32));
}

static int genregs32_set(struct task_struct *target,
@@ -130,82 +127,58 @@
#endif
    const void *kbuf, const void __user *ubuf)
{
    struct pt_regs *regs = target->thread.kregs;
-    unsigned long __user *reg_window;
-    const unsigned long *k = kbuf;
-    const unsigned long __user *u = ubuf;
-    unsigned long reg;
+    u32 uregs[16];
+    u32 psr;
+    int ret;

    if (target == current)
        flush_user_windows();

-    pos /= sizeof(reg);
-    count /= sizeof(reg);
-    -if (kbuf) {
-        for (; count > 0 && pos < 16; count--)
-            regs->u_regs[pos++] = *k++;
-            reg_window = (unsigned long __user *) regs->u_regs[UREG_I6];
-            reg_window -= 16;
-            for (; count > 0 && pos < 32; count--) {
-                if (put_user(*k++, &reg_window[pos++]))
-                    return -EFAULT;

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- }
- | else {
- | for (; count > 0 && pos < 16; count--) {
- | if (get_user(reg, u++))
- | return -EFAULT;
- | regs->u_regs[pos++] = reg;
- }
-
- | reg_window = (unsigned long __user *) regs->u_regs[UREG_I6];
- | reg_window -= 16;
- | for (; count > 0 && pos < 32; count--) {
- | if (get_user(reg, u++)) |
- | put_user(reg, &reg_window[pos++])
- | return -EFAULT;
- }
-
- | while (count > 0) {
- | unsigned long psr;
- |
- | if (kbuf)
- | reg = *k++;
- | else if (get_user(reg, u++))
- | return -EFAULT;
-
- | switch (pos) {
- | case 32: /* PSR */
- | psr = regs->psr;
- | psr &= ~(PSR_ICC | PSR_SYSCALL);
- | psr |= (reg & (PSR_ICC | PSR_SYSCALL));
- | regs->psr = psr;
- | break;
- | case 33: /* PC */
- | regs->pc = reg;
- | break;
- | case 34: /* NPC */
- | regs->npc = reg;
- | break;
- | case 35: /* Y */
- | regs->y = reg;
- | break;
- | case 36: /* WIM */
- | case 37: /* TBR */
- | break;
- | default:
- | goto finish;
- }
+ ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf,
+ regs->u_regs,
+ 0, 16 * sizeof(u32));
+if (ret || !count)
+return ret;

-pos++;
-count--;
+if (pos < 32 * sizeof(u32)) {
+if (regwindow32_get(target, regs, uregs))
+return -EFAULT;
+ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf,
+ uregs,
+ 16 * sizeof(u32), 32 * sizeof(u32));
+if (ret)
+return ret;
+if (regwindow32_set(target, regs, uregs))
+return -EFAULT;
+if (!count)
+return 0;
}

-finish:
-pos *= sizeof(reg);
-count *= sizeof(reg);
-
+ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf,
+ &psr,
+ 32 * sizeof(u32), 33 * sizeof(u32));
+if (ret)
+return ret;
+regs->psr = (regs->psr & ~(PSR_ICC | PSR_SYSCALL)) |
+ (psr & (PSR_ICC | PSR_SYSCALL));
+if (!count)
+return 0;
+ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf,
+ &regs->pc,
+ 33 * sizeof(u32), 34 * sizeof(u32));
+if (ret || !count)
+return ret;
+ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf,
+ &regs->npc,
+ 34 * sizeof(u32), 35 * sizeof(u32));
+if (ret || !count)
+return ret;
+ret = user_regset_copyin(&pos, &count, &kbuf, &ubuf,
+ &regs->y,
+ 35 * sizeof(u32), 36 * sizeof(u32));
+if (ret || !count)
+return ret;
return user_regset_copyin_ignore(&pos, &count, &kbuf, &ubuf,
static int fpregs32_get(struct task_struct *target,
--- linux-4.15.0.orig/arch/sparc/kernel/ptrace_64.c
+++ linux-4.15.0/arch/sparc/kernel/ptrace_64.c
@@ -571,19 +571,13 @@
for (; count > 0 && pos < 32; count--) {
    if (access_process_vm(target,
        (unsigned long)
        &reg_window[pos],
++
        &reg_window[pos++],
        &reg, sizeof(reg),
        FOLL_FORCE)
    != sizeof(reg))
        return -EFAULT;
    -if (access_process_vm(target,
    -    (unsigned long) u,
    -    &reg, sizeof(reg),
    -    FOLL_FORCE | FOLL_WRITE)
    -    != sizeof(reg))
    +if (get_user(reg, u++))
        return -EFAULT;
    -pos++;
    -u++;
} }
@@ -683,12 +677,7 @@
} else {
    for (; count > 0 && pos < 32; count--) {
        -if (access_process_vm(target,
        -    (unsigned long) u,
        -    &reg, sizeof(reg),
        -    FOLL_FORCE)
        -    != sizeof(reg))
        +if (get_user(reg, u++))
            return -EFAULT;
        if (access_process_vm(target,
            (unsigned long)
--- linux-4.15.0.orig/arch/sparc/kernel/rtrap_64.S
+++ linux-4.15.0/arch/sparc/kernel/rtrap_64.S
@@ -30,6 +30,7 @@
    wrpr%g0, RTRAP_PSTATE_IRQOFF, %pstate

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__handle_user_windows:
+add%sp, PTREGS_OFF, %o0
call fault_in_user_windows
wrpr%g0, RTRAP_PSTATE, %pstate
ba,pt%xcc, __handle_preemption_continue
@@ -57,8 +58,9 @@
ldx[%sp + PTREGS_OFF + PT_V9_TSTATE], %l1
sethi%hi(0xf << 20), %l4
and%l1, %l4, %l4
+andn%l1, %l4, %l1
ba,pt%xcc, __handle_preemption_continue
- andn%l1, %l4, %l1
+ srl%l4, 20, %l4

/* When returning from a NMI (%pil==15) interrupt we want to
 * avoid running softirqs, doing IRQ tracing, preempting, etc.
--- linux-4.15.0.orig/arch/sparc/kernel/signal32.c
+++ linux-4.15.0/arch/sparc/kernel/signal32.c
@@ -440,7 +440,11 @@
get_sigframe(ksig, regs, sigframe_size);

if (invalid_frame_pointer(sf, sigframe_size)) {
    -do_exit(SIGILL);
    +if (show_unhandled_signals)
        +pr_info("%s(%d) bad frame in setup_frame32: %08lx TPC %08lx O7 %08lx\n",
        +current->comm, current->pid, (unsigned long)sf,
        +regs->tpc, regs->u_regs[UREG_I7]);
        +force_sigsegv(ksig->sig, current);
        return -EINVAL;
    }

@@ -570,7 +574,11 @@
get_sigframe(ksig, regs, sigframe_size);

if (invalid_frame_pointer(sf, sigframe_size)) {
    -do_exit(SIGILL);
    +if (show_unhandled_signals)
        +pr_info("%s(%d) bad frame in setup_rt_frame32: %08lx TPC %08lx O7 %08lx\n",
        +current->comm, current->pid, (unsigned long)sf,
        +regs->tpc, regs->u_regs[UREG_I7]);
        +force_sigsegv(ksig->sig, current);
        return -EINVAL;
    }

--- linux-4.15.0.orig/arch/sparc/kernel/signal_64.c
+++ linux-4.15.0/arch/sparc/kernel/signal_64.c
@@ -373,7 +373,11 @@
get_sigframe(ksig, regs, sf_size);

if (invalid_frame_pointer(sf, sigframe_size)) {
    -do_exit(SIGILL);
    +if (show_unhandled_signals)
        +pr_info("%s(%d) bad frame in setup_rt_frame32: %08lx TPC %08lx O7 %08lx\n",
        +current->comm, current->pid, (unsigned long)sf,
        +regs->tpc, regs->u_regs[UREG_I7]);
        +force_sigsegv(ksig->sig, current);
        return -EINVAL;
    ]
if (invalid_frame_pointer (sf)) {
  do_exit(SIGILL); /* won’t return, actually */
  if (show_unhandled_signals)
    pr_info("%s[%d] bad frame in setup_rt_frame: %016lx TPC %016lx O7 %016lx\n",
    current->comm, current->pid, (unsigned long)sf,
    regs->tpc, regs->u_regs[UREG_I7]);
  force_sigsegv(ksig->sig, current);
  return -EINVAL;
}

--- linux-4.15.0.orig/arch/sparc/kernel/smp_64.c
+++ linux-4.15.0/arch/sparc/kernel/smp_64.c
@@ -1039,38 +1039,9 @@

 * The SMP TLB coherency scheme we use works as follows:
 * 1) mm->cpu_vm_mask is a bit mask of which cpus an address
 *    space has (potentially) executed on, this is the heuristic
 *    we use to avoid doing cross calls.
 * 2) TLB context numbers are shared globally across all processors
 *    in the system, this allows us to play several games to avoid
 *    cross calls.
 *    One invariant is that when a cpu switches to a process, and
 *    that processes tsk->active_mm->cpu_vm_mask does not have the
 *    current cpu's bit set, that tlb context is flushed locally.
 *    If the address space is non-shared (ie. mm->count == 1) we avoid
 *    cross calls when we want to flush the currently running process's
 *    tlb state. This is done by clearing all cpu bits except the current
 *    processor's in current->mm->cpu_vm_mask and performing the
 *    flush locally only. This will force any subsequent cpus which run
 *    this task to flush the context from the local tlb if the process
 *    migrates to another cpu (again).
 * 3) For shared address spaces (threads) and swapping we bite the
 *    bullet for most cases and perform the cross call (but only to
 *    the cpus listed in cpu_vm_mask).
 *    The performance gain from "optimizing" away the cross call for threads is
 *    questionable (in theory the big win for threads is the massive sharing of
address space state across processors).
+ * mm->cpu_vm_mask is a bit mask of which cpus an address
+ * space has (potentially) executed on, this is the heuristic
+ * we use to limit cross calls.
 */

/* This currently is only used by the hugetlb arch pre-fault
@@ -1080,18 +1051,13 @@

int cpu = get_cpu();

smp_cross_call_masked(&xcall_flush_tlb_mm,
  ctx, 0, 0,
  mm_cpumask(mm));

-local_flush_and_out:
__flush_tlb_mm(ctx, SECONDARY_CONTEXT);

put_cpu();
@@ -1114,17 +1080,15 @@

int cpu = get_cpu();
+
+get_cpu();

info.ctx = ctx;
info.nr = nr;
info.vaddrs = vaddrs;

-if (mm == current->mm && atomic_read(&mm->mm_users) == 1)
-  cpumask_copy(mm_cpumask(mm), cpumask_of(cpu));
-else
-  smp_call_function_many(mm_cpumask(mm), tlb_pending_func,
-    &info, 1);
+  smp_call_function_many(mm_cpumask(mm), tlb_pending_func,
+    &info, 1);

__flush_tlb_pending(ctx, nr, vaddrs);
void smp_flush_tlb_page(struct mm_struct *mm, unsigned long vaddr)
{
    unsigned long context = CTX_HWBITS(mm->context);
    -int cpu = get_cpu();
    +int cpu = get_cpu();
    -if (mm == current->mm && atomic_read(&mm->mm_users) == 1)
    -cpumask_copy(mm_cpumask(mm), cpumask_of(cpu));
    -else
    -smp_cross_call_masked(&xcall_flush_tlb_page,
    -    context, vaddr, 0,
    -    mm_cpumask(mm));
    +smp_cross_call_masked(&xcall_flush_tlb_page,
    +    context, vaddr, 0,
    +    mm_cpumask(mm));
    +__flush_tlb_page(context, vaddr);

    put_cpu();
}

asmlinkage long sys_getdomainname(char __user *name, int len)
{
    - int nlen, err;
    -
    +int nlen, err;
    +char tmp[__NEW_UTS_LEN + 1];
    +
    if (len < 0)
    return -EINVAL;
    - down_read(&uts_sem);
    -
    +down_read(&uts_sem);
    +
    nlen = strlen(utsname()->domainname) + 1;
    err = -EINVAL;
    if (nlen > len)
    -goto out;
    +goto out_unlock;
    +memcpy(tmp, utsname()->domainname, nlen);
    +
    +up_read(&uts_sem);
SYSCALL_DEFINE2(getdomainname, char __user *, name, int, len)
{
    int nlen, err;
    nlen = strlen(utsname()->domainname) + 1;
    err = -EINVAL;
    if (nlen > len)
        goto out_unlock;
    memcpy(tmp, utsname()->domainname, nlen);
    up_read(&uts_sem);
    if (copy_to_user(name, tmp, nlen))
        return -EFAULT;
    return 0;
}
up_read(&uts_sem);
return err;
}
--- linux-4.15.0.orig/arch/sparc/kernel/time_64.c
+++ linux-4.15.0/arch/sparc/kernel/time_64.c
@@ -814,7 +814,7 @@
}
--- linux-4.15.0.orig/arch/sparc/kernel/traps_64.c
+++ linux-4.15.0/arch/sparc/kernel/traps_64.c
@@ -290,14 +290,13 @@
		if ((asi & 0xf2) == ASI_PNF) {
			if (insn & 0x1000000) { /* op3[5:4]=3       */
				handle_ldf_stq(insn, regs);
				return true;
			}
			else
				handle_ld_nf(insn, regs);
			if (insn & 0x1000000)       /* op3[5:4]=3 (fp)  */
				handle_ldf_stq(insn, regs);
				else
					handle_ld_nf(insn, regs);
			return true;
	}
--- linux-4.15.0.orig/arch/sparc/kernel/vio.c
+++ linux-4.15.0/arch/sparc/kernel/vio.c
@@ -403,7 +403,7 @@
if (err) {
    printk(KERN_ERR "VIO: Could not register device %s, err=%d\n",
            dev_name(&vdev->dev), err);
-kfree(vdev);
+put_device(&vdev->dev);
    return NULL;
}
if (vdev->dp)
PERCPU_SECTION(SMP_CACHE_BYTES)

-#ifdef CONFIG_JUMP_LABEL
  . = ALIGN(PAGE_SIZE);
  .exit.text : {
    EXIT_TEXT
  }
-#endif
+
  +.exit.data : {
    +EXIT_DATA
  }+

  . = ALIGN(PAGE_SIZE);
  __init_end = .;
--- linux-4.15.0.orig/arch/sparc/lib/iomap.c
+++ linux-4.15.0/arch/sparc/lib/iomap.c
@@ -19,8 +19,10 @@

 EXPORT_SYMBOL(ioport_map);
 EXPORT_SYMBOL(ioport_unmap);

+#ifdef CONFIG_PCI
 void pci_iounmap(struct pci_dev *dev, void __iomem * addr)
 {
  /* nothing to do */
 }
 EXPORT_SYMBOL(pci_iounmap);
+endif
--- linux-4.15.0.orig/arch/sparc/lib/memset.S
+++ linux-4.15.0/arch/sparc/lib/memset.S
@@ -142,6 +142,7 @@

 ZERO_LAST_BLOCKS(%o0, 0x48, %g2)
 ZERO_LAST_BLOCKS(%o0, 0x08, %g2)
 13:
+EXT(12b, 13b, 21f)
 be8f
 andcc%o1, 4, %g0

 --- linux-4.15.0.orig/arch/sparc/mm/init_64.c
+++ linux-4.15.0/arch/sparc/mm/init_64.c
@@ -1383,6 +1383,7 @@
 return numa_latency[from][to];
 }
+EXPORT_SYMBOL(__node_distance);

static int __init find_best_numa_node_for_mlgroup(struct mdesc_mlgroup *grp) {
    --- linux-4.15.0.orig/arch/sparc/mm/tlb.c
    +++ linux-4.15.0/arch/sparc/mm/tlb.c
    @@ -163,13 +163,10 @@
        pte_unmap(pte);
    }

    -void set_pmd_at(struct mm_struct *mm, unsigned long addr,
    -pmd_t *pmdp, pmd_t pmd)
    -{
        -pmd_t orig = *pmdp;
        -*pmdp = pmd;

+static void __set_pmd_acct(struct mm_struct *mm, unsigned long addr,
+    pmd_t orig, pmd_t pmd)
+{
    if (mm == &init_mm) return;

    @@ -219,17 +216,38 @@
    }
    }

+void set_pmd_at(struct mm_struct *mm, unsigned long addr,
+    pmd_t *pmdp, pmd_t pmd)
+{
+    pmd_t orig = *pmdp;
+    +*pmdp = pmd;
+    __set_pmd_acct(mm, addr, orig, pmd);
+}
+    +static inline pmd_t pmdp_establish(struct vm_area_struct *vma,
+    unsigned long address, pmd_t *pmdp, pmd_t pmd)
+{
+    pmd_t old;
+    +do {
+        old = *pmdp;
+    } while (cmpxchg64(&pmdp->pmd, old.pmd, pmd.pmd) != old.pmd);
+    __set_pmd_acct(vma->vm_mm, address, old, pmd);
+    +return old;
+}
+ /*
 * This routine is only called when splitting a THP
 */
+ void pmdp_invalidate(struct vm_area_struct *vma, unsigned long address,
+ pmd_t pmdp_invalidate(struct vm_area_struct *vma, unsigned long address,
+ pmd_t *pmdp)
{
- pmd_t entry = *pmdp;
+ pmd_t entry;

- pmd_val(entry) &= ~_PAGE_VALID;
+ old = pmdp_establish(vma, address, pmdp, entry);
flush_tlb_range(vma, address, address + HPAGE_PMD_SIZE);

/*
@@ -240,6 +258,8 @@
 if ((pmd_val(entry) & _PAGE_PMD_HUGE) &&
     !is_huge_zero_page(pmd_page(entry)))
 (vma->vm_mm)->context.thp_pte_count--;
+ return old;
 }

void pgtable_trans_huge_deposit(struct mm_struct *mm, pmd_t *pmdp,
--- linux-4.15.0.orig/arch/sparc/mm/ultra.S
+++ linux-4.15.0/arch/sparc/mm/ultra.S
@@ -587,7 +587,7 @@
 sub	 %g7, %g1, %g3
 srlx	 %g3, 18, %g2
 brnz,pn	 %g2, 2f
- add %g2, 1, %g2
+ sethi %hi(PAGE_SIZE), %g2
 sub %g3, %g2, %g3
 or %g1, 0x20, %g1! Nucleus
1: stxa %g0, [%g1 + %g3] ASI_DMMU_DEMAP
@@ -751,7 +751,7 @@
 sub %g7, %g1, %g3
 srlx %g3, 18, %g2
 brnz,pn %g2, 2f
- add %g2, 1, %g2
+ sethi %hi(PAGE_SIZE), %g2
 sub %g3, %g2, %g3
 or %g1, 0x20, %g1! Nucleus
1: stxa %g0, [%g1 + %g3] ASI_DMMU_DEMAP

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--- linux-4.15.0.orig/arch/sparc/net/bpf_jit_comp_32.c
+++ linux-4.15.0/arch/sparc/net/bpf_jit_comp_32.c
@@ -11,8 +11,6 @@
 #include "bpf_jit_32.h"

 -int bpf_jit_enable __read_mostly;
-
 static inline bool is_simm13(unsigned int value)
 {
 return value + 0x1000 < 0x2000;
--- linux-4.15.0.orig/arch/sparc/net/bpf_jit_comp_64.c
+++ linux-4.15.0/arch/sparc/net/bpf_jit_comp_64.c
@@ -12,8 +12,6 @@
 #include "bpf_jit_64.h"

 -int bpf_jit_enable __read_mostly;
-
 static inline bool is_simm13(unsigned int value)
 {
 return value + 0x1000 < 0x2000;
@@ -1328,6 +1326,9 @@
 const u8 tmp2 = bpf2sparc[TMP_REG_2];
 u32 opcode = 0, rs2;
 +if (insn->dst_reg == BPF_REG_FP)
+ctx->saw_frame_pointer = true;
+ctx->tmp_2_used = true;
 emit_loadimm(imm, tmp2, ctx);
@@ -1366,6 +1367,9 @@
 const u8 tmp = bpf2sparc[TMP_REG_1];
 u32 opcode = 0, rs2;
 +if (insn->dst_reg == BPF_REG_FP)
+ctx->saw_frame_pointer = true;
+switch (BPF_SIZE(code)) {
+ case BPF_W:
+ opcode = ST32;
+ @ @ -1398,6 +1402,9 @@
+ const u8 tmp2 = bpf2sparc[TMP_REG_2];
+ const u8 tmp3 = bpf2sparc[TMP_REG_3];
+if (insn->dst_reg == BPF_REG_FP)
+ctx->saw_frame_pointer = true;
ctx->tmp_1_used = true;
ctx->tmp_2_used = true;
ctx->tmp_3_used = true;
const u8 tmp2 = bpf2sparc[TMP_REG_2];
const u8 tmp3 = bpf2sparc[TMP_REG_3];

if (insn->dst_reg == BPF_REG_FP)
ctx->saw_frame_pointer = true;

ctx->tmp_1_used = true;
ctx->tmp_2_used = true;
ctx->tmp_3_used = true;
#define TICK_PRIV_BIT (ULL << 63)
#endif

#ifdef CONFIG_SPARC64
#define SYSCALL_STRING "ta 0x6d;"
-"sub %g0, %o0, %o0;"
+"bcs,a1f;"
+" sub%g0, %%o0, %o0;"
+"1:" 
#else
#define SYSCALL_STRING "ta 0x10;"
+"bcs,a1f;"
+" sub%g0, %%o0, %o0;"
+"1:" 
#endif

#define SYSCALL_CLOBBERS "f0", "f1", "f2", "f3", "f4", "f5", "f6", "f7"," 

static DEVICE_ATTR(chip_width, 0444, chip_width_show, NULL);
static ssize_t chip_height_show(struct device *dev, 
struct_device_attribute *attr,
@@ -46,7 +46,7 @@
{
    return sprintf(page, "%u\n", smp_height);
}
-static DEVICE_ATTR(chip_height, 0444, chip_height_show, NULL);
+static DEVICE_ATTR_RO(chip_height);

static ssize_t chip_serial_show(struct device *dev, 
    struct device_attribute *attr, 
@@ -54,7 +54,7 @@
{
    return get_hv_confstr(page, HV_CONFSTR_CHIP_SERIAL_NUM);
}
-static DEVICE_ATTR(chip_serial, 0444, chip_serial_show, NULL);
+static DEVICE_ATTR_RO(chip_serial);

static ssize_t chip_revision_show(struct device *dev, 
    struct device_attribute *attr, 
@@ -62,7 +62,7 @@
{
    return get_hv_confstr(page, HV_CONFSTR_CHIP_REV);
}
-static DEVICE_ATTR(chip_revision, 0444, chip_revision_show, NULL);
+static DEVICE_ATTR_RO(chip_revision);

static ssize_t type_show(struct device *dev, 
@@ -71,7 +71,7 @@
{
    return sprintf(page, "tilera\n");
}
-static DEVICE_ATTR(type, 0444, type_show, NULL);
+static DEVICE_ATTR_RO(type);

#define HV_CONF_ATTR(name, conf) 
    static ssize_t name ## _show(struct device *dev, 
@@ -184,7 +184,7 @@
    return n < 0 ? n : count;
}
-static DEVICE_ATTR(hv_stats, 0644, hv_stats_show, hv_stats_store);
+static DEVICE_ATTR_RW(hv_stats);

static int hv_stats_device_add(struct device *dev, struct subsys_interface *sif) 
{
    --- linux-4.15.0.orig/arch/um/Kconfig.debug
    +++ linux-4.15.0/arch/um/Kconfig.debug
@@ -19,6 +19,7 @@
config GCOV
bool "Enable gcov support"
depends on DEBUG_INFO
+depends on !KCOV
help
This option allows developers to retrieve coverage data from a UML session.
--- linux-4.15.0.orig/arch/um/drivers/chan_user.c
+++ linux-4.15.0/arch/um/drivers/chan_user.c
@@ -26,10 +26,10 @@
n = read(fd, c_out, sizeof(*c_out));
if (n > 0)
    return n;
-else if (errno == EAGAIN)
-    return 0;
+else if (errno == EAGAIN)
+    return 0;
else if (n == 0)
    return -EIO;
+else if (errno == EAGAIN)
+    return 0;
return -errno;
}
@@ -256,7 +256,8 @@
goto out_close;
}
-if (os_set_fd_block(*fd_out, 0)) {
+err = os_set_fd_block(*fd_out, 0);
+if (err) {
printk(UM_KERN_ERR "winch_tramp: failed to set thread_fd "
    "non-blocking.
"));
goto out_close;
--- linux-4.15.0.orig/arch/um/drivers/line.c
+++ linux-4.15.0/arch/um/drivers/line.c
@@ -261,7 +261,7 @@
if (err == 0) {
    spin_unlock(&line->lock);
    return IRQ_NONE;
-} else if (err < 0) {
+} else if ((err < 0) && (err != -EAGAIN)) {
    line->head = line->buffer;
    line->tail = line->buffer;
}
char *argv[] = { "/usr/sbin/in.telnetd", ".L", 
- "/usr/lib/uml/port-helper", NULL }; 
+ OS_LIB_PATH "/uml/port-helper", NULL }; 
struct port_pre_exec_data data;

new = accept(fd, NULL, 0); 
--- linux-4.15.0.orig/arch/um/drivers/slip_user.c 
+++ linux-4.15.0/arch/um/drivers/slip_user.c 
@@ -145,7 +145,8 @@ 
} 
sfd = err;

-if (set_up_tty(sfd)) 
+err = set_up_tty(sfd); 
+if (err) 
goto out_close2;

pri->slave = sfd; 
--- linux-4.15.0.orig/arch/um/drivers/xterm.c 
+++ linux-4.15.0/arch/um/drivers/xterm.c 
@@ -18,6 +18,7 @@ 
struct xterm_chan {
  int pid;
  int helper_pid;
+  int chan_fd;
  char *title;
  int device;
  int raw;
@@ -33,6 +34,7 @@
return NULL;
*data = ((struct xterm_chan) { .pid = -1, 
   .helper_pid = -1, 
+   .chan_fd= -1,
   .device = device, 
   .title = opts->xterm_title, 
   .raw = opts->raw } );
@@ -149,6 +151,7 @@
goto out_kill;
}

+data->chan_fd = fd; 
new = xterm_fd(fd, &data->helper_pid); 
if (new < 0) { 
  err = new;
@@ -206,6 +209,8 @@
os_kill_process(data->helper_pid, 0);
data->helper_pid = -1;
+if (data->chan_fd != -1)
+os_close_file(data->chan_fd);
+os_close_file(fd);
+
--- linux-4.15.0.orig/arch/um/include/asm/mmu_context.h
+++ linux-4.15.0/arch/um/include/asm/mmu_context.h
@@ -53,7 +53,7 @@
 * when the new ->mm is used for the first time.
 */
-__switch_mm(&new->context.id);
-down_write(&new->mmap_sem);
+tdown_write_nested(&new->mmap_sem, 1);
 uml_setup_stubs(new);
 up_write(&new->mmap_sem);
}
--- linux-4.15.0.orig/arch/um/include/asm/pgtable.h
+++ linux-4.15.0/arch/um/include/asm/pgtable.h
@@ -197,12 +197,17 @@
static inline pte_t pte_wrprotect(pte_t pte)
 {
 -pte_clear_bits(pte, _PAGE_RW);
+if (likely(pte_get_bits(pte, _PAGE_RW)))
+pte_clear_bits(pte, _PAGE_RW);
+else
+return pte;
 return(pte_mknewprot(pte));
 }

static inline pte_t pte_mkread(pte_t pte)
 {
+if (unlikely(pte_get_bits(pte, _PAGE_USER)))
+return pte;
 pte_set_bits(pte, _PAGE_USER);
 return(pte_mknewprot(pte));
 }
@@ -221,6 +226,8 @@
static inline pte_t pte_mkwrite(pte_t pte)
 {
+if (unlikely(pte_get_bits(pte, _PAGE_RW)))
+return pte;
 pte_set_bits(pte, _PAGE_RW);
 return(pde_mknewprot(pde));
 }
--- linux-4.15.0.orig/arch/um/include/asm/tlb.h
+++ linux-4.15.0/arch/um/include/asm/tlb.h

Open Source Used In 5GaaS Edge AC-4 11476
return tlb_remove_page(tlb, page);
}

static inline void
tlb_flush_pmd_range(struct mmu_gather *tlb, unsigned long address,
    unsigned long size)
{
    tlb->need_flush = 1;
    if (tlb->start > address)
        tlb->start = address;
    if (tlb->end < address + size)
        tlb->end = address + size;
}

/**
 * tlb_remove_tlb_entry - remember a pte unmapping for later tlb invalidation.
 */

--- linux-4.15.0.orig/arch/um/kernel/dyn.lds.S
+++ linux-4.15.0/arch/um/kernel/dyn.lds.S
@@ -7,6 +7,12 @@
ENTRY(_start)
jiffies = jiffies_64;

+VERSION {
+ { 
+   local: *;
+ };
+ }
+
+ SECTIONS
+ {
+     PROVIDE (__executable_start = START);
+ }
void sigio_unlock(void)
{
    spin_unlock(&sigio_spinlock);
    mutex_unlock(&sigio_mutex);
}

--- linux-4.15.0.orig/arch/um/kernel/time.c
+++ linux-4.15.0/arch/um/kernel/time.c
@@ -56,7 +56,7 @@
static struct clock_event_device timer_clockevent = {
    .name = "posix-timer",
    .rating = 250,
    .cpumask = cpu_all_mask,
-+ cpumask = cpu_possible_mask,
    .features = CLOCK_EVT_FEAT_PERIODIC | CLOCK_EVT_FEAT_ONESHOT,
    .set_state_shutdown = itimer_shutdown,
--- linux-4.15.0.orig/arch/um/kernel/uml.lds.S
+++ linux-4.15.0/arch/um/kernel/uml.lds.S
@@ -7,6 +7,12 @@
ENTRY(_start)
    jiffies = jiffies_64;

+VERSION {
+    {
+        local: *
+    }
+}
+SECTIONS
{
    /* This must contain the right address - not quite the default ELF one.*/
--- linux-4.15.0.orig/arch/um/os-Linux/file.c
+++ linux-4.15.0/arch/um/os-Linux/file.c
@@ -12,6 +12,7 @@
    include <sys/socket.h>
    include <sys/stat.h>
+    include <sys/sysmacros.h>
    include <sys/un.h>
    include <sys/types.h>
    include <os.h>
--- linux-4.15.0.orig/arch/um/os-Linux/signal.c
+++ linux-4.15.0/arch/um/os-Linux/signal.c
@@ -16,6 +16,7 @@
    include <sysdep/mcontext.h>
    include <um_malloc.h>


```c
#include <sys/ucontext.h>

void (*sig_info[NSIG])(int, struct siginfo *, struct uml_pt_regs *) = {
    [SIGTRAP] = relay_signal,
    @ @ -159,7 +160,7 @ @

static void hard_handler(int sig, siginfo_t *si, void *p)
{
    struct ucontext *uc = p;
    ucontext_t *uc = p;
    mcontext_t *mc = &uc->uc_mcontext;
    unsigned long pending = 1UL << sig;
    fatal_sigsegv();
    longjmp(*switch_buf, 1);
    /* unreachable */
    printk(UM_KERN_ERR "impossible long jump!");
    fatal_sigsegv();
    +return 0;
}

void initial_thread_cb_skas(void (*proc)(void *), void *arg)
--- linux-4.15.0.orig/arch/x86/Kconfig
+++ linux-4.15.0/arch/x86/Kconfig
@@ -51,6 +51,7 @@
    select ARCH_HAS_FAST_MULTIPLIER
    +select ARCH_HAS_FILTER_PGPRT
    select ARCH_HAS_FORTIFY_SOURCE
    select ARCH_HAS_GCOV_PROFILE_ALL
    select ARCH_HAS_KCOV
      if X86_64
@@ -67,6 +68,7 @@
    select HAVE_PERF_REGS
    select HAVE_PERF_USER_STACK_DUMP
```
select HAVE_RCU_TABLE_FREE
+select HAVE_RCU_TABLE_INVALIDATE if HAVE_RCU_TABLE_FREE
select HAVE_REGS_AND_STACK_ACCESS_API
select HAVE_RELIABLE_STACKTRACE if X86_64 && UNWINDER_FRAME_POINTER && STACK_VALIDATION
select HAVE_STACK_VALIDATION if X86_64
select HAVE_SYSCALL_TRACEPOINTS
select HAVE_UNSTABLE_SCHED_CLOCK
select HAVE_USER_RETURN_NOTIFIER
+select HOTPLUG_SMT if SMP
select IRQ_FORCED_THREADING
select PCI_LOCKLESS_CONFIG
select PERF_EVENTS
@@ -268,6 +272,9 @@
#config ARCH_HAS_CACHE_LINE_SIZE
def_bool y

+config ARCH_HAS_FILTER_PGPLOT
+def_bool y
+
+config HAVE_SETUP_PER_CPU_AREA
def_bool y

@@ -432,16 +439,13 @@
config RETPOLINE
bool "Avoid speculative indirect branches in kernel"
default y
+select STACK_VALIDATION if HAVE_STACK_VALIDATION
help
   Compile kernel with the retpoline compiler options to guard against
   kernel-to-user data leaks by avoiding speculative indirect
   branches. Requires a compiler with -mindirect-branch=thunk-extern
   support for full protection. The kernel may run slower.
   
   - Without compiler support, at least indirect branches in assembler
   - code are eliminated. Since this includes the syscall entry path,
   - it is not entirely pointless.
   
+config INTEL_RDT
bool "Intel Resource Director Technology support"
default n
@@ -528,6 +532,7 @@
depends on X86_EXTENDED_PLATFORM
depends on NUMA
depends on EFI
+depends on KEXEC_CORE
depends on X86_X2APIC
depends on PCI
approximately eight kilobytes to the kernel image.

config SCHED_SMT
-bool "SMT (Hyperthreading) scheduler support"
-depends on SMP

SMT scheduler support improves the CPU scheduler's decision making when dealing with Intel Pentium 4 chips with HyperThreading at a cost of slightly increased overhead in some places. If unsure say N here.
+def_bool y if SMP

config SCHED_MC
def_bool y

AMD_MEM_ENCRYPT_ACTIVE_BY_DEFAULT
bool "Activate AMD Secure Memory Encryption (SME) by default"
-default y
depends on AMD_MEM_ENCRYPT

Say yes to have system memory encrypted by default if running on

If unsure, say y.

choice
+prompt "TSX enable mode"
+depends on CPU_SUP_INTEL
+default X86_INTEL_TSX_MODE_OFF
+help
+ Intel's TSX (Transactional Synchronization Extensions) feature
+ allows to optimize locking protocols through lock elision which
+ can lead to a noticeable performance boost.
+
+ On the other hand it has been shown that TSX can be exploited
+ to form side channel attacks (e.g. TAA) and chances are there
+ will be more of those attacks discovered in the future.
+
+ Therefore TSX is not enabled by default (aka tsx=off). An admin
+ might override this decision by tsx=on the command line parameter.
+ Even with TSX enabled, the kernel will attempt to enable the best
+ possible TAA mitigation setting depending on the microcode available
+ for the particular machine.
+
+ This option allows to set the default tsx mode between tsx=on, =off
+ and =auto. See Documentation/admin-guide/kernel-parameters.txt for more
details.
+
+ Say off if not sure, auto if TSX is in use but it should be used on safe
+ platforms or on if TSX is in use and the security aspect of tsx is not
+ relevant.
+
+ config X86_INTEL_TSX_MODE_OFF
+ bool "off"
+ help
+ TSX is disabled if possible - equals to tsx=off command line parameter.
+
+ config X86_INTEL_TSX_MODE_ON
+ bool "on"
+ help
+ TSX is always enabled on TSX capable HW - equals the tsx=on command
+ line parameter.
+
+ config X86_INTEL_TSX_MODE_AUTO
+ bool "auto"
+ help
+ TSX is enabled on TSX capable HW that is believed to be safe against
+ side channel attacks- equals the tsx=auto command line parameter.
+endchoice
+
+ config EFI
bool "EFI runtime service support"
depends on ACPI
@@ -2163,14 +2206,8 @@
If unsure, leave at the default value.

config HOTPLUG_CPU
-bool "Support for hot-pluggable CPUs"
+def_bool y
depends on SMP
----help----
- Say Y here to allow turning CPUs off and on. CPUs can be
- controlled through /sys/devices/system/cpu.
- ( Note: power management support will enable this option
- automatically on SMP systems. )
- Say N if you want to disable CPU hotplug.

config BOOTPARAM_HOTPLUG_CPU0
bool "Set default setting of cpu0_hotpluggable"
@@ -2701,8 +2738,7 @@

config OLPC_XO1_PM
bool "OLPC XO-1 Power Management"
-depends on OLPC && MFD_CS5535 && PM_SLEEP
-select MFD_CORE
+depends on OLPC && MFD_CS5535=y && PM_SLEEP

---help---
Add support for poweroff and suspend of the OLPC XO-1 laptop.

@@ -2898,6 +2934,8 @@
source "drivers/Kconfig"

+source "ubuntu/Kconfig"
+
source "drivers/firmware/Kconfig"

source "fs/Kconfig"
--- linux-4.15.0.orig/arch/x86/Kconfig.debug
+++ linux-4.15.0/arch/x86/Kconfig.debug
@@ -189,7 +189,7 @@
config X86_DECODER_SELFTEST
bool "x86 instruction decoder selftest"
-depends on DEBUG_KERNEL && KPROBES
+depends on DEBUG_KERNEL && INSTRUCTION_DECODER
depends on !COMPILE_TEST
---help---
Perform x86 instruction decoder selftests at build time.
--- linux-4.15.0.orig/arch/x86/Makefile
+++ linux-4.15.0/arch/x86/Makefile
@@ -35,11 +35,13 @@
-DDISABLE_BRANCH_PROFILING \
-    -Wall -Wstrict-prototypes -march=i386 -mregparm=3 \
-    -fno-strict-aliasing -fomit-frame-pointer -fno-pic \
-    -mno-mmx -mno-sse $(call cc-option,-fcf-protection=none)
+    -mno-mmx -mno-sse $(call __cc-option, $(CC), $(REALMODE_CFLAGS), -Wno-address-of-packed-member)
    REALMODE_CFLAGS += $(call __cc-option, $(CC), $(REALMODE_CFLAGS), -ffreestanding)
REALMODE_CFLAGS += $(call __cc-option, $(CC), $(REALMODE_CFLAGS), -fno-stack-protector)
+REALMODE_CFLAGS += $(call __cc-option, $(CC), $(REALMODE_CFLAGS), -Wno-address-of-packed-member)
REALMODE_CFLAGS += $(call __cc-option, $(CC), $(REALMODE_CFLAGS), $(cc_stack_align4))
+REALMODE_CFLAGS += $(CLANG_FLAGS)
export REALMODE_CFLAGS

# BITS is used as extension for files which are available in a 32 bit
@@ -48,7 +50,7 @@
export BITS

ifdef CONFIG_X86_NEED_RELOCS
- LDFLAGS_vmlinux := --emit-relocs
+ LDFLAGS_vmlinux := --emit-relocs --discard-none
endif

#
@@ -61,6 +63,9 @@
KBUILD_CFLAGS += -mno-sse -mno-mmx -mno-sse2 -mno-3dnow
KBUILD_CFLAGS += $(call cc-option,-mno-avx,)
+# Intel CET isn't enabled in the kernel
+KBUILD_CFLAGS += $(call cc-option,-fcf-protection=none)
+
ifeq ($(CONFIG_X86_32),y)
    BITS := 32
    UTS_MACHINE := i386
@@ -223,6 +228,15 @@
LDFLAGS := -m elf_$(UTS_MACHINE)
+
+# The 64-bit kernel must be aligned to 2MB. Pass -z max-page-size=0x200000 to
+# the linker to force 2MB page size regardless of the default page size used
+# by the linker.
+#
+ifdef CONFIG_X86_64
+LDFLAGS += $(call ld-option, -z max-page-size=0x200000)
+endif
+
# Speed up the build
KBUILD_CFLAGS += -pipe
# Workaround for a gcc prelease that unfortunately was shipped in a suse release
@@ -232,10 +246,16 @@
# Avoid indirect branches in kernel to deal with Spectre
ifdef CONFIG_RETPOLINE
-    RETPOLINE_CFLAGS += $(call cc-option,-mindirect-branch=thunk-extern -mindirect-branch-register)
-    ifneq ($(RETPOLINE_CFLAGS),)
-        KBUILD_CFLAGS += $(RETPOLINE_CFLAGS) -DRETPOLINE
-    endif
+
KBUILD_CFLAGS += $(RETPOLINE_CFLAGS)
+    # Additionally, avoid generating expensive indirect jumps which
+    # are subject to retpolines for small number of switch cases.
+    # clang turns off jump table generation by default when under
+    # retpoline builds, however, gcc does not for x86. This has
+    # only been fixed starting from gcc stable version 8.4.0 and
+    # onwards, but not for older ones. See gcc bug #86952.
+    ifneq ($(cc-name), clang)
+        KBUILD_CFLAGS += $(call cc-option,-fno-jump-tables)
+ endif
endif

archscripts: scripts_basic
@@ -251,6 +271,13 @@
ifeq ($(CONFIG_KEXEC_FILE),y)
$(Q)$(MAKE) $(build)=arch/x86/purgatory arch/x86/purgatory/kexec-purgatory.c
endif
+ifdef CONFIG_RETPOLINE
+ifeq ($(RETPOLINE_CFLAGS),)
+@echo "You are building kernel with non-retpoline compiler." >&2
+@echo "Please update your compiler." >&2
+@false
+endif
@endef
+endif
+endif

###
# Kernel objects
--- linux-4.15.0.orig/arch/x86/boot/Makefile
+++ linux-4.15.0/arch/x86/boot/Makefile
@@ -87,7 +87,7 @@
\(startup_32\|startup_64\|efi32_stub_entry\|efi64_stub_entry\|efi_pe_entry\|input_data\|_end\|_ehead\|_text\|z_.*\)$\$
\#define ZO_$2 0x\1/p'
+\sed-zoffset := -e 's/\([0-9a-fA-F][a-zA-Z]\\*\) \([ABCDGRSTVW]\\*\) \(startup_32\|startup_64\|efi32_stub_entry\|efi64_stub_entry\|efi_pe_entry\|input_data\|_end\|_ehead\|_text\|z_.*\)$$/\#define ZO_$2 0x\1/p'
quiet_cmd_zoffset = ZOFFSET $@
      cmd_zoffset = $(NM) $< | sed -n $(sed-zoffset) > $@
      @ @ -100,7 +100,7 @@
AFLAGS_header.o += -I$(objtree)/$(obj)
$(obj)/setup.elf: $(src)/setup.ld $(SETUP_OBJS) FORCE
$(call if_changed,ld)

--- linux-4.15.0.orig/arch/x86/boot/compressed/Makefile
+++ linux-4.15.0/arch/x86/boot/compressed/Makefile
@@ -37,6 +37,8 @@
KBUILD_CFLAGS += $(call cc-option,-fno-stack-protector)
KBUILD_CFLAGS += $(call cc-disable-warning, address-of-packed-member)
KBUILD_CFLAGS += $(call cc-disable-warning, gnu)
+# Disable relocation relaxation in case the link is not PIE.
+KBUILD_CFLAGS += $(call as-option,-Wa$(comma)-mrelax-relocations=no)

KBUILD_AFLAGS := $(KBUILD_CFLAGS) -D__ASSEMBLY__
GCOV_PROFILE := n
@@ -106,9 +108,13 @@
done
endef

+# We need to run two commands under "if_changed", so merge them into a
+# single invocation.
+quiet_cmd_check-and-link-vmlinux = LD $@
+ cmd_check-and-link-vmlinux = $(cmd_check_data_rel); $(cmd_ld)
+
$(obj)/vmlinux: $(vmlinux-objs-y) FORCE
- $(call if_changed,check_data_rel)
- $(call if_changed,ld)
+ $(call if_changed,check-and-link-vmlinux)

OBJCOPYFLAGS_vmlinux.bin := -R .comment -S
$(obj)/vmlinux.bin: vmlinux FORCE
--- linux-4.15.0.orig/arch/x86/boot/compressed/eboot.c
+++ linux-4.15.0/arch/x86/boot/compressed/eboot.c
@@ -1,3 +1,4 @@
+/*
+ * Copyright 2011 Intel Corporation; author Matt Fleming
+ @@ -14,6 +15,7 @@
+ include <asm/e820/types.h>
+ include <asm/setup.h>
+ include <asm/desc.h>
+ include <asm/bootparam_utils.h>

+ include ".string.h"
+ include "eboot.h"
@@ -163,7 +165,8 @@
if (status != EFI_SUCCESS)
goto free_struct;

-memcpy(rom->romdata, pci->romimage, pci->romsize);
+memcpy(rom->romdata, (void *)(unsigned long)pci->romimage,
+ pci->romsize);
return status;

done:
@@ -269,7 +272,8 @@
if (status != EFI_SUCCESS)
goto free_struct;

-memcpy(rom->romdata, pci->romimage, pci->romsize);
+memcpy((void *)romdata, (void *)pci->romimage,
  + pci->romsize);
return status;

free_struct:
@@ -866,11 +870,43 @@
return status;
}

+static efi_status_t allocate_e820(struct boot_params *params,
+  struct setup_data **e820ext,
+  u32 *e820ext_size)
+{
+  unsigned long map_size, desc_size, buff_size;
+  struct efi_boot_memmap boot_map;
+  efi_memory_desc_t *map;
+  efi_status_t status;
+  __u32 nr_desc;
+  +boot_map.map= &map;
+  +boot_map.map_size= &map_size;
+  +boot_map.desc_size= &desc_size;
+  +boot_map.desc_ver= NULL;
+  +boot_map.key_ptr= NULL;
+  +boot_map.buff_size= &buff_size;
+  +status = efi_get_memory_map(sys_table, &boot_map);
+  +if (status != EFI_SUCCESS)
+    +return status;
+  +nr_desc = buff_size / desc_size;
+  +if (nr_desc > ARRAY_SIZE(params->e820_table)) {
+    +u32 nr_e820ext = nr_desc - ARRAY_SIZE(params->e820_table);
+    +status = alloc_e820ext(nr_e820ext, e820ext, e820ext_size);
+    +if (status != EFI_SUCCESS)
+      +return status;
+  }
+  +return EFI_SUCCESS;
+}

+struct exit_boot_struct {
+  struct boot_params *boot_params;
struct efi_info *efi;
-struct setup_data *e820ext;
-__u32 e820ext_size;
bool is64;
};

@@ -878,26 +914,11 @@
    struct efi_boot_memmap *map,
    void *priv)
{
    -static bool first = true;
    const char *signature;
    __u32 nr_desc;
    efi_status_t status;
    struct exit_boot_struct *p = priv;

    -if (first) {
    -
    -
    -
    -
    -status = alloc_e820ext(nr_e820ext, &p->e820ext,
    - &p->e820ext_size);
    -if (status != EFI_SUCCESS)
    -return status;
    -}
    -first = false;
    -}
    signature = p->is64 ? EFI64_LOADER_SIGNATURE : EFI32_LOADER_SIGNATURE;
    memcpy(&p->efi->efi_loader_signature, signature, sizeof(__u32));

@@ -920,8 +941,8 @@
{
    unsigned long map_sz, key, desc_size, buff_size;
    efi_memory_desc_t *mem_map;
    -struct setup_data *e820ext;
    -__u32 e820ext_size;
    +struct setup_data *e820ext = NULL;
    +__u32 e820ext_size = 0;
    efi_status_t status;
    __u32 desc_version;
    struct efi_boot_memmap map;
    @@ -935,18 +956,18 @@
    map.buff_size = &buff_size;
    priv.boot_params =boot_params;
    priv.efi = &boot_params->efi_info;

priv.e820ext = NULL;
priv.e820ext_size = 0;
priv.is64 = is64;

+status = allocate_e820(boot_params, &e820ext, &e820ext_size);
+if (status != EFI_SUCCESS)
+  return status;
+
+ /* Might as well exit boot services now */
status = efi_exit_boot_services(sys_table, handle, &map, &priv,
exit_boot_func);
if (status != EFI_SUCCESS)
  return status;

-e820ext = priv.e820ext;
e820ext_size = priv.e820ext_size;
/* Historic? */
boot_params->alt_mem_k = 32 * 1024;

@@ -990,6 +1011,8 @@
else
  setup_boot_services32(efi_early);

+sanitize_boot_params(boot_params);
+
+/*
+ * If the boot loader gave us a value for secure_boot then we use that,
+ * otherwise we ask the BIOS.
--- linux-4.15.0.orig/arch/x86/boot/compressed/head_32.S
+++ linux-4.15.0/arch/x86/boot/compressed/head_32.S
@@ -49,16 +49,17 @@
* Position Independent Executable (PIE) so that linker won't optimize
* R_386_GOT32X relocation to its fixed symbol address. Older
* linkers generate R_386_32 relocations against locally defined symbols,
- * _bss, _ebss, _got and _egot, in PIE. It isn't wrong, just less
+ * _bss, _ebss, _got, _egot and _end, in PIE. It isn't wrong, just less
* optimal than R_386_RELATIVE. But the x86 kernel fails to properly handle
* R_386_32 relocations when relocating the kernel. To generate
- * R_386_RELATIVE relocations, we mark _bss, _ebss, _got and _egot as
+ * R_386_RELATIVE relocations, we mark _bss, _ebss, _got, _egot and _end as
* hidden:
* /
.hidden _bss
.hidden _ebss
.hidden _got
.hidden _egot
+ hidden _end
ENTRY(startup_32)
@@ -106,7 +107,7 @@
 notl %eax
 andl %eax, %ebx
 cmpl $LOAD_PHYSICAL_ADDR, %ebx
 -jge1f
 +jae1f
 #endif
 movl $LOAD_PHYSICAL_ADDR, %ebx
1:
--- linux-4.15.0.orig/arch/x86/boot/compressed/head_64.S
+++ linux-4.15.0/arch/x86/boot/compressed/head_64.S
@@ -41,6 +41,7 @@
 .hidden _ebss
 .hidden _got
 .hidden _egot
+.hidden _end
 __HEAD
 .code32
@@ -105,7 +106,7 @@
 notl %eax
 andl %eax, %ebx
 cmpl $LOAD_PHYSICAL_ADDR, %ebx
 -jge1f
 +jae1f
 #endif
 movl $LOAD_PHYSICAL_ADDR, %ebx
1:
@@ -243,6 +244,11 @@
 leal efi32_config(%ebp), %eax
 movl %eax, efi_config(%ebp)

+/* Disable paging */
+movl %cr0, %eax
+btrl$X86_CRO_PG_BIT, %eax
+movl %eax, %cr0
+
+jmp startup_32
ENDPROC(efi32_stub_entry)
#endif
@@ -291,7 +297,7 @@
 notq %rax
 andq %rax, %rbp
 cmpq $LOAD_PHYSICAL_ADDR, %rbp
 -jge1f
 +jae1f
#endif
movq $LOAD_PHYSICAL_ADDR, %rbp
1:
--- linux-4.15.0.orig/arch/x86/boot/compressed/kaslr.c
+++ linux-4.15.0/arch/x86/boot/compressed/kaslr.c
@@ -48,6 +48,9 @@
extern unsigned long get_cmd_line_ptr(void);

+/* Used by PAGE_KERN macros: */
+pteval_t __default_kernel_pte_mask __read_mostly = ~0;
+
 /* Simplified build-specific string for starting entropy. */
static const char build_str[] = UTS_RELEASE " (" LINUX_COMPILE_BY " @"
 LINUX_COMPILE_HOST " ) (" LINUX_COMPILER ") " UTS_VERSION;
--- linux-4.15.0.orig/arch/x86/boot/compressed/mem_encrypt.S
+++ linux-4.15.0/arch/x86/boot/compressed/mem_encrypt.S
@@ -25,20 +25,6 @@
push %ebx
push %ecx
push %edx
-push %edi
-
-/* RIP-relative addressing is needed to access the encryption bit
- * variable. Since we are running in 32-bit mode we need this call/pop
- * sequence to get the proper relative addressing.
- */
-call1f
-1: popl %edi
-subl $1b, %edi
-
-movl enc_bit(%edi), %eax
-cmpl $0, %eax
-jge .Lsev_exit

/* Check if running under a hypervisor */
movl $1, %eax
@@ -69,15 +55,12 @@
movl %ebx, %eax
andl $0x3f, %eax /* Return the encryption bit location */
-movl %eax, enc_bit(%edi)
jmp .Lsev_exit

.Lno_sev:
xor %eax, %eax
-movl %eax, enc_bit(%edi)
.Lsev_exit:
  -pop %edi
  pop %edx
  pop %ecx
  pop %ebx
@@ -114,7 +97,3 @@
ret
ENDPROC(get_sev_encryption_mask)
-
.data
-enc_bit:
-.int 0xffffffff
--- linux-4.15.0.orig/arch/x86/boot/compressed/misc.c
+++ linux-4.15.0/arch/x86/boot/compressed/misc.c
@@ -16,6 +16,7 @@
#include "error.h"
#include ".../string.h"
#include ".../voffset.h"
+#include <asm/bootparam_utils.h>
/*
 * WARNING!!
@@ -309,6 +310,10 @@
switch (phdr->p_type) {
case PT_LOAD:
+ifdef CONFIG_X86_64
+if ((phdr->p_align % 0x200000) != 0)
+error("Alignment of LOAD segment isn't multiple of 2MB");
+endif
+ifdef CONFIG_RELOCATABLE
  dest = output;
  dest += (phdr->p_paddr - LOAD_PHYSICAL_ADDR);
--- linux-4.15.0.orig/arch/x86/boot/compressed/misc.h
+++ linux-4.15.0/arch/x86/boot/compressed/misc.h
@@ -19,7 +19,6 @@
#include <asm/page.h>
#include <asm/boot.h>
#include <asm/bootparam.h>
+#include <asm/bootparam_utils.h>
#define BOOT_BOOT_H
#include ".../ctype.h"
--- linux-4.15.0.orig/arch/x86/boot/compressed/pagetable.c
+++ linux-4.15.0/arch/x86/boot/compressed/pagetable.c
@@ -36,9 +36,6 @@

#define __PAGE_OFFSET __PAGE_OFFSET_BASE
#include "/.../mm/ident_map.c"

-/* Used by pgtable.h asm code to force instruction serialization. */
-unsigned long __force_order;
-
/* Used to track our page table allocation area. */
struct alloc_pgt_data {
unsigned char *pgt_buf;
--- linux-4.15.0.orig/arch/x86/boot/tools/build.c
+++ linux-4.15.0/arch/x86/boot/tools/build.c
@@ -391,6 +391,13 @@
die("Unable to mmap "/" %s": %m", argv[2]);
/* Number of 16-byte paragraphs, including space for a 4-byte CRC */
sys_size = (sz + 15 + 4) / 16;
+#ifdef CONFIG_EFI_STUB
+/*
+ * COFF requires minimum 32-byte alignment of sections, and
+ * adding a signature is problematic without that alignment.
+ */
+sys_size = (sys_size + 1) & ~1;
+#endif

/* Patch the setup code with the appropriate size parameters */
buf[0x1f1] = setup_sectors-1;
--- linux-4.15.0.orig/arch/x86/boot/video-vga.c
+++ linux-4.15.0/arch/x86/boot/video-vga.c
@@ -190,7 +190,7 @@
vga_set_vertical_end(60*8);
 }

-static int vga_set_mode(struct mode_info *mode)
+static int __attribute__((optimize("no-jump-tables"))) vga_set_mode(struct mode_info *mode)
 {
 /* Set the basic mode */
vga_set_basic_mode();
--- linux-4.15.0.orig/arch/x86/configs/i386_defconfig
+++ linux-4.15.0/arch/x86/configs/i386_defconfig
@@ -149,7 +149,6 @@
 CONFIG_FB_TILEBLITTING=y

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CONFIG_FB_EFI=y
# CONFIG_LCD_CLASSDEVICE is not set
-CONFIG_VGACON_SOFT_SCROLLBACK=y
CONFIG_LOGO=y
# CONFIG_LOGO_LINUX_MONO is not set
# CONFIG_LOGO_LINUX_VGA16 is not set
@@ -247,6 +245,7 @@
CONFIG_USB=y
CONFIG_USB_Announce_New_Devices=y
CONFIG_USB_MON=y
+CONFIG_USB_XHCI_HCD=y
CONFIG_USB_EHCI_HCD=y
CONFIG_USB_EHCI_TT_NEWSCHED=y
CONFIG_USB_OHCI_HCD=y
--- linux-4.15.0.orig/arch/x86/configs/x86_64_defconfig
+++ linux-4.15.0/arch/x86/configs/x86_64_defconfig
@@ -148,7 +148,6 @@
CONFIG_BLK_DEV_LOOP=y
CONFIG_BLK_DEV_SD=y
CONFIG_BLK_DEV_SR=y
-CONFIG_BLK_DEV_SR_VENDOR=y
CONFIG_CHR_DEV_SG=y
CONFIG_SCSI_CONSTANTS=y
CONFIG_SCSI_SPI_ATTRS=y
@@ -213,7 +212,6 @@
CONFIG_FB_TILEBLITTING=y
CONFIG_FB_EFI=y
# CONFIG_LCD_CLASSDEVICE is not set
-CONFIG_VGACON_SOFT_SCROLLBACK=y
CONFIG_LOGO=y
# CONFIG_LOGO_LINUX_MONO is not set
# CONFIG_LOGO_LINUX_VGA16 is not set
@@ -243,6 +241,7 @@
CONFIG_USB=y
CONFIG_USB_Announce_New_Devices=y
CONFIG_USB_MON=y
+CONFIG_USB_XHCI_HCD=y
CONFIG_USB_EHCI_HCD=y
CONFIG_USB_EHCI_TT_NEWSCHED=y
CONFIG_USB_OHCI_HCD=y
--- linux-4.15.0.orig/arch/x86/crypto/Makefile
+++ linux-4.15.0/arch/x86/crypto/Makefile
@@ -15,7 +15,6 @@
obj-$(CONFIG_CRYPTO_AES_586) += aes-i586.o
obj-$(CONFIG_CRYPTO_TWOFISH_586) += twofish-i586.o
-obj-$(CONFIG_CRYPTO_SALSA20_586) += salsa20-i586.o
obj-$(CONFIG_CRYPTO_SERPENT_SSE2_586) += serpent-sse2-i586.o

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obj-$(CONFIG_CRYPTO_AES_X86_64) += aes-x86_64.o
@@ -24,7 +23,6 @@
obj-$(CONFIG_CRYPTO_BLOWFISH_X86_64) += blowfish-x86_64.o
obj-$(CONFIG_CRYPTO_TWOFISH_X86_64) += twofish-x86_64.o
obj-$(CONFIG_CRYPTO_TWOFISH_X86_64_3WAY) += twofish-x86_64-3way.o
-obj-$(CONFIG_CRYPTO_SALSA20_X86_64) += salsa20-x86_64.o
obj-$(CONFIG_CRYPTO_CHACHA20_X86_64) += chacha20-x86_64.o
obj-$(CONFIG_CRYPTO_SERPENT_SSE2_X86_64) += serpent-sse2-x86_64.o
obj-$(CONFIG_CRYPTO_AES_NI_INTEL) += aesni-intel.o
@@ -59,7 +57,6 @@
aes-i586-y := aes-i586-asm_32.o aes_glue.o
twofish-i586-y := twofish-i586-asm_32.o twofish_glue.o
-salsa20-i586-y := salsa20-i586-asm_32.o salsa20_glue.o
serpent-sse2-i586-y := serpent-sse2-i586-asm_32.o serpent_sse2_glue.o

aes-x86_64-y := aes-x86_64-asm_64.o aes_glue.o
@@ -68,7 +65,6 @@
blowfish-x86_64-y := blowfish-x86_64-asm_64.o blowfish_glue.o
twofish-x86_64-y := twofish-x86_64-asm_64.o twofish_glue.o
twofish-x86_64-3way-y := twofish-x86_64-asm_64-3way.o twofish_glue_3way.o
-salsa20-x86_64-y := salsa20-x86_64-asm_64.o salsa20_glue.o
chacha20-x86_64-y := chacha20-ssse3-x86_64.o chacha20_glue.o
serpent-sse2-x86_64-y := serpent-sse2-x86_64-asm_64.o serpent_sse2_glue.o

--- linux-4.15.0.orig/arch/x86/crypto/aes_ctrby8_avx-x86_64.S
+++ linux-4.15.0/arch/x86/crypto/aes_ctrby8_avx-x86_64.S
@@ -127,10 +127,6 @@
 /* generate a unique variable for ddq_add_x */

 .macro setddq n
-var_ddq_add = ddq_add_
 .endm
-
 /* generate a unique variable for xmm register */
 .macro setxdata n
 var_xdata = %xmm
 @@ -140,9 +136,7 @@
 .macro club name, id
 .altmacro
-\if \name == DDQ_DATA
-setddq %\id
-\else\fi\name == XDATA
+.\if \name == XDATA
 setxdata %\id

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.endif
.noaltmacro
@@ -165,9 +159,8 @@
.set i, 1
.rept (by - 1)
-club DDQ_DATA, i
club XDATA, i
-vpaddqvar_ddq_add(%rip), xcounter, var_xdata
+vpaddq(ddq_add_1 + 16 * (i - 1))(%rip), xcounter, var_xdata
vptestddq_low_msk(%rip), var_xdata
jnz 1f
vpaddqddq_high_add_1(%rip), var_xdata, var_xdata
@@ -180,8 +173,7 @@
vmovdqa1*16(p_keys), xkeyA
vpxorxkey0, xdata0, xdata0
-club DDQ_DATA, by
-vpaddqvar_ddq_add(%rip), xcounter, xcounter
+vpaddq(ddq_add_1 + 16 * (by - 1))(%rip), xcounter, xcounter
vptestddq_low_msk(%rip), xcounter
jnz1f
vpaddqddq_high_add_1(%rip), xcounter, xcounter
--- linux-4.15.0.orig/arch/x86/crypto/aesni-intel_asm.S
+++ linux-4.15.0/arch/x86/crypto/aesni-intel_asm.S
@@ -90,30 +90,6 @@
ALL_F:
.octa 0xffffffffffffffffffffffffffffffff
.octa 0x00000000000000000000000000000000
-.section .rodata
-.align 16
-.type aad_shift_arr, @object
-.size aad_shift_arr, 272
-aad_shift_arr:
.octa 0xffffffffffffffffffffffffffffffff
.octa 0xffffffffffffffffffffffffffffff0C
.octa 0xffffffffffffffffffffffffffff0D0C
.octa 0xffffffffffffffffffffffffff0E0D0C
.octa 0xffffffffffffffffffffffff0F0E0D0C
.octa 0xffffffffffffffffffffff0C0B0A0908
.octa 0xffffffffffffffffffff0D0C0B0A0908
.octa 0xffffffffffffffffff0E0D0C0B0A0908
.octa 0xffffffffffffffff0F0E0D0C0B0A0908
.octa 0xffffffffffffff0C0B0A090807060504
.octa 0xffffffffffff0D0C0B0A090807060504
.octa 0xffffffffff0E0D0C0B0A090807060504
.octa 0xffffffff0F0E0D0C0B0A090807060504
.octa 0xffffff0C0B0A09080706050403020100

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@@ -257,6 +233,37 @@
 pxor   \
 TMP1, \GH            # result is in TMP1
 .endm

+# Reads DLEN bytes starting at DPTR and stores in XMMDst
+# where 0 < DLEN < 16
+# Clobbers %rax, DLEN and XMM1
+.macro READ_PARTIAL_BLOCK DPTR DLEN XMM1 XMMDst
+    cmp $8, \DLEN
+    jl _read_lt8_\@
+    mov (\DPTR), %rax
+    MOVQ_R64_XMM %rax, \XMMDst
+    sub $8, \DLEN
+    jz _done_read_partial_block_\@
+    xor %eax, %eax
+_read_next_byte_\@:
+    shl $8, %rax
+    mov 7(\DPTR, \DLEN, 1), %al
+    dec \DLEN
+    jnz _read_next_byte_\@
+    MOVQ_R64_XMM %rax, \XMMDst
+    _read_next_byte_lt8_\@:
+    xor %eax, %eax
+_read_next_byte_lt8_\@:
+    shl $8, %rax
+    mov -1(\DPTR, \DLEN, 1), %al
+    dec \DLEN
+    jnz _read_next_byte_lt8_\@
+    MOVQ_R64_XMM %rax, \XMMDst
+_done_read_partial_block_\@:
+.endm

/*
 * if a = number of total plaintext bytes
 * b = floor(a/16)
 @@ -273,62 +280,30 @@
 XMM2 XMM3 XMM4 XMMDst TMP6 TMP7 i i_seq operation
mov arg7, %r10  # %r10 = AAD
-mov arg8, %r12  # %r12 = aadLen
-mov %r12, %r11
+mov arg8, %r11  # %r11 = aadLen
pxor %xmm14, %xmm14
pxor %xmm1, %xmm1
pxor %xmm2, %xmm2

movdqu (%r10), %xmm1
PSHUFB_XMM %xmm14, %xmm1 # byte-reflect the AAD data
pxor %xmm14, %xmm14
GHASH_MUL %XMM2, %TMP3, %TMP1, %TMP2, %TMP4, %TMP5, %XMM1
add $16, %r10
-sub $16, %r12
sub $16, %r11
cmp $16, %r11
jge _get_AAD_blocks operation
movdqu %XMM2, %xmm1

/* read the last <16B of AAD */
_get_AAD_rest operation:
 cmp $0, %r11
 je _get_AAD_done operation
  pxor %xmm1, %xmm1
- /* read the last <16B of AAD. since we have at least 4B of
  data right after the AAD (the ICV, and maybe some CT), we can
  read 4B/8B blocks safely, and then get rid of the extra stuff */
  _get_AAD_rest8 operation:
  cmp $4, %r11
  jle _get_AAD_rest4 operation
  movq (%r10), %TMP1
  add $8, %r10
  sub $8, %r11
  pslldq $8, %TMP1
  psrldq $8, %xmm1
  pxor %TMP1, %xmm1
  jmp _get_AAD_rest8 operation
- _get_AAD_rest4 operation:
  cmp $0, %r11
  jle _get_AAD_rest0 operation
  mov (%r10), %eax
-movq %rax, %r10
-add $4, %r10
-sub $4, %r10
-pslldq $12, %r10
-psrldq $4, %xmm
-pxor %xmm
-__get_AAD_rest0
num_initial_blocks
operation:
/* finalize: shift out the extra bytes we read, and align
-left. since pslldq can only shift by an immediate, we use
-vpshufb and an array of shuffle masks */
-movq %r12, %r11
-salq $4, %r11
-movq aad_shift_arr(%r11), %r11
-PSHUFB_XMM %r11, %xmm
-__get_AAD_rest_final
num_initial_blocks
operation:
+READ_PARTIAL_BLOCK %r11, %xmm
PSHUFB_XMM %xmm14, %xmm1 # byte-reflect the AAD data
pxor %xmm2, %xmm1
GHASH_MUL %xmm1, %xmm2, %xmm1, %xmm2, %xmm3, %xmm4
@@ -532,62 +507,30 @@
MOVADQ SHUF_MASK(rip), %xmm14
mov arg7, %r10  # %r10 = AAD
-mov arg8, %r12  # %r12 = aadLen
-mov %r12, %r11
+mov arg8, %r11  # %r11 = aadLen
pxor %xmm14, %xmm14
pxor %xmm2, %xmm2

cmp $16, %r11
-jl __get_AAD_rest8
num_initial_blocks
operation
+jl __get_AAD_rest
num_initial_blocks
operation:
movdqu (%r10), %xmm1
PSHUFB_XMM %xmm14, %xmm1 # byte-reflect the AAD data
pxor %xmm14, %xmm1
GHASH_MUL %xmm2, %xmm3, %xmm4, %xmm5, %xmm6
add $16, %r10
-sub $16, %r12
sub $16, %r11
cmp $16, %r11
jge __get_AAD_blocks
num_initial_blocks
operation

movdqu %xmm2, %xmm1
+
+/* read the last <16B of AAD */
+__get_AAD_rest
num_initial_blocks
operation:
cmp $0, %r11
je _get_AAD_done\num_initial_blocks\operation

-pxor %xmm\i,%xmm\i
-
-/* read the last <16B of AAD. since we have at least 4B of
-data right after the AAD (the ICV, and maybe some PT), we can
-read 4B/8B blocks safely, and then get rid of the extra stuff */
- _get_AAD_rest8\num_initial_blocks\operation:
- cmp $4, %r11
- jle _get_AAD_rest4\num_initial_blocks\operation
- movq (%r10), \TMP1
- add $8, %r10
- sub $8, %r11
- pslldq $8,\TMP1
- psrldq $8, %xmm\i
- p xor \TMP1, %xmm\i
- jmp _get_AAD_rest8\num_initial_blocks\operation
- _get_AAD_rest4\num_initial_blocks\operation:
- cmp $0, %r11
- jle _get_AAD_rest0\num_initial_blocks\operation
- mov (%r10), %eax
- movq %rax, \TMP1
- add $4, %r10
- sub $4, %r10
- pslldq $12, \TMP1
- psrldq $4, %xmm\i
- p xor \TMP1, %xmm\i
- _get_AAD_rest0\num_initial_blocks\operation:
- /* finalize: shift out the extra bytes we read, and align
-left. since pslldq can only shift by an immediate, we use
- vpsubu and an array of shuffle masks */
- movq %r12, %r11
- salq $4, %r11
- movdq aad_shift_arr(%r11), \TMP1
- PSHUFB_XMM \TMP1, %xmm\i
- _get_AAD_rest_final\num_initial_blocks\operation:
+READ_PARTIAL_BLOCK %r10, %r11, \TMP1, %xmm\i
PSHUFB_XMM %xmm14, %xmm\i # byte-reflect the AAD data
pxor \XMM2, %xmm\i
GHASH_MUL \XMM2, \TMP3, \TMP1, \TMP2, \TMP4, \TMP5, \XMM1
@@ -1386,14 +1329,6 @@
* 
* AAD Format with 64-bit Extended Sequence Number
* 
- * aadLen:
- * from the definition of the spec, aadLen can only be 8 or 12 bytes.
- * The code supports 16 too but for other sizes, the code will fail.
- TLen:
  - from the definition of the spec, TLen can only be 8, 12 or 16 bytes.
  - For other sizes, the code will fail.
  -
- poly = x^128 + x^127 + x^126 + x^121 + 1

*****************************************************************************/
@@ -1487,19 +1422,16 @@
PSHUFB_XMM %xmm10, %xmm0

ENCRIPT_SINGLE_BLOCK %xmm0, %xmm1 # E(K, Yn)
-sub $16, %r11
-add %r13, %r11
-movdqu (%arg3,%r11,1), %xmm1 # receive the last <16 byte block
-lea SHIFT_MASK+16(%rip), %r12
-sub %r13, %r12
-# adjust the shuffle mask pointer to be able to shift 16-%r13 bytes
-# (%r13 is the number of bytes in plaintext mod 16)
-movdqu (%r12), %xmm2 # get the appropriate shuffle mask
-PSHUFB_XMM %xmm2, %xmm1 # right shift 16-%r13 bytes

+lea (%arg3,%r11,1), %r10
+mov %r13, %r12
+READ_PARTIAL_BLOCK %r10 %r12 %xmm2 %xmm1
+
+lea ALL_F+16(%rip), %r12
+sub %r13, %r12
movdqa %xmm1, %xmm2
pxor %xmm1, %xmm0 # Ciphertext XOR E(K, Yn)
-movdqu ALL_F-SHIFT_MASK(%r12), %xmm1
+movdqu (%r12), %xmm1
# get the appropriate mask to mask out top 16-%r13 bytes of %xmm0
pand %xmm1, %xmm0 # mask out top 16-%r13 bytes of %xmm0
pand %xmm1, %xmm2
@@ -1508,9 +1440,6 @@
pxor %xmm2, %xmm8
GHASH_MUL %xmm8, %xmm13, %xmm9, %xmm10, %xmm11, %xmm5, %xmm6
- # GHASH computation for the last <16 byte block
-sub %r13, %r11
-add $16, %r11

# output %r13 bytes
MOVQ_R64_XMM%xmm0, %rax
@@ -1664,14 +1593,6 @@

AAD Format with 64-bit Extended Sequence Number

- aadLen:
  - from the definition of the spec, aadLen can only be 8 or 12 bytes.
  - The code supports 16 too but for other sizes, the code will fail.

- TLen:
  - from the definition of the spec, TLen can only be 8, 12 or 16 bytes.
  - For other sizes, the code will fail.

* poly = x^128 + x^127 + x^126 + x^121 + 1

***************************************************************************/
ENTRY(aesni_gcm_enc)
@@ -1764,19 +1685,16 @@
    movdqa SHUF_MASK(%rip), %xmm10

PSHUFB_XMM %xmm10, %xmm0

- ENCRYPT_SINGLE_BLOCK %xmm0, %xmm1       # Encrypt(K, Yn)
  - sub $16, %r11
  - add %r13, %r11
  - movdqu ([arg3,%r11+1,%r12], %xmm1   # receive the last <16 byte blocks
  - lea SHIFT_MASK+16(%rip), %r12
  +
  +lea (%arg3,%r11+1,%r12)
  +mov %r13, %r12

+READ_PARTIAL_BLOCK %r10 %r12 %xmm2 %xmm1

  +
  +lea ALL_F+16(%rip), %r12
  sub %r13, %r12
  # adjust the shuffle mask pointer to be able to shift 16-r13 bytes

  +# (%r13 is the number of bytes in plaintext mod 16)
  -movdqu(%r12), %xmm2       # get the appropriate shuffle mask
  -PSHUFB_XMM %xmm2, %xmm1    # shift right 16-r13 byte
  -pxor %xmm1, %xmm0          # Plaintext XOR Encrypt(K, Yn)
  +movdquALL_F-SHIFT_MASK(%r12), %xmm1
  +movdqu(%r12), %xmm1
  # get the appropriate mask to mask out top 16-r13 bytes of xmm0
  -pand %xmm1, %xmm0          # mask out top 16-r13 bytes of xmm0
  movdqa SHUF_MASK(%rip), %xmm10
  @@ -1785,9 +1703,6 @@
    pxor%xmm0, %xmm8
    GHASH_MUL %xmm8, %xmm13, %xmm9, %xmm10, %xmm11, %xmm5, %xmm6
  # GHASH computation for the last <16 byte block
  -sub%r13, %r11
  -add$16, %r11

  - movdqa SHUF_MASK(%rip), %xmm10
  PSHUFB_XMM %xmm10, %xmm0
--- linux-4.15.0.orig/arch/x86/crypto/aesni-intel_glue.c
+++ linux-4.15.0/arch/x86/crypto/aesni-intel_glue.c
@@ -690,8 +690,8 @@
     rfc4106_set_hash_subkey(ctx->hash_subkey, key, key_len);
 }

-static int rfc4106_set_key(struct crypto_aead *parent, const u8 *key,
-                         unsigned int key_len)
+static int gcmaes_wrapper_set_key(struct crypto_aead *parent, const u8 *key,
+                         unsigned int key_len)
 {
     struct cryptd_aead **ctx = crypto_aead_ctx(parent);
     struct cryptd_aead *cryptd_tfm = *ctx;
@@ -716,8 +716,8 @@
     /* This is the Integrity Check Value (aka the authentication tag length and can
        * be 8, 12 or 16 bytes long. */
-static int rfc4106_set_authsize(struct crypto_aead *parent,
-                               unsigned int authsize)
+static int gcmaes_wrapper_set_authsize(struct crypto_aead *parent,
+                               unsigned int authsize)
 {
     struct cryptd_aead **ctx = crypto_aead_ctx(parent);
     struct cryptd_aead *cryptd_tfm = *ctx;
@@ -824,7 +824,7 @@
        if (sg_is_last(req->src) &&
            (!PageHighMem(sg_page(req->src)) ||
             req->src->offset + req->src->length <= PAGE_SIZE) &&
-        sg_is_last(req->dst) &&
+        sg_is_last(req->dst) && req->dst->length &&
            (!PageHighMem(sg_page(req->dst)) ||
             req->dst->offset + req->dst->length <= PAGE_SIZE)) {
        one_entry_in_sg = 1;
@@ -929,7 +929,7 @@
        aes_ctx);
    }

-static int rfc4106_encrypt(struct aead_request *req)
+static int gcmaes_wrapper_encrypt(struct aead_request *req)
 {
     struct crypto_aead *tfm = crypto_aead_reqtfm(req);
     struct cryptd_aead **ctx = crypto_aead_ctx(tfm);
@@ -945,7 +945,7 @@
        return crypto_aead_encrypt(req);
    }

-static int rfc4106_decrypt(struct aead_request *req)
+static int gcmaes_wrapper_decrypt(struct aead_request *req)


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11504

```c
{
struct crypto_aead *tfm = crypto_aead_reqtfm(req);
struct cryptd_aead **ctx = crypto_aead_ctx(tfm);
@@ -1117,7 +1117,7 @@
{
    __be32 counter = cpu_to_be32(1);
    struct crypto_aead *tfm = crypto_aead_reqtfm(req);
    -struct aesni_rfc4106_gcm_ctx *ctx = aesni_rfc4106_gcm_ctx_get(tfm);
    +struct generic_gcm_aes_ctx *ctx = generic_gcm_aes_ctx_get(tfm);
    void *aes_ctx = &(ctx->aes_key_expanded);
    u8 iv[16] __attribute__ ((__aligned__(AESNI_ALIGN)));  

    @@ -1128,6 +1128,30 @@
        aes_ctx);
}

+static int generic_gcm_aes_init(struct crypto_aead *aead)
+{
+    struct cryptd_aead *cryptd_tfm;
+    struct cryptd_aead **ctx = crypto_aead_ctx(aead);
+    +cryptd_tfm = cryptd_alloc_aead("__driver-generic-gcm-aes-aesni",
+            CRYPTO_ALG_INTERNAL,
+            CRYPTO_ALG_INTERNAL);
+    if (IS_ERR(cryptd_tfm))
+        return PTR_ERR(cryptd_tfm);
+    *ctx = cryptd_tfm;
+    crypto_aead_set_reqsize(aead, crypto_aead_reqsize(&cryptd_tfm->base));
+    +return 0;
+}
+
+static void generic_gcm_aes_exit(struct crypto_aead *aead)
+{
+    struct cryptd_aead **ctx = crypto_aead_ctx(aead);
+    +cryptd_free_aead(*ctx);
+}
+
+static struct aead_alg aesni_aead_algs[] = {
    .setkey = common_rfc4106_set_key,
    .setauthsize = common_rfc4106_set_authsize,
    @@ -1147,10 +1171,10 @@
    }
    .init = rfc4106_init,
    .exit = rfc4106_exit,
    -.setkey = rfc4106_set_key,
```
.setauthsize= rfc4106_set_authsize,
.encrypt= rfc4106_encrypt,
.decrypt= rfc4106_decrypt,
.setkey= gcmaes_wrapper_set_key,
.setauthsize= gcmaes_wrapper_set_authsize,
.encrypt= gcmaes_wrapper_encrypt,
.decrypt= gcmaes_wrapper_decrypt,
.ivsize= GCM_RFC4106_IV_SIZE,
.maxauthsize= 16,
.base = {
@@ -1170,13 +1194,31 @@
   .ivsize= GCM_AES_IV_SIZE,
   .maxauthsize= 16,
   .base = {
+      .cra_name= "__generic-gcm-aes-aesni",
+      .cra_driver_name= "__driver-generic-gcm-aes-aesni",
+      .cra_priority= 0,
+      .cra_flags= CRYPTO_ALG_INTERNAL,
+      .cra_blocksize= 1,
+      .cra_ctxsize= sizeof(struct generic_gcmaes_ctx),
+      .cra_alignmask= AESNI_ALIGN - 1,
+      .cra_module= THIS_MODULE,
  },
  },
+  .init= generic_gcmaes_init,
+  .exit= generic_gcmaes_exit,
+  .setkey= gcmaes_wrapper_set_key,
+  .setauthsize= gcmaes_wrapper_set_authsize,
+  .encrypt= gcmaes_wrapper_encrypt,
+  .decrypt= gcmaes_wrapper_decrypt,
+  .ivsize= GCM_AES_IV_SIZE,
+  .maxauthsize= 16,
+  .base = {
      .cra_name= "gcm(aes)",
      .cra_driver_name= "generic-gcm-aes-aesni",
      .cra_priority= 400,
      .cra_flags= CRYPTO_ALG_ASYNC,
      .cra_blocksize= 1,
      .cra_ctxsize= sizeof(struct generic_gcmaes_ctx),
      .cra_alignmask= AESNI_ALIGN - 1,
      .cra_ctxsize= sizeof(struct cryptd_aead *),
      .cra_module= THIS_MODULE,
  },
};

--- linux-4.15.0.orig/arch/x86/crypto/cast5_avx_glue.c
+++ linux-4.15.0/arch/x86/crypto/cast5_avx_glue.c
@@ -66,8 +66,6 @@
 void (*fn)(struct cast5_ctx *ctx, u8 *dst, const u8 *src);
int err;

-fn = (enc) ? cast5_ecb_enc_16way : cast5_ecb_dec_16way;
-
err = blkcipher_walk_virt(desc, walk);
desc->flags &= ~CRYPTO_TFM_REQ_MAY_SLEEP;

@@ -79,6 +77,7 @@
/* Process multi-block batch */
if (nbytes >= bsize * CAST5_PARALLEL_BLOCKS) {
+fn = (enc) ? cast5_ecb_enc_16way : cast5_ecb_dec_16way;
do {
fn(ctx, wdst, wsrc);

--- linux-4.15.0.orig/arch/x86/crypto/crc32-pclmul_glue.c
+++ linux-4.15.0/arch/x86/crypto/crc32-pclmul_glue.c
@@ -162,6 +162,7 @@
.cra_name		= "crc32",
.cra_driver_name	= "crc32-pclmul",
.cra_priority= 200,
+.cra_flags= CRYPTO_ALG_OPTIONAL_KEY,
.cra_blocksize= CHKSUM_BLOCK_SIZE,
.cra_ctxsize= sizeof(u32),
.cra_module= THIS_MODULE,
--- linux-4.15.0.orig/arch/x86/crypto/crc32c-intel_glue.c
+++ linux-4.15.0/arch/x86/crypto/crc32c-intel_glue.c
@@ -226,6 +226,7 @@
.cra_name		= "crc32c",
.cra_driver_name	= "crc32c-intel",
.cra_priority= 200,
+.cra_flags=CRYPTO_ALG_OPTIONAL_KEY,
.cra_blocksize=CHKSUM_BLOCK_SIZE,
.cra_ctxsize=sizeof(u32),
.cra_module=THIS_MODULE,
--- linux-4.15.0.orig/arch/x86/crypto/crct10dif-pclmul_glue.c
+++ linux-4.15.0/arch/x86/crypto/crct10dif-pclmul_glue.c
@@ -170,7 +170,7 @@
## branch into array
lea	jump_table(%rip), bufp
-movzxw  (bufp, %rax, 2), len
+movzwq  (bufp, %rax, 2), len
lea	crc_array(%rip), bufp
lea	(len, bufp), bufp
JMP_NOSPEC bufp

--- linux-4.15.0.orig/arch/x86/crypto/crc10dif-pclmul_glue.c
+++ linux-4.15.0/arch/x86/crypto/crc10dif-pclmul_glue.c

@@ -76,15 +76,14 @@
            return 0;
        }

-    static int __chksum_finup(__u16 *crcp, const u8 *data, unsigned int len,
-                            u8 *out)
+    static int __chksum_finup(__u16 crc, const u8 *data, unsigned int len, u8 *out)
    {
        if (irq_fpu_usable()) {
            kernel_fpu_begin();
            -*(__u16 *)out = crc_t10dif_pcl(*crcp, data, len);
+            -*(__u16 *)out = crc_t10dif_pcl(crc, data, len);
            kernel_fpu_end();
        } else
            -*(__u16 *)out = crc_t10dif_generic(*crcp, data, len);
+            -*(__u16 *)out = crc_t10dif_generic(crc, data, len);
        return 0;
    }

@@ -93,15 +92,13 @@
        }
    }

    static int chksum_digest(struct shash_desc *desc, const u8 *data,
                              unsigned int length, u8 *out)
    {
-        struct chksum_desc_ctx *ctx = shash_desc_ctx(desc);
-        -*ctx->crc = shash_desc_ctx(desc);
+        return __chksum_finup(0, data, length, out);
        return __chksum_finup(ctx->crc, data, len, out);
    }

    static int __chksum_finup(__u16 crcp, const u8 *data, unsigned int len,
                            u8 *out)
    {
        struct chksum_desc_ctx *ctx = shash_desc_ctx(desc);

-        -*ctx->crc = shash_desc_ctx(desc);
-        -return __chksum_finup(&ctx->crc, data, len, out);
+        return __chksum_finup(0, data, length, out);

    }

    static struct shash_alg alg = {
        --- linux-4.15.0.orig/arch/x86/crypto/poly1305-avx2-x86_64.S
        +++ linux-4.15.0/arch/x86/crypto/poly1305-avx2-x86_64.S
        @ @ -323,6 +323,12 @ @
        vpaddq t2,t1,t1
        vmovd t1x,d4

        +# Now do a partial reduction mod (2^130)-5, carrying h0 -> h1 -> h2 ...
        +# h3 -> h4 -> h0 -> h1 to get h0,h2,h3,h4 < 2^26 and h1 < 2^26 + a small
        +# amount.  Careful: we must not assume the carry bits 'd0 >> 26',
        +# 'd1 >> 26', 'd2 >> 26', 'd3 >> 26', and '(d4 >> 26) * 5' fit in 32-bit
        +# integers.  It's true in a single-block implementation, but not here.
```c
# d1 += d0 >> 26
movd0,%rax
shr$26,%rax
@@ -361,16 +367,16 @@
# h0 += (d4 >> 26) * 5
movd4,%rax
shr$26,%rax
-lea(%eax,%eax,4),%eax
-add%eax,%ebx
+lea(%rax,%rax,4),%rax
+add%rax,%rbx
# h4 = d4 & 0x3ffffff
movd4,%rax
and$0x3ffffff,%eax
mov%eax,h4

# h1 += h0 >> 26
-mov%ebx,%eax
-shr$26,%eax
+mov%rbx,%rax
+shr$26,%rax
add%eax,h1
# h0 = h0 & 0x3ffffff
andl$0x3ffffff,%ebx
--- linux-4.15.0.orig/arch/x86/crypto/poly1305-sse2-x86_64.S
+++ linux-4.15.0/arch/x86/crypto/poly1305-sse2-x86_64.S
@@ -253,16 +253,16 @@
# h0 += (d4 >> 26) * 5
movd4,%rax
shr$26,%rax
-lea(%eax,%eax,4),%eax
-add%eax,%ebx
+lea(%rax,%rax,4),%rax
+add%rax,%rbx
# h4 = d4 & 0x3ffffff
movd4,%rax
and$0x3ffffff,%eax
mov%eax,h4

# h1 += h0 >> 26
-mov%ebx,%eax
-shr$26,%eax
+mov%rbx,%rax
+shr$26,%rax
add%eax,h1
# h0 = h0 & 0x3ffffff
andl$0x3ffffff,%ebx
```

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+ # Now do a partial reduction mod \((2^{130})-5\), carrying h0 -> h1 -> h2 ->
+ # h3 -> h4 -> h0 to get h0, h2, h3, h4 < \(2^{26}\) and h1 < \(2^{26} + \) a small
+ # amount. Careful: we must not assume the carry bits \(d0 >> 26\),
+ # \(d1 >> 26\), \(d2 >> 26\), \(d3 >> 26\), and \((d4 >> 26) \cdot 5\) fit in 32-bit
+ # integers. It's true in a single-block implementation, but not here.
+ 
+ # \(d1 \leftarrow d0 >> 26\)
+ 
+ movd4, %rax
+ shr $26, %rax
+ lea (%eax, %eax, 4), %eax
+ add %eax, %ebx
+ lea (%rax, %rax, 4), %rax
+ add %rax, %rbx
+ # \(h4 = d4 \& 0x3ffffff\)
+ movd4, %rax
+ andl $0x3ffffff, %eax
+ mov %eax, h4
+ 
+ # \(h1 \leftarrow h0 >> 26\)
+ -mov%ebx, %eax
+ -shr $26, %eax
+ +mov%rbx, %rax
+ +shr $26, %rax
+ add %eax, h1
+ 
+ # \(h0 = h0 \& 0x3fffffff\)
+ andl$0x3fffffff, %ebx
vpinsrd $2, _args_digest+2*32(state, idx, 4), %xmm0, %xmm0
vpinsrd $3, _args_digest+3*32(state, idx, 4), %xmm0, %xmm0
-vmovd _args_digest(state, idx, 4), %xmm0
+vmovd_args_digest+4*32(state, idx, 4), %xmm1
vpinsrd $1, _args_digest+5*32(state, idx, 4), %xmm1, %xmm1
vpinsrd $2, _args_digest+6*32(state, idx, 4), %xmm1, %xmm1
vpinsrd $3, _args_digest+7*32(state, idx, 4), %xmm1, %xmm1
--- linux-4.15.0.orig/arch/x86/crypto/sha512-mb/sha512_mb_mgr_init_avx2.c
+++ linux-4.15.0/arch/x86/crypto/sha512-mb/sha512_mb_mgr_init_avx2.c
@@ -57,10 +57,12 @@
{
    unsigned int j;
    -state->lens[0] = 0;
    -state->lens[1] = 1;
    -state->lens[2] = 2;
    -state->lens[3] = 3;
    +/* initially all lanes are unused */
    +state->lens[0] = 0xFFFFFFFF00000000;
    +state->lens[1] = 0xFFFFFFFF00000001;
    +state->lens[2] = 0xFFFFFFFF00000002;
    +state->lens[3] = 0xFFFFFFFF00000003;
    +state->unused_lanes = 0xFF03020100;
    for (j = 0; j < 4; j++)
        state->ldata[j].job_in_lane = NULL;
--- linux-4.15.0.orig/arch/x86/crypto/twofish-x86_64-asm_64-3way.S
+++ linux-4.15.0/arch/x86/crypto/twofish-x86_64-asm_64-3way.S
@@ -55,29 +55,31 @@
#define RX0 %rbp
#define RX1 %r11
#define RX2 %r12
#define RAB1bl %bl
#define RAB2bl %cl

+#define CD0 0x0(%rsp)
+#define CD1 0x8(%rsp)
+#define CD2 0x10(%rsp)
+
+# used only before/after all rounds
#define RCD0 %r8
#define RCD1 %r9
#define RCD2 %r10
-
#define RCD0d %r8d
#define RCD1d %r9d
#define RCD2d %r10d
-
#define RX0 %rbp
#define RX1 %r11
#define RX2 %r12

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- #define RX0d %ebp
- #define RX1d %r11d
- #define RX2d %r12d
-
- #define RY0 %r13
- #define RY1 %r14
- #define RY2 %r15
-
- #define RY0d %r13d
- #define RY1d %r14d
- #define RY2d %r15d
+# used only during rounds
+#define RX0 %r8
+#define RX1 %r9
+#define RX2 %r10
+
+#define RX0d %r8d
+#define RX1d %r9d
+#define RX2d %r10d
+
+#define RY0 %r11
+#define RY1 %r12
+#define RY2 %r13
+
+#define RY0d %r11d
+#define RY1d %r12d
+#define RY2d %r13d

#define RT0 %rdx
#define RT1 %rsi
@@ -85,6 +87,8 @@
#define RT0d %edx
#define RT1d %esi

+#define RT1bl %sil
+
#define do16bit_ror(rot, op1, op2, T0, T1, tmp1, tmp2, ab, dst) \
  movzbl ab ## bl, tmp2 ## d; \
  movzbl ab ## bh, tmp1 ## d; \
@@ -92,6 +96,11 @@
op1##l T0(CTX, tmp2, 4),dst ## d; \
op2##l T1(CTX, tmp1, 4),dst ## d;
+
+#define swap_ab_with_cd(ab, cd, tmp)\
  +movq cd, tmp;\
  +movq ab, cd;\
  +movq tmp, ab;
/* Combined G1 & G2 function. Reordered with help of rotates to have moves
* at beginning.
@@ -110,15 +119,15 @@
/* G1,2 && G2,2 */
do16bit_ror(32, xor, xor, Tx2, Tx3, RT0, RT1, ab ## 0, x ## 0);
do16bit_ror(16, xor, xor, Ty3, Ty0, RT0, RT1, ab ## 0, y ## 0);
-xchgq cd ## 0, ab ## 0;
+swap_ab_with_cd(ab ## 0, cd ## 0, RT0);
\ 
do16bit_ror(32, xor, xor, Tx2, Tx3, RT0, RT1, ab ## 1, x ## 1);
do16bit_ror(16, xor, xor, Ty3, Ty0, RT0, RT1, ab ## 1, y ## 1);
-xchgq cd ## 1, ab ## 1;
+swap_ab_with_cd(ab ## 1, cd ## 1, RT0);
\ 
do16bit_ror(32, xor, xor, Tx2, Tx3, RT0, RT1, ab ## 2, x ## 2);
do16bit_ror(16, xor, xor, Ty3, Ty0, RT0, RT1, ab ## 2, y ## 2);
-xchgq cd ## 2, ab ## 2;
+swap_ab_with_cd(ab ## 2, cd ## 2, RT0);
#define enc_round_end(ab, x, y, n) 
  addl y ## d,		x ## d;
@@ -168,6 +177,16 @@
decrypt_round3(ba, dc, (n*2)+1);
decrypt_round3(ba, dc, (n*2));
+#define push_cd()
+  pushq RCD2;
+  pushq RCD1;
+  pushq RCD0;
+
#define pop_cd()
+  popq RCD0;
+  popq RCD1;
+  popq RCD2;
+
#define inpack3(in, n, xy, m) 
  movq 4*(n)(in),		xy ## 0;
  xorq w+4*m(CTX),		xy ## 0;
@@ -223,11 +242,8 @@
*%rdx: src, RIO
*%rcx: bool, if true: xor output
*/
-pushq %r15;
-pushq %r14;
pushq %r13;
pushq %r12;
-pushq %rbp;
pushq %rbx;

pushq %rcx; /* bool xor */
@@ -235,40 +251,36 @@
inpack_enc3();

-encrypt_cycle3(RAB, RCD, 0);
-encrypt_cycle3(RAB, RCD, 1);
-encrypt_cycle3(RAB, RCD, 2);
-encrypt_cycle3(RAB, RCD, 3);
-encrypt_cycle3(RAB, RCD, 4);
-encrypt_cycle3(RAB, RCD, 5);
-encrypt_cycle3(RAB, RCD, 6);
-encrypt_cycle3(RAB, RCD, 7);
+-push_cd();
+-encrypt_cycle3(RAB, CD, 0);
+-encrypt_cycle3(RAB, CD, 1);
+-encrypt_cycle3(RAB, CD, 2);
+-encrypt_cycle3(RAB, CD, 3);
+-encrypt_cycle3(RAB, CD, 4);
+-encrypt_cycle3(RAB, CD, 5);
+-encrypt_cycle3(RAB, CD, 6);
+-encrypt_cycle3(RAB, CD, 7);
+-pop_cd();

popq RIO; /* dst */
-popq %rbp; /* bool xor */
+popq RT1; /* bool xor */

-testb %bpl, %bpl;
+testb RT1bl, RT1bl;
jnz .L__enc_xor3;

outunpack_enc3(mov);

popq %rbx;
-popq %rbp;
popq %r12;
popq %r13;
-popq %r14;
-popq %r15;
ret;

.L__enc_xor3:
outunpack_enc3(xor);
popq %rbx;
-poplq %rbp;
popq %r12;
poplq %r13;
-poplq %r14;
-poplq %r15;
ret;
ENDPROC,__twofish_enc_blk_3way)

@@ -278,35 +290,31 @@
 *	%rsi: dst
 *	%rdx: src, RIO
 */
 pushq %r15;
 pushq %r14;
pushq %r13;
pushq %r12;
-pushq %rbp;
pushq %rbx;
pushq %rsi; /* dst */
inpack_dec3();

-decrypt_cycle3(RAB, RCD, 7);
-decrypt_cycle3(RAB, RCD, 6);
-decrypt_cycle3(RAB, RCD, 5);
-decrypt_cycle3(RAB, RCD, 4);
-decrypt_cycle3(RAB, RCD, 3);
-decrypt_cycle3(RAB, RCD, 2);
-decrypt_cycle3(RAB, RCD, 1);
-decrypt_cycle3(RAB, RCD, 0);
+push_cd();
+decrypt_cycle3(RAB, CD, 7);
+decrypt_cycle3(RAB, CD, 6);
+decrypt_cycle3(RAB, CD, 5);
+decrypt_cycle3(RAB, CD, 4);
+decrypt_cycle3(RAB, CD, 3);
+decrypt_cycle3(RAB, CD, 2);
+decrypt_cycle3(RAB, CD, 1);
+decrypt_cycle3(RAB, CD, 0);
+pop_cd();

popq RIO; /* dst */

outunpack_dec3();

popq %rbx;
-popq %rbp;
popq %r12;
popq %r13;
-popq %r14;
-popq %r15;
ret;
ENDPROC(twofish_dec_blk_3way)
--- linux-4.15.0.orig/arch/x86/entry/calling.h
+++ linux-4.15.0/arch/x86/entry/calling.h
@@ -97,80 +97,82 @@
#define SIZEOF_PTREGS21*8

-.macro ALLOC_PT_GPREGS_ON_STACK
addq$-(15*8), %rsp
.endm
-
-.macro SAVE_C_REGS_HELPER offset=0 rax=1 rcx=1 r8910=1 r11=1
-\r11
-movq %r11, 6*8+\offset(%rsp)
-endif
-\r8910
-movq %r10, 7*8+\offset(%rsp)
-movq %r9, 8*8+\offset(%rsp)
-movq %r8, 9*8+\offset(%rsp)
-endif
-\rax
-movq %rax, 10*8+\offset(%rsp)
-endif
-\rcx
-movq %rcx, 11*8+\offset(%rsp)
-endif
-movq %rdx, 12*8+\offset(%rsp)
-movq %rsi, 13*8+\offset(%rsp)
-movq %rdi, 14*8+\offset(%rsp)
-UNWIND_HINT_REGS offset=\offset extra=0
-.endm
-.macro SAVE_C_REGS offset=0
-SAVE_C_REGS_HELPER \offset, 1, 1, 1
-.endm
-.macro SAVE_C_REGS_EXCEPT_RAX_RCX offset=0
-SAVE_C_REGS_HELPER \offset, 0, 0, 1
-.endm
-.macro SAVE_C_REGS_EXCEPT_R891011
-SAVE_C_REGS_HELPER 0, 1, 1, 0
-.endm
-.macro SAVE_C_REGS_EXCEPT_RCX_R891011
-SAVE_C_REGS_HELPER 0, 1, 0, 0
-.endm
.endm

- .macro SAVE_C_REGS_EXCEPT_RAX_RCX_R11
- SAVE_C_REGS_HELPER 0, 0, 0, 1, 0
- .endm

- .macro SAVE_EXTRA_REGS offset=0
- movq %r15, 0*8+offset(%rsp)
- movq %r14, 1*8+offset(%rsp)
- movq %r13, 2*8+offset(%rsp)
- movq %r12, 3*8+offset(%rsp)
- movq %rbp, 4*8+offset(%rsp)
- movq %rbx, 5*8+offset(%rsp)
- UNWIND_HINT_REGS offset=\offset
- .endm

+.macro PUSH_AND_CLEAR_REGS rdx=%rdx rax=%rax save_ret=0
+ .if \save_ret
+ pushq %rsi/ pt_regs->si */
+ movq 8(\%rsp), %rsi/* temporarily store the return address in %rsi */
+ movq %rdi, 8(\%rsp)/ pt_regs->di (overwriting original return address) */
+ .else
+ pushq %rdi/ pt_regs->di */
+ pushq %rsi/ pt_regs->si */
+ .endif
+ pushq %rdx/ pt_regs->dx */
+ pushq %rcx/ pt_regs->cx */
+ pushq %rax/ pt_regs->ax */
+ pushq %r8/ pt_regs->r8 */
+ pushq %r9/ pt_regs->r9 */
+ pushq %r10/ pt_regs->r10 */
+ pushq %r11/ pt_regs->r11 */
+ pushq %r12/ pt_regs->r12 */
+ pushq %r13/ pt_regs->r13 */
+ pushq %r14/ pt_regs->r14 */
+ pushq %r15/ pt_regs->r15 */
+ UNWIND_HINT_REGS
+ .if \save_ret
+ pushq %rsi/ return address on top of stack */
+ .endif
+ */
+ */
+ * Sanitize registers of values that a speculation attack might
+ * otherwise want to exploit. The lower registers are likely clobbered
+ * well before they could be put to use in a speculative execution
+ * gadget.
+ */
+xorl%edx, %edx/* nospec dx */
+xorl%ecx, %ecx/* nospec cx */
+xorl%rd8, %rd8/* nospec r8 */
+xorl%rd9, %rd9/* nospec r9 */
+xorl%rd10, %rd10/* nospec r10 */
+xorl%rd11, %rd11/* nospec r11 */
+xorl%rbx, %ebx/* nospec rbx */
+xorl%rbp, %ebp/* nospec rbp */
+xorl%r12, %r12d/* nospec r12 */
+xorl%r13, %r13d/* nospec r13 */
+xorl%r14, %r14d/* nospec r14 */
+xorl%r15, %r15d/* nospec r15 */

-.macro POP_EXTRA_REGS
+.endm
+
+.macro POP_REGS pop_rdi=1 skip_r11rcx=0
popq %r15
popq %r14
popq %r13
popq %r12
popq %rbp
popq %rbx
-.endm
-

-.macro POP_C_REGS
+.if \skip_r11rcx
+popq %rsi
+.else
popq %r11
+.endif
popq %r10
popq %r9
popq %r8
popq %rax
+.if \skip_r11rcx
+popq %rsi
+.else
popq %rcx
+.endif
popq %rdx
popq %rsi
+.if \pop_rdi
popq %rdi
popq %rdi
-.endm
-
-.macro icebp
-.byte 0xf1
/*
 * This is a sneaky trick to help the unwinder find pt_regs on the stack. The
 * @@ -178,7 +180,7 @@
 * is just setting the LSB, which makes it an invalid stack address and is also
 * a signal to the unwinder that it's a pt_regs pointer in disguise.
 *
 * - * NOTE: This macro must be used *after* SAVE_EXTRA_REGS because it corrupts
 * + * NOTE: This macro must be used *after* PUSH_AND_CLEAR_REGS because it corrupts
 * the original rbp.
 * */
 .macro ENCODE_FRAME_POINTER ptregs_offset=0
 @@ -334,6 +336,23 @@
 .endif

 #endif

+/*
+ * Mitigate Spectre v1 for conditional swapgs code paths.
+ *
+ * - * FENCE_SWAPGS_USER_ENTRY is used in the user entry swapgs code path, to
+ * + * prevent a speculative swapgs when coming from kernel space.
+ * + *
+ * + * FENCE_SWAPGS_KERNEL_ENTRY is used in the kernel entry non-swapgs code path,
+ * + * to prevent the swapgs from getting speculatively skipped when coming from
+ * + * user space.
+ */
+ .macro FENCE_SWAPGS_USER_ENTRY
+ ALTERNATIVE "", "lfence", X86_FEATURE_FENCE_SWAPGS_USER
+ .endm
+ .macro FENCE_SWAPGS_KERNEL_ENTRY
+ ALTERNATIVE "", "lfence", X86_FEATURE_FENCE_SWAPGS_KERNEL
+ .endm
+
#endif /* CONFIG_X86_64 */

/*
--- linux-4.15.0.orig/arch/x86/entry/common.c
+++ linux-4.15.0/arch/x86/entry/common.c
@@ -21,6 +21,7 @@
 #include <linux/export.h>
 #include <linux/context_tracking.h>
 #include <linux/user-return-notifier.h>
+##include <linux/nospec.h>
 #include <linux/uprobes.h>
 #include <linux/livepatch.h>

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#include <linux/syscalls.h>
 @@ -30,6 +31,7 @@
 #include <asm/vdso.h>
 #include <linux/uaccess.h>
 #include <asm/cpufeature.h>
+#include <asm/nospec-branch.h>

#define CREATE_TRACE_POINTS
#include <trace/events/syscalls.h>
@@ -206,10 +208,12 @@
 * special case only applies after poking regs and before the
 * very next return to user mode.
 */
-current->thread.status &=~(TS_COMPAT|TS_I386_REGS_POKED);
+tti->status &=~(TS_COMPAT|TS_I386_REGS_POKED);
#endif

user_enter_irqoff();
+
+mds_user_clear_cpu_buffers();
}

#define SYSCALL_EXIT_WORK_FLAGS\
 @@ -282,7 +286,8 @@
 * regs->orig_ax, which changes the behavior of some syscalls.
 */
 if (likely((nr & __SYSCALL_MASK) < NR_syscalls)) {
-regs->ax = sys_call_table[nr & __SYSCALL_MASK](
+nr = array_index_nospec(nr & __SYSCALL_MASK, NR_syscalls);
+regs->ax = sys_call_table[nr](
regs->di, regs->si, regs->dx,
regs->r10, regs->r8, regs->r9);
 }
 @@ -304,7 +309,7 @@
 unsigned int nr = (unsigned int)regs->orig_ax;

#ifdef CONFIG_IA32_EMULATION
-current->thread.status |= TS_COMPAT;
+tti->status |= TS_COMPAT;
#endif

if (READ_ONCE(ti->flags) & _TIF_WORK_SYSCALL_ENTRY) {
 @@ -318,6 +323,7 @@
 }

if (likely(nr < IA32_NR_syscalls)) {
+nr = array_index_nospec(nr, IA32_NR_syscalls);
/*
* It's possible that a 32-bit syscall implementation takes a 64-bit parameter but nonetheless assumes that
--- linux-4.15.0.orig/arch/x86/entry/entry_32.S
+++ linux-4.15.0/arch/x86/entry/entry_32.S
@@ -65,7 +65,7 @@
 # define preempt_stop(clobbers)DISABLE_INTERRUPTS(clobbers); TRACE_IRQS_OFF
 #else
 # define preempt_stop(clobbers)
-# define resume_kernel		restore_all
+# define resume_kernel		restore_all_kernel
 #endif

 .macro TRACE_IRQS_IRET
 @@ -77,6 +77,8 @@
 #endif
 .endm

+#define PTI_SWITCH_MASK (1 << PAGE_SHIFT)
+
+/* User gs save/restore
+ *
+ @@ -154,7 +156,52 @@
+ #endif /* CONFIG_X86_32.LAZY_GS */

 -.macro SAVE_ALL pt_regs_ax=%eax
+ /* Unconditionally switch to user cr3 */
+.macro SWITCH_TO_USER_CR3 scratch_reg:req
+ALTERNATIVE "jmp .Lend\@", ".", X86_FEATURE_PTI
+ +mov\l%cr3, \scratch_reg
+orl\t$PTI_SWITCH_MASK, \scratch_reg
+mov\l\scratch_reg, \cr3
+.Lend\@:
+.endm
+
+.macro BUG_IF_WRONG_CR3 no_user_check=0
+ if\n\no_user_check == 0
+/* coming from usermode? */
+testl\SEGMENT_RPL_MASK, PT_CS(%esp)
+jz.Lend\@
+.endif
+/* On user-cr3? */
+movl%cr3, %eax
+testl\PTI_SWITCH_MASK, %eax
+jnz.Lend_\@ 
+/* From userspace with kernel cr3 - BUG */ 
+ud2 
+.Lend_\@: 
+#endif 
+.endm 
+
+ /* Switch to kernel cr3 if not already loaded and return current cr3 in 
+ * \scratch_reg 
+ */ 
+.macro SWITCH_TO_KERNEL_CR3 scratch_reg:req 
+ALTERNATIVE "jmp .Lend_\@", "", X86_FEATURE_PTI 
+movl%cr3, \scratch_reg 
+/* Test if we are already on kernel CR3 */ 
+testl$PTI_SWITCH_MASK, \scratch_reg 
+jz.Lend_\@ 
+andl$(~PTI_SWITCH_MASK), \scratch_reg 
+movl\scratch_reg, %cr3 
+/* Return original CR3 in \scratch_reg */ 
+oriPTI_SWITCH_MASK, \scratch_reg 
+.Lend_\@: 
+.endm 
+
+.macro SAVE_ALL pt_regs_ax=%eax switch_stacks=0 
+cld 
+PUSH_GS 
pushl%fs 
@@ -173,6 +220,29 @@
 movl$(__KERNEL_PERCPU), %edx 
movl%edx, %fs 
SET_KERNEL_GS %edx 
+
+/* Switch to kernel stack if necessary */ 
+.if \switch_stacks > 0 
+SWITCH_TO_KERNEL_STACK 
+.endif 
+
+.endm 
+
+.macro SAVE_ALL_NMI cr3_reg:req 
+SAVE_ALL 
+
+BUG_IF_WRONG_CR3 
+
+/* Now switch the CR3 when PTI is enabled. 
+ *
+ * We can enter with either user or kernel cr3, the code will
+ * store the old cr3 in `cr3_reg` and switches to the kernel cr3
+ * if necessary.
+ */
+SWITCH_TO_KERNEL_CR3 scratch_reg=\cr3_reg
+
+.Lend_@:
.endm

/*
@@ -221,6 +291,350 @@
POP_GS_EX
+.endm

+.macro RESTORE_ALL_NMI cr3_reg:req pop=0
+/*
+ * Now switch the CR3 when PTI is enabled.
+ *
+ * We enter with kernel cr3 and switch the cr3 to the value
+ * stored on \cr3_reg, which is either a user or a kernel cr3.
+ */
+ALTERNATIVE "jmp .Lswitched_@", "", X86_FEATURE_PTI
+
testl\$PTI_SWITCH_MASK, \cr3_reg
+jz.Lswitched_@
+
+/* User cr3 in \cr3_reg - write it to hardware cr3 */
+movl\cr3_reg, %cr3
+
+.Lswitched_@:
+
+BUG_IF_WRONG_CR3
+
+RESTORE_REGS pop=\pop
+.endm
+
+.macro CHECK_AND_APPLY_ESPFIX
+#ifdef CONFIG_X86_ESPFIX32
+##define GDT_ESPFIX_SS PER_CPU_VAR(gdt_page) + (GDT_ENTRY_ESPFIX_SS * 8)
+
+ALTERNATIVE"jmp .Lend_@", "", X86_BUG_ESPFIX
+
+movlPT_EFLAGS(%esp), %eax# mix EFLAGS, SS and CS
+/*
+ * Warning: PT_OLDSS(%esp) contains the wrong/random values if we
+ * are returning to the kernel.
+ * See comments in process.c:copy_thread() for details.
+ */
+movb PT_OLDSS(%esp), %ah
+movb PT_CS(%esp), %al
+andl $(X86_EFLAGS_VM | (SEGMENT_TI_MASK << 8) | SEGMENT_RPL_MASK), %eax
+cmpfl $((SEGMENT_LDT << 8) | USER_RPL), %eax
+jne .Lend_\@# returning to user-space with LDT SS
+
+ /*
+ * Setup and switch to ESPFIX stack
+ *
+ * We're returning to userspace with a 16 bit stack. The CPU will not
+ * restore the high word of ESP for us on executing iret... This is an
+ * "official" bug of all the x86-compatible CPUs, which we can work
+ * around to make dosemu and wine happy. We do this by preloading the
+ * high word of ESP with the high word of the userspace ESP while
+ * compensating for the offset by changing to the ESPFIX segment with
+ * a base address that matches for the difference.
+ */
+ +mov%esp, %edx/* load kernel esp */
+mov PT_OLDESP(%esp), %eax/* load userspace esp */
+mov%edx, %eax/* eax: new kernel esp */
+sub%eax, %edx/* offset (low word is 0) */
+shr$16, %edx
+mov%dl, GDT_ESPFIX_SS + 4/* bits 16..23 */
+mov%dh, GDT_ESPFIX_SS + 7/* bits 24..31 */
+pushl $__ESPFIX_SS
+pushl %eax/* new kernel esp */
+/*
+ * Disable interrupts, but do not irqtrace this section: we
+ * will soon execute iret and the tracer was already set to
+ * the irqstate after the IRET:
+ */
+DISABLE_INTERRUPTS(CLBR_ANY)
+lss(%esp), %esp/* switch to espfix segment */
+.Lend_\@:
+##endif /* CONFIG_X86_ESPFIX32 */
+.endm
+
+ /*
+ * Called with pt_regs fully populated and kernel segments loaded,
+ * so we can access PER_CPU and use the integer registers.
+ */
+ +
+ /*
+ We need to be very careful here with the %esp switch, because an NMI
+ can happen everywhere. If the NMI handler finds itself on the
+ entry-stack, it will overwrite the task-stack and everything we
+ copied there. So allocate the stack-frame on the task-stack and
+ switch to it before we do any copying.
+ */
+ +
+ /*
```c
#define CS_FROM_ENTRY_STACK (1 << 31)
#define CS_FROM_USER_CR3 (1 << 30)

.macro SWITCH_TO_KERNEL_STACK

  ALTERNATIVE ", " jmp .Lend_\@", X86_FEATURE_XENPV

  BUG_IF_WRONG_CR3

  SWITCH_TO_KERNEL_CR3 scratch_reg=%eax

  /*
  * %eax now contains the entry cr3 and we carry it forward in
  * that register for the time this macro runs
  */
  */
  */
  /* The high bits of the CS dword (__csh) are used for
  * CS_FROM_ENTRY_STACK and CS_FROM_USER_CR3. Clear them in case
  * hardware didn't do this for us.
  */
  */
  andl$(0x0000ffff), PT_CS(%esp)

  /* Are we on the entry stack? Bail out if not! */
  movlPER_CPU_VAR(cpu_entry_area), %ecx
  addl$CPU_ENTRY_AREA_entry_stack + SIZEOF_entry_stack, %ecx
  subl%esp, %ecx /* ecx = (end of entry_stack) - esp */
  cmpl$SIZEOF_entry_stack, %ecx
  jaeh.Lend_\@

  /* Load stack pointer into %esi and %edi */
  movl%esp, %esi
  movl%esi, %edi

  /* Move %edi to the top of the entry stack */
  andl$(MASK_entry_stack), %edi
  addl$(SIZEOF_entry_stack), %edi

  /* Load top of task-stack into %edi */
  movlTSS_entry2task_stack(%edi), %edi

  /* Special case - entry from kernel mode via entry stack */
  ifdef CONFIG_VM86
    movlPT_EFLAGS(%esp), %ecx # mix EFLAGS and CS
    movlPT_CS(%esp), %cl
    andl$(X86_EFLAGS_VM | SEGMENT_RPL_MASK), %ecx
  ifdef
    movlPT_CS(%esp), %ecx
```
```assembly
+andl$SEGMENT_RPL_MASK, %ecx
+#endif
+cmpl$USER_RPL, %ecx
+jb.Lentry_from_kernel_@
+
+/* Bytes to copy */
+movl$PTREGS_SIZE, %ecx
+
+#ifdef CONFIG_VM86
+testl$X86_EFLAGS_VM, PT_EFLAGS(%esi)
+jz.Lcopy_pt_regs_@
+
+/* Stack-frame contains 4 additional segment registers when
+ * coming from VM86 mode
+ */
+addl$(4 * 4), %ecx
+
+#endif
+.Lcopy_pt_regs_@:
+
+/* Allocate frame on task-stack */
+subl%ecx, %edi
+
+/* Switch to task-stack */
+movl%edi, %esp
+
+/*
+ * We are now on the task-stack and can safely copy over the
+ * stack-frame
+ */
+shrl$2, %ecx
+cld
+rep movsl
+
+jmp .Lend_@
+
+.Lentry_from_kernel_@:
+
+/*
+ * This handles the case when we enter the kernel from
+ * kernel-mode and %esp points to the entry-stack. When this
+ * happens we need to switch to the task-stack to run C code,
+ * but switch back to the entry-stack again when we approach
+ * iret and return to the interrupted code-path. This usually
+ * happens when we hit an exception while restoring user-space
+ * segment registers on the way back to user-space or when the
+ * sysenter handler runs with eflags.tf set.
```
When we switch to the task-stack here, we can't trust the contents of the entry-stack anymore, as the exception handler might be scheduled out or moved to another CPU. Therefore we copy the complete entry-stack to the task-stack and set a marker in the iret-frame (bit 31 of the CS dword) to detect what we've done on the iret path.

On the iret path we copy everything back and switch to the entry-stack, so that the interrupted kernel code-path continues on the same stack it was interrupted with.

Be aware that an NMI can happen anytime in this code.

%esi: Entry-Stack pointer (same as %esp)
%edi: Top of the task stack
%eax: CR3 on kernel entry

Calculate number of bytes on the entry stack in %ecx

%esi, %ecx
%edi, %ecx
%eax

%esi to the top of entry-stack

Mark stackframe as coming from entry stack

Test the cr3 used to enter the kernel and add a marker

%esi and %edi are unchanged, %ecx contains the number of bytes to copy. The code at .Lcopy_pt_regs_@ will allocate the stack-frame on task-stack and copy everything over

jmp .Lcopy_pt_regs_@
.Lend_@:
/* Switch back from the kernel stack to the entry stack. */

/* The %esp register must point to pt_regs on the task stack. It will
first calculate the size of the stack-frame to copy, depending on
whether we return to VM86 mode or not. With that it uses 'rep movsl'
to copy the contents of the stack over to the entry stack.

We must be very careful here, as we can't trust the contents of the
task-stack once we switched to the entry-stack. When an NMI happens
while on the entry-stack, the NMI handler will switch back to the top
of the task stack, overwriting our stack-frame we are about to copy.
Therefore we switch the stack only after everything is copied over.
*/

.macro SWITCH_TO_ENTRY_STACK
ALTERNATIVE "", "jmp .Lend_@", X86_FEATURE_XENPV

/* Bytes to copy */
movl $PTREGS_SIZE, %ecx

#ifdef CONFIG_VM86
testl $(X86_EFLAGS_VM), PT_EFLAGS(%esp)
jz .Lcopy_pt_regs_@

/* Additional 4 registers to copy when returning to VM86 mode */
addl $(4 * 4), %ecx

.Lcopy_pt_regs_@:
#endif

/* Initialize source and destination for movsl */
movl PER_CPU_VAR(cpu_tss_rw + TSS_sp0), %edi

subl %ecx, %edi
movl %edi, %ebx

/* Copy over the stack-frame */
shrl $2, %ecx

cld

rep movsl

/* Switch to entry-stack - needs to happen after everything is
+
+ * copied because the NMI handler will overwrite the task-stack
+ * when on entry-stack
+ */
+movl%ebx, %esp
+
+.Lend_\@:
+.endm
+
+/*
+ * This macro handles the case when we return to kernel-mode on the iret
+ * path and have to switch back to the entry stack and/or user-cr3
+ *
+ * See the comments below the .Lentry_from_kernel_\@ label in the
+ * SWITCH_TO_KERNEL_STACK macro for more details.
+ */
+.macro PARANOID_EXIT_TO_KERNEL_MODE
+
+/* Test if we entered the kernel with the entry-stack. Most
+ * likely we did not, because this code only runs on the
+ * return-to-kernel path.
+ *
+ testl$CS_FROM_ENTRY_STACK, PT_CS(%esp)
+jz.Lend_\@
+
+/* Unlikely slow-path */
+
+/* Clear marker from stack-frame */
+andl$(~CS_FROM_ENTRY_STACK), PT_CS(%esp)
+
+/* Copy the remaining task-stack contents to entry-stack */
movl%esp, %esi
+movlPER_CPU_VAR(cpu_tss_rw + TSS_sp0), %edi
+
+/* Bytes on the task-stack to ecx */
movlPER_CPU_VAR(cpu_tss_rw + TSS_sp1), %ecx
+subl%esi, %ecx
+
+/* Allocate stack-frame on entry-stack */
+subl%ecx, %edi
+
+/*
+ * Save future stack-pointer, we must not switch until the
+ * copy is done, otherwise the NMI handler could destroy the
+ * contents of the task-stack we are about to copy.
+ */
movl%edi, %ebx
+
"* Do the copy */
+shrl$2, %ecx
+cld
+rep movsl
+
+/* Safe to switch to entry-stack now */
+movl%ebx, %esp
+
+ /* We came from entry-stack and need to check if we also need to
+ switch back to user cr3.
+ */
+testl$CS_FROM_USER_CR3, PT_CS(%esp)
+jz.Lend_\@
+
+ /* Clear marker from stack-frame */
+andl$(~CS_FROM_USER_CR3), PT_CS(%esp)
+
+ SWITCH_TO_USER_CR3 scratch_reg=%eax
+
+.Lend_\@:
+.endm
/*
 * %eax: prev task
 * %edx: next task
 @@ -234,6 +648,7 @@
pushl%ebx
pushl%edi
pushl%esi
+pushfl

/**
 switch stack */
movl%esp, TASK_threadsp(%eax)
@@ -256,6 +671,7 @@
#endif
/* restore callee-saved registers */
+popfl
popl%esi
popl%edi
popl%ebx
@@ -351,9 +767,9 @@
DISABLE_INTERRUPTS(CLBR_ANY)
.Lneed_resched:
 cmpl$0, PER_CPU_VAR(__preempt_count)
-jnz restore_all
+jnz restore_all_kernel
 testl$X86_EFLAGS_IF, PT_EFLAGS(%esp)# interrupts off (exception path) ?
- jz restore_all
+ jz restore_all_kernel
call preempt_schedule_irq
jmp Lneed_resched
END(resume_kernel)
@@ -412,7 +828,21 @@
 0(\%ebp) arg6
 */
ENTRY(entry_SYSENTER_32)
- movTSS_sysenter_sp0(\%esp), \%esp
+ /*
+ * On entry-stack with all userspace-regds live - save and
+ * restore eflags and \%eax to use it as scratch-reg for the cr3
+ * switch.
+ */
+ pushfl
+ pushl\%eax
+ BUG_IF_WRONG_CR3 no_user_check=1
+ SWITCH_TO_KERNEL_CR3 scratch_reg=\%eax
+ popl\%eax
+ popfl
+
+ /* Stack empty again, switch to task stack */
+ movTSS_entry2task_stack(\%esp), \%esp
+
+ .Lsysenter_past_esp:
+ pushl__USER_DS/* pt_regs->ss */
+ pushl\%ebp/* pt_regs->sp (stashed in bp) */
+ @@ -421,7 +851,7 @@
+ pushl__USER_CS/* pt_regs->cs */
+ pushl0/* pt_regs->ip = 0 (placeholder) */
+ pushl\%eax/* pt_regs->orig_ax */
- SAVE_ALL pt_regs_ax=$-ENOSYS/* save rest */
+ SAVE_ALL pt_regs_ax=$-ENOSYS/* save rest, stack already switched */

/*
 * SYSENTER doesn't filter flags, so we need to clear NT, AC
 @@ -460,25 +890,49 @@

 /* Opportunistic SYSEXIT */
 TRACE_IRQS_ON/* User mode traces as IRQs on. */
+
+ /*
+ * Setup entry stack - we keep the pointer in \%eax and do the
+ * switch after almost all user-state is restored.
+ */
+
+ /* Load entry stack pointer and allocate frame for eflags/eax */
+movlPER_CPU_VAR(cpu_tss_rw + TSS_sp0), %eax
+subl$(2*4), %eax
+
+/* Copy eflags and eax to entry stack */
+movlPT_EFLAGS(%esp), %edi
+movlPT_EAX(%esp), %esi
+movl%edi, (%eax)
+movl%esi, 4(%eax)
+
+/* Restore user registers and segments */
+movlPT_EIP(%esp), %edx /* pt_regs->ip */
+movlPT_OLODESP(%esp), %ecx /* pt_regs->sp */
1:movlPT_FS(%esp), %fs

PTGS_TO_GS
+
+popl%ebx/* pt_regs->bx */
+addl$2*4, %esp/* skip pt_regs->cx and pt_regs->dx */
+popl%esi/* pt_regs->si */
+popl%edi/* pt_regs->di */
+popl%ebp/* pt_regs->bp */
+-popl%eax/* pt_regs->ax */
+
+/* Switch to entry stack */
+movl%eax, %esp
+
+/* Now ready to switch the cr3 */
+SWITCH_TO_USER_CR3 scratch_reg=%eax

/*
 * Restore all flags except IF. (We restore IF separately because
 * STI gives a one-instruction window in which we won't be interrupted,
 * whereas POPF does not.)
 */
-addlSPT_EFLAGS-PT_DS, %esp/* point esp at pt_regs->flags */
-btr$X86_EFLAGS_IF_BIT, (%esp)
+btr$X86_EFLAGS_IF_BIT, (%esp)
+BUG_IF_WRONG_CR3 no_user_check=1
+popfl
+popl%eax

/*
 * Return back to the vDSO, which will pop ecx and edx.
 @ @ -532.7 +986.8 @ @
 ENTRY(entry_INT80_32)
 ASM_CLAC
 pushl%eax/* pt_regs->orig_ax */
 -SAVE_ALL pt_regs_ax=$-ENOSYS/* save rest */
 +
SAVE_ALL pt_regs_ax=$-ENOSYS switch_stacks=1/* save rest */

/*
 * User mode is traced as though IRQs are on, and the interrupt gate
 @@ -546,67 +1001,47 @@ restore_all:
 TRACE_IRQS_IRET
 +SWITCH_TO_ENTRY_STACK
 .Lrestore_all_notrace:
 #ifdef CONFIG_X86_ESPFIX32
 -ALTERNATIVE"jmp .Lrestore_nocheck", "", X86_BUG_ESPFIX
 -
 -movl PT_EFLAGS(%esp), %eax # mix EFLAGS, SS and CS
 /*
 - * Warning: PT_OLDSS(%esp) contains the wrong/random values if we
 - * are returning to the kernel.
 - * See comments in process.c:copy_thread() for details.
 - */
 -movb PT_OLDSS(%esp), %ah
 -movb PT_CS(%esp), %al
 -andl $X86_EFLAGS_VM | (SEGMENT_TI_MASK << 8) | SEGMENT_RPL_MASK, %eax
 -cmplt ((SEGMENT_LDT << 8) | USER_RPL), %eax
 -je .Lldt_ss# returning to user-space with LDT SS
 -#endif
 +CHECK_AND.Apply_ESPFIX
 .Lrestore_nocheck:
 -RESTORE_REGS 4# skip orig_eax/error_code
 +/* Switch back to user CR3 */
 +SWITCH_TO_USER_CR3 scratch_reg=%eax
 +
 +BUG_IF_WRONG_CR3
 +
 +/* Restore user state */
 +RESTORE_REGS pop=4# skip orig_eax/error_code
 .Lirq_return:
 INTERRUPT_RETURN

+restore_all_kernel:
+TRACE_IRQS_IRET
+PARANOID_EXIT_TO_KERNEL_MODE
+BUG_IF_WRONG_CR3
+RESTORE_REGS 4
+jmp.Lirq_return
+
 .section .fixup, "ax"
 ENTRY(iret_exc)
pushl$0# no error code
pushlSdo_iret_error
-jmpcommon_exception
-previous
-_ASM_EXTABLE(.Lirq_return, iret_exc)

#ifdef CONFIG_X86_ESPFIX32
-.Lldt_ss:

-/*
- * Setup and switch to ESPFIX stack
- */
- *
- * We're returning to userspace with a 16 bit stack. The CPU will not
- * restore the high word of ESP for us on executing iret... This is an
- * "official" bug of all the x86-compatible CPUs, which we can work
- * around to make dosemu and wine happy. We do this by preloading the
- * high word of ESP with the high word of the userspace ESP while
- * compensating for the offset by changing to the ESPFIX segment with
- * a base address that matches for the difference.
- */
- */
#define GDT_ESPFIX_SS PER_CPU_VAR(gdt_page) + (GDT_ENTRY_ESPFIX_SS * 8)
-mov%esp, %edx/* load kernel esp */
-movPT_OLDESP(%esp), %eax/* load userspace esp */
-mov%dx, %ax/* eax: new kernel esp */
-sub%eax, %edx/* offset (low word is 0) */
-shr$16, %edx
-mov%dl, GDT_ESPFIX_SS + 4/* bits 16..23 */
-mov%dh, GDT_ESPFIX_SS + 7/* bits 24..31 */
-pushl$__ESPFIX_SS
-pushl%eax/* new kernel esp */
+#ifdef CONFIG_DEBUG_ENTRY
/*
- * Disable interrupts, but do not irqtrace this section: we
- * will soon execute iret and the tracer was already set to
- * the irqstate after the IRET:
+ * The stack-frame here is the one that iret faulted on, so its a
+ * return-to-user frame. We are on kernel-cr3 because we come here from
+ * the fixup code. This confuses the CR3 checker, so switch to user-cr3
+ * as the checker expects it.
+ */
-DISABLE_INTERRUPTS(CLBR_ANY)
-lss(%esp), %esp/* switch to espfix segment */
-jmp.Lrestore_nocheck
+pushl%eax
+SWITCH_TO_USER_CR3 scratch_reg=%eax
+popl%eax
#endif
+
+jmpcommon_exception
+.previous
+.ASM_EXTABLE(.Lirq_return, iret_exc)
ENDPROC(entry_INT80_32)

.macro FIXUP_ESPFIX_STACK
@@ -666,7 +1101,8 @@
common_interrupt:
ASM_CLAC
addl$-0x80, (%esp) /* Adjust vector into the [-256, -1] range */
-SAVE_ALL
+
+SAVE_ALL switch_stacks=1
ENCODEx_FRAME_POINTER
TRACE_IRQS_OFF
movl%esp, %eax
@@ -674,16 +1110,16 @@
jmp	ret_from_intr
ENDPROC(common_interrupt)

#define BUILD_INTERRUPT3(name, nr, fn)
ENTRY(name)
-ASM_CLAC;	pushl~(nr);
-SAVE_ALL;
-ENCODEx_FRAME_POINTER;
-TRACE_IRQS_OFF;
-movl%esp, %eax;
call fn;
jmpret_from_intr;
+#define BUILD_INTERRUPT3(name, nr, fn)
+ENTRY(name)
+ASM_CLAC;
pushl~(nr);
+SAVE_ALL switch_stacks=1;
+ENCODEx_FRAME_POINTER;
+TRACE_IRQS_OFF;
+movl%esp, %eax;
call fn;
jmpret_from_intr;
ENDPROC(name)

#define BUILD_INTERRUPT(name, nr)
@@ -909,16 +1345,20 @@
pushl%es
pushl%ds
pushl%eax
+movl$(__USER_DS), %eax
+movl%eax, %ds
+movl%eax, %es

ENTRY(debug)
/*
   * #DB can happen at the first instruction of
   * entry_SYSENTER_32 or in Xen's SYSENTER prologue. If this
   * happens, then we will be running on a very small stack. We
   * need to detect this condition and switch to the thread
   * stack before calling any C code at all.
   * *
   * If you edit this code, keep in mind that NMI can happen in here.
   * Entry from sysenter is now handled in common_exception
   */
ASM_CLAC
pushl-1# mark this as an int
-SAVE_ALL
-ENCODE_FRAME_POINTER
-xorl%edx, %edx# error code 0
-movl%esp, %eax# pt_regs pointer
-
-/* Are we currently on the SYSENTER stack? */
-movlPER_CPU_VAR(cpu_entry_area), %ecx
-addl$CPU_ENTRY_AREA_entry_stack + SIZEOF_entry_stack, %ecx
-subl%eax, %ecx/* ecx = (end of entry_stack) - esp */
-cmpl$SIZEOF_entry_stack, %ecx
-jb.Ldebug_from_sysenter_stack
-
-TRACE_IRQS_OFF
-call do_debug
-jmp ret_from_exception
-
.Ldebug_from_sysenter_stack:
/* We're on the SYSENTER stack. Switch off. */
-movl%esp, %ebx
-movlPER_CPU_VAR(cpu_current_top_of_stack), %esp
-TRACE_IRQS_OFF
-call do_debug
-movl%ebx, %esp
-jmp ret_from_exception
+pushl$do_debug
+jmp common_exception
END(do_debug)

/*
@@ -982,6 +1391,7 @@
*/
ENTRY(nmi)
ASM_CLAC
+
#ifdef CONFIG_X86_ESPFIX32
pushl%eax
movl%ss, %eax
@@ -991,7 +1401,7 @@
#endif
pushl%eax	# pt_regs->orig_ax
-SAVE_ALL
+SAVE_ALL_NMI cr3_reg=%edi
ENCODE_FRAME_POINTER
xorl%edx, %edx# zero error code
movl%esp, %eax# pt_regs pointer
@@ -1005,7 +1415,7 @@
/* Not on SYSENTER stack. */
calldo_nmi
-jmpl.Lrestore_all_notrace
+jmpl.nmi_return
.
 Lnmi_from_sysenter_stack:
/*
movl PER_CPU_VAR(cpu_current_top_of_stack), %esp
 call do_nmi
 movl %ebx, %esp
 -jmp .Lrestore_all_notrace
 +
 +Lnmi_return:
 +CHECK_AND_APPLY_ESPFIX
 +RESTORE_ALL_NMI cr3_reg=%edi pop=4
 +jmp.Lirq_return

#ifndef CONFIG_X86_ESPFIX32
 .Lnmi.espfix_stack:
 @@ -1031,12 +1445,12 @@
 pushl16(%esp)
 .endr
 pushl %eax
 -SAVE_ALL
 +SAVE_ALL_NMI cr3_reg=%edi
 ENCODE_FRAME_POINTER
 FIXUP_ESPFIX_STACK # %eax == %esp
 xorl %edx, %edx # zero error code
 call do_nmi
 -RESTORE_REGS
 +RESTORE_ALL_NMI cr3_reg=%edi
 lss 12+4(%esp), %esp # back to espfix stack
 jmp.Lirq_return
 #endif
 @@ -1045,7 +1459,8 @@
 ENTRY(int3)
 ASM_CLAC
 pushl$-1 # mark this as an int
 -SAVE_ALL
 +
 +SAVE_ALL switch_stacks=1
 ENCODE_FRAME_POINTER
 TRACE_IRQS_OFF
 xorl %edx, %edx # zero error code
 @@ -1055,6 +1470,7 @@
 END(int3)

 ENTRY(general_protection)
 +ASM_CLAC
 pushl$do_general_protection
 jmp common_exception
 END(general_protection)

 --- linux-4.15.0.orig/arch/x86/entry/entry_64.S
 +++ linux-4.15.0/arch/x86/entry/entry_64.S
.macro TRACE_IRQS_FLAGS flags:req
#ifdef CONFIG_TRACE_IRQFLAGS
-bt9, \flags/* interrupts off? */
+btl9, \flags/* interrupts off? */
jnc1f
TRACE_IRQS_ON
1:
@@ -92,7 +92,7 @@
.trace

@ % -213,7 +213,7 @@
swapgs
/*
 - * This path is not taken when PAGE_TABLE_ISOLATION is disabled so it
 + * This path is only taken when PAGE_TABLE_ISOLATION is disabled so it
 * is not required to switch CR3.
 */
movq %rsp, PER_CPU_VAR(rsp_scratch)
@@ -227,100 +227,15 @@
pushq %rcx /* pt_regs->ip */
GLOBAL(entry_SYSCALL_64_after_hwframe)
pushq %rax /* pt_regs->orig_ax */
-pushq %rdi /* pt_regs->di */
-pushq %rsi /* pt_regs->si */
-pushq %rdx /* pt_regs->dx */
-pushq %rcx /* pt_regs->cx */
-pushq $-ENOSYS /* pt_regs->ax */
-pushq %r8 /* pt_regs->r8 */
-pushq %r9 /* pt_regs->r9 */
-pushq %r10 /* pt_regs->r10 */
-pushq %r11 /* pt_regs->r11 */
-sub$(6*8), %rsp/* pt_regs->bp, bx, r12-15 not saved */
-UNWIND_HINT_REGS extra=0

-TRACE_IRQS_OFF
-
-/*
 - * If we need to do entry work or if we guess we'll need to do
 - * exit work, go straight to the slow path.
- movq PER_CPU_VAR(current_task), %r11
- testl $_TIF_WORK_SYSCALL_ENTRY|_TIF_ALLWORK_MASK, TASK_TI_flags(%r11)
- jnz entry_SYSCALL_64_slow_path
-
-entry_SYSCALL_64_fastpath:
-/*
- * Easy case: enable interrupts and issue the syscall. If the syscall
- * needs pt_regs, we'll call a stub that disables interrupts again
- * and jumps to the slow path.
- */
-TRACE_IRQS_ON
-ENABLE_INTERRUPTS(CLBR_NONE)
-#if __SYSCALL_MASK == ~0
-cmpq $__NR_syscall_max, %rax
-#else
-andl $__SYSCALL_MASK, %eax
-cmpl $__NR_syscall_max, %eax
-#endif
-jal /* return -ENOSYS (already in pt_regs->ax) */
-movq %r10, %rcx
+PUSH_AND_CLEAR_REGS rax=$-ENOSYS

-/*
- * This call instruction is handled specially in stub_ptregs_64.
- * It might end up jumping to the slow path. If it jumps, RAX
- * and all argument registers are clobbered.
- */
-#ifdef CONFIG_RETPOLINE
-movq sys_call_table, %rax, 8
-call __x86_indirect_thunk_rax
-#else
-call*sys_call_table, %rax, 8
-#endif
-.Lentry_SYSCALL_64_after_fastpath_call:
-
-movq %rax, RAX(%rsp)
-1:
-
-/*
- * If we get here, then we know that pt_regs is clean for SYSRET64.
- * If we see that no exit work is required (which we are required
- * to check with IRQs off), then we can go straight to SYSRET64.
- */
-DISABLE_INTERRUPTS(CLBR_ANY)
TRACE_IRQS_OFF
-movq PER_CPU_VAR(current_task), %r11
-testl $_TIF_ALLWORK_MASK, TASK_TI_flags(%r11)
- jnz1f
-
- LOCKDEP_SYS_EXIT
- TRACE_IRQS_ON/* user mode is traced as IRQs on */
- movqRIP(%rsp), %rcx
- movqEFLAGS(%rsp), %r11
- addq$6*8, %rsp/* skip extra regs -- they were preserved */
- UNWIND_HINT_EMPTY
- jmp.Lpop_c_regs_except_rcx_r11_and_sysret
-
- 1:
-/*
- * The fast path looked good when we started, but something changed
- * along the way and we need to switch to the slow path. Calling
- * raise(3) will trigger this, for example. IRQs are off.
- */
- TRACE_IRQS_ON
- ENABLE_INTERRUPTS(CLBR_ANY)
- SAVE_EXTRA_REGS
- movq%rsp, %rdi
- callsyscall_return_slowpath/* returns with IRQs disabled */
- jmpreturn_from_SYSCALL_64
-
- entry_SYSCALL64_slow_path:
 /* IRQs are off. */
- SAVE_EXTRA_REGS
 movq%rsp, %rdi
calldo_syscall_64/* returns with IRQs disabled */
-
- return_from_SYSCALL_64:
 TRACE_IRQS_IRETQ/* we're about to change IF */

/*
 @ @ -391,17 +306,7 @ @
*/
syscall_return_via_sysret:
 /* rcx and r11 are already restored (see code above) */
- UNWIND_HINT_EMPTY
- POP_EXTRA_REGS
- Lpop_c_regs_except_rcx_r11_and_sysret:
- popq%rsi/* skip r11 */
- popq%r10
- popq%r9
- popq%r8
- popq%rax
- popq%rsi/* skip rcx */
- popq%rdx
- popq%rsi
+POP_REGS pop_rdi=0 skip_r11rcx=1

/*
 * Now all regs are restored except RSP and RDI.
@@ -409,6 +314,7 @@
*/
movq%rsp, %rdi
movqPER_CPU_VAR(cpu_tss_rw + TSS_sp0), %rsp
+UNWIND_HINT_EMPTY

pushqRSP-RDI(%rdi)/* RSP */
pushq(%rdi)/* RDI */
@@ -424,47 +330,6 @@
USERGS_SYSRET64
END(entry_SYSCALL_64)

-ENTRY(stub_ptregs_64)
-/*
- * Syscalls marked as needing ptregs land here.
- * If we are on the fast path, we need to save the extra regs,
- * which we achieve by trying again on the slow path. If we are on
- * the slow path, the extra regs are already saved.
- *
- * - RAX stores a pointer to the C function implementing the syscall.
- * - IRQs are on.
- */
-cmpq$.Lentry_SYSCALL_64_after_fastpath_call, (%rsp)
-jne1f
-
-/*
- * Called from fast path -- disable IRQs again, pop return address
- * and jump to slow path
- */
-DISABLE_INTERRUPTS(CLBR_ANY)
-TRACE_IRQS_OFF
-popq%rax
-UNWIND_HINT_REGS extra=0
-jmpentry_SYSCALL64_slow_path
-
-1:
-JMP_NOSPEC %rax/# Called from C */
-END(stub_ptregs_64)
-
-macro ptregs_stub func
-ENTRY(ptregs stub func)
-UNWIND_HINT_FUNC
-leaqfunc(%rip), %rax
-jmpstub_ptregs_64
/* Instantiate ptregs_stub for each ptregs-using syscall */
#define __SYSCALL_64_QUAL_(sym)
#define __SYSCALL_64_QUAL_ptregs(sym) ptregs_stub sym
#define __SYSCALL_64(nr, sym, qual) __SYSCALL_64_QUAL_##qual(sym)
#include <asm/syscalls_64.h>

/* %rdi: prev task */
* %rsi: next task
@@ -481,6 +346,7 @@
pushq %r13
pushq %r14
pushq %r15
+pushfq

/ * switch stack */
movq %rsp, TASK_threadsp(%rdi)
@@ -503,6 +369,7 @@
#ifend

/* restore callee-saved registers */
+popfq
popq %r15
popq %r14
popq %r13
@@ -668,12 +535,13 @@
testb $3, CS-ORIG_RAX(%rsp)
jz 1f
SWAPGS
+FENCE_SWAPGS_USER_ENTRY
calls switch_to_thread_stack
+jmp 2f
1:
-
-ALLOC_PT_GPREGS_ON_STACK
-SAVE_C_REGS
-SAVE_EXTRA_REGS
+FENCE_SWAPGS_KERNEL_ENTRY
+2:
+PUSH_AND_CLEAR_REGS
ENCODE_FRAME_POINTER

testb $3, CS(%rsp)
@@ -734,15 +602,7 @@
ud2
l:
#ifdef
-POP_EXTRA_REGS
-popq%r11
-popq%r10
-popq%r9
-popq%r8
-popq%rax
-popq%rcx
-popq%rdx
-popq%rsi
+POP_REGS pop_rdi=0

/*
 * The stack is now user RDI, orig_ax, RIP, CS, EFLAGS, RSP, SS.
 @@ -750,6 +610,7 @@
 */
movq%rsp, %rdi
movqPER_CPU_VAR(cpu_tss_rw + TSS_sp0), %rsp
+UNWIND_HINT_EMPTY

/* Copy the IRET frame to the trampoline stack. */
pushq6*8(%rdi)/% SS */
@@ -.779,7 +640,7 @@
#ifdef CONFIG_PREEMPT
/* Interrupts are off */
/* Check if we need preemption */
-bt9, EFLAGS(%rsp)/* were interrupts off? */
+btl9, EFLAGS(%rsp)/* were interrupts off? */
jnc1f
0:cmpl$0, PER_CPU_VAR(__preempt_count)
jnz1f
@@ -.800,8 +661,7 @@
ud2
l:
#endif
-POP_EXTRA_REGS
-POP_C_REGS
+POP_REGS
addq$8, %rsp/* skip regs->orig_ax */
INTERRUPT_RETURN

@@ -.1001,7 +861,7 @@
ret
END(switch_to_thread_stack)

-.macro idtentry sym do_sym has_error_code:req paranoid=0 shift_ist=-1
+.macro idtentry sym do_sym has_error_code:req paranoid=0 shift_ist=-1 create_gap=0
ENTRY(sym)
UNWIND_HINT_IRET_REGS offset=\has_error_code*8
@@ -1016,13 +876,25 @@
pushq$-1/* ORIG_RAX: no syscall to restart */
 .endif

-ALLOC_PT_GPREGS_ON_STACK
-
 .if \paranoid < 2
-\testb3, CS(%rsp) /* If coming from userspace, switch stacks */
+\testb3, CS-ORIG_RAX(%rsp) /* If coming from userspace, switch stacks */
\jnz.Lfrom_usermode_switch_stack_@ 
 .endif

+.if \create_gap == 1
+/*
+ * If coming from kernel space, create a 6-word gap to allow the
+ * int3 handler to emulate a call instruction.
+ */
+\testb3, CS-ORIG_RAX(%rsp)
+\jnz.Lfrom_usermode_no_gap_@ 
+.rept6
+\pushq5*8(%rsp)
+.endr
+UNWIND_HINT_IRET_REGS offset=8
+Lfrom_usermode_no_gap_@:
+.endif
+
 .if \paranoid
 call\paranoid_entry
 .else
@@ -1085,7 +957,7 @@
call\do_sym

-jmerror_exit/* %ebx: no swapgs flag */
+jmerror_exit
 .endif
END(sym)
 .endm
@@ -1229,9 +1101,7 @@
 addq$0x30, %rsp
 UNWIND_HINT_IRET_REGS
 pushq$-1 /* orig_ax = -1 => not a system call */
-ALLOC_PT_GPREGS_ON_STACK
-SAVE_C_REGS
-SAVE_EXTRA_REGS
+PUSH_AND_CLEAR_REGS
ENCODE_FRAME_POINTER
jmp error_exit
END(xen_failsafe_callback)
@@ -1247,13 +1117,12 @@
  #endif /* CONFIG_HYPERV */

idtentry debug do_debug has_error_code=0 paranoid=1 shift_ist=DEBUG_STACK
-idtentry int3 do_int3 has_error_code=0 paranoid=1 shift_ist=DEBUG_STACK
+idtentry int3 do_int3 has_error_code=0 create_gap=1
idtentry stack_segment do_stack_segment has_error_code=1

#ifdef CONFIG_XEN
idtentry xen nmi do_nmi has_error_code=0
idtentry xen debug do_debug has_error_code=0
-idtentry xen int3 do_int3 has_error_code=0
#endif
idtentry general protection do_general_protection has_error_code=1
@@ -1275,8 +1144,7 @@
 ENTRY(paranoid_entry)
 UNWIND_HINT_FUNC
cld
-SAVE_C_REGS 8
-SAVE_EXTRA_REGS 8
+PUSH_AND_CLEAR_REGS save_ret=1
ENCODE_FRAME_POINTER 8
movl$1, %ebx
movl$MSR_GS_BASE, %ecx
@@ -1289,6 +1157,13 @@
1:
SAVE_AND_SWITCH_TO_KERNEL_CR3 scratch_reg=%rax save_reg=%r14

+/*
+ * The above SAVE_AND_SWITCH_TO_KERNEL_CR3 macro doesn't do an
+ * unconditional CR3 write, even in the PTI case. So do an lfence
+ * to prevent GS speculation, regardless of whether PTI is enabled.
+ */
+FENCE_SWAPGS_KERNEL_ENTRY
+
ret
END(paranoid_entry)

@@ -1316,21 +1191,19 @@
  jmp.Lparanoid_exit_restore
  .Lparanoid_exit_no_swapgs:
 TRACE_IRQS_IRETQ_DEBUG
+RESTORE_CR3 scratch_reg=%rbx save_reg=%r14
.Lparanoid_exit_restore:
jmp restore_regs_and_return_to_kernel
END(paranoid_exit)

/*
- * Save all registers in pt_regs, and switch gs if needed.
- * Return: EBX=0: came from user mode; EBX=1: otherwise
+ * Save all registers in pt_regs, and switch GS if needed.
 */
ENTRY(error_entry)
UNWIND_HINT_FUNC
cld
-SAVE_C_REGS 8
-SAVE_EXTRA_REGS 8
+PUSH_AND_CLEAR_REGS save_ret=1
ENCODE_FRAME_POINTER 8
-xorl %ebx, %ebx
 testb$3, CS+8(%rsp)
jz .Lerror_kernelspace
@@ -1339,6 +1212,7 @@
 * from user mode due to an IRET fault.
 */
 SWAPGS
+FENCE_SWAPGS_USER_ENTRY
 /* We have user CR3. Change to kernel CR3. */
 SWITCH_TO_KERNEL_CR3 scratch_reg=%rax
@@ -1360,6 +1234,8 @@
 CALL_enter_from_user_mode
 ret
+.Lerror_entry_done lfence:
+FENCE_SWAPGS_KERNEL_ENTRY
.Lerror_entry_done:
TRACE_IRQS_OFF
 ret
@@ -1371,7 +1247,6 @@
 * for these here too.
 */
 .Lerror_kernelspace:
-incl %ebx
 leaq native_irq_return_iret(%rip), %rcx
 cmpq%rcx, RIP+8(%rsp)
 je .Lerror_bad_iret
@@ -1379,7 +1254,7 @@
 cmpq%rax, RIP+8(%rsp)
 je .Lbstep_iret
cmpq $.Lgs_change, RIP+8(%rsp)
-jne .Lerror_entry_done
+jne .Lerror_entry_done lfence

/*
 * hack: _Lgs_change can fail with user gsbase. If this happens, fix up
* @ @ -1387,6 +1262,7 @@
* _Lgs_change's error handler with kernel gsbase.
*/
SWAPGS
+FENCE_SWAPGS_USER_ENTRY
SWITCH_TO_KERNEL_CR3 scratch_reg=%rax
jmp .Lerror_entry_done

@@ -1387,6 +1262,7 @@
* gsbase and CR3. Switch to kernel gsbase and CR3:
*/
SWAPGS
+FENCE_SWAPGS_USER_ENTRY
SWITCH_TO_KERNEL_CR3 scratch_reg=%rax

/*
 * Pretend that the exception came from user mode: set up pt_regs
- * as if we faulted immediately after IRET and clear EBX so that
- * error_exit knows that we will be returning to user mode.
+ * as if we faulted immediately after IRET.
*/
mov %rsp, %rdi
call fixup_bad_iret
mov %rax, %rsp
-decl %ebx
jmp .Lerror_entry_from_usermode_after_swapgs
END(error_entry)

- /*
- * On entry, EBX is a "return to kernel mode" flag:
- * 1: already in kernel mode, don't need SWAPGS
- * 0: user gsbase is loaded, we need SWAPGS and standard preparation for return to usermode
- */
ENTRY(error_exit)
UNWIND_HINT_REGS
DISABLE_INTERRUPTS(CLBR_ANY)
TRACE_IRQS_OFF
-testl %ebx, %ebx
-jnz retint_kernel
+testb $3, CS(%rsp)
+jnz retint_kernel
jmp retint_user
END(error_exit)

@@ -1500,6 +1369,7 @@
swapgs

cld
+FENCE_SWAPGS_USER_ENTRY
SWITCH_TO_KERNEL_CR3 scratch_reg=%rdx
movq%rsp, %rdx
movqPER_CPU_VAR(cpu_current_top_of_stack), %rsp
@@ -1511,22 +1381,7 @@
pushq1*8(%rdx)/* pt_regs->rip */
UNWIND_HINT_IRET_REGS
pushq $1/* pt_regs->orig_ax */
-pushq %rdi/* pt_regs->di */
-pushq %rsi/* pt_regs->si */
-pushq (%rdx)/* pt_regs->dx */
-pushq %rcx/* pt_regs->cx */
-pushq %rax/* pt_regs->ax */
-pushq %r8/* pt_regs->r8 */
-pushq %r9/* pt_regs->r9 */
-pushq %r10/* pt_regs->r10 */
-pushq %r11/* pt_regs->r11 */
-pushq (%rdx)
-UNWIND_HINT_REGS
+PUSH_AND_CLEAR_REGS rdx=(%rdx)
 ENCODE_FRAME_POINTER

/*
@@ -1736,7 +1591,6 @@
 * frame to point back to repeat_nmi.
 */
pushq$-1/* ORIG_RAX: no syscall to restart */
-ALLOC_PT_GPREGS_ON_STACK

/*
 * Use paranoid_entry to handle SWAPGS, but no need to use paranoid_exit
@@ -1760,8 +1614,7 @@
nmi_swapgs:
 SWAPGS_UNSAFE_STACK
nmi_restore:
-POP_EXTRA_REGS
+xorl%r9d, %r9d/* nospec r9 */
pushq $0/* pt_regs->r10 = 0 */
+xorl%r10d, %r10d/* nospec r10 */
pushq $0/* pt_regs->r11 = 0 */
+xorl%r11d, %r11d/* nospec r11 */
pushq %rbx /* pt_regs->rbx */
+xorl%ebx, %ebx/* nospec rbx */
pushq %rbp /* pt_regs->rbp (will be overwritten) */
+xorl%ebp, %ebp/* nospec rbp */
pushq $0/* pt_regs->r12 = 0 */
+xorl%r12d, %r12d/* nospec r12 */
pushq $0/* pt_regs->r13 = 0 */
+xorl%r13d, %r13d/* nospec r13 */
pushq $0/* pt_regs->r14 = 0 */
+xorl%r14d, %r14d/* nospec r14 */
pushq $0/* pt_regs->r15 = 0 */
+xorl%r15d, %r15d/* nospec r15 */

/*
 * User mode is traced as though IRQs are on, and SYSENTER
@@ -278,9 +298,9 @@
*/
SWITCH_TO_USER_CR3_NOSTACK scratch_reg=%r8 scratch_reg2=%r9

-xorq%r8, %r8
-xorq%r9, %r9
-xorq%r10, %r10
+xorl%r8d, %r8d
+xorl%r9d, %r9d
+xorl%r10d, %r10d
swapgs
sysretl
END(entry_SYSCALLCompat)
@@ -337,16 +357,26 @@
pushq%rdx/* pt_regs->dx */
pushq%rcx/* pt_regs->cx */
pushq-ENOSYS/* pt_regs->ax */
-pushq $0/* pt_regs->r8 = 0 */
-pushq $0/* pt_regs->r9 = 0 */
-pushq $0/* pt_regs->r10 = 0 */
-pushq $0/* pt_regs->r11 = 0 */
+pushq %r8/* pt_regs->r8 */
+xorl%r8d, %r8d/* nospec r8 */
+pushq %r9/* pt_regs->r9 */
+xorl%r9d, %r9d/* nospec r9 */
+pushq %r10/* pt_regs->r10 */
+xorl%r10d, %r10d/* nospec r10 */
+pushq %r11/* pt_regs->r11 */
xorl %r11d, %r11d /* nospec r11 */
pushq %rbx /* pt_regs->rbx */
xorl %ebx, %ebx /* nospec rbx */
pushq %rbp /* pt_regs->rbp */
xorl %ebp, %ebp /* nospec rbp */
pushq %r12 /* pt_regs->r12 */
xorl %r12d, %r12d /* nospec r12 */
pushq %r13 /* pt_regs->r13 */
xorl %r13d, %r13d /* nospec r13 */
pushq %r14 /* pt_regs->r14 */
xorl %r14d, %r14d /* nospec r14 */
pushq %r15 /* pt_regs->r15 */
xorl %r15d, %r15d /* nospec r15 */
cld

/*
--- linux-4.15.0.orig/arch/x86/entry/syscall_64.c
+++ linux-4.15.0/arch/x86/entry/syscall_64.c
@@ -7,14 +7,11 @@
 #include <asm/asm-offsets.h>
 #include <asm/syscall.h>
 
-#define __SYSCALL_64_QUAL_(sym) sym
-#define __SYSCALL_64_QUAL_ptregs(sym) ptregs_##sym
-
-#define __SYSCALL_64(nr, sym, qual) extern asmlinkage long __SYSCALL_64_QUAL_##qual(sym)(unsigned long, unsigned long, unsigned long, unsigned long, unsigned long);
+#define __SYSCALL_64(nr, sym, qual) extern asmlinkage long __SYSCALL_64_QUAL_##qual(sym)(unsigned long, unsigned long, unsigned long, unsigned long, unsigned long);

#include <asm/syscalls_64.h>
#undef __SYSCALL_64

-#define __SYSCALL_64(nr, sym, qual) [nr] = __SYSCALL_64_QUAL_##qual(sym),
+#define __SYSCALL_64(nr, sym, qual) [nr] = sym,

extern long sys_ni_syscall(unsigned long, unsigned long, unsigned long, unsigned long, unsigned long);

--- linux-4.15.0.orig/arch/x86/entry/vdso/Makefile
+++ linux-4.15.0/arch/x86/entry/vdso/Makefile
@@ -48,10 +48,8 @@
 export CPPFLAGS_vdso.lds += -P -C

-VDSO_LDFLAGS_vdso.lds = -m64 -Wl,-soname=linux-vdso.so.1 \
 -Wl,-no-undefined \
 --Wl,-z,max-page-size=4096 -Wl,-z,common-page-size=4096 \
 -$(DISABLE_LTO)
$(obj)/vdso64.so.dbg: $(src)/vdso.lds $(vobjs) FORCE 
$(call if_changed,vdso) 
@@ -76,7 +74,13 @@
- fno-omit-frame-pointer -foptimize-sibling-calls 
- DDISABLE_BRANCH_PROFILING -DBUILD_VDSO

-$(vobjs): KBUILD_CFLAGS := $(filter-out $(GCC_PLUGINS_CFLAGS),$(KBUILD_CFLAGS)) $(CFL)
+ifdef CONFIG_RETPOLINE
+ifneq ($(RETPOLINE_VDSO_CFLAGS),)
+ CFL += $(RETPOLINE_VDSO_CFLAGS)
+endif
+endif
+
+$(vobjs): KBUILD_CFLAGS := $(filter-out $(GCC_PLUGINS_CFLAGS)
 $(RETPOLINE_CFLAGS),$(KBUILD_CFLAGS)) $(CFL)
#
# vDSO code runs in userspace and -pg doesn't help with profiling anyway.
@@ -97,10 +101,8 @@
#
CPPFLAGS_vdsox32.lds = $(CPPFLAGS_vdso.lds)
- VDSO_LDFLAGS_vdsox32.lds = -Wl,-m,elf32_x86_64 \
- -Wl,-soname=linux-vdso.so.1 \
- -Wl,-z,max-page-size=4096 \
- -Wl,-z,common-page-size=4096 
+VDSO_LDFLAGS_vdsox32.lds = -m elf32_x86_64 -soname linux-vdso.so.1 \
+ -z max-page-size=4096 

# 64-bit objects to re-brand as x32
vobjs64-for-x32 := $(filter-out $(vobjs-nox32),$(vobjs-y)) 
@@ -128,7 +130,7 @@
 $(call if_changed,vdso)
CPPFLAGS_vdos32.lds = $(CPPFLAGS_vdso.lds)
- VDSO_LDFLAGS_vdos32.lds = -m32 -Wl,-m,elf_i386 -Wl,-soname=linux-gate.so.1 
+VDSO_LDFLAGS_vdos32.lds = -m elf_i386 -soname linux-gate.so.1 

targets += vdso32/vdso32.lds
targets += vdso32/note.o vdso32/system_call.o vdso32/sigreturn.o 
@@ -143,11 +145,19 @@
 KBUILD_CFLAGS_32 := $(filter-out -fno-pic,$(KBUILD_CFLAGS_32))
 KBUILD_CFLAGS_32 := $(filter-out -mfentry,$(KBUILD_CFLAGS_32))
 KBUILD_CFLAGS_32 := $(filter-out $(GCC_PLUGINS_CFLAGS),$($(KBUILD_CFLAGS_32))
+KBUILD_CFLAGS_32 := $(filter-out $(RETPOLINE_CFLAGS),$($(KBUILD_CFLAGS_32))
KBUILD_CFLAGS_32 += -m32 -msoft-float -mregparm=0 -fpic
KBUILD_CFLAGS_32 += $(call cc-option, -fno-stack-protector)
KBUILD_CFLAGS_32 += $(call cc-option, -foptimize-sibling-calls)
KBUILD_CFLAGS_32 += -fno-omit-frame-pointer
KBUILD_CFLAGS_32 += -DDISABLE_BRANCH_PROFILING
+
+ifdef CONFIG_RETPOLINE
+ifndef $(RETPOLINE_VDSO_CFLAGS),
+ KBUILD_CFLAGS_32 += $(RETPOLINE_VDSO_CFLAGS)
+endif
+endif
+
$(obj)/vdso32.so.dbg: KBUILD_CFLAGS = $(KBUILD_CFLAGS_32)

$(obj)/vdso32.so.dbg: FORCE \ @@ -162,13 +172,14 @@
# The DSO images are built using a special linker script.
#
quiet_cmd_vdso = VDSO $@
- cmd_vdso = $(CC) -nostdlib -o $@ \
+ cmd_vdso = $(LD) -nostdlib -o $@ \
   $(VDSO_LDFLAGS) $(VDSO_LDFLAGS,filter %,lds,$ powstał) \
- $ (Wl,-T,filter %,l,ds,$ $ $ filter %,o,$ $ ) && \
+ $ (Wl,$filter %,l,ds,$ $ ) $(filter %,o,$ $ ) && \
sh $(srctree)/$(src)/checkundef.sh '$(NM)' '$@'

-VDSO_LDFLAGS = -fPIC -shared $(call cc-option, -Wl$(comma)--hash-style=both) \ 
-$ (call cc-option, -Wl$(comma)--build-id) -Wl,-Bsymbolic $(LTO_CFLAGS)
+VDSO_LDFLAGS = -shared $(call ld-option, --hash-style=both) \ 
+$ (call ld-option, --build-id) $(call ld-option, --eh-frame-hdr) \ 
+ Bsymbolic
GCOV_PROFILE := n

#
--- linux-4.15.0.orig/arch/x86/entry/vdso/vclock_gettime.c
+++ linux-4.15.0/arch/x86/entry/vdso/vclock_gettime.c
@@ -29,12 +29,12 @@
extern time_t __vdso_time(time_t *t);

#ifdef CONFIG_PARAVIRT_CLOCK
-extern u8 pvclock_page
+extern u8 pvclock_page[PAGE_SIZE]
 __attribute__((visibility("hidden")));
#endif

#ifdef CONFIG_HYPERV_TSCPAGE
-extern u8 hvclock_page
+extern u8 hvclock_page[PAGE_SIZE]
__attribute__((visibility("hidden")));
#endif

@@ -43,8 +43,9 @@
notrace static long vds0_fallback_gettime(long clock, struct timespec *ts)
{
    long ret;
    -asm("syscall" : "=a" (ret) :
        - "0" (__NR_clock_gettime), "D" (clock), "S" (ts) : "memory");
    +asm ("syscall" : "=a" (ret), "=m" (*ts) :
        + "0" (__NR_clock_gettime), "D" (clock), "S" (ts) :
        + "memory", "rcx", "r11");
    return ret;
}

@@ -52,8 +53,9 @@
{
    long ret;
    -asm("syscall" : "=a" (ret) :
        - "0" (__NR_gettimeofday), "D" (tv), "S" (tz) : "memory");
    +asm ("syscall" : "=a" (ret), "=m" (*tv), "=m" (*tz) :
        + "0" (__NR_gettimeofday), "D" (tv), "S" (tz) :
        + "memory", "rcx", "r11");
    return ret;
}

@@ -64,13 +66,13 @@
{
    long ret;
    -asm("syscall" : "=a" (ret) :
        - "0" (__NR_gettimeofday), "D" (tv), "S" (tz) : "memory");
    +asm ("syscall" : "=a" (ret), "=m" (*tv), "=m" (*tz) :
        + "0" (__NR_gettimeofday), "D" (tv), "S" (tz) :
        + "memory", "rcx", "r11");
    return ret;
}

@@ -79,13 +81,13 @@
{
    long ret;
    -asm(
        +asm ("mov %%ebx, %%edx 
            "mov %2, %%ebx 
            +"mov [%clock], %%ebx 
                "call __kernel_vsyscall 
                "mov %%%edx, %%%ebx 
                : "=a" (ret)
                : "0" (__NR_clock_gettime), "g" (clock), "c" (ts)
                +: "=a" (ret), "=m" (*ts)
                +: "0" (__NR_clock_gettime), [clock] "g" (clock), "c" (ts)
                : "memory", "edx");
                return ret;
        }
    @@ -79,13 +81,13 @@
    {
        long ret;
        
Open Source Used In 5GaaS Edge AC-4  11554
asm(
+asm ( 
"mov %%ebx, %%edx \n"
-"mov %2, %%ebx \n"
+"mov %[tv], %%ebx \n"
"call __kernel_vsyscall \n"
"mov %%edx, %%ebx \n"
-: "=a" (ret)
-: "0" (__NR_gettimeofday), "$g$ (tv), "$c$ (tz)
+: "=a" (ret), "$m$ (*tv), "$m$ (*tz)
+: "0" (__NR_gettimeofday), [tv] "$g$ (tv), "$c$ (tz)
: "memory", "edx");
return ret;
})
@@ -189,13 +191,24 @@

if (gtod->vclock_mode == VCLOCK_TSC)
cycles = vread_tsc();
+
+/*
+ * For any memory-mapped vclock type, we need to make sure that gcc
+ * doesn't cleverly hoist a load before the mode check. Otherwise we
+ * might end up touching the memory-mapped page even if the vclock in
+ * question isn't enabled, which will segfault. Hence the barriers.
+ */
+#endif
+ifdef CONFIG_PARAVIRT_CLOCK
-else if (gtod->vclock_mode == VCLOCK_PVCLOCK)
+else if (gtod->vclock_mode == VCLOCK_PVCLOCK) {
+barrier();
cycles = vread_pvclock(mode);
+}
+endif
+ifdef CONFIG_HYPERV_TSCPAGE
-else if (gtod->vclock_mode == VCLOCK_HVCLOCK)
+else if (gtod->vclock_mode == VCLOCK_HVCLOCK) {
+barrier();
cycles = vread_hvclock(mode);
+}
+endif
else
return 0;
--- linux-4.15.0.orig/arch/x86/entry/vdso/vdso32-setup.c
+++ linux-4.15.0/arch/x86/entry/vdso/vdso32-setup.c
@@ -11,6 +11,7 @@
#include <linux/smp.h>
#include <linux/kernel.h>
#include <linux/mm_types.h>
+include <linux/elf.h>

#include <asm/processor.h>
#include <asm/vdso.h>
--- linux-4.15.0.orig/arch/x86/entry/vdso/vma.c
+++ linux-4.15.0/arch/x86/entry/vdso/vma.c
@@ -343,7 +343,7 @@
  #ifdef CONFIG_NUMA
  node = cpu_to_node(cpu);
  #endif
-  if (static_cpu_has(X86_FEATURE_RDTSCP))
+  if (boot_cpu_has(X86_FEATURE_RDTSCP) || boot_cpu_has(X86_FEATURE_RDPID))
    write_rdtscp_aux((node << 12) | cpu);
/
--- linux-4.15.0.orig/arch/x86/entry/vsyscall/vsyscall_64.c
+++ linux-4.15.0/arch/x86/entry/vsyscall/vsyscall_64.c
@@ -355,7 +355,7 @@
    set_pgd(pgd, __pgd(pgd_val(*pgd) | _PAGE_USER));
    p4d = p4d_offset(pgd, VSYSCALL_ADDR);
  #if CONFIG_PGTABLE_LEVELS >= 5
-    p4d->p4d |= _PAGE_USER;
+    set_p4d(p4d, __p4d(p4d_val(*p4d) | _PAGE_USER));
  #endif
    pud = pud_offset(p4d, VSYSCALL_ADDR);
    set_pud(pud, __pud(pud_val(*pud) | _PAGE_USER));
--- linux-4.15.0.orig/arch/x86/events/amd/core.c
+++ linux-4.15.0/arch/x86/events/amd/core.c
@@ -3,10 +3,145 @@
 #include <linux/types.h>
 #include <linux/init.h>
 #include <linux/slab.h>
+  #include <linux/delay.h>
+  #include <linux/jiffies.h>
+  #include <asm/apicdef.h>
+  #include <asm/nmi.h>
+
+  #include "../perf_event.h"
+
+static DEFINE_PER_CPU(unsigned long, perf_nmi_tstamp);
+static unsigned long perf_nmi_window;
+
+static __initconst const u64 amd_hw_cache_event_ids
[PERF_COUNT_HW_CACHE_MAX]
[PERF_COUNT_HW_CACHE_OP_MAX]
@@ -112,23 +118,145 @@
 },
};
+static __initconst const u64 amd_hw_cache_event_ids_f17h
+[PERF_COUNT_HW_CACHE_MAX]
+[PERF_COUNT_HW_CACHE_OP_MAX]
+[PERF_COUNT_HW_CACHE_RESULT_MAX] = {
+ [C(L1D)] = {
+ [C(OP_READ)] = {
+ [C(RESULT_ACCESS)] = 0x0040, /* Data Cache Accesses */
+ [C(RESULT_MISS)] = 0xc860, /* L2$ access from DC Miss */
+ },
+ [C(OP_WRITE)] = {
+ [C(RESULT_ACCESS)] = 0,
+ [C(RESULT_MISS)] = 0,
+ },
+ [C(OP_PREFETCH)] = {
+ [C(RESULT_ACCESS)] = 0xff5a, /* h/w prefetch DC Fills */
+ [C(RESULT_MISS)] = 0,
+ },
+ [C(L1I)] = {
+ [C(OP_READ)] = {
+ [C(RESULT_ACCESS)] = 0x0080, /* Instruction cache fetches */
+ [C(RESULT_MISS)] = 0x0081, /* Instruction cache misses */
+ },
+ [C(OP_WRITE)] = {
+ [C(RESULT_ACCESS)] = -1,
+ [C(RESULT_MISS)] = -1,
+ },
+ [C(OP_PREFETCH)] = {
+ [C(RESULT_ACCESS)] = 0,
+ [C(RESULT_MISS)] = 0,
+ },
+ [C(LL)] = {
+ [C(OP_READ)] = {
+ [C(RESULT_ACCESS)] = 0,
+ [C(RESULT_MISS)] = 0,
+ },
+ [C(OP_WRITE)] = {
+ [C(RESULT_ACCESS)] = 0,
+ [C(RESULT_MISS)] = 0,
+ },
+ [C(OP_PREFETCH)] = {
+ [C(RESULT_ACCESS)] = 0,
+ [C(RESULT_MISS)] = 0,
+ },
+ [C(DTLB)] = {
}
+[C(OP_READ)] = {
+[C(RESULT_ACCESS)] = 0xff45, /* All L2 DTLB accesses */
+[C(RESULT_MISS)] = 0xf045, /* L2 DTLB misses (PT walks) */
+},
+[C(OP_WRITE)] = {
+[C(RESULT_ACCESS)] = 0,
+[C(RESULT_MISS)] = 0,
+},
+[C(OP_PREFETCH)] = {
+[C(RESULT_ACCESS)] = 0,
+[C(RESULT_MISS)] = 0,
+},
+[C(ITLB)] = {
+[C(OP_READ)] = {
+[C(RESULT_ACCESS)] = 0x0084, /* L1 ITLB misses, L2 ITLB hits */
+[C(RESULT_MISS)] = 0xff85, /* L1 ITLB misses, L2 misses */
+},
+[C(OP_WRITE)] = {
+[C(RESULT_ACCESS)] = -1,
+[C(RESULT_MISS)] = -1,
+},
+[C(OP_PREFETCH)] = {
+[C(RESULT_ACCESS)] = -1,
+[C(RESULT_MISS)] = -1,
+},
+[C(BPU)] = {
+[C(OP_READ)] = {
+[C(RESULT_ACCESS)] = 0x00c2, /* Retired Branch Instr. */
+[C(RESULT_MISS)] = 0x00c3, /* Retired Mispredicted BI */
+},
+[C(OP_WRITE)] = {
+[C(RESULT_ACCESS)] = -1,
+[C(RESULT_MISS)] = -1,
+},
+[C(OP_PREFETCH)] = {
+[C(RESULT_ACCESS)] = -1,
+[C(RESULT_MISS)] = -1,
+},
+[C(NODE)] = {
+[C(OP_READ)] = {
+[C(RESULT_ACCESS)] = 0,
+[C(RESULT_MISS)] = 0,
+},
+[C(OP_WRITE)] = {
+[C(RESULT_ACCESS)] = -1,
+[C(RESULT_MISS)] = -1,
+],
+[C(OP_PREFETCH)] = {
+[C(RESULT_ACCESS)] = -1,
+[C(RESULT_MISS)] = -1,
+],
+],
+];
+
/*
 - * AMD Performance Monitor K7 and later.
 + * AMD Performance Monitor K7 and later, up to and including Family 16h:
 */
static const u64 amd_perfmon_event_map[PERF_COUNT_HW_MAX] =
{
- [PERF_COUNT_HW_CPU_CYCLES]= 0x0076,
- [PERF_COUNT_HW_INSTRUCTIONS]= 0x00c0,
- [PERF_COUNT_HW_CACHE_REFERENCES]= 0x077d,
- [PERF_COUNT_HW_CACHE_MISSES]= 0x077e,
- [PERF_COUNT_HW_BRANCH_INSTRUCTIONS]= 0x00c2,
- [PERF_COUNT_HW_BRANCH_MISSES]= 0x00c3,
- [PERF_COUNT_HW_STALLED_CYCLES_FRONTEND]= 0x00d0, /* "Decoder empty" event */
- [PERF_COUNT_HW_STALLED_CYCLES_BACKEND]= 0x00d1, /* "Dispatch stalls" event */
+[PERF_COUNT_HW_CPU_CYCLES]= 0x0076,
+[PERF_COUNT_HW_INSTRUCTIONS]= 0x00c0,
+[PERF_COUNT_HW_CACHE_REFERENCES]= 0x077d,
+[PERF_COUNT_HW_CACHE_MISSES]= 0x077e,
+[PERF_COUNT_HW_BRANCH_INSTRUCTIONS]= 0x00c2,
+[PERF_COUNT_HW_BRANCH_MISSES]= 0x00c3,
+[PERF_COUNT_HW_STALLED_CYCLES_FRONTEND]= 0x00d0, /* "Decoder empty" event */
+[PERF_COUNT_HW_STALLED_CYCLES_BACKEND]= 0x00d1, /* "Dispatch stalls" event */
+];
+
+/
+ * AMD Performance Monitor Family 17h and later:
 + */
+static const u64 amd_f17h_perfmon_event_map[PERF_COUNT_HW_MAX] =
+{
+[PERF_COUNT_HW_CPU_CYCLES]= 0x0076,
+[PERF_COUNT_HW_INSTRUCTIONS]= 0x00c0,
+[PERF_COUNT_HW_CACHE_REFERENCES]= 0xff60,
+[PERF_COUNT_HW_CACHE_MISSES]= 0x0964,
+[PERF_COUNT_HW_BRANCH_INSTRUCTIONS]= 0x00c2,
+[PERF_COUNT_HW_BRANCH_MISSES]= 0x00c3,
+[PERF_COUNT_HW_STALLED_CYCLES_FRONTEND]= 0x0287,
+[PERF_COUNT_HW_STALLED_CYCLES_BACKEND]= 0x0187,
+};
+*/
static u64 amd_pmu_event_map(int hw_event)
{
    if (boot_cpu_data.x86 >= 0x17)
        return amd_f17h_perfmon_event_map[hw_event];
    return amd_perfmon_event_map[hw_event];
}

/*
 * When a PMC counter overflows, an NMI is used to process the event and
 * reset the counter. NMI latency can result in the counter being updated
 * before the NMI can run, which can result in what appear to be spurious
 * NMIs. This function is intended to wait for the NMI to run and reset
 * the counter to avoid possible unhandled NMI messages.
 */
#define OVERFLOW_WAIT_COUNT 50

static void amd_pmu_wait_on_overflow(int idx)
{
    unsigned int i;
    u64 counter;

    /* Wait for the counter to be reset if it has overflowed. This loop
     * should exit very, very quickly, but just in case, don't wait
     * forever...
     */
    for (i = 0; i < OVERFLOW_WAIT_COUNT; i++) {
        rdmsrl(x86_pmu_event_addr(idx), counter);
        if (counter & (1ULL << (x86_pmu.cntval_bits - 1)))
            break;
    }
    /* Might be in IRQ context, so can't sleep */
    udelay(1);
}

static void amd_pmu_disable_all(void)
{
    struct cpu_hw_events *cpuc = this_cpu_ptr(&cpu_hw_events);
    int idx;
    x86_pmu_disable_all();
}
/*
 * This shouldn't be called from NMI context, but add a safeguard here
 * to return, since if we're in NMI context we can't wait for an NMI
 * to reset an overflowed counter value.
 * */
+if (in_nmi())
+return;
+
+/*
 * Check each counter for overflow and wait for it to be reset by the
 * NMI if it has overflowed. This relies on the fact that all active
 * counters are always enabled when this function is called and
 * ARCH_PERFMON_EVENTSEL_INT is always set.
 * */
+for (idx = 0; idx < x86_pmu.num_counters; idx++) {
+if (!test_bit(idx, cpuc->active_mask))
+continue;
+
+amd_pmu_wait_on_overflow(idx);
+}
+
+static void amd_pmu_disable_event(struct perf_event *event)
+{
+x86_pmu_disable_event(event);
+
+/*
 * This can be called from NMI context (via x86_pmu_stop). The counter
 * may have overflowed, but either way, we'll never see it get reset
 * by the NMI if we're already in the NMI. And the NMI latency support
 * below will take care of any pending NMI that might have been
 * generated by the overflow.
 * */
+if (in_nmi())
+return;
+
+amd_pmu_wait_on_overflow(event->hw.idx);
+}
+
+/*
 * Because of NMI latency, if multiple PMC counters are active or other sources
 * of NMI are received, the perf NMI handler can handle one or more overflowed
 * PMC counters outside of the NMI associated with the PMC overflow. If the NMI
 * doesn't arrive at the LAPIC in time to become a pending NMI, then the kernel
 * back-to-back NMI support won't be active. This PMC handler needs to take into
 * account that this can occur, otherwise this could result in unknown NMI
 * messages being issued. Examples of this is PMC overflow while in the NMI
 * handler when multiple PMCs are active or PMC overflow while handling some
static int amd_pmu_handle_irq(struct pt_regs *regs) {
    struct cpu_hw_events *cpuc = this_cpu_ptr(&cpu_hw_events);
    int active, handled;

    active = __bitmap_weight(cpuc->active_mask, X86_PMC_IDX_MAX);

    handled = x86_pmu_handle_irq(regs);

    if (handled) {
        this_cpu_write(perf_nmi_tstamp, jiffies + perf_nmi_window);
        return handled;
    }

    if (time_after(jiffies, this_cpu_read(perf_nmi_tstamp)))
        return NMI_DONE;

    return NMI_HANDLED;
}

static struct event_constraint *
amd_get_event_constraints(struct cpu_hw_events *cpuc, int idx,
struct perf_event *event)
@@ -621,11 +874,11 @@
static __initconst const struct x86_pmu amd_pmu = {
    .name = "AMD",

- .handle_irq= x86_pmu_handle_irq,
- .disable_all= x86_pmu_disable_all,
+ .handle_irq= amd_pmu_handle_irq,
+ .disable_all= amd_pmu_disable_all,
 .enable_all= x86_pmu_enable_all,
 .enable= x86_pmu_enable_event,
- .disable= x86_pmu_disable_event,
+ .disable= amd_pmu_disable_event,
 .hw_config= amd_pmu_hw_config,
 .schedule_events= x86_schedule_events,
 .eventsel= MSR_K7_EVNTSEL0,
@@ -657,6 +910,9 @@
 if (!boot_cpu_has(X86_FEATURE_PERFCTR_CORE))
     return 0;

+ /* Avoid calculating the value each time in the NMI handler */
+     perf_nmi_window = msecs_to_jiffies(100);
+     switch (boot_cpu_data.x86) {
+         case 0x15:
+                 pr_cont("Fam15h ");
+                 @ @ -714,9 +970,10 @@
+                 x86_pmu.amd_nb_constraints = 0;
+         }
+
-/* Events are common for all AMDs */
-     memcpy(hw_cache_event_ids, amd_hw_cache_event_ids,
-            sizeof(hw_cache_event_ids));
-     if (boot_cpu_data.x86 >= 0x17)
-            memcpy(hw_cache_event_ids, amd_hw_cache_event_ids_f17h, sizeof(hw_cache_event_ids));
-     else
-            memcpy(hw_cache_event_ids, amd_hw_cache_event_ids, sizeof(hw_cache_event_ids));
+
     return 0;
    }
    @ @ -728,7 +985,7 @@
    cpuc->perf_cptr_virt_mask = 0;

    /* Reload all events */
-    x86_pmu_disable_all();
+    amd_pmu_disable_all();
    x86_pmu_enable_all(0);
    }
EXPORT_SYMBOL_GPL(amd_pmu_enable_virt);
    @ @ -746,7 +1003,7 @@
    cpuc->perf_cptr_virt_mask = AMD64_EVENTSEL_HOSTONLY;

    /* Reload all events */
-x86_pmu_disable_all();
+amd_pmu_disable_all();
x86_pmu_enable_all(0);
}
EXPORT_SYMBOL_GPL(amd_pmu_disable_virt);
--- linux-4.15.0.orig/arch/x86/events/amd/ibs.c
+++ linux-4.15.0/arch/x86/events/amd/ibs.c
@@ -89,6 +89,8 @@
	u64				max_period;
unsigned long			offset_mask[1];
intoffset_max;
+unsigned int			fetch_count_reset_broken : 1;
+unsigned int			fetch_ignore_if_zero_rip : 1;
struct cpu_perf_ibs __percpu*pcpu;

struct attribute**format_attrs;
@@ -346,11 +348,15 @@
{
	/*
+ * If the internal 27-bit counter rolled over, the count is MaxCnt
+ * and the lower 7 bits of CurCnt are randomized.
+ * Otherwise CurCnt has the full 27-bit current counter value.
+ */
if (config & IBS_OP_VAL)
-count += (config & IBS_OP_MAX_CNT) << 4; /* cnt rolled over */
-if (ibs_caps & IBS_CAPS_RDWRPCNT)
-count += (config & IBS_OP_CUR_CNT) >> 32;
+count = (config & IBS_OP_MAX_CNT) << 4;
+else if (ibs_caps & IBS_CAPS_RDWRPCNT)
+count = (config & IBS_OP_CUR_CNT) >> 32;

return count;
}
*/
@@ -389,7 +400,8 @@
struct hw_perf_event *hwc, u64 config)
{
    config &= ~perf_ibs->cnt_mask;
-    wrmsrl(hwc->config_base, config);
+    if (boot_cpu_data.x86 == 0x10)
+        wrmsrl(hwc->config_base, config);
    config &= ~perf_ibs->enable_mask;
    wrmsrl(hwc->config_base, config);
}
@@ -564,7 +576,8 @@
    .msr		= MSR_AMD64_IBSOPCTL,
    .config_mask	= IBS_OP_CONFIG_MASK,
    -.cnt_mask	= IBS_OP_MAX_CNT,
+    .cnt_mask	= IBS_OP_MAX_CNT | IBS_OP_CUR_CNT |
+    .cnt_mask	= IBS_OP_MAX_CNT | IBS_OP_CUR_CNT_RAND,
    .enable_mask	= IBS_OP_ENABLE,
    .valid_mask	= IBS_OP_VAL,
    .max_period	= IBS_OP_MAX_CNT << 4,
@@ -579,7 +592,7 @@
struct cpu_perf_ibs *pcpu = this_cpu_ptr(perf_ibs->pcpu);
struct perf_event *event = pcpu->event;
-    struct hw_perf_event *hwc = &event->hw;
+    struct hw_perf_event *hwc;
struct perf_sample_data data;
struct perf_raw_record raw;
struct pt_regs regs;
@@ -602,6 +615,10 @@
return 0;
}

+if (WARN_ON_ONCE(!event))
+    goto fail;
+
+hwc = &event->hw;
msr = hwc->config_base;
buf = ibs_data.regs;
rdmsrl(msr, *buf);
@@ -621,7 +638,7 @@
if (event->attr.sample_type & PERF_SAMPLE_RAW)
    offset_max = perf_ibs->offset_max;
else if (check_rip)
    -offset_max = 2;
+    offset_max = 3;
else
  offset_max = 1;
  do {
    @ @ -631.18 +648.24 @ @
    perf_ibs->offset_max,
    offset + 1);
  } while (offset < offset_max);
  */
+ * Read IbsBrTarget, IbsOpData4, and IbsExtCtl separately
+ * depending on their availability.
+ * Can't add to offset_max as they are staggered
+ */
if (event->attr.sample_type & PERF_SAMPLE_RAW) {
  /*
  * Read IbsBrTarget and IbsOpData4 separately
  * depending on their availability.
  * Can't add to offset_max as they are staggered
  */
- if (ibs_caps & IBS_CAPS_BRNTRGT) {
- rdmssl(MSR_AMD64_IBSBRTARGET, *buf++);
- size++;+
+ if (perf_ibs == &perf_ibs_op) {
+ if (ibs_caps & IBS_CAPS_BRNTRGT) {
+ rdmssl(MSR_AMD64_IBSBRTARGET, *buf++);
+ size++;+
+ }+
+ if (ibs_caps & IBS_CAPS_OPDATA4) {
+ rdmssl(MSR_AMD64_IBSOPDATA4, *buf++);
+ size++;+
+ }
+ if (ibs_caps & IBS_CAPS_OPDATA4) {
+ rdmssl(MSR_AMD64_IBSOPDATA4, *buf++);
+ size++;+
+ }
  }
  -if (ibs_caps & IBS_CAPS_OPDATA4) {
  -rdmssl(MSR_AMD64_IBSOFTDATA4, *buf++);
  -size++;+
+ if (perf_ibs == &perf_ibs_fetch && (ibs_caps & IBS_CAPS_FETCHCTLEXTD)) {
+ rdmssl(MSR_AMD64_ICIBSEXTDCTL, *buf++);
  size++;+
  }
  }
  else {
    /* Workaround for erratum #1197 */
+ if (perf_ibs->fetch_ignore_if_zero_rip && !(ibs_data.regs[1]))
+ goto out;
+ set_linear_ip(&regs, ibs_data.regs[1]);
  regs.flags |= PERF_EFLAGS_EXACT;
}
throttle = perf_event_overflow(event, &data, &regs);
out:
- if (throttle)
+ if (throttle) {
    perf_ibs_stop(event, 0);
- else
+   } else {
+     period >>= 4;
+     if ((ibs_caps & IBS_CAPS_RDWROPCNT) &&
+         (*config & IBS_OP_CNT_CTL))
+         period |= *config & IBS_OP_CUR_CNT_RAND;
+     perf_ibs_enable_event(perf_ibs, hwc, period);
+   }
}

perf_event_update_userpage(event);

struct attribute **attr = ibs_op_format_attrs;

/*
 * Some chips fail to reset the fetch count when it is written; instead
 * they need a 0-1 transition of IbsFetchEn.
 */
+ if (boot_cpu_data.x86 >= 0x16 && boot_cpu_data.x86 <= 0x18)
+   perf_ibs_fetch.fetch_count_reset_broken = 1;
+ if (boot_cpu_data.x86 == 0x19 && boot_cpu_data.x86_model < 0x10)
+   perf_ibs_fetch.fetch_ignore_if_zero_rip = 1;
+ perf_ibs_pmu_init(&perf_ibs_fetch, "ibs_fetch");

if (ibs_caps & IBS_CAPS_OPCNT) {
    struct amd_iommu_event_desc {
        -struct kobj_attribute attr;
        +struct device_attribute attr;
        const char *event;
    };
}
static ssize_t _iommu_event_show(struct kobject *kobj, struct kobj_attribute *attr, char *buf)
{
    struct amd_iommu_event_desc *event =
        container_of(attr, struct amd_iommu_event_desc, attr);
    while (amd_iommu_v2_event_descs[i].attr.attr.name)
        i++;

    attrs = kzalloc(sizeof(struct attribute **) * (i + 1), GFP_KERNEL);
    if (!attrs)
        return -ENOMEM;

    -- linux-4.15.0.orig/arch/x86/events/amd/uncore.c
    +++ linux-4.15.0/arch/x86/events/amd/uncore.c
    @ @ -387,7 +387,7 @@
    --- linux-4.15.0.orig/arch/x86/events/amd/uncore.c
    +++ linux-4.15.0/arch/x86/events/amd/uncore.c
    @ @ -19,6 +19,7 @@
    #include <asm/cpufeature.h>
    #include <asm/perf_event.h>
    #include <asm/msr.h>
    +#include <asm/smp.h>

    #define NUM_COUNTERS_NB4
    #define NUM_COUNTERS_L24
    @ @ -35,6 +36,7 @@

    static int num_countertsesllc;
    static int num_countsers_nb;
    +static bool l3_mask;

    static HLIST_HEAD(uncore_unused_list);

    @ @ -191,26 +193,38 @@

    /*
     * NB and Last level cache counters (MSRs) are shared across all cores
     * that share the same NB / Last level cache. Interrupts can be directed
     * to a single target core, however, event counts generated by processes
     * running on other cores cannot be masked out. So we do not support
     * sampling and per-thread events.
     * that share the same NB / Last level cache. On family 16h and below,
     * Interrupts can be directed to a single target core, however, event
     * counts generated by processes running on other cores cannot be masked
     * out. So we do not support sampling and per-thread events via
+ * CAP_NO_INTERRUPT, and we do not enable counter overflow interrupts:
+ */
-if (is_sampling_event(event) || event->attach_state & PERF_ATTACH_TASK)
-return -EINVAL;

/* NB and Last level cache counters do not have usr/os/guest/host bits */
if (event->attr.exclude_user || event->attr.exclude_kernel ||
    event->attr.exclude_host || event->attr.exclude_guest)
return -EINVAL;

-/* and we do not enable counter overflow interrupts */
hwc->config = event->attr.config & AMD64_RAW_EVENT_MASK_NB;
hwc->idx = -1;

if (event->cpu < 0)
return -EINVAL;

+/
+ * SliceMask and ThreadMask need to be set for certain L3 events in
+ * Family 17h. For other events, the two fields do not affect the count.
+ */
+if (l3_mask && is_llc_event(event)) {
+int thread = 2 * (cpu_data(event->cpu).cpu_core_id % 4);
+  +
+  if (smp_num_siblings > 1)
+  thread += cpu_data(event->cpu).apicid & 1;
+  +
+  hwc->config |= (1ULL << (AMD64_L3_THREAD_SHIFT + thread) &
+  AMD64_L3_THREAD_MASK) | AMD64_L3_SLICE_MASK;
+}
+
+ uncore = event_to_amd_uncore(event);
if (!uncore)
return -ENODEV;

static struct pmu amd_llc_pmu = {
  @ @ -298,6 +312,7 @ @
  .start= amd_uncore_start,
  .stop= amd_uncore_stop,
  .read= amd_uncore_read,
  .capabilities= PERF_PMU_CAP_NO_INTERRUPT,
};

static struct pmu amd_llc_pmu = {
  @ @ -308,6 +323,7 @ @
  .start= amd_uncore_start,
  .stop= amd_uncore_stop,
  .read=amd_uncore_read,
  .capabilities= PERF_PMU_CAP_NO_INTERRUPT,
};
static struct amd_uncore *amd_uncore_alloc(unsigned int cpu)
@@ -399,26 +415,8 @@
 if (amd_uncore_llc) {
     unsigned int apicid = cpu_data(cpu).apicid;
     unsigned int nshared, subleaf, prev_eax = 0;
     uncore = *per_cpu_ptr(amd_uncore_llc, cpu);
-    /*
-     * Iterate over Cache Topology Definition leaves until no
-     * more cache descriptions are available.
-     */
-    for (subleaf = 0; subleaf < 5; subleaf++) {
-        cpuid_count(0x8000001d, subleaf, &eax, &ebx, &ecx, &edx);
-        /* EAX[0:4] gives type of cache */
-        if (!(eax & 0x1f))
-            break;
-        prev_eax = eax;
-    }
-    nshared = ((prev_eax >> 14) & 0xfff) + 1;
     uncore->id = apicid - (apicid % nshared);
+    uncore->id = per_cpu(cpu_llc_id, cpu);
     uncore = amd_uncore_find_online_sibling(uncore, amd_uncore_llc);
     *per_cpu_ptr(amd_uncore_llc, cpu) = uncore;
     amd_llc_pmu.name = "amd_l3";
     format_attr_event_l3.show = &event_show_l3;
     format_attr_event_l3.show = &event_show_l3;
+    l3_mask = true;
 } else {
     num_counters_nb = NUM_COUNTERS_NB;
     num_counters_llc = NUM_COUNTERS_L2;
@@ -542,6 +540,7 @@
     amd_llc_pmu.name = "amd_l2";
     format_attr_event_l3 = format_attr_event_l3;
     format_attr_event_l3 = format_attr_event_l3;
+    l3_mask = false;
 }

 amd_nb_pmu.attr_groups= amd_uncore_attr_groups_df;
--- linux-4.15.0.orig/arch/x86/events/core.c
+++ linux-4.15.0/arch/x86/events/core.c

#include <linux/cpu.h>
#include <linux/bitops.h>
#include <linux/device.h>
+include <linux/nospec.h>

#include <asm/apic.h>
#include <asm/stacktrace.h>
 @@ -27,6 +27,7 @@
 #include <asm/apic.h>
 #include <asm/stacktrace.h>
 @ @ -304,17 +305,20 @ @

 config = attr->config;

 -cache_type = (config >> 0) & 0xff;
 +cache_type = (config >> 0) & 0xff;
 if (cache_type >= PERF_COUNT_HW_CACHE_MAX)
     return -EINVAL;
 +cache_type = array_index_nospec(cache_type, PERF_COUNT_HW_CACHE_MAX);

 cache_op = (config >> 8) & 0xff;
 if (cache_op >= PERF_COUNT_HW_CACHE_OP_MAX)
     return -EINVAL;
 +cache_op = array_index_nospec(cache_op, PERF_COUNT_HW_CACHE_OP_MAX);

 cache_result = (config >> 16) & 0xff;
 if (cache_result >= PERF_COUNT_HW_CACHE_RESULT_MAX)
     return -EINVAL;
 +cache_result = array_index_nospec(cache_result, PERF_COUNT_HW_CACHE_RESULT_MAX);

 val = hw_cache_event_ids[cache_type][cache_op][cache_result];

 @ @ -371,7 +375,7 @ @
 * LBR and BTS are still mutually exclusive.
 */
 if (x86_pmu.lbr_pt_coexist && what == x86_lbr_exclusive_pt)
     return 0;
 +goto out;

 if (!atomic inc not zero(&x86_pmu.lbr_exclusive[what])) {
 mutex_lock(&pmc_reserve_mutex);
 @ @ -383,6 +387,7 @ @
 mutex_unlock(&pmc_reserve_mutex);
 }

 +out:
 atomic inc(&active_events);
 return 0;

 @ @ -393,11 +398,15 @ @
void x86_del_exclusive(unsigned int what)
{
+atomic_dec(&active_events);
+
+/*
+ * See the comment in x86_add_exclusive().
+ */
if (x86_pmu.lbr_pt_coexist && what == x86_lbr_exclusive_pt)
return;

atomic_dec(&x86_pmu.lbr_exclusive[what]);
-atomic_dec(&active_events);
}

int x86_setup_perfctr(struct perf_event *event)
@@ -421,6 +430,8 @@
if (attr->config >= x86_pmu.max_events)
return -EINVAL;

+attr->config = array_index_nospec((unsigned long)attr->config, x86_pmu.max_events);
+
/*
 * The generic map:
 */
@@ -432,26 +443,6 @@
if (config == -1LL)
return -EINVAL;

-/*
- * Branch tracing:
- */
-if (attr->config == PERF_COUNT_HW_BRANCH_INSTRUCTIONS &&
- !attr->freq && hwc->sample_period == 1) {
- /* BTS is not supported by this architecture. */
- if (!x86_pmu.bts_active)
- return -EOPNOTSUPP;
- /* BTS is currently only allowed for user-mode. */
- if (!attr->exclude_kernel)
- return -EOPNOTSUPP;
- /* disallow bts if conflicting events are present */
- if (x86_add_exclusive(x86_lbr_exclusive_lbr))
- return -EBUSY;
- 
- /* event->destroy = hw_perf_lbr_event_destroy; */
-}
hwc->config |= config;

return 0;
@@ -1156,16 +1147,13 @@
per_cpu(pmc_prev_left[idx], smp_processor_id()) = left;

-if (!!(hwc->flags & PERF_X86_EVENT_AUTO_RELOAD)) ||
-    local64_read(&hwc->prev_count) != (u64)-left) {
  /*
   * The hw event starts counting from this event offset,
   * mark it to be able to extra future deltas:
   */
  -local64_set(&hwc->prev_count, (u64)-left);
  +local64_set(&hwc->prev_count, (u64)-left);
  +/*
   * The hw event starts counting from this event offset,
   * mark it to be able to extra future deltas:
   +*/
  +local64_set(&hwc->prev_count, (u64)-left);

  -wrmrsl(hwc->event_base, (u64)(-left) & x86_pmu.cntval_mask);
  -}
  +wrmrsl(hwc->event_base, (u64)(-left) & x86_pmu.cntval_mask);

  /*
   * Due to erratum on certan cpu we need
   @@ -1345,8 +1333,9 @@
   struct cpu_hw_events *cpuc = this_cpu_ptr(&cpu_hw_events);
   struct hw_perf_event *hwc = &event->hw;

   -if (__test_and_clear_bit(hwc->idx, cpuc->active_mask)) {
   +if (test_bit(hwc->idx, cpuc->active_mask)) {
     x86_pmu.disable(event);
     +__clear_bit(hwc->idx, cpuc->active_mask);
     cpuc->events[hwc->idx] = NULL;
     WARN_ON_ONCE(hwc->state & PERF_HES_STOPPED);
     -hwc->state |= PERF_HES_STOPPED;
     @@ -1443,16 +1432,8 @@
     apic_write(APIC_LVTPC, APIC_DM_NMI);

     for (idx = 0; idx < x86_pmu.num_counters; idx++) {
       -if (!test_bit(idx, cpuc->active_mask)) {
       +/*
       -*/
       -  * Though we deactivated the counter some cpus
       -  * might still deliver spurious interrupts still
       -  * in flight. Catch them:
       -  */
       +/*
if (__test_and_clear_bit(idx, cpuc->running))
handled++;
if (!test_bit(idx, cpuc->active_mask))
continue;
}
event = cpuc->events[idx];

@@ -1985,7 +1966,7 @@
*/
static void free_fake_cpuc(struct cpu_hw_events *cpuc)
{
-kfree(cpuc->shared_regs);
+intel_cpuc_finish(cpuc);
kfree(cpuc);
}

@@ -1997,14 +1978,11 @@
cpu = kzalloc(sizeof(*cpuc), GFP_KERNEL);
if (!cpuc)
return ERR_PTR(-ENOMEM);
-
-/* only needed, if we have extra_regs */
-if (x86_pmu.extra_regs) {
-    cpuc->shared_regs = allocate_shared_regs(cpu);
-    if (!cpuc->shared_regs)
-        goto error;
-}
cpu->is_fake = 1;
+
+if (intel_cpuc_prepare(cpuc, cpu))
+    goto error;
+return cpuc;
error:
free_fake_cpuc(cpuc);
@@ -2116,6 +2094,19 @@
if (err) {
    if (event->destroy)
        event->destroy(event);
    +event->destroy = NULL;
  }

if (READ_ONCE(x86_pmu.attr_rdpmc))
@@ -2267,6 +2246,19 @@
x86_pmu.check_microcode();
}
```c
+static int x86_pmu_check_period(struct perf_event *event, u64 value) {
+  if (x86_pmu.check_period && x86_pmu.check_period(event, value))
+    return -EINVAL;
+
+  if (value && x86_pmu.limit_period) {
+    if (x86_pmu.limit_period(event, value) > value)
+      return -EINVAL;
+  }
+
+  return 0;
+}
+
+static struct pmu pmu = {
  .pmu_enable = x86_pmu_enable,
  .pmu_disable = x86_pmu_disable,
  .event_idx = x86_pmu_event_idx,
  .sched_task = x86_pmu_sched_task,
  .check_period = x86_pmu_check_period,
};

void arch_perf_update_userpage(struct perf_event *event, size_t size, void *p);

-perf_callchain_store(entry, regs->ip);
+if (!current->mm)
+  return;
+
+if (nmi_uaccess_okay())
+  return;
+
+if (perf_callchain_user32(regs, entry))
++static int buf_nr_pages(struct page *page)
+{
+  +if (!PagePrivate(page))
+    return 1;
+  +return 1 << page_private(page);
+}
+
+static size_t buf_size(struct page *page)
```

static void *
-bts_buffer_setup_aux(int cpu, void **pages, int nr_pages, bool overwrite)
+bts_buffer_setup_aux(struct perf_event *event, void **pages,
+    int nr_pages, bool overwrite)
{
    struct bts_buffer *buf;
    struct page *page;
    int cpu = event->cpu;
    int node = (cpu == -1) ? cpu : cpu_to_node(cpu);
    unsigned long offset;
    size_t size = nr_pages << PAGE_SHIFT;
    /* count all the high order buffers */
    for (pg = 0, nbuf = 0; pg < nr_pages;) {
        page = virt_to_page(pages[pg]);
        -if (WARN_ON_ONCE(!PagePrivate(page) && nr_pages > 1))
        -    return NULL;
        -    pg += 1 << page_private(page);
        +    pg += buf_nr_pages(page);
        nbuf++;
    }
    unsigned int __nr_pages;
    page = virt_to_page(pages[pg]);
    -__nr_pages = PagePrivate(page) ? 1 << page_private(page) : 1;
    +__nr_pages = buf_nr_pages(page);
    buf->buf[nbuf].page = page;
    buf->buf[nbuf].offset = offset;
    buf->buf[nbuf].displacement = (pad ? BTS_RECORD_SIZE - pad : 0);
    --- linux-4.15.0.orig/arch/x86/events/intel/core.c
    +++ linux-4.15.0/arch/x86/events/intel/core.c
    @@ -1995,6 +1995,39 @@
    intel_pmu_enable_all(added);
    }

+static void intel_set_tfa(struct cpu_hw_events *cpuc, bool on)
+{
+    u64 val = on ? MSR_TFA_RTM_FORCE_ABORT : 0;
+    +if (cpuc->tfa_shadow != val) {
+        cpuc->tfa_shadow = val;
+    

+ wrmsrl(MSR_TSX_FORCE_ABORT, val);
+
+static void intel_tfa_commit_scheduling(struct cpu_hw_events *cpuc, int idx, int cntr)
+{
+  /*
+   * We're going to use PMC3, make sure TFA is set before we touch it.
+   */
+  if (cntr == 3 && !cpuc->is_fake)
+    intel_set_tfa(cpuc, true);
+  }
+
+static void intel_tfa_pmu_enable_all(int added)
+{
+  struct cpu_hw_events *cpuc = this_cpu_ptr(&cpu_hw_events);
+  /*
+   * If we find PMC3 is no longer used when we enable the PMU, we can
+   * clear TFA.
+   */
+  if (!test_bit(3, cpuc->active_mask))
+    intel_set_tfa(cpuc, false);
+  intel_pmu_enable_all(added);
+  }
+
+static inline u64 intel_pmu_get_status(void)
+{
+  struct cpu_hw_events *cpuc = this_cpu_ptr(&cpu_hw_events);
+  return cpuc->intel_ctrl_host_mask & (1ull << cpuc->intel_cp_status & ~(1ull << cpuc->intel_ctrl_host_mask & ~)
+  -if (unlikely(hwc->config_base == MSR_ARCH_PERFMON_FIXED_CTR_CTRL)) {
+    intel_pmu_disable_fixed(hwc);
+    return;
+  }
+  -x86_pmu_disable_event(event);
+  -else
+    +x86_pmu_disable_event(event);
+    if (unlikely(event->attr.precise_ip))
+      int bit, loops;

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u64 status;
int handled;
+int pmu_enabled;

cpuc = this_cpu_ptr(&cpu_hw_events);

/*
 * Save the PMU state.
 * It needs to be restored when leaving the handler.
 */
+pmu_enabled = cpuc->enabled;
/+*
* No known reason to not always do late ACK,
* but just in case do it opt-in.
*/
if (!x86_pmu.late_ack)
apic_write(APIC_LVTPC, APIC_DM_NMI);
intel_bts_disable_local();
+cpuc->enabled = 0;
__intel_pmu_disable_all();
handled = intel_pmu_drain_bts_buffer();
handled += intel_bts_interrupt();
@@ -2320,7 +2358,8 @@
done:
 /* Only restore PMU state when it's active. See x86_pmu_disable(). */
 -if (cpuc->enabled)
 +cpuc->enabled = pmu_enabled;
 +if (pmu_enabled)
 _intel_pmu_enable_all(0, true);
 intel_bts_enable_local();

 @@ -2337,16 +2376,7 @@
 static struct event_constraint *
 intel_bts_constraints(struct perf_event *event)
 |
 -struct hw_perf_event *hwc = &event->hw;
 -unsigned int hw_event, bts_event;
 -
 -if (event->attr.freq)
 -return NULL;
 -
 -hw_event = hwc->config & INTEL_ARCH_EVENT_MASK;
 -bts_event = x86_pmu.event_map(PERF_COUNT_HW_BRANCH_INSTRUCTIONS);
 -
 -if (unlikely(hw_event == bts_event && hwc->sample_period == 1))
 +if (unlikely(intel_pmu_has_bts(event)))
 return &bts_constraint;
return NULL;
@@ -2641,6 +2671,35 @@
}

static struct event_constraint *
+dyn_constraint(struct cpu_hw_events *cpuc, struct event_constraint *c, int idx)
+{
+WARN_ON_ONCE(!cpuc->constraint_list);
+
+if (!(c->flags & PERF_X86_EVENT_DYNAMIC)) {
+struct event_constraint *cx;
+
+/*
+ * grab pre-allocated constraint entry
+ */
+cx = &cpuc->constraint_list[idx];
+
+/*
+ * initialize dynamic constraint
+ * with static constraint
+ */
+*cx = *c;
+
+/*
+ * mark constraint as dynamic
+ */
+cx->flags |= PERF_X86_EVENT_DYNAMIC;
+cx = cx;
+
+return c;
+}
+
+static struct event_constraint *
intel_get_excl_constraints(struct cpu_hw_events *cpuc, struct perf_event *event,
    int idx, struct event_constraint *c)
{
@@ -2670,27 +2729,7 @@
    * only needed when constraint has not yet
    * been cloned (marked dynamic)
    */
-if (!(c->flags & PERF_X86_EVENT_DYNAMIC)) {
-struct event_constraint *cx;
-
-/*
- * grab pre-allocated constraint entry
- */
cx = &cpuc->constraint_list[idx];
-
-/* initialize dynamic constraint
- * with static constraint
- */
-cx = *c;
-
-/*
- * mark constraint as dynamic, so we
- * can free it later on
- */
-cx->flags |= PERF_X86_EVENT_DYNAMIC;
-c = cx;
-
+c = dyn_constraint(cpuc, c, idx);

/*
 * From here on, the constraint is dynamic.
@@ -2960,11 +2999,48 @@
flags &= ~PERF_SAMPLE_TIME;
if (!event->attr.exclude_kernel)
flags &= ~PERF_SAMPLE_REGS_USER;
-if (event->attr.sample_regs_user & ~PEBS_REGS)
+if (event->attr.sample_regs_user & ~PEBS_GP_REGS)
flags &= ~(PERF_SAMPLE_REGS_USER | PERF_SAMPLE_REGS_INTR);
return flags;
}

+static int intel_pmu_bts_config(struct perf_event *event)
+{
+struct perf_event_attr *attr = &event->attr;
+
+if (unlikely(intel_pmu_has_bts(event)))
+/* BTS is not supported by this architecture. */
+if (!x86_pmu.bts_active)
+return -EOPNOTSUPP;
+
+/* BTS is currently only allowed for user-mode. */
+if (!attr->exclude_kernel)
+return -EOPNOTSUPP;
+
+/* BTS is not allowed for precise events. */
+if (attr->precise_ip)
+return -EOPNOTSUPP;
+
+/* disallow bts if conflicting events are present */
+if (x86_add_exclusive(x86_lbr_exclusive_lbr))
+return -EBUSY;
+
+event->destroy = hw_perf_lbr_event_destroy;
+}
+
+return 0;
+
+static int core_pmu_hw_config(struct perf_event *event)
+{
+int ret = x86_pmu_hw_config(event);
+
+if (ret)
+return ret;
+
+return intel_pmu_bts_config(event);
+}
+
+static int intel_pmu_hw_config(struct perf_event *event)
+
+ret = intel_pmu_bts_config(event);
+if (ret)
+return ret;
+
+if (event->attr.precise_ip) {
-+if (!event->attr.freq) {
+if (!(event->attr.freq || (event->attr.wakeup_events && !event->attr.watermark))) {
+event->hw.flags |= PERF_X86_EVENT_AUTO_RELOAD;
+if (!(event->attr.sample_type &
-+~intel_pmu_free_running_flags(event)))
+if (!intel_pmu_has_bts(event)) {
/*
 * BTS is set up earlier in this path, so don't account twice
*/
-if (!intel_pmu_has_bts(event)) {
+if (!unlikely(intel_pmu_has_bts(event))) {
/* disallow lbr if conflicting events are present */
if (x86_add_exclusive(x86_lbr_exclusive_lbr))
return -EBUSY;
@@ -3173,6 +3253,26 @@
return c;
}
+static bool allow_tsx_force_abort = true;
+
+static struct event_constraint *
+tfia_get_event_constraints(struct cpu_hw_events *cpuc, int idx,
+ struct perf_event *event)
+{
+struct event_constraint *c = hsw_get_event_constraints(cpuc, idx, event);
+
+/*
+ * Without TFA we must not use PMC3.
+ */
+if (!allow_tsx_force_abort && test_bit(3, c->idxmsk) && idx >= 0) {
+c = dyn_constraint(cpuc, c, idx);
+c->idxmsk64 &= ~(1ULL << 3);
+c->weight--;
+
+return c;
+
/*
 * Broadwell:
 *
@@ -3188,17 +3288,22 @@
 * Therefore the effective (average) period matches the requested period,
 * despite coarser hardware granularity.
 */

-static unsigned bdw_limit_period(struct perf_event *event, unsigned left)
+static u64 bdw_limit_period(struct perf_event *event, u64 left)
{
if ((event->hw.config & INTEL_ARCH_EVENT_MASK) ==
X86_CONFIG(.event=0xc0, .umask=0x01)) {
 if (left < 128)
 left = 128;
-left &= ~0x3fu;
+left &= ~0x3fULL;
 }
 return left;
 }

+static u64 nhm_limit_period(struct perf_event *event, u64 left)
+{
+return max(left, 32ULL);
+
+PMU_FORMAT_ATTR(event,"config:0-7");
+PMU_FORMAT_ATTR(umask,"config:8-15");
+PMU_FORMAT_ATTR(edge,"config:18");

@@ -3226,7 +3331,7 @@
 return x86_event_sysfs_show(page, config, event);
 }

-struct intel_shared_regs *allocate_shared_regs(int cpu)
+static struct intel_shared_regs *allocate_shared_regs(int cpu)
 {
 struct intel_shared_regs *regs;
 int i;
@@ -3258,23 +3363,24 @@
 return c;
 }

-static int intel_pmu_cpu_prepare(int cpu)
-{
-struct cpu_hw_events *cpuc = &per_cpu(cpu_hw_events, cpu);
+
+int intel_cpuc_prepare(struct cpu_hw_events *cpuc, int cpu)
 +{
 if (x86_pmu.extra_regs || x86_pmu.lbr_sel_map) {
 cpuc->shared_regs = allocate_shared_regs(cpu);
 if (!cpuc->shared_regs)
 goto err;
 }

-if (x86_pmu.flags & PMU_FL_EXCL_CNTRS) {
+if (x86_pmu.flags & (PMU_FL_EXCL_CNTRS | PMU_FL_TFA)) {
 size_t sz = X86_PMC_IDX_MAX * sizeof(struct event_constraint);

-cpuc->constraint_list = kzalloc(sz, GFP_KERNEL);
+cpuc->constraint_list = kzalloc_node(sz, GFP_KERNEL, cpu_to_node(cpu));
 if (!cpuc->constraint_list)
 goto err_shared_regs;
+
 }

+if (x86_pmu.flags & PMU_FL_EXCL_CNTRS) {
 cpuc->excl_cntrs = allocate_excl_cntrs(cpu);
 if (!cpuc->excl_cntrs)
 goto err_constraint_list;
@@ -3296,6 +3402,11 @@
 return -ENOMEM;
 }

+static int intel_pmu_cpu_prepare(int cpu)
 +{
 +return intel_cpuc_prepare(&per_cpu(cpu_hw_events, cpu), cpu);
 +}
 +

static void flip_smm_bit(void *data)
{
    unsigned long set = *(unsigned long *)data;
    bbr_sel = NULL;

    flip_smm_bit(&x86_pmu.attr_freeze_on_smi);
    if (x86_pmu.flags & PMU_FL_TFA) {
        WARN_ON_ONCE(cpuc->tfa_shadow);
        cpuc->tfa_shadow = ~0ULL;
        intel_set_tfa(cpuc, false);
    }
    if (x86_pmu.version > 1)
        flip_smm_bit(&x86_pmu.attr_freeze_on_smi);

    if (!cpuc->shared_regs)
        return;
}

static void free_excl_cntrs(int cpu)
{
    struct cpu_hw_events *cpuc = &per_cpu(cpu_hw_events, cpu);
    struct intel_excl_cntrs *c;

    c = cpuc->excl_cntrs;
    if (c->core_id == -1 || --c->refcnt == 0)
        kfree(c);
    cpuc->excl_cntrs = NULL;
    kfree(cpuc->constraint_list);
    cpuc->constraint_list = NULL;
}

static void intel_pmu_cpu_dying(int cpu)
{
    struct cpu_hw_events *cpuc = &per_cpu(cpu_hw_events, cpu);
    fini_debug_store_on_cpu(cpu);
}
+void intel_cpuc_finish(struct cpu_hw_events *cpuc)
+
struct intel_shared_regs *pc;

pc = cpuc->shared_regs;
@@ -3393,9 +3515,12 @@
cpuc->shared_regs = NULL;
 }

-fini_debug_store_on_cpu(cpu);
+free_excl_cntrs(cpuc);
+
-fini_debug_store_on_cpu(cpu);
+static void intel_pmu_cpu_dead(int cpu)
+
{ +
i
+intel_cpuc_finish(&per_cpu(cpu_hw_events, cpu));
}

static void intel_pmu_sched_task(struct perf_event_context *ctx,
@@ -3405,6 +3530,11 @@
intel_pmu_lbr_sched_task(ctx, sched_in);
 }

+static int intel_pmu_check_period(struct perf_event *event, u64 value)
+
{ +
+return intel_pmu_has_bts_period(event, value) ? -EINVAL : 0;
+
+ PMU_FORMAT_ATTR(offcore_rsp, "config1:0-63");

PMU_FORMAT_ATTR(ldlat, "config1:0-15");
@@ -3453,7 +3583,7 @@
 .enable_all= core_pmu_enable_all,
 .enable= core_pmu_enable_event,
 .disable= x86_pmu_disable_event,
-.hw_config= x86_pmu_hw_config,
+.hw_config= core_pmu_hw_config,
.schedule_events= x86_schedule_events,
.eventsel= MSR_ARCH_PERFMON_EVENTSEL0,
+perfctr= MSR_ARCH_PERFMON_PERFCTR0,
@@ -3484,8 +3614,13 @@
 .cpu_prepare= intel_pmu_cpu_prepare,
 .cpu_starting= intel_pmu_cpu_starting,
 .cpu_dying= intel_pmu_cpu_dying,
+ .cpu_dead= intel_pmu_cpu_dead,
+ .check_period= intel_pmu_check_period,
static struct attribute *intel_pmu_attrs[];
+
static __initconst struct x86_pmu intel_pmu = {
  .name = "Intel",
  .handle_irq = intel_pmu_handle_irq,
  @@ -3516,11 +3651,17 @@
  .format_attrs = intel_arch3_formats_attr,
  .events_sysfs_show = intel_event_sysfs_show,
+
  .attrs = intel_pmu_attrs,
+
  .cpu_prepare = intel_pmu_cpu_prepare,
  .cpu_starting = intel_pmu_cpu_starting,
  .cpu_dying = intel_pmu_cpu_dying,
  +.cpu_dead = intel_pmu_cpu_dead,
  +
  .guest_get_msrs = intel_guest_get_msrs,
  .sched_task = intel_pmu_sched_task,
  +
 +.check_period = intel_pmu_check_period,
};

static __init void intel_clovertown_quirk(void)
@@ -3559,7 +3700,7 @@
break;

  case INTEL_FAM6_SANDYBRIDGE_X:
    switch (cpu_data(cpu).x86_mask) {
    +switch (cpu_data(cpu).x86_stepping) {
      case 6: rev = 0x618; break;
      case 7: rev = 0x70c; break;
    }
@@ -3840,8 +3981,11 @@
    NULL
  };

+static DEVICE_BOOL_ATTR(allow_tsx_force_abort, 0644, allow_tsx_force_abort);
+
static struct attribute *intel_pmu_attrs[] = {
  &dev_attr_freeze_on_smi.attr,
  +NULL, /* &dev_attr_allow_tsx_force_abort.attr */
  NULL,
};

@@ -3894,8 +4038,6 @@
x86_pmu.max_pebs_events = min_t(unsigned, MAX_PEBS_EVENTS, x86_pmu.num_counters);

-x86_pmu.attrs = intel_pmu_attrs;
/*
 * Quirk: v2 perfmon does not report fixed-purpose events, so
 * assume at least 3 events, when not running in a hypervisor:
@@ -3957,6 +4099,7 @@
x86_pmu.pebs_constraints = intel_nehalem_pebs_event_constraints;
x86_pmu.enable_all = intel_pmu_nhm_enable_all;
x86_pmu.extra_regs = intel_nehalem_extra_regs;
+x86_pmu.limit_period = nhm_limit_period;

x86_pmu.cpu_events = nhm_events_attrs;

@@ -3976,11 +4119,11 @@
 name = "nehalem";
 break;

-case INTEL_FAM6_ATOM_PINEVIEW:
-case INTEL_FAM6_ATOM_LINCROFT:
-case INTEL_FAM6_ATOM_PENWELL:
-case INTEL_FAM6_ATOM_CLOVERVIEW:
-case INTEL_FAM6_ATOM_CEDARVIEW:
+case INTEL_FAM6_ATOM_BONNELL:
+case INTEL_FAM6_ATOM_BONNELL_MID:
+case INTEL_FAM6_ATOM_SALTWELL:
+case INTEL_FAM6_ATOM_SALTWELL_MID:
+case INTEL_FAM6_ATOM_SALTWELL_TABLET:
 memcpy(hw_cache_event_ids, atom_hw_cache_event_ids,
 sizeof(hw_cache_event_ids));

@@ -3993,9 +4136,11 @@
 name = "bonnell";
 break;

-case INTEL_FAM6_ATOM_SILVERMONT1:
-case INTEL_FAM6_ATOM_SILVERMONT2:
+case INTEL_FAM6_ATOM_SILVERMONT:
+case INTEL_FAM6_ATOM_SILVERMONT_X:
+case INTEL_FAM6_ATOM_SILVERMONT_MID:
 case INTEL_FAM6_ATOM_AIRMONT:
+case INTEL_FAM6_ATOM_AIRMONT_MID:
 memcpy(hw_cache_event_ids, slm_hw_cache_event_ids,
 sizeof(hw_cache_event_ids));
 memcpy(hw_cache_extra_regs, slm_hw_cache_extra_regs,
@@ -4014,7 +4159,7 @@
 break;
case INTEL_FAM6_ATOM_GOLDMONT:
-case INTEL_FAM6_ATOM_DENVERTON:
+case INTEL_FAM6_ATOM_GOLDMONT_X:
    memcpy(hw_cache_event_ids, glm_hw_cache_event_ids,
            sizeof(hw_cache_event_ids));
    memcpy(hw_cache_extra_regs, glm_hw_cache_extra_regs,
@@ -4040,7 +4185,7 @@
            name = "goldmont";
            break;
-
-case INTEL_FAM6_ATOM_GEMINI_LAKE:
+case INTEL_FAM6_ATOM_GOLDMONT_PLUS:
    memcpy(hw_cache_event_ids, glp_hw_cache_event_ids,
            sizeof(hw_cache_event_ids));
    memcpy(hw_cache_extra_regs, glp_hw_cache_extra_regs,
@@ -4299,6 +4444,15 @@
    x86_pmu.cpu_events = get_hsw_events_attrs();
    intel_pmu_pebs_data_source_skl(
            boot_cpu_data.x86_model == INTEL_FAM6_SKYLAKE_X);
+    if (boot_cpu_has(X86_FEATURE_TSX_FORCE_ABORT)) {
+        x86_pmu.flags |= PMU_FL_TFA;
+        x86_pmu.get_event_constraints = tfa_get_event_constraints;
+        x86_pmu.enable_all = intel_tfa_pmu_enable_all;
+        x86_pmu.commit_scheduling = intel_tfa_commit_scheduling;
+        intel_pmuAttrs[1] = &dev_attr_allow_tsx_force_abort.attr;
+    }
+    pr_cont("Skylake events, ");
    name = "skylake";
    break;
@@ -4440,7 +4594,7 @@
    hardlockup_detector_perf_restart();

    for_each_online_cpu(c)
    -free_excl_cntrs(c);
+    free_excl_cntrs(&per_cpu(cpu_hw_events, c));

cpus_read_unlock();
pr_info("PMU erratum BJ122, BV98, HSD29 workaround disabled, HT off\n");
--- linux-4.15.0.orig/arch/x86/events/intel/cstate.c
+++ linux-4.15.0/arch/x86/events/intel/cstate.c
@@ -40,50 +40,51 @@
 * Model specific counters:
 * MSR_CORE_C1_RES: CORE C1 Residency Counter
 * perf code: 0x00
 - * Available model: SLM,AMT,GLM

+ * Available model: SLM,AMT,GLM,CNL
* Scope: Core (each processor core has a MSR)
*MSR_CORE_C3_RESIDENCY: CORE C3 Residency Counter
  * perf code: 0x01
- * Available model: NHM,WSM,SNB,IVB,HSW,BDW,SKL,GLM
+ * Available model: NHM,WSM,SNB,IVB,HSW,BDW,SKL,GLM,CNL
+MSR_CORE_C6_RESIDENCY: CORE C6 Residency Counter
  * perf code: 0x02
- * Available model: SLM,AMT,NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL,GLM
+ * Available model: SLM,AMT,NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL,GLM,CNL
+MSR_CORE_C7_RESIDENCY: CORE C7 Residency Counter
  * perf code: 0x03
- * Available model: SNB,IVB,HSW,BDW,SKL,KNL,GLM
+ * Available model: SNB,IVB,HSW,BDW,SKL,KNL,GLM,CNL
+MSR_PKG_C2_RESIDENCY:  Package C2 Residency Counter.
  * perf code: 0x00
- * Available model: SNB,IVB,HSW,BDW,SKL,KNL,GLM
+ * Available model: SNB,IVB,HSW,BDW,SKL,KNL,GLM,CNL
+MSR_PKG_C3_RESIDENCY:  Package C3 Residency Counter.
  * perf code: 0x01
- * Available model: NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL
+ * Available model: NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL,GLM
+MSR_PKG_C6_RESIDENCY:  Package C6 Residency Counter.
  * perf code: 0x02
- * Available model: SLM,AMT,NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL,GLM
+ * Available model: SLM,AMT,NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL,GLM,CNL
+MSR_PKG_C7_RESIDENCY:  Package C7 Residency Counter.
  * perf code: 0x03
- * Available model: NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL
+ * Available model: NHM,WSM,SNB,IVB,HSW,BDW,SKL,KNL,GLM
+MSR_PKG_C8_RESIDENCY:  Package C8 Residency Counter.
  * perf code: 0x04
- * Available model: HSW ULT only
+ * Available model: HSW ULT,KBL,CNL
* Scope: Package (physical package)
*MSR_PKG_C9_RESIDENCY: Package C9 Residency Counter.
  * perf code: 0x05
  - * Available model: HSW ULT only
  + * Available model: HSW ULT, KBL, CNL
  * Scope: Package (physical package)

*MSR_PKG_C10_RESIDENCY: Package C10 Residency Counter.
  * perf code: 0x06
  - * Available model: HSW ULT, GLM
  + * Available model: HSW ULT, KBL, GLM, CNL
  * Scope: Package (physical package)

#include <linux/module.h>
#include <linux/slab.h>
#include <linux/perf_event.h>
+#include <linux/nospec.h>
#include <asm/cpu_device_id.h>
#include <asm/intel-family.h>
#include <asm/perf_event.h>
#include "../perf_event.h"
@ @ -98.14 +100.14 @ @

MODULE_LICENSE("GPL");

#define DEFINE_CSTATE_FORMAT_ATTR(_var, _name, _format)
- static ssize_t __cstate_##_var##_show(struct kobject *kobj, _
- struct kobj_attribute *attr, char *page)
+ static ssize_t __cstate_##_var##_show(struct device *dev, _
+ struct device_attribute *attr,! char *page)
{
BUILD_BUG_ON(sizeof(_format) >= PAGE_SIZE);
return sprintf(page, _format \\
            "n");
}
- static struct kobj_attribute format_attr_##_var =
+ static struct device_attribute format_attr_##_var =
  __ATTR(_name, 0444, __cstate_##_var##_show, NULL)

static ssize_t cstate_get_attr_cpumask(struct device *dev,
@@ -301,6 +303,7 @@
     if (event->pmu == &cstate_pkg_pmu) {
        if (cfg >= PERF_CSTATE_PKG_EVENT_MAX)
           return -EINVAL;
+       cfg = array_index_nospec((unsigned long)cfg, PERF_CSTATE_PKG_EVENT_MAX);
        if (!pkg_msr[cfg].attr)
           return -EINVAL;
        event->hw.event_base = pkg_msr[cfg].msr;
@@ -486,6 +489,21 @@
          BIT(PERF_CSTATE_PKG_C10_RES),
static const struct cstate_model cnl_cstates __initconst = {
    .core_events = BIT(PERF_CSTATE_CORE_C1_RES) |
    + BIT(PERF_CSTATE_CORE_C3_RES) |
    + BIT(PERF_CSTATE_CORE_C6_RES) |
    + BIT(PERF_CSTATE_CORE_C7_RES),
    +
    .pkg_events = BIT(PERF_CSTATE_PKG_C2_RES) |
    + BIT(PERF_CSTATE_PKG_C3_RES) |
    + BIT(PERF_CSTATE_PKG_C6_RES) |
    + BIT(PERF_CSTATE_PKG_C7_RES) |
    + BIT(PERF_CSTATE_PKG_C8_RES) |
    + BIT(PERF_CSTATE_PKG_C9_RES) |
    + BIT(PERF_CSTATE_PKG_C10_RES),
};
+
static const struct cstate_model slm_cstates __initconst = {
    .core_events = BIT(PERF_CSTATE_CORE_C1_RES) |
    BIT(PERF_CSTATE_CORE_C6_RES),
    @ @ -541.8 +559.8 @ @
X86_CSTATES_MODEL(INTEL_FAM6_HASWELL_ULT, hswult_cstates),
-X86_CSTATES_MODEL(INTEL_FAM6_ATOM_SILVERMONT1, slm_cstates),
-X86_CSTATES_MODEL(INTEL_FAM6_ATOM_SILVERMONT2, slm_cstates),
+X86_CSTATES_MODEL(INTEL_FAM6_ATOM_SILVERMONT, slm_cstates),
+X86_CSTATES_MODEL(INTEL_FAM6_ATOM_SILVERMONT_X, slm_cstates),
X86_CSTATES_MODEL(INTEL_FAM6_ATOM_AIRMONT, slm_cstates),
X86_CSTATES_MODEL(INTEL_FAM6_BROADWELL_CORE, snb_cstates),
@@ -554,16 +572,20 @@
X86_CSTATES_MODEL(INTEL_FAM6_SKYLAKE_DESKTOP, snb_cstates),
X86_CSTATES_MODEL(INTEL_FAM6_SKYLAKE_X, snb_cstates),
-X86_CSTATES_MODEL(INTEL_FAM6_KABYLAEKE_MOBILE, snb_cstates),
-X86_CSTATES_MODEL(INTEL_FAM6_KABYLAEKE_DESKTOP, snb_cstates),
+X86_CSTATES_MODEL(INTEL_FAM6_KABYLAEKE_MOBILE, hswult_cstates),
+X86_CSTATES_MODEL(INTEL_FAM6_KABYLAEKE_DESKTOP, hswult_cstates),
+
+X86_CSTATES_MODEL(INTEL_FAM6_CANNONLAKE_MOBILE, cnl_cstates),
X86_CSTATES_MODEL(INTEL_FAM6_XEON_PHI_KNL, knl_cstates),
X86_CSTATES_MODEL(INTEL_FAM6_XEON_PHI_KNM, knl_cstates),
X86_CSTATES_MODEL(INTEL_FAM6_ATOM_GOLDMONT, glm_cstates),
-X86_CSTATES_MODEL(INTEL_FAM6_ATOM_DENVERTON, glm_cstates),
+X86_CSTATES_MODEL(INTEL_FAM6_ATOM_GOLDMONT_X, glm_cstates),
+X86_CSTATES_MODEL(INTEL_FAM6_ATOM_GOLDMONT_PLUS, glm_cstates),

-X86_CSTATES_MODEL(INTEL_FAM6_ATOM_GEMINI_LAKE, glm_cstates),
+X86_CSTATES_MODEL(INTEL_FAM6_ICELAKE_MOBILE, snb_cstates),
{ },
];

MODULE_DEVICE_TABLE(x86cpu, intel_cstates_match);
--- linux-4.15.0.orig/arch/x86/events/intel/ds.c
+++ linux-4.15.0/arch/x86/events/intel/ds.c
@@ -408,9 +408,11 @@
ds->bts_buffer_base = (unsigned long) cea;
ds_update_cea(cea, buffer, BTS_BUFFER_SIZE, PAGE_KERNEL);
ds->bts_index = ds->bts_buffer_base;
-max = BTS_RECORD_SIZE * (BTS_BUFFER_SIZE / BTS_RECORD_SIZE);
-ds->bts_absolute_maximum = ds->bts_buffer_base + max;
-ds->bts_interrupt_threshold = ds->bts_absolute_maximum - (max / 16);
+max = BTS_BUFFER_SIZE / BTS_RECORD_SIZE;
+ds->bts_absolute_maximum = ds->bts_buffer_base +
+max * BTS_RECORD_SIZE;
+ds->bts_interrupt_threshold = ds->bts_absolute_maximum -
+(max / 16) * BTS_RECORD_SIZE;
return 0;
}

@@ -682,7 +684,7 @@
INTEL_FLAGS_UEVENT_CONSTRAINT(0x1fc7, 0x1), /* SIMD_INST_RETURED.ANY */
INTEL_FLAGS_EVENT_CONSTRAINT(0xcb, 0x1), /* MEM_LOAD_RETIRED.* */
/* INST_RETIRED.ANY, inv=1, cmask=16 (cycles:p). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108000c0, 0x01),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108000c0, 0x01),
EVENT_CONSTRAINT_END
];

@@ -691,7 +693,7 @@
INTEL_FLAGS_UEVENT_CONSTRAINT(0x00c5, 0x1), /* MISPREDICTED_BRANCH_RETIRED */
INTEL_FLAGS_EVENT_CONSTRAINT(0xcb, 0x1), /* MEM_LOAD_RETIRED.* */
/* INST_RETIRED.ANY, inv=1, cmask=16 (cycles:p). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108000c0, 0x01),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108000c0, 0x01),
EVENT_CONSTRAINT_END

@ @ -699,7 +701,7 @@

struct event_constraint intel_slm_pebs_event_constraints[] = [
/* INST_RETIRED.ANY, inv=1, cmask=16 (cycles:p). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108000c0, 0x01),

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+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108000c0, 0x1),
/* Allow all events as PEBS with no flags */
EVENT_CONSTRAINT_END
@@ -730,7 +732,7 @@
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108000c0, 0x0f),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108000c0, 0x0f),
 EVENT_CONSTRAINT_END
]

@@ -747,7 +749,7 @@
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c2, 0xf),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c2, 0xf),
 EVENT_CONSTRAINT_END
]

@@ -756,7 +758,7 @@
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
 EVENT_CONSTRAINT_END
]

@@ -771,9 +773,9 @@
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c2, 0xf),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c2, 0xf),
 INTEL_EXCLEVT_CONSTRAINT(0xd0, 0xf),   /* MEM_UOP_RETIRED.* */
 INTEL_EXCLEVT_CONSTRAINT(0xd1, 0xf),   /* MEM_LOAD_UOPS_RETIRED.* */
 INTEL_EXCLEVT_CONSTRAINT(0xd2, 0xf),   /* MEM_LOAD_UOPS_LLC_HIT_RETIRED.* */
@@ -787,9 +789,9 @@
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
 INTEL_PLD_CONSTRAINT(0x01cd, 0xf),    /* UOPS_RETIRED.ALL, inv=1, cmask=16 (cycles:p). */
 INTEL_PST_CONSTRAINT(0x02cd, 0xf),    /* MEM_TRANS_RETIRED.PRECISE_STORES */
 /* INST_RETIRED.PRECDIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
 EVENT_CONSTRAINT_END

/* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_NA(0x01c2, 0xf), /* UOPS_RETIRED.ALL */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x11d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_LOADS */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x21d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_STORES */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c2, 0xf),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c2, 0xf), /* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
/* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c2, 0xf),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c2, 0xf), /* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_NA(0x01c2, 0xf), /* UOPS_RETIRED.ALL */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x11d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_LOADS */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x21d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_STORES */
-@ @ -.810.9 +812.9 @@
INTEL_FLAGS_UEVENT_CONSTRAINT(0x01c0, 0x2), /* INST_RETIRED.PREC_DIST */
INTEL_PLD_CONSTRAINT(0x01cd, 0xf), /* MEM_TRANS_RETIRED.* */
/* UOPS_RETIRED.ALL, inv=1, cmask=16 (cycles:p). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
/* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c2, 0xf),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c2, 0xf), /* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108000c0, 0x0f),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108000c0, 0x0f),
INTEL_PLD_CONSTRAINT(0x11cd, 0xf), /* MEM_TRANS_RETIRED.* */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108000c0, 0x0f),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108000c0, 0x0f),
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_NA(0x01c2, 0xf), /* UOPS_RETIRED.ALL */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x11d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_LOADS */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x21d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_STORES */
-@ @ -.833.9 +835.9 @@
struct event_constraint intel_skl_pebs_event_constraints[] = {
INTEL_FLAGS_UEVENT_CONSTRAINT(0x1c0, 0x2),/* INST_RETIRED.PREC_DIST */
/* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c2, 0xf),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c2, 0xf), /* INST_RETIRED.PREC_DIST, inv=1, cmask=16 (cycles:ppp). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
/* INST_RETIRED.TOTAL_CYCLES_PS (inv=1, cmask=16) (cycles:p). */
-INTEL_FLAGS_EVENT_CONSTRAINT(0x108001c0, 0x2),
+INTEL_FLAGS_UEVENT_CONSTRAINT(0x108001c0, 0x2),
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_NA(0x01c2, 0xf), /* UOPS_RETIRED.ALL */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x11d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_LOADS */
INTEL_FLAGS_UEVENT_CONSTRAINT_DATALA_XLD(0x21d0, 0xf), /*
MEM_UOPS_RETIRED.STLB_MISS_STORES */
-@ @ -.1153.6 +1155.7 @@
if (pebs == NULL) return;

+regs->flags &= ~PERF_EFLAGS_EXACT;
sample_type = event->attr.sample_type;
dsrc = sample_type & PERF_SAMPLE_DATA_SRC;

@@ -1197,7 +1200,6 @@*/
*regs = *iregs;
*/
regs->flags = pebs->flags;
-set_linear_ip(regs, pebs->ip);

if (sample_type & PERF_SAMPLE_REGS_INTR) {
    regs->ax = pebs->ax;
    #endif
}

-#if (event->attr.precise_ip > 1 && x86_pmu.intel_cap.pebs_format >= 2) {
-    regs->ip = pebs->real_ip;
-    regs->flags |= PERF_EFLAGS_EXACT;
-} else if (event->attr.precise_ip > 1 && intel_pmu_pebs_fixup_ip(regs))
-    regs->flags |= PERF_EFLAGS_EXACT;
-else
-    regs->flags &= ~PERF_EFLAGS_EXACT;
+    if (event->attr.precise_ip > 1) {
+        /* Haswell and later have the eventing IP, so use it: */
+        if (x86_pmu.intel_cap.pebs_format >= 2) {
+            set_linear_ip(regs, pebs->real_ip);
+            regs->flags |= PERF_EFLAGS_EXACT;
+        } else {
+            /* Otherwise use PEBS off-by-1 IP: */
+            set_linear_ip(regs, pebs->ip);
+            +"... and try to fix it up using the LBR entries: */
+            if (intel_pmu_pebs_fixup_ip(regs))
+                regs->flags |= PERF_EFLAGS_EXACT;
+        } else
+            set_linear_ip(regs, pebs->ip);
+        
+    #endif
}

if ((sample_type & (PERF_SAMPLE_ADDR | PERF_SAMPLE_PHYS_ADDR)) &&
    x86_pmu.intel_cap.pebs_format >= 1)
    return NULL;
"*/

+/*
 * Special variant of intel_pmu_save_and_restart() for auto-reload.
 +*/
+static int
+intel_pmu_save_and_restart_reload(struct perf_event *event, int count)
+{
+    struct hw_perf_event *hwc = &event->hw;
+    int shift = 64 - x86_pmu.cntval_bits;
+    u64 period = hwc->sample_period;
+    return NULL;
+}
+u64 prev_raw_count, new_raw_count;
+s64 new, old;
+
+WARN_ON(!period);
+
+/*
+ * drain_pebs() only happens when the PMU is disabled.
+ */
+WARN_ON(this_cpu_read(cpu_hw_events.enabled));
+
+prev_raw_count = local64_read(&hwc->prev_count);
+rdpmcl(hwc->event_base_rdpmc, new_raw_count);
+local64_set(&hwc->prev_count, new_raw_count);
+
+/*
+ * Since the counter increments a negative counter value and
+ * overflows on the sign switch, giving the interval:
+ *
+ * [-period, 0]
+ *
+ * the difference between two consecutive reads is:
+ *
+ * A) value2 - value1;
+ * when no overflows have happened in between,
+ *
+ * B) (0 - value1) + (value2 - (-period));
+ * when one overflow happened in between,
+ *
+ * C) (0 - value1) + (n - 1) * (period) + (value2 - (-period));
+ * when @n overflows happened in between.
+ *
+ * Here A) is the obvious difference, B) is the extension to the
+ * discrete interval, where the first term is to the top of the
+ * interval and the second term is from the bottom of the next
+ * interval and C) the extension to multiple intervals, where the
+ * middle term is the whole intervals covered.
+ *
+ * An equivalent of C, by reduction, is:
+ *
+ * value2 - value1 + n * period
+ */
+new = ((s64)(new_raw_count << shift) >> shift);
+old = ((s64)(prev_raw_count << shift) >> shift);
+local64_add(new - old + count * period, &event->count);
+
+local64_set(&hwc->period_left, -new);
+
+perf_event_update_userpage(event);
+return 0;
+
static void __intel_pmu_pebs_event(struct perf_event *event,
    struct pt_regs *iregs,
    void *base, void *top,
    int bit, int count)
{
    struct hw_perf_event *hwc = &event->hw;
    struct perf_sample_data data;
    struct pt_regs regs;
    void *at = get_next_pebs_record_by_bit(base, top, bit);

    -if (!intel_pmu_save_and_restart(event) &&
    -    !(event->hw.flags & PERF_X86_EVENT_AUTO_RELOAD))
+if (hwc->flags & PERF_X86_EVENT_AUTO_RELOAD) {
+    /*
+     * Now, auto-reload is only enabled in fixed period mode.
+     * The reload value is always hwc->sample_period.
+     * May need to change it, if auto-reload is enabled in
+     * freq mode later.
+     */
+    intel_pmu_save_and_restart_reload(event, count);
+    } else if (!intel_pmu_save_and_restart(event))
    return;

    while (count > 1) {
        n = top - at;
        -if (n <= 0)
+        if (n <= 0) {
+            if (event->hw.flags & PERF_X86_EVENT_AUTO_RELOAD)
+                intel_pmu_save_and_restart_reload(event, 0);
+            return;
+        }

        __intel_pmu_pebs_event(event, iregs, at, top, 0, n);
    }

    ds->pebs_index = ds->pebs_buffer_base;

    -if (unlikely(base >= top))
+if (unlikely(base >= top)) {
+    /*
+     */
The drain_pebs() could be called twice in a short period for auto-reload event in pmu::read(). There are no overflows have happened in between. It needs to call intel_pmu_save_and_restart_reload() to update the event->count for this case.

```c
		for_each_set_bit(bit, (unsigned long *)&cpuc->pebs_enabled,
				 x86_pmu.max_pebs_events) {
			event = cpuc->events[bit];
			if (event->hw.flags & PERF_X86_EVENT_AUTO_RELOAD)
				intel_pmu_save_and_restart_reload(event, 0);
		}
return;
}
```

```c
for (at = base; at < top; at += x86_pmu.pebs_record_size) {
struct pebs_record_nhm *p = at;
@@ -1421,7 +1518,7 @@
if (!pebs_status && cpuc->pebs_enabled &&
!((cpuc->pebs_enabled & (cpuc->pebs_enabled-1)))
- pebs_status = cpuc->pebs_enabled;
+ pebs_status = p->status = cpuc->pebs_enabled;

bit = find_first_bit((unsigned long *)&pebs_status,
 x86_pmu.max_pebs_events);
```
+ wrmsrl(x86_pmu.lbr_tos, tos);
+ task_ctx->lbr_stack_state = LBR_NONE;
+
static void __intel_pmu_lbr_save(struct x86_perf_task_context *task_ctx)
{
  unsigned lbr_idx, mask;
  -u64 tos;
  +u64 tos, from;
  int i;

  if (task_ctx->lbr_callstack_users == 0) {
    @ @ -371,13 +380,17 @@
    mask = x86_pmu.lbr_nr - 1;
    tos = intel_pmu_lbr_tos();
    -for (i = 0; i < tos; i++) {
    +for (i = 0; i < x86_pmu.lbr_nr; i++) {
      lbr_idx = (tos - i) & mask;
      -task_ctx->lbr_from[i] = rdlbr_from(lbr_idx);
      +from = rdlbr_from(lbr_idx);
      +if (!from)
      +break;
      +task_ctx->lbr_from[i] = from;
      task_ctx->lbr_to[i] = rdlbr_to(lbr_idx);
      if (x86_pmu.intel_cap.lbr_format == LBR_FORMAT_INFO)
        rdmsrl(MSR_LBR_INFO_0 + lbr_idx, task_ctx->lbr_info[i]);
    }
    +task_ctx->valid_lbrs = i;
    task_ctx->tos = tos;
    task_ctx->lbr_stack_state = LBR_VALID;
  }
  @ @ -531,7 +544,7 @@
  */
static void intel_pmu_lbr_read_64(struct cpu_hw_events *cpuc)
{
  -bool need_info = false;
  +bool need_info = false, call_stack = false;
  unsigned long mask = x86_pmu.lbr_nr - 1;
  int lbr_format = x86_pmu.intel_cap.lbr_format;
  u64 tos = intel_pmu_lbr_tos();
  @ @ -542,7 +555,7 @@
  if (cpuc->lbr_sel) {
    need_info = !(cpuc->lbr_sel->config & LBR_NO_INFO);
    if (cpuc->lbr_sel->config & LBR_CALL_STACK)
      -num = tos;

call_stack = true;
}

for (i = 0; i < num; i++) {
    from = rdlbr_from(lbr_idx);
    to = rdlbr_to(lbr_idx);

/*
  * Read LBR call stack entries
  * until invalid entry (0s) is detected.
  */
    if (call_stack && !from)
        break;
    if (lbr_format == LBR_FORMAT_INFO && need_info) {
        u64 info;
        /* on PMU interrupt */
        if (boot_cpu_data.x86_model == 28
            && boot_cpu_data.x86_mask < 10) {
            pr_cont("LBR disabled due to erratum");
            return;
        }
    }
    x86_pmu.lbr_sel_mask = LBR_SEL_MASK;
    x86_pmu.lbr_sel_map = snb_lbr_sel_map;
    /* Knights Landing does have MISPREDICT bit */
    if (x86_pmu.intel_cap.lbr_format == LBR_FORMAT_LIP)
        x86_pmu.intel_cap.lbr_format = LBR_FORMAT_EIP_FLAGS;
}

--- linux-4.15.0.orig/arch/x86/events/intel/pt.c
+++ linux-4.15.0/arch/x86/events/intel/pt.c
@@ -234,7 +234,7 @@
 static __init void p6_pmu_rdpmc_quirk(void)
 {
     -if (boot_cpu_data.x86_mask < 9) {
     +if (boot_cpu_data.x86_stepping < 9) {
         /*
         * PPro erratum 26; fixed in stepping 9 and above.
         */
--- linux-4.15.0.orig/arch/x86/events/intel/p6.c
+++ linux-4.15.0/arch/x86/events/intel/p6.c
@@ -1230,4 +1250,8 @@
+++ linux-4.15.0/arch/x86/events/intel/pt.c
@@ -69,7 +69,7 @@
 PT_CAP(topa_multiple_entries,0, CPUID_ECX, BIT(1)),
 PT_CAP(single_range_output,0, CPUID_ECX, BIT(2)),
 PT_CAP(payloads_lip,0, CPUID_ECX, BIT(31)),
-PT_CAP(num_address_ranges,1, CPUID_EAX, 0x3),
+PT_CAP(num_address_ranges,1, CPUID_EAX, 0x7),
 PT_CAP(mtc_periods,1, CPUID_EAX, 0xffff0000),
 PT_CAP(cycle_thresholds,1, CPUID_EBX, 0xffff),
 PT_CAP(psb_periods,1, CPUID_EBX, 0xffff0000),
@@ -1104,10 +1104,11 @@
 /* Return:Our private PT buffer structure. */
 static void *
 -pt_buffer_setup_aux(int cpu, void **pages, int nr_pages, bool snapshot)
+pt_buffer_setup_aux(struct perf_event *event, void **pages,
+                    int nr_pages, bool snapshot)
 {
 struct pt_buffer *buf;
 -int node, ret;
+int node, ret, cpu = event->cpu;
 +int node, ret, cpu = event->cpu;

 if (!nr_pages)
 return NULL;
@@ -1190,7 +1191,7 @@
 if (!filter->range || !filter->size)
 return -EINVAL;
@@ -1217,7 +1218,7 @@
 list_for_each_entry(filter, &head->list, entry) {
 -if (filter->inode && !offs[range]) {
+if (filter->path.dentry && !offs[range]) {
  msr_a = msr_b = 0;
 } else {
 /* apply the offset */
--- linux-4.15.0.orig/arch/x86/events/intel/rapl.c
+++ linux-4.15.0/arch/x86/events/intel/rapl.c
@@ -115,18 +115,6 @@
 * any other bit is reserved
 */
 #define RAPL_EVENT_MASK 0xFFULL

- #define DEFINE_RAPL_FORMAT_ATTR(_var, _name, _format)
- static ssize_t __rapl_##_var##_show(struct kobject *kobj,
- struct kobj_attribute *attr,
- char *page)
- {
- BUILD_BUG_ON(sizeof(_format) >= PAGE_SIZE);
- return sprintf(page, _format)
- }
- static struct kobj_attribute format_attr_##_var
- #define RAPL_CNTR_WIDTH 32

#define RAPL_EVENT_ATTR_STR(_name, v, str)
@@ -548,7 +536,7 @@
    .attrs = NULL, /* patched at runtime */
    }

- DEFINE_RAPL_FORMAT_ATTR(event, event, "config:0-7");
+PMU_FORMAT_ATTR(event, "config:0-7");

static struct attribute *rapl_formats_attr[] = {
    &format_attr_event.attr,
    NULL,
@@ -775,9 +763,11 @@
    X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_DENVERTON, hsw_rapl_init),
    X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_GOLDMONT, hsw_rapl_init),
    -X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_DENVERTON, hsw_rapl_init),
+X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_GOLDMONT_X, hsw_rapl_init),
    +
+X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_GOLDMONT_PLUS, hsw_rapl_init),
    -X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_GEMINI_LAKE, hsw_rapl_init),
    +X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_GEMINI_LAKE, hsw_rapl_init),
    +X86_RAPL_MODEL_MATCH(INTEL_FAM6_ATOM_ICELAKE_MOBILE, skl_rapl_init),
    { },
};

--- linux-4.15.0.orig/arch/x86/events/intel/uncore.c
+++ linux-4.15.0/arch/x86/events/intel/uncore.c
@@ -90,8 +90,8 @@
 return map;
}

ssize_t uncore_event_show(struct kobject *kobj,
    struct kobj_attribute *attr, char *buf)
+ssize_t uncore_event_show(struct device *dev,
+    struct device_attribute *attr, char *buf)
struct uncore_event_desc *event =
    container_of(attr, struct uncore_event_desc, attr);
@@ -218,7 +218,7 @@
    u64 prev_count, new_count, delta;

 int shift;

-    if (event->hw.idx >= UNCORE_PMC_IDX_FIXED)
+    if (event->hw.idx == UNCORE_PMC_IDX_FIXED)
        shift = 64 - uncore_fixed_ctr_bits(box);
 else
    shift = 64 - uncore_perf_ctr_bits(box);
@@ -468,10 +468,8 @@
    local64_set(&event->hw.prev_count, uncore_read_counter(box, event));
    uncore_enable_event(box, event);

-    if (box->n_active == 1) {
-        uncore_enable_box(box);
+    if (box->n_active == 1)
        uncore_pmu_start_hrtimer(box);
-    }

 static void uncore_pmu_event_stop(struct perf_event *event, int flags)
@@ -486,10 +484,8 @@
    WARN_ON_ONCE(hwc->state & PERF_HES_STOPPED);
    hwc->state |= PERF_HES_STOPPED;

-    if (box->n_active == 0) {
-        uncore_disable_box(box);
+    if (box->n_active == 0)
        uncore_pmu_cancel_hrtimer(box);
-    }

 if ((flags & PERF_EF_UPDATE) && !(hwc->state & PERF_HES_UPTODATE)) {
    @@ -708,6 +704,40 @@
            return ret;
        }

+    static void uncore_pmu_enable(struct pmu *pmu)
+    {
+        struct intel_uncore_pmu *uncore_pmu;
+        struct intel_uncore_box *box;
+        uncore_pmu = container_of(pmu, struct intel_uncore_pmu, pmu);
+        if (!uncore_pmu)
+            return;
+ box = uncore_pmu_to_box(uncore_pmu, smp_processor_id());
+ if (!box)
+ return;
+
+ if (uncore_pmu->type->ops->enable_box)
+ uncore_pmu->type->ops->enable_box(box);
+ }
+
+ static void uncore_pmu_disable(struct pmu *pmu)
+ {
+ struct intel_uncore_pmu *uncore_pmu;
+ struct intel_uncore_box *box;
+
+ uncore_pmu = container_of(pmu, struct intel_uncore_pmu, pmu);
+ if (!uncore_pmu)
+ return;
+
+ box = uncore_pmu_to_box(uncore_pmu, smp_processor_id());
+ if (!box)
+ return;
+
+ if (uncore_pmu->type->ops->disable_box)
+ uncore_pmu->type->ops->disable_box(box);
+ }
+
+ static ssize_t uncore_get_attr_cpumask(struct device *dev,
+ struct device_attribute *attr, char *buf)
+ {
+ @ @ -733,6 +763,8 @ @
+ pmu->pmu = (struct pmu) {
+ .attr_groups= pmu->type->attr_groups,
+ .task_ctx_nr= perf_invalid_context,
+ .pmu_enable= uncore_pmu_enable,
+ .pmu_disable= uncore_pmu_disable,
+ .event_init= uncore_pmu_event_init,
+ .add= uncore_pmu_event_add,
+ .del= uncore_pmu_event_del,
+ --- linux-4.15.0.orig/arch/x86/events/intel/uncore.h
+ +++ linux-4.15.0/arch/x86/events/intel/uncore.h
+ @ @ -23,7 +23,7 @ @
+ #define UNCORE_PCI_DEV_TYPE(data)((data >> 8) & 0xff)
+ #define UNCORE_PCI_DEVIDX(data)(data & 0xff)
+ #define UNCORE_EXTRA_PCI_DEV0xff
+ -#define UNCORE_EXTRA_PCI_DEV_MAX3
+ +#define UNCORE_EXTRA_PCI_DEV_MAX4

+ #define UNCORE_EVENT_CONSTRAINT(c, n) EVENT_CONSTRAINT(c, n) EVENT_CONSTRAINT(c, n, 0xff)
#define UNCORE_BOX_FLAG_CTL_OFFS8 1 /* event config registers are 8-byte apart */

struct uncore_event_desc {
    struct kobj_attribute attr;
    +struct device_attribute attr;
    const char *config;
};

struct pci2phy_map *__find_pci2phy_map(int segment);

 ssize_t uncore_event_show(struct kobject *kobj,
    -struct kobj_attribute *attr, char *buf);
+ssize_t uncore_event_show(struct device *dev,
    +struct device_attribute *attr, char *buf);

#define INTEL_UNCORE_EVENT_DESC(_name, _config)
{
}

#define DEFINE_UNCORE_FORMAT_ATTR(_var, _name, _format)
{
    static ssize_t __uncore_##_var##_show(struct kobject *kobj,
        -struct kobj_attribute *attr,
        +struct device_attribute *attr,
        char *page)
    {
        BUILD_BUG_ON(sizeof(_format) >= PAGE_SIZE);
        return sprintf(page, _format "\n");
    } 
    static inline unsigned uncore_pci_box_ctl(struct intel_uncore_box *box)
    @} -281.18 +281.6 @@
    return box->pmu->type->num_counters;
}

-stat static inline void uncore_disable_box(struct intel_uncore_box *box)
-{
-    -if (box->pmu->type->ops->disable_box)
-        box->pmu->type->ops->disable_box(box);
-}
static inline void uncore_enable_box(struct intel_uncore_box *box)
{
  if (box->pmu->type->ops->enable_box)
    box->pmu->type->ops->enable_box(box);
}

static inline void uncore_disable_event(struct intel_uncore_box *box, struct perf_event *event)
{
  --- linux-4.15.0.orig/arch/x86/events/intel/uncore_nhmex.c
  +++ linux-4.15.0/arch/x86/events/intel/uncore_nhmex.c
  @@ -246,7 +246,7 @@
  }
  struct hw_perf_event *hwc = &event->hw;
  if (hwc->idx == UNCORE_PMC_IDX_FIXED)
    wrmsrl(hwc->config_base, NHMEX_PMON_CTL_EN_BIT0);
  else if (box->pmu->type->event_mask & NHMEX_PMON_CTL_EN_BIT0)
    wrmsrl(hwc->config_base, hwc->config | NHMEX_PMON_CTL_EN_BIT22);
  --- linux-4.15.0.orig/arch/x86/events/intel/uncore_snbc.c
  +++ linux-4.15.0/arch/x86/events/intel/uncore_snbc.c
  @@ -15,6 +15,25 @@
  #define PCI_DEVICE_ID_INTEL_KBL_Y_IMC	0x590c
  #define PCI_DEVICE_ID_INTEL_KBL_UQ_IMC	0x5904
  #define PCI_DEVICE_ID_INTEL_KBL_U_Q_IMC	0x5914
  #define PCI_DEVICE_ID_INTEL_KBL_SD_IMC	0x590f
  #define PCI_DEVICE_ID_INTEL_KBL_SQ_IMC	0x591f
  #define PCI_DEVICE_ID_INTEL_CFL_2U_IMC	0x3e0f
  #define PCI_DEVICE_ID_INTEL_CFL_4U_IMC	0x3e1f
  #define PCI_DEVICE_ID_INTEL_CFL_6H_IMC	0x3ec2
  #define PCI_DEVICE_ID_INTEL_CFL_8S_D_IMC	0x3e31
  #define PCI_DEVICE_ID_INTEL_CFL_4S_S_IMC	0x3e33
  #define PCI_DEVICE_ID_INTEL_CFL_6S_S_IMC	0x3eca
  #define PCI_DEVICE_ID_INTEL_CFL_8S_S_IMC	0x3e32
  /* SNB event control */
#define SNB_UNC_CTL_EV_SEL_MASK	0x000000ff

PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_SKL_SQ_IMC),
.driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
},
-
+{ /* IMC */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL KBL_Y IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL KBL_U IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL KBL_UQ IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL KBL SD IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL CFL 2U IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL CFL 4U IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL CFL 4H IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL CFL 6H IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL CFL 2S_D IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE IMC, 0),
+ },
+{ /* IMC */
+PCI DEVICE(PCI_VENDOR_ID_INTEL, PCI DEVICE_ID_INTEL CFL 4S_D IMC),
Open Source Used In 5GaaS Edge AC-4  11608

+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_6S_D_IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_8S_D IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_4S_W IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_6S_W IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_8S_W IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_4S_S IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_6S_S IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* IMC */
+ PCI_DEVICE(PICl_VENDOR_ID_INTEL, PICl_DEVICE_ID_INTEL_CFL_8S_S IMC),
+ .driver_data = UNCORE_PCI_DEV_DATA(SNB_PCI_UNCORE_IMC, 0),
+
+ /* end: all zeroes */
);

IMC_DEV(SKL_HQ IMC, &skl_uncore_pci_driver), /* 6th Gen Core H Quad Core */
IMC_DEV(SKL_SD IMC, &skl_uncore_pci_driver), /* 6th Gen Core S Dual Core */
IMC_DEV(SKL_SQ IMC, &skl_uncore_pci_driver), /* 6th Gen Core S Quad Core */
IMC_DEV(KBL_Y IMC, &skl_uncore_pci_driver), /* 7th Gen Core Y */
IMC_DEV(KBL_U IMC, &skl_uncore_pci_driver), /* 7th Gen Core U */
IMC_DEV(KBL_UQ IMC, &skl_uncore_pci_driver), /* 7th Gen Core U Quad Core */
IMC_DEV(KBL_SD IMC, &skl_uncore_pci_driver), /* 7th Gen Core S Dual Core */
IMC_DEV(KBL_SQ IMC, &skl_uncore_pci_driver), /* 7th Gen Core S Quad Core */
IMC_DEV(CFL_2U IMC, &skl_uncore_pci_driver), /* 8th Gen Core U 2 Cores */
IMC_DEV(CFL_4U IMC, &skl_uncore_pci_driver), /* 8th Gen Core U 4 Cores */
+IMC_DEV(CFL_4H_IMC, &skl_uncore_pci_driver), /* 8th Gen Core H 4 Cores */
+IMC_DEV(CFL_6H_IMC, &skl_uncore_pci_driver), /* 8th Gen Core H 6 Cores */
+IMC_DEV(CFL_2S_D_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 2 Cores Desktop */
+IMC_DEV(CFL_4S_D_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 4 Cores Desktop */
+IMC_DEV(CFL_6S_D_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 6 Cores Desktop */
+IMC_DEV(CFL_8S_D_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 8 Cores Desktop */
+IMC_DEV(CFL_4S_W_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 4 Cores Work Station */
+IMC_DEV(CFL_6S_W_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 6 Cores Work Station */
+IMC_DEV(CFL_8S_W_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 8 Cores Work Station */
+IMC_DEV(CFL_4S_S_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 4 Cores Server */
+IMC_DEV(CFL_6S_S_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 6 Cores Server */
+IMC_DEV(CFL_8S_S_IMC, &skl_uncore_pci_driver), /* 8th Gen Core S 8 Cores Server */
{
    /* end marker */
};

--- linux-4.15.0.orig/arch/x86/events/intel/uncore_snbep.c
+++ linux-4.15.0/arch/x86/events/intel/uncore_snbep.c
@@ -1029,6 +1029,7 @@
    enum {
        SNBEP_PCI_QPI_PORT0_FILTER,
        SNBEP_PCI_QPI_PORT1_FILTER,
+        BDX_PCI_QPI_PORT2_FILTER,
        HSWEP_PCI_PCU_3,
    };

@@ -1221,6 +1222,8 @@
    .id_table = snbep_uncore_pci_ids,
    }

+#define NODE_ID_MASK 0x7
+
/*
 * build pci bus to socket mapping
 */
@@ -1242,7 +1245,7 @@
    err = pci_read_config_dword(ubox_dev, nodeid_loc, &config);
    if (err)
        break;
    -nodeid = config;
+    nodeid = config & NODE_ID_MASK;
    /* get the Node ID mapping */
    err = pci_read_config_dword(ubox_dev, idmap_loc, &config);
    if (err)
        @ @ -3254,15 +3257,18 @@
    },
    /* QPI Port 0 filter */
    PCI_DEVICE(PIC_VENDOR_ID_INTEL, 0x6f86),
    .driver_data = UNCORE_PCI_DEV_DATA(UNCORE_EXTRA_PCI_DEV, 0),
    /* QPI Port 1 filter */
    PCI DEVICE (PIC_VENDOR_ID_INTEL, 0x6f86),
    .driver_data = UNCORE_PCI_DEV_DATA (UNCORE EXTRA_PCIE_DEV, 0),
+ .driver_data = UNCORE_PCI_DEV_DATA(UNCORE_EXTRA_PCI_DEV,
+ SNBEP_PCI_QPI_PORT0_FILTER),
},
/* QPI Port 1 filter */
PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x6f96),
- .driver_data = UNCORE_PCI_DEV_DATA(UNCORE_EXTRA_PCI_DEV, 1),
+ .driver_data = UNCORE_PCI_DEV_DATA(UNCORE_EXTRA_PCI_DEV,
+ SNBEP_PCI_QPI_PORT1_FILTER),
},
/* QPI Port 2 filter */
PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x6f46),
- .driver_data = UNCORE_PCI_DEV_DATA(UNCORE_EXTRA_PCI_DEV, 2),
+ .driver_data = UNCORE_PCI_DEV_DATA(UNCORE_EXTRA_PCI_DEV,
+ BDX_PCI_QPI_PORT2_FILTER),
},
/* end: all zeroes */
};

/*
 * To determine the number of CHAs, it should read bits 27:0 in the CAPID6
 * register which located at Device 30, Function 3, Offset 0x9C. PCI ID 0x2083.
 */
#define SKX_CAPID6	0x9c
#define SKX_CHA_BIT_MASK	GENMASK(27, 0)

static int skx_count_chabox(void)
{
- struct pci_dev *chabox_dev = NULL;
- int bus, count = 0;
-
- while (1) {
- chabox_dev = pci_get_device(PCI_VENDOR_ID_INTEL, 0x208d, chabox_dev);
- if (!chabox_dev)
- break;
- if (count == 0)
- bus = chabox_dev->bus->number;
- if (bus != chabox_dev->bus->number)
- break;
- count++;
- }
+ struct pci_dev *dev = NULL;
+ u32 val = 0;

- pci_dev_put(chabox_dev);
- return count;

+dev = pci_get_device(PCI_VENDOR_ID_INTEL, 0x2083, dev);  
+if (!dev)  
+goto out;  
+  +pci_read_config_dword(dev, SKX_CAPID6, &val);  
+val &= SKX_CHA_BIT_MASK;  
+out:  
+pci_dev_put(dev);  
+return hweight32(val);  
}

void skx_uncore_cpu_init(void)
@@ -3606,7 +3615,7 @@
};

static struct attribute *skx_upi_uncore_formats_attr[] = {
-  &format_attr_event_ext.attr,
+  &format_attr_event.attr,
  &format_attr_umask_ext.attr,
  &format_attr_edge.attr,
  &format_attr_inv.attr,
@@ -3804,16 +3813,16 @@
  , /* M3UPI0 Link 0 */
   -PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x204C),
   , /* M3UPI0 Link 1 */
-  -PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x204D),
+  -PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x204D),
  , /* M3UPI1 Link 2 */
-  -PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x204C),
+  -PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x204C),
  , /* end: all zeroes */
};

--- linux-4.15.0.orig/arch/x86/events/msr.c
+++ linux-4.15.0/arch/x86/events/msr.c
@@ -1,5 +1,6 @@

// SPDX-License-Identifier: GPL-2.0
#include <linux/perf_event.h>
+#include <linux/nospec.h>
#include <asm/intel-family.h>

enum perf_msr_id {  
    
    case INTEL_FAM6_BROADWELL_GT3E:
    case INTEL_FAM6_BROADWELL_X:

    -case INTEL_FAM6_ATOM_SILVERMONT1:
    -case INTEL_FAM6_ATOM_SILVERMONT2:
    +case INTEL_FAM6_ATOM_SILVERMONT:
    +case INTEL_FAM6_ATOM_SILVERMONT_X:
    case INTEL_FAM6_ATOM_AIRMONT:

    case INTEL_FAM6_ATOM_GOLDMONT:
    -case INTEL_FAM6_ATOM_DENVERTON:
    +case INTEL_FAM6_ATOM_GOLDMONT_X:

    -case INTEL_FAM6_ATOM_GEMINI_LAKE:
    +case INTEL_FAM6_ATOM_GOLDMONT_PLUS:

    case INTEL_FAM6_XEON_PHI_KNL:
    case INTEL_FAM6_XEON_PHI_KNM:
    
    case INTEL_FAM6_SKYLAKE_X:
    case INTEL_FAM6_KABYLKE_MOBILE:
    case INTEL_FAM6_KABYLKE_DESKTOP:
    +case INTEL_FAM6_ICELAKE_MOBILE:
    if (idx == PERF_MSR_SMI || idx == PERF_MSR_PPERF)
        return true;
    break;
    
    if (event->attr.type != event->pmu->type)
        return -ENOENT;

    if (event->attr.exclude_user || event->attr.exclude_kernel ||
        event->attr.sample_period) /* no sampling */
        return -EINVAL;

    if (cfg >= PERF_MSR_EVENT_MAX)
        return -EINVAL;

    /* unsupported modes and filters */
    if (event->attr.exclude_user ||
        event->attr.exclude_kernel ||
        event->attr.sample_period) /* no sampling */
        return -EINVAL;

    +if (cfg >= PERF_MSR_EVENT_MAX)
    +return -EINVAL;

    /* unsupported modes and filters */
```c
+ cfg = array_index_nospec((unsigned long)cfg, PERF_MSR_EVENT_MAX);
+ if (!msr[ cfg].attr)
  return -EINVAL;

--- linux-4.15.0.orig/arch/x86/events/perf_event.h
+++ linux-4.15.0/arch/x86/events/perf_event.h
@@ -95,25 +95,25 @@
PERF_SAMPLE_TRANSACTION | PERF_SAMPLE_PHYS_ADDR | \
PERF_SAMPLE_REGS_INTR | PERF_SAMPLE_REGS_USER)

-#define PEBS_REGS \
-  (PERF_REG_X86_AX | \n-   PERF_REG_X86_BX | \n-   PERF_REG_X86_CX | \n-   PERF_REG_X86_DX | \n-   PERF_REG_X86_DI | \n-   PERF_REG_X86_SI | \n-   PERF_REG_X86_SP | \n-   PERF_REG_X86_BP | \n-   PERF_REG_X86_IP | \n-   PERF_REG_X86_FLAGS | \n-   PERF_REG_X86_R8 | \n-   PERF_REG_X86_R9 | \n-   PERF_REG_X86_R10 | \n-   PERF_REG_X86_R11 | \n-   PERF_REG_X86_R12 | 
-   PERF_REG_X86_R13 | 
-   PERF_REG_X86_R14 | 
-   PERF_REG_X86_R15)
+#define PEBS_GP_REGS \
+(1ULL << PERF_REG_X86_AX) | \n+ (1ULL << PERF_REG_X86_BX) | \n+ (1ULL << PERF_REG_X86_CX) | \n+ (1ULL << PERF_REG_X86_DX) | \n+ (1ULL << PERF_REG_X86_DI) | \n+ (1ULL << PERF_REG_X86_SI) | \n+ (1ULL << PERF_REG_X86_SP) | \n+ (1ULL << PERF_REG_X86_BP) | \n+ (1ULL << PERF_REG_X86_IP) | \n+ (1ULL << PERF_REG_X86_FLAGS) | \n+ (1ULL << PERF_REG_X86_R8) | \n+ (1ULL << PERF_REG_X86_R9) | \n+ (1ULL << PERF_REG_X86_R10) | \n+ (1ULL << PERF_REG_X86_R11) | 
+ (1ULL << PERF_REG_X86_R12) | 
+ (1ULL << PERF_REG_X86_R13) | 
```

/*
* Per register state.
@@ -239,6 +239,11 @@
int excl_thread_id; /* 0 or 1 */
/

/*
+ * SKL TSX_FORCE_ABORT shadow
+ */
+u64 tfa_shadow;
+
+/*
+ * AMD specific bits
+ */
struct amd_nb*amd_nb;
@@ -556,7 +561,7 @@
struct x86_pmu_quirk *quirks;
intperfctr_second_write;
boollate_ack;
-unsigned(*limit_period)(struct perf_event *event, unsigned l);
+u64(*limit_period)(struct perf_event *event, u64 l);
/

/*
* sysfs attrs
@@ -639,6 +644,11 @@
* Intel host/guest support (KVM)
*/
struct perf_guest_switch_msr *(*guest_get_msrs)(int *nr);
+
+/*
+ * Check period value for PERF_EVENT_IOC_PERIOD ioctl.
+ */
+int (*check_period) (struct perf_event *event, u64 period);
};

struct x86_perf_task_context {
@@ -646,6 +656,7 @@
u64 lbr_to[MAX_LBR_ENTRIES];
u64 lbr_info[MAX_LBR_ENTRIES];
int tos;
+int valid_lbrs;
int lbr_callstack_users;
int lbr_stack_state;
};
@@ -666,6 +677,7 @@
#define PMU_FL_HAS_RSP_1 0x2 /* has 2 equivalent offcore_rsp regs */
static inline void x86_pmu_disable_event(struct perf_event *event)
{
    u64 disable_mask = __this_cpu_read(cpu_hw_events.perf_ctr_virt_mask);
    struct hw_perf_event *hwc = &event->hw;

    -wrmsrl(hwc->config_base, hwc->config);
    +wrmsrl(hwc->config_base, hwc->config & ~disable_mask);
}

void x86_pmu_enable_event(struct perf_event *event);

#ifdef CONFIG_CPUSUP_INTEL

+static inline bool intel_pmu_has_bts_period(struct perf_event *event, u64 period)
+{
    +struct hw_perf_event *hwc = &event->hw;
    +unsigned int hw_event, bts_event;

    +if (event->attr.freq)
        +return false;
    +
    +hw_event = hwc->config & INTEL_ARCH_EVENT_MASK;
    +bts_event = x86_pmu.event_map(PERF_COUNT_HW_BRANCH_INSTRUCTIONS);
    +
    +return hw_event == bts_event && period == 1;
+}

static inline bool intel_pmu_has_bts(struct perf_event *event)
{
    -if (event->attr.config == PERF_COUNT_HW_BRANCH_INSTRUCTIONS &&
        -!event->attr.freq && event->hw.sample_period == 1)
        -return true;
    +struct hw_perf_event *hwc = &event->hw;

    -return false;
    +return intel_pmu_has_bts_period(event, hwc->sample_period);
}

int intel_pmu_save_and_restart(struct perf_event *event);
x86_get_event_constraints(struct cpu_hw_events *cpuc, int idx,
    struct perf_event *event);

-struct intel_shared_regs *allocate_shared_regs(int cpu);
+extern int intel_cpuc_prepare(struct cpu_hw_events *cpuc, int cpu);
+extern void intel_cpuc_finish(struct cpu_hw_events *cpuc);

int intel_pmu_init(void);

@@ -862,7 +887,8 @@
@@ -996,9 +1022,13 @@
 return 0;
 }

-struct intel_shared_regs *allocate_shared_regs(int cpu)
+static inline int intel_cpuc_prepare(struct cpu_hw_events *cpuc, int cpu)
+{
+    return 0;
+}
+static inline void intel_cpuc_finish(struct cpu_hw_events *cpuc)
+{
+    return NULL;
+}

static inline int is_ht_workaround_enabled(void)
--- linux-4.15.0.orig/arch/x86/hyperv/hv_init.c
+++ linux-4.15.0/arch/x86/hyperv/hv_init.c
@@ -17,6 +17,7 @@
 *
 */

#include <linux/efi.h>
#include <linux/types.h>
#include <asm/hypervisor.h>
#include <asm/hyperv.h>
@@ -29,6 +30,14 @@
 #include <linux/slab.h>
 #include <linux/cpuhotplug.h>

+%ifdef PKG_ABI
+*/
+ * Preserve the ability to 'make deb-pkg' since PKG_ABI is provided
+ * by the Ubuntu build rules.
+ */
+#define PKG_ABI 0
+endif
+

#ifdef CONFIG_HYPERV_TSCPAGE

static struct ms_hyperv_tsc_page *tsc_pg;
@@ -101,6 +110,22 @@
return 0;
}

+static int __init hv_pci_init(void)
+{
+int gen2vm = efi_enabled(EFI_BOOT);
+
+ /*
+ * For Generation-2 VM, we exit from pci_arch_init() by returning 0.
+ * The purpose is to suppress the harmless warning:
+ * "PCI: Fatal: No config space access function found"
+ */
+if (gen2vm)
+return 0;
+
+ /* For Generation-1 VM, we'll proceed in pci_arch_init(). */
+return 1;
+
/* This function is to be invoked early in the boot sequence after the
* hypervisor has been detected.
@@ -108,14 +133,21 @@
* 1. Setup the hypercall page.
* 2. Register Hyper-V specific clocksource.
*/

-void hyperv_init(void)
+void __init hyperv_init(void)
{
-u64 guest_id;
+u64 guest_id, required_msrs;
union hv_x64_msr_hypercall_contents hypercall_msr;

if (x86_hyper_type != X86_HYPER_MS_HYPERV)
return;

+ /* Absolutely required MSRs */
+required_msrs = HV_X64_MSR_HYPERCALL_AVAILABLE |
+HV_X64_MSR_VP_INDEX_AVAILABLE;
+
+ if ((ms_hyperv.features & required_msrs) != required_msrs)
+return;
+
/* Allocate percpu VP index */


hv_vp_index = kmalloc_array(num_possible_cpus(), sizeof(*hv_vp_index), GFP_KERNEL);
@@ -131,7 +163,7 @@
* 1. Register the guest ID
* 2. Enable the hypercall and register the hypercall page
*/
-guest_id = generate_guest_id(0, LINUX_VERSION_CODE, 0);
+guest_id = generate_guest_id(0x80 /*Canonical*/, LINUX_VERSION_CODE, PKG_ABI);
wrmsrl(HV_X64_MSR_GUEST_OS_ID, guest_id);

hv_hypercall_pg = __vmalloc(PAGE_SIZE, GFP_KERNEL, PAGE_KERNEL_RX);
@@ -147,6 +179,8 @@
hyper_alloc_mmu();
+x86_init.pci.arch_init = hv_pci_init;
+
/*
 * Register Hyper-V specific clocksource.
 */
@@ -200,6 +234,13 @@
/* Reset our OS id */
wrmsrl(HV_X64_MSR_GUEST_OS_ID, 0);

+/*
+ * Reset hypercall page reference before reset the page,
+ * let hypercall operations fail safely rather than
+ * panic the kernel for using invalid hypercall page
+ */
+hv_hypercall_pg = NULL;
+
/* Reset the hypercall page */
hypercall_msr.as_uint64 = 0;
wrmsrl(HV_X64_MSR_HYPERCALL, hypercall_msr.as_uint64);
--- linux-4.15.0.orig/arch/x86/hyperv/mmu.c
+++ linux-4.15.0/arch/x86/hyperv/mmu.c
@@ -57,12 +57,14 @@
* Lower 12 bits encode the number of additional
* pages to flush (in addition to the 'cur' page).
*/
-if (diff >= HV_TLB_FLUSH_UNIT)
+if (diff >= HV_TLB_FLUSH_UNIT) {
    gva_list[gva_n] |= ~PAGE_MASK;
-  else if (diff)
+} else if (diff) {
    cur += HV_TLB_FLUSH_UNIT;
+  cur += (diff - 1) >> PAGE_SHIFT;
+} else if (diff) {
    cur = end;
+ cur += HV_TLB_FLUSH_UNIT;
gva_n++;
}
} while (cur < end);
@@ -119,11 +121,17 @@
if (!pcpu_flush || !hv_hypercall_pg)
goto do_native;

@if (cpumask_empty(cpus))
- return;
-
- local_irq_save(flags);
+
+/**
+ * Only check the mask _after_ interrupt has been disabled to avoid the
+ * mask changing under our feet.
+ */
+if (cpumask_empty(cpus)) {
+ local_irq_restore(flags);
+ return;
+}
+
+ flush_pcpu = this_cpu_ptr(pcpu_flush);

if (unlikely(!*flush_pcpu))
@@ -137,7 +145,12 @@
}

if (info->mm) {
+/**
+ * AddressSpace argument must match the CR3 with PCID bits
+ * stripped out.
+ */
+flush->address_space = virt_to_phys(info->mm->pgd);
+flush->address_space &= CR3_ADDR_MASK;
+flush->flags = 0;
} else {
 flush->address_space = 0;
@@ -219,7 +232,12 @@
}

if (info->mm) {
+/**
+ * AddressSpace argument must match the CR3 with PCID bits
+ * stripped out.
+ */

flush->address_space = virt_to_phys(info->mm->pgd);
+flush->address_space &= CR3_ADDR_MASK;
flush->flags = 0;
} else {
flush->address_space = 0;
@@ -278,8 +296,6 @@
if (!(ms_hyperv.hints & HV_X64_REMOTE_TLB_FLUSH_RECOMMENDED))
    return;

-    setup_clear_cpu_cap(X86_FEATURE_PCID);
-
    if (!(ms_hyperv.hints & HV_X64_EX_PROCESSOR_MASKS_RECOMMENDED)) {
        pr_info("Using hypercall for remote TLB flush\n");
    pv_mmu_ops.flush_tlb_others = hyperv_flush_tlb_others;
--- linux-4.15.0.orig/arch/x86/ia32/ia32_aout.c
+++ linux-4.15.0/arch/x86/ia32/ia32_aout.c
@@ -51,7 +51,7 @@
    
    /*
     * fill in the user structure for a core dump..
     */
-    static void dump_thread32(struct pt_regs *regs, struct user32 *dump)
+    static void fill_dump(struct pt_regs *regs, struct user32 *dump)
    {
        u32 fs, gs;
        memset(dump, 0, sizeof(*dump));
@@ -157,10 +157,12 @@
    fs = get_fs();
    set_fs(KERNEL_DS);
    has_dumped = 1;
+    +fill_dump(cprm->regs, &dump);
+    +strncpy(dump.u_comm, current->comm, sizeof(current->comm));
        dump.u_ar0 = offsetof(struct user32, regs);
        dump.signal = cprm->siginfo->si_signo;
-    dump_thread32(cprm->regs, &dump);
    
    /*
     * If the size of the dump file exceeds the rlimit, then see
--- linux-4.15.0.orig/arch/x86/ia32/ia32_signal.c
+++ linux-4.15.0/arch/x86/ia32/ia32_signal.c
@@ -62,9 +62,8 @@
    #define RELOAD_SEG(seg)\
    -unsigned int pre = GET_SEG(seg)\
    +unsigned int pre = (seg) | 3;\
    unsigned int cur = get_user_seg(seg);\

- pre |= 3;
if (pre != cur)
set_user_seg(seg, pre);
}
@@ -73,6 +72,7 @@
struct sigcontext_32 __user *sc)
{
unsigned int tmpflags, err = 0;
+u16 gs, fs, es, ds;
void __user *buf;
u32 tmp;
@@ -80,16 +80,10 @@
current->restart_block.fn = do_no_restart_syscall;

get_user_try {
-/*
- * Reload fs and gs if they have changed in the signal
- * handler. This does not handle long fs/gs base changes in
- * the handler, but does not clobber them at least in the
- * normal case.
- */
-RELOAD_SEG(gs);
-RELOAD_SEG(fs);
-RELOAD_SEG(ds);
-RELOAD_SEG(es);
+gs = GET_SEG(gs);
+fs = GET_SEG(fs);
+ds = GET_SEG(ds);
+es = GET_SEG(es);

COPY(di); COPY(si); COPY(bp); COPY(sp); COPY(bx);
COPY(dx); COPY(cx); COPY(ip); COPY(ax);
@@ -107,6 +101,17 @@
buf = compat_ptr(tmp);
} get_user_catch(err);
+/*
+ * Reload fs and gs if they have changed in the signal
+ * handler. This does not handle long fs/gs base changes in
+ * the handler, but does not clobber them at least in the
+ * normal case.
+ */
+RELOAD_SEG(gs);
+RELOAD_SEG(fs);
+RELOAD_SEG(ds);
+RELOAD_SEG(es);
+
err |= fpu__restore_sig(buf, 1);

force_iret();
--- linux-4.15.0.orig/arch/x86/include/asm/acpi.h
+++ linux-4.15.0/arch/x86/include/asm/acpi.h
@@ -94,7 +94,7 @@
if (boot_cpu_data.x86 == 0x0F &&
    boot_cpu_data.x86_vendor == X86_VENDOR_AMD &&
    boot_cpu_data.x86_model <= 0x05 &&
-    boot_cpu_data.x86_mask < 0x0A)
+    boot_cpu_data.x86_stepping < 0x0A)
    return 1;
else if (boot_cpu_has(X86_BUG_AMD_APIC_C1E))
    return 1;
--- linux-4.15.0.orig/arch/x86/include/asm/alternative.h
+++ linux-4.15.0/arch/x86/include/asm/alternative.h
@@ -218,13 +218,11 @@
* use this macro(s) if you need more than one output parameter
--- linux-4.15.0.orig/arch/x86/include/asm/apic.h
+++ linux-4.15.0/arch/x86/include/asm/apic.h
@@ -10,6 +10,7 @@
#define ARCH_APICTIMER_STOPS_ON_C31
@@ -47,7 +48,7 @@
#ifdef CONFIG_X86_LOCAL_APIC
-extern unsigned int apic_verbosity;
+extern int apic_verbosity;
extern int local_apic_timer_c2_ok;

#define alternative_call_2(oldfunc, newfunc1, feature1, newfunc2, feature2, \
    output, input...)
  asm volatile (ALTERNATIVE_2("call %P[old]", "call %P[new1]", feature1, \
    "call %P[new2]", feature2) : output, ASM_CALL_CONSTRAINT : [old] "i" (oldfunc), [new1] "i" (newfunc1), \n    [new2] "i" (newfunc2), ## input);
}
/*
 * use this macro(s) if you need more than one output parameter
--- linux-4.15.0.orig/arch/x86/include/asm/apic.h
+++ linux-4.15.0/arch/x86/include/asm/apic.h
@@ -10,6 +10,7 @@
#include <asm/fixmap.h>
#include <asm/msr.h>
#include <asm/hardirq.h>
+#include <asm/hardirq.h>

#define ARCH_APICTIMER_STOPS_ON_C31
@@ -47,7 +48,7 @@
#ifdef CONFIG_X86_LOCAL_APIC
-extern unsigned int apic_verbosity;
+extern int apic_verbosity;
extern int local_apic_timer_c2_ok;
extern int disable_apic;
@@ -137,6 +138,7 @@
 extern void lapic_shutdown(void);
 extern void sync_Arb_IDs(void);
 extern void init_bsp_APIC(void);
+extern void apic_intr_mode_select(void);
 extern void apic_intr_mode_init(void);
 extern void setup_local_APIC(void);
 extern void init_apic_mappings(void);
@@ -172,8 +174,10 @@
 extern int setup_APIC_eilvt(u8 lvt_off, u8 vector, u8 msg_type, u8 mask);
 extern void lapic_assign_system_vectors(void);
 extern void lapic_assign_legacy_vector(unsigned int isairq, bool replace);
+extern void lapic_update_legacy_vectors(void);
 extern void lapic_online(void);
 extern void lapic_offline(void);
+extern bool apic_needs_pit(void);

 #else /* !CONFIG_X86_LOCAL_APIC */
 static inline void lapic_shutdown(void) { }
@@ -183,22 +187,14 @@
 # define setup_boot_APIC_clock x86_init_noop
 # define setup_secondary_APIC_clock x86_init_noop
 static inline void lapic_update_tsc_freq(void) { }
+static inline void apic_intr_mode_select(void) { }
 static inline void apic_intr_mode_init(void) { }
+static inline bool apic_needs_pit(void) { return true; }
 #endif /* !CONFIG_X86_LOCAL_APIC */

 #ifdef CONFIG_X86_X2APIC
-/
-/*
- * Make previous memory operations globally visible before
- * sending the IPI through x2apic wrmsr. We need a serializing instruction or
- * mfence for this.
- */
- static inline void x2apic_wrmsr_fence(void)
-{
-asm volatile("mfence" : : "memory");
-}
- static inline void native_apic_msr_write(u32 reg, u32 v)
-{
 if (reg == APIC_DFR || reg == APIC_ID || reg == APIC_LDR ||
@@ -251,6 +247,7 @@
extern int x2apic_mode;
extern int x2apic_phys;
+extern void __init x2apic_set_max_apicid(u32 apicid);
extern void __init check_x2apic(void);
extern void x2apic_setup(void);
static inline int x2apic_enabled(void)
@@ -319,7 +316,7 @@
 /* Probe, setup and smboo functions */
 int(*probe)(void);
 int(*acpi_madt_oem_check)(char *oem_id, char *oem_table_id);
-int(*apic_id_valid)(int apicid);
+int(*apic_id_valid)(u32 apicid);
 int(*apic_id_registered)(void);

 bool(*check_apicid_used)(physid_mask_t *map, int apicid);
@@ -442,6 +439,8 @@
 #endif /* CONFIG_X86_LOCAL_APIC */

 +extern void apic_ack_irq(struct irq_data *data);
 +
 static inline void ack_APIC_irq(void)
 { 
 /*
@@ -451,6 +450,14 @@
 apic_eoi();
 }

 +
 +static inline bool lapic_vector_set_in_irr(unsigned int vector)
 +{ 
 +u32 irr = apic_read(APIC_IRR + (vector / 32 * 0x10));
 +
 +return !(irr & (1U << (vector % 32)));
 +}
 +
 static inline unsigned default_get_apic_id(unsigned long x)
 { 
 unsigned int ver = GET_APIC_VERSION(apic_read(APIC_LVR));
@@ -492,7 +499,7 @@
 return apic->get_apic_id(reg);
 }

 -extern int default_apic_id_valid(int apicid);
 +extern int default_apic_id_valid(u32 apicid);
 extern int default_acpi_madt_oem_check(char *, char *
); 
 extern void default_setup_apic_routing(void);
#ifdef CONFIG_SMP
+bool apic_id_is_primary_thread(unsigned int id);
+bool apic_id_disabled(unsigned int id);
+#else
+static inline bool apic_id_is_primary_thread(unsigned int id) { return false; } 
+static inline bool apic_id_disabled(unsigned int id) { return false; }
+#endif
+
extern void irq_enter(void);
extern void irq_exit(void);

static inline void entering_irq(void)
{
    irq_enter();
+kvm_set_cpu_l1tf_flush_l1d();
}

static inline void entering_ack_irq(void)
{
    irq_enter();
    ack_APIC_irq();
+kvm_set_cpu_l1tf_flush_l1d();
}

static inline void exiting_irq(void)
--- linux-4.15.0.orig/arch/x86/include/asm/apm.h
+++ linux-4.15.0/arch/x86/include/asm/apm.h
@@ -35,6 +35,7 @@
 __asm__ __volatile__(APM_DO_ZERO_SEGS
 "pushl %%edi\n"
 "pushl %%ebp\n"
+ANNOTATE_RETPOLINE_SAFE /* FRBS */
 "lcall *%%cs:apm_bios_entry\n"  
 "setc %%a\n"
 "popl %%ebp\n"
@@ -59,6 +60,7 @@
 __asm__ __volatile__(APM_DOZERO_SEGs
 "pushl %%edi\n"
 "pushl %%ebp\n"
+ANNOTATE_RETPOLINE_SAFE /* FRBS */
 "lcall *%%cs:apm_bios_entry\n"
 "setc %%b\n"
 "popl %%ebp\n"
--- linux-4.15.0.orig/arch/x86/include/asm/asm.h
+++ linux-4.15.0/arch/x86/include/asm/asm.h
@@ -46,6 +46,65 @@
#define _ASM_SI	__ASM_REG(si)
#define _ASM_DI__ASM_REG(di)

+#ifndef __x86_64__
+/* 32 bit */
+
+#define _ASM_ARG1_ASM_AX
+#define _ASM_ARG2_ASM_DX
+#define _ASM_ARG3_ASM_CX
+
+#define _ASM_ARG1L	eax
+#define _ASM_ARG2L	edx
+#define _ASM_ARG3L	ecx
+
+#define _ASM_ARG1W	ax
+#define _ASM_ARG2W	dx
+#define _ASM_ARG3W	cx
+
+#define _ASM_ARG1B	al
+#define _ASM_ARG2B	dl
+#define _ASM_ARG3B	cl
+
+#else
+/* 64 bit */
+
+#define _ASM_ARG1_ASM_DI
+#define _ASM_ARG2_ASM_SI
+#define _ASM_ARG3_ASM_DX
+#define _ASM_ARG4_ASM_CX
+#define _ASM_ARG5r8
+#define _ASM_ARG6r9
+
+#define _ASM_ARG1Qrdi
+#define _ASM_ARG2Qrsi
+#define _ASM_ARG3Qrdx
+#define _ASM_ARG4Qrcx
+#define _ASM_ARG5Qr8
+#define _ASM_ARG6Qr9
+
+#define _ASM_ARG1Ledi
+#define _ASM_ARG2Lesi
+#define _ASM_ARG3Ledx
+#define _ASM_ARG4Lecx
+#define _ASM_ARG5Lr8d
+#define _ASM_ARG6Lr9d
+ #define _ASM_ARG1W	di
+ #define _ASM_ARG2W	si
+ #define _ASM_ARG3W	dx
+ #define _ASM_ARG4W	cx
+ #define _ASM_ARG5W	cr8w
+ #define _ASM_ARG6W	cr9w
+
+ #define _ASM_ARG1B	dil
+ #define _ASM_ARG2B	sil
+ #define _ASM_ARG3B	dl
+ #define _ASM_ARG4B	cl
+ #define _ASM_ARG5B	cr8b
+ #define _ASM_ARG6B	cr9b
+
+ #endif
+
/*
 * Macros to generate condition code outputs from inline assembly,
 * The output operand must be type "bool".
--- linux-4.15.0.orig/arch/x86/include/asm/atomic.h
+++ linux-4.15.0/arch/x86/include/asm/atomic.h
@@ -50,7 +50,7 @@
     : "ir" (i));
 +  : "ir" (i) : "memory");
 }

/**
 @@ -64,7 +64,7 @@
 {
     asm volatile(LOCK_PREFIX "addl \%1,\%0"
         : "+m" (v->counter)
-        : "ir" (i));
+        : "ir" (i) : "memory");
 }

/**
 @@ -90,7 +90,7 @@
 static __always_inline void atomic_inc(atomic_t *v)
 {
     asm volatile(LOCK_PREFIX "incl \%0"
-        : "+m" (v->counter));
+        : "+m" (v->counter) :: "memory");
 }
static __always_inline void atomic_dec(atomic_t *v)
{
    asm volatile("decl %0"
    : "+m" (v->counter));
    + : "+m" (v->counter) : "memory");
}

asm volatile("addq %1,%0"
    : "+m" (v->counter)
    : "er" (i), "m" (v->counter));
    + : "er" (i), "m" (v->counter) : "memory");
}

asm volatile("subq %1,%0"
    : "+m" (v->counter)
    : "er" (i), "m" (v->counter));
    + : "er" (i), "m" (v->counter) : "memory");
}

asm volatile("incq %0"
    : "+m" (v->counter)
    : "m" (v->counter));
    + : "m" (v->counter) : "memory");
}

asm volatile("decq %0"
    : "+m" (v->counter)
    : "m" (v->counter));
    + : "m" (v->counter) : "memory");
}
--- linux-4.15.0.orig/arch/x86/include/asm/barrier.h
+++ linux-4.15.0/arch/x86/include/asm/barrier.h
@@ -24,6 +24,34 @@
 #define wmb() asm volatile("sfence" ::: "memory")
 #endif

+/**
+ * array_index_mask_nospec() - generate a mask that is ~0UL when the
+ *  bounds check succeeds and 0 otherwise
+ *  @index: array element index
+ *  @size: number of elements in array
+ *
+ * Returns:
+ *  0 - (index < size)
+ */
+static inline unsigned long array_index_mask_nospec(unsigned long index,
+ unsigned long size)
+{
+ unsigned long mask;
+       asm volatile ("cmp %1,%2; sbb %0,%0;"
+                     :="r" (mask)
+                     :"g"(size),"r" (index)
+                     :"cc");
+    return mask;
+}
+
+/* Override the default implementation from linux/nospec.h. */
+#define array_index_mask_nospec array_index_mask_nospec
+
+/* Prevent speculative execution past this barrier. */
+#define barrier_nospec() alternative_2("", "mfence", X86_FEATURE_MFENCE_RDTSC, \
+    "lfence", X86_FEATURE_LFENCE_RDTSC)
+
+ifdef CONFIG_X86_PPRO_FENCE
+#define dma_rmb() rmb()
#else
@@ -82,9 +110,27 @@
#endif
/* Atomic operations are already serializing on x86 */
-#define __smp_mb__before_atomic() barrier()
-#define __smp_mb__after_atomic() barrier()
+#define __smp_mb__before_atomic() do { } while (0)
+#define __smp_mb__after_atomic() do { } while (0)

#include <asm-generic/barrier.h>
+/*
+ * Make previous memory operations globally visible before
+ * a WRMSR.
+ * MFENCE makes writes visible, but only affects load/store
+ * instructions. WRMSR is unfortunately not a load/store
+ * instruction and is unaffected by MFENCE. The LFENCE ensures
+ * that the WRMSR is not reordered.
+ * Most WRMSRs are full serializing instructions themselves and
+ * do not require this barrier. This is only required for the
+ * IA32_TSC_DEADLINE and X2APIC MSRs.
+ */
+static inline void weak_wrmsr_fence(void)
+{
+asm volatile("mfence; lfence" : : : "memory");
+
+#endif /* _ASM_X86_BARRIER_H */
--- linux-4.15.0.orig/arch/x86/include/asm/bitops.h
+++ linux-4.15.0/arch/x86/include/asm/bitops.h
@@ -36,13 +36,7 @@*/
*/
/* Technically wrong, but this avoids compilation errors on some gcc
   versions. */
-#define BITOP_ADDR(x) +m" (*(volatile long *) (x))
-#else
-define BITOP_ADDR(x) +m" (*(volatile long *) (x))
-#endif
#define ADDR		BITOP_ADDR(addr)
@@ -78,7 +72,7 @@
likely to crash);
asm volatile("bts %1,%0" : ADDR : "Ir" (nr) : "memory");
+asm volatile(__ASM_SIZE(bts) " %1,%0" : ADDR : "Ir" (nr) : "memory");
}

/**
@@ -115,7 +109,7 @@
        : CONST_MASK_ADDR(nr, addr)
        : "iq" ((u8)-CONST_MASK(nr));
 } else {
-asym volatile(LOCK_PREFIX "btr %1,%0"
+asm volatile(LOCK_PREFIX __ASM_SIZE(btr) " %1,%0"
        : BITOP_ADDR(addr)
        : "Ir" (nr));
 }
 @ @ -137,7 +131,7 @@

static __always_inline void __clear_bit(long nr, volatile unsigned long *addr)
{
-asym volatile("btr %1,%0" : ADDR : "Ir" (nr));
+asm volatile(__ASM_SIZE(btr) " %1,%0" : ADDR : "Ir" (nr));
}

static __always_inline bool clear_bit_unlock_is_negative_byte(long nr, volatile unsigned long *addr)
@@ -182,7 +176,7 @@
*/

static __always_inline void __change_bit(long nr, volatile unsigned long *addr)
{
-asym volatile("btc %1,%0" : ADDR : "Ir" (nr));
+asm volatile(__ASM_SIZE(btc) " %1,%0" : ADDR : "Ir" (nr));
}

/**
@@ -201,7 +195,7 @@
        : CONST_MASK_ADDR(nr, addr)
        : "iq" ((u8)CONST_MASK(nr));
 } else {
-asym volatile(LOCK_PREFIX "btc %1,%0"
+asm volatile(LOCK_PREFIX __ASM_SIZE(btc) " %1,%0"
        : BITOP_ADDR(addr)
        : "Ir" (nr));
 }
 @ @ -217,7 +211,8 @@
*/

static __always_inline bool test_and_set_bit(long nr, volatile unsigned long *addr)
{
-GEN_BINARY_RMWcc(LOCK_PREFIX "bts", *addr, "Ir", nr, "%0", c);
+GEN_BINARY_RMWcc(LOCK_PREFIX __ASM_SIZE(bts),
                *addr, "Ir", nr, "%0", c);

static __always_inline bool test_and_clear_bit(long nr, volatile unsigned long *addr)
{
    GEN_BINARY_RMWcc(LOCK_PREFIX "btr", *addr, "Ir", nr, "%0", c);
    GEN_BINARY_RMWcc(LOCK_PREFIX __ASM_SIZE(btr),
                    *addr, "Ir", nr, "%0", c);
}

static __always_inline bool test_and_change_bit(long nr, volatile unsigned long *addr)
{
    GEN_BINARY_RMWcc(LOCK_PREFIX "btc", *addr, "Ir", nr, "%0", c);
    GEN_BINARY_RMWcc(LOCK_PREFIX __ASM_SIZE(btc),
                    *addr, "Ir", nr, "%0", c);
}
static __always_inline bool constant_test_bit(long nr, const volatile unsigned long *addr)
@@ -329,7 +326,7 @@
 {
  bool oldbit;

-asm volatile("bt %2,%1"
+asm volatile(__ASM_SIZE(bt) " %2,%1"
    CC_SET(c)
    : CC_OUT(c) (oldbit)
    : "m" (*((unsigned long *)addr), "Ir" (nr));
--- linux-4.15.0.orig/arch/x86/include/asm/bootparam_utils.h
+++ linux-4.15.0/arch/x86/include/asm/bootparam_utils.h
@@ -18,6 +18,20 @@
 * Note: efi_info is commonly left uninitialized, but that field has a
 * private magic, so it is better to leave it unchanged.
 */
+/
+
+#define sizeof_mbr(type, member) ({ sizeof(((type *)0)->member); })
+
+#define BOOT_PARAM_PRESERVE(struct_member)				\
+{\
+    .start = offsetof(struct boot_params, struct_member),
+    .len = sizeof_mbr(struct boot_params, struct_member),
+}\
+
+struct boot_params_to_save {
+unsigned int start;
+unsigned int len;
+};
+
+static void sanitize_boot_params(struct boot_params *boot_params)
{ /*
@@ -36,19 +50,41 @@
 */
 if (boot_params->sentinel) {
 /* fields in boot_params are left uninitialized, clear them */
-memset(&boot_params->ext_ramdisk_image, 0,
-       (char *)&boot_params->efi_info -
-       (char *)&boot_params->ext_ramdisk_image);
-memset(&boot_params->kbd_status, 0,
-       (char *)&boot_params->hdr -
-       (char *)&boot_params->kbd_status);
-memset(&boot_params->_pad7[0], 0,
-       (char *)&boot_params->edd_mbr_sig_buffer[0] -
-       (char *)&boot_params->_pad7[0]);
-memset(&boot_params->_pad8[0], 0,
# since some emulators terminate on UD2, we cannot use it for WARN.

---

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Since various instruction decoders disagree on the length of UD1, we cannot use it either. So use UD0 for WARN.

Despite that some emulators terminate on UD2, we use it for WARN().

(binutils knows about "ud1" but {en,de}codes it as 2 bytes, whereas our kernel decoder thinks it takes a ModRM byte, which seems consistent with various things like the Intel SDM instruction encoding rules)

Since various instruction decoders/specs disagree on the encoding of UD0/UD1.

```
#define ASM_UD0 		".byte 0x0f, 0xff"
#define ASM_UD1 		".byte 0x0f, 0xb9" /* + ModRM */
#define ASM_UD2 		".byte 0x0f, 0x0b"

#define INSN_UD00xff0f
#define INSN_UD20x0b0f

#define LEN_UD0 		2
#define LEN_UD2 		2
```

```
#include <asm-generic/bug.h>

--- linux-4.15.0.orig/arch/x86/include/asm/cacheinfo.h
+++ linux-4.15.0/arch/x86/include/asm/cacheinfo.h
@@ -0,0 +1,7 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_X86_CACHEINFO_H
+#define _ASM_X86_CACHEINFO_H
+
+void cacheinfo_amd_init_llc_id(struct cpuinfo_x86 *c, int cpu, u8 node_id);
+
+#endif /* _ASM_X86_CACHEINFO_H */
--- linux-4.15.0.orig/arch/x86/include/asm/cpu_device_id.h
+++ linux-4.15.0/arch/x86/include/asm/cpu_device_id.h
@@ -9,6 +9,33 @@

#include <linux/mod_devicetable.h>

+#define X86_STEPPINGS(mins, maxs) GENMASK(maxs, mins)
+
+/**
+ * X86_MATCH_VENDOR_FAM_MODEL_STEPPINGS_FEATURE - Base macro for CPU matching
+ * @vendor:The vendor name, e.g. INTEL, AMD, HYGON, ANY
+ * The name is expanded to X86_VENDOR@_vendor
+ * @family:The family number or X86_FAMILY_ANY
+ * @model:The model number, model constant or X86_MODEL_ANY
+ * @steppings:Bitmask for steppings, stepping constant or X86_STEPPING_ANY
+ * @feature:A X86_FEATURE bit or X86_FEATURE_ANY
+ * @data:Driver specific data or NULL. The internal storage
+ * format is unsigned long. The supplied value, pointer
+ * etc. is casted to unsigned long internally.
+ *
+ * Backport version to keep the SRBDS pile consistent. No shorter variants
+ * required for this.
+ */
+
+#define X86_MATCH_VENDOR_FAM_MODEL_STEPPINGS_FEATURE(_vendor, _family, _model, _steppings, _feature, _data) {
+    .vendor = X86_VENDOR_##_vendor,
+    .family = _family,
+    .model = _model,
+    .steppings = _steppings,
+    .feature = _feature,
+    .driver_data = (unsigned long) _data
+
+}
+
extern const struct x86_cpu_id *x86_match_cpu(const struct x86_cpu_id *match);

#endif
--- linux-4.15.0.orig/arch/x86/include/asm/cpufeature.h
+++ linux-4.15.0/arch/x86/include/asm/cpufeature.h
@@ -22,13 +22,14 @@
CPUID_LNX_3,
CPUID_7_0_EBX,
CPUID_D_1_EAX,
-CPUID_F_0_EDX,
-CPUID_F_1_EDX,
+CPUID_LNX_4,
+CPUID_DUMMY,
CPUID_8000_0008_EBX,
CPUID_6_EAX,
CPUID_8000_000A_EDX,

--- linux-4.15.0.orig/arch/x86/include/asm/cpu_device_id.h
CPUID_7_ECX,
CPUID_8000_0007_EBX,
+CPUID_7_EDX,
);

#ifdef CONFIG_X86_FEATURE_NAMES
@@ -79,8 +80,9 @@
    CHECK_BIT_IN_MASK_WORD(REQUIRED_MASK, 15, feature_bit) ||
    CHECK_BIT_IN_MASK_WORD(REQUIRED_MASK, 16, feature_bit) ||
    CHECK_BIT_IN_MASK_WORD(REQUIRED_MASK, 17, feature_bit) ||
+   CHECK_BIT_IN_MASK_WORD(REQUIRED_MASK, 18, feature_bit) ||
    REQUIRED_MASK_CHECK ||
-    BUILD_BUG_ON_ZERO(NCAPINTS != 18))
+    BUILD_BUG_ON_ZERO(NCAPINTS != 19))
#endif

#define DISABLED_MASK_BIT_SET(feature_bit)				
( CHECK_BIT_IN_MASK_WORD(DISABLED_MASK, 0, feature_bit) ||
@@ -101,8 +103,9 @@
    CHECK_BIT_IN_MASK_WORD(DISABLED_MASK, 15, feature_bit) ||
    CHECK_BIT_IN_MASK_WORD(DISABLED_MASK, 16, feature_bit) ||
    CHECK_BIT_IN_MASK_WORD(DISABLED_MASK, 17, feature_bit) ||
+   CHECK_BIT_IN_MASK_WORD(DISABLED_MASK, 18, feature_bit) ||
    DISABLED_MASK_CHECK ||
-   BUILD_BUG_ON_ZERO(NCAPINTS != 18))
+   BUILD_BUG_ON_ZERO(NCAPINTS != 19))

#define cpu_has(c, bit)							
(__builtin_constant_p(bit) && REQUIRED_MASK_BIT_SET(bit) ? 1 :
--- linux-4.15.0.orig/arch/x86/include/asm/cpufeatures.h
+++ linux-4.15.0/arch/x86/include/asm/cpufeatures.h
@@ -13,7 +13,7 @@
/* Defines x86 CPU feature bits */
*/
-#define NCAPINTS18 /* N 32-bit words worth of info */
+#define NCAPINTS19 /* N 32-bit words worth of info */
#define NBUGINTS1 /* N 32-bit bug flags */

/*
@@ -198,19 +198,29 @@
#define X86_FEATURE_CODEC_L3( 7*32+ 6) /* Code and Data Prioritization L3 */
#define X86_FEATURE_INVPCID_SINGLE( 7*32+ 7) /* Effectively INVPCID && CR4.PCIDE=1 */
+ * define X86_FEATURE_HW_PSTATE( 7*32+ 8) /* AMD HW-PState */
+ * define X86_FEATURE_PROC_FEEDBACK( 7*32+ 9) /* AMD ProcFeedbackInterface */
+ * define X86_FEATURE_SME( 7*32+10) /* AMD Secure Memory Encryption */
+ * define X86_FEATURE_PTI( 7*32+11) /* Kernel Page Table Isolation enabled */
-#define X86_FEATURE_RETPOLINE(7*32+12) /* Generic Retpoline mitigation for Spectre variant 2 */
-#define X86_FEATURE_RETPOLINE_AMD(7*32+13) /* AMD Retpoline mitigation for Spectre variant 2 */
+#define X86_FEATURE_RETPOLINE(7*32+12) /* Generic Retpoline mitigation for Spectre variant 2 */
+#define X86_FEATURE_RETPOLINE_AMD(7*32+13) /* AMD Retpoline mitigation for Spectre variant 2 */
#define X86_FEATURE_INTEL_PPN(7*32+14) /* Intel Processor Inventory Number */
-#define X86_FEATURE_AVX512_4VNNIW(7*32+16) /* AVX-512 Neural Network Instructions */
-#define X86_FEATURE_AVX512_4FMAPS(7*32+17) /* AVX-512 Multiply Accumulation Single precision */
-
+#define X86_FEATURE_CDP_L2(7*32+15) /* Code and Data Prioritization L2 */
+#define X86_FEATURE_MSR_SPEC_CTRL(7*32+16) /* MSR SPEC_CTRL is implemented */
+#define X86_FEATURE_SSBD(7*32+17) /* Speculative Store Bypass Disable */
#define X86_FEATURE_MBA(7*32+18) /* Memory Bandwidth Allocation */
-#define X86_FEATURE_RSB_CTXSW(7*32+19) /* Fill RSB on context switches */
-#define X86_FEATURE_RSB_CTXSW(7*32+19) /* Fill RSB on context switches */
+#+define X86_FEATURE_CDP_L2(7*32+15) /* Code and Data Prioritization L2 */
+##define X86_FEATURE_MSR_SPEC_CTRL(7*32+16) /* MSR SPEC_CTRL is implemented */
+##define X86_FEATURE_SSBD(7*32+17) /* Speculative Store Bypass Disable */
+#define X86_FEATURE_MBA(7*32+18) /* Memory Bandwidth Allocation */
-#define X86_FEATURE_RSB_CTXSW(7*32+19) /* Fill RSB on context switches */
-#define X86_FEATURE_RSB_CTXSW(7*32+19) /* Fill RSB on context switches */
+##define X86_FEATURE_MSR_SPEC_CTRL(7*32+16) /* MSR SPEC_CTRL is implemented */
+##define X86_FEATURE_SSBD(7*32+17) /* Speculative Store Bypass Disable */
/* Virtualization flags: Linux defined, word 8 */
#define X86_FEATURE_TPR_SHADOW(8*32+0) /* Intel TPR Shadow */
@ @ -229,12 +239,14 @@
#define X86_FEATURE_BMI1(9*32+3) /* 1st group bit manipulation extensions */
#define X86_FEATURE_HLE(9*32+4) /* Hardware Lock Elision */
#define X86_FEATURE_AVX2(9*32+5) /* AVX2 instructions */
+#define X86_FEATURE_FDP_EXCPTN_ONLY(9*32+6) /* FPU data pointer updated only on x87 exceptions */
+#define X86_FEATURE_SMEP(9*32+7) /* Supervisor Mode Execution Protection */
+#define X86_FEATURE_BMI2(9*32+8) /* 2nd group bit manipulation extensions */
+#define X86_FEATURE_ERMS(9*32+9) /* Enhanced REP MOVSB/STOSB instructions */
+#define X86_FEATURE_INVPCID(9*32+10) /* Invalidate Processor Context ID */
+#define X86_FEATURE_RTM(9*32+11) /* Restricted Transactional Memory */
#define X86_FEATURE_CQM(9*32+12) /* Cache QoS Monitoring */
+#define X86_FEATURE_ZERO_FCS_FDS(9*32+13) /* Zero out FPU CS and FPU DS */
+#define X86_FEATURE_MPX(9*32+14) /* Memory Protection Extension */
#define X86_FEATURE_RDT_A(9*32+15) /* Resource Director Technology Allocation */
#define X86_FEATURE_AVX512F(9*32+16) /* AVX-512 Foundation */
@ @ -259,18 +271,30 @@
#define X86_FEATURE_XGETBV(10*32+2) /* XGETBV with ECX = 1 instruction */
#define X86_FEATURE_XSAVES(10*32+3) /* XSAVES/XRSTORS instructions */
/* Intel-defined CPU QoS Sub-leaf, CPUID level 0x0000000F:0 (EDX), word 11 */
#define X86_FEATURE_CQM_LLC(11*32+ 1) /* LLC QoS if 1 */

/* Intel-defined CPU QoS Sub-leaf, CPUID level 0x0000000F:1 (EDX), word 12 */
#define X86_FEATURE_CQM_OCCUP_LLC(12*32+ 0) /* LLC occupancy monitoring */
#define X86_FEATURE_CQM_MBM_TOTAL(12*32+ 1) /* LLC Total MBM monitoring */
#define X86_FEATURE_CQM_MBM_LOCAL(12*32+ 2) /* LLC Local MBM monitoring */
*/

/* Extended auxiliary flags: Linux defined - for features scattered in various
 * CPUID levels like 0xf, etc.
 */

/* Reuse free bits when adding new feature flags! */

/* AMD-defined CPU features, CPUID level 0x80000008 (EBX), word 13 */
#define X86_FEATURE_CLZERO(13*32+ 0) /* CLZERO instruction */
#define X86_FEATURE_IRPERF(13*32+ 1) /* Instructions Retired Count */
#define X86_FEATURE_XSAVEERPTR(13*32+12) /* Always save/restore FP error pointers */
#define X86_FEATURE_AMD_IBBP(13*32+13) /* Indirect Branch Prediction Barrier */
#define X86_FEATURE_AMD_IBRS(13*32+14) /* Indirect Branch Restricted Speculation */
#define X86_FEATURE_AMD_STIBP(13*32+15) /* Single Thread Indirect Branch Predictors */
#define X86_FEATURE_AMD_STIBP_ALWAYS_ON(13*32+17) /* Single Thread Indirect Branch Predictors always-on preferred */
#define X86_FEATURE_AMD_SSBD(13*32+24) /* Speculative Store Bypass Disable */
#define X86_FEATURE_VIRT_SSBD(13*32+25) /* Virtualized Speculative Store Bypass Disable */
#define X86_FEATURE_AMD_SSB_NO(13*32+26) /* Speculative Store Bypass is fixed in hardware. */

/* Thermal and Power Management Leaf, CPUID level 0x00000006 (EAX), word 14 */
#define X86_FEATURE_DTHERM(14*32+ 0) /* Digital Thermal Sensor */
#define X86_FEATURE_VPCLMULQDQ(16*32+10) /* Carry-Less Multiplication Double Quadword */
#define X86_FEATURE_AVX512_VNNI(16*32+11) /* Vector Neural Network Instructions */
#define X86_FEATURE_AVX512_BITALG(16*32+12) /* Support for VPOPCNT[B,W] and VPUSHUF-BITQMB instructions */
#define X86_FEATURE_TME(16*32+13) /* Intel Total Memory Encryption */
#define X86_FEATURE_AVX512_VPOPCNTDQ(16*32+14) /* POPCNT for vectors of DW/QW */
#define X86_FEATURE_LAS57(16*32+16) /* 5-level page tables */
#define X86_FEATURE_RDPID(16*32+22) /* RDPID instruction */
#define X86_FEATURE_SUCCOR(17*32+ 1) /* Uncorrectable error containment and recovery */
#define X86_FEATURE_SMCA (17*32+3) /* Scalable MCA */

+/* Intel-defined CPU features, CPUID level 0x00000007:0 (EDX), word 18 */
+#define X86_FEATURE_AVX512_4VNNIW (18*32+2) /* AVX-512 Neural Network Instructions */
+define X86_FEATURE_AVX512_4FMAPS (18*32+3) /* AVX-512 Multiply Accumulation Single precision */
+define X86_FEATURE_SRBDCTRL (18*32+9) /* SRBDS mitigation MSR available */
+define X86_FEATURE_MD_CLEAR (18*32+10) /* VERW clears CPU buffers */
+define X86_FEATURE_TSX_FORCE_ABORT (18*32+13) /* TSX_FORCE_ABORT */
+define X86_FEATURE_PCONFIG (18*32+18) /* Intel PCONFIG */
+define X86_FEATURE_SPEC_CTRL (18*32+26) /* Speculation Control (IBRS + IBPB) */
+define X86_FEATURE_INTEL_STIBP (18*32+27) /* Single Thread Indirect Branch Predictors */
+define X86_FEATURE_FLUSH_L1D (18*32+28) /* Flush L1D cache */
+define X86_FEATURE_ARCH_CAPABILITIES (18*32+29) /* IA32_ARCH_CAPABILITIES MSR (Intel) */
+define X86_FEATURE_SPEC_CTRL_SSBD (18*32+31) /* Speculative Store Bypass Disable */
+
/* BUG word(s)
*/
#define X86_BUG_CPU_MELTDOWN X86_BUG(14) /* CPU is affected by meltdown attack and needs kernel page table isolation */
#define X86_BUG_SPECTRE_V1 X86_BUG(15) /* CPU is affected by Spectre variant 1 attack with conditional branches */
#define X86_BUG_SPECTRE_V2 X86_BUG(16) /* CPU is affected by Spectre variant 2 attack with indirect branches */
+define X86_BUG_SPEC_STORE_BYPASS X86_BUG(17) /* CPU is affected by speculative store bypass attack */
+define X86_BUG_L1TF X86_BUG(18) /* CPU is affected by L1 Terminal Fault */
+define X86_BUG_MDSX86_BUG(19) /* CPU is affected by Microarchitectural data sampling */
+define X86_BUG_MSBDS_ONLY X86_BUG(20) /* CPU is only affected by the MSDBS variant of BUG_MDS */
+define X86_BUG_SWAPGS X86_BUG(21) /* CPU is affected by speculation through SWAPGS */
+define X86_BUG_TAA X86_BUG(22) /* CPU is affected by TSX Async Abort(TAA) */
+define X86_BUG_ITLB_MULTIHIT X86_BUG(23) /* CPU may incur MCE during certain page attribute changes */
+define X86_BUG_SRBDX86_BUG(24) /* CPU may leak RNG bits if not mitigated */

#endif /* _ASM_X86_CPUFEATURES_H */
--- linux-4.15.0.orig/arch/x86/include/asm/crash.h
+++ linux-4.15.0/arch/x86/include/asm/crash.h
@@ -2,6 +2,8 @@
#ifndef _ASM_X86_CRASH_H
#define _ASM_X86_CRASH_H
+struct kimage;
+
int crash_load_segments(struct kimage *image);
int crash_copy_backup_region(struct kimage *image);
int crash_setup_memmap_entries(struct kimage *image,
--- linux-4.15.0.orig/arch/x86/include/asm/disabled-features.h
+++ linux-4.15.0/arch/x86/include/asm/disabled-features.h
@@ -77,6 +77,7 @@
#define DISABLED_MASK150
#define DISABLED_MASK16(DISABLE_PKU|DISABLE_OSPKE|DISABLE_LA57|DISABLE UMIP)
#define DISABLED_MASK170
-#define DISABLED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 18)
+#define DISABLED_MASK180
+#define DISABLED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 19)

#endif /* _ASM_X86_DISABLED_FEATURES_H */
--- linux-4.15.0.orig/arch/x86/include/asm/dma.h
+++ linux-4.15.0/arch/x86/include/asm/dma.h
@@ -74,7 +74,7 @@
#define MAX_DMA_PFN   ((16UL * 1024 * 1024) >> PAGE_SHIFT)
/* 4GB broken PCI/AGP hardware bus master zone */
-#define MAX_DMA32_PFN ((4UL * 1024 * 1024 * 1024) >> PAGE_SHIFT)
+#define MAX_DMA32_PFN (1UL << (32 - PAGE_SHIFT))

#ifdef CONFIG_X86_32
/* The maximum address that we can perform a DMA transfer to on this platform */
--- linux-4.15.0.orig/arch/x86/include/asm/dmi.h
+++ linux-4.15.0/arch/x86/include/asm/dmi.h
@@ -4,8 +4,8 @@
#include <linux/compiler.h>
#include <linux/init.h>
+include <linux/io.h>

-#include <asm/io.h>
#include <asm/setup.h>

static __always_inline __init void *dmi_alloc(unsigned len)
--- linux-4.15.0.orig/arch/x86/include/asm/efi.h
+++ linux-4.15.0/arch/x86/include/asm/efi.h
@@ -36,8 +37,18 @@
extern asmlinkage unsigned long efi_call_phys(void *, ...);
- #define arch_efi_call_virt_setup() kernel_fpu_begin()
- #define arch_efi_call_virt_teardown() kernel_fpu_end()
+ #define arch_efi_call_virt_setup()
+ { 
+ kernel_fpu_begin();
+ firmware_restrict_branch_speculation_start();
+ }
+
+ #define arch_efi_call_virt_teardown()
+ { 
+ firmware_restrict_branch_speculation_end();
+ kernel_fpu_end();
+ }
+
/*
 * Wrap all the virtual calls in a way that forces the parameters on the stack.
@@ -73,6 +84,7 @@
efi_sync_low_kernel_mappings();
 preempt_disable();
 __kernel_fpu_begin();
+ firmware_restrict_branch_speculation_start();
 
 if (efi_scratch.use_pgd) {
.efi_scratch.prev_cr3 = __read_cr3();
@@ -91,6 +103,7 @@
__flush_tlb_all();
}

+ firmware_restrict_branch_speculation_end();
 __kernel_fpu_end();
 preempt_enable();
})
--- linux-4.15.0.orig/arch/x86/include/asm/fixmap.h
+++ linux-4.15.0/arch/x86/include/asm/fixmap.h
@@ -14,6 +14,16 @@
#ifndef _ASM_X86_FIXMAP_H
#define _ASM_X86_FIXMAP_H
+/*
+ * Exposed to assembly code for setting up initial page tables. Cannot be
+ * calculated in assembly code (fixmap entries are an enum), but is sanity
+ * checked in the actual fixmap C code to make sure that the fixmap is
+ * covered fully.
+ */
+ #define FIXMAP_PMD_NUM 2
+ /* fixmap starts downwards from the 507th entry in level2_fixmap_pgt */
```c
#define FIXMAP_PMD_TOP 507

#ifndef __ASSEMBLY__
#include <linux/kernel.h>
#include <asm/acpi.h>
#endif

extern void reserve_top_address(unsigned long reserve);

#define FIXADDR_SIZE (__end_of_permanent_fixed_addresses << PAGE_SHIFT)
#define FIXADDR_START (FIXADDR_TOP - FIXADDR_SIZE)
#define FIXADDR_TOT_SIZE (__end_of_fixed_addresses << PAGE_SHIFT)
#define FIXADDR_TOT_START (FIXADDR_TOP - FIXADDR_TOT_SIZE)

extern int fixmaps_set;

extern pte_t *pkmap_page_table;

void __native_set_fixmap(enum fixed_addresses idx, pte_t pte);
void native_set_fixmap(enum fixed_addresses idx, phys_addr_t phys, pgprot_t flags);

#ifndef CONFIG_PARAVIRT
--- linux-4.15.0.orig/arch/x86/include/asm/fpu/internal.h
+++ linux-4.15.0/arch/x86/include/asm/fpu/internal.h
@@ -103,18 +103,22 @@
{
    fpstate_sanitize_xstate(struct fpu *fpu);
}

/* Returns 0 or the negated trap number, which results in -EFAULT for #PF */
#define user_insn(insn, output, input...)					({
    int err;
    might_fault();
    asm volatile(ASM_STAC "
    "1:" #insn "\n"
    + "1: " #insn "\n"
    "2: " ASM_CLAC "\n"
    .section .fixup,":ax\n"
    - "3: movl $-1,%[err]\n"
    + "3: negl %eax\n"
    " jmp 2b\n"
    jmp 1b"
})
```

+ static inline void fxsave(struct fxregs_state *fx)
+ {
+ if (IS_ENABLED(CONFIG_X86_32))
+ asm volatile( "fxsave %[fx]" : [fx] "=m" (*fx));
+ else
+ asm volatile("fxsaveq %[fx]" : [fx] "=m" (*fx));
+ }
+ 
+ /* These macros all use (%edi)/(%rdi) as the single memory argument. */
+ #define XSAVE .byte "REX_PREFIX 0x0f,0xae,0x27"
+ #define XSAVEOPT .byte "REX_PREFIX 0x0f,0xae,0x37"
+ @ @ -218.16 +230.20 @ @
+ #define XRSTOR .byte "REX_PREFIX 0x0f,0xae,0x2f"
+ #define XRSTORS .byte "REX_PREFIX 0x0f,0xc7,0x1f"
+ 
+ /* After this @err contains 0 on success or the negated trap number when
+ * the operation raises an exception. For faults this results in -EFAULT.
+ */
+ 
+ #define XSTATE_OP(op, st, lmask, hmask, err)
+ asm volatile("1:" op "%nt"
+ "xor %[err], %[err]\nt"
+ "2:\nt"
+ ".pushsection .fixup,"ax\n".nt"
+ - "3: movl $-2,%[err]\nt"
+ + "3: negl %eax\n".nt"
+ "jmp 2bnt"
+ ".popsection\n"
+ - _ASM_EXTABLE(1b, 3b)
+ - : [err] "=r" (err))
+ + _ASM_EXTABLE_FAULT(1b, 3b)
+ + : [err] "=a" (err)
+ : "D" (st), "m" (*st), "a" (lmask), "d" (hmask)
+ : "memory")
+ 
+ @ @ -279.28 +295.6 @ @
/* This function is called only during boot time when x86 caps are not set
 * up and alternative can not be used yet. */

-static inline void copy_xregs_to_kernel_booting(struct xregs_state *xstate) {
  u64 mask = -1;
  u32 lmask = mask;
  u32 hmask = mask >> 32;
  int err;

  WARN_ON(system_state != SYSTEM_BOOTING);

  if (static_cpu_has(X86_FEATURE_XSAVES))
    XSTATE_OP(XSAVES, xstate, lmask, hmask, err);
  else
    XSTATE_OP(XSAVE, xstate, lmask, hmask, err);

  /* We should never fault when copying to a kernel buffer: */
  WARN_ON_FPU(err);
}

-/*
 * This function is called only during boot time when x86 caps are not set
 * up and alternative can not be used yet.
 */

static inline void copy_kernel_to_xregs_booting(struct xregs_state *xstate) {
  u64 mask = -1;

  switch_fpu_prepare(struct fpu *old_fpu, int cpu) {
  
  if (old_fpu->initialized) {
    if (static_cpu_has(X86_FEATURE_FPU) && old_fpu->initialized) {
      if (!copy_fpregs_to_fpstate(old_fpu))
        old_fpu->last_cpu = -1;
      else
        old_fpu->last_cpu = -1;
    }
  } else
    --- linux-4.15.0.orig/arch/x86/include/asm/hardirq.h
    +++ linux-4.15.0/arch/x86/include/asm/hardirq.h
    @ @ -3,10 +3,12 @@
    #define _ASM_X86_HARDIRQ_H

    #include <linux/threads.h>
    +#include <linux/irq.h>

    typedef struct {
      unsigned int __softirq_pending;
      u16 __softirq_pending;

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+\#if IS_ENABLED(CONFIG_KVM_INTEL)
+u8   kvm_cpu_l1tf_flush_l1d;
+\#endif

unsigned int __nmi_count;/* arch dependent */
\#ifdef CONFIG_X86_LOCAL_APIC
unsigned int apic_timer_irqs;/* arch dependent */
\@\@ -62.4 +64.24 \@\@
extern u64 arch_irq_stat(void);
#define arch_irq_stat	arch_irq_stat

+\#if IS_ENABLED(CONFIG_KVM_INTEL)
+static inline void kvm_set_cpu_l1tf_flush_l1d(void)
+{
+__this_cpu_write(irq_stat.kvm_cpu_l1tf_flush_l1d, 1);
+}
+
+static inline void kvm_clear_cpu_l1tf_flush_l1d(void)
+{
+__this_cpu_write(irq_stat.kvm_cpu_l1tf_flush_l1d, 0);
+}
+
+static inline bool kvm_get_cpu_l1tf_flush_l1d(void)
+{
+return __this_cpu_read(irq_stat.kvm_cpu_l1tf_flush_l1d);
+}
+\#else /* !IS_ENABLED(CONFIG_KVM_INTEL) */
+static inline void kvm_set_cpu_l1tf_flush_l1d(void) { }
+\#endif /* IS_ENABLED(CONFIG_KVM_INTEL) */
+
+\#endif /* _ASM_X86_HARDIRQ_H */
--- linux-4.15.0.orig/arch/x86/include/asm/hw_irq.h
+++ linux-4.15.0/arch/x86/include/asm/hw_irq.h
\@\@ -36.6 +36.7 \@\@
extern asmlinkage void kvm_posted_intr_nested_ipi(void);
extern asmlinkage void error_interrupt(void);
extern asmlinkage void irq_work_interrupt(void);
+extern asmlinkage void uv_bau_message_intr1(void);

extern asmlinkage void spurious_interrupt(void);
extern asmlinkage void thermal_interrupt(void);
\@\@ -150.7 +151.8 \@\@
#endif

#define VECTOR_UNUSED	NULL
-#define VECTOR_RETRIGGERED((void *)-0UL)
+#define VECTOR_RETRIGGERED((void *)-1UL)
typedef struct irq_desc* vector_irq_t[NR_VECTORS];
DECLARE_PER_CPU(vector_irq_t, vector_irq);
--- linux-4.15.0.orig/arch/x86/include/asm/i8259.h
+++ linux-4.15.0/arch/x86/include/asm/i8259.h
@@ -3,6 +3,7 @@
#define _ASM_X86_I8259_H

#include <linux/delay.h>
+include <asm/io.h>

extern unsigned int cached_irq_mask;
@@ -69,6 +70,11 @@ extern struct legacy_pic *legacy_pic;
extern struct legacy_pic null_legacy_pic;
+static inline bool has_legacy_pic(void)
+{
+return legacy_pic != &null_legacy_pic;
+}
+
static inline int nr_legacy_irqs(void)
{
return legacy_pic->nr_legacy_irqs;
--- linux-4.15.0.orig/arch/x86/include/asm/insn.h
+++ linux-4.15.0/arch/x86/include/asm/insn.h
@@ -208,4 +208,37 @@
return insn_offset_displacement(insn) + insn->displacement.nbytes;
}

+/**
+ * for_each_insn_prefix() -- Iterate prefixes in the instruction
+ * @insn: Pointer to struct insn.
+ * @idx: Index storage.
+ * @prefix: Prefix byte.
+ *
+ * Iterate prefix bytes of given @insn. Each prefix byte is stored in @prefix
+ * and the index is stored in @idx (note that this @idx is just for a cursor,
+ * do not change it.)
+ * Since prefixes.nbytes can be bigger than 4 if some prefixes
+ * are repeated, it cannot be used for looping over the prefixes.
+ */
#define for_each_insn_prefix(insn, idx, prefix)	
+for (idx = 0; idx < ARRAY_SIZE(insn->prefixes.bytes) && (prefix = insn->prefixes.bytes[idx]) != 0; idx++)
+}
+}
+#define POP_SS_OPCODE 0x1f
+#define MOV_SREG_OPCODE 0x8e
+/*
+ * Intel SDM Vol.3A 6.8.3 states;
+ * "Any single-step trap that would be delivered following the MOV to SS
+ * instruction or POP to SS instruction (because EFLAGS.TF is 1) is
+ * suppressed."
+ * This function returns true if @insn is MOV SS or POP SS. On these
+ * instructions, single stepping is suppressed.
+ */
+static inline int insn_masking_exception(struct insn *insn)
+{
+    return insn->opcode.bytes[0] == POP_SS_OPCODE ||
+        (insn->opcode.bytes[0] == MOV_SREG_OPCODE &&
+         X86_MODRM_REG(insn->modrm.bytes[0]) == 2);
+
+ }
+
+#endif /* _ASM_X86_INSN_H */

--- linux-4.15.0.orig/arch/x86/include/asm/intel-family.h
+++ linux-4.15.0/arch/x86/include/asm/intel-family.h
@@ -6,10 +6,11 @@
 * "Big Core" Processors (Branded as Core, Xeon, etc...)
 *
 * The "_X" parts are generally the EP and EX Xeons, or the
- * "Extreme" ones, like Broadwell-E.
+ * "Extreme" ones, like Broadwell-E, or Atom microserver.
 * 
- * Things ending in "2" are usually because we have no better
- * name for them. There's no processor called "SILVERMONT2".
+ * While adding a new CPUID for a new microarchitecture, add a new
+ * group to keep logically sorted out in chronological order. Within
+ * that group keep the CPUID for the variants sorted by model number.
 */

#define INTEL_FAM6_CORE_YONAH		0x0E
@@ -49,21 +50,40 @@
#define INTEL_FAM6_KABYLAKEMOBILE	0x8E
#define INTEL_FAM6_KABYLAKEDESKTOP	0x9E
# define INTEL_FAM6_KABYLAKEDESKTOP	0x9E

+#define INTEL_FAM6_CANNONLAKE_MOBILE	0x66
+#define INTEL_FAM6_ICELAKE_X		0x6A
+#define INTEL_FAM6_ICELAKE_XEON_D	0x6C
+#define INTEL_FAM6_ICELAKE_MOBILE	0x7E
+#define INTEL_FAM6_ICELAKE_NNPI		0x9D
+
+#define INTEL_FAM6_TIGERLAKE_L		0x8C
+#define INTEL_FAM6_TIGERLAKE		0x8D

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/* "Small Core" Processors (Atom) */

#define INTEL_FAM6_ATOM_PINEVIEW0x1C
#define INTEL_FAM6_ATOM_LINCROFT0x26
#define INTEL_FAM6_ATOM_PENWELL0x27
#define INTEL_FAM6_ATOM_CLOVERVIEW0x35
#define INTEL_FAM6_ATOM_CEDARVIEW0x36
#define INTEL_FAM6_ATOM_SILVERMONT10x37 /* BayTrail/BYT / Valleyview */
#define INTEL_FAM6_ATOM_SILVERMONT20x4D /* Avaton/Rangely */
#define INTEL_FAM6_ATOM_AIRMONT0x4C /* CherryTrail / Braswell */
#define INTEL_FAM6_ATOM_MERRIFIELD0x4A /* Tangier */
#define INTEL_FAM6_ATOM_MOOREFIELD0x5A /* Anniedale */
#define INTEL_FAM6_ATOM_GOLDMONT0x5C
#define INTEL_FAM6_ATOM_DENVERTON0x5F /* Goldmont Microserver */
#define INTEL_FAM6_ATOM_GEMINI_LAKE0x7A
#define INTEL_FAM6_ATOM_BONNELL0x1C /* Diamondville, Pineview */
#define INTEL_FAM6_ATOM_BONNELL_MID0x26 /* Silverthorne, Lincroft */
#define INTEL_FAM6_ATOM_SALTWELL0x36 /* Cedarview */
#define INTEL_FAM6_ATOM_SALTWELL_MID0x27 /* Penwell */
#define INTEL_FAM6_ATOM_SALTWELL_TABLET0x35 /* Cloverview */
#define INTEL_FAM6_ATOM_SILVERMONT0x37 /* Bay Trail, Valleyview */
#define INTEL_FAM6_ATOM_SILVERMONT_X0x4D /* Avaton, Rangely */
#define INTEL_FAM6_ATOM_SILVERMONT_MID0x4A /* Merrifield */
#define INTEL_FAM6_ATOM_AIRMONT0x4C /* Cherry Trail, Braswell */
#define INTEL_FAM6_ATOM_AIRMONT_MID0x5A /* Moorefield */
#define INTEL_FAM6_ATOM_GOLDMONT0x5C /* Apollo Lake */
#define INTEL_FAM6_ATOM_GOLDMONT_X0x5F /* Denerton */
#define INTEL_FAM6_ATOM_GOLDMONT_PLUS0x7A /* Gemini Lake */
#define INTEL_FAM6_ATOM_TREMON_T0x86 /* Jacobsville */

/*/ Xeon Phi */

--- linux-4.15.0.orig/arch/x86/include/asm/irq_remapping.h
+++ linux-4.15.0/arch/x86/include/asm/irq_remapping.h
@@ -33,6 +33,11 @@
 IRQ_POSTING_CAP = 0,
 }

+enum {
+IRQ_REMAP_XAPIC_MODE,
+IRQ_REMAP_X2APIC_MODE,
+
+struct vcpu_data {
+ u64 pi_desc_addr; /* Physical address of PI Descriptor */
+ u32 vector; /* Guest vector of the interrupt */
+};

--- linux-4.15.0.orig/arch/x86/include/asm/irqflags.h
+++ linux-4.15.0/arch/x86/include/asm/irqflags.h
@@ -6,6 +6,8 @@

#ifndef __ASSEMBLY__
+
+  
+  /* Provide __cpuidle; we can't safely include <linux/cpu.h> */
+#define __prologue_attribute__(_section_(_("cpuidle.text")))
+
+  @ @ -13,7 +15,9 @@
+  * Interrupt control:
+  */

  -static inline unsigned long native_save_fl(void)
  +/* Declaration required for gcc < 4.9 to prevent -Werror=missing-prototypes */
+extern inline unsigned long native_save_fl(void);
+extern inline unsigned long native_save_fl(void)
{ unsigned long flags;

@@ -31,7 +35,8 @@
    return flags;
 }

  -static inline void native_restore_fl(unsigned long flags)
+extern inline void native_restore_fl(void);
+extern inline void native_restore_fl(void)
  { 
    asm volatile("push %0 ; popf"
      : /* no output */
@@ -51,11 +56,13 @@
    static inline __cpuidle void native_safe_halt(void)
    {
      +mds_idle_clear_cpu_buffers();
      asm volatile("sti; hlt":::"memory";
    }

    static inline __cpuidle void native_halt(void)
    {
mds_idle_clear_cpu_buffers();
asm volatile("hlt": : :"memory");

--- linux-4.15.0.orig/arch/x86/include/asm/kexec.h
+++ linux-4.15.0/arch/x86/include/asm/kexec.h
@@ -67,7 +67,7 @@
 /* Memory to backup during crash kdump */
 #define KEXEC_BACKUP_SRC_START (0UL)
 -#define KEXEC_BACKUP_SRC_END (640 * 1024UL) /* 640K */
+#define KEXEC_BACKUP_SRC_END (640 * 1024UL - 1) /* 640K */

 /* CPU does not save ss and sp on stack if execution is already
  * Linear address from which to read.
--- linux-4.15.0.orig/arch/x86/include/asm/kvm_emulate.h
+++ linux-4.15.0/arch/x86/include/asm/kvm_emulate.h
@@ -107,11 +107,12 @@
 * @addr: [IN ] Linear address from which to read.
 * @val: [OUT] Value read from memory, zero-extended to ‘u_long’.
 * @bytes: [IN ] Number of bytes to read from memory.
+ * @system:[IN ] Whether the access is forced to be at CPL0.
 */
int (*read_std)(struct x86_emulate_ctxt *ctxt,
unsigned long addr, void *val,
unsigned int bytes,
-struct x86_exception *fault);
+struct x86_exception *fault, bool system);

/*
 * read_phys: Read bytes of standard (non-emulated/special) memory.
--- linux-4.15.0.orig/arch/x86/include/asm/kvm_host.h
+++ linux-4.15.0/arch/x86/include/asm/kvm_host.h
@@ -17,6 +17,7 @@
 #include <linux/tracepoint.h>

 */
int (*write_std)(struct x86_emulate_ctxt *ctxt,
 unsigned long addr, void *val, unsigned int bytes,
-struct x86_exception *fault);
+struct x86_exception *fault, bool system);

/*
 * fetch: Read bytes of standard (non-emulated/special) memory.
 * Used for instruction fetch.
--- linux-4.15.0.orig/arch/x86/include/asm/kvm_host.h
+++ linux-4.15.0/arch/x86/include/asm/kvm_host.h
@@ -17,6 +17,7 @@
 #include <linux/tracepoint.h>
#include <linux/cpumask.h>
#include <linux/irq_work.h>
+#include <linux/irq.h>

#include <linux/kvm.h>
#include <linux/kvm_para.h>
@@ -86,7 +87,7 @@
 | X86_CR4_PGE | X86_CR4_PCE | X86_CR4_OSFXSR | X86_CR4_PCIDE |
 | X86_CR4_OSXSAVE | X86_CR4_SMEP | X86_CR4_FSGSBASE |
 | X86_CR4_OSXMMEXCPT | X86_CR4_LA57 | X86_CR4_VMXE |
- | X86_CR4_SMAP | X86_CR4_PKE))
+ | X86_CR4_SMAP | X86_CR4_PKE | X86_CR4_UMIP))

#define CR8_RESERVED_BITS (~(unsigned long)X86_CR8_TPR)
@@ -113,7 +114,7 @@
} #define KVM_PERMILLE_MMU_PAGES 20
#define KVM_MIN_ALLOC_MMU_PAGES 64
+#define KVM_MIN_ALLOC_MMU_PAGES 64UL
#define KVM_MMU_HASH_SHIFT 12
#define KVM_NUM_MMU_PAGES (1 << KVM_MMU_HASH_SHIFT)
#define KVM_MIN_FREE_MMU_PAGES 5
@@ -173,6 +174,7 @@
#define DR6_BD		(1 << 13)
#define DR6_BS		(1 << 14)
+#define DR6_BT		(1 << 15)
#define DR6_RTM		(1 << 16)
#define DR6_FIXED_1	0xfffe0ff0
#define DR6_INIT	0xffff0ff0
@@ -275,6 +277,9 @@
struct kvm_mmu_page {
  struct list_head link;
  struct hlist_node hash_link;
+  struct list_head lpage_disallowed_link;
+
+  bool lpage_disallowed; /* Can't be replaced by an equiv large page */
/
/*
 * The following two entries are used to key the shadow page in the
@@ -331,12 +336,12 @@
 void (*set_cr3)(struct kvm_vcpu *vcpu, unsigned long root);
 unsigned long (*get_cr3)(struct kvm_vcpu *vcpu);
 u64 (*get_pdptr)(struct kvm_vcpu *vcpu, int index);
-#int (*page_fault)(struct kvm_vcpu *vcpu, gva_t gva, u32 err,
+int (*page_fault)(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa, u32 err,
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bool prefault);
void (*inject_page_fault)(struct kvm_vcpu *vcpu,
    struct x86_exception *fault);
-gpa_t (*gva_to_gpa)(struct kvm_vcpu *vcpu, gva_t gva, u32 access,
    struct x86_exception *exception);
+gpa_t (*gva_to_gpa)(struct kvm_vcpu *vcpu, gpa_t gva_or_gpa,
     u32 access, struct x86_exception *exception);
gpa_t (*translate_gpa)(struct kvm_vcpu *vcpu, gpa_t gpa, u32 access,
    struct x86_exception *exception);
int (*sync_page)(struct kvm_vcpu *vcpu,
@@ -506,6 +511,8 @@
   u64 smbase;
   bool tpr_access_reporting;
   u64 ia32_xss;
+   u64 microcode_version;
+   u64 arch_capabilities;

    /*
    * Paging state of the vcpu
    @@ -601,6 +608,7 @@
   u64 last_steal;
   struct gfn_to_hva_cache stime;
   struct kvm_steal_time steal;
+   struct gfn_to_pfn_cache cache;
   } st;

   u64 tsc_offset;
@@ -706,6 +714,9 @@
    /* be preempted when it's in kernel-mode(cpl=0) */
   bool preempted_in_kernel;
+    +/* Flush the L1 Data cache for L1TF mitigation on VMENTER */
+    +bool l1tf_flush_l1d;
    
   struct kvm_lpage_info {
      @@ -761,9 +772,9 @@
    
   struct kvm_arch {
      -unsigned int n_used_mmu_pages;
      -unsigned int n_requested_mmu_pages;
      -unsigned int n_max_mmu_pages;
+      +unsigned long n_used_mmu_pages;
+      +unsigned long n_requested_mmu_pages;
+      +unsigned long n_max_mmu_pages;
      +unsigned int indirect_shadow_pages;
unsigned long mmu_valid_gen;
struct hlist_head mmu_page_hash[KVM_NUM_MMU_PAGES];
@@ -772,6 +783,7 @@
 */
struct list_head active_mmu_pages;
struct list_head zapped_obsolete_pages;
+struct list_head lpage_disallowed_mmu_pages;
struct kvm_page_track_notifier_node mmu_sp_tracker;
struct kvm_page_track_notifier_head track_notifier_head;

@@ -847,6 +859,8 @@

bool x2apic_format;
bool x2apic_broadcast_quirk_disabled;
+
+struct task_struct *nx_lpage_recovery_thread;
};

struct kvm_vm_stat {
@@ -860,6 +874,7 @@
 ulong mmu_unsync;
 ulong remote_tlb_flush;
 ulong lpages;
+ulong nx_lpage_splits;
 ulong max_mmu_page_hash_collisions;
};

@@ -875,6 +890,7 @@
 u64 signal_exits;
 u64 irq_window_exits;
 u64 nmi_window_exits;
+u64 l1d_flush;
 u64 halt_exits;
 u64 halt_successful_poll;
 u64 halt_attempted_poll;
@@ -921,7 +937,7 @@
 int (*hardware_setup)(void);               /* __init */
 void (*hardware_unsetup)(void);            /* __exit */
 bool (*cpu_has_accelerated_tpr)(void);
-bool (*cpu_has_high_real_mode_segbase)(void);
+bool (*has_emulated_msr)(int index);
 void (*cpuid_update)(struct kvm_vcpu *vcpu);

 int (*vm_init)(struct kvm *kvm);
@@ -965,7 +981,7 @@
 unsigned long (*get_rflags)(struct kvm_vcpu *vcpu);
 void (*set_rflags)(struct kvm_vcpu *vcpu, unsigned long rflags);
void (*tlb_flush)(struct kvm_vcpu *vcpu);
+void (*tlb_flush)(struct kvm_vcpu *vcpu, bool invalidate_gpa);

void (*run)(struct kvm_vcpu *vcpu);
int (*handle_exit)(struct kvm_vcpu *vcpu);
@@ -990,9 +1006,9 @@
void (*hwapic_irr_update)(struct kvm_vcpu *vcpu, int max_irr);
void (*hwapic_isr_update)(struct kvm_vcpu *vcpu, int isr);
void (*load_eoi_exitmap)(struct kvm_vcpu *vcpu, u64 *eoi_exit_bitmap);
-void (*set_virtual_x2apic_mode)(struct kvm_vcpu *vcpu, bool set);
+void (*set_virtual_apic_mode)(struct kvm_vcpu *vcpu);
void (*set_apic_access_page_addr)(struct kvm_vcpu *vcpu, hpa_t hpa);
-void (*deliver_posted_interrupt)(struct kvm_vcpu *vcpu, int vector);
+int (*deliver_posted_interrupt)(struct kvm_vcpu *vcpu, int vector);
int (*sync_pir_to_irr)(struct kvm_vcpu *vcpu);
int (*tss_addr)(struct kvm *kvm, unsigned int addr);
@@ -1007,7 +1023,9 @@
bool (*has_wbinvd_exit)(void);

-void (*write_tsc_offset)(struct kvm_vcpu *vcpu, u64 offset);
+u64 (*read_l1_tsc_offset)(struct kvm_vcpu *vcpu);
+/* Returns actual tsc_offset set in active VMCS */
+u64 (*write_l1_tsc_offset)(struct kvm_vcpu *vcpu, u64 offset);

void (*get_exit_info)(struct kvm_vcpu *vcpu, u64 *info1, u64 *info2);
@@ -1018,7 +1036,7 @@
bool (*mpx_supported)(void);
bool (*xsaves_supported)(void);

-int (*check_nested_events)(struct kvm_vcpu *vcpu, bool external_intr);
+int (*check_nested_events)(struct kvm_vcpu *vcpu);

void (*sched_in)(struct kvm_vcpu *kvm, int cpu);
@@ -1046,7 +1064,7 @@
void (*enable_log_dirty_pt_masked)(struct kvm *kvm,
    struct kvm_memory_slot *slot,
    gfn_t offset, unsigned long mask);
-int (*write_log_dirty)(struct kvm_vcpu *vcpu);
+int (*write_log_dirty)(struct kvm_vcpu *vcpu, gpa_t l2_gpa);

/* pmu operations of sub-arch */
const struct kvm_pmu_ops *pmu_ops;
@@ -1069,6 +1087,7 @@
int (*update_pi_irte)(struct kvm *kvm, unsigned int host_irq,
uint32_t guest_irq, bool set);
void (*apicv_post_state_restore)(struct kvm_vcpu *vcpu);
+bool (*dy_apicv_has_pending_interrupt)(struct kvm_vcpu *vcpu);

int (*set_hv_timer)(struct kvm_vcpu *vcpu, u64 guest_deadline_tsc);
void (*cancel_hv_timer)(struct kvm_vcpu *vcpu);
@@ -1079,6 +1098,8 @@
int (*pre_enter_smm)(struct kvm_vcpu *vcpu, char *smstate);
int (*pre_leave_smm)(struct kvm_vcpu *vcpu, u64 smbase);
int (*enable_smni_window)(struct kvm_vcpu *vcpu);
+
+int (*get_msr_feature)(struct kvm_msr_entry *entry);
}

struct kvm_arch_async_pf {
@@ -1117,9 +1138,9 @@
    struct kvm_memory_slot *slot,
    gfn_t gfn_offset, unsigned long mask);
void kvm_mmu_zap_all(struct kvm *kvm);
-void kvm_mmu_invalidate_mmio_sptes(struct kvm *kvm, struct kvm_memslots *slots);
-unsigned int kvm_mmu_calculate_mmu_pages(struct kvm *kvm);
-void kvm_mmu_change_mmu_pages(struct kvm *kvm, unsigned int kvm_nr_mmu_pages);
+void kvm_mmu_invalidate_mmio_sptes(struct kvm *kvm, u64 gen);
+unsigned long kvm_mmu_calculate_mmu_pages(struct kvm *kvm);
+void kvm_mmu_change_mmu_pages(struct kvm *kvm, unsigned long kvm_nr_mmu_pages);

int load_pdptrs(struct kvm_vcpu *vcpu, struct kvm_mmu *mmu, unsigned long cr3);
bool pdptrs_changed(struct kvm_vcpu *vcpu);
@@ -1168,7 +1189,7 @@
#define EMULTYPE_SKIP (1 << 2)
#define EMULTYPE_RETRY (1 << 3)
#define EMULTYPE_NO_REEXECUTE (1 << 4)
-int x86_emulate_instruction(struct kvm_vcpu *vcpu, unsigned long cr2,
+int x86_emulate_instruction(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa,
    int emulation_type, void *insn, int insn_len);

static inline int emulate_instruction(struct kvm_vcpu *vcpu,
    emulation_type | EMULTYPE_NO_REEXECUTE, NULL, 0);
}

+static inline int kvm_emulate_instruction_from_buffer(struct kvm_vcpu *vcpu,
+    void *insn, int insn_len)
+{
+    return x86_emulate_instruction(vcpu, 0, EMULTYPE_NO_REEXECUTE,
+        insn, insn_len);
+}
void kvm_enable_efer_bits(u64);
bool kvm_valid_efer(struct kvm_vcpu *vcpu, u64 efer);
int kvm_get_msr(struct kvm_vcpu *vcpu, struct msr_data *msr);
@@ -1266,7 +1294,7 @@
int kvm_emulate_hypercall(struct kvm_vcpu *vcpu);

-int kvm_mmu_page_fault(struct kvm_vcpu *vcpu, gva_t gva, u64 error_code,
+int kvm_mmu_page_fault(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa, u64 error_code,
     void *insn, int insn_len);
void kvm_mmu_invlpg(struct kvm_vcpu *vcpu, gva_t gva);
void kvm_mmu_new_cr3(struct kvm_vcpu *vcpu);
@@ -1348,25 +1376,29 @@
#define kvm_arch_vcpu_memslots_id(vcpu) ((vcpu)->arch.hflags & HF_SMM_MASK ? 1 : 0)
#define kvm_memslots_for_spte_role(kvm, role) __kvm_memslots(kvm, (role).smm)

+asmlinkage void __noreturn kvm_spurious_fault(void);
 +
 /*
 * Hardware virtualization extension instructions may fault if a
 * reboot turns off virtualization while processes are running.
- * Trap the fault and ignore the instruction if that happens.
+ * Usually after catching the fault we just panic; during reboot
+ * instead the instruction is ignored.
 */
-asmlinkage void kvm_spurious_fault(void);
 -
-#define ____kvm_handle_fault_on_reboot(insn, cleanup_insn)	-
-"666: " insn '"n t" \
-"668: \n\t" \
-"-pushsection .fixup, \"axl\" \n" \
-"667: \n\t" \
-cleanup_insn \n\t" \
-"cmpb $0, kvm_rebooting \n\t" \
-"jne 668b \n\t" \
-"_ASM_SIZE(push) "$666b \n\t" \
-"call kvm_spurious_fault \n\t" \
-".popsection \n\t" \
- _ASM_EXTABLE(666b, 667b)
+#define ____kvm_handle_fault_on_reboot(insn, cleanup_insn)
+"666: \n t" \
+insn \n\t" \
+"jmp668f \n\t" \
+"667: \n\t" \
+"callkvm_spurious_fault \n\t" \
+"668: \n\t" \
+".pushsection .fixup, \"axl\" \n\t" \
+"700: \n\t" \

+cleanup_insn "\n\t"
+"cmpb$0, kvm_rebooting\n\t"
+"je667b \n\t"
+"jmp668b \n\t"
+.popsection \n\t"
+_ASM_EXTABLE(666b, 700b)

#define __kvm_handle_fault_on_reboot(insn)
    kvm_handle_fault_on_reboot(insn, "")
@@ -1379,11 +1411,13 @@
void kvm_set_spte_hva(struct kvm *kvm, unsigned long hva, pte_t pte);
int kvm_cpu_has_injectable_intr(struct kvm_vcpu *v);
int kvm_cpu_has_interrupt(struct kvm_vcpu *vcpu);
+int kvm_cpu_has_extint(struct kvm_vcpu *v);
int kvm_arch_interrupt_allowed(struct kvm_vcpu *vcpu);
int kvm_cpu_getInterrupt(struct kvm_vcpu *v);
void kvm_vcpu_reset(struct kvm_vcpu *vcpu, bool init_event);
void kvm_vcpu_reload_apic_access_page(struct kvm_vcpu *vcpu);

+u64 kvm_get_arch_capabilities(void);
void kvm_define_shared_msr(unsigned index, u32 msr);
int kvm_set_shared_msr(unsigned index, u64 val, u64 mask);

--- linux-4.15.0.orig/arch/x86/include/asm/mce.h
+++ linux-4.15.0/arch/x86/include/asm/mce.h
@@ -200,6 +200,7 @@
MCE_PRIO_LOWEST = 0,
};

+struct notifier_block;
extern void mce_register_decode_chain(struct notifier_block *nb);
extern void mce_unregister_decode_chain(struct notifier_block *nb);

@@ -346,6 +347,7 @@
SMCA_IF,/* Instruction Fetch */
SMCA_L2_CACHE,/* L2 Cache */
SMCA_DE,/* Decoder Unit */
+SMCA_RESERVED,/* Reserved */
SMCA_EX,/* Execution Unit */
SMCA_FP,/* Floating Point */
SMCA_L3_CACHE,/* L3 Cache */
--- linux-4.15.0.orig/arch/x86/include/asm/microcode.h
+++ linux-4.15.0/arch/x86/include/asm/microcode.h
@@ -37,7 +37,13 @@
struct device;

-enum ucode_state { UCODE_ERROR, UCODE_OK, UCODE_NFOUND };
enum ucode_state { 
    UCODE_OK= 0, 
    UCODE_NEW, 
    UCODE_UPDATED, 
    UCODE_NFOUND, 
    UCODE_ERROR, 
};

struct microcode_ops { 
    enum ucode_state (*request_microcode_user) (int cpu, 
    int (*apply_microcode) (int cpu); 
    enum ucode_state (*apply_microcode) (int cpu); 
    int (*collect_cpu_info) (int cpu, struct cpu_signature *csig); 
};

--- linux-4.15.0.orig/arch/x86/include/asm/microcode_amd.h 
+++ linux-4.15.0/arch/x86/include/asm/microcode_amd.h 
@@ -41,7 +41,7 @@ 
    unsigned int			tmpb[0]; 
}; 

-#define PATCH_MAX_SIZE PAGE_SIZE 
+#define PATCH_MAX_SIZE (3 * PAGE_SIZE) 

#ifdef CONFIG_MICROCODE_AMD 
    extern void __init load_ucode_amd_bsp(unsigned int family); 
--- linux-4.15.0.orig/arch/x86/include/asm/mmu_context.h 
+++ linux-4.15.0/arch/x86/include/asm/mmu_context.h 
@@ -70,11 +70,7 @@ 
    static inline void *ldt_slot_va(int slot) 
    { 
    -#ifdef CONFIG_X86_64 
    return (void *)(LDT_BASE_ADDR + LDT_SLOT_STRIDE * slot); 
    +#else 
    -BUG(); 
    +#endif 
    } 
*/ 
@@ -181,6 +177,10 @@ 
    void enter_lazy_tlb(struct mm_struct *mm, struct task_struct *tsk); 
*/
static inline int init_new_context(struct task_struct *tsk, struct mm_struct *mm) {
    
    ifdef CONFIG_X86_INTEL_MEMORY_PROTECTION_KEYS
    if (cpu_feature_enabled(X86_FEATURE_OSPKE)) {
        /* pkey 0 is the default and always allocated */
        mm->context.pkey_allocation_map = 0x1;
        /* -1 means unallocated or invalid */
        mm->context.execute_only_pkey = -1;
    } while (0)
    #endif
    #endif

    static inline void arch_dup_pkeys(struct mm_struct *oldmm, struct mm_struct *mm) {
        
        ifdef CONFIG_X86_INTEL_MEMORY_PROTECTION_KEYS
        if (!cpu_feature_enabled(X86_FEATURE_OSPKE))
            return;
        
        /* Duplicate the oldmm pkey state in mm: */
        mm->context.pkey_allocation_map = oldmm->context.pkey_allocation_map;
        mm->context.execute_only_pkey = oldmm->context.execute_only_pkey;
    } endif
    
    static inline int arch_dup_mmap(struct mm_struct *oldmm, struct mm_struct *mm) {
        arch_dup_pkeys(oldmm, mm);
        paravirt_arch_dup_mmap(oldmm, mm);
        return ldt_dup_context(oldmm, mm);
    }
* CPU model specific register (MSR) numbers.
*
@@ -39,6 +41,16 @@
/* Intel MSRs. Some also available on other CPUs */

+#define MSR_IA32_SPEC_CTRL 0x00000048 /* Speculation Control */
+#define SPEC_CTRL_IBRSBIT(0) /* Indirect Branch Restricted Speculation */
+#define SPEC_CTRL_STIBP_SHIFT 1 /* Single Thread Indirect Branch Predictor (STIBP) bit */
+#define SPEC_CTRL_STIBPBIT(SPEC_CTRL_STIBP_SHIFT) /* STIBP mask */
+#define SPEC_CTRL_SSBD_SHIFT 2 /* Speculative Store Bypass Disable bit */
+#define SPEC_CTRL_SSDBBIT(SPEC_CTRL_SSBD_SHIFT) /* Speculative Store Bypass Disable */
+
+#define MSR_IA32_PRED_CMD 0x00000049 /* Prediction Command */
+#define PRED_CMD_IBPB 0 /* Indirect Branch Prediction Barrier */
+
#define MSR_PPIN_CTL 0x0000004e
#define MSR_PPIN 0x0000004f
@@ -57,9 +69,51 @@
#define SNB_C3_AUTO_UNDEMOTE(1UL << 28)

#endif define MSR_MTRRcap 0x000000fe
+
+#define MSR_IA32_ARCH_CAPABILITIES0x0000001a
+#define ARCH_CAP_RDCL_NO BIT(0) /* Not susceptible to Meltdown */
+#define ARCH_CAP_IBRS_ALLBIT(1) /* Enhanced IBRS support */
+define ARCH_CAP_SKIP_VMENTRY_L1DFUSHBIT(3) /* Skip L1D flush on vmentry */
+define ARCH_CAP_SSB_NO BIT(4) /* Not susceptible to Speculative Store Bypass
+attack, so no Speculative Store Bypass
+control required.
+*/
+define ARCH_CAP_MDS_NO BIT(5) /* Not susceptible to Microarchitectural Data
+Sampling (MDS) vulnerabilities.
+*/
+define ARCH_CAP_PSCHANGE_MC_NO BIT(6) /*
+The processor is not susceptible to a
+machine check error due to modifying the
+code page size along with either the
+physical address or cache type
+without TLB invalidation.
+*/
+define ARCH_CAP_TSX_CTRL_MSR BIT(7) /* MSR for TSX control is available. */
+define ARCH_CAP_TAA_NO BIT(8) /* Not susceptible to
+ * TSX Async Abort (TAA) vulnerabilities.
+ */
+
+#define MSR_IA32_FLUSH_CMD	0x0000010b
+#define L1D_FLUSHBIT(0)/*
+ * Writeback and invalidate the
+ * L1 data cache.
+ */
+
+#define MSR_IA32_BBL_CR_CTL	0x00000119
+#define MSR_IA32_BBL_CR_CTL3	0x0000011e
+#define MSR_IA32_TSX_CTRL	0x00000122
+#define TSX_CTRL_RTM_DISABLE	BIT(0) /* Disable RTM feature */
+#define TSX_CTRL_CPUID_CLEAR	BIT(1) /* Disable TSX enumeration */
+
+/* SRBDS support */
+#define MSR_IA32_MCU_OPT_CTRL	0x00000123
+#define RNGDS_MITG_DISBIT(0)
+
+#define MSR_IA32_SYSENTER_CS	0x00000174
+#define MSR_IA32_SYSENTER_ESP	0x00000175
+#define MSR_IA32_SYSENTER_EIP	0x00000176
@@ -300,6 +354,7 @@
+#define MSR_AMD64_PATCH_LEVEL	0x0000008b
+#define MSR_AMD64_TSC_RATIO	0xc0000104
+#define MSR_AMD64_NB_CFG	0xc001001f
+#define MSR_AMD64_CPUID_FN_1	0xc0011004
+#define MSR_AMD64_CPUID_FN_10	0xc011004
+#define MSR_AMD64_PATCH_LOADER0	0xc010020
+#define MSR_AMD64_OSVW_ID_LENGTH0	0xc010140
+#define MSR_AMD64_OSVW_STATUS0	0xc010141
@@ -322,12 +377,15 @@
+#define MSR_AMD64_IBSOP_REG_MASK	((1UL<<MSR_AMD64_IBSOP_REG_COUNT)-1)
+#define MSR_AMD64_IBSCTL0	0xc01103a
+#define MSR_AMD64_IBSBRTARGET0	0xc01103b
+#define MSR_AMD64_ICIBSEXTDCTL0	0xc01103c
+#define MSR_AMD64_IBSOPDATA40	0xc01103d
+#define MSR_AMD64_IBS_REG_COUNT_MAX	8 /* includes MSR_AMD64_IBSBRTARGET */
+#define MSR_AMD64_SEV0	0xc010131
+#define MSR_AMD64_SEV_ENABLED_BIT0
+#define MSR_AMD64_SEV_ENABLEDBIT_ULL(MSR_AMD64_SEV_ENABLED_BIT)
+
+#define MSR_AMD64_VIRT_SPEC_CTRL	0xc01011f
+
+/* Fam 17h MSRs */
+#define MSR_F17H_IRPERF	0xc00000e9

@@ -346,6 +404,7 @@

+ /* Fam 17h MSRs */
+#define MSR_F17H_IRPERF	0xc00000e9

@@ -346,6 +404,7 @@

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+#define MSR_F17H_IRPERF	0xc00000e9

@@ -346,6 +404,7 @@

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@@ -346,6 +404,7 @@

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+#define MSR_F17H_IRPERF	0xc00000e9

@@ -346,6 +404,7 @@

+ /* Fam 17h MSRs */
+#define MSR_F17H_IRPERF	0xc00000e9
```c
#define MSR_F15H_NB_PERF_CTR 0xc0010241
#define MSR_F15H_PTSC 0xc0010280
#define MSR_F15H_IC_CFG 0xc0011021
#define MSR_F15H_EX_CFG 0xc001102c
/* Fam 10h MSRs */
#define MSR_FAM10H_MMIO_CONF_BASE 0xc0010058
#define MSR_K7_PERFCTR3 0xc0010007
#define MSR_K7_CLK_CTL 0xc001001b
#define MSR_K7_HWCR 0xc0010015
#define MSR_K7_HWCR_IRPERF_EN_BIT 30
#define MSR_K7_HWCR_IRPERF_EN BIT_ULL(MSR_K7_HWCR_IRPERF_EN_BIT)
#define MSR_K7_FID_VID_CTL 0xc0010041
#define MSR_K7_FID_VID_STATUS 0xc0010042
@
#define MSR_IA32_TSC_DEADLINE 0x000006E0
+
#define MSR_TSX_FORCE_ABORT 0x0000010F
+
#define MSR_TFA_RTM_FORCE_ABORT BIT 0
#define MSR_TFA_RTM_FORCE_ABORT BIT MSR_TFA_RTM_FORCE_ABORT BIT
+
/* P4/Xeon+ specific */
#define MSR_IA32_MCG_EAX 0x00000180
#define MSR_IA32_MCG_EBX 0x00000181
--- linux-4.15.0.orig/arch/x86/include/asm/msr.h
+++ linux-4.15.0/arch/x86/include/asm/msr.h
@@ -88,7 +88,7 @@
* think of extending them - you will be slapped with a stinking trout or a frozen
* shark will reach you, wherever you are! You've been warned.
*/
-static inline unsigned long long notrace __rdmsr(unsigned int msr)
+static __always_inline unsigned long long __rdmsr(unsigned int msr)
{
 DECLARE_ARGS(val, low, high);

@@ -100,7 +100,7 @@
 return EAX_EDX_VAL(val, low, high);
 }

-static inline void notrace __wrmsr(unsigned int msr, u32 low, u32 high)
+static __always_inline void __wrmsr(unsigned int msr, u32 low, u32 high)
{
 asm volatile("1: wrmsr\n"

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```
* that some other imaginary CPU is updating continuously with a
* time stamp.
*/
-alternative_2("", "mfence", X86_FEATURE_MFENCE_RDTSC,
-  "lfence", X86_FEATURE_LFENCE_RDTSC);
+barrier_nospec();
return rdtsc();
}

--- linux-4.15.0.orig/arch/x86/include/asm/mwait.h
+++ linux-4.15.0/arch/x86/include/asm/mwait.h
@@ -6,6 +6,7 @@
 #include <linux/sched/idle.h>
 #include <asm/cpufeature.h>
+  #include <asm/nospec-branch.h>
 
#define MWAIT_SUBSTATE_MASK	0xf
#define MWAIT_CSTATE_MASK	0xf
@@ -20,7 +21,7 @@
#define MWAIT_ECX_INTERRUPT_BREAK	0x1
#define MWAITX_ECX_TIMER_ENABLE	BIT(1)
#define MWAITX_MAX_LOOPS((u32)-1)
-#define MWAITX_DISABLE_CSTATES	0xf
+#define MWAITX_DISABLE_CSTATES	0xf0

static inline void __monitor(const void *eax, unsigned long ecx,
    unsigned long edx)
@@ -40,6 +41,8 @@
static inline void __mwait(unsigned long eax, unsigned long ecx)
{
+    mds_idle_clear_cpu_buffers();
+    
+    /* "mwait %eax, %ecx;" */
    asm volatile(".byte 0x0f, 0x01, 0xc9;"
            :: "a" (eax), "c" (ecx));
@@ -74,6 +77,8 @@
static inline void __mwaitx(unsigned long eax, unsigned long ebx,
static inline void __mwaitx(unsigned long eax, unsigned long ebx,
    unsigned long ecx)
{
+    /* No MDS buffer clear as this is AMD/HYGON only */
+    
+    /* "mwaitx %eax, %ebx, %ecx;" */
    asm volatile(".byte 0x0f, 0x01, 0xfb;"
            :: "a" (eax), "b" (ebx), "c" (ecx));
static inline void __sti_mwait(unsigned long eax, unsigned long ecx) {
    mds_idle_clear_cpu_buffers();
    trace_hardirqs_on();
    /* "mwait %eax, %ecx;" */
    asm volatile("sti; .byte 0x0f, 0x01, 0xc9;"
        --- linux-4.15.0.orig/arch/x86/include/asm/nmi.h
        +++ linux-4.15.0/arch/x86/include/asm/nmi.h
        @ @ -41.7 +41.6 @@
    struct list_headlist;
    nmi_handler_handler;
    u64max_duration;
    -struct irq_work_irq_work;
    unsigned longflags;
    const char*name;
};
    --- linux-4.15.0.orig/arch/x86/include/asm/nospec-branch.h
    +++ linux-4.15.0/arch/x86/include/asm/nospec-branch.h
    @ @ -1.11 +1.14 @@
    /* SPDX-License-Identifier: GPL-2.0 */

#ifndef __NOSPEC_BRANCH_H__
#define __NOSPEC_BRANCH_H__
+#ifndef _ASM_X86_NOSPEC_BRANCH_H_
+#define _ASM_X86_NOSPEC_BRANCH_H_
+
+#include <linux/static_key.h>

#include <asm/alternative.h>
#include <asm/alternative-asm.h>
#include <asm/cpufeatures.h>
+include <asm/msr-index.h>

/*
 * Fill the CPU return stack buffer.
 @ @ -67.6 +70.18 @@
.endm

/*
 * This should be used immediately before an indirect jump/call. It tells
 * objtool the subsequent indirect jump/call is vouched safe for retpoline
 * builds.
 * */
+macro ANNOTATE_RETPOLINE_SAFE
+Lannotate_@:
/* These are the bare retpoline primitives for indirect jmp and call.
* Do not use these directly; they only exist to make the ALTERNATIVE
* invocation below less ugly.
*/

#ifndef CONFIG_RETPOLINE

/*

".long 999b - .
	"
					
.popsection
	"

#elif defined(CONFIG_X86_64) && defined(RETPOLINE)

+#define ANNOTATE_RETPOLINE_SAFE

+"999\n"n\t"

+.pushsection .discard.retpoline_safe\n+.ASM_PTR .Lannotate_
+.popsection
+.endm

*/
- * Since the inline asm uses the %V modifier which is only in newer GCC,
  - the 64-bit one is dependent on RETPOLINE not CONFIG_RETPOLINE.
+ * Inline asm uses the %V modifier which is only in newer GCC
  + which is ensured when CONFIG_RETPOLINE is defined.
*/

#define CALL_NOSPEC
ANNOTATE_NOSPEC_ALTERNATIVE
-ALTERNATIVE()
+ALTERNATIVE_2()
+ANNOTATE_RETPOLINE_SAFE
"call *%[thunk_target]\n",
"call __x86_indirect_thunk_%V[thunk_target]\n",
-X86_FEATURE_RETPOLINE)
+X86_FEATURE_RETPOLINE

"lfence;\n"
+ANNOTATE_RETPOLINE_SAFE
"call *%[thunk_target]\n",
+X86_FEATURE_RETPOLINE_AMD)

#define THUNK_TARGET(addr) [thunk_target] "r" (addr)

-#elif defined(CONFIG_X86_32) && defined(CONFIG_RETPOLINE)
+#elif !defined(CONFIG_X86_32) && defined(CONFIG_RETPOLINE)

 /* For i386 we use the original ret-equivalent retpoline, because
  * otherwise we'll run out of registers. We don't care about CET
  * here, anyway.
  */

-# define CALL_NOSPEC ALTERNATIVE("call *%[thunk_target]\n",
+# define CALL_NOSPEC ALTERNATIVE("call *%[thunk_target]\n",
+ANNOTATE_NOSPEC_ALTERNATIVE
+ALTERNATIVE_2
+ANNOTATE_RETPOLINE_SAFE
"call *%[thunk_target]\n",
"       jmp 904f;\n"
"       .align 16\n"
901:call 903f;\n@@ -171,14 +202,19 @@
"       lfence;\n"
"       jmp 902b;\n"
"       .align 16\n"
-"903:addl $4, %esp;\n"
+"903:lea 4(%esp), %esp;\n"
"       pushl %[thunk_target];\n"
"       ret;\n"
"       .align 16\n"
904:call 901b;\n-
-X86_FEATURE_RETPOLINE)
+X86_FEATURE_RETPOLINE;
/* The Spectre V2 mitigation variants */
enum spectre_v2_mitigation {
  SPECTRE_V2_NONE,
  -SPECTRE_V2_RETPOLINE_MINIMAL,
  -SPECTRE_V2_RETPOLINE_MINIMAL_AMD,
  SPECTRE_V2_RETPOLINE_GENERIC,
  SPECTRE_V2_RETPOLINE_AMD,
  -SPECTRE_V2_IBRS,
  +SPECTRE_V2_IBRS_ENHANCED,
};

/* The indirect branch speculation control variants */
+enum spectre_v2_user_mitigation {
  +SPECTRE_V2_USER_NONE,
  +SPECTRE_V2_USER_STRICT,
  +SPECTRE_V2_USER_STRICT_PREFERRED,
  +SPECTRE_V2_USER_PRCTRL,
  +SPECTRE_V2_USER_SECCOMP,
};

+/* The Speculative Store Bypass disable variants */
+enum ssb_mitigation {
  +SPEC_STORE_BYPASS_NONE,
  +SPEC_STORE_BYPASS_DISABLE,
  +SPEC_STORE_BYPASS_PRCTRL,
  +SPEC_STORE_BYPASS_SECCOMP,
};

extern char __indirect_thunk_start[];
@@ -201,7 +252,7 @@
    /* On VMEXIT we must ensure that no RSB predictions learned in the guest
    * can be followed in the host, by overwriting the RSB completely. Both
    * retpoline and IBRS mitigations for Spectre v2 need this; only on future
    - * CPUs with IBRS_ATT *might* it be avoided.
    + * CPUs with IBRS_ALL *might* it be avoided.
    */
    static inline void vmexit_fill_RSB(void)
static __always_inline
void alternative_msr_write(unsigned int msr, u64 val, unsigned int feature)
{
asm volatile(ALTERNATIVE("", "wrmsr", %c[feature])
: : "c" (msr),
   "a" ((u32)val),
   "d" ((u32)(val >> 32)),
   [feature] "i" (feature)
: "memory";
}

static inline void indirect_branch_prediction_barrier(void)
{
  u64 val = PRED_CMD_IBPB;
  alternative_msr_write(MSR_IA32_PRED_CMD, val, X86_FEATURE_USE_IBPB);
}

/* The Intel SPEC CTRL MSR base value cache */
extern u64 x86_spec_ctrl_base;

/* With retpoline, we must use IBRS to restrict branch prediction */
/* before calling into firmware. */
/* (Implemented as CPP macros due to header hell.) */
#define firmware_restrict_branch_speculation_start()
  do {
    u64 val = x86_spec_ctrl_base | SPEC_CTRL_IBRS;
    preempt_disable();
    alternative_msr_write(MSR_IA32_SPEC_CTRL, val,
      X86_FEATURE_USE_IBRS_FW);
  while (0)
#
#define firmware_restrict_branch_speculation_end()
  do {
    u64 val = x86_spec_ctrl_base;
    preempt_enable();
  

while (0) {
+DECLARE_STATIC_KEY_FALSE(switch_to_cond_stibp);
+DECLARE_STATIC_KEY_FALSE(switch_mm_cond_ibpb);
+DECLARE_STATIC_KEY_FALSE(switch_mm_always_ibpb);
+
+DECLARE_STATIC_KEY_FALSE(mds_user_clear);
+DECLARE_STATIC_KEY_FALSE(mds_idle_clear);
+
+include <asm/segment.h>
+
+/**
+ * mds_clear_cpu_buffers - Mitigation for MDS and TAA vulnerability
+ *
+ * This uses the otherwise unused and obsolete VERW instruction in
+ * combination with microcode which triggers a CPU buffer flush when the
+ * instruction is executed.
+ */
+static __always_inline void mds_clear_cpu_buffers(void)
+{
+static const u16 ds = __KERNEL_DS;
+
+/**
+ * Has to be the memory-operand variant because only that
+ * guarantees the CPU buffer flush functionality according to
+ * documentation. The register-operand variant does not.
+ * Works with any segment selector, but a valid writable
+ * data segment is the fastest variant.
+ *
+ * "cc" clobber is required because VERW modifies ZF.
+ */
+asm volatile("verw %[ds]" : [ds] "m" (ds) : "cc");
+
+/**
+ * mds_user_clear_cpuBuffers - Mitigation for MDS and TAA vulnerability
+ *
+ * Clear CPU buffers if the corresponding static key is enabled
+ */
+static __always_inline void mds_user_clear_cpu_buffers(void)
+{
+if (static_branch_likely(&mds_user_clear))
+mds_clear_cpu_buffers();
+
+/**
+ * mds_idle_clear_cpuBuffers - Mitigation for MDS vulnerability
+ *
* Clear CPU buffers if the corresponding static key is enabled
+ */
+static inline void mds_idle_clear_cpuBuffers(void)
+{
+ if (static_branch_likely(&mds_idle_clear))
+ mds_clear_cpu_buffers();
+ }
+
#ifdefined("_ASM_X86_NOSPEC_BRANCH_H__")
+
+ Below is used in the eBPF JIT compiler and emits the byte sequence
+ * for the following assembly:
+ *
+ * With retpolines configured:
+ *
+ *  callq do_rop
+ *  spec_trap:
+ *   pause
+ *   lfence
+ *  jmp spec_trap
+ *  do_rop:
+ *    mov %rax,(%rsp)
+ *    retq
+ *
+ * Without retpolines configured:
+ *
+ *  jmp *%rax
+ */
+#endif CONFIG_RETPOLINE
+## define RETPOLINE_RAX_BPF_JIT_SIZE17
+## define RETPOLINE_RAX_BPF_JIT(
+EMIT1_off32(0xE8, 7); /* callq do_rop */
+/* spec_trap: */
+EMIT2(0xF3, 0x90);       /* pause */
+EMIT3(0x0F, 0xAE, 0xE8); /* lfence */
+EMIT2(0xEB, 0xF9);       /* jmp spec_trap */
+/* do_rop: */
+EMIT4(0x48, 0x89, 0x04, 0x24); /* mov %rax,(%rsp) */
+EMIT1(0xC3);             /* retq */
+}#else
+## define RETPOLINE_RAX_BPF_JIT_SIZE2
+## define RETPOLINE_RAX_BPF_JIT(
+EMIT2(0xFF, 0xE0); /* jmp *%rax */
+}#else
+## define RETPOLINE_RAX_BPF_JIT_SIZE2
+## define RETPOLINE_RAX_BPF_JIT(
+}#else
+## define RETPOLINE_RAX_BPF_JIT_SIZE2
+## define RETPOLINE_RAX_BPF_JIT(
+}#else
+## define RETPOLINE_RAX_BPF_JIT_SIZE2
+## define RETPOLINE_RAX_BPF_JIT(
+}#endif
+}
```c
#define N_EXCEPTION_STACKS 1

#ifdef CONFIG_X86_PAE

/* 44=32+12, the limit we can fit into an unsigned long pfns */
#define __PHYSICAL_MASK_SHIFT	44

/* This is beyond the 44 bit limit imposed by the 32bit long pfns,
 but we need the full mask to make sure inverted PROT_NONE
 entries have all the host bits set in a guest.
 The real limit is still 44 bits.
 */
#define __PHYSICAL_MASK_SHIFT52
#define __VIRTUAL_MASK_SHIFT	32
#else /* !CONFIG_X86_PAE */

#endif /* !__ASSEMBLY__ */

#ifdef CONFIG_X86_MCE
#define arch_unmap_kpfn arch_unmap_kpfn
#endif

#endif /* !CONFIG_X86_PAE */

void copy_page(void *to, void *from);
#endif

#ifdef CONFIG_X86_VSYSCALL_EMULATION

#endif

#ifdef CONFIG_KASAN
#ifdef CONFIG_KASAN_EXTRA
#define KASAN_STACK_ORDER 2
#else
#define KASAN_STACK_ORDER 1
#endif
#else
#define KASAN_STACK_ORDER 0
#endif

/*
*/
```
* Set __PAGE_OFFSET to the most negative possible address +
- * PGDIR_SIZE*16 (pgd slot 272). The gap is to allow a space for a
- * hypervisor to fit. Choosing 16 slots here is arbitrary, but it's
- * what Xen requires.
+ * PGDIR_SIZE*17 (pgd slot 273).
+ *
+ * The gap is to allow a space for LDT remap for PTI (1 pgd slot) and space for
+ * a hypervisor (16 slots). Choosing 16 slots for a hypervisor is arbitrary,
+ * but it's what Xen requires.
+ */

#ifdef CONFIG_X86_5LEVEL
-#define __PAGE_OFFSET_BASE _AC(0xff10000000000000, UL)
+#define __PAGE_OFFSET_BASE _AC(0xff11000000000000, UL)
#else
-#define __PAGE_OFFSET_BASE _AC(0xffff880000000000, UL)
+#define __PAGE_OFFSET_BASE _AC(0xffff888000000000, UL)
#endif

#ifdef CONFIG_RANDOMIZE_MEMORY
 --- linux-4.15.0.orig/arch/x86/include/asm/paravirt.h
+++ linux-4.15.0/arch/x86/include/asm/paravirt.h
@@ -7,6 +7,7 @@
 #ifndef CONFIG_PARAVIRT
 #include <asm/pgtable_types.h>
 #include <asm/asm.h>
+  #include <asm/nospec-branch.h>
 #include <asm/paravirt_types.h>

 @@ -297,9 +298,9 @@
 {
  PVOP_VCALL0(pv_mmu_ops.flush_tlb_kernel);
 }
-#static inline void __flush_tlb_single(unsigned long addr)
+static inline void __flush_tlb_one_user(unsigned long addr)
 { 
- PVOP_VCALL1(pv_mmu_ops.flush_tlb_single, addr);
+ PVOP_VCALL1(pv_mmu_ops.flush_tlb_one_user, addr);
 }

 static inline void flush_tlb_others(const struct cpumask *cpumask, @ @ -757.6 +758.7 @ @
   PV_RESTORE_ALL_CALLER_REGS\
 FRAME_END\
 "ret;"
+ " .size " PV_THUNK_NAME(func) ",,." PV_THUNK_NAME(func) ";,";\n " .popsection"
}
/* Get a reference to a callee-save function */
@@ -879,23 +881,27 @@
#define INTERRUPT_RETURN
PARA_SITE(PARA_PATCH(pv_cpu_ops, PV_CPU_iret), CLBR_NONE,
- jmp PARA INDIRECT(pv_cpu_ops+PV_CPU_iret))
+ ANNOTATE RETPOLINE_SAFE;
+ jmp PARA INDIRECT(pv_cpu_ops+PV_CPU_iret))

#define DISABLE_INTERRUPTS(clobbers)
PARA_SITE(PARA_PATCH(pv_irq_ops, PV_IRQ_irq_disable), clobbers,
 PV_SAVE_REGS(clobbers | CLBR_CALLEE_SAVE);
+ ANNOTATE RETPOLINE_SAFE;
 call PARA INDIRECT(pv_irq_ops+PV_IRQ_irq_disable);
 PV_RESTORE_REGS(clobbers | CLBR_CALLEE_SAVE);

#define ENABLE_INTERRUPTS(clobbers)
PARA_SITE(PARA_PATCH(pv_irq_ops, PV_IRQ_irq_enable), clobbers,
 PV_SAVE_REGS(clobbers | CLBR_CALLEE_SAVE);
+ ANNOTATE RETPOLINE_SAFE;
 call PARA INDIRECT(pv_irq_ops+PV_IRQ_irq_enable);
 PV_RESTORE_REGS(clobbers | CLBR_CALLEE_SAVE);

#define GET_CR0_INTO_EAX
push %ecx; push %edx;
+ ANNOTATE RETPOLINE_SAFE;
 call PARA INDIRECT(pv_cpu_ops+PV_CPU_read_cr0);
pop %edx; pop %ecx

#define GET_CR2_INTO_RAX
-call PARA INDIRECT(pv_mmu_ops+PV_MMU_read_cr2)
+ANNOTATE RETPOLINE_SAFE;
+call PARA INDIRECT(pv_mmu_ops+PV_MMU_read_cr2);

#define USERGS_SYSRET64
PARA_SITE(PARA_PATCH(pv_cpu_ops, PV_CPU_usergs_sysret64),
 CLBR_NONE,
- jmp PARA INDIRECT(pv_cpu_ops+PV_CPU_usergs_sysret64))

+ ANNOTATE_RETPOLINE_SAFE;
+ jmp PARA_INDIRECT(pv_cpu_ops+PV_CPU_usergs_sysret64);

#ifdef CONFIG_DEBUG_ENTRY
#define SAVE_FLAGS(clobbers)                                        \
PARA_SITE(PARA_PATCH(pv_irq_ops, PV_IRQ_save_fl), clobbers, \ 
  PV_SAVE_REGS(clobbers | CLBR_CALLEE_SAVE); \ 
+ ANNOTATE_RETPOLINE_SAFE; \ 
  call PARA_INDIRECT(pv_irq_ops+PV_IRQ_save_fl); \ 
  PV_RESTORE_REGS(clobbers | CLBR_CALLEE_SAVE);)
#endif

--- linux-4.15.0.orig/arch/x86/include/asm/paravirt_types.h
+++ linux-4.15.0/arch/x86/include/asm/paravirt_types.h
@@ -43,6 +43,7 @@
#include <asm/desc_defs.h>
#include <asm/kmap_types.h>
#include <asm/pgtable_types.h>
+#include <asm/nospec-branch.h>

struct page;
struct thread_struct;
@@ -217,7 +218,7 @@
/* TLB operations */
void (*flush_tlb_user)(void);
void (*flush_tlb_kernel)(void);
-void (*flush_tlb_single)(unsigned long addr);
+void (*flush_tlb_one_user)(unsigned long addr);
void (*flush_tlb_others)(const struct cpumask *cpus,
  const struct flush_tlb_info *info);

@@ -392,7 +393,9 @@
* offset into the paravirt_patch_template structure, and can therefore be
* freely converted back into a structure offset.
*/
-#define PARAVIRT_CALL	"call *%c[paravirt_opptr];"
+#define PARAVIRT_CALL					\ 
+  "call *%c[paravirt_opptr];" 
+
/*
* These macros are intended to wrap calls through one of the paravirt
--- linux-4.15.0.orig/arch/x86/include/asm/pat.h
+++ linux-4.15.0/arch/x86/include/asm/pat.h
@@ -22,4 +22,6 @@
void io_free_memtype(resource_size_t start, resource_size_t end);
+bool pat_pfn_immune_to_uc_mtrr(unsigned long pfn);
extern u32 read_pci_config(u8 bus, u8 slot, u8 func, u8 offset);
extern u8 read_pci_config_byte(u8 bus, u8 slot, u8 func, u8 offset);
extern u16 read_pci_config_16(u8 bus, u8 slot, u8 func, u8 offset);
+extern u32 pci_early_find_cap(int bus, int slot, int func, int cap);
extern void write_pci_config(u8 bus, u8 slot, u8 func, u8 offset, u32 val);
extern void write_pci_config_byte(u8 bus, u8 slot, u8 func, u8 offset, u8 val);
extern void write_pci_config_16(u8 bus, u8 slot, u8 func, u8 offset, u16 val);

+extern unsigned int pci_early_clear_msi;
extern int early_pci_allowed(void);

typeof(var) pfo_ret__;
switch (sizeof(var)) {
  case 1:
    asm volatile("b __percpu_arg(1)",%0"
      : "=q" (pfo_ret__)
      : "m" (var));
    break;
  case 2:
    asm volatile("w __percpu_arg(1)",%0"
      : "=r" (pfo_ret__)
      : "m" (var));
    break;
  case 4:
    asm volatile("l __percpu_arg(1)",%0"
      : "=r" (pfo_ret__)
      : "m" (var));
    break;
  case 8:
    asm volatile("q __percpu_arg(1)",%0"
      : "=r" (pfo_ret__)
      : "m" (var));
    break;
}

bool oldbit;

-asm volatile("bt "__percpu_arg(2),%1"
+asm volatile("btl "__percpu_arg(2),%1"
CC_SET(c)
: CC_OUT(c) (oldbit)
: "m" (*(__unsigned long __percpu *)addr), "Ir" (nr));
--- linux-4.15.0.orig/arch/x86/include/asm/perf_event.h
+++ linux-4.15.0/arch/x86/include/asm/perf_event.h
@@ -46,6 +46,14 @@
#define INTEL_ARCH_EVENT_MASK
(ARCH_PERFMON_EVENTSEL_UMASK | ARCH_PERFMON_EVENTSEL_EVENT)

+#define AMD64_L3_SLICE_SHIFT48
+#define AMD64_L3_SLICE_MASK\n+((0xFULL) << AMD64_L3_SLICE_SHIFT)
+
+#define AMD64_L3_THREAD_SHIFT56
+#define AMD64_L3_THREAD_MASK\n+((0xFFULL) << AMD64_L3_THREAD_SHIFT)
+
#define X86_RAW_EVENT_MASK\n(ARCH_PERFMON_EVENTSEL_EVENT |
 ARCH_PERFMON_EVENTSEL_UMASK |
@@ -201,16 +209,20 @@
#define IBSCTL_LVT_OFFSET_VALID	(1ULL<<8)
#define IBSCTL_LVT_OFFSET_MASK	0x0F
-/* ibs fetch bits/masks */
+/* IBS fetch bits/masks */
 #define IBS_FETCH_RAND_EN	(1ULL<<57)
 #define IBS_FETCH_VAL	(1ULL<<49)
 #define IBS_FETCH_ENABLE	(1ULL<<48)
 #define IBS_FETCH_CNT	0xFFFF0000ULL
 #define IBS_FETCH_MAX_CNT	0x0000FFFFULL

-/* ibs op bits/masks */
-/* lower 4 bits of the current count are ignored: */
-+#define IBS_OP_CUR_CNT(0xFFFF0ULL<<32)
+/*
 * IBS op bits/masks
 * The lower 7 bits of the current count are random bits
 * preloaded by hardware and ignored in software
 + */
+#define IBS_OP_CUR_CNT(0xFFF80ULL<<32)
+#define IBS_OP_CUR_CNT_RAND(0x0007FULL<<32)
 #define IBS_OP_CNT_CTL	(1ULL<<19)
 #define IBS_OP_VAL	(1ULL<<18)
#define IBS_OP_ENABLE (1ULL << 17)
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable-2level.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable-2level.h
@@ -95,4 +95,21 @@
#define __pte_to_swp_entry(pte) ((swp_entry_t) { (pte).pte_low })
#define __swp_entry_to_pte(x) ((pte_t) { .pte = (x).val })

+/* No inverted PFNs on 2 level page tables */
+
+static inline u64 protnone_mask(u64 val)
+{
+    return 0;
+}
+
+static inline u64 flip_protnone_guard(u64 oldval, u64 val, u64 mask)
+{
+    return val;
+}
+
+static inline bool __pte_needs_invert(u64 val)
+{
+    return false;
+}
+
+#endif /* _ASM_X86_PGTABLE_2LEVEL_H */
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable-2level_types.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable-2level_types.h
@@ -35,4 +35,7 @@
#define PTRS_PER_PTE 1024
+/* This covers all VMSPLIT_* and VMSPLIT_*.OPT variants */
+#define PGD_KERNEL_START (CONFIG_PAGE_OFFSET >> PGDIR_SHIFT)
+
+#endif /* _ASM_X86_PGTABLE_2LEVEL_DEF/ds */
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable-3level.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable-3level.h
@@ -98,6 +100,9 @@

+/* Intel Physical Address Extension (PAE) Mode - three-level page
+ * tables on PPro+ CPUs.
+ */
+export <asm/atomic64_32.h>
+
/*
 * Intel Physical Address Extension (PAE) Mode - three-level page
 * tables on PPro+ CPUs.
@@ -98,6 +100,9 @@

static inline void native_set_pud(pud_t *pudp, pud_t pud) { 
  
#ifdef CONFIG_PAGE_TABLE_ISOLATION
  pud.p4d.pgd = pti_set_user_pgtbl(&pudp->p4d.pgd, pud.p4d.pgd);
#endif
  
set_64bit((unsigned long long *)(pudp), native_pud_val(pud));
} 

@@ -147,10 +152,7 @@
{
  pte_t res;

-/* xchg acts as a barrier before the setting of the high bits */
-  res.pte_low = xchg(&ptep->pte_low, 0);
-  res.pte_high = ptep->pte_high;
-  ptep->pte_high = 0;
+  res.pte = (pteval_t)atomic64_xchg((atomic64_t *)ptep, 0);

  return res;
}

@@ -158,7 +160,6 @@
#define native_ptep_get_and_clear(xp) native_local_ptep_get_and_clear(xp)
#endif

-#ifdef CONFIG_SMP
union split_pmd { 
  struct {
    u32 pmd_low;
@@ -166,6 +167,8 @@
  }
  pmd_t pmd;
};
+  
+#ifdef CONFIG_SMP
static inline pmd_t native_pmdp_get_and_clear(pmd_t *pmdp)
{
  union split_pmd res, *orig = (union split_pmd *)pmdp;
@@ -181,6 +184,40 @@
#define native_pmdp_get_and_clear(xp) native_local_pmdp_get_and_clear(xp)
#endif

+#ifndef pmdp_establish
+#define pmdp_establish pmdp_establish
+static inline pmd_t pmdp_establish(struct vm_area_struct *vma,
+  unsigned long address, pmd_t *pmdp, pmd_t pmd)
+{
+  pmd_t old;
+  

/*
 * If pmd has present bit cleared we can get away without expensive
 * cmpxchg64: we can update pmdp half-by-half without racing with
 * anybody.
 */

if (!(pmd_val(pmd) & _PAGE_PRESENT)) {
    union split_pmd old, new, *ptr;
    +
    +ptr = (union split_pmd *)pmdp;
    +
    +new.pmd = pmd;
    +
    +"/" xchg acts as a barrier before setting of the high bits */
    +old.pmd_low = xchg(&ptr->pmd_low, new.pmd_low);
    +old.pmd_high = ptr->pmd_high;
    +ptr->pmd_high = new.pmd_high;
    +return old.pmd;
    +}
    +
    +do {
    +old = *pmdp;
    +} while (cmpxchg64(&pmdp->pmd, old.pmd, pmd.pmd) != old.pmd);
    +
    +return old;
    +}
    +#endif
    +
    +#ifdef CONFIG_SMP
    +union split_pud {
    +struct {
    +@@ -194,6 +231,10 @@
    +{
    +union split_pud res, *orig = (union split_pud *)pudp;
    +@@ -206,12 +247,43 @@
    +#endif
    /* Encode and de-code a swap entry */
    +#define SWP_TYPE_BITS 5
    +
    +#define SWP_OFFSET_FIRST_BIT(_PAGE_BIT_PROTNONE + 1)
/* We always extract/encode the offset by shifting it all the way up, and then down again */
#define SWP_OFFSET_SHIFT (SWP_OFFSET_FIRST_BIT + SWP_TYPE_BITS)

#define MAX_SWAPFILES_CHECK () BUILD_BUG_ON(MAX_SWAPFILES_SHIFT > 5)
#define __swp_type(x) (((x).val) & 0x1f)
#define __swp_offset(x) ((x).val >> 5)
#define __swp_entry(type, offset) ((swp_entry_t) {(type) | (offset) << 5})
-#define __pte_to_swp_entry(pte) ((swp_entry_t) {(pte).pte_high})
-#define __swp_entry_to_pte(x) ((pte_t) { .pte_high = (x).val })
+
+/* Normally, __swp_entry() converts from arch-independent swp_entry_t to
+ arch-dependent swp_entry_t, and __swp_entry_to_pte() just stores the result
+ to pte. But here we have 32bit swp_entry_t and 64bit pte, and need to use the
+ whole 64 bits. Thus, we shift the “real” arch-dependent conversion to
+ __swp_entry_to_pte() through the following helper macro based on 64bit
+ __swp_entry().
+ */
+#define __swp_pteval_entry(type, offset) ((pteval_t) {
+ (pteval_t)(offset) << SWP_OFFSET_SHIFT >> SWP_TYPE_BITS)
+ | ((pteval_t)(type) << (64 - SWP_TYPE_BITS)) })
+
+/* Analogically, __pte_to_swp_entry() doesn’t just extract the arch-dependent
+ swp_entry_t, but also has to convert it from 64bit to the 32bit
+ intermediate representation, using the following macros based on 64bit
+ __swp_type() and __swp_offset().
+ */
+#define __pteval_swp_type(x) ((unsigned long)((x).pte >> (64 - SWP_TYPE_BITS)))
+#define __pteval_swp_offset(x) ((unsigned long)(~((x).pte) << SWP_TYPE_BITS >> SWP_OFFSET_SHIFT))
+
+/*
*/
#define gup_get_pte gup_get_pte
/*
@@ -260,4 +332,6 @@
 return pte;
 }

+#include <asm/pgtable-invert.h>
+
#endif /* _ASM_X86_PGTABLE_3LEVEL_H */
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable-3level_types.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable-3level_types.h
@@ -21,9 +21,10 @@
endif/* !_ASSEMBLY__ */

#endif CONFIG_PARAVIRT
-#define SHARED_KERNEL_PMD(pv_info.shared_kernel_pmd)
+#define SHARED_KERNEL_PMD(!static_cpu_has(X86_FEATURE_PTI) & &
+ (pv_info.shared_kernel_pmd))
#else
-#define SHARED_KERNEL_PMD1
+#define SHARED_KERNEL_PMD(!static_cpu_has(X86_FEATURE_PTI))
#endif

/*
@@ -44,5 +45,6 @@
*/
#define PTRS_PER_PTE 512

+#define PGD_KERNEL_START(CONFIG_PAGE_OFFSET >> PGDIR_SHIFT)

#endif /* _ASM_X86_PGTABLE_3LEVEL_DEFS_H */
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable-invert.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable-invert.h
@@ -0,0 +1,41 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_PGTABLE_INVERT_H
+#define _ASM_PGTABLE_INVERT_H 1
+#endif
+#ifndef __ASSEMBLY__
+/* A clear pte value is special, and doesn't get inverted.
+ * Note that even users that only pass a pgprot_t (rather
+ * than a full pte) won't trigger the special zero case,
+ * because even PAGE_NONE has _PAGE_PROTNONE | _PAGE_ACCESSED
+ * set. So the all zero case really is limited to just the
+ * cleared page table entry case.
+ */
+static inline bool __pte_needs_invert(u64 val)
+{
+ return val && !(val & _PAGE_PRESENT);
+}
+
+/* Get a mask to xor with the page table entry to get the correct pfn. */
+static inline u64 protnone_mask(u64 val)
+{
+ return __pte_needs_invert(val) ? ~0ull : 0;
+}
static inline u64 flip_protnone_guard(u64 oldval, u64 val, u64 mask) {
    /* When a PTE transitions from NONE to !NONE or vice-versa
       invert the PFN part to stop speculation.
       pte_pfn undoes this when needed.
     */
    if (__pte_needs_invert(oldval) != __pte_needs_invert(val))
        val = (val & ~mask) | (~val & mask);
    return val;
}

#endif /* __ASSEMBLY__ */
#endif

--- linux-4.15.0.orig/arch/x86/include/asm/pgtable.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable.h
@@ -30,11 +30,14 @@
void ptdump_walk_pgd_level(struct seq_file *m, pgd_t *pgd);
void ptdump_walk_pgd_level_debugfs(struct seq_file *m, pgd_t *pgd, bool user);
void ptdump_walk_pgd_level_checkwx(void);
+void ptdump_walk_user_pgd_level_checkwx(void);

#define debug_checkwx() ptdump_walk_pgd_level_checkwx()
+#define debug_checkwx() do { } while (0)
+#define debug_checkwx_user() do { } while (0)
#endif

/* Entries that were set to PROT_NONE are inverted */
+static inline u64 protnone_mask(u64 val);
+static inline unsigned long pte_pfn(pte_t pte) {
    phys_addr_t pfn = pte_val(pte);
    pfn ^= protnone_mask(pfn);
return (pfn & PTE_PFN_MASK) >> PAGE_SHIFT;
}

static inline unsigned long pmd_pfn(pmd_t pmd)
{
  return (pmd_val(pmd) & pmd_pfn_mask(pmd)) >> PAGE_SHIFT;
  phys_addr_t pfn = pmd_val(pmd);
  pfn ^= protnone_mask(pfn);
  return (pfn & pmd_pfn_mask(pmd)) >> PAGE_SHIFT;
}

static inline unsigned long pud_pfn(pud_t pud)
{
  return (pud_val(pud) & pud_pfn_mask(pud)) >> PAGE_SHIFT;
  phys_addr_t pfn = pud_val(pud);
  pfn ^= protnone_mask(pfn);
  return (pfn & pud_pfn_mask(pud)) >> PAGE_SHIFT;
}

static inline unsigned long p4d_pfn(p4d_t p4d)
{
  phys_addr_t pfn = p4d_val(p4d);
  pfn ^= protnone_mask(pfn);
  return (pfn & p4d_pfn_mask(p4d)) >> PAGE_SHIFT;
}

#ifdef CONFIG_TRANSPARENT_HUGEPAGE
/* NOTE: when predicate huge page, consider also pmd_devmap, or use pmd_large */
static inline int pmd_trans_huge(pmd_t pmd)
{
  return (pmd_val(pmd) & (_PAGE_PSE|_PAGE_DEVMAP)) == _PAGE_PSE;
}
#endif

static inline pmd_t pmd_clear_flags(pmd_t pmd, pmdval_t clear)
{
  pmdval_t v = native_pmd_val(pmd);
  return __pmd(v & ~clear);
}

static inline pmd_t pmd_mkold(pmd_t pmd)
{
  return pmd_set_flags(pmd, _PAGE_RW);
}

#ifdef CONFIG_TRANSPARENT_HUGEPAGE
/* NOTE: when predicate huge page, consider also pmd_devmap, or use pmd_large */
static inline int pmd_trans_huge(pmd_t pmd)
{
  return (pmd_val(pmd) & (_PAGE_PSE|_PAGE_DEVMAP)) == _PAGE_PSE;
  } pmdval_t v = native_pmd_val(pmd);
  return __pmd(v | set);
  } return native_make_pmd(v | set);
}

static inline pmd_t pmd_clear_flags(pmd_t pmd, pmdval_t clear)
{
  pmdval_t v = native_pmd_val(pmd);
  return __pmd(v & ~clear);
  } return native_make_pmd(v & ~clear);
}

static inline pmd_t pmd_mkold(pmd_t pmd)
{
  return pmd_set_flags(pmd, _PAGE_RW);
}
-static inline pud_t pud_mkold(pud_t pud)
@@ -459,11 +468,6 @@
return pud_set_flags(pud, _PAGE_RW);
}

-static inline pud_t pud_mknotpresent(pud_t pud)
-{
-    return pud_clear_flags(pud, _PAGE_PRESENT | _PAGE_PROTNONE);
-}

static inline pud_t pud_set_flags(pud_t pud, pudval_t set)
{
    pudval_t v = native_pud_val(pud);

    -return __pud(v | set);
    +return native_make_pud(v | set);
}

static inline pud_t pud_clear_flags(pud_t pud, pudval_t clear)
{
    pudval_t v = native_pud_val(pud);

    -return __pud(v & ~clear);
    +return native_make_pud(v & ~clear);
}

static inline pud_t pud_mkold(pud_t pud)
@@ -526,54 +530,94 @@
return pud_set_flags(pud, _PAGE_RW);
}

-static inline pud_t pud_mknotpresent(pud_t pud)
-{
-    return pud_clear_flags(pud, _PAGE_PRESENT | _PAGE_PROTNONE);
-}

-#ifdef CONFIG_HAVE_ARCH_SOFT_DIRTY
static inline int pte_soft_dirty(pte_t pte)
{
@@ -526,54 +530,94 @@
return protval;
}

+static inline pgprotval_t check_pgprot(pgprot_t pgprot)
+{
+    pgprotval_t massaged_val = massage_pgprot(pgprot);
+    +/* mmdebug.h can not be included here because of dependencies */
+    +#ifdef CONFIG_DEBUG_VM
+    +WARN_ONCE(pgprot_val(pgprot) != massaged_val,
+    +    "attempted to set unsupported pgprot: %016llx 
+    +    "bits: %016llx supported: %016llx
"
+(u64)pgprot_val(pgprot),
+(u64)pgprot_val(pgprot) ^ massaged_val,
+(u64)__supported_pte_mask);
+#endif
+
+return massaged_val;
+}
+
static inline pte_t pfn_pte(unsigned long page_nr, pgprot_t pgprot)
{
- return __pte(((phys_addr_t)page_nr << PAGE_SHIFT) |
- massage_pgprot(pgprot));
+phys_addr_t pfn = (phys_addr_t)page_nr << PAGE_SHIFT;
+pfn ^= protnone_mask(pgprot_val(pgprot));
+pfn &= PTE_PFN_MASK;
+return __pte(pfn | check_pgprot(pgprot));
}

static inline pmd_t pfn_pmd(unsigned long page_nr, pgprot_t pgprot)
{
- return __pmd(((phys_addr_t)page_nr << PAGE_SHIFT) |
- massage_pgprot(pgprot));
+phys_addr_t pfn = (phys_addr_t)page_nr << PAGE_SHIFT;
+pfn ^= protnone_mask(pgprot_val(pgprot));
+pfn &= PHYSICAL_PMD_PAGE_MASK;
+return __pmd(pfn | check_pgprot(pgprot));
}

static inline pud_t pfn_pud(unsigned long page_nr, pgprot_t pgprot)
{
- return __pud(((phys_addr_t)page_nr << PAGE_SHIFT) |
- massage_pgprot(pgprot));
+phys_addr_t pfn = (phys_addr_t)page_nr << PAGE_SHIFT;
+pfn ^= protnone_mask(pgprot_val(pgprot));
+pfn &= PHYSICAL_PUD_PAGE_MASK;
+return __pud(pfn | check_pgprot(pgprot));
+
+static inline pmd_t pmd_mknotpresent(pmd_t pmd)
+{
+ return pfn_pmd(pmd_pfn(pmd),
+ __pgprot(pmd_flags(pmd) & ~(_PAGE_PRESENT|_PAGE_PROTNONE)));
+}
+
+static inline pud_t pud_mknotpresent(pud_t pud)
+{
+ return pfn_pud(pud_pfn(pud),
+ __pgprot(pud_flags(pud) & ~(_PAGE_PRESENT|_PAGE_PROTNONE)));
+}
+static inline u64 flip_protnone_guard(u64 oldval, u64 val, u64 mask);
+
static inline pte_t pte_modify(pte_t pte, pgprot_t newprot)
{
  -pteval_t val = pte_val(pte);
  +pteval_t val = pte_val(pte), oldval = val;

  /* Chop off the NX bit (if present), and add the NX portion of
   * the newprot (if present):
   */
  val &= _PAGE_CHG_MASK;
  -val |= massage_pgprot(newprot) & ~_PAGE_CHG_MASK;
  -
  +val |= check_pgprot(newprot) & ~_PAGE_CHG_MASK;
  +val = flip_protnone_guard(oldval, val, PTE_PFN_MASK);
  return __pte(val);
}

static inline pmd_t pmd_modify(pmd_t pmd, pgprot_t newprot)
{
  -pmdval_t val = pmd_val(pmd);
  +pmdval_t val = pmd_val(pmd), oldval = val;

  val &= _HPAGE_CHG_MASK;
  -val |= massage_pgprot(newprot) & ~_HPAGE_CHG_MASK;
  -
  +val |= check_pgprot(newprot) & ~_HPAGE_CHG_MASK;
  +val = flip_protnone_guard(oldval, val, PHYSICAL_PMD_PAGE_MASK);
  return __pmd(val);
}

-/* mprotect needs to preserve PAT bits when updating vm_page_prot */
+/*
   * mprotect needs to preserve PAT and encryption bits when updating
   * vm_page_prot
   */
#define pgprot_modify pgprot_modify
static inline pgprot_t pgprot_modify(pgprot_t oldprot, pgprot_t newprot)
{
  pgprotval_t preservebits = pgprot_val(oldprot) & _PAGE_CHG_MASK;
  -pgprotval_t addbits = pgprot_val(newprot);
  +pgprotval_t addbits = pgprot_val(newprot) & ~_PAGE_CHG_MASK;
  return __pgprot(preservebits | addbits);
}
#define canon_pgprot(p) __pgprot(massage_pgprot(p))

+static inline pgprot_t arch_filter_pgprot(pgprot_t prot)
+{
+    return canon_pgprot(prot);
+}
+
static inline int is_new_memtype_allowed(u64 paddr, unsigned long size,
    enum page_cache_mode pcm,
    enum page_cache_mode new_pcm)

pmd_t *populate_extra_pmd(unsigned long vaddr);
pte_t *populate_extra_pte(unsigned long vaddr);
+
+#ifdef CONFIG_PAGE_TABLE_ISOLATION
+pgd_t __pti_set_user_pgtbl(pgd_t *pgdp, pgd_t pgd);
+/
+ /*
+ * Take a PGD location (pgdp) and a pgd value that needs to be set there.
+ * Populates the user and returns the resulting PGD that must be set in
+ * the kernel copy of the page tables.
+ */
+static inline pgd_t pti_set_user_pgtbl(pgd_t *pgdp, pgd_t pgd)
+{
+    if (!static_cpu_has(X86_FEATURE_PTI))
+        return pgd;
+    return __pti_set_user_pgtbl(pgdp, pgd);
+}
+#else /* CONFIG_PAGE_TABLE_ISOLATION */
+static inline pgd_t pti_set_user_pgtbl(pgd_t *pgdp, pgd_t pgd)
+{
+    return pgd;
+}
+#endif /* CONFIG_PAGE_TABLE_ISOLATION */
+}
+
+pud_flags(pud) & _PAGE_RW;

```c
#ifdef pmdp_establish
#define pmdp_establish pmdp_establish
+static inline pmd_t pmdp_establish(struct vm_area_struct *vma, 
+unsigned long address, pmd_t *pmdp, pmd_t pmd)
+{
+if (IS_ENABLED(CONFIG_SMP)) {
+return xchg(pmdp, pmd);
+} else {
+pmd_t old = *pmdp;
+WRITE_ONCE(*pmdp, pmd);
+return old;
+}
+}
+#endif
+
+/*
+ * Page table pages are page-aligned. The lower half of the top
+ * level is used for userspace and the top half for the kernel.
+ *
+ * Returns true for parts of the PGD that map userspace and
+ * false for the parts that map the kernel.
+ */
+static inline bool pgdp_maps_userspace(void *__ptr)
+{
+unsigned long ptr = (unsigned long)__ptr;
+
+return (((ptr & ~PAGE_MASK) / sizeof(pgd_t)) < PGD_KERNEL_START);
+}
+
+static inline int pgd_large(pgd_t pgd) { return 0; }
+
+#ifdef CONFIG_PAGE_TABLE_ISOLATION
+/
+ * All top-level PAGE_TABLE_ISOLATION page tables are order-1 pages
+ * (8k-aligned and 8k in size). The kernel one is at the beginning 4k and
+ * the user one is in the last 4k. To switch between them, you
+ * just need to flip the 12th bit in their addresses.
+ */
+#define PTI_PGTABLE_SWITCH_BIT PAGE_SHIFT
+
+/*
+ * This generates better code than the inline assembly in
+ * __set_bit().
+ */
+static inline void *ptr_set_bit(void *ptr, int bit)
+{
+unsigned long __ptr = (unsigned long)ptr;
+
```
+__ptr |= BIT(bit);
+return (void *)__ptr;
+
+static inline void *ptr_clear_bit(void *ptr, int bit)
+{
+unsigned long __ptr = (unsigned long)ptr;
+__ptr &= ~BIT(bit);
+return (void *)__ptr;
+
+static inline pgd_t *kernel_to_user_pgdp(pgd_t *pgdp)
+{
+return ptr_set_bit(pgdp, PTI_PGTABLE_SWITCH_BIT);
+
+static inline pgd_t *user_to_kernel_pgdp(pgd_t *pgdp)
+{
+return ptr_clear_bit(pgdp, PTI_PGTABLE_SWITCH_BIT);
+
+static inline p4d_t *kernel_to_user_p4dp(p4d_t *p4dp)
+{
+return ptr_set_bit(p4dp, PTI_PGTABLE_SWITCH_BIT);
+
+static inline p4d_t *user_to_kernel_p4dp(p4d_t *p4dp)
+{
+return ptr_clear_bit(p4dp, PTI_PGTABLE_SWITCH_BIT);
+#endif /* CONFIG_PAGE_TABLE_ISOLATION */
+
/* clone_pgd_range(pgd_t *dst, pgd_t *src, int count);
* @ @ -1274,6 +1426,14 @@
return __pte_access_permitted(pud_val(pud), write);
}

+#define __HAVE_ARCH_PFN_MODIFY_ALLOWED 1
+extern bool pfn_modify_allowed(unsigned long pfn, pgprot_t prot);
+
+static inline bool arch_has_pfn_modify_check(void)
+{
+return boot_cpu_has_bug(X86_BUG_L1TF);
+
+#include <asm-generic/pgtable.h>
static inline void pgtable_cache_init(void) { }
static inline void check_pgt_cache(void) { }
void paging_init(void);
+void sync_initial_page_table(void);

/*
 * Define this if things work differently on an i386 and an i486:
 * @ @ -61.7 +62.7 @@
#define kpte_clear_flush(ptep, vaddr)\
do {\
    pte_clear(&init_mm, (vaddr), (ptep));\n    __flush_tlb_one((vaddr));\n    __flush_tlb_one_kernel((vaddr));\n} while (0)
*/

#define CPU_ENTRY_AREA_PAGES(NR_CPUS * 40)

#define CPU_ENTRY_AREA_BASE\
    ((FIXADDR_START - PAGE_SIZE * (CPU_ENTRY_AREA_PAGES + 1)) & PMD_MASK)
#define PKMAP_BASE\n
#define LDT_BASE_ADDR\n     ((CPU_ENTRY_AREA_BASE - PAGE_SIZE) & PMD_MASK)
#define LDT_END_ADDR\n     (LDT_BASE_ADDR + PMD_SIZE)

#ifdef CONFIG_HIGHMEM
#define VMALLOC_END (PKMAP_BASE - 2 * PAGE_SIZE)
#else
#define VMALLOC_END (CPU_ENTRY_AREA_BASE - 2 * PAGE_SIZE)
#endif
```c
#define MODULES_VADDR	VMALLOC_START
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable_64.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable_64.h
@@ -14,6 +14,7 @@
#include <asm/processor.h>
#include <linux/bitops.h>
#include <linux/threads.h>
+#include <asm/fixmap.h>

extern p4d_t level4_kernel_pgt[512];
extern p4d_t level4_ident_pgt[512];
@@ -22,12 +23,13 @@
extern pmd_t level2_kernel_pgt[512];
extern pmd_t level2_fixmap_pgt[512];
extern pmd_t level2_ident_pgt[512];
-extern pte_t level1_fixmap_pgt[512];
+extern pte_t level1_fixmap_pgt[512 * FIXMAP_PMD_NUM];
extern pgd_t init_top_pgt[];
#define swapper_pg_dir init_top_pgt

extern void paging_init(void);
+static inline void sync_initial_page_table(void) { }

#define pte_ERROR(e)\
pr_err("%s:%d: bad pte %p(%016lx)n",
@@ -54,15 +56,15 @@
void set_pte_vaddr_p4d(p4d_t *p4d_page, unsigned long vaddr, pte_t new_pte);
void set_pte_vaddr_pud(pud_t *pud_page, unsigned long vaddr, pte_t new_pte);

-static inline void native_pte_clear(struct mm_struct *mm, unsigned long addr,\
-pte_t *ptep)
+static inline void native_set_pte(pte_t *ptep, pte_t pte)
{
- *ptep = native_make_pte(0);
+ WRITE_ONCE(*ptep, pte);
}

-static inline void native_set_pte_atomic(pte_t *ptep, pte_t pte)
+static inline void native_set_pte(pte_t *ptep, pte_t pte)
{
- *ptep = pte;
+native_set_pte(ptep, native_make_pte(0));
}

static inline void native_set_pte_atomic(pte_t *ptep, pte_t pte)
```

static inline void native_set_pmd(pmd_t *pmdp, pmd_t pmd)
{
    *pmdp = pmd;
    WRITE_ONCE(*pmdp, pmd);
}

static inline void native_pmd_clear(pmd_t *pmd)
{
    WRITE_ONCE(*pmdp, pud);
}

static inline void native_set_pud(pud_t *pudp, pud_t pud)
{
    *pudp = pud;
    WRITE_ONCE(*pudp, pud);
}

static inline void native_pud_clear(pud_t *pud)
{
    WRITE_ONCE(*pudp, pud);
}
#endif

#ifndef CONFIG_PAGE_TABLE_ISOLATION
/*
 * All top-level PAGE_TABLE_ISOLATION page tables are order-1 pages
 * (8k-aligned and 8k in size). The kernel one is at the beginning 4k and
 * the user one is in the last 4k. To switch between them, you
 * just need to flip the 12th bit in their addresses.
 */
#else
#define PTI_PGTABLE_SWITCH_BIT PAGE_SHIFT

/*
 * This generates better code than the inline assembly in
 * __set_bit().
 */

static inline void *ptr_set_bit(void *ptr, int bit)
{
    unsigned long __ptr = (unsigned long)ptr;
    __ptr |= BIT(bit);
    return (void *)__ptr;
}

static inline void *ptr_clear_bit(void *ptr, int bit)
{
    unsigned long __ptr = (unsigned long)ptr;
    __ptr &= ~BIT(bit);
    return (void *)__ptr;
}
#endif
- static inline pgd_t *kernel_to_user_pgdp(pgd_t *pgdp) {
  return ptr_set_bit(pgdp, PTI_PGTABLE_SWITCH_BIT);
}

- static inline pgd_t *user_to_kernel_pgdp(pgd_t *pgdp) {
  return ptr_clear_bit(pgdp, PTI_PGTABLE_SWITCH_BIT);
}

- static inline p4d_t *kernel_to_user_p4dp(p4d_t *p4dp) {
  return ptr_set_bit(p4dp, PTI_PGTABLE_SWITCH_BIT);
}

- static inline p4d_t *user_to_kernel_p4dp(p4d_t *p4dp) {
  return ptr_clear_bit(p4dp, PTI_PGTABLE_SWITCH_BIT);
}

- #endif /* CONFIG_PAGE_TABLE_ISOLATION */

- /* Page table pages are page-aligned. The lower half of the top
- level is used for userspace and the top half for the kernel.
- *
- * Returns true for parts of the PGD that map userspace and
- * false for the parts that map the kernel.
- */
- static inline bool pgdp_maps_userspace(void *__ptr) {
  unsigned long ptr = (unsigned long)__ptr;
  return (ptr & ~PAGE_MASK) < (PAGE_SIZE / 2);
}

- #ifdef CONFIG_PAGE_TABLE_ISOLATION
- pgd_t __pti_set_user_pgd(pgd_t *pgdp, pgd_t pgd);

- */
- * Take a PGD location (pgdp) and a pgd value that needs to be set there.
- * Populates the user and returns the resulting PGD that must be set in
- * the kernel copy of the page tables.
- */
- static inline pgd_t pti_set_user_pgd(pgd_t *pgdp, pgd_t pgd) {
  if (!static_cpu_has(X86_FEATURE_PTI))

static inline pgd_t pti_set_user_pgd(pgd_t *pgdp, pgd_t pgd)
{
	return pgd;
}

#else
static inline pgd_t pti_set_user_pgd(pgd_t *pgdp, pgd_t pgd)
{
	return __pti_set_user_pgd(pgdp, pgd);
}
#endif

static inline void native_set_p4d(p4d_t *p4dp, p4d_t p4d)
{
#if defined(CONFIG_PAGE_TABLE_ISOLATION) && !defined(CONFIG_X86_5LEVEL)
	*p4dp = pti_set_user_pgd(&p4dp->pgd, p4d.pgd);
+WRITE_ONCE(*p4dp, pti_set_user_pgtbl(&p4dp->pgd, p4d.pgd));
#else
	*p4dp = p4d;
+WRITE_ONCE(*p4dp, p4d);
#endif
}

@@ -236,9 +154,9 @@
static inline void native_set_pgd(pgd_t *pgdp, pgd_t pgd)
{
#if defined(CONFIG_PAGE_TABLE_ISOLATION)
	*pgdp = pti_set_user_pgd(pgdp, pgd);
+WRITE_ONCE(*pgdp, pti_set_user_pgtbl(pgdp, pgd));
#else
	*pgdp = pgd;
+WRITE_ONCE(*pgdp, pgd);
#endif
}

@@ -257,7 +192,7 @@
/* Level 4 access. */
static inline int pgd_large(pgd_t pgd) { return 0; }
#define mk_kernel_pgd(address) __pgd((address) | _KERNPG_TABLE)
/* PUD - Level3 access */
@@ -275,7 +192,7 @@
 * | ... | 11| 10| 9|8|7|6|5| 4|3|2| 1|0| <- bit number
 * | ... | [SW3][SW2][SW1][G][D][A][CD][WT][U] W|P| <- bit names
- * | OFFSET (14->63) | TYPE (9-13) |0|0|X|X| X|X|X|SD[0] <- swp entry
+ * | TYPE (59-63) | OFFSET (9-58) |0|0|X|X| X|X|X|SD[0] <- swp entry
 *
* G (8) is aliased and used as a PROT.NONE indicator for
* !present ptes. We need to start storing swap entries above
@@ -288,20 +205,34 @@
*
* Bit 7 in swp entry should be 0 because pmd_present checks not only P,
* but also L and G.
+ *
+ * The offset is inverted by a binary not operation to make the high
+ * physical bits set.
+ */
#define SWP_TYPE_FIRST_BIT (_PAGE_BIT_PROTNONE + 1)
#define SWP_TYPE_BITS 5
-/* Place the offset above the type: */
-#define SWP_OFFSET_FIRST_BIT (SWP_TYPE_FIRST_BIT + SWP_TYPE_BITS)
 +#define SWP_OFFSET_FIRST_BIT(_PAGE_BIT_PROTNONE + 1)
 +
 +/* We always extract/encode the offset by shifting it all the way up, and then down again */
 +#define SWP_OFFSET_SHIFT(SWP_OFFSET_FIRST_BIT+SWP_TYPE_BITS)

#define MAX_SWAPFILES_CHECK() BUILD_BUG_ON(MAX_SWAPFILES_SHIFT > SWP_TYPE_BITS)

#define __swp_type(x) (((x).val >> (SWP_TYPE_FIRST_BIT))
- & ((1U << SWP_TYPE_BITS) - 1))
#define __swp_offset(x) ((x).val >> SWP_OFFSET_FIRST_BIT)
#define __swp_entry(type, offset)((swp_entry_t) { 
- ((type) << (SWP_TYPE_FIRST_BIT))
- | ((offset) << SWP_OFFSET_FIRST_BIT) })
+/* Extract the high bits for type */
+#define __swp_type(x) ((x).val >> (64 - SWP_TYPE_BITS))
+
+/* Shift up (to get rid of type), then down to get value */
+#define __swp_offset(x) (~(x).val << SWP_TYPE_BITS >> SWP_OFFSET_SHIFT)
+
+/*
+ * Shift the offset up "too far" by TYPE bits, then down again
+ * The offset is inverted by a binary not operation to make the high
+ * physical bits set.
+ */
+#define __swp_entry(type, offset)(((swp_entry_t) { 
+(~(unsigned long)(offset) << SWP_OFFSET_SHIFT >> SWP_TYPE_BITS)
+ | (unsigned long)(type) << (64-SWP_TYPE_BITS)) })
+
#define pte_to_swp_entry(pte)((swp_entry_t) { pte_val((pte)) })
#define pmd_to_swp_entry(pmd)((swp_entry_t) { pmd_val((pmd)) })
#define __swp_entry_to_pte(x)((pte_t) { .pte = (x).val })
@@ -345,5 +276,7 @@
return true;
}

#include <asm/pgtable-invert.h>
+
#endif /* __ASSEMBLY__ */
#ifndef __ASSEMBLY__ */
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable_64_types.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable_64_types.h
@@ -84,18 +84,25 @@
*/
#define MAXMEM			ACITY(__AC(1, UL) << MAX_PHYSMEM_BITS, UL)
+
#define GUARD_HOLE_PGD_ENTRY	-256UL
#define GUARD_HOLE_SIZE		(16UL << PGDIR_SHIFT)
#define GUARD_HOLE_BASE_ADDR	(GUARD_HOLE_PGD_ENTRY << PGDIR_SHIFT)
#define GUARD_HOLE_END_ADDR	(GUARD_HOLE_BASE_ADDR + GUARD_HOLE_SIZE)
+
ifdef CONFIG_X86_5LEVEL
    # define VMALLOC_SIZE_TB_AC(12800, UL)
    # define __VMALLOC_BASE_AC(0xffff000000000000, UL)
    # define __VMEMMAP_BASE_AC(0xffff000000000000, UL)
    # define LDT_PGD_ENTRY_AC(-112, UL)
    # define LDT_PGD_ENTRY_AC(-240, UL)
    # define LDT_BASE_ADDR(LDT_PGD_ENTRY << PGDIR_SHIFT)
    # define LDT_END_ADDR(LDT_BASE_ADDR + PGDIR_SIZE)
#else
    # define VMALLOC_SIZE_TB_AC(32, UL)
    # define __VMALLOC_BASE_AC(0xffffc900000000000, UL)
    # define __VMEMMAP_BASE_AC(0xffffea000000000000, UL)
    # define LDT_PGD_ENTRY_AC(-3, UL)
    # define LDT_PGD_ENTRY_AC(-240, UL)
    # define LDT_BASE_ADDR(LDT_PGD_ENTRY << PGDIR_SHIFT)
    # define LDT_END_ADDR(LDT_BASE_ADDR + PGDIR_SIZE)
#endif

ifdef CONFIG_RANDOMIZE_MEMORY
    @@ -124,4 +131,6 @@
    # define EARLY_DYNAMIC_PAGE_TABLES	64
+
#define PGD_KERNEL_START	((PAGE_SIZE / 2) / sizeof(pgd_t))
+
#endif /* _ASM_X86_PGTABLE_64_DEFS_H */
--- linux-4.15.0.orig/arch/x86/include/asm/pgtable_types.h
+++ linux-4.15.0/arch/x86/include/asm/pgtable_types.h
@@ -50,6 +50,7 @@
#define _PAGE_GLOBAL	(_AT(pteval_t, 1) << _PAGE_BIT_GLOBAL)
#define _PAGE_SOFTW1 (_AT(pteval_t, 1) << _PAGE_BIT_SOFTW1)
#define _PAGE_SOFTW2 (_AT(pteval_t, 1) << _PAGE_BIT_SOFTW2)
+#define _PAGE_SOFTW3 (_AT(pteval_t, 1) << _PAGE_BIT_SOFTW3)
#define _PAGE_PAT (_AT(pteval_t, 1) << _PAGE_BIT_PAT)
#define _PAGE_PAT_LARGE (_AT(pteval_t, 1) << _PAGE_BIT_PAT_LARGE)
#define _PAGE_SPECIAL (_AT(pteval_t, 1) << _PAGE_BIT_SPECIAL)
@@ -124,7 +125,7 @@
 /*
 #define _PAGE_CHG_MASK (PTE_PFN_MASK | _PAGE_PCD | _PAGE_PWT |
 - _PAGE_SPECIAL | _PAGE_ACCESSED | _PAGE_DIRTY |
- + _PAGE_SOFT_DIRTY | _PAGE_DEVMAP | _PAGE_ENC)
#define _ HPAGE_CHG_MASK (_PAGE_CHG_MASK | _PAGE_PSE)
/*
@@ -148,6 +149,7 @@
 #endif
#define _PAGE_CACHE_MASK (_PAGE_PAT | _PAGE_PCD | _PAGE_PWT)
+#define _PAGE_LARGE_CACHE_MASK (_PAGE_PWT | _PAGE_PCD | _PAGE_PAT_LARGE)
#define _PAGE_NOCACHE (cachemode2protval(_PAGE_CACHE_MODE_UC))
#define _PAGE_CACHE_WP (cachemode2protval(_PAGE_CACHE_MODE_WP))
@@ -197,20 +199,22 @@
 #define __PAGE_KERNEL_NOENC (_PAGE_KERNEL)
#define __PAGE_KERNEL_NOENC_WP (_PAGE_KERNEL_WP)
-#define PAGE_KERNEL _pgprot(__PAGE_KERNEL | _PAGE_ENC)
-#define PAGE_KERNEL_NOENC _pgprot(__PAGE_KERNEL)
-#define PAGE_KERNEL_RO _pgprot(__PAGE_KERNEL_RO | _PAGE_ENC)
-#define PAGE_KERNEL_EXEC _pgprot(__PAGE_KERNEL_EXEC | _PAGE_ENC)
-#define PAGE_KERNEL_EXEC_NOENC _pgprot(__PAGE_KERNEL_EXEC)
-#define PAGE_KERNEL_RX _pgprot(__PAGE_KERNEL_RX | _PAGE_ENC)
-#define PAGE_KERNEL_NOCACHE _pgprot(__PAGE_KERNEL_NOCACHE | _PAGE_ENC)
-#define PAGE_KERNEL_LARGE _pgprot(__PAGE_KERNEL_LARGE | _PAGE_ENC)
-#define PAGE_KERNEL_LARGE_EXEC _pgprot(__PAGE_KERNEL_LARGE_EXEC | _PAGE_ENC)
-#define PAGE_KERNEL_VSYSCALL _pgprot(__PAGE_KERNEL_VSYSCALL | _PAGE_ENC)
+#define default_pgprot(x) _pgprot((x) & __default_kernel_pte_mask)
-#define PAGE_KERNEL_IO _pgprot(__PAGE_KERNEL | _PAGE_ENC)
-#define PAGE_KERNEL_IO_NOCACHE _pgprot(__PAGE_KERNEL_IO | _PAGE_ENC)
+#define PAGE_KERNEL,default_pgprot(__PAGE_KERNEL | _PAGE_ENC)
+#define PAGE_KERNEL_NOENC default_pgprot(__PAGE_KERNEL)
+#define PAGE_KERNEL_RO default_pgprot(__PAGE_KERNEL_RO | _PAGE_ENC)
+#define PAGE_KERNEL_EXEC default_pgprot(__PAGE_KERNEL_EXEC | _PAGE_ENC)
+#define PAGE_KERNEL_EXEC_NOENC default_pgprot(__PAGE_KERNEL_EXEC)
+#define PAGE_KERNEL_RX default_pgprot(__PAGE_KERNEL_RX | _PAGE_ENC)
#define PAGE_KERNEL_NOCACHE default_pgprot(__PAGE_KERNEL_NOCACHE | _PAGE_ENC)
+#define PAGE_KERNEL_LARGE default_pgprot(__PAGE_KERNEL_LARGE | _PAGE_ENC)
+#define PAGE_KERNEL_LARGE_EXEC default_pgprot(__PAGE_KERNEL_LARGE_EXEC | _PAGE_ENC)
+#define PAGE_KERNEL_VSYSCALL default_pgprot(__PAGE_KERNEL_VSYSCALL | _PAGE_ENC)
+#define PAGE_KERNEL_VVAR default_pgprot(__PAGE_KERNEL_VVAR | _PAGE_ENC)
+
+#define PAGE_KERNEL_IO default_pgprot(__PAGE_KERNEL_IO)
+#define PAGE_KERNEL_IO_NOCACHE default_pgprot(__PAGE_KERNEL_IO_NOCACHE)

@endif/* __ASSEMBLY__ */

@@ -267,14 +271,37 @@

typedef struct { pgdval_t pgd; } pgd_t;

+#ifdef CONFIG_X86_PAE
+
+/*
+ * PHYSICAL_PAGE_MASK might be non-constant when SME is compiled in, so we can't
+ * use it here.
+ */
+
+#define PGD_PAE_PAGE_MASK (signed long)PAGE_MASK
+#define PGD_PAE_PHYS_MASK (1ULL << __PHYSICAL_MASK_SHIFT) & PGD_PAE_PAGE_MASK
+
+/*
+ * PAE allows Base Address, P, PWT, PCD and AVL bits to be set in PGD entries.
+ * All other bits are Reserved MBZ
+ */
+ DEFINE_ALLOWED_BITS(PGD_PAE_PHYS_MASK | _PAGE_PRESENT | _PAGE_PWT | _PAGE_PCD | _PAGE_SOFTW1 | _PAGE_SOFTW2 | _PAGE_SOFTW3)
+else
+ No need to mask any bits for !PAE */
+define PGD_ALLOWED_BITS(~0ULL)
+endif
+
+static inline pgd_t native_make_pgd(pgdval_t val)
+{ return (pgd_t) { val & PGD_ALLOWED_BITS }; }
+
+static inline pgdval_t native_pgd_val(pgd_t pgd)
+{ return pgd.pgd & PGD_ALLOWED_BITS; }

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static inline pgdval_t pgd_flags(pgd_t pgd)  
@@ -323,6 +350,11 @@  
#else  
#include <asm-generic/pgtable-nopud.h>  
+static inline pud_t native_make_pud(pudval_t val)  
+{  
+    return (pud_t) { .p4d.pgd = native_make_pgd(val) };  
+}  
+  
+static inline pudval_t native_pud_val(pud_t pud)  
{  
    return native_pgd_val(pud.p4d.pgd);  
@@ -344,6 +376,11 @@  
#else  
#include <asm-generic/pgtable-nopmd.h>  
+static inline pmd_t native_make_pmd(pmdval_t val)  
+{  
+    return (pmd_t) { .pud.p4d.pgd = native_make_pgd(val) };  
+}  
+  
+static inline pmdval_t native_pmd_val(pmd_t pmd)  
{  
    return native_pgd_val(pmd.pud.p4d.pgd);  
@@ -475,6 +512,7 @@  
typedef struct page *pgtable_t;  
extern pteval_t __supported_pte_mask;  
+extern pteval_t __default_kernel_pte_mask;  
extern void set_nx(void);  
extern int nx_enabled;  

--- linux-4.15.0.orig/arch/x86/include/asm/pkeys.h  
+++ linux-4.15.0/arch/x86/include/asm/pkeys.h  
@@ -2,6 +2,13 @@  
#ifndef _ASM_X86_PKEYS_H  
define _ASM_X86_PKEYS_H  

+#define ARCH_DEFAULT_PKEY0  
+  
+/*  
+ * If more than 16 keys are ever supported, a thorough audit  
+ * will be necessary to ensure that the types that store key  
+ * numbers and masks have sufficient capacity.  
+ */  


#define arch_max_pkey() (boot_cpu_has(X86_FEATURE_OSPKE) ? 16 : 1)

extern int arch_set_user_pkey_access(struct task_struct *tsk, int pkey, @-15.7 +22.7 @)
static inline int execute_only_pkey(struct mm_struct *mm)
{
    if (!boot_cpu_has(X86_FEATURE_OSPKE))
        return 0;
    return ARCH_DEFAULT_PKEY;
}

return __execute_only_pkey(mm);
}@ -49.13 +56.21 @
{
    /*
    * "Allocated" pkeys are those that have been returned
    - from pkey_alloc(). pkey 0 is special, and never
    - returned from pkey_alloc().
    + from pkey_alloc() or pkey 0 which is allocated
    + implicitly when the mm is created.
    */
    -if (pkey <= 0)
    +if (pkey < 0)
    return false;
    if (pkey >= arch_max_pkey())
        return false;
    +/*
    + The exec-only pkey is set in the allocation map, but
    + is not available to any of the user interfaces like
    + mprotect_pkey().
    */
    +if (pkey == mm->context.execute_only_pkey)
        return false;
    +
    return mm_pkey_allocation_map(mm) & (1U << pkey);
}

--- linux-4.15.0.orig/arch/x86/include/asm/processor-flags.h
+++ linux-4.15.0/arch/x86/include/asm/processor-flags.h
@@ -39,10 +39,6 @@
#define CR3_PCID_MASK 0xFFFull
#define CR3_NOFLUSH BIT_ULL(63)
#else

-#ifndef CONFIG_PAGE_TABLE_ISOLATION
-# define X86_CR3_PTI_PCID_USER_BIT11
-#endif
-
#else

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/*
 * CR3_ADDR_MASK needs at least bits 31:5 set on PAE systems, and we save
 */
#define CR3_NOFLUSH0
#endif

+#ifdef CONFIG_PAGE_TABLE_ISOLATION
+# define X86_CR3_PTI_PCID_USER_BIT 11
+#endif

#endif /* _ASM_X86_PROCESSOR_FLAGS_H */
--- linux-4.15.0.orig/arch/x86/include/asm/processor.h
+++ linux-4.15.0/arch/x86/include/asm/processor.h
@@ -53,4 +49,8 @@
 #define CR3_NOFLUSH 0
#endif
+#ifdef CONFIG_PAGE_TABLE_ISOLATION
+# define X86_CR3_PTI_PCID_USER_BIT 11
+#endif

--- linux-4.15.0.orig/arch/x86/include/asm/processor.h
+++ linux-4.15.0/arch/x86/include/asm/processor.h
@@ -91,7 +91,7 @@
 __u8			x86;	/* CPU family */
 __u8			vendor/* CPU vendor */
 __u8			model;
-__u8			mask;
+__u8			stepping;
#define CONFIG_X86_64
/* Number of 4K pages in DTLB/ITLB combined(in pages): */
int x86_tlbsize;
@@ -109,7 +109,7 @@
 char x86_vendor_id[16];
 char x86_model_id[64];
/* in KB - valid for CPUS which support this call: */
-intx86_cache_size;
+unsigned int x86_cache_size;
int x86_cache_alignment; /* In bytes */
/* Cache QoS architectural values: */
int x86_cache_max_rmid; /* max index */
@@ -132,6 +132,8 @@
 /* Index into per_cpu list: */
i16cpu_index;
u32microcode;
+/* Address space bits used by the cache internally */
+u8x86_cache_bits;
unsigned initialized : 1;
} __randomize_layout;

@@ -181,20 +183,16 @@
extern void cpu_detect(struct cpuinfo_x86 *c);

+static inline unsigned long long l1tf_pfn_limit(void)
+{
+return BIT_ULL(boot_cpu_data.x86_cache_bits - 1 - PAGE_SHIFT);
+}
extern void early_cpu_init(void);
extern void identify_boot_cpu(void);
extern void identify_secondary_cpu(struct cpuinfo_x86 *);
extern void print_cpu_info(struct cpuinfo_x86 *);
void print_cpu_msr(struct cpuinfo_x86 *);
-extern void init_scattered_cpuid_features(struct cpuinfo_x86 *c);
-extern u32 get_scattered_cpuid_leaf(unsigned int level,
-        unsigned int sub_leaf,
-        enum cpuid_regs_idx reg);
-extern unsigned int init_intel_cacheinfo(struct cpuinfo_x86 *c);
-extern void init_amd_cacheinfo(struct cpuinfo_x86 *c);
-
-extern void detect_extended_topology(struct cpuinfo_x86 *c);
-extern void detect_ht(struct cpuinfo_x86 *c);

#if defined CONFIG_X86_32
extern int have_cpuid_p(void);
@@ -338,7 +336,7 @@
#define INVALID_IO_BITMAP_OFFSET 0x8000

struct entry_stack {
    -unsigned longwords[64];
    +char stack[PAGE_SIZE];
};

struct entry_stack_page {
    @@ -460,8 +458,6 @@
 unsigned short gsindex;
 #endif
    -u32 status;/* thread synchronous flags */
-    */
    -
#elif defined CONFIG_X86_64
 unsigned longfsbase;
 unsigned longgbase;
 @@ -508,15 +504,6 @@
    ];

    /*
    -* Thread-synchronous status.
    -*
    -* This is different from the flags in that nobody else
    -* ever touches our thread-synchronous status, so we don't
    -* have to worry about atomic accesses.
    -* */
    +#define TS_COMPAT 0x0002/* 32bit syscall active (64BIT)*/
    -*/
/*
 * Set IOPL bits in EFLAGS from given mask
 */
static inline void native_set_iopl_mask(unsigned mask)
@@ -961,6 +948,7 @@
 extern unsigned long arch_align_stack(unsigned long sp);
 extern void free_init_pages(char *what, unsigned long begin, unsigned long end);
 +extern void free_kernel_image_pages(void *begin, void *end);

 void default_idle(void);
 ifdef CONFIG_XEN
 @@ -971,4 +959,30 @@
 void stop_this_cpu(void *dummy);
 void df_debug(struct pt_regs *regs, long error_code);
 +void microcode_check(void);
 +
 +enum l1tf_mitigations {
 +L1TF_MITIGATION_OFF,
 +L1TF_MITIGATION_FLUSH_NOWARN,
 +L1TF_MITIGATION_FLUSH,
 +L1TF_MITIGATION_FLUSH_NOSMT,
 +L1TF_MITIGATION_FULL,
 +L1TF_MITIGATION_FULL_FORCE
 +};
 +
 +extern enum l1tf_mitigations l1tf_mitigation;
 +
 +enum mds_mitigations {
 +MDS_MITIGATION_OFF,
 +MDS_MITIGATION_FULL,
 +MDS_MITIGATION_VMWERV,
 +};
 +
 +enum taa_mitigations {
 +TAA_MITIGATION_OFF,
 +TAA_MITIGATION_UCODE_NEEDED,
 +TAA_MITIGATION_VERW,
 +TAA_MITIGATION_TSX_DISABLED,
 +};
 +
 #endif /* _ASM_X86_PROCESSOR_H */
--- linux-4.15.0.orig/arch/x86/include/asm/proto.h
+++ linux-4.15.0/arch/x86/include/asm/proto.h
@@ -4,6 +4,8 @@
 #include <asm/ldt.h>
+struct task_struct;
+
/* misc architecture specific prototypes */

void syscall_init(void);
--- linux-4.15.0.org/arch/x86/include/asm/pti.h
+++ linux-4.15.0/arch/x86/include/asm/pti.h
@@ -6,6 +6,7 @@
#ifdef CONFIG_PAGE_TABLE_ISOLATION
extern void pti_init(void);
extern void pti_check_boottime_disable(void);
+extern void pti_finalize(void);
#else
static inline void pti_check_boottime_disable(void) { }
#endif
--- linux-4.15.0.org/arch/x86/include/asm/ptrace.h
+++ linux-4.15.0/arch/x86/include/asm/ptrace.h
@@ -232,23 +232,51 @@
}

/**
 + * regs_get_kernel_stack_nth_addr() - get the address of the Nth entry on stack
 + * @regs:	pt_regs which contains kernel stack pointer.
 + * @n:	stack entry number.
 + *
 + + * regs_get_kernel_stack_nth_addr() returns the address of the @n th entry of the
 + * kernel stack which is specified by @regs. If the @n th entry is NOT in
 + * the kernel stack, this returns NULL.
 + */
+static inline unsigned long *regs_get_kernel_stack_nth_addr(struct pt_regs *regs, unsigned int n)
+{
+ unsigned long *addr = (unsigned long *)kernel_stack_pointer(regs);
+ 
+ addr += n;
+ if (regs_within_kernel_stack(regs, (unsigned long)addr))
+ 
+ return addr;
+ else
+ return NULL;
+ }
+ +
+/* To avoid include hell, we can't include uaccess.h */
+extern long probe_kernel_read(void *dst, const void *src, size_t size);
+
+*/
+*regs_get_kernel_stack_nth() - get Nth entry of the stack
+ * @regs:pt_regs which contains kernel stack pointer.
+ * @n:stack entry number.
walls_get_kernel_stack_nth() returns the \texttt{n}th entry of the kernel stack which is specified by \texttt{regs}. If the \texttt{n}th entry is NOT in the kernel stack, this returns 0.

```c
static inline unsigned long walls_get_kernel_stack_nth(struct pt_regs *regs,
          unsigned int n)
{
    unsigned long *addr = (unsigned long *)kernel_stack_pointer(regs);
    addr += n;
    if (regs_within_kernel_stack(regs, (unsigned long)addr))
        return *addr;
    else
        return 0;
}
```

---

# Definienda arch_has_single_step()

```c
#define arch_has_single_step() (1)
```

--- linux-4.15.0.orig/arch/x86/include/asm/qspinlock.h

--- linux-4.15.0/arch/x86/include/asm/qspinlock.h

```c
#define _Q_PENDING_LOOPS (1 << 9)
```

---

```c
static __always_inline bool __queued_RMW_btsl(struct qspinlock *lock)
{
    GEN_BINARY_RMWcc(LOCK_PREFIX "btsl", lock->val.counter,
        "I", _Q_PENDING_OFFSET, "%0", c);
}
```

```c
static __always_inline u32 queued_fetch_set_pending_acquire(struct qspinlock *lock)
```
+{  
+u32 val = 0;  
+  
+if (__queued_RMW_btsl(lock))  
+val |= _Q_PENDING_VAL;  
+  
+val |= atomic_read(&lock->val) & ~_Q_PENDING_MASK;  
+  
+return val;  
+  
}  

#define queued_spin_unlock queued_spin_unlock  
/*  
@@ -16,7 +39,7 @@  
*/  
static inline void native_queued_spin_unlock(struct qspinlock *lock)  
{  
  -smp_store_release((u8 *)lock, 0);  
  +smp_store_release(&lock->locked, 0);  
  }  

#ifdef CONFIG_PARAVIRT_SPINLOCKS  
--- linux-4.15.0.orig/arch/x86/include/asm/qspinlock_paravirt.h  
+++ linux-4.15.0/arch/x86/include/asm/qspinlock_paravirt.h  
@@ -22,8 +22,7 @@  
*/  
*  
* void __pv_queued_spin_unlock(struct qspinlock *lock)  
* {  
  -*struct __qspinlock *l = (void *)lock;  
  -*u8 lockval = cmpxchg(&l->locked, _Q_LOCKED_VAL, 0);  
  +*u8 lockval = cmpxchg(&lock->locked, _Q_LOCKED_VAL, 0);  
*  
*if (likely(lockval == _Q_LOCKED_VAL))  
*return;  
--- linux-4.15.0.orig/arch/x86/include/asm/refcount.h  
+++ linux-4.15.0/arch/x86/include/asm/refcount.h  
@@ -67,13 +67,13 @@  
bool refcount_sub_and_test(unsigned int i, refcount_t *r)  
{  
  GEN_BINARY_SUFFFIXED_RMWcc(LOCK_PREFIX "subl", REFCOUNT_CHECK_LT_ZERO,  
  - r->refs.counter, "er", i, "%0", e);  
  + r->refs.counter, "er", i, "%0", e, "cx");  
  }  

static __always_inline __must_check bool refcount_dec_and_test(refcount_t *r)  
{  
  GEN_UNARY_SUFFFIXED_RMWcc(LOCK_PREFIX "decl", REFCOUNT_CHECK_LT_ZERO,  
  - r->refs.counter, "%0", e);  
}
static __always_inline __must_check
--- linux-4.15.0.orig/arch/x86/include/asm/required-features.h
+++ linux-4.15.0/arch/x86/include/asm/required-features.h
@@ -106,6 +106,7 @@
#define REQUIRED_MASK15 0
#define REQUIRED_MASK16 (NEED_LA57)
#define REQUIRED_MASK17 0
-#define REQUIRED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 18)
+#define REQUIRED_MASK18 0
+#define REQUIRED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 19)

#endif /* _ASM_X86_REQUIRED_FEATURES_H */
--- linux-4.15.0.orig/arch/x86/include/asm/rmwcc.h
+++ linux-4.15.0/arch/x86/include/asm/rmwcc.h
@@ -2,8 +2,7 @@
#ifndef _ASM_X86_RMWcc
#define _ASM_X86_RMWcc

-#define __CLOBBERS_MEM		"memory"
-#define __CLOBBERS_MEM_CC_CX	"memory", "cc", "cx"
+#define __CLOBBERS_MEM(clb...)"memory", "## clb"

#if !defined(__GCC_ASM_FLAG_OUTPUTS__) && defined(CC_HAVE_ASM_GOTO)
@@ -40,18 +39,19 @@
#ifndef __GCC_ASM_FLAG_OUTPUTS__ || !defined(CC_HAVE_ASM_GOTO) */
#define GEN_UNARY_RMWcc(op, var, arg0, cc)				
-__GEN_RMWcc(op "arg0", var, cc, __CLOBBERS_MEM)
+__GEN_RMWcc(op "arg0", var, cc, __CLOBBERS_MEM())

define GEN_BINARY_RMWcc(op, var, vcon, val, arg0, cc)				
-__GEN_RMWcc(op __BINARY_RMWcc_ARG arg0, var, cc, __CLOBBERS_MEM)
+#define GEN_BINARY_SUFFIXED_RMWcc(op, suffix, var, vcon, val, arg0, cc, clobbers...)
-__GEN_RMWcc(op "arg0 "int" suffix, var, cc, __CLOBBERS_MEM_CC_CX)
+__GEN_RMWcc(op "arg0 "int" suffix, var, cc, __CLOBBERS_MEM(clobbers))

#define GEN_BINARY_SUFFIXED_RMWcc(op, suffix, var, vcon, val, arg0, cc, clobbers...)
-__GEN_RMWcc(op __BINARY_RMWcc_ARG arg0, var, cc, __CLOBBERS_MEM, vcon (val))
+__GEN_BINARY_SUFFIXED_RMWcc(op, suffix, var, vcon, val, arg0, cc, clobbers...)

+ DEFINE X86 SIMD INTRINSICS REPORTS
   +弁式に変換
   +弁式に変換

---
__GEN_RMWWcc(op __BINARY_RMWWcc_ARG arg0 "int" suffix, var, cc,)
- __CLOBBERS_MEM_CC_CX, vcon (val))
+ __CLOBBERS_MEM(clobbers), vcon (val))

#endif /* _ASM_X86_RMWcc */
--- linux-4.15.0.orig/arch/x86/include/asm/sections.h
+++ linux-4.15.0/arch/x86/include/asm/sections.h
@@ -7,9 +7,11 @@
 extern char __brk_base[], __brk_limit[];
 extern struct exception_table_entry __stop___ex_table[];
+extern char __end_rodata_aligned[];

#if defined(CONFIG_X86_64)
 extern char __end_rodata_hpage_align[];
+extern char __entry_trampoline_start[], __entry_trampoline_end[];
#endif

#elif /* _ASM_X86_SECTIONS_H */
--- linux-4.15.0.orig/arch/x86/include/asm/set_memory.h
+++ linux-4.15.0/arch/x86/include/asm/set_memory.h
@@ -46,6 +46,7 @@
 int set_memory_4k(unsigned long addr, int numpages);
 int set_memory_encrypted(unsigned long addr, int numpages);
 int set_memory_decrypted(unsigned long addr, int numpages);
+int set_memory_np_noalias(unsigned long addr, int numpages);
 int set_memory_array_uc(unsigned long *addr, int addrinarray);
 int set_memory_array_wc(unsigned long *addr, int addrinarray);
--- linux-4.15.0.orig/arch/x86/include/asm/smp.h
+++ linux-4.15.0/arch/x86/include/asm/smp.h
@@ -129,6 +129,7 @@
 void cpu_disable_common(void);
 void native_smp_prepare_boot_cpu(void);
 void native_smp_prepare_cpus(unsigned int max_cpus);
+void calculate_max_logical_packages(void);
 void native_smp_cpus_done(unsigned int max_cpus);
 void common_cpu_up(unsigned int cpunum, struct task_struct *tidle);
 int native_cpu_up(unsigned int cpunum, struct task_struct *tidle);
@@ -170,22 +171,11 @@
 wbinvd();
 return 0;
 }
-#define smp_num_siblings1
#endif /* CONFIG_SMP */

extern unsigned disabled_cpus;
#ifdef CONFIG_X86_LOCAL_APIC

-#ifndef CONFIG_X86_64
static inline int logical_smp_processor_id(void)
{
    /* we don't want to mark this access volatile - bad code generation */
    return GET_APIC_LOGICAL_ID(apic_read(APIC_LDR));
}

#else /* CONFIG_X86_LOCAL_APIC */
--- linux-4.15.0.orig/arch/x86/include/asm/spec-ctrl.h
+++ linux-4.15.0/arch/x86/include/asm/spec-ctrl.h
@@ -0,0 +1,88 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _ASM_X86_SPECCTRL_H_
+#define _ASM_X86_SPECCTRL_H_
+
+#include <linux/thread_info.h>
+#include <asm/nospec-branch.h>
+
+/* On VMENTER we must preserve whatever view of the SPEC_CTRL MSR
+ * the guest has, while on VMEXIT we restore the host view. This
+ * would be easier if SPEC_CTRL were architecturally maskable or
+ * shadowable for guests but this is not (currently) the case.
+ * Takes the guest view of SPEC_CTRL MSR as a parameter and also
+ * the guest's version of VIRT_SPEC_CTRL, if emulated.
+ */
+extern void x86_virt_spec_ctrl(u64 guest_spec_ctrl, u64 guest_virt_spec_ctrl, bool guest);
+
+/**
+ * x86_spec_ctrl_set_guest - Set speculation control registers for the guest
+ * @guest_spec_ctrl:	The guest content of MSR_SPEC_CTRL
+ * @guest_virt_spec_ctrl:	The guest controlled bits of MSR_VIRT_SPEC_CTRL
+ * (may get translated to MSR_AMD64_LS_CFG bits)
+ *
+ * Avoids writing to the MSR if the content/bits are the same
+ */
+static inline
+void x86_spec_ctrl_set_guest(u64 guest_spec_ctrl, u64 guest_virt_spec_ctrl)
+{
+x86_virt_spec_ctrl(guest_spec_ctrl, guest_virt_spec_ctrl, true);
+}
+

+/**
+ * x86_spec_ctrl_restore_host - Restore host speculation control registers
+ * @guest_spec_ctrl: The guest content of MSR_SPEC_CTRL
+ * @guest_virt_spec_ctrl: The guest controlled bits of MSR_VIRT_SPEC_CTRL
+ *(may get translated to MSR_AMD64_LS_CFG bits)
+ *
+ * Avoids writing to the MSR if the content/bits are the same
+ */
+static inline
+void x86_spec_ctrl_restore_host(u64 guest_spec_ctrl, u64 guest_virt_spec_ctrl)
+{
+x86_virt_spec_ctrl(guest_spec_ctrl, guest_virt_spec_ctrl, false);
+}
+
+/* AMD specific Speculative Store Bypass MSR data */
+extern u64 x86_amd_ls_cfg_base;
+extern u64 x86_amd_ls_cfg_ssbd_mask;
+
+static inline u64 ssbd_tif_to_spec_ctrl(u64 tifn)
+{
+BUILD_BUG_ON(TIF_SSBD < SPEC_CTRL_SSBD_SHIFT);
+return (tifn & _TIF_SSBD) >> (TIF_SSBD - SPEC_CTRL_SSBD_SHIFT);
+}
+
+static inline u64 stibp_tif_to_spec_ctrl(u64 tifn)
+{
+BUILD_BUG_ON(TIF_SPEC_IB < SPEC_CTRL_STIBP_SHIFT);
+return (tifn & _TIF_SPEC_IB) >> (TIF_SPEC_IB - SPEC_CTRL_STIBP_SHIFT);
+}
+
+static inline unsigned long ssbd_spec_ctrl_to_tif(u64 spec_ctrl)
+{
+BUILD_BUG_ON(TIF_SSBD < SPEC_CTRL_SSBD_SHIFT);
+return (spec_ctrl & SPEC_CTRL_SSBD) << (TIF_SSBD - SPEC_CTRL_SSBD_SHIFT);
+}
+
+static inline unsigned long stibp_spec_ctrl_to_tif(u64 spec_ctrl)
+{
+BUILD_BUG_ON(TIF_SPEC_IB < SPEC_CTRL_STIBP_SHIFT);
+return (spec_ctrl & SPEC_CTRL_STIBP) << (TIF_SPEC_IB - SPEC_CTRL_STIBP_SHIFT);
+}
+
+static inline u64 ssbd_tif_to_amd_ls_cfg(u64 tifn)
+{
+return (tifn & _TIF_SSBD) ? x86_amd_ls_cfg_ssbd_mask : 0ULL;
+}
+
+#ifdef CONFIG_SMP
extern void speculative_store_bypass_ht_init(void);
+
+static inline void speculative_store_bypass_ht_init(void) {}
+
+extern void speculation_ctrl_update(unsigned long tif);
+extern void speculation_ctrl_update_current(void);
+
+#endif

--- linux-4.15.0.orig/arch/x86/include/asm/stackprotector.h
+++ linux-4.15.0/arch/x86/include/asm/stackprotector.h
@@ -55,8 +55,13 @@
 /*
 * Initialize the stackprotector canary value.
 *
- * NOTE: this must only be called from functions that never return,
+ * NOTE: this must only be called from functions that never return
 * and it must always be inlined.
 + *
  *
+ * In addition, it should be called from a compilation unit for which
+ * stack protector is disabled. Alternatively, the caller should not end
+ * with a function call which gets tail-call optimized as that would
+ * lead to checking a modified canary value.
 */
static __always_inline void boot_init_stack_canary(void)
{

--- linux-4.15.0.orig/arch/x86/include/asm/string_32.h
+++ linux-4.15.0/arch/x86/include/asm/string_32.h
@@ -179,14 +179,7 @@
	No 3D Now!
 */

-#if (__GNUC__ >= 4)
#define memcpy(t, f, n) __builtin_memcpy(t, f, n)
-#else
-#define memcpy(t, f, n)				
-#endif
-#endif /* !CONFIG_FORTIFY_SOURCE */
@@ -282,12 +275,7 @@
{

-#ifdef __GNUC__ > 4)
#define memcpy(t, f, n) __builtin_memcpy(t, f, n)
-#else
-#define memcpy(t, f, n)
-(__builtin_constant_p((n))
- ? __constant_memcpy((t), (f), (n))
- : __memcpy((t), (f), (n)))
-#endif

#endif
#endif /* !CONFIG_FORTIFY_SOURCE */
@@ -282,12 +275,7 @@
{

-#ifdef __GNUC__ > 4)
#define memcpy(t, f, n) __builtin_memcpy(t, f, n)
-#else
-#define memcpy(t, f, n)
-(__builtin_constant_p((n))
- ? __constant_memcpy((t), (f), (n))
- : __memcpy((t), (f), (n)))
-#endif

#endif
#endif /* !CONFIG_FORTIFY_SOURCE */
@@ -282,12 +275,7 @@
{

-#ifdef __GNUC__ > 4)
#define memcpy(t, f, n) __builtin_memcpy(t, f, n)
-#else
-#define memcpy(t, f, n)
-(__builtin_constant_p((n))
- ? __constant_memcpy((t), (f), (n))
- : __memcpy((t), (f), (n)))
-#endif

#endif
#endif /* !CONFIG_FORTIFY_SOURCE */
@@ -282,12 +275,7 @@
{

-#ifdef __GNUC__ > 4)
#define memcpy(t, f, n) __builtin_memcpy(t, f, n)
-#else
-#define memcpy(t, f, n)
-(__builtin_constant_p((n))
- ? __constant_memcpy((t), (f), (n))
- : __memcpy((t), (f), (n)))
-#endif

#endif
#endif /* !CONFIG_FORTIFY_SOURCE */
@@ -282,12 +275,7 @@
{

-#ifdef __GNUC__ > 4)
#define memcpy(t, f, n) __builtin_memcpy(t, f, n)
-#else
-#define memcpy(t, f, n)
-(__builtin_constant_p((n))
- ? __constant_memcpy((t), (f), (n))
- : __memcpy((t), (f), (n)))
-#endif

#endif
#endif /* !CONFIG_FORTIFY_SOURCE */
@@ -282,12 +275,7 @@
{

-#ifdef __GNUC__ > 4)
#define memcpy(t, f, n) __builtin_memcpy(t, f, n)
-#else
-#define memcpy(t, f, n)
-(__builtin_constant_p((n))
- ? __constant_memcpy((t), (f), (n))
- : __memcpy((t), (f), (n)))
-#endif

#endif
#endif /* !CONFIG_FORTIFY_SOURCE */

int d0, d1;
-#if __GNUC__ == 4 && __GNUC_MINOR__ == 0
/* Workaround for broken gcc 4.0 */
-register unsigned long eax asm("%eax") = pattern;
-#else
 unsigned long eax = pattern;
-#endif

switch (count % 4) {
   case 0:
      @ @ -321,15 +309,7 @ @
#define __HAVE_ARCH_MEMSET
 extern void *memset(void *, int, size_t);
#ifndef CONFIG_FORTIFY_SOURCE
#ifdef CONFIG_FORTIFY_SOURCE
-#if (__GNUC__ >= 4)
define memset(s, c, count) __builtin_memset(s, c, count)
-#else
-#define memset(s, c, count)
 - (__builtin_constant_p(c)
 - ? __constant_c_x_memset((s), (0x01010101UL * (unsigned char)(c)), 
 - (count))
 - : __memset((s), (c), (count)))
-#endif
#endif /* !CONFIG_FORTIFY_SOURCE */
#endif /* !HAVE_ARCH_MEMSET */

#define __HAVE_ARCH_MEMSET16
--- linux-4.15.0.orig/arch/x86/include/asm/string_64.h
+++ linux-4.15.0/arch/x86/include/asm/string_64.h
@@ -32,21 +32,6 @@ extern void *memcpy(void *, const void *, size_t);
extern void *__memcpy(void *, const void *, size_t);
-#ifndef CONFIG_FORTIFY_SOURCE
-#if ((__GNUC__ == 4 && __GNUC_MINOR__ < 3) || __GNUC__ < 4)
define memcpy(dst, src, len)
({
  size_t __len = (len);
  void *__ret;
  if (__builtin_constant_p(len) && __len >= 64)
    __ret = __memcpy((dst), (src), __len);
  else
    __ret = __builtin_memcpy((dst), (src), __len);
  __ret;
})
-#endif
-#endif /* !CONFIG_FORTIFY_SOURCE */
-#ifndef CONFIG_FORTIFY_SOURCE
-#if ((__GNUC__ == 4 && __GNUC_MINOR__ < 3) || __GNUC__ < 4)
define __HAVE_ARCH_MEMSET
 void *memset(void *, int, size_t);
 void *__memset(void *, int, size_t);
-#endif /* !CONFIG_FORTIFY_SOURCE */
-#endif /* !HAVE_ARCH_MEMSET */

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--- linux-4.15.0.orig/arch/x86/include/asm/svm.h
+++ linux-4.15.0/arch/x86/include/asm/svm.h
@@ -117,6 +117,8 @@
#define V_IGN_TPR_SHIFT 20
#define V_IGN_TPR_MASK (1 << V_IGN_TPR_SHIFT)

+#define V_IRQ_INJECTION_BITS_MASK (V_IRQ_MASK | V_INTR_PRIO_MASK | V_IGN_TPR_MASK)
+
#define V_INTR_MASKING_SHIFT 24
#define V_INTR_MASKING_MASK (1 << V_INTR_MASKING_SHIFT)

--- linux-4.15.0.orig/arch/x86/include/asm/switch_to.h
+++ linux-4.15.0/arch/x86/include/asm/switch_to.h
@@ -11,9 +11,6 @@

 __visible struct task_struct *__switch_to(struct task_struct *prev,
   struct task_struct *next);
-struct tss_struct;
-void __switch_to_xtra(struct task_struct *prev_p, struct task_struct *next_p,
-                        struct tss_struct *tss);

 /* This runs runs on the previous thread's stack. */
 static inline void prepare_switch_to(struct task_struct *next)
@@ -43,6 +40,7 @@
* order of the fields must match the code in __switch_to_asm().
 */
 struct inactive_task_frame {
+unsigned long flags;
 #ifdef CONFIG_X86_64
 unsigned long r15;
 unsigned long r14;
@@ -87,15 +85,25 @@
 /* This is used when switching tasks or entering/exiting vm86 mode. */
- static inline void update_sp0(struct task_struct *task)
+ static inline void update_task_stack(struct task_struct *task) {
   - load_sp0(task->thread.sp0);
   + if (static_cpu_has(X86_FEATURE_XENPV))
     + load_sp0(task->thread.sp0);
   + else
     + this_cpu_write(cpu_tss_rw.x86_tss.sp1, task->thread.sp0);
   #else
+/*
+ * x86-64 updates x86_tss.sp1 via cpu_current_top_of_stack. That
+ * doesn't work on x86-32 because sp1 and
+ * cpu_current_top_of_stack have different values (because of
+ * the non-zero stack-padding on 32bit).
+ */
if (static_cpu_has(X86_FEATURE_XENPV))
    load_sp0(task_top_of_stack(task));
#endif
+
#endif /* _ASM_X86 SWITCH_TO_H */
--- linux-4.15.0.orig/arch/x86/include/asm/syscall.h
+++ linux-4.15.0/arch/x86/include/asm/syscall.h
@@ -60,7 +60,7 @@
* TS_COMPAT is set for 32-bit syscall entries and then
* remains set until we return to user mode.
 */
-if (task->thread.status & (TS_COMPAT|TS_I386_REGS_POKED))
+if (task->thread_info.status & (TS_COMPAT|TS_I386_REGS_POKED))
 /*
 * Sign-extend the value so (int)-EFOO becomes (long)-EFOO
 * and will match correctly in comparisons.
@@ -116,7 +116,7 @@
unsigned long *args)
 {
# ifdef CONFIG_IA32_EMULATION
-if (task->thread.status & TS_COMPAT)
+if (task->thread_info.status & TS_COMPAT)
    switch (i) {
    case 0:
        if (!n--) break;
@@ -177,7 +177,7 @@
const unsigned long *args)
 {
# ifdef CONFIG_IA32_EMULATION
-if (task->thread.status & TS_COMPAT)
+if (task->thread_info.status & TS_COMPAT)
    switch (i) {
    case 0:
        if (!n--) break;
--- linux-4.15.0.orig/arch/x86/include/asm/text-patching.h
+++ linux-4.15.0/arch/x86/include/asm/text-patching.h
@@ -38,4 +38,34 @@
 extern int poke_int3_handler(struct pt_regs *regs);
 extern void *text_poke_bp(void *addr, const void *opcode, size_t len, void *handler);
+ifndef CONFIG_UML_X86
+static inline void int3_emulate_jmp(struct pt_regs *regs, unsigned long ip)
 +{
 +regs->ip = ip;
 +}
 +
+#define INT3_INSN_SIZE 1
+#define CALL_INSN_SIZE 5
 +
+#ifdef CONFIG_X86_64
+static inline void int3_emulate_push(struct pt_regs *regs, unsigned long val)
+{
+  /*
+   * The int3 handler in entry_64.S adds a gap between the
+   * stack where the break point happened, and the saving of
+   * pt_regs. We can extend the original stack because of
+   * this gap. See the idtentry macro's create_gap option.
+   */
+  regs->sp -= sizeof(unsigned long);
+  *(unsigned long *)regs->sp = val;
+}
 +
+static inline void int3_emulate_call(struct pt_regs *regs, unsigned long func)
+{
+  int3_emulate_push(regs, regs->ip - INT3_INSN_SIZE + CALL_INSN_SIZE);
+  int3_emulate_jmp(regs, func);
+}
+#endif /* CONFIG_X86_64 */
+}
+#endif /* !CONFIG_UML_X86 */
+
+#endif /* _ASM_X86_TEXT_PATCHING_H */
--- linux-4.15.0.orig/arch/x86/include/asm/thread_info.h
+++ linux-4.15.0/arch/x86/include/asm/thread_info.h
@@ -55,6 +55,7 @@
 struct thread_info {
     unsigned long		flags;		/* low level flags */
     u32			status;		/* thread synchronous flags */
+    u32			status;		/* thread synchronous flags */
};

#define INIT_THREAD_INFO(tsk)\}
@ @ -80,9 +81,12 @@ @
#define TIF_SIGPENDING2/* signal pending */
#define TIF_NEED_RESCHED3/* rescheduling necessary */
#define TIF_SINGLESTEP4/* reenable singlestep on user return*/
+#define TIF_SSBD5/* Speculative store bypass disable */
#define TIF_SYSCALL_EMU6/* syscall emulation active */
#define TIF_SYSCALL_AUDIT7/* syscall auditing active */
#define TIF_SECCOMP8/* secure computing */


+#define TIF_SPEC_IB /* Indirect branch speculation mitigation */
+#define TIF_SPEC_FORCE_UPDATE /* Force speculation MSR update in context switch */
#define TIF_USER_RETURN_NOTIFY /* notify kernel of userspace return */
#define TIF_PATCH_PENDING /* pending live patching update */
							(@ @ -106,9 +110,12 @@)
#define _TIF_SIGPENDING(1 << TIF_SIGPENDING)
#define _TIF_NEED_RESCHED(1 << TIF_NEED_RESCHED)
#define _TIF_SINGLESTEP(1 << TIF_SINGLESTEP)
+define _TIF_SSBD(1 << TIF_SSBD)
#define _TIF_SYSCALL_EMU(1 << TIF_SYSCALL_EMU)
#define _TIF_SYSCALL_AUDIT(1 << TIF_SYSCALL_AUDIT)
#define _TIF_SECCOMP(1 << TIF_SECCOMP)
+define _TIF_SPEC_IB(1 << TIF_SPEC_IB)
+define _TIF_SPEC_FORCE_UPDATE(1 << TIF_SPEC_FORCE_UPDATE)
#define _TIF_USER_RETURN_NOTIFY(1 << TIF_USER_RETURN_NOTIFY)
#define _TIF_UPROBE(1 << TIF_UPROBE)
#define _TIF_PATCH_PENDING(1 << TIF_PATCH_PENDING)
							(@ @ -144,8 +151,18 @@
							_TIF_FSCHECK)
/* flags to check in __switch_to() */
-#define _TIF_WORK_CTXSW
-(_TIF_IO_BITMAP|_TIF_NOCPUID|_TIF_NOTSC|_TIF_BLOCKSTEP)
+#define _TIF_WORK_CTXSW_BASE
+(_TIF_IO_BITMAP|_TIF_NOCPUID|_TIF_NOTSC|_TIF_BLOCKSTEP
+ _TIF_SSBD | _TIF_SPEC_FORCE_UPDATE)
+
+/*
+ * Avoid calls to __switch_to_xtra() on UP as STIBP is not evaluated.
+ */
+#ifdef CONFIG_SMP
+ifdefine _TIF_WORK_CTXSW(_TIF_WORK_CTXSW_BASE | _TIF_SPEC_IB)
+else
+ifdefine _TIF_WORK_CTXSW(_TIF_WORK_CTXSW_BASE)
+endif

#define _TIF_WORK_CTXSW_PREV (_TIF_WORK_CTXSW|_TIF_USER_RETURN_NOTIFY)
#define _TIF_WORK_CTXSW_NEXT (_TIF_WORK_CTXSW)
							(@ @ -212,16 +229,37 @@

#endif

/*
 * Thread-synchronous status.
 * +
 * + This is different from the flags in that nobody else
 * + ever touches our thread-synchronous status, so we don't
+ * have to worry about atomic accesses.
+ */
+#define TS_COMPAT		0x0002	/* 32bit syscall active (64BIT)*/
+
+#ifndef __ASSEMBLY__
#define __ASSEMBLY__
#endif CONFIG_COMPAT
#define TS_I386_REGS_POKED	0x0004	/* regs poked by 32-bit ptracer */
+#define TS_COMPAT_RESTART	0x0008
+
+#define arch_set_restart_data	arch_set_restart_data
+
+static inline void arch_set_restart_data(struct restart_block *restart)
+{
+struct thread_info *ti = current_thread_info();
+if (ti->status & TS_COMPAT)
+ti->status |= TS_COMPAT_RESTART;
+else
+ti->status &= ~TS_COMPAT_RESTART;
+}
#endif
-#ifndef __ASSEMBLY__
#endif CONFIG_X86_32
#define in_ia32_syscall() true
#else
#define in_ia32_syscall() (IS_ENABLED(CONFIG_IA32_EMULATION) &&
- current->thread.status & TS_COMPAT)
+ current_thread_info()->status & TS_COMPAT)
#endif

/*
--- linux-4.15.0.orig/arch/x86/include/asm/time.h
+++ linux-4.15.0/arch/x86/include/asm/time.h
@@ -7,6 +7,7 @@
extern void hpet_time_init(void);
extern void time_init(void);
+extern bool pit_timer_init(void);
extern struct clock_event_device *global_clock_event:

--- linux-4.15.0.orig/arch/x86/include/asm/tlbflush.h
+++ linux-4.15.0/arch/x86/include/asm/tlbflush.h
@@ -131,7 +131,12 @@
static inline unsigned long build_cr3_noflush(pgd_t *pgd, u16 asid)
{
 VM_WARN_ON_ONCE(asid > MAX_ASID_AVAILABLE);
-VM_WARN_ON_ONCE(!(this_cpu_has(X86_FEATURE_PCID)));
+/*
+ * Use boot_cpu_has() instead of this_cpu_has() as this function
+ * might be called during early boot. This should work even after
+ * boot because all CPU's the have same capabilities:
+ */
+VM_WARN_ON_ONCE(!boot_cpu_has(X86_FEATURE_PCID));

return __sme_pa(pgd) | kern_pcid(asid) | CR3_NOFLUSH;
}

@ @ -140,7 +145,7 @@
#else
#define __flush_tlb() __native_flush_tlb()
#define __flush_tlb_global() __native_flush_tlb_global()
-#define __flush_tlb_single(addr) __native_flush_tlb_single(addr)
+#define __flush_tlb_one_user(addr) __native_flush_tlb_one_user(addr)
#endif

static inline bool tlb_defer_switch_to_init_mm(void)
@ @ -170,8 +175,22 @@
* are on. This means that it may not match current->active_mm,
* which will contain the previous user mm when we're in lazy TLB
* mode even if we've already switched back to swapper_pg_dir.
+ *
+ * During switch_mm_irqs_off(), loaded_mm will be set to
+ * LOADED_MM_SWITCHING during the brief interrupts-off window
+ * when CR3 and loaded_mm would otherwise be inconsistent. This
+ * is for nmi_uaccess_okay()’s benefit.
+ */
*struct mm_struct *loaded_mm;
+
+#define LOADED_MM_SWITCHING ((struct mm_struct *)1)
+
+/* Last user mm for optimizing IBPB */
+union {
+ struct mm_struct*last_user_mm;
+ unsigned long last_user_mm_ibpb;
+};
+
+u16 loaded_mm_asid;
+u16 next_asid;

@ @ -239,6 +258,38 @@
};
DECLARE_PER_CPU_SHARED_ALIGNED(struct tlb_state, cpu_tlbstate);

+/
+ * Blindly accessing user memory from NMI context can be dangerous
+ * if we’re in the middle of switching the current user task or
+ * switching the loaded mm. It can also be dangerous if we
+ * interrupted some kernel code that was temporarily using a
+ * different mm.
+ */
+static inline bool nmi_uaccess_okay(void)
+{
+struct mm_struct *loaded_mm = this_cpu_read(cpu_tlbstate.loaded_mm);
+struct mm_struct *current_mm = current->mm;
+
+VM_WARN_ON_ONCE(!loaded_mm);
+
+/*
+ * The condition we want to check is
+ * current_mm->pgd == __va(read_cr3_pa()). This may be slow, though,
+ * if we’re running in a VM with shadow paging, and nmi_uaccess_okay()
+ * is supposed to be reasonably fast.
+ *
+ * Instead, we check the almost equivalent but somewhat conservative
+ * condition below, and we rely on the fact that switch_mm_irqs_off()
+ * sets loaded_mm to LOADED_MM_SWITCHING before writing to CR3.
+ */
+if (loaded_mm != current_mm)
+return false;
+
+VM_WARN_ON_ONCE(current_mm->pgd != __va(read_cr3_pa()));
+return true;
+
+/* Initialize cr4 shadow for this CPU. */
+static inline void cr4_init_shadow(void)
+
+static inline void __native_flush_tlb_one_user(unsigned long addr)
+
+u32 loaded_mm_asid = this_cpu_read(cpu_tlbstate.loaded_mm_asid);
+
+u32 loaded_mm_asid = this_cpu_read(cpu_tlbstate.loaded_mm_asid);
+
+/* This is to catch users with enabled preemption and the PGE feature
+ * and don’t trigger the warning in __native_flush_tlb().
VM_WARN_ON_ONCE(preemptible());

if (boot_cpu_has(X86_FEATURE_PGE)) {
    __flush_tlb_global();
} else {
    vmlinux emergencies (preemptible());
}

__flush_tlb_global();

if (boot_cpu_has(X86_FEATURE_PGE)) {
    __flush_tlb_global();
} else {
    vmlinux emergencies (preemptible());
}

vm_tlb_one(addr);
int topology_update_package_map(unsigned int apicid, unsigned int cpu);
-extern int topology_phys_to_logical_pkg(unsigned int pkg);
+int topology_phys_to_logical_pkg(unsigned int pkg);
+bool topology_is_primary_thread(unsigned int cpu);
+bool topology_smt_supported(void);

#else
#define topology_max_packages()\t	(1)
static inline int

topology_update_package_map(unsigned int apicid, unsigned int cpu) { return 0; }
static inline int topology_phys_to_logical_pkg(unsigned int pkg) { return 0; }
static inline int topology_max_smt_threads(void) { return 1; }
+static inline bool topology_is_primary_thread(unsigned int cpu) { return true; }
+static inline bool topology_smt_supported(void) { return false; }
#endif

static inline void arch_fix_phys_package_id(int num, u32 slot)
--- linux-4.15.0.orig/arch/x86/include/asm/trace/irq_vectors.h
+++ linux-4.15.0/arch/x86/include/asm/trace/irq_vectors.h
@@ -236,7 +236,7 @@
TP_PROTO(unsigned int irq, unsigned int vector, bool reserved,
+TP_ARGS(irq, vector, reserved, ret),

-TP_ARGS(irq, vector, ret, reserved),
+TP_ARGS(irq, vector, reserved, ret),

TP_STRUCT__entry(
 _field(unsigned int,irq)
--- linux-4.15.0.orig/arch/x86/include/asm/traps.h
+++ linux-4.15.0/arch/x86/include/asm/traps.h
@@ -40,7 +40,7 @@
asmlinkage void xen_divide_error(void);
asmlinkage void xen_xennmi(void);
asmlinkage void xen_xendebug(void);
-asmlinkage void xen_xenint3(void);
+asmlinkage void xen_int3(void);
asmlinkage void xen_overflow(void);
asmlinkage void xen_bounds(void);
asmlinkage void xen_invalid_op(void);
@@ -104,9 +104,9 @@
void math_emulate(struct math_emu_info *);
#endif CONFIG_X86_32
-asmlinkage void smp_thermal_interrupt(void);
-asmlinkage void smp_threshold_interrupt(void);
-asmlinkage void smp_deferred_error_interrupt(void);
+asmlinkage void smp_thermal_interrupt(struct pt_regs *regs);
+asmlinkage void smp_threshold_interrupt(struct pt_regs *regs);
+asmlinkage void smp_deferred_error_interrupt(struct pt_regs *regs);
# endif

extern void ist_enter(struct pt_regs *regs);
--- linux-4.15.0.orig/arch/x86/include/asm/uaccess.h
+++ linux-4.15.0/arch/x86/include/asm/uaccess.h
@@ -124,6 +124,11 @@
#define __uaccess_begin() stac()
#define __uaccess_end() clac()
+#define __uaccess_begin_nospec()
+({
+    stac();
+    barrier_nospec();
+})

/*
 * This is a type: either unsigned long, if the argument fits into
 @ @ -288.8 +293.7 @@
__put_user_asm(x, ptr, retval, "l", "k", "ir", errret);
break;
 case 8:
-__put_user_asm_u64((__typeof__(*ptr))(x), ptr, retval,
- errret);
+__put_user_asm_u64(x, ptr, retval, errret);
break;
 default:
__put_user_bad();
 @ @ -435.8 +439.10 @@
#define __put_user_nocheck(x, ptr, size)
({
    int __pu_err;
+    __typeof__(*(ptr)) __pu_val;
+    __pu_val = x;
__uaccess_begin();
-__put_user_size((x), (ptr), (size), __pu_err, -EFAULT);
+__put_user_size(__pu_val, (ptr), (size), __pu_err, -EFAULT);
__uaccess_end();
__builtin_expect(__pu_err, 0);
})
@@ -445,8 +451,10 @@
({
    int __gu_err;
    __inttype(*(ptr)) __gu_val;
-__uaccess_begin();
-__get_user_size(__gu_val, (ptr), (size), __gu_err, -EFAULT);
+__typeof__(ptr) __gu_ptr = (ptr);
+__typeof__(size) __gu_size = (size);
+__uaccess_begin_nospec();
"
get_user_size(__gu_val, __gu_ptr, __gu_size, __gu_err, -EFAULT);
__uaccess_end();

(x) = (__force __typeof__(*(ptr)))__gu_val;
__builtin_expect(__gu_err, 0);

#define uaccess_try_nospec do {
current->thread.uaccess_err = 0;
__uaccess_begin_nospec();
}
#define uaccess_catch(err)
(err) |= (current->thread.uaccess_err ? -EFAULT : 0);

#define get_user_ex(x, ptr)
do {
  __typeof__(ptr) __uval = (uval);
  __typeof__(*(ptr)) __old = (old);
  __typeof__(*(ptr)) __new = (new);
  __uaccess_begin();
  switch (size) {
  case 1:
  
  @ -582,7 +594,7 @
  * checking before using them, but you have to surround them with the
  * user_access_begin/end() pair.
  */
-#define user_access_begin()__uaccess_begin()
+static __must_check inline bool user_access_begin(int type,
+ const void __user *ptr,
+ size_t len)
+{
+if (unlikely(!access_ok(type, ptr, len)))
+return 0;
+__uaccess_begin_nospec();
+return 1;
+}
+
+\#define user_access_begin(a, b, c)\user_access_begin(a, b, c)\#define user_access_end()\__uaccess_end()

\#define unsafe_put_user(x, ptr, err_label)\--- linux-4.15.0.orig/arch/x86/include/asm/uaccess_32.h\+++ linux-4.15.0/arch/x86/include/asm/uaccess_32.h\@@ -29,21 +29,21 @@
switch (n) {
  case 1:
    ret = 0;
-    __uaccess_begin();
+    __uaccess_begin_nospec();
    __get_user_asm_nozero(*(u8 *)to, from, ret,
                   "b", "b", ":q", 1);
-    __uaccess_end();
  return ret;
  case 2:
    ret = 0;
-    __uaccess_begin();
+    __uaccess_begin_nospec();
    __get_user_asm_nozero(*(u16 *)to, from, ret,
                   "w", "w", ":r", 2);
-    __uaccess_end();
  return ret;
  case 4:
    ret = 0;
-    __uaccess_begin();
+    __uaccess_begin_nospec();
    __get_user_asm_nozero(*(u32 *)to, from, ret,
                   "l", "k", ":r", 4);
-    __uaccess_end();
  return error_before_label("copy_user", ret, err_label);
  case 1:
-    __uaccess_begin();
+    __uaccess_begin_nospec();
    __get_user_asm_nozero(*(u8 *)to, (u8 __user *)src,
          ret, "b", "b", ":q", 1);
-    __uaccess_end();
  return ret;
  case 2:
-    __uaccess_begin();
+    __uaccess_begin_nospec();
    __get_user_asm_nozero(*(u16 *)to, (u16 __user *)src,
          ret, "w", "w", ":r", 2);
case 4:
-__uaccess_begin();
+__uaccess_begin_nospec();
__get_user_asm_nozero(*u32 *dst, (u32 __user *)src,
   ret, "l", "k", ":r", 4);
__uaccess_end();
return ret;

case 8:
-__uaccess_begin();
+__uaccess_begin_nospec();
__get_user_asm_nozero(*u64 *dst, (u64 __user *)src,
   ret, "q", ":r", 8);
__uaccess_end();
return ret;

case 10:
-__uaccess_begin();
+__uaccess_begin_nospec();
__get_user_asm_nozero(*u64 *dst, (u64 __user *)src,
   ret, "q", ":r", 10);
if (likely(!ret))
@@ -89,7 +89,7 @@
   __uaccess_end();
   return ret;

case 16:
-__uaccess_begin();
+__uaccess_begin_nospec();
__get_user_asm_nozero(*u64 *dst, (u64 __user *)src,
   ret, "q", ":r", 16);
if (likely(!ret))
--- linux-4.15.0.orig/arch/x86/include/asm/unwind.h
+++ linux-4.15.0/arch/x86/include/asm/unwind.h
@@ -23,6 +23,12 @@
#elif defined(CONFIG_UNWINDER_FRAME_POINTER)
    bool got_irq;
    unsigned long *bp, *orig_sp, ip;
/
+/*
+ * If non-NULL: The current frame is incomplete and doesn't contain a
+ * valid BP. When looking for the next frame, use this instead of the
+ * non-existent saved BP.
+ */
+unsigned long *next_bp;
struct pt_regs *regs;
#else
    unsigned long *sp;
--- linux-4.15.0.orig/arch/x86/include/asm/uv/bios.h
+++ linux-4.15.0/arch/x86/include/asm/uv/bios.h
BIOS_STATUS_SUCCESS= 0,
BIOS_STATUS_UNIMPLEMENTED= -ENOSYS,
BIOS_STATUS_EINVAL= -EINVAL,
-BIOS_STATUS_UNAVAIL= -EBUSY
+BIOS_STATUS_UNAVAIL= -EBUSY,
+BIOS_STATUS_ABORT= -EINTR,
};

/* Address map parameters */
@@ -167,4 +168,9 @@
extern struct kobject *sgi_uv_kobj; /* /sys/firmware/sgi_uv */
+
+ /* EFI runtime lock; cf. firmware/efi/runtime-wrappers.c for details */
+ *
+extern struct semaphore __efi_uv_runtime_lock;
+
#undef _ASM_X86_UV_BIOS_H */
--- linux-4.15.0.orig/arch/x86/include/asm/vgtod.h
+++ linux-4.15.0/arch/x86/include/asm/vgtod.h
@@ -93,7 +93,7 @@
* If RDPID is available, use it.
*/
-alternative_io ("lsl %[p],%[seg]",
+alternative_io ("lsl %[seg],%[p]",
 ".byte 0xf3,0x0f,0xc7,0xf8", /* RDPID %eax/rax */
X86_FEATURE_RDPID,
[p] "=a" (p), [seg] "r" (__PER_CPU_SEG));
--- linux-4.15.0.orig/arch/x86/include/asm/vmx.h
+++ linux-4.15.0/arch/x86/include/asm/vmx.h
@@ -352,6 +352,7 @@
#define INTR_TYPE_HARD_EXCEPTION (3 << 8) /* processor exception */
#define INTR_TYPE_SOFT_INTR (4 << 8) /* software interrupt */
+#define INTR_TYPE_PRIV_SW_EXCEPTION (5 << 8) /* ICE breakpoint - undocumented */
#define INTR_TYPE_SOFT_EXCEPTION (6 << 8) /* software exception */

/* GUEST_INTERRUPTIBILITY_INFO flags. */
@@ -570,4 +571,15 @@
VMXERR_INVALID_OPERAND_TO_INVEPT_INVVPID = 28,
};

+enum vmx_l1d_flush_state {
+VMENTER_L1D_FLUSH_AUTO,
+VMENTER_L1D_FLUSH_NEVER,
enum vmx_l1d_flush_state {
    VMENTER_L1D_FLUSH_COND,
    VMENTER_L1D_FLUSH_ALWAYS,
    VMENTER_L1D_FLUSH_EPT_DISABLED,
    VMENTER_L1D_FLUSH_NOT_REQUIRED,
};

extern enum vmx_l1d_flush_state lltf_vmx_mitigation;

@endif
--- linux-4.15.0.orig/arch/x86/include/asm/x86_init.h
+++ linux-4.15.0/arch/x86/include/asm/x86_init.h
@@ -51,12 +51,14 @@
 * @intr_init:		interrupt init code
 * @trap_init:	platform specific trap setup
 + * @intr_mode_select:	interrupt delivery mode selection
 + * @intr_mode_init:	interrupt delivery mode setup
 */
struct x86_init_irqs {
    void (*pre_vector_init)(void);
    void (*intr_init)(void);
    void (*trap_init)(void);
    +void (*intr_mode_select)(void);
    void (*intr_mode_init)(void);
};

--- linux-4.15.0.orig/arch/x86/include/asm/xen/hypercall.h
+++ linux-4.15.0/arch/x86/include/asm/xen/hypercall.h
@@ -217,6 +217,9 @@
 "__HYPERCALL_DECLS;" __HYPERCALL_5ARG(a1, a2, a3, a4, a5);

 +if (call >= PAGE_SIZE / sizeof(hypercall_page[0]))
 +return -EINVAL;
 +stac();
 asm volatile(CALL_NOSPEC : __HYPERCALL_5PARAM
 --- linux-4.15.0.orig/arch/x86/include/uapi/asm/kvm.h
+++ linux-4.15.0/arch/x86/include/uapi/asm/kvm.h
@@ -360,5 +360,6 @@
 #define KVM_X86_QUIRK_LINT0_REENABLED	(1 << 0)
 #define KVM_X86_QUIRK_CD_NW_CLEARED	(1 << 1)
 +#define KVM_X86_QUIRK_LAPIC_MMIO_HOLE	(1 << 2)
 
 #endif /* __ASM_X86_KVM_H */
--- linux-4.15.0.orig/arch/x86/include/uapi/asm/kvm_para.h
### Kernel Header Definitions

```c
#define KVM_FEATURE_STEAL_TIME	5
#define KVM_FEATURE_PV_EOI	6
#define KVM_FEATURE_PV_UNHALT	7
#define KVM_FEATURE_ASYNC_PF_VMEXIT	10
```

/* The last 8 bits are used to indicate how to interpret the flags field
* in pvclock structure. If no bits are set, all flags are ignored.
--- linux-4.15.0.orig/arch/x86/include/uapi/asm/mce.h
 +++ linux-4.15.0/arch/x86/include/uapi/asm/mce.h
 @ @ -30,6 +30,7 @@
 __u64 synd;/* MCA_SYND MSR: only valid on SMCA systems */
 __u64 ipid;/* MCA_IPID MSR: only valid on SMCA systems */
 __u64 ppin;/* Protected Processor Inventory Number */
 +__u32 microcode;/* Microcode revision */
};
```

#define MCE_GET_RECORD_LEN _IOR('M', 1, int)
--- linux-4.15.0.orig/arch/x86/include/uapi/asm/msgbuf.h
+++ linux-4.15.0/arch/x86/include/uapi/asm/msgbuf.h
@ @ -1 +1,32 @@
+/* SPDX-License-Identifier: GPL-2.0 WITH Linux-syscall-note */
+__asm_x64_msbuf_h
+```

```c
struct msqid64_ds {
	struct ipc64_perm msg_perm;
	__kernel_time_t msg_stime;/* last msgsnd time */
	__kernel_time_t msg_rtime;/* last msgrcv time */
	__kernel_time_t msg_ctime;/* last change time */
	__kernel_ulong_t msg_cbytes;/* current number of bytes on queue */
	__kernel_ulong_t msg_qnum;/* number of messages in queue */
	__kernel_ulong_t msg_qbytes;/* max number of bytes on queue */
	__kernel_pid_t msg_lspid;/* pid of last msgsnd */
	__kernel_pid_t msg_lrpid;/* last receive pid */
	__kernel_ulong_t __unused4;
```
```
__kernel_ulong_t __unused5;
+
+#endif
+
+#endif /* __ASM_GENERIC_MSGBUF_H */
--- linux-4.15.0.orig/arch/x86/include/uapi/asm/shmbuf.h
+++ linux-4.15.0/arch/x86/include/uapi/asm/shmbuf.h
@@ -1 +1,43 @@
+/* SPDX-License-Identifier: GPL-2.0 WITH Linux-syscall-note */
+#ifndef __ASM_X86_SHMBUF_H
+#define __ASM_X86_SHMBUF_H
+
+_DEFINED(_x86_64__) || !defined(__ILP32__)
+include <asm-generic/shmbuf.h>
+#else
+/*
+ * The shmid64_ds structure for x86 architecture with x32 ABI.
+ *
+ * On x86-32 and x86-64 we can just use the generic definition, but
+ * x32 uses the same binary layout as x86_64, which is different
+ * from other 32-bit architectures.
+ */
+
+struct shmid64_ds {
+struct ipc64_permshm_perm;/* operation perms */
+size_t_tshm_segsz;/* size of segment (bytes) */
+__kernel_time_t_tshm_atime;/* last attach time */
+__kernel_time_t_tshm_dtime;/* last detach time */
+__kernel_time_t_tshm_ctime;/* last change time */
+__kernel_pid_t_tshm_cpid;/* pid of creator */
+__kernel_pid_t_tshm_lpid;/* pid of last operator */
+__kernel_ulong_t_tshm_nattach;/* no. of current attaches */
+__kernel_ulong_t_tshm_nattch;
+__kernel_ulong_t_tshm_nattch5;
+}
+
+struct shminfo64 {
+__kernel_ulong_t_tshmmax;
+__kernel_ulong_t_tshmmin;
+__kernel_ulong_t_tshmmaxn;
+__kernel_ulong_t_tshmaxn;
+__kernel_ulong_t_tshmaxn;
+__kernel_ulong_t_tshmaxn5;
+__kernel_ulong_t_tshmmax1;
+__kernel_ulong_t_tshmmax2;
+__kernel_ulong_t_tshmmax3;
+__kernel_ulong_t_tshmmax4;
+};
+ #endif
+ +#endif */ __ASM_X86_SHMBUF_H */
--- linux-4.15.0.orig/arch/x86/kernel/Makefile
+++ linux-4.15.0/arch/x86/kernel/Makefile
@@ -61,6 +61,7 @@
          obj-y+= tsc.o tsc_msr.o io_delay.o rtc.o
          obj-y+= pci-iommu_table.o
          obj-y+= resource.o
          +obj-y+= irqflags.o

          obj-y+= process.o
          obj-y+= fpu/
--- linux-4.15.0.orig/arch/x86/kernel/acpi/boot.c
+++ linux-4.15.0/arch/x86/kernel/acpi/boot.c
@@ -181,7 +181,8 @@
            }
            if (!enabled) {
              ++disabled_cpus;
+-if (!apic_id_disabled(id))
+++disabled_cpus;
              return -EINVAL;
            }

          @@ -200,7 +201,7 @@
          }
          struct acpi_madt_local_x2apic *processor = NULL;
          #ifdef CONFIG_X86_X2APIC
-          int apic_id;
+          u32 apic_id;
          u8 enabled;
          #endif

          @@ -215,6 +216,10 @@
          apic_id = processor->local_apic_id;
          enabled = processor->lapic_flags & ACPI_MADT_ENABLED;

          /**< Ignore invalid ID */
+          if (apic_id == 0xffffffff)
+             return 0;
+          
          /*
          * We need to register disabled CPU as well to permit
          * counting disabled CPUs. This allows us to size
          @ @ -222,10 +227,13 @ @
          * to not preallocating memory for all NR_CPUS
          */
* when we use CPU hotplug.

*/
-if (!apic->apic_id_valid(apic_id) && enabled)
-printk(KERN_WARNING PREFIX "x2apic entry ignored\n");
-else
-acpi_register_lapic(apic_id, processor->uid, enabled);
+if (!apic->apic_id_valid(apic_id)) {
+if (enabled)
+pr_warn(PREFIX "x2apic entry ignored\n");
+return 0;
+}
+
+acpi_register_lapic(apic_id, processor->uid, enabled);
#else
-printk(KERN_WARNING PREFIX "x2apic entry ignored\n");
#endif
@@ -1554,10 +1562,18 @@
/*
 * Initialize the ACPI boot-time table parser.
 *
*/
-if (acpi_table_init()) {
+if (acpi_locate_initial_tables())
disable_acpi();
-return;
-}
+else
+acpi_reserve_initial_tables();
+
+int __init early_acpi_boot_init(void)
+{
+if (acpi_disabled)
+return 1;
+
+acpi_table_init_complete();

acpi_table_parse(ACPI_SIG_BOOT, acpi_parse_sbf);

@@ -1570,18 +1586,9 @@
} else {
-printk(KERN_WARNING PREFIX "Disabling ACPI support\n");
disable_acpi();
-return;
+return 1;
}
}
-int __init early_acpi_boot_init(void)
-
-/*
- * If acpi_disabled, bail out
- */
-if (acpi_disabled)
-return 1;

/*
 * Process the Multiple APIC Description Table (MADT), if present
@@ -1739,7 +1746,7 @@
new = (((old & ~0x3) + 2) + ((old >> 1) & 0x1));
val = cmpxchg(lock, old, new);
} while (unlikely (val != old));
-return (new < 3) ? -1 : 0;
+return ((new & 0x3) < 3) ? -1 : 0;
}

int __acpi_release_global_lock(unsigned int *lock)
--- linux-4.15.0.orig/arch/x86/kernel/acpi/cstate.c
+++ linux-4.15.0/arch/x86/kernel/acpi/cstate.c
@@ -133,7 +133,8 @@
/* Make sure we are running on right CPU */

-retval = work_on_cpu(cpu, acpi_processor_ffh_cstate_probe_cpu, cx);
+retval = call_on_cpu(cpu, acpi_processor_ffh_cstate_probe_cpu, cx,
+false);
if (retval == 0) {
/* Use the hint in CST */
 percpu_entry->states[cx->index].eax = cx->address;
--- linux-4.15.0.orig/arch/x86/kernel/acpi/wakeup_32.S
+++ linux-4.15.0/arch/x86/kernel/acpi/wakeup_32.S
@@ -2,6 +2,7 @@
 #include <linux/linkage.h>
 #include <asm/segment.h>
 #include <asm/page_types.h>
+include <asm/nospec-branch.h>

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 @@ -37,6 +38,7 @@
 # jump to place where we left off
 movlsaved_eip, %eax
 +ANNOTATE_RETPOLINE_SAFE
 jmp*%eax
bogus_magic:
--- linux-4.15.0.orig/arch/x86/kernel/acpi/wakeup_64.S
+++ linux-4.15.0/arch/x86/kernel/acpi/wakeup_64.S
@@ -6,6 +6,7 @@
 #include <asm/msr.h>
 #include <asm/asm-offsets.h>
 #include <asm/frame.h>
+#include <asm/nospec-branch.h>
 # Copyright 2003 Pavel Machek <pavel@suse.cz>, distribute under GPLv2

@@ -33,6 +34,7 @@
 movq	saved_rbp, %rbp
 movq	saved_rip, %rax
+ANNOTATE_RETPOLINE_SAFE
 jmp	*%rax
ENDPROC(wakeup_long64)

--- linux-4.15.0.orig/arch/x86/kernel/alternative.c
+++ linux-4.15.0/arch/x86/kernel/alternative.c
@@ -46,17 +46,6 @@
 }
__setup("noreplace-smp", setup_noreplace_smp);

-#ifdef CONFIG_PARAVIRT
- static int __initdata_or_module noreplace_paravirt = 0;
- 
- static int __init setup_noreplace_paravirt(char *str)
- {
- 	noreplace_paravirt = 1;
- 	return 1;
- 
- } 
- __setup("noreplace-paravirt", setup_noreplace_paravirt);
- #endif

#define DPRINTK(fmt, args...)						\ 
do {									\ 
if (debug_alternative)
 @@ -298,7 +287,7 @@
tgt_rip  = next_rip + o_dspl;
n_dspl = tgt_rip - orig_insn;

-DPRINTK("target RIP: %p, new displ: 0x%lx", tgt_rip, n_dspl);
+DPRINTK("target RIP: %px, new displ: 0x%lx", tgt_rip, n_dspl);

if (tgt_rip - orig_insn >= 0) {
 if (n_dspl - 2 <= 127)
add_nops(instr + (a->instrlen - a->padlen), a->padlen);
local_irq_restore(flags);

-DUMP_BYTES(instr, a->instrlen, "%p: [%d:%d] optimized NOPs: ",
+DUMP_BYTES(instr, a->instrlen, "%px: [(%d:%d) optimized NOPs: ",
  instr, a->instrlen - a->padlen, a->padlen);
}

u8 *instr, *replacement;
 u8 insbuf[MAX_PATCH_LEN];

-DPRINTK("alt table %p -> %p", start, end);
+DPRINTK("alt table %px, -> %px", start, end);
/*
 * The scan order should be from start to end. A later scanned
 * alternative code can overwrite previously scanned alternative code.
@@ -400,14 +389,14 @@
 continue;
 }

-DPRINTK("feat: %d*32+%d, old: (%p, len: %d), repl: (%p, len: %d), pad: %d",
 +DPRINTK("feat: %d*32+%d, old: (%px len: %d), repl: (%px, len: %d), pad: %d",
   a->cpuid >> 5,
a->cpuid & 0x1f,
   instr, a->instrlen,
   replacement, a->replacementlen, a->padlen);

-DUMP_BYTES(instr, a->instrlen, "%p: old_insn: ", instr);
-DUMP_BYTES(replacement, a->replacementlen, "%p: rpl_insn: ", replacement);
+DUMP_BYTES(instr, a->instrlen, "%px: old_insn: ", instr);
+DUMP_BYTES(replacement, a->replacementlen, "%px: rpl_insn: ", replacement);
memcpy(insnbuf, replacement, a->replacementlen);
insnbuf_sz = a->replacementlen;
@@ -433,7 +422,7 @@
 a->instrlen - a->replacementlen);
 insnbu_sz += a->instrlen - a->replacementlen;
}
-DUMP_BYTES(insnbuf, insnbuf_sz, "%p: final_insn: ", instr);
+DUMP_BYTES(insnbuf, insnbuf_sz, "%px: final_insn: ", instr);

text_poke_early(instr, insnbuf, insnbuf_sz);
}

struct paravirt_patch_site *p;
char insnbu[MAX_PATCH_LEN];
-if (noreplace_paravirt)
-return;
-
for (p = start; p < end; p++) {
unsigned int used;

@@ -676,14 +662,29 @@
 * handlers seeing an inconsistent instruction while you patch.
 */
void *__init_or_module text_poke_early(void *addr, const void *opcode,
-    size_t len)
+    size_t len)
{
unsigned long flags;
-local_irq_save(flags);
-memcpy(addr, opcode, len);
-local_irq_restore(flags);
-/* Could also do a CLFLUSH here to speed up CPU recovery; but
- that causes hangs on some VIA CPUs. */
+
+if (boot_cpu_has(X86_FEATURE_NX) &&
+    is_module_text_address((unsigned long)addr)) {
+  /* Modules text is marked initially as non-executable, so the
+   code cannot be running and speculative code-fetches are
+   prevented. Just change the code.
+   */
+  memcpy(addr, opcode, len);
+} else {
+local_irq_save(flags);
+memcpy(addr, opcode, len);
+local_irq_restore(flags);
+sync_core();
+
+/*
+ * Could also do a CLFLUSH here to speed up CPU recovery; but
+ * that causes hangs on some VIA CPUs.
+ */
+}
return addr;
}

--- linux-4.15.0.orig/arch/x86/kernel/amd_nb.c
+++ linux-4.15.0/arch/x86/kernel/amd_nb.c
@@ -11,11 +11,17 @@
#include <linux/errno.h>
#include <linux/export.h>

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#include <linux/spinlock.h>
+#include <linux/pci_ids.h>
#include <asm/amd_nb.h>

#define PCI_DEVICE_ID_AMD_17H_ROOT	0x1450
-#define PCI_DEVICE_ID_AMD_17H_M10H_ROOT0x15d0
+#define PCI_DEVICE_ID_AMD_17H_M10H_ROOT	0x1463
+#define PCI_DEVICE_ID_AMD_17H_M30H_ROOT	0x1480
#define PCI_DEVICE_ID_AMD_17H_DF_F3	0x1464
+#define PCI_DEVICE_ID_AMD_17H_M10H_DF_F3 0x15ec
+#define PCI_DEVICE_ID_AMD_17H_M30H_DF_F3 0x1494
+#define PCI_DEVICE_ID_AMD_17H_M70H_DF_F3 0x1444
+#define PCI_DEVICE_ID_AMD_19H_DF_F3	0x1654

/* Protect the PCI config register pairs used for SMN and DF indirect access. */
static DEFINE_MUTEX(smn_mutex);
@@ -24,9 +30,12 @@
static const struct pci_device_id amd_root_ids[] = {
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_ROOT) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_M10H_ROOT) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_M30H_ROOT) },
   {};
+
+#define PCI_DEVICE_ID_AMD_CNB17H_F4     0x1704

const struct pci_device_id amd_nb_misc_ids[] = {
   @ @ -39,7 +48,11 @ @
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_16H_NB_F3) },
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_16H_M30H_NB_F3) },
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_DF_F3) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_M10H_DF_F3) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_M30H_DF_F3) },
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_CNB17H_F3) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_M70H_DF_F3) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_19H_DF_F3) },
   {};

EXPORT_SYMBOL_GPL(amd_nb_misc_ids);
@@ -51,6 +64,10 @@
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_16H_NB_F4) },
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_16H_M30H_NB_F4) },
   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_DF_F4) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_M10H_DF_F4) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_17H_M30H_DF_F4) },
+   { PCI_DEVICE(PCI_VENDOR_ID_AMD, PCIDEVICE_ID_AMD_17H_M70H_DF_F4) },
+   { PCIDEVICE_ID_AMD_19H_DF_F4 },
   {};

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int amd_cache_northbridges(void)
{
    u16 i = 0;
    const struct pci_device_id *root_ids = amd_root_ids;
    struct amd_northbridge *nb;
    struct pci_dev *root, *misc, *link;
    u16 roots_per_misc = 0;
    u16 misc_count = 0;
    u16 root_count = 0;
    u16 i, j;

    if (amd_northbridges.num)
        return 0;

    misc = NULL;
    while ((misc = next_northbridge(misc, amd_nb_misc_ids)) != NULL)
        i++;
    misc_count++;
    if (!i)
        if (!misc_count)
            return -ENODEV;

    nb = kcalloc(misc_count, sizeof(struct amd_northbridge), GFP_KERNEL);
    root = NULL;
    while ((root = next_northbridge(root, root_ids)) != NULL)
        root_count++;

    if (root_count)
        roots_per_misc = root_count / misc_count;

    /*
     * There should be _exactly_ N roots for each DF/SMN
     * interface.
     */
    if (!roots_per_misc || (root_count % roots_per_misc)) {
        pr_info("Unsupported AMD DF/PCI configuration found\n");
        return -ENODEV;
    }

    nb = kcalloc(misc_count, sizeof(struct amd_northbridge), GFP_KERNEL);
if (!nb)
    return -ENOMEM;

amd_northbridges.nb = nb;
- amd_northbridges.num = i;
+ amd_northbridges.num = misc_count;

link = misc = root = NULL;
- for (i = 0; i != amd_northbridges.num; i++) {
+ for (i = 0; i < amd_northbridges.num; i++) {
    node_to_amd_nb(i)->root = root =
    next_northbridge(root, amd_root_ids);
    node_to_amd_nb(i)->misc = misc =
    next_northbridge(misc, amd_nb_misc_ids);
    node_to_amd_nb(i)->link = link =
    next_northbridge(link, amd_nb_link_ids);
    /*
    + * If there are more PCI root devices than data fabric/
    + * system management network interfaces, then the (N)
    + * PCI roots per DF/SMN interface are functionally the
    + * same (for DF/SMN access) and N-1 are redundant. N-1
    + * PCI roots should be skipped per DF/SMN interface so
    + * the following DF/SMN interfaces get mapped to
    + * correct PCI roots.
    + */
    + for (j = 1; j < roots_per_misc; j++)
    + root = next_northbridge(root, root_ids);
    }

if (amd_gart_present())
    @ @ .235,7 +284,7 @ @
if (boot_cpu_data.x86 == 0x10 &&
    boot_cpu_data.x86_model >= 0x8 &&
    (boot_cpu_data.x86_model > 0x9 ||
     boot_cpu_data.x86_mask >= 0x1))
    amd_northbridges.flags |= AMD_NB_L3_INDEX_DISABLE;

if (boot_cpu_data.x86 == 0x15)
--- linux-4.15.0.orig/arch/x86/kernel/aperture_64.c
+++ linux-4.15.0/arch/x86/kernel/aperture_64.c
@@ -30,6 +30,7 @@
#include <asm/dma.h>
#include <asm/amd_nb.h>
#include <asm/x86_init.h>
+#include <linux/crash_dump.h>

/*
* Using 512M as goal, in case kexec will load kernel_big
@ @ -56,6 +57,33 @ @

    int fix_aperture __initdata = 1;

+ifdef CONFIG_PROC_VMCORE
+/*
+ * If the first kernel maps the aperture over e820 RAM, the kdump kernel will
+ * use the same range because it will remain configured in the northbridge.
+ * Trying to dump this area via /proc/vmcore may crash the machine, so exclude
+ * it from vmcore.
+ */
+static unsigned long aperture_pfn_start, aperture_page_count;
+
+static int gart_oldmem_pfn_is_ram(unsigned long pfn)
+{
    +return likely((pfn < aperture_pfn_start) ||
    +    (pfn >= aperture_pfn_start + aperture_page_count));
+}
+
+static void exclude_from_vmcore(u64 aper_base, u32 aper_order)
+{
    +aperture_pfn_start = aper_base >> PAGE_SHIFT;
    +aperture_page_count = (32 * 1024 * 1024) << aper_order >> PAGE_SHIFT;
    +WARN_ON(register_oldmem_pfn_is_ram(&gart_oldmem_pfn_is_ram));
    +}
+endif
+
/* This code runs before the PCI subsystem is initialized, so just
   access the northbridge directly. */

    @ @ -92,32 +120,6 @ @

/* Find a PCI capability */
-static u32 __init find_cap(int bus, int slot, int func, int cap)
-{  
    -int bytes;
    -u8 pos;
    -
    -if (!(read_pci_config_16(bus, slot, func, PCI_STATUS) &
        -PCI_STATUS_CAP_LIST))
    -return 0;
-pos = read_pci_config_byte(bus, slot, func, PCI_CAPABILITY_LIST);
-for (bytes = 0; bytes < 48 && pos >= 0x40; bytes++) {
	u8 id;
-
-pos &= ~3;
-id = read_pci_config_byte(bus, slot, func, pos+PCI_CAP_LIST_ID);
-if (id == 0xff)
	-break;
-if (id == cap)
	-return pos;
-pos = read_pci_config_byte(bus, slot, func,
 -pos+PCI_CAP_LIST_NEXT);
-}
-return 0;
-
    /* Read a standard AGPv3 bridge header */
static u32 __init read_agp(int bus, int slot, int func, int cap, u32 *order)
{
    case PCI_CLASS_BRIDGE_HOST:
-case PCI_CLASS_BRIDGE_OTHER: /* needed? */
    /* AGP bridge? */
    -cap = find_cap(bus, slot, func,
    -PCI_CAP_ID_AGP);
    +cap = pci_early_find_cap(bus, slot,
    +func, PCI_CAP_ID_AGP);
    if (!cap)
        break;
    *valid_agp = 1;
    out:
    if (!fix && !fallback_aper_force) {
        -if (last_aper_base)
        +if (last_aper_base) {
            /* If this is the kdump kernel, the first kernel
            + may have allocated the range over its e820 RAM
            + and fixed up the northbridge
            */
            +exclude_from_vmcore(last_aper_base, last_aper_order);
            +
            return 1;
        +}
    return 0;
}
return 0;
}

/*
 * If this is the kdump kernel _and_ the first kernel did not
 * configure the aperture in the northbridge, this range may
 * overlap with the first kernel's memory. We can't access the
 * range through vmcore even though it should be part of the dump.
 */
exclude_from_vmcore(aper_alloc, aper_order);

/* Fix up the north bridges */
for (i = 0; i < amd_nb_bus_dev_ranges[i].dev_limit; i++) {
    int bus, dev_base, dev_limit;
    ...
    /* Fix up the north bridges */
    for (i = 0; i < amd_nb_bus_dev_ranges[i].dev_limit; i++) {
        int bus, dev_base, dev_limit;
        ...
unsigned int num_processors;

/*
 * Debug level, exported for io_apic.c
 */
unsigned int apic_verbosity;
int pic_mode;

/*
 * According to Intel, MFENCE can do the serialization here.
 */
asm volatile("mfence": : "memory");
-printk_once(KERN_DEBUG "TSC deadline timer enabled\n");
return;
}

@@ -466,6 +466,9 @@
{
  u64 tsc;

  /* This MSR is special and need a special fence: */
+  weak_wrmsr_fence();
  +
  tsc = rdtsc();
  wrmsrl(MSR_IA32_TSC_DEADLINE, tsc + (((u64) delta) * TSC_DIVISOR));
  return 0;
@@ -544,9 +547,9 @@
#define DEADLINE_MODEL_MATCH_REV(model, rev)	{
  X86_VENDOR_INTEL, 6, model, X86_FEATURE_ANY, (unsigned long)rev }

 -static u32 hsx_deadline_rev(void)
+static __init u32 hsx_deadline_rev(void)
{
  -switch (boot_cpu_data.x86_mask) {
+switch (boot_cpu_data.x86_stepping) {
    case 0x02: return 0x3a; /* EP */
    case 0x04: return 0x0f; /* EX */
  }
@@ -554,9 +557,9 @@
  return ~0U;
}

 -static u32 bdx_deadline_rev(void)
+static __init u32 bdx_deadline_rev(void)
{
  -switch (boot_cpu_data.x86_mask) {
+switch (boot_cpu_data.x86_stepping) {
    case 0x02: return 0x00000011;
    case 0x03: return 0x0700000e;
    case 0x04: return 0x0f00000c;
@@ -566,17 +569,20 @@
    return ~0U;
  }

 -static u32 skx_deadline_rev(void)
+static __init u32 skx_deadline_rev(void)
{
  -switch (boot_cpu_data.x86_mask) {
+switch (boot_cpu_data.x86_stepping) {
    case 0x03: return 0x01000136;
case 0x04: return 0x02000014;
}

+if (boot_cpu_data.x86_stepping > 4)
+return 0;
+
+return ~0U;
}

-static const struct x86_cpu_id deadline_match[] = {
+static const struct x86_cpu_id deadline_match[] __initconst = {
DEADLINE_MODEL_MATCH_FUNC( INTEL_FAM6_HASWELL_X, hsx_deadline_rev),
DEADLINE_MODEL_MATCH_REV ( INTEL_FAM6_BROADWELL_X,0x0b000020),
DEADLINE_MODEL_MATCH_FUNC( INTEL_FAM6_BROADWELL_XEON_D,bdx_deadline_rev),
@@ -598,18 +604,19 @@
    {},
    }
};

-static void apic_check_deadline_errata(void)
+static __init bool apic_validate_deadline_timer(void)
{
    const struct x86_cpu_id *m;
    u32 rev;

    -if (!boot_cpu_has(X86_FEATURE_TSC_DEADLINE_TIMER) ||
     - boot_cpu_has(X86_FEATURE_HYPERVISOR))
        -return;
     +if (!boot_cpu_has(X86_FEATURE_TSC_DEADLINE_TIMER))
         +return false;
     +if (boot_cpu_has(X86_FEATURE_HYPERVISOR))
         +return true;

    m = x86_match_cpu(deadline_match);
    if (!m)
        -return;
        +return true;

    /*
     * Function pointers will have the MSB set due to address layout,
     @ @ -621,11 +628,12 @@
     rev = (u32)m->driver_data;

     if (boot_cpu_data.microcode >= rev)
        -return;
        +return true;

     setup_clear_cpu_cap(X86_FEATURE_TSC_DEADLINE_TIMER);
     pr_err(FW_BUG "TSC_DEADLINE disabled due to Errata; "

"please update microcode to version: 0x%x (or later)\n", rev);
+return false;
}

/*@ -711,7 +719,7 @*/
static __initdata unsigned long lapic_cal_j1, lapic_cal_j2;

/*@ -792,10 +800,47 @*/
return 0;
}

+bool __init apic_needs_pit(void)
+{
+    
+    /* If the frequencies are not known, PIT is required for both TSC
+     * and apic timer calibration.
+     */
+    if (!tsc_khz || !cpu_khz)
+        return true;
+    
+    /* Is there an APIC at all or is it disabled? */
+    if (!boot_cpu_has(X86_FEATURE_APIC) || disable_apic)
+        return true;
+    
+    /* If interrupt delivery mode is legacy PIC or virtual wire without
+     * configuration, the local APIC timer won't be set up. Make sure
+     * that the PIT is initialized.
+     */
+    if (apic_intr_mode == APIC_PIC ||
+        apic_intr_mode == APIC_VIRTUAL_WIRE_NO_CONFIG)
+        return true;
+    
+    /* Deadline timer is based on TSC so no further PIT action required */
+    if (boot_cpu_has(X86_FEATURE_TSC_DEADLINE_TIMER))
+        return false;
+    
+    /* APIC timer disabled? */
+    if (disable_apic_timer)
+        return true;
+    
...
The APIC timer frequency is known already, no PIT calibration required. If unknown, let the PIT be initialized.

```c
+ * return lapic_timer_frequency == 0;
+ }
+ }
static int __init calibrate_APIC_clock(void)
{
    struct clock_event_device *levt = this_cpu_ptr(&lapic_events);
    void (*real_handler)(struct clock_event_device *dev);
    +u64 tsc_perj = 0, tsc_start = 0;
    +unsigned long jif_start;
    unsigned long deltaj;
    long delta, deltatsc;
    int pm_referenced = 0;
    @@ -826,28 +871,64 @@
    apic_printk(APIC_VERBOSE, "Using local APIC timer interrupts.\n"
                "calibrating APIC timer ...
"
    +/*
    + * There are platforms w/o global clockevent devices. Instead of
    + * making the calibration conditional on that, use a polling based
    + * approach everywhere.
    + */
    + local_irq_disable();

    /* Replace the global interrupt handler */
    -real_handler = global_clock_event->event_handler;
    -global_clock_event->event_handler = lapic_cal_handler;
    -
    /*
    * Setup the APIC counter to maximum. There is no way the lapic
    * can underflow in the 100ms detection time frame
    */
    __setup_APIC_LVTT(0xffffffff, 0, 0);

    /* Let the interrupts run */
    /*
    + * Methods to terminate the calibration loop:
    + * 1) Global clockevent if available (jiffies)
    + * 2) TSC if available and frequency is known
    + */
    +jif_start = READ_ONCE(jiffies);
    +
    +if (tsc_khz) {
        +tsc_start = rdtsc();
        +tsc_perj = div_u64((u64)tsc_khz * 1000, HZ);
    +}
```
local_irq_enable();

while (lapic_cal_loops <= LAPIC_CAL_LOOPS) {
    cpu_relax();
    while (lapic_cal_loops <= LAPIC_CAL_LOOPS) {
/* Wait for a tick to elapse */
    while (1) {
        if (tsc_khz) {
            u64 tsc_now = rdtsc();
            if ((tsc_now - tsc_start) >= tsc_perj) {
                tsc_start += tsc_perj;
                break;
            } else {
                unsigned long jif_now = READ_ONCE(jiffies);
                local_irq_disable();
                if (time_after(jif_now, jif_start)) {
                    jif_start = jif_now;
                    break;
                }
                cpu_relax();
            }
        } else {
            break;
        }
    }
/* Restore the real event handler */
    global_clock_event->event_handler = real_handler;
/* Invoke the calibration routine */
    local_irq_disable();
    lapic_cal_handler(NULL);
    local_irq_enable();
}

/* Build delta t1-t2 as apic timer counts down */
delta = lapic_cal_t1 - lapic_cal_t2;
levt->features &= ~CLOCK_EVT_FEAT_DUMMY;

/* PM timer calibration failed or not turned on
 * so lets try APIC timer based calibration
PM timer calibration failed or not turned on so let's try APIC timer based calibration, if a global clockevent device is available.

```c
if (!pm_referenced) {
    if (!pm_referenced && global_clock_event) {
        apic_printk(APIC_VERBOSE, "... verify APIC timer\n");
    }
}
```

```c
enum apic_intr_mode_id apic_intr_mode;

-static int __init apic_intr_mode_select(void)
+static int __init __apic_intr_mode_select(void)
{
    /* Check kernel option */
    if (disable_apic) {
        return APIC_SYMMETRIC_IO;
    }

    /* Select the interrupt delivery mode for the BSP */
    void __init apic_intr_mode_select(void)
    {
        apic_intr_mode = __apic_intr_mode_select();
    }

    /* An initial setup of the virtual wire mode. */
    bool upmode = IS_ENABLED(CONFIG_UP_LATE_INIT);

    -apic_intr_mode = apic_intr_mode_select();
    
    switch (apic_intr_mode) {
        case APIC_PIC:
            pr_info("APIC: Keep in PIC mode(8259)\n");
            break;
        default:
            oldvalue, value);
    }

    -static void apic_pending_intr_clear(void)
    {
        long long max_loops = cpu_khz ? cpu_khz : 1000000;
        unsigned long long tsc = 0, ntsc;
```
unsigned int value, queued;
+int i, j, acked = 0;
+
+if (boot_cpu_has(X86_FEATURE_TSC))
+tsc = rdtsc();
+/
+ * After a crash, we no longer service the interrupts and a pending
+ * interrupt from previous kernel might still have ISR bit set.
+ *
+ * Most probably by now CPU has serviced that pending interrupt and
+ * it might not have done the ack_APIC_irq() because it thought,
+ * interrupt came from i8259 as ExtInt. LAPIC did not get EOI so it
+ * does not clear the ISR bit and cpu thinks it has already serviced
+ * the interrupt. Hence a vector might get locked. It was noticed
+ * for timer irq (vector 0x31). Issue an extra EOI to clear ISR.
+ */
+do {
+queued = 0;
+for (i = APIC_ISR_NR - 1; i >= 0; i--)
+queued |= apic_read(APIC_IRR + i*0x10);
+
+for (i = APIC_ISR_NR - 1; i >= 0; i--) {
+value = apic_read(APIC_ISR + i*0x10);
+for (j = 31; j >= 0; j--) {
+if (value & (1<<j)) {
+ack_APIC_irq();
+acked++;
+}
+
+} 
+
+} 
+if (acked > 256) {
+printk(KERN_ERR "LAPIC pending interrupts after %ld EOI\n",
+       acked);
+break;
+}
+if (queued) {
+if (boot_cpu_has(X86_FEATURE_TSC) && cpu_khz) {
+ntsc = rdtsc();
+max_loops = (long long)cpu_khz << 10;
+max_loops -= ntsc - tsc;
+} else
+max_loops--;
+}
+while (queued && max_loops > 0);
+WARN_ON(max_loops <= 0);
+}
* setup_local_APIC - setup the local APIC
*
@@ -1417,19 +1554,22 @@
 void setup_local_APIC(void)
 {
 int cpu = smp_processor_id();
-unsigned int value, queued;
-int i, j, acked = 0;
-unsigned long long tsc = 0, ntsc;
-long long max_loops = cpu_khz ? cpu_khz : 1000000;
+unsigned int value;
-if (boot_cpu_has(X86_FEATURE_TSC))
-tsc = rdtsc();

 if (disable_apic) {
 disable_ioapic_support();
 return;
 }

+/*
+ * If this comes from kexec/kcrash the APIC might be enabled in
+ * SPIV. Soft disable it before doing further initialization.
+ */
+value = apic_read(APIC_SPIV);
+value &= ~APIC_SPIV_APIC_ENABLED;
+apic_write(APIC_SPIV, value);
+
#ifndef CONFIG_X86_32
 /* Pound the ESR really hard over the head with a big hammer - mbligh */
 if (lapic_is_integrated() && apic->disable_esr) {
 @@ -1455,16 +1595,21 @@
 apic->init_apic_ldr();
 
#endif CONFIG_X86_32
 */
-/*
- * APIC LDR is initialized. If logical_apicid mapping was
- * initialized during get_smp_config(), make sure it matches the
- * actual value.
- */
-/*
-i = early_per_cpu(x86_cpu_to_logical_apicid, cpu);
-WARN_ON(i != BAD_APICID && i != logical_smp_processor_id());
-/* always use the value from LDR */
-early_per_cpu(x86_cpu_to_logical_apicid, cpu) =
-logical_smp_processor_id();
+if (apic->dest_logical) {
+int logical_apicid, ldr_apicid;
+
再加上APIC LDR已经初始化。如果logical_apicid映射未初始化期间get_smp_config()，确保它匹配
* 逻辑的真正值。
* /
+logical_apicid = early_per_cpu(x86_cpu_to_logical_apicid, cpu);
+ldr_apicid = GET_APIC_LOGICAL_ID(apic_read(APIC_LDR));
+if (logical_apicid != BAD_APICID)
+WARN_ON(logical_apicid != ldr_apicid);
+/* Always use the value from LDR. */
+early_per_cpu(x86_cpu_to_logical_apicid, cpu) = ldr_apicid;
+}
#endif

/*
@@ -1475,45 +1620,7 @@
value &= ~APIC_TPRI_MASK;
apic_write(APIC_TASKPRI, value);

-/*
- * After a crash, we no longer service the interrupts and a pending
- * interrupt from previous kernel might still have ISR bit set.
- *
- * Most probably by now CPU has serviced that pending interrupt and
- * it might not have done the ack_APIC_irq() because it thought,
- * interrupt came from i8259 as ExtInt. LAPIC did not get EOI so it
- * does not clear the ISR bit and cpu thinks it has already serviced
- * the interrupt. Hence a vector might get locked. It was noticed
- * for timer irq (vector 0x31). Issue an extra EOI to clear ISR.
- */
-}
-}
-do {
-queued = 0;
-for (i = APIC_ISR_NR - 1; i >= 0; i--)
-queued |= apic_read(APIC_IRR + i*0x10);.
-
-for (i = APIC_ISR_NR - 1; i >= 0; i--) {
-value = apic_read(APIC_ISR + i*0x10);
-for (j = 31; j >= 0; j--)
-if (value & (1<<j)) {
-ack_APIC_irq();
-acked++;
-}
-}
-}
-if (acked > 256) {
-printk(KERN_ERR "LAPIC pending interrupts after %d EOI\n",
-ackd);
-break;
-} if (queued) {
    -if (boot_cpu_has(X86_FEATURE_TSC) && cpu_khz) {
      -ntsc = rdtsc();
      -max_loops = (cpu_khz << 10) - (ntsc - tsc);
    } else
      -max_loops--;
    -} while (queued && max_loops > 0);
-WARN_ON(max_loops <= 0);
+apic_pending_intr_clear();

/*
 * Now that we are all set up, enable the APIC
@@ -1570,7 +1677,7 @@
 * TODO: set up through-local-APIC from through-I/O-APIC? --macro
 */
 value = apic_read(APIC_LVT0) & APIC_LVT_MASKED;
- if (!cpu && (pic_mode || !value)) {
-+if (!cpu && (pic_mode || !value || skip_ioapic_setup)) {
+    value = APIC_DM_EXTINT;
        apic_printk(APIC_VERBOSE, "enabled ExtINT on CPU#%d\n", cpu);
    } else {
@@ -1732,20 +1839,22 @@
 return;

 if (remap_mode != IRQ_REMAP_X2APIC_MODE) {
-/* IR is required if there is APIC ID > 255 even when running
- * under KVM
-*/
-+/*
-+ * Using X2APIC without IR is not architecturally supported
-+ * on bare metal but may be supported in guests.
-+*/
-+if (max_physical_apicid > 255 ||
-+!x86_init.hyper.x2apic_available()) {
-+if (!x86_init.hyper.x2apic_available()) {
+pr_info("x2apic: IRQ remapping doesn't support X2APIC mode\n");
 x2apic_disable();
 return;
}

/*
- * without IR all CPUs can be addressed by IOAPIC/MSI
- * only in physical mode
-+ * Without IR, all CPUs can be addressed by IOAPIC/MSI only
-+ * in physical mode, and CPUs with an APIC ID that cannot
-+ * be addressed must not be brought online.
-*/

x2apic_set_max_apicid(255);
x2apic_phys = 1;
}
x2apic_enable();
@@ -1942,7 +2051,8 @@

unsigned int new_apicid;

-apic_check_deadline_errata();
+if (apic_validate_deadline_timer())
+pr_info("TSC deadline timer available\n");

if (x2apic_mode) {
    boot_cpu_physical_apicid = read_apic_id();
@@ -2180,6 +2290,38 @@
    [0 ... NR_CPUS - 1] = -1,
    ];

+bool arch_match_cpu_phys_id(int cpu, u64 phys_id)
+{ 
+    return phys_id == cpuid_to_apicid[cpu];
+}
+
+#ifdef CONFIG_SMP
+/**
+ * apic_id_is_primary_thread - Check whether APIC ID belongs to a primary thread
+ * @id: APIC ID to check
+ */
+bool apic_id_is_primary_thread(unsigned int apicid)
+{
+    u32 mask;
+    +
+    +if (smp_num_siblings == 1)
+        return true;
+    +/* Isolate the SMT bit(s) in the APICID and check for 0 */
+    +mask = (1U << (fls(smp_num_siblings) - 1)) - 1;
+    +return !(apicid & mask);
+    }
+    +#endif
+    +
+    +
+    +
+    +/**
+     * apic_id_disabled - Check whether APIC ID is disabled via SMT control
+     * @id: APIC ID to check
+     */
+     bool apic_id_disabled(unsigned int id)
+     {
+         return (cpu_smt_control == CPU_SMT_FORCE_DISABLED && !apic_id_is_primary_thread(id));
+     }
/* Should use this API to allocate logical CPU IDs to keep nr_logical_cpuids
 * and cpuid_to_apicid[] synchronized.
 */

int default_apic_id_valid(int apicid)
{
    return (apicid < 255);
}

int default_apic_id_valid(u32 apicid)
{
    return (apicid < 255);
}

static int numachip_apic_id_valid(int apicid)
{
    return (apicid < 255);
}

static int numachip_apic_id_valid(u32 apicid)
{
    return (apicid < 255);
}
/* Trust what bootloader passes in MADT */
return 1;

--- linux-4.15.0.orig/arch/x86/kernel/apic/bigsmp_32.c
+++ linux-4.15.0/arch/x86/kernel/apic/bigsmp_32.c
@@ -38,32 +38,12 @@
return early_per_cpu(x86_cpu_to_apicid, cpu);
}

-static inline unsigned long calculate_ldr(int cpu)
-{unsigned long val, id;
-val = apic_read(APIC_LDR) & ~APIC_LDR_MASK;
-id = per_cpu(x86_bios_cpu_apicid, cpu);
-val |= SET_APIC_LOGICAL_ID(id);
-
-return val;
-}

-/*
- * Set up the logical destination ID.
- *
- * Intel recommends to set DFR, LDR and TPR before enabling
- * an APIC. See e.g. "AP-388 82489DX User's Manual" (Intel
- * document number 292116). So here it goes...
+ * bigsmp enables physical destination mode
+ * and doesn't use LDR and DFR
-*/
static void bigsmp_init_apic_ldr(void)
{
-unsigned long val;
-int cpu = smp_processor_id();
-
apic_write(APIC_DFR, APIC_DFR_FLAT);
-val = calculate_ldr(cpu);
-apic_write(APIC_LDR, val);
}

static void bigsmp_setup_apic_routing(void)
--- linux-4.15.0.orig/arch/x86/kernel/apic/io_apic.c
+++ linux-4.15.0/arch/x86/kernel/apic/io_apic.c
@@ -33,6 +33,7 @@
#include <linux/mm.h>
#include <linux/interrupt.h>
+#include <linux/irq.h>
#include <linux/init.h>

#include <linux/mm.h>
#include <linux/interrupt.h>
+#include <linux/irq.h>
#include <linux/init.h>
#include <linux/delay.h>
#include <linux/sched.h>
@@ -57,6 +58,7 @@
#include <asm/acpi.h>
#include <asm/dma.h>
#include <asm/timer.h>
+#+include <asm/time.h>
#include <asm/i8259.h>
#include <asm/setup.h>
#include <asm/irq_remapping.h>
@@ -1042,6 +1044,16 @@
if (idx >= 0 && test_bit(mp_irqs[idx].srcbus, mp_bus_not_pci)) {
    irq = mp_irqs[idx].srcbusirq;
    legacy = mp_is_legacy_irq(irq);
+/*
+ * IRQ2 is unusable for historical reasons on systems which
+ * have a legacy PIC. See the comment vs. IRQ2 further down.
+ *
+ * If this gets removed at some point then the related code
+ * in lapic_assign_system_vectors() needs to be adjusted as
+ * well.
+ */
+if (legacy && irq == PIC_CASCADE_IR)
+    return -EINVAL;
} }

mutex_lock(&ioapic_mutex);
@@ -1603,7 +1615,7 @@
do {
    rep_nop();
    now = rdtsc();
-} while ((now - start) < 40000000000UL / HZ &&
+} while ((now - start) < 40000000000ULL / HZ &&
        time_before_eq(jiffies, end));
}
@@ -1731,9 +1743,10 @@
static inline bool ioapic_irqd_mask(struct irq_data *data)
{
    /* If we are moving the irq we need to mask it */
+/* If we are moving the IRQ we need to mask it */
    if (unlikely(irqd_is_setaffinity_pending(data))) {
        -mask_ioapic_irq(data);
        +if (!irqd_irq_masked(data))
        +mask_ioapic_irq(data);
        return true;
    }
return false;
@@ -1770,7 +1783,9 @@
 *!
 if (!io_apic_level_ack_pending(data->chip_data))
 irq_move_masked_irq(data);
- unmask_ioapic_irq(data);
+/* If the IRQ is masked in the core, leave it: */
 + if (!irqd_irq_masked(data))
+ unmask_ioapic_irq(data);
 }
 }
 #else
@@ -1859,7 +1874,7 @@ * intr-remapping table entry. Hence for the io-apic
 * EOI we use the pin number.
 */
-ack_APIC_irq();
+apic_ack_irq(irq_data);
 eoi_ioapic_pin(data->entry.vector, data);
 }
@@ -1898,6 +1913,50 @@
 return ret;
 }

+/*
+ * Interrupt shutdown masks the ioapic pin, but the interrupt might already
+ * be in flight, but not yet serviced by the target CPU. That means
+ * __synchronize_hardirq() would return and claim that everything is calmed
+ * down. So free_irq() would proceed and deactivate the interrupt and free
+ * resources.
+ *
+ * Once the target CPU comes around to service it it will find a cleared
+ * vector and complain. While the spurious interrupt is harmless, the full
+ * release of resources might prevent the interrupt from being acknowledged
+ * which keeps the hardware in a weird state.
+ *
+ * Verify that the corresponding Remote-IRR bits are clear.
+ */
+static int ioapic_irq_get_chip_state(struct irq_data *irqd, 
+ enum irqchip_irq_state which, 
+ bool *state)
+{
+ struct mp_chip_data *mcd = irqd->chip_data;
+ struct IO_APIC_route_entry rentry;
+ struct irq_pin_list *p;
+ if (which != IRQCHIP_STATE_ACTIVE)
return -EINVAL;
+
+*state = false;
+raw_spin_lock(&ioapic_lock);
+for_each_irq_pin(p, mcd->irq_2_pin) {
+rentry = __ioapic_read_entry(p->apic, p->pin);
+/*
+ * The remote IRR is only valid in level trigger mode. It's
+ * meaning is undefined for edge triggered interrupts and
+ * irrelevant because the IO-APIC treats them as fire and
+ * forget.
+ */
+if (rentry.irr && rentry.trigger) {
+*state = true;
+break;
+}
+}
+raw_spin_unlock(&ioapic_lock);
+return 0;
+
static struct irq_chip ioapic_chip __read_mostly = {
+name = "IO-APIC",
+irq_startup = startup_ioapic_irq,
+flags = IRQCHIP_SKIP_SET_WAKE,
+irq_get_irqchip_state = ioapic_irq_get_chip_state,
+irq_get_irqchip_state = ioapic_irq_get_chip_state,
+irq_get_irqchip_state = ioapic_irq_get_chip_state,
+irq_get_irqchip_state = ioapic_irq_get_chip_state,
+irq_get_irqchip_state = ioapic_irq_get_chip_state,
+irq_get_irqchip_state = ioapic_irq_get_chip_state,
+irq_retrigger = irq_chip_retrigger_hierarchy,
+flags = IRQCHIP_SKIP_SET_WAKE,
+flags = IRQCHIP_SKIP_SET_WAKE,
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+flags = IRQCHIP.Skip.Set.Wake,
+flags = IRQCHIP.Skip.Set.Wake,
+flags = IRQCHIP.Skip.Set.Wake,
int no_pin1 = 0;

+if (!global_clock_event)
+return;
+
local_irq_save(flags);

/*
@@ -2208,6 +2274,7 @@
legacy_pic->init(0);
legacy_pic->make_irq(0);
apic_write(APIC_LVT0, APIC_DM_EXTINT);
+legacy_pic->unmask(0);

unlock_ExtINT_logic();

@@ -2281,12 +2348,12 @@
ip->irqdomain = irq_domain_create_linear(fn, hwirqs, cfg->ops, (void *)(long)ioapic);

-/* Release fw handle if it was allocated above */
-if (!cfg->dev)
-irq_domain_free_fwnode(fn); -
-
-if (!ip->irqdomain)
+if (!ip->irqdomain) {
+/* Release fw handle if it was allocated above */
+if (!cfg->dev)
+ irq_domain_free_fwnode(fn);
return -ENOMEM;
+
ip->irqdomain->parent = parent;

@@ -2300,8 +2367,13 @@
static void ioapic_destroy_irqdomain(int idx)
{
+struct ioapic_domain_cfg *cfg = &ioapics[idx].irqdomain_cfg;
+struct fwnode_handle *fn = ioapics[idx].irqdomain->fwnode;
+
if (ioapics[idx].irqdomain) {
 irq_domain_remove(ioapics[idx].irqdomain);
+if (!cfg->dev)
 irq_domain_free_fwnode(fn);
  ioapics[idx].irqdomain = NULL;
 }
dmar_alloc_hwirq() may be called before setup_IO_APIC(), so use gsi_top if ioapic_dynirq_base hasn't been initialized yet.

/*
 return ioapic_initialized ? ioapic_dynirq_base : gsi_top;
+if (!ioapic_initialized)
 +return gsi_top;
+*/
+ * For DT enabled machines ioapic_dynirq_base is irrelevant and not
+ * updated. So simply return @from if ioapic_dynirq_base == 0.
+ */
+return ioapic_dynirq_base ? : from;
}

#include <linux/mm.h>
#include <linux/interrupt.h>
#include <linux/irq.h>
#include <linux/pci.h>
#include <linux/dmar.h>
#include <linux/hpet.h>
static struct irq_domain *msi_default_domain;

static void irq_msi_compose_msg(struct irq_data *data, struct msi_msg *msg)
{
 struct irq_cfg *cfg = irqd_cfg(data);

 msg->address_hi = MSI_ADDR_BASE_HI;

 if (x2apic_enabled())
 uchars.MSI_DATA_VECTOR(cfg->vector);
 }

#ifdef CONFIG_X86_32
--- linux-4.15.0.orig/arch/x86/kernel/apic/msi.c
+++ linux-4.15.0/arch/x86/kernel/apic/msi.c
@@ -12,6 +12,7 @@
 */

 if (!ioapic_initialized)
 	return gsi_top;
+*/
+ * For DT enabled machines ioapic_dynirq_base is irrelevant and not
+ * updated. So simply return @from if ioapic_dynirq_base == 0.
+ */
+return ioapic_dynirq_base ? : from;
}

#include <linux/mm.h>
#include <linux/interrupt.h>
#include <linux/irq.h>
#include <linux/pci.h>
#include <linux/dmar.h>
#include <linux/hpet.h>
static struct irq_domain *msi_default_domain;

static void irq_msi_compose_msg(struct irq_data *data, struct msi_msg *msg)
{
 struct irq_cfg *cfg = irqd_cfg(data);

 msg->address_hi = MSI_ADDR_BASE_HI;

 if (x2apic_enabled())
 uchars.MSI_DATA_VECTOR(cfg->vector);
 }

+static void irq_msi_compose_msg(struct irq_data *data, struct msi_msg *msg)
+{
+__irq_msi_compose_msg(irqd_cfg(data), msg);
+}
+static void irq_msi_update_msg(struct irq_data *irqd, struct irq_cfg *cfg)
+
+__irq_msi_compose_msg(cfg, msg);
+irq_data_get_irq_chip(irqd)->irq_write_msi_msg(irqd, msg);
+
+static int
+msi_set_affinity(struct irq_data *irqd, const struct cpumask *mask, bool force)
+{ 
+struct irq_cfg old_cfg, *cfg = irqd_cfg(irqd);
+struct irq_data *parent = irqd->parent_data;
+unsigned int cpu;
+int ret;
+
+  /* Save the current configuration */
+  cpu = cpumask_first(irq_data_get_effective_affinity_mask(irqd));
+  old_cfg = *cfg;
+
+  /* Allocate a new target vector */
+  ret = parent->chip->irq_set_affinity(parent, mask, force);
+  if (ret < 0 || ret == IRQ_SET_MASK_OK_DONE)
+    return ret;
+
+  /* For non-maskable and non-remapped MSI interrupts the migration
+     * to a different destination CPU and a different vector has to be
+     * done careful to handle the possible stray interrupt which can be
+     * caused by the non-atomic update of the address/data pair.
+     */
+  * Direct update is possible when:
+  * - The MSI is maskable (remapped MSI does not use this code path)).
+  * - The quirk bit is not set in this case.
+  * - The new vector is the same as the old vector
+  * - The old vector is MANAGED_IRQ_SHUTDOWN_VECTOR (interrupt starts up)
+  * - The interrupt is not yet started up
+  * - The new destination CPU is the same as the old destination CPU
+  */
+  if (!irqd_msi_nomask_quirk(irqd) ||
+      cfg->vector == old_cfg.vector ||
+      old_cfg.vector == MANAGED_IRQ_SHUTDOWN_VECTOR ||
+      !irqd_is_started(irqd) ||
+      cfg->dest_apicid == old_cfg.dest_apicid) {
+    irq_msi_update_msg(irqd, cfg);
+    return ret;
+  }
+
+  /* Paranoia: Validate that the interrupt target is the local
+ * CPU.
+ */
+if (WARN_ON_ONCE(cpu != smp_processor_id())) {
+irq_msi_update_msg(irqd, cfg);
+return ret;
+
+/*
+ * Redirect the interrupt to the new vector on the current CPU
+ * first. This might cause a spurious interrupt on this vector if
+ * the device raises an interrupt right between this update and the
+ * update to the final destination CPU.
+ *
+ * If the vector is in use then the installed device handler will
+ * denote it as spurious which is no harm as this is a rare event
+ * and interrupt handlers have to cope with spurious interrupts
+ * anyway. If the vector is unused, then it is marked so it won't
+ * trigger the 'No irq handler for vector' warning in do_IRQ().
+ *
+ * This requires to hold vector lock to prevent concurrent updates to
+ * the affected vector.
+ */
+lock_vector_lock();
+
+/*
+ * Mark the new target vector on the local CPU if it is currently
+ * unused. Reuse the VECTOR_RETRIGGERED state which is also used in
+ * the CPU hotplug path for a similar purpose. This cannot be
+ * undone here as the current CPU has interrupts disabled and
+ * cannot handle the interrupt before the whole set_affinity()
+ * section is done. In the CPU unplug case, the current CPU is
+ * about to vanish and will not handle any interrupts anymore. The
+ * vector is cleaned up when the CPU comes online again.
+ */
+if (IS_ERR_OR_NULL(this_cpu_read(vector_irq[ cfg->vector])))
+this_cpu_write(vector_irq[ cfg->vector], VECTOR_RETRIGGERED);
+
+/* Redirect it to the new vector on the local CPU temporarily */
+old_cfg.vector = cfg->vector;
+irq_msi_update_msg(irqd, &old_cfg);
+
+/* Now transition it to the target CPU */
+irq_msi_update_msg(irqd, cfg);
+
+/*
+ * All interrupts after this point are now targeted at the new
+ * vector/CPU.
+ *
+ * Drop vector lock before testing whether the temporary assignment
+ * to the local CPU was hit by an interrupt raised in the device,
+ * because the retrigger function acquires vector lock again.
+ */
+unlock_vector_lock();
+
+ /*
+ * Check whether the transition raced with a device interrupt and
+ * is pending in the local APICs IRR. It is safe to do this outside
+ * of vector lock as the irq_desc::lock of this interrupt is still
+ * held and interrupts are disabled: The check is not accessing the
+ * underlying vector store. It's just checking the local APIC's
+ * IRR.
+ */
+if (lapic_vector_set_in_irr(cfg->vector))
+irq_data_get_irq_chip(irqd)->irq_retrigger(irqd);
+
+return ret;
+}
+
/*
 IRQ Chip for MSI PCI/PCI-X/PCI-Express Devices,
 which implement the MSI or MSI-X Capability Structure.
 @@ -60,7 +182,9 @@
 .irq_ack		= irq_chip_ack_parent,
 .irq_retrigger		= irq_chip_retrigger_hierarchy,
 .irq-compose_msi_msg	= irq_msiCompose_msg,
-flags		= IRQCHIP_SKIP_SET_WAKE,
+flags		= IRQCHIP_SKIP_SET_WAKE |
+flags		= IRQCHIP_AFFINITY_PRE_STARTUP,
+IRQCHIP_AFFINITY_PRE_STARTUP,
];

int native_setup_msi_irqs(struct pci_dev *dev, int nvec, int type)
@@ -144,10 +268,12 @@
msi_default_domain =
pci_msi_create_irq_domain(fn, &pci_msi_domain_info,
    parent);
-irq_domain_free_fwnode(fn);
 }
-if (!msi_default_domain)
+if (!msi_default_domain) {
+  irq_domain_free_fwnode(fn);
 pr_warn("failed to initialize irqdomain for MSI/MSI-x.");
+} else
+msi_default_domain->flags |= IRQ_DOMAIN_MSI_NOMASK_QUIRK;
}
#ifdef CONFIG_IRQ_REMAP
@@ -158,7 +284,8 @@
    .irq_ack = irq_chip_ack_parent,
    .irq_retrigger = irq_chip_retrigger_hierarchy,
    .irq_set_vcpu_affinity = irq_chip_set_vcpu_affinity_parent,
-   .flags = IRQCHIP_SKIP_SET_WAKE,
+   .flags = IRQCHIP_SKIP_SET_WAKE |
+   IRQCHIP_AFFINITY_PRE_STARTUP,
};

static struct msi_domain_info pci_msi_ir_domain_info = {
@@ -180,7 +307,8 @@
    if (!fn)
    return NULL;
    d = pci_msi_create_irq_domain(fn, &pci_msi_ir_domain_info, parent);
-   irq_domain_free_fwnode(fn);
+   if (!d)
+   irq_domain_free_fwnode(fn);
    return d;
}
#endif
@@ -200,7 +328,8 @@
    .irq_retrigger = irq_chip_retrigger_hierarchy,
    .irq_compose_msi_msg = irq_msi_compose_msg,
    .irq_write_msi_msg = dmar_msi_write_msg,
-   .flags = IRQCHIP_SKIP_SET_WAKE,
+   .flags = IRQCHIP_SKIP_SET_WAKE |
+   IRQCHIP_AFFINITY_PRE_STARTUP,
};

static irq_hw_number_t dmar_msi_get_hwirq(struct msi_domain_info *info,
@@ -243,7 +372,8 @@
    if (fn) {
    dmar_domain = msi_create_irq_domain(fn, &dmar_msi_domain_info, x86_vector_domain);
    -irq_domain_free_fwnode(fn);
+    if (!dmar_domain)
+    irq_domain_free_fwnode(fn);
    return d;
    }
    #endif
@@ -297,7 +427,7 @@
    .irq_retrigger = irq_chip_retrigger_hierarchy,
    .irq_compose_msi_msg = irq_msi_compose_msg,
    .irq_write_msi_msg = hpet_msi_write_msg,
-   .flags = IRQCHIP_SKIP_SET_WAKE,
+   .flags = IRQCHIP_SKIP_SET_WAKE | IRQCHIP_AFFINITY_PRE_STARTUP,
};
static irq_hw_number_t hpct_msi_get_hwirq(struct msi_domain_info *info,
        @ @ -368,7 +498,10 @ @
    }

d = msi_create_irq_domain(fn, domain_info, parent);
+irq_domain_free_fwnode(fn);
+if (!d) {
+    irq_domain_free_fwnode(fn);
+kfree(domain_info);
+}
return d;
}

--- linux-4.15.0.orig/arch/x86/kernel/apic/vector.c
+++ linux-4.15.0/arch/x86/kernel/apic/vector.c
@@ -11,6 +11,7 @@

#include <linux/interrupt.h>
+    #include <linux/irq.h>
#include <linux/seq_file.h>
#include <linux/init.h>
#include <linux/compiler.h>
@@ -134,21 +135,40 @@

    struct apic_chip_data *apicd = apic_chip_data(irqd);
    struct irq_desc *desc = irq_data_to_desc(irqd);
    +    bool managed =irqd_affinity_is_managed(irqd);

    lockdep_assert_held(&vector_lock);

    trace_vector_update(irqd->irq, newvec, newcpu, apicd->vector,
            apicd->cpu);

    /* Setup the vector move, if required */
    -if (apicd->vector && cpu_online(apicd->cpu)) {
    +/*
    +    * If there is no vector associated or if the associated vector is
    +    * the shutdown vector, which is associated to make PCI/MSI
    +    * shutdown mode work, then there is nothing to release. Clear out
    +    * prev_vector for this and the offline target case.
    +    */
    +apicd->prev_vector = 0;
    +if (!apicd->vector || apicd->vector == MANAGED_IRQ_SHUTDOWN_VECTOR)
    +goto setnew;
    +/*
    +    * If the target CPU of the previous vector is online, then mark
the vector as move in progress and store it for cleanup when the
first interrupt on the new vector arrives. If the target CPU is
vector not possible and the vector can be immediately freed
in the underlying matrix allocator.
*/
if (cpu_online(apicd->cpu)) {
apicd->move_in_progress = true;
apicd->prev_vector = apicd->vector;
apicd->prev_cpu = apicd->cpu;
} else {
apicd->prev_vector = 0;
-irq_matrix_free(vector_matrix, apicd->cpu, apicd->vector,
+managed);
}
+
setnew:
apicd->vector = newvec;
apicd->cpu = newcpu;
BUG_ON(!IS_ERR_OR_NULL(per_cpu(vector_irq, newcpu)[newvec]));
@@ -216,6 +236,15 @@
if (vector && cpu_online(cpu) && cpumask_test_cpu(cpu, dest))
return 0;
+*/
+ * Careful here. @apicd might either have move_in_progress set or
+ * be enqueued for cleanup. Assigning a new vector would either
+ * leave a stale vector on some CPU around or in case of a pending
+ * cleanup corrupt the hlist.
+ */
+if (apicd->move_in_progress || !hlist_unhashed(&apicd->clist))
+return -EBUSY;
+
vector = irq_matrix_alloc(vector_matrix, dest, resvd, &cpu);
if (vector > 0)
apic_update_vector(irqd, vector, cpu);
@@ -254,20 +283,24 @@
const struct cpumask *affmsk = irq_data_get_affinity_mask(irqd);
int node = irq_data_get_node(irqd);
-if (node == NUMA_NO_NODE)
goto all;
-/* Try the intersection of @affmsk and node mask */
-cpumask_and(vector_searchmask, cpumask_of_node(node), affmsk);
-if (!assign_vector_locked(irqd, vector_searchmask))
-return 0;
-/* Try the node mask */
-if (!assign_vector_locked(irqd, cpumask_of_node(node)))


-return 0;
-all:
+if (node != NUMA_NO_NODE) {
+/* Try the intersection of @affmsk and node mask */
+cpumask_and(vector_searchmask, cpumask_of_node(node), affmsk);
+if (!assign_vector_locked(irqd, vector_searchmask))
+return 0;
+}
+
+/* Try the node mask */
+if (!assign_vector_locked(irqd, cpumask_of_node(node)))
+return 0;
+
+/* Try the full online mask */
+cpumask_and(vector_searchmask, affmsk, cpu_online_mask);
+if (!assign_vector_locked(irqd, vector_searchmask))
+return 0;
+
+/* Try the full affinity mask */
+cpumask_and(vector_searchmask, affinity, cpu_online_mask);
+if (!assign_vector_locked(irqd, vector_searchmask))
+return 0;
+
+if (node != NUMA_NO_NODE) {
+/* Try the intersection of @affmsk and node mask */
+cpumask_and(vector_searchmask, cpumask_of_node(node), affmsk);
+if (!assign_vector_locked(irqd, vector_searchmask))
+return 0;
+}
+
+/* Try the full affinity mask */
+cpumask_and(vector_searchmask, affinity, cpu_online_mask);
+if (!assign_vector_locked(irqd, vector_searchmask))
+return 0;
+
+if (node != NUMA_NO_NODE) {
+/* Try the node mask */
+if (!assign_vector_locked(irqd, cpumask_of_node(node)))
+return 0;
+}
+
+/* Try the full online mask */
+return assign_vector_locked(irqd, cpu_online_mask);
+}
@@ -293,14 +326,13 @@
+struct apic_chip_data *apicd = apic_chip_data(irqd);
+int vector, cpu;
+tcpumask_and(vector_searchmask, vector_searchmask, affinity);
+cpu = cpumask_first(vector_searchmask);
+if (cpu >= nr_cpu_ids)
+return -EINVAL;
+tcpumask_and(vector_searchmask, dest, affinity);
+/* set_affinity might call here for nothing */
+if (apicd->vector && cpumask_test_cpu(apicd->cpu, vector_searchmask))
+return 0;
+-vector = irq_matrix_alloc_managed(vector_matrix, cpu);
+vector = irq_matrix_alloc_managed(vector_matrix, vector_searchmask,
+ &cpu);
+trace_vector_alloc_managed(irqd->irq, vector, vector);
+if (vector < 0)
+return vector;
+@
+trace_vector_clear(irqd->irq, vector, apicd->cpu, apicd->prev_vector,
+ apicd->prev_cpu);
+per_cpu(vector_irq, apicd->cpu)[vector] = VECTOR_UNUSED;
+per_cpu(vector_irq, apicd->cpu)[vector] = VECTOR_SHUTDOWN;
irq_matrix_free(vector_matrix, apicd->cpu, vector, managed);
apicd->vector = 0;

@@ -332,7 +364,7 @@
 if (!vector)
     return;

-irq_matrix_free(vector_matrix, apicd->cpu, vector, managed);
+irq_matrix_free(vector_matrix, apicd->cpu, vector, managed);
apicd->vector = 0;
apicd->move_in_progress = 0;
@@ -381,6 +413,17 @@
 if (!irqd_can_reserve(irqd))
     apicd->can_reserve = false;
 }
+/* Check to ensure that the effective affinity mask is a subset
+ * the user supplied affinity mask, and warn the user if it is not
+ */
+if (!cpumask_subset(irq_data_get_effective_affinity_mask(irqd),
+    irq_data_get_affinity_mask(irqd))) {
+    pr_warn("irq %u: Affinity broken due to vector space exhaustion.\n",
+        irqd->irq);
+}
+
+return ret;
}

@@ -393,7 +436,7 @@
 if (WARN_ON_ONCE(cpumask_empty(vector_searchmask))) {
 /* Something in the core code broke! Survive gracefully */
 pr_err("Managed startup for irq %u, but no CPU\n", irqd->irq);
-return EINVAL;
+return -EINVAL;
}

ret = assign_managed_vector(irqd, vector_searchmask);
@@ -418,12 +461,10 @@
 trace_vector_activate(irqd->irq, apicd->is_managed,
     apicd->can_reserve, reserve);

-/* Nothing to do for fixed assigned vectors */
-if (!apicd->can_reserve && !apicd->is_managed)
-    return 0;
-
-raw_spin_lock_irqsave(&vector_lock, flags);
if (reserve || irqd_is_managed_and_shutdown(irqd))
+if (!apicd->can_reserve && !apicd->is_managed)
+assign_irq_vector_any_locked(irqd);
+else if (reserve || irqd_is_managed_and_shutdown(irqd))
vector_assign_managed_shutdown(irqd);
else if (apicd->is_managed)
ret = activate_managed(irqd);
@@ -528,6 +569,10 @@
irqd->chip_data = apicd;
irqd->hwirq = virq + i;
irqd_set_single_target(irqd);
+ /* Don't invoke affinity setter on deactivated interrupts */
+irqd_set_affinity_on_activate(irqd);
+
/*
 * Legacy vectors are already assigned when the IOAPIC
 * takes them over. They stay on the same vector. This is
@@ -645,6 +690,26 @@
irq_matrix_assign_system(vector_matrix, ISA_IRQ_VECTOR(irq), replace);
}

+void __init lapic_update_legacy_vectors(void)
+{
+unsigned int i;
+
+if (IS_ENABLED(CONFIG_X86_IO_APIC) && nr_ioapics > 0)
+return;
+
+/*
+ * If the IO/APIC is disabled via config, kernel command line or
+ * lack of enumeration then all legacy interrupts are routed
+ * through the PIC. Make sure that they are marked as legacy
+ * vectors. PIC_CASCADE_IRQ has already been marked in
+ * lapic_assign_system_vectors().
+ */
+for (i = 0; i < nr_legacy_irqs(); i++) {
+if (i != PIC_CASCADE_IR)
lapic_assign_legacy_vector(i, true);
+}
+
void __init lapic_assign_system_vectors(void)
{
unsigned int i, vector = 0;
@@ -674,7 +739,6 @@
x86_vector_domain = irq_domain_create_tree(fn, &x86_vector_domain_ops,
 NULL);
BUG_ON(x86_vector_domain == NULL);
-irq_domain_free_fwnode(fn);
irq_set_default_host(x86_vector_domain);

arch_init_msi_domain(x86_vector_domain);
@@ -740,20 +804,10 @@
static int apic_set_affinity(struct irq_data *irqd,
    const struct cpumask *dest, bool force)
{
    struct apic_chip_data *apicd = apic_chip_data(irqd);
    int err;

    /*
     - * Core code can call here for inactive interrupts. For inactive
     - * interrupts which use managed or reservation mode there is no
     - * point in going through the vector assignment right now as the
     - * activation will assign a vector which fits the destination
     - * cpumask. Let the core code store the destination mask and be
     - * done with it.
     - */
    -if (!irqd_is_activated(irqd) &&
    -    (apicd->is_managed || apicd->can_reserve))
    -return IRQ_SET_MASK_OK;
    +if (WARN_ON_ONCE(!irqd_is_activated(irqd)))
    +return -EIO;

    raw_spin_lock(&vector_lock);
    cpumask_and(vector_searchmask, dest, cpu_online_mask);
@@ -781,13 +835,18 @@
    return 1;
}

-void apic_ack_edge(struct irq_data *irqd)
+void apic_ack_irq(struct irq_data *irqd)
{
    irq_complete_move(irqd_cfg(irqd));
    irq_move_irq(irqd);
    ack_APIC_irq();
}

+void apic_ack_edge(struct irq_data *irqd)
+{
+    irq_complete_move(irqd_cfg(irqd));
+    apic_ack_irq(irqd);
+}
+
static struct irq_chip lapic_controller = {
    .name = "APIC",

/* Common bits for X2APIC cluster/physical modes. */

-int x2apic_apic_id_valid(int apicid);
+int x2apic_apic_id_valid(u32 apicid);
 int x2apic_apic_id_registered(void);
 void __x2apic_send_IPI_dest(unsigned int apicid, int vector, unsigned int dest);
 unsigned int x2apic_get_apic_id(unsigned long id);
--- linux-4.15.0.orig/arch/x86/kernel/apic/x2apic_cluster.c
+++ linux-4.15.0/arch/x86/kernel/apic/x2apic_cluster.c
 @@ -31,7 +31,8 @@
{
 u32 dest = per_cpu(x86_cpu_toLogical_apicid, cpu);

-2apic_wrmr_fence();
+/* x2apic MSRs are special and need a special fence: */
 +weak_wrmr_fence();
-2apic_send_IPI_dest(dest, vector, APIC_DEST_LOGICAL);
 }

@@ -43,7 +44,8 @@
 unsigned long flags;
 u32 dest;

-2apic_wrmr_fence();
+/* x2apic MSRs are special and need a special fence: */
 +weak_wrmr_fence();
 local_irq_save(flags);

tmpmsk = this_cpu_cpumask_var_ptr(ipi_mask);
@@ -116,6 +118,7 @@
go to update;
 }
 cmsk = cluster_hotplug_mask;
+cmsk->clusterid = cluster;
 cluster_hotplug_mask = NULL;
 update:
 this_cpu_write(cluster_masks, cmsk);
@@ -157,7 +160,8 @@
{
 struct cluster_mask *cmsk = per_cpu(cluster_masks, dead_cpu);

-cpumask_clear_cput(dead_cpu, &cmsk->mask);
+if (cmsk)
+cpumask_clear_cput(dead_cpu, &cmsk->mask);
free_cpumask_var(per_cpu(ipi_mask, dead_cpu));
return 0;
}
--- linux-4.15.0.orig/arch/x86/kernel/apic/x2apic_phys.c
+++ linux-4.15.0/arch/x86/kernel/apic/x2apic_phys.c
@@ -13,6 +13,12 @@
int x2apic_phys;

static struct apic apic_x2apic_phys;
+static u32 x2apic_max_apicid __ro_after_init;
+
+void __init x2apic_set_max_apicid(u32 apicid)
+{
+ x2apic_max_apicid = apicid;
+}

static int set_x2apic_phys_mode(char *arg)
{
@@ -42,7 +48,8 @@
    __x2apic_send_IPI_dest(dest, vector, APIC_DEST_PHYSICAL);
 }
@@ -53,7 +60,8 @@

/* Common x2apic functions, also used by x2apic_cluster */
-int x2apic_apic_id_valid(int apicid)
+int x2apic_apic_id_valid(u32 apicid)
{ }
+if (x2apic_max_apicid && apicid > x2apic_max_apicid)
+return 0;

/* x2apic MSRs are special and need a special fence: */
+weak_wrmsr_fence();

-x2apic_wrmsr_fence();

/x2apic MSRs are special and need a special fence: */
+weak_wrmsr_fence();
__x2apic_send_IPI_dest(dest, vector, APIC_DEST_PHYSICAL);

/* x2apic MSRs are special and need a special fence: */
+weak_wrmsr_fence();

local_irq_save(flags);

/* Common x2apic functions, also used by x2apic_cluster */
-int x2apic_apic_id_valid(int apicid)
+int x2apic_apic_id_valid(u32 apicid)
{ }
+if (x2apic_max_apicid && apicid > x2apic_max_apicid)
+return 0;

/* x2apic MSRs are special and need a special fence: */
+weak_wrmsr_fence();

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+weak_wrmsr_fence();

local_irq_save(flags);

/* x2apic MSRs are special and need a special fence: */
+weak_wrmsr_fence();
return 1;
}

--- linux-4.15.0.orig/arch/x86/kernel/apic/x2apic_uv_x.c
+++ linux-4.15.0/arch/x86/kernel/apic/x2apic_uv_x.c
@@ -26,6 +26,7 @@
 #include <linux/delay.h>
 #include <linux/crash_dump.h>
 #include <linux/reboot.h>
+#include <linux/memory.h>

 #include <asm/uv/uv_nmrsh.h>
 #include <asm/uv/uv_hub.h>
@@ -389,6 +390,51 @@
 }
 EXPORT_SYMBOL(uv_hub_info_version);

+/* Default UV memory block size is 2GB */
+static unsigned long mem_block_size __initdata = (2UL << 30);
 +
+/* Kernel parameter to specify UV mem block size */
+static int __init parse_mem_block_size(char *ptr)
+{
+unsigned long size = memparse(ptr, NULL);
 +
+/* Size will be rounded down by set_block_size() below */
+mem_block_size = size;
+return 0;
+}
+early_param("uv_memblksize", parse_mem_block_size);
 +
+static __init int adj_blksize(u32 lgre)
+{
+unsigned long base = (unsigned long)lgre << UV_GAM_RANGE_SHFT;
+unsigned long size;
+
+for (size = mem_block_size; size > MIN_MEMORY_BLOCK_SIZE; size >>= 1)
+if (IS_ALIGNED(base, size))
+break;
+
+if (size >= mem_block_size)
+return 0;
+
+mem_block_size = size;
+return 1;
+}
+
+static __init void set_block_size(void)
unsigned int order = ffs(mem_block_size);

if (order) {
    /* adjust for ffs return of 1..64 */
    set_memory_block_size_order(order - 1);
    pr_info("UV: mem_block_size set to 0x%lx\n", mem_block_size);
} else {
    /* bad or zero value, default to 1UL << 31 (2GB) */
    pr_err("UV: mem_block_size error with 0x%lx\n", mem_block_size);
    set_memory_block_size_order(31);
}

/* Build GAM range lookup table: */
static __init void build_uv_gr_table(void)
{
    uv_send_IPI_mask(cpu_online_mask, vector);
}

int uv_apic_id_valid(int apicid)
{
    return 1;
}

for (; gre->type != UV_GAM_RANGE_TYPE_UNUSED; gre++) {
    unsigned long size = ((unsigned long)(gre->limit - lgre)
              << UV_GAM_RANGE_SHFT);
    int order = 0;
    char suffix[] = " KMGTPE";
    int flag = ' ';

    while (size > 9999 && order < sizeof(suffix)) {
        size /= 1024;
        order++;
    }

    /* adjust max block size to current range start */
    if (gre->type == 1 || gre->type == 2)
        if (adj_blksize(lgre))
            flag = '*';
    if (!index) {
        pr_info("UV: GAM Range Table...\n");
    }
-pr_info("UV: # %20s %14s %5s %4s %5s %3s %2s\n", "Range", ",", "Size", "Type", "NASID", "SID", "PN");
+pr_info("UV: # %20s %14s %6s %4s %5s %3s %2s\n", "Range", ",", "Size", "Type", "NASID", "SID", "PN");
}
-pr_info("UV: %2d: 0x%014lx-0x%014lx %5luG %3d   %04x  %02x %02x\n",
+pr_info("UV: %2d: 0x%014lx-0x%014lx%c %5lu%c %3d   %04x  %02x %02x\n",
index++,
(unsigned long)lgre << UV_GAM_RANGE_SHFT,
(unsigned long)gre->limit << UV_GAM_RANGE_SHFT,
-((unsigned long)(gre->limit - lgre)) >>
-(30 - UV_GAM_RANGE_SHFT), /* 64M -> 1G */
+flag, size, suffix[order],
gre->type, gre->nasid, gre->sockid, gre->pnode);

+/* update to next range start */
lgre = gre->limit;
if (sock_min > gre->sockid)
sock_min = gre->sockid;
@@ -1416,6 +1478,7 @@
build_socket_tables();
build_uv_gr_table();
+set_block_size();
uv_init_hub_info(&hub_info);
uv_possible_blades = num_possible_nodes();
if (!node_to_pnode)
--- linux-4.15.0.orig/arch/x86/kernel/apm_32.c
+++ linux-4.15.0/arch/x86/kernel/apm_32.c
@@ -240,6 +240,7 @@
#include <asm/olpc.h>
#include <asm/paravirt.h>
#include <asm/reboot.h>
+#include <asm/nospec-branch.h>

#if defined(CONFIG_APM_DISPLAY_BLANK) & & defined(CONFIG_VT)
extern int (*console_blank_hook)(int);
@@ -614,11 +615,13 @@
gdt[0x40 / 8] = bad_bios_desc;
apm_irq_save(flags);
+firmware_restrict_branch_speculation_start();
APM_DO_SAVE_SEGS;
apm_bios_call_asm(call->func, call->ebx, call->ecx,
 &call->eax, &call->ebx, &call->ecx, &call->edx,
 &call->esi);
APM_DO_RESTORE_SEGS;
+firmware_restrict_branch_speculation_end();
apm_irq_restore(flags);
gdt[0x40 / 8] = save_desc_40;

Open Source Used In 5GaaS Edge AC-4 11775
put_cpu();
@@ -690,10 +693,12 @@
gdt[0x40 / 8] = bad_bios_desc;

apm_irq_save(flags);
+firmware_restrict_branch_speculation_start();
APM_DO_SAVE_SEGS;
error = apm_bios_call_simple_asm(call->func, call->ebx, call->ecx,
 &call->eax);
APM_DO_RESTORE_SEGS;
+firmware_restrict_branch_speculation_end();
apm_irq_restore(flags);
gdt[0x40 / 8] = save_desc_40;
put_cpu();
@@ -1635,6 +1640,7 @@
return 0;
}

+#ifdef CONFIG_PROC_FS
static int proc_apm_show(struct seq_file *m, void *v)
{
unsigned short tbx;
@@ -1714,6 +1720,7 @@
units);
return 0;
}
+#endif

static int proc_apm_open(struct inode *inode, struct file *file)
{
@@ -2389,6 +2396,7 @@
if (HZ != 100)
idle_period = (idle_period * HZ) / 100;
if (idle_threshold < 100) {
+cpuidle_poll_state_init(&apm_idle_driver);
if (!cpuidle_register_driver(&apm_idle_driver))
if (cpuidle_register_device(&apm_cpuidle_device))
cpuidle_unregister_driver(&apm_idle_driver);
--- linux-4.15.0.orig/arch/x86/kernel/asm-offsets.c
+++ linux-4.15.0/arch/x86/kernel/asm-offsets.c
@@ -103,4 +103,9 @@
OFFSET(CPU_ENTRY_AREA_entry_trampoline, cpu_entry_area, entry_trampoline);
OFFSET(CPU_ENTRY_AREA_entry_stack, cpu_entry_area, entry_stack_page);
DEFINE(SIZEOF_entry_stack, sizeof(struct entry_stack));
+DEFINE(MASK_entry_stack, (~(sizeof(struct entry_stack) - 1)));
 +
+/* Offset for sp0 and sp1 into the tss_struct */
+OFFSET(TSS_sp0, tss_struct, x86_tss.sp0);

Open Source Used In 5GaaS Edge AC-4  11776
+OFFSET(TSS_sp1, tss_struct, x86_tss.sp1);
}
--- linux-4.15.0.orig/arch/x86/kernel/asm-offsets_32.c
+++ linux-4.15.0/arch/x86/kernel/asm-offsets_32.c
@@ -18,7 +18,7 @@
OFFSET(CPUINFO_x86, cpuinfo_x86, x86);
OFFSET(CPUINFO_x86_vendor, cpuinfo_x86, x86_vendor);
OFFSET(CPUINFO_x86_model, cpuinfo_x86, x86_model);
-OFFSET(CPUINFO_x86_mask, cpuinfo_x86, x86_mask);
+OFFSET(CPUINFO_x86_stepping, cpuinfo_x86, x86_stepping);
OFFSET(CPUINFO_x86 capability, cpuinfo_x86, x86_capability);
OFFSET(CPUINFO_x86_vendor_id, cpuinfo_x86, x86_vendor_id);
@@ -46,8 +46,14 @@
OFFSET(saved_context_gdt_desc, saved_context, gdt_desc);
BLANK();

-/* Offset from the sysenter stack to tss.sp0 */
-DEFINE(TSS_sysenter_sp0, offsetof(struct cpu_entry_area, tss.x86_tss.sp0) -
+/*
+ * Offset from the entry stack to task stack stored in TSS. Kernel entry
+ * happens on the per-cpu entry-stack, and the asm code switches to the
+ * task-stack pointer stored in x86_tss.sp1, which is a copy of
+ * task->thread.sp0 where entry code can find it.
+ */
+DEFINE(TSS_entry2task_stack,
+       offsetof(struct cpu_entry_area, tss.x86_tss.sp1) -
offsetofend(struct cpu_entry_area, entry_stack_page.stack));

#endif CONFIG_CC_STACKPROTECTOR
--- linux-4.15.0.orig/arch/x86/kernel/asm-offsets_64.c
+++ linux-4.15.0/arch/x86/kernel/asm-offsets_64.c
@@ -65,8 +65,6 @@
#undef ENTRY
OFFSET(TSS_ist, tss_struct, x86_tss.ist);
-OFFSET(TSS_sp0, tss_struct, x86_tss.sp0);
-OFFSET(TSS_sp1, tss_struct, x86_tss.sp1);
BLANK();

#endif CONFIG_CC_STACKPROTECTOR
--- linux-4.15.0.orig/arch/x86/kernel/check.c
+++ linux-4.15.0/arch/x86/kernel/check.c
@@ -31,6 +31,11 @@
ssize_t ret;
unsigned long val;
+	if (!arg) {

+if (!arg) {
+pr_err("memory_corruption_check config string not provided\n");
+return -EINVAL;
+
ret = kstrtoul(arg, 10, &val);
if (ret)
    return ret;
@@ -45,6 +50,11 @@
    @ @ -55,6 +50,11 @ @
    ssize_t ret;
    unsigned long val;

+if (!arg) {
+    pr_err("memory_corruption_check_period config string not provided\n");
+    +return -EINVAL;
+    +
    ret = kstrtoul(arg, 10, &val);
    if (ret)
        return ret;
@@ -59,6 +69,11 @@
    @ @ -59,6 +69,11 @ @
    char *end;
    unsigned size;

+if (!arg) {
+    pr_err("memory_corruption_check_size config string not provided\n");
+    +return -EINVAL;
+    +
    +
    size = memparse(arg, &end);

if (*end == '\0')

--- linux-4.15.0.orig/arch/x86/kernel/cpu/Makefile
+++ linux-4.15.0/arch/x86/kernel/cpu/Makefile
@@ -17,7 +17,7 @@
   nostackp := $(call cc-option, -fno-stack-protector)
   CFLAGS_common.o := $(nostackp)

   -obj-y:= intel_cacheinfo.o scattered.o topology.o
   +obj-y:= cacheinfo.o scattered.o topology.o
   obj-y+= common.o
   obj-y+= rd rand.o
   obj-y+= match.o
    @ @ -28,7 +28,7 @ @
   obj-$ (CONFIG_PROC_FS)+= proc.o
   obj-$ (CONFIG_X86_FEATURE_NAMES) += capflags.o powerflags.o

    -obj-$ (CONFIG_CPU_SUP_INTEL)+= intel.o
    +obj-$ (CONFIG_CPU_SUP_INTEL)+= intel.o tsx.o


#include <linux/random.h>
#include <asm/processor.h>
#include <asm/apic.h>
+#include <asm/cacheinfo.h>
#include <asm/cpu.h>
+#include <asm/spec-ctrl.h>
#include <asm/smp.h>
#include <asm/pci-direct.h>
#include <asm/delay.h>
@@ -9,7 +9,9 @@
#include <linux/random.h>
#include <asm/processor.h>
#include <asm/apic.h>
+#include <asm/cacheinfo.h>
#include <asm/cpu.h>
+#include <asm/spec-ctrl.h>
#include <asm/smp.h>
#include <asm/pci-direct.h>
#include <asm/delay.h>
@@ -23,6 +25,7 @@
static const int amd_erratum_383[];
static const int amd_erratum_400[];
+static const int amd_erratum_1054[];
static bool cpu_has_amd_erratum(struct cpuinfo_x86 *cpu, const int *erratum);

/*
@@ -119,7 +122,7 @@
     return;
 }

-if (c->x86_model == 6 && c->x86_mask == 1) {
+if (c->x86_model == 6 && c->x86_stepping == 1) {
    const int K6_BUG_LOOP = 1000000;
    int n;
    void (*f_vide)(void);
@@ -149,7 +152,7 @@
/* K6 with old style WHCR */
     if (c->x86_model < 8)
       (c->x86_model == 8 && c->x86_mask < 8)) {
+      (c->x86_model == 8 && c->x86_stepping < 8)) {
/* We can only write allocate on the low 508Mb */
     if (mbytes > 508)
       mbytes = 508;
@@ -168,7 +171,7 @@
     return;
 }

-if ((c->x86_model == 8 && c->x86_mask > 7)) ||
+if ((c->x86_model == 8 && c->x86_stepping > 7)) ||
       c->x86_model == 9 || c->x86_model == 13) {
/* The more serious chips .. */

@@ -221,7 +224,7 @@
* are more robust with CLK_CTL set to 200xxxxx instead of 600xxxxx
* As per AMD technical note 27212.0.2
*/

@if ((c->x86_model == 8 && c->x86_mask >= 1) || (c->x86_model > 8)) {
    rdmsr(MSR_K7_CLK_CTL, l, h);
    if ((l & 0xfff00000) != 0x20000000) {
        pr_info("CPU: CLK_CTL MSR was %x. Reprogramming to %x",
        @ @ -241,12 +244,12 @@
* but they are not certified as MP capable.
*/

/* Athlon 660/661 is valid. */
@if ((c->x86_model == 6) && ((c->x86_mask == 0) ||
    (c->x86_mask == 1)))
    return;

/* Duron 670 is valid */
-if ((c->x86_model == 7) && (c->x86_mask == 0))
+if ((c->x86_model == 7) && (c->x86_stepping == 0))
return;

/*
 @@ -256,8 +259,8 @@
* See http://www.heise.de/newsticker/data/jow-18.10.01-000 for
* more.
*/
-if (((c->x86_model == 6) && (c->x86_mask >= 2)) ||
    ((c->x86_model == 7) && (c->x86_mask >= 1)) ||
    (c->x86_model > 7))
-if (cpu_has(c, X86_FEATURE_MP))
    return;
@@ -297,7 +300,6 @@
}
@endif

-#ifdef CONFIG_SMP
/
*/

/* Fix up cpu_core_id for pre-F17h systems to be in the
* [0 .. cores_per_node - 1] range. Not really needed but
@@ -314,6 +316,13 @@
        c->cpu_core_id %= cus_per_node;
    }
@endif

Open Source Used In 5GaaS Edge AC-4 11780
static void amd_get_topology_early(struct cpuinfo_x86 *c)
{
  if (cpu_has(c, X86_FEATURE_TOPOEXT))
    smp_num_siblings = ((cpuid_ebx(0x8000001e) >> 8) & 0xff) + 1;
}

/*
 * Fixup core topology information for
 * (1) AMD multi-node processors
 * @ -327,12 +336,12 @@
 */

/* get information required for multi-node processors */
if (boot_cpu_has(X86_FEATURE_TOPOEXT))
{
  int err;
  u32 eax, ebx, ecx, edx;

cpuid(0x80000001e, &eax, &ebx, &ecx, &edx);

  node_id = ecx & 0xff;
  smp_num_siblings = ((ebx >> 8) & 0xff) + 1;

  if (c->x86 == 0x15)
    c->cu_id = ebx & 0xff;
  @@ -345,21 +354,15 @@
} /*
 - * We may have multiple LLCs if L3 caches exist, so check if we
 - * have an L3 cache by looking at the L3 cache CPUID leaf.
 + * In case leaf B is available, use it to derive
 + * topology information.
 */
-ifdef (cpuid_edx(0x80000006))
-  ifdef (c->x86 == 0x17)
-    d /*
-     * LLC is at the core complex level.
-     * Core complex id is ApicId[3].
-     */
-      per_cpu(cpu_llc_id, cpu) = c->apicid >> 3;
-  } else {
-    /*
-     * LLC is at the node level. */
-     per_cpu(cpu_llc_id, cpu) = node_id;
-  } else {
+err = detect_extended_topology(c);
+if (!err)
+c->x86_coreid_bits = get_count_order(c->x86_max_cores);
+
cacheinfo_amd_init_llc_id(c, cpu, node_id);
+
} else if (cpu_has(c, X86_FEATURE_NODEID_MSR)) {
    u64 value;

    legacy_fixup_core_id(c);
}

#endif

/*
 * On a AMD dual core setup the lower bits of the APIC id distinguish the cores.
 */
static void amd_detect_cmp(struct cpuinfo_x86 *c)
{
    #ifdef CONFIG_SMP
    unsigned bits;
    int cpu = smp_processor_id();

    c->phys_proc_id = c->initial_apicid >> bits;
    /* use socket ID also for last level cache */
    per_cpu(cpu_llc_id, cpu) = c->phys_proc_id;
    -amd_get_topology(c);
    -#endif
}

u16 amd_get_nb_id(int cpu)
{
    -u16 id = 0;
    -#ifdef CONFIG_SMP
    -#endif
    -return id;
    +return per_cpu(cpu_llc_id, cpu);
}
EXPORT_SYMBOL_GPL(amd_get_nb_id);

@@ -554,10 +549,33 @@
    rdmsrl(MSR_FAM10H_NODE_ID, value);
    nodes_per_socket = ((value >> 3) & 7) + 1;
    }
+

if (!boot_cpu_has(X86_FEATURE_AMD_SSBD) &&
  !boot_cpu_has(X86_FEATURE_VIRT_SSBD) &&
  c->x86 >= 0x15 && c->x86 <= 0x17) {
  unsigned int bit;
  switch (c->x86) {
    case 0x15: bit = 54; break;
    case 0x16: bit = 33; break;
    case 0x17: bit = 10; break;
    default: return;
  }
  /* Try to cache the base value so further operations can
   * avoid RMW. If that faults, do not enable SSBD.
   */
  if (!rdmsrl_safe(MSR_AMD64_LS_CFG, &x86_amd_ls_cfg_base)) {
    setup_force_cpu_cap(X86_FEATURE_LS_CFG_SSBD);
    setup_force_cpu_cap(X86_FEATURE_SSBD);
    x86_amd_ls_cfg_ssbd_mask = 1ULL << bit;
  }
}

static void early_init_amd(struct cpuinfo_x86 *c)
{
  u64 value;
  u32 dummy;
  early_init_amd_mc(c);
  /* Set MTRR capability flag if appropriate */
  if (c->x86 == 5)
    if (c->x86_model == 13 || c->x86_model == 9 ||
        c->x86_model >= 8 && c->x86_mask >= 8))
      set_cpu_cap(c, X86_FEATURE_K6_MTRR);
  endif
  #if defined(CONFIG_X86_LOCAL_APIC) && defined(CONFIG_PCI)
  clear_cpu_cap(c, X86_FEATURE_SME);
  #endif
  /* Re-enable TopologyExtensions if switched off by BIOS */
  if (c->x86 == 0x15 &&
      c->x86_model >= 0x10 && c->x86_model <= 0x6f) &&
      !cpu_has(c, X86_FEATURE_TOPOEXT)) {
if (msr_set_bit(0xc0011005, 54) > 0) {
  rdmsrl(0xc0011005, value);
  if (value & BIT_64(54)) {
    set_cpu_cap(c, X86_FEATURE_TOPOEXT);
    pr_info_once(FW_INFO "CPU: Re-enabling disabled Topology Extensions Support.
    ");
  }
}

amd_get_topology_early(c);

static void init_amd_k8(struct cpuinfo_x86 *c)
{
  msr_set_bit(MSR_AMD64_DE_CFG, 31);
}

static void init_amd_bd(struct cpuinfo_x86 *c)
{
  static int __init rdrand_cmdline(char *str)
  {
    u64 value;
    if (!str)
      return -EINVAL;
    /* re-enable TopologyExtensions if switched off by BIOS */
    if ((c->x86_model >= 0x10) && (c->x86_model <= 0x6f) &&
        !cpu_has(c, X86_FEATURE_TOPOEXT)) {
      if (!strcmp(str, "force"))
        rdrand_force = true;
    } else
    return -EINVAL;

    if (msr_set_bit(0xc0011005, 54) > 0) {
      rdmsrl(0xc0011005, value);
      if (value & BIT_64(54)) {
        set_cpu_cap(c, X86_FEATURE_TOPOEXT);
        pr_info_once(FW_INFO "CPU: Re-enabling disabled Topology Extensions Support.
    ");
      }
    }
  return 0;
}

early_param("rdrand", rdrand_cmdline);

static void clear_rdrand_cpuid_bit(struct cpuinfo_x86 *c)
{
/* Saving of the MSR used to hide the RDRAND support during
suspend/resume is done by arch/x86/power/cpu.c, which is
dependent on CONFIG_PM_SLEEP.
*/
if (!IS_ENABLED(CONFIG_PM_SLEEP))
return;
+
+/*
+ * The nordrand option can clear X86_FEATURE_RDRAND, so check for
+ * RDRAND support using the CPUID function directly.
+ */
+if (!(cpuid_ecx(1) & BIT(30)) || rdrand_force)
return;
+
+msr_clear_bit(MSR_AMD64_CPUID_FN_1, 62);
+
+/
+ * Verify that the CPUID change has occurred in case the kernel is
+ * running virtualized and the hypervisor doesn't support the MSR.
+ */
+if (cpuid_ecx(1) & BIT(30)) {
pr_info_once("BIOS may not properly restore RDRAND after suspend, but hypervisor does not support hiding
RDRAND via CPUID.
");
return;
}
+
clear_cpu_cap(c, X86_FEATURE_RDRAND);
+pr_info_once("BIOS may not properly restore RDRAND after suspend, hiding RDRAND via CPUID. Use
rdrand=force to reenable.
");
+}
+
+static void init_amd_jg(struct cpuinfo_x86 *c)
+{*
+ * Some BIOS implementations do not restore proper RDRAND support
+ * across suspend and resume. Check on whether to hide the RDRAND
+ * instruction support via CPUID.
+ */
clear_rdrand_cpuid_bit(c);
+}
+
+static void init_amd_bd(struct cpuinfo_x86 *c)
+{
+u64 value;
+
/*
* The way access filter has a performance penalty on some workloads.
* Disable it on the affected CPUs.
wrmsrl_safe(MSR_F15H_IC_CFG, value);
}
+
+ /*
+ * Some BIOS implementations do not restore proper RDRAND support
+ * across suspend and resume. Check on whether to hide the RDRAND
+ * instruction support via CPUID.
+ */
+clear_rdrand_cpuid_bit(c);
}

static void init_amd_zn(struct cpuinfo_x86 *c)
{
+set_cpu_cap(c, X86_FEATURE_ZEN);
+
/*
- * Fix erratum 1076: CPB feature bit not being set in CPUID. It affects
- * all up to and including B1.
+ * Fix erratum 1076: CPB feature bit not being set in CPUID.
+ * Always set it, except when running under a hypervisor.
*/
-if (c->x86_model <= 1 && c->x86_mask <= 1)
+if (!cpu_has(c, X86_FEATURE_HYPERVISOR) && !cpu_has(c, X86_FEATURE_CPB))
set_cpu_cap(c, X86_FEATURE_CPB);
}

cpu_detect_cache_sizes(c);

/* Multi core CPU? */
-if (c->extended_cpuid_level >= 0x80000008) {
-amd_detect_cmp(c);
-srat_detect_node(c);
-}
-
-#ifdef CONFIG_X86_32
-detect_ht(c);

Open Source Used In 5GaaS Edge AC-4  11786
init_amd_cacheinfo(c);

/*@ -872.6 +955.15 @*/
/* AMD CPUs don't reset SS attributes on SYSRET, Xen does. */
if (!cpu_has(c, X86_FEATURE_XENPV))
set_cpu_bug(c, X86_BUG_SYSRET_SS_ATTRS);
+
+ /*
+ * Turn on the Instructions Retired free counter on machines not
+ * susceptible to erratum #1054 "Instructions Retired Performance
+ * Counter May Be Inaccurate".
+ */
+ if (cpu_has(c, X86_FEATURE_IRPERF) &&
+ !cpu_has_amd_erratum(c, amd_erratum_1054))
+ msr_set_bit(MSR_K7_HWCR, MSR_K7_HWCR_IRPERF_EN_BIT);
}

#endif CONFIG_X86_32
/*@ -880.11 +972.11 @*/
/* AMD errata T13 (order #21922) */
if ((c->x86 == 6)) {
/* Duron Rev A0 */
-if (c->x86_model == 3 && c->x86_mask == 0)
+if (c->x86_model == 3 && c->x86_stepping == 0)
 size = 64;
/* Tbird rev A1/A2 */
if (c->x86_model == 4 &&
 -(c->x86_mask == 0 || c->x86_mask == 1))
 +(c->x86_stepping == 0 || c->x86_stepping == 1))
 size = 256;
}
return size;
/*@ -999.6 +1091.9 @*/
static const int amd_erratum_383[] =
AMD_OSVW_ERRATUM(3, AMD_MODEL_RANGE(0x10, 0, 0, 0xff, 0xf));

+/* #1054: Instructions Retired Performance Counter May Be Inaccurate */
+static const int amd_erratum_1054[] =
+AMD_LEGACY_ERRATUM(AMD_MODEL_RANGE(0x17, 0, 0, 0x2f, 0xf));

static bool cpu_has_amd_erratum(struct cpuinfo_x86 *cpu, const int *erratum)
{
/*@ -1021.7 +1116.7 @*/
/* OSVW unavailable or ID unknown, match family-model-stepping range */

-\tms = (cpu->x86_model << 4) | cpu->x86_mask;
+\tms = (cpu->x86_model << 4) | cpu->x86_stepping;

while ((range = *erratum++))

if ((cpu->x86 == AMD_MODEL_RANGE_FAMILY(range)) &&
    (ms >= AMD_MODEL_RANGE_START(range)) &&

--- linux-4.15.0.orig/arch/x86/kernel/cpu/bugs.c
+++ linux-4.15.0/arch/x86/kernel/cpu/bugs.c
@@ -11,33 +11,113 @@
#include <linux/init.h>
#include <linux/utsname.h>
#include <linux/cpu.h>
+##include <linux/module.h>
+##include <linux/nospec.h>
+##include <linux/prctl.h>
+##include <linux/sched/smt.h>

-##include <asm/nospec-branch.h>
+##include <asm/spec-ctrl.h>
+##include <asm/cmdline.h>
  #include <asm/bugs.h>
  #include <asm/processor.h>
  #include <asm/processor-flags.h>
  #include <asm/fpu/internal.h>
  #include <asm/msr.h>
  +##include <asm/vmx.h>
  #include <asm/paravirt.h>
  #include <asm/alternative.h>
  #include <asm/pgtable.h>
  #include <asm/set_memory.h>
  #include <asm/intel-family.h>
  +##include <asm/e820/api.h>
  +#include <asm/hypervisor.h>

  +#include "cpu.h"

+static void __init spectre_v1_select_mitigation(void);
  static void __init spectre_v2_select_mitigation(void);
+static void __init ssb_select_mitigation(void);
+static void __init l1tf_select_mitigation(void);
+static void __init mds_select_mitigation(void);
+static void __init mds_print_mitigation(void);
+static void __init taa_select_mitigation(void);
+static void __init srbds_select_mitigation(void);

+/* The base value of the SPEC_CTRL MSR that always has to be preserved. */
+u64 x86_spec_ctrl_base;
+EXPORT_SYMBOL_GPL(x86_spec_ctrl_base);
+static DEFINE_MUTEX(spec_ctrl_mutex);
+
+/*
+ * The vendor and possibly platform specific bits which can be modified in
+ * x86_spec_ctrl_base.
+ */
+static u64 __ro_after_init x86_spec_ctrl_mask = SPEC_CTRL_IBRS;
+
+/*
+ * AMD specific MSR info for Speculative Store Bypass control.
+ * x86_amd_ls_cfg_ssbd_mask is initialized in identify_boot_cpu().
+ */
+u64 __ro_after_init x86_amd_ls_cfg_base;
+u64 __ro_after_init x86_amd_ls_cfg_ssbd_mask;
+
+/* Control conditional STIBP in switch_to() */
+DEFINE_STATIC_KEY_FALSE(switch_to_cond_stibp);
+/* Control conditional IBPB in switch_mm() */
+DEFINE_STATIC_KEY_FALSE(switch_mm_cond_ibpb);
+/* Control unconditional IBPB in switch_mm() */
+DEFINE_STATIC_KEY_FALSE(switch_mm_always_ibpb);
+
+/* Control MDS CPU buffer clear before returning to user space */
+DEFINE_STATIC_KEY_FALSE(mds_user_clear);
+EXPORT_SYMBOL_GPL(mds_user_clear);
+/* Control MDS CPU buffer clear before idling (halt, mwait) */
+DEFINE_STATIC_KEY_FALSE(mds_idle_clear);
+EXPORT_SYMBOL_GPL(mds_idle_clear);

void __init check_bugs(void)
{
    identify_boot_cpu();

+/*
+ * identify_boot_cpu() initialized SMT support information, let the
+ * core code know.
+ */
+cpu_smt_check_topology();
+
+if (!IS_ENABLED(CONFIG_SMP)) {
    pr_info("CPU: ");
    print_cpu_info(&boot_cpu_data);
}

-/* Select the proper spectre mitigation before patching alternatives */
+/*

+ * Read the SPEC_CTRL MSR to account for reserved bits which may
+ * have unknown values. AMD64_LS_CFG MSR is cached in the early AMD
+ * init code as it is not enumerated and depends on the family.
+ */
+if (boot_cpu_has(X86_FEATURE_MSR_SPEC_CTRL))
+rdmsrl(MSR_IA32_SPEC_CTRL, x86_spec_ctrl_base);
+
+/* Allow STIBP in MSR_SPEC_CTRL if supported */
+if (boot_cpu_has(X86_FEATURE_STIBP))
+x86_spec_ctrl_mask |= SPEC_CTRL_STIBP;
+
+/* Select the proper CPU mitigations before patching alternatives: */
+spectre_v1_select_mitigation();
spectre_v2_select_mitigation();
+ssb_select_mitigation();
+l1tf_select_mitigation();
+mds_select_mitigation();
+taa_select_mitigation();
+srbsd_select_mitigation();
+
+/*
+ * As MDS and TAA mitigations are inter-related, print MDS
+ * mitigation until after TAA mitigation selection is done.
+ */
+mds_print_mitigation();
+
+arch_smt_update();

#ifdef CONFIG_X86_32
/*
@@ -71,7 +151,470 @@
#endif
}
/*
@ @ -71,7 +151,470 @ @
#endif
}

-/* The kernel command line selection */
+void
+x86_virt_spec_ctrl(u64 guest_spec_ctrl, u64 guest_virt_spec_ctrl, bool setguest)
+{
+u64 msrval, guestval, hostval = x86_spec_ctrl_base;
+struct thread_info *ti = current_thread_info();
+
+/* Is MSR_SPEC_CTRL implemented ? */
+if (static_cpu_has(X86_FEATURE_MSR_SPEC_CTRL)) {
+/*
+ * Restrict guest_spec_ctrl to supported values. Clear the
+ * modifiable bits in the host base value and or the
+ * modifiable bits from the guest value.
+ */
+guestval = hostval & ~x86_spec_ctrl_mask;
+guestval |= guest_spec_ctrl & x86_spec_ctrl_mask;
+
+/* SSBD controlled in MSR_SPEC_CTRL */
+if (static_cpu_has(X86_FEATURE_SPEC_CTRL_SSBD) ||
+ static_cpu_has(X86_FEATURE_AMD_SSBD))
+hostval |= ssbd_tif_to_spec_ctrl(ti->flags);
+
+/* Conditional STIBP enabled */
+if (static_branch_unlikely(&switch_to_cond_stibp))
+hostval |= stibp_tif_to_spec_ctrl(ti->flags);
+
+if (hostval != guestval) {
+msrval = setguest ? guestval : hostval;
+wrmsrl(MSR_IA32_SPEC_CTRL, msrval);
+}
+
+/*
+ * If SSBD is not handled in MSR_SPEC_CTRL on AMD, update
+ * MSR_AMD64_L2_CFG or MSR_VIRT_SPEC_CTRL if supported.
+ */
+if (!static_cpu_has(X86_FEATURE_LS_CFG_SSBD) &&
+ !static_cpu_has(X86_FEATURE_VIRT_SSBD))
+return;
+
+/*
+ * If the host has SSBD mitigation enabled, force it in the host's
+ * virtual MSR value. If it's not permanently enabled, evaluate
+ * current's TIF_SSBD thread flag.
+ */
+if (static_cpu_has(X86_FEATURE_SPEC_STORE_BYPASS_DISABLE))
+hostval = SPEC_CTRL_SSBD;
+else
+hostval = ssbd_tif_to_spec_ctrl(ti->flags);
+
+/* Sanitize the guest value */
+guestval = guest_virt_spec_ctrl & SPEC_CTRL_SSBD;
+
+if (hostval != guestval) {
+unsigned long tif;
+
+tif = setguest ? ssbd_spec_ctrl_to_tif(guestval) :
+ ssbd_spec_ctrl_to_tif(hostval);
+
+speculation_ctrl_update(tif);
+}
+}
+EXPORT_SYMBOL_GPL(x86_virt_spec_ctrl);
+
+static void x86_amd_ssb_disable(void)
+{
+    u64 msrval = x86_amd_ls_cfg_base | x86_amd_ls_cfg_ssbd_mask;
+
+    if (boot_cpu_has(X86_FEATURE_VIRT_SSBD))
+        wrmsrl(MSR_AMD64_VIRT_SPEC_CTRL, SPEC_CTRL_SSBD);
+    else if (boot_cpu_has(X86_FEATURE_LS_CFG_SSBD))
+        wrmsrl(MSR_AMD64_LS_CFG, msrval);
+
+#undef pr_fmt
+#define pr_fmt(fmt) "MDS: " fmt
+
+/* Default mitigation for MDS-affected CPUs */
+static enum mds_mitigations mds_mitigation __ro_after_init = MDS_MITIGATION_FULL;
+static bool mds_nosmt __ro_after_init = false;
+
+static const char * const mds_strings[] = {
+    [MDS_MITIGATION_OFF] = "Vulnerable",
+    [MDS_MITIGATION_FULL] = "Mitigation: Clear CPU buffers",
+    [MDS_MITIGATION_VMWERV] = "Vulnerable: Clear CPU buffers attempted, no microcode",
+};
+
+static void __init mds_select_mitigation(void)
+{
+    if (!boot_cpu_has_bug(X86_BUG_MDS) || cpu_mitigations_off()) {
+        mds_mitigation = MDS_MITIGATION_OFF;
+        return;
+    }
+
+    if (mds_mitigation == MDS_MITIGATION_FULL) {
+        if (!boot_cpu_has(X86_FEATURE_MD_CLEAR))
+            mds_mitigation = MDS_MITIGATION_VMWERV;
+        static_branch_enable(&mds_user_clear);
+
+        if (!boot_cpu_has(X86_BUG_MSBDS_ONLY) &&
+            (mds_nosmt || cpu_mitigations_auto_nosmt()))
+            cpu_smt_disable(false);
+    }
+
+    static void __init mds_print_mitigation(void)
+    {
+        if (!boot_cpu_has_bug(X86_BUG_MDS) || cpu_mitigations_off()) {
+            return;
+        }
+
+        if (mds_mitigation == MDS_MITIGATION_FULL) {
+            if (!boot_cpu_has(X86_FEATURE_MD_CLEAR))
+                mds_mitigation = MDS_MITIGATION_VMWERV;
+
+            static_branch_enable(&mds_user_clear);
+
+            if (!boot_cpu_has(X86_BUG_MSBDS_ONLY) &&
+                (mds_nosmt || cpu_mitigations_auto_nosmt()))
+                cpu_smt_disable(false);
+        }
+
+        static void __init mds_print_mitigation(void)
+        {
+            if (!boot_cpu_has_bug(X86_BUG_MDS) || cpu_mitigations_off())
+                return;
static int __init mds_cmdline(char *str)
{
    if (!boot_cpu_has_bug(X86_BUG_MDS))
        return 0;
    if (!str)
        return -EINVAL;
    if (!strcmp(str, "off"))
        mds_mitigation = MDS_MITIGATION_OFF;
    else if (!strcmp(str, "full"))
        mds_mitigation = MDS_MITIGATION_FULL;
    else if (!strcmp(str, "full,nosmt")) {
        mds_mitigation = MDS_MITIGATION_FULL;
        mds_nosmt = true;
    }
    return 0;
}
early_param("mds", mds_cmdline);

/* Default mitigation for TAA-affected CPUs */
static enum taa_mitigations taa_mitigation __ro_after_init = TAA_MITIGATION_VERW;
static bool taa_nosmt __ro_after_init;

static const char * const taa_strings[] = {
    [TAA_MITIGATION_OFF] = "Vulnerable",
    [TAA_MITIGATION_UCODE_NEEDED] = "Vulnerable: Clear CPU buffers attempted, no microcode",
    [TAA_MITIGATION_VERW] = "Mitigation: Clear CPU buffers",
    [TAA_MITIGATION_TSX_DISABLED] = "Mitigation: TSX disabled",
};

static void __init taa_select_mitigation(void)
{
    u64 ia32_cap;
    
    if (!boot_cpu_has_bug(X86_BUG_TAA)) { 
        taa_mitigation = TAA_MITIGATION_OFF;
        return;
    }
}
/* TSX previously disabled by tsx=off */
+if (!boot_cpu_has(X86_FEATURE_RTM)) {
    taa_mitigation = TAA_MITIGATION_TSX_DISABLED;
    goto out;
} +
+taa_mitigation = TAA_MITIGATION_OFF;
+return;
+
+/*
 +  * TAA mitigation via VERW is turned off if both
 +  * tsx_async_abort=off and mds=off are specified.
 +  */
+if (taa_mitigation == TAA_MITIGATION_OFF &&
    mds_mitigation == MDS_MITIGATION_OFF)
    goto out;
+
+/*
 +  * VERW doesn't clear the CPU buffers when MD_CLEAR=1 and MDS_NO=1.
 +  * A microcode update fixes this behavior to clear CPU buffers. It also
 +  * adds support for MSR_IA32_TSX_CTRL which is enumerated by the
 +  * ARCH_CAP_TSX_CTRL_MSR bit.
 +  */
+if ( (ia32_cap & ARCH_CAP_MDS_NO) &&
    !(ia32_cap & ARCH_CAP_TSX_CTRL_MSR))
    taa_mitigation = TAA_MITIGATION_UCODE_NEEDED;
+
+/*
 +  * TSX is enabled, select alternate mitigation for TAA which is
 +  * the same as MDS. Enable MDS static branch to clear CPU buffers.
 +  */
+if (taa_nosmt || cpu_mitigations_auto_nosmt())
    static_branch_enable(&mds_user_clear);
+}
+cpu_smt_disable(false);
+
+/*
+ * Update MDS mitigation, if necessary, as the mds_user_clear is
+ * now enabled for TAA mitigation.
+ */
+if (mds_mitigation == MDS_MITIGATION_OFF &&
    boot_cpu_has_bug(X86_BUG_MDS)) {
    mds_mitigation = MDS_MITIGATION_FULL;
    mds_select_mitigation();
}
+out:
+pr_info("%s\n", taa_strings[taa_mitigation]);
+
+static int __init tsx_async_abort_parse_cmdline(char *str)
+{
+    if (!boot_cpu_has_bug(X86_BUG_TAA))
+        return 0;
+    
+    if (!str)
+        return -EINVAL;
+    
+    if (!strcmp(str, "off")) {
+        taa_mitigation = TAA_MITIGATION_OFF;
+    } else if (!strcmp(str, "full")) {
+        taa_mitigation = TAA_MITIGATION_VERW;
+    } else if (!strcmp(str, "full,nosmt")) {
+        taa_mitigation = TAA_MITIGATION_VERW;
+        taa_nosmt = true;
+    }
+    
+    return 0;
+}
+
+early_param("tsx_async_abort", tsx_async_abort_parse_cmdline);
+
+#undef pr_fmt
+#define pr_fmt(fmt)"SRBDS: " fmt
+
+enum srbds_mitigations {
+    SRBDS_MITIGATION_OFF,
+    SRBDS_MITIGATION_UCODE_NEEDED,
+    SRBDS_MITIGATION_FULL,
+    SRBDS_MITIGATION_TSX_OFF,
+    SRBDS_MITIGATION_HYPERVISOR,
+};
+
+static enum srbds_mitigations srbds_mitigation __ro_after_init = SRBDS_MITIGATION_FULL;
+static const char * const srbds_strings[] = {
+[SRBDS_MITIGATION_OFF]= "Vulnerable",
+[SRBDS_MITIGATION_UCODE_NEEDED]= "Vulnerable: No microcode",
+[SRBDS_MITIGATION_FULL]= "Mitigation: Microcode",
+[SRBDS_MITIGATION_TSX_OFF]= "Mitigation: TSX disabled",
+[SRBDS_MITIGATION_HYPERVISOR]= "Unknown: Dependent on hypervisor status",
+};
+
+static bool srbds_off;
+
+void update_srbds_msr(void)
+{
+u64 mcu_ctrl;
+
+if (!boot_cpu_has_bug(X86_BUG_SRBDS))
+return;
+
+if (boot_cpu_has(X86_FEATURE_HYPERVISOR))
+return;
+
+if (!boot_cpu_has(X86_FEATURE_SRBDS_CTRL))
+return;
+
+rdmsrl(MSR_IA32_MCU_OPT_CTRL, mcu_ctrl);
+
+switch (srbds_mitigation) {
+case SRBDS_MITIGATION_OFF:
+case SRBDS_MITIGATION_TSX_OFF:
+mcu_ctrl |= RNGDS_MITG_DIS;
+break;
+case SRBDS_MITIGATION_FULL:
+mcu_ctrl &= ~RNGDS_MITG_DIS;
+break;
+default:
+break;
+}
+
+wrmrsr(MSR_IA32_MCU_OPT_CTRL, mcu_ctrl);
+}
+
+static void __init srbds_select_mitigation(void)
+{
+u64 ia32_cap;
+
+if (!boot_cpu_has_bug(X86_BUG_SRBDS))
+return;
+
+}
/*
 * Check to see if this is one of the MDS_NO systems supporting
 * TSX that are only exposed to SRBDS when TSX is enabled.
 */

ia32_cap = x86_read_arch_cap_msr();

if ((ia32_cap & ARCH_CAP_MDS_NO) && !boot_cpu_has(X86_FEATURE_RTMI))
    srbds_mitigation = SRBDS_MITIGATION_TSX_OFF;
else if (boot_cpu_has(X86_FEATURE_HYPERVISOR))
    srbds_mitigation = SRBDS_MITIGATION_HYPERVISOR;
else if (!boot_cpu_has(X86_FEATURE_SRBD_CTRL))
    srbds_mitigation = SRBDS_MITIGATION_UCODE_NEEDED;
else if (cpu_mitigations_off() || srbds_off)
    srbds_mitigation = SRBDS_MITIGATION_OFF;
else
    update_srbds_msr();
    pr_info("%s\n", srbds_strings[srbds_mitigation]);
}

static int __init srbds_parse_cmdline(char *str)
{
    if (!str)
        return -EINVAL;
    if (!boot_cpu_has_bug(X86_BUG_SRBD))
        return 0;
    srbds_off = !strcmp(str, "off");
    return 0;
}

early_param("srbds", srbds_parse_cmdline);

#undef pr_fmt
#define pr_fmt(fmt)     "Spectre V1 : " fmt

enum spectre_v1_mitigation {
    SPECTRE_V1_MITIGATION_NONE,
    SPECTRE_V1_MITIGATION_AUTO,
};

static enum spectre_v1_mitigation __ro_after_init =
    SPECTRE_V1_MITIGATION_AUTO;

static const char * const spectre_v1_strings[] = {
    [SPECTRE_V1_MITIGATION_NONE] = "Vulnerable: __user pointer sanitization and usercopy barriers only; no swapgs barriers",
    [SPECTRE_V1_MITIGATION_AUTO] = "Mitigation: usercopy/swapgs barriers and __user pointer sanitization",
};

+/*
Does SMAP provide full mitigation against speculative kernel access to userspace?

static bool smap_works_speculatively(void)
{
    if (!boot_cpu_has(X86_FEATURE_SMAP))
        return false;

    if (boot_cpu_has(X86_BUG_CPU_MELTDOWN))
        return false;

    return true;
}

static void __init spectre_v1_select_mitigation(void)
{
    if (!boot_cpu_has_bug(X86_BUG_SPECTRE_V1) || cpu_mitigations_off()) {
        spectre_v1_mitigation = SPECTRE_V1_MITIGATION_NONE;
        return;
    }

    if (spectre_v1_mitigation == SPECTRE_V1_MITIGATION_AUTO) {
        if (!smap_works_speculatively()) {
            /* Mitigation can be provided from SWAPGS itself or
             * PTI as the CR3 write in the Meltdown mitigation
             */
        }
    }
}

/*
 * With Spectre v1, a user can speculatively control either
 * path of a conditional swapgs with a user-controlled GS
 * value. The mitigation is to add lfences to both code paths.
 *
 * If FSGSBASE is enabled, the user can put a kernel address in
 * GS, in which case SMAP provides no protection.
 *
 * [ NOTE: Don't check for X86_FEATURE_FSGSBASE until the
 * FSGSBASE enablement patches have been merged. ]
 *
 * If FSGSBASE is disabled, the user can only put a user space
 * address in GS. That makes an attack harder, but still
 * possible if there's no SMAP protection.
 */
+if (!smap_works_speculatively()) {
+/
+ * Mitigation can be provided from SWAPGS itself or
+ * PTI as the CR3 write in the Meltdown mitigation
*/
+ * is serializing.
+ *
+ * If neither is there, mitigate with an LFENCE to
+ * stop speculation through swapgs.
+ */
+if (boot_cpu_has_bug(X86_BUG_SWAPGS) &&
+ !boot_cpu_has(X86_FEATURE_PTI))
+setup_force_cpu_cap(X86_FEATURE_FENCE_SWAPGS_USER);
+
+/*
+ * Enable lfences in the kernel entry (non-swapgs)
+ * paths, to prevent user entry from speculatively
+ * skipping swapgs.
+ */
+setup_force_cpu_cap(X86_FEATURE_FENCE_SWAPGS_KERNEL);
+
+pr_info("%s\n", spectre_v1_strings[spectre_v1_mitigation]);
+
+static int __init nospectre_v1_cmdline(char *str)
+{
+spectre_v1_mitigation = SPECTRE_V1_MITIGATION_NONE;
+return 0;
+
+early_param("nospectre_v1", nospectre_v1_cmdline);
+
+#define pr_fmt(fmt)     "Spectre V2 : " fmt
+
+static enum spectre_v2_mitigation spectre_v2_enabled __ro_after_init =
+SPECTRE_V2_NONE;
+
+static enum spectre_v2_user_mitigation spectre_v2_user_stibp __ro_after_init =
+SPECTRE_V2_USER_NONE;
+static enum spectre_v2_user_mitigation spectre_v2_user_ibpb __ro_after_init =
+SPECTRE_V2_USER_NONE;
+
+#ifdef CONFIG_RETPOLINE
+static bool spectre_v2_bad_module;
+
+bool retpoline_module_ok(bool has_retpoline)
+{
+if (spectre_v2_enabled == SPECTRE_V2_NONE || has_retpoline)
+return true;
+
+pr_err("System may be vulnerable to spectre v2\n");
+spectre_v2_bad_module = true;
+return false;
+
+static inline const char *spectre_v2_module_string(void)
+{
+    return spectre_v2_bad_module ? " - vulnerable module loaded" : "";
+}
+
+#else
+static inline const char *spectre_v2_module_string(void) { return ""; }
+#endif
+
+static inline bool match_option(const char *arg, int arglen, const char *opt)
+{
+    int len = strlen(opt);
+    return len == arglen && !strncmp(arg, opt, len);
+}
+
+/* The kernel command line selection for spectre v2 */
enum spectre_v2_mitigation_cmd {
    SPECTRE_V2_CMD_NONE,
    SPECTRE_V2_CMD_AUTO,
    SPECTRE_V2_CMD_RETPOLINE_AMD,
    @.@-81.96 +624,234 @.@
    SPECTRE_V2_CMD_RETPOLINE_GENERIC,
    @.@-81.96 +624,234 @.@
    SPECTRE_V2_CMD_RETPOLINE_AMD,
    @.@-81.96 +624,234 @.@

- static const char *spectre_v2_strings[] = {
    [SPECTRE_V2_NONE] = "Vulnerable",
    [SPECTRE_V2_RETPOLINE_MINIMAL] = "Vulnerable: Minimal generic ASM retpoline",
    [SPECTRE_V2_RETPOLINE_MINIMAL_AMD] = "Vulnerable: Minimal AMD ASM retpoline",
    [SPECTRE_V2_RETPOLINE_GENERIC] = "Mitigation: Full generic retpoline",
    [SPECTRE_V2_RETPOLINE_AMD] = "Mitigation: Full AMD retpoline",
    enum spectre_v2_user_cmd {
    +SPECTRE_V2_USER_CMD_NONE,
    +SPECTRE_V2_USER_CMD_AUTO,
    +SPECTRE_V2_USER_CMD_FORCE,
    +SPECTRE_V2_USER_CMD_PRCTL,
    +SPECTRE_V2_USER_CMD_PRCTL_IBPB,
    +SPECTRE_V2_USER_CMD_SECCOMP,
    +SPECTRE_V2_USER_CMD_SECCOMP_IBPB,
    }

-#undef pr_fmt
-#define pr_fmt(fmt) "Spectre V2 mitigation: " fmt
+
+static const char * const spectre_v2_user_strings[] = {
    +[SPECTRE_V2_USER_NONE] = "User space: Vulnerable",
    +[SPECTRE_V2_USER_STRICT] = "User space: Mitigation: STIBP protection",
}
+[SPECTRE_V2_USER STRICT PREFERRED]= "User space: Mitigation: STIBP always-on protection",
+[SPECTRE_V2 USER PRCTL]= "User space: Mitigation: STIBP via prctl",
+[SPECTRE_V2 USER SECCOMP]= "User space: Mitigation: STIBP via seccomp and prctl",
+};

-static enum spectre_v2_mitigation spectre_v2_enabled = SPECTRE_V2_NONE;
+static const struct {
+const char				*option;
+enum spectre_v2_user_cmd		cmd;
+bool					secure;
+} v2_user_options[] __initconst = {
+{ "auto",SPECTRE_V2_USER_CMD_AUTO,false },
+{ "off",SPECTRE_V2_USER_CMD_NONE,false },
+{ "on",SPECTRE_V2_USER_CMD_FORCE,true },
+{ "prctl",SPECTRE_V2_USER_CMD_PRCTL,false },
+{ "prctl,ibpb",SPECTRE_V2_USER_CMD_PRCTL_IBPB,false },
+{ "seccomp",SPECTRE_V2_USER_CMD_SECCOMP,false },
+{ "seccomp,ibpb",SPECTRE_V2_USER_CMD_SECCOMP_IBPB,false },
+};

-static void __init spec2_print_if_insecure(const char *reason)
+static void __init spec_v2_user_print_cond(const char *reason, bool secure)
{  
- if (boot_cpu_has_bug(X86_BUG_SPECTRE_V2))
- pr_info("%s\n", reason);
+ if (boot_cpu_has_bug(X86_BUG_SPECTRE_V2) != secure)
+ pr_info("spectre_v2_user=%s forced on command line\n", reason);
 }  

-static void __init spec2_print_if_secure(const char *reason)
+static enum spectre_v2_user_cmd __init
+spectre_v2_parse_user_cmdline(enum spectre_v2_mitigation_cmd v2_cmd)
{  
- if (!boot_cpu_has_bug(X86_BUG_SPECTRE_V2))
- pr_info("%s\n", reason);
+ char arg[20];
+ int ret, i;
+ switch (v2_cmd) {
+ case SPECTRE_V2_CMD_NONE:
+ return SPECTRE_V2_USER_CMD_NONE;
+ case SPECTRE_V2_CMD_FORCE:
+ return SPECTRE_V2_USER_CMD_FORCE;
+ default:
+ break;
+ }
+ ret = cmdline_find_option(boot_command_line, "spectre_v2_user",}
+ arg, sizeof(arg));
+if (ret < 0)
+return SPECTRE_V2_USER_CMD_AUTO;
+
+for (i = 0; i < ARRAY_SIZE(v2_user_options); i++) {
+if (match_option(arg, ret, v2_user_options[i].option)) {
+spec_v2_user_print_cond(v2_user_options[i].option,
+v2_user_options[i].secure);
+return v2_user_options[i].cmd;
+}
+}
+
+pr_err("Unknown user space protection option (%s). Switching to AUTO select\n", arg);
+return SPECTRE_V2_USER_CMD_AUTO;
}

-static inline bool retp_compiler(void)
+static void __init
+spectre_v2_user_select_mitigation(enum spectre_v2_mitigation_cmd v2_cmd)
{
+return __is_defined(RETPOLINE);
+enum spectre_v2_user_mitigation mode = SPECTRE_V2_USER_NONE;
+bool smt_possible = IS_ENABLED(CONFIG_SMP);
+enum spectre_v2_user_cmd cmd;
+
+if (!boot_cpu_has(X86_FEATURE_IBPB) && !boot_cpu_has(X86_FEATURE_STIBP))
+return;
+
+if (cpu_smt_control == CPU_SMT_FORCE_DISABLED ||
+    cpu_smt_control == CPU_SMT_NOT_SUPPORTED)
+smt_possible = false;
+
+cmd = spectre_v2_parse_user_cmdline(v2_cmd);
+switch (cmd) {
+case SPECTRE_V2_USER_CMD_NONE:
+goto set_mode;
+case SPECTRE_V2_USER_CMD_FORCE:
+mode = SPECTRE_V2_USER_STRICT;
+break;
+case SPECTRE_V2_USER_CMD_PRCTL:
+case SPECTRE_V2_USER_CMD_PRCTL_IBPB:
+mode = SPECTRE_V2_USER_PRCTL;
+break;
+case SPECTRE_V2_USER_CMD_AUTO:
+case SPECTRE_V2_USER_CMD_SECCOMP:
+case SPECTRE_V2_USER_CMD_SECCOMP_IBPB:
+if (IS_ENABLED(CONFIG_SECCOMP))
+mode = SPECTRE_V2_USER_SECCOMP;
else
+ mode = SPECTRE_V2_USER_PRCTL;
+break;
+
+ /* Initialize Indirect Branch Prediction Barrier */
+if (boot_cpu_has(X86_FEATURE_IBPB)) {
+setup_force_cpu_cap(X86_FEATURE_USE_IBPB);
+
spectre_v2_user_ibpb = mode;
+switch (cmd) {
+case SPECTRE_V2_USER_CMD_FORCE:
+case SPECTRE_V2_USER_CMD_PRCTL_IBPB:
+case SPECTRE_V2_USER_CMD_SECCOMP_IBPB:
+static_branch_enable(&switch_mm_always_ibpb);
+spectre_v2_user_ibpb = SPECTRE_V2_USER_STRICT;
+break;
+case SPECTRE_V2_USER_CMD_PRCTL:
+case SPECTRE_V2_USER_CMD_AUTO:
+case SPECTRE_V2_USER_CMD_SECCOMP:
+static_branch_enable(&switch_mm_cond_ibpb);
+break;
+default:
+break;
+}
+
+pr_info("mitigation: Enabling %s Indirect Branch Prediction Barrier\n",
+static_key_enabled(&switch_mm_always_ibpb) ?
+"always-on" : "conditional");
+}
+
+ /*
+ * If enhanced IBRS is enabled or SMT impossible, STIBP is not
+ * required.
+ */
+if (!smt_possible || spectre_v2_enabled == SPECTRE_V2_IBRS_ENHANCED)
+return;
+
+ /*
+ * At this point, an STIBP mode other than "off" has been set.
+ * If STIBP support is not being forced, check if STIBP always-on
+ * is preferred.
+ */
+if (mode != SPECTRE_V2_USER_STRICT &&
+ boot_cpu_has(X86_FEATURE_AMD_STIBP_ALWAYS_ON))
+mode = SPECTRE_V2_USER_STRICT_PREFERRED;
+
If STIBP is not available, clear the STIBP mode.

```c
/*
 * If STIBP is not available, clear the STIBP mode.
 */

if (!boot_cpu_has(X86_FEATURE_STIBP))
    mode = SPECTRE_V2_USER_NONE;

spectre_v2_user_stibp = mode;

set_mode:
    pr_info("%s\n", spectre_v2_user_strings[mode]);
}
```

```c
- static inline bool match_option(const char *arg, int arglen, const char *opt)
{-
  - int len = strlen(opt);
  + static const char * const spectre_v2_strings[] = {
    +[SPECTRE_V2_NONE] = "Vulnerable",
    +[SPECTRE_V2_RETPOLINE_GENERIC] = "Mitigation: Full generic retpoline",
    +[SPECTRE_V2_RETPOLINE_AMD] = "Mitigation: Full AMD retpoline",
    +[SPECTRE_V2_IBRS_ENHANCED] = "Mitigation: Enhanced IBRS",
    +};

  - return len == arglen && !strncmp(arg, opt, len);
  + static const struct {
    + const char *option;
    + enum spectre_v2_mitigation_cmd cmd;
    + bool secure;
    +} mitigation_options[] __initconst = {
    +{ "off", SPECTRE_V2_CMD_NONE, false },
    +{ "on", SPECTRE_V2_CMD_FORCE, true },
    +{ "retpoline", SPECTRE_V2_CMD_RETPOLINE, false },
    +{ "retpoline,amd", SPECTRE_V2_CMD_RETPOLINE_AMD, false },
    +{ "retpoline,generic", SPECTRE_V2_CMD_RETPOLINE_GENERIC, false },
    +{ "auto", SPECTRE_V2_CMD_AUTO, false },
    +};

  + static void __init spec_v2_print_cond(const char *reason, bool secure)
  +{
    + if (boot_cpu_has_bug(X86_BUG_SPECTRE_V2) != secure)
      + pr_info("%s selected on command line.\n", reason);
  }
```

```c
static enum spectre_v2_mitigation_cmd __init spectre_v2_parse_cmdline(void)
{
    enum spectre_v2_mitigation_cmd cmd = SPECTRE_V2_CMD_AUTO;
    char arg[20];
    int ret;
    int ret, i;
```
ret = cmdline_find_option(boot_command_line, "spectre_v2", arg, sizeof(arg));
if (ret > 0) {
    if (match_option(arg, ret, "off")) {
        goto disable;
    } else if (match_option(arg, ret, "on")) {
        spec2_print_if_secure("force enabled on command line.");
        return SPECTRE_V2_CMD_FORCE;
    } else if (match_option(arg, ret, "retpoline")) {
        spec2_print_if_insecure("retpoline selected on command line.");
        return SPECTRE_V2_CMD_RETPOLINE;
    } else if (match_option(arg, ret, "retpoline,amd")) {
        if (boot_cpu_data.x86_vendor != X86_VENDOR_AMD) {
            pr_err("retpoline,amd selected but CPU is not AMD. Switching to AUTO select\n");
            return SPECTRE_V2_CMD_AUTO;
        } else if (match_option(arg, ret, "auto")) {
            return SPECTRE_V2_CMD_AUTO;
        } else if (cmdline_find_option_bool(boot_command_line, "nospectre_v2") || cpu_mitigations_off()) {
            return SPECTRE_V2_CMD_NONE;
        } else if (ret < 0) {
            return SPECTRE_V2_CMD_AUTO;
        }
    }
    for (i = 0; i < ARRAY_SIZE(mitigation_options); i++) {
        if (!match_option(arg, ret, mitigation_options[i].option))
            continue;
        cmd = mitigation_options[i].cmd;
        break;
    }
}
+if (!cmdline_find_option_bool(boot_command_line, "nospectre_v2"))
+    cpu_mitigations_off();
+return SPECTRE_V2_CMD_NONE;
+
+ret = cmdline_find_option(boot_command_line, "spectre_v2", arg, sizeof(arg));
+if (ret < 0)
+    return SPECTRE_V2_CMD_AUTO;
+
+for (i = 0; i < ARRAY_SIZE(mitigation_options); i++) {
+    if (!match_option(arg, ret, mitigation_options[i].option))
+        continue;
+    cmd = mitigation_options[i].cmd;
+    break;
}
-
-if (!cmdline_find_option_bool(boot_command_line, "nospectre_v2"))
+if (i >= ARRAY_SIZE(mitigation_options)) {
    pr_err("unknown option (%s). Switching to AUTO select\n", arg);
    return SPECTRE_V2_CMD_AUTO;
+disable:
-spec2_print_if_insecure("disabled on command line.");
-return SPECTRE_V2_CMD_NONE;
-

-/* Check for Skylake-like CPUs (for RSB handling) */
-static bool __init is_skylake_era(void)
{-
- if (boot_cpu_data.x86_vendor == X86_VENDOR_INTEL &&
- boot_cpu_data.x86 == 6) {
- switch (boot_cpu_data.x86_model) {
- case INTEL_FAM6_SKYLAKE_MOBILE:
- case INTEL_FAM6_SKYLAKE_DESKTOP:
- case INTEL_FAM6_SKYLAKE_X:
- case INTEL_FAM6_KABYLAKE_MOBILE:
- case INTEL_FAM6_KABYLAKE_DESKTOP:
- return true;
- }
- return false;
+
+ if ((cmd == SPECTRE_V2_CMD_RETPOLINE ||
+     cmd == SPECTRE_V2_CMD_RETPOLINE_AMD ||
+     cmd == SPECTRE_V2_CMD_RETPOLINE_GENERIC) &&
+     !IS_ENABLED(CONFIG_RETPOLINE)) {
+ pr_err("%s selected but not compiled in. Switching to AUTO select\n", mitigation_options[i].option);
+ return SPECTRE_V2_CMD_AUTO;
+ }
+
+ if (cmd == SPECTRE_V2_CMD_RETPOLINE_AMD &&
+ boot_cpu_data.x86_vendor != X86_VENDOR_AMD) {
+ pr_err("retpoline,amd selected but CPU is not AMD. Switching to AUTO select\n");
+ return SPECTRE_V2_CMD_AUTO;
+ }
+
+ spec_v2_print_cond(mitigation_options[i].option,
+ mitigation_options[i].secure);
+ return cmd;
}

static void __init spectre_v2_select_mitigation(void)
@@ -191,10 +872,17 @@
@@ -191,10 +872,17 @@
 return;

case SPECTRE_V2_CMD_FORCE:
-/* FALLTHRU */
- case SPECTRE_V2_CMD_AUTO:
- goto retpoline_auto;
- 
-+if (boot_cpu_has(X86_FEATURE_IBRS_ENHANCED)) {
+ mode = SPECTRE_V2_IBRS_ENHANCED;
+/* Force it so VMEXIT will restore correctly */
+ x86_spec_ctrl_base |= SPEC_CTRL_IBRS;


+wrmsrl(MSR_IA32_SPEC_CTRL, x86_spec_ctrl_base);
+goto specv2_set_mode;
+
+if (IS_ENABLED(CONFIG_RETPOLINE))
+goto retpoline_auto;
+break;

case SPECTRE_V2_CMD_RETPOLINE_AMD:
if (IS_ENABLED(CONFIG_RETPOLINE))
  goto retpoline_amd;
@@ -208,76 +896,838 @@
goto retpoline_auto;
break;

-pr_err("kernel not compiled with retpoline; no mitigation available!");
+pr_err("Spectre mitigation: kernel not compiled with retpoline; no mitigation available!");
return;

retpoline_auto:
if (boot_cpu_data.x86_vendor == X86_VENDOR_AMD) {
  retpoline_amd:
  if (!boot_cpu_has(X86_FEATURE_LFENCE_RDTSC)) {
-    pr_err("LFENCE not serializing. Switching to generic retpoline\n");
+    pr_err("Spectre mitigation: LFENCE not serializing, switching to generic retpoline\n");
    goto retpoline_generic;
  }
-    mode = retp_compiler() ? SPECTRE_V2_RETPOLINE_AMD : 
-    SPECTRE_V2_RETPOLINE_MINIMAL_AMD;
+    mode = SPECTRE_V2_RETPOLINE_AMD;
  setup_force_cpu_cap(X86_FEATURE_RETPOLINE_AMD);
  setup_force_cpu_cap(X86_FEATURE_RETPOLINE);
} else {
  retpoline_generic:
-    mode = retp_compiler() ? SPECTRE_V2_RETPOLINE_GENERIC : 
-    SPECTRE_V2_RETPOLINE_MINIMAL;
+    mode = SPECTRE_V2_RETPOLINE_GENERIC;
  setup_force_cpu_cap(X86_FEATURE_RETPOLINE_GENERIC);
} }

+specv2_set_mode:
spectre_v2_enabled = mode;
pr_info("%s\n", spectre_v2_strings[mode]);

/*
- * If neither SMEP or KPTI are available, there is a risk of
- * hitting userspace addresses in the RSB after a context switch
- * from a shallow call stack to a deeper one. To prevent this fill
- * the entire RSB, even when using IBRS.
+ * If spectre v2 protection has been enabled, unconditionally fill
+ * RSB during a context switch; this protects against two independent
+ * issues:
+ *
+ *- RSB underflow (and switch to BTB) on Skylake+
+ *- SpectreRSB variant of spectre v2 on X86_BUG_SPECTRE_V2 CPUs
+ */
+setup_force_cpu_cap(X86_FEATURE_RSB_CTXSW);
+pr_info("Spectre v2 / SpectreRSB mitigation: Filling RSB on context switch\n");
+
+ /*
+ * Retpoline means the kernel is safe because it has no indirect
+ * branches. Enhanced IBRS protects firmware too, so, enable restricted
+ * speculation around firmware calls only when Enhanced IBRS isn't
+ * supported.
+ *
+ * Skylake era CPUs have a separate issue with *underflow* of the
+ * RSB, when they will predict 'ret' targets from the generic BTB.
+ * The proper mitigation for this is IBRS. If IBRS is not supported
+ * or deactivated in favour of retpolines the RSB fill on context
+ * switch is required.
+ */
+if (!boot_cpu_has(X86_FEATURE_PTI) &&
+    !boot_cpu_has(X86_FEATURE_SMEP)) || is_skylake_era()) {
+    setup_force_cpu_cap(X86_FEATURE_RSB_CTXSW);
+    pr_info("Filling RSB on context switch\n");
+    /* Use "mode" to check Enhanced IBRS instead of boot_cpu_has(), because
+    * the user might select retpoline on the kernel command line and if
+    * the CPU supports Enhanced IBRS, kernel might un-intentionally not
+    * enable IBRS around firmware calls.
+    */
+    if (boot_cpu_has(X86_FEATURE_IBRS) && mode != SPECTRE_V2_IBRS_ENHANCED) {
+        setup_force_cpu_cap(X86_FEATURE_USE_IBRS_FW);
+        pr_info("Enabling Restricted Speculation for firmware calls\n");
+    }
+    /* Set up IBPB and STIBP depending on the general spectre V2 command */
+    spectre_v2_user_select_mitigation(cmd);
+    }
+}
+
+static void update_stibp_msr(void * __unused)
+{
+    wrmsrl(MSR_IA32_SPEC_CTRL, x86_spec_ctrl_base);
+}
+
+/* Update x86_spec_ctrl_base in case SMT state changed. */
+static void update_stibp_strict(void)
+{
+    u64 mask = x86_spec_ctrl_base & ~SPEC_CTRL_STIBP;
+ if (sched_smt_active())
+ mask |= SPEC_CTRL_STIBP;
+ if (mask == x86_spec_ctrl_base)
+ return;
+ 
+ pr_info("Update user space SMT mitigation: STIBP %s\n",
+ mask & SPEC_CTRL_STIBP ? "always-on" : 'off');
+ x86_spec_ctrl_base = mask;
+ on_each_cpu(update_stibp_msr, NULL, 1);
+
+ /* Update the static key controlling the evaluation of TIF_SPEC_IB */
+ static void update_indir_branch_cond(void)
+ {
+ if (sched_smt_active())
+ static_branch_enable(&switch_to_cond_stibp);
+ else
+ static_branch_disable(&switch_to_cond_stibp);
+ }

#define pr_fmt(fmt) fmt

/* Update the static key controlling the MDS CPU buffer clear in idle */
static void update_mds_branch_idle(void)
{
/* Enable the idle clearing if SMT is active on CPUs which are
 * affected only by MSBDS and not any other MDS variant.
 * The other variants cannot be mitigated when SMT is enabled, so
 * clearing the buffers on idle just to prevent the Store Buffer
 * repartitioning leak would be a window dressing exercise.
 */
+ if (!boot_cpu_has_bug(X86_BUG_MSBDS_ONLY))
+ return;
+
+ if (sched_smt_active())
+ static_branch_enable(&mds_idle_clear);
+ else
+ static_branch_disable(&mds_idle_clear);
+
+#define MDS_MSG_SMT "MDS CPU bug present and SMT on, data leak possible. See
+#define TAA_MSG_SMT "TAA CPU bug present and SMT on, data leak possible. See

```c
+ void arch_smt_update(void) {
+    mutex_lock(&spec_ctrl_mutex);
+    switch (spectre_v2_user_stibp) {
+        case SPECTRE_V2_USER_NONE:
+            break;
+        case SPECTRE_V2_USER STRICT:
+        case SPECTRE_V2_USER STRICT PREFERRED:
+            update_stibp_strict();
+            break;
+        case SPECTRE_V2_USER PRCTL:
+        case SPECTRE_V2_USER SECCOMP:
+            update_indir_branch_cond();
+            break;
+    }
+    switch (mds_mitigation) {
+        case MDS_MITIGATION FULL:
+        case MDS_MITIGATION_VMWERV:
+            if (sched_smt_active() && !boot_cpu_has(X86_BUG_MSBDS ONLY))
+                pr_warn_once(MDS_MSG_SMT);
+            update_mds_branch_idle();
+            break;
+        case MDS_MITIGATION OFF:
+            break;
+    }
+    switch (taa_mitigation) {
+        case TAA_MITIGATION VERW:
+        case TAA_MITIGATION UCODE NEEDED:
+            if (sched_smt_active())
+                pr_warn_once(TAA_MSG_SMT);
+            break;
+        case TAA_MITIGATION TSX DISABLED:
+        case TAA_MITIGATION OFF:
+            break;
+    }
+    mutex_unlock(&spec_ctrl_mutex);
+}
```

```
+ #undef pr_fmt
+ #define pr_fmt(fmt) "Speculative Store Bypass: " fmt
+ static enum ssb_mitigation ssb_mode __ro_after_init = SPEC_STORE BYPASS NONE;
```
+/* The kernel command line selection */
+enum ssb_mitigation_cmd {
+SPEC_STORE_BYPASS_CMD_NONE,
+SPEC_STORE_BYPASS_CMD_AUTO,
+SPEC_STORE_BYPASS_CMD_ON,
+SPEC_STORE_BYPASS_CMD_PRCTL,
+SPEC_STORE_BYPASS_CMD_SECCOMP,
+};
+
+static const char * const ssb_strings[] = {
+[SPEC_STORE_BYPASS_NONE]= "Vulnerable",
+[SPEC_STORE_BYPASS_DISABLE]= "Mitigation: Speculative Store Bypass disabled",
+[SPEC_STORE_BYPASS_PRCTL]= "Mitigation: Speculative Store Bypass disabled via prctl",
+[SPEC_STORE_BYPASS_SECCOMP]= "Mitigation: Speculative Store Bypass disabled via prctl and seccomp",
+};
+
+static const struct {
+const char *option;
+enum ssb_mitigation_cmd cmd;
+} ssb_mitigation_options[] __initconst = {
+{ "auto",SPEC_STORE_BYPASS_CMD_AUTO }, /* Platform decides */
+{ "on",SPEC_STORE_BYPASS_CMD_ON }, /* Disable Speculative Store Bypass */
+{ "off",SPEC_STORE_BYPASS_CMD_NONE }, /* Don't touch Speculative Store Bypass */
+{ "prctl",SPECgetStore_BYPASS_CMD_PRCTL }, /* Disable Speculative Store Bypass via prctl */
+{ "seccomp",SPEC_STORE_BYPASS_CMD_SECCOMP }, /* Disable Speculative Store Bypass via prctl and seccomp */
+};
+
+static enum ssb_mitigation_cmd __init ssb_parse_cmdline(void)
+{
+enum ssb_mitigation_cmd cmd = SPEC_STORE_BYPASS_CMD_AUTO;
+char arg[20];
+int ret, i;
+
+if (cmdline_find_option_bool(boot_command_line, "nospec_store_bypass_disable") ||
+ cpu_mitigations_off()) {
+return SPEC_STORE_BYPASS_CMD_NONE;
+} else {
+ret = cmdline_find_option(boot_command_line, "spec_store_bypass_disable",
+ arg, sizeof(arg));
+if (ret &lt; 0)
+return SPEC_STORE_BYPASS_CMD_AUTO;
+
+for (i = 0; i &lt; ARRAY_SIZE(ssb_mitigation_options); i++) {
+if (!match_option(arg, ret, ssb_mitigation_options[i].option))
+continue;
+}
cmd = ssb_mitigation_options[i].cmd;
+
			break;
+
		} +
+
		if (i >= ARRAY_SIZE(ssb_mitigation_options)) {
+
			pr_err("unknown option (%s). Switching to AUTO select\n", arg);
+
			return SPEC_STORE_BYPASS_CMD_AUTO;
+
		}
+
		return cmd;
+
+
+static enum ssb_mitigation __init __ssb_select_mitigation(void)
+
+
+enum ssb_mitigation mode = SPEC_STORE_BYPASS_NONE;
+
+enum ssb_mitigation_cmd cmd;
+
+if (!boot_cpu_has(X86_FEATURE_SSBD))
+
+return mode;
+
+cmd = ssb_parse_cmdline();
+
+if (!boot_cpu_has_bug(X86_BUG_SPEC_STORE_BYPASS) &&
+
+    (cmd == SPEC_STORE_BYPASS_CMD_NONE ||
+
+     cmd == SPEC_STORE_BYPASS_CMD_AUTO))
+
+return mode;
+
+switch (cmd) {
+
+case SPEC_STORE_BYPASS_CMD_AUTO:
+
+case SPEC_STORE_BYPASS_CMD_SECCOMP:
+
+/*
+
+ * Choose prctl+seccomp as the default mode if seccomp is
+
+ * enabled.
+
+ */
+
+if (IS_ENABLED(CONFIG_SECCOMP))
+
+mode = SPEC_STORE_BYPASS_SECCOMP;
+
+else
+
+mode = SPEC_STORE_BYPASS_PRCTL;
+
+break;
+
+case SPEC_STORE_BYPASS_CMD_ON:
+
+mode = SPEC_STORE_BYPASS_DISABLE;
+
+break;
+
+case SPEC_STORE_BYPASS_CMD_PRCTL:
+
+mode = SPEC_STORE_BYPASS_PRCTL;
+
+break;
+
+case SPEC_STORE_BYPASS_CMD_NONE:
+
+break;
+
+}
/*
 * If SSBD is controlled by the SPEC_CTRL MSR, then set the proper
 * bit in the mask to allow guests to use the mitigation even in the
 * case where the host does not enable it.
 */
#if (static_cpu_has(X86_FEATURE_SPEC_CTRL_SSBD) ||
    static_cpu_has(X86_FEATURE_AMD_SSBD)) {
    x86_spec_ctrl_mask |= SPEC_CTRL_SSBD;
}

/* We have three CPU feature flags that are in play here:
 * - X86_BUG_SPEC_STORE_BYPASS - CPU is susceptible.
 * - X86_FEATURE_SSBD - CPU is able to turn off speculative store bypass
 * - X86_FEATURE_SPEC_STORE_BYPASS_DISABLE - engage the mitigation
 */
#if (mode == SPEC_STORE_BYPASS_DISABLE) {
    setup_force_cpu_cap(X86_FEATURE_SPEC_STORE_BYPASS_DISABLE);
#elif (!static_cpu_has(X86_FEATURE_SPEC_CTRL_SSBD) &&
    !static_cpu_has(X86_FEATURE_AMD_SSBD)) {
    x86_amd_ssb_disable();
} else {
    x86_spec_ctrl_base |= SPEC_CTRL_SSBD;
    wrmsrl(MSR_IA32_SPEC_CTRL, x86_spec_ctrl_base);
}

return mode;
}

static void ssb_select_mitigation(void)
{
    ssb_mode = __ssb_select_mitigation();

    if (boot_cpu_has_bug(X86_BUG_SPEC_STORE_BYPASS))
        pr_info("%s\n", ssb_strings[ssb_mode]);
}

#undef pr_fmt
#define pr_fmt(fmt)     "Speculation prctl: " fmt

static void task_update_spec_tif(struct task_struct *tsk)
/* Force the update of the real TIF bits */
+set_tsk_thread_flag(tsk, TIF_SPEC_FORCE_UPDATE);
+
+/*
+ * Immediately update the speculation control MSRs for the current
+ * task, but for a non-current task delay setting the CPU
+ * mitigation until it is scheduled next.
+ *
+ * This can only happen for SECCOMP mitigation. For PRCTL it's
+ * always the current task.
+ */
+if (tsk == current)
+speculation_ctrl_update_current();
+
+static int ssb_prctl_set(struct task_struct *task, unsigned long ctrl)
+{
+if (ssb_mode != SPEC_STORE_BYPASS_PRCTL &&
+    ssb_mode != SPEC_STORE_BYPASS_SECCOMP)
+    return -ENXIO;
+
+switch (ctrl) {
+case PR_SPEC_ENABLE:
+    /* If speculation is force disabled, enable is not allowed */
+    if (task_spec_ssb_force_disable(task))
+        return -EPERM;
+    task_clear_spec_ssb_disable(task);
+    task_update_spec_tif(task);
+    break;
+
+case PR_SPEC_DISABLE:
+    task_set_spec_ssb_disable(task);
+    task_update_spec_tif(task);
+    break;
+
+case PR_SPEC_FORCE_DISABLE:
+    task_set_spec_ssb_disable(task);
+    task_set_spec_ssb_force_disable(task);
+    task_update_spec_tif(task);
+    break;
+
+default:
+    return -ERANGE;
+}
+return 0;
+}
+
+static bool is_spec_ib_user_controlled(void)
+{
+    return spectre_v2_user_ibpb == SPECTRE_V2_USER_PRCTL ||
+              spectre_v2_user_ibpb == SPECTRE_V2_USER_SECCOMP ||
static int ib_prctl_set(struct task_struct *task, unsigned long ctrl)
{
    switch (ctrl) {
    case PR_SPEC_ENABLE:
        if (spectre_v2_user_ibpb == SPECTRE_V2_USER_NONE &&
            spectre_v2_user_stibp == SPECTRE_V2_USER_NONE)
            return 0;
        
        /*
         * With strict mode for both IBPB and STIBP, the instruction
         * code paths avoid checking this task flag and instead,
         * unconditionally run the instruction. However, STIBP and IBPB
         * are independent and either can be set to conditionally
         * enabled regardless of the mode of the other.
         *
         * If either is set to conditional, allow the task flag to be
         * updated, unless it was force-disabled by a previous prctl
         * call. Currently, this is possible on an AMD CPU which has the
         * feature X86_FEATURE_AMD_STIBP_ALWAYS_ON. In this case, if the
         * kernel is booted with 'spectre_v2_user=seccomp', then
         * spectre_v2_user_ibpb == SPECTRE_V2_USER_SECCOMP and
         * spectre_v2_user_stibp == SPECTRE_V2_USER_STRICT PREFERRED.
         */
        if (!is_spec_ib_user_controlled() ||
            task_spec_ib_force_disable(task))
            return -EPERM;

        task_clear_spec_ib_disable(task);
        task_update_spec_tif(task);
        break;
    case PR_SPEC_DISABLE:
    case PR_SPEC_FORCE_DISABLE:
        /*
         * Indirect branch speculation is always allowed when
         * mitigation is force disabled.
         */
        if (spectre_v2_user_ibpb == SPECTRE_V2_USER_NONE &&
            spectre_v2_user_stibp == SPECTRE_V2_USER_NONE)
            return -EPERM;

        if (!is_spec_ib_user_controlled())
            return 0;

        task_set_spec_ib_disable(task);
        break;
    }
}
+if (ctrl == PR_SPEC_FORCE_DISABLE)
+task_set_spec_ib_force_disable(task);
+task_update_spec_tif(task);
+break;
+default:
+return -ERANGE;
+
+default:
+return -ERANGE;
+
+int arch_prctl_spec_ctrl_set(struct task_struct *task, unsigned long which,
+   unsigned long ctrl)
+{
++switch (which) {
++case PR_SPEC_STORE_BYPASS:
++return ssb_prctl_set(task, ctrl);
++case PR_SPEC_INDIRECT_BRANCH:
++return ib_prctl_set(task, ctrl);
++default:
++return -ENODEV;
++}
++
+if ifdef CONFIG_SECCOMP
+void arch_seccomp_spec_mitigate(struct task_struct *task)
++{
++if (ssb_mode == SPECSTORE_BYPASS_SECCOMP)
++ssb_prctl_set(task, PR_SPEC_FORCE_DISABLE);
++if (spectre_v2_user_ibpb == SPECTRE_V2_USER_SECCOMP)
++   ib_prctl_set(task, PR_SPEC_FORCE_DISABLE);
++++}
+}
+static int ssb_prctl_get(struct task_struct *task)
+{
++switch (ssb_mode) {
++case SPECSTORE_BYPASS_DISABLE:
++return PR_SPEC_DISABLE;
++case SPECSTORE_BYPASS_SECCOMP:
++case SPECSTORE_BYPASS_PRCTL:
++return PR_SPEC_PRCTL | PR_SPEC_FORCE_DISABLE;
++return PR_SPEC_PRCTL | PR_SPEC_DISABLE;
++default:
++if (boot_cpu_has_bug(X86_BUG_SPEC_STORE_BYPASS))
++return -ERANGE;
++}
++
+}
+return PR_SPEC_ENABLE;
+return PR_SPEC_NOT_AFFECTED;
+
+static int ib_prctl_get(struct task_struct *task)
+{
+if (!boot_cpu_has_bug(X86_BUG_SPECTRE_V2))
+return PR_SPEC_NOT_AFFECTED;
+
+if (spectre_v2_user_ibpb == SPECTRE_V2_USER_NONE &&
+    spectre_v2_user_stibp == SPECTRE_V2_USER_NONE)
+return PR_SPEC_ENABLE;
+else if (is_spec_ib_user_controlled()) {
+if (task_spec_ib_force_disable(task))
+return PR_SPEC_PRCTL | PR_SPEC_FORCE_DISABLE;
+if (task_spec_ib_disable(task))
+return PR_SPEC_PRCTL | PR_SPEC_DISABLE;
+return PR_SPEC_PRCTL | PR_SPEC_ENABLE;
+} else if (spectre_v2_user_ibpb == SPECTRE_V2_USER_STRICT ||
+    spectre_v2_user_stibp == SPECTRE_V2_USER_STRICT ||
+    spectre_v2_user_stibp == SPECTRE_V2_USER_STRICT_PREFERRED)
+return PR_SPEC_DISABLE;
+else
+return PR_SPEC_NOT_AFFECTED;
+
+switch (which) {
+case PR_SPEC_STORE_BYPASS:
+return ssb_prctl_get(task);
+case PR_SPEC_INDIRECT_BRANCH:
+return ib_prctl_get(task);
+default:
+return -ENODEV;
+}
+
+void x86_spec_ctrl_setup_ap(void)
+{
+if (boot_cpu_has(X86_FEATURE_MSR_SPEC_CTRL))
+wrmr(MSR_IA32_SPEC_CTRL, x86_spec_ctrl_base);
+
+if (ssb_mode == SPEC_STORE_BYPASS_DISABLE)
+x86_amd_ssb_disable();
+}
+bool itlb_multihit_kvm_mitigation;
+EXPORT_SYMBOL_GPL(itlb_multihit_kvm_mitigation);
+
+#undef pr_fmt
+#define pr_fmt(fmt)"L1TF: " fmt
+
+/* Default mitigation for L1TF-affected CPUs */
+enum l1tf_mitigations l1tf_mitigation __ro_after_init = L1TF_MITIGATION_FLUSH;
+if IS_ENABLED(CONFIG_KVM_INTEL)
+EXPORT_SYMBOL_GPL(l1tf_mitigation);
+endif
+enum vmx_l1d_flush_state l1tf_vmx_mitigation = VMENTER_L1D_FLUSH_AUTO;
+EXPORT_SYMBOL_GPL(l1tf_vmx_mitigation);
+
+/*
+ * These CPUs all support 44bits physical address space internally in the
+ * cache but CPUID can report a smaller number of physical address bits.
+ *
+ * The L1TF mitigation uses the top most address bit for the inversion of
+ * non present PTEs. When the installed memory reaches into the top most
+ * address bit due to memory holes, which has been observed on machines
+ * which report 36bits physical address bits and have 32G RAM installed,
+ * then the mitigation range check in l1tf_select_mitigation() triggers.
+ * This is a false positive because the mitigation is still possible due to
+ * the fact that the cache uses 44bit internally. Use the cache bits
+ * instead of the reported physical bits and adjust them on the affected
+ * machines to 44bit if the reported bits are less than 44.
+ */
+static void override_cache_bits(struct cpuinfo_x86 *c)
+{
+if (c->x86 != 6)
+return;
+
+switch (c->x86_model) {
+case INTEL_FAM6_NEHALEM:
+case INTEL_FAM6_WESTMERE:
+case INTEL_FAM6_SANDYBRIDGE:
+case INTEL_FAM6_IVYBRIDGE:
+case INTEL_FAM6_HASWELL_CORE:
+case INTEL_FAM6_HASWELL_ULT:
+case INTEL_FAM6_HASWELL_GT3E:
+case INTEL_FAM6_BROADWELL_CORE:
+case INTEL_FAM6_BROADWELL_GT3E:
+case INTEL_FAM6_SKYLAKE_MOBILE:
+case INTEL_FAM6_SKYLAKE_DESKTOP:
+case INTEL_FAM6_KABYLAKE_MOBILE:
+case INTEL_FAM6_KABYLAKE_DESKTOP:
+if (c->x86_cache_bits < 44)
c->x86_cache_bits = 44;
+break;
+
+static void __init l1tf_select_mitigation(void)
+{
+u64 half_pa;
+
+if (!boot_cpu_has_bug(X86_BUG_L1TF))
+return;
+
+if (cpu_mitigations_off())
+l1tf_mitigation = L1TF_MITIGATION_OFF;
+else if (cpu_mitigations_auto_nosmt())
+l1tf_mitigation = L1TF_MITIGATION_FLUSH_NOSMT;
+
+override_cache_bits(&boot_cpu_data);
+
+switch (l1tf_mitigation) {
+case L1TF_MITIGATION_OFF:
+break;
+case L1TF_MITIGATION_FLUSH_NOWARN:
+break;
+case L1TF_MITIGATION_FLUSH:
+break;
+case L1TF_MITIGATION_FLUSH_NOSMT:
+break;
+case L1TF_MITIGATION_FULL:
+cpu_smt_disable(false);
+break;
+case L1TF_MITIGATION_FULL_FORCE:
+cpu_smt_disable(true);
+break;
+}
+
+#if CONFIG_PGTABLE_LEVELS == 2
+pr_warn("Kernel not compiled for PAE. No mitigation for L1TF\n");
+return;
+#endif
+
+half_pa = (u64)l1tf_pfn_limit() << PAGE_SHIFT;
+
+if ((l1tf_mitigation != L1TF_MITIGATION_OFF &&
+e820__mapped_any(half_pa, ULLONG_MAX - half_pa, E820_TYPE_RAM)) {
+pr_warn("System has more than MAX_PA/2 memory. L1TF mitigation not effective.\n");
+pr_info("You may make it effective by booting the kernel with mem=%llu parameter.\n", half_pa);
+pr_info("However, doing so will make a part of your RAM unusable.\n");
+pr_info("Reading https://www.kernel.org/doc/html/latest/admin-guide/hw-vuln/l1tf.html might help you decide.\n");
+return;
```c
+} + +setup_force_cpu_cap(X86_FEATURE_L1TF_PTEINV); +} + +static int __init l1tf_cmdline(char *str) +{ +if (!boot_cpu_has_bug(X86_BUG_L1TF)) +return 0; + +if (!str) +return -EINVAL; + +if (!strcmp(str, "off")) +l1tf_mitigation = L1TF_MITIGATION_OFF; +else if (!strcmp(str, "flush,nowarn")) +l1tf_mitigation = L1TF_MITIGATION_FLUSH_NOWARN; +else if (!strcmp(str, "flush")) +l1tf_mitigation = L1TF_MITIGATION_FLUSH; +else if (!strcmp(str, "flush,nosmt")) +l1tf_mitigation = L1TF_MITIGATION_FLUSH_NOSMT; +else if (!strcmp(str, "full")) +l1tf_mitigation = L1TF_MITIGATION_FULL; +else if (!strcmp(str, "full,force")) +l1tf_mitigation = L1TF_MITIGATION_FULL_FORCE; + +return 0; +} +early_param("l1tf", l1tf_cmdline); + +#undef pr_fmt +#define pr_fmt(fmt) fmt

#ifdef CONFIG_SYSFS -ssize_t cpu_show_meltdown(struct device *dev, - struct device_attribute *attr, char *buf) + +#define L1TF_DEFAULT_MSG "Mitigation: PTE Inversion"
+};
```
+static ssize_t l1tf_show_state(char *buf)
{
  if (!boot_cpu_has_bug(X86_BUG_CPU_MELTDOWN))
    return sprintf(buf, "Not affected\n");
  if (boot_cpu_has(X86_FEATURE_PTI))
    return sprintf(buf, "Mitigation: PTI\n");
  return sprintf(buf, "Vulnerable\n");
  if (l1tf_vmx_mitigation == VMENTER_L1D_FLUSH_AUTO)
    return sprintf(buf, "%s\n", L1TF_DEFAULT_MSG);
  if (l1tf_vmx_mitigation == VMENTER_L1D_FLUSH_EPT_DISABLED ||
      (l1tf_vmx_mitigation == VMENTER_L1D_FLUSH_NEVER &&
       sched_smt_active())) {
    return sprintf(buf, "%s; VMX: %s\n", L1TF_DEFAULT_MSG,
      l1tf_vmx_states[l1tf_vmx_mitigation]);
  }
  return sprintf(buf, "%s; VMX: %s, SMT %s\n", L1TF_DEFAULT_MSG,
      l1tf_vmx_states[l1tf_vmx_mitigation],
      sched_smt_active() ? "vulnerable" : "disabled");
}

+static ssize_t itlb_multihit_show_state(char *buf)
+{
  if (itlb_multihit_kvm_mitigation)
    return sprintf(buf, "KVM: Mitigation: Split huge pages\n");
  else
    return sprintf(buf, "KVM: Vulnerable\n");
}
#else
+static ssize_t l1tf_show_state(char *buf)
+{
  return sprintf(buf, "%s\n", L1TF_DEFAULT_MSG);
}
+static ssize_t itlb_multihit_show_state(char *buf)
+{
  return sprintf(buf, "Processor vulnerable\n");
}
#endif

+static ssize_t mds_show_state(char *buf)
+{
  if (boot_cpu_has(X86_FEATURE_HYPERVISOR)) {
    return sprintf(buf, "%s; SMT Host state unknown\n", mds_strings[mds_mitigation]);
  }
}
+if (boot_cpu_has(X86_BUG_MSBDS_ONLY)) {
+    return sprintf(buf, "%s; SMT %s\n", mds_strings[mds_mitigation],
+        (mds_mitigation == MDS_MITIGATION_OFF ? "vulnerable" : sched_smt_active() ? "mitigated" : "disabled");
+
++return sprintf(buf, "%s; SMT %s\n", mds_strings[mds_mitigation],
+        sched_smt_active() ? "vulnerable" : "disabled");
+
++static ssize_t txs_async_abort_show_state(char *buf)
++{
++    if ((taa_mitigation == TAA_MITIGATION_TSX_DISABLED) ||
++        (taa_mitigation == TAA_MITIGATION_OFF))
++        return sprintf(buf, "%s\n", taa_strings[taa_mitigation]);
++
++    if (boot_cpu_has(X86_FEATURE_HYPERVISOR)) {
++        return sprintf(buf, "%s; SMT Host state unknown\n", taa_strings[taa_mitigation]);
++    }
++
++    return sprintf(buf, "%s; SMT %s\n", taa_strings[taa_mitigation],
+        sched_smt_active() ? "vulnerable" : "disabled");
+
++static char *stibp_state(void)
++{
++    if (spectre_v2_enabled == SPECTRE_V2_IBRS_ENHANCED)
++        return "";
++
++    switch (spectre_v2_user_stibp) {
++        case SPECTRE_V2_USER_NONE:
++            return ", STIBP: disabled";
++        case SPECTRE_V2_USER_STRICT:
++            return ", STIBP: forced";
++        case SPECTRE_V2_USER_STRICT_PREFERRED:
++            return ", STIBP: always-on";
++        case SPECTRE_V2_USER_PRCTL:
++        case SPECTRE_V2_USER_SECCOMP:
++            if (static_key_enabled(&switch_to_cond_stibp))
++                return ", STIBP: conditional";
++        +}
++        return "";
++    +}
++
++static char *ibpb_state(void)
++{


```c
+if (boot_cpu_has(X86_FEATURE_IBPB)) {
+if (static_key_enabled(&switch_mm_always_ibpb))
+return ", IBPB: always-on";
+if (static_key_enabled(&switch_mm_cond_ibpb))
+return ", IBPB: conditional";
+return ", IBPB: disabled";
+
+}
+return "";
+
+static ssize_t srbds_show_state(char *buf)
+{
+return sprintf(buf, "\%s\n", srbds_strings[srbdsmitigation]);
}
-
ssize_t cpu_show_spectre_v1(struct device *dev,
- struct device_attribute *attr, char *buf)
+
static ssize_t cpu_show_common(struct device *dev, struct device_attribute *attr,
+ char *buf, unsigned int bug)
+
{-if (!boot_cpu_has_bug(X86_BUG_SPECTRE_V1))
+if (!boot_cpu_has_bug(bug))
return sprintf(buf, "Not affected\n");
+
+switch (bug) {
+case X86_BUG_CPU_MELTDOWN:
+if (boot_cpu_has(X86_FEATURE_PTI))
+return sprintf(buf, "Mitigation: PTI\n");
+
+break;
+
+case X86_BUG_SPECTRE_V1:
+return sprintf(buf, "\%s\n", spectre_v1_strings[spectre_v1_mitigation]);
+
+case X86_BUG_SPECTRE_V2:
+return sprintf(buf, "\%s\n", spectre_v2_strings[spectre_v2_enabled],
+ ibpb_state(),
+ boot_cpu_has(X86_FEATURE_USE_IBRS_FW) ? "", IBRS_FW" : "",
+ stibp_state(),
+ boot_cpu_has(X86_FEATURE_RSB_CTXSW) ? "", RSB filling" : "",
+ spectre_v2_module_string());
+
+case X86_BUG_SPEC_STORE_BYPASS:
+return sprintf(buf, "\%s\n", ssb_strings[ssb_mode]);
+
+case X86_BUG_L1TF:
+if (boot_cpu_has(X86_FEATURE_L1TF_PTEINV))
+return l1tf_show_state(buf);
```
break;
+
+case X86_BUG_MDS:
+ return mds_show_state(buf);
+
+case X86_BUG_TAA:
+ return tsx_async_abort_show_state(buf);
+
+case X86_BUG_ITLB_MULTIHIT:
+ return itlb_multihit_show_state(buf);
+
+case X86_BUG_SRBDS:
+ return srbds_show_state(buf);
+
+default:
+ break;
+
return sprintf(buf, "Vulnerable\n");
}

ssize_t cpu_show_meltdown(struct device *dev, struct device_attribute *attr, char *buf)
{
    return cpu_show_common(dev, attr, buf, X86_BUG_CPU_MELTDOWN);
}

ssize_t cpu_show_spectre_v2(struct device *dev,
- struct device_attribute *attr, char *buf)
+ssize_t cpu_show_spectre_v2(struct device *dev, struct device_attribute *attr, char *buf)
{
    if (!boot_cpu_has_bug(X86_BUG_SPECTRE_V2))
        return sprintf(buf, "Not affected\n");

    return cpu_show_common(dev, attr, buf, X86_BUG_CPU_MELTDOWN);
}

+ssize_t cpu_show_spectre_v1(struct device *dev, struct device_attribute *attr, char *buf)
+
+return cpu_show_common(dev, attr, buf, X86_BUG_SPECTRE_V1);
+
+ssize_t cpu_show_spectre_v2(struct device *dev, struct device_attribute *attr, char *buf)
+
+return cpu_show_common(dev, attr, buf, X86_BUG_SPECTRE_V2);
+
- return sprintf(buf, "%s\n", spectre_v2_strings[spectre_v2_enabled]);
+return cpu_show_spec_store_bypass(struct device *dev, struct device_attribute *attr, char *buf)
+
+return cpu_show_common(dev, attr, buf, X86_BUG_SPEC_STORE_BYPASS);
+
+return.cpu_show_l1tf(struct device *dev, struct device_attribute *attr, char *buf)
+}
+return cpu_show_common(dev, attr, buf, X86_BUG_L1TF);
+
+ssize_t cpu_show_mds(struct device *dev, struct device_attribute *attr, char *buf)
+{
+    return cpu_show_common(dev, attr, buf, X86_BUG_MDS);
+
+ssize_t cpu_show_tsx_async_abort(struct device *dev, struct device_attribute *attr, char *buf)
+{
+    return cpu_show_common(dev, attr, buf, X86_BUG_TAA);
+
+ssize_t cpu_show_itlb_multihit(struct device *dev, struct device_attribute *attr, char *buf)
+{
+    return cpu_show_common(dev, attr, buf, X86_BUG_ITLB_MULTIHIT);
+
+ssize_t cpu_show_srbds(struct device *dev, struct device_attribute *attr, char *buf)
+{
+    return cpu_show_common(dev, attr, buf, X86_BUG_SRBD);
+
@endef
--- linux-4.15.0.orig/arch/x86/kernel/cpu/cacheinfo.c
+++ linux-4.15.0/arch/x86/kernel/cpu/cacheinfo.c
@@ -0,0 +1,1006 @@
+// SPDX-License-Identifier: GPL-2.0
+*/
+* Routines to identify caches on Intel CPU.
+*
+* Changes:
+* Venkatesh Pallipadi: Adding cache identification through cpuid(4)
+* Ashok Raj <ashok.raj@intel.com>: Work with CPU hotplug infrastructure.
+* Andi Kleen / Andreas Herrmann: CPUID4 emulation on AMD.
+*/
+
+include <linux/slab.h>
+include <linux/cacheinfo.h>
+include <linux/cpu.h>
+include <linux/sched.h>
+include <linux/capability.h>
+include <linux/sysfs.h>
+include <linux/pci.h>
+
+include <asm/cpufeature.h>
+include <asm/amd_nb.h>
+include <asm/smp.h>
+

#include "cpu.h"
+
#define LVL_1_INST	1
#define LVL_1_DATA	2
#define LVL_2		3
#define LVL_3		4
#define LVL_TRACE	5
+
struct _cache_table {
unsigned char descriptor;
char cache_type;
short size;
};
+
#define MB(x) ((x) * 1024)
+
/* All the cache descriptor types we care about (no TLB or
trace cache entries) */
+
static const struct _cache_table cache_table[] =
+
{ 0x06, LVL_1_INST, 8 }, /* 4-way set assoc, 32 byte line size */
{ 0x08, LVL_1_INST, 16 }, /* 4-way set assoc, 32 byte line size */
{ 0x09, LVL_1_INST, 32 }, /* 4-way set assoc, 64 byte line size */
{ 0x0a, LVL_1_DATA, 8 }, /* 2 way set assoc, 32 byte line size */
{ 0x0c, LVL_1_DATA, 16 }, /* 4-way set assoc, 32 byte line size */
{ 0x0d, LVL_1_DATA, 16 }, /* 4-way set assoc, 64 byte line size */
{ 0x0e, LVL_1_DATA, 24 }, /* 6-way set assoc, 64 byte line size */
{ 0x21, LVL_2, 256 }, /* 8-way set assoc, 64 byte line size */
{ 0x22, LVL_3, 512 }, /* 4-way set assoc, sectored cache, 64 byte line size */
{ 0x23, LVL_3, MB(1) }, /* 8-way set assoc, sectored cache, 64 byte line size */
{ 0x25, LVL_3, MB(2) }, /* 8-way set assoc, sectored cache, 64 byte line size */
{ 0x29, LVL_3, MB(4) }, /* 8-way set assoc, sectored cache, 64 byte line size */
{ 0x2c, LVL_1_DATA, 32 }, /* 8-way set assoc, 64 byte line size */
{ 0x30, LVL_1_INST, 32 }, /* 8-way set assoc, 64 byte line size */
{ 0x39, LVL_2, 128 }, /* 4-way set assoc, sectored cache, 64 byte line size */
{ 0x3a, LVL_2, 192 }, /* 6-way set assoc, sectored cache, 64 byte line size */
{ 0x3b, LVL_2, 128 }, /* 2-way set assoc, sectored cache, 64 byte line size */
{ 0x3c, LVL_2, 256 }, /* 4-way set assoc, sectored cache, 64 byte line size */
{ 0x3d, LVL_2, 384 }, /* 6-way set assoc, sectored cache, 64 byte line size */
{ 0x3e, LVL_2, 512 }, /* 4-way set assoc, sectored cache, 64 byte line size */
{ 0x3f, LVL_2, 256 }, /* 2-way set assoc, sectored cache, 64 byte line size */
{ 0x41, LVL_2, 128 }, /* 4-way set assoc, 32 byte line size */
{ 0x42, LVL_2, 256 }, /* 4-way set assoc, 32 byte line size */
{ 0x43, LVL_2, 512 }, /* 4-way set assoc, 32 byte line size */
{ 0x44, LVL_2, MB(1) }, /* 4-way set assoc, 32 byte line size */
{ 0x45, LVL_2, MB(2) }, /* 4-way set assoc, 32 byte line size */
{ 0x46, LVL_3, MB(4) }, /* 4-way set assoc, 64 byte line size */
+{ 0x47, LVL_3, MB(8) }, /* 8-way set assoc, 64 byte line size */
+{ 0x48, LVL_2, MB(3) }, /* 12-way set assoc, 64 byte line size */
+{ 0x49, LVL_3, MB(4) }, /* 16-way set assoc, 64 byte line size */
+{ 0x4a, LVL_3, MB(6) }, /* 12-way set assoc, 64 byte line size */
+{ 0x4b, LVL_3, MB(8) }, /* 16-way set assoc, 64 byte line size */
+{ 0x4c, LVL_3, MB(12) }, /* 12-way set assoc, 64 byte line size */
+{ 0x4d, LVL_3, MB(16) }, /* 16-way set assoc, 64 byte line size */
+{ 0x4e, LVL_2, MB(6) }, /* 24-way set assoc, 64 byte line size */
+{ 0x60, LVL_1_DATA, 16 }, /* 8-way set assoc, sectored cache, 64 byte line size */
+{ 0x66, LVL_1_DATA, 8 }, /* 4-way set assoc, sectored cache, 64 byte line size */
+{ 0x67, LVL_1_DATA, 16 }, /* 4-way set assoc, sectored cache, 64 byte line size */
+{ 0x68, LVL_1_DATA, 32 }, /* 4-way set assoc, sectored cache, 64 byte line size */
+{ 0x70, LVL_TRACE, 12 }, /* 8-way set assoc */
+{ 0x71, LVL_TRACE, 16 }, /* 8-way set assoc */
+{ 0x72, LVL_TRACE, 32 }, /* 8-way set assoc */
+{ 0x73, LVL_TRACE, 64 }, /* 8-way set assoc */
+{ 0x78, LVL_2, MB(1) }, /* 4-way set assoc, 64 byte line size */
+{ 0x79, LVL_2, 128 }, /* 8-way set assoc, sectored cache, 64 byte line size */
+{ 0x7a, LVL_2, 256 }, /* 8-way set assoc, sectored cache, 64 byte line size */
+{ 0x7b, LVL_2, 512 }, /* 8-way set assoc, sectored cache, 64 byte line size */
+{ 0x7c, LVL_2, MB(1) }, /* 8-way set assoc, sectored cache, 64 byte line size */
+{ 0x7d, LVL_2, MB(2) }, /* 8-way set assoc, 64 byte line size */
+{ 0x7f, LVL_2, 512 }, /* 2-way set assoc, 64 byte line size */
+{ 0x80, LVL_2, 512 }, /* 8-way set assoc, 64 byte line size */
+{ 0x82, LVL_2, 256 }, /* 8-way set assoc, 32 byte line size */
+{ 0x83, LVL_2, 512 }, /* 8-way set assoc, 32 byte line size */
+{ 0x84, LVL_2, MB(1) }, /* 8-way set assoc, 32 byte line size */
+{ 0x85, LVL_2, MB(2) }, /* 8-way set assoc, 32 byte line size */
+{ 0x86, LVL_2, 512 }, /* 4-way set assoc, 64 byte line size */
+{ 0x87, LVL_2, MB(1) }, /* 8-way set assoc, 64 byte line size */
+{ 0xd0, LVL_3, 512 }, /* 4-way set assoc, 64 byte line size */
+{ 0xd1, LVL_3, MB(1) }, /* 4-way set assoc, 64 byte line size */
+{ 0xd2, LVL_3, MB(2) }, /* 4-way set assoc, 64 byte line size */
+{ 0xd6, LVL_3, MB(1) }, /* 8-way set assoc, 64 byte line size */
+{ 0xd7, LVL_3, MB(2) }, /* 8-way set assoc, 64 byte line size */
+{ 0xd8, LVL_3, MB(4) }, /* 12-way set assoc, 64 byte line size */
+{ 0xdc, LVL_3, MB(2) }, /* 12-way set assoc, 64 byte line size */
+{ 0xdd, LVL_3, MB(4) }, /* 12-way set assoc, 64 byte line size */
+{ 0xde, LVL_3, MB(8) }, /* 12-way set assoc, 64 byte line size */
+{ 0xe2, LVL_3, MB(2) }, /* 16-way set assoc, 64 byte line size */
+{ 0xe3, LVL_3, MB(4) }, /* 16-way set assoc, 64 byte line size */
+{ 0xe4, LVL_3, MB(8) }, /* 16-way set assoc, 64 byte line size */
+{ 0xea, LVL_3, MB(12) }, /* 24-way set assoc, 64 byte line size */
+{ 0xeb, LVL_3, MB(18) }, /* 24-way set assoc, 64 byte line size */
+{ 0xec, LVL_3, MB(24) }, /* 24-way set assoc, 64 byte line size */
+{ 0xff, 0, 0 };
+}
+enum _cache_type {
+  CTYPE_NULL = 0,
+  CTYPE_DATA = 1,
+  CTYPE_INST = 2,
+  CTYPE_UNIFIED = 3
+};
+
+union _cpuid4_leaf_eax {
+  struct {
+    enum _cache_type type:5;
+    unsigned int level:3;
+    unsigned int is_self_initializing:1;
+    unsigned int is_fully_associative:1;
+    unsigned int is_reserved:4;
+    unsigned int num_threads_sharing:12;
+    unsigned int num_cores_on_die:6;
+  } split;
+  u32 full;
+};
+
+union _cpuid4_leaf_ebx {
+  struct {
+    unsigned int coherency_line_size:12;
+    unsigned int physical_line_partition:10;
+    unsigned int ways_of_associativity:10;
+  } split;
+  u32 full;
+};
+
+union _cpuid4_leaf_ecx {
+  struct {
+    unsigned int number_of_sets:32;
+  } split;
+  u32 full;
+};
+
+struct _cpuid4_info_regs {
+  union _cpuid4_leaf_eax eax;
+  union _cpuid4_leaf_ebx ebx;
+  union _cpuid4_leaf_ecx ecx;
+  unsigned int id;
+  unsigned long size;
+  struct amd_northbridge *nb;
+};
+
+static unsigned short num_cache_leaves;
+/* AMD doesn't have CPUID4. Emulate it here to report the same
+  information to the user. This makes some assumptions about the machine:
+  L2 not shared, no SMT etc. that is currently true on AMD CPUs.
+  In theory the TLBs could be reported as fake type (they are in "dummy").
+  Maybe later */
+union l1_cache {
  +struct {
    +unsigned line_size:8;
    +unsigned lines_per_tag:8;
    +unsigned assoc:8;
    +unsigned size_in_kb:8;
    +};
    +unsigned val;
  +};
  +union l2_cache {
    +struct {
    +unsigned line_size:8;
    +unsigned lines_per_tag:4;
    +unsigned assoc:4;
    +unsigned size_in_kb:16;
    +};
    +unsigned val;
  +};
  +union l3_cache {
    +struct {
    +unsigned line_size:8;
    +unsigned lines_per_tag:4;
    +unsigned assoc:4;
    +unsigned res:2;
    +unsigned size_encoded:14;
    +};
    +unsigned val;
  +};
  +static const unsigned short assocs[] = {
    +[1] = 1,
    +[2] = 2,
    +[4] = 4,
    +[6] = 8,
    +[8] = 16,
    +[0xa] = 32,
    +[0xb] = 48,
    +[0xc] = 64,
    +[0xd] = 96,
    +[0xe] = 128,
+[0xf] = 0xffff /* fully associative - no way to show this currently */
+
+static const unsigned char levels[] = { 1, 1, 2, 3 };
+static const unsigned char types[] = { 1, 2, 3, 3 };
+
+static const enum cache_type cache_type_map[] = {
+  [CTYPE_NULL] = CACHE_TYPE_NOCACHE,
+  [CTYPE_DATA] = CACHE_TYPE_DATA,
+  [CTYPE_INST] = CACHE_TYPE_INST,
+  [CTYPE_UNIFIED] = CACHE_TYPE_UNIFIED,
+  };
+
+static void
+amd_cpuid4(int leaf, union _cpuid4_leaf_eax *eax,
+    union _cpuid4_leaf_ebx *ebx,
+    union _cpuid4_leaf_ecx *ecx)
+{
+    unsigned dummy;
+    unsigned line_size, lines_per_tag, assoc, size_in_kb;
+    union l1_cache l1i, l1d;
+    union l2_cache l2;
+    union l3_cache l3;
+    union l1_cache *l1 = &l1d;
+
+    eax->full = 0;
+    ebx->full = 0;
+    ecx->full = 0;
+
+    cpuid(0x80000005, &dummy, &dummy, &l1d.val, &l1i.val);
+    cpuid(0x80000006, &dummy, &dummy, &l2.val, &l3.val);
+
+    switch (leaf) {
+    case 1:
+        l1 = &l1i;
+        case 0:
+            if (!l1->val)
+                return;
+            assoc = assocs[l1->assoc];
+            line_size = l1->line_size;
+            lines_per_tag = l1->lines_per_tag;
+            size_in_kb = l1->size_in_kb;
+            break;
+    case 2:
+        if (!l2.val)
+            return;
+        assoc = assocs[l2.assoc];
+        line_size = l2.line_size;
+    case 3:
+        if (!l3.val)
+            return;
+        assoc = assocs[l3.assoc];
+        line_size = l3.line_size;
+    case 4:
+    case 5:
+        if (!l2.val)
+            return;
+        assoc = assocs[l2.assoc];
+        line_size = l2.line_size;
+    case 6:
+        if (!l3.val)
+            return;
+        assoc = assocs[l3.assoc];
+        line_size = l3.line_size;
+    case 7:
+        if (!l2.val)
+            return;
+        assoc = assocs[l2.assoc];
+        line_size = l2.line_size;
+    default:
+        return;
+    }
+}
/* cpu_data has errata corrections for K7 applied */
+ lines_per_tag = l2.lines_per_tag;
+ size_in_kb = __this_cpu_read(cpu_info.x86_cache_size);
+ break;
+ case 3:
+ if (!l3.val)
+ return;
+ assoc = asocs[l3.assoc];
+ line_size = l3.line_size;
+ lines_per_tag = l3.lines_per_tag;
+ size_in_kb = l3.size_encoded * 512;
+ if (boot_cpu_has(X86_FEATURE_AMD_DCM)) {
+ size_in_kb = size_in_kb >> 1;
+ assoc = assoc >> 1;
+ }
+ break;
+ default:
+ return;
+}
+
+ eax->split.is_self_initializing = 1;
+ eax->split.type = types[leaf];
+ eax->split.level = levels[leaf];
+ eax->split.num_threads_sharing = 0;
+ eax->split.num_cores_on_die = __this_cpu_read(cpu_info.x86_max_cores) - 1;
+}
+
+ if (assoc == 0xffff)
+ eax->split.is_fully_associative = 1;
+ ebx->split.coherency_line_size = line_size - 1;
+ ebx->split.ways_of_associativity = assoc - 1;
+ ebx->split.physical_line_partition = lines_per_tag - 1;
+ ecx->split.number_of_sets = (size_in_kb * 1024) / line_size /
+ (ebx->split.ways_of_associativity + 1) - 1;
+}
+
+#if defined(CONFIG_AMD_NB) && defined(CONFIG_SYSFS)
+
+ /* L3 cache descriptors */
+ */
+ static void amd_calc_l3_indices(struct amd_northbridge *nb)
+ {
+ struct amd_l3_cache *l3 = &nb->l3_cache;
+ unsigned int sc0, sc1, sc2, sc3;
+ u32 val = 0;
+ + pci_read_config_dword(nb->misc, 0x1C4, &val);

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+ */ calculate subcache sizes */
+ l3->subcaches[0] = sc0 = !(val & BIT(0));
+ l3->subcaches[1] = sc1 = !(val & BIT(4));
+ +
+ if (boot_cpu_data.x86 == 0x15) {
+ l3->subcaches[0] = sc0 += !(val & BIT(1));
+ l3->subcaches[1] = sc1 += !(val & BIT(5));
+ +
+ l3->subcaches[2] = sc2 = !(val & BIT(8)) + !(val & BIT(9));
+ l3->subcaches[3] = sc3 = !(val & BIT(12)) + !(val & BIT(13));
+ +
+ l3->indices = (max(max3(sc0, sc1, sc2), sc3) << 10) - 1;
+ +
+ */
+ * check whether a slot used for disabling an L3 index is occupied.
+ * @l3: L3 cache descriptor
+ * @slot: slot number (0..1)
+ *
+ * @returns: the disabled index if used or negative value if slot free.
+ */
+ static int amd_get_l3_disable_slot(struct amd_northbridge *nb, unsigned slot)
+ {
+ unsigned int reg = 0;
+ +
+ pci_read_config_dword(nb->misc, 0x1BC + slot * 4, &reg);
+ +
+ /* check whether this slot is activated already */
+ + if (reg & (3UL << 30))
+ + return reg & 0xfff;
+ +
+ + return -1;
+ +
+ + static ssize_t show_cache_disable(struct cacheinfo *this_leaf, char *buf,
+ + unsigned int slot)
+ + {
+ + int index;
+ + struct amd_northbridge *nb = this_leaf->priv;
+ +
+ index = amd_get_l3_disable_slot(nb, slot);
+ + if (index >= 0)
+ + return sprintf(buf, "%d\n", index);
+ +
+ return sprintf(buf, "FREE\n");
+ +}
+ #define SHOW_CACHE_DISABLE(slot)\+
+ static ssize_t\+
+ cache_disable_##slot##_show(struct device *dev,\+
+     struct device_attribute *attr, char *buf)\+
+ {
+     struct cacheinfo *this_leaf = dev_get_drvdata(dev);\+
+     return show_cache_disable(this_leaf, buf, slot);\+
+ }\+
+ SHOW_CACHE_DISABLE(0)\+
+ SHOW_CACHE_DISABLE(1)\+
+
+ static void amd_l3_disable_index(struct amd_northbridge *nb, int cpu,\+
+     unsigned slot, unsigned long idx)\+
+ {
+     int i;\+
+     idx |= BIT(30);\+
+     /*\+
+      * disable index in all 4 subcaches\+
+     */\+
+     for (i = 0; i < 4; i++) \{
+         u32 reg = idx | (i << 20);\+
+         if (!nb->l3_cache.subcaches[i]) \{
+             continue;\+
+         \} \{
+             pci_write_config_dword(nb->misc, 0x1BC + slot * 4, reg);\+
+             /*\+
+              * We need to WBINVD on a core on the node containing the L3\+
+              * cache which indices we disable therefore a simple wbinvd()\+
+              * is not sufficient.\+
+              */\+
+             wbinvd_on_cpu(cpu);\+
+             reg |= BIT(31);\+
+         \} \{
+             pci_write_config_dword(nb->misc, 0x1BC + slot * 4, reg);\+
+         \} \{
+         \} \{
+         /*\+
+          * disable a L3 cache index by using a disable-slot\+
+         */\+
+         @l3:\ L3 cache descriptor\+
+         @cpu:\ A CPU on the node containing the L3 cache\+
+         @slot: slot number (0..1)
+ * @index: index to disable
+ *
+ * @return: 0 on success, error status on failure
+ */
+static int amd_set_l3_disable_slot(struct amd_northbridge *nb, int cpu,
+    unsigned slot, unsigned long index)
+{
+    int ret = 0;
+
+    /* check if @slot is already used or the index is already disabled */
+    ret = amd_get_l3_disable_slot(nb, slot);
+    if (ret >= 0)
+        return -EEXIST;
+
+    if (index > nb->l3_cache.indices)
+        return -EINVAL;
+
+    /* check whether the other slot has disabled the same index already */
+    if (index == amd_get_l3_disable_slot(nb, !slot))
+        return -EEXIST;
+
+    amd_l3_disable_index(nb, cpu, slot, index);
+
+    return 0;
+}
+
+static ssize_t store_cache_disable(struct cacheinfo *this_leaf,
+    const char *buf, size_t count,
+    unsigned int slot)
+{
+    unsigned long val = 0;
+    int cpu, err = 0;
+    struct amd_northbridge *nb = this_leaf->priv;
+
+    if (!capable(CAP_SYS_ADMIN))
+        return -EPERM;
+
+    cpu = cpumask_first(&this_leaf->shared_cpu_map);
+
+    if (kstrtoul(buf, 10, &val) < 0)
+        return -EINVAL;
+
+    err = amd_set_l3_disable_slot(nb, cpu, slot, val);
+    if (err) {
+        if (err == -EEXIST)
+            pr_warn("L3 slot %d in use/index already disabled!\n",
+                slot);
+        return err;
+    }
+}
+}
+}  
+}  
+}  
+  
+static ssize_t subcaches_store(struct device *dev,    
+       struct device_attribute *attr, const char *buf, size_t count)  
+{  
+struct cacheinfo *this_leaf = dev_get_drvdata(dev);  
+int cpu = cpumask_first(&this_leaf->shared_cpu_map);  
+  
+if (!capable(CAP_SYS_ADMIN))  
+return -EPERM;  
+  
+if (kstrtol(buf, 16, &val) < 0)  
+return -EINVAL;  
+  
+if (amd_set_subcaches(cpu, val))  
+return -EINVAL;  
+  
+return count;  
+}  
+}  
+}  
+}  
+  
+static DEVICE_ATTR_RW(cache_disable_0);  
+static DEVICE_ATTR_RW(cache_disable_1);  
+static DEVICE_ATTR_RW(subcaches);
static umode_t
+cache_private_attrs_is_visible(struct kobject *kobj,
+    struct attribute *attr, int unused)
+
+static device *dev = kobj_to_dev(kobj);
+struct cacheinfo *this_leaf = dev_get_drvdata(dev);
+umode_t mode = attr->mode;
+
+if (!this_leaf->priv)
+return 0;
+
+if ((attr == &dev_attr_subcaches.attr) &&
+    amd_nb_has_feature(AMD_NB_L3_PARTITIONING))
+return mode;
+
+if ((attr == &dev_attr_cache_disable_0.attr ||
+     attr == &dev_attr_cache_disable_1.attr) &&
+    amd_nb_has_feature(AMD_NB_L3_INDEX_DISABLE))
+return mode;
+
+return 0;
+
+static struct attribute_group cache_private_group = {
+    .is_visible = cache_private_attrs_is_visible,
+};
+
+static void init_amd_l3_attrs(void)
{+int n = 1;
+static struct attribute **amd_l3_attrs;
+
+if (amd_l3_attrs) /* already initialized */
+return;
+
+if (amd_nb_has_feature(AMD_NB_L3_INDEX_DISABLE))
+n += 2;
+if (amd_nb_has_feature(AMD_NB_L3_PARTITIONING))
+n += 1;
+
+amd_l3_attrs = kcalloc(n, sizeof(*amd_l3_attrs), GFP_KERNEL);
+if (!amd_l3_attrs)
+return;
+
+n = 0;
+if (amd_nb_has_feature(AMD_NB_L3_INDEX_DISABLE)) {
+n = &dev_attr_cache_disable_0.attr;
+
+
+amd_l3_attrs[n++] = &dev_attr_cache_disable_1.attr;
+
+if (amd_nb_has_feature(AMD_NB_L3_PARTITIONING))
+amd_l3_attrs[n++] = &dev_attr_subcaches.attr;
+
+cache_private_group.attrs = amd_l3_attrs;
+
+const struct attribute_group *
+cache_get_priv_group(struct cacheinfo *this_leaf)
+
+struct amd_northbridge *nb = this_leaf->priv;
+
+if (this_leaf->level < 3 || !nb)
+return NULL;
+
+if (nb && nb->l3_cache.indices)
+init_amd_l3_attrs();
+
+return &cache_private_group;
+
+
+static void amd_init_l3_cache(struct _cpuid4_info_regs *this_leaf, int index)
+
+int node;
+
+/* only for L3, and not in virtualized environments */
+if (index < 3)
+return;
+
+node = amd_get_nb_id(smp_processor_id());
+
+this_leaf->nb = node_to_amd_nb(node);
+
+if (this_leaf->nb && this_leaf->nb->l3_cache.indices)
+amd_calc_l3_indices(this_leaf->nb);
+
+#else
+#define amd_init_l3_cache(x, y)
+#endif /* CONFIG_AMD_NB && CONFIG_SYSFS */
+
+static int
+cpuid4_cache_lookup_regs(int index, struct _cpuid4_info_regs *this_leaf)
+
+union _cpuid4_leaf_eax	eax;
+union _cpuid4_leaf_ebx	ebx;
+union _cpuid4_leaf_ecx	ecx;
+unsigned edx;
+
+if (boot_cpu_data.x86_vendor == X86_VENDOR_AMD) {
if (boot_cpu_has(X86_FEATURE_TOPOEXT))
+cpuid_count(0x8000001d, index, &eax.full,
+  &ebx.full, &ecx.full, &edx);
+else
+amd_cpuid4(index, &eax, &ebx, &ecx);
+amd_init_l3_cache(this_leaf, index);
+} else {
+cpuid_count(4, index, &eax.full, &ebx.full, &ecx.full, &edx);
+
+if (eax.split.type == CTYPE_NULL)
+return -EIO; /* better error ? */
+
+this_leaf->eax = eax;
+this_leaf->ebx = ebx;
+this_leaf->ecx = ecx;
+this_leaf->size = (ecx.split.number_of_sets + 1) *
+  (ebx.split.coherency_line_size + 1) *
+  (ebx.split.physical_line_partition + 1) *
+  (ebx.split.ways_of_associativity + 1);
+return 0;
+}
+
+static int find_num_cache_leaves(struct cpuinfo_x86 *c)
+{
+unsigned int		eax, ebx, ecx, edx, op;
+union _cpuid4_leaf_eax	cache_eax;
+i = -1;
+
+if (c->x86_vendor == X86_VENDOR_AMD)
+op = 0x8000001d;
+else
+op = 4;
+
+do {
+  ++i;
+  /* Do cpuid(op) loop to find out num_cache_leaves */
+  cpuid_count(op, i, &eax, &ebx, &ecx, &edx);
+  cache_eax.full = eax;
+} while (cache_eax.split.type != CTYPE_NULL);
+return i;
+}
+
+void cacheinfo_amd_init_llc_id(struct cpuinfo_x86 *c, int cpu, u8 node_id)
+{
+/* We may have multiple LLCs if L3 caches exist, so check if we
+  have an L3 cache by looking at the L3 cache CPUID leaf.
/*!
 * @brief Initialize cache information for AMD processors.
 *
 * @param c Pointer to the CPU information structure.
 *
 * @return 0 on success, non-zero on error.
 *
 * This function initializes cache information for AMD processors.
 */
void init_amd_cacheinfo(struct cpuinfo_x86 *c) {
    
    // If we have the TOPOEXT feature enabled.
    if (boot_cpu_has(X86_FEATURE_TOPOEXT)) {
        num_cache_leaves = find_num_cache_leaves(c);
        } else if (c->extended_cpuid_level >= 0x80000006) {
            if (cpuid_edx(0x80000006) & 0xf000)
                num_cache_leaves = 4;
            else
                num_cache_leaves = 3;
    }

    // Initialize cache information for Intel processors.
    void init_intel_cacheinfo(struct cpuinfo_x86 *c) {
    
    // If we have the TOPOEXT feature enabled.
    if (boot_cpu_has(X86_FEATURE_TOPOEXT)) {
        num_cache_leaves = find_num_cache_leaves(c);
        } else if (c->extended_cpuid_level >= 0x80000006) {
            if (cpuid_edx(0x80000006) & 0xf000)
                num_cache_leaves = 4;
            else
                num_cache_leaves = 3;
    }
}

 CACHE SIZES */
unsigned int trace = 0, l1i = 0, l1d = 0, l2 = 0, l3 = 0;
unsigned int new_l1d = 0, new_l1i = 0; /* Cache sizes from cpuid(4) */
unsigned int new_l2 = 0, new_l3 = 0, i; /* Cache sizes from cpuid(4) */
unsigned int l2_id = 0, l3_id = 0, num_threads_sharing, index_msb;
#ifdef CONFIG_SMP
unsigned int cpu = c->cpu_index;
#endif

if (c->cpuid_level > 3) {
static int is_initialized;

if (is_initialized == 0) {
	/* Init num_cache_leaves from boot CPU */
	num_cache_leaves = find_num_cache_leaves(c);
	is_initialized++;
}

/* Whenever possible use cpuid(4), deterministic cache */
/* parameters cpuid to find the cache details */

for (i = 0; i < num_cache_leaves; i++) {
struct_cpuid4_info_regs this_leaf = {0};
int retval;

retval = cpuid4_cache_lookup_regs(i, &this_leaf);
if (retval < 0)
	continue;

switch (this_leaf.eax.split.level) {
	case 1:
		if (this_leaf.eax.split.type == CTYPE_DATA)
			new_l1d = this_leaf.size/1024;
		else if (this_leaf.eax.split.type == CTYPE_INST)
			new_l1i = this_leaf.size/1024;
		break;
	case 2:
		new_l2 = this_leaf.size/1024;
		num_threads_sharing = 1 + this_leaf.eax.split.num_threads_sharing;
		index_msb = get_count_order(num_threads_sharing);
		l2_id = c->apicid & ~((1 << index_msb) - 1);
		break;
	case 3:
		new_l3 = this_leaf.size/1024;
		num_threads_sharing = 1 + this_leaf.eax.split.num_threads_sharing;
		index_msb = get_count_order(num_threads_sharing);
		l3_id = c->apicid & ~((1 << index_msb) - 1);
+break;
+default:
+break;
+
*/
+ /* Don't use cpuid2 if cpuid4 is supported. For P4, we use cpuid2 for
+ * trace cache
+ */
+if ((num_cache_leaves == 0 || c->x86 == 15) && c->cpuid_level > 1) {
+/* supports eax=2 call */
+int j, n;
+unsigned int regs[4];
+unsigned char *dp = (unsigned char *)regs;
+int only_trace = 0;
+
+if (num_cache_leaves != 0 && c->x86 == 15)
+only_trace = 1;
+
+/* Number of times to iterate */
+n = cpuid_eax(2) & 0xFF;
+
+for (i = 0 ; i < n ; i++) {
+cpuid(2, &regs[0], &regs[1], &regs[2], &regs[3]);
+
+/* If bit 31 is set, this is an unknown format */
+for (j = 0 ; j < 3 ; j++)
+if (regs[j] & (1 << 31))
+regs[j] = 0;
+
+/* Byte 0 is level count, not a descriptor */
+for (j = 1 ; j < 16 ; j++)
+unsigned char des = dp[j];
+unsigned char k = 0;
+
+/* look up this descriptor in the table */
+while (cache_table[k].descriptor != 0) {
+if (cache_table[k].descriptor == des) {
+if (only_trace && cache_table[k].cache_type != LVL_TRACE)
+break;
+switch (cache_table[k].cache_type) {
+case LVL_1_INST:
+l1i += cache_table[k].size;
+break;
+case LVL_1_DATA:
+l1d += cache_table[k].size;
+break;
+*
case LVL_2:
    l2 += cache_table[k].size;
    break;
+case LVL_3:
    l3 += cache_table[k].size;
    break;
+case LVL_TRACE:
    trace += cache_table[k].size;
    break;
+
    +k++;
    +
    +break;
    +}
    +
    +k++;
    +}
    +}
    +}
    +}
    +
    +if (new_l1d)
    +l1d = new_l1d;
    +
    +if (new_l1i)
    +l1i = new_l1i;
    +
    +if (new_l2) {
    +l2 = new_l2;
    +#ifdef CONFIG_SMP
    +per_cpu(cpu_llc_id, cpu) = l2_id;
    +#endif
    +}
    +
    +if (new_l3) {
    +l3 = new_l3;
    +#ifdef CONFIG_SMP
    +per_cpu(cpu_llc_id, cpu) = l3_id;
    +#endif
    +}
    +
    +#ifdef CONFIG_SMP
    +/*
    + * If cpu_llc_id is not yet set, this means cpuid_level < 4 which in
    + * turns means that the only possibility is SMT (as indicated in
    + * cpuid1). Since cpuid2 doesn't specify shared caches, and we know
    + * that SMT shares all caches, we can unconditionally set cpu_llc_id to
    + * c->phys_proc_id.
    + */
    +*/
+if (per_cpu(cpu_llc_id, cpu) == BAD_APICID)
+  per_cpu(cpu_llc_id, cpu) = c->physproc_id;
+  #endif
+
+c->x86_cache_size = l3 ? l3 : (l2 ? l2 : (l1i+l1d));
+
+if (!l2)
+  cpu_detect_cache_sizes(c);
+
+static int __cache_amd_cpumap_setup(unsigned int cpu, int index,
+    struct cpuid4_info_regs *base)
+{
+  struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
+  struct cacheinfo *this_leaf;
+  int i, sibling;
+  *
+  */
+  * For L3, always use the pre-calculated cpu_llc_shared_mask
+  * to derive shared_cpu_map.
+  */
+  if (index == 3) {
+    for_each_cpu(i, cpu_llc_shared_mask(cpu)) {
+      this_cpu_ci = get_cpu_cacheinfo(i);
+      if (!this_cpu_ci->info_list)
+        continue;
+      this_leaf = this_cpu_ci->info_list + index;
+      for_each_cpu(sibling, cpu_llc_shared_mask(cpu)) {
+        if (!cpu_online(sibling))
+          continue;
+        cpumask_set_cpu(sibling,
+          &this_leaf->shared_cpu_map);
+      }  
+    }
+  } else if (boot_cpu_has(X86_FEATURE_TOPOEXT)) {
+    unsigned int apicid, nshared, first, last;
+    nshared = base->eax.split.num_threads_sharing + 1;
+    apicid = cpu_data(cpu).apicid;
+    first = apicid - (apicid % nshared);
+    last = first + nshared - 1;
+    for_each_online_cpu(i) {
+      this_cpu_ci = get_cpu_cacheinfo(i);
+      if (!this_cpu_ci->info_list)
+        continue;
+      apicid = cpu_data(i).apicid;
+if ((apicid < first) || (apicid > last))
+continue;
+
+this_leaf = this_cpu_ci->info_list + index;
+
+for_each_online_cpu(sibling) {
+apicid = cpu_data(sibling).apicid;
+if ((apicid < first) || (apicid > last))
+continue;
+cpumask_set_cpu(sibling,
+&this_leaf->shared_cpu_map);
+}
+}
+
+} else
+return 0;
+
+return 1;
+
+
+static void __cache_cpumap_setup(unsigned int cpu, int index,
+struct _cpuid4_info_regs *base)
+{
+struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
+struct cacheinfo *this_leaf, *sibling_leaf;
+unsigned long num_threads_sharing;
+int index_msb, i;
+struct cpuinfo_x86 *c = &cpu_data(cpu);
+
+if (c->x86_vendor == X86_VENDOR_AMD) {
+if (__cache_amd_cpumap_setup(cpu, index, base))
+return;
+}
+
+this_leaf = this_cpu_ci->info_list + index;
+num_threads_sharing = 1 + base->eax.split.num_threads_sharing;
+
+cpumask_set_cpu(cpu, &this_leaf->shared_cpu_map);
+if (num_threads_sharing == 1)
+return;
+
+index_msb = get_count_order(num_threads_sharing);
+
+for_each_online_cpu(i)
+if (cpu_data(i).apicid >> index_msb == c->apicid >> index_msb) {
+struct cpu_cacheinfo *sib_cpu_ci = get_cpu_cacheinfo(i);
+
+if (i == cpu || !sib_cpu_ci->info_list)
+continue; /* skip if itself or no cacheinfo */
sibling_leaf = sib_cpu_ci->info_list + index;
cpumask_set_cpu(i, this_leaf->shared_cpu_map);
cpumask_set_cpu(cpu, sibling_leaf->shared_cpu_map);
+
+
static void ci_leaf_init(struct cacheinfo *this_leaf,
  struct _cpuid4_info_regs *base)
+
+this_leaf->id = base->id;
+this_leaf->attributes = CACHE_ID;
+this_leaf->level = base->eax.split.level;
+this_leaf->type = cache_type_map[base->eax.split.type];
+this_leaf->coherency_line_size =
  base->ebx.split.coherency_line_size + 1;
+this_leaf->ways_ofAssociativity =
  base->ebx.split.ways_ofAssociativity + 1;
+this_leaf->size = base->size;
+this_leaf->number_of_sets = base->ecx.split.number_of_sets + 1;
+this_leaf->physical_line_partition =
  base->ebx.split.physical_line_partition + 1;
+this_leaf->priv = base->nb;
+}
+
+int init_cache_level(unsigned int cpu)
+
+struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
+
+if (!num_cache_leaves)
+return -ENOENT;
+if (!this_cpu_ci)
+return -EINVAL;
+this_cpu_ci->num_levels = 3;
+this_cpu_ci->num_leaves = num_cache_leaves;
+return 0;
+}
num_threads_sharing = 1 + id4_regs->eax.split.num_threads_sharing;
index_msb = get_count_order(num_threads_sharing);
+id4_regs->id = c->apicid >> index_msb;
+
+int populate_cache_leaves(unsigned int cpu)
+
+unsigned int idx, ret;
+struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
+struct cacheinfo *this_leaf = this_cpu_ci->info_list;
+struct _cpuid4_info_regs id4_regs = {};
+
+for (idx = 0; idx < this_cpu_ci->num_leaves; idx++) {
+ret = cpuid4_cache_lookup_regs(idx, &id4_regs);
+if (ret)
+return ret;
+get_cache_id(cpu, &id4_regs);
+ci_leaf_init(this_leaf++, &id4_regs);
+__cache_cpumap_setup(cpu, idx, &id4_regs);
+}
+this_cpu_ci->cpu_map_populated = true;
+
+return 0;
+
--- linux-4.15.0.orig/arch/x86/kernel/cpu/centaur.c
+++ linux-4.15.0/arch/x86/kernel/cpu/centaur.c
@@ -18,6 +18,13 @@
#define RNG_ENABLED (1 << 3)
#define RNG_ENABLE (1 << 6) /* MSR_VIA_RNG */

#define X86_VMX_FEATURE_PROC_CTLS_TPR_SHADOW 0x00200000
#define X86_VMX_FEATURE_PROC_CTLS_VNMI 0x00400000
#define X86_VMX_FEATURE_PROC_CTLS_2ND_CTLS 0x80000000
#define X86_VMX_FEATURE_PROC_CTLS2_VIRT_APIC 0x00000000
#define X86_VMX_FEATURE_PROC_CTLS2_EPT 0x00000002
#define X86_VMX_FEATURE_PROC_CTLS2_VPID 0x00000020
+

static void init_c3(struct cpuinfo_x86 *c)
{
 u32 lo, hi;
 @@ -108,6 +115,31 @@

 static void centaur_detect_vmx_virtcap(struct cpuinfo_x86 *c)
 {
+u32 vmx_msr_low, vmx_msr_high, msr_ctl, msr_ctl2;
static void init_centaur(struct cpuinfo_x86 *c)
{
    #ifdef CONFIG_X86_32
    @@ -124,6 +156,24 @@
    clear_cpu_cap(c, 0*32+31);
    #endif
    early_init_cap(c);
    init_intel_cacheinfo(c);
    detect_num_cpu_cores(c);
    #ifdef CONFIG_X86_32
    detect ht(c);
    #endif
    +
    +if (c->cpuid_level > 9) {
    +unsigned int eax = cpuid_eax(10);
    +
    +/*
    + * Check for version and the number of counters
    + * Version(eax[7:0]) can't be 0;
    + * Counters(eax[15:8]) should be greater than 1;
    + */
    +if (((eax & 0xff) && (((eax >> 8) & 0xff) > 1))
    +set_cpu_cap(c, X86_FEATURE_ARCH_PERFMON);
    +}
    +
    switch (c->x86) {
    #ifdef CONFIG_X86_32
case 5:
   clear_cpu_cap(c, X86_FEATURE_TSC);
   break;

case 8:
   -switch (c->x86_mask) {
   +switch (c->x86_stepping) {
       default:
           name = "2";
           break;
   }

   #ifdef CONFIG_X86_64
   set_cpu_cap(c, X86_FEATURE_LFENCE_RDTSC);
   #endif
   +
   +if (cpu_has(c, X86_FEATURE_VMX))
   +centaur_detect_vmx_virtcap(c);
   }

   #ifdef CONFIG_X86_32
   /* - Note, it seems this may only be in engineering samples. */
   */
   if ((c->x86 == 6) && (c->x86_model == 9) &&
       -(c->x86_mask == 1) && (size == 65))
   +(c->x86_stepping == 1) && (size == 65))
       size -= 1;
       return size;
   }

--- linux-4.15.0.orig/arch/x86/kernel/cpu/common.c
+++ linux-4.15.0/arch/x86/kernel/cpu/common.c
@@ -64,6 +66,13 @@
 /* representing cpus for which sibling maps can be computed */
 cpumask_var_t cpu_sibling_setup_mask;

+#ifdef CONFIG_X86_LOCAL_APIC
 #include <asm/uv/uv.h>
+#include <asm/intel-family.h>
+EXPORT_SYMBOL(smp_num_siblings);
 }
+/* Last level cache ID of each logical CPU */
+DEFINE_PER_CPU_READ_MOSTLY(u16, cpu_llc_id) = BAD_APICID;
+
+/* correctly size the local cpu masks */
void __init setup_cpu_local_masks(void)
{
    @ @ -375,7 +384,7 @@
    * cpuid bit to be set. We need to ensure that we
    * update that bit in this CPU's "cpu_info".
    */
    -get_cpu_cap(c);
    +set_cpu_cap(c, X86_FEATURE_OSPKE);
}

#ifdef CONFIG_X86_INTEL_MEMORY_PROTECTION_KEYS
    @ @ -575,6 +584,19 @@
    *(s + 1) = \'0\';
    }

    +void detect_num_cpu_cores(struct cpuinfo_x86 *c)
    +{
    +unsigned int eax, ebx, ecx, edx;
    +
    +c->x86_max_cores = 1;
    +if (!IS_ENABLED(CONFIG_SMP) || c->cpuid_level < 4)
    +return;
    +
    +cpuid_count(4, 0, &eax, &ebx, &ecx, &edx);
    +if (eax & 0x1f)
    +c->x86_max_cores = (eax >> 26) + 1;
    +}
    +
    void cpu_detect_cache_sizes(struct cpuinfo_x86 *c)
    {
    unsigned int n, dummy, ebx, ecx, edx, l2size;
    @@ -636,33 +658,36 @@
    tlb_lld_4m[ENTRIES], tlb_lld_1g[ENTRIES]);
    }

    -void detect_ht(struct cpuinfo_x86 *c)
    +int detect_ht_early(struct cpuinfo_x86 *c)
    {
    #ifdef CONFIG_SMP
    u32 eax, ebx, ecx, edx;
    -int index_msb, core_bits;
    -static bool printed;
    
    if (!cpu_has(c, X86_FEATURE_HT))
    {
if (cpu_has(c, X86_FEATURE_CMP_LEGACY))
    - goto out;
+ return -1;

if (cpu_has(c, X86_FEATURE_XTOPOLOGY))
    - return;
+ return -1;

    if (cpu_has(c, X86_FEATURE_XTOPOLOGY))
    - return;
+ return -1;

    cpuid(1, &eax, &ebx, &ecx, &edx);

    smp_num_siblings = (ebx & 0xff0000) >> 16;
    -
    - if (smp_num_siblings == 1) {
    + if (smp_num_siblings == 1)
        pr_info_once("CPU0: Hyper-Threading is disabled\n");
        - goto out;
        - }
        +#endif
+ return 0;
+ }
-
- if (smp_num_siblings <= 1)
- goto out;
+ void detect_ht(struct cpuinfo_x86 *c)
+ {
+ +#ifdef CONFIG_SMP
+ int index_msb, core_bits;
+ +
+ if (detect_ht_early(c) < 0)
+ return;

    index_msb = get_count_order(smp_num_siblings);
    c->phys_proc_id = apic->phys_pkg_id(c->initial_apicid, index_msb);
    @ @ -675,15 +700,6 @ @

    c->cpu_core_id = apic->phys_pkg_id(c->initial_apicid, index_msb) &
        ((1 << core_bits) - 1);
    -
    - out:
    - if (!printed & (c->x86_max_cores * smp_num_siblings) > 1) {
        - pr_info("CPU: Physical Processor ID: %d\n",
        - c->phys_proc_id);
        - pr_info("CPU: Processor Core ID: %d\n",
        - c->cpu_core_id);
        - printed = 1;
cpuid(0x00000001, &tfms, &misc, &junk, &cap0);
c->x86 = x86_family(tfms);
c->x86_model = x86_model(tfms);
c->x86_mask = x86_stepping(tfms);
c->x86_stepping = x86_stepping(tfms);

if (cap0 & (1<<19)) {
  c->x86_clflush_size = ((misc >> 8) & 0xff) * 8;
}

static void init_speculation_control(struct cpuinfo_x86 *c)
{
  /*
   * The Intel SPEC_CTRL CPUID bit implies IBRS and IBPB support,
   * and they also have a different bit for STIBP support. Also,
   * a hypervisor might have set the individual AMD bits even on
   * Intel CPUs, for finer-grained selection of what's available.
   */
  if (cpu_has(c, X86_FEATURE_SPEC_CTRL)) {
    set_cpu_cap(c, X86_FEATURE_IBRS);
    set_cpu_cap(c, X86_FEATURE_IBPB);
    set_cpu_cap(c, X86_FEATURE_MSR_SPEC_CTRL);
  }
  if (cpu_has(c, X86_FEATURE_INTEL_STIBP))
    set_cpu_cap(c, X86_FEATURE_STIBP);
  if (cpu_has(c, X86_FEATURE_AMD_IBRS)) {
    set_cpu_cap(c, X86_FEATURE_IBRS);
    set_cpu_cap(c, X86_FEATURE_MSR_SPEC_CTRL);
  }
  if (cpu_has(c, X86_FEATURE_AMD_IBPB))
    set_cpu_cap(c, X86_FEATURE_IBPB);
  if (cpu_has(c, X86_FEATURE_AMD_STIBP)) {
    set_cpu_cap(c, X86_FEATURE_STIBP);
  }
}
+set_cpu_cap(c, X86_FEATURE_MSR_SPEC_CTRL);
+
+if (cpu_has(c, X86_FEATURE_AMD_SSBD)) {
+set_cpu_cap(c, X86_FEATURE_SSBD);
+set_cpu_cap(c, X86_FEATURE_MSR_SPEC_CTRL);
+clear_cpu_cap(c, X86_FEATURE_VIRT_SSBD);
+
+
+}
+
+static void init_cqm(struct cpuinfo_x86 *c)
+
+{
+if (!cpu_has(c, X86_FEATURE_CQM_LLC)) {
+c->x86_cache_max_rmid  = -1;
+c->x86_cache_occ_scale = -1;
+return;
+}
+
+/* will be overridden if occupancy monitoring exists */
+c->x86_cache_max_rmid = cpuid_ebx(0xf);
+
+if (cpu_has(c, X86_FEATURE_CQM_OCCUP_LLCC) ||
+ cpu_has(c, X86_FEATURE_CQM_MBM_TOTAL) ||
+ cpu_has(c, X86FEATURE_CQM_MBM_LOCAL)) {
+u32 eax, ebx, ecx, edx;
+
+/* QoS sub-leaf, EAX=0Fh, ECX=1 */
+cpuid_count(0xf, 1, &eax, &ebx, &ecx, &edx);
+
+c->x86_cache_max_rmid = ecx;
+c->x86_cache_occ_scale = ebx;
+
+
+}
+
+}
+
+void get_cpu_cap(struct cpuinfo_x86 *c)
+
{|u32 eax, ebx, ecx, edx:
@@ -769,6 +850,7 @@
cpuid_count(0x00000007, 0, &eax, &ebx, &ecx, &edx);
c->x86_capability[CPUID_7_0_EBX] = ebx;
c->x86_capability[CPUID_7_ECX] = ecx;
+c->x86_capability[CPUID_7_EDX] = edx;
}

/* Extended state features: level 0x0000000d */
@@ -778,33 +860,6 @@
c->x86_capability[CPUID_D_1_EAX] = eax;
}
-/* Additional Intel-defined flags: level 0x0000000F */
-if (c->cpuid_level >= 0x0000000F) {
-
-/* QoS sub-leaf, EAX=0Fh, ECX=0 */
cpuid_count(0x0000000F, 0, &eax, &ebx, &ecx, &edx);
c->x86_capability[CPUID_F_0_EDX] = edx;
-
-if (cpu_has(c, X86_FEATURE_CQM_LLCC)) {
-/* will be overridden if occupancy monitoring exists */
c->x86_cache_max_rmid = ebx;
-
-/* QoS sub-leaf, EAX=0Fh, ECX=1 */
cpuid_count(0x0000000F, 1, &eax, &ebx, &ecx, &edx);
c->x86_capability[CPUID_F_1_EDX] = edx;
-
-if ((cpu_has(c, X86_FEATURE_CQM_OCCUP_LLCC)) ||
-    (cpu_has(c, X86_FEATURE_CQM_MBM_TOTAL)) ||
-    (cpu_has(c, X86_FEATURE_CQM_MBM_LOCAL)))) {
-c->x86_cache_max_rmid = ecx;
c->x86_cache_occ_scale = ebx;
-
} 
} else {
-c->x86_cache_max_rmid = -1;
c->x86_cache_occ_scale = -1;
-
-
-/* AMD-defined flags: level 0x80000001 */
eax = cpuid_eax(0x80000000);
c->extended_cpuid_level = eax;
@@ -841,6 +896,8 @@
c->x86_capability[CPUID_8000_000A_EDX] = cpuid_edx(0x8000000a);

init_scattered_cpuid_features(c);
+init_speculation_control(c);
+init_cqm(c);

/*
 * Clear/Set all flags overridden by options, after probe.
@@ -876,6 +933,183 @@
#endif

#define NO_SPECULATION		BIT(0)
#define NO_MELTDOWN		BIT(1)
#define NO_SSB			BIT(2)
#define NO_L1TF			BIT(3)

init_scattered_cpuid_features(c);
+init_speculation_control(c);
+init_cqm(c);

/*
 * Clear/Set all flags overridden by options, after probe.
```c
+#define NO_MDSBIT(4)
+#define MSBDS_ONLYBIT(5)
+#define NO_SWAPGSBIT(6)
+#define NO_ITLB_MULTIHITBIT(7)
+
+#define VULNWL(_vendor, _family, _model, _whitelist)
+{ X86_VENDOR_##_vendor, _family, _model, X86_FEATURE_ANY, _whitelist }
+
+#define VULNWL_INTEL(model, whitelist)
+VULNWL(INTEL, 6, INTEL_FAM6_##model, whitelist)
+
+#define VULNWL_AMD(family, whitelist)
+VULNWL_AMD(family, whitelist)
+
+static const __initconst struct x86_cpu_id cpu_vuln_whitelist[] = {
+VULNWL(ANY, 4, X86_MODEL_ANY, NO_SPECULATION),
+VULNWL(CENTAUR, 5, X86_MODEL_ANY, NO_SPECULATION),
+VULNWL(INTEL, 5, X86_MODEL_ANY, NO_SPECULATION),
+VULNWL(NSC, 5, X86_MODEL_ANY, NO_SPECULATION),
+
+VULNWL_INTEL(ATOM_SALTWELL, NO_SPECULATION | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATOM_SALTWELL_TABLET, NO_SPECULATION | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATOM_SALTWELL_MID, NO_SPECULATION | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATM_BONNELL, NO_SPECULATION | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATM_AIRMONT, NO_L1TF | MSBDS_ONLY | NO_SWAPGS | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATM_AIRMONT_MID, NO_L1TF | MSBDS_ONLY | NO_SWAPGS | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATM_GOLDMONT, NO_MDS | NO_L1TF | NO_SWAPGS | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATM_GOLDMONT_X, NO_MDS | NO_L1TF | NO_SWAPGS | NO_ITLB_MULTIHIT),
+VULNWL_INTEL(ATM_GOLDMONT_PLUS, NO_MDS | NO_L1TF | NO_SWAPGS |
```
/* Technically, swapgs isn't serializing on AMD (despite it previously
being documented as such in the APM). But according to AMD, %gs is
updated non-speculatively, and the issuing of %gs-relative memory
operands will be blocked until the %gs update completes, which is
good enough for our purposes.
*/

/* AMD Family 0xf - 0x12 */
VULNWiltr_VERIFY_INTEL(ATOM_TREMONT_X,NO_ITLB_MULTIHIT),
	/* FAMILY_ANY must be last, otherwise 0x0f - 0x12 matches won't work */
VULNWltrVERIFY_INTEL(IVYBRIDGE,X86_FAMILY_ANY,NO_MELTDOWN | NO_SSB | NO_L1TF | NO_MDS | NO_SWAPGS | NO_ITLB_MULTIHIT),
VULNWltrVERIFY_INTEL(HASWELL_CORE,X86_FAMILY_ANY,SRBDS),
VULNWltrVERIFY_INTEL(HASWELL_ULT,X86_FAMILY_ANY,SRBDS),
VULNWltrVERIFY_INTEL(HASWELL_GT3E,X86_FAMILY_ANY,SRBDS),
VULNWltrVERIFY_INTEL(BROADWELL_GT3E,X86_FAMILY ANY,SRBDS),
VULNWltrVERIFY_INTEL(BROADWELL_CORE,X86_FAMILY ANY,SRBDS),
VULNWltrVERIFY_INTEL(SKYLAKE_MOBILE,X86_FAMILY ANY,SRBDS),
VULNWltrVERIFY_INTEL(SKYLAKE_DESKTOP,X86_FAMILY ANY,SRBDS),
VULNWltrVERIFY_INTEL(KABYLAKE_MOBILE,X86_STEPPINGS(0x0, 0xC),SRBDS),
VULNWltrVERIFY_INTEL(KABYLAKE_DESKTOP,X86_STEPPINGS(0x0, 0xD),SRBDS),
VULNWltrVERIFY_INTEL(X86_STEPPINGS(0x0, 0xD),SRBDS),
	{}
+ static bool __init cpu_matches(const struct x86_cpu_id *table, unsigned long which)
+ {
+ const struct x86_cpu_id *m = x86_match_cpu(table);
+ return m && !(m->driver_data & which);
+ }
+
+ u64 x86_read_arch_cap_msr(void)
+ {
+ u64 ia32_cap = 0;
+
+ if (boot_cpu_has(X86_FEATURE_ARCH_CAPABILITIES))
+ rdmsrl(MSR_IA32_ARCH_CAPABILITIES, ia32_cap);
+ return ia32_cap;
+ }
+
+ static void __init cpu_set_bug_bits(struct cpuinfo_x86 *c)
+ {
+ u64 ia32_cap = x86_read_arch_cap_msr();
+
+ /* Set ITLB_MULTIHIT bug if cpu is not in the whitelist and not mitigated */
+ if (!cpu_matches(cpu_vuln_whitelist, NO_ITLB_MULTIHIT) &&
+ !(ia32_cap & ARCH_CAP_PSCHANGE_MC_NO))
+ setup_force_cpu_bug(X86_BUG_ITLB_MULTIHIT);
+ if (cpu_matches(cpu_vuln_whitelist, NO_SPECULATION))
+ return;
+
+ setup_force_cpu_bug(X86_BUG_SPECTRE_V1);
+ setup_force_cpu_bug(X86_BUG_SPECTRE_V2);
+
+ if (!cpu_matches(cpu_vuln_whitelist, NO_SSB) &&
+ !(ia32_cap & ARCH_CAP_SSB_NO) &&
+ !cpu_has(c, X86_FEATURE_AMD_SSB_NO))
+ setup_force_cpu_bug(X86_BUG_SPEC_STORE_BYPASS);
+ if (ia32_cap & ARCH_CAP_IBRS_ALL)
+ setup_force_cpu_cap(X86_FEATURE_IBRS_ENHANCED);
+ if (!cpu_matches(cpu_vuln_whitelist, NO_MDS) &&
+ !ia32_cap & ARCH_CAP_MDS_NO) {
+ setup_force_cpu_bug(X86_BUG_MDS);
+ if (cpu_matches(cpu_vuln_whitelist, MSBDS_ONLY))
+ setup_force_cpu_bug(X86_BUG_MSBSDS_ONLY);
+ }
+
+if (!cpu_matches(cpu_vuln_whitelist, NO_SWAPGS))
+setup_force_cpu_bug(X86_BUG_SWAPGS);
+
+/*
+ * When the CPU is not mitigated for TAA (TAA_NO=0) set TAA bug when:
+ * - TSX is supported or
+ * - TSX_CTRL is present
+ *
+ * TSX_CTRL check is needed for cases when TSX could be disabled before
+ * the kernel boot e.g. kexec.
+ * TSX_CTRL check alone is not sufficient for cases when the microcode
+ * update is not present or running as guest that don't get TSX_CTRL.
+ */
+if (!(ia32_cap & ARCH_CAP_TAA_NO) &&
  (cpu_has(c, X86_FEATURE_RTM) ||
  (ia32_cap & ARCH_CAP_TSX_CTRL_MSR)))
+setup_force_cpu_bug(X86_BUG_TAA);
+
+/*
+ * SRBDS affects CPUs which support RDRAND or RDSEED and are listed
+ * in the vulnerability blacklist.
+ */
+if ((cpu_has(c, X86_FEATURE_RDRAND) ||
  cpu_has(c, X86_FEATURE_RDSEED)) &&
  cpu_matches(cpu_vuln_blacklist, SRBDS))
+setup_force_cpu_bug(X86_BUG_SRBD);
+
+if (cpu_matches(cpu_vuln_whitelist, NO_MELTDOWN))
+return;
+
+/* Rogue Data Cache Load? No! */
+if (ia32_cap & ARCH_CAP_RDCL_NO)
+return;
+
+setup_force_cpu_bug(X86_BUG_CPU_MELTDOWN);
+
+if (cpu_matches(cpu_vuln_whitelist, NO_L1TF))
+return;
+
+setup_force_cpu_bug(X86_BUG_L1TF);
+
+/*
+ * Do minimum CPU detection early.
+ * Fields really needed: vendor, cpuid_level, family, model, mask,
+ * @ @ -901,11 +1135,15 @@
+ memset(&c->x86_capability, 0, sizeof c->x86_capability);
+ c->extended_cpuid_level = 0;
if (!have_cpuid_p())
identify_cpu_without_cpuid(c);
/* cyrix could have cpuid enabled via c_identify()*/
if (have_cpuid_p()) {
cpu_detect(c);
get_cpu_vendor(c);
get_cpu_cap(c);
+c->x86_cache_bits = c->x86_phys_bits;
setup_force_cpu_cap(X86_FEATURE_CPUID);
}
if (this_cpu->c_early_init)
@@ -917,17 +1155,12 @@
if (this_cpu->c_bsp_init)
this_cpu->c_bsp_init(c);
} else {
-identify_cpu_without_cpuid(c);
setup_clear_cpu_cap(X86_FEATURE_CPUID);
}
setup_force_cpu_cap(X86_FEATURE_ALWAYS);
-if (c->x86_vendor != X86_VENDOR_AMD)
-setup_force_cpu_bug(X86_BUG_CPU_MELTDOWN);
-
-setup_force_cpu_bug(X86_BUG_SPECTRE_V1);
-setup_force_cpu_bug(X86_BUG_SPECTRE_V2);
+cpu_set_bug_bits(c);
fpu__init_system(c);
@@ -1037,6 +1270,8 @@
get_cpu_cap(c);
+c->x86_cache_bits = c->x86_phys_bits;
+
if (c->cpuid_level >= 0x00000001) {
c->initial_apicid = (cpuid_ebx(1) >> 24) & 0xFF;
#ifdef CONFIG_X86_32
@@ -1124,9 +1359,9 @@
int i;
c->loops_per_jiffy = loops_per_jiffy;
-c->x86_cache_size = -1;
+c->x86_cache_size = 0;
c->x86_vendor = X86_VENDOR_UNKNOWN;
c->x86_model = c->x86_mask = 0; /* So far unknown... */
c->x86_vendor_id[0] = '\0'; /* Unset */
c->x86_model_id[0] = '\0'; /* Unset */
c->x86_max_cores = 1;
#endif
enable_sep_cpu();

ttsx_init();
}

void identify_secondary_cpu(struct cpuinfo_x86 *c)
#endif
mtrr_ap_init();
validate_apic_and_package_id(c);
+x86_spec_ctrl_setup_ap();
+update_srbds_msr();
}

static __init int setup_noclflush(char *arg)
#endif
pr_cont((family: 0x%x, model: 0x%x", c->x86, c->x86_model);
-if (c->x86_mask || c->cpuid_level >= 0)
-pr_cont("", stepping: 0x%x)"
else
pr_cont("")
}
@@ -1649,11 +1888,12 @@
enter_lazy_tlb(&init_mm, curr);
/*
- * Initialize the TSS. Don't bother initializing sp0, as the initial
- * task never enters user mode.
+ * Initialize the TSS. sp0 points to the entry trampoline stack
+ * regardless of what task is running.
 */
set_tss_desc(cpu, &get_cpu_entry_area(cpu)->tss.x86_tss);
load_TR_desc();
+load_sp0((unsigned long)(cpu_entry_stack(cpu) + 1));

load_mm_ldt(&init_mm);
return 0;
}
core_initcall(init_cpu_syscore);
+
+/*
+ * The microcode loader calls this upon late microcode load to recheck features,
+ * only when microcode has been updated. Caller holds microcode_mutex and CPU
+ * hotplug lock.
+ */
+void microcode_check(void)
+
+{ struct cpuinfo_x86 info;
+  
+  perf_check_microcode();
+  
+  /* Reload CPUID max function as it might've changed. */
+  info.cpuid_level = cpuid_eax(0);
+  
+  /* Copy all capability leafs to pick up the synthetic ones so that
+    * memcmp() below doesn't fail on that. The ones coming from CPUID will
+    * get overwritten in get_cpu_cap().
+    */
+  memcpy(&info.x86_capability, &boot_cpu_data.x86_capability, sizeof(info.x86_capability));
+  
+  get_cpu_cap(&info);
+  
+  if (!memcmp(&info.x86_capability, &boot_cpu_data.x86_capability, sizeof(info.x86_capability)))
+      return;
+  
+  pr_warn("x86/CPU: CPU features have changed after loading microcode, but might not take effect.\n");
+  pr_warn("x86/CPU: Please consider either early loading through initrd/built-in or a potential BIOS update.\n");
+ }
--- linux-4.15.0.orig/arch/x86/kernel/cpu/cpu.h
+++ linux-4.15.0/arch/x86/kernel/cpu/cpu.h
@@ -45,9 +45,42 @@
extern const struct cpu_dev *const __x86_cpu_dev_start[], *const __x86_cpu_dev_end[];

+/* Copy all capability leafs to pick up the synthetic ones so that
+ * memcmp() below doesn't fail on that. The ones coming from CPUID will
+ * get overwritten in get_cpu_cap().
+ */
+memcpys (&info.x86_capability, &boot_cpu_data.x86_capability, sizeof(info.x86_capability));
+ 
+ get_cpu_cap (&info);
+ 
+ if (!memcmp (&info.x86_capability, &boot_cpu_data.x86_capability, sizeof(info.x86_capability)))
+     return;
+ 
+ pr_warn("x86/CPU: CPU features have changed after loading microcode, but might not take effect.\n");
+ pr_warn("x86/CPU: Please consider either early loading through initrd/built-in or a potential BIOS update.\n");
+ }
--- linux-4.15.0.orig/arch/x86/kernel/cpu/cpu.h
+++ linux-4.15.0/arch/x86/kernel/cpu/cpu.h
@@ -45,9 +45,42 @@
extern const struct cpu_dev *const __x86_cpu_dev_start[],
    *const __x86_cpu_dev_end[];

+ifdef CONFIG_CPU_SUP_INTEL
+enum tsx_ctrl_states {
+    TSX_CTRL_ENABLE,
+    TSX_CTRL_DISABLE,
+    TSX_CTRL_NOT_SUPPORTED,
+};
+"
unsigned int aperfmperf_get_khz(int cpu);

+extern void x86_spec_ctrl_setup_ap(void);
+extern void update_srbds_msr(void);
+
+extern u64 x86_read_arch_cap_msr(void);
+
+#endif /* ARCH_X86_CPU_H */
--- linux-4.15.0.orig/arch/x86/kernel/cpu/cpuid-deps.c
+++ linux-4.15.0/arch/x86/kernel/cpu/cpuid-deps.c
@@ -59,6 +59,9 @@
   { X86_FEATURE_AVX512_4VNNIW,X86_FEATURE_AVX512F },
   { X86_FEATURE_AVX512_4FMAPS,X86_FEATURE_AVX512F },
   { X86_FEATURE_AVX512_VPOPCNTDQ,X86_FEATURE_AVX512F },
+{ X86_FEATURE_CQM_OCCUP_LLC,X86_FEATURE_CQM_LLCC },
+{ X86_FEATURE_CQM_MBM_TOTAL,X86_FEATURE_CQM_LLCC },
+{ X86_FEATURE_CQM_MBM_LOCAL,X86_FEATURE_CQM_LLCC },
   { }
];

--- linux-4.15.0.orig/arch/x86/kernel/cpu/cyrix.c
+++ linux-4.15.0/arch/x86/kernel/cpu/cyrix.c
@@ -124,7 +124,7 @@
 [ X86_FEATURE_AVX512_4VNNIW,X86_FEATURE_AVX512F ],
 [ X86_FEATURE_AVX512_4FMAPS,X86_FEATURE_AVX512F ],
 [ X86_FEATURE_AVX512_VPOPCNTDQ,X86_FEATURE_AVX512F ],
+{ X86_FEATURE_CQM_OCCUP_LLC,X86_FEATURE_CQM_LLCC },
+{ X86_FEATURE_CQM_MBM_TOTAL,X86_FEATURE_CQM_LLCC },
+{ X86_FEATURE_CQM_MBM_LOCAL,X86_FEATURE_CQM_LLCC },
   { }
];
/* Load/Store Serialize to mem access disable (=reorder it) */
-setCx86_old(CX86_PCR0, getCx86_old(CX86_PCR0) & ~0x80);
+setCx86(CX86_PCR0, getCx86(CX86_PCR0) & ~0x80);
/* set load/store serialize from 1GB to 4GB */
ccr3 |= 0xe0;
setCx86(CX86_CCR3, ccr3);
@@ -135,11 +135,11 @@
pr_info("Enable Memory-Write-back mode on Cyrix/NSC processor.\n");

/* CCR2 bit 2: unlock NW bit */
-setCx86_old(CX86_CCR2, getCx86_old(CX86_CCR2) & ~0x04);
+setCx86(CX86_CCR2, getCx86(CX86_CCR2) & ~0x04);
/* set 'Not Write-through' */
write_cr0(read_cr0() | X86_CR0_NW);
/* CCR2 bit 2: lock NW bit and set WT1 */
-setCx86_old(CX86_CCR2, getCx86_old(CX86_CCR2) | 0x14);
+setCx86(CX86_CCR2, getCx86(CX86_CCR2) | 0x14);
}
/*
@@ -153,14 +153,14 @@
local_irq_save(flags);
*/

/* Suspend on halt power saving and enable #SUSP pin */
-setCx86_old(CX86_CCR2, getCx86_old(CX86_CCR2) | 0x88);
+setCx86(CX86_CCR2, getCx86(CX86_CCR2) | 0x88);
ccr3 = getCx86(CX86_CCR3);
setCx86(CX86_CCR3, (ccr3 & 0x0f) | 0x10); /* enable MAPEN */

/* FPU fast, DTE cache, Mem bypass */
-setCx86_old(CX86_CCR4, getCx86_old(CX86_CCR4) | 0x38);
+setCx86(CX86_CCR4, getCx86(CX86_CCR4) | 0x38);
setCx86(CX86_CCR3, ccr3); /* disable MAPEN */

set_cx86_memwb();
@@ -215,7 +215,7 @@
/* common case step number/rev -- exceptions handled below */
c->x86_model = (dir1 >> 4) + 1;
-c->x86_mask = dir1 & 0xf;
+c->x86_stepping = dir1 & 0xf;
/* Now cook; the original recipe is by Channing Corn, from Cyrix.
* We do the same thing for each generation: we work out
@@ -296,7 +296,7 @@
if (c->cpuid_level == 2) {
    /* Enable cxMMX extensions (GX1 Datasheet 54) */
    -setCx86_old(CX86_CCR7, getCx86_old(CX86_CCR7) | 1);
    +setCx86(CX86_CCR7, getCx86(CX86_CCR7) | 1);
}

if (dir1 > 7) {
    dir0_msn++; /* M II */
}

/* Enable MMX extensions (App note 108) */
-setCx86_old(CX86_CCR7, getCx86_old(CX86_CCR7)|1);
+setCx86(CX86_CCR7, getCx86(CX86_CCR7)|1);
} else {
    /* A 6x86MX - it has the bug. */
    set_cpu_bug(c, X86_BUG_COMA);
}

/* enable MAPEN */
-setCx86_old(CX86_CCR3, (ccr3 & 0x0f) | 0x10);
+setCx86(CX86_CCR3, (ccr3 & 0x0f) | 0x10);

/* enable cpuid */
-setCx86_old(CX86_CCR4, getCx86_old(CX86_CCR4) | 0x80);
+setCx86(CX86_CCR4, getCx86(CX86_CCR4) | 0x80);

/* disable MAPEN */
-setCx86(CX86_CCR3, ccr3);

local_irq_restore(flags);
--- linux-4.15.0.orig/arch/x86/kernel/cpu/intel.c
+++ linux-4.15.0/arch/x86/kernel/cpu/intel.c
@@ -102,6 +102,65 @@
    ELF_HWCAP2 |= HWCAP2_RING3MWAIT;
}

+/*
+ * Early microcode releases for the Spectre v2 mitigation were broken.
+ * Information taken from:
+ * - https://kb.vmware.com/s/article/52345
+ * - Microcode revisions observed in the wild
+ * - Release note from 20180108 microcode release
+ */
+struct sku_microcode {
+    u8 model;
+    u8 stepping;
+    u32 microcode;
+};
+static const struct sku_microcode spectre_bad_microcodes[] = {
+    { INTEL_FAM6_KABYLAKE_DESKTOP, 0x0B, 0x80 },
+    { INTEL_FAM6_KABYLAKE_DESKTOP, 0x0A, 0x80 },
+{ INTEL_FAM6_KABYLAKE_DESKTOP,0x09,0x80 },
+{ INTEL_FAM6_KABYLAKE_MOBILE,0x0A,0x80 },
+{ INTEL_FAM6_KABYLAKE_MOBILE,0x09,0x80 },
+{ INTEL_FAM6_SKYLAKE_X,0x03,0x0100013e },
+{ INTEL_FAM6_SKYLAKE_X,0x04,0x0200003c },
+{ INTEL_FAM6_BROADWELL_CORE,0x04,0x028 },
+{ INTEL_FAM6_BROADWELL_GT3E,0x01,0x1b },
+{ INTEL_FAM6_BROADWELL_XEON_D,0x02,0x14 },
+{ INTEL_FAM6_BROADWELL_XEON_D,0x03,0x07000011 },
+{ INTEL_FAM6_BROADWELL_XEON_D,0x02,0x712 },
+{ INTEL_FAM6_IVYBRIDGE_X,0x04,0x42a },
+{ INTEL_FAM6_SANDYBRIDGE_X,0x06,0x61b },
+{ INTEL_FAM6_SANDYBRIDGE_X,0x07,0x712 },
+};
+
+static bool bad_spectre_microcode(struct cpuinfo_x86 *c)
+{
+    int i;
+    
+    /*
+     * We know that the hypervisor lies to us on the microcode version so
+     * we may as well hope that it is running the correct version.
+     */
+    if (cpu_has(c, X86_FEATURE_HYPERVISOR))
+        return false;
+    +if (c->x86 != 6)
+        return false;
+    +for (i = 0; i < ARRAY_SIZE(spectre_bad_microcodes); i++) {
+        if (c->x86_model == spectre_bad_microcodes[i].model &&
+            c->x86_stepping == spectre_bad_microcodes[i].stepping)
+            +return (c->microcode <= spectre_bad_microcodes[i].microcode);
+    }
+    return false;
+}
+
+static void early_init_intel(struct cpuinfo_x86 *c)
+{
+    u64 misc_enable;
+    @@ -122,6 +181,22 @@
+        if (c->x86 >= 6 && !cpu_has(c, X86_FEATURE_IA64))
c->microcode = intel_get_microcode_revision();

+/*/ Now if any of them are set, check the blacklist and clear the lot */
+if ((cpu_has(c, X86_FEATURE_SPEC_CTRL)) ||
    + cpu_has(c, X86_FEATURE_INTEL_STIBP))
    + cpu_has(c, X86_FEATURE_IBRS) || cpu_has(c, X86_FEATURE_IBPB)) ||
    + cpu_has(c, X86_FEATURE_STIBP)) && bad_spectre_microcode(c) {
    +pr_warn("Intel Spectre v2 broken microcode detected; disabling Speculation Control\n");
    +setup_clear_cpu_cap(X86_FEATURE_IBRS);
    +setup_clear_cpu_cap(X86_FEATURE_IBPB);
    +setup_clear_cpu_cap(X86_FEATURE_STIBP);
    +setup_clear_cpu_cap(X86_FEATURE_SPEC_CTRL);
    +setup_clear_cpu_cap(X86_FEATURE_MSRSPEC_CTRL);
    +setup_clear_cpu_cap(X86_FEATURE_INTEL_STIBP);
    +setup_clear_cpu_cap(X86_FEATURE_SSB);
    +setup_clear_cpu_cap(X86_FEATURE_SPEC_CTRL_SSB);
    +}
    +
    */
    *
    * Atom erratum AAE44/AAF40/AAG38/AAH41:
    *
    @@ -130,7 +205,7 @@
    * need the microcode to have already been loaded... so if it is
    * not, recommend a BIOS update and disable large pages.
    */
    -if (c->x86 == 6 && c->x86_model == 0x1c && c->x86_mask <= 2 &&
    +if (c->x86 == 6 && c->x86_model == 0x1c && c->x86_stepping <= 2 &&
        c->microcode < 0x20e) {
        pr_warn("Atom PSE erratum detected, BIOS microcode update recommended\n");
        clear_cpu_cap(c, X86_FEATURE_PSE);
    @@ -146,7 +221,7 @@
    /* CPUID workaround for 0F33/0F34 CPU */
    if (c->x86 == 0xF && c->x86_model == 0x3
        - && (c->x86_mask == 0x3 || c->x86_mask == 0x4))
        + && (c->x86_stepping == 0x3 || c->x86_stepping == 0x4))
        c->x86_phys_bits = 36;
    */
    @@ -229,6 +304,13 @@
    }
    
    check_mpx_erratum(c);
    +
    +*/
    + * Get the number of SMT siblings early from the extended topology
    + * leaf, if available. Otherwise try the legacy SMT detection.
    + */
```c
+if (detect_extended_topology_early(c) < 0)
+detect_ht_early(c);
}

#ifdef CONFIG_X86_32
@@ -244,7 +326,7 @@
if (boot_cpu_data.x86_vendor == X86_VENDOR_INTEL &&
    boot_cpu_data.x86 == 6 &&
    boot_cpu_data.x86_model == 1 &&
-   boot_cpu_data.x86_mask < 8) {
+   boot_cpu_data.x86_stepping < 8) {
    pr_info("Pentium Pro with Errata#50 detected. Taking evasive action.\n");
    return 1;
}
@@ -261,7 +343,7 @@
/* Mask B, Pentium, but not Pentium MMX */
/*
if (c->x86 == 5 &&
-  c->x86_mask >= 1 && c->x86_mask <= 4 &&
+  c->x86_stepping >= 1 && c->x86_stepping <= 4 &&
   c->x86_model <= 3) {
/*
 * Remember we have B step Pentia with bugs
@@ -304,7 +386,7 @@
 /* SEP CPUID bug: Pentium Pro reports SEP but doesn't have it until
 * model 3 mask 3 */
 /*
idi ((c->x86<<8 | c->x86_model<<4 | c->x86_mask) < 0x633)
+if ((c->x86<<8 | c->x86_model<<4 | c->x86_stepping) < 0x633)
clear_cpu_cap(c, X86_FEATURE_SEP);
/*
@@ -322,7 +404,7 @@
 /* P4 Xeon erratum 037 workaround.
 * Hardware prefetcher may cause stale data to be loaded into the cache.
 */
- if ((c->x86 == 15) && (c->x86_model == 1) && (c->x86_mask == 1)) {
+ if ((c->x86 == 15) && (c->x86_model == 1) && (c->x86_stepping == 1)) {
  if (msr_set_bit(MSR_IA32_MISC_ENABLE,
    MSR_IA32_MISC_ENABLE_PREFETCH_DISABLE_BIT) > 0) {
    pr_info("CPU: C0 stepping P4 Xeon detected.\n");
    @ @ -337,7 +419,7 @@
   * Specification Update").
 */
 if (boot_cpu_has(X86_FEATURE_APIC) && (c->x86<<8 | c->x86_model<<4) == 0x520 &&
- (c->x86_mask < 0x6 | c->x86_mask == 0xb))
+ (c->x86_stepping < 0x6 | c->x86_stepping == 0xb))
set_cpu_bug(c, X86_BUG_11AP);
```
static int intel_num_cpu_cores(struct cpuinfo_x86 *c)
{
    unsigned int eax, ebx, ecx, edx;

    if (!IS_ENABLED(CONFIG_SMP) || c->cpuid_level < 4)
        return 1;

    /* Intel has a non-standard dependency on %ecx for this CPUID level. */
    cpuid_count(4, 0, &eax, &ebx, &ecx, &edx);
    if (eax & 0x1f)
        return (eax >> 26) + 1;
    else
        return 1;
}

static void detect_vmx_virtcap(struct cpuinfo_x86 *c)
{
    /* Intel VMX MSR indicated features */
}

static void init_intel(struct cpuinfo_x86 *c)
{
    unsigned int l2 = 0;

    early_init_intel(c);
    intel_workarounds(c);
    * let's use the legacy cpuid vector 0x1 and 0x4 for topology
    * detection.
    */
    c->x86_max_cores = intel_num_cpu_cores(c);
    detect_num_cpu_cores(c);
    #ifdef CONFIG_X86_32
    detect_ht(c);
    #endif
}

-l2 = init_intel_cacheinfo(c);
- /* Detect legacy cache sizes if init_intel_cacheinfo did not */
- if (l2 == 0) {
-     cpu_detect_cache_sizes(c);
-     l2 = c->x86_cache_size;
- }
+    init_intel_cacheinfo(c);

    if (c->cpuid_level > 9) {
        unsigned eax = cpuid_eax(10);
        @@ -543,7 +599,8 @@
        set_cpu_cap(c, X86_FEATURE_LFENCE_RDTSC);

        if (boot_cpu_has(X86_FEATURE_DS)) {
-            unsigned int l1;
+            unsigned int l1, l2;
+            rdmsr(MSR_IA32_MISC_ENABLE, l1, l2);
        if (!((l1 & (1<<11))))
            set_cpu_cap(c, X86_FEATURE_BTS);
        @ @ -571,6 +628,7 @@
            * Dixon is NOT a Celeron.
            */
        if (c->x86 == 6) {
+            unsigned int l2 = c->x86_cache_size;
            char *p = NULL;
            switch (c->x86_model) {
                @ @ -584,7 +642,7 @@
                case 6:
                    if (l2 == 128)
                        p = "Celeron (Mendocino)";
                    -else if (c->x86_mask == 0 || c->x86_mask == 5)
-                        else if (c->x86_stepping == 0 || c->x86_stepping == 5)
+                        else if (c->x86_stepping == 0 || c->x86_stepping == 5)
                    p = "Celeron-A";
                    break;
                @ @ -613,6 +671,11 @@
                    init_intel_energy_perf(c);

                    init_intel_misc_features(c);
                    +
                    +if (tsx_ctrl_state == TSX_CTRL_ENABLE)
                        tsx_enable();
                    +if (tsx_ctrl_state == TSX_CTRL_DISABLE)
                        tsx_disable();
                    }
#ifdef CONFIG_X86_32
@@ -679,6 +742,9 @@
{ 0x5d, TLB_DATA_4K, 256, " TLB_DATA 4 KByte and 4 MByte pages" },
{ 0x61, TLB_INST_4K, 48, " TLB_INST 4 KByte pages, full associative" },
{ 0x63, TLB_DATA_1G, 4, " TLB_DATA 1 GByte pages, 4-way set associative" },
+{ 0x6b, TLB_DATA_4K, 256, " TLB_DATA 4 KByte pages, 8-way associative" },
+{ 0x6c, TLB_DATA_2M, 128, " TLB_DATA 2 MByte or 4 MByte pages, 8-way associative" },
+{ 0x6d, TLB_DATA_1G, 16, " TLB_DATA 1 GByte pages, fully associative" },
{ 0x76, TLB_INST_2M, 8, " TLB_INST 2-MByte or 4-MByte pages, fully associative" },
{ 0xb0, TLB_INST_4K, 128, " TLB_INST 4 KByte pages, 4-way set associative" },
{ 0xb1, TLB_INST_2M, 4, " TLB_INST 2M pages, 4-way, 8 entries or 4M pages, 4-way entries" },
--- linux-4.15.0.orig/arch/x86/kernel/cpu/intel_rdt.c
+++ linux-4.15.0/arch/x86/kernel/cpu/intel_rdt.c
@@ -135,6 +135,40 @@
 .format_str		= "%d=%0*x",
 .fflags			= RFTYPE_RES_CACHE,
 },
+[RDT_RESOURCE_L2DATA] =
+{
+ .rid= RDTRESOURCE_L2DATA,
+ .name= "L2DATA",
+ .domains= domain_init(RDTRESOURCE_L2DATA),
+ .msr_base= IA32_L2_CBMBASE,
+ .msr_update= cat_wrmsr,
+ .cache_level= 2,
+ .cache = { 
+ .min_cbm_bits= 1,
+ .cbm_idx_mult= 2,
+ .cbm_idx_offset= 0,
+ },
+ .parse_ctrlval= parse_cbm,
+ .format_str= "%d=%0*x",
+ .fflags= RFTYPE_RES_CACHE,
+ },
+[RDT_RESOURCE_L2CODE] =
+{
+ .rid= RDTRESOURCE_L2CODE,
+ .name= "L2CODE",
+ .domains= domain_init(RDTRESOURCE_L2CODE),
+ .msr_base= IA32_L2_CBMBASE,
+ .msr_update= cat_wrmsr,
+ .cache_level= 2,
+ .cache = { 
+ .min_cbm_bits= 1,
+ .cbm_idx_mult= 2,
+ .cbm_idx_offset= 1,
+ },
+ .parse_ctrlval= parse_cbm,
.format_str = "%d=%0*x",
.fflags = RTYPE_RES_CACHE,

[RDT_RESOURCE_MBA] =
{
.rid = RDT_RESOURCE_MBA,
@@ -259,15 +293,15 @@
 r->alloc_enabled = true;
}

-static void rdt_get_cdp_l3_config(int type)
+static void rdt_get_cdp_config(int level, int type)
{
-struct rdt_resource *r_l3 = &rdt_resources_all[RDT_RESOURCE_L3];
+struct rdt_resource *r_l = &rdt_resources_all[level];
 struct rdt_resource *r = &rdt_resources_all[type];

- r->num_closid = r_l3->num_closid / 2;
- r->cache.cbm_len = r_l3->cache.cbm_len;
- r->default_ctrl = r_l3->default_ctrl;
- r->cache.shareable_bits = r_l3->cache.shareable_bits;
+ r->num_closid = r_l->num_closid / 2;
+ r->cache.cbm_len = r_l->cache.cbm_len;
+ r->default_ctrl = r_l->default_ctrl;
+ r->cache.shareable_bits = r_l->cache.shareable_bits;
 r->data_width = (r->cache.cbm_len + 3) / 4;
 r->alloc_capable = true;
/*
@@ -277,6 +311,18 @@
 r->alloc_enabled = false;
}

+static void rdt_get_cdp_l3_config(void)
+{
+ rdt_get_cdp_config(RDT_RESOURCE_L3, RDT_RESOURCE_L3DATA);
+ rdt_get_cdp_config(RDT_RESOURCE_L3, RDT_RESOURCE_L3CODE);
+}
+
+static void rdt_get_cdp_l2_config(void)
+{
+ rdt_get_cdp_config(RDT_RESOURCE_L2, RDT_RESOURCE_L2DATA);
+ rdt_get_cdp_config(RDT_RESOURCE_L2, RDT_RESOURCE_L2CODE);
+}
+
 static int get_cache_id(int cpu, int level)
{
 struct cpu_cacheinfo *ci = get_cpu_cacheinfo(cpu);
@@ -367,7 +413,7 @@
}
struct list_head *l;

if (id < 0)
    return ERR_PTR(id);
    +return ERR_PTR(-ENODEV);

list_for_each(l, &r->domains) {
    d = list_entry(l, struct rdt_domain, list);
    @ @ -486,6 +532,8 @ @
    d->id = id;
    cpumask_set_cpu(cpu, &d->cpu_mask);
          +rdt_domain_reconfigure_cdp(r);
          +
    if (r->alloc_capable && domain_setup_ctrlval(r, d)) {
        kfree(d);
        return;
    }
    if (r->mon_capable && is_mbm_enabled())
        rmdir_mondata_subdir_allrdtgrp(r, d->id);
    list_del(&d->list);
    if (is_mbm_enabled())
        rdt_domain_reconfigure_cdp(r);
    if (is_llc_occupancy_enabled() && has_busy_rmid(r, d)) {
        /*
          @ @ -645,6 +693,7 @ @
          RDT_FLAG_L3_CAT,
          RDT_FLAG_L3_CDP,
          RDT_FLAG_L2_CAT,
          +RDT_FLAG_L2_CDP,
          RDT_FLAG_MBA,
          }
        @ @ -667,6 +716,7 @ @
        RDT_OPT(RDT_FLAG_L3_CAT, "l3cat",X86_FEATURE_CAT_L3),
        RDT_OPT(RDT_FLAG_L3_CDP, "l3cdp",X86_FEATURE_CDP_L3),
        RDT_OPT(RDT_FLAG_L2_CAT, "l2cat",X86_FEATURE_CAT_L2),
        +RDT_OPT(RDT_FLAG_L2_CDP, "l2cdp",X86_FEATURE_CDP_L2),
        RDT_OPT(RDT_FLAG_MBA, "mba",X86_FEATURE_MBA),
    };
    #define NUM_RDT_OPTIONS ARRAY_SIZE(rdt_options)
    @ @ -729,15 +779,15 @ @

    if (rdt_cpu_has(X86_FEATURE_CAT_L3)) {
        rdt_get_cache_alloc_cfg(1, &rdt_resources_all[RDT_RESOURCE_L3]);
    }
    -if (rdt_cpu_has(X86_FEATURE_CDP_L3)) {
        -rdt_get_cdp_l3_config(RDT_RESOURCE_L3DATA);
if (rdt_cpu_has(X86_FEATURE_CDP_L3)) {
    rdt_get_cdp_l3_config();
    ret = true;
}

if (rdt_cpu_has(X86_FEATURE_CAT_L2)) {
    /* CPUID 0x10.2 fields are same format at 0x10.1 */
    rdt_get_cache_alloc_cfg(2, &rdt_resources_all[RDT_RESOURCE_L2]);
    if (rdt_cpu_has(X86_FEATURE_CDP_L2))
        rdt_get_cdp_l2_config();
    ret = true;
}

@@ -771,8 +821,10 @@
cache_alloc_hsw_probe();
break;
case INTEL_FAM6_SKYLAKE_X:
    -if (boot_cpu_data.x86_mask <= 4)
    +if (boot_cpu_data.x86_stepping <= 4)
        set_rdt_options("!cmt,!mbmtotal,!mbmlocal,!l3cat");
    +else
        +set_rdt_options("!l3cat");
    }

--- linux-4.15.0.orig/arch/x86/kernel/cpu/intel_rdt.h
+++ linux-4.15.0/arch/x86/kernel/cpu/intel_rdt.h
@@ -7,12 +7,15 @@
#include <linux/jump_label.h>

#define IA32_L2_QOS_CFG0xc82
+#define IA32_L3_QOS_CFG0xc81
#define IA32_L1_CBM_BASE0xc90
#define IA32_L2_CBM_BASE0xd10
#define IA32_MBA_THRTL_BASE0xd50

#define L3_QOS_CDP_ENABLE0x01ULL
+
#define L2_QOS_CDP_ENABLE0x01ULL

/*
 * Event IDs are used to program IA32_QM_EVTSEL before reading event
 * counter from IA32_QM_CTR
 @@ -357,6 +360,8 @@
 RDTRESOURCE_L3DATA,
 RDTRESOURCE_L3CODE,
 RDTRESOURCE_L2,
+RTD_RESOURCE_L2DATA,
+RTD_RESOURCE_L2CODE,
RTD_RESOURCE_MBA,

/* Must be the last */
@@ -444,5 +449,6 @@
 void cqm_handle_limbo(struct work_struct *work);
 bool has_busy_rmid(struct rdt_resource *r, struct rdt_domain *d);
 void __check_limbo(struct rdt_domain *d, bool force_free);
+void rdt_domain_reconfigure_cdp(struct rdt_resource *r);

#endif /* _ASM_X86_INTEL_RDT_H */
--- linux-4.15.0.orig/arch/x86/kernel/cpu/intel_rdt_ctrlmondata.c
+++ linux-4.15.0/arch/x86/kernel/cpu/intel_rdt_ctrlmondata.c
@@ -23,6 +23,7 @@
#define pr_fmt(fmt) KBUILD_MODNAME ": " fmt

+#include <linux/cpu.h>
#include <linux/kernfs.h>
#include <linux/seq_file.h>
#include <linux/slab.h>
@@ -236,9 +237,11 @@
 return -EINVAL;
 buf[nbytes - 1] = '\0';

+cpu_read_lock();
 rdtgrp = rdtgroup_kn_lock_live(of->kn);
 if (!rdtgrp) {
 rdtgroup_kn_unlock(of->kn);
+cpu_read_unlock();
 return -ENOENT;
 }
 rdt_last_cmd_clear();
@@ -275,6 +278,7 @@
 out:
 rdtgroup_kn_unlock(of->kn);
+cpu_read_unlock();
 return ret ?: nbytes;
 }

@@ -343,6 +347,10 @@
 int ret = 0;

 rdtgrp = rdtgroup_kn_lock_live(of->kn);
+if (!rdtgrp) {
+ret = -ENOENT;

goto out;
+
md.priv = of->kn->priv;
resid = md.u.rid;
@@ -351,7 +359,7 @@
    r = &rdt_resources_all[resid];
    d = rdt_find_domain(r, domid, NULL);
  -if (!d) {
-+} if (IS_ERR_OR_NULL(d)) {
      ret = -ENOENT;
    goto out;
  }
--- linux-4.15.0.orig/arch/x86/kernel/cpu/intel_rdt_monitor.c
+++ linux-4.15.0/arch/x86/kernel/cpu/intel_rdt_monitor.c
@@ -225,15 +225,14 @@
    list_add_tail(&entry->list, &rmid_free_lru);
 }
-+static int __mon_event_count(u32 rmid, struct rmid_read *rr)
-static u64 __mon_event_count(u32 rmid, struct rmid_read *rr)
{
  u64 chunks, shift, tval;
  struct mbm_state *m;

  tval = __rmid_read(rmid, rr->evtid);
  if (tval & (RMID_VAL_ERROR | RMID_VAL_UNAVAIL)) {
    -rr->val = tval;
-+} return tval;
  }
  switch (rr->evtid) {
    case QOS_L3_OCCUP_EVENT_ID:
      @@ -247,10 +246,10 @@
        break;
    default:
        /*
-+      - * Code would never reach here because
-+      - * an invalid event id would fail the __rmid_read.
-+      + * Code would never reach here because an invalid
-+      + * event id would fail the __rmid_read.
-+      */
-+      -return -EINVAL;
-+      +return RMID_VAL_ERROR;
    }
    if (rr->first) {

struct rdt_group *rdtgrp, *entry;
struct rmid_read *rr = info;
struct list_head *head;
+u64 ret_val;

rdtgrp = rr->rgrp;

/*
   * For Ctrl groups read data from child monitor groups.
   * For Ctrl groups read data from child monitor groups and
   * add them together. Count events which are read successfully.
   * Discard the rmid_read's reporting errors.
   */
head = &rdtgrp->mon.crdtgrp_list;

if (rdtgrp->type == RDTCTRL_GROUP) {
    list_for_each_entry(entry, head, mon.crdtgrp_list) {
+if (__mon_event_count(entry->mon.rmid, rr) == 0)
     +ret_val = 0;
    }
}
+
+/* Report error if none of rmid_reads are successful */
+if (ret_val)
+rr->val = ret_val;
}

static void mbm_update(struct rdt_domain *d, int rmid)
--- linux-4.15.0.orig/arch/x86/kernel/cpu/intel_rdt_rdtgroup.c
+++ linux-4.15.0/arch/x86/kernel/cpu/intel_rdt_rdtgroup.c
@@ -146,6 +146,7 @@
int ret;

kn = __kernfs_create_file(parent_kn, rft->name, rft->mode,
+GLOBAL_ROOT_UID, GLOBAL_ROOT_GID,
    0, rft->kf_ops, rft, NULL, NULL);
if (IS_ERR(kn))
    return PTR_ERR(kn);
@@ -428,85 +429,88 @@
return ret ?: nbytes;
}
struct task_move_callback {
    struct callback_head work;
    struct rdtgroup *rdtgrp;
};

static void move_myself(struct callback_head *head)
/**
 * rdtgroup_remove - the helper to remove resource group safely
 * @rdtgrp: resource group to remove
 *
 * On resource group creation via a mkdir, an extra kernfs node reference is
 * taken to ensure that the rdtgroup structure remains accessible for the
 * rdtgroup_kn_unlock() calls where it is removed.
 *
 * Drop the extra reference here, then free the rdtgroup structure.
 *
 * Return: void
 */
static void rdtgroup_remove(struct rdtgroup *rdtgrp)
{
    struct task_move_callback *callback;
    struct rdtgroup *rdtgrp;

    callback = container_of(head, struct task_move_callback, work);
    rdtgrp = callback->rdtgrp;
    kernfs_put(rdtgrp->kn);
    kfree(rdtgrp);
}

static void _update_task_closid_rmid(void *task)
{
    /* If resource group was deleted before this task work callback
       was invoked, then assign the task to root group and free the
       resource group.
       If the task is still current on this CPU, update PQR_ASSOC MSR.
       Otherwise, the MSR is updated when the task is scheduled in.
    */
    if (atomic_dec_and_test(&rdtgrp->waitcount) &&
        (rdtgrp->flags & RDT_DELETED)) {
        current->closid = 0;
        current->rmid = 0;
        kfree(rdtgrp);
    }
    preempt_disable();
    /* update PQR_ASSOC MSR to make resource group go into effect */
}
-intel_rdt_sched_in();
-preempt_enable();
+if (task == current)
+intel_rdt_sched_in();
+
-kfree(callback);
+static void update_task_closid_rmid(struct task_struct *t)
+{
+if (IS_ENABLED(CONFIG_SMP) && task_curr(t))
+smp_call_function_single(task_cpu(t), _update_task_closid_rmid, t, 1);
+else
+_update_task_closid_rmid(t);
}

static int __rdtgroup_move_task(struct task_struct *tsk, struct rdtgroup *rdtgrp)
{
-struct task_move_callback *callback;
-int ret;
-
-callback = kzalloc(sizeof(*callback), GFP_KERNEL);
-if (!callback)
-return -ENOMEM;
-callback->work.func = move_myself;
-callback->rdtgrp = rdtgrp;
+/* If the task is already in rdtgrp, no need to move the task. */
+if ((rdtgrp->type == RDTCTRL_GROUP && tsk->closid == rdtgrp->closid &&
+ tsk->rmid == rdtgrp->mon.rmid) ||
+ (rdtgrp->type == RDTMON_GROUP && tsk->rmid == rdtgrp->mon.rmid &&
+ tsk->closid == rdtgrp->mon.parent->closid))
+return 0;

/*
- * Take a refcount, so rdtgrp cannot be freed before the
- * callback has been invoked.
+ * Set the task's closid/rmid before the PQR_ASSOC MSR can be
+ * updated by them.
+ *
+ * For ctrl_mon groups, move both closid and rmid.
+ * For monitor groups, can move the tasks only from
+ * their parent CTRL group.
+ */
-atomic_inc(&rdtgrp->waitcount);
-ret = task_work_add(tsk, &callback->work, true);
-if (ret) {
-/*
- * Task is exiting. Drop the refcount and free the callback.
+ */

- * No need to check the refcount as the group cannot be
- * deleted before the write function unlocks rdtgroup_mutex.
- */
-atomic_dec(&rdtgrp->waitcount);
-kfree(callback);
-rdt_last_cmd_puts("task exited\n");
-} else {
-/*
- * For ctrl_mon groups move both closid and rmid.
- * For monitor groups, can move the tasks only from
- * their parent CTRL group.
- */
-if (rdtgrp->type == RDTCTRL_GROUP) {
-tsk->closid = rdtgrp->closid;
+
+if (rdtgrp->type == RDTCTRL_GROUP) {
+tsk->closid = rdtgrp->closid;
+tsk->rmid = rdtgrp->mon.rmid;
+} else if (rdtgrp->type == RDTMON_GROUP) {
+if (rdtgrp->mon.parent->closid == tsk->closid) {
+tsk->rmid = rdtgrp->mon.rmid;
-} else if (rdtgrp->type == RDTMON_GROUP) {
-} else if (rdtgrp->type == RDTMON_GROUP) {
-tsk->rmid = rdtgrp->mon.rmid;
-} else {
-rdt_last_cmd_puts("Can't move task to different control group\n");
-re = -EINVAL;
-}
+} else {
+rdt_last_cmd_puts("Can't move task to different control group\n");
+return -EINVAL;
}
-ret;
+/*
+ * Ensure the task's closid and rmid are written before determining if
+ * the task is current that will decide if it will be interrupted.
+ */
+barrier();
+
+/*
+ * By now, the task's closid and rmid are set. If the task is current
+ * on a CPU, the PQR_ASSOC MSR needs to be updated to make the resource
+ * group go into effect. If the task is not current, the MSR will be
+ * updated when the task is scheduled in.
+ */
+update_task_closid_rmid(tsk);
+return 0;
}

static int rdtgroup_task_write_permission(struct task_struct *task,
@@ -894,7 +898,6 @@
if (IS_ERR(kn_subdir))
  return PTR_ERR(kn_subdir);
-kernfs_get(kn_subdir);
  ret = rdtgroup_kn_set_ugid(kn_subdir);
  if (ret)
    return ret;
@@ -917,7 +920,6 @@
  kn_info = kernfs_create_dir(parent_kn, "info", parent_kn->mode, NULL);
  if (IS_ERR(kn_info))
    return PTR_ERR(kn_info);
-kernfs_get(kn_info);
  ret = rdtgroup_add_files(kn_info, RF_TOP_INFO);
  if (ret)
@@ -938,12 +940,6 @@
goto out_destroy;
  }
-/*
- * This extra ref will be put in kernfs_remove() and guarantees
- * that @rdtgrp->kn is always accessible.
- */
-kernfs_get(kn_info);
- ret = rdtgroup_kn_set_ugid(kn_info);
- goto out_destroy;
  }
@@ -972,12 +968,6 @@
  if (dest_kn)
    *dest_kn = kn;
-/*
- * This extra ref will be put in kernfs_remove() and guarantees
- * that @rdtgrp->kn is always accessible.
- */
-kernfs_get(kn);
- ret = rdtgroup_kn_set_ugid(kn);
- goto out_destroy;
@@ -990,6 +980,7 @@
kernfs_remove(kn);
return ret;
}+
static void l3_qos_cfg_update(void *arg)
{
bool *enable = arg;
@@ -997,8 +988,17 @@
wrmsrl(IA32_L3_QOS_CFG, *enable ? L3_QOS_CDP_ENABLE : 0ULL);
}

-static int set_l3_qos_cfg(struct rdt_resource *r, bool enable)
+static void l2_qos_cfg_update(void *arg)
{
+bool *enable = arg;
+
+wrmsrl(IA32_L2_QOS_CFG, *enable ? L2_QOS_CDP_ENABLE : 0ULL);
+
+}
+
+static int set_cache_qos_cfg(int level, bool enable)
+
+{ void (*update)(void *arg);
+struct rdt_resource *r_l;
+cpumask_var_t cpu_mask;
+struct rdt_domain *d;
+int cpu;
+@@ -1006,16 +1006,24 @@
+if (!zalloc_cpumask_var(&cpu_mask, GFP_KERNEL))
+return -ENOMEM;
+if (level == RDT_RESOURCE_L3)
+update = l3_qos_cfg_update;
+else if (level == RDT_RESOURCE_L2)
+update = l2_qos_cfg_update;
+else
+return -EINVAL;
+
+r_l = &rdt_resources_all[level];
+list_for_each_entry(d, &r_l->domains, list) {
+ /* Pick one CPU from each domain instance to update MSR */
+cpumask_set_cpu(cpumask_any(&d->cpu_mask), cpu_mask);
+}
+cpu = get_cpu();
+*/ Update QOS_CFG MSR on this cpu if it's in cpu_mask. */
+if (cpumask_test_cpu(cpu, cpu_mask))
+l3_qos_cfg_update(&enable);
+update(&enable);
/* Update QOS_CFG MSR on all other cpus in cpu_mask. */
-smp_call_function_many(cpu_mask, l3_qos_cfg_update, &enable, 1);
+smp_call_function_many(cpu_mask, update, &enable, 1);
put_cpu();

free_cpumask_var(cpu_mask);
@@ -1023,52 +1031,99 @@
return 0;
}

-static int cdp_enable(void)
+static int cdp_enable(int level, int data_type, int code_type)
 {
 -struct rdt_resource *r_l3data = &rdt_resources_all[RDT_RESOURCE_L3DATA];
 -struct rdt_resource *r_l3code = &rdt_resources_all[RDT_RESOURCE_L3CODE];
 -struct rdt_resource *r_l3 = &rdt_resources_all[RDT_RESOURCE_L3];
 +struct rdt_resource *r_ldata = &rdt_resources_all[data_type];
 +struct rdt_resource *r_lcode = &rdt_resources_all[code_type];
 +struct rdt_resource *r_l = &rdt_resources_all[level];
 int ret;

 -if (!r_l3->alloc_capable || !r_l3data->alloc_capable ||
 - r_l3code->alloc_capable)
 +if (!r_l->alloc_capable || !r_ldata->alloc_capable ||
 + !r_lcode->alloc_capable)
 return -EINVAL;

 -ret = set_l3_qos_cfg(r_l3, true);
 +ret = set_cache_qos_cfg(level, true);
 if (!ret) {
 - r_l3->alloc_enabled = false;
 - r_l3data->alloc_enabled = true;
 - r_l3code->alloc_enabled = true;
 + r_l->alloc_enabled = false;
 + r_ldata->alloc_enabled = true;
 + r_lcode->alloc_enabled = true;
 }
 return ret;
}

-static void cdp_disable(void)
+static int cdpl3_enable(void)
+{
+return cdp_enable(RDT_RESOURCE_L3, RDT_RESOURCE_L3DATA,
 + RDT_RESOURCE_L3CODE);
+}
+
+static int cdpl2_enable(void)
return cdp_enable(RDT_RESOURCE_L2, RDT_RESOURCE_L2DATA, RDT_RESOURCE_L2CODE);
}

static void cdp_disable(int level, int data_type, int code_type)
{
    struct rdt_resource *r = &rdt_resources_all[level];
    r->alloc_enabled = r->alloc_capable;

    if (rdt_resources_all[data_type].alloc_enabled) {
        rdt_resources_all[data_type].alloc_enabled = false;
        rdt_resources_all[code_type].alloc_enabled = false;
        set_cache_qos_cfg(level, false);
    }
}

static void cdpl3_disable(void)
{
    cdp_disable(RDT_RESOURCE_L3, RDT_RESOURCE_L3DATA, RDT_RESOURCE_L3CODE);
}

static void cdpl2_disable(void)
{
    cdp_disable(RDT_RESOURCE_L2, RDT_RESOURCE_L2DATA, RDT_RESOURCE_L2CODE);
}

static void cdp_disable_all(void)
{
    if (rdt_resources_all[RDT_RESOURCE_L3DATA].alloc_enabled)
        cdpl3_disable();
    if (rdt_resources_all[RDT_RESOURCE_L2DATA].alloc_enabled)
        cdpl2_disable();
}

static int parse_rdtgroupfs_options(char *data)
{
    char *token, *o = data;
    int ret = 0;

    while ((token = strsep(&o, ",")) != NULL) {
        if (!*token) {  

-return -EINVAL;
+if (!token) {
+ret = -EINVAL;
+goto out;
+}

-if (!strcmp(token, "cdp"))
-ret = cdp_enable();
+if (!strcmp(token, "cdp")) {
+ret = cdpl3_enable();
+if (ret)
+goto out;
+} else if (!strcmp(token, "cdpl2")) {
+ret = cdpl2_enable();
+if (ret)
+goto out;
+} else {
+ret = -EINVAL;
+goto out;
+}
}

+return 0;
+
+out:
+pr_err("Invalid mount option \"%s\n", token);
+
+return ret;
}

@@ -1129,8 +1184,7 @@
if (atomic_dec_and_test(&rdtgrp->waitcount) &&
    (rdtgrp->flags & RDT_DELETED)) {
    kernfs_unbreak_active_protection(kn);
-    kernfs_put(rdtgrp->kn);
-    kfree(rdtgrp);
+    rdtgroup_remove(rdtgrp);
 } else {
    kernfs_unbreak_active_protection(kn);
 }
@@ -1175,13 +1229,12 @@
if (rdt_mon_capable) {
 ret = mongroup_create_dir(rdtgroup_default.kn,
 - NULL, "mon_groups",
+
 &rdtgroup_default, "mon_groups",
 &kn_mongrp);
 if (ret) {
dentry = ERR_PTR(ret);
goto out_info;
}
-kernfs_get(kn_mongrp);

ret = mkdir_mondata_all(rdtgroup_default.kn, &rdtgroup_default, &kn_mondata);
@@ -1189,7 +1242,6 @@
dentry = ERR_PTR(ret);
goto out_mongrp;
}
-kernfs_get(kn_mondata);
rdtgroup_default.mon.mon_data_kn = kn_mondata;
}

@@ -1223,7 +1275,7 @@
out_info:
kernfs_remove(kn_info);
out_cdp:
- cdp_disable();
+ cdp_disable_all();
out:
rdt_last_cmd_clear();
mutex_unlock(&rdtgroup_mutex);
@@ -1329,7 +1381,11 @@
list_for_each_entry_safe(sentry, stmp, head, mon.crdtgrp_list) {
  free_rmid(sentry->mon.rmid);
  list_del(&sentry->mon.crdtgrp_list);
  -kfree(sentry);
+  +if (atomic_read(&sentry->waitcount) != 0)
+  +sentry->flags = RDT_DELETED;
+else
+  +rdtgroup_remove(sentry);
  }
}

@@ -1363,7 +1419,11 @@
kernfs_remove(rdtgrp->kn);
list_del(&rdtgrp->rdtgroup_list);
-kfree(rdtgrp);
+  +if (atomic_read(&rdtgrp->waitcount) != 0)
+  +rdtgrp->flags = RDT_DELETED;
+else
+  +rdtgroup_remove(rdtgrp);
  }
/* Notify online CPUs to update per cpu storage and PQR_ASSOC MSR */
update_closid_rmid(cpu_online_mask, &rdtgroup_default);
@ @ -1383,7 +1443,7 @@
/*Put everything back to default values. */
for_each_alloc_enabled_rdt_resource(r)
    reset_all_ctrls(r);
-cdp_disable();
+cdp_disable_all();
    rmdir_all_sub();
    static_branch_disable_cpuslocked(&rdt_alloc_enable_key);
    static_branch_disable_cpuslocked(&rdt_mon_enable_key);
    @ @ -1405,7 +1465,8 @@
struct kernfs_node *kn;
    int ret = 0;

    -kn = __kernfs_create_file(parent_kn, name, 0444, 0,
+kn = __kernfs_create_file(parent_kn, name, 0444,
    + GLOBAL_ROOT_UID, GLOBAL_ROOT_GID, 0,
    &kf_mondata_ops, priv, NULL, NULL);
    if (IS_ERR(kn))
        return PTR_ERR(kn);
    @ @ -1457,11 +1518,6 @@
    if (IS_ERR(kn))
        return PTR_ERR(kn);

    /*
    - * This extra ref will be put in kernfs_remove() and guarantees
    - * that kn is always accessible.
    - */
    -kernfs_get(kn);
    ret = rdtgroup_kn_set_ugid(kn);
    if (ret)
        goto out_destroy;
    @ @ -1560,7 +1616,7 @@
    /*
    * Create the mon_data directory first.
    */
    -ret = mongroup_create_dir(parent_kn, NULL, "mon_data", &kn);
    +ret = mongroup_create_dir(parent_kn, prgrp, "mon_data", &kn);
    if (ret)
        return ret;

    @ @ -1594,7 +1650,7 @@
    uint files = 0;
    int ret;

    -prdtgrp = rdtgroup_kn_lock_live(prgrp_kn);
    +prdtgrp = rdtgroup_kn_lock_live(parent_kn);
rdt_last_cmd_clear();
if (!prdgrp) {
    ret = -ENODEV;
}

/*
 * kernfs_remove() will drop the reference count on "kn" which
 * will free it. But we still need it to stick around for the
 * rdtgroup_kn_unlock() call below. Take one extra reference
 * here, which will be dropped inside rdtgroup_kn_unlock().
 * rdtgroup_kn_unlock() call. Take one extra reference here,
 * which will be dropped by kernfs_put() in rdtgroup_remove().
 */
kernfs_get(kn);

/*
 * The caller unlocks the prgrp_kn upon success.
 * The caller unlocks the parent_kn upon success.
 */
return 0;

out_idfree:
free_rmid(rdtgrp->mon.rmid);
out_destroy:
+kernfs_put(rdtgrp->kn);
  kernfs_remove(rdtgrp->kn);
out_free_rgrp:
kfree(rdtgrp);
out_unlock:
-rdtgroup_kn_unlock(prgrp_kn);
+rdtgroup_kn_unlock(parent_kn);
return ret;
}

/*
 * The caller unlocks the prgrp_kn upon success.
 * The caller unlocks the parent_kn upon success.
 */
return 0;

out_idfree:
free_rmid(rdtgrp->mon.rmid);
out_destroy:
+kernfs_put(rdtgrp->kn);
  kernfs_remove(rdtgrp->kn);
out_free_rgrp:
kfree(rdtgrp);
out_unlock:
-rdtgroup_kn_unlock(prgrp_kn);
+rdtgroup_kn_unlock(parent_kn);
return ret;
}

/*
 * The caller unlocks the prgrp_kn upon success.
 * The caller unlocks the parent_kn upon success.
 */
return 0;

list_add_tail(&rdtgrp->mon.crdtgrp_list, &prgrp->mon.crdtgrp_list);
- rdtgroup_kn_unlock(prgrp_kn);
+ rdtgroup_kn_unlock(parent_kn);
  return ret;
}

@@ -1739,6 +1796,7 @@
goto out_common_fail;
}
closid = ret;
+ret = 0;

rdtgr->closid = closid;
list_add(&rdtgr->rdtgroup_list, &rdt_all_groups);
@@ -1748,7 +1806,7 @@
  * Create an empty mon_groups directory to hold the subset
  * of tasks and cpus to monitor.
  */
- ret = mongroup_create_dir(kn, NULL, "mon_groups", NULL);
+ ret = mongroup_create_dir(kn, rdtgr, "mon_groups", NULL);
if (ret) {
  rdt_last_cmd_puts("kernfs subdir error\n");
goto out_id_free;
@@ -1763,10 +1821,23 @@
out_common_fail:
  mkdir_rdt_prepare_clean(rdtgr);
out_unlock:
- rdtgroup_kn_unlock(prgrp_kn);
+ rdtgroup_kn_unlock(parent_kn);
  return ret;
}

+ /* Restore the qos cfg state when a domain comes online */
+ void rdt_domain_reconfigure_cdp(struct rdt_resource *r)
+ {
+ if (!r->alloc_capable)
+ return;
+ +
+ if (r == &rdt_resources_all[RDTRESOURCE_L2DATA])
+ l2_qos_cfg_update(&r->alloc_enabled);
+ +
+ if (r == &rdt_resources_all[RDTRESOURCE_L3DATA])
+ l3_qos_cfg_update(&r->alloc_enabled);
+ +
+ /*
* We allow creating mon groups only with in a directory called "mon_groups"
* which is present in every ctrl_mon group. Check if this is a valid
WARN_ON(list_empty(&prdtgrp->mon.crdtgrp_list));
list_del(&rdtgrp->mon.crdtgrp_list);

+kernfs_remove(rdtgrp->kn);
+
/*
 - * one extra hold on this, will drop when we kfree(rdtgrp)
 - * in rdtgroup_kn_unlock()
 + * Free all the child monitor group rmids.
 */
-kernfs_get(kn);
-kernfs_remove(rdtgrp->kn);
+free_all_child_rdtgrp(rdtgrp);

return 0;
}

-/*
 - * Free all the child monitor group rmids.
 - */
-free_all_child_rdtgrp(rdtgrp);
-
list_del(&rdtgrp->rdtgroup_list);

-/*
 - * one extra hold on this, will drop when we kfree(rdtgrp)
 - * in rdtgroup_kn_unlock()
 - */
-kernfs_get(kn);
kernfs_remove(rdtgrp->kn);

return 0;

/*
 * If the rdtgroup is a mon group and parent directory
 * is a valid "mon_groups" directory, remove the mon group.
 */
-if (rdtgrp->type == RDTCTRL_GROUP && parent_kn == rdtgroup_default.kn)
+if (rdtgrp->type == RDTCTRL_GROUP && parent_kn == rdtgroup_default.kn &&
+    rdtgrp != &rdtgroup_default)
ret = rdtgroup_rmdir_ctrl(kn, rdtgrp, tmpmask);
else if (rdtgrp->type == RDTMON_GROUP &&
    is_mon_groups(parent_kn, kn->name))
--- linux-4.15.0.orig/arch/x86/kernel/cpu/match.c
+++ linux-4.15.0/arch/x86/kernel/cpu/match.c
const struct x86_cpu_id *m;
struct cpuinfo_x86 *c = &boot_cpu_data;

for (m = match; m->vendor | m->family | m->model | m->feature; m++) {
    for (m = match;
         m->vendor | m->family | m->model | m->steppings | m->feature;
         m++) {
        if (m->vendor != X86_VENDOR_ANY && c->x86_vendor != m->vendor)
            continue;
        if (m->family != X86_FAMILY_ANY && c->x86 != m->family)
            continue;
        if (m->model != X86_MODEL_ANY && c->x86_model != m->model)
            continue;
        if (m->steppings != X86_STEPPING_ANY &&
            !(BIT(c->x86_stepping) & m->steppings))
            continue;
        if (m->feature != X86_FEATURE_ANY && !cpu_has(c, m->feature))
            continue;
        return m;
    }
}

if (filter_mce(mce))
    return -EINVAL;

if (!mce_evt_pool)
    return -EINVAL;

static struct mce i_mce;
static struct dentry *dfs_inj;

static u8 n_banks;
-

#define MAX_FLAG_OPT_SIZE 3
#define MAX_FLAG_OPT_SIZE 4
#define NBCFG 0x44

enum injection_type {
    @ @ -108,6 +106,9 @ @
    memset(m, 0, sizeof(struct mce));

--- linux-4.15.0.orig/arch/x86/kernel/cpu/mcheck/mce-inject.c
+++ linux-4.15.0/arch/x86/kernel/cpu/mcheck/mce-inject.c
@@ -46,9 +46,7 @@
    static struct mce i_mce;
    static struct dentry *dfs_inj;

-#define MAX_FLAG_OPT_SIZE3
+#define MAX_FLAG_OPT_SIZE4

enum injection_type {
    @ @ -108,6 +106,9 @ @
m->cpuvendor = boot_cpu_data.x86_vendor;
+m->time = ktime_get_real_seconds();
+m->cpuid = cpuid_eax(1);
+m->microcode = boot_cpu_data.microcode;
}

/* Update fake mce registers on current CPU. */
@@ -517,7 +518,7 @@
    /* Update fake mce registers on current CPU. */
    if (inj_type == DFR_INT_INJ) {
      i_mce.status |= MCI_STATUS_DEFERRED;
-    i_mce.status &= (i_mce.status & ~MCI_STATUS_UC);
+    i_mce.status &= ~MCI_STATUS_UC;
      }

    /* Get bank count on target CPU so we can handle non-uniform values. */
    +rdmsrl_on_cpu(m->extcpu, MSR_IA32_MCG_CAP, &cap);
    +n_banks = cap & MCG_BANKCNT_MASK;
    if (val >= n_banks) {
      -pr_err("Non-existent MCE bank: %llu\n", val);
      +pr_err("MCA bank %llu non-existent on CPU%d\n", val, m->extcpu);
      return -EINVAL;
    }

    m->bank = val;
    do_inject();

    /* Reset injection struct */
    +setup_inj_struct(&i_mce);
    +return 0;
  }

  /* Initialize debugfs */
  static int __init debugfs_init(void)
  {
    unsigned int i;
    -u64 cap;
    -

- rdmsrl(MSR_IA32_MCG_CAP, cap);
- n_banks = cap & MCG_BANKCNT_MASK;

dfs_inj = debugfs_create_dir("mce-inject", NULL);
if (!dfs_inj)
--- linux-4.15.0.orig/arch/x86/kernel/cpu/mcheck/mce-internal.h
+++ linux-4.15.0/arch/x86/kernel/cpu/mcheck/mce-internal.h
@@ -115,4 +115,28 @@
 extern struct mca_config mca_cfg;

+#ifndef CONFIG_X86_64
+/*
+ * On 32-bit systems it would be difficult to safely unmap a poison page
+ * from the kernel 1:1 map because there are no non-canonical addresses that
+ * we can use to refer to the address without risking a speculative access.
+ * However, this isn't much of an issue because:
+ * 1) Few unmappable pages are in the 1:1 map. Most are in HIGHMEM which
+ * are only mapped into the kernel as needed
+ * 2) Few people would run a 32-bit kernel on a machine that supports
+ * recoverable errors because they have too much memory to boot 32-bit.
+ */
+static inline void mce_unmap_kpfn(unsigned long pfn) {}
+#define mce_unmap_kpfn mce_unmap_kpfn
+#endif
+
+/* Decide whether to add MCE record to MCE event pool or filter it out. */
+extern bool filter_mce(struct mce *m);
+
+#ifdef CONFIG_X86_MCE_AMD
+extern bool amd_filter_mce(struct mce *m);
+#else
+static inline bool amd_filter_mce(struct mce *m) { return false; ];
+#endif
+
+/*__X86_MCE_INTERNAL_H__ */
--- linux-4.15.0.orig/arch/x86/kernel/cpu/mcheck/mce-severity.c
+++ linux-4.15.0/arch/x86/kernel/cpu/mcheck/mce-severity.c
@@ -143,6 +143,16 @@
	MCESEV(
		PANIC, "Data load in unrecoverable area of kernel",
		SER, MASK(MCI_STATUS_OVER|MCI_UC_SAR|MCI_ADDR|MCACOD,
		MCI_UC_SAR|MCI_ADDR|MCACOD_DATA),
		KERNEL

MCESEV(PANIC, "Instruction fetch error in kernel",
MCESEV(PANIC, "Action required: unknown MCACOD",
--- linux-4.15.0.orig/arch/x86/kernel/cpu/mcheck/mce.c
+++ linux-4.15.0/arch/x86/kernel/cpu/mcheck/mce.c
@@ -57,6 +57,9 @@
 static DEFINE_MUTEX(mce_log_mutex);
+/* sysfs synchronization */
+static DEFINE_MUTEX(mce_sysfs_mutex);
+
+define CREATE_TRACE_POINTS
#include <trace/events/mce.h>

@@ -106,6 +109,10 @@
 static void (*quirk_no_way_out)(int bank, struct mce *m, struct pt_regs *regs);
+ifndef mce_unmap_kpfn
+static void mce_unmap_kpfn(unsigned long pfn);
+endif
+
+ /*
+ * CPU/chipset specific EDAC code can register a notifier call here to print
+ * MCE errors in a human-readable form.
+ @@ -127,6 +134,8 @@
+ if (this_cpu_has(X86_FEATURE_INTEL_PPIN))
+ rdmsrl(MSR_PPIN, m->ppin);
+ +m->microcode = boot_cpu_data.microcode;
+ }

 DEFINE_PER_CPU(struct mce, injectm);
@@ -259,7 +268,7 @@/*
+pr_emerg(HW_ERR "PROCESSOR %u:%x TIME %llu SOCKET %u APIC %x microcode %x\n",
+ m->cpuvendor, m->cpuid, m->time, m->socketid, m->apicid,
+ -cpu_data(m->extcpu).microcode);
+ m->microcode);
static void print_mce(struct mce *m)
@@ -582,7 +591,8 @@
 if (mce_usable_address(mce) && (mce->severity == MCE_AO_SEVERITY)) {
     pfn = mce->addr >> PAGE_SHIFT;
     memory_failure(pfn, MCE VECTOR, 0);
+    if (memory_failure(pfn, MCE VECTOR, 0))
+        mce_unmap_kpfn(pfn);
 }

 return NOTIFY_OK;
@@ -693,19 +703,49 @@

 barrier();
 m.status = mce_rdmsrl(msr_ops.status(i));
+
+/* If this entry is not valid, ignore it */
 if (!(m.status & MCI_STATUS_VAL))
     continue;

 /*
 - * Uncorrected or signalled events are handled by the exception
 - * handler when it is enabled, so don't process those here.
 - *
 - * TBD do the same check for MCI_STATUS_EN here?
 + * If we are logging everything (at CPU online) or this
 + * is a corrected error, then we must log it.
 + */
- if (!(flags & MCP UC) &&
-     (m.status & (mca_cfg.ser ? MCI STATUS_S : MCI STATUS UC)))
-     continue;
+ if ((flags & MCP UC) || !(m.status & MCI_STATUS UC))
+     goto log_it;
+
+/*
+ * Newer Intel systems that support software error
+ * recovery need to make additional checks. Other
+ * CPUs should skip over uncorrected errors, but log
+ * everything else.
+ */
+ if (!mca_cfg.ser) {
+     if (m.status & MCI_STATUS UC)
+         continue;
+     goto log_it;
+ }
+ /*
+ * If this entry is not valid, ignore it
+ */
+ if (mce_usable_address(mce) && (mce->severity == MCE_AO_SEVERITY)) {
+     pfn = mce->addr >> PAGE_SHIFT;
+     memory_failure(pfn, MCE VECTOR, 0);
+     if (memory_failure(pfn, MCE VECTOR, 0))
+         mce_unmap_kpfn(pfn);
+ }

 return NOTIFY_OK;
/* Log "not enabled" (speculative) errors */
+if (!(m.status & MCI_STATUS_EN))
+goto log_it;
+
+/*
+ * Log UCNA (SDM: 15.6.3 "UCR Error Classification")
+ * UC == 1 && PCC == 0 && S == 0
+ */
+if (!(m.status & MCI_STATUS_PCC) && !(m.status & MCI_STATUS_S))
+goto log_it;
+
+/*
+ * Skip anything else. Presumption is that our read of this
+ * bank is racing with a machine check. Leave the log alone
+ * for do_machine_check() to deal with it.
+ */
+continue;
+
+log_it:
error_seen = true;

mce_read_aux(&m, i);
@@ -752,23 +792,26 @@
static int mce_no_way_out(struct mce *m, char **msg, unsigned long *validp,
 struct pt_regs *regs)
{
 -int i, ret = 0;
 char *tmp;
 +int i;
 for (i = 0; i < mca_cfg.banks; i++) {
 m->status = mce_rdmsrl(msr_ops.status(i));
 -if (m->status & MCI_STATUS_VAL) {
-__set_bit(i, validp);
- if (quirk_no_way_out)
-quirk_no_way_out(i, m, regs);
- }
+if (!(m->status & MCI_STATUS_VAL))
+continue;
 +
 +__set_bit(i, validp);
+ if (quirk_no_way_out)
+quirk_no_way_out(i, m, regs);
+
+m->bank = i;
 if (mce_severity(m, mca_cfg.tolerant, &tmp, true) >= MCE_PANIC_SEVERITY) {
 +mce_read_aux(m, i);
 *msg = tmp;
- ret = 1;
+ ret = 1;
} }
- return ret;
+ return 0;
}

/*
 @@ -1049,12 +1092,13 @@
  ret = memory_failure(m->addr >> PAGE_SHIFT, MCE_VECTOR, flags);
 if (ret)
  pr_err("Memory error not recovered");
+else
+ mce_unmap_kpfn(m->addr >> PAGE_SHIFT);
 return ret;
 }

-#if defined(arch_unmap_kpfn) && defined(CONFIG_MEMORY_FAILURE)
- 
- void arch_unmap_kpfn(unsigned long pfn)
+ifndef mce_unmap_kpfn
+static void mce_unmap_kpfn(unsigned long pfn)
{ 
 unsigned long decoy_addr;

@@ -1065,7 +1109,7 @@
 * We would like to just call:
 * set_memory_np((unsigned long)pfn_to_kaddr(pfn), 1);
 * but doing that would radically increase the odds of a
- * speculative access to the posion page because we'd have
+ * speculative access to the poison page because we'd have
 * the virtual address of the kernel 1:1 mapping sitting
 * around in registers.
 * Instead we get tricky. We create a non-canonical address
@@ -1090,7 +1134,6 @@
 if (set_memory_np(decoy_addr, 1))
 pr_warn("Could not invalidate pfn=0x%lx from 1:1 map\n", pfn);
- }
+ #endif

@@ -1197,13 +1240,18 @@
 lmce = m.mcgstatus & MCG_STATUS_LMCES;

 /*
+ * Local machine check may already know that we have to panic.

Broadcast machine check begins rendezvous in mce_start()
* Go through all banks in exclusion of the other CPUs. This way we
* don't report duplicated events on shared banks because the first one
- * to see it will clear it. If this is a Local MCE, then no need to
- * perform rendezvous.
+ * to see it will clear it.
*/
-if (!lmce)
+if (lmce) {
+if (no_way_out)
+mce_panic("Fatal local machine check", &m, msg);
+} else {
order = mce_start(&no_way_out);
+
}

for (i = 0; i < cfg->banks; i++) {
__clear_bit(i, toclear);
@@ -1279,12 +1327,17 @@
no_way_out = worst >= MCE_PANIC_SEVERITY;
} else {
/*
- * Local MCE skipped calling mce_reign()
- * If we found a fatal error, we need to panic here.
- */
- if (worst >= MCE_PANIC_SEVERITY && mca_cfg.tolerant < 3)
-mce_panic("Machine check from unknown source",
-NULL, NULL);
+ * If there was a fatal machine check we should have
+ * already called mce_panic earlier in this function.
+ * Since we re-read the banks, we might have found
+ * something new. Check again to see if we found a
+ * fatal error. We call "mce_severity()" again to
+ * make sure we have the right "msg".
+ */
+if (worst >= MCE_PANIC_SEVERITY && mca_cfg.tolerant < 3) {
+mce_severity(&m, cfg->tolerant, &msg, true);
+mce_panic("Local fatal machine check!", &m, msg);
+}
+}

/*
@@ -1447,13 +1500,12 @@
static int __mcheck_cpu_mce_banks_init(void)
{
 int i;
-u8 num_banks = mca_cfg.banks;
-
mce_banks = kzalloc(num_banks * sizeof(struct mce_bank), GFP_KERNEL);

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mce_banks = kzalloc(MAX_NR_BANKS * sizeof(struct mce_bank), GFP_KERNEL);
if (!mce_banks)
    return -ENOMEM;

for (i = 0; i < num_banks; i++) {
    for (i = 0; i < MAX_NR_BANKS; i++) {
        struct mce_bank *b = &mce_banks[i];

        b->ctl = -1ULL;
    }
}

static int __mcheck_cpu_cap_init(void)
{
    unsigned b;
    u64 cap;
    +u8 b;

    rdmsrl(MSR_IA32_MCG_CAP, cap);

    b = cap & MCG_BANKCNT_MASK;
    -if (!mca_cfg.banks)
        -pr_info("CPU supports %d MCE banks\n", b);
    -if (b > MAX_NR_BANKS) {
        -pr_warn("Using only %u machine check banks out of %u\n", 
                 -MAX_NR_BANKS, b);
        +if (WARN_ON_ONCE(b > MAX_NR_BANKS))
            b = MAX_NR_BANKS;
    }

    -/* Don't support asymmetric configurations today */
    -WARN_ON(mca_cfg.banks != 0 && b != mca_cfg.banks);
    -mca_cfg.banks = b;
    +mca_cfg.banks = max(mca_cfg.banks, b);

    if (!mce_banks) {
        int err = __mcheck_cpu_mce_banks_init();
        -
        if (err)
            return err;
    }

    if (c->x86 == 0x15 && c->x86_model <= 0xf)
        mce_flags.overflow_recov = 1;

    -/*
        - * Turn off MC4_MISC thresholding banks on those models since
        - * they're not supported there.
    */
if (c->x86 == 0x15 &&
    (c->x86_model >= 0x10 && c->x86_model <= 0x1f)) {
    int i;
    u64 hwcr;
    bool need_toggle;
    u32 msrs[] = {
        -0x00000413, /**< MC4_MISC0 */
        -0xc0000408, /**< MC4_MISC1 */
    };
    
    rdmsrl(MSR_K7_HWCR, hwcr);
    
    /* McStatusWrEn has to be set */
    need_toggle = !(hwcr & BIT(18));
    
    if (need_toggle)
        wrmsrl(MSR_K7_HWCR, hwcr | BIT(18));

    /* Clear CntP bit safely */
    for (i = 0; i < ARRAY_SIZE(msrs); i++)
        msr_clear_bit(msrs[i], 62);

    /* restore old settings */
    if (need_toggle)
        wrmsrl(MSR_K7_HWCR, hwcr);
}

if (c->x86_vendor == X86_VENDOR_INTEL) {
    mce_start_timer(t);
}

bool filter_mce(struct mce *m)
+
    if (boot_cpu_data.x86_vendor == X86_VENDOR_AMD)
    +return amd_filter_mce(m);
    +return false;
+
    /* Handle unconfigured int18 (should never happen) */
static void unexpected_machine_check(struct pt_regs *regs, long error_code)
    {
    if (kstrtou64(buf, 0, &new) < 0)
        return -EINVAL;
    }
+mutex_lock(&mce_sysfs_mutex);
if (mca_cfg.ignore_ce ^ !!new) {
    if (new) {
        /* disable ce features */
@@ -2085,6 +2107,8 @@
on_each_cpu(mce_enable_ce, (void *)1, 1);
    }
}
+mutex_unlock(&mce_sysfs_mutex);
+
return size;
}

@@ -2097,6 +2121,7 @@
if (kstrtou64(buf, 0, &new) < 0)
return -EINVAL;

+mutex_lock(&mce_sysfs_mutex);
if (mca_cfg.cmci_disabled ^ !!new) {
    if (new) {
        /* disable cmci */
@@ -2108,6 +2133,8 @@
on_each_cpu(mce_enable_ce, NULL, 1);
    }
}
+mutex_unlock(&mce_sysfs_mutex);
+
return size;
}

@@ -2115,8 +2142,16 @@
    struct device_attribute *attr,
    const char *buf, size_t size)
{
    ssize_t ret = device_store_int(s, attr, buf, size);
+unsigned long old_check_interval = check_interval;
    +ssize_t ret = device_store_ulong(s, attr, buf, size);
    +
    +if (check_interval == old_check_interval)
    +return ret;
    +
    +mutex_lock(&mce_sysfs_mutex);
    mce_restart();
+mutex_unlock(&mce_sysfs_mutex);
+
return ret;
}
static int __init mcheck_late_init(void)
{
    pr_info("Using %d MCE banks\n", mca_cfg.banks);
    if (mca_cfg.recovery)
        static_branch_inc(&mcsafe_key);

    /* Threshold LVT offset is at MSR0xC0000410[15:12] */
    #define SMCA_THR_LVT_OFF 0x00000410

    -static bool thresholding_en;
    +static bool thresholding_irq_en;

    static const char * const th_names[] = {
        "load_store",
        +"load_store",
    
    @ @ -82.6 +83.7 @ @
        [SMCA_IF]= { "insn_fetch","Instruction Fetch Unit" },
        [SMCA_L2_CACHE]= { "l2_cache","L2 Cache" },
        [SMCA_DE]= { "decode_unit","Decode Unit" },
        +[SMCA_RESERVED]= { "reserved","Reserved" },
        [SMCA_EX]= { "execution_unit","Execution Unit" },
        [SMCA_FP]= { "floating_point","Floating Point Unit" },
        [SMCA_L3_CACHE]= { "l3_cache","L3 Cache" },
        @ @ -93.7 +95.12 @ @
        [SMCA_SMU]= { "smu","System Management Unit" },
    
    -const char *smca_get_name(enum smca_bank_types t)
    +static u32 smca_bank_addrs[MAX_NR_BANKS][NR_BLOCKS] __ro_after_init =
        +{
        +[0 ... MAX_NR_BANKS - 1] = { [0 ... NR_BLOCKS - 1] = -1 }
        +};
    +
    +static const char *smca_get_name(enum smca_bank_types t)
if (t >= N_SMCA_BANK_TYPES)
return NULL;
@@ -110,9 +117,26 @@
}
EXPORT_SYMBOL_GPL(smca_get_long_name);

+static enum smca_bank_types smca_get_bank_type(unsigned int bank)
+{
+struct smca_bank *b;
+
+if (bank >= MAX_NR_BANKS)
+return N_SMCA_BANK_TYPES;
+
+b = &smca_banks[bank];
+if (!b->hwid)
+return N_SMCA_BANK_TYPES;
+
+return b->hwid->bank_type;
+
+static struct smca_hwid smca_hwid_mcatypes[] = {
+/* { bank_type, hwid_mcatype, xec_bitmap } */
+
+/* Reserved type */
+{ SMCA_RESERVED, HWID_MCATYPE(0x00, 0x0), 0x0 },
+
+/* ZN Core (HWID=0xB0) MCA types */
+{ SMCA_LS, HWID_MCATYPE(0xB0, 0x0), 0x1FFFEF },
+{ SMCA_IF, HWID_MCATYPE(0xB0, 0x1), 0x3FFF },
@@ -204,10 +228,10 @@
/* Return early if this bank was already initialized. */
-if (smca_banks[bank].hwid)
+if (smca_banks[bank].hwid && smca_banks[bank].hwid->hwid_mcatype != 0)
return;

-if (rdmsr_safe_on_cpu(cpu, MSR_AMD64_SMCA_MCx_IPID(bank), &low, &high)) {
+if (rdmsr_safe(MSR_AMD64_SMCA_MCx_IPID(bank), &low, &high)) {
pr_warn("Failed to read MCA_IPID for bank \%d\n", bank);
return;
}
@@ -411,34 +435,51 @@
wrmsr(MSR_CU_DEF_ERR, low, high);
}

-static u32 get_block_address(unsigned int cpu, u32 current_addr, u32 low, u32 high,
static u32 smca_get_block_address(unsigned int cpu, unsigned int bank, unsigned int block)
{
    u32 addr = 0, offset = 0;
    u32 low, high;
    addr = 0;

    if (mce_flags.smca) {
        if (!block) {
            addr = MSR_AMD64_SMCA_MCx_MISC(bank);
        } else {
            * For SMCA enabled processors, BLKPTR field of the
            * first MISC register (MCx_MISC0) indicates presence of
            * additional MISC register set (MISC1-4).
            * /
            addr = MSR_AMD64_SMCA_MCx_MISCy(bank, block - 1);
        }
    } else {
        if (smca_get_bank_type(bank) == SMCA_RESERVED)
            return addr;

        if (rdmsr_safe_on_cpu(cpu, MSR_AMD64_SMCA_MCx_CONFIG(bank), &low, &high))
            return addr;
        if (!block)
            return MSR_AMD64_SMCA_MCx_MISC(bank);

        if (!(low & MCI_CONFIG_MCAX))
            goto out;

        * Check our cache first: */
        if (smca_bank_addrs[bank][block] != -1)
            return smca_bank_addrs[bank][block];

        if (!rdmsr_safe_on_cpu(cpu, MSR_AMD64_SMCA_MCx_MISC(bank), &low, &high) &&
            (low & MASK_BLKPTR_LO))
            addr = MSR_AMD64_SMCA_MCx_MISCy(bank, block - 1);
        };
        * * For SMCA enabled processors, BLKPTR field of the first MISC register
        * (MCx_MISC0) indicates presence of additional MISC regs set (MISC1-4).
        * /
        if (rdmsr_safe_on_cpu(cpu, MSR_AMD64_SMCA_MCx_CONFIG(bank), &low, &high))
            goto out;
        +
        if (!low & MCI_CONFIG_MCAX))
            goto out;
        +
        if (!rdmsr_safe_on_cpu(cpu, MSR_AMD64_SMCA_MCx_MISC(bank), &low, &high) &&
            (low & MASK_BLKPTR_LO))
            goto out;
        +
    }
}

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addr = MSR_AMD64_SMCA_MCx_MISC_y(bank, block - 1);
+
+out:
+smca_bank_addrs[bank][block] = addr;
+return addr;
+
+static u32 get_block_address(unsigned int cpu, u32 current_addr, u32 low, u32 high,
+    unsigned int bank, unsigned int block)
+{
+u32 addr = 0, offset = 0;
+
+if ((bank >= mca_cfg.banks) || (block >= NR_BLOCKS))
return addr;
-}
+
+if (mce_flags.smca)
+return smca_get_block_address(cpu, bank, block);

/* Fall back to method we used for older processors: */
switch (block) {
@@ -493,9 +534,8 @@
set_offset:
offset = setup_APIC_mce_threshold(offset, new);
-
-    -if ((offset == new) && (mce_threshold_vector != amd_threshold_interrupt))
+    if (offset == new)
+thresholding_irq_en = true;

done:
mce_threshold_block_init(&b, offset);
@@ -504,6 +544,66 @@
return offset;
}

+bool amd_filter_mce(struct mce *m)
+{
+enum smca_bank_types bank_type = smca_get_bank_type(m->bank);
+struct cpuinfo_x86 *c = &boot_cpu_data;
+u8 xec = (m->status >> 16) & 0x3F;
+
+/* See Family 17h Models 10h-2Fh Erratum #1114. */
+if (c->x86 == 0x17 &&
  c->x86_model >= 0x10 && c->x86_model <= 0x2F &&
  bank_type == SMCA_IF && xec == 10)
+return true;
void disable_err_thresholding(struct cpuinfo_x86 *c, unsigned int bank)
{
    int i, num_msrs;
    u64 hwcr;
    bool need_toggle;
    u32 msrs[NR_BLOCKS];

    if (c->x86 == 0x15 && bank == 4) {
        msrs[0] = 0x00000413; /* MC4_MISC0 */
        msrs[1] = 0xc0000408; /* MC4_MISC1 */
        num_msrs = 2;
    } else if (c->x86 == 0x17 &&
               (c->x86_model >= 0x10 && c->x86_model <= 0x2F)) {
        if (smca_get_bank_type(bank) != SMCA_IF) return;
        msrs[0] = MSR_AMD64_SMCA_MCx_MISC(bank);
        num_msrs = 1;
    } else {
        return;
    }

    rdmsrl(MSR_K7_HWCR, hwcr);

    /* McStatusWrEn has to be set */
    need_toggle = !(hwcr & BIT(18));
    if (need_toggle)
        wrmsrl(MSR_K7_HWCR, hwcr | BIT(18));

    /* Clear CntP bit safely */
    for (i = 0; i < num_msrs; i++)
        msr_clear_bit(msrs[i], 62);

    /* restore old settings */
    if (need_toggle)
        wrmsrl(MSR_K7_HWCR, hwcr);
}

void mce_amd_feature_init(struct cpuinfo_x86 *c)
{
    if (mce_flags.smca)
        smca_configure(bank, cpu);

    disable_err_thresholding(c, bank);
    for (block = 0; block < NR_BLOCKS; ++block) {
        address = get_block_address(cpu, address, low, high, bank, block);
        if (!address)
            mce_log(&m);
    }

    asmlinkage __visible void __irq_entry smp_deferred_error_interrupt(void)
    static void threshold_block_release(struct kobject *kobj);
    static struct kobj_type threshold_ktype = {
        .sysfs_ops = &threshold_ops,
        .default_attrs = default_attrs,
        .release = threshold_block_release,
    };

    static const char *get_name(unsigned int bank, struct threshold_block *b)
    {
        if (!mce_flags.smca) {
            if (b && bank == 4)
                return th_names[bank];
            enum smca_bank_types bank_type;
            if (!smca_banks[bank].hwid)
                bank_type = smca_get_bank_type(bank);
            if (bank_type >= N_SMCA_BANK_TYPES)
return NULL;

-bank_type = smca_banks[bank].hwid->bank_type;
-
if (b && bank_type == SMCA_UMC) {
if (b->block < ARRAY_SIZE(smca_umc_block_names))
return smca_umc_block_names[b->block];
@@ -1065,8 +1169,9 @@
return buf_mcatype;
}

-static int allocate_threshold_blocks(unsigned int cpu, unsigned int bank,
-    unsigned int block, u32 address)
+static int allocate_threshold_blocks(unsigned int cpu, struct threshold_bank *tb,
+    unsigned int bank, unsigned int block,
+    u32 address)
{
struct threshold_block *b = NULL;

u32 low, high;
@@ -1110,16 +1215,12 @@
INIT_LIST_HEAD(&b->miscj);

-if (per_cpu(threshold_banks, cpu)[bank]->blocks) {
    list_add(&b->miscj,
    &per_cpu(threshold_banks, cpu)[bank]->blocks->miscj);
-} else {
    per_cpu(threshold_banks, cpu)[bank]->blocks = b;
-}
+if (tb->blocks)
+    list_add(&b->miscj, &tb->blocks->miscj);
+else
+    tb->blocks = b;

-err = kobject_init_and_add(&b->kobj, &threshold_ktype,
-    per_cpu(threshold_banks, cpu)[bank]->kobj,
-    get_name(bank, b));
+err = kobject_init_and_add(&b->kobj, &threshold_ktype, tb->kobj, get_name(bank, b));
if (err)
goto out_free;
recurse:
@@ -1127,7 +1228,7 @@
if (!address)
return 0;
-err = allocate_threshold_blocks(cpu, bank, block, address); 
+err = allocate_threshold_blocks(cpu, tb, bank, block, address);
if (err)
goto out_free;

@@ -1212,8 +1313,6 @@
 goto out_free;
 }

-per_cpu(threshold_banks, cpu)[bank] = b;
-
 if (is_shared_bank(bank)) {
  refcount_set(&b->cpus, 1);
}

@@ -1224,9 +1323,13 @@
 }
 }

-err = allocate_threshold_blocks(cpu, bank, 0, msr_ops.misc(bank));
-if (!err)
-goto out;
+err = allocate_threshold_blocks(cpu, b, bank, 0, msr_ops.misc(bank));
+if (err)
+goto out_free;
+
+per_cpu(threshold_banks, cpu)[bank] = b;
+
+return 0;

out_free:
kfree(b);
@@ -1235,8 +1338,12 @@
 return err;
 }

-static void deallocate_threshold_block(unsigned int cpu,
- unsigned int bank)
+static void deallocate_threshold_block(unsigned int cpu,
+ unsigned int bank)
{
 struct threshold_block *pos = NULL;
 struct threshold_block *tmp = NULL;
@@ -1246,13 +1353,11 @@
 return;

 list_for_each_entry_safe(pos, tmp, &head->blocks->miscj, miscj) {
- kobject_put(&pos->kobj);
+   if (k) {
+    kfree(to_block(kobj));
+  }
+
+ static void deallocate_threshold_block(unsigned int cpu, unsigned int bank)
+{
 struct threshold_block *pos = NULL;
 struct threshold_block *tmp = NULL;
@@ -1246,13 +1353,11 @@
 return;

 list_for_each_entry_safe(pos, tmp, &head->blocks->miscj, miscj) {
- kobject_put(&pos->kobj);
list_del(&pos->miscj);
-kfree(pos);
+kobject_put(&pos->kobj);
}

-kfree(per_cpu(threshold_banks, cpu)[bank]->blocks);
-per_cpu(threshold_banks, cpu)[bank]->blocks = NULL;
+kobject_put(&head->blocks->kobj);
}

static void __threshold_remove_blocks(struct threshold_bank *b)
@@ -1306,9 +1411,6 @@
{
    unsigned int bank;

    -if (!thresholding_en)
-    return 0;
-
    for (bank = 0; bank < mca_cfg.banks; ++bank) {
        if (!(per_cpu(bank_map, cpu) & (1 << bank)))
            continue;
@@ -1326,9 +1428,6 @@
        struct threshold_bank **bp;
        int err = 0;

        -if (!thresholding_en)
-    -return 0;
-    -
        bp = per_cpu(threshold_banks, cpu);
        if (bp)
            return 0;
@@ -1357,9 +1456,6 @@
    }
    unsigned lcpu = 0;

    -if (mce_threshold_vector == amd_threshold_interrupt)
    -thresholding_en = true;
    -
    /* to hit CPUs online before the notifier is up */
    for_each_online_cpu(lcpu) {
        int err = mce_threshold_create_device(lcpu);
@@ -1368,6 +1464,9 @@
        return err;
    }

    +if (thresholding_irq_en)
    +mce_threshold_vector = amd_threshold_interrupt;
+    

return 0;
}
/*
--- linux-4.15.0.orig/arch/x86/kernel/cpu/mcheck/mce_intel.c
+++ linux-4.15.0/arch/x86/kernel/cpu/mcheck/mce_intel.c
@@ -489,17 +489,18 @@
return;

if ((val & 3UL) == 1UL) {
    /* PPIN available but disabled: */
} /* PPIN locked in disabled mode */
return;
}

*/ If PPIN is disabled, but not locked, try to enable: */
-if (!(val & 3UL)) {
+/* Is the enable bit set? */
+if (!(val & 2UL)) {
    wrmsrl_safe(MSR_PPIN_CTL, val | 2UL);
    rdmsrl_safe(MSR_PPIN_CTL, &val);
}

#if include <linux/cpu.h>

#include <asm/processor.h>
+include <asm/traps.h>
#include <asm/apic.h>
#include <asm/mce.h>
#include <asm/msr.h>
@@ -184,7 +185,7 @@
/* if we just entered the thermal event */
if (new_event) {
    if (event == THERMAL_THROTTLING_EVENT)
-pr_crit("CPU%d: \%s temperature above threshold, cpu clock throttled (total events = \%lu)n",
+pr_warn("CPU%d: \%s temperature above threshold, cpu clock throttled (total events = \%lu)n",
this_cpu,
    level == CORE_LEVEL ? "Core" : "Package",
    state->count);
@@ -390,7 +391,7 @@

static void (*smp_thermal_vector)(void) = unexpected_thermal_interrupt;

-asm linkage __visible void __irq_entry smp_thermal_interrupt(struct pt_regs *r)
+asmlinkage __visible void __irq_entry smp_thermal_interrupt(struct pt_regs *regs)
{
    entering_irq();
    trace_thermal_apic_entry(THERMAL_APIC_VECTOR);

    --- linux-4.15.0.orig/arch/x86/kernel/cpu/mcheck/threshold.c
    +++ linux-4.15.0/arch/x86/kernel/cpu/mcheck/threshold.c
    @ @ -6,6 +6,7 @@
    #include <linux/kernel.h>

    #include <asm/irq_vectors.h>
    +#include <asm/traps.h>
    #include <asm/apic.h>
    #include <asm/mce.h>
    #include <asm/trace/irq_vectors.h>
    @@ -18,7 +19,7 @@
    void (*mce_threshold_vector)(void) = default_threshold_interrupt;

    -asm linkage __visible void __irq_entry smp_threshold_interrupt(void)
    +asmlinkage __visible void __irq_entry smp_threshold_interrupt(struct pt_regs *regs)
    {
        entering_irq();
        trace_threshold_apic_entry(THRESHOLD_APIC_VECTOR);

        --- linux-4.15.0.orig/arch/x86/kernel/cpu/microcode/amd.c
        +++ linux-4.15.0/arch/x86/kernel/cpu/microcode/amd.c
        @@ -339,7 +339,7 @@
        return -EINVAL;

        ret = load_microcode_amd(true, x86_family(cpuid_1_eax), desc.data, desc.size);
        -if (ret != UCODE_OK)
        +#if (ret > UCODE_UPDATED)
        return -EINVAL;

        return 0;
        @@ -498,12 +498,13 @@
        return patch_size;
    }

    -static int apply_microcode_amd(int cpu)
    +static enum ucode_state apply_microcode_amd(int cpu)
    {
        struct cpuinfo_x86 *c = &cpu_data(cpu);
        struct microcode_amd *mc_amd;
        struct ucode_cpu_info *uci;


struct ucode_patch *p;
+enum ucode_state ret;

BUG_ON(raw_smp_processor_id() != cpu);
@@ -512,7 +513,7 @@
    p = find_patch(cpu);
    if (!p)
        return 0;
+    return UCODE_NFOUND;

    mc_amd = p->data;
    uci->mc = p->data;
@@ -521,23 +522,30 @@
 /* need to apply patch? */
 if (rev >= mc_amd->hdr.patch_id) {
        -c->microcode = rev;
-    -uci->cpu_sig.rev = rev;
        -return 0;
+    ret = UCODE_OK;
+    goto out;
    }

 if (__apply_microcode_amd(mc_amd)) {
    pr_err("CPU%d: update failed for patch_level=0x%08x\n",
        cpu, mc_amd->hdr.patch_id);
        -return -1;
+    return UCODE_ERROR;
    }
-pr_info("CPU%d: new patch_level=0x%08x\n", cpu,
-pr_info("CPU%d: new patch_level=0x%08x\n", cpu,
        -mc_amd->hdr.patch_id);
-uci->cpu_sig.rev = mc_amd->hdr.patch_id;
-        -c->microcode = mc_amd->hdr.patch_id;
+    rev = mc_amd->hdr.patch_id;
+    ret = UCODE_UPDATED;

        -return 0;
+pr_info("CPU%d: new patch_level=0x%08x\n", cpu, rev);
+    +
+    +out:
+uci->cpu_sig.rev = rev;
+    +c->microcode = rev;
+    +
+    +/* Update boot_cpu_data's revision too, if we're on the BSP: */
+return 0;
+if (c->cpu_index == boot_cpu_data.cpu_index)
static int install_equiv_cpu_table(const u8 *buf)
static enum ucode_state
load_microcode_amd(bool save, u8 family, const u8 *data, size_t size)
{
   struct ucode_patch *p;
   enum ucode_state ret;

   /* free old equiv table */
   free_equiv_cpu_table();

   ret = __load_microcode_amd(family, data, size);
   -if (ret != UCODE_OK)
   +if (ret != UCODE_OK) {
      cleanup();
      +return ret;
   +}

   -#ifdef CONFIG_X86_32
   -/* save BSP's matching patch for early load */
   -if (save) {
   -struct ucode_patch *p = find_patch(0);
   -if (p) {
      -memset(amd_ucode_patch, 0, PATCH_MAX_SIZE);
      -memcpy(amd_ucode_patch, p->data, min_t(u32, ksize(p->data),
       -PATCH_MAX_SIZE));
   -}
   +p = find_patch(0);
   +if (!p) {
   +return ret;
   +} else {
   +if (boot_cpu_data.microcode >= p->patch_id)
   +return ret;
   +}

   +#endif
   +/* save BSP's matching patch for early load */
   +if (!save)
   +return ret;
   +
memset(amd_ucode_patch, 0, PATCH_MAX_SIZE);
memcpy(amd_ucode_patch, p->data, min_t(u32, ksize(p->data), PATCH_MAX_SIZE));
+
return ret;
}

--- linux-4.15.0.orig/arch/x86/kernel/cpu/microcode/core.c
+++ linux-4.15.0/arch/x86/kernel/cpu/microcode/core.c
@@ -22,13 +22,16 @@
#define pr_fmt(fmt) "microcode: " fmt

#include "linux/platform_device.h"
+include "linux/stop_machine.h"
#include "linux/syscore_ops.h"
#include "linux/miscdevice.h"
#include "linux/capability.h"
#include "linux/firmware.h"
#include "linux/kernel.h"
+include "linux/delay.h"
#include "linux/mutex.h"
#include "linux/cpu.h"
+include "linux/DMI.h"
#include "linux/fs.h"
#include "linux/mm.h"

@@ -64,6 +67,11 @@
*/
static DEFINE_MUTEX(microcode_mutex);

+/
+ * Serialize late loading so that CPUs get updated one-by-one.
+ */
+static DEFINE_RAW_SPINLOCK(update_lock);
+ struct ucode_cpu_info ucode_cpu_info[NR_CPUS];

struct cpu_info_ctx {
@@ -373,26 +381,23 @@
return ret;
}

-struct apply_microcode_ctx {
- int err;
-};
-
- static void apply_microcode_local(void *arg)
{  
-struct apply_microcode_ctx *ctx = arg;


enum ucode_state *err = arg;

-ctx->err = microcode_ops->apply_microcode(smp_processor_id());
+*err = microcode_ops->apply_microcode(smp_processor_id());
}

static int apply_microcode_on_target(int cpu)
{
-struct apply_microcode_ctx ctx = { .err = 0 }
+enum ucode_state err;
int ret;

-ret = smp_call_function_single(cpu, apply_microcode_local, &ctx, 1);
-if (!ret)
-ret = ctx.err;
-
+ret = smp_call_function_single(cpu, apply_microcode_local, &err, 1);
+if (!ret) {
+if (err == UCODE_ERROR)
+ret = 1;
+}
return ret;
}

@@ -413,8 +418,9 @@
if (ustate == UCODE_ERROR) {
 error = -1;
 break;
-] else if (ustate == UCODE_OK)
+] else if (ustate == UCODE_NEW) {
 apply_microcode_on_target(cpu);
+]
}

return error;
@@ -489,31 +495,130 @@
/* fake device for request_firmware */
static struct platform_device *microcode_pdev;

-static int reload_for_cpu(int cpu)
+/*
+ * Late loading dance. Why the heavy-handed stomp_machine effort?
+ *
+ * - HT siblings must be idle and not execute other code while the other sibling
+ * is loading microcode in order to avoid any negative interactions caused by
+ * the loading.
+ *
+ * - In addition, microcode update on the cores must be serialized until this
requirement can be relaxed in the future. Right now, this is conservative
and good.

```
#define SPINUNIT /* 100 nsec */

static int check_online_cpus(void)
{
    struct ucode_cpu_info *uci = ucode_cpu_info + cpu;
    enum ucode_state ustate;
    int err = 0;
    unsigned int cpu;

    if (!uci->valid)
        return err;

    /* Make sure all CPUs are online. It's fine for SMT to be disabled if
     * all the primary threads are still online.
     */
    for_each_present_cpu(cpu) {
        if (topology_is_primary_thread(cpu) && !cpu_online(cpu)) {
            pr_err("Not all CPUs online, aborting microcode update.
        
        return -EINVAL;
    }
}

    ustate = microcode_ops->request_microcode_fw(cpu, &microcode_pdev->dev, true);
    if (ustate == UCODE_OK)
        apply_microcode_on_target(cpu);
    else
        if (ustate == UCODE_ERROR)
            err = -EINVAL;
        return err;
}
```

```c
+static atomic_t late_cpus_in;
+static atomic_t late_cpus_out;

+static int __wait_for_cpus(atomic_t *t, long long timeout)
{
    int all_cpus = num_online_cpus();
    atomic_inc(t);
    while (atomic_read(t) < all_cpus) {
        if (timeout < SPINUNIT) {
            pr_err("Timeout while waiting for CPUs rendezvous, remaining: %d
        
        return 0;
    }
```

Open Source Used In 5GaaS Edge AC-4 11915
+return 1;
+
+ndelay(SPINUNIT);
+timeout -= SPINUNIT;
+
+touch_nmi_watchdog();
+}
+return 0;
+}
+
+/**
+ * Returns:
+ * < 0 - on error
+ *   0 - no update done
+ *   1 - microcode was updated
+ */
+static int __reload_late(void *info)
+{
+int cpu = smp_processor_id();
+enum ucode_state err;
+int ret = 0;
+
+/*
+ * Wait for all CPUs to arrive. A load will not be attempted unless all
+ * CPUs show up.
+ */
+if (__wait_for_cpus(&late_cpus_in, NSEC_PER_SEC))
+return -1;
+
+raw_spin_lock(&update_lock);
+apply_microcode_local(&err);
+raw_spin_unlock(&update_lock);
+
+/* siblings return UCODE_OK because their engine got updated already */
+if (err > UCODE_NFOUND) {
+pr_warn("Error reloading microcode on CPU %d\n", cpu);
+ret = -1;
+} else if (err == UCODE_UPDATED || err == UCODE_OK) {
+ret = 1;
+}
+
+/* Increase the wait timeout to a safe value here since we're
+ * serializing the microcode update and that could take a while on a
+ * large number of CPUs. And that is fine as the *actual* timeout will
+ * be determined by the last CPU finished updating and thus cut short.
+ */
+if (__wait_for_cpus(&late_cpus_out, NSEC_PER_SEC * num_online_cpus()))
+panic("Timeout during microcode update\n");
+
+return ret;
+
+/*
+ * Reload microcode late on all CPUs. Wait for a sec until they
+ * all gather together.
+ */
+static int microcode_reload_late(void)
+{
+int ret;
+
+atomic_set(&late_cpus_in, 0);
+atomic_set(&late_cpus_out, 0);
+
+ret = stop_machine_cpuslocked(__reload_late, NULL, cpu_online_mask);
+if (ret > 0)
+microcode_check();
+
+return ret;
}

static ssize_t reload_store(struct device *dev,
   struct device_attribute *attr,
   const char *buf, size_t size)
{
   enum ucode_state tmp_ret = UCODE_OK;
   int bsp = boot_cpu_data.cpu_index;
   unsigned long val;
   int cpu;
   ssize_t ret = 0, tmp_ret;
   ssize_t old_val;
   
   ret = kstrtoul(buf, 0, &val);
   if (ret)
   return size;
   
   get_online_cpus();
   
   +ret = check_online_cpuses();
   +if (ret)
   +goto put;
   +
   +tmp_ret = microcode_ops->request_microcode_fw(bsp, &microcode_pdev->dev, true);
   +if (tmp_ret != UCODE_NEW)
mutex_lock(&microcode_mutex);
-for_each_online_cpu(cpu) { 
	tmp_ret = reload_for_cpu(cpu);
	if (tmp_ret != 0)
		pr_warn("Error reloading microcode on CPU %d\n", cpu);
	/* save retval of the first encountered reload error */
	if (!ret)
		ret = tmp_ret;
}
-if (!ret)
	perf_check_microcode();
+ret = microcode_reload_late();
mutex_unlock(&microcode_mutex);

+put:
put_online_cpus();

-if (!ret)
+if (ret >= 0)
ret = size;
return ret;
@@ -560,7 +666,7 @@
return sprintf(buf, "%0x\n", uci->cpu_sig pf);
}

-static DEVICE_ATTR(reload, 0200, NULL, reload_store);
+static DEVICE_ATTR_WO(reload);
static DEVICE_ATTR(version, 0400, version_show, NULL);
static DEVICE_ATTR(processor_flags, 0400, pf_show, NULL);
@@ -606,10 +712,8 @@
if (system_state != SYSTEM_RUNNING)
return UCODE_NFOUND;

-ustate = microcode_ops->request_microcode_fw(cpu, &microcode_pdev->dev, 
-refresh_fw);
- if (ustate == UCODE_OK) {
-ustate = microcode_ops->request_microcode_fw(cpu, &microcode_pdev->dev, refresh_fw);
+if (ustate == UCODE_OK) {
pr_debug("CPU%d updated upon init\n", cpu);
apply_microcode_on_target(cpu);
}
static int mc_cpu_starting(unsigned int cpu)
{
    struct device *dev;
    
    dev = get_cpu_device(cpu);
    microcode_update_cpu(cpu);
    pr_debug("CPU%d added\n", cpu);
    return 0;
}

static int mc_cpu_online(unsigned int cpu)
{
    struct device *dev = get_cpu_device(cpu);
    if (sysfs_create_group(&dev->kobj, &mc_attr_group))
        pr_err("Failed to create group for CPU%d\n", cpu);
    goto out_ucode_group;
    
    cpuhp_setup_state_nocalls(CPUHP_AP_MICROCODE_LOADER, "x86/microcode:starting",
        mc_cpu_starting, NULL);
    cpuhp_setup_state_nocalls(CPUHP_AP_ONLINE_DYN, "x86/microcode:online",
        mc_cpu_online, mc_cpu_down_prep);

    -- linux-4.15.0.orig/arch/x86/kernel/cpu/microcode/intel.c
    +++ linux-4.15.0/arch/x86/kernel/cpu/microcode/intel.c
    @@ -103,53 +103,6 @@
    return find_matching_signature(mc, csig, cpf);
}

/**
 * Given CPU signature and a microcode patch, this function finds if the
 * microcode patch has matching family and model with the CPU.
 * *
 * %true - if there's a match
 * %false - otherwise
 * */
static bool microcode_matches(struct microcode_header_intel *mc_header,
    unsigned long sig)
{
    unsigned long total_size = get_totalsize(mc_header);
    unsigned long data_size = get_datasize(mc_header);
    struct extended_sigtable *ext_header;
-unsigned int fam_ucode, model_ucode;
-struct extended_signature *ext_sig;
-unsigned int fam, model;
-int ext_sigcount, i;
-
-fam   = x86_family(sig);
-model = x86_model(sig);
-
-fam_ucode   = x86_family(mc_header->sig);
-model_ucode = x86_model(mc_header->sig);
-
-if (fam == fam_ucode && model == model_ucode)
-return true;
-
-/* Look for ext. headers: */
-if (total_size <= data_size + MC_HEADER_SIZE)
-return false;
-
-ext_header   = (void *) mc_header + data_size + MC_HEADER_SIZE;
-ext_sig      = (void *)ext_header + EXT_HEADER_SIZE;
-ext_sigcount = ext_header->count;
-
-for (i = 0; i < ext_sigcount; i++) {
-fam_ucode   = x86_family(ext_sig->sig);
-model_ucode = x86_model(ext_sig->sig);
-
-if (fam == fam_ucode && model == model_ucode)
-return true;
-
-ext_sig++;
-}
-return false;
-
static struct ucode_patch *memdup_patch(void *data, unsigned int size)
{
 struct ucode_patch *p;
 @@ -167,7 +120,7 @@
 return p;
 }

-static void save_microcode_patch(void *data, unsigned int size)
+static void save_microcode_patch(struct ucode_cpu_info *uci, void *data, unsigned int size)
 {
 struct microcode_header_intel *mc_hdr, *mc_saved_hdr;
 struct ucode_patch *iter, *tmp, *p = NULL;
 @@ -190,8 +143,11 @@
p = memdup_patch(data, size):

if (!p)
  pr_err("Error allocating buffer %p\n", data);
else
  list_replace(&iter->plist, &p->plist);
kfree(iter->data);
kfree(iter);
+
}

if (!p)
  return;

+if (!find_matching_signature(p->data, uci->cpu_sig.sig, uci->cpu_sig.pf))
  +return;

  /*
   * Save for early loading. On 32-bit, that needs to be a physical
   * address as the APs are running from physical addresses, before
   * Save this microcode patch. It will be loaded early when a CPU is
   * hot-added or resumes.
   */
   static void save_mc_for_early(struct ucode_cpu_info *uci, u8 *mc, unsigned int size)
   {
   -static void save_mc_for_early(u8 *mc, unsigned int size)
   +static void save_mc_for_early(struct ucode_cpu_info *uci, u8 *mc, unsigned int size)
   
   /* Synchronization during CPU hotplug. */
   static DEFINE_MUTEX(x86_cpu_microcode_mutex);
mutex_lock(&x86_cpu_microcode_mutex);

-save_microcode_patch(mc, size);
+save_microcode_patch(uci, mc, size);
show_saved_mc();

mutex_unlock(&x86_cpu_microcode_mutex);
-#endif
}

static bool load_builtin_intel_microcode(struct cpio_data *cp)
@@ -589,6 +547,23 @@
if (!mc)
return 0;

+/*
+ * Save us the MSR write below - which is a particular expensive
+ * operation - when the other hyperthread has updated the microcode
+ * already.
+ */
+rev = intel_get_microcode_revision();
+if (rev >= mc->hdr.rev) {
++uci->cpu_sig.rev = rev;
+return UCODE_OK;
+}
+
+/* Writeback and invalidate caches before updating microcode to avoid
+ * internal issues depending on what the microcode is updating.
+ */
+native_wbinvd();
+
/* write microcode via MSR 0x79 */
native_wrmsrl(MSR_IA32_UCODE_WRITE, (unsigned long)mc->bits);
@@ -772,27 +747,44 @@
return 0;
}

-static int apply_microcode_intel(int cpu)
+static enum ucode_state apply_microcode_intel(int cpu)
{
+struct ucode_cpu_info *uci = ucode_cpu_info + cpu;
+struct cpuinfo_x86 *c = &cpu_data(cpu);
+struct microcode_intel *mc;
-struct ucode_cpu_info *uci;
-struct cpuinfo_x86 *c;
enum ucode_state ret;
static int prev_rev;
unsigned long rev;

/* We should bind the task to the CPU */
if (WARN_ON(raw_smp_processor_id() != cpu))
  return -1;
+return UCODE_ERROR;

-uci = ucode_cpu_info + cpu;
-mc = uci->mc;
+/* Look for a newer patch in our cache: */
+mc = find_patch(uci);
if (!mc) {
+/* Look for a newer patch in our cache: */
-mc = find_patch(uci);
+mc = uci->mc;
if (!mc)
  return 0;
+return UCODE_NFOUND;
}

+/
+  * Save us the MSR write below - which is a particular expensive
+  * operation - when the other hyperthread has updated the microcode
+  * already.
+  */
+rev = intel_get_microcode_revision();
+if (rev >= mc->hdr.rev) {
+  ret = UCODE_OK;
+  goto out;
+}
+
+  * Writeback and invalidate caches before updating microcode to avoid
+  * internal issues depending on what the microcode is updating.
+  */
+native_wbinvd();
+
+  /* write microcode via MSR 0x79 */
wrmsrl(MSR_IA32_UCODE_WRITE, (unsigned long)mc->bits);

@@ -801,7 +793,7 @@
if (rev != mc->hdr.rev) {
  pr_err("CPU%d update to revision 0x%x failed\n", 
          cpu, mc->hdr.rev);
-  return -1;
+  return UCODE_ERROR;
if (rev != prev_rev) {
    prev_rev = rev;
}

t = &cpu_data(cpu);
+ret = UCODE_UPDATED;
+out:
uci->cpu_sig.rev = rev;
-t->microcode = rev;
+t->microcode = rev;

-return 0;
+/* Update boot_cpu_data's revision too, if we're on the BSP: */
+if (t->cpu_index == boot_cpu_data.cpu_index)
+boot_cpu_data.microcode = rev;
+
+return ret;
}

static enum ucode_state generic_load_microcode(int cpu, void *data, size_t size,
@-830,6 +827,7 @@
unsigned int leftover = size;
unsigned int curr_mc_size = 0, new_mc_size = 0;
unsigned int csig, cpf;
+enum ucode_state ret = UCODE_OK;

while (leftover) {
    struct microcode_header_intel mc_header;
    @-871,6 +869,7 @@
    new_mc = mc;
    new_mc_size = mc_size;
    mc = NULL;/* trigger new vmalloc */
    +ret = UCODE_NEW;
}

ucode_ptr += mc_size;
@-895,12 +894,12 @@
* permanent memory. So it will be loaded early when a CPU is hot added
* or resumes.
*/
-save_mc_for_early(new_mc, new_mc_size);
+save_mc_for_early(uci, new_mc, new_mc_size);

pr_debug("CPU%d found a matching microcode update with version 0x%x (current=0x%x)n",}
cpu, new_rev, uci->cpu_sig.rev);

- return UCODE_OK;
+ return ret;
}

static int get_ucode_fw(void *to, const void *from, size_t n)
@@ -921,7 +920,7 @@
 if (c->x86 == 6 &&
  c->x86_model == INTEL_FAM6_BROADWELL_X &&
- c->x86_mask == 0x01 &&
+ c->x86_stepping == 0x01 &&
   llc_size_per_core > 2621440 &&
   c->microcode < 0xb000021) {
   pr_err_once("Erratum BDF90: late loading with revision < 0xb000021 (0x%x) disabled.
" c->microcode);
@@ -944,7 +943,7 @@
 return UCODE_NFOUND;

 sprintf(name, "intel-ucode/%02x-%02x-%02x",
- c->x86, c->x86_model, c->x86_mask);
+ c->x86, c->x86_model, c->x86_stepping);

 if (request_firmware_direct(&firmware, name, device)) {
  pr_debug("data file %s load failed\n", name);
@@ -982,7 +981,7 @@
 static int __init calc_llc_size_per_core(struct cpuinfo_x86 *c)
 {
- u64 llc_size = c->x86_cache_size * 1024;
+ u64 llc_size = c->x86_cache_size * 1024ULL;

do_div(llc_size, c->x86_max_cores);

--- linux-4.15.0.orig/arch/x86/kernel/cpu/mkcapflags.sh
+++ linux-4.15.0/arch/x86/kernel/cpu/mkcapflags.sh
@@ -4,6 +4,8 @@
 # Generate the x86_cap/bug_flags[] arrays from include/asm/cpufeatures.h
#

+ set -e
+ IN=$1
OUT=$2

--- linux-4.15.0.orig/arch/x86/kernel/cpu/mshyperv.c
+++ linux-4.15.0/arch/x86/kernel/cpu/mshyperv.c
@@ -20,6 +20,7 @@
#include <linux/interrupt.h>
#include <linux/irq.h>
#include <linux/kexec.h>
#include <linux/i8253.h>
#include <asm/processor.h>
#include <asm/hypervisor.h>
#include <asm/hyperv.h>

ms_hyperv.misc_features = cpuid_edx(HYPERV_CPUID_FEATURES);
ms_hyperv.hints = cpuid_eax(HYPERV_CPUID_ENLIGHTMENT_INFO);

- pr_info("Hyper-V: features 0x%x, hints 0x%x\n",
- ms_hyperv.features, ms_hyperv.hints);
+ pr_info("Hyper-V: features 0x%x, hints 0x%x, misc 0x%x\n",
+ ms_hyperv.features, ms_hyperv.hints, ms_hyperv.misc_features);

ms_hyperv.max_vp_index = cpuid_eax(HVCPUID_IMPLEMENTATION_LIMITS);
ms_hyperv.max_lp_index = cpuid_ebx(HVCPUID_IMPLEMENTATION_LIMITS);
if (efi_enabled(EFI_BOOT))
x86_platform.get_nmi_reason = hv_get_nmi_reason;

/*
 * Hyper-V VMs have a PIT emulation quirk such that zeroing the
 * counter register during PIT shutdown restarts the PIT. So it
 * continues to interrupt @18.2 HZ. Setting i8253_clear_counter
 * to false tells pit_shutdown() not to zero the counter so that
 * the PIT really is shutdown. Generation 2 VMs don't have a PIT,
 * and setting this value has no effect.
 */
i8253_clear_counter_on_shutdown = false;

#if IS_ENABLED(CONFIG_HYPERV)
/*
 * Setup the hook to get control post apic initialization.
 *- linux-4.15.0.orig/arch/x86/kernel/cpu/mtrr/generic.c
+++ linux-4.15.0/arch/x86/kernel/cpu/mtrr/generic.c
@@ -166,9 +166,6 @@
*repeat = 0;
*uniform = 1;

-/* Make end inclusive instead of exclusive */
-end--;

prev_match = MTRR_TYPE_INVALID;
for (i = 0; i < num_var_ranges; ++i) {
    unsigned short start_state, end_state, inclusive;
    @@ -260,6 +257,9 @@

```c
int repeat;
uint64_t partial_end;

/* Make end inclusive instead of exclusive */
end--;

if (!mtrr_state_set)
    return MTRR_TYPE_INVALID;

if (is_cpu(INTEL) && boot_cpu_data.x86 == 6 &&
    boot_cpu_data.x86_model == 1 &&
    boot_cpu_data.x86_mask <= 7) {
    if (base & ((1 << (22 - PAGE_SHIFT)) - 1)) {
        pr_warn("mtrr: base(0x%lx000) is not 4 MiB aligned\n", base);
        return -EINVAL;
    }
}

struct mtrr_gentry gentry;
void __user *arg = (void __user *) __arg;

switch (cmd) {
    case MTRRIOC_ADD_ENTRY:
    case MTRRIOC_SET_ENTRY:

    struct mtrr_gentry gentry;
    void __user *arg = (void __user *) __arg;

    memset(&gentry, 0, sizeof(gentry));

    switch (cmd) {
        case MTRRIOC_ADD_ENTRY:
        case MTRRIOC_SET_ENTRY:

        struct mtrr_gentry gentry;
        void __user *arg = (void __user *) __arg;

        memset(&gentry, 0, sizeof(gentry));

        switch (cmd) {
            case MTRRIOC_ADD_ENTRY:
            case MTRRIOC_SET_ENTRY:

            struct mtrr_gentry gentry;
            void __user *arg = (void __user *) __arg;

            memset(&gentry, 0, sizeof(gentry));

            switch (cmd) {
                case MTRRIOC_ADD_ENTRY:
                case MTRRIOC_SET_ENTRY:

                struct mtrr_gentry gentry;
                void __user *arg = (void __user *) __arg;

                memset(&gentry, 0, sizeof(gentry));

                switch (cmd) {
                    case MTRRIOC_ADD_ENTRY:
                    case MTRRIOC_SET_ENTRY:

                    struct mtrr_gentry gentry;
                    void __user *arg = (void __user *) __arg;

                    memset(&gentry, 0, sizeof(gentry));

                    switch (cmd) {
                        case MTRRIOC_ADD_ENTRY:
                        case MTRRIOC_SET_ENTRY:

                        struct mtrr_gentry gentry;
                        void __user *arg = (void __user *) __arg;

                        memset(&gentry, 0, sizeof(gentry));

                        switch (cmd) {
                            case MTRRIOC_ADD_ENTRY:
                            case MTRRIOC_SET_ENTRY:

                            struct mtrr_gentry gentry;
                            void __user *arg = (void __user *) __arg;

                            memset(&gentry, 0, sizeof(gentry));

                            switch (cmd) {
                                case MTRRIOC_ADD_ENTRY:
                                case MTRRIOC_SET_ENTRY:

                                struct mtrr_gentry gentry;
                                void __user *arg = (void __user *) __arg;

                                memset(&gentry, 0, sizeof(gentry));

                                switch (cmd) {
                                    case MTRRIOC_ADD_ENTRY:
                                    case MTRRIOC_SET_ENTRY:

                                    struct mtrr_gentry gentry;
                                    void __user *arg = (void __user *) __arg;

                                    memset(&gentry, 0, sizeof(gentry));

                                    switch (cmd) {
                                        case MTRRIOC_ADD_ENTRY:
                                        case MTRRIOC_SET_ENTRY:

                                        struct mtrr_gentry gentry;
                                        void __user *arg = (void __user *) __arg;

                                        memset(&gentry, 0, sizeof(gentry));

                                        switch (cmd) {
                                            case MTRRIOC_ADD_ENTRY:
                                            case MTRRIOC_SET_ENTRY:

                                            struct mtrr_gentry gentry;
                                            void __user *arg = (void __user *) __arg;

                                            memset(&gentry, 0, sizeof(gentry));

                                            switch (cmd) {
                                                case MTRRIOC_ADD_ENTRY:
                                                case MTRRIOC_SET_ENTRY:

                                                struct mtrr_gentry gentry;
                                                void __user *arg = (void __user *) __arg;

                                                memset(&gentry, 0, sizeof(gentry));

                                                switch (cmd) {
                                                    case MTRRIOC_ADD_ENTRY:
                                                    case MTRRIOC_SET_ENTRY:

                                                    struct mtrr_gentry gentry;
                                                    void __user *arg = (void __user *) __arg;

                                                    memset(&gentry, 0, sizeof(gentry));

                                                    switch (cmd) {
                                                        case MTRRIOC_ADD_ENTRY:
                                                        case MTRRIOC_SET_ENTRY:

                                                        struct mtrr_gentry gentry;
                                                        void __user *arg = (void __user *) __arg;

                                                        memset(&gentry, 0, sizeof(gentry));

                                                        switch (cmd) {
                                                            case MTRRIOC_ADD_ENTRY:
                                                            case MTRRIOC_SET_ENTRY:

                                                            struct mtrr_gentry gentry;
                                                            void __user *arg = (void __user *) __arg;

                                                            memset(&gentry, 0, sizeof(gentry));

                                                            switch (cmd) {
                                                                case MTRRIOC_ADD_ENTRY:
                                                                case MTRRIOC_SET_ENTRY:

                                                                struct mtrr_gentry gentry;
                                                                void __user *arg = (void __user *) __arg;

                                                                memset(&gentry, 0, sizeof(gentry));

                                                                switch (cmd) {
                                                                    case MTRRIOC_ADD_ENTRY:
                                                                    case MTRRIOC_SET_ENTRY:

                                                                    struct mtrr_gentry gentry;
                                                                    void __user *arg = (void __user *) __arg;

                                                                    memset(&gentry, 0, sizeof(gentry));

                                                                    switch (cmd) {
                                                                        case MTRRIOC_ADD_ENTRY:
                                                                        case MTRRIOC_SET_ENTRY:

                                                                        struct mtrr_gentry gentry;
                                                                        void __user *arg = (void __user *) __arg;

                                                                        memset(&gentry, 0, sizeof(gentry));

                                                                        switch (cmd) {
                                                                            case MTRRIOC_ADD_ENTRY:
                                                                            case MTRRIOC_SET_ENTRY:

                                                                            struct mtrr_gentry gentry;
                                                                            void __user *arg = (void __user *) __arg;

                                                                            memset(&gentry, 0, sizeof(gentry));

                                                                            switch (cmd) {
                                                                                case MTRRIOC_ADD_ENTRY:
                                                                                case MTRRIOC_SET_ENTRY:

                                                                                struct mtrr_gentry gentry;
                                                                                void __user *arg = (void __user *) __arg;

                                                                                memset(&gentry, 0, sizeof(gentry));

                                                                                switch (cmd) {
                                                                                }

                                                                                return -EINVAL;
                                                                            }

                                                                            return -EINVAL;
                                                                        }

                                                                        return -EINVAL;
                                                                    }

                                                                        return -EINVAL;
                                                                }

                                                                        return -EINVAL;
                                                            }

                                                            return -EINVAL;
                                                        }

                                                        return -EINVAL;
                                                    }

                                                    return -EINVAL;
                                                }

                                                return -EINVAL;
                                            }

                                            return -EINVAL;
                                        }

                                        return -EINVAL;
                                    }

                                    return -EINVAL;
                                }

                                return -EINVAL;
                            }

                            return -EINVAL;
                        }

                        return -EINVAL;
                    }

                    return -EINVAL;
                }

                return -EINVAL;
            }

            return -EINVAL;
        }

        return -EINVAL;
    }

    return -EINVAL;
}

phys_addr = 36;

size_or_mask = SIZE_OR_MASK_BITS(phys_addr);

```
if (c->x86_mask || c->cpuid_level >= 0)
  seq_printf(m, "stepping: %d
", c->x86_mask);
+if (c->x86_stepping || c->cpuid_level >= 0)
+  seq_printf(m, "stepping: %d
", c->x86_stepping);
else
  seq_puts(m, "stepping: unknown
");
if (c->microcode)
  @ @ -91,8 +91,8 @@
}

/* Cache size */
-if (c->x86_cache_size >= 0)
-  seq_printf(m, "cache size: %d KB
", c->x86_cache_size);
+if (c->x86_cache_size)
+  seq_printf(m, "cache size: %u KB
", c->x86_cache_size);
show_cpuinfo_core(m, c, cpu);
show_cpuinfo_misc(m, c);
--- linux-4.15.0.orig/arch/x86/kernel/cpu/scattered.c
+++ linux-4.15.0/arch/x86/kernel/cpu/scattered.c
@@ -21,11 +21,14 @@
 static const struct cpuid_bit cpuid_bits[] = {
-  { X86_FEATURE_APERFMPERF, CPUID_ECX, 0, 0x00000006, 0 },
-  { X86_FEATURE_EPB, CPUID_ECX, 3, 0x00000006, 0 },
-  { X86_FEATURE_AVX512_4VNNIW, CPUID_EDX, 2, 0x00000007, 0 },
-  { X86_FEATURE_AVX512_4VNNI4, CPUID_EDX, 3, 0x00000007, 0 },
+  { X86_FEATURE_CQM_LLC, CPUID_EDX, 1, 0x0000000f, 0 },
+  { X86_FEATURE_CQM_OCCUP_LLC, CPUID_EDX, 0, 0x0000000f, 0 },
+  { X86_FEATURE_CQM_MBM_TOTAL, CPUID_EDX, 1, 0x0000000f, 1 },
+  { X86_FEATURE_CQM_MBM_LOCAL, CPUID_EDX, 0, 0x0000000f, 1 },
+  { X86_FEATURE_CAT_L3, CPUID_EBX, 1, 0x00000010, 0 },
+  { X86_FEATURE_CAT_L2, CPUID_EBX, 2, 0x00000010, 0 },
+  { X86_FEATURE_CDP_L3, CPUID_ECX, 2, 0x00000010, 1 },
+  { X86_FEATURE_CDP_L2, CPUID_ECX, 2, 0x00000010, 2 },
+  { X86_FEATURE_MBA, CPUID_EBX, 3, 0x00000000, 0 },
+  { X86_FEATURE_HW_PSTATE, CPUID_EDX, 7, 0x80000007, 0 },
+  { X86_FEATURE_CPB, CPUID_EDX, 9, 0x80000007, 0 },
--- linux-4.15.0.orig/arch/x86/kernel/cpu/topology.c
+++ linux-4.15.0/arch/x86/kernel/cpu/topology.c
@@ -22,21 +22,13 @@
#define BITS_SHIFT_NEXT_LEVEL(eax) ((eax) & 0x1f)
#define LEVEL_MAX_SIBLINGS(ebx)((ebx) & 0xffff)

-/*
- * Check for extended topology enumeration cpuid leaf 0xb and if it
- * exists, use it for populating initial_apicid and cpu topology
- * detection.
- */
void detect_extended_topology(struct cpuinfo_x86 *c)
+int detect_extended_topology_early(struct cpuinfo_x86 *c)
{
#ifdef CONFIG_SMP
-unsigned int eax, ebx, ecx, edx, sub_index;
-unsigned int ht_mask_width, core_plus_mask_width;
-unsigned int core_select_mask, core_level_siblings;
-static bool printed;
+unsigned int eax, ebx, ecx, edx;
if (c->cpuid_level < 0xb)
-return;
+return -1;

cpuid_count(0xb, SMT_LEVEL, &eax, &ebx, &ecx, &edx);

@@ -44,7 +36,7 @@
* check if the cpuid leaf 0xb is actually implemented.
 */
if (ebx == 0 || (LEAFB_SUBTYPE(ecx) != SMT_TYPE))
-return;
+return -1;

set_cpu_cap(c, X86_FEATURE_XTOPOLOGY);

@@ -52,10 +44,30 @@
* initial apic id, which also represents 32-bit extended x2apic id.
 */
c->initial_apicid = edx;
+smp_num_siblings = LEVEL_MAX_SIBLINGS(ebx);
+#endif
+return 0;
+
+/*
 + * Check for extended topology enumeration cpuid leaf 0xb and if it
 + * exists, use it for populating initial_apicid and cpu topology
 + * detection.
 + */
+int detect_extended_topology(struct cpuinfo_x86 *c)
+{
+#ifdef CONFIG_SMP
+unsigned int eax, ebx, ecx, edx, sub_index;
+unsigned int ht_mask_width, core_plus_mask_width;
+unsigned int core_select_mask, core_level_siblings;
+if (detect_extended_topology_early(c) < 0)
+return -1;
/*
 * Populate HT related information from sub-leaf level 0.
 */
+cpuid_count(0xb, SMT_LEVEL, &eax, &ebx, &ecx, &edx);
core_level_siblings = smp_num_siblings = LEVEL_MAX_SIBLINGS(ebx);
core_plus_mask_width = ht_mask_width = BITS_SHIFT_NEXT_LEVEL(eax);

@@ -86,15 +98,6 @@
c->apicid = apic->phys_pkg_id(c->initial_apicid, 0);

c->x86_max_cores = (core_level_siblings / smp_num_siblings);
-
-#ifdef printed
-    #endif
+    return 0;
-#endif

--- linux-4.15.0.orig/arch/x86/kernel/cpu/tsx.c
+++ linux-4.15.0/arch/x86/kernel/cpu/tsx.c
@@ -0,0 +1,141 @@
+// SPDX-License-Identifier: GPL-2.0
+/
+ * Intel Transactional Synchronization Extensions (TSX) control.
+ *
+ * Copyright (C) 2019 Intel Corporation
+ *
+ * Author:
+ * Pawan Gupta <pawan.kumar.gupta@linux.intel.com>
+ */
+
+#include <linux/cpufeature.h>
+
+#include <asm/cmdline.h>
+
+#include "cpu.h"
+
+enum tsx_ctrl_states tsx_ctrl_state __ro_after_init = TSX_CTRL_NOT_SUPPORTED;
+
+void tsx_disable(void)
{
+u64 tsx;
+
+rdmsrl(MSR_IA32_TSX_CTRL, tsx);
+
+/* Force all transactions to immediately abort */
+tsx |= TSX_CTRL_RTM_DISABLE;
+
+/*
+ * Ensure TSX support is not enumerated in CPUID.
+ * This is visible to userspace and will ensure they
+ * do not waste resources trying TSX transactions that
+ * will always abort.
+ */
+tsx |= TSX_CTRL_CPUID_CLEAR;
+
+wrmsrl(MSR_IA32_TSX_CTRL, tsx);
+
+
+void tsx_enable(void)
+{
+u64 tsx;
+
+rdmsrl(MSR_IA32_TSX_CTRL, tsx);
+
+/* Enable the RTM feature in the cpu */
+tsx &=- TSX_CTRL_RTM_DISABLE;
+
+/*
+ * Ensure TSX support is enumerated in CPUID.
+ * This is visible to userspace and will ensure they
+ * can enumerate and use the TSX feature.
+ */
+tsx &=- TSX_CTRL_CPUID_CLEAR;
+
+wrmsrl(MSR_IA32_TSX_CTRL, tsx);
+
+
+static bool __init tsx_ctrl_is_supported(void)
+{
+u64 ia32_cap = x86_read_arch_cap_msr();
+
+/*
+ * TSX is controlled via MSR_IA32_TSX_CTRL. However, support for this
+ * MSR is enumerated by ARCH_CAP_TSX_MSR bit in MSR_IA32_ARCH_CAPABILITIES.
+ *
+ * TSX control (aka MSR_IA32_TSX_CTRL) is only available after a
+ * microcode update on CPUs that have their MSR_IA32_ARCH_CAPABILITIES
+ * bit MDS_NO=1. CPUs with MDS_NO=0 are not planned to get
+ * MSR_IA32_TSX_CTRL support even after a microcode update. Thus, 
+ * tsx= cmdline requests will do nothing on CPUs without 
+ * MSR_IA32_TSX_CTRL support. 
+ */
+ return !!(ia32_cap & ARCH_CAP_TSX_CTRL_MSR);
+
+static enum tsx_ctrl_states x86_get_tsx_auto_mode(void)
+{
+  if (boot_cpu_has_bug(X86_BUG_TAA))
+    return TSX_CTRL_DISABLE;
+  return TSX_CTRL_ENABLE;
+
+void __init tsx_init(void)
+{
+  char arg[5] = { }; 
+  int ret;
+
+  if (!tsx_ctrl_is_supported())
+    return;
+  ret = cmdline_find_option(boot_command_line, "tsx", arg, sizeof(arg));
+  if (ret >= 0) {
+    if (!strcmp(arg, "on")) {
+      tsx_ctrl_state = TSX_CTRL_ENABLE;
+    } else if (!strcmp(arg, "off")) {
+      tsx_ctrl_state = TSX_CTRL_DISABLE;
+    } else if (!strcmp(arg, "auto")) {
+      tsx_ctrl_state = x86_get_tsx_auto_mode();
+    } else {
+      tsx_ctrl_state = TSX_CTRL_DISABLE;
+      pr_err("tsx: invalid option, defaulting to off\n");
+    }
+  } else {
+    /* tsx= not provided */
+    if (IS_ENABLED(CONFIG_X86_INTEL_TSX_MODE_AUTO))
+      tsx_ctrl_state = x86_get_tsx_auto_mode();
+    else if (IS_ENABLED(CONFIG_X86_INTEL_TSX_MODE_OFF))
+      tsx_ctrl_state = TSX_CTRL_DISABLE;
+    else
+      tsx_ctrl_state = TSX_CTRL_ENABLE;
+  }
+
+  if (tsx_ctrl_state == TSX_CTRL_DISABLE) {
+    tsx_disable();
+  }
+/*
+ * tsx_disable() will change the state of the RTM and HLE CPUID
+ * bits. Clear them here since they are now expected to be not
+ * set.
+ */
+setup_clear_cpu_cap(X86_FEATURE_RTM);
+setup_clear_cpu_cap(X86_FEATURE_HLE);
+} else if (tsx_ctrl_state == TSX_CTRL_ENABLE) {
+
+/*
+ * HW defaults TSX to be enabled at bootup.
+ * We may still need the TSX enable support
+ * during init for special cases like
+ * kexec after TSX is disabled.
+ */
+tsx_enable();
+
+/*
+ * tsx_enable() will change the state of the RTM and HLE CPUID
+ * bits. Force them here since they are now expected to be set.
+ */
+setup_force_cpu_cap(X86_FEATURE_RTM);
+setup_force_cpu_cap(X86_FEATURE_HLE);
+}
+}

--- linux-4.15.0.orig/arch/x86/kernel/cpu/vmware.c
+++ linux-4.15.0/arch/x86/kernel/cpu/vmware.c
@@ -77,7 +77,7 @@
}

early_param("no-vmw-sched-clock", setup_vmw_sched_clock);

-static unsigned long long vmware_sched_clock(void)
+static unsigned long long notrace vmware_sched_clock(void)
{unsigned long long ns;

--- linux-4.15.0.orig/arch/x86/kernel/crash.c
+++ linux-4.15.0/arch/x86/kernel/crash.c
@@ -23,6 +23,7 @@
#include <linux/export.h>
#include <linux/slab.h>
#include <linux/vmalloc.h>
+#include <linux/overflow.h>
#include <asm/processor.h>
#include <asm/hardirq.h>
#include <linux/vmalloc.h>
+#include <linux/overflow.h>

#include <asm/process.h>
#include <asm/hardirq.h>
@@ -565,7 +566,7 @@
 struct crash_memmap_data cmd;

---
struct crash_mem *cmem;

-cmem = vzalloc(sizeof(struct crash_mem));
+cmem = vzalloc(struct_size(cmem, ranges, 1));
if (!cmem)
    return -ENOMEM;

--- linux-4.15.0.orig/arch/x86/kernel/devicetree.c
+++ linux-4.15.0/arch/x86/kernel/devicetree.c
@@ -12,6 +12,7 @@
    #include <linux/of_address.h>
    #include <linux/of_platform.h>
    #include <linux/of_irq.h>
+    #include <linux/libfdt.h>
    #include <linux/slab.h>
    #include <linux/pci.h>
    #include <linux/of_pci.h>
@@ -200,19 +201,22 @@
static int dt_irqdomain_alloc(struct irq_domain *domain, unsigned int iraq,
    unsigned int nr_irqs, void *arg)
{
-    struct of_phandle_args *irq_data = (void *)arg;
+    struct irq_fwspec *fwspec = (struct irq_fwspec *)arg;
    struct of_ioapic_type *it;
    struct irq_alloc_info tmp;
    +int type_index;

    -if (WARN_ON(irq_data->args_count < 2))
+    if (WARN_ON(fwspec->param_count < 2))
        return -EINVAL;
    -if (irq_data->args[1] >= ARRAY_SIZE(of_ioapic_type))
+    if (type_index >= ARRAY_SIZE(of_ioapic_type))
        return -EINVAL;
    -it = &of_ioapic_type[irq_data->args[1]];
+    it = &of_ioapic_type[type_index];
    ioapic_set_alloc_attr(&tmp, NUMA_NO_NODE, it->trigger, it->polarity);
    tmp.ioapic_id = mpc_ioapic_id(mp_irqdomain_ioapic_idx(domain));
    -tmp.ioapic_pin = irq_data->args[0];
+    tmp.ioapic_pin = fwspec->param[0];
    return mp_irqdomain_alloc(domain, iraq, nr_irqs, &tmp);
}
@@ -276,14 +280,15 @@
map_len = max(PAGE_SIZE - (initial_dtb & ~PAGE_MASK), (u64)128);
initial_boot_params = dt = early_memremap(initial_dtb, map_len);
size = of_get_flat_dt_size();
dt = early_memremap(initial_dtb, map_len);
size = fdt_totalsize(dt);
if (map_len < size) {
    early_memunmap(dt, map_len);
    initial_boot_params = dt = early_memremap(initial_dtb, size);
    dt = early_memremap(initial_dtb, size);
    map_len = size;
}
early_init_dt_verify(dt);
unflatten_and_copy_device_tree();
early_memunmap(dt, map_len);
}
--- linux-4.15.0.orig/arch/x86/kernel/dumpstack.c
+++ linux-4.15.0/arch/x86/kernel/dumpstack.c
@@ -17,6 +17,7 @@
#include <linux/bug.h>
#include <linux/nmi.h>
#include <linux/sysfs.h>
+#include <linux/kasan.h>
#include <asm/cpu_entry_area.h>
#include <asm/stacktrace.h>
@@ -109,7 +110,7 @@
struct stack_info stack_info = {0};
unsigned long visit_mask = 0;
int graph_idx = 0;
-bool partial;
+bool partial = false;

printk("%sCall Trace:\n", log_lvl);
@@ -298,7 +299,10 @@
* We're not going to return, but we might be on an IST stack or
* have very little stack space left. Rewind the stack and kill
* the task.
+  * Before we rewind the stack, we have to tell KASAN that we're going to
+  * reuse the task stack and that existing poisons are invalid.
+*/
+kasan_unpoison_task_stack(current);
rewind_stack_do_exit(signr);
}
NOKPROBE_SYMBOL(oops_end);
--- linux-4.15.0.orig/arch/x86/kernel/early-quirks.c
+++ linux-4.15.0/arch/x86/kernel/early-quirks.c
static void __init early_pci_clear_msi(int bus, int slot, int func)
{
    int pos;
    u16 ctrl;

    if (likely(!pci_early_clear_msi))
        return;

    pos = pci_early_find_cap(bus, slot, func, PCI_CAP_ID_MSI);
    if (pos) {
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSI_FLAGS);
        ctrl &= ~PCI_MSI_FLAGS_ENABLE;
        write_pci_config_16(bus, slot, func, pos + PCI_MSI_FLAGS, ctrl);
        /* Read again to flush previous write */
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSI_FLAGS);
    }

    pos = pci_early_find_cap(bus, slot, func, PCI_CAP_ID_MSIX);
    if (pos) {
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSIX_FLAGS);
        ctrl &= ~PCI_MSIX_FLAGS_ENABLE;
        write_pci_config_16(bus, slot, func, pos + PCI_MSIX_FLAGS, ctrl);
        /* Read again to flush previous write */
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSIX_FLAGS);
    }

    #define dev_err(msg)  pr_err("pci 0000:%02x:%02x.%d: %s", bus, slot, func, msg)

    dev_err("Clearing MSI/MSI-X enable bits early in boot (quirk)n");

    pos = pci_early_find_cap(bus, slot, func, PCI_CAP_ID_MSI);
    if (pos) {
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSI_FLAGS);
        ctrl &= ~PCI_MSI_FLAGS_ENABLE;
        write_pci_config_16(bus, slot, func, pos + PCI_MSI_FLAGS, ctrl);
        /* Read again to flush previous write */
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSI_FLAGS);
    }

    pos = pci_early_find_cap(bus, slot, func, PCI_CAP_ID_MSIX);
    if (pos) {
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSIX_FLAGS);
        ctrl &= ~PCI_MSIX_FLAGS_ENABLE;
        write_pci_config_16(bus, slot, func, pos + PCI_MSIX_FLAGS, ctrl);
        /* Read again to flush previous write */
        ctrl = read_pci_config_16(bus, slot, func, pos + PCI_MSIX_FLAGS);
    }

    #define dev_err(msg)  pr_err("pci 0000:%02x:%02x.%d: %s", bus, slot, func, msg)

    static void __init fix_hypertransport_config(int num, int slot, int func)
    @ @ -527.6 +558.7 @ @
    INTEL_SKL_IDS(&gen9_early_ops),
    INTEL_BXT_IDS(&gen9_early_ops),
    INTEL_KBL_IDS(&gen9_early_ops),
    +INTEL_CFL_IDS(&gen9_early_ops),
    INTEL_GLK_IDS(&gen9_early_ops),
    INTEL_CNL_IDS(&gen9_early_ops),
    ];
    @ @ -680.8 +712.15 @ @
*/
{ PCI_VENDOR_ID_INTEL, 0x0f00, PCI_CLASS_BRIDGE_HOST, PCI_ANY_ID, 0, force_disable_hpet},
+ { PCI_VENDOR_ID_INTEL, 0x3e20, PCI_CLASS_BRIDGE_HOST, PCI_ANY_ID, 0, force_disable_hpet},
+ { PCI_VENDOR_ID_INTEL, 0x3ec4, PCI_CLASS_BRIDGE_HOST, PCI_ANY_ID, 0, force_disable_hpet},
+ { PCI_VENDOR_ID_INTEL, 0x8a12, PCI_CLASS_BRIDGE_HOST, PCI_ANY_ID, 0, force_disable_hpet},
{ PCI_VENDOR_ID_BROADCOM, 0x4331, PCI_CLASS_NETWORK_OTHER, PCI_ANY_ID, 0, apple_airport_reset},
+ { PCI_ANY_ID, PCI_ANY_ID, 0, 0, 0, early_pci_clear_msi},
{};

@@ -734,6 +773,10 @@
 PCI_HEADER_TYPE);

if ((type & 0x7f) == PCI_HEADER_TYPE_BRIDGE) {
 +/* pci_early_clear_msi scans the buses differently. */
 +if (pci_early_clear_msi)
 +return -1;
 +
 +sec = read_pci_config_byte(num, slot, func, PCI_SECONDARY_BUS);
 if (sec > num)
 early_pci_scan_bus(sec);
@@ -760,8 +803,13 @@
 void __init early_quirks(void)
 {
 +int bus;
 +
 +if (!early_pci_allowed())
 return;

 early_pci_scan_bus(0);
 +/* pci_early_clear_msi scans more buses. */
 +for (bus = 1; pci_early_clear_msi && bus < 256; bus++)
 +early_pci_scan_bus(bus);
 }
--- linux-4.15.0.orig/arch/x86/kernel/early_printk.c
+++ linux-4.15.0/arch/x86/kernel/early_printk.c
@@ -213,8 +213,9 @@
 * early_pci_serial_init()
 *
 * This function is invoked when the early_printk param starts with "pciserial"
-* The rest of the param should be ".B:D.F,baud" where B, D & F describe the
-* location of a PCI device that must be a UART device.
+* The rest of the param should be ".force, B:D.F,baud", where B, D & F describe
static __init void early_pci_serial_init(char *s) {
    u32 classcode, bar0;
    u16 cmdreg;
    char *e;
    int force = 0;

    /* First, part the param to get the BDF values */
    if (*s == ',')
        s += 6;
    +
    /* Force the use of an UART device with wrong class code */
    if (!strncmp(s, "force," , 6)) {
        force = 1;
        s += 6;
    +
    +
    /* Part the param to get the BDF values */
    bus = (u8)simple_strtoul(s, &e, 16);
    s = e;
    if (*s != ':')
        s++;
/
    /* Second, find the device from the BDF */
    cmdreg = read_pci_config(bus, slot, func, PCI_COMMAND);
    classcode = read_pci_config(bus, slot, func, PCI_CLASS_REVISION);
    /
    if (((classcode >> 16 != PCI_CLASS_COMMUNICATION_MODEM) &&
        (classcode >> 16 != PCI_CLASS_COMMUNICATION_SERIAL)) ||
    - (((classcode >> 8) & 0xff) != 0x02)) /* 16550 I/F at BAR0 */
    -return;
```c
+ (classcode >> 8) & 0xff) != 0x02)) /* 16550 I/F at BAR0 */ {
+if (!force)
+return;
+
*/

/*
 * Determine if it is IO or memory mapped

@@ -289,7 +298,7 @@
*/

-Lastly, initialize the hardware
+Initialize the hardware
 *
if (*s) {
if (strcmp(s, "nocfg") == 0)
--- linux-4.15.0.orig/arch/x86/kernel/eisa.c
+++ linux-4.15.0/arch/x86/kernel/eisa.c
@@ -7,11 +7,17 @@
#include <linux/eisa.h>
#include <linux/io.h>

+#include <xen/xen.h>
+
static __init int eisa_bus_probe(void)
{
     void __iomem *p = ioremap(0x0FFFD9, 4);
     +void __iomem *p;
     +
     +if (xen_pv_domain() && !xen_initial_domain())
     +return 0;

     -if (readl(p) == 'E' + ('I'<<8) + ('S'<<16) + ('A'<<24))
     +p = ioremap(0x0FFFD9, 4);
     +if (p && readl(p) == 'E' + ('I' << 8) + ('S' << 16) + ('A' << 24))
     EISA_bus = 1;
     iounmap(p);
     return 0;
--- linux-4.15.0.orig/arch/x86/kernel/espfix_64.c
+++ linux-4.15.0/arch/x86/kernel/espfix_64.c
@@ -195,6 +195,10 @@
    stack_page = page_address(alloc_pages_node(node, GFP_KERNEL, 0));
+/*
    +__PAGE_KERNEL_* includes __PAGE_GLOBAL, which we want since
    +this is mapped to userspace.
+/*
```
pte = __pte(__pa(stack_page) | ((__PAGE_KERNEL_RO | _PAGE_ENC) & ptemask));
for (n = 0; n < ESPFIX_PTE_CLONES; n++)
    set_pte(&pte_p[n*PTE_STRIDE], pte);
--- linux-4.15.0.orig/arch/x86/kernel/fpu/core.c
+++ linux-4.15.0/arch/x86/kernel/fpu/core.c
@@ -10,6 +10,7 @@
#include <asm/fpu/signal.h>
#include <asm/fpu/types.h>
#include <asm/traps.h>
+    #include <asm/irq_regs.h>

#include <linux/hardirq.h>
#include <linux/pkeys.h>
--- linux-4.15.0.orig/arch/x86/kernel/fpu/init.c
+++ linux-4.15.0/arch/x86/kernel/fpu/init.c
@@ -249,9 +249,9 @@
 */
 static void __init fpu__init_parse_early_param(void)
 {
-    char arg[32];
+    char arg[128];
    char *argptr = arg;
-    int bit;
+    int arglen, res, bit;
    if (cmdline_find_option_bool(boot_command_line, "no387"))
        setup_clear_cpu_cap(X86_FEATURE_FPU);
    @ @ -271,12 +271,26 @@
    if (cmdline_find_option_bool(boot_command_line, "noxsaves"))
        setup_clear_cpu_cap(X86_FEATURE_XSAVES);

-    if (cmdline_find_option(boot_command_line, "clearcpuid", arg,
-        sizeof(arg)) &&
-        get_option(&argptr, &bit) &&
-        bit >= 0 &&
-        bit < NCAPINTS * 32)
-        setup_clear_cpu_cap(bit);
+    arglen = cmdline_find_option(boot_command_line, "clearcpuid", arg, sizeof(arg));
+    if (arglen <= 0)
+        return;
+    pr_info("Clearing CPUID bits:");
+    do {
+        res = get_option(&argptr, &bit);
+        if (res == 0 || res == 3)
+            break;
+    }/* If the argument was too long, the last bit may be cut off */
+if (res == 1 && arglen >= sizeof(arg))
+break;
+
+if (bit >= 0 && bit < NCAPINTS * 32) {
+pr_cont(" " X86_CAP_FMT, x86_cap_flag(bit));
+setup_clear_cpu_cap(bit);
+}
+} while (res == 2);
+pr_cont("\n");
}

/*
--- linux-4.15.0.orig/arch/x86/kernel/fpu/regset.c
+++ linux-4.15.0/arch/x86/kernel/fpu/regset.c
@@ -128,7 +128,7 @@
/*
 * A whole standard-format XSAVE buffer is needed:
 */
-if ((pos != 0) || (count < fpu_user_xstate_size))
+if (pos != 0 || count != fpu_user_xstate_size)
 return -EFAULT;

 xsave = &fpu->state.xsave;
--- linux-4.15.0.orig/arch/x86/kernel/fpu/signal.c
+++ linux-4.15.0/arch/x86/kernel/fpu/signal.c
@@ -272,6 +272,7 @@
 int state_size = fpu_kernel_xstate_size;
 u64 xfeatures = 0;
 int fx_only = 0;
+int ret = 0;

 ia32_fxstate &= (IS_ENABLED(CONFIG_X86_32) ||
 IS_ENABLED(CONFIG_IA32_EMULATION));
@@ -281,15 +282,21 @@
 return 0;
 }

-if (!access_ok(VERIFY_READ, buf, size))
 -return -EACCES;
+if (!access_ok(VERIFY_READ, buf, size)) {
+ret = -EACCES;
+goto out_err;
+}

 fpu__initialize(fpu);

-if (!static_cpu_has(X86_FEATURE_FPU))
 -return fpregs_soft_set(current, NULL,
- 0, sizeof(struct user_i387_ia32_struct),
- NULL, buf) != 0;
+if (!static_cpu_has(X86_FEATURE_FPU)) {
+ret = fpregs_soft_set(current, NULL,
+ 0, sizeof(struct user_i387_ia32_struct),
+ NULL, buf) != 0;
+if (ret)
+goto out_err;
+return 0;
+
+}

if (use_xsave()) {
struct _fpx_sw_bytes fx_sw_user;
@@ -314,7 +321,6 @@
 * thread's fpu state, reconstruct fxstate from the fsave
 * header. Validate and sanitize the copied state.
 */
-struct fpu *fpu = &tsk->thread.fpu;
struct user_i387_ia32_struct env;
int err = 0;

@@ -345,11 +351,12 @@
sanitize_restored_xstate(tsk, &env, xfeatures, fx_only);
 }

+local_bh_disable();
fpu->initialized = 1;
-preempt_disable();
fpu__restore(fpu);
-preempt_enable();
+local_bh_enable();

+/* Failure is already handled */
return err;
} else {
/*
 @@ -357,13 +364,14 @@
 * state to the registers directly (with exceptions handled).
 */
user_fpu_begin();
-if (copy_user_to_fpregs_zeroing(buf_fx, xfeatures, fx_only)) {
-fpu__clear(fpu);
-return -1;
-
}+
+if (!copy_user_to_fpregs_zeroing(buf_fx, xfeatures, fx_only))
+return 0;
+ret = -1;
+}
return 0;
+out_err:
+fpu__clear(fpu);
+return ret;
}

static inline int xstate_sigframe_size(void)
--- linux-4.15.0.orig/arch/x86/kernel/fpu/xstate.c
+++ linux-4.15.0/arch/x86/kernel/fpu/xstate.c
@@ -405,12 +405,32 @@
}

/*
+ * All supported features have either init state all zeros or are
+ * handled in setup_init_fpu() individually. This is an explicit
+ * feature list and does not use XFEATURE_MASK*SUPPORTED to catch
+ * newly added supported features at build time and make people
+ * actually look at the init state for the new feature.
+ */
+#define XFEATURES_INIT_FPSTATE_HANDLED
+ (XFEATURE_MASK_FP |
+ XFEATURE_MASK_SSE |
+ XFEATURE_MASK_YMM |
+ XFEATURE_MASK_OPMASK |
+ XFEATURE_MASK_ZMM_Hi256 |
+ XFEATURE_MASK_Hi16_ZMM |
+ XFEATURE_MASK_PKRU |
+ XFEATURE_MASK_BNDREGS |
+ XFEATURE_MASK_BNDCSR)
+
+/*
+ * setup the xstate image representing the init state
+ */
static void __init setup_init_fpu_buf(void)
{
    static int on_boot_cpu __initdata = 1;

+BUILD_BUG_ON(XCNTXT_MASK != XFEATURES_INIT_FPSTATE_HANDLED);
+
WARN_ON_FPU(!on_boot_cpu);
on_boot_cpu = 0;

@@ -429,10 +449,22 @@
    copy_kernel_to_xregs_booting(&init_fpstate.xsave);

 /*
- * Dump the init state again. This is to identify the init state
+ * Dump the init state again. This is to identify the init state

- * of any feature which is not represented by all zero's.
+ * All components are now in init state. Read the state back so
+ * that init_fpstate contains all non-zero init state. This only
+ * works with XSAVE, but not with XSAVEOPT and XSAVES because
+ * those use the init optimization which skips writing data for
+ * components in init state.
+ *
+ * XSAVE could be used, but that would require to reshuffle the
+ * data when XSAVES is available because XSAVES uses xstate
+ * compaction. But doing so is a pointless exercise because most
+ * components have an all zeros init state except for the legacy
+ * ones (FP and SSE). Those can be saved with FXSAVE into the
+ * legacy area. Adding new features requires to ensure that init
+ * state is all zeroes or if not to add the necessary handling
+ * here.
+ */
+copy_xregs_to_kernel_booting(&init_fpstate.xsave);
+fxsave(&init_fpstate.fxsave);
}

static int xfeature_uncompacted_offset(int xfeature_nr)

```
@@ -907,8 +939,6 @@

#ifdef CONFIG_ARCH_HAS_PKEYS

-#define NR_VALID_PKRU_BITS (CONFIG_NR_PROTECTION_KEYS * 2)
-#define PKRU_VALID_MASK (NR_VALID_PKRU_BITS - 1)
 /*
 * This will go out and modify PKRU register to set the access
 * rights for @pkey to @init_val.
@@ -927,6 +957,13 @@
 if (!boot_cpu_has(X86_FEATURE_OSPKE))
     return -EINVAL;

+/*
+ * This code should only be called with valid 'pkey'
+ * values originating from in-kernel users. Complain
+ * if a bad value is observed.
+ */
+WARN_ON_ONCE(pkey >= arch_max_pkey());
+
+/* Set the bits we need in PKRU: */
+if (init_val & PKEY_DISABLE_ACCESS)
+    new_pkru_bits |= PKRU_AD_BIT;
+return true;
```
static inline void 
__copy_xstate_to_kernel(void *kbuf, const void *data, 
unsigned int offset, unsigned int size, unsigned int size_total) 
static void fill_gap(unsigned to, void **kbuf, unsigned *pos, unsigned *count) 
{ 
-if (offset < size_total) {
-unsigned int copy = min(size, size_total - offset);
+if (*pos < to) {
+unsigned size = to - *pos;
+
+if (size > *count)
+size = *count;
+memcpy(*kbuf, (void *)&init_fpstate.xsave + *pos, size);
+*kbuf += size;
+*pos += size;
+*count -= size;
+} 
+
-memcpy(kbuf + offset, data, copy);
+static void copy_part(unsigned offset, unsigned size, void *from, 
+void **kbuf, unsigned *pos, unsigned *count)
+{
+fill_gap(offset, kbuf, pos, count);
+if (size > *count)
+size = *count;
+if (size) {
+memcpy(*kbuf, from, size);
+*kbuf += size;
+*pos += size;
+*count -= size;
+} 
+
int copy_xstate_to_kernel(void *kbuf, struct xregs_state *xsave, unsigned int offset_start, unsigned int size_total) 
{ 
-unsigned int offset, size;
-struct xstate_header header;
+const unsigned off_mxcsr = offsetof(struct fxregs_state, mxcsr);
+unsigned count = size_total;
-int i;
# Include header file
@
header.xfeatures = xsave->header.xfeatures;
header.xfeatures &= ~XFEATURE_MASK_SUPERVISOR;

+if (header.xfeatures & XFEATURE_MASK_FP)
+copy_part(0, off_mxcsr,
+ &xsave->i387, &kbuf, &offset_start, &count);
+if (header.xfeatures & (XFEATURE_MASK_SSE | XFEATURE_MASK_YMM))
+copy_part(off_mxcsr, MXCSR_AND_FLAGS_SIZE,
+ &xsave->i387.mxcsr, &kbuf, &offset_start, &count);
+if (header.xfeatures & XFEATURE_MASK_FP)
+copy_part(offsetof(struct fxregs_state, st_space), 128,
+ &xsave->i387.st_space, &kbuf, &offset_start, &count);
+if (header.xfeatures & XFEATURE_MASK_SSE)
+copy_part(xstate_offsets[XFEATURE_SSE], 256,
+ &xsave->i387.xmm_space, &kbuf, &offset_start, &count);
+/*
+ * Fill xsave->i387.sw_reserved value for ptrace frame:
+ */
+copy_part(offsetof(struct fxregs_state, sw_reserved), 48,
+ xstate_fx_sw_bytes, &kbuf, &offset_start, &count);
/*
 * Copy xregs_state->header:
 */
-offset = offsetof(struct xregs_state, header);
-size = sizeof(header);
+copy_part(offsetof(struct xregs_state, header), sizeof(header),
+ &header, &kbuf, &offset_start, &count);

-__copy_xstate_to_kernel(kbuf, &header, offset, size, size_total);
-
-for (i = 0; i < XFEATURE_MAX; i++) {
+for (i = FIRST_EXTENDED_XFEATURE; i < XFEATURE_MAX; i++) {
+/*
+ * Copy only in-use xstates:
+ */
+if ((header.features >> i) & 1) {
+void *src = __raw_xsave_addr(xsave, 1 << i);

-offset = xstate_offsets[i];
-size = xstate_sizes[i];
-
-/* The next component has to fit fully into the output buffer: */
-if (offset + size > size_total)
-break;
-
-__copy_xstate_to_kernel(kbuf, src, offset, size, size_total);
+copy_part(xstate_offsets[i], xstate_sizes[i],
+ src, &kbuf, &offset_start, &count);
}

-
-if (xfeatures_mnxcsr_quirk(header.xfeatures)) {
- offset = offsetof(struct fxregs_state, mxcsr);
- size = MXCSR_AND_FLAGS_SIZE;
- __copy_xstate_to_kernel(kbuf, &xsave->i387.mxcsr, offset, size, size_total);
- }
-
- /*
- * Fill xsave->i387.sw_reserved value for ptrace frame:
- */
- offset = offsetof(struct fxregs_state, sw_reserved);
- size = sizeof(xstate_fx_sw_bytes);
-
- __copy_xstate_to_kernel(kbuf, xstate_fx_sw_bytes, offset, size, size_total);
+fill_gap(size_total, &kbuf, &offset_start, &count);

return 0;
}
int ftrace_arch_code_modify_post_process(void)
+  __releases(&text_mutex)
{
  set_all_modules_text_ro();
  set_kernel_text_ro();
+  mutex_unlock(&text_mutex);
  return 0;
}

union ftrace_code_union {
  char code[MCOUNT_INSN_SIZE];
  struct {
    unsigned char e8;
    unsigned char op;
    int offset;
  } __attribute__((packed));
};

- static unsigned char *ftrace_call_replace(unsigned long ip, unsigned long addr)
+ static unsigned char *
ftrace_text_replace(unsigned char op, unsigned long ip, unsigned long addr)
{
  static union ftrace_code_union calc;

  - calc.e8= 0xe8;
  + calc.op= op;
  calc.offset= ftrace_calc_offset(ip + MCOUNT_INSN_SIZE, addr);

  /*
  * No locking needed, this must be called via kstop_machine
  * which in essence is like running on a uniprocessor machine.
  * */
  return calc.code;
}

+ static unsigned char *
+ ftrace_call_replace(unsigned long ip, unsigned long addr)
+{
  + return ftrace_text_replace(0xe8, ip, addr);
  +
  +
  static inline int
  within(unsigned long addr, unsigned long start, unsigned long end)
static unsigned long ftrace_update_func;
+static unsigned long ftrace_update_func_call;

static int update_ftrace_func(unsigned long ip, void *new)
{
    unsigned char *new;
    int ret;

    +ftrace_update_func_call = (unsigned long)func;
    +
    new = ftrace_call_replace(ip, (unsigned long)func);
    ret = update_ftrace_func(ip, new);

    if (WARN_ON_ONCE(!regs))
        return 0;

    -ip = regs->ip - 1;
    -if (!ftrace_location(ip) && !is_ftrace_caller(ip))
        return 0;
    +ip = regs->ip - INT3_INSN_SIZE;

    -regs->ip += MCOUNT_INSN_SIZE - 1;
    +#ifdef CONFIG_X86_64
    +if (ftrace_location(ip)) {
        +int3_emulate_call(regs, (unsigned long)ftrace_regs_caller);
        +return 1;
    +} else if (is_ftrace_caller(ip)) {
        +if (!ftrace_update_func_call) {
            +int3_emulate_jmp(regs, ip + CALL_INSN_SIZE);
            +return 1;
        +} int3_emulate_call(regs, ftrace_update_func_call);
        +return 1;
    +}
    +#else
    +if (ftrace_location(ip) || is_ftrace_caller(ip)) {
        +int3_emulate_imp(regs, ip + CALL_INSN_SIZE);
        +return 1;
    +}
    +#endif

    -return 1;
static int ftrace_write(unsigned long ip, const char *val, int size)
{
    return 0;
}

static int ftrace_write(unsigned long ip, const char *val, int size)
{
    return 0;
}

-#if defined(CONFIG_X86_64) || defined(CONFIG_FUNCTION_GRAPH_TRACER)
-static unsigned char *ftrace_jmp_replace(unsigned long ip, unsigned long addr)
-{  
-    static union ftrace_code_union calc;
-    /* Jmp not a call (ignore the .e8) */
-    calc.e8 = 0xe9;
-    calc.offset = ftrace_calc_offset(ip + MCOUNT_INSN_SIZE, addr);
-    /*
-     * ftrace external locks synchronize the access to the static variable.
-     */
-    return calc.code;
-}
-#endif
-
/* Currently only x86_64 supports dynamic trampolines */
#ifdef CONFIG_X86_64

+reamble
+__attribute__((packed));
+
+define RET_SIZE1
+
static unsigned long
create_trampoline(struct ftrace_ops *ops, unsigned int *tramp_size)
{
    -unsigned const char *jmp;
    unsigned long start_offset;
    unsigned long end_offset;
    unsigned long op_offset;
    unsigned long offset;
    unsigned long npages;
    unsigned long size;
    unsigned long ip;
    unsigned long retq;
    unsigned long *ptr;
    void *trampoline;
    +void *ip;
/* 48 8b 15 <offset> is movq <offset>(%rip), %rdx */
unsigned const char op_ref[] = { 0x48, 0x8b, 0x15 }
union ftrace_op_code_union op_ptr;
@@ -764,27 +778,28 @@

/*
 * Allocate enough size to store the ftrace_caller code,
-* the jmp to ftrace_epilogue, as well as the address of
-* the ftrace_ops this trampoline is used for.
+* the iret , as well as the address of the ftrace_ops this
+* trampoline is used for.
 */
-trampoline = alloc_tramp(size + MCOUNT_INSN_SIZE + sizeof(void *));
+trampoline = alloc_tramp(size + RET_SIZE + sizeof(void *));
if (!trampoline)
    return 0;

-*tramp_size = size + MCOUNT_INSN_SIZE + sizeof(void *);
+*tramp_size = size + RET_SIZE + sizeof(void *);
+npages = DIV_ROUND_UP(*tramp_size, PAGE_SIZE);

/* Copy ftrace_caller onto the trampoline memory */
ret = probe_kernel_read(trampoline, (void *)start_offset, size);
-if (WARN_ON(ret < 0)) {
-    tramp_free(trampoline, *tramp_size);
-    return 0;
-}
+if (WARN_ON(ret < 0))
+    goto fail;

-ip = (unsigned long)trampoline + size;
+ip = trampoline + size;

-/* The trampoline ends with a jmp to ftrace_epilogue */
-jmp = ftrace_jmp_replace(ip, (unsigned long)ftrace_epilogue);
-memcpy(trampoline + size, jmp, MCOUNT_INSN_SIZE);
+/* The trampoline ends with ret(q) */
+retq = (unsigned long)ftrace_stub;
+ret = probe_kernel_read(ip, (void *)retq, RET_SIZE);
+if (WARN_ON(ret < 0))
+    goto fail;

/*
 * The address of the ftrace_ops that is used for this trampoline
@@ -794,17 +809,15 @@
 * the global function_trace_op variable.
 */
-ptr = (unsigned long *)(trampoline + size + MCOUNT_INSN_SIZE);
+ptr = (unsigned long *)(trampoline + size + RET_SIZE);
*ptr = (unsigned long)ops;

op_offset -= start_offset;
memcpy(&op_ptr, trampoline + op_offset, OP_REF_SIZE);

/* Are we pointing to the reference? */
-if (WARN_ON(memcmp(op_ptr.op, op_ref, 3) != 0)) {
-+tramp_free(trampoline, *tramp_size);
-+return 0;
-}
+if (WARN_ON(memcmp(op_ptr.op, op_ref, 3) != 0))
+goto fail;

/* Load the contents of ptr into the callback parameter */
offset = (unsigned long)ptr;
@@ -818,7 +831,16 @@
/* ALLOC_TRAMP flags lets us know we created it */
ops->flags |= FTRACE_OPS_FL_ALLOC_TRAMP;

+/*
+ * Module allocation needs to be completed by making the page
+ * executable. The page is still writable, which is a security hazard,
+ * but anyhow ftrace breaks W^X completely.
+ */
+set_memory_x((unsigned long)trampoline, npages);
+return (unsigned long)trampoline;
+fail:
+tramp_free(trampoline, *tramp_size);
+return 0;
+}

static unsigned long calc_trampoline_call_offset(bool save_regs)
@@ -868,6 +890,8 @@
func = ftrace_ops_get_func(ops);

+ftrace_update_func_call = (unsigned long)func;
+/* Do a safe modify in case the trampoline is executing */
+new = ftrace_call_replace(ip, (unsigned long)func);
+ret = update_ftrace_func(ip, new);
@@ -888,8 +912,8 @@
return NULL;
/* Make sure this is a call */
-if (WARN_ON_ONCE(calc.e8 != 0xe8)) {
+return NULL;

pr_warn("Expected e8, got %x\n", calc.e8);
+if (WARN_ON_ONCE(calc.op != 0xe8)) {
+pr_warn("Expected e8, got %x\n", calc.op);
return NULL;
}

#ifdef CONFIG_DYNAMIC_FTRACE
extern void ftrace_graph_call(void);

+static unsigned char *ftrace_imp_replace(unsigned long ip, unsigned long addr)
+{
+return ftrace_text_replace(0xe9, ip, addr);
+
+static int ftrace_mod_imp(unsigned long ip, void *func)
+{
unsigned char *new;

+ftrace_update_func_call = 0UL;
new = ftrace_imp_replace(ip, (unsigned long)func);

return update_ftrace_func(ip, new);
#endif -960,10 +984,16 @@
{
unsigned long old;
int faulted;
-struct ftrace_graph_ent trace;
unsigned long return_hooker = (unsigned long)
&amp;return_to_handler;

@@ -1046,19 +1075,7 @@
return;
}

-trace.func = self_addr;
-trace.depth = current-&gt;curr_ret_stack + 1;
-
-/* Only trace if the calling function expects to */
-if (!ftrace_graph_entry(&amp;trace)) {
-*parent = old;
-return;
-}
-
-if (ftrace_push_return_trace(old, self_addr, &amp;trace.depth,
- frame_pointer, parent) == -EBUSY) {
+if (function_graph_enter(old, self_addr, frame_pointer, parent))
+*parent = old;
-return;
-
}
#endif /* CONFIG_FUNCTION_GRAPH_TRACER */
--- linux-4.15.0.orig/arch/x86/kernel/ftrace_64.S
+++ linux-4.15.0/arch/x86/kernel/ftrace_64.S
@@ -171,9 +171,6 @@
 restore_mcount_regs

 /*
- * The copied trampoline must call ftrace_epilogue as it
- * still may need to call the function graph tracer.
- *
- * The code up to this label is copied into trampolines so
- * think twice before adding any new code or changing the
- * layout here.
- @@ -171,9 +171,6 @@
- jmp ftrace_stub

 #endif

 /*
- * This is weak to keep gas from relaxing the jumps */
+/*
+ * This is weak to keep gas from relaxing the jumps.
+ * It is also used to copy the retq for trampolines.
+ */
 WEAK(ftrace_stub)
 retq
ENDPROC(ftrace_caller)
unsigned long __head__startup_64(unsigned long physaddr, 
   struct boot_params *bp) 
{
@@ -55,6 +62,7 @@
   p4dval_t *p4d;
   pudval_t *pud;
   pmdval_t *pmd, pmd_entry;
+  pt eval_t *mask_ptr;
   int i;
   unsigned int *next_pgt_ptr;
@@ -93,7 +101,8 @@
      pmd[506] += load_delta;
+    for (i = FIXMAP_PMD_TOP; i > FIXMAP_PMD_TOP - FIXMAP_PMD_NUM; i--)
+      pmd[i] += load_delta;

    /*
     * Set up the identity mapping for the switchover. These
@@ -109,32 +118,37 @@
      pgtable_flags = _KERNPG_TABLE_NOENC + sme_get_me_mask();

    if (IS_ENABLED(CONFIG_X86_5LEVEL)) {
-      p4d = fixup_pointer(early_dynamic_pgts[next_early_pgt++], physaddr);
+      p4d = fixup_pointer(early_dynamic_pgts[(*next_pgt_ptr)++], physaddr);
+      for (i = physaddr >> P4D_SHIFT; i < PTRS_PER_P4D; i++)
+        p4d[i] = (pgdval_t)p4d + pgtable_flags;
      physaddr;

      i = (physaddr >> PGDIR_SHIFT) % PTRS_PER_PGD;
      pgd[i + 0] = (pgdval_t)p4d + pgtable_flags;
      pgd[i + 1] = (pgdval_t)p4d + pgtable_flags;

-    i = (physaddr >> P4D_SHIFT) % PTRS_PER_P4D;
-      p4d[i + 0] = (pgdval_t)p4d + pgtable_flags;
-      p4d[i + 1] = (pgdval_t)p4d + pgtable_flags;
-    } else {
-      i = (physaddr >> PGDIR_SHIFT) % PTRS_PER_PGD;
-      pgd[i + 0] = (pgdval_t)pud + pgtable_flags;
-      pgd[i + 1] = (pgdval_t)pud + pgtable_flags;
-    }
-  }

-  i = (physaddr >> PUD_SHIFT) % PTRS_PER_PUD;
-  pud[i + 0] = (pudval_t)pud + pgtable_flags;
-  pud[i + 1] = (pudval_t)pud + pgtable_flags;

}
+i = physaddr >> PUD_SHIFT;
+pud[i + 0] % PTRS_PER_PUD] = (pudval_t)pmd + pgtable_flags;
+pud[i + 1] % PTRS_PER_PUD] = (pudval_t)pmd + pgtable_flags;

pmd_entry = __PAGE_KERNEL_LARGE_EXEC & ~_PAGE_GLOBAL;
+/* Filter out unsupported __PAGE_KERNEL_* bits: */
+mask_ptr = fixup_pointer(&__supported_pte_mask, physaddr);
+pmd_entry &= *mask_ptr;
+pmd_entry += sme_get_me_mask();
+pmd_entry += physaddr;

for (i = 0; i < DIV_ROUND_UP(_end - _text, PMD_SIZE); i++) {
-    int idx = i + (physaddr >> PMD_SHIFT) % PTRS_PER_PMD;
-    pmd[idx] = pmd_entry + i * PMD_SIZE;
+    int idx = i + (physaddr >> PMD_SHIFT);
+    pmd[idx % PTRS_PER_PMD] = pmd_entry + i * PMD_SIZE;
    }

/*
@@ -142,13 +156,31 @@
* we might write invalid pmds, when the kernel is relocated
* cleanup_highmap() fixes this up along with the mappings
* beyond _end.
+ *
+ * Only the region occupied by the kernel image has so far
+ * been checked against the table of usable memory regions
+ * provided by the firmware, so invalidate pages outside that
+ * region. A page table entry that maps to a reserved area of
+ * memory would allow processor speculation into that area,
+ * and on some hardware (particularly the UV platform) even
+ * speculative access to some reserved areas is caught as an
+ * error, causing the BIOS to halt the system.
+ */

pmd = fixup_pointer(level2_kernel_pgt, physaddr);
-    for (i = 0; i < PTRS_PER_PMD; i++) {
+    /* invalidate pages before the kernel image */
+    for (i = 0; i < pmd_index((unsigned long)_text); i++)
+        pmd[i] &= ~_PAGE_PRESENT;
+    /* fixup pages that are part of the kernel image */
+    for (; i <= pmd_index((unsigned long)_end); i++)
+        if (pmd[i] & _PAGE_PRESENT)
+            pmd[i] += load_delta;
-    }
+    }
/* invalidate pages after the kernel image */
+for (; i < PTRS_PER_PMD; i++)
+pmd[i] &= ~_PAGE_PRESENT;

/* Fixup phys_base - remove the memory encryption mask to obtain
--- linux-4.15.0.orig/arch/x86/kernel/head_32.S
+++ linux-4.15.0/arch/x86/kernel/head_32.S
@@ -26,6 +26,7 @@
#include <asm/bootparam.h>
#include <asm/export.h>
#include <asm/pgtable_32.h>
+include <asm/nospec-branch.h>

/* Physical address */
define pa(X) ((X) - __PAGE_OFFSET)
@@ -37,7 +38,7 @@
#define X86	new_cpu_data+CPUINFO_x86
#define X86_VENDOR	new_cpu_data+CPUINFO_x86_vendor
#define X86_MODEL	new_cpu_data+CPUINFO_x86_model
-#define X86_MASK	new_cpu_data+CPUINFO_x86_mask
+#define X86_STEPPING	new_cpu_data+CPUINFO_x86_stepping
#define X86_HARD_MATH	new_cpu_data+CPUINFO_hard_math
#define X86_CPUID	new_cpu_data+CPUINFO_cpuid_level
#define X86_CAPABILITY	new_cpu_data+CPUINFO_x86_capability
@@ -153,6 +154,7 @@
movl pa(subarch_entries)(,%eax,4), %eax
movl($__PAGE_OFFSET, %eax)
jmp *%eax

.Lbad_subarch:
@@ -302,6 +304,7 @@
movl setup_once_ref,%eax
andl %eax,%eax
jz 1f	# Did we do this already?
+ANNOTATE_RETPOLINE_SAFE
call *%eax
1:

@@ -332,7 +335,7 @@
shrb $4,%al
movb %al,X86_MODEL
andb $0x0f,%cl# mask mask revision
-movb %cl,X86_MASK
+movb %cl,X86_STEPPING
movl %edx,X86_CAPABILITY
ENTRY(setup_once_ref)
.long setup_once

#ifdef CONFIG_PAGE_TABLE_ISOLATION
#define PGD_ALIGN (2 * PAGE_SIZE)
#define PTI_USER_PGD_FILL 1024
#else
#define PGD_ALIGN (PAGE_SIZE)
#define PTI_USER_PGD_FILL 0
#endif
/*
 * BSS section
 */
__PAGE_ALIGNED_BSS
.align PAGE_SIZE
+align PGD_ALIGN
#ifdef CONFIG_X86_PAE
.globl initial_pg_pmd
initial_pg_pmd:
@@ -526,14 +536,17 @@
initial_page_table:
.fill 1024,4,0
#endif
+align PGD_ALIGN
initial_pg_fixmap:
.fill 1024,4,0
.globl empty_zero_page
-empty_zero_page:
.fill 4096,1,0
.globl swapper_pg_dir
+align PGD_ALIGN
swapper_pg_dir:
.fill 1024,4,0
+fill PTI_USER_PGD_FILL,4,0
+globl empty_zero_page
+empty_zero_page:
.fill 4096,1,0
EXPORT_SYMBOL(empty_zero_page)

/*
@@ -542,7 +555,7 @@
#ifdef CONFIG_X86_PAE
__PAGE_ALIGNED_DATA
/* Page-aligned for the benefit of paravirt? */
-align PAGE_SIZE
ENTRY(initial_page_table)

.initpa(initial_pg_pmd+PGD_IDENT_ATTR),0/* low identity map */

# if KPMDS == 3
--- linux-4.15.0.orig/arch/x86/kernel/head_64.S
+++ linux-4.15.0/arch/x86/kernel/head_64.S
@@ -23,6 +23,8 @@
#include <asm/nops.h>
#include <asm/export.h>
+-#include <asm/nospec-branch.h>
+-#include <asm/fixmap.h>

#ifdef CONFIG_PARAVIRT
#include <asm/asm-offsets.h>
@@ -134,6 +136,7 @@
 /* Ensure I am executing from virtual addresses */
 movq$I, %rax
 #ANNOTATE_RETPOLINE_SAFE
 jmp*%rax
 1:
 UNWIND_HINT_EMPTY
@@ -399,8 +402,13 @@
 .quad	level2_ident_pgt - __START_KERNEL_map + _KERNPG_TABLE_NOENC
 .fill511, 8, 0
 NEXT_PAGE(level2_ident_pgt)
-/* Since I easily can, map the first 1G.
+/* Since I easily can, map the first 1G.
+ * Don't set NX because code runs from these pages.
+ * Note: This sets _PAGE_GLOBAL despite whether
+ * the CPU supports it or it is enabled. But,
+ * the CPU should ignore the bit.
+ */
 PMDS(0, __PAGE_KERNEL_IDENT_LARGE_EXEC, PTRS_PER_PMD)
#else
@@ -431,18 +439,29 @@
 (*NOTE: at +512MB starts the module area, see MODULES_VADDR.
 (* If you want to increase this then increase MODULES_VADDR
 (* too.)
+ * This table is eventually used by the kernel during normal
+ * runtime. Care must be taken to clear out undesired bits
+ * later, like _PAGE_RW or _PAGE_GLOBAL in some cases.
+ */
 PMDS(0, __PAGE_KERNEL_LARGE_EXEC,
NEXT_PAGE(level2_fixmap_pgt)
- .fill506,8,0
- .quad level2_fixmap_pgt - __START_KERNEL_map + _PAGE_TABLE_NOENC
/* 8MB reserved for vsyscalls + a 2MB hole = 4 + 1 entries */
- .fill5,8,0
+ .fill(512 - 4 - FIXMAP_PMD_NUM),8,0
+ pgtno = 0
+ .rept (FIXMAP_PMD_NUM)
+ .quad level2_fixmap_pgt + (pgtno << PAGE_SHIFT) - __START_KERNEL_map \\
  ++ _PAGE_TABLE_NOENC;
+ pgtno = pgtno + 1
+ .endr
+/* 6 MB reserved space + a 2MB hole */
+ .fill4,8,0

NEXT_PAGE(level1_fixmap_pgt)
+ .rept (FIXMAP_PMD_NUM)
  .fill512,8,0
+ .endr

#undef PMDS

--- linux-4.15.0.orig/arch/x86/kernel/hpet.c
+++ linux-4.15.0/arch/x86/kernel/hpet.c
@@ -1,6 +1,7 @@
#include <linux/clocksource.h>
#include <linux/clockchips.h>
#include <linux/interrupt.h>
+#include <linux/irq.h>
#include <linux/export.h>
#include <linux/delay.h>
#include <linux/errno.h>
@@ -908,6 +909,8 @@
return 0;

hpet_set_mapping();
+if (!hpet_virt_address)
+return 0;

/*
 * Read the period and check for a sane value:
--- linux-4.15.0.orig/arch/x86/kernel/hw_breakpoint.c
+++ linux-4.15.0/arch/x86/kernel/hw_breakpoint.c
@@ -352,6 +352,7 @@
#endif
default:
WARN_ON_ONCE(1);
+return -EINVAL;
}

/*
--- linux-4.15.0.orig/arch/x86/kernel/i8253.c
+++ linux-4.15.0/arch/x86/kernel/i8253.c
@@ -8,6 +8,7 @@
#include <linux/timex.h>
#include <linux/i8253.h>
+#include <asm/apic.h>
#include <asm/hpet.h>
#include <asm/time.h>
#include <asm/smp.h>
@@ -18,10 +19,32 @@
*/
struct clock_event_device *global_clock_event;

-void __init setup_pit_timer(void)
+/
+ * Modern chipsets can disable the PIT clock which makes it unusable. It
+ * would be possible to enable the clock but the registers are chipset
+ * specific and not discoverable. Avoid the whack a mole game.
+ *
+ * These platforms have discoverable TSC/CPU frequencies but this also
+ * requires to know the local APIC timer frequency as it normally is
+ * calibrated against the PIT interrupt.
+ */
+static bool __init use_pit(void)
{
+ if (!IS_ENABLED(CONFIG_X86_TSC) || !boot_cpu_has(X86_FEATURE_TSC))
+ return true;
+ /* This also returns true when APIC is disabled */
+ return apic_needs_pit();
+ }
+
+bool __init pit_timer_init(void)
+{
+ if (!use_pit())
+ return false;
+ clockevent_i8253_init(true);
+ global_clock_event = &i8253_clockevent;
+ return true;
+}
#ifndef CONFIG_X86_64
--- linux-4.15.0.orig/arch/x86/kernel/i8259.c
+++ linux-4.15.0/arch/x86/kernel/i8259.c
@@ -5,6 +5,7 @@
#include <linux/sched.h>
#include <linux/ioport.h>
#include <linux/interrupt.h>
+#include <linux/irq.h>
#include <linux/timex.h>
#include <linux/random.h>
#include <linux/init.h>
@@ -206,7 +207,7 @@
    * lets ACK and report it. [once per IRQ] *
    */
    if (! virt_uvec_mask & irqmask)) {
-       printk(KERN_DEBUG
+       printk_deferred(KERN_DEBUG
           "spurious 8259A interrupt: IRQ%d.
", irq);
    }
--- linux-4.15.0.orig/arch/x86/kernel/idt.c
+++ linux-4.15.0/arch/x86/kernel/idt.c
@@ -8,6 +8,7 @@
#include <asm/traps.h>
#include <asm/proto.h>
#include <asm/desc.h>
+include <asm/hw_irq.h>
struct idt_data {
    unsigned int vector;
@@ -140,6 +141,9 @@
#ifdef CONFIG_IRQ_WORK
    INTG(IRQ_WORK_VECTOR, irq_work_interrupt),
#ifdef CONFIG_X86_UV
+    INTG(UV_BAU_MESSAGE, uv_bau_message_intr1),
#endif
    INTG(SPURIOUS_APIC_VECTOR, spurious_interrupt),
    INTG(ERROR_APIC_VECTOR, error_interrupt),
#endif
@@ -160,7 +164,6 @@
 */
 static const __initconst struct idt_data dbg_idts[] = {
    INTG(X86_TRAP_DB, debug),
    -INTG(X86_TRAP_BP, int3),
};
#endif
static const __initconst struct idt_data ist_idts[] = {
    ISTG(X86_TRAP_DB, debug, DEBUG_STACK),
    ISTG(X86_TRAP_NMI, nmi, NMI_STACK),
    -SISTG(X86_TRAP_BP, int3, DEBUG_STACK),
    ISTG(X86_TRAP_DF, double_fault, DOUBLEFAULT_STACK),
#ifdef CONFIG_X86_MCE
    ISTG(X86_TRAP_MC, &machine_check, MCE_STACK),
#endif
}

for_each_clear_bit_from(i, system_vectors, NR_VECTORS) {
#ifdef CONFIG_X86_LOCAL_APIC
    -set_bit(i, system_vectors);
    +/*
    + * Don't set the non assigned system vectors in the
    + * system_vectors bitmap. Otherwise they show up in
    + */proc/interrupts.
    + */
    set_intr_gate(i, spurious_interrupt);
#else
    entry = irq_entries_start + 8 * (i - FIRST_EXTERNAL_VECTOR);
#endif
--- linux-4.15.0.orig/arch/x86/kernel/ioport.c
+++ linux-4.15.0/arch/x86/kernel/ioport.c
@@ -31,7 +31,8 @@
    if ((from + num <= from) || (from + num > IO_BITMAP_BITS))
        return -EINVAL;
    -if (turn_on && !capable(CAP_SYS_RAWIO))
    +if (turn_on && (!capable(CAP_SYS_RAWIO) ||
    +                kernel_is_locked_down("ioperm")))
        return -EPERM;
    /*
    @@ -121,7 +122,8 @@
    */
return -EINVAL;
    /* Trying to gain more privileges? */
if (level > old) {
    -if (!capable(CAP_SYS_RAWIO))
    +if (!capable(CAP_SYS_RAWIO) ||
    +    kernel_is_locked_down("iopl"))
        return -EPERM;
}
regs->flags = (regs->flags & ~X86_EFLAGS_IOPL) |
--- linux-4.15.0.orig/arch/x86/kernel/irq.c
+++ linux-4.15.0/arch/x86/kernel/irq.c
@@ -10,6 +10,7 @@
#include <linux/ftrace.h>
#include <linux/delay.h>
```c
#include <asm/apic.h>
#include <asm/io_apic.h>
@@ -229,7 +230,7 @@
    } else {
        if (!handle_irq(desc, regs)) {
            ack_APIC_irq();
        
-            if (desc != VECTOR_RETRIGGERED) {
+            if (desc != VECTOR_RETRIGGERED && desc != VECTOR_SHUTDOWN) {
                pr_emerg_ratelimited("%s: %d.%d No irq handler for vector\n",
                  __func__, smp_processor_id(),
                  vector);
```

--- linux-4.15.0.orig/arch/x86/kernel/irq_32.c
+++ linux-4.15.0/arch/x86/kernel/irq_32.c
@@ -11,6 +11,7 @@

--- linux-4.15.0.orig/arch/x86/kernel/irq_64.c
+++ linux-4.15.0/arch/x86/kernel/irq_64.c
@@ -25,9 +26,18 @@
 /*
  * Probabilistic stack overflow check:
  *
- * Only check the stack in process context, because everything else
- * runs on the big interrupt stacks. Checking reliably is too expensive,
- * so we just check from interrupts.
+ * Regular device interrupts can enter on the following stacks:
+ *
+ * - User stack
+ *
+ * - Kernel task stack
+ *
+ * - Interrupt stack if a device driver reenables interrupts
```

Open Source Used In 5GaaS Edge AC-4  11964
which should only happen in really old drivers.

- Debug IST stack

All other contexts are invalid.

```
static inline void stack_overflow_check(struct pt_regs *regs)
{
    @@ -52,8 +62,8 @@
    return;

    oist = this_cpu_ptr(&orig_ist);
    -estack_top = (u64)oist->ist[0] - EXCEPTION_STKSZ + STACK_TOP_MARGIN;
    -estack_bottom = (u64)oist->ist[N_EXCEPTION_STACKS - 1];
    +estack_top = (u64)oist->ist[DEBUG_STACK];
    +estack_bottom = estack_bottom - DEBUG_STKSZ + STACK_TOP_MARGIN;
    if (regs->sp >= estack_top && regs->sp <= estack_bottom)
        return;

--- linux-4.15.0.orig/arch/x86/kernel/irqflags.S
+++ linux-4.15.0/arch/x86/kernel/irqflags.S
@@ @-0,0 +1,26 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+
+/*
 * unsigned long native_save_fl(void)
 + */
+ENTRY(native_save_fl)
+pushf
+pop %_ASM_AX
+ret
+ENDPROC(native_save_fl)
+EXPORT_SYMBOL(native_save_fl)
+
+/*
 + * void native_restore_fl(unsigned long flags)
 + */
+ENTRY(native_restore_fl)
+push %_ASM_ARG1
+popf
+ret
+ENDPROC(native_restore_fl)
+EXPORT_SYMBOL(native_restore_fl)
```
--- linux-4.15.0.orig/arch/x86/kernel/irqinit.c
+++ linux-4.15.0/arch/x86/kernel/irqinit.c
@@ -5,6 +5,7 @@
#include <linux/sched.h>
#include <linux/ioport.h>
#include <linux/interrupt.h>
+#include <linux/irq.h>
#include <linux/timex.h>
#include <linux/random.h>
#include <linux/kprobes.h>
--- linux-4.15.0.orig/arch/x86/kernel/kexec-bzimage64.c
+++ linux-4.15.0/arch/x86/kernel/kexec-bzimage64.c
@@ -167,6 +167,9 @@
struct efi_info *current_ei = &boot_params.efi_info;
struct efi_info *ei = &params->efi_info;
+if (!efi_enabled(EFI_RUNTIME_SERVICES))
+return 0;
+
+if (!current_ei->efi_memmap_size)
return 0;
@@ -179,6 +182,7 @@ if (efi_enabled(EFI_OLD_MEMMAP))
return 0;
+params->secure_boot = boot_params.secure_boot;
ei->efi_loader_signature = current_ei->efi_loader_signature;
ei->efi_systab = current_ei->efi_systab;
ei->efi_systab_hi = current_ei->efi_systab_hi;
@@ -208,8 +212,7 @@
params->hdr.hardware_subarch = boot_params.hdr.hardware_subarch;
/* Copying screen_info will do? */
-memcpy(&params->screen_info, &boot_params.screen_info,
-sizeof(struct screen_info));
+memcpy(&params->screen_info, &screen_info, sizeof(struct screen_info));

/* Fill in memsize later */
params->screen_info.ext_mem_k = 0;
@@ -398,11 +401,10 @@
* little bit simple
 */
efi_map_sz = efi_get_runtime_map_size();
-efi_map_sz = ALIGN(efi_map_sz, 16);
params_cmdline_sz = sizeof(struct boot_params) + cmdline_len +
MAX_ELFCOREHDR_STR_LEN;
params_cmdline_sz = ALIGN(params_cmdline_sz, 16);
- kbuf.bufsz = params_cmdline_sz + efi_map_sz +
+ kbuf.bufsz = params_cmdline_sz + ALIGN(efi_map_sz, 16) +
sizeof(struct setup_data) +
sizeof(struct efi_setup_data);
@@ -410,7 +412,7 @@
if (!params)
    return ERR_PTR(-ENOMEM);
    efi_map_offset = params_cmdline_sz;
-    efi_setup_data_offset = efi_map_offset + efi_map_sz;
+    efi_setup_data_offset = efi_map_offset + ALIGN(efi_map_sz, 16);
/* Copy setup header onto bootparams. Documentation/x86/boot.txt */
setup_header_size = 0x0202 + kernel[0x0201] - setup_hdr_offset;
@@ -533,7 +535,7 @@
static int bzImage64_verify_sig(const char *kernel, unsigned long kernel_len)
{
    return verify_pefile_signature(kernel, kernel_len,
    -        NULL,
+        (struct key *)1UL),
        VERIFYING_KEXEC_PE_SIGNATURE);
}
#endif
--- linux-4.15.0.orig/arch/x86/kernel/kgdb.c
+++ linux-4.15.0/arch/x86/kernel/kgdb.c
@@ -438,7 +438,7 @@
*/
void kgdb_roundup_cpus(unsigned long flags)
{
    -apic->send_IPI_allbutself(APIC_DM_NMI);
+apic->send_IPI_allbutself(NMI VECTOR);
}
insn_byte_t prefix;
int i;

if (search_exception_tables((unsigned long)addr))
return 0; /* Page fault may occur on this address. */
@@ -184,9 +187,14 @@
if (insn->opcode.nbytes != 1)
return 0;
-/* Can't boost Address-size override prefix */
-if (unlikely(inat_is_address_size_prefix(insn->attr)))
-return 0;
+for_each_insn_prefix(insn, i, prefix) {
+insn_attr_t attr;
+attr = inat_get_opcode_attribute(prefix);
+/* Can't boost Address-size override prefix and CS override prefix */
+if (prefix == 0x2e || inat_is_address_size_prefix(attr))
+return 0;
+}

opcode = insn->opcode.bytes[0];
@@ -211,8 +219,8 @@
/* clear and set flags are boostable */
return (opcode == 0xf5 || (0xf7 < opcode && opcode < 0xfe));
default:
-/* CS override prefix and call are not boostable */
-return (opcode != 0x2e && opcode != 0x9a);
+/* call is not boostable */
+return opcode != 0x9a;
}

@@ -370,6 +378,10 @@
if (insn->opcode.bytes[0] == BREAKPOINT_INSTRUCTION)
return 0;

+/* We should not singlestep on the exception masking instructions */
+if (insn_masking_exception(insn))
+return 0;
+
#ifdef CONFIG_X86_64
/* Only x86_64 has RIP relative instructions */
if (insn_rip_relative(insn)) {
@@ -391,8 +403,6 @@
-(u8 *) real;
if ((s64) (s32) newdisp != newdisp) {
pr_err("Kprobes error: new displacement does not fit into s32 (%llx)
", newdisp);
-pr_err("Src: %p, Dest: %p, old disp: %x
",
-src, real, insn->displacement.value);
return 0;
}
disp = (u8 *) dest + insn_offset_displacement(insn);
@@ -431,8 +441,20 @@
void *page;

page = module_alloc(PAGE_SIZE);
-if (page)
-set_memory_ro((unsigned long)page & PAGE_MASK, 1);
+if (!page)
+    return NULL;
+
+/*
+ * First make the page read-only, and only then make it executable to
+ * prevent it from being W+X in between.
+ */
+set_memory_ro((unsigned long)page, 1);
+
+/*
+ * TODO: Once additional kernel code protection mechanisms are set, ensure
+ * that the page was not maliciously altered and it is still zeroed.
+ */
+set_memory_x((unsigned long)page, 1);

return page;
}
@@ -440,8 +462,12 @@
/* Recover page to RW mode before releasing it */
void free_insn_page(void *page)
{
-if (page)
-set_memory_nx((unsigned long)page & PAGE_MASK, 1);
-set_memory_rw((unsigned long)page & PAGE_MASK, 1);
+/*
+ * First make the page non-executable, and only then make it writable to
+ * prevent it from being W+X in between.
+ */
+set_memory_nx((unsigned long)page, 1);
+set_memory_rw((unsigned long)page, 1);
module_memfree(page);
}
@@ -569,6 +595,7 @@
unsigned long *sara = stack_addr(regs);
ri->ret_addr = (kprobe_opcode_t *) *sara;

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+ri->fp = sara;

/* Replace the return addr with trampoline addr */
*sara = (unsigned long) &kretprobe_trampoline;
@@ -636,8 +663,7 @@
    * Raise a BUG or we'll continue in an endless reentering loop
    * and eventually a stack overflow.
    */
-   printk(KERN_WARNING "Unrecoverable kprobe detected at %p\n",
-          p->addr);
+   pr_err("Unrecoverable kprobe detected.\n");
   dump_kprobe(p);
   BUG();
  default:
@@ -771,15 +797,28 @@
    unsigned long flags, orig_ret_address = 0;
    unsigned long trampoline_address = (unsigned long)&kretprobe_trampoline;
    kprobe_opcode_t *correct_ret_addr = NULL;
+    void *frame_pointer;
+    bool skipped = false;
+
+    /* Set a dummy kprobe for avoiding kretprobe recursion.
+     * Since kretprobe never run in kprobe handler, kprobe must not
+     * be running at this point.
+     */
+    kprobe_busy_begin();

    INIT_HLIST_HEAD(&empty_rp);
    kretprobe_hash_lock(current, &head, &flags);
    /* fixup registers */
    #ifdef CONFIG_X86_64
    regs->cs = __KERNEL_CS;
    +#if On x86-64, we use pt_regs->sp for return address holder. */
    +frame_pointer = &regs->sp;
    #else
    regs->cs = __KERNEL_CS | get_kernel_rpl();
    regs->gs = 0;
    +#if On x86-32, we use pt_regs->flags for return address holder. */
    +frame_pointer = &regs->flags;
    #endif
    regs->ip = trampoline_address;
    regs->orig_ax = ~0UL;
    @@ -801,8 +840,25 @@
    if (ri->task != current)
        /* another task is sharing our hash bucket */
        continue;
        */
+ * Return probes must be pushed on this hash list correct
+ * order (same as return order) so that it can be poped
+ * correctly. However, if we find it is pushed it incorrect
+ * order, this means we find a function which should not be
+ * probed, because the wrong order entry is pushed on the
+ * path of processing other kretprobe itself.
+ */
+if (ri->fp != frame_pointer) {
+if (!skipped)
+pr_warn("kretprobe is stacked incorrectly. Trying to fixup.\n");
+skipped = true;
+continue;
+
orig_ret_address = (unsigned long)ri->ret_addr;
+if (skipped)
+pr_warn("%ps must be blacklisted because of incorrect kretprobe order\n",
+ri->rp->kp.addr);

if (orig_ret_address != trampoline_address)
/
@@ -820,14 +876,15 @@
if (ri->task != current)
/* another task is sharing our hash bucket */
continue;
+if (ri->fp != frame_pointer)
+continue;

orig_ret_address = (unsigned long)ri->ret_addr;
if (ri->rp & ri->rp->handler) {
 __this_cpu_write(current_kprobe, &ri->rp->kp);
-get_kprobe_ctlblk()->kprobe_status = KPROBE_HIT_ACTIVE;
ri->ret_addr = correct_ret_addr;
ri->rp->handler(ri, regs);
+__this_cpu_write(current_kprobe, NULL);
+__this_cpu_write(current_kprobe, &kprobe_busy);
}

recycle_rp_inst(ri, &empty_rp);
@@ -843,6 +900,8 @@
kretprobe_hash_unlock(current, &flags);

+kprobe_busy_end();
+
+ hlist_for_each_entry_safe(ri, tmp, &empty_rp, hlist) {
+ hlist_del(&ri->hlist);
kfree(ri);
# Open Source Used In 5GaaS Edge AC-4

@@ -1005,6 +1064,11 @@
      * So clear it by resetting the current kprobe:
      */
      regs->flags &= ~X86_EFLAGS_TF;
+      /*
+      * Since the single step (trap) has been cancelled,
+      * we need to restore BTF here.
+      */
+      restore_btf();
+      
+      */
+      * If the TF flag was set before the kprobe hit,
@@ -1168,10 +1232,24 @@
      bool arch_within_kprobe_blacklist(unsigned long addr)
      {
      +      bool is_in_entry_trampoline_section = false;
+      +#ifdef CONFIG_X86_64
+      +      is_in_entry_trampoline_section =
+      +      (addr >= (unsigned long)__entry_trampoline_start &&
+      +      addr < (unsigned long)__entry_trampoline_end);
      +#endif
      return (addr >= (unsigned long)__kprobes_text_start &&
      addr < (unsigned long)__kprobes_text_end) ||
      (addr >= (unsigned long)__entry_text_start &&
      -      addr < (unsigned long)__entry_text_end);
      +      addr < (unsigned long)__entry_text_end) ||
      +      is_in_entry_trampoline_section;
      +    }}
+    +
+    +    int __init arch_populate_kprobe_blacklist(void)
+    +    {
+    +      return kprobe_add_area_blacklist((unsigned long)__entry_text_start,
+    +      (unsigned long)__entry_text_end);
+    +    }
+    +
+    +    int __init arch_init_kprobes(void)
+    --- linux-4.15.0.orig/arch/x86/kernel/kprobes/opt.c
+    +++ linux-4.15.0/arch/x86/kernel/kprobes/opt.c
+    @@ -141,6 +141,11 @@
+    +    void optprobe_template_func(void);
+    +    STACK_FRAME_NON_STANDARD(optprobe_template_func);
+    +    NOKPROBE_SYMBOL(optprobe_template_func);
+    +    NOKPROBE_SYMBOL(optprobe_template_entry);
+    +    NOKPROBE_SYMBOL(optprobe_template_val);
+    +    NOKPROBE_SYMBOL(optprobe_template_call);
+NOKPROBE_SYMBOL(optprobe_template_end);

#define TMPL_MOVE_IDX (long)optprobe_template_val - (long)optprobe_template_entry
@@ -179,7 +184,7 @@
op_pre_handler(&op->kp, regs);
 __this_cpu_write(current_kprobe, NULL);
 }
-preempt_enable_no_resched();
+preempt_enable();
}
NOKPROBE_SYMBOL(optimized_callback);

@@ -189,7 +194,7 @@
 int len = 0, ret;

 while (len < RELATIVEJUMP_SIZE) {
- ret = __copy_instruction(dest + len, src + len, real, &insn);
+ ret = __copy_instruction(dest + len, src + len, real + len, &insn);
 if (!ret || !can_boost(&insn, src + len))
 return -EINVAL;
 len += ret;
--- linux-4.15.0.orig/arch/x86/kernel/kvm.c
+++ linux-4.15.0/arch/x86/kernel/kvm.c
@@ -341,10 +341,10 @@
 #endif
 pa |= KVM_ASYNC_PF_ENABLED;

 /* Async page fault support for L1 hypervisor is optional */
- if (wrmsr_safe(MSR_KVM_ASYNC_PF_EN,
- (pa | KVM_ASYNC_PF_DELIVERY_AS_PF_VMEXIT) & 0xffffffff, pa >> 32) < 0)
- wrmsrl(MSR_KVM_ASYNC_PF_EN, pa);
+ if (kvm_para_has_feature(KVM_FEATURE_ASYNC_PF_VMEXIT))
+ pa |= KVM_ASYNC_PF_DELIVERY_AS_PF_VMEXIT;
 + wrmsrl(MSR_KVM_ASYNC_PF_EN, pa);
__this_cpu_write(apf_reason.enabled, 1);
printk(KERN_INFO"KVM setup async PF for cpu %d\n",
   smp_processor_id());
@@ -666,6 +666,7 @@
  "cmpb$0, " __stringify(KVM_STEAL_TIME_preempted) "+steal_time(%rax);"
  "setne%al;"
  "ret;"
+ ".size __raw_callee_save___kvm_vcpu_is_preempted, .-__raw_callee_save___kvm_vcpu_is_preempted;"
  ".popsection);
#endif
--- linux-4.15.0.orig/arch/x86/kernel/kvmclock.c
+++ linux-4.15.0/arch/x86/kernel/kvmclock.c
@@ -103,12 +103,8 @@
static inline void kvm_sched_clock_init(bool stable)
{
- if (!stable) {
- pv_time_ops.sched_clock = kvm_clock_read;
- +if (!stable)
- clear_sched_clock_stable();
- -return;
- -}
- 
- kvm_sched_clock_offset = kvm_clock_read();
pv_time_ops.sched_clock = kvm_sched_clock_read;

@@ -138,6 +134,7 @@
src = &hv_clock[cpu].pvti;
tsc_khz = pvclock_tsc_khz(src);
put_cpu();
+setup_force_cpu_cap(X86_FEATURE_TSCKNOWN_FREQ);
return tsc_khz;
}

@@ -319,6 +316,8 @@
printk(KERN_INFO "kvm-clock: Using msrs %x and %x",
msr_kvm_system_time, msr_kvm_wall_clock);

+pvclock_set_pvti_cpu0_va(hv_clock);
+
+ if (kvm_para_has_feature(KVM_FEATURE_CLOCKSOURCE_STABLE BIT))
pvclock_set_flags(PVCLOCK_TSC_STABLE_BIT);

@@ -366,14 +365,11 @@
vcpu_time = &hv_clock[cpu].pvti;
flags = pvclock_read_flags(vcpu_time);

- if (!flags & PVCLOCK_TSC_STABLE_BIT)) {
- put_cpu();
- return 1;
- }
- 
- pvclock_set_pvti_cpu0_va(hv_clock);
put_cpu();

+if (!flags & PVCLOCK_TSC_STABLE_BIT))
+return 1;
+
+kvm_clock.archdata.vclock_mode = VCLOCK_PVCLOCK;
#endif
return 0;
--- linux-4.15.0.orig/arch/x86/kernel/ldt.c
+++ linux-4.15.0/arch/x86/kernel/ldt.c
@@ -100,27 +100,113 @@
return new_ldt;
}

+#ifdef CONFIG_PAGE_TABLE_ISOLATION
+
+static void do_sanity_check(struct mm_struct *mm,
+    bool had_kernel_mapping,
+    bool had_user_mapping)
+{
+    if (mm->context.ldt) {
+        /*
+           * We already had an LDT. The top-level entry should already
+           * have been allocated and synchronized with the usermode
+           * tables.
+           */
+        WARN_ON(!had_kernel_mapping);
+        if (static_cpu_has(X86_FEATURE_PTI))
+            WARN_ON(!had_user_mapping);
+    } else {
+        /*
+           * This is the first time we're mapping an LDT for this process.
+           * Sync the pgd to the usermode tables.
+           */
+        WARN_ON(had_kernel_mapping);
+        if (static_cpu_has(X86_FEATURE_PTI))
+            WARN_ON(had_user_mapping);
+    }
+}
+
+#ifdef CONFIG_X86_PAE
+
+static pmd_t *pgd_to_pmd_walk(pgd_t *pgd, unsigned long va)
+{
+    p4d_t *p4d;
+    pud_t *pud;
+    +if (pgd->pgd == 0)
+        return NULL;
+    p4d = p4d_offset(pgd, va);
+    pud = pud_offset(p4d, va);
+    /*
+       * This is the first time we're mapping an LDT for this process.
+       * Sync the pgd to the usermode tables.
+       */
+    WARN_ON(had_kernel_mapping);
+    if (static_cpu_has(X86_FEATURE_PTI))
+        WARN_ON(had_user_mapping);
+    }
+    }
+
+    +#ifdef CONFIG_X86_PAE
+
+    +static pmd_t *pgd_to_pmd_walk(pgd_t *pgd, unsigned long va)
+    +{
+        +p4d_t *p4d;
+        +pud_t *pud;
+        +
+        +if (pgd->pgd == 0)
+            +return NULL;
+        +
+        +p4d = p4d_offset(pgd, va);
+        +if (p4d_none(*p4d))
+            +return NULL;
+        +
+pud = pud_offset(p4d, va);
++if (pud_none(*pud))
++return NULL;
++return pmd_offset(pud, va);
++
++static void map_ldt_struct_to_user(struct mm_struct *mm)
++{
++++pgd_t *k_pgd = pgd_offset(mm, LDT_BASE_ADDR);
++++pgd_t *u_pgd = kernel_to_user_pgdp(k_pgd);
++++pmd_t *k_pmd, *u_pmd;
++
++k_pmd = pgd_to_pmd_walk(k_pgd, LDT_BASE_ADDR);
++u_pmd = pgd_to_pmd_walk(u_pgd, LDT_BASE_ADDR);
++
++if (static_cpu_has(X86_FEATURE_PTI) && !mm->context.ldt)
++set_pmd(u_pmd, *k_pmd);
++}
++
++static void sanity_check_ldt_mapping(struct mm_struct *mm)
++{
++++pgd_t *k_pgd = pgd_offset(mm, LDT_BASE_ADDR);
++++pgd_t *u_pgd = kernel_to_user_pgdp(k_pgd);
++++bool had_kernel, had_user;
++++pmd_t *k_pmd, *u_pmd;
++
++k_pmd = pgd_to_pmd_walk(k_pgd, LDT_BASE_ADDR);
++u_pmd = pgd_to_pmd_walk(u_pgd, LDT_BASE_ADDR);
++had_kernel = (k_pmd->pmd != 0);
++had_user = (u_pmd->pmd != 0);
++
++do_sanity_check(mm, had_kernel, had_user);
++}
++
+#else /* !CONFIG_X86_PAE */
++
++static void map_ldt_struct_to_user(struct mm_struct *mm)
++{
++++pgd_t *pgd = pgd_offset(mm, LDT_BASE_ADDR);
++
++if (static_cpu_has(X86_FEATURE_PTI) && !mm->context.ldt)
++set_pgd(kernel_to_user_pgdp(pgd), *pgd);
++}
++
++static void sanity_check_ldt_mapping(struct mm_struct *mm)
++{
++++pgd_t *pgd = pgd_offset(mm, LDT_BASE_ADDR);
bool had_kernel = (pgd->pgd != 0);
bool had_user = (kernel_to_user_pgd(pgd)->pgd != 0);
+
do_sanity_check(mm, had_kernel, had_user);
+
#if defined CONFIG_X86_PAE
+
+do_sanity_check(mm, had_kernel, had_user);
+
+#endif /* CONFIG_X86_PAE */
+
/*
* If PTI is enabled, this maps the LDT into the kernelmode and
* usermode tables for the given mm.
. *
- * There is no corresponding unmap function. Even if the LDT is freed, we
- * leave the PTEs around until the slot is reused or the mm is destroyed.
- * This is harmless: the LDT is always in ordinary memory, and no one will
- * access the freed slot.
. *
- * If we wanted to unmap freed LDTs, we'd also need to do a flush to make
- * it useful, and the flush would slow down modify_ldt().
. */

static int

map_ldt_struct(struct mm_struct *mm, struct ldt_struct *ldt, int slot)
{
    #ifdef CONFIG_PAGE_TABLE_ISOLATION
    bool is_vmalloc, had_top_level_entry;
    unsigned long va;
    bool is_vmalloc;
    spinlock_t *ptl;
    pgd_t *pgd;
    int i;
    int i, nr_pages;

    if (!static_cpu_has(X86_FEATURE_PTI))
        return 0;
    @@ -131,20 +217,18 @@
    *]
    WARN_ON(ldt->slot != -1);

    ./*
    - * Did we already have the top level entry allocated? We can't
    - * use pgd_none() for this because it doesn't do anything on
    - * 4-level page table kernels.
    . */
    -pgd = pgd_offset(mm, LDT_BASE_ADDR);
    -had_top_level_entry = (pgd->pgd != 0);
    +/* Check if the current mappings are sane */
    +sanity_check_ldt_mapping(mm);
is_vmalloc = is_vmalloc_addr(ldt->entries);

-for (i = 0; i * PAGE_SIZE < ldt->nr_entries * LDT_ENTRY_SIZE; i++) {
+for (i = 0; i < nr_pages; i++) {
    unsigned long offset = i << PAGE_SHIFT;
    const void *src = (char *)ldt->entries + offset;
    unsigned long pfn;
+    pgprot_t pte_prot;
    pte_t pte, *ptep;

    va = (unsigned long)ldt_slot_va(slot) + offset;
@@ -163,46 +247,69 @@
    * target via some kernel interface which misses a
    * permission check.
    */
-    pte = pfn_ppte(pfn, __pgprot(__PAGE_KERNEL_RO & ~_PAGE_GLOBAL));
+    pte_prot = __pgprot(__PAGE_KERNEL_RO & ~_PAGE_GLOBAL);
+    /* Filter out unsuppored __PAGE_KERNEL* bits: */
+    pgprot_val(pte_prot) &= __supported_pte_mask;
+    pte = pfn_ppte(pfn, pte_prot);
    set_pte_at(mm, va, ptep, pte);
    pte_unmap_unlock(ptep, ptl);
}

-if (mm->context.ldt) {
-    /*
-     * We already had an LDT. The top-level entry should already
-     * have been allocated and synchronized with the usermode
-     * tables.
-     */
-    WARN_ON(!had_top_level_entry);
-    if (static_cpu_has(X86_FEATURE_PTI))
-        WARN_ON(!kernel_to_user_pgdp(pgd)->pgd);
-} else {
-    /*
-     * This is the first time we're mapping an LDT for this process.
-     * Sync the pgd to the usermode tables.
-     */
-    WARN_ON(had_top_level_entry);
-    if (static_cpu_has(X86_FEATURE_PTI)) {
-        WARN_ON(kernel_to_user_pgdp(pgd)->pgd);
-        set_pgd(kernel_to_user_pgdp(pgd), *pgd);
-    }
+    /* Propagate LDT mapping to the user page-table */
+    map_ldt_struct_to_user(mm);
static void unmap_ldt_struct(struct mm_struct *mm, struct ldt_struct *ldt) {
    unsigned long va;
    int i, nr_pages;
    if (!ldt)
        return;

    /* LDT map/unmap is only required for PTI */
    if (!static_cpu_has(X86_FEATURE_PTI))
        return;

    nr_pages = DIV_ROUND_UP(ldt->nr_entries * LDT_ENTRY_SIZE, PAGE_SIZE);
    for (i = 0; i < nr_pages; i++) {
        unsigned long offset = i << PAGE_SHIFT;
        spinlock_t *ptl;
        pte_t *ptep;
        va = (unsigned long)ldt_slot_va(ldt->slot) + offset;
        ptep = get_locked_pte(mm, va, &ptl);
        pte_clear(mm, va, ptep);
        pte_unmap_unlock(ptep, ptl);
    }
}

static int map_ldt_struct(struct mm_struct *mm, struct ldt_struct *ldt, int slot) {
    return 0;
}
static void unmap_ldt_struct(struct mm_struct *mm, struct ldt_struct *ldt) {
    ldt->slot = slot;
    return 0;
}
static void free_ldt_pgtables(struct mm_struct *mm) {
#ifdef CONFIG_PAGE_TABLE_ISOLATION
    struct mmu_gather tlb;
    unsigned long start = LDT_BASE_ADDR;
    unsigned long end = start + (1UL << PGDIR_SHIFT);
    if (!static_cpu_has(X86_FEATURE_PTI))
        return;
    install_ldt(mm, new_ldt);
    unmap_ldt_struct(mm, old_ldt);
    free_ldt_struct(old_ldt);
    error = 0;

    --- linux-4.15.0.orig/arch/x86/kernel/machine_kexec_32.c
    +++ linux-4.15.0/arch/x86/kernel/machine_kexec_32.c
    @@ -56,18 +56,24 @@
    static void machine_kexec_free_page_tables(struct kimage *image) {
        -free_page((unsigned long)image->arch.pgd);
        +free_pages((unsigned long)image->arch.pgd, PGD_ALLOCATION_ORDER);
        +image->arch.pgd = NULL;
        ifdef CONFIG_X86_PAE
        free_page((unsigned long)image->arch.pmd0);
        +image->arch.pmd0 = NULL;
        free_page((unsigned long)image->arch.pmd1);
        +image->arch.pmd1 = NULL;
        #endif
        free_page((unsigned long)image->arch.pte0);
        +image->arch.pte0 = NULL;
        free_page((unsigned long)image->arch.pte1);
        +image->arch.pte1 = NULL;
    }

    static int machine_kexec_alloc_page_tables(struct kimage *image) {
        -image->arch.pgd = (pgd_t *)get_zeroed_page(GFP_KERNEL);
        +image->arch.pgd = (pgd_t *)__get_free_pages(GFP_KERNEL | __GFP_ZERO,
            + PGD_ALLOCATION_ORDER);
        ifdef CONFIG_X86_PAE
        image->arch.pmd0 = (pmd_t *)get_zeroed_page(GFP_KERNEL);
        +image->arch.pmd0 = NULL;
        free_page((unsigned long)image->arch.pmd1);
        +image->arch.pmd1 = NULL;
        +image->arch.pte0 = NULL;
        +image->arch.pte1 = NULL;
        }

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image->arch.pmd1 = (pmd_t *)get_zeroed_page(GFP_KERNEL);
  @ @ -79,7 +85,6 @@
     !image->arch.pmd0 || !image->arch.pmd1 ||
 #endif
     !image->arch.pte0 || !image->arch.pte1) {
-machine_kexec_free_page_tables(image);
-return -ENOMEM;
 }
 return 0;
--- linux-4.15.0.orig/arch/x86/kernel/machine_kexec_64.c
+++ linux-4.15.0/arch/x86/kernel/machine_kexec_64.c
@@ -38,9 +38,13 @@
 static void free_transition_pgtable(struct kimage *image)
 {
     free_page((unsigned long)image->arch.p4d);
+    image->arch.p4d = NULL;
     free_page((unsigned long)image->arch.pud);
+    image->arch.pud = NULL;
     free_page((unsigned long)image->arch.pmd);
+    image->arch.pmd = NULL;
     free_page((unsigned long)image->arch.pte);
+    image->arch.pte = NULL;
 }

 static int init_transition_pgtable(struct kimage *image, pgd_t *pgd)
@@ -542,6 +545,7 @@
goto overflow;
 break;
 case R_X86_64_PC32:
+case R_X86_64_PLT32:
     value -= (u64)address;
     *(u32 *)location = value;
     break;
--- linux-4.15.0.orig/arch/x86/kernel/module.c
+++ linux-4.15.0/arch/x86/kernel/module.c
@@ -87,7 +87,7 @@
goto overflow;
 break;
 case R_X86_64_PC32:
+case R_X86_64_PLT32:
     value -= (u64)address;
     *(u32 *)location = value;
     break;
--- linux-4.15.0.orig/arch/x86/kernel/module.c
+++ linux-4.15.0/arch/x86/kernel/module.c
@@ -87,7 +87,7 @@
p = __vmalloc_node_range(size, MODULE_ALIGN,
    MODULES_VADDR + get_module_load_offset(),
    MODULES_END, GFP_KERNEL,
-    PAGE_KERNEL_EXEC, 0, NUMA_NO_NODE,
PAGE_KERNEL, 0, NUMA_NO_NODE,
    __builtin_return_address(0));
if (p && (kasan_module_alloc(p, size) < 0)) {
    vfree(p);
    @@ -126,6 +126,7 @@
    *location += sym->st_value;
    break;
    case R_386_PC32:
    +case R_386_PLT32:
        /* Add the value, subtract its position */
    *location += sym->st_value - (uint32_t)location;
    break;
    @@ -191,6 +192,7 @@
    goto overflow;
    break;
    case R_X86_64_PC32:
    +case R_X86_64_PLT32:
    if (*loc != 0)
    goto invalid_relocation;
    val -= (u64)loc;
    --- linux-4.15.0.orig/arch/x86/kernel/mpparse.c
    +++ linux-4.15.0/arch/x86/kernel/mpparse.c
    @@ -407,7 +407,7 @@
    processor.apicver = mpc_default_type > 4 ? 0x10 : 0x01;
    processor.cpuflag = CPU_ENABLED;
    processor.cpufeature = (boot_cpu_data.x86 << 8) |
    - (boot_cpu_data.x86_model << 4) | boot_cpu_data.x86_mask;
    + (boot_cpu_data.x86_model << 4) | boot_cpu_data.x86_stepping;
    processor.featureflag = boot_cpu_data.x86_capability[CPUID_1_EDX];
    processorreserved[0] = 0;
    processorreserved[1] = 0;
    @@ -544,17 +544,15 @@
    * local APIC has default address
    */
    mp_lapic_addr = APIC_DEFAULT_PHYS_BASE;
    -return;
    +goto out;
    }
}
    pr_info("Default MP configuration \#%d\n", mpf->feature1);
    construct_default_ISA_mptable(mpf->feature1);
}
    } else if (mpf->physptr) {
    -if (check_physptr(mpf, early)) {
    -early_memunmap(mpf, sizeof(*mpf));
    -return;
    -}
    +if (check_physptr(mpf, early))

+goto out;
} else
BUG();

@@ -563,7 +561,7 @@
/*
 * Only use the first configuration found.
 */
-
+out:
early_memunmap(mpf, sizeof(*mpf));
}

@@ -596,8 +594,8 @@
mpf_base = base;
mpf_found = true;

-pr_info("found SMP MP-table at [mem %#010lx-%#010lx] mapped at [%p]\n",
-base, base + sizeof(*mpf) - 1, mpf);
+pr_info("found SMP MP-table at [mem %#010lx-%#010lx]\n",
+base, base + sizeof(*mpf) - 1);

memblock_reserve(base, sizeof(*mpf));
if (mpf->physptr)
--- linux-4.15.0.orig/arch/x86/kernel/msr.c
+++ linux-4.15.0/arch/x86/kernel/msr.c
@@ -84,6 +84,11 @@
int err = 0;
ssize_t bytes = 0;
+if (kernel_is_locked_down("Direct MSR access")) {
+pr_info("Direct access to MSR %x\n", reg);
+return -EPERM;
+}
+
+if (count % 8)
return -EINVAL;/* Invalid chunk size */

@@ -135,6 +140,11 @@
err = -EFAULT;
break;
}
+if (kernel_is_locked_down("Direct MSR access")) {
+pr_info("Direct access to MSR %x\n", regs[1]);/* Display %ecx */
+err = -EPERM;
+break;
+}
err = wrmsr_safe_regs_on_cpu(cpu, regs);
if (err)
break;
--- linux-4.15.0.orig/arch/x86/kernel/nmi.c
+++ linux-4.15.0/arch/x86/kernel/nmi.c
@@ -34,6 +34,7 @@
#include <asm/x86_init.h>
#include <asm/reboot.h>
#include <asm/cache.h>
+#include <asm/nospec-branch.h>

#define CREATE_TRACE_POINTS
#include <trace/events/nmi.h>
@@ -101,18 +102,21 @@
}
fs_initcall(nmi_warning_debugfs);

-static void nmi_max_handler(struct irq_work *w)
+static void nmi_check_duration(struct nmiaction *action, u64 duration)
{
- struct nmiaction *a = container_of(w, struct nmiaction, irq_work);
 int remainder_ns, decimal_msecs;
- u64 whole_msecs = READ_ONCE(a->max_duration);
- remainder_ns = do_div(whole_msecs, (1000 * 1000));
+ if (duration < nmi_longest_ns || duration < action->max_duration)
+ return;
+ 
+ action->max_duration = duration;
+ 
+ remainder_ns = do_div(duration, (1000 * 1000));
 decimal_msecs = remainder_ns / 1000;

 printk_ratelimited(KERN_INFO
 "INFO: NMI handler (%ps) took too long to run: %lld.%03d msecs\n",
 -a->handler, whole_msecs, decimal_msecs);
+action->handler, duration, decimal_msecs);
}

static int nmi_handle(unsigned int type, struct pt_regs *regs)
@@ -139,11 +143,7 @@
delta = sched_clock() - delta;
 trace_nmi_handler(a->handler, (int)delta, thishandled);

 -if (delta < nmi_longest_ns || delta < a->max_duration)
- continue;
- 
-a->max_duration = delta;
-irq_work_queue(&a->irq_work);
rcu_read_unlock();
@@ -161,8 +161,6 @@
    if (!action->handler)
    return -EINVAL;

-init_irq_work(&action->irq_work, nmi_max_handler);
-
raw_spin_lock_irqsave(&desc->lock, flags);

+#ifdef CONFIG_RETPOLINE
WARN_ONCE(1, "Failing to patch indirect CALL in %ps\n", (void *)addr);
+#endif

NOKPROBE_SYMBOL(do_nmi);

--- linux-4.15.0.orig/arch/x86/kernel/paravirt.c
+++ linux-4.15.0/arch/x86/kernel/paravirt.c
@@ -88,10 +88,12 @@
    struct branch *b = insnbuf;
    unsigned long delta = (unsigned long)target - (addr+5);

-#if (tgt_clobbers & ~site_clobbers)
-    return len;/* target would clobber too much for this site */
-#if (len < 5)
+    if (len < 5) {
+        #ifdef CONFIG_RETPOLINE
+        WARN_ONCE(1, "Failing to patch indirect CALL in %ps\n", (void *)addr);
+        #endif
+        return len;/* call too long for patch site */
+    }

    b->opcode = 0xe8; /* call */
    b->delta = delta;
@@ -106,8 +108,12 @@
    struct branch *b = insnbuf;
    unsigned long delta = (unsigned long)target - (addr+5);

-#if (tgt_clobbers & ~site_clobbers)
-    return len;/* target would clobber too much for this site */
-#if (len < 5)
+    if (len < 5) {
+        #ifdef CONFIG_RETPOLINE
+        WARN_ONCE(1, "Failing to patch indirect CALL in %ps\n", (void *)addr);
+        #endif
+        return len;/* call too long for patch site */
+    }

    b->opcode = 0xe8; /* call */
    b->delta = delta;
@@ -106,8 +108,12 @@
    struct branch *b = insnbuf;
    unsigned long delta = (unsigned long)target - (addr+5);

-#if (tgt_clobbers & ~site_clobbers)
-    return len;/* target would clobber too much for this site */
-#if (len < 5)
+    if (len < 5) {
+        #ifdef CONFIG_RETPOLINE
+        WARN_ONCE(1, "Failing to patch indirect CALL in %ps\n", (void *)addr);
+        #endif
+        return len;/* call too long for patch site */
+    }

    b->opcode = 0xe8; /* call */
    b->delta = delta;
WARN_ONCE(1, "Failing to patch indirect JMP in %s\n", (void *)addr);
#endif
return len;/* call too long for patch site */
+
"
+ b->opcode = 0xe9;/* jmp */
+ b->delta = delta;
+ __native_flush_tlb_global();
+
- static void native_flush_tlb_single(unsigned long addr)
+ static void native_flush_tlb_one_user(unsigned long addr)
+ {
-     ___native_flush_tlb_single(addr);
+     ___native_flush_tlb_one_user(addr);
+ }

struct static_key paravirt_steal_enabled;

.

.flush_tlb_user = native_flush_tlb,
.flush_tlb_kernel = native_flush_tlb_global,
.flush_tlb_single = native_flush_tlb_single,
.flush_tlb_one_user = native_flush_tlb_one_user,
.flush_tlb_others = native_flush_tlb_others,

.pgd_alloc = ___paravirt_pgd_alloc,
--- linux-4.15.0.orig/arch/x86/kernel/pci-swiotlb.c
+++ linux-4.15.0/arch/x86/kernel/pci-swiotlb.c
@@ -88,10 +88,8 @@
int __init pci_swiotlb_detect_4gb(void)
{
    /* don't initialize swiotlb if iommu=off (no_iommu=1) */
-    #ifdef CONFIG_X86_64
+    #ifdef CONFIG_X86_64
        if (!no_iommu && max_possible_pfn > MAX_DMA32_PFN)
            swiotlb = 1;
-    #endif

    /*
     * If SME is active then swiotlb will be set to 1 so that bounce
     */
--- linux-4.15.0.orig/arch/x86/kernel/process.c
+++ linux-4.15.0/arch/x86/kernel/process.c
@@ -39,6 +39,9 @@
#include <asm/switch_to.h>
#include <asm/desc.h>
#include <asm/prctl.h>
+include <asm/spec-ctrl.h>
+  
+  #include "process.h"

/*
 * per-CPU TSS segments. Threads are completely 'soft' on Linux,
 * @ @ -57,14 +60,12 @ @
 */
.spp0 = (1UL << (BITS_PER_LONG-1)) + 1,

-#ifdef CONFIG_X86_64
/*
 * .sp1 is cpu_current_top_of_stack. The init task never
 * runs user code, but cpu_current_top_of_stack should still
 * be well defined before the first context switch.
 */
.sp1 = TOP_OF_INIT_STACK,
-#endif

#ifdef CONFIG_X86_32
.ss0 = __KERNEL_DS,
@ @ -254,11 +255,12 @ @
enable_cpuid();
} } 

-static inline void switch_to_bitmap(struct tss_struct *tss,
- struct thread_struct *prev,
+static inline void switch_to_bitmap(struct thread_struct *prev,
     struct thread_struct *next,
 unsigned long tifp, unsigned long tifn)
{ }
+struct tss_struct *tss = this_cpu_ptr(&cpu_tss_rw);
+
if (tifn & _TIF_IO_BITMAP) {
 /*
 * Copy the relevant range of the IO bitmap.
 @ @ -279,8 +281,197 @ @
 } }

-void __switch_to_xtra(struct task_struct *prev_p, struct task_struct *next_p,
- struct tss_struct *tss)
+#ifdef CONFIG_SMP
+
+struct ssb_state {
+ struct ssb_state*shared_state;
+ raw_spinlock_tlock;
+ unsigned intdisable_state;
+ unsigned longlocal_state;
+};
+
+ defining LSTATE_SSB0
+
+ static DEFINE_PER_CPU(struct ssb_state, ssb_state);
+
+ void speculative_store_bypass_ht_init(void)
+{
+ struct ssb_state *st = this_cpu_ptr(&ssb_state);
+ unsigned int this_cpu = smp_processor_id();
+ unsigned int cpu;
+
+ st->local_state = 0;
+
+ /*
+  * Shared state setup happens once on the first bringup
+  * of the CPU. It's not destroyed on CPU hotunplug.
+ */
+ if (st->shared_state)
+ return;
+
+ raw_spin_lock_init(&st->lock);
+
+ /*
+  * Go over HT siblings and check whether one of them has set up the
+  * shared state pointer already.
+ */
+ for_each_cpu(cpu, topology_sibling_cpumask(this_cpu)) {
+ if (cpu == this_cpu)
+ continue;
+
+ if (!per_cpu(ssb_state, cpu).shared_state)
+ continue;
+
+ /* Link it to the state of the sibling: */
+ st->shared_state = per_cpu(ssb_state, cpu).shared_state;
+ return;
+ }
+
+ /*
+  * First HT sibling to come up on the core. Link shared state of
+  * the first HT sibling to itself. The siblings on the same core
+  * which come up later will see the shared state pointer and link
+  * themselves to the state of this CPU.
+ */
+ st->shared_state = st;
+ }
/*
 * Logic is: First HT sibling enables SSBD for both siblings in the core
 * and last sibling to disable it, disables it for the whole core. This how
 * MSR_SPEC_CTRL works in "hardware":
 *
 * CORE_SPEC_CTRL = THREAD0_SPEC_CTRL | THREAD1_SPEC_CTRL
 */

static __always_inline void amd_set_core_ssb_state(unsigned long tifn)
{
    struct ssb_state *st = this_cpu_ptr(&ssb_state);
    u64 msr = x86_amd_ls_cfg_base;
    
    if (!static_cpu_has(X86_FEATURE_ZEN)) {
        msr |= ssbd_tif_to_amd_ls_cfg(tifn);
        wrmsrl(MSR_AMD64_LS_CFG, msr);
        return;
    }
    
    if (tifn & _TIF_SSBD) {
        /*
        * Since this can race with prctl(), block reentry on the
        * same CPU.
        *
        */
        if (__test_and_set_bit(LSTATE_SSB, &st->local_state))
            return;
        
        msr |= x86_amd_ls_cfg_ssbd_mask;
        
        raw_spin_lock(&st->shared_state->lock);
        /* First sibling enables SSBD: */
        if (!st->shared_state->disable_state)
            wrmsrl(MSR_AMD64_LS_CFG, msr);
        st->shared_state->disable_state++;
        raw_spin_unlock(&st->shared_state->lock);
    } else {
        if (!__test_and_clear_bit(LSTATE_SSB, &st->local_state))
            return;
        
        raw_spin_lock(&st->shared_state->lock);
        /* First sibling enables SSBD: */
        if (!st->shared_state->disable_state)
            wrmsrl(MSR_AMD64_LS_CFG, msr);
        st->shared_state->disable_state--;
        raw_spin_unlock(&st->shared_state->lock);
    }

}
+u64 msr = x86_amd_cfg_base | ssbd_tif_to_amd_cfg(tifn);
+
+wrmrsrl(MSR_AMD64_LS_CFG, msr);
+}
+#endif
+
+static __always_inline void amd_set_ssb_virt_state(unsigned long tifn)
+{
+  /*
+   * SSBD has the same definition in SPEC_CTRL and VIRT_SPEC_CTRL, 
+   * so ssbd_tif_to_spec_ctrl() just works.
+   */
+wrmrsrl(MSR_AMD64_VIRT_SPEC_CTRL, ssbd_tif_to_spec_ctrl(tifn));
+}
+
+/*
+ * Update the MSRs managing speculation control, during context switch.
+ *
+ * tifp: Previous task's thread flags
+ * tifn: Next task's thread flags
+ */
+static __always_inline void __speculation_ctrl_update(unsigned long tifp,
+						      unsigned long tifn)
+{
+    unsigned long tif_diff = tifp ^ tifn;
+    u64 msr = x86_spec_ctrl_base;
+    bool updmsr = false;
+
+    /* Handle change of TIF_SSBD depending on the mitigation method. */
+    if (static_cpu_has(X86_FEATURE_VIRT_SSBD)) {
+      if (tif_diff & _TIF_SSBD)
+        amd_set_ssb_virt_state(tifn);
+    } else if (static_cpu_has(X86_FEATURE_LS_CFG_SSBD)) {
+      if (tif_diff & _TIF_SSBD)
+        amd_set_core_ssb_state(tifn);
+    } else if (static_cpu_has(X86_FEATURE_SPEC_CTRL_SSBD) ||
+                static_cpu_has(X86_FEATURE_AMD_SSBD)) {
+      updmsr |= !!(tif_diff & _TIF_SSBD);
+      msr |= ssbd_tif_to_spec_ctrl(tifn);
+    }
+
+    /* Only evaluate TIF_SPEC_IB if conditional STIBP is enabled. */
+    if (IS_ENABLED(CONFIG_SMP) &&
+        static_branch_unlikely(&switch_to_cond_stibp)) {
+      updmsr |= !!(tif_diff & _TIF_SPEC_IB);
+      msr |= stibp_tif_to_spec_ctrl(tifn);
+    }
+
+    +
if (updmsr)
  wrmsrl(MSR_IA32_SPEC_CTRL, msr);
+
static unsigned long speculation_ctrl_update_tif(struct task_struct *tsk)
+
  if (test_and_clear_tsk_thread_flag(tsk, TIF_SPEC_FORCE_UPDATE)) {
    if (task_spec_ssb_disable(tsk))
      set_tsk_thread_flag(tsk, TIF_SSB);
    else
      clear_tsk_thread_flag(tsk, TIF_SSB);
    +
    if (task_spec_ib_disable(tsk))
      set_tsk_thread_flag(tsk, TIF_SPEC_IB);
    else
      clear_tsk_thread_flag(tsk, TIF_SPEC_IB);
  }
  /* Return the updated threadinfo flags*/
  return task_thread_info(tsk)->flags;
+
  void speculation_ctrl_update(unsigned long tif)
  +{
    unsigned long flags;
    /* Forced update. Make sure all relevant TIF flags are different */
    local_irq_save(flags);
    __speculation_ctrl_update(~tif, tif);
    local_irq_restore(flags);
  }
  +
  /* Called from seccomp/prctl update */
  void speculation_ctrl_update_current(void)
  +{
    preempt_disable();
    speculation_ctrl_update(speculation_ctrl_update_tif(current));
    preempt_enable();
  }
  +
  +void __switch_to_xtra(struct task_struct *prev_p, struct task_struct *next_p)
  {
    struct thread_struct *prev, *next;
    unsigned long tifp, tifn;
    @@ -290,7 +481,7 @@
    tifn = READ_ONCE(task_thread_info(next_p)->flags);
    tifp = READ_ONCE(task_thread_info(prev_p)->flags);
    -switch_to_bitmap(tss, prev, next, tifp, tifn);
if ((tifp ^ tifn) & _TIF_NOCPUID)
    set_cpuid_faulting(!!(tifn & _TIF_NOCPUID));
+  +if (likely(!((tifp | tifn) & _TIF_SPEC_FORCE_UPDATE))) {
+    __speculation_ctrl_update(tifp, tifn);
+  } else {
+    speculation_ctrl_update_tif(prev_p);
+    tifn = speculation_ctrl_update_tif(next_p);
+    +/* Enforce MSR update to ensure consistent state */
+    +__speculation_ctrl_update(~tifn, tifn);
+  }
+
/*
--- linux-4.15.0.orig/arch/x86/kernel/process.h
+++ linux-4.15.0/arch/x86/kernel/process.h
@@ -0,0 +1,39 @@
+// SPDX-License-Identifier: GPL-2.0
+//
+// Code shared between 32 and 64 bit
++#include <asm/spec-ctrl.h>
+void __switch_to_xtra(struct task_struct *prev_p, struct task_struct *next_p);
+
+/*
+ * This needs to be inline to optimize for the common case where no extra
+ * work needs to be done.
+ */
+static inline void switch_to_extra(struct task_struct *prev,
+  struct task_struct *next)
+{
+  unsigned long next_tif = task_thread_info(next)->flags;
+  unsigned long prev_tif = task_thread_info(prev)->flags;
+  +if (IS_ENABLED(CONFIG_SMP)) {
+    +/*
+    + * Avoid __switch_to_xtra() invocation when conditional
+    + * STIBP is disabled and the only different bit is
+    + * TIF_SPEC_IB. For CONFIG_SMP=n TIF_SPEC_IB is not
+    + * in the TIF_WORK_CTXSW masks.
+    */
+*/
+if (!static_branch_likely(&switch_to_cond_stibp)) {
+prev_tif &= ~_TIF_SPEC_IB;
+next_tif &= ~_TIF_SPEC_IB;
+}
+
+/*
+ * __switch_to_xtra() handles debug registers, i/o bitmaps,
+ * speculation mitigations etc.
+ */
+if (unlikely(next_tif & _TIF_WORK_CTXSW_NEXT ||
+ prev_tif & _TIF_WORK_CTXSW_PREV))
+__switch_to_xtra(prev, next);
+}
--- linux-4.15.0.orig/arch/x86/kernel/process_32.c
+++ linux-4.15.0/arch/x86/kernel/process_32.c
@@ -59,6 +59,8 @@
 #include <asm/intel_rdt_sched.h>
 #include <asm/proto.h>
+
#include "process.h"
+
void __show_regs(struct pt_regs *regs, int all)
{
unsigned long cr0 = 0L, cr2 = 0L, cr3 = 0L, cr4 = 0L;
@@ -130,6 +132,13 @@
 struct task_struct *tsk;
 int err;
+/*
+ * For a new task use the RESET flags value since there is no before.
+ * All the status flags are zero; DF and all the system flags must also
+ * be 0, specifically IF must be 0 because we context switch to the new
+ * task with interrupts disabled.
+ */
+frame->flags = X86_EFLAGS_FIXED;
+frame->bp = 0;
+frame->ret_addr = (unsigned long) ret_from_fork;
+p->thread.sp = (unsigned long) fork_frame;
+@@ -234,7 +243,6 @@
 struct fpu *prev_fpu = &prev->fpu;
 struct fpu *next_fpu = &next->fpu;
 int cpu = smp_processor_id();
-struct tss_struct *tss = &per_cpu(cpu_tss_RW, cpu);

 /* never put a printk in __switch_to... printk() calls wake_up*() indirectly */
if (get_kernel_rpl() && unlikely(prev->iopl != next->iopl))
set_iopl_mask(next->iopl);

/*
 * Now maybe handle debug registers and/or IO bitmaps
 */
- if (unlikely(task_thread_info(prev_p)->flags & _TIF_WORK_CTXSW_PREV ||
- task_thread_info(next_p)->flags & _TIF_WORK_CTXSW_NEXT))
- __switch_to_xtra(prev_p, next_p, tss);
+ switch_to_extra(prev_p, next_p);

/*
 * Leave lazy mode, flushing any hypercalls made here.
 */
   -update_sp0(next_p);
   +update_task_stack(next_p);
   refresh_sysenter_cs(next);
   this_cpu_write(cpu_current_top_of_stack,
       (unsigned long)task_stack_page(next_p) +
--- linux-4.15.0.orig/arch/x86/kernel/process_64.c
+++ linux-4.15.0/arch/x86/kernel/process_64.c
@ @ -276,6 +278,14 @@
    childregs = task_pt_regs(p);
    fork_frame = container_of(childregs, struct fork_frame, regs);
    frame = &fork_frame->frame;
    +
   +/*
   + * For a new task use the RESET flags value since there is no before.
   + * All the status flags are zero; DF and all the system flags must also
   + * be 0, specifically IF must be 0 because we context switch to the new
   + * task with interrupts disabled.
   + */
   +frame->flags = X86_EFLAGS_FIXED;
   frame->bp = 0;
   frame->ret_addr = (unsigned long) ret_from_fork;
p->thread.sp = (unsigned long) fork_frame;
@@ -370,6 +380,7 @@
 start_thread_common(regs, new_ip, new_sp,
          __USER_CS, __USER_DS, 0);
 }
+EXPORT_SYMBOL_GPL(start_thread);

#ifdef CONFIG_COMPAT
 void compat_start_thread(struct pt_regs *regs, u32 new_ip, u32 new_sp)
@@ -399,7 +410,6 @@
 struct fpu *prev_fpu = &prev->fpu;
 struct fpu *next_fpu = &next->fpu;
 int cpu = smp_processor_id();
-struct tss_struct *tss = &per_cpu(cpu_tss_rw, cpu);
 WARN_ON_ONCE(IS_ENABLED(CONFIG_DEBUG_ENTRY) &&
          this_cpu_read(irq_count) != -1);
@@ -464,14 +474,9 @@
 this_cpu_write(cpu_current_top_of_stack, task_top_of_stack(next_p));

 /* Reload sp0. */
-update_sp0(next_p);
+update_task_stack(next_p);

 /* Now maybe reload the debug registers and handle I/O bitmaps
- */
- if (unlikely(task_thread_info(next_p)->flags & _TIF_WORK_CTXSW_NEXT ||
- task_thread_info(prev_p)->flags & _TIF_WORK_CTXSW_PREV))
- __switch_to_xtra(prev_p, next_p, tss);
+switch_to_extra(prev_p, next_p);

#ifdef CONFIG_XEN_PV
 /*
@@ -528,6 +533,7 @@
 clear_thread_flag(TIF_X32);
 /* Pretend that this comes from a 64bit execve */
 task_pt_regs(current)->orig_ax = __NR_execve;
+current_thread_info()->status &= ~TS_COMPAT;
 /* Ensure the corresponding mm is not marked. */
 if (current->mm)
@@ -557,7 +563,7 @@
 * Pretend to come from a x32 execve.
 */
task_pt_regs(current)->orig_ax = __NR_x32_execve | __X32_SYSCALL_BIT;
-current->thread.status &= ~TS_COMPAT;
+current_thread_info()->status &= ~TS_COMPAT;

Open Source Used In 5GaaS Edge AC-4  11995
current->personality |= force_personality32;
/* Prepare the first "return" to user space */
task_pt_regs(current)->orig_ax = __NR_ia32_execve;
-current->thread.status |= TS_COMPAT;
+current_thread_info()->status |= TS_COMPAT;
#endif
}

--- linux-4.15.0.orig/arch/x86/kernel/ptrace.c
+++ linux-4.15.0/arch/x86/kernel/ptrace.c
@@ -24,6 +24,7 @@

#include <linux/rcupdate.h>
#include <linux/export.h>
#include <linux/context_tracking.h>
+  #include <linux/nospec.h>

#include <linux/uaccess.h>
#include <asm/pgtable.h>
@@ -39,6 +40,7 @@

#include <asm/hw_breakpoint.h>
#include <asm/traps.h>
#include <asm/syscall.h>
+  #include <asm/mmu_context.h>

#include "tls.h"

@@ -342,6 +344,49 @@

return 0;
}

+static unsigned long task_seg_base(struct task_struct *task,
+    unsigned short selector)
+{
+    unsigned short idx = selector >> 3;
+    unsigned long base;
+    +if (likely((selector & SEGMENT_TI_MASK) == 0)) {
+    +if (unlikely(idx >= GDT_ENTRIES))
+        +return 0;
+    +}
+    +/*
+    + * There are no user segments in the GDT with nonzero bases
+    + * other than the TLS segments.
+    + */

    unsigned short selector = task->tv-kernel homosex;
+if (idx < GDT_ENTRY_TLS_MIN || idx > GDT_ENTRY_TLS_MAX)
+return 0;
+
+idx -= GDT_ENTRY_TLS_MIN;
+base = get_desc_base(&task->thread.tls_array[idx]);
+} else {
+}#ifdef CONFIG_MODIFY_LDT_SYSCALL
+struct ldt_struct *ldt;
+
+/*
+ * If performance here mattered, we could protect the LDT
+ * with RCU. This is a slow path, though, so we can just
+ * take the mutex.
+ */
+mutex_lock(&task->mm->context.lock);
+ldt = task->mm->context.ldt;
+if (unlikely(!ldt || idx >= ldt->nr_entries))
+base = 0;
+else
+base = get_desc_base(ldt->entries + idx);
+mutex_unlock(&task->mm->context.lock);
+#else
+base = 0;
+#endif
+
+return base;
+
+#endif /* CONFIG_X86_32 */

static unsigned long get_flags(struct task_struct *task)
@@ -435,18 +480,16 @@
#ifdef CONFIG_X86_64
    case offsetof(struct user_regs_struct, fs_base): {
-    /*
-     * XXX: This will not behave as expected if called on
-     * current or if fsindex != 0.
-    */
-    -return task->thread.fsbase;
+    if (task->thread.fsindex == 0)
+    return task->thread.fsbase;
+    else
+    return task_seg_base(task, task->thread.fsindex);
    }
    case offsetof(struct user_regs_struct, gs_base): {
    /*

Open Source Used In 5GasS Edge AC-4  11997
- * XXX: This will not behave as expected if called on
- * current or if fsindex != 0.
- */
- return task->thread.gsbase;
+ if (task->thread.gsindex == 0)
+ return task->thread.gsbase;
+ else
+ return task_seg_base(task, task->thread.gsindex);
}
#endif
@@ -653,7 +696,8 @@
 unsigned long val = 0;
 if (n < HBP_NUM) {
- struct perf_event *bp = thread->ptrace_bps[n];
+ int index = array_index_nospec(n, HBP_NUM);
+ struct perf_event *bp = thread->ptrace_bps[index];

 if (bp)
 val = bp->hw.info.address;
@@ -935,7 +979,7 @@
 */
 regs->orig_ax = value;
 if (syscall_get_nr(child, regs) >= 0)
- child->thread.status |= TS_I386_REGS_POKED;
+ child->thread_info.status |= TS_I386_REGS_POKED;
 break;

case offsetof(struct user32, regs.eflags):
--- linux-4.15.0.orig/arch/x86/kernel/quirks.c
+++ linux-4.15.0/arch/x86/kernel/quirks.c
@@ -645,12 +645,19 @@
 /* Skylake */
 static void quirk_intel_purley_xeon_ras_cap(struct pci_dev *pdev)
 { 
- u32 capid0;
+ u32 capid0, capid5;
 
 pci_read_config_dword(pdev, 0x84, &capid0);
+pci_read_config_dword(pdev, 0x98, &capid5);

- if ((capid0 & 0xc0) == 0xc0)
+ /*
+ * CAPID0{7:6} indicate whether this is an advanced RAS SKU
+ * CAPID5{8:5} indicate that various NVDIMM usage modes are
+ * enabled, so memory machine check recovery is also enabled.
+ */

+if ((capid0 & 0xc0) == 0xc0 || (capid5 & 0x1e0))
    static_branch_inc(&mcsafe_key);
+
}
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x0ec3, quirk_intel_brickland_xeon_ras_cap);
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x2fc0, quirk_intel_brickland_xeon_ras_cap);
--- linux-4.15.0.orig/arch/x86/kernel/reboot.c
+++ linux-4.15.0/arch/x86/kernel/reboot.c
@@ -32,6 +32,7 @@
 #include <asm/realmode.h>
 #include <asm/x86_init.h>
 #include <asm/efi.h>
+#include <asm/nospec-branch.h>

 /*
 * Power off function, if any
@@ -81,6 +82,19 @@
 return 0;
 }

+/*
+ * Some machines don't handle the default ACPI reboot method and
+ * require the EFI reboot method:
+ */
+static int __init set_efi_reboot(const struct dmi_system_id *d)
+{
+    if (reboot_type != BOOT_EFI && !efi_runtime_disabled()) {
+        reboot_type = BOOT_EFI;
+        pr_info("%s series board detected. Selecting EFI-method for reboot.
", d->ident);
+    }
+    return 0;
+}
+
+void __noreturn machine_real_restart(unsigned int type)
+{
+    local_irq_disable();
@ @ -114.11 +128.11 @@

 /* Jump to the identity-mapped low memory code */
 #ifdef CONFIG_X86_32
-asm volatile("jmpl *%0" ::
+asm volatile(ANNOTATE_RETPOLINE_SAFE "jmpl *%0" ::
    "rm" (real_mode_header->machine_real_restart_asm),
    "a" (type));
#else
-asm volatile("ljmpl *%0" ::
+asm volatile(ANNOTATE_RETPOLINE_SAFE "ljmpl *%0" ::
    "m" (real_mode_header->machine_real_restart_asm),
"D" (type));
#endif
@@ -166,6 +180,14 @@
 DMI_MATCH(DMI_PRODUCT_NAME, "AOA110"),
 },
 },
+/* Handle reboot issue on Acer TravelMate X514-51T */
+callback = set_efi_reboot,
+.ident = "Acer TravelMate X514-51T",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "TravelMate X514-51T"),
+},
+},

/* Apple */
/* Handle problems with rebooting on Apple MacBook5 */
@@ -176,6 +198,14 @@
 DMI_MATCH(DMI_PRODUCT_NAME, "MacBook5"),
 },
 },
+/* Handle problems with rebooting on Apple MacBook6,1 */
+callback = set_pci_reboot,
+.ident = "Apple MacBook6,1",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Apple Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "MacBook6,1"),
+},
+},
+},
/* Handle problems with rebooting on Apple MacBookPro5 */
callback = set_pci_reboot,
.ident = "Apple MacBookPro5",
@@ -359,10 +389,11 @@
 },
 /* Handle problems with rebooting on the OptiPlex 990. */
callback = set_pci_reboot,
-.ident = "Dell OptiPlex 990",
+.ident = "Dell OptiPlex 990 BIOS A0x",
.matches = {
 DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
 DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 990"),
+DMI_MATCH(DMI_BIOS_VERSION, "A0"),
 },
 },
/* Handle problems with rebooting on Dell 300's */
@@ -448,6 +479,15 @@
 },
 },

/* PCIe Wifi card isn't detected after reboot otherwise */
callback = set_pci_reboot,
.ident = "Zotac ZBOX CI327 nano",
.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "NA"),
+DMI_MATCH(DMI_PRODUCT_NAME, "ZBOX-CI327NANO-GS-01"),
+},
+
/* Sony */
{
/* Handle problems with rebooting on Sony VGN-Z540N */
callback = set_bios_reboot,
@@ -457,7 +497,46 @@
DMI_MATCH(DMI_PRODUCT_NAME, "VGN-Z540N"),
 },
},
-
+/* Handle problems with rebooting on the Latitude E6520. */
callback = set_pci_reboot,
.ident = "Dell Latitude E6520",
.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Latitude E6520"),
+},
+},
+{
+/* Handle problems with rebooting on the OptiPlex 790. */
callback = set_pci_reboot,
.ident = "Dell OptiPlex 790",
.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 790"),
+},
+},
+/* Handle problems with rebooting on the OptiPlex 990. */
callback = set_pci_reboot,
.ident = "Dell OptiPlex 990",
.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 990"),
+},
+},
+{
+/* Handle problems with rebooting on the Latitude E6220. */
callback = set_pci_reboot,
.ident = "Dell Latitude E6220",
.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Latitude E6220"),
+}
+ { /* Handle problems with rebooting on the OptiPlex 390. */
+ .callback = set_pci_reboot,
+ .ident = "Dell OptiPlex 390",
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc.")",
+ DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 390"),
+ },
+ },
+ };

@@ -509,29 +588,20 @@
local_irq_disable();

/*
 - * We need to disable VMX on all CPUs before rebooting, otherwise
 - * we risk hanging up the machine, because the CPU ignore INIT
 - * signals when VMX is enabled.
 - *
 - * We can't take any locks and we may be on an inconsistent
 - * state, so we use NMIs as IPIs to tell the other CPUs to disable
 - * VMX and halt.
 - * Disable VMX on all CPUs before rebooting, otherwise we risk hanging
 - * the machine, because the CPU blocks INIT when it's in VMX root.
 - *
 - * For safety, we will avoid running the nmi_shootdown_cpus()
 - * stuff unnecessarily, but we don't have a way to check
 - * if other CPUs have VMX enabled. So we will call it only if the
 - * CPU we are running on has VMX enabled.
 - * We can't take any locks and we may be on an inconsistent state, so
 - * use NMIs as IPIs to tell the other CPUs to exit VMX root and halt.
 - *
 - * We will miss cases where VMX is not enabled on all CPUs. This
 - * shouldn't do much harm because KVM always enable VMX on all
 - * CPUs anyway. But we can miss it on the small window where KVM
 - * is still enabling VMX.
 - * Do the NMI shootdown even if VMX if off on _this_ CPU, as that
 - * doesn't prevent a different CPU from being in VMX root operation.
 */
-if (cpu_has_vmx() && cpu_vmx_enabled()) {
  /* Disable VMX on this CPU. */
  -cpu_vmxooff();
  +if (cpu_has_vmx()) {
  +=/* Safely force _this_ CPU out of VMX root operation. */
  ++_cpu_emergency_vmxooff();}
/* Halt and disable VMX on the other CPUs */
/* Halt and exit VMX root operation on the other CPUs. */
nmi_shootdown_cpus(vmxoff_nmi);

}
/*
 movl $X86_CR4_PAE, %eax
 +testq $X86_CR4_LA57, %r13
 +jz1f
 +orl $X86_CR4_LA57, %eax
 +1:
 movq %rax, %cr4

 jmp 1f
 @@ -186,6 +195,7 @@
 1:
 popq %rdx
 leaq PAGE_SIZE(%r10), %rsp
+ANNOTATE_RETPOLINE_SAFE
 call* %rdx

 /* get the re-entry point of the peer system */
 --- linux-4.15.0.orig/arch/x86/kernel/setup.c
 +++ linux-4.15.0/arch/x86/kernel/setup.c
 @@ -64,6 +64,7 @@
 #include <linux/dma-mapping.h>
 #include <linux/ctype.h>
 #include <linux/uaccess.h>
+#include <linux/security.h>
 #include <linux/percpu.h>
 #include <linux/crash_dump.h>
 @@ -820,6 +821,12 @@
 memblock_reserve(__pa_symbol(_text),
 (unsigned long)__bss_stop - (unsigned long)_text);

+/*
+ * Make sure page 0 is always reserved because on systems with
+ * L1TF its contents can be leaked to user processes.
+ */
+memblock_reserve(0, PAGE_SIZE);
+
 early_reserve_initrd();

 /*
 @@ -998,6 +1005,9 @@
 if (efi_enabled(EFI_BOOT))
 efi_init();

 +efi_set_secure_boot(boot_params.secure_boot);
 +init_lockdown();
 +
dmi_scan_machine();

"
dmi_memdev_walk();
dmi_set_dump_stack_arch_desc();
@@ -1098,6 +1108,7 @@
efi_fake_memmap();
efi_find_mirror();
efi_esrt_init();
+efi_mokvar_table_init();

/*
 * The EFI specification says that boot service code won't be
@@ -1151,23 +1162,11 @@
/* Allocate bigger log buffer */
setup_log_buf(1);

-if (efi_enabled(EFI_BOOT)) {
-switch (boot_params.secure_boot) {
-case efi_secureboot_mode_disabled:
-pr_info("Secure boot disabled\n");
-break;
-case efi_secureboot_mode_enabled:
-pr_info("Secure boot enabled\n");
-break;
-default:
-pr_info("Secure boot could not be determined\n");
-break;
-}
-}
-
reserve_initrd();

acpi_table_upgrade();
+/* Look for ACPI tables and reserve memory occupied by them. */
+acpi_boot_table_init();

vsmp_init();
@@ -1175,11 +1174,6 @@
early_platform_quirks();

-/*
- * Parse the ACPI tables for possible boot-time SMP configuration.
- */
-acpi_boot_table_init();
-
early_acpi_boot_init();

initmem_init();
kasan_init();

#ifdef CONFIG_X86_32
/* sync back kernel address range */
-clone_pgd_range(initial_page_table + KERNEL_PGD_BOUNDARY,
-swapper_pg_dir + KERNEL_PGD_BOUNDARY,
-KERNEL_PGD_PTRS);
-
/*
 - * sync back low identity map too. It is used for example
 - * in the 32-bit EFI stub.
 - * Sync back kernel address range.
 - *
 - * FIXME: Can the later sync in setup_cpu_entry_areas() replace
 - * this call?
 - */
-clone_pgd_range(initial_page_table,
-swapper_pg_dir + KERNEL_PGD_BOUNDARY,
-min(KERNEL_PGD_PTRS, KERNEL_PGD_BOUNDARY));
#endif
+sync_initial_page_table();

tboot_probe();

x86_init.guest.late_init();

e820__reserve_resources();
-e820__register_nosave_regions(max_low_pfn);
+e820__register_nosave_regions(max_pfn);
+ *
+ * FIXME: Can the later sync in setup_cpu_entry_areas() replace
+ * this call?
+ */
-clone_pgd_range(initial_page_table + KERNEL_PGD_BOUNDARY,
-swapper_pg_dir + KERNEL_PGD_BOUNDARY,
-KERNEL_PGD_PTRS);
-
-/*
- * sync back low identity map too. It is used for example
- * in the 32-bit EFI stub.
- */
-clone_pgd_range(initial_page_table,
-swapper_pg_dir + KERNEL_PGD_BOUNDARY,
-min(KERNEL_PGD_PTRS, KERNEL_PGD_BOUNDARY));
-#endif
+sync_initial_page_table();
}

--- linux-4.15.0.orig/arch/x86/kernel/signal.c
+++ linux-4.15.0/arch/x86/kernel/signal.c
@@ -131,16 +131,6 @@
COPY_SEG_CPL3(cs);
COPY_SEG_CPL3(ss);

-#ifdef CONFIG_X86_64
-/*
- * Fix up SS if needed for the benefit of old DOSEMU and
- * CRIU.
- */
-#endif
-if (unlikely(!(uc_flags & UC_STRICT_RESTORE_SS) &&
- user_64bit_mode(regs)))
-force_valid_ss(regs);
-#endif
-get_user_ex(tmpflags, &sc->flags);
regs->flags = (regs->flags & ~FIX_EFLAGS) | (tmpflags & FIX_EFLAGS);
regs->orig_ax = -1;/* disable syscall checks */
@@ -149,6 +139,15 @@
buf = (void __user *)buf_val;
} get_user_catch(err);

+#ifdef CONFIG_X86_64
+/*
+ * Fix up SS if needed for the benefit of old DOSEMU and
+ * CRIU.
+ */
+if (unlikely(!(uc_flags & UC_STRICT_RESTORE_SS) && user_64bit_mode(regs)))
+force_valid_ss(regs);
 ```c
+#endif
+
err |= fpu__restore_sig(buf, IS_ENABLED(CONFIG_X86_32));

force_ioret();
@@ -460,6 +459,7 @@
{
 struct rt_sigframe __user *frame;
 void__user *fp = NULL;
+unsigned long uc_flags;
 int err = 0;

 frame = get_sigframe(&ksig->ka, regs, sizeof(struct rt_sigframe), &fp);
@@ -472,9 +472,11 @@
return -EFAULT;
 }

+uc_flags = frame_uc_flags(regs);
 +
 put_user_try {
 /* Create the ucontext. */
-put_user_ex(frame_uc_flags(regs), &frame->uc.uc_flags);
+put_user_ex(uc_flags, &frame->uc.uc_flags);
 put_user_ex(0, &frame->uc.uc_link);
 put_user_ex(0, &frame->uc.uc_stack, regs->sp);

@@ -540,6 +542,7 @@
{
 #ifdef CONFIG_X86_X32_ABI
 struct rt_sigframe_x32 __user *frame;
+unsigned long uc_flags;
 void__user *restorer;
 int err = 0;
 void__user *fpstate = NULL;
@@ -554,9 +557,11 @@
return -EFAULT;
 }

+uc_flags = frame_uc_flags(regs);
 +
 put_user_try {
 /* Create the ucontext. */
-put_user_ex(frame_uc_flags(regs), &frame->uc.uc_flags);
+put_user_ex(uc_flags, &frame->uc.uc_flags);
 put_user_ex(0, &frame->uc.uc_link);
 compat_save_altstack_ex(&frame->uc.uc_stack, regs->sp);
@@ -764,30 +769,8 @@
```
static inline unsigned long get_nr_restart_syscall(const struct pt_regs *regs)
{
    /*
    * This function is fundamentally broken as currently
    * implemented.
    *
    * The idea is that we want to trigger a call to the
    * restart_block() syscall and that we want in_ia32_syscall(),
    * in_x32_syscall(), etc. to match whatever they were in the
    * syscall being restarted. We assume that the syscall
    * instruction at (regs->ip - 2) matches whatever syscall
    * instruction we used to enter in the first place.
    *
    * The problem is that we can get here when ptrace pokes
    * syscall-like values into regs even if we're not in a syscall
    * at all.
    *
    * For now, we maintain historical behavior and guess based on
    * stored state. We could do better by saving the actual
    * syscall arch in restart_block or (with caveats on x32) by
    * checking if regs->ip points to 'int $0x80'. The current
    * behavior is incorrect if a tracer has a different bitness
    * than the tracee.
    */

    #ifdef CONFIG_IA32_EMULATION
    if (current->thread.status & (TS_COMPAT|TS_I386_REGS_POKED))
    return __NR_ia32_restart_syscall;
    #endif

    #ifdef CONFIG_X86_X32_ABI
    --- linux-4.15.0.orig/arch/x86/kernel/smp.c
    +++ linux-4.15.0/arch/x86/kernel/smp.c
    @@ -181,6 +181,12 @@
    irq_exit();
    }

    +static int register_stop_handler(void)
    +{
    +return register_nmi_handler(NMI_LOCAL, smp_stop_nmi_callback,
    + NMI_FLAG_FIRST, "smp_stop");
    +}

    +static void native_stop_other_cpus(int wait)
    {
    unsigned long flags;
    @@ -214,39 +220,41 @@
    apic->send_IPI_allbutself(REBOOT_VECTOR);
/*
- * Don't wait longer than a second if the caller
- * didn't ask us to wait.
+ * Don't wait longer than a second for IPI completion. The
+ * wait request is not checked here because that would
+ * prevent an NMI shutdown attempt in case that not all
+ * CPUs reach shutdown state.
*/
timeout = USEC_PER_SEC;
-while (num_online_cpus() > 1 && (wait || timeout--))
+while (num_online_cpus() > 1 && timeout--)
  udelay(1);
}
-/* if the REBOOT_VECTOR didn't work, try with the NMI */
-if ((num_online_cpus() > 1) && (!smp_no_nmi_ipi)) {
-  -if (register_nmi_handler(NMI_LOCAL, smp_stop_nmi_callback,
-    NMI_FLAG_FIRST, "smp_stop"))
-  */ Note: we ignore failures here */
-/* Hope the REBOOT_IRQ is good enough */
-goto finish;
-
-/* sync above data before sending IRQ */
-wmb();

-pr_emerg("Shutting down cpus with NMI
");
+/* if the REBOOT_VECTOR didn't work, try with the NMI */
+if (num_online_cpus() > 1) {
+  /*
+   * If NMI IPI is enabled, try to register the stop handler
+   * and send the IPI. In any case try to wait for the other
+   * CPUs to stop.
+   */
+  if (!smp_no_nmi_ipi && !register_stop_handler()) {
+    /* Sync above data before sending IRQ */
+    wmb();

-apic->send_IPI_allbutself(NMI_VECTOR);
+pr_emerg("Shutting down cpus with NMI
");

-apic->send_IPI_allbutself(NMI_VECTOR);
+pr_emerg("Shutting down cpus with NMI
");

-apic->send_IPI_allbutself(NMI_VECTOR);
+}
/*
- * Don't wait longer than a 10 ms if the caller
- * didn't ask us to wait.
+ * Don't wait longer than 10 ms if the caller didn't
+ * request it. If wait is true, the machine hangs here if
timeout = USEC_PER_MSEC * 10;
while (num_online_cpus() > 1 && (wait || timeout--))
    udelay(1);
}

-finish:
local_irq_save(flags);
disable_local_APIC();
mcheck_cpu_clear(this_cpu_ptr(&cpu_info));

{ ack_APIC_irq();
    inc_irq_stat(irq_resched_count);
    kvm_set_cpu_l1tf_flush_l1d();
}

if (trace_resched_ipi_enabled()) {
    /*
     --- linux-4.15.0.orig/arch/x86/kernel/smpboot.c
     +++ linux-4.15.0/arch/x86/kernel/smpboot.c
     @@ -78,13 +78,10 @@
     #include <asm/realmode.h>
     #include <asm/misc.h>
     #include <asm/qspinlock.h>
     */
    /* Number of siblings per CPU package */
    -int smp_num_siblings = 1;
    -EXPORT_SYMBOL(smp_num_siblings);
    -
    /* Last level cache ID of each logical CPU */
    -DEFINE_PER_CPU_READ_MOSTLY(u16, cpu_llc_id) = BAD_APICID;
    +#include <asm/intel-family.h>
    +#include <asm/cpu_device_id.h>
    +#include <asm/spec-ctrl.h>
    +#include <asm/hw_irq.h>

    /* representing HT siblings of each logical CPU */
    DEFINE_PER_CPU_READ_MOSTLY(cpumask_var_t, cpu_sibling_map);
    @ @ -226,6 +223,11 @@
    #ifdef CONFIG_X86_32
    /* switch away from the initial page table */
    load_cr3(swapper_pg_dir);
    */
    + * Initialize the CR4 shadow before doing anything that could
    + * try to read it.
    + */
    +cr4_init_shadow();

+ * one or more CPUs do not reach shutdown state.
 */
__flush_tlb_all();
#endif
load_current_idt();
@@ -243,6 +245,8 @@*/
check_tsc_sync_target();

+speculative_store_bypass_ht_init();
+
+/*
* Lock vector_lock, set CPU online and bring the vector
* allocator online. Online must be set with vector_lock held
@@ -266,6 +270,31 @@
wmb();
cpu_startup_entry(CPUHP_AP_ONLINE_IDLE);
+
+/*
+ * Prevent tail call to cpu_startup_entry() because the stack protector
+ * guard has been changed a couple of function calls up, in
+ * boot_init_stack_canary() and must not be checked before tail calling
+ * another function.
+ */
+prevent_tail_call_optimization();
+
+/**
+ * topology_is_primary_thread - Check whether CPU is the primary SMT thread
+ * @cpu: CPU to check
+ */
+bool topology_is_primary_thread(unsigned int cpu)
+{
+return apic_id_is_primary_thread(per_cpu(x86_cpu_to_apicid, cpu));
+}
+
+/**
+ * topology_smt_supported - Check whether SMT is supported by the CPUs
+ */
+bool topology_smt_supported(void)
+{
+return smp_num_siblings > 1;
+}

/**
@@ -391,15 +420,47 @@*/
return false;
}
+/*
+ * Define snc_cpu[] for SNC (Sub-NUMA Cluster) CPUs.
+ * These are Intel CPUs that enumerate an LLC that is shared by
+ * multiple NUMA nodes. The LLC on these systems is shared for
+ * off-package data access but private to the NUMA node (half
+ * of the package) for on-package access.
+ */
+
+static const struct x86_cpu_id snc_cpu[] = {
+  { X86_VENDOR_INTEL, 6, INTEL_FAM6_SKYLAKE_X },
+};
+
+static bool match_llc(struct cpuinfo_x86 *c, struct cpuinfo_x86 *o)
+{
+  int cpu1 = c->cpu_index, cpu2 = o->cpu_index;
+  if (per_cpu(cpu_llc_id, cpu1) != BAD_APICID &&
+      per_cpu(cpu_llc_id, cpu1) == per_cpu(cpu_llc_id, cpu2))
+    return topology_sane(c, o, "llc");
+  /* Do not match if we do not have a valid APICID for cpu: */
+  if (per_cpu(cpu_llc_id, cpu1) == BAD_APICID)
+    return false;
+  /* Do not match if LLC id does not match: */
+  if (per_cpu(cpu_llc_id, cpu1) != per_cpu(cpu_llc_id, cpu2))
+    return false;
+  /* Allow the SNC topology without warning. Return of false
+   * means 'c' does not share the LLC of 'o'. This will be
+   * reflected to userspace.
+   */
+  if (!topology_same_node(c, o) && x86_match_cpu(snc_cpu))
+    return false;
+  return topology_sane(c, o, "llc");
+}
+*/
/*
 * Set if a package/die has multiple NUMA nodes inside.
 * - * AMD Magny-Cours and Intel Cluster-on-Die have this.
 * + * AMD Magny-Cours, Intel Cluster-on-Die, and Intel
 * + * Sub-NUMA Clustering have this.
 */
static bool x86_has_numa_in_package;

void __init native_smp_cpus_done(unsigned int max_cpus)
{
    pr_debug("Boot done\n");
    pr_info("Max logical packages: %u\n", __max_logical_packages);
}

if (x86_has_numa_in_package)
    set_sched_topology(x86_numa_in_package_topology);
cpumask_clear(cpu_llc_shared_mask(cpu));
cpumask_clear(topology_sibling_cpumask(cpu));
cpumask_clear(topology_core_cpumask(cpu));
c->phys_proc_id = 0;
c->cpu_core_id = 0;
c->booted_cores = 0;
cpusmask_clear_cpu(cpu, cpu_sibling_setup_mask);
recompute_smt_state();
}

if (boot_cpu_data.x86_vendor == X86_VENDOR_AMD)
return;

if (!this_cpu_has(X86_FEATURE_MWAIT))
return;

if (!this_cpu_has(X86_FEATURE_CLFLUSH))
--- linux-4.15.0.orig/arch/x86/kernel/sysfb_efi.c
+++ linux-4.15.0/arch/x86/kernel/sysfb_efi.c
@@ -231,9 +231,55 @@
 {}
 ];
]

+/*
+ * Some devices have a portrait LCD but advertise a landscape resolution (and
+ * pitch). We simply swap width and height for these devices so that we can
+ * correctly deal with some of them coming with multiple resolutions.
+ */
+static const struct dmi_system_id efifb_dmi_swap_width_height[] __initconst = {
+{
+/*
+ * Lenovo MIIX310-10ICR, only some batches have the troublesome
+ * 800x1280 portrait screen. Luckily the portrait version has
+ * its own BIOS version, so we match on that.
+ */
+.matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_EXACT_MATCH(DMI_PRODUCT_VERSION, "MIIX 310-10ICR"),
+DMI_EXACT_MATCH(DMI_BIOS_VERSION, "1HCN44WW"),
+},
+},
+{
+/* Lenovo MIIX 320-10ICR with 800x1280 portrait screen */
.+matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_EXACT_MATCH(DMI_PRODUCT_VERSION, "Lenovo MIIX 320-10ICR"),
/* Lenovo D330 with 800x1280 or 1200x1920 portrait screen */
matches = {
  +DMI_EXACT_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  +DMI_EXACT_MATCH(DMI_PRODUCT_VERSION,
    +%"Lenovo ideapad D330-10IGM"),
  +
  +
  +
}

__init void sysfb_apply_efi_quirks(void)
{
  if (screen_info.orig_video_isVGA != VIDEO_TYPE_EFI ||
      !(screen_info.capabilities & VIDEO_CAPABILITY_SKIP_QUIRKS))
    dmi_check_system(efifb_dmi_system_table);
  +
  +if (screen_info.orig_video_isVGA == VIDEO_TYPE_EFI &&
      dmi_check_system(efifb_dmi_swap_width_height)) {
    +u16 temp = screen_info.lfb_width;
    +
    +screen_info.lfb_width = screen_info.lfb_height;
    +screen_info.lfb_height = temp;
    +screen_info.lfb_linelength = 4 * screen_info.lfb_width;
    +
  }
}

--- linux-4.15.0.orig/arch/x86/kernel/sysfb_simplefb.c
+++ linux-4.15.0/arch/x86/kernel/sysfb_simplefb.c
@@ -94,11 +94,11 @@
      size <<= 16;
      length = mode->height * mode->stride;
      -length = PAGE_ALIGN(length);
      +length = PAGE_ALIGN(length);
    }

    /* setup IORESOURCE_MEM as framebuffer memory */
    memset(&res, 0, sizeof(res));
--- linux-4.15.0.orig/arch/x86/kernel/time.c
+++ linux-4.15.0/arch/x86/kernel/time.c
@@ -12,6 +12,7 @@
    #include <linux/clockchips.h>
#include <linux/interrupt.h>
+﻿#include <linux/irq.h>
#include <linux/i8253.h>
#include <linux/time.h>
#include <linux/export.h>
@@ -23,10 +24,6 @@
#include <asm/hpet.h>
#include <asm/time.h>

-#ifdef CONFIG_X86_64
-__visible volatile unsigned long jiffies __cacheline_aligned = INITIAL_JIFFIES;
-#endif
-
unsigned long profile_pc(struct pt_regs *regs)
{
    unsigned long pc = instruction_pointer(regs);
    /* Default timer init function */
    void __init hpet_time_init(void)
    {
        -if (!hpet_enable())
+-if (!pit_timer_init())
+    } +
+    return;
+}
+
+setup_default_timer_irq();
}

static __init void x86_late_time_init(void)
{
    /* Before PIT/HPET init, select the interrupt mode. This is required
     * to make the decision whether PIT should be initialized correct.
     */
    +x86_init.irqs.intr_mode_select();
    +
    /* Setup the legacy timers */
    x86_init.timers.timer_init();
    +
    /*
    * After PIT/HPET timers init, select and setup
    * the final interrupt mode for delivering IRQs.
    */
    +x86_init.irqs.intr_mode_init();

tsc_init();
--- linux-4.15.0.orig/arch/x86/kernel/tls.c
+++ linux-4.15.0/arch/x86/kernel/tls.c
@@ -5,6 +5,7 @@
 #include <linux/user.h>
 #include <linux/regset.h>
 #include <linux/syscalls.h>
+#include <linux/nospec.h>
 #include <linux/uaccess.h>
 #include <asm/desc.h>
 @ @ -220,6 +221,7 @@
     if (idx == -1 && get_user(idx, &u_info->entry_number))
         return -EFAULT;
 @ @ -227,8 +229,11 @@
 if (idx < GDT_ENTRY_TLS_MIN || idx > GDT_ENTRY_TLS_MAX)
     return -EINVAL;
-    fill_user_desc(&info, idx, &p->thread.tls_array[idx - GDT_ENTRY_TLS_MIN]);
+    index = idx - GDT_ENTRY_TLS_MIN;
+    index = array_index_nospec(index, GDT_ENTRY_TLS_MAX - GDT_ENTRY_TLS_MIN + 1);
+    fill_user_desc(&info, idx, &p->thread.tls_array[index]);

 if (copy_to_user(u_info, &info, sizeof(info)))
     return -EFAULT;
--- linux-4.15.0.orig/arch/x86/kernel/traps.c
+++ linux-4.15.0/arch/x86/kernel/traps.c
@@ -181,7 +181,7 @@
     case BUG_TRAP_TYPE_WARN:
-        regs->ip += LEN_UD0;
+        regs->ip += LEN_UD2;
         return 1;
 }
dotraplinkage void notrace do_int3(struct pt_regs *regs, long error_code)
{
#ifdef CONFIG_DYNAMIC_FTRACE
@@ -592,6 +591,13 @@
  if (poke_int3_handler(regs))
    return;

+/*
+ * Use ist_enter despite the fact that we don't use an IST stack.
+ * We can be called from a kprobe in non-CONTEXT_KERNEL kernel
+ * mode or even during context tracking state changes.
+ *
+ * This means that we can't schedule. That's okay.
+ */
+ ist_enter(regs);
+RCU_LOCKDEP_WARN(!rcu_is_watching(), "entry code didn't wake RCU");
#ifdef CONFIG_KGDB_LOW_LEVEL_TRAP
@@ -609,15 +615,10 @@
  SIGTRAP) == NOTIFY_STOP)
    goto exit;

-/*
- * Let others (NMI) know that the debug stack is in use
- * as we may switch to the interrupt stack.
- */
-debug_stack_usage_inc();
-cond_local_irq_enable(regs);
-do_trap(X86_TRAP_BP, SIGTRAP, "int3", regs, error_code, NULL);
-cond_local_irq_disable(regs);
-debug_stack_usage_dec();
+
  exit:
  ist_exit(regs);
}
@@ -833,16 +834,18 @@
  char *str = (trapnr == X86_TRAP_MF) ? "fpu exception" :
                      "simd exception";
          
- if (notify_die(DIE_TRAP, str, regs, error_code, trapnr, SIGFPE) == NOTIFY_STOP)
+ if (notify_die(DIE_TRAP, str, regs, error_code, trapnr, SIGFPE) == NOTIFY_STOP)
 -return;
  cond_local_irq_enable(regs);

 if (!user_mode(regs)) {
  if (!fixup_exception(regs, trapnr)) {
    -task->thread.error_code = error_code;
    -task->thread.trap_nr = trapnr;
+ if (fixup_exception(regs, trapnr))

```c
return;
}

--- linux-4.15.0.orig/arch/x86/kernel/tsc.c
+++ linux-4.15.0/arch/x86/kernel/tsc.c
@@ -25,6 +25,7 @@
 #include <asm/geode.h>
 #include <asm/apic.h>
 #include <asm/intel-family.h>
+#include <asm/i8259.h>
 unsigned int __read_mostly cpu_khz; /* TSC clocks / usec, not used here */
 EXPORT_SYMBOL(cpu_khz);
@@ -59,7 +60,7 @@
 static DEFINE_PER_CPU_ALIGNED(struct cyc2ns, cyc2ns);

 void cyc2ns_read_begin(struct cyc2ns_data *data)
-void __always_inline cyc2ns_read_begin(struct cyc2ns_data *data)
+{ int seq, idx;
    while (unlikely(seq != this_cpu_read(cyc2ns.seq.sequence)));
 }

 void cyc2ns_read_end(void)
+void __always_inline cyc2ns_read_end(void)
+{ preempt_enable_notrace();
+ }
+seqcount_init(&c2n->seq);
 }

 static inline unsigned long long cycles_2_ns(unsigned long long cyc)
+static __always_inline unsigned long long cycles_2_ns(unsigned long long cyc)
+{ struct cyc2ns_data data;
```
unsigned long long ns;
@@ -280,15 +281,16 @@
    __setup("tsc=", tsc_setup);

-#define MAX_RETRIES   5
-#define SMI_TRESHOLD  50000
+#define MAX_RETRIES5
+#define TSC_DEFAULT_THRESHOLD 0x20000

/*
  * Read TSC and the reference counters. Take care of SMI disturbance
  + * Read TSC and the reference counters. Take care of any disturbances
  */
static u64 tsc_read_refs(u64 *p, int hpet)
{
    u64 t1, t2;
    +u64 thresh = tsc_khz ? tsc_khz >> 5 : TSC_DEFAULT_THRESHOLD;
    int i;

    for (i = 0; i < MAX_RETRIES; i++) {
        @@ -298,7 +300,7 @@
            else
            *p = ACPI_PM_READ_EARLY();
            t2 = get_cycles();
            -if ((t2 - t1) < SMI_TRESHOLD)
            +if ((t2 - t1) < thresh)
                return t2;
        }
        return ULLONG_MAX;
    }
@@ -316,7 +318,7 @@
    hpet2 -= hpet1;
    tmp = ((u64)hpet2 * hpet_readl(HPET_PERIOD));
    do_div(tmp, 1000000);
-    do_div(deltatsc, tmp);
-    deltatsc = div64_u64(deltatsc, tmp);
+    deltatsc = div64_u64(deltatsc, tmp);

    return (unsigned long) deltatsc;
    }
@@ -363,6 +365,20 @@
    unsigned long tscmin, tscmax;
    int pitcnt;

    +if (!has_legacy_pic()) {
        +/*
        + * Relies on tsc_early_delay_calibrate() to have given us semi
        + * usable udelay(), wait for the same 50ms we would have with
        + * the PIT loop below.
        */
    }
+ */
+ udelay(10 * USEC_PER_MSEC);
+ udelay(10 * USEC_PER_MSEC);
+ udelay(10 * USEC_PER_MSEC);
+ udelay(10 * USEC_PER_MSEC);
+ udelay(10 * USEC_PER_MSEC);
+ return ULONG_MAX;
+ }
+
+ /* Set the Gate high, disable speaker */
+ outb((inb(0x61) & ~0x02) | 0x01, 0x61);
@@ -487,6 +503,9 @@
    unsigned long d1, d2;

    +if (!has_legacy_pic())
    +return 0;
    +
    /* Set the Gate high, disable speaker */
+ outb((inb(0x61) & ~0x02) | 0x01, 0x61);
@@ -594,31 +613,38 @@
    crystal_khz = ecx_hz / 1000;

    -if (crystal_khz == 0) {
    -switch (boot_cpu_data.x86_model) {
    -case INTEL_FAM6_SKYLAKE_MOBILE:
    -case INTEL_FAM6_SKYLAKE_DESKTOP:
    -case INTEL_FAM6_KABYLAKE_MOBILE:
    -case INTEL_FAM6_KABYLAKE_DESKTOP:
    -crystal_khz = 24000; /* 24.0 MHz */
    -break;
    -case INTEL_FAM6_ATOM_DENVERTON:
    -crystal_khz = 25000; /* 25.0 MHz */
    -break;
    -case INTEL_FAM6_ATOM_GOLDMONT:
    -crystal_khz = 19200; /* 19.2 MHz */
    -break;
    -}
    -}
    */
+ /* Denverton SoCs don’t report crystal clock, and also don’t support CPUID.0x16 for the calculation below, so hardcode the 25MHz crystal clock.
+ */
+if (crystal_khz == 0 &&

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+boot_cpu_data.x86_model == INTEL_FAM6_ATOM_GOLDMONT_X)
+crystal_khz = 25000;

-if (crystal_khz == 0)
-return 0;
/*
 * TSC frequency determined by CPUID is a "hardware reported"
 */
-setup_force_cpu_cap(X86_FEATURE_TSC_KNOWN_FREQ);
+if (crystal_khz != 0)
+setup_force_cpu_cap(X86_FEATURE_TSC_KNOWN_FREQ);
+
+/*
 * Some Intel SoCs like Skylake and Kabylake don't report the crystal
 * clock, but we can easily calculate it to a high degree of accuracy
 * by considering the crystal ratio and the CPU speed.
 * */
+if (crystal_khz == 0 && boot_cpu_data.cpuid_level >= 0x16) {
+unsigned int eax_base_mhz, ebx, ecx, edx;
+
+cpuid(0x16, &eax_base_mhz, &ebx, &ecx, &edx);
+crystal_khz = eax_base_mhz * 1000 *
+eax_denominator / ebx_numerator;
+}
+
+if (crystal_khz == 0)
+return 0;
/*
 * For Atom SoCs TSC is the only reliable clocksource.
 * @ @ -682,15 +708,15 @@
 * zero. In each wait loop iteration we read the TSC and check
 * the delta to the previous read. We keep track of the min
 * and max values of that delta. The delta is mostly defined
 * by the IO time of the PIT access, so we can detect when a
 * SMI/SMM disturbance happened between the two reads. If the
 * any disturbance happened between the two reads. If the
 * maximum time is significantly larger than the minimum time,
 * then we discard the result and have another try.
 * 2) Reference counter. If available we use the HPET or the
 * PMTIMER as a reference to check the sanity of that value.
 * We use separate TSC readouts and check inside of the
 * reference read for a SMI/SMM disturbance. We dicard
* reference read for any possible disturbance. We discard
* disturbed values here as well. We do that around the PIT
* calibration delay loop as we have to wait for a certain
* amount of time anyway.
if (ref1 == ref2)
continue;

/* Check, whether the sampling was disturbed by an SMI */
/* Check, whether the sampling was disturbed */
if (tsc1 == ULLONG_MAX || tsc2 == ULLONG_MAX)
continue;

static void tsc_refine_calibration_work(struct work_struct *work)
{
  static u64 tsc_start = -1, ref_start;
  static u64 tsc_start = ULLONG_MAX, ref_start;
  static int hpet;
  u64 tsc_stop, ref_stop, delta;
  unsigned long freq;
  if (tsc_start == -1) {
    /* Only set hpet once, to avoid mixing hardware
     * if the hpet becomes enabled later.
     */
    hpet = is_hpet_enabled();
    schedule_delayed_work(&tsc_irqwork, HZ);
    tsc_start = tsc_read_refs(&ref_start, hpet);
    schedule_delayed_work(&tsc_irqwork, HZ);
    return;
  }
  if (tsc_start == -1) {
    /* Only set hpet once, to avoid mixing hardware
     * if the hpet becomes enabled later.
     */
    hpet = is_hpet_enabled();
    schedule_delayed_work(&tsc_irqwork, HZ);
    tsc_start = tsc_read_refs(&ref_start, hpet);
    schedule_delayed_work(&tsc_irqwork, HZ);
    return;
  }
  if (ref_start == ref_stop)
goto out;

  /* Check, whether the sampling was disturbed by an SMI */
  if (tsc_start == ULLONG_MAX || tsc_stop == ULLONG_MAX)
goto out;
  /* Check, whether the sampling was disturbed */
+if (tsc_stop == ULLONG_MAX)
+goto restart;

delta = tsc_stop - tsc_start;
delta *= 1000000LL;
@@ -1266,7 +1293,7 @@

void __init tsc_early_delay_calibrate(void)
{
    unsigned long lpj;
+    u64 lpj;

    if (!boot_cpu_has(X86_FEATURE_TSC))
        return;
@@ -1278,7 +1305,7 @@

    if (!tsc_khz)
        return;

-    lpj = tsc_khz * 1000;
+    lpj = (u64)tsc_khz * 1000;
    do_div(lpj, HZ);
    loops_per_jiffy = lpj;
}
if (!update_stack_state(state, next_bp))
@@ -398,6 +402,21 @@
bp = get_frame_pointer(task, regs);

+/*
+ * If we crash with IP==0, the last successfully executed instruction
+ * was probably an indirect function call with a NULL function pointer.
+ * That means that SP points into the middle of an incomplete frame:
+ * *SP is a return pointer, and *(SP-sizeof(unsigned long)) is where we
+ * would have written a frame pointer if we hadn't crashed.
+ * Pretend that the frame is complete and that BP points to it, but save
+ * the real BP so that we can use it when looking for the next frame.
+ */
+if (regs && regs->ip == 0 &&
+ (unsigned long *)kernel_stack_pointer(regs) >= first_frame) {
+ bp = get_frame_pointer(task, regs);
+ bp = ((unsigned long *)kernel_stack_pointer(regs)) - 1;
+}
+
+/* Initialize stack info and make sure the frame data is accessible: */
+get_stack_info(bp, state->task, &state->stack_info,
+ &state->stack_mask);
@@ -410,7 +429,7 @@
*/
while (!unwind_done(state) &&
    (on_stack(&state->stack_info, first_frame, sizeof(long)) ||
    -state->bp < first_frame))
+((state->next_bp == NULL && state->bp < first_frame))
unwind_next_frame(state);
}
EXPORT_SYMBOL_GPL(__unwind_start);
static struct orc_entry null_orc_entry = {
    .sp_offset = sizeof(long),
    .sp_reg = ORC_REG_SP,
    .bp_reg = ORC_REG_UNDEFINED,
    .type = ORC_TYPE_CALL
};

static struct orc_entry *orc_find(unsigned long ip)
{
static struct orc_entry *orc;

if (!orc_init)
    return NULL;
if (ip == 0)
    return &null_orc_entry;
/* For non-init vmlinux addresses, use the fast lookup table: */
if (ip >= LOOKUP_START_IP && ip < LOOKUP_STOP_IP) {
    /* Find the orc_entry associated with the text address.
     * - * Decrement call return addresses by one so they work for sibling
     *   - * calls and calls to noreturn functions.
     * + * For a call frame (as opposed to a signal frame), state->ip points to
     *   + * the instruction after the call. That instruction's stack layout
     *   + * could be different from the call instruction's layout, for example
     *   + * if the call was to a noreturn function. So get the ORC data for the
     *   + * call instruction itself.
     */
    orc = orc_find(state->signal ? state->ip : state->ip - 1);
    if (!orc || orc->sp_reg == ORC_REG_UNDEFINED)
        goto done;
}
default:
    orc_warn("unknown .orc_unwind entry type %d for ip %pB\n",
        orc->type, (void *)orig_ip);
    -break;
    +goto done;
}
/* Find BP: */
    @ @ -540,17 +557,20 @@
    memset(state, 0, sizeof(*state));
    state->task = task;
    +if (!orc_init)
        +goto err;
    +
/*
 * Refuse to unwind the stack of a task while it's executing on another
 * CPU.  This check is racy, but that's ok: the unwinder has other
 * checks to prevent it from going off the rails.
 */

if (task_on_another_cpu(task))
    goto done;
+goto err;

if (regs) {
    if (user_mode(regs))
        goto done;
    goto the_end;
}

state->ip = regs->ip;
state->sp = kernel_stack_pointer(regs);
@@ -569,9 +589,10 @@
    } else {
        struct inactive_task_frame *frame = (void *)task->thread.sp;

-        state->sp = task->thread.sp;
+        state->sp = task->thread.sp + sizeof(*frame);
        state->bp = READ_ONCE_NOCHECK(frame->bp);
        state->ip = READ_ONCE_NOCHECK(frame->ret_addr);
        state->signal = (void *)state->ip == ret_from_fork;
    }

if (get_stack_info((unsigned long *)state->sp, state->task,  
@@ -583,6 +604,7 @@
    * generate some kind of backtrace if this happens.
 */

void *next_page = (void *)PAGE_ALIGN((unsigned long)state->sp);
+state->error = true;
if (get_stack_info(next_page, state->task, &state->stack_info,  
    &state->stack_mask))
    return;
@@ -603,13 +625,14 @@
/* Otherwise, skip ahead to the user-specified starting frame: */
while (!unwind_done(state) &
    (on_stack(&state->stack_info, first_frame, sizeof(long)) ||  
    -state->sp <= (unsigned long)first_frame))
+state->sp < (unsigned long)first_frame)
    unwind_next_frame(state);

return;

-done:
+err:
+state->error = true;
+the_end:
state->stack_info.type = STACK_TYPE_UNKNOWN;
-return;
}
EXPORT_SYMBOL_GPL(__unwind_start);
--- linux-4.15.0.orig/arch/x86/kernel/uprobes.c
+++ linux-4.15.0/arch/x86/kernel/uprobes.c
@@ -268,12 +268,13 @@
static bool is_prefix_bad(struct insn *insn)
{
+insn_byte_t p;
int i;

-for (i = 0; i < insn->prefixes.nbytes; i++) {
+for_each_insn_prefix(insn, i, p) {
 insn_attr_t attr;

-attr = inat_get_opcode_attribute(insn->prefixes.bytes[i]);
+attr = inat_get_opcode_attribute(p);
switch (attr) {
case INAT_MAKE_PREFIX(INAT_PFX_ES):
case INAT_MAKE_PREFIX(INAT_PFX_CS):
@@ -293,12 +294,16 @@
insn_init(insn, auprobe->insn, sizeof(auprobe->insn), x86_64);
 /* has the side-effect of processing the entire instruction */
 insn_get_length(insn);
-if (WARN_ON_ONCE(!insn_complete(insn)))
+if (!insn_complete(insn))
 return -ENOEXEC;

 if (is_prefix_bad(insn))
 return -ENOTSUPP;

+/* We should not singlestep on the exception masking instructions */
+if (insn_masking_exception(insn))
+return -ENOTSUPP;
+
+if (x86_64)
 good_insns = good_insns_64;
 else
 @@ -517,9 +522,12 @@
 void(*abort)(struct arch_uprobe *, struct pt_regs *)
};

-static inline int sizeof_long(void)
+static inline int sizeof_long(struct pt_regs *regs)


static int default_pre_xol_op(struct arch_uprobe *auprobe, struct pt_regs *regs)
{
    return in_ia32_syscall() ? 4 : 8;
    
    /*
    * Check registers for mode as in_xxx_syscall() does not apply here.
    */
    return user_64bit_mode(regs) ? 8 : 4;
}

static int push_ret_address(struct pt_regs *regs, unsigned long ip)
{
    unsigned long new_sp = regs->sp - sizeof_long();
    unsigned long new_sp = regs->sp - sizeof_long(regs);

    if (copy_to_user((void __user *)new_sp, &ip, sizeof_long(regs)))
        return -EFAULT;
    
    regs->sp = new_sp;
}

static int branch_setup_xol_ops(struct arch_uprobe *auprobe, struct insn *insn)
{
    u8 opc1 = OPCODE1(insn);
    +insn_byte_t p;
    int i;

    switch (opc1) {
        
    }
* Intel and AMD behavior differ in 64-bit mode: Intel ignores 66 prefix.
* No one uses these insns, reject any branch insns with such prefix.
*/
-for (i = 0; i < insn->prefixes.nbytes; i++) {
-if (insn->prefixes.bytes[i] == 0x66)
+for_each_insn_prefix(insn, i, p) {
+if (p == 0x66)
return -ENOTSUPP;
}
@@ -965,7 +974,7 @@
unsigned long
arch_uretprobe_hijack_return_addr(unsigned long trampoline_vaddr, struct pt_regs *regs)
{
-int rasize = sizeof_long(), nleft;
+int rasize = sizeof_long(regs), nleft;
unsigned long orig_ret_vaddr = 0; /* clear high bits for 32-bit apps */

if (copy_from_user(&orig_ret_vaddr, (void __user *)regs->sp, rasize))
@@ -983,7 +992,7 @@
pr_err("uprobe: return address clobbered: pid=%d, %%sp=%#lx, %%ip=%#lx\n", current->pid, regs->sp, regs->ip);

-force_sig_info(SIGSEGV, SEND_SIG_FORCED, current);
+force_sig(SIGSEGV, current);
}
return -1;
--- linux-4.15.0.orig/arch/x86/kernel/vm86_32.c
+++ linux-4.15.0/arch/x86/kernel/vm86_32.c
@@ -149,7 +149,7 @@
preempt_disable();
tsk->thread.sp0 = vm86->saved_sp0;
tsk->thread.sysenter_cs = __KERNEL_CS;
-update_sp0(tsk);
+update_task_stack(tsk);
refresh_sysenter_cs(&tsk->thread);
vm86->saved_sp0 = 0;
preempt_enable();
@@ -374,7 +374,7 @@
refresh_sysenter_cs(&tsk->thread);
}

-update_sp0(tsk);
+update_task_stack(tsk);
preempt_enable();

if (vm86->flags & VM86_SCREEN_BITMAP)
@@ -727,7 +727,8 @@
          return;

     check_vip:
-    if (VEFLAGS & X86_EFLAGS_VIP) {
+    if ((VEFLAGS & (X86_EFLAGS_VIP | X86_EFLAGS_VIF)) ==
+         (X86_EFLAGS_VIP | X86_EFLAGS_VIF)) {
        save_v86_state(regs, VM86_STI);
        return;
     }
--- linux-4.15.0.orig/arch/x86/kernel/vmlinux.lds.S
+++ linux-4.15.0/arch/x86/kernel/vmlinux.lds.S
@@ -36,13 +36,13 @@
 #ifdef CONFIG_X86_32
 OUTPUT_ARCH(i386)
 ENTRY(phys_startup_32)
-    jiffies = jiffies_64;
+    jiffies = jiffies_64;
    
    ifdef CONFIG_X86_64
    /*
     * On 64-bit, align RODATA to 2MB so we retain large page mappings for
-    @ @ -36,13 +36,13 @ @
+    @ @ -36,13 +36,13 @ @
     * so we can enable protection checks as well as retain 2MB large page
     * mappings for kernel text.
     */
     -#define X64_ALIGN_RODATA_BEGIN . = ALIGN(HPAGE_SIZE);
     +#define X86_ALIGN_RODATA_BEGIN . = ALIGN(HPAGE_SIZE);

-#define X64_ALIGN_RODATA_END\n-  . = ALIGN(HPAGE_SIZE)\n+  . = ALIGN(HPAGE_SIZE)\n  -__end_rodata_hpage_align = ;
+  __end_rodata_hpage_align = ;
+  __end_rodata_aligned = ;

 #define ALIGN_ENTRY_TEXT_BEGIN . = ALIGN(PMD_SIZE);
 #define ALIGN_ENTRY_TEXT_END . = ALIGN(PMD_SIZE);

 #else
-  #define X64_ALIGN_RODATA_BEGIN

-#define X64_ALIGN_RODATA_END
+/#define X86_ALIGN_RODATA_BEGIN
+/#define X86_ALIGN_RODATA_END
+. = ALIGN(PAGE_SIZE);  
+__end_rodata_aligned = ;

#define ALIGN_ENTRY_TEXT_BEGIN
#define ALIGN_ENTRY_TEXT_END
@@ -118,9 +121,11 @@
 ifdef CONFIG_X86_64
 . = ALIGN(PAGE_SIZE);
+VMLINUX_SYMBOL(__entry_trampoline_start) = ;
 _entry_trampoline = ;
 *(.entry_trampoline)
 . = ALIGN(PAGE_SIZE);
+VMLINUX_SYMBOL(__entry_trampoline_end) = ;
 ASSERT(. - _entry_trampoline == PAGE_SIZE, "entry trampoline is too big");
#endif
@@ -140,9 +145,9 @@
 /* .text should occupy whole number of pages */
 . = ALIGN(PAGE_SIZE);
-X64_ALIGN_RODATA_BEGIN
+X86_ALIGN_RODATA_BEGIN
 RO_DATA(PAGE_SIZE)
-X64_ALIGN_RODATA_END
+X86_ALIGN_RODATA_END

/* Data */
.data : AT(ADDR(.data) - LOAD_OFFSET) {  
@@ -350,7 +355,8 @@
 .bss : AT(ADDR(.bss) - LOAD_OFFSET) {
  __bss_start = . ;
  *(.bss..page_aligned)
-*(.bss)
+*(BSS_MAIN)
  . = ALIGN(PAGE_SIZE);
  *(BSS_MAIN)
  __bss_stop = . ;
  }
@@ -388,7 +394,7 @@
/* Per-cpu symbols which need to be offset from __per_cpu_load
 * for the boot processor.
 */
-#define INIT_PER_CPU(x) init_per_cpu__##x = x + __per_cpu_load
+#define INIT_PER_CPU(x) init_per_cpu__##x = ABSOLUTE(x) + __per_cpu_load

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INIT_PER_CPU(gdt_page);
INIT_PER_CPU(irq_stack_union);

--- linux-4.15.0.orig/arch/x86/kernel/x86_init.c
+++ linux-4.15.0/arch/x86/kernel/x86_init.c
@@ -57,6 +57,7 @@
 .pre_vector_init= init_ISA_irqs,
 .intr_init= native_init_IRQ,
 .trap_init= x86_init_noop,
+.intr_mode_select= apic_intr_mode_select,
+.intr_mode_init= apic_intr_mode_init
 }

--- linux-4.15.0.orig/arch/x86/kvm/cpuid.c
+++ linux-4.15.0/arch/x86/kvm/cpuid.c
@@ -67,9 +67,7 @@
#define F(x) bit(X86_FEATURE_##x)
/* These are scattered features in cpufeatures.h. */
#define KVM_CPUID_BIT_AVX512_4VNNIW 2
+-define KVM_CPUID_BIT_AVX512_4FMAPS 3
+/* For scattered features from cpufeatures.h; we currently expose none */
#define KF(x) bit(KVM_CPUID_BIT_##x)

int kvm_update_cpuid(struct kvm_vcpu *vcpu)
@@ -293,13 +291,18 @@
{
 switch (func) {
 case 0:
-entry->eax = 1; /* only one leaf currently */
+entry->eax = 7;
++*nent;
 break;
 case 1:
 entry->ecx = F(MOVBE);
+++*nent;
 break;
+case 7:
+entry->flags |= KVM_CPUID_FLAG_SIGNIFICANT_INDEX;
+if (index == 0)
+entry->ecx = F(RDPID);
+++*nent;
 default:
 break;
 }
@@ -367,6 +370,11 @@
 F(3DNOWPREFETCH) | F(OSVW) | 0 /* IBS */ | F(XOP) |
/* SKINIT, WDT, LWP */ | F(FMA4) | F(TBM);

+/* cpuid 0x80000008.ebx */
+const u32 kvm_cpuid_8000_0008_edx_x86_features =
+F(AMD_IBPB) | F(AMD_IBRS) | F(AMD_SSB_NO) | F(VIRT_SSBD) | F(AMD_STIBP);
+
/* cpuid 0xC0000001.edx */
const u32 kvm_cpuid_C000_0001_edx_x86_features =
F(XSTORE) | F(XSTORE_EN) | F(XCRYPT) | F(XCRYPT_EN) |
@@ -387,19 +395,22 @@
/* cpuid 7.0.ecx*/
const u32 kvm_cpuid_7_0_ecx_x86_features =
+F(AVX512VBMI) | F(LA57) | F(PKU) |
-0 /*OSPKE*/ | F(AVX512_VPOPCNTDQ);
+F(AVX512VBMI) | F(LA57) | F(PKU) | 0 /*OSPKE*/ | F(AVX512_VPOPCNTDQ) | F(UMIP) | F(AVX512_VBMIMI) | F(GFNI) |
+F(VAES) | F(VPCLMULQDQ) | F(AVX512_VNNI) | F(AVX512_BITALG);

/* cpuid 7.0.edx*/
const u32 kvm_cpuid_7_0_edx_x86_features =
-KF(AVX512_4VNNIW) | KF(AVX512_4FMAPS);
+F(AVX512_4VNNIW) | F(AVX512_4FMAPS) | F(SPEC_CTRL) |
+F(SPEC_CTRL_SSBD) | F(ARCH_CAPABILITIES) | F(INTEL_STIBP) | F(MD_CLEAR);

/* all calls to cpuid_count() should be made on the same cpu */
get_cpu();

r = -E2BIG;

-if (*nent >= maxnent)
+if (WARN_ON(*nent >= maxnent))
goto out;

do_cpuid_1_ent(entry, function, index);
@@ -476,8 +487,21 @@
/* PKU is not yet implemented for shadow paging. */
if (!tdp_enabled || !boot_cpu_has(X86_FEATURE_OSPKE))
entry->ecx &= ~F(PKU);
-entry->edx &= kvm_cpuid_7_0_edx_x86_features;
-entry->edx &= get_scattered_cpuid_leaf(7, 0, CPUID_EDX);
+
+entry->edx &= kvm_cpuid_7_0_edx_x86_features;
+cpuid_mask(&entry->edx, CPUID_7_EDX);
+if (boot_cpu_has(X86_FEATURE_IBPB) && boot_cpu_has(X86_FEATURE_IBRS))
+entry->edx |= F(SPEC_CTRL);
+if (boot_cpu_has(X86_FEATURE_STIBP))
+entry->edx |= F(INTEL_STIBP);
+if (boot_cpu_has(X86_FEATURE_SPEC_CTRL_SSBD) ||
+ boot_cpu_has(X86_FEATURE_AMD_SSBD))
+entry->edx |= F(SPEC_CTRL_SSBD);
+/
+ * We emulate ARCH_CAPABILITIES in software even
+ * if the host doesn't support it.
+ */
+entry->edx |= F(ARCH_CAPABILITIES);
} else {
  entry->ebx = 0;
  entry->ecx = 0;
  @@ -594,7 +618,8 @@
        (1 << KVM_FEATURE_ASYNC_PF) |
        (1 << KVM_FEATURE_PV_EOI) |
        (1 << KVM_FEATURE_CLOCKSOURCE_STABLE_BIT) |
-        (1 << KVM_FEATURE_PV_UNHALT);
+        (1 << KVM_FEATURE_PV_UNHALT) |
+        (1 << KVM_FEATURE_ASYNC_PF_VMEXIT);

  if (sched_info_on())
    entry->eax |= (1 << KVM_FEATURE_STEAL_TIME);
@@ -624,10 +649,35 @@
          virt_as = max((entry->eax >> 8) & 0xff, 48U);
          phys_as = entry->eax & 0xff;

-/*
- * Use bare metal's MAXPHYADDR if the CPU doesn't report guest
- * MAXPHYADDR separately, or if TDP (NPT) is disabled, as the
- * guest version "applies only to guests using nested paging".
- */
+/*
+ * Use bare metal's MAXPHYADDR if the CPU doesn't report guest
+ * MAXPHYADDR separately, or if TDP (NPT) is disabled, as the
+ * guest version "applies only to guests using nested paging".
+ */
+if (!g_phys_as || !tdp_enabled)
    g_phys_as = phys_as;
+ entry->eax = g_phys_as | (virt_as << 8);
- entry->ebx = entry->edx = 0;
+ entry->edx = 0;
+/*
+ * IBRS, IBPB and VIRT_SSBD aren't necessarily present in
+ * hardware cpuid
+ */
+if (boot_cpu_has(X86_FEATURE_AMD_IBPB))
+entry->ebx |= F(AMD_IBPB);
+if (boot_cpu_has(X86_FEATURE_AMD_IBRS))
+entry->ebx |= F(AMD_IBRS);
+if (boot_cpu_has(X86_FEATURE_VIRT_SSBD))

entry->ebx |= F(VIRT_SSBD);
+entry->ebx &= kvm_cpuid_8000_0008_ebx_x86_features;
cpuid_mask(&entry->ebx, CPUID_8000_0008_EBX);
+/*
+ * The preference is to use SPEC CTRL MSR instead of the
+ * VIRT_SPEC MSR.
+ */
+if (boot_cpu_has(X86_FEATURE_LS_CFG_SSBBD) &&
+    !boot_cpu_has(X86_FEATURE_AMD_SSBBD))
+entry->ebx |= F(VIRT_SSBD);
break;
}

--- linux-4.15.0.orig/arch/x86/kvm/cpuid.h
+++ linux-4.15.0/arch/x86/kvm/cpuid.h
@@ -47,13 +47,12 @@
    [CPUID_8000_0001_ECX] = {0x80000001, 0, CPUID_ECX},
    [CPUID_7_0_EAX] = { 7, 0, CPUID_EAX},
    [CPUID_D_1_EAX] = {0xd, 1, CPUID_EAX},
-    [CPUID_F_0_EDX] = {0xf, 0, CPUID_EDX},
-    [CPUID_F_1_EDX] = {0xf, 1, CPUID_EDX},
    [CPUID_8000_0008_EBX] = {0x80000008, 0, CPUID_EBX},
    [CPUID_6_EAX] = { 6, 0, CPUID_EAX},
    [CPUID_8000_0000A_EDX] = {0x80000000a, 0, CPUID_EDX},
    [CPUID_7_ECX] = { 7, 0, CPUID_ECX},
    [CPUID_8000_00007_EDX] = {0x80000007, 0, CPUID_EDX},
+    [CPUID_7_EDX] = { 7, 0, CPUID_EDX},
};

static __always_inline struct cpuid_reg x86_feature_cpuid(unsigned x86_feature)
@@ -155,6 +154,20 @@
    return x86_stepping(best->eax);
}

+static inline bool guest_has_spec_ctrl_msr(struct kvm_vcpu *vcpu)
+{
+    return (guest_cpuid_has(vcpu, X86_FEATURE_SPEC_CTRL) ||
+guest_cpuid_has(vcpu, X86_FEATURE_AMD_STIBP) ||
+guest_cpuid_has(vcpu, X86_FEATURE_AMD_IBRS) ||
+guest_cpuid_has(vcpu, X86_FEATURE_AMD_SSBD));
+
+static inline bool guest_has_pred_cmd_msr(struct kvm_vcpu *vcpu)
+{
+return (guest_cpuid_has(vcpu, X86_FEATURE_SPEC_CTRL) ||
+guest_cpuid_has(vcpu, X86_FEATURE_AMD_IBPB));
+
+static inline bool supports_cpuid_fault(struct kvm_vcpu *vcpu)
+{
+return vcpu->arch.msr_platform_info & MSR_PLATFORM_INFO_CPUID_FAULT;
+
+#include <asm/kvm_emulate.h>
+#include <linux/stringify.h>
+#include <asm/debugreg.h>
+#+include <asm/nospec-branch.h>
+
+#include "x86.h"
+#include "tss.h"
+@
+
+static int linear_read_system(struct x86_emulate_ctxt *ctxt, ulong linear,
+    void *data, unsigned size)
+{
+    return ctxt->ops->read_std(ctxt, linear, data, size, &ctxt->exception, true);
+
+static int linear_write_system(struct x86_emulate_ctxt *ctxt,
+    ulong linear, void *data,
+    unsigned int size)
+{
+    return ctxt->ops->write_std(ctxt, linear, data, size, &ctxt->exception, true);
+
+static int segmented_read_std(struct x86_emulate_ctxt *ctxt,
+    struct segmented_address addr,
+    void *data,
+    rc = linearize(ctxt, addr, size, false, &linear);
+    if (rc != X86EMUL_CONTINUE)
+        return rc;
+    -return ctxt->ops->read_std(ctxt, linear, data, size, &ctxt->exception);
return ctxt->ops->read_std(ctxt, linear, data, size, &ctxt->exception, false);
}

static int segmented_write_std(struct x86_emulate_ctxt *ctxt,
@@ -835,7 +849,7 @@
return ctxt->ops->write_std(ctxt, linear, data, size, &ctxt->exception);
+
+} /*
@@ -1021,8 +1035,8 @@
    void (*fop)(void) = (void *)em_setcc + 4 * (condition & 0xf);

flags = (flags & EFLAGS_MASK) | X86_EFLAGS_IF;
-asm("push %[flags]; popf; call *%[fastop]
-    : "=a"(rc) : [fastop]"r"(fop), [flags]"r"(flags));
+asm("push %[flags]; popf; " CALL_NOSPEC
+    : "=a"(rc) : [thunk_target]"r"(fop), [flags]"r"(flags));
return rc;
}

@@ -1494,8 +1508,7 @@
return emulate_gp(ctxt, index << 3 | 0x2);

addr = dt.address + index * 8;
-return ctxt->ops->read_std(ctxt, addr, desc, sizeof *desc,
-    &ctxt->exception);
+return linear_read_system(ctxt, addr, desc, sizeof *desc);
}

static void get_descriptor_table_ptr(struct x86_emulate_ctxt *ctxt,
@@ -1558,8 +1571,7 @@
return rc;

 relocate ctxt->ops->read_std(ctxt, *desc_addr_p, desc, sizeof(*desc),
-    &ctxt->exception);
+    &ctxt->exception);
+return linear_read_system(ctxt, *desc_addr_p, desc, sizeof(*desc));
}

/* allowed just for 8 bytes segments */
@@ -1573,8 +1585,7 @@
return rc;
-return ctxt->ops->write_std(ctxt, addr, desc, sizeof *desc,
- &ctxt->exception);
+return linear_write_system(ctxt, addr, desc, sizeof *desc);
}

static int __load_segment_descriptor(struct x86_emulate_ctxt *ctxt,
    @@ -1735,8 +1746,7 @@
    return ret;
 }
} else if (ctxt->mode == X86EMUL_MODE_PROT64) {
-    ret = ctxt->ops->read_std(ctxt, desc_addr+8, &base3,
-    sizeof(base3), &ctxt->exception);
+    ret = linear_read_system(ctxt, desc_addr+8, &base3, sizeof(base3));
    if (ret != X86EMUL_CONTINUE)
        return ret;
    if (emul_is_noncanonical_address(get_desc_base(&seg_desc) |
    @@ -2049,11 +2059,11 @@
            eip_addr = dt.address + (irq << 2);
            cs_addr = dt.address + (irq << 2) + 2;
-
-rc = ops->read_std(ctxt, cs_addr, &cs, 2, &ctxt->exception);
+rc = linear_read_system(ctxt, cs_addr, &cs, 2);
    if (rc != X86EMUL_CONTINUE)
        return rc;
-
-rc = ops->read_std(ctxt, eip_addr, &eip, 2, &ctxt->exception);
+rc = linear_read_system(ctxt, eip_addr, &eip, 2);
    if (rc != X86EMUL_CONTINUE)
        return rc;

@@ -2320,12 +2330,16 @@
 static int emulator_has_longmode(struct x86_emulate_ctxt *ctxt)
 {
+    ifdef CONFIG_X86_64
     u32 eax, ebx, ecx, edx;
     eax = 0x80000001;
     ecx = 0;
     ctxt->ops->get_cpuid(ctxt, &eax, &ebx, &ecx, &edx, false);
     return edx & bit(X86_FEATURE_LM);
+    else
+        return false;
+    endif
 }

#define GET_SMSTATE(type, smbase, offset) \  
@@ -2370,6 +2384,7 @@
return X86EMUL_CONTINUE;
}
+
+ifdef CONFIG_X86_64
static int rsm_load_seg_64(struct x86_emulate_ctxt *ctxt, u64 smbase, int n)
{ struct desc_struct desc;
@@ -2388,6 +2403,7 @@
ctxt->ops->set_segment(ctxt, selector, &desc, base3, n);
return X86EMUL_CONTINUE;
}
+endif

static int rsm_enter_protected_mode(struct x86_emulate_ctxt *ctxt, u64 cr0, u64 cr3, u64 cr4)
@@ -2488,6 +2504,7 @@
return rsm_enter_protected_mode(ctxt, cr0, cr3, cr4);
}
+
+ifdef CONFIG_X86_64
static int rsm_load_state_64(struct x86_emulate_ctxt *ctxt, u64 smbase)
{ struct desc_struct desc;
@@ -2549,6 +2566,7 @@
return X86EMUL_CONTINUE;
}
+endif

static int em_rsm(struct x86_emulate_ctxt *ctxt)
{
@@ -2564,15 +2582,13 @@
* supports long mode.
 */
-cr4 = ctxt->ops->get_cr(ctxt, 4);
if (emulator_has_longmode(ctxt)) {
 struct desc_struct cs_desc;

 /* Zero CR4.PCIDE before CR0.PG. */
-if (cr4 & X86_CR4_PCIDE) {
+cr4 = ctxt->ops->get_cr(ctxt, 4);
+if (cr4 & X86_CR4_PCIDE)
ctxt->ops->set_cr(ctxt, 4, cr4 & ~X86_CR4_PCIDE);
-cr4 &=-X86_CR4_PCIDE;
-}

 /* A 32-bit code segment is required to clear EFER.LMA. */
memset(&cs_desc, 0, sizeof(cs_desc));
if (cr0 & X86_CR0_PE)
    ctxt->ops->set_cr(ctxt, 0, cr0 & ~(X86_CR0_PG | X86_CR0_PE));

-/* Now clear CR4.PAE (which must be done before clearing EFER.LME). */
-if (cr4 & X86_CR4_PAE)
    ctxt->ops->set_cr(ctxt, 4, cr4 & ~X86_CR4_PAE);
-
-/* And finally go back to 32-bit mode. */
-efcr = 0;
-context->ops->set_msr(context, MSR_EFER, efcr);
+if (emulator_has_longmode(context)) {
-/* Clear CR4.PAE before clearing EFER.LME. */
+cr4 = context->ops->get_cr(context, 4);
+/* And finally go back to 32-bit mode. */
+efcr = 0;
-context->ops->set_msr(context, MSR_EFER, efcr);
+
}smbase = context->ops->get_smbase(context);

if (context->ops->pre_leave_smm(context, smbase))
    return X86EMUL_UNHANDLEABLE;

+#ifdef CONFIG_X86_64
     if (emulator_has_longmode(context))
         ret = rsm_load_state_64(context, smbase + 0x8000);
     else
+#endif
     ret = rsm_load_state_32(context, smbase + 0x8000);

if (ret != X86EMUL_CONTINUE) {
   @@ -2906,12 +2927,12 @@
       #ifdef CONFIG_X86_64
       base |= ((u64)base3) << 32;
       #endif
-   r = ops->read_std(context, base + 102, &io_bitmap_ptr, 2, NULL);
+   r = ops->read_std(context, base + 102, &io_bitmap_ptr, 2, NULL, true);
    if (r != X86EMUL_CONTINUE)
        return false;
    if (io_bitmap_ptr + port/8 > desc_limit_scaled(&tr_seg))
        return false;
    -r = ops->read_std(context, base + io_bitmap_ptr + port/8, &perm, 2, NULL);
+r = ops->read_std(ctxt, base + io_bitmap_ptr + port/8, &perm, 2, NULL, true);
if (r != X86EMUL_CONTINUE)
    return false;
if ((perm >> bit_idx) & mask)
    u16 tss_selector, u16 old_tss_sel,
    ulong old_tss_base, struct desc_struct *new_desc)
{
-const struct x86_emulate_ops *ops = ctxt->ops;
struct tss_segment_16 tss_seg;
int ret;
u32 new_tss_base = get_desc_base(new_desc);

-r = ops->read_std(ctxt, old_tss_base, &tss_seg, sizeof tss_seg,
-    &ctxt->exception);
+ret = linear_read_system(ctxt, old_tss_base, &tss_seg, sizeof tss_seg);
if (ret != X86EMUL_CONTINUE)
    return ret;

save_state_to_tss16(ctxt, &tss_seg);

-r = ops->write_std(ctxt, old_tss_base, &tss_seg, sizeof tss_seg,
-    &ctxt->exception);
+ret = linear_write_system(ctxt, old_tss_base, &tss_seg, sizeof tss_seg);
if (ret != X86EMUL_CONTINUE)
    return ret;

-r = ops->read_std(ctxt, new_tss_base, &tss_seg, sizeof tss_seg,
-    &ctxt->exception);
+ret = linear_read_system(ctxt, new_tss_base, &tss_seg, sizeof tss_seg);
if (ret != X86EMUL_CONTINUE)
    return ret;

if (old_tss_sel != 0xffff) {
    tss_seg.prev_task_link = old_tss_sel;

-r = ops->write_std(ctxt, new_tss_base, &tss_seg, sizeof tss_seg,
    &tss_seg.prev_task_link,
    &ctxt->exception);
+ret = linear_write_system(ctxt, new_tss_base, &tss_seg, sizeof tss_seg,
    &tss_seg.prev_task_link,
    &ctxt->exception);
if (ret != X86EMUL_CONTINUE)
    return ret;
}

@@ -3184,38 +3200,34 @@
    u16 tss_selector, u16 old_tss_sel,
ulong old_tss_base, struct desc_struct *new_desc)
{
  const struct x86_emulate_ops *ops = ctxt->ops;
  struct tss_segment_32 tss_seg;
  int ret;
  u32 new_tss_base = get_desc_base(new_desc);
  u32 eip_offset = offsetof(struct tss_segment_32, eip);
  u32 ldt_sel_offset = offsetof(struct tss_segment_32, ldt_selector);

  ret = linear_read_system(ctxt, old_tss_base, &tss_seg, sizeof tss_seg);
  if (ret != X86EMUL_CONTINUE)
    return ret;
  save_state_to_tss32(ctxt, &tss_seg);

  /* Only GP registers and segment selectors are saved */
  ret = linear_read_system(ctxt, new_tss_base, &tss_seg, sizeof tss_seg);
  if (ret != X86EMUL_CONTINUE)
    return ret;
  if (old_tss_sel != 0xffff) {
    tss_seg.prev_task_link = old_tss_sel;
    ret = linear_write_system(ctxt, new_tss_base, &tss_seg.prev_task_link,
      sizeof tss_seg.prev_task_link);
    if (ret != X86EMUL_CONTINUE)
      return ret;
  }
  return X86EMUL_CONTINUE;
}
+static int em_rdpid(struct x86_emulate_ctxt *ctxt)
+{
+    u64 tsc_aux = 0;
+    
+    if (ctxt->ops->get_msr(ctxt, MSR_TSC_AUX, &tsc_aux))
+        return emulate_ud(ctxt);
+    ctxt->dst.val = tsc_aux;
+    return X86EMUL_CONTINUE;
+
+}
+
static int em_rdtsc(struct x86_emulate_ctxt *ctxt)
{
    u64 tsc = 0;
拜师学艺 +3760,10 @@
    {
        struct desc_ptr desc_ptr;

        if ((ctxt->ops->get_cr(ctxt, 4) & X86_CR4_UMIP) &&
            ctxt->ops->cpl(ctxt) > 0)
            return emulate_gp(ctxt, 0);
+
        if (ctxt->mode == X86EMUL_MODE_PROT64)
            ctxt->op_bytes = 8;
        get(ctxt, &desc_ptr);
拜师学 +3823,10 @@

        static int em_smsw(struct x86_emulate_ctxt *ctxt)
        {
            if ((ctxt->ops->get_cr(ctxt, 4) & X86_CR4_UMIP) &&
                ctxt->ops->cpl(ctxt) > 0)
                return emulate_gp(ctxt, 0);
+
            if (ctxt->dst.type == OP_MEM)
                ctxt->dst.bytes = 2;
            ctxt->dst.val = ctxt->ops->get_cr(ctxt, 0);
            @拜师学 +3962,12 @@
        return X86EMUL_CONTINUE;
        }

+static int em_clflushopt(struct x86_emulate_ctxt *ctxt)
+{
+    /* emulating clflushopt regardless of cpuid */
+    return X86EMUL_CONTINUE;
+}
+
+static int em_movsxd(struct x86_emulate_ctxt *ctxt)
+
{ }
    ctxt->dst.val = (s32) ctxt->src.val;
}
maxphyaddr = eax & 0xff;
else
    maxphyaddr = 36;
-rsvd = rsvd_bits(maxphyaddr, 62);
+rsvd = rsvd_bits(maxphyaddr, 63);
+if (ctxt->ops->get_cr(ctxt, 4) & X86_CR4_PCIDE)
    +rsvd &= ~CR3_PCID_INVD;
}

if (new_val & rsvd)
    F(DstMem | SrcImmByte | Lock | PageTable, em_btc),
        ];
    
    */
    + * The "memory" destination is actually always a register, since we come
    + * from the register case of group9.
    + */
+static const struct gprefix pfx_0f_c7_7 = {
+N, N, N, N, II(DstMem | ModRM | Op32 | Op32, em_rdpid, rdtscp),
+};
+
+ static const struct group_dual group9 = {
N, I(DstMem64 | Lock | PageTable, em_cmpxchg8b), N, N, N, N, N,
  }, {
-N, N, N, N, N, N, N, N, N, N, N, N, N,
+N, N, N, N, N, N, N, N, N, N, N, N, N,
+GP(0, &pfx_0f_c7_7),
} ];

static const struct opcode group11[] = {
    @ @ -4426,7 +4474,7 @ @
};

static const struct gprefix pfx_0f_ae_7 = {
-I(SrcMem | ByteOp, em_clflush), N, N, N,
+I(SrcMem | ByteOp, em_clflushopt), I(SrcMem | ByteOp, em_clflushopt), N, N,
};

static const struct group_dual group15 = {
    @ @ -4494,6 +4497,10 @ @
ID(0, &instr_dual_0f_2b), ID(0, &instr_dual_0f_2b), N, N,
    };

+static const struct gprefix pfx_0f_10_0f_11 = {
+I(Unaligned, em_mov), I(Unaligned, em_mov), N, N,
static const struct gprefix pfx_0f_28_0f_29 = {
  I(Aligned, em_mov), I(Aligned, em_mov), N, N,
};

static const struct gprefix pfx_0f_10_0f_11 = {
  GP(ModRM | DstReg | SrcMem | Mov | Sse, &pfx_0f_10_0f_11),
  GP(ModRM | DstMem | SrcReg | Mov | Sse, &pfx_0f_10_0f_11),
  N, N, N, N, N, N,
};

ctxt->fetch.ptr = ctxt->fetch.data;
ctxt->fetch.end = ctxt->fetch.data + insn_len;
ctxt->opcode_len = 1;
+ctxt->intercept = x86_intercept_none;
if (insn_len > 0)
  memcpy(ctxt->fetch.data, insn, insn_len);
else {
  ctxt->ad_bytes = def_ad_bytes ^ 6;
  break;
}

ctxt->ad_bytes = def_ad_bytes ^ 6;
break;

case 0x26:/* ES override */
+has_seg_override = true;
+ctxt->seg_override = VCPU_SREG_ES;
+break;

case 0x2e:/* CS override */
+has_seg_override = true;
+ctxt->seg_override = VCPU_SREG_CS;
+break;

case 0x36:/* SS override */
+has_seg_override = true;
+ctxt->seg_override = VCPU_SREG_SS;
+break;

case 0x3e:/* DS override */
+has_seg Override = true;
-ctxt->seg override = (ctxt->b >> 3) & 3;
+ctxt->seg override = VCPU_SREG_DS;
break;

case 0x64:/* FS override */
+has_seg Override = true;
+ctxt->seg override = VCPU_SREG_FS;
+break;
case 0x65: /* GS override */
has_seg_override = true;
-ctxt->seg_override = ctxt->b & 7;
+ctxt->seg_override = VCPU_SREG_GS;
break;
case 0x40 .. 0x4f: /* REX */
if (mode != X86EMUL_MODE_PROT64)
@@ -5170,10 +5237,15 @@ @ @ -5170,10 +5237,15 @ @
} break;
case Escape:
-if (ctxt->modrm > 0xbf)
-opcode = opcode.u.esc->high[ctxt->modrm - 0xc0];
-else
+if (ctxt->modrm > 0xbf) {
+size_t size = ARRAY_SIZE(opcode.u.esc->high);
+u32 index = array_index_nospec(
+ctxt->modrm - 0xc0, size);
++opcode = opcode.u.esc->high[index];
+} else {
 OpCode = opcode.u.esc->op[(ctxt->modrm >> 3) & 7];
+}
break;
case InstrDual:
if ((ctxt->modrm >> 6) == 3)
@@ -5281,6 +5353,8 @@ @ @ -5281,6 +5353,8 @ @
ctxt->memopp->addr.mem.ea + ctxt->_eip);

done:
+if (rc == X86EMUL_PROPAGATE_FAULT)
+ctxt->have_exception = true;
return (rc != X86EMUL_CONTINUE) ? EMULATION_FAILED : EMULATION_OK;
}
@@ -5335,9 +5409,9 @@ @ @ -5335,9 +5409,9 @ @
if (!((ctxt->d & ByteOp))
fop += __ffs(ctxt->dst.bytes) * FASTOP_SIZE;

-asm("push %[flags]; popf; call [%[fastop]]; pushf; pop %[flags]n"
+asm("push %[flags]; popf; " CALL_NOSPEC " ; pushf; pop %[flags]n"
 +": +a"(ctxt->dst.val), "+d"(ctxt->src.val), [flags]"+D"(flags),
 -[fastop]+S"(fop), ASM_CALL_CONSTRAINT
 +[thunk_target]+S"(fop), ASM_CALL_CONSTRAINT
 +"c"(ctxt->src2.val));

ctxt->eflags = (ctxt->eflags & ~EFLAGS_MASK) | (flags & EFLAGS_MASK);
--- linux-4.15.0.orig/arch/x86/kvm/hyperv.c
struct kvm_vcpu *vcpu = NULL;
int i;

-if (vpidx < KVM_MAX_VCPUS)
  vcpu = kvm_get_vcpu(kvm, vpidx);
+if (vpidx >= KVM_MAX_VCPUS)
  return NULL;
+
  vcpu = kvm_get_vcpu(kvm, vpidx);
if (vcpu && vcpu_to_hv_vcpu(vcpu)->vp_index == vpidx)
return vcpu;
kvm_for_each_vcpu(i, vcpu, kvm)
@@ -214,7 +216,7 @@
struct kvm_vcpu *vcpu = synic_to_vcpu(synic);
int ret;

-clean
+if (!synic->active)
+if (!synic->active && !host)
  return 1;

trace_kvm_hv_synic_set_msr(vcpu->vcpu_id, msr, data, host);
@@ -274,11 +276,12 @@
return ret;
}

-static int synic_get_msr(struct kvm_vcpu_hv_synic *synic, u32 msr, u64 *pdata, bool host)
+static int synic_get_msr(struct kvm_vcpu_hv_synic *synic, u32 msr, u64 *pdata, + bool host)
{
  int ret;

-else
+if (!synic->active)
+if (!synic->active && !host)
  return 1;

-else
+ret = 0;
@@ -747,11 +750,12 @@
  u32 index, u64 *pdata)
{
 struct kvm_hv *hv = &vcpu->kvm->arch.hyperv;
+size_t size = ARRAY_SIZE(hv->hv_crash_param);

-if (WARN_ON_ONCE(index >= ARRAY_SIZE(hv->hv_crash_param)))
+if (WARN_ON_ONCE(index >= size))
  return -EINVAL;
-pdata = hv->hv_crash_param[index];
-pdata = hv->hv_crash_param[array_index_nospec(index, size)];

return 0;
}

@@ -790,11 +794,12 @@
    u32 index, u64 data)
{
    struct kvm_hv *hv = &vcpu->kvm->arch.hyperv;
+    size_t size = ARRAY_SIZE(hv->hv_crash_param);

    -if (WARN_ON_ONCE(index >= ARRAY_SIZE(hv->hv_crash_param)))
     +if (WARN_ON_ONCE(index >= size))
        return -EINVAL;

-hv->hv_crash_param[index] = data;
+    hv->hv_crash_param[array_index_nospec(index, size)] = data;

return 0;
}

@@ -981,6 +986,11 @@
kvm_make_request(KVM_REQ_HV_RESET, vcpu);
}
break;
+case HV_X64_MSR_TIME_REF_COUNT:
+    /* read-only, but still ignore it if host-initiated */
+    if (!host)
+        return 1;
+    break;
default:
    vcpu_unimpl(vcpu, "Hyper-V uhandled wrmsr: 0x%x data 0x%llx\n",
        msr, data);
@@ -1001,20 +1011,20 @@

static int kvm_hv_set_msr(struct kvm_vcpu *vcpu, u32 msr, u64 data, bool host)
{
    struct kvm_vcpu_hv *hv = &vcpu->arch.hyperv;
+    struct kvm_vcpu_hv *hv_vcpu = &vcpu->arch.hyperv;

    switch (msr) {
    case HV_X64_MSR_VP_INDEX:
-        if (!host)
+        if (!host || (u32)data >= KVM_MAX_VCPUS)
            return 1;
-        hv->vp_index = (u32)data;
+        hv_vcpu->vp_index = (u32)data;
        break;
    case HV_X64_MSR_APIC_ASSIST_PAGE: {
u64 gfn;
unsigned long addr;

if (!(data & HV_X64_MSR_APIC_ASSIST_PAGE_ENABLE)) {
    hv->hv_vapic = data;
    hv_vcpu->hv_vapic = data;
    if (kvm_lapic_enable_pv_eoi(vcpu, 0))
        return 1;
    break;
    @@ -1025,7 +1035,7 @@
    return 1;
    if (__clear_user((void __user *)addr, PAGE_SIZE))
        return 1;
    hv->hv_vapic = data;
    hv_vcpu->hv_vapic = data;
    kvm_vcpu_mark_page_dirty(vcpu, gfn);
    if (kvm_lapic_enable_pv_eoi(vcpu,
            gfn_to_gpa(gfn) | KVM_MSR_ENABLED))
        @@ -1041,7 +1051,7 @@
    case HV_X64_MSR_VP_RUNTIME:
        if (!host)
            return 1;
    hv->runtime_offset = data - current_task Runtime_100ns();
    hv_vcpu->runtime_offset = data - current_task Runtime_100ns();
    break;
    case HV_X64_MSR_SCONTROL:
    case HV_X64_MSR_SVERSION:
        @@ -1068,6 +1078,12 @@
    return stimer_set_count(vcpu_to_stimer(vcpu, timer_index),
        data, host);
    } /* read-only, but still ignore it if host-initiated */
    +case HV_X64_MSR_TSC_FREQUENCY:
    +case HV_X64_MSR_APIC_FREQUENCY:
    +if (!host)
    +return 1;
    +break;
    default:
    vcpu_unimpl(vcpu, "Hyper-V uhanded wrmsr: 0x%x data 0x%llx
",
        msr, data);
        @@ -1114,14 +1130,15 @@
    return 0;
    }

    -static int kvm_hv_get_msr(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata)
    +static int kvm_hv_get_msr(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata,
        + bool host)
    {
u64 data = 0;
-struct kvm_vcpu_hv *hv = &vcpu->arch.hyperv;
+struct kvm_vcpu_hv *hv_vcpu = &vcpu->arch.hyperv;

switch (msr) {
  case HV_X64_MSR_VP_INDEX:
    -data = hv->vp_index;
    +data = hv_vcpu->vp_index;
    break;
  case HV_X64_MSR_EOI:
    return kvm_hv_vapic_msr_read(vcpu, APIC_EOI, pdata);
    @@ -1130,10 +1147,10 @@
  case HV_X64_MSR_TPR:
    return kvm_hv_vapic_msr_read(vcpu, APIC_TASKPRI, pdata);
  case HV_X64_MSR_APIC_ASSIST_PAGE:
    -data = hv->hv_vapic;
    +data = hv_vcpu->hv_vapic;
    break;
  case HV_X64_MSR_VP_RUNTIME:
    -data = current_task_runtime_100ns() + hv->runtime_offset;
    +data = current_task_runtime_100ns() + hv_vcpu->runtime_offset;
    break;
  case HV_X64_MSR_SCONTROL:
  case HV_X64_MSR_SVERSION:
    @@ -1141,7 +1158,7 @@
  case HV_X64_MSR_SIMP:
  case HV_X64_MSR_EOM:
  case HV_X64_MSR_SINT0 ... HV_X64_MSR_SINT15:
    -return synic_get_msr(vcpu_to_synic(vcpu), msr, pdata);
    +return synic_get_msr(vcpu_to_synic(vcpu), msr, pdata, host);
  case HV_X64_MSR_STIMER0_CONFIG:
  case HV_X64_MSR_STIMER1_CONFIG:
  case HV_X64_MSR_STIMER2_CONFIG:
    @@ -1187,7 +1204,7 @@
    return kvm_hv_set_msr(vcpu, msr, data, host);
}
-
-int kvm_hv_get_msr_common(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata)
+int kvm_hv_get_msr_common(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata, bool host)
{
  if (kvm_hv_msr_partition_wide(msr)) {
    int r;
    @@ -1197,7 +1214,7 @@
    mutex_unlock(&vcpu->kvm->arch.hyperv hv_lock);
    return r;
  } else
    -return kvm_hv_get_msr(vcpu, msr, pdata);
    +return kvm_hv_get_msr(vcpu, msr, pdata, host);
bool kvm_hv_hypercall_enabled(struct kvm *kvm)
    @ @ -1223,7 +1240,7 @@
struct kvm_run *run = vcpu->run;

kvm_hv_hypercall_set_result(vcpu, run->hyperv.u.hcall.result);
    -return 1;
+return kvm_skip_emulated_instruction(vcpu);
}

int kvm_hv_hypercall(struct kvm_vcpu *vcpu)
--- linux-4.15.0.orig/arch/x86/kvm/hyperv.h
+++ linux-4.15.0/arch/x86/kvm/hyperv.h
@@ -48,7 +48,7 @@
}

int kvm_hv_set_msr_common(struct kvm_vcpu *vcpu, u32 msr, u64 data, bool host);
-int kvm_hv_get_msr_common(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata);
+int kvm_hv_get_msr_common(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata, bool host);

bool kvm_hv_hypercall_enabled(struct kvm *kvm);
int kvm_hv_hypercall(struct kvm_vcpu *vcpu);
--- linux-4.15.0.orig/arch/x86/kvm/i8259.c
+++ linux-4.15.0/arch/x86/kvm/i8259.c
@@ -460,10 +460,14 @@
switch (addr) {
    case 0x20:
    case 0x21:
+    pic_lock(s);
+    pic_ioport_write(&s->pics[0], addr, data);
+    pic_unlock(s);
+    break;
    case 0xa0:
    case 0xa1:
    pic_lock(s);
-    pic_ioport_write(&s->pics[addr >> 7], addr, data);
+    pic_ioport_write(&s->pics[1], addr, data);
    pic_unlock(s);
    break;
    case 0x4d0:
--- linux-4.15.0.orig/arch/x86/kvm/ioapic.c
+++ linux-4.15.0/arch/x86/kvm/ioapic.c
@@ -36,6 +36,7 @@
#include <linux/io.h>
#include <linux/slab.h>
#include <linux/export.h>
+##include <linux/nospec.h>
#include <asm/processor.h>
#include <asm/page.h>
#include <asm/current.h>
@@ -73,13 +74,14 @@
default:
{
  u32 redir_index = (ioapic->ioregsel - 0x10) >> 1;
-  u64 redir_content;
+  u64 redir_content = ~0ULL;

  -if (redir_index < IOAPIC_NUM_PINS)
-    redir_content =
-    -ioapic->redirtbl[redir_index].bits;
  -else
-    redir_content = ~0ULL;
+  if (redir_index < IOAPIC_NUM_PINS) {
+    u32 index = array_index_nospec(
+    +redir_index, IOAPIC_NUM_PINS);
+  +redir_content = ioapic->redirtbl[index].bits;
+  }

  result = (ioapic->ioregsel & 0x1) ?
    (redir_content >> 32) & 0xffffffff :
@@ -94,7 +96,7 @@
static void rtc_irq_eoi_tracking_reset(struct kvm_ioapic *ioapic)
{
  ioapic->rtc_status.pending_eoi = 0;
-  bitmap_zero(ioapic->rtc_status.dest_map.map, KVM_MAX_VCPU_ID);
+  bitmap_zero(ioapic->rtc_status.dest_map.map, KVM_MAX_VCPU_ID + 1);
}

static void kvm_rtc_eoi_tracking_restore_all(struct kvm_ioapic *ioapic);
@@ -297,6 +299,7 @@
ioapic_debug("change redir index %x val %x\n", index, val);
 if (index >= IOAPIC_NUM_PINS)
  return;
+  index = array_index_nospec(index, IOAPIC_NUM_PINS);
  e = &ioapic->redirtbl[index];
  mask_before = e->fields.mask;
  /* Preserve read-only fields */
--- linux-4.15.0.orig/arch/x86/kvm/ioapic.h
+++ linux-4.15.0/arch/x86/kvm/ioapic.h
@@ -297,6 +299,7 @@

 struct dest_map {
 /* vcpu bitmap where IRQ has been sent */
-DECLARE_BITMAP(map, KVM_MAX_VCPU_ID);

/*
 * Vector sent to a given vcpu, only valid when
 * the vcpu's bit in map is set
 */
-u8 vectors[KVM_MAX_VCPU_ID];
+u8 vectors[KVM_MAX_VCPU_ID + 1];
};

--- linux-4.15.0.orig/arch/x86/kvm/irq.c
+++ linux-4.15.0/arch/x86/kvm/irq.c
@@ -52,17 +52,31 @@
 * check if there is pending interrupt from
 * non-APIC source without intack.
 */
-static int kvm_cpu_has_extint(struct kvm_vcpu *v)
+int kvm_cpu_has_extint(struct kvm_vcpu *v)
 {
-u8 accept = kvm_apic_accept_pic_intr(v);
+/*
+ * FIXME: interrupt.pending represents an interrupt whose
+ * side-effects have already been applied (e.g. bit from IRR
+ * already moved to ISR). Therefore, it is incorrect to rely
+ * on interrupt.pending to know if there is a pending
+ * interrupt in the user-mode LAPIC.
+ * This leads to nVMX/nSVM not be able to distinguish
+ * if it should exit from L2 to L1 on EXTERNAL_INTERRUPT on
+ * pending interrupt or should re-inject an injected
+ * interrupt.
+ * [backport note: interrupt.pending was renamed interrupt.injected
+ * in upstream commit 04140b4144cd , not present in this tree.]
+ */
+if (!lapic_in_kernel(v))
+return v->arch.interrupt.pending;
  -if (accept) {
  -if (irqchip_split(v->kvm))
  -return pending_userspace_extint(v);
  -else
  -return v->kvm->arch.vpic->output;
  -} else
+if (!kvm_apic_accept_pic_intr(v))
+return 0;
+if (irqchip_split(v->kvm))
+return pending_userspace_extint(v);
+else
+return v->kvm->arch.vpic->output;

/*
@@ -73,9 +87,6 @@ */
int kvm_cpu_has_injectable_intr(struct kvm_vcpu *v)
{
    -if (!lapic_in_kernel(v))
    -return v->arch.interrupt.pending;
    
    if (kvm_cpu_has_extint(v))
        return 1;

@@ -91,9 +102,6 @@ */
int kvm_cpu_has_interrupt(struct kvm_vcpu *v)
{
    -if (!lapic_in_kernel(v))
    -return v->arch.interrupt.pending;
    
    if (kvm_cpu_has_extint(v))
        return 1;

@@ -107,16 +115,21 @@ */
static int kvm_cpu_get_extint(struct kvm_vcpu *v)
{
    -if (kvm_cpu_has_extint(v)) {
    -if (irqchip_split(v->kvm)) {
    -int vector = v->arch.pending_external_vector;
    
    -v->arch.pending_external_vector = -1;
    -return vector;
    -} else
    -return kvm_pic_read_irq(v->kvm); /* PIC */
    -} else
    +if (!kvm_cpu_has_extint(v)) {
    +WARN_ON(!lapic_in_kernel(v));
    +return -1;
    +}
    +
    +if (!lapic_in_kernel(v))
    +return v->arch.interrupt.nr;
    +
    +if (irqchip_split(v->kvm)) {
    +int vector = v->arch.pending_external_vector;
+->arch.pending_external_vector = -1;
+return vector;
+} else
+return kvm_pic_read_irq(v->kvm); /* PIC */
}

/*
@@ -124,13 +137,7 @@
*/
int kvm_cpu_get_interrupt(struct kvm_vcpu *v)
{
-int vector;
-
-if (!lapic_in_kernel(v))
-return v->arch.interrupt.nr;
-
-vector = kvm_cpu_get_extint(v);
-
+int vector = kvm_cpu_get_extint(v);
if (vector != -1)
    return vector; /* PIC */

@@ -150,3 +157,10 @@
__kvm_migrate_apic_timer(vcpu);
__kvm_migrate_pit_timer(vcpu);
}
+
+bool kvm_arch_irqfd_allowed(struct kvm *kvm, struct kvm_irqfd *args)
+{
+bool resample = args->flags & KVM_IRQFD_FLAG_RESAMPLE;
+
+return resample ? irqchip_kernel(kvm) : irqchip_in_kernel(kvm);
+
+}

 --- linux-4.15.0.orig/arch/x86/kvm/irq.h
+++ linux-4.15.0/arch/x86/kvm/irq.h
@@ -114,6 +114,7 @@
return mode != KVM_IRQCHIP_NONE;
}

+bool kvm_arch_irqfd_allowed(struct kvm *kvm, struct kvm_irqfd *args);
void kvm_inject_pending_timer_irqs(struct kvm_vcpu *vcpu);
void kvm_inject_apic_timer_irqs(struct kvm_vcpu *vcpu);
void kvm_apic_nmi_wd_deliver(struct kvm_vcpu *vcpu);
--- linux-4.15.0.orig/arch/x86/kvm/irq_comm.c
+++ linux-4.15.0/arch/x86/kvm/irq_comm.c
@@ -427,7 +427,7 @@
kvm_set_msi_irq(vcpu->kvm, entry, &irq);

-if (irq.level && & kvm_apic_match_dest(vcpu, NULL, 0,
+if (irq.trig_mode && & kvm_apic_match_dest(vcpu, NULL, 0,
irq.dest_id, irq.dest_mode))
__set_bit(irq.vector, ioapic_handled_vectors);
}
--- linux-4.15.0.orig/arch/x86/kvm/kvm_cache_regs.h
+++ linux-4.15.0/arch/x86/kvm/kvm_cache_regs.h
@@ -5,7 +5,7 @@
#define KVM_POSSIBLE_CR0_GUEST_BITS X86_CR0_TS
#define KVM_POSSIBLE_CR4_GUEST_BITS \  
(X86_CR4_PVI | X86_CR4_DE | X86_CR4_PCE | X86_CR4_OSFXSR \  
-| X86_CR4_OSXMMEXCPT | X86_CR4_LA57 | X86_CR4_PGE) 
+| X86_CR4_OSXMMEXCPT | X86_CR4_LA57 | X86_CR4_PGE | X86_CR4_TSD)

static inline unsigned long kvm_register_read(struct kvm_vcpu *vcpu,
    enum kvm_reg reg)
--- linux-4.15.0.orig/arch/x86/kvm/lapic.c
+++ linux-4.15.0/arch/x86/kvm/lapic.c
@@ -55,7 +55,7 @@
#define PRIo64 "o"
/* 14 is the version for Xeon and Pentium 8.4.8*/
#define APIC_VERSION (0x14UL | ((KVM_APIC_LVT_NUM - 1) << 16))
@@ -133,6 +133,7 @@
    u8 cluster_size = min(max_apic_id - offset + 1, 16U);

+offset = array_index_nospec(offset, map->max_apic_id + 1);
*cluster = &map->phys_map[offset];
*mask = dest_id & (0xffff >> (16 - cluster_size));
} else {
@@ -208,6 +209,9 @@
    if (!kvm_apic_sw_enabled(apic))
        continue;
    +
    ldr = kvm_lapic_get_reg(apic, APIC_LDR);

    if (apic_x2apic_mode(apic)) {
@@ -251,6 +255,8 @@
recalculate_apic_map(apic->vcpu->kvm);
} else
static_key_slow_inc(&apic_sw_disabled.key);
+
+recalculate_apic_map(apic->vcpu->kvm);
}

@@ -321,8 +327,16 @@
if (!lapic_in_kernel(vcpu))
return;

+/*
+ * KVM emulates 82093AA datasheet (with in-kernel IOAPIC implementation)
+ * which doesn't have EOI register; Some buggy OSes (e.g. Windows with
+ * Hyper-V role) disable EOI broadcast in lapic not checking for IOAPIC
+ * version first and level-triggered interrupts never get EOIed in
+ * IOAPIC.
+ */
feat = kvm_find_cpuid_entry(apic->vcpu, 0x1, 0);
-if (feat && (feat->ecx & (1 << (X86_FEATURE_X2APIC & 31))))
+if (feat && (feat->ecx & (1 << (X86_FEATURE_X2APIC & 31))) &&
+ !ioapic_in_kernel(vcpu->kvm))
 v |= APIC_LVR_DIRECTED_EOI;
 kvm_lapic_set_reg(apic, APIC_LVR, v);
 }
@@ -552,9 +566,11 @@
static bool pv_eoi_get_pending(struct kvm_vcpu *vcpu)
{
 u8 val;
-if (pv_eoi_get_user(vcpu, &val) < 0)
+if (pv_eoi_get_user(vcpu, &val) < 0) {
 apic_debug("Can't read EOI MSR value: 0x%llx\n",
 (unsigned long long)vcpu->arch.pv_eoi.msr_val);
+return false;
+}
 return val & 0x1;
 }
@@ -821,7 +837,8 @@
if (irq->dest_id > map->max_apic_id) {
 *bitmap = 0;
 } else {
-*dst = &map->phys_map[irq->dest_id];
+u32 dest_id = array_index_nospec(irq->dest_id, map->max_apic_id + 1);
+*dst = &map->phys_map[dest_id];
 *bitmap = 1;
 }
return true;
@@ -978,11 +995,8 @@
apic_clear_vector(vector, apic->regs + APIC_TMR);
 }

-if (vcpu->arch.apicv_active)
-kvm_x86_ops->deliver_posted_interrupt(vcpu, vector);
-else {
+if (kvm_x86_ops->deliver_posted_interrupt(vcpu, vector)) {
    kvm_lapic_set_irr(vector, apic);
    -
    kvm_make_request(KVM_REQ_EVENT, vcpu);
    kvm_vcpu_kick(vcpu);
@@ -1274,9 +1288,8 @@
 apic_mmio_in_range(struct kvm_lapic *apic, gpa_t addr)
 {
-    return kvm_apic_hw_enabled(apic) &&
-    addr >= apic->base_address &&
-    addr < apic->base_address + LAPIC_MMIO_LENGTH;
+    return addr >= apic->base_address &&
+    addr < apic->base_address + LAPIC_MMIO_LENGTH;
 }

 apic_mmio_read(struct kvm_vcpu *vcpu, struct kvm_io_device *this,
@@ -1288,6 +1301,15 @@
 if (!apic_mmio_in_range(apic, address))
 return -EOPNOTSUPP;

+if (!kvm_apic_hw_enabled(apic) || apic_x2apic_mode(apic)) {
+if (!kvm_check_has_quirk(vcpu->kvm,
+  KVM_X86_QUIRK_LAPIC_MMIO_HOLE))
+  return -EOPNOTSUPP;
+  +memset(data, 0xff, len);
+  +return 0;
+}
+  +
  kvm_lapic_reg_read(apic, offset, len, data);
  return 0;
@@ -1446,23 +1468,6 @@
live_irq_restore(flags);
 }

 static void start_sw_period(struct kvm_lapic *apic)
-{

-if (!apic->lapic_timer.period)
-  return;
-
-if (apic_lvtt_oneshot(apic) &&
   ktime_after(ktime_get(),
   apic->lapic_timer.target_expiration))
  apic_timer_expired(apic);
-  return;
-
-hrtimer_start(&apic->lapic_timer.timer,
   apic->lapic_timer.target_expiration,
   HRTIMER_MODE_ABS_PINNED);
-
static void update_target_expiration(struct kvm_lapic *apic,
   uint32_t old_divisor)
{
  ktime_t now, remaining;
  @@ -1522,11 +1527,43 @@
  static void advance_periodic_target_expiration(struct kvm_lapic *apic)
  {
-    apic->lapic_timer.tscdeadline +=
-    nsec_to_cycles(apic->vcpu, apic->lapic_timer.period);
   +kt ime_t now = ktime_get();
   +u64 tscl = rdtsc();
   +ktime_t delta;
   +
   +/*
   + * Synchronize both deadlines to the same time source or
   + * differences in the periods (caused by differences in the
   + * underlying clocks or numerical approximation errors) will
   + * cause the two to drift apart over time as the errors
   + * accumulate.
   + */
   apic->lapic_timer.target_expiration =
   ktime_add_ns(apic->lapic_timer.target_expiration,
   apic->lapic_timer.period);
   +delta = ktime_sub(apic->lapic_timer.target_expiration, now);
   +apic->lapic_timer.tscdeadline = kvm_read_l1_tsc(apic->vcpu, tscl) +
   +nsec_to_cycles(apic->vcpu, delta);
   +}
   +
   +static void start_sw_period(struct kvm_lapic *apic)
   +{
   +  if (!apic->lapic_timer.period)
   +    return;
   +
   +  /*
   +   * Synchronize both deadlines to the same time source or
   +   * differences in the periods (caused by differences in the
   +   * underlying clocks or numerical approximation errors) will
   +   * cause the two to drift apart over time as the errors
   +   * accumulate.
   +   */
   +  apic->lapic_timer.target_expiration =
   ktime_add_ns(apic->lapic_timer.target_expiration,
   apic->lapic_timer.period);
   +delta = ktime_sub(apic->lapic_timer.target_expiration, now);
   +apic->lapic_timer.tscdeadline = kvm_read_l1_tsc(apic->vcpu, tscl) +
   +nsec_to_cycles(apic->vcpu, delta);
   +}
if (ktime_after(ktime_get(),
apic->lapic_timer.target_expiration)) {
apic_timer_expired(apic);
+
+if (apic_lvt_oneshot(apic))
+return;
+
+advance_periodic_target_expiration(apic);
+}
+
+hrtimer_start(&apic->lapic_timer.timer,
apic->lapic_timer.target_expiration,
+HRTIMER_MODE_ABS_PINNED);
}

bool kvm_lapic_hv_timer_in_use(struct kvm_vcpu *vcpu)
@@ -1757,15 +1794,20 @@
case APIC_LVTTHMR:
case APIC_LVTPC:
case APIC_LVT1:
-casetype APIC_LVTERR;
+case APIC_LVTERR: {
/* TODO: Check vector */
+size_t size;
+u32 index;
+
+if (!kvm_apic_sw_enabled(apic))
+val |= APIC_LVT_MASKED;
-
-val &= apic_lvt_mask[(reg - APIC_LVTT) >> 4];
+size = ARRAY_SIZE(apic_lvt_mask);
+index = array_index_nospec((reg - APIC_LVTT) >> 4, size);
+val &= apic_lvt_mask[index];
kvm_lapic_set_reg(apic, reg, val);
-
-break;
+}
}

case APIC_LVT:
if (!kvm_apic_sw_enabled(apic))
@@ -1832,6 +1874,14 @@
if (!apic_mmio_in_range(apic, address))
return -EOPNOTSUPP;

+if (!kvm_apic_hw_enabled(apic) || apic_x2apic_mode(apic)) {
+if (!kvm_check_has_quirk(vcpu->kvm,
+ KVM_X86_QUIRK_LAPIC_MMIO_HOLE))
+return -EOPNOTSUPP;
+return -EOPNOTSUPP;
+
+return 0;
+
+}
+
/*
  * APIC register must be aligned on 128-bits boundary.
  * 32/64/128 bits registers must be accessed thru 32 bits.
@@ -1917,7 +1967,7 @@
{
 struct kvm_lapic *apic = vcpu->arch.apic;

-if (!lapic_in_kernel(vcpu) || apic_lvtt_oneshot(apic) ||
+if (!kvm_apic_present(vcpu) || apic_lvtt_oneshot(apic) ||
    apic_lvtt_period(apic))
    return;

@@ -1970,13 +2020,11 @@
}
}

-if ((old_value ^ value) & X2APIC_ENABLE) {
-if (value & X2APIC_ENABLE) {
-kvm_apic_set_x2apic_id(apic, vcpu->vcpu_id);
-kvm_x86_ops->set_virtual_x2apic_mode(vcpu, true);
-} else
-kvm_x86_ops->set_virtual_x2apic_mode(vcpu, false);
-}

++if (((old_value ^ value) & X2APIC_ENABLE) && (value & X2APIC_ENABLE))
++kvm_apic_set_x2apic_id(apic, vcpu->vcpu_id);
++
++if (((old_value ^ value) & (MSR_IA32_APICBASE_ENABLE | X2APIC_ENABLE))
++kvm_x86_ops->set_virtual_apic_mode(vcpu);

apic->base_address = apic->vcpu->arch.apic_base &
    MSR_IA32_APICBASE_BASE;
@@ -1993,14 +2041,13 @@

void kvm_lapic_reset(struct kvm_vcpu *vcpu, bool init_event)
{
  -struct kvm_lapic *apic;
  +struct kvm_lapic *apic = vcpu->arch.apic;
  
  int i:

  -apic_debug("%s\n", __func__);
  +if (!apic)
  +return;

...
-ASSERT(vcpu);
apic = vcpu->arch.apic;
-ASSERT(apic != NULL);
apic_debug("%s\n", __func__);

/* Stop the timer in case it's a reset to an active apic */
hrtimer_cancel(&apic->lapic_timer.timer);
@@ -2156,7 +2203,6 @@
*/
vcpu->arch.apic_base = MSR_IA32_APICBASE_ENABLE;
static_key_slow_inc(&apic_sw_disabled.key); /* sw disabled at reset */
-kvm_lapic_reset(vcpu, false);
kvm_iodevice_init(&apic->dev, &apic_mmio_ops);

return 0;
@@ -2171,7 +2217,7 @@
struct kvm_lapic *apic = vcpu->arch.apic;
u32 ppr;

-if (!apic_enabled(apic))
+if (!kvm_apic_present(vcpu))
    return -1;

__apic_update_ppr(apic, &ppr);
@@ -2560,7 +2606,6 @@
    
    pe = xchg(&apic->pending_events, 0);
    if (test_bit(KVM_APIC_INIT, &pe)) {
-        kvm_lapic_reset(vcpu, true);
+        kvm_vcpu_reset(vcpu, true);
        if (kvm_vcpu_is_bsp(apic->vcpu))
            vcpu->arch.mp_state = KVM_MP_STATE_RUNNABLE;
    --- linux-4.15.0.orig/arch/x86/kvm/lapic.h
+++ linux-4.15.0/arch/x86/kvm/lapic.h
@@ -16,6 +16,13 @@
#define APIC_BUS_CYCLE_NS       1
#define APIC_BUS_FREQUENCY     (1000000000ULL / APIC_BUS_CYCLE_NS)

+enum lapic_mode {
+    LAPIC_MODE_DISABLED = 0,
+    LAPIC_MODE_INVALID = X2APIC_ENABLE,
+    LAPIC_MODE_XAPIC = MSR_IA32_APICBASE_ENABLE,
+    LAPIC_MODE_X2APIC = MSR_IA32_APICBASE_ENABLE | X2APIC_ENABLE,
+};
+
+struct kvm_timer {
+    struct hrtimer timer;
s64 period; /* unit: ns */
int kvm_set_apic_base(struct kvm_vcpu *vcpu, struct msr_data *msr_info);
int kvm_apic_get_state(struct kvm_vcpu *vcpu, struct kvm_lapic_state *s);
int kvm_apic_set_state(struct kvm_vcpu *vcpu, struct kvm_lapic_state *s);
class lapic_mode kvm_get_apic_mode(struct kvm_vcpu *vcpu);
int kvm_lapic_find_highest_irr(struct kvm_vcpu *vcpu);

u64 kvm_get_lapic_tscdeadline_msr(struct kvm_vcpu *vcpu);

void kvm_lapic_expired_hv_timer(struct kvm_vcpu *vcpu);
bool kvm_lapic_hv_timer_in_use(struct kvm_vcpu *vcpu);
void kvm_lapic_restart_hv_timer(struct kvm_vcpu *vcpu);

//static inline enum lapic_mode kvm_apic_mode(u64 apic_base)
{ +
  return apic_base & (MSR_IA32_APICBASE_ENABLE | X2APIC_ENABLE);
+
}

#endif
--- linux-4.15.0.orig/arch/x86/kvm/mmu.c
+++ linux-4.15.0/arch/x86/kvm/mmu.c
@@ -40,14 +40,40 @@

#include <linux/uaccess.h>
#include <linux/hash.h>
#include <linux/kern_levels.h>
+ include <linux/kthread.h>

#include <asm/page.h>
#include <asm/pub.h>
#include <asm/cmpxchg.h>
#include <asm/io.h>
#include <asm/vmx.h>
#include <asm/kvm_page_track.h>
#include "trace.h"

+ extern bool itlb_multihit_kvm_mitigation;
+
+static int __read_mostly nx_huge_pages = -1;
+static uint __read_mostly nx_huge_pages_recovery_ratio = 60;
+
+static int set_nx_huge_pages(const char *val, const struct kernel_param *kp);
+static int set_nx_huge_pages_recovery_ratio(const char *val, const struct kernel_param *kp);
+
+static struct kernel_param_ops nx_huge_pages_ops = {
+  .set = set_nx_huge_pages,
+  .get = param_get_bool,
+};
static struct kernel_param_ops nx_huge_pages_recovery_ratio_ops = {
    .set = set_nx_huge_pages_recovery_ratio,
    .get = param_get_uint,
    *
};

module_param_cb(nx_huge_pages, &nx_huge_pages_ops, &nx_huge_pages, 0644);
_MODULE_PARM_TYPE(nx_huge_pages, "bool");
module_param_cb(nx_huge_pages_recovery_ratio, &nx_huge_pages_recovery_ratio_ops,
	&nx_huge_pages_recovery_ratio, 0644);
_MODULE_PARM_TYPE(nx_huge_pages_recovery_ratio, "uint");

/*
* When setting this variable to true it enables Two-Dimensional-Paging
* where the hardware walks 2 page tables:
*/
@ @ -139,9 +165,6 @@

#include <trace/events/kvm.h>

#define CREATE_TRACE_POINTS
#define "mmutrace.h"

#define SPTE_HOST_WRITEABLE	(1ULL << PT_FIRST_AVAIL_BITS_SHIFT)
#define SPTE_MMU_WRITEABLE	(1ULL << (PT_FIRST_AVAIL_BITS_SHIFT + 1))

@ @ -220,17 +243,56 @@
PT64_EPT_EXECUTABLE_MASK;
static const u64 shadow_acc_track_saved_bits_shift = PT64_SECOND_AVAIL_BITS_SHIFT;

/*
 * This mask must be set on all non-zero Non-Present or Reserved SPTEs in order
 * to guard against L1TF attacks.
 */
+static u64 __read_mostly shadow_nonpresent_or_rsvd_mask;
+
+/*
 * The number of high-order 1 bits to use in the mask above.
 */
+static const u64 shadow_nonpresent_or_rsvd_mask_len = 5;
+
+/*
 * In some cases, we need to preserve the GFN of a non-present or reserved
 * SPTE when we usurp the upper five bits of the physical address space to
 * defend against L1TF, e.g. for MMIO SPTEs. To preserve the GFN, we'll
 * shift bits of the GFN that overlap with shadow_nonpresent_or_rsvd_mask
 * left into the reserved bits, i.e. the GFN in the SPTE will be split into
 * high and low parts. This mask covers the lower bits of the GFN.
 */
+static u64 __read_mostly shadow_nonpresent_or_rsvd_lower_gfn_mask;
+ /*
+ * The number of non-reserved physical address bits irrespective of features
+ * that repurpose legal bits, e.g. MKTME.
+ */
+static u8 __read_mostly shadow_phys_bits;
+
static void mmu_spte_set(u64 *sptep, u64 spte);
static void mmu_free_roots(struct kvm_vcpu *vcpu);
+static bool is_executable_pte(u64 spte);
+
#define CREATE_TRACE_POINTS
#include "mmutrace.h"
+
void kvm_mmu_set_mmio_spte_mask(u64 mmio_mask, u64 mmio_value)
{
    BUG_ON((mmio_mask & mmio_value) != mmio_value);
    WARN_ON(mmio_value & (shadow_nonpresent_or_rsvd_mask << shadow_nonpresent_or_rsvd_mask_len));
    WARN_ON(mmio_value & shadow_nonpresent_or_rsvd_lower_gfn_mask);
    shadow_mmio_value = mmio_value | SPTE_SPECIAL_MASK;
    shadow_mmio_mask = mmio_mask | SPTE_SPECIAL_MASK;
}
EXPORT_SYMBOL_GPL(kvm_mmu_set_mmio_spte_mask);
+
+static bool is_mmio_spte(u64 spte)
+{
+    return (spte & shadow_mmio_mask) == shadow_mmio_value;
+}
+
+static inline bool sp_ad_disabled(struct kvm_mmu_page *sp)
+
    return sp->role.ad_disabled;
@@ -238,19 +300,24 @@
            
    return !(spte & shadow_acc_track_value);
}
+
+static bool is_nx_huge_page_enabled(void)
+{
+    return READ_ONCE(nx_huge_pages);
+}
+
    static inline u64 spte_shadow_accessed_mask(u64 spte)
    {
-MMU_WARN_ON((spte & shadow_mmio_mask) == shadow_mmio_value);
+MMU_WARN_ON(is_mmio_spte(spte));
    return !(spte & shadow_acc_track_value);
    }
    
+static bool is_nx_huge_page_enabled(void)
    +{
+    return READ_ONCE(nx_huge_pages);
+    }
    
    static inline u64 spte_shadow_accessed_mask(u64 spte)
{MMU_WARN_ON((spte & shadow_mmio_mask) == shadow_mmio_value);
+MMU_WARN_ON(is_mmio_spte(spte));
return spte_ad_enabled(spte) ? shadow_accessed_mask : 0;
}

static inline u64 spte_shadow_dirty_mask(u64 spte)
{
-MMU_WARN_ON((spte & shadow_mmio_mask) == shadow_mmio_value);
+MMU_WARN_ON(is_mmio_spte(spte));
return spte_ad_enabled(spte) ? shadow_dirty_mask : 0;
}

@@ -308,23 +375,26 @@
{
unsigned int gen = kvm_current_mmio_generation(vcpu);
u64 mask = generation_mmio_spte_mask(gen);
+u64 gpa = gfn << PAGE_SHIFT;

access &= ACC_WRITE_MASK | ACC_USER_MASK;
-mask |= shadow_mmio_value | access | gfn << PAGE_SHIFT;
+mask |= shadow_mmio_value | access;
+mask |= gpa | shadow_nonpresent_or_rsvd_mask;
+mask |= (gpa & shadow_nonpresent_or_rsvd_mask)
+<< shadow_nonpresent_or_rsvd_mask_len;

trace_mark_mmio_spte(sptep, gfn, access, gen);
mmu_spte_set(sptep, mask);
}

-static bool is_mmio_spte(u64 spte)
-{
-return (spte & shadow_mmio_mask) == shadow_mmio_value;
-}
- static gfn_t get_mmio_spte_gfn(u64 spte)
{u64 mask = generation_mmio_spte_mask(MMIO_GEN_MASK) | shadow_mmio_mask;
-return (spte & ~mask) >> PAGE_SHIFT;
+u64 gpa = spte & shadow_nonpresent_or_rsvd_lower_gfn_mask;
+gpa |= (spte >> shadow_nonpresent_or_rsvd_mask_len)
+& shadow_nonpresent_or_rsvd_mask;
+return gpa >> PAGE_SHIFT;
}
static unsigned get_mmio_spte_access(u64 spte)
void kvm_mmu_clear_all_pte_masks(void)
+static u8 kvm_get_shadow_phys_bits(void)
{
  /*
   * boot_cpu_data.x86_phys_bits is reduced when MKTME is detected
   * in CPU detection code, but MKTME treats those reduced bits as
   * 'keyID' thus they are not reserved bits. Therefore for MKTME
   * we should still return physical address bits reported by CPUID.
   */
  if (!boot_cpu_has(X86_FEATURE_TME) ||
      WARN_ON_ONCE(boot_cpu_data.extended_cpuid_level < 0x80000008))
    return boot_cpu_data.x86_phys_bits;
  +return cpuid_eax(0x80000008) & 0xff;
+
+static void kvm_mmu_reset_all_pte_masks(void)
+
+u8 low_phys_bits;
+
  shadow_user_mask = 0;
  shadow_accessed_mask = 0;
  shadow_dirty_mask = 0;
  shadow_mmio_mask = 0;
  shadow_present_mask = 0;
  shadow_acc_track_mask = 0;
  +
  shadow_phys_bits = kvm_get_shadow_phys_bits();
  +
  /*
   * If the CPU has 46 or less physical address bits, then set an
   * appropriate mask to guard against L1TF attacks. Otherwise, it is
   * assumed that the CPU is not vulnerable to L1TF.
   */
  +shadow_nonpresent_or_rsvd_mask = 0;
  +
  if (boot_cpu_has_bug(X86_BUG_L1TF) &&
      !WARN_ON_ONCE(boot_cpu_data.x86_cache_bits >=

+ 52 - shadow_nonpresent_or_rsvd_mask_len)) {
+low_phys_bits = boot_cpu_data.x86_cache_bits
+shadow_nonpresent_or_rsvd_mask_len;
+shadow_nonpresent_or_rsvd_mask =
+rsvd_bits(low_phys_bits, boot_cpu_data.x86_cache_bits - 1);
+
+shadow_nonpresent_or_rsvd_lower_gfn_mask =
+GENMASK_ULL(low_phys_bits - 1, PAGE_SHIFT);
}

static int is_cpuid_PSE36(void)
@@ -890,7 +1003,7 @@
if (cache->nobjs >= min)
return 0;
while (cache->nobjs < ARRAY_SIZE(cache->objects)) {
-    page = (void *)__get_free_page(GFP_KERNEL);
+    page = (void *)__get_free_page(GFP_KERNEL_ACCOUNT);
if (!page)
return -ENOMEM;
cache->objects[cache->nobjs++] = page;
@@ -959,10 +1072,16 @@
 */
@@ -1021,6 +1140,17 @@
kvm_mmu_gfnDisallow_lpage(slot, gfn);
}

+static void account_huge_nx_page(struct kvm *kvm, struct kvm_mmu_page *sp)
+{
+if (sp->lpage_disallowed)
++kvm->stat.nx_lpage_splits;
+list_add_tail(&sp->lpage_disallowed_link,
  &kvm->arch.lpage_disallowed_mmu_pages);
+sp->lpage_disallowed = true;
+
static void unaccount_shadowed(struct kvm *kvm, struct kvm_mmu_page *sp)
{
  struct kvm_memslots *slots;
  @ @ -1038,6 +1168,13 @@
kvm_mmu_gfn_allow_lpage(slot, gfn);
}

+static void unaccount_huge_nx_page(struct kvm *kvm, struct kvm_mmu_page *sp)
+{
++kvm->stat.nx_lpage_splits;
+sp->lpage_disallowed = false;
+list_del(&sp->lpage_disallowed_link);
+
static bool __mmu_gfn_lpage_is_disallowed(gfn_t gfn, int level,
  struct kvm_memory_slot *slot)
{
  @ @ -1060,12 +1197,12 @@
return __mmu_gfn_lpage_is_disallowed(gfn, level, slot);
}

-host_mapping_level(struct kvm *kvm, gfn_t gfn)
+static int host_mapping_level(struct kvm_vcpu *vcpu, gfn_t gfn)
{
  unsigned long page_size;
  int i, ret = 0;

  -page_size = kvm_host_page_size(kvm, gfn);
  +page_size = kvm_host_page_size(vcpu, gfn);

  for (i = PT_PAGE_TABLE_LEVEL; i <= PT_MAX_HUGEPAGE_LEVEL; ++i) {
if (page_size >= KVM_HPAGE_SIZE(i))
  @ @ -1115,7 +1252,7 @@
if (unlikely(*force_pt_level))
return PT_PAGE_TABLE_LEVEL;

-host_level = host_mapping_level(vcpu->kvm, large_gfn);
+host_level = host_mapping_level(vcpu, large_gfn);

if (host_level == PT_PAGE_TABLE_LEVEL)
return host_level;
@@ -1577,10 +1714,10 @@
    * Emulate arch specific page modification logging for the
    * nested hypervisor
    */
-int kvm_arch_write_log_dirty(struct kvm_vcpu *vcpu)
+int kvm_arch_write_log_dirty(struct kvm_vcpu *vcpu, gpa_t l2_gpa)
{
  if (kvm_x86_ops->write_log_dirty)
    return kvm_x86_ops->write_log_dirty(vcpu);
+  return kvm_x86_ops->write_log_dirty(vcpu, l2_gpa);
  return 0;
}
@@ -1891,7 +2028,7 @@
    * aggregate version in order to make the slab shrinker
    * faster
    */
-static inline void kvm_mod_used_mmu_pages(struct kvm *kvm, int nr)
+static inline void kvm_mod_used_mmu_pages(struct kvm *kvm, long nr)
{
  kvm->arch.n_used_mmu_pages += nr;
  percpu_counter_add(&kvm_total_used_mmu_pages, nr);
@@ -2585,6 +2722,9 @@

+    if (sp->lpage_disallowed)
+      unaccount_huge_nx_page(kvm, sp);
+  sp->role.invalid = 1;
  return ret;
}@ @ -2631,7 +2771,7 @@
    * Changing the number of mmu pages allocated to the vm
    * Note: if goal_nr_mmu_pages is too small, you will get dead lock
    */
-void kvm_mmu_change_mmu_pages(struct kvm *kvm, unsigned int goal_nr_mmu_pages)
+void kvm_mmu_change_mmu_pages(struct kvm *kvm, unsigned long goal_nr_mmu_pages)
{
  LIST_HEAD(invalid_list);
@@ -2708,7 +2848,18 @@
    static bool kvm_is_mmio_pfn(kvm_pfn_t pfn)
{
  if (pfn_valid(pfn))
-    return !is_zero_pfn(pfn) && PageReserved(pfn_to_page(pfn));
+    return !is_zero_pfn(pfn) && PageReserved(pfn_to_page(pfn)) &&
/*
 * Some reserved pages, such as those from NVDIMM
 * DAX devices, are not for MMIO, and can be mapped
 * with cached memory type for better performance.
 * However, the above check misconceives those pages
 * as MMIO, and results in KVM mapping them with UC
 * memory type, which would hurt the performance.
 * Therefore, we check the host memory type in addition
 * and only treat UC/UC-/WC pages as MMIO.
 */
!(pat_enabled() || pat_pfn_immune_to_uc_mtrr(pfn));

return true;
}
/*!
if (!speculative)
spte |= spte_shadow_accessed_mask(spte);

if (level > PT_PAGE_TABLE_LEVEL && (pte_access & ACC_EXEC_MASK) &&
    is_nx_huge_page_enabled()) {
    pte_access &= ~ACC_EXEC_MASK;
}

if (pte_access & ACC_EXEC_MASK)
spte |= shadow_x_mask;
else
    pte_access &= ~ACC_WRITE_MASK;
else
    if (!kvm_is_mmio_pfn(pfn))
        spte |= shadow_me_mask;
    pte_access &= ~ACC_WRITE_MASK;

if (pte_access & ACC_WRITE_MASK) {
    ret = RET_PF_EMULATE;

    pgprintk("%s: setting spte %llx\n", __func__, *sptep);
    -pgprintk("instantiating %s PTE (%s) at %llx (%llx) addr %p\n",
    -is_large_pte(*sptep)? "2MB" : "4kB",
    -*sptep & PT_WRITABLE_MASK ? "RW" : "R", gfn,
    -*sptep, sptep);
    +trace_kvm_mmu_set_spte(level, gfn, sptep);
    if (!was_rmapped && is_large_pte(*sptep))

@@ -2867,8 +3022,6 @@
}

-kvm_release_pfn_clean(pfn);
-
return ret;
}

@@ -2903,9 +3056,11 @@
if (ret <= 0)
    return -1;

-for (i = 0; i < ret; i++, gfn++, start++)
+for (i = 0; i < ret; i++, gfn++, start++) {
    mmu_set_spte(vcpu, start, access, 0, sp->role.level, gfn,
        page_to_pfn(pages[i]), true, true);
+    put_page(pages[i]);
+
    return 0;
}

@@ -2953,40 +3108,71 @@
__direct_pte_prefetch(vcpu, sp, sptep);
}

-static int __direct_map(struct kvm_vcpu *vcpu, int write, int map_writable,
-    int level, gfn_t gfn, kvm_pfn_t pfn, bool prefault)
+static void disallowed_hugepage_adjust(struct kvm_shadow_walk_iterator it,
+    gfn_t gfn, kvm_pfn_t *pfnp, int *levelp)
{
    struct kvm_shadow_walk_iterator iterator;
    int level = *levelp;
+    u64 spte = *it.sptep;
    +
    +if (it.level == level && level > PT_PAGE_TABLE_LEVEL &&
+    is_nx_huge_page_enabled() &&
+    is_shadow_present_pte(spte) &&
+    !is_large_pte(spte)) {
+    /*
+    * A small SPTE exists for this pfn, but FNAME(fetch)
+    * and __direct_map would like to create a large PTE
+    * instead: just force them to go down another level,
+    * patching back for them into pfn the next 9 bits of
+    * the address.
+    */
+    */
      return -1;
    +
    +}
+    return ;

    for (i = 0; i < ret; i++, gfn++, start++)
      mmu_set_spte(vcpu, start, access, 0, sp->role.level, gfn,
          page_to_pfn(pages[i]), true, true);
  
      put_page(pages[i]);

      return 0;
}

@@ -2953,40 +3108,71 @@
__direct_pte_prefetch(vcpu, sp, sptep);
}

-static int __direct_map(struct kvm_vcpu *vcpu, int write, int map_writable,
-    int level, gfn_t gfn, kvm_pfn_t pfn, bool prefault)
+static void disallowed_hugepage_adjust(struct kvm_shadow_walk_iterator it,
+    gfn_t gfn, kvm_pfn_t *pfnp, int *levelp)
{
    struct kvm_shadow_walk_iterator iterator;
    int level = *levelp;
+    u64 spte = *it.sptep;
    +
    +if (it.level == level && level > PT_PAGE_TABLE_LEVEL &&
+    is_nx_huge_page_enabled() &&
+    is_shadow_present_pte(spte) &&
+    !is_large_pte(spte)) {
+    /*
+    * A small SPTE exists for this pfn, but FNAME(fetch)
+    * and __direct_map would like to create a large PTE
+    * instead: just force them to go down another level,
+    * patching back for them into pfn the next 9 bits of
+    * the address.
+    */
+    */


+u64 page_mask = KVM_PAGES_PER_HPAGE(level) - KVM_PAGES_PER_HPAGE(level - 1);
+*pfnp |= gfn & page_mask;
+(*levelp)--;
+
+static int __direct_map(struct kvm_vcpu *vcpu, gpa_t gpa, int write,
+int map_writable, int level, kvm_pfn_t pfn,
+bool prefault, bool lpage_disallowed)
+{
+    struct kvm_shadow_walk_iterator it;
+    struct kvm_mmu_page *sp;
+    -int emulate = 0;
+    -gfn_t pseudo_gfn;
+    +int ret;
+    +gfn_t gfn = gpa >> PAGE_SHIFT;
+    +gfn_t base_gfn = gfn;
+
+    if (!VALID_PAGE(vcpu->arch.mmu.root_hpa))
+        -return 0;
+    -for_each_shadow_entry(vcpu, (u64)gfn << PAGE_SHIFT, iterator) {
+        -if (iterator.level == level) {
+            -emulate = mmu_set_spte(vcpu, iterator.sptep, ACC_ALL,
+                write, level, gfn, pfn, prefault,
+                map_writable);
+            -direct_pte_prefetch(vcpu, iterator.sptep);
+            +++vcpu->stat.pf_fixed;
+            -break;
+            -}
+            +return RET_PF_RETRY;
+        -drop_large_spte(vcpu, iterator.sptep);
+        -if (!is_shadow_present_pte(*iterator.sptep)) {
+            -u64 base_addr = iterator.addr;
+            +trace_kvm_mmu_spte_requested(gpa, level, pfn);
+            +for_each_shadow_entry(vcpu, gpa, it) {
+                +/*
+                + * We cannot overwrite existing page tables with an NX
+                + * large page, as the leaf could be executable.
+                + */
+                +disallowed_hugepage_adjust(it, gfn, &pfn, &level);
+                -base_addr &= PT64_LVL_ADDR_MASK(iterator.level);
+                -pseudo_gfn = base_addr >> PAGE_SHIFT;
+                -sp = kvm_mmu_get_page(vcpu, pseudo_gfn, iterator.addr,
+                    -iterator.level - 1, 1, ACC_ALL);
+                +base_gfn = gfn & ~(KVM_PAGES_PER_HPAGE(it.level) - 1);
+if (it.level == level)
+break;

- link_shadow_page(vcpu, iterator.sstep, sp);
+ drop_large_spte(vcpu, it.sstep);
+ if (!is_shadow_present_pte(*it.sstep)) {
+ sp = kvm_mmu_get_page(vcpu, base_gfn, it.addr,
+ it.level - 1, true, ACC_ALL);
+
+ link_shadow_page(vcpu, it.sstep, sp);
+ if (lpage_disallowed)
+ account_huge_nx_page(vcpu->kvm, sp);
} } return emulate;
+
+ ret = mmu_set_spte(vcpu, it.sstep, ACC_ALL,
+ write, level, base_gfn, pfn, prefault,
+ map_writable);
+ direct_pte_prefetch(vcpu, it.sstep);
+++ vcpu->statpf_fixed;
+ return ret;
}

static void kvm_send_hwpoison_signal(unsigned long address, struct task_struct *tsk)
@@ -3021,11 +3207,10 @@
}

static void transparent_hugepage_adjust(struct kvm_vcpu *vcpu,
- gfn_t *gfnp, kvm_pfn_t *pfnp,
+ gfn_t gfn, kvm_pfn_t *pfnp,
 int *levelp)
{
 kvm_pfn_t pfn = *pfnp;
- gfn_t gfn = *gfnp;
+ gfn_t gfn = *gfnp;
 int level = *levelp;

 /*
@@ -3052,8 +3237,6 @@
*/
 if (!is_error_noslot_pfn(pfn) && !kvm_is_reserved_pfn(pfn) &&
- level == PT_PAGE_TABLE_LEVEL &&
+ !kvm_is_zone_device_pfn(pfn) && level == PT_PAGE_TABLE_LEVEL &&
 PageTransCompoundMap(pfn_to_page(pfn)) &&
 !mmu_gfn_lpage_is_disallowed(vcpu, gfn, PT_DIRECTORY_LEVEL)) {
 unsigned long mask;
@@ -3052,8 +3237,6 @@
mask = KVM_PAGES_PER_HPAGE(level) - 1;
VM_BUG_ON((gfn & mask) != (pfn & mask));
if (pfn & mask) {
    gfn &= ~mask;
    *gfnp = gfn;
kvm_release_pfn_clean(pfn);
    pfn &= ~mask;
kvm_get_pfn(pfn);
}

/*
 * - true: let the vcpu to access on the same address again.
 * - false: let the real page fault path to fix it.
 */

static bool fast_page_fault(struct kvm_vcpu *vcpu, gva_t gva, int level,
                          u32 error_code)
{
    struct kvm_shadow_walk_iterator iterator;

do {
    u64 new_spte;

    for_each_shadow_entry_lockless(vcpu, gva, iterator, spte)
        if (!is_shadow_present_pte(spte) ||
            iterator.level < level)
            break;

    trace_fast_page_fault(vcpu, gva, error_code, iterator.sptep,
                           spte, fault_handled);
walk_shadow_page_lockless_end(vcpu);

    while (true);

    trace_fast_page_fault(vcpu, cr2_or_gpa, error_code, iterator.sptep,
                           spte, fault_handled);

    static bool try_async_pf(struct kvm_vcpu *vcpu, bool prefault, gfn_t gfn,
                              gva_t gva, kvm_pfn_t *pfn, bool write, bool *writable);
    static int make_mmu_pages_available(struct kvm_vcpu *vcpu);

    static int nonpaging_map(struct kvm_vcpu *vcpu, gpa_t gpa, u32 error_code,
                              gfn_t gfn, bool prefault)
    {

int r;
int level;
-bool force_pt_level = false;
+bool force_pt_level;
kvm_pfn_t pfn;
unsigned long mmu_seq;
bool map_writable, write = error_code & PFERR_WRITE_MASK;
+bool lpage_disallowed = (error_code & PFERR_FETCH_MASK) &&
+is_nx_huge_page_enabled();
+force_pt_level = lpage_disallowed;
level = mapping_level(vcpu, gfn, &force_pt_level);
if (likely(!force_pt_level)) {
/*
  @ @ -3298.34 +3485.32 @@
  gfn &=(KVM_PAGES_PER_HPAGE(level) - 1);
*/

-if (fast_page_fault(vcpu, v, level, error_code))
+if (fast_page_fault(vcpu, gpa, level, error_code))
  return RET_PF_RETRY;

mmu_seq = vcpu->kvm->mmu_notifier_seq;
smp_rmb();

-if (try_async_pf(vcpu, prefault, gfn, &pfn, write, &map_writable))
+if (try_async_pf(vcpu, prefault, gfn, gpa, &pfn, write, &map_writable))
  return RET_PF_RETRY;

-if (handle_abnormal_pfn(vcpu, v, gfn, pfn, ACC_ALL, &r))
+if (handle_abnormal_pfn(vcpu, gpa, gfn, pfn, ACC_ALL, &r))
  return r;

+r = RET_PF_RETRY;
spin_lock(&vcpu->kvm->mmu_lock);
if (mmu_notifier_retry(vcpu->kvm, mmu_seq))
goto out_unlock;
if (make_mmu_pages_available(vcpu) < 0)
goto out_unlock;
if (likely(!force_pt_level))
-transparent_hugepage_adjust(vcpu, &gfn, &pfn, &level);
-r = __direct_map(vcpu, write, map_writable, level, gfn, pfn, prefault);
-spin_unlock(&vcpu->kvm->mmu_lock);
-
-return r;
-
+transparent_hugepage_adjust(vcpu, gfn, &pfn, &level);
+r = __direct_map(vcpu, gpa, write, map_writable, level, pfn,
+ prefault, false);
out_unlock:
spin_unlock(&vcpu->kvm->mmu_lock);
kvm_release_pfn_clean(pfn);
-return RET_PF_RETRY;
+return r;
}

@@ -3575,7 +3760,7 @@
}]
EXPORT_SYMBOL_GPL(kvm_mmu_sync_roots);

-static gpa_t nonpaging_gva_to_gpa(struct kvm_vcpu *vcpu, gva_t vaddr,
+static gpa_t nonpaging_gva_to_gpa(struct kvm_vcpu *vcpu, gpa_t vaddr,
    u32 access, struct x86_exception *exception)
{
    if (exception)
@@ -3583,7 +3768,7 @@
        return vaddr;
    }

-static gpa_t nonpaging_gva_to_gpa_nested(struct kvm_vcpu *vcpu, gva_t vaddr,
+static gpa_t nonpaging_gva_to_gpa_nested(struct kvm_vcpu *vcpu, gpa_t vaddr,
    u32 access,
    struct x86_exception *exception)
{
    @@ -3744,13 +3929,14 @@
        walk_shadow_page_lockless_end(vcpu);
    }

-static int nonpaging_page_fault(struct kvm_vcpu *vcpu, gva_t gva,
+static int nonpaging_page_fault(struct kvm_vcpu *vcpu, gpa_t gpa,
    u32 error_code, bool prefault)
{
    gfn_t gfn = gva >> PAGE_SHIFT;
+gfn_t gfn = gpa >> PAGE_SHIFT;
    int r;

    -pgprintf("%s: gva %lx error %x\n", __func__, gva, error_code);
    +/* Note, paging is disabled, ergo gva == gpa. */
    +pgprintf("%s: gva %lx error %x\n", __func__, gpa, error_code);

    if (page_fault_handle_page_track(vcpu, error_code, gfn))
        return RET_PF_EMULATE;
@@ -3762,11 +3948,12 @@
        MMU_WARN_ON(!VALID_PAGE(vcpu->arch.mmu.root_hpa));
-static int kvm_arch_setup_async_pf(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa, gfn_t gfn) {
    struct kvm_arch_async_pf arch;

    arch.direct_map = vcpu->arch.mmu.direct_map;
    arch.cr3 = vcpu->arch.mmu.get_cr3(vcpu);

    -return kvm_setup_async_pf(vcpu, gva, kvm_vcpu_gfn_to_hva(vcpu, gfn), &arch);
    +return kvm_setup_async_pf(vcpu, cr2_or_gpa, kvm_vcpu_gfn_to_hva(vcpu, gfn), &arch);
    }

bool kvm_can_do_async_pf(struct kvm_vcpu *vcpu) {
    static bool try_async_pf(struct kvm_vcpu *vcpu, bool prefault, gfn_t gfn, gva_t gva, kvm_pfn_t *pfn, bool write, bool *writable) {
        struct kvm_memory_slot *slot;
        bool async;
    }

    if (!prefault && kvm_can_do_async_pf(vcpu)) {
        -trace_kvm_try_async_get_page(gva, gfn);
        +trace_kvm_try_async_get_page(cr2_or_gpa, gfn);
        if (kvm_find_async_pf_gfn(vcpu, gfn)) {
            -trace_kvm_async_pf_doublefault(gva, gfn);
            +trace_kvm_async_pf_doublefault(cr2_or_gpa, gfn);
            kvm_make_request(KVM_REQ_APF_HALT, vcpu);
            return true;
        } else if (kvm_arch_setup_async_pf(vcpu, gva, gfn))
            +} else if (kvm_arch_setup_async_pf(vcpu, cr2_or_gpa, gfn))
            return true;
    }

@@ -3822,6 +4011,13 @@
{
    int r = 1;

+#ifndef CONFIG_X86_64
+/* A 64-bit CR2 should be impossible on 32-bit KVM. */
+if (WARN_ON_ONCE(fault_address >> 32))
+return -EFAULT;
+endif
+
+vcpu->arch.lltf_flush_l1d = true;
switch (vcpu->arch.apf.host_apf_reason) {
  default:
    trace_kvm_page_fault(fault_address, error_code);
    @@ -3858,7 +4054,7 @@
    return kvm_mtrr_check_gfn_range_consistency(vcpu, gfn, page_num);
  }

-static int tdp_page_fault(struct kvm_vcpu *vcpu, gva_t gpa, u32 error_code,
-static int tdp_page_fault(struct kvm_vcpu *vcpu, gpa_t gpa, u32 error_code,
  bool prefault)
  {
    kvm_pfn_t pfn;
    @@ -3869,6 +4065,8 @@
    unsigned long mmu_seq;
    int write = error_code & PFERR_WRITE_MASK;
    bool map_writable;
+    bool lpage_disallowed = (error_code & PFERR_FETCH_MASK) &&
+    !is_nx_huge_page_enabled();

    MMU_WARN_ON(!VALID_PAGE(vcpu->arch.mmu.root_hpa));

    @@ -3879,22 +4100,20 @@
    if (r)
      return r;

    -force_pt_level = !check_hugepage_cache_consistency(vcpu, gfn,
    -    PT_DIRECTORY_LEVEL);
    +force_pt_level =
    +lpage_disallowed ||
    +!check_hugepage_cache_consistency(vcpu, gfn, PT_DIRECTORY_LEVEL);
    level = mapping_level(vcpu, gfn, &force_pt_level);
    if (likely(!force_pt_level)) {
      if (level > PT_DIRECTORY_LEVEL &&
        @@ -3901,22 +4100,20 @@
        if (handle_abnormal_pfn(vcpu, 0, gfn, pfn, ACC_ALL, &r))
          return r;
}
+r = RET_PF_RETRY;
spin_lock(&vcpu->kvm->mmu_lock);
if (mmu_notifier_retry(vcpu->kvm, mmu_seq))
goto out_unlock;
if (make_mmu_pages_available(vcpu) < 0)
goto out_unlock;
if (likely(!force_pt_level))
- transparent_hugepage_adjust(vcpu, &gfn, &pfn, &level);
- r = __direct_map(vcpu, write, map_writable, level, gfn, pfn, prefault);
- spin_unlock(&vcpu->kvm->mmu_lock);
-
- return r;
-
+ transparent_hugepage_adjust(vcpu, gfn, &pfn, &level);
+ r = __direct_map(vcpu, gpa, write, map_writable, level, pfn,
+ prefault, lpage_disallowed);
out_unlock:
spin_unlock(&vcpu->kvm->mmu_lock);
kvm_release_pfn_clean(pfn);
- return RET_PF_RETRY;
+ return r;
}

static void nonpaging_init_context(struct kvm_vcpu *vcpu,
@@ -4069,7 +4266,7 @@
nonleaf_bit8_rsvd | rsvd_bits(7, 7) |
rsvd_bits(maxphyaddr, 51);
rsvd_check->rsvd_bits_mask[0][2] = exb_bit_rsvd |
-rsvd_bits(maxphyaddr, maxphyaddr, 51);
-rsvd_check->rsvd_bits_mask[0][1] = exb_bit_rsvd |
+gbpages_bit_rsvd |
+gbpages_bit_rsvd |
rsvd_bits(maxphyaddr, 51);
rsvd_check->rsvd_bits_mask[0][1] = exb_bit_rsvd |
rsvd_bits(maxphyaddr, 51);
@@ -4151,7 +4348,16 @@
reset_shadow_zero_bits_mask(struct kvm_vcpu *vcpu, struct kvm_mmu *context)
{
-bool uses_nx = context->nx || context->base_role.sme_andnot_wp;
+ /*
+ * KVM uses NX when TDP is disabled to handle a variety of scenarios,
+ * notably for huge SPTEs if iTLB multi-hit mitigation is enabled and
+ * to generate correct permissions for CR0.WP=0/CR4.SMEP=1/EFER.NX=0.
+ * The iTLB multi-hit workaround can be toggled at any time, so assume
+ * NX can be used by any non-nested shadow MMU to avoid having to reset
+ * MMU contexts. Note, KVM forces EFER.NX=1 when TDP is disabled.
+ */
+bool uses_nx = context->nx || !tdp_enabled ||
+context->base_role.sme_andnot_wp;
struct rsvd_bits_validate *shadow_zero_check;
int i;

@@ -4161,7 +4367,7 @@
    *shadow_zero_check;
    __reset_rsvds_bits_mask(vcpu, shadow_zero_check,
    -boot_cpu_data.x86_phys_bits,
    +shadow_phys_bits,
    context->shadow_root_level, uses_nx,
    guest_cpuid_has(vcpu, X86_FEATURE_GBPAGES),
    is_pse(vcpu), true);
@@ -4198,13 +4404,13 @@
    if (boot_cpu_is_amd())
    __reset_rsvds_bits_mask(vcpu, shadow_zero_check,
    -boot_cpu_data.x86_phys_bits,
    +shadow_phys_bits,
    context->shadow_root_level, false,
    boot_cpu_has(X86_FEATURE_GBPAGES),
    true, true);
    else
    __reset_rsvds_bits_mask_ept(shadow_zero_check,
    -boot_cpu_data.x86_phys_bits,
    +shadow_phys_bits,
        false);

    if (!shadow_me_mask)
@@ -4225,7 +4431,7 @@
    struct kvm_mmu *context, bool execonly)
    {
    __reset_rsvds_bits_mask_ept(&context->shadow_zero_check,
    -boot_cpu_data.x86_phys_bits, execonly);
    +shadow_phys_bits, execonly);
    }

#define BYTE_MASK(access) \
@@ -4260,11 +4466,11 @@

    /* Faults from writes to non-writable pages */
    -u8 wf = (pfec & PFERR_WRITE_MASK) ? ~w : 0;
    +u8 wf = (pfec & PFERR_WRITE_MASK) ? (u8)~w : 0;
    /* Faults from user mode accesses to supervisor pages */
    -u8 uf = (pfec & PFERR_USER_MASK) ? ~u : 0;
    +u8 uf = (pfec & PFERR_USER_MASK) ? (u8)~u : 0;
    /* Faults from fetches of non-executable pages*/
    -u8 ff = (pfec & PFERR_FETCH_MASK) ? ~x : 0;

u8 ff = (pfec & PFERR_FETCH_MASK) ? (u8)~x : 0;
/* Faults from kernel mode fetches of user pages */
u8 smepf = 0;
/* Faults from kernel mode accesses of user pages */
@@ -4681,9 +4887,9 @@

}

static u64 mmu_pte_write_fetch_gpte(struct kvm_vcpu *vcpu, gpa_t *gpa,
   const u8 *new, int *bytes)
{
    u64 gentry = 0;
    int r;

    /*
    @@ -4695,22 +4901,12 @@
    /* Handle a 32-bit guest writing two halves of a 64-bit gppte */
    *gpa &= ~(gpa_t)7;
    *bytes = 8;
    -r = kvm_vcpu_read_guest(vcpu, *gpa, &gentry, 8);
    -if (r)
    -gentry = 0;
    -new = (const u8 *)&gentry;
    }

    -switch (*bytes) {
    -case 4:
    -gentry = *(const u32 *)new;
    -break;
    -case 8:
    -gentry = *(const u64 *)new;
    -break;
    -default:
    -gentry = 0;
    -break;
    +if (*bytes == 4 || *bytes == 8) {
    +r = kvm_vcpu_read_guest_atomic(vcpu, *gpa, &gentry, *bytes);
    +if (r)
    +gentry = 0;
    }

    return gentry;
    @@ -4823,8 +5019,6 @@

    pgprintk("%s: gpa %llx bytes %d
", __func__, gpa, bytes);

    -gentry = mmu_pte_write_fetch_gpte(vcpu, &gpa, new, &bytes);


/*
 * No need to care whether allocation memory is successful
 * or not since pte prefetch is skiped if it does not have
@@ -4833,6 +5027,9 @@
 mmu_topup_memory_caches(vcpu);

 spin_lock(&vcpu->kvm->mmu_lock);
+  gentry = mmu_pte_write_fetch_gpte(vcpu, &gpa, &bytes);
++vcpu->kvm->stat.mmu_pte_write;
      kvm_mmu_audit(vcpu, AUDIT_PRE_PTE_WRITE);

@@ -4902,7 +5099,7 @@
 return 0;
 }

-int kvm_mmu_page_fault(struct kvm_vcpu *vcpu, gva_t cr2, u64 error_code,
+int kvm_mmu_page_fault(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa, u64 error_code,
   void *insn, int insn_len)
 {
   int r, emulation_type = EMULTYPE_RETRY;
@@ -4912,12 +5109,12 @@
 /* With shadow page tables, fault_address contains a GVA or nGPA. */
 if (vcpu->arch.mmu.direct_map) {
     vcpu->arch.gpa_available = true;
-vcpu->arch.gpa_val = cr2;
+  vcpu->arch.gpa_val = cr2_or_gpa;
 }

 r = RET_PF_INVALID;
 if (unlikely(error_code & PFERR_RSVD_MASK)) {
   -r = handle_mmio_page_fault(vcpu, cr2, direct);
+  r = handle_mmio_page_fault(vcpu, cr2_or_gpa, direct);
 if (r == RET_PF_EMULATE) {
     emulation_type = 0;
 goto emulate;
@@ -4925,8 +5122,9 @@
 }

 if (r == RET_PF_INVALID) {
   -r = vcpu->arch.mmu.page_fault(vcpu, cr2, lower_32_bits(error_code),
-    false);
+  r = vcpu->arch.mmu.page_fault(vcpu, cr2_or_gpa,
+    lower_32_bits(error_code),
+    false);
      WARN_ON(r == RET_PF_INVALID);
if (vcpu->arch.mmu.direct_map &&
    (error_code & PFERR_NESTED_GUEST_PAGE) == PFERR_NESTED_GUEST_PAGE) {
    kvm_mmu_unprotect_page(vcpu->kvm, gpa_to_gfn(cr2));
    kvm_mmu_unprotect_page(vcpu->kvm, gpa_to_gfn(cr2_or_gpa));
    return 1;
}

if (mmio_info_in_cache(vcpu, cr2, direct))
+if (mmio_info_in_cache(vcpu, cr2_or_gpa, direct))
emulation_type = 0;
emulate:
-er = x86_emulate_instruction(vcpu, cr2, emulation_type, insn, insn_len);
+/*
 * On AMD platforms, under certain conditions insn_len may be zero on #NPF.
 * This can happen if a guest gets a page-fault on data access but the HW
 * table walker is not able to read the instruction page (e.g instruction
 * page is not present in memory). In those cases we simply restart the
 * guest.
 * */
+if (unlikely(insn && !insn_len))
+return 1;
+
+er = x86_emulate_instruction(vcpu, cr2_or_gpa, emulation_type, insn, insn_len);

switch (er) {
case EMULATE_DONE:
    @ @ -5058,7 +5266,7 @@
typedef bool (*slot_level_handler) (struct kvm *kvm, struct kvm_rmap_head *rmap_head);

    /* The caller should hold mmu-lock before calling this function. */
    -static bool
    +static __always_inline bool
    slot_handle_level_range(struct kvm *kvm, struct kvm_memory_slot *memslot,
        slot_level_handler fn, int start_level, int end_level,
        gfn_t start_gfn, gfn_t end_gfn, bool lock_flush_tlb)
    @ @ -5088,7 +5296,7 @@
    return flush;
}

    -static bool
    +static __always_inline bool
    slot_handle_level(struct kvm *kvm, struct kvm_memory_slot *memslot,
        slot_level_handler fn, int start_level, int end_level,
        bool lock_flush_tlb)
static bool
+static __always_inline bool
slot_handle_all_level(struct kvm *kvm, struct kvm_memory_slot *memslot,
    slot_level_handler fn, bool lock_flush_tlb)
{


PT_MAX_HUGEPAGE_LEVEL, lock_flush_tlb);
}

static bool
+static __always_inline bool
slot_handle_large_level(struct kvm *kvm, struct kvm_memory_slot *memslot,
    slot_level_handler fn, bool lock_flush_tlb)
{

PT_MAX_HUGEPAGE_LEVEL, lock_flush_tlb);
}

static bool
+static __always_inline bool
slot_handle_leaf(struct kvm *kvm, struct kvm_memory_slot *memslot,
    slot_level_handler fn, bool lock_flush_tlb)
{

/*
 * the guest, and the guest page table is using 4K page size
 * mapping if the indirect sp has level = 1.
 */
-if (sp->role.direct &&
    !kvm_is_reserved_pfn(pfn) &&
    PageTransCompoundMap(pfn_to_page(pfn))) {
+if (sp->role.direct && !kvm_is_reserved_pfn(pfn) &&
    !kvm_is_zone_device_pfn(pfn) &&
    !PageTransCompoundMap(pfn_to_page(pfn))) {
    drop_spte(kvm, sptep);
    need_tlb_flush = 1;
goto restart;

return unlikely(!list_empty_careful(&kvm->arch.zapped_obsolete_pages));
}

-void kvm_mmu_invalidate_mmio_sptes(struct kvm *kvm, struct kvm_memslots *slots)
+void kvm_mmu_invalidate_mmio_sptes(struct kvm *kvm, u64 gen)
{
+gen &= MMIO_GEN_MASK;
+ /*
+ * Shift to eliminate the "update in-progress" flag, which isn't
+ * included in the spte's generation number.
+ */
+ gen >>= 1;
+
/ *
- * The very rare case: if the generation-number is round,
+ * Generation numbers are incremented in multiples of the number of
+ * address spaces in order to provide unique generations across all
+ * address spaces. Strip what is effectively the address space
+ * modifier prior to checking for a wrap of the MMIO generation so
+ * that a wrap in any address space is detected.
+ */
+ gen &= ~((u64)KVM_ADDRESS_SPACE_NUM - 1);
+
+ /*
+ * The very rare case: if the MMIO generation number has wrapped,
+ * zap all shadow pages.
+ */
- if (unlikely((slots->generation & MMIO_GEN_MASK) == 0)) {
+ if (unlikely(gen == 0)) {
    kvm_debug_ratelimited("kvm: zapping shadow pages for mmio generation wraparound\n");
kvm_mmu_invalidate_zap_all_pages(kvm);
    }
@@ -5392,7 +5617,7 @@
 int nr_to_scan = sc->nr_to_scan;
 unsigned long freed = 0;

- spin_lock(&kvm_lock);
+ mutex_lock(&kvm_lock);

 list_for_each_entry(kvm, &vm_list, vm_list) {
    int idx;
@@ -5442,7 +5667,7 @@
     break;
 }

- spin_unlock(&kvm_lock);
+ mutex_unlock(&kvm_lock);
 return freed;
 }

@@ -5464,11 +5689,82 @@
 kmem_cache_destroy(mmu_page_header_cache);
}
static bool get_nx_auto_mode(void)
{ /* Return true when CPU has the bug, and mitigations are ON */
  return boot_cpu_has_bug(X86_BUG_ITLB_MULTIHIT) && !cpu_mitigations_off();
}

static void __set_nx_huge_pages(bool val)
{
  nx_huge_pages = itlb_multihit_kvm_mitigation = val;
}

static int set_nx_huge_pages(const char *val, const struct kernel_param *kp)
{
  bool old_val = nx_huge_pages;
  bool new_val;

  /* In "auto" mode deploy workaround only if CPU has the bug. */
  if (sysfs_streq(val, "off"))
    new_val = 0;
  else if (sysfs_streq(val, "force"))
    new_val = 1;
  else if (sysfs_streq(val, "auto"))
    new_val = get_nx_auto_mode();
  else if (strtobool(val, &new_val) < 0)
    return -EINVAL;

  __set_nx_huge_pages(new_val);

  if (new_val != old_val) {
    struct kvm *kvm;
    int idx;

    mutex_lock(&kvm_lock);
    list_for_each_entry(kvm, &vm_list, vm_list) {
      idx = srcu_read_lock(&kvm->srcu);
      kvm_mmu_invalidate_zap_all_pages(kvm);
      srcu_read_unlock(&kvm->srcu, idx);

      wake_up_process(kvm->arch.nx_lpage_recovery_thread);
    }
    mutex_unlock(&kvm_lock);
  }

  return 0;
}

static void kvm_set_mmio_spte_mask(void)
+{
+u64 mask;
+
+/*
+ * Set a reserved PA bit in MMIO SPTEs to generate page faults with
+ * PFEC.RSVD=1 on MMIO accesses. 64-bit PTEs (PAE, x86-64, and EPT
+ * paging) support a maximum of 52 bits of PA, i.e. if the CPU supports
+ * 52-bit physical addresses then there are no reserved PA bits in the
+ * PTEs and so the reserved PA approach must be disabled.
+ */
+if (shadow_phys_bits < 52)
+  mask = BIT_ULL(51) | PT_PRESENT_MASK;
+else
+  mask = 0;
+
+kvm_mmu_set_mmio_sppte_mask(mask, mask);
+}
+
int kvm_mmu_module_init(void)
{
  int ret = -ENOMEM;

-kvm_mmu_clear_all_pte_masks();
+if (nx_huge_pages == -1)
+  __set_nx_huge_pages(get_nx_auto_mode());
+
+kvm_mmu_reset_all_pte_masks();
+
+kvm_set_mmio_sppte_mask();

pte_list_desc_cache = kmem_cache_create("pte_list_desc",
    sizeof(struct pte_list_desc),
@@ -5499,10 +5795,10 @@

/*
 * Caculate mmu pages needed for kvm.
 */
-unsigned int kvm_mmu_calculate_mmu_pages(struct kvm *kvm)
+unsigned long kvm_mmu_calculate_mmu_pages(struct kvm *kvm)
{
  -unsigned int nr_mmu_pages;
  -unsigned int  nr_pages = 0;
  +unsigned long nr_mmu_pages;
  +unsigned long nr_pages = 0;
  struct kvm_memslots *slots;
  struct kvm_memory_slot *memslot;
  int i;
@@ -5515,8 +5811,7 @@
nr_mmu_pages = nr_pages * KVM_PERMILLE_MMU_PAGES / 1000;
-nr_mmu_pages = max(nr_mmu_pages,
-    (unsigned int) KVM_MIN_ALLOC_MMU_PAGES);
+nr_mmu_pages = max(nr_mmu_pages, KVM_MIN_ALLOC_MMU_PAGES);

return nr_mmu_pages;
}
@@ -5535,3 +5830,117 @@
unregister_shrinker(&mmu_shrinker);
mmu_audit_disable();
} +
+static int set_nx_huge_pages_recovery_ratio(const char *val, const struct kernel_param *kp)
+{
+    unsigned int old_val;
+    int err;
+    +old_val = nx_huge_pages_recovery_ratio;
+    +err = param_set_uint(val, kp);
+    +if (err)
+        +return err;
+    +if (READ_ONCE(nx_huge_pages) &&
+        +!old_val && nx_huge_pages_recovery_ratio) {
+        +struct kvm *kvm;
+        +mutex_lock(&kvm_lock);
+        +list_for_each_entry(kvm, &vm_list, vm_list)
+            +wake_up_process(kvm->arch.nx_lpage_recovery_thread);
+        +mutex_unlock(&kvm_lock);
+    }
+    +return err;
+}
+static void kvm_recover_nx_lpages(struct kvm *kvm)
+{
+    +int rcu_idx;
+    +struct kvm_mmu_page *sp;
+    +unsigned int ratio;
+    +LIST_HEAD(invalid_list);
+    +ulong to_zap;
+    +rcu_idx = srcu_read_lock(&kvm->srcu);
+    +spin_lock(&kvm->mmu_lock);
+ratio = READ_ONCE(nx_huge_pages_recovery_ratio);
+to_zap = ratio ? DIV_ROUND_UP(kvm->stat.nx_lpage_splits, ratio) : 0;
+while (to_zap && !list_empty(&kvm->arch.lpage_disallowed_mmu_pages)) {
+  /*
+   * We use a separate list instead of just using active_mmu_pages
+   * because the number of lpage_disallowed pages is expected to
+   * be relatively small compared to the total.
+   */
+  sp = list_first_entry(&kvm->arch.lpage_disallowed_mmu_pages,
+    struct kvm_mmu_page,
+    lpage_disallowed_link);
+  WARN_ON_ONCE(!sp->lpage_disallowed);
+  kvm_mmu_prepare_zap_page(kvm, sp, &invalid_list);
+  WARN_ON_ONCE(sp->lpage_disallowed);
+  if (!--to_zap || need_resched() || spin_needbreak(&kvm->mmu_lock)) {
+    kvm_mmu_commit_zap_page(kvm, &invalid_list);
+    if (to_zap)
+      cond_resched_lock(&kvm->mmu_lock);
+  }
+  kvm_mmu_commit_zap_page(kvm, &invalid_list);
+  spin_unlock(&kvm->mmu_lock);
+  srcu_read_unlock(&kvm->srcu, rcu_idx);
+}
+
+static long get_nx_lpage_recovery_timeout(u64 start_time)
+{ return READ_ONCE(nx_huge_pages) && READ_ONCE(nx_huge_pages_recovery_ratio)
+  ? start_time + 60 * HZ - get_jiffies_64()
+  : MAX_SCHEDULE_TIMEOUT;
+}
+
+static int kvm_nx_lpage_recovery_worker(struct kvm *kvm, uintptr_t data)
+{ u64 start_time;
+long remaining_time;
+while (true) {
+  start_time = get_jiffies_64();
+  remaining_time = get_nx_lpage_recovery_timeout(start_time);
+  set_current_state(TASK_INTERRUPTIBLE);
+  while (!kthread_should_stop() && remaining_time > 0) {
+    schedule_timeout(remaining_time);
+    remaining_time = get_nx_lpage_recovery_timeout(start_time);
+set_current_state(TASK_INTERRUPTIBLE);
+
+set_current_state(TASK_RUNNING);
+
+if (kthread_should_stop())
+return 0;
+
+kvm_recover_nx_lpages(kvm);
+

+int kvm_mmu_post_init_vm(struct kvm *kvm)
+{
+int err;
+
+err = kvm_vm_create_worker_thread(kvm, kvm_nx_lpage_recovery_worker, 0,
+ "kvm-nx-lpage-recovery",
+ &kvm->arch.nx_lpage_recovery_thread);
+if (!err)
+kthread_unpark(kvm->arch.nx_lpage_recovery_thread);
+
+return err;
+}
+
+void kvm_mmu_pre_destroy_vm(struct kvm *kvm)
+{
+if (kvm->arch.nx_lpage_recovery_thread)
+kthread_stop(kvm->arch.nx_lpage_recovery_thread);
+}

--- linux-4.15.0.orig/arch/x86/kvm/mmu.h
+++ linux-4.15.0/arch/x86/kvm/mmu.h
@@ -53,7 +53,7 @@
if (e < s)
return 0;

-RETURN ((1ULL << (e - s + 1)) - 1) << s;
+return ((2ULL << (e - s)) - 1) << s;
 }

void kvm_mmu_set_mmio_spte_mask(u64 mmio_mask, u64 mmio_value);
@@ -68,7 +68,7 @@
int kvm_handle_page_fault(struct kvm_vcpu *vcpu, u64 error_code,
u64 fault_address, char *insn, int insn_len);

-static inline unsigned int kvm_mmu_available_pages(struct kvm *kvm)
+static inline unsigned long kvm_mmu_available_pages(struct kvm *kvm)
{
if (kvm->arch.n_max_mmu_pages > kvm->arch.n_used_mmu_pages)
return kvm->arch.n_max_mmu_pages -
@@ -193,5 +193,9 @@
void kvm_mmu_gfn_allow_lpage(struct kvm_memory_slot *slot, gfn_t gfn);
bool kvm_mmu_slot_gfn_write_protect(struct kvm *kvm,
   struct kvm_memory_slot *slot, u64 gfn);
-int kvm_arch_write_log_dirty(struct kvm_vcpu *vcpu);
+int kvm_arch_write_log_dirty(struct kvm_vcpu *vcpu, gpa_t l2_gpa);
 +
+int kvm_mmu_post_init_vm(struct kvm *kvm);
+void kvm_mmu_pre_destroy_vm(struct kvm *kvm);
+
#endif
--- linux-4.15.0.orig/arch/x86/kvm/mmutrace.h
+++ linux-4.15.0/arch/x86/kvm/mmutrace.h
@@ -249,13 +249,13 @@
TRACE_EVENT(
 fast_page_fault,
 -TP_PROTO(struct kvm_vcpu *vcpu, gva_t gva, u32 error_code,
 +TP_PROTO(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa, u32 error_code,
   u64 *sptep, u64 old_spte, bool retry),
 -TP_ARGS(vcpu, gva, error_code, sptep, old_spte, retry),
 +TP_ARGS(vcpu, cr2_or_gpa, error_code, sptep, old_spte, retry),

 TP_STRUCT__entry(
 __field(int, vcpu_id)
-__field(gva_t, gva)
+__field(gpa_t, cr2_or_gpa)
 __field(u32, error_code)
 __field(u64 *, sptep)
 __field(u64, old_spte)
@@ -265,7 +265,7 @@
 TP_fast_assign(
 __entry->vcpu_id = vcpu->vcpu_id;
-__entry->gva = gva;
+__entry->cr2_or_gpa = cr2_or_gpa;
 __entry->error_code = error_code;
 __entry->sptep = sptep;
 __entry->old_spte = old_spte;
@@ -273,9 +273,9 @@
 __entry->retry = retry;
 ).

 -TP_printk("vcpu %d gva %lx error_code %s sptep %p old %#llx"
+TP_printk("vcpu %d gva %llx error_code %s sptep %p old %#llx"
 " new %llx spurious %d fixed %d", __entry->vcpu_id,
__entry->gva, __print_flags(__entry->error_code, "|",
+kvm_mmu_trace_pferr_flags), __entry->sptep,
+__entry->old_spte, __entry->new_spte,
+__spte_satisfied(old_spte), __spte_satisfied(new_spte)
@@ -325,6 +325,65 @@
+__entry->kvm_gen == __entry->spte_gen
+);
+
+TRACE_EVENT(  
+kvm_mmu_set_spte,
+TP_PROTO(int level, gfn_t gfn, u64 *sptep),
+TP_ARGS(level, gfn, sptep),  
+
+TP_STRUCT__entry(  
+__field(u64, gfn)  
+__field(u64, spte)  
+__field(u64, sptep)  
+__field(u8, level)
+/* These depend on page entry type, so compute them now. */  
+__field(bool, r)
+__field(bool, x)  
+__field(signed char, u)  
+),  
+
+TP_fast_assign(  
+__entry->gfn = gfn;  
+__entry->spte = *sptep;  
+__entry->sptep = virt_to_phys(sptep);  
+__entry->level = level;  
+__entry->r = shadow_present_mask || (__entry->spte & PT_PRESENT_MASK);  
+__entry->x = is_executable_pte(__entry->spte);  
+__entry->u = shadow_user_mask ? !!(__entry->spte & shadow_user_mask) : -1;  
+),  
+
+TP_printk("gfn %llx spte %llx (%s%s%s%s) level %d at %llx",  
+__entry->gfn, __entry->spte, __entry->sptep,  
+__entry->r ? "r" : ":",  
+__entry->spte & PT_WRITABLE_MASK ? "w" : ":",  
+__entry->x ? "x" : ":",  
+__entry->u == -1 ? ":" : (__entry->u ? "u" : ":"),  
+__entry->level, __entry->sptep  
+);  
+
+TRACE_EVENT(  
+kvm_mmu_spte_requested,
+TP_PROTO(gpa_t addr, int level, kvm_pfn_t pfn),
+TP_ARGS(addr, level, pfn),
+ +TP_STRUCT__entry(
+ __field(u64, gfn)
+ __field(u64, pfn)
+ __field(u8, level)
+ ),
+ +
+TP_fast_assign(
+ __entry->gfn = addr >> PAGE_SHIFT;
+ __entry->pfn = pfn | (__entry->gfn & (KVM_PAGES_PER_HPAGE(level) - 1));
+ __entry->level = level;
+ ),
+ +
+TP_printk("gfn %llx pfn %llx level %d",
+ __entry->gfn, __entry->pfn, __entry->level
+ )
+ );
+ +
+#endif /* _TRACE_KVMMMU_H */

#undef TRACE_INCLUDE_PATH
--- linux-4.15.0.orig/arch/x86/kvm/mtrr.c
+++ linux-4.15.0/arch/x86/kvm/mtrr.c
@@ -48,11 +48,6 @@
return false;
}
-
-
static bool valid_mtrr_type(unsigned t)
{
    return t < 8 && (1 << t) & 0x73; /* 0, 1, 4, 5 */
}
-
-
static bool valid_mtrr_type(unsigned t)
{
    return t < 8 && (1 << t) & 0x73; /* 0, 1, 4, 5 */
    @ @ -67,10 +62,7 @@
return false;

if (msr == MSR_IA32_CR_PAT) {
    -for (i = 0; i < 8; i++)
    -if (!valid_pat_type((data >> (i * 8)) & 0xff))
    -return false;
    -return true;
    +return kvm_pat_valid(data);
} else if (msr == MSR_MTRRdefType) {
    if (data & ~0xcff)
return false;
@@ -202,11 +194,15 @@
break;
case MSR_MTRRfix16K_80000 ... MSR_MTRRfix16K_A0000:
  *seg = 1;
  -*unit = msr - MSR_MTRRfix16K_80000;
  +*unit = array_index_nospec(
  +msr - MSR_MTRRfix16K_80000,
  +MSR_MTRRfix16K_A0000 - MSR_MTRRfix16K_80000 + 1);
break;
case MSR_MTRRfix4K_C0000 ... MSR_MTRRfix4K_F8000:
  *seg = 2;
  -*unit = msr - MSR_MTRRfix4K_C0000;
  +*unit = array_index_nospec(
  +msr - MSR_MTRRfix4K_C0000,
  +MSR_MTRRfix4K_F8000 - MSR_MTRRfix4K_C0000 + 1);
break;
default:
return false;
--- linux-4.15.0.orig/arch/x86/kvm/paging_tmpl.h
+++ linux-4.15.0/arch/x86/kvm/paging_tmpl.h
@@ -36,7 +36,7 @@
#define PT_GUEST_ACCESSSED_SHIFT PT_ACCESSSED_SHIFT
#define PT_HAVE_ACCESSSED_DIRTY(mmu) true
#ifdef CONFIG_X86_64
-#define PT_MAX_FULL_LEVELS 4
+#define PT_MAX_FULL_LEVELS PT64_ROOT_MAX_LEVEL
#define CMPXCHG cmpxchg
#else
#define CMPXCHG cmpxchg64
@@ -93,8 +93,8 @@
gpa_t pte_gpa[PT_MAX_FULL_LEVELS];
 pt_element_t __user *ptep_user[PT_MAX_FULL_LEVELS];
 bool pte_writable[PT_MAX_FULL_LEVELS];
-unsigned pt_access;
-unsigned pte_access;
+unsigned int pt_access[PT_MAX_FULL_LEVELS];
+unsigned int pte_access;
gfn_t gfn;
struct x86_exception fault;
};
@@ -181,7 +181,7 @@
* set bit 0 if execute only is supported. Here, we repurpose ACC_USER_MASK
* to signify readability since it isn't used in the EPT case
*/
-static inline unsigned FNAME(gpte_access)(struct kvm_vcpu *vcpu, u64 gpte)
+static inline unsigned FNAME(gpte_access)(u64 gpte) 
{
unsigned access;
#if PTTYPE == PTTYPE_EPT
@@ -202,7 +202,7 @@
static int FNAME(update_accessed_dirty_bits)(struct kvm_vcpu *vcpu,
    struct kvm_mmu *mmu,
    struct guest_walker *walker,
-    int write_fault)
+    gpa_t addr, int write_fault)
{

    unsigned level, index;
    pt_element_t pte, orig_pte;
@@ -227,7 +227,7 @@
    !(pte & PT_GUEST_DIRTY_MASK)) {
        trace_kvm_mmu_set_dirty_bit(table_gfn, index, sizeof(pte));
        #if PTTYPE == PTTYPE_EPT
-            if (kvm_arch_write_log_dirty(vcpu))
+            if (kvm_arch_write_log_dirty(vcpu, addr))
                return -EINVAL;
        #endif

        pte |= PT_GUEST_DIRTY_MASK;
    }

/*
- * Fetch a guest pte for a guest virtual address
+ * Fetch a guest pte for a guest virtual address, or for an L2's GPA.
 */
static int FNAME(walk_addr_generic)(struct guest_walker *walker,
    struct kvm_vcpu *vcpu, struct kvm_mmu *mmu,
    gva_t addr, u32 access)
{
    int ret;
    pt_element_t pte;
@@ -388,14 +388,16 @@
}

walker->ptes[walker->level - 1] = pte;
+
+ /* Convert to ACC_*_MASK flags for struct guest_walker. */
+walker->pt_access[walker->level - 1] = FNAME(gpte_access)(pt_access ^ walk_nx_mask);
} while (!is_last_gpte(mmu, walker->level, pte));

pte_pkey = FNAME(gpte_pkeys)(vcpu, pte);
accessed_dirty = have_ad ? pte_access & PT_GUEST_ACCESSED_MASK : 0;

/* Convert to ACC_*_MASK flags for struct guest_walker. */
-walker->pt_access = FNAME(gpte_access)(vcpu, pt_access ^ walk_nx_mask);
-walker->pte_access = FNAME(gpte_access)(vcpu, pte_access ^ walk_nx_mask);
+walker->pte_access = FNAME(gpte_access)(pte_access ^ walk_nx_mask);
errcode = permission_fault(vcpu, mmu, walker->pte_access, pte_pkey, access);
if (unlikely(errcode))
goto error;
@@ -424,7 +426,8 @@
(PT_GUEST_DIRTY_SHIFT - PT_GUEST_ACCESSSED_SHIFT):

if (unlikely(!accessed_dirty)) {
- ret = FNAME(update_accessed_dirty_bits)(vcpu, mmu, walker, write_fault);
+ ret = FNAME(update_accessed_dirty_bits)(vcpu, mmu, walker, write_fault);
+addr, write_fault);
if (unlikely(ret < 0))
goto error;
else if (ret)
@@ -432,7 +435,8 @@
}

pgprintk("%s: pte %llx pte_access %x pt_access %x\n",
- __func__, (u64)pte, walker->pte_access, walker->pt_access);
+ __func__, (u64)pte, walker->pte_access, walker->pt_access[walker->level - 1]);
return 1;

error:
@@ -452,14 +456,21 @@
  * done by is_rsvd_bits_set() above.
  *
  * We set up the value of exit_qualification to inject:
- * [2:0] - Derive from [2:0] of real exit_qualification at EPT violation
+ * [2:0] - Derive from the access bits. The exit_qualification might be
+ * out of date if it is serving an EPT misconfiguration.
  * [5:3] - Calculated by the page walk of the guest EPT page tables
  * [7:8] - Derived from [7:8] of real exit_qualification
  *
  * The other bits are set to 0.
  */
if (!(errcode & PFERR_RSVD_MASK)) {
-vcpu->arch.exit_qualification &= 0x187;
+vcpu->arch.exit_qualification &= 0x180;
+if (write_fault)
+ vcpu->arch.exit_qualification |= EPT_VIOLATION_ACC_WRITE;
+if (user_fault)
+ vcpu->arch.exit_qualification |= EPT_VIOLATION_ACC_READ;
+if (fetch_fault)
+ vcpu->arch.exit_qualification |= EPT_VIOLATION_ACC_INSTR;
vcpu->arch.exit_qualification |= (pte_access & 0x7) << 3;
}
static int FNAME(walk_addr)(struct guest_walker *walker,
    struct kvm_vcpu *vcpu, gva_t addr, u32 access)
{
    return FNAME(walk_addr_generic)(walker, vcpu, &vcpu->arch.mmu, addr,
        access);
}

pgprintk("%s: gpte %llx spte %p\n", __func__, (u64)gpte, spfte);

gfn = gpte_to_gfn(gpte);
-pte_access = sp->role.access & FNAME(gpte_access)(vcpu, gpte);
+pte_access = sp->role.access & FNAME(gpte_access)(gpte);
FNAME(protect_clean_gpte)(&vcpu->arch.mmu, &pte_access, gpte);

kvm_release_pfn_clean(pfn);
return true;
}

static int FNAME(fetch)(struct kvm_vcpu *vcpu, gva_t addr,
    struct guest_walker *gw,
    int write_fault, int hlevel,
    kvm_pfn_t pfn, bool map_writable, bool prefault)
{
    struct kvm_mmu_page *sp = NULL;
    struct kvm_shadow_walk_iterator it;
    unsigned direct_access, access = gw->pt_access;
    +kvm_pfn_t pfnc, bool map_writable, bool prefault,
    +bool lpage_disallowed
    {
        struct kvm_mmu_page *sp = NULL;
        struct kvm_shadow_walk_iterator it;
        unsigned direct_access, access = gw->pt_access;
        +unsigned int direct_access, access;
        int top_level, ret;
        +gfn t gfn, base_gfn;

        direct_access = gw->pte_access;

    #endif

@@ -623,6 +637,7 @@
sp = NULL;
if (!is_shadow_present_pte(*it.sptep)) {
    table_gfn = gw->table_gfn[it.level - 2];
+    access = gw->pt_access[it.level - 2];
    sp = kvm_mmu_get_page(vcpu, table_gfn, addr, it.level-1,
        false, access);
}
@@ -638,35 +653,48 @@
link_shadow_page(vcpu, it.sptep, sp);
}

-for (;
-    shadow_walk_okay(&it) && it.level > hlevel;
-    shadow_walk_next(&it)) {
-gfn_t direct_gfn;
+/*
+ * FNAME(page_fault) might have clobbered the bottom bits of
+ * gw->gfn, restore them from the virtual address.
+ */
+gfn = gw->gfn | ((addr & PT_LVL_OFFSET_MASK(gw->level)) >> PAGE_SHIFT);
+base_gfn = gfn;
+
+trace_kvm_mmu_spte_requested(addr, gw->level, pfn);

+for (; shadow_walk_okay(&it); shadow_walk_next(&it)) {
    clear_sp_write_flooding_count(it.sptep);
    -validate_direct_spte(vcpu, it.sptep, direct_access);

    -drop_large_spte(vcpu, it.sptep);
+/*
+ * We cannot overwrite existing page tables with an NX
+ * large page, as the leaf could be executable.
+ */
+disallowed_hugepage_adjust(it, gfn, &pfn, &hlevel);

-if (is_shadow_present_pte(*it.sptep))
-    continue;
+base_gfn = gfn & ~(KVM_PAGES_PER_HPAGE(it.level) - 1);
+if (it.level == hlevel)
+    break;
+    validate_direct_spte(vcpu, it.sptep, direct_access);

-direct_gfn = gw->gfn & ~(KVM_PAGES_PER_HPAGE(it.level) - 1);
+drop_large_spte(vcpu, it.sptep);

-sp = kvm_mmu_get_page(vcpu, direct_gfn, addr, it.level-1,
- true, direct_access);
- link_shadow_page(vcpu, it.sptep, sp);
+ if (!is_shadow_present_pte(*it.sptep)) {
+ sp = kvm_mmu_get_page(vcpu, base_gfn, addr,
+ it.level - 1, true, direct_access);
+ link_shadow_page(vcpu, it.sptep, sp);
+ if (lpage_disallowed)
+ accounthuge_nx_page(vcpu->kvm, sp);
+ }
}

-clea-s_sp_write_flooding_count(it.sptep);
ret = mmu_set_spte(vcpu, it.sptep, gw->pte_access, write_fault,
- it.level, gw->gfn, pfn, prefault, map_writable);
+ it.level, base_gfn, pfn, prefault, map_writable);
FNAME(pte_prefetch)(vcpu, gw, it.sptep);

++vcpu->stat.pf_fixed;
return ret;

out_gpte_changed:
-kvm_release_pfn_clean(pfn);
return RET_PF_RETRY;
}

@ -724,7 +752,7 @
 * Returns: 1 if we need to emulate the instruction, 0 otherwise, or
 * a negative value on error.
 */
-static int FNAME(page_fault)(struct kvm_vcpu *vcpu, gva_t addr, u32 error_code,
+static int FNAME(page_fault)(struct kvm_vcpu *vcpu, gpa_t addr, u32 error_code,
 bool prefault)
{
 int write_fault = error_code & PFERR_WRITE_MASK;
 @@ -733,9 +761,11 @@
 int r;
 kvm_pfn_t pfn;
 int level = PT_PAGE_TABLE_LEVEL;
-bool force_pt_level = false;
 unsigned long mmu_seq;
 bool map_writable, is_self_change_mapping;
+bool lpage_disallowed = (error_code & PFERR_FETCH_MASK) &&
+is_nx_huge_page_enabled();
+bool force_pt_level = lpage_disallowed;

 pgprintk("%s: addr %lx err %x\n", __func__, addr, error_code);

@@ -814,6 +844,7 @@
walker.pte_access &= ~ACC_EXEC_MASK;
}

+r = RET_PF_RETRY;
spin_lock(&vcpu->kvm->mmu_lock);
if (mmu_notifier_retry(vcpu->kvm, mmu_seq))
goto out_unlock;
@@ -822,19 +853,15 @@
if (make_mmu_pages_available(vcpu) < 0)
goto out_unlock;
if (!force_pt_level)
-.transparent_hugepage_adjust(vcpu, &walker.gfn, &pfn, &level);
+transparent_hugepage_adjust(vcpu, walker.gfn, &pfn, &level);
  r = FNAME(fetch)(vcpu, addr, &walker, write_fault,
  - level, pfn, map_writable, prefault);
  ++vcpu->stat.pf_fixed;
  + level, pfn, map_writable, prefault, lpage_disallowed);
  kvm_mmu_audit(vcpu, AUDIT_POST_PAGE_FAULT);
-spin_unlock(&vcpu->kvm->mmu_lock);
-
-return r;
out_unlock:
spin_unlock(&vcpu->kvm->mmu_lock);
kvm_release_pfn_clean(pfn);
-return RET_PF_RETRY;
+return r;

static gpa_t FNAME(get_level1_sp_gpa)(struct kvm_mmu_page *sp)
@@ -904,18 +931,19 @@
spin_unlock(&vcpu->kvm->mmu_lock);
}

-static gpa_t FNAME(gva_to_gpa)(struct kvm_vcpu *vcpu, gva_t vaddr, u32 access,
+/* Note, @addr is a GPA when gva_to_gpa() translates an L2 GPA to an L1 GPA. */
+static gpa_t FNAME(gva_to_gpa)(struct kvm_vcpu *vcpu, gpa_t addr, u32 access,
   struct x86_exception *exception)
{
 struct guest_walker walker;
gpa_t gpa = UNMAPPED_GVA;
int r;

- r = FNAME(walk_addr)(&walker, vcpu, vaddr, access);
+ r = FNAME(walk_addr)(&walker, vcpu, addr, access);

  if (r) {
    gpa = gfn_to_gpa(walker.gfn):

- gpa |= vaddr & ~PAGE_MASK;
+ gpa |= addr & ~PAGE_MASK;
} else if (exception)
*exception = walker.fault;

@@ -923,7 +951,8 @@
}
#endif

#if PTTYPE != PTTYPE_EPT
-static gpa_t FNAME(gva_to_gpa_nested)(struct kvm_vcpu *vcpu, gva_t vaddr,
+/* Note, gva_to_gpa_nested() is only used to translate L2 GVAs. */
+static gpa_t FNAME(gva_to_gpa_nested)(struct kvm_vcpu *vcpu, gpa_t vaddr,
   u32 access,
   struct x86_exception *exception)
{
@@ -931,6 +960,11 @@
gpa_t gpa = UNMAPPED_GVA;
   int r;

+#ifndef CONFIG_X86_64
+/* A 64-bit GVA should be impossible on 32-bit KVM. */
+WARN_ON_ONCE(vaddr >> 32);
+#endif
+
   r = FNAME(walk_addr_nested)(&walker, vcpu, vaddr, access);

   if (r) {
@@ -995,7 +1029,7 @@
gfn = gpte_to_gfn(gpte);
   pte_access = sp->role.access;
-pte_access &= FNAME(gpte_access)(vcpu, gpte);
+pte_access &= FNAME(gpte_access)(gpte);
   FNAME(protect_clean_gpte)(&vcpu->arch.mmu, &pte_access, gpte);

   if (sync_mmio_spte(vcpu, &sp->spt[i], gfn, pte_access,
--- linux-4.15.0.orig/arch/x86/kvm/pmu.c
+++ linux-4.15.0/arch/x86/kvm/pmu.c
@@ -131,8 +131,8 @@
intr ? kvm_perf_overflow_intr :
   kvm_perf_overflow, pmc);
if (IS_ERR(event)) {
-  printk_once("kvm_pmu: event creation failed %ld\n",
- PTR_ERR(event));
+pr_debug_ratelimited("kvm_pmu: event creation failed %ld for pmc->idx = %d\n",
   PTR_ERR(event), pmc->idx);
  return;
}
bool fast_mode = idx & (1u << 31);
struct kvm_pmc *pmc;
	u64 ctr_val;
+u64 mask = fast_mode ? ~0u : ~0ull;

-pmc = kvm_x86_ops->pmu_ops->msr_idx_to_pmc(vcpu, idx);
+pmc = kvm_x86_ops->pmu_ops->msr_idx_to_pmc(vcpu, idx, &mask);
if (!pmc)
    return 1;

-ctr_val = pmc_read_counter(pmc);
-if (fast_mode)
    -ctr_val = (u32)ctr_val;
    -*data = ctr_val;
    +*data = pmc_read_counter(pmc) & mask;
    return 0;
}

--- linux-4.15.0.orig/arch/x86/kvm/pmu.h
+++ linux-4.15.0/arch/x86/kvm/pmu.h
@@ -2,6 +2,8 @@
#ifndef __KVM_X86_PMU_H
#define __KVM_X86_PMU_H
+#include <linux/nospec.h>
+
#define vcpu_to_pmu(vcpu) (&(vcpu)->arch.pmu)
#define pmu_to_vcpu(pmu)  (container_of((pmu), struct kvm_vcpu, arch.pmu))
#define pmc_to_pmu(pmc)   (&(pmc)->vcpu->arch.pmu)
@@ -21,7 +23,8 @@
unsigned (*find_fixed_event)(int idx);
bool (*pmc_is_enabled)(struct kvm_pmc *pmc);
struct kvm_pmc *(*pmc_idx_to_pmc)(struct kvm_pmu *pmu, int pmc_idx);
-struct kvm_pmc *(*msr_idx_to_pmc)(struct kvm_vcpu *vcpu, unsigned idx);
+struct kvm_pmc *(*msr_idx_to_pmc)(struct kvm_vcpu *vcpu, unsigned idx, +u64 *mask);
int (*is_valid_msr_idx)(struct kvm_vcpu *vcpu, unsigned idx);
bool (*is_valid_msr)(struct kvm_vcpu *vcpu, u32 msr);
int (*get_msr)(struct kvm_vcpu *vcpu, u32 msr, u64 *data);
@@ -81,8 +84,12 @@
static inline struct kvm_pmc *get_gp_pmc(struct kvm_pmu *pmu, u32 msr, u32 base)
{
    -if (msr >= base && msr < base + pmu->nr_arch_gp_counters)
-return &pmu->gp_counters[msr - base];
+if (msr >= base && msr < base + pmu->nr_arch_gp_counters) {
+u32 index = array_index_nospec(msr - base,
+    pmu->nr_arch_gp_counters);
+    return &pmu->gp_counters[index];
+}

return NULL;
}
@@ -92,8 +99,12 @@
{
    int base = MSR_CORE_PERF_FIXED_CTR0;

    -if (msr >= base && msr < base + pmu->nr_arch_fixed_counters)
    -return &pmu->fixed_counters[msr - base];
    +if (msr >= base && msr < base + pmu->nr_arch_fixed_counters) {
    +u32 index = array_index_nospec(msr - base,
    +    pmu->nr_arch_fixed_counters);
    +    return &pmu->fixed_counters[index];
    +}

    return NULL;
}
--- linux-4.15.0.orig/arch/x86/kvm/pmu_amd.c
+++ linux-4.15.0/arch/x86/kvm/pmu_amd.c
@@ -78,7 +78,7 @@
}
/* idx is the ECX register of RDPMC instruction */
-static struct kvm_pmc *amd_msr_idx_to_pmc(struct kvm_vcpu *vcpu, unsigned idx)
+static struct kvm_pmc *amd_msr_idx_to_pmc(struct kvm_vcpu *vcpu, unsigned idx, u64 *mask)
{
    struct kvm_pmu *pmu = vcpu_to_pmu(vcpu);
    struct kvm_pmc *counters;
--- linux-4.15.0.orig/arch/x86/kvm/pmu_intel.c
+++ linux-4.15.0/arch/x86/kvm/pmu_intel.c
@@ -29,7 +29,7 @@
[4] = { 0x2e, 0x41, PERF_COUNT_HW_CACHE_MISSES },
[5] = { 0xc4, 0x00, PERF_COUNT_HW_BRANCH_INSTRUCTIONS },
[6] = { 0xc5, 0x00, PERF_COUNT_HW_BRANCH_MISSES },
-    [7] = { 0x00, 0x30, PERF_COUNT_HW_REF_CPU_CYCLES },
+    [7] = { 0x00, 0x03, PERF_COUNT_HW_REF_CPU_CYCLES },
};
/* mapping between fixed pmc index and intel_arch_events array */
@@ -87,10 +87,14 @@
static unsigned intel_find_fixed_event(int idx)
{
  if (idx >= ARRAY_SIZE(fixed_pmc_events))
    u32 event;
  size_t size = ARRAY_SIZE(fixed_pmc_events);
+  event = fixed_pmc_events[array_index_nospec(idx, size)];
  return intel_arch_events[event].event_type;

  return PERF_COUNT_HW_MAX;

  return intel_arch_events[idx].event_type;
}

/* check if a PMC is enabled by comparing it with globl_ctrl bits. */
@@ -126,20 +130,25 @@
}

static struct kvm_pmc *intel_msr_idx_to_pmc(struct kvm_vcpu *vcpu,
-    unsigned idx)
+    unsigned idx, u64 *mask)
{
  struct kvm_pmu *pmu = vcpu_to_pmu(vcpu);
  bool fixed = idx & (1u << 30);
  struct kvm_pmc *counters;
+  unsigned int num_counters;

  idx &= ~((3u << 30);
-  if (!(fixed && idx >= pmu->nr_arch_gp_counters)
-      return NULL;
-  if (fixed && idx >= pmu->nr_arch_fixed_counters)
+  if (fixed) {
+    counters = pmu->fixed_counters;
+    num_counters = pmu->nr_arch_fixed_counters;
+  } else {
+    counters = pmu->gp_counters;
+    num_counters = pmu->nr_arch_gp_counters;
+  }
  if (idx >= num_counters)
    return NULL;
-  counters = fixed ? pmu->fixed_counters : pmu->gp_counts;
-  return &counters[idx];
+  *mask &= pmu->counter_bitmask[fixed ? KVM_PMC_FIXED : KVM_PMC_GP];
+  return &counters[array_index_nospec(idx, num_counters)];
}
static bool intel_is_valid_msr(struct kvm_vcpu *vcpu, u32 msr)
@@ -183,9 +192,13 @@
    
    return 0;
  default:
-    if ((pmc = get_gp_pmc(pmu, msr, MSR_IA32_PERFCTR0)) ||
-        (pmc = get_fixed_pmc(pmu, msr))) {
-        *data = pmc_read_counter(pmc);
+    if ((pmc = get_gp_pmc(pmu, msr, MSR_IA32_PERFCTR0)) {
+        u64 val = pmc_read_counter(pmc);
+        *data = val & pmu->counter_bitmask[KVM_PMC_GP];
+        return 0;
+    } else if ((pmc = get_fixed_pmc(pmu, msr))) {
+        u64 val = pmc_read_counter(pmc);
+        *data = val & pmu->counter_bitmask[KVM_PMC_FIXED];
+        return 0;
    } else if ((pmc = get_gp_pmc(pmu, msr, MSR_P6_EVNTSEL0))) {
+        *data = pmc->eventsel;
@@ -235,11 +248,14 @@
    break;
  default:
-    if ((pmc = get_gp_pmc(pmu, msr, MSR_IA32_PERFCTR0)) ||
-        (pmc = get_fixed_pmc(pmu, msr))) {
-        if (!msr_info->host_initiated)
-            data = (s64)(s32)data;
-        pmc->counter += data - pmc_read_counter(pmc);
+    if ((pmc = get_gp_pmc(pmu, msr, MSR_IA32_PERFCTR0)) {
+        if (msr_info->host_initiated)
+            pmc->counter = data;
+        else
+            pmc->counter = (s32)data;
+        return 0;
+    } else if ((pmc = get_fixed_pmc(pmu, msr))) {
+        pmc->counter = data;
          return 0;
    } else if ((pmc = get_gp_pmc(pmu, msr, MSR_P6_EVNTSEL0))) {
          if (data == pmc->eventsel)
--- linux-4.15.0.orig/arch/x86/kvm/svm.c
+++ linux-4.15.0/arch/x86/kvm/svm.c
@@ -45,7 +45,8 @@
      #include <asm/debugreg.h>
      #include <asm/kvm_para.h>
      #include <asm/irq_remapping.h>
-      #include <asm/nospec-branch.h>
+      #include <asm/microcode.h>
+      #include <asm/spec-ctrl.h>
```c
#include <asm/virtex.h>
#include "trace.h"
@@ -174,6 +175,8 @@
 uint64_t sysenter_eip;
 uint64_t tsc_aux;

+u64 msr_decfg;
+
 u64 next_rip;

u64 host_user_msrs[NR_HOST_SAVE_USER_MSRS];
@@ -184,6 +187,14 @@
 gs_base;
 } host;

+u64 spec_ctrl;
+/
+ * Contains guest-controlled bits of VIRT_SPEC_CTRL, which will be
+ * translated into the appropriate L2_CFG bits on the host to
+ * perform speculative control.
+ */
+u64 virt_spec_ctrl;
+
 u32 *msrpm;

ulong nmi_iret_rip;
@@ -249,6 +260,8 @@
 { .index = MSR_CSTAR,.always = true  },
 { .index = MSR_SYSCALL_MASK,.always = true  },
#endif
+{ .index = MSR_IA32_SPEC_CTRL,.always = false },
+{ .index = MSR_IA32_PRED_CMD,.always = false },
{ .index = MSR_IA32_LASTBRANCHFROMIP,.always = false },
{ .index = MSR_IA32_LASTBRANCHTOIP,.always = false },
{ .index = MSR_IA32_LASTINTFROMIP,.always = false },
@@ -285,8 +298,10 @@
 static int vgif = true;
 module_param(vgif, int, 0444);

+static u8 rsm_ins_bytes[] = "\x0f\x40"
+;
+ static void svm_set_cr0(struct kvm_vcpu *vcpu, unsigned long cr0);
- static void svm_flush_tlb(struct kvm_vcpu *vcpu);
+static void svm_flush_tlb(struct kvm_vcpu *vcpu, bool invalidate_gpa);
 static void svm_complete_interrupts(struct vcpu_svm *svm);

 static int nested_svm_exit_handled(struct vcpu_svm *svm);
@@ -376,6 +391,9 @@
```

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c->intercept_dr = h->intercept_dr | g->intercept_dr;
c->intercept_exceptions = h->intercept_exceptions | g->intercept_exceptions;
c->intercept = h->intercept | g->intercept;
+
+c->intercept |= (1ULL << INTERCEPT_VMLOAD);
+c->intercept |= (1ULL << INTERCEPT_VMSAVE);
}

static inline struct vmcb *get_host_vmcb(struct vcpu_svm *svm)
@@ -529,6 +547,7 @@
struct kvm_ldttss_desc *tss_desc;

struct page *save_area;
+struct vmcb *current_vmcb;
};

static DEFINE_PER_CPU(struct svm_cpu_data *, svm_data);
@@ -594,8 +613,14 @@
static void svm_set_efer(struct kvm_vcpu *vcpu, u64 efer)
{
    vcpu->arch.efer = efer;
    -if (!npt_enabled && !(efer & EFER_LMA))
-    efer &= ~EFER_LME;
+    if (!npt_enabled) {
+        /* Shadow paging assumes NX to be available. */
+        efer |= EFER_NX;
+        if (!(efer & EFER_LMA))
+            efer &= ~EFER_LME;
+    }

to_svm(vcpu)->vmcb->save.efer = efer | EFER_SVME;
mark_dirty(to_svm(vcpu)->vmcb, VMCB_CR);
@@ -744,6 +769,11 @@
return 0;
}

+if (sev_active()) {
+    pr_info("KVM is unsupported when running as an SEV guest\n");
+    return 0;
+}
+

return false;
+static bool msr_write_intercepted(struct kvm_vcpu *vcpu, unsigned msr)
+{
+    u8 bit_write;
+    unsigned long tmp;
+    u32 offset;
+    u32 *msrpm;
+    
+    msrcm = is_guest_mode(vcpu) ? to_svm(vcpu)->nested.msrpm:
+    * to_svm(vcpu)->msrpm;
+    
+    offset = svm_msrpm_offset(msr);
+    bit_write = 2 * (msr & 0x0f) + 1;
+    tmp = msrcm[offset];
+    
+    BUG_ON(offset == MSR_INVALID);
+    
+    return !!test_bit(bit_write, &tmp);
+}
+
+static void set_msr_interception(u32 *msrpm, unsigned msr,
+    int read, int write)
+{
+    return 0;
+}
+
+/*
+ * The default MMIO mask is a single bit (excluding the present bit),
+ * which could conflict with the memory encryption bit. Check for
+ * memory encryption support and override the default MMIO mask if
+ * memory encryption is enabled.
+ */
+static __init void svm_adjust_mmio_mask(void)
+{
+    unsigned int enc_bit, mask_bit;
+    u64 msr, mask;
+    
+    /* If there is no memory encryption support, use existing mask */
+    if (cpuid_eax(0x80000000) < 0x8000001f)
+        return;
+    
+    /* If memory encryption is not enabled, use existing mask */
+    rdmsrl(MSR_K8_SYSCFG, msr);
+    if (!(msr & MSR_K8_SYSCFG_MEM_ENCRYPT))
+        return;
+    
+    /* Check for memory encryption support */
+    cpuid_eax(0x80000000) < 0x8000001f
+    
+    /* If memory encryption is enabled, use existing mask */
+    rdmsrl(MSR_K8_SYSCFG, msr);
+    
+    /* Override the default MMIO mask */
+    /* Use the existing memory encryption bit */
+    msr ^= MSR_K8_SYSCFG_MEM_ENCRYPT;
+enc_bit = cpuid_ebx(0x8000001f) & 0x3f;
+mask_bit = boot_cpu_data.x86_phys_bits;
+
+/* Increment the mask bit if it is the same as the encryption bit */
+if (enc_bit == mask_bit)
+mask_bit++;
+
+/*
+ * If the mask bit location is below 52, then some bits above the
+ * physical addressing limit will always be reserved, so use the
+ * rsvd_bits() function to generate the mask. This mask, along with
+ * the present bit, will be used to generate a page fault with
+ * PFER.RSV = 1.
+ *
+ * If the mask bit location is 52 (or above), then clear the mask.
+ */
+mask = (mask_bit < 52) ? rsvd_bits(mask_bit, 51) | PT_PRESENT_MASK : 0;
+
+kvm_mmu_set_mmio_spte_mask(mask, mask);
}

static __init int svm_hardware_setup(void)
{
    int cpu;
    @ @ -1081,6 +1171,8 @@
kvm_enable_efer_bits(EFER_SVME | EFER_LMSLE);
}

+svm_adjust_mmio_mask();
+
for_each_possible_cpu(cpu) {
    r = svm_cpu_init(cpu);
    if (r)
        @ @ -1123,12 +1215,7 @@
}
}

-vgif = false; /* Disabled for CVE-2021-3653 */
+
return 0;

    @ @ -1166,12 +1253,23 @@
seg->base = 0;
}

static void svm_write_tsc_offset(struct kvm_vcpu *vcpu, u64 offset)
+{
+    struct vcpu_svm *svm = to_svm(vcpu);
+    if (is_guest_mode(vcpu))
+        return svm->nested.hsave->control.tsc_offset;
+    return vcpu->arch.tsc_offset;
+
+
+static u64 svm_read_l1_tsc_offset(struct kvm_vcpu *vcpu)
+{
+    struct vcpu_svm *svm = to_svm(vcpu);
+    u64 g_tsc_offset = 0;
+    if (is_guest_mode(vcpu)) {
+        /* Write L1’s TSC offset. */
+        g_tsc_offset = svm->vmcb->control.tsc_offset -
+            svm->nested.hsave->control.tsc_offset;
+        svm->nested.hsave->control.tsc_offset = offset;
+        svm->vmcb->control.tsc_offset = offset + g_tsc_offset;
+        mark_dirty(svm->vmcb, VMCB_INTERCEPTS);
+        return svm->vmcb->control.tsc_offset;
+    }
+
+static u64 svm_write_l1_tsc_offset(struct kvm_vcpu *vcpu, u64 offset)
+
+    struct vcpu_svm *svm = to_svm(vcpu);
+    u64 g_tsc_offset = 0;
+
+    if (is_guest_mode(vcpu)) {
+        /* Write L1’s TSC offset. */
+        g_tsc_offset = svm->vmcb->control.tsc_offset -
+            svm->nested.hsave->control.tsc_offset;
+        svm->nested.hsave->control.tsc_offset = offset;
+        svm->vmcb->control.tsc_offset = offset + g_tsc_offset;
+        mark_dirty(svm->vmcb, VMCB_INTERCEPTS);
+        return svm->vmcb->control.tsc_offset;
+    }

static void avic_init_vmcb(struct vcpu_svm *svm)
    @ @ -1247.6 +1346.7 @@
    set_intercept(svm, INTERCEPT_SKINIT);
    set_intercept(svm, INTERCEPT_WBINVD);
    set_intercept(svm, INTERCEPT_XSETBV);
    set_intercept(svm, INTERCEPT_RSM);

if (!kvm_mwait_in_guest()) {
    set_intercept(svm, INTERCEPT_MONITOR);
    @ @ -1363.20 +1463.23 @@
    static int avic_init_access_page(struct kvm_vcpu *vcpu)
    {
        struct kvm *kvm = vcpu->kvm;
        -int ret;
        +int ret = 0;

        +mutex_lock(&kvm->slots_lock);
if (kvm->arch.apic_access_page_done)
    return 0;
+goto out;

-ret = x86_set_memory_region(kvm,
    APIC_ACCESS_PAGE_PRIVATE_MEMSLOT,
    APIC_DEFAULT_PHYS_BASE,
    PAGE_SIZE);
+ret = __x86_set_memory_region(kvm,
    APIC_ACCESS_PAGE_PRIVATE_MEMSLOT,
    APIC_DEFAULT_PHYS_BASE,
    PAGE_SIZE);
if (ret)
    return ret;
+goto out;

kvm->arch.apic_access_page_done = true;
-return 0;
+out:
+mutex_unlock(&kvm->slots_lock);
+return ret;
}

static int avic_init_backing_page(struct kvm_vcpu *vcpu)
@@ -1528,7 +1631,11 @@
    if (!kvm_vcpu_apicv_active(vcpu))
        return;

-if (WARN_ON(h_physical_id >= AVIC_MAX_PHYSICAL_ID_COUNT))
    /*
    + * Since the host physical APIC id is 8 bits,
    + * we can support host APIC ID upto 255.
    + */
    +if (WARN_ON(h_physical_id > AVIC_PHYSICAL_ID_ENTRY_HOST_PHYSICAL_ID_MASK))
        return;

        entry = READ_ONCE(*(svm->avic_physical_id_cache));
@@ -1582,6 +1689,10 @@
        u32 dummy;
        u32 eax = 1;

+        vcpu->arch.microcode_version = 0x01000065;
+        svm->spec_ctrl = 0;
+        svm->virt_spec_ctrl = 0;
+        if (!init_event) {
+            svm->vcpu.arch.apic_base = APIC_DEFAULT_PHYS_BASE |
+            MSR_IA32_APICBASE_ENABLE;
        }
@@ -1693,10 +1804,25 @@
 return ERR_PTR(err);
 }

+static void svm_clear_current_vmcb(struct vmcb *vmcb)
+{
+  int i;
+  for_each_online_cpu(i)
+    cmpxchg(&per_cpu(svm_data, i)->current_vmcb, vmcb, NULL);
+}
+
+static void svm_free_vcpu(struct kvm_vcpu *vcpu)
+{
+  struct vcpu_svm *svm = to_svm(vcpu);
+
+  /* The vmcb page can be recycled, causing a false negative in
+   * svm_vcpu_load(). So, ensure that no logical CPU has this
+   * vmcb page recorded as its current vmcb.
+   */
+  svm_clear_current_vmcb(svm->vmcb);
+
+  __free_page(pfn_to_page(__sme_clr(svm->vmcb_pa) >> PAGE_SHIFT));
+  __free_pages(virt_to_page(svm->msrpm), MSRPM_ALLOC_ORDER);
+  __free_page(virt_to_page(svm->nested.hsave));
+
 static void svm_vcpu_load(struct kvm_vcpu *vcpu, int cpu)
 {
 struct vcpu_svm *svm = to_svm(vcpu);
+  struct svm_cpu_data *sd = per_cpu(svm_data, cpu);
+  int i;
+
 if (unlikely(cpu != vcpu->cpu)) {
   if (static_cpu_has(X86_FEATURE_RDTSCP))
     wrmsrl(MSR_TSC_AUX, svm->tsc_aux);
+  if (sd->current_vmcb != svm->vmcb) {
+    sd->current_vmcb = svm->vmcb;
+    indirect_branch_prediction_barrier();
+  }
+  avic_vcpu_load(vcpu, cpu);
 }

 return 1;

if (npt_enabled && ((old_cr4 ^ cr4) & X86_CR4_PGE))
-svm_flush_tlb(vcpu);
+svm_flush_tlb(vcpu, true);

vcpu->arch.cr4 = cr4;
if (!npt_enabled)
 @@ -2141,7 +2272,8 @@
 u64 error_code = svm->vmcb->control.exit_info_1;
 return kvm_handle_page_fault(&svm->vcpu, error_code, fault_address,
 -svm->vmcb->control.insn_bytes,
 +static_cpu_has(X86_FEATURE_DECODEASSISTS) ?
 +svm->vmcb->control.insn_bytes : NULL,
 svm->vmcb->control.insn_len);
 }

@@ -2152,13 +2284,15 @@
 trace_kvm_page_fault(fault_address, error_code);
 return kvm_mmu_page_fault(&svm->vcpu, fault_address, error_code,
 -svm->vmcb->control.insn_bytes,
 +static_cpu_has(X86_FEATURE_DECODEASSISTS) ?
 +svm->vmcb->control.insn_bytes : NULL,
 svm->vmcb->control.insn_len);
 }

static int db_interception(struct vcpu_svm *svm)
 {
 struct kvm_run *kvm_run = svm->vcpu.run;
 +struct kvm_vcpu *vcpu = &svm->vcpu;

 if (!svm->vcpu.guest_debug &
      (KVM_GUESTDBG_SINGLESTEP | KVM_GUESTDBG_USE_HW_BP))
 @@ -2169,6 +2303,8 @@
 if (svm->nmi_singlestep) {
 disable_nmi_singlestep(svm);
 +/* Make sure we check for pending NMIs upon entry */
 +kvm_make_request(KVM_REQ_EVENT, vcpu);
 }

 if (svm->vcpu.guest_debug &
 @@ -2379,7 +2515,7 @@
 svm->vmcb->control.nested_cr3 = __sme_set(root);
 mark_dirty(svm->vmcb, VMCB_NPT);
 -svm_flush_tlb(vcpu);
 +svm_flush_tlb(vcpu, true);

static void nested_svm_inject_npf_exit(struct kvm_vcpu *vcpu, 
@@ -2649,8 +2785,8 @@
return NESTED_EXIT_HOST;
break;
case SVM_EXIT_EXCP_BASE + PF_VECTOR:
-/* When we're shadowing, trap PFs, but not async PF */
-!if (!npt_enabled & svm->vcpu.arch.apf.host_apf_reason == 0)
+/* Trap async PF even if not shadowing */
+!if (!npt_enabled || svm->vcpu.arch.apf.host_apf_reason)
return NESTED_EXIT_HOST;
break;
default:
@@ -2739,7 +2875,7 @@
dst->iopm_base_pa = from->iopm_base_pa;
dst->msrpm_base_pa = from->msrpm_base_pa;
dst->tsc_offset = from->tsc_offset;
-!dst->asid = from->asid;
+/* asid not copied, it is handled manually for svm->vmcb. */
dst->tlb_ctl = from->tlb_ctl;
dst->int_ctl = from->int_ctl;
dst->int_vector = from->int_vector;
@@ -2840,6 +2976,7 @@
 /* Restore the original control entries */
copy_vmcb_control_area(vmcb, hsave);

+svm->vcpu.arch.tsc_offset = svm->vmcb->control.tsc_offset;
kvm_clear_exception_queue(&svm->vcpu);
kvm_clear_interrupt_queue(&svm->vcpu);
@@ -2877,6 +3014,14 @@
kvm_mmu_reset_context(&svm->vcpu);
kvm_mmu_load(&svm->vcpu);
/+*
+ * Drop what we picked up for L2 via svm_complete_interrupts() so it
+ * doesn't end up in L1.
+ */
+svm->vcpu.arch.nmi_injected = false;
+kvm_clear_exception_queue(&svm->vcpu);
+kvm_clear_interrupt_queue(&svm->vcpu);
+
return 0;
}

svm->nested.intercept_exceptions = nested_vmcb->control.intercept_exceptions;
svm->nested.intercept = nested_vmcb->control.intercept;

-svm_flush_tlb(&svm->vcpu);
-svm->vmcb->control.int_ctl = nested_vmcb->control.int_ctl | V_INTR_MASKING_MASK;
+svm_flush_tlb(&svm->vcpu, true);
+
+svm->vmcb->control.int_ctl &=
+V_INTR_MASKING_MASK | V_GIF_ENABLE_MASK | V_GIF_MASK;
+
+svm->vmcb->control.int_ctl |= nested_vmcb->control.int_ctl &
+(V_TPR_MASK | V_IRQ_INJECTION_BITS_MASK);
+
if (nested_vmcb->control.int_ctl & V_INTR_MASKING_MASK)
svm->vcpu.arch.hflags |= HF_VINTR_MASK;
else
@@ -2999,10 +3150,12 @@
 /* We don't want to see VMMCALLs from a nested guest */
 clr_intercept(svm, INTERCEPT_VMMCALL);
+
s svm->vcpu.arch.tsc_offset += nested_vmcb->control.tsc_offset;
+svm->vmcb->control.tsc_offset = svm->vcpu.arch.tsc_offset;
+
svm->vmcb->control.virt_ext = nested_vmcb->control.virt_ext;
svm->vmcb->control.int_vector = nested_vmcb->control.int_vector;
svm->vmcb->control.int_state = nested_vmcb->control.int_state;
-svm->vmcb->control.tsc_offset += nested_vmcb->control.tsc_offset;
svm->vmcb->control.event_inj = nested_vmcb->control.event_inj;
svm->vmcb->control.event_inj_err = nested_vmcb->control.event_inj_err;

@@ -3350,6 +3503,12 @@
 return 1;
}

+static int invd_interception(struct vcpu_svm *svm)
+{
+/* Treat an INVD instruction as a NOP and just skip it. */
+return kvm_skip_emulated_instruction(&svm->vcpu);
+
+}

+static int invlpg_interception(struct vcpu_svm *svm)
+
if (!static_cpu_has(X86_FEATURE_DECODEASSISTS))
@@ -3364,6 +3523,12 @@
 return emulate_instruction(&svm->vcpu, 0) == EMULATE_DONE;
}

+static int rsm_interception(struct vcpu_svm *svm)
+{

return kvm_emulate_instruction_from_buffer(&svm->vcpu, 
+rsi_mins_bytes, 2) == EMULATE_DONE; 
+
static int rdpmc_interception(struct vcpu_svm *svm)
{
  int err;
  @ @ -3422.7 +3587.7 @@
  err = 0;
  if (cr >= 16) { /* mov to cr */
    cr -= 16;
    -val = kvm_register_read(&svm->vcpu, reg);
    +val = kvm_register_readl(&svm->vcpu, reg);
    switch (cr) {
      case 0:
        if (!check_selective_cr0_intercepted(svm, val))
          @ @ -3467.7 +3632.7 @@
          kvm_queue_exception(&svm->vcpu, UDVECTOR);
          return 1;
        -kvm_register_write(&svm->vcpu, reg, val);
        +kvm_register_writel(&svm->vcpu, reg, val);
        }
        return kvm_complete_insn_gp(&svm->vcpu, err);
    }
  @ @ -3497.13 +3662.13 @@
  if (dr >= 16) { /* mov to DRn */
    if (!kvm_require_dr(&svm->vcpu, dr - 16))
      return 1;
    -val = kvm_register_read(&svm->vcpu, reg);
    +val = kvm_register_readl(&svm->vcpu, reg);
    kvm_set_dr(&svm->vcpu, dr - 16, val);
    } else {
    if (!kvm_require_dr(&svm->vcpu, dr))
      return 1;
    kvm_get_dr(&svm->vcpu, dr, &val);
    -kvm_register_write(&svm->vcpu, reg, val);
    +kvm_register_writel(&svm->vcpu, reg, val);
    }

return kvm_skip_emulated_instruction(&svm->vcpu);
  @ @ -3525.17 +3690.27 @@
  return 0;
}
+
+static int svm_get_msr_feature(struct kvm_msr_entry *msr)
+{
  +msr->data = 0;
+ switch (msr->index) {
+ case MSR_F10H_DECFG:
+ if (boot_cpu_has(X86_FEATURE_LFENCE_RDTSC))
+ msr->data |= MSR_F10H_DECFG_LFENCE_SERIALIZE;
+ break;
+ default:
+ return 1;
+ }
+
+ return 0;
+
+ static int svm_get_msr(struct kvm_vcpu *vcpu, struct msr_data *msr_info)
+ {
+ struct vcpu_svm *svm = to_svm(vcpu);
+
+ switch (msr_info->index) {
+ case MSR_IA32_TSC:
+ msr_info->data = svm->vmcb->control.tsc_offset +
+ kvm_scale_tsc(vcpu, rdtsc());
+ break;
+ }
+ case MSR_STAR:
+ msr_info->data = svm->vmcb->save.star;
+ break;
+ case MSR_VM_CR:
+ msr_info->data = svm->nested.vm_cr_msr;
+ break;
+ case MSR_IA32_UCODE_REV:
+ msr_info->data = 0x01000065;
+ break;
+ case MSR_IA32_SPEC_CTRL:
+ if (!msr_info->host_initiated &&
+ !guest_has_spec_ctrl_msr(vcpu))
+ return 1;
+ }
+ +msr_info->data = svm->spec_ctrl;
+ break;
+ case MSR_AMD64_VIRT_SPEC_CTRL:
+ if (!msr_info->host_initiated &&
+ !guest_cpuid_has(vcpu, X86_FEATURE_VIRT_SSBD))
+ return 1;
+ }
+ +msr_info->data = svm->virt_spec_ctrl;
+ break;
+ case MSR_F15H_IC_CFG: {
msr_info->data = 0x1E;
}
break;
+case MSR_F10H_DECFG:
+msr_info->data = svm->msr_decfg;
+break;
default:
return kvm_get_msr_common(vcpu, msr_info);
}
svm->vmcb->save.g_pat = data;
mark_dirty(svm->vmcb, VMCB_NPT);
bhreak;
-case MSR_IA32_TSC:
-kvm_write_tsc(vcpu, msr);
+case MSR_IA32_SPEC_CTRL:
+if (!msr->host_initiated &&
+ !guest_has_spec_ctrl_msr(vcpu))
+return 1;
+
+/* The STIBP bit doesn't fault even if it's not advertised */
+if (data & ~(SPEC_CTRL_IBRS | SPEC_CTRL_STIBP | SPEC_CTRL_SSBD))
+return 1;
+
+svm->spec_ctrl = data;
+
+if (!data)
+bhreak;
+
+/*
+ * For non-nested:
+ * When it's written (to non-zero) for the first time, pass
+ * it through.
+ * For nested:
+ * The handling of the MSR bitmap for L2 guests is done in
+ * nested_svm_vmrun_msrpm.
+ * We update the L1 MSR bit as well since it will end up
+ * touching the MSR anyway now.
+ */
+set_msr_interception(svm->msrpm, MSR_IA32_SPEC_CTRL, 1, 1);
+bhreak;
+case MSR_IA32_PRED_CMD:
+if (!msr->host_initiated &&
+ !guest_has_pred_cmd_msr(vcpu))
+return 1;
+if (data & ~PRED_CMD_IBPB)
+return 1;
+if (!data)
+break;
+
+wrmsrl(MSR_IA32_PRED_CMD, PRED_CMD_IBPB);
+if (!data)
+break;
+set_msr_interception(svm->msrpm, MSR_IA32_PRED_CMD, 0, 1);
+break;
+case MSR_AMD64_VIRT_SPEC_CTRL:
+if (!msr->host_initiated &&
+ !guest_cpuid_has(vcpu, X86_FEATURE_VIRT_SSBD))
+return 1;
+
+case MSR_F10H_DECFG: {
+struct kvm_msr_entry msr_entry;
+
+msr_entry.index = msr->index;
+if (svm_get_msr_feature(&msr_entry))
+return 1;
+
+/* Check the supported bits */
+if (data & ~msr_entry.data)
+return 1;
+
+/* Don't allow the guest to change a bit, #GP */
+if (!msr->host_initiated && (data ^ msr_entry.data))
+return 1;
+
+svm->msr_decfg = data;
+break;
+
+case MSR_IA32_APICBASE:
+if (kvm_vcpu_apicv_active(vcpu))
+avic_update_vapic_bar(to_svm(vcpu), data);
 Brazil, 2018

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static bool svm_dy_apicv_has_pending_interrupt(struct kvm_vcpu *vcpu)
+
+{  
+  return false;
+}

static void svm_ir_list_del(struct vcpu_svm *svm, struct amd_iommu_pi_data *pi)
@@ -4639,6 +4905,7 @@
  * Tell IOMMU to use legacy mode for this interrupt.
  * Retrieve ga_tag of prior interrupt remapping data.
  */
+  pi.prev_ga_tag = 0;
pi.is_guest_mode = false;
ret = irq_set_vcpu_affinity(host_irq, &pi);

@@ -4659,9 +4926,8 @@
}

if (!ret && svm) {
-  trace_kvm_pi_irte_update(svm->vcpu.vcpu_id,  
-    host_irq, e->gsi,  
-    vcpu_info.vector,  
+  trace_kvm_pi_irte_update(host_irq, svm->vcpu.vcpu_id,  
+    e->gsi, vcpu_info.vector,  
    vcpu_info.pi_desc_addr, set);
}

@@ -4779,7 +5045,7 @@
return 0;
}

static void svm_flush_tlb(struct kvm_vcpu *vcpu)
+static void svm_flush_tlb(struct kvm_vcpu *vcpu, bool invalidate_gpa)
{
  struct vcpu_svm *svm = to_svm(vcpu);

@@ -4933,6 +5199,15 @@
svm->vmcb->save.cr2 = vcpu->arch.cr2;

clg1();
+kvm_load_guest_xcr0(vcpu);
+
+/*
+ * If this vCPU has touched SPEC_CTRL, restore the guest's value if
+ * it's non-zero. Since vmentry is serialising on affected CPUs, there
+ * is no need to worry about the conditional branch over the wrmsr
+ * being speculatively taken.
+ */
+x86_spec_ctrl_set_guest(svm->spec_ctrl, svm->virt_spec_ctrl);
local_irq_enable();

@@ -5040,10 +5315,30 @@
#endif
#endif

+/*
+ * We do not use IBRS in the kernel. If this vCPU has used the
+ * SPEC_CTRL MSR it may have left it on; save the value and
+ * turn it off. This is much more efficient than blindly adding
+ * it to the atomic save/restore list. Especially as the former
+ * (Saving guest MSRs on vmexit) doesn't even exist in KVM.
+ *
+ * For non-nested case:
+ * If the L01 MSR bitmap does not intercept the MSR, then we need to
+ * save it.
+ *
+ * For nested case:
+ * If the L02 MSR bitmap does not intercept the MSR, then we need to
+ * save it.
+ */
+if (unlikely(!msr_write_intercepted(vcpu, MSR_IA32_SPEC_CTRL)))
+svm->spec_ctrl = native_read_msr(MSR_IA32_SPEC_CTRL);
+
tasklet_disable(vcpu);

local_irq_disable();

+x86_spec_ctrl_restore_host(svm->spec_ctrl, svm->virt_spec_ctrl);
+
vcpu->arch.cr2 = svm->vmcb->save.cr2;
    vcpu->arch.regs[VCPU_REGS_RAX] = svm->vmcb->save.rax;
    vcpu->arch.regs[VCPU_REGS_RSP] = svm->vmcb->save.rsp;
@@ -5052,6 +5347,7 @@
    if (unlikely(svm->vmcb->control.exit_code == SVM_EXIT_NMI))
        kvm_before_handle_nmi(&svm->vcpu);

    +kvm_put_guest_xcr0(vcpu);
    stgi();

    /* Any pending NMI will happen here */
    @@ -5092,7 +5388,7 @@

    svm->vmcb->save.cr3 = __sme_set(root);
    mark_dirty(svm->vmcb, VMCB_CR);
    -svm_flush_tlb(vcpu);
    +svm_flush_tlb(vcpu, true);
static void set_tdp_cr3(struct kvm_vcpu *vcpu, unsigned long root)
@@ -5106,7 +5402,7 @@
svm->vmcb->save.cr3 = kvm_read_cr3(vcpu);
mark_dirty(svm->vmcb, VMCB_CR);

-svm_flush_tlb(vcpu);
+svm_flush_tlb(vcpu, true);
}

static int is_disabled(void)
@@ -5141,8 +5437,15 @@
return false;
}

-static bool svm_has_high_real_mode_segbase(void)
+static bool svm_has_emulated_msr(int index)
{
+  switch (index) {
+    case MSR_IA32_MCG_EXT_CTL:
+      return false;
+    default:
+      break;
+  }
+
  return true;
}

@@ -5530,7 +5833,7 @@
    .hardware_enable = svm_hardware_enable,
    .hardware_disable = svm_hardware_disable,
    .cpu_has_accelerated_tpr = svm_cpu_has_accelerated_tpr,
-svm_has_high_real_mode_segbase = svm_has_high_real_mode_segbase,
-    .has_emulated_msr = svm_has_emulated_msr,
+    .has_emulated_msr = svm_has_emulated_msr,

    .vcpu_create = svm_create_vcpu,
    .vcpu_free = svm_free_vcpu,
@@ -5546,6 +5849,7 @@
    .vcpu_unblocking = svm_vcpu_unblocking,

    .update_bp_intercept = update_bp_intercept,
+    .get_msr_feature = svm_get_msr_feature,
    .get_msr = svm_get_msr,
    .set_msr = svm_set_msr,
    .get_segment_base = svm_get_segment_base,
@@ -5591,7 +5895,7 @@
    .enable_nmi_window = enable_nmi_window,
.enable_irq_window = enable_irq_window,
.update_cr8_intercept = update_cr8_intercept,
.set_virtual_x2apic_mode = svm_set_virtual_x2apic_mode,
.set_virtual_apic_mode = svm_set_virtual_apic_mode,
.get_enable_apicv = svm_get_enable_apicv,
.refresh_apicv_exec_ctrl = svm_refresh_apicv_exec_ctrl,
.load_eoi_exitmap = svm_load_eoi_exitmap,
@@ -5618,7 +5922,8 @@

.has_wbinvd_exit = svm_has_wbinvd_exit,

.write_tsc_offset = svm_write_tsc_offset,
+.read_11_tsc_offset = svm_read_11_tsc_offset,
+.write_11_tsc_offset = svm_write_11_tsc_offset,

.set_tdp_cr3 = set_tdp_cr3,
@@ -5629,6 +5934,7 @@

.pmu_ops = &amd_pmu_ops,
.deliver_posted_interrupt = svm_deliver_avic_intr,
+.dy_apicv_has_pending_interrupt = svm_dy_apicv_has_pending_interrupt,
.update_pi_irte = svm_update_pi_irte,
.setup_mce = svm_setup_mce,

--- linux-4.15.0.orig/arch/x86/kvm/trace.h
+++ linux-4.15.0/arch/x86/kvm/trace.h
@@ -438,13 +438,13 @@

TRACE_EVENT(kvm_apic_accept_irq,
    - TP_PROTO(__u32 apicid, __u16 dm, __u8 tm, __u8 vec),
    + TP_PROTO(__u32 apicid, __u16 dm, __u16 tm, __u8 vec),
    TP_ARGS(apicid, dm, tm, vec),

    TP_STRUCT__entry(
        __field(__u32, apicid)
        __field(__u16, dm)
        - __field(__u8, tm)
        + __field(__u16, tm)
        __field(__u8, vec)
    ),

--- linux-4.15.0.orig/arch/x86/kvm/vmx.c
+++ linux-4.15.0/arch/x86/kvm/vmx.c
@@ -27,6 +27,7 @@
 #include <linux/mm.h>
 #include <linux/highmem.h>
#include <linux/sched.h>
+#include <linux/sched/smt.h>
#include <linux/moduleparam.h>
#include <linux/mod_devicetable.h>
#include <linux/trace_events.h>
@@ -34,6 +35,7 @@
#include <linux/tboot.h>
#include <linux/hrtimer.h>
#include <linux/frame.h>
+##include <linux/nospec.h>
#include "kvm_cache_regs.h"
#include "x86.h"
@@ -50,7 +52,8 @@
#include <asm/apic.h>
#include <asm/irq_remapping.h>
#include <asm/mmu_context.h>
-##include <asm/nospec-branch.h>
+##include <asm/microcode.h>
+##include <asm/spec-ctrl.h>

#include "trace.h"
#include "pmu.h"
@@ -111,6 +114,14 @@
static bool __read_mostly enable_pml = 1;
module_param_named(pml, enable_pml, bool, S_IRUGO);

+##define MSR_TYPE_R1
+##define MSR_TYPE_W2
+##define MSR_TYPE_RW3
+
+##define MSR_BITMAP_MODE_X2APIC1
+##define MSR_BITMAP_MODE_X2APIC_APICV2
+##define MSR_BITMAP_MODE_LM4
+
#define KVM_VMX_TSC_MULTIPLIER_MAX 0xffffffffffffffffULL

/* Guest_tsc -> host_tsc conversion requires 64-bit division. */
@@ -184,8 +195,157 @@
extern const ulong vmx_return;

+static DEFINE_STATIC_KEY_FALSE(vmx_l1d_should_flush);
+static DEFINE_STATIC_KEY_FALSE(vmx_l1d_flush_cond);
+static DEFINE_MUTEX(vmx_l1d_flush_mutex);
+
+/* Storage for pre module init parameter parsing */
+static enum vmx_l1d_flush_state __read_mostly vmentry_l1d_flush_param = VMENTER_L1D_FLUSH_AUTO;
+static const struct {
+    const char *option;
+    bool for_parse;
+} vmentry_l1d_param[] = {
+    [VMENTER_L1D_FLUSH_AUTO] = {"auto", true},
+    [VMENTER_L1D_FLUSH_NEVER] = {"never", true},
+    [VMENTER_L1D_FLUSH_COND] = {"cond", true},
+    [VMENTER_L1D_FLUSH_ALWAYS] = {"always", true},
+    [VMENTER_L1D_FLUSH_EPT_DISABLED] = {"EPT disabled", false},
+    [VMENTER_L1D_FLUSH_NOT_REQUIRED] = {"not required", false},
+};
+
+#define L1D_CACHE_ORDER 4
+static void *vmx_l1d_flush_pages;
+
+static int vmx_setup_l1d_flush(enum vmx_l1d_flush_state l1tf)
+{
    struct page *page;
    unsigned int i;
+
    if (!enable_ept) {
        l1tf_vmx_mitigation = VMENTER_L1D_FLUSH_EPT_DISABLED;
        return 0;
    }
+
    if (boot_cpu_has(X86_FEATURE_ARCH_CAPABILITIES)) {
        u64 msr;
        +
        rdmsr(MSR_IA32_ARCH_CAPABILITIES, msr);
        +
        if (msr & ARCH_CAP_SKIP_VMENTRY_L1DFLUSH) {
            l1tf_vmx_mitigation = VMENTER_L1D_FLUSH_NOT_REQUIRED;
            return 0;
        }
    }
+
    /* If set to auto use the default l1tf mitigation method */
    if (l1tf == VMENTER_L1D_FLUSH_AUTO) {
        switch (l1tf_mitigation) {
        +case L1TF_MITIGATION_OFF:
        +l1tf = VMENTER_L1D_FLUSH_NEVER;
        +break;
        +case L1TF_MITIGATION_FLUSH_NOWARN:
        +case L1TF_MITIGATION_FLUSH:
        +case L1TF_MITIGATION_FLUSH_NOSMT:
        +l1tf = VMENTER_L1D_FLUSH_COND;
        +break;
        +case L1TF_MITIGATION_FULL:
case L1TF_MITIGATION_FULL_FORCE:
	l1tf = VMENTER_L1D_FLUSH_ALWAYS;
+break;
+
+if (l1tf_mitigation == L1TF_MITIGATION_FULL_FORCE) {
+    l1tf = VMENTER_L1D_FLUSH_ALWAYS;
+
+
+if (l1tf != VMENTER_L1D_FLUSH_NEVER && !vmx_l1d_flush_pages &&
+    !boot_cpu_has(X86_FEATURE_FLUSH_L1D)) {
+    page = alloc_pages(GFP_KERNEL, L1D_CACHE_ORDER);
+    if (!page)
+        return -ENOMEM;
+    vmx_l1d_flush_pages = page_address(page);
+    
+    /*
+     * Initialize each page with a different pattern in
+     * order to protect against KSM in the nested
+     * virtualization case.
+     */
+    for (i = 0; i < 1u << L1D_CACHE_ORDER; ++i) {
+        memset(vmx_l1d_flush_pages + i * PAGE_SIZE, i + 1,
+               PAGE_SIZE);
+    }
+}
+
+l1tf_vmx_mitigation = l1tf;
+
+if (l1tf != VMENTER_L1D_FLUSH_NEVER)
+    static_branch_enable(&vmx_l1d_should_flush);
+else
+    static_branch_disable(&vmx_l1d_should_flush);
+
+if (l1tf == VMENTER_L1D_FLUSH_COND)
+    static_branch_enable(&vmx_l1d_flush_cond);
+else
+    static_branch_disable(&vmx_l1d_flush_cond);
+return 0;
+
+static int vmentry_l1d_flush_parse(const char *s)
+{
+    unsigned int i;
+
+    if (s) {
+        for (i = 0; i < ARRAY_SIZE(vmentry_l1d_param); i++) {
+            if (vmentry_l1d_param[i].for_parse &&
+                sysfs_streq(s, vmentry_l1d_param[i].option))
+                break;
+        }
+    }
+return i;
+
+}
+
+}
+
+
+static int vmentry_l1d_flush_set(const char *s, const struct kernel_param *kp)
+
+{ 
+ int l1tf, ret;
+
+ l1tf = vmentry_l1d_flush_parse(s);
+ if (l1tf < 0)
+ return l1tf;
+
+ if (!boot_cpu_has(X86_BUG_L1TF))
+ return 0;
+
+ /*
+ * Has vmx_init() run already? If not then this is the pre init
+ * parameter parsing. In that case just store the value and let
+ * vmx_init() do the proper setup after enable_ept has been
+ * established.
+ */
+ if (l1tf_vmx_mitigation == VMENTER_L1D_FLUSH_AUTO) {
+ vmentry_l1d_flush_param = l1tf;
+ return 0;
+ }
+
+ mutex_lock(&vmx_l1d_flush_mutex);
+ ret = vmx_setup_l1d_flush(l1tf);
+ mutex_unlock(&vmx_l1d_flush_mutex);
+ return ret;
+ }
+
+static int vmentry_l1d_flush_get(char *s, const struct kernel_param *kp)
+
+{ 
+ if (WARN_ON_ONCE(l1tf_vmx_mitigation >= ARRAY_SIZE(vmentry_l1d_param)))
+ return sprintf(s, "???
");
+ return sprintf(s, "%s
", vmentry_l1d_param[l1tf_vmx_mitigation].option);
+ }
+
+static const struct kernel_param_ops vmentry_l1d_flush_ops = {
+ .set = vmentry_l1d_flush_set,
+ .get = vmentry_l1d_flush_get,
+ .};
+module_param_cb(vmentry_l1d_flush, &vmentry_l1d_flush_ops, NULL, 0644);
#define NR_AUTOLOAD_MSRS 8
#define VMCS02_POOL_SIZE 1

struct vmcs {
    u32 revision_id;
    int soft_vnmi_blocked;
    ktime_t entry_time;
    s64 vnmi_blocked_time;
    unsigned long *msr_bitmap;
    struct list_head loaded_vmcss_on_cpu_link;
};

/* stored in guest memory specified by VMPTRLD, but is opaque to the guest,
* which must access it using VMREAD/VMWRITE/VMCLEAR instructions.
* More than one of these structures may exist, if L1 runs multiple L2 guests.
* nested_vmx_run() will use the data here to build a vmcs02: a VMCS for the
* underlying hardware which will be used to run L2.
* This structure is packed to ensure that its layout is identical across
* machines (necessary for live migration).
*/
#define VMCS12_SIZE 0x1000

/* Used to remember the last vmcs02 used for some recently used vmcs12s */
struct vmcs02_list {
    struct list_head list;
    gpa_t vmptr;
    struct loaded_vmcs vmcs02;
};

/* The nested_vmx structure is part of vcpu_vmx, and holds information we need
* for correct emulation of VMX (i.e., nested VMX) on this vcpu.
*/
bool sync_shadow_vmcs;

/* vmcs02_list cache of VMCSs recently used to run L2 guests */
struct list_head vmcs02_pool;
int vmcs02_num;
bool change_vmcs01_virtual_apic_mode;
bool change_vmcs01_virtual_x2apic_mode;

/* L2 must run next, and mustn't decide to exit to L1. */
bool nested_run_pending;
+ struct loaded_vmcs vmcs02;
+
+ /*
- * Guest pages referred to in vmcs02 with host-physical pointers, so
- * we must keep them pinned while L2 runs.
+ * Guest pages referred to in the vmcs02 with host-physical
+ * pointers, so we must keep them pinned while L2 runs.
+ */
struct page *apic_access_page;
struct page *virtual_apic_page;
@@ -457,8 +612,6 @@ 
bool pi_pending;
u16 posted_intr_nv;

-unsigned long *msr_bitmap;
-
struct hrtimer preemption_timer;
bool preemption_timer_expired;

@@ -577,10 +730,16 @@
(unsigned long *)&pi_desc->control);
}

+struct vmx_msrs {
+unsigned intrn;
+struct vmx_msr_entryval[NR_AUTOLOAD_MSRS];
+};
+
+ struct vcpu_vmx {
+ struct kvm_vcpu  vcpu;
+ unsigned long   host_rsp;
+ u8             fail;
+ u8              msr_bitmap_mode;
+ u32             exit_intr_info;
+ u32             idt_vectoring_info;
+ ulong           rflags;
+ @ @ -592,6 +751,9 @ @
u64       msr_host_kernel_gs_base;
u64       msr_guest_kernel_gs_base;
@endef
+ u64       spec_ctrl;
+ u32       vm_entry_controls_shadow;
+ u32       vm_exit_controls_shadow;
+ u32       secondary_exec_control;
+ @ @ -599,18 +761,21 @ @
/*
 * loaded_vmcs points to the VMCS currently used in this vcpu. For a
 * non-nested (L1) guest, it always points to vmcs01. For a nested
 * guest (L2), it points to a different VMCS.
 * loaded_cpu_state points to the VMCS whose state is loaded into the CPU registers that only
 * need to be switched when transitioning to/from the kernel; a NULL
 * value indicates that host state is loaded.
 */

struct loaded_vmcs    vmcs01;
struct loaded_vmcs   *loaded_vmcs;
+struct loaded_vmcs   *loaded_cpu_state;
bool                  __launched; /* temporary, used in vmx_vcpu_run */

struct msr_autoload {
   unsigned nr;
   -struct vmx_msr_entry guest[NR_AUTOLOAD_MSRS];
   -struct vmx_msr_entry host[NR_AUTOLOAD_MSRS];
   +struct vmx_msrs guest;
   +struct vmx_msrs host;
} msr_autoload;
+
struct {
   -int           loaded;
   u16           fs_sel, gs_sel, ldt_sel;
   #ifdef CONFIG_X86_64
   u16           ds_sel, es_sel;
   #endif
}@ -898,21 +1063,18 @@

static inline short vmcs_field_to_offset(unsigned long field)
{
   -BUILD_BUG_ON(ARRAY_SIZE(vmcs_field_to_offset_table) > SHRT_MAX);
   +const size_t size = ARRAY_SIZE(vmcs_field_to_offset_table);
   +unsigned short offset;

   -if (field >= ARRAY_SIZE(vmcs_field_to_offset_table))
   +BUILD_BUG_ON(size > SHRT_MAX);
   +if (field >= size)
      return -ENOENT;

   -/*
   - * FIXME: Mitigation for CVE-2017-5753. To be replaced with a
   - * generic mechanism.
   - */
   -asm("lfence");
   -
   -if (vmcs_field_to_offset_table[field] == 0)
   +field = array_index_nospec(field, size);
   +offset = vmcs_field_to_offset_table[field];

}"
if (offset == 0)
return -ENOENT;
-
return vmcs_field_to_offset_table[field];
+return offset;
}

static inline struct vmcs12 *get_vmcs12(struct kvm_vcpu *vcpu)
@@ -935,6 +1097,9 @@
static void vmx_set_nmi_mask(struct kvm_vcpu *vcpu, bool masked);
static bool nested_vmx_is_page_fault_vmexit(struct vmcs12 *vmcs12,
        u16 error_code);
+static void vmx_update_msr_bitmap(struct kvm_vcpu *vcpu);
+static __always_inline void vmx_disable_intercept_for_msr(unsigned long *msr_bitmap,
+        u32 msr, int type);

static DEFINE_PER_CPU(struct vmcs *, vmxarea);
static DEFINE_PER_CPU(struct vmcs *, current_vmcs);
@@ -954,12 +1119,6 @@
enum {
    VMX_IO_BITMAP_A,
    VMX_IO_BITMAP_B,
-VMX_MSR_BITMAP_LEGACY,
-VMX_MSR_BITMAP_LONGMODE,
-VMX_MSR_BITMAP_LEGACY_X2APIC_APICV,
-VMX_MSR_BITMAP_LONGMODE_X2APIC_APICV,
-VMX_MSR_BITMAP_LEGACY_X2APIC,
-VMX_MSR_BITMAP_LONGMODE_X2APIC,
   VMX_VMREAD_BITMAP,
   VMX_VMWRITE_BITMAP,
   VMX_BITMAP_NR
@@ -969,12 +1128,6 @@
#define vmx_io_bitmap_a                      (vmx_bitmap[VMX_IO_BITMAP_A])
#define vmx_io_bitmap_b                      (vmx_bitmap[VMX_IO_BITMAP_B])
-#define vmx_msr_bitmap_legacy               (vmx_bitmap[VMX_MSR_BITMAP_LEGACY])
-#define vmx_msr_bitmap_longmode             (vmx_bitmap[VMX_MSR_BITMAP_LONGMODE])
-#define vmx_msr_bitmap_legacy_x2apic_apicv  (vmx_bitmap[VMX_MSR_BITMAP_LEGACY_X2APIC_APICV])
-#define vmx_msr_bitmap_longmode_x2apic_apicv (vmx_bitmap[VMX_MSR_BITMAP_LONGMODE_X2APIC_APICV])
-#define vmx_msr_bitmap_legacy_x2apic        (vmx_bitmap[VMX_MSR_BITMAP_LEGACY_X2APIC])
-#define vmx_msr_bitmap_longmode_x2apic      (vmx_bitmap[VMX_MSR_BITMAP_LONGMODE_X2APIC])
#define vmx_vmread_bitmap                    (vmx_bitmap[VMX_VMREAD_BITMAP])
#define vmx_vmwrite_bitmap                   (vmx_bitmap[VMX_VMWRITE_BITMAP])
@@ -1062,11 +1215,6 @@
return is_exception_n(intr_info, PF_VECTOR);
Open Source Used In 5GaaS Edge AC-4  12136

- static inline bool is_no_device(u32 intr_info)
- {
- return is_exception_n(intr_info, NM_VECTOR);
- }
-
static inline bool is_invalid_opcode(u32 intr_info)
{
 return is_exception_n(intr_info, UD_VECTOR);
 // @@ -1085.6 +1233.13 @@
 (INTR_TYPE_HARD_EXCEPTION | MC_VECTOR | INTR_INFO_VALID_MASK);
}

+ /* Undocumented: icebp/int1 */
+ static inline bool is_icebp(u32 intr_info)
+ {
+ return (intr_info & (INTR_INFO_INTR_TYPE_MASK | INTR_INFO_VALID_MASK))
+ == (INTR_TYPE_PRIV_SW_EXCEPTION | INTR_INFO_VALID_MASK);
+ }
+
static inline bool cpu_has_vmx_msr_bitmap(void)
{
 return vmcs_config.cpu_based_exec_ctrl & CPU_BASED_USE_MSR_BITMAPS;
 // @@ -1450.7 +1605.7 @@
 return -1;
}

- static inline void __invvpid(int ext, u16 vpid, gva_t gva)
+ static inline void __invvpid(unsigned long ext, u16 vpid, gva_t gva)
{
 struct {
 u64 vpid : 16;
 // @@ -1464.7 +1619.7 @@
 : : "a"(&operand), "c"(ext) : "cc", "memory");
}

- static inline void __invept(int ext, u64 eptp, gpa_t gpa)
+ static inline void __invept(unsigned long ext, u64 eptp, gpa_t gpa)
{
 struct {
 u64 eptp, gpa;
 // @@ -1522.43 +1677.15 @@
 }

 #ifdef CONFIG_KEXEC_CORE
+ /*
+ * This bitmap is used to indicate whether the vmclear
- operation is enabled on all cpus. All disabled by
default. /*
-static cpumask_t crash_vmclear_enabled_bitmap = CPU_MASK_NONE;
-
-static inline void crash_enable_local_vmclear(int cpu)
-{
-cpumask_set_cpu(cpu, &crash_vmclear_enabled_bitmap);
-}
-
-static inline void crash_disable_local_vmclear(int cpu)
-{
-cpumask_clear_cpu(cpu, &crash_vmclear_enabled_bitmap);
-}
-
-static inline int crash_local_vmclear_enabled(int cpu)
-{
-return cpumask_test_cpu(cpu, &crash_vmclear_enabled_bitmap);
-}
-
static void crash_vmclear_local_loaded_vmcss(void)
{
 int cpu = raw_smp_processor_id();
 struct loaded_vmcs *v;

-if (!crash_local_vmclear_enabled(cpu))
-return;
-
 list_for_each_entry(v, &per_cpu(loaded_vmcss_on_cpu, cpu),
 loaded_vmcss_on_cpu_link)
 vmcs_clear(v->vmcs);
}
-#else
-static inline void crash_enable_local_vmclear(int cpu) { }
-static inline void crash_disable_local_vmclear(int cpu) { }
#endif /* CONFIG_KEXEC_CORE */

static void __loaded_vmcs_clear(void *arg)
@@ -1570,19 +1697,24 @@
 return; /* vcpu migration can race with cpu offline */
 if (per_cpu(current_vmcs, cpu) == loaded_vmcs->vmcs)
 per_cpu(current_vmcs, cpu) = NULL;
-crash_disable_local_vmclear(cpu);
+ +vmcs_clear(loaded_vmcs->vmcs);
+if (loaded_vmcs->shadow_vmcs && loaded_vmcs->launched)
+vmcs_clear(loaded_vmcs->shadow_vmcs); +
list_del(&loaded_vmcs->loaded_vmcss_on_cpu_link);

/*/  
- * we should ensure updating loaded_vmcs->loaded_vmcss_on_cpu_link  
- * is before setting loaded_vmcs->vcpu to -1 which is done in  
- * loaded_vmcs_init. Otherwise, other cpu can see vcpu = -1 fist  
- * then adds the vmcs into percpu list before it is deleted.  
+ * Ensure all writes to loaded_vmcs, including deleting it from its  
+ * current percpu list, complete before setting loaded_vmcs->vcpu to  
+ * -1, otherwise a different cpu can see vcpu == -1 first and add  
+ * loaded_vmcs to its percpu list before it's deleted from this cpu's  
+ * list. Pairs with the smp_rmb() in vmx_vcpu_load_vmcs().  
*/  
smp_wmb();

-loaded_vmcs_init(loaded_vmcs);  
-crash_enable_local_vmclear(cpu);  
+loaded_vmcs->cpu = -1;  
+loaded_vmcs->launched = 0;
}

static void loaded_vmcs_clear(struct loaded_vmcs *loaded_vmcs)  
@@ -1918,6 +2050,52 @@  
 vmcs_write32(EXCEPTION_BITMAP, eb);  
}

+/*  
 + * Check if MSR is intercepted for currently loaded MSR bitmap.  
 + */  
+static bool msr_write_intercepted(struct kvm_vcpu *vcpu, u32 msr)  
+{
+ unsigned long *msr_bitmap;  
+ int f = sizeof(unsigned long);  
+  
+ if (!cpu_has_vmx_msr_bitmap())  
+ return true;  
+  
+ msr_bitmap = to_vmx(vcpu)->loaded_vmcs->msr_bitmap;  
+  
+ if (!(cpu_has_vmx_msr_bitmap()))  
+ return true;  
+  
+ if (msr <= 0x1fff) {
+ return !!test_bit(msr, msr_bitmap + 0x800 / f);  
+ }  
+ else if ((msr >= 0xc0000000) && (msr <= 0xc0001fff)) {
+ msr &= 0x1fff;  
+ return !!test_bit(msr, msr_bitmap + 0xc000 / f);  
+ }  
+ +return true;  
+ }
check if MSR is intercepted for L01 MSR bitmap.

```c
static bool msr_write_intercepted_l01(struct kvm_vcpu *vcpu, u32 msr)
{
    unsigned long *msr_bitmap;
    int f = sizeof(unsigned long);

    if (!cpu_has_vmx_msr_bitmap())
        return true;

    msr_bitmap = to_vmx(vcpu)->vmcs01.msr_bitmap;
    if (msr <= 0x1fff) {
        return !!test_bit(msr, msr_bitmap + 0x800 / f);
    } else if ((msr >= 0xc0000000) && (msr <= 0xc0001fff)) {
        msr &= 0x1fff;
        return !!test_bit(msr, msr_bitmap + 0xc00 / f);
    }

    return true;
}
```

```c
static void clear_atomic_switch_msr_special(struct vcpu_vmx *vmx, unsigned long entry, unsigned long exit)
{
    vm_exit_controls_clearbit(vmx, exit);
}
```

```c
static int find_msr(struct vmx_msrs *m, unsigned int msr)
{
    unsigned int i;

    for (i = 0; i < m->nr; ++i) {
        if (m->val[i].index == msr)
            return i;
    }

    return -ENOENT;
}
```

```c
static void clear_atomic_switch_msr(struct vcpu_vmx *vmx, unsigned msr)
{
    unsigned i;
    struct msr_autoload *m = &vmx->msr_autoload;
```
switch (msr) {
    @ -1948,18 +2137,21 @
}
break;
}
-
-    -for (i = 0; i < m->nr; ++i)
-    -if (m->guest[i].index == msr)
-    -break;
-
-    -if (i == m->nr)
+    +i = find_msr(&m->guest, msr);
+    +if (i < 0)
+    +goto skip_guest;
+    +--m->guest.nr;
+    +m->guest.val[i] = m->guest.val[m->guest.nr];
+    +vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, m->guest.nr);
+    +
+    +skip_guest:
+    +i = find_msr(&m->host, msr);
+    +if (i < 0)
+    +return;
    --m->nr;
    -m->guest[i] = m->guest[m->nr];
    -m->host[i] = m->host[m->nr];
    -vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, m->nr);
    -vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, m->nr);
+    +
+    +--m->host.nr;
+    +m->host.val[i] = m->host.val[m->host.nr];
+    +vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, m->host.nr);
}

static void add_atomic_switch_msr_special(struct vcpu_vmx *vmx,
    @ -1974,9 +2166,9 @
}

static void add_atomic_switch_msr(struct vcpu_vmx *vmx, unsigned msr,
    - u64 guest_val, u64 host_val)
+ u64 guest_val, u64 host_val, bool entry_only)
{
    -unsigned i;
+int i, j = 0;
    struct msr_autoload *m = &vmx->msr_autoload;

    switch (msr) {
        @ -2011,24 +2203,32 @
    wrmsrl(MSR_IA32_PEBS_ENABLE, 0);
for (i = 0; i < m->nr; ++i)
 if (m->guest[i].index == msr)
 break;
+i = find_msr(&m->guest, msr);
+i = find_msr(&m->host, msr);

- if (i == NR_AUTOLOAD_MSRS) {
+ if (i < 0 && m->guest.nr == NR.AUTOLOAD_MSRS) {
+ if (j < 0 && m->host.nr == NR.AUTOLOAD_MSRS) {
printk_once(KERN_WARNING "Not enough msr switch entries."
"Can't add msr %x\n", msr);
return;
- } else if (i == m->nr) {
- ++m->nr;
- vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, m->nr);
- vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, m->nr);
} + if (i < 0) {
+ i = m->guest.nr++;
+ vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, m->guest.nr);
+ } + m->guest.val[i].index = msr;
+ m->guest.val[i].value = guest_val;

- m->guest[i].index = msr;
- m->guest[i].value = guest_val;
- m->host[i].index = msr;
- m->host[i].value = host_val;
+ if (entry_only)
+ return;
+
+ if (j < 0) {
+ j = m->host.nr++;
+ vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, m->host.nr);
+ } + m->host.val[j].index = msr;
+ m->host.val[j].value = host_val;
}

static bool update_transition_efer(struct vcpu_vmx *vmx, int efer_offset)
@@ -2036,17 +2236,9 @@
u64 guest_efer = vmx->vcpu.arch.efer;
u64 ignore_bits = 0;

- if (!enable_ept) {

/*
 * NX is needed to handle CR0.WP=1, CR4.SMEP=1. Testing
 * host CPUID is more efficient than testing guest CPUID
 * or CR4. Host SMEP is anyway a requirement for guest SMEP.
 */

if (boot_cpu_has(X86_FEATURE_SMEP))
guest_efer |= EFER_NX;
else if (!(guest_efer & EFER_NX))
ignore_bits |= EFER_NX;

/* Shadow paging assumes NX to be available. */
if (!enable_ept)
guest_efer |= EFER_NX;

/*
 * LMA and LME handled by hardware; SCE meaningless outside long mode.
 */

if (vmx->host_state.loaded)
vmx->host_state.loaded = 1;

static void __vmx_load_host_state(struct vcpu_vmx *vmx)
{
- if (!vmx->host_state.loaded)
+ if (!vmx->loaded_cpu_state)
 return;

- vmx->host_state.loaded = 1;
+vmx->loaded_cpu_state = vmx->loaded_vmc;
+
/*
 * Set host fs and gs selectors. Unfortunately, 22.2.3 does not
 * allow segment selectors with cpl > 0 or ti == 1.
 */

static void __vmx_load_host_state(struct vcpu_vmx *vmx)
{
- if (!vmx->host_state.loaded)
+ if (!vmx->loaded_cpu_state)
 return;

+WARN_ON_ONCE(vmx->loaded_cpu_state != vmx->loaded_vmc);
#ifdef CONFIG_X86_64
if (is_long_mode(&vmx->vcpu))
    rdmsrl(MSR_KERNEL_GS_BASE, vmx->msr_guest_kernel_gs_base);

if (!already_loaded) {
    loaded_vmcs_clear(vmx->loaded_vmcs);
    local_irq_disable();
    -crash_disable_local_vmclear(cpu);
    /*
     - * Read loaded_vmcs->cpu should be before fetching
     - * loaded_vmcs->loaded_vmcss_on_cpu_link.
     - * See the comments in __loaded_vmcs_clear().
     + * Ensure loaded_vmcs->cpu is read before adding loaded_vmcs to
     + * this cpu's percpu list, otherwise it may not yet be deleted
     + * from its previous cpu's percpu list. Pairs with the
     + * smb_wmb() in __loaded_vmcs_clear().
     */
    smp_rmb();
    list_add(&vmx->loaded_vmcs->loaded_vmcss_on_cpu_link,
             &per_cpu(loaded_vmcss_on_cpu, cpu));
    -crash_enable_local_vmclear(cpu);
    local_irq_enable();
}

if (per_cpu(current_vmcs, cpu) != vmx->loaded_vmcs->vmcs) {
    per_cpu(current_vmcs, cpu) = vmx->loaded_vmcs->vmcs;
    vmcs_load(vmx->loaded_vmcs->vmcs);
    +indirect_branch_prediction_barrier();
}

if (!already_loaded) {
    @@ -2507,10 +2703,13 @@
} else {
    if (vmcs12->exception_bitmap & (1u << nr)) {
        -if (nr == DB_VECTOR)
        +if (nr == DB_VECTOR) {
            *exit_qual = vcpu->arch.dr6;
        -else
        +*exit_qual &= ~(DR6_FIXED_1 | DR6_BT);
        -*exit_qual ^= DR6_RTM;
    }
}
+} else {
  *exit_qual = 0;
+
} return 1;
}
}
@@ -2540,6 +2739,8 @@
return;
}

+WARN_ON_ONCE(vmx->emulation_required);
+
if (kvm_exception_is_soft(nr)) {
vmcs_write32(VM_ENTRY_INSTRUCTION_LEN,
    vmx->vcpu.arch.event_exit_inst_len);
@@ -2572,36 +2773,6 @@
vmx->guest_msrs[from] = tmp;
}

-static void vmx_set_msr_bitmap(struct kvm_vcpu *vcpu)
-{
  -unsigned long *msr_bitmap;
  -
  -if (is_guest_mode(vcpu))
  -msr_bitmap = to_vmx(vcpu)->nested.msr_bitmap;
  -else if (cpu_has_secondary_exec_ctrls() &&
  - (vmcs_read32(SECONDARY_VM_EXEC_CONTROL) &
  - SECONDARY_EXEC_VIRTUALIZE_X2APIC_MODE)) {
  -if (enable_apicv && kvm_vcpu_apicv_active(vcpu)) {
  -if (is_long_mode(vcpu))
  -msr_bitmap = vmx_msr_bitmap_longmode_x2apic_apicv;
  -else
  -msr_bitmap = vmx_msr_bitmap_legacy_x2apic_apicv;
  -} else {
  -if (is_long_mode(vcpu))
  -msr_bitmap = vmx_msr_bitmap_longmode_x2apic;
  -else
  -msr_bitmap = vmx_msr_bitmap_legacy_x2apic;
  -} 
  -} else {
  -if (is_long_mode(vcpu))
  -msr_bitmap = vmx_msr_bitmap_longmode;
  -else
  -msr_bitmap = vmx_msr_bitmap_legacy;
  -}
  -}
  -}
  -}
  -vmcs_write64(MSR_BITMAP, __pa(msr_bitmap));
-}
/*
 * Set up the vmcs to automatically save and restore system
 * msrs. Don’t touch the 64-bit msrs if the guest is in legacy
 */

index = __find_msr_index(vmx, MSR_CSTAR);
if (index >= 0)
    move_msr_up(vmx, index, save_nmsrs++);

index = __find_msr_index(vmx, MSR_TSC_AUX);
if (index >= 0 && guest_cpuid_has(&vmx->vcpu, X86_FEATURE_RDTSCP))
    move_msr_up(vmx, index, save_nmsrs++);

/*
 * MSR_STAR is only needed on long mode guests, and only
 * if efer.sce is enabled.
 */

index = __find_msr_index(vmx, MSR_EFER);
if (index >= 0 && update_transition_efer(vmx, index))
    move_msr_up(vmx, index, save_nmsrs++);

vmx->save_nmsrs = save_nmsrs;

if (cpu_has_vmx_msr_bitmap())
    vmx_set_msr_bitmap(&vmx->vcpu);
+ vmx_update_msr_bitmap(&vmx->vcpu);
}

*/
- * reads and returns guest's timestamp counter "register"
- * guest_tsc = (host_tsc * tsc multiplier) >> 48 + tsc_offset
- * -- Intel TSC Scaling for Virtualization White Paper, sec 1.3
- */

static u64 guest_read_tsc(struct kvm_vcpu *vcpu)
+ static u64 vmx_read_l1_tsc_offset(struct kvm_vcpu *vcpu)
{
    u64 host_tsc, tsc_offset;
+ struct vmcs12 *vmcs12 = get_vmcs12(vcpu);

-host_tsc = rdtsc();
-tsc_offset = vmcs_read64(TSC_OFFSET);
-return kvm_scale_tsc(vcpu, host_tsc) + tsc_offset;
+if (is_guest_mode(vcpu) &&
+    (vmcs12->cpu_based_vm_exec_control & CPU_BASED_USE_TSC_OFFSETING))
+    return vcpu->arch.tsc_offset - vmcs12->tsc_offset;
+    return vcpu->arch.tsc_offset;

-----------------------------
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static void vmx_write_tsc_offset(struct kvm_vcpu *vcpu, u64 offset)
+
static u64 vmx_write_l1_tsc_offset(struct kvm_vcpu *vcpu, u64 offset)
{
    u64 active_offset = offset;
    if (is_guest_mode(vcpu)) {
        /* We're here if L1 chose not to trap WRMSR to TSC. According
         * set for L2 remains unchanged, and still needs to be added
         * to the newly set TSC to get L2's TSC.
         */
        struct vmcs12 *vmcs12;
        /* recalculate vmcs02.TSC_OFFSET: */
        vmcs12 = get_vmcs12(vcpu);
        vmcs_write64(TSC_OFFSET, offset +
               (nested_cpu_has(vmcs12, CPU_BASED_USE_TSC_OFFSETING) ?
               vmcs12->tsc_offset : 0));
    } else {
        trace_kvm_write_tsc_offset(vcpu->vcpu_id,
               vmcs_read64(TSC_OFFSET), offset);
        vmcs_write64(TSC_OFFSET, offset);
    }
    return active_offset;
}

static int vmx_get_msr_feature(struct kvm_msr_entry *msr)
+
{+static int vmx_get_msr_feature(struct kvm_msr_entry *msr)
 +{
    val & ~valid_bits);
}

    return !(val & ~valid_bits);
}

* Reads an msr value (of 'msr_index') into 'pdata'.
* Returns 0 on success, non-0 otherwise.
#endif

case MSR_EFER:
    return kvm_get_msr_common(vcpu, msr_info);
-case MSR_IA32_TSC:
    -msr_info->data = guest_read_tsc(vcpu);
+case MSR_IA32_SPEC_CTRL:
    +if (!msr_info->host_initiated &&
      !guest_has_spec_ctrl_msr(vcpu))
        +return 1;
        +
        +msr_info->data = to_vmx(vcpu)->spec_ctrl;
    break;

case MSR_IA32_SYSENTER_CS:
    msr_info->data = vmcs_read32(GUEST_SYSENTER_CS);
@@ -3307,7 +3481,10 @@
        return 1;
    return vmx_get_vmx_msr(vcpu, msr_info->index, &msr_info->data);
-case MSR_IA32_XSS:
    -if (!vmx_xsaves_supported())
        +if (!vmx_xsaves_supported() ||
          !(msr_info->host_initiated &&
            guest_cpuid_has(vcpu, X86_FEATURE_XSAVE) &&
            guest_cpuid_has(vcpu, X86_FEATURE_XSAVES))))
            return 1;
    msr_info->data = vcpu->arch.ia32_xss;
    break;
@@ -3380,13 +3557,68 @@
        return 1;
    vmcs_write64(GUEST_BNDCFGS, data);
    break;
-case MSR_IA32_TSC:
    -kvm_write_tsc(vcpu, msr_info);
+case MSR_IA32_SPEC_CTRL:
    +if (!msr_info->host_initiated &&
      !guest_has_spec_ctrl_msr(vcpu))
        +return 1;
        +
        +/* The STIBP bit doesn't fault even if it's not advertised */
        +if (data & ~(SPEC_CTRL_IBRS | SPEC_CTRL_STIBP | SPEC_CTRL_SSBD))
            return 1;
            +
            +vmx->spec_ctrl = data;
            +
            +if (!data)
                +break;
                +
                +/*
+ * For non-nested:
+ * When it's written (to non-zero) for the first time, pass
+ * it through.
+ *
+ * For nested:
+ * The handling of the MSR bitmap for L2 guests is done in
+ * nested_vmx_merge_msr_bitmap. We should not touch the
+ * vmcs02.msr_bitmap here since it gets completely overwritten
+ * in the merging. We update the vmcs01 here for L1 as well
+ * since it will end up touching the MSR anyway now.
+ */
+vmx_disable_intercept_for_msr(vmx->vmcs01.msr_bitmap,
+    MSR_IA32_SPEC_CTRL,
+    MSR_TYPE_RW);
+break;
+case MSR_IA32_PRED_CMD:
+    if (!msr_info->host_initiated &&
+        !guest_has_pred_cmd_msr(vcpu))
+        return 1;
+    if (data & ~PRED_CMD_IBPB)
+        return 1;
+    if (!data)
+        break;
+    wrmsrl(MSR_IA32_PRED_CMD, PRED_CMD_IBPB);
+    /*
+     * For non-nested:
+     * When it's written (to non-zero) for the first time, pass
+     * it through.
+     *
+     * For nested:
+     * The handling of the MSR bitmap for L2 guests is done in
+     * nested_vmx_merge_msr_bitmap. We should not touch the
+     * vmcs02.msr_bitmap here since it gets completely overwritten
+     * in the merging.
+     */
+vmx_disable_intercept_for_msr(vmx->vmcs01.msr_bitmap, MSR_IA32_PRED_CMD,
+    MSR_TYPE_W);
+break;
case MSR_IA32_CR_PAT:
    if (!kvm_pat_valid(data))
        return 1;
    if (vmcs_config.vmentry_ctrl & VM_ENTRY_LOAD_IA32_PAT) {
        if (!kvm_mtrr_valid(vcpu, MSR_IA32_CR_PAT, data))
            break;
vmcs_write64(GUEST_IA32_PAT, data);
vcpu->arch.pat = data;
break;
@@ -3420,7 +3652,10 @@
return 1;
return vmx_set_vmx_msr(vcpu, msr_index, data);
case MSR_IA32_XSS:
    if (!vmx_xsaves_supported())
+    !vmx_xsaves_supported() ||
+    !(guest_cpuid_has(vcpu, X86_FEATURE_XSAVE) &&
+    guest_cpuid_has(vcpu, X86_FEATURE_XSAVES)))
return 1;
/*
 * The only supported bit as of Skylake is bit 8, but
@@ -3431,7 +3666,7 @@
    vcpu->arch.ia32_xss = data;
    if (vcpu->arch.ia32_xss != host_xss)
        add_atomic_switch_msr(vmx, MSR_IA32_XSS,
-vcpu->arch.ia32_xss, host_xss);
+        vcpu->arch.ia32_xss, host_xss, false);
    else
        clear_atomic_switch_msr(vmx, MSR_IA32_XSS);
    break;
@@ -3534,21 +3769,6 @@
    if (cr4_read_shadow() & X86_CR4_VMXE)
        return -EBUSY;

-INIT_LIST_HEAD(&per_cpu(loaded_vmcss_on_cpu, cpu));
-INIT_LIST_HEAD(&per_cpu(blocked_vcpu_on_cpu, cpu));
-spin_lock_init(&per_cpu(blocked_vcpu_on_cpu_lock, cpu));
-
-/*
- * Now we can enable the vmclear operation in kdump
- * since the loaded_vmcss_on_cpu list on this cpu
- * has been initialized.
- *
- * Though the cpu is not in VMX operation now, there
- * is no problem to enable the vmclear operation
- * for the loaded_vmcss_on_cpu list is empty!
- */
-crash_enable_local_vmclear(cpu);
-
rdmsrl(MSR_IA32_FEATURE_CONTROL, old);

test_bits = FEATURE_CONTROL_LOCKED;
@@ -3837,11 +4057,6 @@
return vmcs;
}

-static struct vmcs *alloc_vmcs(void)
-{
-return alloc_vmcs_cpu(raw_smp_processor_id());
-}
-
-static void free_vmcs(struct vmcs *vmcs)
{
-free_pages((unsigned long)vmcs, vmcs_config.order);
-loaded_vmcs_clear(loaded_vmcs);
-free_vmcs(loaded_vmcs->vmcs);
-loaded_vmcs->vmcs = NULL;
+
+if (loaded_vmcs->msr_bitmap)
+free_page((unsigned long)loaded_vmcs->msr_bitmap);
-WARN_ON(loaded_vmcs->shadow_vmcs != NULL);
}

-static struct vmcs *alloc_vmcs(void)
+
+{  
+return alloc_vmcs_cpu(raw_smp_processor_id());
+}
+
+static int alloc_loaded_vmcs(struct loaded_vmcs *loaded_vmcs)
+{
+loaded_vmcs->vmcs = alloc_vmcs();
+if (!loaded_vmcs->vmcs)
+return -ENOMEM;
+
+loaded_vmcs->shadow_vmcs = NULL;
+loaded_vmcs_init(loaded_vmcs);
+
+if (cpu_has_vmx_msr_bitmap()) {
+loaded_vmcs->msr_bitmap = (unsigned long *)__get_free_page(GFP_KERNEL);
+if (!loaded_vmcs->msr_bitmap)
+goto out_vmcs;
+memset(loaded_vmcs->msr_bitmap, 0xff, PAGE_SIZE);
+}
+return 0;
+
+out_vmcs:
+free_loaded_vmcs(loaded_vmcs);
+return -ENOMEM;
+
+static void free_kvm_area(void)
static inline void __vmx_flush_tlb(struct kvm_vcpu *vcpu, int vpid, bool invalidate_gpa)
{
    if (enable_ept && (invalidate_gpa || !enable_vpid)) {
        if (!VALID_PAGE(vcpu->arch.mmu.root_hpa))
            return;
        ept_sync_context(construct_eptp(vcpu, vcpu->arch.mmu.root_hpa));
    }
}

static void vmx_flush_tlb_ept_only(struct kvm_vcpu *vcpu)
{
    if (enable_ept)
        vmx_flush_tlb(vcpu);
    __vmx_flush_tlb(vcpu, to_vmx(vcpu)->vpid, invalidate_gpa);
}

static void vmx_decache_cr0_guest_bits(struct kvm_vcpu *vcpu)
{
    struct kvm_mmu *mmu = vcpu->arch.walk_mmu;
    if (is_pae_paging(vcpu)) {
        kvm_mmu *mmu = vcpu->arch.walk_mmu;
        vmcs_write64(GUEST_PDPTR0, mmu->pdptrs[0]);
        vmcs_write64(GUEST_PDPTR1, mmu->pdptrs[1]);
        vmcs_write64(GUEST_PDPTR2, mmu->pdptrs[2]);
    }
}
mmu->pdtrs[0] = vmcs_read64(GUEST_PDPTR0);
mmu->pdtrs[1] = vmcs_read64(GUEST_PDPTR1);
mmu->pdtrs[2] = vmcs_read64(GUEST_PDPTR2);
@@ -4324,6 +4563,9 @@
static int get_ept_level(struct kvm_vcpu *vcpu)
{
    /* Nested EPT currently only supports 4-level walks. */
    if (is_guest_mode(vcpu) && nested_cpu_has_ept(get_vmcs12(vcpu)))
+        return 4;
if (cpu_has_vmx_ept_5levels() && (cpuid_maxphyaddr(vcpu) > 48))
    return 5;
    return 4;
@@ -4359,7 +4601,7 @@
ept_load_pdptrs(vcpu);
}

-vmx_flush_tlb(vcpu);
+vmx_flush_tlb(vcpu, true);
vmcs_writel(GUEST_CR3, guest_cr3);
}

@@ -4715,6 +4957,26 @@
(ss.selector & SEGMENT_RPL_MASK));
}

+static bool nested_vmx_check_io_bitmaps(struct kvm_vcpu *vcpu,
+    unsigned int port, int size);
+static bool nested_vmx_exit_handled_io(struct kvm_vcpu *vcpu,
    struct vmcs12 *vmcs12)
+{
+    unsigned long exit_qualification;
    unsigned short port;
    int size;
    +if (!nested_cpu_has(vmcs12, CPU_BASED_USE_IO_BITMAPS))
+        return nested_cpu_has(vmcs12, CPU_BASED_UNCOND_IO_EXITING);
+    exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
    +port = exit_qualification >> 16;
    +size = (exit_qualification & 7) + 1;
    +return nested_vmx_check_io_bitmaps(vcpu, port, size);
+}
+/*
 * Check if guest state is valid. Returns true if valid, false if
static __always_inline void vmx_disable_intercept_for_msr(unsigned long *msr_bitmap,
						u32 msr, int type)
{
    int f = sizeof(unsigned long);

    /* See Intel PRM Vol. 3, 20.6.9 (MSR-Bitmap Address). Early manuals
     * have the write-low and read-high bitmap offsets the wrong way round.
     */
    if (!cpu_has_vmx_msr_bitmap())
        return;

    /* We can control MSRs 0x00000000-0x00001fff and 0xc0000000-0xc0001fff.
     */
    if (msr <= 0x1fff) {
        if (type & MSR_TYPE_R)
            /* read-low */
            __set_bit(msr, msr_bitmap + 0x000 / f);
        if (type & MSR_TYPE_W)
            /* write-low */
            __set_bit(msr, msr_bitmap + 0x800 / f);
    } else if ((msr >= 0xc0000000) && (msr <= 0xc0001fff)) {
        msr &= 0x1fff;
        if (type & MSR_TYPE_R)
            /* read-high */
            __set_bit(msr, msr_bitmap + 0x400 / f);
        if (type & MSR_TYPE_W)
            /* write-high */
    }

    /* else if ( (msr >= 0xc0000000) && (msr <= 0xc0001fff) ) { 
        msr &= 0x1fff;
        if (type & MSR_TYPE_R)
            /* read-high */
            __set_bit(msr, msr_bitmap + 0x400 / f);
        if (type & MSR_TYPE_W)
            /* write-high */
    } */

}
+\_\_set\_bit(msr, msr\_bitmap + 0xc00 / f);
+
+
+}
+
+
+static \_\_always\_inline void vmx\_set\_intercept\_for\_msr(unsigned long *msr\_bitmap,
+ u32 msr, int type, bool value)
+
+
+{
+  +\_if (value)
+  +vmx\_enable\_intercept\_for\_msr(msr\_bitmap, msr, type);
+  +else
+  +vmx\_disable\_intercept\_for\_msr(msr\_bitmap, msr, type);
+
+
+}

/*
* If a msr is allowed by L0, we should check whether it is allowed by L1.
* The corresponding bit will be cleared unless both of L0 and L1 allow it.
@@ -5001,28 +5305,68 @@
}
}

- static void vmx\_disable\_intercept\_for\_msr(u32 msr, bool longmode\_only)
+static u8 vmx\_msr\_bitmap\_mode(struct kvm\_vcpu *vcpu)
+
+{
+  +if (!longmode\_only)
+  +  _vmx\_disable\_intercept\_for\_msr(vmx\_msr\_bitmap\_legacy,
+  +msr, MSR\_TYPE\_R | MSR\_TYPE\_W);
+  +_vmx\_disable\_intercept\_for\_msr(vmx\_msr\_bitmap\_longmode,
+  +msr, MSR\_TYPE\_R | MSR\_TYPE\_W);
+  +}
+
-
-
- static void vmx\_disable\_intercept\_msr\_x2apic(u32 msr, int type, bool apicv\_active)
-{
-  +if (apicv\_active) {
-  +_vmx\_disable\_intercept\_for\_msr(vmx\_msr\_bitmap\_legacy\_x2apic\_apicv,
-  +msr, type);
-  +_vmx\_disable\_intercept\_for\_msr(vmx\_msr\_bitmap\_longmode\_x2apic\_apicv,
-  +msr, type);
-  +} else {
-  +_vmx\_disable\_intercept\_for\_msr(vmx\_msr\_bitmap\_legacy\_x2apic,
-  +msr, type);
-  +_vmx\_disable\_intercept\_for\_msr(vmx\_msr\_bitmap\_longmode\_x2apic,
-  +msr, type);
-  +} mode = 0;
+  +if (cpu\_has\_secondary\_exec\_ctrls() &
+  +(vmcs\_read32(SECONDARY\_VM\_EXEC\_CONTROL) &
+  SECONDARY\_EXEC\_VIRTUALIZE\_X2APIC\_MODE)) {
+mode |= MSR_BITMAP_MODE_X2APIC;
+if (enable_apicv && kvm_vcpu_apicv_active(vcpu))
+mode |= MSR_BITMAP_MODE_X2APIC_APICV;
+
+if (is_long_mode(vcpu))
+mode |= MSR_BITMAP_MODE_LM;
+
+return mode;
+
+#define X2APIC_MSR(r) (APIC_BASE_MSR + ((r) >> 4))
+
+static void vmx_update_msr_bitmap_x2apic(unsigned long *msr_bitmap,
+u8 mode)
+{
+int msr;
+
+for (msr = 0x800; msr <= 0x8ff; msr += BITS_PER_LONG) {
+unsigned word = msr / BITS_PER_LONG;
+msr_bitmap[word] = (mode & MSR_BITMAP_MODE_X2APIC_APICV) ? 0 : ~0;
+msr_bitmap[word + (0x800 / sizeof(long))] = ~0;
+
+if (mode & MSR_BITMAP_MODE_X2APIC) {
+/*
+ * TPR reads and writes can be virtualized even if virtual interrupt
+ * delivery is not in use.
+ */
+vmx_disable_intercept_for_msr(msr_bitmap, X2APIC_MSR(APIC_TASKPRI), MSR_TYPE_RW);
+if (mode & MSR_BITMAP_MODE_X2APIC_APICV) {
+vmx_enable_intercept_for_msr(msr_bitmap, X2APIC_MSR(APIC_TMCCT), MSR_TYPE_R);
+vmx_disable_intercept_for_msr(msr_bitmap, X2APIC_MSR(APIC_EOI), MSR_TYPE_W);
+vmx_disable_intercept_for_msr(msr_bitmap, X2APIC_MSR(APIC_SELF_IPI), MSR_TYPE_W);
+
+}
+
+static void vmx_update_msr_bitmap(struct kvm_vcpu *vcpu)
+{
+struct vcpu_vmx *vmx = to_vmx(vcpu);
+unsigned long *msr_bitmap = vmx->vmcs01.msr_bitmap;
+u8 mode = vmx_msr_bitmap_mode(vcpu);
+u8 changed = mode ^ vmx->msr_bitmap_mode;
+
+if (!changed)
+return;
+
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+vmx_set_intercept_for_msr(msr_bitmap, MSR_KERNEL_GS_BASE, MSR_TYPE_RW,
+ !(mode & MSR_BITMAP_MODE_LM));
+
+if (changed & (MSR_BITMAP_MODE_X2APIC | MSR_BITMAP_MODE_X2APIC_APICV))
+vmx_update_msr_bitmap_x2apic(msr_bitmap, mode);
+
+vmx->msr_bitmap_mode = mode;
}

static bool vmx_get_enable_apicv(struct kvm_vcpu *vcpu)
@@ -5129,14 +5473,15 @@
if (is_guest_mode(vcpu) &&
    vector == vmx->nested.posted_intr_nv) {
    /* the PIR and ON have been set by L1. */
-kvm_vcpu_trigger_posted_interrupt(vcpu, true);
/*
 * If a posted intr is not recognized by hardware,
 * we will accomplish it in the next vmentry.
 */
    vmx->nested.pi_pending = true;
    kvm_make_request(KVM_REQ_EVENT, vcpu);
    /* the PIR and ON have been set by L1. */
+kvm_vcpu_trigger_posted_interrupt(vcpu, true))
    kvm_vcpu_kick(vcpu);
    return 0;
}
return -1;
@@ -5148,24 +5493,29 @@
    */
    -static void vmx_deliver_posted_interrupt(struct kvm_vcpu *vcpu, int vector)
    +static int vmx_deliver_posted_interrupt(struct kvm_vcpu *vcpu, int vector)
    
    struct vcpu_vmx *vmx = to_vmx(vcpu);
    int r;

    r = vmx->nested.posted_interrupt(vcpu, vector);
    if (!r)
       -return;
    +return 0;
    +
    +if (!vcpu->arch.apicv_active)
       +return -1;

    if (pi_test_and_set_pir(vector, &vmx->pi_desc))
       -return;
return 0;

/* If a previous notification has sent the IPI, nothing to do. */
if (pi_test_and_set_on(&vmx->pi_desc))
    return;
+return 0;

if (!kvm_vcpu_trigger_posted_interrupt(vcpu, false))
kvm_vcpu_kick(vcpu);
+
+return 0;
}
/*
@@ -5233,6 +5583,8 @@
static void set_cr4_guest_host_mask(struct vcpu_vmx *vmx)
{
+BUILD_BUG_ON(KVM_CR4_GUEST_OWNED_BITS & ~KVM_POSSIBLE_CR4_GUEST_BITS);
+
    vmx->vcpu.arch.cr4_guest_owned_bits = KVM_CR4_GUEST_OWNED_BITS;
    if (enable_ept)
        vmx->vcpu.arch.cr4_guest_owned_bits |= X86_CR4_PGE;
@@ -5274,7 +5626,7 @@
}
if (cpu_has_vmx_msr_bitmap())
    vmx_set_msr_bitmap(vcpu);
+vmx_update_msr_bitmap(vcpu);
}
static u32 vmx_exec_control(struct vcpu_vmx *vmx)
@@ -5461,7 +5813,7 @@
vmcs_write64(VMWRITE_BITMAP, __pa(vmx_vmwrite_bitmap));
}
if (cpu_has_vmx_msr_bitmap())
    vmcs_write64(MSR_BITMAP, __pa(vmx->vmcs01.msr_bitmap));
+vmcs_write64(MSR_BITMAP, __pa(vmx->vmcs01.msr_bitmap));
vmcs_write64(VMCS_LINK_POINTER, -1ull); /* 22.3.1.5 */
@@ -5517,9 +5869,9 @@
vmcs_write64(VM_ENTRY_MSR_LOAD_COUNT, 0);
vmcs_write32(VM_EXIT_MSR_STORE_COUNT, 0);
vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, 0);
-vmcs_write64(VM_EXIT_MSR_LOAD_ADDR, __pa(vmx->msr_autoload.host));
+vmcs_write64(VM_EXIT_MSR_LOAD_ADDR, __pa(vmx->msr_autoload.host.val));
vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, 0);
-vmcs_write64(VM_ENTRY_MSR_LOAD_ADDR, __pa(vmx->msr_autoload.guest));
+vmcs_write64(VM_ENTRY_MSR_LOAD_ADDR, __pa(vmx->msr_autoload.guest.val));

if (vmcs_config.vmentry_ctrl & VM_ENTRY_LOAD_IA32_PAT)
  vmcs_write64(GUEST_IA32_PAT, vmx->vcpu.arch.pat);
  @@ -5539,7 +5891,6 @@
  ++vmx->nmsrs;
}

-vm_exit_controls_init(vmx, vmcs_config.vmexit_ctrl);

/* 22.2.1, 20.8.1 */
@@ -5567,7 +5918,9 @@
  u64 cr0;

  vmx->rmode.vm86_active = 0;
  +vmx->spec_ctrl = 0;
  +vcpu->arch.microcode_version = 0x100000000ULL;
  vmx->vcpu.arch.regs[VCPU_REGS_RDX] = get_rdx_init_val();
  kvm_set_cr8(vcpu, 0);
  @@ -5803,8 +6156,13 @@

static int vmx_interrupt_allowed(struct kvm_vcpu *vcpu)
{
  -return (!to_vmx(vcpu)->nested.nested_run_pending &&
  -vmcs_readl(GUEST_RFLAGS) & X86_EFLAGS_IF) &&
  +if (to_vmx(vcpu)->nested.nested_run_pending)
  +return false;
  +
  +if (is_guest_mode(vcpu) && nested_exit_on_intr(vcpu))
  +return true;
  +
  +return (vmcs_readl(GUEST_RFLAGS) & X86_EFLAGS_IF) &&
  +(vmcs_read32(GUEST_INTERRUPTIBILITY_INFO) &
  (GUEST_INTR_STATE_STI | GUEST_INTR_STATE_MOV_SS));
}
@@ -5889,7 +6247,7 @@
*/
static void kvm_machine_check(void)
{
  -#if defined(CONFIG_X86_MCE) && defined(CONFIG_X86_64)
  +#if defined(CONFIG_X86_MCE)
  struct pt_regs regs = {
    .cs = 3, /* Fake ring 3 no matter what the guest ran on */
    .flags = X86_EFLAGS_IF,
vcpu->arch.dr6 &= ~15;
vcpu->arch.dr6 |= dr6 | DR6_RTM;
-if (!(dr6 & ~DR6_RESERVED)) /* icebp */
+if (is_icebp(intr_info))
skip_emulated_instruction(vcpu);

kvm_queue_exception(vcpu, DB_VECTOR);
@@ -6563,7 +6921,21 @@
if (!is_guest_mode(vcpu) &&
 !kvm_io_bus_write(vcpu, KVM_FAST_MMIO_BUS, gpa, 0, NULL)) {
trace_kvm_fast_mmio(gpa);
-return kvm_skip_emulated_instruction(vcpu);
+/*
+ * Doing kvm_skip_emulated_instruction() depends on undefined
+ * behavior: Intel's manual doesn't mandate
+ * VM_EXIT_INSTRUCTION_LEN to be set in VMCS when EPT MISCONFIG
+ * occurs and while on real hardware it was observed to be set,
+ * other hypervisors (namely Hyper-V) don't set it, we end up
+ * advancing IP with some random value. Disable fast mmio when
+ * running nested and keep it for real hardware in hope that
+ * VM_EXIT_INSTRUCTION_LEN will always be set correctly.
+ */
+if (!static_cpu_has(X86_FEATURE_HYPERVISOR))
+return kvm_skip_emulated_instruction(vcpu);
+else
+return emulate_instruction(vcpu, EMULTYPE_SKIP) ==
+EMULATE_DONE;
}

ret = kvm_mmu_page_fault(vcpu, gpa, PFERR_RSVD_MASK, NULL, 0);
@@ -6617,12 +6989,12 @@
goto out;
}

-if (err != EMULATE_DONE) {
-vcpu->run->exit_reason = KVM_EXIT_INTERNAL_ERROR;
-vcpu->run->internal.suberror = KVM_INTERNAL_ERROR_EMULATION;
-vcpu->run->internal.ndata = 0;
-return 0;
-}
+if (err != EMULATE_DONE)
goto emulation_error;
+
+if (vmx->emulation_required && !vmx->rmode.vm86_active &&
+ vcpu->arch.exception.pending)
goto emulation_error;
if (vcpu->arch.halt_request) {
    vcpu->arch.halt_request = 0;
    @ @ -6638,6 +7010,12 @ @
}

out:
return ret;
+
+emulation_error:
+vcpu->run->exit_reason = KVM_EXIT_INTERNAL_ERROR;
+vcpu->run->internal.suberror = KVM_INTERNAL_ERROR_EMULATION;
+vcpu->run->internal.ndata = 0;
+return 0;
}

static int __grow_ple_window(int val)
@@ -6744,7 +7122,7 @@

static __init int hardware_setup(void)
{
    -int r = -ENOMEM, i, msr;
    +int r = -ENOMEM, i;

    rdmsrl_safe(MSR_EFER, &host_efer);
    @ @ -6764,9 +7142,6 @@

    memset(vmx_io_bitmap_b, 0xff, PAGE_SIZE);
    -memset(vmx_msr_bitmap_legacy, 0xff, PAGE_SIZE);
    -memset(vmx_msr_bitmap_longmode, 0xff, PAGE_SIZE);
    -
    if (setup_vmcs_config(&vmcs_config) < 0) {
        r = -EIO;
        goto out;
        @ @ -6835,42 +7210,8 @@
        kvm_tsc_scaling_ratio_frac_bits = 48;
    }
    -vmx_disable_intercept_for_msr(MSR_FS_BASE, false);
    -vmx_disable_intercept_for_msr(MSR_GS_BASE, false);
    -vmx_disable_intercept_for_msr(MSR_KERNEL_GS_BASE, true);
    -vmx_disable_intercept_for_msr(MSR_IA32_SYSENTER_CS, false);
    -vmx_disable_intercept_for_msr(MSR_IA32_SYSENTER_ESP, false);
    -vmx_disable_intercept_for_msr(MSR_IA32_SYSENTER_EIP, false);
    -
    memcpy(vmx_msr_bitmap_legacy_x2apic_apicv,
        vmx_msr_bitmap_legacy, PAGE_SIZE);
memcpy(vmx-msr-bitmap-longmode_x2apic_apicv,
    vmx-msr-bitmap-longmode, PAGE_SIZE);
memcpy(vmx-msr-bitmap-legacy_x2apic,
    vmx-msr-bitmap-legacy, PAGE_SIZE);
memcpy(vmx-msr-bitmap-longmode_x2apic,
    vmx-msr-bitmap-longmode, PAGE_SIZE);
set_bit(0, vmx-vpid-bitmap); /* 0 is reserved for host */

for (msr = 0x800; msr <= 0x8ff; msr++) {
    if (msr == 0x839 /* TMCCT */) continue;
    vmx-disable-intercept-msr_x2apic(msr, MSR_TYPE_R, true);
}

/* TPR reads and writes can be virtualized even if virtual interrupt
 * delivery is not in use.
 */
vmx-disable-intercept-msr_x2apic(0x808, MSR_TYPE_W, true);
vmx-disable-intercept-msr_x2apic(0x808, MSR_TYPE_R | MSR_TYPE_W, false);

/* EOI */
vmx-disable-intercept-msr_x2apic(0x80b, MSR_TYPE_W, true);
/* SELF-IPI */
vmx-disable-intercept-msr_x2apic(0x83f, MSR_TYPE_W, true);
if (enable_ept)
    vmx-enable_tdp();
else
    @ @ -6907,13 +7248,16 @ @
kvm-mce-cap-supported |= MCG_LMCE_P;

return alloc_kvm_area();
+r = alloc_kvm_area();
+if (r)
+goto out;
+return 0;

out:
for (i = 0; i < VMX_BITMAP_NR; i++)
    free_page((unsigned long)vmx_bitmap[i]);
static __exit void hardware_unsetup(void)
@@ -6974,94 +7318,6 @@
}

/*
 - * To run an L2 guest, we need a vmcs02 based on the L1-specified vmcs12.
 - * We could reuse a single VMCS for all the L2 guests, but we also want the
 - * option to allocate a separate vmcs02 for each separate loaded vmcs12 - this
 - * allows keeping them loaded on the processor, and in the future will allow
 - * optimizations where prepare_vmcs02 doesn't need to set all the fields on
 - * every entry if they never change.
 - * So we keep, in vmx->nested.vmcs02_pool, a cache of size VMCS02_POOL_SIZE
 - * (>=0) with a vmcs02 for each recently loaded vmcs12s, most recent first.
 - *
 - * The following functions allocate and free a vmcs02 in this pool.
 - */
-
-/* Get a VMCS from the pool to use as vmcs02 for the current vmcs12. */
-static struct loaded_vmcs *nested_get_current_vmcs02(struct vcpu_vmx *vmx)
-{    
-    struct vmcs02_list *item;
-    list_for_each_entry(item, &vmx->nested.vmcs02_pool, list)
-        if (item->vmptr == vmx->nested.current_vmptr) {
-            list_move(&item->list, &vmx->nested.vmcs02_pool);
-            return &item->vmcs02;
-        }
-    
-    if (vmx->nested.vmcs02_num >= max(VMCS02_POOL_SIZE, 1)) {
-        /* Recycle the least recently used VMCS. */
-        item = list_last_entry(&vmx->nested.vmcs02_pool,
-            &struct vmcs02_list, list);
-        item->vmptr = vmx->nested.current_vmptr;
-        list_move(&item->list, &vmx->nested.vmcs02_pool);
-        return &item->vmcs02;
-    }
-    
-    /* Create a new VMCS */
-    item = kzalloc(sizeof(struct vmcs02_list), GFP_KERNEL);
-    if (!item)
-        return NULL;
-    item->vmcs02.vmcs = alloc_vmcs();
-    item->vmcs02.shadow_vmcs = NULL;
-    if (!item->vmcs02.vmcs) {
-        kfree(item);
-        return NULL;
-    }
-    loaded_vmcs_init(&item->vmcs02);
-    item->vmptr = vmx->nested.current_vmptr;
- list_add(&(item->list), &(vmx->nested.vmcs02_pool));
- vmx->nested.vmcs02_num++;
- return &item->vmcs02;
- }
-
- /* Free and remove from pool a vmcs02 saved for a vmcs12 (if there is one) */
- static void nested_free_vmcs02(struct vcpu_vmx *vmx, gpa_t vmptr)
- {
-    struct vmcs02_list *item;
-    list_for_each_entry(item, &vmx->nested.vmcs02_pool, list)
-        if (item->vmptr == vmptr) {
-            free_loaded_vmcs(&item->vmcs02);
-            list_del(&item->list);
-            kfree(item);
-            vmx->nested.vmcs02_num--;
-            return;
-        }
-    }
-
-    /* Free all VMCSs saved for this vcpu, except the one pointed by
-    * vmx->loaded_vmcs. We must be running L1, so vmx->loaded_vmcs
-    * must be &vmx->vmcs01.
-    */
- static void nested_free_all_saved_vmcss(struct vcpu_vmx *vmx)
- {
-    struct vmcs02_list *item, *n;
-
-    WARN_ON(vmx->loaded_vmcs != &vmx->vmcs01);
-    list_for_each_entry_safe(item, n, &vmx->nested.vmcs02_pool, list) {
-        if (vmx->loaded_vmcs == &item->vmcs02)
-            continue;
-
-            free_loaded_vmcs(&item->vmcs02);
-            list_del(&item->list);
-            kfree(item);
-            vmx->nested.vmcs02_num--;
-            }
-        }
-
-    /* The following 3 functions, nested_vmx_succeed()/failValid()/failInvalid(),
-    * set the success or error code of an emulated VMX instruction, as specified
-    * by Vol 2B, VMX Instruction Reference, "Conventions".
-
@ @ -7161,25 +7417,50 @@

/* Addr = segment_base + offset */
/* offset = base + [index * scale] + displacement */
off = exit_qualification; /* holds the displacement */
+if (addr_size == 1)
+off = (gva_t)sign_extend64(off, 31);
+else if (addr_size == 0)
+off = (gva_t)sign_extend64(off, 15);
if (base_is_valid)
off += kvm_register_read(vcpu, base_reg);
if (index_is_valid)
off += kvm_register_read(vcpu, index_reg)<<scaling;
vmx_get_segment(vcpu, &s, seg_reg);
-*ret = s.base + off;

+/*
+ * The effective address, i.e. @off, of a memory operand is truncated
+ * based on the address size of the instruction. Note that this is
+ * the *effective address*, i.e. the address prior to accounting for
+ * the segment's base.
+ */
+if (addr_size == 1) /* 32 bit */
-*ret &= 0xffffffff;
+off &= 0xffffffff;
+else if (addr_size == 0) /* 16 bit */
+off &= 0xffff;

/* Checks for #GP/#SS exceptions. */
exn = false;
if (is_long_mode(vcpu)) {
+/*
+ * The virtual/linear address is never truncated in 64-bit
+ * mode, e.g. a 32-bit address size can yield a 64-bit virtual
+ * address when using FS/GS with a non-zero base.
+ */
+*ret = s.base + off;
+
/* Long mode: #GP(0)/#SS(0) if the memory address is in a
 * non-canonical form. This is the only check on the memory
 * destination for long mode!
 */
exn = is_noncanonical_address(*ret, vcpu);
} else if (is_protmode(vcpu)) {
+/*
+ * When not in long mode, the virtual/linear address is
+ * unconditionally truncated to 32 bits regardless of the
+ * address size.
+ */
/* Protected mode: apply checks for segment validity in the
 * following order:
 * - segment type check (#GP(0) may be thrown)
 * @ @ -7203,10 +7484,16 @ @
 /* Protected mode: #GP(0)/#SS(0) if the segment is unusable.
 */
exn = (s.unusable != 0);
-/* Protected mode: #GP(0)/#SS(0) if the memory
-	* operand is outside the segment limit.
- */
-exn = exn || (off + sizeof(u64) > s.limit);
+
+/*
+ * Protected mode: #GP(0)/#SS(0) if the memory operand is
+ * outside the segment limit. All CPUs that support VMX ignore
+ * limit checks for flat segments, i.e. segments with base==0,
+ * limit==0xffffffff and of type expand-up data or code.
+ */
+if (!(s.base == 0 && s.limit == 0xffffffff &&
+     ((s.type & 8) || !(s.type & 4))))
+exn = exn || (off + sizeof(u64) > s.limit);
}
if (exn) {
    kvm_queue_exception_e(vcpu,
    @ @ -7228,8 +7515,7 @ @
    vmcs_read32(VMX_INSTRUCTION_INFO), false, &gva))
    return 1;

-if (kvm_read_guest_virt(&vcpu->arch.emulate_ctxt, gva, vmpointer,
-sizeof(*vmpointer), &e)) {
+if (kvm_read_guest_virt(vcpu, gva, vmpointer, sizeof(*vmpointer), &e)) {
    kvm_inject_page_fault(vcpu, &e);
    return 1;
    }
    @ @ -7241,13 +7527,11 @ @
    }
    struct vcpu_vmx *vmx = to_vmx(vcpu);
    struct vmcs *shadow_vmcs;
    int r;

-if (cpu_has_vmx_msr_bitmap()) {
-vmx->nested.msr_bitmap =
-{(unsigned long *))__get_free_page(GFP_KERNEL);
-if (!vmx->nested.msr_bitmap)
-goto out_msr_bitmap;
-}
+r = alloc_loaded_vmcs(&vmx->nested.vmcs02);
+if (r < 0)
+goto out_vmcs02;

vmx->nested.cached_vmcs12 = kmalloc(VMCS12_SIZE, GFP_KERNEL);
if (!vmx->nested.cached_vmcs12)
@@ -7264,13 +7548,12 @@
vmx->vmcs01.shadow_vmcs = shadow_vmcs;
}

-INIT_LIST_HEAD(&(vmx->nested.vmcs02_pool));
-vmx->nested.vmcs02_num = 0;
-
- hrtimer_init(&vmx->nested.preemption_timer, CLOCK_MONOTONIC,
- HRTIMER_MODE_REL_PINNED);
vmx->nested.preemption_timer.function = vmx_preemption_timer_fn;

+vmx->nested.vpid02 = allocate_vpid();
+
vmx->nested.vmxon = true;
return 0;

@@ -7278,9 +7561,9 @@
kfree(vmx->nested.cached_vmcs12);

out_cached_vmcs12:
-free_page((unsigned long)vmx->nested.msr_bitmap);
+free_loaded_vmcs(&vmx->nested.vmcs02);

-out_msr_bitmap:
+out_vmcs02:
return -ENOMEM;
}

@@ -7315,6 +7598,12 @@
return 1;
}

+/* CPL=0 must be checked manually. */
+if (vmx->get_cpl(vcpu)) {
+kvm_inject_gp(vcpu, 0);
+return 1;
+}
+
+if (vmx->nested.vmxon) {
nested_vmx_failValid(vcpu, VMXERR_VMXON_IN_VMX_ROOT_OPERATION);
return kvm_skip_emulated_instruction(vcpu);
@@ -7374,6 +7663,11 @@
static int nested_vmx_check_permission(struct kvm_vcpu *vcpu) {
    if (vmx_get_cpl(vcpu)) {
        kvm_inject_gp(vcpu, 0);
        return 0;
    }

    if (!to_vmx(vcpu)->nested.vmxon) {
        kvm_queue_exception(vcpu, UD_VECTOR);
        return 0;
    }

    vmcs_clear_bits(SECONDARY_VM_EXEC_CONTROL, SECONDARY_EXEC_SHADOW_VMCS);
    vmcs_write64(VMCS_LINK_POINTER, -1ull);
    vmx->nested.sync_shadow_vmcs = false;
}

static inline void nested_release_vmcs12(struct vcpu_vmx *vmx) {
    copy_shadow_to_vmcs12(vmx);
    vmx->nested.sync_shadow_vmcs = false;
    vmx_disable_shadow_vmcs(vmx);
    vmx->nested.posted_intr_nv = -1;
    if (!vmx->nested.vmxon && !vmx->nested.smm.vmxon)
        return;

    hrtimer_cancel(&vmx->nested.preemption_timer);
    vmx->nested.vmxon = false;
    vmx->nested.smm.vmxon = false;
    free_vpid(vmx->nested.vpid02);
    vmx->nested.posted_intr_nv = -1;
    vmx->nested.current_vmptr = -1ull;
    if (vmx->nested.msr_bitmap) {
        free_page((unsigned long)vmx->nested.msr_bitmap);
        vmx->nested.msr_bitmap = NULL;
    } else if (enable_shadow_vmcs) {
        vmcs_clear(vmcs->vmcs01.shadow_vmcs);
        vmx->vmcs01.shadow_vmcs = NULL;
    }
    kfree(vmx->nested.cached_vmcs12);
/* Unpin physical memory we referred to in current vmcs02 */
/* Unpin physical memory we referred to in the vmcs02 */
if (vmx->nested.apic_access_page) {
    kvm_release_page_dirty(vmx->nested.apic_access_page);
    vmx->nested.apic_access_page = NULL;
    @ @ -7450,7 +7741,7 @@
    vmx->nested.pi_desc = NULL;
}

-nested_free_all_saved_vmcss(vmx);
+free_loaded_vmcs(&vmx->nested.vmcs02);
}

/* Emulate the VMXOFF instruction */
@@ -7493,8 +7784,6 @@
    vmptr + offsetof(struct vmcs12, launch_state),
    &zero, sizeof(zero));

-nested_free_vmcs02(vmx, vmptr);
-
    nested_vmx_succeed(vcpu);
    return kvm_skip_emulated_instruction(vcpu);
} 
@@ -7588,6 +7877,9 @@
    const unsigned long *fields = shadow_read_write_fields;
    const int num_fields = max_shadow_read_write_fields;

+if (WARN_ON(!shadow_vmcs))
+return;
+
    preempt_disable();

    vmcs_load(shadow_vmcs);
    @ @ -7635,6 +7927,9 @@
    u64 field_value = 0;
    struct vmcs *shadow_vmcs = vmx->vmcs01.shadow_vmcs;

+if (WARN_ON(!shadow_vmcs))
+return;
+
    vmcs_load(shadow_vmcs);
    for (q = 0; q < ARRAY_SIZE(fields); q++) {
@@ -7687,6 +7982,7 @@
    unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
    u32 vmx_instruction_info = vmcs_read32(VMX_INSTRUCTION_INFO);
    gva_t gva = 0;
+struct x86_exception e;
if (!nested_vmx_check_permission(vcpu))
return 1;
@@ -7713,9 +8009,13 @@
if (get_vmx_mem_address(vcpu, exit_qualification,
vmx_instruction_info, true, &gva))
return 1;
/*_system ok, as hardware has verified cpl=0 */
-kvm_write_guest_virt_system(&vcpu->arch.emulate_ctxt, gva,
- &field_value, (is_long_mode(vcpu) ? 8 : 4), NULL);
+/*_system ok, nested_vmx_check_permission has verified cpl=0 */
+if (kvm_write_guest_virt_system(vcpu, gva, &field_value,
+ (is_long_mode(vcpu) ? 8 : 4),
+ &e)) {
+kvm_inject_page_fault(vcpu, &e);
+return 1;
+
}

nested_vmx_succeed(vcpu);
@@ -7751,8 +8051,8 @@
if (get_vmx_mem_address(vcpu, exit_qualification,
vmx_instruction_info, false, &gva))
return 1;
-if (kvm_read_guest_virt(&vcpu->arch.emulate_ctxt, gva,
- &field_value, (is_64_bit_mode(vcpu) ? 8 : 4), &e)) {
+if (kvm_read_guest_virt(vcpu, gva, &field_value,
+ (is_64_bit_mode(vcpu) ? 8 : 4), &e)) {
+kvm_inject_page_fault(vcpu, &e);
+return 1;
+
)}

/* Emulate the VMPTRST instruction */
static int handle_vmptrst(struct kvm_vcpu *vcpu)
{

-unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
-unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
-unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
-unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
+unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
+unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
+unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
+unsigned long exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
+gpa_t current_vmptr = to_vmx(vcpu)->nested.current_vmptr;
+gpa_t current_vmptr = to_vmx(vcpu)->nested.current_vmptr;

if (!nested_vmx_check_permission(vcpu))
return 1;

-if (get_vmx_mem_address(vcpu, exit_qualification,
if (get_vmx_mem_address(vcpu, exit_qual, instr_info, true, &gva))
return 1;
/* ok to use *_system, as hardware has verified CPL=0 */
-if (kvm_write_guest_virt_system(&vcpu->arch.emulate_ctxt, vmcs_gva,
-(void *)&to_vmx(vcpu)->nested.current_vmptr,
-sizeof(u64), &e)) {
+/* _system ok, nested_vmx_check_permission has verified CPL=0 */
+if (kvm_write_guest_virt_system(vcpu, gva, (void *)&current_vmptr,
+sizeof(gpa_t), &e)) {
kvm_inject_page_fault(vcpu, &e);
return 1;
}
@@ -7906,8 +8205,7 @@
if (get_vmx_mem_address(vcpu, vmcs_readl(EXIT_QUALIFICATION),
vmx_instruction_info, false, &gva))
return 1;
-if (kvm_read_guest_virt(&vcpu->arch.emulate_ctxt, gva, &operand,
-sizeof(operand), &e)) {
+if (kvm_read_guest_virt(vcpu, gva, &operand, sizeof(operand), &e)) {
kvm_inject_page_fault(vcpu, &e);
return 1;
}
@@ -7971,8 +8269,7 @@
if (get_vmx_mem_address(vcpu, vmcs_readl(EXIT_QUALIFICATION),
vmx_instruction_info, false, &gva))
return 1;
-if (kvm_read_guest_virt(&vcpu->arch.emulate_ctxt, gva, &operand,
-sizeof(operand), &e)) {
+if (kvm_read_guest_virt(vcpu, gva, &operand, sizeof(operand), &e)) {
kvm_inject_page_fault(vcpu, &e);
return 1;
}
@@ -8005,7 +8302,7 @@
return kvm_skip_emulated_instruction(vcpu);
}

-__vmx_flush_tlb(vcpu, vmx->nested.vpid02);
+__vmx_flush_tlb(vcpu, vmx->nested.vpid02, true);
nested_vmx_succeed(vcpu);

return kvm_skip_emulated_instruction(vcpu);
@@ -8219,23 +8516,17 @@
static const int kvm_vmx_max_exit_handlers =
ARRAY_SIZE(kvm_vmx_exit_handlers);

-static bool nested_vmx_exit_handled_io(struct kvm_vcpu *vcpu,
-struct vmcs12 *vmcs12)
bool nested_vmx_check_io_bitmaps(struct kvm_vcpu *vcpu, unsigned int port, int size)
{
    unsigned long exit_qualification;
    struct vmcs12 *vmcs12 = get_vmcs12(vcpu);
    gpa_t bitmap, last_bitmap;
    unsigned int port;
    int size;
    u8 b;

    if (!nested_cpu_has(vmcs12, CPU_BASED_USE_IO_BITMAPS))
        return nested_cpu_has(vmcs12, CPU_BASED_UNCOND_IO_EXITING);  
    exit_qualification = vmcs_readl(EXIT_QUALIFICATION);
    port = exit_qualification >> 16;
    size = (exit_qualification & 7) + 1;
    last_bitmap = (gpa_t)-1;
    b = -1;

    switch ((u16)exit_reason) {
        case EXIT_REASON_EXCEPTION_NMI:
if (is_nmi(intr_info))
    return false;
else if (is_page_fault(intr_info))
    return !vmx->vcpu.arch.apf.host_apf_reason && enable_ept;
-else if (is_no_device(intr_info) &&
    !(vmcs12->guest_cr0 & X86_CR0_TS))
    return false;
else if (is_debug(intr_info) &&
    vcpu->guest_debug &
    (KVM_GUESTDBG_SINGLESTEP | KVM_GUESTDBG_USE_HW_BP))
@@ -8854,6 +9143,7 @@
    (exit_reason != EXIT_REASON_EXCEPTION_NMI &&
    exit_reason != EXIT_REASON_EPT_VIOLATION &&
    exit_reason != EXIT_REASON_PML_FULL &&
+exit_reason != EXIT_REASON_APIC_ACCESS &&
    exit_reason != EXIT_REASON_TASK_SWITCH)) {
    vcpu->run->exit_reason = KVM_EXIT_INTERNAL_ERROR;
    vcpu->run->internal.suberror = KVM_INTERNAL_ERROR_DELIVERY_EV;
@@ -8899,6 +9189,76 @@
    }
}

+/*
+ * Software based L1D cache flush which is used when microcode providing
+ * the cache control MSR is not loaded.
+ *
+ * The L1D cache is 32 KiB on Nehalem and later microarchitectures, but to
+ * flush it is required to read in 64 KiB because the replacement algorithm
+ * is not exactly LRU. This could be sized at runtime via topology
+ * information but as all relevant affected CPUs have 32KiB L1D cache size
+ * there is no point in doing so.
+ */
+static void vmx_l1d_flush(struct kvm_vcpu *vcpu)
+{
+    int size = PAGE_SIZE << L1D_CACHE_ORDER;
+    +/*
+    * This code is only executed when the the flush mode is 'cond' or
+    * 'always'
+    */
+    if (static_branch_likely(&vmx_l1d_flush_cond)) {
+        bool flush_l1d;
+        +/*
+        * Clear the per-vcpu flush bit, it gets set again
+        * either from vcpu_run() or from one of the unsafe
+        * VMEXIT handlers.
+        */

+flush_l1d = vcpu->arch.l1tf_flush_l1d;
+vcpu->arch.l1tf_flush_l1d = false;
+
+/*
+ * Clear the per-cpu flush bit, it gets set again from
+ * the interrupt handlers.
+ */
+flush_l1d |= kvm_get_cpu_l1tf_flush_l1d();
+kvm_clear_cpu_l1tf_flush_l1d();
+
+if (!flush_l1d)
+return;
+
+vcpu->stat.l1d_flush++;
+
+if (static_cpu_has(X86_FEATURE_FLUSH_L1D)) {
+wmsrl(MSR_IA32_FLUSH_CMD, L1D_FLUSH);
+return;
+}
+
+asm volatile(
+/* First ensure the pages are in the TLB */
+"xorl%%eax, %%eax\n"
+".Lpopulate_tlb:\n"
+"movzbl[%flush_pages], %%eax\n"
+"addl$4096, %%eax\n"
+"cmpl%%eax, [%size]\n"
+"jne.Lpopulate_tlb\n"
+"xorl%%eax, %%eax\n"
+"cpuid\n"
+/* Now fill the cache */
+"xorl%%eax, %%eax\n"
+".Lfill_cache:\n"
+"movzbl[%flush_pages], %%eax\n"
+"addl$64, %%eax\n"
+"cmpl%%eax, [%size]\n"
+"jne.Lfill_cache\n"
+"lfence\n"
+:: [flush_pages] "r" (vmx_l1d_flush_pages),
+ [size] "r" (size)
+: "eax", "ebx", "ecx", "edx";
+}
+
+static void update_cr8_intercept(struct kvm_vcpu *vcpu, int tpr, int irr)
+{
+struct vmcs12 *vmcs12 = get_vmcs12(vcpu);
+ @ @ -8915.35 +9275.48 @ @
vmcs_write32(TPR_THRESHOLD, irr);
}

- static void vmx_set_virtual_x2apic_mode(struct kvm_vcpu *vcpu, bool set)
+ static void vmx_set_virtual_apic_mode(struct kvm_vcpu *vcpu)
{
    u32 sec_exec_control;

    /* Postpone execution until vmcs01 is the current VMCS. */
    - if (is_guest_mode(vcpu)) {
        - to_vmx(vcpu)->nested.change_vmcs01_virtual_x2apic_mode = true;
        + if (!lapic_in_kernel(vcpu))
            return;
    }

    - if (!cpu_has_vmx_virtualize_x2apic_mode())
    + if (!flexpriority_enabled &&
        + !cpu_has_vmx_virtualize_x2apic_mode())
        return;

    - if (!cpu_need_tpr_shadow(vcpu))
    */ Postpone execution until vmcs01 is the current VMCS. */
    + if (is_guest_mode(vcpu)) {
        + to_vmx(vcpu)->nested.change_vmcs01_virtual_apic_mode = true;
        return;
    }

    sec_exec_control = vmcs_read32(SECONDARY_VM_EXEC_CONTROL);
    + sec_exec_control &= ~(SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESSSES |
    + SECONDARY_EXEC_VIRTUALIZE_X2APIC_MODE);

    - if (set) {
        - sec_exec_control &= ~SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESSSES;
        - sec_exec_control |= SECONDARY_EXEC_VIRTUALIZE_X2APIC_MODE;
    - } else {
        - sec_exec_control &= ~SECONDARY_EXEC_VIRTUALIZE_X2APIC_MODE;
        - sec_exec_control |= SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESSSES;
        - vmx_flush_tlb_ept_only(vcpu);
        + switch (kvm_get_apic_mode(vcpu)) {
        + case LAPIC_MODE_INVALID:
            + WARN_ONCE(true, "Invalid local APIC state");
            + break;
        + case LAPIC_MODE_DISABLED:
            + break;
        + case LAPIC_MODE_XAPIC:
            + if (flexpriority_enabled) {
                + sec_exec_control |=
                + SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESSSES;
                + vmx_flush_tlb(vcpu, true);
case LAPIC_MODE_X2APIC:
    if (cpu_has_vmx_virtualize_x2apic_mode())
        sec_exec_control |= SECONDARY_EXEC_VIRTUALIZE_X2APIC_MODE;
    break;
}
vmcs_write32(SECONDARY_VM_EXEC_CONTROL, sec_exec_control);

vmx_set_msr_bitmap(vcpu);
vmx_update_msr_bitmap(vcpu);

static void vmx_set_apic_access_page_addr(struct kvm_vcpu *vcpu, hpa_t hpa)
@@ -8967,7 +9340,7 @@
    !nested_cpu_has2(get_vmcs12(&vmx->vcpu),
        SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESSSES)) {
    vmcs_write64(APIC_ACCESS_ADDR, hpa);
-vmx_flush_tlb_ept_only(vcpu);
+vmx_flush_tlb(vcpu, true);
}
}
@@ -9054,6 +9427,11 @@
return max_irr;
}

static bool vmx_dy_apicv_has_pending_interrupt(struct kvm_vcpu *vcpu)
{
    return pi_test_on(vcpu_to_pi_desc(vcpu));
+
    static void vmx_load_eoi_exitmap(struct kvm_vcpu *vcpu, u64 *eoi_exit_bitmap)
    {
        if (!kvm_vcpu_apicv_active(vcpu))
@@ -9075,28 +9453,21 @@
        u32 exit_intr_info = 0;
        u16 basic_exit_reason = (u16)vmx->exit_reason;
        -
-        if (!(basic_exit_reason == EXIT_REASON_MCE_DURING_VMENTRY
-            || basic_exit_reason == EXIT_REASON_EXCEPTION_NMI))
-            return;
+        if (vmx->exit_reason != EXIT_REASON_EXCEPTION_NMI)
+            return;

static void vmx_complete_atomic_exit(struct vcpu_vmx *vmx)
{
    u32 exit_intr_info = 0;
    u16 basic_exit_reason = (u16)vmx->exit_reason;
    -
-    if (!(basic_exit_reason == EXIT_REASON_MCE_DURING_VMENTRY
-        || basic_exit_reason == EXIT_REASON_EXCEPTION_NMI))
-        return;
+    if (vmx->exit_reason != EXIT_REASON_EXCEPTION_NMI)
+        return;


-if (!(vmx->exit_reason & VMX_EXIT_REASONS_FAILED_VMENTRY))
-exit_intr_info = vmcs_read32(VM_EXIT_INTR_INFO);
-vmx->exit_intr_info = exit_intr_info;
+vmx->exit_intr_info = vmcs_read32(VM_EXIT_INTR_INFO);

/* if exit due to PF check for async PF */
-if (is_page_fault(exit_intr_info))
+if (is_page_fault(vmx->exit_intr_info))
vmx->vcpu.arch.apf.host_apf_reason = kvm_read_and_reset_pf_reason();

/* Handle machine checks before interrupts are enabled */
-if (basic_exit_reason == EXIT_REASON_MCE_DURING_VMENTRY ||
-is_machine_check(exit_intr_info))
+if (is_machine_check(vmx->exit_intr_info))
kvm_machine_check();

/* We need to handle NMIs before interrupts are enabled */
-if (is_nmi(exit_intr_info)) {
+if (is_nmi(vmx->exit_intr_info)) {
kvm_before_handle_nmi(&vmx->vcpu);
asm("int $2");
kvm_after_handle_nmi(&vmx->vcpu);
@@ -9129,14 +9500,14 @@
#ifdef CONFIG_X86_64
[sp]"=&r"(tmp),
#endif
ASM_CALL_CONSTRAINT
:
-[entry]"r"(entry),
+THUNK_TARGET(entry),
[ss]"i"(__KERNEL_DS),
[cs]"i"(__KERNEL_CS)
);
@@ -9144,9 +9515,21 @@
}
STACK_FRAME_NON_STANDARD(vmx_handle_external_intr);

-static bool vmx_has_high_real_mode_segbase(void)
+static bool vmx_has_emulated_msr(int index)
{ 
-return enable_unrestricted_guest || emulate_invalid_guest_state;
+switch (index) { 

static bool vmx_mpx_supported(void)
@@ -9290,7 +9673,7 @@
clear_atomic_switch_msr(vmx, msrs[i].msr);
else
    add_atomic_switch_msr(vmx, msrs[i].msr, msrs[i].guest,
-                       msrs[i].host);
+                       msrs[i].host, false);
}

static void vmx_arm_hv_timer(struct kvm_vcpu *vcpu)
@@ -9363,6 +9746,8 @@
    if (vcpu->guest_debug & KVM_GUESTDBG_SINGLESTEP)
        vmx_set_interrupt_shadow(vcpu, 0);

+    kvm_load_guest_xcr0(vcpu);
+    
+    if (static_cpu_has(X86_FEATURE_PKU) &&
+            kvm_read_cr4_bits(vcpu, X86_CR4_PKE) &&
+            vcpu->arch.pkru != vmx->host_pkru)
@@ -9373,44 +9758,60 @@
        vmx_arm_hv_timer(vcpu);

+/*
+ * If this vCPU has touched SPEC_CTRL, restore the guest's value if
+ * it's non-zero. Since vmentry is serialising on affected CPUs, there
+ * is no need to worry about the conditional branch over the wrmsr
+ * being speculatively taken.
+ */
+    x86_spec_ctrl_set_guest(vmx->spec_ctrl, 0);
+    
+    vmx->__launched = vmx->loaded_vmcs->launched;
-asm(
/* L1D Flush includes CPU buffer clear to mitigate MDS */
if (static_branch_unlikely(&vmx_l1d_should_flush))
vmx_l1d_flush(vcpu);
else if (static_branch_unlikely(&mds_user_clear))
mds_clear_cpu_buffers();
+
asm volatile ( 
  /* Store host registers */
  "push %%% _ASM_DX "; push %%% _ASM_BP ";"
  "push %%% _ASM_CX " \nl; /* placeholder for guest rcx */
  "push %%% _ASM_CX " \nl"

  "cmp %%% _ASM_SP ", %c[host_rsp](%0) \nl"
  +"cmp %%% _ASM_SP ", %c[host_rsp]((%% _ASM_CX )) \nl"
  
  "je 1f \nl"
  
  
  "mov %%% _ASM_SP ", %c[host_rsp](%0) \nl"
  +"mov %%% _ASM_SP ", %c[host_rsp]((%% _ASM_CX )) \nl"
  
  __ex(ASM_VMX_VMWRITE_RSP_RDX) \nl"

  "1: \nl"
  /* Reload cr2 if changed */
  "mov %c[cr2](%0), %%% _ASM_AX " \nl"
  +"mov %c[cr2](%0), %%% _ASM_CX " \nl"
  
  "mov %c[cr2], %%% _ASM_DX " \nl"
  
  "cmp %%% _ASM_AX ", %%% _ASM_DX " \nl"

  "je 2f \nl"
  
  "mov %%% _ASM_AX", %c[cr2] \nl"

  "2: \nl"
  /* Check if vmlaunch of vmresume is needed */
  
  "cmp $0, %c[launched](%0) \nl"
  +"cmpb $0, %c[launched]((%% _ASM_CX )) \nl"
  /* Load guest registers. Don't clobber flags. */
  "mov %c[rax](%0), %%% _ASM_AX " \nl"
  "mov %c[rbx](%0), %%% _ASM_BX " \nl"
  "mov %c[rdx](%0), %%% _ASM_DX " \nl"
  "mov %c[rsi](%0), %%% _ASM_SI " \nl"
  "mov %c[rdi](%0), %%% _ASM_DI " \nl"
  "mov %c[rbp](%0), %%% _ASM_BP " \nl"
  +"mov %c[rax](%0), %%% _ASM_AX " \nl"
  +"mov %c[rbx](%0), %%% _ASM_BX " \nl"
  +"mov %c[rdx](%0), %%% _ASM_DX " \nl"
  +"mov %c[rsi](%0), %%% _ASM_SI " \nl"
  +"mov %c[rdi](%0), %%% _ASM_DI " \nl"
  +"mov %c[rbp](%0), %%% _ASM_BP " \nl"
#endif

#ifdef CONFIG_X86_64
  "mov %c[r8](%0), %r8 \nl"
  "mov %c[r9](%0), %r9 \nl"
  "mov %c[r10](%0), %r10 \nl"
  "mov %c[r11](%0), %r11 \nl"
  "mov %c[r12](%0), %r12 \nl"
"mov %c[r13](%0), %r13 \n"
"mov %c[r14](%0), %r14 \n"
"mov %c[r15](%0), %r15 \n"
"mov %c[r8](%0), %r8 \n"
"mov %c[r9](%0), %r9 \n"
"mov %c[r10](%0), %r10 \n"
"mov %c[r11](%0), %r11 \n"
"mov %c[r12](%0), %r12 \n"
"mov %c[r13](%0), %r13 \n"
"mov %c[r14](%0), %r14 \n"
"mov %c[r15](%0), %r15 \n"
#endif
"mov %c[rcx](%0), %\asm_cx \n" /* kills %0 (ecx) */
+/* Load guest RCX. This kills the vmx_vcpu pointer! */
+"mov %c[rcx](%0), %\asm_cx \n"

/* Enter guest mode */
jne 1f \n"
@@ -9418,26 +9819,42 @@
jmp 2f \n"
1: " __ex(ASM_VMX_VMRESUME) "\n"
2: " /* Save guest registers, load host registers, keep flags */
"mov %0, %c[words_size](%0) \n"
"pop %0 \n"
"setbe %c[fail](%0)\n"
"mov %c[ax](%0), %c[rax](%0) \n"
"mov %c[bx](%0), %c[rbx](%0) \n"
-__ASM_SIZE(pop) " %c[rcx](%0) \n"
"mov %c[dx](%0), %c[rdx](%0) \n"
"mov %c[si](%0), %c[rsi](%0) \n"
"mov %c[di](%0), %c[rdi](%0) \n"
"mov %c.bp(0), %c[rbp](%0) \n"
+
+/* Save guest's RCX to the stack placeholder (see above) */
+"mov %c[ax](%0), %c[rcx](%0) \n"
+
+/* Load host's RCX, i.e. the vmx_vcpu pointer */
+"pop %c[ax] \n"
+
+/* Set vmx->fail based on EFLAGS.{CF,ZF} */
+"setbe %c[fail](%0) \n"
+
+/* Save all guest registers, including RCX from the stack */
+"mov %c[ax](%0), %c[rcx](%0) \n"
+"mov %c[ax](%0), %c[rcx](%0) \n"
+__ASM_SIZE(pop) " %c[rcx](%0) \n"
+"mov %c[ax](%0), %c[rcx](%0) \n"
+#ifdef CONFIG_X86_64
+    "mov %%%r8, %c[r8](%0) \n"
+    "mov %%%r9, %c[r9](%0) \n"
+    "mov %%%r10, %c[r10](%0) \n"
+    "mov %%%r11, %c[r11](%0) \n"
+    "mov %%%r12, %c[r12](%0) \n"
+    "mov %%%r13, %c[r13](%0) \n"
+    "mov %%%r14, %c[r14](%0) \n"
+    "mov %%%r15, %c[r15](%0) \n"
+    "mov %%%r8, %c[r8](%%ASM_CX) \n"
+    "mov %%%r9, %c[r9](%%ASM_CX) \n"
+    "mov %%%r10, %c[r10](%%ASM_CX) \n"
+    "mov %%%r11, %c[r11](%%ASM_CX) \n"
+    "mov %%%r12, %c[r12](%%ASM_CX) \n"
+    "mov %%%r13, %c[r13](%%ASM_CX) \n"
+    "mov %%%r14, %c[r14](%%ASM_CX) \n"
+    "mov %%%r15, %c[r15](%%ASM_CX) \n"
+    
+    /*
+     * Clear all general purpose registers (except RSP, which is loaded by
+     * the CPU during VM-Exit) to prevent speculative use of the guest's
+     * values, even those that are saved/loaded via the stack. In theory,
+     * an L1 cache miss when restoring registers could lead to speculative
+     * execution with the guest's values. Zeroing XORs are dirt cheap,
+     * i.e. the extra paranoia is essentially free.
+     */
+    "xor %%%r8d, %%%r8d \n"
+    "xor %%%r9d, %%%r9d \n"
+    "xor %%%r10d, %%%r10d \n"
+    "xor %%%r11d, %%%r11d \n"
+    "xor %%%r12d, %%%r12d \n"
+    "xor %%%r13d, %%%r13d \n"
+    "xor %%%r14d, %%%r14d \n"
+    "xor %%%r15d, %%%r15d \n"
+    
@endif

"mov %c[cr2](%0) \n"
+    "mov %%%cr2, %%%_ASM_AX \n"
+    
"mov %%%eax, %%%eax \n"
+    "xor %%%eax, %%%eax \n"
+    "xor %%%ebx, %%%ebx \n"
+    "xor %%%ecx, %%%ecx \n"
+    "xor %%%edx, %%%edx \n"
+    "xor %%%esi, %%%esi \n"
+    "xor %%%edi, %%%edi \n"
+    "xor %%%ebp, %%%ebp \n"
+    "pop %%%_ASM_BP"; pop %%%_ASM_DX \n"
+    
".pushsection .rodata \n"
+    

".global vmx_return

"vmx_return: "_ASM_PTR" 2b

".popsection"
-	 : : "c"(vmx), "d"((unsigned long)HOST_RSP),
+ : "c"((int){0}), "d"((int){0})
+ : "c"(vmx), "d"((unsigned long)HOST_RSP),
[launched]"i"(offsetof(struct vcpu_vmx, __launched)),
[fail]"i"(offsetof(struct vcpu_vmx, fail)),
[host_rsp]"i"(offsetof(struct vcpu_vmx, host_rsp)),
@@ -9491,6 +9912,26 @@
#endif
);}

+/*
+ * We do not use IBRS in the kernel. If this vCPU has used the
+ * SPEC_CTRL MSR it may have left it on; save the value and
+ * turn it off. This is much more efficient than blindly adding
+ * it to the atomic save/restore list. Especially as the former
+ * (Saving guest MSRs on vmexit) doesn't even exist in KVM.
+ *
+ * For non-nested case:
+ * If the L01 MSR bitmap does not intercept the MSR, then we need to
+ * save it.
+ *
+ * For nested case:
+ * If the L02 MSR bitmap does not intercept the MSR, then we need to
+ * save it.
+ */
+if (unlikely(!msr_write_intercepted(vcpu, MSR_IA32_SPEC_CTRL)))
+vmx->spec_ctrl = native_read_msr(MSR_IA32_SPEC_CTRL);
+
x86_spec_ctrl_restore_host(vmx->spec_ctrl, 0);
+
/* Eliminate branch target predictions from guest mode */
vmexit_fill_RSB();

@@ -9538,10 +9979,15 @@
if (vmx->nested.nested_run_pending)
kvm_make_request(KVM_REQ_EVENT, vcpu);

+kvm_put_guest_xcr0(vcpu);
+
vmx->nested.nested_run_pending = 0;
vmx->idt_vectoring_info = 0;

vmx->exit_reason = vmx->fail ? 0xdead : vmcs_read32(VM_EXIT_REASON);
+if ((u16)vmx->exit_reason == EXIT_REASON_MCE_DURING_VMENTRY)
+kvm_machine_check();
if (vmx->fail || (vmx->exit_reason & VMX_EXIT_REASONS_FAILED_VMENTRY))
    return;

@@ -9563,8 +10009,8 @@
    return;

    cpu = get_cpu();
->vmx->loaded_vmcs = vmcs;
    vmx_vcpu_put(vcpu);
+vmx->loaded_vmcs = vmcs;
    vmx_vcpu_load(vcpu, cpu);
    put_cpu();
}
@@ -9604,6 +10050,7 @@
{
    int err;
    struct vcpu_vmx *vmx = kmem_cache_zalloc(kvm_vcpu_cache, GFP_KERNEL);
+    unsigned long *msr_bitmap;
    int cpu;

    if (!vmx)
@@ -9636,13 +10083,20 @@
        goto free_pml;
-
        vmx->loaded_vmcs = &vmx->vmcs01;
        vmx->loaded_vmcs->vmcs = alloc_vmcs();
        vmx->loaded_vmcs->shadow_vmcs = NULL;
        if (!vmx->loaded_vmcs->vmcs)
            err = alloc_loaded_vmcs(&vmx->vmcs01);
        if (err < 0)
            goto free_msrs;
    -loaded_vmcs_init(vmx->loaded_vmcs);
+    msr_bitmap = vmx->vmcs01.msr_bitmap;
+    vmx_disable_intercept_for_msr(msr_bitmap, MSR_FS_BASE, MSR_TYPE_RW);
+    vmx_disable_intercept_for_msr(msr_bitmap, MSR_KERNEL_BASE, MSR_TYPE_RW);
+    vmx_disable_intercept_for_msr(msr_bitmap, MSR_KERNEL_GS_BASE, MSR_TYPE_RW);
+    vmx_disable_intercept_for_msr(msr_bitmap, MSR_IA32_SYSENTER_CS, MSR_TYPE_RW);
+    vmx_disable_intercept_for_msr(msr_bitmap, MSR_IA32_SYSENTER_ESP, MSR_TYPE_RW);
+    vmx_disable_intercept_for_msr(msr_bitmap, MSR_IA32_SYSENTER_EIP, MSR_TYPE_RW);
+    vmx->msr_bitmap_mode = 0;
+
+    vmx->loaded_vmcs = &vmx->vmcs01;
    cpu = get_cpu();
    vmx_vcpu_load(&vmx->vcpu, cpu);
    vmx->vcpu.cpu = cpu;
@@ -9661,10 +10115,8 @@
    goto free_vmcs;
 }

-if (nested) {
+if (nested)
    nested_vmx_setup_ctls_msrs(vmx);
    vmx->nested.vpid02 = allocate_vpid(); 
-}

    vmx->nested.posted_intr_nv = -1;
    vmx->nested.current_vmptr = -1ull;
@@ -9681,7 +10133,6 @@
 return &vmx->vcpu;

 free_vmcs:
-    free_vpid(vmx->nested.vpid02);
    free_loaded_vmcs(vmx->loaded_vmcs);
    free_msrs:
    kfree(vmx->guest_msrs);
@@ -9695,6 +10146,37 @@
 return ERR_PTR(err);
}

+
static int vmx_vm_init(struct kvm *kvm)
{
+    if (boot_cpu_has(X86_BUG_L1TF) && enable_ept) {
+        switch (l1tf_mitigation) {
+        case L1TF_MITIGATION_OFF:
+            break;
+        case L1TF_MITIGATION_FLUSH_FLUSH_NOWARN:
+            /* I explicitly don't care is set */
+            break;
+        case L1TF_MITIGATION_FLUSH:
+        case L1TF_MITIGATION_FLUSH_NOSMT:
+        case L1TF_MITIGATION_FULL:
+            /* Warn upon starting the first VM in a potentially insecure environment. */
+        if (sched_smt_active())
+            pr_warn_once(L1TF_MSG_SMT);
+            if (l1tf_vmx_mitigation == VMENTER_L1D_FLUSH_NEVER)
+                pr_warn_once(L1TF_MSG_L1D);
+break;
+case L1TF_MITIGATION_FULL_FORCE:
+  /* Flush is enforced */
+  break;
+  }
+  }
+  return 0;
+  }
+
static void __init vmx_check_processor_compat(void *rtn)
{
    struct vmcs_config vmcs_conf;
    @ @ -10012.6 +10494.8 @ @
    kunmap(vmx->nested.pi_desc_page);
    kvm_release_page_dirty(vmx->nested.pi_desc_page);
    vmx->nested.pi_desc_page = NULL;
    +vmx->nested.pi_desc = NULL;
    +vmcs_write64(POSTED_INTR_DESC_ADDR, -1ull);
    }
    page = kvm_vcpu_gpa_to_page(vcpu, vmcs12->posted_intr_desc_addr);
    if (is_error_page(page))
    @ @ -10030.7 +10514.8 @ @
    if (cpu_has_vmx_msr_bitmap() &&
        nested_cpu_has(vmcs12, CPU_BASED_USE_MSR_BITMAPS) &&
        nested_vmx_merge_msr_bitmap(vcpu, vmcs12))
    -;
    +vmcs_set_bits(CPU_BASED_VM_EXEC_CONTROL,
        CPU_BASED_USE_MSR_BITMAPS);
else
    vmcs_clear_bits(CPU_BASED_VM_EXEC_CONTROL,
        CPU_BASED_USE_MSR_BITMAPS);
    @ @ -10105.10 +10590.25 @ @
    int msr;
    struct page *page;
    unsigned long *msr_bitmap_l1;
    -unsigned long *msr_bitmap_l0 = to_vmx(vcpu)->nested.msr_bitmap;
    +unsigned long *msr_bitmap_l0 = to_vmx(vcpu)->nested.vmcs02.msr_bitmap;
    +/*
    +  pred_cmd & spec_ctrl are trying to verify two things:
    +  *
    +  * 1. L0 gave a permission to L1 to actually passthrough the MSR. This
    +  * ensures that we do not accidentally generate an L02 MSR bitmap
    +  * from the L12 MSR bitmap that is too permissive.
    +  * 2. That L1 or L2s have actually used the MSR. This avoids
    +  * unnecessarily merging of the bitmap if the MSR is unused. This
    +  * works properly because we only update the L01 MSR bitmap lazily.
    +  * So even if L0 should pass L1 these MSRs, the L01 bitmap is only
    +  * updated to reflect this when L1 (or its L2s) actually write to

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bool pred_cmd = !msr_write_intercepted_l01(vcpu, MSR_IA32_PRED_CMD);
bool spec_ctrl = !msr_write_intercepted_l01(vcpu, MSR_IA32_SPEC_CTRL);

#if !nested_cpu_has_virt_x2apic_mode(vmcs12)
    !pred_cmd && !spec_ctrl)
return false;

page = kvm_vcpu_gpa_to_page(vcpu, vmcs12->msr_bitmap);

if (spec_ctrl)
    nested_vmx_disable_intercept_for_msr(
        msr_bitmap_l1, msr_bitmap_l0,
        MSR_IA32_SPEC_CTRL,
        MSR_TYPE_R | MSR_TYPE_W);

if (pred_cmd)
    nested_vmx_disable_intercept_for_msr(
        msr_bitmap_l1, msr_bitmap_l0,
        MSR_IA32_PRED_CMD,
        MSR_TYPE_W);

    kunmap(page);
    kvm_release_page_clean(page);

return true;

static int nested_vmx_check_apic_access_controls(struct kvm_vcpu *vcpu,
        struct vmcs12 *vmcs12)
{
    if (nested_cpu_has2(vmcs12, SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESS
        &!page_address_valid(vcpu, vmcs12->apic_access_addr))
    return -EINVAL;
else
    return 0;
}

+static int nested_vmx_check_apicv_controls(struct kvm_vcpu *vcpu,
struct vmcs12 *vmcs12)
* If PAE paging and EPT are both on, CR3 is not used by the CPU and * must not be dereferenced.
*/
-if (!is_long_mode(vcpu) && is_pae(vcpu) && is_paging(vcpu) &&  
- !nested_ept) {  
+if (is_pae_paging(vcpu) && !nested_ept) {
if (!load_pdptrs(vcpu, vcpu->arch.walk_mmu, cr3)) {
*entry_failure_code = ENTRY_FAIL_PDPT;
return 1;
@
@ -10594,10 +11116,10 @@
* Set the MSR load/store lists to match L0's settings.
*/
vmcs_write32(VM_EXIT_MSR_STORE_COUNT, 0);
+vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, vmx->msr_autoload.nr);
+vmcs_write64(VM_EXIT_MSR_LOAD_ADDR, __pa(vmx->msr_autoload.host));
+vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, vmx->msr_autoload.guest.nr);
+vmcs_write64(VM_ENTRY_MSR_LOAD_ADDR, __pa(vmx->msr_autoload.guest.val));
/*
* HOST_RSP is normally set correctly in vmx_vcpu_run() just before
@g@@ -10674,14 +11216,14 @@
vmcs12->vm_entry_controls & VM_ENTRY_LOAD_BNDCFGS)
vmcs_write64(GUEST_BNDCFGS, vmcs12->guest_bndcfgs);
-if (vmcs12->cpu_based_vm_exec_control & CPU_BASED_USE_TSC_OFFSETING)
+if (cpu_has_vmx_msr_bitmap())
+vmcs_write64(MSR_BITMAP, __pa(vmx->nested.vmcs02.msr_bitmap));
+if (enable_vpid) {
*/
/* There is no direct mapping between vpid02 and vpid12, the
@g@@ -10695,11 +11217,11 @@
vmcs_write16(VIRTUAL_PROCESSOR_ID, vmx->nested.vpid02);
if (vmcs12->virtual_processor_id != vmx->nested.last_vpid) {

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vmx->nested.last_vpid = vmcs12->virtual_processor_id;
-__vmx_flush_tlb(vcpu, to_vmx(vcpu)->nested.vpid02);
+__vmx_flush_tlb(vcpu, to_vmx(vcpu)->nested.vpid02, true);
}
} else {
vmcs_write16(VIRTUAL_PROCESSOR_ID, vmx->vpid);
-vmx_flush_tlb(vcpu);
+vmx_flush_tlb(vcpu, true);
}

@@ -10723,7 +11245,7 @@
}
} else if (nested_cpu_has2(vmcs12, SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESSSES)) {
-vmx_flush_tlb_ept_only(vcpu);
+vmx_flush_tlb(vcpu, true);
}
/*
@@ -10787,6 +11309,9 @@
if (nested_vmx_check_msr_bitmap_controls(vcpu, vmcs12))
 return VMXERR_ENTRY_INVALID_CONTROL_FIELD;

+if (nested_vmx_check_apic_access_controls(vcpu, vmcs12))
+return VMXERR_ENTRY_INVALID_CONTROL_FIELD;
+ if (nested_vmx_check_tpr_shadow_controls(vcpu, vmcs12))
 return VMXERR_ENTRY_INVALID_CONTROL_FIELD;

@@ -10903,42 +11428,32 @@
{
 struct vcpu_vmx *vmx = to_vmx(vcpu);
 struct vmcs12 *vmcs12 = get_vmcs12(vcpu);
-struct loaded_vmcs *vmcs02;
- u32 msr_entry_idx;
- u32 exit_qual;
- -vmcs02 = nested_get_current_vmcs02(vmx);
- -if (!vmcs02)
- -return -ENOMEM;
+ int r;
+ enter_guest_mode(vcpu);

 if (!((vmcs12->vm_entry_controls & VM_ENTRY_LOAD_DEBUG_CONTROLS))
 vmx->nested.vmcs01_debugctl = vmcs_read64(GUEST_IA32_DEBUGCTL);
vmx_switch_vmcs(vcpu, vmcs02);
+vmx_switch_vmcs(vcpu, &vmx->nested.vmcs02);
vmx_segment_cache_clear(vmx);

-vmx_switch_vmcs(vcpu, vmcs12);
+vmx_switch_vmcs(vcpu, &vmx->vmcs01);

-vmx_switch_vmcs(vcpu, &vmx->vmcs01);

-nested_vm_entry_failure(vcpu, vmcs12,
  - EXIT_REASON_INVALID_STATE, exit_qual);

-vmx_switch_vmcs(vcpu, &vmx->vmcs01);

-nested_vmx_exit_failure(vcpu, vmcs12,
  EXIT_REASON_INVALID_STATE, exit_qual);

return 1;

if (prepare_vmcs02(vcpu, vmcs12, from_vmentry, &exit_qual)) {
  leave_guest_mode(vcpu);
}

if (prepare_vmcs02(vcpu, vmcs12, from_vmentry, &exit_qual)) {
  goto fail;
}


/*
 * Note no nested_vmx_succeed or nested_vmx_fail here. At this point
 * @ @ -10947.6 +11462.14 @@
 * the success flag) when L2 exits (see nested_vmx_vmexit()).
 */

return 0;
+
+fail:
+if (vmcs12->cpu_based_vm_exec_control & CPU_BASED_USE_TSC_OFFSETING)
+vcpu->arch.tsc_offset += vmcs12->tsc_offset;
+
+r = EXIT_REASON_INVALID_STATE;
+if (prepare_vmcs02(vcpu, vmcs12, from_vmentry, &exit_qual))
+goto fail;

nested_get_vmcs12_pages(vcpu, vmcs12);

-vmcs12->vm_entry_msr_load_addr,
-vmcs12->vm_entry_msr_load_count);

-leave_guest_mode(vcpu);

vmx_switch_vmcs(vcpu, &vmx->vmcs01);

-nested_vmx_entry_failure(vcpu, vmcs12,
  EXIT_REASON_MSR_LOAD_FAIL, msr_entry_idx);

-return 1;

+m
+r = EXIT_REASON_MSR_LOAD_FAIL;

exit_qual = nested_vmx_load_msr(vcpu,
vmcs12->vm_entry_msr_load_addr,
vmcs12->vm_entry_msr_load_count);

if (exit_qual)
  goto fail;

/*
 * Note no nested_vmx_succeed or nested_vmx_fail here. At this point
 @ @ -10947.6 +11462.14 @@
 * the success flag) when L2 exits (see nested_vmx_vmexit()).
 */

return 0;
+
+fail:
+if (vmcs12->cpu_based_vm_exec_control & CPU_BASED_USE_TSC_OFFSETING)
+vcpu->arch.tsc_offset -= vmcs12->tsc_offset;
+leave_guest_mode(vcpu);
+vmx_switch_vmcs(vcpu, &vmx->vmcs01);
+nested_vmx_entry_failure(vcpu, vmcs12, r, exit_qual);
+return 1;
}

/*
 @@ -11026,7 +11549,15 @@
 if (ret)
 return ret;

-if (vmcs12->guest_activity_state == GUEST_ACTIVITY_HLT)
+/* Hide L1D cache contents from the nested guest. */
+vmx->vcpu.arch.l1tf_flush_l1d = true;
+/*
+ * If we're entering a halted L2 vcpu and the L2 vcpu won't be woken
+ * by event injection, halt vcpu.
+ */
+if ((vmcs12->guest_activity_state == GUEST_ACTIVITY_HLT) &&
+ (!vmcs12->vm_entry_intr_info_field & INTR_INFO_VALID_MASK))
return kvm_vcpu_halt(vcpu);

vmx->nested.nested_run_pending = 1;
@@ -11116,7 +11647,7 @@
 }
 }

-static int vmx_check_nested_events(struct kvm_vcpu *vcpu, bool external_intr)
+static int vmx_check_nested_events(struct kvm_vcpu *vcpu)
{
 struct vcpu_vmx *vmx = to_vmx(vcpu);
 unsigned long exit_qual;
@@ -11128,7 +11659,6 @@
 if (block_nested_events)
 return -EBUSY;
 nested_vmx_inject_exception_vmexit(vcpu, exit_qual);
-vcpu->arch.exception.pending = false;
 return 0;
 }

@@ -11155,8 +11685,7 @@
 return 0;
 }

-if ((kvm_cpu_has_interrupt(vcpu) || external_intr) &&
  -nested_exit_on_intr(vcpu)) {
+if (kvm_cpu_has_interrupt(vcpu) && nested_exit_on_intr(vcpu)) {
 if (block_nested_events)
return -EBUSY;
nested_vmx_vmexit(vcpu, EXIT_REASON_EXTERNAL_INTERRUPT, 0, 0);
@@ -11344,24 +11873,6 @@
kvm_clear_interrupt_queue(vcpu);
}

-static void load_vmcs12_mmu_host_state(struct kvm_vcpu *vcpu,
-struct vmcs12 *vmcs12)
-{  
-\u32 entry_failure_code;
-
-nested_ept_uninit_mmu_context(vcpu);
-
-/*
-* Only PDPT load can fail as the value of cr3 was checked on entry and
-* couldn't have changed.
-* */
-if (nested_vmx_load_cr3(vcpu, vmcs12->host_cr3, false, &entry_failure_code))
-nested_vmx_abort(vcpu, VMX_ABORT_LOAD_HOST_PDPTE_FAIL);
-
-if (!enable_ept)
-vcpu->arch.walk_mmu->inject_page_fault = kvm_inject_page_fault;
-}
-
-/*
-* A part of what we need to when the nested L2 guest exits and we want to
-* run its L1 parent, is to reset L1's guest state to the host state specified
@@ -11375,6 +11886,7 @@
-struct vmcs12 *vmcs12)
{
    struct kvm_segment seg;
    \u32 entry_failure_code;

    if (vmcs12->vm_exit_controls & VM_EXIT_LOAD_IA32_EFER)
        vcpu->arch.efer = vmcs12->host_ia32_efer;
@@ -11401,7 +11913,17 @@
        vcpu->arch.cr4_guest_owned_bits = ~vmcs_readl(CR4_GUEST_HOST_MASK);
        vmx_set_cr4(vcpu, vmcs12->host_cr4);

        load_vmcs12_mmu_host_state(vcpu, vmcs12);
        nested_ept_uninit_mmu_context(vcpu);
        +
        +/*
        + * Only PDPT load can fail as the value of cr3 was checked on entry and
        + * couldn't have changed.
        + */
        +if (nested_vmx_load_cr3(vcpu, vmcs12->host_cr3, false, &entry_failure_code))
        +nested_vmx_abort(vcpu, VMX_ABORT_LOAD_HOST_PDPTE_FAIL);
+if (!enable_ept)
+  vcpu->arch.walk_nmu->inject_page_fault = kvm_inject_page_fault;

if (enable_vpid) {
/*
 * L1's vpid. TODO: move to a more elaborate solution, giving
 * each L2 its own vpid and exposing the vpid feature to L1.
 */
-vmx_flush_tlb(vcpu);
+vmx_flush_tlb(vcpu, true);
}
/* Restore posted intr vector. */
if (nested_cpu_has_posted_intr(vmcs12))
@@ -11485,13 +12007,147 @@
    vmcs_write64(GUEST_IA32_DEBUGCTL, 0);

if (nested_vmx_load_msr(vcpu, vmcs12->vm_exit_msr_load_addr,
    vmcs12->vm_exit_msr_load_count))
    nested_vmx_abort(vcpu, VMX_ABORT_LOAD_HOST_MSR_FAIL);
}

+static inline u64 nested_vmx_get_vmcs01_guest_ef er(struct vcpu_vmx *vmx)
+{
+  struct shared_msr_entry *efer_msr;
+  unsigned int i;
+  +if (vm_entry_controls_get(vmx) & VM_ENTRY_LOAD_IA32_EFER)
+    return vmcs_read64(GUEST_IA32_EFER);
+  +if (cpu_has_load_ia32_efer)
+    return host_efer;
+  +for (i = 0; i < vmx->msr_autoload.guest.nr; ++i) {
+    +if (vmx->msr_autoload.guest.val[i].index == MSR_EFER)
+      return vmx->msr_autoload.guest.val[i].value;
+  +}
+  +efer_msr = find_msr_entry(vmx, MSR_EFER);
+  +if (efer_msr)
+    return efer_msr->data;
+  +return host_efer;
static void nested_vmx_restore_host_state(struct kvm_vcpu *vcpu) {
    struct vmcs12 *vmcs12 = get_vmcs12(vcpu);
    struct vcpu_vmx *vmx = to_vmx(vcpu);
    struct vmx_msr_entry g, h;
    struct msr_data msr;
    gpa_t gpa;
    u32 i, j;

    vcpu->arch.pat = vmcs_read64(GUEST_IA32_PAT);

    if (vmcs12->vm_entry_controls & VM_ENTRY_LOAD_DEBUG_CONTROLS) {
        if (vmcs12->vm_entry_controls & VM_ENTRY_LOAD_DEBUG_CONTROLS) {
            /* L1’s host DR7 is lost if KVM_GUESTDBG_USE_HW_BP is set
             * as vmcs01.GUEST_DR7 contains a userspace defined value
             * and vcpu->arch.dr7 is not squirreled away before the
             * nested VMENTER (not worth adding a variable in nested_vmx).
             * */
            if (vcpu->guest_debug & KVM_GUESTDBG_USE_HW_BP) {
                kvm_set_dr(vcpu, 7, DR7_FIXED_1);
            } else { WARN_ON(kvm_set_dr(vcpu, 7, vmcs_readl(GUEST_DR7))); }
        } else {
            /* Note that calling vmx_set_efer,cr0,cr4} is important as they
             * handle a variety of side effects to KVM's software model.
             * */
            vmx_set_efer(vcpu, nested_vmx_get_vmcs01_guest_efer(vmx));
            vcpu->arch.cr0_guest_owned_bits = X86_CR0_TS;
            vmx_set_cr0(vcpu, vmcs_readl(CR0_READ_SHADOW));
            vcpu->arch.cr4_guest_owned_bits = ~vmcs_readl(CR4_GUEST_HOST_MASK);
            vmx_set_cr4(vcpu, vmcs_readl(CR4_READ_SHADOW));

            nested_ept_uninit_mmu_context(vcpu);
            vcpu->arch.cr3 = vmcs_readl(GUEST_CR3);
            __set_bit(VCPU_EXREG_CR3, (ulong *)&vcpu->arch.regs_avail);
        }
        /* Use ept_save_pdptrs(vcpu) to load the MMU’s cached PDPTRs
         * from vmcs01 (if necessary). The PDPTRs are not loaded on
         * VMFail, like everything else we just need to ensure our
         * software model is up-to-date.
         * */
    }
+ept_save_pdptrs(vcpu);
+
+kvm_mmu_reset_context(vcpu);
+
+if (cpu_has_vmx_msr_bitmap())
+vmx_update_msr_bitmap(vcpu);
+
+# This nasty bit of open coding is a compromise between blindly
+# loading L1's MSRs using the exit load lists (incorrect emulation
+# of VMFail), leaving the nested VM's MSRs in the software model
+# (incorrect behavior) and snapshotting the modified MSRs (too
+# expensive since the lists are unbound by hardware). For each
+# MSR that was (prematurely) loaded from the nested VMEntry load
+# list, reload it from the exit load list if it exists and differs
+# from the guest value. The intent is to stuff host state as
+# silently as possible, not to fully process the exit load list.
+# */
+msr.host_initiated = false;
+
+for (i = 0; i < vmcs12->vm_entry_msr_load_count; i++) {
+  gpa = vmcs12->vm_entry_msr_load_addr + (i * sizeof(g));
+  if (kvm_vcpu_read_guest(vcpu, gpa, &g, sizeof(g))) {
+    pr_debug_ratelimited(
+      "%s read MSR index failed (%u, 0x%llx)n",
+      __func__, i, gpa);
+    goto vmabort;
+  }
+
+  for (j = 0; j < vmcs12->vm_exit_msr_load_count; j++) {
+    gpa = vmcs12->vm_exit_msr_load_addr + (j * sizeof(h));
+    if (kvm_vcpu_read_guest(vcpu, gpa, &h, sizeof(h))) {
+      pr_debug_ratelimited(
+        "%s read MSR failed (%u, 0x%x)\n",
+        __func__, j, gpa);
+      goto vmabort;
+    }
+    if (h.index != g.index)
+      continue;
+    if (h.value == g.value)
+      break;
+  }
+  if (nested_vmx_load_msr_check(vcpu, &h)) {
+    pr_debug_ratelimited(
+      "%s check failed (%u, 0x%x, 0x%x)\n",
+      __func__, j, h.index, h.reserved);
+    goto vmabort;
+  }
+
+  /*
msr.index = h.index;
msr.data = h.value;
if (kvm_set_msr(vcpu, &msr)) {
    pr_debug_ratelimited("%s WRMSR failed (%u, 0x%x, 0x%llx)\n",
    __func__, j, h.index, h.value);
    goto vmabort;
}
vmabort:

vmexit_abort(vcpu, VMX_ABORT_LOAD_HOST_MSR_FAIL);
}

leave_guest_mode(vcpu);

+if (vmcs12->cpu_based_vm_exec_control & CPU_BASED_USE_TSC_OFFSETING)
+vcpu->arch.tsc_offset -= vmcs12->tsc_offset;
+
if (likely(!vmx->fail)) {
    if (exit_reason == -1)
        sync_vmcs12(vcpu, vmcs12);
    /* if no vmcs02 cache requested, remove the one we used */
    -if (VMCS02_POOL_SIZE == 0)
        nested_free_vmcs02(vmx, vmx->nested.current_vmptr);
-
    /* Update any VMCS fields that might have changed while L2 ran */
    -vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, vmx->msr_autoload.nr);
    -vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, vmx->msr_autoload.nr);
    +vmcs_write32(VM_EXIT_MSR_LOAD_COUNT, vmx->msr_autoload.host.nr);
    +vmcs_write32(VM_ENTRY_MSR_LOAD_COUNT, vmx->msr_autoload.guest.nr);
    vmcs_write64(TSC_OFFSET, vcpu->arch.tsc_offset);
    if (vmx->hv_deadline_tsc == -1)
        vmcs_clear_bits(PIN_BASED_VM_EXEC_CONTROL,
        @@ -11517,6 +12173,9 @@

    if (kvm_has_tsc_control)
decache_tsc_multiplier(vmx);

-if (vmx->nested.change_vmcs01_virtual_x2apic_mode) {
-vmx->nested.change_vmcs01_virtual_x2apic_mode = false;
-vmx_set_virtual_x2apic_mode(vcpu,
-vcpu->arch.apic_base & X2APIC_ENABLE);
+if (vmx->nested.change_vmcs01_virtual_apic_mode) {
+vmx->nested.change_vmcs01_virtual_apic_mode = false;
+vmx_set_virtual_apic_mode(vcpu);
} else if (!nested_cpu_has_ept(vmcs12) &&
    nested_cpu_has2(vmcs12,
    SECONDARY_EXEC_VIRTUALIZE_APIC_ACCESSSES)) {
-vmx_flush_tlb_ept_only(vcpu);
+vmx_flush_tlb(vcpu, true);
}

/* This is needed for same reason as it was needed in prepare_vmcs02 */
@@ -11593,17 +12247,8 @@
vcpu->arch.mp_state = KVM_MP_STATE_RUNNABLE;

if (likely(!vmx->fail)) {
-/*
- * TODO: SDM says that with acknowledge interrupt on
- * exit, bit 31 of the VM-exit interrupt information
- * (valid interrupt) is always set to 1 on
- * EXIT_REASON_EXTERNAL_INTERRUPT, so we shouldn't
- * need kvm_cpu_hasInterrupt(). See the commit
- * message for details.
- */
-*/
-if (nested_exit_intr_ack_set(vcpu) &&
- exit_reason == EXIT_REASON_EXTERNAL_INTERRUPT &&
- kvm_cpu_has_interrupt(vcpu)) {
+if (exit_reason == EXIT_REASON_EXTERNAL_INTERRUPT &&
+ nested_exit_intr_ack_set(vcpu)) {
int irq = kvm_cpu_get_interrupt(vcpu);
WARN_ON(irq < 0);
vmcs12->vm_exit_intr_info = irq |
@@ -11632,7 +12277,13 @@
*/
nested_vmx_failValid(vcpu, VMXERR_ENTRY_INVALID_CONTROL_FIELD);

-load_vmcs12_mmu_host_state(vcpu, vmcs12);
+/*
+ * Restore L1's host state to KVM's software model. We're here
+ * because a consistency check was caught by hardware, which
+ * means some amount of guest state has been propagated to KVM's
+ * model and needs to be unwound to the host's state.
+ */
nested_vmx_restore_host_state(vcpu);

/*
 * The emulated instruction was already skipped in
 @@ -11674,11 +12325,86 @@
 to_vmx(vcpu)->nested.sync_shadow_vmcs = true;
 */

static int vmx_check_intercept_io(struct kvm_vcpu *vcpu,
 + struct x86_instruction_info *info)
 +{
 +struct vmcs12 *vmcs12 = get_vmcs12(vcpu);
 +unsigned short port;
 +bool intercept;
 +int size;
 +
 +if (info->intercept == x86_intercept_in ||
 + info->intercept == x86_intercept_ins) {
 +port = info->src_val;
 +size = info->dst_bytes;
 +} else {
 +port = info->dst_val;
 +size = info->src_bytes;
 +}
 +
 +/*
 + * If the 'use IO bitmaps' VM-execution control is 0, IO instruction
 + * VM-exits depend on the 'unconditional IO exiting' VM-execution
 + * control.
 + *
 + * Otherwise, IO instruction VM-exits are controlled by the IO bitmaps.
 + */
 +if (!nested_cpu_has(vmcs12, CPU_BASED_USE_IO_BITMAPS))
 +intercept = nested_cpu_has(vmcs12,
 + CPU_BASED_UNCOND_IO_EXITING);
 +else
 +intercept = nested_vmx_check_io_bitmaps(vcpu, port, size);
 +
 +/* FIXME: produce nested vmexit and return X86EMUL_INTERCEPTED. */
 +return intercept ? X86EMUL_UNHANDLEABLE : X86EMUL_CONTINUE;
 +}

static int vmx_check_intercept(struct kvm_vcpu *vcpu,
   struct x86_instruction_info *info,
   enum x86_intercept_stage stage)
{
-return X86EMUL_CONTINUE;
+struct vmcs12 *vmcs12 = get_vmcs12(vcpu);
typedef struct x86_emulate_ctxt *ctx

+ switch (info->intercept) {
+ */
+ * RDPID causes #UD if disabled through secondary execution controls.
+ * Because it is marked as EmulateOnUD, we need to intercept it here.
+ */
+ case x86_intercept_rdtscp:
+ if (!nested_cpu_has2(vmcs12, SECONDARY_EXEC_RDTSCP)) {
+ ctxt->exception.vector = UD_VECTOR;
+ ctxt->exception.error_code_valid = false;
+ return X86EMUL_PROPAGATE_FAULT;
+ }
+ break;
+ + case x86_intercept_in:
+ case x86_intercept_ins:
+ case x86_intercept_out:
+ case x86_intercept_outs:
+ return vmx_check_intercept_io(vcpu, info);
+ + case x86_intercept_lgdt:
+ case x86_intercept_lidt:
+ case x86_intercept_lldt:
+ case x86_intercept_ltr:
+ case x86_intercept_sgd:
+ case x86_intercept_sidt:
+ case x86_intercept_str:
+ case x86_intercept_str:
+ if (!nested_cpu_has2(vmcs12, SECONDARY_EXEC_DESC))
+ return X86EMUL_CONTINUE;
+ */
+ FIXME: produce nested vmexit and return X86EMUL_INTERCEPTED. */
+ break;
+ */
+ TODO: check more intercepts... */
+ default:
+ break;
+ +
+ return X86EMUL_UNHANDLEABLE;
}
-static int vmx_write_pml_buffer(struct kvm_vcpu *vcpu)
+static int vmx_write_pml_buffer(struct kvm_vcpu *vcpu, gpa_t gpa)
{
    struct vmcs12 *vmcs12;
    struct vcpu_vmx *vmx = to_vmx(vcpu);
    -gpa_t gpa;
    struct page *page = NULL;
    u64 *pml_address;

    @@ -11789,7 +12514,7 @@
    return 1;
}

-gpa = vmcs_read64(GUEST_PHYSICAL_ADDRESS) & ~0xFFFFull;
+gpa &= ~0xFFFFull;

    page = kvm_vcpu_gpa_to_page(vcpu, vmcs12->pml_address);
    if (is_error_page(page))
        @@ -12011,7 +12736,7 @@
            vcpu_info.pi_desc_addr = __pa(vcpu_to_pi_desc(vcpu));
            vcpu_info.vector = irq.vector;

@@ -12099,7 +12824,9 @@
            .hardware_enable = hardware_enable,
            .hardware_disable = hardware_disable,
            .cpu_has_accelerated_tpr = report_flexpriority,
            -.cpu_has_high_real_mode_segbase = vmx_has_high_real_mode_segbase,
+            .has_emulated_msr = vmx_has_emulated_msr,
+            +.vm_init = vmx_vm_init,
+            .vcpu_create = vmx_create_vcpu,
+            .vcpu_free = vmx_free_vcpu,
        @@ -12110,6 +12837,7 @@
            .vcpu_put = vmx_vcpu_put,

            .update_hp_intercept = update_exception_bitmap,
            +.get_msr_feature = vmx_get_msr_feature,
            .get_msr = vmx_get_msr,
            .set_msr = vmx_set_msr,
            .get_segment_base = vmx_get_segment_base,
@@ -12155,7 +12883,7 @@
            .enable_nmi_window = enable_nmi_window,
.enable_irq_window = enable_irq_window,
.update_cr8_intercept = update_cr8_intercept,
.set_virtual_x2apic_mode = vmx_set_virtual_x2apic_mode,
+set_virtual_apic_mode = vmx_set_virtual_apic_mode,
.set_apic_access_page_addr = vmx_set_apic_access_page_addr,
.get_enable_apicv = vmx_get_enable_apicv,
.refresh_apicv_exec_ctrl = vmx_refresh_apicv_exec_ctrl,
@@ -12165,6 +12893,7 @@
   .hwapic_isr_update = vmx_hwapic_isr_update,
   .sync_pir_to_irr = vmx_sync_pir_to_irr,
   .deliver_posted_interrupt = vmx_deliver_posted_interrupt,
+.dy_apicv_has_pending_interrupt = vmx_dy_apicv_has_pending_interrupt,
.set_tss_addr = vmx_set_tss_addr,
.get_tdp_level = get_ept_level,
@@ -12183,7 +12912,8 @@
.has_wbinvd_exit = cpu_has_vmx_wbinvd_exit,
.write_tsc_offset = vmx_write_tsc_offset,
+.read_l1_tsc_offset = vmx_read_l1_tsc_offset,
+.write_l1_tsc_offset = vmx_write_l1_tsc_offset,
.set_tdp_cr3 = vmx_set_cr3,
@@ -12222,22 +12952,17 @@
.enable_smi_window = enable_smi_window,
};

-static int __init vmx_init(void)
+static void vmx_cleanup_l1d_flush(void)
{
    int r = kvm_init(&vmx_x86_ops, sizeof(struct vcpu_vmx),
                     __alignof__(struct vcpu_vmx), THIS_MODULE);
-    if (r)
-        return r;
-    -
-    +#ifdef CONFIG_KEXEC_CORE
-        rcu_assign_pointer(crash_vmclear_loaded_vmcss,
-                        crash_vmclear_local_loaded_vmcss);
-    +#endif
-    -
-    -return 0;
+if (vmx_l1d_flush_pages) {
+    free_pages((unsigned long)vmx_l1d_flush_pages, L1D_CACHE_ORDER);
+    vmx_l1d_flush_pages = NULL;
+}
+/* Restore state so sysfs ignores VMX */
l1tf_vmx_mitigation = VMENTER_L1D_FLUSH_AUTO;
}

static void __exit vmx_exit(void)
{
#ifdef CONFIG_KEXEC_CORE
RCU_INIT_POINTER(crash_vmclear_loaded_vmcss, NULL);
#endif
kvm_exit();
+
+vmx_cleanup_l1d_flush();
} +module_exit(vmx_exit)
+
+static int __init vmx_init(void)
+
+int r, cpu;
+
+r = kvm_init(&vmx_x86_ops, sizeof(struct vcpu_vmx),
+ __alignof__(struct vcpu_vmx), THIS_MODULE);
+if (r)
+return r;
+
+#ifdef CONFIG_KEXEC_CORE
+for_each_possible_cpu(cpu) {
+INIT_LIST_HEAD(&per_cpu(loaded_vmcss_on_cpu, cpu));
+INIT_LIST_HEAD(&per_cpu(blocked_vcpu_on_cpu, cpu));
+spin_lock_init(&per_cpu(blocked_vcpu_on_cpu_lock, cpu));
+}
+
+for_each_possible_cpu(cpu) {
+INIT_LIST_HEAD(&per_cpu(loaded_vmcss_on_cpu, cpu));
+INIT_LIST_HEAD(&per_cpu(blocked_vcpu_on_cpu, cpu));
+spin_lock_init(&per_cpu(blocked_vcpu_on_cpu_lock, cpu));
+}
+
+kvm_exit();
+
+vmx_cleanup_l1d_flush();
} +module_exit(vmx_exit)
+
+static int __init vmx_init(void)
+
+int r, cpu;
+
+r = kvm_init(&vmx_x86_ops, sizeof(struct vcpu_vmx),
+ __alignof__(struct vcpu_vmx), THIS_MODULE);
+if (r)
+return r;
+
+/*
+ * Must be called after kvm_init() so enable_ept is properly set
+ * up. Hand the parameter mitigation value in which was stored in
+ * the pre module init parser. If no parameter was given, it will
+ * contain 'auto' which will be turned into the default 'cond'
+ * mitigation mode.
+ */
+if (boot_cpu_has(X86_BUG_L1TF)) {
+r = vmx_setup_l1d_flush(vmentry_l1d_flush_param);
+if (r) {
+vmx_exit();
+return r;
+}
+
+for_each_possible_cpu(cpu) {
+INIT_LIST_HEAD(&per_cpu(loaded_vmcss_on_cpu, cpu));
+INIT_LIST_HEAD(&per_cpu(blocked_vcpu_on_cpu, cpu));
+spin_lock_init(&per_cpu(blocked_vcpu_on_cpu_lock, cpu));
+}
+
+if (boot_cpu_has(X86_BUG_L1TF)) {
+r = vmx_setup_l1d_flush(vmentry_l1d_flush_param);
+if (r) {
+vmx_exit();
+return r;
+}

+rcu_assign_pointer(crash_vmclear_loaded_vmcss,
+ crash_vmclear_local_loaded_vmcss);
+#endif
+
+return 0;
+
} module_init(vmx_init)
-module_exit(vmx_exit)
--- linux-4.15.0.orig/arch/x86/kvm/x86.c
+++ linux-4.15.0/arch/x86/kvm/x86.c
@@ -90,14 +90,15 @@
static u64 __read_mostly efer_reserved_bits = ~((u64)EFER_SCE);
#endif
-#define VM_STAT(x) offsetof(struct kvm, stat.x), KVM_STAT_VM
-#define VCPU_STAT(x) offsetof(struct kvm_vcpu, stat.x), KVM_STAT_VCPU
+#define VM_STAT(x, ...) offsetof(struct kvm, stat.x), KVM_STAT_VM, ## __VA_ARGS__
+#define VCPU_STAT(x, ...) offsetof(struct kvm_vcpu, stat.x), KVM_STAT_VCPU, ## __VA_ARGS__

#define KVM_X2APIC_API_VALID_FLAGS (KVM_X2APIC_API_USE_32BIT_IDS | \
 KVM_X2APIC_API_DISABLE_BROADCAST_QUIRK)

static void update_cr8_intercept(struct kvm_vcpu *vcpu);
static void process_nmi(struct kvm_vcpu *vcpu);
+static void process_smi(struct kvm_vcpu *vcpu);
static void enter_smm(struct kvm_vcpu *vcpu);
static void __kvm_set_rflags(struct kvm_vcpu *vcpu, unsigned long rflags);
@@ -110,7 +111,7 @@
static bool __read_mostly report_ignored_msrs = true;
module_param(report_ignored_msrs, bool, S_IRUGO | S_IWUSR);
-
-unsigned int min_timer_period_us = 500;
+unsigned int min_timer_period_us = 200;
module_param(min_timer_period_us, uint, S_IRUGO | S_IWUSR);

static bool __read_mostly kvmclock_periodic_sync = true;
@@ -184,6 +185,7 @@
{ "irq_injections", VCPU_STAT(irq_injections) },
{ "nmi_injections", VCPU_STAT(nmi_injections) },
{ "req_event", VCPU_STAT(req_event) },
+{ "l1d_flush", VCPU_STAT(l1d_flush) },
{ "mmu_shadow_zapped", VM_STAT(mmu_shadow_zapped) },
{ "mmu_pte_write", VM_STAT(mmu_pte_write) },
{ "mmu_pte_updated", VM_STAT(mmu_pte_updated) },
@@ -193,7 +195,8 @@
{ "mmu_cache_miss", VM_STAT(mmu_cache_miss) },
{ "mmu_unsync", VM_STAT(mmu_unsync) },
```c
+{ "remote_tlb_flush", VM_STAT(remote_tlb_flush) },
+{ "largepages", VM_STAT(lpages) },
+{ "nx_largepages_split", VM_STAT(nx_lpage_splits, .mode = 0444) },
+{ "max_mmu_page_hash_collisions",
VM_STAT(max_mmu_page_hash_collisions) },
{ NULL }
@@ -277,13 +280,14 @@
struct kvm_shared_msrs *smsr = per_cpu_ptr(shared_msrs, cpu);
int err;

-if (((value ^ smsr->values[slot].curr) & mask) == 0)
+value = (value & mask) | (smsr->values[slot].host & ~mask);
+if (value == smsr->values[slot].curr)
return 0;
-smsr->values[slot].curr = value;
err = wrmsrl_safe(shared_msrs_global.msrs[slot], value);
if (err)
return 1;

+smsr->values[slot].curr = value;
if (!smsr->registered) {
  smsr->urn.on_user_return = kvm_on_user_return;
  user_return_notifier_register(&smsr->urn);
@@ -308,23 +312,27 @@
}
EXPORT_SYMBOL_GPL(kvm_get_apic_base);

+enum lapic_mode kvm_get_apic_mode(struct kvm_vcpu *vcpu)
+{
+  +return kvm_apic_mode(kvm_get_apic_base(vcpu));
+}
+EXPORT_SYMBOL_GPL(kvm_get_apic_mode);
+
int kvm_set_apic_base(struct kvm_vcpu *vcpu, struct msr_data *msr_info)
{
  -u64 old_state = vcpu->arch.apic_base &
  -(MSR_IA32_APICBASE_ENABLE | X2APIC_ENABLE);
  -u64 new_state = msr_info->data &
  -(MSR_IA32_APICBASE_ENABLE | X2APIC_ENABLE);
+enum lapic_mode old_mode = kvm_get_apic_mode(vcpu);
+enum lapic_mode new_mode = kvm_apic_mode(msr_info->data);
  u64 reserved_bits = ((~0ULL) << cpuid_maxphyaddr(vcpu)) | 0x2ff |
  (guest_cpuid_has(vcpu, X86_FEATURE_X2APIC) ? 0 : X2APIC_ENABLE);

  -if ((msr_info->data & reserved_bits) || new_state == X2APIC_ENABLE)
    -return 1;
  -if (!msr_info->host_initiated &&
```
- ((new_state == MSR_IA32_APICBASE_ENABLE &&
  old_state == (MSR_IA32_APICBASE_ENABLE | X2APIC_ENABLE)) ||
  (new_state == (MSR_IA32_APICBASE_ENABLE | X2APIC_ENABLE) &&
  old_state == 0)))
+if ((msr_info->data & reserved_bits) != 0 || new_mode == LAPIC_MODE_INVALID)
  return 1;
+if (!msr_info->host_initiated) {
+  if (old_mode == LAPIC_MODE_X2APIC && new_mode == LAPIC_MODE_XAPIC)
+    return 1;
+  if (old_mode == LAPIC_MODE_DISABLED && new_mode == LAPIC_MODE_X2APIC)
+    return 1;
+}

kvm_lapic_set_base(vcpu, msr_info->data);
return 0;
@@ -395,8 +403,6 @@
if (!vcpu->arch.exception.pending && !vcpu->arch.exception.injected) {
  queue:
  -if (has_error && !is_protmode(vcpu))
  -has_error = false;
  if (reinject) {
/*
   * On vmentry, vcpu->arch.exception.pending is only
   @@ -612,7 +618,7 @@
   gfn_t gfn;
   int r;

   -if (is_long_mode(vcpu) || !is_pae(vcpu))
   +if (!is_pae_paging(vcpu))
   return false;

   if (!test_bit(VCPU_EXREG_PDPTR,
@@ -697,7 +703,7 @@
       }
       EXPORT_SYMBOL_GPL(kvm_lmsw);

 -static void kvm_load_guest_xcr0(struct kvm_vcpu *vcpu)
 +void kvm_load_guest_xcr0(struct kvm_vcpu *vcpu)
 { 
  if (kvm_read_cr4_bits(vcpu, X86_CR4_OSXSAVE) &&
    !vcpu->guest_xcr0_loaded) {
    @@ -706,8 +712,9 @@
    vcpu->guest_xcr0_loaded = 1;
    }
    }
+EXPORT_SYMBOL_GPL(kvm_load_guest_xcr0);
-static void kvm_put_guest_xcr0(struct kvm_vcpu *vcpu)
+void kvm_put_guest_xcr0(struct kvm_vcpu *vcpu)
{
if (vcpu->guest_xcr0_loaded) {
if (vcpu->arch.xcr0 != host_xcr0)
@@ -715,6 +722,7 @@
vcpu->guest_xcr0_loaded = 0;
}
}
+EXPORT_SYMBOL_GPL(kvm_put_guest_xcr0);

static int __kvm_set_xcr(struct kvm_vcpu *vcpu, u32 index, u64 xcr)
{
@@ -771,7 +779,8 @@
unsigned long old_cr4 = kvm_read_cr4(vcpu);
unsigned long pdptr_bits = X86_CR4_PGE | X86_CR4_PSE | X86_CR4_PAE |
- X86_CR4_SMEP | X86_CR4_SMAP | X86_CR4_PKE;
+ X86_CR4_SMEP;
+unsigned long mmu_role_bits = pdptr_bits | X86_CR4_SMAP | X86_CR4_PKE;

if (cr4 & CR4_RESERVED_BITS)
return 1;
@@ -794,9 +803,14 @@
if (!guest_cpuid_has(vcpu, X86_FEATURE_LA57) && (cr4 & X86_CR4_LA57))
return 1;

+if (!guest_cpuid_has(vcpu, X86_FEATURE_UMIP) && (cr4 & X86_CR4_UMIP))
+return 1;
+
if (is_long_mode(vcpu)) {
if (!(cr4 & X86_CR4_PAЕ))
++return 1;
} else if (is_paging(vcpu) && (cr4 & X86_CR4_PAЕ)

- if ((cr4 ^ old_cr4) & X86_CR4_LA57)
+return 1;
} else if (is_paging(vcpu) && (cr4 & X86_CR4_PAЕ)
&& ((cr4 ^ old_cr4) & pdptr_bits)
&& !load_pdptrs(vcpu, vcpu->arch.walk_mmu,
@@ -815,7 +829,7 @@
if (kvm_x86_ops->set_cr4(vcpu, cr4))
return 1;

- if (((cr4 ^ old_cr4) & pdptr_bits) ||
+ if (((cr4 ^ old_cr4) & mmu_role_bits) ||
     (!cr4 & X86_CR4_PCIDE) && (old_cr4 & X86_CR4_PCIDE)))
kvm_mmu_reset_context(vcpu);
@@ -839,10 +853,10 @@
if (is_long_mode(vcpu) &&
    (cr3 & rsvd_bits(cpuid_maxphyaddr(vcpu), 62))
+  (cr3 & rsvd_bits(cpuid_maxphyaddr(vcpu), 63)))
return 1;
-else if (is_pae(vcpu) && is_paging(vcpu) &&
-  !load_pdptses(vcpu, vcpu->arch.walk_mmu, cr3))
+else if (is_pae_paging(vcpu) &&
+  !load_pdptses(vcpu, vcpu->arch.walk_mmu, cr3))
return 1;

vcpu->arch.cr3 = cr3;
@@ -915,9 +929,11 @@

static int __kvm_set_dr(struct kvm_vcpu *vcpu, int dr, unsigned long val)
{
+  size_t size = ARRAY_SIZE(vcpu->arch.db);
+  switch (dr) {
      case 0 ... 3:
-      vcpu->arch.db[dr] = val;
+      vcpu->arch.db[array_index_nospec(dr, size)] = val;
if (!(vcpu->guest_debug & KVM_GUESTDBG_USE_HW_BP))
  vcpu->arch.eff_db[dr] = val;
break;
@@ -954,9 +970,11 @@

int kvm_get_dr(struct kvm_vcpu *vcpu, int dr, unsigned long *val)
{
+  size_t size = ARRAY_SIZE(vcpu->arch.db);
+  switch (dr) {
      case 0 ... 3:
-    *val = vcpu->arch.db[dr];
+    *val = vcpu->arch.db[array_index_nospec(dr, size)];
break;
    case 4:
    /* fall through */
    @@ -1009,6 +1027,7 @@
#endif
MSR_IA32_TSC, MSR_IA32_CR_PAT, MSR_VM_HSAVE_PA,
MSR_IA32_FEATURE_CONTROL, MSR_IA32_BNDCFGS, MSR_TSC_AUX,
+MSR_IA32_SPEC_CTRL, MSR_IA32_ARCH_CAPABILITIES
};
static unsigned num_msrs_to_save;
@@ -1038,35 +1057,152 @@
static unsigned num_emulated_msrs;

-bool kvm_valid_efer(struct kvm_vcpu *vcpu, u64 efer)
+/*
+ * List of msr numbers which are used to expose MSR-based features that
+ * can be used by a hypervisor to validate requested CPU features.
+ */
+static u32 msr_based_features[] = {
+MSR_F10H_DECFG,
+MSR_IA32_UCODE_REV,
+MSR_IA32_ARCH_CAPABILITIES,
+};
+
+static unsigned int num_msr_based_features;
+
+u64 kvm_get_arch_capabilities(void)
{  
-if (efer & efer_reserved_bits)
+return false;  
+u64 data;  
+  
+rdmsrl_safe(MSR_IA32_ARCH_CAPABILITIES, &data);
+
+/*
+ * If nx_huge_pages is enabled, KVM's shadow paging will ensure that
+ * the nested hypervisor runs with NX huge pages. If it is not,
+ * L1 is anyway vulnerable to ITLB_MULTIHIT exploits from other
+ * L1 guests, so it need not worry about its own (L2) guests.
+ */
+data |= ARCH_CAP_PSCHANGE_MC_NO;
+
+/*
+ * If we're doing cache flushes (either "always" or "cond")
+ * we will do one whenever the guest does a vmlaunch/vmresume.
+ * If an outer hypervisor is doing the cache flush for us
+ * (VMENTER_L1D_FLUSH_NESTED_VM), we can safely pass that
+ * capability to the guest too, and if EPT is disabled we're not
+ * vulnerable. Overall, only VMENTER_L1D_FLUSH_NEVER will
+ * require a nested hypervisor to do a flush of its own.
+ */
+if (l1tf_vmx_mitigation != VMENTER_L1D_FLUSH_NEVER)
data |= ARCH_CAP_SKIP_VMENTRY_L1DFLUSH;
ifdef (!boot_cpu_has_bug(X86_BUG_CPU_MELTDOWN))
data |= ARCH_CAP_RDCL_NO;
endif
ifdef (!boot_cpu_has_bug(X86_BUG_SPEC_STORE_BYPASS))
data |= ARCH_CAP_SSB_NO;
endif
ifdef (!boot_cpu_has_bug(X86_BUG_MDS))
data |= ARCH_CAP_MDS_NO;
endif

/*
 * On TAA affected systems, export MDS_NO=0 when:
 * TAA is enabled on the host, i.e. X86_FEATURE_RTM=1.
 * Updated microcode is present. This is detected by
 * the presence of ARCH_CAP_TSX_CTRL_MSR and ensures
 * that VERW clears CPU buffers.
 * When MDS_NO=0 is exported, guests deploy clear CPU buffer
 * mitigation and don't complain:
 * "Vulnerable: Clear CPU buffers attempted, no microcode"
 * If TSX is disabled on the system, guests are also mitigated against
 * TAA and clear CPU buffer mitigation is not required for guests.
 */
ifdef (!boot_cpu_has(X86_FEATURE_RTM))
data &= ~ARCH_CAP_TAA_NO;
else if (!boot_cpu_has_bug(X86_BUG_TAA))
data |= ARCH_CAP_TAA_NO;
else if (data & ARCH_CAP_TSX_CTRL_MSR)
data &= ~ARCH_CAP_MDS_NO;
endif
/* KVM does not emulate MSR_IA32_TSX_CTRL. */
data &= ~ARCH_CAP_TSX_CTRL_MSR;
return data;
#endif
EXPORT_SYMBOL_GPL(kvm_get_arch_capabilities);

static int kvm_get_msr_feature(struct kvm_msr_entry *msr) {
    switch (msr->index) {
    case MSR_IA32_ARCH_CAPABILITIES:
        msr->data = kvm_get_arch_capabilities();
        break;
    case MSR_IA32_UCODE_REV:
        rdmsrl_safe(msr->index, &msr->data);
        break;
    default:
        if (kvm_x86_ops->get_msr_feature(msr))
+static int do_get_msr_feature(struct kvm_vcpu *vcpu, unsigned index, u64 *data)
+{
+struct kvm_msr_entry msr;
+int r;
+
+msr.index = index;
+r = kvm_get_msr_feature(&msr);
+if (r)
+return r;
+
+*data = msr.data;
+
+return 0;
+}
+
+static int set_efer(struct kvm_vcpu *vcpu, struct msr_data *msr_info)
+
+u64 old_efer = vcpu->arch.efer;
+
+u64 efer = msr_info->data;

-static int set_efer(struct kvm_vcpu *vcpu, u64 efer)
+
+bool kvm_valid_efer(struct kvm_vcpu *vcpu, u64 efer)
+
+{  
+if (efer & efer_reserved_bits)
+return false;
+
+return __kvm_valid_efer(vcpu, efer);
+}

EXPORT_SYMBOL_GPL(kvm_valid_efer);

-static int set_efer(struct kvm_vcpu *vcpu, u64 efer)
+static int set_efer(struct kvm_vcpu *vcpu, struct msr_data *msr_info)
+
+u64 old_efer = vcpu->arch.efer;
++u64 efer = msr_info->data;

+return 1;
+
+return 0;
+
+return 0;
+
+return false;
+
+return false;
+return false;

+return true;
+
+}
+
+bool kvm_valid_efer(struct kvm_vcpu *vcpu, u64 efer)
+
+{  
+if (efer & efer_reserved_bits)
+return false;
+
+return __kvm_valid_efer(vcpu, efer);
+}
-if (!kvm_valid_efer(vcpu, efer))
+if (efer & efer_reserved_bits)
    return 1;

-if (is_paging(vcpu)
-    && (vcpu->arch.efer & EFER_LME) != (efer & EFER_LME))
-    return 1;
+    if (!msr_info->host_initiated) {
+        if (!__kvm_valid_efer(vcpu, efer))
+            return 1;
+        +
+        +    if (is_paging(vcpu) &&
+        +        (vcpu->arch.efer & EFER_LME) != (efer & EFER_LME))
+            return 1;
+        +}

    efer &= ~EFER_LMA;
    efer |= vcpu->arch.efer & EFER_LMA;
@@ -1316,7 +1452,7 @@
    vcpu->arch.tsc_always_catchup = 1;
    return 0;
} else {
-    WARN(1, "user requested TSC rate below hardware speed\n");
+    pr_warn_ratelimited("user requested TSC rate below hardware speed\n");
    return -1;
    }

@@ -1326,8 +1462,8 @@
user_tsc_khz, tsc_khz);

if (ratio == 0 || ratio >= kvm_max_tsc_scaling_ratio) {
    -WARN_ONCE(1, "Invalid TSC scaling ratio - virtual-tsc-khz=%u\n",
    - user_tsc_khz);
    +pr_warn_ratelimited("Invalid TSC scaling ratio - virtual-tsc-khz=%u\n",
    + user_tsc_khz);
    return -1;
    }

@@ -1407,7 +1543,7 @@

static void update_ia32_tsc_adjust_msr(struct kvm_vcpu *vcpu, s64 offset)
{
    -u64 curr_offset = vcpu->arch.tsc_offset;
    +u64 curr_offset = kvm_x86_ops->read_l1_tsc_offset(vcpu);
    vcpu->arch.ia32_tsc_adjust_msr += offset - curr_offset;
}

@@ -1449,14 +1585,15 @@
u64 kvm_read_l1_tsc(struct kvm_vcpu *vcpu, u64 host_tsc)
{
- return vcpu->arch.tsc_offset + kvm_scale_tsc(vcpu, host_tsc);
+ u64 tsc_offset = kvm_x86_ops->read_l1_tsc_offset(vcpu);
+
+ return tsc_offset + kvm_scale_tsc(vcpu, host_tsc);
}
EXPORT_SYMBOL_GPL(kvm_read_l1_tsc);

static void kvm_vcpu_write_tsc_offset(struct kvm_vcpu *vcpu, u64 offset)
{
- kvm_x86_ops->write_tsc_offset(vcpu, offset);
- vcpu->arch.tsc_offset = offset;
+
+ tsc_offset = kvm_x86_ops->read_l1_tsc_offset(vcpu);
+ vcpu->arch.tsc_offset = tsc_offset + offset;
}
void kvm_write_tsc(struct kvm_vcpu *vcpu, struct msr_data *msr)
@@ -1571,7 +1708,8 @@
static inline void adjust_tsc_offset_guest(struct kvm_vcpu *vcpu,
- s64 adjustment)
+
{ u64 tsc_offset = kvm_x86_ops->read_l1_tsc_offset(vcpu);
+
+ tsc_offset = tsc_offset + adjustment;
}
static inline void adjust_tsc_offset_host(struct kvm_vcpu *vcpu, s64 adjustment)
@@ -2027,16 +2165,20 @@
if (data != 0 && data != ~(u64)0)
- return -1;
+ return 1;
 vcpu->arch.mcg_ctl = data;
 break;
 default:
- if (msr >= MSR_IA32_MC0_CTL &&
- msr < MSR_IA32_MCx_CTL(bank_num)) { u32 offset = msr - MSR_IA32_MC0_CTL;
+ u32 offset = array_index_nospec(
+ msr - MSR_IA32_MC0_CTL,
+ MSR_IA32_MCx_CTL(bank_num) - MSR_IA32_MC0_CTL);

/* only 0 or all 1s can be written to IA32_MCi_CTL
* some Linux kernels though clear bit 10 in bank 4 to
* workaround a BIOS/GART TBL issue on AMD K8s, ignore
@@ -2162,16 +2304,25 @@
switch (msr) {
  case MSR_AMD64_NB_CFG:
  case MSR_IA32_UCODE_REV:
  case MSR_IA32_UCODE_WRITE:
  case MSR_VM_HSAVE_PA:
  case MSR_AMD64_PATCH_LOADER:
  case MSR_AMD64_BU_CFG2:
  case MSR_AMD64_DC_CFG:
    case MSR_F15H_EX_CFG:
    break;

    +case MSR_IA32_UCODE_REV:
    +if (msr_info->host_initiated)
    +vcpu->arch.microcode_version = data;
    +break;
    +case MSR_IA32_ARCH_CAPABILITIES:
    +if (!msr_info->host_initiated)
    +return 1;
    +vcpu->arch.arch_capabilities = data;
    +break;
    case MSR_EFER:
    -return set_efer(vcpu, data);
    +return set_efer(vcpu, msr_info);
    case MSR_K7_HWCR:
      data &= ~(u64)0x40; /* ignore flush filter disable */
      data &= ~(u64)0x100; /* ignore ignne emulation enable */
@@ -2206,7 +2357,7 @@
    return kvm_mtrr_set_msr(vcpu, msr, data);
    case MSR_IA32_APICBASE:
      return kvm_set_apic_base(vcpu, msr_info);
    -case APIC_BASE_MSR ... APIC_BASE_MSR + 0x3ff:
    +case APIC_BASE_MSR ... APIC_BASE_MSR + 0xff:
      return kvm_x2apic_msr_write(vcpu, msr, data);
    case MSR_IA32_TSCDEADLINE:
      kvm_set_lapic_tscdeadline_msr(vcpu, data);
@@ -2216,6 +2367,10 @@
      if (!msr_info->host_initiated) {
        s64 adj = data - vcpu->arch.ia32_tsc_adjust_msr;
        adjust_tsc_offset_guest(vcpu, adj);
        +/* Before back to guest, tsc_timestamp must be adjusted
        + * as well, otherwise guest's percpu pvclock time could jump.
        + */
+kvm_make_request(KVM_REQ_CLOCK_UPDATE, vcpu);
}

vcpu->arch.ia32_tsc_adjust_msr = data;
}
@@ -2228,6 +2383,9 @@
return 1;

vcpu->arch.smbase = data;
broadcast;
+case MSR_IA32_TSC:
+kvm_write_tsc(vcpu, msr_info);
+break;

case MSR_KVM_WALL_CLOCK_NEW:
case MSR_KVM_WALL_CLOCK:
vcpu->kvm->arch.wall_clock = data;
@@ -2393,7 +2551,7 @@
}

EXPORT_SYMBOL_GPL(kvm_get_msr);

-static int get_msr_mce(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata)
+static int get_msr_mce(struct kvm_vcpu *vcpu, u32 msr, u64 *pdata, bool host)
{
    u64 data;
    u64 mcg_cap = vcpu->arch.mcg_cap;
@@ -2408,7 +2566,7 @@
data = vcpu->arch.mcg_cap;
broadcast;

case MSR_IA32_MCG_CTL:
-    if (!(mcg_cap & MCG_CTL_P))
+    if (!(mcg_cap & MCG_CTL_P) && !host)
        return 1;
data = vcpu->arch.mcg_ctl;
broadcast;
@@ -2418,7 +2576,10 @@
default:
    if (msr >= MSR_IA32_MC0_CTL &&
        msr < MSR_IA32_MCx_CTL(bank_num)) {
-    u32 offset = msr - MSR_IA32_MC0_CTL;
+    u32 offset = array_index_nospec(
+        msr - MSR_IA32_MC0_CTL,
+        MSR_IA32_MCx_CTL(bank_num) - MSR_IA32_MC0_CTL);
+    data = vcpu->arch.mce_banks[offset];
broadcast;
}
@@ -2449,6 +2610,7 @@
case MSR_AMD64_BU_CFG2:
case MSR_IA32_PERF_CTL:
case MSR_AMD64_DC_CFG:
+case MSR_F15H_EX_CFG:
  msr_info->data = 0;
  break;

+case MSR_K7_EVNTSEL0 ...
MSR_K7_EVNTSEL3:
  @ @ -2460.7 +2622.16 @ @
  msr_info->data = 0;
  break;

+case MSR_IA32_UCODE_REV:
  -msr_info->data = 0x100000000ULL;
  +msr_info->data = vcpu->arch.microcode_version;
  +break;

+case MSR_IA32_TSC:
  +msr_info->data = kvm_scale_tsc(vcpu, rdtsc()) + vcpu->arch.tsc_offset;
  +break;

+case MSR_IA32_ARCH_CAPABILITIES:
  +if (!msr_info->host_initiated &&
+    !guest_cpuid_has(vcpu, X86_FEATURE_ARCH_CAPABILITIES))
  +return 1;
  +msr_info->data = vcpu->arch.arch_capabilities;
  break;

-case MSR_MTRRcap:
  case 0x200 ... 0x2ff:
  @@ -2485,7 +2656,7 @@
  case MSR_IA32_APICBASE:
  msr_info->data = kvm_get_apic_base(vcpu);
  break;

-case APIC_BASE_MSR ...
  +case APIC_BASE_MSR ...
  APIC_BASE_MSR + 0xff:
  return kvm_x2apic_msr_read(vcpu, msr_info->index, &msr_info->data);
  break;

-case MSR_IA32_TSCDEADLINE:
  @@ -2534,7 +2705,8 @@
  case MSR_IA32_MCG_CTL:
  case MSR_IA32_MCG_STATUS:
  case MSR_IA32_MC0_CTL ...
  case MSR_IA32_MCe_CTL(KVM_MAX_MCE_BANKS) - 1:
  -return get_msr_mce(vcpu, msr_info->index, &msr_info->data);
  +return get_msr_mce(vcpu, msr_info->index, &msr_info->data,
  +       msr_info->host_initiated);

-case HV_X64_MSR_CRASH_CTL:
  case HV_X64_MSR_STIMER0_CONFIG ...
  HV_X64_MSR_STIMER3_COUNT:
  return kvm_hv_get_msr_common(vcpu,
    -msr_info->index, &msr_info->data);
  +msr_info->index, &msr_info->data,
  +msr_info->host_initiated);
break;
case MSR_IA32_BBL_CR_CTL3:
    /* This legacy MSR exists but isn't fully documented in current
    @ @ -2612.13 +2785.11 @ @
        int (*do_msr)(struct kvm_vcpu *vcpu,
        unsigned index, u64 *data))
    {
        int i, idx;
        +int i;

           -idx = srcu_read_lock(&vcpu->kvm->srcu);
        for (i = 0; i < msrs->nmsrs; ++i)
            if (do_msr(vcpu, entries[i].index, &entries[i].data))
                break;
        -srcu_read_unlock(&vcpu->kvm->srcu, idx);

        return i;
    }
    @ @ -2717.6 +2888.7 @ @
case KVM_CAP_SET_BOOT_CPU_ID:
    case KVM_CAP_SPLIT_IRQCHIP:
    case KVM_CAP_IMMEDIATE_EXIT:
        +case KVM_CAP_GET_MSR_FEATURES:
            r = 1;
        break;
    case KVM_CAP_ADJUST_CLOCK:
        @ @ -2734.7 +2906.7 @ @
        * fringe case that is not enabled except via specific settings
        * of the module parameters.
        */
        -r = kvm_x86_ops->cpu_has_high_real_mode_segbase();
        +r = kvm_x86_ops->has_emulated_msr(MSR_IA32_SMBASE);
    break;
    case KVM_CAP_VAPIC:
    r = !kvm_x86_ops->cpu_has_accelerated_tpr();
        @ @ -2745.6 +2917.9 @ @
    case KVM_CAP_MAX_VCPUS:
    r = KVM_MAX_VCPUS;
        break;
    +case KVM_CAP_MAX_VCPU_ID:
        +r = KVM_MAX_VCPU_ID;
        +break;
    case KVM_CAP_NR_MEMSLOTS:
    r = KVM_USER_MEM_SLOTS;
    break;
        @ @ -2831.6 +3006.31 @ @
    goto out;
    r = 0;
break;
+case KVM_GET_MSR_FEATURE_INDEX_LIST: {
+struct kvm_msr_list __user *user_msr_list = argp;
+struct kvm_msr_list msr_list;
+unsigned int n;
+
++r = -EFAULT;
++n = msr_list.nmsrs;
+msr_list.nmsrs = num_msr_based_features;
++if (copy_to_user(user_msr_list, &msr_list, sizeof(msr_list)))
++goto out;
++r = -E2BIG;
++if (n < msr_list.nmsrs)
++goto out;
++r = -EFAULT;
++if (copy_to_user(user_msr_list->indices, &msr_based_features, 
++num_msr_based_features * sizeof(u32)))
++goto out;
++r = 0;
++break;
+}
+case KVM_GET_MSRS:
++r = msr_io(NULL, argp, do_get_msr_feature, 1);
++break;
+
+default:
++r = -EINVAL;
@@ -2904,6 +3104,9 @@
++if (!(vcpu->arch.st.msr_val & KVM_MSR_ENABLED))
++return;
++vcpu->arch.st.steal.preempted = 1;

+kvm_write_guest_offset_cached(vcpu->kvm, &vcpu->arch.st.stime, 
+@ @ -2938,6 +3141,12 @ @
+pagefault_enable();
+kvm_x86_ops->vcpu_put(vcpu);
+vcpu->arch.last_host_tsc = rdtsc();
+ /*
+ * If userspace has set any breakpoints or watchpoints, dr6 is restored
+ * on every vmexit, but if not, we might have a stale dr6 from the
+ * guest. do_debug expects dr6 to be cleared after it runs, do the same.
+ */
+set_debugreg(0, 6);
}

static int kvm_vcpu_ioctl_get_lapic(struct kvm_vcpu *vcpu,
 @@ -2964,22 +3173,33 @@
 static int kvm_cpu_accept_dm_intr(struct kvm_vcpu *vcpu)
 {
+ /*
+ * We can accept userspace's request for interrupt injection
+ * as long as we have a place to store the interrupt number.
+ * The actual injection will happen when the CPU is able to
+ * deliver the interrupt.
+ */
+ if (kvm_cpu_has_extint(vcpu))
+ return false;
+
+/* Acknowledging ExtINT does not happen if LINT0 is masked. */
+return (!lapic_in_kernel(vcpu) ||
+kvm_apic_accept_pic_intr(vcpu));
}

-/*
- * if userspace requested an interrupt window, check that the
- * interrupt window is open.
- *
- */
-static int kvm_vcpu_ready_for_interrupt_injection(struct kvm_vcpu *vcpu)
-{
- return kvm_arch_interrupt_allowed(vcpu) &&
- !kvm_cpu_has_interrupt(vcpu) &&
- /*
- * Do not cause an interrupt window exit if an exception
- * is pending or an event needs reinjection; userspace
- * might want to inject the interrupt manually using KVM_SET_REGS
- * or KVM_SET_SREGS. For that to work, we must be at an
- * instruction boundary and with no events half-injected.
- */
+ /*
+ * We can accept userspace's request for interrupt injection
+ * as long as we have a place to store the interrupt number.
+ * The actual injection will happen when the CPU is able to
+ * deliver the interrupt.
+ */
+ if (kvm_cpu_has_extint(vcpu))
+ return false;
+
+/* Acknowledging ExtINT does not happen if LINT0 is masked. */
+return (!lapic_in_kernel(vcpu) ||
+kvm_apic_accept_pic_intr(vcpu));
}

 static int kvm_vcpu_ioctl_interrupt(struct kvm_vcpu *vcpu,
 @@ -3039,7 +3259,7 @@
unsigned bank_num = mcg_cap & 0xff, bank;

r = -EINVAL;
-ifdef (!bank_num || bank_num > KVM_MAX_MCE_BANKS)
+ifdef (!bank_num || bank_num > KVM_MAX_MCE_BANKS)
go to out;
if (mcg_cap & ~(kvm_mce_cap_supported | 0xff | 0xff0000))
go to out;
@@ -3110,6 +3330,10 @@
   struct kvm_vcpu_events *events)
{
process_nmi(vcpu);
+
+if (kvm_check_request(KVM_REQ_SMI, vcpu))
+process_smi(vcpu);
+
/ *
 * FIXME: pass injected and pending separately. This is only
 * needed for nested virtualization, whose state cannot be
@@ -3558,12 +3782,18 @@
r = 0;
b reak;
} -case KVM_GET_MSRS:
+case KVM_GET_MSRS: {
+int idx = srcu_read_lock(&vcpu->kvm->srcu);
r = msr_io(vcpu, argp, do_get_msr, 1);
+srcu_read_unlock(&vcpu->kvm->srcu, idx);
break;
- case KVM_SET_MSRS:
+} +case KVM_SET_MSRS: {
+int idx = srcu_read_lock(&vcpu->kvm->srcu);
r = msr_io(vcpu, argp, do_set_msr, 0);
+srcu_read_unlock(&vcpu->kvm->srcu, idx);
break;
+}
 case KVM_TPR_ACCESS_REPORTING: {
 struct kvm_tpr_access_ctl tac;
@@ -3766,7 +3996,7 @@
}

static int kvm_vm_ioctl_set_nr_mmu_pages(struct kvm *kvm,
- u32 kvm_nr_mmu_pages)
+ unsigned long kvm_nr_mmu_pages)
{
if (kvm_nr_mmu_pages < KVM_MIN_ALLOC_MMU_PAGES)
return -EINVAL;
@@ -3780,7 +4010,7 @@
 return 0;
 }

-static int kvm_vm_ioctl_get_nr_mmu_pages(struct kvm *kvm)
+static unsigned long kvm_vm_ioctl_get_nr_mmu_pages(struct kvm *kvm)
 { return kvm->arch.n_max_mmu_pages;
 }
@@ -4190,10 +4420,13 @@
 r = -EFAULT;
 if (copy_from_user(&u.ps, argp, sizeof u.ps))
 goto out;
+mutex_lock(&kvm->lock);
 r = -ENXIO;
 if (!kvm->arch.vpit)
- goto out;
+ goto set_pit_out;
 r = kvm_vm_ioctl_set_pit(kvm, &u.ps);
+set_pit_out:
+mutex_unlock(&kvm->lock);
 break;
 } case KVM_GET_PIT2: {
@@ -4213,10 +4446,13 @@
 r = -EFAULT;
 if (copy_from_user(&u.ps2, argp, sizeof(u.ps2)))
 goto out;
+mutex_lock(&kvm->lock);
 r = -ENXIO;
 if (!kvm->arch.vpit)
- goto out;
+ goto set_pit2_out;
 r = kvm_vm_ioctl_set_pit2(kvm, &u.ps2);
+set_pit2_out:
+mutex_unlock(&kvm->lock);
 break;
 } case KVM_REINJECT_CONTROL: {
@@ -4237,13 +4473,14 @@
 mutex_unlock(&kvm->lock);
 break;
 case KVM_XEN_HVM_CONFIG: {
+struct kvm_xen_hvm_config xhc;
 r = -EFAULT;
- if (copy_from_user(&kvm->arch.xen_hvm_config, argp,
+ if (copy_from_user(&kvm->arch.xen_hvm_config, argp,
- sizeof(struct kvm_xen_hvm_config)))
+ sizeof(struct kvm_xen_hvm_config)))

if (copy_from_user(&xhc, argp, sizeof(xhc)))
goto out;
t = -EINVAL;
- if (kvm->arch.xen_hvm_config.flags)
  + if (xhc.flags)
goto out;
  + memcpy(&kvm->arch.xen_hvm_config, &xhc, sizeof(xhc));
  r = 0;
  break;
}
@@ -4335,20 +4572,27 @@
num_msrs_to_save = j;

for (i = j = 0; i < ARRAY_SIZE(emulated_msrs); i++) {
  - switch (emulated_msrs[i]) {
  - case MSR_IA32_SMBASE:
  -   if (!kvm_x86_ops->cpu_has_high_real_mode_segbase())
  -     continue;
  -   break;
  - default:
  -     break;
  - }
  + if (!kvm_x86_ops->has_emulated_msr(emulated_msrs[i]))
  + continue;

  if (j < i)
    emulated_msrs[j] = emulated_msrs[i];
  j++;
}
num_emulated_msrs = j;
+
+ for (i = j = 0; i < ARRAY_SIZE(msr_based_features); i++) {
+ struct kvm_msr_entry msr;
+  +msr.index = msr_based_features[i];
+  +if (kvm_get_msr_feature(&msr))
+    continue;
+  +
+  +if (j < i)
+    msr_based_features[j] = msr_based_features[i];
+  +j++;
+  +}
+num_msr_based_features = j;
}

static int vcpu_mmio_write(struct kvm_vcpu *vcpu, gpa_t addr, int len,
@@ -4508,24 +4752,35 @@
return X86EMUL_CONTINUE;
int kvm_read_guest_virt(struct x86_emulate_ctx *ctxt, 
  int kvm_read_guest_virt(struct kvm_vcpu *vcpu, 
     gva_t addr, void *val, unsigned int bytes, 
     struct x86_exception *exception) 
} 
struct kvm_vcpu *vcpu = emul_to_vcpu(ctxt); 
u32 access = ((kvm_x86_ops->get_cpl(vcpu) == 3) ? PFERR_USER_MASK : 0; 

+ /*
+  * FIXME: this should call handle_emulation_failure if X86EMUL_IO_NEEDED
+  * is returned, but our callers are not ready for that and they blindly
+  * call kvm_inject_page_fault. Ensure that they at least do not leak
+  * uninitialized kernel stack memory into cr2 and error code.
+ */
+ memset(exception, 0, sizeof(*exception));
return kvm_read_guest_virt_helper(addr, val, bytes, vcpu, access, 
        exception);
} 
EXPORT_SYMBOL_GPL(kvm_read_guest_virt);

static int kvm_read_guest_virt_system(struct x86_emulate_ctx *ctxt, 
  gva_t addr, void *val, unsigned int bytes, 
  struct x86_exception *exception) 
} 
struct kvm_vcpu *vcpu = emul_to_vcpu(ctxt); 
return kvm_read_guest_virt_helper(addr, val, bytes, vcpu, 0, exception); 
+u32 access = 0;
+ 
+if (!system && kvm_x86_ops->get_cpl(vcpu) == 3) 
+access |= PFERR_USER_MASK;
+ 
+return kvm_read_guest_virt_helper(addr, val, bytes, vcpu, access, exception);
} 
static int kvm_read_guest_phys_system(struct x86_emulate_ctx *ctxt, 
@@ -4537,18 +4792,16 @@ 
return r < 0 ? X86EMUL_IO_NEEDED : X86EMUL_CONTINUE; 
} 

-int kvm_write_guest_virt_system(struct x86_emulate_ctx *ctxt, 
  gva_t addr, void *val, 
  unsigned int bytes, 
  struct x86_exception *exception)
+static int kvm_write_guest_virt_helper(gva_t addr, void *val, unsigned int bytes,
+    struct kvm_vcpu *vcpu, u32 access,
+    struct x86_exception *exception)
{
    struct kvm_vcpu *vcpu = emul_to_vcpu(ctx);
    void *data = val;
    int r = X86EMUL_CONTINUE;

    while (bytes) {
        gpa_t gpa = vcpu->arch.walk_mmu->gva_to_gpa(vcpu, addr,
            PFERR_WRITE_MASK,
            access,
            exception);
        unsigned offset = addr & (PAGE_SIZE-1);
        unsigned towrite = min(bytes, (unsigned)PAGE_SIZE - offset);
        out:
        return r;
    }
    +
    +static int emulator_write_std(struct x86_emulate_ctxt *ctxt, gva_t addr, void *val,
    +    unsigned int bytes, struct x86_exception *exception,
    +    bool system)
    +{
        struct kvm_vcpu *vcpu = emul_to_vcpu(ctx);
        u32 access = PFERR_WRITE_MASK;
        +if (!system && kvm_x86_ops->get_cpl(vcpu) == 3)
            access |= PFERR_USER_MASK;
        +return kvm_write_guest_virt_helper(addr, val, bytes, vcpu,
            access, exception);
    +}
    +
    +int kvm_write_guest_virt_system(struct kvm_vcpu *vcpu, gva_t addr, void *val,
    +    unsigned int bytes, struct x86_exception *exception)
    +{
        /* kvm_write_guest_virt_system can pull in tons of pages. */
        +vcpu->arch.l1tf_flush_l1d = true;
        +
        +/*
        + * FIXME: this should call handle_emulation_failure if X86EMUL_IO_NEEDED
        + * is returned, but our callers are not ready for that and they blindly
        + * call kvm_inject_page_fault. Ensure that they at least do not leak
        + * uninitialized kernel stack memory into cr2 and error code.
        + */
        +memset(exception, 0, sizeof(*exception));
        +return kvm_write_guest_virt_helper(addr, val, bytes, vcpu,
static int vcpu_is_mmio_gpa(struct kvm_vcpu *vcpu, unsigned long gva,  
@@ -5297,8 +5581,8 @@  static const struct x86_emulate_ops emulate_ops = {  
    .read_gpr = emulator_read_gpr,  
    .write_gpr = emulator_write_gpr,  
    .read_std = kvm_read_guest_virt_system,  
-   .write_std = kvm_write_guest_virt_system,  
+   .write_std = emulator_write_std,  
    .read_phys = kvm_read_guest_phys_system,  
    .fetch = kvm_fetch_guest_virt,  
    .read_emulated = emulator_read_emulated,  
@@ -5438,11 +5722,11 @@  return r;  
}  

-static bool reexecute_instruction(struct kvm_vcpu *vcpu, gva_t cr2,  
+static bool reexecute_instruction(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa,  
   bool write_fault_to_shadow_pgtable,  
   int emulation_type)  
{  
-   gpa_t gpa = cr2;  
+   gpa_t gpa = cr2_or_gpa;  
   kvm_pfn_t pfn;  

if (emulation_type & EMULTYPE_NO_REEXECUTE)  
@@ -5510,10 +5794,10 @@  * Write permission should be allowed since only  * write access need to be emulated.  */  
-   gpa = kvm_mmu_gva_to_gpa_write(vcpu, cr2, NULL);  
+   gpa = kvm_mmu_gva_to_gpa_write(vcpu, cr2_or_gpa, NULL);  

/*  * If the mapping is invalid in guest, let cpu retry  
@@ -5510,10 +5794,10 @@  */  

static bool retry_instruction(struct x86_emulate_ctxt *ctxt,  
-   unsigned long cr2, int emulation_type)  
+   gpa_t cr2_or_gpa, int emulation_type)  
{  
   struct kvm_vcpu *vcpu = emul_to_vcpu(ctxt);  
   unsigned long last_retry_eip, last_retry_addr, gpa = cr2;
unsigned long last_retry_eip, last_retry_addr, gpa = cr2_or_gpa;

last_retry_eip = vcpu->arch.last_retry_eip;
last_retry_addr = vcpu->arch.last_retry_addr;
@@ -5539,14 +5823,14 @@
if (x86_page_table_writing_insn(ctxt))
    return false;

-if (ctxt->eip == last_retry_eip && last_retry_addr == cr2)
+if (ctxt->eip == last_retry_eip && last_retry_addr == cr2_or_gpa)
    return false;

vcpu->arch.last_retry_eip = ctxt->eip;
-vcpu->arch.last_retry_addr = cr2;
+vcpu->arch.last_retry_addr = cr2_or_gpa;

if (!vcpu->arch.mmu.direct_map)
    gpa = kvm_mmu_gva_to_gpa_write(vcpu, cr2, NULL);
    gpa = kvm_mmu_gva_to_gpa_write(vcpu, cr2_or_gpa, NULL);

kvm_mmu_unprotect_page(vcpu->kvm, gpa_to_gfn(gpa));

@@ -5676,17 +5960,16 @@
}

-int x86_emulate_instruction(struct kvm_vcpu *vcpu,
    - unsigned long cr2,
    - int emulation_type,
    - void *insn,
    - int insn_len)
+int x86_emulate_instruction(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa,
    + int emulation_type, void *insn, int insn_len)
{
    int r;
    struct x86_emulate_ctxt *ctxt = &vcpu->arch.emulate_ctxt;
    bool writeback = true;
    bool write_fault_to_spt = vcpu->arch.write_fault_to_shadow_pgtable;

    vcpu->arch.l1tf_flush_l1d = true;
    +
    /*
    * Clear write_fault_to_shadow_pgtable here to ensure it is
    * never reused.
    @@ -5703,7 +5986,8 @@
    * handle watchpoints yet, those would be handled in
    * the emulate_ops.
    */
if (kvm_vcpu_check_breakpoint(vcpu, &r))
+ if (!(emulation_type & EMULTYPE_SKIP) &&
    kvm_vcpu_check_breakpoint(vcpu, &r))
return r;

cxt->interruptibility = 0;
@@ -5720,11 +6004,19 @@
@@ -5738,7 +6030,7 @@
    return EMULATE_DONE;
    if (retry_instruction(ctxt, cr2_or_gpa, emulation_type))
        return EMULATE_DONE;
    /* this is needed for vmware backdoor interface to work since it
       @@ -5750,7 +6042,7 @@
       return EMULATE_DONE;
    }

-if (retry_instruction(ctxt, cr2, emulation_type))
+if (retry_instruction(ctxt, cr2_or_gpa, emulation_type))
    return EMULATE_DONE;

    /* this is needed for vmware backdoor interface to work since it
       @@ -5750,7 +6042,7 @@
       return EMULATE_DONE;
    }

    if (emulation_type & EMULTYPE_SKIP)
        return EMULATE_FAIL;
    return handle_emulation_failure(vcpu);

    /* Save the faulting GPA (cr2) in the address field */
    -ctxt->exception.address = cr2;
    +ctxt->exception.address = cr2_or_gpa;

    r = x86_emulate_insn(ctxt);

    @@ -5758,7 +6050,7 @@
    return EMULATE_DONE;
if (r == EMULATION_FAILED) {
-  if (reexecute_instruction(vcpu, cr2, write_fault_to_spt,
+  if (reexecute_instruction(vcpu, cr2_or_gpa, write_fault_to_spt,
    emulation_type))
  return EMULATE_DONE;

@@ -5792,13 +6084,13 @@
  unsigned long rflags = kvm_x86_ops->get_rflags(vcpu);
  toggle_interruptibility(vcpu, ctxt->interruptibility);
  vcpu->arch.emulate_regs_need_sync_to_vcpu = false;
-  kvm_rip_write(vcpu, ctxt->eip);
-  if (r == EMULATE_DONE &&
-      (ctxt->tf || (vcpu->guest_debug & KVM_GUESTDBG_SINGLESTEP)))
+  if (r == EMULATE_DONE &&
+      exception_type(ctxt->exception.vector) == EXCPT_TRAP) {
+    kvm_rip_write(vcpu, ctxt->eip);
+    if (r == EMULATE_DONE && ctxt->tf)
+      kvm_vcpu_do_singlestep(vcpu, &r);
+    __kvm_set_rflags(vcpu, ctxt->eflags);
  }

/*
 * For STI, interrupts are shadowed; so KVM_REQ_EVENT will
@@ -5943,17 +6235,17 @@
  smp_call_function_single(freq->cpu, tsc_khz_changed, freq, 1);

-  spin_lock(&kvm_lock);
+  mutex_lock(&kvm_lock);
  list_for_each_entry(kvm, &vm_list, vm_list) {
    kvm_for_each_vcpu(i, vcpu, kvm) {
      if (vcpu->cpu != freq->cpu)
        continue;
    kvm_make_request(KVM_REQ_CLOCK_UPDATE, vcpu);
-    if (vcpu->cpu != smp_processor_id())
+    if (vcpu->cpu != raw_smp_processor_id())
      send_ipi = 1;
    }
  }
-  spin_unlock(&kvm_lock);
+  mutex_unlock(&kvm_lock);

  if (freq->old < freq->new && send_ipi) {
/*
@@ -6053,33 +6345,6 @@

EXPORT_SYMBOL_GPL(kvm_after_handle_nmi);

-static void kvm_set_mmio_spte_mask(void)
-{  
u64 mask;
-int maxphyaddr = boot_cpu_data.x86_phys_bits;
-
-/*
-* Set the reserved bits and the present bit of an paging-structure
-* entry to generate page fault with PFER.RSV = 1.
-* */
-/* Mask the reserved physical address bits. */
-mask = rsvd_bits(maxphyaddr, 51);
-
-/* Set the present bit. */
-mask |= 1ull;
-
-#ifdef CONFIG_X86_64
-/*
-* If reserved bit is not supported, clear the present bit to disable
-* mmio page fault.
-* */
-if (maxphyaddr == 52)
-mask &= ~1ull;
-#endif
-
-kvm_mmu_set_mmio_spte_mask(mask, mask);
-}

#ifdef CONFIG_X86_64

static void pvclock_gtod_update_fn(struct work_struct *work)
{
@@ -6088,12 +6353,12 @@
struct kvm_vcpu *vcpu;
    int i;

-    spin_lock(&kvm_lock);
+    mutex_lock(&kvm_lock);
    list_for_each_entry(kvm, &vm_list, vm_list)
    kvm_for_each_vcpu(i, vcpu, kvm)
    kvm_make_request(KVM_REQ_MASTERCLOCK_UPDATE, vcpu);
    atomic_set(&kvm_guest_has_master_clock, 0);
-    spin_unlock(&kvm_lock);
+    mutex_unlock(&kvm_lock);
 }

 static DECLARE_WORK(pvclock_gtod_work, pvclock_gtod_update_fn);

goto out;
}
if (ops->disabled_by_bios()) {
    printk(KERN_ERR "kvm: disabled by bios\n");
    printk(KERN_WARNING "kvm: disabled by bios\n");
    r = -EOPNOTSUPP;
    goto out;
}
if (r)
goto out_free_percpu;

-kvm_set_mmio_spte_mask();
-
kvm_x86_ops = ops;

kvm_mmu_set_mask_ptes(PT_USER_MASK, PT_ACCESSED_MASK,
cpuhp_remove_state_nocalls(CPUHP_AP_X86_KVM_CLK_ONLINE);
#endif
pvclock_gtod_unregister_notifier(&pvclock_gtod_notifier);
+cancel_work_sync(&pvclock_gtod_work);
#endif
kvm_x86_ops = NULL;
kvm_mmu_module_exit();
ret = 0;
if (kvm_write_guest(vcpu->kvm, paddr, &clock_pairing,
int kvm_emulate_hypercall(struct kvm_vcpu *vcpu)
{unsigned long nr, a0, a1, a2, a3, ret;
-int op_64_bit, r;
-
-r = kvm_skip_emulated_instruction(vcpu);
+int op_64_bit;

+if (kvm_hv_hypercall_enabled(vcpu->kvm))
-kreturn kvm_hv_hypercall(vcpu);
+if (kvm_hv_hypercall_enabled(vcpu->kvm)) {
+if (!kvm_hv_hypercall(vcpu))
+kreturn 0;
nr = kvm_register_read(vcpu, VCPU_REGS_RAX);
a0 = kvm_register_read(vcpu, VCPU_REGS_RBX);
if (kvm_x86_ops->get_cpl(vcpu) != 0) {
    ret = -KVM_EPERM;
    goto out;
    +
}
switch (nr) {
    ret = -KVM_ENOSYS;
    break;
    -out:
    +out_error:
    if (!op_64_bit)
        kvm_register_write(vcpu, VCPU_REGS_RAX, ret);
    +
    ++vcpu->stat.hypercalls;
    -return r;
    +return kvm_skip_emulated_instruction(vcpu);
    }
EXPORT_SYMBOL_GPL(kvm_emulate_hypercall);

static void kvm_inject_exception(struct kvm_vcpu *vcpu)
{
    if (vcpu->arch.exception.error_code && !is_protmode(vcpu))
        vcpu->arch.exception.error_code = false;
    kvm_x86_ops->queue_exception(vcpu);
    +}

static int inject_pending_event(struct kvm_vcpu *vcpu, bool req_int_win)
+
static void kvm_inject_exception(struct kvm_vcpu *vcpu)
+
static int inject_pending_event(struct kvm_vcpu *vcpu)
{
    int r;
    /* try to reinject previous events if any */
if (vcpu->arch.exception.injected) {
-kvm_x86_ops->queue_exception(vcpu);
+kvm_inject_exception(vcpu);
return 0;
}
@@ -6421,7 +6696,7 @@
}

if (is_guest_mode(vcpu) && kvm_x86_ops->check_nested_events) {
-kvm_x86_ops->check_nested_events(vcpu, req_int_win);
+r = kvm_x86_ops->check_nested_events(vcpu);
if (r != 0)
return r;
}
@@ -6445,7 +6720,7 @@
kvm_update_dr7(vcpu);
}

-kvm_x86_ops->queue_exception(vcpu);
+kvm_inject_exception(vcpu);
} else if (vcpu->arch.smi_pending && !is_smm(vcpu) && kvm_x86_ops->smi_allowed(vcpu)) {
    vcpu->arch.smi_pending = false;
    enter_smm(vcpu);
    @@ -6462,7 +6737,7 @@
    * KVM_REQ_EVENT only on certain events and not unconditionally? */
    if (is_guest_mode(vcpu) && kvm_x86_ops->check_nested_events) {
-kvm_x86_ops->check_nested_events(vcpu, req_int_win);
+r = kvm_x86_ops->check_nested_events(vcpu);
if (r != 0)
return r;
}
@@ -6593,9 +6868,9 @@
    put_smstate(u32, buf, 0x7ef8, vcpu->arch.smbase);
}

+##ifdef CONFIG_X86_64
static void enter_smm_save_state_64(struct kvm_vcpu *vcpu, char *buf) {
+##ifdef CONFIG_X86_64
    struct desc_ptr dt;
    struct kvm_segment seg;
    unsigned long val;
    @@ -6645,10 +6920,8 @@
    for (i = 0; i < 6; i++)
        enter_smm_save_seg_64(vcpu, buf, i);


static void enter_smm(struct kvm_vcpu *vcpu)
{
    trace_kvm_enter_smm(vcpu->vcpu_id, vcpu->arch.smbase, true);
    memset(buf, 0, 512);
    if (guest_cpuid_has(vcpu, X86_FEATURE_LM))
        enter_smm_save_state_64(vcpu, buf);
    else
        enter_smm_save_state_32(vcpu, buf);

    /*
     * @ -6719,8 +6994,10 @@
     * kvm_set_segment(vcpu, &ds, VCPU_SREG_GS);
     * kvm_set_segment(vcpu, &ds, VCPU_SREG_SS);
     */

    kvm_update_cpuid(vcpu);
    kvm_mmu_reset_context(vcpu);
    u64 eoi_exit_bitmap[4];

    if (!kvm_apic_hw_enabled(vcpu->arch.apic))
        return;
    else {
        if (kvm_x86_ops->sync_pir_to_irr && vcpu->arch.apicv_active)
            kvm_x86_ops->sync_pir_to_irr(vcpu);
        else {
            kvm_ioapic_scan_entry(vcpu, vcpu->arch.ioapic_handled_vectors);
            if (ioapic_in_kernel(vcpu->kvm))
                kvm_ioapic_scan_entry(vcpu, vcpu->arch.ioapic_handled_vectors);
        }

    }
bitmap_or((ulong *)eoi_exit_bitmap, vcpu->arch.ioapic_handled_vectors, vcpu_to_synic(vcpu)->vec_bitmap, 256); 
kvm_x86_ops->load_eoi_exitmap(vcpu, eoi_exit_bitmap);
}

static void kvm_vcpu_flush_tlb(struct kvm_vcpu *vcpu)

+static void kvm_vcpu_flush_tlb(struct kvm_vcpu *vcpu, bool invalidate_gpa)
{
++vcpu->stat.tlb_flush;
-kvm_x86_ops->tlb_flush(vcpu);
+kvm_x86_ops->tlb_flush(vcpu, invalidate_gpa);
}

void kvm_arch_mmu_notifier_invalidate_range(struct kvm *kvm, 
@@ -6832,7 +7110,7 @@
if (kvm_check_request(KVM_REQ_MMU_SYNC, vcpu)) 
kvm_mmu_sync_roots(vcpu);
if (kvm_check_request(KVM_REQ_TLB_FLUSH, vcpu))
-kvm_vcpu_flush_tlb(vcpu);
+kvm_vcpu_flush_tlb(vcpu, true);
if (kvm_check_request(KVM_REQ_REPORT_TPR_ACCESS, vcpu)) {
  vcpu->run->exit_reason = KVM_EXIT_TPR_ACCESS;
  r = 0;
@@ -6911,7 +7189,7 @@
goto out;
}

@if (inject_pending_event(vcpu, req_int_win) != 0)
+if (inject_pending_event(vcpu) != 0)
req_immediate_exit = true;
else {
/* Enable SMI/NMI/IRQ window open exits if needed.
@@ -6997,8 +7275,6 @@
goto cancel_injection;
}

-kvm_load_guest_xcr0(vcpu);
-
if (req_immediate_exit) {
  kvm_make_request(KVM_REQ_EVENT, vcpu);
  smp_send_reschedule(vcpu->cpu);
@@ -7016,6 +7292,8 @@
  set_debugreg(vcpu->arch.eff_db[3], 3);
  set_debugreg(vcpu->arch.dr6, 6);
  vcpu->arch.switch_db_regs &= ~KVM_DEBUGREG_RELOAD;
+} else if (unlikely(hw_breakpoint_active())) {
+  set_debugreg(0, 7);
+}
kvm_x86_ops->run(vcpu);
@@ -7050,8 +7328,6 @@
vcpu->mode = OUTSIDE_GUEST_MODE;
    smp_wmb();

    -kvm_put_guest_xcr0(vcpu);
-
kvm_x86_ops->handle_external_intr(vcpu);

    ++vcpu->stat.exits;
    @ @ -7125.7 +7401.7 @@
static inline bool kvm_vcpu_running(struct kvm_vcpu *vcpu)
{
    if (is_guest_mode(vcpu) && kvm_x86_ops->check_nested_events)
        -kvm_x86_ops->check_nested_events(vcpu, false);
    +kvm_x86_ops->check_nested_events(vcpu);

    return (vcpu->arch.mp_state == KVM_MP_STATE_RUNNABLE &&
            !vcpu->arch.apf.halted);
    @ @ -7137.6 +7413.7 @@
    struct kvm *kvm = vcpu->kvm;

    vcpu->srcu_idx = srcu_read_lock(&kvm->srcu);
    +vcpu->arch.l1tf_flush_l1d = true;

    for (;;) {
        if (kvm_vcpu_running(vcpu)) {
            @ @ -7441.6 +7718.9 @@
            int kvm_arch_vcpu_ioctl_get_mpstate(struct kvm_vcpu *vcpu,
                struct kvm_mp_state *mp_state)
            {
                +if (kvm_mpx_supported())
                +kvm_load_guest_fpu(vcpu);
                +
kvm_apic_accept_events(vcpu);
            if (vcpu->arch.mp_state == KVM_MP_STATE_HALTED &&
                vcpu->arch.pv.pv_unhalted)
                @ @ -7448.6 +7728.8 @@
            else
                mp_state->mp_state = vcpu->arch.mp_state;

                +if (kvm_mpx_supported())
                +kvm_put_guest_fpu(vcpu);
                return 0;
            }

            @ @ -7522.6 +7804.7 @@

Open Source Used In 5GaaS Edge AC-4  12232
struct msr_data apic_base_msr;
int mmu_reset_needed = 0;
+int cpuid_update_needed = 0;
int pending_vec, max_bits, idx;
struct desc_ptr dt;

@@ -7559,12 +7842,14 @@
vcpu->arch.cr0 = sregs->cr0;

mmu_reset_needed |= kvm_read_cr4(vcpu) != sregs->cr4;
+cpuid_update_needed |= ((kvm_read_cr4(vcpu) ^ sregs->cr4) &
+ (X86_CR4_OSXSAVE | X86_CR4_PKE));
 kmem_x86_ops->set_cr4(vcpu, sregs->cr4);
 -if (sregs->cr4 & (X86_CR4_OSXSAVE | X86_CR4_PKE))
 +if (cpuid_update_needed)
 kmem_update_cpuid(vcpu);

idx = srcu_read_lock(&vcpu->kvm->srcu);
 -if (!is_long_mode(vcpu) && is_pae(vcpu)) {
 +if (is_pae_paging(vcpu)) {
 load_pdptrs(vcpu, vcpu->arch.walk_mmu, kvm_read_cr3(vcpu));
 mmu_reset_needed = 1;
 }
 @@ -7755,6 +8040,9 @@
void kvm_arch_vcpu_free(struct kvm_vcpu *vcpu)
 {
 void *wbinvd_dirty_mask = vcpu->arch.wbinvd_dirty_mask;
 +struct gfn_to_pfn_cache *cache = &vcpu->arch.st.cache;
 +
 +kvm_release_pfn(cache->pfn, cache->dirty, cache);

 kvmclock_reset(vcpu);

@@ -7781,6 +8104,15 @@
{
 int r;

+vcpu->arch.arch_capabilities = kvm_get_arch_capabilities();
 kmem_vcpu_mtrr_init(vcpu);
 r = vcpu_load(vcpu);
 if (r)
 @@ -7815,19 +8104,15 @@

void kvm_arch_vcpu_destroy(struct kvm_vcpu *vcpu)
 {
 -int r;
 -vcpu->arch.apf.msr_val = 0;


- \( r = \text{vcpu}\_\text{load}(\text{vcpu}); \)
- \text{BUG\_ON}(r);
- \text{kvm}\_\text{mmu}\_\text{unload}(\text{vcpu});
- \text{vcpu}\_\text{put}(\text{vcpu});
- \text{kvm}\_\text{x86}\_\text{ops}\rightarrow\text{vcpu}\_\text{free}(\text{vcpu});
+ \text{kvm}\_\text{arch}\_\text{vcpu}\_\text{free}(\text{vcpu});
}

void \text{kvm}\_\text{vcpu}\_\text{reset}(\text{struct kvm}\_\text{vcpu} *\text{vcpu}, \text{bool init}\_\text{event})
{
+ \text{unsigned long old}\_\text{cr0} = \text{kvm}\_\text{read}\_\text{cr0}(\text{vcpu});
+
+ \text{kvm}\_\text{lapic}\_\text{reset}(\text{vcpu}, \text{init}\_\text{event});
+
+ \text{vcpu}->\text{arch}\.\text{hflags} = 0;

\text{vcpu}->\text{arch}\.\text{smi}\_\text{pending} = 0;
@@ -7895,6 +8180,17 @@
\text{vcpu}->\text{arch}\.\text{ia32}\.\text{xss} = 0;

\text{kvm}\_\text{x86}\_\text{ops}\rightarrow\text{vcpu}\_\text{reset}(\text{vcpu}, \text{init}\_\text{event});
+
+/*
+ * Reset the MMU context if paging was enabled prior to INIT (which is
+ * implied if CR0.PG=1 as CR0 will be '0' prior to RESET). Unlike the
+ * standard CR0/CR4/EFER modification paths, only CR0.PG needs to be
+ * checked because it is unconditionally cleared on INIT and all other
+ * paging related bits are ignored if paging is disabled, i.e. CR0.WP,
+ * CR4, and EFER changes are all irrelevant if CR0.PG was '0'.
+ */
+\text{if} (\text{old}\_\text{cr0} \& X86\_\text{CR0}\_\text{PG})
+\text{kvm}\_\text{mmu}\_\text{reset}\_\text{context}(\text{vcpu});
}

void \text{kvm}\_\text{vcpu}\_\text{deliver}\_\text{sipi}\_\text{vector}(\text{struct kvm}\_\text{vcpu} *\text{vcpu}, \text{u8} \text{vector})
@@ -8148,6 +8444,7 @@

void \text{kvm}\_\text{arch}\_\text{sched}\_\text{in}(\text{struct kvm}\_\text{vcpu} *\text{vcpu}, \text{int} \text{cpu})
{
+\text{vcpu}->\text{arch}\.\text{l1tf}\_\text{flush}\_\text{l1d} = \text{true};
\text{kvm}\_\text{x86}\_\text{ops}\rightarrow\text{sched}\_\text{in}(\text{vcpu}, \text{cpu});
}

@@ -8159,6 +8456,7 @@
\text{INIT}\_\text{HLIST}\_\text{HEAD}(\text{kvm}\rightarrow\text{arch}\.\text{mask}_\text{notifier}\_\text{list});
\text{INIT}\_\text{LIST}\_\text{HEAD}(\text{kvm}\rightarrow\text{arch}\.\text{active}\_\text{mmu}\_\text{pages});
INIT_LIST_HEAD(&kvm->arch.zappedObsolete_pages);
+INIT_LIST_HEAD(&kvm->arch.lpage_disallowed_mmu_pages);
INIT_LIST_HEAD(&kvm->arch.assignedDev_head);
atomic_set(&kvm->arch.noncoherent_dma_count, 0);

@@ -8188,6 +8486,11 @@
return 0;
}

+int kvm_arch_post_init_vm(struct kvm *kvm)
+{
+return kvm_mmu_post_init_vm(kvm);
+}
+
+static void kvm_unload_vcpu_mmu(struct kvm_vcpu *vcpu)
+
+
+if (!size) {
+@
@
+}
+
-\text{if (!size)} {
-\text{if} (!size) {
-r = vm_munmap(old.userspace_addr, old.npages \times PAGE\_SIZE);
-WARN\_ON(r < 0);
-}
+vm_munmap(old.userspace_addr, old.npages \times PAGE\_SIZE);
+
+return 0;
+
+}
@@ -8293,6 +8594,11 @@
}
EXPORT_SYMBOL_GPL(x86_set_memory_region);

+int kvm_arch_pre_destroy_vm(struct kvm *kvm)
+{
+kvm_mmu_pre_destroy_vm(kvm);
+}
+
+void kvm_arch_destroy_vm(struct kvm *kvm)
+
+if (current->mm == kvm->mm) {
+@
+
+/* Clear out the previous array pointers for the KVM MR_MOVE case. The
+ * old arrays will be freed by __kvm_set_memory_region() if installing
+ * the new memslot is successful.
+ */
+ memset(&slot->arch, 0, sizeof(slot->arch));
+ 
+ for (i = 0; i < KVM_NR_PAGE_SIZES; ++i) {
+ struct kvm_lpage_info *linfo;
+ unsigned long ugnf;
+ return -ENOMEM;
+ }

-void kvm_arch_memslots_updated(struct kvm *kvm, struct kvm_memslots *slots)
+void kvm_arch_memslots_updated(struct kvm *kvm, u64 gen)
{
+struct kvm_vcpu *vcpu;
+int i;
+
+/*
+ * memslots->generation has been incremented.
+ * mmio generation may have reached its maximum value.
+ */
-kvm_mmu_invalidate_mmio_sptes(kvm, slots);
+kvm_mmu_invalidate_mmio_sptes(kvm, gen);
+
+/* Force re-initialization of steal_time cache */
+kvm_for_each_vcpu(i, vcpu, kvm)
+kvm_vcpu_kick(vcpu);
+
int kvm_arch_prepare_memory_region(struct kvm *kvm,
@@ -8416,6 +8736,10 @@
const struct kvm_userspace_memory_region *mem,
enum kvm_mr_change change)
{
+if (change == KVM_MR_MOVE)
+return kvm_arch_create_memslot(kvm, memslot,
+     mem->memory_size >> PAGE_SHIFT);
+ return 0;
+
@@ -8563,6 +8887,22 @@
return kvm_vcpu_running(vcpu) || kvm_vcpu_has_events(vcpu);
+
+bool kvm_arch_dy_runnable(struct kvm_vcpu *vcpu)
+if (READ_ONCE(vcpu->arch.pv.pv_unhalted))
+return true;
+
+if (kvm_test_request(KVM_REQ_NMI, vcpu) ||
+kvm_test_request(KVM_REQ_SMI, vcpu) ||
+kvm_test_request(KVM_REQ_EVENT, vcpu))
+return true;
+
+if (vcpu->arch.apicv_active && kvm_x86_ops->dy_apicv_has_pending_interrupt(vcpu))
+return true;
+
+return false;
+
+
bool kvm_arch_vcpu_in_kernel(struct kvm_vcpu *vcpu)
{
return vcpu->arch.preempted_in_kernel;
@@ -8635,7 +8975,7 @@
work->arch.cr3 != vcpu->arch.mmu.get_cr3(vcpu))
return;

-vcpu->arch.mmu.page_fault(vcpu, work->gva, 0, true);
+vcpu->arch.mmu.page_fault(vcpu, work->cr2_or_gpa, 0, true);
}

static inline u32 kvm_async_pf_hash_fn(gfn_t gfn)
@@ -8718,7 +9058,7 @@
{
struct x86_exception fault;

-trace_kvm_async_pf_not_present(work->arch.token, work->gva);
+trace_kvm_async_pf_not_present(work->arch.token, work->cr2_or_gpa);

kvm_add_async_pf_gfn(vcpu, work->arch.gfn);

if (!(!vcpu->arch.apf.msr_val & KVM_ASYNC_PF_ENABLED) ||
@@ -8746,7 +9086,7 @@
work->arch.token = ~0; /* broadcast wakeup */
else

kvm_del_async_pf_gfn(vcpu, work->arch.gfn);
-trace_kvm_async_pf_ready(work->arch.token, work->gva);
+trace_kvm_async_pf_ready(work->arch.token, work->cr2_or_gpa);

if (vcpu->arch.apf.msr_val & KVM_ASYNC_PF_ENABLED &&
   !apf_get_user(vcpu, &val)) }
static inline void kvm_clear_exception_queue(struct kvm_vcpu *vcpu)
{
    vcpu->arch.exception.pending = false;
    vcpu->arch.exception.injected = false;
}

@@ -93,6 +94,11 @@
return likely(kvm_read_cr0_bits(vcpu, X86_CR0_PG));
}

+static inline bool is_pae_paging(struct kvm_vcpu *vcpu)
+{
+    return !is_long_mode(vcpu) && is_pae(vcpu) && is_paging(vcpu);
+}
+
static inline u32 bit(int bitno)
{
    return 1 << (bitno & 31);
@@ -135,6 +141,11 @@
static inline void vcpu_cache_mmio_info(struct kvm_vcpu *vcpu, gva_t gva, gfn_t gfn, unsigned access)
{
    u64 gen = kvm_memslots(vcpu->kvm)->generation;
    
+    if (unlikely(gen & 1))
+        return;
+
    /*
     * If this is a shadow nested page table, the "GVA" is
     * actually a nGPA.
     @ @ -142,7 +153,7 @@
     vcpu->arch.mmio_gva = mmu_is_nested(vcpu) ? 0 : gva & PAGE_MASK;
     vcpu->arch.access = access;
     vcpu->arch.mmio_gfn = gfn;
     -vcpu->arch.mmio_gen = kvm_memslots(vcpu->kvm)->generation;
     +vcpu->arch.mmio_gen = gen;
     }

static inline bool vcpu_match_mmio_gen(struct kvm_vcpu *vcpu)
@@ -212,11 +223,11 @@
void kvm_write_tsc(struct kvm_vcpu *vcpu, struct msr_data *msr);
    u64 get_kvmclock_ns(struct kvm *kvm);

    -int kvm_read_guest_virt(struct x86_emulate_ctxt *ctxt,
    +int kvm_read_guest_virt(struct kvm_vcpu *vcpu,
        gva_t addr, void *val, unsigned int bytes,
        struct x86_exception *exception);
+int kvm_write_guest_virt_system(struct x86_emulate_ctxt *ctxt,
+int kvm_write_guest_virt_system(struct kvm_vcpu *vcpu,
gva_t addr, void *val, unsigned int bytes,
struct x86_exception *exception);

@@ -297,4 +308,16 @@
return true;
}

+static inline bool kvm_pat_valid(u64 data)
+{
+if (data & 0xF8F8F8F8F8F8F8ull)
+return false;
+/* 0, 1, 4, 5, 6, 7 are valid values. */
+return (data | ((data & 0x0202020202020202ull) << 1)) == data;
+}
+
+void kvm_load_guest_xcr0(struct kvm_vcpu *vcpu);
+void kvm_put_guest_xcr0(struct kvm_vcpu *vcpu);
+
#endif

--- linux-4.15.0.orig/arch/x86/lib/Makefile
+++ linux-4.15.0/arch/x86/lib/Makefile
@@ -6,6 +6,18 @@
# Produces uninteresting flaky coverage.
KCOV_INSTRUMENT_delay.o := n

+# Early boot use of cmdline; don’t instrument it
+ifdef CONFIG_AMD_MEM_ENCRYPT
+KCOV_INSTRUMENT_cmdline.o := n
+KASAN_SANITIZE_cmdline.o  := n
+
+ifdef CONFIG_FUNCTION_TRACER
+CFLAGS_REMOVE_cmdline.o = -pg
+endif
+
+CFLAGS_cmdline.o := $(call cc-option, -fno-stack-protector)
+endif
+
+inat_tables_script = $(srctree)/arch/x86/tools/gen-insn-attr-x86.awk
inat_tables_maps = $(srctree)/arch/x86/lib/x86-opcode-map.txt
quiet_cmd_inat_tables = GEN     $@
--- linux-4.15.0.orig/arch/x86/cpu.c
+++ linux-4.15.0/arch/x86/cpu.c
@@ -1,5 +1,6 @@
#include <linux/types.h>
#include <linux/export.h>
unsigned int x86_family(unsigned int sig) {
    unsigned int fam, model;
    fam = x86_family(sig);
    model = (sig >> 4) & 0xf;
}

/*
 * AMD, like Intel, supports the EAX hint and EAX=0xf
 * means, do not enter any deep C-state and we use it
 * AMD, like Intel's MWAIT version, supports the EAX hint and
 * EAX=0xf0 means, do not enter any deep C-state and we use it
 * here in delay() to minimize wakeup latency.
 */
__mwaitx(MWAITX_DISABLE_CSTATES, delay, MWAITX_ECX_TIMER_ENABLE);
cmp TASK_addr_limit(%ASM_DX),%ASM_AX
jae bad_get_user
+sbb %ASM_DX, %ASM_DX/* array_index_mask_nospec() */
+and %ASM_DX, %ASM_AX
ASM_STAC
3:movl -3(%ASM_AX),%edx
xor %eax,%eax
@@ -83,6 +89,8 @@
mov PER_CPU_VAR(current_task), %ASM_DX
cmp TASK_addr_limit(%ASM_DX),%ASM_AX
jae bad_get_user
+sbb %ASM_DX, %ASM_DX/* array_index_mask_nospec() */
+and %ASM_DX, %ASM_AX
ASM_STAC
4:movq -7(%ASM_AX),%rdx
xor %eax,%eax
@@ -94,6 +102,8 @@
mov PER_CPU_VAR(current_task), %ASM_DX
cmp TASK_addr_limit(%ASM_DX),%ASM_AX
jae bad_get_user_8
+sbb %ASM_DX, %ASM_DX/* array_index_mask_nospec() */
+and %ASM_DX, %ASM_AX
ASM_STAC
4:movl -7(%ASM_AX),%edx
5:movl -3(%ASM_AX),%ecx
--- linux-4.15.0.orig/arch/x86/lib/insn-eval.c
+++ linux-4.15.0/arch/x86/lib/insn-eval.c
@@ -70,14 +70,15 @@
{
    int idx = INAT_SEG_REG_DEFAULT;
    int num_overrides = 0, i;
    +insn_byte_t p;

    insn_get_prefixes(insn);

    /* Look for any segment override prefixes. */
    -for (i = 0; i < insn->prefixes.nbytes; i++) {
        +for_each_insn_prefix(insn, i, p) {
            insn_attr_t attr;

            -attr = inat_get_opcode_attribute(insn->prefixes.bytes[i]);
            +attr = inat_get_opcode_attribute(p);
            switch (attr) {
                case INAT_MAKE_PREFIX(INAT_PFX_CS):
                    idx = INAT_SEG_REG_CS;
                    @@ -555,7 +556,8 @@
/**
 * get_desc() - Obtain pointer to a segment descriptor
 *+ * get_desc() - Obtain contents of a segment descriptor
 *+ * @out: Segment descriptor contents on success
 *+ * @sel: Segment selector
 * *
 * Given a segment selector, obtain a pointer to the segment descriptor.
 *
 * Returns:
 *
 * - Pointer to segment descriptor on success.
 *+ * True on success, false on failure.
 * *
 * NULL on error.
 */
-static struct desc_struct *get_desc(unsigned short sel)
+static bool get_desc(struct desc_struct *out, unsigned short sel)
{
    struct desc_ptr gdt_desc = {0, 0};
    unsigned long desc_base;

    #ifdef CONFIG_MODIFY_LDT_SYSCALL
    if ((sel & SEGMENT_TI_MASK) == SEGMENT_LDT) {
        -struct desc_struct *desc = NULL;
        +bool success = false;
        struct ldt_struct *ldt;

        /* Bits [15:3] contain the index of the desired entry. */
        @@ -582,12 +584,14 @@
        mutex_lock(&current->active_mm->context.lock);
        ldt = current->active_mm->context.ldt;
        -if (ldt && sel < ldt->nr_entries)
        -desc = &ldt->entries[sel];
        +if (ldt && sel < ldt->nr_entries) {
        +out = ldt->entries[sel];
        +success = true;
        +}
        mutex_unlock(&current->active_mm->context.lock);

        -return desc;
        +return success;
    }
    endif

    native_store_gdt(&gdt_desc);
    @@ -602,9 +606,10 @@
desc_base = sel & ~(SEGMENT_RPL_MASK | SEGMENT_TI_MASK);

if (desc_base > gdt_desc.size)
    return NULL;
+return false;

-return (struct desc_struct *)(gdt_desc.address + desc_base);
+*out = *(struct desc_struct *)(gdt_desc.address + desc_base);
+return true;
}

/**
@@ -626,7 +631,7 @@
*/
unsigned long insn_get_seg_base(struct pt_regs *regs, int seg_reg_idx)
{
-struct desc_struct *desc;
+struct desc_struct desc;
    short sel;

    sel = get_segment_selector(regs, seg_reg_idx);
@@ -664,11 +669,10 @@
    if (!sel)
        return -1L;

    -desc = get_desc(sel);
-    if (!desc)
+    if (!get_desc(&desc, sel))
        return -1L;

    -return get_desc_base(desc);
+return get_desc_base(&desc);
}

/**
@@ -690,7 +694,7 @@
*/
static unsigned long get_seg_limit(struct pt_regs *regs, int seg_reg_idx)
{
    -struct desc_struct *desc;
    +struct desc_struct desc;
    unsigned long limit;
    short sel;

    @@ -704,8 +708,7 @@
    if (!sel)
        return 0;

    -desc = get_desc(sel);
-    if (!desc)
+    if (!get_desc(&desc, sel))
        return -1L;

    -return get_desc_base(desc);
+return get_desc_base(&desc);
}
```c
if (!desc)
    return 0;

/*
@@ -714,8 +717,8 @@
* not tested when checking the segment limits. In practice,
* this means that the segment ends in (limit << 12) + 0xfff.
*/
-limit = get_desc_limit(desc);
-if (desc->g)
+limit = get_desc_limit(&desc);
+if (desc.g)
    limit = (limit << 12) + 0xfff;

return limit;
@@ -739,7 +742,7 @@
*/
int insn_get_code_seg_params(struct pt_regs *regs)
{
    -struct desc_struct *desc;
    +struct desc_struct desc;
    short sel;

    if (v8086_mode(regs))
        @ @ -750,8 +753,7 @@
    if (sel < 0)
        return sel;

    -desc = get_desc(sel);
    -if (!desc)
    +if (!get_desc(&desc, sel))
        return -EINVAL;

    /*
@@ -759,10 +761,10 @@
* determines whether a segment contains data or code. If this is a data
* segment, return error.
*/
    -if (!(desc->type & BIT(3)))
    +if (!(desc.type & BIT(3)))
        return -EINVAL;

    -switch ((desc->l << 1) | desc->d) {
    +switch ((desc.l << 1) | desc.d) {
        case 0: /*
          Legacy mode. CS.L=0, CS.D=0. Address and operand size are
```
* both 16-bit.
--- linux-4.15.0.orig/arch/x86/lib/kaslrc
+++ linux-4.15.0/arch/x86/lib/kaslrc
@@ -36,8 +36,8 @@
u16 status, timer;

do {
-    outb(I8254_PORT_CONTROL,
-       I8254_CMD_READBACK | I8254_SELECT_COUNTER0);
+    outb(I8254_CMD_READBACK | I8254_SELECT_COUNTER0,
+       I8254_PORT_CONTROL);
    status = inb(I8254_PORT_COUNTER0);
    timer = inb(I8254_PORT_COUNTER0) << 8;
-    linux-4.15.0.orig/arch/x86/lib/memcpy_64.S
+    linux-4.15.0/arch/x86/lib/memcpy_64.S
@@ -13,8 +13,6 @@
     * to a jmp to memcpy_erms which does the REP; MOVSB mem copy.
 */
.
-weak memcpy
-
/*
 * memcpy - Copy a memory block.
 * @
@@ -27,7 +25,9 @@
 * rax original destination
 */
ENTRY(__memcpy)
-ENTRY(memcpy)
+weak memcpy
+p2align 4, 0x90
+memcpy:
ALTERNATIVE_2 "jmp memcpy_orig", ",", X86_FEATURE_REP_GOOD, \ 
    "jmp memcpy_erms", X86_FEATURE_ERMS

--- linux-4.15.0.orig/arch/x86/lib/memmove_64.S
+++ linux-4.15.0/arch/x86/lib/memmove_64.S
@@ -25,8 +25,8 @@
 * rax: dest
 */
.weak memmove
-
-ENTRY(memmove)
+p2align 4, 0x90
+memmove:
ENTRY(__memmove)
/* Handle more 32 bytes in loop */
--- linux-4.15.0.orig/arch/x86/lib/memset_64.S
+++ linux-4.15.0/arch/x86/lib/memset_64.S
@@ -6,8 +6,6 @@
#include <asm/alternative-asm.h>
#include <asm/export.h>

-weak memset
-
/*
 * ISO C memset - set a memory block to a byte value. This function uses fast
 * string to get better performance than the original function. The code is
@@ -19,7 +17,9 @@
 *
 * rax original destination
 */
-ENTRY(memset)
+weak memset
+.p2align 4, 0x90
+memset:
+ENTRY(__memset)
/*
 * Some CPUs support enhanced REP MOVSB/STOSB feature. It is recommended
--- linux-4.15.0.orig/arch/x86/lib/msr-smp.c
+++ linux-4.15.0/arch/x86/lib/msr-smp.c
@@ -240,7 -240,7 @@
rv->err = wrmsr_safe_regs(rv->regs);
}

-int rdmsr_safe_regs_on_cpu(unsigned int cpu, u32 *regs)
+int rdmsr_safe_regs_on_cpu(unsigned int cpu, u32 regs[8])
{
 int err;
 struct msr_regs_info rv;
 @@ -253,7 +253,7 @@
 EXPORT_SYMBOL(rdmsr_safe_regs_on_cpu);

-int wrmsr_safe_regs_on_cpu(unsigned int cpu, u32 *regs)
+int wrmsr_safe_regs_on_cpu(unsigned int cpu, u32 regs[8])
{
 int err;
 struct msr_regs_info rv;
--- linux-4.15.0.orig/arch/x86/lib/usercopy.c
+++ linux-4.15.0/arch/x86/lib/usercopy.c
@@ -7,6 +7,8 @@
 #include <linux/uaccess.h>
 #include <linux/export.h>
#include <asm/tlbflush.h>

/*
 * We rely on the nested NMI work to allow atomic faults from the NMI path; the
 * nested NMI paths are careful to preserve CR2.
 */

if (__range_not_ok(from, n, TASK_SIZE))
    return n;

+if (!nmi_uaccess_okay())
    +return n;
+
/*
 * Even though this function is typically called from NMI/IRQ context
 * disable pagefaults so that its behaviour is consistent even when
 */

unsigned long __copy_user_ll(void *to, const void *from, unsigned long n)
{
    -stac();
    +__uaccess_begin_nospec();
    if (movsl_is_ok(to, from, n))
        __copy_user(to, from, n);
    else
        n = __copy_user_intel(to, from, n);
    -clac();
    +__uaccess_end();
    return n;
}

EXPORT_SYMBOL(__copy_user_ll);

unsigned long __copy_from_user_ll_nocache_nozero(void *to, const void __user *from,
unsigned long n)
{
    -stac();
    +__uaccess_begin_nospec();
    #ifdef CONFIG_X86_INTEL_USERCOPY
    if (n > 64 && static_cpu_has(X86_FEATURE_XMM2))
        n = __copy_user_intel_nocache(to, from, n);
    @ @ -353,7 +353,7 @@
    #else
        __copy_user(to, from, n);
    #endif
    -clac();
    +__uaccess_end();

return n;
}
EXPORT_SYMBOL(__copy_from_user_ll_nocache_nozero);
--- linux-4.15.0.orig/arch/x86/lib/usercopy_64.c
+++ linux-4.15.0/arch/x86/lib/usercopy_64.c
@@ -118,7 +118,7 @@
*/
if (size < 8) {
    if (!IS_ALIGNED(dest, 4) || size != 4)
        clean_cache_range(dst, 1);
    + clean_cache_range(dst, size);
} else {
    if (!IS_ALIGNED(dest, 8)) {
        dest = ALIGN(dest, boot_cpu_data.x86_clflush_size);
--- linux-4.15.0.orig/arch/x86/lib/x86-opcode-map.txt
+++ linux-4.15.0/arch/x86/lib/x86-opcode-map.txt
@@ -333,7 +333,7 @@
06: CLTS
07: SYSRET (o64)
08: INVD
-09: WBINVD
+09: WBINVD | WBNOINVD (F3)
0a:
0b: UD2 (1B)
0c:
@@ -364,7 +364,7 @@
# a ModR/M byte.
1a: BNDCL Gv,Ev (F3) | BNDCU Gv,Ev (F2) | BNDMOV Gv,Ev (66) | BNDLDX Gv,Ev
1b: BNDCN Gv,Ev (F2) | BNDMOV Ev,Gv (66) | BNDMK Gv,Ev (F3) | BNDSTX Ev,Gv
-1c:
+1c: Grp20 (1A),(1C)
1d:
1e:
1f: NOP Ev
@@ -792,7 +792,7 @@
f5: BZHI Gy,By,Ev (v) | PEXT Gy,By,Ev (F3), (v) | PDEP Gy,By,Ev (F2), (v)
f6: ADCX Gy,Ev (66) | ADOX Gy,Ev (F3) | MULX Gy, rDX,Ev (F2), (v)
f7: BEXTR Gy,Ev,By (v) | SHLX Gy,Ev,By (66), (v) | SARX Gy,Ev,By (F3), (v) | SHRX Gy,Ev,By (F2), (v)
+f8: MOVDIR64B Gv,Mdqq (66) | ENQCMD Gv,Mdqq (F2) | ENQCMDS Gv,Mdqq (F3)
+f9: MOVDIRI My,Gy
EndTable
Table: 3-byte opcode 2 (0x0f 0x3a)
@@ -907,7 +907,7 @@
GrpTable: Grp3_2
0: TEST Ev,Iz
-1:
GrpTable: Grp7
-0: SGDT Ms | VMCALL (001),(11B) | VMLAUNCH (010),(11B) | VMRESUME (011),(11B) | VMXOFF (100),(11B)
-1: SIDT Ms | MONITOR (000),(11B) | MWAIT (001),(11B) | CLAC (010),(11B) | STAC (011),(11B)
-2: LGDT Ms | XGETBV (000),(11B) | XSETBV (001),(11B) | VMFUNC (100),(11B) | XEND (101)(11B) | XTEST (110)(11B)
+0: SGDT Ms | VMCALL (001),(11B) | VMLAUNCH (010),(11B) | VMRESUME (011),(11B) | VMXOFF (100),(11B) | PCONFIG (101),(11B) | ENCLV (000),(11B)
+1: SIDT Ms | MONITOR (000),(11B) | MWAIT (001),(11B) | CLAC (010),(11B) | STAC (011),(11B) | ENCLS (111),(11B)
+2: LGDT Ms | XGETBV (000),(11B) | XSETBV (001),(11B) | VMFUNC (100),(11B) | XEND (101)(11B) | XTEST (110)(11B) | ENCLU (111),(11B)
 3: LIDT Ms
 4: SMSW Mw/Rv
 5: rdpkru (110),(11B) | wrpkru (111),(11B)
 6: vscatterpf1qps/d Wx (66),(ev)

GrpTable: Grp20
+0: cldemote Mb

# AMD's Prefetch Group
GrpTable: GrpP
0: PREFETCH
--- linux-4.15.0.orig/arch/x86/math-emu/fpu_emu.h
+++ linux-4.15.0/arch/x86/math-emu/fpu_emu.h
@@ -177,7 +177,7 @@
#define setexponentpos(x,y) { (*(short *)&((x)->exp)) = 
    ((y) + EXTENDED_Ebias) & 0x7fff; }

((y) + EXTENDED_Ebias) & 0x7fff; }
#define exponent16(x) (*(short *)&((x)->exp))
#define setexponent16(x,y) { (*(short *)&((x)->exp)) = (y); }
#define addexponent(x,y) { (*(short *)&((x)->exp)) += (y); }
#define stdexp(x) { (*(short *)&((x)->exp)) += EXTENDED_Ebias; }

--- linux-4.15.0.orig/arch/x86/math-emu/reg_constant.c
+++ linux-4.15.0/arch/x86/math-emu/reg_constant.c
@@ -18,7 +18,7 @@
 #include "control_w.h"

 #define MAKE_REG(s, e, l, h) { l, h, 
-((EXTENDED_Ebias+(e)) | ((SIGN_##s != 0)*0x8000)) }
+u16((EXTENDED_Ebias+(e)) | ((SIGN_##s != 0)*0x8000)) } 

 FPU_REG const CONST_1 = MAKE_REG(POS, 0, 0x00000000, 0x80000000);

#if 0
--- linux-4.15.0.orig/arch/x86/math-emu/wm_sqrt.S
+++ linux-4.15.0/arch/x86/math-emu/wm_sqrt.S
@@ -209,7 +209,7 @@
     cmp $0xffffffff,FPU_fsqrt_arg_1
-    cmpl$0xffffffff,FPU_fsqrt_arg_1
+    cmpl$0xffffffff,FPU_fsqrt_arg_1
    jnz sqrt_stage_2_error
#endif /* PARANOID */

--- linux-4.15.0.orig/arch/x86/mm/cpu_entry_area.c
+++ linux-4.15.0/arch/x86/mm/cpu_entry_area.c
@@ -27,8 +27,20 @@
 void cea_set_pte(void *cea_vaddr, phys_addr_t pa, pgprot_t flags)
 {
     unsigned long va = (unsigned long) cea_vaddr;
+    pte_t pte = pfn_pte(pa >> PAGE_SHIFT, flags);

-set_pte_vaddr(va, pfn_pte(pa >> PAGE_SHIFT, flags));
+/*
+ * The cpu_entry_area is shared between the user and kernel
+ * page tables. All of its ptes can safely be global.
+ * _PAGE_GLOBAL gets reused to help indicate PROT_NONE for
+ * non-present PTEs, so be careful not to set it in that
+ * case to avoid confusion.
+ */
+if (boot_cpu_has(X86_FEATURE_PGE) &&
+    (pgprot_val(flags) & _PAGE_PRESENT))
+    pte = pte_set_flags(pte, _PAGE_GLOBAL);
+    set_pte_vaddr(va, pfn_pte(pa >> PAGE_SHIFT, flags));
}
set_pte_vaddr(va, pte);
}

static void __init
@@ -163,4 +175,10 @@
for_each_possible_cpu(cpu)
  setup_cpu_entry_area(cpu);
+
+/*
+ * This is the last essential update to swapper_pgdir which needs
+ * to be synchronized to initial_page_table on 32bit.
+ */
+sync_initial_page_table();
}
--- linux-4.15.0.orig/arch/x86/mm/dump_pagetables.c
+++ linux-4.15.0/arch/x86/mm/dump_pagetables.c
@@ -18,7 +18,9 @@
#include <linux/init.h>
#include <linux/sched.h>
#include <linux/seq_file.h>
+include <linux/pci.h>
+#include <asm/e820/types.h>
#include <asm/pgtable.h>

/*
@@ -51,10 +53,10 @@
enum address_markers_idx {
  USER_SPACE_NR = 0,
  KERNEL_SPACE_NR,
-  LOW_KERNEL_NR,
-  #if defined(CONFIG_MODIFY_LDT_SYSCALL) && defined(CONFIG_X86_5LEVEL)
+  #ifdef CONFIG_MODIFY_LDT_SYSCALL
    LDT_NR,
  #endif
-  #if defined(CONFIG_MODIFY_LDT_SYSCALL) && !defined(CONFIG_X86_5LEVEL)
-    LDT_NR,
-  #endif
  #ifdef CONFIG_KASAN
  KASAN_SHADOW_END_NR,
-  #endif
  CPU_ENTRY_AREA_NR,
-  #if defined(CONFIG_MODIFY_LDT_SYSCALL) && !defined(CONFIG_X86_5LEVEL)
-    LDT_NR,
-  #endif
  #ifdef CONFIG_X86_ESPFIX64
enum address_markers_idx {
    @ @ -105,6 +104,8 @@
    [END_OF_SPACE_NR]= { -1,NULL }
};

#define INIT_PGD((pgd_t *) &init_top_pgt)
+
#else /* CONFIG_X86_64 */

enum address_markers_idx {
    @ @ -115,6 +116,9 @@
#if defining CONFIG_HIGHMEM
PKMAP_BASE_NR,
#else /* CONFIG_X86_64 */
+                        +[LDT_NR]= { 0UL,"LDT remap" },
+                        +[CPU_ENTRY_AREA_NR]= { 0UL,"CPU entry area" },
+                        +[FIXADDR_START_NR]= { 0UL,"Fixmap area" },
+                        +[END_OF_SPACE_NR]= { -1,NULL }
};

#define INIT_PGD(swapper_pg_dir)
+
#endif /* !CONFIG_X86_64 */

/* Multipliers for offsets within the PTEs */
@@ -225,6 +234,29 @@
        return (signed long)(u << shift) >> shift;
    }

+static void note_wx(struct pg_state *st)
+{
+    unsigned long npages;
+    +
+    npages = (st->current_address - st->start_address) / PAGE_SIZE;
+    +

+ifdef CONFIG_PCI_BIOS
+/#
+ * If PCI BIOS is enabled, the PCI BIOS area is forced to WX.
+ * Inform about it, but avoid the warning.
+ */
+if (pcibios_enabled && st->start_address >= PAGE_OFFSET + BIOS_BEGIN &&
+     st->current_address <= PAGE_OFFSET + BIOS_END) {
+pr_warn_once("x86/mm: PCI BIOS W+X mapping %lu pages\n", npages);
+return;
+}
+#endif
+/* Account the WX pages */
+st->wx_pages += npages;
+WARN_ONCE(1, "x86/mm: Found insecure W+X mapping at address %pS\n",
+          (void *)st->start_address);
+
+/* This function gets called on a break in a continuous series
+ * of PTE entries; the next one is different so we need to
+ @ @ -259.14 +291.8 @@
+int width = sizeof(unsigned long) * 2;
+pgprotval_t pr = pgprot_val(st->current_prot);
+
-if (st->check_wx && (pr & _PAGE_RW) && !(pr & _PAGE_NX)) {
-    WARN_ONCE(1,
-       "x86/mm: Found insecure W+X mapping at address %p/%pS\n",
-                (void *)st->start_address,
-                (void *)st->start_address);
-    st->wx_pages += (st->current_address -
-                    st->start_address) / PAGE_SIZE;
-}
+if (st->check_wx && (pr & _PAGE_RW) && !(pr & _PAGE_NX))
+    note_wx(st);
+
+/*
+ * Now print the actual finished series
+ @ @ -465.11 +491.11 @@
+}
+#ifdef CONFIG_X86_64
+/*
+ - ffff800000000000 - ffff87fffffff is reserved for
+ - the hypervisor.
+ * A hole in the beginning of kernel address space reserved
+ * for a hypervisor.
+ */
+return(idx >= pgd_index(__PAGE_OFFSET) - 16) &&
-(idx < pgd_index(__PAGE_OFFSET));
+return(idx >= pgd_index(GUARD_HOLE_BASE_ADDR)) &&
+(idx < pgd_index(GUARD_HOLE_END_ADDR));
#else
    return false;
#endif
@@ -478,11 +504,7 @@
static void ptdump_walk_pgd_level_core(struct seq_file *m, pgd_t *pgd,
   bool checkwx, bool dmesg)
{
-#ifdef CONFIG_X86_64
-pgd_t *start = (pgd_t *) &init_top_pgt;
-#else
-pgd_t *start = swapper_pg_dir;
-#endif
+pgd_t *start = INIT_PGD;
pgprotval_t prot;
int i;
struct pg_state st = {};
@@ -540,12 +562,13 @@
}
EXPORT_SYMBOL_GPL(ptdump_walk_pgd_level_debugfs);

-static void ptdump_walk_user_pgd_level_checkwx(void)
+void ptdump_walk_user_pgd_level_checkwx(void)
{
#ifdef CONFIG_PAGE_TABLE_ISOLATION
-pgd_t *pgd = (pgd_t *) &init_top_pgt;
+pgd_t *pgd = INIT_PGD;
-if (!static_cpu_has(X86_FEATURE_PTI))
+if (!(__supported_pte_mask & _PAGE_NX) ||
+    !static_cpu_has(X86_FEATURE_PTI))
return;

pr_info("x86/mm: Checking user space page tables\n");
@@ -557,7 +580,6 @@
void ptdump_walk_pgd_level_checkwx(void)
{
ptdump_walk_pgd_level_core(NULL, NULL, true, false);
-ptdump_walk_user_pgd_level_checkwx();
}

static int __init pt_dump_init(void)
@@ -579,6 +601,9 @@
# endif
address_markers[FIXADDR_START_NR].start_address = FIXADDR_START;
address_markers[CPU_ENTRY_AREA_NR].start_address = CPU_ENTRY_AREA_BASE;
+#ifdef CONFIG_MODIFY_LDT_SYSCALL
pmd = pmd_offset(pud, address);
pmd_k = pmd_offset(pud_k, address);
-if (!pmd_present(*pmd_k))
-return NULL;

-if (!pmd_present(*pmd))
+if (pmd_present(*pmd) != pmd_present(*pmd_k))
  set_pmd(pmd, *pmd_k);
+
+if (!pmd_present(*pmd_k))
+return NULL;
else
-BUG_ON(pmd_page(*pmd) != pmd_page(*pmd_k));
+BUG_ON(pmd_pfn(*pmd) != pmd_pfn(*pmd_k));

return pmd_k;
}

-void vmalloc_sync_all(void)
+static void vmalloc_sync(void)
{
  unsigned long address;
@@ -278,29 +279,35 @@
for (address = VMALLOC_START & PMD_MASK;
-     address >= TASK_SIZE_MAX && address < FIXADDR_TOP;
+     address >= TASK_SIZE_MAX && address < VMALLOC_END;
address += PMD_SIZE) {
  struct page *page;

  spin_lock(&pgd_lock);
  list_for_each_entry(page, &pgd_list, lru) {
    spinlock_t *pgt_lock;
    -pmd_t *ret;

    /* the pgt_lock only for Xen */
    pgt_lock = &pgd_page_get_mm(page)->page_table_lock;


spin_lock(pgt_lock);
-ret = vmalloc_sync_one(page_address(page), address);
+vmalloc_sync_one(page_address(page), address);
spin_unlock(pgt_lock);
-
-if (!ret)
-break;
}
spin_unlock(&pgd_lock);
}

+void vmalloc_sync_mappings(void)
+{
+vmalloc_sync();
+}
+
+void vmalloc_sync_unmappings(void)
+{
+vmalloc_sync();
+}
+
/*
 * 32-bit:
 *
@@ -316,8 +323,6 @@
if (!(address >= VMALLOC_START && address < VMALLOC_END))
 return -1;

-WARN_ON_ONCE(in_nmi());
-
/*
 * Synchronize this task's top level page-table
 * with the 'reference' page table.
@@ -330,7 +335,7 @@
if (!pmd_k)
 return -1;

-if (pmd_huge(*pmd_k))
+if (pmd_large(*pmd_k))
 return 0;

pte_k = pte_offset_kernel(pmd_k, address);
@@ -405,11 +410,23 @@
#endif /* CONFIG_X86_64: */
void vmalloc_sync_all(void)
+void vmalloc_sync_mappings(void)
{
+/*
+ * 64-bit mappings might allocate new p4d/pud pages
+ * that need to be propagated to all tasks' PGDs.
+ */
sync_global_pgds(VMALLOC_START & PGDIR_MASK, VMALLOC_END);
}

+void vmalloc_sync_unmappings(void)
+
+/*
+ * Unmappings never allocate or free p4d/pud pages.
+ * No work is required here.
+ */
+
/*
 * 64-bit:
 *
@@ -427,8 +444,6 @@
if (!(address >= VMALLOC_START && address < VMALLOC_END))
    return -1;

-WARN_ON_ONCE(in_nmi());
-
/*
 * Copy kernel mappings over when needed. This can also
 * happen within a race in page table update. In the later
@@ -475,7 +490,7 @@
if (pud_none(*pud) || pud_pfn(*pud) != pud_pfn(*pud_ref))
    BUG();

-if (pud_huge(*pud))
+if (pud_large(*pud))
    return 0;

pmd = pmd_offset(pud, address);
@@ -486,7 +501,7 @@
if (pmd_none(*pmd) || pmd_pfn(*pmd) != pmd_pfn(*pmd_ref))
    BUG();

-if (pmd_huge(*pmd))
+if (pmd_large(*pmd))
    return 0;

pte_ref = pte_offset_kernel(pmd_ref, address);
static void
do_sigbus(struct pt_regs *regs, unsigned long error_code, unsigned long address,
int *pkey, unsigned int fault)

/* Handle faults in the kernel portion of the address space */

static int spurious_fault(unsigned long error_code, unsigned long address)

static int spurious_kernel_fault(unsigned long error_code, unsigned long address)

static int spurious_fault_check(unsigned long error_code, pte_t *pte)

static int spurious_kernel_fault_check(unsigned long error_code, pte_t *pte)

static noinline int
spurious_fault(unsiged long error_code, unsigned long address)

spurious_kernel_fault(unsigned long error_code, unsigned long address)
pte = pte_offset_kernel(pmd, address);
if (!pte_present(*pte))
    return 0;

-ret = spurious_fault_check(error_code, pte);
+ret = spurious_kernel_fault_check(error_code, pte);
if (!ret)
    return 0;

@@ -1157,12 +1173,12 @@
 * Make sure we have permissions in PMD.
 * If not, then there's a bug in the page tables:
 * /
-    ret = spurious_fault_check(error_code, (pte_t *) pmd);
+    ret = spurious_kernel_fault_check(error_code, (pte_t *) pmd);
WARN_ONCE(!ret, "PMD has incorrect permission bits\n");

return ret;
} 

-NOKPROBE_SYMBOL(spurious_fault);
+NOKPROBE_SYMBOL(spurious_kernel_fault);

int show_unhandled_signals = 1;

@@ -1230,35 +1246,16 @@

/*
 * This routine handles page faults. It determines the address,
 * and the problem, and then passes it off to one of the appropriate
 * routines.
 * Called for all faults where 'address' is part of the kernel address
 * space. Might get called for faults that originate from *code* that
 * ran in userspace or the kernel.
 */
-static noinline void
-__do_page_fault(struct pt_regs *regs, unsigned long error_code,
-    unsigned long address)
+static void
do_kern_addr_fault(struct pt_regs *regs, unsigned long hw_error_code,
+    unsigned long address)
{
    struct vm_area_struct *vma;
    struct task_struct *tsk;
    struct mm_struct *mm;
    int fault, major = 0;
    unsigned int flags = FAULT_FLAG_ALLOW_RETRY | FAULT_FLAG_KILLABLE;
...
- u32 pkey;
-
- tsk = current;
- mm = tsk->mm;
-
- /*
- * Detect and handle instructions that would cause a page fault for
- * both a tracked kernel page and a userspace page.
- */
- prefetchw(&mm->mmap_sem);
-
- if (unlikely(kmmio_fault(regs, address)))
- return;
-
- /*
- * We fault-in kernel-space virtual memory on-demand. The
- * We can fault-in kernel-space virtual memory on-demand. The
- * 'reference' page table is init_mm.pgd.
- *
- * NOTE! We MUST NOT take any locks for this case. We may
- @ @ -1266.41 +1263.66 @@
- * only copy the information from the master page table,
- * nothing more.
- *
- * This verifies that the fault happens in kernel space
- * (error_code & 4) == 0, and that the fault was not a
- * protection error (error_code & 9) == 0.
- */
- if (unlikely(fault_in_kernel_space(address))) {
- if (!(error_code & (X86_PF_RSVD | X86_PF_USER | X86_PF_PROT))) {
- if (vmalloc_fault(address) >= 0)
- return;
- }
- }
-
- /* Can handle a stale RO->RW TLB: */
- if (spurious_fault(error_code, address))
+ * Before doing this on-demand faulting, ensure that the
+ * fault is not any of the following:
+ * 1. A fault on a PTE with a reserved bit set.
+ * 2. A fault caused by a user-mode access. (Do not demand-
+ *    fault kernel memory due to user-mode accesses).
+ * 3. A fault caused by a page-level protection violation.
+ * (A demand fault would be on a non-present page which
+ *    would have X86_PF_PROT==0).
+ */
+ if (!(hw_error_code & (X86_PF_RSVD | X86_PF_USER | X86_PF_PROT))) {
+ if (vmalloc_fault(address) >= 0)
+ return;
-/* kprobes don't want to hook the spurious faults: */
-if (kprobes_fault(regs))
-return;
-/*
- * Don't take the mm semaphore here. If we fixup a prefetch
- * fault we could otherwise deadlock:
- */
-bad_area_nosemaphore(regs, error_code, address, NULL);
+/* Was the fault spurious, caused by lazy TLB invalidation? */
+if (spurious_kernel_fault(hw_error_code, address))
+return;

+/* kprobes don't want to hook the spurious faults: */
+if (kprobes_fault(regs))
+return;

+#if 0

+/* Note, despite being a "bad area", there are quite a few
+ * acceptable reasons to get here, such as erratum fixups
+ * and handling kernel code that can fault, like get_user().
+ *
+ * Don't take the mm semaphore here. If we fixup a prefetch
+ * fault we could otherwise deadlock:
+ */
+bдон area_nosemaphore(regs, hw_error_code, address, NULL);
+
+NOKPROBE_SYMBOL(do_kern_addr_fault);
+
+/* Handle faults in the user portion of the address space */
+static inline
+void do_user_addr_fault(struct pt_regs *regs,
+unsigned long hw_error_code,
+unsigned long address)
+{
+unsigned long sw_error_code;
+struct vm_area_struct *vma;
+struct task_struct *tsk;
+struct mm_struct *mm;
+int fault, major = 0;
+unsigned int flags = FAULT_FLAG_ALLOW_RETRY | FAULT_FLAG_KILLABLE;
+u32 pkey;
+
+tsk = current;
+mm = tsk->mm;
/* kprobes don't want to hook the spurious faults: */
if (unlikely(kprobes_fault(regs)))
    return;

-if (unlikely(error_code & X86_PF_RSVD))
-    pgtable_bad(regs, error_code, address);
+if (unlikely(hw_error_code & X86_PF_RSVD))
+    pgtable_bad(regs, hw_error_code, address);

-if (unlikely(smap_violation(error_code, regs))) {
-    bad_area_nosemaphore(regs, error_code, address, NULL);
+    if (unlikely(smap_violation(hw_error_code, regs))) {
+        bad_area_nosemaphore(regs, hw_error_code, address, NULL);
    return;
}

@@ -1309,11 +1331,18 @@
/* in a region with pagefaults disabled then we must not take the fault */
if (unlikely(faulthandler_disabled() || !mm)) {
    -    if (unlikely(smap_violation(error_code, regs))) {
    -        bad_area_nosemaphore(regs, error_code, address, NULL);
    +    if (unlikely(smap_violation(hw_error_code, regs))) {
    +        bad_area_nosemaphore(regs, hw_error_code, address, NULL);
    return;
}

*/

+  * hw_error_code is literally the "page fault error code" passed to
+  * the kernel directly from the hardware. But, we will shortly be
+  * modifying it in software, so give it a new name.
+  */
+  sw_error_code = hw_error_code;
+
+/*
+ * It's safe to allow irq's after cr2 has been saved and the
+ * vmalloc fault has been handled.
+ *
@@ -1322,7 +1351,26 @@ */
if (user_mode(regs)) {
    local_irq_enable();
    -    error_code |= X86_PF_USER;
+/*
+ * Up to this point, X86_PF_USER set in hw_error_code
+ * indicated a user-mode access. But, after this,
+ * X86_PF_USER in sw_error_code will indicate either
+ * that, *or* an implicit kernel(supervisor)-mode access
+ * which originated from user mode.
+ */
+if (!(hw_error_code & X86_PF_USER)) {
+/*
+ * The CPU was in user mode, but the CPU says
+ * the fault was not a user-mode access.
+ * Must be an implicit kernel-mode access,
+ * which we do not expect to happen in the
+ * user address space.
+ */
+pr_warn_once("kernel-mode error from user-mode: %lx\n",
+hw_error_code);
+
+sw_error_code |= X86_PF_USER;
+}
flags |= FAULT_FLAG_USER;
} else {
if (regs->flags & X86_EFLAGS_IF)
@@ -1331,9 +1379,9 @@
perf_sw_event(PERF_COUNT_SW_PAGE_FAULTS, 1, regs, address);
-
-if (error_code & X86_PF_WRITE)
+if (sw_error_code & X86_PF_WRITE)
flags |= FAULT_FLAG_WRITE;
-if (error_code & X86_PF_INSTR)
+if (sw_error_code & X86_PF_INSTR)
flags |= FAULT_FLAG_INSTRUCTION;

/*
@@ -1353,9 +1401,9 @@
* space check, thus avoiding the deadlock:
 */
if (unlikely(!down_read_trylock(&mm->mmap_sem))) {
-endif (error_code & X86_PF_USER) &&
+endif (sw_error_code & X86_PF_USER) &&
 !search_exception_tables(regs->ip)) {
-bad_area_nosemaphore(regs, error_code, address, NULL);
+bad_area_nosemaphore(regs, sw_error_code, address, NULL);
return;
}
retry:
@@ -1371,29 +1419,17 @@

vma = find_vma(mm, address);
if (unlikely(!vma)) {
-bad_area(regs, error_code, address);
+bad_area(regs, sw_error_code, address);
return;
}
if (likely(vma->vm_start <= address))
goto good_area;
if (unlikely(!(vma->vm_flags & VM_GROWSDOWN))) {
    bad_area(regs, error_code, address);
    bad_area(regs, sw_error_code, address);
    return;
}
if (error_code & X86_PF_USER) {
    /*
     * Accessing the stack below %sp is always a bug.
     * The large cushion allows instructions like enter
     * and pusha to work. ("enter $65535, $31" pushes
     * 32 pointers and then decrements %sp by 65535.)
     * /
    -if (unlikely(address + 65536 + 32 * sizeof(unsigned long) < regs->sp)) {
        bad_area(regs, error_code, address);
        return;
    } -}
}
if (unlikely(expand_stack(vma, address))) {
    bad_area(regs, error_code, address);
    return;
} -}
if (unlikely(access_error(error_code, vma))) {
    bad_area_access_error(regs, error_code, address, vma);
}
/* Not returning to user mode? Handle exceptions or die: */
-no_context(regs, error_code, address, SIGBUS, BUS_ADRERR);
+no_context(regs, sw_error_code, address, SIGBUS, BUS_ADRERR);
return;
}
up_read(&mm->mmap_sem);
if (unlikely(fault & VM_FAULT_ERROR)) {
    mm_fault_error(regs, error_code, address, &pkey, fault);
}
@@ -1469,6 +1505,28 @@
check_v8086_mode(regs, address, tsk);
} +NOKPROBE_SYMBOL(do_user_addr_fault);
+
+/*
+ * This routine handles page faults. It determines the address,
+ * and the problem, and then passes it off to one of the appropriate
+ * routines.
+ */
+static noinline void
+__do_page_fault(struct pt_regs *regs, unsigned long hw_error_code,
+unsigned long address)
+{
+prefetchw(&current->mm->mmap_sem);
+
+if (unlikely(kmmio_fault(regs, address)))
+return;
+
+/* Was the fault on kernel-controlled part of the address space? */
+if (unlikely(fault_in_kernel_space(address)))
+do_kern_addr_fault(regs, hw_error_code, address);
+else
+do_user_addr_fault(regs, hw_error_code, address);
+}
+NOKPROBE_SYMBOL(__do_page_fault);

static nokprobe_inline void
--- linux-4.15.0.orig/arch/x86/mm/ident_map.c
+++ linux-4.15.0/arch/x86/mm/ident_map.c
@@ -62,6 +62,7 @@
unsigned long addr, unsigned long end)
{
unsigned long next;
+int result;

for (; addr < end; addr = next) {
p4d_t *p4d = p4d_page + p4d_index(addr);
@@ -73,13 +74,20 @@

if (p4d_present(*p4d)) {
pud = pud_offset(p4d, 0);
-ident_pud_init(info, pud, addr, next);
result = ident_pud_init(info, pud, addr, next);
if (result)
	return result;
+
continue;
}
pud = (pud_t *)info->alloc_pgt_page(info->context);
if (!pud)
return -ENOMEM;
-
	ident_pud_init(info, pud, addr, next);
+
	result = ident_pud_init(info, pud, addr, next);
	if (result)
		return result;
+
set_p4d(p4d, __p4d(__pa(pud) | info->kernpg_flag));
}

@@ -98,6 +106,9 @@
if (!info->kernpg_flag)
info->kernpg_flag = _KERNPG_TABLE;

+/* Filter out unsupported __PAGE_KERNEL_* bits: */
+info->kernpg_flag &= __default_kernel_pte_mask;
+
for (; addr < end; addr = next) {
        pgd_t *pgd = pgd_page + pgd_index(addr);
        p4d_t *p4d;
--- linux-4.15.0.orig/arch/x86/mm/init.c
+++ linux-4.15.0/arch/x86/mm/init.c
@@ -4,6 +4,9 @@
#include <linux/swap.h>
#include <linux/memblock.h>
#include <linux/bootmem.h>/* for max_low_pfn */
+#include <linux/swapfile.h>
+#include <linux/swapops.h>
+#include <linux/kmemleak.h>

#include <asm/set_memory.h>
#include <asm/e820/api.h>
@@ -110,8 +113,6 @@
} else {
        pfn = pgt_buf_end;
        pgt_buf_end += num;
-        printk(KERN_DEBUG "BRK [\%#010lx, \%#010lx] PGTABLE\n",
-                pfn << PAGE_SHIFT, (pgt_buf_end << PAGE_SHIFT) - 1);
for (i = 0; i < num; i++) {
    @ -161,12 +162,6 @
}

static int page_size_mask;

-void enable_global_pages(void)
{-
-    if (!static_cpu_has(X86_FEATURE_PTI))
-        __supported_pte_mask |= _PAGE_GLOBAL;
-}
-
static void __init probe_page_size_mask(void)
{
/*
@@ -187,9 +182,15 @@
    __supported_pte_mask &= ~_PAGE_GLOBAL;
    if (boot_cpu_has(X86_FEATURE_PGE)) {
        cr4_set_bits_and_update_boot(X86_CR4_PGE);
-        enable_global_pages();
+        __supported_pte_mask |= _PAGE_GLOBAL;
    }
    /* By the default is everything supported: */
+    __default_kernel_pte_mask = __supported_pte_mask;
+    /* Except when with PTI where the kernel is mostly non-Global: */
+    if (cpu_feature_enabled(X86_FEATURE_PTI))
+        __default_kernel_pte_mask &= ~_PAGE_GLOBAL;
+
    /* Enable 1 GB linear kernel mappings if available: */
    if (direct_gbpages && boot_cpu_has(X86_FEATURE_GBPAGES)) {
        printk(KERN_INFO "Using GB pages for direct mapping\n");
@@ -706,7 +707,9 @@
    }
    /* For disallowed memory regions in the low 1MB range,
    * request that the page be shown as all zeros.
@@ -756,6 +759,11 @@
    if (debug_pagealloc_enabled()) {
        pr_info("debug: unmapping init [mem %#010lx-%#010lx]\n", begin, end - 1);
+    /* Inform kmemleak about the hole in the memory since the
+ * corresponding pages will be unmapped.
+ */
+kmemleak_free_part((void *)begin, end - begin);
+set_memory_np((begin, (end - begin) >> PAGE_SHIFT);
} else {
/**
@@ -771,13 +779,44 @@
}
}

+/*
+ * begin/end can be in the direct map or the "high kernel mapping"
+ * used for the kernel image only. free_init_pages() will do the
+ * right thing for either kind of address.
+ */
+void free_kernel_image_pages(void *begin, void *end)
+{
+unsigned long begin_ul = (unsigned long)begin;
+unsigned long end_ul = (unsigned long)end;
+unsigned long len_pages = (end_ul - begin_ul) >> PAGE_SHIFT;
+
+
+free_init_pages("unused kernel image", begin_ul, end_ul);
+
+/*
+ * PTI maps some of the kernel into userspace. For performance,
+ * this includes some kernel areas that do not contain secrets.
+ * Those areas might be adjacent to the parts of the kernel image
+ * being freed, which may contain secrets. Remove the "high kernel
+ * image mapping" for these freed areas, ensuring they are not even
+ * potentially vulnerable to Meltdown regardless of the specific
+ * optimizations PTI is currently using.
+ *
+ * The "noaliases" prevents unmapping the direct map alias which is
+ * needed to access the freed pages.
+ *
+ * This is only valid for 64bit kernels. 32bit has only one mapping
+ * which can't be treated in this way for obvious reasons.
+ */
+if (IS_ENABLED(CONFIG_X86_64) && cpu_feature_enabled(X86_FEATURE_PTI))
+set_memory_np_noalias(begin_ul, len_pages);
+
+void __ref free_initmem(void)
+{
e820__reallocate_tables();

-free_init_pages("unused kernel",

-(unsigned long)(&__init_begin),
-(unsigned long)(&__init_end));
+free_kernel_image_pages(&__init_begin, &__init_end);
}

#ifdef CONFIG_BLK_DEV_INITRD
@@ -878,3 +917,26 @@
 __cachemode2pte_tbl[cache] = __cm_idx2pte(entry);
 __pte2cachemode_tbl[entry] = cache;
 }
 +
 +#ifdef CONFIG_SWAP
+unsigned long max_swapfile_size(void)
+{
+unsigned long pages;
+
+/* We encode swap offsets also with 3 bits below those for pf
+ which makes the usable limit higher.
+ */
+#if CONFIG_PGTABLE_LEVELS > 2
+L1tf_limit <<= PAGE_SHIFT - SWP_OFFSET_FIRST_BIT;
+#endif
+}
+return pages;
+}
+#endif /* CONFIG_HIGHMEM */

void __init sync_initial_page_table(void)
{
+clone_pgd_range(initial_page_table + KERNEL_PGD_BOUNDARY,
+swapper_pg_dir + KERNEL_PGD_BOUNDARY,
+KERNEL_PGD_PTRS);
+
+/* sync back low identity map too. It is used for example
+ in the 32-bit EFI stub.
clone_pgd_range(initial_page_table,
    swapper_pg_dir     + KERNEL_PGD_BOUNDARY,
    min(KERNEL_PGD_PTRS, KERNEL_PGD_BOUNDARY));
+
void __init native_pagetable_init(void)
{
    unsigned long pfnp, va;
    permanent_kmaps_init(pgd_base);
}

/* Bits supported by the hardware: */
pteval_t __supported_pte_mask __read_mostly = ~(_PAGE_NX | _PAGE_GLOBAL);
/* Bits allowed in normal kernel mappings: */
pteval_t __default_kernel_pte_mask __read_mostly = _PAGE_NX | _PAGE_GLOBAL;
/* Used in PAGE_KERNEL_* macros which are reasonably used out-of-tree: */
EXPORT_SYMBOL(__default_kernel_pte_mask);

/* user-defined highmem size */
static unsigned int highmem_pages = -1;
set_highmem_pages_init();
#ifdef CONFIG_HIGHMEM
    set_default_mem_hotplug_zone(ZONE_HIGHMEM);
#endif

/* this will put all low memory onto the freelists */
free_all_bootmem();
/* Bits supported by the hardware: */
pteval_t __supported_pte_mask __read_mostly = ~0;
/* Bits allowed in normal kernel mappings: */
pteval_t __default_kernel_pte_mask __read_mostly = ~0;
/* Used in PAGE_KERNEL_* macros which are reasonably used out-of-tree: */
EXPORT_SYMBOL(__default_kernel_pte_mask);
int force_personality32;

@@ -256,7 +261,7 @@
 * It's enough to flush this one mapping.
 * (PGE mappings get flushed as well)
 */
-__flush_tlb_one(vaddr);
+__flush_tlb_one_kernel(vaddr);
}

void set_pte_vaddr_p4d(p4d_t *p4d_page, unsigned long vaddr, pte_t new_pte)
@@ -574,7 +579,6 @@
    paddr_end,
    page_size_mask,
    prot);
-__flush_tlb_all();
    continue;
}
/*
@@ -617,7 +621,6 @@
    pud Populate(&init_mm, pud, pmd);
    spin_unlock(&init_mm.page_table_lock);
 }
-__flush_tlb_all();

 update_page_count(PG_LEVEL_1G, pages);

@@ -658,7 +661,6 @@
    paddr_last = phys_pud_init(pud, paddr,
    paddr_end,
    page_size_mask);
-__flush_tlb_all();
    continue;
}

@@ -670,7 +672,6 @@
    p4d Populate(&init_mm, p4d, pud);
    spin_unlock(&init_mm.page_table_lock);
 }
-__flush_tlb_all();

 return paddr_last;
}
@@ -723,8 +724,6 @@
    if (pgd_changed)
    sync_global_pgds(vaddr_start, vaddr_end - 1);
 Return paddr_last;

}  

register_page_bootmem_info();

/* Register memory areas for /proc/kcore */
-kclist_add(&kcore_vsyscall, (void *)VSYSCALL_ADDR,
-PAGE_SIZE, KCORE_OTHER);
+kclist_add(&kcore_vsyscall, (void *)VSYSCALL_ADDR, PAGE_SIZE, KCORE_USER);

mem_init_print_info(NULL);

#endif

-free_init_pages("unused kernel",
-(unsigned long) __va(__pa_symbol(text_end)),
-(unsigned long) __va(__pa_symbol(rodata_start)));
-free_init_pages("unused kernel",
-(unsigned long) __va(__pa_symbol(rodata_end)),
-(unsigned long) __va(__pa_symbol(_sdata)));
+free_kernel_image_pages((void *)text_end, (void *)rodata_start);
+free_kernel_image_pages((void *)rodata_end, (void *)_sdata);

dump_checkwx();

return 0;

p4d = p4d_offset(pgd, addr);
-if (p4d_none(*p4d))
+if (!p4d_present(*p4d))
  return 0;

pud = pud_offset(p4d, addr);
-if (pud_none(*pud))
+if (!pud_present(*pud))
  return 0;

if (pud_large(*pud))
  return pfn_valid(pud_pfn(*pud));

pmd = pmd_offset(pud, addr);
-if (pmd_none(*pmd))
+if (!pmd_present(*pmd))
  return 0;
+if (!pmd_present(*pmd))
return 0;

if (pmd_large(*pmd))
--- linux-4.15.0.orig/arch/x86/mm/iomap_32.c
+++ linux-4.15.0/arch/x86/mm/iomap_32.c
@@ -44,6 +44,9 @@
return ret;

*prot = __pgprot(__PAGE_KERNEL | cachemode2protval(pcm));
+/* Filter out unsupported __PAGE_KERNEL* bits: */
+pgprot_val(*prot) &= __default_kernel_pte_mask;
+
return 0;

EXPORT_SYMBOL_GPL(iomap_create_wc);

@@ -88,6 +91,9 @@
prot = __pgprot(__PAGE_KERNEL | cachemode2protval(_PAGE_CACHE_MODE_UC_MINUS));

+/* Filter out unsupported __PAGE_KERNEL* bits: */
+pgprot_val(prot) &= __default_kernel_pte_mask;
+
return (void __force __iomem *) kmap_atomic_prot_pfn(pfn, prot);

} EXPORT_SYMBOL_GPL(iomap_atomic_prot_pfn);

--- linux-4.15.0.orig/arch/x86/mm/ioremap.c
+++ linux-4.15.0/arch/x86/mm/ioremap.c
@@ -816,9 +816,12 @@
}

pte = early_ioremap_pte(addr);

+/* Sanitize 'prot' against any unsupported bits: */
+pgprot_val(flags) &= __default_kernel_pte_mask;
+
if (pgprot_val(flags))
set_pte(pte, pfn_pte(phys >> PAGE_SHIFT, flags));
else
pte_clear(&init_mm, addr, pte);
-__flush_tlb_one(addr);
+__flush_tlb_one_kernel(addr);
}

--- linux-4.15.0.orig/arch/x86/mm/kasan_init_64.c
+++ linux-4.15.0/arch/x86/mm/kasan_init_64.c
@@ -194,7 +194,7 @@
if (!IS_ENABLED(CONFIG_X86_5LEVEL))
return (p4d_t *)pgd;
- p4d = __pa_nodebug(pgd_val(*pgd)) & PTE_PFN_MASK;
+ p4d = pgd_val(*pgd) & PTE_PFN_MASK;
 p4d += __START_KERNEL_map - phys_base;
 return (p4d_t *)p4d + p4d_index(addr);
 }

@@ -263,6 +263,12 @@
 pudval_t pud_val = __pa_nodebug(kasan_zero_pmd) | _KERNPG_TABLE;
 p4dval_t p4d_val = __pa_nodebug(kasan_zero_pud) | _KERNPG_TABLE;
 +/* Mask out unsupported __PAGE_KERNEL bits: */
 +pte_val &= __default_kernel_pte_mask;
 +pmd_val &= __default_kernel_pte_mask;
 +pud_val &= __default_kernel_pte_mask;
 +p4d_val &= __default_kernel_pte_mask;
 +
 for (i = 0; i < PTRS_PER_PTE; i++)
 kasan_zero_pte[i] = __pte(pte_val);

 @@ -365,7 +371,13 @@
 */
 memset(kasan_zero_page, 0, PAGE_SIZE);
 for (i = 0; i < PTRS_PER_PTE; i++) {
-pte_t pte = __pte(__pa(kasan_zero_page) | __PAGE_KERNEL_RO | _PAGE_ENC);
+pte_t pte,
+pgprot_t prot;
+
+prot = __pgprot(__PAGE_KERNEL_RO | _PAGE_ENC);
+pgprot_val(prot) &= __default_kernel_pte_mask;
+pte = __pte(__pa(kasan_zero_page) | pgprot_val(prot));
+set_pte(&kasan_zero_pte[i], pte);
 }
 /* Flush TLBs again to be sure that write protection applied. */
--- linux-4.15.0.orig/arch/x86/mm/kaslr.c
+++ linux-4.15.0/arch/x86/mm/kaslr.c
@@ -62,7 +62,7 @@
 }
 kaslr_regions[] = {
 { &page_offset_base, 1 << (__PHYSICAL_MASK_SHIFT - TB_SHIFT) /* Maximum */ },
- { &vmalloc_base, VMALLOC_SIZE_TB },
- { &vmemmap_base, 1 },
+ { &vmemmap_base, 0 },
};

 /* Get size in bytes used by the memory region */
@@ -88,6 +88,7 @@
 unsigned long rand, memory_tb;
 struct rnd_state rand_state;
 unsigned long remain_entropy;

 /* Get size in bytes used by the memory region */

+unsigned long vmemmap_size;
/*
 * These BUILD_BUG_ON checks ensure the memory layout is consistent
@@ -113,6 +114,14 @@
if (memory_tb < kaslr_regions[0].size_tb)
kaslr_regions[0].size_tb = memory_tb;

+/*
+ * Calculate the vmemmap region size in TBs, aligned to a TB
+ * boundary.
+ */
+vmemmap_size = (kaslr_regions[0].size_tb << (TB_SHIFT - PAGE_SHIFT)) * sizeof(struct page);
+kaslr_regions[2].size_tb = DIV_ROUND_UP(vmemmap_size, 1UL << TB_SHIFT);
+
/* Calculate entropy available between regions */
remain_entropy = vaddr_end - vaddr_start;
for (i = 0; i < ARRAY_SIZE(kaslr_regions); i++)
--- linux-4.15.0.orig/arch/x86/mm/kmmio.c
+++ linux-4.15.0/arch/x86/mm/kmmio.c
@@ -126,24 +126,29 @@
static void clear_pmd_presence(pmd_t *pmd, bool clear, pmdval_t *old)
{
+pmd_t new_pmd;
+pmval_t v = pmd_val(*pmd);
+if (clear) {
+ *old = v & ~PAGE_PRESENT;
- v &= ~PAGE_PRESENT;
-} else/* presume this has been called with clear==true previously */
- v |= *old;
-set_pmd(pmd, __pmd(v));
+*old = v;
+new_pmd = pmd_mknotpresent(*pmd);
+} else {
+ /* Presume this has been called with clear==true previously */
+ new_pmd = __pmd(*old);
+ }
+set_pmd(pmd, new_pmd);
}

static void clear_pte_presence(pte_t *pte, bool clear, pteval_t *old)
{
+pteval_t v = pte_val(*pte);
+if (clear) {
+ *old = v & ~PAGE_PRESENT;
- v &= ~PAGE_PRESENT;

- } else/* presume this has been called with clear==true previously */
- v |= *old;
- set_pte_atomic(pte, __pte(v));
+ *old = v;
+ /* Nothing should care about address */
+ pte_clear(&init_mm, 0, pte);
+ } else {
+ /* Presume this has been called with clear==true previously */
+ set_pte_atomic(pte, __pte(*old));
+ }
+
+
+
static int clear_page_presence(struct kmmio_fault_page *f, bool clear)
@@ -168,7 +173,7 @@
return -1;
}

- __flush_tlb_one(f->addr);
+ __flush_tlb_one_kernel(f->addr);
return 0;
}

--- linux-4.15.0.orig/arch/x86/mm/mem_encrypt.c
+++ linux-4.15.0/arch/x86/mm/mem_encrypt.c
@@ -294,7 +294,7 @@
if (pgprot_val(old_prot) == pgprot_val(new_prot))
return;

-pa = pfn << page_level_shift(level);
+pa = pfn << PAGE_SHIFT;
size = page_level_size(level);

/*
@@ -499,8 +499,8 @@
#define PMD_FLAGS_LARGE(__PAGE_KERNEL_LARGE_EXEC & ~_PAGE_GLOBAL)

#define PMD_FLAGS_DECPMD_FLAGS_LARGE
-#define PMD_FLAGS_DEC_WP((PMD_FLAGS_DEC & ~_PAGE_CACHE_MASK) | \n- (_PAGE_PAT | _PAGE_PWT))
+#define PMD_FLAGS_DEC_WP((PMD_FLAGS_DEC & ~_PAGE_LARGE_CACHE_MASK) | \n+ (_PAGE_PAT_LARGE | _PAGE_PWT))

#define PMD_FLAGS_ENC(PMD_FLAGS_LARGE | _PAGE_ENC)

--- linux-4.15.0.orig/arch/x86/mm/mem_encrypt_boot.S
+++ linux-4.15.0/arch/x86/mm/mem_encrypt_boot.S
@@ -15,6 +15,7 @@
#include <asm/page.h>

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#include <asm/processor-flags.h>
#include <asm/msr-index.h>
+#include <asm/nospec-branch.h>

.text
.code64
@@ -59,6 +60,7 @@
    movq %rax, %r8 /* Workarea encryption routine */
    addq $PAGE_SIZE, %r8 /* Workarea intermediate copy buffer */
+
    ANNOTATE_RETPOLINE_SAFE
    call *%rax/* Call the encryption routine */

    pop %r12
--- linux-4.15.0.orig/arch/x86/mm/mmap.c
+++ linux-4.15.0/arch/x86/mm/mmap.c
@@ -226,7 +226,7 @@
 /* Can we access it for direct reading/writing? Must be RAM: */
 int valid_phys_addr_range(phys_addr_t addr, size_t count)
 {
    -return addr + count <= __pa(high_memory);
    +return addr + count - 1 <= __pa(high_memory - 1);
 }
/* Can we access it through mmap? Must be a valid physical address: */
@@ -236,3 +236,24 @@
 return phys_addr_valid(addr + count - 1);
 }
+
+/*
+ * Only allow root to set high MMIO mappings to PROT_NONE.
+ * This prevents an unpriv. user to set them to PROT_NONE and invert
+ * them, then pointing to valid memory for L1TF speculation.
+ *
+ * Note: for locked down kernels may want to disable the root override.
+ */
+bool pfn_modify_allowed(unsigned long pfn, pgprot_t prot)
{+
    +if (!boot_cpu_has_bug(X86_BUG_L1TF))
        +return true;
    +if (!__pte_needs_invert(pgprot_val(prot)))
        +return true;
    +/* If it's real memory always allow */
    +if (pfn_valid(pfn))
        +return true;
    +if (pfn >= l1tf_pfn_limit() && !capable(CAP_SYS_ADMIN))
        +return false;
+return true;
+
--- linux-4.15.0.orig/arch/x86/mm/mmio-mod.c
+++ linux-4.15.0/arch/x86/mm/mmio-mod.c
@@ -385,7 +385,7 @@
     int cpu;
     int err;

-    if (downed_cpus == NULL &&
+    if (!cpumask_available(downed_cpus) &&
         !alloc_cpumask_var(&downed_cpus, GFP_KERNEL)) {
         pr_notice("Failed to allocate mask\n");
         goto out;
@@ -415,7 +415,7 @@
     int cpu;
     int err;

-    if (downed_cpus == NULL || cpumask_weight(downed_cpus) == 0)
+    if (!cpumask_available(downed_cpus) || cpumask_weight(downed_cpus) == 0)
        return;
     pr_notice("Re-enabling CPUs...\n");
     for_each_cpu(cpu, downed_cpus) {
--- linux-4.15.0.orig/arch/x86/mm/numa_emulation.c
+++ linux-4.15.0/arch/x86/mm/numa_emulation.c
@@ -61,7 +61,7 @@
-        if (emu_nid_to_phys[nid] == NUMA_NO_NODE)
-            emu_nid_to_phys[nid] = nid;
+        pb->start += size;
         if (pb->start >= pb->end) {
             --- linux-4.15.0.orig/arch/x86/mm/pageattr.c
             +++ linux-4.15.0/arch/x86/mm/pageattr.c
@@ -93,6 +94,18 @@
         @ @ .53,6 +53,7 @ @
         #define CPA_FLUSHTLB 1
         #define CPA_ARRAY 2
+        #define CPA_PAGES_ARRAY 4
+        +#define CPA_NO_CHECK_ALIAS 8 /* Do not search for aliases */
+
+        ifndef CONFIG_PROC_FS
+            static unsigned long direct_pages_count[PG_LEVEL_NUM];
+            @ @ .93,6 +94,18 @ @
+            static inline void split_page_count(int level) { }
+        #endif
+
     +static inline int
within(unsigned long addr, unsigned long start, unsigned long end) {
  return addr >= start && addr < end;
}

static inline int within_inclusive(unsigned long addr, unsigned long start, unsigned long end) {
  return addr >= start && addr <= end;
}

#ifdef CONFIG_X86_64

static inline unsigned long highmap_start_pfn(void)
@@ -106,20 +119,25 @@
  return __pa_symbol(roundup(_brk_end, PMD_SIZE) - 1) >> PAGE_SHIFT;
 }

-#endif
-
-static inline int within(unsigned long addr, unsigned long start, unsigned long end)
+static bool __cpa_pfn_in_highmap(unsigned long pfn)
{
  return within_inclusive(pfn, highmap_start_pfn(), highmap_end_pfn());
}

-static inline int within_inclusive(unsigned long addr, unsigned long start, unsigned long end)
+static bool __cpa_pfn_in_highmap(unsigned long pfn)
{
  return within_inclusive(pfn, highmap_start_pfn(), highmap_end_pfn());
}

#else
+static bool __cpa_pfn_in_highmap(unsigned long pfn)
{ /* There is no highmap on 32-bit */
  return false;
}

#endif

/* Flushing functions */
static void cpa_flush_all(unsigned long cache)
{
    -BUG_ON(irqs_disabled());
    +BUG_ON(irqs_disabled() && !early_boot_irqs_disabled);

    on_each_cpu(__cpa_flush_all, (void *) cache, 1);
    }

unsigned long do_wbinvd = cache && numpages >= 1024; /* 4M threshold */
#endif

-BUG_ON(irqs_disabled());
+BUG_ON(irqs_disabled() && !early_boot_irqs_disabled);

on_each_cpu(__cpa_flush_all, (void *) do_wbinvd, 1);

/*@ -298,9 +316,11 @*/

/*
 * The .rodata section needs to be read-only. Using the pfn
 * - catches all aliases.
 * + catches all aliases. This also includes __ro_after_init,
 * + so do not enforce until kernel_set_to_readonly is true.
 */
-if (within(pfn, __pa_symbol(__start_rodata) >> PAGE_SHIFT,
+if (kernel_set_to_readonly &&
   within(pfn, __pa_symbol(__start_rodata) >> PAGE_SHIFT,
        __pa_symbol(__end_rodata) >> PAGE_SHIFT))
    pgprot_val(forbidden) |= _PAGE_RW;

/*@ -512,6 +532,23 @*/
#endif
}

+static pgprot_t pgprot_clear_protnone_bits(pgprot_t prot)
+{
+/*
+ * _PAGE_GLOBAL means "global page" for present PTEs.
+ * But, it is also used to indicate _PAGE_PROTNONE
+ * for non-present PTEs.
+ *
+ * This ensures that a _PAGE_GLOBAL PTE going from
+ * present to non-present is not confused as
+ * _PAGE_PROTNONE.
+ */
+if (!(pgprot_val(prot) & _PAGE_PRESENT))
+pgprot_val(prot) &= ~_PAGE_GLOBAL;
+
+return prot;
+
static int
try_preserve_large_page(pte_t *kpte, unsigned long address,
struct cpa_data *cpa)
@@ -566,6 +603,7 @@*/
    /* Clear PSE (aka _PAGE_PAT) and move PAT bit to correct position */
    old_pte = *kpte;
    req_prot = pgprot_large_2_4k(old_prot);

    pgprot_val(req_prot) &= ~pgprot_val(cpa->mask_clr);
@@ -577,19 +615,9 @@*/
    /* different bit positions in the two formats.
    */
    req_prot = pgprot_4k_2_large(req_prot);
-/*
- * Set the PSE and GLOBAL flags only if the PRESENT flag is
- * set otherwise pmd_present/pmd_huge will return true even on
- * a non present pmd. The canon_pgprot will clear _PAGE_GLOBAL
- * for the ancient hardware that doesn't support it.
- */
-+req_prot = pgprot_clear_protnone_bits(req_prot);
+if (pgprot_val(req_prot) & _PAGE_PRESENT)
-pgprot_val(req_prot) |= _PAGE_PSE | _PAGE_GLOBAL;
-else
-pgprot_val(req_prot) &= ~(_PAGE_PSE | _PAGE_GLOBAL);
-
-req_prot = canon_pgprot(req_prot);
+pgprot_val(req_prot) |= _PAGE_PSE;

/*
 * old_pfn points to the large page base pfn. So we need
@@ -674,8 +702,12 @@*/
    switch (level) {
    case PG_LEVEL_2M:
        ref_prot = pmd_pgprot(*(pmd_t *)kpte);
-/* clear PSE and promote PAT bit to correct position */
+/*
+ * Clear PSE (aka _PAGE_PAT) and move
+ * PAT bit to correct position.
+ */
+ref_prot = pgprot_large_2_4k(ref_prot);
ref_pfn = pmd_pfn(*(pmd_t *)kpte);
break;
@@ -698,23 +730,14 @@
            return 1;
        }

-/*
- * Set the GLOBAL flags only if the PRESENT flag is set
- * otherwise pmd/pte_present will return true even on a non
- * present pmd/pte. The canon_pgprot will clear _PAGE_GLOBAL
- * for the ancient hardware that doesn't support it.
- */
- if (pgprot_val(ref_prot) & _PAGE_PRESENT)
-     pgprot_val(ref_prot) |= _PAGE_GLOBAL;
- else
-     pgprot_val(ref_prot) &= ~_PAGE_GLOBAL;
-     ref_prot = pgprot_clear_protnone_bits(ref_prot);
+
-/*
- * Get the target pfn from the original entry:
- */
- pfn = ref_pfn;
- for (i = 0; i < PTRS_PER_PTE; i++, pfn += pfninc)
-     set_pte(&pbase[i], pfn_pte(pfn, canon_pgprot(ref_prot)));
+    set_pte(&pbase[i], pfn_pte(pfn, ref_prot));

if (virt_addr_valid(address)) {
    unsigned long pfn = PFN_DOWN(__pa(address));
@@ -930,19 +953,7 @@
    pte = pte_offset_kernel(pmd, start);

-/*
- * Set the GLOBAL flags only if the PRESENT flag is
- * set otherwise pte_present will return true even on
- * a non present pte. The canon_pgprot will clear
- * _PAGE_GLOBAL for the ancient hardware that doesn't
- * support it.
- */
- if (pgprot_val(pgprot) & _PAGE_PRESENT)
-     pgprot_val(pgprot) |= _PAGE_GLOBAL;
- else
-     pgprot_val(pgprot) &= ~_PAGE_GLOBAL;
-     pgprot = canon_pgprot(pgprot);
+     pgprot = pgprot_clear_protnone_bits(pgprot);
while (num_pages-- && start < end) {
    set_pte(pte, pfn_pte(cpa->pfn, pgprot));
    @@ -1004,8 +1015,8 @@

    pmd = pmd_offset(pud, start);

    -set_pmd(pmd, __pmd(cpa->pfn << PAGE_SHIFT | _PAGE_PSE |
    -    massage_pgprot(pmd_pgprot));
    +set_pmd(pmd, pmd_mkhuge(pfn_pmd(cpa->pfn,
    +    canon_pgprot(pmd_pgprot))));

    start += PMD_SIZE;
    cpa->pfn += PMD_SIZE >> PAGE_SHIFT;
    @@ -1077,8 +1088,8 @@
    * Map everything starting from the Gb boundary, possibly with 1G pages
    */
    while (boot_cpu_has(X86_FEATURE_GBPAGES) && end - start >= PUD_SIZE) {
        -set_pud(pud, __pud(cpa->pfn << PAGE_SHIFT | _PAGE_PSE |
        -    massage_pgprot(pud_pgprot));
        +set_pud(pud, pud_mkhuge(pfn_pud(cpa->pfn,
        +    canon_pgprot(pud_pgprot))));
        start += PUD_SIZE;
        cpa->pfn += PUD_SIZE >> PAGE_SHIFT;
        @@ -1190,6 +1201,10 @@
        cpa->numpages = 1;
        cpa->pfn = __pa(vaddr) >> PAGE_SHIFT;
        return 0;
        +} else if (__cpa_pfn_in_highmap(cpa->pfn)) {
        +/* Faults in the highmap are OK, so do not warn: */
        +return -EFAULT;
        } else {
            WARN(1, KERN_WARNING "CPA: called for zero pte."
            "vaddr = %lx cpa->vaddr = %lx", vaddr,
            @@ -1234,24 +1249,14 @@
            new_prot = static_protections(new_prot, address, pfn);

            */
            -  * Set the GLOBAL flags only if the PRESENT flag is
            -  * set otherwise pte_present will return true even on
            -  * a non present pte. The canon_pgprot will clear
            -  * _PAGE_GLOBAL for the ancient hardware that doesn't
            -  * support it.
            - */
            -if (pgprot_val(new_prot) & _PAGE_PRESENT)
-pgprot_val(new_prot) |= _PAGE_GLOBAL;
-else
-pgprot_val(new_prot) &= ~_PAGE_GLOBAL;
+new_prot = pgprot_clear_protnone_bits(new_prot);

/*
 * We need to keep the pfn from the existing PTE,
 * after all we're only going to change it's attributes
 * not the memory it points to
 */
-new_pte = pfn_pte(pfn, canon_pgprot(new_prot));
+new_pte = pfn_pte(pfn, new_prot);
 cpa->pfn = pfn;

/*
 * Do we really change anything ?
*/
@@ -1352,8 +1357,7 @@
 * to touch the high mapped kernel as well:
 */
 if (!within(vaddr, (unsigned long)_text, _brk_end) &&
-    within_inclusive(cpa->pfn, highmap_start_pfn(),
-    highmap_end_pfn())) {
+    __cpa_pfn_in_highmap(cpa->pfn)) {
 unsigned long temp_cpa_vaddr = (cpa->pfn << PAGE_SHIFT) +
     __START_KERNEL_map - phys_base;
 alias_cpa = *cpa;
@@ -1428,11 +1432,11 @@
 memset(&cpa, 0, sizeof(cpa));
 /*
- * Check, if we are requested to change a not supported
- * feature:
- * Check, if we are requested to set a not supported
+ * Check, if we are requested to set a not supported
+ * feature. Clearing non-supported features is OK.
 */
 mask_set = canon_pgprot(mask_set);
-mask_clr = canon_pgprot(mask_clr);
+if (!pgprot_val(mask_set) && !pgprot_val(mask_clr) && !force_split)
 return 0;
@@ -1483,6 +1487,9 @@
 /* No alias checking for _NX bit modifications */
 checkalias = (pgprot_val(mask_set) | pgprot_val(mask_clr)) != _PAGE_NX;
+/* Has caller explicitly disabled alias checking? */
+if (in_flag & CPA_NO_CHECK_ALIAS)
+checkalias = 0;
ret = __change_page_attr_set_clr(&cpa, checkalias);

@@ -1769,12 +1776,33 @@ 
return change_page_attr_clear(&addr, numpages, __pgprot(_PAGE_PRESENT), 0);
 }

+int set_memory_np_noalias(unsigned long addr, int numpages)
+{
+    int cpa_flags = CPA_NO_CHECK_ALIAS;
+    return change_page_attr_set_clr(&addr, numpages, __pgprot(0),
+                                    __pgprot(_PAGE_PRESENT), 0,
+                                    cpa_flags, NULL);
+}
+
+int set_memory_4k(unsigned long addr, int numpages)
+{
+    return change_page_attr_set_clr(&addr, numpages, __pgprot(0),
+                                    __pgprot(0), 1, 0, NULL);
+}
+
+int set_memory_nonglobal(unsigned long addr, int numpages)
+{
+    return change_page_attr_clear(&addr, numpages,
+                                    __pgprot(_PAGE_GLOBAL), 0);
+}
+
+int set_memory_global(unsigned long addr, int numpages)
+{
+    return change_page_attr_set(&addr, numpages,
+                                 __pgprot(_PAGE_GLOBAL), 0);
+}
+
+static int __set_memory_enc_dec(unsigned long addr, int numpages, bool enc)
+{
+    struct cpa_data cpa;
+    @@ -2035,9 +2063,13 @@
+    /*
+     * We should perform an IPI and flush all tlb's,
+     * but that can deadlock->flush only current cpu:
+     * Preemption needs to be disabled around __flush_tlb_all() due to
+     * CR3 reload in __native_flush_tlb().
+     */
+    preempt_disable();
+    __flush_tlb_all();
+    preempt_enable();
arch_flush_lazy_mmu_mode();
}
@@ -2071,19 +2103,13 @@
    .pgd = pgd,
    .numpages = numpages,
    .mask_set = __pgprot(0),
-   .mask_clr = __pgprot(0),
+   .mask_clr = __pgprot(~page_flags & (_PAGE_NX|_PAGE_RW)),
    .flags = 0,
);

if (!(__supported_pte_mask & _PAGE_NX))
going out;

-if (!((page_flags & _PAGE_NX))
   -cpa.mask_clr = __pgprot(_PAGE_NX);
-
-if (!((page_flags & _PAGE_RW))
   -cpa.mask_clr = __pgprot(_PAGE_RW);
-
if (!((page_flags & _PAGE_ENC))
cpa.mask_clr = pgprot_encrypted(cpa.mask_clr);

--- linux-4.15.0.orig/arch/x86/mm/pat.c
+++ linux-4.15.0/arch/x86/mm/pat.c
@@ -533,7 +533,11 @@
int is_range_ram;
int err = 0;

-BUG_ON(start >= end); /* end is exclusive */
+if (start >= end) {
+    WARN(1, "%s failed: [mem %#010Lx-%#010Lx], req %s
+            __func__, start - 1, cattr_name(req_type));
+    return -EINVAL;
+}

if (!pat_enabled()) {
    /* This is identical to page table setting without PAT */
@@ -678,6 +682,25 @@
}

/**
+ * pat_pfn-immune-to-uc-mtrr - Check whether the PAT memory type
+ * of @pfn cannot be overridden by UC MTRR memory type.
+ */
+ * Only to be called when PAT is enabled.
+ */
+ * Returns true, if the PAT memory type of @pfn is UC, UC-, or WC.
+ * Returns false in other cases.
+ */
+bool pat_pfn_immune_to_uc_mtrr(unsigned long pfn)
+
+enum page_cache_mode cm = lookup_memtype(PFN_PHYS(pfn));
+
+/return cm == _PAGE_CACHE_MODE_UC ||
+ cm == _PAGE_CACHE_MODE_UC_MINUS ||
+ cm == _PAGE_CACHE_MODE_WC;
+}
+EXPORT_SYMBOL_GPL(pat_pfn_immune_to_uc_mtrr);
+
+/**
+ * io_reserve_memtype - Request a memory type mapping for a region of memory
+ * @start: start (physical address) of the region
+ * @end: end (physical address) of the region
+ * @@ -1087,12 +1110,14 @@
+
+static void *memtype_seq_next(struct seq_file *seq, void *v, loff_t *pos)
{ 
+kfree(v);
++*pos;
return memtype_get_idx(*pos);
}

static void memtype_seq_stop(struct seq_file *seq, void *v)
{
+kfree(v);
}

static int memtype_seq_show(struct seq_file *seq, void *v)
@@ -1101,7 +1126,6 @@
seq_printf(seq, "%s @ 0x%Lx-0x%Lx\n", cattr_name(print_entry->type),
print_entry->start, print_entry->end);
-kfree(print_entry);

return 0;
}
--- linux-4.15.0.orig/arch/x86/mm/pgtable.c
+++ linux-4.15.0/arch/x86/mm/pgtable.c
@@ -1,6 +1,7 @@

// SPDX-License-Identifier: GPL-2.0
#include <linux/mm.h>
#include <linux/gfp.h>
+##include <linux/hugetlb.h>
#include <asm/pgalloc.h>
#include <asm/pgtable.h>
#include <asm/tlb.h>
/**
 * We allocate separate PMDs for the kernel part of the user page-table
 * when PTI is enabled. We need them to map the per-process LDT into the
 * user-space page-table.
 *
#define PREALLOCATED_USER_PMDS (static_cpu_has(X86_FEATURE_PTI) ?
 +KERNEL_PGD_PTRS : 0)

void pud_populate(struct mm_struct *mm, pud_t *pudp, pmd_t *pmd)
{
    paravirt_alloc_pmd(mm, __pa(pmd) >> PAGE_SHIFT);
    @ @ -197,14 +206,14 @ @
/* No need to prepopulate any pagetable entries in non-PAE modes. */
#define PREALLOCATED_PMDS 0
-#define PREALLOCATED_USER_PMDS 0
#endif /* CONFIG_X86_PAE */

-static void free_pmds(struct mm_struct *mm, pmd_t *pmds[])
+static void free_pmds(struct mm_struct *mm, pmd_t *pmds[], int count)
{
    int i;

    -for(i = 0; i < PREALLOCATED_PMDS; i++)
+for (i = 0; i < count; i++)
    if (pmds[i]) {
        pgtable_pmd_page_dtor(virt_to_page(pmds[i]));
        free_page((unsigned long)pmds[i]);
        @ @ -212,7 +221,7 @ @
    }
}

-static int preallocate_pmds(struct mm_struct *mm, pmd_t *pmds[])
+static int preallocate_pmds(struct mm_struct *mm, pmd_t *pmds[], int count)
{
    int i;
    bool failed = false;
    @ @ -221,7 +230,7 @ @
    if (mm == &init_mm)
        gfp &= ~_GFP_ACCOUNT;

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for(i = 0; i < PREALLOCATED_PMDS; i++) {
    pmd_t *pmd = (pmd_t *)__get_free_page(gfp);
    if (!pmd)
        failed = true;
}
if (failed) {
    free_pmds(mm, pmds);
    return -ENOMEM;
}

static void mop_up_one_pmd(struct mm_struct *mm, pgd_t *pgdp)
{
    pgd_t pgd = *pgdp;
    if (pgd_val(pgd) != 0) {
        pmd_t *pmd = (pmd_t *)pgd_page_vaddr(pgd);
        paravirt_release_pmd(pgd_val(pgd) >> PAGE_SHIFT);
        pmd_free(mm, pmd);
        mm_dec_nr_pmds(mm);
    }
}

static void pgd_mop_up_pmds(struct mm_struct *mm, pgd_t *pgdp)
{
    int i;

    for(i = 0; i < PREALLOCATED_PMDS; i++) {
        pgd_t pgd = pgdp[i];
        for (i = 0; i < PREALLOCATED_PMDS; i++)
            mop_up_one_pmd(mm, &pgdp[i]);

        if (pgd_val(pgd) != 0) {
            pmd_t *pmd = (pmd_t *)pgd_page_vaddr(pgd);
            #ifdef CONFIG_PAGE_TABLE_ISOLATION
                pgdp[i] = native_make_pgd(0);
            #ifdef CONFIG_PAGE_TABLE_ISOLATION
            if (!static_cpu_has(X86_FEATURE_PTI))
                pgdp[i] = native_make_pgd(0);
            #ifdef CONFIG_PAGE_TABLE_ISOLATION
        }
+return;

-paravirt_release_pmd(pgd_val(pgd) >> PAGE_SHIFT);
-pmd_free(mm, pmd);
-mm_dec_nr_pmds(mm);
-
-
+pgdp = kernel_to_user_pgdp(pgdp);
 +
 +for (i = 0; i < PREALLOCATED_USER_PMDS; i++)
+mop_up_one_pmd(mm, &pgdp[i + KERNEL_PGD_BOUNDARY]);
+#endif
}

static void pgd_prepopulate_pmd(struct mm_struct *mm, pgd_t *pgd, pmd_t *pmds[])
@@ -291,6 +315,38 @@
}
}

+#ifdef CONFIG_PAGE_TABLE_ISOLATION
+static void pgd_prepopulate_user_pmd(struct mm_struct *mm, pgd_t *k_pgd, pmd_t *pmds[])
+{
+pgd_t *s_pgd = kernel_to_user_pgdp(swapper_pg_dir);
+pgd_t *u_pgd = kernel_to_user_pgdp(k_pgd);
+p4d_t *u_p4d;
+pud_t *u_pud;
+int i;
+
+u_p4d = p4d_offset(u_pgd, 0);
+u_pud = pud_offset(u_p4d, 0);
+
+s_pgd += KERNEL_PGD_BOUNDARY;
+u_pud += KERNEL_PGD_BOUNDARY;
+
+for (i = 0; i < PREALLOCATED_USER_PMDS; i++, u_pud++, s_pgd++) {
+pmd_t *pmd = pmds[i];
+
+memcpy(pmd, (pmd_t *)pgd_page_vaddr(*s_pgd),
+ sizeof(pmd_t) * PTRS_PER_PMD);
+
+pud_populate(mm, u_pud, pmd);
+
+
+
+}
+#else
+static void pgd_prepopulate_user_pmd(struct mm_struct *mm, pgd_t *k_pgd, pmd_t *pmds[])
+
+}
* Xen paravirt assumes pgd table should be in one page. 64 bit kernel also
* assumes that pgd should be in one page.
@@ -338,7 +394,8 @@
* We allocate one page for pgd.
*/
if (!SHARED_KERNEL_PMD)
-    return (pgd_t *)__get_free_page(PGALLOC_GFP);
+    return (pgd_t *)__get_free_pages(PGALLOC_GFP,
+    PGD_ALLOCATION_ORDER);

/*
* Now PAE kernel is not running as a Xen domain. We can allocate
@@ -350,7 +407,7 @@
static inline void _pgd_free(pgd_t *pgd)
{
    if (!SHARED_KERNEL_PMD)
-        free_page((unsigned long)pgd);
+        free_pages((unsigned long)pgd, PGD_ALLOCATION_ORDER);
    else
        kmem_cache_free(pgd_cache, pgd);
}
@@ -370,6 +437,15 @@
pgd_t *pgd_alloc(struct mm_struct *mm)
{
    pgd_t *pgd;
    +pmd_t *u_pmds[PREALLOCATED_USER_PMDS];
    pmd_t *pmds[PREALLOCATED_PMDS];

    pgd = _pgd_alloc();
    @@ -379,12 +437,15 @@

    mm->pgd = pgd;
    -if (preallocate_pmds(mm, pmds) != 0)
    +if (preallocate_pmds(mm, pmds, PREALLOCATED_PMDS) != 0)
        goto out_free_pgd;

    -if (paravirt_pgd_alloc(mm) != 0)
    +if (preallocate_pmds(mm, u_pmds, PREALLOCATED_USER_PMDS) != 0)
        goto out_free_pmds;

    +if (paravirt_pgd_alloc(mm) != 0)
        goto out_free_user_pmds;
    +
/**
 * Make sure that pre-populating the pmds is atomic with
 * respect to anything walking the pgd_list, so that they
 * @@ -394,13 +455,16 @@

 pgd_ctor(mm, pgd);
pgd_prepopulate_pmd(mm, pgd, pmds);
+pgd_prepopulate_user_pmd(mm, pgd, u_pmds);

 spin_unlock(&pgd_lock);

 return pgd;

+out_free_user_pmds:
+free_pmds(mm, u_pmds, PREALLOCATED_USER_PMDS);
out_free_pmds:
-free_pmds(mm, pmds);
+free_pmds(mm, pmds, PREALLOCATED_PMDS);
out_free_pgd:
_pgd_free(pgd);
out:
@@ -429,7 +493,7 @@
 int changed = !pte_same(*ptep, entry);

 if (changed && dirty)
-*ptep = entry;
+set_pte(ptep, entry);

 return changed;
 }
@@ -444,7 +508,7 @@
 VM_BUG_ON(address & ~HPAGE_PMD_MASK);

 if (changed && dirty) {
-*pmdp = entry;
+set_pmd(pmdp, entry);
 /*
 * We had a write-protection fault here and changed the pmd
 * to to more permissive. No need to flush the TLB for that,
 * @@ -464,7 +528,7 @@
 VM_BUG_ON(address & ~HPAGE_PUD_MASK);

 if (changed && dirty) {
-*pudp = entry;
+set_pud(pudp, entry);
 /*
 * We had a write-protection fault here and changed the pud
 * to to more permissive. No need to flush the TLB for that,
unsigned long address = __fix_to_virt(idx);

#ifdef CONFIG_X86_64
   /*
   * Ensure that the static initial page tables are covering the
   * fixmap completely.
   */
   BUILD_BUG_ON(__end_of_permanent_fixed_addresses >
                (FIXMAP_PMD_NUM * PTRS_PER_PTE));
#endif

if (idx >= __end_of_fixed_addresses) {
    BUG();
    return;
}

void native_set_fixmap(enum fixed_addresses idx, phys_addr_t phys,
                        pgprot_t flags)
{  
  /* Sanitize 'prot' against any unsupported bits: */
  pgprot_val(flags) &= __default_kernel_pte_mask;
  __native_set_fixmap(idx, pfn_pte(phys >> PAGE_SHIFT, flags));
}

@if -572,6 +636,15 @@
}

void native_set_fixmap(unsigned /* enum fixed_addresses */ idx,
                        phys_addr_t phys, pgprot_t flags)
{
  /* Sanitize 'prot' against any unsupported bits: */
  pgprot_val(flags) &= __default_kernel_pte_mask;
  __native_set_fixmap(idx, pfn_pte(phys >> PAGE_SHIFT, flags));
}

@if -580,9 +653,12 @@
fixmaps_set++;
}

@if -536,6 +712,10 @@
    (mtrr != MTRR_TYPE_WRBACK))
return 0;

/* Bail out if we are we on a populated non-leaf entry: */
@if -664,6 +744,10 @@
    return 0;
+
    prot = pgprot_4k_2_large(prot);

    set_pte((pte_t *)pud, pfn_pte(
@if -664,6 +744,10 @@
return 0;
}

/* Bail out if we are we on a populated non-leaf entry: */
@if -664,6 +744,10 @@
}
+return 0;
+
prot = pgprot_4k_2_large(prot);

set_pte((pte_t *)pmd, pfn_pte(
@@ -702,4 +786,99 @@
return 0;
}
+
+#ifdef CONFIG_X86_64
+/*
+ * pud_free_pmd_page - Clear pud entry and free pmd page.
+ * @pud: Pointer to a PUD.
+ * @addr: Virtual address associated with pud.
+ */
+ * Context: The pud range has been unmapped and TLB purged.
+ * Return: 1 if clearing the entry succeeded. 0 otherwise.
+ *
+ * NOTE: Callers must allow a single page allocation.
+ */
+int pud_free_pmd_page(pud_t *pud, unsigned long addr)
+{
+pmd_t *pmd, *pmd_sv;
+pte_t *pte;
+int i;
+
+if (pud_none(*pud))
++return 1;
+
+pmd = (pmd_t *)pud_page_vaddr(*pud);
+pmd_sv = (pmd_t *)__get_free_page(GFP_KERNEL);
+if (!pmd_sv)
++return 0;
+
+for (i = 0; i < PTRS_PER_PMD; i++) {
++pmd_sv[i] = pmd[i];
++if (!pmd_none(pmd[i]))
++pmd_clear(&pmd[i]);
++}
+
++pud_clear(pud);
+
+/* INVLPG to clear all paging-structure caches */
+flush_tlb_kernel_range(addr, addr + PAGE_SIZE-1);
+
+for (i = 0; i < PTRS_PER_PMD; i++) {
++if (!pmd_none(pmd_sv[i]))
++
+pte = (pte_t *)pmd_page_vaddr(pmd_sv[i]);
+free_page((unsigned long)pte);
+
+free_page((unsigned long)pmd_sv);  
+
+pte = (pte_t *)pmd_page_vaddr(pmd_sv[i]);
+free_page((unsigned long)pte);
+
+free_page((unsigned long)pmd_sv);
+
+pgtable_pmd_page_dtor(virt_to_page(pmd));
+free_page((unsigned long)pmd);
+
+return 1;
+
+}
+
+/*
+ * pmd_free_pte_page - Clear pmd entry and free pte page.
+ * @pmd: Pointer to a PMD.
+ * @addr: Virtual address associated with pmd.
+ *
+ * Context: The pmd range has been unmapped and TLB purged.
+ * Return: 1 if clearing the entry succeeded. 0 otherwise.
+ */
+int pmd_free_pte_page(pmd_t *pmd, unsigned long addr)
+{
+pte_t *pte;
+
+if (pmd_none(*pmd))
+return 1;
+
+pte = (pte_t *)pmd_page_vaddr(*pmd);
+pmd_clear(pmd);
+
+/* INVLPG to clear all paging-structure caches */
+flush_tlb_kernel_range(addr, addr + PAGE_SIZE-1);
+
+free_page((unsigned long)pte);
+
+return 1;
+}
+
+}
+
+#else /* !CONFIG_X86_64 */
+
+int pud_free_pmd_page(pud_t *pud, unsigned long addr)
+{
+pud None(*pud);
+
+return 1;
+}
+
+} /* !CONFIG_X86_64 */
+
+/* Disable free page handling on x86-PAE. This assures that ioremap()
+ * does not update sync'd pmd entries. See vmalloc_sync_one().
+ */
+int pmd_free_pte_page(pmd_t *pmd, unsigned long addr)
+{
+return pmd_none(*pmd);
+}
+
+#endif /* CONFIG_X86_64 */
#endif /* CONFIG_HAVE_ARCH_HUGE_VMAP */
--- linux-4.15.0.orig/arch/x86/mm/pgtable_32.c
+++ linux-4.15.0/arch/x86/mm/pgtable_32.c
@@ -63,7 +63,7 @@
* It's enough to flush this one mapping.
* (PGE mappings get flushed as well)
 */
-	__flush_tlb_one(vaddr);
+__flush_tlb_one_kernel(vaddr);
}

unsigned long __FIXADDR_TOP = 0xffffffff;
--- linux-4.15.0.orig/arch/x86/mm/pkeys.c
+++ linux-4.15.0/arch/x86/mm/pkeys.c
@@ -94,26 +94,27 @@
* The mapping is execute-only. Go try to get the
* execute-only protection key. If we fail to do that,
* fall through as if we do not have execute-only
- */
-if (vma_is_pkey_exec_only(vma) &&
- (prot & (PROT_READ|PROT_WRITE))) {
- return 0;
- }
+ /*
+ * The mapping is execute-only. Go try to get the
+ * execute-only protection key. If we fail to do that,
+ * fall through as if we do not have execute-only
+ * support.
+ * support in this mm.
+ */
+if (prot == PROT_EXEC) {
+ pkey = execute_only_pkey(vma->vm_mm);
+ if (pkey > 0)
+ return pkey;
+} else if (vma_is_pkey_exec_only(vma)) {
/*
 * Protections are *not* PROT_EXEC, but the mapping
 * is using the exec-only pkey. This mapping was
 * PROT_EXEC and will no longer be. Move back to
 * the default pkey.
 */
+return ARCH_DEFAULT_PKEY;
}
+
/*
 * This is a vanilla, non-pkey mprotect (or we failed to
 * setup execute-only), inherit the pkey from the VMA we
 --- linux-4.15.0.orig/arch/x86/mm/pti.c
+++ linux-4.15.0/arch/x86/mm/pti.c
@@ -35,6 +35,7 @@
#include <linux/spinlock.h>
#include <linux/mm.h>
#include <linux/uaccess.h>
+#include <linux/cpu.h>
+#include <linux/sections.h>

#include <asm/cpufeature.h>
#include <asm/hypervisor.h>
@@ -45,6 +46,7 @@
#include <asm/pgalloc.h>
#include <asm/tlbflush.h>
#include <asm/desc.h>
+#include <asm/sections.h>

#undef pr_fmt
#define pr_fmt(fmt)     "Kernel/User page tables isolation: " fmt
@@ -54,6 +56,16 @@
#define __GFP_NOTRACK	0
#endif

+#define CONFIG_X86_64
+#define PTI_LEVEL_KERNEL_IMAGE_PTIPTRACLONE_PMD
+else
+#define PTI_LEVEL_KERNEL_IMAGE_PTIPTRACLONE_PTE
+endif
+
static void __init pti_print_if_insecure(const char *reason)
{
if (boot_cpu_has_bug(X86_BUG_CPU_MELTDOWN))
@@ -66,12 +78,22 @@

+/ *
+ Define the page-table levels we clone for user-space on 32
+ and 64 bit.
+ */
+ifdef CONFIG_X86_64
+#definePTI_LEVEL_KERNEL_IMAGEPTI_CLONE_PMD
+else
+#definePTI_LEVEL_KERNEL_IMAGEPTI_CLONE_PTE
+endif
+
static void __init pti_print_if_insecure(const char *reason)
{
pr_info("%s\n", reason);
}

+enum pti_mode {
+PTI_AUTO = 0,
+PTI_FORCE_OFF,
+PTI_FORCE_ON
+} pti_mode;
+
+void __init pti_check_boottime_disable(void)
+
+ { char arg[5];
+ int ret;

+/* Assume mode is auto unless overridden. */
+pti_mode = PTI_AUTO;
+
+ if (hypervisor_is_type(X86_HYPER_XEN_PV)) {
+ pti_mode = PTI_FORCE_OFF;
+ pti_print_if_insecure("disabled on XEN PV.");
+ return;
+ }
@@ -79,18 +101,24 @@
+ ret = cmdline_find_option(boot_command_line, "pti", arg, sizeof(arg));
+ if (ret > 0) {
+ if (ret == 3 && !strncmp(arg, "off", 3)) {
+ pti_mode = PTI_FORCE_OFF;
+ pti_print_if_insecure("disabled on command line.");
+ return;
+ }
+ if (ret == 2 && !strncmp(arg, "on", 2)) {
+ pti_mode = PTI_FORCE_ON;
+ pti_print_if_secure("force enabled on command line.");
+ goto enable;
+ }
+ -if (ret == 4 && !strncmp(arg, "auto", 4))
+ +if (ret == 4 && !strncmp(arg, "auto", 4)) {
+ pti_mode = PTI_AUTO;
+ goto autosel;
+ +}
+ }
+
+ -if (cmdline_find_option_bool(boot_command_line, "nopti")) {
+ +if (cmdline_find_option_bool(boot_command_line, "nopti") ||
+ cpu_mitigations_off()) {
+ pti_mode = PTI_FORCE_OFF;
+ pti_print_if_insecure("disabled on command line.");
+ return;
+ }
setup_force_cpu_cap(X86_FEATURE_PTI);

- pgd_t __pti_set_user_pgd(pgd_t *pgdp, pgd_t pgd)
+ pgd_t __pti_set_user_pgtbl(pgd_t *pgdp, pgd_t pgd)
{ /*
   * Changes to the high (kernel) portion of the kernelmode page
   * Returns a pointer to a P4D on success, or NULL on failure.
   */
   -static __init p4d_t *pti_user_pagetable_walk_p4d(unsigned long address)
+static p4d_t *pti_user_pagetable_walk_p4d(unsigned long address)
{
    pgd_t *pgd = kernel_to_user_pgdp(pgd_offset_k(address));
    gfp_t gfp = (GFP_KERNEL | __GFP_NOTRACK | __GFP_ZERO);
    if (pgd_none(*pgd)) {
        unsigned long new_p4d_page = __get_free_page(gfp);
        if (!new_p4d_page)
            return NULL;
    } else
        set_pgd(pgd, __pgd(_KERNPG_TABLE | __pa(new_p4d_page)));

   -static __init pmd_t *pti_user_pagetable_walk_pmd(unsigned long address)
+static pmd_t *pti_user_pagetable_walk_pmd(unsigned long address)
{
    gfp_t gfp = (GFP_KERNEL | __GFP_NOTRACK | __GFP_ZERO);
    p4d_t *p4d = pti_user_pagetable_walk_p4d(address);
    pud_t *pud;

    +p4d = pti_user_pagetable_walk_p4d(address);
    +if (!p4d)
        +return NULL;
    +BUILD_BUG_ON(p4d_large(*p4d) != 0);
    if (p4d_none(*p4d)) {
        unsigned long new_pud_page = __get_free_page(gfp);
        -if (!new_pud_page)
+if (WARN_ON_ONCE(!new_pud_page))
return NULL;

set_p4d(p4d, __p4d(_KERNPG_TABLE | __pa(new_pud_page)));
@@ -200,7 +232,7 @@
    }
  if (pud_none(*pud)) {
      unsigned long new_pmd_page = __get_free_page(gfp);
-    if (!new_pmd_page)
-      if (WARN_ON_ONCE(!new_pmd_page))
+    if (WARN_ON_ONCE(!new_pmd_page))
        return NULL;

    set_pud(pud, __pud(_KERNPG_TABLE | __pa(new_pmd_page)));
    return pmd_offset(pud, address);
  }

-#ifdef CONFIG_X86_VSYSCALL_EMULATION
/*
 * Walk the shadow copy of the page tables (optionally) trying to allocate
 * page table pages on the way down. Does not support large pages.
 @@ -219,12 +250,16 @@
 *
 * Returns a pointer to a PTE on success, or NULL on failure.
 */
-static __init pte_t *pti_user_pagetable_walk_pte(unsigned long address)
+static pte_t *pti_user_pagetable_walk_pte(unsigned long address)
{
  gfp_t gfp = (GFP_KERNEL | __GFP_NOTRACK | __GFP_ZERO);
  -pmd_t *pmd = pti_user_pagetable_walk_pmd(address);
+  pmd_t *pmd;
  pte_t *pte;

+  pmd = pti_user_pagetable_walk_pmd(address);
+  if (!pmd)
+    return NULL;
+  
+  /* We can't do anything sensible if we hit a large mapping. */
  if (pmd_large(*pmd)) {
    WARN_ON(1);
    @@ -247,6 +282,7 @@
        return pte;
  }

+#ifdef CONFIG_X86_VSYSCALL_EMULATION
static void __init pti_setup_vsyscall(void)
{
  pte_t *pte, *target_pte;
static void __init pti_setup_vsyscall(void) { }
#endif

static void __init
pti_clone_pmds(unsigned long start, unsigned long end, pmdval_t clear)
+enum pti_clone_level {
+PTI_CLONE_PMD,
+PTI_CLONE_PTE,
+};
+
+static void
+pti_clone_pgtable(unsigned long start, unsigned long end,
+enum pti_clone_level level)
+
unsigned long addr;

/* Clone the populated PMDs which cover start to end. These PMD areas
* can have holes.
*/

for (addr = start; addr < end; addr += PMD_SIZE) {
 for (addr = start; addr < end;)
+pte_t *pte, *target_pte;
pmd_t *pmd, *target_pmd;
pgd_t *pgd;
p4d_t *p4d;
pud_t *pud;

/* Overflow check */
+if (addr < start)
+break;
+
pgd = pgd_offset_k(addr);
if (WARN_ON(pgd_none(*pgd)))
    return;
p4d = p4d_offset(pgd, addr);
if (WARN_ON(p4d_none("p4d")))
    return;
+
    pud = pud_offset(p4d, addr);
-if (pud_none("pud"))
+if (pud_none("pud")) {
+WARN_ON_ONCE(addr & ~PUD_MASK);
+addr = round_up(addr + 1, PUD_SIZE);
continue;
+}
+
pmd = pmd_offset(pud, addr);
-if (pmd_none(*pmd))
+if (pmd_none(*pmd)) {
+WARN_ON_ONCE(addr & ~PMD_MASK);
+addr = round_up(addr + 1, PMD_SIZE);
+continue;
+
-target_pmd = pti_user_pagetable_walk_pmd(addr);
-if (WARN_ON(!target_pmd))
-return;
+if (pmd_large(*pmd) || level == PTI_CLONE_PMD) {
+target_pmd = pti_user_pagetable_walk_pmd(addr);
+if (WARN_ON(!target_pmd))
+return;
+
+/*
+ * Only clone present PMDs. This ensures only setting
+ * _PAGE_GLOBAL on present PMDs. This should only be
+ * called on well-known addresses anyway, so a non-
+ * present PMD would be a surprise.
+ */
+if (WARN_ON(!(pmd_flags(*pmd) & _PAGE_PRESENT)))
+return;
+
+/*
+ * Setting ‘target_pmd’ below creates a mapping in both
+ * the user and kernel page tables. It is effectively
+ * global, so set it as global in both copies. Note:
+ * the X86_FEATURE_PGE check is not _required_ because
+ * the CPU ignores _PAGE_GLOBAL when PGE is not
+ * supported. The check keeps consistency with
+ * code that only set this bit when supported.
+ */
+if (boot_cpu_has(X86_FEATURE_PGE))
+*pmd = pmd_set_flags(*pmd, _PAGE_GLOBAL);
+
+/*
+ * Copy the PMD. That is, the kernelmode and usermode
+ * tables will share the last-level page tables of this
+ * address range
+ */
+*target_pmd = *pmd;
+
+addr += PMD_SIZE;
+
+} else if (level == PTI_CLONE_PTE) {
+}
/** Walk the page-table down to the pte level */
+pte = pte_offset_kernel(pmd, addr);
+if (pte_none(*pte)) {
+addr += PAGE_SIZE;
+continue;
+}
+
+/* Only clone present PTEs */
+if (WARN_ON(!(pte_flags(*pte) & _PAGE_PRESENT)))
+return;
+
+/* Allocate PTE in the user page-table */
+target_pte = pti_user_pagetable_walk_pte(addr);
+if (WARN_ON(!target_pte))
+return;
+
+/* Set GLOBAL bit in both PTEs */
+if (boot_cpu_has(X86_FEATURE_PGE))
+*pte = pte_set_flags(*pte, _PAGE_GLOBAL);
+
+/* Clone the PTE */
+*target_pte = *pte;
+
+/* Copy the PMD. That is, the kernelmode and usermode
+ * tables will share the last-level page tables of this
+ * address range
+ */
+*target_pmd = pmd_clear_flags(*pmd, clear);
+addr += PAGE_SIZE;
+
+} else {
+BUG();
+
+}
+
+
+
+/* Clone a single p4d (i.e. a top-level entry on 4-level systems and a
+ * next-level entry on 5-level systems.
+ @@ -318,6 +429,9 @@
+ pgd_t *kernel_pgd;
+
+user_p4d = pti_user_pagetable_walk_p4d(addr);
+if (!user_p4d)
+return;
+    */
kernel_pgd = pgd_offset_k(addr);
kernal_p4d = p4d_offset(kernel_pgd, addr);
*user_p4d = *kernel_p4d;
@@ -331,6 +445,25 @@
pti_clone_p4d(CPU_ENTRY_AREA_BASE);
}

+#else /* CONFIG_X86_64 */
+
+/*
+ * On 32 bit PAE systems with 1GB of Kernel address space there is only
+ * one pgd/p4d for the whole kernel. Cloning that would map the whole
+ * address space into the user page-tables, making PTI useless. So clone
+ * the page-table on the PMD level to prevent that.
+ */
+static void __init pti_clone_user_shared(void)
+{
+unsigned long start, end;
+
+start = CPU_ENTRY_AREA_BASE;
+end = start + (PAGE_SIZE * CPU_ENTRY_AREA_PAGES);
+
+pti_clone_pgtable(start, end, PTI_CLONE_PMD);
+}
+#endif /* CONFIG_X86_64 */
+
/*
 * Clone the ESPFIX P4D into the user space visible page table
 */
@@ -344,11 +477,121 @@
/*
 * Clone the populated PMDs of the entry and irqentry text and force it RO.
 */
-static void __init pti_clone_entry_text(void)
+static void pti_clone_entry_text(void)
+{
+pti_clone_pgtable((unsigned long) __entry_text_start,
+ (unsigned long) __irqentry_text_end,
+ PTI_CLONE_PMD);
+}
+
+/*
+ * Global pages and PCIDs are both ways to make kernel TLB entries
+ * live longer, reduce TLB misses and improve kernel performance.
+ * But, leaving all kernel text Global makes it potentially accessible
+ * to Meltdown-style attacks which make it trivial to find gadgets or
+ * defeat KASLR.
+ *
Only use global pages when it is really worth it.
 static inline bool pti_kernel_image_global_ok(void)
{
 /*
 * Systems with PCIDs get little benefit from global
 * kernel text and are not worth the downsides.
 */
 if (cpu_feature_enabled(X86_FEATURE_PCID))
 return false;
 +
 /*
 * Only do global kernel image for pti=auto. Do the most
 * secure thing (not global) if pti=on specified.
 */
 if (pti_mode != PTI_AUTO)
 return false;
 +
 /*
 * K8 may not tolerate the cleared _PAGE_RW on the userspace
 * global kernel image pages. Do the safe thing (disable
 * global kernel image). This is unlikely to ever be
 * noticed because PTI is disabled by default on AMD CPUs.
 */
 if (boot_cpu_has(X86_FEATURE_K8))
 return false;
 +
 /*
 * RANDSTRUCT derives its hardening benefits from the
 * attacker's lack of knowledge about the layout of kernel
 * data structures. Keep the kernel image non-global in
 * cases where RANDSTRUCT is in use to help keep the layout a
 * secret.
 */
 if (IS_ENABLED(CONFIG_GCC_PLUGIN_RANDSTRUCT))
 return false;
 +
 return true;
}
+
/*
 * This is the only user for these and it is not arch-generic
 * like the other set_memory.h functions. Just extern them.
 */
+extern int set_memory_nonglobal(unsigned long addr, int numpages);
+extern int set_memory_global(unsigned long addr, int numpages);
For some configurations, map all of kernel text into the user page tables. This reduces TLB misses, especially on non-PCID systems.

```c
+ static void pti_clone_kernel_text(void)
+ {
+  /*
+   * rodata is part of the kernel image and is normally
+   * readable on the filesystem or on the web. But, do not
+   * clone the areas past rodata, they might contain secrets.
+   */
+  unsigned long start = PFN_ALIGN(_text);
+  unsigned long end_clone  = (unsigned long)__end_rodata_aligned;
+  unsigned long end_global = PFN_ALIGN((unsigned long)__stop___ex_table);
+  if (!pti_kernel_image_global_ok())
+    return;
+  pr_debug("mapping partial kernel image into user address space\n");
+  /*
+   * Note that this will undo _some_ of the work that
+   * pti_set_kernel_image_nonglobal() did to clear the
+   * global bit.
+   */
+  pti_clone_pgtable(start, end_clone, PTI_LEVEL_KERNEL_IMAGE);
+  /*
+   * pti_clone_pgtable() will set the global bit in any PMDs
+   * that it clones, but we also need to get any PTEs in
+   * the last level for areas that are not huge-page-aligned.
+   */
+  /* Set the global bit for normal non-__init kernel text: */
+  set_memory_global(start, (end_global - start) >> PAGE_SHIFT);
+ }
+ void pti_set_kernel_image_nonglobal(void)
+ {
+  pti_clone_pmds((unsigned long)__entry_text_start,
+                  (unsigned long)__irqentry_text_end,
+                  _PAGE_RW | _PAGE_GLOBAL);
+  /* The identity map is created with PMDs, regardless of the
+   * actual length of the kernel. We need to clear
+   * _PAGE_GLOBAL up to a PMD boundary, not just to the end
+   * of the image.
+   */
+  unsigned long start = PFN_ALIGN(_text);
```
unsigned long end = ALIGN((unsigned long)_end, PMD_PAGE_SIZE);
+
+/*
+ * This clears _PAGE_GLOBAL from the entire kernel image.
+ * pti_clone_kernel_text() map put _PAGE_GLOBAL back for
+ * areas that are mapped to userspace.
+ */
+set_memory_nonglobal(start, (end - start) >> PAGE_SHIFT);
+
*/
@@ -361,8 +604,55 @@
pr_info("enabled\n");

#ifdef CONFIG_X86_32
+/*
+ * We check for X86_FEATURE_PCID here. But the init-code will
+ * clear the feature flag on 32 bit because the feature is not
+ * supported on 32 bit anyway. To print the warning we need to
+ * check with cpuid directly again.
+ */
+if (cpuid_ecx(0x1) & BIT(17)) {
+  /* Use printk to work around pr_fmt() */
+  printk(KERN_WARNING "\n");
+  printk(KERN_WARNING "**************************\n");
+  printk(KERN_WARNING "** WARNING! WARNING! WARNING! WARNING! WARNING! WARNING! WARNING!
+  **\n");
+  printk(KERN_WARNING "**\n");
+  printk(KERN_WARNING "** You are using 32-bit PTI on a 64-bit PCID-capable CPU. **\n");
+  printk(KERN_WARNING "** Your performance will increase dramatically if you **\n");
+  printk(KERN_WARNING "** switch to a 64-bit kernel! **\n");
+  printk(KERN_WARNING "**\n");
+  printk(KERN_WARNING "** WARNING! WARNING! WARNING! WARNING! WARNING! WARNING! WARNING!
+  **\n");
+  printk(KERN_WARNING "**\n");
+  printk(KERN_WARNING "**************************\n");
+}
+#endif
+
pti_clone_user_shared();

pti_set_kernel_image_nonglobal();
/* Replace some of the global bits just for shared entry text: */
pti_clone_entry_text();
pti_setup_espfix64();
pti_setup_vsyscall();
}
* Finalize the kernel mappings in the userspace page-table. Some of the
mappings for the kernel image might have changed since pti_init()
cloned them. This is because parts of the kernel image have been
mapped RO and/or NX. These changes need to be cloned again to the
userspace page-table.

```c
void pti_finalize(void)
{
  if (!boot_cpu_has(X86_FEATURE_PTI))
    return;
  
  /*
   * We need to clone everything (again) that maps parts of the
   * kernel image.
   */
  pti_clone_entry_text();
  pti_clone_kernel_text();
  
  debug_checkwx_user();
}
```

--- linux-4.15.0.orig/arch/x86/mm/testmmiotrace.c
+++ linux-4.15.0/arch/x86/mm/testmmiotrace.c
@@ -115,6 +115,9 @@
{
  unsigned long size = (read_far) ? (8 << 20) : (16 << 10);

+  if (kernel_is_locked_down("MMIO trace testing"))
+    return -EPERM;
+
  if (mmio_address == 0) {
    pr_err("you have to use the module argument mmio_address.
            \n");
    pr_err("DO NOT LOAD THIS MODULE UNLESS YOU REALLY KNOW WHAT YOU ARE DOING!\n");
  --- linux-4.15.0.orig/arch/x86/mm/tlb.c
  +++ linux-4.15.0/arch/x86/mm/tlb.c
  @@ -6,13 +6,14 @@
      #include <linux/interrupt.h>
      #include <linux/export.h>
      #include <linux/cpu.h>
      +#include <linux/debugfs.h>

      #include <asm/tlbflush.h>
      #include <asm/mmu_context.h>
      +#include <asm/nospec-branch.h>
      #include <asm/cache.h>
      #include <asm/apic.h>
      #include <asm/uv/uv.h>
      -#include <linux/debugfs.h>
```
/*
 * TLB flushing, formerly SMP-only
 @ @ -29,6 +30,12 @@ */

/*
+ * Use bit 0 to mangle the TIF_SPEC_IB state into the mm pointer which is
+ * stored in cpu_tlb_state.last_user_mm_ibpb.
+ */
+#define LAST_USER_MM_IBPB 0x1UL
+
+/*
* We get here when we do something requiring a TLB invalidation
* but could not go invalidate all of the contexts. We do the
* necessary invalidation by clearing out the 'ctx_id' which
@ @ -179,6 +186,89 @@
}
}

+static inline unsigned long mm_mangle_tif_spec_ib(struct task_struct *next)
+{
+    unsigned long next_tif = task_thread_info(next)->flags;
+    unsigned long ibpb = (next_tif >> TIF_SPEC_IB) & LAST_USER_MM_IBPB;
+    +return (unsigned long)next->mm | ibpb;
+}
+
+static void cond_ibpb(struct task_struct *next)
+{
+    if (!next || !next->mm)
+        return;
+    
+    /*
    * Both, the conditional and the always IBPB mode use the mm
    * pointer to avoid the IBPB when switching between tasks of the
    * same process. Using the mm pointer instead of mm->context.ctx_id
    * opens a hypothetical hole vs. mm_struct reuse, which is more or
    * less impossible to control by an attacker. Aside of that it
    * would only affect the first schedule so the theoretically
    * exposed data is not really interesting.
    */
+    +if (static_branch_likely(&switch_mm_cond_ibpb)) {
+        unsigned long prev_mm, next_mm;
+        +
+        +/*
+        * This is a bit more complex than the always mode because
+        * it has to handle two cases:
+    */
}
1) Switch from a user space task (potential attacker) which has TIF_SPEC_IB set to a user space task (potential victim) which has TIF_SPEC_IB not set.

2) Switch from a user space task (potential attacker) which has TIF_SPEC_IB not set to a user space task (potential victim) which has TIF_SPEC_IB set.

This could be done by unconditionally issuing IBPB when a task which has TIF_SPEC_IB set is either scheduled in or out. Though that results in two flushes when:

- the same user space task is scheduled out and later scheduled in again and only a kernel thread ran in between.
- a user space task belonging to the same process is scheduled in after a kernel thread ran in between
- a user space task belonging to the same process is scheduled in immediately.

Optimize this with reasonably small overhead for the above cases. Mangle the TIF_SPEC_IB bit into the mm pointer of the incoming task which is stored in cpu_tlbstate.last_user_mm_ibpb for comparison.

```
next_mm = mm_mangle_tif_spec_ib(next);
prev_mm = this_cpu_read(cpu_tlbstate.last_user_mm_ibpb);

if (next_mm != prev_mm && (next_mm | prev_mm) & LAST_USER_MM_IBPB)
  indirect_branch_prediction_barrier();

this_cpu_write(cpu_tlbstate.last_user_mm_ibpb, next_mm);
```

If (static_branch_unlikely(&switch_mm_always_ibpb)) {

Only flush when switching to a user space task with a different context than the user space task which ran last on this CPU.

/**
+if (this_cpu_read(cpu_tlbstate.last_user_mm) != next_mm) {
+indirect_branch_prediction_barrier();
+this_cpu_write(cpu_tlbstate.last_user_mm, next_mm);
+}
+
+void switch_mm_irqs_off(struct mm_struct *prev, struct mm_struct *next, 
+struct task_struct *tsk) {

@@ -248,6 +338,13 @@
    u16 new_asid;
    bool need_flush;

    /*
     * Avoid user/user BTB poisoning by flushing the branch
     * predictor when switching between processes. This stops
     * one process from doing Spectre-v2 attacks on another.
     */
    cond_ibpb(tsk);
+
    if (IS_ENABLED(CONFIG_VMAP_STACK)) {
        /* If our current stack is in vmalloc space and isn't
@@ -270,6 +367,10 @@
            choose_new_asid(next, next_tlb_gen, &new_asid, &need_flush);

        /* Let nmi_uaccess_OK() know that we're changing CR3. */
        +this_cpu_write(cpu_tlbstate.loaded_mm, LOADED_MM_SWITCHING);
        +barrier();
        +
        if (need_flush) {
            this_cpu_write(cpu_tlbstate.ctxs[new_asid].ctx_id, next->context.ctx_id);
            this_cpu_write(cpu_tlbstate.ctxs[new_asid].tlb_gen, next_tlb_gen);
            @ @ -292,6 +393,9 @@
            trace_tlb_flush_rcuidle(TLB_FLUSH_ON_TASK_SWITCH, 0);
        }

        /* Make sure we write CR3 before loaded_mm. */
        +barrier();
        +
        this_cpu_write(cpu_tlbstate.loaded_mm, next);
        this_cpu_write(cpu_tlbstate.loaded_mm_asid, new_asid);
    }  
    @ @ -369,6 +473,7 @@
    write_cr3(build_cr3(mm->pgd, 0));
}
/* Reinitialize tlbstate. */
this_cpu_write(cpu_tlbstate.last_user_mm_ibpb, LAST_USER_MM_IBPB);
this_cpu_write(cpu_tlbstate.loaded_mm_asid, 0);
this_cpu_write(cpu_tlbstate.next_asid, 1);
this_cpu_write(cpu_tlbstate.ctxs[0].ctx_id, mm->contextctx_id);

addr = f->start;
while (addr < f->end) {
    __flush_tlb_one_user(addr);
    addr += PAGE_SIZE;
}

void flush_tlb_kernel_range(unsigned long start, unsigned long end)
+#include <asm/nospec-branch.h>
#include <linux/bpf.h>

-int bpf_jit_enable __read_mostly;
- 
/*
 * assembly code in arch/x86/net/bpf_jit.S
*/
@@ -154,6 +153,19 @@
     BIT(BPF_REG_AX));
 }

 /* is_ereg_8l() == true if BPF register 'reg' is mapped to access x86-64
 + lower 8-bit registers dil,sil,bpl,sp1,r8b..r15b, which need extra byte
 + of encoding. al,cl,dl,bl have simpler encoding.
 + */
+static bool is_ereg_8l(u32 reg)
+{
+    return is_ereg(reg) ||
+        (1 << reg) & (BIT(BPF_REG_1) |
+            BIT(BPF_REG_2) |
+            BIT(BPF_REG_FP));
+
+    /* add modifiers if 'reg' maps to x64 registers r8..r15 */
+static u8 add_1mod(u8 byte, u32 reg)
+{
+    return 0;
+
+    /* mov edx, edx */
+    EMIT2(0x89, 0xD2);                        /* mov edx, edx */
+    EMIT3(0x39, 0x56,                         /* cmp dword ptr [rsi + 16], edx */
+          offsetof(struct bpf_array, map.max_entries));
+    #define OFFSET1 43 /* number of bytes to jump */
+    #define OFFSET1 (41 + RETPOLINE_RAX_BPF_JIT_SIZE) /* number of bytes to jump */
+    EMIT2(X86_JBE, OFFSET1);                  /* jbe out */
+    label1 = cnt;
+
+    /* mov eax, dword ptr [rbp + 36] */
+    EMIT2_off32(0x8B, 0x85, 36);              /* mov eax, dword ptr [rbp + 36] */
+    EMIT3(0x83, 0xF8, MAX_TAIL_CALL_CNT);     /* cmp eax, MAX_TAIL_CALL_CNT */
+    #define OFFSET2 32
+    #define OFFSET2 (30 + RETPOLINE_RAX_BPF_JIT_SIZE)
+    EMIT2(X86_JA, OFFSET2);                   /* ja out */
+    label2 = cnt;
+    EMIT3(0x83, 0xC0, 0x01);                  /* add eax, 1 */
+    #-@ -310,7 +322,7 @@
+    * goto out;
EMIT3(0x48, 0x85, 0xC0); /* test rax,rax */
-
*/
#define OFFSET3 10
*#define OFFSET3 (8 + RETPOLINE_RAX_BPF_JIT_SIZE)
EMIT2(X86_JE, OFFSET3); /* je out */
label3 = cnt;

@@ -323,7 +335,7 @@
* rdi == ctx (1st arg)
* rax == prog->bpf_func + prologue_size
*/
-EMIT2(0xFF, 0xE0); /* jmp rax */
+RETPOLINE_RAX_BPF_JIT();

/* out: */
BUILD_BUG_ON(cnt - label1 != OFFSET1);
@@ -771,9 +783,8 @@
/* STX: *(u8*)(dst_reg + off) = src_reg */
case BPF_STX | BPF_MEM | BPF_B:
/* emit 'mov byte ptr [rax + off], al' */
-if (is_ereg(dst_reg) || is_ereg_8l(src_reg))
+if (is_ereg(dst_reg) || is_ereg_8l(src_reg))
-    /* Add extra byte for eregs or SIL,DIL,BPL in src_reg */
EMIT2(add_2mod(0x40, dst_reg, src_reg), 0x88);
else
EMIT1(0x88);
@@ -988,7 +999,17 @@
  break;

-case BPF_JMP | BPF_JA:
-  jmp_offset = addrs[i + insn->off] - addrs[i];
+if (insn->off == -1)
+  /* -1 jmp instructions will always jump
+ backwards two bytes. Explicitly handling
+ this case avoids wasting too many passes
+ when there are long sequences of replaced
+ dead code.
+ */
+ jmp_offset = -2;
+ else
+   jmp_offset = addrs[i + insn->off] - addrs[i];
+   if (!jmp_offset)
+      /* optimize out nop jumps */
+      break;
@@ -1096,7 +1117,16 @@
if (image) {
  -if (unlikely(proglen + ilen > oldproglen)) {
    /*
     * When populating the image, assert that:
     * i) We do not write beyond the allocated space, and
     * ii) addr[i] did not change from the prior run, in order
     * to validate assumptions made for computing branch
     * displacements.
     */
    +if (unlikely(proglen + ilen > oldproglen ||
            proglen + ilen != addr[i])) {
      pr_err("bpf_jit: fatal error\n");
      return -EFAULT;
    }  
    
  }  
  for (pass = 0; pass < 10 || image; pass++) {  
    proglen = do_jit(prog, addr[i], image, oldproglen, &ctx);
    if (proglen <= 0) {  
      out_image:  
        image = NULL;
        if (header)
          bpf_jit_binary_free(header);
    }  
    for (pass = 0; pass < 20 || image; pass++) {  
      proglen = do_jit(prog, addr, image, oldproglen, &ctx);
      if (proglen <= 0) {  
        +out_image:  
          image = NULL;
          if (header)
            bpf_jit_binary_free(header);
      }  
      if (proglen != oldproglen) {  
        pr_err("bpf_jit: proglen=%d != oldproglen=%d\n",
                proglen, oldproglen);
        -prog = orig_prog;
        -goto out_addrs;
        +goto out_image;
      }  
      break;
    }  
  }  
  oldproglen = proglen;
  +cond_resched();
}  

if (bpf_jit_enable > 1)
+++ linux-4.15.0/arch/x86/oprofile/nmi_int.c
@@ -460,7 +460,7 @@
goto fail;

for_each_possible_cpu(cpu) {
-    if (!cpu)
+    if (!IS_ENABLED(CONFIG_SMP) || !cpu)
        continue;

    memcpy(per_cpu(cpu_msrs, cpu).counters,
--- linux-4.15.0.orig/arch/x86/pci/broadcom_bus.c
+++ linux-4.15.0/arch/x86/pci/broadcom_bus.c
@@ -50,8 +50,8 @@
         word1 = read_pci_config_16(bus, slot, func, 0xc0);
         word2 = read_pci_config_16(bus, slot, func, 0xc2);
     if (word1 != word2) {
-         res.start = (word1 << 16) | 0x0000;
-         res.end   = (word2 << 16) | 0xffff;
+         res.start = ((resource_size_t) word1 << 16) | 0x0000;
+         res.end   = ((resource_size_t) word2 << 16) | 0xffff;
         res.flags = IORESOURCE_MEM;
         update_res(info, res.start, res.end, res.flags, 0);
     }
--- linux-4.15.0.orig/arch/x86/pci/common.c
+++ linux-4.15.0/arch/x86/pci/common.c
@@ -33,6 +33,7 @@
         pcibios_last_bus = -1;
         unsigned long pirq_table_addr;
         +unsigned int pci_early_clear_msi;
         const struct pci_raw_ops *__read_mostly raw_pci_ops;
         const struct pci_raw_ops *__read_mostly raw_pci_ext_ops;
@@ -608,6 +609,9 @@
     } else if (!strcmp(str, "skip_isa_align")) {
         pci_probe |= PCI_CAN_SKIP_ISA_ALIGN;
         return NULL;
+    } else if (!strcmp(str, "clearmsi")) {
+        pci_early_clear_msi = 1;
+        return NULL;
    } else if (!strcmp(str, "noioapicquirk")) {
        noioapicquirk = 1;
        return NULL;
--- linux-4.15.0.orig/arch/x86/pci/early.c
+++ linux-4.15.0/arch/x86/pci/early.c
@@ -51,6 +51,31 @@
         outw(val, 0xcfc + (offset&2));
     }
+u32 pci_early_find_cap(int bus, int slot, int func, int cap)
+{
    +int bytes;
    +u8 pos;
    +
    +if (!(read_pci_config_16(bus, slot, func, PCI_STATUS) &
            +PCI_STATUS_CAP_LIST))
        +return 0;
    +
    +pos = read_pci_config_byte(bus, slot, func, PCI_CAPABILITY_LIST);
    +for (bytes = 0; bytes < 48 && pos >= 0x40; bytes++) {
        +u8 id;
        +
        +pos &= ~3;
        +id = read_pci_config_byte(bus, slot, func, pos+PCI_CAP_LIST_ID);
        +if (id == 0xff)
            +break;
        +if (id == cap)
            +return pos;
        +pos = read_pci_config_byte(bus, slot, func,
            +pos+PCI_CAP_LIST_NEXT);
    +}
    +return 0;
}

int early_pci_allowed(void)
{
    return (pci_probe & (PCI_PROBE_CONF1|PCI_PROBE_NOEARLY)) ==
--- linux-4.15.0.orig/arch/x86/pci/fixup.c
+++ linux-4.15.0/arch/x86/pci/fixup.c
@@ -572,6 +572,10 @@
 DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x6f60, pci_invalid_bar);
 DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x6fa0, pci_invalid_bar);
 DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x6fc0, pci_invalid_bar);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0xa1ec, pci_invalid_bar);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0xa1ed, pci_invalid_bar);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0xa26c, pci_invalid_bar);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0xa26d, pci_invalid_bar);

/*
 * Device [1022:7808]
 * @ @ -589,6 +593,17 @@
 DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_AMD, 0x7808, pci_fixup_amd_ehci_pme);

/*
 * Device [1022:7914]
 * + When in D0, PME# doesn't get asserted when plugging USB 2.0 device.
+ static void pci_fixup_amd_fch_xhci_pme(struct pci_dev *dev)
+ {
+    dev_info(&dev->dev, "PME# does not work under D0, disabling it\n");
+    dev->pme_support &= ~(PCI_PM_CAP_PME_D0 >> PCI_PM_CAP_PME_SHIFT);
+ }
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_AMD, 0x7914, pci_fixup_amd_fch_xhci_pme);
+
+ /*
+ Apple MacBook Pro: Avoid [mem 0x7fa00000-0x7fbfffff]
+ *
+ * Using the [mem 0x7fa00000-0x7fbfffff] region, e.g., by assigning it to
+ * mem-[632,10] +647,24 @@
+ * @@ -632,10 +647,24 @@
+ *]
+ *DEV->bus->bus_flags |= PCI_BUS_FLAGS_NO_AERSID;
+ }
+-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x2030, quirk_no_aersid);
+-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x2031, quirk_no_aersid);
+-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x2032, quirk_no_aersid);
+-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x2033, quirk_no_aersid);
+-DECLARE_PCI_FIXUP_CLASS_EARLY(PCI_VENDOR_ID_INTEL, PCI_ANY_ID,
+    PCI_CLASS_BRIDGE_PCI, 8, quirk_no_aersid);
+
+static void quirk_intel_th_dnv(struct pci_dev *dev)
+{
+    struct resource *r = &dev->resource[4];
+    
+    /*
+     * Denverton reports 2k of RTIT_BAR (intel_th resource 4), which
+     * appears to be 4 MB in reality.
+     */
+    if (r->end == r->start + 0x7ff) {
+        r->start = 0;
+        r->end   = 0x3fffff;
+        r->flags |= IORESOURCE_UNSET;
+    } 
+}
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x19e1, quirk_intel_th_dnv);

#ifdef CONFIG_PHYS_ADDR_T_64BIT

@@ -750,4 +779,48 @@
    DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_AMD, 0x15b1, pci_amd_enable_64bit_bar);
    DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_AMD, 0x1601, pci_amd_enable_64bit_bar);
+
+#define RS690_LOWER_TOP_OF_DRAM2	0x30
+#define RS690_LOWER_TOP_OF_DRAM2_VALID	0x1
+#define RS690_UPPER_TOP_OF_DRAM2	0x31
```c
#define RS690_HTIU_NB_INDEX 0xA8
#define RS690_HTIU_NB_INDEX_WR_ENABLE 0x100
#define RS690_HTIU_NB_DATA 0xAC

/*
 * Some BIOS implementations support RAM above 4GB, but do not configure the
 * PCI host to respond to bus master accesses for these addresses. These
 * implementations set the TOP_OF_DRAM_SLOT1 register correctly, so PCI DMA
 * works as expected for addresses below 4GB.
 *
 * Reference: "AMD RS690 ASIC Family Register Reference Guide" (pg. 2-57)
 * https://www.amd.com/system/files/TechDocs/43372_rs690_rrg_3.00o.pdf
 */

static void rs690_fix_64bit_dma(struct pci_dev *pdev)
{
    u32 val = 0;
    phys_addr_t top_of_dram = __pa(high_memory - 1) + 1;
    if (top_of_dram <= (1ULL << 32))
        return;
    pci_write_config_dword(pdev, RS690_HTIU_NB_INDEX,
                          RS690_LOWER_TOP_OF_DRAM2);
    pci_read_config_dword(pdev, RS690_HTIU_NB_DATA, &val);
    if (val)
        return;
    pci_info(pdev, "Adjusting top of DRAM to %pa for 64-bit DMA support\n", &top_of_dram);
    return;
    pci_write_config_dword(pdev, RS690_HTIU_NB_INDEX,
                          RS690_UPPER_TOP_OF_DRAM2 | RS690_HTIU_NB_INDEX_WR_ENABLE);
    pci_write_config_dword(pdev, RS690_HTIU_NB_DATA, top_of_dram >> 32);
    pci_write_config_dword(pdev, RS690_HTIU_NB_INDEX,
                          RS690_LOWER_TOP_OF_DRAM2 | RS690_HTIU_NB_INDEX_WR_ENABLE);
    pci_write_config_dword(pdev, RS690_HTIU_NB_DATA, top_of_dram | RS690_LOWER_TOP_OF_DRAM2_VALID);
}

DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ATI, 0x7910, rs690_fix_64bit_dma);
```

---

Open Source Used In 5GaaS Edge AC-4 12319
```c
#include <asm/acpi.h>

#define PCIE_CAP_OFFSET 0x100

void __init pcibios_irq_init(void)
{
    struct irq_routing_table *rtable = NULL;
    
    DBG(KERN_DEBUG "PCI: IRQ init\n");

    if (raw_pci_ops == NULL)
        pirq_table = pirq_find_routing_table();

    ifdef CONFIG_PCI_BIOS
        if (!pirq_table && (pci_probe & PCI_BIOS_IRQ_SCAN))
            pirq_table = pcibios_get_irq_routing_table();
        rtable = pirq_table;
    endif

    if (pirq_table) {
        pirq_peer_trick();
        PIRQ peer trick
        * If we're using the I/O APIC, avoid using the PCI IRQ
        * routing table
        */
        if (io_apic_assign_pci_irqs)
            kfree(rtable);
            pirq_table = NULL;
            PIRQ_table = NULL;
    } else {
    }

    x86_initpci.fixup_irqs();
```

---

```
#include <asm/xen/pci.h>
#include <asm/xen/cpuid.h>
#include <asm/apic.h>
#include <asm/acpi.h>
#include <asm/8259.h>
```
static int xen_pcifront_enable_irq(struct pci_dev *dev)
--- linux-4.15.0.orig/arch/x86/platform/atom/punit_atom_debug.c
+++ linux-4.15.0/arch/x86/platform/atom/punit_atom_debug.c
@@ -154,8 +154,8 @@
(kernel_ulong_t)&drv_data }

static const struct x86_cpu_id intel_punit_cpu_ids[] = {
  -ICPU(INTEL_FAM6_ATOM_SILVERMONT1, punit_device_byt),
  -ICPU(INTEL_FAM6_ATOM_MERRIFIELD, punit_device_tng),
  +ICPU(INTEL_FAM6_ATOM_SILVERMONT, punit_device_byt),
  +ICPU(INTEL_FAM6_ATOM_SILVERMONT_MID,  punit_device_tng),
  -ICPU(INTEL_FAM6_ATOM_AIRMONT, punit_device_cht),
  { }
};
--- linux-4.15.0.orig/arch/x86/platform/efi/early_printk.c
+++ linux-4.15.0/arch/x86/platform/efi/early_printk.c
@@ -179,7 +179,7 @@
 num--;
}
  -if (efi_x >= si->lfb_width) {
  +if (efi_x + font->width > si->lfb_width) {
    efi_x = 0;
    efi_y += font->height;
  }
--- linux-4.15.0.orig/arch/x86/platform/efi/efi.c
+++ linux-4.15.0/arch/x86/platform/efi/efi.c
@@ -86,6 +86,8 @@
 pgd_t *save_pgd;

 save_pgd = efi_call_phys_prolog();
+if (!save_pgd)
+return EFI_ABORTED;

 /* Disable interrupts around EFI calls: */
 local_irq_save(flags);
@@ -480,7 +482,6 @@
 efi_char16_t *c16;
 char vendor[100] = "unknown";
 int i = 0;
-void *tmp;

 #ifdef CONFIG_X86_32
 if (boot_params.efi_info.efi_systab_hi ||
@@ -505,14 +506,16 @@
 /*
 * Show what we know for posterity
 */
c16 = tmp = early_memremap(efi.systab->fw_vendor, 2);
+c16 = early_memremap_ro(efi.systab->fw_vendor,
+sizeof(vendor) * sizeof(efi_char16_t));
if (c16) {
    for (i = 0; i < sizeof(vendor) - 1 && *c16; ++i)
        vendor[i] = *c16++;
    for (i = 0; i < sizeof(vendor) - 1 && c16[i]; ++i)
        vendor[i] = c16[i];
    vendor[i] = '\0';
} else
+early_memunmap(c16, sizeof(vendor) * sizeof(efi_char16_t));
+} else {
    pr_err("Could not map the firmware vendor\n");
    -early_memunmap(tmp, 2);
    +}

pr_info("EFI v%u.%u by %s\n",
    efi.systab->hdr.revision >> 16,
    efi.systab->hdr.revision >> 16,
@@ -893,9 +896,6 @@
    if (efi_enabled(EFI_OLD_MEMMAP) && (__supported_pte_mask & _PAGE_NX))
        runtime_code_page_mkexec();
    -
-/* clean DUMMY object */
-efi_delete_dummy_variable();
#endif
    }
@@ -932,16 +932,14 @@

if (efi_alloc_page_tables()) {
    pr_err("Failed to allocate EFI page tables\n");
    -clear_bit(EFI_RUNTIME_SERVICES, &efi.flags);
    -return;
    +goto err;
    }

    efi_merge_regions();
    new_memmap = efi_map_regions(&count, &pg_shift);
    if (!new_memmap) {
        pr_err("Error realloacting memory, EFI runtime non-functional\n");
        -clear_bit(EFI_RUNTIME_SERVICES, &efi.flags);
        -return;
        +goto err;
        }
    pa = __pa(new_memmap);
@@ -955,8 +953,7 @@
if (efi_memmap_init_late(pa, efi.memmap.desc_size * count)) {
    pr_err("Failed to remap late EFI memory map\n");
    clear_bit(EFI_RUNTIME_SERVICES, &efi.flags);
    return;
    goto err;
}

if (efi_enabled(EFI_DBG)) {
    efi_print_memmap();
}

-BUG_ON(!efi.systab);
+if (WARN_ON(!efi.systab))
    goto err;

-if (efi_setup_page_tables(pa, 1 << pg_shift)) {
    clear_bit(EFI_RUNTIME_SERVICES, &efi.flags);
    return;
}
+if (efi_setup_page_tables(pa, 1 << pg_shift))
    goto err;

efi_sync_low_kernel_mappings();

@@ -989,9 +985,9 @@

if (status != EFI_SUCCESS) {
    -pr_alert("Unable to switch EFI into virtual mode (status=%lx)\n",
        status);
    -panic("EFI call to SetVirtualAddressMap() failed!");
    +pr_err("Unable to switch EFI into virtual mode (status=%lx)\n",
    +status);
    +goto err;
}

/*
@@ -1018,6 +1014,10 @@

/* clean DUMMY object */
efi_delete_dummy_variable();
+return;
+err:
+clear_bit(EFI_RUNTIME_SERVICES, &efi.flags);
void __init efi_enter_virtual_mode(void)
--- linux-4.15.0.orig/arch/x86/platform/efi/efi_32.c
+++ linux-4.15.0/arch/x86/platform/efi/efi_32.c
@@ -85,12 +85,7 @@
 void __init efi_call_phys_epilog(pgd_t *save_pgd)
 { }
-struct desc_ptr gdt_descr;
-
-gdt_descr.address = (unsigned long)get_cpu_gdt_rw(0);
-gdt_descr.size = GDT_SIZE - 1;
-load_gdt(&gdt_descr);
-
+load_fixmap_gdt(0);
 load_cr3(save_pgd);
 __flush_tlb_all();
 }
--- linux-4.15.0.orig/arch/x86/platform/efi/efi_64.c
+++ linux-4.15.0/arch/x86/platform/efi/efi_64.c
@@ -84,13 +84,16 @@
 if (!efi_enabled(EFI_OLD_MEMMAP)) { }
 save_pgd = (pgd_t *)__read_cr3();
 write_cr3((unsigned long)efi_scratch.efi_pgt);
-goto out;
+__flush_tlb_all();
+return save_pgd;
 }

early_code_mapping_set_exec(1);

n_pgds = DIV_ROUND_UP((max_pfn << PAGE_SHIFT), PGDIR_SIZE);
save_pgd = kmalloc_array(n_pgds, sizeof(*save_pgd), GFP_KERNEL);
+if (!save_pgd)
+return NULL;
/
* Build 1:1 identity mapping for efi=old_map usage. Note that
@@ -138,10 +141,12 @@
 pgd_offset_k(pgd * PGDIR_SIZE)->pgd &= ~_PAGE_NX;
 }
]
-out:
__flush_tlb_all();

return save_pgd;
+out:
+efi_call_phys_epilog(save_pgd);
+return NULL;
}

void __init efi_call_phys_epilog(pgd_t *save_pgd)
@@ -167,14 +172,14 @@
pgd = pgd_offset_k(pgd_idx * PGDIR_SIZE);
set_pgd(pgd_offset_k(pgd_idx * PGDIR_SIZE), save_pgd[pgd_idx]);

-    if (!(pgd_val(*pgd) & _PAGE_PRESENT))
+    if (!pgd_present(*pgd))
        continue;

    for (i = 0; i < PTRS_PER_P4D; i++) {
        p4d = p4d_offset(pgd,
                        pgd_idx * PGDIR_SIZE + i * P4D_SIZE);

-        if (!(p4d_val(*p4d) & _PAGE_PRESENT))
+        if (!p4d_present(*p4d))
            continue;

        pud = (pud_t *)p4d_page_vaddr(*p4d);
@@ -228,7 +233,7 @@
    if (!pud) {
        if (CONFIG_PGTABLE_LEVELS > 4)
            free_page((unsigned long)pgd_page_vaddr(*pgd));
-        -free_page((unsigned long)efi_pgd);
+        -free_pages((unsigned long)efi_pgd, PGD_ALLOCATION_ORDER);
            return -ENOMEM;
    }

@@ -309,7 +314,7 @@
static inline phys_addr_t
    virt_to_phys_or_null_size(void *va, unsigned long size)
    {
-        bool bad_size;
+        phys_addr_t pa;

        if (!va)
            return 0;
@@ -317,16 +322,13 @@
        if (virt_addr_valid(va))
            return virt_to_phys(va);

        /*
-         * A fully aligned variable on the stack is guaranteed not to
-         * cross a page bounary. Try to catch strings on the stack by
-         * checking that 'size' is a power of two.
-        */
        }
-bad_size = size > PAGE_SIZE || !is_power_of_2(size);
+pa = slow_virt_to_phys(va);

-WARN_ON(!IS_ALIGNED((unsigned long)va, size) || bad_size);
+/* check if the object crosses a page boundary */
+if (WARN_ON((pa ^ (pa + size - 1)) & PAGE_MASK))
+return 0;

-return slow_virt_to_phys(va);
+return pa;
}

#define virt_to_phys_or_null(addr)
@@ -395,11 +397,12 @@
return 0;

page = alloc_page(GFP_KERNEL|__GFP_DMA32);
-if (!page)
-panic("Unable to allocate EFI runtime stack < 4GB\n");
+if (!page) {
+  pr_err("Unable to allocate EFI runtime stack < 4GB\n");
+  return 1;
+}

-efi_scratch.phys_stack = virt_to_phys(page_address(page));
-efi_scratch.phys_stack += PAGE_SIZE; /* stack grows down */
+efi_scratch.phys_stack = page_to_phys(page + 1); /* stack grows down */

 npages = (_etext - _text) >> PAGE_SHIFT;
 text = __pa(_text);
 @@ -423,7 +426,7 @@
 if (!(md->attribute & EFI_MEMORY_WB))
   flags |= _PAGE_PCD;

-  if (sev_active())
-    if (sev_active() && md->type != EFI_MEMORY_MAPPED_IO)
-    flags |= _PAGE_ENC;

 pfn = md->phys_addr >> PAGE_SHIFT;
@@ -771,18 +774,25 @@
 efi_thunk_get_variable(efi_char16_t *name, efi_guid_t *vendor,
   u32 *attr, unsigned long *data_size, void *data)
 {
+  u8 buf[24] __aligned(8);
+  efi_guid_t *vnd = PTR_ALIGN((efi_guid_t *)buf, sizeof(*vnd));
  efi_status_t status;
  u32 phys_name, phys_vendor, phys_attr;
  u32 phys_data_size, phys_data;
+*vnd = *vendor;
+
phys_data_size = virt_to_phys_or_null(data_size);
-phys_vendor = virt_to_phys_or_null(vendor);
+phys_vendor = virt_to_phys_or_null(vnd);
phys_name = virt_to_phys_or_null_size(name, efi_name_size(name));
phys_attr = virt_to_phys_or_null(attr);
phys_data = virt_to_phys_or_null_size(data, *data_size);
-
-status = efi_thunk(get_variable, phys_name, phys_vendor,
   -phys_attr, phys_data_size, phys_data);
+if (!phys_name || (data && !phys_data))
+status = EFI_INVALID_PARAMETER;
+else
+status = efi_thunk(get_variable, phys_name, phys_vendor,
   +phys_attr, phys_data_size, phys_data);
return status;
}
@@ -791,16 +801,22 @@
ifiei_thunk_set_variable(efi_char16_t *name, efi_guid_t *vendor,
   u32 attr, unsigned long data_size, void *data)
{
  +u8 buf[24] __aligned(8);
+efi_guid_t *vnd = PTR_ALIGN((efi_guid_t *)buf, sizeof(*vnd));
u32 phys_name, phys_vendor, phys_data;
 efisatus_t status;

+*vnd = *vendor;
+
phys_name = virt_to_phys_or_null_size(name, efi_name_size(name));
-phys_vendor = virt_to_phys_or_null(vendor);
+phys_vendor = virt_to_phys_or_null(vnd);
phys_data = virt_to_phys_or_null_size(data, data_size);
-
/* If data_size is > sizeof(u32) we've got problems */
-status = efi_thunk(set_variable, phys_name, phys_vendor,
   -attr, data_size, phys_data);
+if (!phys_name || (data && !phys_data))
+status = EFI_INVALID_PARAMETER;
+else
+status = efi_thunk(set_variable, phys_name, phys_vendor,
   +attr, data_size, phys_data);

return status;
}
@@ -810,16 +826,24 @@
efi_char16_t *name,
  efi_guid_t *vendor)
{
  u8 buf[24] __aligned(8);
  efi_guid_t *vnd = PTR_ALIGN((efi_guid_t *)buf, sizeof(*vnd));
  efi_status_t status;
  u32 phys_name_size, phys_name, phys_vendor;

  *vnd = *vendor;
  
  phys_name_size = virt_to_phys_or_null(name_size);
  -phys_vendor = virt_to_phys_or_null(vendor);
  +phys_vendor = virt_to_phys_or_null(vnd);
  phys_name = virt_to_phys_or_null_size(name, *name_size);

  -status = efi_thunk(get_next_variable, phys_name_size,
    -  phys_name, phys_vendor);
  +if (!phys_name)
    +status = EFI_INVALID_PARAMETER;
  +else
    +status = efi_thunk(get_next_variable, phys_name_size,
      + phys_name, phys_vendor);

  +*vendor = *vnd;

  return status;
}
*/
+ANNOTATE_RETPOLINE_SAFE /* FRBS */
jmp*%ecx
2:
@@ -96,6 +99,7 @@ adding EIP with PAGE_OFFSET.
*/
mov$1f, %edx
+ANNOTATE_RETPOLINE_SAFE /* FRBS */
jmp*%edx
1:

--- linux-4.15.0.orig/arch/x86/platform/efi/efi_stub_64.S
+++ linux-4.15.0/arch/x86/platform/efi/efi_stub_64.S
@@ -12,6 +12,7 @@
#include <asm/msr.h>
#include <asm/processor-flags.h>
#include <asm/page_types.h>
+include <asm/nospec-branch.h>
#define SAVE_XMM			#
 mov %rsp, %rax;			#
@@ -50,6 +51,7 @@
mov %r8, %r9
mov %rcx, %r8
mov %rsi, %rcx
+ANNOTATE_RETPOLINE_SAFE /* FRBS */
call *%rdi
addq $48, %rsp
RESTORE_XMM
--- linux-4.15.0.orig/arch/x86/platform/efi/efi_thunk_64.S
+++ linux-4.15.0/arch/x86/platform/efi/efi_thunk_64.S
@@ -22,6 +22,7 @@
#include <linux/linkage.h>
#include <asm/page_types.h>
#include <asm/segment.h>
+include <asm/nospec-branch.h>
.text
.code64
@@ -54,6 +55,7 @@
leaq __efi64_thunk(%rip), %rbx
subq %rax, %rbx
+ANNOTATE_RETPOLINE_SAFE /* FRBS */
call*%rbx
movq efi_saved_sp(%rip), %rsp
@@ -135,6 +137,7 @@
    movl %eax, %es
    movl %eax, %ss
+
    ANNOTATE_RETPOLINE_SAFE /* FRBS */
call*%edi

/* We must preserve return value */
--- linux-4.15.0.orig/arch/x86/platform/efi/quirks.c
+++ linux-4.15.0/arch/x86/platform/efi/quirks.c
@@ -257,10 +257,6 @@
     return;
 }

-/* No need to reserve regions that will never be freed. */
-if (md.attribute & EFI_MEMORY_RUNTIME)
-    return;
-
 size += addr % EFI_PAGE_SIZE;
 size = round_up(size, EFI_PAGE_SIZE);
 addr = round_down(addr, EFI_PAGE_SIZE);
@@ -290,6 +286,8 @@
     e820__range_update(addr, size, E820_TYPE_RAM, E820_TYPE_RESERVED);
     e820__update_table(e820_table);
 }

/*
--- linux-4.15.0.orig/arch/x86/platform/intel-mid/device_libs/platform_bt.c
+++ linux-4.15.0/arch/x86/platform/intel-mid/device_libs/platform_bt.c
@@ -68,7 +68,7 @@
 { X86_VENDOR_INTEL, 6, model, X86_FEATURE_ANY, (kernel_ulong_t)&ddata }
 
 static const struct x86_cpu_id bt_sfi_cpu_ids[] = {
-    ICPU(INTEL_FAM6_ATOM_MERRIFIELD, tng_bt_sfi_data),
+    ICPU(INTEL_FAM6_ATOM_SILVERMONT_MID, tng_bt_sfi_data),
    {};

--- linux-4.15.0.orig/arch/x86/platform/intel-mid/device_libs/platform_mrfld_wdt.c
+++ linux-4.15.0/arch/x86/platform/intel-mid/device_libs/platform_mrfld_wdt.c
@@ -18,6 +18,7 @@
 #include <asm/intel-mid.h>
 #include <asm/intel_scu_ipc.h>
 #include <asm/io_apic.h>

+#include <asm/hw_irq.h>

#define TANGIER_EXT_TIMER0_MSI 12

--- linux-4.15.0.orig/arch/x86/platform/intel-mid/intel-mid.c
+++ linux-4.15.0/arch/x86/platform/intel-mid/intel-mid.c
@@ -79,7 +79,7 @@
 static void intel_mid_reboot(void)
 {
- intel_scu_ipc_simple_command(IPCMSG_COLD_BOOT, 0);
+ intel_scu_ipc_simple_command(IPCMSG_COLD_RESET, 0);
 }

 static unsigned long __init intel_mid_calibrate_tsc(void)
--- linux-4.15.0.orig/arch/x86/platform/olpc/olpc-xo1-rtc.c
+++ linux-4.15.0/arch/x86/platform/olpc/olpc-xo1-rtc.c
@@ -16,6 +16,7 @@
#include <asm/msr.h>
#include <asm/olpc.h>
+#include <asm/x86_init.h>
static void rtc_wake_on(struct device *dev)
{
@@ -75,6 +76,8 @@
 if (r)
 return r;
+ x86_platform.legacy.rtc = 0;
+ device_init_wakeup(&xo1_rtc_device.dev, 1);
 return 0;
 }
--- linux-4.15.0.orig/arch/x86/platform/uv/bios_uv.c
+++ linux-4.15.0/arch/x86/platform/uv/bios_uv.c
@@ -29,7 +29,8 @@
 struct uv_systab *uv_systab;
 -s64 uv_bios_call(enum uv_bios_cmd which, u64 a1, u64 a2, u64 a3, u64 a4, u64 a5)
 +static s64 __uv_bios_call(enum uv_bios_cmd which, u64 a1, u64 a2, u64 a3,
 +u64 a4, u64 a5)
 { 
 struct uv_systab *tab = uv_systab;
 s64 ret;
 @@ -51,6 +52,19 @@

return ret;
+
+s64 uv_bios_call(enum uv_bios_cmd which, u64 a1, u64 a2, u64 a3, u64 a4, u64 a5)
+{
+s64 ret;
+
+if (down_interruptible(&__efi_uv_runtime_lock))
+return BIOS_STATUS_ABORT;
+
+ret = __uv_bios_call(which, a1, a2, a3, a4, a5);
+up(&__efi_uv_runtime_lock);
+
+return ret;
+
EXPORT_SYMBOL_GPL(uv_bios_call);

s64 uv_bios_call_irqsave(enum uv_bios_cmd which, u64 a1, u64 a2, u64 a3,
@@ -59,10 +73,15 @@
unsigned long bios_flags;
s64 ret;
+
+if (down_interruptible(&__efi_uv_runtime_lock))
+return BIOS_STATUS_ABORT;
+
+local_irq_save(bios_flags);
-ret = uv_bios_call(which, a1, a2, a3, a4, a5);
+ret = __uv_bios_call(which, a1, a2, a3, a4, a5);
local_irq_restore(bios_flags);
+
+up(&__efi_uv_runtime_lock);
+
return ret;
+
--- linux-4.15.0.orig/arch/x86/platform/uv/tlb_uv.c
+++ linux-4.15.0/arch/x86/platform/uv/tlb_uv.c
@@ -299,7 +299,7 @@
local_flush_tlb();
stat->d_alltlb++;
} else {
-__flush_tlb_single(msg->address);
+__flush_tlb_one_user(msg->address);
stat->d_onetlb++;
}
stat->d_requestee++;
@@ -1285,6 +1285,7 @@
struct msg_desc msgdesc;
ack_APIC_irq();
+kvm_set_cpu_l1tf_flush_l1d();
time_start = get_cycles();

bcp = &per_cpu(bau_control, smp_processor_id());
@@ -2254,8 +2255,6 @@
init_uvhub(uvhub, vector, uv_base_pnode);
}
-alloc_intr_gate(vector, uv_bau_message_intr1);
-
for_each_possible_blade(uvhub) {
if (uv_blade_nr_possible_cpus(uvhub)) {
unsigned long val;
--- linux-4.15.0.orig/arch/x86/platform/uv/uv_irq.c
+++ linux-4.15.0/arch/x86/platform/uv/uv_irq.c
@@ -47,11 +47,6 @@
static void uv_noop(struct irq_data *data) { }

static void uv_ack_apic(struct irq_data *data)
-{
-ack_APIC_irq();
-}
-
static int
uv_set_irq_affinity(struct irq_data *data, const struct cpumask *mask,
bool force)
@@ -73,7 +68,7 @@
.name = "UV-CORE",
.irq_mask = uv_noop,
.irq_unmask = uv_noop,
- .irq_eoi = uv_ack_apic,
+ .irq_eoi = apic_ack_irq,
.irq_set_affinity = uv_set_irq_affinity,
};

@@ -172,9 +167,10 @@
go.to out;

uv_domain = irq_domain_create_tree(fn, &uv_domain_ops, NULL);
-irq_domain_free_fwnode(fn);
if (uv_domain)
uv_domain->parent = x86_vector_domain;
+else
+irq_domain_free_fwnode(fn);
out:
mutex_unlock(&uv_lock);

--- linux-4.15.0.orig/arch/x86/power/cpu.c
+++ linux-4.15.0/arch/x86/power/cpu.c
@@ -13,6 +13,7 @@
 #include <linux/smp.h>
 #include <linux/perf_event.h>
 #include <linux/tboot.h>
+#include <linux/dmi.h>
 #include <asm/pgtable.h>
 #include <asm/proto.h>
@@ -24,7 +25,7 @@
 #include <asm/debugreg.h>
 #include <asm/cpu.h>
 #include <asm/mmu_context.h>
-#include <linux/dmi.h>
+#include <asm/cpu_device_id.h>
 #ifdef CONFIG_X86_32
 __visible unsigned long saved_context_ebx;
@@ -299,7 +300,17 @@
 * address in its instruction pointer may not be possible to resolve
 * any more at that point (the page tables used by it previously may
 * have been overwritten by hibernate image data).
- */
+ *
+ * First, make sure that we wake up all the potentially disabled SMT
+ * threads which have been initially brought up and then put into
+ * mwait/cpuidle sleep.
+ * Those will be put to proper (not interfering with hibernation
+ * resume) sleep afterwards, and the resumed kernel will decide itself
+ * what to do with them.
+ */
+ret = cpuhp_smt_enable();
+if (ret)
+return ret;
+return ret;
 smp_ops.play_dead = resume_play_dead;
 ret = disable_nonboot_cpus();
smp_ops.play_dead = play_dead;
@@ -388,15 +399,14 @@
core_initcall(bsp_pm_check_init);

-static int msr_init_context(const u32 *msr_id, const int total_num)
+static int msr_build_context(const u32 *msr_id, const int num)
 { 
- int i = 0;

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struct saved_msrs *saved_msrs = &saved_context.saved_msrs;
struct saved_msr *msr_array;

int total_num;
int i, j;

if (saved_context.saved_msrs.array || saved_context.saved_msrs.num > 0) {
    pr_err("x86/pm: MSR quirk already applied, please check your DMI match table.
    return -EINVAL;
}

if (!msr_array) {
    return -ENOMEM;
}

for (i = 0; i < total_num; i++) {
    msr_array[i].info.msr_no = msr_id[i];
    if (saved_msrs->array) {
        /*
        * Multiple callbacks can invoke this function, so copy any
        * MSR save requests from previous invocations.
        */
        memcpy(msr_array, saved_msrs->array,
                sizeof(struct saved_msr) * saved_msrs->num);
        kfree(saved_msrs->array);
    }
    for (i = saved_msrs->num, j = 0; i < total_num; i++, j++) {
        msr_array[i].info.msr_no = msr_id[j];
        msr_array[i].valid = false;
        msr_array[i].info.reg.q = 0;
    }
   (saved_context.saved_msrs.num = total_num;
    saved_context.saved_msrs.array = msr_array;
    saved_msrs->num = total_num;
    saved_msrs->array = msr_array;

    return 0;
}

/*
 * The following section is a quirk framework for problematic BIOSen:
 */
/* The following sections are a quirk framework for problematic BIOSen:
 * Sometimes MSRs are modified by the BIOSen after suspended to
 * RAM, this might cause unexpected behavior after wakeup.
Thus we save/restore these specified MSRs across suspend/resume

```c
u32 bdw_msr_id[] = { MSR_IA32_THERM_CONTROL }; 
```

```c
pr_info("x86/pm: %s detected, MSR saving is needed during suspending.\n", d->ident);
```

```c
{return msr_init_context(bdw_msr_id, ARRAY_SIZE(bdw_msr_id));
```

```c
+return msr_build_context(bdw_msr_id, ARRAY_SIZE(bdw_msr_id));
```

```c
static const struct dmi_system_id msr_save_dmi_table[] = {
```
```c
+
```
```c
+static int msr_save_cpuid_features(const struct x86_cpu_id *c)
+{
+    u32 cpuid_msr_id[] = {
+        MSR_AMD64_CPUID_FN_1,
+    };
+    pr_info("x86/pm: family %#hx cpu detected, MSR saving is needed during suspending.\n", c->family);
+    return msr_build_context(cpuid_msr_id, ARRAY_SIZE(cpuid_msr_id));
+}
+
+static const struct x86_cpu_id msr_save_cpu_table[] = {
+    {
+        .vendor = X86_VENDOR_AMD,
+        .family = 0x15,
+        .model = X86_MODEL_ANY,
+        .feature = X86_FEATURE_ANY,
+        .driver_data = (kernel_ulong_t)msr_save_cpuid_features,
+    },
+    {
+        .vendor = X86_VENDOR_AMD,
+        .family = 0x16,
+        .model = X86_MODEL_ANY,
+        .feature = X86_FEATURE_ANY,
+        .driver_data = (kernel_ulong_t)msr_save_cpuid_features,
+    },
+    {}
+};
```
```c
+typedef int (*pm_cpu_match_t)(const struct x86_cpu_id *);
+static int pm_cpu_check(const struct x86_cpu_id *c)
```
int ret = 0;

m = x86_match_cpu(msr_save_cpu_table);
if (m) {
  pm_cpu_match_t fn;
  fn = (pm_cpu_match_t)m->driver_data;
  ret = fn(m);
}
return ret;

static int pm_check_save_msr(void)
{
  dmi_check_system(msr_save_dmi_table);
  pm_cpu_check(msr_save_cpu_table);
  return 0;
}

--- linux-4.15.0.orig/arch/x86/power/hibernate_32.c
+++ linux-4.15.0/arch/x86/power/hibernate_32.c
@@ -145,7 +145,7 @@
     #endif

-int swsusp_arch_resume(void)
+asmlinkage int swsusp_arch_resume(void)
{
  int error;

--- linux-4.15.0.orig/arch/x86/power/hibernate_64.c
+++ linux-4.15.0/arch/x86/power/hibernate_64.c
@@ -13,6 +13,7 @@
 #include <linux/suspend.h>
 #include <linux/scatterlist.h>
 #include <linux/kdebug.h>
+#include <linux/cpu.h>

 #include <crypto/hash.h>

@@ -51,6 +52,12 @@
 pmd_t *pmd;
pud_t *pud;
p4d_t *p4d;
+pgprot_t pgtable_prot = __pgprot(_KERNPG_TABLE);
+pgprot_t pmd_text_prot = __pgprot(__PAGE_KERNEL_LARGE_EXEC);
/* Filter out unsupported __PAGE_KERNEL* bits: */
+pgprot_val(pmd_text_prot) &= __default_kernel_pte_mask;
+pgprot_val(pgtable_prot) &= __default_kernel_pte_mask;

/* The new mapping only has to cover the page containing the image */
@@ -81,15 +88,19 @@
return -ENOMEM;
+set_pmd(pmd + pmd_index(restore_jump_address),
+-pmd((jump_address_phys & PMD_MASK) | __PAGE_KERNEL_LARGE_EXEC));
+set_pud(pud + pud_index(restore_jump_address),
+-pud(__pa(pmd) | _KERNPG_TABLE));
+set_pgd(pgd + pgd_index(restore_jump_address),
+-pgd(__pa(pud) | pgprot_val(pgtable_prot)));
if (IS_ENABLED(CONFIG_X86_5LEVEL)) {
  -set_p4d(p4d + p4d_index(restore_jump_address), __p4d(__pa(pud) | _KERNPG_TABLE));
  -set_pg4d(pg4d + pg4d_index(restore_jump_address), __pg4d(p4d) | _KERNPG_TABLE));
+pg4d_t new_p4d = __p4d(__pa(pud) | pgprot_val(pgtable_prot));
+pgd_t new_pgd = __pgd(__pa(p4d) | pgprot_val(pgtable_prot));
+
+set_p4d(p4d + p4d_index(restore_jump_address), new_p4d);
+set_pg4d(pgd + pgd_index(restore_jump_address), new_pgd);
} else {
/* No p4d for 4-level paging: point the pgd to the pud page table */
- set_pg4d(pgd + pgd_index(restore_jump_address), __pg4d(__pa(pud) | _KERNPG_TABLE));
- set_pgd(pgd + pgd_index(restore_jump_address), __pgd(__pa(p4d) | _KERNPG_TABLE));
+pgd_t new_pgd = __pgd(__pa(p4d) | pgprot_val(pgtable_prot));
+set_pgd(pgd + pgd_index(restore_jump_address), new_pgd);
}
return 0;
@@ -174,7 +185,7 @@
return 0;
}

-int swsusp_arch_resume(void)
-asmlinkage int swsusp_arch_resume(void)
{
  int error;
  @@ -249,9 +260,9 @@
return ret;
}

-static void hibernation_e820_save(void *buf)
-static int hibernation_e820_save(void *buf)
{
static bool hibernation_e820_mismatch(void *buf) {
    return memcmp(result, buf, MD5_DIGEST_SIZE) ? true : false;
} #else
static void hibernation_e820_save(void *buf) {
    return 0;
}
#endif

rdr->magic = RESTORE_MAGIC;

- hibernation_e820_save(rdr->e820_digest);
- return 0;
+ return hibernation_e820_save(rdr->e820_digest);
}

/**
@@ -347,3 +357,35 @@
*/
@@ -347,3 +357,35 @@

return 0;
}
+
+int arch_resume_nosmt(void)
+{
+    int ret = 0;
+    /*
+     * We reached this while coming out of hibernation. This means
+     * that SMT siblings are sleeping in hlt, as mwait is not safe
+     * against control transition during resume (see comment in
+     * hibernate_resume_nonboot_cpu_disable()).
+     *
+     * If the resumed kernel has SMT disabled, we have to take all the
+     * SMT siblings out of hlt, and offline them again so that they
+     * end up in mwait proper.
+     *
+     * Called with hotplug disabled.
+     */
+    +cpu_hotplug_enable();
if (cpu_smt_control == CPU_SMT_DISABLED ||
cpu_smt_control == CPU_SMT_FORCE_DISABLED) {
enum cpuhp_smt_control old = cpu_smt_control;
+
+ret = cpuhp_smt_enable();
+if (ret)
+goto out;
+ret = cpuhp_smt_disable(old);
+if (ret)
+goto out;
+
+out:
+cpu_hotplug_disable();
+return ret;
+
ENTRY(swsusp_arch_suspend)
movq$saved_context, %rax
@@ -67,6 +68,7 @@
/* jump to relocated restore code */
movqrelocated_restore_code(%rip), %rcx
+ANNOTATE_RETPOLINE_SAFE
jmpq*%rcx

/* code below has been relocated to a safe page */
@@ -97,6 +99,7 @@
.Ldone:
/* jump to the restore_registers address from the image header */
+ANNOTATE_RETPOLINE_SAFE
jmpq*%r8

/* code below belongs to the image kernel */
--- linux-4.15.0.orig/arch/x86/purgatory/Makefile
+++ linux-4.15.0/arch/x86/purgatory/Makefile
@@ -6,19 +6,52 @@
targets += $(purgatory-y)
PURGATORY_OBJS = $(addprefix $(obj)/,$(purgatory-y))
+
+$ (obj)/string.o: $(srctree)/arch/x86/boot/compressed/string.c FORCE
+$\text{(call if\_changed\_rule,cc\_o\_c)}$
+
LDFLAGS_purgatory.ro := -e purgatory\_start \-r --no-undefined -nostdlib -z nodefaultlib

targets += purgatory.ro

+# Sanitizer, etc. runtimes are unavailable and cannot be linked here.
+GCOV\_PROFILE:= n
KASAN\_SANITIZE:= n
+UBSAN\_SANITIZE:= n
KCOV\_INSTRUMENT := n

+# These are adjustments to the compiler flags used for objects that
# make up the standalone purgatory.ro
+
+PURGATORY\_CFLAGS\_REMOVE := -mcm=kernel
+PURGATORY\_CFLAGS := -mcm=large -ffreestanding \-fno-zero-initialized-in-bss
+PURGATORY\_CFLAGS += $(DISABLE\_STACK\_LEAK\_PLUGIN) -DDISABLE\_BRANCH\_PROFILING
+
# Default KBUILD\_CFLAGS can have -pg option set when FTRACE is enabled. That
# in turn leaves some undefined symbols like ___fentry___ in purgatory and not
# sure how to relocate those. Like kexec\_tools, use custom flags.
+# sure how to relocate those.
+ifdef CONFIG\_FUNCTION\_TRACER
+PURGATORY\_CFLAGS\_REMOVE+= $(CC\_FLAGS\_TRACE)
+endif
+
+ifdef CONFIG\_CC\_STACK\_PROTECTOR
+PURGATORY\_CFLAGS\_REMOVE+= -fstack-protector
+endif
+
+ifdef CONFIG\_CC\_STACK\_PROTECTOR\_STRONG
+PURGATORY\_CFLAGS\_REMOVE+= -fstack-protector-strong
+endif
+
+ifdef CONFIG\_RETPOLINE
+PURGATORY\_CFLAGS\_REMOVE+= $(RETPOLINE\_CFLAGS)
+endif
+
+CFLAGS\_REMOVE\_purgatory.o += $(PURGATORY\_CFLAGS\_REMOVE)
+CFLAGS\_purgatory.o += $(PURGATORY\_CFLAGS)
+
+CFLAGS\_REMOVE\_sha256.o += $(PURGATORY\_CFLAGS\_REMOVE)
+CFLAGS\_sha256.o += $(PURGATORY\_CFLAGS)

-KBUILD\_CFLAGS := -fno-strict-aliasing -Wall -Wstrict-prototypes -fno-zero-initialized-in-bss -fno-builtin -ffreestanding \-c \-MD \-Os \-mcm=large
-KBUILD\_CFLAGS += -m$(BITS)
-KBUILD\_CFLAGS += $(call cc\_option,-fno\_PIE)
+CFLAGS_REMOVE_string.o += $(PURGATORY_CFLAGS_REMOVE)
+CFLAGS_string.o += $(PURGATORY_CFLAGS)

$(obj)/purgatory.ro: $(PURGATORY_OBJS) FORCE
$(call if_changed,ld)
--- linux-4.15.0.orig/arch/x86/purgatory/purgatory.c
+++ linux-4.15.0/arch/x86/purgatory/purgatory.c
@@ -70,3 +70,9 @@
    }
    copy_backup_region();
    
+/*
+ * Defined in order to reuse memcpy() and memset() from
+ * arch/x86/boot/compressed/string.c
+ */
+void warn(const char *msg) {}
--- linux-4.15.0.orig/arch/x86/realmode/init.c
+++ linux-4.15.0/arch/x86/realmode/init.c
@@ -20,8 +20,6 @@
    void *base = __va(mem);

    real_mode_header = (struct real_mode_header *) base;
    -printk(KERN_DEBUG "Base memory trampoline at [%p] %llx size %zu\n",
    -    base, (unsigned long long)mem, size);
    }

void __init reserve_real_mode(void)
--- linux-4.15.0.orig/arch/x86/realmode/rm/Makefile
+++ linux-4.15.0/arch/x86/realmode/rm/Makefile
@@ -47,7 +47,7 @@
 targets += realmode.lds
 $(obj)/realmode.lds: $(obj)/pasyms.h

-LDFLAGS_realmode.elf := --emit-relocs -T
+LDFLAGS_realmode.elf := -m elf_i386 --emit-relocs -T
 CPPFLAGS_realmode.lds += -P -C -I$(objtree)/$(obj)

targets += realmode.elf
--- linux-4.15.0.orig/arch/x86/realmode/rm/trampoline_32.S
+++ linux-4.15.0/arch/x86/realmode/rm/trampoline_32.S
@@ -23,6 +23,7 @@
 #include <asm/linkage.h>
 #include <asm/segment.h>
 #include <asm/page_types.h>
+#include <asm/nospec-branch.h>
 #include "realmode.h"
.text
@@ -61,6 +62,7 @@
.section ".text32","ax"
.code32
ENTRY(startup_32)# note: also used from wakeup_asm.S
+ANNOTATE_RETPOLINE_SAFE
jmp*%eax

.bss
--- linux-4.15.0.orig/arch/x86/realmode/rm/trampoline_64.S
+++ linux-4.15.0/arch/x86/realmode/rm/trampoline_64.S
@@ -102,7 +102,7 @@
 * don't we'll eventually crash trying to execute encrypted
 * instructions.
 */
-bt$TH_FLAGS_SME_ACTIVE_BIT, pa_tr_flags
+bt$l$TH_FLAGS_SME_ACTIVE_BIT, pa_tr_flags
jnc.Ldone
movl$MSR_K8_SYSCFG, %ecx
rdmsr
--- linux-4.15.0.orig/arch/x86/tools/chkobjdump.awk
+++ linux-4.15.0/arch/x86/tools/chkobjdump.awk
@@ -10,6 +10,7 @@
/^GNU objdump/ { 
verstr = ""
+gsub(\(.*\)/, ",");
for (i = 3; i <= NF; i++)
if (match($i, "^[0-9]\")) {
verstr = $i;
--- linux-4.15.0.orig/arch/x86/tools/gen-insn-attr-x86.awk
+++ linux-4.15.0/arch/x86/tools/gen-insn-attr-x86.awk
@@ -257,7 +257,7 @@
return add_flags(imm, mod)
}
-lprefix1_expr = "\((66|!F3)\)"
-lprefix2_expr = "\(F3\)"
-lprefix3_expr = "\((F2|!F3|66&F2)\)"
+lprefix1_expr = "\((66|F3)\)"
+lprefix2_expr = "\(F3\)"
+lprefix3_expr = "\((F2|!F3|66&F2)\)"
lprefix_expr = "\((66|F2|F3)\)"
max_lprefix = 4

@@ -257,7 +257,7 @@
return add_flags(imm, mod)
}
-/*[0-9a-f]+/ { 
+/*[0-9a-f]+/ { 
if (NR == 1)
next
# get index
--- linux-4.15.0.org/arch/x86/tools/relocs.c
+++ linux-4.15.0/arch/x86/tools/relocs.c
@@ -67,6 +67,7 @@
"__tracedata_(start|end)"
"__(start|stop)_notes"
"__end_rodata"
+"__end_rodata_aligned"
"__initramfs_start"
"(jiffies|jiffies_64)"
#if ELF_BITS == 64
@@ -770,9 +771,12 @@
break;

case R_X86_64_PC32:
+case R_X86_64_PLT32:
/*
 * PC relative relocations don't need to be adjusted unless
 * referencing a percpu symbol.
 + *
 + * NB: R_X86_64_PLT32 can be treated as R_X86_64_PC32.
 */
if (is_percpu_sym(sym, symname))
add_reloc(&relocs32neg, offset);
@@ -837,9 +841,11 @@
break;
@@ -880,9 +886,11 @@
case R_386_PC32:
+case R_386_PC16:
+case R_386_PC8:
+case R_386_PLT32:
/*
 - * NONE can be ignored and PC relative relocations don't
 - * need to be adjusted.
 + * NONE can be ignored and PC relative relocations don't need
 + * to be adjusted. Because sym must be defined, R_386_PLT32 can
 + * be treated the same way as R_386_PC32.
 */
break;
@@ -880,9 +886,11 @@
case R_386_PC32:
+case R_386_PC16:
+case R_386_PC8:
+case R_386_PLT32:
/*
 - * NONE can be ignored and PC relative relocations don't
 - * need to be adjusted.
 + * NONE can be ignored and PC relative relocations don't need

+ * to be adjusted. Because sym must be defined, R_386_PLT32 can
+ * be treated the same way as R_386_PC32.
+ */

break;

--- linux-4.15.0.orig/arch/x86/um/shared/sysdep/ptrace_32.h
+++ linux-4.15.0/arch/x86/um/shared/sysdep/ptrace_32.h
@@ -10,20 +10,10 @@
static inline void update_debugregs(int seq) { }

/* syscall emulation path in ptrace */
-
-#ifndef PTRACE_SYSEMU
-#define PTRACE_SYSEMU 31
-#endif
-
void set_using_sysemu(int value);
int get_using_sysemu(void);
extern int sysemu_supported;

-#ifndef PTRACE_SYSEMU_SINGLESTEP
-#define PTRACE_SYSEMU_SINGLESTEP 32
-#endif
-
#define UPT_SYSCALL_ARG1(r) UPT_BX(r)
#define UPT_SYSCALL_ARG2(r) UPT_CX(r)
#define UPT_SYSCALL_ARG3(r) UPT_DX(r)
--- linux-4.15.0.orig/arch/x86/um/stub_segv.c
+++ linux-4.15.0/arch/x86/um/stub_segv.c
@@ -6,11 +6,12 @@
#include <sysdep/stub.h>
#include <sysdep/faultinfo.h>
#include <sysdep/mcontext.h>
+#include <sys/ucontext.h>

void __attribute__((__section__ ("__syscall_stub")))
stub_segv_handler(int sig, siginfo_t *info, void *p)
{
-struct ucontext *uc = p;
+ucontext_t *uc = p;

GET_FAULTINFO_FROM_MC(*((struct faultinfo *) STUB_DATA),
    &uc->uc_mcontext);
--- linux-4.15.0.orig/arch/x86/xen/apic.c
+++ linux-4.15.0/arch/x86/xen/apic.c
@@ -112,7 +112,7 @@
return xen_pv_domain();
-static int xen_id_always_valid(int apicid)
+static int xen_id_always_valid(u32 apicid)
{
    return 1;
}
--- linux-4.15.0.orig/arch/x86/xen/efi.c
+++ linux-4.15.0/arch/x86/xen/efi.c
@@ -77,7 +77,9 @@
efi.get_variable             = xen_efi_get_variable;
efi.get_next_variable       = xen_efi_get_next_variable;
efi.set_variable            = xen_efi_set_variable;
+efi.set_variable_nonblocking = xen_efi_set_variable;
efi.query_variable_info     = xen_efi_query_variable_info;
+efi.query_variable_info_nonblocking = xen_efi_query_variable_info;
efi.update_capsule          = xen_efi_update_capsule;
efi.query_capsule_caps      = xen_efi_query_capsule_caps;
efi.get_next_high_mono_count = xen_efi_get_next_highモノ_count;
--- linux-4.15.0.orig/arch/x86/xen/enlighten.c
+++ linux-4.15.0/arch/x86/xen/enlighten.c
@@ -3,10 +3,10 @@
 #endif
 #include <linux/cpu.h>
 #include <linux/kexec.h>
 +#include <linux/slab.h>

 #include <xen/features.h>
 #include <xen/page.h>
-#include <xen/interface/memory.h>

 +#include <asm/xen/hypercall.h>
 #include <asm/xen/hypervisor.h>
 @@ -259,19 +259,41 @@
 BUG();
 }

+static int reboot_reason = SHUTDOWN_reboot;
+static bool xen_legacy_crash;
void xen_emergency_restart(void)
{
-xen_reboot(SHUTDOWN_reboot);
+xen_reboot(reboot_reason);
}

 static int
 xen_panic_event(struct notifier_block *this, unsigned long event, void *ptr)
if (!kexec_crash_loaded())
xen_reboot(SHUTDOWN_crash);
+
static int __init parse_xen_legacy_crash(char *arg)
+
return NOTIFY_DONE;
}

static int __init parse_xen_legacy_crash(char *arg)
+
static struct notifier_block xen_panic_block = {
    .notifier_call = xen_panic_event,
    .priority = INT_MIN
}

if (!kexec_crash_loaded())
xen_reboot(SHUTDOWN_crash);
+
+xen_reboot(SHUTDOWN_crash);
+
reboot_reason = SHUTDOWN_crash;
+
/*
  * If panic_timeout==0 then we are supposed to wait forever.
  * However, to preserve original dom0 behavior we have to drop
  * into hypervisor. (domU behavior is controlled by its
  * config file)
  */
+
if (panic_timeout == 0)
+panic_timeout = -1;
+
return NOTIFY_DONE;
}

+static int __init parse_xen_legacy_crash(char *arg)
+
+xen_legacy_crash = true;
+
return 0;
+
+early_param("xen_legacy_crash", parse_xen_legacy_crash);
+
static struct notifier_block xen_panic_block = {
    .notifier_call = xen_panic_event,
    .priority = INT_MIN
}

EXPORT_SYMBOL(xen_arch_unregister_cpu);
#endif

-#ifdef CONFIG_XEN_BALLOON_MEMORY_HOTPLUG
-void __init arch_xen_balloon_init(struct resource *hostmem_resource)
-{ 
-struct xen_memory_map memmap;
-int rc;
-unsigned int i, last_guest_ram;
-phys_addr_t max_addr = PFN_PHYS(max_pfn);
-struct e820_table *xen_e820_table;
-const struct e820_entry *entry;
-struct resource *res;
-
-if (!xen_initial_domain())
-return;
xen_e820_table = kmalloc(sizeof(*xen_e820_table), GFP_KERNEL);
if (!xen_e820_table)
    return;

memmap.nr_entries = ARRAY_SIZE(xen_e820_table->entries);
set_xen_guest_handle(memmap.buffer, xen_e820_table->entries);
rc = HYPERVISOR_memory_op(XENMEM_machine_memory_map, &memmap);
if (rc) {
    pr_warn("%s: Can't read host e820 (%d)\n", __func__, rc);
    goto out;
}

last_guest_ram = 0;
for (i = 0; i < memmap.nr_entries; i++) {
    if (xen_e820_table->entries[i].addr >= max_addr)
        break;
    if (xen_e820_table->entries[i].type == E820_TYPE_RAM)
        last_guest_ram = i;
}

entry = &xen_e820_table->entries[last_guest_ram];
if (max_addr >= entry->addr + entry->size)
    goto out; /* No unallocated host RAM. */

hostmem_resource->start = memmap.buffer;
hostmem_resource->end = hostmem_resource->start + entry->size;

/*
 * Mark non-RAM regions between the end of dom0 RAM and end of host RAM
 * as unavailable. The rest of that region can be used for hotplug-based
 * ballooning.
 */
for (; i < memmap.nr_entries; i++) {
    entry = &xen_e820_table->entries[i];
    if (entry->type == E820_TYPE_RAM)
        continue;
    if (entry->addr >= hostmem_resource->end)
        break;

    res = kzalloc(sizeof(*res), GFP_KERNEL);
    if (!res)
        goto out;
    res->name = "Unavailable host RAM";
    res->start = entry->addr;
- res->end = (entry->addr + entry->size < hostmem_resource->end) ?
  - entry->addr + entry->size : hostmem_resource->end;
- rc = insert_resource(hostmem_resource, res);
- if (rc) {
  - pr_warn("%s: Can't insert [%llx - %llx) (%d)\n",
    - __func__, res->start, res->end, rc);
  - kfree(res);
  - goto out;
  - }
  - }
  - 
  - out:
  - kfree(xen_e820_table);
  - }
#endif /* CONFIG_XEN_BALLOON_MEMORY_HOTPLUG */
--- linux-4.15.0.orig/arch/x86/xen/enlighten_hvm.c
+++ linux-4.15.0/arch/x86/xen/enlighten_hvm.c
@@ -65,6 +65,19 @@
{
  early_memunmap(HYPERVISOR_shared_info, PAGE_SIZE);
  HYPERVISOR_shared_info = __va(PFN_PHYS(shared_info_pfn));
+  /*
+   * The virtual address of the shared_info page has changed, so
+   * the vcpu_info pointer for VCPU 0 is now stale.
+   *
+   * The prepare_boot_cpu callback will re-initialize it via
+   * xen_vcpu_setup, but we can't rely on that to be called for
+   * old Xen versions (xen_have_vector_callback == 0).
+   *
+   * It is, in any case, bad to have a stale vcpu_info pointer
+   * so reset it now.
+   */
+  +xen_vcpu_info_reset(0);
 mp--init_hvm_pv_info(void)
--- linux-4.15.0.orig/arch/x86/xen/enlighten_pv.c
+++ linux-4.15.0/arch/x86/xen/enlighten_pv.c
@@ -598,12 +598,12 @@
 static struct trap_array_entry trap_array[] = {
  { debug,            xen_xendebug,              true },
  -{ int3,            xen_xenint3,              true },
  { double_fault,     xen_double_fault,         true },
#ifdef CONFIG_X86_MCE
  { machine_check,    xen_machine_check,        true },
#endif
{ nmi, xen_xennmi, true },
+{ int3, xen_int3, false },
{ overflow, xen_overflow, false },
#ifdef CONFIG_IA32_EMULATION
{ entry_INT80_compat, xen_entry_INT80_compat, false },
#endif
@@ -721,8 +721,8 @@
preempt_enable();
}

-static void xen_convert_trap_info(const struct desc_ptr *desc,
-struct trap_info *traps)
+static unsigned xen_convert_trap_info(const struct desc_ptr *desc,
+struct trap_info *traps, bool full)
{
    unsigned in, out, count;

    @@ -732,17 +732,18 @@
    for (in = out = 0; in < count; in++) {
        gate_desc *entry = (gate_desc *)(desc->address) + in;

        -if (cvt_gate_to_trap(in, entry, &traps[out]))
        +if (cvt_gate_to_trap(in, entry, &traps[out]) || full)
            out++;
    }
    -traps[out].address = 0;
    +
    +return out;
}

void xen_copy_trap_info(struct trap_info *traps)
{
    const struct desc_ptr *desc = this_cpu_ptr(&idt_desc);

    -xen_convert_trap_info(desc, traps);
    +xen_convert_trap_info(desc, traps, true);
}

/* Load a new IDT into Xen. In principle this can be per-CPU, so we
@@ -752,6 +753,7 @@
{
    static DEFINE_SPINLOCK(lock);
    static struct trap_info traps[257];
    +unsigned out;

    trace_xen_cpu_load_idt(desc);

    @@ -759,7 +761,8 @@
memcpy(this_cpu_ptr(&idt_desc), desc, sizeof(idt_desc));

-xen_convert_trap_info(desc, traps);
+out = xen_convert_trap_info(desc, traps, false);
+memset(&traps[out], 0, sizeof(traps[0]));

xen_mc_flush();
if (HYPervisor_set_trap_table(traps))
@@ -900,10 +903,7 @@
  val = native_read_msr_safe(msr, err);
 switch (msr) {
  case MSR_IA32_APICBASE:
-#ifdef CONFIG_X86_X2APIC
-  if (!(cpuid_ecx(1) & (1 << (X86_FEATURE_X2APIC & 31))))
-#endif
-  val &= ~X2APIC_ENABLE;
+  val &= ~X2APIC_ENABLE;
  break;
 }
 return val;
@@ -912,14 +912,15 @@
 static int xen_write_msr_safe(unsigned int msr, unsigned low, unsigned high)
 {
  int ret;
+  #ifdef CONFIG_X86_64
+    unsigned int which;
+    u64 base;
+  #endif

  ret = 0;

  switch (msr) {
+    #ifdef CONFIG_X86_64
    #undef CONFIG_X86_64
    unsigned which;
    u64 base;
    -
    case MSR_FS_BASE:which = SEGBASE_FS; goto set;
    case MSR_KERNEL_GS_BASE:which = SEGBASE_GS_USER; goto set;
    case MSR_GS_BASE:which = SEGBASE_GS_KERNEL; goto set;
@@ -1216,6 +1217,11 @@
      x86_platform.legacy.rtc = 1;
    }

+static void __init xen_domu_set_legacy_features(void)
+{
+  +x86_platform.legacy.rtc = 0;
+}  

/* First C function to be called on Xen boot */
asmlinkage __visible void __init xen_start_kernel(void)
{
    @@ -1230,16 +1236,25 @@
    xen_setup_features();

    -xen_setup_machphys_mapping();
    -
    /* Install Xen paravirt ops */
    pv_info = xen_info;
    pv_init_ops.patch = paravirt_patch_default;
    pv_cpu_ops = xen_cpu_ops;
    +xen_init_irq_ops();
    +
    +/*
    + * Setup xen_vcpu early because it is needed for
    + * local_irq_disable(), irqs_disabled(), e.g. in printk().
    + *
    + * Don't do the full vcpu_info placement stuff until we have
    + * the cpu_possible_mask and a non-dummy shared_info.
    + */
    +xen_vcpu_info_reset(0);

    x86_platform.get_nmi_reason = xen_get_nmi_reason;

    x86_init.resources.memory_setup = xen_memory_setup;
    +x86_init.irqs.intr_mode_select= x86_init_noop;
    x86_init.irqs.intr_mode_init= x86_init_noop;
    x86_init.oem.arch_setup = xen_arch_setup;
    x86_init.oem.banner = xen_banner;
    @@ -1248,10 +1263,12 @@
    * Set up some pagetable state before starting to set any ptes.
    */

    +xen_setup_machphys_mapping();
    xen_init_mmu_ops();

    /* Prevent unwanted bits from being set in PTEs. */
    __supported_pte_mask &= ~_PAGE_GLOBAL;
    +__default_kernel_pte_mask &= ~_PAGE_GLOBAL;

    /*
    * Prevent page tables from being allocated in highmem, even
    @@ -1259,10 +1276,6 @@
    */
    __userpte_alloc_gfp &= ~__GFP_HIGHMEM;
- /* Work out if we support NX */
- get_cpu_cap(&boot_cpu_data);
- x86_configure_nx();
-
/* Get mfn list */
xen_build_dynamic_phys_to_machine();

@@ -1272,20 +1285,13 @@
*/
xen_setup_gdt(0);

-xen_init_irq_ops();
+/* Work out if we support NX */
+get_cpu_cap(&boot_cpu_data);
+x86_configure_nx();

/* Let's presume PV guests always boot on vCPU with id 0. */
per_cpu(xen_vcpu_id, 0) = 0;

- /*
- * Setup xen_vcpu early because idt_setup_early_handler needs it for
- * local_irq_disable(), irqs_disabled().
- *
- * Don't do the full vcpu_info placement stuff until we have
- * the cpu_possible_mask and a non-dummy shared_info.
- */
- xen_vcpu_info_reset(0);
-
idt_setup_early_handler();

xen_init_capabilities();
@@ -1380,6 +1417,15 @@
add_preferred_console("hvc", 0, NULL);
if (pci_xen)
x86_init.pci.arch_init = pci_xen_init;
+x86_platform.set_legacy_features =
+xen_domu_set_legacy_features;
} else {
 const struct dom0_vga_console_info *info =
 (void *)(char *)(xen_start_info +
@@ -1409,6 +1417,15 @@
x86_init.mpparse.get_smp_config = x86_init_uint_noop;

xen_boot_params_init_edd();
+
+#ifdef CONFIG_ACPI
+/*
+ * Disable selecting "Firmware First mode" for correctable
memory errors, as this is the duty of the hypervisor to
decide.
*/
+acpi_disable_cmcff = 1;
#endif

#ifdef CONFIG_PCI
/* PCI BIOS service won't work from a PV guest. */
--- linux-4.15.0.orig/arch/x86/xen/enlighten_pvh.c
+++ linux-4.15.0/arch/x86/xen/enlighten_pvh.c
@@ -69,7 +69,7 @@
* Version 2.12 supports Xen entry point but we will use default x86/PC
* environment (i.e. hardware_subarch 0).
*/
-pvh_bootparams.hdr.version = 0x212;
+pvh_bootparams.hdr.version = (2 << 8) | 12;
pvh_bootparams.hdr.type_of_loader = (9 << 4) | 0; /* Xen loader */
}

--- linux-4.15.0.orig/arch/x86/xen/irq.c
+++ linux-4.15.0/arch/x86/xen/irq.c
@@ -128,8 +128,6 @@
void __init xen_init_irq_ops(void)
{
-/* For PVH we use default pv_irq_ops settings. */
-if (!xen_feature(XENFEAT_hvm_callback_vector))
-pv_irq_ops = xen_irq_ops;
+pv_irq_ops = xen_irq_ops;
x86_init.irqs.intr_init = xen_init_IRQ;
}

--- linux-4.15.0.orig/arch/x86/xen/mmu.c
+++ linux-4.15.0/arch/x86/xen/mmu.c
@@ -42,13 +42,11 @@
}/
EXPORT_SYMBOL_GPL(arbitrary_virt_to_machine);

-static void xen_flush_tlb_all(void)
+static noinline void xen_flush_tlb_all(void)
{ struct mmuext_op *op;
  struct multicall_space mcs;

  -trace_xen_mmu_flush_tlb_all(0);
  -preempt_disable();

  mcs = xen_mc_entry(sizeof(*op));
if (is_pagetable_dying_supported())
    pv_mmu_ops.exit_mmap = xen_hvm_exit_mmap;
#endif
}
--- linux-4.15.0.orig/arch/x86/xen/mmu_pv.c
+++ linux-4.15.0/arch/x86/xen/mmu_pv.c
@@ -425,14 +425,13 @@
 static void xen_set_pte_atomic(pte_t *ptep, pte_t pte)
 {
     trace_xen_mmu_set_pte_atomic(ptep, pte);
-    set_64bit((u64 *)ptep, native_pte_val(pte));
+    __xen_set_pte(ptep, pte);
 }

 static void xen_pte_clear(struct mm_struct *mm, unsigned long addr, pte_t *ptep)
 {
     trace_xen_mmu_pte_clear(mm, addr, ptep);
-    if (!xen_batched_set_pte(ptep, native_make_pte(0)))
-        native_pte_clear(mm, addr, ptep);
+    __xen_set_pte(ptep, native_make_pte(0));
 }

 static void xen_pmd_clear(pmd_t *pmdp)
 @@ -615,19 +614,20 @@
     unsigned long limit)
 {
-    unsigned hole_low, hole_high;
+    unsigned hole_low = 0, hole_high = 0;
     /* The limit is the last byte to be touched */
     limit--;
     BUG_ON(limit >= FIXADDR_TOP);

+    #ifdef CONFIG_X86_64
+    /*
+     * 64-bit has a great big hole in the middle of the address
+     * space, which contains the Xen mappings. On 32-bit these
+     * will end up making a zero-sized hole and so is a no-op.
+     * space, which contains the Xen mappings.
+     */
+     hole_low = pgd_index(USER_LIMIT);
hole_high = pgd_index(PAGE_OFFSET);
hole_low = pgd_index(GUARD_HOLE_BASE_ADDR);
hole_high = pgd_index(GUARD_HOLE_END_ADDR);
#endif

nr = pgd_index(limit) + 1;
for (i = 0; i < nr; i++) {
    return this_cpu_read(xen_vcpu_info.arch.cr2);
}

static void xen_flush_tlb(void)
+static noinline void xen_flush_tlb(void)
{
    struct mmuext_op *op;
    struct multicall_space mcs;

    -trace_xen_mmu_flush_tlb(0);
    -
    preempt_disable();

    mcs = xen_mc_entry(sizeof(*op));
    @ @ -1300,12 +1298,12 @ @
    preempt_enable();
}

-static void xen_flush_tlb_single(unsigned long addr)
+static void xen_flush_tlb_one_user(unsigned long addr)
{
    struct mmuext_op *op;
    struct multicall_space mcs;

    -trace_xen_mmu_flush_tlb_single(addr);
    +trace_xen_mmu_flush_tlb_one_user(addr);
    preempt_disable();

    @ @ -1543,7 +1541,7 @ @
    pte = __pte_ma(((pte_val_ma(*ptep) & _PAGE_RW) | ~_PAGE_RW) &
        pte_val_ma(pte));
    #endif
    -native_set_pte(ptep, pte);
    +__xen_set_pte(ptep, pte);
}

/* Early in boot, while setting up the initial pagetable, assume */
@@ -1870,7 +1868,7 @@
    init_top_pgt[0] = __pgd(0);
/* Pre-constructed entries are in pfn, so convert to mfn */
-/* L4[272] -> level3_ident_pgt */
+/* L4[273] -> level3_ident_pgt */
/* L4[511] -> level3_kernel_pgt */
convert_pfn_mfn(init_top_pgt);

@@ -1880,7 +1878,7 @@
/* L3_k[511] -> level2_fixmap_pgt */
convert_pfn_mfn(level3_kernel_pgt);

-/* L3_k[511][506] -> level1_fixmap_pgt */
+/* L3_k[511][508-FIXMAP_PMD_NUM ... 507] -> level1_fixmap_pgt */
convert_pfn_mfn(level2_fixmap_pgt);

/* We get [511][511] and have Xen's version of level2_kernel_pgt */
@@ -1890,8 +1888,8 @@
addr[0] = (unsigned long)pgd;
addr[1] = (unsigned long)l3;
addr[2] = (unsigned long)l2;
-/* Graft it onto L4[272][0]. Note that we creating an aliasing problem:
- * Both L4[272][0] and L4[511][510] have entries that point to the same
+/* Graft it onto L4[273][0]. Note that we creating an aliasing problem:
+ * Both L4[273][0] and L4[511][510] have entries that point to the same
 * L2 (PMD) tables. Meaning that if you modify it in __va space
 * it will be also modified in the __ka space! (But if you just
 * modify the PMD table to point to other PTE's or none, then you
@@ -1925,7 +1923,11 @@
set_page_prot(level2_ident_pgt, PAGE_KERNEL_RO);
set_page_prot(level2_kernel_pgt, PAGE_KERNEL_RO);
set_page_prot(level2_fixmap_pgt, PAGE_KERNEL_RO);
-set_page_prot(level1_fixmap_pgt, PAGE_KERNEL_RO);
+
+for (i = 0; i < FIXMAP_PMD_NUM; i++) {
+    set_page_prot(level1_fixmap_pgt + i * PTRS_PER_PTE,
+    PAGE_KERNEL_RO);
+}

/* Pin down new L4 */
pin_pagetable_pfn(MMUEXT_PIN_L4_TABLE,
@@ -2076,10 +2078,10 @@
pt = early_memremap(pt_phys, PAGE_SIZE);
clear_page(pt);
for (idx_pte = 0;
-idx_pte < min(n_pte, PTRS_PER_PTE);
-idx_pte++) {
-    set_pte(pt + idx_pte,
-    pfn_pte(p2m_pfn, PAGE_KERNEL));
idx_pte < min(n_pte, PTRS_PER_PTE);
idx_pte++;

pt[idx_pte] = pfn_pte(p2m_pfn, PAGE_KERNEL);
p2m_pfn++;
}
n_pte -= PTRS_PER_PTE;
make_lowmem_page_readonly(__va(pt_phys));
pin_pagetable_pfn(MMUEXT_PIN_L1_TABLE, PFN_DOWN(pt_phys));

set_pmd(pmd + idx_pt,
__pmd(_PAGE_TABLE | pt_phys));
pt_phys += PAGE_SIZE;
}
n_pt -= PTRS_PER_PMD;
make_lowmem_page_readonly(__va(pmd_phys));
pin_pagetable_pfn(MMUEXT_PIN_L2_TABLE, PFN_DOWN(pmd_phys));

set_pud(pud + idx_pmd, __pud(_PAGE_TABLE | pmd_phys));
pmd_phys += PAGE_SIZE;
}
n_pmd -= PTRS_PER_PUD;

.flush_tlb_user = xen_flush_tlb,
.flush_tlb_kernel = xen_flush_tlb,
.flush_tlb_single = xen_flush_tlb_single,
.flush_tlb_one_user = xen_flush_tlb_one_user,
.flush_tlb_others = xen_flush_tlb_others,

.pgd_alloc = xen_pgd_alloc,

/* Expanded the p2m? */
-if (pfn > xen_p2m_last_pfn) {
exen_p2m_last_pfn = pfn;
+if (pfn >= xen_p2m_last_pfn) {
+xen_p2m_last_pfn = ALIGN(pfn + 1, P2M_PER_PAGE);

HYPERVISOR_shared_info->arch.max_pfn = xen_p2m_last_pfn;
}
int i, ret = 0;
pte_t *pte;

@if (xen_feature(XENFEAT_auto_translated_physmap))
+return 0;
+
@if (kmap_ops)
ret = HYPERVISOR_grant_table_op(GNTTABOP_map_grant_ref, kmap_ops, count);
@

for (i = 0; i < count; i++) {
unsigned long mfn, pfn;
+struct gnttab_unmap_grant_ref unmapped[2];
+int rc;

  /* Do not add to override if the map failed. */
  -if (map_ops[i].status)
  +if (map_ops[i].status != GNTST_okay ||
  +  (kmap_ops && kmap_ops[i].status != GNTST_okay))
    continue;

  if (map_ops[i].flags & GNTMAP_contains_pte) {
    WARN(pfn_to_mfn(pfn) != INVALID_P2M_ENTRY, "page must be ballooned");

    -if (unlikely(!set_phys_to_machine(pfn, FOREIGN_FRAME(mfn)))) {
    +if (likely(set_phys_to_machine(pfn, FOREIGN_FRAME(mfn))))
      +continue;
      +
      +/*
      +  * Signal an error for this slot. This in turn requires
      +  * immediate unmapping.
      +  */
      +map_ops[i].status = GNTST_general_error;
      +unmapped[0].host_addr = map_ops[i].host_addr,
      +unmapped[0].handle = map_ops[i].handle;
      +map_ops[i].handle = ~0;
      +if (map_ops[i].flags & GNTMAP_device_map)
        +unmapped[0].dev_bus_addr = map_ops[i].dev_bus_addr;
      +else
        +unmapped[0].dev_bus_addr = 0;
      +
      +if (kmap_ops) {
+kmap_ops[i].status = GNTST_general_error;
+unmap[1].host_addr = kmap_ops[i].host_addr,
+unmap[1].handle = kmap_ops[i].handle;
+kmap_ops[i].handle = ~0;
+if (kmap_ops[i].flags & GNTMAP_device_map)
+unmap[1].dev_bus_addr = kmap_ops[i].dev_bus_addr;
+else
+unmap[1].dev_bus_addr = 0;
}
+
+/*
+ * Pre-populate both status fields, to be recognizable in
+ * the log message below.
+ */
+unmap[0].status = 1;
+unmap[1].status = 1;
+
+rc = HYPERVISOR_grant_table_op(GNTTABOP_unmap_grant_ref, 
+      unmap, 1 + !!kmap_ops);
+if (rc || unmmap[0].status != GNTST_okay ||
+    unmmap[1].status != GNTST_okay)
+pr_err_once("gnttab unmap failed: rc=%d st0=%d st1=%d\n", 
+    rc, unmmap[0].status, unmmap[1].status);
}

out:
@@ -736,21 +778,22 @@
{ 
int i, ret = 0;

+if (xen_feature(XENFEAT_auto_translated_physmap))
+return 0;
+
+for (i = 0; i < count; i++) {
unsigned long mfn = __pfn_to_mfn(page_to_pfn(pages[i]));
unsigned long pfn = page_to_pfn(pages[i]);

-    if (mfn == INVALID_P2M_ENTRY || !(mfn & FOREIGN_FRAME_BIT)) {
-        if (mfn != INVALID_P2M_ENTRY && (mfn & FOREIGN_FRAME_BIT))
-            set_phys_to_machine(pfn, INVALID_P2M_ENTRY);
-        else
-            ret = -EINVAL;
-        goto out;
-    }
-
-    set_phys_to_machine(pfn, INVALID_P2M_ENTRY);
}
if (kunmap_ops)
ret = HYPERVISOR_grant_table_op(GNTTABOP_unmap_grant_ref,
-kunmap_ops, count);
-out:
+kunmap_ops, count) ?: ret;
+return ret;
}
EXPORT_SYMBOL_GPL(clear_foreign_p2m_mapping);
--- linux-4.15.0.orig/arch/x86/xen/platform-pci-unplug.c
+++ linux-4.15.0/arch/x86/xen/platform-pci-unplug.c
@@ -146,6 +146,10 @@
{
int r;

+/* PVH guests don't have emulated devices. */
+if (xen_pvh_domain())
+return;
+
+/* user explicitly requested no unplug */
+if (xen_emul_unplug & XEN_UNPLUG_NEVER)
+return;
--- linux-4.15.0.orig/arch/x86/xen/pmu.c
+++ linux-4.15.0/arch/x86/xen/pmu.c
@@ -478,7 +478,7 @@
irqreturn_t xen_pmu_irq_handler(int irq, void *dev_id)
{
int err, ret = IRQ_NONE;
-struct pt_regs regs;
+struct pt_regs regs = {0};
const struct xen_pmu_data *xenpmu_data = get_xenpmu_data();
uint8_t xenpmu_flags = get_xenpmu_flags();

--- linux-4.15.0.orig/arch/x86/xen/setup.c
+++ linux-4.15.0/arch/x86/xen/setup.c
@@ -808,6 +808,7 @@
addr = xen_e820_table.entries[i].addr;
size = xen_e820_table.entries[i].size;
while (i < xen_e820_table.nr_entries) {
+bool discard = false;

chunk_size = size;
type = xen_e820_table.entries[i].type;
-@ @ -823,10 +824,11 @@
exen_add_extra_mem(pfn_s, n_pfns);
exen_max_p2m_pfn = pfn_s + n_pfns;
} else
-@ @ -836,8 +836,8 @@
type = E820_TYPE_UNUSABLE;
+discard = true;
xen_align_and_add_e820_region(addr, chunk_size, type);
+if (!discard)
xen_align_and_add_e820_region(addr, chunk_size, type);

addr += chunk_size;
size -= chunk_size;
--- linux-4.15.0.orig/arch/x86/xen/smp.c
+++ linux-4.15.0/arch/x86/xen/smp.c
@@ -122,6 +122,8 @@
if (xen_hvm_domain())
native_smp_cpus_done(max_cpus);
+else
+calculate_max_logical_packages();

if (xen_have_vcpu_info_placement)
return;
--- linux-4.15.0.orig/arch/x86/xen/smp_pv.c
+++ linux-4.15.0/arch/x86/xen/smp_pv.c
@@ -32,6 +32,7 @@
#include <xen/interface/vcpu.h>
#include <xen/interface/xenpmu.h>

+#include <asm/spec-ctrl.h>
#include <asm/xen/interface.h>
#include <asm/xen/hypercall.h>

@@ -70,6 +71,8 @@
cpu_data(cpu).x86_max_cores = 1;
set_cpu_sibling_map(cpu);

+speculative_store_bypass_ht_init();
+
xen_setup_cpu_clockevents();

notify_cpu_starting(cpu);
@@ -86,6 +89,7 @@
{
cpu_bringup();
cpu_startup_entry(CPUHP_AP_ONLINE_IDLE);
+prevent_tail_call_optimization();
}

void xen_smp_intr_free_pv(unsigned int cpu)
@@ -250,6 +254,8 @@
}
set_cpu_sibling_map(0);

+speculative_store_bypass_ht_init();
+
+xen_pmu_init(0);

if (xen_smp_intr_init(0) || xen_smp_intr_init_pv(0))
--- linux-4.15.0.orig/arch/x86/xen/spinlock.c
+++ linux-4.15.0/arch/x86/xen/spinlock.c
@@ -9,6 +9,7 @@
#include <linux/log2.h>
#include <linux/gfp.h>
#include <linux/slab.h>
+#include <linux/atomic.h>

#include <asm/paravirt.h>
#include <asm/qspinlock.h>
@@ -21,6 +22,7 @@
static DEFINE_PER_CPU(int, lock_kicker_irq) = -1;
static DEFINE_PER_CPU(char *, irq_name);
+static DEFINE_PER_CPU(atomic_t, xen_qlock_wait_nest);
static bool xen_pvspin = true;

#include <asm/qspinlock.h>
@@ -42,33 +44,24 @@
static void xen_qlock_wait(u8 *byte, u8 val)
{
    int irq = __this_cpu_read(lock_kicker_irq);
+atomic_t *nest_cnt = this_cpu_ptr(&xen_qlock_wait_nest);

    /* If kicker interrupts not initialized yet, just spin */
    -if (irq == -1)
    +if (irq == -1 || in_nmi())
    return;

    /* clear pending */
    -xen_clear_irq_pending(irq);
    -barrier();
    -
    /*
    - * We check the byte value after clearing pending IRQ to make sure
    - * that we won’t miss a wakeup event because of the clearing.
    - *
    - * The sync_clear_bit() call in xen_clear_irq_pending() is atomic.
    - * So it is effectively a memory barrier for x86.
    - */
    -if (READ_ONCE(*byte) != val)
-return;
+/* Detect reentry. */
+atomic_inc(nest_cnt);

/*
- * If an interrupt happens here, it will leave the wakeup irq pending, which will cause xen_poll_irq() to return immediately.
- */
+/* If irq pending already and no nested call clear it. */
+if (atomic_read(nest_cnt) == 1 && xen_test_irq_pending(irq)) {
  xen_clear_irq_pending(irq);
} else if (READ_ONCE(*byte) == val) {
+/* Block until irq becomes pending (or a spurious wakeup) */
+xen_poll_irq(irq);
+
*/
/* Block until irq becomes pending (or perhaps a spurious wakeup) */
-xen_poll_irq(irq);
+atomic_dec(nest_cnt);
}

static irqreturn_t dummy_handler(int irq, void *dev_id)
@@ -110,10 +103,20 @@
void xen_uninit_lock_cpu(int cpu)
{
+int irq;
+
if (!xen_pvspin)
  return;
-unbind_from_irqhandler(per_cpu(lock_kicker_irq, cpu), NULL);
+/*
+ * When booting the kernel with 'mitigations=auto,nosmt', the secondary
+ * CPUs are not activated, and lock_kicker_irq is not initialized.
+ */
+irq = per_cpu(lock_kicker_irq, cpu);
+if (irq == -1)
+return;
+
+-unbind_from_irqhandler(irq, NULL);
+per_cpu(lock_kicker_irq, cpu) = -1;
+kfree(per_cpu(irq_name, cpu));
+per_cpu(irq_name, cpu) = NULL;
--- linux-4.15.0.orig/arch/x86/xen/suspend.c
+++ linux-4.15.0/arch/x86/xen/suspend.c
@@ -1,12 +1,15 @@
// SPDX-License-Identifier: GPL-2.0
#include <linux/types.h>
#include <linux/tick.h>
+ #include <linux/percpu-defs.h>

#include <xen/xen.h>
#include <xen/interface/xen.h>
#include <xen/grant_table.h>
#include <xen/events.h>

+ #include <asm/cpufeatures.h>
+ #include <asm/msr-index.h>
# include <asm/xen/hypercall.h>
# include <asm/xen/page.h>
# include <asm/fixmap.h>
@@ -15,6 +18,8 @@
# include "mmu.h"
# include "pmu.h"

+ static DEFINE_PER_CPU(u64, spec_ctrl);
+ void xen_arch_pre_suspend(void)
{ 
 xen_save_time_memory_area();
 @@ -35,6 +40,9 @@
 static void xen_vcpu_notify_restore(void *data)
 { 
 + if (xen_pv_domain() & boot_cpu_has(X86_FEATURE_SPEC_CTRL))
 + wrmsrl(MSR_IA32_SPEC_CTRL, this_cpu_read(spec_ctrl));
 + /* Boot processor notified via generic timekeeping_resume() */
 if (smp_processor_id() == 0)
 return;
 @@ -44,7 +52,15 @@
 static void xen_vcpu_notify_suspend(void *data)
 { 
 +u64 tmp;
 +
 tick_suspend_local();
 +
 + if (xen_pv_domain() & boot_cpu_has(X86_FEATURE_SPEC_CTRL)) {
 + rdmsrl(MSR_IA32_SPEC_CTRL, tmp);
 + this_cpu_write(spec_ctrl, tmp);
 + wrmsrl(MSR_IA32_SPEC_CTRL, 0);
 + }
 }
void xen_arch_resume(void)
--- linux-4.15.0.org/arch/x86/xen/time.c
+++ linux-4.15.0/arch/x86/xen/time.c
@@ -31,6 +31,8 @@
 /* Xen may fire a timer up to this many ns early */
#define TIMER_SLOP 100000

+static u64 xen_sched_clock_offset __read_mostly;
+
+static u64 xen_sched_clock(void)
+{
+    return xen_clocksource_read() - xen_sched_clock_offset;
+}
+
 static void xen_read_wallclock(struct timespec *ts)
{
    struct shared_info *s = HYPERVISOR_shared_info;
@@ -57,6 +59,11 @@
     return xen_clocksource_read();
 }

+static u64 xen_sched_clock(void)
+{
+    return xen_clocksource_read() - xen_sched_clock_offset;
+}
+
 static const struct pv_time_ops xen_time_ops __initconst = {
-.sched_clock = xen_clocksource_read,
+.sched_clock = xen_sched_clock,
 .steal_clock = xen_steal_clock,
};

 static struct pvclock_vsyscall_time_info *xen_clock __read_mostly;
+static u64 xen_clock_value_saved;

 void xen_save_time_memory_area(void)
{
struct vcpu_register_time_memory_area t;
int ret;

+xen_clock_value_saved = xen_clocksource_read() - xen_sched_clock_offset;
+
if (!xen_clock)
return;

@@ -397,7 +405,7 @@
int ret;
if (!xen_clock)
-  return;
+  goto out;

  t.addr.v = &xen_clock->pvti;

@@ -414,6 +422,11 @@
  if (ret != 0)
      pr_notice("Cannot restore secondary vcpu_time_info (err %d)",
        ret);
+      out:
+      /* Need pvclock_resume() before using xen_clocksource_read(). */
+      pvclock_resume();
+  xen_sched_clock_offset = xen_clocksource_read() - xen_clock_value_saved;

static void xen_setup_vsyscall_time_info(void)
@@ -505,6 +518,7 @@

void __ref xen_init_time_ops(void)
{  
+xen_sched_clock_offset = xen_clocksource_read();
  pv_time_ops = xen_time_ops;

x86_init.timers.timer_init = xen_time_init;
@@ -547,6 +561,7 @@

return;
  }

+xen_sched_clock_offset = xen_clocksource_read();
  pv_time_ops = xen_time_ops;
  x86_init.timers.setup_percpu_clockev = xen_time_init;
  x86_cpuinit.setup_percpu_clockev = xen_hvm_setup_cpu_clockevents;
--- linux-4.15.0.orig/arch/x86/xen/xen-asm_64.S
+++ linux-4.15.0/arch/x86/xen/xen-asm_64.S
@@ -12,6 +12,7 @@
#include <asm/segment.h>
#include <asm/asm-offsets.h>
#include <asm/thread_info.h>
+include <asm/asm.h>
#include <xen/interface/xen.h>

@@ -24,13 +25,13 @@
pop %r11
jmp \name
END(xen_\name)
+_ASM_NOKPROBE(xen_\name)
.endm

xen_pv_trap divide_error
xen_pv_trap debug
xen_pv_trap xendebug
xen_pv_trap int3
-xen_pv_trap xenint3
xen_pv_trap xennmi
xen_pv_trap overflow
xen_pv_trap bounds
--- linux-4.15.0.orig/arch/x86/xen/xen-head.S
+++ linux-4.15.0/arch/x86/xen/xen-head.S
@@ -9,7 +9,9 @@
#include <asm/boot.h>
#include <asm/asm.h>
+include <asm/msr.h>
#include <asm/page_types.h>
+include <asm/percpu.h>
#include <asm/unwind_hints.h>

#include <xen/interface/elfnote.h>
@@ -35,6 +37,20 @@
mov %_ASM_SI, xen_start_info
mov $init_thread_union+THREAD_SIZE, %_ASM_SP

+#ifdef CONFIG_X86_64
+/* Set up %gs.
+ * The base of %gs always points to the bottom of the irqstack
+ * union. If the stack protector canary is enabled, it is
+ * located at %gs:40. Note that, on SMP, the boot cpu uses
+ * init data section till per cpu areas are set up.
+ */
+mov$MSR_GS_BASE,%ecx
+movq$INIT_PER_CPU_VAR(irq_stack_union),%rax
+cdq
+wrmser
+#endif
+
jmp xen_start_kernel
END(startup_xen)

__FINIT
--- linux-4.15.0.orig/arch/x86/xen/xen-pvh.S
+++ linux-4.15.0/arch/x86/xen/xen-pvh.S
@@ -27,6 +27,7 @@
#include <asm/boot.h>
#include <asm/processor-flags.h>
#include <asm/msr.h>
#include <asm/nospec-branch.h>
#include <xen/interface/elfnote.h>

__HEAD
@@ -54,6 +55,9 @@
* charge of setting up it's own stack, GDT and IDT.
*/

+#define PVH_GDT_ENTRY_CANARY	4
+#define PVH_CANARY_SEL	(PVH_GDT_ENTRY_CANARY * 8)
+
ENTRY(pvh_start_xen)
cld

@@ -98,15 +102,33 @@
/* 64-bit entry point. */
.code64
1:
+/* Set base address in stack canary descriptor. */
+mov $MSR_GS_BASE,%ecx
+mov $_pa(canary), %eax
+xor %edx, %edx
+wrmser
+
call xen_prepare_pvh

/* startup_64 expects boot_params in %rsi. */
mov $_pa(pvh_bootparams), %rsi
mov $_pa(startup_64), %rax
+ANNOTATE_RETPOLINE_SAFE
jmp *%rax

#else /* CONFIG_X86_64 */

+/* Set base address in stack canary descriptor. */
movl $_pa(gdt_start),%eax
movl $_pa(canary),%ecx
movw %cx, (PVH_GDT_ENTRY_CANARY * 8) + 2(%eax)
shrl $16, %ecx
movb %cl, (PVH_GDT_ENTRY_CANARY * 8) + 4(%eax)
movb %ch, (PVH_GDT_ENTRY_CANARY * 8) + 7(%eax)
+mov SPVH_CANARY_SEL,%eax
+mov %eax,%gs
+
call mk_early_pgtbl_32

mov $._pa(initial_page_table), %eax
@@ -150,11 +172,15 @@
.quad GDT_ENTRY(0xc09a, 0, 0xffffffff) /* __KERNEL_CS */
#endif
.quad GDT_ENTRY(0xc092, 0, 0xffffffff) /* __KERNEL_DS */
+.quad GDT_ENTRY(0x4090, 0, 0x18)    /* PVH_CANARY_SEL */
gdt_end:

-.balign 4
+.balign 16
+canary:
+.fill 48, 1, 0
+
early_stack:
-.fill 256, 1, 0
+.fill BOOT_STACK_SIZE, 1, 0
early_stack_end:

ELFNOTE(Xen, XEN_ELFNOTE_PHYS32_ENTRY,
--- linux-4.15.0.orig/arch/xtensa/Kconfig
+++ linux-4.15.0/arch/xtensa/Kconfig
@@ -20,7 +20,7 @@
select HAVE_DMA_CONTIGUOUS
select HAVE_EXIT_THREAD
select HAVE_FUNCTION_TRACER
+-select HAVE_FUTEX_CMPXCHG if !MMU
+select HAVE_FUTEX_CMPXCHG if !MMU && FUTEX
select HAVE_HW_BREAKPOINT if PERF_EVENTS
select HAVE_IRQ_TIME_ACCOUNTING
select HAVE_MEMBLOCK
--- linux-4.15.0.orig/arch/xtensa/boot/Makefile
+++ linux-4.15.0/arch/xtensa/boot/Makefile
@@ -34,7 +34,7 @@
$(addprefix $(obj)/,$(host-progs))
$(Q)$$(MAKE) $(build)=$(obj)/$@ $(MAKECMDGOALS)
vmlinux.bin: vmlinux FORCE

$(call if_changed,objcopy)
--- linux-4.15.0.orig/arch/xtensa/boot/dts/xtfpga.dtsi
+++ linux-4.15.0/arch/xtensa/boot/dts/xtfpga.dtsi
@@ -103,7 +103,7 @@
    
         
--- linux-4.15.0.orig/arch/xtensa/configs/smp_lx200_defconfig
+++ linux-4.15.0/arch/xtensa/configs/smp_lx200_defconfig
@@ -34,6 +34,7 @@
    CONFIG_HOTPLUG_CPU=y
# CONFIG_INITIALIZE_XTENSA_MMU_INSIDE_VMLINUX is not set
# CONFIG_PCI is not set
+CONFIG_VECTORS_OFFSET=0x00002000
CONFIG_XTENSA_PLATFORM_XTFPGA=y
CONFIG_CMDLINE_BOOL=y
CONFIG_CMDLINE="earlycon=uart8250,mmio32native,0xfd050020,115200n8 console=ttyS0,115200n8 ip=dhcpoot=/dev/nfs rw debug memmap=96M@0"
--- linux-4.15.0.orig/arch/xtensa/include/asm/cacheasm.h
+++ linux-4.15.0/arch/xtensa/include/asm/cacheasm.h
@@ -31,16 +31,32 @@
    *
    */

-macro__loop_cache_all ar at insn size line_width

  movi\ar, 0
+macro__loop_cache_unroll ar at insn size line_width max_immed
+  +.if(1 << \(line_width\)) > \(max_immed\)
+    .set_reps, 1
+  .elseif(2 << \(line_width\)) > \(max_immed\)
+    .set_reps, 2
+  .else
+    .set_reps, 4
+  .endif
+  +__loopi\ar, \at, \size, (_reps << \(line_width\))
+  .set_index, 0

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+rep_reps
+\insn\ar, _index << (\line_width)
+.set_index, _index + 1
+.endr
+__endla\ar, \at, _reps << (\line_width)
+ .endm
+

-__loop\ar, \at, \size, (4 << (\line_width))
-\insn\ar, 0 << (\line_width)
-\insn\ar, 1 << (\line_width)
-\insn\ar, 2 << (\line_width)
-\insn\ar, 3 << (\line_width)
-__endla\ar, \at, 4 << (\line_width)
+.macro__loop_cache_all ar at insn size line_width max_immed
  +
  +movi\ar, 0
  +__loop_cache_unroll \ar, \at, insn, \size, line_width, \max_immed

.endm
@@ -57,14 +73,9 @@
.endm

-macro__loop_cache_page ar at insn line_width
+.macro__loop_cache_page ar at insn line_width max_immed

-__loop\ar, \at, PAGE_SIZE, 4 << (\line_width)
-\insn\ar, 0 << (\line_width)
-\insn\ar, 1 << (\line_width)
-\insn\ar, 2 << (\line_width)
-\insn\ar, 3 << (\line_width)
-__endla\ar, \at, 4 << (\line_width)
+__loop_cache_unroll \ar, \at, insn, PAGE_SIZE, line_width, \max_immed

.endm
@@ -72,7 +83,8 @@
.macro___unlock_dcache_all ar at
#if XCHAL_DCACHE_LINE_LOCKABLE && XCHAL_DCACHE_SIZE
-__loop_cache_all \ar \at diu XCHAL_DCACHE_SIZE XCHAL_DCACHE_LINEWIDTH
+__loop_cache_all \ar \at diu XCHAL_DCACHE_SIZE \XCHAL_DCACHE_LINEWIDTH
+XCHAL_DCACHE_LINEWIDTH 240
#endif
.endm
@@ -.81,7 +93,8 @@
.macro unlock_icache_all ar at

#if XCHAL_ICACHE_LINE_LOCKABLE && XCHAL_ICACHE_SIZE
-__loop_cache_all ar \at iiu XCHAL_ICACHE_SIZE XCHAL_ICACHE_LINEWIDTH
+__loop_cache_all ar \at iiu XCHAL_ICACHE_SIZE \n+XCHAL_ICACHE_LINEWIDTH 240
#endif

.endm
@@ -.90,7 +103,8 @@
.macro flush_invalidate_dcache_all ar at

#if XCHAL_DCACHE_SIZE
-__loop_cache_all ar \at diwbi XCHAL_DCACHE_SIZE XCHAL_DCACHE_LINEWIDTH
+__loop_cache_all ar \at diwbi XCHAL_DCACHE_SIZE \n+XCHAL_DCACHE_LINEWIDTH 240
#endif

.endm
@@ -.99,7 +113,8 @@
.macro flush_dcache_all ar at

#if XCHAL_DCACHE_SIZE
-__loop_cache_all ar \at diwb XCHAL_DCACHE_SIZE XCHAL_DCACHE_LINEWIDTH
+__loop_cache_all ar \at diwb XCHAL_DCACHE_SIZE \n+XCHAL_DCACHE_LINEWIDTH 240
#endif

.endm
@@ -.108,8 +123,8 @@
.macro invalidate_dcache_all ar at

#if XCHAL_DCACHE_SIZE
-__loop_cache_all ar \at di __stringify(DCACHE_WAY_SIZE) \n- XCHAL_DCACHE_LINEWIDTH
+__loop_cache_all ar \at dii XCHAL_DCACHE_SIZE \n+ XCHAL_DCACHE_LINEWIDTH 1020
#endif

.endm
@@ -.118,8 +133,8 @@
.macro invalidate_icache_all ar at

#if XCHAL_ICACHE_SIZE
-__loop_cache_all ar \at iii __stringify(ICACHE_WAY_SIZE) \n- XCHAL_ICACHE_LINEWIDTH
+__loop_cache_all \ar \at iiii XCHAL_ICACHE_SIZE \\
+XCHAL_ICACHE_LINEWIDTH 1020
#endif

.endm
@@ -166,7 +181,7 @@
.macro ___flush_invalidate_dcache_page ar as
#if XCHAL_DCACHE_SIZE
-__loop_cache_page \ar \as dhwb XCHAL_DCACHE_LINEWIDTH
+__loop_cache_page \ar \as dhwb XCHAL_DCACHE_LINEWIDTH 1020
#endif

.endm
@@ -175,7 +190,7 @@
.macro ___flush_dcache_page ar as
#if XCHAL_DCACHE_SIZE
-__loop_cache_page \ar \as dhwb XCHAL_DCACHE_LINEWIDTH
+__loop_cache_page \ar \as dhwb XCHAL_DCACHE_LINEWIDTH 1020
#endif

.endm
@@ -184,7 +199,7 @@
.macro ___invalidate_dcache_page ar as
#if XCHAL_DCACHE_SIZE
-__loop_cache_page \ar \as dhi XCHAL_DCACHE_LINEWIDTH
+__loop_cache_page \ar \as dhi XCHAL_DCACHE_LINEWIDTH 1020
#endif

.endm
@@ -193,7 +208,7 @@
.macro ___invalidate_icache_page ar as
#if XCHAL_ICACHE_SIZE
-__loop_cache_page \ar \as ihi XCHAL_ICACHE_LINEWIDTH
+__loop_cache_page \ar \as ihi XCHAL_ICACHE_LINEWIDTH 1020
#endif

.endm
@@ -171,7 +179,6 @@
int ret = 0;

--- linux-4.15.0.orig/arch/xtensa/include/asm/futex.h
+++ linux-4.15.0/arch/xtensa/include/asm/futex.h
@@ -92,7 +92,6 @@
    u32 oldval, u32 newval)
 {
    int ret = 0;
    -u32 prev;
if (!access_ok VERIFY_WRITE, uaddr, sizeof(u32))
return -EFAULT;
@@ -103,26 +102,24 @@

__asm__ __volatile__ (
    "# futex_atomic_cmpxchg_inatomic
    -1:i32i %1, %3, 0
    -"mov%0, %5
    -"wsr%1, scompare1
    -"2:s32c1i%0, %3, 0
    -"3\n
    +"wsr%5, scompare1
    +"1:s32c1i%1, %4, 0
    +"s32i%1, %6, 0
    +"2\n    ".section .fixup,"ax"
    ".align 4\n
    -"4:.long3b\n    -"5:i32r%1, 4b\n    -"movi%0, %6\n    +"3:.long2b\n    +"4:i32r%1, 3b\n    +"movi%0, %7\n    ".jx%1\n
    ".previous\n    ".section __ex_table,"a"
    ".long 1b,5b,2b,5b
    "+.long 1b,4b\n
    ".previous\n
    : "+r" (ret), "=&r" (prev), "+m" (*uaddr)
    : "r" (uaddr), "r" (oldval), "r" (newval), "I" (-EFAULT)
    +: "+r" (ret), "+r" (newval), "+m" (*uaddr), "+m" (*uval)
    +: "r" (uaddr), "r" (oldval), "r" (uval), "I" (-EFAULT)
    : "memory");

-*uval = prev;
return ret;
}

--- linux-4.15.0.orig/arch/xtensa/include/asm/processor.h
+++ linux-4.15.0/arch/xtensa/include/asm/processor.h
@@ -24,7 +24,11 @@
    # error Linux requires the Xtensa Windowed Registers Option.
@endif

-#define ARCH_SLAB_MINALIGN XCHAL_DATA_WIDTH
+/* Xtensa ABI requires stack alignment to be at least 16 */
+ #define STACK_ALIGN (XCHAL_DATA_WIDTH > 16 ? XCHAL_DATA_WIDTH : 16)

+ #define ARCH_SLAB_MINALIGN STACK_ALIGN

/*
 * User space process size: 1 GB.
--- linux-4.15.0.orig/arch/xtensa/kernel/asm-offsets.c
+++ linux-4.15.0/arch/xtensa/kernel/asm-offsets.c
@@ -91,14 +91,14 @@
 DEFINE(THREAD_SP, offsetof(struct task_struct, thread.sp));
 DEFINE(THREAD_CPENABLE, offsetof(struct thread_info, cpenable));
#if XTENSA_HAVE_COPROCESSORS
- 	DEFINE(THREAD_XTREGS_CP0, offsetof(struct thread_info, xtregs_cp));
- 	DEFINE(THREAD_XTREGS_CP1, offsetof(struct thread_info, xtregs_cp));
- 	DEFINE(THREAD_XTREGS_CP2, offsetof(struct thread_info, xtregs_cp));
- 	DEFINE(THREAD_XTREGS_CP3, offsetof(struct thread_info, xtregs_cp));
- 	DEFINE(THREAD_XTREGS_CP4, offsetof(struct thread_info, xtregs_cp));
- 	DEFINE(THREAD_XTREGS_CP5, offsetof(struct thread_info, xtregs_cp));
- 	DEFINE(THREAD_XTREGS_CP6, offsetof(struct thread_info, xtregs_cp));
- 	DEFINE(THREAD_XTREGS_CP7, offsetof(struct thread_info, xtregs_cp));
+ 	DEFINE(THREAD_XTREGS_CP0, offsetof(struct thread_info, xtregs_cp.cp0));
+ 	DEFINE(THREAD_XTREGS_CP1, offsetof(struct thread_info, xtregs_cp.cp1));
+ 	DEFINE(THREAD_XTREGS_CP2, offsetof(struct thread_info, xtregs_cp.cp2));
+ 	DEFINE(THREAD_XTREGS_CP3, offsetof(struct thread_info, xtregs_cp.cp3));
+ 	DEFINE(THREAD_XTREGS_CP4, offsetof(struct thread_info, xtregs_cp.cp4));
+ 	DEFINE(THREAD_XTREGS_CP5, offsetof(struct thread_info, xtregs_cp.cp5));
+ 	DEFINE(THREAD_XTREGS_CP6, offsetof(struct thread_info, xtregs_cp.cp6));
+ 	DEFINE(THREAD_XTREGS_CP7, offsetof(struct thread_info, xtregs_cp.cp7));
#endif
DEFINE(THREAD_XTREGS_USER, offsetof(struct thread_info, xtregs_user));
DEFINE(XTREGS_USER_SIZE, sizeof(xtregs_user_t));
--- linux-4.15.0.orig/arch/xtensa/kernel/head.S
+++ linux-4.15.0/arch/xtensa/kernel/head.S
@@ -88,9 +88,12 @@
 initialize_mmu
 #if defined(CONFIG_MMU) && XCHAL_HAVE_PTP_MMU && XCHAL_HAVE_SPANNING_WAY
 rsra2, excsave1
- 	movia3, 0x08000000
+ 	movia3, XCHAL_KSEG_PADDR
+ 	bltu2, a3, 1f
+ 	suba2, a2, a3
+ 	movia3, XCHAL_KSEG_SIZE
 bgeua2, a3, 1f
- 	movia3, 0xd0000000
+ 	movia3, XCHAL_KSEG_CACHED_VADDR
 adda2, a2, a3
 wsra2, excsave1
movia2, cpu_start_ccount

l32ia3, a2, 0
beqia3, 0, 1b
movia3, 0
s32ia3, a2, 0
-wmemw
l32ia3, a2, 0
beqia3, 0, 1b
wsra3, ccount

rsra0, prid
nega2, a0
movia3, cpu_start_id
+wmemw
s32ia2, a3, 0
#if XCHAL_DCACHE_IS_WRITEBACK
dhwbia3, 0
#endif

void __init init_IRQ(void)
{
  #-ifdef CONFIG_OF
  +#ifdef CONFIG_USE_OF
  irqchip_init();
  #else
  #ifdef CONFIG_HAVE_SMP

  -- linux-4.15.0.orig/arch/xtensa/kernel/irq.c
  +++ linux-4.15.0/arch/xtensa/kernel/irq.c
  @@ -145,7 +145,7 @@
  void __init init_IRQ(void)
  {
  -#ifdef CONFIG_OF
  +#ifdef CONFIG_USE_OF
  irqchip_init();
  #else
  #ifdef CONFIG_HAVE_SMP

  -- linux-4.15.0.orig/arch/xtensa/kernel/irq.c
  +++ linux-4.15.0/arch/xtensa/kernel/irq.c
  @@ -145,7 +145,7 @@
  .read = xtensa_pmu_read,
  };

  -static int xtensa_pmu_setup(int cpu)
+static int xtensa_pmu_setup(unsigned int cpu)
{
    unsigned i;

    --- linux-4.15.0.orig/arch/xtensa/kernel/process.c
+++ linux-4.15.0/arch/xtensa/kernel/process.c
@@ -88,18 +88,21 @@

void coprocessor_flush_all(struct thread_info *ti)
{
    unsigned long cpenable;
+-unsigned long cpenable, old_cpenable;
    int i;

    preempt_disable();

    +RSR_CPENABLE(old_cpenable);
    cpenable = ti->cpenable;
    +WSR_CPENABLE(cpenable);

    for (i = 0; i < XCHAL_CP_MAX; i++) {
        if ((cpenable & 1) != 0 && coprocessor_owner[i] == ti)
            coprocessor_flush(ti, i);
        cpenable >>= 1;
    }
    +WSR_CPENABLE(old_cpenable);

    preempt_enable();
}
@@ -311,8 +314,8 @@
/* Stack layout: sp-4: ra, sp-3: sp */

-    pc = MAKE_PC_FROM_RA(*(unsigned long*)sp - 4, sp);
-    sp = *(unsigned long *)sp - 3;
+    pc = MAKE_PC_FROM_RA(SPILL_SLOT(sp, 0), sp);
+    sp = SPILL_SLOT(sp, 1);
} while (count++ < 16);
return 0;
}
--- linux-4.15.0.orig/arch/xtensa/kernel/ptrace.c
+++ linux-4.15.0/arch/xtensa/kernel/ptrace.c
@@ -127,12 +127,37 @@

#if XTENSA_HAVE_COPROCESSORS
#define CP_OFFSETS(cp) \
static const struct {
    size_t elf_xtregs_offset;
    size_t ti_offset;
    size_t sz;
} cp_offsets[] = {
    CP_OFFSETS(cp0),
    CP_OFFSETS(cp1),
    CP_OFFSETS(cp2),
    CP_OFFSETS(cp3),
    CP_OFFSETS(cp4),
    CP_OFFSETS(cp5),
    CP_OFFSETS(cp6),
    CP_OFFSETS(cp7),
};
#endif

static int ptrace_getxregs(struct task_struct *child, void __user *uregs) {
    struct pt_regs *regs = task_pt_regs(child);
    struct thread_info *ti = task_thread_info(child);
    elf_xtregs_t __user *xtregs = uregs;
    int ret = 0;
    int i __maybe_unused;
    if (!access_ok(VERIFY_WRITE, uregs, sizeof(elf_xtregs_t)))
        return -EIO;
    #if XTENSA_HAVE_COPROCESSORS
    /* Flush all coprocessor registers to memory. */
    coprocessor_flush_all(ti);
    -ret |= __copy_to_user(&xtregs->cp0, &ti->xtregs_cp,
        -sizeof(xtregs_coprocessor_t));
    +for (i = 0; i < ARRAY_SIZE(cp_offsets); ++i)
        +ret |= __copy_to_user((char __user *)xtregs +
            +cp_offsets[i].elf_xtregs_offset,
            +(const char *)ti +
            +cp_offsets[i].ti_offset,
            +cp_offsets[i].sz);
    #endif
    ret |= __copy_to_user(&xtregs->opt, &regs->xtregs_opt,
        sizeof(xtregs->opt));
@@ -157,6 +187,7 @@
        struct pt_regs *regs = task_pt_regs(child);
        elf_xtregs_t *xtregs = uregs;
        int ret = 0;
+        int i __maybe_unused;

        if (!access_ok VERIFY_READ, uregs, sizeof(elf_xtregs_t)))
            return -EFAULT;
@@ -166,8 +197,11 @@
            coprocessor_flush_all(ti);
            coprocessor_release_all(ti);

-        ret |= __copy_from_user(&ti->xtregs_cp, &xtregs->cp0,           
-                sizeof(xtregs_coprocessor_t));
+        for (i = 0; i < ARRAY_SIZE(cp_offsets); ++i)
+            ret |= __copy_from_user((char *)ti + cp_offsets[i].ti_offset,
+                (const char __user *)xtregs +              
+                cp_offsets[i].elf_xtregs_offset,           
+                cp_offsets[i].sz);
+    #endif
        ret |= __copy_from_user(&regs->xtregs_opt, &xtregs->opt,      
                sizeof(xtregs->opt));
            --- linux-4.15.0.orig/arch/xtensa/kernel/setup.c
+    #endif
            extern char _SecondaryResetVector_text_end;

-    static inline int mem_reserve(unsigned long start, unsigned long end)
+    static inline int __init_memblock mem_reserve(unsigned long start,
+        unsigned long end)
    {
        return memblock_reserve(start, end - start);
    }
@@ -507,6 +508,7 @@
 
 "add%2, %2, %7\n\t"
 "addi%0, %0, -1\n\t"
+ "isync\n\t"
 /* Jump to identity mapping */
 "jx%3\n"
 "2:\n\t"
@@ -709,7 +711,8 @@
 static void *
 c_next(struct seq_file *f, void *v, loff_t *pos)
 {
-    return NULL;
+    +++*pos;

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static void
--- linux-4.15.0.orig/.../kernel/smp.c
+++ linux-4.15.0/arch/xtensa/kernel/smp.c
@@ -83,7 +83,7 @@
 {
 unsigned i;

-for (i = 0; i < max_cpus; ++i)
+for_each_possible_cpu(i)
 set_cpu_present(i, true);
 }

@@ -96,6 +96,11 @@
 pr_info("%s: Core Count = %d\n", __func__, ncpus);
 pr_info("%s: Core Id = %d\n", __func__, core_id);

+if (ncpus > NR_CPUS) {
+ ncpus = NR_CPUS;
+ pr_info("%s: limiting core count by %d\n", __func__, ncpus);
+}
+ for (i = 0; i < ncpus; ++i)
 set_cpu_possible(i, true);
 }
@@ -195,9 +200,11 @@
 int i;

 #ifdef CONFIG_HOTPLUG_CPU
- cpu_start_id = cpu;
- system_flush_invalidate_dcache_range( 
- (unsigned long)&cpu_start_id, sizeof(cpu_start_id));
+ WRITE_ONCE(cpu_start_id, cpu);
+ /* Pairs with the third memw in the cpu_restart */
+ mb();
+ system_flush_invalidate_dcache_range((unsigned long)&cpu_start_id, 
+ sizeof(cpu_start_id));
#endif
 smp_call_function_single(0, mx_cpu_start, (void *)cpu, 1);

@@ -206,18 +213,21 @@
 ccount = get_ccount();
 while (!ccount);

-cpu_start_ccount = ccount;
+WRITE_ONCE(cpu_start_ccount, ccount);
while (time_before(jiffies, timeout)) {
  do {
    /* Pairs with the first two memws in the
    * .Lboot_secondary.
    */
    mb();
    if (!cpu_start_ccount)
      break;
  }
  ccount = READ_ONCE(cpu_start_ccount);
} while (ccount && time_before(jiffies, timeout));

if (cpu_start_ccount) {
  if (ccount)
    smp_call_function_single(0, mx_cpu_stop,
    (void *)cpu, 1);
  cpu_start_ccount = 0;
  WRITE_ONCE(cpu_start_ccount, 0);
  return -EIO;
}

pr_debug("%s: Calling wakeup_secondary(cpu:%d, idle:%p, sp: %08lx)\n", __func__, cpu, idle, start_info.stack);

init_completion(&cpu_running);
ret = boot_secondary(cpu, idle);
if (ret == 0) {
  wait_for_completion_timeout(&cpu_running,
  @ @ -298.8 +309.10 @ @
  unsigned long timeout = jiffies + msecs_to_jiffies(1000);
  while (time_before(jiffies, timeout)) {
    system_invalidate_dcache_range((unsigned long)&cpu_start_id,
    -sizeof(cpu_start_id));
    if (cpu_start_id == -cpu) {
      sizeof(cpu_start_id));
    /* Pairs with the second memw in the cpu_restart */
    mb();
    if (READ_ONCE(cpu_start_id) == -cpu) {
      platform_cpu_kill(cpu);
      return;
    }
  }
--- linux-4.15.0.orig/arch/xtensa/kernel/stacktrace.c
+++ linux-4.15.0/arch/xtensa/kernel/stacktrace.c
@@ -253,10 +253,14 @@
return 1;
}

+/*
+ * level == 0 is for the return address from the caller of this function,
+ * not from this function itself.
+ */
unsigned long return_address(unsigned level)
{
    struct return_addr_data r = {
        .skip = level + 1,
        .skip = level,
    };
    walk_stackframe(stack_pointer(NULL), return_address_cb, &r);
    return r.addr;
}

if (timer->irq_enabled) {
    disable_irq(evt->irq);
    disabling_irq_nosync(evt->irq);
    timer->irq_enabled = 0;
}
return 0;

info.si_errno = 0;
info.si_code = BUS_ADRALN;
info.si_addr = (void *) regs->excvaddr;
-force_sig_info(SIGSEGV, &info, current);
+force_sig_info(SIGBUS, &info, current);
+++ linux-4.15.0/arch/xtensa/kernel/xtensa_ksyms.c
@@ -82,13 +82,13 @@
 }EXPORT_SYMBOL(__xtensa_libgcc_window_spill);

-unsigned long __sync_fetch_and_and_4(unsigned long *p, unsigned long v)
+unsigned int __sync_fetch_and_and_4(volatile void *p, unsigned int v)
{ BUG(); }
EXPORT_SYMBOL(__sync_fetch_and_and_4);

-unsigned long __sync_fetch_and_or_4(unsigned long *p, unsigned long v)
+unsigned int __sync_fetch_and_or_4(volatile void *p, unsigned int v)
{ BUG(); }
EXPORT_SYMBOL(__sync_fetch_and_or_4);

@@ -114,13 +114,6 @@
	/* FIXME EXPORT_SYMBOL(screen_info); */
@endif

-EXPORT_SYMBOL(outsb);
-EXPORT_SYMBOL(outsw);
-EXPORT_SYMBOL(outsl);
-EXPORT_SYMBOL(insb);
-EXPORT_SYMBOL(insw);
-EXPORT_SYMBOL(insl);

-extern long common_exception_return;
EXPORT_SYMBOL(common_exception_return);

--- linux-4.15.0.orig/arch/xtensa/mm/cache.c
+++ linux-4.15.0/arch/xtensa/mm/cache.c
@@ -74,8 +74,10 @@
 kvaddr = TLBTEMP_BASE_1 +
 (page_to_phys(page) & DCACHE_ALIAS_MASK);
+
+preempt_disable();
+__invalidate_dcache_page_alias(kvaddr, page_to_phys(page));
+preempt_enable();
 } } }
@@ -160,6 +162,7 @@ if (!alias && !mapping)
{return;

---
+preempt_disable();
virt = TLBTEMP_BASE_1 + (phys & DCACHE_ALIAS_MASK);
__flush_invalidate_dcache_page_alias(virt, phys);
@@ -170,6 +173,7 @@
if (mapping)
    __invalidate_icache_page_alias(virt, phys);
+preempt_enable();
}
/* There shouldn't be an entry in the cache for this page anymore. */
@@ -203,8 +207,10 @@
unsigned long phys = page_to_phys(pfn_to_page(pfn));
unsigned long virt = TLBTEMP_BASE_1 + (address & DCACHE_ALIAS_MASK);

+preempt_disable();
__flush_invalidate_dcache_page_alias(virt, phys);
__invalidate_icache_page_alias(virt, phys);
+preempt_enable();
}
EXPORT_SYMBOL(local_flush_cache_page);
@@ -231,11 +237,13 @@
unsigned long phys = page_to_phys(page);
unsigned long virt;

+preempt_disable();
tmp = TLBTEMP_BASE_1 + (phys & DCACHE_ALIAS_MASK);
__flush_invalidate_dcache_page_alias(tmp, phys);
tmp = TLBTEMP_BASE_1 + (addr & DCACHE_ALIAS_MASK);
__flush_invalidate_dcache_page_alias(tmp, phys);
__invalidate_icache_page_alias(tmp, phys);
+preempt_enable();

clear_bit(PG_arch_1, &page->flags);
}
@@ -269,7 +277,9 @@
if (alias) {
    unsigned long t = TLBTEMP_BASE_1 + (vaddr & DCACHE_ALIAS_MASK);
+preempt_disable();
    __flush_invalidate_dcache_page_alias(t, phys);
+preempt_enable();
}
/* Copy data */
@@ -284,9 +294,11 @@
if (alias) {
    unsigned long t = TLBTEMP_BASE_1 + (vaddr & DCACHE_ALIAS_MASK);
    preempt_disable();
    __flush_invalidate_dcache_range((unsigned long) dst, len);
    if ((vma->vm_flags & VM_EXEC) != 0)
        __invalidate_icache_page_alias(t, phys);
    preempt_enable();
}

if (alias) {
    unsigned long t = TLBTEMP_BASE_1 + (vaddr & DCACHE_ALIAS_MASK);
    preempt_disable();
    __flush_invalidate_dcache_page_alias(t, phys);
    preempt_enable();
}

memcpy(dst, src, len);
--- linux-4.15.0.orig/arch/xtensa/mm/init.c
+++ linux-4.15.0/arch/xtensa/mm/init.c
@@ -308,7 +320,9 @@
    if (alias) {
        unsigned long t = TLBTEMP_BASE_1 + (vaddr & DCACHE_ALIAS_MASK);
        preempt_disable();
-       __flush_invalidate_dcache_page_alias(t, phys);
        preempt_enable();
    }

memcpy(dst, src, len);
--- linux-4.15.0.orig/arch/xtensa/mm/init.c
+++ linux-4.15.0/arch/xtensa/mm/init.c
@@ -79,19 +79,75 @@
    free_area_init_node(0, zones_size, ARCH_PFN_OFFSET, NULL);
    }

#ifdef CONFIG_HIGHMEM
    static void __init free_area_high(unsigned long pfn, unsigned long end)
+{
+    for (; pfn < end; pfn++)
+        free_highmem_page(pfn_to_page(pfn));
+}
+
    static void __init free_highpages(void)
+{
+    unsigned long max_low = max_low_pfn;
+    struct memblock_region *mem, *res;
+    reset_all_zones_managed_pages();
+    /* set highmem page free */
+    for_each_memblock(memory, mem) {
+        unsigned long start = memblock_region_memory_base_pfn(mem);
+        unsigned long end = memblock_region_memory_end_pfn(mem);
+        /* Ignore complete lowmem entries */
+        if (end <= max_low)
+            continue;
+    }

    static void __init free_area_high(unsigned long pfn, unsigned long end)
    {
        for (; pfn < end; pfn++)
            free_highmem_page(pfn_to_page(pfn));
    }

    static void __init free_highpages(void)
    {
        unsigned long max_low = max_low_pfn;
        struct memblock_region *mem, *res;
        reset_all_zones_managed_pages();
        /* set highmem page free */
        for_each_memblock(memory, mem) {
            unsigned long start = memblock_region_memory_base_pfn(mem);
            unsigned long end = memblock_region_memory_end_pfn(mem);
            /* Ignore complete lowmem entries */
            if (end <= max_low)
                continue;
    }
+ if (memblock_is_nomap(mem))
+ continue;
+
+ /* Truncate partial highmem entries */
+ if (start < max_low)
+ start = max_low;
+
+ /* Find and exclude any reserved regions */
+ for_each_memblock(reserved, res) {
+ unsigned long res_start, res_end;
+ + res_start = memblock_region_reserved_base_pfn(res);
+ res_end = memblock_region_reserved_end_pfn(res);
+ + if (res_end < start)
+ continue;
+ if (res_start < start)
+ res_start = start;
+ if (res_start > end)
+ res_start = end;
+ if (res_end > end)
+ res_end = end;
+ if (res_start != start)
+ free_area_high(start, res_start);
+ start = res_end;
+ if (start == end)
+ break;
+ }
+
+ /* And now free anything which remains */
+ if (start < end)
+ free_area_high(start, end);
+
+ #else
+ static void __init free_highpages(void)
+ {
+ }
+ +#endif
+
+ /*
+ * Initialize memory pages.
+ */
+
+ void __init mem_init(void)
+ {
+ -#ifdef CONFIG_HIGHMEM
+ oldest:
+ +
+ /*
+ * Initialize memory pages.
+ */
+
+ void __init mem_init(void)
+ {
+ -#ifdef CONFIG_HIGHMEM
+ oldest:
+ +
+ /*
+ * Initialize memory pages.
+ */
+ 

Open Source Used In 5GaaS Edge AC-4 12387
unsigned long tmp;
-
-reset_all_zones_managed_pages();
-for (tmp = max_low_pfn; tmp < max_pfn; tmp++)
-free_highmem_page(pfn_to_page(tmp));
-#endif
+
+free_highpages();

max_mapnr = max_pfn - ARCH_PFN_OFFSET;
high_memory = (void *)__va(max_low_pfn << PAGE_SHIFT);
--- linux-4.15.0.orig/arch/xtensa/mm/tlb.c
+++ linux-4.15.0/arch/xtensa/mm/tlb.c
@@ -218,6 +218,8 @@
                    unsigned tlbidx = w | (e << PAGE_SHIFT);
                    unsigned r0 = dtlb ?
                    read_dtlb_virtual(tlbidx) : read_itlb_virtual(tlbidx);
                    unsigned r1 = dtlb ?
                    read_dtlb_translation(tlbidx) : read_itlb_translation(tlbidx);
                    unsigned vpn = (r0 & PAGE_MASK) | (e << PAGE_SHIFT);
                    unsigned pte = get_pte_for_vaddr(vpn);
                    unsigned mm_asid = (get_rasid_register() >> 8) & ASID_MASK;
@@ -233,8 +235,6 @@
}

    if (tlb_asid == mm_asid) {
        unsigned r1 = dtlb ? read_dtlb_translation(tlbidx) :
        +read_itlb_translation(tlbidx);
        if ((pte ^ r1) & PAGE_MASK) {
            pr_err("%cTLB: way: %u, entry: %u, mapping: %08x->%08x, PTE: %08x\n",
                dtlb ? 'D' : 'I', w, e, r0, r1, pte);
        }
        __init rs_init(void)
        {
            tty_port_init(&serial_port);
            int ret;

            serial_driver = alloc_tty_driver(SERIAL_MAX_NUM_LINES);
            +if (!serial_driver)
            +return -ENOMEM;
            tty_port_init(&serial_port);
            printk("%s %s\n", serial_name, serial_version);
            return 0;
        }

--- linux-4.15.0.orig/arch/xtensa/platforms/iss/console.c
+++ linux-4.15.0/arch/xtensa/platforms/iss/console.c
@@ -181,9 +181,13 @@

    int __init rs_init(void)
    {
        tty_port_init(&serial_port);
        +int ret;

        serial_driver = alloc_tty_driver(SERIAL_MAX_NUM_LINES);
        +if (!serial_driver)
        +return -ENOMEM;
        +tty_port_init(&serial_port);
        printk("%s %s\n", serial_name, serial_version);
        return 0;
    }

--- linux-4.15.0.orig/arch/xtensa/platforms/iss/console.c
+++ linux-4.15.0/arch/xtensa/platforms/iss/console.c
@@ -181,9 +181,13 @@

    int __init rs_init(void)
    {
        tty_port_init(&serial_port);
        +int ret;

        serial_driver = alloc_tty_driver(SERIAL_MAX_NUM_LINES);
        +if (!serial_driver)
        +return -ENOMEM;
        +tty_port_init(&serial_port);
        printk("%s %s\n", serial_name, serial_version);
        return 0;
    }

--- linux-4.15.0.orig/arch/xtensa/platforms/iss/console.c
+++ linux-4.15.0/arch/xtensa/platforms/iss/console.c
@@ -181,9 +181,13 @@

    int __init rs_init(void)
    {
        tty_port_init(&serial_port);
        +int ret;

        serial_driver = alloc_tty_driver(SERIAL_MAX_NUM_LINES);
        +if (!serial_driver)
        +return -ENOMEM;
        +tty_port_init(&serial_port);
        printk("%s %s\n", serial_name, serial_version);
        return 0;
    }
tty_set_operations(serial_driver, &serial_ops);
tty_port_link_device(&serial_port, serial_driver, 0);

- if (tty_register_driver(serial_driver))
- panic("Couldn't register serial driver\n");
+ ret = tty_register_driver(serial_driver);
+ if (ret) {
+ pr_err("Couldn't register serial driver\n");
+ tty_driver_kref_put(serial_driver);
+ tty_port_destroy(&serial_port);
+ return ret;
+ }
+
+ return 0;
+
--- linux-4.15.0.orig/arch/xtensa/platforms/iss/setup.c
+++ linux-4.15.0/arch/xtensa/platforms/iss/setup.c
@@ -78,23 +78,28 @@
void __init platform_setup(char **p_cmdline)
 {
+static void *argv[COMMAND_LINE_SIZE / sizeof(void *)] __initdata;
+static char cmdline[COMMAND_LINE_SIZE] __initdata;
 int argc = simc_argc();
 int argv_size = simc_argv_size();

 if (argc > 1) {
- void **argv = alloc_bootmem(argv_size);
- char *cmdline = alloc_bootmem(argv_size);
- int i;
- if (argv_size > sizeof(argv)) {
- pr_err("%s: command line too long: argv_size = %d\n", 
- __func__, argv_size);
+ int i;
+ for (i = 1; i < argc; ++i) {
+ strcat(cmdline, argv[i]);
+ for (i = 1; i < argc; ++i) {
+```
+if (i > 1)
+    strcat(cmdline, " ");
+    strcat(cmdline, argv[i]);
+    }
+    *p_cmdline = cmdline;
+
+
-atomic_notifier_chain_register(&panic_notifier_list, &iss_panic_block);
--- linux-4.15.0.orig/arch/xtensa/platforms/iss/simdisk.c
+++ linux-4.15.0/arch/xtensa/platforms/iss/simdisk.c
@@ -21,7 +21,6 @@
#include <platform/simcall.h>
#define SIMDISK_MAJOR 240
#define SECTOR_SHIFT 9
#define SIMDISK_MINORS 1
#define MAX_SIMDISK_COUNT 10

--- linux-4.15.0.orig/arch/xtensa/platforms/xtfpga/setup.c
+++ linux-4.15.0/arch/xtensa/platforms/xtfpga/setup.c
@@ -54,8 +54,12 @@
void platform_restart(void)
{
    /* Try software reset first. */
+    WRITE_ONCE(*(u32 *)XTFPGA_SWRST_VADDR, 0xdead);
+    /* If software reset did not work, flush and reset the mmu,
+     * simulate a processor reset, and jump to the reset vector.
+     */
    cpu_reset();
    /* control never gets here */
}
@@ -85,7 +89,7 @@
@endif

#ifdef CONFIG_OF
+#ifdef CONFIG_USE_OF
    static void __init xtfpga_clk_setup(struct device_node *np)
    {
        @@ -303,4 +307,4 @@
    }
@endif

-#ifdef CONFIG_OF
+#ifdef CONFIG_USE_OF

 static void __init xtfpga_clk_setup(struct device_node *np)
 {
    @@ -303,4 +307,4 @@
 *}
void bfqg_and_blkg_put(struct bfq_group *bfqg)
{
    -bfqg_put(bfqg);
    blkg_put(bfqg_to_blkg(bfqg));
    +bfqg_put(bfqg);
}

/* @stats = 0 */
unsigned long flags;
int i;

+spin_lock_irqsave(&bfqd->lock, flags);
+if (!entity) /* root group */
    -return;
+goto put_async_queues;

-spin_lock_irqsave(&bfqd->lock, flags);
/*
* Empty all service_trees belonging to this group before
* deactivating the group itself.
@@ -809,6 +811,8 @@
__bfq_deactivate_entity(entity, false);
+
+put_async_queues:
  bfq_put_async_queues(bfqd, bfqg);

spin_unlock_irqrestore(&bfqd->lock, flags);
@@ -910,7 +914,8 @@
if (ret)
  return ret;

-return bfq_io_set_weight_legacy(of_css(of), NULL, weight);
+ret = bfq_io_set_weight_legacy(of_css(of), NULL, weight);
+return ret ?: nbytes;

#endif CONFIG_DEBUG_BLK_CGROUP
--- linux-4.15.0.orig/block/bfq-iosched.c
+++ linux-4.15.0/block/bfq-iosched.c
@@ -1721,7 +1721,6 @@
if (!RB_EMPTY_NODE(&rq->rb_node))
goto end;
-spin_lock_irq(&bfqg->bfqd->lock);

/*
 * If next and rq belong to the same bfq_queue and next is older
@@ -1746,7 +1745,6 @@
bfq_remove_request(q, next);
bfqg_stats_update_io_remove(bfqq_group(bfqq), next->cmd_flags);

-spin_lock_irq(&bfqg->bfqd->lock);
end:
bfqg_stats_update_io_merged(bfqq_group(bfqq), next->cmd_flags);

}
whether bfqq is being weight-raised, because
* bfq_symmetric_scenario() does not take into account also
* weight-raised queues (see comments on
  * bfq_weights_tree_add()). In particular, if bfqq is being
  * weight-raised, it is important to idle only if there are
  * other, non-weight-raised queues that may steal throughput
  * to bfqq. Actually, we should be even more precise, and
  * differentiate between interactive weight raising and
  * soft real-time weight raising.

* As a side note, it is worth considering that the above
* device-idling countermeasures may however fail in the
* to let requests be served in the desired order until all
* the requests already queued in the device have been served.
*/
-asymmetric_scenario = bfqq->wr_coeff > 1 ||
+asymmetric_scenario = (bfqq->wr_coeff > 1 &&
  bfqd->wr_busy_queues < bfqd->busy_queues) ||
!bfq_symmetric_scenario(bfqd);
*/
@@ -3630,20 +3636,22 @@
*/
- * We exploit the put_rq_private hook to decrement
- * rq_in_driver, but put_rq_private will not be
- * invoked on this request. So, to avoid unbalance,
- * just start this request, without incrementing
- * rq_in_driver. As a negative consequence,
- * rq_in_driver is deceptively lower than it should be
- * while this request is in service. This may cause
- * bfq_schedule_dispatch to be invoked uselessly.
+ * We exploit the bfq_finish_requeue_request hook to
decrement rq_in_driver, but
+ * bfq_finish_requeue_request will not be invoked on
+ * this request. So, to avoid unbalance, just start
+ * this request, without incrementing rq_in_driver. As
+ * a negative consequence, rq_in_driver is deceptively
+ * lower than it should be while this request is in
+ * service. This may cause bfq_schedule_dispatch to be
+ * invoked uselessly.

* As for implementing an exact solution, the
- * put_request hook, if defined, is probably invoked
- * also on this request. So, by exploiting this hook,
- * we could 1) increment rq_in_driver here, and 2)
- * decrement it in put_request. Such a solution would
+ * bfq_finish_requeue_request hook, if defined, is
+ * probably invoked also on this request. So, by
+ * exploiting this hook, we could 1) increment
+ * rq_in_driver here, and 2) decrement it in
+ * bfq_finish_requeue_request. Such a solution would
* let the value of the counter be always accurate,
* but it would entail using an extra interface
* function. This cost seems higher than the benefit,
@@ -3689,35 +3697,16 @@
return rq;
}

- static struct request *bfq_dispatch_request(struct blk_mq_hw_ctx *hctx)
- {
- struct bfq_data *bfqd = hctx->queue->elevator->elevator_data;
- struct request *rq;
- #if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
- struct bfq_queue *in_serv_queue, *bfqq;
- bool waiting_rq, idle_timer_disabled;
- #endif
- 
- spin_lock_irq(&bfqd->lock);
- 
- #if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
- in_serv_queue = bfqd->in_service_queue;
- waiting_rq = in_serv_queue && bfq_bfqq_wait_request(in_serv_queue);
- 
- rq = __bfq_dispatch_request(hctx);
- 
- idle_timer_disabled =
- waiting_rq && !bfq_bfqq_wait_request(in_serv_queue);
- 
- #else
- rq = __bfq_dispatch_request(hctx);
- #endif
- 
- spin_unlock_irq(&bfqd->lock);
+ static void bfq_update_dispatch_stats(struct request_queue *q,
+ struct request *rq,
+ struct bfq_queue *in_serv_queue,
+ bool idle_timer_disabled)
+ {
+ struct bfq_queue *bfqq = rq ? RQ_BFQQ(rq) : NULL;

- #if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
- bfqq = rq ? RQ_BFQQ(rq) : NULL;

- static struct request *bfq_dispatch_request(struct blk_mq_hw_ctx *hctx)
if (!idle_timer_disabled && !bfqq)
-    return rq;
+    return;

/*
 * rq and bfqq are guaranteed to exist until this function
 @ @ -3732,7 +3721,7 @@
 * In addition, the following queue lock guarantees that
 * bfqq_group(bfqq) exists as well.
 */
-    spin_lock_irq(hctx->queue->queue_lock);
+    spin_lock_irq(q->queue_lock);
if (idle_timer_disabled)
/*
 * Since the idle timer has been disabled,
 @ @ -3751,9 +3740,37 @@
   bfqg_stats_set_start_empty_time(bfqg);
   bfqg_stats_update_io_remove(bfqg, rq->cmd_flags);
 }
-    spin_unlock_irq(hctx->queue->queue_lock);
+    spin_unlock_irq(q->queue_lock);
+}  
+#else
+static inline void bfq_update_dispatch_stats(struct request_queue *q,
+    struct request *rq,
+    struct bfq_queue *in_serv_queue,
+    bool idle_timer_disabled) {} 
#endif

+static struct request *bfq_dispatch_request(struct blk_mq_hw_ctx *hctx)
+{
+    struct bfq_data *bfqd = hctx->queue->elevator->elevator_data;
+    struct request *rq;
+    struct bfq_queue *in_serv_queue;
+    bool waiting_rq, idle_timer_disabled;
+
+    spin_lock_irq(&bfqd->lock);
+    
+    in_serv_queue = bfqd->in_service_queue;
+    waiting_rq = in_serv_queue && bfq_bfqq_wait_request(in_serv_queue);
+    
+   rq = __bfq_dispatch_request(hctx);
+    
+    idle_timer_disabled =
+    waiting_rq && !bfq_bfqq_wait_request(in_serv_queue);
+    
+    spin_unlock_irq(&bfqd->lock);
+    


unsigned long flags;
    spin_lock_irqsave(&bfqd->lock, flags);
    bfqq->bic = NULL;
    bfq_exit_bfqq(bfqd, bfqq);
    bic_set_bfqq(bic, NULL, is_sync);
    spin_unlock_irqrestore(&bfqd->lock, flags);
    if (bfqq->new_ioprio >= IOPRIO_BE_NR) {
        pr_crit("bfq_set_next_ioprio_data: new_ioprio %d\n", 
                 bfqq->new_ioprio);
        bfqq->new_ioprio = IOPRIO_BE_NR - 1;
    }
    bfqq->entity.new_weight = bfq_ioprio_to_weight(bfqq->new_ioprio);
    return idle_timer_disabled;
}

#if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
static void bfq_update_insert_stats(struct request_queue *q, 
    struct bfq_queue *bfqq, 
    bool idle_timer_disabled, 
    unsigned int cmd_flags)
{
    if (!bfqq)
        return;

    /*
     * bfqq still exists, because it can disappear only after
     * either it is merged with another queue, or the process it
     * is associated with exits. But both actions must be taken by
     * the same process currently executing this flow of
     * instructions.
     * In addition, the following queue lock guarantees that
     * bfq_group(bfqq) exists as well.
     */
    spin_lock_irq(q->queue_lock);
    bfqq_stats_update_io_add(bfqq_group(bfqq), bfqq, cmd_flags);

    /*
     * bfq_update_dispatch_stats(hctx->queue, rq, in_serv_queue,
     * idle_timer_disabled);
     * return rq;
     */

    unsigned long flags;
    spin_lock_irqsave(&bfqd->lock, flags);
    bfqq->bic = NULL;
    bfq_exit_bfqq(bfqd, bfqq);
    bic_set_bfqq(bic, NULL, is_sync);
    spin_unlock_irqrestore(&bfqd->lock, flags);
    if (bfqq->new_ioprio >= IOPRIO_BE_NR) {
        pr_crit("bfq_set_next_ioprio_data: new_ioprio %d\n", 
                 bfqq->new_ioprio);
        bfqq->new_ioprio = IOPRIO_BE_NR - 1;
    }
    bfqq->entity.new_weight = bfq_ioprio_to_weight(bfqq->new_ioprio);
    return idle_timer_disabled;
}
if (idle_timer_disabled)
+bfqg_stats_update_idle_time(bfqq_group(bfqq));
+spin_unlock_irq(q->queue_lock);
+
+#else
+static inline void bfq_update_insert_stats(struct request_queue *q,
+    struct bfq_queue *bfqq,
+    bool idle_timer_disabled,
+    unsigned int cmd_flags) {}
+#endif
+
+static void bfq_prepare_request(struct request *rq, struct bio *bio);
+
+static void bfq_insert_request(struct blk_mq_hw_ctx *hctx, struct request *rq,
+    bool at_head)
{
    struct request_queue *q = hctx->queue;
    struct bfq_data *bfqd = q->elevator->elevator_data;
-#if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
    struct bfq_queue *bfqq = RQ_BFQQ(rq);
    bool idle_timer_disabled = false;
    unsigned int cmd_flags;
-#endif
    spin_lock_irq(&bfqd->lock);
    if (blk_mq_sched_try_insert_merge(q, rq)) {
@@ -4304,7 +4354,18 @@
    else
        list_add_tail(&rq->queuelist, &bfqd->dispatch);
    } else {
-#if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
+#if defined(WARN_ON_ONCE(!bfqq))
+    */
+        * This should never happen. Most likely rq is
+        * a requeued regular request, being
+        * re-inserted without being first
+        * re-prepared. Do a prepare, to avoid
+        * failure.
+        */
+        +bfq_prepare_request(rq, rq->bio);
+        +bfqq = RQ_BFQQ(rq);
+    }
+    +
+    idle_timer_disabled = __bfq_insert_request(bfqd, rq);
+    */
+        * Update bfqq, because, if a queue merge has occurred
@@ -4312,9 +4373,6 @@
+        */
+        * redirected into a new queue.
bfqq = RQ_BFQQ(rq);
#else
__bfq_insert_request(bfqd, rq);
#endif

if (rq_mergeable(rq)) {
elv_rqhash_add(q, rq);
}@ @ -4323,35 +4381,17 @@
}
}

-#if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
/*
 * Cache cmd_flags before releasing scheduler lock, because rq
 * may disappear afterwards (for example, because of a request
 * merge).
 */
cmd_flags = rq->cmd_flags;
-#endif
+
spin_unlock_irq(&bfqd->lock);

-#if defined(CONFIG_BFQ_GROUP_IOSCHED) && defined(CONFIG_DEBUG_BLK_CGROUP)
-if (!bfqq)
-return;
-/*
 - * bfqq still exists, because it can disappear only after
 - * either it is merged with another queue, or the process it
 - * is associated with exits. But both actions must be taken by
 - * the same process currently executing this flow of
 - * instruction.
 - *
 - * In addition, the following queue lock guarantees that
 - * bfqq_group(bfqq) exists as well.
 - */
 -spin_lock_irq(q->queue_lock);
 -bfqg_stats_update_io_add(bfqq_group(bfqq), bfqq, cmd_flags);
 -if (idle_timer_disabled)
 -bfqg_stats_update_idle_time(bfqq_group(bfqq));
 -spin_unlock_irq(q->queue_lock);
 -#endif
 +bfq_update_insert_stats(q, bfqq, idle_timer_disabled,
 +cmd_flags);
}
bfq_schedule_dispatch(bfqd);
}

-static void bfq_put_rq_priv_body(struct bfq_queue *bfqq)
+static void bfq_finish_requeue_request_body(struct bfq_queue *bfqq)
{
    bfqq->allocated--;

    bfq_put_queue(bfqq);
}

-static void bfq_finish_request(struct request *rq)
+/
+ * Handle either a requeue or a finish for rq. The things to do are
+ * the same in both cases: all references to rq are to be dropped. In
+ * particular, rq is considered completed from the point of view of
+ * the scheduler.
+ */
+static void bfq_finish_requeue_request(struct request *rq)
{
    -struct bfq_queue *bfqq;
    +struct bfq_queue *bfqq = RQ_BFQQ(rq);
    +struct bfq_data *bfqd;

    -if (!rq->elv.icq)
    +/
    + * Requeue and finish hooks are invoked in blk-mq without
    + * checking whether the involved request is actually still
    + * referenced in the scheduler. To handle this fact, the
    + * following two checks make this function exit in case of
    + * spurious invocations, for which there is nothing to do.
    + *
    + * First, check whether rq has nothing to do with an elevator.
    + */
    +if (unlikely(!(rq->rq_flags & RQF_ELVPRIV)))
    +return;
    +
    +/
    + * rq either is not associated with any icq, or is an already
    + * requeued request that has not (yet) been re-inserted into
    + * a bfq_queue.
    + */
    +if (!rq->elv.icq || !bfqq)
    return;

    -bfqq = RQ_BFQQ(rq);
    bfqd = bfqq->bfqd;

if (rq->rq_flags & RQF_STARTED)
@@ -4512,13 +4574,14 @@
spin_lock_irqsave(&bfqd->lock, flags);

bfq_completed_request(bfqq, bfqd);
-bfq_put_rq_priv_body(bfqq);
+bfq_finish_requeue_request_body(bfqq);

spin_unlock_irqrestore(&bfqd->lock, flags);
} else {
/*
 * Request rq may be still/already in the scheduler,
- * in which case we need to remove it. And we cannot
+ * in which case we need to remove it (this should
+ * never happen in case of requeue). And we cannot
 * defer such a check and removal, to avoid
 * inconsistencies in the time interval from the end
 * of this function to the start of the deferred work.
@@ -4533,9 +4596,26 @@
bfqg_stats_update_io_remove(bfqq_group(bfqq),
 rq->cmd_flags);
}
-bfq_put_rq_priv_body(bfqq);
+bfq_finish_requeue_request_body(bfqq);
}

+/*
 + * Reset private fields. In case of a requeue, this allows
 + * this function to correctly do nothing if it is spuriously
 + * invoked again on this same request (see the check at the
 + * beginning of the function). Probably, a better general
 + * design would be to prevent blk-mq from invoking the requeue
 + * or finish hooks of an elevator, for a request that is not
 + * referred by that elevator.
 + *
 + * Resetting the following fields would break the
 + * request-insertion logic if rq is re-inserted into a bfq
 + * internal queue, without a re-preparation. Here we assume
 + * that re-insertions of requeued requests, without
 + * re-preparation, can happen only for pass_through or at_head
 + * requests (which are not re-inserted into bfq internal
 + * queues).
 + */
 rq->elv.priv[0] = NULL;
 rq->elv.priv[1] = NULL;
}
@@ -4640,8 +4720,16 @@
bool new_queue = false;
bool bfqq_already_existing = false, split = false;

#if (!rq->elv.icq)
+/*
+ * Even if we don't have an icq attached, we should still clear
+ * the scheduler pointers, as they might point to previously
+ * allocated bic/bfqq structs.
+ */
+if (!rq->elv.icq) {
+rq->elv.priv[0] = rq->elv.priv[1] = NULL;
return;
+
bic = icq_to_bic(rq->elv.icq);

spin_lock_irq(&bfqd->lock);
@@ -4707,20 +4795,28 @@
spin_unlock_irq(&bfqd->lock);
}

-static void bfq_idle_slice_timer_body(struct bfq_queue *bfqq)
+static void
+bfq_idle_slice_timer_body(struct bfq_data *bfqd, struct bfq_queue *bfqq)
{| -struct bfq_data *bfqd = bfqq->bfqd;
enum bfqq_expiration reason;
unsigned long flags;

spin_lock_irqs(&bfqd->lock, flags);
-bfq_clear_bfqq_wait_request(bfqq);
+
+/*
+ * Considering that bfqq may be in race, we should firstly check
+ * whether bfqq is in service before doing something on it. If
+ * the bfqq in race is not in service, it has already been expired
+ * through __bfq_bfqq_expire func and its wait_request flags has
+ * been cleared in __bfq_bfqd_reset_in_service func.
+ */
if (bfqq != bfqd->in_service_queue) {
spin_unlock_irqrestore(&bfqd->lock, flags);
return;
}

+bfq_clear_bfqq_wait_request(bfqq);
+
if (bfq_bfqq_budget_timeout(bfqq))
+/*
+ * Also here the queue can be safely expired
if (bfqq)
  -bfq_idle_slice_timer_body(bfq);
  +bfq_idle_slice_timer_body(bfqd, bfqq);

return HRTIMER_NORESTART;
}

static struct elevator_type iosched_bfq_mq = {
  .ops.mq = {
    .prepare_request= bfq_prepare_request,
    .finish_request= bfq_finish_request,
    +.requeue_request = bfq_finish_requeue_request,
    +.finish_request= bfq_finish_requeue_request,
    .exit_icq= bfq_exit_icq,
    .insert_requests= bfq_insert_requests,
    .dispatch_request= bfq_dispatch_request,
    --- linux-4.15.0.orig/block/bfq-wf2q.c
    +++ linux-4.15.0/block/bfq-wf2q.c
    @@ -1171,10 +1171,17 @@
    st = bfq_entity_service_tree(entity);
    is_in_service = entity == sd->in_service_entity;

    -if (is_in_service) {
    -bfq_calc_finish(entity, entity->service);
    +bfq_calc_finish(entity, entity->service);
    +
    +if (is_in_service)
    +sd->in_service_entity = NULL;
    -}
    +else
    +/*
    + * Non in-service entity: nobody will take care of
    + * resetting its service counter on expiration. Do it
    + * now.
    + */
    +entity->service = 0;

    if (entity->tree == &st->active)
    bfq_active_extract(st, entity);
    --- linux-4.15.0.orig/block/bio-integrity.c
    +++ linux-4.15.0/block/bio-integrity.c
    @@ -313,8 +313,11 @@
    ret = bio_integrity_add_page(bio, virt_to_page(buf),
          bytes, offset);
-if (ret == 0)
-    return false;
+if (ret == 0) {
+    printk(KERN_ERR "could not attach integrity payload\n");
+    status = BLK_STS_Resource;
+    goto err_end_io;
+}

if (ret < bytes)
    break;
--- linux-4.15.0.orig/block/bio.c
+++ linux-4.15.0/block/bio.c
@@ -43,9 +43,9 @@
 * break badly! cannot be bigger than what you can fit into an
 * unsigned short
 */
-#define BV(x) { .nr_vecs = x, .name = "biovec-"__stringify(x) }
+#define BV(x, n) { .nr_vecs = x, .name = "biovec-"#n }
static struct biovec_slab bvec_slabs[BVEC_POOL_NR] __read_mostly = {
    -BV(1), BV(4), BV(16), BV(64), BV(128), BV(BIO_MAX_PAGES),
    +BV(1, 1), BV(4, 4), BV(16, 16), BV(64, 64), BV(128, 128), BV(BIO_MAX_PAGES, max),
};
#undef BV
@@ -156,7 +156,7 @@
unsigned int bvec_nr_vecs(unsigned short idx)
}{
    -return bvec_slabs[idx].nr_vecs;
+    return bvec_slabs[--idx].nr_vecs;
}

void bvec_free(mempool_t *pool, struct bio_vec *bv, unsigned int idx)
@@ -312,7 +312,7 @@
{
    struct bio *parent = bio->bi_private;

    -if (!parent->bi_status)
+    if (bio->bi_status && !parent->bi_status)
        parent->bi_status = bio->bi_status;
    bio_put(bio);
    return parent;
@@ -773,7 +773,7 @@
    return 0;
}

    -if (bio->bi_vcnt >= bio->bi_max_vecs)
+    if (bio_full(bio))

return 0;

/**
 * bio_add_page-attempt to add page to bio
 * @bio: destination bio
 * @page: page to add
 * @len: vec entry length
 * @offset: vec entry offset
 */

/*
 * cloned bio must not modify vec list
 */

int bio_add_page(struct bio *bio, struct page *page,
 unsigned int len, unsigned int offset)

bool __bio_try_merge_page(struct bio *bio, struct page *page,
 unsigned int len, unsigned int off)
-if (page == bv->bv_page &&
 - offset == bv->bv_offset + bv->bv_len) {
+if (page == bv->bv_page && off == bv->bv_offset + bv->bv_len) {
  bv->bv_len += len;
-goto done;
+bio->bi_iter.bi_size += len;
+return true;
}
+return false;
+
+EXPORT_SYMBOL_GPL(__bio_try_merge_page);

-if (bio->bi_vcnt >= bio->bi_max_vecs)
-return 0;
+/**
+ * __bio_add_page - add page to a bio in a new segment
+ * @bio: destination bio
+ * @page: page to add
+ * @len: length of the data to add
+ * @off: offset of the data in @page
+ *
+ * Add the data at @page + @off to @bio as a new bvec. The caller must ensure
+ * that @bio has space for another bvec.
+ */
+void __bio_add_page(struct bio *bio, struct page *page,
+unsigned int len, unsigned int off)
+{
+struct bio_vec *bv = &bio->bi_io_vec[bio->bi_vcnt];

-bv= &bio->bi_io_vec[bio->bi_vcnt];
-bv->bv_page= page;
-bv->bv_len= len;
-bv->bv_offset= offset;
+WARN_ON_ONCE(bio_flagged(bio, BIO_CLONED));
+WARN_ON_ONCE(bio_full(bio));
+
+bv->bv_page = page;
+bv->bv_offset = off;
+bv->bv_len = len;

-bio->bi_vcnt++;
-done:
bio->bi_iter.bi_size += len;
+bio->bi_vcnt++;
+
+EXPORT_SYMBOL_GPL(__bio_add_page);
/**
 * bio_add_page - attempt to add page to bio
 * @bio: destination bio
 * @page: page to add
 * @len: vec entry length
 * @offset: vec entry offset
 *
 * Attempt to add a page to the bio_vec maplist. This will only fail
 * if either bio->bi_vcnt == bio->bi_max_vecs or it's a cloned bio.
 *
 * @bio: bio to add pages to
 * @iter: iov iterator describing the region to be mapped
 *
 * Pins as many pages from *iter and appends them to @bio's bvec array. The
 * pages will have to be released using put_page() when done.
 * For multi-segment *iter, this function only adds pages from the
 * the next non-empty segment of the iov iterator.
 */
int bio_add_page(struct bio *bio, struct page *page,
	unsigned int len, unsigned int offset)
{
  if (!__bio_try_merge_page(bio, page, len, offset)) {
    if (bio_full(bio))
      return 0;
    __bio_add_page(bio, page, len, offset);
  }
  return len;
}
EXPORT_SYMBOL(bio_add_page);

/**
 * bio_iov_iter_get_pages - pin user or kernel pages and add them to a bio
 * __bio_iov_iter_get_pages - pin user or kernel pages and add them to a bio
 * @bio: bio to add pages to
 * @iter: iov iterator describing the region to be mapped
 *
 * Pins as many pages from *iter and appends them to @bio's bvec array. The
 * pages will have to be released using put_page() when done.
 * For multi-segment *iter, this function only adds pages from the
 * the next non-empty segment of the iov iterator.
 */
int bio_iov_iter_get_pages(struct bio *bio, struct iov_iter *iter)
{
  unsigned short nr_pages = bio->bi_max_vecs - bio->bi_vcnt;
  struct bio_vec *bv = bio->bi_io_vec + bio->bi_vcnt, idx;
  struct page **pages = (struct page **)bv;
  size_t offset, diff;
  size_t offset;
  ssize_t size;

  size = iov_iter_get_pages(iter, pages, LONG_MAX, nr_pages, &offset);
  if (unlikely(size <= 0))
return size ? size : -EFAULT;
-nr_pages = (size + offset + PAGE_SIZE - 1) / PAGE_SIZE;
+idx = nr_pages = (size + offset + PAGE_SIZE - 1) / PAGE_SIZE;

/*
 * Deep magic below: We need to walk the pinned pages backwards
 */
@@ -903,21 +935,46 @@
bio->bi_iter.bi_size += size;
bio->bi_vcnt += nr_pages;

-diff = (nr_pages * PAGE_SIZE - offset) - size;
-while (nr_pages--) {
-    bv[nr_pages].bv_page = pages[nr_pages];
-    bv[nr_pages].bv_len = PAGE_SIZE;
-    bv[nr_pages].bv_offset = 0;
+while (idx--) {
+    bv[idx].bv_page = pages[idx];
+    bv[idx].bv_len = PAGE_SIZE;
+    bv[idx].bv_offset = 0;
}

bv[0].bv_offset += offset;
bv[0].bv_len -= offset;
-if (diff)
-    bv[bio->bi_vcnt - 1].bv_len -= diff;
+bv[nr_pages - 1].bv_len -= nr_pages * PAGE_SIZE - offset - size;

iov_iter_advance(iter, size);
return 0;
}
+
+/**
+ * bio_iov_iter_get_pages - pin user or kernel pages and add them to a bio
+ * @bio: bio to add pages to
+ * @iter: iov iterator describing the region to be mapped
+ *
+ * Pins pages from *iter and appends them to @bio's bvec array. The
+ * pages will have to be released using put_page() when done.
+ * The function tries, but does not guarantee, to pin as many pages as
+ * fit into the bio, or are requested in *iter, whatever is smaller.
+ * If MM encounters an error pinning the requested pages, it stops.
+ * Error is returned only if 0 pages could be pinned.
+ */
+int bio_iov_iter_get_pages(struct bio *bio, struct iov_iter *iter)
+{
+    unsigned short orig_vcnt = bio->bi_vcnt;
+    unsigned short orig_pages = bio->bi_iter.bi_size;
+    
+    do {

int ret = __bio_iov_iter_get_pages(bio, iter);
+
+if (unlikely(ret))
+return bio->bi_vcnt > orig_vcnt ? 0 : ret;
+
+} while (iov_iter_count(iter) & & !bio_full(bio));
+
+return 0;
+
EXPORT_SYMBOL_GPL(bio_iov_iter_get_pages);

static void submit_bio_wait_endio(struct bio *bio)
@@ -1259,8 +1316,11 @@
{
}

-if (bio_add_pc_page(q, bio, page, bytes, offset) < bytes)
+if (bio_add_pc_page(q, bio, page, bytes, offset) < bytes) {
+if (!map_data)
+__free_page(page);
+break;
+
len -= bytes;
offset = 0;
@@ -1281,6 +1341,8 @@
if (ret)
goto cleanup;
} else {
+if (bmd->is_our_pages)
+zero_fill_bio(bio);
iov_iter_advance(iter, bio->bi_iter.bi_size);
}

@@ -1836,9 +1898,10 @@
bio_integrity_trim(split);

bio_advance(bio, split->bi_iter.bi_size);
+bio->bi_iter.bi_done = 0;

if (bio_flagged(bio, BIO_TRACE_COMPLETION))
-bio_set_flag(bio, BIO_TRACE_COMPLETION);
+bio_set_flag(split, BIO_TRACE_COMPLETION);

return split;
}
--- linux-4.15.0.orig/block/blk-cgroup.c
+++ linux-4.15.0/block/blk-cgroup.c
@@ -872,13 +872,20 @@
goto fail;
}

+if (radix_tree_preload(GFP_KERNEL)) {
+blkg_free(new_blkg);
+ret = -ENOMEM;
+goto fail;
+
+rcu_read_lock();
spin_lock_irq(q->queue_lock);

blkg = blkg_lookup_check(pos, pol, q);
if (IS_ERR(blkg)) {
ret = PTR_ERR(blkg);
-goto fail_unlock;
+blkg_free(new_blkg);
+goto fail_preloaded;
}

if (blkg) {
@@ -887,10 +894,12 @@
blkg = blkg_create(pos, q, new_blkg);
if (unlikely(IS_ERR(blkg))) {
ret = PTR_ERR(blkg);
-goto fail_unlock;
+blkg_free(new_blkg);
+goto fail_preloaded;
}
}

+radix_tree_preload_end();
+
if (pos == blkcg)
goto success;
}
@@ -900,6 +909,8 @@
ctx->body = body;
return 0;

+fail_preloaded:
+radix_tree_preload_end();
fail_unlock:
spin_unlock_irq(q->queue_lock); 
rcu_read_unlock();
@@ -1149,18 +1160,16 @@
rcu_read_lock();
spin_lock_irq(q->queue_lock);
blk = blkg_create(&blkcg_root, q, new_blk);
+if (IS_ERR(blkg))
+goto err_unlock;
+q->root_blk = blk;
+q->root_rl.blkg = blk;
spin_unlock_irq(q->queue_lock);
rcu_read_unlock();

if (preloaded)
radix_tree_preload_end();

-if (IS_ERR(blkg))
-return PTR_ERR(blkg);
-
-q->root_blk = blk;
-q->root_rl.blkg = blk;
-
ret = blk_throtl_init(q);
if (ret) {
spin_lock_irq(q->queue_lock);
@@ -1168,6 +1177,13 @@
spin_unlock_irq(q->queue_lock);
} return ret;
+
+err_unlock:
+spin_unlock_irq(q->queue_lock);
+rcu_read_unlock();
+if (preloaded)
+radix_tree_preload_end();
+return PTR_ERR(blkg);
}

/**
@@ -1374,17 +1390,12 @@
__clear_bit(pol->plid, q->blkcg_pols);

list_for_each_entry(blkg, &q->blkcg_list, q_node) {
-/* grab blkcg lock too while removing @pd from @blkcg */
-spin_lock(&blkcg->lock);
-
if (blkg->pd[pol->plid]) {
  if (pol->pd_offline_fn)
    pol->pd_offline_fn(blkg->pd[pol->plid]);
  blkg->pd[pol->plid] = NULL;
}
spin_unlock(&blkg->blkcg->lock);
}

spin_unlock_irq(q->queue_lock);
--- linux-4.15.0.orig/block/blk-core.c
+++ linux-4.15.0/block/blk-core.c
@@ -143,6 +143,7 @@
    [BLK_STS_MEDIUM] = { -ENODATA, "critical medium" },
    [BLK_STS_PROTECTION] = { -EILSEQ, "protection" },
    [BLK_STS_RESOURCE] = { -ENOMEM, "kernel resource" },
+   [BLK_STS_DEV_RESOURCE] = { -EBUSY, "device resource" },
    [BLK_STS_AGAIN] = { -EAGAIN, "nonblocking retry" },

 /* device mapper special case, should not leak out: */
@@ -339,7 +340,6 @@
 struct blk_mq_hw_ctx *hctx;
 int i;

-cancel_delayed_work_sync(&q->requeue_work);
 queue_for_each_hw_ctx(q, hctx, i)
 cancel_delayed_work_sync(&hctx->run_work);
 } else {
@@ -699,6 +699,18 @@
 queue_flag_set(QUEUE_FLAG_DEAD, q);
 spin_unlock_irq(lock);
+
 */
+ * make sure all in-progress dispatch are completed because
+ * blk_freeze_queue() can only complete all requests, and
+ * dispatch may still be in-progress since we dispatch requests
+ * from more than one contexts.
+ *
+ * We rely on driver to deal with the race in case that queue
+ * initialization isn't done.
+ */
+if (q->mq_ops && blk_queue_init_done(q))
+   blk_mq_quiesce_queue(q);
+
+ /* for synchronous bio-based driver finish in-flight integrity i/o */
+   blk_flush_integrity();
@@ -707,7 +719,8 @@
 blk_sync_queue(q);

    if (q->mq_ops)
-   blk_mq_free_queue(q);
+   blk_mq_exit_queue(q);
+   blk_mq_free_queue(q);

percpu_ref_exit(&q->q_usage_counter);

spin_lock_irq(lock);
@@ -812,9 +825,8 @@
while (true) {
    bool success = false;
    -int ret;
    +int ret = 0;

    -rcu_read_lock_sched();
    +rcu_read_lock();
    if (percpu_ref_tryget_live(&q->q_usage_counter)) {
        /*
         * The code that sets the PREEMPT_ONLY flag is
         @ @ -827,7 +839,7 @@
         percpu_ref_put(&q->q_usage_counter);
         */
    }
    -rcu_read_unlock_sched();
    +rcu_read_unlock();

    if (success)
        return 0;
    @@ -844,14 +856,12 @@
        /*
         * The code that sets the PREEMPT_ONLY flag is
         @ @ -827,7 +839,7 @@
         percpu_ref_put(&q->q_usage_counter);
         */
    }
    -rcu_read_unlock_sched();
    +rcu_read_unlock();

    if (success)
        return 0;
    @@ -859,7 +871,7 @@
    }
    }

    -ret = wait_event_interruptible(q->mq_freeze_wq,
    -(atomic_read(&q->mq_freeze_depth) == 0 &&
     - (preempt || !blk_queue_preempt_only(q))) ||
    -blk_queue_dying(q));
    +wait_event(q->mq_freeze_wq,
    + (atomic_read(&q->mq_freeze_depth) == 0 &&
    + (preempt || !blk_queue_preempt_only(q))) ||
    + blk_queue_dying(q));
    if (blk_queue_dying(q))
        return -ENODEV;
    -if (ret)
    -return ret;
    }
}

@@ -875,6 +885,10 @@
kblockd_schedule_work(&q->timeout_work);
}

+static void blk_timeout_work_dummy(struct work_struct *work) {
+{

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```
+}
+
struct request_queue *blk_alloc_queue_node(gfp_t gfp_mask, int node_id)
{
    struct request_queue *q;

    q->backing_dev_info->ra_pages =
        (VM_MAX_READAHEAD * 1024) / PAGE_SIZE;
    q->backing_dev_info->io_pages =
        (VM_MAX_READAHEAD * 1024) / PAGE_SIZE;
    q->backing_dev_info->capabilities = BDI_CAP_CGROUP_WRITEBACK;
    q->backing_dev_info->name = "block";
    q->node = node_id;

    timer_setup(&q->backing_dev_info->laptop_mode_wb_timer,
                laptop_mode_timer_fn, 0);
    timer_setup(&q->timeout, blk_rq_timed_out_timer, 0);

    INIT_WORK(&q->timeout_work, blk_timeout_work_dummy);
    INIT_LIST_HEAD(&q->queue_head);
    INIT_LIST_HEAD(&q->timeout_list);
    INIT_LIST_HEAD(&q->icq_list);

    WARN_ON_ONCE(q->mq_ops);

    -q->fq = blk_alloc_flush_queue(q, NUMA_NO_NODE, q->cmd_size);
    +q->fq = blk_alloc_flush_queue(q, NUMA_NO_NODE, q->cmd_size, GFP_KERNEL);
    if (!q->fq)
        return -ENOMEM;

    out_free_flush_queue:
    blk_free_flush_queue(q->fq);
    +q->fq = NULL;
    return -ENOMEM;

} EXPORT_SYMBOL(blk_init_allocated_queue);
```

```
unsigned int count;
if (unlikely(bio_op(bio) == REQ_OP_WRITE_SAME))
    -count = queue_logical_block_size(bio->bi_disk->queue);
    +count = queue_logical_block_size(bio->bi_disk->queue) >> 9;
else
    count = bio_sectors(bio);
```
bypass a potential scheduler on the bottom device for
insert. */
-blk_mq_request_bypass_insert(rq, true);
-return BLK_STS_OK;
+return blk_mq_request_issue_directly(rq);
}

spin_lock_irqsave(q->queue_lock, flags);

if (bio_has_data(bio))
    rq->nr_phys_segments = bio_phys_segments(q, bio);
+else if (bio_op(bio) == REQ_OP_DISCARD)
    rq->nr_phys_segments = 1;

rq->__data_len = bio->bi_iter.bi_size;
rq->bio = rq->biotail = bio;

if (src->rq_flags & RQF_SPECIAL_PAYLOAD) {
    dst->rq_flags |= RQF_SPECIAL_PAYLOAD;
    dst->special_vec = src->special_vec;
}

void blk_pm_runtime_init(struct request_queue *q, struct device *dev)
{
    /* not support for RQF_PM and ->rpm_status in blk-mq yet */
    if (q->mq_ops) {
        pm_runtime_disable(dev);
        return;
    }
    q->dev = dev;
    q->rpm_status = RPM_ACTIVE;
}
--- linux-4.15.0.orig/block/blk-exec.c
+++ linux-4.15.0/block/blk-exec.c
@@ -61,7 +61,7 @@
*/
* be reused after dying flag is set
*/
if (q->mq_ops) {
    blk_mq_sched_insert_request(rq, at_head, true, false, false);
    blk_mq_sched_insert_request(rq, at_head, true, false);
    return;
}

--- linux-4.15.0.orig/block/blk-flush.c
+++ linux-4.15.0/block/blk-flush.c
@@ -419,7 +419,7 @@
    blk_flush_complete_seq(rq, fq, REQ_FSEQ_DATA, error);
    spin_unlock_irqrestore(&fq->mq_flush_lock, flags);
-	blk_mq_run_hw_queue(hctx, true);
+tblk_mq_sched_restart(hctx);
}

/**
@@ -561,12 +561,12 @@
 EXPORT_SYMBOL(blkdev_issue_flush);

 struct blk_flush_queue *blk_alloc_flush_queue(struct request_queue *q,
-    int node, int cmd_size)
+    int node, int cmd_size, gfp_t flags)
 {
    struct blk_flush_queue *fq;
    int rq_sz = sizeof(struct request);
-
    fq = kzalloc_node(sizeof(*fq), GFP_KERNEL, node);
+    fq = kzalloc_node(sizeof(*fq), flags, node);
    if (!fq)
        goto fail;

@@ -574,7 +574,7 @@
 spin_lock_init(&fq->mq_flush_lock);

    rq_sz = round_up(rq_sz + cmd_size, cache_line_size());
    -fq->flush_rq = kzalloc_node(rq_sz, GFP_KERNEL, node);
+    fq->flush_rq = kzalloc_node(rq_sz, flags, node);
    if (!fq->flush_rq)
        goto fail_rq;

--- linux-4.15.0.orig/block/blk-ioc.c
+++ linux-4.15.0/block/blk-ioc.c
@@ -87,6 +87,7 @@
 * making it impossible to determine icq_cache. Record it in @icq.
 */

icq->__rcu_icq_cache = et->icq_cache;
+icq->flags |= ICQ_DESTROYED;
call_rcu(&icq->__rcu_head, icq_free_icq_rcu);
}

@@ -230,15 +231,21 @@
{
 unsigned long flags;

 +rcu_read_lock();
 while (!list_empty(icq_list)) {
 struct io_cq *icq = list_entry(icq_list->next, 
     struct io_cq, q_node);
 struct io_context *ioc = icq->ioc;

 spin_lock_irqsave(&ioc->lock, flags);
+if (icq->flags & ICQ_DESTROYED) {
+spun_unlock_irqresto(&ioc->lock, flags);
+continue;
+}
 ioc_destroy_icq(icq);
 spin_unlock_irqrestore(&ioc->lock, flags);
 }
+rcu_read_unlock();
}

/**
 --- linux-4.15.0.orig/block/blb-lib.c
+++ linux-4.15.0/block/blb-lib.c
@@ -29,9 +29,7 @@
{
 struct request_queue *q = bdev_get_queue(bdev);
 struct bio *bio = *biop;
-unsigned int granularity;
 unsigned int op;
-unsigned int alignment;
 sector_t bs_mask;

 if (!q)
 @@ -51,30 +49,14 @@
if ((sector | nr_sects) & bs_mask)
 return -EINVAL;

-/* Zero-sector (unknown) and one-sector granularities are the same. */
-granularity = max(q->limits.discard_granularity >> 9, 1U);
-alignment = (bdev_discard_alignment(bdev) >> 9) % granularity;
+if (!nr_sects)
+return -EINVAL;

while (nr_sects) {
    unsigned int req_sects;
    sector_t end_sect, tmp;
    -
    -/* Make sure bi_size doesn't overflow */
    -req_sects = min_t(sector_t, nr_sects, UINT_MAX >> 9);
    +sector_t req_sects = min_t(sector_t, nr_sects,
    +bio_allowed_max_sectors(q));
    
    -/* If splitting a request, and the next starting sector would be
    - * misaligned, stop the discard at the previous aligned sector.
    - */
    -end_sect = sector + req_sects;
    -tmp = end_sect;
    -if (req_sects < nr_sects &&
    -   sector_div(tmp, granularity) != alignment) {
    -end_sect = end_sect - alignment;
    -sector_div(end_sect, granularity);
    -end_sect = end_sect * granularity + alignment;
    -req_sects = end_sect - sector;
    -}
    +WARN_ON_ONCE((req_sects << 9) > UINT_MAX);
    bio = next_bio(bio, 0, gfp_mask);
    bio->bi_iter.bi_sector = sector;
    @@ -82,8 +64,8 @@
    bio_set_op_attrs(bio, op, 0);
    bio->bi_iter.bi_size = req_sects << 9;
    +sector += req_sects;
    +nr_sects -= req_sects;
    -sector = end_sect;
    
    /*
    * We can loop for a long time in here, if someone does
    @@ -164,7 +146,7 @@
    return -EOPNOTSUPP;
    
    /* Ensure that max_write_same_sectors doesn't overflow bi_size */
    -max_write_same_sectors = UINT_MAX >> 9;
    +max_write_same_sectors = bio_allowed_max_sectors(q);
    
    while (nr_sects) {
        bio = next_bio(bio, 1, gfp_mask);
        --- linux-4.15.0.orig/block/blk-map.c
        +++ linux-4.15.0/block/blk-map.c

unsigned long align = q->dma_pad_mask | queue_dma_alignment(q);
struct bio *bio = NULL;
struct iov_iter i;
-int ret;
+int ret = -EINVAL;

if (!iter_is_iovec(iter))
goto fail;
@@ -145,10 +145,10 @@
return 0;

unmap_rq:
-__blk_rq_unmap_user(bio);
+blk_rq_unmap_user(bio);
fail:
rq->bio = NULL;
-return -EINVAL;
+return ret;
}
EXPORT_SYMBOL(blk_rq_map_user_iov);

--- linux-4.15.0.orig/block/blk-merge.c
+++ linux-4.15.0/block/blk-merge.c
@@ -27,7 +27,8 @@
/* Zero-sector (unknown) and one-sector granularities are the same. */
granularity = max(q->limits.discard_granularity >> 9, 1U);

-max_discard_sectors = min(q->limits.max_discard_sectors, UINT_MAX >> 9);
+max_discard_sectors = min(q->limits.max_discard_sectors, 
+bio_allowed_max_sectors(q));
max_discard_sectors -= max_discard_sectors % granularity;

if (unlikely(!max_discard_sectors)) {
@@ -299,13 +300,7 @@
void blk_recount_segments(struct request_queue *q, struct bio *bio)
{
-unsigned short seg_cnt;
-
-/* estimate segment number by bi_vcnt for non-cloned bio */
-if (bio_flagged(bio, BIO_CLONED))
-seg_cnt = bio_segments(bio);
-else
-seg_cnt = bio->bi_vcnt;
+unsigned short seg_cnt = bio_segments(bio);

if (test_bit(QUEUE_FLAG_NO_SG_MERGE, &q->queue_flags) &

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static int ll_merge_requests_fn(struct request_queue *q, struct request *req, struct request *next) {
    part_stat_unlock();
}

static inline bool blk_discard_mergable(struct request *req) {
    if (req_op(req) == REQ_OP_DISCARD && queue_max_discard_segments(req->q) > 1) {
        return true;
    }
    return false;
}

+static bool req_attempt_discard_merge(struct request_queue *q, struct request *req, struct request *next) {
+{
+    unsigned short segments = blk_rq_nr_discard_segments(req);
+    if (segments >= queue_max_discard_segments(q))
+        goto no_merge;
+    if (blk_rq_sectors(req) + bio_sectors(next->bio) > blk_rq_get_max_sectors(req, blk_rq_pos(req)))
+        goto no_merge;
+    req->nr_phys_segments = segments + blk_rq_nr_discard_segments(next);
+    return true;
+no_merge:
+    req_set_nomerge(q, req);
+    return false;
+}
+if (blk_discard_mergable(req))
+return ELEVATOR_DISCARD_MERGE;
+else if (blk_rq_pos(req) + blk_rq_sectors(req) == blk_rq_pos(next))
+return ELEVATOR_BACK_MERGE;
+
+return ELEVATOR_NO_MERGE;
+
} /*
 * For non-mq, this has to be called with the request spinlock acquired.
@@ -658,12 +696,6 @@
if (req_op(req) != req_op(next))
return NULL;

-/*
- /* not contiguous
- */
-if (blk_rq_pos(req) + blk_rq_sectors(req) != blk_rq_pos(next))
-return NULL;
-
-if (rq_data_dir(req) != rq_data_dir(next)
   || req->rq_disk != next->rq_disk
   || req_no_special_merge(next))
@@ -684,10 +716,22 @@
* If we are allowed to merge, then append bio list
* from next to rq and release next. merge_requests_fn
* will have updated segment counts, update sector
- * counts here.
+ * counts here. Handle DISCARDs separately, as they
+ * have separate settings.
- */
-if (!ll_merge_requests_fn(q, req, next))
+
+switch (blk_try_req_merge(req, next)) {
+case ELEVATOR_DISCARD_MERGE:
+if (!req_attempt_discard_merge(q, req, next))
+return NULL;
+break;
+case ELEVATOR_BACK_MERGE:
+if (!ll_merge_requests_fn(q, req, next))
+return NULL;
+break;
+default:
+return NULL;
+
+}

/*
 * If failfast settings disagree or any of the two is already
req->__data_len += blk_rq_bytes(next);

-elv_merge_requests(q, req, next);
+if (!blk_discard_mergable(req))
+elv_merge_requests(q, req, next);

/*
 * 'next' is going away, so update stats accordingly

enum elv_merge blk_try_merge(struct request *rq, struct bio *bio)
{
    -if (req_op(rq) == REQ_OP_DISCARD &&
        queue_max_discard_segments(rq->q) > 1)
    +if (blk_discard_mergable(rq))
        return ELEVATOR_DISCARD_MERGE;
    else if (blk_rq_pos(rq) + blk_rq_sectors(rq) == bio->bi_iter.bi_sector)
        return ELEVATOR_BACK_MERGE;

static int cpu_to_queue_index(unsigned int nr_queues, const int cpu)
{
    /*
     * Non present CPU will be mapped to queue index 0.
     */
    -if (!cpu_present(cpu))
        -return 0;
    return cpu % nr_queues;
}

+static int hctx_dispatch_busy_show(void *data, struct seq_file *m)
+{
    +struct blk_mq_hw_ctx *hctx = data;
    +seq_printf(m, "%lu", hctx->dispatch_busy);
    +return 0;
    +}

--- linux-4.15.0.orig/block/blk-mq-cpumap.c
+++ linux-4.15.0/block/blk-mq-cpumap.c
@@ -16,11 +16,6 @@
 static int cpu_to_queue_index(unsigned int nr_queues, const int cpu)
 {
     /*
--- linux-4.15.0.orig/block/blk-mq-debugfs.c
+++ linux-4.15.0/block/blk-mq-debugfs.c
@@ -607,6 +607,14 @@
 return 0;
 }

+static int hctx_dispatch_busy_show(void *data, struct seq_file *m)
+{
    +struct blk_mq_hw_ctx *hctx = data;
    +seq_printf(m, "%lu", hctx->dispatch_busy);
    +return 0;
    +}

---
static void *ctx_rq_list_start(struct seq_file *m, loff_t *pos)
         __acquires(&ctx->lock)
{
   @@ -703,7 +711,11 @@
     const struct blk_mq_debugfs_attr *attr = m->private;
     void *data = d_inode(file->f_path.dentry->d_parent)->i_private;

-   if (!attr->write
+   /*
+    * Attributes that only implement .seq_ops are read-only and 'attr' is
+    * the same with 'data' in this case.
+    */
+   if (attr == data || !attr->write)
   return -EPERM;

   return attr->write(data, buf, count, ppos);
@@ -772,6 +784,7 @@
{
"queued", 0600, hctx_queued_show, hctx_queued_write},
{"run", 0600, hctx_run_show, hctx_run_write},
{"active", 0400, hctx_active_show},
+{"dispatch_busy", 0400, hctx_dispatch_busy_show},
{},
};

--- linux-4.15.0.orig/block/blk-mq-sched.c
+++ linux-4.15.0/block/blk-mq-sched.c
@@ -81,6 +81,15 @@
} else
  clear_bit(BLK_MQ_S_SCHED_RESTART, &hctx->state);

+/*
+ * Order clearing SCHED_RESTART and list_empty_careful(&hctx->dispatch)
+ * in blk_mq_run_hw_queue(). Its pair is the barrier in
+ * blk_mq_dispatch_rq_list(). So dispatch code won't see SCHED_RESTART,
+ * meantime new request added to hctx->dispatch is missed to check in
+ * blk_mq_run_hw_queue().
+ */
+smp_mb();
+ return blk_mq_run_hw_queue(hctx, true);
}
- * If we need to get budget before queuing request, we
- * dequeue request one by one from sw queue for avoiding
- * to mess up I/O merge when dispatch runs out of resource.
- *
- * TODO: get more budgets, and dequeue more requests in
- * one time.
- */
+ } else if (hctx->dispatch_busy) {
+ /* dequeue request one by one from sw queue if queue is busy */
+ blk_mq_do_dispatch_ctx(hctx);
+ } else {
+ blk_mq_flush_busy_ctxs(hctx, &rq_list);
+ @@ -324,7 +326,8 @@
+ return e->type->ops.mq.bio_merge(hctx, bio);
+ }

-if (hctx->flags & BLK_MQ_F_SHOULD_MERGE) {
+if ((hctx->flags & BLK_MQ_F_SHOULD_MERGE) &&
+!list_empty_careful(&ctx->rq_list)) {
+ /* default per sw-queue merge */
+ spin_lock(&ctx->lock);
+ ret = blk_mq_attempt_merge(q, ctx, bio);
+ @@ -428,7 +431,7 @@
+ void blk_mq_sched_insert_request(struct request *rq, bool at_head,
+ - bool run_queue, bool async, bool can_block)
+ + bool run_queue, bool async)
+ {
+ struct request_queue *q = rq->q;
+ struct elevator_queue *e = q->elevator;
+ @@ -471,8 +474,19 @@
+ if (e && e->type->ops.mq.insert_requests)
+ e->type->ops.mq.insert_requests(hctx, list, false);
+ else
+ else {
+ /*
+ * try to issue requests directly if the hw queue isn't
+ * busy in case of 'none' scheduler, and this way may save
+ * us one extra enqueue & dequeue to sw queue.
+ */
+ if (!hctx->dispatch_busy && !e && !run_queue_async) {
+ blk_mq_try_issue_list_directly(hctx, list);
+ if (list_empty(list))
+ return;
+ }
+ blk_mq_insert_requests(hctx, ctx, list);
```c
void blk_mq_sched_insert_request(struct request *rq, bool at_head,
    bool run_queue, bool async, bool can_block);
void blk_mq_sched_insert_requests(struct request_queue *q,
    struct blk_mq_ctx *ctx,
    struct list_head *list, bool run_queue_async);
```

```
#include <linux/smp.h>
#include <linux/blk-mq.h>
#include "blk.h"
#include "blk-mq.h"
#include "blk-mq-tag.h"
```

```
static ssize_t blk_mq_hw_sysfs_cpus_show(struct blk_mq_hw_ctx *hctx, char *page) {
    const size_t size = PAGE_SIZE - 1;
    unsigned int i, first = 1;
    ssize_t ret = 0;
    int ret = 0, pos = 0;

    for_each_cpu(i, hctx->cpumask) {
        if (first)  ```
-ret += sprintf(ret + page, "%u", i);
+ret = snprintf(pos + page, size - pos, "%u", i);
else
-ret += sprintf(ret + page, ", %u", i);
+ret = snprintf(pos + page, size - pos, ", %u", i);
+
+if (ret >= size - pos)
+break;

first = 0;
+pos += ret;
}

-ret += sprintf(ret + page, 
);
-return ret;
+ret = snprintf(pos + page, size + 1 - pos, 
);
+return pos + ret;
}

static struct attribute *default_ctx_attrs[] = {
--- linux-4.15.0.orig/block/blk-mq-tag.c
+++ linux-4.15.0/block/blk-mq-tag.c
@@ -23,6 +23,9 @@
@@ -333,6 +336,13 @@
 struct blk_mq_tags *tags = hctx->tags;
@@ -348,7 +358,7 @@
 bt_for_each(hctx, &tags->breserved_tags, fn, priv, true);

/*
 * If a previously inactive queue goes active, bump the active user count.
 * We need to do this before try to allocate driver tag, then even if fail
 * to get tag when first time, the other shared-tag users could reserve
 * budget for it.
 */
bool __blk_mq_tag_busy(struct blk_mq_hw_ctx *hctx)
{
@@ -333,6 +336,13 @@
 struct blk_mq_tags *tags = hctx->tags;
 int i;

+/*
+ * __blk_mq_update_nr_hw_queues will update the nr_hw_queues and
+ * queue_hw_ctx after freeze the queue, so we use q_usage_counter
+ * to avoid race with it.
+ */
+if (!percpu_ref_tryget(&q->q_usage_counter))
+return;

 queue_for_each_hw_ctx(q, hctx, i) {
 struct blk_mq_tags *tags = hctx->tags;
@@ -348,7 +358,7 @@
 bt_for_each(hctx, &tags->breserved_tags, fn, priv, true);
bt_for_each(hctx, &tags->bitmap_tags, fn, priv, false);
}
-
+blk_queue_exit(q);
}

static int bt_alloc(struct sbitmap_queue *bt, unsigned int depth,  
  @@ -415,8 +425,6 @@
    if (tdepth <= tags->nr_reserved_tags)
        return -EINVAL;
-
    -tdepth -= tags->nr_reserved_tags;
-    
    /*
     * If we are allowed to grow beyond the original size, allocate
     * a new set of tags before freeing the old one.
     */  
    @@ -436,7 +444,8 @@
        if (tdepth > 16 * BLKDEV_MAX_RQ)
            return -EINVAL;
-
    -new = blk_mq_alloc_rq_map(set, hctx->queue_num, tdepth, 0);
-    +new = blk_mq_alloc_rq_map(set, hctx->queue_num, tdepth,
+    +tags->nr_reserved_tags);
    +
        if (!new)
            return -ENOMEM;
    ret = blk_mq_alloc_rqs(set, new, hctx->queue_num, tdepth);
@@ -453,7 +462,8 @@
    */
    -sbitmap_queue_resize(&tags->bitmap_tags, tdepth);
+    +sbitmap_queue_resize(&tags->bitmap_tags, 
+    +tdepth - tags->nr_reserved_tags);
    }
 return 0;
--- linux-4.15.0.orig/block/blk-mq.c  
+++ linux-4.15.0/block/blk-mq.c  
@@ -119,6 +119,25 @@
    blk_mq_queue_tag_busy_iter(q, blk_mq_check_inflight, &mi);
    }

+static void blk_mq_check_inflight_rw(struct blk_mq_hw_ctx *hctx,  
+    +struct request *rq, void *priv,
+    +    +bool reserved)
+    +{
+    +struct mq_inflight *mi = priv;
+    +

+if (rq->part == mi->part)  
+mi->inflight[rq_data_dir(rq)]++;  
+
+void blk_mq_in_flight_rw(struct request_queue *q, struct hd_struct *part,  
+ unsigned int inflight[2])  
+{  
+struct mq_inflight mi = { .part = part, .inflight = inflight, };  
+  
+inflight[0] = inflight[1] = 0;  
+blk_mq_queue_tag_busy_iter(q, blk_mq_check_inflight_rw, &mi);  
+}  
+
+void blk_freeze_queue_start(struct request_queue *q)  
{  
int freeze_depth;  
@@ -279,7 +298,7 @@  
rq->tag = -1;  
rq->internal_tag = tag;  
} else {  
-if (blk_mq_tag_busy(data->hctx)) {  
+if (data->hctx->flags & BLK_MQ_F_TAG_SHARED) {  
rq->rq_flags = RQF_MQ_INFLIGHT;  
atomic_inc(&data->hctx->nr_active);  
}  
@@ -357,6 +376,8 @@  */  
if (!op_is_flush(op) && e->type->ops.mq.limit_depth)  
e->type->ops.mq.limit_depth(op, data);  
} else {  
+blk_mq_tag_busy(data->hctx);  
}  

tag = blk_mq_get_tag(data);  
@@ -443,7 +464,7 @@  
blk_queue_exit(q);  
return ERR_PTR(-EXDEV);  
}  
-cpu = cpumask_first(alloc_data.hctx->cpumask);  
+cpu = cpumask_first_and(alloc_data.hctx->cpumask, cpu_online_mask);  
alloc_data.ctx = __blk_mq_get_ctx(q, cpu);  
}

rq = blk_mq_get_request(q, NULL, op, &alloc_data);  
@@ -559,6 +580,24 @@  
put_cpu();  
}

+static void hctx_unlock(struct blk_mq_hw_ctx *hctx, int srcu_idx)
static void hctx_lock(struct blk_mq_hw_ctx *hctx, int *srcu_idx)
{
    if (!(hctx->flags & BLK_MQ_F_BLOCKING)) {
        /* shut up gcc false positive */
        *srcu_idx = 0;
        rcu_read_lock();
    } else
        *srcu_idx = srcu_read_lock(hctx->queue_rq_srcu);
}

/**
 * blk_mq_complete_request - end I/O on a request
 * @rq: the request being processed
 */

trace_block_rq_requeue(q, rq);
wbt_requeue(q->rq_wb, &rq->issue_stat);
blk_mq_sched_requeue_request(rq);

if (test_and_clear_bit(REQ_ATOM_STARTED, &rq->atomic_flags)) {
    if (q->dma_drain_size && blk_rq_bytes(rq))
        __blk_mq_requeue_request(rq);
    else
    {
        /* this request will be re-inserted to io scheduler queue */
        blk_mq_sched_requeue_request(rq);
        BUG_ON(blk_queued_rq(rq));
        blk_mq_add_to_requeue_list(rq, true, kick_requeue_list);
    }
}

spin_unlock_irq(&q->requeue_lock);
list_for_each_entry_safe(rq, next, &rq_list, queuelist) {
    if (!(rq->rq_flags & (RQF_SOFTBARRIER | RQF_DONTPREP)))
        continue;
    rq->rq_flags &= ~RQF_SOFTBARRIER;
    list_del_init(&rq->queuelist);
blk_mq_sched_insert_request(rq, true, false, false, true);
+/
+ * If RQF_DONTPREP, rq has contained some driver specific
+ * data, so insert it to hctx dispatch list to avoid any
+ * merge.
+ */
+if (rq->rq_flags & RQF_DONTPREP)
+blk_mq_request_bypass_insert(rq, false);
+else
+blk_mq_sched_insert_request(rq, true, false, false);
}

while (!list_empty(&rq_list)) {
    rq = list_entry(rq_list.next, struct request, queuelist);
    list_del_init(&rq->queuelist);
    blk_mq_sched_insert_request(rq, false, false, false, true);
    blk_mq_sched_insert_request(rq, false, false, false);
}

blk_mq_run_hw_queues(q, false);
@@ -729,7 +778,7 @@
}

void blk_mq_kick_requeue_list(struct request_queue *q)
{
    -kblockd_schedule_delayed_work(&q->requeue_work, 0);
+ kblockd_mod_delayed_work_on(WORK_CPU_UNBOUND, &q->requeue_work, 0);
}
://blk_mq_kick_requeue_list:
EXPORT_SYMBOL(blk_mq_kick_requeue_list);

@@ -972,6 +1021,7 @@
    .hctx = blk_mq_map_queue(rq->q, rq->mq_ctx->cpu),
    .flags = wait ? 0 : BLK_MQ_REQ_NOWAIT,
    ];
+bool shared;

    might_sleep_if(wait);

@@ -981,9 +1031,10 @@
if (blk_mq_tag_is_reserved(data.hctx->sched_tags, rq->internal_tag))
data.flags |= BLK_MQ_REQ_RESERVED;
+shared = blk_mq_tag_busy(data.hctx);
    rq->tag = blk_mq_get_tag(&data);
    if (rq->tag >= 0) {
        -if (blk_mq_tag_busy(data.hctx)) {
+if (shared) {
            rq->rq_flags |= RQF_MQ_INFLIGHT;
            atomic_inc(&data.hctx->nr_active);
+static void blk_mq_update_dispatch_busy(struct blk_mq_hw_ctx *hctx, bool busy)
+
+{ signed int ewma;
+ if (!hctx->queue->elevator)
+ return;
+
+ ewma = hctx->dispatch_busy;
+ if (!ewma && !busy)
+ return;
+ ewma *= BLK_MQ_DISPATCH_BUSY_EWMA_WEIGHT - 1;
+ if (busy)
+ ewma += 1 << BLK_MQ_DISPATCH_BUSY_EWMA_FACTOR;
+ ewma /= BLK_MQ_DISPATCH_BUSY_EWMA_WEIGHT;
+ hctx->dispatch_busy = ewma;
+ }
+
+static void blk_mq_handle_dev_resource(struct request *rq,
+ list_head *list)
+
+{ struct list_head *next =
+ list_first_entry_or_null(list, struct request, queuelist);
+ +*/
+ if (next)
+ blk_mq_put_driver_tag(next);
+*/
+}
+  +list_add(&rq->queuelist, list);  
+__blk_mq_requeue_request(rq);  
+}  
+  */
+ * Returns true if we did some work AND can potentially do more.
+ */
bool blk_mq_dispatch_rq_list(struct request_queue *q, struct list_head *list,
    bool got_budget)
{
   @@ -1079,6 +1181,7 @@
              struct request *rq, *nxt;
    bool no_tag = false;
    int errors, queued;
    +blk_status_t ret = BLK_STS_OK;

    if (list_empty(list))
        return false;
    @@ -1091,10 +1194,14 @@
            errors = queued = 0;
            do {
                struct blk_mq_queue_data bd;
                -blk_status_t ret;

                rq = list_first_entry(list, struct request, queuelist);
                -if (!blk_mq_get_driver_tag(rq, &hctx, false)) {
                +
                    hctx = blk_mq_map_queue(rq->q, rq->mq_ctx->cpu);
                    +if (!got_budget && !blk_mq_get_dispatch_budget(hctx))
                        +break;
                    +
                    +if (!blk_mq_get_driver_tag(rq, NULL, false)) {
                        /*
                         * The initial allocation attempt failed, so we need to
                         * rerun the hardware queue when a tag is freed. The
                         @@ -1103,8 +1210,7 @@
                         * we'll re-run it below.
                         */
                        if (!blk_mq_mark_tag_wait(&hctx, rq)) {
                            /*
                             * For non-shared tags, the RESTART check
                             * will suffice.
                             @@ -1115,11 +1221,6 @@
                            }
                        }
                    }
                }
            }

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if (!got_budget && !blk_mq_get_dispatch_budget(hctx)) {
  blk_mq_put_driver_tag(rq);
  break;
}

list_del_init(&rq->queuelist);

bd.rq = rq;
@@ -1136,18 +1237,8 @@
ret = q->mq_ops->queue_rq(hctx, &bd);
- if (ret == BLK_STS_RESOURCE) {
- /*
-  * If an I/O scheduler has been configured and we got a
-  * driver tag for the next request already, free it
-  * again.
- */
- if (!list_empty(list)) {
-   nxt = list_first_entry(list, struct request, queuelist);
-   blk_mq_put_driver_tag(nxt);
- } 
- list_add(&rq->queuelist, list);
- __blk_mq_requeue_request(rq);
+ if (ret == BLK_STS_RESOURCE || ret == BLK_STS_DEV_RESOURCE) {
+ blk_mq_handle_dev_resource(rq, list);
  break;
}

@@ -1167,11 +1258,22 @@
 * that is where we will continue on next queue run.
 */
 if (!list_empty(list)) {
+ bool needs_restart;
+ spin_lock(&hctx->lock);
  list_splice_init(list, &hctx->dispatch);
  spin_unlock(&hctx->lock);

  /*
  * Order adding requests to hctx->dispatch and checking
  * SCHED_RESTART flag. The pair of this smp_mb() is the one
  * in blk_mq_sched_restart(). Avoid restart code path to
  * miss the new added requests to hctx->dispatch, meantime
  * SCHED_RESTART is observed here.
  */

/* If SCHED_RESTART was set by the caller of this function and
* it is no longer set that means that it was cleared by another
* thread and hence that a queue rerun is needed.
*/

/* Some but not all block drivers stop a queue before
* returning BLK_STSRESOURCE. Two exceptions are scsi-mq
* and dm-rq.
*/

/* If driver returns BLK_STSRESOURCE and SCHED_RESTART
* bit is set, run queue after a delay to avoid IO stalls
* that could otherwise occur if the queue is idle.
*/

- if (!blk_mq_sched_needs_restart(hctx) ||
needs_restart = blk_mq_sched_needs_restart(hctx);
+ if (!needs_restart ||
(no_tag && list_empty_careful(&hctx->dispatch_wait.entry)))
blk_mq_run_hw_queue(hctx, true);
-
+ else if (needs_restart && (ret == BLK_STSRESOURCE))
+ blk_mq_delay_run_hw_queue(hctx, BLK_MQRESOURCE_DELAY);
+ blk_mq_update_dispatch_busy(hctx, true);
+ return false;
+ } else
+ blk_mq_update_dispatch_busy(hctx, false);
+
+ /*
+ * If the host/device is unable to accept more work, inform the
+ * caller of that.
+ */
+ if (ret == BLK_STSRESOURCE || ret == BLK_STSDEVRESOURCE)
+ return false;

return (queued + errors) != 0;
}

/*
* We should be running this queue from one of the CPUs that
* are mapped to it.
*/

-WARN_ON(!cpumask_test_cpu(raw_smp_processor_id(), hctx->cpumask) &&
-cpu_online(hctx->next_cpu));
+
+ * There are at least two related races now between setting
+ hctx->next_cpu from blk_mq_hctx_next_cpu() and running
+ * __blk_mq_run_hw_queue():
+ *
+ * - hctx->next_cpu is found offline in __blk_mq_hctx_next_cpu(),
+ * but later it becomes online, then this warning is harmless
+ * at all
+ *
+ * - hctx->next_cpu is found online in __blk_mq_hctx_next_cpu(),
+ * but later it becomes offline, then the warning can't be
+ * triggered, and we depend on blk-mq timeout handler to
+ * handle dispatched requests to this hctx
+ */
+ if (!cpumask_test_cpu(raw_smp_processor_id(), hctx->cpumask) &&
+ cpu_online(hctx->next_cpu)) {
+ printk(KERN_WARNING "run queue from wrong CPU %d, hctx %s\n",
+ raw_smp_processor_id(),
+ cpumask_empty(hctx->cpumask) ? "inactive": "active");
+ dump_stack();
+ }
+ /*
+ * We can't run the queue inline with ints disabled. Ensure that
+ * @ @ -1216,17 +1354,20 @ @
+ */
+ WARN_ON_ONCE(in_interrupt());
+
- if (!((hctx->flags & BLK_MQ_F_BLOCKING)) { 
- rcu_read_lock();
- blk_mq_sched_dispatch_requests(hctx);
- rcu_read_unlock();
- } else { 
- might_sleep();
- might_sleep_if(hctx->flags & BLK_MQ_F_BLOCKING);
+
-srcu_idx = srcu_read_lock(hctx->queue_rq_srcu);
-blk_mq_sched_dispatch_requests(hctx);
-srcu_read_unlock(hctx->queue_rq_srcu, srcu_idx);
-}
+ hctx_lock(hctx, &srcu_idx);
+ blk_mq_sched_dispatch_requests(hctx);
+ hctx_unlock(hctx, srcu_idx);
+ }
+ +
+ static inline int blk_mq_first_mapped_cpu(struct blk_mq_hw_ctx *hctx)
+ {
+ int cpu = cpumask_first_and(hctx->cpumask, cpu_online_mask);
+ if (cpu >= nr_cpu_ids)
+ cpu = cpumask_first(hctx->cpumask);
+return cpu;
}

/*
@@ -1237,29 +1378,47 @@
*/
static int blk_mq_hctx_next_cpu(struct blk_mq_hw_ctx *hctx)
{
    bool tried = false;
    int next_cpu = hctx->next_cpu;
    +
    if (hctx->queue->nr_hw_queues == 1)
        return WORK_CPU_UNBOUND;

    if (~hctx->next_cpu_batch <= 0) {
        -int next_cpu;
        -
        -next_cpu = cpumask_next(hctx->next_cpu, hctx->cpumask);
        +select_cpu:
        +next_cpu = cpumask_next_and(next_cpu, hctx->cpumask,
        +cpu_online_mask);
        if (next_cpu >= nr_cpu_ids)
            -next_cpu = cpumask_first(hctx->cpumask);
        +next_cpu = blk_mq_first_mapped_cpu(hctx);
        +hctx->next_cpu_batch = BLK_MQ_CPU_WORK_BATCH;
        +
    }

    +/
    + * Do unbound schedule if we can't find a online CPU for this hctx,
    + * and it should only happen in the path of handling CPU DEAD.
    + */
    +if (!cpu_online(next_cpu)) {
    +if (!tried) {
        +tried = true;
        +goto select_cpu;
    +}
    +
    +/
    + * Make sure to re-select CPU next time once after CPUs
    + * in hctx->cpumask become online again.
    + */
    hctx->next_cpu = next_cpu;
    -hctx->next_cpu_batch = BLK_MQ_CPU_WORK_BATCH;
    +hctx->next_cpu_batch = 1;
    +return WORK_CPU_UNBOUND;
}

-return hctx->next_cpu;

+hctx->next_cpu = next_cpu;
+return next_cpu;
}

static void __blk_mq_delay_run_hw_queue(struct blk_mq_hw_ctx *hctx, bool async,
unsigned long msecs)
{
- if (WARN_ON_ONCE(!blk_mq_hw_queue_mapped(hctx)))
- return;
-
- if (unlikely(blk_mq_hctx_stopped(hctx)))
  return;

@@ -1274,9 +1433,8 @@
  put_cpu();
}
-kblockd_schedule_delayed_work_on(blk_mq_hctx_next_cpu(hctx),
- &hctx->run_work,
- msecs_to_jiffies(msecs));
+blockd_mod_delayed_work_on(blk_mq_hctx_next_cpu(hctx), &hctx->run_work,
+ msecs_to_jiffies(msecs));
}

void blk_mq_delay_run_hw_queue(struct blk_mq_hw_ctx *hctx, unsigned long msecs)
@@ -1287,7 +1445,23 @@

bool blk_mq_run_hw_queue(struct blk_mq_hw_ctx *hctx, bool async)
{
- if (blk_mq_hctx_has_pending(hctx)) {
+ int srcu_idx;
  +bool need_run;
  +
+ /*
+ * When queue is quiesced, we may be switching io scheduler, or
+ * updating nr_hw_queues, or other things, and we can't run queue
+ * any more, even __blk_mq_hctx_has_pending() can't be called safely.
+ *
+ * And queue will be rerun in blk_mq_unquiesce_queue() if it is
+ * quiesced.
+ */
+ need_run = !blk_queue_quiesced(hctx->queue) &&
+ blk_mq_hctx_has_pending(hctx);
+ need_run_lock(hctx, &srcu_idx);
+ need_run = !blk_queue_quiesced(hctx->queue) &&
+ blk_mq_hctx_has_pending(hctx);
+ srcu_unlock(hctx, srcu_idx);
+ if (need_run) {
  __blk_mq_delay_run_hw_queue(hctx, async, 0);
return true;
}
@@ -1543,7 +1717,7 @@
BUG_ON(!rq->q);
if (rq->mq_ctx != this_ctx) {
  if (this_ctx) {
    -trace_block_unplug(this_q, depth, from_schedule);
    +trace_block_unplug(this_q, depth, !from_schedule);
    blk_mq_sched_insert_requests(this_q, this_ctx,
      &ctx_list,
      from_schedule);
  @ @ -1563,7 +1737,7 @@
      * on `ctx_list`. Do those.
      */
    if (this_ctx) {
      -trace_block_unplug(this_q, depth, from_schedule);
      +trace_block_unplug(this_q, depth, !from_schedule);
      blk_mq_sched_insert_requests(this_q, this_ctx, &ctx_list,
        from_schedule);
    }
  @ @ -1595,9 +1769,9 @@
    return blk_tag_to_qc_t(rq->internal_tag, hctx->queue_num, true);
  }

  -static void __blk_mq_try_issue_directly(struct blk_mq_hw_ctx *hctx,
    -struct request *rq,
    -blk_qc_t *cookie, bool may_sleep)
  +static blk_status_t __blk_mq_issue_directly(struct blk_mq_hw_ctx *hctx,
    +struct request *rq,
    +blk_qc_t *cookie)
  {
    struct request_queue *q = rq->q;
    struct blk_mq_queue_data bd = {
      @ @ -1606,65 +1780,128 @@
    };
    blk_qc_t new_cookie;
    blk_status_t ret;
    -bool run_queue = true;
    -/* RCU or SRCU read lock is needed before checking quiesced flag */
    -if (blk_mq_hctx_stopped(hctx) || blk_queue_quiesced(q)) {
      -run_queue = false;
      -goto insert;
    -}
    -
    -if (q->elevator)
    -goto insert;
    -
-if (!blk_mq_get_driver_tag(rq, NULL, false))
  goto insert;
-
-if (!blk_mq_get_dispatch_budget(hctx)) {
  blk_mq_put_driver_tag(rq);
  goto insert;
-
}  

new_cookie = request_to_qc_t(hctx, rq);

/*
 - * For OK queue, we are done. For error, kill it. Any other
 - * error (busy), just add it to our list as we previously
 - * would have done
 + * For OK queue, we are done. For error, caller may kill it.
 + * Any other error (busy), just add it to our list as we
 + * previously would have done.
 */
ret = q->mq_ops->queue_rq(hctx, &bd);
switch (ret) {
case BLK_STS_OK:
+blk_mq_update_dispatch_busy(hctx, false);
*cookie = new_cookie;
  -return;
+break;
case BLK_STS_RESOURCE:
+case BLK_STS_DEV_RESOURCE:
+blk_mq_update_dispatch_busy(hctx, true);
__blk_mq_requeue_request(rq);
  goto insert;
+break;
default:
+blk_mq_update_dispatch_busy(hctx, false);
*cookie = BLK_QC_T_NONE;
-blk_mq_end_request(rq, ret);
 -return;
+break;
}

+return ret;
+}
+
+static blk_status_t __blk_mq_try_issue_directly(struct blk_mq_hw_ctx *hctx,
+struct request *rq,
+blk_qc_t *cookie,
+bool bypass_insert)
+
+{
+struct request_queue *q = rq->q;
bool run_queue = true;
+
*/
+ * RCU or SRCU read lock is needed before checking quiesced flag.
+ *
+ * When queue is stopped or quiesced, ignore 'bypass_insert' from
+ * blk_mq_request_issue_directly(), and return BLK_STS_OK to caller,
+ * and avoid driver to try to dispatch again.
+ */
+if (blk_mq_hctx_stopped(hctx) || blk_queue_quiesced(q)) {
+run_queue = false;
+bypass_insert = false;
+goto insert;
+}
+
+if (q->elevator && !bypass_insert)
+goto insert;
+
+if (!blk_mq_get_dispatch_budget(hctx))
+goto insert;
+
+if (!blk_mq_get_driver_tag(rq, NULL, false)) {
+blk_mq_put_dispatch_budget(hctx);
+goto insert;
+}
+
+return __blk_mq_issue_directly(hctx, rq, cookie);
insert:
+blk_mq_sched_insert_request(rq, false, run_queue, false, may_sleep);
+if (bypass_insert)
+return BLK_STS_RESOURCE;
+
+blk_mq_request_bypass_insert(rq, run_queue);
+return BLK_STS_OK;
}

static void blk_mq_try_issue_directly(struct blk_mq_hw_ctx *hctx,
struct request *rq, blk_qc_t *cookie)
{
-while (!(hctx->flags & BLK_MQ_F_BLOCKING)) {
-rcu_read_lock();
-__blk_mq_try_issue_directly(hctx, rq, cookie, false);
-rcu_read_unlock();
-} else {
-unsigned int srcu_idx;
+blk_status_t ret;
+int srcu_idx;

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might_sleep();
might_sleep_if(hctx->flags & BLK_MQ_F_BLOCKING);

srcu_idx = srcu_read_lock(hctx->queue_rq_srcu);
__blk_mqTrialIssueDirectly(hctx, rq, cookie, true);
srcu_read_unlock(hctx->queue_rq_srcu, srcu_idx);

hctx_lock(hctx, &srcu_idx);
+
ret = __blk_mqTrialIssueDirectly(hctx, rq, cookie, false);
if (ret == BLK_STS_RESOURCE || ret == BLK_STS_DEV_RESOURCE)
blk_mqRequestBypassInsert(rq, true);
else if (ret != BLK_STS_OK)
blk_mqEndRequest(rq, ret);
+
return ret;
+
blk_status_t blk_mq_request_issue_directly(struct request *rq)
+
blk_status_t ret;
int srcu_idx;
blk_qc_t unused_cookie;
struct blk_mq_ctx *ctx = rq->mq_ctx;
struct blk_mq_hw_ctx *hctx = blk_mq_map_queue(rq->q, ctx->cpu);
+
lock(hctx, &srcu_idx);
ret = __blk_mqTrialIssueDirectly(hctx, rq, &unused_cookie, true);
unlock(hctx, srcu_idx);
+
return ret;
+
void blk_mqTrialIssueListDirectly(struct blk_mq_hw_ctx *hctx,
struct list_head *list)
+
while (!list_empty(list)) {
blk_status_t ret;
request *rq = list_first_entry(list, struct request,
queuelist);
+
list_del_init(&rq->queuelist);
ret = blk_mq_request_issue_directly(rq);
if (ret != BLK_STS_OK) {
if (ret == BLK_STS_RESOURCE || ret == BLK_STS_DEVRESOURCE) {
blk_mq_requestBypassInsert(rq,
list_empty(list));
break;}
+blk_mq_end_request(rq, ret);
+
}

@@ -1769,14 +2006,15 @@
 blk_mq_try_issue_directly(data.hctx, same_queue_rq, &cookie);
 }
-} else if (q->nr_hw_queues > 1 && is_sync) {
+} else if ((q->nr_hw_queues > 1 && is_sync) || (!q->elevator &&
 +!data.hctx->dispatch_busy)) {
 blk_mq_put_ctx(data.ctx);
 blk_mq_bio_to_request(rq, bio);
 blk_mq_try_issue_directly(data.hctx, rq, &cookie);
 } else if (q->elevator) {
 blk_mq_put_ctx(data.ctx);
 blk_mq_bio_to_request(rq, bio);
-blk_mq_sched_insert_request(rq, false, true, true, true);
+blk_mq_sched_insert_request(rq, false, true, true);
 } else {
 blk_mq_put_ctx(data.ctx);
 blk_mq_bio_to_request(rq, bio);
@@ -1994,7 +2232,8 @@
 }
 blk_mq_debugfs_unregister_hctx(hctx);

-blk_mq_tag_idle(hctx);
+if (blk_mq_hw_queue_mapped(hctx))
+blk_mq_tag_idle(hctx);

 if (set->ops->exit_request)
 set->ops->exit_request(set, hctx->fq->flush_rq, hctx_idx);
@@ -2004,12 +2243,7 @@
 if (set->ops->exit_hctx)
 set->ops->exit_hctx(hctx, hctx_idx);

-if (hctx->flags & BLK_MQ_F_BLOCKING)
-cleanup_srcu_struct(hctx->queue_rq_srcu);
- blk_mq_remove_cpuhp(hctx);
-blk_free_flush_queue(hctx->fq);
-sbitmap_free(&hctx->ctx_map);
 }

static void blk_mq_exit_hw_queues(struct request_queue *q,
@@ -2050,12 +2284,12 @@
* runtime
*/
hctx->ctxs = kmalloc_array_node(nr_cpu_ids, sizeof(void *),
-GFP_KERNEL, node);
+GFP_NOIO | __GFP_NOWARN | __GFP_NORETRY, node);
if (!hctx->ctxs)
goto unregister_cpu_notifier;

@if (sbitmap_init_node(&hctx->ctx_map, nr_cpu_ids, ilog2(8), GFP_KERNEL,
-      node))
+if (sbitmap_init_node(&hctx->ctx_map, nr_cpu_ids, ilog2(8),
+      GFP_NOIO | __GFP_NOWARN | __GFP_NORETRY, node))
goto free_ctxs;

hctx->nr_ctx = 0;
@@ -2070,7 +2304,8 @@
if (blk_mq_sched_init_hctx(q, hctx, hctx_idx))
goto exit_hctx;

-htctx->fq = blk_alloc_flush_queue(q, hctx->numa_node, set->cmd_size);
+htctx->fq = blk_alloc_flush_queue(q, hctx->numa_node, set->cmd_size,
+GFP_NOIO | __GFP_NOWARN | __GFP_NORETRY);
if (!htctx->fq)
goto sched_exit_hctx;

@@ -2087,7 +2322,7 @@
return 0;

free_fq:
-kfree(htctx->fq);
+blk_free_flush_queue(htctx->fq);
sched_exit_hctx:
blk_mq_sched_exit_hctx(q, hctx, hctx_idx);
exit_hctx:
@@ -2116,16 +2351,11 @@
INIT_LIST_HEAD(&__ctx->rq_list);
__ctx->queue = q;

-/* If the cpu isn't present, the cpu is mapped to first hctx */
-if (!cpu_present(i))
-continue;
-
-htctx = blk_mq_map_queue(q, i);
-
-/*
 * Set local node, IFF we have more than one hw queue. If
 * not, we remain on the home node of the device
 */
+hctx = blk_mq_map_queue(q, i);
if (nr_hw_queues > 1 && hctx->numa_node == NUMA_NO_NODE)
hctx->numa_node = local_memory_node(cpu_to_node(i));
}
@@ -2167,11 +2397,6 @@
struct blk_mq_ctx *ctx;
struct blk_mq_tag_set *set = q->tag_set;

-/*
-* Avoid others reading incomplete hctx->cpumask through sysfs
- */
-mutex_lock(&q->sysfs_lock);
-
queue_for_each_hw_ctx(q, hctx, i) {
  cpumask_clear(hctx->cpumask);
  hctx->nr_ctx = 0;
@@ -2182,7 +2407,7 @@
  * 
  * If the cpu isn't present, the cpu is mapped to first hctx.
  */
- for_each_present_cpu(i) {
+ for_each_possible_cpu(i) {
    hctx_idx = q->mq_map[i];
    /* unmapped hw queue can be remapped after CPU topo changed */
    if (!set->tags[hctx_idx] &&
@@ -2204,8 +2429,6 @@
      hctx->ctxs[hctx->nr_ctx++] = ctx;
  }

-mutex_unlock(&q->sysfs_lock);
-
queue_for_each_hw_ctx(q, hctx, i) {
/*
 * If no software queues are mapped to this hardware queue,
@@ -2236,7 +2459,7 @@
/*
 * Initialize batch roundrobin counts
 */
-hctx->next_cpu = cpumask_first(hctx->cpumask);
+hctx->next_cpu = blk_mq_first_mapped_cpu(hctx);
  hctx->next_cpu_batch = BLK_MQ_CPU_WORK_BATCH;
}
@@ -2283,7 +2506,6 @@
}

mutex_lock(&set->tag_list_lock);
list_del_rcu(&q->tag_set_list);
-INIT_LIST_HEAD(&q->tag_set_list);
if (list_is_singular(&set->tag_list)) {  
/* just transitioned to unshared */  
set->flags &= ~BLK_MQ_F_TAG_SHARED;  
}  
blk_mq_update_tag_set_depth(set, false);  
}
mutex_unlock(&set->tag_list_lock);
-
synchronize_rcu();
+INIT_LIST_HEAD(&q->tag_set_list);
}

static void blk_mq_add_queue_tag_set(struct blk_mq_tag_set *set,  
struct blk_mq_hw_ctx **hctxs = q->queue_hw_ctx;

blk_mq_sysfs_unregister(q);  
+
+/* protect against switching io scheduler */  
+mutex_lock(&q->sysfs_lock);
for (i = 0; i < set->nr_hw_queues; i++) {  
int node;
@@ -2394,12 +2619,14 @@  
node = blk_mq_hw_queue_to_node(q->mq_map, i);
  hctxs[i] = kzalloc_node(blk_mq_hw_ctx_size(set),
  -GFP_KERNEL, node);
  +GFP_NOIO | __GFP_NOWARN | __GFP_NORETRY,
  +node);
  if (!hctxs[i])
    break;
-
  if (!zalloc_cpumask_var_node(&hctxs[i]->cpumask, GFP_KERNEL,
  -node)) {
    +if (!zalloc_cpumask_var_node(&hctxs[i]->cpumask,
       +GFP_NOIO | __GFP_NOWARN | __GFP_NORETRY,
       +node)) {
      kfree(hctxs[i]);
      hctxs[i] = NULL;
      break;
@@ -2430,6 +2657,7 @@
  }
  q->nr_hw_queues = i;
  +mutex_unlock(&q->sysfs_lock);
  blk_mq_sysfs_register(q);
  }
void blk_mq_free_queue(struct request_queue *q)
/* tags can _not_ be used after returning from blk_mq_exit_queue */
void blk_mq_exit_queue(struct request_queue *q)
{
-struct blk_mq_tag_set*set = q->tag_set;
+struct blk_mq_tag_set*set = q->tag_set;

-blk_mq_del_queue_tag_set(q);
+/* Checks hctx->flags & BLK_MQ_F_TAG_QUEUE_SHARED. */
blk_mq_exit_hw_queues(q, set->nr_hw_queues);
+/* May clear BLK_MQ_F_TAG_QUEUE_SHARED in hctx->flags. */
+blk_mq_del_queue_tag_set(q);
}

/* Basically redo blk_mq_init_queue with queue frozen */
 @@ -2601,9 +2832,27 @@

static int blk_mq_update_queue_map(struct blk_mq_tag_set *set)
{
- if (set->ops->map_queues)
+ if (set->ops->map_queues) {
+ int cpu;
+ /*
+ * transport.map_queues is usually done in the following
+ * way:
+ *
+ * for (queue = 0; queue < set->nr_hw_queues; queue++) {
+ * mask = get_cpu_mask(queue)
+ * for_each_cpu(cpu, mask)
+ * set->mq_map[cpu] = queue;
+ * }
+ *
+ * When we need to remap, the table has to be cleared for
+ * killing stale mapping since one CPU may not be mapped
+ * to any hw queue.
+ */
+ for_each_possible_cpu(cpu)
+ set->mq_map[cpu] = 0;
+ return set->ops->map_queues(set);
-else
+} else
 return blk_mq_map_queues(set);
if (!set)
  return -EINVAL;

+if (q->nr_requests == nr)
+return 0;
+
blk_mq_freeze_queue(q);
+blk_mq_quiesce_queue(q);

ret = 0;
queue_for_each_hw_ctx(q, hctx, i) {
  if (!ret)
    q->nr_requests = nr;
+
+blk_mq_unquiesce_queue(q);
+blk_mq_unfreeze_queue(q);

return ret;
}

void blk_mq_freeze_queue(struct request_queue *q);
-void blk_mq_free_queue(struct request_queue *q);
+void blk_mq_exit_queue(struct request_queue *q);
int blk_mq_update_nr_requests(struct request_queue *q, unsigned int nr);
void blk_mq_wake_waiters(struct request_queue *q);
bool blk_mq_dispatch_rq_list(struct request_queue *, struct list_head *, bool);
void blk_mq_insert_requests(struct blk_mq_hw_ctx *hctx, struct blk_mq_ctx *ctx,
                            struct list_head *list);
/* Used by blk_insert_cloned_request() to issue request directly */
+blk_status_t blk_mq_request_issue_directly(struct request *rq);
+void blk_mq_try_issue_list_directly(struct blk_mq_hw_ctx *hctx,
+        struct list_head *list);
+
/*/CPU -> queue mappings*/
@@ -137,7 +142,9 @@
} 
void blk_mq_in_flight(struct request_queue *q, struct hd_struct *part,
-unsigned int inflight[2]);
+-unsigned int inflight[2]);
+void blk_mq_in_flight_rw(struct request_queue *q, struct hd_struct *part,
+unsigned int inflight[2]);

static inline void blk_mq_put_dispatch_budget(struct blk_mq_hw_ctx *hctx)
{ 
--- linux-4.15.0.orig/block/blk-settings.c
+++ linux-4.15.0/block/blk-settings.c
@@ -128,7 +128,7 @@
/* Inherit limits from component devices */
 lim->max_segments = USHRT_MAX;
 -lim->max_discard_segments = 1;
+lim->max_discard_segments = USHRT_MAX;
 lim->max_hw_sectors = UINT_MAX;
 lim->max_segment_size = UINT_MAX;
 lim->max_sectors = UINT_MAX;
@@ -379,7 +379,7 @@
 *   storage device can address. The default of 512 covers most
 *   hardware.
 **/
-void blk_queue_logical_block_size(struct request_queue *q, unsigned short size)
+void blk_queue_logical_block_size(struct request_queue *q, unsigned int size)
{ 
q->limits.logical_block_size = size;

@@ -513,6 +513,14 @@
} 
EXPORT_SYMBOL(blk_queue_io_opt);

+static unsigned int blk_round_down_sectors(unsigned int sectors, unsigned int lbs)
+{ 
+ sectors = round_down(sectors, lbs >> SECTOR_SHIFT);
+if (sectors < PAGE_SIZE >> SECTOR_SHIFT)
+ sectors = PAGE_SIZE >> SECTOR_SHIFT;
+return sectors;
+
+/**
 * blk_queue_stack_limits - inherit underlying queue limits for stacked drivers
 * @t: the stacking driver (top)
@@ -639,6 +647,10 @@
 ret = -1;
 }

+t->max_sectors = blk_round_down_sectors(t->max_sectors, t->logical_block_size);
+t->max_hw_sectors = blk_round_down_sectors(t->max_hw_sectors, t->logical_block_size);
+t->max_dev_sectors = blk_round_down_sectors(t->max_dev_sectors, t->logical_block_size);
 +
 */ Discard alignment and granularity */
if (b->discard_granularity) {
    alignment = queue_limit_discard_alignment(b, start);
@@ -717,6 +729,9 @@
 printk(KERN_NOTICE "%s: Warning: Device %s is misaligned\n",
               top, bottom);
 }
+
+t->backing_dev_info->io_pages =
+t->limits.max_sectors >> (PAGE_SHIFT - 9);
}
EXPORT_SYMBOL(disk_stack_limits);

--- linux-4.15.0.orig/block/blk-stat.h
+++ linux-4.15.0/block/blk-stat.h
@@ -188,6 +188,11 @@
 mod_timer(&cb->timer, jiffies + nsecs_to_jiffies(nsecs));
 }

+static inline void blk_stat_deactivate(struct blk_stat_callback *cb)
+{
+    del_timer_sync(&cb->timer);
+} 
+ 
+/**
 * blk_stat_activate_msecs() - Gather block statistics during a time window in
 * milliseconds.
--- linux-4.15.0.orig/block/blk-sysfs.c
+++ linux-4.15.0/block/blk-sysfs.c
@@ -808,6 +808,9 @@
 blk_free_queue_stats(q->stats);

+if (q->mq_ops)
+cancel_delayed_work_sync(&q->requeue_work);
+
blk_exit_rl(q, &q->root_rl);

if (q->queue_tags)
--- linux-4.15.0.orig/block/blk-throttle.c
+++ linux-4.15.0/block/blk-throttle.c
@@ -892,13 +892,10 @@
unsigned long jiffy_elapsed, jiffy_wait, jiffy_elapsed_rnd;
u64 tmp;

-jiffy_elapsed = jiffy_elapsed_rnd = jiffies - tg->slice_start[rw];
-/* Slice has just started. Consider one slice interval */
-if (!jiffy_elapsed)
-jiffy_elapsed_rnd = tg->td->throtl_slice;
+jiffy_elapsed = jiffies - tg->slice_start[rw];

-jiffy_elapsed_rnd = roundup(jiffy_elapsed_rnd, tg->td->throtl_slice);
+/* Round up to the next throttle slice, wait time must be nonzero */
+jiffy_elapsed_rnd = roundup(jiffy_elapsed + 1, tg->td->throtl_slice);

/*
 * jiffy_elapsed_rnd should not be a big value as minimum iops can be

void blk_throtl_exit(struct request_queue *q)
{
  BUG_ON(!q->td);
+del_timer_sync(&q->td->service_queue.pending_timer);
throtl_shutdown_wq(q);
blkcg_deactivate_policy(q, &blkcg_policy_throtl);
free_percpu(q->td->latency_buckets);
--- linux-4.15.0.orig/block/blk-wbt.c
+++ linux-4.15.0/block/blk-wbt.c
@@ -101,9 +101,13 @@
return time_before(jiffies, wb->dirty_sleep + HZ);
}

-static inline struct rq_wait *get_rq_wait(struct rq_wb *rwb, bool is_kswapd)
+static inline struct rq_wait *get_rq_wait(struct rq_wb *rwb,
 +enum wbt_flags wb_acct)
+
-return &rwb->rq_wait[is_kswapd];
+if (wb_acct & WBT_KSWAPD)
+return &rwb->rq_wait[WBT_RWQ_KSWAPD];
+
+return &rwb->rq_wait[WBT_RWQ_BG];
}
static void rwb_wake_all(struct rq_wb *rwb)
@@ -113,20 +117,16 @@
     for (i = 0; i < WBT_NUM_RWQ; i++) {
       struct rq_wait *rqw = &rwb->rq_wait[i];

 -if (waitqueue_active(&rqw->wait))
+if (wq_has_sleeper(&rqw->wait))
       wake_up_all(&rqw->wait);
   }
 }

-void __wbt_done(struct rq_wb *rwb, enum wbt_flags wb_acct)
+static void wbt_rqw_done(struct rq_wb *rwb, struct rq_wait *rqw,
+enum wbt_flags wb_acct)
{
-struct rq_wait *rqw;
+struct rq_wait *rqw;
  int inflight, limit;

-void __wbt_done(struct rq_wb *rwb, enum wbt_flags wb_acct)
+static void wbt_rqw_done(struct rq_wb *rwb, struct rq_wait *rqw,
+enum wbt_flags wb_acct)
{
-struct rq_wait *rqw;
+struct rq_wait *rqw;
  int inflight, limit;

 if (!((wb_acct & WBT_TRACKED)))
  return;
-
  rqw = get_rq_wait(rwb, wb_acct & WBT_KSWAPD);
  inflight = atomic_dec_return(&rqw->inflight);

 /*
 @@ -153,7 +153,7 @@
   if (inflight && inflight >= limit)
   return;

 -if (waitqueue_active(&rqw->wait)) {
+if (wq_has_sleeper(&rqw->wait)) {
   int diff = limit - inflight;

   if (!inflight || diff >= rwb->wb_background / 2)
@@ -161,6 +161,17 @@
   }
 }

+void __wbt_done(struct rq_wb *rwb, enum wbt_flags wb_acct)
+{
+struct rq_wait *rqw;
+  if (!((wb_acct & WBT_TRACKED)))
+  return;
+  rqw = get_rq_wait(rwb, wb_acct);
+  wbt_rqw_done(rwb, rqw, wb_acct);

+ *
+ */
+ if (!rwb_enabled(rwb))
+ return UINT_MAX;
+
+ /*
+ * At this point we know it's a buffered write. If this is
+ * ksawpd trying to free memory, or REQ_SYNC is set, then
+ * it's WB_SYNC_ALL writeback, and we'll use the max limit for
+ */
+ return limit;
+ }

-static inline bool may_queue(struct rq_wb *rwb, struct rq_wait *rqw,
    wait_queue_entry_t *wait, unsigned long rw)
+struct wbt_wait_data {
    struct wait_queue_entry wq;
    struct task_struct *task;
    struct rq_wb *rwb;
    struct rq_wait *rqw;
    unsigned long rw;
    bool got_token;
+};
+
+static int wbt_wake_function(struct wait_queue_entry *curr, unsigned int mode,
    int wake_flags, void *key)
+ {
+  /*
+   * inc it here even if disabled, since we'll dec it at completion.
+   * this only happens if the task was sleeping in __wbt_wait(),
+   * and someone turned it off at the same time.
+   */
+  -if (!rwb_enabled(rwb)) {
+    atomic_inc(&rqw->inflight);
+    return true;
+  }
+  struct wbt_wait_data *data = container_of(curr, struct wbt_wait_data,
+    wq);
/*
 * If the waitqueue is already active and we are not the next
 * in line to be woken up, wait for our turn.
 * If we fail to get a budget, return -1 to interrupt the wake up
 * loop in __wake_up_common.
 */

- if (waitqueue_active(&rqw->wait) &&
  - rqw->wait.head.next != &wait->entry)
  -return false;
+ if (!atomic_inc_below(&data->rqw->inflight, get_limit(data->rwb, data->rw)))
  +return -1;

- return atomic_inc_below(&rqw->inflight, get_limit(rwb, rw));
+ data->got_token = true;
+ list_del_init(&curr->entry);
+ wake_up_process(data->task);
+ return 1;
}

/*
 * Block if we will exceed our limit, or if we are currently waiting for
 * the timer to kick off queuing again.
 */
- static void __wbt_wait(struct rq_wb *rwb, unsigned long rw, spinlock_t *lock)
+ static void __wbt_wait(struct rq_wb *rwb, enum wbt_flags wb_acct,
  + unsigned long rw, spinlock_t *lock)
__releases(lock)
__acquires(lock)
{
- struct rq_wait *rqw = get_rq_wait(rwb, current_is_kswapd());
- DEFINE_WAIT(wait);
+ struct rq_wait *rqw = get_rq_wait(rwb, wb_acct);
+ struct wbt_wait_data data = {
  +.wq = {
  +.func= wbt_wake_function,
  +.entry= LIST_HEAD_INIT(data.wq.entry),
  +},
  +.task = current,
  +.rwb = rwb,
  +.rqw = rqw,
  +.rw = rw,
  +};
+ bool has_sleeper;

- if (may_queue(rwb, rqw, &wait, rw))
+ has_sleeper = wq_has_sleeper(&rqw->wait);
+ if (!has_sleeper && atomic_inc_below(&rqw->inflight, get_limit(rwb, rw)))
prepare_to_wait_exclusive(&rqw->wait, &data.wq, TASK_UNINTERRUPTIBLE);
do {
    prepare_to_wait_exclusive(&rqw->wait, &wait, TASK_UNINTERRUPTIBLE);
    if (data.got_token)
        break;

    if (may_queue(rwb, rqw, &wait, rw))
        if (!has_sleeper &&
            atomic_inc_below(&rqw->inflight, get_limit(rwb, rw))) {
            finish_wait(&rqw->wait, &data.wq);
            /*
             * We raced with wbt_wake_function() getting a token,
             * which means we now have two. Put our local token
             * and wake anyone else potentially waiting for one.
             */
            if (data.got_token)
                wbt_rqw_done(rwb, rqw, wb_acct);
            break;
        }

    if (lock) {
        spin_unlock_irq(lock);
    } else
        io_schedule();
    +has_sleeper = false;
} while (1);

finish_wait(&rqw->wait, &wait);
finish_wait(&rqw->wait, &data.wq);

static inline bool wbt_should_throttle(struct rq_wb *rwb, struct bio *bio) {
    enum wbt_flags wbt_wait(struct rq_wb *rwb, struct bio *bio, spinlock_t *lock) {
        unsigned int ret = 0;
        enum wbt_flags ret = 0;

        if (!rwb_enabled(rwb))
            return 0;
@@ -598,14 +646,14 @@
    return ret;
 }

-__wbt_wait(rwb, bio->bi_opf, lock);
+if (current_is_kswapd())
 +ret |= WBT_KSWAPD;
 +__wbt_wait(rwb, ret, bio->bi_opf, lock);

 if (!blk_stat_is_active(rwb->cb))
  rwb_arm_timer(rwb);

-if (current_is_kswapd())
-  ret |= WBT_KSWAPD;
-
  return ret | WBT_TRACKED;
 }

@@ -659,8 +707,10 @@
{
    struct rq_wb *rwb = q->rq_wb;

-    if (rwb && rwb->enable_state == WBT_STATE_ON_DEFAULT)
+    if (rwb && rwb->enable_state == WBT_STATE_ON_DEFAULT) {
+        blk_stat_deactivate(rwb->cb);
        wbt_exit(q);
+    }
 }

 EXPORT_SYMBOL_GPL(wbt_disable_default);

@@ -697,7 +747,15 @@

 static int wbt_data_dir(const struct request *rq)
{
    -return rq_data_dir(rq);
+    const int op = req_op(rq);
+    
+    if (op == REQ_OP_READ)
+        return READ;
+    else if (op == REQ_OP_WRITE || op == REQ_OP_FLUSH)
+        return WRITE;
+    else /* don't account */
+        return -1;
 }

 int wbt_init(struct request_queue *q)
enum {
    -WBT_NUM_RWQ = 2,
    +WBT_RWQ_BG = 0,
    +WBT_RWQ_KSWAPD,
    +WBT_NUM_RWQ,
};

/*
--- linux-4.15.0.orig/block/blk-zoned.c
+++ linux-4.15.0/block/blk-zoned.c
@@ -277,16 +277,17 @@
 if (!blk_queue_is_zoned(q))
     return -ENOTTY;
 
-if (!capable(CAP_SYS_ADMIN))
-    return -EACCES;
-
  if (copy_from_user(&rep, argp, sizeof(struct blk_zone_report)))
    return -EFAULT;

if (!rep.nr_zones)
    return -EINVAL;

-zones = kcalloc(rep.nr_zones, sizeof(struct blk_zone), GFP_KERNEL);
+if (rep.nr_zones > INT_MAX / sizeof(struct blk_zone))
+    return -ERANGE;
+
+zones = kvmalloc(rep.nr_zones * sizeof(struct blk_zone),
+    GFP_KERNEL | __GFP_ZERO);
if (!zones)
    return -ENOMEM;

 out:
-    kfree(zones);
+    kvfree(zones);

    return ret;
 }

@@ -308,7 +309,6 @@
 }

 out:
-    kfree(zones);
+    kvfree(zones);

    return ret;
 }
@@ -334,9 +335,6 @@
 if (!blk_queue_is_zoned(q))
return -ENOTTY;

-if (!capability(CAP_SYS_ADMIN))
- return -EACCES;
-
if (!(mode & FMODE_WRITE))
return -EBADF;

--- linux-4.15.0.orig/block/blk.h
+++ linux-4.15.0/block/blk.h
@@ -55,7 +55,7 @@
}

struct blk_flush_queue *blk_alloc_flush_queue(struct request_queue *q,
- int node, int cmd_size);
+ int node, int cmd_size, gfp_t flags);
void blk_free_flush_queue(struct blk_flush_queue *q);

int blk_init_rl(struct request_list *rl, struct request_queue *q,
@@ -246,6 +246,16 @@
}

static inline unsigned int bio_allowed_max_sectors(struct request_queue *q)
{
+ return round_down(UINT_MAX, queue_logical_block_size(q)) >> 9;
+
+ /*
+ * The max size one bio can handle is UINT_MAX because bvec_iter.bi_size
+ * is defined as 'unsigned int', meantime it has to aligned to with logical
+ * block size which is the minimum accepted unit by hardware.
+ */
+ static inline unsigned int bio_allowed_max_sectors(struct request_queue *q)
+ {
+ return round_down(UINT_MAX, queue_logical_block_size(q)) >> 9;
+ }
+ 
+ /*
+ * Internal io_context interface
+ */
void get_io_context(struct io_context *ioc);

--- linux-4.15.0.orig/block/cfq-iosched.c
+++ linux-4.15.0/block/cfq-iosched.c
@@ -4741,12 +4741,13 @@
}{
  struct cfq_data *cfqd = e->elevator_data;
  
- if (__data < (MIN))
- __data = (MIN);
- 
- if (__data < (MIN))
- __data = (MIN);
-else if (__data > (MAX))
-__data = (MAX);
+if (__data < __min)
+__data = __min;
+else if (__data > __max)
+__data = __max;
if (__CONV)
 *(__PTR) = (u64)__data * NSEC_PER_MSEC;
else
 @@ -4775,12 +4776,13 @@
 static ssize_t __FUNC(struct elevator_queue *e, const char *page, size_t count)
 |
 struct cfq_data *cfqd = e->elevator_data;
-unsigned int __data;
+unsigned int __data, __min = (MIN), __max = (MAX);
+|
| cfq_var_store(&__data, (page));
-__data = (MIN);
-else if (__data > (MAX))
-__data = (MAX);
+if (__data < __min)
+__data = __min;
+else if (__data > __max)
+__data = __max;
*(__PTR) = (u64)__data * NSEC_PER_USEC;
return count;
}
case BLKTRACE_TEARDOWN: /* compatible */
ret = blk_trace_ioctl(bdev, cmd, compat_ptr(arg));
return ret;
+case IOC_PR_REGISTER:
+case IOC_PR_RESERVE:
+case IOC_PR_RELEASE:
+case IOC_PR_PREEMPT:
+case IOC_PR_PREEMPT_ABORT:
+case IOC_PR_CLEAR:
+return blkdev_ioctl(bdev, mode, cmd,
+(unsigned long)compat_ptr(arg));
default:
if (disk->fops->compat_ioctl)
ret = disk->fops->compat_ioctl(bdev, mode, cmd, arg);
--- linux-4.15.0.orig/block/elevator.c
+++ linux-4.15.0/block/elevator.c
@@ -640,7 +640,7 @@
while (e->type->ops.sq.elevator_dispatch_fn(q, 1))
 ;
- if (q->nr_sorted && printed++ < 10) {
+ if (q->nr_sorted && !blk_queue_is_zoned(q) && printed++ < 10) {
 printk(KERN_ERR "%s: forced dispatching is broken "
 "(nr_sorted=%u), please report this\n",
 q->elevator->type->elevator_name, q->nr_sorted);
@@ -968,6 +968,7 @@
 int ret;
 blk_mq_freeze_queue(q);
 +blk_mq_quiesce_queue(q);

 if (q->elevator) {
 if (q->elevator->registered)
@@ -994,6 +995,7 @@
 blk_add_trace_msg(q, "elv switch: none");

 out:
+blk_mq_unquiesce_queue(q);
 blk_mq_unfreeze_queue(q);
 return ret;
 }
+return 0;
return elevator_switch(q, NULL);
+
strlcpy(elevator_name, name, sizeof(elevator_name));
e = elevator_get(q, strstrip(elevator_name), true);
--- linux-4.15.0.orig/block/genhd.c
+++ linux-4.15.0/block/genhd.c
@@ -82,6 +82,18 @@
}{}

+void part_in_flight_rw(struct request_queue *q, struct hd_struct *part,
+                        unsigned int inflight[2])
++++
+if (q->mq_ops) {
+    blk_mq_in_flight_rw(q, part, inflight);
+    return;
+}
+++
+    inflight[0] = atomic_read(&part->in_flight[0]);
+    inflight[1] = atomic_read(&part->in_flight[1]);
+}
++
+struct hd_struct *__disk_get_part(struct gendisk *disk, int partno)
+
+{ struct disk_part_tbl *ptbl = rcu_dereference(disk->part_tbl);
+    part = rcu_dereference(ptbl->part[piter->idx]);
+    if (!part)
+        continue;
+    get_device(part_to_dev(part));
+    piter->part = part;
+    if (!part_nr_sects_read(part) &&
+        !(piter->flags & DISK_PITER_INCL_EMPTY) &&
+        !(piter->flags & DISK_PITER_INCL_EMPTY_PART0 &&
+            piter->idx == 0))
+        put_device(part_to_dev(part));
+    piter->part = NULL;
+    continue;
+}
+
+get_device(part_to_dev(part));
+ piter->part = part;
+ if (!part_nr_sects_read(part) &&
+     !(piter->flags & DISK_PITER_INCL_EMPTY) &&
+     !(piter->flags & DISK_PITER_INCL_EMPTY_PART0 &&
+         piter->idx == 0))
+     put_device(part_to_dev(part));
+     piter->part = NULL;
+     continue;
+}

-get_device(part_to_dev(part));
- piter->part = part;
+ piter->idx += inc;
+ break;
+}
+/**
+ * We invalidate devt by assigning NULL pointer for devt in idr.
+ */
+void blk_invalidate_devt(dev_t devt)
+{
+if (MAJOR(devt) == BLOCK_EXT_MAJOR) {
+spin_lock_bh(&ext_devt_lock);
+idr_replace(&ext_devt_idr, NULL, blk_mangle_minor(MINOR(devt)));
+spin_unlock_bh(&ext_devt_lock);
+}
+}
+
+static char *bdevt_str(dev_t devt, char *buf)
+{
+if (MAJOR(devt) <= 0xff && MINOR(devt) <= 0xff) {
+if (disk->flags & GENHD_FL_HIDDEN) {
+dev_set_uevent_suppress(ddev, 0);
+}
+}
+
+/* No minors to use for partitions */
+if (!disk_part_scan_enabled(disk)) {
+disk->part0.holder_dir = kobject_create_and_add("holders", &ddev->kobj);
+disk->slave_dir = kobject_create_and_add("slaves", &ddev->kobj);
+
+if (disk->flags & GENHD_FL_HIDDEN) {
+dev_set_uevent_suppress(ddev, 0);
+}
+i}
if (!(disk->flags & GENHD_FL_HIDDEN))
blk_unregister_region(disk_dev(disk), disk->minors);
/*
 * Remove gendisk pointer from idr so that it cannot be looked up
 * while RCU period before freeing gendisk is running to prevent
 * use-after-free issues. Note that the device number stays
 * "in-use" until we really free the gendisk.
 */
+blk_invalidate_devt(disk_dev(disk));

kobject_put(disk->part0.holder_dir);
kobject_put(disk->slave_dir);
--- linux-4.15.0.orig/block/ioctl.c
+++ linux-4.15.0/block/ioctl.c
@@ -733,6 +760,13 @@
+-truncate_inode_pages_range(mapping, start, start + len - 1);
+return blkdev_issue_discard(bdev, start >> 9, len >> 9,
+GFP_KERNEL, flags);
}
--- linux-4.15.0.orig/block/kyber-iosched.c
+++ linux-4.15.0/block/kyber-iosched.c
@@ -833,6 +833,7 @@
+.limit_depth = kyber_limit_depth,
+.prepare_request = kyber_prepare_request,
+.finish_request = kyber_finish_request,
+.requeue_request = kyber_finish_request,
+.completed_request = kyber_completed_request,
+.dispatch_request = kyber_dispatch_request,
+.has_work = kyber_has_work,
--- linux-4.15.0.orig/block/partition-generic.c
+++ linux-4.15.0/block/partition-generic.c
@@ -51,6 +51,12 @@
 EXPORT_SYMBOL(bdevname);

+const char *bio_devname(struct bio *bio, char *buf)
+{
+return disk_name(bio->bi_disk, bio->bi_partno, buf);
+}
+EXPORT_SYMBOL(bio_devname);
+/*
There's very little reason to use this, you should really have a struct block_device just about everywhere and use

```c
jiffies_to_msecs(part_stat_read(p, time_in_queue));
```

```c
ssize_t part_inflight_show(struct device *dev,
			struct device_attribute *attr, char *buf)
{
struct hd_struct *p = dev_to_part(dev);
+struct request_queue *q = part_to_disk(p)->queue;
+unsigned int inflight[2];

-return sprintf(buf, "%8u %8u\n", atomic_read(&p->in_flight[0]),
-atomic_read(&p->in_flight[1]));
-part_in_flight_rw(q, p, inflight);
+return sprintf(buf, "%8u %8u\n", inflight[0], inflight[1]);
}
```

```c
#ifdef CONFIG_FAIL_MAKE_REQUEST
@@ -237,9 +245,10 @@
 .uevent		= part_uevent,
 }

-static void delete_partition_rcu_cb(struct rcu_head *head)
+static void delete_partition_work_fn(struct work_struct *work)
{
+struct hd_struct *part = container_of(to_rcu_work(work), struct hd_struct,
											rcu_work);
-part->start_sect = 0;
-part->nr_sects = 0;
-@ @ -250,7 +259,8 @@
-void __delete_partition(struct percpu_ref *ref)
{ }
```

```c
/*
@@ -275,6 +285,13 @@
kobject_put(part->holder_dir);
 device_del(part_to_dev(part));
```
/*
 * Remove gendisk pointer from idr so that it cannot be looked up
 * while RCU period before freeing gendisk is running to prevent
 * use-after-free issues. Note that the device number stays
 * "in-use" until we really free the gendisk.
 */
+blk_invalidate_devt(part_devt(part));
hd_struct_kill(part);
}

--- linux-4.15.0.orig/block/partitions/aix.c
+++ linux-4.15.0/block/partitions/aix.c
@@ -178,7 +178,7 @@
 u32 vgda_sector = 0;
 u32 vgda_len = 0;
 int numlvs = 0;
-struct pvd *pvd;
+struct pvd *pvd = NULL;
 struct lv_info {
     unsigned short pps_per_lv;
     unsigned short pps_found;
@@ -232,10 +232,11 @@
 if (lvip[i].pps_per_lv)
     foundlvs += 1;
 }
+/* pvd loops depend on n[].name and lvip[].pps_per_lv */
+pvd = alloc_pvd(state, vgda_sector + 17);
}
put_dev_sector(sect);
-pvd = alloc_pvd(state, vgda_sector + 17);
if (pvd) {
    int numpps = be16_to_cpu(pvd->pp_count);
    int psn_part1 = be32_to_cpu(pvd->psn_part1);
@@ -282,10 +283,14 @@
 next_lp_ix += 1;
 }
for (i = 0; i < state->limit; i += 1)
-    if (lvip[i].pps_found && !lvip[i].lv_is_contiguous)
-        char tmp[sizeof(n[i].name) + 1]; // null char
+    if (lvip[i].pps_found && !lvip[i].lv_is_contiguous) {
+        char tmp[sizeof(n[i].name) + 1]; // null char
+        snprintf(tmp, sizeof(tmp), "%s", n[i].name);
+        pr_warn("partition \%s (%u pp's found) is not contiguous\n", 
+                 tmp, lvip[i].pps_found);
+        tmp, lvip[i].pps_found);
+    } else
    }
kfree(pvd);
}
kfree(n);
--- linux-4.15.0.orig/block/partitions/msdos.c
+++ linux-4.15.0/block/partitions/msdos.c
@@ -301,7 +301,9 @@
        continue;
        bsd_start = le32_to_cpu(p->p_offset);
        bsd_size = le32_to_cpu(p->p_size);
-      if (memcmp(flavour, "bsd\0", 4) == 0)
+      /* FreeBSD has relative offset if C partition offset is zero */
+      if (memcmp(flavour, "bsd\0", 4) == 0 &&
+          le32_to_cpu(l->d_partitions[2].p_offset) == 0)
        bsd_start += offset;
        if (offset == bsd_start && size == bsd_size)
          /* full parent partition, we have it already */
--- linux-4.15.0.orig/block/scsi_ioctl.c
+++ linux-4.15.0/block/scsi_ioctl.c
@@ -29,6 +29,9 @@
#include <linux/times.h>
#include <linux/uio.h>
#include <linux/uaccess.h>
+  #include <linux/fd.h>
+  #include <linux/raid/md_u.h>
+  #include <linux/mtio.h>

#include <scsi/scsi.h>
#include <scsi/scsi_ioctl.h>
@@ -706,8 +709,17 @@
case SG_GET_RESERVED_SIZE:
  case SG_SET_RESERVED_SIZE:
  case SG_EMULATED_HOST:
+  case BLKFLSBUF:
+    case BLKROSET:
    return 0;
  case CDROM_GET_CAPABILITY:
+    case CDROM_DRIVE_STATUS:
+    case FDGETPRM:
+    case RAID_VERSION:
+    case MTIOCGET:
+      #ifdef CONFIG_COMPAT
+        case 0x801c6d02: /* MTIOCGET32 */
+      #endif
    /* Keep this until we remove the printk below. udev sends it
     * and we do not want to spam dmesg about it. CD-ROMs do
     * not have partitions, so we get here only for disks.
--- linux-4.15.0.orig/block/sed-opal.c
--- linux-4.15.0.orig/certs/Kconfig
+++ linux-4.15.0/block/sed-opal.c
@@ -877,7 +877,7 @@
         return 0;
     }

-    if (n > resp->num) {
+    if (n >= resp->num) {
         pr_debug("Response has %d tokens. Can't access %d\n", 
                 resp->num, n);
         return 0;
@@ -899,7 +899,7 @@
         return 0;
     }

-    if (n > resp->num) {
+    if (n >= resp->num) {
         pr_debug("Response has %d tokens. Can't access %d\n", 
                 resp->num, n);
         return 0;
@@ -2078,13 +2078,16 @@
 static int opal_enable_disable_shadow_mbr(struct opal_dev *dev, 
     struct opal_mbr_data *opal_mbr)
 {
-    u8 enable_disable = opal_mbr->enable_disable == OPAL_MBR_ENABLE ? 
+    u8 enable_disable = OPAL_TRUE;
+    const struct opal_step mbr_steps[] = {
         { opal_discovery0, },
         { start_admin1LSP_opal_session, &opal_mbr->key },
-        { set_mbr_done, &opal_mbr->enable_disable },
+        { set_mbr_done, &enable_disable },
         { end_opal_session, },
         { start_admin1LSP_opal_session, &opal_mbr->key },
-        { set_mbr_enable_disable, &opal_mbr->enable_disable },
+        { set_mbr_enable_disable, &enable_disable },
         { end_opal_session, },
         { NULL, }
    ];
@@ -2204,7 +2207,7 @@
 static int __opal_set_mbr_done(struct opal_dev *dev, struct opal_key *key)
 {
-    u8 mbr_done_tf = 1;
+    u8 mbr_done_tf = OPAL_TRUE;
    const struct opal_step mbrdone_step[] = {
         { opal_discovery0, },
         { start_admin1LSP_opal_session, key },
--- linux-4.15.0.orig/certs/Kconfig
wrapper to incorporate the list into the kernel. Each <hash> should be a string of hex digits.

+config EFI_SIGNATURE_LIST_PARSER
+bool "EFI signature list parser"
+depends on EFI
+select X509_CERTIFICATE_PARSER
+help
+ This option provides support for parsing EFI signature lists for
+ X.509 certificates and turning them into keys.
+
+config LOAD_UEFI_KEYS
+bool "Load certs and blacklist from UEFI db for module checking"
+depends on SYSTEM_BLACKLIST_KEYRING
+depends on SECONDARY_TRUSTED_KEYRING
+depends on EFI
+depends on EFI_SIGNATURE_LIST_PARSER
+help
+ If the kernel is booted in secure boot mode, this option will cause
+ the kernel to load the certificates from the UEFI db and MokListRT
+ into the secondary trusted keyring. It will also load any X.509
+ SHA256 hashes in the dbx list into the blacklist.
+
+ The effect of this is that, if the kernel is booted in secure boot
+ mode, modules signed with UEFI-stored keys will be permitted to be
+ loaded and keys that match the blacklist will be rejected.
+
+config SYSTEM_REVOCATION_LIST
+bool "Provide system-wide ring of revocation certificates"
+depends on SYSTEM_BLACKLIST_KEYRING
+depends on PKCS7_MESSAGE_PARSER=y
+help
+ If set, this allows revocation certificates to be stored in the
+ blacklist keyring and implements a hook whereby a PKCS#7 message can
+ be checked to see if it matches such a certificate.
+
+config SYSTEM_REVOCATION_KEYS
+string "X.509 certificates to be preloaded into the system blacklist keyring"
+depends on SYSTEM_REVOCATION_LIST
+help
+ If set, this option should be the filename of a PEM-formatted file
+ containing X.509 certificates to be included in the default blacklist
+ keyring.
+
# Makefile for the linux kernel signature checking certificates.

-obj-$(CONFIG_SYSTEM_TRUSTED_KEYRING) += system_keyring.o system_certificates.o
-obj-$(CONFIG_SYSTEM_BLACKLIST_KEYRING) += blacklist.o
+obj-$(CONFIG_SYSTEM_TRUSTED_KEYRING) += system_keyring.o system_certificates.o common.o
+obj-$(CONFIG_SYSTEM_BLACKLIST_KEYRING) += blacklist.o common.o
+obj-$(CONFIG_SYSTEM_REVOCATION_LIST) += revocation_certificates.o
ifneq ($(CONFIG_SYSTEM_BLACKLIST_HASH_LIST),"")
obj-$(CONFIG_SYSTEM_BLACKLIST_KEYRING) += blacklist_hashes.o
endif
else
obj-$(CONFIG_SYSTEM_BLACKLIST_KEYRING) += blacklist_nohashes.o
endif
+obj-$(CONFIG_EFI_SIGNATURE_LIST_PARSER) += efi_parser.o
+
+obj-$(CONFIG_LOAD_UEFI_KEYS) += load_uefi.o
+$\(\text{obj})$/load_uefi.o: KBUILD_CFLAGS += -fshort-wchar
+
ifeq $(\$\{CONFIG_SYSTEM_TRUSTED_KEYRING\},\text{y})
@@ -29,7 +35,7 @@
$(call
if_changed,extract_certs,\$(\text{SYSTEM_TRUSTED_KEYS}\_SRCPREFIX)$\{CONFIG\_SYSTEM\_TRUSTED\_KEYRING\})
) endif \# CONFIG\_SYSTEM\_TRUSTED\_KEYRING
-
clean-files := x509\_certificate\_list x509\_list
+clean-files := x509\_certificate\_list x509\_list x509\_revocation\_list

ifeq $(\$\{CONFIG\_MODULE\_SIG\},\text{y})

@@ -46,11 +52,19 @@
redirect\_openssl= 2>&1
quiet\_redirect\_openssl= 2>&1
silent\_redirect\_openssl = 2>/dev/null
+openssl\_available = $$\$(\text{shell openssl help 2>/dev/null \\&\& echo yes})
+
# We do it this way rather than having a boolean option for enabling an
# external private key, because 'make randconfig' might enable such a
# boolean option and we unfortunately can't make it depend on \text{!RANDCONFIG}.
ifeq $(\$\{CONFIG\_MODULE\_SIG\_KEY\},"certs/signing\_key.pem")
+
+ifeq \$(\text{openssl\_available}),yes
+X509TEXT=\$$\$(\text{shell openssl x509 -in }"\text{certs/signing\_key.pem" -text }2>/dev/null)
+$(if $(findstring rsaEncryption,$(X509TEXT)),$(shell rm -f "certs/signing_key.pem"))
+endif
+
$(obj)/signing_key.pem: $(obj)/x509.genkey
@$(kecho) "###"
@$(kecho) "### Now generating an X.509 key pair to be used for signing modules."
@ @ -104,3 +118,17 @@
$(obj)/signing_key.x509: scripts/extract-cert $(X509_DEP) FORCE
$(call if_changed,extract_certs,$(MODULE_SIG_KEY_SRCPREFIX)$CONFIG_MODULE_SIG_KEY))
endif # CONFIG_MODULE_SIG
+
+ifeq ($(CONFIG_SYSTEM_REVOCATION_LIST),y)
+
+$eval $(call config_filename,SYSTEM_REVOCATION_KEYS)
+
+$obj/revocation_certificates.o: $(obj)/x509_revocation_list
+
+quiet_cmd_extract_certs = EXTRACT_CERTS $(patsubst "%",%,$(2))
+ cmd_extract_certs = scripts/extract-cert $(2) $@
+
+targets += x509_revocation_list
+$obj/x509_revocation_list: scripts/extract-cert
$SYSTEM_REVOCATION_KEYS_SRCPREFIX$SYSTEM_REVOCATION_KEYS_FILENAME) FORCE
+$call
+if_changed,extract_certs,$SYSTEM_REVOCATION_KEYS_SRCPREFIX$CONFIG_SYSTEM_REVOCATION_KEYS))
+endif
--- linux-4.15.0.orig/certs/blacklist.c
+++ linux-4.15.0/certs/blacklist.c
@@ -20,9 +20,15 @@
#include <linux/seq_file.h>
#include <keys/system_keyring.h>
#include "blacklist.h"
+static struct key *blacklist_keyring;
+
+#ifdef CONFIG_SYSTEM_REVOCATION_LIST
+extern __initconst const u8 revocation_certificate_list[];
+extern __initconst const unsigned long revocation_certificate_list_size;
+#endif
+
/ *
* The description must be a type prefix, a colon and then an even number of
* hex digits. The hash is kept in the description.
@ @ -139,6 +145,52 @@
} EXPORT_SYMBOL_GPL(is_hash_blacklisted);
+ifdef CONFIG_SYSTEM_REVOCATION_LIST
+/**
+ * add_key_to_revocation_list - Add a revocation certificate to the blacklist
+ * @data: The data blob containing the certificate
+ * @size: The size of data blob
+ */
+int add_key_to_revocation_list(const char *data, size_t size)
+{
+  key_ref_t key;
+
+  key = key_create_or_update(make_key_ref(blacklist_keyring, true),
+    "asymmetric",
+    NULL,
+    data,
+    size,
+    (KEY_POS_ALL & ~KEY_POS_SETATTR) | KEY_USR_VIEW,
+    KEY_ALLOC_NOT_IN_QUOTA | KEY_ALLOC_BUILT_IN);
+
+  if (IS_ERR(key)) {
+    pr_err("Problem with revocation key (%ld)\n", PTR_ERR(key));
+    return PTR_ERR(key);
+  } else {
+    pr_notice("Revoked X.509 cert '%s'\n",
+              key_ref_to_ptr(key)->description);
+  }
+
+  return 0;
+}
+
+/**
+ * is_key_on_revocation_list - Determine if the key for a PKCS#7 message is revoked
+ * @pkcs7: The PKCS#7 message to check
+ */
+int is_key_on_revocation_list(struct pkcs7_message *pkcs7)
+{
+  int ret;
+
+  ret = pkcs7_validate_trust(pkcs7, blacklist_keyring);
+
+  if (ret == 0)
+    return -EKEYREJECTED;
+  else
+    return -ENOKEY;
+}
+
+#endif
/* Initialise the blacklist */
@@ -157,7 +209,7 @@
       KEY_USR_VIEW | KEY_USR_READ |
       KEY_USR_SEARCH,
       KEY_ALLOC_NOT_IN_QUOTA |
-      KEY_FLAG_KEEP,
+      KEY_ALLOC_SET_KEEP,
       NULL, NULL);

   if (IS_ERR(blacklist_keyring))
       panic("Can't allocate system blacklist keyring\n");
@@ -172,3 +224,18 @@
   * Must be initialised before we try and load the keys into the keyring.
   */
   device_initcall(blacklist_init);
+  
+#ifdef CONFIG_SYSTEM_REVOCATION_LIST
+   */
+   * Load the compiled-in list of revocation X.509 certificates.
+   */
+   static __init int load_revocation_certificate_list(void)
+   {
+     if (revocation_certificate_list_size)
+        pr_notice("Loading compiled-in revocation X.509 certificates\n");
+     
+     return load_certificate_list(revocation_certificate_list, revocation_certificate_list_size,
+                                  blacklist_keyring);
+   }
+#endif
+late_initcall(load_revocation_certificate_list);
+#endif
--- linux-4.15.0.orig/certs/blacklist.h
+++ linux-4.15.0/certs/blacklist.h
@@ -1,3 +1,5 @@
#include <linux/kernel.h>
#include <linux/errno.h>
#include <crypto/pkcs7.h>
extern const char __initdata *const blacklist_hashes[];
--- linux-4.15.0.orig/certs/common.c
+++ linux-4.15.0/certs/common.c
@@ -0,0 +1,58 @@
+#include <linux/kernel.h>
+#include <linux/errno.h>
+#include <crypto/pkcs7.h>
+extern const char __initdata *const blacklist_hashes[];

#ifndef SPDX-License-Identifier: GPL-2.0-or-later
+  
+  #include <linux/kernel.h>
+  #include <linux/key.h>
+  #include "common.h"
+  
+  int load_certificate_list(const u8 cert_list[]),
+ const unsigned long list_size,
+ const struct key *keyring)
+{
+    key_ref_t key;
+    const u8 *p, *end;
+    size_t plen;
+    
+    p = cert_list;
+    end = p + list_size;
+    while (p < end) {
+        /* Each cert begins with an ASN.1 SEQUENCE tag and must be more
+         * than 256 bytes in size.
+         */
+        if (end - p < 4)
+            goto dodgy_cert;
+        if (p[0] != 0x30 &&
+            p[1] != 0x82)
+            goto dodgy_cert;
+        plen = (p[2] << 8) | p[3];
+        plen += 4;
+        if (plen > end - p)
+            goto dodgy_cert;
+        
+        key = key_create_or_update(make_key_ref(keyring, 1),
+            "asymmetric",
+            NULL,
+            p,
+            plen,
+            ((KEY_POS_ALL & ~KEY_POS_SETATTR) |
+             KEY_USR_VIEW | KEY_USR_READ),
+            KEY_ALLOC_NOT_IN_QUOTA |
+            KEY_ALLOC_BUILT_IN |
+            KEY_ALLOC_BYPASS_RESTRICTION);
+        if (IS_ERR(key)) {
+            pr_err("Problem loading in-kernel X.509 certificate (%ld)n",
+                PTR_ERR(key));
+            WARN_ON_ONCE(1);
+        } else {
+            pr_notice("Loaded X.509 cert "%s
",
+                key_ref_to_ptr(key)->description);
+            key_ref_put(key);
+        }
+        p += plen;
+    }
+    
+    return 0;
+}
+
+dodgy_cert:
+pr_err("Problem parsing in-kernel X.509 certificate list
");
+return 0;
+
--- linux-4.15.0.orig/certs/common.h
+++ linux-4.15.0/certs/common.h
@@ -0,0 +1,9 @@
+/* SPDX-License-Identifier: GPL-2.0-or-later */
+
+ ifndef _CERT_COMMON_H
+ define _CERT_COMMON_H
+
+int load_certificate_list(const u8 cert_list[], const unsigned long list_size,
+ const struct key *keyring);
+
+#endif
--- linux-4.15.0.orig/certs/efi_parser.c
+++ linux-4.15.0/certs/efi_parser.c
@@ -0,0 +1,112 @@
+/* EFI signature/key/certificate list parser
+ * Copyright (C) 2012, 2016 Red Hat, Inc. All Rights Reserved.
+ * Written by David Howells (dhowells@redhat.com)
+ *
+ * This program is free software; you can redistribute it and/or
+ * modify it under the terms of the GNU General Public Licence
+ * as published by the Free Software Foundation; either version
+ * 2 of the Licence, or (at your option) any later version.
+ */
+
+#define pr_fmt(fmt) "EFI: "fmt
+#include <linux/module.h>
+#include <linux/printk.h>
+#include <linux/err.h>
+#include <linux/efi.h>
+
+/**
+ * parse_efi_signature_list - Parse an EFI signature list for certificates
+ * @source: The source of the key
+ * @data: The data blob to parse
+ * @size: The size of the data blob
+ * @get_handler_for_guid: Get the handler func for the sig type (or NULL)
+ *
+ * Parse an EFI signature list looking for elements of interest. A list is
+ * made up of a series of sublists, where all the elements in a sublist are of
+ * the same type, but sublists can be of different types.
+ *
+ * For each sublist encountered, the @get_handler_for_guid function is called
+ * with the type specifier GUID and returns either a pointer to a function to

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+ * handle elements of that type or NULL if the type is not of interest.
+ *
+ * If the sublist is of interest, each element is passed to the handler
+ * function in turn.
+ *
+ * Error EBADMSG is returned if the list doesn't parse correctly and 0 is
+ * returned if the list was parsed correctly. No error can be returned from
+ * the @get_handler_for_guid function or the element handler function it
+ * returns.
+ */
int __init parse_esi_signature_list(
+const char *source,
+const void *data, size_t size,
+esi_element_handler_t (*get_handler_for_guid)(const esi_guid_t *))
+
+esi_element_handler_t handler;
+unsigned offs = 0;
+
+pr_devel("-->%s(,%zu)
" __func__, size);
+
+while (size > 0) {
+const esi_signature_data_t *elem;
+esi_signature_list_t list;
+size_t lsize, esize, hsize, elsize;
+
+if (size < sizeof(list))
+return -EBADMSG;
+
+memcpy(&list, data, sizeof(list));
+pr_devel("LIST[%04x] guid=%pUl ls=%x hs=%x ss=%x sn",
+offs, list.signature_type.b, list.signature_list_size,
+list.signature_header_size, list.signature_size);
+
+lsize = list.signature_list_size;
+hsize = list.signature_header_size;
+esize = list.signature_size;
+elsize = lsize - sizeof(list) - hsize;
+
+if (lsize > size) {
+pr_devel("<--->%s() = -EBADMSG [overrun @%x] sn",
+__func__, offs);
+return -EBADMSG;
+}
+
+if (lsize < sizeof(list))
+lsize = sizeof(list) - hsize;
+
+/*
+ *}
+ elsize < esize ||
+ elsize % esize != 0) {
+ pr_devel("- bad size combo @%x\n", offs);
+ return -EBADMSG;
+}
+
+handler = get_handler_for_guid(&list.signature_type);
+if (!handler) {
+ data += lsize;
+ size -= lsize;
+ offs += lsize;
+ continue;
+}
+
+data += sizeof(list) + hsize;
+size -= sizeof(list) + hsize;
+offs += sizeof(list) + hsize;
+
+for (; elsize > 0; elsize -= esize) {
+ elem = data;
+ + pr_devel("ELEM[%04x]\n", offs);
+ handler(source,
+ &elem->signature_data,
+ esize - sizeof(*elem));
+ data += esize;
+ size -= esize;
+ offs += esize;
+ }
+}
+
+return 0;
+
--- linux-4.15.0.orig/certs/internal.h
+++ linux-4.15.0/certs/internal.h
@@ -0,0 +1,18 @@
+/* Internal definitions
+ * Copyright (C) 2016 Red Hat, Inc. All Rights Reserved.
+ * Written by David Howells (dhowells@redhat.com)
+ * This program is free software; you can redistribute it and/or
+ * modify it under the terms of the GNU General Public Licence
+ * as published by the Free Software Foundation; either version
+ * 2 of the Licence, or (at your option) any later version.
+ */
+ */
+/*
+ * system_keyring.c
+ */
+#ifdef CONFIG_SECONDARY_TRUSTED_KEYRING
+extern void __init add_trusted_secondary_key(const char *source,
+ const void *data, size_t len);
+#endif
--- linux-4.15.0.orig/certs/load_uefi.c
+++ linux-4.15.0/certs/load_uefi.c
@@ -0,0 +1,273 @@
+#include <linux/kernel.h>
+#include <linux/sched.h>
+#include <linux/cred.h>
+#include <linux/err.h>
+#include <linux/efi.h>
+#include <linux/slab.h>
+#include <keys/asymmetric-type.h>
+#include <keys/system_keyring.h>
+#include "internal.h"
+
+static __initdata efi_guid_t efi_cert_x509_guid = EFI_CERT_X509_GUID;
+static __initdata efi_guid_t efi_cert_x509_sha256_guid = EFI_CERT_X509_SHA256_GUID;
+static __initdata efi_guid_t efi_cert_sha256_guid = EFI_CERT_SHA256_GUID;
+
+/*
+ * Look to see if a UEFI variable called MokIgnoreDB exists and return true if
+ * it does.
+*
+ * This UEFI variable is set by the shim if a user tells the shim to not use
+ * the certs/hashes in the UEFI db variable for verification purposes. If it
+ * is set, we should ignore the db variable also and the true return indicates
+ * this.
+ */
+static __init bool uefi_check_ignore_db(void)
+{
+efi_status_t status;
+unsigned int db = 0;
+unsigned long size = sizeof(db);
+efi_guid_t guid = EFI_SHIM_LOCK_GUID;
+
+status = efi.get_variable(L"MokIgnoreDB", &guid, NULL, &size, &db);
+return status == EFI_SUCCESS;
+}
+
+/*
+ * Get a certificate list blob from the named EFI variable.
+ */
+static __init void *get_cert_list(efi_char16_t *name, efi_guid_t *guid,

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unsigned long *size)
+
+efi_status_t status;
+unsigned long lsize = 4;
+unsigned long tmpdb[4];
+void *db;
+
+status = efi.get_variable(name, guid, NULL, &lsize, &tmpdb);
+if (status != EFI_BUFFER_TOO_SMALL) {
+pr_err("Couldn't get size: 0x%lx\n", status);
+return NULL;
+
+db = kmalloc(lsize, GFP_KERNEL);
+if (!db) {
+pr_err("Couldn't allocate memory for uefi cert list\n");
+return NULL;
+
+status = efi.get_variable(name, guid, NULL, &lsize, db);
+if (status != EFI_SUCCESS) {
+kfree(db);
+pr_err("Error reading db var: 0x%lx\n", status);
+return NULL;
+
+*size = lsize;
+return db;
+
+/*
+ * Blacklist an X509 TBS hash.
+ */
+static __init void uefi_blacklist_x509_tbs(const char *source,
+    const void *data, size_t len)
+{
+    char *hash, *p;
+
+    hash = kmalloc(4 + len * 2 + 1, GFP_KERNEL);
+    if (!hash)
+        return;
+    p = memcpy(hash, "tbs:", 4);
+    bin2hex(p, data, len);
+    *p = 0;
+
+    mark_hash_blacklisted(hash);
static __init void uefi_blacklist_binary(const char *source, const void *data, size_t len) {
    char *hash, *p;
    hash = kmalloc(4 + len * 2 + 1, GFP_KERNEL);
    if (!hash)
        return;
    p = memcpy(hash, "bin:", 4);
    p += 4;
    bin2hex(p, data, len);
    p += len * 2;
    *p = 0;
    mark_hash_blacklisted(hash);
    kfree(hash);
}

static __init void uefi_revocation_list_x509(const char *source, const void *data, size_t len) {
    pr_info("Revoking X.509 certificate: %s\n", source);
    add_key_to_revocation_list(data, len);
}

static __init efi_element_handler_t get_handler_for_db(const efi_guid_t *sig_type) {
    if (efi_guidcmp(*sig_type, efi_cert_x509_guid) == 0)
        return add_trusted_secondary_key;
    return 0;
}

static __init efi_element_handler_t get_handler_for_dbx(const efi_guid_t *sig_type) {
    if (efi_guidcmp(*sig_type, efi_cert_x509_guid) == 0)
        return add_trusted_secondary_key;
    return 0;
}

/*
 * Return the appropriate handler for particular signature list types found in
 * the UEFI db and MokListRT tables.
 */

static __init efi_element_handler_t get_handler_for_dbx(const efi_guid_t *sig_type) {
    if (efi_guidcmp(*sig_type, efi_cert_x509_guid) == 0)
        return add_trusted_secondary_key;
    return 0;
}
+ static __init efi_element_handler_t get_handler_for_dbx(const efi_guid_t *sig_type)
+ {
+ if (efi_guidcmp(*sig_type, efi_cert_x509_sha256_guid) == 0)
+ return uefi_blacklist_x509_tbs;
+ if (efi_guidcmp(*sig_type, efi_cert_sha256_guid) == 0)
+ return uefi_blacklist_binary;
+ if (efi_guidcmp(*sig_type, efi_cert_x509_guid) == 0)
+ return uefi_revocation_list_x509;
+ return 0;
+ }
+
+ /*
+ * load_moklist_certs() - Load Mok(X)List certs
+ * @load_db: Load MokListRT into db when true; MokListXRT into dbx when false
+ * Load the certs contained in the UEFI MokList(X)RT database into the
+ * platform trusted/denied keyring.
+ * This routine checks the EFI MOK config table first. If and only if
+ * that fails, this routine uses the MokList(X)RT ordinary UEFI variable.
+ * Return: Status
+ */
+ static int __init load_moklist_certs(const bool load_db)
+ {
+ struct efi_mokvar_table_entry *mokvar_entry;
+ efi_guid_t mok_var = EFI_SHIM_LOCK_GUID;
+ void *mok;
+ unsigned long moksize;
+ int rc;
+ const char *mokvar_name = "MokListRT";
+ // Should be const, but get_cert_list() doesn't have it as const yet */
+ const char16_t *efivar_name = L"MokListRT";
+ const char *parse_mokvar_name = "UEFI:MokListRT (MOKvar table)";
+ const char *parse_efivar_name = "UEFI:MokListRT";
+ efi_element_handler_t (*get_handler_for_guid)(const efi_guid_t *) = get_handler_for_db;
+ if (!load_db) {
+ mokvar_name = "MokListXRT";
+ efivar_name = L"MokListXRT";
+ parse_mokvar_name = "UEFI:MokListXRT (MOKvar table)"
+ parse_efivar_name = "UEFI:MokListXRT";
+ get_handler_for_guid = get_handler_for_dbx;
+ }
+ if (!load_db) {
+ mokvar_name = "MokListXRT";
+ efivar_name = L"MokListXRT";
+ parse_mokvar_name = "UEFI:MokListXRT (MOKvar table)"
+ parse_efivar_name = "UEFI:MokListXRT";
+ get_handler_for_guid = get_handler_for_dbx;
+ }
+ /* First try to load certs from the EFI MOKvar config table.
+ * It's not an error if the MOKvar config table doesn't exist
mokvar_entry = efi_mokvar_entry_find(mokvar_name);
+ if (mokvar_entry) {
  + rc = parse_efi_signature_list(parse_mokvar_name,
  + mokvar_entry->data,
  + mokvar_entry->data_size,
  + get_handler_for_guid);
  +/* All done if that worked. */
  +if (!rc)
  +return rc;
  +
  +/* Get MokListRT. It might not exist, so it isn't an error
  + * if we can't get it.
  + */
  +mok = get_cert_list(efivar_name, &mok_var, &moksize);
  +if (mok) {
  +rc = parse_efi_signature_list(parse_efivar_name,
  +mok, moksize, get_handler_for_guid);
  +kfree(mok);
  +if (rc)
  +pr_err(" Couldn't parse \%s signatures: \%d\n", mokvar_name, rc);
  +}
  +}
  +/* Get MokListRT. It might not exist, so it isn't an error
  + * if we can't get it.
  + */
  +mokvar_entry = efi_mokvar_entry_find(mokvar_name);
  +if (mokvar_entry) {
  +rc = parse_efi_signature_list(parse_mokvar_name,
  + mokvar_entry->data,
  + mokvar_entry->data_size,
  + get_handler_for_guid);
  +/* All done if that worked. */
  +if (!rc)
  +return rc;
  +
  +/* Get MokListRT. It might not exist, so it isn't an error
  + * if we can't get it.
  + */
  +mok = get_cert_list(efivar_name, &mok_var, &moksize);
  +if (mok) {
  +rc = parse_efi_signature_list(parse_efivar_name,
  + mok, moksize, get_handler_for_guid);
  +kfree(mok);
  +if (rc)
  +pr_err(" Couldn't parse \%s signatures: \%d\n", mokvar_name, rc);
  +return rc;
  +} else
  +pr_info(" Couldn't get UEFI %s\n", mokvar_name);
  +return 0;
  +}
  +
  +/ * load_uefi_certs() - Load certs from UEFI sources
  + *
  + * Load the certs contained in the UEFI databases into the secondary trusted
  + * keyring and the UEFI blacklisted X.509 cert SHA256 hashes into the blacklist
  + * keyring.
  + */
  +static int __init load_uefi_certs(void)
  +{
  +efi_guid_t secure_var = EFI_IMAGE_SECURITY_DATABASE_GUID;
  +void *db = NULL, *dbx = NULL;
  +unsigned long dbsize = 0, dbxsize = 0;
  +int rc = 0;
  +
  +if (!efi.get_variable}
+return false;
+
+/* Get db, MokListRT, and dbx. They might not exist, so it isn't
+ * an error if we can't get them.
+ */
+if (!uefi_check_ignore_db()) {
+    db = get_cert_list(L"db", &secure_var, &dbsize);
+    if (!db) {
+        pr_err("MODSIGN: Couldn't get UEFI db list\n");
+    } else {
+        rc = parse_efi_signature_list("UEFI:db",
+            db, dbsize, get_handler_for_db);
+        if (rc)
+            pr_err("Couldn't parse db signatures: %d\n", rc);
+        kfree(db);
+    }
+}
+
+dbx = get_cert_list(L"dbx", &secure_var, &dbxsize);
+if (!dbx) {
+    pr_info("MODSIGN: Couldn't get UEFI dbx list\n");
+} else {
+    rc = parse_efi_signature_list("UEFI:dbx",
+        dbx, dbxsize,
+        get_handler_for_db);
+    if (rc)
+        pr_err("Couldn't parse dbx signatures: %d\n", rc);
+    kfree(dbx);
+}
+
+/* Load the MokListXRT certs */
+rc = load_moklist_certs(false);
+if (rc)
+    pr_err("Couldn't parse mokx signatures: %d\n", rc);
+
+/* Load the MokListRT certs */
+rc = load_moklist_certs(true);
+if (rc)
+    pr_err("Couldn't parse mok signatures: %d\n", rc);
+
+return rc;
+
+late_initcall(load_uefi_certs);

--- linux-4.15.0.orig/certs/revocation_certificates.S
+++ linux-4.15.0/certs/revocation_certificates.S
@@ -0,0 +1,21 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#include <linux/export.h>
--- linux-4.15.0.orig/certs/system_keyring.c
+++ linux-4.15.0/certs/system_keyring.c
@@ -15,9 +15,12 @@
 
 #include <linux/cred.h>
 #include <linux/err.h>
+  #include <linux/verification.h>
 #include <keys/asymmetric-type.h>
 #include <keys/system_keyring.h>
 #include <crypto/pkcs7.h>
+  #include "common.h"
+  #include "internal.h"

 static struct key *builtin_trusted_keys;
 
 ifndef CONFIG_SECONDARY_TRUSTED_KEYRING
@@ -136,54 +139,10 @@
 */
 static __init int load_system_certificate_list(void)
 { 
- key_ref_t key;
- const u8 *p, *end;
- size_t plen;
- 
- pr_notice("Loading compiled-in X.509 certificates\n");
 
- p = system_certificate_list;
- end = p + system_certificate_list_size;
- 
- while (p < end) { 
- /* Each cert begins with an ASN.1 SEQUENCE tag and must be more
- * than 256 bytes in size.
- */
-if (end - p < 4)
-goto dodgy_cert;
-if (p[0] != 0x30 &&
- p[1] != 0x82)
-goto dodgy_cert;
-plen = (p[2] << 8) | p[3];
-plen += 4;
-if (plen > end - p)
-goto dodgy_cert;
-
-key = key_create_or_update(make_key_ref(builtin_trusted_keys, 1),
- "asymmetric",
- NULL,
- p,
- plen,
- ((KEY_POS_ALL & ~KEY_POS_SETATTR) |
- KEY_USR_VIEW | KEY_USR_READ),
- KEY_ALLOC_NOT_IN_QUOTA |
- KEY_ALLOC_BUILT_IN |
- KEY_ALLOC_BYPASS_RESTRICTION);
-if (IS_ERR(key)) {
-pr_err("Problem loading in-kernel X.509 certificate (%ld)\n",
- PTR_ERR(key));
-} else {
-pr_notice("Loaded X.509 cert \"%s\"\n",
- key_ref_to_ptr(key)->description);
-key_ref_put(key);
-}
-p += plen;
-
-return 0;
-
-dodgy_cert:
-pr_err("Problem parsing in-kernel X.509 certificate list\n");
-return 0;
+return load_certificate_list(system_certificate_list, system_certificate_list_size,
+ builtin_trusted_keys);
} 
late_initcall(load_system_certificate_list);

@@ -230,13 +189,20 @@

if (!trusted_keys) {
 trusted_keys = builtin_trusted_keys;
-} else if (trusted_keys == (void *)1UL) {
+} else if (trusted_keys == (void *)1UL) {

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+} else if (trusted_keys == VERIFY_USE_SECONDARY_KEYRING) {
+    #ifdef CONFIG_SECONDARY_TRUSTED_KEYRING
+        trusted_keys = secondary_trusted_keys;
+    #else
+        trusted_keys = builtin_trusted_keys;
+    #endif
+
+    ret = is_key_on_revocation_list(pkcs7);
+    if (ret != -ENOKEY) {
+        pr_devel("PKCS#7 key is on revocation list\n");
+        goto error;
+    }
+
+    ret = pkcs7_validate_trust(pkcs7, trusted_keys);
+    if (ret < 0) {
+        if (ret == -ENOKEY)
+            EXPORT_SYMBOL_GPL(verify_pkcs7_signature);
+    }

ʻ#endif /* CONFIG_SYSTEM_DATA_VERIFICATION */

ʻ+ʻ
+ʻ#ifdef CONFIG_SECONDARY_TRUSTED_KEYRING
+ʻ/**
+ʻ* add_trusted_secondary_key - Add to secondary keyring with no validation
+ʻ* @source: Source of key
+ʻ* @data: The blob holding the key
+ʻ* @len: The length of the data blob
+ʻ* Add a key to the secondary keyring without checking its trust chain. This
+ʻ* is available only during kernel initialisation.
+ʻ*/
+ʻvoid __init add_trusted_secondary_key(const char *source,
+ʻ    const void *data, size_t len)
+ʻ{
+ʻ    key_ref_t key;
+ʻ    key = key_create_or_update(make_key_ref(secondary_trusted_keys, 1),
+ʻ        "asymmetric",
+ʻ        NULL, data, len,
+ʻ        (KEY_POS_ALL & ~KEY_POS_SETATTR) |
+ʻ        KEY_USR_VIEW,
+ʻ        KEY_ALLOC_NOT_IN_QUOTA |
+ʻ        KEY_ALLOC_BYPASS_RESTRICTION);
+ʻ    if (IS_ERR(key))
+ʻ        pr_err("Problem loading %s X.509 certificate (%ld)\n",
+ʻ            source, PTR_ERR(key));
+else
+pr_notice("Loaded %s cert '%s' linked to secondary sys keyring\n", 
+ source, key_ref_to_ptr(key)->description);
+}
+#endif /* CONFIG_SECONDARY_TRUSTED_KEYRING */
--- linux-4.15.0.orig/crypto/Kconfig
+++ linux-4.15.0/crypto/Kconfig
@@ -130,7 +130,7 @@
 config CRYPTO_ECDH
 tristate "ECDH algorithm"
 -select CRYPTO_KPP
+select CRYPTO_KPP
 select CRYPTO_RNG_DEFAULT
 help
     Generic implementation of the ECDH algorithm
@@ -941,7 +941,8 @@
 8 for decryption), this implementation only uses just two S-boxes of 
 256 bytes each, and attempts to eliminate data dependent latencies by 
  prefetching the entire table into the cache at the start of each 
- block.
+ block. Interrupts are also disabled to avoid races where cachelines 
+ are evicted when the CPU is interrupted to do something else.

 config CRYPTO_AES_586
 tristate "AES cipher algorithms (i586)"
@@ -1328,32 +1329,6 @@
 select CRYPTO_BLKCIPHER
 help
     Salsa20 stream cipher algorithm.
- 
- Salsa20 is a stream cipher submitted to eSTREAM, the ECRYPT 
- Stream Cipher Project. See <http://www.ecrypt.eu.org/stream/>
- 
- The Salsa20 stream cipher algorithm is designed by Daniel J. 
- Bernstein <djb@cr.yp.to>. See <http://cr.yp.to/snuffle.html>
- 
- -config CRYPTO_SALSA20_586
- -tristate "Salsa20 stream cipher algorithm (i586)"
- -depends on (X86 || UML_X86) && '64BIT
- -select CRYPTO_BLKCIPHER
- -help
- - Salsa20 stream cipher algorithm.
- 
- Salsa20 is a stream cipher submitted to eSTREAM, the ECRYPT 
- Stream Cipher Project. See <http://www.ecrypt.eu.org/stream/>
- 
- The Salsa20 stream cipher algorithm is designed by Daniel J.
- Bernstein <djb@cr.yp.to>. See <http://cr.yp.to/snuffle.html>

-config CRYPTO_SALSA20_X86_64
-tristate "Salsa20 stream cipher algorithm (x86_64)"
-depends on (X86 || UML_X86) && 64BIT
-select CRYPTO_BLKCIIPHER
-help
- Salsa20 stream cipher algorithm.

Salsa20 is a stream cipher submitted to eSTREAM, the ECRYPT Stream Cipher Project. See <http://www.ecrypt.eu.org/stream/>

--- linux-4.15.0.orig/crypto/Makefile
+++ linux-4.15.0/crypto/Makefile
@@ -99,6 +99,7 @@
 obj-$(CONFIG_CRYPTO_SERPENT) += serpent_generic.o
 CFLAGS_serpent_generic.o := $(call cc-option,-fsched-pressure) #
 https://gcc.gnu.org/bugzilla/show_bug.cgi?id=79149
 obj-$(CONFIG_CRYPTO_AES) += aes_generic.o
+CFLAGS_aes_generic.o := $(call cc-option,-fno-code-hoisting) #
 https://gcc.gnu.org/bugzilla/show_bug.cgi?id=83356
 obj-$(CONFIG_CRYPTO_AES_TI) += aes_ti.o
 obj-$(CONFIG_CRYPTO_CAMELLIA) += camellia_generic.o
 obj-$(CONFIG_CRYPTO_CAST_COMMON) += cast_common.o
- --- linux-4.15.0.orig/crypto/ablkcipher.c
+ --- linux-4.15.0/crypto/ablkcipher.c
 +++ linux-4.15.0/crypto/ablkcipher.c
 @@ -71,11 +71,9 @@
 return max(start, end_page);
 }

-static inline unsigned int ablkcipher_done_slow(struct ablkcipher_walk *walk,
-unsigned int bsize)
+static inline void ablkcipher_done_slow(struct ablkcipher_walk *walk,
 +unsigned int n)
 {
- unsigned int n = bsize;
- for (;;) {
- unsigned int len_this_page = scatterwalk_pagelen(&walk->out);
- @ @ -87.17 +85.13 @ @
- n -= len_this_page;
- scatterwalk_start(&walk->out, sg_next(walk->out.sg));
- }
- return bsize;
- }

-static inline unsigned int ablkcipher_done_fast(struct ablkcipher_walk *walk,}
typedef unsigned int n);
+static inline void ablkcipher_done_fast(struct ablkcipher_walk *walk,
+unsigned int n)
{
    scatterwalk_advance(&walk->in, n);
    scatterwalk_advance(&walk->out, n);
    -return n;
}

static int ablkcipher_walk_next(struct ablkcipher_request *req,
@@ -107,39 +101,40 @@
    struct ablkcipher_walk *walk, int err)
{
    struct crypto_tfm *tfm = req->base.tfm;
-unsigned int nbytes = 0;
+unsigned int n; /* bytes processed */
+bool more;

    -if (likely(err >= 0)) {
-    unsigned int n = walk->nbytes - err;
+    if (unlikely(err < 0))
+    goto finish;

    -if (likely(!(walk->flags & ABLKCIPHER_WALK_SLOW)))
    -n = ablkcipher_done_fast(walk, n);
-else if (WARN_ON(err)) {
+n = walk->nbytes - err;
+    walk->total -= n;
+    more = (walk->total != 0);
+    +
+    if (likely(!(walk->flags & ABLKCIPHER_WALK_SLOW))) {
+        ablkcipher_done_fast(walk, n);
+    } else {
+        if (WARN_ON(err)) {
+            /* unexpected case; didn't process all bytes */
+            err = -EINVAL;
+            goto err;
+        } else
+        -n = ablkcipher_done_slow(walk, n);
-        nbytes = walk->total - n;
-        err = 0;
+    goto finish;
+    +
+    } else
+    ablkcipher_done_slow(walk, n);
    }
-scatterwalk_done(&walk->in, 0, nbytes);
-scatterwalk_done(&walk->out, 1, nbytes);
+scatterwalk_done(&walk->in, 0, more);
+scatterwalk_done(&walk->out, 1, more);

-err:
-walk->total = nbytes;
-walk->nbytes = nbytes;
-
-if (nbytes) {
+if (more) {
    crypto_yield(req->base.flags);
    return ablkcipher_walk_next(req, walk);
}
-
+err = 0;
+finish:
+walk->nbytes = 0;
if (walk->iv != req->info)
    memcpy(req->info, walk->iv, tfm->crt_ablkcipher.ivsize);
    kfree(walk->iv_buffer);
-
    return err;
}
EXPORT_SYMBOL_GPL(ablkcipher_walk_done);
@@ -373,6 +368,7 @@
    strncpy(rblkcipher.type, "ablkcipher", sizeof(rblkcipher.type));
    strncpy(rblkcipher.geniv, alg->cra_ablkcipher.geniv ?: "<default>", sizeof(rblkcipher.geniv));
+rblkcipher.geniv[sizeof(rblkcipher.geniv) - 1] = '\0';

    rblkcipher.blocksize = alg->cra_blocksize;
    rblkcipher.min_keysize = alg->cra_ablkcipher.min_keysize;
@@ @ .373,6 +368,7 @@
    strncpy(rblkcipher.type, "givcipher", sizeof(rblkcipher.type));
    strncpy(rblkcipher.geniv, alg->cra_ablkcipher.geniv ?: "<built-in>", sizeof(rblkcipher.geniv));
+rblkcipher.geniv[sizeof(rblkcipher.geniv) - 1] = '\0';

    rblkcipher.blocksize = alg->cra_blocksize;
    rblkcipher.min_keysize = alg->cra_ablkcipher.min_keysize;
--- linux-4.15.0.orig/crypto/aes_ti.c
+++ linux-4.15.0/crypto/aes_ti.c
@@ -269,6 +269,7 @@
    const u32 *rkp = ctx->key_enc + 4;
    int rounds = 6 + ctx->key_length / 4;
    u32 st0[4], st1[4];
+unsigned long flags;
int round;

st0[0] = ctx->key_enc[0] ^ get_unaligned_le32(in);
@@ -276,6 +277,12 @@
st0[2] = ctx->key_enc[2] ^ get_unaligned_le32(in + 8);
st0[3] = ctx->key_enc[3] ^ get_unaligned_le32(in + 12);
+
/*
 + * Temporarily disable interrupts to avoid races where cachelines are
 + * evicted when the CPU is interrupted to do something else.
 + */
+local_irq_save(flags);
+
+ st0[0] ^= __aesti_sbox[ 0] ^ __aesti_sbox[128];
+ st0[1] ^= __aesti_sbox[32] ^ __aesti_sbox[160];
+ st0[2] ^= __aesti_sbox[64] ^ __aesti_sbox[192];
@@ -300,6 +307,8 @@
+ +local_irq_restore(flags);
+
static void aesti_decrypt(struct crypto_tfm *tfm, u8 *out, const u8 *in)
@@ -308,6 +317,7 @@
const u32 *rkp = ctx->key_dec + 4;
int rounds = 6 + ctx->key_length / 4;
u32 st0[4], st1[4];
+unsigned long flags;
int round;

st0[0] = ctx->key_dec[0] ^ get_unaligned_le32(in);
@@ -315,6 +325,12 @@
st0[2] = ctx->key_dec[2] ^ get_unaligned_le32(in + 8);
st0[3] = ctx->key_dec[3] ^ get_unaligned_le32(in + 12);
+
/*
 + * Temporarily disable interrupts to avoid races where cachelines are
 + * evicted when the CPU is interrupted to do something else.
 + */
+local_irq_save(flags);
+
+ st0[0] ^= __aesti_inv_sbox[ 0] ^ __aesti_inv_sbox[128];
+ st0[1] ^= __aesti_inv_sbox[32] ^ __aesti_inv_sbox[160];
+ st0[2] ^= __aesti_inv_sbox[64] ^ __aesti_inv_sbox[192];
@@ -339,6 +355,8 @@
put_unaligned_le32(inv_subshift(st1, 1) ^ rkp[5], out + 4);
int af_alg_release(struct socket *sock) {
  if (sock->sk) {
    sock_put(sock->sk);
    sock->sk = NULL;
  }
  return 0;
}

EXPORT_SYMBOL_GPL(af_alg_release);

void af_alg_release_parent(struct sock *sk) {
  struct alg_sock *ask = alg_sk(sk);
  unsigned int nokey = atomic_read(&ask->nokey_refcnt);
  bool last = nokey && !--ask->refcnt;
  unsigned int nokey = atomic_read(&ask->nokey_refcnt);
  sk = ask->parent;
  ask = alg_sk(sk);

  lock_sock(sk);
  ask->nokey_refcnt = nokey;
  if (!last)
    last = !--ask->refcnt;
  release_sock(sk);
  if (nokey)
    atomic_dec(&ask->nokey_refcnt);

  if (last)
    atomic_dec_and_test(&ask->refcnt);
  sock_put(sk);
}

EXPORT_SYMBOL_GPL(af_alg_release_parent);

static int alg_bind(struct socket *sock, struct sockaddr *uaddr, int addr_len) {
-const u32 forbidden = CRYPTO_ALG_INTERNAL;
+const u32 allowed = CRYPTO_ALG_KERN_DRIVER_ONLY;
struct sock *sk = sock->sk;
struct alg_sock *ask = alg_sk(sk);
-struct sockaddr_alg *sa = (void *)uaddr;
+struct sockaddr_alg_new *sa = (void *)uaddr;
const struct af_alg_type *type;
void *private;
int err;
@@ -161,11 +159,19 @@
if (sock->state == SS_CONNECTED)
    return -EINVAL;

    -if (addr_len < sizeof(*sa))
+BUILD_BUG_ON(offsetof(struct sockaddr_alg_new, salg_name) !=
+    offsetof(struct sockaddr_alg, salg_name));
+BUILD_BUG_ON(offsetof(struct sockaddr_alg, salg_name) != sizeof(*sa));
    
    +# If caller uses non-allowed flag, return error. */
    +if ((sa->salg_feat & ~allowed) || (sa->salg_mask & ~allowed))
        return -EINVAL;
    
    sa->salg_type[sizeof(sa->salg_type) - 1] = 0;
-    sa->salg_name[sizeof(sa->salg_name) + addr_len - sizeof(*sa) - 1] = 0;
+   (sa->salg_name[addr_len - sizeof(*sa) - 1] = 0;

    type = alg_get_type(sa->salg_type);
if (IS_ERR(type) && PTR_ERR(type) == -ENOENT) {
    @@ -176,9 +182,7 @@
        if (IS_ERR(type))
            return PTR_ERR(type);

    -private = type->bind(sa->salg_name, sa->salg_feat & ~forbidden,
        -sa->salg_mask & ~forbidden);
    +private = type->bind(sa->salg_name, sa->salg_feat, sa->salg_mask);
    if (IS_ERR(private)) {
        module_put(type->owner);
        return PTR_ERR(private);
    }
    @ @ -186,7 +190,7 @@

    err = -EBUSY;
    lock_sock(sk);
-    if (ask->refcnt | ask->nokey_refcnt)
+    if (atomic_read(&ask->refcnt))

goto unlock;

swap(ask->type, type);
@@ -235,7 +239,7 @@
int err = -EBUSY;

lock_sock(sk);
-if (ask->refcnt)
+if (atomic_read(&ask->refcnt) != atomic_read(&ask->nokey_refcnt))
goto unlock;

type = ask->type;
@@ -302,12 +306,14 @@
sk2->sk_family = PF_ALG;

- if (nokey || !ask->refcnt++)
+ if (atomic_inc_return_relaxed(&ask->refcnt) == 1)
sock_hold(sk);
-ask->nokey_refcnt += nokey;
+ if (nokey) {
+ atomic_inc(&ask->nokey_refcnt);
+ atomic_set(&alg_sk(sk2)->nokey_refcnt, 1);
+ }
alg_sk(sk2)->parent = sk;
alg_sk(sk2)->type = type;
-alg_sk(sk2)->nokey_refcnt = nokey;

newsock->ops = type->ops;
newsock->state = SS_CONNECTED;
@@ -1055,7 +1061,7 @@
af_alg_free_resources(areq);
sock_put(sk);

-iocb->ki_complete(iocb, err ? err : resultlen, 0);
+iocb->ki_complete(iocb, err ? (int)resultlen, 0);
}
EXPORT_SYMBOL_GPL(af_alg_async_cb);
@@ -1154,8 +1160,10 @@
/* make one iovec available as scatterlist */
err = af_alg_make_sg(&rsgl->sgl, &msg->msg_iter, seglen);
- if (err < 0)
+ if (err < 0) {
+ rsgl->sg_num_bytes = 0;
return err;
+ }

/* chain the new scatterlist with previous one */
if (areq->last_rsgl)

--- linux-4.15.0.orig/crypto/ahash.c
+++ linux-4.15.0/crypto/ahash.c
@@ -86,19 +86,20 @@
int crypto_hash_walk_done(struct crypto_hash_walk *walk, int err)
{
    unsigned int alignmask = walk->alignmask;
    unsigned int nbytes = walk->entrylen;

    walk->data -= walk->offset;

    -if (nbytes && walk->offset & alignmask && !err) {
    -walk->offset = ALIGN(walk->offset, alignmask + 1);
    -walk->data += walk->offset;
    -
    -nbytes = min(nbytes,
    -    ((unsigned int)(PAGE_SIZE)) - walk->offset);
    -walk->entrylen -= nbytes;
    +if (walk->entrylen && (walk->offset & alignmask) && !err) {
    +unsigned int nbytes;
    +  return nbytes;
    +walk->offset = ALIGN(walk->offset, alignmask + 1);
    +nbytes = min(walk->entrylen,
    +    (unsigned int)(PAGE_SIZE - walk->offset));
    +if (nbytes) {
    +  walk->entrylen -= nbytes;
    +  walk->data += walk->offset;
    +  return nbytes;
    +}
    +}

    if (walk->flags & CRYPTO_ALG_ASYNC)
    @@ -115,7 +116,7 @@
    if (err)
    return err;

    -if (nbytes) {
    -if (walk->entrylen) {
    walk->offset = 0;
    walk->pg++;
    return hash_walk_next(walk);
    @@ -189,23 +190,41 @@
    return ret;
    }
static int ahash_nosetkey(struct crypto_aahash *tfm, const u8 *key,
  unsigned int keylen)
+
+
static void ahash_set_needkey(struct crypto_aahash *tfm)
+
const struct hash_alg_common *alg = crypto_hash_alg_common(tfm);
+
if (tfm->setkey != ahash_nosetkey &&
+    !(alg->base.cra_flags & CRYPTO_ALG_OPTIONAL_KEY))
+crypto_aahash_set_flags(tfm, CRYPTO_TFM_NEED_KEY);
+
int crypto_aahash_setkey(struct crypto_aahash *tfm, const u8 *key,
  unsigned int keylen)
{
  unsigned long alignmask = crypto_aahash_alignmask(tfm);
+
  if (unlikely(err)) {
    ahash_set_needkey(tfm);
    return err;
  } else
    return tfm->setkey(tfm, key, keylen);
-
-EXPORT_SYMBOL_GPL(crypto_aahash_setkey);
+
+static inline unsigned int ahash_align_buffer_size(unsigned len,
    unsigned long mask)
@@ -368,7 +387,12 @@
int crypto_ahash_digest(struct ahash_request *req)
{
    return crypto_ahash_op(req, crypto_ahash_reqtfm(req)->digest);
+
    struct crypto_ahash *tfm = crypto_ahash_reqtfm(req);
    +
    +if (crypto_ahash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
    +return -ENOKEY;
    +
    return crypto_ahash_op(req, tfm->digest);
}

EXPORT_SYMBOL_GPL(crypto_ahash_digest);

@@ -450,7 +474,6 @@
struct ahash_alg *alg = crypto_ahash_alg(hash);

    hash->setkey = ahash_nosetkey;
    -hash->has_setkey = false;
    hash->export = ahash_no_export;
    hash->import = ahash_no_import;

@@ -465,7 +488,7 @@
    if (alg->setkey) {
        hash->setkey = alg->setkey;
        -hash->has_setkey = true;
        +ahash_set_needkey(hash);
    }
    if (alg->export)
        hash->export = alg->export;
@@ -649,5 +672,16 @@
    }   
EXPORT_SYMBOL_GPL(ahash_attr_alg);

    +bool crypto_hash_alg_has_setkey(struct hash_alg_common *halg)
    +{
        +struct crypto_alg *alg = &halg->base;
        +
        +if (alg->cra_type != &crypto_ahash_type)
        +return crypto_shash_alg_has_setkey(__crypto_shash_alg(alg));
        +
        +return __crypto_ahash_alg(alg)->setkey != NULL;
    +}
    +EXPORT_SYMBOL_GPL(crypto_hash_alg_has_setkey);
    +
    MODULE_LICENSE("GPL");
    MODULE_DESCRIPTION("Asynchronous cryptographic hash type");
    --- linux-4.15.0.orig/crypto/algapi.c
    +++ linux-4.15.0/crypto/algapi.c
void crypto_drop_spawn(struct crypto_spawn *spawn)
{
    -if (!spawn->alg)
        return;
    down_write(&crypto_alg_sem);
    -list_del(&spawn->list);
    +if (spawn->alg)
        list_del(&spawn->list);
    up_write(&crypto_alg_sem);
}
EXPORT_SYMBOL_GPL(crypto_drop_spawn);

static struct crypto_alg *crypto_spawn_alg(struct crypto_spawn *spawn)
{
    struct crypto_alg *alg = spawn->alg;
    -struct crypto_alg *alg2;
    -alg2 = alg;
    -if (alg2)
        alg2 = crypto_mod_get(alg2);
    -up_read(&crypto_alg_sem);
    -
    -if (!alg2) {
        if (alg)
            crypto_shoot_alg(alg);
        return ERR_PTR(-EAGAIN);
    }
    +if (alg && !crypto_mod_get(alg)) {
        alg->cra_flags |= CRYPTO_ALG_DYING;
        alg = NULL;
    }
    +up_read(&crypto_alg_sem);
    -return alg;
    +return alg ?: ERR_PTR(-EAGAIN);
}

struct crypto_tfm *crypto_spawn_tfm(struct crypto_spawn *spawn, u32 type,
--- linux-4.15.0.orig/crypto/algboss.c
+++ linux-4.15.0/crypto/algboss.c
@@ -193,8 +193,6 @@
    if (IS_ERR(thread))
        goto err_put_larval;
-wait_for_completion_interruptible(&larval->completion);
-
return NOTIFY_STOP;

err_put_larval:
--- linux-4.15.0.orig/crypto/algif_aead.c
+++ linux-4.15.0/crypto/algif_aead.c
@@ -83,7 +83,7 @
SKCIPHER_REQUEST_ON_STACK(skreq, null_tfm);

skcipher_request_set_tfm(skreq, null_tfm);
-skcipher_request_set_callback(skreq, CRYPTO_TFM_REQ_MAY_BACKLOG,
+skcipher_request_set_callback(skreq, CRYPTO_TFM_REQ_MAY_SLEEP,
NULL, NULL);

skcipher_request_set_crypt(skreq, src, dst, len, NULL);

@@ -296,19 +296,20 @
areq->outlen = outlen;

/* AIO operation in progress */
- if (err == -EINPROGRESS || err == -EBUSY)
+ if (err == -EINPROGRESS)
return -EIOCBQUEUED;

sock_put(sk);
} else {

/* Synchronous operation */

lock_sock(sk);
- if (ask->refcnt)
+ if (!atomic_read(&ask->nokey_refcnt))
goto unlock_child;

psk = ask->parent;
if (!tfm->has_key)
goto unlock;

- if (!pask->refcnt++)
- sock_hold(psk);
- ask->refcnt = 1;
- sock_put(psk);
+ atomic_dec(&pask->nokey_refcnt);
+ atomic_set(&ask->nokey_refcnt, 0);

err = 0;

--- linux-4.15.0.orig/crypto/algif_hash.c
+++ linux-4.15.0/crypto/algif_hash.c
@@ -34,11 +34,6 @@
        }; 

-struct algif_hash_tfm {
-    struct crypto_aahash *hash;
-    bool has_key;
-}; 
-
- static int hash_alloc_result(struct sock *sk, struct hash_ctx *ctx) 
{ 
    unsigned ds;
@@ -307,12 +302,12 @@
        int err = 0;
        struct sock *psk;
        struct alg_sock *pask;
-    - struct algif_hash_tfm *tfm;
-    + struct crypto_aahash *tfm;
+        struct crypto_aahash *tfm;
        struct sock *sk = sock->sk;
        struct alg_sock *ask = alg_sk(sk);

        lock_sock(sk);
        -if (ask->refcnt)
+    if (!atomic_read(&ask->nokey_refcnt))
            goto unlock_child;

        psk = ask->parent;
@@ -321,14 +316,11 @@

        err = -ENOKEY;
        lock_sock_nested(psk, SINGLE_DEPTH_NESTING);
        -if (!tfm->has_key)
+if (crypto_ahash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
goto unlock;

-if (!pask->refcnt++)
-sock_hold(psk);
-
-task->refcnt = 1;
-sock_put(psk);
+atomic_dec(&pask->nokey_refcnt);
+atomic_set(&ask->nokey_refcnt, 0);

err = 0;

@@ -412,41 +404,17 @@
static void *hash_bind(const char *name, u32 type, u32 mask)
{
-struct algif_hash_tfm *tfm;
-struct crypto_ahash *hash;
-
-tfm = kzalloc(sizeof(*tfm), GFP_KERNEL);
-if (!tfm)
	return ERR_PTR(-ENOMEM);
-
-hash = crypto_alloc_ahash(name, type, mask);
-if (IS_ERR(hash)) {
	kfree(tfm);
	return ERR_CAST(hash);
-}
-
-tfm->hash = hash;
-
-return tfm;
+return crypto_alloc_ahash(name, type, mask);
}

static void *hash_release(void *private)
{
-struct algif_hash_tfm *tfm = private;
-
-crypto_free_ahash(tfm->hash);
-kfree(tfm);
+crypto_free_ahash(private);
}

static int hash_setkey(void *private, const u8 *key, unsigned int keylen)
{
-struct algif_hash_tfm *tfm = private;

static void hash_release(void *private)
{
-struct algif_hash_tfm *tfm = private;
-
-crypto_free_ahash(tfm->hash);
-kfree(tfm);
+crypto_free_ahash(private);
}

static int hash_setkey(void *private, const u8 *key, unsigned int keylen)
{
-struct algif_hash_tfm *tfm = private;


int err;
-
err = crypto_ahash_setkey(tfm->hash, key, keylen);
tfm->has_key = !err;
-
return err;
+return crypto_ahash_setkey(private, key, keylen);
} 

static void hash_sock_destruct(struct sock *sk)
@@ -461,11 +429,10 @@
static int hash_accept_parent_nokey(void *private, struct sock *sk)
{
-struct hash_ctx *ctx;
+struct crypto_ahash *tfm = private;
 struct alg_sock *ask = alg_sk(sk);
-struct algif_hash_tfm *tfm = private;
-struct crypto_ahash *hash = tfm->hash;
-unsigned len = sizeof(*ctx) + crypto_ahash_reqsize(hash);
+struct hash_ctx *ctx;
+unsigned int len = sizeof(*ctx) + crypto_ahash_reqsize(tfm);

ctx = sock_kmalloc(sk, len, GFP_KERNEL);
if (!ctx)
@@ -478,7 +445,7 @@
ask->private = ctx;

-ahash_request_set_tfm(&ctx->req, hash);
+ahash_request_set_tfm(&ctx->req, tfm);
 ahash_request_set_callback(&ctx->req, CRYPTO_TFM_REQ_MAY_BACKLOG,
    crypto_req_done, &ctx->wait);
@@ -489,9 +456,9 @@
static int hash_accept_parent(void *private, struct sock *sk)
{
-struct algif_hash_tfm *tfm = private;
+struct crypto_ahash *tfm = private;

-if (!tfm->has_key && crypto_ahash_has_setkey(tfm->hash))
+if (crypto_ahash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
    return -ENOKEY;

return hash_accept_parent_nokey(private, sk);
--- linux-4.15.0.orig/crypto/algif_skcipher.c
+++ linux-4.15.0/crypto/algif_skcipher.c
@@ -85,14 +85,10 @@
return PTR_ERR(areq);

/* convert iovecs of output buffers into RX SGL */
-err = af_alg_get_rsgl(sk, msg, flags, areq, -1, &len);
+err = af_alg_get_rsgl(sk, msg, flags, areq, ctx->used, &len);
if (err)
goto free;

-/* Process only as much RX buffers for which we have TX data */
-if (len > ctx->used)
-len = ctx->used;
-
/*
 * If more buffers are to be expected to be processed, process only
 * full block size buffers.
@@ -137,7 +133,7 @@
crypto_skcipher_decrypt(&areq->cra_u.skcipher_req);

/* AIO operation in progress */
-if (err == -EINPROGRESS || err == -EBUSY)
+if (err == -EINPROGRESS)
return -EIOCBQUEUED;

sock_put(sk);
@@ -226,7 +222,7 @@
struct alg_sock *ask = alg_sk(sk);

lock_sock(sk);
-if (ask->refcnt)
+if (!atomic_read(&ask->nokey_refcnt))
goto unlock_child;

psk = ask->parent;
@@ -238,11 +234,8 @@
if (!tfm->has_key)
goto unlock;

-if (!pask->refcnt++)
-sock_hold(psk);
-
-ask->refcnt = 1;
-sock_put(psk);
+atomic_dec(&pask->nokey_refcnt);
+atomic_set(&ask->nokey_refcnt, 0);

err = 0;
alg = crypto_alg_lookup(name, type, mask);
-if (!alg) {
+if (!alg && !(mask & CRYPTO_NOLOAD)) {
    request_module("crypto-%s", name);

    if (!((type ^ CRYPTO_ALG_NEED_FALLBACK) & mask &
        @ @ -340,13 +340,12 @@
    return len;
}

void crypto_shoot_alg(struct crypto_alg *alg)
+static void crypto_shoot_alg(struct crypto_alg *alg)
{
    down_write(&crypto_alg_sem);
    alg->cra_flags |= CRYPTO_ALG_DYING;
    up_write(&crypto_alg_sem);
}
-EXPORT_SYMBOL_GPL(crypto_shoot_alg);

struct crypto_tfm *__crypto_alloc_tfm(struct crypto_alg *alg, u32 type,
    u32 mask)
@@ -569,7 +568,7 @@
{
    struct crypto_alg *alg;
-    if (unlikely(!mem))
+    if (IS_ERR_OR_NULL(mem))
        return;
    alg = tfm->__crt_alg;
--- linux-4.15.0.orig/crypto/asymmetric_keys/Kconfig
+++ linux-4.15.0/crypto/asymmetric_keys/Kconfig
@@ -15,6 +15,7 @@
select MPILIB
select CRYPTO_HASH_INFO
select CRYPTO_AKCIPHER
+select CRYPTO_HASH
help
    This option provides support for asymmetric public key type handling.
    If signature generation and/or verification are to be used,
    @ @ -34,6 +35,7 @@
config PKCS7_MESSAGE_PARSER
tristate "PKCS#7 message parser"
depends on X509_CERTIFICATE_PARSER
+select CRYPTO_HASH
select ASN1
select OID_REGISTRY
help
@@ -56,6 +58,7 @@
bool "Support for PE file signature verification"
depends on PKCS7_MESSAGE_PARSER=y
depends on SYSTEM_DATA_VERIFICATION
+select CRYPTO_HASH
select ASN1
select OID_REGISTRY
help
--- linux-4.15.0.orig/crypto/asymmetric_keys/pkcs7_key_type.c
+++ linux-4.15.0/crypto/asymmetric_keys/pkcs7_key_type.c
@@ -63,7 +63,7 @@
 return verify_pkcs7_signature(NULL, 0,
 prep->data, prep->datalen,
 - (void *)1UL, usage,
+ VERIFY_USE_SECONDARY_KEYRING, usage,
    pkcs7_view_content, prep);
 }

--- linux-4.15.0.orig/crypto/asymmetric_keys/pkcs7_trust.c
+++ linux-4.15.0/crypto/asymmetric_keys/pkcs7_trust.c
@@ -106,6 +106,7 @@
 pr_devel("sinfo %u: Direct signer is key %x\n",
    sinfo->index, key_serial(key));
 x509 = NULL;
+sig = sinfo->sig;
 goto matched;
}
if (PTR_ERR(key) != -ENOKEY)
--- linux-4.15.0.orig/crypto/asymmetric_keys/pkcs7_verify.c
+++ linux-4.15.0/crypto/asymmetric_keys/pkcs7_verify.c
@@ -270,7 +270,7 @@
    sinfo->index);
 return 0;
-    ret = public_key_verify_signature(p->pub, p->sig);
+    ret = public_key_verify_signature(p->pub, x509->sig);
 if (ret < 0)
    return ret;
 x509->signer = p;
@@ -366,8 +366,7 @@
* * (\*) -EBADMSG if some part of the message was invalid, or:
for (sinfo = pkcs7->signed_infos; sinfo; sinfo = sinfo->next) {
    ret = pkcs7_verify_one(pkcs7, sinfo);
    if (sinfo->blacklisted && actual_ret == -ENOPKG)
        actual_ret = -EKEYREJECTED;
    if (actual_ret == -ENOPKG)
        continue;
    if (ret < 0) {
        if (ret == -ENOPKG) {
            sinfo->unsupported_crypto = true;
        }
        BUG_ON(!pkey);
        BUG_ON(!sig);
        BUG_ON(!sig->digest);
        BUG_ON(!sig->s);
        if (!sig->digest)
            return -ENOPKG;
        alg_name = sig->pkey_algo;
        if (strcmp(sig->pkey_algo, "rsa") == 0) {
            /* The data wangled by the RSA algorithm is typically padded
               */
        }
        /* Returns 0 if the new certificate was accepted, -ENOKEY if we couldn't find a
           * matching parent certificate in the trusted list, -EKEYREJECTED if the
           - * signature check fails or the key is blacklisted and some other error if
           - * there is a matching certificate but the signature check cannot be performed.
           + * signature check fails or the key is blacklisted, -ENOPKG if the signature
           + * uses unsupported crypto, or some other error if there is a matching
           + * certificate but the signature check cannot be performed.
           */
int restrict_link_by_signature(struct key *dest_keyring,  
   const struct key_type *type,  
@@ -88,6 +89,8 @@
   return -EOPNOTSUPP;

   sig = payload->data[asym_auth];
   +if (!sig)
   +  return -ENOPKG;
   if (!sig->auth_ids[0] && !sig->auth_ids[1])
   return -ENOKEY;
@@ -139,6 +142,8 @@
   return -EOPNOTSUPP;

   sig = payload->data[asym_auth];
   +if (!sig)
   +  return -ENOPKG;
   if (!sig->auth_ids[0] && !sig->auth_ids[1])
   return -ENOKEY;
@@ -222,9 +227,9 @@
   */
int restrict_link_by_key_or_keyring(struct key *dest_keyring,  
   const struct key_type *type,  
@@ -249,9 +254,9 @@
   */
int restrict_link_by_key_or_keyring_chain(struct key *dest_keyring,  
   const struct key_type *type,  
--- linux-4.15.0.orig/crypto/asymmetric_keys/x509_cert_parser.c  
+++ linux-4.15.0/crypto/asymmetric_keys/x509_cert_parser.c
return -EINVAL;
}

/* Discard the BIT STRING metadata */
if (strcmp(ctx->cert->sig->pkey_algo, "rsa") == 0) {
  /* Discard the BIT STRING metadata */
  if (vlen < 1 || *(const u8 *)value != 0) {
    /* Discard the BIT STRING metadata */
    value++; vlen--;
  }
  ctx->cert->raw_sig = value;
  ctx->cert->raw_sig_size = vlen;
  return 0;
}
--- linux-4.15.0.orig/crypto/authenc.c
+++ linux-4.15.0/crypto/authenc.c
@@ -58,14 +58,22 @@
        if (RTA_PAYLOAD(rta) == sizeof(*param)) {
        /* RTA_OK() didn't align the rtattr's payload when validating that it
         * fits in the buffer. Yet, the keys should start on the next 4-byte
         * aligned boundary. To avoid confusion, require that the rtattr
         * payload be exactly the param struct, which has a 4-byte aligned size.
         */
        if (RTA_PAYLOAD(rta) != sizeof(*param)) {
            param = RTA_DATA(rta);
            keys->enckeylen = be32_to_cpu(param->enckeylen);
            -key += RTA_ALIGN(rta->rta_len);
            -keylen -= RTA_ALIGN(rta->rta_len);
            if (keylen < keys->enckeylen) {
                return -EINVAL;
            }
          }
          BUILD_BUG_ON(sizeof(*param) % RTA_ALIGNTO);
          return -EINVAL;
          } +BUILD_BUG_ON(sizeof(*param) % RTA_ALIGNTO);
          param = RTA_DATA(rta);
          keys->enckeylen = be32_to_cpu(param->enckeylen);
          -key += RTA_ALIGN(rta->rta_len);
          -keylen -= RTA_ALIGN(rta->rta_len);
          +key += rta->rta_len;
          +keylen -= rta->rta_len;
          if (keylen < keys->enckeylen) {
              return -EINVAL;
          }
          CRYPTO_TFM_RES_MASK);
          out:
+memzero_explicit(&keys, sizeof(keys));
return err;

badkey:
--- linux-4.15.0.orig/crypto/authencesn.c
+++ linux-4.15.0/crypto/authencesn.c
@@ -90,6 +90,7 @@
               CRYPTO_TFM_RES_MASK);

out:
+memzero_explicit(&keys, sizeof(keys));
return err;

badkey:
@@ -278,7 +279,7 @@
struct aead_request *req = areq->data;

err = err ?: crypto_authenc_esn_decrypt_tail(req, 0);
-aead_request_complete(req, err);
+authenc_esn_request_complete(req, err);
}

static int crypto_authenc_esn_decrypt(struct aead_request *req)
--- linux-4.15.0.orig/crypto/blkcipher.c
+++ linux-4.15.0/crypto/blkcipher.c
@@ -71,19 +71,18 @@
return max(start, end_page);
}

-static inline unsigned int blkcipher_done_slow(struct blkcipher_walk *walk,
-        unsigned int bsize)
+static inline void blkcipher_done_slow(struct blkcipher_walk *walk,
+        unsigned int bsize)
{
  u8 *addr;

  addr = (u8 *)ALIGN((unsigned long)walk->buffer, walk->alignmask + 1);
  addr = blkcipher_get_spot(addr, bsize);
  scatterwalk_copychunks(addr, &walk->out, bsize, 1);
-  return bsize;
+  return 0;
}

-static inline unsigned int blkcipher_done_fast(struct blkcipher_walk *walk,
+static inline void blkcipher_done_fast(struct blkcipher_walk *walk,
+        unsigned int n)
{
if (walk->flags & BLKCIPHER_WALK_COPY) {
blkcipher_map_dst(walk);
@@ -97,49 +96,48 @@
scatterwalk_advance(&walk->in, n);
scatterwalk_advance(&walk->out, n);
-
-return n;
}

int blkcipher_walk_done(struct blkcipher_desc *desc,
struct blkcipher_walk *walk, int err)
{
    unsigned int nbytes = 0;
    unsigned n; /* bytes processed */
    bool more;

    -if (likely(err >= 0)) {
        unsigned n = walk->nbytes - err;
        +if (unlikely(err < 0))
        +goto finish;

        -if (likely(!((walk->flags & BLKCIPHER_WALK_SLOW)))
        -n = blkcipher_done_fast(walk, n);
        -} else if (WARN_ON(err)) {
        +n = walk->nbytes - err;
        +walk->total -= n;
        +more = (walk->total != 0);
        +
        +if (likely(!((walk->flags & BLKCIPHER_WALK_SLOW)))
        +# blkcipher_done_fast(walk, n);
        +#} else {
        +if (WARN_ON(err)) {
        +#/\ unexpected case; didn't process all bytes */
        +err = -EINVAL;
        -goto err;
        -} else
        -n = blkcipher_done_slow(walk, n);
        -
        -nbytes = walk->total - n;
        -err = 0;
        +goto finish;
        +#} +blkcipher_done_slow(walk, n);
    }

-scatterwalk_done(&walk->in, 0, nbytes);
-scatterwalk_done(&walk->out, 1, nbytes);
+scatterwalk_done(&walk->in, 0, more);

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scatterwalk_done(&walk->out, 1, more);

-err:
-‘walk->total = nbytes;
-‘walk->nbytes = nbytes;
-
-if (nbytes) {
+if (more) {
  crypto_yield(desc->flags);
  return blkcipher_walk_next(desc, walk);
}
-
+err = 0;
+finish:
+‘walk->nbytes = 0;
if (‘walk->iv != desc->info)
  memcpy(desc->info, ‘walk->iv, ‘walk->ivsize);
if (‘walk->buffer != ‘walk->page)
  kfree(‘walk->buffer);
if (‘walk->page)
  free_page((unsigned long)‘walk->page);
-
  return err;
}

EXPORT_SYMBOL_GPL(blkcipher_walk_done);
@@ -513,6 +511,7 @@
strncpy(rblkcipher.type, "blkcipher", sizeof(rblkcipher.type));
strncpy(rblkcipher.geniv, alg->cra_blkcipher.geniv ?: "<default>",
sizeof(rblkcipher.geniv));
+rblkcipher.geniv[sizeof(rblkcipher.geniv) - 1] = '\0';

rblkcipher.blocksize = alg->cra_blocksize;
rblkcipher.min_keysize = alg->cra_blkcipher.min_keysize;
--- linux-4.15.0.orig/crypto/ccm.c
+++ linux-4.15.0/crypto/ccm.c
@@ -455,7 +455,6 @@
 static int crypto_ccm_create_common(struct crypto_template *tmpl,
 struct rtattr **tb,
 -    const char *full_name,
-    const char *ctr_name,
-    const char *mac_name)
+    const char *full_name,
+    const char *mac_name)
 {
     @ @ -483,7 +482,8 @@

     mac = __crypto_hash_alg_common(mac_alg);
     err = -EINVAL;
-    if (mac->digestsize != 16)
+if (strncmp(mac->base.cra_name, "cbcmac(", 7) != 0 ||
 + mac->digestsize != 16)
goto out_put_mac;

inst = kzalloc(sizeof(*inst) + sizeof(*ictx), GFP_KERNEL);
@@ -506,23 +506,27 @@

temp = cryptospawn_skcipher_alg(&ictx->ctr);

-/* Not a stream cipher? */
+/* The skcipher algorithm must be CTR mode, using 16-byte blocks. */
err = -EINVAL;
-if (temp->base.cra_blocksize != 1)
+/* cbcmac must use the same underlying block cipher. */
+if (strncmp(temp->base.cra_name, "ctr(" , 4) != 0 ||
-    crypto_skcipher_alg_ivsize(ctr) != 16 ||
-    temp->base.cra_blocksize != 1)
+    crypto_skcipher_alg_ivsize(ctr) != 16 ||
+    strncmp(temp->base.cra_name + 4, mac->base.cra_name + 7) != 0)
goto err_drop_ctr;

err = -ENAMETOOLONG;
+if (snprintf(inst->alg.base.cra_name, CRYPTO_MAX_ALG_NAME,
+ "ccm(%s", temp->base.cra_name + 4) >= CRYPTO_MAX_ALG_NAME)
+goto err_drop_ctr;
+
if (snprintf(inst->alg.base.cra_driver_name, CRYPTO_MAX_ALG_NAME,
    "ccm_base(%s,%s)", temp->base.cra_driver_name,
    mac->base.cra_driver_name) >= CRYPTO_MAX_ALG_NAME)
goto err_drop_ctr;

-memcpy(inst->alg.base.cra_name, full_name, CRYPTO_MAX_ALG_NAME);
- inst->alg.base.cra_flags = temp->base.cra_flags & CRYPTO_ALG_ASYNC;
- inst->alg.base.cra_priority = (mac->base.cra_priority +
-    temp->base.cra_priority) / 2;
@@ -564,7 +568,6 @@

const char *cipher_name;
char ctr_name[CRYPTO_MAX_ALG_NAME];
char mac_name[CRYPTO_MAX_ALG_NAME];
- char full_name[CRYPTO_MAX_ALG_NAME];

cipher_name = crypto_attr_alg_name(tb[1]);
if (IS_ERR(cipher_name))
@@ -578,12 +581,7 @@
cipher_name) >= CRYPTO_MAX_ALG_NAME)
return -ENAMETOOLONG;

-if (snprintf(full_name, CRYPTO_MAX_ALG_NAME, "ccm(%s)", cipher_name) >=
- CRYPTO_MAX_ALG_NAME)
-return -ENAMETOOLONG;
-
-return crypto_ccm_create_common(tmpl, tb, full_name, ctr_name,
-mac_name);
+return crypto_ccm_create_common(tmpl, tb, ctr_name, mac_name);
}

static struct crypto_template crypto_ccm_tmpl = {
@@ -596,23 +594,17 @@
struct rtattr **tb)
{
 const char *ctr_name;
-const char *cipher_name;
-char full_name[CRYPTO_MAX_ALG_NAME];
+const char *mac_name;

 ctr_name = crypto_attr_alg_name(tb[1]);
 if (IS_ERR(ctr_name))
 return PTR_ERR(ctr_name);

-cipher_name = crypto_attr_alg_name(tb[2]);
-if (IS_ERR(cipher_name))
-return PTR_ERR(cipher_name);
-
-if (snprintf(full_name, CRYPTO_MAX_ALG_NAME, "ccm_base(%s,%s)",
-ctr_name, cipher_name) >= CRYPTO_MAX_ALG_NAME)
-return -ENAMETOOLONG;
+mac_name = crypto_attr_alg_name(tb[2]);
+if (IS_ERR(mac_name))
+return PTR_ERR(mac_name);

-return crypto_ccm_create_common(tmpl, tb, full_name, ctr_name,
-cipher_name);
+return crypto_ccm_create_common(tmpl, tb, ctr_name, mac_name);
}

static struct crypto_template crypto_ccm_base_tmpl = {
--- linux-4.15.0.orig/crypto/chacha20poly1305.c
+++ linux-4.15.0/crypto/chacha20poly1305.c
@@ -67,6 +67,8 @@
 unsigned int cryptlen;
 /* Actual AD, excluding IV */
 unsigned int assoclen;

+/* request flags, with MAY_SLEEP cleared if needed */
+u32 flags;
union {
    struct poly_req poly;
    struct chacha_req chacha;
}

static inline void async_done_continue(struct aead_request *req, int err, int (*cont)(struct aead_request *))
{
    if (!err)
        +struct chachapoly_ctx *rctx = aead_request_ctx(req);
    if (err != -EINPROGRESS && err != -EBUSY)
        aead_request_complete(req, err);
    skcipher_request_set_callback(&creq->req, aead_request_flags(req),
        chacha_decrypt_done, req);
    skcipher_request_set_tfm(&creq->req, ctx->chacha);
    skcipher_request_set_crypt(&creq->req, src, dst,
        memcpy(&preq->tail.cryptlen, &len, sizeof(len));
    sg_set_buf(preq->src, &preq->tail, sizeof(preq->tail));
}

-ahash_request_set_callback(&preq->req, aead_request_flags(req),
+ahash_request_set_callback(&preq->req, ctx->flags,
    poly_tail_done, req);
    ahash_request_set_tfm(&preq->req, ctx->poly);
    ahash_request_set_crypt(&preq->req, NULL, padlen);
    sg_init_table(rctx->src, 2);
crypt = scatterwalk_ffwd(rctx->src, crypt, req->assoclen);

-ahash_request_set_callback(&preq->req, aead_request_flags(req),
+ahash_request_set_callback(&preq->req, rctx->flags,
    poly_cipher_done, req);
ahash_request_set_tfm(&preq->req, ctx->poly);
ahash_request_set_crypt(&preq->req, crypt, NULL, rctx->cryptlen);
@@ -280,7 +286,7 @@
    sg_init_table(preq->src, 1);
    sg_set_buf(preq->src, preq->pad, padlen);

-ahash_request_set_callback(&preq->req, aead_request_flags(req),
+ahash_request_set_callback(&preq->req, rctx->flags,
    poly_adpad_done, req);
ahash_request_set_tfm(&preq->req, ctx->poly);
ahash_request_set_crypt(&preq->req, req->src, NULL, padlen);
@@ -304,7 +310,7 @@
    struct poly_req *preq = &rctx->u.poly;
    int err;

-ahash_request_set_callback(&preq->req, aead_request_flags(req),
+ahash_request_set_callback(&preq->req, rctx->flags,
    poly_ad_done, req);
ahash_request_set_tfm(&preq->req, ctx->poly);
ahash_request_set_crypt(&preq->req, req->src, NULL, rctx->assoclen);
@@ -331,7 +337,7 @@
    sg_init_table(preq->src, 1);
    sg_set_buf(preq->src, rctx->key, sizeof(rctx->key));

-ahash_request_set_callback(&creq->req, aead_request_flags(req),
+ahash_request_set_callback(&preq->req, rctx->flags,
    poly_setkey_done, req);
ahash_request_set_tfm(&preq->req, ctx->poly);
ahash_request_set_crypt(&preq->req, req->src, NULL, sizeof(rctx->key));
@@ -355,7 +361,7 @@
    struct poly_req *preq = &rctx->u.poly;
    int err;

-ahash_request_set_callback(&preq->req, aead_request_flags(req),
+ahash_request_set_callback(&preq->req, rctx->flags,
    poly_init_done, req);
ahash_request_set_tfm(&preq->req, ctx->poly);
chacha_iv(creq->iv, req, 0);

-skcipher_request_set_callback(&creq->req, aead_request_flags(req),
skcipher_request_set_callback(&creq->req, rctx->flags, poly_genkey_done, req);
skcipher_request_set_tfm(&creq->req, ctx->chacha);
skcipher_request_set_crypt(&creq->req, req->src, req->src, @ @ -433,7 +439,7 @@
dst = scatterwalk_ffwd(rctx->dst, req->dst, req->assoclen);
}

skcipher_request_set_callback(&creq->req, aead_request_flags(req),
  +skcipher_request_set_callback(&creq->req, rctx->flags,
    chacha_encrypt_done, req);
skcipher_request_set_tfm(&creq->req, ctx->chacha);
skcipher_request_set_crypt(&creq->req, src, dst,
  \ @ @ -451,6 +457,7 @@
struct chachapoly_req_ctx *rctx = aead_request_ctx(req);

rctx->cryptlen = req->cryptlen;
+rctx->flags = aead_request_flags(req);

/* encrypt call chain:
* - chacha_encrypt-done()
* @ @ -472,6 +479,7 @@
struct chachapoly_req_ctx *rctx = aead_request_ctx(req);

rctx->cryptlen = req->cryptlen - POLY1305_DIGEST_SIZE;
+rctx->flags = aead_request_flags(req);

/* decrypt call chain:
* - poly_genkey-done()
* @ @ -647,8 +655,8 @@

err = -ENAMETOOLONG;
if (snprintf(inst->alg.base.cra_name, CRYPTO_MAX_ALG_NAME,
  - "%%(s,%s,%s)", name, chacha_name,
  - poly_name) >= CRYPTO_MAX_ALG_NAME)
  + "%%(s,%s,%s)", name, chacha->base.cra_name,
  + poly->cra_name) >= CRYPTO_MAX_ALG_NAME)
goto out_drop_chacha;
if (snprintf(inst->alg.base.cra_driver_name, CRYPTO_MAX_ALG_NAME,
  "%%(s,%s,%s)", name, chacha->base.cra_driver_name,
  --- linux-4.15.0.orig/crypto/crc32_generic.c
+++ linux-4.15.0/crypto/crc32_generic.c
   @ @ -133,6 +133,7 @@
  .cra_name= "crc32",
  .cra_driver_name= "crc32-generic",
  .cra_priority= 100,
  +.cra_flags= CRYPTO_ALG_OPTIONAL_KEY,
  .cra_blocksize= CHKSUM_BLOCK_SIZE,
.cra_ctxsize = sizeof(u32),
.cra_module = THIS_MODULE,
--- linux-4.15.0.orig/crypto/crc32c_generic.c
+++ linux-4.15.0/crypto/crc32c_generic.c
@@ -146,6 +146,7 @@
  .cra_name = "crc32c",
  .cra_driver_name = "crc32c-generic",
  .cra_priority = 100,
+cra_flags=CRYPTO_ALG_OPTIONAL_KEY,
  .cra_blocksize = CHKSUM_BLOCK_SIZE,
  .cra_alignmask = 3,
  .cra_ctxsize = sizeof(struct chksum_ctx),
--- linux-4.15.0.orig/crypto/crct10dif_generic.c
+++ linux-4.15.0/crypto/crct10dif_generic.c
@@ -65,10 +65,9 @@
 return 0;
 }

-static int __chksum_finup(__u16 *crcp, const u8 *data, unsigned int len,
-                        u8 *out)
+static int __chksum_finup(__u16 crc, const u8 *data, unsigned int len, u8 *out)
 {
-  *__u16 *out = crc_t10dif_generic(*crcp, data, len);
+  *__u16 *out = crc_t10dif_generic(crc, data, len);
    return 0;
 }

@@ -77,15 +76,13 @@
{
  struct chksum_desc_ctx *ctx = shash_desc_ctx(desc);

-    return __chksum_finup(&ctx->crc, data, len, out);
+    return __chksum_finup(0, data, len, out);
 }

 static int chksum_digest(struct shash_desc *desc, const u8 *data,
                           unsigned int length, u8 *out)
{
-  struct chksum_desc_ctx *ctx = shash_desc_ctx(desc);
-  *
-    return __chksum_finup(&ctx->crc, data, length, out);
+    return __chksum_finup(0, data, length, out);
 }

 static struct shash_alg alg = {
--- linux-4.15.0.orig/crypto/cryptd.c
+++ linux-4.15.0/crypto/cryptd.c
@@ -583,6 +583,7 @@

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struct skcipherd_instance_ctx *ctx = skcipher_instance_ctx(inst);
crypto_drop_skcipher(&ctx->spawn);
+kfree(inst);
}

static int cryptd_create_skcipher(struct crypto_template *tmpl,
@@ -893,10 +894,9 @@
if (err)
goto out_free_inst;

-type = CRYPTO_ALG_ASYNC;
-if (alg->cra_flags & CRYPTO_ALG_INTERNAL)
-type |= CRYPTO_ALG_INTERNAL;
-inst->alg.halg.base.cra_flags = type;
+inst->alg.halg.base.cra_flags = CRYPTO_ALG_ASYNC |
+(alg->cra_flags & (CRYPTO_ALG_INTERNAL |
+ CRYPTO_ALG_OPTIONAL_KEY));

inst->alg.halg.digestsize = salg->digestsize;
inst->alg.halg.statesize = salg->statesize;
@@ -911,7 +911,8 @@
inst->alg.export = cryptd_hash_export;
inst->alg.import = cryptd_hash_import;
-inst->alg.setkey = cryptd_hash_setkey;
+if (crypto_shash_alg_has_setkey(salg))
+inst->alg.setkey = cryptd_hash_setkey;
inst->alg.digest = cryptd_hash_digest_enqueue;

err = ahash_register_instance(tmpl, inst);
--- linux-4.15.0.orig/crypto/crypto_user.c
+++ linux-4.15.0/crypto/crypto_user.c
@@ -55,6 +55,9 @@
list_for_each_entry(q, &crypto_alg_list, cra_list) {
        int match = 0;
        +if (crypto_is_larval(q))
        +continue;
        +
        if ((q->cra_flags ^ p->cru_type) & p->cru_mask)
        continue;
@@ -83,7 +86,7 @@

        +if (crypto_is_larval(q))
        +continue;
        +
        if ((q->cra_flags ^ p->cru_type) & p->cru_mask)
        continue;

        @ @ -83,7 +86,7 @@
        }
        struct crypto_report_cipher rcipher;

        -strlcpy(rcipher.type, "cipher", sizeof(rcipher.type));
+strncpy(rcipher.type, "cipher", sizeof(rcipher.type));

cia = alg->cra_cipher;
cia.min_keysize = alg->cra_cipher.cia_min_keysize;
if (nla_put(skb, CRYPTOCFGA_REPORT_COMPRESS,
    sizeof(struct crypto_report_comp), &rcomp))
goto nla_put_failure;
ncia = alg->cra_cipher;
cia.min_keysize = alg->cra_cipher.cia_min_keysize;
if (nla_put(skb, CRYPTOCFGA_REPORT_ACOMP,
    sizeof(struct crypto_report_acomp), &racomp))
goto nla_put_failure;
ncia = alg->cra_cipher;
cia.min_keysize = alg->cra_cipher.cia_min_keysize;
if (nla_put(skb, CRYPTOCFGA_REPORT_AKCIPHER,
    sizeof(struct crypto_report_akcipher), &rakcipher))
goto nla_put_failure;
ncia = alg->cra_cipher;
cia.min_keysize = alg->cra_cipher.cia_min_keysize;
if (nla_put(skb, CRYPTOCFGA_REPORT_KPP,
    sizeof(struct crypto_report_kpp), &rkpp))
goto nla_put_failure;

static int crypto_report_one(struct crypto_alg *alg,
    struct crypto_user_alg *ualg, struct sk_buff *skb)
{
    strlcpy(ualg->crn_name, alg->cra_name, sizeof(ualg->crn_name));
    strlcpy(ualg->cdn_name, alg->cra_driver_name,
    struct crypto_report_comp rcomp;
    struct crypto_report_acomp racomp;
    struct crypto_report_akcipher rakcipher;
    struct crypto_report_kpp rkpp;
    if (nla_put(skb, CRYPTOCFGA_REPORT_ACOMP,
        sizeof(struct crypto_report_acomp), &racomp))
    goto nla_put_failure;
    if (nla_put(skb, CRYPTOCFGA_REPORT_AKCIPHER,
        sizeof(struct crypto_report_akcipher), &rakcipher))
    goto nla_put_failure;
    if (nla_put(skb, CRYPTOCFGA_REPORT_KPP,
        sizeof(struct crypto_report_kpp), &rkpp))
    goto nla_put_failure;

    struct crypto_report_comp rcomp;
    struct crypto_report_acomp racomp;
    struct crypto_report_akcipher rakcipher;
    struct crypto_report_kpp rkpp;
sizeof(ualg->cru_driver_name));
-strlenpy(ualg->cru_module_name, module_name(alg->cra_module),
+strncpy(ualg->cru_module_name, module_name(alg->cra_module),
sizeof(ualg->cru_module_name));

ualg->cru_type = 0;
@@ -176,7 +179,7 @@
    if (alg->cra_flags & CRYPTO_ALG_LARVAL) {
        struct crypto_report_larval rl;

-    strncpy(rl.type, "larval", sizeof(rl.type));
+    strncpy(rl.type, "larval", sizeof(rl.type));
    if (nla_put(skb, CRYPTOCFGA_REPORT_LARVAL, sizeof(struct crypto_report_larval), &rl))
        goto nla_put_failure;
@@ -285,38 +288,43 @@
    drop_alg:
        crypto_mod_put(alg);

    -if (err)
    +if (err) {
        +kfree_skb(skb);
        return err;
    +}

    return nlmsg_unicast(crypto_nlsk, skb, NETLINK_CB(in_skb).portid);
}

static int crypto_dump_report(struct sk_buff *skb, struct netlink_callback *cb)
{
    struct crypto_alg *alg;
    +const size_t start_pos = cb->args[0];
    +size_t pos = 0;
    struct crypto_dump_info info;
    -int err;
    -
    -if (cb->args[0])
    -goto out;
    -
    -cb->args[0] = 1;
    +struct crypto_alg *alg;
    +int res;

    info.in_skb = cb->skb;
    info.out_skb = skb;
    info.nlmsg_seq = cb->nlh->nlmsg_seq;
    info.nlmsg_flags = NLM_F_MULTI;
down_read(&crypto_alg_sem);
list_for_each_entry(alg, &crypto_alg_list, cra_list) {
    err = crypto_report_alg(alg, &info);
    if (err)
        goto out_err;
    if (pos >= start_pos) {
        res = crypto_report_alg(alg, &info);
        if (res == -EMSGSIZE)
            break;
        if (res)
            goto out;
    }
    pos++;
}
+cb->args[0] = pos;
+res = skb->len;
out:
-return skb->len;
-out_err:
-return err;
+up_read(&crypto_alg_sem);
+return res;
}

static int crypto_dump_report_done(struct netlink_callback *cb)
@@ -500,7 +508,7 @@
if ((type == (CRYPTO_MSG_GETALG - CRYPTO_MSG_BASE) &&
     (nlh->nlmsg_flags & NLM_F_DUMP))) {

-                    u16 dump_alloc = 0;
+                    unsigned long dump_alloc = 0;

    if (link->dump == NULL)
        return -EINVAL;
@@ -508,16 +516,16 @@
    down_read(&crypto_alg_sem);
    list_for_each_entry(alg, &crypto_alg_list, cra_list)
    dump_alloc += CRYPTO_REPORT_MAXSIZE;
    +up_read(&crypto_alg_sem);

    {
        struct netlink_dump_control c = {
            .dump = link->dump,
            .done = link->done,
            -.min_dump_alloc = dump_alloc,
            +.min_dump_alloc = min(dump_alloc, 65535UL),
        };


err = netlink_dump_start(crypto_nlsk, skb, nlh, &c);
}
-up_read(&crypto_alg_sem);

return err;
}
--- linux-4.15.0.orig/crypto/drbg.c
+++ linux-4.15.0/crypto/drbg.c
@@ -1134,8 +1134,10 @@
if (!drbg)
    return;
    kzfree(drbg->Vbuf);
+    drbg->Vbuf = NULL;
    drbg->V = NULL;
    kzfree(drbg->Cbuf);
+    drbg->Cbuf = NULL;
    drbg->C = NULL;
    kzfree(drbg->scratchpadbuf);
    drbg->scratchpadbuf = NULL;
--- linux-4.15.0.orig/crypto/ecc.c
+++ linux-4.15.0/crypto/ecc.c
@@ -898,36 +898,50 @@
static inline void ecc_swap_digits(const u64 *in, u64 *out,
    unsigned int ndigits)
{
    +const __be64 *src = (__force __be64 *)in;
    int i;

    for (i = 0; i < ndigits; i++)
-        out[i] = __swab64(in[ndigits - 1 - i]);
+        out[i] = be64_to_cpu(src[ndigits - 1 - i]);
}

-int ecc_is_key_valid(unsigned int curve_id, unsigned int ndigits,
-const u64 *private_key, unsigned int private_key_len)
+static int __ecc_is_key_valid(const struct ecc_curve *curve,
+    const u64 *private_key, unsigned int ndigits)
{
    -int nbytes;
-const struct ecc_curve *curve = ecc_get_curve(curve_id);
+    u64 one[ECC_MAX_DIGITS] = { 1, };
+    u64 res[ECC_MAX_DIGITS];

    if (!private_key)
        return -EINVAL;

-    nbytes = ndigits << ECC_DIGITS_TO_BYTES_SHIFT;
-
if (private_key_len != nbytes)
+if (curve->g.ndigits != ndigits)
    return -EINVAL;

- if (vli_is_zero(private_key, ndigits))
+/* Make sure the private key is in the range [2, n-3]. */
+if (vli_cmp(one, private_key, ndigits) != -1)
    return -EINVAL;
-/* Make sure the private key is in the range [1, n-1]. */
-if (vli_cmp(curve->n, private_key, ndigits) != 1)
+  vli_sub(res, curve->n, one, ndigits);
+  vli_sub(res, res, one, ndigits);
+  if (vli_cmp(res, private_key, ndigits) != 1)
    return -EINVAL;

return 0;
}

+int ecc_is_key_valid(unsigned int curve_id, unsigned int ndigits,
+                     const u64 *private_key, unsigned int private_key_len)
+{
+    int nbytes;
+    const struct ecc_curve *curve = ecc_get_curve(curve_id);
+    nbytes = ndigits << ECC_DIGITS_TO_BYTES_SHIFT;
+    if (private_key_len != nbytes)
+        return -EINVAL;
+    return _ecc_is_key_valid(curve, private_key, ndigits);
+}
+
/*
 * ECC private keys are generated using the method of extra random bits,
 * equivalent to that described in FIPS 186-4, Appendix B.4.1.
 * DRBG with a security strength of 256.
 */
if (crypto_get_default_rng())
    -err = -EFAULT;
+return -EFAULT;

err = crypto_rng_get_bytes(crypto_default_rng, (u8 *)priv, nbytes);
crypto_put_default_rng();
if (err)
    return err;
-if (vli_is_zero(priv, ndigits))
-return -EINVAL;
-
-/* Make sure the private key is in the range [1, n-1]. */
-if (vli_cmp(curve->n, priv, ndigits) != 1)
+/* Make sure the private key is in the valid range. */
+if (__ecc_is_key_valid(curve, priv, ndigits))
return -EINVAL;

ecc_swap_digits(priv, privkey, ndigits);
@@ -1019,6 +1030,36 @@
return ret;
}

+/* SP800-56A section 5.6.2.3.4 partial verification: ephemeral keys only */
+static int ecc_is_pubkey_valid_partial(const struct ecc_curve *curve,
+    struct ecc_point *pk)
+{
+u64 yy[ECC_MAX_DIGITS], xxx[ECC_MAX_DIGITS], w[ECC_MAX_DIGITS];
+
+/* Check 1: Verify key is not the zero point. */
+if (ecc_point_is_zero(pk))
+return -EINVAL;
+
+/* Check 2: Verify key is in the range [1, p-1]. */
+if (vli_cmp(curve->p, pk->x, pk->ndigits) != 1)
+return -EINVAL;
+if (vli_cmp(curve->p, pk->y, pk->ndigits) != 1)
+
+/* Check 3: Verify that y^2 == (x^3 + ax + b) mod p */
+vli_mod_square_fast(yy, pk->y, curve->p, pk->ndigits); /* y^2 */
+vli_mod_square_fast(xxx, pk->x, curve->p, pk->ndigits); /* x^2 */
+vli_mod_mult_fast(xxx, xxx, pk->x, curve->p, pk->ndigits); /* x^3 */
+vli_mod_mult_fast(w, curve->a, pk->x, curve->p, pk->ndigits); /* ax */
+vli_mod_add(w, w, curve->b, curve->p, pk->ndigits); /* a + b */
+vli_mod_add(w, w, xxx, curve->p, pk->ndigits); /* x^3 + a + b */
+if (vli_cmp(yy, w, pk->ndigits) != 0) /* Equation */
+return -EINVAL;
+
+/* Check 4: Verify that x^3 + ax + b is invertible */
+vli_mod_inverse(w, w, curve->p, pk->ndigits);
+
+if (vli_is_zero(w, pk->ndigits))
+return -EINVAL;
+
+int crypto_ecdh_shared_secret(unsigned int curve_id, unsigned int ndigits,
const u64 *private_key, const u64 *public_key,
    u64 *secret)
@@ -1045,16 +1086,20 @@
goto out;
}

+ecc_swap_digits(public_key, pk->x, ndigits);
+ecc_swap_digits(&public_key[ndigits], pk->y, ndigits);
+ret = ecc_is_pubkey_valid_partial(curve, pk);
+if (ret)
+goto err_alloc_product;
+
+ecc_swap_digits(private_key, priv, ndigits);
+
product = ecc_alloc_point(ndigits);
if (!product) {
    ret = -ENOMEM;
    goto err_alloc_product;
}

-ecc_swap_digits(public_key, pk->x, ndigits);
-ecc_swap_digits(&public_key[ndigits], pk->y, ndigits);
-ecc_swap_digits(private_key, priv, ndigits);
-
ec_point_mult(product, pk, priv, rand_z, curve->p, ndigits);

ecc_swap_digits(product->x, secret, ndigits);

--- linux-4.15.0.orig/crypto/ecc_curve_defs.h
+++ linux-4.15.0/crypto/ecc_curve_defs.h
@@ -13,9 +13,11 @@
 struct ecc_point g;
 u64 *p;
 u64 *n;
+u64 *a;
+u64 *b;
};

-/* NIST P-192 */
+/* NIST P-192: a = p - 3 */
static u64 nist_p192_g_x[] = { 0xF4FF0AFD82FF1012ull, 0x7CBF20EB43A18800ull,
   0x188DA80EB03090F6ull };
static u64 nist_p192_g_y[] = { 0x73F977A11E794811ull, 0x631011ED6B24CDD5ull,
   0xFFFFFFFF99DEF836ull };
static u64 nist_p192_n[] = { 0x146BC9B1B4D22831ull, 0xFFFFFFFF99DEF836ull,
   0xFFFFFFFF99DEF836ull };
+static u64 nist_p192_a[] = { 0xFFFFFFFFFFFFFFFCull, 0xFFFFFFFFFFFFFFFFEull,
+ 0xFFFFFFFFFFFFFFFFEull };
+static u64 nist_p192_b[] = { 0x0FB881ECC146B91ull, 0x0FA7E9AB72243049ull,
+ 0x64210519E59C80E7ull };
static struct ecc_curve nist_p192 = {
.name = "nist_192",
.g = {
    @@ -32,10 +38,12 @@
    .ndigits = 3,
},
.p = nist_p192_p,
.-n = nist_p192_n
+n = nist_p192_n,
+.a = nist_p192_a,
+.b = nist_p192_b
};

/* NIST P-256 */
+/* NIST P-256: a = p - 3 */
static u64 nist_p256_g_x[] = { 0xF4A13945D898C296ull, 0x77037D812DEB33A0ull, 0xF8BCE6E563A440F2ull, 0x6B17D1F2E12C4247ull };
static u64 nist_p256_g_y[] = { 0xCB6406837BF51F5ull, 0x2BCE33576B315EC5ull, 0x44,6 +52,10 @@
    0x0000000000000000ull, 0xFFFFFFFF00000001ull }
static u64 nist_p256_n[] = { 0xB3EBBD55769886BCull, 0x5AC635D8AA3A93E7ull }
static struct ecc_curve nist_p256 = {
    .name = "nist_256",
    .g = {
        @@ -52,7 +64,9 @@
        .ndigits = 4,
    },
    .p = nist_p256_p,
    .n = nist_p256_n
+n = nist_p256_n,
+.a = nist_p256_a,
+.b = nist_p256_b
};

#endif
--- linux-4.15.0.orig/crypto/ecdh.c
+++ linux-4.15.0/crypto/ecdh.c
@@ -43,7 +43,8 @@
    unsigned int ndigits;
    struct ecdh params;
    unsigned int ndigits;
        -if (crypto_ecdh_decode_key(buf, len, &params) < 0)
        +if (crypto_ecdh_decode_key(buf, len, &params) < 0 ||
        +    params.key_size > sizeof(ctx->private_key))
return -EINVAL;

ndigits = ecdh_supported_curve(params.curve_id);
@@ -57,12 +58,13 @@
return ecc_gen_privkey(ctx->curve_id, ctx->ndigits,
ctx->private_key);

- if (ecc_is_key_valid(ctx->curve_id, ctx->ndigits,
- (const u64 *)params.key, params.key_size) < 0)
- return -EINVAL;
-
memcpy(ctx->private_key, params.key, params.key_size);
+
+ if (ecc_is_key_valid(ctx->curve_id, ctx->ndigits,
+ ctx->private_key, params.key_size) < 0) {
+ memzero_explicit(ctx->private_key, params.key_size);
+ return -EINVAL;
+ }
return 0;
}

--- linux-4.15.0.orig/crypto/ecdh_helper.c
+++ linux-4.15.0/crypto/ecdh_helper.c
@@ -71,6 +71,9 @@
if (secret.type != CRYPTO_KPP_SECRET_TYPE_ECDH)
 return -EINVAL;

+ if (unlikely(len < secret.len))
+ return -EINVAL;
+ ptr = ecdh_unpack_data(&params->curve_id, ptr, sizeof(params->curve_id));
ptr = ecdh_unpack_data(&params->key_size, ptr, sizeof(params->key_size));
if (secret.len != crypto_ecdh_key_len(params))
--- linux-4.15.0.orig/crypto/gcm.c
+++ linux-4.15.0/crypto/gcm.c
@@ -597,7 +597,6 @@
static int crypto_gcm_create_common(struct crypto_template *tmpl,
 struct rtattr **tb,
- const char *full_name,
- const char *ctr_name,
- const char *ghash_name)
{
@@ -638,7 +638,8 @@
goto err_free_inst;

err = -EINVAL;
- if (ghash->digestsize != 16)
+if (strcmp(ghash->base.cra_name, "ghash") != 0 ||
    ghash->digestsize != 16)
go to err_drop_ghash;

crypto_set_skcipher_spawn(&ctx->ctr, aead_crypto_instance(inst));
@@ -650,24 +650,24 @@

crypto_set_skcipher_spawn(&ctx->ctr, aead_crypto_instance(inst));
@@ -650,24 +650,24 @@

crypto_set_skcipher_spawn(&ctx->ctr, aead_crypto_instance(inst));
@@ -650,24 +650,24 @@

crypto_set_skcipher_spawn(&ctx->ctr, aead_crypto_instance(inst));
@@ -650,24 +650,24 @@

crypto_set_skcipher_spawn(&ctx->ctr, aead_crypto_instance(inst));
@@ -650,24 +650,24 @@

crypto_set_skcipherSpawn(&ctx->ctr, aead_crypto_instance(inst));

ctr = crypto_spawn_skcipher_alg(&ctx->ctr);

-/* We only support 16-byte blocks. */
+/* The skcipher algorithm must be CTR mode, using 16-byte blocks. */
err = -EINVAL;
- if (crypto_skcipher_alg_ivsize(ctr) != 16)
+ if (strncmp(ctr->base.cra_name, "ctr", 4) != 0 ||
    crypto_skcipher_alg_ivsize(ctr) != 16 ||
    ctr->base.cra_blocksize != 1)
go out_put_ctr;

-/* Not a stream cipher? */
+err = -ENAMETOOLONG;
+ if (ctr->base.cra_blocksize != 1)
+ err = -ENAMETOOLONG;
+ if (strncmp(ctr->base.cra_name, "ctr", 4) != 0 ||
    crypto_skcipher_alg_ivsize(ctr) != 16 ||
    ctr->base.cra_blocksize != 1)
go out_put_ctr;

-err = -ENAMETOOLONG;
+ if (strncmp(ctr->base.cra_name, "ctr", 4) != 0 ||
    crypto_skcipher_alg_ivsize(ctr) != 16 ||
    ctr->base.cra_blocksize != 1)
go out_put_ctr;

+if (crypto_skcipher_alg_name(ctr) != "gcm")
+ err = -ENAMETOOLONG;
+ if (strncmp(ctr->base.cra_driver_name, "gcm", CRYPTO_MAX_ALG_NAME) >
+     "gcm_base(%s,%s)", ctr->base.cra_driver_name + 4) >= CRYPTO_MAX_ALG_NAME)
go out_put_ctr;

-memcpy(inst->alg.base.cra_name, full_name, CRYPTO_MAX_ALG_NAME);

- inst->alg.base.cra_flags = (ghash->base.cra_flags |
- ctr->base.cra_flags) & CRYPTO_ALG_ASYNC;
inst->alg.base.cra_priority = (ghash->base.cra_priority +
@@ -709,7 +709,6 @@
{
 const char *cipher_name;
 char ctr_name[CRYPTO_MAX_ALG_NAME];
- char full_name[CRYPTO_MAX_ALG_NAME];

 cipher_name = crypto_attr alg_name(tb[1]);
 if (IS_ERR(cipher_name))
@@ -719,12 +718,7 @@
 return -ENAMETOOLONG;
if (snprintf(full_name, CRYPTO_MAX_ALG_NAME, "gcm(%s)", cipher_name) >= CRYPTO_MAX_ALG_NAME)
    return -ENAMETOOLONG;
-
return crypto_gcm_create_common(tmpl, tb, full_name, ctr_name, "ghash");
+return crypto_gcm_create_common(tmpl, tb, ctr_name, "ghash");
}

static struct crypto_template crypto_gcm_tmpl = {
    const char *ctr_name;
    const char *ghash_name;
    char full_name[CRYPTO_MAX_ALG_NAME];

ctr_name = crypto_attr_alg_name(tb[1]);
    if (IS_ERR(ctr_name))
        return PTR_ERR(ctr_name);
    if (IS_ERR(ghash_name))
        return PTR_ERR(ghash_name);
    if (snprintf(full_name, CRYPTO_MAX_ALG_NAME, "gcm_base(%s,%s)",
        ctr_name, ghash_name) >= CRYPTO_MAX_ALG_NAME)
        return -ENAMETOOLONG;
-
return crypto_gcm_create_common(tmpl, tb, full_name, ctr_name, ghash_name);
+
return crypto_gcm_create_common(tmpl, tb, ctr_name, ghash_name);
}

static struct crypto_template crypto_gcm_base_tmpl = {
    --- linux-4.15.0.orig/crypto/ghash-generic.c
    +++ linux-4.15.0/crypto/ghash-generic.c
    @ @ -34,6 +34,7 @@
    const u8 *key, unsigned int keylen)

    struct ghash_ctx *ctx = crypto_shash_ctx(tfm);
    +be128 k;

    if (keylen != GHASH_BLOCK_SIZE) {
        crypto_shash_set_flags(tfm, CRYPTO_TFM_RES_BAD_KEY_LEN);
        @ @ -42,7 +43,12 @@

        if (ctx->gf128)
            gf128mul_free_4k(ctx->gf128);
        -ctx->gf128 = gf128mul_init_4k_lle((be128 *)key);
BUILD_BUG_ON(sizeof(k) != GHASH_BLOCK_SIZE);
memcpy(&k, key, GHASH_BLOCK_SIZE); /* avoid violating alignment rules */
ctx->gf128 = gf128mul_init_4k_lle(&k);
memzero_explicit(&k, GHASH_BLOCK_SIZE);
if (!ctx->gf128)
    return -ENOMEM;

--- linux-4.15.0.orig/crypto/internal.h
+++ linux-4.15.0/crypto/internal.h
@@ -84,7 +84,6 @@
   void crypto_remove_spawns(struct crypto_alg *alg, struct list_head *list,
   struct crypto_alg *nalg);
   void crypto_remove_final(struct list_head *list);
-void crypto_shoot_alg(struct crypto_alg *alg);
   struct crypto_tfm *__crypto_alloc_tfm(struct crypto_alg *alg, u32 type,
   u32 mask);
   void *crypto_create_tfm(struct crypto_alg *alg,
--- linux-4.15.0.orig/crypto/keywrap.c
+++ linux-4.15.0/crypto/keywrap.c
@@ -188,7 +188,7 @@
 }
 /* Perform authentication check */
-if (block.A != cpu_to_be64(0xa6a6a6a6a6a6a6a6))
+if (block.A != cpu_to_be64(0xa6a6a6a6a6a6a6a6ULL))
    ret = -EBADMSG;

memzero_explicit(&block, sizeof(struct crypto_kw_block));
@@ -221,7 +221,7 @@
     * Place the predefined IV into block A -- for encrypt, the caller
     * does not need to provide an IV, but he needs to fetch the final IV.
     */
-    block.A = cpu_to_be64(0xa6a6a6a6a6a6a6a6);
+    block.A = cpu_to_be64(0xa6a6a6a6a6a6a6a6ULL);
/
/*
 * src scatterlist is read-only. dst scatterlist is r/w. During the
--- linux-4.15.0.orig/crypto/lrw.c
+++ linux-4.15.0/crypto/lrw.c
@@ -139,7 +139,12 @@
     return x + ffz(val);
 } 

-return x;
+/*
+ * If we get here, then x == 128 and we are incrementing the counter
+ */
+ * from all ones to all zeros. This means we must return index 127, i.e.
+ * the one corresponding to key2*[ 1,...,1 ].
+ */
+ return 127;
}

static int post_crypt(struct skcipher_request *req)
@@ -313,7 +318,7 @@
    rctx->left = 0;
    if (rctx->ext)
        -kfree(rctx->ext);
+        kzfree(rctx->ext);
    }

static int do_encrypt(struct skcipher_request *req, int err)
@@ -522,7 +527,7 @@
    crypto_free_skcipher(ctx->child);
 }

-static void free(struct skcipher_instance *inst)
+static void free_inst(struct skcipher_instance *inst)
 {
     crypto_drop_skcipher(skcipher_instance_ctx(inst));
     kfree(inst);
@@ -634,7 +639,7 @@
     inst->alg.encrypt = encrypt;
     inst->alg.decrypt = decrypt;

     -inst->free = free;
+inst->free = free_inst;

     err = skcipher_register_instance(tmpl, inst);
     if (err)
         --- linux-4.15.0.orig/crypto/mcryptd.c
+++ linux-4.15.0/crypto/mcryptd.c
@@ -517,10 +517,9 @@
         if (err)
             goto out_free_inst;
         -type = CRYPTO_ALG_ASYNC;
+type |= CRYPTO_ALG_INTERNAL;
         -inst->alg.halg.base.cra_flags = type;
+inst->alg.halg.base.cra_flags = CRYPTO_ALG_ASYNC |
+        (alg->cra_flags & (CRYPTO_ALG_INTERNAL |
+         CRYPTO_ALG_OPTIONAL_KEY));
inst->alg.halg.digestsize = halg->digestsize;
inst->alg.halg.statesize = halg->statesize;
@@ -535,7 +534,8 @@
inst->alg.finup  = mcryptd_hash_finup_enqueue;
inst->alg.export = mcryptd_hash_export;
inst->alg.import = mcryptd_hash_import;
-inst->alg.setkey = mcryptd_hash_setkey;
+if (crypto_hash_alg_has_setkey(halg))
+inst->alg.setkey = mcryptd_hash_setkey;
inst->alg.digest = mcryptd_hash_digest_enqueue;

err = ahash_register_instance(tmpl, inst);
--- linux-4.15.0.orig/crypto/pcbc.c
+++ linux-4.15.0/crypto/pcbc.c
@@ -50,7 +50,7 @@
unsigned int nbytes = walk->nbytes;
u8 *src = walk->src.virt.addr;
u8 *dst = walk->dst.virt.addr;
-u8 *iv = walk->iv;
+u8 * const iv = walk->iv;

do {
    crypto_xor(iv, src, bsize);
@@ -71,7 +71,7 @@
    int bsize = crypto_cipher_blocksize(tfm);
    unsigned int nbytes = walk->nbytes;
u8 *src = walk->src.virt.addr;
    -u8 *iv = walk->iv;
    +u8 * const iv = walk->iv;
    u8 tmpbuf[bsize];

do {
@@ -83,8 +83,6 @@
    src += bsize;
} while ((nbytes -= bsize) >= bsize);

-memcpy(walk->iv, iv, bsize);
-
return nbytes;
}

@@ -120,7 +118,7 @@
unsigned int nbytes = walk->nbytes;
u8 *src = walk->src.virt.addr;
u8 *dst = walk->dst.virt.addr;
-u8 *iv = walk->iv;
+u8 * const iv = walk->iv;

do {
crypto_cipher_decrypt_one(tfm, dst, src);
} while ((nbytes -= bsize) >= bsize);
-memcpy(walk->iv, iv, bsize);
 return nbytes;
}

int bsize = crypto_cipher_blocksize(tfm);
unsigned int nbytes = walk->nbytes;
u8 *src = walk->src.virt.addr;
- u8 *iv = walk->iv;
+ u8 * const iv = walk->iv;
u8 tmpbuf[bsize] __aligned(__alignof__(u32));

do {
} while ((nbytes -= bsize) >= bsize);
-memcpy(walk->iv, iv, bsize);
 return nbytes;
}

--- linux-4.15.0.orig/crypto/pcrypt.c
+++ linux-4.15.0/crypto/pcrypt.c
@@ -130,7 +130,6 @@
struct padata_priv *padata = pcrypt_request_padata(preq);
padata->info = err;
-req->base.flags &= ~CRYPTO_TFM_REQ_MAY_SLEEP;
}
@@ -394,7 +393,7 @@
int ret;
pinst->kobj.kset = pcrypt_kset;
- ret = kobject_add(&pinst->kobj, NULL, name);
+ ret = kobject_add(&pinst->kobj, NULL, "%s", name);
 if (!ret)
kobject_uevent(&pinst->kobj, KOBJ_ADD);

static void __exit pcrypt_exit(void)
{
+crypto_unregister_template(&pcrypt_tmpl);
+pcrypt_fini_padata(&pcrypt);
+pcrypt_fini_padata(&pdecrypt);

kset_unregister(pcrypt_kset);
-crypto_unregister_template(&pcrypt_tmpl);
}

module_init(pcrypt_init);
--- linux-4.15.0.orig/crypto/poly1305_generic.c
+++ linux-4.15.0/crypto/poly1305_generic.c
@@ -47,17 +47,6 @@
}EXPORT_SYMBOL_GPL(crypto_poly1305_init);

-int crypto_poly1305_setkey(struct crypto_shash *tfm,
-    const u8 *key, unsigned int keylen)
-{
-    /* Poly1305 requires a unique key for each tag, which implies that
-       * we can't set it on the tfm that gets accessed by multiple users
-       * simultaneously. Instead we expect the key as the first 32 bytes in
-       * the update() call. */
-    -return -ENOTSUPP;
-}EXPORT_SYMBOL_GPL(crypto_poly1305_setkey);

-static void poly1305_setrkey(struct poly1305_desc_ctx *dctx, const u8 *key)
+/* Poly1305 requires a unique key for each tag, which implies that we can't set
+   * it on the tfm that gets accessed by multiple users simultaneously. Instead we
+   * expect the key as the first 32 bytes in the update() call.
+   */
+unsigned int crypto_poly1305_setdesckey(struct poly1305_desc_ctx *dctx,
-const u8 *src, unsigned int srclen)
+    const u8 *src, unsigned int srclen)
-
+    .init	= crypto_poly1305_init,
.update= crypto_poly1305_update, 
.final= crypto_poly1305_final, 
.setkey= crypto_poly1305_setkey, 
descsize= sizeof(struct poly1305_desc_ctx),
.base= 
.cra_name= "poly1305",
--- linux-4.15.0.orig/crypto/rsa-pkcs1pad.c
+++ linux-4.15.0/crypto/rsa-pkcs1pad.c
@@ -261,15 +261,6 @@
pkcs1pad_sg_set_buf(req_ctx->in_sg, req_ctx->in_buf, 
ctx->key_size - 1 - req->src_len, req->src);

-request_ctx->out_buf = kmalloc(ctx->key_size, GFP_KERNEL); 
-if (!request_ctx->out_buf) {
-kfree(request_ctx->in_buf);
-return -ENOMEM;
-
-pkcs1pad_sg_set_buf(req_ctx->out_sg, request_ctx->out_buf, 
-context->key_size, NULL);
-
-akcipher_request_set_tfm(&request_ctx->child_req, ctx->child);
-akcipher_request_set_callback(&request_ctx->child_req, request->base.flags, 
pkcs1pad_encrypt_sign_complete_cb, req);
--- linux-4.15.0.orig/crypto/salsa20_generic.c
+++ linux-4.15.0/crypto/salsa20_generic.c
@@ -186,7 +186,7 @@
blkcipher_walk_init(&walk, dst, src, nbytes);
err = blkcipher_walk_virt_block(desc, &walk, 64);

-salsa20_ivsetup(ctx, walk.iv);
+salsa20_ivsetup(ctx, desc->info);

while (walk.nbytes >= 64) {
  salsa20_encrypt_bytes(ctx, walk.dst.virt.addr, 
--- linux-4.15.0.orig/crypto/serpent_generic.c
+++ linux-4.15.0/crypto/serpent_generic.c
@@ -229,7 +229,13 @@
x4 ^= x2;
 })

-static void __serpent_setkey_sbox(u32 r0, u32 r1, u32 r2, u32 r3, u32 r4, u32 *k) 
+/*
+ * both gcc and clang have misoptimized this function in the past,
+ * producing horrible object code from spilling temporary variables
+ * on the stack. Forcing this part out of line avoids that.
+ */
+static noinline void __serpent_setkey_sbox(u32 r0, u32 r1, u32 r2,
+ u32 r3, u32 r4, u32 *k)
{
    k += 100;
    S3(r3, r4, r0, r1, r2); store_and_load_keys(r1, r2, r4, r3, 28, 24);

--- linux-4.15.0.orig/crypto/sha3_generic.c
+++ linux-4.15.0/crypto/sha3_generic.c
@@ -18,6 +18,7 @@
#include <linux/types.h>
#include <crypto/sha3.h>
#include <asm/byteorder.h>
+#include <asm/unaligned.h>

#define KECCAK_ROUNDS 24

@@ -149,7 +150,7 @@
    for (i = 0; i < sctx->rsizw; i++)
        sctx->st[i] ^= ((u64 *) src)[i];
    +sctx->st[i] ^= get_unaligned_le64(src + 8 * i);
    keccakf(sctx->st);

done += sctx->rsiz;
@@ -174,7 +175,7 @@
    for (i = 0; i < sctx->rsizw; i++)
        sctx->st[i] ^= ((u64 *) sctx->buf)[i];
    +sctx->st[i] ^= get_unaligned_le64(sctx->buf + 8 * i);
    keccakf(sctx->st);

--- linux-4.15.0.orig/crypto/shash.c
+++ linux-4.15.0/crypto/shash.c
@@ -25,12 +25,24 @@

static const struct crypto_type crypto_shash_type;

-int shash_no_setkey(struct crypto_shash *tfm, const u8 *key,
    -unsigned int keylen)
+static int shash_no_setkey(struct crypto_shash *tfm, const u8 *key,
+    +unsigned int keylen)
{ return -ENOSYS;
}
-EXPORT_SYMBOL_GPL(shash_no_setkey);
+/*
+ * Check whether an shash algorithm has a setkey function.
+ *
+ * For CFI compatibility, this must not be an inline function. This is because
+ * when CFI is enabled, modules won't get the same address for shash_no_setkey
+ * (if it were exported, which inlining would require) as the core kernel will.
+ */
+bool crypto_shash_alg_has_setkey(struct shash_alg *alg)
+{
+return alg->setkey != shash_no_setkey;
+}
+EXPORT_SYMBOL_GPL(crypto_shash_alg_has_setkey);

static int shash_setkey_unaligned(struct crypto_shash *tfm, const u8 *key,
unsigned int keylen)
@@ -53,16 +65,32 @@
return err;
}

+static void shash_set_needkey(struct crypto_shash *tfm, struct shash_alg *alg)
+{
+if (crypto_shash_alg_has_setkey(alg) &&
+ !((alg->base.cra_flags & CRYPTO_ALG_OPTIONAL_KEY))
+crypto_shash_set_flags(tfm, CRYPTO_TFM_NEED_KEY);
+}
+
int crypto_shash_setkey(struct crypto_shash *tfm, const u8 *key,
unsigned int keylen)
{
struct shash_alg *shash = crypto_shash_alg(tfm);
unsigned long alignmask = crypto_shash_alignmask(tfm);
+int err;

if (((unsigned long)key & alignmask)
-return shash_setkey_unaligned(tfm, key, keylen);
+err = shash_setkey_unaligned(tfm, key, keylen);
+else
+err = shash->setkey(tfm, key, keylen);
+
+if (unlikely(err)) {
+shash_set_needkey(tfm, shash);
+return err;
+}

-return shash->setkey(tfm, key, keylen);
+crypto_shash_clear_flags(tfm, CRYPTO_TFM_NEED_KEY);
+return 0;
}
EXPORT_SYMBOL_GPL(crypto_shash_setkey);
struct shash_alg *shash = crypto_shash_alg(tfm);
unsigned long alignmask = crypto_shash_alignmask(tfm);

+if (crypto_shash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
+return -ENOKEY;
+
+if (((unsigned long)data | (unsigned long)out) & alignmask)
return shash_digest_unaligned(desc, data, len, out);

crypto_ahash_set_flags(crt, crypto_shash_get_flags(shash) & 
+CRYPTO_TFM_NEED_KEY);

if (alg->export)
ct->export = shash_async_export;
static int crypto_shash_init_tfm(struct crypto_tfm *tfm)
{
struct crypto_shash *hash = __crypto_shash_cast(tfm);
+struct shash_alg *alg = crypto_shash_alg(hash);
+
+hash->descsize = alg->descsize;
+
+hash_set_needkey(hash, alg);

+hash->descsize = crypto_shash_alg(hash)->descsize;
return 0;
}

ctx->cryptd_tfm = cryptd_tfm;

-reqsize = sizeof(struct skcipher_request);
-reqsize += crypto_skcipher_reqsize(&cryptd_tfm->base);
+reqsize = crypto_skcipher_reqsize(cryptd_skcipher_child(cryptd_tfm));
+reqsize = max(reqsize, crypto_skcipher_reqsize(&cryptd_tfm->base));
+reqsize += sizeof(struct skcipher_request);

crypto_skcipher_set_reqsize(tfm, reqsize);

--- linux-4.15.0.orig/crypto/skcipher.c
+++ linux-4.15.0/crypto/skcipher.c
@@ -108,18 +108,21 @@
#define skcipher_walk_done(struct skcipher_walk *walk, int err)
{
-unsigned int n = walk->nbytes - err;
-unsigned int nbytes;
+unsigned int n = walk->nbytes;
+unsigned int nbytes = 0;

-nbytes = walk->total - n;
+if (!n)
+goto finish;

-if (unlikely(err < 0)) {
-unsigned int nbytes = 0;
-unsigned int n = walk->nbytes;
+if (likely(err >= 0)) {
+unsigned int n = walk->nbytes;
+unsigned int nbytes = 0;

-nbytes = walk->total - n;
+if (!n)
+goto finish;

-if (unlikely(err < 0)) {
-n = 0;
-} else if (likely(!walk->flags & (SKCIPHER_WALK_PHYS |
- SKCIPHER_WALK_SLOW |
- SKCIPHER_WALK_COPY |
- SKCIPHER_WALK_DIFF))) {
+if (likely(err >= 0)) {
+n -= err;
+nbytes = walk->total - n;
+
+}
+
+if (likely(!walk->flags & (SKCIPHER_WALK_PHYS |
SKCIPHER_WALK_SLOW |
+ SKCIPHER_WALK_COPY |
SKCIPHER_WALK_DIFF)))) {
unmap_src:
  skcipher_unmap_src(walk);
  }
} else if (walk->flags & SKCIPHER_WALK_DIFF) {

memcpy(walk->dst.virt.addr, walk->page, n);
skcipher_unmap_dst(walk);
} else if (unlikely(walk->flags & SKCIPHER_WALK_SLOW)) {

WARN_ON(err)) {
+if (err > 0) {
+/*
+ * Didn't process all bytes. Either the algorithm is
+ * broken, or this was the last step and it turned out
* the message wasn't evenly divisible into blocks but
* the algorithm requires it.
 */
err = -EINVAL;
nbytes = 0;
} else
    @@ -141,7 +150,7 @@
err = 0;

walk->total = nbytes;
-walk->nbytes = nbytes;
+walk->nbytes = 0;

scatterwalk_advance(&walk->in, n);
scatterwalk_advance(&walk->out, n);
@@ -154,6 +163,7 @@
return skcipher_walk_next(walk);
}

+finish:
/* Short-circuit for the common/fast path. */
if (!((unsigned long)walk->buffer | (unsigned long)walk->page))
goto out;
@@ -399,7 +409,7 @@
unsigned size;
unsigned size;
u8 *iv;

-aligned_bs = ALIGN(bs, alignmask);
-aligned_bs = ALIGN(bs, alignmask + 1);

+* Minimum size to align buffer by alignmask. */
size = alignmask & ~a;
--- linux-4.15.0.orig/crypto/sm3_generic.c
+++ linux-4.15.0/crypto/sm3_generic.c
@@ -100,7 +100,7 @@
for (i = 0; i <= 63; i++) {

-ss1 = rol32((rol32(a, 12) + e + rol32(t(i), i)), 7);
+ss1 = rol32((rol32(a, 12) + e + rol32(t(i), i & 31)), 7);

ss2 = ss1 ^ rol32(a, 12);
--- linux-4.15.0.orig/crypto/tcrypt.c
+++ linux-4.15.0/crypto/tcrypt.c
@@ -198,11 +198,13 @@
}
sg_init_table(sg, np + 1);
-np--;  
+if (rem)
+np--;
for (k = 0; k < np; k++)
sg_set_buf(&sg[k + 1], xbuf[k], PAGE_SIZE);

-sg_set_buf(&sg[k + 1], xbuf[k], rem);
+if (rem)
+sg_set_buf(&sg[k + 1], xbuf[k], rem);
}

static void test_aead_speed(const char *algo, int enc, unsigned int secs,
@@ -696,6 +698,9 @@
break;
}
+if (speed[i].klen)
+crypto_ahash_setkey(tfm, tvmem[0], speed[i].klen);
+pr_info("test%3u 
" "(%5u byte blocks,%5u bytes per update,%4u updates): ",
i, speed[i].blen, speed[i].plen, speed[i].blen / speed[i].plen);
--- linux-4.15.0.orig/crypto/testmgr.c
+++ linux-4.15.0/crypto/testmgr.c
@@ -1767,14 +1767,21 @@
err = alg_test_hash(desc, driver, type, mask);
if (err)
-goto out;
+return err;

tfm = crypto_alloc_shash(driver, type, mask);
if (IS_ERR(tfm)) {
+if (PTR_ERR(tfm) == -ENOENT) {
+/*
+ * This crc32c implementation is only available through
+ * ahash API, not the shash API, so the remaining part
+ * of the test is not applicable to it.
+ */
+return 0;
+}
printk(KERN_ERR "alg: crc32c: Failed to load transform for %s: 
" "%ld\n", driver, PTR_ERR(tfm));
-err = PTR_ERR(tfm);
-goto out;
+return PTR_ERR(tfm);
}
do {
    @@ -1801,7 +1808,6 @@
    crypto_free_shash(tfm);

    -out:
    return err;
}

--- linux-4.15.0.orig/crypto/testmgr.h
+++ linux-4.15.0/crypto/testmgr.h
@@ -548,7 +548,7 @@
static const struct akcipher_testvec pkcs1pad_rsa_tv_template[] = {
    .key =
    "\x30\x82\x03\x1f\x02\x01\x10\x02\x82\x01\x01\x00\xd7\x1e\x77\x82"
    +"\x30\x82\x03\x1f\x02\x01\x00\x02\x82\x01\x01\x00\xd7\x1e\x77\x82"
    "\x8c\x92\x31\xe7\x69\x02\xa2\xd5\x5c\x78\xde\xa2\x0c\x8f\xf0\x3b"
    "\x59\x31\xd0\x40\x0e\x60\x61\x06\xb9\x2f\x62\x40\x80\x76\xc8\x67"
    "\xa4\xb5\x59\x56\x69\x17\x07\xfa\xf9\x4c\x8d\x6c\x37\x7a\x46\x7d"
    @@ -597,8 +597,8 @@
    "\x8f\x81\x1b\xd6\x55\x60\x5e\x48\x8b\x76\x6d\x9a\xa8\x37\xf9\x7a"
    "\xda\xe1\x16\xd0\x5d\x1a\x30\xd4\xe9\x9c\x5b\x3c\x15\xf8\x9c\x1f\xda"
    "\x1a\x86\x48\x55\xce\x83\xee\x8e\x51\x7c\x6e\x32\x12\x47\x7d\x46"
    "\xb8\x35\xdf\x41\x02\x01\x30\x02\x01\x30\x02\x01\x30\x02\x01\x30"
    "\xb8\x35\xdf\x41\x02\x01\x30\x02\x01\x30\x02\x01\x30"
    +"\xb8\x35\xdf\x41\x02\x01\x00\x02\x01\x00\x02\x01\x00\x02\x01\x00"
    +"\xb8\x35\xdf\x41\x02\x01\x00\x02\x01\x00\x02\x01\x00"
    .key_len = 804,
/*
 * m is SHA256 hash of following message:
@@ -4727,7 +4727,49 @@
    .psize= 80,
    .digest= "\x13\x00\x00\x00\x00\x00\x00\x00"
    "\x00\x00\x00\x00\x00\x00\x00",
-};
+}; /* Regression test for overflow in AVX2 implementation */
+.plaintext= "\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
 +"\xff\xff\xff\xff\xff\xff\xff\xff"
/*
--- linux-4.15.0.orig/crypto/tgr192.c
+++ linux-4.15.0/crypto/tgr192.c
@@ -25,8 +25,9 @@
 #include <linux/init.h>
 #include <linux/module.h>
 #include <linux/mm.h>
-#include <asm/byteorder.h>
+#include <asm/byteorder.h>
+#include <asm/unaligned.h>

 #define TGR192_DIGEST_SIZE 24
 #define TGR160_DIGEST_SIZE 20
*/
u64 a, b, c, aa, bb, cc;
const __le64 *ptr = (const __le64 *)data;
for (i = 0; i < 8; i++)
    x[i] = le64_to_cpu(ptr[i]);
    x[i] = get_unaligned_le64(data + i * sizeof(__le64));

/* save */
a = aa = tctx->a;
--- linux-4.15.0.orig/crypto/vmac.c
+++ linux-4.15.0/crypto/vmac.c
@@ -1,6 +1,10 @@
/*
 * Modified to interface to the Linux kernel
 + * VMAC: Message Authentication Code using Universal Hashing
 + *
 + *
 + * Copyright (c) 2009, Intel Corporation.
 + * Copyright (c) 2018, Google Inc.
 + *
 + * This program is free software; you can redistribute it and/or modify it
 + * under the terms and conditions of the GNU General Public License,
 @@ -16,14 +20,15 @@
 + *
 * Place - Suite 330, Boston, MA 02111-1307 USA.
 */

-* VMAC and VHASH Implementation by Ted Krovetz (tdk@acm.org) and Wei Dai.
-* This implementation is herby placed in the public domain.
-* The authors offers no warranty. Use at your own risk.
-* Please send bug reports to the authors.
-* Last modified: 17 APR 08, 1700 PDT
-* --------------------------------------------------------------- */
+
/* Derived from:
 + * VMAC and VHASH Implementation by Ted Krovetz (tdk@acm.org) and Wei Dai.
 + * This implementation is herby placed in the public domain.
 + * The authors offers no warranty. Use at your own risk.
 + * Last modified: 17 APR 08, 1700 PDT
 + */

#include <asm/unaligned.h>
#include <linux/init.h>
#include <linux/types.h>

---
#include <linux/crypto.h>
#include <linux/scatterlist.h>
#include <asm/byteorder.h>
#include <crypto/scatterwalk.h>
#include <crypto/vmac.h>
#include <crypto/internal/hash.h>

/*
 * User definable settings.
 */
#define VMAC_TAG_LEN	64
#define VMAC_KEY_SIZE	128/* Must be 128, 192 or 256*/
#define VMAC_KEY_LEN	(VMAC_KEY_SIZE/8)
#define VMAC_NHBYTES128/* Must 2^i for any 3 < i < 13 Standard = 128*/
+
+/* per-transform (per-key) context */
+struct vmac_tfm_ctx {
    struct crypto_cipher *cipher;
    u64 nhkey[(VMAC_NHBYTES/8)+2*(VMAC_TAG_LEN/64-1)];
    u64 polykey[2*VMAC_TAG_LEN/64];
    u64 l3key[2*VMAC_TAG_LEN/64];
};
+
+/* per-request context */
+struct vmac_desc_ctx {
    union {
        u8 partial[VMAC_NHBYTES];/* partial block */
        __le64 partial_words[VMAC_NHBYTES / 8];
    };
    unsigned int partial_size;/* size of the partial block */
    bool first_block_processed;
    u64 polytmp[2*VMAC_TAG_LEN/64];/* running total of L2-hash */
};
+
*/
* Constants and masks
*/
#define UINT64_C(x) x##ULL

-static void vhash_abort(struct vmac_ctx *ctx)
-{ 
    ctx->polytmp[0] = ctx->polykey[0] ;
    ctx->first_block_processed = 0;
static u64 l3hash(u64 p1, u64 p2, u64 k1, u64 k2, u64 len)
{
    u64 rh, rl, t, z = 0;
    return rl;
}

-BUG_ON(mbytes % VMAC_NHBYTES);
/+* L1 and L2-hash one or more VMAC_NHBYTES-byte blocks */
static void vhash_blocks(const struct vmac_tfm_ctx *tctx,
			 struct vmac_desc_ctx *dctx,
			 const __le64 *mptr, unsigned int blocks)
{
    const u64 *kptr = tctx->nhkey;
    const u64 pkh = tctx->polykey[0];
    const u64 pkl = tctx->polykey[1];

    _le64 *mptr = (u64 *)m;
    i = mbytes / VMAC_NHBYTES; /* Must be non-zero */

    -ch = ctx->polytmp[0];
    -cl = ctx->polytmp[1];

    if (!ctx->first_block_processed)
        ctx->first_block_processed = true;

    nh_vmac_nhbytes(mptr, kptr, VMAC_NHBYTES/8, rh, rl);
    rh &= m62;
ADD128(ch, cl, rh, rl);
mptr += (VMAC_NHBYTES/sizeof(u64));
-i--;
+blocks--;
}

-while (i--) {
+while (blocks--) {
nh_vmac_nhbytes(mptr, kptr, VMAC_NHBYTES/8, rh, rl);
rh &= m62;
poly_step(ch, cl, pkh, pkl, rh, rl);
mptr += (VMAC_NHBYTES/sizeof(u64));
}

-ctx->polytmp[0] = ch;
-ctx->polytmp[1] = cl;
+dctx->polytmp[0] = ch;
+dctx->polytmp[1] = cl;
}

-static u64 vhash(unsigned char m[], unsigned int mbytes,
-u64 *tagl, struct vmac_ctx *ctx)
+static int vmac_setkey(struct crypto_shash *tfm,
+ const u8 *key, unsigned int keylen)
{
-u64 rh, rl, *mptr;
-const u64 *kptr = (u64 *)ctx->nhkey;
-int i, remaining;
-u64 ch, cl;
-u64 pkh = ctx->polykey[0];
-u64 pkl = ctx->polykey[1];

-mptr = (u64 *)m;
-i = mbytes / VMAC_NHBYTES;
-remaining = mbytes % VMAC_NHBYTES;

- if (ctx->first_block_processed) {
- ch = ctx->polytmp[0];
- cl = ctx->polytmp[1];
- } else if (i) {
- nh_vmac_nhbytes(mptr, kptr, VMAC_NHBYTES/8, ch, cl);
- ch &= m62;
- ADD128(ch, cl, pkh, pkl);
- mptr += (VMAC_NHBYTES/sizeof(u64));
- i--;
- } else if (remaining) {
- nh_16(mptr, kptr, 2*((remaining+15)/16), ch, cl);
- ch &= m62;

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ADD128(ch, cl, pkh, pkl);
-mptr += (VMAC_NHBYTES/sizeof(u64));
-goto do_l3;
} else {/* Empty String */
-ch = pkh; cl = pkl;
-goto do_l3;
}
-
-while (i--) {
-nh_vmac_nhbytes(mptr, kptr, VMAC_NHBYTES/8, rh, rl);
-rh &= m62;
-poly_step(ch, cl, pkh, pkl, rh, rl);
-mptr += (VMAC_NHBYTES/sizeof(u64));
}
-
-if (remaining) {
-nh_16(mptr, kptr, 2*((remaining+15)/16), rh, rl);
-rh &= m62;
-poly_step(ch, cl, pkh, pkl, rh, rl);
-
-do_l3:
-vhash_abort(ctx);
-remaining *= 8;
-return l3hash(ch, cl, ctx->l3key[0], ctx->l3key[1], remaining);
-
-
-static u64 vmac(unsigned char m[], unsigned int mbytes,
-const unsigned char n[16], u64 *tagl,
-struct vmac_ctx_t *ctx)
-{   
-u64 *in_n, *out_p;
-u64 p, h;
-int i;
-
-in_n = ctx->__vmac_ctx.cached_nonce;
-out_p = ctx->__vmac_ctx.cached_aes;
-
-i = n[15] & 1;
-if (((u64 *)(n+8) != in_n[1]) || (*(u64 *)(n) != in_n[0])) {   
-in_n[0] = *(u64 *)(n);
-in_n[1] = *(u64 *)(n+8);
-((unsigned char *)in_n)[15] &= 0xFE;
-crypto_cipher_encrypt_one(ctx->child,
-(unsigned char *)out_p, (unsigned char *)in_n);
+struct vmac_tfm_ctx *ctx = crypto_shash_ctx(tfm);
+__be64 out[2];
+u8 in[16] = { 0 };
+unsigned int i;
+int err;

-((unsigned char *)in_n)[15] = (unsigned char)(1-i);
+if (keylen != VMAC_KEY_LEN) {
+crypto_shash_set_flags(tfm, CRYPTO_TFM_RES_BAD_KEY_LEN);
+return -EINVAL;
}
- p = be64_to_cpup(out_p + i);
-h = vhash(m, mbytes, (u64 *)0, &ctx->__vmac_ctx);
-return le64_to_cpu(p + h);
-
-
-static int vmac_set_key(unsigned char user_key[], struct vmac_ctx_t *ctx)
-{  
-u64 in[2] = {0}, out[2];
-unsigned i;
-int err = 0;

-err = crypto_cipher_setkey(ctx->child, user_key, VMAC_KEY_LEN);
+err = crypto_cipher_setkey(tctx->cipher, key, keylen);
-if (err)
+return err;
  return err;

/* Fill nh key */
-((unsigned char *)in)[0] = 0x80;
+for (i = 0; i < sizeof(ctx->__vmac_ctx.nhkey)/8; i += 2) {
+crypto_cipher_encrypt_one(ctx->child,
-((unsigned char *)out, (unsigned char *)in);
+ctx->__vmac_ctx.nhkey[i] = be64_to_cpup(out);
+ctx->__vmac_ctx.polykey[i] = 0;
-((unsigned char *)in)[15] += 1;
+in[0] = 0x80;
+for (i = 0; i < ARRAY_SIZE(tctx->nhkey); i += 2) {
+crypto_cipher_encrypt_one(tctx->cipher, (u8 *)out, in);
+ctx->nhkey[i] = be64_to_cpu(out[0]);
+ctx->nhkey[i+1] = be64_to_cpu(out[1]);
+in[15]++;
}

/* Fill poly key */
-((unsigned char *)in)[0] = 0xC0;
+for (i = 0; i < sizeof(ctx->__vmac_ctx.polykey)/8; i += 2) {
+crypto_cipher_encrypt_one(ctx->child,
-((unsigned char *)out, (unsigned char *)in);
+ctx->__vmac_ctx.polytmp[i] =
+ctx->__vmac_ctx.polykey[i] =
-be64_to_cpup(out) & mpoly;
ctx->__vmac_ctx.polytmp[i+1] =
ctx->__vmac_ctx.polykey[i+1] =
be64_to_cpup(out+1) & mpoly;
((unsigned char *)in)[15] += 1;
in[0] = 0xC0;
in[15] = 0;
for (i = 0; i < ARRAY_SIZE(tctx->polykey); i += 2) {
crypto_cipher_encrypt_one(tctx->cipher, (u8 *)out, in);
tctx->polykey[i] = be64_to_cpu(out[0]) & mpoly;
tctx->polykey[i+1] = be64_to_cpu(out[1]) & mpoly;
in[15]++;
}
/* Fill ip key */
((unsigned char *)in)[0] = 0xE0;
in[1] = 0;
for (i = 0; i < sizeof(ctx->__vmac_ctx.l3key)/8; i += 2) {
in[0] = 0xE0;
in[15] = 0;
for (i = 0; i < ARRAY_SIZE(tctx->l3key); i += 2) {
do {
crypto_cipher_encrypt_one(ctx->child,
(unsigned char *)out, (unsigned char *)in);
ctx->__vmac_ctx.l3key[i] = be64_to_cpu(out);
ctx->__vmac_ctx.l3key[i+1] = be64_to_cpu(out+1);
((unsigned char *)in)[15] += 1;
} while (ctx->__vmac_ctx.l3key[i] >= p64
|| ctx->__vmac_ctx.l3key[i+1] >= p64);
crypto_cipher_encrypt_one(tctx->cipher, (u8 *)out, in);
tctx->l3key[i] = be64_to_cpu(out[0]);
tctx->l3key[i+1] = be64_to_cpu(out[1]);
in[15]++;
} while (tctx->l3key[i] >= p64 || tctx->l3key[i+1] >= p64);
} /* Invalidate nonce/aes cache and reset other elements */
ctx->__vmac_ctx.cached_nonce[0] = (u64)-1; /* Ensure illegal nonce */
ctx->__vmac_ctx.cached_nonce[1] = (u64)0; /* Ensure illegal nonce */
ctx->__vmac_ctx.first_block_processed = 0;

-return err;
+return 0;
}

-static int vmac_init(struct shash_desc *desc)
{
struct vmac_ctx_t *ctx = crypto_shash_ctx(parent);
const struct vmac_tfm_ctx *tctx = crypto_shash_ctx(desc->tfm);
struct vmac_desc_ctx *dctx = shash_desc_ctx(desc);

if (keylen != VMAC_KEY_LEN) {
crypto_shash_set_flags(parent, CRYPTO_TFM_RES_BAD_KEY_LEN);
return -EINVAL;
}

return vmac_set_key((u8 *)key, ctx);
}

static int vmac_init(struct shash_desc *pdesc)
{
    dctx->partial_size = 0;
    dctx->first_block_processed = false;
    memcpy(dctx->polytmp, tctx->polykey, sizeof(dctx->polytmp));
    return 0;
}

static int vmac_update(struct shash_desc *desc, const u8 *p, unsigned int len)
{
    struct crypto_shash *parent = desc->tfm;
    struct vmac_ctx_t *ctx = crypto_shash_ctx(parent);
    int expand;
    int min;

    expand = VMAC_NHBYTES - ctx->partial_size > 0 ? VMAC_NHBYTES - ctx->partial_size : 0;
    min = len < expand ? len : expand;
    memcpy(ctx->partial + ctx->partial_size, p, min);
    ctx->partial_size += min;

    if (len < expand)
        return 0;

    vhash_update(ctx->partial, VMAC_NHBYTES, &ctx->__vmac_ctx);
    ctx->partial_size = 0;

    len -= expand;
    p += expand;

    if (len % VMAC_NHBYTES) {
        memcpy(ctx->partial, p + len - (len % VMAC_NHBYTES),


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const struct vmac_tfm_ctx *tctx = crypto_shash_ctx(desc->tfm);
+struct vmac_desc_ctx *dctx = shash_desc_ctx(desc);
+unsigned int n;
+
+if (dctx->partial_size) {
+n = min(len, VMAC_NHBYTES - dctx->partial_size);
+memcpy(dctx->partial + dctx->partial_size, p, n);
+dctx->partial_size += n;
+p += n;
+len -= n;
+if (dctx->partial_size == VMAC_NHBYTES) {
+vhash_blocks(tctx, dctx, dctx->partial_words, 1);
+dctx->partial_size = 0;
+}
+}
+
+if (len >= VMAC_NHBYTES) {
+n = round_down(len, VMAC_NHBYTES);
+/* TODO: 'p' may be misaligned here */
+vhash_blocks(tctx, dctx, (const __le64 *)p, n / VMAC_NHBYTES);
+p += n;
+len -= n;
+}
+
+if (len) {
+memcpy(dctx->partial, p, len);
+dctx->partial_size = len;
+}

-vhash_update(p, len - len % VMAC_NHBYTES, &ctx->__vmac_ctx);
-
return 0;
}

-static int vmac_final(struct shash_desc *pdesc, u8 *out)
+static u64 vhash_final(const struct vmac_tfm_ctx *tctx,
+struct vmac_desc_ctx *dctx)
{
-struct crypto_shash *parent = pdesc->tfm;
-struct vmac_ctx_t *ctx = crypto_shash_ctx(parent);
-vmac_t mac;
-u8 nonce[16] = { };
-
-/* vmac() ends up accessing outside the array bounds that
-* we specify. In appears to access up to the next 2-word
-* boundary. We'll just be uber cautious and zero the
- * unwritten bytes in the buffer.
  - */
- if (ctx->partial_size) {
  - memset(ctx->partial + ctx->partial_size, 0, 
  - VMAC_NHBYTES - ctx->partial_size);
  - }
- mac = vmac(ctx->partial, ctx->partial_size, nonce, NULL, ctx);
- memcpy(out, &mac, sizeof(vmac_t));
- memzero_explicit(&mac, sizeof(vmac_t));
- memset(&ctx->__vmac_ctx, 0, sizeof(struct vmac_ctx));
- ctx->partial_size = 0;
+ unsigned int partial = dctx->partial_size;
+ u64 ch = dctx->polytmp[0];
+ u64 cl = dctx->polytmp[1];
  +
+ /* L1 and L2-hash the final block if needed */
+ if (partial) {
  + /* Zero-pad to next 128-bit boundary */
  + unsigned int n = round_up(partial, 16);
  + u64 rh, rl;
  +
  + memset(&dctx->partial[partial], 0, n - partial);
  + nh_16(dctx->partial_words, tctx->nhkey, n / 8, rh, rl);
  + rh &= m62;
  + if (dctx->first_block_processed)
  + poly_step(ch, cl, tctx->polykey[0], tctx->polykey[1],
  + rh, rl);
  + else
  + ADD128(ch, cl, rh, rl);
  +
  +
  + /* L3-hash the 128-bit output of L2-hash */
  + return l3hash(ch, cl, tctx->l3key[0], tctx->l3key[1], partial * 8);
  +
  +
  +/* static int vmac_final(struct shash_desc *desc, u8 *out)
  + {
  + const struct vmac_tfm_ctx *tctx = crypto_shash_ctx(desc->tfm);
  + struct vmac_desc_ctx *dctx = shash_desc_ctx(desc);
  + static const u8 nonce[16] = {}; /* TODO: this is insecure */
  + union {
  + u8 bytes[16];
  + __be64 pads[2];
  + } block;
  + int index;
  + u64 hash, pad;
  +
  + /* Finish calculating the VHASH of the message */
+hash = vhash_final(tctx, dctx);
+
+/* Generate pseudorandom pad by encrypting the nonce */
+memcpy(&block, nonce, 16);
+index = block.bytes[15] & 1;
+block.bytes[15] &= ~1;
+crypto_cipher_encrypt_one(tctx->cipher, block.bytes, block.bytes);
+pad = be64_to_cpu(block.pads[index]);
+
+/* The VMAC is the sum of VHASH and the pseudorandom pad */
+put_unaligned_le64(hash + pad, out);
return 0;
}

static int vmac_init_tfm(struct crypto_tfm *tfm)
{
    struct crypto_cipher *cipher;
    struct crypto_instance *inst = (void *)tfm->__crt_alg;
    struct vmac_ctx_t *ctx = crypto_tfm_ctx(tfm);
    struct crypto_spawn *spawn = crypto_instance_ctx(inst);
    cipher = crypto_spawn_cipher(spawn);
    if (IS_ERR(cipher))
        return PTR_ERR(cipher);
    ctx->child = cipher;
    tctx->cipher = cipher;
    return 0;
}

static void vmac_exit_tfm(struct crypto_tfm *tfm)
{
    struct vmac_ctx_t *ctx = crypto_tfm_ctx(tfm);
    crypto_free_cipher(ctx->child);
    tctx->cipher = ctx = crypto_tfm_ctx(tfm);
    +crypto_free_cipher(tctx->cipher);
}

static int vmac_create(struct crypto_template *tmpl, struct rtattr **tb)
{ return -EINVAL;

if (alg->cra_blocksize != 16)
    goto out_put_alg;

inst = shash_alloc_instance("vmac", alg);
err = PTR_ERR(inst);
if (IS_ERR(inst))
    goto out_put_alg;

inst->alg.base.cra_blocksize = alg->cra_blocksize;
inst->alg.base.cra_alignmask = alg->cra_alignmask;

inst->alg.digestsize = sizeof(vmac_t);
inst->alg.base.cra_ctxsize = sizeof(struct vmac_ctx_t);
inst->alg.base.cra_ctxsize = sizeof(struct vmac_tfm_ctx);
inst->alg.base.cra_init = vmac_init_tfm;
inst->alg.base.cra_exit = vmac_exit_tfm;

inst->alg.digestsize = VMAC_TAG_LEN / 8;
inst->alg.init = vmac_init;
inst->alg.update = vmac_update;
inst->alg.final = vmac_final;

--- linux-4.15.0.orig/crypto/xts.c
+++ linux-4.15.0/crypto/xts.c
@@ -465,7 +465,7 @@
crypto_free_cipher(ctx->tweak);
 }

static void free_inst(struct skcipher_instance *inst)
{
    crypto_drop_skcipher(skcipher_instance_ctx(inst));
    kfree(inst);
    inst->alg.encrypt = encrypt;
inst->alg.decrypt = decrypt;

-inst->free = free;
+inst->free = free_inst;

err = skcipher_register_instance(tmpl, inst);
if (err)
+EXPORT_SYMBOL arch/x86/kvm/kvm 0xd2f9ce67kvm_cpu_has_pending_timer
+EXPORT_SYMBOL crypto/mcryptd 0x19dbdBCMcryptd_arm_flusher
+EXPORT_SYMBOL crypto/sm3_generic 0x49a247bcoutcrypt_sm3_finup
+EXPORT_SYMBOL crypto/sm3_generic 0xa263042crypt_sm3_update
+EXPORT_SYMBOL crypto/xor 0x5b6c00e6xor_blocks
+EXPORT_SYMBOL drivers/acpi/nfit/nfit 0xc9ce93beto_nfit_uuid
+EXPORT_SYMBOL drivers/acpi/video 0x3997c8c3acpi_video_get_levels
+EXPORT_SYMBOL drivers/acpi/video 0x4bee69d2acpi_video_get_edid
+EXPORT_SYMBOL drivers/acpi/video 0x6de77ffacpi_video_get_backlight_type
+EXPORT_SYMBOL drivers/acpi/video 0x7a45377bacpi_video_unregister
+EXPORT_SYMBOL drivers/acpi/video 0x7cc484a5acpi_video_handles_brightness_key_presses
+EXPORT_SYMBOL drivers/acpi/video 0x8826c13bacpi_video_register
+EXPORT_SYMBOL drivers/acpi/video 0x9e2ca535acpi_video_set_dmi_backlight_type
+EXPORT_SYMBOL drivers/atm/suni 0x46ee7406suni_init
+EXPORT_SYMBOL drivers/atm/uPD98402 0x12d73abaUPD98402_init
+EXPORT_SYMBOL drivers/bcm/bcmca 0x80a2529cbcmca_core_irq
+EXPORT_SYMBOL drivers/bcm/bcmca 0xea1254d8bcmca_core_dma_translation
+EXPORT_SYMBOL drivers/block/drbd/drbd 0x127a5901drbd_set_st_err_str
+EXPORT_SYMBOL drivers/block/drbd/drbd 0x35131b36drbd_role_str
+EXPORT_SYMBOL drivers/block/drbd/drbd 0x7730f22ddrbd_conn_str
+EXPORT_SYMBOL drivers/block/drbd/drbd 0xaf27bebdrbd_disk_str
+EXPORT_SYMBOL drivers/block/paride/paride 0x0f1096f0dpi_disconnect
+EXPORT_SYMBOL drivers/block/paride/paride 0x215e124dipi_connect
+EXPORT_SYMBOL drivers/block/paride/paride 0x3d1abe66paride_register
+EXPORT_SYMBOL drivers/block/paride/paride 0x4267110api_register_driver
+EXPORT_SYMBOL drivers/block/paride/paride 0x5de58413pi_write_block
+EXPORT_SYMBOL drivers/block/paride/paride 0x65977adbpi_write_regr
+EXPORT_SYMBOL drivers/block/paride/paride 0x6e82e51fpi_release
+EXPORT_SYMBOL drivers/block/paride/paride 0x6ef15147pi_rea detriment
+EXPORT_SYMBOL drivers/block/paride/paride 0x71e8300dpi_read_block
+EXPORT_SYMBOL drivers/block/paride/paride 0x82d9901api_schedule_claimed
+EXPORT_SYMBOL drivers/block/paride/paride 0xa63062e7paride_unregister
+EXPORT_SYMBOL drivers/block/paride/paride 0xb21ba7dpi_unregister_driver
+EXPORT_SYMBOL drivers/block/paride/paride 0xceca2189cpi_init
+EXPORT_SYMBOL drivers/block/paride/paride 0xfee4b4bapi_do_claimed
+EXPORT_SYMBOL drivers/bluetooth/btbc 0xb344e9fbbcmd_patchram
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x1348760diipmi_request_sett ime
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x16dce76ipmi_set_my_address
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x1a10c898ipmi_set_maintenance_mode
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x1aba5b8ipmi_unregister_smi
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x2780f23a9ipmi_smimedia_register
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x39b4ec7bipmi_get_version
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x40f2b10cipmi_alloc_smi_msg
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x4c971becipmi_smimsg_received
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x524f651ipmi_get_my_address
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x5e80f37cipmi_unregister_for_cmd
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x5b6b5b5ipmi_get_my_LUN
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x67369b42ipmi_addr_src_to_str
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x020355cedrm_vma_offset_manager_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x0289aa93drem_gem_private_object_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x02b6a2eadrm_framebuffer_cleanup
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x030b859edrm_crtc_vblank_reset
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x03c63897__drem_get_edid_firmware_path
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x044468e4drem_ati_pcigart_cleanup
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x05c12a25drem_legacy_ioremap
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x05c773c4drem_vma_node_revoke
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x05dc0359drem_property_create_blob
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x062ca9e5drem_atomic_set_crtc_for_plane
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x0720aa85drem_mode_create
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x074d4b5fdrem_crtc_vblank_count_and_time
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x079824e8drem_syncobj_create
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x09063a45drem_modeselect_lock_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x0a72f765dfclflush_virt_range
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x0ae4b94cdrem_ht_remove
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x0c35514fdrem_modeselect_lock_all_ctx
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x0d0d3d83drem_property_create
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x0f80e987dmm_takedown
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x107742a9drem_get_subpixel_order_name
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x111a2b163drem_bridge_enable
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x13b66554drem_crtc_vblank_workqueue
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x13c80b93drem_flip_work_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x152699d7drem_bridge_pre_enable
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1536cb1fdrem_ioctl
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x16ef724edrem_put_dev
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x18428c31drem_dev_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x194edaadrmdem_edid_header_is_valid
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x195e5204drem_cvt_mode
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1a111479drem_syncobj_free
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1a770ac3drem_detect_hdmimonitor
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1c09da25drem_mode_create_tv_properties
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1d46dc9drem_property_destroy
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1d5ff704drem_open
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e0dca9drem_calc_vbltimestamps_from_scanoutpos
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e14b61edrem_syncobj_remove_callback
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e17421drem_bridge_attach
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e218088drem_universal_plane_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e6c54dfdrem_crtc_handle_vblank
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1ea17810drem_mode_validate_basic
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1f49f05bdrem_atomic_state_default_clear
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1f707b0cdrem_mode_connector_set_path_property
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x20645642drem_debug
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x21e58346drem_framebuffer_unregister_private
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x238f7a9bdrem_i2c_encoder_prepare
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x23d08f04drem_property_add_enum
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x23ee1654drem_wait_one_vblank
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x7c74f856drm_gem_prime_import
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x7c9fba67drm_atomic_state_default_release
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x7d9028a8drm_modset_acquire_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x7ff8b559drm_hmdi_avinfoframe_quant_range
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x81c3525adrmm_atomic_set_fb_for_plane
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x82c2998fdrm_flip_workAllocate_task
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x83775e08drm_mode_create_aspect_ratio_property
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x84278163drm_modset_unlock_all
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x85b94a4ddrm_irq_uninstall
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x868c834bdrm_gem_put_pages
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x871ab41adrmm_rect_intersect
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x87ffbf35drm_i2c_encoder_dpms
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x88e4b22edrm_vma_node_allow
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x8a675145dram_atomic_get_crtc_state
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x8b21b08cdrm_dev_printk
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x8c6d6f77cdrm_mode_copy
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x8d9c7c91drmm_prime_pages_to_sg
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x8e748e51dram_agp_enable
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x8ef9111dram_dev_set_config_internal
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x89f882ddrm_dev_alloc
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x917acfeedrm_crtc_enable_color_mgmt
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x91ea12e2drm_bridge_post_disable
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x91fe1cdcmmm_rectcale_vscale
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x923e4477dram_dev_get
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x928f9111dram_dev_set_hsync
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x962c94b5dram_dev_set_config
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x97f43148dram_crtc_from_index
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x97f80a49dram_dev_set_config
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x99c1e6dram_crtc_force_disable_all
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x99f00d3drm_panel_remove
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x9af142ddrm_gem_create_mmap_offset
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x9b8020d4drm_connector_list_iter_begin
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x9c038e03dram_object_attach_property
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x9df645ddrm_elevator_off
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x9e5a9ff3dram_event_reserve_init_locked
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x9eb6445fdram_encoder_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x9f8a9e1dram_gem_prime_import_dev
+EXPORT_SYMBOL drivers/gpu/drm/drm 0xa16f309fdram_atomic_state_clear

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+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x3f716f69drm_helper_connector_dpms
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x3ffac560drm_fb_helper_sys_read
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x3ff4ceddrm_dp_mst_hpd_irq
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x415c8824drm_atomic_helper_wait_for_flip_done
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x41e995b7drm_helper_disable_unused_functions
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x42b378a4drm_dp_dual_mode_max_tmds_clock
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x444c8d99drm_scde_write
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x4615ce44drm_dp_downstream_max_bpc
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x468e9bddd drm_dp_mst_allocate_vcpip
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x474d5f3bdrm_atomic_helper_commit_modeset_enabled
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x4a7ab04fdrm_scde_set_scrambling
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x4e58a0c9drm_atomic_helper_commit_modeset_enabled
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x51ca55f6drm_crtc_helper_set_config
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x52f75e44 drm_primary_helper_update
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5315d63 __drm_atomic_helper_private_obj_duplicate_state
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5407ae9edrm_dp_get_dual_mode_type_name
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x54adac47drm_atomic_helper_crtc_reset
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x54c1ce50drm_atomic_helper_commit_planes
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5527e24cdrm_panel_bridge_remove
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x552c922ddrm_atomic_helper_check_planes
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x574d5f3bdrm_fb_helper_debug_leave
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x57d0c805drm_fb_helper_fill_fix
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5818b853drm_lspcon_set_mode
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5860c953 drm_dp_link_power_down
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x59637f3d drm_dp_downstream_max_clock
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x599b8f7a7dm_kms_helper_poll_enable
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5a7ab04fdrm_scde_set_scrambling
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5b72e777fdrm_fb_helper_prepare
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5c3fc313f drm_fb_helper_restore_fbdem_mode_unlocked
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5e367f3d drm_dp_panel_bridge_add
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5e367f3d drm_gem_fb_destroy
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5f669a5d drm_plane_helper_check_state
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x5f057847drm_fb_helper_blank
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x606e2a6bd drm_dp_send_power_updown_phy
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x610f7964drm_dp_find_vcpis_slots
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x65e4be0drm_atomic_helper_wait_for_dependencies
+EXPORT_SYMBOL drivers/gpu/drm/kms_helper 0x66dc12bb7drm_helper_crtc_mode_set
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+EXPORT_SYMBOL net/mac80211/mac80211 0x8f25e6d1ieee80211_csa_finish
+EXPORT_SYMBOL net/mac80211/mac80211 0xb3ec1c6f ieee80211_stop_tx_ba_cb_irqsafe
+EXPORT_SYMBOL net/mac80211/mac80211 0xb8b0e98d_06ieee80211_sched_scan_stopped
+EXPORT_SYMBOL net/mac80211/mac80211 0xb97d19741ieee80211_csa_update_counter
+EXPORT_SYMBOL net/mac80211/mac80211 0xb9e4b0ebbie80211_alloc_hw_nm
+EXPORT_SYMBOL net/mac80211/mac80211 0xb9ee3bdfiae80211_rx_irqsafe
+EXPORT_SYMBOL net/mac80211/mac80211 0xc0f3834cie80211_reserve_tid
+EXPORT_SYMBOL net/mac80211/mac80211 0xc0f3834cie80211_free_hw
+EXPORT_SYMBOL net/mac80211/mac80211 0xc3a0c8b8ieee80211_rate_control_unregister
+EXPORT_SYMBOL net/mac80211/mac80211 0xc436ad19ieee80211_queue_delayed_work
+EXPORT_SYMBOL net/mac80211/mac80211 0xce953fb47__ieee80211_get_rx_led_name
+EXPORT_SYMBOL net/mac80211/mac80211 0xceb0572adieee80211_free_txskb
+EXPORT_SYMBOL net/mac80211/mac80211 0xceb3a8c95ieee80211_send_bar
+EXPORT_SYMBOL net/mac80211/mac80211 0xdc5c82e5dieee80211_tx_prepare_skb
+EXPORT_SYMBOL net/mac80211/mac80211 0xda72625cbieee80211_parse_p2p_noa
+EXPORT_SYMBOL net/mac80211/mac80211 0xd8a778f5ieee80211_proberesp_get
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+EXPORT_SYMBOL net/mac80211/mac80211 0xf91d6b3aieee80211_sta_eosp
+EXPORT_SYMBOL net/mac80211/mac80211 0xfbfcf4b99ieee80211_rts_get
+EXPORT_SYMBOL net/mac80211/mac80211 0xcfc7c1052ieee80211_manage_rx_ba_offl
+EXPORT_SYMBOL net/mac80211/mac80211 0xfc83f3b7ieee80211_tdls_oper_request
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+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x017120627ip_vs_conn_new
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x01f8e819bip_vs_tcp_conn_listen
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x0341a58a7ip_vs_conn_out_get
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x038b6821unregister_ip_vs_app
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x0425e0682register_ip_vs_app
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x05a791971ip_vs_new_conn_out
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x061f0f25ip_vs_scheduler_err
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x067eb881cip_vs_nfct_expect_related
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x08358d109 unregister_ip_vs_scheduler
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x085c260a1ip_vs_proto_get
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x087c86258register_ip_vs_scheduler
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0x0a0ed10cbbregister_ip_vs_app_inc
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+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0xc980a4f7ip_vs_conn_put
+EXPORT_SYMBOL net/netfilter/ipvs/ip_vs 0xc9b1ede12ip_vs_proto_data_get
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+EXPORT_SYMBOL net/netfilter/nf_conntrack 0x5895000fct_ext_add
+EXPORT_SYMBOL net/netfilter/nf_conntrack_pptp 0xc6662b93pptp_msg_name
+EXPORT_SYMBOL net/netfilter/nf_nat 0x0dac72d9nf_nat_mangle_udp_packet
+EXPORT_SYMBOL net/wireless/cfg80211 0x7520b8b4cfg80211_get_station
+EXPORT_SYMBOL net/wireless/cfg80211 0x7ae805dfreq_reg_info
+EXPORT_SYMBOL net/wireless/cfg80211 0x7de16577cfg80211_check_combinations
+EXPORT_SYMBOL net/wireless/cfg80211 0x7ef39823cfg80211_sched_scan_stopped
+EXPORT_SYMBOL net/wireless/cfg80211 0x8106f3a3cfg80211_free_nan_func
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+EXPORT_SYMBOL net/wireless/cfg80211 0xc81a395fcfg80211_cqm_pktloss_notify
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+EXPORT_SYMBOL net/wireless/cfg80211 0x841fec6dcfg80211_gtk_rekey_notify
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+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x362275e8 VBoxGuest_RTMemContFree
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+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x381d7c24 VBoxGuest_RTMemAllocVarTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x383a0b9d VBoxGuest_RTMPokeCpu
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3a47392e VBoxGuest_RTErrConvertFromErrno
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3b04381e VBoxGuest_RTSemEventMultiReset
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3b231c95 VBoxGuest_RTTimeNanoTS
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3bcf543a VBoxGuest_RTLogFileDefaultInstanceEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3d00f113 VBoxGuest_g_u32RTAssertLine
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3de43f66 VBoxGuest_RTSemEventCreate
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3dfc9ab8 VBoxGuest_RTSemMutexIsOwned
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3e75c0be VBoxGuest_RTLogCreateDefaultInstanceEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3f3b3c07 VBoxGuest_RTThreadIsInInterrupt
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x40996438 VBoxGuest_RTThreadPreemptRestore
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x42ecc6d1 VBoxGuest_RTThreadPreemptIsPossible
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x43fdd8d9 VBoxGuest_RTLogDefaultInstance
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x45041d39 VBoxGuest_RTThreadGetClassName
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x450f54f1 VBoxGuest_RTLogDefaultInstance
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4575f117 VBoxGuest_RTThreadWaitEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x458bba2c VBoxGuest_RTThreadPreemptIsPossible
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x461fa9fe VBoxGuest_RTLogFileRelDefaultInstanceEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x464c1423 VBoxGuest_RTLogSetCustomPrefixCallback
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x46ca42f2 VBoxGuest_RTLogFormatV
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x47f5c0be VBoxGuest_RTLogDefaultInstance
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4847ae52 VBoxGuest_RTMpGetCount
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x49f1be17 VBoxGuest_RTThreadFromNative
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4a67110 VBoxGuest_RTThreadTimeCompare
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4b2ec091 VBoxGuest_RTThreadGetClassName
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4b6e0a41 VBoxGuest_RTThreadPreemptIsPossible
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4ba9f2e1 VBoxGuest_RTThreadPreemptDelays
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4bcf543a VBoxGuest_RTLogFileDefaultInstanceEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4c755b9f VBoxGuest_RTThreadCreate
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4d67110 VBoxGuest_RTThreadTimeCompare
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4e75c0be VBoxGuest_RTLogFileDefaultInstanceEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4f041d39 VBoxGuest_RTThreadGetClassName
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x4f4d19c VBoxGuest_RTLogDefaultInstance
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+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xa6d22472 VBoxGuest_RTThreadUserWait
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xa6de1bcd VBoxGuest_RTTimerChangeInterval
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xa86c5a96 VBoxGuest_RT0SemEventSignal
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xa86d3302 VBoxGuest_RTStrPrintfEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xa9863302 VBoxGuest_RT0LogClip
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+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xa9863302 VBoxGuest_RT0LogCloneRC
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+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xac441d VBoxGuest_g_szRTAssertMsg1
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xad4df4e VBoxGuest_RT0SemMutexRequestNoResumeDebug
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xad649089 VBoxGuest_RTStrToUInt64Full
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xae1f546 VBoxGuest_RT0LogRelPrintf
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xae3e0ecd VBoxGuest_RTLogDestinations
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xae42c3d VBoxGuest_RTLogGetGroupSettings
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+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xb05840a7 VBoxGuest_RT0SemEventMultiWaitExDebug
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xb1cc9148 VBoxGuest_RT0MemKernelCopyTo
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xb24ea0e3 VBoxGuest_g_pszRTAssertFile
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xb444f4a1 VBoxGuest_RT0LogDestinations
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xb6941b2e VBoxGuest_RT0StrToUInt8
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xb8c6f7e VBoxGuest_RT0LogSimpleDump
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xb9d7a27d VBoxGuest_RT0HeapSimpleDump
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xbaa97421 VBoxGuest_g_szRTAssertMsg2
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xbba928e6 VBoxGuest_RT0HeapSimpleGetHeapSize
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xbcb4d30f VBoxGuest_RT0MemObjAllocContTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc1095c44 VBoxGuest_RTTimeImplode
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc3a1e5de VBoxGuest_RT0LogGetGroupSettings
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc3f3e96 VBoxGuest_RT0MemAllocTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc63cc2f0 VBoxGuest_RT0MemExecDonate
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc71362b7 VBoxGuest_RT0LogRelSetBuffering
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc88fb4aa VBoxGuest_RT0HeapSimpleInit
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc91cea98 VBoxGuest_RTStrCopyEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xc9a6a8e7 VBoxGuest_RTThreadCreateF
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xcaee97bf VBoxGuest_RT0LogComPrintf
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xcb2a6b54 VBoxGuest_RT0MemExecFree
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xceae9d6a VBoxGuest_RTStrConvertHexBytes
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xd14e8ec VBoxGuest_RT0TimerDestroy
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xda8f3b9 VBoxGuest_RT0SemEventWait
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0xda2a37e3 VBoxGuest_RT0TimerReleaseSystemGranularity
+EXPORT_SYMBOL vmlinux 0x052b0bfe peeretbid
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+EXPORT_SYMBOL vmlinux 0x054996b4 schedule_timeout_interruptible
+EXPORT_SYMBOL vmlinux 0x055c38bb pcie_set_mps
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+EXPORT_SYMBOL vmlinux 0x056d008a_break_lease
+EXPORT_SYMBOL vmlinux 0x05926159 mod_zone_page_state
+EXPORT_SYMBOL vmlinux 0x0594b866 tcp_release_cb
+EXPORT_SYMBOL vmlinux 0x05a34d7f_is_primary_device
+EXPORT_SYMBOL vmlinux 0x05abbdd6blkdev_issue_discard
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+EXPORT_SYMBOL vmlinux 0x05f7e14a ip6_xmit
+EXPORT_SYMBOL vmlinux 0x06052f8d __memmove
+EXPORT_SYMBOL vmlinux 0x06055911 dma_virt_ops
+EXPORT_SYMBOL vmlinux 0x061651bestcat
+EXPORT_SYMBOL vmlinux 0x0634100 mod_zone_page_state
+EXPORT_SYMBOL vmlinux 0x063d6b56 unregister_shrinker
+EXPORT_SYMBOL vmlinux 0x066a3848 allocate_skb
+EXPORT_SYMBOL vmlinux 0x067b8d35security_release_seqctx
+EXPORT_SYMBOL vmlinux 0x0680ac30 siphash_1u64
+EXPORT_SYMBOL vmlinux 0x0689c36ed instantiate_no_diralias
+EXPORT_SYMBOL vmlinux 0x068e7263ioremap_cache
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+EXPORT_SYMBOL vmlinux 0x06a6348 dev_add_offload
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+EXPORT_SYMBOL vmlinux 0x13dce33citw_handler_set_thrsy
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+EXPORT_SYMBOL vmlinux 0x169f2935ppp_register_compressor
+EXPORT_SYMBOL vmlinux 0x16a6a4acnapi_schedule_prep
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+EXPORT_SYMBOL vmlinux 0x16b9ad41blk_mdq_delay_kick_requeue_list
+EXPORT_SYMBOL vmlinux 0x16c54d53convert_art_to_tsc
+EXPORT_SYMBOL vmlinux 0x16ch169devfreq_add_device
+EXPORT_SYMBOL vmlinux 0x16d0123escsi_register_driver
+EXPORT_SYMBOL vmlinux 0x16e297c3bit_wait
+EXPORT_SYMBOL vmlinux 0x17049ca4devm_request_threaded_irq
+EXPORT_SYMBOL vmlinux 0x170c25eeacpi_get_next_object
+EXPORT_SYMBOL vmlinux 0x1710b30bdevfreq_monitor_resume
+EXPORT_SYMBOL vmlinux 0x1711fc8e__invalidate_device
+EXPORT_SYMBOL vmlinux 0x17179f2bdma_fence_init
+EXPORT_SYMBOL vmlinux 0x172946e3skb_get_hash_perturb
+EXPORT_SYMBOL vmlinux 0x1745a1e2iw_handler_set_spi
+EXPORT_SYMBOL vmlinux 0x174b48bfnf_afinfo
+EXPORT_SYMBOL vmlinux 0x17671c46input_close_device
+EXPORT_SYMBOL vmlinux 0x17772171mipi_dsi_detach
+EXPORT_SYMBOL vmlinux 0x179261c2iov_iter_gap_alignment
+EXPORT_SYMBOL vmlinux 0x17973e40current_work
+EXPORT_SYMBOL vmlinux 0x179cd425tcp_md5_hash_key
+EXPORT_SYMBOL vmlinux 0x17ac935fconfig_group_init_type_name
+EXPORT_SYMBOL vmlinux 0x17be7889__destroy_inode
+EXPORT_SYMBOL vmlinux 0x17c8215eup
+EXPORT_SYMBOL vmlinux 0x17ca6158net_dgram_ops
+EXPORT_SYMBOL vmlinux 0x17d1743adev_uc_unsync
+EXPORT_SYMBOL vmlinux 0x17db49a9fd_install
+EXPORT_SYMBOL vmlinux 0x17e5727avme_bus_type
+EXPORT_SYMBOL vmlinux 0x17f341a0i8042_lock_chip
+EXPORT_SYMBOL vmlinux 0x17f7fd39blk_complete_request
+EXPORT_SYMBOL vmlinux 0x17fcb60smem_mpool
+EXPORT_SYMBOL vmlinux 0x1804624dentry_update_name_case
+EXPORT_SYMBOL vmlinux 0x1829691register_sysctl_table
+EXPORT_SYMBOL vmlinux 0x183f94b8mempool_alloc_slab
+EXPORT_SYMBOL vmlinux 0x184b82fmmce_vddrange_to_ocrmask
+EXPORT_SYMBOL vmlinux 0x184d092fagg_generic_create_gatt_table
+EXPORT_SYMBOL vmlinux 0x1869d8audp_poll
+EXPORT_SYMBOL vmlinux 0x186d3ec3_mmc_claim_host
+EXPORT_SYMBOL vmlinux 0x1870df2fget_display_brightness
+EXPORT_SYMBOL vmlinux 0x187a701dconfgs_unregister_group
+EXPORT_SYMBOL vmlinux 0x188fe483poll_schedule_timeout
+EXPORT_SYMBOL vmlinux 0x18986da1get_random_bytes_arch
+EXPORT_SYMBOL vmlinux 0x18a32d5ttty_unlock
+EXPORT_SYMBOL vmlinux 0x18b72573register_kmmio_probe
+EXPORT_SYMBOL vmlinux 0x18b7f6adev_mc_add_global
+EXPORT_SYMBOL vmlinux 0x18cd503devm_device_unregister_opportunity
+EXPORT_SYMBOL vmlinux 0x18e075d2bdi_alloc_node
+EXPORT_SYMBOL vmlinux 0x18e60984___do_once_start
+EXPORT_SYMBOL vmlinux 0x18e87cf5register_filesystem
+EXPORT_SYMBOL vmlinux 0x18fd87c1fget_raw
+EXPORT_SYMBOL vmlinux 0x1911d191bd2_journal_blocks_per_page
+EXPORT_SYMBOL vmlinux 0x19128b7afile_write_and_wait_range
+EXPORT_SYMBOL vmlinux 0x19230db2set_create_files_as
+EXPORT_SYMBOL vmlinux 0x192ba8c7dev_change_proto_down
+EXPORT_SYMBOL vmlinux 0x19377eebctp_ioctl
+EXPORT_SYMBOL vmlinux 0x1940db2tmakeruid
+EXPORT_SYMBOL vmlinux 0x1949affdtc AppBundlePages
+EXPORT_SYMBOL vmlinux 0x19513bd0netpoll_send_skb_on_dev
+EXPORT_SYMBOL vmlinux 0x19598151bdi_register
+EXPORT_SYMBOL vmlinux 0x196846f6splice_direct_to_actor
+EXPORT_SYMBOL vmlinux 0x196a09d86pci_fixup_cardbus
+EXPORT_SYMBOL vmlinux 0x1984da421out_of_line_wait_on_bit
+EXPORT_SYMBOL vmlinux 0x198787b0pci_enable_device
+EXPORT_SYMBOL vmlinux 0x1993aadout_of_line_wait_on_atomic_t
+EXPORT_SYMBOL vmlinux 0x1993c7e0phy_mac_interrupt
+EXPORT_SYMBOL vmlinux 0x19969b05sock_setsockopt
+EXPORT_SYMBOL vmlinux 0x199ed09cdnet_disable_timestamp
+EXPORT_SYMBOL vmlinux 0x19b20b10vme_unregister_error_handler
+EXPORT_SYMBOL vmlinux 0x19bd383bsecurity_secmark_refcount_dec
+EXPORT_SYMBOL vmlinux 0x19cf472bcld Complete
+EXPORT_SYMBOL vmlinux 0x19d9c77mini_qdisc_pair_init
+EXPORT_SYMBOL vmlinux 0x19da67tcp initializes_rcv_mss
+EXPORT_SYMBOL vmlinux 0x19f8504fsencrypt_decrypt_bio_pages
+EXPORT_SYMBOL vmlinux 0xa1a4973setattr_prepare
+EXPORT_SYMBOL vmlinux 0xa1b4ac9ZSTD_decompressDctx
+EXPORT_SYMBOL vmlinux 0xa45c6ccacpi_disabled
+EXPORT_SYMBOL vmlinux 0x14a867set_pages_array_wc
+EXPORT_SYMBOL vmlinux 0x1fd07ffkdb_grepping_flag
+EXPORT_SYMBOL vmlinux 0x1fe8a605radix_tree_gang_lookup_tag
+EXPORT_SYMBOL vmlinux 0x1fe912f1netdev_alloc_frag
+EXPORT_SYMBOL vmlinux 0x20000329simple_strtoul
+EXPORT_SYMBOL vmlinux 0x2003da6bcrypto_sha256_finup
+EXPORT_SYMBOL vmlinux 0x2005e68aacpi_remove_fixed_event_handler
+EXPORT_SYMBOL vmlinux 0x20092385acpi_enter_sleep_state_s4bios
+EXPORT_SYMBOL vmlinux 0x200b2041in6addr_any
+EXPORT_SYMBOL vmlinux 0x20159717mmc_wait_for_app_cmd
+EXPORT_SYMBOL vmlinux 0x201b0f93input_free_device
+EXPORT_SYMBOL vmlinux 0x20236628filp_clone_open
+EXPORT_SYMBOL vmlinux 0x202bd5fblk_queue_dma_pad
+EXPORT_SYMBOL vmlinux 0x204089alease_get_mtime
+EXPORT_SYMBOL vmlinux 0x204c19f5tcp_alloc_md5sig_pool
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+EXPORT_SYMBOL vmlinux 0x20552432truncate_setsize
+EXPORT_SYMBOL vmlinux 0x20555f29__generic_file_write_iter
+EXPORT_SYMBOL vmlinux 0x20592a00tty_hangup
+EXPORT_SYMBOL vmlinux 0x205f2927timer_reduce
+EXPORT_SYMBOL vmlinux 0x20632488super_setup_bdi_name
+EXPORT_SYMBOL vmlinux 0x206621a5inode_dio_wait
+EXPORT_SYMBOL vmlinux 0x206acdee__cleancache_put_page
+EXPORT_SYMBOL vmlinux 0x2072ee9brequest_threaded_irq
+EXPORT_SYMBOL vmlinux 0x207657a8jdbc2_journal_force_commit_nested
+EXPORT_SYMBOL vmlinux 0x20851574gen_new_estimator
+EXPORT_SYMBOL vmlinux 0x208739f6acpi_load_table
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+EXPORT_SYMBOL vmlinux 0x209a6b71kobject_set_name
+EXPORT_SYMBOL vmlinux 0x20a789acirc_set_chip_data
+EXPORT_SYMBOL vmlinux 0x20ad276dvme_new_dma_list
+EXPORT_SYMBOL vmlinux 0x20c55ae0sscanf
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+EXPORT_SYMBOL vmlinux 0x20df5a3dvme_dma_pci_attribute
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+EXPORT_SYMBOL vmlinux 0x20fa4351security_sb_clone_mnt_opts
+EXPORT_SYMBOL vmlinux 0x211f68f1getnstimeofday64
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+EXPORT_SYMBOL vmlinux 0x211f68f1getnstimeofday64
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+EXPORT_SYMBOL vmlinux 0x2c7612d7override_creds
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+EXPORT_SYMBOL vmlinux 0x2cbee9faphy_driver_register
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+EXPORT_SYMBOL vmlinux 0x2d398426iterate_dir
+EXPORT_SYMBOL vmlinux 0x2d408e77vga_switchooo_client_fb_set
+EXPORT_SYMBOL vmlinux 0x2d4779e4check_disk_change
+EXPORT_SYMBOL vmlinux 0x2d496784pcim_iomap_table
+EXPORT_SYMBOL vmlinux 0x2d53023djbd2_journal_lock_updates
+EXPORT_SYMBOL vmlinux 0x2d71c58dsimple_stats
+EXPORT_SYMBOL vmlinux 0x2d900cf5input_register_handler
+EXPORT_SYMBOL vmlinux 0x2d994605security_inode_copy_up_xattr
+EXPORT_SYMBOL vmlinux 0x2dbebc66compat_tcp_setsockopt
+EXPORT_SYMBOL vmlinux 0x2dece09et_tz_trend
+EXPORT_SYMBOL vmlinux 0x2dd56564arch_register_cpu
+EXPORT_SYMBOL vmlinux 0x2dd414a0proc_mkdir
+EXPORT_SYMBOL vmlinux 0x2dd936bflex_array_shrink
+EXPORT_SYMBOL vmlinux 0x2ddfc2acpci_format_exception
+EXPORT_SYMBOL vmlinux 0x2def7f76rtc_cmos_write
+EXPORT_SYMBOL vmlinux 0x2df31b1cpci_setup_cardbus
+EXPORT_SYMBOL vmlinux 0x2df3c3bedim_turn
+EXPORT_SYMBOL vmlinux 0x2dfec02cdrom_dummy_generic_packet
+EXPORT_SYMBOL vmlinux 0x2e0d2f7fqueue_work_on
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+EXPORT_SYMBOL vmlinux 0x2e1ca751clck_put
+EXPORT_SYMBOL vmlinux 0x2e26ab1askb_orphan_partial
+EXPORT_SYMBOL vmlinux 0x2e2b40d2strncat
+EXPORT_SYMBOL vmlinux 0x2e2f09aenf_log_unset
+EXPORT_SYMBOL vmlinux 0x2e57062ebblk_integrity_merge_rq
+EXPORT_SYMBOL vmlinux 0x2e593a27timespec64_to_jiffies
+EXPORT_SYMBOL vmlinux 0x2e5f1407vga_set_legacy_decoding
+EXPORT_SYMBOL vmlinux 0x2e6256d0tcf_block_get
+EXPORT_SYMBOL vmlinux 0x2e7f5d54pciread_vpd
+EXPORT_SYMBOL vmlinux 0x2ea2c95c__x86_indirect_thunk_rax
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+EXPORT_SYMBOL vmlinux 0x3d917c21filemap_page_mkwrite
+EXPORT_SYMBOL vmlinux 0x3d96d8cfddevm_gpiod_get
+EXPORT_SYMBOL vmlinux 0x3d9b7ffccinet_frag_destroy
+EXPORT_SYMBOL vmlinux 0x3da171f9pci_mem_start
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+EXPORT_SYMBOL vmlinux 0x3e0ace16nd_region_release_lane
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+EXPORT_SYMBOL vmlinux 0x3e2b0ba6groups_alloc
+EXPORT_SYMBOL vmlinux 0x3e3d9101delayed_work_timer_fn
+EXPORT_SYMBOL vmlinux 0x3e319dbfjournal_init_inode
+EXPORT_SYMBOL vmlinux 0x3e36336egt_disk
+EXPORT_SYMBOL vmlinux 0x3e4f42fevlan_ioclt_set
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+EXPORT_SYMBOL vmlinux 0x3e591754generic_fillattr
+EXPORT_SYMBOL vmlinux 0x3e6b9a0a__secpath_destroy
+EXPORT_SYMBOL vmlinux 0x3e7bad9dskb_queue_tail
+EXPORT_SYMBOL vmlinux 0x3e83d29fparam_ops_bint
+EXPORT_SYMBOL vmlinux 0x3e9110fa__hw_addr_unsync
+EXPORT_SYMBOL vmlinux 0x3e93588bb_class
+EXPORT_SYMBOL vmlinux 0x3e95083cvme_slave_get
+EXPORT_SYMBOL vmlinux 0x3eaf1316fb_find_mode
+EXPORT_SYMBOL vmlinux 0x3eaf5b6dbalance_dirty_pages_ratelimited
+EXPORT_SYMBOL vmlinux 0x3ee4dfdee dev_get_valid_name
+EXPORT_SYMBOL vmlinux 0x3ef47a97devm_gpiod_get_array_optional
+EXPORT_SYMBOL vmlinux 0x3e1703phy_unregister_fixup_for_id
+EXPORT_SYMBOL vmlinux 0x3f0546a8ioread32_rep
+EXPORT_SYMBOL vmlinux 0x3f0fe41cinode_no highmem
+EXPORT_SYMBOL vmlinux 0x3f1a4673bd2_journal_finish_inode_data_buffers
+EXPORT_SYMBOL vmlinux 0x3f1f0517security_path_rename
+EXPORT_SYMBOL vmlinux 0x3f20549c__ put_page
+EXPORT_SYMBOL vmlinux 0x3f20eb35phy_ethtool_ksettings_get
+EXPORT_SYMBOL vmlinux 0x3f4547a7put_unused_fd
+EXPORT_SYMBOL vmlinux 0x3f46ceee4dput
+EXPORT_SYMBOL vmlinux 0x3f5d4b0agenphy_soft_reset
+EXPORT_SYMBOL vmlinux 0x3f625d42scsi_target_resume
+EXPORT_SYMBOL vmlinux 0x3f66acbcscssi_host_get
+EXPORT_SYMBOL vmlinux 0x3f6fa96ffcrfm_state_delete_tunnel
+EXPORT_SYMBOL vmlinux 0x3f7f3ba4dma_fence_enable_sw_signaling
+EXPORT_SYMBOL vmlinux 0x3f9cd407elevator_exit
+EXPORT_SYMBOL vmlinux 0x3fa084a3inet_sk_rebuild_header
+EXPORT_SYMBOL vmlinux 0x3fa284ddebd2_journal_forget
+EXPORT_SYMBOL vmlinux 0x3fc5ca95xcrm_init_replay
+EXPORT_SYMBOL vmlinux 0x3fe2ccmemweight
+EXPORT_SYMBOL vmlinux 0x3fe85d7cnetdev_has_upper_dev_all_rcu
+EXPORT_SYMBOL vmlinux 0x3fe048fsg_next
+EXPORT_SYMBOL vmlinux 0x3f2214cinet_sendpage
+EXPORT_SYMBOL vmlinux 0x400390fba pci_check_resource_conflict
+EXPORT_SYMBOL vmlinux 0x40047820dquot_transfer
+EXPORT_SYMBOL vmlinux 0x400e946bsock_no_getsockopt
+EXPORT_SYMBOL vmlinux 0x400ecfchnvm_ erase_sync
+EXPORT_SYMBOL vmlinux 0x400f55a1vga_switcheroo_lock_ddc
+EXPORT_SYMBOL vmlinux 0x402b8281_request_module
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+EXPORT_SYMBOL vmlinux 0x4035fd08vga_put
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+EXPORT_SYMBOL vmlinux 0x40456994page_readlink
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+EXPORT_SYMBOL vmlinux 0x408836bagnet_fs_type
+EXPORT_SYMBOL vmlinux 0x40973662sysctl_udp_mem
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+EXPORT_SYMBOL vmlinux 0x40a9b349vzalloc
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+EXPORT_SYMBOL vmlinux 0x40c7247csimeminfo
+EXPORT_SYMBOL vmlinux 0x40c89d46acpi_get_table_by_index
+EXPORT_SYMBOL vmlinux 0x40d04664console_trylock
+EXPORT_SYMBOL vmlinux 0x40d59096unregister_restart_handler
+EXPORT_SYMBOL vmlinux 0x40d84a37ZSTD_getFrameParams
+EXPORT_SYMBOL vmlinux 0x40ef1b3refcount_dec_and_lock
+EXPORT_SYMBOL vmlinux 0x41069816flush rcu_work
+EXPORT_SYMBOL vmlinux 0x410f740dconfig_item_set_name
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+EXPORT_SYMBOL vmlinux 0x41d27aa9queued_read lock_slowpath
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+EXPORT_SYMBOL vmlinux 0x47b4a63pnp_register_card_driver
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+EXPORT_SYMBOL vmlinux 0x56d9012rf_s_needed
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+EXPORT_SYMBOL vmlinux 0x570be82ftty_port_raise_dtr_rts
+EXPORT_SYMBOL vmlinux 0x571041afilenmap_write_and_wait_range
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+EXPORT_SYMBOL vmlinux 0x574c2e74bitmap_release_region
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+EXPORT_SYMBOL vmlinux 0x5792f848strlcpy
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+EXPORT_SYMBOL vmlinux 0x57b91cacsget_users
+EXPORT_SYMBOL vmlinux 0x57d41a72rfkill_alloc
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+EXPORT_SYMBOL vmlinux 0x57f7f9eclocksources_change_rating
+EXPORT_SYMBOL vmlinux 0x57fac552start_tt
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+EXPORT_SYMBOL vmlinux 0x580a5873kthread_delayed_work_timer_fn
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+EXPORT_SYMBOL vmlinux 0x581eab00_skb_recv_datagram
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+EXPORT_SYMBOL vmlinux 0x582247dnotify_change
+EXPORT_SYMBOL vmlinux 0x582fab8hmm_device_put
+EXPORT_SYMBOL vmlinux 0x5838f6c9rtc_valid_tm
+EXPORT_SYMBOL vmlinux 0x58392e85vga_switcheroo_unlock_ddc
+EXPORT_SYMBOL vmlinux 0x58413a47add_wait_queue_exclusive
+EXPORT_SYMBOL vmlinux 0x584738f9rdmsr_safe_on_cpu
+EXPORT_SYMBOL vmlinux 0x5857b225ioread16_rep
+EXPORT_SYMBOL vmlinux 0x58604e44dalloc_iova_mem
+EXPORT_SYMBOL vmlinux 0x586054ffiov_iter_bvec
+EXPORT_SYMBOL vmlinux 0x586103beacpi_setup_gpe_for_wake
+EXPORT_SYMBOL vmlinux 0x586d9b5cpci_get_class
+EXPORT_SYMBOL vmlinux 0x587559d3vga_switcheroo_register_audio_client
+EXPORT_SYMBOL vmlinux 0x58782eablook5_nowait
+EXPORT_SYMBOL vmlinux 0x587c8d3fdown
+EXPORT_SYMBOL vmlinux 0x5880b16ablk_queue_resize_tags
+EXPORT_SYMBOL vmlinux 0x58ac24bdmiobus_register_board_info
+EXPORT_SYMBOL vmlinux 0x58bd4645cdev_close_many
+EXPORT_SYMBOL vmlinux 0x58bb73bc7match wildcard
+EXPORT_SYMBOL vmlinux 0x58c6ad2anetdev_upper_dev_unlink
+EXPORT_SYMBOL vmlinux 0x58d75642compart_mc_getsockopt
+EXPORT_SYMBOL vmlinux 0x58d88accfilemap_fdawait_range_keep_errors
+EXPORT_SYMBOL vmlinux 0x58dd1e36skb_add_rx_frag
+EXPORT_SYMBOL vmlinux 0x58e3306dbit_wait_io
+EXPORT_SYMBOL vmlinux 0x59054ae5__posix_acl_chmod
+EXPORT_SYMBOL vmlinux 0x590b9531security_sk_clone
+EXPORT_SYMBOL vmlinux 0x590cb646__ip4_datagram_connect
+EXPORT_SYMBOL vmlinux 0x590cddfb__blkdev_issue_discard
+EXPORT_SYMBOL vmlinux 0x590fde16memcg_kmem_enabled_key
+EXPORT_SYMBOL vmlinux 0x591199b2input_set_keycode
+EXPORT_SYMBOL vmlinux 0x593c1bac__x86 indirect thunk rbx
+EXPORT_SYMBOL vmlinux 0x5944d015__cachemode2pte_tbl
+EXPORT_SYMBOL vmlinux 0x5944f66acpi_put_table
+EXPORT_SYMBOL vmlinux 0x594bf15bioport_map
+EXPORT_SYMBOL vmlinux 0x5952d825filemap_fdatawrite
+EXPORT_SYMBOL vmlinux 0x5955580fnet_gso_segment
+EXPORT_SYMBOL vmlinux 0x5980cb0nf_log_unbind_pf
+EXPORT_SYMBOL vmlinux 0x598a600cnf_log_bind_pf
+EXPORT_SYMBOL vmlinux 0x5999b8010__nlmsg_put
+EXPORT_SYMBOL vmlinux 0x599c5262revalidate_disk
+EXPORT_SYMBOL vmlinux 0x59ac61e3proto_register
+EXPORT_SYMBOL vmlinux 0x59acc80dkmalloc_caches
+EXPORT_SYMBOL vmlinux 0x59bbbd2f__udp_disconnect
+EXPORT_SYMBOL vmlinux 0x59bc9609acpi_write_bit_register
+EXPORT_SYMBOL vmlinux 0x59be7ae1ns_capable
+EXPORT_SYMBOL vmlinux 0x59e5c10tn_tty_compat_ioctl_helper
+EXPORT_SYMBOL vmlinux 0x59ec4633vga_switcheroo_unregister_client
+EXPORT_SYMBOL vmlinux 0x59f93811scsi_device_lookup
+EXPORT_SYMBOL vmlinux 0x5a0b73d0zlib_deflateInit2
+EXPORT_SYMBOL vmlinux 0x5a20ec55sock_cmsg_send
+EXPORT_SYMBOL vmlinux 0x5a4896a8__put_user_2
+EXPORT_SYMBOL vmlinux 0x5a4d313efgl28mul_4k_ile
+EXPORT_SYMBOL vmlinux 0x5a54b443pci_save_state
+EXPORT_SYMBOL vmlinux 0x5a571c1fscsi_mode_sense
+EXPORT_SYMBOL vmlinux 0x5a573053nd_btt_version
+EXPORT_SYMBOL vmlinux 0x5a5a2271__cpu_online_mask
+EXPORT_SYMBOL vmlinux 0x5a61f888finet_frag_reasm_finish
+EXPORT_SYMBOL vmlinux 0x5a63419finet_add_protocol
+EXPORT_SYMBOL vmlinux 0x5a6aa7c3done_path_create
+EXPORT_SYMBOL vmlinux 0x5a717792buffer_migrate_page
+EXPORT_SYMBOL vmlinux 0x5a74dac4hmm_vma_fault
+EXPORT_SYMBOL vmlinux 0x5a879d25scsi_host_alloc
+EXPORT_SYMBOL vmlinux 0x5a8a0fc9skb_clone_sk
+EXPORT_SYMBOL vmlinux 0x5a8ae15azstd__initDDict
+EXPORT_SYMBOL vmlinux 0x5a921311strncpy
+EXPORT_SYMBOL vmlinux 0x5a7367cjb2_journal_start
+EXPORT_SYMBOL vmlinux 0x5a376a5acpi_install_fixed_event_handler
+EXPORT_SYMBOL vmlinux 0x5aae44229pm8606_osc_disable
+EXPORT_SYMBOL vmlinux 0x5aee91c76dm_kcopyd_copy
+EXPORT_SYMBOL vmlinux 0x5afee266jbd2_journal_init_dev
+EXPORT_SYMBOL vmlinux 0x5aff4177vme_lm_get
+EXPORT_SYMBOL vmlinux 0x5bf0b32fivfs_getattr_nosec
+EXPORT_SYMBOL vmlinux 0x5b56860cvmunmap
+EXPORT_SYMBOL vmlinux 0x5b5ad1e5dev_addr_add
+EXPORT_SYMBOL vmlinux 0x5b64abc6pci_bus_find_capability
+EXPORT_SYMBOL vmlinux 0x5b7334e5current_time
+EXPORT_SYMBOL vmlinux 0x5b78216ajbd2_journal_submit_inode_data_buffers
+EXPORT_SYMBOL vmlinux 0x5b827878__neigh_set_probe_once
+EXPORT_SYMBOL vmlinux 0x5b910ca5tcf_block_cb_priv
+EXPORT_SYMBOL vmlinux 0x5b9c808aacpi_get_possible_resources
+EXPORT_SYMBOL vmlinux 0x5ba44195freeze_bdev
+EXPORT_SYMBOL vmlinux 0x5bb2871csock_get_timestamp
+EXPORT_SYMBOL vmlinux 0x5bc10524printk_emit
+EXPORT_SYMBOL vmlinux 0x5bd7c749tcp_read_sock
+EXPORT_SYMBOL vmlinux 0x5be635bcrec32c_csum_stub
+EXPORT_SYMBOL vmlinux 0x5bed73c3__copy_from_iter_nocache
+EXPORT_SYMBOL vmlinux 0x5bf613202c_get_adapter
+EXPORT_SYMBOL vmlinux 0x5bf9e775pice_capability_read_word
+EXPORT_SYMBOL vmlinux 0x5bfbb1475sis_nd_dax
+EXPORT_SYMBOL vmlinux 0x5c017464kvasprintf
+EXPORT_SYMBOL vmlinux 0x5c0442fdacpi_gbl_FADT
+EXPORT_SYMBOL vmlinux 0x5c1a186econt_write_begin
+EXPORT_SYMBOL vmlinux 0x5c1a67a2d_prune_aliases
+EXPORT_SYMBOL vmlinux 0x5c1e5370skb_free_datagram

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+EXPORT_SYMBOL vmlinux 0x5e373fb4gf128mul_64k_bbe
+EXPORT_SYMBOL vmlinux 0x5e4aa99b__vfs_removeattr
+EXPORT_SYMBOL vmlinux 0x5e5e46d9errseq_check_and_advance
+EXPORT_SYMBOL vmlinux 0x5e5f10d9vlan_vids_del_by_dev
+EXPORT_SYMBOL vmlinux 0x5e662425vm_insertmixed_mkwrite
+EXPORT_SYMBOL vmlinux 0x5e7ecd0ammc_retune_pause
+EXPORT_SYMBOL vmlinux 0x5e8287f1freeze_super
+EXPORT_SYMBOL vmlinux 0x5e95b1cdecode_current_umask
+EXPORT_SYMBOL vmlinux 0x5e9a49292nv_max_phys_sects
+EXPORT_SYMBOL vmlinux 0x5eac9f0ctry_module_get
+EXPORT_SYMBOL vmlinux 0x5eb24829dm_shift_arg
+EXPORT_SYMBOL vmlinux 0x5eb3bf78md_cluster_ops
+EXPORT_SYMBOL vmlinux 0x5eb7d57fset_pages_array_wb
+EXPORT_SYMBOL vmlinux 0x5ed040b0pm_set_vt_switch
+EXPORT_SYMBOL vmlinux 0x5f005368kstrtou8
+EXPORT_SYMBOL vmlinux 0x5f098b2ain6addr_interface_local_allrouters
+EXPORT_SYMBOL vmlinux 0x5f1ac5faiov_iter_single_seg_count
+EXPORT_SYMBOL vmlinux 0x5f58ba01dev_mfd_add_devices
+EXPORT_SYMBOL vmlinux 0x5f59a3e1pciebus_to_resource
+EXPORT_SYMBOL vmlinux 0x5f894366address_space_init_once
+EXPORT_SYMBOL vmlinux 0x5f8ececd5blk_integrity_unregister
+EXPORT_SYMBOL vmlinux 0x5f9bfae8km_policy_expired
+EXPORT_SYMBOL vmlinux 0x5f723e5dev_uc_flush
+EXPORT_SYMBOL vmlinux 0x5f725b8cdev_alloc
+EXPORT_SYMBOL vmlinux 0x5fd00e6fso_build_data
+EXPORT_SYMBOL vmlinux 0x5fd5ac6dm_put_device
+EXPORT_SYMBOL vmlinux 0x5fde2fbskh_abort_seq_read
+EXPORT_SYMBOL vmlinux 0x5f56145inode_init_owner
+EXPORT_SYMBOL vmlinux 0x5f7401eadd_to_pipe
+EXPORT_SYMBOL vmlinux 0x6005c351zpool_has_pool
+EXPORT_SYMBOL vmlinux 0x600683d3do_unblank_screen
+EXPORT_SYMBOL vmlinux 0x601cb54drb_replace_node_cached
+EXPORT_SYMBOL vmlinux 0x601f665fdm_io_client_create
+EXPORT_SYMBOL vmlinux 0x602ed00dacpi_current_gpe_count
+EXPORT_SYMBOL vmlinux 0x6033d817scsicam_bios_param
+EXPORT_SYMBOL vmlinux 0x60352082register_inet6addr notifier
+EXPORT_SYMBOL vmlinux 0x6037ccf5mmc_can_secure_erase_trim
+EXPORT_SYMBOL vmlinux 0x603f6942radix_tree_next_chunk
+EXPORT_SYMBOL vmlinux 0x604316d8acpi_finish_gpe
+EXPORT_SYMBOL vmlinux 0x6046b83facpi_debug_print_raw
+EXPORT_SYMBOL vmlinux 0x605b4b13padata_remove_cpu
+EXPORT_SYMBOL vmlinux 0x605f96e3configfs_register_subsystem
+EXPORT_SYMBOL vmlinux 0x6088f48security_inode_getsectx
+EXPORT_SYMBOL vmlinux 0x608fcc11tcp_v4_mtu_reduced
+EXPORT_SYMBOL vmlinux 0x609de96inet_gro_complete
+EXPORT_SYMBOL vmlinux 0x609f1c7esys synchronize_net
+EXPORT_SYMBOL vmlinux 0x609f5b35ucss2_strnlen
+EXPORT_SYMBOL vmlinux 0x60a32ea9pm_power_off

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+EXPORT_SYMBOL vmlinux 0x6773edf5 skb_udp_tunnel_segment
+EXPORT_SYMBOL vmlinux 0x67a9c8c7 simple_pin_fs
+EXPORT_SYMBOL vmlinux 0x67b27e5c tty_std_termios
+EXPORT_SYMBOL vmlinux 0x67b78eb3 seq_hlist_next.rcu
+EXPORT_SYMBOL vmlinux 0x67b90995 reservation_object_copy_fences
+EXPORT_SYMBOL vmlinux 0x67d25f61 console_stop
+EXPORT_SYMBOL vmlinux 0x67db66ee devm_excon_unregister_notifier_all
+EXPORT_SYMBOL vmlinux 0x67e3dbf4 mfd_cell_enable
+EXPORT_SYMBOL vmlinux 0x67f90601 of_find_mipi_dsi_device_by_node
+EXPORT_SYMBOL vmlinux 0x6800089d tso_count_descs
+EXPORT_SYMBOL vmlinux 0x6817d463 cpu_to_acpiid
+EXPORT_SYMBOL vmlinux 0x6819ef0d_path
+EXPORT_SYMBOL vmlinux 0x681f551f is_acpi_device_node
+EXPORT_SYMBOL vmlinux 0x6832969e udp_set_csum
+EXPORT_SYMBOL vmlinux 0x6842153f blk.peek_request
+EXPORT_SYMBOL vmlinux 0x6848c5ed frame_vector_to_pages
+EXPORT_SYMBOL vmlinux 0x684ce17e dev_mfd_unregister
+EXPORT_SYMBOL vmlinux 0x685a7b47 set_bh_page
+EXPORT_SYMBOL vmlinux 0x686531c9 cgroups_sort
+EXPORT_SYMBOL vmlinux 0x686f7cb3 __bdi_put
+EXPORT_SYMBOL vmlinux 0x687b6a16 kdbgetsymval
+EXPORT_SYMBOL vmlinux 0x68902ebe netlink_ack
+EXPORT_SYMBOL vmlinux 0x689f370d frame_vector_to_pages
+EXPORT_SYMBOL vmlinux 0x68b75a76 mempool_create
+EXPORT_SYMBOL vmlinux 0x68d4027a acookie_ecn_ok
+EXPORT_SYMBOL vmlinux 0x69066dce __agp_generic_mask_memory
+EXPORT_SYMBOL vmlinux 0x690f07b5 proc_dointvec
+EXPORT_SYMBOL vmlinux 0x69145446 inet_csk_prepare_forced_close
+EXPORT_SYMBOL vmlinux 0x692b7196 mfnp_memset
+EXPORT_SYMBOL vmlinux 0x692d8f5a __mb_cache_entry_free
+EXPORT_SYMBOL vmlinux 0x693374f5 __sb_start_write
+EXPORT_SYMBOL vmlinux 0x6940f07b proc_dointvec
+EXPORT_SYMBOL vmlinux 0x6951c095 inet_csk_ready
+EXPORT_SYMBOL vmlinux 0x695f370d frame_vector_to_pages
+EXPORT_SYMBOL vmlinux 0x6965724c mempool_create
+EXPORT_SYMBOL vmlinux 0x696f9c16 __mb_cache_entry_free
+EXPORT_SYMBOL vmlinux 0x6971447a artc_month_days
+EXPORT_SYMBOL vmlinux 0x69748dc3 mpii_dsi_dcs_set_tear_scanline
+EXPORT_SYMBOL vmlinux 0x697bc546 cvfs_tmpfile
+EXPORT_SYMBOL vmlinux 0x6980628c scsci_init_io
+EXPORT_SYMBOL vmlinux 0x6988d0c acpucr_dr7
+EXPORT_SYMBOL vmlinux 0x6990ca7d diowrite16be
+EXPORT_SYMBOL vmlinux 0x69a67bd9 sk_dst_check
+EXPORT_SYMBOL vmlinux 0x69acdf38 memcpys
+EXPORT_SYMBOL vmlinux 0x69ad2f20 kms_touint
+EXPORT_SYMBOL vmlinux 0x69b7b7b7 _icmp_send
+EXPORT_SYMBOL vmlinux 0x69be334 dmasking_tagged
+EXPORT_SYMBOL vmlinux 0x69c05691 param_get_uullong
+EXPORT_SYMBOL vmlinux 0x69d38b8b up_write
+EXPORT_SYMBOL vmlinux 0x69daec747 devm_gpiod_get_array
+EXPORT_SYMBOL vmlinux 0x69e61657 _sb_start_write
+EXPORT_SYMBOL vmlinux 0x69ecc34genl_unregister_family
+EXPORT_SYMBOL vmlinux 0x69f24461__set_page_dirty_nobuffers
+EXPORT_SYMBOL vmlinux 0x69fbc0a2acpi_get_event_resources
+EXPORT_SYMBOL vmlinux 0x6a037cf1mempool_kfree
+EXPORT_SYMBOL vmlinux 0x6a14593dbio_integrity_alloc
+EXPORT_SYMBOL vmlinux 0x6a2ee0c5phy_resume
+EXPORT_SYMBOL vmlinux 0x6a362b03sock_no_bind
+EXPORT_SYMBOL vmlinux 0x6a48e0e9__xfrm_init_state
+EXPORT_SYMBOL vmlinux 0x6a552157install_exec_creds
+EXPORT_SYMBOL vmlinux 0x6a5ecb18unregister_module_notifier
+EXPORT_SYMBOL vmlinux 0x6a5f363sigprocmask
+EXPORT_SYMBOL vmlinux 0x6a606f55slash_name
+EXPORT_SYMBOL vmlinux 0x6a6d08dbmd_handle_request
+EXPORT_SYMBOL vmlinux 0x6a75bc7celv_rb_former_request
+EXPORT_SYMBOL vmlinux 0x6a7d4580dmaclg_uncharge
+EXPORT_SYMBOL vmlinux 0x6a8128e3alloc_cpu_mask_var
+EXPORT_SYMBOL vmlinux 0x6a892300node_newsize_ok
+EXPORT_SYMBOL vmlinux 0x6a939848inet_dgram_connect
+EXPORT_SYMBOL vmlinux 0x6a939848inet_dgram_connect
+EXPORT_SYMBOL vmlinux 0x6a9e0a91proc_dointvec_jiffies
+EXPORT_SYMBOL vmlinux 0x6ace973diowrite32be
+EXPORT_SYMBOL vmlinux 0x6acbfec5seq__lseek
+EXPORT_SYMBOL vmlinux 0x6ad85887acpi_enable_gpe
+EXPORT_SYMBOL vmlinux 0x6ada8640dma_fence_wait_timeout
+EXPORT_SYMBOL vmlinux 0x6add5c9admi_find_device
+EXPORT_SYMBOL vmlinux 0x6adedaacvme_register_error_handler
+EXPORT_SYMBOL vmlinux 0x6ae0a81proc_dointvec_jiffies
+EXPORT_SYMBOL vmlinux 0x6ae5ab11fserseq_set
+EXPORT_SYMBOL vmlinux 0x6aef4ac4zlib_deflateReset
+EXPORT_SYMBOL vmlinux 0x6af14991twl6040_reg_read
+EXPORT_SYMBOL vmlinux 0x6b0a3963seq_read
+EXPORT_SYMBOL vmlinux 0x6b1230a0load_nls_default
+EXPORT_SYMBOL vmlinux 0x6b1b67d3_bdevname
+EXPORT_SYMBOL vmlinux 0x6b2515e0touchscreen_parse_properties
+EXPORT_SYMBOL vmlinux 0x6b2dc060dump_stack
+EXPORT_SYMBOL vmlinux 0x6b46d923cpu_info
+EXPORT_SYMBOL vmlinux 0x6b510f02proc_doulongvec_ms_jiffies_minmax
+EXPORT_SYMBOL vmlinux 0x6b55255e_hw_addr_sync_dev
+EXPORT_SYMBOL vmlinux 0x6b640864nla_strlcpy
+EXPORT_SYMBOL vmlinux 0x6b6a6b622node_data
+EXPORT_SYMBOL vmlinux 0x6bbfc71cinet_release
+EXPORT_SYMBOL vmlinux 0x6bc3fbc0_unregister_chrdev
+EXPORT_SYMBOL vmlinux 0x6bc5f026cderm_ioctl
+EXPORT_SYMBOL vmlinux 0x6bce7f58_module_put_and_exit
+EXPORT_SYMBOL vmlinux 0x6bdcfd09qdisc_class_hash_remove
+EXPORT_SYMBOL vmlinux 0x6be3f432_put_user_ns
+EXPORT_SYMBOL vmlinux 0x6bf75ac0give_up_console
+EXPORT_SYMBOL vmlinux 0x6bfb1bdds_k_page_frag_refill
+EXPORT_SYMBOL vmlinux 0x6c09ee05pci_get_device
+EXPORT_SYMBOL vmlinux 0x6eeea81sock_register
+EXPORT_SYMBOL vmlinux 0x6efec2dmount_bdev
+EXPORT_SYMBOL vmlinux 0x6f0a58b2serio_open
+EXPORT_SYMBOL vmlinux 0x6f0d7927blk_queue_max_discard_sectors
+EXPORT_SYMBOL vmlinux 0x6f0c7944tty_port_free_xmit_buf
+EXPORT_SYMBOL vmlinux 0x6f0d21f6nvdimm_namespace_capacity
+EXPORT_SYMBOL vmlinux 0x6f1f2aamoamiobus_free
+EXPORT_SYMBOL vmlinux 0x6f2ee23dev_get_by_index_rcu
+EXPORT_SYMBOL vmlinux 0x6f3be8f6mdio_device_create
+EXPORT_SYMBOL vmlinux 0x6f37a94__set_page_dirty_buffers
+EXPORT_SYMBOL vmlinux 0x6f492eeppp_dev_name
+EXPORT_SYMBOL vmlinux 0x6f533e31nla_put_64bit
+EXPORT_SYMBOL vmlinux 0x6f556bdbcapi_get_gpe_device
+EXPORT_SYMBOL vmlinux 0x6f6246phy_register_fixup
+EXPORT_SYMBOL vmlinux 0x6f6b29fapci_set_master
+EXPORT_SYMBOL vmlinux 0x6f993f70mmc_add_host
+EXPORT_SYMBOL vmlinux 0x6f99de60key_instantiate_and_link
+EXPORT_SYMBOL vmlinux 0x6fa14d68vfs_mknod
+EXPORT_SYMBOL vmlinux 0x6f9e30emmc_start_blkops
+EXPORT_SYMBOL vmlinux 0x6fcb87a1touch_softlockup_watchdog
+EXPORT_SYMBOL vmlinux 0x6fe3399tontd_btt
+EXPORT_SYMBOL vmlinux 0x6fe2039acpi_write
+EXPORT_SYMBOL vmlinux 0x6f0037osoft_cursor
+EXPORT_SYMBOL vmlinux 0x6f0f026pci_add_resource_offset
+EXPORT_SYMBOL vmlinux 0x6f933br6_lookup
+EXPORT_SYMBOL vmlinux 0x70028920tcp_md5_do_add
+EXPORT_SYMBOL vmlinux 0x700af5d8mmce_hw_reset
+EXPORT_SYMBOL vmlinux 0x7012e2e8iwhandler_get_thrspy
+EXPORT_SYMBOL vmlinux 0x7023ea8unregister_acpi_notifier
+EXPORT_SYMBOL vmlinux 0x704be03kmem_cache_alloc
+EXPORT_SYMBOL vmlinux 0x7045b9bnetif_set_xps_queue
+EXPORT_SYMBOL vmlinux 0x7051371cskb_copy
+EXPORT_SYMBOL vmlinux 0x70523a7a__cond_resched_softirq
+EXPORT_SYMBOL vmlinux 0x7054a3e4request_dma
+EXPORT_SYMBOL vmlinux 0x705620ccscsi_cmd_ioctl
+EXPORT_SYMBOL vmlinux 0x7074928alloc_anon_inode
+EXPORT_SYMBOL vmlinux 0x7075937eproc_dointvec_ms_jiffies
+EXPORT_SYMBOL vmlinux 0x707f43f6__ctzdi2
+EXPORT_SYMBOL vmlinux 0x7086d34fddev_me_del_global
+EXPORT_SYMBOL vmlinux 0x709cd62await_for_completion_interruptible_timeout
+EXPORT_SYMBOL vmlinux 0x70a721e7fbon_set_bitops
+EXPORT_SYMBOL vmlinux 0x70d8ab82acpi_acquire_global_lock
+EXPORT_SYMBOL vmlinux 0x70da4eb6__inode_sub_bytes
+EXPORT_SYMBOL vmlinux 0x70e1edafneigh_lookup
+EXPORT_SYMBOL vmlinux 0x70e8caebcbnlee_notify
+EXPORT_SYMBOL vmlinux 0x70f4d9fa__wait_on_buffer
+EXPORT_SYMBOL vmlinux 0x70f96f6ahandle_edge_irq
+EXPORT_SYMBOL vmlinux 0x70f9688glob_match
+EXPORT_SYMBOL vmlinux 0x7105ff8capp_create_memory
+EXPORT_SYMBOL vmlinux 0x71138b71nla_put
+EXPORT_SYMBOL vmlinux 0x711c61f8scsi_device_lookup_by_target
+EXPORT_SYMBOL vmlinux 0x711f1f91blbk_init_queue_node
+EXPORT_SYMBOL vmlinux 0x7129e5f8hex_asc
+EXPORT_SYMBOL vmlinux 0x712c2c48cdrom_get_last_written
+EXPORT_SYMBOL vmlinux 0x7134a0f7dblk_put_request
+EXPORT_SYMBOL vmlinux 0x714d0ed7xfmr_prepare_input
+EXPORT_SYMBOL vmlinux 0x714f7508udp_gro_receive
+EXPORT_SYMBOL vmlinux 0x716ef5cedget_parent
+EXPORT_SYMBOL vmlinux 0x71711212coverflowgid
+EXPORT_SYMBOL vmlinux 0x719070b8_dquot_transfer
+EXPORT_SYMBOL vmlinux 0x71a50dbcblkldev
+EXPORT_SYMBOL vmlinux 0x71a672efdmam_pool_destroy
+EXPORT_SYMBOL vmlinux 0x71bae78vmme_erase
+EXPORT_SYMBOL vmlinux 0x71cb0d9bdconfig_group_find_item
+EXPORT_SYMBOL vmlinux 0x71cd66eanigh_update
+EXPORT_SYMBOL vmlinux 0x71d2f9c0param_set_charp
+EXPORT_SYMBOL vmlinux 0x71e0ca2dfnxm6_rcv_tnl
+EXPORT_SYMBOL vmlinux 0x71f2ad6inet_del_protoco1
+EXPORT_SYMBOL vmlinux 0x720280c5nf_getsockopt
+EXPORT_SYMBOL vmlinux 0x721e278baipv4_specific
+EXPORT_SYMBOL vmlinux 0x722c1b7b_cpushp_remove_state_cpuslocked
+EXPORT_SYMBOL vmlinux 0x7234dedbddev_change_flags
+EXPORT_SYMBOL vmlinux 0x7245c54hblkmq_requeue_request
+EXPORT_SYMBOL vmlinux 0x724dadbvme_bus_num
+EXPORT_SYMBOL vmlinux 0x724dd63_brelse
+EXPORT_SYMBOL vmlinux 0x725f76et_monotonic_coarse64
+EXPORT_SYMBOL vmlinux 0x727e6e20alloc_xenballooned_pages
+EXPORT_SYMBOL vmlinux 0x729ce79deget_random_64
+EXPORT_SYMBOL vmlinux 0x729fa01pci_find_bus
+EXPORT_SYMBOL vmlinux 0x72a990b6__skb_checksum_complete_head
+EXPORT_SYMBOL vmlinux 0x72a98fdcopy_user_generic_unrolled
+EXPORT_SYMBOL vmlinux 0x72aa9b0csset_binfmt
+EXPORT_SYMBOL vmlinux 0x72c4b3d4free_dma
+EXPORT_SYMBOL vmlinux 0x72c9d287default_grn
+EXPORT_SYMBOL vmlinux 0x72cc119c3netlib_calipso_ops_register
+EXPORT_SYMBOL vmlinux 0x72cad4is_badinode
+EXPORT_SYMBOL vmlinux 0x72e663e5raw_read_unlock_bh
+EXPORT_SYMBOL vmlinux 0x72ea7b2dscsi_device_type
+EXPORT_SYMBOL vmlinux 0x72fd7837udp_lib_getsockopt
+EXPORT_SYMBOL vmlinux 0x7315a4e9twl6030_mmccard_detect_config
+EXPORT_SYMBOL vmlinux 0x732662c4dmam_pool_create
+EXPORT_SYMBOL vmlinux 0x7326ab78tty_wait_until_sent
+EXPORT_SYMBOL vmlinux 0x73382c5ectf_classify
+EXPORT_SYMBOL vmlinux 0x734e37c9rdma_dim
+EXPORT_SYMBOL vmlinux 0x735a0bd5native_io_delay
+EXPORT_SYMBOL vmlinux 0x737159b1release_sock
+EXPORT_SYMBOL vmlinux 0x738cf591pcix_set_mmrbc
+EXPORT_SYMBOL vmlinux 0x738f7967da903x_query_status
+EXPORT_SYMBOL vmlinux 0x73963109tcp_setsockopt
+EXPORT_SYMBOL vmlinux 0x73988634xxh32_digest
+EXPORT_SYMBOL vmlinux 0x73b64564jbd2_journal_inode_ranged_wait
+EXPORT_SYMBOL vmlinux 0x73bb8a33blk_mq_init_allocated_queue
+EXPORT_SYMBOL vmlinux 0x73c84560ex_handler_ext
+EXPORT_SYMBOL vmlinux 0x73d4c9e1sock_rfree
+EXPORT_SYMBOL vmlinux 0x73d9o2b0call_fib_notifiers
+EXPORT_SYMBOL vmlinux 0x73dc6eddseq_puts
+EXPORT_SYMBOL vmlinux 0x73dd54ebirq_fpu_usable
+EXPORT_SYMBOL vmlinux 0x73e82896seq_pad
+EXPORT_SYMBOL vmlinux 0x73e92a4bfiee_ns_capable
+EXPORT_SYMBOL vmlinux 0x73f3d437elv_register_queue
+EXPORT_SYMBOL vmlinux 0x73fbc279path_has_submounts
+EXPORT_SYMBOL vmlinux 0x740a1b95reserve_evntsel_nmi
+EXPORT_SYMBOL vmlinux 0x7410aba2streplace
+EXPORT_SYMBOL vmlinux 0x7412ed5bkvfree_sensitive
+EXPORT_SYMBOL vmlinux 0x7416c34acpuhp_setup_state
+EXPORT_SYMBOL vmlinux 0x74189e98do_trace_rdpmc
+EXPORT_SYMBOL vmlinux 0x742578a5wait_for_random_bytes
+EXPORT_SYMBOL vmlinux 0x743f0472_alloc_disk_node
+EXPORT_SYMBOL vmlinux 0x743f15a4max8998_update_reg
+EXPORT_SYMBOL vmlinux 0x744a5e96xfm4_prepare_output
+EXPORT_SYMBOL vmlinux 0x744cc231cancel_delayed_work_sync
+EXPORT_SYMBOL vmlinux 0x7457b04dinode_needs_sync
+EXPORT_SYMBOL vmlinux 0x745ae3e6genl_notify
+EXPORT_SYMBOL vmlinux 0x746a6185simple_unlink
+EXPORT_SYMBOL vmlinux 0x746d8646set_page_dirty_lock
+EXPORT_SYMBOL vmlinux 0x747195fohdmi_vendor_infoframe_init
+EXPORT_SYMBOL vmlinux 0x747429a4devm_devfreq_remove_device
+EXPORT_SYMBOL vmlinux 0x747e741eata_std_end_eh
+EXPORT_SYMBOL vmlinux 0x7485e15eunregister_chrdev_region
+EXPORT_SYMBOL vmlinux 0x749835c1mpage_readpage
+EXPORT_SYMBOL vmlinux 0x74a460aa__put_cred
+EXPORT_SYMBOL vmlinux 0x74c1349_bsw_hweight32
+EXPORT_SYMBOL vmlinux 0x74c18544skb_flow_dissector_init
+EXPORT_SYMBOL vmlinux 0x74c677b6m_i_miter_next
+EXPORT_SYMBOL vmlinux 0x74c7646bblk_rq_map_integrity_sg
+EXPORT_SYMBOL vmlinux 0x74c86df4sock_no_listen
+EXPORT_SYMBOL vmlinux 0x74cc2bdddimentary_key_instantiate
+EXPORT_SYMBOL vmlinux 0x74d04bffxfm_input
+EXPORT_SYMBOL vmlinux 0x74d7b9d0netlink_set_err
+EXPORT_SYMBOL vmlinux 0x74e5ff1adcpv6_encap_enable
+EXPORT_SYMBOL vmlinux 0x74e68afdpool_register_driver
+EXPORT_SYMBOL vmlinux 0x74fdee31ip_setsockopt
+EXPORT_SYMBOL vmlinux 0x74fe8632dim_park_on_top
+EXPORT_SYMBOL vmlinux 0x75108d24km_is_alive
+EXPORT_SYMBOL vmlinux 0x79068fdaacpi_install_method
+EXPORT_SYMBOL vmlinux 0x79242048netdev_features_change
+EXPORT_SYMBOL vmlinux 0x7932073enetdev_reset_tc
+EXPORT_SYMBOL vmlinux 0x794f66dttty_driver_flush_buffer
+EXPORT_SYMBOL vmlinux 0x79572a1ado_trace_read_msr
+EXPORT_SYMBOL vmlinux 0x79675aceprepare_to_swap_event
+EXPORT_SYMBOL vmlinux 0x79666bedtw6040_get_syscl
+EXPORT_SYMBOL vmlinux 0x7984eeefcketty_update
+EXPORT_SYMBOL vmlinux 0x7989191adquot_destroy
+EXPORT_SYMBOL vmlinux 0x799a072inet_ioctl
+EXPORT_SYMBOL vmlinux 0x799a4a6bxfm_input_resume
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+EXPORT_SYMBOL vmlinux 0x79aa4a2get_random_bytes
+EXPORT_SYMBOL vmlinux 0x79ba83733register_netdev
+EXPORT_SYMBOL vmlinux 0x79cc5751security_inode_copy_up
+EXPORT_SYMBOL vmlinux 0x79df06c18block_commit_write
+EXPORT_SYMBOL vmlinux 0x79e76126get_cpu_entry_area
+EXPORT_SYMBOL vmlinux 0x79f64516register_console
+EXPORT_SYMBOL vmlinux 0x7a064f51phy_loopback
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+EXPORT_SYMBOL vmlinux 0x7a2379d7input_alloc_absinfo
+EXPORT_SYMBOL vmlinux 0x7a2a77b4cpu_number
+EXPORT_SYMBOL vmlinux 0x7a323684rename_lock
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+EXPORT_SYMBOL vmlinux 0x7a3d01d5clear_nlink
+EXPORT_SYMBOL vmlinux 0x7a3ede02vga_con
+EXPORT_SYMBOL vmlinux 0x7a4497dbzfree
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+EXPORT_SYMBOL vmlinux 0x7a6c7edc_day_settimeofday64
+EXPORT_SYMBOL vmlinux 0x7a6e530bsecurity_unix_may_send
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+EXPORT_SYMBOL vmlinux 0x7adb05b9.pid
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+EXPORT_SYMBOL vmlinux 0xab9e2f4f__task_pid_nr ns
+EXPORT_SYMBOL vmlinux 0xabaa7f7id_alloc_name
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+EXPORT_SYMBOL vmlinux 0xb17cd408blk_put_queue
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+EXPORT_SYMBOL vmlinux 0xd25d474console_blank_hook
+EXPORT_SYMBOL vmlinux 0xd272060agp_generic_enable
+EXPORT_SYMBOL vmlinux 0xd27a03d6free_task
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+EXPORT_SYMBOL vmlinux 0xd2b09ce5__kmalloc
+EXPORT_SYMBOL vmlinux 0xd2b4f018nvmm_get_l2p_tbl
+EXPORT_SYMBOL vmlinux 0xd2b66db1inet_proto_csum_replace4
+EXPORT_SYMBOL vmlinux 0xd2c6624dnla_validate
+EXPORT_SYMBOL vmlinux 0xd2e925bbbio_split
+EXPORT_SYMBOL vmlinux 0xd2d4694mdio_device_register
+EXPORT_SYMBOL vmlinux 0xd2d976d3bio_init
+EXPORT_SYMBOL vmlinux 0xd2d976d3bio_init
+EXPORT_SYMBOL vmlinux 0xd2e108register_netdevicerotify
+EXPORT_SYMBOL vmlinux 0xd2ebbc2fmdiobus_alloc_size
+EXPORT_SYMBOL vmlinux 0xd2f721dpnp_possible_config
+EXPORT_SYMBOL vmlinux 0xd3001ccgenvphy_restart_aneg
+EXPORT_SYMBOL vmlinux 0xd30200admigrate_page
+EXPORT_SYMBOL vmlinux 0xd32e01f4xfrm_state_check_expire
+EXPORT_SYMBOL vmlinux 0xd32ff0c4dev_set_group
+EXPORT_SYMBOL vmlinux 0xd3358cf3configfs_depend_item
+EXPORT_SYMBOL vmlinux 0xd343d1uart_remove_one_port
+EXPORT_SYMBOL vmlinux 0xd346a579blk_mq_can_queue
+EXPORT_SYMBOL vmlinux 0xd36c3d59prandom_bytes_state
+EXPORT_SYMBOL vmlinux 0xd3894dcawait_on_page_bit_killable
+EXPORT_SYMBOL vmlinux 0xd38cd261__default_kernel_nte_mask
+EXPORT_SYMBOL vmlinux 0xd39f7192 wake_up_process
+EXPORT_SYMBOL vmlinux 0xda3acd78 mount_ns
+EXPORT_SYMBOL vmlinux 0xda7f66a simple_getattr
+EXPORT_SYMBOL vmlinux 0xdb8387 ckey_reject_and_link
+EXPORT_SYMBOL vmlinux 0xdaeb94 bbioiset_free
+EXPORT_SYMBOL vmlinux 0xdf61f9 send_sig
+EXPORT_SYMBOL vmlinux 0xda4e5888 adev_change_carrier
+EXPORT_SYMBOL vmlinux 0xda4e46fc4 fsckrypt_init_context
+EXPORT_SYMBOL vmlinux 0xda4139ad1 blk_fetch_request
+EXPORT_SYMBOL vmlinux 0xda4150e80 blkdev_issue_write_same
+EXPORT_SYMBOL vmlinux 0xda426474 fsckrypt_d_ops
+EXPORT_SYMBOL vmlinux 0xda42aa101 agp_enable
+EXPORT_SYMBOL vmlinux 0xda42d8480 tcp prot
+EXPORT_SYMBOL vmlinux 0xda44bb2d7 dev_remove_pack
+EXPORT_SYMBOL vmlinux 0xda44e77d7 dadd timer
+EXPORT_SYMBOL vmlinux 0xda457d434 blk_execute_rq
+EXPORT_SYMBOL vmlinux 0xda459e04d4 sgl_free_order
+EXPORT_SYMBOL vmlinux 0xda45cc6ca taxi2hex
+EXPORT_SYMBOL vmlinux 0xda46dbd0e tparam_set_long
+EXPORT_SYMBOL vmlinux 0xda47357a9 blk_free_tags
+EXPORT_SYMBOL vmlinux 0xda47ebadb register_cdrom
+EXPORT_SYMBOL vmlinux 0xda4835ef8 dmi_check_system
+EXPORT_SYMBOL vmlinux 0xda490f611 generic_end_io_acct
+EXPORT_SYMBOL vmlinux 0xda49975d7 sdev_enable_disk_events
+EXPORT_SYMBOL vmlinux 0xda4a74e16 radix tree_tag get
+EXPORT_SYMBOL vmlinux 0xda4bb4a82 inet6addr_validator_notifier_call_chain
+EXPORT_SYMBOL vmlinux 0xda4c4a000 pcie relaxed ordering enabled
+EXPORT_SYMBOL vmlinux 0xda4cb753 kill_pgrp
+EXPORT_SYMBOL vmlinux 0xda4d56411 ddevm_nvmem_cell_put
+EXPORT_SYMBOL vmlinux 0xda4db3e98 mbcache_entry_find_first
+EXPORT_SYMBOL vmlinux 0xda4fa5c30 finish_wait
+EXPORT_SYMBOL vmlinux 0xda4fe433 toutd_dump skip
+EXPORT_SYMBOL vmlinux 0xda50f6f48 acpi detach_data
+EXPORT_SYMBOL vmlinux 0xda511be3 tcf_em_tree_validate
+EXPORT_SYMBOL vmlinux 0xda5242f ffnf_register_net_hooks
+EXPORT_SYMBOL vmlinux 0xda5263820 mbcache_destroy
+EXPORT_SYMBOL vmlinux 0xda53cf1c2 datagram poll
+EXPORT_SYMBOL vmlinux 0xda54a7662 skb split
+EXPORT_SYMBOL vmlinux 0xda55c62 dcinet_csk reqsk_queue_drop
+EXPORT_SYMBOL vmlinux 0xda57ff8 dcdma fence_free
+EXPORT_SYMBOL vmlinux 0xda587639 tcp v4 do rcv
+EXPORT_SYMBOL vmlinux 0xda5a6165 ddevm_extcon_register_notifier_all
+EXPORT_SYMBOL vmlinux 0xda5af55 aboot cpu data
+EXPORT_SYMBOL vmlinux 0xda5db1893 na append
+EXPORT_SYMBOL vmlinux 0xda5e08a acqdisc warn_nonwc
+EXPORT_SYMBOL vmlinux 0xda5fc9d63 ip4 datagram connect
+EXPORT_SYMBOL vmlinux 0xda60736e ccf1f28 mul_free 64k
+EXPORT_SYMBOL vmlinux 0xda61299c1 proto unregister
+EXPORT_SYMBOL vmlinux 0x81f148exfrm4_svc
+EXPORT_SYMBOL vmlinux 0x82c628facpi_processor_notify_smm
+EXPORT_SYMBOL vmlinux 0x82e6e0ed_lookup
+EXPORT_SYMBOL vmlinux 0x840b8e7net6_csk_route_req
+EXPORT_SYMBOL vmlinux 0x89da37fmovable_zone
+EXPORT_SYMBOL vmlinux 0x89db77duart_match_port
+EXPORT_SYMBOL vmlinux 0x8a25efunregister_md_personality
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+EXPORT_SYMBOL vmlinux 0x8de264fdfst_destroy
+EXPORT_SYMBOL vmlinux 0x8ded085radix_tree_maybe_preload
+EXPORT_SYMBOL vmlinux 0x8e484fregister_chrdev_region
+EXPORT_SYMBOL vmlinux 0x8e6317ecall_usermodehelper_setup
+EXPORT_SYMBOL vmlinux 0x90043b5vm_zone_stat
+EXPORT_SYMBOL vmlinux 0x9091363acpi_install_notify_handler
+EXPORT_SYMBOL vmlinux 0x90b42fascsi_register
+EXPORT_SYMBOL vmlinux 0x90c5285scm_detach_fds
+EXPORT_SYMBOL vmlinux 0x9305951inf_log_set
+EXPORT_SYMBOL vmlinux 0x93fad89fb_set_cmap
+EXPORT_SYMBOL vmlinux 0x94322e7acpi_evaluate_reference
+EXPORT_SYMBOL vmlinux 0x9540b21simple_dir_inode_operations
+EXPORT_SYMBOL vmlinux 0x9716c4 xen_arch_register_cpu
+EXPORT_SYMBOL vmlinux 0x9782073xfm_policy_unregister_afinfo
+EXPORT_SYMBOL vmlinux 0x979a547__x86indirect_thunk_rdi
+EXPORT_SYMBOL vmlinux 0x985dc99mempool_free_pages
+EXPORT_SYMBOL vmlinux 0x9906572pci_stop_and_remove_bus_device
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+EXPORT_SYMBOL vmlinux 0x99e0b8f6tty_do_resize
+EXPORT_SYMBOL vmlinux 0x9a87106nd_namespace_blk_validate
+EXPORT_SYMBOL vmlinux 0x9ada3emigrate_page_states
+EXPORT_SYMBOL vmlinux 0x9ae8e14nd_pfn_probe
+EXPORT_SYMBOL vmlinux 0x9bcd8akey_task_permission
+EXPORT_SYMBOL vmlinux 0x9b7e4aa9mipidsi_shutdown_peripheral
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+EXPORT_SYMBOL vmlinux 0x9d47d32blmkq_run_hw_queues
+EXPORT_SYMBOL vmlinux 0x9d8fd16register_restart_handler
+EXPORT_SYMBOL vmlinux 0x9ed5b02__page_frag_cache_drain
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+EXPORT_SYMBOL vmlinux 0x9f1c2fxfm6_input_addr
+EXPORT_SYMBOL vmlinux 0x9f4f53cdev_trans_start
+EXPORT_SYMBOL vmlinux 0xda0d71cjd2_journal_stop
+EXPORT_SYMBOL vmlinux 0xda0e9af7cdrom_modemode_sense
+EXPORT_SYMBOL vmlinux 0xda1d117bhsiphash_4u32
+EXPORT_SYMBOL vmlinux 0xda195b6__tcf_idr_release
+EXPORT_SYMBOL vmlinux 0xda16f31__d_drop
+EXPORT_SYMBOL vmlinux 0xda294fawiotlb_sync_sg_for_cpu
+EXPORT_SYMBOL vmlinux 0xda295fd5pci_write_config_dword
+EXPORT_SYMBOL vmlinux 0xda2db28flush_old_exec
+EXPORT_SYMBOL vmunix 0xde6151dbtcp_memory_allocated
+EXPORT_SYMBOL vmunix 0xde67481fmmc_card_is_blockaddr
+EXPORT_SYMBOL vmunix 0xde7426a9vme_irq_request
+EXPORT_SYMBOL vmunix 0xde928090agp_collect_device_status
+EXPORT_SYMBOL vmunix 0xde9360batotalram_pages
+EXPORT_SYMBOL vmunix 0xde99c970serial8250_set_isa_configurator
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+EXPORT_SYMBOL vmunix 0xedf5877net_accept
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+EXPORT_SYMBOL vmunix 0xdf54a8f7netlink_unregister_notifier
+EXPORT_SYMBOL vmunix 0xdf566a59__x86_indirectThunk_r9
+EXPORT_SYMBOL vmunix 0xdf60cc27_print_symbol
+EXPORT_SYMBOL vmunix 0xdf612d5dsopnet_data
+EXPORT_SYMBOL vmunix 0xdf7248a2tcp_enter_quickack_mode
+EXPORT_SYMBOL vmunix 0xdf81d54d_rehash
+EXPORT_SYMBOL vmunix 0xdf8c695a__ndelay
+EXPORT_SYMBOL vmunix 0xdf929370fs_overflowgid
+EXPORT_SYMBOL vmunix 0xdfbdc84watchdog_unregister_governor
+EXPORT_SYMBOL vmunix 0xdff46c53configfs_depend_item_unlocked
+EXPORT_SYMBOL vmunix 0xdff00865fib_notifier_ops_unregister
+EXPORT_SYMBOL vmunix 0xdf929370fs_overflowgid
+EXPORT_SYMBOL vmunix 0xdf905e5vmemem_free
+EXPORT_SYMBOL vmunix 0xe00043bbsock_cfree_s
+EXPORT_SYMBOL vmunix 0xe01c9917reservation_object_add_excl_fence
+EXPORT_SYMBOL vmunix 0xe01fe70dmccione_recovery
+EXPORT_SYMBOL vmunix 0xe02ba436trace_print_hex_seq
+EXPORT_SYMBOL vmunix 0xe03525afpci_msix_vec_count
+EXPORT_SYMBOL vmunix 0xe041f449jbd2_journal_restart
+EXPORT_SYMBOL vmunix 0xe04d9ffdpnp_activate_dev
+EXPORT_SYMBOL vmunix 0xe059e0cbxfm_alloc_spi
+EXPORT_SYMBOL vmunix 0xe06ef8eis__nd_pfn
+EXPORT_SYMBOL vmunix 0xe075d6ebiter_div_u64_rem
+EXPORT_SYMBOL vmunix 0xe07e5f44acpi_reconfig_notifier_unregister
+EXPORT_SYMBOL vmunix 0xe0875eb1kstrtoool
+EXPORT_SYMBOL vmunix 0xe08fe6b0netif_napi_add
+EXPORT_SYMBOL vmunix 0xe0ac8bd2acpi_bus_generate_netlink_event
+EXPORT_SYMBOL vmunix 0xe0b13336argv_free
+EXPORT_SYMBOL vmunix 0xe0b9524dfpccpu_counter_set
+EXPORT_SYMBOL vmunix 0xe0c11812rtnl_notify
+EXPORT_SYMBOL vmlinux 0xe2ffef3scsi_req_init
+EXPORT_SYMBOL vmlinux 0xe317764djiffies_to timespec64
+EXPORT_SYMBOL vmlinux 0xe3193f22devfreq_monitor_suspend
+EXPORT_SYMBOL vmlinux 0xe319eb24acpi_pci_osc_control_set
+EXPORT_SYMBOL vmlinux 0xe32075a8__pskb_trim
+EXPORT_SYMBOL vmlinux 0xe3313e2avlنان_vid_del
+EXPORT_SYMBOL vmlinux 0xe336f4c5set_anon_super
+EXPORT_SYMBOL vmlinux 0xe35da477mdibus_get phy
+EXPORT_SYMBOL vmlinux 0xe3696211tcf_idr_check
+EXPORT_SYMBOL vmlinux 0xe386ae3afbc Con_rotate_ccw
+EXPORT_SYMBOL vmlinux 0xe39e0b57tcp_v4_send_check
+EXPORT_SYMBOL vmlinux 0xe3a53f4csort
+EXPORT_SYMBOL vmlinux 0xe3b15f01pcie_get_minimum_link
+EXPORT_SYMBOL vmlinux 0xe3d8a0fswake_up_all
+EXPORT_SYMBOL vmlinux 0xe3d6f284fb_find_mode cvt
+EXPORT_SYMBOL vmlinux 0xe3f41aflock_rename
+EXPORT_SYMBOL vmlinux 0xe3f8e9__x86 indirect thunk_rbp
+EXPORT_SYMBOL vmlinux 0xe40b4bfp_output_wakeup
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+EXPORT_SYMBOL vmlinux 0xe42e111esock_no_accept
+EXPORT_SYMBOL vmlinux 0xe43ac5c7finish_swait
+EXPORT_SYMBOL vmlinux 0xe441e95arefcount_dec_not_one
+EXPORT_SYMBOL vmlinux 0xe44aa7aedo_splice_direct
+EXPORT_SYMBOL vmlinux 0xe452b05ekmemdup_nul
+EXPORT_SYMBOL vmlinux 0xe46bb62bxfrm_state_delete
+EXPORT_SYMBOL vmlinux 0xe4787ab6par4m_array_ops
+EXPORT_SYMBOL vmlinux 0xe484e35fioread32
+EXPORT_SYMBOL vmlinux 0xe48c9440proc_doulongvec_minmax
+EXPORT_SYMBOL vmlinux 0xe4bf7fcd__lock_buffer
+EXPORT_SYMBOL vmlinux 0xe4b2dqqfbi2c_verify_client
+EXPORT_SYMBOL vmlinux 0xe4dace883compa4_tcp_getsockopt
+EXPORT_SYMBOL vmlinux 0xe4e8078abitmap_to u32array
+EXPORT_SYMBOL vmlinux 0xe4f0d583swake_up_locked
+EXPORT_SYMBOL vmlinux 0xe4f742fbin4it_timer_key
+EXPORT_SYMBOL vmlinux 0xe4fbeb6fgeneric_file_fsync
+EXPORT_SYMBOL vmlinux 0xe523ad75synchronize_irq
+EXPORT_SYMBOL vmlinux 0xe52be699_sock_cmsg_send
+EXPORT_SYMBOL vmlinux 0xe530d757acpi_clear_gpe
+EXPORT_SYMBOL vmlinux 0xe534b824skb_copy_bits
+EXPORT_SYMBOL vmlinux 0xe539d4f5get_user_pages_remote
+EXPORT_SYMBOL vmlinux 0xe5505b18fb_get_mode
+EXPORT_SYMBOL vmlinux 0xe5579d66devfreq_unregister_opp_notifier
+EXPORT_SYMBOL vmlinux 0xe56de9ecdnal_iieee_notify
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+EXPORT_SYMBOL vmlinux 0xe590dea3sk_busy_loop_end
+EXPORT_SYMBOL vmlinux 0xe5a0405a net_frags_exit_net
+EXPORT_SYMBOL vmlinux 0xe5bb735f jiffies64_to_nsecs
+EXPORT_SYMBOL vmlinux 0xe5bc9a53 slhc_free
+EXPORT_SYMBOL vmlinux 0xe5c6ae21 mempool_free
+EXPORT_SYMBOL vmlinux 0xe5c78a99 do_blank_screen
+EXPORT_SYMBOL vmlinux 0xe5d76b36 journal_flush
+EXPORT_SYMBOL vmlinux 0xe5d9f8e6 md_wait_for_blocked_rdev
+EXPORT_SYMBOL vmlinux 0xe5de40c xfrm4_protocol_register
+EXPORT_SYMBOL vmlinux 0xe5fe32b2 dev_mc_unsync
+EXPORT_SYMBOL vmlinux 0xe60fc10cpadata_start
+EXPORT_SYMBOL vmlinux 0xe62526e9 skb_prepare_seq_read
+EXPORT_SYMBOL vmlinux 0xe6264bb6 dev_set_parent
+EXPORT_SYMBOL vmlinux 0xe63f531e kmem_cache_alloc_node_trace
+EXPORT_SYMBOL vmlinux 0xe64d98fe rdmsr_safe_regs
+EXPORT_SYMBOL vmlinux 0xe66176e4 netdev_rx_csum_fault
+EXPORT_SYMBOL vmlinux 0xe66a57ea qdisc_watchdog_schedule_ns
+EXPORT_SYMBOL vmlinux 0xe66aa5903 pagevec_lru_add
+EXPORT_SYMBOL vmlinux 0xe66b8b56 scsi_eh_restore_cmnd
+EXPORT_SYMBOL vmlinux 0xe6c44f6a acpi_notifier_call_chain
+EXPORT_SYMBOL vmlinux 0xe6f39b6f ttly_hung_up_p
+EXPORT_SYMBOL vmlinux 0xe6f601 netdev_emerg
+EXPORT_SYMBOL vmlinux 0xe6f4104 devilgrade_write
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+EXPORT_SYMBOL vmlinux 0xe716baed acpi_unregister_ioctl
+EXPORT_SYMBOL vmlinux 0xe7201741 vfs_dedup_file_range
+EXPORT_SYMBOL vmlinux 0xe7238584 unlock_page_memcg
+EXPORT_SYMBOL vmlinux 0xe727b696 genlmsg_put
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+EXPORT_SYMBOL vmlinux 0xe74376b4 dmam_free_coherent
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+EXPORT_SYMBOL vmlinux 0xe7645dc4 generic_file_open
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+EXPORT_SYMBOL vmlinux 0xe790808e netpoll_cleanup
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+EXPORT_SYMBOL vmlinux 0xf147db2hdmi_spd_infoframe_init
+EXPORT_SYMBOL vmlinux 0xf151665f_unregister_queue_handler
+EXPORT_SYMBOL vmlinux 0xf16c2551devm_register_reboot_notifier
+EXPORT_SYMBOL vmlinux 0xf1700a6alock_sock_nested
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+EXPORT_SYMBOL vmlinux 0xf1984d35mark_buffer_dirty_inode
+EXPORT_SYMBOL vmlinux 0xf1d339adpci_request_regions
+EXPORT_SYMBOL vmlinux 0xf1e98c74avenrun
+EXPORT_SYMBOL vmlinux 0xf1f12bdd__nla_put_64bit
+EXPORT_SYMBOL vmlinux 0xf1fca1eclockref_mark_dead
+EXPORT_SYMBOL vmlinux 0xf2236c70__breadahead
+EXPORT_SYMBOL vmlinux 0xf22c33a5csi_device_set_state
+EXPORT_SYMBOL vmlinux 0xf23fb99__kfifo_in
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+EXPORT_SYMBOL vmlinux 0xf2997713tty_termios_hw_change
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+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x84f3e159kvm_lapic_expired_hv_timer
+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x85543943kvm_vcpu_write_guest
+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x86de02f1kvm_mmu_unprotect_page
+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x86e91f76kvm_queue_exception
+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x87ff1e29__tracepoint_kvm_pml_full
+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x8945e56a__tracepoint_kvm_nested_vmrun
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+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x901c19a3kvm_vcpu_read_guest
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+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x939d55e7kvm_vcpu_halt
+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x94a216313kvm_define_shared_msr
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+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0x9f32817akvm_pi_rite_update
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+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0xa1a6d30fkvm_inject_page_fault
+EXPORT_SYMBOL_GPL arch/x86/kvm/kvm 0xa1f268dvcpu_put
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+EXPORT_SYMBOL_GPL drivers/bluetooth/bluetooth 0x40f849e4btintel_version_info
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+EXPORT_SYMBOL_GPL drivers/bluetooth/bluetooth 0x5eaf005dbtintel_exit_mfg
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+EXPORT_SYMBOL_GPL drivers/crypto/qat/qat_common/intel_qat 0x1232a10badf_v2pf_notify_shutdown
+EXPORT_SYMBOL_GPL drivers/crypto/qat/qat_common/intel_qat 0x19a549f9a0df_dev_add
+EXPORT_SYMBOL_GPL drivers/crypto/qat/qat_common/intel_qat 0x1e8dec3eadf_devmgr_update_class_index

Open Source Used In 5GaaS Edge AC-4 12808
Open Source Used In 5GaaS Edge AC-4 12813

+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0x10a92845 sensor_hub_device_open
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+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0x3751b9b6 sensor_hub_get_feature
+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0x74c7fd94 sensor_hub_set_feature
+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0x8567a404 sensor_hub_register_callback
+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0x9512c55 sensor_hub_device_close
+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0xb8db755 sensor_hub_input_attr_get_raw_value
+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0xd9b5e8a sensor_hub_input_get_attribute_info
+EXPORT_SYMBOL_GPL drivers/hid/hid-sensor-hub 0xe073dd06 sensor_hub_remove_callback
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+EXPORT_SYMBOL_GPL drivers/usbhid/usbhid 0x17aebc3f hiddev_hid_event
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+EXPORT_SYMBOL_GPL drivers/hsi/hsi 0x12b7f2c5 hvsock_device_unregister
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+EXPORT_SYMBOL_GPL drivers/hsi/hsi 0x5db6e9878 vmbus_free_msg
+EXPORT_SYMBOL_GPL drivers/hsi/hsi 0x8b9f5d10 vmbus_async
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+EXPORT_SYMBOL_GPL sound/intel/baytrail/snd-soc-baytrail_pcm 0x0748b4efsst_byt_dsp_boot
+EXPORT_SYMBOL_GPL sound/intel/baytrail/snd-soc-baytrail_pcm 0x0964f6casst_byt_dsp_free
+EXPORT_SYMBOL_GPL sound/intel/baytrail/snd-soc-baytrail_pcm 0x0964e6fssst_byt_dsp
+EXPORT_SYMBOL_GPL sound/intel/baytrail/snd-soc-baytrail_pcm 0x0964e6fssst_byt_dsp_wait_for_ready
+EXPORT_SYMBOL_GPL sound/intel/baytrail/snd-soc-baytrail_pcm 0x0964e6fssst_byt_dsp_suspend_late
+EXPORT_SYMBOL_GPL sound/intel/baytrail/snd-soc-baytrail_pcm 0xe8a846dassst_byt_dsp_init
+EXPORT_SYMBOL_GPL sound/intel/common/snd-soc-acpi-intel-match 0x42414eeasnacpi_intel_broadwell_machines
+EXPORT_SYMBOL_GPL sound/intel/common/snd-soc-acpi-intel-match 0x42dd7ad7
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x1a85a72bsst dsp dma_copyfrom
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x227a51b2
sst_module_runtime_free_blocks
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x2a21cc77sst_module_alloc_blocks
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x33b8032dsst dsp_get_offset
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x33e629dssst_block_alloc_scratch
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x3a21cc7ssst_module_alloc_blocks
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x5aecdac1ssst_fw_reload
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x6648241dssst_block_free_scratch
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+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x66efcbbfssst_fw_new
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x86641e58ssst_fw_unload
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x8a22c269ssst_module_runtime_free
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x90ec6a71ssst_mem_block_register
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0xa2b573a1
sst_module_runtime_restore
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+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0xb66d150dsst_free_blocks
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+EXPORT_SYMBOL_GPL vmlinux 0xd89e8c93tpm_generic_restore
+EXPORT_SYMBOL_GPL vmlinux 0xd8aeb764mnt_want_write
+EXPORT_SYMBOL_GPL vmlinux 0xd8ac7639dev_pm_opp_unregister_set_opp_helper
+EXPORT_SYMBOL_GPL vmlinux 0xd8ae8c93tpm_generic_restore
+EXPORT_SYMBOL_GPL vmlinux 0xd8b7e2f6mnt_want_write
+EXPORT_SYMBOL_GPL vmlinux 0xd8c035eacrypto_unregister_aead
+EXPORT_SYMBOL_GPL vmlinux 0xd8d36e86mnt_want_write
+EXPORT_SYMBOL_GPL vmlinux 0xd8d7b539cryptodestroy_tfm
+EXPORT_SYMBOL_GPL vmlinux 0xd8e2c765mnt_want_write
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+EXPORT_SYMBOL_GPL vmlinux 0xdfa01adedevm_acpi_dma_controller_register
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+EXPORT_SYMBOL_GPL vmlinux 0xffe17893public_key_free
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+EXPORT_SYMBOL_GPL vmlinux 0xffda78dbus_deregister_device_driver
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/generic.compiler
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/generic.compiler
@@ -0,0 +1 @@
+GCC: (Ubuntu 7.5.0-3ubuntu1~18.04) 7.5.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/generic.modules
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/generic.modules
@@ -0,0 +1,5167 @@

Open Source Used In 5GaaS Edge AC-4 13037
+ab3100
+ab3100-otp
+abituguru
+abituguru3
+ablk_helper
+abp060mg
+ac97_bus
+acard-ahci
+acecad
+acenic
+acer-wmi
+acerhdf
+acp_audio_dma
+acpi-als
+acpi_configfs
+acpi_extlog
+acpi_ipmi
+acpi_pad
+acpi_power_meter
+acpi_thermal_rel
+acpihp_ibm
+acquirewdt
+act200l-sir
+act8865-regulator
+act_bpf
+act_conmmark
+act_csum
+act_gact
+act_ipt
+act_mirred
+act_nat
+act_pedit
+act_police
+act_sample
+act_simple
+act_skbedit
+act_skbmod
+act_tunnel_key
+act_vlan
+actisys-sir
+ad2s1200
+ad2s1210
+ad2s90
+ad5064
+ad525x_dpot
+ad525x_dpot-i2c
+ad525x_dpot-spi
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+adc128d818
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+addi_apci_1500
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+addi_apci_3501
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+adf7242
+adfs
+adi
+adis16060
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+adis16136
+adis16201
+adis16203
+adis16209
+adis16240
+adis16260
+adis16400
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+adl_pci6208
+adl_pci7x3x
+adl_pci8164
+adl_pci9111
+adl_pci9118
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+aes_t
+aesni-intel
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+aim_v4l2
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+aio_iiro_16
+aiptek
+aircable
+airo
+airo_cs
+airspy
+ak8975
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+alienware-wmi
+alim1535_wdt
+alim7101_wdt
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+altera-cvp
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+altera-pr-ip-core
+altera-ps-spi
+altera-stapl
+altera_jtaguart
+altera_ps2
+altera_tse
+altera_uart
+alx
+am2315
+am53c974
+ambassador
+amc6821
+amd
+amd-rng
+amd-xgbe
+amd5536udc_pci
+amd64_edac_mod
+amd76xrom
+amd8111e
+amd_freq_sensitivity
+amd_iommu_v2
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+analogix-anx78xx
+anatop-regulator
+ansi_cprng
+anubis
+aoe
+apanel
+apds9300
+apds9802als
+apds990x
+apds9960
+apple-gmux
+apple_bl
+appledisplay
+applesmc
+appletalk
+appletouch
+applicom
+aquantia
+ar5523
+ar7part
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+arc-rimi
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+arc_uart
+arcfb
+arcmsr
+arcnet
+arcxenn_bl
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+arizona-i2c
+arizona-ldo1
+arizona-micsupp
+arizona-spi
+ark3116
+arkfb
+arp_tables
+arpt_mangle
+arptable_filter
+as102_fe
+as3711-regulator
+as3711_bl
+as3935
+as5011
+asb100
+asc7621
+ascot2e
+asix
+aspeed-pwm-tacho
+ast
+asus-laptop
+asus-nb-wmi
+asus-wireless
+asus-wmi
+asus_atk0110
+async_memcpy
+async_pq
+async RAID6_recov
+async_tx
+async_xor
+at24
+at25
+at76c50x-usb
+at803x
+authenc
+authencesn
+autofs4
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+avma1_cs
+avmfritz
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+b53_spi
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+baycom_ser_hdx
+bcache
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+msi-laptop
+msi-wmi
+msi001
+msi2500
+msp3400
+mspro_block
+msr
+mt2060
+mt2063
+mt20xx
+mt2131
+mt2266
+mt29f_spinand
+mt312
+mt352
+mt6311-regulator
+mt6323-regulator
+mt6397-core
+mt6397-regulator
+mt7530
+mt7601u
+mt9m001
+mt9m111
+mt9t031
+mt9t112
+mt9v011
+mt9v022
+mtd
+mtd_blkdevs
+mtd_dataflash
+mtdblock
+mtdblock_ro
+mtdoops
+mtDRAM
+mtDSWAP
+mtIP32XX
+mtK-QUADSPI
+mtK-sd
+mtouch
+multiPath
+multiQ3
+musH_hdrc
+mv88e6060
+mv88e69xx
+mv_u3d_core
+mv_uDC
+mvMDIO
+mvSAS
+mvumi
+mvwave
+mwifiex
+mwifiex_pciE
+mwifiex_sdio
+mwifiex_usb
+mwI8K
+mxb
+mxc4005
+mxc6255
+mxll11sf-demod
+mxll11sf-tuner
+mxl301rf
+mxl5005s
+mxl5007t
+mxl5xx
+mxm-wmi
+mxser
+mxuport
+myri10ge
+n411
+n5pf
+n_gsm
+n_hdlc
+n_tracerouter
+n_tracesink
+nand
+nand_bch
+nand_ecc
+nandsim
+national
+natsemi
+nau7802
+navman
+nb8800
+nbd
+nci
+nci_spi
+nci_uart
+ncpfs
+nct6683
+nct6775
+nct7802
+nct7904
+nd_blk
+nd_btt
+nd_pmem
+ne2k-pci
+neofb
+net1080
+net2272
+net2280
+netconsole
+netjet
+netlink_diag
+netrom
+nettel
+netup-unidvb
+netxen_nic
+newtonkbd
+nf_conntrack
+nf_conntrack_amanda
+nf_conntrack_broadcast
+nf_conntrack_ftp
+nf_conntrack_h323
+nf_conntrack_ipv4
+nf_conntrack_ipv6
+nf_conntrack_irc
+nf_conntrack_netbios_ns
+nf_conntrack_netlink
+nf_conntrack_pptp
+nf_conntrack_proto_gre
+nf_conntrack_sane
+nf_conntrack_sip
+nf_conntrack_snmp
+nf_conntrack_tftp
+nf_defrag_ipv4
+nf_defrag_ipv6
+nf_dup_ipv4
+nf_dup_ipv6
+nf_dup_netdev
+nf_log_arp
+nf_log_bridge
+nf_log_common
+nf_log_ipv4
+nf_log_ipv6
+nf_log_netdev
+nf_nat
+nf_nat_amanda
+nf_nat_ftp
+nf_nat_h323
+nf_nat_ipv4
+nf_nat_ipv6
+nf_nat_irc
+nf_nat_masquerade_ipv4
+nf_nat_masquerade_ipv6
+nf_nat_pptp
+nf_nat_proto_gre
+nf_nat_redirect
+nf_nat_sip
+nf_nat_snmp_basic
+nf_nat_tftp
+nf_reject_ipv4
+nf_reject_ipv6
+nf_socket_ipv4
+nf_socket_ipv6
+nf_synproxy_core
+nf_tables
+nf_tables_arp
+nf_tables_bridge
+nf_tables_inet
+nf_tables_ipv4
+nf_tables_ipv6
+nf_tables_netdev
+nfc
+nfc_digital
+nfcmrvl
+nfcmrvl_i2c
+nfcmrvl_spi
+nfcmrvl_uart
+nfcmrvl_usb
+nfcsim
+nf
+nfnetlink
+nfnetlink_acct
+nfnetlink_cthelper
+nfnetlink_ctimeout
+nfnetlink_log
+nfnetlink_queue
nft_set_bitmap
nft_set_hash
nft_set_rbtree
nftl
ngene
nhc_dest
nhc_fragment
nhc_hop
nhc_ipv6
nhc_mobility
nhc_routing
nhc_udp
ni903x_wdt
ni_6527
ni_65xx
ni_660x
ni_670x
ni_at_a2150
ni_at_a0
ni_atmio
ni_atmio16d
ni_daq_700
ni_daq_dio24
ni_labpc
ni_labpc_common
ni_labpc_cs
ni_labpc_isadma
ni_labpc_pci
ni_mio_cs
ni_pcidio
ni_pcidimio
ni_tio
ni_tiocmd
ni_usb6501
nic7018_wdt
nicpf
nicstar
nicvf
nilfs2
niu
nlmon
nls_ascii
nls_cp1250
nls_cp1251
nls_cp1255
nls_cp737
nls_cp775
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+nls_koi8-r
+nls_koi8-ru
+nls_koi8-u
+nls_utf8
+nmclan_cs
+nosy
+notifier-error-inject
+nouveau
+nozomi
+ns558
+ns83820
+nsc-ircc
+nsh
+ntb
+ntb_hw_idt
+ntb_hw_intel
+ntb_hw_switchtec
+ntb_netdev
+ntb_perf
+ntb_pingpong
+ntb_tool
+ntb_transport
+ntc_thermistor
+nfts
+null_blk
+nuvoton-cir
+nv_tco
+nvidiafb
+nvme
+nvme-core
+nvme-fabrics
+nvme-fc
+nvme-loop
+nvme-rdma
+nvnet
+nvmet
+nvmet-fc
+nvmet-rcma
+nvram
+nxp-nci
+nxp-nci_i2c
+nxt200x
+nxt6000
+obdclass
+obdecho
+ocfb
+ocfs2
+ocfs2_dlm
+ocfs2_dlmfs
+ocfs2_nodemanager
+ocfs2_stack_o2cb
+ocfs2_stack_user
+ocfs2_stackglue
+ocrdma
+of_xilinx_wdt
+old_belkin-sir
+omfs
+omminet
+on20
+on26
+onenand
+opa_vnic
+opencores-kbd
+openvswitch
+oprofile
+opt3001
+opticon
+option
+or51132
+pcd
+pcf50633
+pcf50633-adc
+pcf50633-backlight
+pcf50633-charger
+pcf50633-gpio
+pcf50633-input
+pcf50633-regulator
+pcf8574_keypad
+pcf8591
+pch_udc
+pci
+pci-hyperv
+pci-stub
+pci200syn
+pcips2
+pcf7111
+pcf724
+pcf726
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+pcf816
+pcf818
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+pcmcia
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+pcmcia_rsrc
+pcmciamtd
+pcmda12
+pcmmio
+pcmio
+pcnet32
+pcnet_cs
+pcrypt
+pcspxr
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+pd6729
+pda_power
+pde_adma
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+peak_pciefd
+peak_pcmcia
+peak_usb
+peaq-wmi
+pegasus
+pmbus_core
+pmc551
+pmcraid
+pn533
+pn533_i2c
+pn533_usb
+pn544
+pn544_i2c
+pn544_mei
+pn_pep
+pn2_edac
+poly1305-x86_64
+poly1305_generic
+port100
+powermate
+powr1220
+ppa
+ppdev
+ppp_async
+ppp_deflate
+ppp_mppe
+ppp_synctty
+pppoatm
+pppo
+pppox
+pps_gpio
+pps_Idisc
+pps_core
+pps_parport
+pptp
+pretimeout_panic
+prism2_usb
+processor_thermal_device
+ps2-gpio
+ps2mult
+psample
+psmouse
+psnap
+psxpad-spi
+pt
+ptlrpc
+ptp
+ptp_kvm
+pulse8-cec
+pulsedlight-lidar-lite-v2
+punit_atom_debug
+pv88060-regulator
+pv88080-regulator
+pv88090-regulator
+pvcalls-front
+pvpanic
+pvrsusb2
+pwc
+pwm-beeper
+pwm-cros-ec
+pwm-lp3943
+pwm-lpss
+pwm-lpss-pci
+pwm-lpss-platform
+pwm-pca9685
+pwm-regulator
+pwm-tw1
+pwm-tw1-led
+pwm-vibra
+pwm_bl
+pxa27x_udc
+qat_dh895xcc
+qat_dh895xccvf
+qca8k
+qcaux
+qcom-emac
+qcom-spmi-iadc
+qcom-spmi-vadc
+qcom-vadc-common
+qcom_glink_native
+qcom_glink_rpm
+qcom_spmi-regulator
+qcserial
+qed
+ qede
+qedf
+qedi
+qedr
+qemu_fw_cfg
+qinfo_probe
+qla1280
+qla2xxx
+qla3xxx
+qla4xxx
+qlcnic
+qlge
+qlogic_cs
+qlogicfas408
+qm1d1c0042
+qmi_wwan
+qn4
+rc-purpletv
+rc-pv951
+rc-rc6-mce
+rc-real-audio-220-32-keys
+rc-reddo
+rc-snapstream-firefly
+rc-streamzap
+rc-su3000
+rc-tango
+rc-tbs-nec
+rc-technisat-ts35
+rc-technisat-usb2
+rc-terratec-cinergy-c-pci
+rc-terratec-cinergy-s2-hd
+rc-terratec-cinergy-xs
+rc-terratec-slim
+rc-terratec-slim-2
+rc-tevii-nec
+rc-tivo
+rc-total-media-in-hand
+rc-total-media-in-hand-02
+rc-trekstor
+rc-tt-1500
+rc-twinhan-dtv-cab-ci
+rc-twinhan1027
+rc-videomate-m1f
+rc-videomate-s350
+rc-videomate-tv-pvr
+rc-winfast
+rc-winfast-usbii-deluxe
+rc-zx-irdec
+rc5t583-regulator
+rcuperf
+rdfc321x-southbridge
+rdma_cm
+rdma_rxe
+rdma_ucm
+rdmavt
+rds
+rds_rdma
+rds_tcp
+realtek
+redboot
+redrat3
+reed_solomon
+regmap-spmi
+regmap-wl
+regulator-haptic
+reiserfs
+remoteproc
+repaper
+reset-ti-syscon
+retu-mfd
+retu-pwrbUTTON
+retu_wdt
+rfc1051
+rfc1201
+rfcomm
+rfd77402
+rfd_ftl
+rfkill-gpio
+rio-scan
+rio_cm
+rio_mport_cdev
+rionet
+rivafb
+rj54n1cb0c
+rmd128
+rmd160
+rmd256
+rmd320
+rmi_core
+rmi_i2c
+rmi_smbus
+rmi_spi
+rmnet
+rmdis_host
+rmdis_wlan
+rockchip
+rocker
+rocket
+rohm_bu21023
+romfs
+rose
+rotary_encoder
+rp2
+rpcredma
+rpcsec_gss_krb5
+rpmsg_char
+rpmsg_core
+rpr0521
+rrpc
+rsi_91x
+rsi_sdio
+rsi_usb
+rsxx
+rt2400pci
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+rt2500usb
+rt2800lib
+rt2800mmio
+rt2800pci
+rt2800usb
+rt2x00lib
+rt2x00mmio
+rt2x00pci
+rt2x00usb
+rt5033
+rt5033-regulator
+rt5033_battery
+rt61pci
+rt73usb
+rt9455_charger
+rtc-88pm80x
+rtc-88pm860x
+rtc-ab-b5ze-s3
+rtc-ab3100
+rtc-abx80x
+rtc-am1805
+rtc-bq32k
+rtc-bq4802
+rtc-da9052
+rtc-da9055
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+rtc-ds1305
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+rtc-ds3232
+rtc-em3027
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+rtc-hid-sensor-time
+rtc-isl12022
+rtc-wm831x
+rtc-wm8350
+rtc-x1205
+rti520
+rti800
+rti802
+rti2830
+rti2832
+rti2832_sdr
+rti8150
+rti8187
+rti8188ee
+rti818x_pci
+rti8192c-common
+rti8192ce
+rti8192cu
+rti8192de
+rti8192ee
+rti8192se
+rti8723-common
+rti8723ae
+rti8723be
+rti8821ae
+rti8xxx
+rtl_pci
+rtl_usb
+rtllib
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+rtllib_crypt_tkip
+rtllib_crypt_wep
+rtlwifi
+rts5208
+rtsx_pci
+rtsx_pci_ms
+rtsx_pci_sdmmc
+rtsx_usb
+rtsx_usb_ms
+rtsx_usb_sdmmc
+rx51_battery
+rxrpc
+s1d13xxxfb
+s2250
+s2255drv
+s2io
+s2mpa01
+s2mps11
+s3fb
+s3fwrn5
+s3fwrn5_i2c
+s526
+s5h1409
+s5h1411
+s5h1420
+s5m8767
+s626
+s6e63m0
+s6sy761
+s921
+saa6588
+saa6752hs
+saa7110
+saa7115
+saa7127
+saa7134
+saa7134-alsa
+saa7134-dvb
+saa7134-empress
+saa7134-go7007
+saa7146
+saa7146_vv
+saa7164
+saa717x
+saa7185
+saa7706h
+safe_serial
+salsa20_generic
+samsung-keypad
+samsung-laptop
+samsung-q10
+samsung-sxgbe
+sata_dwc_460ex
+sata_inic162x
+sata_mv
+sata_nv
+sata.promise
+sata_qstor
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+sata_via
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+savagefb
+sb1000
+scif_bus
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+scsi_debug
+scsi_dh_alua
+scsi_dh_emc
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+scsi_dh_rdac
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+scsi_transport_sas
+scsi_transport_spi
+scsi_transport_srp
+sctp
+sctp_diag
+sctp_probe
+sdhci
+sdhci-acpi
+sdhci-pci
+sdhci-pltfm
+sdhci-xenon-driver
+sdio_uart
+sdrcoh_cs
+sedlbauer_cs
+seed
+sensorhub
+ser_gigaset
+serial2002
+serial_cs
+serial_ir
+serio_raw
+sermouse
+serpent-avx-x86_64
+serpent-avx2
+serpent-sse2-x86_64
+serpent_generic
+serport
+ses
+sfc
+sfc-falcon
+sh_veu
+sha1-mb
+sha1-ssse3
+sha256-mb
+sha256-ssse3
+sha3_generic
+sha512-mb
+sha512-ssse3
+shark2
+sm501
+sm501fb
+sm712fb
+sm750fb
+sm_common
+sm_ftl
+smartpqi
+smb347-charger
+smc
+smc91c92_cs
+smc_diag
+smipcie
+smm665
+smsc
+smsc-irc2
+smsc37b787_wdt
+smsc47b397
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+smsddio
+smsusb
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+snd-ac97-codec
+snd-ad1889
+snd-ak4113
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+snd-ak4xxx-adda
+snd-ali5451
+snd-alloop
+snd-als300
+snd-als4000
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+snd-atiixp
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+snd-au8810
+snd-au8820
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+snd-emu10k1-synth
+snd-emu10k1x
+snd-emux-synth
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+snd-firewire-tascam
+snd-fireworks
+snd-fm801
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+snd-hdsp
+snd-hdspm
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+snd-mona
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+snd-opl3-synth
+snd-oxfw
+snd-oxygen
+snd-oxygen-lib
+snd-pcm
+snd-pcm-dmaengine
+snd-pcsp
+snd-pcxhr
+snd-pdaudiocf
+snd-portman2x4
+snd-pt2258
+snd-rawmidi
+snd-riptide
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+snd-rme9652
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+snd-seq-midi-event
+snd-seq-virmidi
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+snd-skl_nau88125_max98357a
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+snd-soc-acp-rt5645-mach
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+snd-soc-fsl-sai
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+snd-soc-kbl_rt5663_rt5514_max98927
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+snd-soc-pcm179x-spi
+snd-soc-pcm3168a
+snd-soc-pcm3168a-i2c
+snd-soc-pcm3168a-spi
+snd-soc-pcm512x
+snd-soc-pcm512x-i2c
+snd-soc-pcm512x-spi
+snd-soc-rl6231
+snd-soc-rl6347a
+snd-soc-rt286
+speakup_ltlk
+speakup_soft
+speakup_spkout
+speakup_txprt
+spectrum_cs
+speedfax
+speedstep-lib
+speedtch
+spi-altera
+spi-axi-spi-engine
+spi-bitbang
+spi-butterfly
+spi-cadence
+spi-dln2
+spi-dw
+spi-dw-midpci
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+spi-gpio
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+spi-loopback-test
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+splat
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+ssp_gyro_sensor
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+vimc-debayer
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+vimc_common
+vimc_scaler
+vimc_sensor
+vimc_streamer
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+viperboard_adc
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+w831786ng
Open Source Used In 5GaaS Edge AC-4

+wm8350-regulator
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+wm8350_wdt
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+wm97xx-ts
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+x25_asy
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+zpa2326
+zpa2326_i2c
+zpa2326_spi
+zpios
+rzr36016
+rzr36050
+rzr36060
+rzr36067
+rzr364xx
+zram
+zstd_compress
+zunicode
+zxdc

--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/generic.retpoline
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/generic.retpoline
@@ -0,0 +1 @@
+# retpoline v1.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/lowlatency
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/lowlatency
@@ -0,0 +1,22890 @@
+# retoline v1.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/lowlatency
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/lowlatency
@@ -0,0 +1,22890 @@
+EXPORT_SYMBOL arch/x86/kvm/kvm 0x6a8be4aa	kvm_cpu_has_pending_timer
+EXPORT_SYMBOL crypto/mcryptd 0x19dbdbce	mcryptd_arm_flusher
+EXPORT_SYMBOL crypto/sm3_generic 0x709fd272	crypto_sm3_finup
+EXPORT_SYMBOL crypto/sm3_generic 0xe9080958
crypto_sm3_update
+EXPORT_SYMBOL crypto/xor 0x5b6c00e6xor_blocks
+EXPORT_SYMBOL drivers/acpi/nfit/nfit 0xceec93beto_nfit_uuid
+EXPORT_SYMBOL drivers/acpi/video 0x2d90d684acpi_video_get_edid
+EXPORT_SYMBOL drivers/acpi/video 0x4a3ddd5acpi_video_get_levels
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+EXPORT_SYMBOL drivers/media/v4l2-core/videodev 0x45a44c24v4l2_ctrl_fill
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AC-4 13192
mlx5_query_port_eth_proto_oper
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+EXPORT_SYMBOL drivers/net/wireless/ath/ath 0xc7f50eb2ath_reg_notifier_apply
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ath10k_htt_rx_pktlog_completion_handler
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+EXPORT_SYMBOL net/wimax/wimax 0x79397e8bexdr_truncate_encode
+EXPORT_SYMBOL net/wireless/cfg80211 0x016f250bcfg80211_iter_combinations
+EXPORT_SYMBOL net/wireless/cfg80211 0x01c0b88acf cfg80211_cqm_txe_notify
+EXPORT_SYMBOL net/wireless/cfg80211 0x02f37d35cfg80211_disconnected
+EXPORT_SYMBOL net/wireless/cfg80211 0x036f1a1cfg80211_nan_match
+EXPORT_SYMBOL net/wireless/cfg80211 0x049658bfieee80211_get_hdrlen_from_skb
+EXPORT_SYMBOL net/wireless/cfg80211 0x07c56534cfg80211_tdlis_oper_request
+EXPORT_SYMBOL net/wireless/cfg80211 0x09c64fbideee80211_frequency_to_channel
+EXPORT_SYMBOL net/wireless/cfg80211 0x0c855b25dee80211_chandef_to_operating_class
+EXPORT_SYMBOL net/wireless/cfg80211 0x0f672739cfg80211_rx_unexpected_4addr_frame
+EXPORT_SYMBOL net/wireless/cfg80211 0x79721638ieee80211 AMSDU_to_8023s
+EXPORT_SYMBOL net/wireless/cfg80211 0x7a8a4ef7ieee80211_get_channel
+EXPORT_SYMBOL net/wireless/cfg80211 0x7bedd29awiphy_free
+EXPORT_SYMBOL net/wireless/cfg80211 0x8211b2cregulatory_set_wiphy_regd
+EXPORT_SYMBOL net/wireless/cfg80211 0x8306f85dwiphy_register
+EXPORT_SYMBOL net/wireless/cfg80211 0x899379efieee80211_bss_get_ie
+EXPORT_SYMBOL net/wireless/cfg80211 0x8b9e6811cfg80211_remain_on_channel_expired
+EXPORT_SYMBOL net/wireless/cfg80211 0x8ca47951cfg80211_crit_proto_stopped
+EXPORT_SYMBOL net/wireless/cfg80211 0x8ca54763cfg80211_probe_status
+EXPORT_SYMBOL net/wireless/cfg80211 0x8ca54763cfg80211_free_nan_func
+EXPORT_SYMBOL net/wireless/cfg80211 0x8e1d4e42cfg80211_free_nmi
+EXPORT_SYMBOL net/wireless/cfg80211 0x9050d037cfg80211_conn_failed
+EXPORT_SYMBOL net/wireless/cfg80211 0x9a7ea8cccfg80211_ready_on_channel
+EXPORT_SYMBOL net/wireless/cfg80211 0x9a4b03786ieee80211_mandatory_rates
+EXPORT_SYMBOL net/wireless/cfg80211 0x9b24344cfg80211_gtk_rekey_notify
+EXPORT_SYMBOL net/wireless/cfg80211 0x9c345277cfg80211_assoc_timeout
+EXPORT_SYMBOL net/wireless/cfg80211 0x9d654799cfg80211_find_ie_match
+EXPORT_SYMBOL net/wireless/cfg80211 0xe10c2e1bcfg80211_ft_event
+EXPORT_SYMBOL net/wireless/cfg80211 0xe1c28882cfg80211_send_event_skb
+EXPORT_SYMBOL net/wireless/cfg80211 0xe554f867ieee80211_data_to_8023_exthdr
+EXPORT_SYMBOL sound/core/snd 0x446c7d71snd_jack_set_key
+EXPORT_SYMBOL sound/core/snd 0x4558bdf5snd_cards
+EXPORT_SYMBOL sound/core/snd 0xa43ea5c0snd_request_card
+EXPORT_SYMBOL sound/core/snd 0x507e54bd sndctl_find_id
+EXPORT_SYMBOL sound/core/snd 0x520f74e3 sndctl_free_one
+EXPORT_SYMBOL sound/core/snd 0x5cc4b757snd_unregister_oss_device
+EXPORT_SYMBOL sound/core/snd 0x661c6526 sndctl_make_virtual_master
+EXPORT_SYMBOL sound/core/snd 0x6252f815 sndctl_remove_id
+EXPORT_SYMBOL sound/core/snd 0x62dd6eb4 snd_jack_set_parent
+EXPORT_SYMBOL sound/core/snd 0x6b4487d8 sndctl_boolean_mono_info
+EXPORT_SYMBOL sound/core/snd 0x70c15ac1 snd_dma_disable
+EXPORT_SYMBOL sound/core/snd 0x77647d5 esnd_pci_quirk_lookup
+EXPORT_SYMBOL sound/core/snd 0x77c75ede snd_card_register
+EXPORT_SYMBOL sound/core/snd 0x78355f26 snd_mixer_oss_notify_callback
+EXPORT_SYMBOL sound/core/snd 0x79843992 snd_card_file_remove
data
+EXPORT_SYMBOL sound/core/snd 0x7f5f315c sndctl_notify
+EXPORT_SYMBOL sound/core/snd 0x81b69e41 sndctl_enum_info
+EXPORT_SYMBOL sound/core/snd 0x83f75c2d sndctl_add_slave
+EXPORT_SYMBOL sound/core/snd 0x8458f5b9 snd_device_free
+EXPORT_SYMBOL sound/core/snd 0x856ca91esnd_ctl_register_ioctl
+EXPORT_SYMBOL sound/core/snd 0x88f3789f snd_oss_info_register
+EXPORT_SYMBOL sound/core/snd 0x8f595b11 snd_major
+EXPORT_SYMBOL sound/core/snd 0x8f76b34asnd_power_wait
+EXPORT_SYMBOL sound/core/snd 0x91f2b82csnd_info_create_card_entry
+EXPORT_SYMBOL sound/core/snd 0x9a2a2f0b snd_ctl_rename_id
+EXPORT_SYMBOL sound/core/snd 0x9b1e67ec snd_card_new
+EXPORT_SYMBOL sound/core/snd 0x9e6d79f8 snd_oss_info_get_str
+EXPORT_SYMBOL sound/core/snd 0xa0fd2427 snd_pci_quirk_lookup_id
+EXPORT_SYMBOL sound/core/snd 0xa5dd737f snd_info_register
+EXPORT_SYMBOL sound/core/snd 0xa7c2bd9f snd_card_free_when_closed
+EXPORT_SYMBOL sound/core/snd 0xb2e5ae4asnd_lookup_minor_data
+EXPORT_SYMBOL sound/core/snd 0xb8a96c2asnd_info_create_module_entry
+EXPORT_SYMBOL sound/core/snd 0xbde1579asnd_card_file_add
+EXPORT_SYMBOL sound/core/snd 0xbf3694f0 snd_ctl_replace
+EXPORT_SYMBOL sound/core/snd 0xc06d8c51 snd_card_set_id
+EXPORT_SYMBOL sound/core/snd 0xc84654b4 snd_ctl_unregister_ioctl
+EXPORT_SYMBOL sound/core/snd 0xe4946d92 snd_ctl_unregister_iocntl
+EXPORT_SYMBOL sound/core/snd 0xe97ebda1 sandbox_unregister_device
+EXPORT_SYMBOL sound/core/snd 0xf1b2d0bf snd_card_set_id
+EXPORT_SYMBOL sound/core/snd 0xf33513db sandbox_info_free_entry
+EXPORT_SYMBOL sound/core/snd 0xf71702cesnd_ctl_find_numid

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+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x0f116d34oxygen_write_uart
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x18238c75oxygen_write_i2c
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x200b8d67oxygen_write8_masked
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x26a051a1oxygen_write32_masked
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x47872d69oxygen_read8
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x479580dboxygen_reset_uart
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x605a274oxxygen_write_ac97_masked
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x70e0a477oxygen_pci_shutdown
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x7a133480oxygen_read_ac97
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x83d8bf6aoxygen_pci_probe
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x8536a487oxygen_write_ac97
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x861a22bboxygen_pci_pm
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x86f1cf8oxygen_write_spi
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0xb08a9a5atoxygen_write16
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0xb54642a0oxygen_write16_masked
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0xc03b0cb9oxygen_read16
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x4e73aa82ttlv320aic23_regmap
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x5649a5d3ttlv320aic23_probe
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x4799b857ssnd_trident_write_voice_regs
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x5615f19cssnd_trident_alloc_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x654aed6bssnd_trident_start_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xb3344ffassnd_trident_stop_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xe2483c08ssnd_trident_free_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xebe1ea6bssnd_soc_ac97_codec
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x088deb29register_sound_mixer
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x1f5295fdregister_sound_midi
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x4f8f7aregistersound_class
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x6380ee8aregister_sound_dsp
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x7ac989aunregister_sound_mixer
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x99c95faunregister_sound_special
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xca23f3ndeviceunregister_sound_special_device
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x0de6fbregister_sound_special_device
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xfbc3e09aunregister_sound_dsp
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x17abdc4snd_emux_free
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xc302162snd_emux_new
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xe8376fesesnd_emux_register
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x4d90f0f4ssnd_emux_terminate_all
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xf01916c5ssnd_emux_lock_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x655cb202ssnd_sf_linear_to_log
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xf0795400ssnd_emux_unlock_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x756b9145ssnd_util_mem_free

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+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x151752ec VBoxGuest_RTHeapSimpleGetFreeSize
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x160b14d4 VBoxGuest_RTMapGetPresentSet
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x16102af1 VBoxGuestRTGuestIDC
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x1926b25c VBoxGuest_RTLogRelLogger
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x195f674d VBoxGuest_RTLogBackdoorPrintfV
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x19790b4c VBoxGuest_RTLogFlags
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x197acd65 VBoxGuest_RTInit
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x1a6d7d6e VBoxGuest_RTThreadPreemptIsEnabled
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x1ae28abb VBoxGuest_RTThreadIsSelfAlive
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x1c3b0f90 VBoxGuest_RTReadRequest
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x1dc5ebbe VBoxGuest_RTThreadWaitNoResume
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x1f3e577b VBoxGuest_RTMemAllocZTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x20d9d625 VBoxGuest_RTTimeToString
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x2254228b VBoxGuest_RTMapGetPresentCount
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x2387f039 VBoxGuest_RTMapIsCpuPresent
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x25219f5e VBoxGuest_RT0Term
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x2580d04c VBoxGuest_RTSpinlockAcquire
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x262275e8 VBoxGuest_RTMemUserCopyTo
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x265dcfd VBoxGuest_RTAssertMsg2WeakV
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x26858cf0 VBoxGuest_RTStrToInt64Full
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x2698f453 VBoxGuest_RTThreadGetType
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x272d5e29 VBoxGuest_RTMemoryCopy
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x276d539c VBoxGuest_RTThreadsetName
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x281d7c24 VBoxGuest_RTMapCpuId
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x283a0b9d VBoxGuest_RTLogSetDefaultInstanceThread
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x291252b8 VBoxGuest_RTLogPrint
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x2a2284fb VBoxGuest_RTLogCreateEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x2af3453c VBoxGuest_RTStrPrintf
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x30e40c69 VBoxGuest_RTLogSetDefaultInstanceThread
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3168cadf VBoxGuest_RTTimeSystemMilliTS
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x31ac4c5f VBoxGuest_RTInit
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x333d731a VBoxGuest_RTMpCpuId
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x343e3e1b VBoxGuest_RTLogGetDestinations
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3480f453 VBoxGuest_RTSemMutexDestroy
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x358153bb VBoxGuest_RTStrCopy
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x362275e8 VBoxGuest_RTMemContFree
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x372d5e29 VBoxGuest_RTPowerNotificationDeregister
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x376d539c VBoxGuest_RTThreadGetType
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x381d7c24 VBoxGuest_RTMemAllocVarTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x383a0b9d VBoxGuest_RTMapCpuId
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3a47392e VBoxGuest_RTErrConvertFromErrno
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3abe5252 VBoxGuest_RTStrPrintfV
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3b04381e VBoxGuest_RTMemEventMultiReset
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3b231c95 VBoxGuest_RTTimeNanoTS
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x3bcf543a VBoxGuest_RTLogGetDefaultInstanceEx
+EXPORT_SYMBOL vmlinux 0x007b1e5dgenphy_write_mmd_unsupported
+EXPORT_SYMBOL vmlinux 0x00886be5node_data
+EXPORT_SYMBOL vmlinux 0x0088c61c_raw_write_unlock_irqrestore
+EXPORT_SYMBOL vmlinux 0x009e04ftrt_dst_alloc
+EXPORT_SYMBOL vmlinux 0x00a9bad2nf_register_net_hook
+EXPORT_SYMBOL vmlinux 0x00b79c9__invalidate_device
+EXPORT_SYMBOL vmlinux 0x00d7e722vme_im_count
+EXPORT_SYMBOL vmlinux 0x00f1ae0dma_async_device_register
+EXPORT_SYMBOL vmlinux 0x0100e51schedule
+EXPORT_SYMBOL vmlinux 0x0101d5b1ip_idents_reserve
+EXPORT_SYMBOL vmlinux 0x012789cayield
+EXPORT_SYMBOL vmlinux 0x0141c5a5tty_port_destroy
+EXPORT_SYMBOL vmlinux 0x015053d9ntty_ioctl_helper
+EXPORT_SYMBOL vmlinux 0x0154fa8cdmapool_create
+EXPORT_SYMBOL vmlinux 0x0155371vm_brk_flags
+EXPORT_SYMBOL vmlinux 0x01632dabagp_generic_alloc_pages
+EXPORT_SYMBOL vmlinux 0x017de3d5tnr_cpu_ids
+EXPORT_SYMBOL vmlinux 0x017fd8a9pcicore_host_bridge
+EXPORT_SYMBOL vmlinux 0x0188f990pcimionmap_regions
+EXPORT_SYMBOL vmlinux 0x01b299a0page_zero_new_buffers
+EXPORT_SYMBOL vmlinux 0x01bd1258truncate_pagecache
+EXPORT_SYMBOL vmlinux 0x01d1cc38amdommu_device_info
+EXPORT_SYMBOL vmlinux 0x01ee49e1md_check_recovery
+EXPORT_SYMBOL vmlinux 0x02066e41xfm_prepare_input
+EXPORT_SYMBOL vmlinux 0x0209f8acip6tun_encaps
+EXPORT_SYMBOL vmlinux 0x020b5a4ip_send_check
+EXPORT_SYMBOL vmlinux 0x020e947sxmiotlb_sync_single_for_device
+EXPORT_SYMBOL vmlinux 0x022a9041ddelete
+EXPORT_SYMBOL vmlinux 0x02373bbddconfigfs_unregister_subsystem
+EXPORT_SYMBOL vmlinux 0x0237b57aarch_unregister_cpu
+EXPORT_SYMBOL vmlinux 0x025483b1set_current_groups
+EXPORT_SYMBOL vmlinux 0x02648be1inet_csk_prepare_forced_close
+EXPORT_SYMBOL vmlinux 0x0264d444writeback_inodes_sb_nr
+EXPORT_SYMBOL vmlinux 0x02732c85__get_hash_from_flowi4
+EXPORT_SYMBOL vmlinux 0x0274dc2bnetif_get_num_default_rq_queues
+EXPORT_SYMBOL vmlinux 0x028c729enapi_schedule_prep
+EXPORT_SYMBOL vmlinux 0x028d9a1etcf_idr_insert
+EXPORT_SYMBOL vmlinux 0x02a0c946ntty_compat_ioctl_helper
+EXPORT_SYMBOL vmlinux 0x02a874nffcontrack_destroy
+EXPORT_SYMBOL vmlinux 0x02a6e55arc16_table
+EXPORT_SYMBOL vmlinux 0x02ed303__xfm_route_forward
+EXPORT_SYMBOL vmlinux 0x02ea111escsi_driverbyte_string
+EXPORT_SYMBOL vmlinux 0x02fedbaameigh_table_clear
+EXPORT_SYMBOL vmlinux 0x0300a3c2mmc_detect_change
+EXPORT_SYMBOL vmlinux 0x0305a165udp_lib_rehash
+EXPORT_SYMBOL vmlinux 0x0314b855netdev_set_tc_queue
+EXPORT_SYMBOL vmlinux 0x031b15adrdsr_on_cpus
+EXPORT_SYMBOL vmlinux 0x0334da4escsi_command_size_tbl
+EXPORT_SYMBOL vmlinux 0x033f8c4fnetdev_set_blocksize
+EXPORT_SYMBOL vmlinux 0x0366307aconsole_suspend_enabled
+EXPORT_SYMBOL vmlinux 0x036aa0e6neigh_event_ns
+EXPORT_SYMBOL vmlinux 0x037a0cbeakfree
+EXPORT_SYMBOL vmlinux 0x039220d7_i2c_transfer
+EXPORT_SYMBOL vmlinux 0x0392bcebi_wait_on_bit
+EXPORT_SYMBOL vmlinux 0x039a287binet_select_addr
+EXPORT_SYMBOL vmlinux 0x03a3b823i2c_del_adapter
+EXPORT_SYMBOL vmlinux 0x03c4535vfsvfs_staffs
+EXPORT_SYMBOL vmlinux 0x03e0ac0make_kgid
+EXPORT_SYMBOL vmlinux 0x03e1bb1fsync_bdev
+EXPORT_SYMBOL vmlinux 0x03ede720phy_mii_ioctl
+EXPORT_SYMBOL vmlinux 0x03fdd2571vm_unmap_ram
+EXPORT_SYMBOL vmlinux 0x041ab798nd_btt_version
+EXPORT_SYMBOL vmlinux 0x0422fe4ainet_csk_timer_bug_msg
+EXPORT_SYMBOL vmlinux 0x0428d436raw_read_lock
+EXPORT_SYMBOL vmlinux 0x044210casksb_copy_datagram_from_iter
+EXPORT_SYMBOL vmlinux 0x04482cdbrefrigerator
+EXPORT_SYMBOL vmlinux 0x04518afnetpoll_poll_disable
+EXPORT_SYMBOL vmlinux 0x0455a2c9param_ops_short
+EXPORT_SYMBOL vmlinux 0x045d6795dev_activate
+EXPORT_SYMBOL vmlinux 0x04705371register_chrdev
+EXPORT_SYMBOL vmlinux 0x0487f331fbfind_best_display
+EXPORT_SYMBOL vmlinux 0x04a14811nvme_erase_sync
+EXPORT_SYMBOL vmlinux 0x04c6b8bksbkb_insert
+EXPORT_SYMBOL vmlinux 0x04c62d7_memset
+EXPORT_SYMBOL vmlinux 0x04d8c750release_perfctr_nmi
+EXPORT_SYMBOL vmlinux 0x04e11789siphash_3u32
+EXPORT_SYMBOL vmlinux 0x04ea56f9_kstrtol
+EXPORT_SYMBOL vmlinux 0x04ea5d10ksize
+EXPORT_SYMBOL vmlinux 0x050877b9dmi_first_match
+EXPORT_SYMBOL vmlinux 0x05094bb2netlink_set_err
+EXPORT_SYMBOL vmlinux 0x05240ee7percpu_counter_batch
+EXPORT_SYMBOL vmlinux 0x05269a49blk_run_queue_async
+EXPORT_SYMBOL vmlinux 0x0531f86cscsi_is_host_device
+EXPORT_SYMBOL vmlinux 0x05352f3dbdidi_register_owner
+EXPORT_SYMBOL vmlinux 0x05439f62bpci_release_regions
+EXPORT_SYMBOL vmlinux 0x05449964schedule_timeout_interruptible
+EXPORT_SYMBOL vmlinux 0x0553e7dcpci_dev_put
+EXPORT_SYMBOL vmlinux 0x0559c010security_path_unlink
+EXPORT_SYMBOL vmlinux 0x055c8559_kfifo_dma_in_prepare_r
+EXPORT_SYMBOL vmlinux 0x05eff323blk_integrity_unregister
+EXPORT_SYMBOL vmlinux 0x058e0608serio_reconnect
+EXPORT_SYMBOL vmlinux 0x204c19f5 tcp_alloc_md5sig_pool
+EXPORT_SYMBOL vmlinux 0x2054b408 xxh64_update
+EXPORT_SYMBOL vmlinux 0x205f2927 timer_reduce
+EXPORT_SYMBOL vmlinux 0x2065cf38 ps2_init
+EXPORT_SYMBOL vmlinux 0x2068d4e2 block_is_partially_uptodate
+EXPORT_SYMBOL vmlinux 0x2072ee9b brequest_threaded_irq
+EXPORT_SYMBOL vmlinux 0x20799271 tcp_idr_cleanup
+EXPORT_SYMBOL vmlinux 0x20851574 gen_new_estimator
+EXPORT_SYMBOL vmlinux 0x208739f6 acpi_load_table
+EXPORT_SYMBOL vmlinux 0x209a6b71 kobject_set_name
+EXPORT_SYMBOL vmlinux 0x20a789ac irq_set_chip_data
+EXPORT_SYMBOL vmlinux 0x20c55ae0 sscanf
+EXPORT_SYMBOL vmlinux 0x211f68f1 getnstimeofday64
+EXPORT_SYMBOL vmlinux 0x213a66dc unix_detach_fds
+EXPORT_SYMBOL vmlinux 0x215a8ec8 slhc_init
+EXPORT_SYMBOL vmlinux 0x21a40f92 tso_start
+EXPORT_SYMBOL vmlinux 0x21aa7da1 xfrm_user_policy
+EXPORT_SYMBOL vmlinux 0x21c785ip6_find_1stfragopt
+EXPORT_SYMBOL vmlinux 0x21c8bbdev_mc_sync_multiple
+EXPORT_SYMBOL vmlinux 0x21d1c4d7 frontswoff_preempt
+EXPORT_SYMBOL vmlinux 0x21e2e835bk Post_runtime_resume
+EXPORT_SYMBOL vmlinux 0x222094d set_nlink
+EXPORT_SYMBOL vmlinux 0x222e7ce2 sysfs_streq
+EXPORT_SYMBOL vmlinux 0x223211b1 devm_gpio_request_one
+EXPORT_SYMBOL vmlinux 0x22329fd4 uart_get_baud_rate
+EXPORT_SYMBOL vmlinux 0x224f7055 devm_extcon_register_notifier_all
+EXPORT_SYMBOL vmlinux 0x22559d9 blk_queue_softirq_done
+EXPORT_SYMBOL vmlinux 0x22604650 search_binary_handler
+EXPORT_SYMBOL vmlinux 0x226fc201 net_proto_csum_replace4
+EXPORT_SYMBOL vmlinux 0x2276db98 kstrtoint
+EXPORT_SYMBOL vmlinux 0x227934ed skb_vlan_pop
+EXPORT_SYMBOL vmlinux 0x227c52e5 napi_schedule_irqoff
+EXPORT_SYMBOL vmlinux 0x22837328 cookie_timestamp_decode
+EXPORT_SYMBOL vmlinux 0x229f3ba9f ddi_type_trans
+EXPORT_SYMBOL vmlinux 0x22ab6421 kill_pid
+EXPORT_SYMBOL vmlinux 0x22b325d5 mk_sound
+EXPORT_SYMBOL vmlinux 0x22ba9660 set_cached_acl
+EXPORT_SYMBOL vmlinux 0x22bd1cb6bgrab
+EXPORT_SYMBOL vmlinux 0x22ce61d7 default_qdisc_ops
+EXPORT_SYMBOL vmlinux 0x2d994605security_inode_copy_up_xattr
+EXPORT_SYMBOL vmlinux 0x2d9bea22truncate_setsize
+EXPORT_SYMBOL vmlinux 0x2da80909xfmr_state_lookup_byspi
+EXPORT_SYMBOL vmlinux 0x2da87e11force_sig
+EXPORT_SYMBOL vmlinux 0x2dc5736cclk_get
+EXPORT_SYMBOL vmlinux 0x2dd42f0dfscrypt_get_encryption_info
+EXPORT_SYMBOL vmlinux 0x2dd16564arch_register_cpu
+EXPORT_SYMBOL vmlinux 0x2dd986afip_getsockopt
+EXPORT_SYMBOL vmlinux 0x2dd9a36bfllvrmem_array_shrink
+EXPORT_SYMBOL vmlinux 0x2dd9bdfacpi_format_exception
+EXPORT_SYMBOL vmlinux 0x2ddf7176rtc_cmos_write
+EXPORT_SYMBOL vmlinux 0x2df3c3bedim_turn
+EXPORT_SYMBOL vmlinux 0x2df40ebe1__test_set_page_writeback
+EXPORT_SYMBOL vmlinux 0x2df66aaaacpi_register_debugger
+EXPORT_SYMBOL vmlinux 0x2e010e51security_inode_init_security
+EXPORT_SYMBOL vmlinux 0x2e0e60d7fqueue_work_on
+EXPORT_SYMBOL vmlinux 0x2e0e6752bxcfrn_find_acq
+EXPORT_SYMBOL vmlinux 0x2e1ca751clk_put
+EXPORT_SYMBOL vmlinux 0x2e2b40d2strncat
+EXPORT_SYMBOL vmlinux 0x2e41933epadata_start
+EXPORT_SYMBOL vmlinux 0x2e593a27timespec64_to_jiffies
+EXPORT_SYMBOL vmlinux 0x2e60154adevm_devfreq_add_device
+EXPORT_SYMBOL vmlinux 0x2e63a3edsock_common_getsockopt
+EXPORT_SYMBOL vmlinux 0x2e6a7628get_cached_acl_rcu
+EXPORT_SYMBOL vmlinux 0x2e832a1btcp_sync_mss
+EXPORT_SYMBOL vmlinux 0x2e83a644cf_action_exec
+EXPORT_SYMBOL vmlinux 0x2e95195c__x86_indirect_thunk_rax
+EXPORT_SYMBOL vmlinux 0x2ec2e210agp Generic_remove_memory
+EXPORT_SYMBOL vmlinux 0x2ee49055ab3100_event_register
+EXPORT_SYMBOL vmlinux 0x2ef63ad6sclsi_dev_info_list_del_keyed
+EXPORT_SYMBOL vmlinux 0x2efa1e2t tty_port_put
+EXPORT_SYMBOL vmlinux 0x2f03fa4bc4security_secmark_refcount_inc
+EXPORT_SYMBOL vmlinux 0x2f046c97submit_bio_wait
+EXPORT_SYMBOL vmlinux 0x2f112193tcf_em_unregister
+EXPORT_SYMBOL vmlinux 0x2f287b00irq_cput_rmap_add
+EXPORT_SYMBOL vmlinux 0x2f2c01bctcf_exts_change
+EXPORT_SYMBOL vmlinux 0x2f2ccee2tcf_chain_get
+EXPORT_SYMBOL vmlinux 0x2f2e91b2security_ib_alloc_security
+EXPORT_SYMBOL vmlinux 0x2f384db3acpi_is_video_device
+EXPORT_SYMBOL vmlinux 0x2f392f0ageneric_file_mmap
+EXPORT_SYMBOL vmlinux 0x2f4c2c62blapkq_map_user_ioctl
+EXPORT_SYMBOL vmlinux 0x2f4f00a8input_unregister_device
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+EXPORT_SYMBOL vmlinux 0x2f72025invalidate_bdev
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+EXPORT_SYMBOL vmlinux 0x2f85f662ttport_raise_dtr_rts
+EXPORT_SYMBOL vmlinux 0x2f8a6b5input_allocate_device
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+EXPORT_SYMBOL vmlinux 0x349c8a85strchr
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+EXPORT_SYMBOL vmlinux 0x34be8a76dev_queue_xmit
+EXPORT_SYMBOL vmlinux 0x34c16ca0__sync_dirty_buffer
+EXPORT_SYMBOL vmlinux 0x34d43030__tracepoint_rdpmsg
+EXPORT_SYMBOL vmlinux 0x34e89e73dm_unregister_target
+EXPORT_SYMBOL vmlinux 0x34f3484esecurity__un_dev_attach_queue
+EXPORT_SYMBOL vmlinux 0x34f89363acpi_terminate_debugger
+EXPORT_SYMBOL vmlinux 0x35173833register_reboot_notifier
+EXPORT_SYMBOL vmlinux 0x352d40e0_copy_from_iter_nocache
+EXPORT_SYMBOL vmlinux 0x35301d7d_add_ci
+EXPORT_SYMBOL vmlinux 0x3533ea02gro_cells_receive
+EXPORT_SYMBOL vmlinux 0x3536da76qdisc_watchdog_init
+EXPORT_SYMBOL vmlinux 0x353831eacbio_reset
+EXPORT_SYMBOL vmlinux 0x3539f11bmach_strepy
+EXPORT_SYMBOL vmlinux 0x353e21e3acpi_bios_warning
+EXPORT_SYMBOL vmlinux 0x35625687locks_mandatory_area
+EXPORT_SYMBOL vmlinux 0x356461c8rtc_time64_to_tm
+EXPORT_SYMBOL vmlinux 0x357f1738nvmsubmit_io
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+EXPORT_SYMBOL vmlinux 0x35a8f828zlib_inflateInit2
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+EXPORT_SYMBOL vmlinux 0x54498413xfrm_state_check_expire
+EXPORT_SYMBOL vmlinux 0x544a9db5f_kmstroull
+EXPORT_SYMBOL vmlinux 0x545c8aa9c9 CLEAR_PAGE_DIRTY_BITS
+EXPORT_SYMBOL vmlinux 0x5464d3f6acpi_remove_sci_handler
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+EXPORT_SYMBOL vmlinux 0x65c3c113wait_for_completion_killable_timeout
+EXPORT_SYMBOL vmlinux 0x65c8831ZSTD_decompress_usingDict
+EXPORT_SYMBOL vmlinux 0x65d9e877cpufreq_register_notifier
+EXPORT_SYMBOL vmlinux 0x65df1a3x dec_end
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+EXPORT_SYMBOL vmlinux 0x65ec1a__icmp_send
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+EXPORT_SYMBOL vmlinux 0x65f3a9f_b videomode_to var
+EXPORT_SYMBOL vmlinux 0x661866a2jbd2_journal_init_jbd_inode
+EXPORT_SYMBOL vmlinux 0x6637cd0acpi_install_table_handler
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+EXPORT_SYMBOL vmlinux 0x66602c47bdput
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+EXPORT_SYMBOL vmlinux 0x6b1b67d3__bdevname
+EXPORT_SYMBOL vmlinux 0x6b2dc060dump_stack
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+EXPORT_SYMBOL vmlinux 0x6b46d923cpu_info
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+EXPORT_SYMBOL vmlinux 0x786d3403 vmlinux 0x7879a868 jbd2_journal_submit_inode_data_buffers
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+EXPORT_SYMBOL vmlinux 0x863a276acolor_table
+EXPORT_SYMBOL vmlinux 0x86495e2b_dev_kfree_skb_any
+EXPORT_SYMBOL vmlinux 0x865029ac_hw_addr_sync
+EXPORT_SYMBOL vmlinux 0x8662a774mntput
+EXPORT_SYMBOL vmlinux 0x868acba5get_options
+EXPORT_SYMBOL vmlinux 0x868c94d4obtain_root
+EXPORT_SYMBOL vmlinux 0x86a99b37dev_remove_pack
+EXPORT_SYMBOL vmlinux 0x86a9bbeeconsole_start
+EXPORT_SYMBOL vmlinux 0x86c5839celv_dispatch_sort
+EXPORT_SYMBOL vmlinux 0x86c86143remap_vmalloc_range_partial
+EXPORT_SYMBOL vmlinux 0x86ca11d1nf_log_trace
+EXPORT_SYMBOL vmlinux 0x86dfdfdfacpi_processor_preregister_performance
+EXPORT_SYMBOL vmlinux 0x86f9b5bitmap_parse_user
+EXPORT_SYMBOL vmlinux 0x87042536xfm_policy_bysel_ctx
+EXPORT_SYMBOL vmlinux 0x870df16clkdev_add
+EXPORT_SYMBOL vmlinux 0x871c0a7efiemap_check_flags
+EXPORT_SYMBOL vmlinux 0x872b03eartnlnla_parse_ifla
+EXPORT_SYMBOL vmlinux 0x872b5ee8 __pv_queued_spin_lock_slowpath
+EXPORT_SYMBOL vmlinux 0x8730bb8submit_bh
+EXPORT_SYMBOL vmlinux 0x8733f55esimple_write_begin
+EXPORT_SYMBOL vmlinux 0x874b2532scsi_cmd_ioctl
+EXPORT_SYMBOL vmlinux 0x874cadfip_generic_getfrag
+EXPORT_SYMBOL vmlinux 0x87529586skb_checksum_help
+EXPORT_SYMBOL vmlinux 0x875e5038mapping_tagged
+EXPORT_SYMBOL vmlinux 0x8760b96phy_unregister_fixup_for_uid
+EXPORT_SYMBOL vmlinux 0x876b6587udp_table
+EXPORT_SYMBOL vmlinux 0x876dacf3ec_write
+EXPORT_SYMBOL vmlinux 0x876fad20i2c_clients_command
+EXPORT_SYMBOL vmlinux 0x877ea6d6xfrm_state_insert
+EXPORT_SYMBOL vmlinux 0x878469bdZSTD_decompressStream
+EXPORT_SYMBOL vmlinux 0x8786404cppp_output_wakeup
+EXPORT_SYMBOL vmlinux 0x879c25d5flow_get_u32_dst
+EXPORT_SYMBOL vmlinux 0x879dde92posix_acl_equiv_mode
+EXPORT_SYMBOL vmlinux 0x87a427a2sk_stream_wait_close
+EXPORT_SYMBOL vmlinux 0x87addf8wrmsr_safe_regs_on_cpu
+EXPORT_SYMBOL vmlinux 0x87beb3cdpci_find_pcie_root_port
+EXPORT_SYMBOL vmlinux 0x87c1189dpage_cache_next_hole
+EXPORT_SYMBOL vmlinux 0x87d09a62fscrypt_frame_encrypted_size
+EXPORT_SYMBOL vmlinux 0x87edf695__skb_checksum_complete_head
+EXPORT_SYMBOL vmlinux 0x87f83188miapi_dsci_dcs_set_tear_off
+EXPORT_SYMBOL vmlinux 0x88035fa9fixed_phy_update_state
+EXPORT_SYMBOL vmlinux 0x880889bcdev_disable_lro
+EXPORT_SYMBOL vmlinux 0x883a90ssimple_rename
+EXPORT_SYMBOL vmlinux 0x883a3333genlmsg_put
+EXPORT_SYMBOL vmlinux 0x884dab9bseqno_fence_ops
+EXPORT_SYMBOL vmlinux 0x88582829_raw_read_lock_bh
+EXPORT_SYMBOL vmlinux 0x887fa47e_getnstimeofday64
+EXPORT_SYMBOL vmlinux 0x88969c4btag_pages_for_writeback
+EXPORT_SYMBOL vmlinux 0x88a99b8fdev_graft_qdisc
+EXPORT_SYMBOL vmlinux 0x88abb78bZSTD_insertBlock
+EXPORT_SYMBOL vmlinux 0x88c51d8deth_header
+EXPORT_SYMBOL vmlinux 0x88c7bf77xfrm_find_acq_byseq
+EXPORT_SYMBOL vmlinux 0x88d95010textsearch_find_continuous
+EXPORT_SYMBOL vmlinux 0x88db9f48__check_object_size
+EXPORT_SYMBOL vmlinux 0x88e1d00page_frag_free
+EXPORT_SYMBOL vmlinux 0x88e38d9csum_and_copy_from_iter
+EXPORT_SYMBOL vmlinux 0x88e9cf68get_users
+EXPORT_SYMBOL vmlinux 0x88ea1587netdev_lower_get_next_private
+EXPORT_SYMBOL vmlinux 0x88ea2313__sk_queue_drop_skb
+EXPORT_SYMBOL vmlinux 0x8906c910iov_iter_copy_from_user_atomic
+EXPORT_SYMBOL vmlinux 0x89105c0btpcp_read_sock
+EXPORT_SYMBOL vmlinux 0x89211ee6tcp_prot
+EXPORT_SYMBOL vmlinux 0x892b26a0set_memory_nx
+EXPORT_SYMBOL vmlinux 0x892d44f2agp_find_bridge
+EXPORT_SYMBOL vmlinux 0x8937142bscsi_remove_device
+EXPORT_SYMBOL vmlinux 0x92f812cceth_change_mtu
+EXPORT_SYMBOL vmlinux 0x92fa5abbvme_lm_detach
+EXPORT_SYMBOL vmlinux 0x92ffba1agp_collect_device_status
+EXPORT_SYMBOL vmlinux 0x93022b6__scsi_format_command
+EXPORT_SYMBOL vmlinux 0x9305f8e66cputreq_get
+EXPORT_SYMBOL vmlinux 0x9309a822c_verify_adapter
+EXPORT_SYMBOL vmlinux 0x9324f93a8iosf_mbi_read
+EXPORT_SYMBOL vmlinux 0x9349c21__serio_register_driver
+EXPORT_SYMBOL vmlinux 0x93551e5bpci_msix_vec_count
+EXPORT_SYMBOL vmlinux 0x93559ff8xfmr_state_delete
+EXPORT_SYMBOL vmlinux 0x935be497unregister_binfm
+EXPORT_SYMBOL vmlinux 0x937733e3qid_valid
+EXPORT_SYMBOL vmlinux 0x937a7d78mini_qdisc_pair_swap
+EXPORT_SYMBOL vmlinux 0x937c1954clvd_dev_drop
+EXPORT_SYMBOL vmlinux 0x93818e67ppp_dev_name
+EXPORT_SYMBOL vmlinux 0x938de938blk_rq_map_integrity_sg
+EXPORT_SYMBOL vmlinux 0x938ff253tcp_proc_register
+EXPORT_SYMBOL vmlinux 0x939a6e0b2iou_schedule
+EXPORT_SYMBOL vmlinux 0x93beb3fc74register_dcevent_notifier
+EXPORT_SYMBOL vmlinux 0x93b51868current_task
+EXPORT_SYMBOL vmlinux 0x93c1c9f8tcp_setsockopt
+EXPORT_SYMBOL vmlinux 0x93c343c18pci_bus_write_config_word
+EXPORT_SYMBOL vmlinux 0x93d4c2dageneric_permission
+EXPORT_SYMBOL vmlinux 0x93f3e52acpci_extract_package
+EXPORT_SYMBOL vmlinux 0x93fca811__get_free_pages
+EXPORT_SYMBOL vmlinux 0x94026a5csilun_to_int
+EXPORT_SYMBOL vmlinux 0x9408b61dfinish_no_open
+EXPORT_SYMBOL vmlinux 0x9412a3e8get_super_thawed
+EXPORT_SYMBOL vmlinux 0x9465e25fposix_acl_update_mode
+EXPORT_SYMBOL vmlinux 0x94961283vunmap
+EXPORT_SYMBOL vmlinux 0x94c87e8securedb_endport_manage_subnet
+EXPORT_SYMBOL vmlinux 0x94cd70ecfs_encryption_d_ops
+EXPORT_SYMBOL vmlinux 0x94db7ec3d_genocide
+EXPORT_SYMBOL vmlinux 0x94f46149bk_stack_limits
+EXPORT_SYMBOL vmlinux 0x94f92785__dquot_transfer
+EXPORT_SYMBOL vmlinux 0x950143adset_binfmt
+EXPORT_SYMBOL vmlinux 0x95268a06pcie_capability_write_word
+EXPORT_SYMBOL vmlinux 0x95395301acpi_exception
+EXPORT_SYMBOL vmlinux 0x954218bbmount_subtree
+EXPORT_SYMBOL vmlinux 0x9545af6tasklet_init
+EXPORT_SYMBOL vmlinux 0x954f79f2touchscreen_parse_properties
+EXPORT_SYMBOL vmlinux 0x9550ff03sync_inode_metadata
+EXPORT_SYMBOL vmlinux 0x9554f8ada903x_query_status
+EXPORT_SYMBOL vmlinux 0x955a832f__preempt_schedule
+EXPORT_SYMBOL vmlinux 0x957ccd3mount_pseudo_xattr
+EXPORT_SYMBOL vmlinux 0x95bd6e26acpi_install_sci_handler
+EXPORT_SYMBOL vmlinux 0x95e26cd4__nla_reserve_64bit
+EXPORT_SYMBOL vmlinux 0x95f0f8d83dquot_quota_off
+EXPORT_SYMBOL vmlinux 0x95f42da4 param_get_invbool
+EXPORT_SYMBOL vmlinux 0x96020424 mdio_driver_register
+EXPORT_SYMBOL vmlinux 0x960e7db2 blk_mq_init_queue
+EXPORT_SYMBOL vmlinux 0x9635ab08 netif_carrier_on
+EXPORT_SYMBOL vmlinux 0x9649c497 clkdev_alloc
+EXPORT_SYMBOL vmlinux 0x964eef62 jbd dev2 journal_start
+EXPORT_SYMBOL vmlinux 0x9653932 set_pages_array WB
+EXPORT_SYMBOL vmlinux 0x965a2e00 neigh_seq_start
+EXPORT_SYMBOL vmlinux 0x9669c4f5 dcb ieee delapp
+EXPORT_SYMBOL vmlinux 0x96a4f5ccscsi_device_lookup_by_target
+EXPORT_SYMBOL vmlinux 0x96a56124fs_bio_set
+EXPORT_SYMBOL vmlinux 0x96b29254 strntcasecmp
+EXPORT_SYMBOL vmlinux 0x96b5c7a0nd_region_acquire_lane
+EXPORT_SYMBOL vmlinux 0x96ba5f27blk_rq_map_kern
+EXPORT_SYMBOL vmlinux 0x96c69dev_get_by_napi_id
+EXPORT_SYMBOL vmlinux 0x96cb4b1blk mq add_to_requeue_list
+EXPORT_SYMBOL vmlinux 0x96cd2b04 scsi sense_key_string
+EXPORT_SYMBOL vmlinux 0x96e90b87 dev_change_proto_down
+EXPORT_SYMBOL vmlinux 0x96f526f8_unregister_sockopt
+EXPORT_SYMBOL vmlinux 0x96f54382 getblk_gfp
+EXPORT_SYMBOL vmlinux 0x971cd39dev refcnt read
+EXPORT_SYMBOL vmlinux 0x973b2b0input_set_abs_params
+EXPORT_SYMBOL vmlinux 0x973fa82register_acpi notifier
+EXPORT_SYMBOL vmlinux 0x974e89zstd decompressBegin usingDict
+EXPORT_SYMBOL vmlinux 0x9754c10radix tree preload
+EXPORT_SYMBOL vmlinux 0x9763b0pm860x reg read
+EXPORT_SYMBOL vmlinux 0x976516cvmemmap_base
+EXPORT_SYMBOL vmlinux 0x9776a8532c master recv
+EXPORT_SYMBOL vmlinux 0x97817c54 simple nosetlease
+EXPORT_SYMBOL vmlinux 0x97868aef _kfifo alloc
+EXPORT_SYMBOL vmlinux 0x97999817rflkill set_hw state
+EXPORT_SYMBOL vmlinux 0x97a57333cre t10dif update
+EXPORT_SYMBOL vmlinux 0x97b9663unregister_cdm
+EXPORT_SYMBOL vmlinux 0x97bb1fcscsi is_target_device
+EXPORT_SYMBOL vmlinux 0x97c5bd0acpi unload parent_table
+EXPORT_SYMBOL vmlinux 0x97ce8c13auser revoke
+EXPORT_SYMBOL vmlinux 0x97de0ddacpi install gpe_block
+EXPORT_SYMBOL vmlinux 0x97df3f4bitmap startwrite
+EXPORT_SYMBOL vmlinux 0x981edf1backlight_device_unregister
+EXPORT_SYMBOL vmlinux 0x9829fc11 _kfifo out seek r
+EXPORT_SYMBOL vmlinux 0x983492cfintel gmch probe
+EXPORT_SYMBOL vmlinux 0x9846a1c5pci clear master
+EXPORT_SYMBOL vmlinux 0x9847c8c7prepare kernel cred
+EXPORT_SYMBOL vmlinux 0x9856d424dma fence array ops
+EXPORT_SYMBOL vmlinux 0x9857aafdinet6 del offload
+EXPORT_SYMBOL vmlinux 0x9867dc7farch io free memtype wc
+EXPORT_SYMBOL vmlinux 0x986857d1cf exts dump
+EXPORT_SYMBOL vmlinux 0x986e6135fb pad unaligned buffer
+EXPORT_SYMBOL vmlinux 0xa87d7eaageniphy_update_link
+EXPORT_SYMBOL vmlinux 0xa8896870blk_register_region
+EXPORT_SYMBOL vmlinux 0xa8a63aaa0tty_port_carrier_raised
+EXPORT_SYMBOL vmlinux 0xa8cf3db9dquot_quota_on_mount
+EXPORT_SYMBOL vmlinux 0xa8d1c805dentry_update_name_case
+EXPORT_SYMBOL vmlinux 0xa8eb932cblkmq_queue_stopped
+EXPORT_SYMBOL vmlinux 0xa8f3d133_xfrm_dst_lookup
+EXPORT_SYMBOL vmlinux 0xa9026f18jbd2_journal_get_write_access
+EXPORT_SYMBOL vmlinux 0xa915b5b2fb_firmware_edid
+EXPORT_SYMBOL vmlinux 0xa9168676xmmt_recursion
+EXPORT_SYMBOL vmlinux 0xa916b694strmLEN
+EXPORT_SYMBOL vmlinux 0xa94fa645tcp_disconnect
+EXPORT_SYMBOL vmlinux 0xa952cd93app_unbind_memory
+EXPORT_SYMBOL vmlinux 0xa955a66bbacklight_device_get_by_type
+EXPORT_SYMBOL vmlinux 0xa957a24dbblk_queue_init_tags
+EXPORT_SYMBOL vmlinux 0xa95bc8fclinet_frags_exit_net
+EXPORT_SYMBOL vmlinux 0xa96e57bamsi_desc_to_pci_dev
+EXPORT_SYMBOL vmlinux 0xa976957dbitmap_remap
+EXPORT_SYMBOL vmlinux 0xa9785b49cpu_core_map
+EXPORT_SYMBOL vmlinux 0xa991a208inet_ioctl
+EXPORT_SYMBOL vmlinux 0xa9992349ipmr_cache_free
+EXPORT_SYMBOL vmlinux 0xa99b39c2prandom_bytes
+EXPORT_SYMBOL vmlinux 0xa9a19645cfblock_get
+EXPORT_SYMBOL vmlinux 0xa9a8e17farcl_phys_wc_add
+EXPORT_SYMBOL vmlinux 0xa9b2d676_vmalloc
+EXPORT_SYMBOL vmlinux 0xa9be0092blk_run_queue
+EXPORT_SYMBOL vmlinux 0xa9cc142dtpcproc_unregister
+EXPORT_SYMBOL vmlinux 0xa9e08275_raw_spin_lock_bh
+EXPORT_SYMBOL vmlinux 0xa9f10218abx500_startupt_irq_enabled
+EXPORT_SYMBOL vmlinux 0xaa0a5e7dmcmc_request_done
+EXPORT_SYMBOL vmlinux 0xaa3832a7path_is_mountpoint
+EXPORT_SYMBOL vmlinux 0xaa51bebcbphy_aneg_done
+EXPORT_SYMBOL vmlinux 0xaa5dc1dbmmc_can_discard
+EXPORT_SYMBOL vmlinux 0xaa6f23adrfkill_get_led_trigger_name
+EXPORT_SYMBOL vmlinux 0xaa70448a_acpi_handle_debug
+EXPORT_SYMBOL vmlinux 0xaa7b5740unlock_page_mmcg
+EXPORT_SYMBOL vmlinux 0xaa7b6231phy_device_register
+EXPORT_SYMBOL vmlinux 0xaa7ccbd5kblockd_schedule_delayed_work_on
+EXPORT_SYMBOL vmlinux 0xaa7d37d4dowait_intr_irq
+EXPORT_SYMBOL vmlinux 0xaa7e7157freezing_slow_path
+EXPORT_SYMBOL vmlinux 0xaa84f5devclkldev_hwa_alloc
+EXPORT_SYMBOL vmlinux 0xaa9923bablk_post_runtime_suspend
+EXPORT_SYMBOL vmlinux 0xaab9a15iov_iter_kvec
+EXPORT_SYMBOL vmlinux 0xad0ae78_bitmap_shift_right
+EXPORT_SYMBOL vmlinux 0xad6d92fkrkinit_sw_state
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+EXPORT_SYMBOL vmlinux 0xaada855dicmpv6_ndo_send
+EXPORT_SYMBOL vmlinux 0xaabe8a0eacpi_bus_power_manageable
+EXPORT_SYMBOL vmlinux 0xaaeda01cnetlink_broadcast
+EXPORT_SYMBOL vmlinux 0xaaf74ef8blk_init_queue_node
+EXPORT_SYMBOL vmlinux 0xaafde258strtracecmp
+EXPORT_SYMBOL vmlinux 0xaaff074dquot_enable
+EXPORT_SYMBOL vmlinux 0xab04df8phy_ethtool_get_wol
+EXPORT_SYMBOL vmlinux 0xab0b4796agp_generic_create_gatt_table
+EXPORT_SYMBOL vmlinux 0xab264dechachah20_block
+EXPORT_SYMBOL vmlinux 0xab2ca83dev_load
+EXPORT_SYMBOL vmlinux 0xab3dd9dev_mc_del
+EXPORT_SYMBOL vmlinux 0xab3697e4irq_poll_init
+EXPORT_SYMBOL vmlinux 0xab50e45fddevm_gpio_request
+EXPORT_SYMBOL vmlinux 0xab551fadaacpi_get_data_full
+EXPORT_SYMBOL vmlinux 0xab5f31c8pci_dev_get
+EXPORT_SYMBOL vmlinux 0xab600421probe_irq_off
+EXPORT_SYMBOL vmlinux 0xab63baa5unregister_inetaddr_validator_notifier
+EXPORT_SYMBOL vmlinux 0xab641a7cblk_set_stack_limit
+EXPORT_SYMBOL vmlinux 0xab65ed80set_memory_uc
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+EXPORT_SYMBOL vmlinux 0xab781570fb_get_options
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+EXPORT_SYMBOL vmlinux 0xab8e9214devm_gpiod_get_optional
+EXPORT_SYMBOL vmlinux 0xab993a87swiothb_dma_mapping_error
+EXPORT_SYMBOL vmlinux 0xabbeac5c5input_nt_init_slots
+EXPORT_SYMBOL vmlinux 0xac08bf7cwireless_spy_update
+EXPORT_SYMBOL vmlinux 0xac0daa85mcmd_spy_update
+EXPORT_SYMBOL vmlinux 0xac1a55beunregister_reboot_notifier
+EXPORT_SYMBOL vmlinux 0xac213e6dev_get_by_name_rcu
+EXPORT_SYMBOL vmlinux 0xac219f4dpksam_extract
+EXPORT_SYMBOL vmlinux 0xac398912flex_array_clear
+EXPORT_SYMBOL vmlinux 0xac541d4netdev_update_features
+EXPORT_SYMBOL vmlinux 0xac54a288blk_queue_bounce_limit
+EXPORT_SYMBOL vmlinux 0xac59ce17unlock_page
+EXPORT_SYMBOL vmlinux 0xac5e84f2shrink_dcache_sb
+EXPORT_SYMBOL vmlinux 0xac7c319acpi_tb_upload_table
+EXPORT_SYMBOL vmlinux 0xacab29b7seq_hlist_start_percpu
+EXPORT_SYMBOL vmlinux 0xacb4c7a7blk_get_request
+EXPORT_SYMBOL vmlinux 0xacbf0940pci_unmap_isspace
+EXPORT_SYMBOL vmlinux 0xacce27cf_dev_get_by_index
+EXPORT_SYMBOL vmlinux 0xaccc6ain4_pnton
+EXPORT_SYMBOL vmlinux 0xacd1bcmdipi_dsi_dcs_set_tear_on
+EXPORT_SYMBOL vmlinux 0xacf1ee1nd_device_notify
+EXPORT_SYMBOL vmlinux 0xb2f74fb6intel_gmc_remove
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+EXPORT_SYMBOL vmlinux 0xb308c97dwait_woken
+EXPORT_SYMBOL vmlinux 0xb32026faata_link_printk
+EXPORT_SYMBOL vmlinux 0xb3284531acpi_dbg_layer
+EXPORT_SYMBOL vmlinux 0xb32e822fsecurity_sb_set_mnt_opts
+EXPORT_SYMBOL vmlinux 0xb33224a3tcp_v4_mtu_reduced
+EXPORT_SYMBOL vmlinux 0xb336c2b2empty_name
+EXPORT_SYMBOL vmlinux 0xb351a744errseq_sample
+EXPORT_SYMBOL vmlinux 0xb3521777find_first_bit
+EXPORT_SYMBOL vmlinux 0xb3687850out_of_line_wait_on_bit_lock
+EXPORT_SYMBOL vmlinux 0xb3a2dfdfnmi_panic
+EXPORT_SYMBOL vmlinux 0xb3adab31sock_create
+EXPORT_SYMBOL vmlinux 0xb3dfbadkey_type_keyring
+EXPORT_SYMBOL vmlinux 0xb3dc76dscsi_hostbyte_string
+EXPORT_SYMBOL vmlinux 0xb3d7cb1dcokie_een_ok
+EXPORT_SYMBOL vmlinux 0xb3f3ebd3xhx32_reset
+EXPORT_SYMBOL vmlinux 0xb3f7646ekthread_should_stop
+EXPORT_SYMBOL vmlinux 0xb407d1aadma_virt_ops
+EXPORT_SYMBOL vmlinux 0xb409ff44bitmap_end_sync
+EXPORT_SYMBOL vmlinux 0xb40b6643netdev_err
+EXPORT_SYMBOL vmlinux 0xb415bfcbpercpu_counter_destroy
+EXPORT_SYMBOL vmlinux 0xb41f38ccmcmd_cluster_ops
+EXPORT_SYMBOL vmlinux 0xb423db1console_blanked
+EXPORT_SYMBOL vmlinux 0xb441911aconsole_blanked
+EXPORT_SYMBOL vmlinux 0xb44ad4b3_copy_to_user
+EXPORT_SYMBOL vmlinux 0xb46bd0e2device_add_disk
+EXPORT_SYMBOL vmlinux 0xb46ec83cip_nc_inc_group
+EXPORT_SYMBOL vmlinux 0xb479322scsi_dev_info_add_list
+EXPORT_SYMBOL vmlinux 0xb47189b5reservation_ww_class
+EXPORT_SYMBOL vmlinux 0xb474defpci_irq_get_node
+EXPORT_SYMBOL vmlinux 0xb47ca30csmpipv6_magic
+EXPORT_SYMBOL vmlinux 0xb49a73badquotTransfer
+EXPORT_SYMBOL vmlinux 0xb49e8767neigh_event_send
+EXPORT_SYMBOL vmlinux 0xb4b19ad7met_addr_type
+EXPORT_SYMBOL vmlinux 0xb4b8824cont_write_begin
+EXPORT_SYMBOL vmlinux 0xb4dcb85configfs_unregister_default_group
+EXPORT_SYMBOL vmlinux 0xb511cb32d_alloc_pseudo
+EXPORT_SYMBOL vmlinux 0xb51f3465skb_put
+EXPORT_SYMBOL vmlinux 0xb52c7adcbio_clone_fast
+EXPORT_SYMBOL vmlinux 0xb52ee8beintel_gtt_clear_range
+EXPORT_SYMBOL vmlinux 0xb548fb5e5pci_release_region
+EXPORT_SYMBOL vmlinux 0xb56392b1jdbc2journal_check_used_features
+EXPORT_SYMBOL vmlinux 0xb57334c2frontswap_shrink
+EXPORT_SYMBOL vmlinux 0xb573cede3delete_from_page_cache
+EXPORT_SYMBOL vmlinux 0xb574b791rdmacg_register_device
+EXPORT_SYMBOL vmlinux 0xb57dfe00kernel_sendmsg
+EXPORT_SYMBOL vmlinux 0xb5933299ip_checksum
+EXPORT_SYMBOL vmlinux 0xbeb0287bitmap_sync_with_cluster
+EXPORT_SYMBOL vmlinux 0xbe1d25ctcf_exts_dump_stats
+EXPORT_SYMBOL vmlinux 0xbec1c16ainet_peer_xrfim_allow
+EXPORT_SYMBOL vmlinux 0xbf126bcmigrate_page_move_mapping
+EXPORT_SYMBOL vmlinux 0xbf43296console_conditional_schedule
+EXPORT_SYMBOL vmlinux 0xbf0f05c8phy_unregister_fixup
+EXPORT_SYMBOL vmlinux 0xbf12cb3cppp_unit_number
+EXPORT_SYMBOL vmlinux 0xbf181dffeetcf_block_cb_decref
+EXPORT_SYMBOL vmlinux 0xbf34f8f0fxfm_alloc_spi
+EXPORT_SYMBOL vmlinux 0xbf3d5ad1pci_scan_bridge
+EXPORT_SYMBOL vmlinux 0xbf49dc99 mmc_claim_host
+EXPORT_SYMBOL vmlinux 0xbf631c5bnetlink_capable
+EXPORT_SYMBOL vmlinux 0xbf631ce0rt6_lookup
+EXPORT_SYMBOL vmlinux 0xbf8ce41seq_release
+EXPORT_SYMBOL vmlinux 0xbf9bce8d__cap_empty_set
+EXPORT_SYMBOL vmlinux 0xbf9c09bmax8925_set_bits
+EXPORT_SYMBOL vmlinux 0xbf92eeinit_opal_dev
+EXPORT_SYMBOL vmlinux 0xbf9fab77blk_queue_alignment_offset
+EXPORT_SYMBOL vmlinux 0xbf3bf0bfreg_irq_cpu_rmap
+EXPORT_SYMBOL vmlinux 0xbf7df7fdown_write
+EXPORT_SYMBOL vmlinux 0xbf177bciowrite32_rep
+EXPORT_SYMBOL vmlinux 0xbf613d66evalidisk
+EXPORT_SYMBOL vmlinux 0xbf613d66indirect_thunk_r11
+EXPORT_SYMBOL vmlinux 0xbfe63b3xenbus_dev_request_and_reply
+EXPORT_SYMBOL vmlinux 0xbf027bf2loop_unregister_transfer
+EXPORT_SYMBOL vmlinux 0xc002941utc_lib_get_port
+EXPORT_SYMBOL vmlinux 0xc00906dbtty_flip_buffer_push
+EXPORT_SYMBOL vmlinux 0xc029437ctset_pages_array_uc
+EXPORT_SYMBOL vmlinux 0xc035d297fblk_queue_update_dma_alignment
+EXPORT_SYMBOL vmlinux 0xc064e057get_io_context
+EXPORT_SYMBOL vmlinux 0xc078bc76jbd2_complete_transaction
+EXPORT_SYMBOL vmlinux 0xc07ea8c7nfs_ainfo
+EXPORT_SYMBOL vmlinux 0xc079c7e7ip_me_join_group
+EXPORT_SYMBOL vmlinux 0xc0823e4ctwl_i2c__write
+EXPORT_SYMBOL vmlinux 0xc0861871tti_vhangup
+EXPORT_SYMBOL vmlinux 0xc097de84bprm_change_interp
+EXPORT_SYMBOL vmlinux 0xc0980cdecquot_operations
+EXPORT_SYMBOL vmlinux 0xc0a3d10ffind_next_bit
+EXPORT_SYMBOL vmlinux 0xc0b0582cppanic_notifier_list
+EXPORT_SYMBOL vmlinux 0xc0b4d960inode_init_everywhere
+EXPORT_SYMBOL vmlinux 0xc0f555b8unix_attach_fds
+EXPORT_SYMBOL vmlinux 0xc0fca0f1ZSTD_nextSrcSizeToDecompress
+EXPORT_SYMBOL vmlinux 0xc0f7e26c3jbd2_journal_release_jbd_inode
+EXPORT_SYMBOL vmlinux 0xc0f1d908mipi_dsi_dcs_soft_reset
+EXPORT_SYMBOL vmlinux 0xc0e02e8babort
+EXPORT_SYMBOL vmlinux 0xc0e0b49fdevm_clk_put

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+EXPORT_SYMBOL vmlinux 0xc0f3acbfpci_get_class
+EXPORT_SYMBOL vmlinux 0xc0f69aa7genl_register_family
+EXPORT_SYMBOL vmlinux 0xc0f9f8edjbd2_journal_clear_err
+EXPORT_SYMBOL vmlinux 0xc10138fempage_readpages
+EXPORT_SYMBOL vmlinux 0xc11366c5tty_port_hangup
+EXPORT_SYMBOL vmlinux 0xc126dc7eqdisc_class_hash_grow
+EXPORT_SYMBOL vmlinux 0xc127bc2bmake_bad_inode
+EXPORT_SYMBOL vmlinux 0xc13c47c4tty_port_free_xmit_buf
+EXPORT_SYMBOL vmlinux 0xc1514a3bfree_irq
+EXPORT_SYMBOL vmlinux 0xc15a44c6memzero_explicit
+EXPORT_SYMBOL vmlinux 0xc15f34dfparam_set_byte
+EXPORT_SYMBOL vmlinux 0xc16410b9ZSTD_getDictID_fromDDict
+EXPORT_SYMBOL vmlinux 0xc188721frb_insert_color Cached
+EXPORT_SYMBOL vmlinux 0xc1939e80nttt Probe
+EXPORT_SYMBOL vmlinux 0xc19553b7ttysalloc_xmit_buf
+EXPORT_SYMBOL vmlinux 0xc19c3f49inet_rcv_saddr_equal
+EXPORT_SYMBOL vmlinux 0xc19e6941dowait_intr
+EXPORT_SYMBOL vmlinux 0xc19805xfmmrcv
+EXPORT_SYMBOL vmlinux 0xc1cddbf1mmc_register_driver
+EXPORT_SYMBOL vmlinux 0xc1d8caf_firstget
+EXPORT_SYMBOL vmlinux 0xc1d9477finet_add_offload
+EXPORT_SYMBOL vmlinux 0xc1dabc24prepare_to_swait_event
+EXPORT_SYMBOL vmlinux 0xc1e1c93fmount_bdev
+EXPORT_SYMBOL vmlinux 0xc1f11181input_register_handle
+EXPORT_SYMBOL vmlinux 0xc1f7625invalide_partition
+EXPORT_SYMBOL vmlinux 0xc2082552param_get_int
+EXPORT_SYMBOL vmlinux 0xc21b36dfiscrypt_decrypt_page
+EXPORT_SYMBOL vmlinux 0xc2424641agp3_generic_cleanup
+EXPORT_SYMBOL vmlinux 0xc24a4229fiscrypt_restore_control_page
+EXPORT_SYMBOL vmlinux 0xc24f1ee1tty_register_Ldisc
+EXPORT_SYMBOL vmlinux 0xc262a139briotctrl_set
+EXPORT_SYMBOL vmlinux 0xc2665fe1mdio_bus_type
+EXPORT_SYMBOL vmlinux 0xc26a2648copy_page_to_iter
+EXPORT_SYMBOL vmlinux 0xc278c965cpu_all_bits
+EXPORT_SYMBOL vmlinux 0xc27e0e5eww_mutex_lock_interruptible
+EXPORT_SYMBOL vmlinux 0xc281c868inet6_add_offload
+EXPORT_SYMBOL vmlinux 0xc28ded3eunix_gc_lock
+EXPORT_SYMBOL vmlinux 0xc29957c3__x86间接_thunk_rcx
+EXPORT_SYMBOL vmlinux 0xc299b967strlen
+EXPORT_SYMBOL vmlinux 0xc29d9b7esk_page_frag_refill
+EXPORT_SYMBOL vmlinux 0xc2a99676input_unregister_handler
+EXPORT_SYMBOL vmlinux 0xc2d70c1fd_drop
+EXPORT_SYMBOL vmlinux 0xc2e587d1reset_devices
+EXPORT_SYMBOL vmlinux 0xc2ebabe8inet6_offloads
+EXPORT_SYMBOL vmlinux 0xc2fc92c2blk_mq_free_tag_set
+EXPORT_SYMBOL vmlinux 0xc3073e5vm_submit_io_sync
+EXPORT_SYMBOL vmlinux 0xc310b981strlen
+EXPORT_SYMBOL vmlinux 0xc32128b6set_anon_super
+EXPORT_SYMBOL vmlinux 0xc53adcbdma_ops
+EXPORT_SYMBOL vmlinux 0xc553d4d4ioread16
+EXPORT_SYMBOL vmlinux 0xc55853d3profile_pc
+EXPORT_SYMBOL vmlinux 0xc57bbe34.rfc4_vmd_tfr_encap
+EXPORT_SYMBOL vmlinux 0xc589f22flow_keys_dissector
+EXPORT_SYMBOL vmlinux 0xc599a772security_xfrm_state_delete
+EXPORT_SYMBOL vmlinux 0xc5bfda699sync_inode
+EXPORT_SYMBOL vmlinux 0xc5a695abmd_wakeup_thread
+EXPORT_SYMBOL vmlinux 0xc5c1d2cageneric_error_remove_page
+EXPORT_SYMBOL vmlinux 0xc5d6481config_item_put
+EXPORT_SYMBOL vmlinux 0xc5d946c46agp_try_unsupported_boot
+EXPORT_SYMBOL vmlinux 0xc5e4a5d1cpumask_next
+EXPORT_SYMBOL vmlinux 0xc616c5bpcim_enable_device
+EXPORT_SYMBOL vmlinux 0xc62b1cd7devm_gpiod_put
+EXPORT_SYMBOL vmlinux 0xc6150800console_unlock
+EXPORT_SYMBOL vmlinux 0xc64d8c9fpci_read_config_word
+EXPORT_SYMBOL vmlinux 0xc65aeb7aggp3_gen_sizes
+EXPORT_SYMBOL vmlinux 0xc663d981sync_inode
+EXPORT_SYMBOL vmlinux 0xc666a132acp_try_unsupported_boot
+EXPORT_SYMBOL vmlinux 0xc67ada38get_super
+EXPORT_SYMBOL vmlinux 0xc69e63eaakfree_skb_list
+EXPORT_SYMBOL vmlinux 0xc6a0d9f9eth_header_cache_update
+EXPORT_SYMBOL vmlinux 0xc6a23c0c3mdio_device_remove
+EXPORT_SYMBOL vmlinux 0xc6a9d1fesock_no_connect
+EXPORT_SYMBOL vmlinux 0xc6b368d3acpi_gpe_count
+EXPORT_SYMBOL vmlinux 0xc6b74405put_zone_device_private_or_public_page
+EXPORT_SYMBOL vmlinux 0xc6c465a_kfifo_max_r
+EXPORT_SYMBOL vmlinux 0xc6c6c89capable
+EXPORT_SYMBOL vmlinux 0xc6cded6kmem_cache_create
+EXPORT_SYMBOL vmlinux 0xc6d9d4bamaca_cqe_post_req
+EXPORT_SYMBOL vmlinux 0xc6e5d28fprepare_to_wait_exclusive
+EXPORT_SYMBOL vmlinux 0xc6fe85ecdm_qkick_requeue_list
+EXPORT_SYMBOL vmlinux 0xc708c3aserial8250_resume_port
+EXPORT_SYMBOL vmlinux 0xc74c9b1clocksource_change_rating
+EXPORT_SYMBOL vmlinux 0xc751f6cmdiobus_unregister
+EXPORT_SYMBOL vmlinux 0xc7563db8twl_set_regcache_bypass
+EXPORT_SYMBOL vmlinux 0xc760f00generic_pipe_buf_get
+EXPORT_SYMBOL vmlinux 0xc76c458bdel_timer
+EXPORT_SYMBOL vmlinux 0xc781bd9frfkill_resume_polling
+EXPORT_SYMBOL vmlinux 0xc7856a3dinet6addr_notifier_call_chain
+EXPORT_SYMBOL vmlinux 0xc79bdc36dm_vcalloc
+EXPORT_SYMBOL vmlinux 0xc7a4fbedrtnl_lock
+EXPORT_SYMBOL vmlinux 0xc7a55281may_umount_tree
+EXPORT_SYMBOL vmlinux 0xc7a5759e6cppp_register_channel
+EXPORT_SYMBOL vmlinux 0xc7b3ec50ipv6_chk_prefix
+EXPORT_SYMBOL vmlinux 0xcd279169nla_find
+EXPORT_SYMBOL vmlinux 0xcd439246native_save_fl
+EXPORT_SYMBOL vmlinux 0xcd484d18wait_for_completion_interruptible
+EXPORT_SYMBOL vmlinux 0xcd4b2adbpie_capability_clear_and_set_dword
+EXPORT_SYMBOL vmlinux 0xcd65c2dewait_iff_congested
+EXPORT_SYMBOL vmlinux 0xcd88b20c__get_hash_from_flowi6
+EXPORT_SYMBOL vmlinux 0xcdac2ac0flow_hash_from_keys
+EXPORT_SYMBOL vmlinux 0xcdb05766dquot_drop
+EXPORT_SYMBOL vmlinux 0xcdb114d3sock_kzfree_s
+EXPORT_SYMBOL vmlinux 0xcdb20154bdi_set_max_ratio
+EXPORT_SYMBOL vmlinux 0xcdc30402locks_lock_inode_wait
+EXPORT_SYMBOL vmlinux 0xcdc39c9esecurity_ismaclabel
+EXPORT_SYMBOL vmlinux 0xcdc42ac0__fib6_flush_trees
+EXPORT_SYMBOL vmlinux 0xcdcda840nip_ip6_checksum
+EXPORT_SYMBOL vmlinux 0xce77bcffree_opal_dev
+EXPORT_SYMBOL vmlinux 0xce8e10bkskb_queue_tail
+EXPORT_SYMBOL vmlinux 0xcef38554inet_csk_delete_keepalive_timer
+EXPORT_SYMBOL vmlinux 0xce0315b8dma_async_device_unregister
+EXPORT_SYMBOL vmlinux 0xce056cb8acpi_bus_get_device
+EXPORT_SYMBOL vmlinux 0xce12f420vme_bus_error_handler
+EXPORT_SYMBOL vmlinux 0xce1db753compat_tcp_setssockopt
+EXPORT_SYMBOL vmlinux 0xce1ead2xfrm_state_unregister_afinfo
+EXPORT_SYMBOL vmlinux 0xce255edaparam_ops_string
+EXPORT_SYMBOL vmlinux 0xce2840e7irq_set_irq_wake
+EXPORT_SYMBOL vmlinux 0xce423fd6bdquot_resume
+EXPORT_SYMBOL vmlinux 0xce4904a4apci_leave_sleep_state
+EXPORT_SYMBOL vmlinux 0xce4e47b6__kfifo_skip_r
+EXPORT_SYMBOL vmlinux 0xce5ac24fzlib_inflate_workspacesize
+EXPORT_SYMBOL vmlinux 0xce7708cf__skb_tx_hash
+EXPORT_SYMBOL vmlinux 0xce74fe4serial8250_set_isa_configurator
+EXPORT_SYMBOL vmlinux 0xce7850ecrc32_le_shift
+EXPORT_SYMBOL vmlinux 0xce7bfe70vm_brk
+EXPORT_SYMBOL vmlinux 0xce8b1878__x86 indirect thunk r14
+EXPORT_SYMBOL vmlinux 0xce9f60c2md_error
+EXPORT_SYMBOL vmlinux 0xceab0311strchrnul
+EXPORT_SYMBOL vmlinux 0xceae504fcmdbuf_lines_parts_free
+EXPORT_SYMBOL vmlinux 0xceb1748epipe_lock
+EXPORT_SYMBOL vmlinux 0xcec54e52generic_keyInstantiate
+EXPORT_SYMBOL vmlinux 0xceec680fnetlink_broadcast_filtered
+EXPORT_SYMBOL vmlinux 0xceec777eabidr_destroy
+EXPORT_SYMBOL vmlinux 0xcef605cpci_get_slot
+EXPORT_SYMBOL vmlinux 0xcefa3862blkmq_kick_requeue_list
+EXPORT_SYMBOL vmlinux 0xcef4a0c8edrom_get_last_written
+EXPORT_SYMBOL vmlinux 0xcef51982kstrtrou16
+EXPORT_SYMBOL vmlinux 0xcef62207dmam_alloc_attrs
+EXPORT_SYMBOL vmlinux 0xcef8fbdesgl_alloc_order
+EXPORT_SYMBOL vmlinux 0xd1f3e4set_groups
+EXPORT_SYMBOL vmlinux 0xd1f3e5nla_reserve
+EXPORT_SYMBOL vmlinux 0xd22d04dtry_wait_for_completion
+EXPORT_SYMBOL vmlinux 0xd2302c78ionmu_tcb_pool_init
+EXPORT_SYMBOL vmlinux 0xd23d49dascsi_dev_info_list_add_keyed
+EXPORT_SYMBOL vmlinux 0xd24cb964dquot_set_dqinfo
+EXPORT_SYMBOL vmlinux 0xd2555f19jiffies_64_to_clock_t
+EXPORT_SYMBOL vmlinux 0xd25c8ce8backlight_device_set_brightness
+EXPORT_SYMBOL vmlinux 0xd25d474console_blank_hook
+EXPORT_SYMBOL vmlinux 0xd265a6dnvm_dev_dma_free
+EXPORT_SYMBOL vmlinux 0xd26b3ed2alloc_xen ballooned_pages
+EXPORT_SYMBOL vmlinux 0xd2789b8end_pfn_probe
+EXPORT_SYMBOL vmlinux 0xd27b25ddblk_check_plugged
+EXPORT_SYMBOL vmlinux 0xd292cd3eunregister_netdevice_queue
+EXPORT_SYMBOL vmlinux 0xd2a1e276_tracepoint_read_msr
+EXPORT_SYMBOL vmlinux 0xd2ac1c98sk_backlog_rcv
+EXPORT_SYMBOL vmlinux 0xd2b01865blk_start_queue_async
+EXPORT_SYMBOL vmlinux 0xd2b09c5kmalloc
+EXPORT_SYMBOL vmlinux 0xd2c6624dnla_validate
+EXPORT_SYMBOL vmlinux 0xd2cfdee3lock_socket_nested
+EXPORT_SYMBOL vmlinux 0xd2da1048register_netdevice_notifier
+EXPORT_SYMBOL vmlinux 0xd2e7e06bvga_switcheroo_lock_ddc
+EXPORT_SYMBOL vmlinux 0xd31ee18abuffer_migrate_page
+EXPORT_SYMBOL vmlinux 0xd322f2c2devfreq_suspend_device
+EXPORT_SYMBOL vmlinux 0xd3358cf3configfs_depend_item
+EXPORT_SYMBOL vmlinux 0xd33b6463skb_checksum
+EXPORT_SYMBOL vmlinux 0xd353cf06vga_switcheroo_register_audio_client
+EXPORT_SYMBOL vmlinux 0xd3550a3devm_backlight_device_register
+EXPORT_SYMBOL vmlinux 0xd35d6e2cbclk_mq_stop_hw_queue
+EXPORT_SYMBOL vmlinux 0xd366e9b7pci_free_host_bridge
+EXPORT_SYMBOL vmlinux 0xd36e3d59prandom_bytes_state
+EXPORT_SYMBOL vmlinux 0xd3776473pci_try_set_mwi
+EXPORT_SYMBOL vmlinux 0xd38cd261__default_kernel_pte_mask
+EXPORT_SYMBOL vmlinux 0xd39621baproc_set_user
+EXPORT_SYMBOL vmlinux 0xd3bbdf5genphy_config_aneg
+EXPORT_SYMBOL vmlinux 0xd38fd2seq_puts
+EXPORT_SYMBOL vmlinux 0xd3e65531get_super_exclusive_thawed
+EXPORT_SYMBOL vmlinux 0xd3e6db16mipi_dsi_dcs_get_display_brightness
+EXPORT_SYMBOL vmlinux 0xd40d2baposix_acl_chmod
+EXPORT_SYMBOL vmlinux 0xd4124224eth_validate_addr
+EXPORT_SYMBOL vmlinux 0xd414f50dquot_commit
+EXPORT_SYMBOL vmlinux 0xd44e7d7daddd_timer
+EXPORT_SYMBOL vmlinux 0xd4522129devm_memremap
+EXPORT_SYMBOL vmlinux 0xd459e0d4sgl_free_order
+EXPORT_SYMBOL vmlinux 0xd45cc6caintern2hex
+EXPORT_SYMBOL vmlinux 0xd4d6167fb_show_logo
+EXPORT_SYMBOL vmlinux 0xd4696d03devm_get_clk_from_child
+EXPORT_SYMBOL vmlinux 0xd46f2981is_bad_inode
| EXPORT_SYMBOL | vmlinux 0x4d79eece | kern_path_create |
| EXPORT_SYMBOL | vmlinux 0x4d83ef8d | dmi_check_system |
| EXPORT_SYMBOL | vmlinux 0x4d850711 | nvm_get_tgt_bb_tbl |
| EXPORT_SYMBOL | vmlinux 0x4d4934d6 | net揆et6_ioctl |
| EXPORT_SYMBOL | vmlinux 0x4d47ae6radix_tree_tag_get |
| EXPORT_SYMBOL | vmlinux 0x4d4ab4e46 | truncate_inode_pages |
| EXPORT_SYMBOL | vmlinux 0x4d4b09f37 | unix_get_socket |
| EXPORT_SYMBOL | vmlinux 0x4d4b3878 | sk_send_sigurg |
| EXPORT_SYMBOL | vmlinux 0x4d4bb4a82 | net6addr_validator_notifier_call_chain |
| EXPORT_SYMBOL | vmlinux 0x4d4c92124 | xfrm6_prepare_output |
| EXPORT_SYMBOL | vmlinux 0x4d51b32f | mb_cache_entry_find_first |
| EXPORT_SYMBOL | vmlinux 0x4d5263820 | mb_cache_destroy |
| EXPORT_SYMBOL | vmlinux 0x4d537b359 | trace_raw_output_prep |
| EXPORT_SYMBOL | vmlinux 0x4d54202c1 | import_iovec |
| EXPORT_SYMBOL | vmlinux 0x4d5532064f | notifier_ops_unregister |
| EXPORT_SYMBOL | vmlinux 0x4d58d94da | kernel_connect |
| EXPORT_SYMBOL | vmlinux 0x4d59c0f07 | netlink_unicast |
| EXPORT_SYMBOL | vmlinux 0x4d5ae5565 | boot_cpu_data |
| EXPORT_SYMBOL | vmlinux 0x4d5c7b359 | trace_raw_output_prep |
| EXPORT_SYMBOL | vmlinux 0x4d5db1893 | nla_append |
| EXPORT_SYMBOL | vmlinux 0x4d6024084 | scsi_init_io |
| EXPORT_SYMBOL | vmlinux 0x4d60736ec | ccf128mul_free_64k |
| EXPORT_SYMBOL | vmlinux 0x4d616683a | acryptfs_fill_auth_tok |
| EXPORT_SYMBOL | vmlinux 0x4d6397ac | raidev_bag_sect |
| EXPORT_SYMBOL | vmlinux 0x4d6c64e8 | e564bf_match_mode |
| EXPORT_SYMBOL | vmlinux 0x4d6fcede | udplite_prot |
| EXPORT_SYMBOL | vmlinux 0x4d662d9c8 | textsearch_prepare |
| EXPORT_SYMBOL | vmlinux 0x4d666ae00 | alloc_skb |
| EXPORT_SYMBOL | vmlinux 0x4d688716 | bdm_kcopyd_client_create |
| EXPORT_SYMBOL | vmlinux 0x4d6973140 | devfreq_monitor_start |
| EXPORT_SYMBOL | vmlinux 0x4d69e97dposix_acl_alloc |
| EXPORT_SYMBOL | vmlinux 0x4d6b2ed5 | generate_pm_trace |
+EXPORT_SYMBOL vmlinux 0xd6b33026cpu_khz
+EXPORT_SYMBOL vmlinux 0xd6d66167blk_mq_tagset_busy_iter
+EXPORT_SYMBOL vmlinux 0xd6dc0d88match_u64
+EXPORT_SYMBOL vmlinux 0xd6e688fvmalloc
+EXPORT_SYMBOL vmlinux 0xdf38517security_xfrm_policy_alloc
+EXPORT_SYMBOL vmlinux 0xdf6de043is_module_sig_enforced
+EXPORT_SYMBOL vmlinux 0xd7060fba4banf_log_bind_pf
+EXPORT_SYMBOL vmlinux 0xd70cf9edsegs6_hmac_net_init
+EXPORT_SYMBOL vmlinux 0xd70d35a1gf128mul_4k_bbe
+EXPORT_SYMBOL vmlinux 0xd72a42cddev_driver_string
+EXPORT_SYMBOL vmlinux 0xd73874d1misc_deregister
+EXPORT_SYMBOL vmlinux 0xd73b8454siphash_2u64
+EXPORT_SYMBOL vmlinux 0xd75c79dftmp_call_function
+EXPORT_SYMBOL vmlinux 0xd77a3db0ctb_imageblit
+EXPORT_SYMBOL vmlinux 0xd77ae207prepare_to_wait
+EXPORT_SYMBOL vmlinux 0xd7d280adirq_poll_complete
+EXPORT_SYMBOL vmlinux 0xd7dab87dttty_port_close_start
+EXPORT_SYMBOL vmlinux 0xd777777breserve_perfctr_nmi
+EXPORT_SYMBOL vmlinux 0xd7e56a4esimple_strtoll
+EXPORT_SYMBOL vmlinux 0xd7e77309fb_get_mode
+EXPORT_SYMBOL vmlinux 0xd7e7390xfm6_rcv_tnl
+EXPORT_SYMBOL vmlinux 0xd81f2ad5tcp_register_action
+EXPORT_SYMBOL vmlinux 0xd81f2ad5fb_get_mode
+EXPORT_SYMBOL vmlinux 0xd81f2ad5acpi_processor_power_init_bm_check
+EXPORT_SYMBOL vmlinux 0xd81f2ad5gro_cells_init
+EXPORT_SYMBOL vmlinux 0xd81f2ad5app_allocate_memory
+EXPORT_SYMBOL vmlinux 0xd81f2ad5ttty_port_lower_dtr_rts
+EXPORT_SYMBOL vmlinux 0xd81f2ad5cdev_fillrect
+EXPORT_SYMBOL vmlinux 0xd81f2ad5bdevddev
+EXPORT_SYMBOL vmlinux 0xd81f2ad5movable_zone
+EXPORT_SYMBOL vmlinux 0xd81f2ad5bcsi_extd_sense_format
+EXPORT_SYMBOL vmlinux 0xd81f2ad5attr_full_name
+EXPORT_SYMBOL vmlinux 0xd81f2ad5page_bulk_read
+EXPORT_SYMBOL vmlinux 0xd81f2ad5fscremption_free_buffer
+EXPORT_SYMBOL vmlinux 0xd81f2ad5ecie_capability_read_word
+EXPORT_SYMBOL vmlinux 0xd81f2ad5radix_tree_maybe_preload
+EXPORT_SYMBOL vmlinux 0xd81f2ad5register_chrdev_region
+EXPORT_SYMBOL vmlinux 0xd81f2ad5rio_query_mport
+EXPORT_SYMBOL vmlinux 0xd81f2ad5cdevcache readdir
+EXPORT_SYMBOL vmlinux 0xd81f2ad5csimple_empty
+EXPORT_SYMBOL vmlinux 0xd81f2ad5tcp_req_err
+EXPORT_SYMBOL vmlinux 0xd81f2ad5btp_csplice_read
+EXPORT_SYMBOL vmlinux 0xd81f2ad5vm_zone_stat
+EXPORT_SYMBOL vmlinux 0xd81f2ad5emipi_dsi_dcs_write
+EXPORT_SYMBOL vmlinux 0xd81f2ad5keyring alloc
+EXPORT_SYMBOL vmlinux 0xd81f2ad5install_notify_handler
+EXPORT_SYMBOL vmlinux 0xe5867808 dlc1_ioctl_set
+EXPORT_SYMBOL vmlinux 0xe590dea3 sk_busy_loop_end
+EXPORT_SYMBOL vmlinux 0xe596820 dpagecache_get_page
+EXPORT_SYMBOL vmlinux 0xe5b7355 jiffies64_to_nsec
+EXPORT_SYMBOL vmlinux 0xe5c9a53 slhc_free
+EXPORT_SYMBOL vmlinux 0xe5c6ae21 mempool_free
+EXPORT_SYMBOL vmlinux 0xe5d3f21 dev_mc_sync
+EXPORT_SYMBOL vmlinux 0xe5ed5467 xfrm_policy_walk_done
+EXPORT_SYMBOL vmlinux 0xe5ed5467 xfrm_policy_walk_init
+EXPORT_SYMBOL vmlinux 0xe5ef30a3 param_set_int
+EXPORT_SYMBOL vmlinux 0xe601424 bfind_get_entries_tag
+EXPORT_SYMBOL vmlinux 0xe614d75efb_set_var
+EXPORT_SYMBOL vmlinux 0xe639b83 appp_unregister_channel
+EXPORT_SYMBOL vmlinux 0xe63a32c1 mmc_wait_for_cmd
+EXPORT_SYMBOL vmlinux 0xe63e7b0k_query
+EXPORT_SYMBOL vmlinux 0xe64d98ferdmr_safe_regs
+EXPORT_SYMBOL vmlinux 0xe65e4212 get_mm_exc_file
+EXPORT_SYMBOL vmlinux 0xe662fa1 cnetpoll_setup
+EXPORT_SYMBOL vmlinux 0xe6671196 mark_buffer_dirty_inode
+EXPORT_SYMBOL vmlinux 0xe66ed6c0 cliv_add_request
+EXPORT_SYMBOL vmlinux 0xe690f7fZSTD_decompressBegin
+EXPORT_SYMBOL vmlinux 0xe69a9df4dmi_spd_ifoiframe_pack
+EXPORT_SYMBOL vmlinux 0xe69e3738acdev_set_parent
+EXPORT_SYMBOL vmlinux 0xe6bae384 truncate_inode_pages_final
+EXPORT_SYMBOL vmlinux 0xe6d5b87 cmdiobus_free
+EXPORT_SYMBOL vmlinux 0xe6d7905sock_no_sendmsg_locked
+EXPORT_SYMBOL vmlinux 0xe6eb8568 clk_bulk_get
+EXPORT_SYMBOL vmlinux 0xe6ec4451 md_reap_sync_thread
+EXPORT_SYMBOL vmlinux 0xe6f14734 blk_put_request
+EXPORT_SYMBOL vmlinux 0xe6f166d1 phy_disconnect
+EXPORT_SYMBOL vmlinux 0xe6fa9ab param_set_invbool
+EXPORT_SYMBOL vmlinux 0xe704d67 aqmp_alloc_page_array
+EXPORT_SYMBOL vmlinux 0xe716baed ACPI_unregister_iopac
+EXPORT_SYMBOL vmlinux 0xe747b7bdjbd2 journal_try_to_free_buffers
+EXPORT_SYMBOL vmlinux 0xe757d78 atomic_t_wait
+EXPORT_SYMBOL vmlinux 0xe7897426 register_quota_format
+EXPORT_SYMBOL vmlinux 0xe7917c4radix_tree_tagged
+EXPORT_SYMBOL vmlinux 0xe7a7d795fb_is_primary_device
+EXPORT_SYMBOL vmlinux 0xe7b0d0 fb_x86 INDIRECTThunk_r13
+EXPORT_SYMBOL vmlinux 0xe7d4aadseq_list_next
+EXPORT_SYMBOL vmlinux 0xe7d5e5d kernel_omap_regions_request_all
+EXPORT_SYMBOL vmlinux 0xe7ee4372agp_create_memory
+EXPORT_SYMBOL vmlinux 0xe7ff124dndev_sysctl_unregister
+EXPORT_SYMBOL vmlinux 0xe802a9account_page_dirtied
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+EXPORT_SYMBOL vmlinux 0xf04229bfvm_unregister_tgt_type
+EXPORT_SYMBOL vmlinux 0xf05ffaa5bf_var_to_videomode
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+EXPORT_SYMBOL vmlinux 0xf0718132dma_fence_default_wait
+EXPORT_SYMBOL vmlinux 0xf08675cfscrypt_ioclt_get_policy
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+EXPORT_SYMBOL vmlinux 0xf08c67dendapi_alloc_frag
+EXPORT_SYMBOL vmlinux 0xf0afbee5sk_wait_data
+EXPORT_SYMBOL vmlinux 0xf0bb603__blk_end_request_cur
+EXPORT_SYMBOL vmlinux 0xf0ca59e5fTTYE-name
+EXPORT_SYMBOL vmlinux 0xf0ce9ae3get_task_ioc_ctx
+EXPORT_SYMBOL vmlinux 0xf0e15bf4list_sort
+EXPORT_SYMBOL vmlinux 0xf0f164e8pctbios_resource_to_bus
+EXPORT_SYMBOL vmlinux 0xf0f1f014forget_cached_acl
+EXPORT_SYMBOL vmlinux 0xf10233eslhc_remember
+EXPORT_SYMBOL vmlinux 0xf10526acverify_spi_info
+EXPORT_SYMBOL vmlinux 0xf10de53fioread8
+EXPORT_SYMBOL vmlinux 0xf11543fffind_first_zero_bit
+EXPORT_SYMBOL vmlinux 0xf11641dcm_put_device
+EXPORT_SYMBOL vmlinux 0xf14364f4register_cdrom
+EXPORT_SYMBOL vmlinux 0xf147dcb2hdmi_spd_infoframe_init
+EXPORT_SYMBOL vmlinux 0xf14cc0d7kernel_setsockopt
+EXPORT_SYMBOL vmlinux 0xf195da8e__usecs_to_jiffies
+EXPORT_SYMBOL vmlinux 0xf1969a8e__usecs_to_jiffies
+EXPORT_SYMBOL vmlinux 0xf199a5598noop_qdisc
+EXPORT_SYMBOL vmlinux 0xf1acc7batcpgetsockopt
+EXPORT_SYMBOL vmlinux 0xf1db1704nla_mempy
+EXPORT_SYMBOL vmlinux 0xf1e98c74avenrun
+EXPORT_SYMBOL vmlinux 0xf1f12bd__nla_put_64bit
+EXPORT_SYMBOL vmlinux 0xf1f8aeb6scci_cmd_blk_ioctl
+EXPORT_SYMBOL vmlinux 0xf1fca1eclockref_mark_dead
+EXPORT_SYMBOL vmlinux 0xf1fe3149swiotlb_alloc_coherent
+EXPORT_SYMBOL vmlinux 0xf2196a577ppp_input
+EXPORT_SYMBOL vmlinux 0xf227b69atecp_v4_md5_lookup
+EXPORT_SYMBOL vmlinux 0xf228af5blk_peek_request
+EXPORT_SYMBOL vmlinux 0xf23fcb99__kfifo_in
+EXPORT_SYMBOL vmlinux 0xf24d5705dquot_set_dqblk
+EXPORT_SYMBOL vmlinux 0xf267f06dev_mc_flush
+EXPORT_SYMBOL vmlinux 0xf27005casericounregister_child_port
+EXPORT_SYMBOL vmlinux 0xf288e352pcic_enable_wake
+EXPORT_SYMBOL vmlinux 0xf28ed62machine_to_phys_nr
+EXPORT_SYMBOL vmlinux 0xf295cd96mmcrretune_release
+EXPORT_SYMBOL vmlinux 0xf2997713tty_termios_hw_change
+EXPORT_SYMBOL vmlinux 0xf2b928c9inet_confirm_addr
+EXPORT_SYMBOL vmlinux 0xf2c2122eiov_iter_get_pages_alloc
+EXPORT_SYMBOL vmlinux 0xf2c43f3fzlib_deflate
+EXPORT_SYMBOL vmlinux 0xf2c6d2b1nobb_truncate_page
+EXPORT_SYMBOL vmlinux 0xf2e44f11__register_nmi_handler
+EXPORT_SYMBOL vmlinux 0xf2fde2a5vfs_setpos
+EXPORT_SYMBOL vmlinux 0xf3012762pci_disable_device
+EXPORT_SYMBOL vmlinux 0xf301cafc6040_get_pll
+EXPORT_SYMBOL vmlinux 0xf30965aciosf_mbi_register_pmic_bus_access_notifier
+EXPORT_SYMBOL vmlinux 0xf312cb9dpace_set
+EXPORT_SYMBOL vmlinux 0xf313da4esh_transform
+EXPORT_SYMBOL vmlinux 0xf319124fdown_write_killable
+EXPORT_SYMBOL vmlinux 0xf31a7757max8998_read_reg
+EXPORT_SYMBOL vmlinux 0xf31b0da0ip6_dst_hoplimit
+EXPORT_SYMBOL vmlinux 0xf3205786free_task
+EXPORT_SYMBOL vmlinux 0xf3279f64tty_devnum
+EXPORT_SYMBOL vmlinux 0xf3296d5aunregister_nls
+EXPORT_SYMBOL vmlinux 0xf3341268__clear_user
+EXPORT_SYMBOL vmlinux 0xf346231fname_list_start_head
+EXPORT_SYMBOL vmlinux 0xf3494f6con_is_bound
+EXPORT_SYMBOL vmlinux 0xf353a698register_module_notifier
+EXPORT_SYMBOL vmlinux 0xf3815dacdset_cow_metrics_generic
+EXPORT_SYMBOL vmlinux 0xf389fe60__hw_addr_init
+EXPORT_SYMBOL vmlinux 0xf38d401a__insert_inode_hash
+EXPORT_SYMBOL vmlinux 0xf3916987global_cursor_default
+EXPORT_SYMBOL vmlinux 0xf396cd21tcp_parse_md5sig_option
+EXPORT_SYMBOL vmlinux 0xf3986b06acpi_os_map_generic_address
+EXPORT_SYMBOL vmlinux 0xf3a8bb51seq_hex_dump
+EXPORT_SYMBOL vmlinux 0xf3e6402e__bitmap_equal
+EXPORT_SYMBOL vmlinux 0xf3f1ba4fpcibios_align_resource
+EXPORT_SYMBOL vmlinux 0xf3f7ce6fwiresem_wake
+EXPORT_SYMBOL vmlinux 0xf41bf644devm_memunmap
+EXPORT_SYMBOL vmlinux 0xf41b8456registered_fb
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comedi_isadma_disable_on_sample
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+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0xe6abf803bxt_sst_dp_deinit
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xd68ec3d8 snd_soc_dapm_enable_pin_unlocked
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xd92559dcsnd_soc_component_force_enable_pin_unlocked
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xd991e712snd_soc_add_codec_controls
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xda5c2928 snd_soc_add_codec_controls
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xda781645snd_soc_dapm_put_pin_switch
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xdbda7468 snd_soc_card_get_kcontrol
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xdc7c2285snd_soc_get_dai_id
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xdd87418d snd_soc_dapm_enable_pin
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xddaf8cc8 snd_soc_component_enable_pin
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xe03fd68e snd_soc_dapm_get_volsw
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xe09b3a93 snd_soc_get_parse_card_name
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xe26ae31cdevm_snd_soc_register_component
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xe29a6322 snd_soc_of_parse_card_name
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xe68eb3f3 snd_soc_component_test_bits
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xe81b44e6 snd_soc_free_ac97_codec
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xe913c112 snd_soc_add_platform
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xea5cbaaf snd_soc_component_exit_regmap
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xeadf2efb snd_soc_tplg_component_remove
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xebe711ae snd_soc_params_to_bclk
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xee3355c3 snd_soc_info_xr_sx
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xf287d31c snd_soc_set_ac97_ops
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xf476215b snd_soc_unregister_component
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xf49f2379 snd_soc_info_enum_double
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xf9407c84 snd_soc_bytes_tlv_callback
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xfc7d7aeb snd_soc_dapm_regulator_event
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xfe476dba snd_soc_send_sysex_message
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xfe9655bd snd_soc_dapm_stop_pin
+EXPORT_SYMBOL_GPL sound/soc/snd-soc-core 0xff0e1c76 snd_soc_jack_add_zones
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x202a1b1b line6_midi_id
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x328e32ff line6_init_pcm
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x4f26c2d3 line6_send_raw_message_async
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x5a076b2c line6_read_data
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x61886d51 line6_resume
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x8ea0a4d3 line6_resume
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x9e98ae0 line6_suspend
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xb2d5fe31 line6_disconnect
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xb0b9dc67 line6_version_request_async
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xb5ecfd38 line6_probe
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xc6041861 line6_read_serial_number
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xce49e75f line6_alloc_sysex_buffer
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xdb1e249c line6_pcm_acquire
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+EXPORT_SYMBOL_GPL vmlinux 0x0800fccrio_unlock_device
+EXPORT_SYMBOL_GPL vmlinux 0x08066d75extcon_set_property
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| EXPORT_SYMBOL_GPL vmunix 0xea5196daeip_osc_setup |
| EXPORT_SYMBOL_GPL vmunix 0xeba38f5ata_sg_init |
| EXPORT_SYMBOL_GPL vmunix 0xed840b5ata_sff_dma_pause |
| EXPORT_SYMBOL_GPL vmunix 0xedc5427mbox_client_txdone |
| EXPORT_SYMBOL_GPL vmunix 0xef5095pci_disable_sriov |
| EXPORT_SYMBOL_GPL vmunix 0xefef1bled_trigger_show |
| EXPORT_SYMBOL_GPL vmunix 0xf229c4coops_begin |
| EXPORT_SYMBOL_GPL vmunix 0xf311177da9052_regmap_config |
| EXPORT_SYMBOL_GPL vmunix 0xf332f197regmap_write_async |
| EXPORT_SYMBOL_GPL vmunix 0xf676b06xenbus_dev_remove |
| EXPORT_SYMBOL_GPL vmunix 0xf72de1cdemv_usb_get_phy |
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| EXPORT_SYMBOL_GPL vmunix 0xf84d4cgnttab_release_grant_reference |
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| EXPORT_SYMBOL_GPL vmunix 0xfafedaadev_pm_domain_set |
| EXPORT_SYMBOL_GPL vmunix 0xfb39bcd__blk_rq_debugfs_rq_show |
| EXPORT_SYMBOL_GPL vmunix 0xfc6e45__fsnotify_inode_delete |
| EXPORT_SYMBOL_GPL vmunix 0xfc9eb88dwatchdog_set_restart_priority |
| EXPORT_SYMBOL_GPL vmunix 0xfd75c3btty_port_register_device_serdev |
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| EXPORT_SYMBOL_GPL vmunix 0xe00f238emd_stop_writes |
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| EXPORT_SYMBOL_GPL vmunix 0xe0166e31__hvc_resize |
| EXPORT_SYMBOL_GPL vmunix 0xe01db5eaefivar_entry_find |
| EXPORT_SYMBOL_GPL vmunix 0xe039529gpio_request_one |
| EXPORT_SYMBOL_GPL vmunix 0xe045c494filter_match_preds |
| EXPORT_SYMBOL_GPL vmunix 0xe049f1fb7rvcq_create_virtqueue |
| EXPORT_SYMBOL_GPL vmunix 0xe065d168pm_print_active_wakeup_sources |
| EXPORT_SYMBOL_GPL vmunix 0xe06c4cb1hrtimer_resolution |
| EXPORT_SYMBOL_GPL vmunix 0xe06d9726dio_retune_crc_enable |
| EXPORT_SYMBOL_GPL vmunix 0xe071b517out_of_line_wait_on_bit_timeout |
| EXPORT_SYMBOL_GPL vmunix 0xe08ccf52hrtimer_start_range_ns |
| EXPORT_SYMBOL_GPL vmunix 0xe08d2a04play_idle |
| EXPORT_SYMBOL_GPL vmunix 0xe08f5bf9usb_autopm_put_interface_async |
| EXPORT_SYMBOL_GPL vmunix 0xe0940347da903x_unregister_notifier |
| EXPORT_SYMBOL_GPL vmunix 0xe09a8a03wm5110_revd_irq |
| EXPORT_SYMBOL_GPL vmunix 0xe09ec761driver_unregister |
| EXPORT_SYMBOL_GPL vmunix 0xe0a22866usb_put_intf |
| EXPORT_SYMBOL_GPL vmunix 0xe0af0decata_xfer_mode2mask |
| EXPORT_SYMBOL_GPL vmunix 0xe0c77a2fehci_hub_control |
| EXPORT_SYMBOL_GPL vmunix 0xe0c80df4efivar_entry_add |
| EXPORT_SYMBOL_GPL vmunix 0xe0d46b21crypto_ft_tab |
| EXPORT_SYMBOL_GPL vmunix 0xe0f683ereset_control_put |
| EXPORT_SYMBOL_GPL vmunix 0xe0f8bd4eklist_add_before |
| EXPORT_SYMBOL_GPL vmunix 0xe103b44alp8788_read_multi_bytes |
| EXPORT_SYMBOL_GPL vmunix 0xe12192ffspi_res_release |
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+EXPORT_SYMBOL_GPL vmlinux 0xa751973a3aw הנתונים_call_chain
+EXPORT_SYMBOL_GPL vmlinux 0xa859327bwn831x_reg_write
+EXPORT_SYMBOL_GPL vmlinux 0xa870f7bedevm_remove_action
+EXPORT_SYMBOL_GPL vmlinux 0xa88dc9c7crypto_mod_get
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+EXPORT_SYMBOL_GPL vmlinux 0xa8b4eb4bregmap_get_device
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+EXPORT_SYMBOL_GPL vmlinux 0xf7d0da6clkrегистiter_divider
+EXPORT_SYMBOL_GPL vmlinux 0xf7d13960acpi_match_device
+EXPORT_SYMBOL_GPL vmlinux 0xf7d2bd4handle_simple_irq
+EXPORT_SYMBOL_GPL vmlinux 0xf7e690cbsbitmap_queue_wake_all
+EXPORT_SYMBOL_GPL vmlinux 0xf7e43a4sel_alloc_table_chained
+EXPORT_SYMBOL_GPL vmlinux 0xf7f1ea87fwnode_get_parent
+EXPORT_SYMBOL_GPL vmlinux 0xf807ad6nd_mapping_attribute_group
+EXPORT_SYMBOL_GPL vmlinux 0xf801fe7simple_attr_read
+EXPORT_SYMBOL_GPL vm_linux 0xfffc4847 dma_request_chan_by_mask
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/lowlateny.compiler
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/lowlateny.compiler
@@ -0,0 +1 @@
+GCC: (Ubuntu 7.5.0-3ubuntu1~18.04) 7.5.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/lowlateny.modules
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/lowlateny.modules
@@ -0,0 +1,5168 @@
+104-quad-8
+3c574_cs
+3c589_cs
+3c59x
+3w-9xxx
+3w-sas
+3w-xxxx
+6lowpan
+6pack
+8021q
+8139cp
+8139too
+8250_dw
+8250_exar
+8250_lpss
+8250_men_mcb
+8250_mib
+8250_moxa
+8255
+8255_pci
+8390
+842
+842_compress
+842_decompress
+88pm800
+88pm800-regulator
+88pm805
+88pm80x
+88pm80x_onkey
+88pm8607
+88pm860x-ts
+88pm860x_battery
+88pm860x_bl
+88pm860x_charger
+88pm860x_onkey
+9p
+9pnet
+9pnet_rdma
+9pnet_virtio
+9pnet_xen
Open Source Used In 5GaaS Edge AC-4

+BusLogic
+DAC960
+a100u2w
+a3d
+a8293
+aacraid
+aat2870-regulator
+aat2870_bl
+ab3100
+ab3100-otp
+abituguru
+abituguru3
+ablok_helper
+abp060mg
+ac97_bus
+acard-ahci
+acecad
+acenic
+acer-wmi
+acerhdf
+acp_audio_dma
+acpi-als
+acpi_configfs
+acpi_extlog
+acpi_ipmi
+acpi_pad
+acpi_power_meter
+acpi_thermal_rel
+acpihp_ibm
+acquirewdt
+act2001-sir
+act8865-regulator
+act_bpf
+act_connmark
+act_csum
+act_gact
+act_ipt
+act_mirred
+act_nat
+act_pedit
+act_police
+act_sample
+act_simple
+act_skbedit
+act_skbmod
+act_tunnel_key
+act_vlan
+actisys-sir
+ad2s1200
+ad2s1210
+ad2s90
+ad5064
+ad525x_dpot
+ad525x_dpot-i2c
+ad525x_dpot-spi
+ad5360
+ad5380
+ad5398
+ad5421
+ad5446
+ad5449
+ad5504
+ad5592r
+ad5592r-base
+ad5593r
+ad5624r_spi
+ad5686
+ad5755
+ad5761
+ad5764
+ad5791
+ad5933
+ad714x
+ad714x-i2c
+ad714x-spi
+ad7150
+ad7152
+ad7192
+ad7266
+ad7280a
+ad7291
+ad7298
+ad7303
+ad7314
+ad7414
+ad7418
+ad7476
+ad7606
+ad7606_par
+ad7606_spi
+ad7746
+ad7766
+ad7780
+ad7791
+ad7793
+ad7816
+adv_pci1760
+adv_pci_dio
+advansys
+advantechwdt
+adx134x
+adx134x-i2c
+adx134x.spi
+adxrs450
+aes-x86_64
+aes_ti
+aesni-intel
+af9013
+af9033
+af_proc
+af_key
+af_packet_diag
+afe4403
+afe4404
+affs
+ah4
+ah6
+aia152x_cs
+ahci
+ahci_platform
+aic79xx
+aic7xxx
+aic94xx
+aim_cdev
+aim_network
+aim_sound
+aim_v4l2
+aio_aio12_8
+aio_iiro_16
+aiptek
+aircable
+airo
+airo_cs
+airspy
+ak8975
+al3320a
+algif_aead
+algif_hash
+algif_rng
+algif_skcipher
+ali-ircc
+alienware-wmi
+alim1535_wdt
+alim7101_wdt
+altera-ci
+altera-cvp
+altera-msgdma
+altera-pr-ip-core
+altera-ps-spi
+altera-stapl
+altera_jtaguart
+altera_ps2
+altera_tse
+altera_uart
+alx
+am2315
+am53c974
+ambassador
+amc6821
+amd
+amd-rng
+amd-xgbe
+amd5536udc_pci
+amd64_edac_mod
+amd76xrom
+amd8111e
+amd_freq_sensitivity
+amd_iommu_v2
+amdgpu
+amdkfd
+amilo-rfkill
+amplc_dio200
+amplc_dio200_common
+amplc_dio200_pci
+amplc_pc236
+amplc_pc236_common
+amplc_pc263
+amplc_pci224
+amplc_pci230
+amplc_pci236
+amplc_pci263
+ams-iaq-core
+ams369fg06
+analog
+analogix-anx78xx
+anatop-regulator
+ansi_cprng
+anubis
+aoe
+apanel
+apds9300
+apds9802als
+apds900x
+apds9960
+apple-gmux
+apple_bl
+appledisplay
+applesmc
+appletalk
+appletouch
+applicom
+aquantia
+ar5523
+ar7part
+arc-rawmode
+arc-ri
+arc4
+arc_ps2
+arc_uart
+arcfb
+arcmsr
+arcnet
+arccnn_bl
+arizona-haptics
+arizona-i2c
+arizona-ldo1
+arizona-micsupp
+arizona-spi
+ark3116
+arkfb
+arp_tables
+arpt_mangle
+arptable_filter
+as102_fe
+as3711-regulator
+as3711_bl
+as3935
+as5011
+asb100
+asc7621
+ascot2e
+asix
+aspeed-pwm-tacho
+ast
+asus-laptop
+asus-nb-wmi
+asus-wireless
+asus-wmi
+asus_atk0110
+async_memcpy
+au8522_decoder
+au8522_dig
+aufs
+auo-pixcir-ts
+auo_k1900fb
+auo_k1901fb
+auo_k190x
+auth_rpcgss
+authenc
+authencesn
+autofs4
+avm_cs
+avma1_cs
+avmfritz
+ax25
+ax88179_178a
+axnet_cs
+axp20x
+axp20x-i2c
+axp20x-pek
+axp20x-regulator
+axp20x_ac_power
+axp20x_adc
+axp20x_battery
+axp20x_usb_power
+axp288_adc
+axp288_charger
+axp288_fuel_gauge
+b1
+b1dma
+b1pci
+b1pcmcia
+b2c2-flexcop
+b2c2-flexcop-pci
+b2c2-flexcop-usb
+b43
+b43legacy
+b44
+b53_common
+b53_mdio
+b53_mmap
+b53_spi
+b53_srab
+bas_gigaset
+batman-adv
+baycom_par
+baycom_ser_fdx
+baycom_ser_hdx
+bcache
+bch
+bcm-phy-lib
+bcm203x
+bcm3510
+bcm590xx
+bcm590xx-regulator
+bcm5974
+bcm7xxx
+bcm87xx
+bcma
+bcma-hcd
+bd6107
+bd9571mww
+bd9571mww-regulator
+bdc
+be2iscsi
+be2net
+befs
+belkin_sa
+bfa
+bfq
+bfs
+bfusb
+hh1750
+hh1770glc
+hh1780
+binfmt_misc
+block2mtd
+blocklayoutdriver
+blowfish-x86_64
+blowfish_common
+blowfish_generic
+bluecard_cs
+bluetooth
+bluetooth_6lowpan
+bma150
+bma180
+bma220_spi
+bmc150-accel-core
+bmc150-accel-i2c
+bmc150-accel-spi
+bmc150_magn
+bmc150_magn_i2c
+bmc150_magn_spi
+bmgi60_core
+bmgi60_i2c
+bmgi60_spi
+bmi160_core
+bmi160_i2c
+bmi160_spi
+bmp280
+bmp280-i2c
+bmp280-spi
+bna
+bnep
+bnx2
+bnx2fc
+bnx2i
+bnx2x
+bnxt_en
+bnxt_re
+bochs-drm
+bonding
+bpa10x
+bpck
+bpqether
+bq2415x_charger
+bq24190_charger
+bq24257_charger
+bq24735-charger
+bq25890_charger
+bq27xxx_battery
+bq27xxx_battery_hdq
+bq27xxx_battery_i2c
+br2684
+br_netfilter
+brcmfmac
+brcmsmac
+brcmutil
+brd
+bridge
+broadcom
+broadsheetfb
+bsd_comp
+bt3c_cs
+bt819
+bt856
+bt866
+bt878
+btbcm
+btcoexist
+btintel
+btmrvl
+btmrvl_sdio
+btqca

Open Source Used In 5GaaS Edge AC-4 13642
+btrfs
+btrfs
+bsdio
+btv
+btuart_cs
+btv
+btwilink
+bu21013_ts
+btv
+btwilink
+bu21013_ts
+budget
+budget-av
+budget-ci
+budget-core
+budget-patch
+c2port-duramar2150
+c4
+c67x00
+c6xdigio
+c_can
+c_can_pci
+c_can_platform
+ca8210
+cachefiles
+cadence_wdt
+cafe_ccic
+cafe_nand
+caif
+caif_hsi
+caif_serial
+caif_socket
+caif_usb
+caif_virtio
+camellia-aesni-avx-x86_64
+camellia-aesni-avx2
+camellia-x86_64
+camellia_generic
+can
+can-bcm
+can-dev
+can-gw
+can-raw
+capi
+capidrv
+capmode
+capsule-loader
+cari9170
+carminefb
+cassini
+cast5-avx-x86_64
+chacha20poly1305
+chaoskey
+charlcd
+chash
+chcr
+chipreg
+chnl_net
+chromeos_laptop
+chromeos_pstore
+ci_hdrc
+ci_hdrc_msm
+ci_hdrc_pci
+ci_hdrc_usb2
+ci_hdrc_zevio
+cin
da
+cifs
+cio-dac
+cin
rus
+cirrus
+cirrusfb
+ck804xrom
+classmate-laptop
+clip
+clk-cdce706
+clk-cs2000-cp
+clk-palmas
+clk-pwm
+clk-s2mps11
+clk-si5351
+clk-tw16040
+clk-wm831x
+cls_basic
+cls_bpf
+cls_cgroup
+cls_flow
+cls_flower
+cls_fw
+cls_matchall
+cls_route
+cls_rsvp
+cls_rsvp6
+cls_tcindex
+cls_u32
+cm109
+cm32181
+cm3232
+cm3323
+cm36651
+cm4000_es
+cm4040_cs
+cma3000_d0x
+cma3000_d0x_i2c
+cmac
+cmdlinepart
+cnc
+co20020
+co20020-pci
+co20020_cs
+co90io
+co90xx
+comedi
+comedi_8254
+comedi_8255
+comedi_bond
+comedi_isadma
+comedi_parport
+comedi_pci
+comedi_pcmcia
+comedi_test
+comedi_usb
+comm
+compal-laptop
+contec_pci_dio
+cordic
+core
+coretemp
+corina
+cosm_bus
+cosm_client
+cp210x
+cpcihp_generic
+cpcihp_zt5550
+cpia2
+cpsw_ale
+cpu5wdt
+cpuid
+cr_bllcd
+cramfs
+cr-itu-t
+cr32-pclmul
+cr32_generic
+cr4
+cr7
+crc8
+crc10dif-pclmul
+cros_ec_accel_legacy
+cros_ec_baro
+cros_ec_core
+cros_ec_devs
+cros_ec_i2c
+cros_ec_keyb
+cros_ec_light_prox
+cros_ec_lpcs
+cros_ec_sensors
+cros_ec_sensors_core
+cros_ec_spi
+cros_kbd_led_backlight
+crvml
+cryptd
+crypto_engine
+crypto_simd
+crypto_user
+cryptoloop
+cs3308
+cs5345
+cs53132a
+csiostor
+ct82c710
+cuse
+cw1200_core
+cw1200_wlan_sdio
+cw1200_wlan_spi
+cx18
+cx18-alsa
+cx22700
+cx22702
+cx231xx
+cx231xx-alsa
+cx231xx-dvb
+cx2341x
+cx23885
+cx24110
+cx24113
+cx24116
+cx24117
+cx24120
+cx24123
+cx25821
+cx25821-alsa
+cx25840
+cx82310_eth
+ds2490
+ds2760_battery
+ds2780_battery
+ds2781_battery
+ds2782_battery
+ds3000
+ds4424
+ds620
+dsa_core
+dsbr100
+dsc4
+dss1_divert
+dst
+dst_ca
+dstr
+dt2801
+dt2811
+dt2814
+dt2815
+dt2817
+dt282x
+dt3000
+dt3155
+dt9812
+dt11_cs
+dummy
+dummy_irq
+dummy_stm
+dvb-as102
+dvb-bt8xx
+dvb-core
+dvb-pll
+dvb-tppci
+dvb-ttpusb-budget
+dvb-usb
+dvb-usb-a800
+dvb-usb-af9005
+dvb-usb-af9005-remote
+dvb-usb-af9015
+dvb-usb-af9035
+dvb-usb-anysee
+dvb-usb-au6610
+dvb-usb-az6007
+dvb-usb-az6027
+dvb-usb-ce6230
+dvb-usb-cinergyT2
+dvb-usb-cxusb
+dvb-usb-dib0700
+fb_ssd1305
+fb_ssd1306
+fb_ssd1325
+fb_ssd1331
+fb_ssd1351
+fb_st7735r
+fb_st7789v
+fb_sys_fops
+fb_tinylcd
+fb_tls8204
+fb_uc1611
+fb_uc1701
+fb_upd161704
+fb_watterott
+fbtt
+fbtt_device
+fc0011
+fc0012
+fc0013
+fc2580
+fcoe
+fcrypt
+fdomain
+fdomain_cs
+fdp
+fdp_i2c
+fealnx
+ff-memless
+fid
+finmek-cir
+firedtv
+firestream
+firewire-core
+firewire-net
+firewire-ohci
+firewire-sbp2
+firewire-serial
+fit2
+fit3
+fixed
+fjes
+fl512
+fld
+flexfb
+floppy
+fm10k
+fm801-gp
+fm_drv
+fmc
+fmc-chardev
+fmc-fakedev
+fmc-trivial
+fmc-write-eeprom
+fmvji8x_cs
+fnic
+forcedeth
+fore_200e
+ftog210-hcd
+ftog210-udc
+fou
+fou6
+fpga-mgr
+freevxfs
+friq
+frpw
+fsa9480
+fscache
+fschmd
+fsi-core
+fsi-master-gpio
+fsi-master-hub
+fsi-scom
+fsi_lpuart
+ftdi-elan
+ftdi_sio
+ftl
+ftsteutates
+fujitsu-laptop
+fujitsu-tablet
+fujitsu_ts
+fusb302
+g450_pll
+g760a
+g762
+g_acm_ms
+g_audio
+g_cdc
+g_dbgp
+g_ether
+g_ffs
+g_hid
+g_mass_storage
+g_midi
+g_ncm
+g_nokia
+g_printer
+g_serial
+g_webcam
+g_zero
+gadgetfs
+gamecon
+gameport
+garmin_gps
+garp
+gb-audio-apbridgea
+gb-audio-gb
+gb-audio-manager
+gb-bootrom
+gb-es2
+gb-firmware
+gb-gbphy
+gb-gpio
+gb-hid
+gb-i2c
+gb-light
+gb-log
+gb-loopback
+gb-power-supply
+gb-pwm
+gb-raw
+gb-sdio
+gb-spi
+gb-spilib
+gb-uart
+gb-usb
+gb-vibrator
+gdmitty
+gdth
+gen_probe
+generic
+generic-adc-battery
+generic_bl
+geneve
+genwqe_card
+gf2k
+gfs2
+ghash-clmulni-intel
+gigaset
+girbil-sir
+gl518sm
+gl520sm
+gl620a
+glue_helper
+hid-retrode
+hid-rmi
+hid-roccat
+hid-roccat-arvo
+hid-roccat-common
+hid-roccat-isku
+hid-roccat-kone
+hid-roccat-koneplus
+hid-roccat-konepure
+hid-roccat-kovaplus
+hid-roccat-lua
+hid-roccat-pyra
+hid-roccat-ryos
+hid-roccat-savu
+hid-saitek
+hid-samsung
+hid-sensor-accel-3d
+hid-sensor-als
+hid-sensor-custom
+hid-sensor-gyro-3d
+hid-sensor-hub
+hid-sensor-humidity
+hid-sensor-iio-common
+hid-sensor-incl-3d
+hid-sensor-magn-3d
+hid-sensor-press
+hid-sensor-prox
+hid-sensor-rotation
+hid-sensor-temperature
+hid-sensor-trigger
+hid-sjoy
+hid-sony
+hid-speedlink
+hid-steelseries
+hid-sunplus
+hid-tivo
+hid-tmff
+hid-topseed
+hid-twinhan
+hid-uclogic
+hid-udraw-ps3
+hid-waltop
+hid-wiimote
+hid-xinmo
+hid-zpff
+hid-zydacron
+hideep
+hidp
+i2c-piix4
+i2c-robotfuzz-osif
+i2c-scmi
+i2c-simtec
+i2c-sis5595
+i2c-sis630
+i2c-sis96x
+i2c-smbus
+i2c-stub
+i2c-taos-evm
+i2c-tiny-usb
+i2c-via
+i2c-viapro
+i2c-viperboard
+i2c-xiic
+i3000_edac
+i3200_edac
+i40e
+i40evf
+i40iw
+i5000_edac
+i5100_edac
+i5400_edac
+i5500_temp
+i5k_amb
+i6300esb
+i7300_edac
+i740fb
+i7core_edac
+i82092
+i82975x_edac
+i915
+iTCO_vendor_support
+iTCO_wdt
+ib700wdt
+ib_cm
+ib_core
+ib_ipoib
+ib_iser
+ib_isert
+ib_mthca
+ib_qib
+ib_srp
+ib_srpt
+ib_umad
+ib_uverbs
+ibm-cffps
+ibm_rtl
+ibmaem
+ibmasm
+ibmasr
+ibmpex
+ichxrom
+icp
+icp_multi
+icplus
+ics932s401
+ideapad-laptop
+ideapad_slidebar
+idma64
+idmouse
+idt77252
+idt_89hpex
+idt_gen2
+idt_gen3
+idtcs
+ie31200_edac
+ie6xx_wdt
+ieee802154
+ieee802154_6lowpan
+ieee802154_socket
+ifb
+ife
+ifi_canfd
+iforce
+igb
+igbvf
+igorplugusb
+iguanair
+ii_pci20kc
+iio-trig-hrtimer
+iio-trig-interrupt
+iio-trig-loop
+iio-trig-sysfs
+iio_dummy
+iio_hwmon
+ila
+ili210x
+ili922x
+ili9320
+img-ascii-lcd
+img-i2s-in
+img-i2s-out
+img-parallel-out
+img-spdif-in
+img-spdif-out
+imm
+imon
+ims-pcu
+imx074
+ina209
+ina2xx
+ina2xx-adc
+ina3221
+industrialio
+industrialio-buffer-cb
+industrialio-configfs
+industrialio-sw-device
+industrialio-sw-trigger
+industrialio-triggered-buffer
+industrialio-triggered-event
+inet_diag
+inexio
+infl
+initio
+input-leds
+input-polldev
+int3400_thermal
+int3402_thermal
+int3403_thermal
+int3406_thermal
+int340x_thermal_zone
+int51x1
+intel-cstate
+intel-hid
+intel-ish-ipc
+intel-ishtp
+intel-ishtp-hid
+intel-lpss
+intel-lpss-acpi
+intel-lpss-pci
+intel-rapl-perf
+intel-rng
+intel-rst
+intel-smartconnect
+intel-vbtn
+intel-wmi-thunderbolt
+intel-xway
+intel_bxt_pmic_thermal
+intel_bxtwc_tmu
+intel_cht_int33fe
+intel_int0002_vgpio
+intel_ips
+intel_menlow
+ipip
+ipmi_devintf
+ipmi_msghandler
+ipmi_poweroff
+ipmi_si
+ipmi_ssif
+ipmi_watchdog
+ipoctal
+ips
+ipt_CLUSTERIP
+ipt_ECN
+ipt_MASQUERADE
+ipt_REJECT
+ipt_SYNPROXY
+ipt_ah
+ipt_rpfILTER
+iptable_filter
+iptable_mangle
+iptable_nat
+iptable_raw
+iptable_security
+ipvlan
+ipvtap
+ipw
+ipw2100
+ipw2200
+ipwireless
+ipx
+ir-jvc-decoder
+ir-kbd-i2c
+ir-lirc-codec
+ir-mce_kbd-decoder
+ir-nec-decoder
+ir-rc5-decoder
+ir-rc6-decoder
+ir-sanyo-decoder
+ir-sharp-decoder
+ir-sony-decoder
+ir-usb
+ir-xmp-decoder
+ir35221
+ircomm
+ircomm-tty
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+irda-usb
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+irnet
+irqbypass
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+isci
+iscsi_boot_sysfs
+iscsi_ibft
+iscsi_target_mod
+iscsi_tcp
+isdn
+isdn BSDcomp
+isdnhdlc
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+isight_firmware
+isl29003
+isl29018
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+isl29125
+isl6271a-regulator
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+isp1760
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+it87_wdt
+it913x
+itd1000
+ite-cir
+itg3200
+iuu_phoenix
+ivtv
+ivtv-alsa
+ivtvfb
+iw_cm
+iw_cxgb3
+iw_cxgb4
+iw_nes
+iwl3945
+iwl4965
+iwldevm
+iwllegacy
+iwlvm
+iwlwifi
+ix2505v
+ixgb
+ixgbe
+ixgbevf
+janz-cmodio
+janz-ican3
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+jedec_probe
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+jfs
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+jme
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+jr3_pci
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+jsm
+k10temp
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+kaweth
+kb3886_bl
+kbic
+khtab
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+kcomedilib
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+kempld_wdt
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+keysnap_remote
+keywrap
+kfifo_buf
+khazad
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+ksdazzle-sir
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+kyrofb
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+l2tp_ip
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+l64781
+lan78xx
+lan9303-core
+lan9303_i2c
+lan9303_mdio
+lanai
+lapb
+lapbether
+latch-addr-flash
+lattice-ecp3-config
+lcd
+l9d9040
+ldbus
+lec
+led-class-flash
+leds-88pm860x
+leds-adp5520
+leds-apu
+legousbtower
+lg-vl600
+lg2160
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+lgdt330x
+lg8gxx
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+lib80211_crypt_ccmp
+lib80211_crypt_tkip
+lib80211_crypt_wep
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+libceph
+libcfs
+libcomposite
+liberc32c
+libcxgb
+libcxgbi
+libertas
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+libertas_sdio
+libertas_spi
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+libertas_tf_usb
+libfc
+libfcoe
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+libiscsi_tcp
+libore
+libosd
+libssas
+lightning
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+lirc_zilog
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+lm3533-als
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+lm3533-ctrlbank
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+lp872x
+lp873x
+lp8755
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+lp8788-charger
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+lpc_sch
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+ltc2990
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+mISDNipac
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+max8997_haptic
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+mce-inject
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+mlxsw_minimal
+mlxsw_pci
+mlxsw_spectrum
+mlxsw_switchib
+mlxsw_switchx2
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+mn88473
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+mostcore
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+mpls_iptunnel
+mpls_router
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+mscc
+msdos
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+msi-wmi
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+mt6311-regulator
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+navman
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+neofb
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+net2280
+netconsole
+netjet
+netlink_diag
+netrom
+nettel
+netup-unidvb
+netxen_nic
+newtonkbd
+nf_conntack
+nf_conntack_amanda
+nf_conntack_broadcast
+nf_conntack_ftp
+nf_conntack_h323
+nf_conntack_ipv4
+nf_conntack_ipv6
+nf_conntack_irc
+nf_conntack_netbios_ns
+nf_conntack_netlink
+nf_conntack_pptp
+nf_conntack_proto_gre
Open Source Used In 5GaaS Edge AC-4

+nf_conntrack_sane
+nf_conntrack_sip
+nf_conntrack_snmp
+nf_conntrack_tftp
+nf_defrag_ipv4
+nf_defrag_ipv6
+nf_dup_ipv4
+nf_dup_ipv6
+nf_dup_netdev
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+nf_log_bridge
+nf_log_common
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+nf_log_netdev
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+nf_nat_ipv6
+nf_nat_irc
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+nf_nat_masquerade_ipv6
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+nf_nat_proto_gre
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+nf_reject_ipv6
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+nfnetlink
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+nfnetlink_cethelper
+nfnetlink_cftimeout
+nfnetlink_log
+nfnetlink_queue
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+nfs_acl
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+nfs_layout_nfsv41_files
+nfsd
+nfsv2
+nfsv3
+nfsv4
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+nft_chain_nat_ipv6
+nft_chain_route_ipv4
+nft_chain_route_ipv6
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+nft_dup_ipv6
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+nft_fwd_netdev
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+nft_masq_ipv6
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+nft_redir_ipv6
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+nft_reject_ipv4
+nft_reject_ipv6
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+nft_set_hash
+nft_set_rbtree
+nftl
+ngene
+nhc_dest
+nhc_fragment
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+nls_koi8-ru
+nls_koi8-u
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+notifier-error-inject
+nouveau
+nozomi
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+ns83820
+nsc-ircc
+nsh
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+nxt6000
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+obdecho
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+ocfs2_dlms
+ocfs2_nodemananger
+ocfs2_stack_o2cb
+ocfs2_stack_user
+ocfs2_stackglue
+ocrdma
+of_xilinx_wdt
+old_belkin-sir
+omfs
+omninext
+on20
+on26
+onenand
+opawvnic
+opencores-kbd
+openvswitch
+oprofile
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+opticon
+option
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+or51211
+orangefs
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+osst
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+padlock-sha
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+palmas-regulator
+palmas_gpadc
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+pandora_bl
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+panel-raspberrypi-touchscreen
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+parkbd
+parman
+parport
+parport_ax88796
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+pc87427
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+pcap_ts
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+pcd
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+peak_pcmcia
+peak_usb
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+pegasus
+pegasus_notetaker
+penmount
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+phantom
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+phy-qcom-usb-hsic
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+pktgen
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+plat_nand
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+plip
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+ptlrpc
+ptp
+ptp_kvm
+pulse8-cc
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+pv88080-regulator
+pv88090-regulator
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+qcom-vadc-common
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+qcom_glink_rpm
+qcom_spmi-regulator
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+qedf
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+qedr
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+rpmsg_core
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+rt2800mmio
+rt2800pci
+rt2800usb
+rt2x00lib
+rt2x00mmio
+rt2x00pci
+rt2x00usb
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+rt5033_battery
+rt61pci
+rt73usb
+rt9455_charger
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+rtl8192se
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+rtllib_crypt_wep
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+sata_sis
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+sata_sx4
+sata_uli
+sata_via
+sata_vsc
+savagefb
+sb1000
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+sbc_epx_c3
+sbc_fritpc2_wdt
+sbc_gxx
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+sbp_target
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+sbs-battery
+sbs-charger
+sbs-manager
+sbshc
+sc1200wdt
+sc16is7xx
+sc92031
+sca3000
+scb2_flash
+sch311x_wdt
+sch5627
+sch5636
+sch56xx-common
+sch_atm
+sch_cbq
+sch_cbs
+sch_choke
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+sch_drr
+sch_dsmark
+sch_fq
+sch_fq_codel
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+sch_hfsc
+sch_hhf
+sch_htb
+sch_ingress
+sch_mq prio
+sch_multiq
+sch_netem
+sch_pie
+sh_veu
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+sha1-ssse3
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+sha256-ssse3
+sha3_generic
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+sha512-ssse3
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+sht3x
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+si1145
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+si2165
+si2168
+si21xx
+si4713
+si476x-core
+si7005
+si7020
+sidewinder
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+sierra_net
+sil164
+silead
+sir-dev
+sir_ir
+sirf-audio-codec
+sis-agp
+sis190
+sis5595
+sis900
+sis_i2c
+sisfb
+sisusbvga
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+sja1000_platform
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+skfp
+skge
+skx_edac
+sky2
+sky81452
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+snd-hda-codec-idt
+snd-hda-codec-realtek
+snd-hda-codec-si3054
+snd-hda-codec-via
+snd-hda-core
+snd-hda-ext-core
+snd-hda-intel
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+snd-soc-fsl-sai
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+snd-virmidi
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+soc_camera_platform
+soc_mediabus
+softdog
+softing
+softing_cs
+so106x10
+solos-pci
+sony-btf-mpx
+sony-laptop
+soundcore
+sp2
+sp5100_tco
+sp8870
+sp887x
+spaceball
+spaceorb
+sparse-keymap
+stk8ba50
+stkwebcam
+stm_console
+stm_core
+stm_ftrace
+stm_heartbeat
+stmfts
+stmmac
+stmmac-platform
+stowaway
+stp
+streamzap
+stts751
+stv0288
+stv0297
+stv0299
+stv0367
+stv0900
+stv090x
+stv0910
+stv6110
+stv6110x
+stv6111
+stx104
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+sunge
+sunge_phy
+sunhme
+suni
+sunkbd
+sunrpc
+sur40
+surface3-wmi
+surface3_button
+surface3_spi
+surfacepro3_button
+svgalib
+switchtec
+sx8
+sx8654
+sx9500
+sym53c500_cs
+sym53c8xx
+symbolserial
+synaptics_i2c
+synaptics_usb
+synclink
+synclink_cs
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+tda18271c2dd
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+tda8261
+tda826x
+tda827x
+tda8290
+tda9840
+tda9887
+tda998x
+tdfxfb
+tdo24m
+tea
+tea575x
+tea5761
+tea5767
+tea6415c
+tea6420
+team
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+team_mode_broadcast
+team_mode_loadbalance
+team_mode_random
+team_mode_roundrobin
+tef6862
+tehuti
+tekram-sir
+telex_cs
+teranetics
+test_bpf
+test_firmware
+test_module
+test_power
+test_static_key_base
+test_static_keys
+test_udelay
+test_user_copy
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+tgr192
+thermal-generic-adc
+thinkpad_acpi
+thmc50
+thunder_bgx
+thunder_xcv
+thunderbolt
+thunderbolt-net
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+ti-adc0832
+ti-adc084s021
+ti-adc108s102
+ti-adc12138
+ti-adc128s052
+ti-adc161s626
+ti-ads1015
+ti-ads7950
+ti-dac082s085
+ti-lmu
+ti-tlc4541
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+ti_am335x_tsc
+ti_am335x_tscadc
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+tifm_ms
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+tm6000
+tm6000-alsa
+tm6000-dvb
+tmadc
+tmem
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+tmp007
+tmp102
+tmp103
+tmp108
+tmp401
+tmp421
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+twl4030-vibra
+twl4030_charger
+twl4030_keypad
+twl4030_made_battery
+twl4030_wdt
+twl6030-gpadc
+twl6030-regulator
+twl6040-vibra
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+twofish-x86_64
+twofish-x86_64-3way
+twofish_common
+twofish_generic
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+typec_ucsi
+typhoon
+u132-hcd
+uPD60620
+uPD98402
+u_audio
+u_ether
+u_serial
+uartlite
+uas
+ubi
+ubifs
+ucb1400_core
+ucb1400_ts
+ucd9000
+ucd9200
+ucsi_acpi
+uda1342
+udc-core
+udf
+udl
+udlf
+udp_diag
+udp_tunnel
+ueagle-atm
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+ufshcd
+ufshcd-dwc
+ufshcd-pci
+ufshcd-pltfrm
+uhid
+uio
+uio_aec
+uio_cif
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+uio_lv_generic
+uio_mf624
+uio_netx
+uio_pci_generic
+uio_pdrv_genirq
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+uio_sercos3
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+uli526x
+ulpi
+umc
+umem
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+ums-cypress
+ums-datafab
+ums-eneub6250
+ums-freecom
+ums-isd200
+ums-jumpshot
+ums-karma
+ums-onetouch
+ums-realtek
+ums-sddr09
+ums-sddr55
+ums-usbat
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+upd64083
+upd780730
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+usb-storage
+usb251xb
+usb3503
+usb4604
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+usb_f_ecm_subset
+usb_f_eem
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+userspace-consumer
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+uvesaafb
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+vboxvideo
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+via_wdt
+viafb
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+videobuf2-vmalloc
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+vime_streamer
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+virtio_net
+virtio_rpmmsg_bus
+virtio_scsi
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+visorhba
+visorinput
+visornic
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+vmw_vsock_vmci_transport
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+xfrm4_mode_tunnel
+xfrm4_tunnel
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+xfrm6_tunnel
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+xfrm_ipcomp
+xfrm_user
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+xillybus_pcie
+xirc2ps_cs
+xircom_cb
+xor
+xpad
+xr_usb_serial_common
+xsens_mt
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+xt_DSCP
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+xt_HMARK
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+xt_TCPOPTSTRIP
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+xt_time
+xt_u32
+xtkbd
+xusb
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+yam
+yealink
+yellowfin
+yenta_socket
+yurex
+z3fold
+ztm
+zaurus
+zavl
+zcommon
+zdl201
+zdl211rw
+zdl301
+zdl301_demod
+zet6223
+zforce_ts
+zfs
+zhenhua
+zirave_wdt
+z10036
+z10039
+z10353
+z16100
+znpair
+zpa2326
+zpa2326_i2c
+zpa2326_spi
+zpios
+zr36016
+zr36050
+zr36060
+zr36067
+zr364xx
+zram
+zstd_compress
+zunicode
+zx-tdm
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/amd64/lowlatency.retpoline
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/amd64/lowlatency.retpoline
@@ -0,0 +1 @@
+# retpoline v1.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/arm64/generic
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/arm64/generic
@@ -0,0 +1,22101 @@
+EXPORT_SYMBOL arch/arm64/crypto/aes-arm64 0x1c28d07e__aes_arm64_decrypt
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1b5019d1drm_atomic_crtc_set_property
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1bd1280ddrm_syncobj_find
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e10de9edrm_bridge_mode_valid
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e1aa9b9dram_mode_prune_invalid
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x1e462458dram_dev_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x20645642dram_debug
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+EXPORT_SYMBOL drivers/gpu/drm/drm 0x21cb811cdrm_crtc_from_index
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+EXPORT_SYMBOL sound/core/snd 0xe1b3e8fesnd_info_free_entry
+EXPORT_SYMBOL sound/core/snd 0xe40589fesnd_bolean_stereo_info
+EXPORT_SYMBOL sound/core/snd 0xf011fdc2snd_ctl_add_slave
+EXPORT_SYMBOL sound/core/snd 0x583ae15snd_device_free
+EXPORT_SYMBOL sound/core/snd 0xccc89f48snd_card_new
+EXPORT_SYMBOL sound/core/snd 0xde5b8f98snd_release_and_free_resource
+EXPORT_SYMBOL sound/core/snd 0xe1b3e8fesnd_card_set_id
+EXPORT_SYMBOL sound/core/snd 0xe04589fesnd_pci_quirk_lookup
+EXPORT_SYMBOL sound/core/snd 0xf011fdec2snd_card_file_add
+EXPORT_SYMBOL sound/core/snd 0xfd2736b3snd_ctl_register_ioctl_compat
+EXPORT_SYMBOL vmlinux 0x00b9700seq_file_path
+EXPORT_SYMBOL vmlinux 0x00d7272vme_lm_count
+EXPORT_SYMBOL vmlinux 0x00d9135devm_memremap
+EXPORT_SYMBOL vmlinux 0x00e38d90_skb_recv_datagram
+EXPORT_SYMBOL vmlinux 0x00fa30a8mark_buffer_async_write
+EXPORT_SYMBOL vmlinux 0x00fd7b81acpi_bus_get_device
+EXPORT_SYMBOL vmlinux 0x01000e51schedule
+EXPORT_SYMBOL vmlinux 0x0101d5b1ip_ids_reserve
+EXPORT_SYMBOL vmlinux 0x0115909unlock_page_memcg
+EXPORT_SYMBOL vmlinux 0x012415b3nd_bit_arena_is_valid
+EXPORT_SYMBOL vmlinux 0x012415b3nd_bit_arena_is_valid
+EXPORT_SYMBOL vmlinux 0x01363db6xfm_init_state
+EXPORT_SYMBOL vmlinux 0x014353d5uart_update_timeout
+EXPORT_SYMBOL vmlinux 0x0146dc01mini_qdisc_pair_swap
+EXPORT_SYMBOL vmlinux 0x01553371vm_brk_flags
+EXPORT_SYMBOL vmlinux 0x015c6479blkdev_put
+EXPORT_SYMBOL vmlinux 0x0168d71amdioibus_get_phy
+EXPORT_SYMBOL vmlinux 0x0171d14dtcp_sockets_allocated
+EXPORT_SYMBOL vmlinux 0x01770628tty_driver_flush_buffer
+EXPORT_SYMBOL vmlinux 0x0179e94csun_partial_copy
+EXPORT_SYMBOL vmlinux 0x017de3d5tcp_sockets_allocated
+EXPORT_SYMBOL vmlinux 0x018c13f0__dquot_free_space
+EXPORT_SYMBOL vmlinux 0x0191a297blk_start_request
+EXPORT_SYMBOL vmlinux 0x01a3c8e7inet_csk_prepare_forced_close
+EXPORT_SYMBOL vmlinux 0x020d51dc_d_make_root
+EXPORT_SYMBOL vmlinux 0x02124474ip_send_check
+EXPORT_SYMBOL vmlinux 0x022fe6fdgnet_stats_copy_app
+EXPORT_SYMBOL vmlinux 0x0246443pci_release_resource
+EXPORT_SYMBOL vmlinux 0x025483b1set_current_groups
+EXPORT_SYMBOL vmlinux 0x025eae50thaw_bdev
+EXPORT_SYMBOL vmlinux 0x02732c85__get_hash_from_flow
+EXPORT_SYMBOL vmlinux 0x0274dc2netif_get_num_default_rss_queues
+EXPORT_SYMBOL vmlinux 0x027f177amdiobus_unregister_device
+EXPORT_SYMBOL vmlinux 0x0299904cpci_remove_bus
+EXPORT_SYMBOL vmlinux 0x02a18c74nf_contrack_destroy
+EXPORT_SYMBOL vmlinux 0x02a38e7inet_csk_prepare_forced_close
+EXPORT_SYMBOL vmlinux 0x02a6ce5acrc16_table
+EXPORT_SYMBOL vmlinux 0x02b74cf8pci_setup_cardbus
+EXPORT_SYMBOL vmlinux 0x02c12a40input_match_device_id
+EXPORT_SYMBOL vmlinux 0x02c608e8neigh_event_ns
+EXPORT_SYMBOL vmlinux 0x02e2558dev_trans_start
+EXPORT_SYMBOL vmlinux 0x02d41be3qman_schedule_fq
+EXPORT_SYMBOL vmlinux 0x02df0b0jiffies
+EXPORT_SYMBOL vmlinux 0x02e15280vme_slot_num
+EXPORT_SYMBOL vmlinux 0x02e1750dnetdev_set_tc_queue
+EXPORT_SYMBOL vmlinux 0x02e111escsi_driverbyte_string
+EXPORT_SYMBOL vmlinux 0x155072bcdev_get_flags
+EXPORT_SYMBOL vmlinux 0x1563f4ddvme_dma_list_exec
+EXPORT_SYMBOL vmlinux 0x1564397epcie_capability_read_dword
+EXPORT_SYMBOL vmlinux 0x157c355falloc_pages_current
+EXPORT_SYMBOL vmlinux 0x15880516tty_driver_kref_put
+EXPORT_SYMBOL vmlinux 0x15948579insert_inode_locked
+EXPORT_SYMBOL vmlinux 0x1594cfe1netif_napi_del
+EXPORT_SYMBOL vmlinux 0x159eb280down_read
+EXPORT_SYMBOL vmlinux 0x159f4e57get_tz_trend
+EXPORT_SYMBOL vmlinux 0x159fbec5kern_path_mounpt
+EXPORT_SYMBOL vmlinux 0x15bafes29unregister_md_cluster_operations
+EXPORT_SYMBOL vmlinux 0x15bed7a5LZ4_decompress_safe_partial
+EXPORT_SYMBOL vmlinux 0x15d4c67sk_common_release
+EXPORT_SYMBOL vmlinux 0x15dacc81fsip Crypt_decrypt_bio_pages
+EXPORT_SYMBOL vmlinux 0x1607f35mdio_device_remove
+EXPORT_SYMBOL vmlinux 0x1610f2e1mb_cache_entry_create
+EXPORT_SYMBOL vmlinux 0x16113094kblockd_schedule_delayed_work
+EXPORT_SYMBOL vmlinux 0x162db3cimmu_put_dma_cookie
+EXPORT_SYMBOL vmlinux 0x16311bcreadix_tree_lookup_slot
+EXPORT_SYMBOL vmlinux 0x16316a10ZSTD_getFrameContentSize
+EXPORT_SYMBOL vmlinux 0x1632bcc0__ll_sc_cmpxchg_double
+EXPORT_SYMBOL vmlinux 0x163b33c5_siphash_aligned
+EXPORT_SYMBOL vmlinux 0x167168f8axfsm_unregister_type
+EXPORT_SYMBOL vmlinux 0x167c5967print_hex_dump
+EXPORT_SYMBOL vmlinux 0x167d6fe3vfs_clone_file_range
+EXPORT_SYMBOL vmlinux 0x167ef454dpbp_get_attributes
+EXPORT_SYMBOL vmlinux 0x16941176bdget_disk
+EXPORT_SYMBOL vmlinux 0x169938c1__sysfs_match_string
+EXPORT_SYMBOL vmlinux 0x169f83cflgen_pool_for_each_chunk
+EXPORT_SYMBOL vmlinux 0x16b06938netlink_ns_capable
+EXPORT_SYMBOL vmlinux 0x16b109b8swake_up
+EXPORT_SYMBOL vmlinux 0x16c887db0sclsi_init_io
+EXPORT_SYMBOL vmlinux 0x16e297c3bit_wait
+EXPORT_SYMBOL vmlinux 0x16e7e2cbbcpu_all_bits
+EXPORT_SYMBOL vmlinux 0x16fa34adrst_dsl_alloc
+EXPORT_SYMBOL vmlinux 0x1703e24fbio_alloc_pages
+EXPORT_SYMBOL vmlinux 0x170c25eeacpi_get_next_object
+EXPORT_SYMBOL vmlinux 0x17370578fcrypt_framenusr_to_disk
+EXPORT_SYMBOL vmlinux 0x173c7449km_policy_expired
+EXPORT_SYMBOL vmlinux 0x174d0d99eth_prepare_mac_addr_change
+EXPORT_SYMBOL vmlinux 0x17511142inet_gro_complete
+EXPORT_SYMBOL vmlinux 0x17647ce8mipl_dsi_device_register_full
+EXPORT_SYMBOL vmlinux 0x17793d9asdev_disable_disk_events
+EXPORT_SYMBOL vmlinux 0x17973e4current_work
+EXPORT_SYMBOL vmlinux 0x17a2fe0d_inode_sub_bytes
+EXPORT_SYMBOL vmlinux 0x17a535cacllk_get
+EXPORT_SYMBOL vmlinux 0x17bc50dllpoin_enable_device
+EXPORT_SYMBOL vmlinux 0x17e65478clocksource_unregister
+EXPORT_SYMBOL vmlinux 0x2a60c2d7node_states
+EXPORT_SYMBOL vmlinux 0x2a70bde3kernel_sendpage_locked
+EXPORT_SYMBOL vmlinux 0x2a83eb28pci_request_region
+EXPORT_SYMBOL vmlinux 0x2a99a3d8dm_table_get_md
+EXPORT_SYMBOL vmlinux 0x2ab9b94e9pci_unmap_rom
+EXPORT_SYMBOL vmlinux 0x2aa06ecppci_alloc_dev
+EXPORT_SYMBOL vmlinux 0x2abc3a399backlight_force_update
+EXPORT_SYMBOL vmlinux 0x2ac36288kvasprintf_const
+EXPORT_SYMBOL vmlinux 0x2adfc9d1iovéterzero
+EXPORT_SYMBOL vmlinux 0x2ae07b9sg_miter_skip
+EXPORT_SYMBOL vmlinux 0x2b070578dm io
+EXPORT_SYMBOL vmlinux 0x2b0ba2b0scsi_sense_dese_find
+EXPORT_SYMBOL vmlinux 0x2b1abce3fman_has_errata_a050385
+EXPORT_SYMBOL vmlinux 0x2b26024btry_to_writeback_inodes sb
+EXPORT_SYMBOL vmlinux 0x2b2ce78bkstrtos8
+EXPORT_SYMBOL vmlinux 0x2b2f7e3bphy_register_fixup_for_id
+EXPORT_SYMBOL vmlinux 0x2b3c1457blk mq_end_request
+EXPORT_SYMBOL vmlinux 0x2b4458ddparam_set_bint
+EXPORT_SYMBOL vmlinux 0x2b49fbsbuart_suspend_port
+EXPORT_SYMBOL vmlinux 0x2b5cb50nf_hooks_needed
+EXPORT_SYMBOL vmlinux 0x2b60ef05kfree_skb
+EXPORT_SYMBOL vmlinux 0x2b6ece685dma_fence_init
+EXPORT_SYMBOL vmlinux 0x2b8cd0cfquot_alloc_inode
+EXPORT_SYMBOL vmlinux 0x2b9da7a4genl lock
+EXPORT_SYMBOL vmlinux 0x2ba409d2cdrom get_media_event
+EXPORT_SYMBOL vmlinux 0x2bb55d6eacpi_remove_notify_handler
+EXPORT_SYMBOL vmlinux 0x2bc4b1e3nvdimmbus unlock
+EXPORT_SYMBOL vmlinux 0x2bfab10__memmove
+EXPORT_SYMBOL vmlinux 0x2bfeb410acpi_get_handle
+EXPORT_SYMBOL vmlinux 0x2c0ea1f5blk_init_queue
+EXPORT_SYMBOL vmlinux 0x2c1f9507single_open_size
+EXPORT_SYMBOL vmlinux 0x2c256e1finput_scancode_to_scalar
+EXPORT_SYMBOL vmlinux 0x2c39641dphecy_resume
+EXPORT_SYMBOL vmlinux 0x2c475916generic_setlease
+EXPORT_SYMBOL vmlinux 0x2c5016ffmipi_dsi_driver_register_full
+EXPORT_SYMBOL vmlinux 0x2c545293sync_mapping_buffers
+EXPORT_SYMBOL vmlinux 0x2c560f26__register_nls
+EXPORT_SYMBOL vmlinux 0x2c7276d7kernel_sock_shutdown
+EXPORT_SYMBOL vmlinux 0x2c886c26nobb write_begin
+EXPORT_SYMBOL vmlinux 0x2c9950fc__cpuhp_remove_state
+EXPORT_SYMBOL vmlinux 0x2cb04c78netdev_reset_tc
+EXPORT_SYMBOL vmlinux 0x2cb2a362iov_iter_for_each_range
+EXPORT_SYMBOL vmlinux 0x2cc0c0c5tcp_setsockopt
+EXPORT_SYMBOL vmlinux 0x2cd8f745mmc_gpio_set_cd_isr
+EXPORT_SYMBOL vmlinux 0x2cf73cb7kstrtol_from_user
+EXPORT_SYMBOL vmlinux 0x2d140a58genl unlock
+EXPORT_SYMBOL vmlinux 0x2d30596cforkqid_muneged
+EXPORT_SYMBOL vmlinux 0x2d3385d3system_wq
+EXPORT_SYMBOL vmlinux 0x33f08b8c__qdsc_calculate_pkt_len
+EXPORT_SYMBOL vmlinux 0x33fcf44a__kfifo_out_r
+EXPORT_SYMBOL vmlinux 0x34056f6f__qdisc_calculate_pkt_len
+EXPORT_SYMBOL vmlinux 0x340ce76bpici_bus_write_config_word
+EXPORT_SYMBOL vmlinux 0x341d9330tcp_fastopen_defer_connect
+EXPORT_SYMBOL vmlinux 0x3431fdaf5__ll_sc_atomic64_fetch_andnot_acquire
+EXPORT_SYMBOL vmlinux 0x3434c088bitmap_cond_end_sync
+EXPORT_SYMBOL vmlinux 0x3439279dev_uc_add_excl
+EXPORT_SYMBOL vmlinux 0x344b3b0dfpcore_set_obj_irq
+EXPORT_SYMBOL vmlinux 0x3464b72dnlstrdup
+EXPORT_SYMBOL vmlinux 0x346bff7fsimple_noselease
+EXPORT_SYMBOL vmlinux 0x346d40ceseg6_hmac_net_exit
+EXPORT_SYMBOL vmlinux 0x347df7c2reuseport_attach_prog
+EXPORT_SYMBOL vmlinux 0x3490a717__ll_sc_atomic64_add_return_relaxed
+EXPORT_SYMBOL vmlinux 0x34962dfckmem_cache_size
+EXPORT_SYMBOL vmlinux 0x349ba85strchr
+EXPORT_SYMBOL vmlinux 0x349e4c6qcomm_sc_assign_mem
+EXPORT_SYMBOL vmlinux 0x34a2f2a3bitmap_malloc
+EXPORT_SYMBOL vmlinux 0x34c06076_copy_from_iter
+EXPORT_SYMBOL vmlinux 0x34c13b86phy_write_mmd
+EXPORT_SYMBOL vmlinux 0x34d1c68bofind_matching_node_and_match
+EXPORT_SYMBOL vmlinux 0x34f8864nf_log_set
+EXPORT_SYMBOL vmlinux 0x34f9b47dnet_add_protocol
+EXPORT_SYMBOL vmlinux 0x3517383eregister_reboot_notifier
+EXPORT_SYMBOL vmlinux 0x3539f111match_strlenpy
+EXPORT_SYMBOL vmlinux 0x35503c03ckobject_set_name
+EXPORT_SYMBOL vmlinux 0x355e21e3acpi_bios_warning
+EXPORT_SYMBOL vmlinux 0x35633d51mmc_retune_timer_stop
+EXPORT_SYMBOL vmlinux 0x356461c8rtc_time64_to_tm
+EXPORT_SYMBOL vmlinux 0x356e878edevm_gpiod_put_array
+EXPORT_SYMBOL vmlinux 0x35772342__ll_sc_atomic_fetch_add
+EXPORT_SYMBOL vmlinux 0x35789e27mmc_wait_for_req_done
+EXPORT_SYMBOL vmlinux 0x359b1c63jiffies_64
+EXPORT_SYMBOL vmlinux 0x35a88f28zlib_inflateInit2
+EXPORT_SYMBOL vmlinux 0x35e78831udp_lib_unhash
+EXPORT_SYMBOL vmlinux 0x35f08beanla_reserve_nohdr
+EXPORT_SYMBOL vmlinux 0x35fd4301dquot_disable
+EXPORT_SYMBOL vmlinux 0x360391b1textsearch_unregister
+EXPORT_SYMBOL vmlinux 0x360a76f0tcf_exts_destroy
+EXPORT_SYMBOL vmlinux 0x360b1afeprobe_irq_mask
+EXPORT_SYMBOL vmlinux 0x360f8f8a__cond_resched_lock
+EXPORT_SYMBOL vmlinux 0x360ff19fdown
+EXPORT_SYMBOL vmlinux 0x3611f6d2nf_nat_decode_session_hook
+EXPORT_SYMBOL vmlinux 0x362750e3of_device_unregister
+EXPORT_SYMBOL vmlinux 0x364af431import_iovec
+EXPORT_SYMBOL vmlinux 0x3657cc7cryptosha256_update
+EXPORT_SYMBOL vmlinux 0x3acdd6c4 get_bitmap_from_slot
+EXPORT_SYMBOL vmlinux 0x3aed3d1 ccdrom_ioctl
+EXPORT_SYMBOL vmlinux 0x3af07ecf xxh32
+EXPORT_SYMBOL vmlinux 0x3b156a9unix_destruct_scm
+EXPORT_SYMBOL vmlinux 0x3b1bdfc0 generic_mii_ioctl
+EXPORT_SYMBOL vmlinux 0x3b300948 percpu_counter_set
+EXPORT_SYMBOL vmlinux 0x3b628765fman_port_get_hash_result_offset
+EXPORT_SYMBOL vmlinux 0x3b62a642pci_find_parent_resource
+EXPORT_SYMBOL vmlinux 0x3b644591 __bitmap_shift_left
+EXPORT_SYMBOL vmlinux 0x3b7c1078dma_find_channel
+EXPORT_SYMBOL vmlinux 0x3b901463tcf_block_put
+EXPORT_SYMBOL vmlinux 0x3b953a70 allocate_resource
+EXPORT_SYMBOL vmlinux 0x3b973e99 tcp_md5_do_add
+EXPORT_SYMBOL vmlinux 0x3b98f19f phy_attached_print
+EXPORT_SYMBOL vmlinux 0x3b99ed36a __ll_sc_atomic64_fetchnot_release
+EXPORT_SYMBOL vmlinux 0x3bb151c8 xfrm_policy_bysel_ctx
+EXPORT_SYMBOL vmlinux 0x3bb5ee13 bmap
+EXPORT_SYMBOL vmlinux 0x3bb66dac file splice_write
+EXPORT_SYMBOL vmlinux 0x3bbad28ida_pre_get
+EXPORT_SYMBOL vmlinux 0x3bc6d3jbd2_journal_try_to_free_buffers
+EXPORT_SYMBOL vmlinux 0x3bc6c8enapi_disable
+EXPORT_SYMBOL vmlinux 0x3bd4599f xfrm_lookup_route
+EXPORT_SYMBOL vmlinux 0x3bd877cmax8925_set_bits
+EXPORT_SYMBOL vmlinux 0x3be1c7c8pci_alloc_host_bridge
+EXPORT_SYMBOL vmlinux 0x3be7643esecurity_xfrm_policy_free
+EXPORT_SYMBOL vmlinux 0x3bee7741fsprotocol_setup_filename
+EXPORT_SYMBOL vmlinux 0x3c17a778 __ip_dev_find
+EXPORT_SYMBOL vmlinux 0x3c195f95brioctl_set
+EXPORT_SYMBOL vmlinux 0x3c2b661akey_payload_reserve
+EXPORT_SYMBOL vmlinux 0x3c394d7iommu_tbl_range_alloc
+EXPORT_SYMBOL vmlinux 0x3c3f3e39 __local_bb_enable_ip
+EXPORT_SYMBOL vmlinux 0x3c4a4d0abx500_event_registers_startup_state_get
+EXPORT_SYMBOL vmlinux 0x3c56b931xfrm_user_policy
+EXPORT_SYMBOL vmlinux 0x3c578bac __wake_up
+EXPORT_SYMBOL vmlinux 0x3c5e9c8load_nls_default
+EXPORT_SYMBOL vmlinux 0x3c80c06c kstrtoull
+EXPORT_SYMBOL vmlinux 0x3c885e4aeblk_put_request
+EXPORT_SYMBOL vmlinux 0x3c9684fedma_fence_context_alloc
+EXPORT_SYMBOL vmlinux 0x3ca17ef6inet_csk_accept
+EXPORT_SYMBOL vmlinux 0x3cb520ỗi_get_hp_hw_control_from_firmware
+EXPORT_SYMBOL vmlinux 0x3cd0fe6request_firmware_nowait
+EXPORT_SYMBOL vmlinux 0x3cd9ed83logic_insw
+EXPORT_SYMBOL vmlinux 0x3ce4ca6fdisable_irq
+EXPORT_SYMBOL vmlinux 0x3ceb6d19wl6040_clear_bits
+EXPORT_SYMBOL vmlinux 0x41b3f0ftouchscreen_set_mt_pos
+EXPORT_SYMBOL vmlinux 0x41bebf9nd_integrity_init
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+EXPORT_SYMBOL vmlinux 0x41fe8cb1security_skb_classify_flow
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+EXPORT_SYMBOL vmlinux 0x42160169flush_workqueue
+EXPORT_SYMBOL vmlinux 0x4226c0e9mod_timer
+EXPORT_SYMBOL vmlinux 0x42286212__il_sc_atomic64_fetch_and
+EXPORT_SYMBOL vmlinux 0x422fe37emipi_dsi_dcs_write
+EXPORT_SYMBOL vmlinux 0x42350e8ducs2_strlen
+EXPORT_SYMBOL vmlinux 0x4248ae3csingle_task_running
+EXPORT_SYMBOL vmlinux 0x424d3620zlib_inflateIncomp
+EXPORT_SYMBOL vmlinux 0x425e3736pci_alloc_irq_vectors_affinity
+EXPORT_SYMBOL vmlinux 0x42609c6belv_rb_former_request
+EXPORT_SYMBOL vmlinux 0x426430cbbra_radix_tree_next_slot
+EXPORT_SYMBOL vmlinux 0x426a47dparam_get_invbool
+EXPORT_SYMBOL vmlinux 0x42729ce4filemap_write_and_wait_range
+EXPORT_SYMBOL vmlinux 0x42830f35param_get_ulong
+EXPORT_SYMBOL vmlinux 0x428bc0afcpu_hwcaps_keys
+EXPORT_SYMBOL vmlinux 0x42909d5dkernel_sendmsg_locked
+EXPORT_SYMBOL vmlinux 0x429ca75netdev_printk
+EXPORT_SYMBOL vmlinux 0x429f9c5tty_set_operations
+EXPORT_SYMBOL vmlinux 0x42a1243skb_append_datato_frags
+EXPORT_SYMBOL vmlinux 0x42a26a2bttry_to_del_timer_sync
+EXPORT_SYMBOL vmlinux 0x42a55e8eb0jbd2_journal_blocks_per_page
+EXPORT_SYMBOL vmlinux 0x4302d0ebfree_pages
+EXPORT_SYMBOL vmlinux 0x4308a9e9etextsearch_prepare
+EXPORT_SYMBOL vmlinux 0x4322590cskb_copy_and_csum_bits
+EXPORT_SYMBOL vmlinux 0x432e8fbaeth_change_mtu
+EXPORT_SYMBOL vmlinux 0x433c7d0param_set_byte
+EXPORT_SYMBOL vmlinux 0x4351577aafb_parse_edid
+EXPORT_SYMBOL vmlinux 0x43667243mod_zone_page_state
+EXPORT_SYMBOL vmlinux 0x438da0d6d_sock_tx_timestamp
+EXPORT_SYMBOL vmlinux 0x4380c77cparam_ops_int
+EXPORT_SYMBOL vmlinux 0x438610bsecurity_tun_dev_alloc_security
+EXPORT_SYMBOL vmlinux 0x4388495bskb_copy_and_csum_datagram_msg
+EXPORT_SYMBOL vmlinux 0x43917857of_dev_get
+EXPORT_SYMBOL vmlinux 0x43a71552block_page_mkwrite
+EXPORT_SYMBOL vmlinux 0x43b8c53dgenphy_aneg_done
+EXPORT_SYMBOL vmlinux 0x43cf75299sk_mc_loop
+EXPORT_SYMBOL vmlinux 0x43d36682pci_prepare_to_sleep
+EXPORT_SYMBOL vmlinux 0x43d5f55xfrm_state_walk_done
+EXPORT_SYMBOL vmlinux 0x43f3399bset_security_override
+EXPORT_SYMBOL vmlinux 0x4406c3d2tty_port_free_xmit_buf
+EXPORT_SYMBOL vmlinux 0x463ba2e1sock_create_kern
+EXPORT_SYMBOL vmlinux 0x46425e44vfs_fsync_range
+EXPORT_SYMBOL vmlinux 0x464cb7c2inode_needs_sync
+EXPORT_SYMBOL vmlinux 0x464d4430memset16
+EXPORT_SYMBOL vmlinux 0x4654a570balance_dirty_pages_ratelimited
+EXPORT_SYMBOL vmlinux 0x4657d0a7update_region
+EXPORT_SYMBOL vmlinux 0x465cab34secure_ipv6_port_ephemeral
+EXPORT_SYMBOL vmlinux 0x46649cd1vme_lm_set
+EXPORT_SYMBOL vmlinux 0x466c14a7__delay
+EXPORT_SYMBOL vmlinux 0x4674843ablk_rq_map_user
+EXPORT_SYMBOL vmlinux 0x467df16dnetdev_rss_key_fill
+EXPORT_SYMBOL vmlinux 0x46843599jcf_exts_dump_stats
+EXPORT_SYMBOL vmlinux 0x469151bfpci_iomap
+EXPORT_SYMBOL vmlinux 0x469ffa8f tcp_parse_options
+EXPORT_SYMBOL vmlinux 0x46a8b34aabhipdate_or_lock
+EXPORT_SYMBOL vmlinux 0x46ba3fb9neigh_seq_stop
+EXPORT_SYMBOL vmlinux 0x46c47fb6__node_distance
+EXPORT_SYMBOL vmlinux 0x46df6996fbcon_rotate_ccw
+EXPORT_SYMBOL vmlinux 0x470d1c10padata_do_parallel
+EXPORT_SYMBOL vmlinux 0x471c7645cleancache_get_page
+EXPORT_SYMBOL vmlinux 0x475f010bfman_get_rx_extra_headroom
+EXPORT_SYMBOL vmlinux 0x475f010baci_purge_cached_objects
+EXPORT_SYMBOL vmlinux 0x4769773bamhba_request_regions
+EXPORT_SYMBOL vmlinux 0x4777df80get_next_parent
+EXPORT_SYMBOL vmlinux 0x47f9773bamba_request_regions
+EXPORT_SYMBOL vmlinux 0x47f1df80journal_inode_ranged_wait
+EXPORT_SYMBOL vmlinux 0x478ec7afkill_bdev
+EXPORT_SYMBOL vmlinux 0x478f86a1d_operate
+EXPORT_SYMBOL vmlinux 0x4791cadfjbd2_journal_force_commit_nested
+EXPORT_SYMBOL vmlinux 0x47939e0dtasklet_hi_schedule
+EXPORT_SYMBOL vmlinux 0x4799b558swiotlb_free_coherent
+EXPORT_SYMBOL vmlinux 0x479c386find_next_zero_bit
+EXPORT_SYMBOL vmlinux 0x47ab7bcelv_unregister_queue
+EXPORT_SYMBOL vmlinux 0x47af99b8dpcon_open
+EXPORT_SYMBOL vmlinux 0x47ce5batunregister_inet6addr_validator_notifier
+EXPORT_SYMBOL vmlinux 0x47ce7c3anetdev_features_change
+EXPORT_SYMBOL vmlinux 0x47e936a3ttty_register_driver
+EXPORT_SYMBOL vmlinux 0x48171c0bclk_add_alias
+EXPORT_SYMBOL vmlinux 0x48193639acpi_lid_open
+EXPORT_SYMBOL vmlinux 0x481a2940napi_schedule_prep
+EXPORT_SYMBOL vmlinux 0x481b9abcpci_enter_sleep_state_prep
+EXPORT_SYMBOL vmlinux 0x482812a0gen_pool_best_fit

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+EXPORT_SYMBOL vmlinux 0x4a68df1cwriteback_inodes_sb_nr
+EXPORT_SYMBOL vmlinux 0x4a798b15textsearch_destroy
+EXPORT_SYMBOL vmlinux 0x4a984633blkdev_reread_part
+EXPORT_SYMBOL vmlinux 0x4aaed53emutex_unlock
+EXPORT_SYMBOL vmlinux 0x4ab106bexfrm_state_register_afile
+EXPORT_SYMBOL vmlinux 0x4ab55d0c__mod_zone_page_state
+EXPORT_SYMBOL vmlinux 0x4ab6da6seq_open_private
+EXPORT_SYMBOL vmlinux 0x4ac53b33dump_align
+EXPORT_SYMBOL vmlinux 0x4addb3a3fvfio_pci_driver_ptr
+EXPORT_SYMBOL vmlinux 0x4afe9a77csi_partsize
+EXPORT_SYMBOL vmlinux 0x4b007a5celfimal_random_ready_callback
+EXPORT_SYMBOL vmlinux 0x4b21546a7mfill_cell_enable
+EXPORT_SYMBOL vmlinux 0x4b1f054rdinput_allocate_device
+EXPORT_SYMBOL vmlinux 0x4b28b707_frontend_swap
+EXPORT_SYMBOL vmlinux 0x4b2c1df7qman_p_irqsource_add
+EXPORT_SYMBOL vmlinux 0x4b3e3ceabtty_porttty_set
+EXPORT_SYMBOL vmlinux 0x4b42d979dev_uc_flush
+EXPORT_SYMBOL vmlinux 0x4b4e040f__ll_sc_atomic64_fetch_xor
+EXPORT_SYMBOL vmlinux 0x4b5f49edkm_copyd_do_callback
+EXPORT_SYMBOL vmlinux 0x4b7d291csock_kfree_s
+EXPORT_SYMBOL vmlinux 0x4b80d6a5dump_emit
+EXPORT_SYMBOL vmlinux 0x4b8b3239vprintf
+EXPORT_SYMBOL vmlinux 0x4b9ac79bgen_pool_first_fit_align
+EXPORT_SYMBOL vmlinux 0x4ba350dcmcmd_done_sync
+EXPORT_SYMBOL vmlinux 0x4ba6578bgenphy_read_mmd_unsupported
+EXPORT_SYMBOL vmlinux 0x4ba6a7e9e0eth_header
+EXPORT_SYMBOL vmlinux 0x4baf35a7vme_master_get
+EXPORT_SYMBOL vmlinux 0x4bbc3380__blk_end_request_cur
+EXPORT_SYMBOL vmlinux 0x4bbc3380__blk_end_request_cur
+EXPORT_SYMBOL vmlinux 0x4bd4780fgeneric_start_io_acct
+EXPORT_SYMBOL vmlinux 0x4bf727c1dmam_alloc_attrs
+EXPORT_SYMBOL vmlinux 0x4c007878jbd2_journal_get_undo_access
+EXPORT_SYMBOL vmlinux 0x4c01ddbbacpi_walk_resource_buffer
+EXPORT_SYMBOL vmlinux 0x4c07a7e0acpi_processor_unregister_performance
+EXPORT_SYMBOL vmlinux 0x4c22d8a2tcp_create_openreq_child
+EXPORT_SYMBOL vmlinux 0x4c308bf2dma_releaseDeclared_memory
+EXPORT_SYMBOL vmlinux 0x4c416eb9LZ4_decompress_fast
+EXPORT_SYMBOL vmlinux 0x4c428a75abort_type
+EXPORT_SYMBOL vmlinux 0x4c44f462inc_nlink
+EXPORT_SYMBOL vmlinux 0x4c52c8c3tcp_proc_unregister
+EXPORT_SYMBOL vmlinux 0x4c5ed81a__ll_sc_atomic64_dec_if_positive
+EXPORT_SYMBOL vmlinux 0x4c5f3b6neigh_table_init
+EXPORT_SYMBOL vmlinux 0x4c60eeftest_and_change_bit
+EXPORT_SYMBOL vmlinux 0x4c70b79exfrm_input
+EXPORT_SYMBOL vmlinux 0x4c71be4bconfig_group_init_type_name
+EXPORT_SYMBOL vmlinux 0x50e995aarq_domain_set_info
+EXPORT_SYMBOL vmlinux 0x50e0f749__cleancache_invalidate_inode
+EXPORT_SYMBOL vmlinux 0x50e15c04__check_sticky
+EXPORT_SYMBOL vmlinux 0x50e2ad7cinet_reqsk_alloc
+EXPORT_SYMBOL vmlinux 0x50e6d48security_sb_clone_mnt_opts
+EXPORT_SYMBOL vmlinux 0x50f85302__arm_smccc_hvc
+EXPORT_SYMBOL vmlinux 0x50f99d3simple_transaction_set
+EXPORT_SYMBOL vmlinux 0x50fed155i2c_smbus_read_i2c_block_data_or_emulated
+EXPORT_SYMBOL vmlinux 0x5107ddedblk_complete_request
+EXPORT_SYMBOL vmlinux 0x51164ad9cmdline_parts_set
+EXPORT_SYMBOL vmlinux 0x5118c382secure_dccp_sequence_number
+EXPORT_SYMBOL vmlinux 0x51226cb2dev_uc_init
+EXPORT_SYMBOL vmlinux 0x51492fchpci_enable_msi
+EXPORT_SYMBOL vmlinux 0x51622cfexxh32_update
+EXPORT_SYMBOL vmlinux 0x5164f162i2c_smbus_read_i2c_block_data_or_emulated
+EXPORT_SYMBOL vmlinux 0x5166b041inet_sendpage
+EXPORT_SYMBOL vmlinux 0x5175b82secure_dccp_sequence_number
+EXPORT_SYMBOL vmlinux 0x517acb1pci_request_irq
+EXPORT_SYMBOL vmlinux 0x517c419dlookupsnoop
+EXPORT_SYMBOL vmlinux 0x518fac8bpadata_do_serial
+EXPORT_SYMBOL vmlinux 0x51b47af3ip6_dst_alloc
+EXPORT_SYMBOL vmlinux 0x51c070c9svmlinux
+EXPORT_SYMBOL vmlinux 0x51d124edacpi_pci_disabled
+EXPORT_SYMBOL vmlinux 0x51d1f979pci_enable_device_io
+EXPORT_SYMBOL vmlinux 0x51d40568mutex_lock_killable
+EXPORT_SYMBOL vmlinux 0x51d8883__frontswap_test
+EXPORT_SYMBOL vmlinux 0x51e0807__getblk_gfp
+EXPORT_SYMBOL vmlinux 0x51e77c97pfis_valid
+EXPORT_SYMBOL vmlinux 0x51e8a7bqman_release_fqid
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+EXPORT_SYMBOL vmlinux 0x52317590phy_init_eee
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+EXPORT_SYMBOL vmlinux 0x6e44d0c8tcp_check_req
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+EXPORT_SYMBOL vmlinux 0x7b202362mount_subtree
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+EXPORT_SYMBOL vmlinux 0x7b3eac6bio_flush_dcache_pages
+EXPORT_SYMBOL vmlinux 0x7b54f3ebd Lookup
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+EXPORT_SYMBOL vmlinux 0x7c809a21invalidate_mapping_pages
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+EXPORT_SYMBOL vmlinux 0x7ea4ba2cvmalloc_to_page
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+EXPORT_SYMBOL vmlinux 0x97fe033dblk_queue_virt_boundary
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+EXPORT_SYMBOL vmlinux 0x982d20a3reservation_object_add_excl_fence
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+EXPORT_SYMBOL vmlinux 0x984b9d49unregister_netdevice_queue
+EXPORT_SYMBOL vmlinux 0x98561afetty_unlock
+EXPORT_SYMBOL vmlinux 0x98595c1evfs_rmdir
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+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xc94a93e0 nf_ct_expect_find_get
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xda344ddbnf nf_conntrack_helpers_unregister
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xeab62b965 nf_conntrack_l4proto_udplite4
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x0582fc0efcf80211_wext_siwtgs
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x48d6fd43cfg80211_wext_giwrety
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x56720e62cfg80211_wext_giwmode
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x6631db8cfd80211_vendor_cmd_reply
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x77168f3d cfg80211_wext_giwrange
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x582fc0efcfg80211_shutdown_all_interfaces
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x8f81eb2ecfg80211_wext_siwrts
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0x99889d1cfg80211_wext_giwname
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0xda4eb55ccfg80211_wext_giwscan
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0xa7c2d97bcfg80211_wext_siwsrscan
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0xcfff6997cfg80211_wext_giwfrag
+EXPORT_SYMBOL_GPL net/wireless/cfg80211 0xaf5af98acfg80211_wext_giwmode
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x0a575945 xfrm_count_pfkey_auth_supported
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x28e23139 xfrm_probe_algs
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x3bf471d7 xfrm_calg_getbyname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x47b34e60 xfrm_ealg_getbyname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x60d73277 xfrm_aead_getbyname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x7a8ce627 xfrm_count_pfkey_enc_supported
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x834ba96dxfrm_aalg_get_byid
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xaaaee6685 xfrm_aalg_getbyname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x0e762fe2 xfrm_aalg_get_byidx
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+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xdaftc35c8 xfrm_ealg_getbyidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xdfc8a6dxfrm_ealg_getbyid
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x1c6d51edipcomp_input
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x6080abf2 ipcomp_output
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x6ae0f6ceipcomp_destroy
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x91b90348ipcomp_init_state
+EXPORT_SYMBOL_GPL sound/ac97_bus 0x201e3875 snd_ac97_reset
+EXPORT_SYMBOL_GPL sound/core/snd 0x0a3cddaf snd_card_disconnect_sync
+EXPORT_SYMBOL_GPL sound/core/snd 0x1915c7f8 snd_device_initialize
+EXPORT_SYMBOL_GPL sound/core/snd 0x2de1b875 snd_ctl_add_vmaster_hook
+EXPORT_SYMBOL_GPL sound/core/snd 0x46d89f83 snd_ctl_sync_vmaster
+EXPORT_SYMBOL_GPL sound/core/snd 0x4b5f472fsnd_card_add_dev_attr
+EXPORT_SYMBOL_GPL sound/core/snd 0x73d0e4c1 snd_device_disconnect
+EXPORT_SYMBOL_GPL sound/core/snd 0x77f3603dsnd_ctl_apply_vmaster_slaves
+EXPORT_SYMBOL_GPL sound/core/snd 0x89654db2 snd_ctl_get_preferred_subdevice
+EXPORT_SYMBOL_GPL sound/core/snd 0x0b60c4debsnd_ctl_activate_id
+EXPORT_SYMBOL_GPL sound/core/snd-pcm 0x04e1b99fsnd_pcm_std_chmaps
+EXPORT_SYMBOL_GPL sound/core/snd-pcm 0x09e913c1 snd_pcm_alt_chmaps
+EXPORT_SYMBOL_GPL sound/core/snd-pcm 0x0ef29b66snd_pcm_lib_default_mmap
+EXPORT_SYMBOL_GPL sound/core/snd-pcm 0x38123a0dsnd_pcm_stream_unlock
+EXPORT_SYMBOL_GPL sound/core/snd-pcm 0x3ea92794snd_pcm_stream_lock
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x46854f45snd_hdac_bus_stop_cmd_io
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x4c7ec4b6snd_hdac_get_ch_alloc_from_ca
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x4d8ec078snd_hda_bus_type
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x52a82990snd_hdac_check_power_state
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x53a7b341hdac_get_device_id
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x554c8511snd_hdac_stream_assign
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x589c8bb1snd_hdac_bus_send_cmd
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x59a287c7snd_hdac_dsp_prepare
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x5c636f04snd_hdac_bus_exit
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x5d51942esnd_hdac_regmap_update_raw
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x5e66c88asnd_hdac_cleanup
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x6068a2basnd_hdac_codec_modalias
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x67604e76snd_hdac_regmap_read_raw
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x6801b98snd_hdac_stream_timecounter_init
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x9770b448snd_hdac_stream_init
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0xb07a55a7snd_hdac_stream_clear
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0xbeb7674snd_hdac_refresh_widgets
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0xbe7d7d7cdsnd_array_new
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+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0xce7f722e0snd_hdac_make_cmd
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+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x7136fc88 snd_hda_gen_parse_auto_config
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x76dc6871 hda_main_out_badness
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x871a6e44 hda_extra_out_badness
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+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xe6b8fafs snd_hda_gen_reboot_notify
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xf8499888 snd_hda_gen_hp_automute
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-adau-utils 0x6e8deb52 adau_calc_pll_cfg
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-adau1761 0x628a37e7 adau1761_regmap_config
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-adau17x1 0xe1f2a090 adau17x1_dai_ops
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs4271 0x4822b8a1 cs4271_probe
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42l51 0x375ad98c cs42l51_of_match
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0x0245c4f2 cs42xx8_of_match
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42888 0x7f38e08b adau17x1_data
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0xe1f2a090 adau17x1_resume
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+EXPORT_SYMBOL_GPL vmlinux 0x481e914acproc_get_parent_data
+EXPORT_SYMBOL_GPL vmlinux 0x4828e77bacpi_scan_lock_acquire
+EXPORT_SYMBOL_GPL vmlinux 0x48333577_fat_fs_error
+EXPORT_SYMBOL_GPL vmlinux 0x48398ab5acpi_create_platform_device
+EXPORT_SYMBOL_GPL vmlinux 0x4845066addrconf_prefix_rcv_add_addr
+EXPORT_SYMBOL_GPL vmlinux 0x485609d0of_usb_host_tpl_support
+EXPORT_SYMBOL_GPL vmlinux 0x485cd7f6kvm_rebooting
+EXPORT_SYMBOL_GPL vmlinux 0x4868c3b9rcu_batches_started_bh
+EXPORT_SYMBOL_GPL vmlinux 0x4871f5a6compat_get timespec64
+EXPORT_SYMBOL_GPL vmlinux 0x4878416etheral_zone_of_sensor_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x487c5d33nf_log buf_add
+EXPORT_SYMBOL_GPL vmlinux 0x488240fcptc leave_memory_pressure
+EXPORT_SYMBOL_GPL vmlinux 0x4896a9c4regulator_set_pull_down_remap
+EXPORT_SYMBOL_GPL vmlinux 0x48a6bed1pm wakeup ws_event
+EXPORT_SYMBOL_GPL vmlinux 0x48c4dec7acpi_gpiochip_request interrupts
+EXPORT_SYMBOL_GPL vmlinux 0x48c6f740serdev_device_get_tio cm
+EXPORT_SYMBOL_GPL vmlinux 0x48cba357blkg_pfill_rwsstat
+EXPORT_SYMBOL_GPL vmlinux 0x48ee44bc6task_cgroup_path
+EXPORT_SYMBOL_GPL vmlinux 0x49156b60_tracepoint_kfree_skb
+EXPORT_SYMBOL_GPL vmlinux 0x491e8c7dpci_bus_add_device
+EXPORT_SYMBOL_GPL vmlinux 0x4928e799phy_get
+EXPORT_SYMBOL_GPL vmlinux 0x492a5d15__device_reset
+EXPORT_SYMBOL_GPL vmlinux 0x49439e62pci_bus_resource_n
+EXPORT_SYMBOL_GPL vmlinux 0x49470a5cefvarent_delete
+EXPORT_SYMBOL_GPL vmlinux 0x49526c03bgmac_adjust_link
+EXPORT_SYMBOL_GPL vmlinux 0x497c8b52ata_host_activate

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+EXPORT_SYMBOL_GPL vmlinux 0x50e87f53__devm_regmap_init_i2c
+EXPORT_SYMBOL_GPL vmlinux 0x50ebf9b8thermal_remove_hwmon_sysfs
+EXPORT_SYMBOL_GPL vmlinux 0x50f46847alarm_cancel
+EXPORT_SYMBOL_GPL vmlinux 0x510ad434round_jiffies_up
+EXPORT_SYMBOL_GPL vmlinux 0x511bf097__clk_determine_rate
+EXPORT_SYMBOL_GPL vmlinux 0x51433d20__clk_determine_rate
+EXPORT_SYMBOL_GPL vmlinux 0x514a9a74cpu_cgrp_subsys_on_dfl_key
+EXPORT_SYMBOL_GPL vmlinux 0x514db9c9ctp_is_tpm2
+EXPORT_SYMBOL_GPL vmlinux 0x515a4fa7cpu_cgrp_subsys_on_dfl_key
+EXPORT_SYMBOL_GPL vmlinux 0x516786a8cpu_cgrp_subsys_on_dfl_key
+EXPORT_SYMBOL_GPL vmlinux 0x51652513crypto_register_instance
+EXPORT_SYMBOL_GPL vmlinux 0x51652513crypto_register_instance
+EXPORT_SYMBOL_GPL vmlinux 0x5170a58d7devm_regulator_bulk_get
+EXPORT_SYMBOL_GPL vmlinux 0x5172d8bc__cookie_v4_check
+EXPORT_SYMBOL_GPL vmlinux 0x5174e239elv_register
+EXPORT_SYMBOL_GPL vmlinux 0x5175cd34devfreq_get_devfreq_by_phandle
+EXPORT_SYMBOL_GPL vmlinux 0x5177a708tpm_calc_ordinal_duration
+EXPORT_SYMBOL_GPL vmlinux 0x5181131aefivar_entry_set_safe
+EXPORT_SYMBOL_GPL vmlinux 0x518268f8timer_compare
+EXPORT_SYMBOL_GPL vmlinux 0x518268f8timer_compare
+EXPORT_SYMBOL_GPL vmlinux 0x518d6846tpm_pm_resume
+EXPORT_SYMBOL_GPL vmlinux 0x5192f3d2__cookie_v4_init_sequence
+EXPORT_SYMBOL_GPL vmlinux 0x5192f3d2__cookie_v4_init_sequence
+EXPORT_SYMBOL_GPL vmlinux 0x51a383e5pci_reset_bridge_secondary_bus
+EXPORT_SYMBOL_GPL vmlinux 0x51adbe875property_entries_free
+EXPORT_SYMBOL_GPL vmlinux 0x51b0f277rt_mutex_unlock
+EXPORT_SYMBOL_GPL vmlinux 0x51bff8d4tiomap_truncate_page
+EXPORT_SYMBOL_GPL vmlinux 0x51c0beedwm8350_reg_unlock
+EXPORT_SYMBOL_GPL vmlinux 0x51c213d6pm_clk_remove
+EXPORT_SYMBOL_GPL vmlinux 0x51c63ba6tpm_getcap
+EXPORT_SYMBOL_GPL vmlinux 0x51c203e0md_kick_rdev_from_array
+EXPORT_SYMBOL_GPL vmlinux 0x51c203e0md_kick_rdev_from_array
+EXPORT_SYMBOL_GPL vmlinux 0x55417264unregister_vt_notifier
+EXPORT_SYMBOL_GPL vmlinux 0x55510645clk_register_fixed_factor
+EXPORT_SYMBOL_GPL vmlinux 0x55526907xen_features
+EXPORT_SYMBOL_GPL vmlinux 0x55691527device_link_add
+EXPORT_SYMBOL_GPL vmlinux 0x556e4390clk_get_rate
+EXPORT_SYMBOL_GPL vmlinux 0x55784228regmap_irq_get_virq
+EXPORT_SYMBOL_GPL vmlinux 0x558c136aasbitmap_get_shallow
+EXPORT_SYMBOL_GPL vmlinux 0x5599886c3hwspin_lock_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x559b27f8xdp_do_flush_map
+EXPORT_SYMBOL_GPL vmlinux 0x55aa134atbitmap_copy_from_slot
+EXPORT_SYMBOL_GPL vmlinux 0x55b784c6pinctrl_dev_get_name
+EXPORT_SYMBOL_GPL vmlinux 0x55bca43e3put_filp
+EXPORT_SYMBOL_GPL vmlinux 0x55ecff4bit_wait_io_timeout
+EXPORT_SYMBOL_GPL vmlinux 0x55f30a52__cpuhp_state_remove_instance
+EXPORT_SYMBOL_GPL vmlinux 0x5600ce3b mbox_send_message
+EXPORT_SYMBOL_GPL vmlinux 0x56069753 get_empty_filp
+EXPORT_SYMBOL_GPL vmlinux 0x5606adb5atomic_notifier_chain_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x56149fcd5dio_writesb
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+EXPORT_SYMBOL_GPL vmlinux 0x56256e8aorderly_poweroff
+EXPORT_SYMBOL_GPL vmlinux 0x56279979device_create_with_groups
+EXPORT_SYMBOL_GPL vmlinux 0x56310925regulator_mode_to_status
+EXPORT_SYMBOL_GPL vmlinux 0x5641485btty_termios_encode_baud_rate
+EXPORT_SYMBOL_GPL vmlinux 0x5654836erst_get_record_id_next
+EXPORT_SYMBOL_GPL vmlinux 0x5662a1dkset_find_obj
+EXPORT_SYMBOL_GPL vmlinux 0x56694f31bluetooth_ioctl
+EXPORT_SYMBOL_GPL vmlinux 0x567dd6c_tracepoint_add_device_to_group
+EXPORT_SYMBOL_GPL vmlinux 0x56812b1bsdio_claim_host
+EXPORT_SYMBOL_GPL vmlinux 0x568eb5fmsi_set_msi
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+EXPORT_SYMBOL_GPL vmlinux 0x5735bf5ipv6_fixup_options
+EXPORT_SYMBOL_GPL vmlinux 0x5746094bof_clk_get_from_provider
+EXPORT_SYMBOL_GPL vmlinux 0x575c5f9execute_in_process_context
+EXPORT_SYMBOL_GPL vmlinux 0x575e9910nvmmem_cell_read_u32
+EXPORT_SYMBOL_GPL vmlinux 0x5779d445xenbus_exists
+EXPORT_SYMBOL_GPL vmlinux 0x57893723pcie_port_bus_type
+EXPORT_SYMBOL_GPL vmlinux 0x5790e7a0pci_unlock_rescan_remove
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+EXPORT_SYMBOL_GPL vmlinux 0x5a7bfe41crypto_probing_notify
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+EXPORT_SYMBOL_GPL vmlinux 0x64c1868fata_pci_bmdma_clear_simplex
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+EXPORT_SYMBOL_GPL vmlinux 0x650e4562dax_flush
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+EXPORT_SYMBOL_GPL vmlinux 0x6624fffatata_bmdma_setup
+EXPORT_SYMBOL_GPL vmlinux 0x6636c3e9irq_set_vcpu_affinity
+EXPORT_SYMBOL_GPL vmlinux 0x6656d3c90cpu_freq_enable_fast_switch
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+EXPORT_SYMBOL_GPL vmlinux 0x6cb0ce87irq_get_percpu_devid_partition
+EXPORT_SYMBOL_GPL vmlinux 0x6cb7ee1dbus_hcd_start_port_resume
+EXPORT_SYMBOL_GPL vmlinux 0x6cc149ecrypto_rng_reset
+EXPORT_SYMBOL_GPL vmlinux 0x6cd21997/ata_tf_to_fis
+EXPORT_SYMBOL_GPL vmlinux 0x6ce520dregulator_list_voltage_linear
+EXPORT_SYMBOL_GPL vmlinux 0x6ceec509usb_sg_wait
+EXPORT_SYMBOL_GPL vmlinux 0x6cef600dgp iod_set_raw_array_value
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+EXPORT_SYMBOL_GPL vmlinux 0x6cf8d291anon_inode_getfd
+EXPORT_SYMBOL_GPL vmlinux 0x6d01995fxen_efi_query_variable_info
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+EXPORT_SYMBOL_GPL vmlinux 0x6d146c9fwdma_get_slave_caps
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+EXPORT_SYMBOL_GPL vmlinux 0xdae4f1bfmode_option
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+EXPORT_SYMBOL_GPL vmlinux 0xdae9675fcfs_rename_link_ns
+EXPORT_SYMBOL_GPL vmlinux 0xdaeb26a335extcon_dev_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xdaec5510alloc_vm_area
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+EXPORT_SYMBOL_GPL vmlinux 0xdb03e8f9__bio_try_merge_page
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+EXPORT_SYMBOL_GPL vmlinux 0xdb0478basdio_unregister_driver
+EXPORT_SYMBOL_GPL vmlinux 0xdb04b794dev_pm Opp_of_get_opp_desc_node
+EXPORT_SYMBOL_GPL vmlinux 0xdb04e2e8edefaultfs_create_x32
+EXPORT_SYMBOL_GPL vmlinux 0xdb04eb88btkg_prfill_stat
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+EXPORT_SYMBOL_GPL vmlinux 0xdb0b64a27gfn_to_pfn_memslot
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+EXPORT_SYMBOL_GPL vmlinux 0xdb0b8a1bfusermodehelper_read_trylock
+EXPORT_SYMBOL_GPL vmlinux 0xdb0b9128a6netdev_is_rx_handler_busy
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+EXPORT_SYMBOL_GPL vmlinux 0xdb0b972147_udp_enqueue_schedule_skb
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+EXPORT_SYMBOL_GPL vmlinux 0xdb0bd795ca7dma_buf_vunmap
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--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/arm64/generic.compiler
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/arm64/generic.compiler
@@ -0,0 +1 @@
+GCC: (Ubuntu/Linaro 7.5.0-3ubuntu1~18.04) 7.5.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/arm64/generic.modules
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/arm64/generic.modules
@@ -0,0 +1,5250 @@
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+3w-9xxx
+3w-sas
+3w-xxxx
+6lowpan
+6pack
+8021q
+8139cp
+8139too
+8250_aspeed_vuart
+8250_exar
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+8250_moxa
+8255
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+8390
+842
+842_compress
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+88pm800
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+9pnet_virtio
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+a3d
+a53-pll
+a8293
+aacraid
+aat2870-regulator
+aat2870_bl
+ab3100
+ab3100-otp
+abp060mg
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+act_simple
+act_skbedit

Open Source Used In 5GaaS Edge AC-4 14208
+ad7780
+ad7791
+ad7793
+ad7816
+ad7877
+ad7879
+ad7879-i2c
+ad7879-spi
+ad7887
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+ad8366
+ad8801
+ad9523
+ad9832
+ad9834
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+adc-keys
+adc128d818
+adcxx
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+addi_apci_1500
+addi_apci_1516
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+ast
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+async_raid6_recover
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+async_xor
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+ath9k_hct
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+atl1
+atl1c
+atl1e
+atl2
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+atm
+atmel
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+atmel-hlcdc
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+atmel_mxt_ts
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+atusb
+atxp1
+baycom_ser_fdx
+baycom_ser_hdx
+bcache
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+bcm-keypad
+bcm-pdc-mailbox
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+bcmsysport
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+bd9571mwv-regulator
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+be2net
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+berlin2-adc
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+bfq
+bfs
+bfusb
+bh1750
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+cdc_eem
+cdc_ether
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+ceph
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+cfi_cmdset_0002
+cfi_cmdset_0020
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+cfspi_slave
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+ch7006
+ch9200
+chacha20-neon
+chacha20_generic
+chacha20poly1305
+chaoskey
+charlcd
+chash
+cher
+chipone_icn8318
+chipostreg
+chnl_net
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+ci_hdrc_imx
+ci_hdrc_msm
+ci_hdrc_pci
+ci_hdrc_tegra
+ci_hdrc_usb2
+ci_hdrc_zevio
+cicada
+cifs
+cirrus
+cirrusfb
+clip
+clk-cdce706
+clk-cdce925
+clk-cs2000-cp
+clk-hi3519
+clk-hi655x
+clk-max77686
+clk-palmas
+clk-pwm
+clk-qcom
+clk-rk808
+clk-rpm
+clk-s2mps11
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+clk-si514
+clk-si5351
+clk-si570
+clk-smd-rpm
+clk-tw16040
+clk-versaclock5
+clk-wm831x
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+cls_bpf
+cls_cgroup
+cls_flow
+cls_flower
+cls_fw
+cls_matchall
+cls_route
+cls_rsvp
+cls_rsv6
+cls_tcindex
+cls_u32
+cm109
+cm32181
+cm3232
+cm3323
+cm3605
+cm36651
+cm3000_d0x
+cm3000_d0x_i2c
+cmac
+cmdlinepart
+cmt
+cnic
+cobalt
+cobra
+coda
+colibri-vf50-ts
+com20020
+com20020-pci
+com90io
+com90xx
+comedi
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+comedi_8255
+comedi_bond
+comedi_parport
+comedi_pci
+comedi_test
+comedi_usb
+contec_pci_dio
+cordic
+core
+cortina
+cp210x
+cpcap-adc
+cpcap-battery
+cpcap-pwrbUTTON
+cpcap-regulator
+cpia2
+cppc_cpufreq
+cpsw_ale
+cptpf
+cptvf
+cramfs
+crc-itu-t
+crc32-ce
+crc32_generic
+crc4
+crc7
+crc8
+crct10dif-ce
+crg-hi3516cv300
+crg-hi3798cv200
+cros_ec_accel_legacy
+cros_ec_baro
+cros_ec_core
+cros_ec_devs
+cros_ec_i2c
+cros_ec_keyb
+cros_ec_light_prox
+cros_ec_sensors
+cros_ec_sensors_core
+cros_ec_spi
+cros_kbd_led_backlight
+cryptd
+crypto_engine
+crypto_simd
+crypto_user
+cryptoloop
+cs3308
+cs5345
+cs53132a
+csiostor
+cuse
+cw1200_core
+cw1200_wlan_sdio
+cw1200_wlan_spi
+cx18
+cx18-alsa
+cx22700
+cx22702
+cx231xx
+cx231xx-alsa
+cx231xx-dvb
+cx2341x
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+cx88-alsa
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+digicolor-usart
+diskonchip
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+diva_mnt
+divacapi
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+divas
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+dlci
+dlink-dir685-touchkeys
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+drbd
+drm
+drm_kms_helper
+drop_monitor
+drv260x
+drv2665
+drv2667
+drv39xyj
+drxd
+drxk
+ds1621
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+ds1wm
+ds2482
+ds2490
+ds2760_battery
+ds2780_battery
+ds2781_battery
+ds2782_battery
+ds3000
+ds4424
+ds620
+dsa_core
+dsbr100
+dscc4
+dss1_divert
+dst
+dst_ca
+dt2801
+dt2811
+dt2814
+dt2815
+dt2817
+dt282x
+dt3000
+dt3155
+dt9812
+dumb-vga-dac
+dummy
+dummy-irq
+dummy_stm
+dvb-as102
+dvb-bt8xx
+dvb-core
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+dvb-ttusb-budget
+dvb-usb
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+dw-hdmi-ahb-audio
+dw-hdmi-cec
+dw-hdmi-i2s-audio
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+dw_dmac_core
+dw_dmac_pci
+dw_drm_dsi
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+dynapro
+e100
+e1000
+e1000e
+e3x0-button
+e4000
+earth-pt1
+earth-pt3
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+ebt_among
+ebt_arp
+ebt_arpreply
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+echo
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+eeprom_93xx46
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+efi_test
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+emc6w201
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+ems_usb
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+emxx_udc
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+enc28j60
+enclosure
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+fcrypt
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+fdp_i2c
+fealnx
+ff_memless
+fid
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+firedttv
+firewire-core
+firewire-net
+firewire-ohci
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+g_audio
+g_cdc
+g_dbgp
+gEther
+g_ffs
+g_hid
+g_mass_storage
+g_midi
+g_ncm
+g_nokia
+g_printer
+g_serial
+g_webcam
+g_zero
+gadgetfs
+gamecon
+gameport
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+gb-audio-manager
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+generic_bl
+genet
+geneve
+genwqe_card
+gf2k
+gfs2
+ghash-ce
+gianfar_driver
+gianfar_ptp
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+gl520sm
+gl620a
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+gluebi
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+gtp
+guillemot
+gunze
+hackrf
+hamachi
+hampshire
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+hi6421v530-regulator
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+hisi_femac
+hisi_powerkey
+hisi_sas_main
+hisi_sas_v1_hw
+hisi_sas_v2_hw
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+i2c-stub
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+i2c-thunderx
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+i2c-via
+i2c-viapro
+i2c-viperboard
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+i2c-xiic
+i2c-xlp9xx
+i40e
+i40evf
+i40iw
+i5k_amb
+i6300esb
+i740fb
+ib_cm
+ib_core
+ib_ipoib
+ib_iser
+ib_isert
+ib_mthca
+ib_qib
+ib_srp
+ib_srpt
+ib_umad
+ib_uverbs
+ibm-cffps
+ibmaem
+ibmpex
+ice40-spi
+icp
+icp_multi
+icplus
+ics932s401
+idma64
+idmouse
+idt77252
+idt_89hpesx
+ieee802154
+ieee802154_6lowpan
+ieee802154_socket
+ifb
+ife
+ifi_canfd
+iforce
+igb
+igbvf
+igorplugusb
+iguanair
+ii_pci20kc
+iio-mux
+iio-trig-hrtimer
+iio-trig-interrupt
+iio-trig-loop
+iio-trig-sysfs
+iio_dummy
+iio_hwmon
+ila
+ili210x
+ili922x
+ili9320
+img-ascii-lcd
+img-i2s-in
+img-i2s-out
+img-parallel-out
+img-spdif-in
+img-spdif-out
+imon
+ims-pcu
+imx074
+imx2_wdt
+imx6ul_tsc
+ina209
+ina2xx
+ina2xx-adc
+ina3221
+industrialio
+industrialio-buffer-cb
+industrialio-configfs
+industrialio-sw-device
+industrialio-sw-trigger
+industrialio-triggered-buffer
+industrialio-triggered-event
+inet_diag
+inexio
+intftl
+initio
+input-leds
+input-polldev
+int51x1
+intel-xway
+intel_th
+intel_th_gth
+intel_th_msu
+intel_th_pci
+intel_th_pti
+intel_th_sth
+intel_vr_nor
+interact
+inv-mpu6050
+inv-mpu6050-i2c
+inv-mpu6050-spi
+io_edgeport
+io_ti
+ioc4
+iowarrior
+ip6_gre
+ip6_tables
+ip6_tunnel
+ip6_udp_tunnel
+ip6_vti
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+ip6t_NPT
+ip6t_REJECT
+ip6t_SYNPROXY
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+ip6table_filter
+ip6table_mangle
+ip6table_nat
+ip6table_raw
+ip6table_security
+ip_gre
+ip_set
+ip_set_bitmap_ip
+ip_set_bitmap_ipmac
+ip_set_bitmap_port
+ip_set_hash_ip
+ip_set_hash_ipmac
+ip_set_hash_ipmark
+ip_set_hash_ipport
+ip_set_hash_ipportip
+ip_set_hash_ipportnet
+ip_set_hash_mac
+ip_set_hash_net
+ip_set_hash_netiface
+ip_set_hash_netnet
+ip_set_hash_netport
+ip_set_hash_netportnet
+ip_set_list_set
+ip_tables
+ip_tunnel
+ip_vs
+ip_vs_dh
+ip_vs_fo
+ip_vs_ftp
+ip_vs_lblc
+ip_vs_lblcr
+ip_vs_lc
+ip_vs_nq
+ip_vs_ovf
+ip_vs_pe_sip
+ip_vs_rr
+ip_vs_sed
+ip_vs_sh
+ip_vs_wlc
+ip_vs_wrr
+ip_vti
+ipack
+ipaq
+ipcomp
+ipcomp6
+iphase
+ipheth
+ipip
+ipmi_devintf
+ipmi_msghandler
+ipmi_poweroff
+ipmi_si
+ipmi_ssif
+ipmi_watchdog
+ipoctal
+ipr
+iproc-rng200
+iproc_nand
+ips
+ipt_CLUSTERIP
+ipt_ECN
+ipt_MASQUERADE
+ipt_REJECT
+ipt_SYNPROXY
+ipt_ah
+ipt_rpfILTER
+iptable_filter
+iptable_mangle
+iptable_nat
+iptable_raw
+iptable_security
+ipvlan
+ipvtap
+ipw
+ipw2100
+ipw2200
+ipx
+ir-hix5hd2
+ir-jvc-decoder
+ir-kbd-i2c
+ir-lirc-codec
+ir-mce_kbd-decoder
+ir-nec-decoder
+ir-rc5-decoder
+ir-rc6-decoder
+ir-sanyo-decoder
+ir-sharp-decoder
+ir-sony-decoder
+ir-spi
+ir-usb
+ir-xmp-decoder
+ir35221
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+ircomm-tty
+irda
+irda-usb
+irlan
+irmet
+irtty-sir
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+iscsi_target_mod
+iscsi_tcp
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+itg3200
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+ivtvfb
+iw_cm
+iw_cxgb3
+iw_cxgb4
+iw_nes
+iwl3945
+iwl4965
+iwlcdn
+iwlegacy
+iwlmvm
+iwlwifi
+i2x2505v
+ixgb
+ixgbe
+ixgbevf
+janz-cmodio
+janz-ican3
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+jedec_probe
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+jmb38x_ms
+jme
+joydev
+joydump
+jr3_pci
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+kaweth
+ktab
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+kcomedilib
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+kempld_wdt
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+kfifo_buf
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+kvaser_pci
+kvaser_usb
+kxcjk-1013
+kxsd9
+kxsd9-i2c
+kxsd9-spi
+kxtj9
+kyber-iosched
+kyrofb
+1loip
+l2tp core
+l2tp debugfs
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+l2tp ip
+l2tp ip6
+l2tp_netlink
+l2tp ppp
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+lcc-mdm9615
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+ldusb
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+led-class-flash
+leds-88pm860x
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+leds-adp5520
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+leds-pwm
+leds-regulator
+leds-tca6507
+leds-tlc591xx
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+ledtrig-gpio
+ledtrig-heartbeat
+ledtrig-oneshot
+ledtrig-timer
+ledtrig-transient
+ledtrig-usbport
+lego_ev3_battery
+legousbtower
+lg-vl600
+lg2160
+lgt3305
+lgt3306a
+lgt330x
+lgs8gxx
+lib80211
+lib80211_crypt_ccmp
+lib80211_crypt_tkip
+lib80211_crypt_wep
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+lm93
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+lp87565
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+lp8788-buck
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+ltc2978
+ltc2990
+ltc3589
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+ltc4260
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+lrv350qv
+lustre
+lv5207lp
+lvds-encoder
+lvtest
+lxt
+lz4
+lz4_compress
+lz4hc
+lz4hc_compress
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+m52790
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+m88ds3103
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+mac-croatian
+mac-cyrillic
+mac-gaelic
+mac-greek
+mac-iceland
+mac-inuit
+mac-roman
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+mdio-bcm-unimac
+mdio-bithang
+mdio-cavium
+mdio-gpio
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+mdio-mux-gpio
+mdio-mux-mmioreg
+mdio-octeon
+mdio-thunder
+mdio-xgene
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+micrel
+microchip
+microread
+microread_i2c
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+minix
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+mpptl
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+ms_sensors_i2c
+mscc
+msdos
+msi001
+msi2500
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+msm-rng
+msp3400
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+mt2131
+mt2266
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+mt312
+mt352
+mt6311-regulator
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+nf_conntrack_proto_gre
+nf_conntrack_sane
+nf_conntrack_sip
+nf_conntrack_ssnmp
+nf_conntrack_tftp
+nf_defrag_ipv4
+nf_defrag_ipv6
+nf_dup_ipv4
+nf_dup_ipv6
+nf_dup_netdev
+nf_log_arp
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+nf_reject_ipv6
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+obdecho
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+ocfs2_dlmfs
+ocfs2_nodemanager
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+ocfs2_stack_user
+ocfs2_stackglue
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+omap4-keypad
+omfs
+omninet
+onenand
+opencores-kbd
+openvswitch
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+p8023
+pa12203001
+palmas-pwrbutton
+palmas-regulator
+palmas_gpadc
+pandora_bl
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+panel-innolux-p079zca
+panel-jdi-lt070me05000
+panel-lg-lg4573
+panel-lvds
+panel-orisitech-otm8009a
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+parkbd
+parman
+parport
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+pcf8574_keypad
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+pci
+pci-stub
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+pm8xxx-vibrator
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+pretimeout_panic
+prism2_usb
+ps2-gpio
+ps2mult
+psample
+psmouse
+psnap
+psxpad-spi
+ptrpc
+ptp
+ptp_dte
+pulse8-cec
+pulsedlight-lidar-lite-v2
+pv88060-regulator
+pv88080-regulator
+pv88090-regulator
+pvcalls-front
+pvrusb2
+pwc
+pwm-atmel-hlcdc
+pwm-bcm-iproc
+pwm-bcm2835
+pwm-beeper
+pwm-berlin
+pwm-brcmstb
+pwm-cros-ec
+pwm-fan
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+qca_7k_common
+qcaspi
+qcauart
+qcaux
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+qcom-camss
+qcom-coincell
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+qcom-spmi-vadc
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+qcom-wdt
+qcom_adsp_pil
+qcom_common
+remoteproc
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+reset-hi3660
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+rockchip
+rockchip-dfi
+rockchip-io-domain
+rockchip-rga
+rockchip_saradc
+rockchip_thermal
+rockchipdrm

Open Source Used In 5GaaS Edge AC-4  14282
+rocker
+rocket
+rohm_bu21023
+romfs
+rose
+rotary_encoder
+rp2
+rpcrdma
+rpcsec_gss krb5
+rpmsg_char
+rpmsg_core
+rpr0521
+rrpc
+rsi_91x
+rsi_sdio
+rsi_usb
+rsxx
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+rt2500usb
+rt2800lib
+rt2800mmio
+rt2800pci
+rt2800usb
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- rtc-ds1305
- rtc-ds1307
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- rtc-ds1347
- rtc-ds1374
- rtc-ds1390
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- rtc-ds1672
- rtc-ds1685
- rtc-ds1742
- rtc-ds2404
- rtc-ds3232
- rtc-em3027
- rtc-fm3130
- rtc-frtc010
- rtc-hid-sensor-time
- rtc-hym8563
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- rtc-isl1208
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- rtc-m4859
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- rtc-max8998
- rtc-mc13xxx
- rtc-mcp795
- rtc-msm6242
- rtc-mt6397
- rtc-mt7622
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- rtc-pcap
- rtc-pcf2123
- rtc-pcf2127
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+rtc-zynqmp
+rtl520
+rti800
+rti802
+rtl2830
+rtl2832
+rtl2832_sdr
+rtl8150
+rtl8187
+rtl8188ee
+rtl818x_pci
+rtl8192c-common
+rtl8192ce
Open Source Used In 5GaaS Edge AC-4

+rtl8192cu
+rtl8192de
+rtl8192ee
+rtl8192se
+rtl8723-common
+rtl8723ae
+rtl8723be
+rtl8821ae
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+rtllib_crypt_wep
+rtlwifi
+rts5208
+rtsx_pci
+rtsx_pci_ms
+rtsx_pci_sdmmc
+rtsx_usb
+rtsx_usb_ms
+rtsx_usb_sdmmc
+rx51_battery
+rxrpc
+rza_wdt
+s1d13xxxfb
+s2250
+s2255drv
+s2io
+s2mpa01
+s2mps11
+s3fb
+s3fwrn5
+s3fwrn5_i2c
+s526
+s5h1409
+s5h1411
+s5h1420
+s5m8767
+s626
+s6e63m0
+s6sy761
+s921
+saa6588
+saa6752hs
+saa7115
+saa7127

---

Open Source Used In 5GaaS Edge AC-4 14286
+saa7134
+saa7134-alsa
+saa7134-dvb
+saa7134-empress
+saa7134-go7007
+saa7146
+saa7146_vv
+saa7164
+saa717x
+saa7706h
+safe_serial
+salsa20_generic
+samsung-keypad
+samsung-sxgbe
+sata_dwc_460ex
+sata_inic162x
+sata_mv
+sata_nv
+sata_promise
+sata_qstor
+sata_rcar
+sata_sil
+sata_sil24
+sata_sis
+sata_svw
+sata_sx4
+sata_uli
+sata_via
+sata_vsc
+savagefb
+sb1000
+sbp_target
+sbs-battery
+sbs-charger
+sbs-manager
+sbsa_gwdt
+sc16is7xx
+sc92031
+sca3000
+sch5627
+sch5636
+sch56xx-common
+sch_atm
+sch_cbq
+sch_cbs
+sch_choke
+sch_codel
+sch_drr
sch_dsrmak
sch fq
sch fq_codel
sch gred
sch hfsc
sch hhf
sch htb
sch ingress
sch mqprio
sch multiq
sch netem
sch pie
sch plug
sch prio
sch qfq
sch red
sch sfq
sch sfq
sch tfb
sch teql
scpi-cpufreq
scpi-hwmon
scpi_pm_domain
scsi_debug
scsi dh_alua
scsi dh_emc
scsi dh_hp_sw
scsi dh_rdac
scsi_transport_fc
scsi_transport_iscsi
scsi_transport_sas
scsi_transport_spi
scsi_transport_srp
sctp
sctp_diag
sctp_probe
sdhci
sdhci-acpi
sdhci-bcstmbl
sdhci-bcstmbl
sdhci-PROC
sdhci-cadence
sdhci-PROC
sdhci-msm
sdhci-of-arasan
sdhci-of-at91
sdhci-of-esdhe
sdhci-omap
sdhci-PCI
sdhci-pltfm
+sdhci-pxav3
+sdhci-xenon-driver
+sdhci_f_sdh30
+sdio_uart
+seed
+sensorhub
+ser_gigaset
+serial2002
+serial_ir
+serial_mctrl_gpio
+serio_raw
+sermouse
+serpent_generic
+serport
+ses
+sfc
+sfc-falcon
+sh-sci
+sh_eth
+sh_keysc
+sh_mmcif
+sh_mobile_ceu_camera
+sh_mobile_lcdcfb
+sh_mobile_meram
+sh_veu
+sh_vou
+sha1-ce
+sha2-ce
+sha256-arm64
+sha3_generic
+sha512-arm64
+shark2
+shdma
+shpchp
+sh15
+sh21
+sh3x
+shtc1
+si1145
+si2157
+si2165
+si2168
+si21xx
+si4713
+si476x-core
+si7005
+si7020
+sidewinder
+smp2p
+smsc
+smsc47b397
+smsc47m1
+smsc47m192
+smsc75xx
+smsc911x
+smsc9420
+smsc95xx
+smscufx
+smsdvb
+smmsm
+smsmdtv
+smssdio
+smsusb
+snd
+snd-ac97-codec
+snd-ad1889
+snd-ak4113
+snd-ak4114
+snd-ak4xxx-adda
+snd-ali5451
+snd-aloop
+snd-als300
+snd-atiixp
+snd-atiixp-modem
+snd-au8810
+snd-au8820
+snd-au8830
+snd-aw2
+snd-azt3328
+snd-bcd2000
+snd-bcm2835
+snd-bebob
+snd-bt87x
+snd-ca0106
+snd-cmipci
+snd-cs4281
+snd-cs46xx
+snd-cs8427
+snd-ctxfi
+snd-darla20
+snd-darla24
+snd-dice
+snd-dummy
+snd-echo3g
+snd-emu10k1
+snd-emu10k1-synth
+snd-emu10k1x
+snd-emux-synth
+snd-ens1370
+snd-ens1371
+snd-es1938
+snd-es1968
+snd-fireface
+snd-firewire-digi00x
+snd-firewire-lib
+snd-firewire-motu
+snd-firewire-tascam
+snd-fireworks
+snd-fm801
+snd-gina20
+snd-gina24
+snd-hda-codec
+snd-hda-codec-analog
+snd-hda-codec-ca0110
+snd-hda-codec-ca0132
+snd-hda-codec-cirrus
+snd-hda-codec-cmedia
+snd-hda-codec-conexant
+snd-hda-codec-generic
+snd-hda-codec-hdmi
+snd-hda-codec-idt
+snd-hda-codec-realtek
+snd-hda-codec-si3054
+snd-hda-codec-via
+snd-hda-core
+snd-hda-intel
+snd-hdsp
+snd-hdspm
+snd-hrtimer
+snd-hwdep
+snd-i2c
+snd-ice1712
+snd-ice1724
+snd-ice17xx-ak4xxx
+snd-indigo
+snd-indigadj
+snd-indigodjx
+snd-indigoio
+snd-indigoiox
+snd-intel8x0
+snd-intel8x0m
+snd-isight
+snd-korg1212
+snd-layla20
Open Source Used In 5GaaS Edge AC-4

+snd-usb-audio
+snd-usb-caiaq
+snd-usb-hiface
+snd-usb-line6
+snd-usb-pod
+snd-usb-podhd
+snd-usb-toneport
+snd-usb-variax
+snd-usbmidid-lib
+snd-util-mem
+snd-via82xx
+snd-via82xx-modem
+snd-virmidi
+snd-virtuoso
+snd-vx-lib
+snd-vx222
+snd-ymfpci
+snic
+snps_udc_core
+snps_udc_plat
+soc_button_array
+soc_camera
+soc_camera_platform
+soc_mediabus
+soc_scale_crop
+softdog
+softing
+sol06x10
+solos- pci
+sony-btf-mpx
+soundcore
+sp2
+sp805_wdt
+sp8870
+sp887x
+spaceball
+spaceorb
+sparse-keymap
+spec8x5
+sppeakup
+sppeakup_acntsa
+sppeakup_apollo
+sppeakup_audptr
+sppeakup_bns
+sppeakup_decext
+sppeakup_decitk
+sppeakup_dummy
+sppeakup_ltlk
+speakup_soft
+speakup_spkout
+speakup_txprt
+speedfax
+speedtch
+spi-altera
+spi-axi-spi-engine
+spi-bcm-qsqi
+spi-bcm2835
+spi-bcm2835aux
+spi-bitbang
+spi-brcmstb-qsqi
+spi-butterfly
+spi-cadence
+spi-dln2
+spi-dw
+spi-dw-midpci
+spi-dw-mmio
+spi-fsl-dspi
+spi-gpio
+spi-iproc-qsqi
+spi-lm70llp
+spi-loopback-test
+spi-mt65xx
+spi-nor
+spi-oc-tiny
+spi-pl022
+spi-pxa2xx-pci
+spi-pxa2xx-platform
+spi-qup
+spi-rockchip
+spi-rspi
+spi-sc18is602
+spi-sh-hspi
+spi-sh-msiof
+spi-slave-system-control
+spi-slave-time
+spi-sprd-adi
+spi-sun6i
+spi-thunderx
+spi-tle62x0
+spi-xcomm
+spi-xlp
+spi-zynqmp-gsqi
+spi_ks8995
+spidev
+spl
+splat
+spmi
+spmi-pmic-arb
+sprd-dma
+sprd-sc27xx-spi
+sprd_hwspinlock
+sprd_serial
+sr9700
+sr9800
+srf04
+srf08
+ssb
+ssb-hcd
+ssd1307fb
+ssfdc
+ssp_accel_sensor
+ssp_gyro_sensor
+ssp_iio
+sst251
+sstfb
+ssu100
+st
+st-nci
+st-nci_i2c
+st-nci_spi
+st1232
+st21nfca_hci
+st21nfca_i2c
+st7586
+st95hf
+st_accel
+st_accel_i2c
+st_accel_spi
+st_drv
+st_gyro
+st_gyro_i2c
+st_gyro_spi
+st_lsm6dsx
+st_lsm6dsx_i2c
+st_lsm6dsx_spi
+st_magn
+st_magn_i2c
+st_magn_spi
+st_pressure
+st_pressure_i2c
+st_pressure_spi
+st_sensors
+st_sensors_i2c
+st_sensors_spi
+sunxi-cir
+sunxi-mmc
+sunxi-rsb
+sunxi_wdt
+sur40
+surface3_spi
+svgalib
+switchtec
+sx8
+sx8654
+sx9500
+sym53c8xx
+symbolserial
+synaptics_i2c
+synaptics_usb
+synclink_gt
+synclinkmp
+syscon-reboot-mode
+syscopyarea
+sysfillrect
+/sysimgblt
+sysv
+t1pci
+t5403
+tap
+target_core_file
+target_core_iblock
+target_core_mod
+target_core_pscsi
+target_core_user
+tc-dwc-g210
+tc-dwc-g210-pci
+tc-dwc-g210-pltfrm
+tc358767
+tc3589x-keypad
+tc654
+tc74
+tc90522
+tca6416-keypad
+tca8418_keypad
+tcm_fc
+tcm_loop
+tcm_qla2xxx
+tcm_usb_gadget
+tcp_bbr
+tcp_bic
+tcp_cdg
+tcp_dctcp
+tcp_diag
+tcp_highspeed
+tcp_htcp
+tcp_hybla
+tcp_illinois
+tcp_lp
+tcp_nv
+tcp_probe
+tcp_scalable
+tcp_vegas
+tcp_veno
+tcp_westwood
+tcp_yeah
+tcpci
+tcpm
+tcrypt
+tcs3414
+tcs3472
+tda10021
+tda10023
+tda10048
+tda1004x
+tda10071
+tda10086
+tda18212
+tda18218
+tda18271
+tda18271c2dd
+tda665x
+tda7432
+tda8083
+tda8261
+tda826x
+tda827x
+tda8290
+tda9840
+tda9887
+tda998x
+tdfxfb
+tdo24m
+tea
+tea575x
+tea5761
+tea5767
+tea6415c
+tea6420
+team
+team_mode_activebackup
+team_mode_broadcast
+team_mode_loadbalance
+team_mode_random
+team_mode_roundrobin
+tee
+tef6862
+tehuti
+tekram-sir
+teranetics
+test_bpf
+test_firmware
+test_module
+test_power
+test_static_key_base
+test_static_keys
+test_udelay
+test_user_copy
+tg3
+tg192
+thermal-generic-adc
+thmc50
+thunder_bgx
+thunder_xcv
+thunderx-mmc
+thunderx2_pmu
+thunderx_edac
+thunderx_zip
+ti-adc081c
+ti-adc0832
+ti-adc084s021
+ti-adc108s102
+ti-adc12138
+ti-adc128s052
+ti-adc161s626
+ti-ads1015
+ti-ads7950
+ti-ads8688
+ti-dac082s085
+ti-lmu
+ti-tfp410
+ti-tlc4541
+ti_am335x_adc
+ti_am335x_tsc
+ti_am335x_tscadc
+ti_usb_3410_5052
+tifs_7xx1
+tifs_core
+tifs_ms
+tifm_sd
+timeriomem-rng
+tinydrm
+tipc
+tlan
+tlsl
+tm2-touchkey
+tm6000
+tm6000-alsa
+tm6000-dvb
+tmio
+tmio_mmc_core
+tmp006
+tmp007
+tmp102
+tmp103
+tmp108
+tmp401
+tmp421
+toim3232-sir
+torture
+toshsd
+touchit213
+touchright
+touchwin
+tpci200
+tpi0102
+tpm-rng
+tpm_atmel
+tpm_i2c_atmel
+tpm_i2c_infineon
+tpm_i2c_nuvoton
+tpm_infineon
+tpm_st33zp24
+tpm_st33zp24_i2c
+tpm_st33zp24_spi
+tpm_vtpm_proxy
+tps40422
+tps51632-regulator
+tps53679
+tps6105x
+tps6105x-regulator
+tps62360-regulator
+tps65010
+tps65023-regulator
+tps6507x
+tps6507x-regulator
+usbtouchscreen
+usbtv
+usbvision
+usdhifrol0
+userio
+userspace-consumer
+ushc
+uss720
+uvcvideo
+uvesafb
+uwb
+v4l2-common
+v4l2-dv-timings
+v4l2-flash-led-class
+v4l2-fwnode
+v4l2-mem2mem
+v4l2-tpg
+vc4
+vcan
+vchiq
+vcnl4000
+vctrl-regulator
+veml6070
+venus-core
+venus-dec
+venus-enc
+ves1820
+ves1x93
+veth
+vexpress-hwmon
+vexpress-regulator
+vf610_adc
+vf610_dac
+vfio
+vfio-amba
+vfio-pci
+vfio-platform
+vfio-platform-amdxgbe
+vfio-platform-base
+vfio-platform-calxedaxgmac
+vfio_iommu_type1
+vfio_mdev
+vfio_platform_bcmflexrm
+vfio_virqfd
+vgastate
+vgem
+vgg2432a4
+vhci-hcd
+vhost
+vhost_net
+vhost_scsi
+vhost_vsock
+via-rhine
+via-sdmmc
+via-velocity
+via686a
+video-mux
+videobuf-core
+videobuf-dma-sg
+videobuf-dvb
+videobuf-vmalloc
+videobuf2-core
+videobuf2-dma-contig
+videobuf2-dma-sg
+videobuf2-dvb
+videobuf2-memops
+videobuf2-v4l2
+videobuf2-vmalloc
+videodev
+vim2m
+vimc
+vimc-debayer
+vimc_capture
+vimc_common
+vimc_scaler
+vimc_sensor
+vimc_streamer
+viperboard
+viperboard_adc
+virtio-gpu
+virtio-mg
+virtio_blk
+virtio_crypto
+virtio_input
+virtio_net
+virtio_rpmmsg_bus
+virtio_scsi
+virtual
+visor
+vitesse
+vivid
+vl6180
+vl6i_ir
+vmac
+vme_fake
+vme_tsi148
+vme_user
+vme_vmi_vme7805
+vmk80xx
+vmw_pvr dma
+vmw_vsock_virtio_transport
+vmw_vsock_virtio_transport_common
+vmxnet3
+vp27smpx
+vport-geneve
+vport-gre
+vport-vxlan
+vrf
+vringh
+vsock
+vsock_diag
+vsockmon
+vsp1
+vsxxxaa
+vt1211
+vt6655_stage
+vt6656_stage
+vt8231
+vt8623fb
+vub300
+vx855
+vxcan
+vxge
+vxl an
+vx298x
+w1-gpio
+w1_ds2405
+w1_ds2406
+w1_ds2408
+w1_ds2413
+w1_ds2423
+w1_ds2431
+w1_ds2433
+w1_ds2438
+w1_ds2760
+w1_ds2780
+w1_ds2781
+w1_ds2805
+w1_ds28e04
+w1_ds28e17
+w1_smem
+w1_therm
+w5100
+w5100-spi
+w5300
+w6692
+w83627ehf
+w83627hf
+w83781d
+w83791d
+w83792d
+w83793
+w83795
+w831785ts
+w831786ng
+wacom
+wacom_i2c
+wacom_serial4
+wacom_w8001
+walkera0701
+wanxl
+warrior
+wcn36xx
+wcnss_ctrl
+wdat719x
+wdat_wdt
+wdat87xx_j2c
+wdt_pci
+whc-rc
+whci
+whci-hcd
+whiteheat
+wil6210
+wilc1000
+wilc1000-sdio
+wilc1000-spi
+wimax
+winbond-840
+wire
+wireguard
+wishbone-serial
+wil1251
+wil1251_sdio
+wil1251_spi
+wil1273-core
+wil12xx
+wil18xx
+wilcore
+wilcore_sdio
+wilcore_spi
+wm831x-dcdc
+wm831x-hwmon
+wm831x-isink
+wm831x-ldo
+wm831x-on
+wm831x-ts
+wm831x_backup
+wm831x_bl
+wm831x_power
+wm831x_wdt
+wm8350-hwmon
+wm8350-regulator
+wm8350_power
+wm8350_wdt
+wm8400-regulator
+wm8739
+wm8775
+wm8994
+wm8994-regulator
+wm97xx-ts
+wp512
+wusb-cbaf
+wusb-wa
+wusbc
+x25
+x25_asy
+x_tables
+xc4000
+xc5000
+xcbc
+xen-blkback
+xen-evtchn
+xen-fbfront
+xen-gntalloc
+xen-gntdev
+xen-kbdfront
+xen-netback
+xen-privcmd
+xen-scsiback
+xen-scsifront
+xen-tpmfront
+xen_wdt
+xenfs
+xfrm4_mode_beet
+xfrm4_mode_transport
+xfrm4_mode_tunnel
+xfrm4_tunnel
+xfrm6_mode_beet
+xfrm6_mode_ro
+xfrm6_mode_transport
+xfrm6_mode_tunnel
+xfrm6_tunnel
+xfrm_algo
+xfrm_ipcomp
+xfrm_user
+xfs
+xgene-dma
+xgene-enet
+xgene-enet-v2
+xgene-hwmon
+xgene-rng
+xgene_edac
+xgifb
+xhrisk-mtk
+xhrisk-plat-hcd
+xilinx-pr-decoupler
+xilinx-spi
+xilinx-tpg
+xilinx-video
+xilinx-vtc
+xilinx_can
+xilinx_dma
+xilinx_gmiir2rmii
+xilinx_uartps
+xilinxxfb
+xillybus_core
+xillybus_of
+xillybus_pcie
+xor
+xpaf
+xseens_mti
+xt_AUDIT
+xt_CHECKSUM
+xt_CLAASSIFY
+xt_CONNSECMArk
+xt_CT
+xt_DSCP
+xt_HL
+xt_HMARK
+xt_IDLETIMER
+xt_LED
+xt_LOG
+xt_NETMAP
+xt_NFLOG
+xt_NFQUEUE
+xt_RATEEST
+xt_REDIRECT
+xt_SECMARK
+xt_TCPMSS
+xt_TCPOPTSTRIP
+xt_TEE
+xt_TPROXY
+xt TRACE
+xt_addrtype
+xt_bpf
+xt_cgroup
+xt_cluster
+xt_comment
+xt_connbytes
+xt_connlabel
+xt_connlimit
+xt_connmark
+xt_conntrack
+xt_cpu
+xt_dccp
+xt_devgroup
+xt_dscp
+xt_ecn
+xt_esp
+xt_hashlimit
+xt_helper
+xt.hl
+xt_ipcomp
+xt_iprange
+xt_ipvs
+xt_l2tp
+xt_length
+xt_limit
+xt_mac
+xt_mark
+xt_multiport
+xt_nat
+xt_nfacct
+xt_osf
+xt_owner
+xt_physdev
+xt_pkttype
+xt_policy
+xt_quota
+xt_rateest
+xt_realm
+xt_recent
+xt_sctp
+xt_set
+xt_socket
+xt_state
+xt_statistic
+xt_string
+xt_tcpmss
+xt_tcpudp
+xt_time
+xt_u32
+xtkbd
+xsusbpm
+xz_dec_test
+yam
+ykealnk
+yellowfin
+yurex
+z3fold
+zaurus
+zavl
+zcommon
+zd1201
+zd1211rw
+zd1301
+zd1301_demod
+zet6223
+zforce_ts
+zfs
+zhenhua
+ziirave_wdt
+zl10036
+zl10039
+zl10353
+zl6100
+zvnpair
+zpa2326
+zpa2326_i2c
+zpa2326_spi
+zpios
+zr364xx
+zram
+zstd_compress
+zunicode
+zx-tdm
+zynqmp_dma
--- linux-4.15.0.org/debian.master/abi/4.15.0-165.173/arm64/generic.retpoline
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/arm64/generic.retpoline
@@ -0,0 +1 @ @
## RETPOLINE NOT ENABLED
--- linux-4.15.0.org/debian.master/abi/4.15.0-165.173/armhf/generic
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/armhf/generic
@@ -0,0 +1,21691 @ @
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0x8c8ee770 ipmi_destroy_user
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xa298b91 ipmi_get_maintenance_mode
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xb36f0ff ipmi_create_user
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xc93b6816 ipmi_set_my_LUN
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xd69f8567 ipmi_set_gets_events
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xe0fa83f2 ipmi_register_for_cmd
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xe4f4665b ipmi_validate_addr
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xe6ab72a6 ipmi_set_my_LUN
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xf2576cb9 ipmi_watchdog_pretimeout
+EXPORT_SYMBOL drivers/char/ipmi/ipmi_msghandler 0xf9a7ca6d ipmi_watcher_unregister
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Open Source Used In 5GaaS Edge AC-4 14376
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**Open Source Used In 5GaaS Edge AC-4 14380**
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+EXPORT_SYMBOL vmlinux 0x12c2124escsi_get_host_dev
+EXPORT_SYMBOL vmlinux 0x12c50ee9mmc_start_areq
+EXPORT_SYMBOL vmlinux 0x12d64a56udp6_csum_init
+EXPORT_SYMBOL vmlinux 0x12fa6039phy_detach
+EXPORT_SYMBOL vmlinux 0x13243d4bwl2511_get_platform_data
+EXPORT_SYMBOL vmlinux 0x13315729flex_array_alloc
+EXPORT_SYMBOL vmlinux 0x13395795unregister_netdevice_queue
+EXPORT_SYMBOL vmlinux 0x133a9541twl6040_get_syscl
+EXPORT_SYMBOL vmlinux 0x1342289fudp_seq_open
+EXPORT_SYMBOL vmlinux 0x1346100fnet_fragment_fff
+EXPORT_SYMBOL vmlinux 0x13597e13serio_unregister_child_port
+EXPORT_SYMBOL vmlinux 0x1366540aget_user_pages_unlocked
+EXPORT_SYMBOL vmlinux 0x1372f2bbtcp_release_cb
+EXPORT_SYMBOL vmlinux 0x13778d9bkey_task_permission
+EXPORT_SYMBOL vmlinux 0x1382ce40sgl_free
+EXPORT_SYMBOL vmlinux 0x138b5e97node_owner_or_capable
+EXPORT_SYMBOL vmlinux 0x138e4994dm_kobject_release
+EXPORT_SYMBOL vmlinux 0x13aa9696sync_dirty_buffer
+EXPORT_SYMBOL vmlinux 0x13ba4f61__test_set_page_writeback
+EXPORT_SYMBOL vmlinux 0x13b1d3afsksk_mc_loop
+EXPORT_SYMBOL vmlinux 0x13b28b29qcom_scnopas_shutdown
+EXPORT_SYMBOL vmlinux 0x13b517bfmount_nodev
+EXPORT_SYMBOL vmlinux 0x13d0adf7__kfifo_out
+EXPORT_SYMBOL vmlinux 0x13d985c3nand_read_page_raw
+EXPORT_SYMBOL vmlinux 0x13f21252system_entering_hibernation
+EXPORT_SYMBOL vmlinux 0x13f905dof_node_put
+EXPORT_SYMBOL vmlinux 0x14026a56of_graph_get_remote_node
+EXPORT_SYMBOL vmlinux 0x14094c51find_vma
+EXPORT_SYMBOL vmlinux 0x1415634fskb_push
+EXPORT_SYMBOL vmlinux 0x14167eb7bio_chain
+EXPORT_SYMBOL vmlinux 0x1420b379kstrto16_from_user
+EXPORT_SYMBOL vmlinux 0x143a4cd__wait_on_bit
+EXPORT_SYMBOL vmlinux 0x145fafa0secure_tcpv6_seq
+EXPORT_SYMBOL vmlinux 0x1bdab5d0xfrrm_spd_getinfo
+EXPORT_SYMBOL vmlinux 0xbe1e232pci_assign_resource
+EXPORT_SYMBOL vmlinux 0xbf099c3arm_coherent_dma_ops
+EXPORT_SYMBOL vmlinux 0xbf0ad1pci_dev_put
+EXPORT_SYMBOL vmlinux 0xc05af01cjdbc2_journal_invalidatepage
+EXPORT_SYMBOL vmlinux 0xc1c3c33tcp_simple_retransmit
+EXPORT_SYMBOL vmlinux 0xc1c24fa02bit_waitqueue
+EXPORT_SYMBOL vmlinux 0xc2e9992pci_bus_claim_resources
+EXPORT_SYMBOL vmlinux 0xc38cf42sync_mappingBuffers
+EXPORT_SYMBOL vmlinux 0xc3b69f9fcdrom_mode_select
+EXPORT_SYMBOL vmlinux 0xc3b8b56free_task
+EXPORT_SYMBOL vmlinux 0xc3eb466md_write_end
+EXPORT_SYMBOL vmlinux 0xc45dec6alloc_skb_with frags
+EXPORT_SYMBOL vmlinux 0xc5e3878icst525_idx2s
+EXPORT_SYMBOL vmlinux 0xc9491ddgenphy_config_aneg
+EXPORT_SYMBOL vmlinux 0xcc475b8xfrrm_replay_seqhi
+EXPORT_SYMBOL vmlinux 0xccaef70phy_resume
+EXPORT_SYMBOL vmlinux 0xcd375ewriteback_inodes_sb
+EXPORT_SYMBOL vmlinux 0xce1fee1dma_fence_wait_any_timeout
+EXPORT_SYMBOL vmlinux 0xce8f90eudp_gro_complete
+EXPORT_SYMBOL vmlinux 0xcfe2c75dpiqetrop_drop
+EXPORT_SYMBOL vmlinux 0xd027e4bsnd_pcm_format_signed
+EXPORT_SYMBOL vmlinux 0xd04d577tty_driver_kref_put
+EXPORT_SYMBOL vmlinux 0xd07228dvmc_bus_error_handler
+EXPORT_SYMBOL vmlinux 0xd0abc5param_ops_bool
+EXPORT_SYMBOL vmlinux 0xd54e3e1netlink_broadcast
+EXPORT_SYMBOL vmlinux 0xdbb0ccvga_triget
+EXPORT_SYMBOL vmlinux 0xd911cd6sync_filesystem
+EXPORT_SYMBOL vmlinux 0xd93af013map_destroy
+EXPORT_SYMBOL vmlinux 0xdaaf33phy_ethtool_set_link_ksettings
+EXPORT_SYMBOL vmlinux 0xd79083f_setown
+EXPORT_SYMBOL vmlinux 0xdb7dc4ppo4gprot_kernel
+EXPORT_SYMBOL vmlinux 0xdc36131fb_destroy_modedb
+EXPORT_SYMBOL vmlinux 0xda4456swake_up_all
+EXPORT_SYMBOL vmlinux 0xdd5716f6fb_copy_cmap
+EXPORT_SYMBOL vmlinux 0xde9dc4fxxh64
+EXPORT_SYMBOL vmlinux 0xde7e4asnd_pcm_lib_preallocate_free_for_all
+EXPORT_SYMBOL vmlinux 0xdf72291xfrm_user_policy
+EXPORT_SYMBOL vmlinux 0xdf9fe7sg_zero_buffer
+EXPORT_SYMBOL vmlinux 0xdfe0f3bddevm_fwnode_get_index_gpiod_from_child
+EXPORT_SYMBOL vmlinux 0xe047854warn_slowpath_fmt
+EXPORT_SYMBOL vmlinux 0xe26be3bget_anon_bdev
+EXPORT_SYMBOL vmlinux 0xe592180snd_timer_open
+EXPORT_SYMBOL vmlinux 0xe66eb2cgeneric_fillattr
+EXPORT_SYMBOL vmlinux 0xe6d26a8strrstr
+EXPORT_SYMBOL vmlinux 0xe7ac25aidr_replace_ext
+EXPORT_SYMBOL vmlinux 0xe8f0616devfreq_update_status
+EXPORT_SYMBOL vmlinux 0xe96f43d_cpu_possible_mask
+EXPORT_SYMBOL vmlinux 0x1e980ff1 neigh_connected_output
+EXPORT_SYMBOL vmlinux 0x1e9edfb7 seq_hlist_start_head_rcu
+EXPORT_SYMBOL vmlinux 0x1e9f06a0 unregister_sysctl_table
+EXPORT_SYMBOL vmlinux 0x1f13f88f dqfoul_set_dqblk
+EXPORT_SYMBOL vmlinux 0x1f1f0125 xfrm_dst_ifdown
+EXPORT_SYMBOL vmlinux 0x1f1fa161 blk_queue_update_dma_pad
+EXPORT_SYMBOL vmlinux 0x1f36a0f0 mpi_dsi_shutdown_peripheral
+EXPORT_SYMBOL vmlinux 0x1f4dce66 inet_register_protosw
+EXPORT_SYMBOL vmlinux 0x1f625283 init_opal_dev
+EXPORT_SYMBOL vmlinux 0x1f7e807f kstrtoint_from_user
+EXPORT_SYMBOL vmlinux 0x1f8c04c net_set_sk_err
+EXPORT_SYMBOL vmlinux 0x1f97e807f target_for_each_device
+EXPORT_SYMBOL vmlinux 0x1f9b7d80f_n_addr_cells
+EXPORT_SYMBOL vmlinux 0x1fbb16da ip_set_tos2prio
+EXPORT_SYMBOL vmlinux 0x1fde79c9 mpi_dsi_setblocklen
+EXPORT_SYMBOL vmlinux 0x1fde912f netdev_alloc_frag
+EXPORT_SYMBOL vmlinux 0x1ff033a3 nla_reserve
+EXPORT_SYMBOL vmlinux 0x1ff0e83a do_map_probe
+EXPORT_SYMBOL vmlinux 0x1ff10246 generic_setlease
+EXPORT_SYMBOL vmlinux 0x1ff1195f in6addr_any
+EXPORT_SYMBOL vmlinux 0x1ff1f0e8 shrink_dcache_parent
+EXPORT_SYMBOL vmlinux 0x20010d6f neigh_direct_output
+EXPORT_SYMBOL vmlinux 0x200671e4 d_prune_aliases
+EXPORT_SYMBOL vmlinux 0x20085246 mmioset
+EXPORT_SYMBOL vmlinux 0x200b2041 phy_disconnect
+EXPORT_SYMBOL vmlinux 0x200b7510 ir_set_bits
+EXPORT_SYMBOL vmlinux 0x200c9dff kmalloc
+EXPORT_SYMBOL vmlinux 0x201a331f sscanf
+EXPORT_SYMBOL vmlinux 0x2027510c ida_destroy
+EXPORT_SYMBOL vmlinux 0x2039bdbe request_key_async_with_auxdata
+EXPORT_SYMBOL vmlinux 0x205f2927 timer_reduce
+EXPORT_SYMBOL vmlinux 0x2069dbbe locks_mandatory_area
+EXPORT_SYMBOL vmlinux 0x206bddb free_irq
+EXPORT_SYMBOL vmlinux 0x2071d060 notify_change
+EXPORT_SYMBOL vmlinux 0x207f690e request_threaded_irq
+EXPORT_SYMBOL vmlinux 0x208f79acreq_set_chip_data
+EXPORT_SYMBOL vmlinux 0x209055ae osccanf
+EXPORT_SYMBOL vmlinux 0x209d61b4 phy_disconnect
+EXPORT_SYMBOL vmlinux 0x20de71e4 prune_aliases
+EXPORT_SYMBOL vmlinux 0x21110dbfmmi
+EXPORT_SYMBOL vmlinux 0x211331f divs3
+EXPORT_SYMBOL vmlinux 0x213e5fa4of_get_property
+EXPORT_SYMBOL vmlinux 0x21519da5 pci_free_irq_vectors
+EXPORT_SYMBOL vmlinux 0x2175965d vme_dma_pci_attribute
+EXPORT_SYMBOL vmlinux 0x2182cd1 revert_creds
+EXPORT_SYMBOL vmlinux 0x2188ec8shc_init
+EXPORT_SYMBOL vmlinux 0x2190326c cof_get_i2c_adapter_by_node
+EXPORT_SYMBOL vmlinux 0x219f759ammiocpy
+EXPORT_SYMBOL vmlinux 0x2b0ba2b0scsi_sense_dese_find
+EXPORT_SYMBOL vmlinux 0x2b281c53scsi_device_lookup_by_target
+EXPORT_SYMBOL vmlinux 0x2b2c7652pskb_trim
+EXPORT_SYMBOL vmlinux 0x2b2ce7b8kstrtos8
+EXPORT_SYMBOL vmlinux 0x2b316e54tegra_ivc_read_advance
+EXPORT_SYMBOL vmlinux 0x2b3be8f6tf_em_register
+EXPORT_SYMBOL vmlinux 0x2b55fc7fthread_create_on_node
+EXPORT_SYMBOL vmlinux 0x2b5a1d0inet_csk_reset_keepalive_timer
+EXPORT_SYMBOL vmlinux 0x2b5b43ectcp_peek_len
+EXPORT_SYMBOL vmlinux 0x2b790c92nand_scan
+EXPORT_SYMBOL vmlinux 0x2b99722a_cpu_active_mask
+EXPORT_SYMBOL vmlinux 0x2b9d7a4genl_lock
+EXPORT_SYMBOL vmlinux 0x2ba2bf9csnd_ctl_register_ioctl
+EXPORT_SYMBOL vmlinux 0x2bc1ceccmutex_lock_interruptible
+EXPORT_SYMBOL vmlinux 0x2bc62efemmcc_alloc_host
+EXPORT_SYMBOL vmlinux 0x2bc9d95bio_put
+EXPORT_SYMBOL vmlinux 0x2bd8ff52xfrm_trans_queue
+EXPORT_SYMBOL vmlinux 0x2bdc5e7asock_no_bind
+EXPORT_SYMBOL vmlinux 0x2be5cd5rwsem_downgrade_wake
+EXPORT_SYMBOL vmlinux 0x2befee8apci_irq_get_affinity
+EXPORT_SYMBOL vmlinux 0x2bffece8cancel_delayed_work_sync
+EXPORT_SYMBOL vmlinux 0x2c01eb74mutex_lock_killable
+EXPORT_SYMBOL vmlinux 0x2c116a13serial8250_do_set_termios
+EXPORT_SYMBOL vmlinux 0x2c14323akstrtol_from_user
+EXPORT_SYMBOL vmlinux 0x2c256e1finput_scancode_to_scalar
+EXPORT_SYMBOL vmlinux 0x2c2fab43generic_file_write_iter
+EXPORT_SYMBOL vmlinux 0x2c329e54tegra_powergate_sequence_power_up
+EXPORT_SYMBOL vmlinux 0x2c52827funregister_framebuffer
+EXPORT_SYMBOL vmlinux 0x2c69b169scsi_command_normalize_sense
+EXPORT_SYMBOL vmlinux 0x2c76f60ecgroup_bpf_run_filter_skb
+EXPORT_SYMBOL vmlinux 0x2c7c8e9apciebios_min_mem
+EXPORT_SYMBOL vmlinux 0x2c81ec75_irq_regs
+EXPORT_SYMBOL vmlinux 0x2c8bd6f9crypto_sha1_update
+EXPORT_SYMBOL vmlinux 0x2c9950fc__cpuhp_remove_state
+EXPORT_SYMBOL vmlinux 0x2ca078d8epage_mapped
+EXPORT_SYMBOL vmlinux 0x2ca103f9d_add
+EXPORT_SYMBOL vmlinux 0x2ca658b5blk_rq_init
+EXPORT_SYMBOL vmlinux 0x2cc24cfb_splice_from_pipe
+EXPORT_SYMBOL vmlinux 0x2cd0faecsimplesetattr
+EXPORT_SYMBOL vmlinux 0x2cd270f2mipi_dsi_dcs_set_column_address
+EXPORT_SYMBOL vmlinux 0x2d0254b2clone_cred
+EXPORT_SYMBOL vmlinux 0x2d043a76nfs_log_trace
+EXPORT_SYMBOL vmlinux 0x2d06810bof_graph_get_next_endpoint
+EXPORT_SYMBOL vmlinux 0x2d08856snd_power_wait
+EXPORT_SYMBOL vmlinux 0x2d132891of_translate_dma_address
+EXPORT_SYMBOL vmlinux 0x2d140a58genl_unlock
+EXPORT_SYMBOL vmlinux 0x2d1cd8d8_netdev_dma_alloc_skb
+EXPORT_SYMBOL vmlinux 0x2d1f6e8c8csi_is_host_device
+EXPORT_SYMBOL vmlinux 0x2d20ef14 snd_pcm_set_sync
+EXPORT_SYMBOL vmlinux 0x2d2620b5 pci_stop_and_remove_bus_device
+EXPORT_SYMBOL vmlinux 0x2d284dec blk_alloc_queue
+EXPORT_SYMBOL vmlinux 0x2d30243e netif_receive_skb_core
+EXPORT_SYMBOL vmlinux 0x2d3385d3 system_wq
+EXPORT_SYMBOL vmlinux 0x2d569b0abl_requeue_request
+EXPORT_SYMBOL vmlinux 0x2d6f0758pix_get_max_mmrbc
+EXPORT_SYMBOL vmlinux 0x2e16f15tcf_unregister_action
+EXPORT_SYMBOL vmlinux 0x2e19dd254pci_request_selected_regions
+EXPORT_SYMBOL vmlinux 0x2e1c751clk__put
+EXPORT_SYMBOL vmlinux 0x2e3aa03dev_addr_addr
+EXPORT_SYMBOL vmlinux 0x2e34d1jbd2_complete_transaction
+EXPORT_SYMBOL vmlinux 0x2e64d7b6seq_open_private
+EXPORT_SYMBOL vmlinux 0x2e663b00skb_split
+EXPORT_SYMBOL vmlinux 0x2e6a29a7udp_proc_unregister
+EXPORT_SYMBOL vmlinux 0x2e743a43pneigh_enqueue
+EXPORT_SYMBOL vmlinux 0x2e8709a9fput
+EXPORT_SYMBOL vmlinux 0x2e9f76esock_rfree
+EXPORT_SYMBOL vmlinux 0x2eab555cckey_unlink
+EXPORT_SYMBOL vmlinux 0x2ea9772aalv_dispatch_add_tail
+EXPORT_SYMBOL vmlinux 0x2eb9d46mmccq_post_req
+EXPORT_SYMBOL vmlinux 0x2ec524ad__kfifo_in_r
+EXPORT_SYMBOL vmlinux 0x2ec60216configfs_remove_default_groups
+EXPORT_SYMBOL vmlinux 0x2ee3b093netlink_ack
+EXPORT_SYMBOL vmlinux 0x2ee5ab47udp_push_pending_frames
+EXPORT_SYMBOL vmlinux 0x2eefb6frwsem_down_write_failed
+EXPORT_SYMBOL vmlinux 0x2eef73ableblk_end_request_all
+EXPORT_SYMBOL vmlinux 0x2ef0777ask_stream_wait_connect
+EXPORT_SYMBOL vmlinux 0x2ef63ad6cscldev_info_list_del_keyed
+EXPORT_SYMBOL vmlinux 0x2ef9d052swiotlb_map_sg_atts
+EXPORT_SYMBOL vmlinux 0x2ff03fc4security_secmark_refcount_inc
+EXPORT_SYMBOL vmlinux 0x2ff1b0d62ZSTD_insertBlock
+EXPORT_SYMBOL vmlinux 0x2ff39419netdev_emerg
+EXPORT_SYMBOL vmlinux 0x2ff32a98call_netdevice_notifiers
+EXPORT_SYMBOL vmlinux 0x2ff5f8xfrm_sad_getinfo
+EXPORT_SYMBOL vmlinux 0x2ff8700irq_cpu_rmap_add
+EXPORT_SYMBOL vmlinux 0x2ff91b2security_ib_alloc_security
+EXPORT_SYMBOL vmlinux 0x2ff888afkern_path_create
+EXPORT_SYMBOL vmlinux 0x3d8f791ddevm_request_threaded_irq
+EXPORT_SYMBOL vmlinux 0x3dae5b5c__dquot_free_space
+EXPORT_SYMBOL vmlinux 0x3db49c83unlink_framebuffer
+EXPORT_SYMBOL vmlinux 0x3db7a771generic_key_instantiate
+EXPORT_SYMBOL vmlinux 0x3dbbc085mipi_dsi_generic_read
+EXPORT_SYMBOL vmlinux 0x3dc53080gen_pool_alloc_algo
+EXPORT_SYMBOL vmlinux 0x3dec69abcpagecache_get_page
+EXPORT_SYMBOL vmlinux 0x3dec9b6ebn_register_queue_handler
+EXPORT_SYMBOL vmlinux 0x3dec8b88a0irq_set_handler_data
+EXPORT_SYMBOL vmlinux 0x3dda9104db_get_queue
+EXPORT_SYMBOL vmlinux 0x3df553d5blk_get_queue
+EXPORT_SYMBOL vmlinux 0x3e24732dxfm_policy_byid
+EXPORT_SYMBOL vmlinux 0x3e2b0ba6groups_alloc
+EXPORT_SYMBOL vmlinux 0x3e3d0910delayed_work_timer_fn
+EXPORT_SYMBOL vmlinux 0x3e78595eblk_pre_runtime_resume
+EXPORT_SYMBOL vmlinux 0x3e884f4bvm_get_page_prot
+EXPORT_SYMBOL vmlinux 0x3e89e11dnetdev_class_create_file_ns
+EXPORT_SYMBOL vmlinux 0x3e9110fa__hw_addr_unsync
+EXPORT_SYMBOL vmlinux 0x3e924c55irq_set_chip
+EXPORT_SYMBOL vmlinux 0x3e92f57eudp_sendmsg
+EXPORT_SYMBOL vmlinux 0x3f1547d4bio_uninit
+EXPORT_SYMBOL vmlinux 0x3f22b0e7i2c_del_adapter
+EXPORT_SYMBOL vmlinux 0x3f35710fcdev_device_del
+EXPORT_SYMBOL vmlinux 0x3f6217fisk_stream_wait_memory
+EXPORT_SYMBOL vmlinux 0x3f65d93f_breadahead_gfp
+EXPORT_SYMBOL vmlinux 0x3f833f61fib_notifier_ops_unregister
+EXPORT_SYMBOL vmlinux 0x3fe8a9f6axxx500_get_register_interruptible
+EXPORT_SYMBOL vmlinux 0x3fe9128param_ops_long
+EXPORT_SYMBOL vmlinux 0x4001003a0__completion_interruptible
+EXPORT_SYMBOL vmlinux 0x40290615nvm_unregister_tgt_type
+EXPORT_SYMBOL vmlinux 0x402b8281__request_module
+EXPORT_SYMBOL vmlinux 0x40545163sk_capable

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+EXPORT_SYMBOL vmlinux 0x4059792fprint_hex_dump
+EXPORT_SYMBOL vmlinux 0x405c96f0___invalidate_device
+EXPORT_SYMBOL vmlinux 0x4066b1cafilp_close
+EXPORT_SYMBOL vmlinux 0x407136b1___put_user_8
+EXPORT_SYMBOL vmlinux 0x407782ffdev_open
+EXPORT_SYMBOL vmlinux 0x407a3275omap_start_dma
+EXPORT_SYMBOL vmlinux 0x40973662syseq_tp_mem
+EXPORT_SYMBOL vmlinux 0x409873e3ttty_termios_baud_rate
+EXPORT_SYMBOL vmlinux 0x40a27c37scsi_dev_info_remove_list
+EXPORT_SYMBOL vmlinux 0x40a2d1ddm_table_get_size
+EXPORT_SYMBOL vmlinux 0x40a9b349vzalloc
+EXPORT_SYMBOL vmlinux 0x40b51c05_sysfs_match_string
+EXPORT_SYMBOL vmlinux 0x40c0e0c2f__init_swait_queue_head
+EXPORT_SYMBOL vmlinux 0x40c336e6blk_dump_rq_flags
+EXPORT_SYMBOL vmlinux 0x40c7247csi_meminfo
+EXPORT_SYMBOL vmlinux 0x40d04644console_trylock
+EXPORT_SYMBOL vmlinux 0x40d0489fjbd2_journal_update_sb_errno
+EXPORT_SYMBOL vmlinux 0x40d05da8inet_rcv_saddr_equal
+EXPORT_SYMBOL vmlinux 0x40d59096unregister_restart_handler
+EXPORT_SYMBOL vmlinux 0x40d76f2dnf_log_unregister
+EXPORT_SYMBOL vmlinux 0x40f4d0dup_iter
+EXPORT_SYMBOL vmlinux 0x40f524a_raw_read_lock_irq
+EXPORT_SYMBOL vmlinux 0x40f79810ashldi3
+EXPORT_SYMBOL vmlinux 0x40fd22c8elv_bio_merge_ok
+EXPORT_SYMBOL vmlinux 0x410a1600__cleancache_get_page
+EXPORT_SYMBOL vmlinux 0x410fcd88drop_nlink
+EXPORT_SYMBOL vmlinux 0x4121b7ffkeyring_alloc
+EXPORT_SYMBOL vmlinux 0x413dad1dcnbl_cee_notify
+EXPORT_SYMBOL vmlinux 0x41482d8bstrndup_user
+EXPORT_SYMBOL vmlinux 0x415eda57of_match_device
+EXPORT_SYMBOL vmlinux 0x41670690tcf_extsrc_validate
+EXPORT_SYMBOL vmlinux 0x4188d439neigh_rand_reach_time
+EXPORT_SYMBOL vmlinux 0x418a5367__scsi_format_command
+EXPORT_SYMBOL vmlinux 0x419913dbbsnd_card_new
+EXPORT_SYMBOL vmlinux 0x41b3f0fctouchscreen_set_mouse
+EXPORT_SYMBOL vmlinux 0x41b44d79neigh_table_clear
+EXPORT_SYMBOL vmlinux 0x41c1ed15a4udp_lib_getsockopt
+EXPORT_SYMBOL vmlinux 0x41f4b64simple_transaction_read
+EXPORT_SYMBOL vmlinux 0x4202af52dm_kcopyd_copy
+EXPORT_SYMBOL vmlinux 0x4215a929__wake_up
+EXPORT_SYMBOL vmlinux 0x42160169flush_workqueue
+EXPORT_SYMBOL vmlinux 0x4226292cserio_unregister_port
+EXPORT_SYMBOL vmlinux 0x4226e0c9mod_timer
+EXPORT_SYMBOL vmlinux 0x42350e0aucs2_strlen
+EXPORT_SYMBOL vmlinux 0x4248ae3csingle_task_running
+EXPORT_SYMBOL vmlinux 0x424d3620zlib_inflateIncomp
+EXPORT_SYMBOL vmlinux 0x426bc54dmam_alloc_attrs
+EXPORT_SYMBOL vmlinux 0x428f0b58inode_init_owner
+EXPORT_SYMBOL vmlinux 0x44ad6aafthy_schedule_flip
+EXPORT_SYMBOL vmlinux 0x44b1d426__dynamic_pr_debug
+EXPORT_SYMBOL vmlinux 0x44b5ee9akasprintf
+EXPORT_SYMBOL vmlinux 0x44c944d9csi_print_command
+EXPORT_SYMBOL vmlinux 0x44cf82b3net_dim
+EXPORT_SYMBOL vmlinux 0x44da5d0f_csum_ipv6_magic
+EXPORT_SYMBOL vmlinux 0x44decadsnd_jack_report
+EXPORT_SYMBOL vmlinux 0x44e3287radix_tree_gang_lookup_tag
+EXPORT_SYMBOL vmlinux 0x44e660dcfscrypt_fname_disk_to_usr
+EXPORT_SYMBOL vmlinux 0x44e9a829match_token
+EXPORT_SYMBOL vmlinux 0x44f14464ip6_dst_hoplimit
+EXPORT_SYMBOL vmlinux 0x44f75143dev_mpci_remap_iospace
+EXPORT_SYMBOL vmlinux 0x45006ceedefault_red
+EXPORT_SYMBOL vmlinux 0x4529597xfrcm_policy_destroy
+EXPORT_SYMBOL vmlinux 0x453c8403pci_msi_enabled
+EXPORT_SYMBOL vmlinux 0x4562a134_tracepoint_kmem_cache_free
+EXPORT_SYMBOL vmlinux 0x4565bccasnd_pcm_hw_constraint_list
+EXPORT_SYMBOL vmlinux 0x4578f528_kfifo_to_user
+EXPORT_SYMBOL vmlinux 0x4580ad65dmove
+EXPORT_SYMBOL vmlinux 0x458aff48snd_jack_new
+EXPORT_SYMBOL vmlinux 0x45da0d5system_serial_low
+EXPORT_SYMBOL vmlinux 0x45ca50a9noseal_pipe_buf_ops
+EXPORT_SYMBOL vmlinux 0x45dd1f9fgeneric_end_io_acct
+EXPORT_SYMBOL vmlinux 0x45f9c572nfs_log_unset
+EXPORT_SYMBOL vmlinux 0x46191c58pci_bus_read_config_dword
+EXPORT_SYMBOL vmlinux 0x462a2e75match_strlcpy
+EXPORT_SYMBOL vmlinux 0x4643dc2azerocopy_sg_from_iter
+EXPORT_SYMBOL vmlinux 0x465c934secure_ipv6_port_ephemeral
+EXPORT_SYMBOL vmlinux 0x46649cd1vme_lm_set
+EXPORT_SYMBOL vmlinux 0x466d8148pci_wait_for_pending_transaction
+EXPORT_SYMBOL vmlinux 0x46759b88pcie_capability_write_word
+EXPORT_SYMBOL vmlinux 0x46c6fb2msm_pinctrl_probe
+EXPORT_SYMBOL vmlinux 0x46cb3ceewould_dump
+EXPORT_SYMBOL vmlinux 0x46db328c_div0
+EXPORT_SYMBOL vmlinux 0x46e23322read_code
+EXPORT_SYMBOL vmlinux 0x46f5579cswiotlb_unmap_sg_attrs
+EXPORT_SYMBOL vmlinux 0x473d06c7snd_pcm_new_stream
+EXPORT_SYMBOL vmlinux 0x473f6af8vfs_getattr
+EXPORT_SYMBOL vmlinux 0x474c90e6sk_mem_schedule
+EXPORT_SYMBOL vmlinux 0x4757dadcdcb_ieee_getapp_mask
+EXPORT_SYMBOL vmlinux 0x47598085skb_vlan_push
+EXPORT_SYMBOL vmlinux 0x476c6aflblk_queue_physical_block_size
+EXPORT_SYMBOL vmlinux 0x477fd10__put_user_ns
+EXPORT_SYMBOL vmlinux 0x4789b84zstD_isFrame
+EXPORT_SYMBOL vmlinux 0x47939e0d_tasklet_hi_schedule
+EXPORT_SYMBOL vmlinux 0x47a6f0a2xfm_policy_insert
+EXPORT_SYMBOL vmlinux 0x47ae12cbndefault_data_interface
+EXPORT_SYMBOL vmlinux 0x47c65bfcunregister/inet6addr_validator_notifier
+EXPORT_SYMBOL vmlinux 0x4b08e9f9iptv6_dev_get_saddr
+EXPORT_SYMBOL vmlinux 0x4b15b221seg6_hmac_net_init
+EXPORT_SYMBOL vmlinux 0x4b1ec3e2kstrtoul_from_user
+EXPORT_SYMBOL vmlinux 0x4b224af7posix_acl_valid
+EXPORT_SYMBOL vmlinux 0x4b5fd49edm_kcopyd_do_callback
+EXPORT_SYMBOL vmlinux 0x4b67b9f5call_usermodehelper_exec
+EXPORT_SYMBOL vmlinux 0x4b6c7eda__dev_getfirstbyhwtype
+EXPORT_SYMBOL vmlinux 0x4b7aa1f8input_set_capability
+EXPORT_SYMBOL vmlinux 0x4b8b3239vprintk
+EXPORT_SYMBOL vmlinux 0x4b989b8c2dma_async_tx_descriptor_init
+EXPORT_SYMBOL vmlinux 0x4b9aaf0esnd_card_disconnect
+EXPORT_SYMBOL vmlinux 0x4ba535a7vme_master_get
+EXPORT_SYMBOL vmlinux 0x4bb21ca5dma_fence_get_status
+EXPORT_SYMBOL vmlinux 0x4bb95d63dmmamdeclare_coherent_memory
+EXPORT_SYMBOL vmlinux 0x4bdc103kmem_cache_destroy
+EXPORT_SYMBOL vmlinux 0x4bee7f63up
+EXPORT_SYMBOL vmlinux 0x4be85a03memweight
+EXPORT_SYMBOL vmlinux 0x4beb974cmax8998_bulk_write
+EXPORT_SYMBOL vmlinux 0x4bfel0d5devm_kvasprintf
+EXPORT_SYMBOL vmlinux 0x4c143c2ajbd2_journal_init_jbd_inode
+EXPORT_SYMBOL vmlinux 0x4c1cca3bcpumask_next_wrap
+EXPORT_SYMBOL vmlinux 0x4c233a44_raw_read_unlock_bh
+EXPORT_SYMBOL vmlinux 0x4c2ae700strnstr
+EXPORT_SYMBOL vmlinux 0x4c2eff8dev_alert
+EXPORT_SYMBOL vmlinux 0x4c3d37b8dumpemit
+EXPORT_SYMBOL vmlinux 0x4c3fbb45clkdev_drop
+EXPORT_SYMBOL vmlinux 0x4c416eb9lZ4_decompress_fast
+EXPORT_SYMBOL vmlinux 0x4c460a03csisireport_device_reset
+EXPORT_SYMBOL vmlinux 0x4c570f3put_io_context
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+EXPORT_SYMBOL vmlinux 0x4c66bdcakernel_bind
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+EXPORT_SYMBOL vmlinux 0x4c9a0bad__SetPageMovable
+EXPORT_SYMBOL vmlinux 0x4cb2a02bbacklight_device_unregister
+EXPORT_SYMBOL vmlinux 0x4cb441diwe_stream_add_event
+EXPORT_SYMBOL vmlinux 0x4cc2854dtegra114_clockassert_dflldvcoreset
+EXPORT_SYMBOL vmlinux 0x4cc972d6tegra_iwcleanup
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+EXPORT_SYMBOL vmlinux 0x4d3bfa94presp_event
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+EXPORT_SYMBOL vmlinux 0x574c2e74bitmap_release_region
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+EXPORT_SYMBOL vmlinux 0x57782e74mmc_gpiod_request_cd_irq
+EXPORT_SYMBOL vmlinux 0x579153dbswakeup_up
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+EXPORT_SYMBOL vmlinux 0x57efa2b7devfreq_suspend_device
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+EXPORT_SYMBOL vmlinux 0x580eff40devm_backlight_device_unregister
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+EXPORT_SYMBOL vmlinux 0x58516557omap_set_dma_src_data_pack
+EXPORT_SYMBOL vmlinux 0x5859060cssock_cmsg_send
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+EXPORT_SYMBOL vmlinux 0x7a5e167bsched_autogroup_detach
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+EXPORT_SYMBOL vmlinux 0x7aca47308seq_read
+EXPORT_SYMBOL vmlinux 0x7acdf982simple_empty
+EXPORT_SYMBOL vmlinux 0x7ad050b9qid_Jt
+EXPORT_SYMBOL vmlinux 0x7adc0bfrb_replace_node_rcu
+EXPORT_SYMBOL vmlinux 0x7adc81d4follow_down_one
+EXPORT_SYMBOL vmlinux 0x7ae8c707dquot_operations
+EXPORT_SYMBOL vmlinux 0x7af10ef6fb_get_mode
+EXPORT_SYMBOL vmlinux 0x7af4eb9cely_register_queue
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+EXPORT_SYMBOL vmlinux 0x7ba5a3b4tegra_powergate_power_off
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+EXPORT_SYMBOL vmlinux 0x80d81308ormap_vrfb_release_ctx
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+EXPORT_SYMBOL vmlinux 0x8125b590empty_zero_page
+EXPORT_SYMBOL vmlinux 0x81329103of_count_phandle_with_args
+EXPORT_SYMBOL vmlinux 0x81347f88thread_associate_blkcg
+EXPORT_SYMBOL vmlinux 0x81461a13udp_ioctl
+EXPORT_SYMBOL vmlinux 0x81476df5netdev_lower_dev_get_private
+EXPORT_SYMBOL vmlinux 0x814c8eb7pci_request_irq
+EXPORT_SYMBOL vmlinux 0x814e7730nf_ct_destroy
+EXPORT_SYMBOL vmlinux 0x8155a986get_super_thawed
+EXPORT_SYMBOL vmlinux 0x815b5dd4match_octal
+EXPORT_SYMBOL vmlinux 0x818bd9e3bh_uptodate_or_lock
+EXPORT_SYMBOL vmlinux 0x818d179sisiphash_lu32
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+EXPORT_SYMBOL vmlinux 0x81e6b37fdmi_get_system_info
+EXPORT_SYMBOL vmlinux 0x81f28f32ac97_bus_type
+EXPORT_SYMBOL vmlinux 0x82072614tasklet_kill
+EXPORT_SYMBOL vmlinux 0x821557c7security_path_mknod
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+EXPORT_SYMBOL vmlinux 0x825085bbnetif_get_napi_add
+EXPORT_SYMBOL vmlinux 0x8265b302kblockd_schedule_work_on
+EXPORT_SYMBOL vmlinux 0x82701365int_to_scsilun
+EXPORT_SYMBOL vmlinux 0x828062b1__frontswap_init
+EXPORT_SYMBOL vmlinux 0x82871b60dmt_modes
+EXPORT_SYMBOL vmlinux 0x829b05dcblok_limits_io_min
+EXPORT_SYMBOL vmlinux 0x82b303d7pcim_iounmap
+EXPORT_SYMBOL vmlinux 0x82ce887a8blk_get_request_flags
+EXPORT_SYMBOL vmlinux 0x82f886a1ZSTD_findFrameCompressedSize
+EXPORT_SYMBOL vmlinux 0x82fc27d5bioso_devname
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+EXPORT_SYMBOL vmlinux 0x8318d631cdev_init
+EXPORT_SYMBOL vmlinux 0x8320682cdquot_mark_dquot_dirty
+EXPORT_SYMBOL vmlinux 0x8320bea8__umodsi3

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+EXPORT_SYMBOL vmlinux 0x8322a425filemap_write_and_wait
+EXPORT_SYMBOL vmlinux 0x83272a99I_BDEV
+EXPORT_SYMBOL vmlinux 0x83581089gf128mul_init_4k_lle
+EXPORT_SYMBOL vmlinux 0x835da3e5pci_write_config_dword
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+EXPORT_SYMBOL vmlinux 0x838689d7ether_setup
+EXPORT_SYMBOL vmlinux 0x838e3419xfm6_find_1stfragopt
+EXPORT_SYMBOL vmlinux 0x83b009eaxfrm_state_walk_init
+EXPORT_SYMBOL vmlinux 0x83b45d9eswiothl_alloc_coherent
+EXPORT_SYMBOL vmlinux 0x83c19a9bppp_input_error
+EXPORT_SYMBOL vmlinux 0x83c52fbauxfrm4_protocol_init
+EXPORT_SYMBOL vmlinux 0x83e0b01crypt_dci_dcs_get_power_mode
+EXPORT_SYMBOL vmlinux 0x84000453of_device_is_available
+EXPORT_SYMBOL vmlinux 0x8401c26apci_free_irq
+EXPORT_SYMBOL vmlinux 0x8407141fssock_no_sendmsg
+EXPORT_SYMBOL vmlinux 0x840c0581dm_register_target
+EXPORT_SYMBOL vmlinux 0x840c3a5d_snd_ctl_add_slave
+EXPORT_SYMBOL vmlinux 0x84648a6epci_get_class
+EXPORT_SYMBOL vmlinux 0x846a7d96inet6_add_protocol
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+EXPORT_SYMBOL vmlinux 0x8499cab39kmap_high
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+EXPORT_SYMBOL vmlinux 0x84a70302migrate_page_copy
+EXPORT_SYMBOL vmlinux 0x84b183aestrcmp
+EXPORT_SYMBOL vmlinux 0x84cf25a6unix_ge_lock
+EXPORT_SYMBOL vmlinux 0x84d65c0akfree_skb
+EXPORT_SYMBOL vmlinux 0x84eb1fa8release_and_free_resource
+EXPORT_SYMBOL vmlinux 0x84ffea8bidr_preload
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+EXPORT_SYMBOL vmlinux 0x85b5e625rfkill_set_states
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+EXPORT_SYMBOL vmlinux 0x87e137b1file_checkpoint_and_advance_wb_err
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+EXPORT_SYMBOL vmlinux 0x885f2daesync_blockdev
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+EXPORT_SYMBOL vmlinux 0xd11b41blk_end_request
+EXPORT_SYMBOL vmlinux 0xd236a06sock_queue_rcv_skb
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+EXPORT_SYMBOL vmlinux 0xd507a61sg_miter_start
+EXPORT_SYMBOL vmlinux 0xd69763memcpy
+EXPORT_SYMBOL vmlinux 0xd67fd8cinit_special_inode
+EXPORT_SYMBOL vmlinux 0xd697b96proc_doulongvee_ms_jiffies_minmax
+EXPORT_SYMBOL vmlinux 0xd6edbdsubmit Biological_password
+EXPORT_SYMBOL vmlinux 0xd80e3eanapi_consume_skb
+EXPORT_SYMBOL vmlinux 0xd9510acsckb_flow_dissector_init
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+EXPORT_SYMBOL vmlinux 0x9dd3db5__page_frag_cache_drain
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+EXPORT_SYMBOL vmlinux 0x9e01edd7forget_all_cached_acls
+EXPORT_SYMBOL vmlinux 0x9e02a19dgend_gen_new_estimator
+EXPORT_SYMBOL vmlinux 0x9e07740kioe_set_cancel_fn
+EXPORT_SYMBOL vmlinux 0x9e0c711dvmzalloc_node
+EXPORT_SYMBOL vmlinux 0x9e13f66gf128mul_lle
+EXPORT_SYMBOL vmlinux 0x9e4f4afeefdm_io_client_destroy
+EXPORT_SYMBOL vmlinux 0x9e52ac12prepare_to_wait_event
+EXPORT_SYMBOL vmlinux 0x9e61b005set_freezable
+EXPORT_SYMBOL vmlinux 0x9e68f6256scsi_kmap_atomic_sg
+EXPORT_SYMBOL vmlinux 0x9e68e94dev_uc_flush
+EXPORT_SYMBOL vmlinux 0x9e6d79f88snd_info_get_str
+EXPORT_SYMBOL vmlinux 0x9e750011xattr_full_name
+EXPORT_SYMBOL vmlinux 0x9e763530reciprocal_value
+EXPORT_SYMBOL vmlinux 0x9e7d7db1dpot
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+EXPORT_SYMBOL vmlinux 0x9e99c48trace_print_hex_seq
+EXPORT_SYMBOL vmlinux 0x9e9f6d9dmemunmap
+EXPORT_SYMBOL vmlinux 0x9ebe1992pci_get_mps
+EXPORT_SYMBOL vmlinux 0x9efb580gen_pool_fixed_alloc
+EXPORT_SYMBOL vmlinux 0x9e972155register_sounddsp
+EXPORT_SYMBOL vmlinux 0x9ed9e03esystem_state
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+EXPORT_SYMBOL vmlinux 0x9f08f6c4generic_block_fiemap
+EXPORT_SYMBOL vmlinux 0x9f104379give_up_console
+EXPORT_SYMBOL vmlinux 0x9f2d2cf0find_inode_nowait
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+EXPORT_SYMBOL vmlinux 0x9f50b7770keyringing_restrict
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+EXPORT_SYMBOL vmlinux 0x9fde31unregister_netdevice_many
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+EXPORT_SYMBOL vmlinux 0x9f9a3a75netdev_max_backlog
+EXPORT_SYMBOL vmlinux 0x9f9d3b39bi2c_verify_client
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nfs_free_client
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x068c90ce
nfs_writeback_update_inode
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x088ca629
nfs_pageio_init_read

Open Source Used In 5GaaS Edge AC-4 14633
+EXPORT_SYMBOL_GPL fs/nfs/0xaf419532 nfs_release_request
+EXPORT_SYMBOL_GPL fs/nfs/0xb3d25a3 nfs_inode_attach_open_context
+EXPORT_SYMBOL_GPL fs/nfs/0xb3d3d14 nfs_flock
+EXPORT_SYMBOL_GPL fs/nfs/0xb606e716 nfs_fattr_init
+EXPORT_SYMBOL_GPL fs/nfs/0xb87cb06c nfs_path
+EXPORT_SYMBOL_GPL fs/nfs/0xb89b66e7 nfs_init_cinfo
+EXPORT_SYMBOL_GPL fs/nfs/0xb95266b nfs_server_copy_userdata
+EXPORT_SYMBOL_GPL fs/nfs/0xbdd0f50 nfs_init_server_rpcclient
+EXPORT_SYMBOL_GPL fs/nfs/0xc09ba8f8c nfs_do_submount
+EXPORT_SYMBOL_GPL fs/nfs/0xc3a2be67 nfs_net_id
+EXPORT_SYMBOL_GPL fs/nfs/0xc4ff1e9f nfs_auth_info_match
+EXPORT_SYMBOL_GPL fs/nfs/0xc8e60d4c nfs_file_release
+EXPORT_SYMBOL_GPL fs/nfs/0xcbe5150 nfs_fhget
+EXPORT_SYMBOL_GPL fs/nfs/0xce87beec nfs_access_add_cache
+EXPORT_SYMBOL_GPL fs/nfs/0xcf863235 nfs_commitdata_release
+EXPORT_SYMBOL_GPL fs/nfs/0xd025999b nfs_instantiate
+EXPORT_SYMBOL_GPL fs/nfs/0xd2513081 nfs_display_fhandle_hash
+EXPORT_SYMBOL_GPL fs/nfs/0xdae9b5d7 nfs4_disable_idmapping
+EXPORT_SYMBOL_GPL fs/nfs/0xe7901d5d nfs_wait_on_request
+EXPORT_SYMBOL_GPL fs/nfs/0xe80eaf14 nfs_sb_deactive
+EXPORT_SYMBOL_GPL fs/nfs/0xe9a5114c5 nfs_initiate_pgio
+EXPORT_SYMBOL_GPL fs/nfs/0xed8b7f26 nfs_file_llseek
+EXPORT_SYMBOL_GPL fs/nfs/0xef812f67 nfs_server_remove_lists

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Open Source Used In 5GaaS Edge AC-4 14636
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_nat_ipv6 0x133a2b7f2f9f
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_masquerade_ipv6 0x2f07a1e8
nf_masquerade_ipv6_unregister_notifier
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_nat_masquerade_ipv6 0x67b1dd69
nf_nat_masquerade_ipv6_unregister_notifier
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_reject_ipv6 0x752615anf_nat_masquerade_ipv6
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_reject_ipv6 0x00be028bf.net_reject_ipv6_tchdr_put
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_reject_ipv6 0x0ab48902n gerektirir IPv6_tchdr_put
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_reject_ipv6 0x4b381ab4n_send_reset6
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_reject_ipv6 0xc8de19caCnf_reject_ipv6_tchdr_get
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_reject_ipv6 0xd4b0e9anf_send_unreach6
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_socket_ipv6 0x777bf2c2cnf_sk_lookup_slow_v6
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nf_tables_ipv6 0x6dbb8801n_baf IPV6
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nft_fib_ipv6 0x2ddc82a9n_fib6_eval
+EXPORT_SYMBOL_GPL net/ipv6/netfilter/nft_fib_ipv6 0x865cb30dnt_fib6_eval_type
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x0133a2b7l2tp_session_free
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x25c728cf2tp_tunnel_closeall
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x28d0352fl2tp_session_create
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x5076fe98l2tp_tunnel_register
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x51d352eled2tp_udp_encap_recv
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0xf41f17ed2tp_session_get_nth
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x9080dea8l2tp_tunnel_get
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x97d94e82l2tp_tunnel_get
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x56f18091l2tp_tunnel_unhash
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x681b7b1bl2tp_tunnel_delete
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x839801e7l2tp_session_queue_purge
+EXPORT_SYMBOL_GPL net/l2tp/l2tp_core 0x839801e7l2tp_session_queue_purge
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x0f23c651IEEE80211_READY ON CHANNEL
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x1851437dIEEE80211_REQUEST_SMPs
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x19d24026IEEE80211_UPDATE MU_GROUPS
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x1b9b4e2IEEE80211GTK_REKEY_ADD
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x265ae5a1IEEE80211_ITER_CHAN Contexts_ATOMIC
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x29987317wdev_to_ieee80211_vif
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x301516f5IEEE80211_REMOVE_KEY
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x4a4e6cb0IEEE80211_ITERATE_INTERFACES
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x52e6145IEEE80211_ITERATE_ACTIVE_INTERFACES_RTNL
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x53086042IEEE80211_FIND_STA BY_IFADDR
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x5304488IEEE80211_ITERATE_STATIONS_ATOMIC
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x6817b7b1IEEE80211_ITERATE_ACTIVE_INTERFACES_ATOMIC
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x6859bc1bIEEE80211_VIF_TO_WDEV
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x33415b6d xtt_register_table
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x3b8fc77a xtt_table_unlock
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x3f1ef70a xtt_tee_enabled
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x40728a63 xtt_find_revision
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x4bd57d1 xtt_request_find_match
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0xd4bd57d1 xtt_request_find_target
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x75a23ff9 xtt_check_target
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x807d2b2 xtt_receseq
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x8569324d xtt_target_to_user
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0x9c995c69 xtt_percpu_counter_alloc
+EXPORT_SYMBOL_GPL net/netfilter/x_tables 0xb4daeeb xtt_unregister_table
+EXPORT_SYMBOL_GPL net/netfilter/xt_RATEEST 0x4bc67fb3 rateest_lookup
+EXPORT_SYMBOL_GPL net/netfilter/xt_RATEEST 0x96641eab rateest_put
+EXPORT_SYMBOL_GPL net/netfilter/xt_connlimit 0x1f8dafa2 conncount_lookup
+EXPORT_SYMBOL_GPL net/netfilter/xt_connlimit 0x60279fbc conncount_add
+EXPORT_SYMBOL_GPL net/netfilter/xt_connlimit 0xd6e25e03 conncount_cache_free
+EXPORT_SYMBOL_GPL net/nfc/nci/nci_spi 0x2000caff nci_spi_read
+EXPORT_SYMBOL_GPL net/nfc/nci/nci_spi 0x357684f3 nci_spi_send
+EXPORT_SYMBOL_GPL net/nfc/nci/nci_spi 0x1f8dafa2 nciSpi conver
+EXPORT_SYMBOL_GPL net/nfc/nci/nci_spi 0x782337fa nciSpi conver
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x35c1c4b1 qrtr_endpoint_register
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x505a6ac6 qrtr_endpoint_post
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x781ba2e5 qrtr_endpoint_unregister
+EXPORT_SYMBOL_GPL net/psample/psample 0x0ab694db psample_group_get
+EXPORT_SYMBOL_GPL net/psample/psample 0x2801e0dcp sample_sample_packet
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x35c1c4b1 qrtr_endpoint_register
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x505a6ac6 qrtr_endpoint_post
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x781ba2e5 qrtr_endpoint_unregister
+EXPORT_SYMBOL_GPL net/psample/psample 0x0ab694db psample_group_get
+EXPORT_SYMBOL_GPL net/psample/psample 0x2801e0dcp sample_sample_packet
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x35c1c4b1 qrtr_endpoint_register
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x505a6ac6 qrtr_endpoint_post
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x781ba2e5 qrtr_endpoint_unregister
+EXPORT_SYMBOL_GPL net/psample/psample 0x0ab694db psample_group_get
+EXPORT_SYMBOL_GPL net/psample/psample 0x2801e0dcp sample_sample_packet
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x35c1c4b1 qrtr_endpoint_register
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x505a6ac6 qrtr_endpoint_post
+EXPORT_SYMBOL_GPL net/qrtr/qrtr 0x781ba2e5 qrtr_endpoint_unregister
+EXPORT_SYMBOL_GPL net/psample/psample 0x0ab694db psample_group_get
+EXPORT_SYMBOL_GPL net/psample/psample 0x2801e0dcp sample_sample_packet
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+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xf3a98db1 xdr_partial_copy_from_skb
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x0f3d5d75 svc_proc_unregister
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x0f65b220 xdr_encode_word
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x0f72da13 svc_set_iostats
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x0ff6707b3 svc_set_num_threads
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x0ffdecb27 xdr_shift_buf
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x006ca76f virtio_transport_free_pkt
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x00305a4c1 virtio_transport_stream_enqueue
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x0070f7cfac virtio_transport_set_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x013aa5d05 virtio_transport_put_credit
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x016bbc778 virtio_transport_notify_recv_pre_block
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x01e185357 virtio_transport_stream_rchvhiwat
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x0242dc37e virtio_transport_notify_send_pre_enqueue
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x02813d10c virtio_transport_destruct
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x02c72feed virtio_transport_notify_send_init
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x02d8035a8 virtio_transport_get_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x036b554ec virtio_transport_dgram_bind
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x03a0ec1c2 virtio_transport_get_min_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x047eb373 virtio_transport_notify_send_pre_block
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x048dd41ae virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x049398864 virtio_transport_recv_pkt
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x06b53f55a virtio_transport_notify_recv_post_dequeue
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x07058ce69 virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x07e954d4a5 virtio_transport_dgram_enqueue
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x08b1e1dbb virtio_transport_release
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x091886fe9 virtio_transport_dgram_dequeue
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0x092f72fe1 virtio_transport_stream_dequeue
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x6e66685xfrm_aalg_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xa762fe2xfrm_aalg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xad1b60edxfrm_calg_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xdbfc35c8xfrm_ealg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xda3a6dxfrm_ealg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm_ipcomp 0x2c1067adipcomp_output
+EXPORT_SYMBOL_GPL net/xfrm_ipcomp 0x42ea5be2ipcomp_input
+EXPORT_SYMBOL_GPL net/xfrm_ipcomp 0x61e05ae1ipcomp_init_state
+EXPORT_SYMBOL_GPL net/xfrm_ipcomp 0xb287abepcomp_destroy
+EXPORT_SYMBOL_GPL sound/core/snd-seq-device 0x96db24snd_seq_driver_unregister
+EXPORT_SYMBOL_GPL sound/core/snd-seq-device 0x6ba36550_snd_seq_driver_register
+EXPORT_SYMBOL_GPL sound/firewire/snd-firewire-lib 0x009b6d07amdtp_am824_set_midi_position
+EXPORT_SYMBOL_GPL sound/firewire/snd-firewire-lib 0x1d7b5e57amdtp_am824_set_pcm_position
+EXPORT_SYMBOL_GPL sound/firewire/snd-firewire-lib 0x1e56c1b9amdtp_am824_midi_trigger
+EXPORT_SYMBOL_GPL sound/firewire/snd-firewire-lib 0xb287abepcomp_destroy
+EXPORT_SYMBOL_GPL sound/firewire/snd-firewire-lib 0xe976553camdtp_am824_add_pcm_hw_constraints
+EXPORT_SYMBOL_GPL sound/firewire/snd-firewire-lib 0xfb9eef85amdtp_am824_set_parameters
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x2066bnsnd_hdac_regmap_read_raw
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x209c0asnd_hdac_exec_verb
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x91a76snd_hdac_registetchmap_ops
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x066a2snsnd_hdac_stop_channel
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x6e35snd_hdac_get_connections
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x2a85snd_hdac_get_sub_nodes
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x16033ecsnd_hdac_link_power
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x211b6c9snd_hdac_get_stream
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x91e97dedsnd_hdac_bus_init_channel
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x25c0d14snd_hdac Codec_write
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x207086esnd_hdac_stream_setup_periods
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x9e34xcsnd_hdac_bus_stop_chip
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x2fde406smd_hdac_add_chmap_ctls
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x37d4328bsnd_hdac_power_up_pm
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x3544c2snd_hdac_get_active_channels
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x51e82aedsnd_hdac_regmap_write_raw
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x4711832snd_hdac_bus_exit
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x4762022smd_hdac_stream_set_params
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x4ac363csnd_hdac_channel_allocation
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x4cc74c46snd_hdac_get_ch_alloc_from_ca
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x4dca6c1smd_hdac_make_cmd
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x53835snd_hdac_bus_free_stream_pages
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x55c6c99snd_hdac_bus_send_cmd
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x56c3d48snd_hdac_device_register
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x580909csnd_hdac_bus_reset_link
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x581c550smd_hdac_bus_updatelr
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x5c6f2c53snd_hdac_dpstrigger
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x5fcb3e1smd_hdac_overriderparm
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x641c5221smd_hdac_bus_type
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x64e40a52snd_hdac_stream_setup
+EXPORT_SYMBOL_GPL sound/hda/snd-hdacore 0x67bfc791snd_hdac_spk_to_chmap
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x685e3feesnd_hdac_setup_channel_mapping
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x6d0972b5snd_hdac_read
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x727d5f7dssnd_hdac_power_down_pm
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x73348711ssnd_hdac_regmap_init
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x7468d359ssnd_hdac_stream_sync
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x76e1cd02snd_hdac_is_supported_format
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x77c754a8ssnd_hdac_chmap_to_spk_mask
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x789bd578ssnd_hdac_stream_init
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x82250145ssnd_hdac_bus_exec_verb
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x8685ddb0ssnd_hdac_bus_get_response
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x896d1752ssnd_hdac_bus_remove_device
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x8ac47805ssnd_hdac_dsp_cleanup
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x8e34b910ssnd_hdac_bus_exec_verb_unlocked
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x997b23d4ssnd_hdac_stream_stop
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x9a8e1877ssnd_array_free
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x9ab13116ssnd_hdac_bus_add_device
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x9c66dcdssnd_hdac_device_init
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xa1b08163ssnd_hdac_device_exit
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xa2749ab6ssnd_hdac_bus_exit_link_reset
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xa9ac888fssnd_hdac_query_supported_pcm
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xaf515fa1ssnd_hdac_power_up
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xb5145cbassnd_hdac_stream_cleanup
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xb58c72fssnd_hdac_bus_queue_event
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xb69b73c8ssnd_hdac_regmap_exit
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xb7d6f6a8ssnd_hdac_bus_handle_stream_irq
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xb80629c7ssnd_hdac_bus_init
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xb8f0b22ssnd_hdac_stream_reset
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xbad77b7ssnd_hdac_refresh_widgets
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xbbde66e1ssnd_hdac_regmap_update_raw
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xbe7dd7dssnd_array_new
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xc01a8921ssnd_hdac_stream_start
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xc0d396dfssnd_hdac_parse_capabilities
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xc2e47dd8ssnd_hdac_stream_release
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xcdf79c49ssnd_hdac_read_parm
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xce69429dssnd_hdac_stream_clear
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xce8e2112ssnd_hdac_check_power_state
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xcf9b0467ssnd_hdac_get_device_id
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xda697ac0ssnd_hdac_read_parm_uncached
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xda94362ssnd_hdac_codec_read
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xdae09edadasnd_hdac_codec_modalias
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xd3f8777dssnd_hdac_bus_enter_link_reset
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xd4269f7ssnd_hdac_device_unregister
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xd56f1f21ssnd_hdac_power_down
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x1765f37bssnd_hdac_bus_alloc_stream_pages
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0x13d9a04asnssnd_hdac_cale_stream_format
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xe0a1f39ssnd_hdac_stream_assign
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xe2578128ssnd_hdac_device_set_chip_name
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac-core 0xe4e07754ssnd_hdac_print_channel_allocation
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x3d8f0dbd snd_hda_codec_eapd_power_filter
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x3de499fa snd_hda_detach_beep_device
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x43c5f185 snd_hda_get_default_vref
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x43f66bde snd_hda_check_amp_caps
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x44e26319 snd_hda_mixer_amp_volume_put
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x46680bdd hda_codec_driver_unregister
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x475548d3 snd_hda_mixer_amp_tlv
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x47c4941f snd_hda_correct_pin_ctl
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x490616a8 snd_hda_parse_pin_defcfg
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x531a98ef snd_hda_codec_new
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x54875171 snd_register_beep_device
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x55674ed4 snd_hda_codec_setup_stream
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x57776b26 snd_multi_out_prepare
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x637b6053 snd_hda_spdif_ctls_unassign
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x64819d61 snd_hda壸tk_init_streams
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x67bf2e9d snd_hda_mixer_amp_volume_get
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x6e74794d snd_hda_jack_report_sync
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x7074c483 snd_hda_add_new_ctls
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x76a37da5 snd_hda_mixer_amp_volume_get
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x79a93ba snd_hda_codec_cleanup_stream
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x80857cc2 snd_hda_get_int_hint
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x8396e954 snd_hda_check_amp_list_power
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x83b1aef7 snd_hda_ctl_add
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x93a49fed snd_hda_multi_out_dig_open
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x9aa30c92 snd_hda_multi_out_dig_close
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xa1becbe1 snd_hda_apply_pincfgs
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xa332825e snd_hda_sequence_write
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xa521fbdaxx snd_hda_jack_detect_enable_callback
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xa752ee56 snd_hda_get_int_hint
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xacaec0d snd_hda_multi_out_dig_open
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xace64609 snd_hda_sequence_write
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x0b00be9c snd_hda_ctl_add
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xb03f2d52 snd_hda_get_num_devices
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0xb131c92e snd_hda_add_new_ctls

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+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x5d252cb3 snd_hda_gen_mic_autoswitch
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xe37f04 snd_hda_gen_free
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x6fd00b09 snd_hda_gen_path_power_filter
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x76dc6871 hda_main_out_badness
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x78d55836 snd_hda_gen_init
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x871afe44 hda_extra_out_badness
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x8f67077 bsnid_hda_gen_hp_automute
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xae059d07 snd_hda_get_path_idx
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x6e8deb52 adauf_calc_pll_cfg
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x39c734b4 adauf1761_regmap_config
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x4441faeb adauf1761_probe
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x65de5fd2 adauf17x1_readable_register
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x66f1559a adauf17x1_set_micbias_voltage
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x7067512 adauf17x1_resume
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x9f7c211 adauf17x1_has_dsp
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xc49041 adauf17x1_set_micbias_voltage
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xf4da45db adauf17x1_dai_ops
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x009707fb arizona_out_vi_ramp
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x045f53a8 arizona_lhpf_coeff_put
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x06a075eb arizona_dvfs_sysclk_ev
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x07920907 arizona_init_spk
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x0c4a3dd arizona_lhpf3_mode
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x0ca709c arizona_set_fll_refclk
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x0d7d0ad0 arizona_isrc_fsh
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x145fd3a3 arizona_asc_rate1
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x183479arizona_hp_ev
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x23681e59 arizona_atcg_rate
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x2fc3c8e7 arizona_adsps2_rate_controls
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x35a56b6 arizona_set_fll
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x39989928 arizona_asc_rate1
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x3e41899 arizona_init_vol_limit
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x4117c87 arizona_dai_ops
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x43defb1 arizona_init_dai
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x46277216 arizona_rate_val
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x520b4a70 arizona_clk_ev
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x55231444 arizona_set_output_mode
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x56dd095earizona_anc_input_src
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x5775dfc2arizona_of_get_audio_pdata
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x5eb3816carizona_voice_trigger_switch
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x6140663barizona_out_vd_ramp
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x69102a0arizona_sample_rate_text
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x729a5ef3arizona_mixer_values
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x7f26f273arizona_mixer_texts
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x7fcb929aarizona_sample_rate_val_to_name
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x81e914e8arizona_eq_coeff_put
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x88ec5ea2arizona_output_anc_src
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x8d89e046arizona_in_vd_ramp
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x96ec48cf6arizona_isrc_fsl
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x97fe9853arizona_init_common
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0x99bd52cf1arizona_lhpf1_mode
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xaa3d366carizona_lhpf2_mode
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xb16644dcarizona_in_ev
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xb21be5edarizona_init_fll
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xb3e3225earizona_in_hpf_cut_enum
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xc9c29637arizona_mixer_tlv
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xc9ed0356arizona_lhpf4_mode
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xed977862arizona_simple_dai_ops
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-arizona 0xf0d3521farizona_dvfs_up
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42l51 0x375ad98ccs42l51_probe
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42l51 0x346bfbeecss42l51_regmap
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0x0245c4f2cs42xx8_0f_match
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0x13a54da6cs42xx8_0f_match
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0x5997e995cs42xx8_pm
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0x7cac7292cs42888_data
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0xcd37949cs42448_data
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-da7219 0x620ccaccd7219_aad_init
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-da7219 0xba6cfca6da7219_aad_exit
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-da7219 0xc46a8639da7219_aad_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-es8328 0x062f3d2e8328_regmap_config
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-es8328 0xaa7d35e8328_probe
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-max98090 0x2147448e8max98090_mic_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-max98095 0x0769f0c4max98095_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-nau8824 0xd91be3dau8824_enable_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-pcm179x-codec 0x0b7bfa34pcm179x_common_exit
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-pcm179x-codec 0x214744e8max98095_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-pcm3168a 0x0b7bfa34pcm179x_common_init
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-pcm3168a 0xff81f557pcm3168a_remove
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rl6231 0x8d7fa148rl6231_get_pre_div
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5514-spi 0x2505420ert5514_spi_write
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5514-spi 0x5f5e7624rt5514_spi burst_write
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5640 0x0375ec58devm_sigmadsp_init
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5640 0x18007bd2sigmadsp_attach
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5640 0x2e153a27sigmadsp_setup
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5640 0x304cf51sigmadsp_restrict_params
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5640 0x471e396rt5640_dmic_enable
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5640 0x60450e72rt5640_set_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5640 0xe8d72f14rt5640_set_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5677 0x09783c47art5640_dmic_enable
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5677 0x72rt5645_set_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5677 0x72rt5645_set_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5677 0x9783c47art5640_dmic_enable
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-rt5677 0x9783c47art5640_jack_detect
+EXPORT_SYMBOL_GPL sound/soc/tegra/snd-tegra30-ahub 0xb419329btegra30_ahub_disable_rx_fifo
+EXPORT_SYMBOL_GPL sound/soc/tegra/snd-tegra30-ahub 0xb4a9367dtegra30_ahub_enable_rx_fifo
+EXPORT_SYMBOL_GPL sound/soc/tegra/snd-tegra30-ahub 0xc78c7125tegra30_ahub_free_rx_fifo
+EXPORT_SYMBOL_GPL sound/soc/tegra/snd-tegra30-ahub 0xccb67e55tegra124_ahub_set_cif
+EXPORT_SYMBOL_GPL sound/soc/tegra/snd-tegra30-ahub 0xc99b9372tegra30_ahub_free_rx_fifo
+EXPORT_SYMBOL_GPL sound/soc/tegra/snd-tegra30-ahub 0xe549335ategra30_ahub_unset_rx_cif_source
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x123d1a19line6_read_serial_number
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x202a1b1bline6_midi_id
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x2b54dd53line6_init_pcm
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x61886d51line6_start_timer
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x717d2b57line6_write_data
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x7564ed83line6_alloc_sysex_buffer
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x7fa713b8line6_disconnect
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0x9cd939efline6_read_data
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xa0a939c3line6_resume
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xa84d839cline6_send_raw_message_async
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xac0c7166line6_legacy
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xb26ce2e8line6_version_request_async
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xc082b1c7line6_pcm_release
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xc608e8line6_suspend
+EXPORT_SYMBOL_GPL sound/usb/line6/snd-usb-line6 0xd96396ecbline6_probe
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x3fe35aeriq_bypass_unregister_consumer
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x41886d51line6_send_raw_message_async
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x5a635bline6_pcm_acquire
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x632780line6_auto
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x6bf3f3bpf_prog_sub
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x7aaf83chedevice_setscheduler
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x803404bdata_ff_from_fis
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x8758cdevice_remove_file_self
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x8eb8f5data_id_string
+EXPORT_SYMBOL_GPL virt/lib/irqbypass 0x8f772c3irq_bypass_unregister_consumer
+EXPORT_SYMBOL_GPL vmlinux 0x00101e45raw_abort
+EXPORT_SYMBOL_GPL vmlinux 0x0010ec77devm_clk_hw_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x001361d1devm_clk_hw_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x00166497pinctrl_generic_add_group
+EXPORT_SYMBOL_GPL vmlinux 0x0034c28fefivar_init
+EXPORT_SYMBOL_GPL vmlinux 0x0048081cpinctrl_generic_set
+EXPORT_SYMBOL_GPL vmlinux 0x005a635bline6_invoke
+EXPORT_SYMBOL_GPL vmlinux 0x00608e8line6_suspend
+EXPORT_SYMBOL_GPL vmlinux 0x006820b4pci_write_msi_msg
+EXPORT_SYMBOL_GPL vmlinux 0x007aaf83chandler
+EXPORT_SYMBOL_GPL vmlinux 0x00803404bdata_ff_from_fis
+EXPORT_SYMBOL_GPL vmlinux 0x009304b6ata阘
+EXPORT_SYMBOL_GPL vmlinux 0x00a66ff0gpiod_set_array_optional
+EXPORT_SYMBOL_GPL vmlinux 0x00b858cdevice_remove_file_self
+EXPORT_SYMBOL_GPL vmlinux 0x00c017platform_bus_type
+EXPORT_SYMBOL_GPL vmlinux 0x00e62a17platform_bus_type
+EXPORT_SYMBOL_GPL vmlinux 0x00ebcb5data_id_string
+EXPORT_SYMBOL_GPL vmlinux 0x00f7ac7__devm_regmap_init_spi

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+EXPORT_SYMBOL_GPL vmlinux 0x0c8dfc79c3589x_set_bits
+EXPORT_SYMBOL_GPL vmlinux 0x0c94d4cbty_kclose
+EXPORT_SYMBOL_GPL vmlinux 0x0ca31863sysfs_create_files
+EXPORT_SYMBOL_GPL vmlinux 0x0ca7987cget_empty_filp
+EXPORT_SYMBOL_GPL vmlinux 0x0ca904b4ksysfs_on_each_symbol
+EXPORT_SYMBOL_GPL vmlinux 0x0cbf67ffsnd_compr_stop_error
+EXPORT_SYMBOL_GPL vmlinux 0x0cc1e40fcrypto_it_tab
+EXPORT_SYMBOL_GPL vmlinux 0x0cd9359pinctrl_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x0cf770mtmtd_pairing_groups
+EXPORT_SYMBOL_GPL vmlinux 0x0cf16f00sk_clear_memalloc
+EXPORT_SYMBOL_GPL vmlinux 0x0cf71f1__lock_page_killable
+EXPORT_SYMBOL_GPL vmlinux 0x0da0e0f0skb_gso_transport_segment
+EXPORT_SYMBOL_GPL vmlinux 0x0da24e3bpower_supply_get_by_name
+EXPORT_SYMBOL_GPL vmlinux 0x0da459213work_on_cpu_safe
+EXPORT_SYMBOL_GPL vmlinux 0x0da460b31mbox_send_message
+EXPORT_SYMBOL_GPL vmlinux 0x0da4961denf_log_buf_open
+EXPORT_SYMBOL_GPL vmlinux 0x0da5f73efballoon_page_enqueue
+EXPORT_SYMBOL_GPL vmlinux 0x0da6e989cryptosha_setkey
+EXPORT_SYMBOL_GPL vmlinux 0x0da71bfcdevice_move
+EXPORT_SYMBOL_GPL vmlinux 0x0da7d4d70rcu_batches_completed
+EXPORT_SYMBOL_GPL vmlinux 0x0da8423a0bdev_write_page
+EXPORT_SYMBOL_GPL vmlinux 0xda06ff1serial8250_set_defaults
+EXPORT_SYMBOL_GPL vmlinux 0xda699b1sata_scr_read
+EXPORT_SYMBOL_GPL vmlinux 0xda9fa90of_gen_pool_get
+EXPORT_SYMBOL_GPL vmlinux 0xda905md_rdev_clear
+EXPORT_SYMBOL_GPL vmlinux 0xda7979clockevents_unbind_device
+EXPORT_SYMBOL_GPL vmlinux 0xda8f97pm_suspend_via_s2idle
+EXPORT_SYMBOL_GPL vmlinux 0xdbbb677blinkmq_freeze_queue
+EXPORT_SYMBOL_GPL vmlinux 0xdb1cd75list_reverse_order
+EXPORT_SYMBOL_GPL vmlinux 0xdec584io_cgrp_subs
+EXPORT_SYMBOL_GPL vmlinux 0xdf545fp6_datagram_recv_ctl
+EXPORT_SYMBOL_GPL vmlinux 0xe0b86eddevice_property_present
+EXPORT_SYMBOL_GPL vmlinux 0xe1dd699cmd_do_sync
+EXPORT_SYMBOL_GPL vmlinux 0xe2d847csdio_writel
+EXPORT_SYMBOL_GPL vmlinux 0xe359238of_overlay_apply
+EXPORT_SYMBOL_GPL vmlinux 0xe5b9f1fmv_mbus_dram_info_nooverlap
+EXPORT_SYMBOL_GPL vmlinux 0xe74e69fnode_graph_get_remote_port_parent
+EXPORT_SYMBOL_GPL vmlinux 0xe799757dequeue_signal
+EXPORT_SYMBOL_GPL vmlinux 0xe89c61skb_append_pagefrags
+EXPORT_SYMBOL_GPL vmlinux 0xe8a3f0__netdev_watchdog_up
+EXPORT_SYMBOL_GPL vmlinux 0xe8a574acpuacct_cgrp_subssys_on_dfl_key
+EXPORT_SYMBOL_GPL vmlinux 0xeaaeebc9ip6_input
+EXPORT_SYMBOL_GPL vmlinux 0xeb3fbb3snd_soc_jack_add_gpios
+EXPORT_SYMBOL_GPL vmlinux 0xed7ce24__vfs_setattr_noperm
+EXPORT_SYMBOL_GPL vmlinux 0xee5ea8ttty_ldisc_ref
+EXPORT_SYMBOL_GPL vmlinux 0xeef40dddevm_phy_get
+EXPORT_SYMBOL_GPL vmlinux 0xef86e94i2c_detect_slave_mode
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+EXPORT_SYMBOL_GPL vmlinux 0xf08d13bbus_set_iommu
+EXPORT_SYMBOL_GPL vmlinux 0xf09edf0irq_domain_alloc_irqs_parent
+EXPORT_SYMBOL_GPL vmlinux 0xf1f2d3aextcon_get_edev_by_phandle
+EXPORT_SYMBOL_GPL vmlinux 0xf243dfc_crypto_larval_lookup
+EXPORT_SYMBOL_GPL vmlinux 0xf289ac1look_up_OID
+EXPORT_SYMBOL_GPL vmlinux 0xf2da3drcrdma_cgrp_subsys_on_dfl_key
+EXPORT_SYMBOL_GPL vmlinux 0xf336d7frecutorture_get_gp_data
+EXPORT_SYMBOL_GPL vmlinux 0xf37d452ata_qc_complete
+EXPORT_SYMBOL_GPL vmlinux 0xf390bd6pci_enable_ats
+EXPORT_SYMBOL_GPL vmlinux 0xf469bbdevice_get_next_child_node
+EXPORT_SYMBOL_GPL vmlinux 0xf46d006of_clk_hw_simple_get
+EXPORT_SYMBOL_GPL vmlinux 0xf5bd47crypto_unregister_template
+EXPORT_SYMBOL_GPL vmlinux 0xf5d7ac8genpd_dev_pm_attach
+EXPORT_SYMBOL_GPL vmlinux 0xf751aeainput_event_from_user
+EXPORT_SYMBOL_GPL vmlinux 0xfa8636aauxbus_hub_claim_port
+EXPORT_SYMBOL_GPL vmlinux 0xfa91871bpf_prog_create
+EXPORT_SYMBOL_GPL vmlinux 0xfc5e8efferq_rules_dump
+EXPORT_SYMBOL_GPL vmlinux 0xfe63066mmu_notifier_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xfd3998aclk_hw_register_mux
+EXPORT_SYMBOL_GPL vmlinux 0xfd87a98arizona_dev_init
+EXPORT_SYMBOL_GPL vmlinux 0xe413d00mtd_ooblayout_count_freebytes
+EXPORT_SYMBOL_GPL vmlinux 0xe6325bkthread_cancel_work_sync
+EXPORT_SYMBOL_GPL vmlinux 0xe6bb179device_create_vargs
+EXPORT_SYMBOL_GPL vmlinux 0xff357cesock_diag_register
+EXPORT_SYMBOL_GPL vmlinux 0xff9af09cpdma_ctlr_int_ctrl
+EXPORT_SYMBOL_GPL vmlinux 0xffec2fusb_find_interface
+EXPORT_SYMBOL_GPL vmlinux 0x100359e4stop_machine
+EXPORT_SYMBOL_GPL vmlinux 0x100ab093_tracepoint_powernv_throttle
+EXPORT_SYMBOL_GPL vmlinux 0x101007bddebugfs_create_ulong
+EXPORT_SYMBOL_GPL vmlinux 0x10138352tracing_on
+EXPORT_SYMBOL_GPL vmlinux 0x10160cedsdhci_add_host
+EXPORT_SYMBOL_GPL vmlinux 0x101e33a5add_mtd_blktrans_dev
+EXPORT_SYMBOL_GPL vmlinux 0x1030bb42platform_get_resource
+EXPORT_SYMBOL_GPL vmlinux 0x103c7f12security_inode_readlink
+EXPORT_SYMBOL_GPL vmlinux 0x10573451edac_mc_handle_error
+EXPORT_SYMBOL_GPL vmlinux 0x1060da0epcie_bus_configure_settings
+EXPORT_SYMBOL_GPL vmlinux 0x106c699page_cache_sync_readahead
+EXPORT_SYMBOL_GPL vmlinux 0x1073f2dfregister_kprobe
+EXPORT_SYMBOL_GPL vmlinux 0x10753a7fpci_ioremap_bar
+EXPORT_SYMBOL_GPL vmlinux 0x108c4bcdpower_supply_powers
+EXPORT_SYMBOL_GPL vmlinux 0x10b5da2ewltstate_free
+EXPORT_SYMBOL_GPL vmlinux 0x10cc52cusb_amd_quirk_pll_enable
+EXPORT_SYMBOL_GPL vmlinux 0x10cd547securityfs_create_dir
+EXPORT_SYMBOL_GPL vmlinux 0x10ffee25devm_get_free_pages
+EXPORT_SYMBOL_GPL vmlinux 0x1104c4d5trace_seq_puts
+EXPORT_SYMBOL_GPL vmlinux 0x110bd3decgroup_get_from_path
+EXPORT_SYMBOL_GPL vmlinux 0x112ab9b0get_itimerspec64
+EXPORT_SYMBOL_GPL vmlinux 0x113c084fxhci_suspend
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+EXPORT_SYMBOL_GPL vmlinux 0x13868c1dtpmm_chip_alloc
+EXPORT_SYMBOL_GPL vmlinux 0x1388472fsock_diag_unregister_inet_compat
+EXPORT_SYMBOL_GPL vmlinux 0x138e0957dax_write_cache_enabled
+EXPORT_SYMBOL_GPL vmlinux 0x13958084crypto_alg_mod_lookup
+EXPORT_SYMBOL_GPL vmlinux 0x13998354blocking_notifier_chain_cond_register
+EXPORT_SYMBOL_GPL vmlinux 0x13ba182fata_link_offline
+EXPORT_SYMBOL_GPL vmlinux 0x13776f0pinconf_generic_dump_config
+EXPORT_SYMBOL_GPL vmlinux 0x140aa4a4pci_find_next_ht_capability
+EXPORT_SYMBOL_GPL vmlinux 0x14168170devm_phy_put
+EXPORT_SYMBOL_GPL vmlinux 0x142f8f9ecall_switchdev_notifiers
+EXPORT_SYMBOL_GPL vmlinux 0x14352714devm_RTC_allocate_device
+EXPORT_SYMBOL_GPL vmlinux 0x1440adfbcrypto_alg_extsize
+EXPORT_SYMBOL_GPL vmlinux 0x145216d7list_tru_add
+EXPORT_SYMBOL_GPL vmlinux 0x1459e9a6tcp_twsk_destructor
+EXPORT_SYMBOL_GPL vmlinux 0x145b047cinput_ff_flush
+EXPORT_SYMBOL_GPL vmlinux 0x14774bc0dev_pm_opp_enable
+EXPORT_SYMBOL_GPL vmlinux 0x148b7697usb_phy_set_event
+EXPORT_SYMBOL_GPL vmlinux 0x148e73e3wtunnel_valid_encap_type
+EXPORT_SYMBOL_GPL vmlinux 0x14a98a21cpu_cgrp_subsys_enabled_key
+EXPORT_SYMBOL_GPL vmlinux 0x14c282d8ping_seq_stop
+EXPORT_SYMBOL_GPL vmlinux 0x14d94c2aphy_get
+EXPORT_SYMBOL_GPL vmlinux 0x14dada2esnd_soc_add_card_controls
+EXPORT_SYMBOL_GPL vmlinux 0x14e9d47bpci_reset_bus
+EXPORT_SYMBOL_GPL vmlinux 0x14f84e2cblk_set_queue_dying
+EXPORT_SYMBOL_GPL vmlinux 0x1517b642regmap_field_update_bits_base
+EXPORT_SYMBOL_GPL vmlinux 0x15182becsdnd_soc_dapm_mixer_update_power
+EXPORT_SYMBOL_GPL vmlinux 0x153b60a6klist_del
+EXPORT_SYMBOL_GPL vmlinux 0x1569549bpici_disable_pcie_error_reporting
+EXPORT_SYMBOL_GPL vmlinux 0x156ace65tcp_register_ulp
+EXPORT_SYMBOL_GPL vmlinux 0x15892417async_synchronize_cookie
+EXPORT_SYMBOL_GPL vmlinux 0x15b11624t6ps6586x_irq_get_virq
+EXPORT_SYMBOL_GPL vmlinux 0x15bb18bdblexical_cipher_walk_phys
+EXPORT_SYMBOL_GPL vmlinux 0x15ef446rcu_batches_started
+EXPORT_SYMBOL_GPL vmlinux 0x15f3003wm831x_auxadc_read_uv
+EXPORT_SYMBOL_GPL vmlinux 0x16084aa2hisi_clk_init
+EXPORT_SYMBOL_GPL vmlinux 0x160a90f8mtd_sblayout_get_ecbytes
+EXPORT_SYMBOL_GPL vmlinux 0x161774afwnode_get_next_parent
+EXPORT_SYMBOL_GPL vmlinux 0x163466c5da93x_register_notifier
+EXPORT_SYMBOL_GPL vmlinux 0x1650f27crtorture_record_progress
+EXPORT_SYMBOL_GPL vmlinux 0x165667f3pci_enable_pcie_error_reporting
+EXPORT_SYMBOL_GPL vmlinux 0x1664f39power_supply_am_i_supplied
+EXPORT_SYMBOL_GPL vmlinux 0x167fc114devres_remove
+EXPORT_SYMBOL_GPL vmlinux 0x16b89e54_bio_try_merge_page
+EXPORT_SYMBOL_GPL vmlinux 0x16c16fa4scsi_target_block
+EXPORT_SYMBOL_GPL vmlinux 0x16ce8591sdio_retune_hold_now
+EXPORT_SYMBOL_GPL vmlinux 0x16fcb143watchdog_notify_pretimeout
+EXPORT_SYMBOL_GPL vmlinux 0x16fd545fserdev_device_get_tiomc
+EXPORT_SYMBOL_GPL vmlinux 0x1703f62spi_alloc_device

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+EXPORT_SYMBOL_GPL vmlinux 0x1711b928virtqueue_add_inbuf_ctx
+EXPORT_SYMBOL_GPL vmlinux 0x171d9850hci_mtk_drop_ep_quirk
+EXPORT_SYMBOL_GPL vmlinux 0x17264fc5__ablkcipher_walk_complete
+EXPORT_SYMBOL_GPL vmlinux 0x172f6466rtnl_link_register
+EXPORT_SYMBOL_GPL vmlinux 0x173d5c08uart_handle_cts_change
catch
+EXPORT_SYMBOL_GPL vmlinux 0x174591f2snd_soc_put_enum_double
+EXPORT_SYMBOL_GPL vmlinux 0x175177cefuse_do_ioctl
+EXPORT_SYMBOL_GPL vmlinux 0x177a0633arch_set_freq_scale
+EXPORT_SYMBOL_GPL vmlinux 0x1778cfb2clone_private_mount
+EXPORT_SYMBOL_GPL vmlinux 0x177c338dtwl_get_version
+EXPORT_SYMBOL_GPL vmlinux 0x17952675alarm_forward_now
+EXPORT_SYMBOL_GPL vmlinux 0x179ad301pci_find_ext_capability
+EXPORT_SYMBOL_GPL vmlinux 0x179ce3d9strp_done
+EXPORT_SYMBOL_GPL vmlinux 0x17cbfd5emtd_wunit_to_pairing_info
+EXPORT_SYMBOL_GPL vmlinux 0x17db074cfib6_rule_default
+EXPORT_SYMBOL_GPL vmlinux 0x17f245aewm831x Bulk read
+EXPORT_SYMBOL_GPL vmlinux 0x17f6504bata_sff_prereset
+EXPORT_SYMBOL_GPL vmlinux 0x180929dcpdma_ctrl_create
+EXPORT_SYMBOL_GPL vmlinux 0x181ad4e沣settingsetattr
+EXPORT_SYMBOL_GPL vmlinux 0x18210241musb_queue_resume_work
+EXPORT_SYMBOL_GPL vmlinux 0x1822392fproc_douintvec_minmax
+EXPORT_SYMBOL_GPL vmlinux 0x1831a9cf__notifier_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x183622f2ata_common_sdev_attr
+EXPORT_SYMBOL_GPL vmlinux 0x184b9c1csnd_soc_dapm_free
+EXPORT_SYMBOL_GPL vmlinux 0x1853653cctree_alloc
+EXPORT_SYMBOL_GPL vmlinux 0x1862e70abio_associate_blkcg
+EXPORT_SYMBOL_GPL vmlinux 0x1866eccecc_ring_buffer_size
+EXPORT_SYMBOL_GPL vmlinux 0x18723d46cleanup_srco_struct_iter
+EXPORT_SYMBOL_GPL vmlinux 0x187615f9amba_apb_device_add
+EXPORT_SYMBOL_GPL vmlinux 0x187ec05bkthread_unpark
+EXPORT_SYMBOL_GPL vmlinux 0x188194f5gadget_find_ep_by_name
+EXPORT_SYMBOL_GPL vmlinux 0x188981c1regulator_set_soft_start_regmap
+EXPORT_SYMBOL_GPL vmlinux 0x1895d46fsnd_soc_dapm_del_routes
+EXPORT_SYMBOL_GPL vmlinux 0x18962588pci_disable_ats
+EXPORT_SYMBOL_GPL vmlinux 0x18aafa2tpm_get_timeouts
+EXPORT_SYMBOL_GPL vmlinux 0x18b38ba2direct_make_request
+EXPORT_SYMBOL_GPL vmlinux 0x18bc8e33b1kg_conf_prep
+EXPORT_SYMBOL_GPL vmlinux 0x18e4f8aasophy_read_reg
+EXPORT_SYMBOL_GPL vmlinux 0x18eb106dsnd_soc_dpcm_can_be_free_stop
+EXPORT_SYMBOL_GPL vmlinux 0x18ebe58cpufreq_unregister_governor
+EXPORT_SYMBOL_GPL vmlinux 0x18f2cafcpus_read_unlock
+EXPORT_SYMBOL_GPL vmlinux 0x191d2d47snd_soc_find_dai_link
+EXPORT_SYMBOL_GPL vmlinux 0x192280d6c⊊s_w_ale_stop
+EXPORT_SYMBOL_GPL vmlinux 0x192710b3iirq_alloc_generic_chip
+EXPORT_SYMBOL_GPL vmlinux 0x192f59cdpercpu_ida_alloc
+EXPORT_SYMBOL_GPL vmlinux 0x193864a2pci_enable_pasid
+EXPORT_SYMBOL_GPL vmlinux 0x1938f51asnd_soc_dpcm_can_be_params
+EXPORT_SYMBOL_GPL vmlinux 0x193d3b3carizona_clk32k_disable
+EXPORT_SYMBOL_GPL vmlinux 0x1952144a__ndisc_fill_addr_option
+EXPORT_SYMBOL_GPL vmlinux 0x1952cee5dev_coredump
+EXPORT_SYMBOL_GPL vmlinux 0x199a7cf2blk_md_tagset_iter
+EXPORT_SYMBOL_GPL vmlinux 0x19a304bausb_disabled
+EXPORT_SYMBOL_GPL vmlinux 0x19b5cd11hwmon_device_register_with_info
+EXPORT_SYMBOL_GPL vmlinux 0x19c20269soc_device_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x19c8ed21snd_soc_of_parse_audio_prefix
+EXPORT_SYMBOL_GPL vmlinux 0x19d01dc9pci_epf_alloc_space
+EXPORT_SYMBOL_GPL vmlinux 0x19de7fa4hash_hashahash_digest
+EXPORT_SYMBOL_GPL vmlinux 0x19e401a3spi_write_then_read
+EXPORT_SYMBOL_GPL vmlinux 0x19e7508aproperty_entries_dup
+EXPORT_SYMBOL_GPL vmlinux 0x19f462abffree_call_rcu
+EXPORT_SYMBOL_GPL vmlinux 0x19fb92d5switchdev_port_obj_add
+EXPORT_SYMBOL_GPL vmlinux 0x1a055368devres_add
+EXPORT_SYMBOL_GPL vmlinux 0x1a0db78cata_pci_sff_init_one
+EXPORT_SYMBOL_GPL vmlinux 0x1a122ab0snd_soc_dapm_get_volsw
+EXPORT_SYMBOL_GPL vmlinux 0x1a1b5840tty_buffer_lock_exclusive
+EXPORT_SYMBOL_GPL vmlinux 0x1a1d95fassnd_soc_dapm_force_bias_level
+EXPORT_SYMBOL_GPL vmlinux 0x1a1f157dev_pm_op_max_transition_latency
+EXPORT_SYMBOL_GPL vmlinux 0x1a27a1dausb_hcd_start_port_resume
+EXPORT_SYMBOL_GPL vmlinux 0x1a497d0bseq_release_net
+EXPORT_SYMBOL_GPL vmlinux 0x1a55195bsysfs_create_file_ns
+EXPORT_SYMBOL_GPL vmlinux 0x1a6b16dakey_type_trusted
+EXPORT_SYMBOL_GPL vmlinux 0x1a8fdd87posix_acl_access_xattr_handler
+EXPORT_SYMBOL_GPL vmlinux 0x1abf9750of_pci_dma_range_parser_init
+EXPORT_SYMBOL_GPL vmlinux 0x1acef7d2pm_freezing
+EXPORT_SYMBOL_GPL vmlinux 0x1ad2c490find_asymmetric_key
+EXPORT_SYMBOL_GPL vmlinux 0x1addee63schedule_hrtimeout_range
+EXPORT_SYMBOL_GPL vmlinux 0x1af1b198snd_soc_dapm_new_widgets
+EXPORT_SYMBOL_GPL vmlinux 0x1af626bfwnode_graph_get_remote_port
+EXPORT_SYMBOL_GPL vmlinux 0x1af9e453usb_set_configuration
+EXPORT_SYMBOL_GPL vmlinux 0x1b01587akset_create_and_add
+EXPORT_SYMBOL_GPL vmlinux 0x1b157f9cusb_alloc_streams
+EXPORT_SYMBOL_GPL vmlinux 0x1b1f40b5perf_aux_output_begin
+EXPORT_SYMBOL_GPL vmlinux 0x1b2047afusb_gadget_disconnect
+EXPORT_SYMBOL_GPL vmlinux 0x1b5183dbdevm_excon_dev_register
+EXPORT_SYMBOL_GPL vmlinux 0x1b52db1cprobe_kernel_read
+EXPORT_SYMBOL_GPL vmlinux 0x1b57d05usb_for_each_dev
+EXPORT_SYMBOL_GPL vmlinux 0x1b680f6aseg6_do_srh_inline
+EXPORT_SYMBOL_GPL vmlinux 0x1b6a0a32jp8788_update_bits
+EXPORT_SYMBOL_GPL vmlinux 0x1b8206dtask_active_pid_ns
+EXPORT_SYMBOL_GPL vmlinux 0x1b8822d8pinctrl_gpio_direction_output
+EXPORT_SYMBOL_GPL vmlinux 0x1b9aca3fiprobe_return
+EXPORT_SYMBOL_GPL vmlinux 0x1b9d9944__wake_up_locked_key
+EXPORT_SYMBOL_GPL vmlinux 0x1bb5fe26atomic_notifier_chain_register
+EXPORT_SYMBOL_GPL vmlinux 0x1bb78e36bio_alloc_mddev
+EXPORT_SYMBOL_GPL vmlinux 0x1bc40a8dgpmc OMAP Get_Nand_Ops
+EXPORT_SYMBOL_GPL vmlinux 0x1bc5eebpinctrl GPIo Direction Input
+EXPORT_SYMBOL_GPL vmlinux 0x1bd871rceil usb unanchor urb
+EXPORT_SYMBOL_GPL vmlinux 0x1bf4b7f2pci epc_raise_irq
+EXPORT_SYMBOL_GPL vmlinux 0x1bf5396snd pcm hw constraint_eld
+EXPORT_SYMBOL_GPL vmlinux 0xc002ae4dev pm opp put_supported_hw
+EXPORT_SYMBOL_GPL vmlinux 0xc0f4715off irq to_resource_table
+EXPORT_SYMBOL_GPL vmlinux 0xc1a538cdevm extcon dev free
+EXPORT_SYMBOL_GPL vmlinux 0xc1af6e3inet csk clone lock
+EXPORT_SYMBOL_GPL vmlinux 0xc1b6c2carelay close
+EXPORT_SYMBOL_GPL vmlinux 0xc1df6ae1 udp4 lib lookup
+EXPORT_SYMBOL_GPL vmlinux 0xc1e8d88cpu freq get_supported_attr
+EXPORT_SYMBOL_GPL vmlinux 0xc1f2589kthread flush work
+EXPORT_SYMBOL_GPL vmlinux 0xc551bcdcpu freq boost enabled
+EXPORT_SYMBOL_GPL vmlinux 0xc57aa09tcp done
+EXPORT_SYMBOL_GPL vmlinux 0xc5bf1f2 irq free_descs
+EXPORT_SYMBOL_GPL vmlinux 0xc5f74124clk get_phase
+EXPORT_SYMBOL_GPL vmlinux 0xc798dd9for each kernel_tracepoint
+EXPORT_SYMBOL_GPL vmlinux 0xc7f1984elf unregister
+EXPORT_SYMBOL_GPL vmlinux 0xc80d27d btree geo128
+EXPORT_SYMBOL_GPL vmlinux 0xc874408badblocks init
+EXPORT_SYMBOL_GPL vmlinux 0xc87a811__ round jiffies up
+EXPORT_SYMBOL_GPL vmlinux 0xca30145mtd del partition
+EXPORT_SYMBOL_GPL vmlinux 0xca5b2ackernel kobj
+EXPORT_SYMBOL_GPL vmlinux 0xca6cebe__pci reset function locked
+EXPORT_SYMBOL_GPL vmlinux 0xcbd920cpu mitigations off
+EXPORT_SYMBOL_GPL vmlinux 0xcbf598thermal zone get offset
+EXPORT_SYMBOL_GPL vmlinux 0xcd0af58snd dmaengine pcm prepare slave_config
+EXPORT_SYMBOL_GPL vmlinux 0xcdca706pinctrl register
+EXPORT_SYMBOL_GPL vmlinux 0xcdff2f2snd soc component disable pin
+EXPORT_SYMBOL_GPL vmlinux 0xce3f888debugfs create x8
+EXPORT_SYMBOL_GPL vmlinux 0xcebbd0pl08x filter id
+EXPORT_SYMBOL_GPL vmlinux 0x1d107e9blkg rwstat recursive sum
+EXPORT_SYMBOL_GPL vmlinux 0x1d22cedirq get irqchip state
+EXPORT_SYMBOL_GPL vmlinux 0x1d3b028blk mq unquiesce queue
+EXPORT_SYMBOL_GPL vmlinux 0x1d3584fdev pm qos expose flags
+EXPORT_SYMBOL_GPL vmlinux 0x1d486ee6thermal cooling device unregister
+EXPORT_SYMBOL_GPL vmlinux 0x1d52c890usb hcd unmap urb setup for dma
+EXPORT_SYMBOL_GPL vmlinux 0x1d58ae14lpdr2 jedec timings
+EXPORT_SYMBOL_GPL vmlinux 0x1d68d474wakeup source prepare
+EXPORT_SYMBOL_GPL vmlinux 0x1d6b0afplatform bus
+EXPORT_SYMBOL_GPL vmlinux 0x1d75065cpm generic poweroff late
+EXPORT_SYMBOL_GPL vmlinux 0x1d77bf8unix socket table
+EXPORT_SYMBOL_GPL vmlinux 0x1d7ed91snd soc dapm sync
+EXPORT_SYMBOL_GPL vmlinux 0x1d8e531cdm path uevent
+EXPORT_SYMBOL_GPL vmlinux 0x1dc572fflat get dotdot entry
+EXPORT_SYMBOL_GPL vmlinux 0x1dcff8f3skb segment
+EXPORT_SYMBOL_GPL vmlinux 0xdd07664irq domain associate
+EXPORT_SYMBOL_GPL vmlinux 0x284fe20d dev_pm_genpd_set_performance_state
+EXPORT_SYMBOL_GPL vmlinux 0x28620ed kernelacpi_device activated
+EXPORT_SYMBOL_GPL vmlinux 0x28730be1 cpufreq_cpu_get_raw
+EXPORT_SYMBOL_GPL vmlinux 0x2874d0e2 dm_internal_resume
+EXPORT_SYMBOL_GPL vmlinux 0x287a13b4 cpuidle_register_device
+EXPORT_SYMBOL_GPL vmlinux 0x287ebe47 transport_setup_device
+EXPORT_SYMBOL_GPL vmlinux 0x2896c977 setfl
+EXPORT_SYMBOL_GPL vmlinux 0x28ab44b9 pinctrl_gpio_free
+EXPORT_SYMBOL_GPL vmlinux 0x28ada747 serial8250_request_dma
+EXPORT_SYMBOL_GPL vmlinux 0x28b030d2 of_overlay_notifier_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x28b8192c usbus_disable_autosuspend
+EXPORT_SYMBOL_GPL vmlinux 0x28cc832d omap_mcbsp_st_add Controls
+EXPORT_SYMBOL_GPL vmlinux 0x28d676c9 _efivar_entry_iter
+EXPORT_SYMBOL_GPL vmlinux 0x28e169cb pci_user_read_config_dword
+EXPORT_SYMBOL_GPL vmlinux 0x28e720d5 netdev_walk_all_upper_dev_rcu
+EXPORT_SYMBOL_GPL vmlinux 0x28f46bac dst_cache_set_ip4
+EXPORT_SYMBOL_GPL vmlinux 0x2907ef61 hrtimer_active
+EXPORT_SYMBOL_GPL vmlinux 0x290917f5 sha1_zero_message_hash
+EXPORT_SYMBOL_GPL vmlinux 0x2911f408 ata_bmdma_setup
+EXPORT_SYMBOL_GPL vmlinux 0x2929426f udp4_lib_lookup
+EXPORT_SYMBOL_GPL vmlinux 0x293a9ef6 fl6_update_dst
+EXPORT_SYMBOL_GPL vmlinux 0x293b6508 blkdev_report_zones
+EXPORT_SYMBOL_GPL vmlinux 0x2942863e handle_bad_irq
+EXPORT_SYMBOL_GPL vmlinux 0x29506775 put timespec64
+EXPORT_SYMBOL_GPL vmlinux 0x2950c8d8 invalidate_inode_pages2_range
+EXPORT_SYMBOL_GPL vmlinux 0x295b982a ahisi_clk_register_fixed_rate
+EXPORT_SYMBOL_GPL vmlinux 0x2987c25e gpio_to_desc
+EXPORT_SYMBOL_GPL vmlinux 0x298b81f1 pci_try_reset_bus
+EXPORT_SYMBOL_GPL vmlinux 0x298da27 udp4_lib_lookup
+EXPORT_SYMBOL_GPL vmlinux 0x299ab922 tracepoint_bpf_prog_put_rcu
+EXPORT_SYMBOL_GPL vmlinux 0x299b6676 led_trigger_set_default
+EXPORT_SYMBOL_GPL vmlinux 0x29c72470 dma_cgrp_subsys_enabled_key
+EXPORT_SYMBOL_GPL vmlinux 0x29e8f928 dhci_pltfm_init
+EXPORT_SYMBOL_GPL vmlinux 0x29eb37f1 current_is_async
+EXPORT_SYMBOL_GPL vmlinux 0x29fa419f decode_rs8
+EXPORT_SYMBOL_GPL vmlinux 0x2a0040fmdio_bus_init
+EXPORT_SYMBOL_GPL vmlinux 0x2a0a6d4 devfreq_cooling_register
+EXPORT_SYMBOL_GPL vmlinux 0x2a3017b6 local out
+EXPORT_SYMBOL_GPL vmlinux 0x2a3e6b28 mpi_read_raw_from_sgl
+EXPORT_SYMBOL_GPL vmlinux 0x2a546baccsi_check_sense
+EXPORT_SYMBOL_GPL vmlinux 0x2a58074 thermal_of_cooling_device_register
+EXPORT_SYMBOL_GPL vmlinux 0x2a64e4bbblk_mq_free_request
+EXPORT_SYMBOL_GPL vmlinux 0x2a678a13_suspend_report_result
+EXPORT_SYMBOL_GPL vmlinux 0x2a856508 usb_hcd_unlink_urb_from_ep
+EXPORT_SYMBOL_GPL vmlinux 0x2a94a507 sysfs_create_groups
+EXPORT_SYMBOL_GPL vmlinux 0x2a9ca6ac disk_part_iter_exit
+EXPORT_SYMBOL_GPL vmlinux 0x2d5a69a00f_devfreq_cooling_register
+EXPORT_SYMBOL_GPL vmlinux 0x2d64a74edc_ihci_init_driver
+EXPORT_SYMBOL_GPL vmlinux 0x2d7a53a0fperf_trace_run_bpf_submit
+EXPORT_SYMBOL_GPL vmlinux 0x2d7c73b5kstrdup_quotable
+EXPORT_SYMBOL_GPL vmlinux 0x2d81ced3balloon_page_alloc
+EXPORT_SYMBOL_GPL vmlinux 0x2d83fb2bsnd_pcm_stream_unlock_irq
+EXPORT_SYMBOL_GPL vmlinux 0x2d8de31ebus_register
+EXPORT_SYMBOL_GPL vmlinux 0x2d9b027dirq_domain_pop_irq
+EXPORT_SYMBOL_GPL vmlinux 0x2d9eb42ewakeup_source_drop
+EXPORT_SYMBOL_GPL vmlinux 0x2da09ae9snd_dmaengine_pcm_pointer_no_residue
+EXPORT_SYMBOL_GPL vmlinux 0x2dc11ca8clockevents_config_and_register
+EXPORT_SYMBOL_GPL vmlinux 0x2dd06953class_dev_iter_next
+EXPORT_SYMBOL_GPL vmlinux 0x2de9c0b4gpiod_add_lookup_table
+EXPORT_SYMBOL_GPL vmlinux 0x2dfda1bcpower_supply_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x2e02acd7pci_remove_root_bus
+EXPORT_SYMBOL_GPL vmlinux 0x2e2360b1ftrace_set_global_notrace
+EXPORT_SYMBOL_GPL vmlinux 0x2e2f174orting_buffer_record_disable_cpu
+EXPORT_SYMBOL_GPL vmlinux 0x2e3adapppiode_direction_output
+EXPORT_SYMBOL_GPL vmlinux 0x2e5401f7pinmux_generic_add_function
+EXPORT_SYMBOL_GPL vmlinux 0x2e553ff2ata_link_online
+EXPORT_SYMBOL_GPL vmlinux 0x2e71057disk_map_sector_rcu
+EXPORT_SYMBOL_GPL vmlinux 0x2e7df62eof_irq_parse_raw
+EXPORT_SYMBOL_GPL vmlinux 0x2e82e63fsmcapt_register_percpu_thread_cpumask
+EXPORT_SYMBOL_GPL vmlinux 0x2e85d130phy_pm_runtime_allow
+EXPORT_SYMBOL_GPL vmlinux 0x2e8797cdc_bio_add_page
+EXPORT_SYMBOL_GPL vmlinux 0x2e94a67ddevm_mdiobus_free
+EXPORT_SYMBOL_GPL vmlinux 0x2e963954skb_gro_receive
+EXPORT_SYMBOL_GPL vmlinux 0x2e9670c0p320_ipc_transmit
+EXPORT_SYMBOL_GPL vmlinux 0x2ea0f1d0clk_hw_register_gate
+EXPORT_SYMBOL_GPL vmlinux 0x2ea5486emvebu_mbus_get_io_win_info
+EXPORT_SYMBOL_GPL vmlinux 0x2eb3135cpu_is_hotpluggable
+EXPORT_SYMBOL_GPL vmlinux 0x2ec53d99clk_gate_ops
+EXPORT_SYMBOL_GPL vmlinux 0x2ecddc6eplatform_device_register_full
+EXPORT_SYMBOL_GPL vmlinux 0x2ef9a06ts6586x_write
+EXPORT_SYMBOL_GPL vmlinux 0x2ef4df8i2c_new_probed_device
+EXPORT_SYMBOL_GPL vmlinux 0x2f0d9053usb_otg_state_string
+EXPORT_SYMBOL_GPL vmlinux 0x2f2959e5ftrace_set_filter
+EXPORT_SYMBOL_GPL vmlinux 0x2f32368esnd_pcm_add_chmap_ctl
+EXPORT_SYMBOL_GPL vmlinux 0x2f4113a2cookie_register
+EXPORT_SYMBOL_GPL vmlinux 0x2f47aaf9rt_mutex_timed_lock
+EXPORT_SYMBOL_GPL vmlinux 0x2f64a35fusbd_hcd_unmap Urb_for_dma
+EXPORT_SYMBOL_GPL vmlinux 0x2f6c85e5ping_buffer_empty
+EXPORT_SYMBOL_GPL vmlinux 0x2fa3b8bcp6_update_pmtu
+EXPORT_SYMBOL_GPL vmlinux 0x2fb385bsk_attach_filter
+EXPORT_SYMBOL_GPL vmlinux 0x2fc98d6ewn5110_spi_regmap
+EXPORT_SYMBOL_GPL vmlinux 0x2fca6d0rtnl_link_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x2fe66cd6bk_mq_virtio_map_queues
+EXPORT_SYMBOL_GPL vmlinux 0x300213e0trace_call_bpf
+EXPORT_SYMBOL_GPL vmlinux 0x32a45f77inverse_translate
+EXPORT_SYMBOL_GPL vmlinux 0x32ab06ccirq_percpu_is_enabled
+EXPORT_SYMBOL_GPL vmlinux 0x32b12907wm8997_i2c_regmap
+EXPORT_SYMBOL_GPL vmlinux 0x32c3cb4eclass_compat_register
+EXPORT_SYMBOL_GPL vmlinux 0x32c66421snd_soc_unregister_card
+EXPORT_SYMBOL_GPL vmlinux 0x32c84acmhmtk_smi_larb_put
+EXPORT_SYMBOL_GPL vmlinux 0x32c9291bata_pci_device_resume
+EXPORT_SYMBOL_GPL vmlinux 0x32e04d5dapm_clock_event
+EXPORT_SYMBOL_GPL vmlinux 0x331827carter_mutex_trylock
+EXPORT_SYMBOL_GPL vmlinux 0x33223939devm_of_platform_depopulate
+EXPORT_SYMBOL_GPL vmlinux 0x3328ef44i2c_client_type
+EXPORT_SYMBOL_GPL vmlinux 0x3333e060fat_alloc_new_dir
+EXPORT_SYMBOL_GPL vmlinux 0x33333e34spi_busnum_to_master
+EXPORT_SYMBOL_GPL vmlinux 0x3335570fenable_percpu_irq
+EXPORT_SYMBOL_GPL vmlinux 0x336154carcutorture_record_test_transition
+EXPORT_SYMBOL_GPL vmlinux 0x3376f97dperf_pmu_migrate_context
+EXPORT_SYMBOL_GPL vmlinux 0x3378c222ping_seq_fops
+EXPORT_SYMBOL_GPL vmlinux 0x337aa777dev_pm_domain_attach
+EXPORT_SYMBOL_GPL vmlinux 0x337f605bfbd_unlink_disk_holder
+EXPORT_SYMBOL_GPL vmlinux 0x33c8a2dsnd_soc_component_update_bits
+EXPORT_SYMBOL_GPL vmlinux 0x33cf0b28xhci_shutdown
+EXPORT_SYMBOL_GPL vmlinux 0x33f6143ping_queue_rcv_skb
+EXPORT_SYMBOL_GPL vmlinux 0x33e06143pm_generic_restore_noirq
+EXPORT_SYMBOL_GPL vmlinux 0x33e06143ping_queue_rcv_skb
+EXPORT_SYMBOL_GPL vmlinux 0x33e06143ping_queue_rcv_skb
+EXPORT_SYMBOL_GPL vmlinux 0x3c32a6d4bd_link_disk_holder
+EXPORT_SYMBOL_GPL vmlinux 0x3c493ab5snd_soc_dai_set_pll
+EXPORT_SYMBOL_GPL vmlinux 0x3c4a4a99btree_init_mempool
+EXPORT_SYMBOL_GPL vmlinux 0x3c757234property_entries_free
+EXPORT_SYMBOL_GPL vmlinux 0x3c777e78i2e_handle_smbus_host_notify
+EXPORT_SYMBOL_GPL vmlinux 0x3c7e95f3clk_hw_register
+EXPORT_SYMBOL_GPL vmlinux 0x3c7f21f4gpiochip_line_is_open_drain
+EXPORT_SYMBOL_GPL vmlinux 0x3c81441arm_check_condition
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+EXPORT_SYMBOL_GPL vmlinux 0x5f60d380 bpf prog select runtime
+EXPORT_SYMBOL_GPL vmlinux 0x5f61e9edac get private
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+EXPORT_SYMBOL_GPL vmlinux 0x6040b2a2s yfs remove link
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+EXPORT_SYMBOL_GPL vmlinux 0x6049e9f dsnd soc component init regmap
+EXPORT_SYMBOL_GPL vmlinux 0x60506751 unmap kernel range no flush
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+EXPORT_SYMBOL_GPL vmlinux 0x8e452d3bsnd_soc_write
+EXPORT_SYMBOL_GPL vmlinux 0x8e467be0ring_new_virtqueue
+EXPORT_SYMBOL_GPL_GPL vmlinux 0x8e491780__dev_forward_skb
+EXPORT_SYMBOL_GPL vmlinux 0x8e51a3c7dev_pm_opp_cpmask_remove_table
+EXPORT_SYMBOL_GPL_GPL vmlinux 0x8e784250dio_end_io
+EXPORT_SYMBOL_GPL_GPL vmlinux 0x8e7894bd__atomic_notifier_call_chain
+EXPORT_SYMBOL_GPL vmlinux 0x8e7e416bled_trigger_remove
+EXPORT_SYMBOL_GPL_GPL vmlinux 0x8ea653bdioimmu_group_remove_device
+EXPORT_SYMBOL_GPL vmlinux 0x8ea859funregister_hw_breakpoint
+EXPORT_SYMBOL_GPL vmlinux 0x8eab3058usb_amd_pt_check_port
+EXPORT_SYMBOL_GPL vmlinux 0x8eaa8dfusb_find_common_endpoints
+EXPORT_SYMBOL_GPL vmlinux 0x8eb6773cinet_csk_update_pmtu
+EXPORT_SYMBOL_GPL vmlinux 0x8edf4710device_pm_wait_for_dev
+EXPORT_SYMBOL_GPL vmlinux 0x8ee11cf1ata_sff_error_handler
+EXPORT_SYMBOL_GPL vmlinux 0x8ee171a9dev_coredumpm
+EXPORT_SYMBOL_GPL vmlinux 0x8eed56ddomap_dm_timer_request_by_node
+EXPORT_SYMBOL_GPL vmlinux 0x8ee3399dax_read_unlock
+EXPORT_SYMBOL_GPL vmlinux 0x8efb7673platform_add_devices
+EXPORT_SYMBOL_GPL vmlinux 0x8efd4f76blkg_prfill_rwlock
+EXPORT_SYMBOL_GPL vmlinux 0x8ff00da87tty_set_ldisc
+EXPORT_SYMBOL_GPL vmlinux 0x8ff0748afrcu_expedite_gp
+EXPORT_SYMBOL_GPL vmlinux 0x8ff25645bclass_for_each_device
+EXPORT_SYMBOL_GPL vmlinux 0x8ff2d4b3bsubsys_find_device_by_id
+EXPORT_SYMBOL_GPL vmlinux 0x8ff3886ad0tcp_unregister_ulp
+EXPORT_SYMBOL_GPL vmlinux 0x8ff3c4fff8sata_sff_hardreset
+EXPORT_SYMBOL_GPL vmlinux 0x8ff40ca2sdhci_start_signal_voltage_switch
+EXPORT_SYMBOL_GPL vmlinux 0x8ff4fd851klist_init
+EXPORT_SYMBOL_GPL vmlinux 0x8ff51ce0devm_gpiochip_remove
+EXPORT_SYMBOL_GPL vmlinux 0x8ff686d02ahci_start_fis_rx
+EXPORT_SYMBOL_GPL vmlinux 0x8ff6c877__round_jiffies_relative
+EXPORT_SYMBOL_GPL vmlinux 0x8ff7c3412virtqueue_get_avail_addr
+EXPORT_SYMBOL_GPL vmlinux 0x8ff81d6bserdev_device_write_room
+EXPORT_SYMBOL_GPL vmlinux 0x8ffa65240of_usb_update_otg_caps
+EXPORT_SYMBOL_GPL vmlinux 0x8ffcc3dev_pm_opp_remove
+EXPORT_SYMBOL_GPL vmlinux 0x8fd3677ee__mtd_next_device
+EXPORT_SYMBOL_GPL vmlinux 0x8fe2e73dev_attr_unload_heads
+EXPORT_SYMBOL_GPL vmlinux 0x8fe34dd4sg_free_table_chained
+EXPORT_SYMBOL_GPL vmlinux 0x8fec5836pm_relax
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+EXPORT_SYMBOL_GPL vmlinux 0x90131997pm_generic_poweroff_noirq
+EXPORT_SYMBOL_GPL vmlinux 0x90275e59security_file_permission
+EXPORT_SYMBOL_GPL vmlinux 0x903957adof_usb_get_dr_mode_by_phy
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+EXPORT_SYMBOL_GPL vmlinux 0x903c3601tpm_tis_resume
+EXPORT_SYMBOL_GPL vmlinux 0x9059ef5a9usb_set_interface
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+EXPORT_SYMBOL_GPL vmlinux 0x90a1004acrypto_has_alg
+EXPORT_SYMBOL_GPL vmlinux 0x90a59f30un_get_socket
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+EXPORT_SYMBOL_GPL vmlinux 0x95b875d2devfreq_event_is_enabled
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+EXPORT_SYMBOL_GPL vmlinux 0x95e0ba53dev_opf_of_get_opf_desc_node
+EXPORT_SYMBOL_GPL vmlinux 0x961342e8regulator_disable
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+EXPORT_SYMBOL_GPL vmlinux 0x9661b4c4nand_maximize_ecc
+EXPORT_SYMBOL_GPL vmlinux 0x96749b2eusb_put_hcd
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+EXPORT_SYMBOL_GPL vmlinux 0x968f6502nvmem_cell_read_u32
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+EXPORT_SYMBOL_GPL vmlinux 0x96919667musb_readdl
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+EXPORT_SYMBOL_GPL vmlinux 0x96b5c09etransport_add_device
+EXPORT_SYMBOL_GPL vmlinux 0x96b70bceomap_dm_timer_set_source
+EXPORT_SYMBOL_GPL vmlinux 0x96bb4a76atscsci_change_queue_depth
+EXPORT_SYMBOL_GPL vmlinux 0x96c28cd9snd_component_set_jack
+EXPORT_SYMBOL_GPL vmlinux 0x96da2be2virtqueue_kick
+EXPORT_SYMBOL_GPL vmlinux 0x96d0e07of_dma_controller_register
+EXPORT_SYMBOL_GPL vmlinux 0x96e88cf2net_csk_listen_stop
+EXPORT_SYMBOL_GPL vmlinux 0x96f8c151__devm_pci_epc_create
+EXPORT_SYMBOL_GPL vmlinux 0x9702b3b8dounbind_con_driver
+EXPORT_SYMBOL_GPL vmlinux 0x97159e50dfdevfreq_cooling_register_power
+EXPORT_SYMBOL_GPL vmlinux 0x9734f85bblks_stat_alloc_callback
+EXPORT_SYMBOL_GPL vmlinux 0x9741f24fuse_sync_release
+EXPORT_SYMBOL_GPL vmlinux 0x975519c1asymmetric_key_id_same
+EXPORT_SYMBOL_GPL vmlinux 0x975ad3adblocking_notifier_chain_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x978211bdttree_last
+EXPORT_SYMBOL_GPL vmlinux 0x978ec2d6stmpme_set_bits
+EXPORT_SYMBOL_GPL vmlinux 0x97a8435mmce_regulator_set_vqmmc
+EXPORT_SYMBOL_GPL vmlinux 0x97b80082nd dmaengine_pcm_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x97c864basnd_soc_register_platform
+EXPORT_SYMBOL_GPL vmlinux 0x97ce1533ata_ehi_push_desc
+EXPORT_SYMBOL_GPL vmlinux 0x97de283debug_locks_silent
+EXPORT_SYMBOL_GPL vmlinux 0x97e0706cregcache_cache_only
+EXPORT_SYMBOL_GPL vmlinux 0x97e7f902trace_vbprintk
+EXPORT_SYMBOL_GPL vmlinux 0x97f45f65ata_scsi_ioctl
+EXPORT_SYMBOL_GPL vmlinux 0x982fb58ecrypto_unregister_skcipher
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+EXPORT_SYMBOL_GPL vmlinux 0x9833bc0chvc_kick
+EXPORT_SYMBOL_GPL vmlinux 0x983a7e97fb_deferred_io_fsync
+EXPORT_SYMBOL_GPL vmlinux 0x983cc228__fscrypt_prepare_lookup

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+EXPORT_SYMBOL_GPL vmlinux 0x9cc76eacrypto_enqueue_request
+EXPORT_SYMBOL_GPL vmlinux 0x9cd39eb6pci_remap_cfgspace
+EXPORT_SYMBOL_GPL vmlinux 0x9cd986cdpmac_ctlr_stop
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+EXPORT_SYMBOL_GPL vmlinux 0x9d0366b9regmap_add_irq_chip
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+EXPORT_SYMBOL_GPL vmlinux 0x9d74968eevent_triggers_post_call
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+EXPORT_SYMBOL_GPL vmlinux 0xe3b8d14sdhci_cale_clk
+EXPORT_SYMBOL_GPL vmlinux 0xe3f8d15mtd_block_isbad
+EXPORT_SYMBOL_GPL vmlinux 0xe472f5fsnpmpad
+EXPORT_SYMBOL_GPL vmlinux 0xe5a05f96regulator_list_hardware_vsel
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+EXPORT_SYMBOL_GPL vmlinux 0xe97b5d7cinet_unregister
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+EXPORT_SYMBOL_GPL vmlinux 0xebe73c46usb_disable_dm
+EXPORT_SYMBOL_GPL vmlinux 0xecc4b38hwpin_int
+EXPORT_SYMBOL_GPL vmlinux 0xece05a2rlt_bucket_nested
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+EXPORT_SYMBOL_GPL vmlinux 0xed5092dsmemcpy_toio
+EXPORT_SYMBOL_GPL vmlinux 0xed63c62gpiochip_unlock_irq
+EXPORT_SYMBOL_GPL vmlinux 0xedeb49bcrypto_db_decode_key
+EXPORT_SYMBOL_GPL vmlinux 0xeed13e8dwakeup_source_add
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+EXPORT_SYMBOL_GPL vmlinux 0xef023ab0serdev_device_alloc
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+EXPORT_SYMBOL_GPL vmlinux 0xef187814_get_task_comm
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+EXPORT_SYMBOL_GPL vmlinux 0xef25f603power_supply_set_property
+EXPORT_SYMBOL_GPL vmlinux 0xef42e6b8ping_init_sock
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+EXPORT_SYMBOL_GPL vmlinux 0xd494e006extcon_get_property_capability
+EXPORT_SYMBOL_GPL vmlinux 0xd495ec8cpsw_ale_dump
+EXPORT_SYMBOL_GPL vmlinux 0xd4a18520bkleq_freeze_queue_wait
+EXPORT_SYMBOL_GPL vmlinux 0xd4b2324bpf_skb_vlan_push_proto
+EXPORT_SYMBOL_GPL vmlinux 0xd4c14632system_unbound_wq
+EXPORT_SYMBOL_GPL vmlinux 0xd4c75f0usbs_reset_endpoint
+EXPORT_SYMBOL_GPL vmlinux 0x7f11d938bus_for_each_dev
+EXPORT_SYMBOL_GPL vmlinux 0x7f15b93biommu_group_get
+EXPORT_SYMBOL_GPL vmlinux 0x7f1e8c91do_unregister_con_driver
+EXPORT_SYMBOL_GPL vmlinux 0x7f241064usb_deregister
+EXPORT_SYMBOL_GPL vmlinux 0x7f2cd50pinmux_generic_remove_function
+EXPORT_SYMBOL_GPL vmlinux 0x7f399d2a2efivar_entry_iter_end
+EXPORT_SYMBOL_GPL vmlinux 0x7f4184dbclk_mux_determine_rate_flags
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+EXPORT_SYMBOL_GPL vmlinux 0x7f68e985regulator_has_full_constraints
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+EXPORT_SYMBOL_GPL vmlinux 0x7f78e43ata_bmdma_qc_issue
+EXPORT_SYMBOL_GPL vmlinux 0x7fbd67b9of_pci_address_to_resource
+EXPORT_SYMBOL_GPL vmlinux 0x7fcdade8snd_soc_of_parse_dai
+EXPORT_SYMBOL_GPL vmlinux 0x7fda4906inet_hash_connect
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Open Source Used In 5GaaS Edge AC-4  14820

+EXPORT_SYMBOL drivers/media/v4l2-core/videodev 0xb9218b73v4l2_ctrl_handler_free
+EXPORT_SYMBOL drivers/media/v4l2-core/videodev 0xb9f57a72v4l2_clk_unregister_fixed
+EXPORT_SYMBOL drivers/media/v4l2-core/videodev 0xbb9c0590v4l2_clk_set_rate
+EXPORT_SYMBOL drivers/media/v4l2-core/videodev 0xc659aa5video_device_release
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+EXPORT_SYMBOL drivers/media/v4l2-core/videodev 0xe6da0099video_unregister_device
+EXPORT_SYMBOL drivers/media/v4l2-core/videodev 0xfa893aecv4l2_s_extCtrls
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+EXPORT_SYMBOL drivers/staging/lustre/ptlrpc/ptlrpc 0xc96547d6ldlm_revalidate_lock_handle

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+EXPORT_SYMBOL lib/crc8 0xab9ad613crc8_populate_lsb
+EXPORT_SYMBOL lib/crc8 0xd4534d80crc8_populate_msb
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+EXPORT_SYMBOL lib/lru_cache 0x03f599c7	lc_get_cumulative
+EXPORT_SYMBOL lib/lru_cache 0x0b15a25d
cache_seq_printf_stats
+EXPORT_SYMBOL lib/lru_cache 0x4feade4b	lc_create
+EXPORT_SYMBOL lib/lru_cache 0x56fc3ea0	lc_put
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+EXPORT_SYMBOL lib/lz4/lz4_compress 0x4cc636f2	LZ4_compress_HC
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0x1de3f19a	ZSTD_compressBegin_advanced
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0x2a0fd0d0	ZSTD_getCParams
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0x2eacbe22	ZSTD_compressBlock

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EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x4836e152 amdtp_stream_get_max_payload
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x4a5da901fw_iso_resources_init
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x53ca18e8 amdtp_rate_table
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x5975df75 amdtp_stream_stop
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x673e92e0 iso_packets_buffer_destroy
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x79758850 snd_fw_transaction
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x8166e02 amdtp_stream_pcm_prepare
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x82740872 amdtp_stream_set_parameters
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x8e8c2044 avc_general_get_plug_info
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x93750c6b amdtp_stream_init
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x97db3d46 cmp_connection_establish
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x99cc49bf snd_fw_schedule_registration
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xa9d6a7e2 amdtp_stream_destroy
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xad62d698 fcp_bus_reset
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xda623b944 amdtp_stream_pcm_abort
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x0a1565bd iso_packets_buffer_init
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xe9fae944 fw_iso_resources_free
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xdbafff4f amdtp_stream_pcm_abort
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x33539b3 iso_packets_buffer_init
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xea010cad cmp_connection_check_used
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xf2593c34 fw_iso_resources_allocate
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0x0f6163958 cmp_connection_init
EXPORT_SYMBOL sound/firewire/snd-firewire-lib 0xc79160f amdtp_stream_start
EXPORT_SYMBOL sound/i2c/other/snd-ak4113 0x437a0560 snd_ak4113_resume
EXPORT_SYMBOL sound/i2c/other/snd-ak4113 0xdbafff4f snd_ak4113_suspend
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0x09a1565b snd_ak4114_resume
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0x0e010cad cmp_connection_check_used
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0x0f6163958 cmp_connection_init
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0x2c2a372asd snd_ak4114_build
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0x3a59ef05 snd_ak4114_reg_write
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0x4d701964 snd_ak4114_external_rate
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0x72b930d asnd_snd_ak4114_check_rate_and_errors
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0xcaa3b954 snd_ak4114_suspend
EXPORT_SYMBOL sound/i2c/other/snd-ak4114 0xe43083664 snd_ak4114_reinit
EXPORT_SYMBOL sound/i2c/other/snd-ak43xx-addr 0x163ac8a0 snd_ak43xx_build_controls
EXPORT_SYMBOL sound/i2c/other/snd-ak43xx-addr 0x37453a8b snd_ak43xx_reset
EXPORT_SYMBOL sound/i2c/other/snd-ak43xx-addr 0x3b8719d4 snd_ak43xx_init
EXPORT_SYMBOL sound/i2c/other/snd-ak43xx-addr 0x96fb13c3 snd_ak43xx_write
EXPORT_SYMBOL sound/i2c/other/snd-pt2258 0x5e9f2fca snd_pt2258_reinit
EXPORT_SYMBOL sound/i2c/other/snd-pt2258 0x766d036a snd_pt2258_build_controls
EXPORT_SYMBOL sound/i2c/snd-cs8427 0x5def2609 snd_cs8427_iec958_pcm
EXPORT_SYMBOL sound/i2c/snd-cs8427 0x623a5e8e snd_cs8427_create
EXPORT_SYMBOL sound/i2c/snd-cs8427 0x6972df74 snd_cs8427_init
EXPORT_SYMBOL sound/i2c/snd-cs8427 0x9521981e9 snd_cs8427_reg_write
EXPORT_SYMBOL sound/i2c/snd-cs8427 0xf0cc338f snd_cs8427_iec958_active
+EXPORT_SYMBOL vmlinux 0x08ff37f7 nvdimm_bus_unlock
+EXPORT_SYMBOL vmlinux 0x0902f878 net_dim_get_def_tx_moderation
+EXPORT_SYMBOL vmlinux 0x09299841 udp_lite_prot
+EXPORT_SYMBOL vmlinux 0x093202eewsiotlhb_sync_sg_for_device
+EXPORT_SYMBOL vmlinux 0x0932eb77 sscsi_unregister
+EXPORT_SYMBOL vmlinux 0x093f0e3epci_request_selected_regions_exclusive
+EXPORT_SYMBOL vmlinux 0x09524ba5quot_release
+EXPORT_SYMBOL vmlinux 0x096bf7esnd_ctl_make_virtual_master
+EXPORT_SYMBOL vmlinux 0x097ec1ff raw_write_lock_irqsave
+EXPORT_SYMBOL vmlinux 0x098b71c6fb_dealloc_cmap
+EXPORT_SYMBOL vmlinux 0x098dfb43finish_wait
+EXPORT_SYMBOL vmlinux 0x099890f6tcp_filter
+EXPORT_SYMBOL vmlinux 0x099f5929 __clean_cache_invalid_inode
+EXPORT_SYMBOL vmlinux 0x09a437fkmemdup_nul
+EXPORT_SYMBOL vmlinux 0x09a3ed0pci_cfs_remove_epf_group
+EXPORT_SYMBOL vmlinux 0x09af8b6f__start_for_each_device
+EXPORT_SYMBOL vmlinux 0x09c8eb5ffont_vga_8x16
+EXPORT_SYMBOL vmlinux 0x09d44df9in_lock_functions
+EXPORT_SYMBOL vmlinux 0x09d7e61cset_security_override_from_ctx
+EXPORT_SYMBOL vmlinux 0x0a011e5bscsi_host_alloc
+EXPORT_SYMBOL vmlinux 0x0a125af6mme_clean_up_queue
+EXPORT_SYMBOL vmlinux 0x0a263da6would_dump
+EXPORT_SYMBOL vmlinux 0x0a292872reservation_seqcount_class
+EXPORT_SYMBOL vmlinux 0x0a3131f6strnchr
+EXPORT_SYMBOL vmlinux 0x0a33226crescue32_le_shift
+EXPORT_SYMBOL vmlinux 0x0a469d23mfd_clone_cell
+EXPORT_SYMBOL vmlinux 0x0a4d4168scsi_print_result
+EXPORT_SYMBOL vmlinux 0x0a540cafparam_set_charp
+EXPORT_SYMBOL vmlinux 0x0a556c9f_find_compatible_node
+EXPORT_SYMBOL vmlinux 0x0a5a59f4hmi_vga_info_frame_init
+EXPORT_SYMBOL vmlinux 0x0a5f73pci_disable_device
+EXPORT_SYMBOL vmlinux 0x0a9e4744empty_zero_page
+EXPORT_SYMBOL vmlinux 0x0aa309cf synchronize_hardirq
+EXPORT_SYMBOL vmlinux 0x0aa6c16of_cpu_freq_power_cooling_register
+EXPORT_SYMBOL vmlinux 0x0ab91aa4pci_read_config_word
+EXPORT_SYMBOL vmlinux 0x0ad5db4ks_set_register
+EXPORT_SYMBOL vmlinux 0x0ac7f79dma_issue_pending_all
+EXPORT_SYMBOL vmlinux 0x0ad59f22adjust Managed_page_count
+EXPORT_SYMBOL vmlinux 0x0ad8f956xfmm State_insert
+EXPORT_SYMBOL vmlinux 0x0ad9777fneigh direct_output
+EXPORT_SYMBOL vmlinux 0xae0f2vm_set tgp_bb_tbl
+EXPORT_SYMBOL vmlinux 0xae4f500dev graft_qdisc
+EXPORT_SYMBOL vmlinux 0xb073410bblk_queue_segment_boundary
+EXPORT_SYMBOL vmlinux 0xb0d888bicmpv6_err_convert
+EXPORT_SYMBOL vmlinux 0xb12b4security_path_mknod
+EXPORT_SYMBOL vmlinux 0xb1beb31vmaac32_user
+EXPORT_SYMBOL vmlinux 0x14901d14seq_puts
+EXPORT_SYMBOL vmlinux 0x14af6f38register_cdrom
+EXPORT_SYMBOL vmlinux 0x14c3f231input_open_device
+EXPORT_SYMBOL vmlinux 0x14dc712of_graph_get_endpoint_by_regs
+EXPORT_SYMBOL vmlinux 0x14d4a9c5_change_bit
+EXPORT_SYMBOL vmlinux 0x14e45908scci_add_host_with_dma
+EXPORT_SYMBOL vmlinux 0x14f45434passthru_features_check
+EXPORT_SYMBOL vmlinux 0x14fbfd05key_task_permission
+EXPORT_SYMBOL vmlinux 0x150ad92bioport_resource
+EXPORT_SYMBOL vmlinux 0x1518a6a2iptun_encaps
+EXPORT_SYMBOL vmlinux 0x151bd37app_register_net_channel
+EXPORT_SYMBOL vmlinux 0x151f84898schedule_timeout_uninterruptible
+EXPORT_SYMBOL vmlinux 0x152561decroc_ec_cmd_xfer_status
+EXPORT_SYMBOL vmlinux 0x1526b301unix_tot_inflight
+EXPORT_SYMBOL vmlinux 0x153cd803write_dirty_buffer
+EXPORT_SYMBOL vmlinux 0x1546338dm_kcpypd_client_destroy
+EXPORT_SYMBOL vmlinux 0x156fece78netdev_alert
+EXPORT_SYMBOL vmlinux 0x158240acpci_irq_get_affinity
+EXPORT_SYMBOL vmlinux 0x158a55d7sock_register
+EXPORT_SYMBOL vmlinux 0x15ab86acof_get_i2c_adapter_by_node
+EXPORT_SYMBOL vmlinux 0x15ad5ed3mdiobus_write_nested
+EXPORT_SYMBOL vmlinux 0x15b016c9mmc_register_driver
+EXPORT_SYMBOL vmlinux 0x15baf29unregister_md_cluster_operations
+EXPORT_SYMBOL vmlinux 0x15bed7a51LZ4_decompress_safe_partial
+EXPORT_SYMBOL vmlinux 0x15d00805nand_bch_correct_data
+EXPORT_SYMBOL vmlinux 0x15d433c0ZSTD_decompressStream
+EXPORT_SYMBOL vmlinux 0x15f2bc26nosteal_pipe_buf_ops
+EXPORT_SYMBOL vmlinux 0x160f2e1cmb_cache_entry_create
+EXPORT_SYMBOL vmlinux 0x161efb34dquot_quota_off
+EXPORT_SYMBOL vmlinux 0x16305289warn_slowpath_null
+EXPORT_SYMBOL vmlinux 0x16643d6d_hash_and_lookup
+EXPORT_SYMBOL vmlinux 0x16b5cb09gen_pool_set_algo
+EXPORT_SYMBOL vmlinux 0x16c0a28bfget_fsquotum
+EXPORT_SYMBOL vmlinux 0x16d658e8file_fdatawait_range
+EXPORT_SYMBOL vmlinux 0x16f2c0b0_bio_integrity_trim
+EXPORT_SYMBOL vmlinux 0x170f6b958kioمصلحة الـbus_type
+EXPORT_SYMBOL vmlinux 0x1718ef5etruncate_pagecache_range
+EXPORT_SYMBOL vmlinux 0x171cf05skb_copy_and_csum_bits
+EXPORT_SYMBOL vmlinux 0x171df93fnetdev_class_remove_file_ns
+EXPORT_SYMBOL vmlinux 0x171ff90ata_port_printk
+EXPORT_SYMBOL vmlinux 0x173f5cfmouthscreen_parse_properties
+EXPORT_SYMBOL vmlinux 0x174c90adev_mc_add_excl
+EXPORT_SYMBOL vmlinux 0x1a6841b0 input_match_device_id
+EXPORT_SYMBOL vmlinux 0x1a6b7fed nd_region_release_lane
+EXPORT_SYMBOL vmlinux 0x1a82a91 devm_gpiod_put_array
+EXPORT_SYMBOL vmlinux 0x1a8d4b7 eblk_integrity_merge_rq
+EXPORT_SYMBOL vmlinux 0x1a980903 pcie_relaxed_ordering_enabled
+EXPORT_SYMBOL vmlinux 0x1aa52f5c cdev_add
+EXPORT_SYMBOL vmlinux 0x1ab94f1 lambda_request_regions
+EXPORT_SYMBOL vmlinux 0x1addf27 memcp y_fromio
+EXPORT_SYMBOL vmlinux 0x1ad46b4 ai net_sendpage
+EXPORT_SYMBOL vmlinux 0x1aeded9d DCtxWorkspaceBound
+EXPORT_SYMBOL vmlinux 0x1ae d6f6tt_port_lower_dtr_rts
+EXPORT_SYMBOL vmlinux 0x1aff3ed7 vfs_fsmc_range
+EXPORT_SYMBOL vmlinux 0x1b015d25 bitmap_parselist
+EXPORT_SYMBOL vmlinux 0x1b1e1088 sg_nents
+EXPORT_SYMBOL vmlinux 0x1b1c794b inet_get_local_port_range
+EXPORT_SYMBOL vmlinux 0x1b1ec5c apps_register_source
+EXPORT_SYMBOL vmlinux 0x1b2d6d2 cp com_sc m_cpu_power_down
+EXPORT_SYMBOL vmlinux 0x1b2f2086 tty_port_close
+EXPORT_SYMBOL vmlinux 0x1b30e3e9 _frontswap_load
+EXPORT_SYMBOL vmlinux 0x1b456b04 prepare_creds
+EXPORT_SYMBOL vmlinux 0x1b475bb3 rwsem_down_read_failed
+EXPORT_SYMBOL vmlinux 0x1b53925 econookie_ecn_ok
+EXPORT_SYMBOL vmlinux 0x1b591d27 param_ops_uint
+EXPORT_SYMBOL vmlinux 0x1b6314fd ain_aton
+EXPORT_SYMBOL vmlinux 0x1b77357d mac ag_unregister_device
+EXPORT_SYMBOL vmlinux 0x1bcb94c inet dev_addr_type
+EXPORT_SYMBOL vmlinux 0x1be05b85 blk mq_run_hw_queue
+EXPORT_SYMBOL vmlinux 0x1be4080e bitmap cond_end_sync
+EXPORT_SYMBOL vmlinux 0x1be88b7frwsem_down_write_failed
+EXPORT_SYMBOL vmlinux 0x1bef7978 pcm_iomap_regions_request_all
+EXPORT_SYMBOL vmlinux 0x1bf5dd49 snd_pcm_hw_constraint_msbits
+EXPORT_SYMBOL vmlinux 0x1c026af7 tty_insert_flip_string_flags
+EXPORT_SYMBOL vmlinux 0x1c24f02 bit_waitqueue
+EXPORT_SYMBOL vmlinux 0x1c2ca8e8 skb_checksum_complete
+EXPORT_SYMBOL vmlinux 0x1c2ce549 watchdog_register_governor
+EXPORT_SYMBOL vmlinux 0x1c3761e0 blk mq_kick_requeue_list
+EXPORT_SYMBOL vmlinux 0x1c5ad4fcsock_sendsmsg
+EXPORT_SYMBOL vmlinux 0x1c5e3878 istc525_idx2s
+EXPORT_SYMBOL vmlinux 0x1c8d3805 jbd2_journal_init_dev
+EXPORT_SYMBOL vmlinux 0x1c8ea4fb phy_ethtool_set_link ksettings
+EXPORT_SYMBOL vmlinux 0x1c951ff lock_rename
+EXPORT_SYMBOL vmlinux 0x1cb4ba2iomm u tbl_range_alloc
+EXPORT_SYMBOL vmlinux 0x1cb65231 scsi_verify_blk_ioctl
+EXPORT_SYMBOL vmlinux 0x1cbe3625 fscrypt_decrypt_page
+EXPORT_SYMBOL vmlinux 0x1cd85342 inet6_offloads
+EXPORT_SYMBOL vmlinux 0x1cdf3720 generic_read_dir
+EXPORT_SYMBOL vmlinux 0x1ce1fe1 dma_fence_wait any_timeout
+EXPORT_SYMBOL vmlinux 0x1ce599a6 scsi_device_resume
+EXPORT_SYMBOL vmlinux 0x1cebb40 cnvm_register_tgt_type
+EXPORT_SYMBOL vmlinux 0x1cfbb57 submit_bh
+EXPORT_SYMBOL vmlinux 0x1d027e4 bsnd_pcm_format_signed
+EXPORT_SYMBOL vmlinux 0x1d18218f snddevfreq_unregister_opp_notifier
+EXPORT_SYMBOL vmlinux 0x1d237f07 snd_card_file_remove
+EXPORT_SYMBOL vmlinux 0x1d4827a6 nlmsg_notify
+EXPORT_SYMBOL vmlinux 0x1d68aca3 linkwatch_fire_event
+EXPORT_SYMBOL vmlinux 0x1d6de368 nvdimm_namespace_common_probe
+EXPORT_SYMBOL vmlinux 0x1d72202d put_cmsg
+EXPORT_SYMBOL vmlinux 0x1d98567d delm_config
+EXPORT_SYMBOL vmlinux 0x1da94338 __ClearPageMovable
+EXPORT_SYMBOL vmlinux 0x1dca4456 wake_up_all
+EXPORT_SYMBOL vmlinux 0x1dd3b906 proto_unregister
+EXPORT_SYMBOL vmlinux 0x1dd571e6 fb_copy_cmap
+EXPORT_SYMBOL vmlinux 0x1de9dc4f xxh64
+EXPORT_SYMBOL vmlinux 0x1deec528 fb_set_cmap
+EXPORT_SYMBOL vmlinux 0x1e047854 __xfrm_policy_check
+EXPORT_SYMBOL vmlinux 0x1e1e7916 vfs_rename
+EXPORT_SYMBOL vmlinux 0x1e23478c of_graph_get_remote_port_parent
+EXPORT_SYMBOL vmlinux 0x1e26be3b phy_find_first
+EXPORT_SYMBOL vmlinux 0x1e3363c phy_find_first
+EXPORT_SYMBOL vmlinux 0x1e47854 warn_slowpath_fmt
+EXPORT_SYMBOL vmlinux 0x1e5b9189 ttcn_port_tty_get
+EXPORT_SYMBOL vmlinux 0x1e62b9b2 vlanומות dev
+EXPORT_SYMBOL vmlinux 0x1e6d26a8 strstr
+EXPORT_SYMBOL vmlinux 0x1e7ac25 ai dr_replace_ext
+EXPORT_SYMBOL vmlinux 0x1e7e528f set_cmap
+EXPORT_SYMBOL vmlinux 0x1e81e0c1 __xfrm_policy_check
+EXPORT_SYMBOL vmlinux 0x1e96f43d __cpu_possible_mask
+EXPORT_SYMBOL vmlinux 0x1e9edfb7 seq_hlist_start_head_rcu
+EXPORT_SYMBOL vmlinux 0x1e9f06a0 unregister_sysctl_table
+EXPORT_SYMBOL vmlinux 0x1ea16fe6 instantaneous
+EXPORT_SYMBOL vmlinux 0x1ea469f cleancache_register_ops
+EXPORT_SYMBOL vmlinux 0x1ea469f cleancache_register_ops
+EXPORT_SYMBOL vmlinux 0x1ea76ca4 reuseport_alloc
+EXPORT_SYMBOL vmlinux 0x1eb508d clk_bulk_get
+EXPORT_SYMBOL vmlinux 0x1eb848e __percpu_counter_sum
+EXPORT_SYMBOL vmlinux 0x1f0b7343 cdrom_mode_select
+EXPORT_SYMBOL vmlinux 0x1f3024e7 mem_map
+EXPORT_SYMBOL vmlinux 0x1f49e0f scrypt_fname_userto_disk
+EXPORT_SYMBOL vmlinux 0x1f825283 init_opal_dev
+EXPORT_SYMBOL vmlinux 0x1f7321f bd_delete
+EXPORT_SYMBOL vmlinux 0x1f7611a6 inet_addr_type_dev_table
+EXPORT_SYMBOL vmlinux 0x1f7901 aapci_iounmap
+EXPORT_SYMBOL vmlinux 0x1f7e807f kstrto ioint_from_user
+EXPORT_SYMBOL vmlinux 0x250113b4memory_read_from_buffer
+EXPORT_SYMBOL vmlinux 0x2508fbf3get_userns
+EXPORT_SYMBOL vmlinux 0x250c5de2inet_frags_fini
+EXPORT_SYMBOL vmlinux 0x2519524csesu_unblock_requests
+EXPORT_SYMBOL vmlinux 0x2524e38inet_csk_reqsk_queue_add
+EXPORT_SYMBOL vmlinux 0x25277497rfkill_register
+EXPORT_SYMBOL vmlinux 0x252d0b4pci_release_selected_regions
+EXPORT_SYMBOL vmlinux 0x25506649pagevec_lookup_range_nr_tag
+EXPORT_SYMBOL vmlinux 0x25559780htc_egpio_get_wakeup_irq
+EXPORT_SYMBOL vmlinux 0x25681200hioset_create
+EXPORT_SYMBOL vmlinux 0x2570a138reservation_seqcount_string
+EXPORT_SYMBOL vmlinux 0x25757a93dma_async_tx_descriptor_init
+EXPORT_SYMBOL vmlinux 0x25820c64fs_overflowuid
+EXPORT_SYMBOL vmlinux 0x2588bcffudp_disconnect
+EXPORT_SYMBOL vmlinux 0x25997793pci_resize_resource
+EXPORT_SYMBOL vmlinux 0x25a8d34ecpci_add_resource
+EXPORT_SYMBOL vmlinux 0x25a97750xfmr_input_unregister_afinfo
+EXPORT_SYMBOL vmlinux 0x25b19fa94bblk_mq_free_tag_set
+EXPORT_SYMBOL vmlinux 0x25e8ed29sg_nents_for_len
+EXPORT_SYMBOL vmlinux 0x25ef0af7tcp_exts_destroy
+EXPORT_SYMBOL vmlinux 0x26136f69call_usermodehelper_setup
+EXPORT_SYMBOL vmlinux 0x2627d860pcim_iomap_regions
+EXPORT_SYMBOL vmlinux 0x263beb75ecryptfs_get_versions
+EXPORT_SYMBOL vmlinux 0x2655663ecsnd_timer_open
+EXPORT_SYMBOL vmlinux 0x2656630dev_get_by_index
+EXPORT_SYMBOL vmlinux 0x26603772snd_mixer_oss_notify_callback
+EXPORT_SYMBOL vmlinux 0x2667042adquot_set_dqinfo
+EXPORT_SYMBOL vmlinux 0x266f1b0mdioibus_register_device
+EXPORT_SYMBOL vmlinux 0x267a6b55bprm_change_interp
+EXPORT_SYMBOL vmlinux 0x2695e9c1_find_next_zero_bit_le
+EXPORT_SYMBOL vmlinux 0x269fa9f4xfrm_sad_getinfo
+EXPORT_SYMBOL vmlinux 0x26b227b8vme_slot_num
+EXPORT_SYMBOL vmlinux 0x26b950b__kfifo_from_user_r
+EXPORT_SYMBOL vmlinux 0x26c128clockref_mark_dead
+EXPORT_SYMBOL vmlinux 0x26d3b825copy_strings_kernel
+EXPORT_SYMBOL vmlinux 0x26e76f5systcl_1udp_wmem_min
+EXPORT_SYMBOL vmlinux 0x26fa932aablk_end_request_all
+EXPORT_SYMBOL vmlinux 0x26fd839b__ethtool_get_link_ksettings
+EXPORT_SYMBOL vmlinux 0x27187037get_task_io_context
+EXPORT_SYMBOL vmlinux 0x272fc016dst_alloc
+EXPORT_SYMBOL vmlinux 0x27354b4ddregister_filesystem
+EXPORT_SYMBOL vmlinux 0x27468668scm_fp_dup
+EXPORT_SYMBOL vmlinux 0x27479d14param_free_charp
+EXPORT_SYMBOL vmlinux 0x274c4b98sock_no_getname
+EXPORT_SYMBOL vmlinux 0x274d080dc__kfifo_dma_out_prepare
+EXPORT_SYMBOL vmlinux 0x2753ec59netif_set_real_num_tx_queues
+EXPORT_SYMBOL vmlinux 0x27756bc8csesu sanitize_inquiry_string
+EXPORT_SYMBOL vmlinux 0x39ce7c5funregister_key_type
+EXPORT_SYMBOL vmlinux 0x39da555cbio_uninit
+EXPORT_SYMBOL vmlinux 0x3a1ac0f54set_normalized_timespec64
+EXPORT_SYMBOL vmlinux 0x3a2d2621da903x_query_status
+EXPORT_SYMBOL vmlinux 0x3a324d43fbcon_set_bitops
+EXPORT_SYMBOL vmlinux 0x3a52f406inc_nlink
+EXPORT_SYMBOL vmlinux 0x3a59427ejbd2_journal_invalidatepage
+EXPORT_SYMBOL vmlinux 0x3a6163abregister_netdev
+EXPORT_SYMBOL vmlinux 0x3a78960bunregister_console
+EXPORT_SYMBOL vmlinux 0x3a899609inet_listen
+EXPORT_SYMBOL vmlinux 0x3a90db29pci_iomap_range
+EXPORT_SYMBOL vmlinux 0x3a92f9arwsem_wake
+EXPORT_SYMBOL vmlinux 0x3a9b6fb9blk_unregister_region
+EXPORT_SYMBOL vmlinux 0x3aa3b7d5tcf_chain_put
+EXPORT_SYMBOL vmlinux 0x3ab7f464neigh_lookup
+EXPORT_SYMBOL vmlinux 0x3abb36d6get_cached_acl_rcu
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+EXPORT_SYMBOL vmlinux 0x3b15b030netdev_lower_get_next_private_rcu
+EXPORT_SYMBOL vmlinux 0x3b15bf75netif_carrier_on
+EXPORT_SYMBOL vmlinux 0x3b16f700csum_and_copy_from_iter_full
+EXPORT_SYMBOL vmlinux 0x3b23e52fpci_back_from_sleep
+EXPORT_SYMBOL vmlinux 0x3b375d87rdst_alloc
+EXPORT_SYMBOL vmlinux 0x3b48eafbfnd_get_pages_range_tag
+EXPORT_SYMBOL vmlinux 0x3b56a96eMMC_claim_host
+EXPORT_SYMBOL vmlinux 0x3b59e7a7dmam_pool_create
+EXPORT_SYMBOL vmlinux 0x3b5ef3beunregister_md_personality
+EXPORT_SYMBOL vmlinux 0x3b5f07cdrom_release
+EXPORT_SYMBOL vmlinux 0x3b60d4edvlan_dev_vlan_proto
+EXPORT_SYMBOL vmlinux 0x3b644591bitmap_shift_left
+EXPORT_SYMBOL vmlinux 0x3b77d2acstop tty
+EXPORT_SYMBOL vmlinux 0x3b8b49712cget_adapter
+EXPORT_SYMBOL vmlinux 0x3b8f8742cf_idr_create
+EXPORT_SYMBOL vmlinux 0x3b91f3afsdn_free_pages
+EXPORT_SYMBOL vmlinux 0x3b953a70allocate_resource
+EXPORT_SYMBOL vmlinux 0x3b9d3ae0filemap_datawait_range
+EXPORT_SYMBOL vmlinux 0x3ba4a9d1empty_aops
+EXPORT_SYMBOL vmlinux 0x3ba77d21neigh_parms_alloc
+EXPORT_SYMBOL vmlinux 0x3baca892vnm_pub_area
+EXPORT_SYMBOL vmlinux 0x3ba82a4ps2_command
+EXPORT_SYMBOL vmlinux 0x3bb7ee7i2c_smbus_write_block_data
+EXPORT_SYMBOL vmlinux 0x3bb3d24dnvmsubmit_io_sync
+EXPORT_SYMBOL vmlinux 0x3bbf46eavgabase
+EXPORT_SYMBOL vmlinux 0x3bc2b28generic_block_fiemap
+EXPORT_SYMBOL vmlinux 0x3bc350c8pcm_iounmap_regions
+EXPORT_SYMBOL vmlinux 0x3bd1174swiotlb_sync_sg_for_cpu
+EXPORT_SYMBOL vmlinux 0x3bd8f30fata_print_version
+EXPORT_SYMBOL vmlinux 0x3be43d31generic_cont_expand_simple
+EXPORT_SYMBOL vmlinux 0x3be7643security_xfrm_policy_free
+EXPORT_SYMBOL vmlinux 0x49a5f742dev_uc_del
+EXPORT_SYMBOL vmlinux 0x49a67a0ekithread_stop
+EXPORT_SYMBOL vmlinux 0x49b4d7c8simple_link
+EXPORT_SYMBOL vmlinux 0x49b65f99ts0_count_descs
+EXPORT_SYMBOL vmlinux 0x49d3457acpumask_any_but
+EXPORT_SYMBOL vmlinux 0x49de38afpci_alloc_dev
+EXPORT_SYMBOL vmlinux 0x49de642ctty_port_open
+EXPORT_SYMBOL vmlinux 0x49e2c7a7inet_csks_accept
+EXPORT_SYMBOL vmlinux 0x49ebacb_dclear_bit
+EXPORT_SYMBOL vmlinux 0x49eeb6b36mmc_gpio_request_cd
+EXPORT_SYMBOL vmlinux 0x4a23184esnd_pcm_create_iec958_consumer_hw_params
+EXPORT_SYMBOL vmlinux 0x4a33595dof_phy_find_device
+EXPORT_SYMBOL vmlinux 0x4a39e5a1omap_set_dma_src_params
+EXPORT_SYMBOL vmlinux 0x4a3d6e1cip_getsockoptt
+EXPORT_SYMBOL vmlinux 0x4a3ea5c0snd_request_card
+EXPORT_SYMBOL vmlinux 0x4a449b62udp_disconnect
+EXPORT_SYMBOL vmlinux 0x4a506dc6tcp_prot
+EXPORT_SYMBOL vmlinux 0x4a7f173inode_needs_sync
+EXPORT_SYMBOL vmlinux 0x4a84d347bio_alloc_bioset
+EXPORT_SYMBOL vmlinux 0x4a9f39f__set_page_dirty_buffers
+EXPORT_SYMBOL vmlinux 0x4ac681dfget_raw
+EXPORT_SYMBOL vmlinux 0x4ace4162scsi_is_target_device
+EXPORT_SYMBOL vmlinux 0x4ad3a3fvfio_pci_driver_ptr
+EXPORT_SYMBOL vmlinux 0x4afe9a777scsi_partsize
+EXPORT_SYMBOL vmlinux 0x4b0b4bee_xfrm_init_state
+EXPORT_SYMBOL vmlinux 0x4b13a92egeneric_perform_write
+EXPORT_SYMBOL vmlinux 0x4b1cc5c1bl_queue_dma_alignment
+EXPORT_SYMBOL vmlinux 0x4b1dc378wait_iff_congested
+EXPORT_SYMBOL vmlinux 0x4b1ec3e2kstrtou_f_from_user
+EXPORT_SYMBOL vmlinux 0x4b235e86snd_ctl_find_id
+EXPORT_SYMBOL vmlinux 0x4b239d20snd_card_new
+EXPORT_SYMBOL vmlinux 0x4b3570cip_defrag
+EXPORT_SYMBOL vmlinux 0x4b5d49edm_kcopyd_do_callback
+EXPORT_SYMBOL vmlinux 0x4b76f03of_graph_get_remote_endpoint
+EXPORT_SYMBOL vmlinux 0x4b883239vprintr
+EXPORT_SYMBOL vmlinux 0x4b9f16a4eskb_vlan_un tag
+EXPORT_SYMBOL vmlinux 0x4b93b425of_graph_get_port_parent
+EXPORT_SYMBOL vmlinux 0x4ba54682elv_rformer_request
+EXPORT_SYMBOL vmlinux 0x4baf35a7vme_master_get
+EXPORT_SYMBOL vmlinux 0x4bb21ca5dma_fence_get_status
+EXPORT_SYMBOL vmlinux 0x4bc70ca1submit_bio_wait
+EXPORT_SYMBOL vmlinux 0x4bcep928ndo_dfltdflb_add
+EXPORT_SYMBOL vmlinux 0x4cb920iov_iter_advance
+EXPORT_SYMBOL vmlinux 0x4bd6ca1fdcache_dir_open
+EXPORT_SYMBOL vmlinux 0x4bd20a2skb_put
+EXPORT_SYMBOL vmlinux 0x4be3757pci_release_region
+EXPORT_SYMBOL vmlinux 0x4be7fd63up
+EXPORT_SYMBOL vmlinux 0x4be85a03memweight
+EXPORT_SYMBOL vmlinux 0x4c00fc72dev_dax_pgoff
+EXPORT_SYMBOL vmlinux 0x4c13463binode_get_bytes
+EXPORT_SYMBOL vmlinux 0x4c171219tcp_v4_send_check
+EXPORT_SYMBOL vmlinux 0x4c1ca3bcpumask_next_wrap
+EXPORT_SYMBOL vmlinux 0x4c233a44_raw_read_unlock_bh
+EXPORT_SYMBOL vmlinux 0x4c2ae700strnstr
+EXPORT_SYMBOL vmlinux 0x4c2c1c56xfm_input
+EXPORT_SYMBOL vmlinux 0x4c340f36cf_idr_search
+EXPORT_SYMBOL vmlinux 0x4c416eb9LZ4_decompress_fast
+EXPORT_SYMBOL vmlinux 0x4c4d4232down_write_trylock
+EXPORT_SYMBOL vmlinux 0x4c4f2f77secpath_set
+EXPORT_SYMBOL vmlinux 0x4c5c23d7cputfreq_get_policy
+EXPORT_SYMBOL vmlinux 0x4c5f5c58c_raw_read_lock_bh
+EXPORT_SYMBOL vmlinux 0x4c6299decruncate_inode_pages
+EXPORT_SYMBOL vmlinux 0x4c9a5aceata_scsi_timed_out
+EXPORT_SYMBOL vmlinux 0x4cb533b4kernel_sock_ioctl
+EXPORT_SYMBOL vmlinux 0x4cb61036dcbnl_ieee_notify
+EXPORT_SYMBOL vmlinux 0x4cba441diwe_stream_add_event
+EXPORT_SYMBOL vmlinux 0x4cd5fa75netdev_err
+EXPORT_SYMBOL vmlinux 0x4cd70378ns_to_timeval
+EXPORT_SYMBOL vmlinux 0x4d0ab53dparam_ops_ushort
+EXPORT_SYMBOL vmlinux 0x4d0d163dcopy_page
+EXPORT_SYMBOL vmlinux 0x4d0d0d0dadd_ci
+EXPORT_SYMBOL vmlinux 0x4d2fa427remap_vmalloc_range_partial
+EXPORT_SYMBOL vmlinux 0x4d318fbdetvn_register_queue
+EXPORT_SYMBOL vmlinux 0x4d334cb2add
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+EXPORT_SYMBOL vmlinux 0x4d3c153fsigprocmask
+EXPORT_SYMBOL vmlinux 0x4d45d89eudp_memory_allocated
+EXPORT_SYMBOL vmlinux 0x4d4fa150kobject_set_name
+EXPORT_SYMBOL vmlinux 0x4d5b950bset_anon_super
+EXPORT_SYMBOL vmlinux 0x4d6fee22xfm_init_replay
+EXPORT_SYMBOL vmlinux 0x4d974b9cregister_sysrq_key
+EXPORT_SYMBOL vmlinux 0x4d9b652brb_erase
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+EXPORT_SYMBOL vmlinux 0x4da9ac92xxh32_copy_state
+EXPORT_SYMBOL vmlinux 0x4dc94fa8kernel_setsockopt
+EXPORT_SYMBOL vmlinux 0x4de6038memscan
+EXPORT_SYMBOL vmlinux 0x4df119fa__bitmap_parse
+EXPORT_SYMBOL vmlinux 0x4df2e84gen_estimator_read
+EXPORT_SYMBOL vmlinux 0x4df3b991mmc_alloc_host
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+EXPORT_SYMBOL vmlinux 0x5f928266_arp_send
+EXPORT_SYMBOL vmlinux 0x5f9829a2_pci_enable_device
+EXPORT_SYMBOL vmlinux 0x5f9b16fsg_miter_skip
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+EXPORT_SYMBOL vmlinux 0x5ff11cc3_pcbios_min_io
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+EXPORT_SYMBOL vmlinux 0x601cb54d_replace_node_cached
+EXPORT_SYMBOL vmlinux 0x601f665f_fd_client_create
+EXPORT_SYMBOL vmlinux 0x602b01xmm_card_is_blockaddr
+EXPORT_SYMBOL vmlinux 0x602a8907_wrtnode_uidgid
+EXPORT_SYMBOL vmlinux 0x602c96f0_copy_to_user_fromio
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+EXPORT_SYMBOL vmlinux 0x60352082_getnet6addr_notifier
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+EXPORT_SYMBOL vmlinux 0x60987cc8 dateString
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+EXPORT_SYMBOL vmlinux 0x612e010atty_unlock
+EXPORT_SYMBOL vmlinux 0x6133cb18config_item_init_type_name
+EXPORT_SYMBOL vmlinux 0x61379fe0kernel_sendpage
+EXPORT_SYMBOL vmlinux 0x61407a47scaled_ppm_to_ppb
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+EXPORT_SYMBOL vmlinux 0x6396de92 snd_card_disconnect
+EXPORT_SYMBOL vmlinux 0x63a7c28c bitmap_find_free_region
+EXPORT_SYMBOL vmlinux 0x63c4d61f __bitmap_weight
+EXPORT_SYMBOL vmlinux 0x63cc1d08 phy_set_max_speed
+EXPORT_SYMBOL vmlinux 0x63ea23b8 napi_get.fragments
+EXPORT_SYMBOL vmlinux 0x63eb9355 panic_blink
+EXPORT_SYMBOL vmlinux 0x63ee90ad padata_alloc_possible
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+EXPORT_SYMBOL vmlinux 0x6405dcd3 slhc_toss
+EXPORT_SYMBOL vmlinux 0x64127b67 bitmap_find_next_zero_area_off
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+EXPORT_SYMBOL vmlinux 0x64607ebcf netif_napi_del
+EXPORT_SYMBOL vmlinux 0x646a1f02 __ip_select_ident
+EXPORT_SYMBOL vmlinux 0x64726291 udp6_set_csum
+EXPORT_SYMBOL vmlinux 0x647f0719 inet_offloads
+EXPORT_SYMBOL vmlinux 0x6486d537 snd_ctl_boolean_mono_info
+EXPORT_SYMBOL vmlinux 0x648eb59d gc_inflight_list
+EXPORT_SYMBOL vmlinux 0x649f2f00 atcp_init_sock
+EXPORT_SYMBOL vmlinux 0x649f7af9 abtcf_exts_validate
+EXPORT_SYMBOL vmlinux 0x64999478 congestion_wait
+EXPORT_SYMBOL vmlinux 0x649f200a tcf_exts_validate
+EXPORT_SYMBOL vmlinux 0x64a068b1 add_wait_queue_exclusive
+EXPORT_SYMBOL vmlinux 0x64a9c92e default_dio
+EXPORT_SYMBOL vmlinux 0x64a3f629 generic_block_fiemap
+EXPORT_SYMBOL vmlinux 0x64b05bc8 dma_alloc_pages_fallback
+EXPORT_SYMBOL vmlinux 0x64b3fd59 kmmap_high
+EXPORT_SYMBOL vmlinux 0x650ec2c4 pcie_capability_write_word
+EXPORT_SYMBOL vmlinux 0x65086035 snd_pcm_format_silence_64
+EXPORT_SYMBOL vmlinux 0x6513a3fafb get_color_depth
+EXPORT_SYMBOL vmlinux 0x651a3bc9dwrsem downgrade_wake
+EXPORT_SYMBOL vmlinux 0x651a4139 test_taint
+EXPORT_SYMBOL vmlinux 0x6527e48 __ nla_put
+EXPORT_SYMBOL vmlinux 0x65378228 mnt_drop_write_file
+EXPORT_SYMBOL vmlinux 0x65408378 zlib-inflate_blob
+EXPORT_SYMBOL vmlinux 0x65441307 aud autoimmune_log_start
+EXPORT_SYMBOL vmlinux 0x6546f668 get_mode
+EXPORT_SYMBOL vmlinux 0x655611bf7 get_vaddr_frames
+EXPORT_SYMBOL vmlinux 0x656d33f7 scsi kmap_atomic_sg
+EXPORT_SYMBOL vmlinux 0x65676c71 get_super_thawed
+EXPORT_SYMBOL vmlinux 0x6576e6d scsi-free_host_dev
+EXPORT_SYMBOL vmlinux 0x6580ae92 __ sb_start_write
+EXPORT_SYMBOL vmlinux 0x65828ec3xfm_state_walk
+EXPORT_SYMBOL vmlinux 0x6585efe1 __ pskb_copy_fclone
+EXPORT_SYMBOL vmlinux 0x65894e9d snd_pcm_lib_xfer
+EXPORT_SYMBOL vmlinux 0x6d2ff37da_get_new_above
+EXPORT_SYMBOL vmlinux 0x6d6f857fuid_null
+EXPORT_SYMBOL vmlinux 0x6dd5271a__memset64
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+EXPORT_SYMBOL vmlinux 0x6de1d016tcp_shutdown
+EXPORT_SYMBOL vmlinux 0x6de63d7dfneigh_connected_output
+EXPORT_SYMBOL vmlinux 0x6df44334fwnode_graph_parse_endpoint
+EXPORT_SYMBOL vmlinux 0x6e11a3fed_invalidate
+EXPORT_SYMBOL vmlinux 0x6e1ceb83__bforget
+EXPORT_SYMBOL vmlinux 0x6e2f12bdcdrom_ioctl
+EXPORT_SYMBOL vmlinux 0x6e395044csci_track_queue_full
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+EXPORT_SYMBOL vmlinux 0x6e607d2blkdev_issue_discard
+EXPORT_SYMBOL vmlinux 0x6e6e8b86dev_set_parent
+EXPORT_SYMBOL vmlinux 0x6e720ff2rtul_unlock
+EXPORT_SYMBOL vmlinux 0x6e82f592bio_integrity_prep
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+EXPORT_SYMBOL vmlinux 0x6e4a748a2dev_deactivate
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+EXPORT_SYMBOL vmlinux 0x6e438990of_find_i2c_device_by_node
+EXPORT_SYMBOL vmlinux 0x6e30d50phy_ethtool_get_wol
+EXPORT_SYMBOL vmlinux 0x6e50e8a7__scsi_device_lookup_by_target
+EXPORT_SYMBOL vmlinux 0x6e8f0cd8snd_pcm_format_linear
+EXPORT_SYMBOL vmlinux 0x6f15530dmdaengine_get_unmap_data
+EXPORT_SYMBOL vmlinux 0x6f22be00pm vt_switch_required
+EXPORT_SYMBOL vmlinux 0x6f2fbc807pm param_ops_bool
+EXPORT_SYMBOL vmlinux 0x6f37382ealloc_anon_inode
+EXPORT_SYMBOL vmlinux 0x6f3938c5tty_register_device
+EXPORT_SYMBOL vmlinux 0x6f43ad5tty_devnum
+EXPORT_SYMBOL vmlinux 0x6f5966fbp爸pare_to_wait
+EXPORT_SYMBOL vmlinux 0x6f6e1357inet6_add_protocol
+EXPORT_SYMBOL vmlinux 0x6f78a270iw_handler_set_spy
+EXPORT_SYMBOL vmlinux 0x6f800606gen_pool_virt_to_phys
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+EXPORT_SYMBOL vmlinux 0x6f855636mmc_cqe_start_req
+EXPORT_SYMBOL vmlinux 0x6fae64dgenl_notify
+EXPORT_SYMBOL vmlinux 0x6fa31bfcomplete_all
+EXPORT_SYMBOL vmlinux 0x6fcb87a1touch_softlockup_watchdog
+EXPORT_SYMBOL vmlinux 0x6fd36c06sync_dirty_buffer
+EXPORT_SYMBOL vmlinux 0x6ff09de0input_get_keycode
+EXPORT_SYMBOL vmlinux 0x6ff402b6pci_add_resource_offset
+EXPORT_SYMBOL vmlinux 0x6ffee0092noop_qdisc
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+EXPORT_SYMBOL vmlinux 0x7505bdefmemchr_inv
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+EXPORT_SYMBOL vmlinux 0x751c7d24netpoll_parse_options
+EXPORT_SYMBOL vmlinux 0x752e86b1dev_driver_string
+EXPORT_SYMBOL vmlinux 0x752fbc8apci_bus_type
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+EXPORT_SYMBOL vmlinux 0x754e7b27path_get
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+EXPORT_SYMBOL vmlinux 0x7e28cfa0__quota_error
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+EXPORT_SYMBOL vmlinux 0x7e3cb090nd_region_to NSType
+EXPORT_SYMBOL vmlinux 0x7e66199get_mm_exe_file
+EXPORT_SYMBOL vmlinux 0x7e75b261sync_inodes_sb
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+EXPORT_SYMBOL vmlinux 0x7f0218aff_msecs_to_jiffies
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+EXPORT_SYMBOL vmlinux 0x7f21adb4refcount_dec_and_lock
+EXPORT_SYMBOL vmlinux 0x7f23afe3mutex_trylock
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+EXPORT_SYMBOL vmlinux 0x7f5e8537dev_warn
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+EXPORT_SYMBOL vmlinux 0x7f631abatextsearch_prepare
+EXPORT_SYMBOL vmlinux 0x7f63b31e_memcopy_toio
+EXPORT_SYMBOL vmlinux 0x7f6f1f02snd_seq_root
+EXPORT_SYMBOL vmlinux 0x7f77bb4irq_poll_disable
+EXPORT_SYMBOL vmlinux 0x7f849e16mipi_dsi_dcs_exit_sleep_mode
+EXPORT_SYMBOL vmlinux 0x7fa99814sync_inode
+EXPORT_SYMBOL vmlinux 0x7fc064d1vme_register_bridge
+EXPORT_SYMBOL vmlinux 0x7fc97f58frm_state_add
+EXPORT_SYMBOL vmlinux 0x7fcdf7968blk_queue_free_tags
+EXPORT_SYMBOL vmlinux 0x7fddd32bnvdimm_namespace_capacity
+EXPORT_SYMBOL vmlinux 0x7fde2edvme_master_read
+EXPORT_SYMBOL vmlinux 0x7fe32873replace_node
+EXPORT_SYMBOL vmlinux 0x7feba80dev_get_flags
+EXPORT_SYMBOL vmlinux 0x7ff3b187_gnet_stats_copy_basic
+EXPORT_SYMBOL vmlinux 0x800c1e0cjbd2_journal_try_to_free_buffers
+EXPORT_SYMBOL vmlinux 0x800c4ffamulti3
+EXPORT_SYMBOL vmlinux 0x800b92b_full_name_hash
+EXPORT_SYMBOL vmlinux 0x803d002btc openreq_init_rwin
+EXPORT_SYMBOL vmlinux 0x804c024c_netlink_kernel_create
+EXPORT_SYMBOL vmlinux 0x804c06param_get_string
+EXPORT_SYMBOL vmlinux 0x8067358ipv6 chk custom_prefix
+EXPORT_SYMBOL vmlinux 0x8087b10bxfm_policy_bvid
+EXPORT_SYMBOL vmlinux 0x80a480bb2c_smbus_read_word_data
+EXPORT_SYMBOL vmlinux 0x80b3a957remove_arg_zero
+EXPORT_SYMBOL vmlinux 0x80bddd2b4nf_ip6_checkum
+EXPORT_SYMBOL vmlinux 0x80be6a95param_set_ullong
+EXPORT_SYMBOL vmlinux 0x80c9886btext393xb_lcd_mode
+EXPORT_SYMBOL vmlinux 0x80ca5026_bin2bcd
+EXPORT_SYMBOL vmlinux 0x80cecaebitmap_map_endwrite
+EXPORT_SYMBOL vmlinux 0x80d683efb_register_client
+EXPORT_SYMBOL vmlinux 0x80de4221scm_destroy
+EXPORT_SYMBOL vmlinux 0x80e925bpci_bus_claim_resources
+EXPORT_SYMBOL vmlinux 0x80e99d9econt_write_begin
+EXPORT_SYMBOL vmlinux 0x8102c743dma_common_get_sgtable
+EXPORT_SYMBOL vmlinux 0x810519f9dhashlen_string
+EXPORT_SYMBOL vmlinux 0x8132c5f2pci_bus_put
+EXPORT_SYMBOL vmlinux 0x8147e986from_kgid
+EXPORT_SYMBOL vmlinux 0x814e7730nf_ct_destroy
+EXPORT_SYMBOL vmlinux 0x814e2e9skb_clone_sk
+EXPORT_SYMBOL vmlinux 0x815b5dd4match_octal
+EXPORT_SYMBOL vmlinux 0x818d179siphash_1u32
+EXPORT_SYMBOL vmlinux 0x81b35151xfm_state_update
+EXPORT_SYMBOL vmlinux 0x81b69e41snd_ctl_enum_info
+EXPORT_SYMBOL vmlinux 0x848a5d8asnd_card_register
+EXPORT_SYMBOL vmlinux 0x849d946anetpoll_cleanup
+EXPORT_SYMBOL vmlinux 0x84ab0dd2seq_put_decimal_ll
+EXPORT_SYMBOL vmlinux 0x84b183aaestrncmp
+EXPORT_SYMBOL vmlinux 0x84bf15bdquot_commit
+EXPORT_SYMBOL vmlinux 0x84cf25afunix_gc_lock
+EXPORT_SYMBOL vmlinux 0x84da5429ip_setssockopt
+EXPORT_SYMBOL vmlinux 0x84ffea8bidr_preload
+EXPORT_SYMBOL vmlinux 0x851f3adamadma_fence_array_ops
+EXPORT_SYMBOL vmlinux 0x852fa214follow_pfn
+EXPORT_SYMBOL vmlinux 0x854643datcp_parse_options
+EXPORT_SYMBOL vmlinux 0x855c3c48gro_find_complete_by_type
+EXPORT_SYMBOL vmlinux 0x855d7ac6pci_find_capability
+EXPORT_SYMBOL vmlinux 0x8563f8c1scsi_mode_sense
+EXPORT_SYMBOL vmlinux 0x8566b6b1tcp_add_backlog
+EXPORT_SYMBOL vmlinux 0x85670f1drtnl_is_locked
+EXPORT_SYMBOL vmlinux 0x8573d122sget
+EXPORT_SYMBOL vmlinux 0x85765f6eomap_enable_dma_irq
+EXPORT_SYMBOL vmlinux 0x8582e8ffcpu_all_bits
+EXPORT_SYMBOL vmlinux 0x8591d7d5ledtrig_mtd_activity
+EXPORT_SYMBOL vmlinux 0x859a87a7aset_security_override
+EXPORT_SYMBOL vmlinux 0x85a9b6c5kern_path_create
+EXPORT_SYMBOL vmlinux 0x85b5e625rfkill_set_states
+EXPORT_SYMBOL vmlinux 0x85c658eenvm_unregister_tgt_type
+EXPORT_SYMBOL vmlinux 0x85ded073nla_parse
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+EXPORT_SYMBOL vmlinux 0x863f951c__skb_checksum_complete_head
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+EXPORT_SYMBOL vmlinux 0x8651dc34mipi_dsi_dcs_write_buffer
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+EXPORT_SYMBOL vmlinux 0x86a79499jbd2_journal_force_commit
+EXPORT_SYMBOL vmlinux 0x86a9ab1dPageMovable
+EXPORT_SYMBOL vmlinux 0x86bed960mmc_power_restore_host
+EXPORT_SYMBOL vmlinux 0x86e4d8c8__cgroup_bpf_run_filter_sk
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+EXPORT_SYMBOL vmlinux 0x86ee04885simple_lookup
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+EXPORT_SYMBOL vmlinux 0x8ed310ebseq_release_private
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+EXPORT_SYMBOL vmlinux 0x8f678b07_stack_chk_guard
+EXPORT_SYMBOL vmlinux 0x8f70bb4acomplete_request_key
+EXPORT_SYMBOL vmlinux 0x8f72105xfm_parse_spi
+EXPORT_SYMBOL vmlinux 0x8f7e39d9user_path_at_empty
+EXPORT_SYMBOL vmlinux 0x8f8bb88dpci_bus_write_config_word
+EXPORT_SYMBOL vmlinux 0x8fa4130aomap_set_dma_callback
+EXPORT_SYMBOL vmlinux 0x8fb024510ndd
+EXPORT_SYMBOL vmlinux 0x8fd180e7kernel_neon_begin
+EXPORT_SYMBOL vmlinux 0x8fe323dablock_read_full_page
+EXPORT_SYMBOL vmlinux 0x8f0e4cc8doid_wait_intr
+EXPORT_SYMBOL vmlinux 0x8f14e7drcrypto_sha512_finup
+EXPORT_SYMBOL vmlinux 0x8f189ed0seg6_hmac_exit
+EXPORT_SYMBOL vmlinux 0x8f9db3b8crc16
+EXPORT_SYMBOL vmlinux 0x8f977e0tree_tag_get
+EXPORT_SYMBOL vmlinux 0x8f905bfb_pan_display
+EXPORT_SYMBOL vmlinux 0x900d08dcdrom_get_media_event
+EXPORT_SYMBOL vmlinux 0x90068c0find_node_by_phandle
+EXPORT_SYMBOL vmlinux 0x900a04a0dev_open
+EXPORT_SYMBOL vmlinux 0x901602e7skb_append
+EXPORT_SYMBOL vmlinux 0x901967e2dev_get_by_napi_id
+EXPORT_SYMBOL vmlinux 0x901bf7e1tcp_getsockopt
+EXPORT_SYMBOL vmlinux 0x902f640devfreq_remove_device
+EXPORT_SYMBOL vmlinux 0x9036235is_nvdim_bus_locked
+EXPORT_SYMBOL vmlinux 0x903ed82path_has_submounts
+EXPORT_SYMBOL vmlinux 0x905cd094phy_ethtool_ksettings_set
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+EXPORT_SYMBOL vmlinux 0x9068fa09xfrm6_rcv_cb
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+EXPORT_SYMBOL vmlinux 0x90cda993bdget
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+EXPORT_SYMBOL vmlinux 0x9aaefecsysctl_nf_log_all_netns
+EXPORT_SYMBOL vmlinux 0x9ab18c94__check_sticky
+EXPORT_SYMBOL vmlinux 0x9abf1bb5jdbc2_journal_revoke
+EXPORT_SYMBOL vmlinux 0x9ac76475mme_of_parse_voltage
+EXPORT_SYMBOL vmlinux 0x9af0382eununix_destruct_scn
+EXPORT_SYMBOL vmlinux 0x9afeae58bldev_get_by_dev
+EXPORT_SYMBOL vmlinux 0x9b03692fkradix_tree_iter_resume
+EXPORT_SYMBOL vmlinux 0x9b1990b1kthread_destroy_worker
+EXPORT_SYMBOL vmlinux 0x9b1ba31ddev_get_phys_port_name
+EXPORT_SYMBOL vmlinux 0x9b2560b9gf128mul_init_4k_bbe
+EXPORT_SYMBOL vmlinux 0x9b3032afvmlinux_get_tgt_bb_tbl
+EXPORT_SYMBOL vmlinux 0x9b33e0d7unregister_debevent_notifier
+EXPORT_SYMBOL vmlinux 0x9b388444get_zeroed_page
+EXPORT_SYMBOL vmlinux 0x9b390b13of_phy_register_fixed_link
+EXPORT_SYMBOL vmlinux 0x9b66035blklk_register_region
+EXPORT_SYMBOL vmlinux 0x9b6eb137ksize
+EXPORT_SYMBOL vmlinux 0x9b79a112path_is_mountpoint
+EXPORT_SYMBOL vmlinux 0x9b816a83vfs_statx_fd
+EXPORT_SYMBOL vmlinux 0x9ba3b5f6pci_find_bus
+EXPORT_SYMBOL vmlinux 0x9ba7089dargv_split
+EXPORT_SYMBOL vmlinux 0x9bb88b3flex_array_put
+EXPORT_SYMBOL vmlinux 0x9bd0c6bbsecurity_task_getseccid
+EXPORT_SYMBOL vmlinux 0x9be6965bbsubmit_read
+EXPORT_SYMBOL vmlinux 0x9bfac5e7__kernel_is_locked_down
+EXPORT_SYMBOL vmlinux 0x9bf97852c_register_driver
+EXPORT_SYMBOL vmlinux 0x9c0bd51f_raw_spin_lock
+EXPORT_SYMBOL vmlinux 0x9c0c37365bioet_integrity_create
+EXPORT_SYMBOL vmlinux 0x9c491f60sg_alloc_table
+EXPORT_SYMBOL vmlinux 0x9c58a1c4devm_pci_remap_isspace
+EXPORT_SYMBOL vmlinux 0x9c6c2ac4rtml_unicast
+EXPORT_SYMBOL vmlinux 0x9c72ad21pci_unregister_driver
+EXPORT_SYMBOL vmlinux 0x9c7419dcZSTD_initDStream_usingDDict
+EXPORT_SYMBOL vmlinux 0x9c79740dsnd_timer_close
+EXPORT_SYMBOL vmlinux 0x9c84ee93zero_fill_bio
+EXPORT_SYMBOL vmlinux 0x9c8f5016ctp_timewait_state_process
+EXPORT_SYMBOL vmlinux 0x9ca764c8inet_unregister_protosw
+EXPORT_SYMBOL vmlinux 0x9cab34a6rfskill_set_led_trigger_name
+EXPORT_SYMBOL vmlinux 0x9cbea88ctcf_chain_get
+EXPORT_SYMBOL vmlinux 0x9cb14a4dbio_split
+EXPORT_SYMBOL vmlinux 0x9cb33c37_raw_read_unlock_irqrestore
+EXPORT_SYMBOL vmlinux 0x9cbf4507kfree_skb_list
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+EXPORT_SYMBOL vmlinux 0x9cedbadlinode_newsize_ok
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+EXPORT_SYMBOL vmlinux 0x9cf69c30serial8250_do_pm
+EXPORT_SYMBOL vmlinux 0x9dd0d6206unregister_netdevice_notifier
+EXPORT_SYMBOL vmlinux 0x9de4785config_item_get_unless_zero
+EXPORT_SYMBOL vmlinux 0x9f539064pci_get_domain_bus_and_slot
+EXPORT_SYMBOL vmlinux 0x9f54ead7gro_cells_destroy
+EXPORT_SYMBOL vmlinux 0x9f5f5b0b_of_n_size_cells
+EXPORT_SYMBOL vmlinux 0x9f69018dwtlkfdw040_reg_write
+EXPORT_SYMBOL vmlinux 0x9f701b7epci_bus_read_config_dword
+EXPORT_SYMBOL vmlinux 0x9f886e70pci_scan_bus
+EXPORT_SYMBOL vmlinux 0x9f8c9033_sockfd_lookup
+EXPORT_SYMBOL vmlinux 0x9f984513strtchr
+EXPORT_SYMBOL vmlinux 0x9fd0d0eduuid_is_valid
+EXPORT_SYMBOL vmlinux 0x9fc0d29afinish_no_open
+EXPORT_SYMBOL vmlinux 0x9fd7ca1flex_array_prealloc
+EXPORT_SYMBOL vmlinux 0x9fde396bmmc_release_host
+EXPORT_SYMBOL vmlinux 0x9fdec31unregister_netdevice_many
+EXPORT_SYMBOL vmlinux 0x9fe83b1xfmr_find_acq
+EXPORT_SYMBOL vmlinux 0x9f893a75netdev_max_backlog
+EXPORT_SYMBOL vmlinux 0x9a00087dseg6_hmac_info_add
+EXPORT_SYMBOL vmlinux 0x9a05676e0fastasync_helper
+EXPORT_SYMBOL vmlinux 0xa00c3136phy_drivers_register
+EXPORT_SYMBOL vmlinux 0x9a0f78e9sock_dequeue_err_skb
+EXPORT_SYMBOL vmlinux 0x9a0b9c9sock_no_bind
+EXPORT_SYMBOL vmlinux 0x9a023b147kmem_cache_destroy
+EXPORT_SYMBOL vmlinux 0x9a03c1852skb_copy_datagram_iter
+EXPORT_SYMBOL vmlinux 0x9a0d3e98ifn6addr_linklocal_allnodes
+EXPORT_SYMBOL vmlinux 0x9a0e1bdqdisc_class_hash_insert
+EXPORT_SYMBOL vmlinux 0x9a0501769pci_iomap
+EXPORT_SYMBOL vmlinux 0x9a05489fdev_uc_sync_multiple
+EXPORT_SYMBOL vmlinux 0x9a05c0dfmempool_kmalloc
+EXPORT_SYMBOL vmlinux 0x9a06d9e1__kfifo_dma_out_finish_r
+EXPORT_SYMBOL vmlinux 0x9a0730467mempool_create_node
+EXPORT_SYMBOL vmlinux 0x9a073b5f1follow_up
+EXPORT_SYMBOL vmlinux 0x9a07ed110xz_dec_init
+EXPORT_SYMBOL vmlinux 0x9a084749a__bitmap_or
+EXPORT_SYMBOL vmlinux 0x9a0b04675vmalloc_32
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+EXPORT_SYMBOL vmlinux 0x9a0c9d9e9ebvfs_path_lookup
+EXPORT_SYMBOL vmlinux 0x9a0d88enetworkdev_adjacent_get_private
+EXPORT_SYMBOL vmlinux 0x9a0e70f3lalnetlalink_get_net
+EXPORT_SYMBOL vmlinux 0x9a0e0b14cysctl_tcp_mem
+EXPORT_SYMBOL vmlinux 0x9a0f4b79wakeup_bit
+EXPORT_SYMBOL vmlinux 0x9a0fd2427sd_pci_quirk_lookup_id
+EXPORT_SYMBOL vmlinux 0x9a108eb4dsysctl_optmem_max
+EXPORT_SYMBOL vmlinux 0x9a10fda22netdev_boot_setup_check
+EXPORT_SYMBOL vmlinux 0x9a117fedbfl_getsockopt
+EXPORT_SYMBOL vmlinux 0x9a11800adsnd_soc_alloc_ac97_codec
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+EXPORT_SYMBOL vmlinux 0x9a12550e3mmc_erase_group_aligned
+EXPORT_SYMBOL vmlinux 0x9a141518twi030_interrupt_unmask
+EXPORT_SYMBOL vmlinux 0x9a1443f5dflex_array_free_parts

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+EXPORT_SYMBOL vmlinux 0xa3709dd9devm_gpio_request
+EXPORT_SYMBOL vmlinux 0xa37e78b6flex_array_get
+EXPORT_SYMBOL vmlinux 0xa37ec4d4ip_options_rcv_srr
+EXPORT_SYMBOL vmlinux 0xa385a61devfreq_unregister_notifier
+EXPORT_SYMBOL vmlinux 0xa3a3281adirectory_update_name_case
+EXPORT_SYMBOL vmlinux 0xa3c0e06memcg_sockets_enabled_key
+EXPORT_SYMBOL vmlinux 0xa3ce4999dev_pm_op_register_notifier
+EXPORT_SYMBOL vmlinux 0xa3c9e341writeback_inodes_sb_nr
+EXPORT_SYMBOL vmlinux 0xa3cd3a0dmnet6_getname
+EXPORT_SYMBOL vmlinux 0xa3df086devm_backlight_device_register
+EXPORT_SYMBOL vmlinux 0xa3e1d06phy_drivers_unregister
+EXPORT_SYMBOL vmlinux 0xa3df50cdm_io
+EXPORT_SYMBOL vmlinux 0xa40813e9eth_header_cache
+EXPORT_SYMBOL vmlinux 0xa43f247elv_rb_add
+EXPORT_SYMBOL vmlinux 0xa4b68d1nd_dev_io_uuid
+EXPORT_SYMBOL vmlinux 0xa4b00d60map_rev
+EXPORT_SYMBOL vmlinux 0xa4717deasock_kzfree_s
+EXPORT_SYMBOL vmlinux 0xa48f5b09omap_dma_set_global_params
+EXPORT_SYMBOL vmlinux 0xa4ae5enetif_tx_wake_queue
+EXPORT_SYMBOL vmlinux 0xa4b2c55omap_set_dma_priority
+EXPORT_SYMBOL vmlinux 0xa4d8a286devfreq_monitor_suspend
+EXPORT_SYMBOL vmlinux 0xa4fd30blk_end_request
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+EXPORT_SYMBOL vmlinux 0xa5604defptp_clock_index
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+EXPORT_SYMBOL vmlinux 0xa573b3emmc_def retune_timer_stop
+EXPORT_SYMBOL vmlinux 0xa598e29cvesa_modes
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+EXPORT_SYMBOL vmlinux 0xa5e16a57kill_fasync
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+EXPORT_SYMBOL vmlinux 0xab78150b get_options
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+EXPORT_SYMBOL vmlinux 0xab8ae31c free_anon_bdev
+EXPORT_SYMBOL vmlinux 0xabf22f3d max8925_bulk_read
+EXPORT_SYMBOL vmlinux 0xabf7f971f ainfo
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+EXPORT_SYMBOL vmlinux 0xacab29b7 seq_hlist_start_percpu
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+EXPORT_SYMBOL vmlinux 0xacf8d813 unmap_iospace
+EXPORT_SYMBOL vmlinux 0xacf8d813 register_reboot_notifer
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+EXPORT_SYMBOL vmlinux 0xaf50e76df_set_personality
+EXPORT_SYMBOL vmlinux 0xaf72d92cfrod,kgid_munged
+EXPORT_SYMBOL vmlinux 0xaf84865e__get_user_8
+EXPORT_SYMBOL vmlinux 0xaf87316bblk_mq_complete_request
+EXPORT_SYMBOL vmlinux 0xaf8aa518system_rev
+EXPORT_SYMBOL vmlinux 0xaf937886set_posix_acl
+EXPORT_SYMBOL vmlinux 0xaf9a044boverride_creds
+EXPORT_SYMBOL vmlinux 0xaf9f941get_super_exclusive_thawed
+EXPORT_SYMBOL vmlinux 0xaf9fd30sock_no_socketpair
+EXPORT_SYMBOL vmlinux 0xafadd995LZ4_decompress_fast_continue
+EXPORT_SYMBOL vmlinux 0xafb6986ddisc_destroy
+EXPORT_SYMBOL vmlinux 0xafb97268skb_prepare_seq_read
+EXPORT_SYMBOL vmlinux 0xafbc7cfget_io_context
+EXPORT_SYMBOL vmlinux 0xafda7da8param_set_invbool
+EXPORT_SYMBOL vmlinux 0xafde8014inode_permission
+EXPORT_SYMBOL vmlinux 0xafed9b15get_user_pages
+EXPORT_SYMBOL vmlinux 0xb001ad8bpool_freewait
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+EXPORT_SYMBOL vmlinux 0xc7208c3aserial8250_resume_port
+EXPORT_SYMBOL vmlinux 0xc722d6ebip_do_fragment
+EXPORT_SYMBOL vmlinux 0xc726819bmmcm_retune_release
+EXPORT_SYMBOL vmlinux 0xc729c0bammc_start_request
+EXPORT_SYMBOL vmlinux 0xc738a8e6kid_anon_super
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mlx5_query_vport_admin_state
+EXPORT_SYMBOL_GPL drivers/net/ethernet/microchip/encx24j600-regmap 0x368d3d71 regmap_encx24j600_spi_write
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+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x5bf15adiscsi_free_session
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x5f39ac10iscsi_get_port_speed_name
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x624640a5iscsi_block_scsi_eh
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x63af078liscsi_destroy_endpoint
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x699fe53eiscsi_get_discovery_parent_name
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x69a607discsi_create_iscsi
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x796d6909iscsi_get_port_state_name
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x84a005f1iscsi_get_router_state_name
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x87260088iscsi_is_session_online
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0x8e6850d1iscsi_post_host_event
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0xa823597d1iscsi_destroy_conn
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0xa2ca9839iscsi_flashnode_bus_match
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0xac5e859iscsi_register_transport
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0xb4085366iscsi_block_session
+EXPORT_SYMBOL_GPL drivers/scsi/libbsas/libbsas 0xb999091discsi_add_session

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+EXPORT_SYMBOL_GPL drivers/tee/tee 0xdf7d1a46tee_shm_va2pa
+EXPORT_SYMBOL_GPL drivers/tee/tee 0x7e640f44tee_shm_pa2va
+EXPORT_SYMBOL_GPL drivers/tee/tee 0xfd761d5ftee_shm_get_va
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/tracesink 0x585ebaacn_tracesink_datadrain
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0x1f449588mctr_gpio_disable_ms
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0x427f28aamctr_gpio_get_outputs
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0x48a3d20bmctr_gpio_get
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0x78b8hecmmctr_gpio_init_noauto
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0x96c51267mctr_gpio_init
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0xdfc86c90mctr_gpio_set
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0xe9c0d23dmctr_gpio_free
+EXPORT_SYMBOL_GPL drivers/tty/ttyh/mctr_gpio 0xeaad54924mctr_gpio_to_gpiod
+EXPORT_SYMBOL_GPL drivers/uio/uio 0x5a002a72uio_event_notify
+EXPORT_SYMBOL_GPL drivers/uio/uio 0x69a22361_uio_register_device
+EXPORT_SYMBOL_GPL drivers/uio/uio 0x9f4e7746uio_unregister_device
+EXPORT_SYMBOL_GPL drivers/usb/atm/usbatm 0x5751f1dbusbatm_usb_disconnect
+EXPORT_SYMBOL_GPL drivers/usb/atm/usbatm 0x737d661cusbatm_usb_probe
+EXPORT_SYMBOL_GPL drivers/usb/chipidea/ci_hdrc 0x0535a895ci_hdrc_add_device
+EXPORT_SYMBOL_GPL drivers/usb/chipidea/ci_hdrc 0x0dc13495ci_hdrc_remove_device
+EXPORT_SYMBOL_GPL drivers/usb/chipidea/ci_hdrc 0x81b1667bhw_phymode_configure
+EXPORT_SYMBOL_GPL drivers/usb/chipidea/usbmisc_imx 0x1e4fb0dausbmisc_init
+EXPORT_SYMBOL_GPL drivers/usb/chipidea/usbmisc_imx 0xa24c8d11imx_usbmisc_set_wakeup
+EXPORT_SYMBOL_GPL drivers/usb/chipidea/usbmisc_imx 0x8b42e5319imx_usbmisc_init_post
+EXPORT_SYMBOL_GPL drivers/usb/common/ulpi 0x0a394be2__ulpi_register_driver
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+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/u_audio 0x799c905dg_audio_setup
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+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/u_audio 0x8697a183u_audio_stop_capture
+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/u_audio 0x8827664cu_audio_start_capture
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+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/uEther 0x2250a376ether_register_netdev
+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/uEther 0x66ea3ba9ether_get_host_addr_cdc
+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/uEther 0x792b5eether_get_host_addr
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+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/uEther 0x8878cafather_get_cleanup
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+EXPORT_SYMBOL_GPL drivers/usb/gadget/function/uEther 0xa77eda2ether_set_gadget
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+EXPORT_SYMBOL_GPL drivers/video/fbdev/core/fb_sys_fops 0x35f5382afb_sys_read
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+EXPORT_SYMBOL_GPL drivers/video/fbdev/omap2/omapfb/dss/omapdss 0x29c6a8a7 omapdss_of_get_next_endpoint
+EXPORT_SYMBOL_GPL drivers/video/fbdev/omap2/omapfb/dss/omapdss 0x3a28cf2a omapdss_of_find_source_for_first_ep
+EXPORT_SYMBOL_GPL drivers/video/fbdev/omap2/omapfb/dss/omapdss 0x6b0dd667 omapdss_of_get_first_endpoint
+EXPORT_SYMBOL_GPL drivers/video/fbdev/omap2/omapfb/dss/omapdss 0xfb133fa2 omapdss_of_get_next_port
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+EXPORT_SYMBOL_GPL drivers/wl/wire 0x6ca878abwl1.touch_block
+EXPORT_SYMBOL_GPL drivers/wl/wire 0x6df511dl1.write_8
+EXPORT_SYMBOL_GPL drivers/wl/wire 0x7c2f2afbw1calc_crc8
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+EXPORT_SYMBOL_GPL fs/lockd/lockd 0x8a098ce4unlock_all_by_sb
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+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x0e5f2fd6nfs_retry_commit
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+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x1a6ed9d5nfs_request_remove_commit_list
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+EXPORT_SYMBOL_GPL kernel/torture 0x4c7529bdtorture_shutdown_absorb
+EXPORT_SYMBOL_GPL kernel/torture 0x52665f8btorture_random
+EXPORT_SYMBOL_GPL kernel/torture 0x5346b23btorture_shuffle_cleanup
+EXPORT_SYMBOL_GPL kernel/torture 0x6364b2f0stutter_wait
+EXPORT_SYMBOL_GPL kernel/torture 0x679d9e50torture_must_stop
+EXPORT_SYMBOL_GPL kernel/torture 0x688e6a64torture_cleanup_end
+EXPORT_SYMBOL_GPL kernel/torture 0x6bdeda8ftorture_onoff_init
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+EXPORT_SYMBOL_GPL kernel/torture 0xe6989fd3tortion_init_end
+EXPORT_SYMBOL_GPL kernel/torture 0xe9ff1468tortion_stutter_init
+EXPORT_SYMBOL_GPL kernel/torture 0xf6d34fb5tortion_kthread_stopping
+EXPORT_SYMBOL_GPL kernel/torture 0xf7790bc7tortion_create_kthread
+EXPORT_SYMBOL_GPL lib/842/842_compress 0x1ce013cfsw842_compress
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+EXPORT_SYMBOL_GPL lib/crc4 0x0083af0atorture_shuffle_init
+EXPORT_SYMBOL_GPL lib/notifier-error-inject 0x455870ddnotifier_err_inject_init
+EXPORT_SYMBOL_GPL lib/notifier-error-inject 0x86876551notifier_err_inject_dir
+EXPORT_SYMBOL_GPL lib/raid6/raid6_pq 0x021957e1raid6_datap_recov
+EXPORT_SYMBOL_GPL lib/raid6/raid6_pq 0x0f8a2742raid6_2data_recov
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x2d107b5ebase_inv_old_true_key
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+EXPORT_SYMBOL_GPL net/6lowpan/6lowpan 0x1608a5calowpan_header_compress
+EXPORT_SYMBOL_GPL net/6lowpan/6lowpan 0xc5da820lowpan_header_decompress
+EXPORT_SYMBOL_GPL net/802/garp 0x16f3be40garp_request_join
+EXPORT_SYMBOL_GPL net/802/garp 0x8b138949garp_uninit_applicant
+EXPORT_SYMBOL_GPL net/802/garp 0xc4c1a508garp_register_application
+EXPORT_SYMBOL_GPL net/802/garp 0xed88959cgarp_unregister_application
+EXPORT_SYMBOL_GPL net/802/mrp 0xf25bfed9mrp_init_applicant
+EXPORT_SYMBOL_GPL net/802/mrp 0xf9b5c831mrp_request_leave
+EXPORT_SYMBOL_GPL net/802/mrp 0x8b0e1d2mrp_unregister_application
+EXPORT_SYMBOL_GPL net/802/mrp 0xdbc5277amrp_uninit_applicant
+EXPORT_SYMBOL_GPL net/802/mrp 0x8b0e1d2mrp_unregister_application

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+EXPORT_SYMBOL_GPL net/l2tp/l2tp_netlink 0x467007302tp nl_register_ops
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x301516f5ieee80211_remove_key
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x36cb3aa4ieee80211_ready_on_channel
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x6a37182ieee80211_iterate_interfaces
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x72dd823ieee80211_find_sta_by_ifaddr
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x73fa026ieee80211_iterate Stations_atomic
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x74dbc3afieee80211_vif_to_wdev
+EXPORT_SYMBOL_GPL net/mac80211/mac80211 0x7597175fieee80211_iterate_active Interfaces_rtnl
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+EXPORT_SYMBOL_GPL net/rds/rds 0x3596777rrds_rdma_send_complete
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+EXPORT_SYMBOL_GPL net/rds/rds 0xef07df49rrds_conn_create_outgoing
+EXPORT_SYMBOL_GPL net/rds/rds 0xf5bdcb6frds_inc_path_init
+EXPORT_SYMBOL_GPL net/rds/rds 0xf8a654e3rrds_conn_path_connect_if_down
+EXPORT_SYMBOL_GPL net/sctp/scp 0x47b58ae2sctp_transport_lookup_process
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<th>Function</th>
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<td>get_task_comm</td>
<td>0x4405c4e</td>
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<td>fib_multipath_hash</td>
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<td>cpu_pm_register_notifier</td>
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<td>sdio_register_driver</td>
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<td>vmlinux</td>
<td>0x44590c0</td>
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<tr>
<td>__get_task_comm</td>
<td>0x446a462etty</td>
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<td>clk_round_rate</td>
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<td>__get_task_comm</td>
<td>0x4473db68ktimeget_snapshot</td>
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+EXPORT_SYMBOL_GPL vmlinux 0xc4421796rtc_device_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xc445974espi write then read
+EXPORT_SYMBOL_GPL vmlinux 0xc454fc7btwl get_type
+EXPORT_SYMBOL_GPL vmlinux 0xc45d8a4usb get descriptor
+EXPORT_SYMBOL_GPL vmlinux 0xc4673f3blk mq free request
+EXPORT_SYMBOL_GPL vmlinux 0xc471e67atwl4030 audio disable_resource
+EXPORT_SYMBOL_GPL vmlinux 0xc48b7ccfata_mode_string
+EXPORT_SYMBOL_GPL vmlinux 0xc4bb856of irq parse raw
+EXPORT_SYMBOL_GPL vmlinux 0xc4bd4021dev pm qos expose latency tolerance
+EXPORT_SYMBOL_GPL vmlinux 0xc4d31edadvm regulator unregister
+EXPORT_SYMBOL_GPL vmlinux 0xc4d6632page_endio
+EXPORT_SYMBOL_GPL vmlinux 0xc4f8a836dev pm clear wake irq
+EXPORT_SYMBOL_GPL vmlinux 0xc4fb3181d exchange
+EXPORT_SYMBOL_GPL vmlinux 0xc5029856regmap field alloc
+EXPORT_SYMBOL_GPL vmlinux 0xc506af9csock zero_copy_callback
+EXPORT_SYMBOL_GPL vmlinux 0xc512fe84mddev init writes pending
+EXPORT_SYMBOL_GPL vmlinux 0xc51a6d0drirq gc_mask set bit
+EXPORT_SYMBOL_GPL vmlinux 0xc5377d27irq create of mapping
+EXPORT_SYMBOL_GPL vmlinux 0xc567c9f2pm runtime force resume
+EXPORT_SYMBOL_GPL vmlinux 0xc5698d2emd kick rdev from array
+EXPORT_SYMBOL_GPL vmlinux 0xc569d8ce _clk get name
+EXPORT_SYMBOL_GPL vmlinux 0xc575c73debug locks off
+EXPORT_SYMBOL_GPL vmlinux 0xdb2192f4nvdimm_bus_register
+EXPORT_SYMBOL_GPL vmlinux 0xdb36bf8snd_soc_bytes_tlv_callback
+EXPORT_SYMBOL_GPL vmlinux 0xdb4d59firmware_kobj
+EXPORT_SYMBOL_GPL vmlinux 0xdb5698capErrMsg_file
+EXPORT_SYMBOL_GPL vmlinux 0xdb64a7gfnn_to_pf_mems
+EXPORT_SYMBOL_GPL vmlinux 0xdb739a20split_page
+EXPORT_SYMBOL_GPL vmlinux 0xdb799818snd_soc_get_dai_substream
+EXPORT_SYMBOL_GPL vmlinux 0xdb8a1bf3fusermodehelper_read_trylock
+EXPORT_SYMBOL_GPL vmlinux 0xdb920047group_attach_task_all
+EXPORT_SYMBOL_GPL vmlinux 0xdbc0f2c2iommu_fwspec_add_ids
+EXPORT_SYMBOL_GPL vmlinux 0xdbc7642blkg_stat_recursive_sum
+EXPORT_SYMBOL_GPL vmlinux 0xdbf7cb70mpi_get nbits
+EXPORT_SYMBOL_GPL vmlinux 0xdc2a4bf3nv_mbus_dram_info
+EXPORT_SYMBOL_GPL vmlinux 0xdc2d868dma_buf_detach
+EXPORT_SYMBOL_GPL vmlinux 0xdc3e393efivars_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xdc41f01aata_qc_complete_multiple
+EXPORT_SYMBOL_GPL vmlinux 0xdc427548_regmap_init_mnio_clk
+EXPORT_SYMBOL_GPL vmlinux 0xdc4a82b0sdhci_resume_host
+EXPORT_SYMBOL_GPL vmlinux 0xdc4f5e80usb_anchor_suspend_wakes
+EXPORT_SYMBOL_GPL vmlinux 0xdc6596fairq_set_parent
+EXPORT_SYMBOL_GPL vmlinux 0xdc6aa37ddma_buf_fd
+EXPORT_SYMBOL_GPL vmlinux 0xdc6ba1daphctl_generic_add_group
+EXPORT_SYMBOL_GPL vmlinux 0xdc7ee395crypto_register_rng
+EXPORT_SYMBOL_GPL vmlinux 0xdc825d6cusb_and_quirk_pll_disable
+EXPORT_SYMBOL_GPL vmlinux 0xdc91f7c9regulator_set_soft_start_regmap
+EXPORT_SYMBOL_GPL vmlinux 0xdc941969crypto_sha1_digest
+EXPORT_SYMBOL_GPL vmlinux 0xdc97af2esyscore_suspend
+EXPORT_SYMBOL_GPL vmlinux 0xdc987e41power_supply_property_is_writeable
+EXPORT_SYMBOL_GPL vmlinux 0xdc9fa232raw_notifier_chain_register
+EXPORT_SYMBOL_GPL vmlinux 0xdcada3e4pci_add_dynid
+EXPORT_SYMBOL_GPL vmlinux 0xdcbb5328user_destroy
+EXPORT_SYMBOL_GPL vmlinux 0xdcfc09f3_wait_rcu_gp
+EXPORT_SYMBOL_GPL vmlinux 0xdce2a26ping_err
+EXPORT_SYMBOL_GPL vmlinux 0xdcf80939serdev_controller_add
+EXPORT_SYMBOL_GPL vmlinux 0xdced71bhwmom_device_register_with_info
+EXPORT_SYMBOL_GPL vmlinux 0xdcfd444crht_bucket_nested_insert
+EXPORT_SYMBOL_GPL vmlinux 0xdd15cf89switchdev_port_attr_set
+EXPORT_SYMBOL_GPL vmlinux 0xdd243601crht_bucket_nested_insert
+EXPORT_SYMBOL_GPL vmlinux 0xdd2e133dhrtimer_start_range_ns
+EXPORT_SYMBOL_GPL vmlinux 0xdd2efc0fring_buffer_reset_cpu
+EXPORT_SYMBOL_GPL vmlinux 0xdd391effprofile_event_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xdd4adeaevpm_enable_wake_irq
+EXPORT_SYMBOL_GPL vmlinux 0xdd61495kvm_write_guest_offset_cached
+EXPORT_SYMBOL_GPL vmlinux 0xdd654b85of_detach_node
+EXPORT_SYMBOL_GPL vmlinux 0xdd6ce97get_current_tty
+EXPORT_SYMBOL_GPL vmlinux 0xdd718e52crypto_unregister_aeads
+EXPORT_SYMBOL_GPL vmlinux 0xfa336c7adevres_find
+EXPORT_SYMBOL_GPL vmlinux 0xfa3bbc7busb_alloc_dev
+EXPORT_SYMBOL_GPL vmlinux 0xfa4667a2usb_anchor_resume_wakeups
+EXPORT_SYMBOL_GPL vmlinux 0xfa5445cfdriver_for_each_device
+EXPORT_SYMBOL_GPL vmlinux 0xfa57262aregulator_set_pull_down_regmap
+EXPORT_SYMBOL_GPL vmlinux 0xfa7cb06bspi_slave_abort
+EXPORT_SYMBOL_GPL vmlinux 0xfa8eb779tps80031__ext_power_req_config
+EXPORT_SYMBOL_GPL vmlinux 0xfa9a6d0bcupufreq_disable_fast_switch
+EXPORT_SYMBOL_GPL vmlinux 0xfab30dc0audio_bus_exit
+EXPORT_SYMBOL_GPL vmlinux 0xfac5b761opowercap_unregister_zone
+EXPORT_SYMBOL_GPL vmlinux 0xfad4a9c9gfn_to_memsol
+EXPORT_SYMBOL_GPL vmlinux 0xfad9c827kill_dax
+EXPORT_SYMBOL_GPL vmlinux 0xfad9e7d6edev_mtd_blktrans_dev
+EXPORT_SYMBOL_GPL vmlinux 0xfade927badblocks_exit
+EXPORT_SYMBOL_GPL vmlinux 0xfae67b1fcap_mmap_addr
+EXPORT_SYMBOL_GPL vmlinux 0xfaf03dc3dev_mdev_device_add_group
+EXPORT_SYMBOL_GPL vmlinux 0xfaf03dc3dev_mdev_device_add_group
+EXPORT_SYMBOL_GPL vmlinux 0xfaf9066ata_sas_port_resume
+EXPORT_SYMBOL_GPL vmlinux 0xfaf03dc3dev_mdev_device_add_group
+EXPORT_SYMBOL_GPL vmlinux 0xfb15abe7ata_host_alloc
+EXPORT_SYMBOL_GPL vmlinux 0xfb1a59daata_cable_unknown
+EXPORT_SYMBOL_GPL vmlinux 0xfb1b3eregulator_bulk_register_supply_alias
+EXPORT_SYMBOL_GPL vmlinux 0xfb2591c3__clk_determine_rate
+EXPORT_SYMBOL_GPL vmlinux 0xfb32b30fring_buffer_read_prepare_sync
+EXPORT_SYMBOL_GPL vmlinux 0xfb391574register_pernet_subsys
+EXPORT_SYMBOL_GPL vmlinux 0xfb3eb99blk_init_request_from_bio
+EXPORT_SYMBOL_GPL vmlinux 0xfb436c62devm_regulator_register_notifier
+EXPORT_SYMBOL_GPL vmlinux 0xfb55cfdfomap_dm_timer_read_status
+EXPORT_SYMBOL_GPL vmlinux 0xfb6ee899power_group_name
+EXPORT_SYMBOL_GPL vmlinux 0xfb78a59mshub_interrupt
+EXPORT_SYMBOL_GPL vmlinux 0xfb92ad5edevice_attach
+EXPORT_SYMBOL_GPL vmlinux 0xfb989735usb_gadget_vbus_draw
+EXPORT_SYMBOL_GPL vmlinux 0xfb989735usb_gadget_vbus_draw
+EXPORT_SYMBOL_GPL vmlinux 0xfbc1f5f6ehci_suspend
+EXPORT_SYMBOL_GPL vmlinux 0xfbcc6cd1ata_sas_port_suspend
+EXPORT_SYMBOL_GPL vmlinux 0xfbdb6fiof_mpc8xxx_spi_probe
+EXPORT_SYMBOL_GPL vmlinux 0xfbdc89a3sdev_mdev_device_add_group
+EXPORT_SYMBOL_GPL vmlinux 0xfbde2ddevice_remove_resource
+EXPORT_SYMBOL_GPL vmlinux 0xfb86b21devm_clk_hw_register
+EXPORT_SYMBOL_GPL vmlinux 0xfc00a3e7mtd_point
+EXPORT_SYMBOL_GPL vmlinux 0xfc03e4cpcl_device_remove_resource
+EXPORT_SYMBOL_GPL vmlinux 0xfc04d97apage_is_ram
+EXPORT_SYMBOL_GPL vmlinux 0xfc097f20devm_add_action
+EXPORT_SYMBOL_GPL vmlinux 0xfc1b00f__lock_page_killable
+EXPORT_SYMBOL_GPL vmlinux 0xfc391b63cmotify_event
+EXPORT_SYMBOL_GPL vmlinux 0xfc3973d8tracepoint_mc_event
+EXPORT_SYMBOL_GPL vmlinux 0xfc57485eusb_put_phy
+EXPORT_SYMBOL_GPL vmlinux 0xfc64689binet6_lookup_listener

Open Source Used In 5GaaS Edge AC-4 15234
+88pm800-regulator
+88pm805
+88pm80x
+88pm80x_onkey
+88pm8607
+88pm860x-ts
+88pm860x_battery
+88pm860x_bl
+88pm860x_charger
+88pm860x_onkey
+9p
+9pnet
+9pnet_rdma
+9pnet_virtio
+DAC960
+a100u2w
+a3d
+a53_pll
+a8293
+aacraid
+aat2870-regulator
+aat2870_bl
+ab3100
+ab3100-otp
+abp060mg
+acard-ahci
+acecad
+acenic
+acp_audio_dma
+act2001-sir
+act8865-regulator
+act8945a
+act8945a-regulator
+act8945a_charger
+act_bpf
+act_connmark
+act_csum
+act_gact
+act_ipt
+act_mirred
+act_nat
+act_pedit
+act_police
+act_sample
+act_simple
+act_skbedit
+act_skbmod
+act_tunnel_key
+act_vlan
+actisys-sir
+ad2s1200
+ad2s1210
+ad2s90
+ad5064
+ad525x_dpot
+ad525x_dpot-i2c
+ad525x_dpot-spi
+ad5360
+ad5380
+ad5398
+ad5421
+ad5446
+ad5449
+ad5504
+ad5592r
+ad5592r-base
+ad5593r
+ad5624r_spi
+ad5686
+ad5755
+ad5761
+ad5764
+ad5791
+ad5933
+ad714x
+ad714x-i2c
+ad714x-spi
+ad7150
+ad7152
+ad7192
+ad7266
+ad7280a
+ad7291
+ad7298
+ad7303
+ad7314
+ad7414
+ad7418
+ad7476
+ad7606
+ad7606_par
+ad7606_spi
+ad7746
+ad7766
+ad7780
+ad7791
+ad7793
+ad7816
+ad7877
+ad7879
+ad7879-i2c
+ad7879-spi
+ad7887
+ad7923
+ad799x
+ad8366
+ad8801
+ad9523
+ad9832
+ad9834
+ad_sigma_delta
+adc-keys
+adc128d818
+adcx
+addi_apci_1032
+addi_apci_1500
+addi_apci_1516
+addi_apci_1564
+addi_apci_16xx
+addi_apci_2032
+addi_apci_2200
+addi_apci_3120
+addi_apci_3501
+addi_apci_3xxx
+addi_watchdog
+ade7753
+ade7754
+ade7758
+ade7759
+ade7854
+ade7854-i2c
+ade7854-spi
+adf4350
+adf7242
+adfs
+adi
+adis16060
+adis16080
+adis16130
+adis16136
+adis16201
+adis16203
+adis16209
+adis16240
+adv_pci1724
+adv_pci1760
+adv_pci_dio
+advansys
+adxl34x
+adxl34x-i2c
+adxl34x-spi
+adxrs450
+aes-arm
+aes-arm-bs
+aes-arm-ce
+aes_ti
+af9013
+af9033
+af_alg
+af_key
+af_packet_diag
+afe4403
+afe4404
+affs
+afs
+ah4
+ah6
+ahci
+ahci_ceva
+ahci_dm816
+ahci_mtk
+ahci_mvebu
+ahci_qoriq
+aic79xx
+aic7xxx
+aic94xx
+aim_cdev
+aim_network
+aim_sound
+aim_v4l2
+aio_aio12_8
+aio_iiro_16
+airtek
+aircable
+airspy
+ak8974
+ak8975
+al3320a
+algif_aead
+algif_hash
+algif_rng
+algif_skcipher
+alim7101_wdt
+altera-ci
+altera-cvp
+altera-msgdma
+altera-pr-ip-core
+altera-pr-ip-core-plat
+altera-ps-spi
+altera-stapl
+altera_jtaguart
+altera_ps2
+altera_tse
+altera_uart
+alx
+am2315
+am35x
+am53e974
+amba-pi010
+ambakmi
+amc6821
+amd
+amd5536udc_pci
+amd8111e
+amdgpucpu
+amplc_dio200
+amplc_dio200_common
+amplc_dio200_pci
+amplc_pci236
+amplc_pci236_common
+amplc_pci263
+amplc_pci224
+amplc_pci230
+amplc_pci236
+amplc_pci263
+ams-iaq-core
+ams369fg06
+analog
+analogix-anx78xx
+analogix_dp
+anatop-regulator
+ansi_cprng
+anubis
+ao-cec
+aoe
+apbps2
+apcs-msm8916
+apds9300
+apds9802als
+apds990x
+apds9960
+appledisplay
+appletalk
+appletouch
+applicom
+aquantia
+ar1021_i2c
+ar5523
+ar7part
+arc-rawmode
+arc-ri mi
+arc4
+arc_emac
+arc_ps2
+arc_uart
+arcmsr
+arcnet
+arcpgu
+arcxmm_bl
+arizona-haptics
+arizona-i2c
+arizona-ldo1
+arizona-micsupp
+arizona-spi
+ark3116
+arkfb
+arm_big_little
+arm_big_little_dt
+arm_mhu
+arm_scpi
+armada
+arp_tables
+arpt_mangle
+arptable_filter
+artpec6_crypto
+as102_fe
+as3711-regulator
+as3711_bl
+as3722-regulator
+as3935
+as5011
+asc7621
+ascot2e
+asix
+aspeed-pwm-tacho
+ast
+async_memcpy
+async_pq
+baycom_ser_hdx
+bcache
+bcm-keypad
+bcm-phy-lib
+bcm-sf2
+bcm203x
+bcm3510
+bcm47xxsflash
+bcm590xx
+bcm590xx-regulator
+bcm5974
+bcm63138_nand
+bcm6368_nand
+bcm63xx_uart
+bcm7xxx
+bcm87xx
+bcmac
+bcm.sysport
+bd6107
+bd9571mwv
+bd9571mwv-regulator
+bdc
+be2iscsi
+be2net
+befs
+belkin_sa
+berlin2-adc
+bfa
+bfq
+bfs
+bfusb
+bh1750
+bh1770gle
+bh1780
+binfmt_misc
+block2mtd
+blocklayoutdriver
+blowfish_common
+blowfish_generic
+bluetooth
+bluetooth_6lowpan
+bma150
+bma180
+bma220_spi
+bmc150-accel-core
+bmc150-accel-i2c
+bmc150-accel-spi
+bmc150_magn
+bmc150_magn_i2c
+bmc150_magn_spi
+bm160_core
+bm160_i2c
+bm160_spi
+bmi160_core
+bmi160_i2c
+bmi160_spi
+bmp280
+bmp280-i2c
+bmp280-spi
+bna
+bnep
+bnx2
+bnx2fc
+bnx2i
+bnx2x
+bnxt_en
+bnxt_re
+bochs-drm
+bonding
+bpa10x
+bpck
+bpck6
+bpqether
+bq2415x_charger
+bq24190_charger
+bq24257_charger
+bq24735-charger
+bq25890_charger
+bq27xxx_battery
+bq27xxx_battery_hdq
+bq27xxx_battery_i2c
+br2684
+br_netfilter
+brcmfmac
+brcmnnad
+brcmsmac
+brcmstb_nand
+brcmutil
+brd
+bridge
+broadcom
+broadsheetfb
+bsd_comp
+bt878
+btbcm
+btcoexist
+cassini
+cast5_generic
+cast6_generic
+cast_common
+catc
+cb710
+cb710-mmc
+cb_pcidas
+cb_pcidas64
+cb_pcidda
+cb_pcimdas
+cb_pcimdda
+cc10001_adc
+cc2520
+cc770
+cc770_isa
+cc770_platform
+ccm
+ccree
+ccs811
+cdc-acm
+cdc-phonet
+cdc-wdm
+cdc_eem
+cdc_ether
+cde_mibim
+cde_ncm
+cde_subset
+cec
+ceph
+cfg80211
+cfi_cmdset_0001
+cfi_cmdset_0002
+cfi_cmdset_0020
+cfi_probe
+cfi_util
+cfspi_slave
+ch
+ch341
+ch7006
+ch9200
+chacha20-neon
+chacha20_generic
+chacha20poly1305
+chaoskey
+chartcd
+chash
+cher
+cm32181
+cm3232
+cm3323
+cm3605
+cm36651
+cma3000_d0x
+cma3000_d0x_i2c
+cmac
+cmtip
+cnic
+coalt
+cobra
+coda
+colibri-vf50-ts
+com20020
+com20020-pci
+com90io
+com90xx
+comedi
+comedi_8254
+comedi_8255
+comedi_bond
+comedi_parport
+comedi_pci
+comedi_test
+comedi_usb
+comm
+contec_pci_dio
+cordic
+core
+cortina
+cp210x
+cpcap-adc
+cpcap-battery
+cpcap-charger
+cpcap-pwrbutton
+cpcap-regulator
+cpia2
+cppi41
+cramfs
+crctitu-t
+crc32-arm-ce
+crc32_generic
+crc4
+crc7
+crc8
+crct10dif-arm-ce
+crg-hi3516cv300
+cx8800
+cx8802
+cx88xx
+cxacr
+cxd2099
+cxd2820r
+cxd2841er
+cxgb
+cxgb3
+cxgb3i
+cxgb4
+cxgb4i
+cxgb4vf
+cxgbit
+cy8ctmg110_ts
+cyapatp
+cyber2000fb
+cyberjack
+cyclades
+cypress_cy7c63
+cypress_firmware
+cypress_m8
+cytherm
+cyttsp4_core
+cyttsp4_i2c
+cyttsp4_spi
+cyttsp_core
+cyttsp_i2c
+cyttsp_i2c_common
+cyttsp_spi
+da280
+da311
+da9030_battery
+da9034-ts
+da903x
+da903x_bl
+da9052-battery
+da9052-hwmon
+da9052-regulator
+da9052_bl
+da9052_onkey
+da9052_tsi
+da9052_wdt
+da9055-hwmon
+da9055-regulator
+da9055_onkey
+da9055_wdt
+da9062-core
+dib7000m
+dib7000p
+dib8000
+dibx000_common
+digi_acceleport
+digicolor-usart
+diskonchip
+diva_idi
+diva_mnt
+divacapi
+divadidd
+divas
+dl2k
+dlci
+dlink-dir685-touchkeys
+dlm
+dln2
+dln2-adc
+dm-bio-prison
+dm-bufio
+dm-cache
+dm-cache-smq
+dm-crypt
+dm-delay
+dm-era
+dm-flakey
+dm-integrity
+dm-log
+dm-log-userspace
+dm-log-writes
+dm-mirror
+dm-multipath
+dm-persistent-data
+dm-queue-length
+dm-raid
+dm-region-hash
+dm-round-robin
+dm-service-time
+dm-snapshot
+dm-switch
+dm-thin-pool
+dm-verity
+dm-zero
+dm-zoned
+dm1105
+dm9000
+dm9601
+dmard06
+ebt_among
+ebt_arp
+ebt_arpreply
+ebt_dnat
+ebt_ip
+ebt_ip6
+ebt_limit
+ebt_log
+ebt_mark
+ebt_mark_m
+ebt_nflog
+ebt_pkttype
+ebt_redirect
+ebt_snat
+ebt_stp
+ebt_vlan
+ebtable_broute
+ebtable_filter
+ebtable_nat
+ebtables
+ec100
+ecdh_generic
+echainiv
+echo
+edt-ft5x06
+eeeprom
+eeeprom_93cx6
+eeeprom_93xx46
+eeti_ts
+efi-pstore
+efi_test
+efibc
+efs
+egalax_ts
+egalax_ts_serial
+ehci-omap
+ehset
+ektf2127
+elan_i2c
+elants_i2c
+elo
+em28xx
+em28xx-alsa
+em28xx-dvb
+em28xx-rc
+em28xx-v4l
+em_canid
+em_cmp
+em_ipset
+em_meta
+em_nbyte
+em_text
+em_u32
+emac_rockchip
+emc1403
+emc2103
+emc6w201
+emi26
+emi62
+emif
+empeg
+ems_pci
+ems_usb
+emu10k1-gp
+ena
+enc28j60
+enclosure
+encx24j600
+encx24j600-regmap
+eni
+enic
+envelope-detector
+epat
+epia
+epic100
+eql
+esas2r
+esd_usb2
+esi-sir
+esp4
+esp4_offload
+esp6
+esp6_offload
+esp_scsi
+et1011c
+et131x
+ethoc
+evbug
+exc3000
+exofs
+extcon-ade-jack
+extcon-arizona
+extcon-axp288
+extcon-gpio
+extcon-max14577
+extcon-max3355
+fb_ssd1331
+fb_ssd1351
+fb_st7735r
+fb_st7789v
+fb_sys_fops
+fb_tinylcd
+fb_tls8204
+fb_uc1611
+fb_uc1701
+fb_upd161704
+fb_watterott
+fbit
+fbtft
+fbtft_device
+fc0011
+fc0012
+fc0013
+fc2580
+fcoe
+fcrypt
+fdomain
+fdp
+fdp_i2c
+fcalnx
+ff_memless
+fid
+firedtv
+firewire-core
+firewire-net
+firewire-ohci
+firewire-sbp2
+firewire-serial
+fit2
+fit3
+fl512
+fld
+flexcan
+flexfb
+fm10k
+fm801-gp
+fm_drv
+fmc
+fmc-chardev
+fmc-fakedev
+fmc-trivial
+fmc-write-eeprom
+forcedeth
+fore_200e
+fotg210-hcd

Open Source Used In 5GaaS Edge AC-4  15262
+fotg210-udc
+fou
+fou6
+fpga-bridge
+fpga-mgr
+fpga-region
+freevxfs
+friq
+frpw
+fsa9480
+fscache
+fsi-core
+fsi-master-gpio
+fsi-master-hub
+fsi-scom
+fsi-dcu-dm
+fsi-edma
+fsi_lpuart
+ftdi-elan
+ftdi_sio
+ftgmac100
+ftl
+ftmac100
+ftsteutates
+fujitsu_ts
+fusb302
+g450_pll
+g760a
+g762
+g_acm_ms
+g_audio
+g_cdc
+g_dbg
+g_ether
+g_ffs
+g_hid
+g_mass_storage
+g_midi
+g_multi
+g_ncm
+g_nokia
+g_printer
+g_serial
+g_webcam
+g_zero
+gadgetfs
+gamecon
+gameport
+gl518sm
+gl520sm
+gl620a
+glink_ssr
+gluebi
+go7007
+go7007-loader
+go7007-usb
+goku_udc
+goodix
+gp2ap002a00f
+gp2ap020a00f
+gp8psk-fe
+gpio
+gpio-74x164
+gpio-74xx-mmio
+gpio-addr-flash
+gpio-adnp
+gpio-adp5520
+gpio-adp5588
+gpio-altera
+gpio-arizona
+gpio-exp209
+gpio-bd9571mwv
+gpio-beeper
+gpio-charger
+gpio-da9052
+gpio-da9055
+gpio-dln2
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+gpio-grgpio
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+gpio-ir-tx
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+gspca_main
+gspca_mars
+gspca_mf97310a
+gspca_nw80x
+gspca_ov519
+gspca_ov534
+gspca_ov534_9
+gspca_pac207
+gspca_pac7302
+gspca_pac7311
+gspca_se401
+gspca_sn9c2028
+gspca_sn9c20x
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+gspca_sonixj
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+gspca_spca505
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+gspca_sq930x
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+gspca_topro
+gspca_touptek
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+gspca_vicam
+gspca_xirlink_cit
+gspca_zc3xx
+gtp
+gullemot
+gunze
+hackrf
+hamachi
+hampshire
+hanwang
+hci
+i2c-mux-reg
+i2c-mv64xxx
+i2c-nforce2
+i2c-nomadik
+i2c-ocores
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+i2c-parport-light
+i2c-pca-platform
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+i2c-riic
+i2c-rk3x
+i2c-robotfuzz-osif
+i2c-sh_mobile
+i2c-simtec
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+i2c-stub
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+i2c-versatile
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+i2c-viapro
+i2c-viperboard
+i2c-xiic
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+i5k_amb
+i6300esb
+i740fb
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+ib_ipoib
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+ib_mthca
+ib_srp
+ib_srpt
+ib_umad
+ib_uverbs
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+ibmpex
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+idmouse
+idt77252
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+ieee802154_6lowpan
+ieee802154_socket
+ifb
+ife
+ifi_canfd
+iforce
+igb
+igbvf
+igorplugusb
+iguanair
+ii_pci20kc
+iio-mux
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+iio-trig-interrupt
+iio-trig-loop
+iio-trig-sysfs
+iio_dummy
+iio_hwmon
+ila
+ili210x
+ili922x
+ili9320
+img-ascii-lcd
+img-i2s-in
+img-i2s-out
+img-parallel-out
+img-spdif-in
+img-spdif-out
+imm
+imon
+impa7
+ims-pcu
+imsx-ipu-v3
+imx-ldb
+imx-tve
+imx074
+imx6ul_tsc
+imxdrm
+ina209
+ina2xx
+ina2xx-adc
+ina3221
+industrialio
+industrialio-buffer-cb
+industrialio-configfs
+industrialio-sw-device
+industrialio-sw-trigger
+industrialio-triggered-buffer
+industrialio-triggered-event
+inet_diag
+inexio
+inftl
+initio
+input-leds
+input-polldev
+int51x1
+intel-xway
+intel_th
+intel_th_gth
+intel_th_msu
+intel_th_pci
+intel_th_pti
+intel_th_sth
+intel_vr_nor
+interact
+inv-mpu6050
+inv-mpu6050-i2c
+inv-mpu6050-spi
+io_edgeport
+io_ti
+ioc4
+iowarrior
+ip6_gre
+ip6_tables
+ip6_tunnel
+ip6_udp_tunnel
+ip6_vti
+ip6t_MASQUERADE
+ip6t_NPT
+ip6t_REJECT
+ip6t_SYNPROXY
+ip6t_ah
+ip6t_eui64
+ip6t_frag
+ip6t_hbh
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+ip6t_mh
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+ip6t_rt
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+ip6table_mangle
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+ip6table_raw
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+ip_set_bitmap_ipmac
+ip_set_bitmap_port
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+ip_vs_lc
+ip_vs_nq
+ip_vs_ovf
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+ip_vs_rr
+ip_vs_sed
+ip_vs_sh
+ip_vs_wlc
+ip_vs_wrr
+ip_vti
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+ipaq
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+ipcomp6
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+irda
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+irnet
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+janz-ican3
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+jifs2
+jfs
+jmb38x_ms
+jme
+joydev
+joydump
+jr3_pci
+jsa1212
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+kaweth
+kbic
+kbtab
+kcm
+kcomedilib
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+kempld-core
+kempld_wdt
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+keyspan
+keyspan_pda
+keyspan_remote
+keywrap
+kfifo_buf
+khazard
+kingsun-sir
+kl5kusb105
+kmx61
+ko2iblnd
+kobil_sct
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+ks8842
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+ksdazzle-sir
+ksocklnd
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+kxsd9-spi
+kxtj9
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+kyrofb
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+lan9303_ndio
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+lcc-mdm9615
+lcc-msm8960
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+ledtrig-usbport
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+lm3639_bl
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+lnbp21
+lnbp22
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+lmet_selftest
+lockd
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+micrel
+microchip
+micoread
+micoread_i2c
+microtek
+mii
+minix
+mip6
+mipi-dbi
+mite
+mk712
+mkiss
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+mlx4_ib
+mlx5_core
+mlx5_ib
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+mlxsw_switchib
+mlxsw_switchx2
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+mmcc-msm8974
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+mv_udc
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+xic4005
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+mx1111sf-tuner
+mx1301rf
+mx15005s
+mx15007t
+mx15xx
+mxser
+mxsfb
+mxuport
+myri10ge
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+n_tracerouter
+n_tracesink
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+nau7802
+navman
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+net2280
+netconsole
+netjet
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+netrom
+netup-unidvb
+netxen_nic
+newtonkbd
+nf_contrack
+nf_contrack_amanda
+nf_contrack_broadcast
+nf_contrack_fip
+nf_contrack_h323
+nf_contrack_ipv4
+nf_contrack_ipv6
+nf_contrack irc
+nf_contrack_netbios_ns
+nf_contrack_netlink
+nf_contrack_pppp
+nf_contrack_proto_gre
+nf_contrack_sane
+nf_contrack_sip
+nf_contrack_ssnmp
+nf_contrack_tftp
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+nf_defrag_ipv6
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+nf_log_arp
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+nf_log_common
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+nf_log_netdev
+nf_nat
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+nf_nat_fip
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+nf_nat_ipv6
+nf_nat irc
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+nf_nat_masquerade_ipv6
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+nf_nat_proto_gre
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+nf_reject_ipv6
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+nfcmrvl_usb
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+nfnetlink_queue
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+nfs_layout_flexfiles
+nfs_layout_nfsv41_files
+nfsd
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+nft_chain_nat_ipv4
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+nft_chain_route_ipv6
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+nls_is08859-4
+obdclass
+obdecho
+ocfb
+ocfs2
+ocfs2_dlm
+ocfs2_dlmfs
+ocfs2_nodemanager
+ocfs2_stack_o2cb
+ocfs2_stack_user
+ocfs2_stackglue
+ocrdma
+of_mmc_spi
+of_xilinx_wdt
+old_belkin-sir
+omap
+omap-aes-driver
+omap-crypto
+omap-des
+omap-mailbox
+omap-ocp2scp
+omap-rng
+omap-sham
+omap2430
+omap2fb
+omap4-keypad
+omap_hdq
+omap_hwspinlock
+omap_wdt
+omapdss
+omfs
+omninet
+on20
+on26
+onenand
+opencores-kbd
+openvswitch
+oprofile
+opt3001
+optee
+opticon
+option
+or51132
+or51211
+orangefs
+orinoco
+orinoco_nortel
+orinoco_plx
+orinoco_tmd
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+osc
+osd
+osst
+oti6858
+ov2640
+ov5642
+ov7640
+ov7670
+ov772x
+ov9640
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+overlay
+oxu210hp-hcd
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+p54spi
+p54usb
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+p8023
+pa12203001
+palmas-pwrbutton
+palmas-regulator
+palmas_gpadc
+pandora_bl
+panel
+panel-innolux-p079zca
+panel-jdi-ht070me05000
+panel-lg-lg4573
+panel-lvds
+panel-orisetech-otm8009a
+panel-panasonic-vvx10f034n00
+panel-raspberrypi-touchscreen
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+panel-simple
+panel-sitronix-st7789v
+parade-ps8622
+parallel-display
+paride
+parkbd
+parman
+parport
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+pcd
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+pcf50633-backlight
+pcf50633-charger
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+pcf50633-input
+pcf50633-regulator
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+pda_power
+pdc_adma
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+peak_pciefd
+peak_usb
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+pegasus_notetaker
+penmount
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+physmap
+physmap_of
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+pinctrl-ssbi-gpio
+pinctrl-ssbi-mpp
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+pkcs7_test_key
+pktcdvd
+pktgen
+pl1111_drm
+pl172
+pl2303
+pl330
+plat-ram
+plat_nand
+platform_lcd
+platform_mhu
+plip
+plusb
+pluto2
+plx_pci
+pm-notifier-error-inject
+pm2fb
+pm3fb
+pm80xx
+pm8941-pwrkey
+pm8941-wled
+pm8xxx-vibrator
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+pmc551
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+ptlrpc
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+pwrseq_simple
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+pxa27x_udc
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+qcauart
+qcaux
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+sch_drr
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+speedfax
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+spi-bitbang
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+synclinkmp
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+target_core_user
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+tc90522
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+videobuf-dvb
+videobuf-vmalloc
+videobuf2-core
+videobuf2-dma-contig
+videobuf2-dma-sg
+videobuf2-dvb
+videobuf2-memops
+videobuf2-v4l2
+videobuf2-vmalloc
+videodev
+vim2m
+vimc
+vimc-debayer
+vimc_capture
+vimc_common
+vimc_scaler
+vimc_sensor
+vimc_streamer
+viperboard
+viperboard_adc
+virtio-gpu
+virtio-rng
+virtio_blk
+virtio_crypto
+virtio_input
+virtio_net
+virtio_rpmmsg_bus
+virtio_scsi
+virtual
+visor
+vitesse
+vivid
+vl6180
+vlsi_ir
+vmac
+vme_fake
+vme_tsi148
+vme_user
+vme_vmi7805
+vmk80xx
+vmw_pvrdma
+vmw_vsock_virtio_transport
+vmw_vsock_virtio_transport_common
+vmxnet3
+vp27smpx
+vport-geneve
+w83l785ts
+w83l786ng
+wacom
+wacom_i2c
+wacom_serial4
+wacom_w8001
+walker0701
+wanxl
+warrior
+wcn36xx
+wcnss_ctrl
+wd719x
+wdt87xx_i2c
+wdt_pci
+whc-rc
+whci
+whci-hcd
+whiteheat
+wil6210
+wilc1000
+wilc1000-sdio
+wilc1000-spi
+wimax
+winbond-840
+wire
+wireguard
+wishbone-serial
+w11251
+w11251_sdio
+w11251_spi
+w11273-core
+w112xx
+w118xx
+w1core
+w1core_sdio
+w1core_spi
+wm831x-dcdc
+wm831x-hwmon
+wm831x-isink
+wm831x-ldo
+wm831x-on
+wm831x-ts
+wm831x_backup
+wm831x_bl
+wm831x_power
+wm831x_wdt
+wm8350-hwmon
+wm8350-regulator
+wm8350_power
+wm8350_wdt
+wm8400-regulator
+wm8739
+wm8775
+wm8994
+wm8994-regulator
+wm97xx-ts
+wp512
+wusb-cbaf
+wusb-wa
+wusbcore
+x25
+x25_asy
+x_tables
+xc4000
+xc5000
+xcbc
+xfrm4_mode_beet
+xfrm4_mode_transport
+xfrm4_mode_tunnel
+xfrm4_tunnel
+xfrm6_mode_beet
+xfrm6_mode_ro
+xfrm6_mode_transport
+xfrm6_mode_tunnel
+xfrm6_tunnel
+xfrm_algo
+xfrm_ipcomp
+xfrm_user
+xfs
+xgifb
+xgmac
+xc5000
+xhci-mtk
+xhci-plat-hcd
+xilinx-pr-decoupler
+xilinx-spi
+xilinx-tpg
+xilinx-video
+xilinx-vtc
+xilinx_gmii2rgmii
+xilinx_uartps
+xillybus_core
+xillybus_of
+xillybus_pcie
+xor
+xor-neon
+xpad
Open Source Used in 5GaaS Edge AC-4

+xsens_mt
+xt_AUDIT
+xt_CHECKSUM
+xt_CLASSIFY
+xt_CONNSECMARK
+xt_CT
+xt_DSCP
+xt_HL
+xt_HMARK
+xt_IDLETIMER
+xt_LED
+xt_LOG
+xt_NETMAP
+xt_NFLOG
+xt_NFQUEUE
+xt_RATEEST
+xt_REDIRECT
+xt_SECMARK
+xt_TCPMSS
+xt_TCPQPTSTRIP
+xt_TEE
+xt_TPROXY
+xt_TRACE
+xt_addrtype
+xt_bpf
+xt_cgroup
+xt_cluster
+xt_comment
+xt_connbytes
+xt_connlabel
+xt_conllimit
+xt_connmrk
+xt_connt track
+xt_cpu
+xt_dccp
+xt_devgroup
+xt_dsctp
+xt_ecn
+xt_esp
+xt_hashlimit
+xt_helper
+xt_hl
+xt_ipcomp
+xt_iprange
+xt_ipvs
+xt_l2tp
+xt_length
+xt_limit
+zr364xx
+zram
+zstd_compress
+zx-tdm
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/armhf/generic-lpae.retpoline
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/armhf/generic-lpae.retpoline
@@ -0,0 +1 @@
+# RETPOLINE NOT ENABLED
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/armhf/generic.compiler
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/armhf/generic.compiler
@@ -0,0 +1 @@
+GCC: (Ubuntu/Linaro 7.5.0-3ubuntu1~18.04) 7.5.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/armhf/generic.modules
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/armhf/generic.modules
@@ -0,0 +1,5329 @@
+3w-9xxx
+3w-sas
+3w-xxxx
+6lowpan
+6pack
+8021q
+8139cp
+8139too
+8250_aspeed_vuart
+8250_dw
+8250_exar
+8250_men_mcb
+8250_moxa
+8250_omap
+8250_uniphier
+8255
+8255_pci
+8390
+842
+842_compress
+842_decompress
+88pm800
+88pm800-regulator
+88pm805
+88pm80x
+88pm80x_onkey
+88pm8607
+88pm860x-ts
+88pm860x_battery
+88pm860x_bl
+88pm860x_charger
+88pm860x_onkey
+9p
+9pnet
+9pnet_rdma
+9pnet_virtio
+DAC960
+a100u2w
+a3d
+a53_pll
+a8293
+aacraid
+aat2870-regulator
+aat2870_bl
+ab3100
+ab3100-otp
+abp060mg
+acard-ahci
+acecad
+acenic
+acp_audio_dma
+act200l-sir
+act8865-regulator
+act8945a
+act8945a-regulator
+act8945a_charger
+act_bpf
+act_connmark
+act_csicum
+act_gact
+act_ipt
+act_mirred
+act_nat
+act_pedit
+act_police
+act_sample
+act_simple
+act_skbedit
+act_skbmod
+act_tunnel_key
+act_vlan
+actisys-sir
+ad2s1200
+ad2s1210
+ad2s90
+ad5064
+ad525x_dpot
+ad525x_dpot-i2c
+ad525x_dpot-spi
+ad5360
+ad5380
+adm1025
+adm1026
+adm1029
+adm1031
+adm1275
+adm8211
+adm9240
+adp5520-keys
+adp5520_bl
+adp5588-keys
+adp5589-keys
+adp8860_bl
+adp8870_bl
+adq12b
+ads1015
+ads7828
+ads7846
+ads7871
+adt7310
+adt7316
+adt7316-i2c
+adt7316-spi
+adt7410
+adt7411
+adt7462
+adt7470
+adt7475
+adt7x10
+adummy
+adutux
+adv7511-v4l2
+adv7511_drm
+adv7604
+adv7842
+adv_pci1710
+adv_pci1720
+adv_pci1723
+adv_pci1724
+adv_pci1760
+adv_pci_dio
+advansys
+adx134x
+adx134x-i2c
+adx134x-spi
+adxrs450
+aes-arm
+aes-arm-bs
+aes-arm-ce
+arc-rimi
+arc4
+arc_emac
+arc_ps2
+arc_uart
+arcmsr
+arcnet
+arcpgu
+arcxcmn_bl
+arizona-haptics
+arizona-i2c
+arizona-ldo1
+arizona-micsupp
+arizona-spi
+ark3116
+arkfb
+arm_big_little
+arm_big_little_dt
+arm_mhu
+arm_scpi
+armada
+arp_tables
+arpt_mangle
+arptable_filter
+artep6_crypto
+as102_fe
+as3711-regulator
+as3711_bl
+as3722-regulator
+as3935
+as5011
+asc7621
+ascot2e
+asix
+aspeed-pwm-tacho
+ast
+async_memcpy
+async_pq
+async_raid6_recov
+async_tx
+async_xor
+at24
+at25
+at76c50x-usb
+at803x
+at86rf230
+ata_generic
+ata_piix
Open Source Used In 5GaaS Edge AC-4

+atbm8830
+aten
+ath
+ath10k_core
+ath10k_pci
+ath10k_sdio
+ath10k_usb
+ath3k
+ath5k
+ath6kl_core
+ath6kl_sdio
+ath6kl_usb
+ath9k
+ath9k_common
+ath9k_htc
+ath9k_hw
+ati_remote
+ati_remote2
+atl1
+atl1c
+atl1e
+atl2
+atlas-ph-sensor
+atm
+atmel
+atmel-flexcom
+atmel-hlcdc
+atmel-hlcdc-dc
+atmel_captouch
+atmel_mxt_ts
+atmel_pci
+atmtcp
+atp870u
+atusb
+atxp1
+aty128fb
+atyfb
+au0828
+au8522_common
+au8522_decoder
+au8522_dig
+aufs
+auo-pixcir-ts
+auo_k1900fb
+auo_k1901fb
+auo_k190x
+auth_rpcgss
+authenc
+authencesn
+autofs4
+avmfritz
+ax25
+ax88179_178a
+ax88796
+axp20x
+axp20x-i2c
+axp20x-pek
+axp20x-regulator
+axp20x_ac_power
+axp20x_adc
+axp20x_battery
+axp20x_usb_power
+axp288_adc
+axp288_charger
+axp288_fuel_gauge
+b1
+b1dma
+b1pci
+b2c2-flexcop
+b2c2-flexcop-pci
+b2c2-flexcop-usb
+b43
+b43legacy
+b44
+b53_common
+b53_mdio
+b53_mmap
+b53_spi
+b53_srab
+bl_switcher_dummy_if
+bam_dma
+bas_gigaset
+batman-adv
+baycom_epp
+baycom_par
+baycom_ser_fdx
+baycom_ser_hdx
+bcache
+bcm-keypad
+bcm-phy-lib
+bcm-sf2
+bcm203x
+bcm3510
+bcm47xxsflash
+bcm590xx
+bcm590xx-regulator
+bcm5974
+bcm63138_nand
+bcm6368_nand
+bcm63xx_uart
+bcm7xxx
+bcm87xx
+bcma
+bcmsysport
+bd6107
+bd9571mwv
+bd9571mwv-regulator
+bdc
+be2iscsi
+be2net
+befs
+belkin_sa
+berlin2-adc
+bfa
+bfq
+bfs
+bfusb
+bh1750
+bh1770glc
+bh1780
+binfoff_misc
+block2mtd
+blocklayoutdriver
+blowfish_common
+blowfish_generic
+bluetooth
+bluetooth_6lowpan
+bma150
+bma180
+bma220_spi
+bmc150-accel-core
+bmc150-accel-i2c
+bmc150-accel-spi
+bmc150_magn
+bmc150_magn_i2c
+bmc150_magn_spi
+bmgi60_core
+bmgi60_i2c
+bmgi60_spi
+bmi160_core
+bmi160_i2c
+bmi160_spi
+bmp280
+bmp280-i2c
+bmp280-spi
+bna
+bnep
+bnx2
+bnx2fc
+bnx2i
+bnx2x
+bnxt_en
+bnxt_re
+bochs-drm
+bonding
+bpa10x
+bpck
+bpck6
+bpqether
+bq2415x_charger
+bq24190_charger
+bq24257_charger
+bq24735-charger
+bq25890_charger
+bq27xxx_battery
+bq27xxx_battery_hdq
+bq27xxx_battery_i2c
+br2684
+br_netfilter
+brcmfmac
+brcmnnand
+brcmsmac
+brcmsnb_nand
+brcmutil
+brd
+bridge
+broadcom
+broadsheetfb
+bsd_comp
+bt878
+bthcm
+btoexsist
+btintel
+btmrvl
+btmrvl_sdio
+btqca
+btqcomsmd
+btrfs
+btrtl
+btsciio
+bttv
+btusb
+btwilink
+bu21013_ts
+budget
+budget-av
+budget-ci
+budget-core
+budget-patch
+c4
+c67x00
+c6xdigio
+c_can
+c_can_pci
+c_can_platform
+ca8210
+caam
+caam_jr
+caam_pci
+caamalg
+caamalg_desc
+caamhash
+caamrng
+cachefiles
+cadence-quadspic
+cadence_wdt
+cafe_ccic
+cafe_nand
+caif
+caif_hsi
+caif_serial
+caif_socket
+caif_usb
+caif_virtio
+camellia_generic
+can
+can-bcm
+can-dev
+can-gw
+can-raw
+cap11xx
+cap
+capidrv
+capmode
+capsule-loader
+carl9170
+carminefb
+cassini
+cast5_generic
+cast6_generic
+cast_common
+catc
+cb710
+cb710-mmc
+cb_pcidas
+cb_pcidas64
+cb_pcidda
+cb_pcimdas
+cb_pcimdda
+cc10001_adc
+cc2520
+cc770
+cc770_isa
+cc770_platform
+ccm
+ccree
+ccs811
+cdc-acm
+cdc-phonet
+cdc-wdm
+cdc_eem
+cdc_ether
+cdc_mbim
+cdc_ncm
+cdc_subset
+ccc
+ceph
+cfg80211
+cfi_cmdset_0001
+cfi_cmdset_0002
+cfi_cmdset_0020
+cfi_probe
+cfi_util
+cfspi_slave
+ch
+ch341
+ch7006
+ch9200
+chacha20-neon
+chacha20_generic
+chacha20poly1305
+chaoskey
+charlcd
+chash
+chcr
+chipone_icn8318
+chnl_net
+ci_hdrc
+ci_hdrc_imx
+ci_hdrc msm
+ci_hdrc_pci
+ci_hdrc_tegra
+ci_hdrc_usb2
+ci_hdrc_zevio
+cicada
+cifs
+cirrus
+cirrusfb
+clip
+clk-cdce706
+clk-cdce925
+clk-cs2000-cp
+clk-exynos-audss
+clk-hi3519
+clk-hi655x
+clk-max77686
+clk-palmas
+clk-pwm
+clk-qcom
+clk-rk808
+clk-rpm
+clk-s2mps11
+clk-scpi
+clk-si514
+clk-si5351
+clk-si570
+clk-smd-rpm
+clk-tw6040
+clk-versaclock5
+clk-wm831x
+cls_basic
+cls_bpf
+cls_cgroup
+cls_flow
+cls_flower
+cls_fw
+cls_matchall
+cls_route
+cls_rsvp
+cls_rsv6
+cls_tcindex
+cls_u32
+cm109
+cm32181
+cm3232
+cm3323
+cm3605
+cm36651
+cma3000_d0x
+cma3000_d0x_i2c
+cmac
+cmt_speech
+cmtp
+cnic
+cobalt
+cobra
+coda
+colibri-vf50-ts
+com20020
+com20020-pci
+com90io
+com90xx
+comedi
+comedi_8254
+comedi_8255
+comedi_bond
+comedi_parport
+comedi_pci
+comedi_test
+comedi_usb
+comm
+contec_pci_dio
+cordic
+core
+cortina
+cp210x
+cpcap-abc
+cpcap-battery
+cpcap-charger
+cpcap-pwrbutton
+cpcap-regulator
+cpia2
+cplpi41
+cramfs
+crc-itu-t
+crc32-arm-ce
+crc32_generic
+crc4
+crc7
+crc8
+crct10dif-arm-ce
+crg-hi3516cv300
+crg-hi3798cv200
+cros_ec_accel_legacy
+da9062-thermal
+da9062_wdt
+da9063-regulator
+da9063_onkey
+da9063_wdt
+da9150-charger
+da9150-core
+da9150-fg
+da9150-gpadc
+da9210-regulator
+da9211-regulator
+dac02
+daqboard2000
+das08
+das08_isa
+das08_pci
+das16
+das16m1
+das1800
+das6402
+das800
+davicom
+davinci_emac
+db9
+dc395x
+dccp
+dccp_diag
+dccp_ipv4
+dccp_ipv6
+dccp_probe
+dbridge
+de2104x
+decnet
+deflate
+defxx
+denali
+denali_dt
+denali_pci
+des_generic
+designware_i2s
+devlink
+dgnc
+dht11
+dib0070
+dib0090
+dib3000mb
+dib3000mc
+dib7000m
+dmard10
+dme1737
+dmfe
+dmi-sysfs
+dmm32at
+dmx3191d
+dn_rtnmsg
+dnet
+docg3
+docg4
+dove_thermal
+dp83640
+dp83822
+dp83848
+dp83867
+dpot-dac
+drbd
+drm
+drm_kms_helper
+drop_monitor
+drv260x
+drv2665
+drv2667
+drx39xyj
+drxd
+drxk
+ds1621
+ds1682
+ds1803
+ds1wm
+ds2482
+ds2490
+ds2760_battery
+ds2780_battery
+ds2781_battery
+ds2782_battery
+ds3000
+ds4424
+ds620
+dsa_core
+dsbr100
+dscc4
+dss1_divert
+dst
+dst_ca
+dstr
+dt2801
+dt2811
+ebt_arp
+ebt_arpreply
+ebt_dnat
+ebt_ip
+ebt_ip6
+ebt_limit
+ebt_log
+ebt_mark
+ebt_mark_m
+ebt_nflog
+ebt_pkttype
+ebt_redirect
+ebt_snat
+ebt_stp
+ebt_vlan
+ebtable_broute
+ebtable_filter
+ebtable_nat
+ebtables
+ec100
+ecdh_generic
+echainiv
+echo
+edt-ft5x06
+eprom
+eprom_93cx6
+eprom_93xx46
+ecti_ts
+efi-pstore
+efi_test
+efibc
+efs
+egalax_ts
+egalax_ts_serial
+ehci-mxc
+ehci-omap
+ehci-tegra
+ehset
+ektf2127
+elan_i2c
+elants_i2c
+elo
+em28xx
+em28xx-alsa
+em28xx-dvb
+em28xx-rc
+em28xx-v4l
+em_canid
+extcon-max14577
+extcon-max3355
+extcon-max77693
+extcon-max77843
+extcon-max8997
+extcon-palmas
+extcon-qcom-spmi-misc
+extcon-rt8973a
+extcon-sm5502
+extcon-usb-gpio
+extcon-usbc-cros-ec
+exynos-gsc
+exynos-lpass
+exynos-rng
+exynos_adc
+exynosdrm
+ezusb
+f2fs
+f71805f
+f71882fg
+f75375s
+f81232
+f81534
+fakelb
+fan53555
+farsync
+faulty
+fb_agm1264k-fl
+fb_bd663474
+fb_ddc
+fb_hx8340bn
+fb_hx8347d
+fb_hx8353d
+fb_hx8357d
+fb_ii9163
+fb_ii9320
+fb_ii9325
+fb_ii9340
+fb_ii9341
+fb_ii9481
+fb_ii9486
+fb_pcd8544
+fb_ra8875
+fb_s6d02a1
+fb_s6d1121
+fb_sh1106
+fb_ssd1289
+fb_ssd1305
+fb_ssd1306
+fb_ssd1325
+fb_ssd1331
+fb_ssd1351
+fb_st7735r
+fb_st7789v
+fb_sys_fops
+fb_tinyled
+fb_tls8204
+fb_uc1611
+fb_uc1701
+fb_upd161704
+fb_watterott
+ftbft
+ftbft_device
+fc0011
+fc0012
+fc0013
+fc2580
+fcoe
+fcrypt
+fdomain
+fdp
+fdp_i2c
+fealnx
+ff-memless
+fid
+firedtv
+firewire-core
+firewire-net
+firewire-ohci
+firewire-sbp2
+firewire-serial
+fit2
+fit3
+fl512
+fld
+flexcan
+flexfb
+fm10k
+fm801-gp
+fm_drv
+fmc
+fmc-chardev
+fmc-fakedev
+fmc-trivial
+fmc-write-eeprom
+forcedeth
+genet
+geneve
+gf2k
+gfs2
+ghash-arm-ce
+gianfar_driver
+gianfar_ptp
+gigaset
+girbil-sir
+gl518sm
+gl520sm
+gl620a
+glink_ssr
+gluebi
+go7007
+go7007-loader
+go7007-usb
+goku_udc
+goodix
+gp2ap002a00f
+gp2ap020a00f
+gp8psk-fe
+gpio
+gpio-74x164
+gpio-74xx-mmio
+gpio-addr-flash
+gpio-adnp
+gpio-adp5520
+gpio-adp5588
+gpio-altera
+gpio-arizona
+gpio-axp209
+gpio-bd9571mwv
+gpio-beeper
+gpio-charger
+gpio-da9052
+gpio-da9055
+gpio-dln2
+gpio-dwapb
+gpio-exar
+gpio-fan
+gpio-grgpio
+gpio-ir-recv
+gpio-ir-tx
+gpio-janz-ttl
+gpio-kempld
+gpio-lp3943
+gpio-lp873x
+gpio-lp87565
+gpio-max3191x
+gpio-max7300
+gpio-max7301
+gpio-max730x
+gpio-max732x
+gpio-max77620
+gpio-mb86s7x
+gpio-mc33880
+gpio-menz127
+gpio-pca953x
+gpio-pcf857x
+gpio-pci-idio-16
+gpio-pisosr
+gpio-rcar
+gpio-rdc321x
+gpio-regulator
+gpio-syson
+gpio-tpic2810
+gpio-ts65086
+gpio-ts65218
+gpio-ts65912
+gpio-ts4800
+gpio-ts4900
+gpio-uch1400
+gpio-uniphier
+gpio-viperboard
+gpio-wm831x
+gpio-wm8350
+gpio-wm8994
+gpio-xra1403
+gpio_backlight
+gpio_decoder
+gpio_keys
+gpio_keys_polled
+gpio_mouse
+gpio_tilt_polled
+gpio_wdt
+gmni_nand
+gr_udc
+grace
+grcan
+gre
+greybus
+grip
+grip_mp
+gs_fpga
+gs_usb
+gspeech_vicam
+gspeech_xirlink_cit
+gspeech_zc3xx
+gtco
+gtp
+guillemot
+gunze
+hackrf
+hamachi
+hampshire
+hanwang
+hci
+hci_nokia
+hci_uart
+hci_vhci
+hclge
+hclgevf
+hd44780
+hdce100x
+hdlc
+hdlc_cisco
+hdlc_fr
+hdlc_ppp
+hdlc_raw
+hdlc_raw_eth
+hdlc_x25
+hdled
+hdledrv
+hdm_dim2
+hdm_i2c
+hdm_usb
+hdma
+hdma_mgmt
+hdprv
+he
+helene
+hexium_gemini
+hexium_orion
+hfc4s8s_1l
+hfc_usb
+hfcmulti
+hfcpci
+hfcsub
+hfs
+hfsplus
+hi311x
+hi6210-i2s
+hi6220-mailbox
+hi6220_reset
+hi6421-pmic-core
+hi6421-regulator
+hi6421v530-regulator
+hi655x-pmic
+hi655x-regulator
+hi8435
+hid
+hid-a4tech
+hid-accutouch
+hid-alps
+hid-apple
+hid-appleir
+hid-asus
+hid-aureal
+hid-axff
+hid-belkin
+hid-betopff
+hid-cherry
+hid-chicony
+hid-cmedia
+hid-corsair
+hid-cp2112
+hid-cypress
+hid-dr
+hid-elecom
+hid-elo
+hid-emsff
+hid-ezkey
+hid-gaff
+hid-gembird
+hid-generic
+hid-gfrm
+hid-gt683r
+hid-gyration
+hid-holtek-kbd
+hid-holtek-mouse
+hid-holtekff
+hid-icade
+hid-ite
+hid-kensington
+hid-keytouch
+hid-kye
+hid-lcpower
+hid-led
+hid-lenovo
+hid-logitech
+hid-logitech-dj
+hid-logitech-hidpp
+hid-magicmouse
+hid-mf
+hid-microsoft
+hid-monterey
+hid-multitouch
+hid-nti
+hid-ntrig
+hid-ortek
+hid-penmount
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+hid-picoled
+hid-pl
+hid-plantronics
+hid-primax
+hid-prodikeys
+hid-retrode
+hid-rmi
+hid-roccat
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+hid-roccat-common
+hid-roccat-isku
+hid-roccat-kone
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+hid-samsung
+hid-sensor-accel-3d
+hid-sensor-als
+hid-sensor-custom
+hid-sensor-gyro-3d
+hid-sensor-hub
+hid-sensor-humidity
+hid-sensor-iio-common
+hid-sensor-incl-3d
+hid-sensor-magn-3d
+hid-sensor-press
+hid-sensor-prox
+hid-sensor-rotation
+hid-sensor-temperature
+hid-sensor-trigger
+hid-sjoy
+hid-sony
+hid-speedlink
+hid-steelseries
+hid-sunplus
+hid-tivo
+hid-tmff
+hid-topseed
+hid-twinhan
+hid-uclogic
+hid-udraw-ps3
+hid-wallop
+hid-wiimote
+hid-xinmo
+hid-zpff
+hid-zydacron
+hideep
+hidp
+hifn_795x
+highbank-cpufreq
+highbank_l2_edac
+highbank_mc_edac
+hih6130
+hip04_eth
+hisax
+hisax_fcpcipnp
+hisax_isac
+hisax_st5481
+hisi-rng
+hisi-sfc
+hisi504_nand
+hisi_femac
+hisi_powerkey
+hisi_thermal
+hix5hd2_gmac
+hmc5843_core
+hmc5843_i2c
+hmc5843_spi
+hmc6352
+hnae
+hnae3
+hns_dsaf
+hns_enet_drv
+hns_mdio
+hopper
+horus3a
+host1x
+hostap
+hostap_pci
+hostap_plx
+hp03
+hp100
+hp206c
+hpfs
+hpilo
+bpsa
+hptiop
+hsi
+hsi_char
+hso
+hsr
+ht16k33
+htc-pasic3
+hts221
+hts221_i2c
+hts221_spi
+htu21
+huawei_cdc_ncm
+hwa-hc
+hwa-rc
+hwmon-vid
+hx711
+hx8357
+hysdn
+i1480-dfu-usb
+i1480-est
+i2400m
+i2400m-usb
+i2c-algo-bit
+i2c-algo-pca
+i2c-ali1535
+i2c-ali1563
+i2c-ali15x3
+i2c-amd756
+i2c-amd8111
+i2c-arb-gpio-challenge
+i2c-cbus-gpio
+i2c-cros-ec-tunnel
+i2c-demux-pinctrl
+i2c-designware-pci
+i2c-diolan-u2c
+i2c-dln2
+i2c-emev2
+i2c-exynos5
+i2c-gpio
+i2c-hid
+i2c-hix5hd2
+i2c-i801
+i2c-imx-lpi2c
+i2c-isch
+i2c-kemplied
+i2c-matroxfb
+i2c-meson
+i2c-mt65xx
+i2c-mux
+i2c-mux-gpio
+i2c-mux-gpmux
+i2c-mux-ltc4306
+i2c-mux-mlxp1ld
+i2c-mux-pca9541
+i2c-mux-pca954x
+i2c-mux-pinctrl
+i2c-mux-reg
+i2c-mv64xxx
+i2c-nforce2
+i2c-nomadik
+i2c-ocores
+i2c-parport
+i2c-parport-light
+i2c-pca-platform
+i2c-piix4
+i2c-pxa
+i2c-qup
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+i2c-sh_mobile
+i2c-simtec
+i2c-sis5595
+i2c-sis630
+i2c-sis96x
+i2c-slave-eeprom
+i2c-smbus
+i2c-stub
+i2c-taos-evm
+i2c-tegra
+i2c-tiny-usb
+i2c-versatile
+i2c-via
+i2c-viapro
+i2c-viperboard
+i2c-xiic
+i40e
+i40evf
+i40iw
+i5k_amb
+i6300esb
+i740fb
+ib_cm
+ib_core
+ib_iopoib
+ib_iser
+ib_isert
+ib_mthca
+ib_sr
+ib_srp
+ib_umad
+ib_uverbs
+ibm-cffps
+ibmaem
+ibmpex
+ice40-spi
+icp_multi
+icplus
+ics932s401
+idma64
+idmouse
+idt77252
+idt_89hpesx
+ieee802154
+ieee802154_6lowpan
+ieee802154_socket
+ifb
+ife
+ifi_canfd
+iforce
+igb
+igbvf
+igorplugusb
+iguanaair
+ii_pci20kc
+iio-mux
+iio-trig-hrtimer
+iio-trig-interrupt
+iio-trig-loop
+iio-trig-sysfs
+iio_dummy
+iio_hwmon
+ila
+ili210x
+ili922x
+ili9320
+img-ascii-lcd
+ipt_CLUSTERIP
+ipt_ECN
+ipt_MASQUERADE
+ipt_REJECT
+ipt_SYNPROXY
+ipt_ah
+ipt_rpsfilter
+iptable_filter
+iptable_mangle
+iptable_nat
+iptable_raw
+iptable_security
+ipvlan
+ipvtap
+ipw
+ipw2100
+ipw2200
+ipx
+ir-hix5hd2
+ir-jvc-decoder
+ir-kbd-i2c
+ir-lirc-codec
+ir-mce_kbd-decoder
+ir-nec-decoder
+ir-rc5-decoder
+ir-rc6-decoder
+ir-rx51
+ir-sanyo-decoder
+ir-sharp-decoder
+ir-sony-decoder
+ir-spi
+ir-usb
+ir-xmp-decoder
+ir35221
+ircomm
+ircomm-tty
+irda
+irda-usb
+irlan
+irm
+irq-ts4800
+irqbypass
+irtty-sir
+iscsi_boot_sysfs
+iscsi_target_mod
+iscsi_tcp
+isdn
+isdn_bsdcomp
+isdnhdlc
+isicom
+isight_firmware
+isl29003
+isl29018
+isl29020
+isl29028
+isl29125
+isl6271a-regulator
+isl6405
+isl6421
+isl6423
+isl9305
+isofs
+isp116x-hcd
+isp1362-hcd
+isp1704_charger
+isp1760
+it87
+it913x
+itd1000
+itag3200
+iuu_phoenix
+ivtv
+ivtv-alsa
+ivtvfb
+iw_cm
+iw_cxgb3
+iw_cxgb4
+iw_nes
+iwl3945
+iwl4965
+iwldevm
+iwllegacy
+iwlmonvm
+iwlwifi
+iwx2505v
+ixgb
+ixgbe
+ixgbevf
+janz-cmodio
+janz-ican3
+jc42
+jedec_probe
+jffs2
+jfs
+jmb38x_ms
+jme
+leds-lp3944
+leds-lp3952
+leds-lp5521
+leds-lp5523
+leds-lp5562
+leds-lp55xx-common
+leds-lp8501
+leds-lp8788
+leds-lp8860
+leds-lt3593
+leds-max77693
+leds-max8997
+leds-mc13783
+leds-menf21bmc
+leds-mt6323
+leds-ns2
+leds-pca9532
+leds-pca955x
+leds-pca963x
+leds-pm8058
+leds-pwm
+leds-regulator
+leds-tca6507
+leds-tlc591xx
+leds-wm831x-status
+leds-wm8350
+ledtrig-activity
+ledtrig-backlight
+ledtrig-camera
+ledtrig-default-on
+ledtrig-gpio
+ledtrig-heartbeat
+ledtrig-oneshot
+ledtrig-timer
+ledtrig-transient
+ledtrig-usbport
+lego_ev3_battery
+legousbtower
+lg-vl600
+lgl2160
+lgdt3305
+lgdt3306a
+lgdt330x
+lgs8gx
+lib80211
+lib80211_crypt_ccmp
+lib80211_crypt_tkip
+lib80211_crypt_wep
Open Source Used In 5GaaS Edge AC-4

+libceph
+libcfs
+libcomposite
+liberc32c
+libexgb
+libcxgbi
+libertas
+libertas_sdio
+libertas_spi
+libertas_tf
+libertas_tf_usb
+libfc
+libfcoe
+libipw
+libiscsi
+libiscsi_tcp
+libore
+libosd
+libsas
+lightning
+lineage-pem
+linear
+lirc_dev
+lirc_zilog
+lis3lv02d
+lis3lv02d_i2c
+lis3lv02d_spi
+litelink-sir
+lkkbd
+llc
+llc2
+lm25066
+lm3533-als
+lm3533-core
+lm3533-ctrlbank
+lm3533_bl
+lm3630a_bl
+lm3639_bl
+lm363x-regulator
+lm63
+lm70
+lm73
+lm75
+lm77
+lm78
+lm80
+lm83
+lm8323
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+lm85
+lm87
+lm90
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+lm93
+lm95234
+lm95241
+lm95245
+lm991000
+lm8328gf05
+lm8501kf03
+lmv
+lnbh25
+lnbp21
+lnbp22
+lnet
+lnet_selftest
+lockd
+lsv
+lo
+lp
+lp3943
+lp3971
+lp3972
+lp855x_bl
+lp8727_charger
+lp872x
+lp873x
+lp873x-regulator
+lp8755
+lp87565
+lp87565-regulator
+lp8788-buck
+lp8788-charge
+lp8788-ldo
+lp8788_adc
+lp8788_bl
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+lpch
+lpch
+lpch
+lpddr2_nvm
+lpddr_cmds
+lpfc
+lru_cache
+lsw
+ltc2471
+ltc2485
+ltc2497
+ltc2632
+ltc2941-battery-gauge
+ltc2945
+ltc2978
+ltc2990
+ltc3589
+ltc3651-charger
+ltc3676
+ltc3815
+ltc4151
+ltc4215
+ltc4222
+ltc4245
+ltc4260
+ltc4261
+ltr501
+ltv350qv
+lustre
+lv5207lp
+lvds-encoder
+lvtst
+lxt
+lz4
+lz4_compress
+lz4hc
+lz4hc_compress
+m25p80
+m2m-deinterlace
+m52790
+m62332
+m88ds3103
+m88rs2000
+m88rs6000t
+mISDN_core
+mISDN_dsp
+mISD Ninfineon
+mISD Ninpac
+mISD Nisar
+m_can
+ma600-sir
+mac-celtic
+mac-centeuro
+mac-croatian
+mac-cyrillic
+mac-gaelic
+mac-greek
+mac-iceland
+mac-inuit
+mac-roman
+mac-romanian
+mac-turkish
+mac80211
+mac80211_hwsim
+mac802154
+macb
+mach_pci
+macmodes
+macsec
+macvlan
+macvtap
+mag3110
+magellan
+mailbox-altera
+mailbox-test
+mali-dp
+mantis
+mantis_core
+map_absent
+map_ram
+map_rom
+marvell
+marvell-cesa
+marvell10g
+matrix-keymap
+matrix_keypad
+matrox_w1
+matroxfb_DAC1064
+matroxfb_Ti3026
+matroxfb_accel
+matroxfb_base
+matroxfb_crtc2
+matroxfb_g450
+matroxfb_maven
+matroxfb_misc
+max1027
+max11100
+max1111
+max1118
+max11801_ts
+max1363
+max14577-regulator
+max14577_charger
+max14656_charger_detector
+max1586
+max16064
+max16065
+max1619
+max1668
+max17040_battery
+max17042_battery
+max1721x_battery
+max197
+max20751
+max2165
+max30100
+max30102
+max3100
+max31722
+max31785
+max31790
+max3421-hcd
+max34440
+max44000
+max517
+max5481
+max5487
+max5821
+max63xx_wdt
+max6621
+max6639
+max6642
+max6650
+max6697
+max6875
+max7359_keypad
+max77620-regulator
+max77620_thermal
+max77620_wdt
+max77686-regulator
+max77693-haptic
+max77693-regulator
+max77693_charger
+max77802-regulator
+max8649
+max8660
+max8688
+max8903_charger
+max8907
+max8907-regulator
+max8925-regulator
+max8925_bl
+max8925_onkey
+max8925_power
+max8952
+max8973-regulator
+max8997-regulator
+max8997_charger
+max8997_haptic
+max8998
+max8998_charger
+max9611
+maxim_thermocouple
+mb862xxfb
+mb86a16
+mb86a20s
+mc13783-adc
+mc13783-pwrbutton
+mc13783-regulator
+mc13783_ts
+mc13892-regulator
+mc13xxx-core
+mc13xxx-i2c
+mc13xxx-regulator-core
+mc13xxx-spi
+mc3230
+mc44s803
+mcb
+mcb-lpc
+mcb-pci
+mcba_usb
+mceusb
+mchp23k256
+mcp2120-sir
+mcp251x
+mcp3021
+mcp320x
+mcp3422
+mcp4131
+mcp4531
+mcp4725
+mcp4922
+mcryptd
+mcs5000_ts
+mcs7780
+mcs7830
+mcs_touchkey
+mct_u232
+md-cluster
+md4
+mdc
+mdc800
+mdev
+mdio
+mt7530
+mt7601u
+mt9m001
+mt9m111
+mt9t031
+mt9t112
+mt9v011
+mt9v022
+mtd_dataflash
+mtdoops
+mtDRAM
+mtdswap
+mtp32xx
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+mtk-crypto
+mtk-pmic-wrap
+mtk-quadspi
+mtk-rng
+mtk-sd
+mtk-vpu
+mtk_ecc
+mtk_nand
+mtk_thermal
+mtk_wdt
+mtouch
+mtu3
+ multipath
+ multiq3
+ musb_am335x
+ musb_dsps
+ mux-adg792a
+ mux-core
+ mux-gpio
+ mux-mmio
+ mv643xx_eth
+ mv88e6060
+ mv88e6xxx
+ mv_u3d_core
+ mv_udc
+ mvmdio
+ mvnet
+ mvpp2
+ mvsas
+ mvsdio
+ mvumi
+ mwifiex
+ mwifiex_pcie
+ mwifiex_sdio
+mwifiex_usb
+mwI8k
+mxb
+mxc-scc
+mxc4005
+mxc6255
+mxc_nand
+mxc_w1
+mxcmmc
+mxl111sf-demod
+mxl111sf-tuner
+mxl301rf
+mxl5005s
+mxl5007t
+mxl5xx
+mxser
+mxsfb
+mxuport
+myri10ge
+n_gsm
+n_hdlc
+n_tracerouter
+n_tracesink
+nandsim
+national
+natsemi
+nau7802
+navman
+nb8800
+nbd
+nbpfaxi
+nci
+nci_spi
+nci_uart
+ncpfs
+nct66683
+nct6775
+nct7802
+nct7904
+ne2k-pci
+neofb
+net1080
+net2272
+net2280
+netconsole
+netjet
+netlink_diag
+netrom
+netup-unidvb
+netxen_nic
+newtonkbd
+nf_conntrack
+nf_conntrack_amanda
+nf_conntrack_broadcast
+nf_conntrack_ftp
+nf_conntrack_h323
+nf_conntrack_ipv4
+nf_conntrack_ipv6
+nf_conntrack_irc
+nf_conntrack_netbios_ns
+nf_conntrack_netlink
+nf_conntrack_pptp
+nf_conntrack_proto_gre
+nf_conntrack_sane
+nf_conntrack_sip
+nf_conntrack_snmp
+nf_conntrack_tftp
+nf_defrag_ipv4
+nf_defrag_ipv6
+nf_dup_ipv4
+nf_dup_ipv6
+nf_dup_netdev
+nf_log_arp
+nf_log_bridge
+nf_log_common
+nf_log_ipv4
+nf_log_ipv6
+nf_log_netdev
+nf_nat
+nf_nat_amanda
+nf_nat_ftp
+nf_nat_h323
+nf_nat_ipv4
+nf_nat_ipv6
+nf_nat_irc
+nf_nat_masquerade_ipv4
+nf_nat_masquerade_ipv6
+nf_nat_pptp
+nf_nat_proto_gre
+nf_nat_redirect
+nf_nat_sip
+nf_nat_snmp_basic
+nf_nat_tftp
+nf_reject_ipv4
+nf_reject_ipv6
+nf_socket_ipv4
+ni_tio
+ni_tiocmd
+ni_usb6501
+nicstar
+nifs2
+niu
+nlmon
+nls_ascii
+nls_cp1250
+nls_cp1251
+nls_cp1255
+nls_cp737
+nls_cp775
+nls_cp850
+nls_cp852
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+nls_koi8-ru
+nls_koi8-u
+nls_utf8
+nokia-modem
+nosy
+or51132
+or51211
+orangefs
+orinoco
+orinoco_nortel
+orinoco_plx
+orinoco_tmd
+orinoco_usb
+orion_nand
+orion_wdt
+osc
+osd
+osst
+oti6858
+ov2640
+ov5642
+ov7640
+ov7670
+ov772x
+ov9640
+ov9740
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+oxu210hp-hcd
+p54common
+p54pci
+p54spi
+p54usb
+p8022
+p8023
+pa12203001
+palmas-pwrbutton
+palmas-regulator
+palmas_gpadc
+pandora_bl
+panel
+panel-innolux-p079zca
+panel-jiangdong-070me05000
+panel-lg-lg4573
+panel-lvds
+panel-orisetech-otm8009a
+panel-panasonic-vvx10f034n00
+panel-raspberrypi-touchscreen
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Open Source Used In 5GaaS Edge AC-4 15415
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+xt_TPROXY
+xt_TRACE
+xt_addrtype
+xt_bpf
+xt_cgroup
+xt_cluster
+xt_comment
+xt_connbytes
+xt_connlabel
+xt_connlimit
+xt_connmark
+xt_conntrack
+xt_cpu
+xt_dccp
+xt_devgroup
+xt_dscp
+xt_ecn
+xt_esp
+xt_hashlimit
+xt_helper
+xt.hl
+xt_ipcomp
+xt_iprange
+xt_ips
+xt_l2tp
+xt_length
+xt_limit
+xt_mac
+xt_mark
+xt_multiport
+xt_nat
+xt_nfacct
+xt_osf
+xt_owner
+xt_physdev
+xt_pkttype
+xt_policy
+xt_quota
+xt_rateest
+xt_realm
+xt_recent
+xt_sctp
+xt_set
+xt_socket
+xt_state
+xt_statistic
+xt_string
+xt_tcpmss
+xt_tcpudp
+xt_time
+xt_u32
+xtkbd
+xusbatm
+xz_dec_test
+yam
+yealink
+yellowfin
+yurex
+z3fold
+zaurus
+zd1201
+zd1211rw
+zd1301
+zd1301_demod
+zhet6223
+zforce_ts
+zhenhua
+zirave_wdt
+z10036
+z10039
+z10353
+z6100
+zpa2326
+zpa2326_i2c
+zpa2326_spi
+zr364xx
+zram
+zstd_compress
+zlx-tdm
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/armhf/generic.retpoline
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/armhf/generic.retpoline
@@ -0,0 +1 @@
+# RETPOLINE NOT ENABLED
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/fwinfo
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/fwinfo
@@ -0,0 +1,1330 @@
firmware:       3826.arm
+firmware:       3com/typhoon.bin
+firmware:       6fire/dmx6fireap.ihx
+firmware:       6fire/dmx6firec.bin
+firmware:       6fire/dmx6firel2.ihx
+firmware:       BCM2033-FW.bin
+firmware:       BCM2033-MD.hex
+firmware:       BT3CPCC.bin
+firmware:       RTL8192E/boot.img
+firmware:       RTL8192E/data.img
+firmware:       RTL8192E/main.img
+firmware:       RTL8192U/boot.img
+firmware:       RTL8192U/data.img
+firmware:       RTL8192U/main.img
+firmware:       a300_pfp.fw
+firmware:       a300_pm4.fw
+firmware:       a330_pfp.fw
+firmware:       a330_pm4.fw
+firmware:       a420_pfp.fw
+firmware:       a420_pm4.fw
+firmware:       a530_fm4.fw
+firmware:       a530_pfp.fw
+firmware:       acenic/tg1.bin
+firmware:       acenic/tg2.bin
+firmware:       adaptec/starfire_rx.bin
+firmware: amdgpupolaris10_vce.bin
+firmware: amdgpupolaris11_ce.bin
+firmware: amdgpupolaris11_ce_2.bin
+firmware: amdgpupolaris11_k_mc.bin
+firmware: amdgpupolaris11_k_smc.bin
+firmware: amdgpupolaris11_mc.bin
+firmware: amdgpupolaris11_me.bin
+firmware: amdgpupolaris11_me_2.bin
+firmware: amdgpupolaris11_mec.bin
+firmware: amdgpupolaris11_mec2.bin
+firmware: amdgpupolaris11_mec2_2.bin
+firmware: amdgpupolaris11_mec_2.bin
+firmware: amdgpupolaris11_pfp.bin
+firmware: amdgpupolaris11_pfp_2.bin
+firmware: amdgpupolaris11_rlc.bin
+firmware: amdgpupolaris11_sdma.bin
+firmware: amdgpupolaris11_sdma1.bin
+firmware: amdgpupolaris11_smc.bin
+firmware: amdgpupolaris11_smc_sk.bin
+firmware: amdgpupolaris11_uvd.bin
+firmware: amdgpupolaris11_vce.bin
+firmware: amdgpupolaris12_ce.bin
+firmware: amdgpupolaris12_ce_2.bin
+firmware: amdgpupolaris12_k_mc.bin
+firmware: amdgpupolaris12_mc.bin
+firmware: amdgpupolaris12_me.bin
+firmware: amdgpupolaris12_me_2.bin
+firmware: amdgpupolaris12_mec.bin
+firmware: amdgpupolaris12_mec2.bin
+firmware: amdgpupolaris12_mec2_2.bin
+firmware: amdgpupolaris12_mec_2.bin
+firmware: amdgpupolaris12_pfp.bin
+firmware: amdgpupolaris12_pfp_2.bin
+firmware: amdgpupolaris12_rlc.bin
+firmware: amdgpupolaris12_sdma.bin
+firmware:amdgpupolaris12_sdma1.bin
+firmware: amdgpupolaris12_smc.bin
+firmware: amdgpupolaris12_uvd.bin
+firmware: amdgpupolaris12_vce.bin
+firmware: amdgpupolaris_raven_asd.bin
+firmware: amdgpupolaris_raven_ce.bin
+firmware:amdgpupolaris_raven_gpu_info.bin
+firmware: amdgpupolaris_raven_me.bin
+firmware: amdgpupolaris_raven_mec.bin
+firmware: amdgpupolaris_raven_mec2.bin
+firmware: amdgpupolaris_raven_pfp.bin
+firmware: amdgpupolaris_raven_rlc.bin
+firmware: amdgpupolaris_raven_sdma.bin
+firmware: amdgpu/raven_vcn.bin
+firmware: amdgpu/stoney_ce.bin
+firmware: amdgpu/stoney_me.bin
+firmware: amdgpu/stoney_mec.bin
+firmware: amdgpu/stoney_pfp.bin
+firmware: amdgpu/stoney_rlc.bin
+firmware: amdgpu/stoney_sdma.bin
+firmware: amdgpu/stoney_vce.bin
+firmware: amdgpu/tonga_ce.bin
+firmware: amdgpu/tonga_k_smc.bin
+firmware: amdgpu/tonga_mc.bin
+firmware: amdgpu/tonga_mec.bin
+firmware: amdgpu/tonga_mec2.bin
+firmware: amdgpu/tonga_pfp.bin
+firmware: amdgpu/tonga_rlc.bin
+firmware: amdgpu/tonga_sdma.bin
+firmware: amdgpu/tonga_sdma1.bin
+firmware: amdgpu/tonga_smc.bin
+firmware: amdgpu/tonga_uvd.bin
+firmware: amdgpu/topaz_vce.bin
+firmware: amdgpu/topaz_ce.bin
+firmware: amdgpu/topaz_k_smc.bin
+firmware: amdgpu/topaz_mc.bin
+firmware: amdgpu/topaz_me.bin
+firmware: amdgpu/topaz_mec.bin
+firmware: amdgpu/topaz_pfp.bin
+firmware: amdgpu/topaz_rlc.bin
+firmware: amdgpu/topaz_sdma.bin
+firmware: amdgpu/topaz_sdma1.bin
+firmware: amdgpu/topaz_smc.bin
+firmware: amdgpu/vega10_acg_smc.bin
+firmware: amdgpu/vega10_asd.bin
+firmware: amdgpu/vega10_ce.bin
+firmware: amdgpu/vega10_gpu_info.bin
+firmware: amdgpu/vega10_me.bin
+firmware: amdgpu/vega10_mec.bin
+firmware: amdgpu/vega10_mec2.bin
+firmware: amdgpu/vega10_pfp.bin
+firmware: amdgpu/vega10_rlc.bin
+firmware: amdgpu/vega10_sdma.bin
+firmware: amdgpu/vega10_sdma1.bin
+firmware: amdgpu/vega10_smc.bin
+firmware: amdgpu/vega10_sos.bin
+firmware: amdgpu/vega10_uvd.bin
+firmware: amdgpu/vega10_vce.bin
+firmware: ar5523.bin
+firmware: asihpi/dsp5000.bin
+firmware: asihpi/dsp6200.bin
+firmware: asihpi/dsp6205.bin
+firmware: asihpi/dsp6400.bin
+firmware: asihpi/dsp6600.bin
+firmware: asihpi/dsp8700.bin
+firmware: asihpi/dsp8900.bin
+firmware: ast_dp501_fw.bin
+firmware: ath10k/QCA6174/hw2.1/board-2.bin
+firmware: ath10k/QCA6174/hw2.1/board.bin
+firmware: ath10k/QCA6174/hw2.1/firmware-4.bin
+firmware: ath10k/QCA6174/hw2.1/firmware-5.bin
+firmware: ath10k/QCA6174/hw3.0/board-2.bin
+firmware: ath10k/QCA6174/hw3.0/board.bin
+firmware: ath10k/QCA6174/hw3.0/firmware-4.bin
+firmware: ath10k/QCA6174/hw3.0/firmware-5.bin
+firmware: ath10k/QCA6174/hw3.0/firmware-6.bin
+firmware: ath10k/QCA9377/hw1.0/board.bin
+firmware: ath10k/QCA9377/hw1.0/firmware-5.bin
+firmware: ath10k/QCA9887/hw1.0/board-2.bin
+firmware: ath10k/QCA9887/hw1.0/board.bin
+firmware: ath10k/QCA9887/hw1.0/firmware-5.bin
+firmware: ath10k/QCA9888X/hw2.0/board-2.bin
+firmware: ath10k/QCA9888X/hw2.0/board.bin
+firmware: ath10k/QCA9888X/hw2.0/firmware-2.bin
+firmware: ath10k/QCA9888X/hw2.0/firmware-3.bin
+firmware: ath10k/QCA9888X/hw2.0/firmware-4.bin
+firmware: ath10k/QCA9888X/hw2.0/firmware-5.bin
+firmware: ath3k-1.fw
+firmware: ath6k/AR6003/hw2.0/athwlan.bin.z77
+firmware: ath6k/AR6003/hw2.0/bdata.SD31.bin
+firmware: ath6k/AR6003/hw2.0/bdata.bin
+firmware: ath6k/AR6003/hw2.0/data.patch.bin
+firmware: ath6k/AR6003/hw2.0/otp.bin.z77
+firmware: ath6k/AR6003/hw2.1.1/athwlan.bin
+firmware: ath6k/AR6003/hw2.1.1/bdata.SD31.bin
+firmware: ath6k/AR6003/hw2.1.1/bdata.bin
+firmware: ath6k/AR6003/hw2.1.1/data.patch.bin
+firmware: ath6k/AR6003/hw2.1.1/otp.bin
+firmware: ath6k/AR6004/hw1.0/bdata.DB132.bin
+firmware: ath6k/AR6004/hw1.0/bdata.bin
+firmware: ath6k/AR6004/hw1.0/fw.ram.bin
+firmware: ath6k/AR6004/hw1.1/bdata.DB132.bin
+firmware: ath6k/AR6004/hw1.1/bdata.bin
+firmware: ath6k/AR6004/hw1.1/fw.ram.bin
+firmware: ath6k/AR6004/hw1.2/bdata.bin
+firmware: ath6k/AR6004/hw1.2/fw.ram.bin
+firmware: ath6k/AR6004/hw1.3/bdata.bin
+firmware:  b43legacy/ucode4.fw
+firmware:  bfubase.frm
+firmware:  bnx2/bnx2-mips-06-6.2.3.fw
+firmware:  bnx2/bnx2-mips-09-6.2.1b.fw
+firmware:  bnx2/bnx2-rv2p-06-6.0.15.fw
+firmware:  bnx2/bnx2-rv2p-09-6.0.17.fw
+firmware:  bnx2/bnx2-rv2p-09ax-6.0.17.fw
+firmware:  bnx2/bnx2-e1-7.13.1.0.fw
+firmware:  bnx2/bnx2-e1h-7.13.1.0.fw
+firmware:  bnx2/bnx2-e2-7.13.1.0.fw
+firmware:  bcm/bcm43xx-0.fw
+firmware:  bcm/bcm43xx_hdr-0.fw
+firmware:  bcm/bcmfmac43143-sdio.bin
+firmware:  bcm/bcmfmac43143.bin
+firmware:  bcm/bcmfmac43236b.bin
+firmware:  bcm/bcmfmac43241b0-sdio.bin
+firmware:  bcm/bcmfmac43241b4-sdio.bin
+firmware:  bcm/bcmfmac43241b5-sdio.bin
+firmware:  bcm/bcmfmac43242a.bin
+firmware:  bcm/bcmfmac4329-sdio.bin
+firmware:  bcm/bcmfmac4330-sdio.bin
+firmware:  bcm/bcmfmac4334-sdio.bin
+firmware:  bcm/bcmfmac43340-sdio.bin
+firmware:  bcm/bcmfmac4335-sdio.bin
+firmware:  bcm/bcmfmac43362-sdio.bin
+firmware:  bcm/bcmfmac4339-sdio.bin
+firmware:  bcm/bcmfmac4340-sdio.bin
+firmware:  bcm/bcmfmac4340a0-sdio.bin
+firmware:  bcm/bcmfmac4345-sdio.bin
+firmware:  bcm/bcmfmac4350-pcie.bin
+firmware:  bcm/bcmfmac4350c2-pcie.bin
+firmware:  bcm/bcmfmac4354-sdio.bin
+firmware:  bcm/bcmfmac4356-pcie.bin
+firmware:  bcm/bcmfmac4356-sdio.bin
+firmware:  bcm/bcmfmac43569.bin
+firmware:  bcm/bcmfmac43570-pcie.bin
+firmware:  bcm/bcmfmac4358-pcie.bin
+firmware:  bcm/bcmfmac4359-pcie.bin
+firmware:  bcm/bcmfmac43602-pcie.bin
+firmware:  bcm/bcmfmac4365b-pcie.bin
+firmware:  bcm/bcmfmac4365c-pcie.bin
+firmware:  bcm/bcmfmac4366b-pcie.bin
+firmware:  bcm/bcmfmac4366c-pcie.bin
+firmware:  bcm/bcmfmac4371-pcie.bin
+firmware:  bcm/bcmfmac4373-sdio.bin
+firmware:  bcm/bcmfmac4373.bin
+firmware:  c218tunx.cod
+firmware:  c320tunx.cod
+firmware:       car9170-1.fw  
+firmware:       cavium/cmn5xx_se.fw  
+firmware:       cbfw-3.2.5.1.bin  
+firmware:       cis/3CCFEM556.cis  
+firmware:       cis/3CXEM556.cis  
+firmware:       cis/COMpad2.cis  
+firmware:       cis/COMpad4.cis  
+firmware:       cis/DP83903.cis  
+firmware:       cis/LA-PCM.cis  
+firmware:       cis/MT5634ZLX.cis  
+firmware:       cis/NE2K.cis  
+firmware:       cis/PCMLM28.cis  
+firmware:       cis/PE-200.cis  
+firmware:       cis/PE520.cis  
+firmware:       cis/RS-COM-2P.cis  
+firmware:       cis/SW_555_SER.cis  
+firmware:       cis/SW_7xx_SER.cis  
+firmware:       cis/SW_8xx_SER.cis  
+firmware:       cis/tamarack.cis  
+firmware:       cmmb_ming_app.inp  
+firmware:       cmmb_vega_12mhz.inp  
+firmware:       comedi/jr3pci.idm  
+firmware:       cp204unix.cod  
+firmware:       cpi2/stv0672_vp4.bin  
+firmware:       cs46xx/cwc4630  
+firmware:       cs46xx/cwcasync  
+firmware:       cs46xx/cwcbinhack  
+firmware:       cs46xx/cwcsnoop  
+firmware:       ct2fw-3.2.5.1.bin  
+firmware:       ctefx.bin  
+firmware:       ctfw-3.2.5.1.bin  
+firmware:       cxgb3/ael2005_opt_edc.bin  
+firmware:       cxgb3/ael2005_twx_edc.bin  
+firmware:       cxgb3/ael2020_twx_edc.bin  
+firmware:       cxgb3/t3b_psram-1.1.0.bin  
+firmware:       cxgb3/t3c_psram-1.1.0.bin  
+firmware:       cxgb3/tf7fw-7.12.0.bin  
+firmware:       cxgb4/t4fw.bin  
+firmware:       cxgb4/t5fw.bin  
+firmware:       cxgb4/t6fw.bin  
+firmware:       cyzfir.bin  
+firmware:       daqboard2000_firmware.bin  
+firmware:       digiface_firmware.bin  
+firmware:       digiface_firmware_rev11.bin  
+firmware:       dvb-cx18-mpc718-mt352.fw  
+firmware:       dvb-demod-m88ds3103.fw  

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+firmware: ea/3g_asic.fw
+firmware: ea/darla20_dsp.fw
+firmware: ea/darla24_dsp.fw
+firmware: ea/echo3g_dsp.fw
+firmware: ea/gina20_dsp.fw
+firmware: ea/gina24_301_asic.fw
+firmware: ea/gina24_301_dsp.fw
+firmware: ea/gina24_361_asic.fw
+firmware: ea/gina24_361_dsp.fw
+firmware: ea/indigo_dj_dsp.fw
+firmware: ea/indigo_djx_dsp.fw
+firmware: ea/indigo_dsp.fw
+firmware: ea/indigo_io_dsp.fw
+firmware: ea/layla20asic.fw
+firmware: ea/layla20_dsp.fw
+firmware: ea/layla24_1asic.fw
+firmware: ea/layla24_2Aasic.fw
+firmware: ea/layla24_2Sasic.fw
+firmware: ea/layla24_dsp.fw
+firmware: ea/loader_dsp.fw
+firmware: ea/mia_dsp.fw
+firmware: ea/mona_2asic.fw
+firmware: ea/mona_301_1asic_48.fw
+firmware: ea/mona_301_1asic_96.fw
+firmware: ea/mona_301_dsp.fw
+firmware: ea/mona_361_1asic_48.fw
+firmware: ea/mona_361_1asic_96.fw
+firmware: ea/mona_361_dsp.fw
+firmware: edgeport/boot.fw
+firmware: edgeport/boot2.fw
+firmware: edgeport/down.fw
+firmware: edgeport/down2.fw
+firmware: edgeport/down3.bin
+firmware: emi26/bitstream.fw
+firmware: emi26/firmware.fw
+firmware: emi26/loader.fw
+firmware: emi62/bitstream.fw
+firmware: emi62/loader.fw
+firmware: emi62/spdif.fw
+firmware: emu/audio_dock.fw
+firmware: emu/emu0404.fw
+firmware: emu/emu1010_notebook.fw
+firmware: emu/emu1010b.fw
+firmware: emu/hana.fw
+firmware: emu/micro_dock.fw
+firmware: ene-ub6250/ms_init.bin
+firmware: ene-ub6250/ms_rdwr.bin
+firmware: ipw2200-ibss.fw
+firmware: ipw2200-sniffer.fw
+firmware: isci/isci_firmware.bin
+firmware: isdbt_nova_12mhz.inp
+firmware: isdbt_nova_12mhz_b0.inp
+firmware: isdbt_pele.inp
+firmware: isdbt_rio.inp
+firmware: isdn/ISAR.BIN
+firmware: isi4608.bin
+firmware: isi4616.bin
+firmware: isi608.bin
+firmware: isi608em.bin
+firmware: isi616em.bin
+firmware: isight.fw
+firmware: is3886pci
+firmware: is3886usb
+firmware: is3887usb
+firmware: iwlwifi-100-5.ucode
+firmware: iwlwifi-1000-5.ucode
+firmware: iwlwifi-105-6.ucode
+firmware: iwlwifi-135-6.ucode
+firmware: iwlwifi-2000-6.ucode
+firmware: iwlwifi-2030-6.ucode
+firmware: iwlwifi-3160-17.ucode
+firmware: iwlwifi-3168-29.ucode
+firmware: iwlwifi-3945-2.ucode
+firmware: iwlwifi-4965-2.ucode
+firmware: iwlwifi-5000-5.ucode
+firmware: iwlwifi-5150-2.ucode
+firmware: iwlwifi-6000-6.ucode
+firmware: iwlwifi-6000g2a-6.ucode
+firmware: iwlwifi-6000g2b-6.ucode
+firmware: iwlwifi-6050-5.ucode
+firmware: iwlwifi-7260-17.ucode
+firmware: iwlwifi-7265-17.ucode
+firmware: iwlwifi-7265D-29.ucode
+firmware: iwlwifi-8000C-34.ucode
+firmware: iwlwifi-8265-34.ucode
+firmware: iwlwifi-9000-pu-a0-jf-a0-34.ucode
+firmware: iwlwifi-9000-pu-a0-jf-b0-34.ucode
+firmware: iwlwifi-9000-pu-b0-jf-b0-34.ucode
+firmware: iwlwifi-9260-th-a0-jf-a0-34.ucode
+firmware: iwlwifi-9260-th-b0-jf-b0-34.ucode
+firmware: iwlwifi-Qu-a0-hr-a0-34.ucode
+firmware: iwlwifi-Qu-a0-jf-b0-34.ucode
+firmware: iwlwifi-QuQnj-a0-hr-a0-34.ucode
+firmware: iwlwifi-QuQnj-a0-jf-b0-34.ucode
+firmware: iwlwifi-QuQnj-f0-hr-a0-34.ucode
+firmware: iwlwifi-QuQnj-f0-jf-b0-34.ucode
+firmware: iwlwifi-QuQnj-f0-hr-a0-34.ucode
+firmware: kaweth/new_code.bin
+firmware: kaweth/new_code_fix.bin
+firmware: kaweth/trigger_code.bin
+firmware: kaweth/trigger_code_fix.bin
+firmware: keyspan/mpr.fw
+firmware: keyspan/usa18x.fw
+firmware: keyspan/usa19.fw
+firmware: keyspan/usa19qi.fw
+firmware: keyspan/usa19qw.fw
+firmware: keyspan/usa19w.fw
+firmware: keyspan/usa28.fw
+firmware: keyspan/usa28x.fw
+firmware: keyspan/usa28xa.fw
+firmware: keyspan/usa28xb.fw
+firmware: keyspan/usa49w.fw
+firmware: keyspan/usa49wlc.fw
+firmware: keyspan_pda/keyspan_pda.fw
+firmware: keyspan_pda/xircom_pgs.fw
+firmware: korg/k1212.dsp
+firmware: ks7010sd.rom
+firmware: lattice-ecp3.bit
+firmware: lbtf_usb.bin
+firmware: lgs8g75.fw
+firmware: libertas/cf8305.bin
+firmware: libertas/cf8381.bin
+firmware: libertas/cf8381_helper.bin
+firmware: libertas/cf8385.bin
+firmware: libertas/cf8385_helper.bin
+firmware: libertas/gspi8385.bin
+firmware: libertas/gspi8385_helper.bin
+firmware: libertas/gspi8385_hlp.bin
+firmware: libertas/gspi8686.bin
+firmware: libertas/gspi8686_hlp.bin
+firmware: libertas/gspi8686_v9.bin
+firmware: libertas/gspi8686_v9_helper.bin
+firmware: libertas/gspi8688.bin
+firmware: libertas/gspi8688_helper.bin
+firmware: libertas/sd8385.bin
+firmware: libertas/sd8385_helper.bin
+firmware: libertas/sd8686_v8.bin
+firmware: libertas/sd8686_v8_helper.bin
+firmware: libertas/sd8686_v9.bin
+firmware: libertas/sd8686_v9_helper.bin
+firmware: libertas/sd8688.bin
+firmware: libertas/sd8688_helper.bin
+firmware: libertas/usb8388.bin
+firmware: libertas/usb8388_v5.bin
+firmware: libertas/usb8388_v9.bin
+firmware: libertas/usb8682.bin
+firmware: libertas_cs.fw
+firmware: libertas_cs_helper.fw
+firmware: liquidio/lio_210nv_nic.bin
+firmware: liquidio/lio_210sv_nic.bin
+firmware: liquidio/lio_23xx_nic.bin
+firmware: liquidio/lio_410nv_nic.bin
+firmware: me2600_firmware.bin
+firmware: me4000_firmware.bin
+firmware: mellanox/mlxsw_spectrum-13.1530.152.mfa2
+firmware: mixart/miXart8.elf
+firmware: mixart/miXart8.xlx
+firmware: mixart/miXart8AES.xlx
+firmware: moxa/moxa-1110.fw
+firmware: moxa/moxa-1130.fw
+firmware: moxa/moxa-1131.fw
+firmware: moxa/moxa-1150.fw
+firmware: moxa/moxa-1151.fw
+firmware: mrvl/sd8688.bin
+firmware: mrvl/sd8688_helper.bin
+firmware: mrvl/sd8786_uapsta.bin
+firmware: mrvl/sd8787_uapsta.bin
+firmware: mrvl/sd8797_uapsta.bin
+firmware: mrvl/sd8887_uapsta.bin
+firmware: mrvl/sd8897_uapsta.bin
+firmware: mrvl/sd8997_uapsta.bin
+firmware: mrvl/us8766_uapsta.bin
+firmware: mrvl/us8797_uapsta.bin
+firmware: mrvl/us8801_uapsta.bin
+firmware: mrvl/usbusb8997_combo_v4.bin
+firmware: mt7601u.bin
+firmware: mts_cdma.fw
+firmware: mts_edge.fw
+firmware: mts_gsm.fw
+firmware: mts_m9234mu.fw
+firmware: mts_m9234zba.fw
+firmware: multiface_firmware.bin
+firmware: multiface_firmware_rev11.bin
+firmware: mwl8k/fmimage_8363.fw
+firmware: mwl8k/fmimage_8366.fw
+firmware: mwl8k/fmimage_8366_ap-3.fw
+firmware: mwl8k/fmimage_8687.fw
+firmware: mwl8k/helper_8363.fw
+firmware: mwl8k/helper_8366.fw
+firmware: mwl8k/helper_8687.fw
+firmware: myri10ge_eth_z8e.dat
+firmware: myri10ge_ethp_z8e.dat
+firmware: myri10gerss_eth_z8e.dat
+firmware: myri10ge_rss_ethp_z8e.dat
+firmware: netronome/nic_AMDA0081-0001_1x40.nffw
+firmware: netronome/nic_AMDA0081-0001_4x10.nffw
+firmware: netronome/nic_AMDA0096-0001_2x10.nffw
+firmware: netronome/nic_AMDA0097-0001_2x40.nffw
+firmware: netronome/nic_AMDA0097-0001_4x10_1x40.nffw
+firmware: netronome/nic_AMDA0099-0001_2x10.nffw
+firmware: netronome/nic_AMDA0099-0001_2x25.nffw
+firmware: ni6534a.bin
+firmware: niscrb01.bin
+firmware: niscrb02.bin
+firmware: nvidia/gk20a/fecs_data.bin
+firmware: nvidia/gk20a/fecs_inst.bin
+firmware: nvidia/gk20a/gpccs_data.bin
+firmware: nvidia/gk20a/gpccsInst.bin
+firmware: nvidia/gk20a/sw_bundle_init.bin
+firmware: nvidia/gk20a/sw_ctx.bin
+firmware: nvidia/gk20a/sw_method_init.bin
+firmware: nvidia/gk20a/sw_nonctx.bin
+firmware: nvidia/gm200/acr/bl.bin
+firmware: nvidia/gm200/acr/ucode_load.bin
+firmware: nvidia/gm200/acr/ucode_unload.bin
+firmware: nvidia/gm200/gr/fecs_bl.bin
+firmware: nvidia/gm200/gr/fecs_data.bin
+firmware: nvidia/gm200/gr/fecs_inst.bin
+firmware: nvidia/gm200/gr/fecs_sig.bin
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+firmware: nvidia/gm200/gr/gpccs_data.bin
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+firmware: nvidia/gm200/gr/gpccs_sig.bin
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+firmware: nvidia/gm200/gr/sw_method_init.bin
+firmware: nvidia/gm200/gr/sw_nonctx.bin
+firmware: nvidia/gm204/acr/bl.bin
+firmware: nvidia/gm204/acr/ucode_load.bin
+firmware: nvidia/gm204/acr/ucode_unload.bin
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+firmware: nvidia/gm204/gr/fecs_data.bin
+firmware: nvidia/gm204/gr/fecs_inst.bin
+firmware: nvidia/gm204/gr/fecs_sig.bin
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+firmware: nvidia/gm204/gr/sw_nonctx.bin
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+firmware: nvidia/gm206/acr/ucode_unload.bin
+firmware: nvidia/gm206/gr/fecs_bl.bin
+firmware: nvidia/gm206/gr/fecs_data.bin
+firmware: nvidia/gm206/gr/fecs_inst.bin
+firmware: nvidia/gm206/gr/fecs_sig.bin
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+firmware: nvidia/gm206/gr/gpccs_data.bin
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+firmware: nvidia/gm206/gr/sw_method_init.bin
+firmware: nvidia/gm206/gr/sw_nonctx.bin
+firmware: nvidia/gm20b/acr/bl.bin
+firmware: nvidia/gm20b/acr/ucode_load.bin
+firmware: nvidia/gm20b/acr/ucode_unload.bin
+firmware: nvidia/gm20b/gr/fecs_bl.bin
+firmware: nvidia/gm20b/gr/fecs_data.bin
+firmware: nvidia/gm20b/gr/fecs_inst.bin
+firmware: nvidia/gm20b/gr/fecs_sig.bin
+firmware: nvidia/gm20b/gr/gpccs_data.bin
+firmware: nvidia/gm20b/gr/gpccs_inst.bin
+firmware: nvidia/gm20b/gr/gpccs_sig.bin
+firmware: nvidia/gm20b/gr/sw_bundle_init.bin
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+firmware: nvidia/gm20b/gr/sw_method_init.bin
+firmware: nvidia/gm20b/gr/sw_nonctx.bin
+firmware: nvidia/gm20b/pmu/desc.bin
+firmware: nvidia/gm20b/pmu/image.bin
+firmware: nvidia/gm20b/pmu/sig.bin
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+firmware: nvidia/gp100/acr/ucode_unload.bin
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+firmware: nvidia/gp100/gr/fecs_inst.bin
+firmware: nvidia/gp100/gr/fecs_sig.bin
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+firmware: nvidia/gp100/gr/gpccs_data.bin
+firmware: nvidia/gp100/gr/gpccs_inst.bin
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+firmware: nvidia/gp100/gr/sw_ctx.bin
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+firmware: nvidia/gp100/gr/sw_nonctx.bin
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+firmware: nvidia/gp102/acr/ucode_load.bin
+firmware: nvidia/gp102/acr/ucodeUnload.bin
+firmware: nvidia/gp102/acr/unload_bl.bin
+firmware: nvidia/gp102/gr/fecs_bl.bin
+firmware: nvidia/gp102/gr/fecs_data.bin
+firmware: nvidia/gp102/gr/fecs_inst.bin
+firmware: nvidia/gp102/gr/fecs_sig.bin
+firmware: nvidia/gp102/gr/gpccs_bl.bin
+firmware: nvidia/gp102/gr/gpccs_data.bin
+firmware: nvidia/gp102/gr/gpccs_inst.bin
+firmware: nvidia/gp102/gr/gpccs_sig.bin
+firmware: nvidia/gp102/gr/sw_bundle_init.bin
+firmware: nvidia/gp102/gr/sw_ctx.bin
+firmware: nvidia/gp102/gr/sw_method_init.bin
+firmware: nvidia/gp102/gr/sw_nonctx.bin
+firmware: nvidia/gp102/nvdec/scrubber.bin
+firmware: nvidia/gp102/sec2/desc.bin
+firmware: nvidia/gp102/sec2/image.bin
+firmware: nvidia/gp102/sec2/sig.bin
+firmware: nvidia/gp104/acr/bl.bin
+firmware: nvidia/gp104/acr/ucode_load.bin
+firmware: nvidia/gp104/acr/ucodeUnload.bin
+firmware: nvidia/gp104/acr/unload_bl.bin
+firmware: nvidia/gp104/gr/fecs_bl.bin
+firmware: nvidia/gp104/gr/fecs_data.bin
+firmware: nvidia/gp104/gr/fecs_inst.bin
+firmware: nvidia/gp104/gr/fecs_sig.bin
+firmware: nvidia/gp104/gr/gpccs_bl.bin
+firmware: nvidia/gp104/gr/gpccs_data.bin
+firmware: nvidia/gp104/gr/gpccs_inst.bin
+firmware: nvidia/gp104/gr/gpccs_sig.bin
+firmware: nvidia/gp104/gr/sw_bundle_init.bin
+firmware: nvidia/gp104/gr/sw_ctx.bin
+firmware: nvidia/gp104/gr/sw_method_init.bin
+firmware: nvidia/gp104/gr/sw_nonctx.bin
+firmware: nvidia/gp104/nvdec/scrubber.bin
+firmware: nvidia/gp104/sec2/desc.bin
+firmware: nvidia/gp104/sec2/image.bin
+firmware: nvidia/gp104/sec2/sig.bin
+firmware: nvidia/gp106/acr/bl.bin
+firmware: nvidia/gp106/acr/ucode_load.bin
+firmware: nvidia/gp106/acr/ucodeUnload.bin
+firmware: nvidia/gp106/acr/unload_bl.bin
+firmware: nvidia/gp106/gr/fecs_bl.bin
+firmware: nvidia/gp106/gr/fecs_data.bin
+firmware: nvidia/gp106/gr/fecs_inst.bin
+firmware: nvidia/gp106/gr/fecs_sig.bin
+firmware: nvidia/gp106/gr/gpccs_bl.bin

Open Source Used In 5GaaS Edge AC-4 15472
+firmware:  nvidia/tegra124/vic03_ucode.bin
+firmware:  nvidia/tegra124/xusb.bin
+firmware:  nvidia/tegra210/xusb.bin
+firmware:  orinoco_ezusb_fw
+firmware:  ositech/Xilinx7OD.bin
+firmware:  pca200e.bin
+firmware:  pca200e_ecd.bin2
+firmware:  pcxhr/dspb1222e.b56
+firmware:  pcxhr/dspb1222hr.b56
+firmware:  pcxhr/dspb882e.b56
+firmware:  pcxhr/dspb882hr.b56
+firmware:  pcxhr/dspb924.b56
+firmware:  pcxhr/dspd1222.d56
+firmware:  pcxhr/dspd222.d56
+firmware:  pcxhr/dspd882.d56
+firmware:  pcxhr/dspe882.e56
+firmware:  pcxhr/dspe924.e56
+firmware:  pcxhr/xlxc1222e.dat
+firmware:  pcxhr/xlxc1222hr.dat
+firmware:  pcxhr/xlxc222.dat
+firmware:  pcxhr/xlxc882e.dat
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+firmware:  phanfw.bin
+firmware:  prism2_ru.fw
+firmware:  prism_ap_fw.bin
+firmware:  prism_sta_fw.bin
+firmware:  qat_895xcc.bin
+firmware:  qed/qed_init_values_zipped-8.20.0.0.bin
+firmware:  ql2100_fw.bin
+firmware:  ql2200_fw.bin
+firmware:  ql2300_fw.bin
+firmware:  ql2322_fw.bin
+firmware:  ql2400_fw.bin
+firmware:  ql2500_fw.bin
+firmware:  qlogic/1040.bin
+firmware:  qlogic/12160.bin
+firmware:  qlogic/1280.bin
+firmware:  qlogic/sd7220.fw
+firmware:  r8a779x_usb3_v1.dlmem
+firmware:  r8a779x_usb3_v2.dlmem
+firmware:  r8a779x_usb3_v3.dlmem
+firmware:  radeon/ARUBA_me.bin
+firmware:  radeon/ARUBA_pfp.bin
+firmware:  radeon/ARUBA_rlc.bin
+firmware:  radeon/BARTS_mc.bin
+firmware:  radeon/BARTS_me.bin
+firmware: radeon/BARTS_pfp.bin
+firmware: radeon/BARTS_smc.bin
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+firmware: radeon/BONAIRE_mc.bin
+firmware: radeon/BONAIRE_mc2.bin
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+firmware: radeon/BONAIRE_sdma.bin
+firmware: radeon/BONAIRE_smc.bin
+firmware: radeon/BONAIRE_uvd.bin
+firmware: radeon/BONAIRE_vce.bin
+firmware: radeon/BTC_rlc.bin
+firmware: radeon/CAICOS_mc.bin
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+firmware: radeon/MULLINS_ce.bin
+firmware: radeon/MULLINS_me.bin
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+firmware: radeon/OLAND_sdma.bin
+firmware: radeon/PALM_me.bin
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+firmware: radeon/PITCAIRN_ce.bin
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+firmware: radeon/R200_cp.bin
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+firmware: radeon/R600_me.bin
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+firmware:      radeon/TURKS_pfp.bin
+firmware:      radeon/TURKS_smc.bin
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+firmware:      radeon/VERDE_smc.bin
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+firmware:      radeon/bonaire_ce.bin
+firmware:      radeon/bonaire_k_smc.bin
+firmware:      radeon/bonaire_mc.bin
+firmware:      radeon/bonaire_me.bin
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+firmware:      radeon/kabini_rlc.bin
+firmware:      radeon/kabini_sdma.bin
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+firmware: radeon/kaveri_rlc.bin
+firmware: radeon/kaveri_sdma.bin
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+firmware: radeon/mullins_pfp.bin
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+firmware: radeon/mullins_sdma.bin
+firmware: radeon/mullins_sdma1.bin
+firmware: radeon/mullins_udv.bin
+firmware: radeon/mullins_vce.bin
+firmware: radeon/oland_ce.bin
+firmware: radeon/oland_k_smc.bin
+firmware: radeon/oland_mc.bin
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+firmware: radeon/pitcairn_k_smc.bin
+firmware: radeon/pitcairn_mc.bin
+firmware: radeon/pitcairn_me.bin
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+firmware: radeon/si58_mc.bin
+firmware: radeon/tahiti_ce.bin
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+firmware: radeon/tahiti_smc.bin
+firmware: radeon/verde_ce.bin
+firmware: radeon/verde_k_smc.bin
+firmware: radeon/verde_mc.bin
+firmware: radeon/verde_me.bin
+firmware: radeon/verde_pfp.bin
+firmware: radeon/verde_rlc.bin
+firmware: radeon/verde_smc.bin
+firmware: riptide.hex
+firmware: rp2.fw
+firmware: rpm_firmware.bin
+firmware: rs9113_wlan_qspi.rps
+firmware: rt2561.bin
+firmware: rt2561s.bin
+firmware: rt2661.bin
+firmware: rt2860.bin
+firmware: rt2870.bin
+firmware: rt73.bin
+firmware: rtl_nic/rtl8105e-1.fw
+firmware: rtl_nic/rtl8106e-1.fw
+firmware: rtl_nic/rtl8106e-2.fw
+firmware: rtl_nic/rtl8107e-1.fw
+firmware: rtl_nic/rtl8107e-2.fw
+firmware: rtl_nic/rtl8168d-1.fw
+firmware: rtl_nic/rtl8168d-2.fw
+firmware: rtl_nic/rtl8168e-1.fw
+firmware: rtl_nic/rtl8168e-2.fw
+firmware: rtl_nic/rtl8168e-3.fw
+firmware: rtl_nic/rtl8168f-1.fw
+firmware: rtl_nic/rtl8168f-2.fw
+firmware: rtl_nic/rtl8168g-2.fw
+firmware: rtl_nic/rtl8168g-3.fw
+firmware: rtl_nic/rtl8168h-1.fw
+firmware: rtl_nic/rtl8168h-2.fw
+firmware: rtl_nic/rtl8402-1.fw
+firmware: rtl_nic/rtl8411-1.fw
+firmware: rtl_nic/rtl8411-2.fw
+firmware: rtlwifi/rtl8188efw.bin
+firmware: rtlwifi/rtl8192cfw.bin
+firmware: rtlwifi/rtl8192cfwU.bin
+firmware: rtlwifi/rtl8192cfwU_B.bin
+firmware: rtlwifi/rtl8192cufw.bin
+firmware: rtlwifi/rtl8192cufw_A.bin
+firmware: rtlwifi/rtl8192cufw_B.bin
+firmware: rtlwifi/rtl8192cu-fw_TMSC.bin
+firmware: rtlwifi/rtl8192defw.bin
+firmware: rtlwifi/rtl8192eefw.bin
+firmware: rtlwifi/rtl8192eufc.nic.bin
+firmware: rtlwifi/rtl8192sefw.bin
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+firmware: rtlwifi/rtl8723aufw_A.bin
+firmware: rtlwifi/rtl8723aufw_B.bin
+firmware: rtlwifi/rtl8723aufw_B_NoBT.bin
+firmware: rtlwifi/rtl8723befw.bin
+firmware: rtlwifi/rtl8723befw_36.bin
+firmware:   tehuti/bdx.bin
+firmware:   ti-connectivity/wl1251-fw.bin
+firmware:   ti-connectivity/wl1251-nvs.bin
+firmware:   ti-connectivity/wl127x-fw-5-mr.bin
+firmware:   ti-connectivity/wl127x-fw-5-plt.bin
+firmware:   ti-connectivity/wl127x-fw-5-sr.bin
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+firmware:   ti-connectivity/wl128x-fw-5-plt.bin
+firmware:   ti-connectivity/wl128x-fw-5-sr.bin
+firmware:   ti-connectivity/wl18xx-fw-4.bin
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+firmware:   ti_5052.fw
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+firmware:   tigon/tg3_tso.bin
+firmware:   tigon/tg3_tso5.bin
+firmware:   ttusb-budget/dspbootcode.bin
+firmware:   turtlebeach/msndinit.bin
+firmware:   turtlebeach/msndperm.bin
+firmware:   turtlebeach/pndsperm.bin
+firmware:   turtlebeach/pndspini.bin
+firmware:   ueagle-atm/930-fpga.bin
+firmware:   ueagle-atm/CMV4i.bin
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+firmware: usbduxsigma_firmware.bin
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+firmware: v4l-cx23418-apu.fw
+firmware: v4l-cx23418-cpu.fw
+firmware: v4l-cx23418-dig.fw
+firmware: v4l-cx2341x-dec.fw
+firmware: v4l-cx2341x-enc.fw
+firmware: v4l-cx2341x-init.mpg
+firmware: v4l-cx23885-avcore-01.fw
+firmware: v4l-cx23885-enc.fw
+firmware: v4l-cx25840.fw
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+firmware: v4l-pvrusb2-29xxx-01.fw
+firmware: v4l-pvrusb2-73xxx-01.fw
+firmware: vicam/firmware.fw
+firmware: vntwusb.fw
+firmware: vpdma-1b8.bin
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+firmware: vx/bd563s3.boot
+firmware: vx/bd563v2.boot
+firmware: vx/bx_1_vp4.b56
+firmware: vx/bx_1_vxp.b56
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+firmware: vx/l_1_vp4.d56
+firmware: vx/l_1_vx2.d56
+firmware: vx/l_1_vxp.d56
+firmware: vx/x1_1_vp4.xlx
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+firmware: vx/x1_2_v22.xlx
+firmware: vxge/X3fw-pxe.ncf
+firmware: vxge/X3fw.ncf
+firmware: wavefront.os
+firmware: wd719x-risc.bin
+firmware: wd719x-wcs.bin
+firmware: whiteheat.fw
+firmware: whiteheat_loader.fw
+firmware: wil6210.brd
+firmware: wil6210.fw
+firmware: wil6210_sparrow_plus.fw
+firmware: wlan/prima/WCNSS_qcom_wlan_nv.bin
+firmware: xc3028-v27.fw
+firmware: xc3028L-v36.fw
+firmware: yam/1200.bin
+firmware: yam/9600.bin
+firmware: yamaha/ds1_ctrl.fw
+firmware: yamaha/ds1_dsp.fw
+firmware: yamaha/ds1e_ctrl.fw
+firmware:  yamaha/yss225_registers.bin
+firmware:  zd1201-ap.fw
+firmware:  zd1201.fw
+firmware:  zd1211/zd1211_ub
+firmware:  zd1211/zd1211_uphr
+firmware:  zd1211/zd1211.ur
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+EXPORT_SYMBOL drivers/block/sunide/paride 0xc8af8403api_write_regr

Open Source Used In 5GaaS Edge AC-4  15484
+EXPORT_SYMBOL drivers/fmc/fmc 0xb3705400 fmc_find_sdb_device
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+EXPORT_SYMBOL drivers/staging/lustre/ptlrpc/ptlrpc 0x407876f3 sptlrpc_sec_put

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+EXPORT_SYMBOL drivers/staging/lustre/lustre/ptlrpc/ptlrpc 0x8568bacdlustre.msg_clear_flags
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+EXPORT_SYMBOL net/9p/9pnet 0x57967cefp9_is_proto_dotl
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+EXPORT_SYMBOL net/appletalk/appletalk 0x810a9e8a_alloc_ltalkdev
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+EXPORT_SYMBOL net/atm/atm 0x15bfa2fatm_dev_release_vccs
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+EXPORT_SYMBOL net/atm/atm 0x3a02133f deregister_atm_ioctl
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EXTRA_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x73aa8a5a VBoxGuest_RTThreadSelf->Name
EXTRA_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7406c97b VBoxGuest_RTStrCopy
EXTRA_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7532f928 VBoxGuest_RTTimeImplode
EXTRA_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7548d825 VBoxGuest_RTStrToInt16Ex
EXTRA_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x765c7530 VBoxGuest_RTTimeExplode
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EXTRA_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7a791d7d VBoxGuest_RTMemGetPresentCoreCount
EXTRA_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7b6712ca VBoxGuest_RTAssertMsg1Weak
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+EXPORT_SYMBOL vmlinux 0x0377f8c__inode_add_bytes
+EXPORT_SYMBOL vmlinux 0x03992052cont_write_begin
+EXPORT_SYMBOL vmlinux 0x05e13eb9ZSTD_initDDict
+EXPORT_SYMBOL vmlinux 0x05e25804__request_region
+EXPORT_SYMBOL vmlinux 0x05f44c50rtnl_set_sk_err
+EXPORT_SYMBOL vmlinux 0x05f6081ecommit_creds
+EXPORT_SYMBOL vmlinux 0x05f9b7a6skb.tx_error
+EXPORT_SYMBOL vmlinux 0x060b947cd_alloc
+EXPORT_SYMBOL vmlinux 0x061651bestrcat
+EXPORT_SYMBOL vmlinux 0x06237dc4netif_receive_skb_core
+EXPORT_SYMBOL vmlinux 0x0634100habitmap.parselist_user
+EXPORT_SYMBOL vmlinux 0x064b7761fscrypt_decrypt_bio_pages
+EXPORT_SYMBOL vmlinux 0x0653244ckobject_del
+EXPORT_SYMBOL vmlinux 0x06638289generic_listxattr
+EXPORT_SYMBOL vmlinux 0x06724b38ZSTD_getFrameParams
+EXPORT_SYMBOL vmlinux 0x067d8d35security_release_secctx
+EXPORT_SYMBOL vmlinux 0x0680ac30siphash_1u64
+EXPORT_SYMBOL vmlinux 0x068c7263ioremap_cache
+EXPORT_SYMBOL vmlinux 0x069f048fphy_device_register
+EXPORT_SYMBOL vmlinux 0x06a964a2_raw_spin_lock_irq
+EXPORT_SYMBOL vmlinux 0x06ae1f42bmap
+EXPORT_SYMBOL vmlinux 0x06b99657dma_mmap_from_dev_coherent
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+EXPORT_SYMBOL vmlinux 0x06c0dae5__kernel_fpu_end
+EXPORT_SYMBOL vmlinux 0x06c8f2de_slhc_compress
+EXPORT_SYMBOL vmlinux 0x06d50a24csum_partial
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+EXPORT_SYMBOL vmlinux 0x07146266seg6_push_hmac
+EXPORT_SYMBOL vmlinux 0x0727c4f3iowrite8
+EXPORT_SYMBOL vmlinux 0x072901cvme_master_rmw
+EXPORT_SYMBOL vmlinux 0x07333b70register_netdev
+EXPORT_SYMBOL vmlinux 0x0738c642write_inode_now
+EXPORT_SYMBOL vmlinux 0x07416239pci_write_config_word
+EXPORT_SYMBOL vmlinux 0x0755ac9cfiowrite8
+EXPORT_SYMBOL vmlinux 0x075a2c33ZSTD_decompressBegin_usingDict
+EXPORT_SYMBOL vmlinux 0x07608604acpi_get_vendor_resource
+EXPORT_SYMBOL vmlinux 0x0762acc1acpi_device_hid
+EXPORT_SYMBOL vmlinux 0x077a0fa0ip_options_compile
+EXPORT_SYMBOL vmlinux 0x0795cc54tfclassify
+EXPORT_SYMBOL vmlinux 0x07a4b576flex_array_free
+EXPORT_SYMBOL vmlinux 0x149e1af6generic_read_dir
+EXPORT_SYMBOL vmlinux 0x14aad581km_query
+EXPORT_SYMBOL vmlinux 0x14ab7d12neigh_seq_stop
+EXPORT_SYMBOL vmlinux 0x14e831b4devm_request_threaded_irq
+EXPORT_SYMBOL vmlinux 0x14f245b4key_payload_reserve
+EXPORT_SYMBOL vmlinux 0x150ad92biport_resource
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+EXPORT_SYMBOL vmlinux 0x15255199md_set_array_sectors
+EXPORT_SYMBOL vmlinux 0x1526b301unix_tot_inflight
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+EXPORT_SYMBOL vmlinux 0x15ba50a6jiffies
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+EXPORT_SYMBOL vmlinux 0x160cd915inode_needs_sync
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+EXPORT_SYMBOL vmlinux 0x1919b901km_report
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+EXPORT_SYMBOL vmlinux 0x297f9305mipi_dsi_dcs_set_pixel_format
+EXPORT_SYMBOL vmlinux 0x29a4f6d6escsi_cmd_get_serial
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+EXPORT_SYMBOL vmlinux 0x29b84494sync_inode
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+EXPORT_SYMBOL vmlinux 0x29fdda53ksstrtos8_from_user
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+EXPORT_SYMBOL vmlinux 0x2a75d975etty_port_close_end
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+EXPORT_SYMBOL vmlinux 0x30b01320pci_read_config_word
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+EXPORT_SYMBOL vmlinux 0x30e4f43tt_termios_copy_hw
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+EXPORT_SYMBOL vmlinux 0x30ff63e4ntty_ioctl_helper
+EXPORT_SYMBOL vmlinux 0x3102d70bfrontswap_curd_pages
+EXPORT_SYMBOL vmlinux 0x310917fesort
+EXPORT_SYMBOL vmlinux 0x311e0bbccagp_generic_destroy_page
+EXPORT_SYMBOL vmlinux 0x31380354getrawmonotonic64
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+EXPORT_SYMBOL vmlinux 0x314315c0configfs_register_group
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+EXPORT_SYMBOL vmlinux 0x31866246sched_autogroup_detach
+EXPORT_SYMBOL vmlinux 0x3191f09__krealloc
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+EXPORT_SYMBOL vmlinux 0x322954ca6processors
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+EXPORT_SYMBOL vmlinux 0x40d04664console_trylock
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+EXPORT_SYMBOL vmlinux 0x40d59096unregister_restart_handler
+EXPORT_SYMBOL vmlinux 0x40efe1b3refcount_dec_and_lock
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+EXPORT_SYMBOL vmlinux 0x99daa9bftry_offline_node
+EXPORT_SYMBOL vmlinux 0x99dceee3blk_queue_io_min
+EXPORT_SYMBOL vmlinux 0x99e13ffbfmxfrm_sad_getinfo
+EXPORT_SYMBOL vmlinux 0x99e2496feth_header_cache_update
+EXPORT_SYMBOL vmlinux 0x99e8febb0netdev_lower_get_next_private_rcu
+EXPORT_SYMBOL vmlinux 0x99eb7545sock_wfree
+EXPORT_SYMBOL vmlinux 0x9a010c5d_seq_open_private
+EXPORT_SYMBOL vmlinux 0x9a07369ebblk_mq_init_queue
+EXPORT_SYMBOL vmlinux 0x9a1b2d49netdev_master_upper_dev_get_rcu
+EXPORT_SYMBOL vmlinux 0x9a1df65strpbrk
+EXPORT_SYMBOL vmlinux 0x9a1fc4b4jiffies_to_timeval
+EXPORT_SYMBOL vmlinux 0x9a3d208bpcltry_set_mwi
+EXPORT_SYMBOL vmlinux 0x9a4704c5ipv6_find_hdr
+EXPORT_SYMBOL vmlinux 0x9afddf5f6free_skb_partial
+EXPORT_SYMBOL vmlinux 0x9a68dd5netpoll_poll_disable
+EXPORT_SYMBOL vmlinux 0x9a6a83f9cmos_lock
+EXPORT_SYMBOL vmlinux 0x9a6f2471mempool_alloc
+EXPORT_SYMBOL vmlinux 0x9a8d1c12dev_driver_string
+EXPORT_SYMBOL vmlinux 0x9a87ba6cf_em_tree_dump
+EXPORT_SYMBOL vmlinux 0x9aa9ce4trace_print_flags_seq_u64
+EXPORT_SYMBOL vmlinux 0x9aeeeecsysctl_nf_log_all_netns
+EXPORT_SYMBOL vmlinux 0x9aafc0e1tcp_hashinfo
+EXPORT_SYMBOL vmlinux 0x9ad402e5generic_block_fiemap
+EXPORT_SYMBOL vmlinux 0x9aef45e6set_user_nice
+EXPORT_SYMBOL vmlinux 0x9affdece__alloc_disk_node
+EXPORT_SYMBOL vmlinux 0x9bf87aadregister_sysctl_paths
+EXPORT_SYMBOL vmlinux 0x9bfac5e7__kernel_is_locked_down
+EXPORT_SYMBOL vmlinux 0x9c127d84skb_vlan_untag
+EXPORT_SYMBOL vmlinux 0xa5fd22b6generic_delete_inode
+EXPORT_SYMBOL vmlinux 0xa6061d33lw_rwlock
+EXPORT_SYMBOL vmlinux 0xa60c0dc5dma_fence_match_context
+EXPORT_SYMBOL vmlinux 0xa6156a8dblk_rq_map_kern
+EXPORT_SYMBOL vmlinux 0xa63b3be85scsi_get_sense_info_fld
+EXPORT_SYMBOL vmlinux 0xa6472d05mpage_readpages
+EXPORT_SYMBOL vmlinux 0xa6682fdd__init_waitqueue_head
+EXPORT_SYMBOL vmlinux 0xa675804cutft8s_to_utf16s
+EXPORT_SYMBOL vmlinux 0xa67dbeb6acpi_release_mutex
+EXPORT_SYMBOL vmlinux 0xa681fe88generate_random_uuid
+EXPORT_SYMBOL vmlinux 0xa6970398__kfifo_to_user_r
+EXPORT_SYMBOL vmlinux 0xa6a2e7ffjffrm_unregister_type
+EXPORT_SYMBOL vmlinux 0xa6b35640wait_for_completion_killable
+EXPORT_SYMBOL vmlinux 0xa6b44a67filemap_fault
+EXPORT_SYMBOL vmlinux 0xa6bd63caacpi_bios_error
+EXPORT_SYMBOL vmlinux 0xa6e333f69tcp_mtu_to_mss
+EXPORT_SYMBOL vmlinux 0xa6efe3d9dentry_update_name_case
+EXPORT_SYMBOL vmlinux 0xa6f271b8__hw_addr_unsync_dev
+EXPORT_SYMBOL vmlinux 0xa70e9658dev_mc_add_global
+EXPORT_SYMBOL vmlinux 0xa70fabbe_evntsel_nmi
+EXPORT_SYMBOL vmlinux 0xa72439d8blk_queue_physical_block_size
+EXPORT_SYMBOL vmlinux 0xa726ef48__lock_page
+EXPORT_SYMBOL vmlinux 0xa7274a2axxh32
+EXPORT_SYMBOL vmlinux 0xa735db59prandom_u32
+EXPORT_SYMBOL vmlinux 0xa741b286jbd2__journal_restart
+EXPORT_SYMBOL vmlinux 0xa747ec0afget_cached_acl
+EXPORT_SYMBOL vmlinux 0xa74c07f7net_sendpage
+EXPORT_SYMBOL vmlinux 0xa7782167netif_stacked_transfer_operstate
+EXPORT_SYMBOL vmlinux 0xa77bf829register_net6addr_validator_notifier
+EXPORT_SYMBOL vmlinux 0xa78e413bddevm_register_reboot_notifier
+EXPORT_SYMBOL vmlinux 0xa79f7aftty_register_driver
+EXPORT_SYMBOL vmlinux 0xa7bf0ff3dma_fence_get_status
+EXPORT_SYMBOL vmlinux 0xa7bdaeb3netlink_net_capable
+EXPORT_SYMBOL vmlinux 0xa7cf6c2atomic64_dec_return_cx8
+EXPORT_SYMBOL vmlinux 0xa7edd557phy_driver_unregister
+EXPORT_SYMBOL vmlinux 0xa7edc4call_userdatahelper
+EXPORT_SYMBOL vmlinux 0xa7f044e8tcf_em_register
+EXPORT_SYMBOL vmlinux 0xa7f88cfd_raw_write_lock_bh
+EXPORT_SYMBOL vmlinux 0xa80a0e57new_inode
+EXPORT_SYMBOL vmlinux 0xa80d78d0profile_pc
+EXPORT_SYMBOL vmlinux 0xa82944bcvme_new_dma_list
+EXPORT_SYMBOL vmlinux 0xa82dd421serio_unregister_port
+EXPORT_SYMBOL vmlinux 0xa8395b8dpnp_activate_dev
+EXPORT_SYMBOL vmlinux 0xa843805aget_unused_fd_flags
+EXPORT_SYMBOL vmlinux 0xa85a8fboopen_exec
+EXPORT_SYMBOL vmlinux 0xa8644941inet6_del_protocol
+EXPORT_SYMBOL vmlinux 0xa86c36f9blk_end_request
+EXPORT_SYMBOL vmlinux 0xa86e8e3md_cluster_ops
+EXPORT_SYMBOL vmlinuz 0xb009bb4c __skb_checksum_complete
+EXPORT_SYMBOL vmlinuz 0xb01ae107mdiobus_get_phy
+EXPORT_SYMBOL vmlinuz 0xb01b1db8intel_gtt_insert_sg_entries
+EXPORT_SYMBOL vmlinuz 0xb01f05bt10_pi_type3_ip
+EXPORT_SYMBOL vmlinuz 0xb029b605netdev_state_change
+EXPORT_SYMBOL vmlinuz 0xb02e0f12filemap_fdatawait_range_keep_errors
+EXPORT_SYMBOL vmlinuz 0xb05fcs10sysctl_rmem_max
+EXPORT_SYMBOL vmlinuz 0xb0641dfcw6040_get_pll
+EXPORT_SYMBOL vmlinuz 0xb076d99eip6v6_setssockopt
+EXPORT_SYMBOL vmlinuz 0xb08b7706sg_miter_next
+EXPORT_SYMBOL vmlinuz 0xb098e2e7nla_reserve
+EXPORT_SYMBOL vmlinuz 0xb0a0da00rational_best_approximation
+EXPORT_SYMBOL vmlinuz 0xb0a3bb7mark_buffer_write_io_error
+EXPORT_SYMBOL vmlinuz 0xb0a35c5dtrace_print_symbols_seq
+EXPORT_SYMBOL vmlinuz 0xb0a473bcmcc_mpio_get_ro
+EXPORT_SYMBOL vmlinuz 0xb0a1184pigraph_claim_resources
+EXPORT_SYMBOL vmlinuz 0xb0d374a8__tty_insert_flip_char
+EXPORT_SYMBOL vmlinuz 0xbbe01781get_option
+EXPORT_SYMBOL vmlinuz 0xb0e5bb0fxfrm_unregister_km
+EXPORT_SYMBOL vmlinuz 0xb11b9769net_frag_find
+EXPORT_SYMBOL vmlinuz 0xb11e991vfss_stax
+EXPORT_SYMBOL vmlinuz 0xb120886eremove_proc_subtree
+EXPORT_SYMBOL vmlinuz 0xb121390aprobe_irq_on
+EXPORT_SYMBOL vmlinuz 0xb1218cbf unregister_client
+EXPORT_SYMBOL vmlinuz 0xb12f1c29mmc_power_save_host
+EXPORT_SYMBOL vmlinuz 0xb1325a79netpoll_setup
+EXPORT_SYMBOL vmlinuz 0xb150bc1md_bitmap_free
+EXPORT_SYMBOL vmlinuz 0xb15479dcmd_update_sb
+EXPORT_SYMBOL vmlinuz 0xb1645a2esg_free_table
+EXPORT_SYMBOL vmlinuz 0xb1751a72generic_file_splice_read
+EXPORT_SYMBOL vmlinuz 0xb179b44dscsi_report_bus_reset
+EXPORT_SYMBOL vmlinuz 0xb17aca61ddown_write_killable
+EXPORT_SYMBOL vmlinuz 0xb1904934wait_for_completion
+EXPORT_SYMBOL vmlinuz 0xb19c07b5mmc_calc_max_discard
+EXPORT_SYMBOL vmlinuz 0xb1b1f138elv_bio_merge_ok
+EXPORT_SYMBOL vmlinuz 0xb1b1f95isapnp_protocol
+EXPORT_SYMBOL vmlinuz 0xb1b84944mod_zone_page_state
+EXPORT_SYMBOL vmlinuz 0xb1bf8b10scsi_iotcl_reset
+EXPORT_SYMBOL vmlinuz 0xb1c3a01aops_in_progress
+EXPORT_SYMBOL vmlinuz 0xb1c52947tcf_ifr_check
+EXPORT_SYMBOL vmlinuz 0xb1cf44dfbf_find_best_mode
+EXPORT_SYMBOL vmlinuz 0xb1cfad22dmsr_on_cpu
+EXPORT_SYMBOL vmlinuz 0xb1d6d51tcp_v4_mtu_reduced
+EXPORT_SYMBOL vmlinuz 0xb1d75b58lkdev_get_by_path
+EXPORT_SYMBOL vmlinuz 0xb1deb3c6input_register_device
+EXPORT_SYMBOL vmlinuz 0xb1ef0b0bty_devnum
+EXPORT_SYMBOL vmlinuz 0xb1ff3danelbl_catmap_walk
+EXPORT_SYMBOL vmlinuz 0xb1ff573pci_find_pcie_root_port
+EXPORT_SYMBOL vmlinux 0xb219d56cwbinvd_on_cpu
+EXPORT_SYMBOL vmlinux 0xb24566b9dump_page
+EXPORT_SYMBOL vmlinux 0xb24a80a8iterate_supers_type
+EXPORT_SYMBOL vmlinux 0xb25f0fbvlan_dev_vlan_id
+EXPORT_SYMBOL vmlinux 0xb2682405utf8_to_utf32
+EXPORT_SYMBOL vmlinux 0xb26e6b53intel_gtt_insert_page
+EXPORT_SYMBOL vmlinux 0xb29530b9bgnet_stats_start_copy
+EXPORT_SYMBOL vmlinux 0xb2c06ebf_notifier_ops_unregister
+EXPORT_SYMBOL vmlinux 0xb2c61ad7fscrypt_put_encryption_info
+EXPORT_SYMBOL vmlinux 0xb2ce8c2c2mipi_dcs_enter_sleep_mode
+EXPORT_SYMBOL vmlinux 0xb2ce0f75vfs_stats
+EXPORT_SYMBOL vmlinux 0xb2d48a2equeue_work_on
+EXPORT_SYMBOL vmlinux 0xb2f74fb6intel_gmc_remove
+EXPORT_SYMBOL vmlinux 0xb308c97d__put_user_4
+EXPORT_SYMBOL vmlinux 0xb308c97d__wait_woken
+EXPORT_SYMBOL vmlinux 0xb31d60a7follow_pfn
+EXPORT_SYMBOL vmlinux 0xb326b72input_unregister_handle
+EXPORT_SYMBOL vmlinux 0xb3284531acpi_dbg_layer
+EXPORT_SYMBOL vmlinux 0xb335e856neigh_xmit
+EXPORT_SYMBOL vmlinux 0xb336c2b2empty_name
+EXPORT_SYMBOL vmlinux 0xb34041f3may_umount
+EXPORT_SYMBOL vmlinux 0xb351a744errseq_sample
+EXPORT_SYMBOL vmlinux 0xb352177efind_first_bit
+EXPORT_SYMBOL vmlinux 0xb358424fnetlink_broadcast
+EXPORT_SYMBOL vmlinux 0xb365a41nbtt_arena_is_valid
+EXPORT_SYMBOL vmlinux 0xb3687850out_of_line_wait_on_bit_lock
+EXPORT_SYMBOL vmlinux 0xb373da37dentry_open
+EXPORT_SYMBOL vmlinux 0xb3755a95target_for_each_device
+EXPORT_SYMBOL vmlinux 0xb3a97b0dvfs_readlink
+EXPORT_SYMBOL vmlinux 0xb3c23f32acpi_processor_register_performance
+EXPORT_SYMBOL vmlinux 0xb3d2c76dscsi_hostbyte_string
+EXPORT_SYMBOL vmlinux 0xb3d2def5quoto_quot_off
+EXPORT_SYMBOL vmlinux 0xb3d9319dsimple_transaction_set
+EXPORT_SYMBOL vmlinux 0xb3e0590dacpi_set_current_resources
+EXPORT_SYMBOL vmlinux 0xb3ee6b43abx500_get_register_page_interruptible
+EXPORT_SYMBOL vmlinux 0xb3ff3ebd3xxh32_reset
+EXPORT_SYMBOL vmlinux 0xb41f64ekthread_should_stop
+EXPORT_SYMBOL vmlinux 0xb415bfcbpercpu_counter_destroy
+EXPORT_SYMBOL vmlinux 0xb423d9bconsole_blanked
+EXPORT_SYMBOL vmlinux 0xb44ad4b3_copy_to_user
+EXPORT_SYMBOL vmlinux 0xb4519a8fsstring_escape_mem
+EXPORT_SYMBOL vmlinux 0xb45578bbmemscan
+EXPORT_SYMBOL vmlinux 0xb45800eeecdev_addr_add
+EXPORT_SYMBOL vmlinux 0xb45e1026scsi_execute
+EXPORT_SYMBOL vmlinux 0xb466e789key_instantiate_and_link
+EXPORT_SYMBOL vmlinux 0xb4709322scsi_dev_info_add-list
+EXPORT_SYMBOL vmlinux 0xb4728033pci_match_id
+EXPORT_SYMBOL vmlinux 0xb4742a8cnetdev_bonding_info_change

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+EXPORT_SYMBOL vmlinux 0xb476c8f4ZSTD_decompress_usingDict
+EXPORT_SYMBOL vmlinux 0xb49ae34epci_request_regions
+EXPORT_SYMBOL vmlinux 0xb49d0eccparam_ops_invbool
+EXPORT_SYMBOL vmlinux 0xb49e9ccbbblk_queue_free_tags
+EXPORT_SYMBOL vmlinux 0xb4aad45fsock_get_timestamp
+EXPORT_SYMBOL vmlinux 0xb4ch737c_tracepoint_read_msr
+EXPORT_SYMBOL vmlinux 0xb4ce8f53__dec_zone_page_state
+EXPORT_SYMBOL vmlinux 0xb4d04fd5dm_kcopyd_zero
+EXPORT_SYMBOL vmlinux 0xb4db235agenphy_soft_reset
+EXPORT_SYMBOL vmlinux 0xb4dd9e4bvfs_get_link
+IMPORT_SYMBOL vmlinux 0xb5086834mmc_gpio_set_cd_isr
+IMPORT_SYMBOL vmlinux 0xb51e18aclk_get
+IMPORT_SYMBOL vmlinux 0xb51c66f1sync_filesystem
+IMPORT_SYMBOL vmlinux 0xb52ba0ecaccount_page_redirty
+IMPORT_SYMBOL vmlinux 0xb52e8beintel_gtt_clear_range
+IMPORT_SYMBOL vmlinux 0xb5445e4ftty_port_raise_dtr_rts
+IMPORT_SYMBOL vmlinux 0xb545114aregister_md_cluster_operations
+IMPORT_SYMBOL vmlinux 0xb560a556pskb_copy_fclone
+IMPORT_SYMBOL vmlinux 0xb5705eaerntl_link_get_net
+IMPORT_SYMBOL vmlinux 0xb57343c2frontswap_shrink
+IMPORT_SYMBOL vmlinux 0xb574b791rdmacg_register_device
+IMPORT_SYMBOL vmlinux 0xb5929217udp_skb_destructor
+IMPORT_SYMBOL vmlinux 0xb59e1c7fxfmr_policy_unregister_afinfo
+IMPORT_SYMBOL vmlinux 0xb5a459dcunregister_blkdev
+IMPORT_SYMBOL vmlinux 0xb5a7165dma_pool_destroy
+IMPORT_SYMBOL vmlinux 0xb5ae824qcie_get_mps
+IMPORT_SYMBOL vmlinux 0xb5b0399abioset_integrity_create
+IMPORT_SYMBOL vmlinux 0xb5b78d0vcpu_msr
+IMPORT_SYMBOL vmlinux 0xb5d479adnmv_erase_sync
+IMPORT_SYMBOL vmlinux 0xb5ef52b2iosf_mbi_call_pmic_bus_accessNotifier_chain
+IMPORT_SYMBOL vmlinux 0xb5f43c37sock_queue_err_skb
+IMPORT_SYMBOL vmlinux 0xb61358b3no_seekeend_map
+IMPORT_SYMBOL vmlinux 0xb61cab7b_radix_tree_insert
+IMPORT_SYMBOL vmlinux 0xb6240ec7scsi_unblock_requests
+IMPORT_SYMBOL vmlinux 0xb6244511s_init_one
+IMPORT_SYMBOL vmlinux 0xb63f115irq_poll_enable
+IMPORT_SYMBOL vmlinux 0xb648e778flock_put_ext
+IMPORT_SYMBOL vmlinux 0xb649a37await_on_page_bit_killable
+IMPORT_SYMBOL vmlinux 0xb660a1bdinet6_ioctl
+IMPORT_SYMBOL vmlinux 0xb67135e5_xfrm_route_forward
+IMPORT_SYMBOL vmlinux 0xb674a534acpi_unmap_cpu
+IMPORT_SYMBOL vmlinux 0xb678366fint_sqrt
+IMPORT_SYMBOL vmlinux 0xb6796ea7dev_get_flags
+IMPORT_SYMBOL vmlinux 0xb67fec0euuid_parse
+IMPORT_SYMBOL vmlinux 0xb6896671cre_t10dif
+IMPORT_SYMBOL vmlinux 0xb6936fcbcd2bin
+IMPORT_SYMBOL vmlinux 0xb69e2ae2register_kmmio_probe
+IMPORT_SYMBOL vmlinux 0xb69f34d2bdget
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+EXPORT_SYMBOL vmlinux 0xb8d3fb25gen_pool_create
+EXPORT_SYMBOL vmlinux 0xb8ddf92rwsem_wake
+EXPORT_SYMBOL vmlinux 0xb8e777e7kstrtouint_from_user
+EXPORT_SYMBOL vmlinux 0xb8ef800__cleancache_init_fs
+EXPORT_SYMBOL vmlinux 0xb8f9eb9cs1i_eh_prep_cmd
+EXPORT_SYMBOL vmlinux 0xb90727b7bz_free
+EXPORT_SYMBOL vmlinux 0xb91391afilemap_page_mkwrite
+EXPORT_SYMBOL vmlinux 0xb91c2820rtnl_configure_link
+EXPORT_SYMBOL vmlinux 0xb9344b8dget_cached_acl
+EXPORT_SYMBOL vmlinux 0xb94891ddmm_power_restore_host
+EXPORT_SYMBOL vmlinux 0xb959e4b7scsi_device_set_state
+EXPORT_SYMBOL vmlinux 0xb96b1510tcp_select_initial_window
+EXPORT_SYMBOL vmlinux 0xb973a893ip6_dst_alloc
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+EXPORT_SYMBOL vmlinux 0xb99f03a30dquot_mark_dquot_dirty
+EXPORT_SYMBOL vmlinux 0xba03cfa9nobh_write_end
+EXPORT_SYMBOL vmlinux 0xba198955sk_dst_check
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+EXPORT_SYMBOL vmlinux 0xba2d8594ec_read
+EXPORT_SYMBOL vmlinux 0xba33788dto_ndd
+EXPORT_SYMBOL vmlinux 0xba43b10birq_regs
+EXPORT_SYMBOL vmlinux 0xba497f13loops_per_jiffies
+EXPORT_SYMBOL vmlinux 0xba76973eproc_mkdir
+EXPORT_SYMBOL vmlinux 0xba89b607_copy_from_iter_full_nocache
+EXPORT_SYMBOL vmlinux 0xbaa2f80d8042_remove_filter
+EXPORT_SYMBOL vmlinux 0xbac3c2f2ns_to_timespec64
+EXPORT_SYMBOL vmlinux 0xbbacc32f4to_nbd_ttt
+EXPORT_SYMBOL vmlinux 0xbbad938epcim_omap_regions_request_all
+EXPORT_SYMBOL vmlinux 0xbbb9800mark_page_accessed
+EXPORT_SYMBOL vmlinux 0xbbdc0b0csioftb_sync_single_for_cpu
+EXPORT_SYMBOL vmlinux 0xbbd012b0erace_cached
+EXPORT_SYMBOL vmlinux 0xbb0540azzmlib_inflateReset
+EXPORT_SYMBOL vmlinux 0xbb14eb31bcmp
+EXPORT_SYMBOL vmlinux 0xbb17294fbdev_stack_limits
+EXPORT_SYMBOL vmlinux 0xbb183391soft_cursor
+EXPORT_SYMBOL vmlinux 0xc6f03f58devm_ioremap_uc
+EXPORT_SYMBOL vmlinux 0xc7208c3aserial8250_resume_port
+EXPORT_SYMBOL vmlinux 0xc730a0denf_getsockopt
+EXPORT_SYMBOL vmlinux 0xc737266dtep_v4_send_check
+EXPORT_SYMBOL vmlinux 0xc7380ac8vga_switcheroo_init_domain_pm_ops
+EXPORT_SYMBOL vmlinux 0xc742be1dev_get_iflink
+EXPORT_SYMBOL vmlinux 0xc7563db8twl_set_regcache_bypass
+EXPORT_SYMBOL vmlinux 0xc75a3d05writeback_inodes_sb
+EXPORT_SYMBOL vmlinux 0xc76c458bde_timer
+EXPORT_SYMBOL vmlinux 0xc781bd9frrkill_resume_polling
+EXPORT_SYMBOL vmlinux 0xc7856a3dinet6addr_notifier_call_chain
+EXPORT_SYMBOL vmlinux 0xc79b8f9bphy_drivers_register
+EXPORT_SYMBOL vmlinux 0xc79b036dvcalloc
+EXPORT_SYMBOL vmlinux 0xc7a4fbedrtlntal_lock
+EXPORT_SYMBOL vmlinux 0xc7b30bbpneigh_enqueue
+EXPORT_SYMBOL vmlinux 0xc7c1107aLZ4_decompress_safe
+EXPORT_SYMBOL vmlinux 0xc7c71d8f_id_invalidate
+EXPORT_SYMBOL vmlinux 0xc7c7b4af__blk_end_request_cur
+EXPORT_SYMBOL vmlinux 0xc808568bacpi_processor_notify_smm
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+EXPORT_SYMBOL vmlinux 0xc8339e24string_unescape
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+EXPORT_SYMBOL vmlinux 0xc8456032tcp_timewait_state_process
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+EXPORT_SYMBOL vmlinux 0xc84a0a7eselq_hlist_start_rcu
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+EXPORT_SYMBOL vmlinux 0xc877477etcf_block_cb_inref
+EXPORT_SYMBOL vmlinux 0xc8815782unregister_key_type
+EXPORT_SYMBOL vmlinux 0xc883f1aalloc_fdidd
+EXPORT_SYMBOL vmlinux 0xc890c008zlib_deflateEnd
+EXPORT_SYMBOL vmlinux 0xc8953cb9ppp_register_compressor
+EXPORT_SYMBOL vmlinux 0xc897c382sg_init_table
+EXPORT_SYMBOL vmlinux 0xc8a9115bcpumask_local_spread
+EXPORT_SYMBOL vmlinux 0xc8b491e7scti_command_normalize_sense
+EXPORT_SYMBOL vmlinux 0xc8d90627PageMovable
+EXPORT_SYMBOL vmlinux 0xc90d189cx_handler_refcount
+EXPORT_SYMBOL vmlinux 0xc90fc2aand_region_release_lan<br>
+EXPORT_SYMBOL vmlinux 0xcd9808c9netlbl_calipso_ops_register
+EXPORT_SYMBOL vmlinux 0xcd98462creservation_object_add_excl_fence
+EXPORT_SYMBOL vmlinux 0xcda8e807clkdev_alloc
+EXPORT_SYMBOL vmlinux 0xcdeadac0flow_hash_from_keys
+EXPORT_SYMBOL vmlinux 0xcdb3a28edevfreq_recommended OPP
+EXPORT_SYMBOL vmlinux 0xcd39c9esecurity_ismaclabel
+EXPORT_SYMBOL vmlinux 0xcdd5413cfind_mipi_dsi_device_by_node
+EXPORT_SYMBOL vmlinux 0xcd12de6clkmrelease
+EXPORT_SYMBOL vmlinux 0xcd77bccfree_opal_dev
+EXPORT_SYMBOL vmlinux 0xcde7c68fxfrm_spd_getinfo
+EXPORT_SYMBOL vmlinux 0xcd41032__scm_destroy
+EXPORT_SYMBOL vmlinux 0xce0f811aget_tz_trend
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+EXPORT_SYMBOL vmlinux 0xce3f616cseq_pad
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+EXPORT_SYMBOL vmlinux 0xce522c1cpiosix_acl_update_mode
+EXPORT_SYMBOL vmlinux 0xce5ac24fzlib_inflate_workspacesize
+EXPORT_SYMBOL vmlinux 0xce73fdaeagp_generic_enable
+EXPORT_SYMBOL vmlinux 0xce7bfe70vm_brk
+EXPORT_SYMBOL vmlinux 0xce8ac233sync_blockdev
+EXPORT_SYMBOL vmlinux 0xce8f001jbd2_journal_inode_ranged_write
+EXPORT_SYMBOL vmlinux 0xce985c4reservation_object_reserve_shared
+EXPORT_SYMBOL vmlinux 0xce985c4reservation_object_reserve_shared
+EXPORT_SYMBOL vmlinux 0xcea0311strchr
+EXPORT_SYMBOL vmlinux 0xcec0d9b8LZ4_decompress_safe_continue
+EXPORT_SYMBOL vmlinux 0xcec6464ec__put_cred
+EXPORT_SYMBOL vmlinux 0xceced039param_set Bool
+EXPORT_SYMBOL vmlinux 0xcece7f5d5swiotlb_sync_sg_for_device
+EXPORT_SYMBOL vmlinux 0xcefde616ip_cmsg_recv_offset
+EXPORT_SYMBOL vmlinux 0xcef51982kstrstou16
+EXPORT_SYMBOL vmlinux 0xcef8bdesgl_alloc_order
+EXPORT_SYMBOL vmlinux 0xcef2b073try_to_writeback_inodes sb
+EXPORT_SYMBOL vmlinux 0xcefc99aserial8250_unregister_port
+EXPORT_SYMBOL vmlinux 0xcfe0b47enmmecan_quad
+EXPORT_SYMBOL vmlinux 0xcfd0731noop_qdisc
+EXPORT_SYMBOL vmlinux 0xcfe1e8f__block_write_begin
+EXPORT_SYMBOL vmlinux 0xcf4b436fkern_unmount
+EXPORT_SYMBOL vmlinux 0xcf4f2benvm_submit_io
+EXPORT_SYMBOL vmlinux 0xc50785cskbtry_coalesce
+EXPORT_SYMBOL vmlinux 0xc6ce1fmsrs_free
+EXPORT_SYMBOL vmlinux 0xc7e077dev_set_group
+EXPORT_SYMBOL vmlinux 0xcfbc4135textsearch_find_continuous
+EXPORT_SYMBOL vmlinux 0xcfe417dupd_push_pending_frames
+EXPORT_SYMBOL vmlinux 0xcfd3231vmmmap
+EXPORT_SYMBOL vmlinux 0xcfd3231vmmmap
+EXPORT_SYMBOL vmlinux 0xd006f85tcp_get_cookie_sock
+EXPORT_SYMBOL vmlinux 0xd016f85tcp_get_cookie_sock
+EXPORT_SYMBOL vmlinux 0xd77bfskstore_bits
+EXPORT_SYMBOL vmlinux 0xd0211d59noop_lseek
+EXPORT_SYMBOL vmlinux 0xe997667bwmsr_on_cpu
+EXPORT_SYMBOL vmlinux 0xe99e9a75d_splice_alias
+EXPORT_SYMBOL vmlinux 0xe9a04b3b_acpi_map_cpu
+EXPORT_SYMBOL vmlinux 0xe9a7985agen_pool_set_algo
+EXPORT_SYMBOL vmlinux 0xe9bd443cd_parse_cdc_header
+EXPORT_SYMBOL vmlinux 0xe9bf2128mmc_can_secure_erase_trim
+EXPORT_SYMBOL vmlinux 0xe9c972ectwl6040_clear_bits
+EXPORT_SYMBOL vmlinux 0xe9cf2f50up_read
+EXPORT_SYMBOL vmlinux 0xe9f7149cezlib_deflate_workspacesize
+EXPORT_SYMBOL vmlinux 0xea08a239agp_generic_destroy_pages
+EXPORT_SYMBOL vmlinux 0xea0c3fa9secpath_dup
+EXPORT_SYMBOL vmlinux 0xea167ebblock_commit_write
+EXPORT_SYMBOL vmlinux 0xea223662softnet_data
+EXPORT_SYMBOL vmlinux 0xea2fe3bmd_reload_slb
+EXPORT_SYMBOL vmlinux 0xea35ed51pci_find_capability
+EXPORT_SYMBOL vmlinux 0xea5d2414nf_unregister_net_hook
+EXPORT_SYMBOL vmlinux 0xea5d7e93empty_aops
+EXPORT_SYMBOL vmlinux 0xea698ea3phy_device_create
+EXPORT_SYMBOL vmlinux 0xea746c7dseq_puts
+EXPORT_SYMBOL vmlinux 0xea75f7a5get_user_pages
+EXPORT_SYMBOL vmlinux 0xea7987f1key_update
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+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0x256bad14tcpm_register_port
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0x3b84657btcpm_pd_transmit_complete
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0x412707f9tcpm_pd_receive
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0x76eeda4btcpm_unregister_port
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0x9e0bd75htcpm_pd_hard_reset
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0xc37b9769tcpm_cc_change
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0xce50012tcpm_vbus_change
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0xe871867ctcpm_update_sink_capabilities
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0xea220941tcpm_tpcp_reset
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0x03608f2atypec_cable_set_identity
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0x059e09tcpm_unregister_altmode
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0xb90ac2bytec_unregister_plug
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0xc179066bytec_register_cable
+EXPORT_SYMBOL_GPL drivers/usb/typec/tcpm 0xc8a4b22atypec_register_port
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x050030bcpnfs_generic_pg_cleanup
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x054be45layoutstats_timer
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x0624797dnfs41_sequence_done
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x067eb038pnfs_layoutcommit_inode
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x0ae2f9aenfs4_init_deviceid_node
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x0fd5863anfs4_pnfs_ds_add
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x16a35f15pnfs_generic_pg_readpages
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x170f3ed6nfs4_maxgetdevinfo_overhead
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x20868b2apnfs_set_lo_fail
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x216ec568pnfs_generic_clear_request_commit
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x24568f3enfs4_sequence_done
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x28a3406bpnfs_destroy_layout
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x303fb41apnfs4_put_deviceid_node
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x31ee0f61pnfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x359a3060pnfs_read_resend_pnfs
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x3d437e89pnfs_pnfs_ds_put
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x41ab713epnfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x42bcd283pnfs_ds_connect
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x44ae51f8nfs4_find_or_create_ds_client
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x4b76b444pnfs4_decode_mp_ds_addr
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x51040d3bpnfs_generic_scan_commit_lists
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x54a29e90pnfs_generic_pg_init_write
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x581df7dfpnfs_pnfs_read_done_resend_to_mds
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x5f69f1bebnfs_update_layout
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x63f0b272pnfs_unregister_layoutdriver
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x64f20f9bnpnfs_remove_bad_delegation
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x69d3558dpnfs_generic_rwlock_release
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x69f21c0fpnfs_schedule_migration_recovery
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x721cfec5enfs4_test_session_trunk
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x734e703fpnfs_register_layoutdriver
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x77531d1apnfs_generic_layout_insert_lseg
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x7b0e5ce6pnfs_write_done_resend_to_mds
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x7be7383cnfs4_find_get_deviceid
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x7ef01af9__tracepoint_nfs4_pnfs_commit_ds
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x80319152nfs4_schedule_session_recovery
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x80c79172nfs4_setup_sequence
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x863b6c02pnfs_generic_commit_pagelist
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x914339e9pnfs_generic_recover_commit_reqs
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0x927f9eb4pnfs_generic_pg_check_layout
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0xa02df320npnfs_map_string_to_numeric
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0xa4a0ec85pnfs_generic_pg_test
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0xa4eb982pnfs_generic_pg_init_read
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0xa5e3b078pnfs_id_read_done
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0xa8c11322pnfs_generic_write_commit_done
+EXPORT_SYMBOL_GPL fs/nfs/nfs4 0xace53669nfs4_test_deviceid_unavailable

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+EXPORT_SYMBOL_GPL kernel/torture 0xf6d34fb5torture_kthread_stopping
+EXPORT_SYMBOL_GPL lib/842/842_compress 0xce013cfsw842_compress
+EXPORT_SYMBOL_GPL lib/842/842_decompress 0x0d22f116sw842_decompress
+EXPORT_SYMBOL_GPL lib/bch 0x231d70fcencode_bch
+EXPORT_SYMBOL_GPL lib/bch 0x6b770f49decode_bch
+EXPORT_SYMBOL_GPL lib/bch 0x9463ff71init_bch
+EXPORT_SYMBOL_GPL lib/bch 0xbd5f12defree_bch
+EXPORT_SYMBOL_GPL lib/crc4 0x0083af0acrc4
+EXPORT_SYMBOL_GPL lib/notifier-error-inject 0x71369752notifier_err_inject_init
+EXPORT_SYMBOL_GPL lib/raid6/raid6_pq 0x0f1957e1raid6_datap_recv
+EXPORT_SYMBOL_GPL lib/raid6/raid6_pq 0x0f18a2742raid6_2data_recv
+EXPORT_SYMBOL_GPL lib/reed_solomon/reed_solomon 0x201d8ea3encode_rs8
+EXPORT_SYMBOL_GPL lib/reed_solomon/reed_solomon 0x29fa419fdecode_rs8
+EXPORT_SYMBOL_GPL lib/reed_solomon/reed_solomon 0x53ae66d3free_rs
+EXPORT_SYMBOL_GPL lib/reed_solomon/reed_solomon 0x92966564init_rs_non_canonical
+EXPORT_SYMBOL_GPL lib/reed_solomon/reed_solomon 0xb050f329init_rs
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x04df0dc9base_true_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x1d17a143base_inv_old_false_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x3c6e9dadbase_inv_false_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x53ae66d3base_inv_true_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x92966564base_inv_old_true_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x968c1dbase_old_false_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0x761d13ebase_old_true_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0xdf7f0c85base_false_key
+EXPORT_SYMBOL_GPL lib/test_static_key_base 0xdf7f0c85base_false_key
+EXPORT_SYMBOL_GPL net/6lowpan/6lowpan 0xa214b772lowpan_header_compress
+EXPORT_SYMBOL_GPL net/6lowpan/6lowpan 0xb67d50bdlowpan_header_decompress
+EXPORT_SYMBOL_GPL net/802/garp 0x60878097garp_uninit_application
+EXPORT_SYMBOL_GPL net/802/garp 0x624f659bgarp_request_join
+EXPORT_SYMBOL_GPL net/802/garp 0x6ae7749egarp_unregister_application
+EXPORT_SYMBOL_GPL net/802/garp 0xa50bfa2agarp_register_application
+EXPORT_SYMBOL_GPL net/802/garp 0xa56b1cagarp_init_application
+EXPORT_SYMBOL_GPL net/802/garp 0x67d50bdgarp_request_leave
+EXPORT_SYMBOL_GPL net/802/mrp 0x444b3b9emrp_request_leave
+EXPORT_SYMBOL_GPL net/802/mrp 0x7ba98963mrp_register_application
+EXPORT_SYMBOL_GPL net/802/mrp 0x892799f8mrp_unregister_application
+EXPORT_SYMBOL_GPL net/802/mrp 0x8c80656damrp_init_application
+EXPORT_SYMBOL_GPL net/802/mrp 0x9554d3emrp_request_join
+EXPORT_SYMBOL_GPL net/802/mrp 0xa7033836mrp_uninit_application
+EXPORT_SYMBOL_GPL net/802/stp 0x432a9375stp_proto_unregister
+EXPORT_SYMBOL_GPL net/802/stp 0x4e0f0b46stp_proto_register
+EXPORT_SYMBOL_GPL net/9p9pnet 0x2cd6dc97p9_clientrypted
+EXPORT_SYMBOL_GPL net/9p9pnet 0x4f87c645p9_client_xattrwalk
+EXPORT_SYMBOL_GPL net/atom/atom 0xb09fa79register_atmdevice_notifier
+EXPORT_SYMBOL_GPL net/atom/atom 0xcf6a3daunregister_atmdevice_notifier
+EXPORT_SYMBOL_GPL net/ax25/ax25 0x8448802bax25_register_pid
+EXPORT_SYMBOL_GPL net/netfilter/nf_dupdev_net 0xe2d5c705nf_fwd_netdev_egress
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x09bacc0bnet_log_dump_vlan
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x39c6b90anf_log_dump_udp_header
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x3dda0ed6nf_log_dump_packet_common
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x45a3c590nf_log_l2packet
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x460b708fnf_log_dump_tcp_header
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x12a18dfnfnf_log_dump_sk_uid_gid
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x02c6d0acnf_nat_l4proto_register
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x05b601e2nfnf_nat_alloc_null_binding
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x093fae4bmfnf_nat_l4proto_unregister
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x131f636cnfnf_nat_l4proto_in_range
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+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x4cb1e99dfnct_nat_ext_add
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+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x9a307348nfnf_nat_l4proto_unregister
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0xe45f8e3anfnf_nat_l4proto_find
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+EXPORT_SYMBOL_GPL net/netfilter/nf_nat_redirect 0x90dcd02dnf_nat_redirect_ipv4
+EXPORT_SYMBOL_GPL net/netfilter/nf_synproxy_core 0x11a006b5nf_synproxy_check_timestamp_cookie
+EXPORT_SYMBOL_GPL net/netfilter/nf_synproxy_core 0x2f4b3363synproxy_timestamp_adjust
+EXPORT_SYMBOL_GPL net/netfilter/nf_synproxy_core 0x64d1e57synproxy_parse_options
+EXPORT_SYMBOL_GPL net/netfilter/nf_synproxy_core 0x8841d399synproxy_build_options
+EXPORT_SYMBOL_GPL net/netfilter/nf_synproxy_core 0x90298227synproxy_init_timestamp_cookie
+EXPORT_SYMBOL_GPL net/netfilter/nf_synproxy_core 0xb42336asynproxy_options_size
+EXPORT_SYMBOL_GPL net/netfilter/nf_synproxy_core 0xca96c082synproxy_net_id
+EXPORT_SYMBOL_GPL net/netfilter/nf_tables 0x0e4e7451nft_data_init
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x1628ea79nft_unregister_chain_type
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x18326b99nft_do_chain
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x1b2b7c4enfnft_register_chain_type
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x1de6a6695nft_unregister_expr
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x1e6b75a3nft_parse_register
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x230c7f13nft_register_expr
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x3139760nft_validate_register_store
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x3e78f877nftables_obj_lookup
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x43f9d11nft_register_afinfo
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x52a3856nft_obj_notify
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+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x54dbb086nft_set_lookup
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x5c6aab05nft_set_gc_batch_alloc
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x5e2d19de_nft_release_basechain
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x601885b0nftables_bind_set
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x605e3aecnf_register_obj
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x7843bdf7nft_unregister_obj
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x85430a76nft_validate_register_load
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x858a261anft_trace_enabled
+EXPORT_SYMBOL_GPL net/netfilter/nftables 0x86043b61nft_unregister_afinfo
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x940a89ebrpc_lookup_machine_cred
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9611aa94cache_seq_start
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x985af929svc_bind
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x98b75d64rpcauth_list_flavors
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9a66be70svc_create_xprt
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9b42ef30xpq_complete_rqst
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9bfb25a0unix_domain_find
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9c53a262xdr_process_buf
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9c6d2586sunrpc_cache_pipe_upcall
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9e1ec621rpc_pipe_generic_upcall
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9e9aece7svc_reserve
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9eb7488brpc_force_rebind
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9ebea211rpc_clone_client_set_auth
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xa0988034xdr_skb_read_bits
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xa13acdb8svcc_pool_map_put
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xa3bee894rpc_unregister
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xa4917ed4rpc_pton
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xa506ba35rpc_free
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xa790e931xprt_set_retrans_timeout_rtt
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xa8f8b5f6xprt_disconnect_done
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xaba947d6rpc_net_ns
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xb1c1f6dfrpcauth_key_timeout_notify
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xb2c3f5ferpc_call_sync
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xb312d0c4rpc_peeraddr
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xb3a871f0svc_set_num_threads_sync
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xb47ba04erpc_clone_client
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xb506ba35rpc_free
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+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xb9f9d1b96nfsd_debug
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xc00556aesvc_destroy
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xc07f4b08rpc_protocol
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xc0993e01sunrpc_init_cache_detail
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xc12435e3rpc_calc_rto
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0xc158c010rpc_init_pipe_dir_object
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+EXPORT_SYMBOL_GPL vmlinux 0x00531a17xen_xlate_map_balooned_pages
+EXPORT_SYMBOL_GPL vmlinux 0x006026f8regulator_get_current_limit
+EXPORT_SYMBOL_GPL vmlinux 0x00632780work_busy
+EXPORT_SYMBOL_GPL vmlinux 0x006820b4pci_write_msi_msg
+EXPORT_SYMBOL_GPL vmlinux 0x008b1999rt_mutex_timed_lock
+EXPORT_SYMBOL_GPL vmlinux 0x0090bd19blk_stat_free_callback
+EXPORT_SYMBOL_GPL vmlinux 0x009304b6atαι_tf_from_fis
+EXPORT_SYMBOL_GPL vmlinux 0x00a0d0c1wakeup_source_drop
+EXPORT_SYMBOL_GPL vmlinux 0x00a55557acpi_release_memory
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+EXPORT_SYMBOL_GPL vmlinux 0x00c488d6platform_irq_count
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+EXPORT_SYMBOL_GPL vmlinux 0x00eba1c4regulator_set_mode
+EXPORT_SYMBOL_GPL vmlinux 0x00ebcb5data_id_string
+EXPORT_SYMBOL_GPL vmlinux 0x00f49097vfs_removexattr
+EXPORT_SYMBOL_GPL vmlinux 0x011cf028regulator_suspend_finish
+EXPORT_SYMBOL_GPL vmlinux 0x012054ddbsg_job_done
+EXPORT_SYMBOL_GPL vmlinux 0x01223c4brio_mport_send_doorbell
+EXPORT_SYMBOL_GPL vmlinux 0x0136a5d3_hwpin_unlock
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+EXPORT_SYMBOL_GPL vmlinux 0x01613998rtc_update_irq
+EXPORT_SYMBOL_GPL vmlinux 0x016afc9aextcon_get_property_capability
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+EXPORT_SYMBOL_GPL vmlinux 0x01828595dev_pm OPP_remove
+EXPORT_SYMBOL_GPL vmlinux 0x01848a8elocal_apic_timer_c2_ok
+EXPORT_SYMBOL_GPL vmlinux 0x018e4ce2device_pm_wait_for_dev
+EXPORT_SYMBOL_GPL vmlinux 0x019e66f5pcie_flr
+EXPORT_SYMBOL_GPL vmlinux 0x01a02f6cpuidle_disable_device
+EXPORT_SYMBOL_GPL vmlinux 0x01aaf5fbperf_event_addr_filters_sync
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+EXPORT_SYMBOL_GPL vmlinux 0x01e1a8dekgdb_breakpoint
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+EXPORT_SYMBOL_GPL vmlinux 0x143e39b5devfreq_event_get_eudev_by_phandle
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+EXPORT_SYMBOL_GPL vmlinux 0xb52db1cprobe_kernel_read
+EXPORT_SYMBOL_GPL vmlinux 0xb56c305regulator_bulk_unregister_supply_alias
+EXPORT_SYMBOL_GPL vmlinux 0xb586f15devm_device_remove_groups
+EXPORT_SYMBOL_GPL vmlinux 0xb81fd97ata Cable_sata
+EXPORT_SYMBOL_GPL vmlinux 0xb8822d8pinctrl_gpio_direction_output
+EXPORT_SYMBOL_GPL vmlinux 0xb9aca3fjprobe_return
+EXPORT_SYMBOL_GPL vmlinux 0xbba237fbdefault_cpu_present_to_apic
+EXPORT_SYMBOL_GPL vmlinux 0xbba86f9dndimm volatile_region_create
+EXPORT_SYMBOL_GPL vmlinux 0xbc5eepinctrl_gpio_direction_input
+EXPORT_SYMBOL_GPL vmlinux 0xbe85038edac_device_handle_ue
+EXPORT_SYMBOL_GPL vmlinux 0xbfc3082__clocksource_register_scale
+EXPORT_SYMBOL_GPL vmlinux 0xbf7d7398class_compat_remove_link
+EXPORT_SYMBOL_GPL vmlinux 0xc031294dev pm opp set prop name
+EXPORT_SYMBOL_GPL vmlinux 0xc3405c8debugfs_file_get
+EXPORT_SYMBOL_GPL vmlinux 0xc37f778debugfs_create_ulong
+EXPORT_SYMBOL_GPL vmlinux 0xce562fmmc_cmdq_disable
+EXPORT_SYMBOL_GPL vmlinux 0xc5541bdcufreq_boost_enabled
+EXPORT_SYMBOL_GPL vmlinux 0xc57479cget scattered_cpuid_leaf
+EXPORT_SYMBOL_GPL vmlinux 0xc5bf128irq_free_descs
+EXPORT_SYMBOL_GPL vmlinux 0xc5f742ck_get_phase
+EXPORT_SYMBOL_GPL vmlinux 0xc6d954evfs_setlease
+EXPORT_SYMBOL_GPL vmlinux 0xc80d27dmtree _geo128
+EXPORT_SYMBOL_GPL vmlinux 0xc878a811__round jiffies_up
+EXPORT_SYMBOL_GPL vmlinux 0xc9a05c63cpufreq_driver_fast_switch
+EXPORT_SYMBOL_GPL vmlinux 0xcb247a7dev pm opp put opp_table
+EXPORT_SYMBOL_GPL vmlinux 0xcbd92b0cpu mitigations off
+EXPORT_SYMBOL_GPL vmlinux 0xce7e7d29blk_init request_from_bio
+EXPORT_SYMBOL_GPL vmlinux 0xcf0772ahypervisor_kobj
+EXPORT_SYMBOL_GPL vmlinux 0xcf9e06gpiod_get_array_value
+EXPORT_SYMBOL_GPL vmlinux 0xd0598b4ehci_resume
+EXPORT_SYMBOL_GPL vmlinux 0xd222cedirq _get irqchip_state
+EXPORT_SYMBOL_GPL vmlinux 0xd962c82dirq_domain Alloc irqs_parent
+EXPORT_SYMBOL_GPL vmlinux 0xdfe0c0fwakeup source create
+EXPORT_SYMBOL_GPL vmlinux 0xd58ae14lpDDR2_jedec_timings
+EXPORT_SYMBOL_GPL vmlinux 0xc5f698ommu_domain_get_attr
+EXPORT_SYMBOL_GPL vmlinux 0xda921b1dev pm opp register set opp_helper
+EXPORT_SYMBOL_GPL vmlinux 0xda73e1cxen_set_callback via)
+EXPORT_SYMBOL_GPL vmlinux 0xda77b0funix_socket_table
+EXPORT_SYMBOL_GPL vmlinux 0xda8622bcatata_sff_port_intr
+EXPORT_SYMBOL_GPL vmlinux 0xda88339crypto_register_aead
+EXPORT_SYMBOL_GPL vmlinux 0xda8c038fstatic_key_disable
+EXPORT_SYMBOL_GPL vmlinux 0xda49ec5ata_std sched eh
+EXPORT_SYMBOL_GPL vmlinux 0xda7f42device_show_int
+EXPORT_SYMBOL_GPL vmlinux 0xda80f86pci epc_get msi
+EXPORT_SYMBOL_GPL vmlinux 0xda84f99ata_sff softreset
+EXPORT_SYMBOL_GPL vmlinux 0xdaee20c5dev pm domain detach
+EXPORT_SYMBOL_GPL vmlinux 0x27148785rio__mport_read_config_16
+EXPORT_SYMBOL_GPL vmlinux 0x2723527cfat_sync_inode
+EXPORT_SYMBOL_GPL vmlinux 0x272a4728uart_handle_cts_change
+EXPORT_SYMBOL_GPL vmlinux 0x27387d7fp埔_chip_register
+EXPORT_SYMBOL_GPL vmlinux 0x273aab74xen_have_vector_callback
+EXPORT_SYMBOL_GPL vmlinux 0x274cf5e1_clk_get_flags
+EXPORT_SYMBOL_GPL vmlinux 0x2754f760device_store_int
+EXPORT_SYMBOL_GPL vmlinux 0x275dd652blk_queue_bypass_end
+EXPORT_SYMBOL_GPL vmlinux 0x2769a93percpu_ref_switch_to_atomic
+EXPORT_SYMBOL_GPL vmlinux 0x277582d9fatm_dev_manager
+EXPORT_SYMBOL_GPL vmlinux 0x2773abf7xen_context_switch
+EXPORT_SYMBOL_GPL vmlinux 0x277c55e9urandom_set
+EXPORT_SYMBOL_GPL vmlinux 0x277af7e4urscb__alloc
+EXPORT_SYMBOL_GPL vmlinux 0x27803b5dregulator_map_voltage_ascend
+EXPORT_SYMBOL_GPL vmlinux 0x278b51e9crypto_inst_create
+EXPORT_SYMBOL_GPL vmlinux 0x278c31b4sysfs_remove_files
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+EXPORT_SYMBOL_GPL vmlinux 0x278fc1b1regulator_map_voltage
+EXPORT_SYMBOL_GPL vmlinux 0x27915243ata_sff_data_xfer_noirq
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+EXPORT_SYMBOL_GPL vmlinux 0x27ac1f3e64tmsd_find_chipset_info
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+EXPORT_SYMBOL_GPL vmlinux 0x27f70568usb_phy_set_event
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+EXPORT_SYMBOL_GPL vmlinux 0x28757002irq_domain_remove
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+EXPORT_SYMBOL_GPL vmlinux 0x28b64c64xen_has_pv_and_legacy_disk_devices
+EXPORT_SYMBOL_GPL vmlinux 0x28f9ae3mddev_unlock
+EXPORT_SYMBOL_GPL vmlinux 0x2909175fsha1_zero_message_hash
+EXPORT_SYMBOL_GPL vmlinux 0x29152430data_sff_data_xfer_noirq
+EXPORT_SYMBOL_GPL vmlinux 0x291a7a5ip6_input
+EXPORT_SYMBOL_GPL vmlinux 0x292f2ececontrofile
+EXPORT_SYMBOL_GPL vmlinux 0x29300e1asecurity_inode_setattr
+EXPORT_SYMBOL_GPL vmlinux 0x29368e4__inet_inherit_port
+EXPORT_SYMBOL_GPL vmlinux 0x2939f6f6update_dst
+EXPORT_SYMBOL_GPL vmlinux 0x294c41ecmddev_init
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+EXPORT_SYMBOL_GPL vmlinux 0x29f073evrtc_cmos_write
+EXPORT_SYMBOL_GPL vmlinux 0x29e06775put_timespec64
+EXPORT_SYMBOL_GPL vmlinux 0x29f58dc2iomap_zero_range
+EXPORT_SYMBOL_GPL vmlinux 0x29f6888usb_phy_set_charge_current
+EXPORT_SYMBOL_GPL vmlinux 0x2e36f50irq_domain_get_irq_data
+EXPORT_SYMBOL_GPL vmlinux 0x2e4f845extcon_get_extcon_dev
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+EXPORT_SYMBOL_GPL vmlinux 0x2eadaf9astrp_stop
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+EXPORT_SYMBOL_GPL vmlinux 0x2ec237c5devm_pm_op_get_max_clock_latency
+EXPORT_SYMBOL_GPL vmlinux 0x2ec53d99clk_gate_ops
+EXPORT_SYMBOL_GPL vmlinux 0x2ed2e590phy_pm_runtime_get
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+EXPORT_SYMBOL_GPL vmlinux 0x2f558ab2serial8250_rpm_get
+EXPORT_SYMBOL_GPL vmlinux 0x2f5dd14fmd_rdev_clear
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+EXPORT_SYMBOL_GPL vmlinux 0x2f795669sata_scr_valid
+EXPORT_SYMBOL_GPL vmlinux 0x2f7c2c9module_mutex
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+EXPORT_SYMBOL_GPL vmlinux 0x2fba0dfcdevice_get_next_child_node
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+EXPORT_SYMBOL_GPL vmlinux 0x2fbc9167nd_region_attribute_group
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+EXPORT_SYMBOL_GPL vmlinux 0x302d6d5afalloc_iova_fast
+EXPORT_SYMBOL_GPL vmlinux 0x3040c9c9crypto_type_has_alg
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+EXPORT_SYMBOL_GPL vmlinux 0x318e73ebthermal_zone_get_slope
+EXPORT_SYMBOL_GPL vmlinux 0x3192d768cpufreq_remove_update_util_hook
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+EXPORT_SYMBOL_GPL vmlinux 0x31db0521nfnl_ct_hook
+EXPORT_SYMBOL_GPL vmlinux 0x31fd983cregcache_cache_only
+EXPORT_SYMBOL_GPL vmlinux 0x32015d2dacpi_dev_get_property
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+EXPORT_SYMBOL_GPL vmlinux 0x3ad1669nvdimm_bus_add_badrange
+EXPORT_SYMBOL_GPL vmlinux 0x3af2631airegmap_check_range_table
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+EXPORT_SYMBOL_GPL vmlinux 0x3b25e49ario_mdport_class
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+EXPORT_SYMBOL_GPL vmlinux 0x3b49792awbt_disable_default
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+EXPORT_SYMBOL_GPL vmlinux 0x3b769d23xdp_do_redirect
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+EXPORT_SYMBOL_GPL vmlinux 0x3b93b69csdio_writew
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+EXPORT_SYMBOL_GPL vmlinux 0x3bbf466ftcp_enter_memory_pressure
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+EXPORT_SYMBOL_GPL vmlinux 0x3c6921efata_sas_port_start
+EXPORT_SYMBOL_GPL vmlinux 0x3c757234property_entries_free
+EXPORT_SYMBOL_GPL vmlinux 0x3c9390dbpci_vpd_find_tag
+EXPORT_SYMBOL_GPL vmlinux 0x3ca584f3cjw_register_fixed_factor
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+EXPORT_SYMBOL_GPL vmlinux 0x3ce29e4blkcipher_walk_virt_block
+EXPORT_SYMBOL_GPL vmlinux 0x3cd06035add_input_randomness
+EXPORT_SYMBOL_GPL vmlinux 0x3cedad013strp_check_rcv

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+EXPORT_SYMBOL_GPL vmlinux 0x555c842epci_epc_destroy
+EXPORT_SYMBOL_GPL vmlinux 0x556e4390clk_get_rate
+EXPORT_SYMBOL_GPL vmlinux 0x55767ce7gpiod_get_raw_value
+EXPORT_SYMBOL_GPL vmlinux 0x55784228regmap_irq_get_virq
+EXPORT_SYMBOL_GPL vmlinux 0x55808c54netdev_walk_all_lower_dev_rcu
+EXPORT_SYMBOL_GPL vmlinux 0x558c136asbitmap_get_shallow
+EXPORT_SYMBOL_GPL vmlinux 0x558f3bdadvm_regulator_bulk_get
+EXPORT_SYMBOL_GPL vmlinux 0x559b27f8xdp_do_flush_map
+EXPORT_SYMBOL_GPL vmlinux 0x559ca7e2pci_reset_function
+EXPORT_SYMBOL_GPL vmlinux 0x55a33a86relay_file_operations
+EXPORT_SYMBOL_GPL vmlinux 0x55a66bb2usb_put_hcd
+EXPORT_SYMBOL_GPL vmlinux 0x55a989554key_type_asymmetric
+EXPORT_SYMBOL_GPL vmlinux 0x55af4631class_destroy
+EXPORT_SYMBOL_GPL vmlinux 0x55d49a68virtqueue_add_inbuf
+EXPORT_SYMBOL_GPL vmlinux 0x55ecff4bit_wait_io_timeout
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+EXPORT_SYMBOL_GPL vmlinux 0x56310925regulator_mode_to_status
+EXPORT_SYMBOL_GPL vmlinux 0x56398615mark_tsc_unstable
+EXPORT_SYMBOL_GPL vmlinux 0x5641485btty_termios_encode_baud_rate
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+EXPORT_SYMBOL_GPL vmlinux 0x56539d69pci_load_saved_state
+EXPORT_SYMBOL_GPL vmlinux 0x5654f836erst_get_record_id_next
+EXPORT_SYMBOL_GPL vmlinux 0x56639ce9loop_backing_file
+EXPORT_SYMBOL_GPL vmlinux 0x5666bc462rtc_initialize_alarm
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+EXPORT_SYMBOL_GPL vmlinux 0x56947347dmi_walk
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+DAC960
+NCR53c406a
+a100u2w
+a3d
+a8293
+aacraid
+aat2870-regulator
+aat2870_bl
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+ab3100-otp
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+abituguru3
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ati_remote2
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atl1c
atl1e
atl2
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atlas_btms
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+baycom_ser_hdx
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+bd9571mwv-regulator
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+be2net
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+belkin_sa
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+bfq
+bfs
+bfusb
+bh1750
+bh1770glc
+bh1780
+binfmt_misc
+block2mtd
+blocklayoutdriver
+blowfish_common
+blowfish_generic
+bluecard_cs
+bluetooth
+bluetooth_6lowpan
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+bma180
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+bnx2i
+bnx2x
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+bonding
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+bpck6
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+brcmsmac
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+broadcom
+broadsheetfb
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+btcoexist
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+mkiss
+mlx4_core
+mlx4_en
+mlx4_ib
+mlx5_core
+mlx5_ib
+mlx90614
+ mlxsw_cpld-hotplug
+mlxsw
+mlxsw_core
+mlxsw_i2c
+mlxsw_minimal
+mlxsw_pci
+mlxsw_spectrum
+mlxsw_switchib
+mlxsw_switchx2
+mma7455_core
+mma7455_i2c
+mma7455_spi
+mma7660
+mma8450
+mma8452
+mma9551
+mma9551_core
+mma9553
+mmc35240
+mmc_block
+mmc_spi
+mms114
+mm88472
+mm88473
+mos7720
+mos7840
+mostcore
+moxa
+mpc624
+mpl115
+mpl115_i2c
+mpl115_spi
+mpl3115
+mpls_gso
+mpls_iptunnel
+mpls_router
+mpoa
+mpr121_touchkey
+mptr3sas
+mpthead
+mpbtc
+mpfc
+mpil
+mpscas
+mpscsih
+mpspi
+mpu3050
+mq-deadline
+mrfd4j40
+mrp
+ms5611_core
+ms5611_i2c
+ms5611_spi
+ms5637
+ms_block
+ms_sensors_i2c
+mscc
+msdos
+msi-laptop
+msi-wmi
+msi1001
+msi2500
+mspro3400
+mspro_block
+msr
+mt2060
+mt2063
+mt20xx
+mt2131
+mt2266
+mt29f_spinand
+mt312
+mt352
+mt6311-regulator
+mt6323-regulator
+mt6397-core
+mt6397-regulator
+mt7530
+mt7601u
+mt9m001
+mt9m111
+mt9t031
+mt9t112
+mt9v011
+mt9v022
+mtd
+mtd_blkdevs
+mtd_dataflash
+mtdblock
+mtdblock_ro
+mtdoops
+mtdram
+mtdswap
+mtp32xx
+mtk-quadspi
+mtk-sd
+mtouch
+multipath
+multiq3
+mush_hdrc
+mv88e6060
+mv88e6xxx
+mv_u3d_core
+mv_udc
+mvmdio
+mvsas
+mvumi
+mwave
+mwifiex
+mwifiex_pcie
+mwifiex_sdio
+mwifiex_usb
+mw18k
+mbx
+mx4005
+nettel
+netup-unidvb
+netxen_nic
+newtonkbd
+nf_conntrack
+nf_conntrack_amanda
+nf_conntrack_broadcast
+nf_conntrack_fip
+nf_conntrack_h323
+nf_conntrack_ipv4
+nf_conntrack_ipv6
+nf_conntrack_irc
+nf_conntrack_netbios_ns
+nf_conntrack_netlink
+nf_conntrack_pptp
+nf_conntrack_proto_gre
+nf_conntrack_sane
+nf_conntrack_sip
+nf_conntrack_snmp
+nf_conntrack_tftp
+nf_defrag_ipv4
+nf_defrag_ipv6
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+ni_atmio
+ni_atmio16d
+ni_daq_700
+ni_daq_dio24
+obdecho
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+ocfs2_dlm
+ocfs2_dlmfs
+ocfs2_nodemanager
+ocfs2_stack_o2cb
+ocfs2_stack_user
+ocfs2_stackglue
+ocrdma
+of_xilinx_wdt
+old_belkin-sir
+omfs
+omminet
+on20
+on26
+onenand
+opencores-kbd
+openvswitch
+oprofile
+opt3001
+opticon
+option
+or51132
+or51211
+orangefs
+orinoco
+orinoco_cs
+orinoco_nortel
+orinoco_plx
+orinoco_tmd
+orinoco_usb
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+osd
+osst
+oti6858
+ov2640
+ov5642
+ov7640
+ov7670
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+ov9640
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+phy-pxa-28nm-usb2
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+phy-tahvo
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+pktgen
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+pm3fb
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+pwm-vibra
+pwm_bl
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+qat_dh895xcc
+qat_dh895xccvf
+qca8k
+qcaux
+qcom-emac
+qcom-spmi-iadc
+qcom-spmi-vadc
+qcom-vadc-common
+qcom_glink_native
+qcom_glink_rpm
+qcom_spmi-regulator
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+qla3xxx
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+qlogicfas
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+qmi_wwan
+qnx4
+qnx6
+qsemi
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+qt2160
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+qttfmac_pearl_pcie
+quatech2
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+rtl8188ee
+rtl818x_pci
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+rtl8192ce
+rtl8192cu
+rtl8192de
+rtl8192ee
+rtl8192se
+rtl8723-common
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+rtl8723be
+rtl8821ae
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+rtllib_crypt_tkip
+rtllib_crypt_wep
+rtlwifi
+rts5208
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+rtsx_pci_ms
+rtsx_pci_sdmmc
+rtsx_usb
+rtsx_usb_ms
+rtsx_usb_sdmmc
+rx51_battery
+rxrpc
+s1d13xxxfb
+s2250
+s2255drv
+s2io
+s2mpa01
+s2mps11
+s3fb
+s3fwn5
+s3fwn5_i2c
+s526
+s5h1409
+s5h1411
+s5h1420
+s5m8767
+s626
+s6e63m0
+s6sy761
+s921
+saa6588
+saa6752hs
+saa7110
+saa7115
+saa7127
+saa7134
+saa7134-alsa
+saa7134-dvb
+saa7134-empress
+saa7134-go7007
+saa7146
+saa7146_vv
+saa7164
+saa717x
+saa7185
+saa7706h
+safe_serial
+salsa20_generic
+samsung-keypad
+samsung-laptop
+samsung-q10
+samsung-sxgbe
+sata_dwc_460ex
+sata_inic162x
+sata_mv
+sata_nv
+sata.promise
+sata_qstor
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+sata_sil24
+sata_sis
+sata_svw
+sata_sx4
+sata_uli
+sata_via
+sata_vsc
+savagefb
+sb1000
+sbc60xxwdt
+sbc7240_wdt
+sbc8360
+sbc_epx_c3
+sbc_fitpc2_wdt
+sbc_gxx
+sn
+snp_target
+sbs
+sbs-battery
+sbs-charger
+sbs-manager
+sbsvhc
+sc1200wdt
+sc16is7xx
+sc92031
+sca3000
+sch2_flash
+sec
+sch311x_wdt
+sch5627
+sch5636
+sch56xx-common
+sch_atm
+sch_cbq
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+sch_choke
+sch_codel
+sch_drr
+sch_dsmark
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+snd-als100
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+snd-darla20
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+snd-emu8000-synth
+snd-emux-synth
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+snd-usb-variax
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+sonypi
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zx-tdm
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+EXPORT_SYMBOL lib/lz4/lz4_compress 0x212d15ae LZ4_compress_fast_continue
+EXPORT_SYMBOL lib/lz4/lz4_compress 0x4f4d78c5 LZ4_compress_default
+EXPORT_SYMBOL lib/lz4/lz4_compress 0x5bc92e85 LZ4_compress_destSize
+EXPORT_SYMBOL lib/lz4/lz4_compress 0x6004858d LZ4_compress_fast
+EXPORT_SYMBOL lib/lz4/lz4_compress 0xb6804152 LZ4_loadDict
+EXPORT_SYMBOL lib/lz4/lz4_compress 0xd4af9965 LZ4_saveDict
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0x4cc636f2 LZ4HC_loadDict
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0x765fd165 LZ4HC_saveDict
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0x15fe0cd3 LZ4HC_compress_HC_continue
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0x5ba93f9d LZ4HC_compress_HC
+EXPORT_SYMBOL lib/lz4/lz4hc_compress 0xb0d904b7 LZ4HC_setExternalDict
+EXPORT_SYMBOL lib/parman 0x0f518717 parman_prio_init
+EXPORT_SYMBOL lib/parman 0x7b03d378 parman_item_add
+EXPORT_SYMBOL lib/parman 0x8b7e26f5 parman_item_remove
+EXPORT_SYMBOL lib/parman 0xc3e2d892 parman_create
+EXPORT_SYMBOL lib/parman 0x36a3d260 parman_prio_fini
+EXPORT_SYMBOL lib/parman 0xca39ae6 parman_destroy
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x0bd662f6 raid6_gfmul
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x15fe0cd3 raid6_gfexp
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x3281fb74 raid6_gfinv
+EXPORT_SYMBOL lib/raid6/raid6_pq 0xb0d904b7 raid6_empty_zero_page
+EXPORT_SYMBOL lib/raid6/raid6_pq 0xc3e2d892 raid6_gflog
+EXPORT_SYMBOL lib/raid6/raid6_pq 0xc3e2d892 raid6_gfrex
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x71432c37 ZSTD_compressBegin_advanced
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x1d324f16 ZSTD_compressBegin
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x2eacbe22 ZSTD_compressBeginBlock
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x3281fb74 ZSTD_compress_usngDict
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x3545701d ZSTD_compressBound
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x35bdc817 ZSTD_getBlockSizeMax
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x3b209a35 ZSTD_compressBegin
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x41e56a18 ZSTD_checkCParams
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x51022053 ZSTD_compressBegin_usingDict
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x58f4c817 ZSTD_adjustCParams
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x63230633 ZSTD_initCStream
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x6443babd ZSTD_compressContinue
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x66dbb4d2 ZSTD_initCDict
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x6cbcd95e ZSTD_compressStream
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x71432c37 ZSTD_CTXWorkspaceBound
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x78431876 ZSTD_compressBegin_usingDict
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x7aba5c0b ZSTD_getParams
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x7bf51b66 ZSTD_resetCStream
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x91009b6 ZSTD_compressEnd
+EXPORT_SYMBOL lib/raid6/raid6_pq 0x9e0e162 ZSTD_CStreamOutSize
+EXPORT_SYMBOL lib/raid6/raid6_pq 0xa4ec8127 ZSTD_maxCLevel
+EXPORT_SYMBOL lib/raid6/raid6_pq 0xa9eb465f ZSTD_CStreamInSize
+EXPORT_SYMBOL lib/raid6/raid6_pq 0xb7872388 ZSTD_copyCCtx
+EXPORT_SYMBOL lib/zstd/zstd_compress 0xba2ffeeaZSTD_initCStream_usingCDict
+EXPORT_SYMBOL lib/zstd/zstd_compress 0xc04b3f8cZSTD_compressCCtx
+EXPORT_SYMBOL net/6lowpan/6lowpan 0x4e02383b6lowpan_unregister_netdev
+EXPORT_SYMBOL net/6lowpan/6lowpan 0x8c1b0e66lowpan_register_netdevice
+EXPORT_SYMBOL net/6lowpan/6lowpan 0xce6a94743lowpan_nhc_add
+EXPORT_SYMBOL net/6lowpan/6lowpan 0xf94e7453lowpan_unregister_netdev
+EXPORT_SYMBOL net/802/p8022 0x581233ddunregister_8022_client
+EXPORT_SYMBOL net/802/p8022 0x3ff1bcacmake_8023_client
+EXPORT_SYMBOL net/802/p8023 0x8c1b0e66lowpan_unregister_netdevice
+EXPORT_SYMBOL net/9p/9pnet 0x06371da8p9_client_mknod_dotl
+EXPORT_SYMBOL net/9p/9pnet 0x0d3bd1eev9fs_register_trans
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+EXPORT_SYMBOL net/9p/9pnet 0x4b3ee67ap9_client_create_dotl
+EXPORT_SYMBOL net/9p/9pnet 0x51ce2e209fs_get_default_trans
+EXPORT_SYMBOL net/9p/9pnet 0x5b6b85909_client_fsync
+EXPORT_SYMBOL net/9p/9pnet 0x69fe9026p9_parse_header
+EXPORT_SYMBOL net/9p/9pnet 0x6a588469p9_client_create
+EXPORT_SYMBOL net/9p/9pnet 0x718d79cfp9_client_getattr_dotl
+EXPORT_SYMBOL net/9p/9pnet 0x88f154450p9_client_remove
+EXPORT_SYMBOL net/llc/llc 0x67f0727c llc_set_station_handler
+EXPORT_SYMBOL net/llc/llc 0x7a5ae1ac llc_add_pack
+EXPORT_SYMBOL net/llc/llc 0xbcb77a03 llc_mac_hdr_init
+EXPORT_SYMBOL net/llc/llc 0xd7a60dd9 llc_sap_open
+EXPORT_SYMBOL net/mac80211/mac80211 0x043ffa77 ieee80211_beacon_get_tim
+EXPORT_SYMBOL net/mac80211/mac80211 0x046a3d1b ieee80211_scan_completed
+EXPORT_SYMBOL net/mac80211/mac80211 0x060ca327 ieee80211_start_tx_ba_cb_irqsafe
+EXPORT_SYMBOL net/mac80211/mac80211 0x0746b3a8 ie80211_sta_pspoll
+EXPORT_SYMBOL net/mac80211/mac80211 0x089fa5c2 ie80211_rts_get
+EXPORT_SYMBOL net/mac80211/mac80211 0x0a1d5c8 rate_control_set_rates
+EXPORT_SYMBOL net/mac80211/mac80211 0x1037d4fie ie80211_tx_prepare_skb
+EXPORT_SYMBOL net/mac80211/mac80211 0x10fd30ce ie80211_get_tkip_p1k_iv
+EXPORT_SYMBOL net/mac80211/mac80211 0x14ca63a2 ie80211_nullfunc_get
+EXPORT_SYMBOL net/mac80211/mac80211 0x177daa00 ie80211_restart_hw
+EXPORT_SYMBOL net/mac80211/mac80211 0x1b25f1f1 ie80211_disable_rssi_reports
+EXPORT_SYMBOL net/mac80211/mac80211 0x2060fabb ieee80211_alloc_hw_nm
+EXPORT_SYMBOL net/mac80211/mac80211 0x23eeca42 ie80211_sta_ps_transition
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+EXPORT_SYMBOL net/mac80211/mac80211 0x291ef127 ie80211_wake_queues
+EXPORT_SYMBOL net/mac80211/mac80211 0x2a889b5f ie80211_stop_queue
+EXPORT_SYMBOL net/mac80211/mac80211 0x30029c96 ie80211_start ieee80211
+EXPORT_SYMBOL net/mac80211/mac80211 0x33b85819 ieee80211_create_tptLed_trigger
+EXPORT_SYMBOL net/mac80211/mac80211 0x34489b5f ie80211_beacon_loss
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+EXPORT_SYMBOL net/mac80211/mac80211 0x36f61651 ie80211 Beacon_get_template
+EXPORT_SYMBOL net/mac80211/mac80211 0x36f61651 ie80211_get_tkip_p2k
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+EXPORT_SYMBOL net/mac80211/mac80211 0x4a8bf789 ieee80211_proberesp_get
+EXPORT_SYMBOL net/mac80211/mac80211 0x4fdd7f1 wiphy_to_ieee80211_hw
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+EXPORT_SYMBOL net/mac80211/mac80211 0x61844102 ieee80211_sched_scan_stopped
+EXPORT_SYMBOL net/mac80211/mac80211 0x66bb5207 ieee80211_reserve_tid
+EXPORT_SYMBOL net/netfilter/x_tables 0xf6ac74d0xt_unregister_matches
+EXPORT_SYMBOL net/netfilter/x_tables 0xfef779faxt_find_jump_offset
+EXPORT_SYMBOL net/nfc/hci/hci 0x13f39ce4nfc_hci_disconnect_gate
+EXPORT_SYMBOL net/nfc/hci/hci 0x18ed0ae1nfc_llc_stop
+EXPORT_SYMBOL net/nfc/hci/hci 0x204a67c0nfc_hci_recv_frame
+EXPORT_SYMBOL net/nfc/hci/hci 0x3d5ded4cnfc_hci_allocate_device
+EXPORT_SYMBOL net/nfc/hci/hci 0x43f39ce4nfc_hci_result_to_errno
+EXPORT_SYMBOL net/nfc/hci/hci 0x4fba7523nfc_hci_reset_pipes
+EXPORT_SYMBOL net/nfc/hci/hci 0x556b5828nfc_hci_get_param
+EXPORT_SYMBOL net/nfc/hci/hci 0x5789638bnfc_hci_reset_pipes_per_host
+EXPORT_SYMBOL net/nfc/hci/hci 0x58adc694nfc_hci_send_cmdasync
+EXPORT_SYMBOL net/nfc/hci/hci 0x5d569782nfc_hci_connect_gate
+EXPORT_SYMBOL net/nfc/hci/hci 0x5e5f303dnfc_hci_driver_failure
+EXPORT_SYMBOL net/nfc/hci/hci 0x5ff37b55nfc_hci_get_clientdata
+EXPORT_SYMBOL net/nfc/hci/hci 0x643f39ce4nfc_hci_register_device
+EXPORT_SYMBOL net/nfc/hci/hci 0x5a6d6289nfc_llc_start
+EXPORT_SYMBOL net/nfc/hci/hci 0xa6fe723fnfc_hci_set_clientdata
+EXPORT_SYMBOL net/nfc/hci/hci 0xaaecd914nfc_hci_set_param
+EXPORT_SYMBOL net/nfc/hci/hci 0xb781ff63nfc_hci_unregister_device
+EXPORT_SYMBOL net/nfc/hci/hci 0xe0a0b4dnfc_hci_sak_to_protocol
+EXPORT_SYMBOL net/nfc/hci/hci 0xc74e1d87nfc_hci_send_cmd
+EXPORT_SYMBOL net/nfc/hci/hci 0xdf2146b6nfc_hci_disconnect_all_gates
+EXPORT_SYMBOL net/nfc/hci/hci 0xe969f523nfc_hci_free_device
+EXPORT_SYMBOL net/nfc/hci/hci 0xedc069a8nfc_hci_send_event
+EXPORT_SYMBOL net/nfc/hci/hci 0xeebf8f09nfc_hci_target_discovered
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+EXPORT_SYMBOL net/nfc/nci/nci 0x1887079bnci_hci_send_event
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+EXPORT_SYMBOL net/nfc/nci/nci 0x26fb976encni_conn_max_data_pkt_payload_size
+EXPORT_SYMBOL net/nfc/nci/nci 0x2d90e4d7nci_req_complete
+EXPORT_SYMBOL net/nfc/nci/nci 0x37b18f60nci_nfcee_loopback
+EXPORT_SYMBOL net/nfc/nci/nci 0x39817ad2nci_hci_set_param
+EXPORT_SYMBOL net/nfc/nci/nci 0x5b7f6f08nci_hci_clear_all_pipes
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+EXPORT_SYMBOL net/nfc/nci/nci 0x710c5365nci_get_conn_info_by_dest_type_params
+EXPORT_SYMBOL net/nfc/nci/nci 0x8b1d4328nci_get_prop_cmd
+EXPORT_SYMBOL net/nfc/nci/nci 0x8c8db682nci_unregister_device
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+EXPORT_SYMBOL net/wireless/cfg80211 0xb76ad73ecfg80211_tdls_oper_request
+EXPORT_SYMBOL net/wireless/cfg80211 0xc0e9c5a0cfg80211_get_bss
+EXPORT_SYMBOL net/wireless/cfg80211 0xc26a7d79cfg80211_start iface
+EXPORT_SYMBOL net/wireless/cfg80211 0xc61fa2b0cfg80211_sched_scan_results
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+EXPORT_SYMBOL sound/core/oss/snd-mixer-oss 0xefccee80211_get_crypto_ops
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+EXPORT_SYMBOL sound/core/snd-pcm 0x2ab51b52snd_pcm_hw_constraint_ranges
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+EXPORT_SYMBOL sound/i2c/other/snd-i2c 0xf5e1cf86snd_i2c_probeaddr
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+EXPORT_SYMBOL sound/i2c/other/snd-tea6330t 0xb21b0a4csnd_tea6330t_detect
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+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0xeac2e4oxyg_write8
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0xf51465eboxxygen_write32_masked
+EXPORT_SYMBOL sound/pci/oxygen/snd-oxygen-lib 0x02b1266d4oxyg_write_spi
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x41393399snd_trident_write_voice_regs
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x6e8e660c4snd_trident_stop_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x7c83e45snd_trident_free_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0x9709765ssnd_trident_start_voice
+EXPORT_SYMBOL sound/pci/trident/snd-trident 0xb030b622snd_trident_alloc_voice
+EXPORT_SYMBOL sound/soc/codecs/snd-soc-tlv320aic23 0x01e982fc	tmlv320aic23_regmap
+EXPORT_SYMBOL sound/soc/codecs/snd-soc-tlv320aic23 0x5e9f7fe0	tmlv320aic23_probe
+EXPORT_SYMBOL sound/soc/intel/common/snd-soc-sst-firmware 0xccc8d0e2assstdma_new
+EXPORT_SYMBOL sound/soc/intel/common/snd-soc-sst-firmware 0xcd045797ssst_dma_free
+EXPORT_SYMBOL sound/soc/snd-soc-core 0xb08f8382snd_alloc_ac97_codec
+EXPORT_SYMBOL sound/soundcore 0x1e81c7a1register_sound_mixer
+EXPORT_SYMBOL sound/soundcore 0x60d44d0aregister_sound_special
+EXPORT_SYMBOL sound/soundcore 0x7afcf8aunregister_sound_mixer
+EXPORT_SYMBOL sound/soundcore 0x94714ebbrегистre_sound_special_device
+EXPORT_SYMBOL sound/soundcore 0x99c95fa5unregister_sound_special
+EXPORT_SYMBOL sound/soundcore 0xc41daa31sound_class
+EXPORT_SYMBOL sound/soundcore 0xcb6f84b0register_sound_midi
+EXPORT_SYMBOL sound/soundcore 0xcc37beeregister_sound_dsp
+EXPORT_SYMBOL sound/soundcore 0xcd03b10unregister_sound_dsp
+EXPORT_SYMBOL sound/soundcore 0xfdab6de3nunregister_sound_midi
+EXPORT_SYMBOL sound/synth/emux/snd-emux-synth 0x07b8a88fsnd_emux_terminate_all
+EXPORT_SYMBOL sound/synth/emux/snd-emux-synth 0x3145a497snd_emux_lock_voice
+EXPORT_SYMBOL sound/synth/emux/snd-emux-synth 0x46579f69snd_emux_register
+EXPORT_SYMBOL sound/synth/emux/snd-emux-synth 0x9428a508snd_emux_unlock_voice
+EXPORT_SYMBOL sound/synth/emux/snd-emux-synth 0x655cb02snd_sfp_linear_to_log
+EXPORT_SYMBOL sound/synth/emux/snd-emux-synth 0x876b53dc snd_emux_free
+EXPORT_SYMBOL sound/synth/emux/snd-emux-synth 0x3926b7esnd_emux_new
+EXPORT_SYMBOL sound/synth/snd-util-mem 0x2e58af9e__snd_util_mem_alloc
+EXPORT_SYMBOL sound/synth/snd-util-mem 0x38dc65bfsnd_util_mem_new
+EXPORT_SYMBOL sound/synth/snd-util-mem 0x43f32b4esnd_util_mem_avail
+EXPORT_SYMBOL sound/synth/snd-util-mem 0x6791e8d1__snd_util_memblk_new
+EXPORT_SYMBOL sound/synth/snd-util-mem 0x75cd04b3snd_util_memhr_free
+EXPORT_SYMBOL sound/synth/snd-util-mem 0x895b579e__snd_util_mem_free
+EXPORT_SYMBOL sound/synth/snd-util-mem 0xa4d8dca9snd_util_mem_free
+EXPORT_SYMBOL sound/synth/snd-util-mem 0xe53439fasnd_util_memhr_new
+EXPORT_SYMBOL sound/usb/snd-usbmidi-lib 0x16756de0snd_usbmi_input_start
+EXPORT_SYMBOL sound/usb/snd-usbmidi-lib 0x5e3d34b1dsnd_usbmi_input_stop
+EXPORT_SYMBOL sound/usb/snd-usbmidi-lib 0x8efbc523__snd_usbmi_create
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x75be580a VBoxGuest_RTMpOnSpecific
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x765c7530 VBoxGuest_RTTimeExplode
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x779f8365 VBoxGuest_RTErrConvertToErrno
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x77a366c5 VBoxGuest_RTMpNotificationRegister
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x78c7ea22 VBoxGuest_RTLLogCreateEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7a791d4e VBoxGuest_RTMpGetPresentCoreCount
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7b6712c9 VBoxGuest_RTAssertMsg1Weak
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7b8123ea VBoxGuest_RTSemEventGetResolution
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7e494311 VBoxGuest_RTR0MemObjIsMapping
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x7f659ba6 VBoxGuest_RTThreadUserWaitNoResume
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x80a3518c VBoxGuest_RTM DupExTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x84262ba9 VBoxGuest_RTLLogRelLoggerV
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x84f44f1b VBoxGuest_RTR0MemObjAllocPhysExTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8571e565 VBoxGuest_RTR STRToInt16
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x85752eb4 VBoxGuest_RTTimerCanDoHighResolution
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x860486d0 VBoxGuest_RTLogFlags
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x862d6a0d VBoxGuest_RTTimerStop
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x864ecc29 VBoxGuest_RTR0MemObjMapUserTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x878f4a90 VBoxGuest_RTTimerCreateEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x892fa6e0 VBoxGuest_RTMpGetMaxCpuId
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x89c645f1 VBoxGuest_RTR STRToInt8Full
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8afec15 VBoxGuest_RTTimeNanoTS
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8c79502a VBoxGuest_RTTimeSpecFromString
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8d3b898a VBoxGuest_RTMemFreeEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8e2dc854 VBoxGuest_RTTimerChangeInterval
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8f82b7e7 VBoxGuest_RTTimerCompare
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8f82c5e5 VBoxGuest_RTMpGetOnlineCount
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8f82e86 VBoxGuest_RTSemEventMultiWaitEx
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8f833dd7 VBoxGuest_RTSemFastMutexCreate
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x8f83594 VBoxGuest_RTR STRToInt8Ex
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x90d44be8 VBoxGuest_RTL LogSetCustomPrefixCallback
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x925e6d74 VBoxGuest_RTSemEventDestroy
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9473e15b VBoxGuest_RTTThreadCreateF
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x94a348d5 VBoxGuest_RTAssertMsg2
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9534e87 VBoxGuest_RTLogSetDefaultInstanceThread
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9653a98 VBoxGuest_RTMemObjIsValidAddr
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x974c2f0 VBoxGuest_RTR STRFormatTypeDeregister
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9776307 VBoxGuest_RTLogFlushRC
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9812d337 VBoxGuest_RTPowerNotificationRegister
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x983a1ac VBoxGuest_RTR0MemObjLockKernelTag
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9851ae1 VBoxGuest_RTStrFormat
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x98b04ae VBoxGuest_RTAssertMsg2AddV
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x98f3dcd VBoxGuest_RTLogFlushToLogger
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9909ff3 VBoxGuest_g pszRTAssertFunction
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9990d50 VBoxGuest_RTL0MemKernelCopyFrom
+EXPORT_SYMBOL ubuntu/vbox/vboxguest/vboxguest 0x9af30b75 VBoxGuest_RTM pOnAll
+EXPORT_SYMBOL vmlinux 0x046325b1inode_permission
+EXPORT_SYMBOL vmlinux 0x0487f831fb_find_best_display
+EXPORT_SYMBOL vmlinux 0x04989ad7sget
+EXPORT_SYMBOL vmlinux 0x049ecb062param_get_bool
+EXPORT_SYMBOL vmlinux 0x04d8c750releasperfctr_nmi
+EXPORT_SYMBOL vmlinux 0x04dad883ab3100_event_unregister
+EXPORT_SYMBOL vmlinux 0x04e11789siphash_3u32
+EXPORT_SYMBOL vmlinux 0x04e31936cachedir_1seek
+EXPORT_SYMBOL vmlinux 0x04e60c04__do_once_done
+EXPORT_SYMBOL vmlinux 0x04ea56f9_kstrol
+EXPORT_SYMBOL vmlinux 0x04ead13dquot_reclaim_space_nodirty
+EXPORT_SYMBOL vmlinux 0x050877b9dmi_first_match
+EXPORT_SYMBOL vmlinux 0x050b9f9fa should_remove_suid
+EXPORT_SYMBOL vmlinux 0x05105b6aadvfreq_monitor_stop
+EXPORT_SYMBOL vmlinux 0x05163204kmap_atomic
+EXPORT_SYMBOL vmlinux 0x05240ee7percpu_counter_batch
+EXPORT_SYMBOL vmlinux 0x052b9295filemap_fault
+EXPORT_SYMBOL vmlinux 0x0578b1c9___dev_remove_pack
+EXPORT_SYMBOL vmlinux 0x05939d0bbitmap_parselist_user
+EXPORT_SYMBOL vmlinux 0x05a2acffmdiobus_alloc_size
+EXPORT_SYMBOL vmlinux 0x05b8e7a4inet_frag_pull_head
+EXPORT_SYMBOL vmlinux 0x05b9e7a9inet_frag_pull_head
+EXPORT_SYMBOL vmlinux 0x05c9329filemap_fault
+EXPORT_SYMBOL vmlinux 0x05faee738kmap_atomic
+EXPORT_SYMBOL vmlinux 0x05f0042bfsoffpage
+EXPORT_SYMBOL vmlinux 0x05f9d7a1inet_free
+EXPORT_SYMBOL vmlinux 0x061651bestrcat
+EXPORT_SYMBOL vmlinux 0x061f3594inet_bind
+EXPORT_SYMBOL vmlinux 0x0624a9e0inet_ioctl
+EXPORT_SYMBOL vmlinux 0x062c1ba5get_disk
+EXPORT_SYMBOL vmlinux 0x0637c400bitmap_parselist_user
+EXPORT_SYMBOL vmlinux 0x06479e58generic_make_request
+EXPORT_SYMBOL vmlinux 0x0653244ckobject_del
+EXPORT_SYMBOL vmlinux 0x066f7635__dquot_transfer
+EXPORT_SYMBOL vmlinux 0x06724b38ZSTD_getFrameParams
+EXPORT_SYMBOL vmlinux 0x067d8d35security_release_seccxt
+EXPORT_SYMBOL vmlinux 0x0680ac30siphash_1u64
+EXPORT_SYMBOL vmlinux 0x068c7263ioremap_cache
+EXPORT_SYMBOL vmlinux 0x069a964a2_raw_spin_lock_irq
+EXPORT_SYMBOL vmlinux 0x06c0dae5kernel_fpu_end
+EXPORT_SYMBOL vmlinux 0x06c8f2deslhc_compress
+EXPORT_SYMBOL vmlinux 0x06f13173manage_wrt_inode_uidgid
+EXPORT_SYMBOL vmlinux 0x06f799a0udp_lib_getsockopt
+EXPORT_SYMBOL vmlinux 0x07097916arp_send
+EXPORT_SYMBOL vmlinux 0x0710d17dfs2_begin_command
+EXPORT_SYMBOL vmlinux 0x071a8fd2nvme_get_area

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+EXPORT_SYMBOL vmlinux 0x1105f942sock_release
+EXPORT_SYMBOL vmlinux 0x11089ac7_cctype
+EXPORT_SYMBOL vmlinux 0x112532e8pci_request_region
+EXPORT_SYMBOL vmlinux 0x113de308acpi_dev_present
+EXPORT_SYMBOL vmlinux 0x1145bdcd_make_kgid
+EXPORT_SYMBOL vmlinux 0x11630a7blk_max_low_pfn
+EXPORT_SYMBOL vmlinux 0x117093bseqdisc_class_hash_init
+EXPORT_SYMBOL vmlinux 0x11a46d63bmq_stop_hw_queue
+EXPORT_SYMBOL vmlinux 0x11a6232cinode_newsize_ok
+EXPORT_SYMBOL vmlinux 0x11a8d721bmq_end_request
+EXPORT_SYMBOL vmlinux 0x11b067bd__sk_queue_drop_skb
+EXPORT_SYMBOL vmlinux 0x11bc2397abx500_register_ops
+EXPORT_SYMBOL vmlinux 0x11d843b8blk_queue_unprep_rq
+EXPORT_SYMBOL vmlinux 0x11e0e41dm_read_arg
+EXPORT_SYMBOL vmlinux 0x11f13787add_wait_queue
+EXPORT_SYMBOL vmlinux 0x11f7ed4chtex_to_bin
+EXPORT_SYMBOL vmlinux 0x120d67d4nvm_put_area
+EXPORT_SYMBOL vmlinux 0x121b4e4bmemremap
+EXPORT_SYMBOL vmlinux 0x1226fcsvlan_iocntl_set
+EXPORT_SYMBOL vmlinux 0x125e7038nvmsdev
+EXPORT_SYMBOL vmlinux 0x126152a7call_netdevice_notifiers
+EXPORT_SYMBOL vmlinux 0x12658dc4_getblk_gfp
+EXPORT_SYMBOL vmlinux 0x128a66acacpi_bus_get_device
+EXPORT_SYMBOL vmlinux 0x129d1e3load_nls_default
+EXPORT_SYMBOL vmlinux 0x12a38747usleep_range
+EXPORT_SYMBOL vmlinux 0x12ad5bb2_kmalloc
+EXPORT_SYMBOL vmlinux 0x12f54900security_unix_may_send
+EXPORT_SYMBOL vmlinux 0x13087af9pci_fixup_device
+EXPORT_SYMBOL vmlinux 0x131bf684km_is_alive
+EXPORT_SYMBOL vmlinux 0x13243d4bwl1251_get_platform_data
+EXPORT_SYMBOL vmlinux 0x132a0dfebddev_dax_pgoft
+EXPORT_SYMBOL vmlinux 0x132b429dkthread_create_worker
+EXPORT_SYMBOL vmlinux 0x13315729flinux_array_alloc
+EXPORT_SYMBOL vmlinux 0x134cdd34inet_frag_rbtree_purge
+EXPORT_SYMBOL vmlinux 0x135e4fd4__tcf_em_tree_match
+EXPORT_SYMBOL vmlinux 0x1372926cd_alloc
+EXPORT_SYMBOL vmlinux 0x1376fd08fb_show_logo
+EXPORT_SYMBOL vmlinux 0x1377c69b_seq_open_private
+EXPORT_SYMBOL vmlinux 0x1391ba91kernel_accept
+EXPORT_SYMBOL vmlinux 0x13c3a6bpcim_ioctl_regions_request_all
+EXPORT_SYMBOL vmlinux 0x13cbdf88ww_mutex_lock_interruptible
+EXPORT_SYMBOL vmlinux 0x13d0ad7__kfifo_out
+EXPORT_SYMBOL vmlinux 0x13f42152system_entering_hibernation
+EXPORT_SYMBOL vmlinux 0x141271f十七_dev_found
+EXPORT_SYMBOL vmlinux 0x141e5f71fsencrypt_fname_alloc_buffer
+EXPORT_SYMBOL vmlinux 0x2570a138reservation_seqcount_string
+EXPORT_SYMBOL vmlinux 0x25734bb7blk_queue_start_tag
+EXPORT_SYMBOL vmlinux 0x257c6e37poll_freewait
+EXPORT_SYMBOL vmlinux 0x25820c64fs_overlowuid
+EXPORT_SYMBOL vmlinux 0x2584e0ctcp_md5_hash_skb_data
+EXPORT_SYMBOL vmlinux 0x2589c8ffdevice_get_mac_address
+EXPORT_SYMBOL vmlinux 0x258c05d5mount_bdev
+EXPORT_SYMBOL vmlinux 0x25a8d34cpic_add_resource
+EXPORT_SYMBOL vmlinux 0x25b8d34cpic_add_resource
+EXPORT_SYMBOL vmlinux 0x25ba5a6bc policer_config
+EXPORT_SYMBOL vmlinux 0x25be5a6bc policer_config
+EXPORT_SYMBOL vmlinux 0x25c268dfunregister_binfmt
+EXPORT_SYMBOL vmlinux 0x25c46628__udp_disconnect
+EXPORT_SYMBOL vmlinux 0x25d11116neigh_direct_output
+EXPORT_SYMBOL vmlinux 0x25deebd3tnf_log_bind_pf
+EXPORT_SYMBOL vmlinux 0x25ee629sg_nents_for_len
+EXPORT_SYMBOL vmlinux 0x25f1d88__quota_error
+EXPORT_SYMBOL vmlinux 0x2623421dneigh_lookup
+EXPORT_SYMBOL vmlinux 0x263be75ecryptfs_get_versions
+EXPORT_SYMBOL vmlinux 0x268ce6a2sys_close
+EXPORT_SYMBOL vmlinux 0x26bb950b__kfisofrom_user_r
+EXPORT_SYMBOL vmlinux 0x26bca9acpi_evaluate_ost
+EXPORT_SYMBOL vmlinux 0x26c62237kobjecinit
+EXPORT_SYMBOL vmlinux 0x26d4c3faata_std_end_eh
+EXPORT_SYMBOL vmlinux 0x26dd3d3fdevice_register
+EXPORT_SYMBOL vmlinux 0x26df4f0nmbh_write_begin
+EXPORT_SYMBOL vmlinux 0x26e299e0unregister_memory_notifier
+EXPORT_SYMBOL vmlinux 0x26e76b8sysctl_udp_wmem_min
+EXPORT_SYMBOL vmlinux 0x26f92ca__kfifodriven
+EXPORT_SYMBOL vmlinux 0x27158146take_dentry_name_snapshot
+EXPORT_SYMBOL vmlinux 0x271cb95acpiprivatesdata_handler
+EXPORT_SYMBOL vmlinux 0x2726d732gro_find_receive_by_type
+EXPORT_SYMBOL vmlinux 0x272e547becon_set_default_unimap
+EXPORT_SYMBOL vmlinux 0x27479d14param_free_charp
+EXPORT_SYMBOL vmlinux 0x274d08d2__kfifodma_out_prepare
+EXPORT_SYMBOL vmlinux 0x27756bc8scsisanitize_inquiry_string
+EXPORT_SYMBOL vmlinux 0x277f3aberead_code
+EXPORT_SYMBOL vmlinux 0x27810361acpi_os_wait_events_complete
+EXPORT_SYMBOL vmlinux 0x27864d57memparse
+EXPORT_SYMBOL vmlinux 0x278a3c88mutext_interruptible
+EXPORT_SYMBOL vmlinux 0x2793d97rdma_dim
+EXPORT_SYMBOL vmlinux 0x27a33c7bvmee_error_handler
+EXPORT_SYMBOL vmlinux 0x27ad14fns_capable
+EXPORT_SYMBOL vmlinux 0x27ae7d0eeetranaction
+EXPORT_SYMBOL vmlinux 0x27bbf221disableirq_nosync
+EXPORT_SYMBOL vmlinux 0x27c68705node_states
+EXPORT_SYMBOL vmlinux 0x27e39d1amipi_dsi_set_maximum_return_packet_size
+EXPORT_SYMBOL vmlinux 0x32b5fa2fmem_section
+EXPORT_SYMBOL vmlinux 0x32dd69bnd_sb_checksum
+EXPORT_SYMBOL vmlinux 0x32e1c9d2inode_owner_or_capable
+EXPORT_SYMBOL vmlinux 0x32e6a3ccrdmacg_uncharge
+EXPORT_SYMBOL vmlinux 0x32e6f1acpi_video_backlight_string
+EXPORT_SYMBOL vmlinux 0x3305f6c5bio_add_page
+EXPORT_SYMBOL vmlinux 0x33169537i2c_clients_command
+EXPORT_SYMBOL vmlinux 0x332727descsi_eh_prep_cmd
+EXPORT_SYMBOL vmlinux 0x3345fe88esk_dst_check
+EXPORT_SYMBOL vmlinux 0x3354cfe24cafe
+EXPORT_SYMBOL vmlinux 0x33586d4b__cpuhp_setup_state_cpuslocked
+EXPORT_SYMBOL vmlinux 0x3364cbb2key_link
+EXPORT_SYMBOL vmlinux 0x33901c5dxfrm_register_type_offload
+EXPORT_SYMBOL vmlinux 0x3399710bpci_stop_and_remove_bus_device
+EXPORT_SYMBOL vmlinux 0x339eb164generic_perform_write
+EXPORT_SYMBOL vmlinux 0x339f3f87icmp6_send
+EXPORT_SYMBOL vmlinux 0x33a779b9param_ops_bint
+EXPORT_SYMBOL vmlinux 0x33c7435cpandom_u32_state
+EXPORT_SYMBOL vmlinux 0x33c7fa9dev_get_stats
+EXPORT_SYMBOL vmlinux 0x33e64d4dquot_quota_sync
+EXPORT_SYMBOL vmlinux 0x33dbfd93tcp_memory_allocated
+EXPORT_SYMBOL vmlinux 0x33f0768ccpufreq_quick_get_max
+EXPORT_SYMBOL vmlinux 0x33f08246qdisc_tree_reduce_backlog
+EXPORT_SYMBOL vmlinux 0x33f8aa74phy_stop
+EXPORT_SYMBOL vmlinux 0x340c3f5fpufreq_generic_suspend
+EXPORT_SYMBOL vmlinux 0x342d405ttty_check_change
+EXPORT_SYMBOL vmlinux 0x342f60feapm_info
+EXPORT_SYMBOL vmlinux 0x34402ffmmc_gpio_request_cd
+EXPORT_SYMBOL vmlinux 0x3464b72dnla_strdup
+EXPORT_SYMBOL vmlinux 0x346c7d2cblk_queue_segment_boundary
+EXPORT_SYMBOL vmlinux 0x347f06c6tcp_get_md5sig_pool
+EXPORT_SYMBOL vmlinux 0x3481d8f2sock_register
+EXPORT_SYMBOL vmlinux 0x349673c5tcf_em_unregister
+EXPORT_SYMBOL vmlinux 0x3499c85strchr
+EXPORT_SYMBOL vmlinux 0x34a2f2a3bitmap_zalloc
+EXPORT_SYMBOL vmlinux 0x34a6b89cepci_iomap_range
+EXPORT_SYMBOL vmlinux 0x34a9bb3airq_domain_set_info
+EXPORT_SYMBOL vmlinux 0x34af076celv_bio_merge_ok
+EXPORT_SYMBOL vmlinux 0x34bfacbpcpix_set_mmrbc
+EXPORT_SYMBOL vmlinux 0x34c1d3e5generic_start_io_acct
+EXPORT_SYMBOL vmlinux 0x34d4f519bdquot_commit
+EXPORT_SYMBOL vmlinux 0x34e06840generic_block_fiemap
+EXPORT_SYMBOL vmlinux 0x34f3484esecurity_tun_dev_attach_queue
+EXPORT_SYMBOL vmlinux 0x34ffc468proc_dointvec_ms_jiffies
+EXPORT_SYMBOL vmlinux 0x35093c5inode_add_bytes
+EXPORT_SYMBOL vmlinux 0x35145ebcsci_device_put
+EXPORT_SYMBOL vmlinux 0x3517383eregister_reboot_notifier
+EXPORT_SYMBOL vmlinux 0x35243532scsi_set_medium_removal
+EXPORT_SYMBOL vmlinuz 0x377664c9hdmi_avi_infoframe_pack
+EXPORT_SYMBOL vmlinuz 0x37814808inet_dev_addr_type
+EXPORT_SYMBOL vmlinuz 0x3785af1fphy_mii_ioctl
+EXPORT_SYMBOL vmlinuz 0x378af799netlbl_bitmap_walk
+EXPORT_SYMBOL vmlinuz 0x378ddf5d
+EXPORT_SYMBOL vmlinuz 0x37b14043hsiphash_1u32
+EXPORT_SYMBOL vmlinuz 0x37b7ad68trt6_lookups
+EXPORT_SYMBOL vmlinuz 0x37b7ce678follow_down
+EXPORT_SYMBOL vmlinuz 0x37b8b39escreen_info
+EXPORT_SYMBOL vmlinuz 0x37bfc70jiffies_to_msecs
+EXPORT_SYMBOL vmlinuz 0x37c4935dsetup_new_exec
+EXPORT_SYMBOL vmlinuz 0x37d27788pci_bus_write_config_word
+EXPORT_SYMBOL vmlinuz 0x37d50c33register_netdev
+EXPORT_SYMBOL vmlinuz 0x37db8f19dmi_get_date
+EXPORT_SYMBOL vmlinuz 0x37e74642get_jiffies_64
+EXPORT_SYMBOL vmlinuz 0x37f614b7__kfifo_len_r
+EXPORT_SYMBOL vmlinuz 0x38099e13wrmssl_on_cpu
+EXPORT_SYMBOL vmlinuz 0x380eeb40mipi_dsi_dcs_set_pixel_format
+EXPORT_SYMBOL vmlinuz 0x380f823dnetdev_change_features
+EXPORT_SYMBOL vmlinuz 0x381a798a
+EXPORT_SYMBOL vmlinuz 0x3826c096module_put
+EXPORT_SYMBOL vmlinuz 0x384829fd__skb_recv_udp
+EXPORT_SYMBOL vmlinuz 0x3886061fnd_btt_probe
+EXPORT_SYMBOL vmlinuz 0x38869d88kstat
+EXPORT_SYMBOL vmlinuz 0x3894b488xfm_policy_destroy
+EXPORT_SYMBOL vmlinuz 0x38a37a066skb_find_text
+EXPORT_SYMBOL vmlinuz 0x38a71b7epci_free_resource_list
+EXPORT_SYMBOL vmlinuz 0x38a9f7c5in6addr_loopback
+EXPORT_SYMBOL vmlinuz 0x38bb3ce23ipv6_push_frag_opts
+EXPORT_SYMBOL vmlinuz 0x38c49d1cradix_tree_delete_item
+EXPORT_SYMBOL vmlinuz 0x38d0ce32unregister_lsm_notifier
+EXPORT_SYMBOL vmlinuz 0x38dcf4d3dev_uc_dew
+EXPORT_SYMBOL vmlinuz 0x38ef3954devm_ioremap_nocache
+EXPORT_SYMBOL vmlinuz 0x38e02090raw_read_trylock
+EXPORT_SYMBOL vmlinuz 0x38e7327akmem_cache_alloc_bulk
+EXPORT_SYMBOL vmlinuz 0x38fc0533phy_suspend
+EXPORT_SYMBOL vmlinuz 0x39081193__max_logical_packages
+EXPORT_SYMBOL vmlinuz 0x3912b399abx500_event_registers_startup_state_get
+EXPORT_SYMBOL vmlinuz 0x3939f80fkill_pause_polling
+EXPORT_SYMBOL vmlinuz 0x394331aap_queue_xmit
+EXPORT_SYMBOL vmlinuz 0x394616aain_egroup_p
+EXPORT_SYMBOL vmlinuz 0x3960fa91key_put
+EXPORT_SYMBOL vmlinuz 0x398a77b7group_bpf_enabled_key
+EXPORT_SYMBOL vmlinuz 0x398d3a8b__init_swait_queue_head
+EXPORT_SYMBOL vmlinuz 0x39970ec1crypto_sha1_finup
+EXPORT_SYMBOL vmlinuz 0x39991865icmp_global_allow
+EXPORT_SYMBOL vmlinux 0x39a055f3acpi_remove_gpe_handler
+EXPORT_SYMBOL vmlinux 0x39a44a4escsi_ioctl
+EXPORT_SYMBOL vmlinux 0x39b52d19_bitmap_and
+EXPORT_SYMBOL vmlinux 0x39bc53d8locks_mandatory_area
+EXPORT_SYMBOL vmlinux 0x39bd305support_ops_ulong
+EXPORT_SYMBOL vmlinux 0x39c88f5flush_rcu_work
+EXPORT_SYMBOL vmlinux 0x39e9f7a3ppp_input
+EXPORT_SYMBOL vmlinux 0x39ee6329trunc_pagecache_range
+EXPORT_SYMBOL vmlinux 0x3a09128vm_insert_mixed
+EXPORT_SYMBOL vmlinux 0x3a0847fplatform_thermal_notify
+EXPORT_SYMBOL vmlinux 0x3a1ac05set_normalized_timespec64
+EXPORT_SYMBOL vmlinux 0x3a293872ata_scsi_timed_out
+EXPORT_SYMBOL vmlinux 0x3a2bf87a2dev_base_lock
+EXPORT_SYMBOL vmlinux 0x3a328399intel_gtchipset_flush
+EXPORT_SYMBOL vmlinux 0x3a5130f3find_lock_entry
+EXPORT_SYMBOL vmlinux 0x3a700148release_sock
+EXPORT_SYMBOL vmlinux 0x3a816e8xfnm_state_walk_done
+EXPORT_SYMBOL vmlinux 0x3a8fc01acdev_alloc
+EXPORT_SYMBOL vmlinux 0x3a92797ascm_detach_fds
+EXPORT_SYMBOL vmlinux 0x3ab691bio_integrity_clone
+EXPORT_SYMBOL vmlinux 0x3a9b6b9blkin_unregister_region
+EXPORT_SYMBOL vmlinux 0x3aa33208pci_disable_msi
+EXPORT_SYMBOL vmlinux 0x3aa65f7fdm_fence_add_callback
+EXPORT_SYMBOL vmlinux 0x3abb82b5xfmr6_prepare_output
+EXPORT_SYMBOL vmlinux 0x3ad684nvms_register_tgt_type
+EXPORT_SYMBOL vmlinux 0x3b088e0quot_acquire
+EXPORT_SYMBOL vmlinux 0x3b080f1ipv6_select_ident
+EXPORT_SYMBOL vmlinux 0x3b201620machine_real_restart
+EXPORT_SYMBOL vmlinux 0x3b3a1f5cdevm_memunmap
+EXPORT_SYMBOL vmlinux 0x3b4ed6f6would_dump
+EXPORT_SYMBOL vmlinux 0x3b8e41dmnwait_for_req_done
+EXPORT_SYMBOL vmlinux 0x3b8f8d4xfmr_init_replay
+EXPORT_SYMBOL vmlinux 0x3b64459bitmap_shift_left
+EXPORT_SYMBOL vmlinux 0x3b65d94fvmIRQ_handler
+EXPORT_SYMBOL vmlinux 0x3b799e4kthread_bind
+EXPORT_SYMBOL vmlinux 0x3b87ce1dsonktrim
+EXPORT_SYMBOL vmlinux 0x3b941a3fmc_can_discard
+EXPORT_SYMBOL vmlinux 0x3b95a70allocate_resource
+EXPORT_SYMBOL vmlinux 0x3ba3a5a6_mod_zone_page_state
+EXPORT_SYMBOL vmlinux 0x3bbe3542dcb_getapp
+EXPORT_SYMBOL vmlinux 0x3bc1e29buffer_migrate_page
+EXPORT_SYMBOL vmlinux 0x3bd9f6cbcs interpreter_resume
+EXPORT_SYMBOL vmlinux 0x3be7644security_xfrmpolicy_free
+EXPORT_SYMBOL vmlinux 0x3be9c0c0svm_iptv_log_register
+EXPORT_SYMBOL vmlinux 0x3bf1ca36ilookup
+EXPORT_SYMBOL vmlinux 0x3bf407c3pci_back_from_sleep
+EXPORT_SYMBOL vmlinux 0x3e2d0910delayed_work_timer_fn
+EXPORT_SYMBOL vmlinux 0x3e307648devm_devfreq_add_device
+EXPORT_SYMBOL vmlinux 0x3e32beehdphy_ethtool_nway_reset
+EXPORT_SYMBOL vmlinux 0x3e3bb08bqdisk_hash_add
+EXPORT_SYMBOL vmlinux 0x3e4258f6fasync_helper
+EXPORT_SYMBOL vmlinux 0x3e45c1dbset_pages_uc
+EXPORT_SYMBOL vmlinux 0x3e4b5c44nd_btt_version
+EXPORT_SYMBOL vmlinux 0x3e5108devm_devfreq_register_opp_notifier
+EXPORT_SYMBOL vmlinux 0x3e633e4cjbdl2_journal_clear_err
+EXPORT_SYMBOL vmlinux 0x3e654f49acpi_decode_pld_buffer
+EXPORT_SYMBOL vmlinux 0x3e677b1cf8blank
+EXPORT_SYMBOL vmlinux 0x3e6c89a8stopTTY
+EXPORT_SYMBOL vmlinux 0x3e7e666elev_dispatch_sort
+EXPORT_SYMBOL vmlinux 0x3e9110fa__hw_addr_unsync
+EXPORT_SYMBOL vmlinux 0x3e95083cvmc_slave_get
+EXPORT_SYMBOL vmlinux 0x3e9bc38e1__sync_dirty_buffer
+EXPORT_SYMBOL vmlinux 0x3e9660atcp_shutdown
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+EXPORT_SYMBOL vmlinux 0x3ef80794iov_iter_gap_alignment
+EXPORT_SYMBOL vmlinux 0x3ef1703phy_unregister_fixup_for_id
+EXPORT_SYMBOL vmlinux 0x3eff5ac2intel_scu_ipc_writev
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+EXPORT_SYMBOL vmlinux 0x3f33ef9dpcci_bus_read_config_dword
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+EXPORT_SYMBOL vmlinux 0x3f6be3fimport_single_range
+EXPORT_SYMBOL vmlinux 0x3f735c4din_dev_finish_destroy
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+EXPORT_SYMBOL vmlinux 0x40282881_request_module
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+EXPORT_SYMBOL vmlinux 0x40973662sysctl_udp_mem
+EXPORT_SYMBOL vmlinux 0x4097fa45acpi_read_bit_register
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+EXPORT_SYMBOL vmlinux 0x40a2d1dddm_table_get_size
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+EXPORT_SYMBOL vmlinux 0x40d04664console_trylock
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+EXPORT_SYMBOL vmlinux 0x40eef1b3refcount_dec_and_lock
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+EXPORT_SYMBOL vmlinux 0x413c7217genphy_soft_reset
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+EXPORT_SYMBOL vmlinux 0x41563573vga_switcheroo_unlock_ddc
+EXPORT_SYMBOL vmlinux 0x4168444adevm_free_irq
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+EXPORT_SYMBOL vmlinux 0x41862ad4vme_alloc_consistent
+EXPORT_SYMBOL vmlinux 0x4188d439neigh_rand_reach_time
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+EXPORT_SYMBOL vmlinux 0x446081aed_path
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+EXPORT_SYMBOL vmlinux 0x446d0963da903x_query_status
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+EXPORT_SYMBOL vmlinux 0x44e32873radix_tree_gang_lookup_tag
+EXPORT_SYMBOL vmlinux 0x44e3ce67devm_input_allocate_device
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+EXPORT_SYMBOL vmlinux 0x455cc208dev_printk_emit
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+EXPORT_SYMBOL vmlinux 0x458799c72scsi_command_normalize_sense
+EXPORT_SYMBOL vmlinux 0x4588f5eb9raw_read_unlock
+EXPORT_SYMBOL vmlinux 0x458cf3e5insert_inode_locked4
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+EXPORT_SYMBOL vmlinux 0x46912a14lockref_get
+EXPORT_SYMBOL vmlinux 0x4698d67cconfig_item_set_name
+EXPORT_SYMBOL vmlinux 0x46ad966pnp_find_dev
+EXPORT_SYMBOL vmlinux 0x46b2ecf7blkdev_issue_discard
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+EXPORT_SYMBOL vmlinux 0x471585f3neigh_proc_dointvec_ms_jiffies
+EXPORT_SYMBOL vmlinux 0x47245513pffifo_fast_ops
+EXPORT_SYMBOL vmlinux 0x4734855fbk_pre_runtime_resume
+EXPORT_SYMBOL vmlinux 0x473b7564pnpbios_protocol
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+EXPORT_SYMBOL vmlinux 0x475642e3page_mapping
+EXPORT_SYMBOL vmlinux 0x475f010bacpi_purge_cached_objects
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+EXPORT_SYMBOL vmlinux 0x47848420setattr_copy
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+EXPORT_SYMBOL vmlinux 0x47939e0d_tasklet_hi_schedule
+EXPORT_SYMBOL vmlinux 0x479c3c86find_next_zero_bit
+EXPORT_SYMBOL vmlinux 0x47a2fe29path_nosuid
+EXPORT_SYMBOL vmlinux 0x47a356filemap_fdatawrite
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+EXPORT_SYMBOL vmlinux 0x8b0f54a_bאפל_check_dev_permission
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+EXPORT_SYMBOL vmlinux 0x8b8059bdin_group_p
+EXPORT_SYMBOL vmlinux 0x8b860444cpu_rmap.put
+EXPORT_SYMBOL vmlinux 0x8b989ca9acpi_bus_can_wakeup
+EXPORT_SYMBOL vmlinux 0x8b99268bsock_alloc_send_pskb
+EXPORT_SYMBOL vmlinux 0xba9b9bb1tty_port_lower_dtr_rts
+EXPORT_SYMBOL vmlinux 0xbc3c8f2ns_to_timespec64
+EXPORT_SYMBOL vmlinux 0xbc48419filemap_map_pages
+EXPORT_SYMBOL vmlinux 0xbc8f9bdblk_end_request_all
+EXPORT_SYMBOL vmlinux 0xbd7b7e4unregister_md_personality
+EXPORT_SYMBOL vmlinux 0xbaed012rbb_eraseCached
+EXPORT_SYMBOL vmlinux 0xbaefc02eskb_queue_tail
+EXPORT_SYMBOL vmlinux 0xbb04169netdev_state_change
+EXPORT_SYMBOL vmlinux 0xbb054aazlib_inflateReset
+EXPORT_SYMBOL vmlinux 0xbb134d7watchdog_register_governer
+EXPORT_SYMBOL vmlinux 0xbb14eb31bcmp
+EXPORT_SYMBOL vmlinux 0xbb16a9admd_integrity_add_rdev
+EXPORT_SYMBOL vmlinux 0xbb17167dev_uc_add_excl
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+EXPORT_SYMBOL vmlinux 0xbb35675b__bitmap_intersects
+EXPORT_SYMBOL vmlinux 0xbb577230kernel_getsockopt
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+EXPORT_SYMBOL vmlinux 0xbb6499f2mb_cache_entry_delete
+EXPORT_SYMBOL vmlinux 0xbb66fc8aaneigl_parms_alloc
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+EXPORT_SYMBOL vmlinux 0xbb8e169avga_switcheroo_handler_flags
+EXPORT_SYMBOL vmlinux 0xbb99125cget_default_font
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+EXPORT_SYMBOL vmlinux 0xbc435770dump_stack
+EXPORT_SYMBOL vmlinux 0xbc4365b5pnp_device_attach
+EXPORT_SYMBOL vmlinux 0xbc49223fvgaswitcheroo_client_probe_defer
+EXPORT_SYMBOL vmlinux 0xbc4a292acconsume_skb
+EXPORT_SYMBOL vmlinux 0xbc50422edthtool_interact_link_masks
+EXPORT_SYMBOL vmlinux 0xbc5bceasindev_has_upper_dev
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+EXPORT_SYMBOL vmlinux 0xd688716bdmcopyd_client_create
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+EXPORT_SYMBOL vmlinux 0xd6dc9d08match_u64
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+EXPORT_SYMBOL vmlinux 0xd75c79dfunding_function
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+EXPORT_SYMBOL vmlinux 0xd780band resistance
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+EXPORT_SYMBOL vmlinux 0xef3ba0ddczone_page_state
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+EXPORT_SYMBOL vmlinux 0xefdd70csecsecurity secid to sectx
+EXPORT_SYMBOL vmlinux 0xefe0999eacpi_get_event_status
+EXPORT_SYMBOL vmlinux 0xefeb1c8twl6040_clear_bits
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+EXPORT_SYMBOL vmlinux 0xef00188cdsget users
+EXPORT_SYMBOL vmlinux 0xef008a885seg6 hmac_init
+EXPORT_SYMBOL vmlinux 0xef0187927_sg_page iter_next
+EXPORT_SYMBOL vmlinux 0xef0267ea7_xfrms state destroy
+EXPORT_SYMBOL vmlinux 0xef02a6977queue_rcu_work
+EXPORT_SYMBOL vmlinux 0xef02b1b48_dev_kfree_skb_irq
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+EXPORT_SYMBOL_GPL crypto/af_alg 0xe585d958af_alg_alloc_areq
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Open Source Used In 5GaaS Edge AC-4 16400
fsg_common_remove_luns
+EXPORT_SYMBOL_GPL drivers/usb/serial/usbserial 0xffbb6855usb_serial_generic_write_bulk_callback
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+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusb-wa 0x8061ebdc	trpipe_clear_feature_stalled
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusb-wa 0x911b7bd4	wa_create
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusb-wa 0xc543b60e	wa_process_errored_transfers_run
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusbcore 0x04c415d0	wusbhc_mmcie_rm
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusbcore 0x0bb6bf5e	wusb_cluster_id_get
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusbcore 0x1dc9397d	wusbhc_reset_all
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusbcore 0x427ce389	wusbhc_rh_control
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusbcore 0x6259442a	wusbhc_mmcie_set
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusbcore 0x9f0d1a14	wusbhc_rh_status_data
+EXPORT_SYMBOL_GPL drivers/usb/wusbcore/wusbcore 0xb4d92b41	wusbhc_b_destroy

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+EXPORT_SYMBOL_GPL fs/nfs/0xfb7ee006/nfs_alloc_fattr
+EXPORT_SYMBOL_GPL fs/nfs/0x1ebc0b6/nfs_web_all
+EXPORT_SYMBOL_GPL fs/nfs/0xfc619/nfs_display_fhandle
+EXPORT_SYMBOL_GPL fs/nfsv3/0x4124e59/nfs_set_ds_client
+EXPORT_SYMBOL_GPL fs/nfsv4/0x004f3548/nfs_generic_write_commit_done
+EXPORT_SYMBOL_GPL fs/nfsv4/0x02c46e6/nfs_tracepoint/nfs4_pnfs_write
+EXPORT_SYMBOL_GPL fs/nfsv4/0x0378104/nfs_sequence_done
+EXPORT_SYMBOL_GPL fs/nfsv4/0x054be45/layoutstats_timer
+EXPORT_SYMBOL_GPL fs/nfsv4/0x0c8eb918/nfs_schedule_lease_moved_recovery
+EXPORT_SYMBOL_GPL fs/nfsv4/0x0dcb173e4/nfs_layout_mark_request_commit
+EXPORT_SYMBOL_GPL fs/nfsv4/0x0e9c50e5/nfs_schedule_lease_recovery
+EXPORT_SYMBOL_GPL fs/nfsv4/0x097f3d6/nfs_generic_pg_test
+EXPORT_SYMBOL_GPL fs/nfsv4/0x170f3ed6/nfs_max_getdevinfo_overhead
+EXPORT_SYMBOL_GPL fs/nfsv4/0x192b97e37/nfs_generic_layout_insert_lseg
+EXPORT_SYMBOL_GPL fs/nfsv4/0x1c2ef8992/nfs_schedule_session_recovery
+EXPORT_SYMBOL_GPL fs/nfsv4/0x300e659/nfs_generic_pg_readpages
+EXPORT_SYMBOL_GPL fs/nfsv4/0x349552e/nfs_schedule_migration_recovery
+EXPORT_SYMBOL_GPL fs/nfsv4/0x3535aba7/nfs_generic_scan_commit_lists
+EXPORT_SYMBOL_GPL fs/nfsv4/0x36a824b/nfs_decode_mp_ds_addr
+EXPORT_SYMBOL_GPL fs/nfsv4/0x3747271/nfs_write_done_resend_to_mds
+EXPORT_SYMBOL_GPL fs/nfsv4/0x41997077/nfs_read_done_resend_to_mds
+EXPORT_SYMBOL_GPL fs/nfsv4/0x427d516/nfs_set_ds_client
+EXPORT_SYMBOL_GPL fs/nfsv4/0x4645e22/nfs_schedule_stateid_recovery
+EXPORT_SYMBOL_GPL fs/nfsv4/0x4a52951/nfs_schedule_stateid
+EXPORT_SYMBOL_GPL fs/nfsv4/0x4ef93164/nfs_generic_prepare_to_resend_writes
+EXPORT_SYMBOL_GPL fs/nfsv4/0x53c94a34/nfs_generic_commit_pagelist
+EXPORT_SYMBOL_GPL fs/nfsv4/0x594b9378/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x63876b5d/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x69cc038/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x6dcb289f/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x760eaf5b/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x76701d22/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x76701d22/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x7e0df01/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x7e0df01/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x7e0df01/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x84e3022d/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x8507054/nfs_generic_sync
+EXPORT_SYMBOL_GPL fs/nfsv4/0x8a860c/enfs4_init_devicid_node
+EXPORT_SYMBOL_GPL fs/nfsv4/0x9662c214/nfs_generic_recover_commit_reqs
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xa575945xfrm_count_pfkey_auth_supported
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x28e23139xfrm_probe_algs
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x3bf471d7xfrm_calg_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x47b34e60xfrm_ealg_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x60f83277xfrm_aead_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x6a8a6277xfrm_count_pfkey_enc_supported
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xc0a16685xfrm_aalg_get_byid
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x28e23139xfrm_calg_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x3bf471d7xfrm_calg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x47b34e60xfrm_ealg_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x60b73277xfrm_aead_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x7a8ca627xfrm_count_pfkey_enc_supported
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x834ba96d
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0x8ad160dxfrm_aalg_get_byid
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xdbfc35c8xfrm_ealg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_algo 0xda03a6dxfrm_ealg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x1d177a67
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x28e23139xfrm_calg_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x3bf471d7xfrm_calg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x47b34e60xfrm_ealg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x60b73277xfrm_aead_get_byname
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x7a8ca627xfrm_count_pfkey_enc_supported
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x834ba96d
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x8ad160dxfrm_aalg_get_byid
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0xdbfc35c8xfrm_ealg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0xda03a6dxfrm_ealg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0xf5a09685xfrm_aalg_get_byidx
+EXPORT_SYMBOL_GPL net/xfrm/xfrm_ipcomp 0x0a16685xfrm_aalg_get_byname
+EXPORT_SYMBOL_GPL sound/ac97_bus 0x9b5c50db
+EXPORT_SYMBOL_GPL sound/ac97_bus 0xb9a5c50db
+EXPORT_SYMBOL_GPL sound/ac97_bus 0xd177a67
+EXPORT_SYMBOL_GPL sound/ac97_bus 0x0a16685xfrm_aalg_get_byname
+EXPORT_SYMBOL_GPL sound/ac97_bus 0x834ba96d
+EXPORT_SYMBOL_GPL sound/ac97_bus 0xda03a6dxfrm_aalg_get_byidx
+EXPORT_SYMBOL_GPL sound/ac97_bus 0xda03a6dxfrm_aalg_get_byname
+EXPORT_SYMBOL_GPL sound/ac97_bus 0xda03a6dxfrm_aalg_get_byname
+EXPORT_SYMBOL_GPL sound/ac97_bus 0xda03a6dxfrm_aalg_get_byidx
+EXPORT_SYMBOL_GPL sound/ac97_bus 0xda03a6dxfrm_aalg_get_byid
+EXPORT_SYMBOL_GPL sound/core/snd 0x1d859389
+EXPORT_SYMBOL_GPL sound/core/snd 0x1d859389
+EXPORT_SYMBOL_GPL sound/core/snd 0x326c9176
+EXPORT_SYMBOL_GPL sound/core/snd 0x6014bfc0
+EXPORT_SYMBOL_GPL sound/core/snd 0x7eb1664b
+EXPORT_SYMBOL_GPL sound/core/snd 0x7eb1664b
+EXPORT_SYMBOL_GPL sound/core/snd 0x9c5bce804
+EXPORT_SYMBOL_GPL sound/core/snd 0xc22e390e
+EXPORT_SYMBOL_GPL sound/core/snd 0xc9aceb03
+EXPORT_SYMBOL_GPL sound/core/snd 0xc9aceb03
+EXPORT_SYMBOL_GPL sound/core/snd 0x04e1b99f
+EXPORT_SYMBOL_GPL sound/core/snd 0x04e1b99f
+EXPORT_SYMBOL_GPL sound/core/snd 0x17dc1f17
+EXPORT_SYMBOL_GPL sound/core/snd 0x17dc1f17
+EXPORT_SYMBOL_GPL sound/core/snd 0x23f09915
+EXPORT_SYMBOL_GPL sound/core/snd 0x23f09915
+EXPORT_SYMBOL_GPL sound/core/snd 0x3fgh2b133
+EXPORT_SYMBOL_GPL sound/core/snd 0x3fgh2b133
+EXPORT_SYMBOL_GPL sound/core/snd 0x7d75d8aa
+EXPORT_SYMBOL_GPL sound/core/snd 0x841a308a
+EXPORT_SYMBOL_GPL sound/core/snd 0x841a308a
+EXPORT_SYMBOL_GPL sound/core/snd 0x857e8db1
+EXPORT_SYMBOL_GPL sound/core/snd 0x857e8db1
+EXPORT_SYMBOL_GPL sound/core/snd 0x8d863969
+EXPORT_SYMBOL_GPL sound/core/snd 0xa286a234
+EXPORT_SYMBOL_GPL sound/core/snd 0xa286a234
+EXPORT_SYMBOL_GPL sound/core/snd 0xda8b78b1
+EXPORT_SYMBOL_GPL sound/core/snd 0xda8b78b1
+EXPORT_SYMBOL_GPL sound/core/snd 0xe127859b
+EXPORT_SYMBOL_GPL sound/core/snd 0xe127859b
+EXPORT_SYMBOL_GPL sound/core/snd 0xf64afa00
+EXPORT_SYMBOL_GPL sound/core/snd 0xf64afa00
+EXPORT_SYMBOL_GPL sound/core/snd 0x2ca6061d
+EXPORT_SYMBOL_GPL sound/core/snd 0x2ca6061d
+EXPORT_SYMBOL_GPL sound/core/snd 0x3f5a1dfd2
+EXPORT_SYMBOL_GPL sound/core/snd 0x3f5a1dfd2
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac_bus_exec_verb
+EXPORT_SYMBOL_GPL sound/hda/snd-hdac_bus_exec_verb
+EXPORT_SYMBOL_GPL sound/i2c/other/snd-ak4113 0x15051c4fsndak4113_external_rate
+EXPORT_SYMBOL_GPL sound/i2c/other/snd-ak4113 0x15b07deasnak4113_create
+EXPORT_SYMBOL_GPL sound/i2c/other/snd-ak4113 0x2a89e103sndak4113_check_rate_and_errors
+EXPORT_SYMBOL_GPL sound/i2c/other/snd-ak4113 0x307a6259sndak4113_build
+EXPORT_SYMBOL_GPL sound/i2c/other/snd-ak4113 0xc8493619sndak4113_reinit
+EXPORT_SYMBOL_GPL sound/i2c/other/snd-ak4113 0xf00da02bsndak4113_reg_write
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x007e9befsnd_hda_pin_sense
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x011c610atsnd_hda_mixer_amp_volume_info
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x03a55718azx_get_pos_posbuf
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x056f29dbsnd_hda_mixer_amp_switch_get
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x0676f5acsnd_hda_get_input_pin_attr
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x099dec918snd_hda_jack_unsol_event
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x0e72b475snd_hda_get_conn_list
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x1116cca8snd_hda_apply_pinfgs
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x14b25250snsnd_hda_multi_out_dig_prepare
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x151cbacaaxz_bus_init
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x155ce878snd_hda_code_update_widgets
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x15e9729snd_hda_spdif_ctls_assign
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x165efb1eaaxz_init_chip
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x18d8ca68snd_hda_find_mixer_ctl
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x1aad3b10snd_hda_add_verbs
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x1aedd5e9b9snd_hda_jack_add_kctls
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x1ccion629snd_hda_get_autocfg_input_label
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x2a37af58snd_hda_apply_verbs
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x2b31563asnd_hda_overrire_conn_list
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x2e817be2snd_hda_jack_add_kctl
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x32b17fb4caxxz_init_streams
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x33994557snd_hda_code_pcm_new
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x33c7acexsnd_hda_lock_devices
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x3510acf9snd_hda_input_mux_put
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x35edfca6axpzrope_codecs
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x35f2ab37snd_hda_shutup_pins
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x371509c8hdacodec_driver_unregister
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x375caed5snd_hda_input_mux_info
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x387c54csnd_hda_multi_out_dig_open
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x38cd44adsnd_hda_mixer_amp_volume_get
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x38ce402baxzx_interrupt
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x3adee433snd_hda_jack_tlbl_get
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x3c7fa13c_hda_code_driver_register
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x3cebe0c7csnd_hda_mixer_amp_switch_info
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x4119a514snd_hda_codec_new
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x417b1814snd_hda_get_pin_label
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x4242bc8snd_hda_multi_out_analog_open
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x44c4b8e1snd_hda_get_connections
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x4598e7bnsnd_hda_set_power_save
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x6d9c2feb snd_hda_gen_mic_autoswitch
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x76dc6871 hda_main_out_badness
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x871a6e44 hda_extra_out_badness
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0x8dcebefa snd_hda_gen_path_power_filter
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xa74428a8 snd_hda_gen_hp_automute
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xa8f2896cs snd_hda_gen_add_kctl
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xba8ed7c2 snd_hda_gen_spec_init
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xe9766e6snd snd_hda_gen_stream_pm
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xe250a53d snd_hda_gen_check_power_status
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xebd88c12 snd_hda_gen_add_kctl
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec-generic 0xec7da3f3 snd_hda_gen_add_kctl
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-adau-utils 0x6e8deb52 adaualc_pll_cfg
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-adau1761 0x7a4beb37 adaum1761_probe
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-adau1761 0xa7384f16 adaum1761_regmap_config
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42l51 0x375ad98c cs42l51_of_match
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42l51 0x65dfe7f6 cs42l51_regmap
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-cs42xx8 0x0245c4f2 cs42xx8_of_match
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-da7219 0x16782b7a da7219_aad_jack_det
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-da7219 0x427c0d63 da7219_aad_exit
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-da7219 0x88c906c8 da7219_aad_init
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-es8328 0x52316e3f es8328_regmap_config
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-hipc179x-codec 0x03b5c5868pc179x_common_exit
+EXPORT_SYMBOL_GPL sound/soc/codecs/snd-soc-hipc179x-codec 0x3b5c5868pc179x_common_init

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+EXPORT_SYMBOL_GPL sound/soc/intel/snd-soc-sst-baytrail-pcm 0x9bb6da36sst_byt_dsp_init
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-acpi-intel-match 0x42414eea
snd_soc_acpi_intel_broadwell_machines
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-acpi-intel-match 0x42dd7ad7
snd_soc_acpi_intel_baytrail_machines
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-acpi-intel-match 0x837ceb0
snd_soc_acpi_intel_cherrytrail_machines
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-acpi-intel-match 0x9bb6da36
sst_byt_dsp_init
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-acpi-intel-match 0x9d033527
snd_soc_acpi_intel_baytrail_legacy_machines
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-acpi-intel-match 0xcb0d9d41
snd_soc_acpi_intel_haswell_machines
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x0af0925
sst_dsp_shim_update_bits_unlocked
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x10fb40desst_dsp_shim_read
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x14296280sst_dsp_shim_update_bits64
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x17df568sst_outbox_write
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x1ad0e79sst_dsp_shim_read64_unlocked
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x5e8b82sst_shim32_read
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x19f9b2bssst_dsp_boot
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x31281f54sst_dsp_read64
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x3ff7513sst_dsp_shim_read_unlocked
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x42ee29faafsst_dsp_mailbox_init
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x4a045773sst_dsp_ipc_msg_rx
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x63055daddsst_dsp_dump
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x638b2cssst_ipc_msg_tx
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x74ace0dasssst_dsp_shim_register_poll
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x8285d3b7sst_dsp_sleep
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0x82b316afsst_dsp_inbox_write
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0xb1e58f26sst_dsp_shim_update_bits_forced_unlocked
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0xb449b4d9sst_dsp_shim_update_bits64_unlocked
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0xe0506e72sst_memcpy_toio_32
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0xe14c0d1estsst_memcpy_fromio_32
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0xe1b3e756sst_dsp_shim_write_unlocked
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0xe4cc6d5bsst_dsp_shim_write64
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-dsp 0xe61872esst_dsp_stall
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x0a60a886 sst_module_runtime_new
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x1858ca69 sst_block_alloc_scratch
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x22cbf4f7 sst_module_alloc_blocks
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x25d4ffe5 sst dsp_free
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x2fd62138 sst_module_runtime_free
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x333aed7c sst_module_runtime_free_blocks
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x378de25b sst dsp_dma_get_channel
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x3ee07328 sst_module_runtime_save
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x40606eef sst dsp_dma_copyto
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x421ad7bf sst_module_free
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x4400311e sst_module_runtime_restore
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x4dd0f7fb sst_fw_free_all
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x5059bcfc sst_module_get_from_id
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x5259f0a8 sst_module_runtime_free
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x5d30630f sst_block_free_scratch
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x6664221c sst_dsp_new
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0xc0ff5ddf sst_dsp_dma_copyfrom
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0xc2489850 sst_module_runtime_get_from_id
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0xecee8f96 sst_dsp_dma_get_offset
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x15f9464f sst_ipc_init
+EXPORT_SYMBOL_GPL sound/soc/intel/common/snd-soc-sst-firmware 0x169793fd sst_ipc_fini
+EXPORT_SYMBOL_GPL sound/soc/intel/haswell/snd-soc-sst-haswell-pcm 0x58232c6e hsw dsp_free
+EXPORT_SYMBOL_GPL sound/soc/intel/haswell/snd-soc-sst-haswell-pcm 0x58b232c6 hsw dsp_init
+EXPORT_SYMBOL_GPL sound/soc/intel/haswell/snd-soc-sst-haswell-pcm 0x17855502 skl sst_init_fw
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0x0c1d7458
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0x32ce3e70 sst_ipc_drop_all
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0x46eca01c sst_ipc_tx_msg_reply_complete
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0x6153c2aa sst_ipc_tx_msg_reply_find_msg
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0x4b7f6285 sst_fw_load
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0xecee8f96 sst dsp_dma_get_offset
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0x15f9464f sst_ipc_init
+EXPORT_SYMBOL_GPL sound/soc/intel/skylake/snd-soc-skl-ipc 0x17855502 skl sst_init_fw

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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x1906fa2dskl_dsp_sleep
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x1ee5a4f4skl_ipc_set_pipeline_state
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x1e6c301acnl_sst_init_fw
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x3799ac/scskl_ipc_init_instance
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x3dd98005skl_dsp_put_core
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x41a305declnt dsp cleanup
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x43242a63skl_get_pvt id
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x4709bea7bxt_sst dsp init
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x50b7d8e1skl_ipc_restore_pipeline
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x772fa3fckl_ipc_set_dx
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x88ed6a92skl_ipc_set_large_config
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0xa985a033skl_clear_module_cnt
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0xc1d25f3bskl_ipc unload modules
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0xd026afd1clnt dsp init
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x0089b36f+snd_soc_acpi codec list
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x03896a2b+snd_soc_acpi find machine
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+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x0c896e4f snd_soc_dapm get pin switch
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x0d907706snd_soc_register_dai
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x0e994a17f snd_soc_put_strobe
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x0f827702snd_soc_dpcm can be free stop
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x0fe8b07adssnd_soc_dpcm can be params
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x10c63305soc_ac97 ops
+EXPORT_SYMBOL_GPL sound/intel/skylake/snd-soc-skl-ipc 0x12367adbsnd_soc_write
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+EXPORT_SYMBOL_GPL vmlinux 0x11d7589eadd_hwgenerator_randomness
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+EXPORT_SYMBOL_GPL vmlinux 0x124f2056crypto_get_attr_type
+EXPORT_SYMBOL_GPL vmlinux 0x1268f357resume_device_irqs
+EXPORT_SYMBOL_GPL vmlinux 0x12828cf3dev_pm_opppfind_freq_exact
+EXPORT_SYMBOL_GPL vmlinux 0x1296176pm_runtime_idle
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+EXPORT_SYMBOL_GPL vmlinux 0x1b5023b3hash_register_instance
+EXPORT_SYMBOL_GPL vmlinux 0x1b52db1probe_kernel_read
+EXPORT_SYMBOL_GPL vmlinux 0x1b72d6bbpm_clk_runtime_resume
+EXPORT_SYMBOL_GPL vmlinux 0x1b7bb5e5hwmon_device_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x1b7f28acblk_freeze_queue_start
+EXPORT_SYMBOL_GPL vmlinux 0x1b84ad68devm_device_add_groups
+EXPORT_SYMBOL_GPL vmlinux 0x1b86e8a4hvc_instantiate
+EXPORT_SYMBOL_GPL vmlinux 0x1b8822d8pinctrl_gpio_direction_output
+EXPORT_SYMBOL_GPL vmlinux 0x1b9ac5f probe_return
+EXPORT_SYMBOL_GPL vmlinux 0x1ba09c1c_netpoll_free_async
+EXPORT_SYMBOL_GPL vmlinux 0x1ba237b0default_cpu_present_to_apicid
+EXPORT_SYMBOL_GPL vmlinux 0x1bb155f6regmap_async_complete_cb
+EXPORT_SYMBOL_GPL vmlinux 0x1bbb3955clk_hw_get_parent
+EXPORT_SYMBOL_GPL vmlinux 0x1bc5ebepinctrl_gpio_direction_input
+EXPORT_SYMBOL_GPL vmlinux 0x1bc8ac1dev_pm_genpd_set_performance_state
+EXPORT_SYMBOL_GPL vmlinux 0x1be7dc08scsi autopm_put_device
+EXPORT_SYMBOL_GPL vmlinux 0x1c0beb09nd_cmd_in_size
+EXPORT_SYMBOL_GPL vmlinux 0x1c21e0uebaip_debugfs dir
+EXPORT_SYMBOL_GPL vmlinux 0x1c35bb8e9tpm_tis_core_init
+EXPORT_SYMBOL_GPL vmlinux 0x1c47b673pci_reset_function_locked
+EXPORT_SYMBOL_GPL vmlinux 0x1c48a8f9regmap_check_range_table
+EXPORT_SYMBOL_GPL vmlinux 0x1c5541bdcpufreq_boost_enabled
+EXPORT_SYMBOL_GPL vmlinux 0x1c57479cget_scattered_cpuid_leaf
+EXPORT_SYMBOL_GPL vmlinux 0x1c58ed60get_kernel_page
+EXPORT_SYMBOL_GPL vmlinux 0x23f7e685bpf_prog_add
+EXPORT_SYMBOL_GPL vmlinux 0x241c7daf_vfs_setattr_noperm
+EXPORT_SYMBOL_GPL vmlinux 0x24422f9dbsg_job_get
+EXPORT_SYMBOL_GPL vmlinux 0x24457174audit_enabled
+EXPORT_SYMBOL_GPL vmlinux 0x24587d2eusb_ifnum_to_if
+EXPORT_SYMBOL_GPL vmlinux 0x2469810f__rcu_read_unlock
+EXPORT_SYMBOL_GPL vmlinux 0x246f4157tracepoint_probe_register
+EXPORT_SYMBOL_GPL vmlinux 0x247ef831kdb_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x249553e5__clk_mux_determine_rate
+EXPORT_SYMBOL_GPL vmlinux 0x2499f446ata_bmdma_post_internal_cmd
+EXPORT_SYMBOL_GPL vmlinux 0x24a4a100crypto_db_key_len
+EXPORT_SYMBOL_GPL vmlinux 0x24ae5493crypto_aesexpand_key
+EXPORT_SYMBOL_GPL vmlinux 0x24ee6b7devm_pci_epc_destroy
+EXPORT_SYMBOL_GPL vmlinux 0x24b0754usb_acpi_set_power_state
+EXPORT_SYMBOL_GPL vmlinux 0x24b55858wm5102_i2c_regmap
+EXPORT_SYMBOL_GPL vmlinux 0x24c7698axenbus_write
+EXPORT_SYMBOL_GPL vmlinux 0x24d6cc9exenbus_unregister_driver
+EXPORT_SYMBOL_GPL vmlinux 0x24e9066fehci_handshake
+EXPORT_SYMBOL_GPL vmlinux 0x24eb7e32leds_list
+EXPORT_SYMBOL_GPL vmlinux 0x24f39c39reset_control_reset
+EXPORT_SYMBOL_GPL vmlinux 0x24f5194edev_pm_qos_add_ancestor_request
+EXPORT_SYMBOL_GPL vmlinux 0x25007042spi_register_controller
+EXPORT_SYMBOL_GPL vmlinux 0x250d7d94hypervisor_kobj
+EXPORT_SYMBOL_GPL vmlinux 0x2512f142fwnode_graph_get_port_parent
+EXPORT_SYMBOL_GPL vmlinux 0x2518e39bbitmap_queue_show
+EXPORT_SYMBOL_GPL vmlinux 0x2523f769blobmap_queue_show
+EXPORT_SYMBOL_GPL vmlinux 0x2528da1asdio_retune_hold_now
+EXPORT_SYMBOL_GPL vmlinux 0x25306ab3clkgate_is_enabled
+EXPORT_SYMBOL_GPL vmlinux 0x25379e73clk_set_min_rate
+EXPORT_SYMBOL_GPL vmlinux 0x253cf69edbdma_post internal_cmd
+EXPORT_SYMBOL_GPL vmlinux 0x2548e675bpf_prog_add
+EXPORT_SYMBOL_GPL vmlinux 0x25517e6ahci_handshake
+EXPORT_SYMBOL_GPL vmlinux 0x2554e4b8bspower_supply_register_no_ws
+EXPORT_SYMBOL_GPL vmlinux 0x2557b0ab0input_ff_destroy
+EXPORT_SYMBOL_GPL vmlinux 0x255e07f5usb_queue_reset_device
+EXPORT_SYMBOL_GPL vmlinux 0x2562b79bhwspin_lock_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x2569005eceph_key
+EXPORT_SYMBOL_GPL vmlinux 0x25747f91bpf_prog_select_runtime
+EXPORT_SYMBOL_GPL vmlinux 0x257c5177bpm_add
+EXPORT_SYMBOL_GPL vmlinux 0x2583a17bfsecurity_inode_permission
+EXPORT_SYMBOL_GPL vmlinux 0x25865538rio_device
+EXPORT_SYMBOL_GPL vmlinux 0x258b3f652debugfs_file_put
+EXPORT_SYMBOL_GPL vmlinux 0x25984588sysfs_disable
+EXPORT_SYMBOL_GPL vmlinux 0x259a4809devhyperv_report_panic

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+EXPORT_SYMBOL_GPL vmlinux 0x264ecd12gpiod_to_chip
+EXPORT_SYMBOL_GPL vmlinux 0x264f3f35inet_csk_listen_start
+EXPORT_SYMBOL_GPL vmlinux 0x26520970vm_memory_commited
+EXPORT_SYMBOL_GPL vmlinux 0x26578a65fs_dax_get_by_bdev
+EXPORT_SYMBOL_GPL vmlinux 0x265b787cvelxfs_devs
+EXPORT_SYMBOL_GPL vmlinux 0x26606a02fdmmalloc
+EXPORT_SYMBOL_GPL vmlinux 0x2662d6a5smp_call_on_cpu
+EXPORT_SYMBOL_GPL vmlinux 0x2663c918register_vmap_purge_notifier
+EXPORT_SYMBOL_GPL vmlinux 0x2665c169__clark_set
+EXPORT_SYMBOL_GPL vmlinux 0x2665c169__clark_set
+EXPORT_SYMBOL_GPL vmlinux 0x2669c555ck_hw_register_gpio_gate
+EXPORT_SYMBOL_GPL vmlinux 0x26727775kexec_crash_loaded
+EXPORT_SYMBOL_GPL vmlinux 0x2679d87bda9x_half
+EXPORT_SYMBOL_GPL vmlinux 0x2679d87bda9x_half
+EXPORT_SYMBOL_GPL vmlinux 0x267f4237da903x_unregister_notifier
+EXPORT_SYMBOL_GPL vmlinux 0x2690cb55clk_hw_register_gpio_gate
+EXPORT_SYMBOL_GPL vmlinux 0x2692d72fvirtio_check_driver_offered_feature
+EXPORT_SYMBOL_GPL vmlinux 0x26965721slow_virt_to_phys
+EXPORT_SYMBOL_GPL vmlinux 0x26a53575virtio_break_device
+EXPORT_SYMBOL_GPL vmlinux 0x26b71fb4ring_buffer_time_stamp
+EXPORT_SYMBOL_GPL vmlinux 0x26c09af9fdummy_con
+EXPORT_SYMBOL_GPL vmlinux 0x26c90ea4scsi_eh_get Sense
+EXPORT_SYMBOL_GPL vmlinux 0x26c95bc6regmap_get_valBytes
+EXPORT_SYMBOL_GPL vmlinux 0x26dd90e7irq_get_per_cpu_devid_partition
+EXPORT_SYMBOL_GPL vmlinux 0x26ed2186register_vmap_purge_notifier
+EXPORT_SYMBOL_GPL vmlinux 0x26fe9e5crhwspin_lock_request_specific
+EXPORT_SYMBOL_GPL vmlinux 0x2714db2edm_internal_suspend_fast
+EXPORT_SYMBOL_GPL vmlinux 0x27303a93inet_csk_addr2sockaddr
+EXPORT_SYMBOL_GPL vmlinux 0x273a9474xen_have_vector_callback
+EXPORT_SYMBOL_GPL vmlinux 0x274cf5e1__clk_get_flags
+EXPORT_SYMBOL_GPL vmlinux 0x275f4760percpu_ref_switch_to_atomic_sync
+EXPORT_SYMBOL_GPL vmlinux 0x27584d14rio_unmap_outb_region
+EXPORT_SYMBOL_GPL vmlinux 0x275d2977blk_mq_alloc_request_hctx
+EXPORT_SYMBOL_GPL vmlinux 0x27606f10fib_rules_lookup
+EXPORT_SYMBOL_GPL vmlinux 0x27637f22dst_cache_set_ip6
+EXPORT_SYMBOL_GPL vmlinux 0x276643feshash_ahash_finup
+EXPORT_SYMBOL_GPL vmlinux 0x2790723device_for_each_child_reverse
+EXPORT_SYMBOL_GPL vmlinux 0x2797ab93percpu_ref_switch_to_atomic
+EXPORT_SYMBOL_GPL vmlinux 0x279cb985apei_exec_pre_map_gars
+EXPORT_SYMBOL_GPL vmlinux 0x27bfdf35ty_ldiscard
+EXPORT_SYMBOL_GPL vmlinux 0x27c1e63fusb_amd_find_chipset_info
+EXPORT_SYMBOL_GPL vmlinux 0x27dca2a9vfs_fallocate
+EXPORT_SYMBOL_GPL vmlinux 0x27e5c244blq_rdma_map_queues
+EXPORT_SYMBOL_GPL vmlinux 0x27fa66e1nr_free_buffer_pages
+EXPORT_SYMBOL_GPL vmlinux 0x280798efusb_mon_register
+EXPORT_SYMBOL_GPL vmlinux 0x281badblocks_check
+EXPORT_SYMBOL_GPL vmlinux 0x2821cadbrtnl_af_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x2828d45usb_deregister
+EXPORT_SYMBOL_GPL vmlinux 0x282cadabcusLed_activity
+EXPORT_SYMBOL_GPL vmlinux 0x2847f28espi_alloc_device
+EXPORT_SYMBOL_GPL vmlinux 0x284d25descsi_queue_work
+EXPORT_SYMBOL_GPL vmlinux 0x2864abc9klist_node_attached
+EXPORT_SYMBOL_GPL vmlinux 0x286fe8capci_num_vf
+EXPORT_SYMBOL_GPL vmlinux 0x287fe3adshmem_get_seals
+EXPORT_SYMBOL_GPL vmlinux 0x288e3615trace_event_buffer_reserve

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+EXPORT_SYMBOL_GPL vmlinux 0x43d30739blk_stat_remove_callback
+EXPORT_SYMBOL_GPL vmlinux 0x43d5cc5efanout_mutex
+EXPORT_SYMBOL_GPL vmlinux 0x43f56e82ata_xfer_mode2shift
+EXPORT_SYMBOL_GPL vmlinux 0x43f81957clk_round_rate
+EXPORT_SYMBOL_GPL vmlinux 0x44090927regmap_reinit_cache
+EXPORT_SYMBOL_GPL vmlinux 0x4420f20ccscru_notifier_chain_register
+EXPORT_SYMBOL_GPL vmlinux 0x445a09c0nvmem_device_cell_write
+EXPORT_SYMBOL_GPL vmlinux 0x446f2eccpingv6_ops
+EXPORT_SYMBOL_GPL vmlinux 0x4473db68ktime_get_snapshot
+EXPORT_SYMBOL_GPL vmlinux 0x448032b3fuse_conn_get
+EXPORT_SYMBOL_GPL vmlinux 0x448bae22virtqueue_get_used_addr
+EXPORT_SYMBOL_GPL vmlinux 0x448efb59list_iter_exit
+EXPORT_SYMBOL_GPL vmlinux 0x4493cecbregulator_get_device_vsel_register
+EXPORT_SYMBOL_GPL vmlinux 0x44b3874pcpci_msi_mask_irq
+EXPORT_SYMBOL_GPL vmlinux 0x44b5ca4edev_queue_unregister_queue
+EXPORT_SYMBOL_GPL vmlinux 0x44b664c3dev_reset_control_get
+EXPORT_SYMBOL_GPL vmlinux 0x44b996a9sata_link_debounce
+EXPORT_SYMBOL_GPL vmlinux 0x44f5f7e6mtrr_state
+EXPORT_SYMBOL_GPL vmlinux 0x4501a905ex_handler_fprestore
+EXPORT_SYMBOL_GPL vmlinux 0x450414c5device_property_read_string
+EXPORT_SYMBOL_GPL vmlinux 0x4507f4a8cpuhp_tasks_frozen
+EXPORT_SYMBOL_GPL vmlinux 0x4512b086intel_scu_devices_create
+EXPORT_SYMBOL_GPL vmlinux 0x4515b878irq_domain_xlate_onetwocell
+EXPORT_SYMBOL_GPL vmlinux 0x452a0b39crypto_aahash_finup
+EXPORT_SYMBOL_GPL vmlinux 0x45347ffdtsata_link_debounce
+EXPORT_SYMBOL_GPL vmlinux 0x4541fe0d__tracepoint_arm_event
+EXPORT_SYMBOL_GPL vmlinux 0x454594a4eexon_register_notifier_all
+EXPORT_SYMBOL_GPL vmlinux 0x454cd73ebklq_debugfs_rq_show
+EXPORT_SYMBOL_GPL vmlinux 0x454d45f6bdk_policy_register
+EXPORT_SYMBOL_GPL vmlinux 0x454f1eb4efi_query_variable_store
+EXPORT_SYMBOL_GPL vmlinux 0x45558f56clk_unregister_fixed_factor
+EXPORT_SYMBOL_GPL vmlinux 0x45621a41usb_hcd_amd_remote_wakeup_quirk
+EXPORT_SYMBOL_GPL vmlinux 0x456d0b2e_tracepoint_fib6_table_lookup
+EXPORT_SYMBOL_GPL vmlinux 0x4572c43f_tracepoint_add_device_to_group
+EXPORT_SYMBOL_GPL vmlinux 0x457594facrypto_alg_list
+EXPORT_SYMBOL_GPL vmlinux 0x45833429rio_mportinitialize
+EXPORT_SYMBOL_GPL vmlinux 0x458a2e33debugfs_create_ulong
+EXPORT_SYMBOL_GPL vmlinux 0x458d04ftimecounter_read
+EXPORT_SYMBOL_GPL vmlinux 0x45bf1f3crypto_inc
+EXPORT_SYMBOL_GPL vmlinux 0x45d080ca_tracepoint_arm_event
+EXPORT_SYMBOL_GPL vmlinux 0x45d14df9hypercall_page
+EXPORT_SYMBOL_GPL vmlinux 0x45d35dbfksk_zeroCopy_headlen
+EXPORT_SYMBOL_GPL vmlinux 0x45def6e8gpiod_get
+EXPORT_SYMBOL_GPL vmlinux 0x45dfbb1a3raw_hash_sk
+EXPORT_SYMBOL_GPL vmlinux 0x45e1f107blkcg_deactivate_policy
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+EXPORT_SYMBOL_GPL vmlinux 0x4b0ce59ephy_pm_runtime_forbid
+EXPORT_SYMBOL_GPL vmlinux 0x4b17e177kernel_read_file_from_fd
+EXPORT_SYMBOL_GPL vmlinux 0x4b25d32dring_buffer_read_prepare
+EXPORT_SYMBOL_GPL vmlinux 0x4b4ead34crypto_shash_update
+EXPORT_SYMBOL_GPL vmlinux 0x4b55369bkernfs_put
+EXPORT_SYMBOL_GPL vmlinux 0x4b9522f8rtc_read_time
+EXPORT_SYMBOL_GPL vmlinux 0x4ba0f290tty_lidisc_flush
+EXPORT_SYMBOL_GPL vmlinux 0x4ba8f99dfpublic_key_subtype
+EXPORT_SYMBOL_GPL vmlinux 0x4bc8727fxen_balloon_init
+EXPORT_SYMBOL_GPL vmlinux 0x4bd0b055clk_hw_register_fractional_divider
+EXPORT_SYMBOL_GPL vmlinux 0x4be695d9sysfs_remove_group
+EXPORT_SYMBOL_GPL vmlinux 0x4bf17cb1crypto_unregister_scomp
+EXPORT_SYMBOL_GPL vmlinux 0x4bf36e1ciommu_get_domain_for_dev
+EXPORT_SYMBOL_GPL vmlinux 0x4bf64138ltunnel_fill_encap
+EXPORT_SYMBOL_GPL vmlinux 0x4c09a902crypto_unregister_aeads
+EXPORT_SYMBOL_GPL vmlinux 0x4c243e89skcipher_walk_complete
+EXPORT_SYMBOL_GPL vmlinux 0x4c79121fixed_phy_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x4c8d450devm_kstrdup
+EXPORT_SYMBOL_GPL vmlinux 0x4c9fbc3ecn_add_callback
+EXPORT_SYMBOL_GPL vmlinux 0x4c4147e6clk_gpio_mux_ops
+EXPORT_SYMBOL_GPL vmlinux 0x4c456806gpiochip_unlock_as_irq
+EXPORT_SYMBOL_GPL vmlinux 0x4c52704blk_poll
+EXPORT_SYMBOL_GPL vmlinux 0x4c602bf1__blkg_release_rcu
+EXPORT_SYMBOL_GPL vmlinux 0x4c60fdbdmabuf_fd
+EXPORT_SYMBOL_GPL vmlinux 0x4c72765relay_reset
+EXPORT_SYMBOL_GPL vmlinux 0x4c759827byte_rev_table
+EXPORT_SYMBOL_GPL vmlinux 0x4c762b5cx86_stepping
+EXPORT_SYMBOL_GPL vmlinux 0x4c7c0d0ahtool_set_device_id
+EXPORT_SYMBOL_GPL vmlinux 0x4c84e464pci_epc_mem_alloc_addr
+EXPORT_SYMBOL_GPL vmlinux 0x4c8e319erio_route_add_entry
+EXPORT_SYMBOL_GPL vmlinux 0x4ca09e08tcp_cong_avoid_ai
+EXPORT_SYMBOL_GPL vmlinux 0x4ca68b2brio_dev_put
+EXPORT_SYMBOL_GPL vmlinux 0x4cbbd228ata_bm_dma_qc_prep
+EXPORT_SYMBOL_GPL vmlinux 0x4cebdc0cata_sff_busy_sleep
+EXPORT_SYMBOL_GPL vmlinux 0x4ce1fdd5pci_cfg_access_lock
+EXPORT_SYMBOL_GPL vmlinux 0x4cf23332__usb_get_extra_descriptor
+EXPORT_SYMBOL_GPL vmlinux 0x4cf6cfc1fpinctrl_find_gpio_range_from_pin
+EXPORT_SYMBOL_GPL vmlinux 0x4d0015e2cpu_hotplug_disable
+EXPORT_SYMBOL_GPL vmlinux 0x4d5706f8extcon_set_state
+EXPORT_SYMBOL_GPL vmlinux 0x4d62f307rhashtable_destroy
+EXPORT_SYMBOL_GPL vmlinux 0x4d732007acpi_register gsi
+EXPORT_SYMBOL_GPL vmlinux 0x4da1bphy_pm_runtime_get_sync
+EXPORT_SYMBOL_GPL vmlinux 0x4da83b60list_lru_walk_node
+EXPORT_SYMBOL_GPL vmlinux 0x4de17ab3usb_state_string
+EXPORT_SYMBOL_GPL vmlinux 0x4de462fdphy_start_machine
+EXPORT_SYMBOL_GPL vmlinux 0x5cc4e47dmdms_user_clear
+EXPORT_SYMBOL_GPL vmlinux 0x5cc509a4nsecs_to_jiffies
+EXPORT_SYMBOL_GPL vmlinux 0x5cc5972cplatform_device_alloc
+EXPORT_SYMBOL_GPL vmlinux 0x5cd23f60edac_mc_add_mc_with_groups
+EXPORT_SYMBOL_GPL vmlinux 0x5ce816daffind_pid_ns
+EXPORT_SYMBOL_GPL vmlinux 0x5d06a585cgroup_attach_task_all
+EXPORT_SYMBOL_GPL vmlinux 0x5d09941bedac_device_alloc_ctl_info
+EXPORT_SYMBOL_GPL vmlinux 0x5d12e48finput_event_to_user
+EXPORT_SYMBOL_GPL vmlinux 0x5d247eaedounregister_con_driver
+EXPORT_SYMBOL_GPL vmlinux 0x5d2a1dafuser_describe
+EXPORT_SYMBOL_GPL vmlinux 0x5d366decgnttab_cancel_free_callback
+EXPORT_SYMBOL_GPL vmlinux 0x5d4aeb4dev_attr_em_message
+EXPORT_SYMBOL_GPL vmlinux 0x5d852ef1spi_busnum_to_master
+EXPORT_SYMBOL_GPL vmlinux 0x5d9ef08fbind_interdomain_evtchn_to_irq_lateeoi
+EXPORT_SYMBOL_GPL vmlinux 0x5da67adczs_compact
+EXPORT_SYMBOL_GPL vmlinux 0x5dad69edcrypto_ablkcipher_type
+EXPORT_SYMBOL_GPL vmlinux 0x5dbfa4fboot_cpu_physical_apicid
+EXPORT_SYMBOL_GPL vmlinux 0x5df66dax509_decode_time
+EXPORT_SYMBOL_GPL vmlinux 0x5e24e177pskb_put
+EXPORT_SYMBOL_GPL vmlinux 0x5e39f0a3__udp4_lib_lookup
+EXPORT_SYMBOL_GPL vmlinux 0x5e4bc0debugfs_create_u32_array
+EXPORT_SYMBOL_GPL vmlinux 0x5e51be65ktime_get_ts64
+EXPORT_SYMBOL_GPL vmlinux 0x5e51cd74swiotlb_nr_tbl
+EXPORT_SYMBOL_GPL vmlinux 0x5e5cf653relay_buf_full
+EXPORT_SYMBOL_GPL vmlinux 0x5e67b71devm_set_key
+EXPORT_SYMBOL_GPL vmlinux 0x5e6ba70bdevm_regulator_register_supply_alias
+EXPORT_SYMBOL_GPL vmlinux 0x5e7d0e49virtqueue_poll
+EXPORT_SYMBOL_GPL vmlinux 0x5e7e42c8serdev_device_write_flush
+EXPORT_SYMBOL_GPL vmlinux 0x5e8feacdbsg_register_queue
+EXPORT_SYMBOL_GPL vmlinux 0x5e915591pci_epc_add_epf
+EXPORT_SYMBOL_GPL vmlinux 0x5e917000dcu_cgrp_subsys_on_dfl_key
+EXPORT_SYMBOL_GPL vmlinux 0x5eb37f30badblocks_exit
+EXPORT_SYMBOL_GPL vmlinux 0x5eb52923edac_mod_work
+EXPORT_SYMBOL_GPL vmlinux 0x5ebc123addebugfs_attr_read
+EXPORT_SYMBOL_GPL vmlinux 0x5edadc56nf_queue_entry_get_refs
+EXPORT_SYMBOL_GPL vmlinux 0x5edfccc2iommu_domain_window_enable
+EXPORT_SYMBOL_GPL vmlinux 0x5ee04548handle_bad_irq
+EXPORT_SYMBOL_GPL vmlinux 0x5ee51fb6of_pwm_get
+EXPORT_SYMBOL_GPL vmlinux 0x5eead4facecss_process_vm
+EXPORT_SYMBOL_GPL vmlinux 0x5efdddbdevice_property_read_u64_array
+EXPORT_SYMBOL_GPL vmlinux 0x5f05b85f__inet_twsk_schedule
+EXPORT_SYMBOL_GPL vmlinux 0x5f0b8dd0regulator_set_voltage_time
+EXPORT_SYMBOL_GPL vmlinux 0x5f2da8c4check_tsc_unstable
+EXPORT_SYMBOL_GPL vmlinux 0x5f35dab4pwm_capture
+EXPORT_SYMBOL_GPL vmlinux 0x5f44416busb_reset_configuration
+EXPORT_SYMBOL_GPL vmlinux 0x5f5d8d11tcp_unregister_congestion_control
+EXPORT_SYMBOL_GPL vmlinux 0x5f6f1e9edax_get_private
+EXPORT_SYMBOL_GPL vmlinux 0x5f9763c4fiat_add_entries

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+EXPORT_SYMBOL_GPL vmlinux 0x69b37766mnt_drop_write  
+EXPORT_SYMBOL_GPL vmlinux 0x69b8a800pm_relax  
+EXPORT_SYMBOL_GPL vmlinux 0x69e83deuuuid_gen  
+EXPORT_SYMBOL_GPL vmlinux 0x6a1384c4sk_set_peek_off  
+EXPORT_SYMBOL_GPL vmlinux 0x6a1733ebiommu_group_unregister_notifier  
+EXPORT_SYMBOL_GPL vmlinux 0x6a3665fdumc_normaddr_to_sysaddr  
+EXPORT_SYMBOL_GPL vmlinux 0x6a472643iommu_capability  
+EXPORT_SYMBOL_GPL vmlinux 0x6a4f623bmnmu_notifier_syncronize  
+EXPORT_SYMBOL_GPL vmlinux 0x6a5b566crecu_sched_force_quiescent_state  
+EXPORT_SYMBOL_GPL vmlinux 0x6a67f6f0vmsfs_writef  
+EXPORT_SYMBOL_GPL vmlinux 0x6a75f5a3__lock_page_killable  
+EXPORT_SYMBOL_GPL vmlinux 0x6a7ce245pci_restore_ats_state  
+EXPORT_SYMBOL_GPL vmlinux 0x6a8082ea__tracepoint_wbc_writepage  
+EXPORT_SYMBOL_GPL vmlinux 0x6a8441becpci_hp_start  
+EXPORT_SYMBOL_GPL vmlinux 0x6a8b2337device_remove_bin_file  
+EXPORT_SYMBOL_GPL vmlinux 0x6a8d90cfata_sg_init  
+EXPORT_SYMBOL_GPL vmlinux 0x6ab9a92regmap_bulk_write  
+EXPORT_SYMBOL_GPL vmlinux 0x6abed103ip6_datagram_connect  
+EXPORT_SYMBOL_GPL vmlinux 0x6aca0439dregister_trace_event  
+EXPORT_SYMBOL_GPL vmlinux 0x6acad21faacpi_get_cpuid  
+EXPORT_SYMBOL_GPL vmlinux 0x6ad0c534usb_anchor_urb  
+EXPORT_SYMBOL_GPL vmlinux 0x6ad42a5fusbs_set_interface  
+EXPORT_SYMBOL_GPL vmlinux 0x6ad6a789__tracepoint_powernv_throttle  
+EXPORT_SYMBOL_GPL vmlinux 0x6a9a2b1bitmap_init_node  
+EXPORT_SYMBOL_GPL vmlinux 0x6b00544adax_iomap_rw  
+EXPORT_SYMBOL_GPL vmlinux 0x6b0dc565xen_set_irq_priority  
+EXPORT_SYMBOL_GPL vmlinux 0x6b1acc9eii2egeneric_gpio_recovery  
+EXPORT_SYMBOL_GPL vmlinux 0x6b2c8f68gpiodirection_input  
+EXPORT_SYMBOL_GPL vmlinux 0x6b334acctrace_seq_bitmask  
+EXPORT_SYMBOL_GPL vmlinux 0x6b38a9d8sdio_writeb  
+EXPORT_SYMBOL_GPL vmlinux 0x6b44832pcienable_pasid  
+EXPORT_SYMBOL_GPL vmlinux 0x6b721181aead_geniv_alloc  
+EXPORT_SYMBOL_GPL vmlinux 0x6b7a4335hyperv_cleanup  
+EXPORT_SYMBOL_GPL vmlinux 0x6b813c83mnt_drop_write  
+EXPORT_SYMBOL_GPL vmlinux 0x6b81c38bpowersupply_unregister_notifier  
+EXPORT_SYMBOL_GPL vmlinux 0x6b893pmu_migrate_context  
+EXPORT_SYMBOL_GPL vmlinux 0x6b9a324devres_alloc_node  
+EXPORT_SYMBOL_GPL vmlinux 0x6b950a2gpiochip_config_write  
+EXPORT_SYMBOL_GPL vmlinux 0x6b9e599gpiochip_line_is_persistent  
+EXPORT_SYMBOL_GPL vmlinux 0x6b9d0dmi_memdev_name  
+EXPORT_SYMBOL_GPL vmlinux 0x6c07d933add_uevent_var  
+EXPORT_SYMBOL_GPL vmlinux 0x6c0a33encpuide_unregister_driver  
+EXPORT_SYMBOL_GPL vmlinux 0x6c1251fdapei_exec_read_register  
+EXPORT_SYMBOL_GPL vmlinux 0x6c209eaballoc_percpu_gfp  
+EXPORT_SYMBOL_GPL vmlinux 0x6c389761acpi_bus_get_private_data
+EXPORT_SYMBOL_GPL vmlinux 0x86bfc292unix_inq_len
+EXPORT_SYMBOL_GPL vmlinux 0x86c7f22fata_sas_async_probe
+EXPORT_SYMBOL_GPL vmlinux 0x86f0d974get_cached_msi_msg
+EXPORT_SYMBOL_GPL vmlinux 0x86f6b99dsynchronize_rcu Expedited
+EXPORT_SYMBOL_GPL vmlinux 0x86f85114net_dec_egress_queue
+EXPORT_SYMBOL_GPL vmlinux 0x86f8c910pcap_set_ts_bits
+EXPORT_SYMBOL_GPL vmlinux 0x86fbd9f6tfs_dev_deferred_io_fsync
+EXPORT_SYMBOL_GPL vmlinux 0x870e16b7xen_test_irq_shared
+EXPORT_SYMBOL_GPL vmlinux 0x870e768dmdmdev_resume
+EXPORT_SYMBOL_GPL vmlinux 0x871c1774irq_domain_associate
+EXPORT_SYMBOL_GPL vmlinux 0x871d21e2nvdimm_cmd_mask
+EXPORT_SYMBOL_GPL vmlinux 0x8720782tdriver_attach
+EXPORT_SYMBOL_GPL vmlinux 0x87463e76/pm_runtime_suspend
+EXPORT_SYMBOL_GPL vmlinux 0x875f74e8kset_find_obj
+EXPORT_SYMBOL_GPL vmlinux 0x87721823alloc_vm_area
+EXPORT_SYMBOL_GPL vmlinux 0x877f84c2clk_register_gpio_mux
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+EXPORT_SYMBOL_GPL vmlinux 0xf554bd49blcm
+EXPORT_SYMBOL_GPL vmlinux 0xf553318dcpuidle_pause_and_lock
+EXPORT_SYMBOL_GPL vmlinux 0xf55e30f9wtnnles_valid_enclpepe_attr
+EXPORT_SYMBOL_GPL vmlinux 0xf5785b42evtech_n_get
+EXPORT_SYMBOL_GPL vmlinux 0xf57b9664seq_release_net
+EXPORT_SYMBOL_GPL vmlinux 0xf5f0766evirtqueue_enable_cb_delayed
+EXPORT_SYMBOL_GPL vmlinux 0xf58b375a__wake_up_sync
+EXPORT_SYMBOL_GPL vmlinux 0xf58f18d5edac_mc_free
+EXPORT_SYMBOL_GPL vmlinux 0xf5945b9acgnntab_free_grant_references
+EXPORT_SYMBOL_GPL vmlinux 0xf5a691cdinvaldicate_bh_lrus
+EXPORT_SYMBOL_GPL vmlinux 0xf5ac439dev_pm_opo_get_max_transition_latency
+EXPORT_SYMBOL_GPL vmlinux 0xf5c10139pci_epf_unregister_driver
+EXPORT_SYMBOL_GPL vmlinux 0xf5c3245cpm_genpad_syscore_poweroff
+EXPORT_SYMBOL_GPL vmlinux 0xf5ce8f1wnode_handle_put
+EXPORT_SYMBOL_GPL vmlinux 0xf5d30bd2xhci_gen_setup
+EXPORT_SYMBOL_GPL vmlinux 0xf5d770d6pm_generic_freeze_late
+EXPORT_SYMBOL_GPL vmlinux 0xf5d7eb5aregister_ftaurexport
+EXPORT_SYMBOL_GPL vmlinux 0xf817f3a3__sock_recv_timestamp
+EXPORT_SYMBOL_GPL vmlinux 0xf8235ecdunregister_asymmetric_key_parser
+EXPORT_SYMBOL_GPL vmlinux 0xf82e2d01vfs_kern_mount
+EXPORT_SYMBOL_GPL vmlinux 0xf82f16b3execute_in_process_context
+EXPORT_SYMBOL_GPL vmlinux 0xf82f3657work_on_cpu
+EXPORT_SYMBOL_GPL vmlinux 0xf8301cf6regmap_field_read
+EXPORT_SYMBOL_GPL vmlinux 0xf8359ef5watchdog_unregister_device
+EXPORT_SYMBOL_GPL vmlinux 0xf865d73avirtqueue_add_sgs
+EXPORT_SYMBOL_GPL vmlinux 0xf8792e63devfreq_event_disable_eudev
+EXPORT_SYMBOL_GPL vmlinux 0xf8802492print_stack_trace
+EXPORT_SYMBOL_GPL vmlinux 0xf881ceedload_fixmap_gdt
+EXPORT_SYMBOL_GPL vmlinux 0xf88c5162vfs_setxattr
+EXPORT_SYMBOL_GPL vmlinux 0xf889597easertdev_device_get_tiocm
+EXPORT_SYMBOL_GPL vmlinux 0xf88f41a3serial8250_do_get_mctrl
+EXPORT_SYMBOL_GPL vmlinux 0xf894f363handle_fasteoi_irq
+EXPORT_SYMBOL_GPL vmlinux 0xf8c11197nf_queue_nf_hook_drop
+EXPORT_SYMBOL_GPL vmlinux 0xf8d054b7iommu_group_get
+EXPORT_SYMBOL_GPL vmlinux 0xf8d48697pci_hp_create_module_link
+EXPORT_SYMBOL_GPL vmlinux 0xf8d52665xfmm_audit_state_icvfail
+EXPORT_SYMBOL_GPL vmlinux 0xf8e03f7dfixed_phy_register
+EXPORT_SYMBOL_GPL vmlinux 0xf8e6b564hibernation_set_ops
+EXPORT_SYMBOL_GPL vmlinux 0xf8f3a0fbatata_ratelimit
+EXPORT_SYMBOL_GPL vmlinux 0xf8fe3986pat_fpn_immune_to_uc_mtrr
+EXPORT_SYMBOL_GPL vmlinux 0xf90047c4fpu__restore
+EXPORT_SYMBOL_GPL vmlinux 0xf906b2a1trace_seq_path
+EXPORT_SYMBOL_GPL vmlinux 0xf92ce956kdbg_dump
+EXPORT_SYMBOL_GPL vmlinux 0xf931a96craw_notifier_call_chain
+EXPORT_SYMBOL_GPL vmlinux 0xf94f6acacdev_power_poll
+EXPORT_SYMBOL_GPL vmlinux 0xf95322f4kthread_parkme
+EXPORT_SYMBOL_GPL vmlinux 0xf961363dbdev_read_page
+EXPORT_SYMBOL_GPL vmlinux 0xf962872aregister_net_sysctl
+EXPORT_SYMBOL_GPL vmlinux 0xf965db1crypto_givcipher_type
+EXPORT_SYMBOL_GPL vmlinux 0xf9783b8ttystate_Ldisc
+EXPORT_SYMBOL_GPL vmlinux 0xf97d6aee_clocksource_register_scale
+EXPORT_SYMBOL_GPL vmlinux 0xf98d52cled_set_brightness
+EXPORT_SYMBOL_GPL vmlinux 0xf9a054b5round_jiffies
+EXPORT_SYMBOL_GPL vmlinux 0xf9a120b8task_class_state
+EXPORT_SYMBOL_GPL vmlinux 0xf9b550d3nf_queue_entry_release_refs
+EXPORT_SYMBOL_GPL vmlinux 0xf9ca3160ata_id_xfermask
+EXPORT_SYMBOL_GPL vmlinux 0xf9de14dcdevices_cgrp_subsys_enabled_key
+EXPORT_SYMBOL_GPL vmlinux 0xfa084a4csecurity_path_chown
+EXPORT_SYMBOL_GPL vmlinux 0xfaf096edpcre_msi_set_desc
+EXPORT_SYMBOL_GPL vmlinux 0xfa1eb910unregister_syscore_ops
+EXPORT_SYMBOL_GPL vmlinux 0xfa2637c6aregcache_cache_only
+EXPORT_SYMBOL_GPL vmlinux 0xfa35044aalternatives_patched
+EXPORT_SYMBOL_GPL vmlinux 0xfa40f001fib_table_lookup
+EXPORT_SYMBOL_GPL vmlinux 0xfa458174watchdog_init_timeout
+EXPORT_SYMBOL_GPL vmlinux 0xffe17893 public_key_free
+EXPORT_SYMBOL_GPL vmlinux 0xffeebf32 ACPI_dev_get_dma_resources
+EXPORT_SYMBOL_GPL vmlinux 0xfff0b44b tree_last
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/i386/lowlatency.compiler
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/i386/lowlatency.compiler
@@ -0,0 +1 @@
+GCC: (Ubuntu 7.5.0-3ubuntu1~18.04) 7.5.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/i386/lowlatency.modules
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/i386/lowlatency.modules
@@ -0,0 +1,5273 @@
+104-quad-8
+3c509
+3c515
+3c574_cs
+3c589_cs
+3c59x
+3w-9xxx
+3w-sas
+3w-xxxx
+53c700
+6lowpan
+6pack
+8021q
+8139cp
+8139too
+8250_accent
+8250_boca
+8250_dw
+8250_exar
+8250_exar_st16c554
+8250_fourport
+8250_hub6
+8250_lps
+8250_men_mcb
+8250_mid
+8250_moxa
+8255
+8255_pci
+8390
+8390p
+842
+842_compress
+842_decompress
+88pm800
+88pm800-regulator
+88pm805
+88pm80x
+88pm80x_onkey
+act_ipt
+act_mirred
+act_nat
+act_pedit
+act_police
+act_sample
+act_simple
+act_skbbedit
+act_skbmod
+act_tunnel_key
+act_vlan
+actisys-sir
+ad2s1200
+ad2s1210
+ad2s90
+ad5064
+ad525x_dpot
+ad525x_dpot-i2c
+ad525x_dpot-spi
+ad5360
+ad5380
+ad5398
+ad5421
+ad5446
+ad5449
+ad5504
+ad5592r
+ad5592r-base
+ad5593r
+ad5624r_spi
+ad5686
+ad5755
+ad5761
+ad5764
+ad5791
+ad5933
+ad714x
+ad714x-i2c
+ad714x-spi
+ad7150
+ad7152
+ad7192
+ad7266
+ad7280a
+ad7291
+ad7298
+ad7303
+ad7314
+aiptek
+aircable
+airo
+airo_cs
+airspy
+ak8975
+al3320a
+algif_aead
+algif_hash
+algif_rng
+algif_skcipher
+ali-agp
+ali-ircc
+alienware-wmi
+alim1535_wdt
+alim7101_wdt
+altera-ci
+altera-cvp
+altera-msgdma
+altera-pr-ip-core
+altera-ps.spi
+altera-stapl
+altera_jtaguart
+altera_ps2
+altera_tse
+altera_uart
+alx
+am2315
+am53c974
+ambassador
+amc6821
+amd
+amd-rng
+amd-xgbe
+amd5536adc_pci
+amd64_edac_mod
+amd76x_edac
+amd76xrom
+amd8111e
+amd_freq_sensitivity
+amdgpu
+amilo-rfkill
+amplc_dio200
+amplc_dio200_common
+amplc_dio200_pci
+amplc_pc236
+amplc_pc236_common
+amplc_pc263
+amplc_pci224
+amplc_pci230
+amplc_pci236
+amplc_pci263
+ams-iaq-core
+ams369fg06
+analog
+analogix-anx78xx
+anatop-regulator
+ansi_cprng
+anubis
+aoe
+apanel
+apds9300
+apds9802als
+apds990x
+apds9960
+apm
+apple-gmux
+apple_bl
+appledisplay
+applesmc
+appletalk
+appletouch
+applicom
+aquantia
+ar5523
+ar7part
+arc-rawmode
+arc-rcmi
+arc4
+arc_ps2
+arc_uart
+arcfb
+arcmsr
+arcnet
+arcxcmn_bl
+arizona-haptics
+arizona-i2c
+arizona-ldo1
+arizona-micsupp
+arizona-spi
+ark3116
+arkfb
+arp_tables
+arpt_mangle
+arptable_filter
+as102_fe
+blpcmcia
+b2c2-flexcop
+b2c2-flexcop-pci
+b2c2-flexcop-usb
+b43
+b43legacy
+b44
+b53_common
+b53_mdio
+b53_mmap
+b53_spi
+b53_srab
+bas_gigaset
+batman-adv
+baycom_epp
+baycom_par
+baycom_ser_fdx
+baycom_ser_hdx
+bcache
+bch
+bcm-phy-lib
+bcm203x
+bcm3510
+bcm590xx
+bcm590xx-regulator
+bcm5974
+bcm7xxx
+bcm87xx
+bcma
+bcma-hcd
+bd6107
+bd9571mwv
+bd9571mwv-regulator
+bdc
+be2iscsi
+be2net
+befs
+belkin_sa
+bfa
+bfq
+bfs
+bfusb
+bh1750
+bh1770glc
+bh1780
+binfmt_misc
+block2mtd
+blocklayoutdriver
+blowfish_common
+blowfish_generic
+bluetcard_cs
+bluetooth
+bluetooth_6lowpan
+bma150
+bma180
+bma220_spi
+bmc150-accel-core
+bmc150-accel-i2c
+bmc150-accel-spi
+bmc150_magn
+bmc150_magn_i2c
+bmc150_magn_spi
+bmg160_core
+bmg160_i2c
+bmg160_spi
+bmi160_core
+bmi160_i2c
+bmi160_spi
+bmp280
+bmp280-i2c
+bmp280-spi
+bna
+bnep
+bnx2
+bnx2fc
+bnx2i
+bnx2x
+bnxt_en
+bnxt_re
+bochs-drm
+bonding
+bpa10x
+bpck
+bpck6
+bpqether
+bq2415x_charger
+bq24190_charger
+bq24257_charger
+bq24735-charger
+bq25890_charger
+bq27xxx_battery
+bq27xxx_battery_hdq
+bq27xxx_battery_i2c
+br2684
+br_netfilter
+brcmfnmac
+brcmsmac
+brcmutil
+brd
+bridge
+broadcom
+broadsheetfb
+bsd_comp
+bt3c_cs
+bt819
+bt856
+bt866
+bt878
+btbcm
+btoexist
+btintel
+btmrvl
+btmrvl_sdio
+btqca
+btrfs
+btrtl
+btosdio
+btv
+btuart_cs
+btusb
+btwilink
+bu21013_ts
+budget
+budget-av
+budget-ci
+budget-core
+budget-patch
+c101
+c2port-duramar2150
+c4
+c67x00
+c6xdigio
+c_can
+c_can_pci
+c_can_platform
+ca8210
+cachefiles
+cadence_wdt
+cafe_ccic
+cafe_nand
+caif
+caif_hsi
+caif_serial
+caif_socket
+cfg80211
+cfi_cmdset_0001
+cfi_cmdset_0002
+cfi_cmdset_0020
+cfi_probe
+cfi_util
+cfspi_slave
+ch
+ch341
+ch7006
+ch9200
+chacha20_generic
+chacha20poly1305
+chaoskey
+charlcd
+chash
+chcr
+chipreg
+chnl_net
+chromeos_laptop
+chromeos_pstore
+ci_hdrc
+ci_hdrc_msm
+ci_hdrc_pci
+ci_hdrc_usb2
+ci_hdrc_zevio
+cicada
+cifs
+cio-dac
+cirrus
+cirrusfb
+ck804xrom
+classmate-laptop
+clip
+clk-cdce706
+clk-cs2000-cp
+clk-palmas
+clk-pwm
+clk-s2mps11
+clk-si5351
+clk-tw16040
+clk-wm831x
+cls_basic
+cls_bpf
+cls_cgroup
+cls_flow
+cls_flower
+cls_fw
+pcihp_generic
+pcihp_zt5550
+cpia2
+cpqphp
+cpsw_ale
+cpu5wdt
+cpuid
+cr_billcd
+cramfs
+crc-itu-t
+crc32-pclmul
+crc32_generic
+crc4
+crc7
+crc8
+cros_ec_accel_legacy
+cros_ec_baro
+cros_ec_core
+cros_ec_devs
+cros_ec_i2c
+cros_ec_keyb
+cros_ec_light_prox
+cros_ec_lpcs
+cros_ec_sensors
+cros_ec_sensors_core
+cros_ec_spi
+cros_kbd_led_backlight
+crvml
+cryptd
+crypto_engine
+crypto_simd
+crypto_user
+cryptoloop
+cs3308
+cs5345
+cs53132a
+cs5535-mfd
+cs553x_nand
+cs89x0
+csiostor
+ct82c710
+cuse
+cw1200_core
+cw1200_wlan_sdio
+cw1200_wlan_spi
+cx18
+cx18-alsa
+cx22700
+cx22702
+cx231xx
+cx231xx-alsa
+cx231xx-dvb
+cx2341x
+cx23885
+cx24110
+cx24113
+cx24116
+cx24117
+cx24120
+cx24123
+cx25821
+cx25821-alsa
+cx25840
+cx82310_eth
+cx88-alsa
+cx88-blackbird
+cx88-dvb
+cx88-vp3054-i2c
+cx8800
+cx8802
+cx88xx
+cxacr
+cxcd2099
+cxcd2820r
+cxcd2841er
+cxgb
+cxgb3
+cxgb3i
+cxgb4
+cxgb4i
+cxgb4vf
+cxgbbit
+cy8ctmg110_ts
+cyapatp
+cyber2000fb
+cyberjack
+cyclades
+cypress_.cy7c63
+cypress_firmware
+cypress_m8
+cytherm
+cyttsp4_core
+cyttsp4_i2c
+cyttsp4_spi
+cyttsp_core
+cyttsp_i2c
+cyttsp_i2c_common
+cyttsp_spi
+da280
+da311
+da9030_battery
+da9034-ts
+da903x
+da903x_bl
+da9052-battery
+da9052-hwmon
+da9052-regulator
+da9052_bl
+da9052_onkey
+da9052_tsi
+da9052_wdt
+da9055-hwmon
+da9055-regulator
+da9055_onkey
+da9055_wdt
+da9062-core
+da9062-regulator
+da9062_wdt
+da9063-regulator
+da9063_onkey
+da9063_wdt
+da9150-charger
+da9150-core
+da9150-fg
+da9150-gpadc
+da9210-regulator
+da9211-regulator
+dac02
+daqboard2000
+das08
+das08_cs
+das08_isa
+das08_pci
+das16
+das16m1
+das1800
+das6402
+das800
+davicom
+db9
+dc395x
+dccp
+dccp_diag
+dccp_ipv4
+dccp_ipv6
+dccp_probe
+dcdbas
+ddbridge
+de2104x
+de4x5
+deernet
+deflate
+defxx
+dell-laptop
+dell-rbtn
+dell-smbios
+dell-smm-hwmon
+dell-smo8800
+dell-uart-backlight
+dell-wmi
+dell-wmi-aio
+dell-wmi-descriptor
+dell-wmi-led
+dell_rbu
+denali
+denali_pci
+des_generic
+designware_i2s
+device_dax
+devlink
+dgnc
+dht11
+dib0070
+dib0090
+dib3000mb
+dib3000mc
+dib7000m
+dib7000p
+dib8000
+dibx000_common
+digi_acceleport
+diskonchip
+diva_idi
+diva_mnt
+divacapi
+divadidd
+divas
+dl2k
+dlci
+dlink-dir685-touchkeys
+dlm
+dlm2
+dlm2-adc
+dm-bio-prison
+dm-bufio
+dm-cache
+dm-cache-smq
+dm-crypt
+dm-delay
+dm-era
+dm-flakey
+dm-integrity
+dm-log
+dm-log-userspace
+dm-log-writes
+dm-mirror
+dm-multipath
+dm-persistent-data
+dm-queue-length
+dm-raid
+dm-region-hash
+dm-round-robin
+dm-service-time
+dm-snapshot
+dm-switch
+dm-thin-pool
+dm-verity
+dm-zero
+dm-zoned
+dm1105
+dm9601
+dmard09
+dmard10
+dmel737
+dmfe
+dmisysfs
+dmms32at
+dmx3191d
+dn_rtmmsg
+dnnet
+docg3
+docg4
+donauboe
+dp83640
+dp83822
+dp83848
+dp83867
+dpt_i2o
+dptf_power
+drbd
+drm
+drm_kms_helper
+drop_monitor
+drv260x
+drv2665
+drv2667
+drx39xyj
+drxd
+drxk
+ds1621
+ds1682
+ds1803
+ds1wm
+ds2482
+ds2490
+ds2760_battery
+ds2780_battery
+ds2781_battery
+ds2782_battery
+ds3000
+ds4424
+ds620
+dsa_core
+dsbr100
+dscc4
+dss1_divert
+dst
+dst_ca
+dstr
+dt2801
+dt2811
+dt2814
+dt2815
+dt2817
+dt282x
+dt3000
+dt3155
+dt9812
+dtl1_cs
+dtlk
+dummy
+dummy_irq
+dummy_stm
+dvb-as102
+dvb-bt8xx
+dvb-core
+dvb-pll
+dvb-ttpci
+dvb-ttusb-budget
+dvb-usb
+dvb-usb-a800
+dvb-usb-af9005
+dvb-usb-af9005-remote
+dvb-usb-af9015
+dvb-usb-af9035
+dvb-usb-anysee
+dvb-usb-au6610
+dvb-usb-az6007
+dvb-usb-az6027
+dvb-usb-ce6230
+dvb-usb-cinergyT2
+dvb-usb-cxusb
+dvb-usb-dib0700
+dvb-usb-dibusb-common
+dvb-usb-dibusb-mb
+dvb-usb-dibusb-mc
+dvb-usb-dibusb-mc-common
+dvb-usb-digitv
+dvb-usb-dtt200u
+dvb-usb-dtv5100
+dvb-usb-dvbsky
+dvb-usb-dw2102
+dvb-usb-ec168
+dvb-usb-friio
+dvb-usb-gl861
+dvb-usb-gp8psk
+dvb-usb-lmedm04
+dvb-usb-m920x
+dvb-usb-mxl111sf
+dvb-usb-nova-t-usb2
+dvb-usb-opera
+dvb-usb-pctv452e
+dvb-usb-rtl28xxu
+dvb-usb-technisat-usb2
+dvb-usb-ttusb2
+dvb-usb-umt-010
+dvb-usb-vp702x
+dvb-usb-vp7045
+dvb_usb_v2
+dw_dmac
+dw_dmac_core
+dw_dmac_pci
+dw_wdt
+dwc-xlgmac
+dwc2_pci
+dwc3
+dwc3-pci
+dwmac-generic
+dyna_pci10xx
+dynaproc
+e100
+e1000
+e1000e
+e3x0-button
+e4000
+e752x_edac
+e7xxx_edac
+earth-pt1
+earth-pt3
+eata
+ebc-c384_wdt
+ebt_802_3
+ebt_among
+ebt_arp
+ebt_arpreply
+ebt_dnat
+ebt_ip
+ebt_ip6
+ebt_limit
+ebt_log
+ebt_mark
+ebt_mark_m
+ebt_nft
+ebt_pkttype
+ebt_redirect
+ebt_snat
+ebt_stp
+ebt_vlan
+ebtable_broute
+ebtable_filter
+ebtable_nat
+ebtables
+ec100
+ec_bhf
+ec_sys
+eccdh_generic
+echainiv
+echo
+edac_mce_amd
+edt-fi5x06
+eeepc-laptop
+eeepc-wmi
+eeprom
+eeprom_93cx6
+eeprom_93xx46
+ecti_ts
+efficeon-agp
+efi-pstore
+efi_test
+efibc
+efs
+egalax_ts_serial
+ehset
+einj
+ektf2127
+elan_i2c
+elants_i2c
+elo
+elsa_cs
+em28xx
+em28xx-alsa
+em28xx-dvb
+em28xx-rc
+em28xx-v4l
+em_canid
+em_cmp
+em_ipset
+em_meta
+em_nbyte
+em_text
+em_u32
+emc1403
+emc2103
+emc6w201
+emi26
+emi62
+emp3g
+ems_pci
+ems_pcmcia
+ems_usb
+emu10k1-gp
+ena
+enc28j60
+enclosure
+encx24j600
+encx24j600-regmap
+ene_ir
+eni
+enic
+epat
+epia
+epic100
+fb_ddc
+fb_hx8340bn
+fb_hx8347d
+fb_hx8353d
+fb_hx8357d
+fb_ili9163
+fb_ili9320
+fb_ili9325
+fb_ili9340
+fb_ili9341
+fb_ili9481
+fb_ili9486
+fb_pcm8544
+fb_ra8875
+fb_s6d02a1
+fb_s6d1121
+fb_sh1106
+fb_ssd1289
+fb_ssd1305
+fb_ssd1306
+fb_ssd1325
+fb_ssd1331
+fb_ssd1351
+fb_st7735r
+fb_st7789v
+fb_sys_fops
+fb_tinyled
+fb_tls8204
+fb_uc1611
+fb_uc1701
+fb_upd161704
+fb_watterott
+fbftt
+fbftt_device
+fc0011
+fc0012
+fc0013
+fc2580
+fcoe
+fcrypt
+fdomain
+fdomain_cs
+fdp
+fdp_i2c
+fealnx
+ff_memless
+fid
+finmek-cir
+gb-vibrator
+gdmty
+gdmulte
+gdth
+gen_probe
+generic
+generic-advdc-battery
+generic_bl
+geneve
+geode-aes
+geode-rng
+gf2k
+gfs2
+gigaset
+girbil-sir
+gl518sm
+gl520sm
+gl620a
+glue_helper
+gluebi
+gma500_gfx
+go7007
+go7007-loader
+go7007-usb
+goku_udc
+goodix
+gp2ap002a00f
+gp2ap020a00f
+gp8psk-fe
+gpio
+gpio-104-dio-48e
+gpio-104-idi-48
+gpio-104-idio-16
+gpio-addr-flash
+gpio-adp5520
+gpio-adp5588
+gpio-amd8111
+gpio-amdpt
+gpio-arizona
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+gpio-beeper
+gpio-charger
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+gpio-gpio-mm
+gpio-ich
+gpio-it87
+gpio-janz- ttl
+gpio-kempld
+gpio-lp3943
+gpio-lp873x
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+gpio-max7300
+gpio-max7301
+gpio-max730x
+gpio-max732x
+gpio-mb86s7x
+gpio-mc33880
+gpio-menzi27
+gpio-ml- ioh
+gpio-pca953x
+gpio-pcf857x
+gpio-pch
+gpio-pci-idio-16
+gpio-pisosr
+gpio-rdc321x
+gpio-regulator
+gpio-sch
+gpio-sch311x
+gpio-tpic2810
+gpio-tps65086
+gpio-tps65912
+gpio-tw14030
+gpio-tw16040
+gpio-ucb1400
+gpio-viperboard
+gpio-vx855
+gpio-wcove
+gpio-wm831x
+gpio-wm8350
+gpio-wm8994
+gpio-ws16c48
+gpio-xra1403
+gpio_backlight
+gpio_decoder
+gpio_keys
+gpio_keys_polled
+gpio_mouse
+gspca_stk1135
+gspca_stv0680
+gspca_stv06xx
+gspca_sunplus
+gspca_t613
+gspca_topro
+gspca_touptek
+gspca_tv8532
+gspca_vc032x
+gspca_vicam
+gspca_xirlink_cit
+gspca_zc3xx
+gtco
+gtp
+guillemot
+gunze
+gx-suspmmod
+gx1fb
+gxfb
+hackrf
+hamachi
+hampshire
+hangcheck-timer
+hanwang
+hci
+hci_nokia
+hci_uart
+hci_vhci
+hd44780
+hdaps
+hdcc100x
+hdlc
+hdlc_cisco
+hdlc_fr
+hdlc_ppp
+hdlc_raw
+hdlc_raw_eth
+hdlc_x25
+hdldrv
+hdms_dim2
+hdmi_i2c
+hdms_usb
+hdma
+hdma_mgmt
+hdpvr
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+hecubafb
+helene
+hexium_gemini
+hexium_orion
+hfc4s8s_l1
+hfc_usb
+hfcmulti
+hfcpci
+hfcususb
+hfs
+hfsplus
+hgafb
+hi311x
+hi6210-i2s
+hi8435
+hid
+hid-a4tech
+hid-accutouch
+hid-alps
+hid-apple
+hid-appleir
+hid-asus
+hid-aureal
+hid-axff
+hid-belkin
+hid-betopff
+hid-cherry
+hid-chicony
+hid-cmedia
+hid-corsair
+hid-cp2112
+hid-cypress
+hid-dr
+hid-elecom
+hid-elo
+hid-emsff
+hid-ezkey
+hid-gaff
+hid-gembird
+hid-generic
+hid-gfrm
+hid-gt683r
+hid-gyration
+hid-holtek-kbd
+hid-holtek-mouse
+hid-holtekff
+hid-hyperv
+hid-icade
+hid-icade
+hid-kensington

__Open Source Used In 5GaaS Edge AC-4 16591__
+hid-sensor-press
+hid-sensor-prox
+hid-sensor-rotation
+hid-sensor-temperature
+hid-sensor-trigger
+hid-sjoy
+hid-sony
+hid-speedlink
+hid-steelseries
+hid-sunplus
+hid-tivo
+hid-tmff
+hid-topseed
+hid-twinhan
+hid-uclogic
+hid-udraw-ps3
+hid-wallop
+hid-wiimote
+hid-xinmo
+hid-zpff
+hid-zydacron
+hideep
+hidp
+hih6130
+hinic
+hio
+hisax
+hisax_fcpcipnp
+hisax_isac
+hisax_st5481
+hmc5843_core
+hmc5843_i2c
+hmc5843_spi
+hmc6352
+hopper
+horizon
+horus3a
+hostap
+hostap_cs
+hostap_pci
+hostap_plx
+hostess_sv11
+hp-wireless
+hp-wmi
+hp03
+hp100
+hp206c
+hp_accel
+hpfs
+hpiolo
+bpsa
+hptiop
+hpwdt
+hsi
+hsi_char
+hso
+hsr
+hsv_dma
+hsv_dma_pci
+htc-pasic3
+htcpen
+hts221
+hts221_i2c
+hts221_spi
+htv21
+huawei_cdc_ncm
+hv_balloon
+hv_netvsc
+hv_sock
+hv_storvsc
+hv-utils
+hv_vmbus
+hwa-hc
+hwa-rc
+hwmon-vid
+hx711
+hx8357
+hyperv-keyboard
+hyperv_fb
+hysdn
+i1480-dfu-usb
+i1480-est
+i2400m
+i2400m-usb
+i2c-algo-bit
+i2c-algo-pca
+i2c-ali1535
+i2c-ali1563
+i2c-ali15x3
+i2c-amd-mp2-pci
+i2c-amd-mp2-plat
+i2c-amd756
+i2c-amd756-s4882
+i2c-amd8111
+i2c-cbus-gpio
+i2c-cht-wc
+i2c-cros-ec-tunnel
+i2c-designware-pci
+i2c-diolan-u2c
+i2c-dln2
+i2c-eg20t
+i2c-gpio
+i2c-hid
+i2c-i801
+i2c-isch
+i2c-ismt
+i2c-kempld
+i2c-matroxfb
+i2c-mux
+i2c-mux-gpio
+i2c-mux-ltc4306
+i2c-mux-mlxcpld
+i2c-mux-pca9541
+i2c-mux-pca954x
+i2c-mux-reg
+i2c-nforce2
+i2c-nforce2-s4985
+i2c-ocores
+i2c-parport
+i2c-parport-light
+i2c-pca-isa
+i2c-pca-platform
+i2c-piix4
+i2c-robotfuzz-osif
+i2c-scmi
+i2c-simtec
+i2c-sis5595
+i2c-sis630
+i2c-sis96x
+i2c-smbus
+i2c-stub
+i2c-taos-evm
+i2c-tiny-usb
+i2c-via
+i2c-viapro
+i2c-viperboard
+i2c-xiic
+i3000_edac
+i3200_edac
+i40e
+i40evf
+i40iw
+i5000_edac
+i5100_edac
+ie6xx_wdt
+ieee802154
+ieee802154_6lowpan
+ieee802154_socket
+ifb
+ife
+ifi_canfd
+iforce
+igb
+igbvf
+igorplugusb
+iguanair
+ii_pci20kc
+iio-trig-hrtimer
+iio-trig-interrupt
+iio-trig-loop
+iio-trig-systs
+iio_dummy
+iio_hwmon
+ila
+ili210x
+ili922x
+ili9320
+img-ascii-lcd
+img-i2s-in
+img-i2s-out
+img-parallel-out
+img-spdif-in
+img-spdif-out
+imm
+imon
+ims-pcu
+imx074
+ina209
+ina2xx
+ina2xx-adc
+ina3221
+industrialio
+industrialio-buffer-cb
+industrialio-configfs
+industrialio-sw-device
+industrialio-sw-trigger
+industrialio-triggered-buffer
+industrialio-triggered-event
+inet_diag
+inexio
+inftl
+initio
+intel_vr_nor
+intelfb
+interact
+inv-mpu6050
+inv-mpu6050-i2c
+inv-mpu6050-spi
+io_edgeport
+io_ti
+ioc4
+iowarrior
+ip6_gre
+ip6_tables
+ip6_tunnel
+ip6_udp_tunnel
+ip6_vti
+ip6t_MASQUERADE
+ip6t_NPT
+ip6t_REJECT
+ip6t_SYNPROXY
+ip6t_ah
+ip6t_eui64
+ip6t_frag
+ip6t_hbh
+ip6t_ipv6header
+ip6t_nh
+ip6t_rpfilter
+ip6t_rt
+ip6table_filter
+ip6table_mangle
+ip6table_nat
+ip6table_raw
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+ip_gre
+ip_set
+ip_set_bitmap_ip
+ip_set_bitmap_ipmac
+ip_set_bitmap_port
+ip_set_hash_ip
+ip_set_hash_ipmac
+ip_set_hash_ipmark
+ip_set_hash_ipport
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+ip_set_hash_mac
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+ip_set_hash_netport
+ip_set_hash_netportnet
+ip_set_list_set
+ip_tables
+ip_tunnel
+ip_vs
+ip_vs_dh
+ip_vs_fo
+ip_vs_ftp
+ip_vs_lblc
+ip_vs_lblcr
+ip_vs_lc
+ip_vs_nq
+ip_vs_ovf
+ip_vs_pe_sip
+ip_vs_rr
+ip_vs_sed
+ip_vs_sh
+ip_vs_wlc
+ip_vs_wrr
+ip_vti
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+ipaq
+ipcomp
+ipcomp6
+iphase
+ipheth
+ipip
+ipmi_devintf
+ipmi_msghandler
+ipmi_poweroff
+ipmi_si
+ipmi_ssif
+ipmi_watchdog
+ipoctal
+ipr
+ips
+ipt_CLUSTERIP
+ipt(ECN
+ipt(MASQUERADE
+ipt(REJECT
+ipt(SYNPROXY
+ipt(ah
+ipt_rpfilter
+iptable_filter
+iptable_mangle
+iptable_nat
+iptable_raw
+iptable_security
+ipvlan
+ipvtap
+ipw
+ipw2100
+ipw2200
+ipwireless
+ipx
+ir-jvc-decoder
+ir-kbd-i2c
+ir-lirc-codec
+ir-mce_kbd-decoder
+ir-nec-decoder
+ir-rc5-decoder
+ir-rc6-decoder
+ir-sanyo-decoder
+ir-sharp-decoder
+ir-sony-decoder
+ir-usb
+ir-xmp-decoder
+ir35221
+ircomm
+ircomm-tty
+irda
+irda-usb
+iris
+irlan
+irtty
+irqbypass
+irtty-sir
+isci
+iscsi_boot_sysfs
+iscsi_ibft
+iscsi_target_mod
+iscsi_tcp
+isdn
+isdn_bsdcomp
+isdnhdlc
+isicom
+isight_firmware
+isl29003
+isl29018
+isl29020
+isl29028
+isl29125
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+ledtrig-timer
+ledtrig-transient
+ledtrig-usbport
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+lgdt3306a
+lgdt330x
+lgs8gxx
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+lib80211_crypt_tkip
+lib80211_crypt_wep
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+libahci_platform
+libceph
+libcfs
+libcomposite
+libcrc32c
+libcxgb
+libcxgbi
+libertas
+libertas_cs
+libertas_sdio
+libertas_spi
+libertas_tf
+libertas_tf_usb
+libfc
+libfcoe
+libipw
+libiscsi
+libiscsi_tcp
+libore
+libosd
+libsas
+lightning
+lineage-pem
+linear
+lirc_dev
+lirc_zilog
+lis3lv02d
+lis3lv02d_i2c
+litelink-sir
+lkkbd
+lkc
+lkc2
+lm25066
+lm3533-als
+lm3533-core
+lm3533-ctrlbank
+lm3533_bl
+lm3630a_bl
+lm3639_bl
+lm363x-regulator
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+miSDNipac
+miSDNisar
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+ma600-sir
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+mac-centeuro
+mac-croatian
+mac-cyrillic
+mac-gaelic
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+max8688
+max8903_charger
+max8907
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+max8998_charger
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+mc13783-regulator
+mc13783_ts
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+mc13xxx-i2c
+mc13xxx-regulator-core
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+mc3230
+mc44s803
+mc
+mc-b-lpc
+mc-b-pci
+mc-ba_usb
+mc-c-inject
+mc-eusb
+mc-hp23k256
+mc-p2120-sir
+mc-p251x
+mc-p3021
+mc-p320x
+mc-p3422
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+mc-p4725
+mc-p4922
+mcryptd
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+mc-s830
+mc-s_touchkey
+mc-t_u232
+md-cluster
+md4
+mdacon
+mdc
+mdc800
+mddev
+mdio
+mdio-bitbang
+mdio-gpio
+me4000
+me_daq
+media
+megaraid
+megaraid_mbox
+megaraid_mm
+megaraid_sas
+mei
+mei-me
+mei-txe
+mei_phy
+mei_wdt
+melfas_mip4
+memory-notifier-error-inject
+memstick
+men_z135_uart
+men_z188_adc
+mena21_wdt
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+menf21bmc_wdt
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+metronomefb
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+mi0283qt
+micrel
+microchip
+microread
+microread_i2c
+microread_mei
+microtek
+mii
+minix
+mip6
+mipi-dbi
+mite
+mixcomwd
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+mlx5_core
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+mlxfw
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+mlxsw_i2c
+mlxsw_minimal
+mlxsw_pci
+mlxsw_spectrum
+mlxsw_switchib
+mscc
+msdos
+msi-laptop
+msi-wmi
+msi001
+msi2500
+msp3400
+mspro_block
+msr
+mt2060
+mt2063
+mt20xx
+mt2131
+mt2266
+mt29f_spinand
+mt312
+mt352
+mt6311-regulator
+mt6323-regulator
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+mt9031
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+mt9v011
+mt9v022
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+mtd_dataflash
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+mtdblock_ro
+mtdoops
+mtdram
+mtdswap
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+mtk-sd
+mtouch
+multipath
+multiq3
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+mv88e6xxx
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+mv_udc
+mvmdio
+mvsas
+mvumi
+mwave
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+mwifiex_sdio
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+mxb
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+mx1111sf-tuner
+mx1301rf
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+mxl5007t
+mxl5xx
+mxm-wmi
+mxser
+mxuport
+myri10ge
+n2
+n411
+n_gsm
+n_hdlc
+n_tracerouter
+n_tracesink
+nand
+nand_bch
+nand_ecc
+nandsim
+national
+natsemi
+nau7802
+navman
+nb8800
+nbd
+nci
+nci_spi
+nci_uart
+ncpfs
+nct6683
+nct6775
+nct7802
+nct7904
+nd_blk
+nd_btt
+nd_pmem
+ne
+ne2k-pci
+neofb
+net1080
+net2272
+net2280
+netconsole
+netjet
+netlink_diag
+netrom
+nettel
+netup-unidvb
+netxen_nic
+newtonkbd
+nf_conntrack
+nf_conntrack_amanda
+nf_conntrack_broadcast
+nf_conntrack_ftp
+nf_conntrack_h323
+nf_conntrack_ipv4
+nf_conntrack_ipv6
+nf_conntrack_irc
+nf_conntrack_netbios_ns
+nf_conntrack_netlink
+nf_conntrack_pptp
+nf_conntrack_proto_gre
+nf_conntrack_sane
+nf_conntrack_sip
+nf_conntrack_snmp
+nf_conntrack_tftp
+nf_defrag_ipv4
+nf_defrag_ipv6
+nf_dup_ipv4
+nf_dup_ipv6
+nf_dup_netdev
+nf_log_arp
+nf_log_bridge
+nf_log_common
+nf_log_ipv4
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+nf_log_netdev
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+nf_nat_ipv6
+nft_compat
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+nft_ct
+nft_dup_ipv4
+nft_dup_ipv6
+nft_dup_netdev
+nft_exthdr
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+nft_fib_ipv6
+nft_fib_netdev
+nft_fwd_netdev
+nft_hash
+nft_limit
+nft_log
+nft_masq
+nft_masq_ipv4
+nft_masq_ipv6
+nft_meta
+nft_meta_bridge
+nft_nat
+nft_numgen
+nft_objref
+nft_queue
+nft_quota
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+nft_redir_ipv4
+nft_redir_ipv6
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+nft_reject_bridge
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+nft_reject_ipv4
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+nft_set_hash
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+nftl
+ngene
+nhc_dest
+nhc_fragment
+nhc_hop
+nhc_ipv6
+nhc_mobility
+nhc_routing
+nhc_udp
+ni65
+ni903x_wdt
+ni_6527
+ni_65xx
+ni_660x
+ni_670x
+ni_at_a2150
+ni_at_ao
+ni_atmio
+ni_atmio16d
+ni_daq_700
+ni_daq_dio24
+ni_labpc
+ni_labpc_common
+ni_labpc_cs
+ni_labpc_isadma
+ni_labpc_pci
+ni_mio_cs
+ni_pcidio
+ni_pcimio
+ni_tio
+ni_tiocmd
+ni_usb6501
+nic7018_wdt
+nicstar
+nifs2
+niu
+nlmon
+nls_ascii
+nls_cp1250
+nls_cp1251
+nls_cp1255
+nls_cp737
+nls_cp775
+nls_cp850
+nls_cp852
+nls_cp855
+nls_cp857
+nls_cp860
+nls_cp861
+nls_cp862
+nls_cp863
+nls_cp864
+nls_cp865
+nls_cp866
+nls_cp869
+nls_cp874
+nls_cp932
+nls_cp936
+nls_cp949
+nls_cp950
+nls_euc-jp
+nls_iso8859-1
+nls_iso8859-13
+nls_iso8859-14
+nls_iso8859-15
+nls_iso8859-2
+nls_iso8859-3
+nls_iso8859-4
+nls_iso8859-5
+nls_iso8859-6
+nls_iso8859-7
+nls_iso8859-9
+nls_koi8-r
+nls_koi8-ru
+nls_koi8-u
+nls_utf8
+nmclan_cs
+nosy
+notifier-error-inject
+nouveau
+nozomi
+ns558
+ns83820
+nsc-ircc
+nsc_gpio
+nsh
+nsp32
+nsp_cs
+ntb
+ntb_hw_idt
+ntb_hw_switchtec
+ntb_netdev
+ntb_perf
+ntb_pingpong
+ntb_tool
+ntb_transport
+ntc_thermistor
+ntfs
+null_blk
+nuvoton-cir
+nv_tco
+nvme
+nvme-core
+nvme-fabrics
+nvme-fc
+nvme-loop
+nvme-rdma
+nvnet
+nvnet-fc
+nvnet-rdma
+nvram
+nxp-nci
+nxp-nci_i2c
+nxt200x
+nxt6000
+obdclass
+obdecho
+ocfb
+ocfs2
+ocfs2_dlm
+ocfs2_dlmfs
+ocfs2_nodemanager
+ocfs2_stack_o2cb
+ocfs2_stack_user
+ocfs2_stackglue
+ocrdma
+of_xilinx_wdt
+old_belkin-sir
+omfs
+omminet
+on20
+on26
+onenand
+opencores-kbd
+openvswitch
+oprofile
+opt3001
+opticon
+option
+or51132
+or51211
+orangefs
+orinoco
+orinoco_cs
+orinoco_nortel
+orinoco_plx
+orinoco_tmd
+orinoco_usb
+osc
+osd
+osst
+ot6858
+ov2640
+ov5642
+ov7640
+ov7670
+ov772x
+ov9640
+ov9740
+overlay
+oxu210hp-hcd
+p4-clockmod
+p54common
+p54pci
+p54spi
+p54usb
+p8022
+p8023
+pa12203001
+padlock-aes
+padlock-sha
+palmas-pwrbutton
+palmas-regulator
+palmas_gpadc
+panasonic-laptop
+pandora_bl
+panel
+panel-raspberrypi-touchscreen
+paride
+parkbd
+parman
+parport
+parport_ax88796
+parport_cs
+parport_pc
+parport_serial
+pata_acpi
+pata_ali
+pata_amd
+pata_artop
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+pata_atp867x
+pata_cmd640
+pata_cmd64x
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+pata_cs5535
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+pata_efar
+pata_hpt366
+pata_hpt37x
+pata_hpt3x2n
+pata_hpt3x3
+pata_isapnp
+pata_it8213
+pata_it821x
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+pata_piccolo
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+pata_sil82c105
+pata_triflex
+pata_via
+pblk
+pc110pad
+pc300too
+pc87360
+pc8736x_gpio
+pc87413_wdt
+pc87427
+pcap-regulator
+pcap_keys
+pcap_ts
+pcbc
+pcd
+pcf50633
+pcf50633-adr
+pcf50633-backlight
+pcf50633-charger
+pcf50633-gpio
+pcf50633-input
+pcf50633-regulator
+pcf8574_keypad
+pcf8591
+pch_can
+pch_dma
+pch_gbe
+pch_plhub
+pch_uart
+pch_udc
+pci
+pci-stub
+pci200syn
+pciips2
+pcl711
+pcl724
+pcl726
+pcl730
+pcl812
+pcl816
+pcl818
+pcm3724
+pcmad
+pmcia
+pmcia_core
+pmcia_rsrc
+pmciadt
+pmcmia12
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+pmmmaio
+pcnet32
+pcnet_cs
+pcrypt
+pcspkar
+pcwd
+pcwd_pci
+pcwd_usb
+pd
+pd6729
+pda_power
+pde_adma
+peak_pci
+peak_pciefd
+peak_pcmcia
+peak_usb
+peaq-wmi
+pegasus
+pegasus_notetaker
+penmount
+pf
+pfdc
+pfuze100-regulator
+pg
+phantom
+phonet
+phram
+phy-bcm-kona-usb2
+phy-cpcap-usb
+phy-exynos-usb2
+phy-generic
+phy-gpio-vbus-usb
+phy-isp1301
+phy-pxa-28nm-hsic
+phy-pxa-28nm-usb2
+phy-qcom-usb-hs
+phy-qcom-usb-hsic
+phy-tahvo
+phy-tusb1210
+physmap
+pi433
+pinctrl-broxton
+pinctrl-cedarfork
+pinctrl-cherryview
+pinctrl-denverton
+pinctrl-geminilake
+pinctrl-lewisburg
+pinctrl-mcp23s08
+pinctrl-sunrisepoint
+pistachio-internal-dac
+pixcir_i2c_ts
+pkcs7_test_key
+pktcdvd
+pktgen
+pl2303
+plat-ram
+plat_nand
+platform_lcd
+plip
+plusb
+pluto2
+plx_pci
+pm-notifier-error-inject
+pm2fb
+pm3fb
+pm80xx
+pm8941-wled
+pmbus
+pmbus_core
+pmc551
+pmcraid
+pn533
+pn533_i2c
+pn533_usb
+pn544
+pn544_i2c
+pn544_mei
+pn_pep
+poly1305_generic
+port100
+powermate
+powernow-k6
+powernow-k7
+powr1220
+ppa
+ppdev
+ppp_async
+ppp_deflate
+ppp_mppe
+ppp_synctty
+pppoatm
+pppoe
+pppox
+pps-gpio
+pps-ldisc
+pps_core
+pps_parport
+pptp
+prettimeout_panic
+prism2_usb
+processor_thermal_device
+ps2-gpio
+ps2mult
+psample
+psmouse
+psnap
+psxpad-spi
+pt
+pti
+ptlrpc
+ptp
+ptp_kvm
+ptp_pch
+pulse8-cec
+pulsedlight-lidar-lite-v2
+qm1d1c0042
+qmi_wwan
+qnx4
+qnx6
+qsemi
+qt1010
+qt1070
+qt2160
+qtnfmac
+qtnfmac_pearl_pcie
+quatech2
+quatech_daqp_cs
+quota_tree
+quota_v1
+quota_v2
+qx1
+r592
+r6040
+r8152
+r8169
+r8188eu
+r8192e_pci
+r8192u_usb
+r820t
+r82600_edac
+r852
+r8712u
+r8723bs
+r8822be
+r8a66597-hcd
+r8a66597-udc
+radeon
+radeonfb
+radio-aimslob
+radio-aztech
+radio-bcm2048
+radio-cadet
+radio-gemtek
+radio-i2c-si470x
+radio-isa
+radio-keene
+radio-ma901
+radio-maxiradio
+radio-miropcm20
+radio-mr800
+radio-platform-si4713
+radio-raremono
+radio-rtrack2
radio-sf16fmi
radio-sf16fmr2
radio-shark
radio-si476x
radio-tea5764
radio-terratec
radio-timb
radio-trust
radio-typhoon
radio-usb-si470x
radio-usb-si4713
radio-wl1273
radio-zoltrix
raid0
raid1
raid10
raid456
raid6_pq
raid_class
rainshadow-cec
ramoops
raw
raw_diag
ray_cs
raydium_i2c_ts
rbd
rc-adstech-dvb-t-pci
rc-alink-dtu-m
rc-anysee
rc-apac-viewcomp
rc-astrometa-t2hybrid
rc-asus-pc39
rc-asus-ps3-100
rc-ati-tv-wonder-hd-600
rc-ati-x10
rc-avermedia
rc-avermedia-a16d
rc-avermedia-cardbus
rc-avermedia-dvbt
rc-avermedia-m135a
rc-avermedia-m733a-rm-k6
rc-avermedia-rm-ks
rc-avertv-303
rc-azurewave-ad-tu700
rc-behold
rc-behold-columbus
rc-budget-ci-old
rc-cec
+rtc-ds1307
+rtc-ds1343
+rtc-ds1347
+rtc-ds1374
+rtc-ds1390
+rtc-ds1511
+rtc-ds1553
+rtc-ds1672
+rtc-ds1685
+rtc-ds1742
+rtc-ds2404
+rtc-ds3232
+rtc-em3027
+rtc-fm3130
+rtc-frt0010
+rtc-hid-sensor-time
+rtc isl12022
+rtc isl1208
+rtc-lp8788
+rtc-m41180
+rtc-m41193
+rtc-m41194
+rtc-m48135
+rtc-m48159
+rtc-m48186
+rtc-max6900
+rtc-max6902
+rtc-max6916
+rtc-max8907
+rtc-max8925
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+rtc-max8998
+rtc-mc13xxx
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+rtc-mrst
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+rtc-mt6397
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+rtc-pcap
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+rtc-pcf2127
+rtc-pcf150633
+rtc-pcf85063
+rtc-pcf8523
+rtc-pcf85363
+rtc-pcf8563
+rtc-pcf8583
+rtc-r9701
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+samsung-sxgbe
+sata_dwc_460ex
+sata_inic162x
+sata_nv
+sata_promis
+sata_qstor
+sata_sil
+sata_sil24
+sata_sis
+sata_svw
+sata_sx4
+sata_uli
+sata_via
+sata_vsc
+savagefb
+sb1000
+sbc60xxwdt
+sbc7240_wdt
+sbc8360
+sbc_epx_c3
+sbc_fitpc2_wdt
+sbc_gxx
+sbni
+sbp_target
+sbs
+sbs-battery
+sbs-charger
+sbs-manager
+sbshc
+sc1200wdt
+sc16is7xx
+sc92031
+sca3000
+scb2_flash
+scc
+sch311x_wdt
+sch5627
+sch5636
+sch56xx-common
+sch_atm
+sch_cbq
+sch_cbs
+sch_choke
+sch_codel
+sch_drr
+sch_dsmark
+snd
+snd-ac97-codec
+snd-ad1816a
+snd-ad1848
+snd-ad1889
+snd-adlib
+snd-ak4113
+snd-ak4114
+snd-ak4117
+snd-ak4xxx-adda
+snd-ali5451
+snd-alloop
+snd-als100
+snd-als300
+snd-als4000
+snd-ash6pi
+snd-atiixp
+snd-atiixp-modem
+snd-au8810
+snd-au8820
+snd-au8830
+snd-aw2
+snd-azt1605
+snd-azt2316
+snd-azt2320
+snd-azt3328
+snd-bcd2000
+snd-bebob
+snd-bt87x
+snd-ca0106
+snd-cmi8328
+snd-cmi8330
+snd-cmipci
+snd-compress
+snd-cs4231
+snd-cs4236
+snd-cs4281
+snd-cs46xx
+snd-cs5530
+snd-cs5535audio
+snd-cs8427
+snd-ctxfi
+snd-darla20
+snd-darla24
+snd-dice
+snd-dummy
+snd-echo3g
+snd-emu10k1
+snd-emu10k1-synth
+snd-emu10k1x
+snd-emu8000-synth
+snd-emux-synth
+snd-ens1370
+snd-ens1371
+snd-es1688
+snd-es1688-lib
+snd-es18xx
+snd-es1938
+snd-es1968
+snd-fireface
+snd-firewire-digi00x
+snd-firewire-lib
+snd-firewire-motu
+snd-firewire-tascam
+snd-fireworks
+snd-fm801
+snd-gina20
+snd-gina24
+snd-gus-lib
+snd-gusclassic
+snd-gusextreme
+snd-gusmax
+snd-hda-codec
+snd-hda-codec-analog
+snd-hda-codec-ca0110
+snd-hda-codec-ca0132
+snd-hda-codec-cirrus
+snd-hda-codec-cmedia
+snd-hda-codec-conexant
+snd-hda-codec-generic
+snd-hda-codec-hdmi
+snd-hda-codec-idt
+snd-hda-codec-realtek
+snd-hda-codec-si3054
+snd-hda-codec-via
+snd-hda-core
+snd-hda-ext-core
+snd-hda-intel
+snd-hdmi-lpe-audio
+snd-hdsp
+snd-hdspm
+snd-hrtimer
+snd-hwdep
+snd-i2c
+snd-ice1712
+snd-ice1724
+snd-pcxhr
+snd-pdaudiocf
+snd-portman2x4
+snd-pt2258
+snd-rawmidi
+snd-riptide
+snd-rme32
+snd-rme96
+snd-rme9652
+snd-sb-common
+snd-sb16
+snd-sb16-csp
+snd-sb16-dsp
+snd-sb8
+snd-sb8-dsp
+snd-sbawe
+snd-sc6000
+snd-seq
+snd-seq-device
+snd-seq-dummy
+snd-seq-midi
+snd-seq-midi-emul
+snd-seq-midi-event
+snd-seq-virmidi
+snd-serial-u16550
+snd-sis7019
+snd-skl_nau88125_max98357a
+snd-soc-ac97
+snd-soc-acp-rt5645-mach
+snd-soc-acpi
+snd-soc-acpi-intel-match
+snd-soc-adau-utils
+snd-soc-adau1701
+snd-soc-adau1761
+snd-soc-adau1761-i2c
+snd-soc-adau1761-spi
+snd-soc-adau17x1
+snd-soc-adau7002
+snd-soc-ak4104
+snd-soc-ak4554
+snd-soc-ak4613
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+snd-soc-ak5386
+snd-soc-alc5623
+snd-soc-bt-sco
+snd-soc-core
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+snd-soc-cs35l35
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+snd-soc-cs4271-spi
+snd-soc-cs4274
+snd-soc-cs4251
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+snd-soc-cs4252
+snd-soc-cs4256
+snd-soc-cs4273
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+snd-soc-cs42xx8-i2c
+snd-soc-cs43130
+snd-soc-cs4349
+snd-soc-cs53130
+snd-soc-da7213
+snd-soc-da7219
+snd-soc-dio2125
+snd-soc-dmic
+snd-soc-es7134
+snd-soc-es8316
+snd-soc-es8328
+snd-soc-es8328-i2c
+snd-soc-es8328-spi
+snd-soc-fsl-asrc
+snd-soc-fsl-esai
+snd-soc-fsl-sai
+snd-soc-fsl-spdif
+snd-soc-fsl-ssi
+snd-soc-gtm601
+snd-soc-hdac-hdmi
+snd-soc-hdmi-codec
+snd-soc-imx-audmux
+snd-soc-inno-rk3036
+snd-soc-kbl_rt5663_max98927
+snd-soc-kbl_rt5663_rt5514_max98927
+snd-soc-max98090
+snd-soc-max98357a
+snd-soc-max98504
+snd-soc-max9860
+snd-soc-max98927
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+snd-soc-msm8916-digital
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+snd-soc-nau8810
+snd-soc-nau8824
+snd-soc-nau8825
+snd-soc-pcm1681
+snd-soc-pcm179x-codec
+snd-soc-pcm179x-i2c
+snd-soc-pcm179x-spi
+snd-soc-pcm3168a
+snd-soc-pcm3168a-i2c
+snd-soc-pcm3168a-spi
+snd-soc-pcm512x
+snd-soc-pcm512x-i2c
+snd-soc-pcm512x-spi
+snd-soc-rl6231
+snd-soc-rl6347a
+snd-soc-rt286
+snd-soc-rt298
+snd-soc-rt5514
+snd-soc-rt5514-spi
+snd-soc-rt5616
+snd-soc-rt5631
+snd-soc-rt5640
+snd-soc-rt5645
+snd-soc-rt5651
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+snd-soc-rt5663
+snd-soc-rt5670
+snd-soc-rt5677
+snd-soc-rt5677-spi
+snd-soc-sgtl5000
+snd-soc-si476x
+snd-soc-sigmadsp
+snd-soc-sigmadsp-i2c
+snd-soc-sigmadsp-regmap
+snd-soc-simple-card
+snd-soc-simple-card-utils
+snd-soc-skl
+snd-soc-skl-ipc
+snd-soc-skl_nau88125_ssm4567
+snd-soc-skl_rt286
+snd-soc-sn95031
+snd-soc-spdif-rx
+snd-soc-spdif-tx
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+snd-soc-ssm2602-i2c
+snd-soc-ssm2602-spi
+snd-soc-ssm4567
+snd-soc-sst-acpi
+snd-soc-sst-atom-hifi2-platform
+snd-soc-sst-baytrail-pcm
+snd-soc-sst-bdw-rt5677-mach
+snd-soc-sst-broadwell
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+snd-soc-sst-bxt-rt298
+snd-soc-sst-byt-ght-da7213
+snd-soc-sst-byt-ght-es8316
+snd-soc-sst-bytcr-rt5640
+snd-soc-sst-bytcr-rt5651
+snd-soc-sst-bytcr-rt5660
+snd-soc-sst-cht-bsw-max98090_ti
+snd-soc-sst-cht-bsw-rt5645
+snd-soc-sst-cht-bsw-rt5672
+snd-soc-sst-dsp
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+snd-soc-sst-ipc
+snd-soc-sta32x
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+snd-soc-tas5086
+snd-soc-tas571x
+snd-soc-tas5720
+snd-soc-tfa9879
+snd-soc-tlv320aic23
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+snd-soc-tlv320aic23-spi
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+snd-soc-wm8903
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+snd-soc-wm8978
+snd-soc-wm8985
+snd-soc-xtfpga-i2s
+snd-soc-zx-aud96p22
+snd-sonicvibes
+snd-sscape
+snd-tea6330t
+snd-timer
+snd-trident
+snd-ua101
+snd-usb-6fire
+snd-usb-audio
+snd-usb-caiaq
+snd-usb-hiface
+snd-usb-line6
+snd-usb-pod
+snd-usb-podhd
+snd-usb-toneport
+snd-usb-us1221
+snd-usb-usx2y
+snd-usb-variax
+snd-usbmidi-lib
+snd-util-mem
+snd-via82xx
+snd-via82xx-modem
+snd-virmidi
+snd-virtuoso
+snd-vx-lib
+snd-vx222
+snd-vxpocket
+snd-wavefront
+snd-wss-lib
+snd-ymfpci
+snic
+snps_udc_core
+soc_button_array
+soc_camera
+soc_camera_platform
+soc_mediabus
+softdog
+softing
+softing_cs
+solo6x10
+solos-pci
+sony-btf-mpx
+sony-laptop
+sonypi
+soundcore
+sp2
+sp5100_tco
+sp8870
+sp887x
+spaceball
+spaceorb
+sparse-keymap
+spcp8x5
+speakup
+speakup_acntpc
+speakup_acntsa
+speakup_apollo
+speakup_audptr
+speakup_bns
+speakup_decext
+speakup_deccpe
+speakup_dectlk
+speakup_dtlk
+speakup_dummy
+speakup_keypc
+speakup_ltlk
+speakup_soft
+speakup_spkout
+speakup_txprt
+spectrum_cs
+speedfax
+speedtch
+spi-altera
+spi-axi-spi-engine
+spi-bitbang
+spi-butterfly
+spi-cadence
+spi-dln2
+spi-dw
+spi-dw-midpci
+spi-dw-mmio
+spi-gpio
+spi-lm70llp
+spi-loopback-test
+spi-nor
+spi-oc-tiny
+spi-pxa2xx-pci
+spi-pxa2xx-platform
+spi-sc18is602
+spi-slave-system-control
+spi-slave-time
+spi-tle62x0
+spi-topcliff-pch
+spi-xcomm
+spi-zynqmp-gqspi
+spi_ks8995
+spidev
+spmi
+sr9700
+sr9800
+srfo4
+srfo8
+ssb
+ssb-hcd
+ssfdc
+ssp_accel_sensor
+ssp_gyro_sensor
+ssp_iio
+st251
+sstfb
+ssu100
+ssv_dnp
+st
+st-nci
+st-nci_i2c
+st-nci_spi
+st1232
+st21nfca_hci
+st21nfca_i2c
+st7586
+st95hf
+st_accel
+st_accel_i2c
+st_accel_spi
+st_drv
+st_gyro
+st_gyro_i2c
+st_gyro_spi
+st LSM6DSX
+st LSM6DSX_i2c
+st LSM6DSX_spi
+st_magn
+st_magn_i2c
+st_magn_spi
+st_pressure
+st_pressure_i2c
+surface3_button
+surface3_spi
+surfacepro3_button
+svgallib
+switchtec
+sworks-agp
+sx8
+sx8654
+sx9500
+sym53c416
+sym53c500_cs
+sym53c8xx
+symbolserial
+synaptics_i2c
+synaptics_usb
+synclink
+synclink_cs
+synclink_gt
+synclinkmp
+syscopyarea
+sysfillrect
+sysimgblt
+sysv
+tlisa
+t1pci
+t5403
+tap
+target_core_file
+target_core_iblock
+target_core_mod
+target_core_pscsi
+target_core_user
+tc-dwc-g210
+tc-dwc-g210-pci
+tc-dwc-g210-pltfrm
+tc1100-wmi
+tc654
+tc74
+tc90522
+tc9a6416-keypad
+tc8a418_keypad
+tcic
+tcm_fc
+tcm_loop
+tcm qla2xxx
+tcm_usb_gadget
+tcp_bbr
+tcp_bic
+team
+team_mode_activebackup
+team_mode_broadcast
+team_mode_loadbalance
+team_mode_random
+team_mode_roundrobin
+tef6862
+tehuti
+tekram-sir
+teles_cs
+teranetics
+test_bpf
+test_firmware
+test_module
+test_power
+test_static_key_base
+test_static_keys
+test_udelay
+test_user_copy
+tg3
+tg192
+thermal-generic-adc
+thinkpad_acpi
+thmc50
+thunderbolt
+thunderbolt-net
+ti-adc081c
+ti-adc0832
+ti-adc084s021
+ti-adc108s102
+ti-adc12138
+ti-adc128s052
+ti-adc161s626
+ti-ads3101
+ti-ads7950
+ti-dac082s085
+ti-lmu
+ti-tlc4541
+ti_am335x_adc
+ti_am335x_tsc
+ti_am335x_tscadc
+ti_usb_3410_5052
+tifm_7xx1
+tifm_core
+tifm_ms
+tifm_sd
+timb_dma
+timberdale
+timbuart
+timeriomem-rng
+tinydrm
+tipc
+tlan
+tlclk
+tls
+tm2-touchkey
+tm6000
+tm6000-alsa
+tm6000-dvb
+tm6c
+tmem
+tmp006
+tmp007
+tmp102
+tmp103
+tmp108
+tmp401
+tmp421
+toim3232-sir
+topstar-laptop
+torture
+toshiba_acpi
+toshiba_bluetooth
+toshiba_haps
+toshsd
+touchit213
+touchright
+touchwin
+tpci200
+tpl0102
+tpm-rng
+tpm_atmel
+tpm_i2c_atmel
+tpm_i2c_infineon
+tpm_i2c_nuvoton
+tpm_infineon
+tpm_nsc
+tpm_st33zp24
+tpm_st33zp24_i2c
+tpm_st33zp24_spi
+tpm_tis_spi
+tpm_vtpm_proxy
+tps40422
+tps51632-regulator
+tps53679
+tps6105x
tps6105x-regulator
tps62360-regulator
tps65010
tps65023-regulator
tps6507x
tps6507x-regulator
tps6507x-ts
tps65086
tps65086-regulator
tps65090-charger
tps65090-regulator
tps65132-regulator
tps6524x-regulator
tps6586x-regulator
tps65910-regulator
tps65912-regulator
tps6598x
tps80031-regulator
trancevibrator
trf7970a
tridentfb
ts2020
ts_bm
ts_fsm
ts_kmp
ts2004
ts2005
ts2007
ts200x-core
ts40
ts4an1
tsi568
tsi57x
ts721_mport
ts12550
ts12563
ts12583
ts12x7x
ts14531
tsyso1
tsyso2d	

Open Source Used In 5GaaS Edge AC-4 16656
+tulip
+tuner
+tuner-simple
+tuner-types
+tuner-xc2028
+tunnel4
+tunnel6
+turbografx
+tvaudio
+tveeprom
+tvp5150
+tw2804
+tw5864
+tw68
+tw686x
+tw9903
+tw9906
+tw9910
+twidjoy
+twl-regulator
+twl4030-madc
+twl4030-pwrbutton
+twl4030-vibra
+twl4030_charger
+twl4030_keypad
+twl4030_made_battery
+twl4030_wdt
+twl6030-gpacd
+twl6030-regulator
+twl6040-vibra
+twofish-i586
+twofish_common
+twofish_generic
+typec
+typec_ucsi
+typhoon
+u132-hcd
+uPD60620
+uPD98402
+u_audio
+u_ether
+u_serial
+uartlite
+uas
+ubi
+ubifs
+ucb1400_core
+ucb1400_ts
+ucd9000
+ucd9200
+ucsi_acpi
+uda1342
+udc-core
+udf
+udl
+udlbfb
+udp_diag
+udp_tunnel
+ueagle-atm
+ufs
+ufshcd
+ufshcd-dwc
+ufshcd-pci
+ufshcd-pltfm
+uhid
+uiio
+uiio_aec
+uiio_cif
+uiio_dmemb_genirq
+uiio_hv_generic
+uiio_mf624
+uiio_netx
+uiio_pci_generic
+uiio_prv_genirq
+uiio_pruss
+uiio_sercos3
+uleds
+uli526x
+ulpi
+umc
+umem
+ums-alauda
+ums-cypress
+ums-datafab
+ums-eneub6250
+ums-freecom
+ums-isd200
+ums-jumpshot
+ums-karma
+ums-onetouch
+ums-realtek
+ums-sddr09
+ums-sddr55
+ums-usbat
+unix_diag
+upd64031a
+upd64083
+upd78f0730
+us5182d
+usb-serial-simple
+usb-storage
+usb251xb
+usb3503
+usb4604
+usb8xxx
+usb_debug
+usb_f_acm
+usb_f_ecm
+usb_f_ecm_subset
+usb_f_eem
+usb_f_fs
+usb_f_hid
+usb_f_mass_storage
+usb_f_midi
+usb_f_ncm
+usb_f_obex
+usb_f_phonet
+usb_f_printer
+usb_f_rndis
+usb_f_serial
+usb_f_ss_lb
+usb_f_tcm
+usb_f_uac1
+usb_f_uac1_legacy
+usb_f_uac2
+usb_f_uvc
+usb_gigaset
+usb_wwan
+usbdtm
+usbdux
+usbduxfast
+usbduxsigma
+usbhid
+usbi-core
+usbi-host
+usbi-vudc
+usbkbd
+usblcd
+usblp
+usbmon
+usbmouse
+usbnet
+usbserial
+usbseg
+usbtest
+usbtmc
+usbtouchscreen
+usb
+usbvision
+usdhfrol0
+userio
+userspace-consumer
+ushe
+usnic_verbs
+uss720
+uvcc
+uveas
+uv
+v4l2-common
+v4l2-dv-timings
+v4l2-flash-led-class
+v4l2-fwnode
+v4l2-mem2mem
+v4l2-tpg
+vboxguest
+vboxsf
+vboxvideo
+vc
c+vnl4000
+venl6070
+ves1820
+ves1x93
+veth
+vfi
+vfi_pci
+vfi_iommu_type1
+vfi_mdev
+vfi_virq
+vga16fb
+vgastate
+vgem
+vgg232a4
+vhci-hcd
+vhost
+vhost_net
+vhost_scsi
+vhost_vsock
+via-camera
+via-cputemp
+via-ircc
+via-rhine
Open Source Used In 5GaaS Edge AC-4

- via-rng
- via-sdmmc
- via-velocity
- via686a
- via_wdt
- viafb
- video
- videobuf-core
- videobuf-dma-sg
- videobuf-dvb
- videobuf-vmalloc
- videobuf2-core
- videobuf2-dma-contig
- videobuf2-dma-sg
- videobuf2-dvb
- videobuf2-memops
- videobuf2-v4l2
- videobuf2-vmalloc
- videocodec
- videodev
- vim2m
- vimc
- vimc-debayer
- vimc_capture
- vimc_common
- vimc_scaler
- vimc_sensor
- vimc_streamer
- viperboard
- viperboard_adc
- virt-dma
- virtio-gpu
- virtio-rng
- virtio_blk
- virtio_crypto
- virtio_input
- virtio_net
- virtio_rpmmsg_bus
- virtio_scsi
- virtual
- visor
- vitesse
- vivid
- vl6180
- vlsci_ir
- vmac
- vme_ca91cx42
- vme_fake
+vme_tsi148
+vme_user
+vme_vmhivme7805
+vmk80xx
+vmlfb
+vmw_balloon
+vmw_pvrdma
+vmw_pvscsi
+vmw_vmci
+vmw_vsock_virtio_transport
+vmw_vsock_virtio_transport_common
+vmw_vsock_vmci_transport
+vmwgfx
+vmxnet3
+vp27smpx
+vport-geneve
+vport-gre
+vport-vxlan
+vpx3220
+vrf
+vrng
+vsock
+vsock_diag
+vsockmon
+vsxxxaa
+vt1211
+vt6655_stage
+vt6656_stage
+vt8231
+vt8623fib
+vub300
+vx855
+vxcan
+vxge
+vxlan
+vxge
+vxlan
+vxlan
+vxlan
+vxlan
+vxlan
+vxlan
+vxlan
+vxlan
+vxlan
+w1-gpio
+w1_ds2405
+w1_ds2406
+w1_ds2408
+w1_ds2413
+w1_ds2423
+w1_ds2431
+w1_ds2433
+w1_ds2438
+w1_ds2760
+w1_ds2780
+w1_ds2781
+w1_ds2805
+w1_ds28e04
+w1_ds28e17
+w1_snem
+w1_therm
+w5100
+w5100-spi
+w5300
+w6692
+w83627ehf
+w83627hf
+w83627hf_wdt
+w83781d
+w83791d
+w83792d
+w83793
+w83795
+w83877f_wdt
+w83977af_ir
+w83977f_wdt
+w831785ts
+w831786ng
+wacom
+wacom_i2c
+wacom_serial4
+wacom_w8001
+wafer5823wdt
+walkera0701
+waxl
+warrior
+wbsd
+wcn36xx
+w7
+w7d19s
+wdat_wdt
+w7
+w7d87xx_i2c
+w7d_pci
+whec-rc
+whci
+whci-hcd
+whiteheat
+wil6210
+wilc1000
+wilc1000-sdio
+wilc1000-spi
+wimax
+wimbond-840
+winbond-cir
+wire
+wireguard
+wishbone-serial
+wistron_btms
+w11251
+w11251_sdio
+w11251_spi
+w11273-core
+w112xx
+w118xx
+w13501_cs
+wlc
+wlc_sdio
+wm831x-dcdc
+wm831x-hwmon
+wm831x-isink
+wm831x-ldo
+wm831x-on
+wm831x-ts
+wm831x_backup
+wm831x_bl
+wm831x_power
+wm831x_wdt
+wm8350-hwmon
+wm8350-regulator
+wm8350_power
+wm8350_wdt
+wm8400-regulator
+wm8739
+wm8775
+wm8994
+wm8994-regulator
+wm97xx-ts
+wmi
+wmi-bmof
+wp512
+wusb-cbaf
+wusb-wa
+wusbcore
+x25
+x25_asy
+x38_edac
+x86_pkg_temp_thermal
+x_tables
+xc4000
+xc5000
+xcbe
+xen-bkback
+xen-evtchn
+xen-fhfront
+xen-gntalloc
+xen-gntdev
+xen-kbdfront
+xen-netback
+xen-pciback
+xen-pci_front
+xen-pci_back
+xen-privcmd
+xen-scsiback
+xen-scsifront
+xen-tpmfront
+xen_wdt
+xenfs
+xfrm4_mode_beet
+xfrm4_mode_transport
+xfrm4_mode_tunnel
+xfrm4_tunnel
+xfrm6_mode_beet
+xfrm6_mode_ro
+xfrm6_mode_transport
+xfrm6_mode_tunnel
+xfrm6_tunnel
+xfrm_algo
+xfrm_ipcomp
+xfrm_user
+xfs
+xgene_hwm
+xgifb
+xhci_plat_hcd
+xilinx_spi
+xilinx_gmii2rgmii
+xillybus_core
+xillybus_pcie
+xirc2ps_cs
+xircmcb
+xor
+xpad
+xr_usb_serial_common
+xssens_mt
+xt_AUDIT
+xt_CHECKSUM
+xt_CLASSIFY
+xt_CONNSECMARK
+xt_CT
+xt_DSCP
+xt_HL
+xt_HMARK
+xt_IDLETIMER
+xt_LED
+xt_LOG
+xt_NETMAP
+xt_NFLOG
+xt_NFQUEUE
+xt_RATEEST
+xt_REDIRECT
+xt_SECMARK
+xt_TCPMSS
+xt_TCOPTSTRIPT
+xt_TEE
+xt_TPROXY
+xt_TRACE
+xt_addrtype
+xt_bpf
+xt_cgroup
+xt_cluster
+xt_comment
+xt_connbytes
+xt_connlable
+xt_connlimit
+xt_connmark
+xt_connttrack
+xt_cpu
+xt_dccp
+xt_devgroup
+xt_dscp
+xt_ecn
+xt_esp
+xt_hashlimit
+xt_helper
+xt_hl
+xt_ipcomp
+xt_iprange
+xt_ipvs
+xt_l2tp
+xt_length
+xt_limit
+xt_mac
+xt_mark
+xt_multiport
+xt_nat
+xt_nfacct
+xt_osf
+xt_owner
+xt_physdev
+zram
+zstd_compressor
+zx-tdm

--- linux-4.15.0.org/debian/abi/4.15.0-165.173/i386/lowl latency.retpoline
+++ linux-4.15.0/debian/abi/4.15.0-165.173/i386/lowl latency.retpoline
@@ -0,0 +1,10 @@
+# retpoline v1.0
+arch/x86/pci/pcbios.c .text pci_bios_read lcall *(%esi)
+arch/x86/pci/pcbios.c .text pci_bios_write lcall *(%esi)
+arch/x86/pci/pcbios.c .text pcibios_get_irq_routing_table lcall *(%esi)
+arch/x86/pci/pcbios.c .text pcibios_set_irq_routing lcall *(%esi)
+drivers/video/fbdev/vesafb.c .text vesafb_pan_display call *(%edi)
+drivers/video/fbdev/vesafb.c .text vesafb_setpalette.isra.7 call *(%esi)
+drivers/video/fbdev/vesafb.c .text vesafb_pan_display call *(%edi)
+drivers/video/fbdev/vesafb.c .text vesafb_setcolreg call *(%esi)
--- linux-4.15.0.org/debian/master/abi/4.15.0-165.173/ppc64el/generic
+++ linux-4.15.0/debian/master/abi/4.15.0-165.173/ppc64el/generic
@@ -0,0 +1,21380 @@
+EXPORT_SYMBOL arch/powerpc/platforms/pseries/hvcserver 0x048d27cc	hvcs_register_connection
+EXPORT_SYMBOL arch/powerpc/platforms/pseries/hvcserver 0x536d329b	hvcs_get_partner_info
+EXPORT_SYMBOL arch/powerpc/platforms/pseries/hvcserver 0xc39c3704	hvcs_free_partner_info
+EXPORT_SYMBOL arch/powerpc/platforms/pseries/hvcserver 0xd0a02396	hvcs_free_connection
+EXPORT_SYMBOL crypto/mcryptd 0x53349319	mcryptd_armflusher
+EXPORT_SYMBOL crypto/sm3_generic 0xa99746ae
crypto_sm3_finup
+EXPORT_SYMBOL crypto/sm3_generic 0xcc692a4c
crypto_sm3_update
+EXPORT_SYMBOL crypto/xor 0x5b6c00e6
oxor_blocks
+EXPORT_SYMBOL drivers/atm/suni 0x606b6807
+suni_init
+EXPORT_SYMBOL drivers/bcma/bcma 0x560c6588
+bcma_core_dma_translation
+EXPORT_SYMBOL drivers/bcma/bcma 0xb0d765
+bcma_core_irq
+EXPORT_SYMBOL drivers/block/drbd/drbd 0x0a2a28f3
+drbd_set_st_err_str
+EXPORT_SYMBOL drivers/block/drbd/drbd 0x35131b36
+drbd_role_str
+EXPORT_SYMBOL drivers/block/drbd/drbd 0x7730f222
+drbd_conn_str
+EXPORT_SYMBOL drivers/block/drbd/drbd 0xaf27bebf
+drbd_disk_str
+EXPORT_SYMBOL drivers/block/paride/paride 0x14d99618
+pi_read_block
+EXPORT_SYMBOL drivers/block/paride/paride 0x1e516cb2
+pi_write_regr
+EXPORT_SYMBOL drivers/block/paride/paride 0x28a3e2b
+pi_schedule_claimed
+EXPORT_SYMBOL drivers/block/paride/paride 0x3ecf5888
+pi_disconnect
+EXPORT_SYMBOL drivers/block/paride/paride 0x3fe3822a
+paride_register
+EXPORT_SYMBOL drivers/block/paride/paride 0x4267110a
+api_register_driver
+EXPORT_SYMBOL drivers/block/paride/paride 0x5eabe471
+paride_unregister
+EXPORT_SYMBOL drivers/block/paride/paride 0x8ab11b4b
+pi_read_regr
+EXPORT_SYMBOL drivers/block/paride/paride 0xb21ba07d
+pi_unregister_driver
+EXPORT_SYMBOL drivers/block/paride/paride 0xcbcd00c3
+pi_connect
+EXPORT_SYMBOL drivers/block/paride/paride 0xcd036ebe
+pi_write_regr
+EXPORT_SYMBOL drivers/block/paride/paride 0xe6660189
+pi_release
+EXPORT_SYMBOL drivers/block/paride/paride 0x6e12471pi
+init
+EXPORT_SYMBOL drivers/block/paride/paride 0x9f19c474
+pi_write_block
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x43d2e266drm_property_create_bool
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4436c408drm_crtc_vblank_put
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x44556d65drm_legacy_rmmmap
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4457c092drm_crtc_set_max_vblank_count
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x44e1e65drm_connector_list_iter_end
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x454a0254drm_crtc_wait_one_vblank
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x45597663drm_modeset_unlock_all
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x45ad49b7drm_app_unbind
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x461344fdrm_flip_work_queue_task
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x469fa6b3drm_mm_replace_node
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x46e1ef65drm_connector_list_iter_end
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x47b83b6cdrm_debugfs_remove_files
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x48604740drm_gem_prime_import
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x48c05170drm_mode_destroy
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x49c7bb60fdrm_find_bridge
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4a4d3bdrm_vma_node_is_allowed
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4aaa3ef0drm_calc_timestamping_constants
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4b0082eddrm_vma_offset_manager_destroy
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4b0a21c0drm_atomic_private_obj_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4c511235drm_edid_is_valid
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4c770440drm_legacy_addbufs_pci
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4de64619drm_framebuffer_remove
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x4e1a0f0drm_mode_config_reset
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x508119d4drm_atomic_set_fence_for_plane
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x50e28c07drm_edid_to_sad
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x516de507drm_atomic_get_crtc_state
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x52598b0edmdrm_edid_to_eld
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x526f6f71drm_rect_calc_hscale_relaxed
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x52ab855edmdrm_add_edid_modes
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x52d7bb51drm_plane_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x52d9b64cdrm_i2c_encoder_dpms
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x54a0ed60drm_gem_free_mmap_offset
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x54d6c7edmcrm_crtc_vblank_count
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x551ba96edmdrm_property_create_bitmask
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x56072d6bdcrm_mm_init
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x572c3545drmcrtc_force_disable
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x575b000ddrm_bridge_mode_set
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x57b6ef3driom_ioctl_flags
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x58f6137edmdrm_legacy_pci_exit
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x59e5000edmdrm_edid_block_valid
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5a462477edm_gem_create_mmap_offset
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5a850375drm_framebuffer_plane_width
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5a86e607drm_calc_vbltimestamp_from_scanoutpos
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5a9779drm_mode_config_cleanup
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5b1c742edm_property_blob_put
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5b2ba53dmdrm_display_info_set_bus_formats
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5baeb729dmidrm_dmabuf_export
+EXPORT_SYMBOL drivers/gpu/drm/drm 0x5cedb4cadrm_syncobj_replace_fence
+EXPORT_SYMBOL drivers/gpu/drm/drm_kms_helper 0x39e6410cdrm_atomic_helper_commit_cleanup_done
+EXPORT_SYMBOL drivers/gpu/drm/drm_kms_helper 0x3b9a161ddrm_dp_dpdc_read_link_status
+EXPORT_SYMBOL drivers/gpu/drm/drm_kms_helper 0x3b8f03fdrc_scdc_write
+EXPORT_SYMBOL drivers/gpu/drm/drm_kms_helper 0x3c790adddrm_dp_mst_reset_vcpi_slots
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Open Source Used in 5GaaS Edge AC-4 16746
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+EXPORT_SYMBOL sound/soundcore 0x7af9d8auregister_sound_mixer
+EXPORT_SYMBOL sound/soundcore 0x907d918bregister_sound_special
+EXPORT_SYMBOL sound/soundcore 0x99c95fa5unregister_sound_special
+EXPORT_SYMBOL sound/soundcore 0xb4fa075esound_class
+EXPORT_SYMBOL sound/soundcore 0xbf640b3aregister_sound_special_device
+EXPORT_SYMBOL sound/soundcore 0x7af9d8auregister_sound_mixer
+EXPORT_SYMBOL sound/soundcore 0x907d918bregister_sound_special
+EXPORT_SYMBOL sound/soundcore 0x99c95fa5unregister_sound_special
+EXP
+EXPORT_SYMBOL vmlinux 0x0394bab9inet6_del_protocol
+EXPORT_SYMBOL vmlinux 0x03aa2499skb_append_datarow_frams
+EXPORT_SYMBOL vmlinux 0x03ae52eegeneric_tlbflush
+EXPORT_SYMBOL vmlinux 0x03da7af7ipv6_setsockopt
+EXPORT_SYMBOL vmlinux 0x03fd2571vm_unmap_ram
+EXPORT_SYMBOL vmlinux 0x03fd5dffptp_clock_event
+EXPORT_SYMBOL vmlinux 0x04074f4fioremap
+EXPORT_SYMBOL vmlinux 0x04106b6fbh_submit_read
+EXPORT_SYMBOL vmlinux 0x04121a49km_query
+EXPORT_SYMBOL vmlinux 0x04122bc9pci_release_resource
+EXPORT_SYMBOL vmlinux 0x04221dddahmm_vma_get_pfn
+EXPORT_SYMBOL vmlinux 0x0422fe4ainet_csk_timer_bug_msg
+EXPORT_SYMBOL vmlinux 0x042ba323generic_key_instantiate
+EXPORT_SYMBOL vmlinux 0x043fd525__scsi_print_sense
+EXPORT_SYMBOL vmlinux 0x04482cdb__refrigerator
+EXPORT_SYMBOL vmlinux 0x047c6508thermal_cdev_update
+EXPORT_SYMBOL vmlinux 0x047f907cnetpoll_send_skb_on_dev
+EXPORT_SYMBOL vmlinux 0x0487f831fb_find_best_display
+EXPORT_SYMBOL vmlinux 0x04b55948dma_fence_array_ops
+EXPORT_SYMBOL vmlinux 0x04d78788swiotlb_alloc_coherent
+EXPORT_SYMBOL vmlinux 0x04e11789siphash_3u32
+EXPORT_SYMBOL vmlinux 0x04ea56f9kstrtol
+EXPORT_SYMBOL vmlinux 0x04f158be__raw_write_trylock
+EXPORT_SYMBOL vmlinux 0x05186ca4flush_icache_range
+EXPORT_SYMBOL vmlinux 0x05240ee7percpu_counter_batch
+EXPORT_SYMBOL vmlinux 0x05268e62dev_set_group
+EXPORT_SYMBOL vmlinux 0x0530dede_raw_write_trylock
+EXPORT_SYMBOL vmlinux 0x0537b2f8paca
+EXPORT_SYMBOL vmlinux 0x054496b4schedule_timeout_interruptible
+EXPORT_SYMBOL vmlinux 0x05493078mipi_dsi_driver_register_full
+EXPORT_SYMBOL vmlinux 0x054c7764cdrom_dummy_generic_packet
+EXPORT_SYMBOL vmlinux 0x055c8559__kfifo_dma_in_prepare_r
+EXPORT_SYMBOL vmlinux 0x05680880rtnl_set_sk_err
+EXPORT_SYMBOL vmlinux 0x056f56b6of_find_mipi_dsi_device_by_node
+EXPORT_SYMBOL vmlinux 0x056f94edtcp_setsockopt
+EXPORT_SYMBOL vmlinux 0x0571a7acblk_integrity_merge_rq
+EXPORT_SYMBOL vmlinux 0x0571a7acblk_integrity_merge_rq
+EXPORT_SYMBOL vmlinux 0x0571a7acblk_integrity_merge_rq
+EXPORT_SYMBOL vmlinux 0x0599e8ebmipi_dsi_dcs_enter_sleep_mode
+EXPORT_SYMBOL vmlinux 0x05a514a1_insl_ns
+EXPORT_SYMBOL vmlinux 0x05c6b8ecpcbios_resource_to_bus
+EXPORT_SYMBOL vmlinux 0x05cd70d7__block_write_full_page
+EXPORT_SYMBOL vmlinux 0x05d14fadada_remove
+EXPORT_SYMBOL vmlinux 0x05e25804__request_region
+EXPORT_SYMBOL vmlinux 0x05e75f39input_flush_device
+EXPORT_SYMBOL vmlinux 0x060537dbscsi_report_opcode
+EXPORT_SYMBOL vmlinux 0x061515dedst_destroy
+EXPORT_SYMBOL vmlinux 0x061651bestrcat
+EXPORT_SYMBOL vmlinux 0x061a3f00security_inode_copy_up
+EXPORT_SYMBOL vmlinux 0x1526b301unix_tot_inflight
+EXPORT_SYMBOL vmlinux 0x1544e6a1fib_notifier_ops_register
+EXPORT_SYMBOL vmlinux 0x154c6338dm_kcopyd_client_destroy
+EXPORT_SYMBOL vmlinux 0x154e9e9ekey_type_keyring
+EXPORT_SYMBOL vmlinux 0x157da3c9comap_sock_common_getsockopt
+EXPORT_SYMBOL vmlinux 0x15baf29unregister_md_cluster_operations
+EXPORT_SYMBOL vmlinux 0x15bed7a5LZ4_decompress_safe_partial
+EXPORT_SYMBOL vmlinux 0x15e29c04simple_dname
+EXPORT_SYMBOL vmlinux 0x15e6cc32tcp_get_cookie_sock
+EXPORT_SYMBOL vmlinux 0x15e7281euart_suspend_port
+EXPORT_SYMBOL vmlinux 0x15e8fb7nd_device_notify
+EXPORT_SYMBOL vmlinux 0x15e144cjd2_journal_get_write_access
+EXPORT_SYMBOL vmlinux 0x15f232f6iptun_encaps
+EXPORT_SYMBOL vmlinux 0x15ff2fc7__insert_inode_hash
+EXPORT_SYMBOL vmlinux 0x160bd45crtas_token
+EXPORT_SYMBOL vmlinux 0x160e20e9dquot_alloc
+EXPORT_SYMBOL vmlinux 0x160f2e1cmb_cache_entry_create
+EXPORT_SYMBOL vmlinux 0x160f7cbpcie_capability_read_dword
+EXPORT_SYMBOL vmlinux 0x16113094kblockd_schedule_delayed_work
+EXPORT_SYMBOL vmlinux 0x161f7ce74inet6_csk_route_req
+EXPORT_SYMBOL vmlinux 0x1623bb55pci_write_config_byte
+EXPORT_SYMBOL vmlinux 0x16311bceadix_tree_lookup_slot
+EXPORT_SYMBOL vmlinux 0x16316a10ZSTD_getFrameContentSize
+EXPORT_SYMBOL vmlinux 0x1633a18abitmap_unplug
+EXPORT_SYMBOL vmlinux 0x1637095ddgeneric_perform_write
+EXPORT_SYMBOL vmlinux 0x163b33ee5_siphash_aligned
+EXPORT_SYMBOL vmlinux 0x164c9db2nd_device_notify
+EXPORT_SYMBOL vmlinux 0x164d7484fb_set_suspend
+EXPORT_SYMBOL vmlinux 0x1655468add_to_pipe
+EXPORT_SYMBOL vmlinux 0x1660f1batcp_enter_quickack_mode
+EXPORT_SYMBOL vmlinux 0x167c5967print_hex_dump
+EXPORT_SYMBOL vmlinux 0x168a311cinetpeer_invalidate_tree
+EXPORT_SYMBOL vmlinux 0x169938c1__sysfs_match_string
+EXPORT_SYMBOL vmlinux 0x16a12eefneigh_sysctl_unregister
+EXPORT_SYMBOL vmlinux 0x16add084edac_mc_find
+EXPORT_SYMBOL vmlinux 0x16b15cd4audit_log_start
+EXPORT_SYMBOL vmlinux 0x16cb5948param_get_string
+EXPORT_SYMBOL vmlinux 0x16d0a120register_console
+EXPORT_SYMBOL vmlinux 0x16e297c3bit_wait
+EXPORT_SYMBOL vmlinux 0x16e984a9sock_no_setsockopt
+EXPORT_SYMBOL vmlinux 0x16ece12efilp_close
+EXPORT_SYMBOL vmlinux 0x16f882f2blk_mq_start_hw_queue
+EXPORT_SYMBOL vmlinux 0x16fd5960frontswap_register_ops
+EXPORT_SYMBOL vmlinux 0x1724c8b5vme_slot_num
+EXPORT_SYMBOL vmlinux 0x1737ff82sync_dirty_buffer
+EXPORT_SYMBOL vmlinux 0x1743414f__debugger_fault_handler
+EXPORT_SYMBOL vmlinux 0x17455c6cphy_connect
+EXPORT_SYMBOL vmlinux 0x17469be4follow_down
+EXPORT_SYMBOL vmlinux 0xc36fa97proc_dointvec_userhz_jiffies
+EXPORT_SYMBOL vmlinux 0xc379depci_find_capability
+EXPORT_SYMBOL vmlinux 0xc3e024memcmp
+EXPORT_SYMBOL vmlinux 0xc4f63a6mfd_cell_disable
+EXPORT_SYMBOL vmlinux 0xc79f9cbreregister_sysctl
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+EXPORT_SYMBOL vmlinux 0xc9685d5ppp_register_compressor
+EXPORT_SYMBOL vmlinux 0xc986279unregister_console
+EXPORT_SYMBOL vmlinux 0xc9e984ccsctl_dma_unmap
+EXPORT_SYMBOL vmlinux 0xca3be60misc_register
+EXPORT_SYMBOL vmlinux 0xcb1e82bnotify_change
+EXPORT_SYMBOL vmlinux 0xce74becnetif_skb_features
+EXPORT_SYMBOL vmlinux 0xd07e365memdup_user_nul
+EXPORT_SYMBOL vmlinux 0xd098260dma_find_channel
+EXPORT_SYMBOL vmlinux 0xd1056e5crc32_be
+EXPORT_SYMBOL vmlinux 0xd13a44c__tracepoint_kmem_cache_alloc_node
+EXPORT_SYMBOL vmlinux 0xd3029a3of_scan_pci_bridge
+EXPORT_SYMBOL vmlinux 0xd4e7d0bidisconnect
+EXPORT_SYMBOL vmlinux 0xd583eagenphcy_read_mmd_unsupported
+EXPORT_SYMBOL vmlinux 0xda7194mmc_erase
+EXPORT_SYMBOL vmlinux 0xda281fffb_get_buffer_offset
+EXPORT_SYMBOL vmlinux 0xda2e28apercpu_counter_destroy
+EXPORT_SYMBOL vmlinux 0xda2747d_add_ci
+EXPORT_SYMBOL vmlinux 0xda0fa21param_ops_ullong
+EXPORT_SYMBOL vmlinux 0xda3c6131fb_destroy_modedb
+EXPORT_SYMBOL vmlinux 0xda571e6fb_copy_cmap
+EXPORT_SYMBOL vmlinux 0xdae1669release_firmware
+EXPORT_SYMBOL vmlinux 0xdafe8388key_alloc
+EXPORT_SYMBOL vmlinux 0xdae01660evsnprintf
+EXPORT_SYMBOL vmlinux 0xda05ffbanetdev_lower_get_next_private
+EXPORT_SYMBOL vmlinux 0xda0db6dns_query
+EXPORT_SYMBOL vmlinux 0xda15804inet6_release
+EXPORT_SYMBOL vmlinux 0xda198854blk_mq_requeue_request
+EXPORT_SYMBOL vmlinux 0xda1abd2tcp_have_smc
+EXPORT_SYMBOL vmlinux 0xda26be3bget_anon_bdev
+EXPORT_SYMBOL vmlinux 0xda2fe05generic_shutdown_super
+EXPORT_SYMBOL vmlinux 0xda4d2e3cof_device_is_available
+EXPORT_SYMBOL vmlinux 0xda5f94e2neigh_parms_release
+EXPORT_SYMBOL vmlinux 0xda604f7mdio_driver_register
+EXPORT_SYMBOL vmlinux 0xda62cc42generic_error_remove_page
+EXPORT_SYMBOL vmlinux 0xda6d26a8strstr
+EXPORT_SYMBOL vmlinux 0xda875885add_wait_queue
+EXPORT_SYMBOL vmlinux 0xda9edf7seq_hlist_start_head_rcu
+EXPORT_SYMBOL vmlinux 0xdaec855dbip6_xmit
+EXPORT_SYMBOL vmlinux 0xdaed7e9fmemcpy_page_flushcache
+EXPORT_SYMBOL vmlinux 0xdaeb21a2gro_cells_init
+EXPORT_SYMBOL vmlinux 0xda97a03of_parse_phandle
+EXPORT_SYMBOL vmlinux 0xda05fd5fssock_no_poll
+EXPORT_SYMBOL vmlinux 0x2484adc3__kfifo_to_user_r
+EXPORT_SYMBOL vmlinux 0x2485cba__percpu_counter_compare
+EXPORT_SYMBOL vmlinux 0x2488b36fxfrm_register_type
+EXPORT_SYMBOL vmlinux 0x24d1655exfrm6_prepare_output
+EXPORT_SYMBOL vmlinux 0x24ee07e8jbd2_journal_blocks_per_page
+EXPORT_SYMBOL vmlinux 0x252649de max8998_bulk_write
+EXPORT_SYMBOL vmlinux 0x25277497rfkill_register
+EXPORT_SYMBOL vmlinux 0x25301bc6arch_web_cache_pmem
+EXPORT_SYMBOL vmlinux 0x25345c44register_md_personality
+EXPORT_SYMBOL vmlinux 0x253eb945neigh_destroy
+EXPORT_SYMBOL vmlinux 0x254a286bclean_bdev_aliases
+EXPORT_SYMBOL vmlinux 0x254c26f9bio_advance
+EXPORT_SYMBOL vmlinux 0x2551b4e3dev_uc_del
+EXPORT_SYMBOL vmlinux 0x25619261crypto_sha1_update
+EXPORT_SYMBOL vmlinux 0x25644885tcf_idr_create
+EXPORT_SYMBOL vmlinux 0x2570a138reservation_seqcount_string
+EXPORT_SYMBOL vmlinux 0x257c9a9ccurrent_time
+EXPORT_SYMBOL vmlinux 0x25820c64fs_overflowuid
+EXPORT_SYMBOL vmlinux 0x259fc351miobus_read_nested
+EXPORT_SYMBOL vmlinux 0x25a8d34ecpci_add_resource
+EXPORT_SYMBOL vmlinux 0x25b77053cdev_add
+EXPORT_SYMBOL vmlinux 0x25bdc925mipi_dsi_dcs_write
+EXPORT_SYMBOL vmlinux 0x25d31ed6get_user_pages_remote
+EXPORT_SYMBOL vmlinux 0x25dca3e6generic_file_splice_read
+EXPORT_SYMBOL vmlinux 0x25e8ed29sg_nents_for_len
+EXPORT_SYMBOL vmlinux 0x25e9d4bdresource_list_free
+EXPORT_SYMBOL vmlinux 0x25ec38ebcdrom_open
+EXPORT_SYMBOL vmlinux 0x25f31fb9dev_get_by_index
+EXPORT_SYMBOL vmlinux 0x260ef868sk_send_sigurg
+EXPORT_SYMBOL vmlinux 0x263beb75cryptfs_get_versions
+EXPORT_SYMBOL vmlinux 0x263c3152bcmp
+EXPORT_SYMBOL vmlinux 0x26411dc9hdmicore_infoframe_log
+EXPORT_SYMBOL vmlinux 0x2654aa06of_node_put
+EXPORT_SYMBOL vmlinux 0x26655f19scsi_block_when_processing_errors
+EXPORT_SYMBOL vmlinux 0x2665d543akey_create_or_update
+EXPORT_SYMBOL vmlinux 0x26685ec4generic_write_checks
+EXPORT_SYMBOL vmlinux 0x2695c855skb_insert
+EXPORT_SYMBOL vmlinux 0x26b2e233_skb_checksum_complete
+EXPORT_SYMBOL vmlinux 0x26d93a95reuseport_attach_prog
+EXPORT_SYMBOL vmlinux 0x26e298e0unregister_memory_notifier
+EXPORT_SYMBOL vmlinux 0x26e76fb8sysctl_udp_wmem_min
+EXPORT_SYMBOL vmlinux 0x26f5a9casock_no_socketpair
+EXPORT_SYMBOL vmlinux 0x270100d8phy_ethtool_ksettings_set
+EXPORT_SYMBOL vmlinux 0x2711f2d5generic_file_fsync
+EXPORT_SYMBOL vmlinux 0x2725ab68simple_symlink_inode_operations
+EXPORT_SYMBOL vmlinux 0x272abf68vm_map_ram
+EXPORT_SYMBOL vmlinux 0x27479d14param_free_charp
+EXPORT_SYMBOL vmlinux 0x274d08dc__kfifo_dma_out_prepare
+EXPORT_SYMBOL vmlinux 0x274fcef0udp_lib_unhash
+EXPORT_SYMBOL vmlinux 0x27543b5dinode_init_once
+EXPORT_SYMBOL vmlinux 0x275cd93neigh_seq_stop
+EXPORT_SYMBOL vmlinux 0x27646df3start_thread
+EXPORT_SYMBOL vmlinux 0x2768db83inet6_add_protocol
+EXPORT_SYMBOL vmlinux 0x27756bc8scsi-sanitize_inquiry_string
+EXPORT_SYMBOL vmlinux 0x27864d57memparse
+EXPORT_SYMBOL vmlinux 0x2786f6ainet_proto_csum_replace_by_diff
+EXPORT_SYMBOL vmlinux 0x27950566dump_align
+EXPORT_SYMBOL vmlinux 0x27bbf22iddisable_irq_nosync
+EXPORT_SYMBOL vmlinux 0x28166464netlbl_bitmap_setbit
+EXPORT_SYMBOL vmlinux 0x28176a00tparam_set_ullong
+EXPORT_SYMBOL vmlinux 0x281823c5__kfifo_out_peek
+EXPORT_SYMBOL vmlinux 0x28318305snprintf
+EXPORT_SYMBOL vmlinux 0x2882f890input_set_abs_params
+EXPORT_SYMBOL vmlinux 0x289edeceblk_queue_update_dma_alignment
+EXPORT_SYMBOL vmlinux 0x28a2ed02scsi_build_sense_buffer
+EXPORT_SYMBOL vmlinux 0x28a7beba__percpu_counter_init
+EXPORT_SYMBOL vmlinux 0x28b40391simple_readpage
+EXPORT_SYMBOL vmlinux 0x28cb77e9tcp_connect
+EXPORT_SYMBOL vmlinux 0x28edc8d59dma_fence_wait_timeout
+EXPORT_SYMBOL vmlinux 0x28f7c1c0tcp_check_req
+EXPORT_SYMBOL vmlinux 0x291416e9vfs_create
+EXPORT_SYMBOL vmlinux 0x291b5732devfs_remove
+EXPORT_SYMBOL vmlinux 0x292b5133pdcamera_unregister_notifier
+EXPORT_SYMBOL vmlinux 0x2929809ffnetdev_master_upper_dev_get_rcu
+EXPORT_SYMBOL vmlinux 0x292d798xfmm_state_lookup_byaddr
+EXPORT_SYMBOL vmlinux 0x293f1910security_ib_pkey_access
+EXPORT_SYMBOL vmlinux 0x2942aba9nf_hook_slow
+EXPORT_SYMBOL vmlinux 0x29537c9ealloc_chrdev_region
+EXPORT_SYMBOL vmlinux 0x29579b73pci_capability_clear_and_set_dword
+EXPORT_SYMBOL vmlinux 0x295aded38pskb_expand_head
+EXPORT_SYMBOL vmlinux 0x2967d135dma_fence_remove_callback
+EXPORT_SYMBOL vmlinux 0x2974d130__breadahead_gfp
+EXPORT_SYMBOL vmlinux 0x29ac1f90irq_to_desc
+EXPORT_SYMBOL vmlinux 0x29ad7151try_to_free_buffers
+EXPORT_SYMBOL vmlinux 0x29c98ca8iget_failed
+EXPORT_SYMBOL vmlinux 0x2a63a60c	dma_fence_default_wait
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+EXPORT_SYMBOL vmlinux 0xa068635inet6_bind
+EXPORT_SYMBOL vmlinux 0xa07a96blksdev_issue_flush
+EXPORT_SYMBOL vmlinux 0xa28cf19__filemap_set_wb_err
+EXPORT_SYMBOL vmlinux 0xa303d4drivers_check_signature
+EXPORT_SYMBOL vmlinux 0xa36123tty_port_lower_dtr_rts
+EXPORT_SYMBOL vmlinux 0xa37d074dma_pool_free
+EXPORT_SYMBOL vmlinux 0xa3e930ddevfreq_add_governor
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+EXPORT_SYMBOL vmlinux 0XA5db49aidr_alloc cyclic
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+EXPORT_SYMBOL vmlinux 0xb4d1747truncat inode_pages
+EXPORT_SYMBOL vmlinux 0xb5cbb50nf_hooks_needed
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+EXPORT_SYMBOL vmlinux 0xb9da7a4genl_lock
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+EXPORT_SYMBOL vmlinux 0x2bd818a1skb_copy expand
+EXPORT_SYMBOL vmlinux 0x2bd009c9inet offloads
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+EXPORT_SYMBOL vmlinux 0x2e55d873quot_drop
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+EXPORT_SYMBOL vmlinux 0x2ed382b4input_alloc_absinfo
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+EXPORT_SYMBOL vmlinux 0x2ef0446up_read
+EXPORT_SYMBOL vmlinux 0x2ebf195dmacg_uncharge
+EXPORT_SYMBOL vmlinux 0x2efee423seq_vprintf
+EXPORT_SYMBOL vmlinux 0x2f03fe4bsecurity_seckey_recount_unc
+EXPORT_SYMBOL vmlinux 0x2f10092ejournal_finish_inode_data_buffers
+EXPORT_SYMBOL vmlinux 0x2f27b00irq_cpu_rmap_add
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+EXPORT_SYMBOL vmlinux 0x2f2e91b2security_ib_alloc_security
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+EXPORT_SYMBOL vmlinux 0x40d04664console_trylock
+EXPORT_SYMBOL vmlinux 0x40d59096unregister_restart_handler
+EXPORT_SYMBOL vmlinux 0x40d84a37ZSTD_getFrameParams
+EXPORT_SYMBOL vmlinux 0x40ea3f81pci_request_regions
+EXPORT_SYMBOL vmlinux 0x40ec3753lock_sock_fast
+EXPORT_SYMBOL vmlinux 0x40eeb040devm_memremap
+EXPORT_SYMBOL vmlinux 0x4100e0a6avme_irq_request
+EXPORT_SYMBOL vmlinux 0x41069816flush_rcu_work
+EXPORT_SYMBOL vmlinux 0x41220ee2kill_litter_super
+EXPORT_SYMBOL vmlinux 0x4127f1c9input_reset_device
+EXPORT_SYMBOL vmlinux 0x4129e61register_netdev
+EXPORT_SYMBOL vmlinux 0x4143fa56mach_psseries
+EXPORT_SYMBOL vmlinux 0x4147d96dradi0__local_flush_tlb_mm
+EXPORT_SYMBOL vmlinux 0x41482d88bstrndup_user
+EXPORT_SYMBOL vmlinux 0x4148e220ipv6_dev_get_saddr
+EXPORT_SYMBOL vmlinux 0x4159c38fioremap_wc
+EXPORT_SYMBOL vmlinux 0x416f8f52gen_new_estimator
+EXPORT_SYMBOL vmlinux 0x417ac4a4netifReceive_skb_core
+EXPORT_SYMBOL vmlinux 0x417b45a2mipi_dsi_dcs_set_display_on
+EXPORT_SYMBOL vmlinux 0x417c96c0__netlink_kernel_create
+EXPORT_SYMBOL vmlinux 0x4188d439neigh_rand_reach_time
+EXPORT_SYMBOL vmlinux 0x419d1ec7bprm_change_interp
+EXPORT_SYMBOL vmlinux 0x41b3f0fc touchscreen_set_mt_pos
+EXPORT_SYMBOL vmlinux 0x41e41fdbbdev_dax_pgoff
+EXPORT_SYMBOL vmlinux 0x41e8e6cad_instantiate_new
+EXPORT_SYMBOL vmlinux 0x41ee0293tw6030_mmc_card_detect
+EXPORT_SYMBOL vmlinux 0x41ef8fbffl_rw_block
+EXPORT_SYMBOL vmlinux 0x41faa3e2radix__flush_tlb_pwc
+EXPORT_SYMBOL vmlinux 0x42160169flush_workqueue
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+EXPORT_SYMBOL vmlinux 0x4226c0c9mod_timer
+EXPORT_SYMBOL vmlinux 0x4228796eadcache_dir_close
+EXPORT_SYMBOL vmlinux 0x4248ae3csingle_task_running
+EXPORT_SYMBOL vmlinux 0x424d3620zlib_inflateIncomp
+EXPORT_SYMBOL vmlinux 0x42503b14pci_bus_type
+EXPORT_SYMBOL vmlinux 0x4255fbbf__frontswap_load
+EXPORT_SYMBOL vmlinux 0x42595e58vgacon_text_force
+EXPORT_SYMBOL vmlinux 0x426430cb_radix_tree_next_slot
+EXPORT_SYMBOL vmlinux 0x42682b5security_sb_clone_mnt_opts
+EXPORT_SYMBOL vmlinux 0x427fae78flush_dcachecache_iocache_page
+EXPORT_SYMBOL vmlinux 0x42932c44mdiodbus_setup_mdiodiv_from_board_info
+EXPORT_SYMBOL vmlinux 0x429d824c__tcf_em_tree_match
+EXPORT_SYMBOL vmlinux 0x42c50185unlock_buffer
+EXPORT_SYMBOL vmlinux 0x42c52f87agp_generic_free_by_type
+EXPORT_SYMBOL vmlinux 0x42c26a2btry_to_del_timer_sync
+EXPORT_SYMBOL vmlinux 0x42e5392dfscrypt_ioclt_set_policy
+EXPORT_SYMBOL vmlinux 0x42ea0d93dquot INITIALIZE
+EXPORT_SYMBOL vmlinux 0x4301fd55nvm_dev_dma_free
+EXPORT_SYMBOL vmlinux 0x4302d0eb free_pages
+EXPORT_SYMBOL vmlinux 0x43cfd3c skb_checksum_complete_head
+EXPORT_SYMBOL vmlinux 0x4349da1e sb_end_write
+EXPORT_SYMBOL vmlinux 0x434a4f3 bitch_input_unregister_device
+EXPORT_SYMBOL vmlinux 0x4351577afb_parse_edid
+EXPORT_SYMBOL vmlinux 0x435a3550f_find_device_by_node
+EXPORT_SYMBOL vmlinux 0x436c2179iowrite32
+EXPORT_SYMBOL vmlinux 0x43774be2key_payload_reserve
+EXPORT_SYMBOL vmlinux 0x437a0d6d__sock_tx_timestamp
+EXPORT_SYMBOL vmlinux 0x438610bdsecurity_dev_alloc_security
+EXPORT_SYMBOL vmlinux 0x43a9938f_get_page_prot
+EXPORT_SYMBOL vmlinux 0x43cdaafilemap_datawait_keep_errors
+EXPORT_SYMBOL vmlinux 0x43ce3f27scsi_device_lookup
+EXPORT_SYMBOL vmlinux 0x43d53124inode_nohighmem
+EXPORT_SYMBOL vmlinux 0x440d2e07sg_miter_next
+EXPORT_SYMBOL vmlinux 0x4411c503prandom_seed
+EXPORT_SYMBOL vmlinux 0x4412d1b5xfmr_unregister_type
+EXPORT_SYMBOL vmlinux 0x442b6e1dmakemax
+EXPORT_SYMBOL vmlinux 0x4440765c__sk_receive_skb
+EXPORT_SYMBOL vmlinux 0x44637c9fpio_fast_ops
+EXPORT_SYMBOL vmlinux 0x4466d711inet_shutdown
+EXPORT_SYMBOL vmlinux 0x4488bc8aprepare_to_wait_event
+EXPORT_SYMBOL vmlinux 0x448eac3ekmemdup
+EXPORT_SYMBOL vmlinux 0x44a8c595pci_enable_msi_range
+EXPORT_SYMBOL vmlinux 0x44af0322pci_find_hose_for_OF_device
+EXPORT_SYMBOL vmlinux 0x44b5ee9akasprintf
+EXPORT_SYMBOL vmlinux 0x44beec81jbd2_journal_try_to_free_buffers
+EXPORT_SYMBOL vmlinux 0x44cd92e9register_ofconf
+EXPORT_SYMBOL vmlinux 0x44e0caepadata_do_serial
+EXPORT_SYMBOL vmlinux 0x44e9a829match_token
+EXPORT_SYMBOL vmlinux 0x44f62e73dqput
+EXPORT_SYMBOL vmlinux 0x45002919ip6tun_encaps
+EXPORT_SYMBOL vmlinux 0x45006ceedefault_red
+EXPORT_SYMBOL vmlinux 0x4507bd85give_up_console
+EXPORT_SYMBOL vmlinux 0x450bd37epmd_index_size
+EXPORT_SYMBOL vmlinux 0x4520f2ed__set_page_dirty_buffers
+EXPORT_SYMBOL vmlinux 0x452287dfgen_pool_best_fit
+EXPORT_SYMBOL vmlinux 0x4538403pci_msi_enabled
+EXPORT_SYMBOL vmlinux 0x4540d014netif_napi_del
+EXPORT_SYMBOL vmlinux 0x454b9a71inet_register_protosw
+EXPORT_SYMBOL vmlinux 0x456944fbpci_write_vpd
+EXPORT_SYMBOL vmlinux 0x45785f28__kfifo_to_user
+EXPORT_SYMBOL vmlinux 0x457f7d5ehmm_vma_alloc_locked_page
+EXPORT_SYMBOL vmlinux 0x45850e12seq_puts
+EXPORT_SYMBOL vmlinux 0x4597ee01srp_rport_put
+EXPORT_SYMBOL vmlinux 0x459b4e93blk_rq_tag_to_rq
+EXPORT_SYMBOL vmlinux 0x45a9109qdisc_destroy
+EXPORT_SYMBOL vmlinux 0x45a55ec8_iounmap

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+EXPORT_SYMBOL vmlinux 0x5994a107make_bad_inode
+EXPORT_SYMBOL vmlinux 0x59a70904acf_register_action
+EXPORT_SYMBOL vmlinux 0x59b928c2no_llseek
+EXPORT_SYMBOL vmlinux 0x59c13b4eudp_skb_destructor
+EXPORT_SYMBOL vmlinux 0x59d21457simple_empty
+EXPORT_SYMBOL vmlinux 0x59da8e98call_usermodehelper_exec
+EXPORT_SYMBOL vmlinux 0x59df6f5dshow_logo
+EXPORT_SYMBOL vmlinux 0x59f940f6skb_page_frag_refill
+EXPORT_SYMBOL vmlinux 0x5af257barch_local_irq_restore
+EXPORT_SYMBOL vmlinux 0x5a08efefdmmc_free_host
+EXPORT_SYMBOL vmlinux 0x5a0b73d0zlib_deflateInit2
+EXPORT_SYMBOL vmlinux 0x5a1741fbsscsi_ch_prep_cmd
+EXPORT_SYMBOL vmlinux 0x5a177ba12cdc_parsecdc_header
+EXPORT_SYMBOL vmlinux 0x5a205d34seq_dentry
+EXPORT_SYMBOL vmlinux 0x5a42c74bskb_put
+EXPORT_SYMBOL vmlinux 0x5a442553filp_clone_open
+EXPORT_SYMBOL vmlinux 0x5a477329iov_iter_zero
+EXPORT_SYMBOL vmlinux 0x5a493379vga_get
+EXPORT_SYMBOL vmlinux 0x5a4d313egf128mul_4k_ile
+EXPORT_SYMBOL vmlinux 0x5a5c3fcbio_iterator_advance
+EXPORT_SYMBOL vmlinux 0x5a6a39eamake_kgid
+EXPORT_SYMBOL vmlinux 0x5a6d5449jbd2_journal_clear_err
+EXPORT_SYMBOL vmlinux 0x5a713937phy_device_remove
+EXPORT_SYMBOL vmlinux 0x5a73f482finish_swait
+EXPORT_SYMBOL vmlinux 0x5a8ae15azSTD_initDDict
+EXPORT_SYMBOL vmlinux 0x5a921311strncmp
+EXPORT_SYMBOL vmlinux 0x5a9f1d63memmove
+EXPORT_SYMBOL vmlinux 0x5aad2c73break_lease
+EXPORT_SYMBOL vmlinux 0x5ab01534__tcf_block_cb_register
+EXPORT_SYMBOL vmlinux 0x5ac35a2bseseq__seek
+EXPORT_SYMBOL vmlinux 0x5abc5f5pfifos__qdisc_ops
+EXPORT_SYMBOL vmlinux 0x5adb42c8phy_ethtool_ksettings_get
+EXPORT_SYMBOL vmlinux 0x5af2aebdev_deactivate
+EXPORT_SYMBOL vmlinux 0x5aff4177vme_lm_get
+EXPORT_SYMBOL vmlinux 0x5aff7177netdev_update_features
+EXPORT_SYMBOL vmlinux 0x5b25d73_skb_pad
+EXPORT_SYMBOL vmlinux 0x5b3367e02c__put_adapter
+EXPORT_SYMBOL vmlinux 0x5b3ee620get_unmapped_area
+EXPORT_SYMBOL vmlinux 0x5b4f1f11tas_service_present
+EXPORT_SYMBOL vmlinux 0x5b6860cvm_munmap
+EXPORT_SYMBOL vmlinux 0x5b90ca5tcf_block_cb_priv
+EXPORT_SYMBOL vmlinux 0x5b9828c5dma_spin_lock
+EXPORT_SYMBOL vmlinux 0x5b9d304fmigrate__page_states
+EXPORT_SYMBOL vmlinux 0x5b9ec51dconfig_group_init
+EXPORT_SYMBOL vmlinux 0x5bc10524printf_emit
+EXPORT_SYMBOL vmlinux 0x5bc63116__pagevec_release
+EXPORT_SYMBOL vmlinux 0x5bd5df86of_graph_get_endpoint_by_regs
+EXPORT_SYMBOL vmlinux 0x5be63c5bcrc32__csum_stub
+EXPORT_SYMBOL vmlinux 0x5c017464kvasprintf
+EXPORT_SYMBOL vmlinux 0x5c058b68neigh_changeaddr
+EXPORT_SYMBOL vmlinux 0x5c14c828noop_llseek
+EXPORT_SYMBOL vmlinux 0x5c17bcof_find_i2c_device_by_node
+EXPORT_SYMBOL vmlinux 0x5c37f319_raw_spin_unlock_irqrestore
+EXPORT_SYMBOL vmlinux 0x5c4595e2page_cache_next_hole
+EXPORT_SYMBOL vmlinux 0x5c5289fddevfreq_suspend_device
+EXPORT_SYMBOL vmlinux 0x5c60cb86security_sock_rcv_skb
+EXPORT_SYMBOL vmlinux 0x5c66f3cc__blk_rq_end_request
+EXPORT_SYMBOL vmlinux 0x5c66f301cdev_warn
+EXPORT_SYMBOL vmlinux 0x5c7574a1vscanf
+EXPORT_SYMBOL vmlinux 0x5c942219scsi_set_sense_field_pointer
+EXPORT_SYMBOL vmlinux 0x5ca3b03akobject_get
+EXPORT_SYMBOL vmlinux 0x5ca3cc53__nla Reserve
+EXPORT_SYMBOL vmlinux 0x5ca3e7ccradix_tree_gang_lookup_tag_slot
+EXPORT_SYMBOL vmlinux 0x5cb6d6daskb_mac_gso_segment
+EXPORT_SYMBOL vmlinux 0x5cd9dc2ddev_null_data
+EXPORT_SYMBOL vmlinux 0x5cbda33acpm_pin_device
+EXPORT_SYMBOL vmlinux 0x5cbf3010__debugger_ipi
+EXPORT_SYMBOL vmlinux 0x5cf53ce2input_free_minor
+EXPORT_SYMBOL vmlinux 0x5ce7d46phy_mii_ioctl
+EXPORT_SYMBOL vmlinux 0x5d00a57dpci_set_irq
+EXPORT_SYMBOL vmlinux 0x5d372c1d__tracepoint_kmalloc_node
+EXPORT_SYMBOL vmlinux 0x5d460cd3mmccpio_request_ro
+EXPORT_SYMBOL vmlinux 0x5d50b75bdev_mc_del_global
+EXPORT_SYMBOL vmlinux 0x5d5504dscsi_sd_probe_domain
+EXPORT_SYMBOL vmlinux 0x5d57e85cget_super
+EXPORT_SYMBOL vmlinux 0x5d6e31fcb_get_mode
+EXPORT_SYMBOL vmlinux 0x5d750477put_tty_driver
+EXPORT_SYMBOL vmlinux 0x5d755cddrop_nlink
+EXPORT_SYMBOL vmlinux 0x5d760874dm_kobject_release
+EXPORT_SYMBOL vmlinux 0x5d89d88srio_unregister_port
+EXPORT_SYMBOL vmlinux 0x5de27d0dev_get_by_index_rcu
+EXPORT_SYMBOL vmlinux 0x5de2935ahdmiframe_pack
+EXPORT_SYMBOL vmlinux 0x5de9791fsk_stream_error
+EXPORT_SYMBOL vmlinux 0x5e27495zstd_decompress_usingDDict
+EXPORT_SYMBOL vmlinux 0x5e2217d4srp_reconnect_rport
+EXPORT_SYMBOL vmlinux 0x5e336987flex_array_prealloc
+EXPORT_SYMBOL vmlinux 0x5e373bf4glf128mul_64k_bbe
+EXPORT_SYMBOL vmlinux 0x5e3a57d0kill_bdev
+EXPORT_SYMBOL vmlinux 0x5e3bb094of_iomap
+EXPORT_SYMBOL vmlinux 0x5e4aeddpm560x_page_reg_write
+EXPORT_SYMBOL vmlinux 0x5e4f3485__xfrm_state_delete
+EXPORT_SYMBOL vmlinux 0x5e57979ac__phy_resume
+EXPORT_SYMBOL vmlinux 0x5e5e4d9errseq_check_and_advance
+EXPORT_SYMBOL vmlinux 0x5e953048ptp_find_pin
+EXPORT_SYMBOL vmlinux 0x5e95b1cdcurrent_umask
+EXPORT_SYMBOL vmlinux 0x5eb24829dm_shift_arg
+EXPORT_SYMBOL vmlinux 0x639963bc__breadahead
+EXPORT_SYMBOL vmlinux 0x639c7a2dmark_page_accessed
+EXPORT_SYMBOL vmlinux 0x63a7c28cbitmap_find_free_region
+EXPORT_SYMBOL vmlinux 0x63bbd8a1of_find_i2c_adapter_by_node
+EXPORT_SYMBOL vmlinux 0x63bffb8eneigh__proc_dointvec
+EXPORT_SYMBOL vmlinux 0x63c4d61f_bitmap_weight
+EXPORT_SYMBOL vmlinux 0x63eb9355panic_blink
+EXPORT_SYMBOL vmlinux 0x63ed57a8of_device_is_compatible
+EXPORT_SYMBOL vmlinux 0x63fa3819seq_open
+EXPORT_SYMBOL vmlinux 0x63ff23e3cancel_delayed_work
+EXPORT_SYMBOL vmlinux 0x6405dcd3slhc_toss
+EXPORT_SYMBOL vmlinux 0x640dca7bi8042_remove_filter
+EXPORT_SYMBOL vmlinux 0x64127b67bitmap_find_next_zero_area_off
+EXPORT_SYMBOL vmlinux 0x641894bdeventflags_get_valid_name
+EXPORT_SYMBOL vmlinux 0x641b6e19mmc_cqe_start_req
+EXPORT_SYMBOL vmlinux 0x643d9ba1groups_free
+EXPORT_SYMBOL vmlinux 0x6451ec92of_find_node_by_type
+EXPORT_SYMBOL vmlinux 0x645ce986dmam_alloc_coherent
+EXPORT_SYMBOL vmlinux 0x64748315pci_bus_read_config_byte
+EXPORT_SYMBOL vmlinux 0x6489b0fetcf_idr_search
+EXPORT_SYMBOL vmlinux 0x648eb59dgc_inflight_list
+EXPORT_SYMBOL vmlinux 0x64999478congestion_wait
+EXPORT_SYMBOL vmlinux 0x649c6085blkp_pm_runtime_init
+EXPORT_SYMBOL vmlinux 0x64a9c928default_blu
+EXPORT_SYMBOL vmlinux 0x64b28e01scsi_eh_finish_cmd
+EXPORT_SYMBOL vmlinux 0x64bbc288string_unescape
+EXPORT_SYMBOL vmlinux 0x64c637b7dput
+EXPORT_SYMBOL vmlinux 0x64cd4aacpci_assign_resource
+EXPORT_SYMBOL vmlinux 0x64e18b7ei2c_smbus_write_block_data
+EXPORT_SYMBOL vmlinux 0x64e2094dof_match_device
+EXPORT_SYMBOL vmlinux 0x64f33751__serio_register_driver
+EXPORT_SYMBOL vmlinux 0x650eaf5bblk_alloc_queue_node
+EXPORT_SYMBOL vmlinux 0x651164dckm_policy_expired
+EXPORT_SYMBOL vmlinux 0x6513a3fafb_get_color_depth
+EXPORT_SYMBOL vmlinux 0x651a4139test_taint
+EXPORT_SYMBOL vmlinux 0x651c63b7dput
+EXPORT_SYMBOL vmlinux 0x652ce9aanal_memcmp
+EXPORT_SYMBOL vmlinux 0x6534d46evlan_vid_add
+EXPORT_SYMBOL vmlinux 0x65375328ip_mc_leave_group
+EXPORT_SYMBOL vmlinux 0x65408378zlib_inflate_blob
+EXPORT_SYMBOL vmlinux 0x6549fd80nvmsubmit_io
+EXPORT_SYMBOL vmlinux 0x655611bfget_vaddr_frames
+EXPORT_SYMBOL vmlinux 0x655731aaacall_usermodehelper_setup
+EXPORT_SYMBOL vmlinux 0x656c1a0string_escape_mem
+EXPORT_SYMBOL vmlinux 0x656ca3e4scsi_verify_blk_ioctl
+EXPORT_SYMBOL vmlinux 0x6595b8afelv_rb_find
+EXPORT_SYMBOL vmlinux 0x659d8918atomic_dec_and_mutex_lock
+-EXPORT_SYMBOL vmlinux 0x6e4f56abmd_done_sync
+-EXPORT_SYMBOL vmlinux 0x6e63f729param_ops_ushort
+-EXPORT_SYMBOL vmlinux 0x6e65767dtexsearch_prepare
+-EXPORT_SYMBOL vmlinux 0x6e6b493dradix_tree_gang_lookup
+-EXPORT_SYMBOL vmlinux 0x6e720ff2rtal_unlock
+-EXPORT_SYMBOL vmlinux 0x6e7f0fd2cmdline_parts_parse
+-EXPORT_SYMBOL vmlinux 0x6e80ba99getty_port_alloc_xmit_buf
+-EXPORT_SYMBOL vmlinux 0x6e8d1f29arp_tbl
+-EXPORT_SYMBOL vmlinux 0x6e966faask_alloc
+-EXPORT_SYMBOL vmlinux 0x6e9834edfio_register_notifier
+-EXPORT_SYMBOL vmlinux 0x6e9a448d__pte_frag_nr
+-EXPORT_SYMBOL vmlinux 0x6e9cd7agp_backend_acquire
+-EXPORT_SYMBOL vmlinux 0x6e9dd606__symbol_put
+-EXPORT_SYMBOL vmlinux 0x6eb676ac1vme_bus_type
+-EXPORT_SYMBOL vmlinux 0x6eba875eserio_bus
+-EXPORT_SYMBOL vmlinux 0x6ebb80dlookupsync_inode_metadata
+-EXPORT_SYMBOL vmlinux 0x6ee18ef7xfrm4_protocol_register
+-EXPORT_SYMBOL vmlinux 0x6f02a40fmark_buffer_dirty_inode
+-EXPORT_SYMBOL vmlinux 0x6f25266cata_scsi_timed_out
+-EXPORT_SYMBOL vmlinux 0x6f29e454vio_unregister_device
+-EXPORT_SYMBOL vmlinux 0x6f2905edcb_getapp
+-EXPORT_SYMBOL vmlinux 0x6f4d2f3fnetlink_rcv_skb
+-EXPORT_SYMBOL vmlinux 0x6f533e31nla_put_64bit
+-EXPORT_SYMBOL vmlinux 0x6f56c5f9check_disk_size_change
+-EXPORT_SYMBOL vmlinux 0x6f62baf2tty_insert_flip_string_fixed_flag
+-EXPORT_SYMBOL vmlinux 0x6f687de7ckernel_getsockname
+-EXPORT_SYMBOL vmlinux 0x6f944039udp_lib_getsockopt
+-EXPORT_SYMBOL vmlinux 0x6fb442a3cdrom_release
+-EXPORT_SYMBOL vmlinux 0x6fb87b6iov_iter_pipe
+-EXPORT_SYMBOL vmlinux 0x6fcb87a1touch_softlockup_watchdog
+-EXPORT_SYMBOL vmlinux 0x6f4f026pci_add_resource_offset
+-EXPORT_SYMBOL vmlinux 0x70110938configfs_unregister_group
+-EXPORT_SYMBOL vmlinux 0x70392879adma_pool_create
+-EXPORT_SYMBOL vmlinux 0x70414b49ppp_input
+-EXPORT_SYMBOL vmlinux 0x70523a7a__cond_resched_softirq
+-EXPORT_SYMBOL vmlinux 0x7054a3e4request_dma
+-EXPORT_SYMBOL vmlinux 0x70685228__dev_get_by_name
+-EXPORT_SYMBOL vmlinux 0x70721317request_firmware
+-EXPORT_SYMBOL vmlinux 0x707f43f6__ctzdi2
+-EXPORT_SYMBOL vmlinux 0x709af857release_pages
+-EXPORT_SYMBOL vmlinux 0x70a874e3clone_cred
+-EXPORT_SYMBOL vmlinux 0x70cefc1aagp_unbind_memory

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+EXPORT_SYMBOL vmlinux 0x70f96f88glob_match
+EXPORT_SYMBOL vmlinux 0x71138b71nl_a_put
+EXPORT_SYMBOL vmlinux 0x71177d5dst_cow_metrics_generic
+EXPORT_SYMBOL vmlinux 0x7129e5f8hex_asc
+EXPORT_SYMBOL vmlinux 0x712e2737pcim_set_mwi
+EXPORT_SYMBOL vmlinux 0x71380ac8cpumask_next_wrap
+EXPORT_SYMBOL vmlinux 0x71494339__skb_recv_udp
+EXPORT_SYMBOL vmlinux 0x71711211coverflowgid
+EXPORT_SYMBOL vmlinux 0x717ea7a2devm_devfreq_unregister_notifier
+EXPORT_SYMBOL vmlinux 0x718ace8bmmc_of_parse_voltage
+EXPORT_SYMBOL vmlinux 0x71a50dbcregister_blkdev
+EXPORT_SYMBOL vmlinux 0x71a672efdmam_pool_destroy
+EXPORT_SYMBOL vmlinux 0x71bcb8cfalloc_file
+EXPORT_SYMBOL vmlinux 0x71c77800blk_init_tags
+EXPORT_SYMBOL vmlinux 0x71d05b93vfs_getattr_nosec
+EXPORT_SYMBOL vmlinux 0x71efcf92bdiregister_va
+EXPORT_SYMBOL vmlinux 0x7210c9f4txfrm4_prepare_output
+EXPORT_SYMBOL vmlinux 0x7222c1b7bcpuhp_remove_state_cpuslocked
+EXPORT_SYMBOL vmlinux 0x72577e6bget_monotonic_coarse64
+EXPORT_SYMBOL vmlinux 0x72608c0ed usleep flushing
+EXPORT_SYMBOL vmlinux 0x7263bc4dnexysysctl_register
+EXPORT_SYMBOL vmlinux 0x7273a5a51iwhandler_get_spy
+EXPORT_SYMBOL vmlinux 0x728c45benetif_device_attach
+EXPORT_SYMBOL vmlinux 0x729c97deget_random_u64
+EXPORT_SYMBOL vmlinux 0x72a6dd44ps2Handle_ack
+EXPORT_SYMBOL vmlinux 0x72a9e45emmc_detect_card_removed
+EXPORT_SYMBOL vmlinux 0x72adbf81nd_btt_version
+EXPORT_SYMBOL vmlinux 0x72ba0dca5netif_napi_add
+EXPORT_SYMBOL vmlinux 0x72b24d34dfree_dma
+EXPORT_SYMBOL vmlinux 0x72b9d287default_grn
+EXPORT_SYMBOL vmlinux 0x72c98139__arch_hweight64
+EXPORT_SYMBOL vmlinux 0x72e0e850block_page_mkwrite
+EXPORT_SYMBOL vmlinux 0x72ea7b2dsccidevice_type
+EXPORT_SYMBOL vmlinux 0x72f52adcecv_deactivate
+EXPORT_SYMBOL vmlinux 0x7315a4e9twl6030_mmc_card_detect_config
+EXPORT_SYMBOL vmlinux 0x7317a47apciio_base
+EXPORT_SYMBOL vmlinux 0x73247706genphy_restart_aneg
+EXPORT_SYMBOL vmlinux 0x7327313bnnetif_txwake_queue
+EXPORT_SYMBOL vmlinux 0x732bc835kfreesk
+EXPORT_SYMBOL vmlinux 0x7344ba11blkintr_yieldmerge_bio
+EXPORT_SYMBOL vmlinux 0x734ca7e2mipidi_sics_set_page_address
+EXPORT_SYMBOL vmlinux 0x734ea37c9dma_dim
+EXPORT_SYMBOL vmlinux 0x735e350bremap_vmalloc_vmalloc_range
+EXPORT_SYMBOL vmlinux 0x737d53ddfp
+EXPORT_SYMBOL vmlinux 0x73988634xhx32_digest
+EXPORT_SYMBOL vmlinux 0x73a2bb866tcp_md5_do_del
+EXPORT_SYMBOL vmlinux 0x73aca27apci_bus_size Bridges
+EXPORT_SYMBOL vmlinux 0x73de72d2hmm_device_put
+EXPORT_SYMBOL vmlinux 0xbe98a883pci_ep_cfs_remove_epf_group
+EXPORT_SYMBOL vmlinux 0xbe98a883pci_ep_cfs_remove_epf_group
+EXPORT_SYMBOL vmlinux 0xbf6745b5csci_host_get
+EXPORT_SYMBOL vmlinux 0xbf8034edmi_inoframe_unpack
+EXPORT_SYMBOL vmlinux 0xbf8735e2tcp_fastopen_defer_connect
+EXPORT_SYMBOL vmlinux 0xbf8d88fbuffer_migrate_page
+EXPORT_SYMBOL vmlinux 0xbfbcf8b_set_cmap
+EXPORT_SYMBOL vmlinux 0xbfdec7edmam_free_coherent
+EXPORT_SYMBOL vmlinux 0xbfded847register_sysctl_table
+EXPORT_SYMBOL vmlinux 0xbfef21cdff7_ip6_checksum
+EXPORT_SYMBOL vmlinux 0xbf821fsl_bbc_addr
+EXPORT_SYMBOL vmlinux 0xbf851888blk_rq_append_bio
+EXPORT_SYMBOL vmlinux 0xbf8c163576pcim_iomap_table
+EXPORT_SYMBOL vmlinux 0xbf8c183cbeioprintf16
+EXPORT_SYMBOL vmlinux 0xbf8caab733blk_queue_virt_boundary
+EXPORT_SYMBOL vmlinux 0xbf8c5901dinet_rtx_syn_ack
+EXPORT_SYMBOL vmlinux 0xbf8c6377bmmce_retune_pause
+EXPORT_SYMBOL vmlinux 0xbf8c6d3b70import_iovec
+EXPORT_SYMBOL vmlinux 0xbf8ca3a21elelevator_init
+EXPORT_SYMBOL vmlinux 0xbf8cf92a9no_seek_end_llseek
+EXPORT_SYMBOL vmlinux 0xbf8c9e3049 tcdf_idr_release
+EXPORT_SYMBOL vmlinux 0xbf8ca1f82bpci_dev_driver
+EXPORT_SYMBOL vmlinux 0xbf8cabe627blk_queue_invalidete_tags
+EXPORT_SYMBOL vmlinux 0xbf8cad630cend_page_writeback
+EXPORT_SYMBOL vmlinux 0xbf8ca3e383ctcp_make_synack
+EXPORT_SYMBOL vmlinux 0xbf8cc3fd02net_dim_get_rx_moderation
+EXPORT_SYMBOL vmlinux 0xbf8cc9cabiowritelf16_rep
+EXPORT_SYMBOL vmlinux 0xbf8ccca6aappid_output_wakeup
+EXPORT_SYMBOL vmlinux 0xbf8ce8b4acdevinm_request_threaded_irq
+EXPORT_SYMBOL vmlinux 0xbf8d15114a_release_region
+EXPORT_SYMBOL vmlinux 0xbf8d49cd53revalidate_disk
+EXPORT_SYMBOL vmlinux 0xbf8d55bb8aqid_eq
+EXPORT_SYMBOL vmlinux 0xbf8d73278ehex_asc_upper
+EXPORT_SYMBOL vmlinux 0xbf8d842c97netdev_lower_get_next_private_rcu
+EXPORT_SYMBOL vmlinux 0xbf8dccc00dnetdev_notify_peers
+EXPORT_SYMBOL vmlinux 0xbf8d88aadschedule_timeout
+EXPORT_SYMBOL vmlinux 0xbf8ded56b9mfld_remove_devices
+EXPORT_SYMBOL vmlinux 0xbf8df92f66memchr_inv
+EXPORT_SYMBOL vmlinux 0xbf8df9dd10guid_null
+EXPORT_SYMBOL vmlinux 0xbe237910blk_mq_add_to_requeue_list
+EXPORT_SYMBOL vmlinux 0xbe377e9ffile_isns_capable
+EXPORT_SYMBOL vmlinux 0xbe3e357c4watchdog_unregister_governor
+EXPORT_SYMBOL vmlinux 0xbee4bd172d_delete
+EXPORT_SYMBOL vmlinux 0xbe570d43vgaput
+EXPORT_SYMBOL vmlinux 0xe58de56phy_register_fixup
+EXPORT_SYMBOL vmlinux 0xe73ff4fww_mutex_unlock
+EXPORT_SYMBOL vmlinux 0xe809c5enmsg_notify
+EXPORT_SYMBOL vmlinux 0xe813b12posix_acl_from_mode
+EXPORT_SYMBOL vmlinux 0xa72a0f5b_nr_online_nodes
+EXPORT_SYMBOL vmlinux 0xa72b120_blease_modify
+EXPORT_SYMBOL vmlinux 0xa735b59_prandom_u32
+EXPORT_SYMBOL vmlinux 0xa73edd38__neigh_create
+EXPORT_SYMBOL vmlinux 0xa75b3706_pseries_enable_reloc_on_exc
+EXPORT_SYMBOL vmlinux 0xa77b1ed6_wait_on_bit_lock
+EXPORT_SYMBOL vmlinux 0xa77bfd29_register_inet6addr_validator_notifier
+EXPORT_SYMBOL vmlinux 0xa783f6f5_peernet2id
+EXPORT_SYMBOL vmlinux 0xa7904be1__net_stats_copy_basic
+EXPORT_SYMBOL vmlinux 0xa797559_aproc_mkdir_mode
+EXPORT_SYMBOL vmlinux 0xa79b6582_tcp_getsockopt
+EXPORT_SYMBOL vmlinux 0xa7a0e646_netdev_upper_dev_link
+EXPORT_SYMBOL vmlinux 0xa7a3f6edc_k_setup
+EXPORT_SYMBOL vmlinux 0xa7b1f62.sock_diag_put_filterinfo
+EXPORT_SYMBOL vmlinux 0xa7bda5d6__neigh_set_probe_once
+EXPORT_SYMBOL vmlinux 0xa7c078d3_ip_options_compile
+EXPORT_SYMBOL vmlinux 0xa7e8d96_security_path_rename
+EXPORT_SYMBOL vmlinux 0xa8028059aget_unused_fd_flags
+EXPORT_SYMBOL vmlinux 0xa804a210dec_LZ4_decompress_fast_continue
+EXPORT_SYMBOL vmlinux 0xa805367k_killgrp
+EXPORT_SYMBOL vmlinux 0xa806043f_param_set_invbool
+EXPORT_SYMBOL vmlinux 0xa8699090param_ops_int
+EXPORT_SYMBOL vmlinux 0xa874cd5_lbib_default_rule_add
+EXPORT_SYMBOL vmlinux 0xa89f709_acp_rtx_synack
+EXPORT_SYMBOL vmlinux 0xa8a4da210b_clone_bioset
+EXPORT_SYMBOL vmlinux 0xa8c8d9c7of_find_all_nodese
+EXPORT_SYMBOL vmlinux 0xa8e94a75unlock_two_nondirectories
+EXPORT_SYMBOL vmlinux 0xa8f69561pci_read_config_byte
+EXPORT_SYMBOL vmlinux 0xa916876_xmit_recursion
+EXPORT_SYMBOL vmlinux 0xa916b94strnlen
+EXPORT_SYMBOL vmlinux 0xa922a856_unregister_protosw
+EXPORT_SYMBOL vmlinux 0xa92731eappr_hypercall_start
+EXPORT_SYMBOL vmlinux 0xa92c96efdev_err
+EXPORT_SYMBOL vmlinux 0xa92d89d4param_ops_invbool
+EXPORT_SYMBOL vmlinux 0xa93dfc99pci_find_pcie_root_port
+EXPORT_SYMBOL vmlinux 0xa944b35asecurity_sock_graft
+EXPORT_SYMBOL vmlinux 0xa976957_dbitmap_remap
+EXPORT_SYMBOL vmlinux 0xa99422admigrate_page_copy
+EXPORT_SYMBOL vmlinux 0xa999ec15___d_drop
+EXPORT_SYMBOL vmlinux 0xa99b39c2prandom_bytes
+EXPORT_SYMBOL vmlinux 0xa9a3a6askb_kill_datagram
+EXPORT_SYMBOL vmlinux 0xa9bed7fd__zerocopy_sg_from_iter
+EXPORT_SYMBOL vmlinux 0xa9e99838_sock_get_timestamps
+EXPORT_SYMBOL vmlinux 0xaa2668epnv_cxl_release_hwirqs
+EXPORT_SYMBOL vmlinux 0xaa278288phy_ethtool_get_wol
+EXPORT_SYMBOL vmlinux 0xaa28be04seg6_hmac_info_del
+EXPORT_SYMBOL vmlinux 0xaa2a0ab8csi_dma_map
+EXPORT_SYMBOL vmlinux 0xb64f4b8a agenl_register_family
+EXPORT_SYMBOL vmlinux 0xb650c25f_tracepoint_module_get
+EXPORT_SYMBOL vmlinux 0xb66f620etty_port_close_end
+EXPORT_SYMBOL vmlinux 0xb678366fint_sqrt
+EXPORT_SYMBOL vmlinux 0xb67feca0euuid_parse
+EXPORT_SYMBOL vmlinux 0xb689803bxfrm_input_register_afinfo
+EXPORT_SYMBOL vmlinux 0xb68b0682remap_vmalloc_range_partial
+EXPORT_SYMBOL vmlinux 0xb6907635seq_put_decimal_ll
+EXPORT_SYMBOL vmlinux 0xb69366fe_bcd2bin
+EXPORT_SYMBOL vmlinux 0xb6947002mini_qdisc_pair_init
+EXPORT_SYMBOL vmlinux 0xb6a68816find_last_bit
+EXPORT_SYMBOL vmlinux 0xb6c1241b__sk_dst_check
+EXPORT_SYMBOL vmlinux 0xb6c8f87fionmu_tbl_range_alloc
+EXPORT_SYMBOL vmlinux 0xb6f1ec1bdbg_register_target
+EXPORT_SYMBOL vmlinux 0xb71514e3fscrypt_d_ops
+EXPORT_SYMBOL vmlinux 0xb71e47b3udp_flush_pending_frames
+EXPORT_SYMBOL vmlinux 0xb7488905scsi_normalize_sense
+EXPORT_SYMBOL vmlinux 0xb75f53acount_pseudo_xattr
+EXPORT_SYMBOL vmlinux 0xb7678ec8bcdev_alloc
+EXPORT_SYMBOL vmlinux 0xb77131b1psched_ratecfg_precompute
+EXPORT_SYMBOL vmlinux 0xb77932ebflex_array_clear
+EXPORT_SYMBOL vmlinux 0xb78debe3LZ4_decompress_fast_usingDict
+EXPORT_SYMBOL vmlinux 0xb795781fdquot_commit
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+EXPORT_SYMBOL vmlinux 0xb7b7ed50framebuffer_release
+EXPORT_SYMBOL vmlinux 0xb7bc9femmc_power_restore_host
+EXPORT_SYMBOL vmlinux 0xb7cc6db7sysctl_max_skb_frags
+EXPORT_SYMBOL vmlinux 0xb7ce3cc3proto_register
+EXPORT_SYMBOL vmlinux 0xb7dc614d4fquotactl_sysfile_ops
+EXPORT_SYMBOL vmlinux 0xb8015600__ip_dev_find
+EXPORT_SYMBOL vmlinux 0xb80f0865skb_queue_purge
+EXPORT_SYMBOL vmlinux 0xb813813d downgrade_write
+EXPORT_SYMBOL vmlinux 0xb818391fab3100_event_register
+EXPORT_SYMBOL vmlinux 0xb83129dbZSTD_decompressContinue
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+EXPORT_SYMBOL vmlinux 0xb8341ad3_memset64
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+EXPORT_SYMBOL vmlinux 0xb83adb67backlight_device_unregister
+EXPORT_SYMBOL vmlinux 0xb845f02exfrm_init_state
+EXPORT_SYMBOL vmlinux 0xb872472fskb_unlink
+EXPORT_SYMBOL vmlinux 0xb874b87a_clzsi2
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+EXPORT_SYMBOL vmlinux 0xb8b04a22d_instantiate_no_diralias
+EXPORT_SYMBOL vmlinux 0xb8cdef28blk_delay_queue
+EXPORT_SYMBOL vmlinux 0xbb2f4b61rdmacg_try_charge
+EXPORT_SYMBOL vmlinux 0xbb35675b__bitmap_intersects
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+EXPORT_SYMBOL vmlinux 0xbb5d343dxfrm_get_acqseq
+EXPORT_SYMBOL vmlinux 0xbb649f92mb_cache_entry_delete
+EXPORT_SYMBOL vmlinux 0xbb6615d3cdrom_get_last_written
+EXPORT_SYMBOL vmlinux 0xbb88b14d5max8925_set_bits
+EXPORT_SYMBOL vmlinux 0xbb99125cget_default_font
+EXPORT_SYMBOL vmlinux 0xbbaa4de2mmc_is_req_done
+EXPORT_SYMBOL vmlinux 0xbbbc37bacompat_sock_get_timestampns
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+EXPORT_SYMBOL vmlinux 0xbdcd694__skbuff_get_ports
+EXPORT_SYMBOL vmlinux 0xc82e26c2vme_register_driver
+EXPORT_SYMBOL vmlinux 0xc83f5fccc㎥mline_parts_find
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+EXPORT_SYMBOL vmlinux 0xc855728cgiveup_altivec
+EXPORT_SYMBOL vmlinux 0xc856d5c0mmc_wait_for_cmd
+EXPORT_SYMBOL vmlinux 0xc85c43dcopal_nx_coproc_init
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+EXPORT_SYMBOL vmlinux 0xc9ac0e0fkey_invalidate
+EXPORT_SYMBOL vmlinux 0xc9ad2f2ablk_cleanup_queue
+EXPORT_SYMBOL vmlinux 0xc9e241f8netlink_broadcast
+EXPORT_SYMBOL vmlinux 0xc9e569a71sk_stream_wait_close
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+EXPORT_SYMBOL vmlinux 0xca10b2fvlan_uses_dev
+EXPORT_SYMBOL vmlinux 0xca1336fcsock_rfree
+EXPORT_SYMBOL vmlinux 0xca1e513fZSTD_resetDStream
+EXPORT_SYMBOL vmlinux 0xca21ebd3bitmap_free
+EXPORT_SYMBOL vmlinux 0xca223ddevm_devfreq_add_device
+EXPORT_SYMBOL vmlinux 0xca3b28c6store_vr_state
+EXPORT_SYMBOL vmlinux 0xca431c05wake_bit_function
+EXPORT_SYMBOL vmlinux 0xca56983blkrq_map_integrity_sg
+EXPORT_SYMBOL vmlinux 0xca5ee09avme_free_consistent
+EXPORT_SYMBOL vmlinux 0xca5fc676scsi_scan_host
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+EXPORT_SYMBOL vmlinux 0xca90688akeyring_alloc
+EXPORT_SYMBOL vmlinux 0xca9360b5rb_next
+EXPORT_SYMBOL vmlinux 0xca96945ddev_change_carrier
+EXPORT_SYMBOL vmlinux 0xca972aceredirty_page_for_writepage
+EXPORT_SYMBOL vmlinux 0xca9a368escsi_get_host_dev
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+EXPORT_SYMBOL vmlinux 0xcac859f2input_mt_report_slot_state
+EXPORT_SYMBOL vmlinux 0xcad817dm_bridge
+EXPORT_SYMBOL vmlinux 0xcb01f442vfs_mknod
+EXPORT_SYMBOL vmlinux 0xcb0288ealedtrig_cpu
+EXPORT_SYMBOL vmlinux 0xcb0e9ca1dm_qq_kick_requeue_list
+EXPORT_SYMBOL vmlinux 0xcbbf0a6faudit_log_task_context
+EXPORT_SYMBOL vmlinux 0xcbc3b94echeck_failure
+EXPORT_SYMBOL vmlinux 0xcbc88a23ZSTD_isFrame
+EXPORT_SYMBOL vmlinux 0xcbc9557funregister_sysrq_key
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+EXPORT_SYMBOL vmlinux 0xcc175286pci_clear_master
+EXPORT_SYMBOL vmlinux 0xcc215573flex_array_shrink
+EXPORT_SYMBOL vmlinux 0xcc23c0b5d橥
+EXPORT_SYMBOL vmlinux 0xcc248d26serial8250_suspend_port
+EXPORT_SYMBOL vmlinux 0xcc5005femsleep_interruptible
+EXPORT_SYMBOL vmlinux 0xcc5d229can_do_mlock
+EXPORT_SYMBOL vmlinux 0xcc76e858tcp_poll
+EXPORT_SYMBOL vmlinux 0xcc8841alping_prot
+EXPORT_SYMBOL vmlinux 0xcc8af0c1of_device_is_big_endian
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+EXPORT_SYMBOL vmlinux 0xcc99e23mcluster_mod
+EXPORT_SYMBOL vmlinux 0xccae80f4pcieps_add_epf_group
+EXPORT_SYMBOL vmlinux 0xccce21f5input_get_new_minor
+EXPORT_SYMBOL vmlinux 0xccce42ca1try_module_get
+EXPORT_SYMBOL vmlinux 0xd18fe5f6completion_done
+EXPORT_SYMBOL vmlinux 0xd19557f9sync_inodes_sb
+EXPORT_SYMBOL vmlinux 0xd19b7644kmem_cache_alloc_trace
+EXPORT_SYMBOL vmlinux 0xd1c2ba16phy_find_first
+EXPORT_SYMBOL vmlinux 0xd1c57bcpci_release_selected_regions
+EXPORT_SYMBOL vmlinux 0xd1cf0882bio_free_pages
+EXPORT_SYMBOL vmlinux 0xd1d87e92scsi_mlreturn_string
+EXPORT_SYMBOL vmlinux 0xd1e4def1quot_set_dqinfo
+EXPORT_SYMBOL vmlinux 0xd1ec3fa5mmce_can_secure_erase_trim
+EXPORT_SYMBOL vmlinux 0xd1f07c75skb_checksum_trimmed
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+EXPORT_SYMBOL vmlinux 0xd20fd068mark_info_dirty
+EXPORT_SYMBOL vmlinux 0xd217cbb_module_get
+EXPORT_SYMBOL vmlinux 0xd218595ascsi_cmd_ioclt
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+EXPORT_SYMBOL vmlinux 0xd25d4f74console_blank_hook
+EXPORT_SYMBOL vmlinux 0xd269426asimple_release_fs
+EXPORT_SYMBOL vmlinux 0xd26b868ainput_mt_init_slots
+EXPORT_SYMBOL vmlinux 0xd27b25ddblk_check_plugged
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+EXPORT_SYMBOL vmlinux 0xd294192cvm_insertmixed_mkwrite
+EXPORT_SYMBOL vmlinux 0xd29c197fvme_irq_handler
+EXPORT_SYMBOL vmlinux 0xd2a998a8vme_bus_error_handler
+EXPORT_SYMBOL vmlinux 0xd2a5f55tty_devnum
+EXPORT_SYMBOL vmlinux 0xd2aea230page_frag_alloc
+EXPORT_SYMBOL vmlinux 0xd2b09ce5__kmalloc
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+EXPORT_SYMBOL vmlinux 0xd2c0e30open_exec
+EXPORT_SYMBOL vmlinux 0xd2e6624dnla_validate
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+EXPORT_SYMBOL vmlinux 0xd2f1a048register_netdevice_notifier
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+EXPORT_SYMBOL vmlinux 0xed9f59a20__ctzsi2
+EXPORT_SYMBOL vmlinux 0xedaaaf6p6_getsockopt
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+EXPORT_SYMBOL vmlinux 0xef033db1biov_chain
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+EXPORT_SYMBOL vmlinux 0xef2260ceiw_handler_set_spy
+EXPORT_SYMBOL vmlinux 0xef26b999fb Firmware_edid
+EXPORT_SYMBOL vmlinux 0xef28818tcp_init_sock
+EXPORT_SYMBOL vmlinux 0xef2d0107_local_fh_enable
+EXPORT_SYMBOL vmlinux 0xef40dc3ecjbd2_journal_force_commit
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+EXPORT_SYMBOL vmlinux 0xef8f49caget_mm_exe_file
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+EXPORT_SYMBOL vmlinux 0xef91879bbb_first_postorder
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+EXPORT_SYMBOL vmlinux 0xefed5bcca__udp_table_size
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+EXPORT_SYMBOL vmlinux 0xeef29fxxh64
+EXPORT_SYMBOL vmlinux 0xef16f04djd2_log_start_commit
+EXPORT_SYMBOL vmlinux 0xef1df322generic_delete_inode
+EXPORT_SYMBOL vmlinux 0xef24f51ip_generic_getfrag
+EXPORT_SYMBOL vmlinux 0xef3a9d26devm_nvmem_cell_put
+EXPORT_SYMBOL vmlinux 0xef3df348__nla_put
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+EXPORT_SYMBOL vmlinux 0xff06f629ioread16be
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+EXPORT_SYMBOL vmlinux 0xff102033eslhc_remember
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+EXPORT_SYMBOL vmlinux 0xff149e0a8get_super_thawed
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+EXPORT_SYMBOL vmlinux 0xf472017aswakeup_all
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+EXPORT_SYMBOL vmlinux 0xf4b8a2d9of_get_next_parent
+EXPORT_SYMBOL vmlinux 0xf4bda5f6__cancel_dirty_page
+EXPORT_SYMBOL vmlinux 0xf4dbe9b9__frontswap.invalidate_area
+EXPORT_SYMBOL vmlinux 0xf4e9d133kthread_create_worker
+EXPORT_SYMBOL vmlinux 0xf4ed35bcsctepcy
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+EXPORT_SYMBOL vmlinux 0xf4f2befmmcc_flush_cache
+EXPORT_SYMBOL vmlinux 0xf4f50116security_skb_classify_flow
+EXPORT_SYMBOL vmlinux 0xf4f8b8ce6devm_io_request_one
+EXPORT_SYMBOL vmlinux 0xf4fe6d38drop_super
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+EXPORT_SYMBOL vmlinux 0xf51bed40skb_udp_tunnel_segment
+EXPORT_SYMBOL vmlinux 0xf5222143raw_spin_lock_irqsave
+EXPORT_SYMBOL vmlinux 0xf526f04fxfmr_state_walk_done
+EXPORT_SYMBOL vmlinux 0xf53cd174alloc_fddev
+EXPORT_SYMBOL vmlinux 0xf53d4c26qdisc_class_hash_destroy
+EXPORT_SYMBOL vmlinux 0xf53f722trace_print_symbols_seq
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+EXPORT_SYMBOL vmlinux 0xf59329dairq_set_chip
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+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x81873f18nfs_lookup
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x818888e0nfs_commitdata_release
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x81a2c524nfs_alloc_server
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x818888e0nfs_pageio_reset_write_mds
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x818888e0nfs_pageio_init_write
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x818888e0nfs_sops
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x818888e0nfs_commit_free
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x8190a5530fnfsiod_workqueue
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x8191d1fe52max_session_slots
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x8192b5670nifs_invalidate_atime
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x81974ccf38nfs_try_mount
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x81977fdbe91nfs_file_llseek
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x8198b0e8nfs_init_timeout_values
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x8199acda18nfs4_fs_type
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x8199c311nansfs_server_insert_lists
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x8199e6cb04nansfs_alloc_client
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819a3ec5b8nansfs_destroy_inode
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819a688609nfs_create_server
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819a877ea9nfs_server_copy_userdata
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819a8e91aenfs_daesend_implementation_id
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819a99e79dnfs4_dentry_operations
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819aadfe64enfs_open_context
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819aaf4d4enfs_max_session_cl_slots
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819abe722807nfs_wait_client_init_complete
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819aef81192nfs_dentry_operations
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819b555632nregister_nfs_version
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819b0ad1a5nfs_file_write
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819b28963fnfs_kill_super
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819b5622902nfs_clean_inode
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819b60e716nfs_fattr_init
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819b68cd19enfs_commit_inode
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819b993e918nfs_client_init_status
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819bd38379enfs_retry_commit
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819bdf59364nfs_fhget
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819c05555fnfs_getattr
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819c3a267nfs_net_id
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819c44f1e9fnfs_auth_info_match
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819c551056nfs_clone_sb_security
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819c7c9a7cnfs_put_lock_context
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819ca0ae41nfs_show_stats
+EXPORT_SYMBOL_GPL fs/nfs/nfs 0x819cf0f95nfs_file_operations
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0x90ff6e9f
+nf_ct_invert_tuplepr
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0x945a1c7nf
+nf_ct_expect_register_notifier
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0x95b939f
ct_tcp_seqadj_set
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0x98548a32nf
+conntrack_tuple_taken
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0x9cf0b18cf
+Lproto_log_invalid
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xa0ad3ee7
+__nf_conntrack_confirm
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xa565bdf
+nf_conntrack_helper_try_module_get
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0x9a949b04__nf_ct_try_assign_helper
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xac7e40b9nf
+ct_expect_init
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xb440ccbf
+nf_helper_expectfn_find_by_symbol
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xb53a8d00nf
+ct_timeout_find_get_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xb602c57enf
+ct_l3proto_module_put
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xb781adednf
+ct_iterate_cleanup_net
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xb7e99893nf
+ct_helper_expectfn_find_by_name
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xb944fcanf
+conntrack_helper_put
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xbc77d68nf
+conntrack_l4proto_tcp6
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xc0987254nf
+ct_expect_iterate_destroy
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xc18ac88dnf
+ct_expect_hsize
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xc40f284cnf
+ct_helper_hsize
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xc9c9e29fnf
+ct_port_tuple_to_nlattr
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xd505c3e0nf
+ct_port_nlattr_tuple_size
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xd5983ef8nf
+ct_expect_alloc
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xe3c4091fnf
+ct_port_tuple_to_nlattr
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xe82b122dnf
+conntrack_helper_unregister
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xe9aa612cnf
+ct_refresh_acct
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xeac9a1c7nf
+ct_delivery_catched_events
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xebeb99d3nf
+ct_helper_ext_add
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xf577af5dnf
+ct_expect_find_get
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack 0xff40b965nf
+conntrack_locks
+EXPORT_SYMBOL_GPL net/netfilter/nf_conntrack_amanda 0x97b439f8nf
+nat_amanda_hook

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+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_broadcast 0x67d0b13dnf_contrack_broadcast_help
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_ftp 0xfd658c11nf_nat_ftp_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_h323 0x0b48585nat_rtp_rtcp_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_h323 0x206aa2abset_h225_addr_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_h323 0x50627f5get_h225_addr
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_h323 0x5386570set_ras_addr_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_h323 0x5ac8f199nat_callforwarding_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_h323 0x24ea71ee5net_nat IRC Hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_pppt 0x09c6f3ednf_nat_pptp_hook_expectfn
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_pppt 0xbe647a6nf_nat_pptp_hook_exp_gre
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_pppt 0x0d1242c84nf_nat_pptp_hook_inbound
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_pppt 0x0d87af8d6nf_nat_pptp_hook_outbound
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_proto_gre 0xe67b6b86nf_ct_gre_keymap_add
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_proto_gre 0xc273369nf_ct_gre_keymap_destroy
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_sip 0x71f2ecbc75sip_parse_header_uri
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_sip 0x7533448ct_sip_parse_numerical_param
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_sip 0x9ac72778ct_sip_get_header
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_sip 0xc4f44998ct_sip_get_sdphdr
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_sip 0xca66d408ct_sip_parse_address_param
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_sip 0xc6e6bed5nat_sip_hooks
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_sip 0x4ed2f265ct_sip_parse_request
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_snmp 0x9c66a8f6nf_nat_snmp_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf_contrack_tftp 0x1e89b4d4dfn_nat_tftp_hook
+EXPORT_SYMBOL_GPL net/netfilter/nf.dup.netdev 0x10b9e598nf_dup_netdev_egress
+EXPORT_SYMBOL_GPL net/netfilter/nf.dup.netdev 0x924f0a34nf_fwd_netdev_egress
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x07d0a11nf_log_dump_tcp_header
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x08d8517dnf_log_12packet
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x57106665nf_log_dump_sk_uid_gid
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0x3d2fa77nf_log_dump_packet_common
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0xd91287c6nf_log_dump_vlan
+EXPORT_SYMBOL_GPL net/netfilter/nf_log_common 0xeb43ca2enf_log_dump_udp_header
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x0d9b84b4nf_nat_l4proto_nlaattr_to_range
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x131f636cnf_nat_l4proto_in_range
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x2c2f4eaanf_ct_nat_ext_add
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x71972ccbnf_nat_packet
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x8f6601c7nf_nat_l4proto_unique_tuple
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x95746318nf_nat_alloc_null_binding
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x95746318nf_nat_reserved
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0xa732708afnf_nat_l4proto_unregister
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x84b3080b8nf_nat_l4proto_register
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0x84b3080b8nf_nat_l4proto_unregister
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat 0xe10db8c3__nf_nat_l4proto_find
+EXPORT_SYMBOL_GPL net/netfilter/nf_nat_redirect 0x0a2f9d9dfn_nat_redirect_ipv4

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+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x34ae2c3svc_wake_up
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x37416025svc_alien_sock
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x387e1639rpc_pipes_notifier_register
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x39db47b0svc_proc_register
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x3c5f3389sunrpc_cache_update
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x434b2f61xprt_pin_rqst
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x44847bf1rpc_count_iostats_metrics
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x4e8f6ca7sunrpc_net_id
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5141f476svc_reg_xprt_class
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x51c1e3bcrpc_mkpipe_dentry
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x538c6446nlm_debug
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5539b000rpc_remove_pipe_dir_object
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5706eb9erpc_pipe_generic_upcall
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5773fa5frpc_register_transport
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x594eeb10rpc_switch_client_transport
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5a70160estsvc_authenticate
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5cb05094svc_recv
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5d773c29xprt_reserve_xprt_cong
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5da42abcxmlrpc_terminate_string
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x5ee6df148rpc_clnt_xprt_switch_add_xprt
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x60757777xprt_free
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x62f34d68rpc_unlink
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x64ac2835rpc_init_pipe_dir_head
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x6623ca3axdr_buf_subsegment
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x6681c60exdr_buf_subsegment
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x66898099xprt_release_rqst_cong
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x67dd06dfmxprc_mkpipe_data
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x69198ac0xprt_free
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x69810f94cache_seq_stop
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x699198ac0rpc_init_wait_queue
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x6e6c6df1xprt_create_xprt
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x6f0a518bsvc_sock_update_bufs
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x708009xprt_unregister
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x71fa908acache_flush
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x72ba948drpcauth_init_cred
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x746819bfsunrpc_destroy_cache_detail
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x752583df xdr_inline_decode
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x76f684b0 sunrpc_cache_register_pipefs
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x78e81a23 put rpccred
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x79694499 pc_localaddr
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x79f15345 rpc_encode_word
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7a02465xd xdr-process_buf
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7a912c3xprt_alloc
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7b2ad185 auth_domain_lookup
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7b4f723exdr_decode_word
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7be9745rpclnt_test_and_add_xprt
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7c3561d1rpc_uaddr2sockaddr
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7d53067rpc_init_rtt
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7eb34057rpc_clnt_swap_deactivate
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7ecc0066arpcauth_unregister
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x7f785b6svc_find_xprt
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x80951b28 rpcauth_get_gssinfo
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x8176a4e0 csum_partial_copy_to_xdr
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x81d818b8 xprt_wake_pending_tasks
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x827eafc0 rpc_sleep_on
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x834d0597rpc_force_rebind
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x83e90823 rpc_exit
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x84580efexprt_complete_rqst
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x85b33df4 rpc_queue_upcall
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x86a8996bsvc_addsock
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x86d7aa3auth_domain_put
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x878cb037 xdr_enter_page
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x88798243arpc_task_release_transport
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x89e3eb15cache_register_net
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x8a92b944gsssd_running
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x8af0898brpc_clone_client_set_auth
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x8d55b21arpc_lookup_machine_cred
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x8f136bberpc_find_or_alloc_pipe_dir_object
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x90e95456rpc_destroy_pipe_data
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x91c7d89svcauth_unix_set_client
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x934fa744rpc_net_ns
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x95287377svc_xprt_do_enqueue
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9687372rpcauth_cred_key_to_expire
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x976fc935svc_rqst_alloc
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x98177f1crpc_sleep_on_priority
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x98b75d64rpcauth_list_flavors
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x993492e7svc_create
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x998e8328xdr_reserve_space
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9ac11d9drpc_call_null
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9ad4d222rpc_wake_up_first
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9b02402drpc_d_lookup_sb
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9c7faba5brpc_setbufsize
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9cf6a35svc_max_payload
+EXPORT_SYMBOL_GPL net/sunrpc/sunrpc 0x9d68d78svc_reserve
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xbe6f79c9
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_get_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
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+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
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+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc6ce71e
virtio_transport_stream_is_active
+EXPORT_SYMBOL_GPL net/vmw_vsock/vmw_vsock_virtio_transport_common 0xc9f20f75
virtio_transport_set_max_buffer_size
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x0132effasnd_hdac_bus_send_cmd
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x065e9702snd_hdac_stream_setup
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x0bccaft5snd_hdac_regmap_init
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x0c5b00ccchdac_get_device_id
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x0d2426ccsnd_hdac_stream_assign
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x11c56409snd_hdac_stream_sync
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x13fbb01bsnd_hdac_bus_get_response
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x16f25179snd_hdac_regmap_read_raw
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x1be2a000snd_hdac_link_power
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x231ce77a2snd_hdac_exec_verb
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x23727fff snd_hdac_bus_exec_verb
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x27bcb815snd_hdac_stream_reset
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x2e062c79snd_hdac_bus_free_stream_pages
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x3301c9e999snd_hdac_codec_write
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x34549348snd_hdac_get_stream
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x3470b5dsnd_hdac_codec_read
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x34a0b8670snd_hdac_regmap_update_raw
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x3b544c2snd_hdac_get_active_channels
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x3dcdbf83snd_hdac_refresh_widgets
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x3ddfadasn snd_hdac_register_chmap_ops
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x3e4cc277snd_hdac_stream_stop
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x45607ae6snd_hdac_stream_set_params
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x47858012snd_hdac_bus_update_rirb
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x48e82e5bsnd_hdac_get_ch_alloc_from_ca
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x50212aea snd_hdac_device_unregister
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x550d4da7snd_hdac_regmap_exit
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x5698012snd_hdac_bus_parse_capabilities
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x576676b3snd_hdac_stream_release
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x57c92431snd_hdac_power_down
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x5776f4d1bdsn snd_hdac_bus_exec_verb_unlocked
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x577c5448snd_hdac_chmap_to_spk_mask
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x57c92403snd_hdac_power_up
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x57d51515snd_hdac_setup_channel_mapping
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x57f8f5b80snd_hdac_stream_release
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x63c346b5snd_hdac_is_supported_format
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x63e9f900snd_hdac_bus_parse_capabilities
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x683469fnsnd_hdac_stream_timecounter_init
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x685af2c16snd_hdac_device_register
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x68926d96snd_hdac_bus_reset_link
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x68f8faffsnd_hdac_bus_exit
+EXPORT_SYMBOL_GPL sound/hda/snd-hda-core 0x6df88281snd_hdac_device_exit
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x0ba181f0hda_get_autocfg_input_label
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x0dad064bhid_snd_hda_multi_out_dig_open
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x0ef53c7cgsnd_hda_pick_fixup
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x0f87d24bhda_get_connections
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+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x14f656d4ax_get_position
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+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x286319bbhda_jack_report_sync
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+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x25246558hda_codec_set_power
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x29c46714hda_codec_set_pin
+EXPORT_SYMBOL_GPL sound/pci/hda/snd-hda-codec 0x338532cbhda_add_nid
+EXPORT_SYMBOL_GPL sound/soc/snd-core 0x0b39f625snd_soc_unregister_codec
+EXPORT_SYMBOL_GPL sound/soc/snd-core 0x0ce6bacssnd_soc_get_enum_double
+EXPORT_SYMBOL_GPL sound/soc/snd-core 0x0d784cf1snd_soc_dapm_new_controls
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+EXPORT_SYMBOL_GPL sound/soc/snd-core 0x11ccf0486ssnd_soc_set_ac97_ops_of_reset
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+EXPORT_SYMBOL_GPL vmlinux 0xd49824b7kthread_flush_work
+EXPORT_SYMBOL_GPL vmlinux 0xd49f6e33thermal_zone_get_zone_by_name
+EXPORT_SYMBOL_GPL vmlinux 0xd4a44970cpufreq_driver_resolve_freq
+EXPORT_SYMBOL_GPL vmlinux 0xd4b42324bfp_skb_vlan_push_proto
+EXPORT_SYMBOL_GPL vmlinux 0xd4bd399cnoop_backing_dev_info
+EXPORT_SYMBOL_GPL vmlinux 0xd4c14632system_unbound_wq
+EXPORT_SYMBOL_GPL vmlinux 0xd4dc2c6d_rules_seq_read
+EXPORT_SYMBOL_GPL vmlinux 0xd4d749f6regulator_bulk_force_disable
+EXPORT_SYMBOL_GPL vmlinux 0xd4e4bcdecdevm_mdiobus_alloc_size
+EXPORT_SYMBOL_GPL vmlinux 0xd4ef38b__of_phy_provider_register
+EXPORT_SYMBOL_GPL vmlinux 0xd519049pm_generic_restore_early
+EXPORT_SYMBOL_GPL vmlinux 0xd51f301tps65912_regmap_config
+EXPORT_SYMBOL_GPL vmlinux 0xd503781ip6_input
+EXPORT_SYMBOL_GPL vmlinux 0xd51329bklp_shadow_alloc
+EXPORT_SYMBOL_GPL vmlinux 0xd5151b64dax_attribute_group
+EXPORT_SYMBOL_GPL vmlinux 0xd51be1a0ip6_route_output_flags
+EXPORT_SYMBOL_GPL vmlinux 0xd53b8a84devm_extcon_dev_register
+EXPORT_SYMBOL_GPL vmlinux 0xd53c293dkpthread_mod_delayed_work
+EXPORT_SYMBOL_GPL vmlinux 0xd5596d48opal_xcom_write
+EXPORT_SYMBOL_GPL vmlinux 0xd55ad93bionmu_group_get_iommu_data
+EXPORT_SYMBOL_GPL vmlinux 0xd565f64ktime_get_ts64
+EXPORT_SYMBOL_GPL vmlinux 0xd56c9b37__tracepoint_block_rq_remap
+EXPORT_SYMBOL_GPL vmlinux 0xd57346d2save_stack_trace_tsk_reliable
+EXPORT_SYMBOL_GPL vmlinux 0xd57788b5cs47f24_patch
+EXPORT_SYMBOL_GPL vmlinux 0xd5ba8828tpm_chip_alloc
+EXPORT_SYMBOL_GPL vmlinux 0xd5bd7dacring_buffer_record_enable_cpu
+EXPORT_SYMBOL_GPL vmlinux 0xd5bfdf79devm_usb_get_phy_by_phandle
+EXPORT_SYMBOL_GPL vmlinux 0xd5f81a73class_compat_remove_link
+EXPORT_SYMBOL_GPL vmlinux 0xd6086b1bgsid_is_active_low
+EXPORT_SYMBOL_GPL vmlinux 0xd60c99b5rcu_batches_completed_bh
+EXPORT_SYMBOL_GPL vmlinux 0xd61edc58regmap_get_device
+EXPORT_SYMBOL_GPL vmlinux 0xd6292a4usb_unpoison_anchored_urbs
+EXPORT_SYMBOL_GPL vmlinux 0xd65620oexterncon_get_extcon_dev
+EXPORT_SYMBOL_GPL vmlinux 0xd665066ccryptotype_has_alg
+EXPORT_SYMBOL_GPL vmlinux 0xd67364f7eventfd_ctx_fdget
+EXPORT_SYMBOL_GPL vmlinux 0xd678fa2dysfs_remove_files
+EXPORT_SYMBOL_GPL vmlinux 0xd681ee84cpufreq_freq_attr_scaling_boost_freqs
+EXPORT_SYMBOL_GPL vmlinux 0xd69d2345vfio_add_group_dev

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+EXPORT_SYMBOL_GPL vmlinux 0xf6e874f5ata_timing_merge
+EXPORT_SYMBOL_GPL vmlinux 0xf6f16c56rcu_barrier_tasks
+EXPORT_SYMBOL_GPL vmlinux 0xf6f5308cunregister_kretprobe
+EXPORT_SYMBOL_GPL vmlinux 0xf709b127raw_seq_open
+EXPORT_SYMBOL_GPL vmlinux 0xf74306eefinet_hash
+EXPORT_SYMBOL_GPL vmlinux 0xf75db464ata_sff_dev_classify
+EXPORT_SYMBOL_GPL vmlinux 0xf7629fd8btree_init_mempool
+EXPORT_SYMBOL_GPL vmlinux 0xf766e94usb_register_device_driver
+EXPORT_SYMBOL_GPL vmlinux 0xf7769c6dblk_queue_bypass_end
+EXPORT_SYMBOL_GPL vmlinux 0xf781a737reset_controller_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xf782225fgov_update_cpu_data
+EXPORT_SYMBOL_GPL vmlinux 0xf78cf8fasdio_set_block_size
+EXPORT_SYMBOL_GPL vmlinux 0xf79d1832ehci_setup
+EXPORT_SYMBOL_GPL vmlinux 0xf7ab6678euser_free_preparse
+EXPORT_SYMBOL_GPL vmlinux 0xf7b4c845pci_create_root_bus
+EXPORT_SYMBOL_GPL vmlinux 0xf7c38696skbgso_transport_seglen
+EXPORT_SYMBOL_GPL vmlinux 0xf7d2105ata_sff_tf_read
+EXPORT_SYMBOL_GPL vmlinux 0xf7e43aesggAlloc_table_chained
+EXPORT_SYMBOL_GPL vmlinux 0xf7f1ea87fwnode_get_parent
+EXPORT_SYMBOL_GPL vmlinux 0xf8049ddhpv6_dup_options
+EXPORT_SYMBOL_GPL vmlinux 0xf8169909ata_sas_port_destroy
+EXPORT_SYMBOL_GPL vmlinux 0xf82d9b52phy_exit
+EXPORT_SYMBOL_GPL vmlinux 0xf82f3657work_on_cpu
+EXPORT_SYMBOL_GPL vmlinux 0xf8344cfersonsparse_priv_key
+EXPORT_SYMBOL_GPL vmlinux 0xf837e0ebunregister_kprobes
+EXPORT_SYMBOL_GPL vmlinux 0xf8541055ead_init_geniv
+EXPORT_SYMBOL_GPL vmlinux 0xf85f373iommu_take_ownership
+EXPORT_SYMBOL_GPL vmlinux 0xf860ceebserdev_device_write_buf
+EXPORT_SYMBOL_GPL vmlinux 0xf878a02awm8350_read_auxadc
+EXPORT_SYMBOL_GPL vmlinux 0xf8802492print_stack_trace
+EXPORT_SYMBOL_GPL vmlinux 0xf8829faearizona_clk32k_enable
+EXPORT_SYMBOL_GPL vmlinux 0xf8944918rio_mport_read_config_32
+EXPORT_SYMBOL_GPL vmlinux 0xf8b757b2dddebug_add_module
+EXPORT_SYMBOL_GPL vmlinux 0xf8c8a4f1to_of_pinfo
+EXPORT_SYMBOL_GPL vmlinux 0xf8d4f35asavestack_trace_regs
+EXPORT_SYMBOL_GPL vmlinux 0xf8e398fcmemstart_addr
+EXPORT_SYMBOL_GPL vmlinux 0xf8f3a0fbatable_ratelimit
+EXPORT_SYMBOL_GPL vmlinux 0xf8f66b84sock_diag_put_meminfo
+EXPORT_SYMBOL_GPL vmlinux 0xf8fe3d0bkmmsgs_dump_register
+EXPORT_SYMBOL_GPL vmlinux 0xf91e99efuse_request_send_background
+EXPORT_SYMBOL_GPL vmlinux 0xf9207190sysfs_break_active_protection
+EXPORT_SYMBOL_GPL vmlinux 0xf92aa35iommu_unmap
+EXPORT_SYMBOL_GPL vmlinux 0xf92ce956db_printf
+EXPORT_SYMBOL_GPL vmlinux 0xf932015funderscore_call_chain
+EXPORT_SYMBOL_GPL vmlinux 0xf95322f4kthread_parkme
+EXPORT_SYMBOL_GPL vmlinux 0xf95fe590balloon_aops
+EXPORT_SYMBOL_GPL vmlinux 0xf9632da8devm_phy_destroy
+EXPORT_SYMBOL_GPL vmlinux 0xf98969d7sock_diag_unregister_inet_compat
+EXPORT_SYMBOL_GPL vmlinux 0xff5a8eacfecn_del_callback
+EXPORT_SYMBOL_GPL vmlinux 0xff62c854blk_g_print_stat_bytes
+EXPORT_SYMBOL_GPL vmlinux 0xffa51c78hrtimer_cancel
+EXPORT_SYMBOL_GPL vmlinux 0xffa918e2pci_epc_raise_irq
+EXPORT_SYMBOL_GPL vmlinux 0xffdb4b4erio_import_class
+EXPORT_SYMBOL_GPL vmlinux 0xffe17893public_key_free
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/ppc64el/generic.compiler
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/ppc64el/generic.compiler
@@ -0,0 +1 @@
+GCC: (Ubuntu 7.5.0-3ubuntu1~18.04) 7.5.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/ppc64el/generic.modules
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/ppc64el/generic.modules
@@ -0,0 +1,4807 @@
+3c59x
+3w-9xxx
+3w-sas
+3w-xxxx
+6lowpan
+6pack
+8021q
+8139cp
+8139too
+8250_aspeed_vuart
+8250_dw
+8250_exar
+8250_men_mcb
+8250_moxa
+8255
+8255_pci
+8390
+842
+842_compress
+842_decompress
+88pm800
+88pm800-regulator
+88pm805
+88pm80x
+88pm80x_onkey
+88pm8607
+88pm860x-ts
+88pm860x_battery
+88pm860x_bl
+88pm860x_charger
+88pm860x_onkey
+9p
+9pnet
+9pnet_rdma
+9pnet_virtio
+ad5449
+ad5504
+ad5592r
+ad5592r-base
+ad5593r
+ad5624r_spi
+ad5686
+ad5755
+ad5761
+ad5764
+ad5791
+ad5933
+ad714x
+ad714x-i2c
+ad714x-spi
+ad7150
+ad7152
+ad7192
+ad7266
+ad7280a
+ad7291
+ad7298
+ad7303
+ad7314
+ad7414
+ad7418
+ad7476
+ad7606
+ad7606_par
+ad7606_spi
+ad7746
+ad7766
+ad7780
+ad7791
+ad7793
+ad7816
+ad7877
+ad7879
+ad7879-i2c
+ad7879-spi
+ad7887
+ad7923
+ad799x
+ad8366
+ad8801
+ad9523
+ad9832
+ad9834
+ad_sigma_delta
+adc-keys
+adc128d818
+adcx
+addi_apci_1032
+addi_apci_1500
+addi_apci_1516
+addi_apci_1564
+addi_apci_16xx
+addi_apci_2032
+addi_apci_2200
+addi_apci_3120
+addi_apci_3501
+addi_apci_3xxx
+addi_watchdog
+ade7753
+ade7754
+ade7758
+ade7759
+ade7854
+ade7854-i2c
+ade7854-spi
+adf4350
+adf7242
+adfs
+adi
+adis16060
+adis16080
+adis16130
+adis16136
+adis16201
+adis16203
+adis16209
+adis16240
+adis16260
+adis16400
+adis16480
+adis_lib
+adjd_s311
+adl_pci6208
+adl_pci7x3x
+adl_pci8164
+adl_pci9111
+adl_pci9118
+adm1021
+adm1025
+adm1026
+adm1029
+adm1031
+adm1275
+adm8211
+adm9240
+adp5520-keys
+adp5520_bl
+adp5588-keys
+adp5589-keys
+adp8860_bl
+adp8870_bl
+adq12b
+ads1015
+ads7828
+ads7846
+ads7871
+adt7310
+adt7316
+adt7316-i2c
+adt7316-spi
+adt7410
+adt7411
+adt7462
+adt7470
+adt7475
+adt7x10
+adummy
+adutux
+adv7511-v4l2
+adv7511_drm
+adv7604
+adv7842
+adv_pci1710
+adv_pci1720
+adv_pci1723
+adv_pci1724
+adv_pci1760
+adv_pci_dio
+advansys
+adx134x
+adx134x-i2c
+adx134x-spi
+adxrs450
+aes_ti
+af9013
+af9033
+af_alg
+af_key
+af_packet_diag
+afe4403
+afe4404
+affs
+ah4
+ah6
+ahci
+ahci_ceva
+ahci_platform
+ahci_qoriq
+aic79xx
+aic7xxx
+aic94xx
+aim_cdev
+aim_network
+aim_sound
+aim_v4l2
+aio_aio12_8
+aio_iiro_16
+aiptek
+aircable
+airo
+airspy
+ak8974
+ak8975
+al3320a
+algif_aead
+algif_hash
+algif_rng
+algif_skcipher
+ali-ircc
+alim7101_wdt
+altera-ci
+altera-cvp
+altera-msgdma
+altera-pr-ip-core
+altera-pr-ip-core-plat
+altera-ps-spi
+altera-stapl
+altera_jtaguart
+altera_ps2
+altera_tse
+altera_uart
+alx
+am2315
+am53c974
+amc6821
+amd
+amd5536udc_pci
+amd8111e
+amdgpu
+amplc_dio200
+amplc_dio200_common
+amplc_dio200_pci
+amplc_pc236
+amplc_pc236_common
+amplc_pc263
+amplc_pci224
+amplc_pci230
+amplc_pci236
+amplc_pci263
+ams-iaq-core
+ams369fg06
+analog
+analogix-anx78xx
+anatop-regulator
+ansi_cprng
+anubis
+aoe
+apbps2
+apds9300
+apds9802als
+apds990x
+apds9960
+appledisplay
+appletalk
+appletouch
+applicom
+aquantia
+ar1021_i2c
+ar5523
+ar7part
+arc-rwmode
+arc-rimi
+arc4
+arc_ps2
+arc_uart
+arcmsr
+arcnet
+arcpgu
+arcxcnn_bl
+arizona-haptics
+arizona-i2c
+arizona-ldo1
+arizona-micsupp
+arizona-spi
+ark3116
+arkfb
+arp_tables
+arpt_mangle
+arptable_filter
+as102_fe
+as3711-regulator
+as3711_bl
+as3722-regulator
+as3935
+as5011
+asc7621
+ascot2e
+asix
+aspeed-pwm-tacho
+ast
+async_memcpy
+async_pq
+async_raid6_re cov
+async_rx
+async_xor
+at24
+at25
+at76c50x-usb
+at803x
+at86rf230
+ata_generic
+ata_piix
+atbm8830
+aten
+ath
+ath10k_core
+ath10k_pci
+ath10k_sdio
+ath10k_usb
+ath3k
+ath5k
+ath6kl_core
+ath6kl_sdio
+ath6kl_usb
+ath9k
+ath9k_common
+ath9k_hc
+ath9k_hw
+ati_remote
+ati_remote2
+at1l
+at1lc
+at1le
+atl2
+atlas-ph-sensor
+atm
+atmel
+atmel-flexcom
+atmel-hldc
+atmel_captouch
+atmel_mxt_ts
+atmel_pci
+atmtcp
+atp870u
+atusb
+atxp1
+aty128fb
+atyfb
+au0828
+au8522_common
+au8522_decoder
+au8522_dig
+aufs
+auo-pixcir-ts
+auo_k1900fb
+auo_k1901fb
+auo_k190x
+auth_rpcgss
+authenc
+authencesn
+autofs4
+avmfritz
+ax25
+ax88179_178a
+axp20x
+axp20x-i2c
+axp20x-pek
+axp20x-regulator
+axp20x_ac_power
+axp20x_adc
+axp20x_battery
+axp20x_usb_power
+axp288_adc
+axp288_charger
+axp288_fuel_gauge
+b1
+b1dma
+b1pci
+b2c2-flexcop
+b2c2-flexcop-pci
+b2c2-flexcop-usb
+carl9170
+carminefb
+cassini
+cast5_generic
+cast6_generic
+cast_common
+catc
+cb710
+cb710-mmc
+cb_pcidas
+cb_pcidas64
+cb_pcidda
+cb_pcimdas
+cb_pcimdda
+cc2520
+cc770
+cc770_isa
+cc770_platform
+ccm
+ccree
+ccs8111
+cdc-acm
+cdc-phonet
+cdc-wdm
+cdc_eem
+cdc_ether
+cdc_mbim
+cdc_ncm
+cdc_subset
+cecc
+ceph
+cfg80211
+cfi_cmdset_0001
+cfi_cmdset_0002
+cfi_cmdset_0020
+cfi_probe
+cfi_util
+cfspi_slave
+ch
+ch341
+ch7006
+ch9200
+chacha20_generic
+chacha20poly1305
+chaoskey
+charlcd
+chash
+cher
+cx231xx
+cx231xx-alsa
+cx231xx-dvb
+cx2341x
+cx23885
+cx24110
+cx24113
+cx24116
+cx24117
+cx24120
+cx24123
+cx25821
+cx25821-alsa
+cx25840
+cx82310_eth
+cx88-alsa
+cx88-blackbird
+cx88-dvb
+cx88-vp3054-i2c
+cx8800
+cx8802
+cx88xx
+cxacru
+cxd2099
+cxd2820r
+cxd2841er
+cxgb
+cxgb3
+cxgb3i
+cxgb4
+cxgb4i
+cxgb4vf
+cxgb4bit
+cxl
+cxlflash
+cy8ctmg110_ts
+cyapatp
+cyber2000fb
+cyberjack
+cyclades
+cypress_cy7c63
+cypress_firmware
+cypress_m8
+cytherm
+cyttsp4_core
+cyttsp4_i2c
+cyttsp4_spi
+cyttsp_core
+cyttsp_i2c
+cyttsp_i2c_common
+cyttsp_spi
+da280
+da311
+da9030_battery
+da9034-ts
+da903x
+da903x_bl
+da9052-battery
+da9052-hwmon
+da9052-regulator
+da9052_bl
+da9052_onkey
+da9052_tsi
+da9052_wdt
+da9055-hwmon
+da9055-regulator
+da9055_onkey
+da9055_wdt
+da9062-core
+da9062-regulator
+da9062-thermal
+da9062_wdt
+da9063-regulator
+da9063_onkey
+da9063_wdt
+da9150-charger
+da9150-core
+da9150-fg
+da9150-gpadc
+da9210-regulator
+da9211-regulator
+dac02
+daqboard2000
+das08
+das08_isa
+das08_pci
+das16
+das16m1
+das1800
+das6402
+das800
+davicom
+dax_pmem
+db9
+dc395x
+dccp
+dcp_diag
+dcp_ipv4
+dcp_ipv6
+dcp_probe
+ddbridge
+de2104x
+de4x5
+decent
+deflate
+defxx
+denali
+denali_pci
+des_generic
+device_dax
+devlink
+dgnc
+dht11
+dib0070
+dib0090
+dib3000mb
+dib3000mc
+dib7000m
+dib7000p
+dib8000
+dibx000_common
+digi_acceleport
+digicolor-usart
+diskonchip
+diva_idi
+diva_mnt
+divacapi
+divadidd
+divas
+dil2k
+dldi
+dlink-dir685-touchkeys
+dlm
+dln2
+dln2-adc
+dm-bio-prison
+dm-bufio
+dm-cache
+dm-cache-smq
+dm-crypt
+dm-delay
+dm-era
+dm-flakey
+dm-integrity
+dm-log
+dm-log-userspace
+dm-log-writes
+dm-mirror
+dm-multipath
+dm-persistent-data
+dm-queue-length
+dm-raid
+dm-region-hash
+dm-round-robin
+dm-service-time
+dm-snapshot
+dm-switch
+dm-thin-pool
+dm-verity
+dm-zero
+dm-zoned
+dm1105
+dm9601
+dmard06
+dmard09
+dmard10
+dmfe
+dmm32at
+dmx3191d
+dn_rtems
+dnet
+docg3
+docg4
+dp83640
+dp83822
+dp83848
+dp83867
+dpot-dac
+drbd
+drm
+drm_kms_helper
+drop_monitor
+drv260x
+drv266x
+drv2667
+drx39xyj
+drxd
+drxk
+ds1621
+ds1682
+ds1803
+ds1wm

Open Source Used In 5GaaS Edge AC-4 17139
+earth-pt3
+cata
+ebt_802_3
+ebt_among
+ebt_arp
+ebt_arpreply
+ebt_dnat
+ebt_ip
+ebt_ip6
+ebt_limit
+ebt_log
+ebt_mark
+ebt_mark_m
+ebt_nflog
+ebt_pkttype
+ebt_redirect
+ebt_snat
+ebt_stp
+ebt_vlan
+ebtable_broute
+ebtable_filter
+ebtable_nat
+ebtables
+ec100
+ecdh_generic
+echainiv
+echo
+edt-ft5x06
+eeprom
+eeprom_93cx6
+eeprom_93xx46
+eeti_ts
+efs
+egalax_ts
+egalax_ts_serial
+ehci-platform
+ehset
+ektf2127
+elan_i2c
+elants_i2c
+elo
+em28xx
+em28xx-alsa
+em28xx-dvb
+em28xx-rc
+em28xx-v4l
+em_canid
+em_cmp
+extcon-max8997
+extcon-palmas
+extcon-rt8973a
+extcon-sm5502
+extcon-usb-gpio
+ezusb
+f2fs
+r75375s
+f81232
+f81534
+fakelb
+fan53555
+farsync
+faulty
+fb_agm1264k-fl
+fb_bd663474
+fb_ddc
+fb_hx8340bn
+fb_hx8347d
+fb_hx8353d
+fb_hx8357d
+fb_ili9163
+fb_ili9320
+fb_ili9325
+fb_ili9340
+fb_ili9341
+fb_ili9481
+fb_ili9486
+fb_pcd8544
+fb_ra8875
+fb_s6d02a1
+fb_s6d1121
+fb_sh1106
+fb_ssd1289
+fb_ssd1305
+fb_ssd1306
+fb_ssd1325
+fb_ssd1331
+fb_ssd1351
+fb_st7735r
+fb_st7789v
+fb_sys_fops
+fb_tinyled
+fb_tls8204
+fb_uc1611
+fb_uc1701
+fb_upd161704
+fb_watterott
+fbttf
+fbttf_device
+fc0011
+fc0012
+fc0013
+fc2580
+fcoe
+fcrept
+fdomain
+fdp
+fdp_i2c
+fealnx
+ff-memless
+fifd
+firedtv
+firewire-core
+firewire-net
+firewire-ohci
+firewire-sbp2
+firewire-serial
+fit2
+fit3
+fixed
+fl512
+fld
+flexcan
+flexfb
+floppy
+fm10k
+fm801-gp
+fm_drv
+fmc
+fmc-chardev
+fmc-fakedev
+fmc-trivial
+fmc-write-eeprom
+forcedeth
+fore_200e
+fotg210-hcd
+fotg210-udc
+fou
+fou6
+fpga-bridge
+fpga-mgr
+fpga-region
+freevxfs
+friq
+frpw
+fsa9480
+fsccache
+fsccore
+fsccmaster-gpio
+fsccmaster-hub
+fsccscom
+fsccedma
+fscl_luart
+ftdiflel
+ftdi_sio
+ftl
+ftststeutates
+ftussitsu_ts
+ftusb302
+g450_pll
+g760a
+g762
+g_acm_ms
+g_audio
+g_cdc
+g_dbgpp
+g_ether
+g_ffs
+g_hid
+g_mass_storage
+g_midi
+g_ncm
+g_nokia
+g_printer
+g_serial
+g_webcam
+g_zero
+gadgetfs
+gamecon
+gameport
+garmin_gps
+garp
+gb-audio-apbridgea
+gb-audio-gb
+gb-audio-manager
+gb-bootrom
+gb-es2
+gb-firmware
+gb-gbphy
+gb-gpio
+gb-hid
+gb-i2c
+gb-light
+gb-log
+gb-loopback
+gb-power-supply
+gb-pwm
+gb-raw
+gb-sdio
+gb-spi
+gb-spilib
+gb-uart
+gb-usb
+gb-vibrator
+gdmulte
+gdth
+gen_probe
+generic
+generic-adc-battery
+generic_bl
+genet
+geneve
+genwqe_card
+gf2k
+gfs2
+gigaset
+girbil-sir
+gl518sm
+gl520sm
+gl620a
+gluebi
+go7007
+go7007-loader
+go7007-usb
+goku_udc
+goodix
+gp2ap002a00f
+gp2ap020a00f
+gp8psk-fe
+gpio
+gpio-74x164
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+gpio-addr-flash
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+gpio-tps65912
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+gpio_backlight
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+hi6210-i2s
+hi6421-pmic-core
+hi6421-regulator
+hi6421v530-regulator
+hi8435
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+hts221_spi
+htu21
+huawei_cdc_ncm
+hvcs
+hvcserver
+hwa-hc
+hwa-rc
+hwmon-vid
+hwpoe-inject
+hx711
+hx8357
+hysdn
+i1480-dfu-usb
+i1480-est
+i2400m
+i2400m-usb
+i2c-algo-bit
+i2c-algo-pca
+i2c-ali1535
+i2c-ali1563
+i2c-ali15x3
+i2c-amd756
+i2c-amd8111
+i2c-arb-gpio-challenge
+i2c-cbus-gpio
+i2c-demux-pinctrl
+i2c-designware-pci
+i2c-diolan-u2c
+i2c-dln2
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+i2c-mux-pinctrl
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+i2c-nforce2
+i2c-ocores
+i2c-parport
+i2c-parport-light
+i2c-pca-platform
+i2c-piix4
+i2c-robotfuzz-osif
+i2c-simtec
+i2c-sis5595
+i2c-sis630
+i2c-sis96x
+i2c-smbus
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+i2c-viapro
+i2c-viperboard
+i2c-xiic
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+i40iw
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+i6300esb
+i740fb
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+ib_core
+ib_ipoib
+ib_iser
+ib_isert
+ib_mthca
+ib_qib
+ib_srp
+ib_srpt
+ib_umad
+ib_uverbs
+ibm-cffps
+ibmaem
+ibmpex
+ibmpowernv
+ibmveth
+ibmvfc
+ibmvnic
+ibmvscsi
+ibmvscsis
+ice40-spi
+icom
+icp
+ina3221
+industrialio
+industrialio-buffer-cb
+industrialio-configfs
+industrialio-sw-device
+industrialio-sw-trigger
+industrialio-triggered-buffer
+industrialio-triggered-event
+inet_diag
+inexio
+inftl
+initio
+input-leds
+input-polldev
+int51x1
+intel-xway
+intel_th
+intel_th_gth
+intel_th_msu
+intel_th_pci
+intel_th_pti
+intel_th_sth
+intel_vr_nor
+interact
+inv-mpu6050
+inv-mpu6050-i2c
+inv-mpu6050-spi
+io_edgeport
+io_ti
+ioc4
+iowarrior
+ip6_gre
+ip6_tables
+ip6_tunnel
+ip6_udp_tunnel
+ip6_vti
+ip6t_MASQUERADE
+ip6t_NPT
+ip6t_REJECT
+ip6t_SYNPROXY
+ip6t_ah
+ip6t_eui64
+ip6t_frag
+ip6t_hbh
+ip6t_ipv6header
+ip6t_mh
+ip6t_rpfILTER
+ip6t_rt
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+ip6table_nat
+ip6table_raw
+ip6table_security
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+ip_set
+ip_set_bitmap_ip
+ip_set_bitmap_ipmac
+ip_set_bitmap_port
+ip_set_hash_ip
+ip_set_hash_ipmac
+ip_set_hash_ipmark
+ip_set_hash_ippport
+ip_set_hash_ippportnet
+ip_set_hash_mac
+ip_set_hash_net
+ip_set_hash_netiface
+ip_set_hash_netnet
+ip_set_hash_netport
+ip_set_hash_netportnet
+ip_set_list_set
+ip_tables
+ip_tunnel
+ip_vs
+ip_vs_dh
+ip_vs_fo
+ip_vs_ft
+ip_vs_lblc
+ip_vs_lblcr
+ip_vs_lc
+ip_vs_nq
+ip_vs_ovf
+ip_vs_pe_sip
+ip_vs_rr
+ip_vs_sed
+ip_vs_sh
+ip_vs_w1c
+ip_vs_wrr
+ip_vti
+ipack
+ipaq
+ipcomp
+ipcomp6
+iphase
+ipheth
+ipip
+ipmi_devintf
+ipmi_msghandler
+ipmi_powernv
+ipmi_poweroff
+ipmi_si
+ipmi_ssh
+ipmi_watchdog
+ipoctal
+ipr
+ips
+ipt_CLUSTERIP
+ipt_ECN
+ipt_MASQUERADE
+ipt_REJECT
+ipt_SYNPROXY
+ipt_ah
+ipt_rpfilter
+iptable_filter
+iptable_mangle
+iptable_nat
+iptable_raw
+iptable_security
+ipvlan
+ipvtap
+ipw
+ipw.2100
+ipw.2200
+ipx
+ir-hix5hd2
+ir-jvc-decoder
+ir-kbd-i2c
+ir-lirc-codec
+ir-mce_kbd-decoder
+ir-nec-decoder
+ir-rc5-decoder
+ir-rc6-decoder
+ir-sanyo-decoder
+ir-sharp-decoder
+ir-sony-decoder
+ir-spi
+ir-usb
+ir-xmp-decoder
+ir35221
+ircomm
+ircomm-tty
+irda
+irda-usb
+irlan
+jc42
+jedec_probe
+jffs2
+jfs
+jmb38x_ms
+jme
+joydev
+joydump
+jr3_pci
+jsa1212
+jsm
+kafs
+kalmia
+kaweth
+kbic
+kbtab
+kcm
+kcomedilib
+ke_counter
+kemplied-core
+kemplied_wdt
+kernelcapi
+keyspan
+keyspan_pda
+keyspan_remote
+keywrap
+kfifo_buf
+khadad
+kingsun-sir
+kl5kusb105
+kmx61
+ko2iblnad
+kobi_sct
+ks0108
+ks7010
+ks8842
+ks8851
+ks8851_mll
+ks959-sir
+ksdazzle-sir
+ksocklnd
+ksz884x
+ksz_common
+ksz_spi
+kttt
+kvaiser_pci
+kvaiser_usb
+kvm
Open Source Used In 5GaaS Edge AC-4 17162

+kvm-hv
+kvm-pr
+kxcjkl-1013
+kxxsd9
+kxxsd9-i2c
+kxxsd9-spi
+kxtj9
+kyber-iosched
+kyrofb
+11oip
+l2tp_core
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+lan9303_mdio
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+l9040
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+leds-tlc591xx
+leds-wm831x-status
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+macsec
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+micrel
+microchip
+micread
+micread_i2c
+microtek
+mii
+minix
+mip6
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+mpthbase
+mpctl
+mptfc
+mptlan
+mptsa
+mptscsih
+mptsppi
+mpt3050
+mq-deadline
+mrf24j40
+mrp
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+ms_sensors_i2c
+mscc
+msdos
+msi001
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+mt312
+mt352
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+mt9v022
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+mtd_dataflash
+mtdblock
+mtdblock_ro
+mtdoops
+mtdram
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+mtip32xx
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+mtk-sd
+mtouch
+multipath
+multiq3
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+mux-core
+mux-gpio
+mux-mmio
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+mv88e6xxx
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+mv_udc
+mvmdio
+mvpsas
+mvumi
+mwifiex
+mwifiex_pcie
+mwifiex_sdio
+mwifiex_usb
+mwifiex_sdio
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+mx8
+mx8c4005
+mx8c6255
+mx1111sf-demod
+mx1111sf-tuner
+mx1301rf
+mx15005s
+mx15007t
+mx15xx
+mxser
+mxuport
+myri10ge
+n5pf
+n_gsm
+n_hdlc
+n_tracerouter
+n_tracesink
+nand
+nand_bch
+nand_ecc
+nandsim
+national
+natsemi
+nau7802
+navman
+nb8800
+nbd
+nci
+nci_spi
+nci_uart
+ncpfs
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+nct7904
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+neofb
+net1080
+net2272
+net2280
+netconsole
+netjet
+netlink_diag
+netrom
+netup-unidvb
+netxen_nic
+newtonkbd
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+nf_conntrack_amanda
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+nf_conntrack_ipv6
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+nf_conntrack_tftp
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+nf_nat_masquerade_ipv4
+nf_nat_masquerade_ipv6
+nf_nat_pptp
+nf_nat_proto_gre
+nf_nat_redirect
+nf_nat_sip
+nf_nat_snmp_basic
+nf_nat_tftp
+nf_reject_ipv4
+nf_reject_ipv6
+nf_socket_ipv4
+nf_socket_ipv6
+nf_synproxy_core
+nf_tables
+nf_tables_arp
+nf_tables_bridge
+nf_tables_inet
+nf_tables_ipv4
+nf_tables_ipv6
+nf_tables_netdev
+nfc
+nfc_digital
+nfcmrvl
+nfcmrvl_i2c
+nfcmrvl_spi
+nfcmrvl_uart
+nfcmrvl_usb
+nfcim
+nfnetlink
+nfnetlink_acct
+nfnetlink_cethelper
+nfnetlink_cctimeout
+nfnetlink_log
+nfnetlink_queue
+nfp
+nfs
+nfs_acl
+nfs_layout_flexfiles
+nfs_layout_nfsv41_files
+nfsd
+nfsv2
+nfsv3
+nfsv4
+nft_chain_nat_ipv4
+nft_chain_nat_ipv6
+nft_chain_route_ipv4
+nft_chain_route_ipv6
+nft_compat
+nft_counter
+nft_ct
+nft_dup_ipv4
+nft_dup_ipv6
+nft_dup_netdev
+nft_exthdr
+nft_fib
+nft_fib_inet
+nft_fib_ipv4
+nft_fib_ipv6
+nft_fib_netdev
+nft_fwd_netdev
+nft_hash
+nft_limit
+nft_log
+nft_masq
+nft_masq_ipv4
+nft_masq_ipv6
+nft_meta
+nft_meta_bridge
+nft_nat
+nft_numgen
+nft_objref
+nft_queue
+nft_quota
+nft_redir
+nft_redir_ipv4
+nft_redir_ipv6
+nft_reject
+nft_reject_bridge
+nft_reject_inet
+nft_reject_ipv4
+nft_reject_ipv6
+nft_RT
+nft_set_bitmap
+nft_set_hash
+nft_set_rbtree
+nftl
+ngene
+nhc_dest
+nhc_fragment
+nhc_hop
+nhc_ipv6
+nhc_mobility
+nhc_routing
+nhc_udp
+ni_6527
+ni_65xx
+ni_660x
+ni_670x
+ni_at_a2150
+ni_at_a0
+ni_atmio
+ni_atmio16d
+ni_labpc
+ni_labpe_common
+ni_labpe_isadma
+ni_labpe_pci
+ni_pcidio
+ni_pcmio
+ni_tio
+ni_tiocmd
+ni_usb6501
+nicpf
+nicstar
+nicvf
+nifs2
+niu
+nlmon
+nls_ascii
+nls_cp1250
+nls_cp1251
+nls_cp1255
+nls_cp737
+nls_cp775
+nls_cp850
+nls_cp852
+nls_cp855
+nls_cp857
+nls_cp860
+nls_cp861
+nls_cp862
+nls_cp863
+orinoco
+orinoco_nortel
+orinoco_plx
+orinoco_tmd
+orinoco_usb
+osc
+osd
+osst
+ol6858
+ov2640
+ov5642
+ov7640
+ov7670
+ov772x
+ov9640
+ov9740
+overlay
+oxu210hp-hcd
+p54common
+p54pci
+p54spi
+p54usb
+p8022
+p8023
+pa12203001
+palmas-pwrbutton
+palmas-regulator
+palmas_gpadc
+pandora_bl
+panel
+panel-innolux-p079zca
+panel-jdi-lt070me05000
+panel-lg-lg4573
+panel-lvds
+panel-orisetech-otm8009a
+panel-panasonic-vvx10f034a00
+panel-raspberrypi-touchscreen
+panel-samsung-ld9040
+panel-samsung-s6e3ha2
+panel-samsung-s6e63j0x03
+panel-samsung-s6e8aa0
+panel-seiko-43wvf1g
+panel-sharp-lq101r1sx01
+panel-sharp-ls043t1le01
+panel-simple
+panel-sitronix-st7789v
+parade-ps8622
+paride
+pn544
+pn544_i2c
+po_pep
+pv-phi
+poly1305_generic
+port100
+powermate
+powernv-op-panel
+powernv-rng
+powernv_flash
+powr1220
+ppa
+ppdev
+ppp_async
+ppp_deflate
+ppp_mppe
+ppp_synctty
+pppoatm
+pppoe
+pppox
+pps-gpio
+pps-ldisc
+pps_parport
+pptp
+pretimout_panic
+prism2_usb
+ps2-gpio
+ps2mult
+psample
+pseries-rng
+pseries_energy
+psmouse
+psnap
+psxpad-spi
+pt
+pthrpc
+pulse8-ccce
+pulsedlight-lidar-lite-v2
+pv88060-regulator
+pv88080-regulator
+pv88090-regulator
+pvrusb2
+pwc
+pwm-beeper
+pwm-fan
+pwm-fsl-ftm
+pwm-ir-tx
+pwm-lp3943
+pwm-pca9685
+pwm-regulator
+pwm-tw1
+pwm-tw1-led
+pwm-vibra
+pwm_bl
+pwrseq_emmc
+pwrseq_sd8787
+pwrseq_simple
+pxa27x_udc
+qca8k
+qca_7k_common
+qcaspi
+qcauart
+qcaux
+qcom-emac
+qcom-spmi-iadc
+qcom-spmi-temp-alarm
+qcom-spmi-vadc
+qcom-vadc-common
+qcom_glink_native
+qcom_glink_rpm
+qcom_spmi-regulator
+qcserial
+qed
+qede
+qedf
+qedi
+qedr
+qinfo_probe
+qla1280
+qla2xxx
+qla3xxx
+qla4xxx
+qlcnic
+qlge
+qm1d1c0042
+qmi_wwan
+qnx4
+qnx6
+qoriq_thermal
+qsemi
+qt1010
+qt1070
+qt2160
+qtnfmac
+qtnfmac_pearl_pcie
+quatech2
+rc-anysee
+rc-apac-viewcomp
+rc-astrometa-t2hybrid
+rc-asus-pc39
+rc-asus-ps3-100
+rc-ati-tv-wonder-hd-600
+rc-ati-x10
+rc-avermedia
+rc-avermedia-a16d
+rc-avermedia-cardbus
+rc-avermedia-dvbt
+rc-avermedia-m135a
+rc-avermedia-m733a-rm-k6
+rc-avermedia-rm-ks
+rc-avertv-303
+rc-azurewave-ad-tu700
+rc-behold
+rc-behold-columbus
+rc-budget-ci-old
+rc-cec
+rc-cinergy
+rc-cinergy-1400
+rc-core
+rc-d680-dmb
+rc-delock-61959
+rc-dib0700-nec
+rc-dib0700-rc5
+rc-digitalnow-tinytwin
+rc-digittrade
+rc-dm1105-nec
+rc-dntv-live-dvb-t
+rc-dntv-live-dvbt-pro
+rc-dtt200u
+rc-dvbsky
+rc-dvico-mce
+rc-dvico-portable
+rc-em-terratec
+rc-encore-enltv
+rc-encore-enltv-fm53
+rc-encore-enltv2
+rc-evga-indtube
+rc-eztv
+rc-flydvb
+rc-flyvideo
+rc-fusionhdtv-mce
+rc-gadmei-rm008z
+rc-geekbox
+rc-genius-tvgo-al1mce
+rc-gotview7135
+rc-hauppauge
+rc-hisi-poplar
+rc-hisi-tv-demo
+rc-imon-mce
+rc-imon-pad
+rc-iodata-bctv7e
+rc-it913x-v1
+rc-it913x-v2
+rc-kaiomy
+rc-kworld-315u
+rc-kworld-pc150u
+rc-kworld-plus-tv-analog
+rc-leadtek-y04g0051
+rc-lme2510
+rc-loopback
+rc-manli
+rc-medion-x10
+rc-medion-x10-digitainer
+rc-medion-x10-or2x
+rc-msi-digivox-ii
+rc-msi-digivox-iii
+rc-msi-tvanywhere
+rc-msi-tvanywhere-plus
+rc-nebula
+rc-nec-terratec-cinergy-xs
+rc-norwood
+rc-nptgtech
+rc-pctv-sedna
+rc-pinnacle-color
+rc-pinnacle-grey
+rc-pinnacle-pctv-hd
+rc-pixelview
+rc-pixelview-002t
+rc-pixelview-mk12
+rc-pixelview-new
+rc-powercolor-real-angel
+rc-proteus-2309
+rc-purpletv
+rc-pv951
+rc-rc6-mce
+rc-real-audio-220-32-keys
+rc-reddo
+rc-snapstream-firefly
+rc-streamzap
+rc-su3000
+rc-tango
+rc-tbs-nec
+rfcomm
+rfd77402
+rfd_fft
+rfkill-gpio
+rio-scan
+rio_cm
+rio_import_cdev
+rionet
+rivafb
+rj54n1cb0c
+rk805-pwrkey
+rk808
+rk808-regulator
+rmd128
+rmd160
+rmd256
+rmd320
+rmi_core
+rmi_i2c
+rmi_smbus
+rmi_spi
+rmnet
+m5618
+m5618-regulator
+m5618_wdt
+rndis_host
+rndis_wlan
+rockchip
+rocket
+rocket
+rohm_bu21023
+romfs
+rose
+rotary_encoder
+rp2
+rpdlpar_io
+rpaphp
+rpcrdma
+rpcsec_gss_krb5
+rpmsg_char
+rpmsg_core
+rpr0521
+rrpc
+rsi_91x
+rsi_sdio
+rsi_usb
+rsxx
+rt2400pci
+rtc-frt010
+rtc-hid-sensor-time
+rtc-hym8563
+rtc-isl12022
+rtc-isl1208
+rtc-lp8788
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+rtc-max8907
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+rtc-tps65910
+rtc-tps80031
+rtc-tw1
+rtc-v3020
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+rtc-wm8350
+rtc-x1205
+rtc-zynqmp
+rtc_cmos_setup
+rti520
+rti800
+rti802
+rtl2830
+rtl2832
+rtl2832_sdr
+rtl8150
+rtl8187
+rtl8188ee
+rtl8188x_pci
+rtl8192c-common
+rtl8192ce
+rtl8192cu
+rtl8192de
+rtl8192ee
+rtl8192se
+rtl8723-common
+rtl8723ae
+rtl8723be
+rtl8821ae
+rtl8xxxu
+rtl_pci
+rtl_usb
+rtllib
+rtllib_crypt_ccmp
+rtllib_crypt_tkip
+rtllib_crypt_wep
+rtlwifi
+rt5208
+rtlx_pci
+rtsx_pci
+rtsx_pci_ms
+rtsx_pci_sdmmc
+rtlx_usb
+rtsx_usb_ms
+rtsx_usb_sdmmc
+rx51_battery
+rxrpc
+s1d13xxxfb
+s2250
+s2255drv
+s2io
+s2mpa01
+s2mps11
+s3fb
+s3fwrn5
+s3fwrn5_i2c
+s526
+s5h1409
+s5h1411
+s5h1420
+s5m8767
+s626
+s6e63m0
+s6sy761
+s921
+saa6588
+saa6752hs
+saa7115
+saa7127
+saa7134
+saa7134-alsa
+saa7134-dvb
+saa7134-empress
+saa7134-g07007
+saa7146
+saa7146_vv
+saa7164
+saa717x
+saa7706h
+safe_serial
+salsa20_generic
+samsung-sxgbe
+sata_dwc_460ex
+sata_inic162x
+sata_mv
+sata_nv
+sata_promise
+sata_qstor
+sata_sil
+sata_sil24
+sata_sis
+sata_svw
sata_sx4
sata_uli
sata_via
sata_vsc
savagefb
sbp_target
sbs-battery
sbs-charger
sbs-manager
sc16is7xx
sc92031
sca3000
scanlog
sch_atm
sch_cbq
sch_cbs
sch_choke
sch_codel
sch_drr
sch_dsmark
sch fq
sch fq_codel
sch_gred
sch_hfsc
sch_hhf
sch_htb
sch_ingress
sch_mqprio
sch_multiq
sch_netem
sch_pie
sch_plug
sch_prio
sch_qfq
sch_red
sch_sfb
sch_sfq
sch_tbf
sch_teql
scsi_debug
scsi_dh_ala
scsi_dh_emc
scsi_dh_hp_sw
scsi_dh_rdac
scsi_transport_fc
scsi_transport_iscsi
scsi_transport_sas
scsi_transport_spi
+sctp
+sctp_diag
+sctp_probe
+sdhci
+sdhci-cadence
+sdhci-of-at91
+sdhci-of-esdhc
+sdhci-of-hlwd
+sdhci-omap
+sdhci-pci
+sdhci-pltfm
+sdhci-xenon-driver
+sdhci_f_sdh30
+sdio_uart
+seed
+sensorhub
+ser_gigaset
+serial2002
+serial_ir
+serio_raw
+sermouse
+serpent_generic
+serport
+ses
+sfc
+sfc-falcon
+sh_veu
+sha1-powerpc
+sha3_generic
+shark2
+sht15
+sht21
+sht3x
+shtc1
+si1145
+si2157
+si2165
+si2168
+si21xx
+si4713
+si476x-core
+si7005
+si7020
+sidewinder
+sierra
+sierra_net
+siii902x
+siii9234
+sil-sii8620
+sil164
+silead
+sir-dev
+sir_ir
+sirf-audio-codec
+sis190
+sis5595
+sis900
+sis_i2c
+sisfb
+sisusbvga
+sit
+sja1000
+sja1000_isa
+sja1000_platform
+skd
+skfp
+skge
+sky2
+sky81452
+sky81452-backlight
+sky81452-regulator
+sl811-hcd
+slcan
+slcbranch
+slip
+slram
+sm3_generic
+sm501
+sm501fb
+sm712fb
+sm750fb
+sm_common
+sm_ftl
+smapti
+smb347-charger
+smc
+smc_diag
+smipcie
+smmm665
+smsec
+smsec-irc2
+smsec47m192
+smsec75xx
+smsec911x
+smsec9420
+smsec95xx
+snd-mtpav
+snd-mts64
+snd-nm256
+snd-opl3-lib
+snd-opl3-synth
+snd-oxfw
+snd-oxygen
+snd-oxygen-lib
+snd-pcm
+snd-pcm-dmaengine
+snd-pcxhr
+snd-portman2x4
+snd-pt2258
+snd-rawmidi
+snd-riptide
+snd-rme32
+snd-rme96
+snd-rme9652
+snd-sb-common
+snd-seq
+snd-seq-device
+snd-seq-dummy
+snd-seq-midi
+snd-seq-midi-emul
+snd-seq-midi-event
+snd-seq-virmidi
+snd-serial-u16550
+snd-soc-ac97
+snd-soc-acp-rt5645-mach
+snd-soc-adau-utils
+snd-soc-adau1701
+snd-soc-adau1761
+snd-soc-adau1761-i2c
+snd-soc-adau1761-spi
+snd-soc-adau17x1
+snd-soc-adau7002
+snd-soc-ak4104
+snd-soc-ak4554
+snd-soc-ak4613
+snd-soc-ak4642
+snd-soc-ak5386
+snd-soc-alc5623
+snd-soc-audio-graph-card
+snd-soc-audio-graph-scu-card
+snd-soc-bt-sco
+snd-soc-core
+snd-soc-cs35132
+snd-soc-cs35133
+snd-soc-wm8776
+snd-soc-wm8804
+snd-soc-wm8804-i2c
+snd-soc-wm8804-spi
+snd-soc-wm8903
+snd-soc-wm8960
+snd-soc-wm8962
+snd-soc-wm8974
+snd-soc-wm8978
+snd-soc-wm8985
+snd-soc-xtfpga-i2s
+snd-soc-zx-aud96p22
+snd-sonicvibes
+snd-timer
+snd-trident
+snd-ua101
+snd-usb-6fire
+snd-usb-audio
+snd-usb-caiaq
+snd-usb-hiface
+snd-usb-line6
+snd-usb-pod
+snd-usb-podhd
+snd-usb-toneport
+snd-usb-usx2y
+snd-usb-variax
+snd-usbmidi-lib
+snd-util-mem
+snd-via82xx
+snd-via82xx-modem
+snd-virmidi
+snd-virtuoso
+snd-vx-lib
+snd-vx222
+snd-ymfpci
+snic
+snps_udc_core
+snps_udc_plat
+soc_button_array
+soc_camera
+soc_camera_platform
+soc_mediabus
+softdog
+softing
+solo6x10
+solos-pci
+sony-btf-mpx
+soundcore
+sp2
+sp8870
+sp887x
+spaceball
+spaceorb
+sparse-keymap
+spcp8x5
+speakup
+speakup_acnts
+speakup_apollo
+speakup_audptr
+speakup_bns
+speakup_decx
+speakup_dectlk
+speakup_dummi
+speakup_ltlk
+speakup_soft
+speakup_spkout
+speakup_tpxrt
+speedfax
+speedtch
+spi-alter
+spi-axi-spi-engine
+spi-bitbang
+spi-butterfly
+spi-cadence
+spi-dln2
+spi-dw
+spi-dw-midpci
+spi-dw-mmio
+spi-gpio
+spi-lm70llp
+spi-loopback-test
+spi-nor
+spi-oc-tiny
+spi-pxa2xx-platform
+spi-sc18is602
+spi-slave-system-control
+spi-slave-time
+spi-tle6x0
+spi-xcomm
+spi_zynqmp-gqspi
+spi_ks8995
+spidev
+spl
+splat
+spmi
+sr9700
Open Source Used In 5GaaS Edge AC-4

+stir4200
+stk1160
+stk3310
+stk8312
+stk8ba50
+stkwebcam
+stm_console
+stm_core
+stm_ftrace
+stm_heartbeat
+stmfts
+stmmac
+stmmac-platform
+stmpe-keypad
+stmpe-ts
+stowaway
+stp
+streamzap
+stts751
+stv0288
+stv0297
+stv0299
+stv0367
+stv0900
+stv090x
+stv0910
+stv6110
+stv6110x
+stv6111
+sundance
+sungem
+sungem_phy
+sunhme
+suni
+sunkbd
+sunrpc
+sur40
+surface3_spi
+svgalib
+switchtec
+sx8
+sx8654
+sx9500
+sym53c8xx
+symbolserial
+synaptics_i2c
+synaptics_usb
+synclink
+synclink_gt
+synclinkmp
+syscon-reboot-mode
+syscopyarea
+sysfillrect
+sysimgblt
+sysv
+t1pci
+5403
+tap
+target_core_file
+target_core_iblock
+target_core_mod
+target_core_pscsi
+target_core_user
+tc-dwc-g210
+tc-dwc-g210-pci
+tc-dwc-g210-pltfrm
+tc358767
+tc3589x-keypad
+tc654
+tc74
+tc90522
+tca6416-keypad
+tca8418_keypad
+tcm_fc
+tcm_loop
+tcm_qla2xxx
+tcm_usb_gadget
+tcp_bbr
+tcp_bic
+tcp_cdg
+tcp_dctcp
+tcp_diag
+tcp_highspeed
+tcp_htcp
+tcp_hybla
+tcp_illinois
+tcp_lp
+tcp_nv
+tcp_probe
+tcp_scalable
+tcp_vegas
+tcp_veno
+tcp_westwood
+tcp_yeah
+tcpci
+tcpm
+tcrypt
+tcs3414
+tcs3472
+tda10021
+tda10023
+tda10048
+tda1004x
+tda10071
+tda10086
+tda18212
+tda18218
+tda18271
+tda18271c2dd
+tda665x
+tda7432
+tda8083
+tda8261
+tda826x
+tda827x
+tda8290
+tda9840
+tda9887
+tda998x
+tdfxfb
+tdo24m
+tea
+tea575x
+tea5761
+tea5767
+tea6415c
+tea6420
+team
+team_mode_activebackup
+team_mode_broadcast
+team_mode_loadbalance
+team_mode_random
+team_mode_roundrobin
+tef6862
+tehuti
+tekram-sir
+teranetics
+test_bpf
+test_firmware
+test_module
+test_power
+test_static_key_base
+test_static_keys
+test_udelay
+test_user_copy
+tg3
+tg192
+thermal-generic-adc
+thmc50
+thunder_bgx
+thunder_xcv
+ti-adc081c
+ti-adc0832
+ti-adc084s021
+ti-adc108s102
+ti-adc12138
+ti-adc128s052
+ti-adc161s626
+ti-ads1015
+ti-ads7950
+ti-ads8688
+ti-dac082s085
+ti-lmu
+ti-tp410
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phy_ethtool_sset
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phy_ethtool_get_link_ksettings
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mdio_device_get

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<td>net/ceph/libceph 0x3f335e1cehp_copy_from_page_vector</td>
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+EXPORT_SYMBOL net/rxrpc/rxrpc 0xf72cee96 rxrpc_kernel_abort_call
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+EXPORT_SYMBOL vmlinux 0x01000e51 schedule
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+EXPORT_SYMBOL vmlinux 0xa4339634ip_mc_dec_group
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+EXPORT_SYMBOL vmlinux 0xa45310c2path_nosuid
+EXPORT_SYMBOL vmlinux 0xa499c33dsimple_setattr
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+EXPORT_SYMBOL vmlinux 0xa4c2ab9finode_sub_bytes
+EXPORT_SYMBOL vmlinux 0xa4c41694kstrtos16_from_user
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+EXPORT_SYMBOL vmlinux 0xa531f390pci_request_regions
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+EXPORT_SYMBOL vmlinux 0xbfe78fa5pci_wait_for_pending_transaction
+EXPORT_SYMBOL vmlinux 0xbfeec3d5loop_unregister_transfer
+EXPORT_SYMBOL vmlinux 0xbf4733escm_fp_dup
+EXPORT_SYMBOL vmlinux 0xbff64b9kmemdup_null
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+EXPORT_SYMBOL vmlinux 0xc0a7f671seq_escape
+EXPORT_SYMBOL vmlinux 0xc0b00f5cd_instantiate_no_diralias
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+EXPORT_SYMBOL vmlinux 0xc0e2ec8babort
+EXPORT_SYMBOL vmlinux 0xc0e7b567percpu_counter_add_batch
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+EXPORT_SYMBOL vmlinux 0xc1d8cfaf__fdget
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+EXPORT_SYMBOL vmlinux 0xda647b8b4end_buffer_write_sync
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+EXPORT_SYMBOL vmlinux 0xd64d25fa-security_socket_getpeersec_dgram
+EXPORT_SYMBOL vmlinux 0xd666a588smp_ctl_clear_bit
+EXPORT_SYMBOL vmlinux 0xd67ed342tty_lock
+EXPORT_SYMBOL vmlinux 0xd688716bdm_kcopyd_client_create
+EXPORT_SYMBOL vmlinux 0xd69ef97dposix_acl_alloc
+EXPORT_SYMBOL vmlinux 0xd6a5732fdrom_dummy_generic_packet
+EXPORT_SYMBOL vmlinux 0xd6a78f14jbd2_journal_force_commit
+EXPORT_SYMBOL vmlinux 0xd6ab9bbmd_cluster_ops
+EXPORT_SYMBOL vmlinux 0xd6c92ac8dev_me_sync
+EXPORT_SYMBOL vmlinux 0xd6d57cc8vm_unregister_tgt_type
+EXPORT_SYMBOL vmlinux 0xd6d91dd6simple_pin_fs
+EXPORT_SYMBOL vmlinux 0xd6dc0d88match__u64
+EXPORT_SYMBOL vmlinux 0xd6e465ebblk_run_queue
+EXPORT_SYMBOL vmlinux 0xd6e688fvmalloc
+EXPORT_SYMBOL vmlinux 0xd6f38517security_xfrm_policy_alloc
+EXPORT_SYMBOL vmlinux 0xd6fcfedquot_drop
+EXPORT_SYMBOL vmlinux 0xd6fde043is_module_sig_enforced
+EXPORT_SYMBOL vmlinux 0xd70d35a1gf128mul_4k_bbe
+EXPORT_SYMBOL vmlinux 0xd73957feip_defrag
+EXPORT_SYMBOL vmlinux 0xd73b16fcmidiobus_setup_mdiodev_from_board_info
+EXPORT_SYMBOL vmlinux 0xd75c79dsmmp_call_function
+EXPORT_SYMBOL vmlinux 0xd76ff878__xfrm_init_state
+EXPORT_SYMBOL vmlinux 0xd79d8cf3crypto_sha512_update
+EXPORT_SYMBOL vmlinux 0xd79e6b6fiunique
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+EXPORT_SYMBOL vmlinux 0xd7bacd85misc_deregister
+EXPORT_SYMBOL vmlinux 0xd7d280adirc_poll_complete
+EXPORT_SYMBOL vmlinux 0xd83849e2ZSTD__getDictID_fromFrame
+EXPORT_SYMBOL vmlinux 0xd83957feip_defrag
+EXPORT_SYMBOL vmlinux 0xd8486086path_is_under
+EXPORT_SYMBOL vmlinux 0xd8565d3ctcp_create_openreq_child
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+EXPORT_SYMBOL vmlinux 0xd890e93amdv_recovery
+EXPORT_SYMBOL vmlinux 0xd89da37fmovable_zone
+EXPORT_SYMBOL vmlinux 0xd8aa574b1cgroup_bpf_enabled_key
+EXPORT_SYMBOL vmlinux 0xd8a994ebcsctl_extd_sense_format
+EXPORT_SYMBOL vmlinux 0xd8b1e4f8fsencrypt_f-name_free_buffer
+EXPORT_SYMBOL vmlinux 0xd8ded085radius_tree_maybe_preload
+EXPORT_SYMBOL vmlinux 0xd8e484f0register_chrdev_region
+EXPORT_SYMBOL vmlinux 0xd8ec822fdev_addr_flush
+EXPORT_SYMBOL vmlinux 0xd8fcda72ccpm
+EXPORT_SYMBOL vmlinux 0xd90043b5vm_zone_stat
+EXPORT_SYMBOL vmlinux 0xd90cd532netif_carrier_on
+EXPORT_SYMBOL vmlinux 0xd92f5487__pskb_pull_tail

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+EXPORT_SYMBOL vmlinux 0xd94b4644vfs_setpos
+EXPORT_SYMBOL vmlinux 0xd9502ec8scsi_report_bus_reset
+EXPORT_SYMBOL vmlinux 0xd962fc69neigh_direct_output
+EXPORT_SYMBOL vmlinux 0xd964f77fnetdev_recnt_read
+EXPORT_SYMBOL vmlinux 0xd96de8cb__sysfs_match_string
+EXPORT_SYMBOL vmlinux 0xd9836adneigh_parms_release
+EXPORT_SYMBOL vmlinux 0xd985dc99mempool_free_pages
+EXPORT_SYMBOL vmlinux 0xd9a5e583bcomplete_all
+EXPORT_SYMBOL vmlinux 0xd9b3f977consoledevno
+EXPORT_SYMBOL vmlinux 0xda11b09tcp_init_sock
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+EXPORT_SYMBOL vmlinux 0xda393856inode_add_bytes
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+EXPORT_SYMBOL vmlinux 0xda72a7ecZSTD_nextInputType
+EXPORT_SYMBOL vmlinux 0xda99237edevm_gpiod_get_index_optional
+EXPORT_SYMBOL vmlinux 0xda9e234fbblk_queue_init_tags
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+EXPORT_SYMBOL_GPL drivers(hwtracing/stm/stm_core 0x060f4ae6stm_source_write
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+EXPORT_SYMBOL_GPL drivers(md/bcache/bcache 0x34731cfstm_register_device
+EXPORT_SYMBOL_GPL drivers(md/bcache/bcache 0x6f435d94stm_source_register_device
+EXPORT_SYMBOL_GPL drivers(md/bcache/bcache 0x7a047bedstm_source_unregister_device
+EXPORT_SYMBOL_GPL drivers(md/bcache/bcache 0xb21bc198stm_unregister_device
+EXPORT_SYMBOL_GPL drivers(infiniband/sw/rxe/rdma_rxe 0xeb1b8402rxe_dev_put
+EXPORT_SYMBOL_GPL drivers(md/bcache/bcache 0xb21bc198stm_unregister_device
+EXPORT_SYMBOL_GPL drivers(infiniband/sw/rxe/rdma_rxe 0xeb1b8402rxe_dev_put

+EXPORT_SYMBOL_GPL drivers/net/ethernet/mellanox/mlx5/core/mlx5_core 0x424ea06bmlx5_core_mad_ifc
+EXPORT_SYMBOL_GPL drivers/net/ethernet/mellanox/mlx5/core/mlx5_core 0x437be8d3
mlx5_core_destroy_qp
+EXPORT_SYMBOL_GPL drivers/net/ethernet/mellanox/mlx5/core/mlx5_core 0x4403219e
mlx5_query_port_vl_bw_cap
+EXPORT_SYMBOL_GPL drivers/net/ethernet/mellanox/mlx5/core/mlx5_core 0x46575ffemlx5_DB_free
mlx5_query_nic_vport_mac_address
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bcm_phy_read_misc
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bcm_phy_write_misc
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fixed_phy_register
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+EXPORT_SYMBOL_GPL drivers/net/phy/libphy 0xae480c86
phy_enable_apd
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genphy_c45_read_link
+IMPORT_SYMBOL_GPL drivers/net/phy/libphy 0x2a0a40fa
mdio_enablebus
+IMPORT_SYMBOL_GPL drivers/net/phy/libphy 0x4a2cefc1
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+IMPORT_SYMBOL_GPL drivers/net/phy/libphy 0xae480c86
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+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x136ababfiscsi_complete_pdu
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x18a2a693iscsi_session_failure
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x198b8dcfbiisci_put_task
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x2b887534iscsi_it_to_task
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x2d74d9a9iscsi_conn_setup
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x34e1792eiscsi_eh_recover_target
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+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x6c37e3bisiscsi_eh_cmd.timed_out
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x750e34a8iscsi_eh_device_reset
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x760799f0iscsi_put_task
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+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0x80e9e702iscsi_update_cmdsn
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+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0xf76bea3iscsi_conn.failure
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi 0xf77bd403iscsi_conn_recovery_timedout
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x0f139e3ciscsi_tcp_task_init
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x2944b9dificsi_tcp_segment.unmap
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x3a8200biscsi_tcp_r2pool.alloc
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x3c364a30iscsi_tcp_conn_setup
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x409b16e4iscsi_tcp_recv_skb
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x522d83f0iscsi_tcp_conn.teardown
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x5eb25a71iscsi_tcp_conn.get_stats
+EXPORT_SYMBOL_GPL drivers/scsi/libiscsi.tcp 0x6b19b288iscsi_tcp_task_xmit

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Open Source Used In 5GaaS Edge AC-4 17359
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_dev_has_owner
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_dev_disable_notify
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_dev_init
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_dev_init_device_iotlb
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_dev_stop
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_dequeue_msg
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_poll_init
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_check_owner
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_init_device_iotlb
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_discard_vq_desc
+EXPORT_SYMBOL_GPL drivers/vhost/vhost_vq_avail_empty
+EXPORT_SYMBOL_GPL fs/dlm/dlm_posix_unlock
+EXPORT_SYMBOL_GPL fs/dlm/dlm_posix_get
+EXPORT_SYMBOL_GPL fs/dlm/dlm_posix_lock
+EXPORT_SYMBOL_GPL fs/dlm/dlm_posix_get_lockspace
+EXPORT_SYMBOL_GPL fs/dlm/dlm_release_lockspace
+EXPORT_SYMBOL_GPL fs/dlm/dlm_unlock
+EXPORT_SYMBOL_GPL fs/dlm/dlm_posix_lockspace
+EXPORT_SYMBOL_GPL fs/dlm/dlm_posix_lockspace
+EXPORT_SYMBOL_GPL fs/lockd/nfs_file_write
+EXPORT_SYMBOL_GPL fs/lockd/nfs_lock
+EXPORT_SYMBOL_GPL fs/lockd/nfs_callback_nr_threads
+EXPORT_SYMBOL_GPL fs/lockd/nfs_release_request
+EXPORT_SYMBOL_GPL fs/lockd/nfs_callback_nr_threads
+EXPORT_SYMBOL_GPL fs/lockd/nfs_wait_on_request
+EXPORT_SYMBOL_GPL fs/lockd/nfs_initiate_commit
+EXPORT_SYMBOL_GPL fs/nfs/nfs_file_write
+EXPORT_SYMBOL_GPL fs/nfs/nfs_set_sb_security
+EXPORT_SYMBOL_GPL fs/nfs/nfs_lock
+EXPORT_SYMBOL_GPL fs/nfs/nfs_release_request
+EXPORT_SYMBOL_GPL fs/nfs/nfs_wait_on_request
+EXPORT_SYMBOL_GPL fs/nfs/nfs_initiate_commit
Open Source Used In 5GaaS Edge AC-4 17363
+EXPORT_SYMBOL_GPL fs/nfs/0x6c36064enfs_mkdir
+EXPORT_SYMBOL_GPL fs/nfs/0x6ec70d3nfs_drop_inode
+EXPORT_SYMBOL_GPL fs/nfs/0x71db3630nfs_get_client
+EXPORT_SYMBOL_GPL fs/nfs/0x721155efnfs4_label_alloc
+EXPORT_SYMBOL_GPL fs/nfs/0x748f360anfs_scan_commit_list
+EXPORT_SYMBOL_GPL fs/nfs/0x74de149etnfs_writeback_update_inode
+EXPORT_SYMBOL_GPL fs/nfs/0x75ae1babfnfs_fs_type
+EXPORT_SYMBOL_GPL fs/nfs/0x77787858nfs_show_devname
+EXPORT_SYMBOL_GPL fs/nfs/0x77a10efnfs_atomic_open
+EXPORT_SYMBOL_GPL fs/nfs/0x792304a1nfs_setattr
+EXPORT_SYMBOL_GPL fs/nfs/0x79d302e0nfs_commit_inode
+EXPORT_SYMBOL_GPL fs/nfs/0x7b578bb5nfs_create
+EXPORT_SYMBOL_GPL fs/nfs/0x7c7e4efbnfs_invalidate_atime
+EXPORT_SYMBOL_GPL fs/nfs/0x7e1fc35anfs_fhget
+EXPORT_SYMBOL_GPL fs/nfs/0x7e8e099fnfs_generic_pgio
+EXPORT_SYMBOL_GPL fs/nfs/0x7f250596nfs_version
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+EXPORT_SYMBOL_GPL net/netfilter/nft_fib 0xc9d1e4f8nft_fib_validate
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+EXPORT_SYMBOL_GPL vmlinux 0x10339722zpci_iomap_start
+EXPORT_SYMBOL_GPL vmlinux 0x1033a327virtio_add_status
+EXPORT_SYMBOL_GPL vmlinux 0x103df664ccw_device_siosl
+EXPORT_SYMBOL_GPL vmlinux 0x104ac162add_disk_randomness

Open Source Used In 5GaaS Edge AC-4 17393
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<th>Function</th>
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+EXPORT_SYMBOL_GPL vmlinux 0x743cd4depgiod_get_array_value
+EXPORT_SYMBOL_GPL vmlinux 0x743cf443key_set_timeout
+EXPORT_SYMBOL_GPL vmlinux 0x745340fevfs_listxattr
+EXPORT_SYMBOL_GPL vmlinux 0x745b1919pci_try_reset_bus
+EXPORT_SYMBOL_GPL vmlinux 0x7464aaedst_cache_set_ip4
+EXPORT_SYMBOL_GPL vmlinux 0x747f644crtlnl_af_unregister
+EXPORT_SYMBOL_GPL vmlinux 0x74b5ea68lcm_not_zero
+EXPORT_SYMBOL_GPL vmlinux 0x74ba1f7atrace_is_on
+EXPORT_SYMBOL_GPL vmlinux 0x74e051ering_buffer_unlock_commit
+EXPORT_SYMBOL_GPL vmlinux 0x74f5ef6irq_domain_xlate_twocell
+EXPORT_SYMBOL_GPL vmlinux 0x751badeip6_pol_route
+EXPORT_SYMBOL_GPL vmlinux 0x751de79crypto_unregister_instance
+EXPORT_SYMBOL_GPL vmlinux 0x7522f3bairq_modify_status
+EXPORT_SYMBOL_GPL vmlinux 0x753553b3inet_hash
+EXPORT_SYMBOL_GPL vmlinux 0x7536e41trace_seq_printf
+EXPORT_SYMBOL_GPL vmlinux 0x7544c06btpm_get_random
+EXPORT_SYMBOL_GPL vmunix 0xa6b21ef2dpm_suspend_end
+EXPORT_SYMBOL_GPL vmunix 0xa6e1a69dkick_all_cpus_sync
+EXPORT_SYMBOL_GPL vmunix 0xa71701cbdevm_device_add_group
+EXPORT_SYMBOL_GPL vmunix 0xa728815bncsi_unregister_dev
+EXPORT_SYMBOL_GPL vmunix 0xa7497162_netdev_watchdog_up
+EXPORT_SYMBOL_GPL vmunix 0xa7709871xfm_audit_state_add
+EXPORT_SYMBOL_GPL vmunix 0xa78a2e57kthread_unpark
+EXPORT_SYMBOL_GPL vmunix 0xa7b6e12birq_domain_add_legacy
+EXPORT_SYMBOL_GPL vmunix 0xa7b9de98blk_mq_unquiesce_queue
+EXPORT_SYMBOL_GPL vmunix 0xa7c1e41acdevice_move
+EXPORT_SYMBOL_GPL vmunix 0xa80d48e5bio_trim
+EXPORT_SYMBOL_GPL vmunix 0xa818a780irq_get_domain_generic_chip
+EXPORT_SYMBOL_GPL vmunix 0xa81c0764_vring_new_virtqueue
+EXPORT_SYMBOL_GPL vmunix 0xa82648baelv_rqhash_del
+EXPORT_SYMBOL_GPL vmunix 0xa84e0e04tpm_get_timeouts
+EXPORT_SYMBOL_GPL vmunix 0xa84f3eb2device_for_each_child_reverse
+EXPORT_SYMBOL_GPL vmunix 0xa851973araw_notifier_call_chain
+EXPORT_SYMBOL_GPL vmunix 0xa86784cbraw_seq_stop
+EXPORT_SYMBOL_GPL vmunix 0xa86f7d52crypto_destroy_timeline
+EXPORT_SYMBOL_GPL vmunix 0xa8948379tty_standard_install
+EXPORT_SYMBOL_GPL vmunix 0xa8ad849ekernfs_notify
+EXPORT_SYMBOL_GPL vmunix 0xa8c8d1cf newObj_hashable_insert_slow
+EXPORT_SYMBOL_GPL vmunix 0xa8d87d13smmpool_register_per_cpu_thread_cpumask
+EXPORT_SYMBOL_GPL vmunix 0xa8e57176fwnode_property_read_u8_array
+EXPORT_SYMBOL_GPL vmunix 0xa8f0bdf3probe_user_read
+EXPORT_SYMBOL_GPL vmunix 0xa9320d27ktime_get_seconds
+EXPORT_SYMBOL_GPL vmunix 0xa93897da_clocksource_update_freq_scale
+EXPORT_SYMBOL_GPL vmunix 0xa9777aaeefn_to_memsnode
+EXPORT_SYMBOL_GPL vmunix 0xa9789d99housekeeping_test_cpu
+EXPORT_SYMBOL_GPL vmunix 0xa99b7041fforeach_kernel_tracepoint
+EXPORT_SYMBOL_GPL vmunix 0xa99f02b9sock_diag_register
+EXPORT_SYMBOL_GPL vmunix 0xa9a1907cryptoremove_spawns
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+EXPORT_SYMBOL_GPL vmunix 0xac492b3_udp6_lib_lookup
+EXPORT_SYMBOL_GPL vmunix 0xaac56a2tty_init_termios
+EXPORT_SYMBOL_GPL vmunix 0xaac956a2unregister_kprobe
+EXPORT_SYMBOL_GPL vmunix 0xaada918c9ftrace_dump
+EXPORT_SYMBOL_GPL vmunix 0xaabe98c9adenable_cmfd
+EXPORT_SYMBOL_GPL vmunix 0xaadd10174class_dev_iter_next
+EXPORT_SYMBOL_GPL vmunix 0xab0288dasched_setscheduler
+EXPORT_SYMBOL_GPL vmunix 0xab567d31percpu_ref_reinit
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+EXPORT_SYMBOL_GPL vmlinux 0xb26a1addelfcorehdr_addr
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+EXPORT_SYMBOL_GPL vmlinux 0xb5b818ec3_tracepoint_block_unplug
+EXPORT_SYMBOL_GPL vmlinux 0xb5c10a8cunregister_virtio_driver
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+EXPORT_SYMBOL_GPL vmlinux 0xb9defab5debugfs_create_atomic_t
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+EXPORT_SYMBOL_GPL vmlinux 0xd067d35system_freezable_power_efficient_wq
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+EXPORT_SYMBOL_GPL vmlinux 0xd0714861platform_device_add_data
+EXPORT_SYMBOL_GPL vmlinux 0xd0959a3apingseq_start
+EXPORT_SYMBOL_GPL vmlinux 0xd0c05159temergency_restart
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+EXPORT_SYMBOL_GPL vmlinux 0xd20bf6baddcointergrace
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+EXPORT_SYMBOL_GPL vmlinux 0xd3862767scsi_target_block
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+EXPORT_SYMBOL_GPL vmlinux 0xd48d75d0__pneigh_lookup
+EXPORT_SYMBOL_GPL vmlinux 0xd9071733_wake_up_locked_key
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+EXPORT_SYMBOL_GPL vmlinux 0xd9457564jump_label_rate_limit
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+EXPORT_SYMBOL_GPL vmlinux 0xdc0121a6dm_device_name
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+EXPORT_SYMBOL_GPL vmlinux 0xdc9fa232raw_notifier_chain_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xdc9fa232raw_notifier_chain_register
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+EXPORT_SYMBOL_GPL vmlinux 0xdd10f288cpcci_hp_register_controller
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+EXPORT_SYMBOL_GPL vmlinux 0xe5883bd9class_compat_unregister
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+EXPORT_SYMBOL_GPL vmlinux 0xe5d713c1wb_writeout_inc
+EXPORT_SYMBOL_GPL vmlinux 0xe5f25c41clli_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xe6048343socket_zero_copy_put
+EXPORT_SYMBOL_GPL vmlinux 0xe6107b1acpi_epc_write_header
+EXPORT_SYMBOL_GPL vmlinux 0xe65009f5socket_zero_copy_callback
+EXPORT_SYMBOL_GPL vmlinux 0xe65176eselinux_is_enabled
+EXPORT_SYMBOL_GPL vmlinux 0xe6526abtcp_register_ulp
+EXPORT_SYMBOL_GPL vmlinux 0xe6590302pci_set_pcie_reset_state
+EXPORT_SYMBOL_GPL vmlinux 0xe68bcf4devm_pcie_epc_create
+EXPORT_SYMBOL_GPL vmlinux 0xe6a1cc4cklist_iter_init_node
+EXPORT_SYMBOL_GPL vmlinux 0xe6c68344debug_remove_module
+EXPORT_SYMBOL_GPL vmlinux 0xe75407afhousekeeping_any_cpu
+EXPORT_SYMBOL_GPL vmlinux 0xe769232esprint_symbol_no_offset
+EXPORT_SYMBOL_GPL vmlinux 0xe79bf6c4kfp_shadow_get
+EXPORT_SYMBOL_GPL vmlinux 0xe7b3558cfat_dir_empty
+EXPORT_SYMBOL_GPL vmlinux 0xe7b718dfchsc_determine_channel_path_desc
+EXPORT_SYMBOL_GPL vmlinux 0xe7d446ccchp_start_bucket_nested_insert
+EXPORT_SYMBOL_GPL vmlinux 0xe7ee8777pceu_base_addr
+EXPORT_SYMBOL_GPL vmlinux 0xe8509f55socket_zero_copy_callback
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+EXPORT_SYMBOL_GPL vmlinux 0xe8590302pci_set_pcie_reset_state
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+EXPORT_SYMBOL_GPL vmlinux 0xe88ccdb5tcp_Register_congestion_control
+EXPORT_SYMBOL_GPL vmlinux 0xe89d0927get_user_pages_fast
+EXPORT_SYMBOL_GPL vmlinux 0xe8bb7bdfn_to_pfn_memslot_atomic
+EXPORT_SYMBOL_GPL vmlinux 0xe8bb7bfepci_complete_power_transition
+EXPORT_SYMBOL_GPL vmlinux 0xe8cc65abablkcipher_walk_done
+EXPORT_SYMBOL_GPL vmlinux 0xe8d0927fchp_pget_mask
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+EXPORT_SYMBOL_GPL vmlinux 0xe93b0c34unuse_mm
+EXPORT_SYMBOL_GPL vmlinux 0xe93e49c3dres_free
+EXPORT_SYMBOL_GPL vmlinux 0xe943344platform_device_add_resources
+EXPORT_SYMBOL_GPL vmlinux 0xe9474bdddst_cache_init
+EXPORT_SYMBOL_GPL vmlinux 0xe961937ebllld_busy
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+EXPORT_SYMBOL_GPL vmlinux 0xe98aa762p6_input
+EXPORT_SYMBOL_GPL vmlinux 0xe99d52aepci_hp_unregister_bus
+EXPORT_SYMBOL_GPL vmlinux 0xe992647epci_generic_config_read32
+EXPORT_SYMBOL_GPL vmlinux 0xe9a0b1f6crypto_alloc_kpp
+EXPORT_SYMBOL_GPL vmlinux 0xe9f917batty_port/tty_hangup

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+EXPORT_SYMBOL_GPL vmlinux 0xf2eb76d3blkg_print_stat_bytes_recursive
+EXPORT_SYMBOL_GPL vmlinux 0xf2d6cf29dev_qos_update_user_latency_tolerance
+EXPORT_SYMBOL_GPL vmlinux 0xf2bad9alloc_dax
+EXPORT_SYMBOL_GPL vmlinux 0xf2dbdef4device_wakeup_enable
+EXPORT_SYMBOL_GPL vmlinux 0xf2cfd6class_interface_register
+EXPORT_SYMBOL_GPL vmlinux 0xf311e56key_being_used_for
+EXPORT_SYMBOL_GPL vmlinux 0xf31b3t1workqueue_set_max_active
+EXPORT_SYMBOL_GPL vmlinux 0xf351c45cpu_put
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+EXPORT_SYMBOL_GPL vmlinux 0xf41c2674bpf_prog_free
+EXPORT_SYMBOL_GPL vmlinux 0xf441a3cseq_next
+EXPORT_SYMBOL_GPL vmlinux 0xf44f2dbirq_domain_associate_many
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+EXPORT_SYMBOL_GPL vmlinux 0xf49a830csidiAttached_handler_name
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+EXPORT_SYMBOL_GPL vmlinux 0xf4a7v4check
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+EXPORT_SYMBOL_GPL vmlinux 0xf4c1c9privacy
+EXPORT_SYMBOL_GPL vmlinux 0xf4d1280crypto_alloc_acomp
+EXPORT_SYMBOL_GPL vmlinux 0xf4e9499fs_free_bcache
+EXPORT_SYMBOL_GPL vmlinux 0xf4f5eb4e_kernel_read_file
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+EXPORT_SYMBOL_GPL vmlinux 0xf51cf354perf_pmu_register
+EXPORT_SYMBOL_GPL vmlinux 0xf54bd49blcm
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+EXPORT_SYMBOL_GPL vmlinux 0xf568bc71__atomic_notifier_call_chain
+EXPORT_SYMBOL_GPL vmlinux 0xf57ec2d9dpm_for_each_dev
+EXPORT_SYMBOL_GPL vmlinux 0xf5891cdinvalid_file
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+EXPORT_SYMBOL_GPL vmlinux 0xf5e9499fs_free_bcache
+EXPORT_SYMBOL_GPL vmlinux 0xf5f47a1blk_conf_prep
+EXPORT_SYMBOL_GPL vmlinux 0xf650f372perf_trace_run_bpf_submit
+EXPORT_SYMBOL_GPL vmlinux 0xf65e2a84__inet_twsk_schedule
+EXPORT_SYMBOL_GPL vmlinux 0xf67d8e6dev_fwnode
+EXPORT_SYMBOL_GPL vmlinux 0xf681ef52dev_classdev_to_classdev
+EXPORT_SYMBOL_GPL vmlinux 0xf688ae88__bio_try_merge_page
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+EXPORT_SYMBOL_GPL vmlinux 0xf6c8dc62cpu_hotplug_enable
+EXPORT_SYMBOL_GPL vmlinux 0xf6f16c56cpu_barrier_tasks
+EXPORT_SYMBOL_GPL vmlinux 0xf7138943attribute_container_classdev_to_classdev
+EXPORT_SYMBOL_GPL vmlinux 0xf733d33cryptospawn_fm
+EXPORT_SYMBOL_GPL vmlinux 0xf734f6efplatform_get_resource
+EXPORT_SYMBOL_GPL vmlinux 0xf74731eirq_ge_mask_set_bit
+EXPORT_SYMBOL_GPL vmlinux 0xf750453b3ndev_master_ifindex_rcu
+EXPORT_SYMBOL_GPL vmlinux 0xf77be4mpci_epc_linkup
+EXPORT_SYMBOL_GPL vmlinux 0xf7bb1855sock_diag_put_meminfo
+EXPORT_SYMBOL_GPL vmlinux 0xf7da5ee8static_key_slow_dec_deferred
+EXPORT_SYMBOL_GPL vmlinux 0xf7e8b288klist_iter_init
+EXPORT_SYMBOL_GPL vmlinux 0xf7e43a3esg_alloc_table_chained
+EXPORT_SYMBOL_GPL vmlinux 0xf7e8fd6blklkdev_prio
+EXPORT_SYMBOL_GPL vmlinux 0xf815c3ec__compat_only_sysfs_link_entry_to_kobj
+EXPORT_SYMBOL_GPL vmlinux 0xf82a73dctrace_clock_jiffies
+EXPORT_SYMBOL_GPL vmlinux 0xf82be8ddcrypto_shash_finup
+EXPORT_SYMBOL_GPL vmlinux 0xf82f3657work_on_cpu
+EXPORT_SYMBOL_GPL vmlinux 0xf84ec558reservation_object_wait_timeout_rcu
+EXPORT_SYMBOL_GPL vmlinux 0xf84d2aa4trace_ops_set_global_filter
+EXPORT_SYMBOL_GPL vmlinux 0xf8802492print_stack_trace
+EXPORT_SYMBOL_GPL vmlinux 0xf8c03b5aPageHuge
+EXPORT_SYMBOL_GPL vmlinux 0xf8c47e0dddebug_add_module
+EXPORT_SYMBOL_GPL vmlinux 0xf8d0b8e9gmap_shadow_valid
+EXPORT_SYMBOL_GPL vmlinux 0xf8d413c1_tracepoint_tcp_send_reset
+EXPORT_SYMBOL_GPL vmlinux 0xf8e6b564hibernation_set_ops
+EXPORT_SYMBOL_GPL vmlinux 0xf8e6f32inet_hashinfo_init
+EXPORT_SYMBOL_GPL vmlinux 0xf8f3db75fib6_new_table
+EXPORT_SYMBOL_GPL vmlinux 0xf8fe3d0bkmsmsg_dump_register
+EXPORT_SYMBOL_GPL vmlinux 0xf92c53f3fat_getattr
+EXPORT_SYMBOL_GPL vmlinux 0xf932015f__raw_notifier_call_chain
+EXPORT_SYMBOL_GPL vmlinux 0xf95322f4thread_parkme
+EXPORT_SYMBOL_GPL vmlinux 0xf97712d7gmap_shadow_pgt_lookup
+EXPORT_SYMBOL_GPL vmlinux 0xf9769f12devmhwrng_unregister
+EXPORT_SYMBOL_GPL vmlinux 0xf9774393simple_attr_release
+EXPORT_SYMBOL_GPL vmlinux 0xf97a94bfmutex_unlock
+EXPORT_SYMBOL_GPL vmlinux 0xf982b48platform_device_register_full
+EXPORT_SYMBOL_GPL vmlinux 0xf9a054b5_round_jiffies
+EXPORT_SYMBOL_GPL vmlinux 0xf9a15ce0blkcipher_walk_virt_block
+EXPORT_SYMBOL_GPL vmlinux 0xf9a063480gmap_shadow_page
+EXPORT_SYMBOL_GPL vmlinux 0xf9b6d4d3mnt_drop_write
+EXPORT_SYMBOL_GPL vmlinux 0xfa04a688_netpoll_free_async
+EXPORT_SYMBOL_GPL vmlinux 0xfa056d73skm_segment
+EXPORT_SYMBOL_GPL vmlinux 0xfa1eb910unregister_syscore_ops
+EXPORT_SYMBOL_GPL vmlinux 0xfe847595kill_pid_info_as_cred
+EXPORT_SYMBOL_GPL vmlinux 0xfe889dbccposix_acl_create
+EXPORT_SYMBOL_GPL vmlinux 0xfe990052gpio_free
+EXPORT_SYMBOL_GPL vmlinux 0xfec4233a__crypto_xor
+EXPORT_SYMBOL_GPL vmlinux 0xfec444f6fsnotify_alloc_group
+EXPORT_SYMBOL_GPL vmlinux 0xfd214a1event_triggers_call
+EXPORT_SYMBOL_GPL vmlinux 0xfec1cd3ekvm_get_dirty_log
+EXPORT_SYMBOL_GPL vmlinux 0xff05b8bfsave_stack_trace_regs
+EXPORT_SYMBOL_GPL vmlinux 0xff05fa13vring_interrupt
+EXPORT_SYMBOL_GPL vmlinux 0xff5a8cfecn_del_callback
+EXPORT_SYMBOL_GPL vmlinux 0xff5fc9b6crypto_spawn_tfm
+EXPORT_SYMBOL_GPL vmlinux 0xffca4bffkey_type_user
+EXPORT_SYMBOL_GPL vmlinux 0xffcdc4a9tod_clock_base
+EXPORT_SYMBOL_GPL vmlinux 0xffe17893public_key_free
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/s390x/generic.compiler
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/s390x/generic.compiler
@@ -0,0 +1 @@
+GCC: (Ubuntu 7.5.0-3ubuntu1~18.04) 7.5.0
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/s390x/generic.modules
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/s390x/generic.modules
@@ -0,0 +1,919 @@
+8021q
+842
+842_compress
+842_decompress
+9p
+9net
+9net_rdma
+9net_virtio
+act_bpf
+act_connmark
+act_csum
+act_gact
+act_ipt
+act_mirror
+act_nat
+act_pedit
+act_police
+act_sample
+act_simple
+act_skbedit
+act_skmbmod
+act_tunnel
+act_vlan
+aes_s390
+aes_t
+af_alg
+af_iucv

---
+genwqe_card
+gfs2
+ghash_s390
+gpio-bt8xx
+gpio-dwapb
+gpio-generic
+gpio-pci-idio-16
+gpio-rdc321x
+grace
+gre
+gtp
+hangcheck-timer
+hmcdrv
+ib_cm
+ib_core
+ib_ipoib
+ib_iser
+ib_isert
+ib_mthca
+ib_srp
+ib_srpt
+ib_umad
+ib_uverbs
+icp
+icplus
+ifb
+ife
+ila
+inet_diag
+intel-xway
+intel_th
+intel_th_gth
+intel_th_msu
+intel_th_pci
+intel_th_pti
+intel_th_sth
+ip6_gre
+ip6_tables
+ip6_tunnel
+ip6_udp_tunnel
+ip6_vti
+ip6t_MASQUERADE
+ip6t_NPT
+ip6t_REJECT
+ip6t_SYNPROXY
+ip6t_ah
+ip6t_eui64
+ip6t_frag
+ip6t_hbh
+ip6t_ipv6header
+ip6t_mh
+ip6t_rpfilter
+ip6t_rt
+ip6table_filter
+ip6table_mangle
+ip6table_nat
+ip6table_raw
+ip6table_security
+ip_gre
+ip_set
+ip_set_bitmap_ip
+ip_set_bitmap_ipmac
+ip_set_bitmap_port
+ip_set_hash_ip
+ip_set_hash_ipmac
+ip_set_hash_ipmark
+ip_set_hash_ipport
+ip_set_hash_ipportip
+ip_set_hash_ipportnet
+ip_set_hash_mac
+ip_set_hash_net
+ip_set_hash_netiface
+ip_set_hash_netnet
+ip_set_hash_netport
+ip_set_hash_netportnet
+ip_set_list_set
+ip_tables
+ip_tunnel
+ip_vs
+ip_vs_dh
+ip_vs_fo
+ip_vs_ftp
+ip_vs_lblc
+ip_vs_lbcr
+ip_vs_lc
+ip_vs_nq
+ip_vs_ovf
+ip_vs_pe_sip
+ip_vs_rr
+ip_vs_sed
+ip_vs_sh
+ip_vs_wlc
+ip_vs_wrr
+ip_vti
+ipcomp
+ipcomp6
+ipip
+ipt_CLUSTERIP
+ipt_ecn
+ipt_masquerade
+ipt_reject
+ipt_synproxy
+ipt_ah
+ipt_rpfILTER
+iptable_filter
+iptable_mangle
+iptable_nat
+iptable_raw
+iptable_security
+ipvlan
+ipvtap
+iqrbypass
+iscsi_boot_sysfs
+iscsi_target_mod
+iscsi_tcp
+isofs
+iw_cm
+kafs
+kcm
+keywrap
+khazad
+kyber-iosched
+l2tp_core
+l2tp_debugfs
+l2tp_eth
+l2tp_ip
+l2tp_ip6
+l2tp_netlink
+lc
+libceph
+libcrc32c
+libfc
+libfcoe
+libiscsi
+libiscsi_tcp
+libosd
+libphy
+libsas
+linear
+llc
+lockd
+lrucache
+lrw
+lxt
+lz4
+lz4_compress
+lz4hc
+lz4hc_compress
+mac-celtic
+mac-centeuro
+mac-croatian
+mac-cyrillic
+mac-gaelic
+mac-greek
+mac-iceland
+mac-inuit
+mac-roman
+mac-romanian
+mac-turkish
+macsec
+macvlan
+macvtap
+marvell
+marvell10g
+mcryptd
+md-cluster
+md4
+mdev
+memory-notifier-error-inject
+mena21_wdt
+mfd-core
+ michael_mic
+ micrel
+ microchip
+ mip6
+ mlx4_core
+ mlx4_en
+ mlx4_ib
+ mlx5_core
+ mlx5_ib
+ mlxfw
+ mlxsw_core
+ mlxsw_pci
+ monreader
+ monwriter
+ mpls_gso
+ mpls_iptunnel
+ mpls_router
+ mpt3sas
+ mq-deadline
+ mrd
+ mscc
+msdos
+national
+nb8800
+nbd
+netconsole
+netiucv
+netlink_diag
+nf_conntrack
+nf_conntrack_amanda
+nf_conntrack_broadcast
+nf_conntrack_ftp
+nf_conntrack_h323
+nf_conntrack_ipv4
+nf_conntrack_ipv6
+nf_conntrackirc
+nf_conntrack_netbios_ns
+nf_conntrack_netlink
+nf_conntrack_ppptp
+nf_conntrack_proto_gre
+nf_conntrack_sane
+nf_conntrack_sip
+nf_conntrack_snmnp
+nf_conntrack_tftp
+nf_defrag_ipv4
+nf_defrag_ipv6
+nf_dup_ipv4
+nf_dup_ipv6
+nf_dup_netdev
+nf_log_arp
+nf_log_bridge
+nf_log_common
+nf_log_ipv4
+nf_log_ipv6
+nf_log_netdev
+nf_nat
+nf_nat_amanda
+nf_nat_ftp
+nf_nat_h323
+nf_nat_ipv4
+nf_nat_ipv6
+nf_natirc
+nf_nat_masquerade_ipv4
+nf_nat_masquerade_ipv6
+nf_nat_ppptp
+nf_nat_proto_gre
+nf_nat_redirect
+nf_nat_sip
+nf_nat_snmnp_basic
+nf_nat_tftp
+nf_reject_ipv4
+nf_reject_ipv6
+nf_socket_ipv4
+nf_socket_ipv6
+nf_synproxy_core
+nf_tables
+nf_tables_arp
+nf_tables_bridge
+nf_tables_inet
+nf_tables_ipv4
+nf_tables_ipv6
+nf_tables_netdev
+nfnetlink
+nfnetlink_acct
+nfnetlink_cthelper
+nfnetlink_cttimeout
+nfnetlink_log
+nfnetlink_queue
+nfs
+nfs_acl
+nfs_layout_flexfiles
+nfs_layout_nfsv41_files
+nfsd
+nfsv2
+nfsv3
+nfsv4
+nft_chain_nat_ipv4
+nft_chain_nat_ipv6
+nft_chain_route_ipv4
+nft_chain_route_ipv6
+nft_compat
+nft_counter
+nft_ct
+nft_dup_ipv4
+nft_dup_ipv6
+nft_dup_netdev
+nft_exthdr
+nft_fib
+nft_fib_inet
+nft_fib_ipv4
+nft_fib_ipv6
+nft_fib_netdev
+nft_fwd_netdev
+nft_hash
+nft_limit
+nft_log
+nft_masq
+nft_masq_ipv4
+nft_masq_ipv6
+nft_meta
+nft_meta_bridge
+nft_nat
+nft_numgen
+nft_objref
+nft_queue
+nft_quota
+nft_redir
+nft_redir_ipv4
+nft_redir_ipv6
+nft_reject
+nft_reject_bridge
+nft_reject_inet
+nft_reject_ipv4
+nft_reject_ipv6
+nft_rt
+nft_set_bitmap
+nft_set_hash
+nft_set_rbtree
+nilfs2
+nlmon
+nls_asci
+nls_cp1250
+nls_cp1251
+nls_cp1255
+nls_cp737
+nls_cp775
+nls_cp850
+nls_cp852
+nls_cp855
+nls_cp857
+nls_cp860
+nls_cp861
+nls_cp862
+nls_cp863
+nls_cp864
+nls_cp865
+nls_cp866
+nls_cp869
+nls_cp874
+nls_cp932
+nls_cp936
+nls_cp949
+nls_cp950
+nls_euc-jp
+nls_iso8859-1
+pktgen
+pm-notifier-error-inject
+poly1305_generic
+pps_core
+pretimeout_panic
+prng
+psample
+psnap
+ptp
+qdio
+qeth
+qeth_l2
+qeth_l3
+qsemi
+quota_tree
+quota_v1
+quota_v2
+raid0
+raid1
+raid10
+raid456
+raid6_pq
+raid_class
+raw_diag
+rbd
+relperf
+rdc321x-southbridge
+rdma_cm
+rdma_rxe
+rdma_ucm
+rdmavt
+rds
+rds_rdma
+rds_tcp
+realtek
+remoteproc
+rmd128
+rmd160
+rmd256
+rmd320
+rockchip
+rpcrdma
+rpcsec_gss_krb5
+rrpc
+rxrpc
+s390-trng
+salsa20_generic
+sch_cbq

Open Source Used In 5GaaS Edge AC-4 17464
+slicoss
+sm3_generic
+smc
+smc_diag
+smse
+smsgiucv_app
+softdog
+spl
+splat
+st
+st_drv
+ste10Xp
+stm_console
+stm_core
+stm_ftrace
+stm_heartbeat
+stp
+sunrpc
+switchtec
+tap
+tape
+tape_34xx
+tape_3590
+tape_class
+target_core_file
+target_core_iblock
+target_core_mod
+target_core_pscsi
+target_core_user
+tcn.fc
+tcn_loop
+tcp_bbr
+tcp_bic
+tcp_cdg
+tcp_dctcp
+tcp_diag
+tcp_highspeed
+tcp_htcp
+tcp_hybla
+tcp_illinois
+tcp_lp
+tcp_nv
+tcp_probe
+tcp_scalable
+tcp_vegas
+tcp_veno
+tcp_westwood
+tcp_yeah
+tcrypt
+tea
+team
+team_mode_activebackup
+team_mode_broadcast
+team_mode_loadbalance
+team_mode_random
+team_mode_roundrobin
+teranetics
+test_bpf
+test_firmware
+test_module
+test_static_key_base
+test_static_keys
+test_udelay
+test_user_copy
+tgr192
+tipc
+tls
+torture
+tpm-rng
+tpm_vtpm_proxy
+ts_bm
+ts_fsm
+ts_kmp
+tunnel4
+tunnel6
+twofish_common
+twofish_generic
+uPD60620
+uartlite
+udf
+udp_diag
+udp_tunnel
+uio
+unix_diag
+veth
+vfio
+vfio-pci
+vfio_ap
+vfio_ccw
+vfio_iommu_type1
+vfio_mdev
+vfio_virqfd
+vhost
+vhost_net
+vhost_scsi
+vhost_vsock
+virtio-rng
+virtio_blk
+virtio_crypto
+virtio_net
+virtio_scsi
+vitesses
+vmac
+vmlogrdr
+vmur
+vmw_vsock_virtio_transport
+vmw_vsock_virtio_transport_common
+vport_geneve
+vport_gre
+vport_vxlan
+vrf
+vsocock
+vsocock_diag
+vsocockmon
+vx855
+vxlan
+wireguard
+wps512
+x_tables
+xcbc
+xfrm4_mode_bett
+xfrm4_mode_transport
+xfrm4_mode_tunnel
+xfrm4_tunnel
+xfrm6_mode_bett
+xfrm6_mode_ro
+xfrm6_mode_transport
+xfrm6_mode_tunnel
+xfrm6_tunnel
+xrfm_algo
+xrfm_ipcomp
+xrfm_user
+xfs
+xilinx_gmi2rgmii
+xor
+xt_AUDIT
+xt_CHECKSUM
+xt_CLASSIFY
+xtCONNSECMARK
+xt_CT
+xt_DSCP
+xt_HL
+xt_HMARK
+xt_IDLETIMER
+xt_LOG
+xt_NETMAP
+xt_NFLOG
+xt_NFQUEUE
+xt_RATEEST
+xt_REDIRECT
+xt_SECMARK
+xt_TCPMSS
+xt_TCPOPTSTRIP
+xt_TEE
+xt_TPROXY
+xt_TRACE
+xt_addrtype
+xt_bpf
+xt_cgroup
+xt_cluster
+xt_comment
+xt_connbytes
+xt_connlabel
+xt_connlimit
+xt_connmk
+xt_conntrack
+xt_cpu
+xt_dccp
+xt_devgroup
+xt_dscp
+xt_ecn
+xt_esp
+xt_hashlimit
+xt_helper
+xt_hl
+xt_ipcomp
+xt_iprange
+xt_ipv6
+xt_l2tp
+xt_length
+xt_limit
+xt_mac
+xt_mark
+xt_multiport
+xt_nat
+xt_nfacct
+xt_osf
+xt_owner
+xt_physdev
+xt_pkttype
+xt_policy
+xt_quota
+xt_rateest
+xt_realm
+xt_recent
+xt_sctp
+xt_set
+xt_socket
+xt_state
+xt_statistic
+xt_string
+xt_tcmp
+xt_tcpudp
+xt_tcpudp
+xt_time
+xt_u32
+z3fold
+zavl
+zcommon
+zcrypt
+zcrypt_cex2a
+zcrypt_cex4
+zcrypt_pcie
+zfc
+zfs
+zlib_deflate
+znpair
+zpios
+zram
+zstd_compress
+zunicode
--- linux-4.15.0.orig/debian.master/abi/4.15.0-165.173/s390x/generic.retpoline
+++ linux-4.15.0/debian.master/abi/4.15.0-165.173/s390x/generic.retpoline
@@ -0,0 +1 @@
+# RETPOLINE NOT ENABLED
--- linux-4.15.0.orig/debian.master/changelog
+++ linux-4.15.0/debian.master/changelog
@@ -0,0 +1,32241 @@
+linux (4.15.0-166.174) bionic; urgency=medium
+* bionic/linux: 4.15.0-166.174 -proposed tracker (LP: #1953667)
+  * Ubuntu version macros overflow with high ABI numbers (LP: #1953522)
+    - SAUCE: Revert "stable: clamp SUBLEVEL in 4.14"
+  * test_bpf.sh test in net of ubuntu_kernel_selftests failed on B-4.15 and
+    variants (LP: #1953287)
+    - SAUCE: Revert "bpf: add also cbpf long jump test cases with heavy expansion"
+  * test_bpf.sh test in net of ubuntu_kernel_selftests failed on B-4.15 and
+    variants (LP: #1953287) // CVE-2018-25020
+ bpf: fix truncated jump targets on heavy expansions
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 08 Dec 2021 18:15:03 +0100
+
+linux (4.15.0-165.173) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-165.173 -proposed tracker (LP: #1952780)
+
+ * Support builtin revoked certificates (LP: #1932029)
+ - certs: Add EFI_CERT_X509_GUID support for dbx entries
+ - certs: Move load_system_certificate_list to a common function
+ - integrity: Move import of MokListRT certs to a separate routine
+ - integrity: Load certs from the EFI MOK config table
+ - certs: Add ability to preload revocation certs
+ - certs: add 'x509_revocation_list' to .gitignore
+ - SAUCE: Dump stack when X.509 certificates cannot be loaded
+ - [Packaging] build canonical-revoked-certs.pem from branch/arch certs
+ - [Packaging] Revoke 2012 UEFI signing certificate as built-in
+ - [Config] Configure CONFIG_SYSTEM_REVOCATION_KEYS with revoked keys
+
+ * Support importing mokx keys into revocation list from the mok table
+ (LP: #1928679)
+ - efi: Support for MOK variable config table
+ - efi: mokvar-table: fix some issues in new code
+ - efi: mokvar: add missing include of asm/early_ioremap.h
+ - efi/mokvar: Reserve the table only if it is in boot services data
+ - SAUCE: integrity: Load mokx certs from the EFI MOK config table
+ - SAUCE: integrity: add informational messages when revoking certs
+
+ * CVE-2021-4002
+ - arm64: tlb: Provide forward declaration of tlb_flush() before including
+ - tlb.h
+ - mm: mmu_notifier fix for tlb_end_vma
+ - hugetlbfs: flush TLBs correctly after huge_pmd_unshare
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Tue, 30 Nov 2021 17:58:59 +0100
+
+linux (4.15.0-164.172) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-164.172 -proposed tracker (LP: #1952348)
+
+ * Packaging resync (LP: #1786013)
+ - [Packaging] resync update-dkms-versions helper
+ - debian/dkms-versions -- update from kernel-versions (main/2021.11.29)
+
+ * Bionic update: upstream stable patchset 2021-11-23 (LP: #1951997)
+ - btrfs: always wait on ordered extents at fsync time
+ - ARM: dts: at91: sama5d2_som1_ek: disable ISC node by default
- xtensa: xtfpga: use CONFIG_USE_OF instead of CONFIG_OF
- xtensa: xtfpga: Try software restart before simulating CPU reset
- NFSD: Keep existing listeners on portlist error
- netfilter: ipvs: make global sysctl readonly in non-init netns
- NIOS2: irqflags: rename a redefined register name
- can: rcar_can: fix suspend/resume
- can: peak_usb: pcan_usb_fd_decode_status(): fix back to ERROR_ACTIVE state
- nf: nci: fix the UAF of rf_conn_info object
- netfilter: Kconfig: use 'default y' instead of 'm' for bool config option
- btrfs: deal with errors when checking if a dir entry exists during log replay
- net: stmmac: add support for dwmac 3.40a
- ARM: dts: spear3xx: Fix gmac node
- isdn: mISDN: Fix sleeping function called from invalid context
- platform/x86: intel_scu_ipc: Update timeout value in comment
- ALSA: hda: avoid write to STATESTES if controller is in reset
- tracing: Have all levels of checks prevent recursion
- ARM: 9122/1: select HAVE_FUTEX_CMPXCHG
- dma-debug: fix sg checks in debug_dma_map_sg()
- ASoC: wm8960: Fix clock configuration on slave mode
- lan78xx: select CRC32
- net: hns3: add limit ets dwrr bandwidth cannot be 0
- net: hns3: disable sriov before unload hclge layer
- ALSA: hda/realtek: Add quirk for Clevo PC50HS
- mm, slub: fix mismatch between reconstructed freelist depth and cnt
- gcc-plugins/structleak: add makefile var for disabling structleak

 * creat09 from ubuntu_ltp_syscalls and cve-2018-13405 from ubuntu_ltp/cve
   failed with XFS (LP: #1950239)
- xfs: ensure that the inode uid/gid match values match the icdinode ones
- xfs: merge the projid fields in struct xfs_icdinode
- xfs: remove the icdinode di_uid/di_gid members
- xfs: fix up non-directory creation in SGID directories

 * ubuntu_ltp / finit_module02 fails on v4.15 and other kernels (LP: #1950644)
- vfs: check fd has read access in kernel_read_file_from_fd()

 * reuseport_bpf_numa in net from ubuntu_kernel_selftests fails on ppc64le
   (LP: #1867570)
- selftests/net: Fix reuseport_bpf_numa by skipping unavailable nodes
- Bionic update: upstream stable patchset 2021-11-12 (LP: #1950816)
- net: mdio: introduce a shutdown method to mdio device drivers
- xen-netback: correct success/error reporting for the SKB-with-fraglist case
- sparc64: fix pci_iounmap() when CONFIG_PCI is not set
- ext2: fix sleeping in atomic bugs on error
- scsi: sd: Free scsi_disk device via put_device()
- usb: testusb: Fix for showing the connection speed
- usb: dwc2: check return value after calling platform_get_resource()
- scsi: ses: Retry failed Send/Receive Diagnostic commands
- libata: Add ATA_HORKAGE_NO_NCQ_ON_ATI for Samsung 860 and 870 SSD.
- libtimerqueue: Rely on rbtree semantics for next timer
- selftests: be sure to make khdr before other targets
- Partially revert "usb: Kconfig: using select for USB_COMMON dependency"
- USB: cdc-acm: fix racy tty buffer accesses
- USB: cdc-acm: fix break reporting
- ovl: fix missing negative dentry check in ovl_rename()
- nfsd4: Handle the NFSv4 READDR 'dircount' hint being zero
- xen/balloon: fix cancelled balloon action
- ARM: dts: omap3430-sdp: Fix NAND device node
- ARM: dts: qcom: apq8064: use compatible which contains chipid
- bpf: add also chpf long jump test cases with heavy expansion
- bpf, mips: Validate conditional branch offsets
- xtensa: call irqchip_init only when CONFIG_USE_OF is selected
- bpf: Fix integer overflow in prealloc_elems_and_freelist()
- phy: mdio: fix memory leak
- net_sched: fix NULL deref in fifo_set_limit()
- powerpc/fsl/dts: Fix phy-connection-type for fm1mac3
- ptp_pch: Load module automatically if ID matches
- ARM: imx6: disable the GIC CPU interface before calling stby-poweroff
- sequence
- net: bridge: use nla_total_size_64bit() in br_get_linkxstats_size()
- netlink: annotate data races around nlk->bound
- drm/nouveau/debugfs: fix file release memory leak
- rtnetlink: fix if_nlmsg_stats_size() under estimation
- i40e: fix endless loop under rtln
- i2c: acpi: fix resource leak in reconfiguration device addition
- net: phy: bcm7xxx: Fixed indirect MMD operations
- net: apple: Fix logical maximum and usage maximum of Magic Keyboard JIS
- netfilter: ip6_tables: zero-initialize fragment offset
- mac80211: Drop frames from invalid MAC address in ad-hoc mode
- m68k: Handle arrivals of multiple signals correctly
- net: sun: SUNVNET_COMMON should depend on INET
- scsi: ses: Fix unsigned comparison with less than zero
- scsi: virtio_scsi: Fix spelling mistake "Unsupport" -> "Unsupported"
- perf/x86: Reset destroy callback on event init failure
- sched: Always inline is_percpu_thread()
- bpf, arm: Fix register clobbering in div/mod implementation
+ - i40e: Fix freeing of uninitialized misc IRQ vector
+ - mac80211: check return value of rhashtable_init
+ - stable: clamp SUBLEVEL in 4.14
+ - ALSA: seq: Fix a potential UAF by wrong private_free call order
+ - s390: fix strchr() implementation
+ - btrfs: deal with errors when replaying dir entry during log replay
+ - btrfs: deal with errors when adding inode reference during log replay
+ - btrfs: check for error when looking up inode during dir entry replay
+ - xhci: Fix command ring pointer corruption while aborting a command
+ - xhci: Enable trust tx length quirk for Fresco FL11 USB controller
+ - cb710: avoid NULL pointer subtraction
+ - efi/cper: use stack buffer for error record decoding
+ - efi: Change down_interruptible() in virt_efi_reset_system() to
+   down_trylock()
+ - usb: musb: dsps: Fix the probe error path
+ - Input: xpad - add support for another USB ID of Nacon GC-100
+ - USB: serial: qcsserial: add EM9191 QDL support
+ - USB: serial: option: add Quectel EC200S-CN module support
+ - USB: serial: option: add Telit LE910Cx composition 0x1204
+ - USB: serial: option: add prod. id for Quectel EG91
+ - virtio: write back F_VERSION_1 before validate
+ - nvme: Fix shift-out-of-bound (UBSAN) with byte size cells
+ - x86/Kconfig: Do not enable AMD_MEM_ENCRYPT_ACTIVE_BY_DEFAULT automatically
+ - iio: adc: aspeed: set driver data when adc probe.
+ - iio: adc128s052: Fix the error handling path of `adc128_probe()'
+ - iio: light: opt3001: Fixed timeout error when 0 lux
+ - iio: ssp_sensors: add more range checking in ssp_parse_dataframe()
+ - iio: ssp_sensors: fix error code in ssp_print_mcu_debug()
+ - scpt: account stream padding length for reconf chunk
+ - net: arc: select CRC32
+ - net: korina: select CRC32
+ - net: encx24j600: check error in devm_regmap_init_encx24j600
+ - ethernet: s2io: fix setting mac address during resume
+ - nfc: fix error handling of nfc_proto_register()
+ - NFC: digital: fix possible memory leak in digital tg_listen_mdaa()
+ - NFC: digital: fix possible memory leak in digital_request_sdd_req()
+ - pata_legacy: fix a couple uninitialized variable bugs
+ - drm/msm: Fix null pointer dereference on pointer edp
+ - drm/msm/dsi: fix off by one in dsi_bus_pll_enable error handling
+ - acpi/arm64: fix next_platform_timer() section mismatch error
+ - qed: Fix missing error code in qed_slowpath_start()
+ - r8152: select CRC32 and CRYPTO_HASH/CRYPTO_SHA256
  + -- Kelsey Skunberg <kelsey.skunberg@canonical.com> Fri, 26 Nov 2021 17:31:19 -0700
  +linux (4.15.0-163.171) bionic; urgency=medium
  + * bionic/linux: 4.15.0-163.171 -proposed tracker (LP: #1949874)
+ * Packaging resync (LP: #1786013)
+ - [Packaging] update Ubuntu.md
+ - debian/dkms-versions -- update from kernel-versions (main/2021.11.08)
+
+ * Unable to build net/reuseport_bpf and other tests in ubuntu_kernel_selftests
+ on Bionic with make command (LP: #1949889)
+ - selftests: Fix loss of test output in run_kselftests.sh
+ - selftests: Makefile set KSFT_TAP_LEVEL to prevent nested TAP headers
+ - selftests: fix headers_install circular dependency
+ - selftests: fix bpf build/test workflow regression when KBUILD_OUTPUT is set
+ - selftests: vm: Fix test build failure when built by itself
+
+ * KVM emulation failure when booting into VM crash kernel with multiple CPUs
+ (LP: #1948862)
+ - KVM: x86: Properly reset MMU context at vCPU RESET/INIT
+
+ * aufs: kernel bug with apparmor and fuseblk (LP: #1948470)
+ - SAUCE: aufs: bugfix, stop omitting path->mnt
+
+ * ebpf: bpf_redirect fails with ip6 gre interfaces (LP: #1947164)
+ - net: handle ARPHRD_IP6GRE in dev_is_mac_header_xmit()
+
+ * require CAP_NET_ADMIN to attach N_HCI ldisc (LP: #1949516)
+ - Bluetooth: hci_ldisc: require CAP_NET_ADMIN to attach N_HCI ldisc
+
+ * ACL updates on OCFS2 are not revalidated (LP: #1947161)
+ - ocfs2: fix remounting needed after setfacl command
+
+ * ppc64 BPF JIT mod by 1 will not return 0 (LP: #1948351)
+ - powerpc/bpf: Fix BPF_MOD when imm == 1
+
+ * Drop "UBUNTU: SAUCE: cachefiles: Page leaking in cachefiles_read_backing_file while vmscan is active" (LP: #1947709)
+ - Revert "UBUNTU: SAUCE: cachefiles: Page leaking in cachefiles_read_backing_file while vmscan is active"
+ - cachefiles: Fix page leak in cachefiles_read_backing_file while vmscan is active
+
+ * Some test in ubuntu_bpf test_verifier failed on i386 Bionic kernel
+ (LP: #1788578)
+ - bpf: fix context access in tracing progs on 32 bit archs
+
+ * test_bpf.sh from ubuntu_kernel_selftests.net from linux ADT test failure
+ with linux/4.15.0-149.153 i386 (Segmentation fault) (LP: #1934414)
+ - selftests/bpf: make test_verifier run most programs
+ - bpf: add couple of test cases for div/mod by zero
+ - bpf: add further test cases around div/mod and others
- Bionic update: upstream stable patchset 2021-11-02 (LP: #1949512)
  - usb: gadget: r8a66597: fix a loop in set_feature()
  - usb: musb: usb6010: uninitialized data in tusb_fifo_write_unaligned()
  - cifs: fix incorrect check for null pointer in header_assemble
  - xen/x86: fix PV trap handling on secondary processors
  - usb-storage: Add quirk for ScanLogic SL11R-IDE older than 2.6c
  - USB: serial: cp210x: add ID for GW Instek GDM-834x Digital Multimeter
  - staging: greaybus: uart: fix tty use after free
  - Re-enable UAS for LaCie Rugged USB3-FW with fk quirk
  - USB: serial: mos7840: remove duplicated 0xac24 device ID
  - USB: serial: option: add Telit LN920 compositions
  - USB: serial: option: remove duplicate USB device ID
  - USB: serial: option: add device id for Foxconn T99W265
  - mcb: fix error handling in mcb_alloc_bus()
  - serial: mvebu-uart: fix driver's tx_empty callback
  - net: hso: fix muxed tty registration
  - bnxt_en: Fix TX timeout when TX ring size is set to the smallest
  - net/mlx4_en: Don't allow aRFS for encapsulated packets
  - scsi: iscsi: Adjust iface sysfs attr detection
  - thermal/core: Potential buffer overflow in thermal_build_list_of_policies()
  - irqchip/gic-v3-its: Fix potential VPE leak on error
  - md: fix a lock order reversal in md_alloc
  - blktrace: Fix uaf in blk_trace access after removing by sysfs
  - net: macb: fix use after free on rmmod
  - net: stmmac: allow CSR clock of 300MHz
  - m68k: Double cast io functions to unsigned long
  - xen/balloon: use a kernel thread instead a workqueue
  - compiler.h: Introduce absolute_pointer macro
  - net: i825xx: Use absolute_pointer for memcpy from fixed memory location
  - sparc: avoid stringop-overread errors
  - qnx4: avoid stringop-overread errors
  - parisc: Use absolute_pointer() to define PAGE0
  - arm64: Mark __stack_chk_guard as __ro_after_init
  - alpha: Declare virt_to_phys and virt_to_bus parameter as pointer to volatile
  - net: 6pack: Fix tx timeout and slot time
  - spi: Fix tegra20 build with CONFIG_PM=n
  - arm64: dts: marvell: armada-37xx: Extend PCIe MEM space
  - PCI: aardvark: Fix checking for PIO Non-posted Request
  - PCI: aardvark: Fix checking for PIO status
  - xen/balloon: fix balloon kthread freezing
  - qnx4: work around gcc false positive warning bug
  - tty: Fix out-of-bound vmalloc access in imageblit
  - cpufreq: schedutil: Use kobject release() method to free sugov_tunables
  - cpufreq: schedutil: Destroy mutex before kobject_put() frees the memory
  - mac80211: fix use-after-free in CCMP/GCMP RX
  - ipvs: check that ip_vs_conn_tab_bits is between 8 and 20
  - mac80211: Fix ieee80211_amsdu_aggregate frag_tail bug
+ - mac80211: limit injected vht mcs/nss in ieee80211ParseTxRadiotap
+ - scpt: break out if skb_header_pointer returns NULL in scptRcvOotb
+ - hwmon: (tmp421) fix rounding for negative values
+ - e100: fix length calculation in e100GetRegsLen
+ - e100: fix buffer overrun in e100GetRegs
+ - scsi: csiostor: Add module sofdep on cxgb4
+ - af_unix: fix races in sk_peer_pid and sk_peer_cred accesses
+ - ipack: ipoctal: fix stack information leak
+ - ipack: ipoctal: fix tty registration race
+ - ipack: ipoctal: fix tty-registration error handling
+ - ipack: ipoctal: fix missing allocation-failure check
+ - ipack: ipoctal: fix module reference leak
+ - ext4: fix potential infinite loop in ext4_dx readdir()
+ - net: udp: annotate data race around udp_skb(sk)->corkflag
+ - EDAC/synopsys: Fix wrong value type assignment for edac_mode
+ - ARM: 9077/1: PLT: Move struct plt_entries definition to header
+ - ARM: 9078/1: Add warn suppress parameter to arm_gen_branch_link()
+ - ARM: 9079/1: ftrace: Add MODULE_PLTS support
+ - ARM: 9098/1: ftrace: MODULE_PLT: Fix build problem without DYNAMIC_FTRACE
+ - arm64: Extend workaround for erratum 1024718 to all versions of Cortex-A55
+ - hso: fix bailout in error case of probe
+ - usb: hso: fix error handling code of hso_create_net_device
+ - usb: hso: remove the bailout parameter
+ - crypto: ccp - fix resource leaks in ccp_run_aes_gcm_cmd()
+ - HID: betop: fix slab-out-of-bounds Write in betop_probe
+ - netfilter: ipset: Fix oversized kvmalloc() calls
+ - HID: usbhid: free raw_report buffers in usbhid_stop
+ - cred: allow get_cred() and put_cred() to be given NULL.
+ - gpi0: uniphier: Fix void functions to remove return value
+ - tty: synclink_gt, drop unneeded forward declarations
+ - tty: synclink_gt: rename a conflicting function name
+ - drm/amd/display: Pass PCI deviceid into DC
+ - hwmon: (tmp421) Replace S_<PERMS> with octal values
+ - hwmon: (tmp421) report /PVLD condition as fault
+ + * ACL updates on OCFS2 are not revalidated (LP: #1947161) // Bionic update:
+ upstream stable patchset 2021-11-02 (LP: #1949512)
+ - ocfs2: drop acl cache for directories too
+ + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 05 Nov 2021 12:22:08 +0100
+ + linux (4.15.0-162.170) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-162.170 -proposed tracker (LP: #1947293)
+ + * Add final-checks to check certificates (LP: #1947174)
+ + - [Packaging] Add system trusted and revocation keys final check
+ +
+ * CVE-2020-36385
+ - RDMA/cma: Add missing locking to rdma_accept()
+ - RDMA/ucma: Fix the locking of ctx->file
+ - RDMA/ucma: Rework ucma_migrate_id() to avoid races with destroy
+
+ + * CVE-2021-28950
+ - fuse: fix live lock in fuse_iget()
+
+ + * CVE-2020-36322
+ - fuse: fix bad inode
+
+ + * Bionic update: upstream stable patchset 2021-10-13 (LP: #1947011)
+ - rcu: Fix missed wakeup of exp_wq waiters
+ - apparmor: remove duplicate macro list_entry_is_head()
+ - cryptp: talitos - fix max key size for sha384 and sha512
+ - scpt: validate chunk size in __rcv_asconf_lookup
+ - scpt: add param size validation for SCTP_PARAM_SET_PRIMARY
+ - dmaengine: acpi: Avoid comparison GSI with Linux vIRQ
+ - thermal/drivers/exynos: Fix an error code in exynos_tmu_probe()
+ - 9p/trans_virtio: Remove sysfs file on probe failure
+ - prctl: allow to setup brk for et_fct executables
+ - profiling: fix shift-out-of-bounds bugs
+ - pwm: lpc32xx: Don't modify HW state in .probe() after the PWM chip was
+ registered
+ - Kconfig.debug: drop selecting non-existing HARDLOCKUP_DETECTOR_ARCH
+ - parisc: Move pci_dev_is_behind_card_dino to where it is used
+ - dmaengine: iot: depends on !UML
+ - dmaengine: xilinx_dma: Set DMA mask for coherent APIs
+ - ceph: lockdep annotations for try_nonblocking_invalidate
+ - nilfs2: fix memory leak in nilfs_sysfs_create_device_group
+ - nilfs2: fix NULL pointer in nilfs_###name##_#attr_release
+ - nilfs2: fix memory leak in nilfs_sysfs_create_##name##_group
+ - nilfs2: fix memory leak in nilfs_sysfs_delete_##name##_group
+ - nilfs2: fix memory leak in nilfs_sysfs_create_snapshot_group
+ - nilfs2: fix memory leak in nilfs_sysfs_delete_snapshot_group
+ - pwm: rockchip: Don't modify HW state in .remove() callback
+ - blk-throttle: fix UAF by deleting timer in blk_throtl_exit()
+ - drm/nouvea/nvkm: Replace -ENOSYS with -ENODEV
+ - nilfs2: use refcount_dec_and_lock() to fix potential UAF
+ - drivers: base: cacheinfo: Get rid of DEFINE_SMP_CALL_CACHE_FUNCTION()
+
+ + * Invalid backport to v4.15: missing pgtable_l5_enabled (LP: #1946464)
+ - SAUCE: Revert "x86/mm: Don't free P4D table when it is folded at runtime"
+
+ + * CVE-2021-38199
+ - NFSv4: Initialise connection to the server in nfs4_alloc_client()
+
+ + * CVE-2019-19449
* f2fs: fix wrong total_sections check and fsmeta check
* f2fs: fix to do sanity check on segment/section count
* vrf: fix refcnt leak with vxlan slaves (LP: #1945180)
* ipv4: Fix device used for dst_alloc with local routes
* Check for changes relevant for security certifications (LP: #1945989)
  * [Packaging] Add a new fips-checks script
  * [Packaging] Add fips-checks as part of finalchecks
* CVE-2021-3759
  * memcg: enable accounting of ipc resources
* Bionic update: upstream stable patchset 2021-09-27 (LP: #1945224)
  * ARC: Fix CONFIG_STACKDEPOT
  * can: usb: esd_usb2: esd_usb2_rx_event(): fix the interchange of the CAN RX
    and TX error counters
  * Revert "USB: serial: ch341: fix character loss at high transfer rates"
  * USB: serial: option: add new VID/PID to support Fibocom FG150
  * usb: dwc3: gadget: Fix dwc3_calc_trbs_left()
  * usb: dwc3: gadget: Stop EP0 transfers during pullup disable
  * IB/hfi1: Fix possible null-pointer dereference in _extend_sdma_tx_descs()
  * e1000e: Fix the max snoop/no-snoop latency for 10M
  * ip_gre: add validation for csum_start
  * xgene-v2: Fix a resource leak in the error handling path of 'xge_probe()'
  * net: marvell: fix MVNETA_TX_IN_PRGRS bit number
  * usb: gadget: u_audio: fix race condition on endpoint stop
  * opp: remove WARN when no valid OPPs remain
  * virtio: Improve vq->broken access to avoid any compiler optimization
  * vrings: Use wiov->used to check for read/write desc order
  * drm: Copy drm_wait_vblank to user before returning
  * drm/nouveadisp: power down unused DP links during init
  * net/rds: dma_map_sg is entitled to merge entries
  * vt_kdsetmode: extend console locking
  * fbmem: add margin check to fb_check_caps()
  * KVM: x86/mmufix: Treat NX as used (not reserved) for all !TDP shadow MMUs
  * Revert "floppy: reintroduce O_NDELAY fix"
  * net: qrtr: fix another OOB Read in qrtr_endpoint_post
  * net: hns3: fix get wrong pfc_en when query PFC configuration
  * xtensa: fix kconfig unmet dependency warning for HAVE_FUTEX_CMPXCHG
  * qed: Fix the VF msix vectors flow
  * net: macb: Add a NULL check on desc_ptp
  * qede: Fix memset corruption
  * perf/x86/intel/pt: Fix mask of num_address_ranges
  * perf/x86/amd/poll: Work around erratum #1197
  * cryptoloop: add a deprecation warning
  * ARM: 8918/2: only build return_address() if needed
  * ALSA: pcm: fix divide error in snd_pcm_lib_ioctl
- clk: fix build warning for orphan_list
- media: stkwebcam: fix memory leak in stk_camera_probe
- igmp: Add ip_mc_list lock in ip_check_mc_rcu
- USB: serial: mos7720: improve OOM-handling in read_mos_reg()
- /2fs: fix potential overflow
- ath10k: fix recent bandwidth conversion bug
- ipv4/icmp: 13ndev: Perform icmp error route lookup on source device routing
- table (v2)
- crypto: talitos - reduce max key size for SEC1
- powerpc/module64: Fix comment in R_PPC64_ENTRY handling
- powerpc/boot: Delete unneeded .globl _zimage_start
- net: ll_temac: Remove left-over debug message
- mm/page_alloc: speed up the iteration of max_order
- Revert "btrfs: compression: don't try to compress if we don't have enough pages"
- usb: host: xhci-rcar: Don't reload firmware after the completion
- x86/reboot: Limit Dell Optiplex 990 quirk to early BIOS versions
- PCI: Call Max Payload Size-related fixup quirks early
- regmap: fix the offset of register error log
- crypto: mxs-dcp - Check for DMA mapping errors
- power: supply: apx288_fuel_gauge: Report register-address on readb / writeb errors
- crypto: omap-sham - clear dma flags only after omap_sham_update_dma_stop()
- udf: Check LVID earlier
- isofs: joliet: Fix iocharset=utf8 mount option
- nvme-rdma: don't update queue count when failing to set io queues
- power: supply: max17042_battery: fix typo in MAX17042_TOFF
- s390/cio: add dev_busid sysfs entry for each subchannel
- libata: fix ata_host_start()
- crypto: qat - do not ignore errors from enable_vf2pf_comms()
- crypto: qat - handle both source of interrupt in VF ISR
- crypto: qat - fix reuse of completion variable
- crypto: qat - fix naming for init/shutdown VF to PF notifications
- crypto: qat - do not export adf iov_putmsg()
- udf_get_extendedattr() had no boundary checks.
- m68k: emu: Fix invalid free in nfeth_cleanup()
- spi: spi-fsl-dspi: Fix issue with uninitialized dma_slave_config
- spi: spi-pic32: Fix issue with uninitialized dma_slave_config
- clocksources/drivers/sh_cmt: Fix wrong setting if don't request IRQ for clock channel
- crypto: qat - use proper type for vf_mask
- certs: Trigger creation of RSA module signing key if it's not an RSA key
- soc: rockchip: ROCKCHIP_GRF should not default to y, unconditionally
- media: dvb-usb: fix uninit-value in dvb_usb_adapter_dvb_init
- media: dvb-usb: fix uninit-value in vp702x_read_mac_addr
- media: go7007: remove redundant initialization
- Bluetooth: sco: prevent information leak in sco_conn_defer_accept()
- tcp: seq_file: Avoid skipping sk during tcp seek last pos
+ - net: cipso: fix warnings in netlbl_cipsov4_add_std
+ - i2c: highlander: add IRQ check
+ - PCI: PM: Avoid forcing PCI_D0 for wakeup reasons inconsistently
+ - PCI: PM: Enable PME if it can be signaled from D3cold
+ - soc: qcom: smm: Fix missed interrupts if state changes while masked
+ - Bluetooth: increase BTNAMSIZ to 21 chars to fix potential buffer overflow
+ - arm64: dts: exynos: correct GIC CPU interfaces address range on Exynos7
+ - Bluetooth: fix repeated calls to sco_sock_kill
+ - drm/msm/dsi: Fix some reference counted resource leaks
+ - usb: gadget: udc: at91: add IRQ check
+ - usb:phy: fsl-usb: add IRQ check
+ - usb:phy: twl6030: add IRQ checks
+ - Bluetooth: Move shutdown callback before flushing tx and rx queue
+ - usb: host: ohci-tmio: add IRQ check
+ - usb:phy: tahvo: add IRQ check
+ - mac80211: Fix insufficient headroom issue for AMSDU
+ - usb: gadget: mv_u3d: request_irq() after initializing UDC
+ - Bluetooth: add timeout sanity check to hci_inquiry
+ - i2c: iop3xx: fix deferred sanity check in hci_inquiry
+ - i2c: s3c2410: fix IRQ check
+ - mmc: dw_mmc: Fix issue with uninitialized dma_slave_config
+ - mmc: moxart: Fix issue with uninitialized dma_slave_config
+ - CIFS: Fix a potentially linear read overflow
+ - i2c: mt65xx: fix IRQ check
+ - usb: ehci-orion: Handle errors of clk_prepare_enable() in probe
+ - usb: bdc: Fix an error handling path in 'bdc_probe()' when no suitable DMA
+ - config is available
+ - tty:serial: fsl_lpuart: fix the wrong mapbase value
+ - ath6kl: wmi: fix an error code in ath6kl_wmi_sync_point()
+ - bcma: Fix memory leak for internally-handled cores
+ - ipv4: make exception cache less predictable
+ - net: sched: Fix qdisc_rate_table refcount leak when get tcf_block failed
+ - net: qualcomm: fix QCA7000 checksum handling
+ - netns: protect netns ID lookups with RCU
+ - tty: Fix data race between tiocsti() and flush_to_ldisc()
+ - x86/resctrl: Fix a maybe-uninitialized build warning treated as error
+ - KVM: x86: Update vCPU's hv_clock before back to guest when tsc_offset is
+ - adjusted
+ - IMA: remove -Wmissing-prototypes warning
+ - backlight: pwm_bl: Improve bootloader/kernel device handover
+ - clk: kirkwood: Fix a clocking boot regression
+ - fbmem: don't allow too huge resolutions
+ - rtc: tps65910: Correct driver module alias
+ - blk-zoned: allow zone management send operations without CAP_SYS_ADMIN
+ - blk-zoned: allow BLKREPORTZONE without CAP_SYS_ADMIN
+ - PCI/MSI: Skip masking MSI-X on Xen PV
+ - powerpc/perf/hv-gpci: Fix counter value parsing
+ - xen: fix setting of max_pfn in shared_info
+ - include/linux/list.h: add a macro to test if entry is pointing to the head
+ - 9p/xen: Fix end of loop tests for list_for_each_entry
+ - soc: aspeed: lpc-ctrl: Fix boundary check for mmap
+ - crypto: public_key: fix overflow during implicit conversion
+ - block: bfq: fix bfq_set_next_ioprio_data()
+ - power: supply: max17042: handle fails of reading status register
+ - dm crypt: Avoid percpu_counter spinlock contention in crypt_page_alloc()
+ - VMCI: fix NULL pointer dereference when unmapping queue pair
+ - media: uvc: don't do DMA on stack
+ - media: re-loopback: return number of emitters rather than error
+ - libata: add ATA_HORKAGE_NO_NCQ_TRIM for Samsung 860 and 870 SSDs
+ - ARM: 9105/1: atags_to_fdt: don't warn about stack size
+ - PCI: Restrict ASMMedia ASM1062 SATA Max Payload Size Supported
+ - PCI: Return ~0 data on pciconfig_read() CAP_SYS_ADMIN failure
+ - PCI: xilinx-nwl: Enable the clock through CCF
+ - PCI: aardvark: Increase polling delay to 1.5s while waiting for PIO response
+ - PCI: aardvark: Fix masking and unmasking legacy INTx interrupts
+ - HID: input: do not report stylus battery state as "full"
+ - RDMA/iwcm: Release resources if iw_cm module initialization fails
+ - docs: Fix infiniband uverbs minor number
+ - pinctrl: samsung: Fix pinctrl bank pin count
+ - vfio: Use config not menuconfig for VFIO_NOIOMMU
+ - openrisc: don't printk() unconditionally
+ - pinctrl: single: Fix error return code in pcs_parse_bits_in_pinctrl_entry()
+ - scsi: qedi: Fix error codes in qedi_alloc_global_queues()
+ - MIPS: Malta: fix alignment of the devicetree buffer
+ - media: dib8000: rewrite the init prbs logic
+ - crypto: mxs-dep - Use sg_mapping_iter to copy data
+ - PCI: Use pci_update_current_state() in pci_enable_device_flags()
+ - iio: dac: ad5624r: Fix incorrect handling of an optional regulator.
+ - ARM: dts: qcom: apq8064: correct clock names
+ - video: fbdev: kyro: fix a DoS bug by restricting user input
+ - netlink: Deal with ESRCH error in nlmsg_notify()
+ - Smack: Fix wrong semantics in smk_access_entry()
+ - usb: host: fotg210: fix the endpoint's transactional opportunities
  + calculation
+ - usb: host: fotg210: fix the actual_length of an iso packet
+ - usb: gadget: uEther: fix a potential null pointer dereference
+ - usb: gadget: composite: Allow bMaxPower=0 if self-powered
+ - staging: board: Fix uninitialized spinlock when attaching genpd
+ - tty: serial: jsm: hold port lock when reporting modem line changes
+ - bpf/tests: Fix copy-and-paste error in double word test
+ - bpf/tests: Do not PASS tests without actually testing the result
+ - video: fbdev: asiliantfb: Error out if 'pixclock' equals zero
+ - video: fbdev: kyro: Error out if 'pixclock' equals zero
+ - video: fbdev: riva: Error out if 'pixclock' equals zero
+ - ipv4: ip_output.c: Fix out-of-bounds warning in ip_copy_addrs()
+ - flow_dissector: Fix out-of-bounds warnings
+ - s390/jump_label: print real address in a case of a jump label bug
+ - serial: 8250: Define RX trigger levels for OxSemi 950 devices
+ - xtensa: ISS: don't panic in rs_init
+ - hvsi: don't panic on tty_register_driver failure
+ - serial: 8250_pci: make setup_port() parameters explicitly unsigned
+ - staging: ks7010: Fix the initialization of the 'sleep_status' structure
+ - ata: sata_dwc_460ex: No need to call phy_exit() before phy_init()
+ - Bluetooth: skip invalid hci_sync_conn_complete_evt
+ - ASoC: Intel: bytcr_rt5640: Move "Platform Clock" routes to the maps for the
  matching in-/output
+ - media: v412-dv-timings.c: fix wrong condition in two for-loops
+ - arm64: dts: qcom: sdm660: use reg value for memory node
+ - net: ethernet: stmmac: Do not use unreachable() in ipq806x_gmac_probe()
+ - Bluetooth: avoid circular locks in sco_sock_connect
+ - gpus: drm: amd: amdgpu: amdgpu_i2c: fix possible uninitialized-variable
  access in amdgpu_i2c_router_select_ddc_port()
+ - ARM: tegra: tamonten: Fix UART pad setting
+ - rpc: fix gss_svc_init cleanup on failure
+ - staging: rts5208: Fix get_ms_information() heap buffer size
+ - gfs2: Don't call dlm after protocol is unmounted
+ - mmc: sdhci-of-arasan: Check return value of non-void funtions
+ - mmc: rtsx_pci: Fix long reads when clock is prescaled
+ - selftests/bpf: Enlarge select() timeout for test_maps
+ - cifs: fix wrong release in sess_alloc_buffert() failed path
+ - Revert "USB: xcui: fix U1/U2 handling for hardware with XHCI_INTEL_HOST
  quirk set"
+ - usb: musb: musb_dsps: request_irq() after initializing musb
+ - usbf: give back URBS for unsent unlink requests during cleanup
+ - usbf:vHCI_hcd USB port can get stuck in the disabled state
+ - ASoC: rockchip: i2s: Fix regmap_ops hang
+ - ASoC: rockchip: i2s: Fixup config for DAIFMT_DSP_A/B
+ - parport: remove non-zero check on count
+ - ath9k: fix OOB read ar9300_eeprom_restore_internal
+ - ath9k: fix sleeping in atomic context
+ - net: fix NULL pointer reference in cipso_v4_doi_free
+ - net: w5100: check return value after calling platform_get_resource()
+ - parisc: fix crash with signals and alloca
+ - scsi: BusLogic: Fix missing pr_cont() use
+ - scsi: qla2xxx: Sync queue idx with queue_pair_map idx
+ - cpufreq: powernv: Fix init_chip_info initialization in numa=off
+ - mm/hugetlb: initialize hugetlb_usage in mm_init
+ - memcg: enable accounting for pids in nested pid namespaces
+ - platform/chrome: cros_ec_proto: Send command again when timeout occurs
+ - xen: reset legacy rtc flag for PV domU
+ - bnx2x: Fix enabling network interfaces without VFs
+ - PM: base: power: don't try to use non-existing RTC for storing data
+ - x86/mm: Fix kern_addr_valid() to cope with existing but not present entries
+ net-caif: avoid user-triggerable WARN_ON(1)
+ ptp: dp83640: don’t define PAGE0
+ net/l2tp: Fix reference count leak in l2tp_udp_recv_core
+ r6040: Restore MDIO clock frequency after MAC reset
+ tipc: increase timeout in tipc_sk_enqueue()
+ events: Reuse value read using READ_ONCE instead of re-reading it
+ net/af_unix: fix a data-race in unix_dgram_poll
+ tc: fix tp->undo_retrans accounting in tcp_sacktag_one()
+ mm/memory_hotplug: use "unsigned long" for PFN in zone_for_pfn_range()
+ dt/bindings: mtd: gpmc: Fix the ECC bytes vs. OOB bytes equation
+ mfd: Don’t use irq_create_mapping() to resolve a mapping
+ PCI: Add ACS quirks for Cavium multi-function devices
+ net: usb: cdc_mbim: avoid altsetting toggling for Telit LN920
+ ethtool: Fix an error code in cxgb2.c
+ PCI: Sync __pci_register_driver() stub for CONFIG_PCI=n
+ mtd: rawnand: cafe: Fix a resource leak in the error handling path of
  ’cafe_nand_probe()
+ ARC: export clear_user_page() for modules
+ net: dsa: b53: Fix calculating number of switch ports
+ netfilter: socket: icmp6: fix use-after-scope
+ qlcnic: Remove redundant unlock in qlenic_pinit_from_rom
+ net: renesas: sh_eth: Fix freeing wrong tx descriptor
+ SUNRPC/nfs: Fix return value for nfs4_callback_compound()
+ usb: mtu3: use @mult for HS isoc or intr
+ usb: mtu3: fix the wrong HS mult value
+ lib/mpi: use kcalloc in mpi_resize
+ media: venus: venc: Fix potential null pointer dereference on pointer fmt
+ platform/x86: dell-smbios-wmi: Add missing kfree in error-exit from
  run_smbios_call
+ f2fs: fix to unmap pages from userspace process in punch_hole()
+ userfaultfd: prevent concurrent API initialization
+ arm64/sve: Use correct size when reinitialising SVE state
+ perf machine: Initialize srcline string member in add_location struct
+ net/mlx5: Fix potential sleeping in atomic context
+ net: hns3: pad the short tunnel frame before sending to hardware
+ mfd: axp20x: Update AXP288 volatile ranges
+ KVM: arm64: Handle PSCI resets before userspace touches vCPU state
+ ip_gre: validate csum_start only on pull
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 18 Oct 2021 12:35:58 +0200
+ linux (4.15.0-161.169) bionic; urgency=medium
+ * bionic/linux: 4.15.0-161.169 -proposed tracker (LP: #1947358)
+ * Bionic/linux-aws Boot failure downgrading from Bionic/linux-aws-5.4 on
  r5.metal (LP: #1946149)
+ - SAUCE: Revert "PCI/MSI: Enforce MSI[X] entry updates to be visible"
- SAUCE: Revert "PCI/MSI: Enforce that MSI-X table entry is masked for update"

-- Stefan Bader <stefan.bader@canonical.com> Fri, 15 Oct 2021 15:16:33 +0200

+linux (4.15.0-160.168) bionic; urgency=medium

+ * bionic/linux: 4.15.0-160.168 -proposed tracker (LP: #1944933)

+ * Packaging resync (LP: #1786013)
  - debian/dkms-versions -- update from kernel-versions (main/2021.09.27)

+ * ext4 journal recovery fails w/data=journal + mmap (LP: #1847340)
  - jbd2: introduce/export functions
    - jbd2_journal_submit|finish_inode_data_buffers()
  - jbd2, ext4, ocfs2: introduce/use journal callbacks
  - j_submit|finish_inode_data_buffers()
  - ext4: data=journal: fixes for ext4_page_mknwrite()
  - ext4: data=journal: write-protect pages on j_submit_inode_data_buffers()
  - ext4: fix mmap write protection for data=journal mode

+ * CVE-2021-40490
  - ext4: fix race writing to an inline_data file while its xattrs are changing

+ * Bionic update: upstream stable patchset 2021-09-22 (LP: #1944600)
  - iio: humidity: hdc100x: Add margin to the conversion time
  - iio: adc: Fix incorrect exit of for-loop
  - ASoC: intel: atom: Fix reference to PCM buffer address
  - i2c: dev: zero out array used for i2c reads from userspace

+ * ACPI: NFIT: Fix support for virtual SPA ranges
+ * ASoC: cs42l42: Correct definition of ADC Volume control
+ * ASoC: cs42l42: Don't allow SND_SOC_DAI_FMT_LEFT_J
+ * ASoC: cs42l42: Fix inversion of ADC Notch Switch control
+ * ASoC: cs42l42: Remove duplicate control for WNF filter frequency
+ * net: dsa: mt7530: add the missing RxUnicast MIB counter
  - ppp: Fix generating ifname when empty IFLA_IFNAME is specified
  - psample: Add a fwd declaration for skbuff

+ * net: Fix memory leak in iee802154_raw_deliver
+ * net: bridge: fix memleak in br_add_if()
+ * tcp_bbr: fix u32 wrap bug in round logic if bbr_init() called after 2B packets

+ * xen/events: Fix race in set_evtehn_to_irq
+ * vsocv/virtio: avoid potential deadlock when vsocv device remove

+ * powerpc/kprobes: Fix kprobe Oops happens in booke
+ * x86/tools: Fix objdump version check again
+ * x86/resctrl: Fix default monitoring groups reporting
  - PCI/MSI: Enable and mask MSI-X early
  - PCI/MSI: Do not set invalid bits in MSI mask
  - PCI/MSI: Correct misleading comments
+ - PCI/MSI: Use msi_mask_irq() in pci_msi_shutdown()
+ - PCI/MSI: Protect msi_desc::masked for multi-MSI
+ - PCI/MSI: Mask all unused MSI-X entries
+ - PCI/MSI: Enforce that MSI-X table entry is masked for update
+ - PCI/MSI: Enforce MSI[X] entry updates to be visible
+ - vmlinux.lds.h: Handle clang's module.{c,d}tor sections
+ - mac80211: drop data frames without key on encrypted links
+ - x86/fpu: Make init_fparate correct with optimized XSAVE
+ - ath: Use safer key clearing with key cache entries
+ - ath9k: Clear key cache explicitly on disabling hardware
+ - ath: Export ath_hw_keysetmac()
+ - ath: Modify ath_key_delete() to not need full key entry
+ - ath9k: Postpone key cache entry deletion for TXQ frames reference it
+ - dmaengine: usb-dmac: Fix PM reference leak in usb_dmac_probe()
+ - ARM: dts: am43x-epos-evm: Reduce i2c0 bus speed for tsp65218
+ - dmaengine: of-dma: router_xlate to return -EPROBE_DEFER if controller is not
+   yet available
+ - scsi: megaraid_mm: Fix end of loop tests for list_for_each_entry()
+ - scsi: scsi_dh_rdac: Avoid crash during rdac_bus_attach()
+ - scsi: core: Avoid printing an error if target Alloc() returns -ENXIO
+ - ARM: dts: nomadik: Fix up interrupt controller node names
+ - net: usb: lan78xx: don't modify phy_device state concurrently
+ - Bluetooth: hidp: use correct wait queue when removing ctrl_wait
+ - dccp: add do-while-0 stubs for dccp_pr_debug macros
+ - vhost: Fix the calculation in vhost_overflow()
+ - bnx: don't lock the tx queue from napi poll
+ - ptp_pch: Restore dependency on PCI
+ - net: qlcnic: add missed unlock in qlcnic_83xx_flash_read32
+ - net: mdio-mux: Don't ignore memory allocation errors
+ - net: mdio-mux: Handle -EPROBE_DEFER correctly
+ - mmc: dw mmc: Fix hang on data CRC error
+ - ALSA: hda - fix the 'Capture Switch' value change notifications
+ - ipack: tpci200: fix many double free issues in tpci200_pci_probe
+ - btrfs: prevent rename2 from exchanging a subvol with a directory from
+   different parents
+ - ASoC: intel: atom: Fix breakage for PCM buffer address setup
+ - locks: print a warning when mount fails due to lack of "mand" support
+ - fs: warn about impending deprecation of mandatory locks
+ - netfilter: nft_exthdr: fix endianness of tcp option cast
+ - KVM: X86: MMU: Use the correct inherited permissions to get shadow page
+ - ASoC: cs42l42: Fix LRCLK frame start edge
+ - net: igmp: fix data-race in igmp_ifc_timer_expire()
+ - net: dsa: lan9303: fix broken backpressure in .port_fdb_dump
+ - genirq: Provide IRQCHIP_AFFINITY_PRE_STARTUP
+ - x86/msi: Force affinity setup before startup
+ - x86/ioapic: Force affinity setup before startup
+ - genirq/msi: Ensure deactivation on teardown
+ linux (4.15.0-159.167) bionic; urgency=medium
+ * Packaging resync (LP: #1786013)
+ - debian/dkms-versions -- update from kernel-versions (main/2021.09.06)
+ * dell300x: rsi wifi and bluetooth crash after suspend and resume
+  (LP: #1940488)
+ - Revert "rsi: Use resume_noirq for SDIO"
+ * LRMe5: switch primary version handling to kernel-versions data set
+  (LP: #1928921)
+ - [Packaging] switch to kernel-versions
+ * kvm_unit_tests: emulator test fails on 4.4 / 4.15 kernel, timeout
+  (LP: #1932966)
+ - kvm: Add emulation for movups/movupd
+ * memory leaking when removing a profile (LP: #1939915)
+ - security/apparmor/label.c: Clean code by removing redundant instructions
+ - apparmor: Fix memory leak of profile proxy
+ * ubuntu_kernel_selftests: memory-hotplug: avoid spamming logs with
dump_page() (LP: #1941829)
+ - selftests: memory-hotplug: avoid spamming logs with dump_page(), ratio limit
   hot-remove error test
+ * Bionic update: upstream stable patchset 2021-08-27 (LP: #1941916)
+ - btrfs: mark compressed range uptodate only if all bio succeed
+ - regulator: rt5033: Fix n_voltages settings for BUCK and LDO
+ - r8152: Fix potential PM refcount imbalance
+ -qed: fix possible unpaired spin_(un)lock_bh in _qed_mcp_cmd_and_union()
+ - net: Fix zero-copy head len calculation.
+ - Revert "Bluetooth: Shutdown controller after workqueues are flushed or
   cancelled"
+ - KVM: do not allow mapping valid but non-reference-counted pages
+ - Revert "watchdog: iTCO_wdt: Account for rebooting on second timeout"
+ - spi: mediatek: Fix fifo transfer
+ - padata: validate cpumask without removed CPU during offline
+ - Revert "ACPICA: Fix memory leak caused by _CID repair function"
+ - ALSA: seq: Fix racy deletion of subscriber
+ - clk: stm32f4: fix post divisor setup for I2S/SAI PLLs
+ - omap5-board-common: remove not physically existing vdds_lv8_main fixed-regulator
+ - scsi: sr: Return correct event when media event code is 3
+ - media: videobuf2-core: dequeue if start_streaming fails
- net: natsemi: Fix missing pci_disable_device() in probe and remove
- npf: update ethtool reporting of pauseframe control
- mips: Fix non-POSIX regexp
- bnx2x: fix an error code in bnx2x_nic_load()
- net: pegasus: fix uninit-value in get_interrupt_interval
- net: fec: fix use-after-free in fec_driv_remove
- net: vxge: fix use-after-free in vxge_device_unregister
- Bluetooth: defer cleanup of resources in hci_unregister_dev()
- USB: usbtc: Fix RCU stall warning
- USB: serial: option: add Telit FD980 composition 0x1056
- USB: serial: ch341: fix character loss at high transfer rates
- usb: gadget: f_hid: added GET_IDLE and SET_IDLE handlers
- usb: gadget: f_hid: fixed NULL pointer dereference
- usb: gadget: f_hid: idle uses the highest byte for duration
- usb: otg-fsm: Fix hrtimer list corruption
- scripts/tracing: fix the bug that can't parse raw_trace_func
- staging: rtl8723bs: Fix a resource leak in sd_int_dpc
- media: rtl28xxu: fix zero-length control request
- pipe: increase minimum default pipe size to 2 pages
- ext4: fix potential htree corruption when growing large_dir directories
- serial: 8250: Mask out floating 16/32-bit bus bits
- MIPS: Malta: Do not byte-swap accesses to the CBUS UART
- pcmcia: i82092: fix a null pointer dereference bug
- spi: meson-spicc: fix memory leak in meson_spicc_remove
- perf/x86/amd: Don't touch the AMD64_EVENTSEL_HOSTONLY bit inside the guest
- qmi_wwan: add network device usage statistics for qmimux devices
- libata: fix ata_pio_sector for CONFIG_HIGHMEM
- reiserfs: add check for root_inode in reiserfs_fill_super
- alpha: Send stop IPI to send to online CPUs
- net/qla3xxx: fix schedule while atomic in ql_wait_for_drivr_lock and
  ql_adapter_reset
- USB:ehci:fix Kunpeng920 ehci hardware problem
- ppp: Fix generating ppp unit id when ifname is not specified
- ovl: prevent private clone if bind mount is not allowed
- net: xilinx_emaclite: Do not print real IOMEM pointer
- KVM: x86: accept userspace interrupt only if no event is injected
- KVM: x86/mmuid: Fix per-cpu counter corruption on 32-bit builds

* Bionic update: upstream stable patchset 2021-08-17 (LP: #1940315)
- selftest: fix build error in tools/testing/selftests/vm/userfaultfd.c
- KVM: x86: determine if an exception has an error code only when injecting
  it.
- net: split out functions related to registering inflight socket files
- [Config] updateconfigs for UNIX_SCM
- af_unix: fix garbage collect vs MSG_PEEK
- net/802/mrp: fix memleak in mrp_request_join()
+ net/802/garp: fix memleak in garp_request_join()
+ net: annotate data race around sk_ll_usec
+ sctp: move 198 addresses from unusable to private scope
+ hfs: add missing clean-up in hfs_fill_super
+ hfs: fix high memory mapping in hfs_bnode_read
+ hfs: add lock nesting notation to hfs_find_init
+ ARM: dts: versatile: Fix up interrupt controller node names
+ virtio_net: Do not pull payload in skb->head
+ gro: ensure frag0 meets IP header alignment
+ x86/kvm: fix vcpu-id indexed array sizes
+ ocfs2: fix zero out valid data
+ ocfs2: issue zeroout to EOF blocks
+ can: raw: raw_setsockopt(): fix raw_rcv panic for sock UAF
+ can: mcba_usb_start(): add missing urb->transfer_dma initialization
+ can: usb_8dev: fix memory leak
+ can: ems_usb: fix memory leak
+ can: esd_usb2: fix memory leak
+ NIU: fix incorrect error return, missed in previous revert
+ nfcsim: fix use after free during module unload
+ x86/asm: Ensure asm/proto.h can be included stand-alone
+ cfg80211: Fix possible memory leak in function cfg80211_bss_update
+ netfilter: conntrack: adjust stop timestamp to real expiry value
+ netfilter: nft_nat: allow to specify layer 4 protocol NAT only
+ tipc: fix sleeping in tipc accept routine
+ mlx4: Fix missing error code in mlx4_load_one()
+ net: llc: fix skb_over_panic
+ net/mlx5: Fix flow table chaining
+ sctp: fix return value check in __scpt_rcv_asconf_lookup
+ tulip: windbond-840: Fix missing pci_disable_device() in probe and remove
+ sis900: Fix missing pci_disable_device() in probe and remove
+ can: hi3110: fix a signedness bug in hi3110_cmd()
+ i40e: Fix log TC creation failure when max num of queues is exceeded
+ i40e: Add additional info to PHY type error

* Bionic update: upstream stable patchset 2021-08-13 (LP: #1939913)
* ARM: dts: gemini: add device_type on pci
* ARM: dts: rockchip: fix pinctrl sleep nodename for rk3036-kylin and rk3288
* arm64: dts: rockchip: fix pinctrl sleep nodename for rk3399.dtsi
* ARM: dts: rockchip: Fix the timer clocks order
* ARM: dts: rockchip: Fix power-controller node names for rk3288
* arm64: dts: rockchip: Fix power-controller node names for rk3328
* reset: ti-syscon: fix to_ti_syscon_reset_data macro
* ARM: brcmstb: dts: fix NAND nodes names
* ARM: Cygnus: dts: fix NAND nodes names
* ARM: NSP: dts: fix NAND nodes names
* ARM: dts: BCM63xx: Fix NAND nodes names
* ARM: dts: imx6: phyFLEX: Fix UART hardware flow control
* ARM: imx: pm-imx5: Fix references to imx5_cpu_suspend_info
+ ARM: dts: stm32: fix RCC node name on stm32f429 MCU
+ arm64: dts: juno: Update SCPI nodes as per the YAML schema
+ arm64: dts: ls208xa: remove bus-num from dspi node
+ thermal/core: Correct function name thermal_zone_device_unregister()
+ kbuild: mkcompile_h: consider timestamp if KBUILD_BUILD_TIMESTAMP is set
+ rtc: max77686: Do not enforce (incorrect) interrupt trigger type
+ scsi: aic7xxx: Fix unintentional sign extension issue on left shift of u8
+ scsi: libfc: Fix array index out of bound exception
+ sched/fair: Fix CFS bandwidth hrtimer expiry type
+ net: ipv6: fix return value of ip6_skb_dst_mtu
+ netfilter: ctnetlink: suspicious RCU usage in ctnetlink_dump_helpinfo
+ net: bridge: sync fdb to new unicast-filtering ports
+ net: bcmgenet: Ensure all TX/RX queues DMAs are disabled
+ net: maxa: fix UAV in maxart_mac_probe
+ net: qcom/emac: fix UAV in emac_remove
+ net: ti: fix UAV in tlan_remove_one
+ net: send SYNACK packet with accepted fmark
+ net: validate lwtstate->data before returning from skb_tunnel_info()
+ dma-buf/sync_file: Don't leak fences on merge failure
+ tcp: annotate data races around tp->mtu_info
+ ipv6: tcp: drop silly ICMPv6 packet too big messages
+ igb: Fix use-after-free error during reset
+ ixgbe: Fix an error handling path in 'ixgbe_probe()'
+ igb: Fix an error handling path in 'igb_probe()'
+ fm10k: Fix an error handling path in 'fm10k_probe()'
+ e1000e: Fix an error handling path in 'e1000e_probe()'
+ iavf: Fix an error handling path in 'iavf_probe()'
+ igb: Check if num of q_vectors is smaller than max before array access
+ perf probe: Fix dso->nsinfo refcounting
+ perf Izma: Close Izma stream on exit
+ perf test bpf: Free obj_buf
+ perf probe-file: Delete namelist in del_events() on the error path
+ spi: mediatek: fix fifo rx mode
+ liquidio: Fix unintentional sign extension issue on left shift of u16
+ s390/bpf: Perform r1 range checking before accessing jit->seen_reg[r1]
+ net: fix unint-value in caif_seqpkt_sendmsg
+ net: decrenet: Fix sleeping inside in af_decrenet
+ netrom: Decrease sock refcount when sock timers expire
+ scsi: iscsi: Fix iface sysfs attr detection
+ scsi: target: Fix protect handling in WRITE SAME(32)
+ spi: cadence: Correct initialisation of runtime PM again
+ Revert "USB: quirks: ignore remote wake-up on Fibocom L850-GL LTE modem"
+ proc: Avoid mixing integer types in mem_rwlock()
+ s390/ftrace: fix ftrace_update_ftrace_func implementation
+ ALSA: sb: Fix potential ABBA deadlock in CSP driver
+ xhci: Fix lost USB 2 remote wake
+ KVM: PPC: Book3S: Fix H_RTAS rets buffer overflow
+ usb: hub: Disable USB 3 device initiated lpm if exit latency is too high
+ * fails to launch linux L2 guests on AMD (LP: #1940134) // CVE-2021-3653
  +  - KVM: nSVM: avoid picking up unsupported bits from L2 in int_ctl
  +    (CVE-2021-3653)
  +
  + * fails to launch linux L2 guests on AMD (LP: #1940134)
  +  - SAUCE: Revert "UBUNTU: SAUCE: KVM: nSVM: avoid picking up unsupported bits
  +    from L2 in int_ctl"
  +
  + -- Kelsey Skunberg <kelsey.skunberg@canonical.com>  Thu, 19 Aug 2021 16:30:31 -0600
  +
  +linux (4.15.0-155.162) bionic; urgency=medium
  +
  + * bionic/linux: 4.15.0-155.162 -proposed tracker (LP: #1939833)
  +
  + * Packaging resync (LP: #1786013)
  +  - debian/dkms-versions -- update from kernel-versions (main/2021.08.16)
  +
  + * CVE-2021-3656
  +  - SAUCE: KVM: nSVM: always intercept VMLOAD/VMSAVE when nested
  +
  + * CVE-2021-3653
  +  - SAUCE: KVM: nSVM: avoid picking up unsupported bits from L2 in int_ctl
  +
  + * dev_forward_skb: do not scrub skb mark within the same name space
  +  (LP: #1935040)
  +  - dev_forward_skb: do not scrub skb mark within the same name space
  +
  + * 'ptrace trace' needed to readlink() /proc/*/ns/* files on older kernels
  +  (LP: #1890848)
  +  - apparmor: fix ptrace read check
  +
  + * Bionic update: upstream stable patchset 2021-08-03 (LP: #1938824)
  +  - ALSA: usb-audio: fix rate on Ozone Z90 USB headset
  +  - media: dvb-usb: fix wrong definition
  +  - Input: usbtouchscreen - fix control-request directions
  +  - net: can: ems_usb: fix use-after-free in ems_usb_disconnect()
  +  - usb: gadget: eem: fix echo command packet response issue
  +  - USB: cdc-acm: blacklist Heimann USB Appset device
  +  - ntfs: fix validity check for file name attribute
  +  - iov_iter_fault_in_readable() should do nothing in xarray case
  +  - Input: joydev - prevent use of not validated data in JSIOCSBTNMAP ioctl
  +  - ARM: dts: at91: sama5d4: fix pinctrl muxing
  +  - btrfs: send: fix invalid path for unlink operations after parent
  +  - orphanization
  +  - btrfs: clear defrag status of a root if starting transaction fails
  +  - ext4: cleanup in-core orphan list if ext4_truncate() failed to get a
  +    transaction handle
  +  - ext4: fix kernel infoleak via ext4_extent_header
+ - ext4: correct the cache_nr in tracepoint ext4_es_shrink_exit
+ - ext4: remove check for zero nr_to_scan in ext4_es_scan()
+ - ext4: fix avefree in find_group_orlov
+ - ext4: use ext4_grp_locked_error in mb_find_extent
+ - can: gw: synchronize rcu operations before removing gw job entry
+ - can: peak_pciefd: pucan_handle_status(): fix a potential starvation issue in
  + TX path
+ - SUNRPC: Fix the batch tasks count wraparound.
+ - SUNRPC: Should wake up the privileged task firstly.
+ - s390/cio: dont call css_wait_for_slow_path() inside a lock
+ - rtc: stm32: Fix unbalanced clk_disable_unprepare() on probe error path
+ - iio: ltr501: mark register holding upper 8 bits of ALS_DATA{0,1} and PS_DATA
  + as volatile, too
+ - iio: ltr501: ltr559: fix initialization of LTR501_ALS_CONTR
+ - iio: ltr501: ltr501_read_ps(): add missing endianness conversion
+ - serial: sh-sci: Stop dmaengine transfer in sci_stop_tx()
+ - serial_cs: Add Option International GSM-Ready 56K/ISDN modem
+ - serial_cs: remove wrong GLOBETROTTER.cis entry
+ - ath9k: Fix kernel NULL pointer dereference during ath_reset_internal()
+ - ssb: sdio: Don't overwrite const buffer if block_write fails
+ - rsi: Assign beacon rate settings to the correct rate_info descriptor field
+ - seq_buf: Make trace_seq_putmem_hex() support data longer than 8
+ - fuse: check connected before queuing on fpq->io
+ - spi: Make of_register_spi_device also set the fwnode
+ - spi: spi-loopback-test: Fix 'tx_buf' might be 'rx_buf'
+ - spi: spi-topcliff-pch: Fix potential double free in
  + pch_spi_process_messages()
+ - spi: omap-100k: Fix the length judgment problem
+ - crypto: nx - add missing MODULE_DEVICE_TABLE
+ - media: cpi2: fix memory leak in cpi2_usb_probe
+ - media: cobalt: fix race condition in setting HDP
+ - media: pvrusb2: fix warning in pvr2_i2c_core_done
+ - crypto: qat - check return code of qat_hal_rd_rel_reg()
+ - crypto: qat - remove unused macro in FW loader
+ - media: em28xx: Fix possible memory leak of em28xx struct
+ - media: v4l2-core: Avoid the dangling pointer in v4l2_fh_release
+ - media: bt8xx: Fix a missing check bug in bt878_probe
+ - media: st-hva: Fix potential NULL pointer dereferences
+ - media: dvd_usb: memory leak in cinergyt2_fe_attach
+ - mmc: via-sdmmc: add a check against NULL pointer dereference
+ - crypto: shash - avoid comparing pointers to exported functions under CFI
+ - media: dvb_net: avoid speculation from net slot
+ - media: siano: fix device register error path
+ - btrfs: fix error handling in __btrfs_update_delayed_inode
+ - btrfs: abort transaction if we fail to update the delayed inode
+ - btrfs: disable build on platforms having page size 256K
+ - regulator: da9052: Ensure enough delay time for .set_voltage_time_sel
+ - HID: do not use down_interruptible() when unbinding devices
+ ACPI: processor idle: Fix up C-state latency if not ordered
+ hv_utils: Fix passing zero to 'PTR_ERR' warning
+  lib: vsprintf: Fix handling of number field widths in vsscanf
+ ACPI: EC: Make more Asus laptops use ECDT _GPE
+ block_dump: remove block_dump feature in mark_inode_dirty()
+ fs: dlm: cancel work sync othercon
+ random32: Fix implicit truncation warning in prandom_seed_state()
+ fs: dlm: fix memory leak when fenced
+ ACPI: sysfs: Fix a buffer overrun problem with description_show()
+ ocfs2: fix snprintf() checking
+ net: pch_gbe: Propagate error from devm_gpio_request_one()
+ drmm/rockchip: cdn-dp-core: add missing clk_disable_unprepare() on error in cdn_dp_grf_write()
+ ehea: fix error return code in ehea_restart_qps()
+ RDMA/rxe: Fix failure during driver load
+ drm: qxl: ensure surf.data is uninitialized
+ wireless: car9170: fix LEDs build errors & warnings
+ brcmsmac: mac80211_if: Fix a resource leak in an error handling path
+ ath10k: Fix an error code in ath10k_add_interface()
+ netlabel: Fix memory leak in netbl_mgnt_add_common
+ netfilter: nft_exthdr: check for IPv6 packet before further processing
+ samples/bpf: Fix the error return code of xdp_redirect's main()
+ - net: ethernet: aeroflex: fix UAF in greth_of_remove
+ - net: ethernet: ezchip: fix UAF in nps_enet_remove
+ - net: ethernet: ezchip: fix error handling
+ - pkt_sched: sch_qfq: fix qfq_change_class() error path
+ - vxlan: add missing rcu_read_lock() in neigh_reduce()
+ - net: bcmgenet: Fix attaching to PYH failed on RPi 4B
+ - i40e: Fix error handling in i40e_vsi_open
+ - Revert "ibmvnic: remove duplicate napi_schedule call in open function"
+ - Bluetooth: mgmt: Fix slab-out-of-bounds in tlv_data_is_valid
+ - net: sched: fix warning in tcindex_alloc_perfect_hash
+ - tty: nozomi: Fix a resource leak in an error handling function
+ - mwifiex: re-fix for unaligned accesses
+ - iio: adis_buffer: do not return ints in irq handlers
+ - iio: accel: bma180: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: accel: bma220: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: accel: hid: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: accel: kxcjk-1013: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: accel: stk8312: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: accel: stk8ba50: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: adc: ti-ads1015: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: adc: vfi610: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: gyro: bmg160: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: humidity: am2315: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: prox: sr08: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: prox: as3935: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: light: isl29125: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: light: tcs3414: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ - iio: potentiostat: lmp91000: Fix alignment of buffer in
  iio_push_to_buffers_with_timestamp()
+ - ASoC: hisilicon: fix missing clk_disable_unprepare() on error in
  hi6210_i2s_startup()
+ Input: hil_kbd - fix error return code in hil_dev_connect()
+ char: pcmcia: error out if 'num_bytes_read' is greater than 4 in
  set_protocol()
+ tty: nozoani: Fix the error handling path of 'nozoani_card_init()' 
  Rename si_flags field
+ s390: appdata depends on PROC_SYSCTL
+ eeprom: idt_89hpexx: Put fwnode in matching case during ->probe()
+ iio: adc: mxx-iradc: Fix buffer alignment in
  iio_push_to_buffers_with_timestamp()
+ staging: gdm724x: check for buffer overflow in gdm_lte_multi_sdu_pkt()
+ staging: gdm724x: check for overflow in gdm_lte_netif_rx()
+ ASoC: cs42l42: Correct definition of CS42L42_ADC_PDN_MASK
+ of: Fix truncation of memory sizes on 32-bit platforms
+ scsi: mpt3sas: Fix error return value in _scsih_expander_add()
+ phy: ti: dm816x: Fix the error handling path in dm816x_usb_phy_probe()
+ extcon: sm5502: Drop invalid register write in sm5502_reg_data
+ extcon: max8997: Add missing modalias string
+ configs: fix memleak in configs_release_bin_file
+ leds: as3645a: Fix error return code in as3645a_parse_node()
+ leds: ktd2692: Fix an error handling path
+ mm/huge_memory.c: don't discard hugepage if other processes are mapping it
+ selftests/vm/pkeys: fix alloc_random_pkey() to make it really, really random
+ mmc: vub3000: fix control-request direction
+ scsi: core: Retry I/O for Notify (Enable Spinup) Required error
+ drm/mxsfb: Don't select DRM_KMS_FB_HELPER
+ drm/zte: Don't select DRM_KMS_FB_HELPER
+ drm/amd/apdgpu/sriov disable all ip hw status by default
+ atm: iphase: fix possible use-after-free in ia_module_exit()
+ mLSDN: fix possible use-after-free in HFC_cleanup()
+ atm: nicstar: Fix possible use-after-free in nicstar_cleanup()
+ net: Treat __napi_schedule_irqoff() as __napi_schedule() on PREEMPT_RT
+ reiserfs: add check for invalid 1st journal block
+ drm/virtio: Fix double free on probe failure
+ udf: Fix NULL pointer dereference in udf_symlink function
+ e100: handle eeprom as little endian
+ clk: renesas: r8a77995: Add ZA2 clock
+ clk: tegra: Ensure that PLLU configuration is applied properly
+ ipv6: use prandom_u32() for ID generation
+ RDMA/cxgb4: Fix missing error code in create_qp()
+ dm space maps: don't reset space map allocation cursor when committing
+ virtio_net: Remove BUG() to avoid machine dead
+ net: bcmgenet: check return value after calling platform_get_resource()
+ net: micrel: check return value after calling platform_get_resource()
+ fjes: check return value after calling platform_get_resource()
+ selinux: use __GFP_NOWARN with GFP_NOWAIT in the AVC
+ xfrm: Fix error reporting in xfrm_state_construct.
- wkcore/wl12xx: Fix wl12xx get_mac error if device is in ELP
- w1l251: Fix possible buffer overflow in w1l251_cmd_scan
- cw1200: add missing MODULE_DEVICE_TABLE
- atm: nicstar: use \textit{dma_free_coherent} instead of \textit{kfree}
- atm: nicstar: register the interrupt handler in the right place
- vsoc: notify server to shutdown when client has pending signal
- RDMA/rxe: Don't overwrite errno from ib_umem_get()
- iwififi: mvm: don't change band on bound PHY contexts
- sfc: avoid double pci_remove of VFs
- sfc: error code if SRIOV cannot be disabled
- wireless: wext-spy: Fix out-of-bounds warning
- RDMA/cma: Fix rdma_resolve_route() memory leak
- Bluetooth: Fix the HCI to MGMT status conversion table
- Bluetooth: Shutdown controller after workqueues are flushed or cancelled
- Bluetooth: btusb: fix bt fiwmare downloading failure issue for qca btso.
- scpt: validate from \_addr \_param return
- scpt: add size validation when walking chunks
- fscrypt: don't ignore minor_hash when hash is 0
- bdi: Do not use freezable workqueue
- fuse: reject internal erro
- powerpe/barrier: Avoid collision with clang's \texttt{\_lwsync} macro
- usb: gadget: f fs: Fix setting of device and driver data cross-references
- drm/radeon: Add the missed drm_gem_object_put() in
  \texttt{radeon_user_framebuffer\_create()}
- pinctrl/amd: Add device HID for new AMD GPIO controller
- mmc: sdhci: Fix warning message when accessing RPMB in HS400 mode
- mmc: core: clear flags before allowing to retune
- mmc: core: Allow UHS-I voltage switch for SDSC cards if supported
- ata: ahci_sunxi: Disable DIPM
- fcpu/hotplug: Cure the cpusets trainwreck
- ASoC: tegra: Set driver_name=tegra for all machine drivers
- qemu-fw-\cfg: Make \texttt{fw\_cfg\_rev\_attr} a proper \texttt{kobj\_attribute}
- ipmi/watchdog: Stop watchdog timer when the current action is \texttt{\_none}
- power: supply: ab8500: Fix an old bug
- seq_buf: Fix overflow in seq_buf\_putmem\_hex()
- tracing: Simplify \& fix saved\_tgids logic
- ipack/carriers/tpci200: Fix a double free in tpci200\_pci\_probe
- dm btrees remove: assign new_root only when removal succeeds
- media: dtv5100: fix control-request directions
- media: zr364xx: fix memory leak in zr364xx\_start_readpipe
- media: gspca/sq905: fix control-request direction
- media: gspca/sunplus: fix zero-length control requests
- jfs: fix GPF in DiFree
- smackifs: restrict bytes count in smk_set_cipso()
- KVM: x86: Use guest MAXPHYADDR from CPUID.0x8000_0008 iff TDP is enabled
- KVM: X86: Disable hardware breakpoints unconditionally before kvm_x86->run()
- scsi: core: Fix bad pointer dereference when ehandler kthread is invalid
- tracing: Do not reference char * as a string in histograms
+ - PCI: aardvark: Don't rely on jiffies while holding spinlock
+ - PCI: aardvark: Fix kernel panic during PIO transfer
+ - tty: serial: fsl_lpuart: fix the potential risk of division or modulo by zero
+ - misc/libmasm/module: Fix two use after free in ibmasm_init_one
+ - Revert "ALSA: bebob/oxfw: fix Kconfig entry for Mackie d.2 Pro"
+ - w1: ds2438: fixing bug that would always get page0
+ - scsi: lpfc: Fix "Unexpected timeout" error in direct attach topology
+ - scsi: lpfc: Fix crash when lpfc_sli4_hba_setup() fails to initialize the SGLs
+ - scsi: core: Cap scsi_host cmd_per_lun at can_queue
+ - tty: serial: 8250: serial_cs: Fix a memory leak in error handling path
+ - fs/jfs: Fix missing error code in lmLogInit()
+ - scsi: iscsi: Add iscsi_elb_conn refcount helpers
+ - scsi: iscsi: Fix host->max_id use
+ - scsi: qedl: Fix null ref during abort handling
+ - mfd: da9052/stmpe: Add and modify MODULE_DEVICE_TABLE
+ - s390/sclp_vt220: fix console name to match device
+ - ALSA: sb: Fix potential double-free of CSP mixer elements
+ - powerpc/ps3: Add dma_mask to ps3_dma_region
+ - gpio: zynq: Check return value of pm_runtime_get_sync
+ - ALSA: ppc: fix error return code in snd_pmac_probe()
+ - selftests/powerpc: Fix "no_handler" EBB selftest
+ - ASoC: soc-core: Fix the error return code in snd_soc_of_parse_audio_routing()
+ - ALSA: bebob: add support for ToneWeal FW66
+ - usb: gadget: f_hid: fix endianness issue with descriptors
+ - usb: gadget: hid: fix error return code in hid_bind()
+ - powerpc/boot: Fixup device-tree on little endian
+ - backlight: lm3630a: Fix return code of .update_status() callback
+ - ALSA: hda: Add IRQ check for platform_get_irq()
+ - staging: rtl8723bs: fix macro value for 2.4Ghz only device
+ - intel_th: Wait until port is in reset before programming it
+ - i2c: core: Disable client irq on reboot/shutdown
+ - lib/decompress_unlz4.c: correctly handle zero-padding around initrds.
+ - pwm: spear: Don't modify HW state in .remove callback
+ - power: supply: abi8500: Avoid NULL pointers
+ - power: supply: max17042: Do not enforce (incorrect) interrupt trigger type
+ - power: reset: gpio-poweroff: add missing MODULE_DEVICE_TABLE
+ - ARM: 9087/1: kprobes: test-thumb: fix for LLVM_IAS=1
+ - watchdog: Fix possible use-after-free in wdt_startup()
+ - watchdog: sc520_wdt: Fix possible use-after-free in wdt_turnoff()
+ - watchdog: Fix possible use-after-free by calling del_timer_sync()
+ - watchdog: iTCO_wdt: Account for rebooting on second timeout
+ - x86/fpu: Return proper error codes from user access functions
+ - orangefs: fix orangefs df output.
+ - ceph: remove bogus checks and WARN_ONs from ceph_set_page_dirty
+ - NFS: nfs_find_open_context() may only select open files
+ - power: supply: charger-manager: add missing MODULE_DEVICE_TABLE
+ - power: supply: ab8500: add missing MODULE_DEVICE_TABLE
+ - pwm: tegra: Don't modify HW state in .remove callback
+ - ACPI: AMBA: Fix resource name in /proc/iomem
+ - ACPI: video: Add quirk for the Dell Vostro 3350
+ - virtio-block: Fix memory leak among suspend/resume procedure
+ - virtio_net: Fix error handling in virtnet_restore()
+ - virtio_console: Assure used length from device is limited
+ - i2fs: add MODULE_SOFTDEP to ensure crc32 is included in the initramfs
+ - PCI/sysfs: Fix dsmin_label_utf16s_to_utf8s() buffer overrun
+ - power: supply: rt5033_battery: Fix device tree enumeration
+ - um: fix error return code in slip_open()
+ - um: fix error return code in winch_tramp()
+ - watchdog: aspeed: fix hardware timeout calculation
+ - nfs: fix acl memory leak of posix_acl_create()
+ - ubifs: Set/Clear I_LINKABLE under i_lock for whiteout inode
+ - x86/fpu: Limit xstate copy size in xstateregs_set()
+ - ALSA: isa: Fix error return code in snd_cmi8330_probe()
+ - NFSv4/nFS: Don't call _nfs4_pnfs_v3_ds_connect multiple times
+ - hexagon: use common DISCARDS macro
+ - reset: a10sr: add missing of_match_table reference
+ - ARM: dts: exynos: fix PWM LED max brightness on Odroid XU/XU3
+ - ARM: dts: exynos: fix PWM LED max brightness on Odroid XU4
+ - memory: atmel-ebi: add missing of_node_put for loop iteration
+ - rtc: fix snprintf() checking in is_rtc_hctosys()
+ - ARM: dts: r8a7779, marzen: Fix DU clock names
+ - ARM: dts: BCM5301X: Fixup SPI binding
+ - reset: bail if try_module_get() fails
+ - memory: fsl_ifc: fix leak of IO mapping on probe failure
+ - memory: fsl_ifc: fix leak of private memory on probe failure
+ - ARM: dts: am335x: align ti,pindir-d0-d1-in property with dt-shema
+ - scsi: be2iscsi: Fix an error handling path in beiscsi_dev_probe()
+ - mips: always link byteswap helpers into decompressor
+ - mips: disable branch profiling in boot/decompress.o
+ - MIPS: vdsno: Invalid GIC access through VDSO
+ - net: bridge: multicast: fix PIM hello router port marking race
+ - ALSA: usb-audio: Fix OOB access at proc output
+ - iio: light: tcs3472: do not free unallocated IRQ
+ - rsi: fix AP mode with WPA failure due to encrypted EAPOL
+ - evm: Execute evm_inode_init_security() only when an HMAC key is loaded
+ - evm: fix writing <securityfs>/evm_overflow
+ - wcn36xx: Move hal_buf allocation to devm_kmalloc in probe
+ - ssb: Fix error return code in ssb_bus_scan()
+ - brcmfmac: fix setting of station info chains bitmask
+ - ipv6: ethhdrs: do not blindly use init_net
+ - i40e: Fix autoneg disabling for non-10GBaseT links
+ - ipv6: fix out-of-bound access in ip6_parse_tlv()
+ - iio: light: tcs3472: Fix buffer alignment in
+ iio_push_to_buffers_with_timestamp()
+ - ASoC: rsnd: tidyup loop on rsnd_adg_clk_query()
+ - visorbus: fix error return code in visorchipset_init()
+ - serial: 8250: Actually allow UPF_MAGIC_MULTIPLIER baud rates
+ - powerpc: Offline CPU in stop_this_cpu()
+ - serial: mvebu-uart: correctly calculate minimal possible baudrate
+ - arm64: dts: marvell: armada-37xx: Fix reg for standard variant of UART
+ - vfio/pci: Handle concurrent vma faults
+ - clocksource/arm_arch_timer: Improve Allwinner A64 timer workaround
+ - PCI: Leave Apple Thunderbolt controllers on for s2idle or standby
+ - media: subdev: disallow ioctl for saa6588/davinci
+ - PCI: iproc: Fix multi-MSI base vector number allocation
+ - PCI: iproc: Support multi-MSI only on uniprocessor kernel
+ - virtio_net: move tx vq operation under tx queue lock
+ - ARM: dts: exynos: fix PWM LED max brightness on Odroid HC1
+ - ARM: dts: am437x: align ti,pindir-d0-out-d1-in property with dt-shema
+ * Bionic update: upstream stable patchset 2021-07-20 (LP: #1936960)
+ - include/linux/mmdebug.h: make VM_WARN* non-rvals
+ - mm: add VM_WARN_ON_ONCE_PAGE() macro
+ - mm/rmap: remove unneeded semicolon in page_not_mapped()
+ - mm/rmap: use page_not_mapped in try_to_unmap()
+ - mm/thp: try_to_unmap() use TTU_SYNC for safe splitting
+ - mm/thp: fix vma_address() if virtual address below file offset
+ - mm/thp: fix page_address_in_vma() on file THP tails
+ - mm: thp: replace DEBUG_VM BUG with VM_WARN when unmap fails for split
+ - mm: page_vma_mapped_walk(): use page for pvmw->page
+ - mm: page_vma_mapped_walk(): settle PageHuge on entry
+ - mm: page_vma_mapped_walk(): use pmde for *pvmw->pmd
+ - mm: page_vma_mapped_walk(): prettify PVMW_MIGRATION block
+ - mm: page_vma_mapped_walk(): crossing page table boundary
+ - mm: page_vma_mapped_walk(): add a level of indentation
+ - mm: page_vma_mapped_walk(): use goto instead of while (1)
+ - mm: page_vma_mapped_walk(): get vma_address_end() earlier
+ - mm/thp: fix page_vma_mapped_walk() if THP mapped by ptes
+ - mm/thp: another PVMW_SYNC fix in page_vma_mapped_walk()
+ - mm, futex: fix shared futex pgoff on shmem huge page
+ - scsi: sr: Return appropriate error code when disk is ejected
+ - drm/nouveau: fix dma_address check for CPU/GPU sync
+ - kfifo: DECLARE_KIFO_PTR(fifo, u64) does not work on arm 32 bit
+ - kthread_worker: split code for canceling the delayed work timer
+ - kthread: prevent deadlock when kthread_mod_delayed_work() races with
  kthread_cancel_delayed_work_sync()
+ - xen/events: reset active flag for lateeoi events later
+ - ARM: dts: imx6qdl-sabresd: Remove incorrect power supply assignment
+ - ARM: OMAP: replace setup_irq() by request_irq()
+ - clocksource/drivers/timer-ti-dm: Add clockevent and clocksource support
+ - clocksource/drivers/timer-ti-dm: Prepare to handle dra7 timer wrap issue
+ * Bionic update: upstream stable patchset 2021-07-14 (LP: #1936231)
+ - Revert "UBUNTU: SAUCE: Revert "proc: Check /proc/$pid/attr/ writes against
  file opener"
+ - proc: Track /proc/$pid/attr/ opener mm_struct
+ - net/ncf/rawsock.c: fix a permission check bug
+ - ASoC: sti-sas: add missing MODULE_DEVICE_TABLE
+ - isdn: mISDN: netjet: Fix crash in nj_probe:
+ - bonding: init notify_work earlier to avoid uninitialized use
+ - netlink: disable IRQs for netlink_lock_table()
+ - net: mdiobus: get rid of a BUG_ON()
+ - cgroup: disable controllers at parse time
+ - wq: handle VM suspension in stall detection
+ - net/qla3xxx: fix schedule while atomic in ql_sem_spinlock
+ - scsi: vmw_pvscsi: Set correct residual data length
+ - scsi: target: qla2xxx: Wait for stop_phase1 at WWN removal
+ - net: macb: ensure the device is available before accessing GEMGX1 control
  registers
+ - net: apptalk: cops: Fix data race in cops_probe1
+ - MIPS: Fix kernel hang under FUNCTION_GRAPH_TRACER and PREEMPT_TRACER
+ - bnx2x: Fix missing error code in bnx2x_iiov_init_one()
+ - powerpc/fsl: set fsl,i2c-erratum-a004447 flag for P2041 i2c controllers
+ - powerpc/fsl: set fsl,i2c-erratum-a004447 flag for P1010 i2c controllers
+ - i2c: mpc: Make use of i2c_recover_bus()
+ - i2c: mpc: implement erratum A-004447 workaround
+ - drm: Fix use-after-free read in drm_getunique()
+ - drm: Lock pointer access in drm_master_release()
+ - kvm: avoid speculation-based attacks from out-of-range memslot accesses
+ - staging: rtl8723bs: Fix uninitialized variables
+ - btrfs: return value from btrfs_mark_extent_written() in case of error
+ - cgroup1: don't allow 'n' in renaming
+ - USB: f_ncm: ncm_bitrate (speed) is unsigned
+ - usb: dwc3: ep0: fix NULL pointer exception
+ - usb: typec: ucsi: Clear PPM capability data in ucsi_init() error path
+ - usb: gadget: f_fs: Ensure io_completion_wq is idle during unbind
+ - USB: serial: omninet: add device id for Zyxel Omni 56K Plus
+ - USB: serial: quatech2: fix control-request directions
+ - ush: gadget: eem: fix wrong eem header operation
+ - usb: fix various gadgets null ptr deref on 10gbps cabling.
+ - usb: fix various gadget panics on 10gbps cabling
+ - regulator: core: resolve supply for boot-on/always-on regulators
+ - regulator: max77620: Use device_set_of_node_from_dev()
+ - perf: Fix data race between pin_count increment/decrement
+ - NFS: Fix a potential NULL dereference in nfs_get_client()
+ - perf session: Correct buffer copying when peeking events
+ - kvm: fix previous commit for 32-bit builds
- NFS: Fix use-after-free in nfs4_init_client()
- NFSv4: nfs4_proc_set_acl needs to restore NFS_CAP_UIDGID_NOMAP on error.
- scsi: core: Fix error handling of scsi_host_alloc()
- scsi: core: Put .shost_dev in failure path if host state changes to RUNNING
- scsi: core: Only put parent device if host state differs from HOST_CREATED
- ftrace: Do not blindly read the ip address in ftrace_bug()
- tracing: Correct the length check which causes memory corruption
- proc: only require mm_struct for writing
- scsi: bnx2fc: Return failure if io_req is already in ABTS processing
- ARM: dts: imx6qdl-sabresd: Assign corresponding power supply for LDOs
- usb: f_ncm: only first packet of aggregate needs to start timer
- usb: pd: Set PD_T_SINK_WAIT_CAP to 310ms
- RDMA/mlx4: Do not map the core_clock page to user space unless enabled
- vmlinux.lds.h: Avoid orphan section with !SMP
- sched/fair: Make sure to update tg contrib for blocked load
- net: ieee802154: fix null deref in parse dev addr
- HID: hid-sensor-hub: Return error for hid_set_field() failure
- HID: Add BUS_VIRTUAL to hid_connect logging
- HID: usbhid: fix info leak in hid_submit_ctrl
- ARM: OMAP2+: Fix build warning when mmc_omap is not built
- HID: gt683r: add missing MODULE_DEVICE_TABLE
- gfs2: Fix use-after-free in gfs2_glock_shrink_scan
- scsi: target: core: Fix warning on realtime kernels
- ethernet: myri10ge: Fix missing error code in myri10ge_probe()
- nvme-loop: reset queue count to 1 in nvme_loop_destroy_io_queues()
- nvme-loop: clear NVME_LOOP_Q_LIVE when nvme_loop_configure_admin_queue() fails
- nvme-loop: check for NVME_LOOP_Q_LIVE in nvme_loop_destroy_admin_queue()
- net: ipconfig: Don't override command-line hostnames or domains
- rtnetlink: Fix missing error code in rtnl_bridge_notify()
- net/x25: Return the correct errno code
- net: Return the correct errno code
- fib: Return the correct errno code
- dmaengine: ALTERA_MSGDMA depends on HAS_IOMEM
- dmaengine: QCOM_HIDMA_MGMT depends on HAS_IOMEM
- dmaengine: stedma40: add missing iounmap() on error in d40_probe()
- mm/memory-failure: make sure wait for page writeback in memory_failure
- batman-adv: Avoid WARN_ON timing related checks
- net: ipv4: fix memory leak in netlbl_cipsov4_add_std
- net: rds: fix memory leak in rds_recvmsg
- udp: fix race between close() and udp_abort()
- rtnetlink: Fix regression in bridge VLAN configuration
- netfilter: synproxy: Fix out of bounds when parsing TCP options
- alx: Fix an error handling path in 'alx_probe()'
- net: stmmac: dwmac1000: Fix extended MAC address registers definition
- qlcnic: Fix an error handling path in 'qlcnic_probe()'
- netxen_nic: Fix an error handling path in 'netxen_nic_probe()'
- net: cdc_ncm: switch to eth%d interface naming
+ - net: usb: fix possible use-after-free in smsc75xx_bind
+ - net: ipv4: fix memory leak in ip_mc_add1_src
+ - net/af_unix: fix a data-race in unix_dgram_sendmsg / unix_release_sock
+ - be2net: Fix an error handling path in 'be_probe()'
+ - net: hamradio: fix memory leak in mkiss_close
+ - net: cdc_eem: fix tx fixup skb leak
+ - icmp: don't send out ICMP messages with a source address of 0.0.0.0
+ - net: ethernet: fix potential use-after-free in ec_bhf_remove
+ - radeon: use memcpy_to/fromio for UVD fw upload
+ - hwmon: (scpi-hwmon) shows the negative temperature properly
+ - can: bcm: fix infoleak in struct bcm_msg_head
+ - can: mcb_a: fix memory leak in mcb_a
+ - usb: core: hub: Disable autosuspend for Cypress CY7C65632
+ - tracing: Do not stop recording cmdlines when tracing is off
+ - tracing: Do not stop recording comms if the trace file is being read
+ - tracing: Do no increment trace_clock_global() by one
+ - PCI: Mark TI C667X to avoid bus reset
+ - PCI: Mark some NVIDIA GPUs to avoid bus reset
+ - PCI: Add ACS quirk for Broadcom BCM57414 NIC
+ - PCI: Work around Huawei Intelligent NIC VF FLR erratum
+ - ARCh: save ABI registers across signal handling
+ - dmaengine: pl330: fix wrong usage of spinlock flags in dma_cyclc
+ - net: bridge: fix vlan tunnel dst null pointer dereference
+ - net: bridge: fix vlan tunnel dst refcnt when egressing
+ - mm/slub.c: include swab.h
+ - net: fec_ptp: add clock rate zero check
+ - can: bcm/raw/isotp: use per module netdevice notifier
+ - inet: use bigger hash table for IP ID generation
+ - ush: dwc3: core: fix kernel panic when do reboot
+ - x86/fpu: Reset state for all signal restore failures
+ - drm/nouveau: wait for moving fence after pinning v2
+ - drm/radeon: wait for moving fence after pinning
+ - ARM: 9081/1: fix gcc-10 thumb2-kernel regression
+ - Makefile: Move -Wno-unused-but-set-variable out of GCC only block
+ - MIPS: generic: Update node names to avoid unit addresses
+ - Revert "PCI: PM: Do not read power state in pci_enable_device_flags()"
+ - mac80211: remove warning in ieee80211_get_sband()
+ - cfg80211: call cfg80211_leave_ocb when switching away from OCB
+ - mac80211: drop multicast fragments
+ - ping: Check return value of function 'ping_queue_rcv_skb'
+ - inet: annotate date races around sk->sk_txhash
+ - net: caif: fix memory leak in ldisc_open
+ - net/packet: annotate accesses to po->bind
+ - net/packet: annotate accesses to po->ifindex
+ - r8152: Avoid memcpy() over-reading of ETH_SS_STATS
+ - sh_eth: Avoid memcpy() over-reading of ETH_SS_STATS
+ - r8169: Avoid memcpy() over-reading of ETH_SS_STATS
+ - net: qed: Fix memcpy() overflow of qed_dcbx_params()
+ - net: ll_temac: Avoid ndo_start_xmit returning NETDEV_TX_BUSY
+ - pinctrl: stm32: fix the reported number of GPIO lines per bank
+ - nilfs2: fix memory leak in nilfs_sysfs_delete_device_group
+ - 12c: robotfuzz-osif: fix control-request directions
+ - scsi: scsi_devinfo: Add blacklist entry for HPE OPEN-V
+ - net/mlx5e: Remove dependency in IPSec initialization flows
+ - net: add documentation to socket.c
+ - net: make get_net_ns return error if NET_NS is disabled
+ - net: qtrr: fix OOB Read in qtrr_endpoint_post
+ - ptp: ptp_clock: Publish scaled_ppm_to_ppb
+ - ptp: improve max_adj check against unreasonable values
+ - net: fec_ptp: fix issue caused by refactor the fec_devtype
+ - ASoC: rt5659: Fix the lost powers for the HDA header
+ - cfg80211: make certificate generation more robust
+ - mm/slub: clarify verification reporting
+ - net: ethtool: clear heap allocations for ethtool function
+ - PCI: Add AMD RS690 quirk to enable 64-bit DMA
+ + -- Stefan Bader <stefan.bader@canonical.com> Fri, 13 Aug 2021 13:47:03 +0200
+ + linux (4.15.0-154.161) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-154.161 -proposed tracker (LP: #1938411)
+ + * Potential reverts of 4.19.y stable changes in 18.04 (LP: #1938537)
+ + - SAUCE: Revert "locking/mutex: clear MUTEX_FLAGS if wait_list is empty due to
+ + signal"
+ + - SAUCE: Revert "drm/amd/amdgpu: fix refcount leak"
+ + + * Packaging resync (LP: #1786013)
+ + - [Packaging] resync getabis
+ + - [Packaging] update helper scripts
+ + - update dkms package versions
+ + + * btrfs: Automatic balance returns -EUCLEAN and leads to forced readonly
+ + filesystem (LP: #1934709) // CVE-2019-19036
+ + - btrfs: Validate child tree block's level and first key
+ + - btrfs: Detect unbalanced tree with empty leaf before crashing btree
+ + operations
+ + + * btrfs: Automatic balance returns -EUCLEAN and leads to forced readonly
+ + filesystem (LP: #1934709)
+ + - Revert "btrfs: Detect unbalanced tree with empty leaf before crashing btree
+ + operations"
+ + - Revert "btrfs: Validate child tree block's level and first key"
+ + - btrfs: Only check first key for committed tree blocks
+ + - btrfs: Fix wrong first_key parameter in replace_path

Open Source Used In 5GasS Edge AC-4 17504
+ * Enable fib-onlink-tests.sh and msg_zerocopy.sh in kselftests/net on Bionic
+ (LP: #1934759)
+ - selftests: Add fib-onlink-tests.sh to TEST_PROGS
+ - selftests: net: use TEST_PROGS_EXTENDED
+ - selftests/net: enable msg_zerocopy test
+ - SAUCE: selftests: Make fib-onlink-tests.sh executable
+
+ * Kernel oops due to uninitialized list on kernfs (kernfs_kill_sb)
+ (LP: #1934175)
+ - kernfs: deal with kernfs_fill_sup() failures
+ - unfuck sysfs_mount()
+
+ * large_dir in ext4 broken (LP: #1933074)
+ - SAUCE: ext4: fix directory index node split corruption
+
+ * btrfs: Attempting to balance a nearly full filesystem with relocated root
+ nodes fails (LP: #1933172) // CVE-2019-19036
+ - btrfs: reloc: fix reloc root leak and NULL pointer dereference
+
+ * btrfs: Attempting to balance a nearly full filesystem with relocated root
+ nodes fails (LP: #1933172)
+ - Revert "btrfs: reloc: fix reloc root leak and NULL pointer dereference"
+
+ * Pixel format change broken for Elgato Cam Link 4K (LP: #1932367)
+ - (upstream) media: uvcvideo: Fix pixel format change for Elgato Cam Link 4K
+
+ * Bionic update: upstream stable patchset 2021-06-23 (LP: #1933375)
+ - net: usb: cdc_ncm: don't spew notifications
+ - efi: Allow EFI_MEMORY_XP and EFI_MEMORY_RO both to be cleared
+ - efi: cper: fix snprintf() use in cper_dimm_err_location()
+ - vfio/pci: Fix error return code in vfio_ecap_init()
+ - vfio/pci: zap_vma_ptes() needs MMU
+ - vfio/platform: fix module_put call in error flow
+ - ipvs: ignore IP_VS_SVC_F_HASHED flag when adding service
+ - HID: pidff: fix error return code in hid_pidff_init()
+ - HID: i2c-hid: fix format string mismatch
+ - netfilter: nfnetlink_cthelper: hit EBUSY on updates if size mismatches
+ - ieee802154: fix error return code in ieee802154_add_iface()
+ - ieee802154: fix error return code in ieee802154_llsec_getparams()
+ - Bluetooth: fix the erroneous flush_work() order
+ - Bluetooth: use correct lock to prevent UAF of hdev object
+ - net: caif: added csresl_release function
+ - net: caif: add proper error handling
+ - net: caif: fix memory leak in caif_device_notify
+ - net: caif: fix memory leak in cfusbl_device_notify
+ - ALSA: timer: Fix master timer notification
+ - ext4: fix bug on in ext4_es_cache_extent as ext4_split_extent_at failed
+ - pid: take a reference when initializing `cad_pid`
+ - ocf2: fix data corruption by fallocate
+ - nfc: fix NULL ptr dereference in llcp_sock_getname() after failed connect
+ - btrfs: fix error handling in btrfs_del_csums
+ - btrfs: fixup error handling in fixup_inode_link_counts
+ - mm, hugetlb: fix simple resv_huge_pages underflow on UFFDIO_COPY
+ - selftests/bpf: make 'dubious pointer arithmetic' test useful
+ - bnxt_en: Remove the setting of dev_port.
+ - KVM: SVM: Truncate GPR value for DR and CR accesses in !64-bit mode
+ - sched/fair: Optimize select_idle_cpu
+ - xen-pci: redo VF placement in the virtual topology
+ - ALSA: usb: update old-style static const declaration
+ - nl80211: validate key indexes for cfg80211_registered_device
+ - x86/apic: Mark _all_ legacy interrupts when IO/APIC is missing
+ - btrfs: return errors from btrfs_del_csums in cleanup_ref_head
+ - KVM: arm64: Fix debug register indexing

+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Fri, 30 Jul 2021 14:39:24 +0200
+ +linux (4.15.0-153.160) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-153.160 -proposed tracker (LP: #1938319)
+ + * 4.15.0-151 is freezing various CPUs (LP: #1938013)
+ + - mac80211: fix memory corruption in EAPOL handling
+ + -- Stefan Bader <stefan.bader@canonical.com>  Thu, 29 Jul 2021 08:26:59 +0200
+ +linux (4.15.0-151.157) bionic; urgency=medium
+ + * CVE-2021-33909
+ + - SAUCE: seq_file: Disallow extremely large seq buffer allocations
+ + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Fri, 09 Jul 2021 17:19:20 -0300
+ +linux (4.15.0-150.155) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-150.155 -proposed tracker (LP: #1934374)
+ + * lxd exec fails (LP: #1934187)
+ + - SAUCE: Revert "proc: Check /proc/Spid/attr/ writes against file opener"
+ + -- Kelsey Skunberg <kelsey.skunberg@canonical.com>  Sat, 03 Jul 2021 06:59:05 -0600
+ +linux (4.15.0-149.153) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-149.153 -proposed tracker (LP: #1933434)
+
* selftests: bpf: test_verifier fixes (LP: #1933385)
+ bpf: Update selftests to reflect new error states
+ bpf, selftests: Adjust few selftest result_unpriv outcomes
+ * CVE-2021-33200
+ bpf: Fix mask direction swap upon off reg sign change
+ -- Stefan Bader <stefan.bader@canonical.com>  Thu, 24 Jun 2021 11:14:19 +0200
+ linux (4.15.0-148.152) bionic; urgency=medium
+ * bionic/linux: 4.15.0-148.152 -proposed tracker (LP: #1932515)
+ * Packaging resync (LP: #1786013)
+ update dkms package versions
+ * Upstream v5.9 introduced 'module' patches that removed exported symbols
+ (LP: #1932065)
+ SAUCE: Revert "modules: inherit TAINT_PROPRIETARY_MODULE"
+ SAUCE: Revert "modules: return licensing information from find_symbol"
+ SAUCE: Revert "modules: rename the licence field in struct symsearch to license"
+ SAUCE: Revert "modules: unexport __module_address"
+ SAUCE: Revert "modules: unexport __module_text_address"
+ SAUCE: Revert "modules: mark each_symbol_section static"
+ SAUCE: Revert "modules: mark find_symbol static"
+ SAUCE: Revert "modules: mark ref_module static"
+ * Disable hv-kvp-daemon.service on certain instance types (LP: #1932081)
+ [Packaging]: Add kernel command line condition to hv-kvp-daemon service
+ Bionic update: upstream stable patchset 2021-06-11 (LP: #1931740)
+ openrisc: Fix a memory leak
+ RDMA/rxe: Clear all QP fields if creation failed
+ scsi: qla2xxx: Fix error return code in qla82xx_write_flash_dword()
+ ptrace: make ptrace() fail if the tracee changed its pid unexpectedly
+ cifs: fix memory leak in smb2_copychunk_range
+ ALSA: line6: Fix racy initialization of LINE6 MIDI
+ ALSA: usb-audio: Validate MS endpoint descriptors
+ ALSA: bebob/oxfw: fix Kconfig entry for Mackie d.2 Pro
+ Revert "ALSA: sb8: add a check for request_region"
+ Revert "rapidio: fix a NULL pointer dereference when create_workqueue() fails"
+ rapidio: handle create_workqueue() failure
+ xen-pci: reconfigure also from backend watch handler
+ dm snapshot: fix crash with transient storage and zero chunk size
+ Revert "video: hgaflb: fix potential NULL pointer dereference"
+ Revert "net: stmicro: fix a missing check of clk_prepare"
+ - Revert "leds: lp5523: fix a missing check of return value of lp55xx_read"
+ - Revert "hwmon: (lm80) fix a missing check of bus read in lm80 probe"
+ - Revert "video: imsttfb: fix potential NULL pointer dereferences"
+ - Revert "ecryptfs: replace BUG_ON with error handling code"
+ - Revert "gdrom: fix a memory leak bug"
+ - cdrom: gdrom: deallocate struct gdrom_unit fields in remove_gdrom
+ - cdrom: gdrom: initialize global variable at init time
+ - Revert "media: rcar_drif: fix a memory disclosure"
+ - Revert "rtlwifi: fix a potential NULL pointer dereference"
+ - Revert "qlcnic: Avoid potential NULL pointer dereference"
+ - Revert "niu: fix missing checks of niu_pci_eeprom_read"
+ - ethernet: sun: niu: fix missing checks of niu_pci_eeprom_read()
+ - net: stmicro: handle clk_prepare() failure during init
+ - net: rtlwifi: properly check for alloc_workqueue() failure
+ - leds: lp5523: check return value of lp5xx_read and jump to cleanup code
+ - qlcnic: Add null check after calling netdev_alloc_skb
+ - video: hgafb: fix potential NULL pointer dereference
+ - vgacon: Record video mode changes with VT_RESIZEX
+ - vt: Fix character height handling with VT_RESIZEX
+ - tty: vt: always invoke vc->vc_sw->con_resize callback
+ - video: hgafb: correctly handle card detect failure during probe
+ - Bluetooth: SMP: Fail if remote and local public keys are identical
+ - firmware: arm_scpi: Prevent the ternary sign expansion bug
+ - platform/x86: dell-smbios-wmi: Fix oops on rmmod dell_smbios
+ - locking/mutex: clear MUTEX_FLAGS if wait_list is empty due to signal
+ - ALSA: hda/realtek: Add some CLOVE SSIDs of ALC293
+ - Revert "serial: mvebu-uart: Fix to avoid a potential NULL pointer
dereference"
+ - mm, vmstat: drop zone->lock in /proc/pagetypeinfo
+ - usb: dwc3: gadget: Enable suspend events
+ - NFC: nci: fix memory leak in nci_allocate_device
+ - NFSv4: Fix a NULL pointer dereference in pnfs_mark_matching_lsegs_return()
+ - iommu/mt-d: Fix sysfs leak in alloc_iommu()
+ - perf intel-pt: Fix sample instruction bytes
+ - perf intel-pt: Fix transaction abort handling
+ - proc: Check /proc/$pid/attr/ writes against file opener
+ - net: hso: fix control-request directions
+ - mac80211: assure all fragments are encrypted
+ - mac80211: prevent mixed key and fragment cache attacks
+ - mac80211: properly handle A-MSDUs that start with an RFC 1042 header
+ - cfg80211: mitigate A-MSDU aggregation attacks
+ - mac80211: drop A-MSDUs on old ciphers
+ - mac80211: add fragment cache to sta_info
+ - mac80211: check defrag PN against current frame
+ - mac80211: prevent attacks on TKIP/WEP as well
+ - mac80211: do not accept/forward invalid EAPOL frames
+ - ath10k: Validate first subframe of A-MSDU before processing the list
+ - dm snapshot: properly fix a crash when an origin has no snapshots
+ - kgdb: fix gcc-11 warnings harder
+ - misc/uss720: fix memory leak in uss720_probe
+ - thunderbolt: dma_port: Fix NVM read buffer bounds and offset issue
+ - mei: request autosuspend after sending rx flow control
+ - staging: iio: ad7746: avoid overwrite of num_channels
+ - iio: adc: ad7793: Add missing error code in ad7793_setup()
+ - USB: trancевibrator: fix control-request direction
+ - serial: sh-sci: Fix off-by-one error in FIFO threshold register setting
+ - serial: rp2: use 'request_firmware' instead of 'request_firmware_nowait'
+ - USB: serial: ti_usb_3410_5052: add startech.com device id
+ - USB: serial: option: add Telit LE910-S1 compositions 0x7010, 0x7011
+ - USB: serial: pl2303: add device id for ADLINK ND-6530 GC
+ - usb: gadget: udc: renesas_usb3: Add a race in usbd_start_pipen()
+ - net: usb: fix memory leak in smsc75xx_bind
+ - Bluetooth: cmtp: fix file refcount when cmtp_attach_device fails
+ - NFS: fix an incorrect limit in filesystem_decode_layout()
+ - NFS: Don't corrupt the value of pg_bytes_written in nfs_do_recoalesce()
+ - NFSv4: Fix v4.0/v4.1 SEEK_DATA return -ENOTSUPP when set NFS_V4_2 config
+ - drm/meson: Fix a double free issue in tipc_sk_mcast_rcv
+ - skb_linearize the head skb when reassembling msgs
+ - i2c: s3c2410: fix possible NULL pointer deref on read message after write
+ - i2c: i801: Don't generate an interrupt on bus reset
+ - perf jevents: Fix getting maximum number of fds
+ - platform/x86: hp_accel: Avoid invoking _INI to speed up resume
+ - serial: max310x: unregister uart driver in case of failure and abort
+ - net/mlx4: Fix EEPROM dump support
+ - Revert "net/tipc: Fix a double free in tipc_sk_mcast_rcv"
+ - perf: event_group: Add checks after calling ioremap
+ - isdn: mISDNinfineon: check/cleanup ioremap failure correctly in setup_io
+ - dmaengine: qcom_hidma: comment platform_driver_register call
+ - libertas: register sysfs groups properly
+ - media: dbv: Add check on sp8870_readreg return
+ - media: gspca: properly check for errors in po1030_probe()
+ - scsi: BusLogic: Fix 64-bit system enumeration error for Buslogic
+ - openrisc: Define memory barrier mb
+ - btrfs: do not BUG_ON in link_to_fixup_dir
+ - platform/x86: hp-wireless: add AMD's hardware id to the supported list
+ - platform/x86: intel_punit_ipc: Append MODULE_DEVICE_TABLE for ACPI
+ - SMB3: incorrect file id in requests compounded with open
+ - drm/amdgpu: Fix a use-after-free
+ - net: netcp: Fix an error message
+ - net: mdio: thunder: Fix a double free issue in the .remove function
+ - net: mdio: octeon: Fix some double free issues
+ - net: bnx2: Fix error return code in bnx2_init_board()
+ - mld: fix panic in mld_newpack()
+  staging: emxx_udc: fix loop in _nbu2ss_nuke()
+  - ASoC: cs35133: fix an error code in probe()
+  - bpf: Set mac_len in bpf_skb_change_head
+  - ixgbe: fix large MTU request from VF
+  - scsi: libbsas: Use _safe() loop in sas_resume_port()
+  - ipv6: record frag_max_size in atomic fragments in input path
+  - sch_dsmark: fix a NULL deref in qdisc_reset()
+  - MIPS: alchemy: xxs1500: add gpio-au1000.h header file
+  - MIPS: ralink: export rt_sysc_membase for rt2880_wdt.c
+  - hugetlbfs: hugetlb_fault_mutex_hash() cleanup
+  - drivers/net/ethernet: clean up unused assignments
+  - usb: core: reduce power-on-good delay time of root hub
+  - USB: usbfs: Don't WARN about excessively large memory allocations
+  - bpf: extend is_branch_taken to registers
+  - bpf: Move off_reg into sanitize_ptr_alu
+  - bpf: Ensure off_reg has no mixed signed bounds for all types
+  - bpf: Rework ptr_limit into alu_limit and add common error path
+  - bpf: Improve verifier error messages for users
+  - bpf: Refactor and streamline bounds check into helper
+  - bpf: Move sanitize_val_alu out of op switch
+  - bpf: Tighten speculative pointer arithmetic mask
+  - bpf: Fix leakage of uninitialized bpf stack under speculation
+  - bpf: Wrap aux data inside bpfsanitize_info container
+  - bpf: No need to simulate speculative domain for immediates
+  - net: dsa: fix a crash if ->get_sset_count() fails
+  - drm/amd/amdgp: fix refcount leak
+  - net: dsa: fix error code getting shifted with 4 in dsa_slave_get_sset_count
+  - openvswitch: meter: fix race when getting now_ms.
+  - net: lns3: check the return of skb_checksum_help()
+  - Bionic update: upstream stable patchset 2021-06-11 (LP: #1931740) //
+  - CVE-2020-24587 for such cases.
+  - mac80211: extend protection against mixed key and fragment cache attacks
+  * [82A1, Realtek ALC287, Speaker, Internal] Underruns, dropouts or crackling sound (LP: #1925057) // Bionic update: upstream stable patchset 2021-06-11
+  (LP: #1931740)
+  - ALSA: hda/realtek: reset eapd coeff to default value for alc287
+  +  * test_map in ubuntu_bpf failed with "Allowed update sockmap '0:3' not in ESTABLISHED" (LP: #1839912)
+  - SAUCE: Revert "bpf: test_maps, only support ESTABLISHED socks"
+  +  * Bionic update: upstream stable patchset 2021-06-01 (LP: #1930472)
+  - MIPS: Introduce isa-rev.h to define MIPS_ISA_REV
+  - MIPS: cpu-features.h: Replace __mips_isa_rev with MIPS_ISA_REV
+  - s390/disassembler: increase ebpf disasm buffer size
+  - ACPI: custom_method: fix potential use-after-free issue
- ACPI: custom_method: fix a possible memory leak
- arm64: dts: mt8173: fix property typo of 'phys' in dsi node
- cryptfs: fix kernel panic with null dev_name
- spi: spi-ti-qspi: Free DMA resources
- mmc: block: Update ext_csd.cache_ctrl if it was written
- mmc: core: Do a power cycle when the CMD11 fails
- mmc: core: Set read only for SD cards with permanent write protect bit
- cifs: Return correct error code from smb2_get_enc_key
- btrfs: fix metadata extent leak after failure to create subvolume
- intel_th: pci: Add Rocket Lake CPU support
- fbdev: zero-fill colormap in fb colormap.c
- staging: wimax/i2400m: fix byte-order issue
- crypto: api - check for ERR pointers in crypto_destroy_tfm()
- usb: gadget: uvc: add bInterval checking for HS mode
- usb: gadget: f_uac1: validate input parameters
- usb: dwc3: gadget: Ignore EP queue requests during bus reset
- usb: xhci: Fix port minor revision
- PCI: PM: Do not read power state in pci_enable_device_flags()
- x86/build: Propagate $(CLANG_FLAGS) to $(REALMODE_FLAGS)
- tee: oppee: do not check memref size on return from Secure World
- perf/arm_pmu_platform: Fix error handling
- spi: dln2: Fix reference leak to master
- spi: omap-100k: Fix reference leak to master
- intel_th: Consistency and off-by-one fix
- phy: phy-tw14030-usb: Fix possible use-after-free in tw14030_usb_remove()
- btrfs: convert logic BUG_ON()'s in replace_path to ASSERT()'s
- scsi: lpfc: Fix incorrect dbde assignment when building target abts wqe
- scsi: lpfc: Fix pt2pt connection does not recover after LOGO
- scsi: target: pcsi: Fix warning in pcsi_complete_cmd()
- media: tee-cir: check for receive overflow
- power: supply: bq27xxx: fix power_avg for newer ICs
- extcon: arizona: Fix some issues when HPDET IRQ fires after the jack has been unplugged
- media: media/saa7164: fix saa7164_encoder_register() memory leak bugs
- media: gspca/sq905.c: fix uninitialized variable
- power: supply: Use IRQF_ONESHOT
- drm/amdpu : Fix asic reset regression issue introduce by 8f211f8eac7c4f
- scsi: qla2xxx: Always check the return value of qla24xx_get_isp_stats()
- scsi: qla2xxx: Fix use after free in bsg
- scsi: dhp_dh_alua: Remove check for ASC 24h in alua_rtpg()
- media: em28xx: fix memory leak
- media: vivid: update EDID
- clk: socfpga: arria10: Fix memory leak of socfpga_clk on error return
- power: supply: generic-adc-battery: fix possible use-after-free in
  gab_remove()
- power: supply: s3c_adc_battery: fix possible use-after-free in
  s3c_adc_bat_remove()
- media: adv7604: fix possible use-after-free in adv76xx_remove()
+ media: i2c: adv7511-v4l2: fix possible use-after-free in adv7511_remove()
+ media: i2c: adv7842: fix possible use-after-free in adv7842_remove()
+ media: dvb-usb: fix memory leak in dvb_usb_adapter_init
+ media: gscp/stv06xx: fix memory leak
+ drm/msm/mdp5: Configure PP_SYNC_HEIGHT to double the vtotal
+ drm/amdgpu: fix NULL pointer dereference
+ scsi: lpfc: Fix crash when a REG_RPI mailbox fails triggering a LOGO response
+ scsi: lpfc: Remove unsupported mbox PORT_CAPABILITIES logic
+ libfsc: Fix a format specifier
+ ALSA: emu8000: Fix a use after free in snd_emu8000_create_mixer
+ ALSA: hda/conexant: Re-order CX5066 quirk table entries
+ ALSA: sb: Fix two use after free in snd.sb_qsound_build
+ btrfs: fix race when picking most recent mod log operation for an old root
+ arm64/vdso: Discard .note.gnu.property sections in vDSO
+ openvswitch: fix stack OOB read while fragmenting IPv4 packets
+ ACPI: GTDT: Don't corrupt interrupt mappings on watchdog probe failure
+ NFSv4: Don't discard segments marked for return in _pnfs_return_layout()
+ jffs2: Fix kasan slab-out-of-bounds problem
+ powerpe/eeh: Fix EEH handling for hugepages in ioremap space
+ powerpc: fix EDEADLOCK redefinition error in uapi/asm/errno.h
+ intel_th: pci: Add Alder Lake-M support
+ md/raid1: properly indicate failure when ending a failed write request
+ security: commoncap: fix -Wstringop-overread warning
+ Fix misc new gcc warnings
+ jffs2: check the validity of dstlen in jffs2_zlib_compress()
+ Revert 337f13046ff0 ("futex: Allow FUTEX_CLOCK_REALTIME with FUTEX_WAIT op")
+ posix-timers: Preserve return value in clock_adjtime32()
+ ftrace: Handle commands when closing set_ftrace_filter file
+ ext4: fix check to prevent false positive report of incorrect used inodes
+ ext4: fix error code in ext4_commit_super
+ media: dvbdev: Fix memory leak in dvb_media_device_free()
+ usb: gadget: dummy_hcd: fix gpf in gadget_setup
+ usb: gadget: Fix double free of device descriptor pointers
+ usb: gadget/function/f_fs string table fix for multiple languages
+ usb: dwc3: gadget: Fix START_TRANSFER link state check
+ tracing: Map all PIDs to command lines
+ dm persistent data: packed struct should have an aligned() attribute too
+ dm space map common: fix division bug in sm_ll_find_free_block()
+ dm rq: fix double free of blk_mq_tag_set in dev remove after table load
  fails
+ modules: mark ref_module static
+ modules: mark find_symbol static
+ modules: unexport __module_text_address
+ modules: unexport __module_address
+ modules: rename the licence field in struct symsearch to license
+ modules: return licensing information from find_symbol
+ - modules: inherit TAINT_PROPRIETARY_MODULE
+ - Bluetooth: verify AMP hci_chan before amp_destroy
+ - hsr: use netdev_err() instead of WARN_ONCE()
+ - bluetooth: eliminate the potential race condition when removing the HCI controller
+ - net/nfc: fix use-after-free llcp_sock_bind/connect
+ - MIPS: pci-rt2880: fix slot 0 configuration
+ - FDDI: defxx: Bail out gracefully with unassigned PCI resource for CSR
+ - misc: lis3lv02d: Fix false-positive WARN on various HP models
+ - misc: vmw_vmci: explicitly initialize vmci_notify_bm_set_msg struct
+ - misc: vmw_vmci: explicitly initialize vmci_datagram payload
+ - tracing: Restructure trace_clock_global() to never block
+ - md-cluster: fix use-after-free issue when removing rdev
+ - md: split mddev_find
+ - md: factor out a mddev_find_locked helper from mddev_find
+ - md: md_open returns -EBUSY when entering racing area
+ - ipw2x00: potential buffer overflow in libipw_wx_set_encodext()
+ - cfg80211: scan: drop entry from hidden_list on overflow
+ - drm/radeon: fix copy of uninitialized variable back to userspace
+ - ALSA: hda/realtek: Re-order ALC882 Acer quirk table entries
+ - ALSA: hda/realtek: Re-order ALC882 Sony quirk table entries
+ - ALSA: hda/realtek: Re-order ALC269 Sony quirk table entries
+ - ALSA: hda/realtek: Re-order ALC269 Lenovo quirk table entries
+ - ALSA: hda/realtek: Remove redundant entry for ALC861 Haier/Uniwil devices
+ - x86/cpu: Initialize MSR_TSC_AUX if RDTSCP *or* RDPID is supported
+ - KVM: s390: split kvm_s390_logical_to_effective
+ - KVM: s390: fix guarded storage control register handling
+ - KVM: s390: split kvm_s390_real_to_abs
+ - usb: gadget: pch_udc: Revert d3cb25a12138 completely
+ - memory: gpmc: fix out of bounds read and dereference on gpmc_cs[]
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Odroid X/U3 family
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on SMDK5250
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Snow
+ - serial: stm32: fix incorrect characters on console
+ - serial: stm32: fix tx_empty condition
+ - usb: typec: tcpci: Check ROLE_CONTROL while interpreting CC_STATUS
+ - x86/microcode: Check for offline CPUs before requesting new microcode
+ - usb: gadget: pch_udc: Replace cpu_to_le32() by lower_32_bits()
+ - usb: gadget: pch_udc: Check if driver is present before calling ->setup()
+ - usb: gadget: pch_udc: Check for DMA mapping error
+ - crypto: qat - don't release uninitialized resources
+ - crypto: qat - ADF_STATUS_PF_RUNNING should be set after adf_dev_init
+ - fotg210-udc: Fix DMA on EP0 for length > max packet size
+ - fotg210-udc: Fix EP0 IN requests bigger than two packets
+ - fotg210-udc: Remove a dubious condition leading to fotg210_done
+ - fotg210-udc: Mask GRP2 interrupts we don't handle
+ - fotg210-udc: Don't DMA more than the buffer can take
+ - fotg210-udc: Complete OUT requests on short packets
+ mtd: require write permissions for locking and badblock ioctls
+ bus: qcom: Put child node before return
+ phy: marvell: ARMADA375_USBCLUSTER_PHY should not default to y, unconditionally
+ crypto: qat - fix error path in adf_isr_resource_alloc()
+ USB: gadget: udc: fix wrong pointer passed to IS_ERR() and PTR_ERR()
+ mtd: rawnand: gpmi: Fix a double free in gpmi_nand_init
+ staging: rtl8192u: Fix potential infinite loop
+ staging: greybus: uart: fix unprivileged TIOCCSERIAL
+ spi: Fix use-after-free with devm_spi_alloc_*
+ soc: qcom: mdtt_loader: Validate that p_filesz < p_memsz
+ soc: qcom: mdtt_loader: Detect truncated read of segments
+ ACPI: CPPC: Replace cppc_attr with kobj_attribute
+ crypto: qat - Fix a double free in adf_create_ring
+ usb: gadget: r8a66597: Add missing null check on return from platform_get_resource
+ USB: cdc-acm: fix unprivileged TIOCCSERIAL
+ tty: fix return value for unsupported ioctls
+ firmware: qcom-scm: Fix QCOM_SCN configuration
+ platform/x86: pmc_atom: Match all Beckhoff Automation baytrail boards with critclk_systems DMI table
+ x86/platform/uv: Fix !KEXEC build failure
+ ttyprintk: Add TTY hangup callback.
+ media: vivid: fix assignment of dev->bbuf_out_flags
+ media: omap4iss: return error code when omap4iss_get() failed
+ media: m88rs6000t: avoid potential out-of-bounds reads on arrays
+ x86/kprobes: Fix to check non boostable prefixes correctly
+ pata_arasan_cf: fix IRQ check
+ pata_ipx4xx_cf: fix IRQ check
+ sata_nv: add IRQ checks
+ ata: libahci_platform: fix IRQ check
+ vfio/mdev: Do not allow a mdev_type to have a NULL parent pointer
+ clk: uniphier: Fix potential infinite loop
+ scsi: jazzEsp: Add IRQ check
+ scsi: sun3xEsp: Add IRQ check
+ scsi: sni53c710: Add IRQ check
+ mfd: stm32-timers: Avoid clearing auto reload register
+ HSI: core: fix resource leaks in hsi_add_client_from_dt()
+ x86/events/amd/iommu: Fix sysfs type mismatch
+ HID: plantronics: Workaround for double volume key presses
+ perf symbols: Fix dso__fprintf_symbols_by_name() to return the number of printed chars
+ net: lapbether: Prevent racing when checking whether the netif is running
+ powerpc/prom: Mark identical_pvr_fixup as _init
+ powerpc: Fix HAVE_HARDLOCKUP_DETECTOR_ARCH build configuration
+ ALSA: core: remove redundant spin_lock pair in snd_card_disconnect
+ bug: Remove redundant condition check in report_bug
+ nfc: pn533: prevent potential memory corruption

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+ - ALSA: usb-audio: Add error checks for usb_driver_claim_interface() calls
+ - liquidio: Fix unintended sign extension of a left shift of a u16
+ - powerpc/perf: Fix PMU constraint check for EBB events
+ - powerpc: iodmu: fix build when neither PCI or IBMVIO is set
+ - mac80211: bail out if cipher schemes are invalid
+ - mt7601u: fix always true expression
+ - IB/hfi1: Fix error return code in parse_platform_config()
+ - net: thunderex: Fix unintentional sign extension issue
+ - i2c: cadence: add IRQ check
+ - i2c: emev2: add IRQ check
+ - i2c: jz4780: add IRQ check
+ - i2c: sh7760: add IRQ check
+ - MIPS: pci-legacy: stop using of_pci_range_to_resource
+ - powerpc/pseries: extract host bridge from pci_bus prior to bus removal
+ - rtlwifi: 8821ae: upgrade PHY and RF parameters
+ - i2c: sh7760: fix IRQ error path
+ - mwl8k: Fix a double Free in mwl8k_probe_hw
+ - vsoc/vmci: log once the failed queue pair allocation
+ - RDMA/40iw: Fix error unwinding when i40iw_hmc_sd_one fails
+ - net: davinci_emac: Fix incorrect masking of tx and rx error channel
+ - ath9k: Fix error check in ath9k_hw_read_revisions() for PCI devices
+ - powerpc/52xx: Fix an invalid ASM expression (addi used instead of add)
+ - netemac/emac-mac: Fix a use after free in emac_mac_tx_buf_send
+ - net: nfc:digital: Fix a double free in digital_tg_recv_dep_req
+ - kfifo: fix ternary sign extension bugs
+ - net: emac: Fix incorrect masking of tx and rx error channel
+ - ip6_vti: proper dev_{hold|put} in ndo_[un]init methods
+ - mac80211: clear the beacon's CRC after channel switch
+ - pinctrl: samsung: use 'int' for register masks in Exynos
+ - cuse: prevent clone
+ - selftests: Set CC to clang in lib.mk if LLVM is set
+ - kconfig: nconf: stop endless search loops
+ - scpt: Fix out-of-bounds warning in scpt_process_asconf_param()
+ - powerpc/smp: Set numa node before updating mask
+ - ASoC: rt286: Generalize support for ALC3263 codec
+ - samples/bpf: Fix broken tracec1 due to kprobe argument change
+ powerpc/pseries: Stop calling printk in rtas_stop_self()
+ wl3501_cs: Fix out-of-bounds warnings in wl3501_send_pkt
+ wl3501_cs: Fix out-of-bounds warnings in wl3501_mgmt_join
+ powerpc/iommu: Annotate nested lock for lockdep
+ net: ethernet: mtk_eth_soc: fix RX VLAN offload
+ ASoC: rt286: Make RT286_SET_GPIO_* readable and writable
+ f2fs: fix a redundant call to f2fs_balance_fs if an error occurs
+ PCI: Release OF node in pci_scan_device()’s error path
+ ARM: 9064/1: hw_breakpoint: Do not directly check the event’s
+ overflow_handler hook
+ rpmsg: qcom_glink_native: fix error return code of qcom_glink_rx_data()
+ NFSv4.2: Always flush out writes in nfs42_proc_fallocate()
+ NFS: Deal correctly with attribute generation counter overflow
+ pNFS/flexfiles: fix incorrect size check in decode_nfs_fh()
+ NFSv4.2 fix handling of sr_eof in SEEK’s reply
+ rtc: ds1307: Fix wday settings for rx8130
+ sctp: fix a SCTP_MIB_CURRESETAB leak in scpt sf do_dupcooking
+ drm/radeon: Fix off-by-one power state index heap overwrite
+ khugepaged: fix wrong result value for trace_mmCollapse_huge_page_isolate()
+ mm/hugeltb: handle the error case in hugeltb_fix_reserve_counts()
+ ksm: fix potential missing rmap_item for stable_node
+ net: fix nla_strcmp to handle more than one trailing null character
+ kernel: kexec_file: fix error return code of kexec_calculate_store_digests()
+ netfilter: nftables: avoid overflows in nft_hash_buckets()
+ ARC: entry: fix off-by-one error in syscall number validation
+ powerpc/64s: Fix crashes when toggling stf barrier
+ powerpc/64s: Fix crashes when toggling entry flush barrier
+ squashfs: fix divide error in calculate_skip()
+ userfaultfd: release page in error path to avoid BUG_ON
+ drm/radeon/dpm: Disable sclk switching on Oland when two 4K 60Hz monitors
+ are connected
+ iio: proximity: pulsedlight: Fix runtime PM imbalance on error
+ usb: fotg210-hcd: Fix an error message
+ ACPI: scan: Fix a memory leak in an error handling path
+ blk-mq: Swap two calls in blk_mq_exit_queue()
+ usb: dwc3: omap: improve extcon initialization
+ usb: xhci: Increase timeout for HC halt
+ usb: dwc2: Fix gadget DMA unmap direction
+ usb: core: hub: fix race condition about TRSMRCY of resume
+ iio: gyro: mpu3050: Fix reported temperature value
+ iio: tsl2583: Fix division by a zero lux_val
+ KVM: x86: Cancel pvclock_gtd_work on module removal
+ FDDI: defx: Make MMIO the configuration default except for EISA
+ MIPS: Reinstate platform `__div64_32` handler
+ MIPS: Avoid DIVU in `__div64_32` is result would be zero
+ MIPS: Avoid hardcoded DIVU in `__div64_32` altogether
+ thermal/core/fair share: Lock the thermal zone while looping over instances
+ RDMA/i40iw: Avoid panic when reading back the IRQ affinity hint
+ - kobject_uevent: remove warning in init_uevent_argv()
+ - netfilter: conntrack: Make global sysctls readonly in non-init nets
+ - clk: exynos7: Mark aclk_fsys1_200 as critical
+ - x86/msr: Fix wr/rdmsr_safe_regs_on_cpu() prototypes
+ - kdb: fix gcc-11 warning on indentation
+ - usb: sl811-hcd: improve misleading indentation
+ - cxgb4: Fix the -Wmisleading-indentation warning
+ - isdn: capi: fix mismatched prototypes
+ - PCI: thunder: Fix compile testing
+ - ARM: 9066/1: ftrace: pause/unpause function graph tracer in cpu_suspend()
+ - ACPI / hotplug / PCI: Fix reference count leak in enable_slot()
+ - Input: elants_i2c - do not bind to i2c-hid compatible ACPI instantiated
+ - Input: silead - add workaround for x86 BIOS-es which bring the chip up in a
  stuck state
+ - um: Mark all kernel symbols as local
+ - ceph: fix fscache invalidation
+ - gpiolib: acpi: Add quirk to ignore EC wakeups on Dell Venue 10 Pro 5055
+ - ALSA: hda: generic: change the DAC ctl name for LO+SPK or LO+HP
+ - block: reexpand iov_iter after read/write
+ - lib: stackdepot: turn depot_lock spinlock to raw_spinlock
+ - sit: proper dev_[hold|put] in ndo_[un]init methods
+ - ip6_tunnel: sit: proper dev_[hold|put] in ndo_[un]init methods
+ - xhci: Do not use GFP_KERNEL in (potentially) atomic context
+ - ipv6: remove extra dev_hold() for fallback tunnels
+ - ARM: 9056/1: decompressor: fix BSS size calculation for LLVM ld.lld
+ - arm64: dts: marvell: armada-37xx: add syscon compatible to NB clk node
+ - mtd: rawnand: atmel: Update ecc_stats.corrected counter
+ - mmc: sdhci-pci: Fix initialization of some SD cards for Intel BYT-based
  controllers
+ - genirq/matrix: Prevent allocation counter corruption
+ - usb: xhci-mtk: support quirk to disable usb2 lpm
+ - media: drivers: media: pci: sta2x11: fix Kconfig dependency on GPIOLIB
+ - media: tc358743: fix possible use-after-free in tc358743_remove()
+ - amdgpu: avoid incorrect %hu format string
+ - s390/archrandom: add parameter check for s390_arch_random_generate
+ - ALSA: usb-audio: Add dB range mapping for Sennheiser Communications Headset
  PC 8
+ - ALSA: hda/realtek: Add quirk for Intel Clevo PCx0Dx
+ - ubifs: Only check replay with inode type to judge if inode linked
+ - mlxsw: spectrum_mr: Update egress RIF list before route's action
+ - NFS: Don't discard pNFS layout segments that are marked for return
+ - tmp: vtpm_proxy: Avoid reading host log when using a virtual device
+ - dm raid: fix inconclusive reshape layout on fast raid4/5/6 table reload
+ - sequences
+ - arm64: vdso: remove commas between macro name and arguments
+ - ext4: do not set SB_ACTIVE in ext4_orphan_cleanup()
+ - tty: fix memory leak in vc_deallocate

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+ rsi: Use resume_noirq for SDIO
+ MIPS: pci-mt7620: fix PLL lock check
+ md: Fix missing unused status line of /proc/mdstat
+ ALSA: hda/realtek: Re-order ALC882 Clevo quirk table entries
+ ALSA: hda/realtek: Re-order ALC269 HP quirk table entries
+ ALSA: hda/realtek: Re-order ALC269 Dell quirk table entries
+ ARM: dts: exynos: correct fuel gauge interrupt trigger level on Midas family
+ ARM: dts: exynos: correct MUIC interrupt trigger level on Midas family
+ ARM: dts: exynos: correct PMIC interrupt trigger level on Midas family
+ regmap: set debugfs_name to NULL after it is freed
+ mtd: rawnand: fsoc: Fix error code in fsmc_nand_probe()
+ mtd: rawnand: brcmnd: fix OOB R/W with Hamming ECC
+ mtd: rawnand: qcom: Return actual error code instead of -ENODEV
+ usbi: vudc: fix missing unlock on error in usbip_sockfd_store()
+ clk: qcom: a53-pll: Add missing MODULE_DEVICE_TABLE
+ scsi: ibmvfc: Fix invalid state machine BUG_ON()
+ sched/debug: Fix cgroup_path[] serialization
+ net: hns3: Limiting the scope of vector_ring_chain variable
+ ALSA: usb: midi: don't return -ENOMEM when usb_urb_ep_type_check fails
+ net: geneve: modify IP header check in geneve6_xmit_skb and geneve_xmit_skb
+ RDMA/bnxt_re: Fix a double free in bnxt_qplib_alloc_res
+ net: Only allow init netns to set default tcp cong to a restricted algo
+ i2c: bail out early when RDWR parameters are wrong
+ net: bridge: when suppression is enabled exclude RARP packets
+ i2c: Add I2C_AQ_NO_REP_START adapter quirk
+ ethtool: ioctl: Fix out-of-bounds warning in store_link_ksettings_for_user()
+ PCI: iproc: Fix return value of iproc_msi_irq_domain_alloc()
+ PCI: endpoint: Fix missing destroy_workqueue()
+ net: hns3: disable phy loopback setting in hclge_mac_start_phy
+ scpt: do asoc update earlier in scpt_sfi_do_dupcook_a
+ ethernet:enic: Fix a use after free bug in enic_hard_start_xmit
+ netfilter: xt_SECMARK: add new revision to fix structure layout
+ drm/radeon: Avoid power table parsing memory leaks
+ sched/fair: Fix unfairness caused by missing load decay
+ xhci: Add reset resume quirk for AMD xhci controller.
+ cdc-wdm: untangle a circular dependency between callback and softint
+ nvme: do not try to reconfigure APST when the controller is not live
+ pinctrl: ingenic: Improve unreachable code generation
+ ARM: 9075/1: kernel: Fix interrupted SMC calls
+ scsi: target: tcmu: Return from tcmu_handle_completions() if cmd_id not found
+ tweewide: Fix most Shebang lines
+ scripts: switch explicitly to Python 3
+ -- Stefan Bader <stefan.bader@canonical.com>  Mon, 21 Jun 2021 17:38:37 +0200

+linux (4.15.0-147.151) bionic; urgency=medium
+
+ * CVE-2021-3444
+  - bpf: Fix truncation handling for mod32 dst reg wrt zero
+  + * CVE-2021-3600
+  - SAUCE: bpf: Do not use ax register in interpreter on div/mod
+  - bpf: fix subprog verifier bypass by div/mod by 0 exception
+  - SAUCE: bpf: Fix 32-bit register truncation on div/mod instruction
+  + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 18 Jun 2021 13:49:56 -0300
+ +linux (4.15.0-146.150) bionic; urgency=medium
+ +  + * UAF on CAN BCM bcm_rx_handler (LP: #1931855)
+  - SAUCE: can: bcm: delay release of struct bcm_op after synchronize_rcu
+  + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Thu, 17 Jun 2021 14:50:04 -0300
+ +linux (4.15.0-145.149) bionic; urgency=medium
+ +  + * bionic/linux: 4.15.0-145.149 -proposed tracker (LP: #1929967)
+  +  + * Packaging resync (LP: #1786013)
+  - update dkms package versions
+  +  + * raid10: Block discard is very slow, causing severe delays for mkfs and
+  - fstrim operations (LP: #1896578)
+  - md: add md_submit_discard_bio() for submitting discard bio
+  - md/raid10: extend r10bio devs to raid disks
+  - md/raid10: pull the code that wait for blocked dev into one function
+  - md/raid10: improve raid10 discard request
+  - md/raid10: improve discard request for far layout
+  +  + * CVE-2021-23133
+  +  - scctp: delay auto_asconf init until binding the first addr
+  +  + * Bionic update: upstream stable patchset 2021-05-25 (LP: #1929603)
+  - Input: nspire-keypad - enable interrupts only when opened
+  - dmaengine: dw: Make it dependent to HAS_IOMEM
+  - ARM: dts: Fix moving mmc devices with aliases for omap4 & 5
+  - arc: kernel: Return -EFAULT if copy_to_user() fails
+  - neighbour: Disregard DEAD dst in neigh_update
+  - ARM: keystone: fix integer overflow warning
+  - ASoC: fsl_esai: Fix TDM slot setup for I2S mode
+  - scsi: scsi_transport_srp: Don't block target in SRP_PORT_LOST state
+  - net: ieee802154: stop dump llsec keys for monitors
+  - net: ieee802154: stop dump llsec devs for monitors
+  - net: ieee802154: forbid monitor for add llsec dev
+  - net: ieee802154: stop dump llsec devkeys for monitors
+ - net: iee802154: forbid monitor for add llsec devkey  
+ - net: iee802154: stop dump llsec seclevels for monitors  
+ - net: iee802154: forbid monitor for add llsec seclevel  
+ - pcnet32: Use pci_resource_len to validate PCI resource  
+ - mac80211: clear sta->fast_rx when STA removed from 4-addr VLAN  
+ - Input: i8042 - fix Pegatron C15B ID entry  
+ - HID: wacom: set EV_KEY and EV_ABS only for non-HID_GENERIC type of devices  
+ - readdr: make sure to verify directory entry for legacy interfaces too  
+ - arm64: fix inline asm in load_unaligned_zeropad()  
+ - arm64: alternatives: Move length validation in alternative_{insn, endif}  
+ - scsi: libas: Reset num_scatter if libata marks qc as NODATA  
+ - netfilter: conntrack: do not print icmpv6 as unknown via /proc  
+ - netfilter: nft_limit: avoid possible divide error in nft_limit_init  
+ - net: davicom: Fix regulator not turned off on failed probe  
+ - net: sit: Unregister catch-all devices  
+ - i40e: fix the panic when running bpf in xdpdrv mode  
+ - ibmvnic: avoid calling napi_disable() twice  
+ - ibmvnic: remove duplicate napi_schedule call in do_reset function  
+ - ibmvnic: remove duplicate napi_schedule call in open function  
+ - ARM: footbridge: fix PCI interrupt mapping  
+ - ARM: 9071/1: uprobes: Don't hook on thumb instructions  
+ - pinctrl: lewisburg: Update number of pins in community  
+ - HID: wacom: Assign boolean values to a bool variable  
+ - ARM: dts: Fix swapped mmc order for omap3  
+ - net: geneve: check skb is large enough for IPv4/IPv6 header  
+ - s390/entry: save the caller of psw_idle  
+ - xen-netback: Check for hotplug-status existence before watching  
+ - cavium/liquidio: Fix duplicate argument  
+ - ia64: fix discontig.c section mismatches  
+ - ia64: tools: remove duplicate definition of ia64_mf() on ia64  
+ - x86/crash: Fix crash_setup_memmap_entries() out-of-bounds access  
+ - net: hso: fix NULL-deref on disconnect regression  
+ - USB: CDC-ACM: fix poison/unpoison imbalance  
+ - lockdep: Add a missing initialization hint to the "INFO: Trying to register  
+ - non-static key" message  
+ - drm/msm: Fix a5xx/a6xx timestamps  
+ - Input: s6sy761 - fix coordinate read bit shift  
+ - net: ip6_tunnel: Unregister catch-all devices  
+ - ACPI: tables: x86: Reserve memory occupied by ACPI tables  
+ - ACPI: x86: Call acpi_boot_table_init() after acpi_table_upgrade()  
+ - net: usb: ax88179_178a: initialize local variables before use  
+ - iwlwifi: Fix softirq/hardirq disabling in iwl_pcie_enqueue_hcmd()  
+ - nips: Do not include hi and lo in clobber list for R6  
+ - bpf: Fix masking negation logic upon negative dst register  
+ - iwlwifi: Fix softirq/hardirq disabling in iwl_pcie_gen2_enqueue_hcmd()  
+ - ALSA: usb-audio: Add MIDI quirk for Vox ToneLab EX  
+ - USB: Add reset-resume quirk for WD19's Realtek Hub  
+ - platform/x86: thinkpad_acpi: Correct thermal sensor allocation
* r8152 tx status -71 (LP: #1922651) // Bionic update: upstream stable
+ patchset 2021-05-25 (LP: #1929603)
+ - USB: Add LPM quirk for Lenovo ThinkPad USB-C Dock Gen2 Ethernet
+ * seccomp_bpf: syscall_faked from kselftests fail on s390x (LP: #1928522)
+ - selftests/seccomp: s390 shares the syscall and return value register
+ * Fix kdump failures (LP: #1927518)
+ - video: hyperv_fb: Add ratelimit on error message
+ - Drivers: hv: vmbus: Increase wait time for VMbus unload
+ - Drivers: hv: vmbus: Initialize unload_event statically
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 28 May 2021 17:37:08 +0200
+ +linux (4.15.0-144.148) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-144.148 -proposed tracker (LP: #1927648)
+ + * Introduce the 465 driver series, fabric-manager, and libnvidia-nscq
+ + (LP: #1925522)
+ + - debian/dkms-versions -- add NVIDIA 465 and migrate 450 to 460
+ + * xfrm_policy.sh / pmtu.sh / udpgso_bench.sh from net in
+ + ubuntu_kernel_selftests will fail if running the whole suite (LP: #1856010)
+ + - selftests/net: bump timeout to 5 minutes
+ + * locking/qrwlock: Fix ordering in queued_write_lock_slowpath() (LP: #1926184)
+ + - locking/barriers: Introduce smp_cond_load_relaxed() and
+ + atomic_cond_read_relaxed()
+ + - locking/qrwlock: Fix ordering in queued_write_lock_slowpath()
+ + * Bionic update: upstream stable patchset 2021-04-30 (LP: #1926808)
+ + - net: fec: ptp: avoid register access when ipg clock is disabled
+ + - powerpc/4xx: Fix build errors from mfdec() (LP: #1927518)
+ + - atm: eni: dont release is never initialized
+ + - atm: lanai: dont run lanai_dev_close if not open
+ + - Revert "r8152: adjust the settings about MAC clock speed down for RTL8153"
+ + - ixgbe: Fix memleak in ixgbe_configure_clsu32
+ + - net: tehuti: fix error return code in bdx_probe()
+ + - sun/niu: fix wrong RXMLAC_BC_FRM_CNTL_COUNT count
+ + - gpilib: acpi: Add missing IRQF_ONESHOT
+ + - nfs: fix PNFS_FLEXFILE_LAYOUT Kconfig default
+ + - NFS: Correct size calculation for create reply length
+ + - net: hisilicon: hns: fix error return code of hns_nic_clear_all_rx_fetch()
+ + - net: wan: fix error return code of uhdlc_init()
+ + - atm: uPD98402: fix incorrect allocation
+ + - atm: idt77252: fix null-ptr-dereference

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Open Source Used In 5GaaS Edge AC-4 17521
+ - sparc64: Fix opcode filtering in handling of no fault loads
+ - u64_stats,lockdep: Fix u64_stats_init() vs lockdep
+ - drm/radeon: fix AGP dependency
+ - nfs: we don't support removing system.nfs4_acl
+ - ia64: fix ia64_syscall_get_set_arguments() for break-based syscalls
+ - ia64: fix ptrace(PTRACE_SYSCALL_INFO_EXIT) sign
+ - squashfs: fix inode lookup sanity checks
+ - squashfs: fix xattr id and id lookup sanity checks
+ - arm64: dts: ls1046a: mark crypto engine dma coherent
+ - arm64: dts: ls1012a: mark crypto engine dma coherent
+ - arm64: dts: ls1043a: mark crypto engine dma coherent
+ - ARM: dts: at91-sama5d27_som1: fix phy address to 7
+ - dm ioct: fix out of bounds array access when no devices
+ - bus: omap_l3_noc: mark l3 irqs as IRQF_NO_THREAD
+ - libbpf: Fix INSTALL flag order
+ - macvlan: macvlan_count_rx() needs to be aware of preemption
+ - net: dsa: bcm_sf2: Qualify phydev->dev_flags based on port
+ - e1000e: add rtnl_lock() to e1000_reset_task
+ - e1000e: Fix error handling in e1000_set_d0_lplu_state_82571
+ - net/qlcnic: Fix a use after free in qlcnic_83xx_get_minidump_template
+ - fmac100: Restart MAC HW once
+ - can: peak_usb: add forgotten supported devices
+ - can: c_can_pci: c_can_pci_remove(): fix use-after-free
+ - can: c_can: move runtime PM enable/disable to c_can_platform
+ - can: m_can: m_can_do_rx_poll(): fix extraneous msg loss warning
+ - mac80211: fix rate mask reset
+ - net: cdc-phonet: fix data-interface release on probe failure
+ - net: stmmac: dwmac-sun8i: Provide TX and RX fifo sizes
+ - drm/msm: fix shutdown hook in case GPU components failed to bind
+ - arm64: kdump: update ppos when reading elfcorehdr
+ - net/mlx5e: Fix error path for ethtool set-priv-flag
+ - RDMA/cxgb4: Fix adapter LE hash errors while destroying ipv6 listening
+ - server
+ - ACPI: scan: Rearrange memory allocation in acpi_device_add()
+ - ACPI: scan: Use unique number for instance_no
+ - perf auxtrace: Fix auxtrace queue conflict
+ - scsi: qed: Fix error return code of qedi_alloc_global_queues()
+ - scsi: mpt3sas: Fix error return code of mpt3sas_base_attach()
+ - net/mutex: Fix non debug version of mutex_lock_io_nested()
+ - can: dev: Move device back to init netns on owning netns delete
+ - net: sched: validate stab values
+ - net: qrtr: fix a kernel-infoleak in qrtr_recvmsg()
+ - mac80211: fix double free in ibss_leave
+ - ext4: add reclaim checks to xattr code
+ - can: peak_usb: Revert "can: peak_usb: add forgotten supported devices"
+ - block: Suppress uevent for hidden device when removed
+ - netsec: restore phy power state after controller reset
+ - can: flexcan: flexcan_chip_freeze(): fix chip freeze for missing bitrate
+ - dm verity: add root hash pkcs#7 signature verification
+ - x86/mem_encrypt: Correct physical address calculation in __set_clr_pte_enc()
+ - selinux: vsock: Set SID for socket returned by accept()
+ - ipv6: weaken the v4mapped source check
+ - ext4: fix bh ref count on error paths
+ - rpc: fix NULL dereference on kmalloc failure
+ - ASoC: rt5640: Fix dac- and adc- vol-tlv values being off by a factor of 10
+ - ASoC: rt5651: Fix dac- and adc- vol-tlv values being off by a factor of 10
+ - ASoC: sgtl5000: set DAP_AVC_CTRL register to correct default value on probe
+ - ASoC: es8316: Simplify adc_pga_gain_tlv table
+ - ASoC: cs42412: Fix mixer volume control
+ - ASoC: cs42412: Always wait at least 3ms after reset
+ - vhost: Fix vhost_vq_reset()
+ - scsi: st: Fix a use after free in st_open()
+ - scsi: qla2xxx: Fix broken #endif placement
+ - staging: comedii: cb_pcidas: fix request_irq() warn
+ - staging: comedii: cb_pcidas64: fix request_irq() warn
+ - ASoC: rt5659: Update MCLK rate in set_sysclk()
+ - ext4: do not iput inode under running transaction in ext4_rename()
+ - brcmfmac: clear EAP/association status bits on linkdown events
+ - net: ethernet: aquantia: Handle error cleanup of start on open
+ - appletalk: Fix skb allocation size in loopback case
+ - net: wan/lmc: unregister device when no matching device is found
+ - bpf: Remove MTU check in __bpf_skb_max_len
+ - ALSA: usb-audio: Apply sample rate quirk to Logitech Connect
+ - ALSA: hda/realtek: fix a determine_headset_type issue for a Dell AIO
+ - ALSA: hda/realtek: call alc_update_headset_mode() in hp_automute_hook
+ - tracing: Fix stack trace event size
+ - mm: fix race by making init_zero_pfn() early_initcall
+ - drm/amdgpu: fix offset calculation in amdgpu_vm_bo_clear_mappings()
+ - drm/amdgpu: check alignment on CPU page for bo map
+ - reiserfs: update reiserfs_xattr_initialized() condition
+ - mm: memcontrol: fix NR_WRITEBACK leak in memcg and system stats
+ - mm: memcg: make sure memory.events is uptodate when waking pollers
+ - mem_cgroup: make sure moving_account, move_lock_task and stat_cpu in the same cacheline
+ - mm: fix oom_kill event handling
+ - mm: writeback: use exact memcg dirty counts
+ - pinctrl: rockchip: fix restore error in resume
+ - extcon: Add stubs for extcon_register_notifier_all() functions
+ - extcon: Fix error handling in extcon_dev_register
+ - firewire: nosy: Fix a use-after-free bug in nosy_ioctl()
+ - usbip: vhci_hcd fix shift out-of-bounds in vhci_hub_control()
+ - USB: quirks: ignore remote wake-up on Fibocom L850-GL LTE modem
+ - usb: musb: Fix suspend with devices connected for a64
+ - usb: xhci-mtk: fix broken streams issue on 0.96 xHCI
+ - cdc-acm: fix BREAK rx code path adding necessary calls
+ - USB: cdc-acm: untangle a circular dependency between callback and sofint
+ - USB: cdc-acm: downgrade message to debug
+ - USB: cdc-acm: fix use-after-free after probe failure
+ - usb: gadget: udc: amd5536udc_pci fix null-ptr-dereference
+ - staging: rtl8192e: Fix incorrect source in memcpyp() 
+ - staging: rtl8192e: Change state information from u16 to u8
+ - drivers: video: fbcon: fix NULL dereference in fbcon_cursor()
+ - ARM: dts: am33xx: add aliases for mmc interfaces
+ - net: pxa168_eth: Fix a potential data race in pxa168_eth_remove 
+ - mISDN: fix crash in fritzpci
+ - mac80211: choose first enabled channel for monitor
+ - drm/msm: Ratelimit invalid-fence message 
+ - platform/x86: thinkpad_acpi: Allow the FnLock LED to change state
+ - x86/build: Turn off -fcf-protection for realmode targets
+ - scsi: target: pscsi: Clean up after failure in pscsi_map_sg()
+ - ia64: mca: allocate early mca with GFP_ATOMIC
+ - cifs: revalidate mapping when we open files for SMB1 POSIX
+ - cifs: Silently ignore unknown oplock break handle
+ - init/Kconfig: make COMPILE_TEST depend on !S390
+ - init/Kconfig: make COMPILE_TEST depend on HAS_IOMEM
+ - ia64: fix format strings for err_inject
+ - ALSA: aloop: Fix initialization of controls
+ - ASoC: intel: atom: Stop advertising non working S24LE support
+ - nfc: fix refcount leak in llcp_sock_bind()
+ - nfc: fix refcount leak in llcp_sock_connect()
+ - nfc: fix memory leak in llcp_sock_connect()
+ - nfc: Avoid endless loops caused by repeated llcp_sock_connect()
+ - xen/evchn: Change irq_info lock to raw_spinlock_t
+ - net: ipv6: check for validity before dereferencing cfg->fc_nlinfo.nlh
+ - ia64: fix user_stack_pointer() for ptrace()
+ - ocfs2: fix deadlock between setattr and dio_end_io_write
+ - fs: direct-io: fix missing sdio->boundary
+ - parisc: parisc-agp requires SBA IOMMU driver
+ - parisc: avoid a warning on u8 cast for cmpxchg on u8 pointers
+ - ARM: dts: turris-omnia: configure LED[2]/INTn pin as interrupt pin
+ - batman-adv: initialize "struct batadv_tvlv_tt_vlan_data"->reserved field
+ - net: ensure mac header is set in virtio_net_hdr_to_skb()
+ - net: sched: sch_teql: fix null-pointer dereference
+ - usbip: add sysfs_lock to synchronize sysfs code paths
+ - usbip: stub-dev synchronize sysfs code paths
+ - usbip: synchronize event handler with sysfs code paths
+ - i2c: turn recovery error on init to debug
+ - regulator: bd9571mww: Fix AVS and DVFS voltage range
+ - ASoC: wm8960: Fix wrong bclk and lrcntl with pll enabled for some chips
+ - amd-xgbe: Update DMA coherency values
+ - sch_red: fix off-by-one checks in red_check_params()
+ - gianfar: Handle error code at MAC address change
+ - net:tipc: Fix a double free in tipc_sk_mcast_rcv
+ - ARM: dts: imx6: ptab01: Set vmmmc supply for both SD interfaces
- net/ncsi: Avoid channel_monitor hrtimer deadlock
- ASoC: sunxi: sun4i-codec: fill ASoC card owner
- soc/fsl: qbman: fix conflicting alignment attributes
- clk: fix invalid usage of list cursor in register
- clk: fix invalid usage of list cursor in unregister
- workqueue: Move the position of debug_work_activate() in __queue_work()}
- s390/cpcmd: fix inline assembly register clobbering
- net/mlx5: Fix placement of log_max_flow_counter
- RDMA/cxgb4: check for ipv6 address properly while destroying listener
- clk: socfpga: fix iomem pointer cast on 64-bit
- net/ncsi: Add generic netlink family
- net/ncsi: Refactor MAC, VLAN filters
- net/ncsi: Avoid GFP_KERNEL in response handler
- cfg80211: remove WARN_ON() in cfg80211_sme_connect
- net: tun: set tun->dev->addr_len during TUNSETLINK processing
- drivers: net: fix memory leak in atusb_probe
- drivers: net: fix memory leak in peak_usb_create_dev
- net: mac802154: Fix general protection fault
- net: ieee802154: nl-mac: fix check on panid
- net: ieee802154: fix nl802154 del llsec key
- net: ieee802154: fix nl802154 del llsec dev
- net: ieee802154: fix nl802154 add llsec key
- net: ieee802154: fix nl802154 del llsec devkey
- net: ieee802154: forbid monitor for set llsec params
- net: ieee802154: forbid monitor for del llsec secelvel
- net: ieee802154: stop dump llsec params for monitors
- Revert "cifs: Set CIFS_MOUNT_USE_PREFIX_PATH flag on setting cifs sb->prepath."
- KVM: arm64: Hide system instruction access to Trace registers
- KVM: arm64: Disable guest access to trace filter controls
- drm/imx: imx-ldb: fix out of bounds array access warning
- gfs2: report "already frozen/thawed" errors
- block: only update parent bi_status when bio fail
- net: phy: broadcom: Only advertise EEE for supported modes
- netfilter: x_tables: fix compat match/target pad out-of-bound write
- perf map: Tighten snprintf() string precision to pass gcc check on some 32-bit arches
- xen/events: fix setting irq affinity
- net: hso: fix null-ptr-deref during tty device unregistration
- usbip: vudc synchronize sysfs code paths
- net: xfrm: Localize sequence counter per network namespace
- i40e: Added Asym_Pause to supported link modes
- i40e: Fix kernel oops when i40e driver removes VF's
- drm/tegra: dc: Don't set PLL clock to 0Hz
- riscv,entry: fix misaligned base for excp_vect_table
- * s390x broken with unknown syscall number on kernels < 5.8 (LP: #1895132)
- s390/prtrace: return -ENOSYS when invalid syscall is supplied
+ s390/ptrace: pass invalid syscall numbers to tracing
+ * Bionic update: upstream stable patchset 2021-04-14 (LP: #1923897)
+ - uapi: nfnetlink_cethelper.h: fix userspace compilation error
+ - ath9k: fix transmitting to stations in dynamic SMPS mode
+ - net: Fix gro aggregation for udp encaps with zero csum
+ - net: Introduce parse_protocol header_ops callback
+ - net: check if protocol extracted by virtio_net_hdr_set_proto is correct
+ - net: avoid infinite loop in mpls_gso_segment when mpls_hlen == 0
+ - can: skb: can_skb_set_owner(): fix ref counting if socket was closed before
  setting skb ownership
+ - can: flexcan: assert FRZ bit in flexcan_chip_freeze()
+ - can: flexcan: enable RX FIFO after FRZ/HALT valid
+ - netfilter: x_tables: gpf inside xt_find_revision()
+ - cifs: return proper error code in statfs(2)
+ - scripts/recordmcount.{c,pl}: support -ffunction-sections .text.* section
  names
+ - Revert "mm, slab: consider rest of partial list if acquire_slab() fails"
+ - sh_eth: fix TRSCER mask for SH771x
+ - net/mlx4_en: update moderation when config reset
+ - net: stmmac: fix incorrect DMA channel intr enable setting of EQoS v4.10
+ - net: sched: avoid duplicates in classes dump
+ - net: usb: qmi_wwan: allow qmimux add/del with master up
+ - cips,calips: resolve a number of problems with the DOI refcounts
+ - net: lapbether: Remove netif_start_queue / netif_stop_queue
+ - net: davicom: Fix regulator not turned off on failed probe
+ - net: davicom: Fix regulator not turned off on driver removal
+ - net: stmmac: stop each tx channel independently
+ - perf traceevent: Ensure read cmdlines are null terminated.
+ - s390/cio: return -EFAULT if copy_to_user() fails again
+ - drm/compat: Clear bounce structures
+ - drm: meson_drv add shutdown function
+ - s390/cio: return -EFAULT if copy_to_user() fails
+ - media: usbtv: Fix deadlock on suspend
+ - net: phy: fix save wrong speed and duplex problem if autoneg is on
+ - udf: fix silent AED tagLocation corruption
+ - mmc: mxs-mmc: Fix a resource leak in an error handling path in
  'mxs_mmc_probe()'
+ - mmc: mediatek: fix race condition between msdc_request_timeout and irq
+ - powerpc: improve handling of unrecoverable system reset
+ - powerpc/perf: Record counter overflow always if SAMPLE_IP is unset
+ - PCI: xgene-msi: Fix race in installing chained irq handler
+ - PCI: mediatek: Add missing of_node_put() to fix reference leak
+ - s390/smp: __smp_rescan_cpus() - move cpumask away from stack
+ - scsi: libiscsi: Fix iscsi_prep_scsi_pdu() error handling
+ - ALSA: hdahdmi: Cancel pending works before suspend
+ - ALSA: hda: Drop the BATCH workaround for AMD controllers
+ - ALSA: hda: Avoid spurious unsol event handling during S3/S4
- ALSA: usb-audio: Fix "cannot get freq eq" errors on Dell AE515 sound bar
- Revert 95ebabde382c ("capabilities: Don't allow writing ambiguous v3 file capabilities")
- s390/dasd: fix hanging DASD driver unbind
- s390/dasd: fix hanging IO request during DASD driver unbind
- mmc: core: Fix partition switch time for eMMC
- Goodix Fingerprint device is not a modem
- USB: gadget: uEther: Fix a configs return code
- usb: gadget: f_uac2: always increase endpoint max_packet_size by one audio slot
- usb: gadget: f_uac1: stop playback on function disable
- usb: renesas_usbhs: Clear PIPECFG for re-enabling pipe with other EPNUM
- xhci: Improve detection of device initiated wake signal.
- usb: xhci: Fix ASMedia ASM1042A and ASM3242 DMA addressing
- USB: serial: io_edgeport: fix memory leak in edge_startup
- USB: serial: ch341: add new Product ID
- USB: serial: cp210x: add ID for Acuity Brands nLight Air Adapter
- USB: serial: cp210x: add some more GE USB IDs
- usbip: fix stub_dev to check for stream socket
- usbip: fix vhci_hcd to check for stream socket
- usbip: fix vudc to check for stream socket
- usbip: fix vhci_hcd attach_store() races leading to gpf
- staging: rtl8192u: fix ->ssid overflow in r8192_wx_set_scan()
- staging: rtl8188eu: prevent ->ssid overflow in rtw_wx_set_scan()
- staging: rtl8712: unterminated string leads to read overflow
- staging: rtl8188eu: fix potential memory corruption in rtw_check Beacon_data()
- staging: ks7010: prevent buffer overflow in ks_wlan_set_scan()
- staging: rtl8712: Fix possible buffer overflow in r8712_sitesurvey_cmd
- staging: rtl8192e: Fix possible buffer overflow in rtl92e_wx_set_scan
- staging: comedi: addi_apci_1032: Fix endian problem for COS sample
- staging: comedi: addi_apci_1500: Fix endian problem for command sample
- staging: comedi: adv_pci1710: Fix endian problem for AI command data
- staging: comedi: das6402: Fix endian problem for AI command data
- staging: comedi: das800: Fix endian problem for AI command data
- staging: comedi: dmm32at: Fix endian problem for AI command data
- staging: comedi: me4000: Fix endian problem for AI command data
- staging: comedi: pcl711: Fix endian problem for AI command data
- staging: comedi: pcl818: Fix endian problem for AI command data
- sh_eth: fix TRSCER mask for R7S72100
- NFSv4.2: fix return value of _nfs4_get_security_label()
- block: rsxx: fix error return code of rsxx_pci_probe()
- configs: fix a use-after-free in __configs_open_file
- stop_machine: mark helpers __always_inline
- include/linux/sched/mm.h: use rcu_dereference in in_vfork()
- powerpc/64s: Fix instruction encoding for lis in ppc_function_entry()
- binfmt_misc: fix possible deadlock in bm_register_write
- hwmon: (lm90) Fix max6658 sporadic wrong temperature reading
+ - KVM: arm64: Fix exclusive limit for IPA size
+ - xen/events: reset affinity of 2-level event when tearing it down
+ - xen/events: don't unmask an event channel when an eoi is pending
+ - xen/events: avoid handling the same event on two cpus at the same time
+ - tcp: add sanity tests to TCP_QUEUE_SEQ
+ - net: qrtr: fix error return code of qrtr_sendmsg()
+ - net: stmmac: fix watchdog timeout during suspend/resume stress test
+ - i2c: rcar: optimize cacheline to minimize HW race condition
+ - powerpc/pci: Add ppc_md.discover_phbs()
+ - PCI: Fix pci_register_io_range() memory leak
+ - i40e: Fix memory leak in i40e_probe
+ - ALSA: usb: Add Plantronics C320-M USB ctrl msg delay quirk
+ - ALSA: usb-audio: Apply the control quirk to Plantronics headsets
+ - mmc: cqhci: Fix random crash when remove mmc module/card
+ - usbip: fix vudc.usbip_sockfd_store races leading to gpf
+ - net: b53: Support setting learning on port
+ - ext4: check journal inode extents more carefully
+ - perf tools: Use %define api.pure full instead of %pure-parser
+ - tools build feature: Check if get_current_dir_name() is available
+ - tools build feature: Check if eventfd() is available
+ - tools build: Check if gettid() is available before providing helper
+ - tools build feature: Check if pthread_barrier_t is available
+ - btrfs: fix race when cloning extent buffer during rewind of an old root
+ - nvnet: don't check iqsqs,ioqses for discovery controllers
+ - NFSD: Repair misuse of sv_lock in 5.10.16-rt30.
+ - svcrdma: disable timeouts on rdma backchannel
+ - sunrpc: Fix refcount leak for rpc auth modules
+ - net/qrtr: fix __netdev_alloc_skb call
+ - scsi: lpfc: Fix some error codes in debugfs
+ - nvme-rdma: fix possible hang when failing to set io queues
+ - usb-storage: Add quirk to defeat Kindle's automatic unload
+ - USB: replace hardcode maximum usb string length by definition
+ - usb: gadget: configfs: Fix KASAN use-after-free
+ - iio:adc:sm32-adc: Add HAS_IOMEM dependency
+ - iio: adc://qcom-spml-vadc: add default scale to LR_MUX2_BAT_ID channel
+ - iio: adis16400: Fix an error code in adis16400_initial_setup()
+ - iio: gyro: mpu3050: Fix error handling in mpu3050_trigger_handler
+ - iio: hid-sensor-humidity: Fix alignment issue of timestamp channel
+ - iio: hid-sensor-prox: Fix scale not correct issue
+ - iio: hid-sensor-temperature: Fix issues of timestamp channel
+ - PCI: rpadlpar: Fix potential drc_name corruption in store functions
+ - perf/x86/intel: Fix a crash caused by zero PEBS status
+ - x86/ioapic: Ignore IRQ2 again
+ - kernel, fs: Introduce and use set_restart_fn() and arch_set_restart_data()
+ - x86: Move TS_COMPAT back to asm/thread_info.h
+ - x86: Introduce TS_COMPAT_RESTART to fix get_nr_restart_syscall()
+ - ext4: Fix old entry again if failed to rename whiteout
+ - ext4: do not try to set xattr into ea_inode if value is empty
+ - ext4: fix potential error in ext4_do_update_inode
+ - genirq: Disable interrupts for force threaded handlers
+ - btrfs: fix slab cache flags for free space tree bitmap
+ - powerpc: Force inlining of cpu_has_feature() to avoid build failure
+ - usbip: Fix incorrect double assignment to udc->ud.tcp_rx
+ - x86/apic/of: Fix CPU devicetree-node lookups
+
+ -- Kelsey Skunberg <kelsey.skunberg@canonical.com>  Fri, 07 May 2021 18:44:53 -0600
+
+ linux (4.15.0-143.147) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-143.147 -proposed tracker (LP: #1923811)
+
+ * CVE-2021-29650
+ - netfilter: x_tables: Use correct memory barriers.
+
+ * LRMv4: switch to signing nvidia modules via the Ubuntu Modules signing key
+ (LP: #1918134)
+ - [Packaging] dkms-build[,-nvidia-N] sync back from LRMv4
+
+ * Security-Fix Xen XSA 371 for Kernel 5.4.0-71 (LP: #1921902) //
+ CVE-2021-28688
+ - xen-blkbk: don't leak persistent grants from xen_blkbk_map()
+
+ * CVE-2021-20292
+ - drm/ttm/nouveau: don't call tt destroy callback on alloc failure.
+
+ * CVE-2021-29264
+ - gianfar: fix jumbo packets+napi+rx overrun crash
+
+ * CVE-2021-29265
+ - usbip: fix stub_dev usbip_sockfd_store() races leading to gpf
+
+ * Bcache bypass writeback on caching device with fragmentation (LP: #1900438)
+ - bcache: consider the fragmentation when update the writeback rate
+
+ * Bionic update: upstream stable patchset 2021-03-31 (LP: #1922124)
+ - net: usb: qmi_wwan: support ZTE P685M modem
+ - scripts: use pkg-config to locate libcrypto
+ - scripts: set proper OpenSSL include dir also for sign-file
+ - hugetlb: fix update_and_free_page contig page struct assumption
+ - drm/virtio: use kvmalloc for large allocations
+ - virtio/s390: implement virtio-ccw revision 2 correctly
+ - arm64 module: set plt* section addresses to 0x0
+ - arm64: Avoid redundant type conversions in xchg() and cmpxchg()
+ - arm64: cmpxchg: Use "K" instead of "L" for il/sc immediate constraint
+ - arm64: Use correct il/sc atomic constraints
+ - JFS: more checks for invalid superblock
+ - media: mceusb: sanity check for prescaler value
+ - xfs: Fix assert failure in xfs_setattr_size()
+ - smackfs: restrict bytes count in smackfs write functions
+ - net: fix up truesize of cloned skb in skb_prepare_for_shift()
+ - mm/hugelbk.c: fix unnecessary address expansion of pmd sharing
+ - net: bridge: use switchdev for port flags set through sysfs too
+ - dt-bindings: net: btusb: DT fix s/interrupt-name/interrupt-names/
+ - staging: fwserial: Fix error handling in fwserial_create
+ - x86/reboot: Add Zotac ZBOX CI327 nano PCI reboot quirk
+ - vt/consolemap: do font sum unsigned
+ - wcore: Fix command execute failure 19 for wl12xx
+ - pktgen: fix misuse of BUG_ON() in pktgen_thread_worker()
+ - ath10k: fix wmi mgmt tx queue full due to race condition
+ - x86/build: Treat R_386_PLT32 relocation as R_386_PC32
+ - Bluetooth: Fix null pointer dereference in amp_read_loc_assoc_final_data
+ - staging: most: sound: add sanity check for function argument
+ - media: uvcvideo: Allow entities with no pads
+ - /fs: handle unallocated section and zone on pinned/age
+ - parisc: Bump 64-bit IRQ stack size to 64 KB
+ - Xen/gnttab: handle p2m update errors on a per-slot basis
+ - xen-netback: respect gnttab_map_refs()'s return value
+ - zmalloc: account the number of compacted pages correctly
+ - swap: fix swapfile read/write offset
+ - media: v4l: ioctl: Fix memory leak in video_usercopy
+ - PCI: Add a REBAR size quirk for Sapphire RX 5600 XT Pulse
+ - drm/amd/display: Guard against NULL pointer deref when get_i2c_info fails
+ - /fs: fix to set/clear I_LINKABLE under i_lock
+ - btrfs: fix error handling in commit_fs_roots
+ - ALSA: hda/realtek: Add quirk for Clevo NH55RZQ
+ - ALSA: hda/realtek: Apply dual codec quirks for MSI Godlike X570 board
+ - btrfs: raid56: simplify tracking of Q stripe presence
+ - btrfs: fix raid6 qstripe kmap
+ - usbip: tools: fix build error for multiple definition
+ - ALSA: ctxfi: cthw20k2: fix mask on conf to allow 4 bits
+ - rsxx: Return -EFAULT if copy_to_user() fails
+ - dm table: fix iterate_devices based device capability checks
+ - dm table: fix DAX iterate_devices based device capability checks
+ - dm table: fix zoned iterate_devices based device capability checks
+ - iommu/amd: Fix sleeping in atomic in increase_address_space()
+ - mwifiex: pcie: skip cancel_work_sync() on reset failure path
+ - platform/x86: acer-wmi: Cleanup ACER_CAP_FOO defines
+ - platform/x86: acer-wmi: Cleanup accelerometer device handling
+ - platform/x86: acer-wmi: Add new force_caps module parameter
+ - platform/x86: acer-wmi: Add ACER_CAP_SET_FUNCTION_MODE capability flag
+ - platform/x86: acer-wmi: Add support for SW_TABLET_MODE on Switch devices
+ - platform/x86: acer-wmi: Add ACER_CAP_KBD_DOCK quirk for the Aspire Switch
+ 10E SW3-016
+ - PCI: Add function 1 DMA alias quirk for Marvell 9215 SATA controller
+ - misc: eeprom_93xx46: Add quirk to support Microchip 93LC46B eeprom
+ - drm/ msm/a5xx: Remove overwriting A5XX_PCIE_DBG_ECO_CNTL register
+ - Revert "zram: close udev startup race condition as default groups"
+ - HID: mf: add support for 0079:1846 Mayflash/Dragonrise USB Gamecube Adapter
+ + * Bionic update: upstream stable patchset 2021-03-16 (LP: #1919380)
+ + - fb: Graph: Initialize tracing_graph_pause at task creation
+ + - tracing: Do not count ftrace events in top level enable output
+ + - tracing: Check length before giving out the filter buffer
+ + - arm/xen: Don't probe xenbus as part of an early initcall
+ + - MIPS: BMIPS: Fix section mismatch warning
+ + - arm64: dts: rockchip: Fix PCIe DT properties on rk3399
+ + - platform/x86: hp-wmi: Disable tablet-mode reporting by default
+ + - ovl: perform vfs_getxattr() with mounter creds
+ + - cap: fix conversions on getxattr
+ + - ovl: skip getxattr of security labels
+ + - ARM: dts: lpc32xx: Revert set default clock rate of HCLK PLL
+ + - ARM: ensure the signal page contains defined contents
+ + - bpf: Check for integer overflow when using roundup_pow_of_two()
+ + - netfilter: xt_recent: Fix attempt to update deleted entry
+ + - xen/netback: avoid race in xenvif_rx_ring_slots_available()
+ + - netfilter: conntrack: skip identical origin tuple in same zone only
+ + - usb: dwc3: ulpi: fix checkpatch warning
+ + - usb: dwc3: ulpi: Replace CPU-based busyloop with Protocol-based one
+ + - net/vmw_vsock: improve locking in vsock_connect_timeout()
+ + - net: watchdog: hold device global xmit lock during tx disable
+ + - vsock/virtio: update credit only if socket is not closed
+ + - vsock: fix locking in vsock_shutdown()
+ + - i2c: stm32f7: fix configuration of the digital filter
+ + - h8300: fix PREEMPTION build, TI_PRE_COUNT undefined
+ + - x86/build: Disable CET instrumentation in the kernel for 32-bit too
+ + - trace: Use -mcount-record for dynamic ftrace
+ + - tracing: Fix SKIP_STACK_VALIDATION=1 build due to bad merge with -mrecord-mcount
+ + - tracing: Avoid calling cc-option -mrecord-mcount for every Makefile
+ + - Xen/x86: don't bail early from clear_foreign_p2m_mapping()
+ + - Xen/x86: also check kernel mapping in set_foreign_p2m_mapping()
+ + - Xen/gntdev: correct dev_bus_addr handling in gntdev_map_grant_pages()
+ + - Xen/gntdev: correct error checking in gntdev_map_grant_pages()
+ + - xen/arm: don't ignore return errors from set_phys_to_machine
+ + - xen-blkback: don't "handle" error by BUG()
+ + - xen-netback: don't "handle" error by BUG()
+ + - xen-iscsi: don't "handle" error by BUG()
+ + - xen-blkback: fix error handling in xen_blkback_map()
+ + - scsi: qla2xxx: Fix crash during driver load on big endian machines
+ + - kvm: check tlbs_dirty directly
+ + - drm/amd/display: Free atomic state after drm_atomic_commit
+ + - riscv: virt_addr_valid must check the address belongs to linear mapping
ARM: kexec: fix oops after TLB are invalidated
- net: hns3: add a check for queue_id in hclge_reset_vf_queue()
- firmware_loader: align .builtin_fw to 8
- net/rds: restrict iovecs length for RDS_CMSG_RDMA_ARGS
- ovl: expand warning in ovl_d_real()
- net: qrtr: Fix port ID for control messages
- HID: make arrays usage and value to be the same
- usb: quirks: add quirk to start video capture on ELMO L-12F document camera
- ntfs: check for valid standard information attribute
- arm64: tegra: Add power-domain for Tegra210 HDA
- NET: usb: qmi_wwan: Adding support for Cinterion MV31
- cifs: Set CIFS_MOUNT_USE_PREFIX_PATH flag on setting cifs_sb->prepath.
- scripts/recordmcount.pl: support big endian for ARCH sh
- vmlinux.lds.h: add DWARF v5 sections
- kdb: Make memory allocations more robust
- MIPS: vmlinux.lds.S: add missing PAGE_ALIGNED_DATA() section
- random: fix the RNDRESEEDCRNG ioctl
- Bluetooth: btqcomsmd: Fix a resource leak in error handling paths in the probe function
- Bluetooth: Fix initializing response id after clearing struct
- ARM: dts: exynos: correct PMIC interrupt trigger level on Monk
- ARM: dts: exynos: correct PMIC interrupt trigger level on Rinato
- ARM: dts: exynos: correct PMIC interrupt trigger level on Spring
- ARM: dts: exynos: correct PMIC interrupt trigger level on Arndale Octa
- arm64: dts: exynos: correct PMIC interrupt trigger level on TM2
- arm64: dts: exynos: correct PMIC interrupt trigger level on Espresso
- cpufreq: brcmstb-avs-cpufreq: Fix resource leaks in ->remove()
- usb: gadget: u_audio: Free requests only after callback
- Bluetooth: drop HCI device reference before return
- Bluetooth: Put HCI device if inquiry procedure interrupts
- ARM: dts: Configure missing thermal interrupt for 4430
- usb: dwc2: Do not update data length if it is 0 on inbound transfers
- usb: dwc2: Abort transaction after errors with unknown reason
- usb: dwc2: Make "trimming xfer length" a debug message
- staging: rtl8723bs: wifi_regd.c: Fix incorrect number of regulatory rules
- arm64: dts: msm8916: Fix reserved and rfsa nodes unit address
- ARM: s3c: fix fiq for clang IAS
- bpf_lru_list: Read double-checked variable once without lock
- ath9k: fix data bus crash when setting nf_override via debugfs
- bnxt_en: reverse order of TX disable and carrier off
- xen/netback: fix spurious event detection for common event case
- mac80211: fix potential overflow when multiplying to u32 integers
- b43: N-PHY: Fix the update of coef for the PHY revision >= 3case
- ibmvnic: skip send_request_unmap for timeout reset
- net: amd-xgbe: Reset the PHY rx data path when mailbox command timeout
- net: amd-xgbe: Reset link when the link never comes back
- net: mvneta: Remove per-cpu queue mapping for Armada 3700
+ - fbdev: aty: SPARC64 requires FB_ATY_CT
+ - drm/gma500: Fix error return code in psb_driver_load()
+ - gma500: clean up error handling in init
+ - crypto: sun4i-ss - fix kmap usage
+ - MIPS: c-r4k: Fix section mismatch for loongson2_sc_init
+ - MIPS: lantiq: Explicitly compare LTQ_EBU_PCC_Istat against 0
+ - media: i2c: ov5670: Fix PIXEL_RATE minimum value
+ - media: vsp1: Fix an error handling path in the probe function
+ - media: media/pci: Fix memleak in empress_init
+ - media: tm6000: Fix memleak in tm6000_start_stream
+ - ASoC: cs42l56: fix up error handling in probe
+ - crypto: bcm - Rename struct device_private to bcm_device_private
+ - media: lmedm04: Fix misuse of comma
+ - media: qm1d1c0042: fix error return code in qm1d1c0042_init()
+ - media: cx25821: Fix a bug when reallocating some dma memory
+ - media: pxa_camera: declare variable when DEBUG is defined
+ - media: uvcvideo: Accept invalid bFormatIndex and bFrameIndex values
+ - ata: ahci_brcm: Add back regulators management
+ - Drivers: hv: vmbus: Avoid use-after-free in vmbus_onoffer_rescind()
+ - btrfs: clarify error returns values in __load_free_space_cache
+ - hwrng: timeriomem - Fix cooldown period calculation
+ - crypto: ecdh_helper - Ensure 'len >= secret.len' in decode_key()
+ - ima: Free IMA measurement buffer on error
+ - ima: Free IMA measurement buffer after kexec syscall
+ - fs/jfs: fix potential integer overflow on shift of a int
+ - jffs2: fix use after free in jffs2_sum_write_data()
+ - capabilities: Don't allow writing ambiguous v3 file capabilities
+ - clk: meson: clk-pll: fix initializing the old rate (fallback) for a PLL
+ - quota: Fix memory leak when handling corrupted quota file
+ - spi: cadence-quadspi: Abort read if dummy cycles required are too many
+ - HID: core: detect and skip invalid inputs to snto32()
+ - dmaengine: fsldma: Fix a resource leak in the remove function
+ - dmaengine: fsldma: Fix a resource leak in an error handling path of the
  probe function
+ - dmaengine: hsu: disable spurious interrupt
+ - mfd: bd9571mww: Use devm_mfd_add_devices()
+ - fdt: Properly handle "no-map" field in the memory region
+ - of/fdt: Make sure no-map does not remove already reserved regions
+ - power: reset: at91-sama5d2_shdwc: fix wkupdbe mask
+ - rtc: s5m: select REGMAP_I2C
+ - clocksourceldrivers/mxs_timer: Add missing semicolon when DEBUG is defined
+ - regulator: axp20x: Fix reference cout leak
+ - certs: Fix blacklist flag type confusion
+ - spi: atmel: Put allocated master before return
+ - isofs: release buffer head before return
+ - auxdisplay: ht16k33: Fix refresh rate handling
+ - IB/umad: Return EIO in case of when device disassociated
+ - powerpc/47x: Disable 256k page size
+ mmc: usdhi6rol0: Fix a resource leak in the error handling path of the probe
+ ARM: 9046/1: decompressor: Do not clear SCTL.R.nTLSMD for ARMv7+ cores
+ amba: Fix resource leak for drivers without .remove
+ tracepoint: Do not fail unregistration of a probe due to memory failure
+ perf tools: Fix DSO filtering when not finding a map for a sampled address
+ RDMA/rxe: Fix coding error in rxe_recv.c
+ spi: stm32: properly handle 0 byte transfer
+ mm/mcci: Prevent use after free in mm831x_auxadc_read_irq()
+ powerpc/pseries/dlpar: handle ibm, configure-connector delay status
+ powerpc/8xx: Fix software emulation interrupt
+ spi: pxa2xx: Fix the controller numbering for Wildcat Point
+ perf intel-pt: Fix missing CYC processing in PSB
+ perf test: Fix unaligned access in sample parsing test
+ Input: elo - fix an error code in elo_connect()
+ sparc64: only select COMPAT_BINFMT_ELF if BINFMT_ELF is set
+ misc: eeprom_93xx46: Fix module alias to enable module autoprobe
+ misc: eeprom_93xx46: Add module alias to avoid breaking support for non device tree users
+ pwm: rockchip: rockchip_pwm_probe(): Remove superfluous clk_unprepare()
+ VMC1: Use set_page_dirty_lock() when unregistering guest memory
+ PCI: Align checking of syscall user config accessors
+ drm/msm/dsi: Correct io_start for MSM8994 (20nm PHY)
+ ext4: fix potential htree index checksum corruption
+ i40e: Fix flow for IPv6 next header (extension header)
+ i40e: Fix overwriting flow control settings during driver loading
+ net/mlx4_core: Add missed mlx4_free_cmd_mailbox()
+ ocfs2: fix a use after free on error
+ mm/memory.c: fix potential pte_unmap_unlock pte error
+ mm/hugetlb: fix potential double free in hugetlb_register_node() error path
+ arm64: Add missing ISB after invalidating TLB in __primary_switch
+ i2c: brcmstm: Fix brcmstd_send_i2c_cmd condition
+ mm/rmap: fix potential pte_unmap on an not mapped pte
+ scsi: bnx2fc: Fix Kconfig warning & CNIC build errors
+ blk-settings: align max_sectors on "logical_block_size" boundary
+ ACPI: property: Fix fwnode string properties matching
+ ACPI: configfs: add missing check after configfs_register_default_group()
+ HID: wacom: Ignore attempts to overwrite the touch_max value from HID
+ Input: raydium_ts_i2c - do not send zero length
+ Input: xpad - add support for PowerA Enhanced Wired Controller for Xbox
+ Series X|S
+ Input: joydev - prevent potential read overflow in ioctl
+ Input: i8042 - add ASUS Zenbook Flip to noseltest list
+ USB: serial: option: update interface mapping for ZTE P685M
+ usb: musb: Fix runtime PM race in musb_queue_resume_work
+ USB: serial: mos7840: fix error code in mos7840_write()
+ USB: serial: mos7720: fix error code in mos7720_write()
+ usb: dwc3: gadget: Fix setting of DEPCFG.Interval_m1
+ usb: dwc3: gadget: Fix dep->interval for fullspeed interrupt
+ - ALSA: hda/realtek: modify EAPD in the ALC886
+ - tpm_tis: Fix check_locality for correct locality acquisition
+ - KEYs: trusted: Fix migratable=1 failing
+ - btrfs: abort the transaction if we fail to inc ref in btrfs_copy_root
+ - btrfs: fix reloc root leak with 0 ref reloc roots on recovery
+ - btrfs: fix extent buffer leak on failure to copy root
+ - crypto: sun4i-ss - checking sg length is not sufficient
+ - crypto: sun4i-ss - handle BigEndian for cipher
+ - seccomp: Add missing return in non-void function
+ - drivers/misc/vmw_vmci: restrict too big queue size in qp_host_alloc_queue
+ - staging: rtl81188eu: Add Edimax EW-7811UN V2 to device table
+ - x86/reboot: Force all cpus to exit VMX root if VMX is supported
+ - floppy: reintroduce O_NDELAY fix
+ - x86: uprobe: Return EOPNOTSUPP for AARCH32 instruction probing
+ - watchdog: mei_wdt: request stop on unregister
+ - mtd: spi-nor: hisi-sfc: Put child node ap on error path
+ - fs/affs: release old buffer head on error path
+ - hugetlb: fix_copy_huge_page_from_user contig page struct assumption
+ - mm: hugetlb: fix a race between freeing and dissolving the page
+ - libnvdimm/dimn: Avoid race between probe and available_slots_show()
+ - module: Ignore _GLOBAL_OFFSET_TABLE_ when warning for undefined symbols
+ - mmc: sdhci-esdhc-imx: fix kernel panic when remove module
+ - gpio: pcf857x: Fix missing first interrupt
+ - printk: fix deadlock when kernel panic
+ - ISFs: fix out-of-repair __setattr_copy()
+ - sparc32: fix a user-triggerable oops in clear_user()
+ - gfs2: Don't skip dlm unlock if glock has an lvb
+ - dm era: Recover committed writesp after crash
+ - dm era: Verify the data block size hasn't changed
+ - dm era: Fix bitset memory leaks
+ - dm era: Use correct value size in equality function of writesp tree
+ - dm era: Reinitialize bitset cache before digesting a new writesp
dm era: only resizing metadata in preressume
+ - icmp: introduce helper for nat'd source address in network device context
+ - icmp: allow icmpv6_nso_send to work with CONFIG_IPV6=n
+ - gtp: use icmp_nso_send helper
+ - sunet: use icmp_nso_send helper
+ - ipv6: icmp6: avoid indirect call for icmpv6_send()
+ - ipv6: silence compilation warning for non-IPv6 builds
+ - net: icmp: pass zeroed opts from icmp{,v6}_ndo_to_send before sending
+ - dm era: Update in-core bitset after committing the metadata
+ - USB: quirks: sort quirk entries
+ - jump_label/lockdep: Assert we hold the hotplug lock for _cpuslocked()
+ - operations
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Artik 5
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Odroid XU3 family
+ - arm64: dts: allwinner: A64: properly connect USB PHY to port 0
+ - arm64: dts: allwinner: Drop non-removable from SoPine/LTS SD card
- arm64: dts: allwinner: A64: Limit MMC2 bus frequency to 150 MHz
- memory: ti-aemif: Drop child node when jumping out loop
- ihmvnnc: add memory barrier to protect long term buffer
- net: amd-xgbe: Fix NETDEV WATCHDOG transmit queue timeout warning
- drm/amdgpud: Fix macro name _AMDGPU_TRACE_H_ in preprocessor if condition
- drm/amd/display: Fix 10/12 bpc setup in DCE output hit depth reduction.
- crypto: talitos - Work around SEC6 ERRATA (AES-CTR mode data size error)
- pifs: fix to avoid inconsistent quota data
- regulator: s5m8767: Drop regulators OF node reference
- mmc: renesas_sdhi_internal_dmac: Fix DMA buffer alignment from 8 to 128-bytes
- RDMA/rxe: Correct skb on loopback path
- i40e: Add zero-initialization of AQ command structures
- i40e: Fix add TC filter for IPv6
- r8169: fix jumbo packet handling on RTL8168e
- USB: serial: ftdi_sio: fix FTX sub-integer prescaler
- crypto: arm64/sha - add missing module aliases
- misc: rtsx: init of rts522a add OCP power off when no card is present
- seq_file: document how per-entry resources are managed.
- x86: fix seq_file iteration for pat/memtype.c

+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 14 Apr 2021 15:15:21 +0200
+ linux (4.15.0-142.146) bionic; urgency=medium
+ * overlayfs calls vfs_setxattr without cap_convert_nscap
+ - vfs: move cap_convert_nscap() call into vfs_setxattr()
+ * CVE-2021-29154
+ - SAUCE: bpf, x86: Validate computation of branch displacements for x86-64
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Mon, 12 Apr 2021 18:46:50 -0300
+ linux (4.15.0-141.145) bionic; urgency=medium
+ * bionic/linux: 4.15.0-141.145 -proposed tracker (LP: #1919536)
+ * binary assembly failures with CONFIG_MODVERSIONS present (LP: #1919315)
+ - [Packaging] quiet (nomially) benign errors in BUILD script
+ * selftests: bpf verifier fails after sanitize_ptr_alu fixes (LP: #1920995)
+ - bpf: Simplify alu_limit masking for pointer arithmetic
+ - bpf: Add sanity check for upper ptr_limit
+ - bpf, selftests: Fix up some test_verifier cases for unprivileged
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
* CVE-2018-13095
  * xfs: More robust inode extent count validation
* i40e PF reset due to incorrect MDD event (LP: #1772675)
  * i40e: change behavior on PF in response to MDD event
* Bionic update: upstream stable patchset 2021-03-09 (LP: #1918330)
  * ACPI: sysfs: Prefer "compatible" modalias
  * ARM: dts: imx6qdl-gw52xx: fix duplicate regulator naming
  * wext: fix NULL-ptr-dereference with cfg80211's lack of commit()
  * net: usb: qmi_wwan: added support for Thales Cinterion PLSx3 modem family
  * drivers: soc: atmel: Avoid calling at91_soc_init on non AT91 SoCs
  * drivers: soc: atmel: add null entry at the end of at91_soc_allowed_list[]
  * KVM: x86/pmu: Fix HW_REF_CPU_CYCLES event pseudo-encoding in intel_arch_events[]
  * KVM: x86: get smi pending status correctly
  * xen: Fix XenStore initialisation for XS_LOCAL
  * leds: trigger: fix potential deadlock with libata
  * mt7601u: fix kernel crash unplugging the device
  * mt7601u: fix rx buffer refcounting
  * xen-blkfront: allow discard-* nodes to be optional
  * ARM: imx: build suspend-imx6.S with arm instruction set
  * netfilter: nft_dynset: add timeout extension to template
  * xfrm: Fix oops in xfrm_replay_advance_bmp
  * RDMA/cxgb4: Fix the reported max_recv_sge value
  * iwlwifi: pcie: use jiffies for memory read spin time limit
  * iwlwifi: pcie: reschedule in long-running memory reads
  * mac80211: pause TX while changing interface type
  * can: dev: prevent potential information leak in can_fill_info()
  * x86/entry/64/compat: Preserve r8-r11 in int $0x80
  * x86/entry/64/compat: Fix "x86/entry/64/compat: Preserve r8-r11 in int $0x80"
  * iommu/vt-d: Gracefully handle DMAR units with no supported address widths
  * iommu/vt-d: Don't dereference iommu_device if IOMMU_API is not built
  * NFC: fix resource leak when target index is invalid
  * NFC: fix possible resource leak
  * team: protect features update by RCU to avoid deadlock
  * tcp: fix TLP timer not set when CA_STATE changes from DISORDER to OPEN
  * kernel: kexec: remove the lock operation of system_transition_mutex
  * PM: hibernate: flush swap writer after marking
  * pNFS/NFSv4: Fix a layout segment leak in nfsfs_layout_process()
  * net/mlx5: Fix memory leak on flow table creation error flow
  * rxrpc: Fix memory leak in rxrpc_lookup_local
  * net: dsa: bcm_sf2: put device node before return
  * ibmvnic: Ensure that CRQ entry read are correctly ordered
  * ACPI: thermal: Do not call acpi_thermal_check() directly
  * net_sched: gen_estimator: support large ewma log
  * phy: pcap-usb: Fix warning for missing regulator_disable
  * x86: __always_inline__(rd,wr)msr()
+ - scsi: scsi_transport_srp: Don't block target in failfast state
+ - scsi: libfc: Avoid invoking response handler twice if ep is already completed
+ - mac80211: fix fast-rx encryption check
+ - scsi: ibmvfc: Set default timeout to avoid crash during migration
+ - objtool: Don't fail on missing symbol table
+ - kthread: Extract KTHREAD_IS_PER_CPU
+ - workqueue: Restrict affinity change to rescuer
+ - USB: serial: cp210x: add pid/vid for WSDA-200-USB
+ - USB: serial: cp210x: add new VID/PID for supporting Teraoka AD2000
+ - USB: serial: option: Adding support for Cinterion MV31
+ - arm64: dts: ds1s1046a: fix dcfg address range
+ - net: lapb: Copy the skb before sending a packet
+ - elfcore: fix building with clang
+ - USB: gadget: legacy: fix an error code in eth_bind()
+ - USB: usblp: don't call usb_set_interface if there's a single alt
+ - usb: dwc2: Fix endpoint direction check in ep_from_windex
+ - ovl: fix dentry leak in ovl_get_redirect
+ - mac80211: fix station rate table updates on assoc
+ - kretprobe: Avoid re-registration of the same kretprobe earlier
+ - xhci: fix bounce buffer usage for non-sg list case
+ - cifs: report error instead of invalid when revalidating a dentry fails
+ - smb3: Fix out-of-bounds bug in SMB2_negotiate()
+ - mmc: core: Limit retries when analyse of SDIO tuples fails
+ - nvme-pci: avoid the deepest sleep state on Kingston A2000 SSDs
+ - ARM: footbridge: fix dc21285 PCI configuration accessors
+ - mm: hugetlbfs: fix cannot migrate the falloccated HugeTLB page
+ - mm: hugetlb: fix a race between isolating and freeing page
+ - mm: hugetlb: remove VM_BUG_ON_PAGE from page_huge_active
+ - mm: thp: fix MADV_REMOVE deadlock on shmem THP
+ - x86/build: Disable CET instrumentation in the kernel
+ - x86/apic: Add extra serialization for non-serializing MSRs
+ - Input: xpad - sync supported devices with fork on GitHub
+ - jommu/vt-d: Do not use flush-queue when caching-mode is on
+ - net: dsa: mv88e6xxxx: override existent unicast portvec in port_fdb_add
+ - net: mcppp2: TCAM entry enable should be written after SRAM data
+ - memblock: do not start bottom-up allocations with kernel_end
+ - usb: renesas_usbhs: Clear pipe running flag in usbhs_pkt_pop()
+ - genirq/msi: Activate Multi-MSI early when MSI_FLAG_ACTIVATE_EARLY is set
+ - KVM: SVM: Treat SVM as unsupported when running as an SEV guest
+ - md: Set prev_flush_start and flush_bio in an atomic way
+ - net: ip_tunnel: fix mtu calculation
+ - block: fix NULL pointer dereference in register_disk
+ - remoteproc: qcom_q6v5_mss: Validate modem blob firmware size before load
+ - remoteproc: qcom_q6v5_mss: Validate MBA firmware size before load
+ - af_key: relax availability checks for skb size calculation
+ - pNFS/NFSv4: Try to return invalid layout in pnfs_layout_process()
+ - iwlwifi: mvm: take mutex for calling iwl_mvm_get_sync_time()
+ - iwlwifi: pcie: add a NULL check in iwl_pcie_txq_unmap
+ - iwlwifi: mvm: guard against device removal in reprobe
+ - SUNRPC: Move simple_get_bytes and simple_get_netobj into private header
+ - SUNRPC: Handle 0 length opaque XDR object data properly
+ - lib/string: Add strscpy_pad() function
+ - includetrace/events/writeback.h: fix -Wstringop-truncation warnings
+ - memcg: fix a crash in wb_workfn when a device disappears
+ - blk-mq: don't hold q->sysfs_lock in blk_mq_map_swqueue
+ - squashfs: add more sanity checks in id lookup
+ - squashfs: add more sanity checks in inode lookup
+ - squashfs: add more sanity checks in xattr id lookup
+
+ * SRU: Add FUA support for XFS (LP: #1917918)
+ - block: add blk_queue_fua() helper function
+ - xfs: move generic_write_sync calls inwards
+ - iomap: iomap_dio_rw() handles all sync writes
+ - iomap: Use FUA for pure data O_DS SYNC DIO writes
+
+ * CVE-2021-3348
+ - nbd: freeze the queue while we're adding connections
+
+ * Bionic kernel 4.15.0-136 causes dosemu2 (with kvm mode) freezes due to lack
+ - blk-mq: Add FUA support
+ - KVM: x86: handle !lapic_in_kernel case in kvm_cpu_*_extint
+
+ * switch LRM to be signed using the Ubuntu Drivers signing key (LP: #1917034)
+ - [Packaging] sync dkms-build to updated API
+
+ * Bionic update: upstream stable patchset 2021-02-26 (LP: #1917093)
+ - i2c: bpmp-tegra: Ignore unknown I2C_M flags
+ - ALSA: seq: oss: Fix missing error check in snd_seq_oss_synth_make_info()
+ - ALSA: hda/via: Add minimum mute flag
+ - ACPI: scan: Make acpi_bus_get_device() clear return pointer on error
+ - mmc: sdhci-xenon: fix 1.8v regulator stabilization
+ - dm: avoid filesystem lookup in dm_get_dev_t()
+ - drm/atomic: put state on error path
+ - ASoC: Intel: haswell: Add missing pm_ops
+ - scsi: ufs: Correct the LUN used in eh_device_reset_handler() callback
+ - xen: Fix event channel callback via INTX/GSI
+ - drm/nouveau/bios: fix issue shadowing expansion ROMs
+ - drm/nouveau/privring: ack interrupts the same way as RM
+ - drm/nouveau/i2c/gm200: increase width of aux semaphore owner fields
+ - i2c: octeon: check correct size of maximum RECV_LEN packet
+ - can: dev: can_restart: fix use after free bug
+ - can: vxcan: vxcan_xmit: fix use after free bug
+ - iio: ad5504: Fix setting power-down state
+ - irqchip/mips-cpu: Set IPI domain parent chip
+ - intel_th: pci: Add Alder Lake-P support
+ - stm class: Fix module init return on allocation failure
+ - ehci: fix EHCI host controller initialization sequence
+ - USB: ehci: fix an interrupt calltrace error
+ - usb: udc: core: Use lock when write to soft_connect
+ - usb: bdc: Make bdc pci driver depend on BROKEN
+ - [Config] updateconfigs for USB_BDC_PCI
+ - xhci: make sure TRB is fully written before giving it to the controller
+ - xhci: tegra: Delay for disabling LFPS detector
+ - compiler.h: Raise minimum version of GCC to 5.1 for arm64
+ - netfilter: rpfilter: mask ecn bits before fib lookup
+ - sh: dna: fix kconfig dependency for G2_DMA
+ - sh_eth: Fix power down vs. is_opened flag ordering
+ - skbuff: back tiny skb's with kmalloc() in __netdev_alloc_skb() too
+ - udp: mask TOS bits in udp_v4_early_demux()
+ - ipv6: create multicast route with RTPROT_KERNEL
+ - net_sched: avoid shift-out-of-bounds in tcindex_set_parms()
+ - net: dsa: b53: fix an off by one in checking "vlan->vid"
+ - gpio: mvebu: fix pwm_get_state period calculation
+ - Revert "mm/slab: fix a memory leak in sysfs_slab_add()"
+ - futex: Ensure the correct return value from futex_lock_pi()
+ - futex: Replace pointless printk in fixup_owner()
+ - futex: Provide and use pi_state_update_owner()
+ - rtmutex: Remove unused argument from rt_mutex_proxy_unlock()
+ - futex: Use pi_state_update_owner() in put_pi_state()
+ - futex: Simplify fixup_pi_state_owner()
+ - futex: Handle faults correctly for PI futexes
+ - tracing: Fix race in trace_open and buffer resize call
+ - fs: move I_DIRTY_INODE to fs.h
+ - writeback: Drop I_DIRTY_TIME_EXPIRE
+ - fs: fix laziest expiration handling in __writeback_single_inode()
+ - mmc: core: don't initialize block size from ext_csd if not present
+ - scsi: qed: Correct max length of CHAP secret
+ - riscv: Fix kernel time_init()
+ - HID: Ignore battery for Elan touchscreen on ASUS UX550
+ - clk: tegra30: Add hda clock default rates to clock driver
+ - drm/nouveau/mmu: fix vram heap sizing
+ - scsi: megaraid_sas: Fix MEGASAS_IOC_FIRMWARE regression
+ - can: peak_usb: fix use after free bugs
+ - serial: mvebu-uart: fix tx lost characters at power off
+ - driver core: Extend device_is_dependent()
+ - net_sched: reject silly cell_log in qdisc_get_rtab()
+ - tools: Factor HOSTCC, HOSTLD, HOSTAR definitions

+ * Enforce CONFIG_DRM_BOCHS=m (LP: #1916290)
+ * Please trust Canonical Livepatch Service kmod signing key (LP: #1898716)
+ * [Config] enable CONFIG_MODVERSIONS=y
+ - [Packaging] build canonical-certs.pem from branch/arch certs
+ - [Config] add Canonical Livepatch Service key to SYSTEM_TRUSTED_KEYS
+ - [Config] add ubuntu-drivers key to SYSTEM_TRUSTED_KEYS
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 24 Mar 2021 18:47:50 +0100
+ +linux (4.15.0-140.144) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-140.144 -proposed tracker (LP: #1920169)
+ + * CVE-2020-27170
+ + - bpf: Fix off-by-one for area size in creating mask to left
+ + * CVE-2020-27171
+ + - bpf: Prohibit alu ops for pointer types not defining ptr_limit
+ + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 19 Mar 2021 09:17:46 -0300
+ +linux (4.15.0-139.143) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-139.143 -proposed tracker (LP: #1919218)
+ + * CVE-2021-27365
+ + - scsi: iscsi: Verify lengths on passthrough PDUs
+ + - sysfs: Add sysfs_emit and sysfs_emit_at to format sysfs output
+ + - scsi: iscsi: Ensure sysfs attributes are limited to PAGE_SIZE
+ + * CVE-2021-27363 // CVE-2021-27364
+ + - scsi: iscsi: Restrict sessions and handles to admin capabilities
+ + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Mon, 15 Mar 2021 17:54:59 -0300
+ +linux (4.15.0-137.141) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-137.141 -proposed tracker (LP: #1916199)
+ + * Fix oops in skb_segment for Bionic series (LP: #1915552)
+ + - net: permit skb_segment on head_frag frag_list skb
+ + - net: bpf: add a test for skb_segment in test_bpf module
+ + - test_bpf: Fix NULL vs IS_ERR() check in test_skb_segment()
+ + * Bionic update: upstream stable patchset 2021-02-10 (LP: #1915328)
+ + - net: cdc_ncm: correct overhead in delayed_ndp_size
+ + - net: vlan: avoid leaks on register_vlan_dev() failures
+ + - net: ip: always refragment ip defragmented packets
+ + - net: fix ptmtu check in nopmtudisc mode
+ + - x86/resctrl: Use an IPI instead of task_work_add() to update PQR_ASSOC MSR
+ + - x86/resctrl: Don't move a task to the same resource group
+ - vmlinux.lds.h: Add PGO and AutoFDO input sections
+ - drm/i915: Fix mismatch between misplaced vma check and vma insert
+ - spi: pxa2xx: Fix use-after-free on unbind
+ - iio: imu: st_lsm6dsx: flip irq return logic
+ - iio: imu: st_lsm6dsx: fix edge-trigger interrupts
+ - ARM: OMAP2+: omap_device: fix idling of devices during probe
+ - i2c: sprd: use a specific timeout to avoid system hang up issue
+ - cpufreq: powernow-k8: pass policy rather than use cpufreq_cpu_get()
+ - spi: stm32: FIFO threshold level - fix align packet size
+ - dmaengine: xilinx_dma: check dma_async_device_register return value
+ - dmaengine: xilinx_dma: fix mixed_enum_type covetivity warning
+ - wil6101: select CONFIG_CRC32
+ - block: rsxx: select CONFIG_CRC32
+ - iommu/intel: Fix memleak in intel_irq_remapping_alloc
+ - net/mlx5e: Fix memleak in mlx5e_create_i2_table_groups
+ - net/mlx5e: Fix two double free cases
+ - wan: ds26522: select CONFIG_BITREVERSE
+ - KVM: arm64: Don’t access PMCR_EL0 when no PMU is available
+ - block: fix use-after-free in disk_part_iter_next
+ - net: drop bogus skb with CHECKSUM_PARTIAL and offset beyond end of trimmed packet
+ - net: hns3: fix the number of queues actually used by ARQ
+ - net: stmmac: dwmac-sun8i: Balance internal PHY resource references
+ - net: stmmac: dwmac-sun8i: Balance internal PHY power
+ - net/sonic: Fix some resource leaks in error handling paths
+ - net: ipv6: fib: flush exceptions when purging route
+ - dmaengine: xilinx_dma: fix incompatible param warning in _child_probe()
+ - lightnvm: select CONFIG_CRC32
+ - ASoC: dapm: remove widget from dirty list on free
+ - MIPS: boot: Fix unaligned access with CONFIG_MIPS_RAW_APPENDED_DT
+ - MIPS: relocatable: fix possible boot hangup with KASLR enabled
+ - ACPI: scan: Harden acpi_device_add() against device ID overflows
+ - mm/hugetlb: fix potential missing huge page size info
+ - dm snapshot: flush merged data before committing metadata
+ - r8152: Add Lenovo Powered USB-C Travel Hub
+ - ext4: fix bug for rename with RENAME_WHITEOUT
+ - ARC: build: remove non-existing bootpImage from KBUILD_IMAGE
+ - ARC: build: add uImage.lzma to the top-level target
+ - ARC: build: add boot_targets to PHONY
+ - btrfs: fix transaction leak and crash after RO remount caused by qgroup rescan
+ - ethernet: ucc_geth: fix definition and size of ucc_geth_tx_global_pram
+ - arch/arc: add copy_user_page() to <asm/page.h> to fix build error on ARC
+ - misdn: dsp: select CONFIG_BITREVERSE
+ - net: ethernet: fs_enet: Add missing MODULE_LICENSE
+ - ACPI: scan: add stub acpi_create_platform_device() for !CONFIG_ACPI
+ - ARM: picocell: fix missing interrupt-parent properties
+ - dump_common_audit_data(): fix racy accesses to ->d_name
+ - ASoC: Intel: fix error code cnl_set_dsp_D0()
+ - NFS4: Fix use-after-free in trace_event_raw_event_nfs4_set_lock
+ - pNFS: Mark layout for return if return-on-close was not sent
+ - NFS: nfs_igrab_and_active must first reference the superblock
+ - ext4: fix superblock checksum failure when setting password salt
+ - RDMA/usnic: Fix memleak in find_free_vf_and_create_qp_grp
+ - mm, slub: consider rest of partial list if acquire_slab() fails
+ - net: sunrpc: interpret the return value of kstrtou32 correctly
+ - dm: eliminate potential source of excessive kernel log noise
+ - ALSA: firewire-tascam: Fix integer overflow in midi_port_work()
+ - ALSA: firewall: Fix integer overflow in transmit_midi_msg()
+ - netfilter: conntrack: fix reading nf_contrack_buckets
+ - usb: ohci: Make distrust_firmware param default to false
+ - nfsd4: readdirplus shouldn't return parent of export
+ - netxen_nic: fix MSI/MSI-x interrupts
+ - rndis_host: set proper input size for OID_GEN_PHYSICAL_MEDIUM request
+ - esp: avoid unneeded kmap_atomic call
+ - net: dcb: Validate netlink message in DCB handler
+ - net: dcb: Accept RTM_GETDCB messages carrying set-like DCB commands
+ - net: stmmac: Fixed mtu changed by cache aligned
+ - net: sit: unregister_netdevice on newlink's error path
+ - net: avoid 32 x truesize under-estimation for tiny skbs
+ - rxrph: Fix handling of an unsupported token type in rxrpc_read()
+ - tipc: fix NULL deref in tipc_link_xmit()
+ - spi: cadence: cache reference clock rate during probe
+ - x86/hyperv: check cpu mask after interrupt has been disabled
+ - mtd: rawnand: fs1_ifc: check result of SRAM initialization fixup
+ - kbuild: enforce -Werror=return-type
+ - crypto: x86/crc32c - fix building with clang ias
+ - rxrpc: Call state should be read with READ_ONCE() under some circumstances
+ * [ssbs-0118] backport SSBS bug (arm64: cpufeature: Detect SSBS and advertise
to userspace) (LP: #1911376)
+ - SAUCE: Move SSBS snippet from arm64_elf_hwcaps to arm64_features
+ * Bionic update: upstream stable patchset 2021-01-25 (LP: #1913214)
+ - x86/entry/64: Add instruction suffix
+ - md/raid10: initialize r10_bio->read_slot before use.
+ - ALSA: usb-audio: simplify set_sync_ep_implicit_fb_quirk
+ - ALSA: usb-audio: fix sync-ep altsetting sanity check
+ - mm: memcontrol: eliminate raw access to stat and event counters
+ - mm: memcontrol: implement lruvec stat functions on top of each other
+ - mm: memcontrol: fix excessive complexity in memory.stat reporting
+ - vfio/pci: Move dummy_resources_list init in vfio_pci_probe()
+ - powerpc/bitops: Fix possible undefined behaviour with fls() and fls64()
+ - uapi: move constants from <linux/kernel.h> to <linux/const.h>
+ - of: fix linker-section match-table corruption
+ - reiserfs: add check for an invalid ih_entry_count
+ misc: vmw_vmci: fix kernel info-leak by initializing dbells in
+ vmci_ctxt_get_chkpt_doorbells()
+ - media: gp8psk: initialize stats at power control logic
+ - ALSA: seq: Use bool for snd_seq_queue internal flags
+ - rtc: sun6i: Fix memleak in sun6i rtc_clk_init
+ - module: set MODULE_STATE_GOING state when a module fails to load
+ - quota: Don't overflow quota file offsets
+ - powerpc: sysdev: add missing iounmap() on error in mpic_msgr_probe()
+ - module: delay kobject uevent until after module init call
+ - ALSA: pcm: Clear the full allocated memory at hw_params
+ - dm verity: skip verity work if I/O error when system is shutting down
+ - kdev_t: always inline major/minor helper functions
+ - iio:imu:bm160: Fix alignment and data leak issues
+ - mwifex: Fix possible buffer overflows in mwifex_cmd_802_11_ad_hoc_start
+ - ext4: don't remount read-only with errors=continue on reboot
+ - KVM: SVM: relax conditions for allowing MSR_IA32_SPEC_CTRL accesses
+ - KVM: x86: reinstate vendor-agnostic check on SPEC_CTRL cpuid bits
+ - xen/gntdev.c: Mark pages as dirty
+ - ALSA: rawmidi: Access runtime->avail always in spinlock
+ - fcntl: Fix potential deadlock in send_sig{io, urg}()
+ - dmaengine: at_hdmac: Substitute kzalloc with kmalloc
+ - dmaengine: at_hdmac: add missing put_device() call in at_dma_xlate()
+ - dmaengine: at_hdmac: add missing kfree() call in at_dma_xlate()
+ - kbuild: don't hardcode depmod path
+ - workqueue: Kick a worker based on the actual activation of delayed works
+ - scsi: ufs-pci: Ensure UFS device is in PowerDown mode for suspend-to-disk
+ - poweroff()
+ - scsi: ide: Do not set the RQF_PREEMPT flag for sense requests
+ - lib/genalloc: fix the overflow when size is too big
+ - depmod: handle the case of /sbin/depmod without /sbin in PATH
+ - ethernet: ucc_geth: fix use-after-free in ucc_geth_remove()
+ - ethernet: ucc_geth: set dev->max_mtu to 1518
+ - atm: idt77252: call pci_disable_device() on error path
+ - qede: fix offload for IPIP tunnel packets
+ - virtio_net: Fix recursive call to cpus_read_lock()
+ - net/ncsi: Use real net-device for response handler
+ - net: ethernet: Fix memleak in ethoc_probe
+ - net-sysfs: take the rtnl lock when storing xps_cpus
+ - net: ethernet: t: cpts: fix ethtool output when no ptp_clock registered
+ - ipv4: Ignore ECN bits for fib lookups in fib_compute_spec_dst()
+ - net: hns: fix return value check in __lb_other_process()
+ - net: hd1c_ppp: Fix issues when mod_timer is called while timer is running
+ - CDC-NCM: remove "connected" log message
+ - net: usb: qmi_wwan: add Quectel EM160R-GL
+ - vhsci_net: fix ubuf refcount incorrectly when sendmsg fails
+ - net: sched: prevent invalid Scell_log shift count
+ - net-sysfs: take the rtnl lock when accessing xps_cpus_map and num_tc
- net: mvpp2: Fix GoP port 3 Networking Complex Control configurations
- net: systemport: set dev->max_mtu to UMAC_MAX_MTU_SIZE
- video: hyperv_fb: Fix the mmap() regression for v5.4.y and older
- crypto: ecdh - avoid buffer overflow in ecdh_set_secret()
- usb: gadget: enable super speed plus
- USB: cdc-acm: blacklist another IR Droid device
- usb: dwc3: ulpi: Use VStsDone to detect PHY regs access completion
- usb: chipidea: ci_hdrc_imx: add missing put_device() call in
  usbmisc_get_init_data()
- USB: xhci: fix U1/U2 handling for hardware with XHCI_INTEL_HOST quirk set
- usb: usbip: vhci_hcd: protect shift size
- usb: uas: Add PNY USB Portable SSD to unusual_uas
- USB: serial: iuu_phoenix: fix DMA from stack
- USB: serial: option: add LongSung M5710 module support
- USB: serial: option: add Quectel EM160R-GL
- USB: yurex: fix control-URB timeout handling
- USB: usbip: fix DMA to stack
- ALSA: usb-audio: Fix UBSAN warnings for MIDI jacks
- usb: gadget: select CONFIG_CRC32
- usb: gadget: f_uac2: reset wMaxPacketSize
- usb: gadget: function: printer: Fix a memory leak for interface descriptor
- USB: gadget: legacy: fix return error code in acm_ms_bind()
- usb: gadget: Fix spinlock lockup on usb_function_deactivate
- usb: gadget: configfs: Preserve function ordering after bind failure
- usb: gadget: configfs: Fix use-after-free issue with udc_name
- USB: serial: keysan_pda: remove unused variable
- x86/mm: Fix leak of pmd ptlock
- ALSA: hda/conexant: add a new hda codec CX11970
- ALSA: hda/realtek - Fix speaker volume control on Lenovo C940
- Revert "device property: Keep secondary firmware node secondary by type"
- netfilter: ipset: fix shift-out-of-bounds in htable_bits()
- netfilter: xt_RATEEST: reject non-null terminated string from userspace
- x86/mtrr: Correct the range check before performing MTRR type lookups
- KVM: x86: fix shift out of bounds reported by UBSAN
- i40e: Fix Error I40E_AQ_RC_EINVAL when removing VFs
- tun: fix return value when the number of iovs exceeds MAX_SKB_FRAGS
- USB: cdc-wdm: Fix use after free in service_outstanding_interrupt().
- USB: Gadget Ethernet: Re-enable Jumbo frames.
- usb: gadget: u_ether: Fix MTU size mismatch with RX packet size
+ -- Stefan Bader <stefan.bader@canonical.com>  Fri, 19 Feb 2021 11:28:35 +0100
+ linux (4.15.0-136.140) bionic; urgency=medium
+ * bionic/linux: 4.15.0-136.140 -proposed tracker (LP: #1913117)
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
- update dkms package versions
+
+ * Introduce the new NVIDIA 460-server series and update the 460 series
+ (LP: #1913200)
+ - [Config] dkms-versions -- drop NVIDIA 435 455 and 440-server
+ - [Config] dkms-versions -- add the 460-server nvidia driver
+
+ * switch to an autogenerated nvidia series based core via dkms-versions
+ (LP: #1912803)
+ - [Packaging] nvidia -- use dkms-versions to define versions built
+ - [Packaging] update-version-dkms -- maintain flags fields
+ - [Config] dkms-versions -- add transitional/skip information for nvidia
+ packages
+
+ * DMI entry syntax fix for Pegatron / ByteSpeed C15B (LP: #1910639)
+ - Input: i8042 - unbreak Pegatron C15B
+
+ * CVE-2020-29372
+ - mm: check that mm is still valid in madvise()
+
+ * update ENA driver, incl. new ethtool stats (LP: #1910291)
+ - net: ena: change num_queues to num_io_queues for clarity and consistency
+ - net: ena: ethtool: get_channels: use combined only
+ - net: ena: ethtool: support set_channels callback
+ - net: ena: ethtool: remove redundant non-zero check on rc
+ - net/amazon: Ensure that driver version is aligned to the linux kernel
+ - net: ena: ethtool: clean up minor indentation issue
+ - net: ena: remove code that does nothing
+ - net: ena: add unmask interrupts statistics to ethtool
+ - net: ena: cosmetic: change ena_com_stats_admin stats to u64
+ - net: ena: cosmetic: remove unnecessary code
+ - net: ena: ethtool: convert stat_offset to 64 bit resolution
+ - net: ena: ethtool: Add new device statistics
+ - net: ena: Change license into format to SPDX in all files
+ - net: ena: Change RSS related macros and variables names
+
+ * CVE-2020-29374
+ - gup: document and work around "COW can break either way" issue
+
+ * Bionic update: upstream stable patchset 2021-01-12 (LP: #1911331)
+ - spi: bcm2835aux: Fix use-after-free on unbind
+ - spi: bcm2835aux: Restore err assignment in bcm2835aux_spi_probe
+ - iwlwifi: pcie: limit memory read spin time
+ - arm64: dts: rockchip: Assign a fixed index to mmc devices on rk3399 boards.
+ - iwlwifi: mvm: fix kernel panic in case of assert during CSA
+ - ARC: stack unwinding: don't assume non-current task is sleeping
+ - scsi: ufs: Make sure clk scaling happens only when HBA is runtime ACTIVE
+ - soc: fsl: dpio: Get the cpumask through cpumask_of(cpu)
+ - platform/x86: acer-wmi: add automatic keyboard background light toggle key
+ as KEY_LIGHTS_TOGGLE
+ - Input: cm109 - do not stomp on control URB
+ - Input: i8042 - add Acer laptops to the i8042 reset list
+ - kbuild: avoid static_assert for genksyms
+ - scsi: be2iscsi: Revert "Fix a theoretical leak in beiscsi_create_eqs()"
+ - x86/mm/mem_encrypt: Fix definition of PMD_FLAGS_DEC_WP
+ - PCI: qcom: Add missing reset for ipq806x
+ - net: stmmac: free tx skb buffer in stmmac_resume()
+ - tcp: fix cwnd-limited bug for TSO deferral where we send nothing
+ - net/mlx4_en: Avoid scheduling restart task if it is already running
+ - net/mlx4_en: Handle TX error CQE
+ - net: stmmac: delete the eee_ctrl_timer after napi disabled
+ - net: stmmac: dwnm-meson8b: fix mask definition of the m250_sel mux
+ - net: bridge: vlan: fix error return code in __vlan_add()
+ - mac80211: mesh: fix mesh_pathbl_init() error path
+ - USB: dummy-hcd: Fix uninitialized array use in init()
+ - USB: add RESET_RESUME quirk for Snapscan 1212
+ - ALSA: usb-audio: Fix potential out-of-bounds shift
+ - ALSA: usb-audio: Fix control 'access overflow' errors from chmap
+ - xhci: Give USB2 ports time to enter U3 in bus suspend
+ - USB: UAS: introduce a quirk to set no_write_same
+ - USB: sisusbvga: Make console support depend on BROKEN
+ - [Config] updateconfigs for USB_SISUSBVGA_CON
+ - ALSA: pcm: oss: Fix potential out-of-bounds shift
+ - serial: 8250_omap: Avoid FIFO corruption caused by MDR1 access
+ - drm: fix drm_dp_mst_port refcount leaks in drm_dp_mst_allocate_vcp
+ - pinctrl: merrifield: Set default bias in case no particular value given
+ - pinctrl: baytrail: Avoid clearing debounce value when turning it off
+ - ARM: dts: sun8i: v3s: fix GIC node memory range
+ - gpio: mvebu: fix potential user-after-free on probe
+ - scsi: bnx2i: Requires MMU
+ - can: softing: softing_netdev_open(): fix error handling
+ - RDMA/cm: Fix an attempt to use non-valid pointer when cleaning timewait
+ - kernel/cpu: add arch override for clear_tasks_nm_cpumask() mm handling
+ - drm/tegra: sor: Disable clocks on error in tegra_sor_init()
+ - vxlan: Add needed_headroom for lower device
+ - vxlan: Copy needed_tailroom from lowerdev
+ - scsi: mpt3sas: Increase IOCInit request timeout to 30s
+ - dm table: Remove BUG_ON(in_interrupt())
+ - soc/tegra: fuse: Fix index bug in get_process_id
+ - USB: serial: option: add interface-number sanity check to flag handling
+ - USB: gadget: f_acm: add support for SuperSpeed Plus
+ - USB: gadget: f_mid: setup SuperSpeed Plus descriptors
+ - ush: gadget: f_fs: Re-use SS descriptors for SuperSpeedPlus
+ - USB: gadget: f_rndis: fix bitrate for SuperSpeed and above
+ - USB: chipidea: ci_hdrc_imx: Pass DISABLE_DEVICE_STREAMING flag to imx6ul
+ - ARM: dts: exynos: fix roles of USB 3.0 ports on Odroid XU
+ ARM: dts: exynos: fix USB 3.0 VBUS control and over-current pins on Exynos5410
+ ARM: dts: exynos: fix USB 3.0 pins supply being turned off on Odroid XU
+ HID: i2c-hid: add Vero K147 to descriptor override
+ serial_core: Check for port state when tty is in error state
+ quota: Sanity-check quota file headers on load
+ media: msi2500: assign SPI bus number dynamically
+ crypto: af_alg - avoid undefined behavior accessing salg_name
+ md: fix a warning caused by a race between concurrent md_ioctl(js)
+ Bluetooth: Fix slab-out-of-bounds read in hci_le_direct_adv_report_evt()
+ drm/gma500: fix double free of gma_connector
+ soc: renesas: mobile-sysc: Fix some leaks in rmobile_init_pm_domains()
+ soc: mediatek: Check if power domains can be powered on at boot time
+ RDMA/bnxr_re: Set queue pair state when being queried
+ selinux: fix error initialization in inode_doinit_with_dentry()
+ RDMA/rxe: Compute PSN windows correctly
+ x86/mm/ident_map: Check for errors from ident_pud_init()
+ ARM: p2v: fix handling of LPAE translation in BE mode
+ sched/deadline: Fix sched_dl_global_validate()
+ sched: Reenable interrupts in do_sched_yield()
+ crypto: talitos - Fix return type of current_desc_hdr()
+ spi: img-spfi: fix reference leak in img_spfi_resume
+ ASoC: pcm: DRAIN support reactivation
+ selinux: fix inode_doinit_with_dentry() LABEL_INVALID error handling
+ arm64: dts: exynos: Correct psci compatible used on Exynos7
+ Bluetooth: Fix null pointer dereference in hci_event_packet()
+ spi: spi-tspi: fix reference leak in ti_tspi_setup
+ spi: tegra20-slink: fix reference leak in slink ops of tegra20
+ spi: tegra20-sflash: fix reference leak in tegra_sflash_resume
+ spi: tegra114: fix reference leak in tegra spi ops
+ mwifiex: fix mwifiex_shutdown_sw() causing sw reset failure
+ ASoC: wm8998: Fix PM disable depth imbalance on error
+ ASoC: arizona: Fix a wrong free in wm8997_probe
+ RDMA/mthca: Work around -Wenum-conversion warning
+ MIPS: BCM47XX: fix kconfig dependency bug for BCM47XX_BCMA
+ staging: greybus: codecs: Fix reference counter leak in error handling
+ media: mtk-vcodec: add missing put_device() call in mtk_vcodec_release_dec_pm()
+ scsi: core: Fix VPD LUN ID designator priorities
+ media: solo6x10: fix missing snd_card_free in error handling case
+ drm/omap: dmm_tiler: fix return error code in omap_dmm_probe()
+ Input: ads7846 - fix race that causes missing releases
+ Input: ads7846 - fix integer overflow on Rt calculation
+ Input: ads7846 - fix unaligned access on 7845
+ powerpc/feature: Fix CPU_FTRS_ALWAYS by removing CPU_FTRS_GENERIC_32
+ crypto: omap-aes - Fix PM disable depth imbalance in omap_aes_probe
+ soc: ti: knav_qmss: fix reference leak in knav_queue_probe
+ soc: ti: Fix reference imbalance in knav_dma_probe
+ - drivers: soc: ti: knav_qmss_queue: Fix error return code in knav_queue_probe
+ - Input: omap4-keypad - fix runtime PM error handling
+ - RDMA/cxgb4: Validate the number of CQEs
+ - memstick: fix a double-free bug in memstick_check
+ - ARM: dts: at91: sama5d4_xplained: add pincontrol for USB Host
+ - ARM: dts: at91: sama5d3_xplained: add pincontrol for USB Host
+ - orinoco: Move context allocation after processing the skb
+ - cw1200: fix missing destroy_workqueue() on error in cw1200_init_common
+ - media: siano: fix memory leak of debugfs members in smsdvb_hotplug
+ - samples: bpf: Fix lwt_len_hist reusing previous BPF map
+ - mips: cdmm: fix use-after-free in mips_cdmm_bus_discover
+ - media: max2175: fix max2175_set_cmos_mode() error code
+ - HSI: omap_ssi: Don't jump to free ID in ssi_add_controller()
+ - ARM: dts: Remove non-existent i2c1 from 98dx3236
+ - power: supply: bq24190_charger: fix reference leak
+ - genirq/irqdomain: Don't try to free an interrupt that has no mapping
+ - PCI: iopro: Fix out-of-bound array accesses
+ - ARM: dts: at91: at91sam9r1: fix ADC triggers
+ - ath10k: Fix an error handling path
+ - ath10k: Release some resources in an error handling path
+ - NFSv4.2: condition READDIR’s mask for security label based on LSM state
+ - SUNRPC: xprt_load_transport() needs to support the netid "rdma6"
+ - lockd: don’t use interval-based rebinding over TCP
+ - NFS: switch nfsiod to be an UNBOUND workqueue.
+ - vfio-pci: Use io_remap_pfn_range() for PCI IO memory
+ - media: saa7146: fix array overflow in videoc_s_audio()
+ - clocksource/drivers/cadence_ttc: Fix memory leak in ttc_setup_clockevent()
+ - ARM: dts: at91: sama5d2: map securam as device
+ - pinctrl: falcon: add missing put_device() call in pinctrl_falcon_probe()
+ - arm64: dts: rockchip: Fix UART pull-ups on rk3328
+ - memstick: r592: Fix error return in r592_probe()
+ - net/mlx5: Properly convey driver version to firmware
+ - ASoC: jz4740-i2s: add missed checks for clk_get()
+ - dm ioct1: fix error return code in target_message
+ - clocksource/drivers/arm_arch_timer: Correct fault programming
+ - CNTKCTL_EL1.EVENT
+ - cpufreq: highbank: Add missing MODULE_DEVICE_TABLE
+ - cpufreq: mediatek: Add missing MODULE_DEVICE_TABLE
+ - cpufreq: st: Add missing MODULE_DEVICE_TABLE
+ - cpufreq: loongson1: Add missing MODULE_ALIAS
+ - cpufreq: scpi: Add missing MODULE_ALIAS
+ - scsi: qedi: Fix missing destroy_workqueue() on error in __qedi_probe
+ - scsi: pm80xx: Fix error return in pm8001_pci_probe()
+ - seq_buf: Avoid type mismatch for seq_buf_init
+ - scsi: fnic: Fix error return code in fnic_probe()
+ - powerpc/pseries/hibernation: drop pseries_suspend_begin() from suspend ops
+ - powerpc/pseries/hibernation: remove redundant cacheinfo update
+ - usb: ehci-omap: Fix PM disable depth unbalance in ehci_hcd_omap_probe
+ - usb: oxu210hp-hcd: Fix memory leak in oxu_create
+ - speakup: fix uninitialized flush_lock
+ - nfsd: Fix message level for normal termination
+ - nfs_common: need lock during Iterate through the list
+ - x86/kprobes: Restore BTF if the single-stepping is cancelled
+ - clk: tegra: Fix duplicated SE clock entry
+ - extcon: max77693: Fix modalias string
+ - ASoC: wm_adsp: remove "ctl" from list on error in wm_adsp_create_control()
+ - irqchip/alpine-msi: Fix freeing of interrupts on allocation error path
+ - watchdog: sirfsoc: Add missing dependency on HAS_IOMEM
+ - um: chan_xterm: Fix fd leak
+ - nfc: s3fwrn5: Release the nfc firmware
+ - powerpc/ps3: use dma_mapping_error()
+ - checkpatch: fix unescaped left brace
+ - net: bcmgenet: Fix a resource leak in an error handling path in the probe
+  function
+ - net: allwinner: Fix some resources leak in the error handling path of the
  probe and in the remove function
+ - net: korina: fix return value
+ - watchdog: qcom: Avoid context switch in restart handler
+ - watchdog: coh901327: add COMMON_CLK dependency
+ - clk: ti: Fix memleak in ti_fapll_synth_setup
+ - pwm: zx: Add missing cleanup in error path
+ - pwm: lp3943: Dynamically allocate PWM chip base
+ - perf record: Fix memory leak when using ' --user-reg = ? ' to list registers
+ - qlcnic: Fix error code in probe
+ - clk: s2mps11: Fix a resource leak in error handling paths in the probe
  function
+ - clk: sunxi-ng: Make sure divider tables have sentinel
+ - cfg80211: initialize rekey_data
+ - fix namespaced fscaps when ' CONFIG_SECURITY
+ - Input: cros_ec_keyb - send 'scancodes' in addition to key events
+ - Input: goodix - add upside-down quirk for Teclast X98 Pro tablet
+ - media: gspca: Fix memory leak in probe
+ - media: sunxi-cir: ensure IR is handled when it is continuous
+ - media: netup_unidvb: Don't leak SPI master in probe error path
+ - Input: cyapa_gen6 - fix out-of-bounds stack access
+ - PM: ACPI: PCI: Drop acpi_pm_set_bridge_wakeup()
+ - Revert "ACPI / resources: Use AE_CTRL_TERMINATE to terminate resources
  walks"
+ - ACPI: PNP: compare the string length in the matching_id()
+ - ALSA: hda/realtek - Enable headset mic of ASUS Q524UQK with ALC255
+ - ALSA: pcm: oss: Fix a few more UBSAN fixes
+ - ALSA: usb-audio: Disable sample read check if firmware doesn't give back
+ - s390/smp: perform initial CPU reset also for SMT siblings
+ - s390/dasd: prevent inconsistent LCU device data
+ - s390/dasd: fix list corruption of pavgp group list
+ - s390/dasd: fix list corruption of lcu list
+ staging: comedi: mf6x4: Fix AI end-of-conversion detection
+ powerpc/perf: Exclude kernel samples while counting events in user space.
+ crypto: ecdh - avoid unaligned accesses in ecdh_set_secret()
+ EDAC/amd64: Fix PCI component registration
+ USB: serial: mos7720: fix parallel-port state restore
+ USB: serial: keysan_pda: fix dropped unthrottle interrupts
+ USB: serial: keysan_pda: fix write deadlock
+ USB: serial: keysan_pda: fix stalled writes
+ USB: serial: keysan_pda: fix write-wakeup use-after-free
+ USB: serial: keysan_pda: fix tx-unthrottle use-after-free
+ USB: serial: keysan_pda: fix write unthrottling
+ ext4: fix a memory leak of ext4_free_data
+ ext4: fix deadlock with fs freezing and EA inodes
+ KVM: arm64: Introduce handling of AArch32 TTBCR2 traps
+ ARM: dts: at91: sama5d2: fix CAN message ram offset and size
+ powerpc/rtas: Fix typo of ibm.open-errinjct in RTAS filter
+ powerpc/xmon: Change printk() to pr_cont()
+ powerpc/powervm/memtrace: Don't leak kernel memory to user space
+ ima: Don't modify file descriptor mode on the fly
+ ceph: fix race in concurrent __ceph_remove_cap invocations
+ jffs2: Fix GC exit abnormally
+ jfs: Fix array index bounds check in dbAdjTree
+ drm/dp_aux_dev: check aux_dev before use in drm_dp_aux_dev_get_by_minor()
+ spi: spi-sdh: Fix use-after-free on unbind
+ spi: davinci: Fix use-after-free on unbind
+ spi: pic32: Don't leak DMA channels in probe error path
+ spi: rb4xx: Don't leak SPI master in probe error path
+ spi: sc18is602: Don't leak SPI master in probe error path
+ spi: st-ssc4: Fix unbalanced pm_runtime_disable() in probe error path
+ soc: qcom: smp2p: Safely acquire spinlock without IRQs
+ mtd: parser: cmdline: Fix parsing of part-names with colons
+ iio: buffer: Fix demux update
+ iio: adc: rockchip_saradc: fix missing clk_disable_unprepare() on error in
    rockchip_saradc_resume
+ iio:pressure:mpl3115: Force alignment of buffer
+ iio:imu:bmi160: Fix too large a buffer.
+ md/cluster: fix deadlock when node is doing resync job
+ clk: mvebu: a3700: fix the XTAL MODE pin to MPP1_9
+ xen-blinkdev: set ring->xenblkd to NULL after kthread_stop()
+ xen/xenbus: Allow watches discard events before queueing
+ xen/xenbus: Add 'will_handle' callback support in xenbus_watch_path()
+ xen/xenbus/xen_bus_type: Support will_handle watch callback
+ xen/xenbus: Count pending messages for each watch
+ xenbus/xenbus_backendl: Disallow pending watch messages
+ libnvdimm/namespace: Fix reaping of invalidated block-window-namespace
    labels
+ PCI: Fix pci_slot_release() NULL pointer dereference
- Kbuild: do not emit debug info for assembly with LLVM_IAS=1
- x86/lib: Change `.weak` to `SYM_FUNC_START_WEAK` for arch/x86/lib/mem*.64.S
- powerpc: Drop -me200 addition to build flags
- platform/x86: thinkpad_acpi: Do not report SW_TABLET_MODE on Yoga 11e
- x86/apic/vector: Fix ordering in vector assignment
- tcp: select sane initial rcvq_space.space for big MSS
- arm64: Change `.weak` to `SYM_FUNC_START_WEAK_PI` for arch/arm64/lib/mem*.S
- block: factor out requeue handling from dispatch code
- ixgbe: avoid premature Rx buffer reuse
- drm/tve200: Fix handling of platform_get_irq() error
- x86/apic: Fix x2apic enablement without interrupt remapping
- crypto: talitos - Endianess in current_desc_hdr()
- arm64: dts: exynos: Include common syscon restart/poweroff for Exynos7
- media: tm6000: Fix sizeof() mismatches
- video: fbdev: atmel_lcdfb: fix return error code in atmel_lcdfb_of_init()
- usb/max3421: fix return error code in max3421_probe()
- spi: mxs: fix reference leak in mxs_spi_probe
- crypto: crypto4xx - Replace bitwise OR with logical OR in crypto4xx_build_pd
- spi: fix resource leak for drivers without .remove callback
- dmaengine: mve_xor_v2: Fix error return code in mve_xor_v2_probe()
- power: supply: axp288_charger: Fix HP Pavilion x2 10 DMI matching
- PCI: Bounds-check command-line resource alignment requests
- PCI: Fix overflow in command-line resource alignment requests
- arm64: dts: meson: fix spi-max-frequency on Khadas VIM2
- platform/x86: dell-smbios-base: Fix error return code in dell_smbios_init
- bus: fsl.mc: fix error return code in fsl.mc_object_allocate()
- mac80211: don't set TDLS STA bandwidth wider than possible
- watchdog: Fix potential dereferencing of null pointer
- um: tty: Fix handling of close in tty lines
- libnvimmm/label: Return -ENXIO for no slot in __blk_label_update
- ARM: sunxi: Add machine match for the Allwinner V3 SoC
- Iwt: Disable BH too in run_lwt_bpf()
- ALSA: hda: Fix regressions on clear and reconfig sysfs
- ALSA: hda/realtek: Enable headset mic of ASUS X430UN with ALC256
- ALSA: hda/realtek: Add quirk for MSI-GP73
- ALSA: hda/realtek: Apply jack fixup for Quanta NL3
- s390/dasd: fix hanging device offline processing
- USB: serial: digi_acceleport: fix write-wakeup deadlocks
- powerpc: Fix incorrect stw{, u, x, u} instructions in __set_pce_at
- ubifs: wbuf: Don't leak kernel memory to flash
- scsi: lpfc: Fix invalid sleeping context in lpfc_sli4_nvmet_alloc()
- scsi: lpfc: Re-fix use after free in lpfc_rq_buf_free()
- pinctrl: sunxi: Always call chained_irq[enter, exit] in
+ sunxi_pinctrl_irq_handler

* MSFT Touchpad not working on Lenovo Legion-5 15ARH05 (LP: #1887190) //
Bionic update: upstream stable patchset 2021-01-12 (LP: #1911331)
+ - pinctrl: amd: remove debounce filter setting in IRQ type setting
+  
+ + Bionic update: upstream stable patchset 2021-01-07 (LP: #1910599)
+ + - i2c: imx: use clk notifier for rate changes
+ + - i2c: imx: Fix external abort on interrupt in exit paths
+ + - gpio: mockup: fix resource leak in error path
+ + - powerpc/8xx: Always fault when _PAGE_ACCESSED is not set
+ + - Input: sunkbd - avoid use-after-free in teardown paths
+ + - mac80211: always wind down STA state
+ + - can: proc: can_remove_proc(): silence remove_proc_entry warning
+ + - KVM: x86: clflushopt should be treated as a no-op by emulation
+ + - ACPI: GED: fix -Wformat
+ + - ah6: fix error return code in ah6_input()
+ + - atm: nicstar: Unmap DMA on send error
+ + - bnx_t_en: read EEPROM A2h address using page 0
+ + - devlink: Add missing genlmsg_cancel() in devlink_nl_sb_port_pool_fill()
+ + - inet_diag: Fix error path to cancel the message in inet_req_diag_fill()
+ + - mlxsw: core: Use variable timeout for EMAD retries
+ + - net: b44: fix error return code in b44_init_one()
+ + - net: bridge: add missing counters to ndo_get_stats64 callback
+ + - net: dsa: nv88e6xxx: Avoid VTU corruption on 6097
+ + - net: Have netpoll bring-up DSA management interface
+ + - netlabel: fix our progress tracking in netlbl_unlabel_staticlist()
+ + - netlabel: fix an uninitialized warning in netlbl_unlabel_staticlist()
+ + - net/mlx4_core: Fix init_hca fields offset
+ + - net: x25: Increase refcnt of "struct x25_neigh" in x25_rx_call_request
+ + - qlcnic: fix error return code in qlnic_83xx_restart_hw()
+ + - scpt: change to hold/put transport for proto_unreach_timer
+ + - net/mlx5: Disable QoS when min_rates on all VFs are zero
+ + - net: usb: qmi_wwan: Set DTR quirk for MR400
+ + - tcp: only postpone PROBE_RTT if RTT is < current min_rtt estimate
+ + - net: ftgmac100: Fix crash when removing driver
+ + - pinctrl: rockchip: enable gpio pclk for rockchip_gpio_to_irq
+ + - arm64: psci: Avoid printing in cpu_psci_cpu_die()
+ + - vfs: remove lockdep bogosity in __sb_start_write
+ + - Input: adxl34x - clean up a data type in adxl34x_probe()
+ + - MIPS: export has_transparent_hugepage() for modules
+ + - arm: dts: imx6qdf-udoo: fix rmii phy-mode for ksz9031 phy
+ + - ARM: dts: imx50-evk: Fix the chip select 1 IOMUX
+ + - perf lock: Don't free "lock_seq_stat" if read_count isn't zero
+ + - can: af_can: prevent potential access of uninitialized member in can_rcv()
+ + - can: af_can: prevent potential access of uninitialized member in canfd_rcv()
+ + - can: dev: can_restart(): post buffer from the right context
+ + - can: ti_hecc: Fix memleak in ti_hecc_probe
+ + - can: mcba_usb: mcba_usb_start_xmit(): first fill skb, then pass to
+ + - can: put_echo_skb()
+ + - can: peak_usb: fix potential integer overflow on shift of a int
+ + - can: m_can: m_can_handle_state_change(): fix state change
+ - ASoC: qcom: lpass-platform: Fix memory leak
+ - MIPS: Alchemy: Fix memleak in alchemy_clk_setup_cpu
+ - regulator: ti-abb: Fix array out of bound read access on the first transition
+ - xfs: revert "xfs: fix rmap key and record comparison functions"
+ - libfs: fix error cast of negative value in simple_attr_write()
+ - powerpc/uaccess-flush: fix missing includes in kup-radix.h
+ - speakup: Do not let the line discipline be used several times
+ - ALSA: ctl: fix error path at adding user-defined element set
+ - ALSA: mixart: Fix mutex deadlock
+ - tty: serial: imx: keep console clocks always on
+ - efivarsfs: fix memory leak in efivarsfs_create()
+ - staging: rtl8723bs: Add 024c:0627 to the list of SDIO device-ids
+ - ext4: fix bogus warning in ext4_update_dx_flag()
+ - iio: accel: kxcjk1013: Replace is_sm0500_device with an acpi_type enum
+ - iio: accel: kxcjk1013: Add support for KIOX010A ACPI DSM for setting tablet-mode
+ - regulator: fix memory leak with repeated set_machine_constraints()
+ - regulator: avoid resolve_supply() infinite recursion
+ - regulator: workaround self-referent regulators
+ - xtensa: disable preemption around cache alias management calls
+ - mac80211: minstrel: remove deferred sampling code
+ - mac80211: minstrel: fix tx status processing corner case
+ - mac80211: free sta in sta_info_insert_finish() on errors
+ - s390/cpum_sf.c: fix file permission for cpum sfb size
+ - s390/dasd: fix null pointer dereference for ERP requests
+ - x86/microcode/intel: Check patch signature before saving microcode for early loading
+ - net: qualcomm: rmnet: Fix incorrect receive packet handling during cleanup
+ - page_frag: Recover from memory pressure
+ - qed: fix error return code in qed_iwarp_ll2_start()
+ - scsi: ufs: Fix unbalanced scsi_block_reqs_cnt caused by ufshcd_hold()
+ - arm64: dts: allwinner: a64: Pine64 Plus: Fix ethernet node
+ - arm64: dts: allwinner: h5: OrangePi PC2: Fix ethernet node
+ - Revert "arm: sun8i: orangepi-pc-plus: Set EMAC activity LEDs to active high"
+ - ARM: dts: sun8i: h3: orangepi-plus2e: Enable RGMII RX/TX delay on Ethernet
+ - PHY
+ - arm64: dts: allwinner: a64: bananapi-m64: Enable RGMII RX/TX delay on PHY
+ - arm64: dts: allwinner: h5: OrangePi Prime: Fix ethernet node
+ - ALSA: firewire: Clean up a locking issue in copyRespToBuf()
+ - ALSA: usb-audio: Add delay quirk for all Logitech USB devices
+ - ALSA: hda/realtek: Add some Clove SSID in the ALC293(ALC1220)
+ - ptrace: Set PF_SUPERPRIV when checking capability
+ - seccomp: Set PF_SUPERPRIV when checking capability
+ - mm/userfaultfd: do not access vma->vm_mm after calling handle_userfault()
+ - perf event: Check ref_reloc_sym before using it
+ - btrfs: fix lockdep splat when reading qgroup config on mount
+ - wireless: Use linux/stddef.h instead of stddef.h
- btrfs: adjust return values of btrfs_inode_by_name
- arm64: pgttable: Fix pte accessible()
- arm64: pgttable: Ensure dirty bit is preserved across pte_wrprotect()
- ALSA: hda/hdmi: Use single mutex unlock in error paths
- ALSA: hda/hdmi: fix incorrect locking in hdmi_pcm_close
- HID: cypress: Support Varmilo Keyboards' media hotkeys
- Input: i8042 - allow insmod to succeed on devices without an i8042 controller
- HID: hid-sensor-hub: Fix issue with devices with no report ID
- dmaengine: xilinx_dma: use readl_poll_timeout_atomic variant
- x86/xen: don't unbind uninitialized lock_kicker_irq
- HID: Add Logitech Dinovo Edge battery quirk
- proc: don't allow async path resolution of /proc/self components
- nvme: free sq/cq dbbuf pointers when dbbuf set fails
- dmaengine: pl330: _prep_dma_mempcy: Fix wrong burst size
- scsi: libiscsi: Fix NOP race condition
- scsi: target: iscsi: Fix cmd abort fabric stop race
- perf/x86: fix sysfs type mismatches
- phy: tegra: xusb: Fix dangling pointer on probe failure
- batman-adv: set .owner to THIS_MODULE
- scsi: ufs: Fix race between shutdown and runtime resume flow
- bnxt_en: fix error return code in bnxt_init_one()
- bnxt_en: fix error return code in bnxt_init_board()
- video: hyperv_fb: Fix the cache type when mapping the VRAM
- bnxt_en: Release PCI regions when DMA mask setup fails during probe.
- IB/mthca: fix return value of error branch in mthca_init_cq()
- nfc: s3fwrn5: use signed integer for parsing GPIO numbers
- net: ena: set initial DMA width to avoid intel iommu issue
- ibmvnic: fix NULL pointer dereference in reset_sub_cq_queues
- ibmvnic: fix NULL pointer dereference in ibmvic_reset_cq
- efivarfs: revert "fix memory leak in efivarfs_create()"
- can: gs_usb: fix endianess problem with candleLight firmware
- platform/x86: toshiba_acpi: Fix the wrong variable assignment
- can: m_can: fix nominal bitiming tseg2 min for version >= 3.1
- perf probe: Fix to die_entrypc() returns error correctly
- USB: core: Change %pK for __user pointers to %px
- usb: gadget: f_midi: Fix memleak in f_midi_alloc
- usb: gadget: Fix memleak in gadgetfs_fill_super
- x86/speculation: Fix prctl() when spectre_v2_user={seccomp,prctl},ibpb
- x86/resctrl: Remove superfluous kernfs_get() calls to prevent refcount leak
- x86/resctrl: Add necessary kernfs_put() calls to prevent refcount leak
- USB: core: Fix regression in Hercules audio card
- btrfs: don't access possibly stale fs_info data for printing duplicate device
- KVM: x86: Fix split-irqchip vs interrupt injection window request
- HID: add support for Sega Saturn
- cxgb4: fix the panic caused by non smac rewrite
- s390/qeth: fix tear down of async TX buffers
- platform/x86: thinkpad_acpi: Send tablet mode switch at wakeup time
- USB: quirks: Add USB_QUIRK_DISCONNECT_SUSPEND quirk for Lenovo A630Z TIO
- built-in usb-audio card
- net/af_iucv: set correct sk_protocol for child sockets
- rose: Fix Null pointer dereference in rose_send_frame()
- sock: set sk_err to ee_errno on dequeue from errq
- tcp: Set INET_ECN_xmit configuration in tcp_reinit_congestion_control
- tun: honor IIOC_NOWAIT flag
- usbneth: ipheth: fix connectivity with iOS 14
- bonding: wait for sysfs kobject destruction before freeing struct slave
- netfilter: bridge: reset skb->pkt_type after NF_INET_POST_ROUTING traversal
- ipv4: Fix tos mask in inet_rtm_getroute()
- ibmvnic: Fix TX completion error handling
- net/x25: prevent a couple of overflows
- cxgb3: fix error return code in t3_sge_alloc_qset()
- net: pasemi: fix error return code in pasemi_mac_open()
- net/mlx5: Fix wrong address reclaim when command interface is down
- dt-bindings: net: correct interrupt flags in examples
- ALSA: usb-audio: US16x08: fix value count for level meters
- Input: xpad - support Ardwiino Controllers
- RDMA/i40iw: Address an mmap handler exploit in i40iw
- ipv6: addrlabel: fix possible memory leak in ip6addrLbl_net_init
- ibmvnic: fix call_netdevice_notifiers in do_reset
- i40e: Fix removing driver while bare-metal VFs pass traffic
- geneve: pull IP header before ECN decapsulation
- pinctrl: baytrail: Replace WARN with dev_info_once when setting direct-irq
- pin to output
- pinctrl: baytrail: Fix pin being driven low for a while on gpiod_get(....
- VTIO_OUT_HIGH)
- vlan: consolidate VLAN parsing code and limit max parsing depth
- usb: gadget: f_fs: Use local copy of descriptors for userspace copy
- USB: serial: klsusb105: fix memleak on open
- USB: serial: ch341: add new Product ID for CH341A
- USB: serial: ch341: sort device-id entries
- USB: serial: option: add Fibocom NL668 variants
- USB: serial: option: add support for Thales Cinterion EXS82
- USB: serial: option: fix Quectel BG96 matching
- tty: Fix ->pgrp locking in tiocspgrp()
- tty: Fix ->session locking
- ALSA: hda/realtek - Add new codec supported for ALC897
- ALSA: hda/generic: Add option to enforce preferred_dacs pairs
- iftrace: Fix updating FTRACE_FL_TRAMP
- cifs: fix potential use-after-free in cifs_echo_request()
- mm/swapfile: do not sleep with a spin lock held
- i2c: imx: Fix reset of I2SR_IAL flag
- i2c: imx: Check for I2SR_IAL after every byte
- speakup: Reject setting the speakup line discipline outside of speakup
+ - iommu/amd: Set DTE[IntTabLen] to represent 512 IRTEs
+ - spi: Introduce device-managed SPI controller allocation
+ - spi: bcm-qspi: Fix use-after-free on unbind
+ - spi: bcm2835: Fix use-after-free on unbind
+ - spi: bcm2835: Release the DMA channel if probe fails after dma_init
+ - tracing: Fix userstacktrace option for instances
+ - gfs2: check for empty rgrp tree in gfs2_ri_update
+ - i2c: qup: Fix error return code in qup_i2c_bam_schedule_desc()
+ - Input: i8042 - fix error return code in i8042_setup_aux()
+ - x86/uprobes: Do not use prefixes.nbytes when looping over prefixes.bytes
+ - ALSA: hda/realtek: Add mute LED quirk to yet another HP x360 model
+ - x86/insn-eval: Use new for_each_insn_prefix() macro to loop over prefixes
+ bytes
+ - Revert "geneve: pull IP header before ECN decapsulation"
+ -- Ian May <ian.may@canonical.com>  Wed, 27 Jan 2021 17:31:43 -0600
+ linux (4.15.0-135.139) bionic; urgency=medium
+ * bionic/linux: 4.15.0-135.139 -proposed tracker (LP: #1912223)
+ * [drm:qxl_enc_commit [qxl]] *ERROR* head number too large or missing monitors
+ config: (LP: #1908219)
+ - qxl: remove qxl_io_log()
+ - qxl: move qxl_send_monitors_config()
+ - qxl: hook monitors_config updates into crtc, not encoder.
+ * Touchpad not detected on ByteSpeed C15B laptop (LP: #1906128)
+ - Input: i8042 - add ByteSpeed touchpad to noloop table
+ * vmx_nm_test in ubuntu_kvm_unit_tests interrupted on X-oracle-4.15 / B-oracle-4.15 / X-KVM / B-KVM (LP: #1872401)
+ - KVM: nVMX: Always reflect #NM VM-exits to L1
+ * stack trace in kernel (LP: #1903596)
+ - net: napi: remove useless stack trace
+ * CVE-2020-27777
+ - [Config]: Set CONFIG_PPC_RTAS_FILTER
+ * Bionic update: upstream stable patchset 2020-12-04 (LP: #1906875)
+ - regulator: defer probe when trying to get voltage from unresolved supply
+ - ring-buffer: Fix recursion protection transitions between interrupt context
+ - time: Prevent undefined behaviour in timespec64_to_ns()
+ - nbd: don't update block size after device is started
+ - btrfs: sysfs: init devices outside of the chunk_mutex
+ - btrfs: reschedule when cloning lots of extents
+ - genirq: Let GENERIC_IRQ_IPI select IRQ_DOMAIN_HIERARCHY
+ - hv_balloon: disable warning when floor reached
+ - net: xfrm: fix a race condition during allocating spi
+ - perf tools: Add missing swap for ino_generation
+ - ALSA: hda: prevent undefined shift in snd_hdac_ext_bus_get_link()
+ - can: rx-offload: don't call kfree_skb() from IRQ context
+ - can: dev: can_get_echo_skb(): prevent call to kfree_skb() in hard IRQ
+ context
+ - can: dev: __can_get_echo_skb(): fix real payload length return value for RTR
+ frames
+ - can: can_create_echo_skb(): fix echo skb generation: always use skb_clone()
+ - can: peak_usb: add range checking in decode operations
+ - can: peak_usb: peak_usb_get_ts_time(): fix timestamp wrapping
+ - can: peak_canfd: pucan_handle_can_rx(): fix echo management when loopback is
+ on
+ - xfs: flush new eof page on truncate to avoid post-eof corruption
+ - Btrfs: fix missing error return if writeback for extent buffer never started
+ - ath9k_htc: Use appropriate rx_datalen type
+ - usb: gadget: goku_udc: fix potential crashes in probe
+ - gfs2: Free rd_bits later in gfs2_clear_rgrpd to fix use-after-free
+ - gfs2: Add missing truncate_inode_pages_final for sd_aspace
+ - gfs2: check for live vs. read-only file system in gfs2_fitrim
+ - scsi: hpsa: Fix memory leak in hpsa_init_one()
+ - drm/amdgpu: perform srbm soft reset always on SDMA resume
+ - mac80211: fix use of skb payload instead of header
+ - cfg80211: Regulatory: Fix inconsistent format argument
+ - scsi: scsi_dh_alua: Avoid crash during alua_bus_detach()
+ - iommu/amd: Increase interrupt remapping table limit to 512 entries
+ - pinctrl: intel: Set default bias in case no particular value given
+ - ARM: 9019/1: kprobes: Avoid fortify_panic() when copying optprobe template
+ - pinctrl: aspeed: Fix GPI only function problem.
+ - nbd: fix a block_device refcount leak in nbd_release
+ - xfs: fix flags argument to rmap lookup when converting shared file rmaps
+ - xfs: fix rmap key and record comparison functions
+ - xfs: fix a missing unlock on error in xfs_fs_map_blocks
+ - of/address: Fix of_node memory leak in of_dma_is_coherent
+ - cosa: Add missing kfree in error path of cosa_write
+ - perf: Fix get_recursion_context()
+ - ext4: correctly report "not supported" for {usr,grp}quota when
+ CONFIG_QUOTA
+ - ext4: unlock xattr_sem properly in ext4_inline_data_truncate()
+ - thunderbolt: Add the missed ida_simple_remove() in ring_request_msix()
+ - uio: Fix use-after-free in uio_unregister_device()
+ - usb: cdc-acm: Add DISABLE_ECHO for Renesas USB Download mode
+ - mei: protect mei_cl_mtu from null dereference
+ - futex: Don't enable IRQs unconditionally in put_pi_state()
+ - ocfs2: initialize ip_next_orphan
+ - selinux: Fix error return code in selib_pkey_sid_slow()
+ - don't dump the threads that had been already exiting when zapped.
+ - drm/gma500: Fix out-of-bounds access to struct drm_device.vblank[]
+ - pinctrl: amd: use higher precision for 512 RtcClk
+ - pinctrl: amd: fix incorrect way to disable debounce filter
+ - swiotlb: fix "x86: Don't panic if can not alloc buffer for swiotlb"
+ - IPv6: Set SIT tunnel hard_header_len to zero
+ - net/af_iucv: fix null pointer dereference on shutdown
+ - net/x25: Fix null-ptr-deref in x25_connect
+ - vfi: Fix fast path output packet handling with async Netfilter rules
+ - r8169: fix potential skb double free in an error path
+ - net: Update window Clamp if SOCK_RCVBUF is set
+ - random32: make prandom_u32() output unpredictable
+ - x86/speculation: Allow IBPB to be conditionally enabled on CPUs with always-
  on STIBP
+ - perf/core: Fix bad use of igrab()
+ - perf/core: Fix crash when using HW tracing kernel filters
+ - perf/core: Fix a memory leak in perf_event_parse_addr_filter()
+ - Revert "kernel/reboot.c: convert simple_strtoul to kstrtoint"
+ - reboot: fix overflow parsing reboot cpu number
+ - Convert trailing spaces and periods in path components
+ - xfs: fix scrub flagging rtinherit even if there is no rt device
+ - drm/amd/pm: perform SMC reset on suspend/hibernation
+ - drm/amd/pm: do not use ixFEATURE_STATUS for checking smc running
+ - s390/smp: move rcu_cpu_starting() earlier
+ - tpm_tis: Disable interrupts on ThinkPad T490s
+ - tick/common: Touch watchdog in tick_unfreeze() on all CPUs
+ - mfd: sprd: Add wakeup capability for PMIC IRQ
+ - btrfs: ref-verify: fix memory leak in btrfs_ref_tree_mod
+ - thunderbolt: Fix memory leak if ida_simple_get() fails in
  enumerate_services()
+ - btrfs: fix potential overflow in cluster_pages_for_defrag on 32bit arch
+ - mmc: renesas_sdhi_core: Add missing tmio_mmc_host_free() at remove
+ +-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 18 Jan 2021 18:20:48 +0100
+ + linux (4.15.0-134.138) bionic; urgency=medium
+ + * Packaging resync (LP: #1786013)
+ + - update dkms package versions
+ + -- Stefan Bader <stefan.bader@canonical.com>  Fri, 15 Jan 2021 11:30:49 +0100
+ + linux (4.15.0-132.136) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-132.136 -proposed tracker (LP: #1911147)
+ + * Packaging resync (LP: #1786013)
+ + - update dkms package versions
+
+ * CVE-2020-28374
+ - SAUCE: target: fix XCOPY NAA identifier lookup
+
+ + Stefan Bader <stefan.bader@canonical.com> Tue, 12 Jan 2021 14:38:57 +0100
+ +linux (4.15.0-130.134) bionic; urgency=medium
+
+ + * Packaging resync (LP: #1786013)
+ + - update dkms package versions
+
+ + * CVE-2021-1052 // CVE-2021-1053
+ + - [Packaging] NVIDIA -- Add the NVIDIA 460 driver
+
+ + Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Tue, 05 Jan 2021 14:18:33 -0300
+ +linux (4.15.0-129.132) bionic; urgency=medium
+
+ + * bionic/linux: 4.15.0-129.132 -proposed tracker (LP: #1907635)
+
+ + * Packaging resync (LP: #1786013)
+ + - update dkms package versions
+
+ + * Ubuntu 18.04- call trace in kernel buffer when unloading ib_ipoib module
+ + (LP: #1904848)
+ + - SAUCE: net/mlx5e: IPoIB, initialize update_stat_work for ipoib devices
+
+ + * memory is leaked when tasks are moved to net_prio (LP: #1886859)
+ + - netprio_cgroup: Fix unlimited memory leak of v2 cgroups
+
+ + * s390: dbginfo.sh triggers kernel panic, reading from
+ + /sys/kernel/mm/page_idle/bitmap (LP: #1904884)
+ + - mm/page_idle.c: skip offline pages
+
+ + * Bionic update: upstream stable patchset 2020-11-23 (LP: #1905333)
+ + - drm/i915: Break up error capture compression loops with cond_resched()
+ + - tipc: fix use-after-free in tipc_bcast_get_mode
+ + - gianfar: Replace skb_realloc_headroom with skb_cow_head for PTP
+ + - gianfar: Account for Tx PTP timestamp in the skb headroom
+ + - net: usb: qmi_wwan: add Telit LE910Cx 0x1230 composition
+ + - scpt: Fix COMM_LOST/CANT_STR_ASSOC err reporting on big-endian platforms
+ + - sfp: Fix error handing in sfp_probe()
+ + - Blktrace: bail out early if block debugfs is not configured
+ + - i40e: Fix of memory leak and integer truncation in i40e_virtnl.c
+ + - Fonts: Replace discarded const qualifier
+ + - ALSA: usb-audio: Add implicit feedback quirk for Qu-16
+ + - lib/crc32test: remove extra local_irq_disable/enable
+ + - kthread_worker: prevent queuing delayed work from timer_fn when it is being
canceled
+ - mm: always have io_remap_pfn_range() set pgprot_decrypted()
+ - gfs2: Wake up when sd_glock_disposal becomes zero
+ - ftrace: Fix recursion check for NMI test
+ - ftrace: Handle tracing when switching between context
+ - tracing: Fix out of bounds write in get_trace_buf
+ - ftrace: Handle transient "ownerless" rmutex state correctly
+ - ARM: dts: sun4i-a10: fix cpu_alert temperature
+ - x86/kexec: Use up-to-dated screen_info copy to fill boot params
+ - of: Fix reserved-memory overlap detection
+ - blk-cgroup: Fix memleak on error path
+ - blk-cgroup: Pre-allocate tree node on blkg_conf_prep
+ - scsi: core: Don't start concurrent async scan on same host
+ - vsoc: use ns_capable_noaudit() on socket create
+ - dm/kv4: drv: Add error handing for bind
+ - ACPI: NFIT: Fix comparison to 'ENXIO'
+ - vt: Disable KD_FONT_OP_COPY
+ - fork: fix copy_process(CLONE_PARENT) race with the exiting ->real_parent
+ - serial: 8250_mtk: Fix uart_get_baud_rate warning
+ - serial: txx9: add missing platform_driver_unregister() on error in
+ serial_txx9_init
+ - USB: serial: cyberjack: fix write-URB completion race
+ - USB: serial: option: add Quectel EC200T module support
+ - USB: serial: option: add LE910Cx compositions 0x1203, 0x1230, 0x1231
+ - USB: serial: option: add Telit FN980 composition 0x1055
+ - USB: Add NO_LPM quirk for Kingston flash drive
+ - usb: mtu3: fix panic in mtu3_gadget_stop()
+ - ARC: stack unwinding: avoid indefinite looping
+ - Revert "ARC: entry: fix potential EFA clobber when TIF_SYSCALL_TRACE"
+ - PM: runtime: Resume the device earlier in __device_release_driver()
+ - btrfs: extent_io: add proper error handling to lock_extent_buffer_for_iot()
+ - Btrfs: fix unwritten extent buffers and hangs on future writeback attempts
+ - Btrfs: tree-checker: fix the error message for transid error
+ - mm: mempolicy: fix potential pte_unmap_unlock pte error
+ - tools: perf: Fix build error in v4.19.y
+ - net: dsa: read mac address from DT for slave device
+ - arm64: dts: marvell: espressobin: Add ethernet switch aliases
+ + * Bionic update: upstream stable patchset 2020-11-23 (LP: #1905333) //
+ + CVE-2019-19770 which shows this issue is not a core debugfs issue, but
+ + blktrace: fix debugfs use after free
+ + * Bionic update: upstream stable patchset 2020-11-18 (LP: #1904791)
+ + scripts/setlocalversion: make git describe output more reliable
+ + arm64: link with -z norelo regardless of CONFIG_RELOCATABLE
+ + gtp: fix an use-before-init in gtp_newlink()
+ + ravb: Fix bit fields checking in ravb_hwtstamp_get()
+ + tipc: fix memory leak caused by tipc_buf_append()
+ + arch/x86/amd/ibs: Fix re-arming IBS Fetch
+ - x86/xen: disable Firmware First mode for correctable memory errors
+ - p54: avoid accessing the data mapped to streaming DMA
+ - mtd: lpddr: Fix bad logic in print_drs_error
+ - ata: sata_rcar: Fix DMA boundary mask
+ - fuse: fix page dereference after free
+ - fs: futex: fix page dereference after free
+ - mtx: avoid accessing the data mapped to streaming DMA
+ - powerpc/powerpc: Fix spurious DBG() warning
+ - arch: select ARCH_WANT_IRQS_OFF_ACTIVATE_MM
+ - sparc64: remove mm_cpumask clearing to fix kthread_use_mm race
+ - f2fs: add trace exit in exception path
+ - f2fs: fix to check segment boundary during SIT page readahead
+ - ufi: change sigio_spinlock to a mutex
+ - ARM: 8997/2: hw_breakpoint: Handle inexact watchpoint addresses
+ - xfs: fix realtime bitmap/summary file truncation when growing rt volume
+ - video: fbdev: pvr2fb: initialize variables
+ - ath10k: start recovery process when payload length exceeds max htc length
+ - for sdi
+ - ath10k: fix VHT NSS calculation when STBC is enabled
+ - drm/bridge/megachips: Add checking if ge_b850v3_lvds_init() is working correctly
+ - media: videodev2.h: RGB BT2020 and HSV are always full range
+ - media: platform: Improve queue set up flow for bug fixing
+ - usb: typec: tcpm: During PR_SWAP, source caps should be sent only after tSwapSourceStart
+ - media: tw5864: check status of tw5864_frameinterval_get
+ - mmc: via-sdmmc: Fix data race bug
+ - drm/bridge/synopsys: dsi: add support for non-continuous HS clock
+ - printk: reduce LOG_BUF_SHIFT range for H8300
+ - kgd: Make "kgdbcon" work properly with "kgdb_earlycon"
+ - cpufreq: sti-cpufreq: add stih418 support
+ - USB: adutux: fix debugging
+ - uio: free uio id after uio file node is freed
+ - arm64/mm: return cpu_all_mask when node is NUMA_NO_NODE
+ - ACPI: Add out of bounds and numa_off protections to pxm_to_node()
+ - drivers/net/wan/hdlc_fr: Correctly handle special skb->protocol values
+ - bnxr: not wan/hdlc_fr: Do not rely on caller to provide non NULL mc_io
+ - power: supply: test_power: add missing newlines when printing parameters by sysfs
+ - md/bitmap: md_bitmap_get_counter returns wrong blocks
+ - bnxr: Log unknown link speed appropriately.
+ - clk: ti: clockdomain: fix static checker warning
+ - net: 9p: initialize sun_server.sun_path to have addr's value only when addr is valid
+ - drivers: watchdog: rdc321x_wdt: Fix race condition bugs
+ - ext4: Detect already used quota file early
+ - gfs2: add validation checks for size of superblock
+ - arm64: dts: renesas: ulcb: add full-pwr-cycle-in-suspend into eMMC nodes
+ - memory: emif: Remove bogus debugfs error handling
+ - ARM: dts: s5pv210: remove DMA controller bus node name to fix dtschema
+  warnings
+ - ARM: dts: s5pv210: move PMU node out of clock controller
+ - ARM: dts: s5pv210: remove dedicated 'audio-subsystem' node
+ - nbd: make the config put is called before the notifying the waiter
+ - sgl_alloc_order: fix memory leak
+ - nvme-rdma: fix crash when connect rejected
+ - md/raid5: fix oops during stripe resizing
+ - perf/x86/amd/ibs: Don't include randomized bits in get_ibst_op_count()
+ - perf/x86/amd/ibs: Fix raw sample data accumulation
+ - leds: bcm6328, bcm6358: use devres LED registering function
+ - fs: Don't invalidate page buffers in block_write_full_page()
+ - NFS: fix nfs_path in case of a rename retry
+ - ACPI / extlog: Check for RDMSR failure
+ - ACPI: debug: don't allow debugging when ACPI is disabled
+ - acpi-cpufreq: Honor _PSD table setting on new AMD CPUs
+ - w1: mxc_w1: Fix timeout resolution problem leading to bus error
+ - scsi: mptfusion: Fix null pointer dereferences in mptscsih_remove()
+ - btrfs: reschedule if necessary when logging directory items
+ - btrfs: send, recompute reference path after orphanization of a directory
+ - btrfs: use kvzalloc() to allocate clone_roots in btrfs_ioctl_send()
+ - btrfs: cleanup cow block on error
+ - btrfs: fix use-after-free on readahead extent after failure to create it
+ - usb: dwc3: ep0: Fix ZLP for OUT ep0 requests
+ - usb: dwc3: core: add phy cleanup for probe error handling
+ - usb: dwc3: core: don't trigger runtime pm when remove driver
+ - usb: cdc-acm: fix cooldown mechanism
+ - usb: host: fsl-mp-frac: check return of dma_set_mask()
+ - drm/v915: Force VT'd workarounds when running as a guest OS
+ - vt: keyboard, simplify vt_kdgkbsent
+ - vt: keyboard, extend func_buf_lock to readers
+ - dmaengine: dma-jz4780: Fix race in jz4780_dma_tx_status
+ - iio:adc:ti-adc0832 Fix alignment issue with timestamp
+ - iio:adc:ti-adc12138 Fix alignment issue with timestamp
+ - s390/stp: add locking to sysfs functions
+ - [Config] update config for PPC_RTAS_FILTER
+ - powerpc/rtas: Restrict RTAS requests from userspace
+ - powerpc: Warn about use of smt_snooze_delay
+ - powerpc/powern/elog: Fix race while processing OPAL error log event.
+ - NFSv4.2: support EXCHGID4_FLAG_SUPP_FENCE_OPS 4.2 EXCHANGE_ID flag
+ - NFSD: Add missing NFSv2 .pc_func methods
+ - ubifs: dent: Fix some potential memory leaks while iterating entries
+ - perf python scripting: Fix printable strings in python3 scripts
+ - ubi: check kthread_should_stop() after the setting of task state
+ - ia64: fix build error with !COREDUMP
+ - drm/amdgp: don't map BO in reserved region
+ - ceph: promote to unsigned long long before shifting
+ - libceph: clear con->out_msg on Policy::stateful_server faults
+ - 9P: Cast toloff_t before multiplying
+ - ring-buffer: Return 0 on success from ring_buffer_resize()
+ - vringh: fix __vringh_iov() when riow and wiow are different
+ - ext4: fix leaking sysfs kobject after failed mount
+ - ext4: fix error handling code in add_new_gdb
+ - ext4: fix invalid inode checksum
+ - drm/ttm: fix evicton valuable range check.
+ - rtc: rx8010: don't modify the global rtc ops
+ - tty: make FONTX ioctl use the tty pointer they were actually passed
+ - arm64: berlin: Select DW_APB_TIMER_OF
+ - [Config] update annotations for DW_APB_TIMER_OF
+ - cachefiles: Handle readpage error correctly
+ - hil/parisc: Disable HIL driver when it gets stuck
+ - arm: dts: mt7623: add missing pause for switchport
+ - ARM: samsung: fix PM debug build with DEBUG_LL but !MMU
+ - ARM: s3c24xx: fix missing system reset
+ - device property: Keep secondary firmware node secondary by type
+ - device property: Don't clear secondary pointer for shared primary firmware node
+ - KVM: arm64: Fix AArch32 handling of DBGD{CCINT,SCRext} and DBGVCR
+ - staging: comedi: cb_pcidas: Allow 2-channel commands for AO subdevice
+ - staging: octeon: repair "fixed-link" support
+ - staging: octeon: Drop on uncorrectable alignment or FCS error
+ - objtool: Support Clang non-section symbols in ORC generation
+ - arm64: Run ARCH_WORKAROUND_1 enabling code on all CPUs
+ - x86/PCI: Fix intel_mid_pci.c build error when ACPI is not enabled
+ - cxgb4: set up filter action after rewrites
+ - cxl: Rework error message for incompatible slots
+ - serial: pl011: Fix lockdep splat when handling magic-sysrq interrupt
+ - fscrypt: only set dentry_operations on ciphertext dentries
+ - xen/events: don't use chip_data for legacy IRQs
+ - xen/events: avoid removing an event channel while handling it
+ - xen/events: add a proper barrier to 2-level uevent unmasking
+ - xen/events: fix race in evtchn_fifo_unmask()
+ - xen/events: add a new "late EOI" evtchn framework
+ - xen/blkback: use lateeoi irq binding
+ - xen/netback: use lateeoi irq binding
+ - xen/scsiback: use lateeoi irq binding
+ - xen/pvcallsback: use lateeoi irq binding
+ - xen/pccallback: use lateeoi irq binding
+ - xen/events: switch user event channels to lateeoi model
+ - xen/events: use a common cpu hotplug hook for event channels
+ - xen/events: defer eoi in case of excessive number of events
+ - xen/events: block rogue events for some time
+ - RDMA/qedr: Fix memory leak in iWARP CM
+ - [Config] update config for ARCH_WANT_IRQS_OFF_ACTIVATE_MM
+ - mm: fix exec activate_mm vs TLB shootdown and lazy tlb switching race
+ - f2fs: fix uninit-value in f2fs_lookup
+ - power: supply: bq27xxx: report "not charging" on all types
+ - media: imx274: fix frame interval handling
+ - arm64: topology: Stop using MPIR for topology information
+ - ia64: kprobes: Use generic kretprobe trampoline handler
+ - media: uvcvideo: Fix dereference of out-of-bound list iterator
+ - riscv: Define AT_VECTOR_SIZE_ARCH for ARCH_DLINFO
+ - usb: xhci: omit duplicate actions when suspending a runtime suspended host.
+ - drm/amd/display: HDMI remote sink need mode validation for Linux
+ - btrfs: fix replace of seed device
+ - rpmmsg: glink: Use complete_all for open states
+ - cifs: handle -EINTR in cifs_setattr
+ - ACPI: button: fix handling lid state changes when input device closed
+ - scsi: qla2xxx: Fix crash on session cleanup with unload
+ - btrfs: improve device scanning messages
+ - usb: xhci: Workaround for S3 issue on AMD SNPS 3.0 xHC
+ - usb: typec: tcpm: reset hard_reset_count for any disconnect
+ - powerpc: Fix undetected data corruption with P9N DD2.1 VSX CI load emulation
+ - drm/amd/display: Don't invoke gdb_breakpoint() unconditionally

+ * [HP 635] Radeon 6310 brightness control does not work (LP: #1894667) //
Bionic update: upstream stable patchset 2020-11-18 (LP: #1904791)
+ - ACPI: video: use ACPI backlight for HP 635 Notebook
+
+ * Bionic update: upstream stable patchset 2020-11-17 (LP: #1904613)
+ - RDMA/cma: Remove dead code for kernel rdmacm multicast
+ - RDMA/hns: Fix missing sq_sig_type when querying QP
+ - rpmmsg: smd: Fix a kobj leak in in qcom_smd_parse_edge()
+ - pwm: img: Fix null pointer access in probe
+ - watchdog: Fix memleak in watchdog_cdev_register
+ - watchdog: Use put_device on error
+ - SUNRPC: fix copying of multiple pages in gss_read_proxy_verf()
+ - netfilter: conntrack: connection timeout after re-register
+ - netfilter: nf_fwd_netdev: clear timestamp in forwarding path
+ - ARM: dts: imx6sl: fix rng node
+ - ARM: dts: sun8i: r40: bananapi-m2-ultra: Fix dcdc1 regulator
+ - memory: omap-gpmc: Fix build error without CONFIG_OF
+ - arm64: dts: qcom: pm8916: Remove invalid reg size from wcd_codec
+ - ip_gre: set dev->hard_header_len and dev->needed_headroom properly
+ - usb: dwc3: simple: add support for Hikey 970
+
+ * Bionic: btrfs: kernel BUG at /build/linux-
+ eTBZpZ/linux-4.15.0/fs/btrfs/ctree.c:3233! (LP: #1902254)
+ btrfs: tree-checker: fix incorrect printk format
+ Bionic update: upstream stable patchset 2020-11-10 (LP: #1903768)
+ Bluetooth: fix kernel oops in store_pending_adv_report
+ Bluetooth: Consolidate encryption handling in hci_encrypt_cfm
+ Bluetooth: Fix update of connection state in `hci_encrypt_cfm`
+ Bluetooth: Disconnect if E0 is used for Level 4
+ media: usbtv: Fix reftcounting mixup
+ USB: serial: option: add Cellient MPL200 card
+ USB: serial: option: Add Telit FT980-KS composition
+ staging: comedi: check validity of wMaxPacketSize of usb endpoints found
+ USB: serial: pl2303: add device-id for HP GC device
+ USB: serial: ftdi_sio: add support for FreeCalypso JTAG+UART adapters
+ reiserfs: Initialize inode keys properly
+ reiserfs: Fix oops during mount
+ drivers/net/ethernet/marvell/mvmdio.c: Fix non OF case
+ crypto: bcm - Verify GCM/CCM key length in setkey
+ crypto: qat - check cipher length for aead AES-CBC-HMAC-SHA
+ ARM: 8858/1: vdso: use $(LD) instead of $(CC) to link VDSO
+ ARM: 8939/1: kbuild: use correct nm executable
+ ARM: 8867/1: vdso: pass --be8 to linker if necessary
+ ibmveth: Switch order of ibmveth_helper calls.
+ ibmveth: Identify ingress large send packets.
+ ipv4: Restore flowi4_oif update before call to xfrm_lookup_route
+ mlx4: handle non-napi callers to napi_poll
+ net: usb: qmi_wwan: add Cellient MPL200 card
+ tipc: fix the skb_unshare() in tipc_buf_append()
+ net/ipv4: always honour route mtu during forwarding
+ r8169: fix data corruption issue on RTL8402
+ binder: fix UAF when releasing todo list
+ ALSA: bebob: potential info leak in hwdep_read()
+ net: hdlc: In hdlc_rcv, check to make sure dev is an HDLC device
+ net: hdlc_raw_eth: Clear the IFF_TX_SKB_SHARING flag after calling ether_setup
+ nfc: Ensure presence of NFC_ATTR_FIRMWARE_NAME attribute in
+ nfc_genl_fw_download()
+ tcp: fix to update snd_w11 in bulk receiver fast path
+ icmp: randomize the global rate limiter
+ cifs: remove bogus debug code
+ cifs: Return the error from crypt_message when enc/dec key not found.
+ KVM: x86/mmu: Commit zap of remaining invalid pages when recovering lpages
+ KVM: SVM: Initialize prev_ga_tag before use
+ ima: Don't ignore errors from crypto_shash_update()
+ crypto: algif_aead - Do not set MAY_BACKLOG on the async path
+ EDAC/i5100: Fix error handling order in i5100_init_one()
+ x86/fpu: Allow multiple bits in clearcpuid= parameter
+ drivers/perf: xgene_pmu: Fix uninitialized resource struct
+ crypto: algif_scipher - EBUSY on aio should be an error
+ crypto: mediatek - Fix wrong return value in mtk_desc_ring_alloc()
+ crypto: ixp4xx - Fix the size used in a 'dma_free_coherent()' call
+ media: tuner-simple: fix regression in simple_set_radio_freq
+ media: Revert "media: exynos4-is: Add missed check for
+  pinctrl_lookup_state()"
+ media: m5mols: Check function pointer in m5mols_sensor_power
+ media: uvcvideo: Set media controller entity functions
+ media: omap3isp: Fix memleak in isp_probe
+ crypto: omap-sham - fix digest register handling with export/import
+ crypto: mediatek - fix leaks in mtk_desc_ring_alloc
+ media: mx2_emmaprp: Fix memleak in emmaprp_probe
+ media: tc358743: initialize variable
+ media: s5p-mfc: Fix a reference count leak
+ media: ti-vpe: Fix a missing check and reference count leak
+ regulator: resolve supply after creating regulator
+ ath10k: provide survey info as accumulated data
+ Bluetooth: hci_uart: Cancel init work before unregistering
+ ath6kl: prevent potential array overflow in ath6kl_add_new_sta()
+ ath9k: Fix potential out of bounds in ath9k_htc_txcollection_cb()
+ wcn36xx: Fix reported 02.11n rx_highest rate wcn3660/wcn3680
+ ASoC: qcom: lpass-platform: fix memory leak
+ ASoC: qcom: lpass-cpu: fix concurrency issue
+ brcmfmac: check ndev pointer
+ mwifimac: Do not use GFP_KERNEL in atomic context
+ drm/gma500: fix errror check
+ scsi: qla4xxx: Fix an error handling path in 'qla4xxx_get_host_stats()'  
+ scsi: csiostor: Fix wrong return value in csio_hw_prep() 
+ backlight: sky81452-backlight: Fix refcount imbalance on error
+ VMCI: check return value of get_user_pages_fast() for errors
+ tty: serial: earlycon dependency
+ pty: do tty_flip_buffer_push without port->lock in pty_write
+ pwm: lpss: Fix off by one error in base_unit math in pwm_lpss_prepare()
+ pwm: lpss: Add range limit check for the base_unit register value
+ drivers/virt/fsl_hypervisor: Fix error handling path
+ video: fbdev: vga16fb: fix setting of pixclock because a pass-by-value error
+ video: fbdev: sis: fix null ptr dereference
+ HID: roccat: add bounds checking in kone_sysfs_write_settings()
+ pinctrl: mcp23s08: Fix mcp23x17_regmap initialiser
+ pinctrl: mcp23s08: Fix mcp23x17 precious range
+ ath6kl: wmi: prevent a shift wrapping bug in ath6kl_wmi_delete_pstream_cmd()
+ misc: mic: scif: Fix error handling path
+ ALSA: seq: oss: Avoid mutex lock for a long-time iocll
+ usb: dwc2: Fix parameter type in function pointer prototype
+ quota: clear padding in v2r1_mem2diskdqb()
+ HID: hid-input: fix stylus battery reporting
+ qtnfmac: fix resource leaks on unsupported iftype error return path
+ net: enic: Cure the enic api locking trainwreck
+ - mfd: sm501: Fix leaks in probe()
+ - iwlwifi: mvm: split a print to avoid a WARNING in ROC
+ - usb: gadget: u_eth: enable qmult on SuperSpeed Plus as well
+ - nl80211: fix non-split wiphy information
+ - usb: dtc2: Fix INTR OUT transfers in DDMA mode.
+ - scsi: be2iscsi: Fix a theoretical leak in beiscsi_create_eqs()
+ - mwifiex: fix double free
+ - net: korina: fix kfree of rx/tx descriptor array
+ - mm/memcg: fix device private memcg accounting
+ - mm, oom_adj: don't loop through tasks in __set_oom_adj when not necessary
+ - IB/mlx4: Fix starvation in paravirt mux/demux
+ - IB/mlx4: Adjust delayed work when a dup is observed
+ - powerpe/pseries: Fix missing of_node_put() in rng_init()
+ - powerpe/icp-hv: Fix missing of_node_put() in success path
+ - mtd: lpddr: fix excessive stack usage with clang
+ - mtd: mtld: Don't write panic data twice
+ - ARM: 9007/1: 12c: fix prefetch bits init in L2X0_AUX_CTRL using DT values
- arc: plat-hsdk: fix kconfig dependency warning when !RESET_CONTROLLER
+ - xfs: limit entries returned when counting fsmap records
+ - RDMA/qedr: Fix use of uninitialized field
+ - powerpe/tau: Use appropriate temperature sample interval
+ - powerpe/tau: Remove duplicated set_thresholds() call
+ - powerpe/tau: Disable TAU between measurements
+ - perf intel-pt: Fix "context_switch event has no tid" error
+ - RDMA/hsns: Set the unsupported wr opcode
+ - kdb: Fix pager search for multi-line strings
+ - overflow: Include header file with SIZE_MAX declaration
+ - powerpe/perf: Exclude pmc5/6 from the irrelevant PMU group constraints
+ - powerpe/perf/hv-gpci: Fix starting index value
+ - cpufreq: powernv: Fix frame-size-overflow in powernv_cpufreq_reboot_notifier
+ - IB/rdmavt: Fix sizeof mismatch
+ - 12fs: wait for sysfs kobject removal before freeing 12fs_sb_info
+ - lib/crc32.c: fix trivial typo in preprocessor condition
+ - ramfs: fix nommu mmap with gaps in the page cache
+ - rapidio: fix error handling path
+ - rapidio: fix the missed put_device() for rio_mport_add_riodev
+ - mailbox: avoid timer start from callback
+ - i2c: rear: Auto select RESET_CONTROLLER
+ - PCI: iproc: Set affinity mask on MSI interrupts
+ - clk: at91: clk-main: update key before writing AT91_CKGR_MOR
+ - clk: bcm2835: add missing release if devm_clk_hw_register fails
+ - ext4: limit entries returned when counting fsmap records
+ - vfio/pci: Clear token on bypass registration failure
+ - vfio iommu type1: Fix memory leak in vfio_iommu_type1_pin_pages
+ - Input: imx6ul_tsc - clean up some errors in imx6ul_tsc_resume()
+ - Input: smfts - fix a & vs && typo
+ - Input: ep93xx_keypad - fix handling of platform_get_irq() error
+ - Input: omap4-keypad - fix handling of platform_get_irq() error
+ - Input: tw4030_keypad - fix handling of platform_get_irq() error
+ - Input: sun4i-ps2 - fix handling of platform_get_irq() error
+ - KVM: x86: emulating RDPID failure shall return #UD rather than #GP
+ - memory: omap-gpmc: Fix a couple off by ones
+ - memory: fsl-corenet-cf: Fix handling of platform_get_irq() error
+ - arm64: dts: qcom: msm8916: Fix MDP/DSI interrupts
+ - ARM: dts: owl-s500: Fix incorrect PPI interrupt specifiers
+ - arm64: dts: zynqmp: Remove additional compatible string for i2c IPs
+ - powerpc/powerpc/dump: Fix race while processing OPAL dump
+ - nvme: fix uninitialized work for zero kato
+ - NTB: hw: amd: fix an issue about leak system resources
+ - perf: correct SNOOPX field offset
+ - i2c: core: Restore acpi_walk_dep_device_list() getting called after registering the ACPI i2c devs
+ - crypto: ccp - fix error handling
+ - media: firewire: fix memory leak
+ - media: ati_remote: sanity check for both endpoints
+ - media: st-delta: Fix reference count leak in delta_run_work
+ - media: sti: Fix reference count leaks
+ - media: exynos4-is: Fix several reference count leaks due to pm_runtime_get_sync
+ - media: exynos4-is: Fix a reference count leak due to pm_runtime_get_sync
+ - media: exynos4-is: Fix a reference count leak
+ - media: vsp1: Fix runtime PM imbalance on error
+ - media: platform: s3c-camif: Fix runtime PM imbalance on error
+ - media: platform: sti: hva: Fix runtime PM imbalance on error
+ - media: bdisp: Fix runtime PM imbalance on error
+ - media: media/pci: prevent memory leak in bttv_probe
+ - media: uvcvideo: Ensure all probed info is returned to v4l2
+ - mmc: sdio: Check for CISTPL_VERS_1 buffer size
+ - media: saa7134: avoid a shift overflow
+ - fs: dlm: fix configfs memory leak
+ - media: venus: core: Fix runtime PM imbalance in venus_probe
+ - ntfs: add check for mft record size in superblock
+ - mac80211: handle lack of sband->bitrates in rates
+ - PM: hibernate: remove the bogus call to get_gendisk() in software_resume()
+ - scsi: mvumi: Fix error return in mvumi_io_attach()
+ - scsi: target: core: Add CONTROL field for trace events
+ - mic: vop: copy data to kernel space then write to io memory
+ - misc: vop: add round_up(x,4) for vring_size to avoid kernel panic
+ - usb: gadget: function: printer: fix use-after-free in __lock_acquire
+ - udf: Limit sparing table size
+ - udf: Avoid accessing uninitialized data on failed inode read
+ - USB: cdc-acm: handle broken union descriptors
+ - can: flexcan: flexcan_chip_stop(): add error handling and propagate error value
+ - ath9k: hif_usb: fix race condition between usb_get_urb() and
+ usb_kill_anchored_urbs()
+ - misc: rtsx: Fix memory leak in rtsx_pci_probe
+ - reiserfs: only call unlock_new_inode() if I_NEW
+ - xfs: make sure the rt allocator doesn't run off the end
+ - usb: ohci: Default to per-port over-current protection
+ - Bluetooth: Only mark socket zapped after unlocking
+ - scsi: ibmvfc: Fix error return in ibmvfc_probe()
+ - brcmsmac: fix memory leak in wlc_phy_attach_lchnphy
+ - rtl8xxxu: prevent potential memory leak
+ - Fix use after free in get_capset_info callback.
+ - scsi: qedi: Protect active command list to avoid list corruption
+ - scsi: qedi: Fix list_del corruption while removing active I/O
+ - tty: ipwireless: fix error handling
+ - ipvs: Fix uninit-value in do_ip_vs_set_ctl()
+ - reiserfs: Fix memory leak in reiserfs_parse_options()
+ - mwifiex: don't call del_timer_sync() on uninitialized timer
+ - brcm80211: fix possible memleak in brcmf_proto_msgbuf_attach
+ - usb: core: Solve race condition in anchor cleanup functions
+ - scsi: ufs: ufs-qcom: Fix race conditions caused by ufs_qcom_testbus_config()
+ - ath10k: check idx validity in __ath10k htt_rx_ring_fill_n()
+ - net: korina: cast KSEG0 address to pointer in kfree
+ - tty: serial: fsl_lpuart: fix lpuart32_poll_get_char
+ - usb: cdc-acm: add quirk to blacklist ETAS ES58X devices
+ - USB: cdc-wdm: Make wdm_flush() interruptible and add wdm_fsync().
+ - eeprom: at25: set minimum read/write access stride to 1
+ - powerpc/powerpc/omap: Use IRQ_HANDLED instead of numbers in interrupt handler
+ - net: fix pos incrementment in ipv6_route_seq_next
+ - ALSA: hda/realtek: Enable audio jacks of ASUS D700SA with ALC887
+ - x86/nmi: Fix nmi_handler() duration miscalculation
+ - x86/events/amd/iommu: Fix sizeof mismatch
+ - media: uvcvideo: Silence shift-out-of-bounds warning
+ - hwmon: (pmbus/max34440) Fix status register reads for MAX344{51,60,61}
+ - media: tc358743: cleanup tc358743_cec_isr
+ - pinctrl: bcm: fix kconfig dependency warning when !GPIOLIB
+ - spi: spi-s3c64xx: swap s3c64xx_spi_set_cs() and s3c64xx_enable_datapath()
+ - staging: rtl8192u: Do not use GFP_KERNEL in atomic context
+ - net: stmmac: use netif_tx_start|stop_all_queues() function
+ - scsi: target: tcmu: Fix warning: 'page' may be used uninitialized
+ - ipvs: clear skb->tstamp in forwarding path
+ - netfilter: nf_log: missing vlan offload tag and proto
+ - RDMA/ucma: Fix locking for ctx->events_reported
+ - RDMA/ucma: Add missing locking around rdma_leave_multicast()
+ - RDMA/qedr: Fix inline size returned for iWARP
+ - -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Thu, 10 Dec 2020 12:54:32 +0100
* bionic/linux: 4.15.0-128.131 -proposed tracker (LP: #1907354)

* Packaging resync (LP: #1786013)
  - update dkms package versions

* raid10: discard leads to corrupted file system (LP: #1907262)
  - Revert "md/raid10: improve discard request for far layout"
  - Revert "md/raid10: improve raid10 discard request"
  - Revert "md/raid10: pull codes that wait for blocked dev into one function"
  - Revert "md/raid10: extend r10bio devs to raid disks"
  - Revert "md: add md_submit_discard_bio() for submitting discard bio"

-- Khalid Elmously <khalid.elmously@canonical.com>  Wed, 09 Dec 2020 01:27:33 -0500

* bionic/linux: 4.15.0-126.129 -proposed tracker (LP: #1905305)

* CVE-2020-4788
  - SAUCE: powerpc/64s: Define MASKABLE_RELON_EXCEPTION_PSERIES_OOL
  - SAUCE: powerpc/64s: move some exception handlers out of line
  - powerpc/64s: flush L1D on kernel entry
  - SAUCE: powerpc: Add a framework for user access tracking
  - powerpc: Implement user_access_begin and friends
  - powerpc: Fix __clear_user() with KUAP enabled
  - powerpc/uaccess: Evaluate macro arguments once, before user access is allowed
  - powerpc/64s: flush L1D after user accesses

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Mon, 23 Nov 2020 15:01:09 -0300

* bionic/linux: 4.15.0-125.128 -proposed tracker (LP: #1903137)

* Update kernel packaging to support forward porting kernels (LP: #1902957)
  - [Debian] Update for leader included in BACKPORT_SUFFIX

* Avoid double newline when running insertchanges (LP: #1903293)
  - [Packaging] insertchanges: avoid double newline

* EFI: Fails when BootCurrent entry does not exist (LP: #1899993)
  - efi: Replace invalid slashes with exclamation marks in dentries.

* CVE-2020-14351
  - perf/core: Fix race in the perf_mmap_close() function
* raid10: Block discard is very slow, causing severe delays for mkfs and fstrim operations (LP: #1896578)
* md: add md_submit_discard_bio() for submitting discard bio
* md/raid10: extend r10bio devs to raid disks
* md/raid10: pull codes that wait for blocked dev into one function
* md/raid10: improve raid10 discard request
* md/raid10: improve discard request for far layout

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* Bionic: btrfs: kernel BUG at /build/linux-eTBZpZ/linux-4.15.0/fs/btrfs/ctree.c:3233! (LP: #1902254)
* btrfs: use offset_in_page instead of open-coding it
* btrfs: use BUG() instead of BUG_ON(1)
* btrfs: drop unnecessary offset_in_page in extent buffer helpers
* btrfs: extent_io: do extra check for extent buffer read write functions
* btrfs: extent-tree: kill BUG_ON() in __btrfs_free_extent()
* btrfs: extent-tree: kill the BUG_ON() in insert_inline_extent_backref()
* btrfs: ctree: check key order before merging tree blocks

* Bionic update: upstream stable patchset 2020-11-04 (LP: #1902943)
* USB: gadget: f_ncm: Fix NDP16 datagram validation
* gpio: tc35894: fix up tc35894 interrupt configuration
* vsock/virtio: use RCU to avoid use-after-free on the_virtio_vsck
* vsock/virtio: stop workers during the .remove()
* vsock/virtio: add transport parameter to the
* virtio_transport_reset_no_sock()
* net: virtio_vsck: Enhance connection semantics
* Input: i8042 - add nopnp quirk for Acer Aspire 5 A515
* ftrace: Move RCU is watching check after recursion check
* drm/amdgpu: restore proper ref count in amdgpu_display_crtc_set_config
* drivers/net/wan/hdlc_fr: Add needed_headroom for PVC devices
* drm/sun4i: mixer: Extend regmap max_register
* net: dec: de2104x: Increase receive ring size for Tulip
* rndis_host: increase sleep time in the query-response loop
* nvme-core: get/put ctrl and transport module in nvme_dev_open/release()
* drivers/net/wan/lapbether: Make skb->protocol consistent with the header
* drivers/net/wan/hdlec: Set skb->protocol before transmitting
* mac80211: do not allow bigger VHT MPDUs than the hardware supports
* spi: fsl-espi: Only process interrupts for expected events
* nvme-fc: fail new connections to a deleted host or remote port
* pinctrl: mvebu: Fix i2c sda definition for 98DX3236
* nvs: Fix security label length not being reset
* clk: samsung: exynos4: mark 'chipid' clock as CLK_IGNORE_UNUSED
* iommu/exynos: add missing put_device() call in exynos_iommu_of_xlate()
* i2c: cpm: Fix i2c_ram structure
* Input: trackpoint - enable Synaptics trackpoints
* random32: Restore __latent_entropy attribute on net_rand_state
* epoll: do not insert into poll queues until all sanity checks are done
+ - epoll: replace ->visited/visited_list with generation count
+ - epoll: EPOLL_CTL_ADD: close the race in decision to take fast path
+ - ep_create_wakeup_source(): dentry name can change under you...
+ - netfilter: cnetlink: add a range check for l3/l4 protonum
+ - drm/syncobj: Fix drm_syncobj_handle_to_fd refcount leak
+ - fdbuf, newport_con: Move FONT_EXTRA_WORDS macros into linux/font.h
+ - Fonts: Support FONT_EXTRA_WORDS macros for built-in fonts
+ - Revert "ravb: Fixed to be able to unload modules"
+ - fbcon: Fix global-out-of-bounds read in fbcon_get_font()
+ - net: wireless: nl80211: fix out-of-bounds access in nl80211_del_key()
+ - usernodehelper: reset umask to default before executing user process
+ - platform/x86: thinkpad_acpi: initialize tp_nvrnam_state variable
+ - platform/x86: thinkpad_acpi: re-initialize ACPI buffer size when reuse
+ - driver core: Fix probe_count imbalance in really_probe()
+ - perf top: Fix stdio interface input handling with glibc 2.28+
+ - mtd: rawnand: sunxi: Fix the probe error path
+ - macsec: avoid use-after-free in macsec_handle_frame()
+ - mm/khugepaged: fix filemap page_to_pgoff(page) != offset
+ - cifs: Fix incomplete memory allocation on setxattr path
+ - i2c: meson: fix clock setting overwrite
+ - scpt: fix scpt_auth_init_hmacs() error path
+ - team: set dev->needed_headroom in team_setup_by_port()
+ - net: team: fix memory leak in __team_options_register
+ - openswinn: handle DNAT tuple collision
+ - drm/amdgpu: prevent double kfree ttm->sg
+ - xfrm: clone XFRMA_REPLAY_ESN_VAL in xfrm_do_migrate
+ - xfrm: clone XFRMA_SEC_CTX in xfrm_do_migrate
+ - xfrm: clone whole lifetime_cur structure in xfrm_do_migrate
+ - net: stmmac: removed enabling eee in EEE set callback
+ - platform/x86: fix kconfig dependency warning for FUJITSU_LAPTOP
+ - xfrm: Use correct address family in xfrm_state_find
+ - bonding: set dev->needed_headroom in bond_setup_by_slave()
+ - mdiio: fix mdiio-thunder.c dependency & build error
+ - net: usb: ax88179_178a: fix missing stop entry in driver_info
+ - rxrpc: Fix rrxad token xdr encoding
+ - rxrpc: Downgrade the BUG() for unsupported token type in rxrpc_read()
+ - rxrpc: Fix some missing _bh annotations on locking conn->state_lock
+ - rxrpc: Fix server keyring leak
+ - perf: Fix task_function_call() error handling
+ - mmc: core: don't set limits.discard_granularity as 0
+ - mm: khugepaged: recalculate min_free_kbytes after memory hotplug as expected
+ - by khugepaged
+ - net: usb: rtl8150: set random MAC address when set_ethernet_addr() fails
+ - drm/nouveau/mem: guard against NULL pointer access in mem_del
+ - i2c: i801: Exclude device from suspend direct complete optimization
+ - nvme-core: put ctrl ref when module ref get fail
+ - i2c: meson: fixup rate calculation with filter delay
+ - xfrm: clone XFRMA_SET_MARK in xfrm_do_migrate
+ - net/mlx5e: Fix VLAN cleanup flow
+ - net/mlx5e: Fix VLAN create flow
+
+ * kci_test_encap_fou() in rtnetlink.sh from kselftests/net failed with "FAIL:
+ can't add fou port 7777, skipping test" (LP: #1891421)
+ - selftests: rtnetlink: load fou module for kci_test_encap_fou() test
+
+ * Bionic update: upstream stable patchset 2020-10-23 (LP: #1901257)
++ - af_key: pfkey_dump needs parameter validation
+ - KVM: fix memory leak in kvm_io_bus_unregister_dev()
+ - kprobes: fix kill kprobe which has been marked as gone
+ - mm/thp: fix __split_huge_pmd_locked() for migration PMD
+ - cxgb4: Fix offset when clearing filter byte counters
+ - geneve: add transport ports in route lookup for geneve
+ - hdle_ppp: add range checks in ppp_cp_parse_cr()
+ - ip: fix tos reflection in ack and reset packets
+ - net: ipv6: fix kconfig dependency warning for IPV6_SEG6_HMAC
+ - nfp: use correct define to return NONE fec
+ - tipc: Fix memory leak in tipc_group_create_member()
+ - tipc: use skb_unshare() instead in tipc_buf_append()
+ - bnxt_en: Protect bnxt_set_eee() and bnxt_set_pauseparam() with mutex.
+ - net: phy: Avoid NPD upon phy_detach() when driver is unbound
+ - net: qrtr: check skb_put_padto() return value
+ - net: add __must_check to skb_put_padto()
+ - ipv4: Update exception handling for multipath routes via same device
+ - MAINTAINERS: add CLANG/LLVM BUILD SUPPORT info
+ - Documentation/llvm: add documentation on building w/ Clang/LLVM
+ - Documentation/llvm: fix the name of llvm-size
+ - net: wan: wanxl: use allow to pass CROSS_COMPILE_M68k for rebuilding
  firmware
+ - net: wan: wanxl: use $(M68KCC) instead of $(M68KAS) for rebuilding firmware
+ - kbuild: replace AS=clang with LLVM_IAS=1
+ - tcp_bbr: refactor bbr_target_cwnd() for general inflight provisioning
+ - tcp_bbr: adapt cwnd based on ack aggregation estimation
+ - serial: 8250: Avoid error message on reprobe
+ - RDMA/ucma: ucma_context reference leak in error path
+ - mm: fix double page fault on arm64 if PTE_AF is cleared
+ - scsi: aacraid: fix illegal IO beyond last LBA
+ - m68k: q40: Fix info-leak in rtc_ioctl
+ - gma/gma500: fix a memory disclosure bug due to uninitialized bytes
+ - ASoC: kirkwood: fix IRQ error handling
+ - media: smiapp: Fix error handling at NVM reading
+ - arch/x86/lib/usercopy_64.c: fix __copy_user_flushcache() cache writeback
+ - x86/ioapic: Unbreak check_timer()
+ - ALSA: usb-audio: Add delay quirk for H570c USB headsets
+ - ALSA: hda/realktek - Couldn't detect Mic if booting with headset plugged
+ - PM / devfreq: tegra30: Fix integer overflow on CPU's freq max out
+ - scsi: fnic: fix use after free
+ - clk/ti/adpll: allocate room for terminating null
+ - mtd: cfi_cmdset_0002: don't free cfi->cfiq in error path of
  + cfi_amndstd_setup()
+ - mfd: mfd-core: Protect against NULL call-back function pointer
+ - tracing: Adding NULL checks for trace_array descriptor pointer
+ - bcache: fix a lost wake-up problem caused by mca_cannibalize_lock
+ - RDMA/is40iw: Fix potential use after free
+ - xfs: fix attr leaf header freemap.size underflow
+ - RDMA/iw_cgxb4: Fix an error handling path in 'c4iw_connect()' 
+ - mnc: core: Fix size overflow for mmc partitions
+ - gfs2: clean up oopen glock mess in gfs2_create_inode
+ - debugfs: Fix !DEBUG_FS debugfs_create_automount
+ - CIFS: Properly process SMB3 lease breaks
+ - kernel/sys.c: avoid copying possible padding bytes in copy_to_user
+ - neigh_stat_seq_next() should increase position index
+ - rt_cpu_seq_next should increase position index
+ - seqlock: Require WRITE_ONCE surrounding raw_seqcount_barrier
+ - media: ti-vpe: cal: Restrict DMA to avoid memory corruption
+ - ACPI: EC: Reference count query handlers under lock
+ - dmaengine: zynqmp_dma: fix burst length configuration
+ - powerpc/eeh: Only dump stack once if an MMIO loop is detected
+ - tracing: Set kernel_stack's caller size properly
+ - ar5523: Add USB ID of SMCWUSBT-G2 wireless adapter
+ - selftests/ftrace: fix glob selftest
+ - tools/power/x86/intel_pstate_tracer: changes for python 3 compatibility
+ - Bluetooth: Fix refcount use-after-free issue
+ - mm: pagewalk: fix termination condition in walk_pte_range()
+ - Bluetooth: prefetch channel before killing sock
+ - ALSA: hda: Clear RIRB status before reading WP
+ - skbuff: fix a data race in skb_queue_len()
+ - audit: CONFIG_CHANGE don't log internal bookkeeping as an event
+ - selinux: sel_avc_get_stat_idx should increase position index
+ - scsi: lpfc: Fix RQ buffer leakage when no IOCbs available
+ - scsi: lpfc: Fix coverity errors in fmdi attribute handling
+ - drm/omap: fix possible object reference leak
+ - perf test: Fix test trace+probe_vfs_getname.sh on s390
+ - RDMA/rxe: Fix configuration of atomic queue pair attributes
+ - KVM: x86: fix incorrect comparison in trace event
+ - media: staging/imx: Missing assignment in
  + imx_media_capture_device_register()
+ - x86/pkeys: Add check for pkey "overflow"
+ - bpf: Remove recursion prevention from rcu free callback
+ - dmaengine: tegra-apb: Prevent race conditions on channel's freeing
+ - media: go7007: Fix URB type for interrupt handling
+ - Bluetooth: guard against controllers sending zero'd events
+ - timekeeping: Prevent 32bit truncation in scale64_check_overflow()
+ - ext4: fix a data race at inode->i_disksize
+ - mm: avoid data corruption on CoW fault into PFN-mapped VMA
+ - drm/amdgpu: increase atombios cmd timeout
+ - ath10k: use kzalloc to read for ath10k_sdio_hif_diag_read
+ - scsi: aacraid: Disabling TM path and only processing IOP reset
+ - Bluetooth: L2CAP: handle l2cap config request during open state
+ - media: tda10071: fix unsigned sign extension overflow
+ - xfs: don't ever return a stale pointer from __xfs_dir3_free_read
+ - tpm: ibmvtpm: Wait for buffer to be set before proceeding
+ - rtc: ds1374: fix possible race condition
+ - tracing: Use address-of operator on section symbols
+ - serial: 8250_port: Don't service RX FIFO if throttled
+ - serial: 8250_omap: Fix sleeping function called from invalid context during probe
+ - serial: 8250: 8250_omap: Terminate DMA before pushing data on RX timeout
+ - perf cpumap: Fix snprintf overflow check
+ - cpufreq: powernv: Fix frame-size-overflow in powernv_cpufreq_work_fn
+ - tools: gpio-hammer: Avoid potential overflow in main
+ - RDMA/rxe: Set sys_image_guid to be aligned with HW IB devices
+ - SUNRPC: Fix a potential buffer overflow in 'svc_print_xprts()'
+ - svcrdma: Fix leak of transport addresses
+ - ubifs: Fix out-of-bounds memory access caused by abnormal value of node_len
+ - ALSA: usb-audio: Fix case when USB MIDI interface has more than one extra
  endpoint descriptor
+ - NFS: Fix races nfs_page_group_destroy() vs
  nfs_destroy_unlinked_subrequests()
+ - mm/kmemleak.c: use address-of operator on section symbols
+ - mm/filemap.c: clear page error before actual read
+ - mm/vmscan.c: fix data races using kswapd_classzone_idx
+ - mm/mmap.c: initialize align_offset explicitly for vm_unmapped_area
+ - scsi: qedi: Fix termination timeouts in session logout
+ - serial: uartps: Wait for tx_empty in console setup
+ - KVM: Remove CREATE_IRQCHIP/SET_PIT2 race
+ - bdev: Reduce time holding bd_mutex in sync in blkdev_close()
+ - drivers: char: tlclk.c: Avoid data race between init and interrupt handler
+ - staging:r8188eu: avoid skb_clone for amsdu to msdu conversion
+ - arm64: vcc: Fix error return code in vcc_probe()
+ - cpufreq: Relax checks for AArch32 support at EL[0-2]
+ - dt-bindings: sound: wm8994: Correct required supplies based on actual
  implementation
+ - atm: fix a memory leak of vcc->user_back
+ - power: supply: max17040: Correct voltage reading
+ - phy: samsung: s5pv210-usb2: Add delay after reset
+ - Bluetooth: Handle Inquiry Cancel error after Inquiry Complete
+ - USB: EHCI: ehci-mv: fix error handling in mv_ehci_probe()
+ - tty: serial: samsung: Correct clock selection logic
+ - ALSA: hda: Fix potential race in unsol event handler
+ - powerpc/traps: Make unrecoverable NMIs die instead of panic
+ - fuse: don't check refcount after stealing page
+ - USB: EHCI: ehci-mv: fix less than zero comparison of an unsigned int
+ - arm64/cpufeature: Drop TraceFilt feature exposure from ID_DFR0 register
+ - e1000: Do not perform reset in reset_task if we are already down
+ - drm/nouveaud/debugfs: fix runtime pm imbalance on error
+ - printk: handle blank console arguments passed in.
+ - usb: dwc3: Increase timeout for CmdAct cleared by device controller
+ - btrfs: don't force read-only after error in drop snapshot
+ - vfio/pci: fix memory leaks of eventfd ctx
+ - perf util: Fix memory leak of prefix_if_not_in
+ - perf kcore_copy: Fix module map when there are no modules loaded
+ - mtd: rawnand: omap_elm: Fix runtime PM imbalance on error
+ - ceph: fix potential race in ceph_check_caps
+ - mm/swap_state: fix a data race in swapin_nr_pages
+ - rapidio: avoid data race between file operation callbacks and
  mport_cdev_add().
+ - mtd: parser: cmdline: Support MTD names containing one or more colons
+ - x86/speculation/nuds: Mark mds_user_clear_cpu_buffers() __always_inline
+ - vfio/pci: Clear error and request eventfd ctx after releasing
+ - cifs: Fix double add page to memcg when cifs_readpages
+ - scsi: libfc: Handling of extra kref
+ - scsi: libfc: Skip additional kref updating work event
+ - selftests/x86/syscall_nt: Clear weird flags after each test
+ - vfio/pci: fix racy on error and request eventfd ctx
+ - btrfs: qgroup: fix data leak caused by race between writeback and truncate
+ - s390/init: add missing __init annotations
+ - i2c: core: Call i2c_acpi_install_space_handler() before
  i2c_acpi_register_devices()
+ - objtool: Fix noreturn detection for ignored functions
+ - ieee802154: fix one possible memleak in ca8210_dev_com_init
+ - ieee802154/adf7242: check status of adf7242_read_reg
+ - clocksource/drivers/h8300_timer8: Fix wrong return value in
  h8300_8timer_init()
+ - batman-adv: bla: fix type misuse for backbone_gw hash indexing
+ - atm: eni: fix the missed pci_disable_device() for eni_init_one()
+ - batman-adv: mcast/TT: fix wrongly dropped or rerouted packets
+ - mac802154: tx: fix use-after-free
+ - drm/vc4/vc4_hDMI: fill ASoC card owner
+ - net: qed: RDMA personality shouldn't fail VF load
+ - batman-adv: Add missing include for in_interrupt()
+ - batman-adv: mcast: fix duplicate mcast packets in BLA backbone from mesh
+ - ALSA: asihpi: fix iounmap in error handler
+ - MIPS: Add the missing ‘CPU_1074K’ into __get_cpu_type()
+ - s390/dasd: Fix zero write for FBA devices
+ - kprobes: Fix to check probe enabled before disarm_kprobe_ftrace()
+ - mm, THP, swap: fix allocating cluster for swapfile by mistake
+ - lib/string.c: implement stpcpy
+ - ata: define AC_ERR_OK
+ - ata: make qc_prep return ata_completion_errors
- ata: sata_mv, avoid trigerrable BUG_ON
- media: mc-device.c: fix memleak in media_device_register_entity
- tpm_crb: fix fTPM on AMD Zen+ CPUs
- RDMA/qedr: Fix potential use after free
- fix dget_parent() fastpath race
- scsi: pm80xx: Cleanup command when a reset times out
- ASoC: max98090: remove msleep in PLL unlocked workaround
- ipv6_route_seq_next should increase position index
- scsi: ufs: Fix a race condition in the tracing code
- s390/cpum_sf: Use kzalloc and minor changes
- ceph: ensure we have a new cap before continuing in fill_inode
- mm/swapfile.c: swap_next should increase position index
- dmaengine: stm32-mdma: use vchan_term_vdesc() in terminate_all
- dmaengine: stm32-dma: use vchan_term_vdesc() in terminate_all
- drm/amd/display: dal_ddc_i2c_payloads_create can fail causing panic
- firmware: arm_sdei: Use cpus_read_lock() to avoid races with cpuhp
- random: fix data races at timer_rand_state
- bus: hisi_lpc: Fixup IO ports addresses to avoid use-after-free in host removal
- perf jevents: Fix leak of mapfile memory
- xfs: mark dir corrupt when lookup-by-hash fails
- rtc: sa1100: fix possible race condition
- nfsd: Don't add locks to closed or closing open stateidis
- KVM: PPC: Book3S HV: Treat TM-related invalid form instructions on P9 like the valid ones
- thermal: rcar_thermal: Handle probe error gracefully
- nvme: Fix controller creation races with teardown flow
- scsi: hpsa: correct race condition in offload enabled
- PCI: Use ioremap(), not phys_to_virt() for platform ROM
- KVM: arm64: vgic-its: Fix memory leak on the error path of vgic_add_lpi()
- net: openvswitch: use u64 for meter bucket
- scsi: aacraid: Fix error handling paths in aac_probe_one()
- scsi: cxlflash: Fix error return code in cxlflash_probe()
- drm/nouveau: fix runtime pm imbalance on error
- perf evsel: Fix 2 memory leaks
- perf stat: Fix duration_time value for higher intervals
- perf metricgroup: Free metric_events on error
- ASoC: img-i2s-out: Fix runtime PM imbalance on error
- wlcore: fix runtime pm imbalance in wl1271_tx_work
- nvme: fix possible deadlock when I/O is blocked
- net: openvswitch: use div_u64() for 64-by-32 divisions
- nvme: explicitly update mpath disk capacity on revalidation
- ASoC: wm8994: Skip setting of the WM8994_MICBIAS register for WM1811
- drm/amdkfd: fix a memory leak issue
- batman-adv: mcast: fix duplicate mcast packets from BLA backbone to mesh
- KVM: x86: Reset MMU context if guest toggles CR4.SMAP or CR4.PKE
- KVM: SVM: Add a dedicated INVD intercept routine
- s390/zcrypt: Fix ZCRYPT_PERDEV_REQCNT ioctl
+ kprobes: Fix compiler warning for !CONFIG_KPROBES_ON_FTRACE
+ KVM: arm64: Assume write fault on S1PTW permission fault on instruction fetch
+ * bcache: Issues with large IO wait in bch_mca_scan() when shrinker is enabled
  (LP: #1898786)
+ - bcache: remove member accessed from struct btree
+ - bcache: reap c->btree_cache_freeable from the tail in bch_mca_scan()
+ - bcache: reap from tail of c->btree_cache in bch_mca_scan()
+ * -tools-common packages descriptions have typo "PGKVER" (LP: #1898903)
+ - [Packaging] Fix typo in -tools template s/PGKVER/PKGVER/
+ * [hns3-0901]add hns3_gro_complete for HW GRO process (LP: #1893711)
+ - net: hns3: add rx multicast packets statistic
+ - net: hns3: minor refactor for hns3_rx_checksum
+ - net: hns3: add hns3_gro_complete for HW GRO process
+ * mwifnex stops working after kernel upgrade (LP: #1897299)
+ - mwifnex: Increase AES key storage size to 256 bits
+ * Bionic update: upstream stable patchset 2020-09-30 (LP: #1897977)
+ - ARM: dts: socfpga: fix register entry for timer3 on Arria10
+ - RDMA/rxe: Fix memleak in rxe_mem_init_user
+ - RDMA/rxe: Drop pointless checks in rxe_init_ports
+ - scsi: libasas: Set data_dir as DMA_NONE if libata marks qc as NODATA
+ - RDMA/core: Fix reported speed and width
+ - mmc: sdhci-msm: Add retries when all tuning phases are found valid
+ - ARM: dts: BCM5301X: Fixed QSPI compatible string
+ - arm64: dts: ns2: Fixed QSPI compatible string
+ - ARC: HSDK: wireup perf irq
+ - dmaengine: acpi: Put the CSRT table after using it
+ - drivers/net/wan/lapbether: Added needed_tailroom
+ - NFC: st95hf: Fix memleak in st95hf_in_send_cmd
+ - firestream: Fix memleak in fs_open
+ - ALSA: hda: Fix 2 channel swapping for Tegra
+ - drivers/net/wan/lapbether: Set network_header before transmitting
+ - xfs: initialize the shortform attr header padding entry
+ - irqchip/eznps: Fix build error for !ARC700 builds
+ - drivers/net/wan/hdlc_cisco: Add hard_header_len
+ - ARC: [plat-hsdk]: switch ethernet phy-mode to rgmii-id
+ - cpufreq: intel_pstate: Refuse to turn off with HWP enabled
+ - ALSA: hda: fix a runtime pm issue in SOF when integrated GPU is disabled
+ - gcov: Disable gcov build with GCC 10
+ - iio: adc: mcp3422: fix locking scope
+ - iio: adc: mcp3422: fix locking on error path
+ - iio: adc: ti-ads1015: fix conversion when CONFIG_PM is not set
+ - iio:adc:ti-adc084s021 Fix alignment and data leak issues.
+ - iio:adc:ina2xx Fix timestamp alignment issue.
+ - iio:adc:max1118 Fix alignment of timestamp and data leak issues
+ - iio:adc:ti-adc081c Fix alignment and data leak issues
+ - iio:magnetometer:ak8975 Fix alignment and data leak issues.
+ - iio:light:max44000 Fix timestamp alignment and prevent data leak.
+ - iio:accel:mma8452: Fix timestamp alignment and prevent data leak.
+ - staging: wlan-ng: fix out of bounds read in prism2sta_probe_usb()
+ - btrfs: require only sector size alignment for parent eb bytenr
+ - btrfs: fix lockdep splat in add_missing_dev
+ - btrfs: fix wrong address when faulting in pages in the search ioctl
+ - regulator: push allocation in set_consumer_device_supply() out of lock
+ - scsi: target: iscsi: Fix data digest calculation
+ - scsi: target: iscsi: Fix hang in iscsit_access_np() when getting
+   tpg->np_login_sem
+ - rbd: require global CAP_SYS_ADMIN for mapping and unmapping
+ - RDMA/rxe: Fix the parent sysfs read when the interface has 15 chars
+ - fbcon: remove soft scrollback code
+ - fbcon: remove now unused 'softback_lines' cursor() argument
+ - vgacon: remove software scrollback support
+ - [Config] updateconfigs for VGACON_SOFT_SCROLLBACK
+ - KVM: VMX: Don't freeze guest when event delivery causes an APIC-access exit
+ - ARM: dts: vfxxx: Add syscon compatible with OCOTP
+ - video: fbdev: fix OOB read in vga_8planes_imageblit()
+ - staging: greybus: audio: fix uninitialized value issue
+ - usb: core: fix slab-out-of-bounds Read in read_descriptors
+ - USB: serial: ftdi_sio: add IDs for Xsens Mti USB converter
+ - USB: serial: option: support dynamic Quectel USB compositions
+ - USB: serial: option: add support for SIM7070/SIM7080/SIM7090 modules
+ - usb: Fix out of sync data toggle if a configured device is reconfigured
+ - usb: typec: ucsi: acpi: Check the _DEP dependencies
+ - gcov: add support for GCC 10.1
+ - gfs2: initialize transaction tr ailX_lists earlier
+ - net: handle the return value of pskb_carve_frag_list() correctly
+ - hv_netvsc: Remove "unlikely" from netvsc_select_queue
+ - NFSv4.1 handle ERR_DELAY error reclaiming locking state on delegation recall
+ - scsi: pm8001: Fix memleak in pm8001_exec_internal_task_abort
+ - scsi: libfc: Fix for double free()
+ - scsi: lpfc: Fix FLOGI/PLOGI receive race condition in pt2pt discovery
+ - spi: spi-loopback-test: Fix out-of-bounds read
+ - SUNRPC: stop printk reading past end of string
+ - rapidio: Replace 'select' DMAENGINES 'with depends on'
+ - nvme-fc: cancel async events before freeing event struct
+ - i2fs: fix indefinite loop scanning for free nid
+ - i2c: algo: pca: Reapply i2c bus settings after reset
+ - spi: Fix memory leak on split transfers
+ - KVM: MIPS: Change the definition of kvm type
+ - clk: rockchip: Fix initialization of mux_pll_src_4plls_p
+ - Drivers: hv: vmbus: Add timeout to vmbus_wait_for_unload
+ - MIPS: SNI: Fix MIPS_L1_CACHE_SHIFT
+ - perf test: Free formats for perf pmu parse test
+ - fbcon: Fix user font detection test at fbcon_resize()
+ - MIPS: SNI: Fix spurious interrupts
+ - drm/mediatek: Add exception handling in mtk_drm_probe() if component init
+ - fail
+ - drm/mediatek: Add missing put_device() call in mtk_hdmie_dt_parse_pdata()
+ - USB: quirks: Add USB_QUIRK_IGNORE_REMOTE_WAKEUP quirk for BYD zhaoxin
+ - notebook
+ - USB: UAS: fix disconnect by unplugging a hub
+ - usblp: fix race between disconnect() and read()
+ - i2c: i801: Fix resume bug
+ - percpu: fix first chunk size calculation for populated bitmap
+ - Input: trackpoint - add new trackpoint variant IDs
+ - Input: i8042 - add Entroware Proteus EL07R4 to nomux and reset list
+ - serial: 8250_pci: Add Realtek 816a and 816b
+ - ehci-hcd: Move include to keep CRC stable
+ - powerpe/dma: Fix dma_map_ops::get_required_mask
+ - x86/defconfig: Enable CONFIG_USB_XHCI_HCD=y
+ - RDMA/bnxt_re: Do not report transparent vlan from QP1
+ - ARM: dts: bcm: HR2: Fixed QSPI compatible string
+ - ARM: dts: NSP: Fixed QSPI compatible string
+ - netfilter: conntrack: allow sctp heartbeat after connection re-use
+ - cpufreq: intel_pstate: Fix intel_pstate_get_hwp_max() for turbo disabled
+ - iommu/amd: Do not use IOMMUv2 functionality when SME is active
+ - drm/tve200: Stabilize enable/disable
+ - drm/msm: Disable preemption on all 5xx targets
+ - phy: qcom-qmp: Use correct values for ipq8074 PCIe Gen2 PHY init
+ - dsa: Allow forwarding of redirected IGMP traffic
+ - RDMA/bnxt_re: Restrict the max_gids to 256
+ - regulator: pwm: Fix machine constraints application
+ - openrisc: Fix cache API compile issue when not inlining
+ - f2fs: Return EOF on unaligned end of file DIO read
+ - ASoC: qcom: Set card->owner to avoid warnings
+ - perf test: Fix the "signal" test inline assembly
+ - x86/boot/compressed: Disable relocation relaxation
+
+ * Bionic update: upstream stable patchset 2020-09-23 (LP: #1896817)
+ - HID: core: Correctly handle ReportSize being zero
+ - HID: core: Sanitize event code and type when mapping input
+ - perf record/stat: Explicitly call out event modifiers in the documentation
+ - drm/msm: add shutdown support for display platform_driver
+ - hwmon: (applesmc) check status earlier.
+ - nvmet: Disable keep-alive timer when kato is cleared to 0h
+ - ceph: don't allow setlease on cephfs
+ - cpuidle: Fixup IRQ state
+ - s390: don't trace preemption in percpu macros
+ - xen/xenbus: Fix granting of vmalloc'd memory
+ - dmaengine: of-dma: Fix of_dma_router_xlate's of_dma_xlate handling
+ - batman-adv: Avoid uninitialized chaddr when handling DHCP
+ - batman-adv: Fix own OGM check in aggregated OGMs
+ - batman-adv: bla: use netif_rx_ni when not in interrupt context
+ - dmaengine: at_hdmac: check return value of of_find_device_by_node() in
+ at_dma_xlate()
+ - MIPS: mm: BMIPS5000 has inclusive physical caches
+ - MIPS: BMIPS: Also call bmips_cpu_setup() for secondary cores
+ - netfilter: nf_tables: add NFTA_SET_USERDATA if not null
+ - netfilter: nf_tables: incorrect enum nft_list_attributes definition
+ - netfilter: nf_tables: fix destination register zeroing
+ - net: hns: Fix memleak in hns_nic_dev_probe
+ - net: systemport: Fix memleak in bcm_sysport_probe
+ - ravb: Fixed to be able to unload modules
+ - net: arc_emac: Fix memleak in arc_mdio_probe
+ - dmaengine: pl330: Fix burst length if burst size is smaller than bus width
+ - bnxt_en: Check for zero dir entries in NVRAM.
+ - bnxt_en: Fix PCI AER error recovery flow
+ - nvmet-fc: Fix a missed _irqsave version of spin_lock in
+ 'nvmet_fc_fod_op_done()'
+ - perf tools: Correct SNOOPX field offset
+ - net: ethernet: mlx4: Fix memory allocation in mlx4_buddy_init()
+ - fix regression in "epoll: Keep a reference on files added to the check list"
+ - tg3: Fix soft lockup when tg3_reset_task() fails.
+ - iommu/vt-d: Serialize IOMMU GCMD register modifications
+ - thermal: ti-soc-thermal: Fix bogus thermal shutdowns for omap4430
+ - include/linux/log2.h: add missing () around n in roundup_pow_of_two()
+ - btrfs: drop path before adding new uuid tree entry
+ - btrfs: Remove redundant extent_buffer_get in get_old_root
+ - btrfs: Remove extraneous extent_buffer_get from tree_mod_log_rewind
+ - btrfs: set the lockdep class for log tree extent buffers
+ - uaccess: Add non-pagefault user-space read functions
+ - uaccess: Add non-pagefault user-space write function
+ - btrfs: fix potential deadlock in the search ioctl
+ - net: usb: qmi_wwan: add Telit 0x1050 composition
+ - usb: qmi_wwan: add D-Link DWM-222 A2 device ID
+ - ALSA: ca0106: fix error code handling
+ - ALSA: pcm: oss: Remove superfluous WARN_ON() for mulaw sanity check
+ - ALSA: hda/hdmi: always check pin power status in i915 pin fixup
+ - ALSA: firewire-digi00x: exclude Avid Adrenaline from detection
+ - affs: fix basic permission bits to actually work
+ - block: allow for_each_bvec to support zero len bvec
+ - block: Move SECTOR_SIZE and SECTOR_SHIFT definitions into <linux/blkdev.h>
+ - libata: implement ATA_HORKAGE_MAX_TRIM_128M and apply to Sandisks
+ - dm cache metadata: Avoid returning cmd->bm wild pointer on error
+ - dm thin metadata: Avoid returning cmd->bm wild pointer on error
+ - mm: slub: fix conversion of freelist_corrupted()
+ - KVM: arm64: Add kvm_extable for vaxorcism code
+ - KVM: arm64: Defer guest entry when an asynchronous exception is pending
+ - KVM: arm64: Survive synchronous exceptions caused by AT instructions
+ - KVM: arm64: Set HCR_EL2.PTW to prevent AT taking synchronous exception
+ - checkpatch: fix the usage of capture group ( ... )
+ - mm/hugel: fix a race between hugelb system handlers
+ - cfg80211: regulatory: reject invalid hints
+ - net: usb: Fix uninit-was-stored issue in asix_read_phy_addr()
+ - ALSA; firewire-tascam: exclude Tascam FE-8 from detection
+ - block: ensure bdi->io_pages is always initialized
+ - vfio/pci: Fix SR-IOV VF handling with MMIO blocking
+ - bnx3: don't enable NAPI until rings are ready
+ - netlabel: fix problems with mapping removal
+ - net: usb: dm9601: Add USB ID of Keenetic Plus DSL
+ - scpt: not disable bh in the whole scpt_get_port_local()
+ - tipc: fix shutdown() of connectionless socket
+ - net: disable netpoll on fresh napis
+ - scsi: target: tcmu: Fix size in calls to tcmu_flush_dcache_range
+ - scsi: target: tcmu: Optimize use of flush_dcache_page
+ - selftests/bpf: Fix massive output from test_maps
+ - netfilter: nfnetlink: nfnetlink_unicast() reports EAGAIN instead of ENOBUFS
+ - perf jevents: Fix suspicious code in fixregex()
+ - ext2: don't update mtime on COW faults
+ - xfs: don't update mtime on COW faults

+ -- Stefan Bader <stefan.bader@canonical.com>  Mon, 09 Nov 2020 14:37:17 +0100
+ linux (4.15.0-124.127) bionic; urgency=medium
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ * Introduce the new NVIDIA 455 series (LP: #1902093)
+ - [Packaging] NVIDIA -- Add the NVIDIA 455 driver
+ -- Stefan Bader <stefan.bader@canonical.com>  Thu, 05 Nov 2020 18:43:42 +0100
+ * linux (4.15.0-123.126) bionic; urgency=medium
+ * CVE-2020-8694
+ - powercap: make attributes only readable by root
+ -- Stefan Bader <stefan.bader@canonical.com>  Wed, 21 Oct 2020 11:12:40 +0200

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Open Source Used In 5GaaS Edge AC-4 17584

* linux (4.15.0-122.124) bionic; urgency=medium
+ * bionic/linux: 4.15.0-122.124 -proposed tracker (LP: #1899941)
+ * CVE-2020-12351 // CVE-2020-12352 // CVE-2020-24490
+ - Bluetooth: Disable High Speed by default
+ - Bluetooth: MGMT: Fix not checking if BT_HS is enabled
+ - [Config] Disable BlueZ highspeed support
+ * CVE-2020-12351
+ - Bluetooth: L2CAP: Fix calling sk_filter on non-socket based channel
+ * CVE-2020-12352
+ - Bluetooth: A2MP: Fix not initializing all members
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Thu, 15 Oct 2020 14:39:56 +0200
+ * linux (4.15.0-121.123) bionic; urgency=medium
+ + * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Mon, 05 Oct 2020 16:32:15 +0200
+ + * CVE-2020-120.122) bionic; urgency=medium
+ + * CVE-2020-16119
+ - SAUCE: dccp: avoid double free of ccid on child socket
+ + * CVE-2020-16120
+ - Revert "UBUNTU: SAUCE: overlayfs: ensure mounter privileges when reading
directories"
+ - ovl: pass correct flags for opening real directory
+ - ovl: switch to mounter creds in readdir
+ - ovl: verify permissions in ovl_path_open()
+ + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Tue, 29 Sep 2020 15:07:43 -0300
+ + * linux (4.15.0-119.120) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-119.120 -proposed tracker (LP: #1896040)
+ + * gtp: unable to associate contexts to interfaces (LP: #1894605)
+ - gtp: add GTPA_LINK info to msg sent to userspace
+ + uvcvideo: add mapping for HEVC payloads (LP: #1895803)
+ - media: videodev2.h: Add v4l2 definition for HEVC
+ - SAUCE: media: uvcvideo: Add mapping for HEVC payloads
+ * Novalink (mkvterm command failure) (LP: #1892546)
+ - tty: hvcs: Don't NULL tty->driver_data until hvcs_cleanup()
+ + * rtnetlink.sh in net from ubuntu_kernel_selftests is returning 1 for a
+ skippend test (LP: #1895258)
+ - selftests: net: return Kselftest Skip code for skipped tests
+ + * Bionic update: upstream stable patchset 2020-09-16 (LP: #1895873)
+ - net: Fix potential wrong skb->protocol in skb_vlan_un-tag()
+ - tipc: fix uninit skb->data in tipc_nl_compat_dumpit()
+ - ipvlan: fix device features
+ - grep6: Fix reception with IP6_TNL_F_RCV_DSCP_COPY
+ - ALSA: pci: delete repeated words in comments
+ - ASoC: tegra: Fix reference count leaks.
+ - mfd: intel-lpss: Add Intel Emmitsburg PCH PCI IDs
+ - arm64: dt: qcom: msm8916: Pull down PDM GPIOs during sleep
+ - powerepc/xive: Ignore kmemleak false positives
+ - media: pci: ttci: av7110: fix possible buffer overflow caused by bad DMA
+ - value in debirq()
+ - blktrace: ensure our debugfs dir exists
+ - scsi: target: tcmu: Fix crash on ARM during cmd completion
+ - iommu/iova: Don't BUG on invalid PFNs
+ - drm/radeon: fix multiple reference count leak
+ - drm/amdgpu: fix ref count leak in amdgpu_driver_open_kms
+ - drm/amd/display: fix ref count leak in amdgpu_drm_ioctl
+ - drm/amdgpu: fix ref count leak in amdgpu_display_crtc_set_config
+ - drm/amdgpu/display: fix ref count leak when pm_runtime_get_sync fails
+ - scsi: lpfc: Fix short refcount mismatch when deleting vport
+ - selftests/powerpc: Purge extra count_pmc() calls of ebb selftests
+ - omapfb: fix multiple reference count leaks due to pm_runtime_get_sync
+ - PCI: Fix pci_create_slot() reference count leak
+ - rtlwifi: rtl8192cu: Prevent leaking urb
+ - mips/vdso: Fix resource leaks in genvdso.c
+ - cec-api: prevent leaking memory through hole in structure
+ - f2fs: fix use-after-free issue
+ - drm/nouveau/drm/nouveau: fix reference count leak in nouveau_fbccon_open
+ - drm/nouveau: Fix reference count leak in nouveau_connector_detect
+ - locking/lockdep: Fix overflow in presentation of average lock-time
+ - scsi: iscsi: Do not put host in iscsi_set_flashnode_param()
+ - ceph: fix potential mdsc use-after-free crash
+ - scsi: fcoe: Memory leak fix in fcoe_sysfs_fcf_del()
+ - EDAC/ie31200: Fallback if host bridge device is already initialized
+ - media: davinci: vpif_capture: fix potential double free
+ - KVM: arm64: Fix symbol dependency in __hyp_call_panic_nvhe
+ - powerepc/spufs: add CONFIG_COREDUMP dependency
+ - USB: sisusbvga: Fix a potential UB casued by left shifting a negative value
+ efi: provide empty efi_enter_virtual_mode implementation
+ Revert "ath10k: fix DMA related firmware crashes on multiple devices"
+ media: gpio-ir-tx: improve precision of transmitted signal due to scheduling
+ nvme-fc: Fix wrong return value in __nvme_fc_init_request()
+ null_blk: fix passing of REQ_FUA flag in null_handle_rq
+ i2c: rcar: in slave mode, clear NACK earlier
+ usb: gadget: f_tcm: Fix some resource leaks in some error paths
+ jbd2: make sure jh have b_transaction set in refile/unfile_buffer
+ ext4: don't BUG on inconsistent journal feature
+ jbd2: abort journal if free a async write error metadata buffer
+ fs: prevent BUG_ON in submit_bh_wbc()
+ spi: stm32: fix stm32_spi_prepare_mbr in case of odd clk_rate
+ s390/cio: add cond_resched() in the slow_eval_known_fn() loop
+ scsi: ufs: Fix possible infinite loop in ufshdc_hold
+ scsi: ufs: Improve interrupt handling for shared interrupts
+ scsi: ufs: Clean up completed request without interrupt notification
+ net: gianfar: Add of_node_put() before goto statement
+ powerpc/perf: Fix soft lockups due to missed interrupt accounting
+ HID: i2c-hid: Always sleep 60ms after I2C_HID_PWR_ON commands
+ btrfs: fix space cache memory leak after transaction abort
+ fbcon: prevent user font height or width change from causing potential out-of-bounds access
+ USB: lvtest: return proper error code in probe
+ vt: defer kfree() of vc_screenbuf in vc_do_resize()
+ vt_iocctl: change VT_RESIZEX ioctl to check for error return from vc_resize()
+ serial: samsung: Removes the IRQ not found warning
+ serial: pl011: Fix oops on -EPROBE_DEFER
+ serial: pl011: Don't leak amba_ports entry on driver register error
+ serial: 8250_exar: Fix number of ports for Commtech PCIe cards
+ serial: 8250: change lock order in serial8250_do_startup()
+ writeback: Protect inode->i_list with inode->i_lock
+ writeback: Avoid skipping inode writeback
+ writeback: Fix sync livelock due to b_dirty_time processing
+ XEN uses irqdesc::irq_data_common::handler_data to store a per interrupt XEN data pointer which contains XEN specific information.
+ xhci: Do warm-reset when both CAS and XDEV_RESUME are set
+ PM: sleep: core: Fix the handling of pending runtime resume requests
+ device property: Fix the secondary firmware node handling in
+ set_primary_fwnode()
+ drm/amdgpu: Fix buffer overflow in INFO ioctl
+ USB: yurex: Fix bad gfp argument
+ usb: uas: Add quirk for PNY Pro Elite
+ USB: Ignore UAS for JMicron JM567 ATA/ATAPI Bridge
+ usb: host: ohci-exynos: Fix error handling in exynos_ohci_probe()
+ overflow.h: Add allocation size calculation helpers
+ USB: gadget: u_f: add overflow checks to VLA macros
+ USB: gadget: f_ncm: add bounds checks to ncm_unwrap_ntb()
+ USB: gadget: u_f: Unbreak offset calculation in VLAs
+ - USB: cdc-acm: rework notification_buffer resizing
+ - usb: storage: Add unusual_uas entry for Sony PSZ drives
+ - btrfs: check the right error variable in btrfs_del_dir_entries_in_log
+ - tpm: Unify the mismatching TPM space buffer sizes
+ - HID: hiddev: Fix slab-out-of-bounds write in hiddev_ioctl_usage()
+ - ALSA: usb-audio: Update documentation comment for MS2109 quirk
+ - net: ena: Make missed_tx stat incremental
+ - ASoC: img: Fix a reference count leak in img_i2s_in_set_fmt
+ - ASoC: img-parallel-out: Fix a reference count leak
+ - usb: storage: Add unusual_uas entry for Sony PSZ drives
+ - btrfs: check the right error variable in btrfs_del_dir_entries_in_log
+ - tpm: Unify the mismatching TPM space buffer sizes
+ - HID: hiddev: Fix slab-out-of-bounds write in hiddev_ioctl_usage()
+ - ALSA: usb-audio: Update documentation comment for MS2109 quirk
+ - net: ena: Make missed_tx stat incremental
+ - ASoC: img: Fix a reference count leak in img_i2s_in_set_fmt
+ - ASoC: img-parallel-out: Fix a reference count leak

- dell latitude 5491 touchscreen doesn't work (LP: #1889446) // Bionic update:
- upstream stable patchset 2020-09-16 (LP: #1895873)
- USB: quirks: Add no-lpm quirk for another Raydium touchscreen

* Bionic update: upstream stable patchset 2020-09-11 (LP: #1895328)
- drm/vgem: Replace opencoded version of drm_gem_dumb_map_offset()
- perf probe: Fix memory leakage when the probe point is not found
- khugepaged: khugepaged_test_exit() check mmget_still_valid()
- khugepaged: adjust VM_BUG_ON_MM() in __khugepaged_enter()
- powerpc/mm: Only read faulting instruction when necessary in do_page_fault()
- btrfs: export helpers for subvolume name/id resolution
- btrfs: don't show full path of bind mounts in subvol=
- btrfs: Move free_pages_out label in inline extent handling branch in compress_file_range
- btrfs: inode: fix NULL pointer dereference if inode doesn't need compression
- btrfs: sysfs: use NOFS for device creation
- romfs: fix uninitialized memory leak in romfs_dev_read()
- kernel/relay.c: fix memleak on destroy relay channel
- mm: include CMA pages in lowmem_reserve at boot
- mm, page_alloc: fix core hung in free_pcpages_bulk()
- ext4: fix checking of directory entry validity for inline directories
+ - jbd2: add the missing unlock_buffer() in the error path of
+   jbd2_write_superblock()
+ - [Config] update configs for CONFIG_SPI_DYNAMIC
+ - spi: Prevent adding devices below an unregistering controller
+ - scsi: ufs: Add DELAY_BEFORE_LPM quirk for Micron devices
+ - media: budget-core: Improve exception handling in budget_register()
+ - rtc: goldfish: Enable interrupt in set_alarm() when necessary
+ - media: vps: clean up resources in init
+ - Input: psmouse: add a newline when writing 'proto' by sysfs
+ - m68knommul: fix overwriting of bits in ColdFire V3 cache control
+ - xfs: fix inode quota reservation checks
+ - jffs2: fix UAF problem
+ - cpufreq: intel_pstate: Fix cpuinfo_max_freq when MSR_TURBO_RATIO_LIMIT is 0
+ - scsi: libfc: Free skb in fc_disc_gpn_id_resp() for valid cases
+ - virtio_ring: Avoid loop when vq is broken in virtqueue_poll
+ - xfs: Fix UBSAN null-ptr-deref in xfs_sysfs_init
+ - alpha: fix annotation of io[read,write]{16,32}be()
+ - ext4: fix potential negative array index in do_split()
+ - i40e: Set RX_ONLY mode for unicast promiscuous on VLAN
+ - i40e: Fix crash during removing i40e driver
+ - net: fec: correct the error path for regulator disable in probe
+ - bonding: show saner speed for broadcast mode
+ - bonding: fix a potential double_unregister
+ - ASoC: msm8916-wcd-analog: fix register Interrupt offset
+ - ASoC: intel: Fix memleak in sst_media_open
+ - vfio/type1: Add proper error unwind for vfio_iommu_replay()
+ - bonding: fix active-backup failover for current ARP slave
+ - hv_netvsc: Fix the queue_mapping in netvsc_vf_xmit()
+ - net: dsa: b53: check for timeout
+ - powerpc/pseries: Do not initiate shutdown when system is running on UPS
+ - epoll: Keep a reference on files added to the check list
+ - do_epoll_ctl(): clean the failure exits up a bit
+ - mm/hugetlb: fix calculation of adjust_range_if_pmd_sharing_possible
+ - xen: don't reschedule in preemption off sections
+ - clk: Evict unregistered clks from parent caches
+ - KVM: arm/arm64: Don't reschedule in unmap_stage2_range()
+ - scsi: zfcp: Fix use-after-free in request timeout handlers
+ - ext4: don't allow overlapping system zones
+ - s390/runtime_instrumentation: fix storage key handling
+ - s390/ptrace: fix storage key handling
+ - kvm: x86: Toggling CR4.SMAP does not load PDPTEs in PAE mode
+ - kvm: x86: Toggling CR4.PKE does not load PDPTEs in PAE mode
+ - Fix build error when CONFIG_ACPI is not set/enabled
+ - net: ena: Prevent reset after device destruction
+ * Bionic update: upstream stable patchset 2020-09-02 (LP: #1893986)
+ - net/mlx5e: Don't support phy switch id if not in switchdev mode
+ - tracepoint: Mark __tracepoint_string's __used

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- HID: input: Fix devices that return multiple bytes in battery report
- x86/mce/inject: Fix a wrong assignment of i_mce.status
- sched: correct SD_flags returned by tl->sd_flags()
- arm64: dts: rockchip: fix rk3399-puma vcc5v0-host gpio
- arm64: dts: rockchip: fix rk3399-puma gmac reset gpio
- EDAC: Fix reference count leaks
- arm64: dts: qcom: msm8916: Replace invalid bias-pull-none property
- arm64: dts: exynos: Fix silent hang after boot on Espresso
- m68k: mac: Don't send IOP message until channel is idle
- m68k: mac: Fix IOP status/control register writes
- platform/x86: intel-hid: Fix return value check in check_acpi_dev()
- platform/x86: intel-vbtn: Fix return value check in check_acpi_dev()
- ARM: at91: pm: add missing put_device() call in at91_pm_sram_init()
- spi: lantiq: fix: Rx overflow error in full duplex mode
- ARM: socfpga: PM: add missing put_device() call in
  socfpga_setup_ocram_self_refresh()
- dma: fix leak & null ref in panel_connector_get_modes
- Bluetooth: add a mutex lock to avoid UAF in do_enable_set
- fs/btrfs: Add cond_resched() for try_release_extent_mapping() stalls
- drm/radeon: Fix reference count leaks caused by pm_runtime_get_sync
- video: fbdev: neofb: fix memory leak in neo_scan_monitor()
- md-cluster: fix wild pointer of unlock_all_bitmaps()
- arm64: dts: hisilicon: hikey: fixes to comply with adv7533 DT binding
- drm/nouveaup: fix multiple instances of reference count leaks
- drm/debugfs: fix plain echo to connector "force" attribute
- irqchip/irq-mtk-sysirq: Replace spinlock with raw_spinlock
- mm/mmap.c: Add cond_resched() for exit_mmap() CPU stalls
- brcmfmac: To fix Bss Info flag definition Bug
- brcmfmac: set state of hanger slot to FREE when flushing PSQ
- iwlegacy: Check the return value of pcie_capability_read_*()
- gpu: host1x: debug: Fix multiple channels emitting messages simultaneously
- usb: gadget: net2280: fix memory leak on probe error handling paths
- bdc: Fix bug causing crash after multiple disconnects
- usb: bdc: Halt controller on suspend
- dyndbg: fix a BUG_ON in ddebug_describe_flags
- bcache: fix super block seq numbers comparison in register_cache_set()
- ACPICA: Do not increment operation_region reference counts for field units
- agp/intel: Fix a memory leak on module initialisation failure
- video: fbdev: sm712fbi: fix an issue about iounmap for a wrong address
- console: newport_con: fix an issue about leak related system resources
- video: pxafb: Fix the function used to balance a 'dma_alloc_coherent()' call
- iio: improve IIO_CONCENTRATION channel type description
- drm/arm: fix unintentional integer overflow on left shift
- leds: lm355x: avoid enum conversion warning
- media: omap3isp: Add missed v4l2_ctrl_handler_free() for
  preview_init_entities()
- ASoC: Intel: bxt_rt298: add missing .owner field
- scsi: cumana_2: Fix different dev_id between request_irq() and free_irq()
+ - drm/mipi: use dcs write for mipi_dsi_dcs_set_tear_scanline
+ - cxl: Fix kobject memleak
+ - drm/radeon: fix array out-of-bounds read and write issues
+ - scsi: powertec: Fix different dev_id between request_irq() and free_irq()
+ - scsi: esox: Fix different dev_id between request_irq() and free_irq()
+ - ipvs: allow connection reuse for unconfirmed conntrack
+ - media: firewire: Using uninitialized values in node_probe()
+ - media: exynos4-is: Add missed check for pinctrl_lookup_state()
+ - xfs: fix reflink quota reservation accounting error
+ - PCI: Fix pci_cfg_wait queue locking problem
+ - leds: core: Flush scheduled work for system suspend
+ - drm: panel: simple: Fix bpc for LG LB070WV8 panel
+ - drm/bridge: sil_i8620: initialize return of sii8620_readb
+ - scsi: scsi_debug: Add check for sdebug_max_queue during module init
+ - mfwifiex: Prevent memory corruption handling keys
+ - powerpc/vdso: Fix vdso cpu truncation
+ - staging: rtl8192u: fix a dubious looking mask before a shift
+ - PCI/ASPM: Add missing newline in sysfs 'policy'
+ - drm/imx: tve: fix regulator_disable error path
+ - USB: serial: iuu_phoenix: fix led-activity helpers
+ - thermal: ti-soc-thermal: Fix reversed condition in
  ti_thermal_expose_sensor()
+ - coresight: tmc: Fix TMC mode read in tmc_read_unprepare_etb()
+ - MIPS: OCTEON: add missing put_device() call in dwc3_octeon_device_init()
+ - usb: dwc2: Fix error path in gadget registration
+ - scsi: mesh: Fix panic after host or bus reset
+ - net: dsa: mv88e6xxx: MV88E6097 does not support jumbo configuration
+ - Smack: fix another vsscanf out of bounds
+ - Smack: prevent underflow in smk_set_cipso()
+ - power: supply: check if calc_soc succeeded in pm860x_init_batter'
+ - Bluetooth: hci_serdev: Only unregister device if it was registered
+ - selftests/powerpc: Fix CPU affinity for child process
+ - PCI: Release IVRS table in AMD ACS quirk
+ - selftests/powerpc: Fix online CPU selection
+ - s390/qeth: don't process empty bridge port events
+ - wl1251: fix always return 0 error
+ - tools, build: Propagate build failures from tools/build/Makefile.build
+ - net: ethernet: aquantia: Fix wrong return value
+ - liquidio: Fix wrong return value in cn23xx_get_pf_num()
+ - net: spider_net: Fix the size used in a 'dma_free_coherent()' call
+ - fsl/fman: use 32-bit unsigned integer
+ - fsl/fman: fix dereference null return value
+ - fsl/fman: fix unreachable code
+ - fsl/fman: check dereferencing null pointer
+ - fsl/fman: fix eth hash table allocation
+ - dlm: Fix kobject memleak
+ - pinctrl-single: fix pcs_parse_pinconf() return value
+ - x86/fsdbase/64: Fix NULL deref in 86_fsdbase_read_task
+ crypto: aesni - add compatibility with IAS
+ af_packet: TPACKET_V3: fix fill status rwlock imbalance
+ drivers/net/wan/lapbether: Added needed_headroom and a skb->len check
+ net/nfc/rawsock.c: add CAP_NET_RAW check.
+ net: refactor bind_bucket fastreuse into helper
+ net: Set fput_needed iff FDPUT_FPUT is set
+ USB: serial: cp210x: re-enable auto-RTS on open
+ USB: serial: cp210x: enable usb generic throttle/unthrottle
+ ALSA: usb-audio: Creative USB X-Fi Pro SB1095 volume knob support
+ ALSA: usb-audio: fix overeager device match for MacroSilicon MS2109
+ ALSA: usb-audio: add quirk for Pioneer DDJ-RB
+ crypto: qat - fix double free in qat_uclo_create_batch_init_list
+ crypto: ccp - Fix use of merged scatterlists
+ crypto: cpt - don't sleep of CRYPTO_TFM_REQ_MAY_SLEEP was not specified
+ bitfield.h: don't compile-time validate _val in FIELD_FIT
+ fs/minix: check return value of sb_getblk()
+ fs/minix: don't allow getting deleted inodes
+ fs/minix: reject too-large maximum file size
+ ALSA: usb-audio: work around streaming quirk for MacroSilicon MS2109
+ 9p: Fix memory leak in v9fs_mount
+ spi: spidev: Align buffers for DMA
+ mtd: raw NAND: qcom: avoid write to unavailable register
+ parisc: Implement __smp_store_release and __smp_load_acquire barriers
+ parisc: mask out enable and reserved bits from sba imask
+ ARM: 8992/1: Fix unwind_frame for clang-built kernels
+ irqdomain/treewide: Free firmware node after domain removal
+ xen/balloon: fix accounting in alloc_xenballooned_pages error path
+ xen/balloon: make the balloon wait interruptible
+ net: initialize fastreuse on inet_inherit_port
+ mbuf: warn on confusing error scenario with sec=krb5
+ PCI: hotplug: ACPI: Fix context refcounting in acpiphp_grab_context()
+ btrfs: don't allocate anonymous block device for user invisible roots
+ btrfs: only search for left_info if there is no right_info in
+ try_merge_free_space
+ btrfs: fix memory leaks after failure to lookup checksums during inode
+ logging
+ dt-bindings: iio: io-channel-mux: Fix compatible string in example code
+ iio: dac: ad5592r: fix unbalanced mutex unlocks in ad5592r_read_raw()
+ xtensa: fix xtensa_pmu_setup prototype
+ powerpc: Fix circular dependency between percpu.h and mmu.h
+ net: ethernet: stmmac: Disable hardware multicast filter
+ net: stmmac: dmac1000: provide multicast filter fallback
+ net/compat: Add missing sock updates for SCM_RIGHTS
+ md/raid5: Fix Force reconstruct-write io stuck in degraded raid5
+ bcache: allocate meta data pages as compound pages
+ mac80211: fix misplaced while instead of if
+ MIPS: CPU#0 is not hotpluggable
+ ext2: fix missing percpu_counter_inc
+ - ocfs2: change slot number type s16 to u16
+ - ftrace: Setup correct FTRACE_FL_REGS flags for module
+ - kprobes: Fix NULL pointer dereference at kprobe_ftrace_handler
+ - tracing/hwlat: Honor the tracing_cpumask
+ - tracing: Use trace_sched_process_free() instead of exit() for pid tracing
+ - watchdog: f71808e_wdt: indicate WDIOF_CARDRESET support in watchdog_info.options
+ - watchdog: f71808e_wdt: remove use of wrong watchdog_info option
+ - watchdog: f71808e_wdt: clear watchdog timeout occurred flag
+ - pseries: Fix 64 bit logical memory block panic
+ - perf intel-pt: Fix FUP packet state
+ - drm/imx: imx-ldb: Disable both channels for split mode in enc->disable()
+ - mfd: arizona: Ensure 32k clock is put on driver unbind and error
+ - RDMA/ipoib: Return void from ipoib_ib_dev_stop()
+ - USB: serial: ftdi_sio: clean up receive processing
+ - gpu: ipu-v3: image-convert: Combine rotate/no-rotate irq handlers
+ - dm rq: don't call blk_mq_queue_stopped() in dm_stop_queue()
+ - iommu/omap: Check for failure of a call to omap_iommu_dump_ctx
+ - iommu/vt-d: Enforce PASID devTLB field mask
+ - i2c: rcar: slave: only send STOP event when we have been addressed
+ - clk: clk-atlas6: fix return value check in atlas6_clk_init()
+ - pwm: bcm-iproc: handle clk_get_rate() return
+ - tools build feature: Use CC and CXX from parent
+ - i2c: rcar: avoid race when unregistering slave
+ - Input: sentelic - fix error return when fsp_reg_write fails
+ - drm/vmwgfx: Use correct vmw_legacy_display_unit pointer
+ - drm/vmwgfx: Fix two list_for_each loop exit tests
+ - net: qcom/emac: add missed clk_disable_unprepare in error path of emac_clks_phase1_init
+ - nfs: Fix getxattr kernel panic and memory overflow
+ - fs/ufs: avoid potential u32 multiplication overflow
+ - test_kmod: avoid potential double free in trigger_config_run_type()
+ - mfd: dl2: Run event handler loop under spinlock
+ - ALSA: echoaudio: Fix potentialOops in snd_echo_resume()
+ - perf bench mem: Always memset source before memcpy
+ - tools build feature: Quote CC and CXX for their arguments
+ - sh: landisk: Add missing initialization of sh_io_port_base
+ - khugepaged: retract_page_tables() remember to test exit
+ - genirq/affinity: Make affinity setting if activated opt-in
+ - ARM: dts: gose: Fix ports node name for adv7180
+ - ARM: dts: gose: Fix ports node name for adv7612
+ - drm/amdgpu: avoid dereferencing a NULL pointer
+ - usb: mtu3: clear dual mode of u3port when disable device
+ - drm/radeon: disable AGP by default
+ - brcmfmac: keep SDIO watchdog running when console_interval is non-zero
+ - ath10k: Acquire tx_lock in tx error paths
+ - xfs: don't eat an EIO/ENOSPC writeback error when scrubbing data fork
+ - RDMA/rxe: Skip gid check in loopback mode
+ - RDMA/rxe: Prevent access to wr->next ptr after wr is posted to send queue
+ - usb: core: fix quirks_param_set() writing to a const pointer
+ - powerpc/core: Fix CONFIG_PPC_MPC52XX references
+ - include/asm-generic/vmlinux.lds.h: align ro_after_init
+ - PCI: Mark AMD Navi10 GPU rev 0x00 ATS as broken
+ - PCI: Add device even if driver attach failed
+ - PCI: qcom: Define some PARF params needed for ipq8064 SoC
+ - PCI: qcom: Add support for tx term offset for rev 2.1.0
+ - PCI: Probe bridge window attributes once at enumeration-time
+ - btrfs: ref-verify: fix memory leak in add_block_entry
+ - btrfs: don't traverse into the seed devices in show_devname
+ - btrfs: fix messages after changing compression level by remount
+ - btrfs: fix return value mixup in btrfs_get_extent
+ - powerpc: Allow 4224 bytes of stack expansion for the signal frame
+ - driver core: Avoid binding drivers to dead devices
+ - RDMA/ipoib: Fix ABBA deadlock with ipoib_reap_ah()
+ - media: rockchip: rga: Introduce color fmt macros and refactor CSC mode logic
+ - media: rockchip: rga: Only set output CSC mode for RGB input
+ - mmc: renesas_sdhi Internal_dmac: clean up the code for dma complete
+ - openrisc: Fix oops caused when dumping stack
+ - scsi: lpfc: nvmet: Avoid hang / use-after-free again when destroying targetport
+ - watchdog: initialize device before misc_register
+ - fs/minix: set s_maxbytes correctly
+ - fs/minix: fix block limit check for V1 filesystems
+ - fs/minix: remove expected error message in block_to_path()
+ - arm64: dts: marvell: espressobin: add ethernet alias
+ - drm/amdgpu: Fix bug where DPM is not enabled after hibernate and resume
+ * [UBUNTU 20.04] kernel: s390/cpum_cf, perf: changeDFLT_CCERROR counter name
+ (LP: #1891454)
+ - s390/cpum_cf: Add new extended counters for IBM z15
+ * CVE-2018-10322
+ - xfs: move inode fork verifiers to xfs_dinode_verify
+ - xfs: enhance dinode verifier
+ * Stefan Bader <stefan.bader@canonical.com> Fri, 18 Sep 2020 10:48:34 +0200
+ * linux (4.15.0-118.119) bionic; urgency=medium
+ * bionic/linux: 4.15.0-118.119 -proposed tracker (LP: #1894697)
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ * Introduce the new NVIDIA 450-server and the 450 UDA series (LP: #1887674)
- [packaging] add signed modules for nvidia 450 and 450-server
+ * cgroup refcount is bogus when cgroup_sk_alloc is disabled (LP: #1886860)
+ - cgroup: add missing skcd->no_refcnt check in cgroup_sk_clone()
+ * CVE-2020-12888
+ - vfio/type1: Support faulting PFNMAP vmas
+ - vfio-pci: Fault mmaps to enable vma tracking
+ - vfio-pci: Invalidate mmaps and block MMIO access on disabled memory
+ * [Hyper-V] VSS and File Copy daemons intermittently fails to start
  + (LP: #1891224)
+ - [Packaging] Bind hv_vss_daemon startup to hv_vss device
+ - [Packaging] bind hv_fcopy_daemon startup to hv_fcopy device
+ * KVM: Fix zero_page reference counter overflow when using KSM on KVM compute
  + host (LP: #1837810)
+ - KVM: fix overflow of zero page refcount with ksm running
+ * Fix false-negative return value for rtnetlink.sh in kselftests/net
  + (LP: #1890136)
+ - selftests: rtnetlink: correct the final return value for the test
+ - selftests: rtnetlink: make kci_test_encap() return sub-test result
+ * Bionic update: upstream stable patchset 2020-08-18 (LP: #1892091)
+ - USB: serial: qcserial: add EM7305 QDL product ID
+ - USB: iowarrior: fix up report size handling for some devices
+ - usb: xhci: define IDs for various ASMedia host controllers
+ - usb: xhci: Fix ASMedia ASM1142 DMA addressing
+ - Revert "ALSA: hda: call runtime_allow() for all hda controllers"
+ - ALSA: seq: oss: Serialize ioctlS
+ - staging: android: ashmem: Fix lockdep warning for write operation
+ - Bluetooth: Fix slab-out-of-bounds read in hci_extended_inquiry_result_evt()
+ - Bluetooth: Prevent out-of-bounds read in hci_inquiry_result_evt()
+ - Bluetooth: Prevent out-of-bounds read in hci_inquiry_result_with_rssi_evt()
+ - omapfb: dss: Fix max fclx divider for omap36xx
+ - binder: Prevent context manager from incrementing ref 0
+ - vgacon: Fix for missing check in scrollback handling
+ - mtd: properly check all write ioctls for permissions
+ - leds: wm831x-status: fix use-after-free on unbind
+ - leds: da903x: fix use-after-free on unbind
+ - leds: lm3533: fix use-after-free on unbind
+ - leds: 88pm860x: fix use-after-free on unbind
+ - net/9p: validate fds in p9_fd_open
+ - drm/nouveau/fbcon: fix module unload when fbcon init has failed for some
  + reason
+ - drm/nouveau/fbcon: zero-initialise the mode_cmd2 structure
+ - i2c: slave: improve sanity check when registering
+ - i2c: slave: add sanity check when unregistering
+ - usb: hso: check for return value in hso_serial_common_create()
+ - firmware: Fix a reference count leak.
+ - cfg80211: check vendor command doit pointer before use
+ - igb: reinit_locked() should be called with rtl1_lock
+ - atm: fix atm_dev refcnt leaks in atmtcp_remove_persistent
+ - tools lib traceevent: Fix memory leak in process_dynamic_array_len
+ - Drivers: hv: vmbus: Ignore CHANNELMSG_TL_CONNECT_RESULT(23)
+ - xattr: break delegations in {set,remove}xattr
+ - ipv4: Silence suspicious RCU usage warning
+ - ipv6: fix memory leaks on IPV6_ADDRFORM path
+ - net: ethernet: mtk_eth_soc: fix MTU warnings
+ - vxlan: Ensure FDB dump is performed under RCU
+ - net: lan78xx: replace bogus endpoint lookup
+ - hv_netvsc: do not use VF device if link is down
+ - net: gre: recompute gre csum for scctp over gre tunnels
+ - openvswitch: Prevent kernel-infoleak in ovs_et_put_key()
+ - Revert "vxlan: fix tos value before xmit"
+ - selftests/net: relax cpu affinity requirement in msg_zerocopy test
+ - rxrpc: Fix race between recvmsg and sendmsg on immediate call failure
+ - i40e: add num_vectors checker in iwarp handler
+ - i40e: Wrong truncation from u16 to u8
+ - i40e: Memory leak in i40e_config_iwarp_qvlist
+ - Smack: fix use-after-free in smk_write_relabel_self()

* Bionic update: upstream stable patchset 2020-08-11 (LP: #1891228)
+ - AX.25: Fix out-of-bounds read in ax25_connect()
+ - AX.25: Prevent out-of-bounds read in ax25_sendmsg()
+ - dev: Defer free of skbs in flush_backlog
+ - drivers/net/wan/x25_asy: Fix to make it work
+ - net-sysfs: add a newline when printing 'tx_timeout' by sysfs
+ - net: udp: Fix wrong clean up for IS_UDPLITE macro
+ - rxrpc: Fix sendmsg() returning EPIPE due to recvmsg() returning ENODATA
+ - AX.25: Prevent integer overflows in connect and sendmsg
+ - ip6_gre: fix null-ptr-deref in ip6gre_init_net()
+ - rtnetlink: Fix memory(net_device) leak when ->newlink fails
+ - tcp: allow at most one TLP probe per flight
+ - regmap: debugfs: check count when read regmap file
+ - qrtr: orphan socket in qrtr_release()
+ - scpt: shrink stream outq only when new outcnt < old outcnt
+ - scpt: shrink stream outq when fails to do addstream reconf
+ - crypto: ccp - Release all allocated memory if sha type is invalid
+ - media: rc: prevent memory leak in cx23888_ir_probe
+ - iio: imu: adis16400: fix memory leak
+ - ath9k_htc: release allocated buffer if timed out
+ - ath9k: release allocated buffer if timed out
+ - PCI/ASPM: Disable ASPM on ASMedia ASM1083/1085 PCIe-to-PCI bridge
+ - wireless: Use offsetof instead of custom macro.
+ ARM: 8986/1: hw_breakpoint: Don't invoke overflow handler on uaccess
+ watchpoints
+ - drm/amdgpu: Prevent kernel-infoleak in amdgpu_info_ioctl()
+ - drm: hold gem reference until object is no longer accessed
+ - f2fs: check memory boundary by insane namelen
+ - f2fs: check if file namelen exceeds max value
+ - 9p/trans_fd: abort p9_read_work if req status changed
+ - 9p/trans_fd: Fix concurrency del of req_list in p9_fd_cancelled/p9_read_work
+ - x86/build/lto: Fix truncated .bss with -data-sections
+ - rds: Prevent kernel-infoleak in rds_notifyQueue_get()
+ - xfs: fix missed wakeup on l_flush_wait
+ - net/x25: Fix x25_neigh refcnt leak when x25 disconnect
+ - net/x25: Fix null-ptr-deref in x25_disconnect
+ - selftests/net: rxtimestamp: fix clang issues for target arch PowerPC
+ - sh: Fix validation of system call number
+ - net: lan78xx: add missing endpoint sanity check
+ - net: lan78xx: fix transfer-buffer memory leak
+ - mlx4: disable device on shutdown
+ - mlxsw: core: Increase scope of RCU read-side critical section
+ - mlxsw: core: Free EMAD transactions using kfree_rcu()
+ - ibmvnic: Fix IRQ mapping disposal in error path
+ - bpf: Fix map leak in HASH_OF_MAPS map
+ - mac80211: mesh: Free ie data when leaving mesh
+ - mac80211: mesh: Free pending skb when destroying a mpath
+ - arm64/alternatives: move length validation inside the subsection
+ - arm64: csum: Fix handling of bad packets
+ - usb: hso: Fix debug compile warning on sparc32
+ - qed: Disable "MFW indication via attention" SPAM every 5 minutes
+ - nfc: s3fwrn5: add missing release on skb in s3fwrn5_recv_frame
+ - parisc: add support for cmpxchg on u8 pointers
+ - net: ethernet: ravb: exit if re-initialization fails in tx timeout
+ - Revert "i2c: cadence: Fix the hold bit setting"
+ - x86/unwind/orc: Fix ORC for newly forked tasks
+ - exgb4: add missing release on skb in uld_send()
+ - xen-netfront: fix potential deadlock in xennet_remove()
+ - KVM: LAPIC: Prevent setting the tsdeadline timer if the lapic is hw disabled
+ - x86/8259: Use printk_deferred() to prevent deadlock
+ - drm/amdgpu: fix multiple memory leaks in acp_hw_init
+ - selftests/net: psock_fanout: fix clang issues for target arch PowerPC
+ - net/mlx5: Verify Hardware supports requested ptp function on a given pin
+ - random32: update the net random state on interrupt and activity
+ - ARM: percpu.h: fix build error
+ - random: fix circular include dependency on arm64 after addition of percpu.h
+ - random32: remove net_rand_state from the latent entropy gcc plugin
+ - random32: move the pseudo-random 32-bit definitions to random.h
+ - ext4: fix direct I/O read error
+ Open Source Used In 5GaaS Edge AC-4  17596
+ -- Kleber Saciloto de Souza <kleber.souza@canonical.com> Tue, 08 Sep 2020 12:09:02 +0200
+ linux (4.15.0-117.118) bionic; urgency=medium
+ * bionic/linux: 4.15.0-117.118 -proposed tracker (LP: #1894277)
+ * Packaging resync (LP: #1786013)
+ * CVE-2020-14386
+ * SAUCE: net/packet: fix overflow in tpacket_rcv
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Fri, 04 Sep 2020 16:23:00 -0300
+ linux (4.15.0-115.116) bionic; urgency=medium
+ * bionic/linux: 4.15.0-115.116 -proposed tracker (LP: #1893055)
+ * Potential Regression] dscr_inherit_exec_test from powerpc in
+ ubuntu_kernel_selftests failed on B/E/F (LP: #1888332)
+ * powerpc/64s: Don't init FSCR_DSCR in __init_FSCR()
+ -- Stefan Bader <stefan.bader@canonical.com> Wed, 26 Aug 2020 15:45:29 +0200
+ linux (4.15.0-114.115) bionic; urgency=medium
+ * ipsec: policy priority management is broken (LP: #1890796)
+ * xfrm: policy: match with both mark and mask on user interfaces
+ -- Stefan Bader <stefan.bader@canonical.com> Tue, 11 Aug 2020 10:58:21 +0200
+ linux (4.15.0-113.114) bionic; urgency=medium
+ * bionic/linux: 4.15.0-113.114 -proposed tracker (LP: #1890705)
+ * ipsec: policy priority management is broken (LP: #1890796)
+ * xfrm: policy: match with both mark and mask on user interfaces
+ -- Stefan Bader <stefan.bader@canonical.com> Tue, 11 Aug 2020 10:58:21 +0200
+ linux (4.15.0-113.114) bionic; urgency=medium
+ * bionic/linux: 4.15.0-113.114 -proposed tracker (LP: #1890705)
+ * Packaging resync (LP: #1786013)
+ * Reapply "usb: handle warm-reset port requests on hub resume" (LP: #1859873)
+ * usb: handle warm-reset port requests on hub resume
+ * Bionic update: upstream stable patchset 2020-07-29 (LP: #1889474)
+ * gpio: arizona: handle pm_runtime_get_sync failure case
+ * gpio: arizona: put pm_runtime in case of failure
+ * pinctrl: amd: fix npins for uart0 in kerncz_groups
+ * mac80211: allow rx of mesh eapol frames with default rx key
+ - scsi: scsi_transport_spi: Fix function pointer check
+ - xtensa: fix __sync_fetch_and_{and,or}_4 declarations
+ - xtensa: update *pos in cpuinfo_op.next
+ - drivers/net/wan/lapbether: Fixed the value of hard_header_len
+ - net: sky2: initialize return of gm_phy_read
+ - drm/nouveaui2c/g94-: increase NV_PMGR_DP_AUXCTL_TRANSACTREQ timeout
+ - irqdomain/treewide: Keep firmware node unconditionally allocated
+ - SUNRPC reverting d03727b248d0 ("NFSv4 fix CLOSE not waiting for direct IO
+    completion")
+ - spi: spi-fsl-dspi: Exit the ISR with IRQ_NONE when it's not ours
+ - IB/umem: fix reference count leak in ib_unmem_odp_get()
+ - uprobes: Change handle_swbp() to send SIGTRAP with si_code=SI_KERNEL, to fix
+    GDB regression
+ - ALSA: info: Drop WARN_ON() from buffer NULL sanity check
+ - ASoC: rt5670: Correct RT5670_LDO_SEL_MASK
+ - btrfs: fix double free on ulist after backref resolution failure
+ - btrfs: fix mount failure caused by race with umount
+ - btrfs: fix page leaks after failure to lock page for delalloc
+ - bnxt_en: Fix race when modifying pause settings.
+ - hippi: Fix a size used in a 'pci_free_consistent()' in an error handling
+    path
+ - ax88172a: fix ax88172a_unbind() failures
+ - net: dp83640: fix SIOC_SHWTSTAMP to update the struct with actual
+    configuration
+ - drm: sun4i: hdmi: Fix inverted HPD result
+ - net: smc91x: Fix possible memory leak in smc_drv_probe()
+ - bonding: check error value of register_netdevice() immediately
+ - mlxsw: destroy workqueue when trap_register in mlxsw_emad_init
+ - ipvs: fix the connection sync failed in some cases
+ - i2c: reac: always clear ICSAR to avoid side effects
+ - bonding: check return value of register_netdevice() in bond_newlink()
+ - serial: exar: Fix GPIO configuration for Sealevel cards based on XR17V35X
+ - scripts/decode_stacktrace: strip basepath from all paths
+ - HID: i2c-hid: add Mediacom FlexBook edge13 to descriptor override
+ - HID: apple: Disable Fn-key key-re-mapping on clone keyboards
+ - dmaengine: tegra210-adma: Fix runtime PM imbalance on error
+ - Input: add 'SW_MACHINE_COVER'
+ - spi: mediatek: use correct SPI_CFG2_REG MACRO
+ - regmap: dev_get_regmap_match(): fix string comparison
+ - hwmon: (aspeed-pwm-tacho) Avoid possible buffer overflow
+ - dmaengine: ioat setting ioat timeout as module parameter
+ - Input: synaptics - enable InterTouch for ThinkPad X1E 1st gen
+ - usb: gadget: udc: gr_udc: fix memleak on error handling path in gr_ep_init()
+ - arm64: Use test_tsk_thread_flag() for checking TIF_SINGLESTEP
+ - x86: math-emu: Fix up 'cmp' insn for clang ias
+ - binder: Don't use mmput() from shrinker function.
+ - usb: xhci-mtk: fix the failure of bandwidth allocation
+ - usb: xhci: Fix ASM2142/ASM3142 DMA addressing
+ - Revert "cifs: Fix the target file was deleted when rename failed."
+ - staging: wlan-ng: properly check endpoint types
+ - staging: comedi: addi_apci_1032: check INSN_CONFIG_DIGITAL_TRIG shift
+ - staging: comedi: ni_6527: fix INSN_CONFIG_DIGITAL_TRIG support
+ - staging: comedi: addi_apci_1500: check INSN_CONFIG_DIGITAL_TRIG shift
+ - staging: comedi: addi_apci_1564: check INSN_CONFIG_DIGITAL_TRIG shift
+ - serial: 8250: fix null-ptr-deref in serial8250_start_tx()
+ - serial: 8250_mtk: Fix high-speed baud rates clamping
+ - fdev: Detect integer underflow at "struct fbcon_ops"->clear_margins.
+ - vt: Reject zero-sized screen buffer size.
+ - Makefile: Fix GCC_TOOLCHAIN_DIR prefix for Clang cross compilation
+ - mm/memcg: fix refcount error while moving and swapping
+ - io-mapping: indicate mapping failure
+ - parisc: Add atomic64_set_release() define to avoid CPU soft lockups
+ - ath9k: Fix regression with Atheros 9271
+ - fuse: fix weird page warning
+ - qed: suppress "don't support RoCE & iWARP" flooding on HW init
+ - scripts/gdb: fix lx-symbols 'gdb.error' while loading modules
+ - HID: alps: support devices with report id 2
+ - RISC-V: Upgrade smp_mb__after_spinlock() to iorw,iorw
+ - x86, vmlinux.lds: Page-align end of ..page_aligned sections
+ - ASoC: rt5670: Add new gpio1_is_ext_spk_en quirk and enable it on the Lenovo
+ Miix 2 10
+ * Bionic update: upstream stable patchset 2020-07-24 (LP: #1888907)
+ - KVM: s390: reduce number of IO pins to 1
+ - spi: spi-fsl-dspi: Adding shutdown hook
+ - spi: spi-fsl-dspi: Fix lockup if device is removed during SPI transfer
+ - spi: spi-fsl-dspi: use IRQF_SHARED mode to request IRQ
+ - spi: spi-fsl-dspi: Fix external abort on interrupt in resume or exit paths
+ - ARM: dts: omap4-droid4: Fix spi configuration and increase rate
+ - gpu: host1x: Detach driver on unregister
+ - spi: spidev: fix a race between spidev_release and spidev_remove
+ - spi: spidev: fix a potential use-after-free in spidev_release()
+ - ixgbe: protect ring accesses with READ- and WRITE_ONCE
+ - s390/kasan: fix early pgm check handler execution
+ - cifs: update ct ime and mtime during truncate
+ - ARM: imx6: add missing put_device() call in imx6q_suspend_init()
+ - scsi: mptscsih: Fix read sense data size
+ - nvme-rdma: assign completion vector correctly
+ - x86/entry: Increase entry_stack size to a full page
+ - net: cxgb4: fix return error value in t4_prep_fw
+ - smsc95xx: check return value of smsc95xx_reset
+ - smsc95xx: avoid memory leak in smsc95xx_bind
+ - ALSA: compress: fix partial_drain completion state
+ - arm64: kgdb: Fix single-step exception handling oops
+ - nbd: Fix memory leak in nbd_add_socket
+ - bnx3_t_en: fix NULL dereference in case SR-IOV configuration fails
- net: macb: mark device wake capable when "magic-packet" property present
- mlxsw: spectrum_router: Remove inappropriate usage of WARN_ON()
- ALSA: opl3: fix infoleak in opl3
- ALSA: hda - let hs_mic be picked ahead of hp_mic
- ALSA: usb-audio: add quirk for MacroSilicon MS2109
- KVM: arm64: Fix definition of PAGE_HYPDEVICE
- KVM: arm64: Stop clobbering x0 for HVC_SOFT_RESTART
- KVM: x86: bit 8 of non-leaf PDPEs is not reserved
- KVM: x86: Inject #GP if guest attempts to toggle CR4.LA57 in 64-bit mode
- KVM: x86: Mark CR4.TSD as being possibly owned by the guest
- btrfs: fix fatal extent_buffer readahead vs releasepage race
- drm/radeon: fix double free
- dm: use noio when sending kobject event
- ARC: entry: fix potential EFA clobber when SYSCALL_TRACE
- ARC: elf: use right ELF_ARCH
- s390/mm: fix huge pte soft dirty copying
- genetlink: remove genl_bind
- ipv4: fill il4_icmp [{type.code} in ping_v4_sendmsg
- l2tp: remove skb_dst_set() from l2tp_xmit_skb()
- ltc: make sure applications use ARPHERDETHER
- net: Added pointer check for dst->ops->neigh lookups in dst_neigh_lookup_skb
- tcp: md5: add missing memory barriers in tcp_md5_do_add()/tcp_md5_hash_key()
- tcp: md5: refine tcp_md5_do_add()/tcp_md5_hash_key() barriers
- tcp: md5: allow changing MD5 keys in all socket states
- net_sched: fix a memory leak in atm_tc_init()
- tcp: make sure listeners don't initialize congestion-control state
- tcp: md5: do not send silly options in SYNOOKIES
- cgroup: fix cgroup_skb_alloc() for sk_clone_lock()
- cgroup: Fix sock_cgroup_data on big-endian.
- drm/exynos: fix ref count leak in mic_pre_enable
- arm64/alternatives: use subsections for replacement sequences
- tpm_tis: extra chip->ops check on error path in tpm_tis_core_init
- gfs2: read-only mounts should grab the sd_freeze_glock
- i2c: eg207: Load module automatically if ID matches
- arm64: alternative: Use true and false for boolean values
- arm64/alternatives: don't patch up internal branches
- iio: magnetometer:ak8974: Fix alignment and data leak issues
- iio: humidity:hd100x Fix alignment and data leak issues
- iio: magnetometer: ak8974: Fix runtime PM imbalance on error
- iio: mma8452: Add missed iio_device_unregister() call in mma8452_probe()
- iio: pressure: zpa2326: handle pm_runtime_get_sync failure
- iio: pressure:ms5611 Fix buffer element alignment
- iio:health:afe4403 Fix timestamp alignment and prevent data leak.
- spi: spi-fsl-dspi: Fix lockup if device is shutdown during SPI transfer
- spi: fix initial SPI_SR value in spi-fsl-dspi
- net: dsa: bcm_sf2: Fix node reference count
- of: of_mdio: Correct loop scanning logic
- Revert "usb/ohci-platform: Fix a warning when hibernating"
+ - Revert "usb/ehci-platform: Set PM runtime as active on resume"
+ - Revert "usb/xhci-plat: Set PM runtime as active on resume"
+ - doc: dt: bindings: usb: dwc3: Update entries for disabling SS instances in
  + park mode
+ - mmc: sdhci: do not enable card detect interrupt for gpio cd type
+ - ACPI: video: Use native backlight on Acer Aspire 5783z
+ - ACPI: video: Use native backlight on Acer TravelMate 5735Z
+ - iio:health:afe4404 Fix timestamp alignment and prevent data leak.
+ - phy: sun4i-usb: fix dereference of pointer phy0 before it is null checked
+ - arm64: dts: meson: add missing gxl mg clock
+ - spi: spi-sun6i: sun6i_spi_transfer_one(): fix setting of clock rate
+ - usb: gadget: udc: atmel: fix uninitialized read in debug printk
+ - staging: comedi: verify array index is correct before using it
+ - Revert "thermal:mediatek: fix register index error"
+ - ARM: dts: socfpga: Align L2 cache-controller nodename with dtschema
+ - copy_xstate_to_kernel: Fix typo which caused GDB regression
+ - perf stat: Zero all the 'ena' and 'run' array slot stats for interval mode
+ - mtd: rawnand: brcmnnad: fix CS0 layout
+ - mtd: rawnand: oxnas: Keep track of registered devices
+ - mtd: rawnand: oxnas: Unregister all devices on error
+ - mtd: rawnand: oxnas: Release all devices in the _remove() path
+ - HID: magicmouse: do not set up autorepeat
+ - ALSA: line6: Perform sanity check for each URB creation
+ - ALSA: usb-audio: Fix race against the error recovery URB submission
+ - USB: c67x00: fix use after free in c67x00_giveback_urb
+ - usb: dwc2: Fix shutdown callback in platform
+ - usb: chipidea: core: add wakeup support for extcon
+ - usb: gadget: function: fix missing spinlock in f_uac1_legacy
+ - USB: serial: iuu_phoenix: fix memory corruption
+ - USB: serial: cypress_m8: enable Simply Automated UPB PIM
+ - USB: serial: ch341: add new Product ID for CH340
+ - USB: serial: option: add GosunCn GM500 series
+ - virtio: virtio_console: add missing MODULE_DEVICE_TABLE() for rproc serial
+ - fuse: Fix parameter for FS_IOC_(GET,SET)FLAGS
+ - Revert "zram: convert remaining CLASS_ATTR() to CLASS_ATTR_RO()"
+ - mei: bus: don't clean driver pointer
+ - Input: i8042 - add Lenovo XiaoXin Air 12 to i8042 nomux list
+ - uio_pdrv_genirq: fix use without device tree and no interrupt
+ - timer: Fix wheel index calculation on last level
+ - MIPS: Fix build for LTS kernel caused by backporting lpj adjustment
+ - hwmon: (emc2103) fix unable to change fan pwm1_enable attribute
+ - intel_th: pci: Add Jasper Lake CPU support
+ - intel_th: pci: Add Tiger Lake PCH-H support
+ - intel_th: pci: Add Emmitsburg PCH support
+ - dmaengine: fsl-edma: Fix NULL pointer exception in fsl_edma_rx_handler
+ - misc: atmel-ssc: lock with mutex instead of spinlock
+ - thermal/drivers/cpufreq_cooling: Fix wrong frequency converted from power
+ - arm64: ptrace: Override SPSR_SS when single-stepping is enabled
* sched/fair: handle case of task_h_load() returning 0
* linux: don't omit recovery_deletes in target_copy()
* rxrpc: Fix trace string
* regmap: fix alignment issue
* i/o: protect ring accesses with READ- and WRITE_ONCE
* usb: dwc3: pci: Fix reference count leak in dwc3_pci_resume_work
* net: qrtr: Fix an out of bounds read qrtr_endpoint_post()
* drm/mediatek: Check plane visibility in atomic_update
* net: hns3: fix use-after-free when doing self test
* cxgb4: fix all-mask IP address comparison
* perf: Make perf able to build with latest libbfd
* drm/msm: fix potential memleak in error branch
* HID: quirks: Remove ITE 8595 entry from hid_have_special_driver
* scsi: sr: remove references to BLK_DEV_SR_VENDOR, leave it enabled
* [Config] updateconfigs for BLK_DEV_SR_VENDOR
* ALSA: usb-audio: Create a registration quirk for Kingston HyperX Amp
  (0951:16d8)
* ALSA: usb-audio: Rewrite registration quirk handling
* ALSA: usb-audio: Add registration quirk for Kingston HyperX Cloud Alpha S
* ALSA: usb-audio: Add registration quirk for Kingston HyperX Cloud Flight S
* regmap: debugfs: Don't sleep while atomic for fast_io regmaps
* HID: quirks: Always poll Obins Anne Pro 2 keyboard
* HID: quirks: Ignore Simply Automated UPB PIM
* ALSA: line6: Sync the pending work cancel at disconnection
* ALSA: hda/realtek - change to suitable link model for ASUS platform
* ALSA: hda/realtek - Enable Speaker for ASUS UX533 and UX534
* timer: Prevent base->clk from moving backward
* riscv: use 16KB kernel stack on 64-bit
* intel_th: Fix a NULL dereference when hub driver is not loaded
* genirq/affinity: Handle affinity setting on inactive interrupts correctly
* NFSv4.1: Interrupted connections cause high bandwidth RPC ping-pong between
  client and server (LP: #1887607)
* NFSv4.1: Avoid false retries when RPC calls are interrupted
* NFSv4.x: Handle bad/dead sessions correctly in nfs41_sequence_process()
* NFS: Fix interrupted slots by sending a solo SEQUENCE operation
* tap: use after free (LP: #1889735)
* tap: fix use-after-free
* Bionic update: upstream stable patchset 2020-07-17 (LP: #1887990)
* btrfs: fix a block group ref counter leak after failure to remove block
* group
* btrfs: cow_file_range() num_bytes and disk_num_bytes are same
* btrfs: fix data block group relocation failure due to concurrent scrub
* mm: fix swap cache node allocation mask
* EDAC/amd64: Read back the scrub rate PCI register on F15h
* usbnet: smsc95xx: Fix use-after-free after removal
+ - mm/slub.c: fix corrupted freechain in deactivate_slab()
+ - mm/slub: fix stack overruns with SLUB_STATS
+ - usb: usbtest: fix missing kfree(dev->buf) in usbtest_disconnect
+ - kgdb: Avoid suspicious RCU usage warning
+ - cxgb4: use unaligned conversion for fetching timestamp
+ - cxgb4: parse TC-U32 key values and masks natively
+ - hwmon: (max6697) Make sure the OVERT mask is set correctly
+ - hwmon: (acpi_power_meter) Fix potential memory leak in
+ acpi_power_meter_add()
+ - drm: sun4i: hdmi: Remove extra HPD polling
+ - virtio-blk: free vblk-qs in error path of virtblk_probe()
+ - i2c: algo-pca: Add 0x78 as SCL stuck low status for PCA9665
+ - nfsd: apply umask on fs without ACL support
+ - Revert "ALSA: usb-audio: Improve frames size computation"
+ - SMB3: Honor 'seal' flag for multiuser mounts
+ - SMB3: Honor persistent/resilient handle flags for multiuser mounts
+ - cifs: Fix the target file was deleted when rename failed.
+ - MIPS: Add missing EHB in mtc0 -> mfc0 sequence for DSPen
+ - irqchip/gic: Atomically update affinity
+ - dm zoned: assign max_io_len correctly
+ - [Config] updateconfigs for EFI_CUSTOM_SSDT_OVERLAYS
+ - efi: Make it possible to disable efivar_ssdte entirely
+ - s390/debug: avoid kernel warning on too large number of pages
+ - cxgb4: use correct type for all-mask IP address comparison
+ - SMB3: Honor lease disabling for multiuser mounts
+
* Enable Quectel EG95 LTE modem [2c7c:0195]  (LP: #1886744)
+ - net: usb: qmi_wwan: add support for Quectel EG95 LTE modem
+ - USB: serial: option: add Quectel EG95 LTE modem
+
* kernel oops xr-usb-serial (LP: #1885271)
+ - SAUCE: Revert "xr-usb-serial: fix kbuild"
+ - SAUCE: Revert "xr-usb-serial: Changes to support updates in struct
+ gpio_chip"
+ - SAUCE: Revert "xr-usb-serial: re-initialise baudrate after resume from
+ S3/S4"
+ - SAUCE: Revert "xr-usb-serial: Update driver for Exar USB serial ports"
+
* [hns3-0115] add 8 BD limit for tx flow  (LP: #1859756)
+ - net: hns3: add 8 BD limit for tx flow
+ - net: hns3: avoid mult + div op in critical data path
+ - net: hns3: remove some ops in struct hns3_nic_ops
+ - net: hns3: fix for not calculating tx bd num correctly
+ - net: hns3: unify maybe_stop_tx for TSO and non-TSO case
+ - net: hns3: add check for max TX BD num for tso and non-tso case
+ - net: hns3: fix for TX queue not restarted problem
+ - net: hns3: fix a use after free problem in hns3_nic_maybe_stop_tx()
+ * Regression in kernel 4.15.0-91 causes kernel panic with Bcache
+  (LP: #1867916)
+  - bcache: check and adjust logical block size for backing devices
+  + use-after-free in af_alg_accept() due to bh_lock_sock() (LP: #1884766)
+  - crypto: af_alg - fix use-after-free in af_alg_accept() due to bh_lock_sock()
+  + Bionic update: upstream stable patchset 2020-07-15 (LP: #1887715)
+  - net: be more gentle about silly gso requests coming from user
+  - block/bio-integrity: don't free 'buf' if bio_integrity_add_page() failed
+  - net: sched: export __netdev_watchdog_up()
+  - fix a braino in "sparc32: fix register window handling in
+    genregs32_[gs]et()"
+  - apparmor: don't try to replace stale label in ptraceme check
+  - ibmveth: Fix max MTU limit
+  - mld: fix memory leak in ipv6_mc_destroy_dev()
+  - net: bridge: enfore alignment for ethernet address
+  - net: fix memleak in register_netdevice()
+  - net: usb: ax88179_178a: fix packet alignment padding
+  - rocker: fix incorrect error handling in dma_rings_init
+  - rxrpc: Fix notification call on completion of discarded calls
+  - scctp: Don't advertise IPv4 addresses if ipv6only is set on the socket
+  - tcp: grow window for OOO packets only for SACK flows
+  - tg3: driver sleeps indefinitely when EEH errors exceed eeh_max_freezes
+  - ip_tunnel: fix use-after-free in ip_tunnel_lookup()
+  - tcp_cubic: fix spurious HYSTART_DELAY exit upon drop in min RTT
+  - ip6_gre: fix use-after-free in ip6gre_tunnel_lookup()
+  - net: Fix the arp error in some cases
+  - net: Do not clear the sock TX queue in sk_set_socket()
+  - net: core: reduce recursion limit value
+  - USB: ohci-sm501: Add missed iounmap() in remove
+  - usb: dwc2: Postponed gadget registration to the udc class driver
+  - usb: add USB_QUIRK_DELAY_INIT for Logitech C922
+  - USB: ehci: reopen solution for Synopsys HC bug
+  - usb: host: xhci-mtk: avoid runtime suspend when removing hcd
+  - usb: host: ehci-exynos: Fix error check in exynos_ehci_probe()
+  - ALSA: usb-audio: add quirk for Denon DCD-1500RE
+  - xhci: Fix incorrect EP_STATE_MASK
+  - xhci: Fix enumeration issue when setting max packet size for FS devices.
+  - cdc-acm: Add DISABLE_ECHO quirk for Microchip/SMSC chip
+  - loop: replace kill_bdev with invalidate_bdev
+  - ALSA: usb-audio: Clean up mixer element list traverse
+  - ALSA: usb-audio: Fix OOB access of mixer element list
+  - xhci: Poll for U0 after disabling USB2 LPM
+  - cifs/smb3: Fix data inconsistent when punch hole
+  - cifs/smb3: Fix data inconsistent when zero file range
+  - efi/esrt: Fix reference count leak in esre_create_sysfs_entry.
+  - ARM: dts: NSP: Correct FA2 mailbox node
- rxrpc: Fix handling of rwind from an ACK packet
- RDMA/cma: Protect bind_list and listen_list while finding matching cm id
- ASoC: rockchip: Fix a reference count leak.
- RDMA/mad: Fix possible memory leak in ib_mad_post_receive_mads()
- net: qed: fix left elements count calculation
- net: qed: fix NVMe login fails over VF
- net: qed: fix excessive QM ILT lines consumption
- ARM: imx5: add missing put_device() call in imx_suspend_alloc_ocram()
- usb: gadget: udc: Potential Oops in error handling code
- netfilter: ipset: fix unaligned atomic access
- net: bcmgenet: use hardware padding of runt frames
- sched/core: Fix PI boosting between RT and DEADLINE tasks
- ata/libata: Fix usage of page address by page_address_in
  ata_scsi_mode_select_xlat function
- net: alx: fix race condition in alx_remove
- s390/ptrace: fix setting syscall number
- kbuild: improve cc-option to clean up all temporary files
- blktrace: break out of blktrace setup on concurrent calls
- ALSA: hda: Add NVIDIA codec IDs 9a & 9d through a0 to patch table
- ACPI: sysfs: Fix pm_profile_attr type
- KVM: X86: Fix MSR range of APIC registers in X2APIC mode
- KVM: nVMX: Plumb L2 GPA through to PML emulation
- btrfs: fix failure of RWF_NOWAIT write into prealloc extent beyond eof
- mm/slab: use memzero_explicit() in kzfree()
- ocfs2: load global_inode_alloc
- ocfs2: fix value of OCFS2_INVALID_SLOT
- ocfs2: fix panic on nfs server over ocfs2
- arm64: perf: Report the PC value in REGS_ABI_32 mode
- tracing: Fix event trigger to accept redundant spaces
- drm/radeon: fix fb_div check in ni_init_smc_spll_table()
- Staging: rtl8723bs: prevent buffer overflow in update_sta_support_rate()
- sunrpc: fixed rollback in rpc_gssd_dummy_populate()
- SUNRPC: Properly set the @subbuf parameter of xdr_buf_subsegment()
- pNFS/flexfiles: Fix list corruption if the mirror count changes
- NFSv4 fix CLOSE not waiting for direct IO completion
- xfs: add agf freeblocks verify in xfs_agf_verify
- net: bcmgenet: remove HFB_CTRL access
- EDAC/amd64: Add Family 17h Model 30h PCI IDs
- i2c: tegra: Cleanup kerneldoc comments
- i2c: tegra: Add missing kerneldoc for some fields
- net: phy: Check harder for errors in get_phy_id()
- ALSA: usb-audio: add quirk for Samsung USBC Headset (AKG)
- scsi: zfcp: Fix panic on ERP timeout for previously dismissed ERP action
- xhci: Return if xHCI doesn’t support LPM
- IB/mad: Fix use after free when destroying MAD agent
- regmap: Fix memory leak from regmap_register_patch
- RDMA/qedr: Fix KASAN: use-after-free in ucma_event_handler+0x532
- cxgb4: move handling L2T ARP failures to caller
+ - sched/deadline: Initialize ->dl_boosted
+ - s390/vdso: fix vDSO clock_getres()
+ - arm64: sve: Fix build failure when ARM64_SVE=y and SYSCTL=n
+ - ALSA: hda/realtek - Add quirk for MSI GE63 laptop
+ 
+ * Bionic update: upstream stable patchset 2020-07-07 (LP: #1886710)
+ - s390: fix syscall_get_error for compat processes
+ - drm/i915: Whitelist context-local timestamp in the gen9 cmdparser
+ - power: supply: bq24257_charger: Replace depends on REGMAP_I2C with select
+ - clk: sunxi: Fix incorrect usage of round_down()
+ - i2c: pixi4: Detect secondary SMBus controller on AMD AM4 chipsets
+ - iio: pressure: bmp280: Tolerate IRQ before registering
+ - remoteproc: Fix IDR initialisation in rproc_alloc()
+ - clk: qcom: msm8916: Fix the address location of pll->config_reg
+ - backlight: lp855x: Ensure regulators are disabled on probe failure
+ - ASoC: davinci-mcasp: Fix dma_chan refcnt leak when getting dma type
+ - ARM: integrator: Add some Kconfig selections
+ - scsi: qedi: Check for buffer overflow in qedi_set_path()
+ - ALSA: isa/wavefront: prevent out of bounds write in ioctl
+ - scsi: qla2xxx: Fix issue with adapter's stopping state
+ - iio: bmp280: fix compensation of humidity
+ - i2fs: report delalloc reserve as non-free in statfs for project quota
+ - i2c: pxa: clear all master action bits in i2c_pxa_stop_message()
+ - usbip: poison URBs upon disconnect
+ - dm mpath: switch paths in dm_blk_ioctl() code path
+ - PCI: aardvark: Don't blindly enable ASPM L0s and don't write to read-only register
+ - ps3disk: use the default segment boundary
+ - vfio/pci: fix memory leaks in alloc_perm_bits()
+ - m68k/PCI: Fix a memory leak in an error handling path
+ - nfsd: wm8994: Fix driver operation if loaded as modules
+ - scsi: lpfc: Fix lpfc_nodelist leak when processing unsolicited event
+ - clk: clk-flexgen: fix clock-critical handling
+ - powerpc/perf/hv-24x7: Fix inconsistent output values incase multiple hv-24x7 events run
+ - nfsd: Fix svc_xprt refcnt leak when setup callback client failed
+ - powerpc/crashkernel: Take "mem=" option into account
+ - yam: fix possible memory leak in yam_init_driver
+ - NTB: Fix the default port and peer numbers for legacy drivers
+ - mkssysmap: Fix the mismatch of `.L.' symbols in System.map
+ - apparmor: fix introspection of of task mode for unconfined tasks
+ - scsi: sr: Fix sr_probe() missing deallocate of device minor
+ - scsi: ibmvscsi: Don't send host info in adapter info MAD after LPM
+ - staging: greybus: fix a missing-check bug in gb_lights_light_config()
+ - scsi: qedi: Do not flush offload work if ARP not resolved
+ - ALSA: usb-audio: Improve frames size computation
+ - s390/qdio: put thinint indicator after early error
+ - thermal/drivers/ti-soc-thermal: Avoid dereferencing ERR_PTR
+ staging: sm750fb: add missing case while setting FB_VISUAL
+ i2c: pxa: fix i2c_pxa_scream_blue_murder() debug output
+ serial: amba-pl011: Make sure we initialize the port.lock spinlock
+ drivers: base: Fix NULL pointer exception in __platform_driver_probe() if a
driver developer is foolish
+ PCI: rcr: Fix incorrect programming of OB windows
+ PCI/ASPM: Allow ASPM on links to PCIe-to-PCI/PCI-X Bridges
+ scsi: qla2xxx: Fix warning after FC target reset
+ power: supply: lp8788: Fix an error handling path in
  'lp8788_charger_probe()'
+ power: supply: smb347-charger: IRQSTAT_D is volatile
+ scsi: mpt3sas: Fix double free warnings
+ dlm: remove BUG() before panic()
+ clk: ti: composite: fix memory leak
+ PCI: Fix pci_register_host_bridge() device_register() error handling
+ tty: n_gsm: Fix SOF skipping
+ tty: n_gsm: Fix waking up upper tty layer when room available
+ powerpc/pseseries: Fix FWNMI_VALID off by one
+ powerpc/ps3: Fix kexec shutdown hang
+ vfio-pci: Mask cap zero
+ ush/ohci-platform: Fix a warning when hibernating
+ drm/msm/mdp5: Fix mdp5_init error path for failed mdp5_kms allocation
+ USB: host: ehci-mxc: Add error handling in ehci_mxc_drzv.probe()
+ tty: n_gsm: Fix bogus i++ in gsm_data_kick
+ clk: samsung: exynos5433: Add IGNORE_UNUSED flag to sclk_i2s1
+ powerpc/64s/pgtable: fix an undefined behaviour
+ dm zoned: return NULL if dmz_get_zone_for_reclaim() fails to find a zone
+ PCI/PTM: Inherit Switch Downstream Port PTM settings from Upstream Port
+ IB/cma: Fix ports memory leak in cma_cfigfs
+ watchdog: da9062: No need to ping manually before setting timeout
+ USB: gadget: dwc2: gadget: move gadget resume after the core is in L0 state
+ USB: gadget: udc: s3c2410_udc: Remove pointless NULL check in
  s3c2410_udc_nuke
+ user: gadget: lpc32xx_udc: don't dereference ep pointer before null check
+ usb: gadget: fix potential double-free in m66592_probe.
+ USB: gadget: Fix issue with config_ep_by_speed function
+ x86/apic: Make TSC deadline timer detection message visible
+ clk: bcm2835: Fix return type of bcm2835_register_gate
+ scsi: ufs-qcom: Fix scheduling while atomic issue
+ net: sunrpc: Fix off-by-one issues in 'rpc_ntop6'
+ NFSv4.1 fix rpc_call_done assignment for BIND_CONN_TO_SESSION
+ powerpc/4xx: Don't unmap NULL mbase
+ extcon: adc-jack: Fix an error handling path in 'adc_jack_probe()'
+ ASoC: fsl_asrc_dma: Fix dma_chan leak when config DMA channel failed
+ vfio/mdev: Fix reference count leak in add_mdev_supported_type
+ openiscsi: Fix issue with argument clobbering for clone/fork
+ gfs2: Allow lock_nolock mount to specify jid=X
+ scsi: iscsi: Fix reference count leak in iscsi_boot_create_kobj
+ - scsi: ufs: Don't update urgent bkops level when toggling auto bkops
+ - pinctrl: imx: Fix an error handling path in 'imx_pinctrl_core_probe()'
+ - pinctrl: freescale: imx: Fix an error handling path in 'imx_pinctrl_probe()'
+ - crypto: omap-sham: add proper load balancing support for multicore
+ - geneve: change from tx_error to tx_dropped on missing metadata
+ - lib/zlib: remove outdated and incorrect pre-increment optimization
+ - include/linux/bitops.h: avoid clang shift-count-overflow warnings
+ - elfnote: mark all .note sections SHF_ALLOC
+ - selftests/vm/pkeys: fix alloc_random_pkey() to make it really random
+ - blktrace: use erro instead of bi_status
+ - blktrace: fix endianness in get_pdu_int()
+ - blktrace: fix endianness for blk_log_remap()
+ - gfs2: fix use-after-free on transaction ail lists
+ - selftests/net: in timestamping, strncpy needs to preserve null byte
+ - drm/sun4i: hdmi ddc clk: Fix size of m divider
+ - scsi: acornscsi: Fix an error handling path in acornscsi_probe()
+ - usb/xhci-plat: Set PM runtime as active on resume
+ - usb/ehci-platform: Set PM runtime as active on resume
+ - perf report: Fix NULL pointer dereference in
   hists__fprintf nr_sample_events()
+ - bcache: fix potential deadlock problem in btree gc_coalesce
+ - block: Fix use-after-free in blkdev_get()
+ - arm64: hw_breakpoint: Don't invoke overflow handler on uaccess watchpoints
+ - drm: encoder_slave: fix refcounting error for modules
+ - drm/dp_mst: Reformat drm_dp_check_act_status() a bit
+ - drm/qxl: Use correct notify port address when creating cursor ring
+ - selinux: fix double free
+ - ext4: fix partial cluster initialization when splitting extent
+ - drm/dp_mst: Increase ACT retry timeout to 3s
+ - x86/boot/compressed: Relax sed symbol type regex for LLVM ld.lld
+ - block: nr_sects_write(): Disable preemption on seqcount write
+ - mtd: rawnand: Pass a nand_chip object to nand_release()
+ - mtd: rawnand: diskonchip: Fix the probe error path
+ - mtd: rawnand: sharpsl: Fix the probe error path
+ - mtd: rawnand: xway: Fix the probe error path
+ - mtd: rawnand: orion: Fix the probe error path
+ - mtd: rawnand: oxnas: Add of_node_put()
+ - mtd: rawnand: oxnas: Fix the probe error path
+ - mtd: rawnand: socrates: Fix the probe error path
+ - mtd: rawnand: plat_nand: Fix the probe error path
+ - mtd: rawnand: mtk: Fix the probe error path
+ - mtd: rawnand: tmio: Fix the probe error path
+ - crypto: algif_skcipher: Cap recv SG list at ctx->used
+ - crypto: algboss: - don't wait during notifier callback
+ - kprobes: Fix to protect kick_kprobe_optimizer() by kprobe_mutex
+ - e1000e: Do not wake up the system via WOL if device wakeup is disabled
+ - kretprobe: Prevent triggering kretprobe from within kprobe_flush_task
+ - sched/rt, net: Use CONFIG_PREEMPTION.patch
+ - net: core: device_rename: Use rwsem instead of a seqcount
+ - kvm: x86: Move kvm_set_mmio_spte_mask() from x86.c to mmu.c
+ - kvm: x86: Fix reserved bits related calculation errors caused by MKTME
+ - KVM: x86/mmnu: Set mmio_value to '0' if reserved #PF can't be generated
+ - ASoC: tegra: tegra_wm8903: Support nvidia, headset property
+ - PCI: Allow pci_resize_resource() for devices on root bus
+ - clk: samsung: Mark top ISP and CAM clocks on Exynos542x as critical
+ - serial: 8250: Fix max baud limit in generic 8250 port
+ - gpio: dwapb: Call acpi_gpiochip_free_interrupts() on GPIO chip de-
+ registration
+ - pwm: img: Call pm_runtime_put() in pm_runtime_get_sync() failed case
+ - x86/purgatory: Disable various profiling and sanitizing options
+ - arm64: dts: mt8173: fix unit name warnings
+ - gpio: dwapb: Append MODULE_ALIAS for platform driver
+ - pinctrl: rza1: Fix wrong array assignment of rza1l_swio_entries
+ - ALSA: usb-audio: Fix racy list management in output queue
+ - PCI: v3-semi: Fix a memory leak in v3_pci_probe() error handling paths
+ - pinctrl: rockchip: fix memleak in rockchip_dt_node_to_map
+ - powerpc/64: Don't initialise init_task->thread.regs
+ - HID: Add quirks for Trust Panora Graphic Tablet
+ - RDMA/iw_cxgb4: cleanup device debugfs entries on ULD remove
+ - ASoC: fix incomplete error-handling in img_i2s_in_probe.
+ - of: Fix a refcounting bug in __of_attach_node_sysfs()
+ - NTB: Revert the change to use the NTB device dev for DMA allocations
+ - drivers/perf: hisi: Fix wrong value for all counters enable
+ - x86/idt: Keep spurious entries unset in system_vectors
+ - usb: host: ehci-platform: add a quirk to avoid stuck
+ - afs: Fix non-setting of mtime when writing into mmap
+ - afs: afs_write_end() should change i_size under the right lock
+ - drm/amdgpu: Replace invalid device ID with a valid device ID
+ - ext4: avoid race conditions when remounting with options that change dax
+ - net: octeon: mgmt: Repair filling of RX ring
+ - Revert "dpaa_eth: fix usage as DSA master, try 3"

+ * Computer is frozen after suspend (LP: #1867983) // Bionic update: upstream
+ stable patchset 2020-07-07 (LP: #1886710)
+ - bibata: Use per port sync for detach
+ * The thread level parallelism would be a bottleneck when searching for the
+ shared pmd by using hugetlfs (LP: #1882039)
+ - hugetlfs: take read_lock on i_mmap for PMD sharing
+ * Bionic update: upstream stable patchset 2020-06-25 (LP: #1885176)
+ - ipv6: fix IPV6_ADDRFORM operation logic
+ - vxlan: Avoid infinite loop when suppressing NS messages with invalid options
+ - make 'user_access_begin()' do 'access_ok()'
+ - Fix 'access_ok()' on alpha and SH
+ - arch/openrisc: Fix issues with access_ok()
+ - x86: uaccess: Inhibit speculation past access_ok() in user_access_begin()
+ - lib: Reduce user_access_begin() boundaries in strncpy_from_user() and strnlen_user()
+ - serial: imx: Fix handling of TC irq in combination with DMA
+ - crypto: talitos - fix ECB and CBC alg's ivsize
+ - ARM: 8977/1: ptrace: Fix mask for thumb breakpoint hook
+ - sched/fair: Don't NUMA balance for kthreads
+ - Input: synaptics - add a second working PNP_ID for Lenovo T470s
+ - drivers/net/ibmvnic: Update VNIC protocol version reporting
+ - powerpc/xive: Clear the page tables for the ESB IO mapping
+ - ath9k_htc: Silence undersized packet warnings
+ - perf probe: Accept the instance number of kretprobe event
+ - mm: add kvfree_sensitive() for freeing sensitive data objects
+ - x86_64: Fix jiffies ODR violation
+ - x86/PCI: Mark Intel C620 MROMs as having non-compliant BARs
+ - x86/speculation: Prevent rogue cross-process SSBD shutdown
+ - x86/reboot/quirks: Add MacBook6,1 reboot quirk
+ - efi/efivars: Add missing kobject_put() in sysfs entry creation error path
+ - ALSA: es1688: Add the missed snd_card_free()
+ - ALSA: hda/realtek - add a pintbl quirk for several Lenovo machines
+ - ALSA: usb-audio: Fix inconsistent card PM state after resume
+ - ACPI: sysfs: Fix reference count leak in acpi_sysfs_add_hotplug_profile()
+ - ACPI: CPPC: Fix reference count leak in acpi_cppc_processor_probe()
+ - ACPI: GED: add support for _Exx / _Lxx handler methods
+ - ACPI: PM: Avoid using power resources if there are none for D0
+ - cgroupl blkcg: Prepare some symbols for module and !CONFIG_CGROUP usages
+ - nilfs2: fix null pointer dereference at nilfs_segctor_do_construct()
+ - spi: bcm2835aux: Fix controller unregister order
+ - spi: bcm-qspi: when tx/rx buffer is NULL set to 0
+ - crypto: cavium/nitrox - Fix `nitrox_get_first_device()' when ndevlist is fully iterated
+ - ALSA: pcm: disallow linking stream to itself
+ - kvm: x86: Fix L1TF mitigation for shadow MMU
+ - KVM: x86/mmuf: Consolidate "is MMIO SPTE" code
+ - KVM: x86: only do L1TF workaround on affected processors
+ - x86/speculation: Avoid force-disabling IBPB based on STIBP and enhanced IBRS.
+ - x86/speculation: PR_SPEC_FORCE_DISABLE enforcement for indirect branches.
+ - spi: dw: Fix controller unregister order
+ - spi: No need to assign dummy value in spi_unregister_controller()
+ - spi: Fix controller unregister order
+ - spi: pxa2xx: Fix controller unregister order
+ - spi: bcm2835: Fix controller unregister order
+ - crypto: virtio: Fix use-after-free in virtio_crypto_skcipher_finalize_req()
+ - crypto: virtio: Fix src/dst scatterlist calculation in __virtio_crypto_skcipher_do_req()
+ - crypto: virtio: Fix dest length calculation in __virtio_crypto_skcipher_do_req()
+ - selftests/net: in rxtimestamp getopt_long needs terminating null entry
+ - ovl: initialize error in ovl_copy_xattr
+ - proc: Use new_inode not new_inode_pseudo
+ - video: fbdev: w100fb: Fix a potential double free.
+ - KVM: nSVM: fix condition for filtering async PF
+ - KVM: nSVM: leave ASID aside in copy_vmcb_control_area
+ - KVM: nVMX: Consult only the "basic" exit reason when routing nested exit
+ - KVM: MIPS: Define KVM_ENTRYHI_ASID to cpu_asid_mask(&boot_cpu_data)
+ - KVM: MIPS: Fix VPN2_MASK definition for variable cpu_vmbits
+ - KVM: arm64: Make vcpu_cp1x() work on Big Endian hosts
+ - ath9k: Fix use-after-free Read in ath9k_wmi_ctrl_rx
+ - ath9k: Fix use-after-free Write in ath9k_htc_rx_msg
+ - ath9x: Fix stack-out-of-bounds Write in ath9k_hif_usb_rx_cb
+ - ath9k: Fix general protection fault in ath9k_hif_usb_rx_cb
+ - Sack: slab-out-of-bounds in vsscanf
+ - mm/slub: fix a memory leak in sysfs_slab_add()
+ - fat: don't allow to mount if the FAT length == 0
+ - perf: Add cond_resched() to task_function_call()
+ - agp/intel: Reinforce the barrier after GTT updates
+ - mm: sdhci-msm: Clear tuning done flag while hs400 tuning
+ - mm: sdio: Fix potential NULL pointer error in mmc_sdio_init_card()
+ - can: kvaser_usb: kvaser_usb_leaf: Fix some info-leaks to USB devices
+ - xen/pvcalls-back: test for errors when calling backend_connect()
+ - ACPI: GED: use correct trigger type field in _Exx / _Lxx handling
+ - drm: bridge: adv7511: Extend list of audio sample rates
+ - crypto: cc -- don't "select" CONFIG_DMADEVICES
+ - media: si2157: Better check for running tuner in init
+ - objtool: Ignore empty alternatives
+ - spi: pxa2xx: Apply CS clk quirk to BXT
+ - net: ena: fix error returning in ena_com_get_hash_function()
+ - spi: dw: Zero DMA Tx and Rx configurations on stack
+ - ixgbe: Fix XDP redirect on archs with PAGE_SIZE above 4K
+ - MIPS: Loongson: Build ATI Radeon GPU driver as module
+ - Bluetooth: Add SCO fallback for invalid LMP parameters error
+ - kgdb: Prevent infinite recursive entries to the debugger
+ - spi: dw: Enable interrupts in accordance with DMA xfer mode
+ - clocksource: dw_apb_timer: Make CPU-affiliation being optional
+ - clocksource: dw_apb_timer_of: Fix missing clockevent timers
+ - btrfs: do not ignore error from btrfs_next_leaf() when inserting checksums
+ - ARM: 8978/1: mm: make act_mm() respect THREAD_SIZE
+ - spi: dw: Fix Rx-only DMA transfers
+ - x86/kvm/hyper-v: Explicitly align hcall param for kvm_hyperv_exit
+ - net: vmxnet3: fix possible buffer overflow caused by bad DMA value in
  vmxnet3_get rss()
+ - staging: android: ion: use vmap instead of vm_map_ram
+ - bcmfmac: fix wrong location to get firmware feature
+ - tools api fs: Make xxx__mountpoint() more scalable
+ - e1000: Distribute switch variables for initialization
+ dt-bindings: display: mediatek: control dpi pins mode to avoid leakage
+ audit: fix a net reference leak in audit_send_reply()
+ media: dvb: return -EREMOTEIO on i2c transfer failure.
+ media: platform: fcp: Set appropriate DMA parameters
+ MIPS: Make sparse_init() using top-down allocation
+ audit: fix a net reference leak in audit_list_rules_send()
+ netfilter: nft_nat: return EOPNOTSUPP if type or flags are not supported
+ net: bcmgenet: set Rx mode before starting netif
+ lib/mmpi: Fix 64-bit MIPS build with Clang
+ exit: Move preemption fixup up, move blocking operations down
+ net: lpc-enet: fix error return code in lpc_mii_init()
+ media: cec: silence shift wrapping warning in __cec_s_log_addrs()
+ net: allwinner: Fix use correct return type for ndo_start_xmit()
+ powerpc/spufs: fix copy_to_user while atomic
+ Crypto/chcr: fix for ccm(aes) failed test
+ MIPS: Truncate link address into 32bit for 32bit kernel
+ mips: cm: Fix an invalid error code of INTVN_*_ERR
+ kgdb: Fix spurious true from in_dbg_master()
+ nvme: refine the Qemu Identify CNS quirk
+ wcn36xx: Fix error handling path in 'wcn36xx_probe()'
+ net: qed*: Reduce RX and TX default ring count when running inside kdump
+ kernel
+ md: don't flush workqueue unconditionally in md_open
+ rtlwifi: Fix a double free in _rtl_usb_tx_urb_setup()
+ mwifiex: Fix memory corruption in dump_station
+ x86/boot: Correct relocation destination on old linkers
+ mips: MAAR: Use more precise address mask
+ mips: Add udelay lpj numbers adjustment
+ x86/mm: Stop printing BRK addresses
+ m68k: mac: Don't call via_flush_cache() on Mac II fx
+ macvlan: Skip loopback packets in RX handler
+ PCI: Don't disable decoding when mmio_always_on is set
+ MIPS: Fix IRQ tracing when call handle_fpe() and handle_msa_fpe()
+ mmc: sdhci-msm: Set SDHCI_QUIRK_MULTIBLOCK_READ_ACM12 quirk
+ staging: greybus: sdio: Respect the cmd->busy_timeout from the mmc core
+ mmc: via-sdmmc: Respect the cmd->busy_timeout from the mmc core
+ ixgbe: fix signed-integer-overflow warning
+ mmc: sdhci-esdhc-imx: fix the mask for tuning start point
+ spi: dw: Return any value retrieved from the dma_transfer callback
+ cpuidle: Fix three reference count leaks
+ platform/x86: hp-wmi: Convert simple_strtoul() to kstrtou32()
+ string.h: fix incompatibility between FORTIFY_SOURCE and KASAN
+ btrfs: send: emit file capabilities after chown
+ mm: thp: make the THP mapcount atomic against _split_huge_pmd_locked()
+ ima: Fix ima digest hash table key calculation
+ ima: Directly assign the ima_default_policy pointer to ima_rules
+ kvm: Fix possible memory leak in kvm_vcpu_mmap()
+ ext4: fix EXT_MAX_EXTENSION to check for zeroed eh_max
- ext4: fix error pointer dereference
- ext4: fix race between ext4_sync_parent() and rename()
- PCI: Add ACS quirk for iProc PAXB
- PCI: Add ACS quirk for Ampere root ports
- PCI: Make ACS quirk implementations more uniform
- vga_switcheroo: Deduplicate power state tracking
- vga_switcheroo: Use device link for HDA controller
- PCI: Generalize multi-function power dependency device links
- PCI: Add ACS quirk for Intel Root Complex Integrated Endpoints
- PCI: Unify ACS quirk desired vs provided checking
- btrfs: fix error handling when submitting direct I/O bio
- btrfs: fix wrong file range cleanup after an error filling dealloc range
- blk-mq: move _blk_mq_update_nr_hw_queues synchronize_rcu call
- PCI: Program MPS for RGCP devices
- e1000e: Relax condition to trigger reset for ME workaround
- carl9170: remove P2P_GO support
- media: go7007: fix a miss of snd_card_free
- b43legacy: Fix case where channel status is corrupted
- b43: Fix connection problem with WPA3
- b43 Legacy: Fix connection problem with WPA3
- media: ov5640: fix use of destroyed mutex
- igb: Report speed and duplex as unknown when device is runtime suspended
- power: vexpres: add suppress_bind_attrs to true
- pinctrl: samsung: Save/restore eint_mask over suspend for EINT_TYPE GPIOs
- sparc32: fix register window handling in genregs32_[gs]et()
- sparc64: fix misuses of access_process_vm() in genregs32_[sg]et()
- dm crypt: avoid truncating the logical block size
- kernel/cpu_pm: Fix uninitied local in cpu_pm
- ARM: tegra: Correct PL310 Auxiliary Control Register initialization
- drivers/macintosh: Fix memleak in windfarm_pm112 driver
- powerpc/64s: Don't let DT CPU features set FSCR_DSCR
- powerpc/64s: Save FSCR to init_task.thread.fscr after feature init
- kbuild: force to build vmlinux if CONFIG_MODVERSION=y
- sunrpc: svcauth_gss_register_pseudoflavor must reject duplicate registrations.
- sunrpc: clean up properly in gss_mech_unregister()
- mtd: rawnand: brcmnand: fix hamming oob layout
- mtd: rawnand: pasemi: Fix the probe error path
- w1: omap-hdq: cleanup to add missing newline for some dev_dbg
- perf probe: Do not show the skipped events
- perf probe: Fix to check blacklist address correctly
- perf symbols: Fix debuginfo search for Ubuntu
- bridge: Avoid infinite loop when suppressing NS messages with invalid options
- tun: correct header offsets in napi frags mode
- Input: mms114 - fix handling of mms345l
- x86/cpu/amd: Make erratum #1054 a legacy erratum
- ALSA: usb-audio: Add vendor, product and profile name for HP Thunderbolt
+ Dock
+ - PM: runtime: clk: Fix clk_pm_runtime_get() error path
+ - net: atlantic: make hw_get_regs optional
+ - efi/libstub/x86: Work around LLVM ELF quirk build regression
+ - mmc: meson-mx-sdio: trigger a soft reset after a timeout or CRC error
+ - Bluetooth: btbcm: Add 2 missing models to subver tables
+ - sched/core: Fix illegal RCU from offline CPUs
+ - drivers/perf: hisi: Fix typo in events attribute array
+ - xfs: reset buffer write failure state on successful completion
+ - net/mlx5e: IPoIB, Drop multicast packets that this interface sent
+ - crypto: stm32/crc32 - fix ext4 chksum BUG_ON()
+ - crypto: stm32/crc32 - fix multi-instance
+ - btrfs: qgroup: mark qgroup inconsistent if we're inheriting snapshot to a new
  qgroup
+ - bcache: fix refcount underflow in bcache_device_free()
+ - PCI: Avoid Pericom USB controller OHCI/EHCI PME# defect
+ - PCI: Remove unused NFP32xx IDs
+ - PCI: add USR vendor id and use it in r8169 and w6692 driver
+ - PCI: Move Rohm Vendor ID to generic list
+ - misc: pci_endpoint_test: Add the layerscape EP device support
+ - misc: pci_endpoint_test: Add support to test PCI EP in AM654x
+ - x86/amd_nb: Add PCI device IDs for family 17h, model 70h
+ - ALSA: lx6464es - add support for LX6464ESe pci express variant
+ - PCI: Add Genesys Logic, Inc. Vendor ID
+ - PCI: Add Amazon's Annapurna Labs vendor ID
+ - x86/amd_nb: Add Family 19h PCI IDs
+ - PCI: Add Loongson vendor ID
+ - serial: 8250_pci: Move Pericom IDs to pci_ids.h
+ - alpha: fix memory barriers so that they conform to the specification
+ - perf probe: Check address correctness by map instead of _etext
+
+ * Bionic update: upstream stable patchset 2020-06-12 (LP: #1883314)
+ - libnvdimm: Fix endian conversion issues
+ - spi: dw: use "smp_mb()" to avoid sending spi data error
+ - s390/fttrace: save traced function caller
+ - ARC: Fix ICCM & DCCM runtime size checks
+ - ARC: [plat-ecnps]: Restrict to CONFIG_ISA_ARCOMPACT
+ - i2c: altera: Fix race between xfer_msg and isr thread
+ - x86/mmiotrace: Use cpumask_available() for cpumask_var_t variables
+ - net: bmac: Fix read of MAC address from ROM
+ - net/ethernet/freescale: rework quiesce/activate for uce_geth
+ - net: ethernet: stmmac: Enable interface clocks on probe for IPQ806x
+ - net: smsc911x: Fix runtime PM imbalance on error
+ - HID: sony: Fix for broken buttons on DS3 USB dongles
+ - HID: i2c-hid: add Schneider SCL142ALM to descriptor override
+ - p54usb: add AirVasT USB stick device-id
+ - mmc: fix compilation of user API
+ - scsi: ufs: Release clock if DMA map fails
+ - airo: Fix read overflows sending packets
+ - devinet: fix memleak in inetdev_init()
+ - 12tp: do not use inet_hash()/inet_unhash()
+ - net: usb: qmi_wwan: add Telit LE910C1-EUX composition
+ - NFC: st21nfca: add missed kfree_skb() in an error path
+ - vsoc: fix timeout in vsock_accept()
+ - net: check untrusted gso_size at kernel entry
+ - 12tp: add sk_family checks to 12tp_validate_socket
+ - USB: serial: qserial: add DW5816e QDL support
+ - USB: serial: usb_wwan: do not resubmit rx urb on fatal errors
+ - USB: serial: option: add Telit LE910C1-EUX compositions
+ - usb: musb: start session in resume for host port
+ - usb: musb: Fix runtime PM imbalance on error
+ - vt: keyboard: avoid signed integer overflow in k_ascii
+ - tty: hvc_console, fix crashes on parallel open/close
+ - staging: rtl8712: Fix IEEE80211_ADDBA_PARAM_BUF_SIZE_MASK
+ - CDC-ACM: heed quirk also in error handling
+ - nvmem: qfprom: remove incorrect write support
+ - iio: vcn4000: Fix i2c swapped word reading.
+ - uprobes: ensure that uprobe->offset and ->ref_ctr_offset are properly aligned
+ - drm/i915: fix port checks for MST support on gen >= 11
+ - s390/mm: fix set_huge_pte_at() for empty ptes
+ * Bionic update: upstream stable patchset 2020-06-11 (LP: #1883167)
+ - ax25: fix setsockopt(SO_BINDTODEVICE)
+ - net: ipip: fix wrong address family in init error path
+ - net/mlx5: Add command entry handling completion
+ - net: revert "net: get rid of an signed integer overflow in ip_idents_reserve()"
+ - net sched: fix reporting the first-time use timestamp
+ - r8152: support additional Microsoft Surface Ethernet Adapter variant
+ - scps: Start shutdown on association restart if in SHUTDOWN-SENT state and socket is closed
+ - net/mlx5e: Update netdev txq on completions during closure
+ - net: qrtr: Fix passing invalid reference to qrtr_local_enqueue()
+ - net: sun: fix missing release regions in cas_init_one().
+ - net/mlx4_core: fix a memory leak bug.
+ - ARM: dts: rockchip: fix phy nodename for rk3228-evb
+ - arm64: dts: rockchip: swap interrupts interrupt-names rk3399 gpu node
+ - ARM: dts: rockchip: fix pinctrl sub nodename for spi in rk322x.dtsi
+ - gpio: tegra: mask GPIO IRQs during IRQ shutdown
+ - net: microchip: encx24j600: add missed kthread_stop
+ - gfs2: move privileged user check to gfs2_quota_lock_check
+ - cachefiles: Fix race between read_waiter and read_copier involving op->to_do
+ - usb: gadget: legacy: fix redundant initialization warnings
+ - net: freescale: select CONFIG_FIXED_PHY where needed
- cifs: Fix null pointer check in cifs_read
- samples: bpf: Fix build error
- Input: usbtouchscreen - add support for BonXeon TP
- Input: evdev - call input_flush_device() on release(), not flush()
- Input: xpad - add custom init packet for Xbox One S controllers
- Input: dlink-dir685-touchkeys - fix a typo in driver name
- Input: i8042 - add ThinkPad S230u to i8042 reset list
- Input: synaptics-rmi4 - really fix attn_data use-after-free
- Input: synaptics-rmi4 - fix error return code in rmi_driver_probe()
- ARM: 8843/1: use unified assembler in headers
- ARM: uaccess: consolidate uaccess asm to asm/uaccess-asm.h
- ARM: uaccess: integrate uaccess_save and uaccess_restore
- ARM: uaccess: fix DACR mismatch with nested exceptions
- gpio: exar: Fix bad handling for ida_simple_get error path
- IB/qib: Call kobject_put() when kobject_init_and_add() fails
- ARM: dts: imx6q-bx50v3: Add internal switch
- ARM: dts/imx6q-bx50v3: Set display interface clock parents
- ARM: dts: bcm2835-rpi-zero-w: Fix led polarity
- mmc: block: Fix use-after-free issue for rpmb
- RDMA/pvrdma: Fix missing pci disable in pvrdma_pci_probe()
- ALSA: hwdep: fix a left shifting 1 by 31 UB bug
- ALSA: usb-audio: mixer: volume quirk for ESS Technology Asus USB DAC
- exec: Always set cap_ambient in cap_bprm_set_creds
- ALSA: hda/realtek - Add new codec supported for ALC287
- libceph: ignore pool overlay and cache logic on redirects
- mm: remove VM_BUG_ON(PageSlab()) from page_mapcount()
- fs/binfmt_elf.c: allocate initialized memory in fill_thread_core_info()
- include/asm-generic/topology.h: guard cpumask_of_node() macro argument
- iommu: Fix reference count leak in iommu_group_alloc.
- parisc: Fix kernel panic in mem_init()
- mac80211: mesh: fix discovery timer re-arming issue / crash
- x86/dma: Fix max PFN arithmetic overflow on 32 bit systems
- copy_xstate_to_kernel(): don't leave parts of destination uninitialized
- xfrm: allow to accept packets with ipv6 NEXTHDR_HOP in xfrm_input
- xfrm: call xfrm_output_gso when inner_protocol is set in xfrm_output
- xfrm: fix a warning in xfrm_policy_insert_list
- xfrm: fix a NULL-ptr deref in xfrm_local_error
- xfrm: fix error in comment
- vt4: eliminated some duplicate code.
- ip_vti: receive ipip packet by calling ip_tunnel_rcv
- netfilter: nft_reject_bridge: enable reject with bridge vlan
- netfilter: ipset: Fix subcounter update skip
- netfilter: nfnetlink_cethelper: unbreak userspace helper support
- netfilter: nf_conntrack_pptp: prevent buffer overflows in debug code
- esp6: get the right proto for transport mode in esp6_gso_encap
- qlcnic: fix missing release in qlcnic_83xx_interrupt_test.
- netfilter: nf_conntrack_pptp: fix compilation warning with W=1 build
+ - mm/vmalloc.c: don't dereference possible NULL pointer in __vunmap()
+ - KVM: VMX: check for existence of secondary exec controls before accessing
+ - dpaa_eth: fix usage as DSA master, try 3
+ - net: dsa: mt7530: fix roaming from DSA user ports
+ - net: inet_csk: Fix so_reuseport bind-address cache in tb->fast*
+ - scpt: Don't add the shutdown timer if its already been added
+ - arm64: dts: rockchip: fix status for &gmac2phy in rk3328-evb.dts
+ - ARM: dts: rockchip: swap clock-names of gpu nodes
+ - IB/i40iw: Remove bogus call to netdev_master_upper_dev_get()
+ - riscv: stacktrace: Fix undefined reference to `walk_stackframe'
+ - ARM: 8970/1: decompressor: increase tag size
+ - ARM: dts: bcm: HR2: Fix PPI interrupt types
+ - ALSA: hda/realtek - Add a model for Thinkpad T570 without DAC workaround
+ - ALSA: usb-audio: Quirks for Gigabyte TRX40 Aorus Master onboard audio
+ - IB/ipoib: Fix double free of skb in case of multicast traffic in CM mode
+ - bnxt_en: Fix accumulation of bp->net_stats_prev.
+ + * apparmor reference leak causes refcount_t overflow with af_alg_accept()
+   (LP: #1883962)
+ - apparmor: check/put label on apparmor_sk_clone_security()
+ + * Freezing on boot since kernel 4.15.0-72-generic release (LP: #1856387)
+ - x86/timer: Don't skip PIT setup when APIC is disabled or in legacy mode
+ + * smbboot: don't call topology_sane() when Sub-NUMA-Clustering is enabled
+   (LP: #182478)
+ - x86, sched: Allow topologies where NUMA nodes share an LLC
+ + -- Khalid Elmously <khalid.elmously@canonical.com>  Sun, 09 Aug 2020 02:32:04 -0400
+ +linux (4.15.0-112.113) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-112.113 -proposed tracker (LP: #1887048)
+ + - Packaging resync (LP: #1786013)
+ - update dkms package versions
+ + * CVE-2020-11935
+ - SAUCE: aufs: do not call i_readcount_inc()
+ - SAUCE: aufs: bugfix, IMA i_readcount
+ + * CVE-2020-10757
+ - mm: Fix mremap not considering huge pmd devmap
+ + * Update lockdown patches (LP: #1884159)
+ - efi/efi_test: Lock down /dev/efi_test and require CAP_SYS_ADMIN
+ - efi: Restrict efivar_ssdtt_load when the kernel is locked down
+ - powerpc/xmon: add read-only mode
- powerpc/xmon: Restrict when kernel is locked down
- [Config] CONFIG_XMON_DEFAULT_RO_MODE=y
- SAUCE: acpi: disallow loading configfs acpi tables when locked down

* seccomp_bpf fails on powerpc (LP: #1885757)
- SAUCE: selftests/seccomp: fix ptrace tests on powerpc

* Introduce the new NVIDIA 418-server and 440-server series, and update the current NVIDIA drivers (LP: #1881137)
- [packaging] add signed modules for the 418-server and the 440-server flavours

-- Khalid Elmously <khalid.elmously@canonical.com>  Thu, 09 Jul 2020 19:13:37 -0400

+ linux (4.15.0-111.112) bionic; urgency=medium
+ * bionic/linux: 4.15.0-111.112 -proposed tracker (LP: #1886999)
+ * Bionic update: upstream stable patchset 2020-05-07 (LP: #1877461)
- SAUCE: mlxsw: Add missmerged ERR_PTR hunk
+ * linux 4.15.0-109-generic network DoS regression vs -108 (LP: #1886668)
- SAUCE: Revert "netprio_cgroup: Fix unlimited memory leak of v2 cgroups"

-- Khalid Elmously <khalid.elmously@canonical.com>  Thu, 09 Jul 2020 16:03:14 -0400

+ linux (4.15.0-109.110) bionic; urgency=medium
+ * Packaging resync (LP: #1786013)
+ - [Packaging] update helper scripts
+ - update dkms package versions
+ * Build and ship a signed wireguard.ko (LP: #1861284)
+ - [Packaging] wireguard -- add support for building signed .ko
+ * CVE-2019-16089
- SAUCE: nbd_genl_status: null check for nla_nest_start
+ * CVE-2019-19642
- kernel/relay.c: handle alloc_percpu returning NULL in relay_open
+ * CVE-2019-12380
+ - efi/x86/Add missing error handling to old_memmap 1:1 mapping code
+ * CVE-2019-19039 // CVE-2019-19377
- btrfs: sink flush_fn to extent_write_cache_pages
- btrfs: extent_io: Move the BUG_ON() in flush_write_bio() one level up
- btrfs: Don't submit any btree write bio if the fs has errors
* CVE-2019-19036
  - btrfs: volumes: Use more straightforward way to calculate map length
  - btrfs: tree-checker: Try to detect missing INODE_ITEM
  - Btrfs: tree-checker: detect file extent items with overlapping ranges
  - Btrfs: make tree checker detect checksum items with overlapping ranges
  - btrfs: hardened against duplicate fsid on scanned devices
  - Btrfs: fix missing data checksums after replaying a log tree
  - btrfs: reloc: fix reloc root leak and NULL pointer dereference
  - btrfs: Validate child tree block's level and first key
  - btrfs: Detect unbalanced tree with empty leaf before crashing btree operations

* CVE-2019-19318
  - btrfs: tree-checker: Replace root parameter with fs_info
  - btrfs: tree-checker: Check level for leaves and nodes
  - btrfs: tree-checker: get fs_info from eb in generic_err
  - btrfs: tree-checker: get fs_info from eb in file_extent_err
  - btrfs: tree-checker: get fs_info from eb in check_csum_item
  - btrfs: tree-checker: get fs_info from eb in dir_item_err
  - btrfs: tree-checker: get fs_info from eb in check_dir_item
  - btrfs: tree-checker: get fs_info from eb in block_group_err
  - btrfs: tree-checker: get fs_info from eb in check_block_group_item
  - btrfs: tree-checker: get fs_info from eb in check_extent_data_item
  - btrfs: tree-checker: get fs_info from eb in check_leaf_item
  - btrfs: tree-checker: get fs_info from eb in check_leaf
  - btrfs: tree-checker: get fs_info from eb in chunk_err
  - btrfs: tree-checker: get fs_info from eb in dev_item_err
  - btrfs: tree-checker: get fs_info from eb in check_inode_item
  - btrfs: tree-checker: Add ROOT_ITEM check
  - btrfs: tree-checker: Add EXTENT_ITEM and METADATA_ITEM check
  - btrfs: tree-checker: Add simple keyed refs check
  - btrfs: tree-checker: Add EXTENT_DATA_REF check
  - btrfs: tree-checker: Fix wrong check on max devid
  - Btrfs: fix selftests failure due to uninitialized i_mode in test inodes

* CVE-2019-19813 // CVE-2019-19816
  - btrfs: refactor parameter of BTRFS_MAX_DEVS() from root to fs_info
  - btrfs: Move btrfs_check_chunk_valid() to tree-check.[ch] and export it
  - btrfs: tree-checker: Make chunk item checker messages more readable
  - btrfs: tree-checker: Make btrfs_check_chunk_valid() return EUCLEAN instead of EIO
  - btrfs: tree-checker: Check chunk item at tree block read time
  - btrfs: tree-checker: Verify dev item
  - btrfs: tree-checker: Enhance chunk checker to validate chunk profile
  - btrfs: tree-checker: Verify inode item
  - btrfs: inode: Verify inode mode to avoid NULL pointer dereference
+ * CVE-2020-0543
+  - UBUNTU/SAUCE: x86/speculation/srbds: do not try to turn mitigation off when
+    not supported
+
+ + * Build Nvidia drivers in conjunction with kernel (LP: #1764792)
+  - [Packaging] disable nvidia dkms builds for mainline
+
+ + * Bionic update: upstream stable patchset 2020-06-02 (LP: #1881801)
+  - i2c: dev: Fix the race between the release of i2c_dev and cdev
+  - ima: Set file->f_mode instead of file->f_flags in ima_calc_file_hash()
+  - evm: Check also if *tfm is an error pointer in init_desc()
+  - ima: Fix return value of ima_write_policy()
+  - fix multiplication overflow in copy_fdtable()
+  - iommu/amd: Fix over-read of ACPI UID from IVRS table
+  - i2c: mux: demux-pinctrl: Fix an error handling path in
+    'i2c_demux_pinctrl_probe()'
+  - ubi: Fix seq_file usage in detailed_erase_block_info debugfs file
+  - gcc-common.h: Update for GCC 10
+  - HID: multitouch: add eGalaxTouch P80H84 support
+  - scsi: qla2xxx: Fix hang when issuing nvme disconnect-all in NPIV
+  - configsfs: fix config_item refcnt leak in configsfs_rmdir()
+  - vhost/vsock: fix packet delivery order to monitoring devices
+  - component: Silence bind error on -EPROBE_DEFER
+  - sccs: ibmvsccs: Fix WARN_ON during event pool release
+  - x86/apic: Move TSC deadline timer debug printk
+  - gtp: set NLM_F_MULTI flag in gtp_genl_dump_pdp()
+  - ceeph: fix double unlock in handle_cap_export()
+  - USB: core: Fix misleading driver bug report
+  - platform/x86: asus-nb-wmi: Do not load on Asus T100TA and T200TA
+  - ARM: futex: Address build warning
+  - padata: Replace delayed timer with immediate workqueue in padata_reorder
+  - padata: initialize pd->cpu with effective cpumask
+  - padata: purge get_cpu and reorder_via_wq from padata_do_serial
+  - arm64: fix the flush_icache_range arguments in machine_kexec
+  - ALSA: iec1712: Initialize STDSP24 properly when using the model=staudio
+    option
+  - ALSA: pcm: fix incorrect hw_base increase
+  - apparmor: Fix aa_label refcnt leak in policy_update
+  - dmaengine: tegra210-adma: Fix an error handling path in 'tegra_adma_probe()'
+  - powerpc: restore alphabetic order in Kconfig
+  - powerpc: Remove STRICT_KERNEL_RWX incompatibility with RELOCATABLE
+  - powerpc64s: Disable STRICT_KERNEL_RWX
+  - x86/uaccess, ubsan: Fix UBSAN vs. SMAP
+  - ubsan: build ubsan.c more conservatively
+  - libnvdimm/btt: Remove unnecessary code in btt_freelist_init
+  - libnvdimm/btt: Fix LBA masking during 'free list' population
+  - media: fdp1: Fix R-Car M3-N naming in debug message
* cxgb4: free mac_hlist properly
* cxgb4/cxgb4vf: Fix mac_hlist initialization and free
* Revert "gfs2: Don't demote a glock until its revokes are written"
* staging: iio: ad2s1210: Fix SPI reading
* staging: greybus: Fix uninitialized scalar variable
* iio: sca3000: Remove an erroneous 'get_device()'
* iio: dac: vf610: Fix an error handling path in 'vf610_dac_probe()'
* mei: release me_cl object reference
* rapidio: fix an error in get_user_pages_fast() error handling
* rxrpc: Fix a memory leak in rxkad_verify_response()
* x86/unwind/orc: Fix unwind_get_return_address_ptr() for inactive tasks
* iio: adc: stm32-adc: Use dma_request_chan() instead
dma_request_slave_channel()
* iio: adc: stm32-adc: fix device used to request dma
* riscv: set max_pfn to the PFN of the last page
* HID: alps: Add AU11657 device ID
* HID: alps: ALPS_1657 is too specific; use U1_UNICORN_LEGACY instead
* aquantia: Fix the media type of AQC100 ethernet controller in the driver
* HID: i2c-hid: reset Synaptics SYNA2393 on resume
* HID: quirks: Add HID_QUIRK_NO_INIT_REPORTS quirk for Dell K12A keyboard-dock
* stmmac: fix pointer check after utilization in stmmac_interrupt
* ALSA: hda/realtek: Fix silent output on Gigabyte X570 Aorus Xtreme
* ALSA: hda/realtek: Add more fixup entries for Clevo machines
* drm/etnaviv: fix perfmon domain interation
* nfit: Add Hyper-V NVDIMM DSM command set to white list
* thunderbolt: Drop duplicated get_switch_at_route()
* net: bcmgenet: code movement
* net: bcmgenet: abort suspend on error
* misc: rtsx: Add short delay after exit from ASPM

* Bionic update: upstream stable patchset 2020-05-21 (LP: #1880014)
* USB: serial: qcsarial: Add DW5816e support
* dp83640: reverse arguments to list_add_tail
* fq_codel: fix TCA_FQ_CODEL_DROP_BATCH_SIZE sanity checks
* net: macsec: preserve ingress frame ordering
* net/mlx4_core: Fix use of ENOSPC around mlx4_counter_alloc()
* net: usb: qmi_wwan: add support for DW5816e
* sch_choke: avoid potential panic in choke_reset()
* sch_sfq: validate silly quantum values
* bnxt_en: Fix VLAN acceleration handling in bnxt_fix_features().
* net/mlx5: Fix forced completion access non initialized command entry
* net/mlx5: Fix command entry leak in Internal Error State
* bnxt_en: Improve AER slot reset.
* bnxt_en: Fix VF anti-spoof filter setup.
* net: stricter validation of untrusted gso packets
* ipv6: fix cleanup ordering for ip6_mr failure
* HID: wacom: Read HID_DG_CONTACTMAX directly for non-generic devices
- HID: usbhid: Fix race between usbhid_close() and usbhid_stop()
- USB: usb: add quirk for LaCie 2Big Quadra
- USB: serial: garmin_gps: add sanity checking for data length
- tracing: Add a vmalloc_sync_mappings() for safe measure
- KVM: arm: vgic: Fix limit condition when writing to GICD[1][CS]ACTIVER
- mm/page_alloc: fix watchdog soft lockups during set_zone_contiguous()
- coredump: fix crash when umh is disabled
- batman-adv: fix batadv_nc_random_weight_tq
- batman-adv: Fix refcnt leak in batadv_show_throughput_override
- batman-adv: Fix refcnt leak in batadv_store_throughput_override
- batman-adv: Fix refcnt leak in batadv_v_ogm_process
- x86/entry/64: Fix unwind hints in kernel exit path
- x86/entry/64: Fix unwind hints in rewond_stack_do_exit()
- x86/unwind/orc: Don't skip the first frame for inactive tasks
- x86/unwind/orc: Prevent unwinding before ORC initialization
- netfilter: nat: never update the UDP checksum when it's 0
- objtool: Fix stack offset tracking for indirect CFAs
- scripts/decodecode: fix trapping instruction formatting
- net: stmmac: Use mutex instead of spinlock
- shmem: fix possible deadlocks on shmlock_user_lock
- net/sonic: Fix a resource leak in an error handling path in
  'jazz_sonic_probe()'
- net: moxa: Fix a potential double 'free_irq()' 
- drop_monitor: work around gcc-10 stringop-overflow warning
- virtio-blk: handle block_device_operations callbacks after hot unplug
- scsi: sg: add sg_remove_request in sg_write
- dmaengine: pch_dma.c: Avoid data race between probe and irq handler
- dmaengine: mmp_tdma: Reset channel error on release
- cpufreq: intel_pstate: Only mention the BIOS disabling turbo mode once
- ALSA: hda/hdmi: fix race in monitor detection during probe
- drm/qxl: lost qxl_bo_kunmapAtomic_page in qxl_image_init_helper()
- ipc/util.c: sysvipc_find_ipc() incorrectly updates position index
- x86/entry/64: Fix unwind hints in register clearing code
- ipmi: Fix NULL pointer dereference in ssif_probe
- pinctrl: baytrail: Enable pin configuration setting for GPIO chip
- pinctrl: cherryview: Add missing spinlock usage in chv_gpio_irq_handler
- i40iw: Fix error handling in i40iw_manage_arp_cache()
- netfilter: conntrack: avoid gcc-10 zero-length-bounds warning
- IB/mlx4: Test return value of calls to ib_get_cached_pkey
- hwmon: (da9052) Synchronize access with mfd
- pnp: Use list_for_each_entry() instead of open coding
- gcc-10 warnings: fix low-hanging fruit
- kbuild: compute false-positive -Wmaybe-uninitialized cases in Kconfig
- Stop the ad-hoc games with -Wno-maybe-initialized
- gcc-10: disable 'zero-length-bounds' warning for now
- gcc-10: disable 'array-bounds' warning for now
- gcc-10: disable 'stringop-overflow' warning for now
+ - gcc-10: disable 'restrict' warning for now
+ - gcc-10: avoid shadowing standard library 'free()' in crypto
+ - x86/asm: Add instruction suffixes to bitops
+ - net: phy: micrel: Use strlcpy() for ethtool::get_strings
+ - net: fix a potential recursive NETDEV_FEAT_CHANGE
+ - net: phy: fix aneg restart in phy_ethtool_set_eee
+ - Revert "ipv6: add mtu lock check in __ip6_rt_update_pmtu"
+ - hinic: fix a bug of ndo_stop
+ - net: dsa: loop: Add module soft dependency
+ - net: ipv4: really enforce backoff for redirects
+ - netpro_cgroup: Fix unlimited memory leak of v2 cgroups
+ - net: tcp: fix rx timestamp behavior for tcp_recvmmsg
+ - ALSA: hda/realtek - Limit int mic boost for Thinkpad T530
+ - ALSA: rawmidi: Initialize allocated buffers
+ - ALSA: rawmidi: Fix racy buffer resize under concurrent accesses
+ - ARM: dts: dra?: Fix bus_dma_limit for PCIe
+ - ARM: dts: imx27-phytec-phycard-s-rdk: Fix the I2C1 pinctrl entries
+ - x86: Fix early boot crash on gcc-10, third try
+ - ALSA: usb-audio: Add control message quirk delay for Kingston HyperX headset
+ - usb: core: hub: limit HUB_QUIRK_DISABLE_AUTOSUSPEND to USB5534B
+ - usb: host: xhci-plat: keep runtime active when removing host
+ - usb: xhci: Fix NULL pointer dereference when enqueuing trbs from urb sg list
+ - x86/unwind/orc: Fix error handling in __unwind_start()
+ - exec: Move would_dump into flush_old_exec
+ - clk: rockchip: fix incorrect configuration of rk3228 aclk_gpu* clocks
+ - usb: gadget: net2272: Fix a memory leak in an error handling path in
  'net2272_plat_probe()'
+ - usb: gadget: audio: Fix a missing error return value in audio_bind()
+ - usb: gadget: legacy: fix error return code in gncm_bind()
+ - usb: gadget: legacy: fix error return code in cdc_bind()
+ - arm64: dts: rockchip: Replace RK805 PMIC node name with "pmic" on rk3328
  boards
+ - arm64: dts: rockchip: Rename dwc3 device nodes on rk3399 to make dtc happy
+ - ARM: dts: r8a73a4: Add missing CMT1 interrupts
+ - ARM: dts: r8a7740: Add missing extal2 to CPG node
+ - KVM: x86: Fix off-by-one error in kvm_vcpu_ioctl_x86_setup_mce
+ - Makefile: disallow data races on gcc-10 as well
+ - scctp: Fix bundling of SHUTDOWN with COOKIE-ACK
+ - arm64: hugetlb: avoid potential NULL dereference
+ - net: dsa: Do not make user port errors fatal
+ - pppoe: only process PADT targeted at local interfaces
+ - risvc: fix vdsos build with lld
+ - netfilter: nft_set_rbtree: Introduce and use nft_rbtree_interval_start()
+ - cifs: fix leaked reference on requeued write
+ - clk: Unlink clock if failed to prepare or enable
+ * upgrading to 4.15.0-99-generic breaks the sound and the trackpad
+ (LP: #1875916) // Bionic update: upstream stable patchset 2020-05-21
- Revert "ALSA: hda/realtek: Fix pop noise on ALC225"

* Pop sound from build-in speaker during cold boot and resume from S3
  (LP: #1866357) // Bionic update: upstream stable patchset 2020-05-21
  (LP: #1880014)
  - Bionic update: upstream stable patchset 2020-05-19 (LP: #1879536)
  - vhost: vsocx: kick send_pkt worker once device is started
  - powerpc/pci/of: Parse unassigned resources
  - ASoC: topology: Check return value of pcm_new_ver
  - selftests/ipc: Fix test failure seen after initial test run
  - ASoC: sgtl5000: Fix VAG power-on handling
  - ASoC: rsnd: Fix HDMI channel mapping for multi-SSI mode
  - ASoC: codecs: hda_hDMI: Fix incorrect use of list_for_each_entry
  - wimax/i2400m: Fix potential urb refcnt leak
  - net: stmmac: fix enabling socfga's ptp_ref_clock
  - net: stmmac: Fix sub-second increment
  - cifs: protect updating server->dstaddr with a spinlock
  - s390/fttrace: fix potential crashes when switching tracers
  - scripts/config: allow colons in option strings for sed
  - lib/mpi: Fix building for powerpc with clang
  - net: bcmgenet: suppress warnings on failed Rx SKB allocations
  - net: systemport: suppress warnings on failed Rx SKB allocations
  - sctp: Fix SHUTDOWN CTSN Ack in the peer restart case
  - ALSA: hda: Match both PCI ID and SSID for driver blacklist
  - mac80211: add iee80211_is_any_nullfunc()
  - cgroup, netclassid: remove double cond_resched
  - ASoC: rsnd: Fix parent SSI start/stop in multi-SSI mode
  - drm/amdgpu: Correctly initialize thermal controller for GPUs with Powerplay
    table v0 (e.g Hawaii)
  - ASoC: rsnd: Don't treat master SSI in multi SSI setup as parent
  - ASoC: rsnd: Fix "status check failed" spam for multi-SSI
  - drm/amdgpu: Fix oops when pp_funcs is unset in ACPI event
  - hexagon: clean up ioremap
  - hexagon: define ioremap_uc
  - drm/atomic: Take the atomic toys away from X

* Performing function level reset of AMD onboard USB and audio devices causes
  system lockup (LP: #1865988)
  - SAUCE: PCI: Avoid FLR for AMD Matisse HD Audio & USB 3.0
  - SAUCE: PCI: Avoid FLR for AMD Starship USB 3.0

* add 16-bit width registers support for EEPROM at24 device (LP: #1876699)
  - SAUCE: at24-smbus-16bit-address
* qeth: utilize virtual MAC for Layer2 OSD devices (LP: #1880834)
+ - s390/qeth: improve fallback to random MAC address
+ - s390/qeth: utilize virtual MAC for Layer2 OSD devices
+
+ * Slow send speed with Intel I219-V on Ubuntu 18.04.1 (LP: #1802691)
+ - e1000e: Disable TSO for buffer overrun workaround
+
+ * CVE-2020-10711
+ - netlabel: cope with NULL catmap
+
+ * CVE-2020-13143
+ - USB: gadget: fix illegal array access in binding with UDC
+
+ * rtl8723bu wifi issue after being turned off (LP: #1878296)
+ - rtl8xxxxu: Improve TX performance of RTL8723BU on rtl8xxxxu driver
+ - rtl8xxxxu: add bluetooth co-existence support for single antenna
+ - rtl8xxxxu: remove set but not used variable 'rate_mask'
+ - rtl8xxxxu: Remove set but not used variable 'vif', 'dev', 'len'
+
+ * Cannot create ipvlans with > 1500 MTU on recent Bionic kernels
+ (LP: #1879658)
+ - ipvlan: use ETH_MAX_MTU as max mtu
+
+ * Miscellaneous Ubuntu changes
+ - [Config] wireguard -- enable on all architectures
+
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Mon, 22 Jun 2020 23:07:19 -0300
+
+linux (4.15.0-108.109) bionic; urgency=medium
+
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+
+ * dkms-build: downloads fail in private PPAs (LP: #1883874)
+ - dkms-build: apt-cache policy elides username:password information
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Fri, 19 Jun 2020 13:07:28 +0200
+
+linux (4.15.0-106.107) bionic; urgency=medium
+
+ * CVE-2020-0543
+ - SAUCE: x86/cpu: Add a steppings field to struct x86_cpu_id
+ - SAUCE: x86/cpu: Add 'table' argument to cpu_matches()
+ - SAUCE: x86/speculation: Add Special Register Buffer Data Sampling (SRBDS)
+ - SAUCE: x86/speculation: Add SRBDS vulnerability and mitigation documentation
+ - SAUCE: x86/speculation: Add Ivy Bridge to affected list
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Thu, 04 Jun 2020 12:16:05 +0200
+linux (4.15.0-103.104) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-103.104 -proposed tracker (LP: #1881272)
+
+ * "BUG: unable to handle kernel paging request" when testing
+ ubuntu_kvm_smoke_test.kvm_smoke_test with B-KVM in proposed (LP: #1881072)
+ - KVM: VMX: Explicitly reference RCX as the vmx_vcpu pointer in asm blobs
+ - KVM: VMX: Mark RCX, RDX and RSI as clobbered in vmx_vcpu_run()'s asm blob
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 29 May 2020 14:20:17 +0200
+
+linux (4.15.0-102.103) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-102.103 -proposed tracker (LP: #1878856)
+
+ * Packaging resync (LP: #1786013)
+   - update dkms package versions
+
+ * debian/scripts/file-downloader does not handle positive failures correctly
+   (LP: #1878897)
+   - [Packaging] file-downloader not handling positive failures correctly
+
+ * Kernel log flood "ceph: Failed to find inode for 1" (LP: #1875884)
+   - ceph: don't check quota for snap inode
+   - ceph: quota: cache inode pointer in ceph_snap_realm
+
+ * [UBUNTU 18.04] zpcictl --reset - contribution for kernel (LP: #1870320)
+   - s390/pci: Recover handle in clp_set_pci_fn()
+   - s390/pci: Fix possible deadlock in recover_store()
+
+ * Bionic update: upstream stable patchset 2020-05-12 (LP: #1878256)
+   - drm/edid: Fix off-by-one in DispID DTD pixel clock
+   - drm/qxl: qxl_release leak in qxl_draw_dirty_fb()
+   - drm/qxl: qxl_release leak in qxl_hw_surface_alloc()
+   - drm/qxl: qxl_release use after free
+   - btrfs: fix block group leak when removing fails
+   - btrfs: fix partial loss of prealloc extent past i_size after fsync
+   - mmc: sdhci-xenon: fix annoying 1.8V regulator warning
+   - mmc: sdhci-pci: Fix eMMC driver strength for BYT-based controllers
+   - ALSA: hda/realtek - Two front mics on a Lenovo ThinkCenter
+   - ALSA: hda/realmi: fix without unlocked before return
+   - ALSA: pcm: oss: Place the plugin buffer overflow checks correctly
+   - PM: ACPI: Output correct message on target power state
+   - PM: hibernate: Freeze kernel threads in software_resume()
+   - dm verity fec: fix hash block number in verity_fec_decode
+   - RDMA/mlx5: Set GRH fields in query QP on RoCE
+   - RDMA/mlx4: Initialize ib_spec on the stack
+ - vfio: avoid possible overflow in vfio_iommu_type1_pin_pages
+ - vfio/iommu-type1: Fix VA->PA translation for PFNMAP VMAs in vaddr_get_pfn()
+ - iommu/qcom: Fix local_base status check
+ - s390: target/iblock: fix WRITE SAME zeroing
+ - iommu/amd: Fix legacy interrupt remapping for x2APIC-enabled system
+ - ALSA: opti9xx: shut up gcc-10 range warning
+ - nvs: Fix potential posix_acl refcnt leak in nvs3_set_acl
+ - dmaengine: dmmtest: Fix iteration non-stop logic
+ - selinux: properly handle multiple messages in selinux_netlink_send()
+ - ASoC: tas571x: disable regulators on failed probe
+ - ASoC: wm8960: Fix wrong clock after suspend & resume
+ - rxrpc: Fix DATA Tx to disable nofrag for UDP on AF_INET6 socket
+ - xfs: acquire superblock freeze protection on eofblocks scans
+ - cpumap: Avoid warning when CONFIG_DEBUG_PER_CPU_MAPS is enabled
+ - net: fec: set GPR bit on suspend by DT configuration.
+ - ALSA: hda: Keep the controller initialization even if no codecs found
+ - ALSA: hda: Explicitly permit using autosuspend if runtime PM is supported
+ - ALSA: hda: call runtime_allow() for all hda controllers
+ - scsi: qla2xxx: check UNLOADING before posting async work
+ - RDMA/core: Fix race between destroy and release FD object
+ - btrfs: transaction: Avoid deadlock due to bad initialization timing of
+   fs_info:journal_info
+ - mmc: sdhci-msm: Enable host capabilities pertains to R1b response
+ - mmc: meson-mx-sdio: Set MMC_CAP_WAIT WHILE BUSY
+ - mmc: meson-mx-sdio: remove the broken ->card_busy() op
+ *
+ - Bionic update: upstream stable patchset 2020-05-07 (LP: #1877461)
+ - ext4: fix extent_status fragmentation for plain files
+ - net: ipv4: avoid unused variable warning for sysctl
+ - crypto: mxs-dcp - make symbols 'sha1_null_hash' and 'sha256_null_hash'
+ static
+ - vfi4: removed duplicate log message.
+ - watchdog: reset last_hw_keepalive time at start
+ - scsi: lpfc: Fix kasan slab-out-of-bounds error in lpfc_unregister
+ - ceph: return ceph_mdsc_do_request() errors from __get_parent()
+ - ceph: don't skip updating wanted caps when cap is stale
+ - pwm: rcar: Fix late Runtime PM enablement
+ - scsi: iscsi: Report unbind session event when the target has been removed
+ - ASoC: Intel: atom: Take the drv->lock mutex before calling
+ sst_send_slot_map()
+ - kernel/gcov/fs.c: gcov_seq_next() should increase position index
+ - selftests: kmod: fix handling test numbers above 9
+ - ipc/utility: sysvipc_find_ipc() should increase position index
+ - s390/cio: avoid duplicated 'ADD' uevents
+ - pwm: renesas-tpu: Fix late Runtime PM enablement
+ - pwm: bcm2835: Dynamically allocate base
+ - perf/core: Disable page faults when getting phys address
+ - PCI/ASPM: Allow re-enabling Clock PM
+  - mm, slub: restore the original intention of prefetch_freepointer()
+  - cxgb4: fix large delays in PTP synchronization
+  - ipv6: fix restrict IPV6_ADDRFORM operation
+  - macsec: avoid to set wrong mtu
+  - macvlan: fix null dereference in macvlan_device_event()
+  - net: bcmgenet: correct per TX/RX ring statistics
+  - net: netrom: Fix potential nr_neigh refcnt leak in nr_add_node
+  - net/x25: Fix x25_neigh refcnt leak when receiving frame
+  - tcp: cache line align MAX_TCP_HEADER
+  - team: fix hang in team_mode_get()
+  - net: dsa: b53: Fix ARL register definitions
+  - xfrm: Always set XFRM_TRANSFORMED in xfrm{4,6}_output_finish
+  - vrf: Check skb for XFRM_TRANSFORMED flag
+  - KEYS: Avoid false positive ENOMEM error on key read
+  - ALSA: hda: Remove ASUS ROG Zenith from the blacklist
+  - iio: adc: stm32-adc: fix sleep in atomic context
+  - iio: xilinx-xadc: Fix ADC-B powerdown
+  - iio: xilinx-xadc: Fix clearing interrupt when enabling trigger
+  - iio: xilinx-xadc: Fix sequencer configuration for aux channels in
  simultaneous mode
+  - fs/namespace.c: fix mountpoint reference counter race
+  - USB: sisusbvga: Change port variable from signed to unsigned
+  - USB: Add USB_QUIRK_DELAY_CTRL_MSG and USB_QUIRK_DELAY_INIT for Corsair K70
+  + RGB RAPIDFIRE
+  - USB: early: Handle AMD's spec-compliant identifiers, too
+  - USB: core: Fix free-while-in-use bug in the USB S-Glibrary
+  - USB: hub: Fix handling of connect changes during sleep
+  - overflow.h: Add arithmetic shift helper
+  - vmalloc: fix remap_vmalloc_range() bounds checks
+  - mm/hugetlb: fix a addressing exception caused by huge_pte_offset
+  - mm/ksm: fix NULL pointer dereference when KSM zero page is enabled
+  - tools/vm: fix cross-compile build
+  - ALSA: usx2y: Fix potential NULL dereference
+  - ALSA: hda/realltek - Add new codec supported for ALC245
+  - ALSA: usb-audio: Fix usb audio refcnt leak when getting spdif
+  - ALSA: usb-audio: Filter out unsupported sample rates on Focusrite devices
+  - tpm/tpm_tis: Free IRQ if probing fails
+  - tpm: ibmvtpm: retry on H_CLOSED in tpm_ibmvtpm_send()
+  - KVM: Check validity of resolved slot when searching memslots
+  - KVM: VMX: Enable machine check support for 32bit targets
+  - tty: hvc: fix buffer overflow during hvc_alloc().
+  - tty: rocket, avoid OOB access
+  - usb-storage: Add unusual_devs entry for JMicron JMS566
+  - audit: check the length of userspace generated audit records
+  - ASoC: dapm: fixup dapm kcontrol widget
+  - iwlwifi: pcie: actually release queue memory in TVQM
+  - ARM: imx: provide v7_cpu_resume() only on ARM_CPU_SUSPEND=y
+  - powerpc/setup_64: Set cache-line-size based on cache-block-size
+ - staging: comedi: dt2815: fix writing hi byte of analog output
+ - staging: comedi: Fix comedi_device refcnt leak in comedi_open
+ - vt: don't hardcode the mem allocation upper bound
+ - staging: vt6656: Don't set RCR_MULTICAST or RCR_BROADCAST by default.
+ - staging: vt6656: Fix calling conditions of vnt_set_bss_mode
+ - staging: vt6656: Fix pairwise key entry save.
+ - staging: vt6656: Power save stop wake_up_count wrap around.
+ - cdc-acm: close race between suspend() and acm_softint
+ - cdc-acm: introduce a cool down
+ - UAS: no use logging any details in case of ENODEV
+ - UAS: fix deadlock in error handling and PM flushing work
+ - usb: f_fs: Clear OS Extended descriptor counts to zero in ffs_data_reset()
+ - serial: sh-sci: Make sure status register SCxSR is read in correct sequence
+ - xfs: Fix deadlock between AGI and AGF with RENAME_WHITEOUT
+ - remoteproc: Fix wrong rvring index computation
+ - mtd: cfi: fix deadloop in cfi_cmdset_0002.c do_write_buffer
+ - binder: take read mode of mmap_sem in binder_alloc_free_page()
+ - usb: dwc3: gadget: Do link recovery for SS and SSP
+ - usb: gadget: udc: bdc: Remove unnecessary NULL checks in bdc_req_complete
+ - iio:ad7797: Use correct attribute_group
+ - nfsd: memory corruption in nfsd4_lock()
+ - i2c: altera: use proper variable to hold erro
+ - net/cxgb4: Check the return from t4_query_params properly
+ - ARM: dts: bcm283x: Disable dsi0 node
+ - perf/core: fix parent pid/tid in task exit events
+ - mm: shmem: disable interrupt when acquiring info->lock in userfaultfd_copy
+ - path
+ - bpf, x86: Fix encoding for lower 8-bit registers in BPF_STX BPF_B
+ - x86: hyperv: report value of misc_features
+ - xfs: fix partially uninitialized structure in xfs_relink_remap_extent
+ - scsi: target: fix PR IN / READ FULL STATUS for FC
+ - objtool: Fix CONFIG_UBSAN_TRAP unreachable warnings
+ - objtool: Support Clang non-section symbols in ORC dump
+ - xen/xenbus: ensure xenbus_map_ring_valloc() returns proper grant status
+ - arm64: Delete the space separator in __emit_inst
+ - ext4: use matching invalidatepage in ext4_writepage
+ - ext4: increase wait time needed before reuse of deleted inode numbers
+ - ext4: convert BUG_ON's to WARN_ON's in mballoc.c
+ - hwmon: (jc42) Fix name to have no illegal characters
+ - qed: Fix use after free in qed_chain_free
+ - ext4: check for non-zero journal inum in ext4_calculate_overhead
+ - propagate_one(): mnt_set_mountpoint() needs mount_lock
+ - kconfig: qconf: Fix a few alignment issues
+ - loop: Better discard support for block devices
+ - drm/amd/display: Not doing optimize bandwidth if flip pending.
+ - virtio-blk: improve virtqueue error to BLK_STS
+ - scsi: smartpqi: fix call trace in device discovery
- net: ipv6: add net argument to ip6_dst_lookup_flow
- net: ipv6: stub: use ip6_dst_lookup_flow instead of ip6_dst_lookup_flow
- f2fs: fix to avoid memory leakage in f2fs_listxattr
- KVM: VMX: Zero out *all* general purpose registers after VM-Exit
- KVM: Introduce a new guest mapping API
- kvm: fix compilation on aarch64
- kvm: fix compilation on s390
- kvm: fix compile on s390 part 2
- KVM: Properly check if "page" is valid in kvm_vcpu_unmap
- x86/kvm: Introduce kvm_(un)map_gfn()
- x86/kvm: Cache gfn to pfn translation
- vrf: Fix IPv6 with qdisc and xfrm
- net: dsa: b53: Lookup VID in ARL searches when VLAN is enabled
- net: dsa: b53: Rework ARL bin logic
- net: dsa: b53: b53_arl_rw_op() needs to select IVL or SVL
- mlxsw: Fix some IS_ERR() vs NULL bugs
- iio: core: remove extra semi-colon from devm_iio_device_register() macro
- iio: st_sensors: rely on odr mask to know if odr can be set
- iio: xilinx-xadc: Make sure not exceed maximum samplerate
- iwifi: mv: beacon statistics shouldn't go backwards
- xhci: prevent bus suspend if a roothub port detected a over-current
- condition
- * Bionic update: upstream stable patchset 2020-04-27 (LP: #1875506)
- KVM: VMX: fix crash cleanup when KVM wasn't used
- amd-xgbe: Use __napi_schedule() in BH context
- hsr: check protocol version in hsr_newlink()
- net: ipv4: devinet: Fix crash when add/del multicast IP with autojoin
- net: ipv6: do not consider routes via gateways for anycast address check
- net: qrtr: send msgs from local of same id as broadcast
- net: revert default NAPI poll timeout to 2 jiffies
- net: stmmac: dwmac-sunxi: Provide TX and RX fifo sizes
- scsi: ufs: Fix ufshcd_hold() caused scheduling while atomic
- jbd2: improve comments about freeing data buffers whose page mapping is NULL
- pwm: pca9685: Fix PWM/GPIO inter-operation
- ext4: fix incorrect group count in ext4_fill_super error message
- ext4: fix incorrect inodes per group in error message
- ASoC: Intel: mrfld: fix incorrect check on p->sink
- ASoC: Intel: mrfld: return error codes when an error occurs
- ALSA: usb-audio: Don't override ignore_ctl_error value from the map
- tracing: Fix the race between registering 'snapshot' event trigger and triggering 'snapshot' operation
- btrfs: check commit root generation in should_ignore_root
- mac80211_hwsim: Use kstrndup() in place of kasprintf()
- ext4: do not zeroout extents beyond i_disksize
- dm flakey: check for null arg_name in parse_features()
- kvm: x86: Host feature SSBD doesn't imply guest feature SPEC_CTRL_SSBD
- x86/microcode/AMD: Increase microcode PATCH_MAX_SIZE
- x86/intel_rdt: Add two new resources for L2 Code and Data Prioritization (CDP)
- x86/intel_rdt: Enable L2 CDP in MSR IA32_L2_QOS_CFG
- x86/resctrl: Preserve CDP enable over CPU hotplug
- x86/resctrl: Fix invalid attempt at removing the default resource group
- mm/vmalloc.c: move 'area->pages' after if statement
- objtool: Fix switch table detection in .text.unlikely
- scsi: sg: add sg_remove_request in sg_common_write
- ext4: use non-movable memory for superblock readahead
- arm, bpf: Fix bugs with ALU64 {RSH, ARSH} BPF_K shift by 0
- netfilter: nf_tables: report EOPNOTSUPP on unsupported flags/object type
- irqchip/mbigen: Free msi_desc on device teardown
- ALSA: hda: Don't release card at firmware loading error
- lib/raid6: use vdupq_n_u8 to avoid endianness warnings
- video: fbdev: sis: Remove unnecessary parentheses and commented code
- drm: NULL pointer dereference [null-pointer-deref] (CWE 476) problem
- clk: Fix debugfs_create_*() usage
- Revert "gpio: set up initial state from .get_direction()"
- wil6210: increase firmware ready timeout
- wil6210: fix temperature debugfs
- scsi: ufs: make sure all interrupts are processed
- scsi: ufs: ufs-qcom: remove broken hci version quirk
- wil6210: rate limit wil_rx_refill error
- rpsmg: glink: use put_device() if device_register fail
- rtc: pm8xxx: Fix issue in RTC write path
- rpsmg: glink: Fix missing mutex_init() in qcom_glink_alloc_channel()
- rpsmg: glink: smem: Ensure ordering during tx
- wil6210: fix PCIe bus mastering in case of interface down
- wil6210: add block size checks during FW load
- wil6210: fix length check in __wmi_send
- wil6210: abort properly in cfg suspend
- rbd: avoid a deadlock on header_rwsem when flushing notifies
- rbd: call rbd_dev_unprobe() after unwatching and flushing notifies
- of: unittest: kmemleak in of_unittest_platform_populate()
- clk: at91: usb: continue if clk_hw_round_rate() return zero
- power: supply: bq27xxx_battery: Silence deferred-probe error
- clk: tegra: Fix Tegra PMC clock out parents
- soc: imx: gpc: fix power up sequencing
- rtc: 88pm860x: fix possible race condition
- NFSv4/pnfs: Return valid stateids in nfs_layout_find_inode_by_stateid()
- NFS: direct.c: Fix memory leak of dreq when nfs_get_lock_context fails
- s390/cpuinfo: fix wrong output when CPU0 is offline
- powerpc/maple: Fix declaration made after definition
- ext4: do not commit super on read-only bdev
- include/linux/swapops.h: correct guards for non_swap_entry()
- percpu_counter: fix a data race at vm_committed_as
- compiler.h: fix error in BUILD_BUG_ON() reporting
- KVM: s390: vsie: Fix possible race when shadowing region 3 tables
+ - x86: ACPI: fix CPU hotplug deadlock
+ - drm/amdkfd: kfree the wrong pointer
+ - NFS: Fix memory leaks in nfs_pageio_stop_mirroring()
+ - iommu/vt-d: Fix mm reference leak
+ - ext2: fix empty body warnings when -Wextra is used
+ - ext2: fix debug reference to ext2_xattr_cache
+ - libnvdimm: Out of bounds read in __nd_ioctl()
+ - iommu/amd: Fix the configuration of GCR3 table root pointer
+ - net: dsa: bcm_sf2: Fix overflow checks
+ - fbdev: potential information leak in do_fb_ioctl()
+ - tty: evh_bytechan: Fix out of bounds accesses
+ - locktorture: Print ratio of acquisitions, not failures
+ - mtd: lpddr: Fix a double free in probe()
+ - mtd: phram: fix a double free issue in error path
+ - KEYS: Use individual pages in big_key for crypto buffers
+ - KEYs: Don't write out to userspace while holding key semaphore
+ - keys: Fix proc_keys_next to increase position index
+ - wil6210: ignore HALP ICR if already handled
+ - wil6210: remove reset file from debugfs
+ - ARM: dts: imx6: Use gpc for FEC interrupt controller to fix wake on LAN.
+ - of: unittest: kmemleak on changeset destroy
+ - of: overlay: kmemleak in dup_and_fixup_symbol_prop()
+ - s390/cpum_sf: Fix wrong page count in error message
+ - f2fs: fix NULL pointer dereference in f2fs_write_begin()
+ * psck_tpacket from the net test in ubuntu_kernel_selftests failed on KVM
  kernels (LP: #1812176)
+ - selftests/net: skip psck_tpacket test if KALLSYMS was not enabled
+ * Bionic ubuntu ethtool doesn't check ring parameters boundaries
  (LP: #1874444)
+ - ethtool: Ensure new ring parameters are within bounds during SRINGPARAM
+ * Improve TSC refinement (and calibration) reliability (LP: #1877858)
  + - x86/tsc: Make calibration refinement more robust
  + - x86/tsc: Use CPUID.0x16 to calculate missing crystal frequency
+ * Do not treat unresolved test case in ftrace from ubuntu_kernel_selftests as
  failure (LP: #1877958)
+ - ftrace/selftest: make unresolved cases cause failure if --fail-unresolved
  set
+ * Add support for Ambiq micro AM1805 RTC chip (LP: #1876667)
+ - SAUCE: rtc: add am-1805 RTC driver
+ * 'Elan touchpad' not detected on 'Lenovo ThinkBook 15 IIL' (LP: #1861610)
+ - SAUCE: Input: elan_i2c - add more hardware ID for Lenovo laptop
+
+ * Kdump broken since 4.15.0-65 on secureboot - purgatory cannot load
+ (LP: #1869672)
+ - SAUCE: x86/purgatory: Fix Makefile to prevent undefined symbols
+ + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 15 May 2020 14:47:09 +0200
+ +linux (4.15.0-101.102) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-101.102 -proposed tracker (LP: #1877262)
+ + * 4.15.0-100.101 breaks userspace builds due to a bug in the headers
+ /usr/include/linux/swab.h of linux-libc-dev (LP: #1877123)
+ - include/uapi/linux/swab.h: fix userspace breakage, use __BITS_PER_LONG for
+  swap
+ + * bionic snapdragon 4.15 snap failed Certification testing (LP: #1877657)
+ - Revert "drm/msm: Use the correct dma_sync calls in msm_gem"
+ - Revert "drm/msm: stop abusing dma_map/unmap for cache"
+ + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Mon, 11 May 2020 11:08:26 +0200
+ +linux (4.15.0-100.101) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-100.101 -proposed tracker (LP: #1875878)
+ + * built-using constraints preventing uploads (LP: #1875601)
+ - temporarily drop Built-Using data
+ + * Add debian/rules targets to compile/run kernel selftests (LP: #1874286)
+ - [Packaging] add support to compile/run selftests
+ + * getitimer returns it_value=0 erroneously (LP: #1349028)
+ - [Config] CONTEXT_TRACKING_FORCE policy should be unset
+ + * QEMU/KVM display is garbled when booting from kernel EFI stub due to missing
+ bochs-drm module (LP: #1872863)
+ - [Config] Enable CONFIG_DRM_BOCHS as module for all archs
+ + * Backport MPLS patches from 5.3 to 4.15 (LP: #1851446)
+ - net/mlx5e: Report netdevice MPLS features
+ - net: vlan: Inherit MPLS features from parent device
+ - net: bonding: Inherit MPLS features from slave devices
+ - net/mlx5e: Move to HW checksumming advertising
+ + * LIO hanging in iscsi_free_session and iscsi_stop_session (LP: #1871688)
+ - scsi: target: remove boilerplate code
+ - scsi: target: fix hang when multiple threads try to destroy the same iscsi
+  session
+ - scsi: target: iscsi: calling iscsit_stop_session() inside
+  iscsit_close_session() has no effect
+ 
+ + * Add hw timestamps to received skbs in peak_canfd (LP: #1874124)
+  - can: peak_canfd: provide hw timestamps in rx skbs
+ 
+ + * Bionic update: upstream stable patchset 2020-04-23 (LP: #1874502)
+  - ARM: dts: sun8i-a83t-tbs-a711: HM5065 doesn't like such a high voltage
+  - bus: sunxi-rsb: Return correct data when mixing 16-bit and 8-bit reads
+  - net: vxge: fix wrong __VA_ARGS__ usage
+  - hinic: fix a bug of waiting for IO stopped
+  - hinic: fix wrong para of wait_for_completion_timeout
+  - cxgb4/ptp: pass the sign of offset delta in FW CMD
+  - qlcenic: Fix bad kcalloc null test
+  - i2c: st: fix missing struct parameter description
+  - firmware: arm_sdei: fix double-lock on hibernate with shared events
+  - null_blk: Fix the null_add_dev() error path
+  - null_blk: Handle null_add_dev() failures properly
+  - null_blk: fix spurious IO errors after failed past-wp access
+  - xhci: bail out early if driver can't access host in resume
+  - x86: Don't let pgprot_modify() change the page encryption bit
+  - block: keep bdi->io_pages in sync with max_sectors_kb for stacked devices
+  - irqchip/versatile-fpga: Handle chained IRQs properly
+  - sched: Avoid scale real weight down to zero
+  - selftests/x86/prtrace_syscall_32: Fix no-vDSO segfault
+  - PCI/switchtec: Fix init_completion race condition with poll_wait()
+  - libata: Remove extra scsi_host_put() in ata_scsci_add_hosts()
+  - gfs2: Don't demote a clock until its revokes are written
+  - x86/boot: Use unsignined comparison for addresses
+  - efi/x86: Ignore the memory attributes table on i386
+  - genirq/irqdomain: Check pointer in irq_domain_alloc_irqs_hierarchy()
+  - block: Fix use-after-free issue accessing struct io_cq
+  - usb: dwc3: core: add support for disabling SS instances in park mode
+  - irqchip/gic-v4: Provide irq_retrigger to avoid circular locking dependency
+  - md: check arrays is suspended in mddev_detach before call quiesce operations
+  - locking/lockdep: Avoid recursion in lockdep_count_{for,back}ward_deps()
+  - block, bfq: fix use-after-free in bfq_idle_slice_timer_body
+  - btrfs: qgroup: ensure qgroup_rescan_running is only set when the worker is
+    at least queued
+  - btrfs: remove a BUG_ON() from merge_reloc_roots()
+  - btrfs: track reloc roots based on their commit root bytenr
+  - uapi: rename ext2_swab() to swab() and share globally in swab.h
+  - slab: improve bit diffusion for freelist ptr obfuscation
+  - ASoC: fix regwmask
+  - ASoC: dapm: connect virtual mux with default value
+  - ASoC: dpcm: allow start or stop during pause for backend
+  - ASoC: topology: use name_prefix for new kcontrol
+  - usb: gadget: f_fs: Fix use after free issue as part of queue failure
+ - usb: gadget: composite: Inform controller driver of self-powered
+ - ALSA: usb-audio: Add mixer workaround for TRX40 and co
+ - ALSA: hda: Add driver blacklist
+ - ALSA: hda: Fix potential access overflow in beep helper
+ - ALSA: ice1724: Fix invalid access for enumerated ctl items
+ - ALSA: pcm: oss: Fix regression by buffer overflow fix
+ - ALSA: doc: Document PC Beep Hidden Register on Realtek ALC256
+ - ALSA: hda/realtek - Set principled PC Beep configuration for ALC256
+ - ALSA: hda/realtek - Remove now-unnecessary XPS 13 headphone noise fixups
+ - ALSA: hda/realtek - Add quirk for MSI GL63
+ - media: ti-vpe: cal: fix disable_irqs to only the intended target
+ - acpi/x86: ignore unspecified bit positions in the ACPI global lock field
+ - thermal: devfreq_cooling: inline all stubs for CONFIG_DEVFREQ_THERMAL=n
+ - nvme-fc: Revert "add module to ops template to allow module references"
+ - nvme: Treat discovery subsystems as unique subsystems
+ - PCI/ASPM: Clear the correct bits when enabling L1 substates
+ - PCI: Add boot interrupt quirk mechanism for Xeon chipsets
+ - PCI: endpoint: Fix for concurrent memory allocation in OB address region
+ - irqchip/versatile-fpga: Apply clear-mask earlier
+ - pstore: pstore_ftrace_seq_next should increase position index
+ - MIPS/tlbex: Fix LDDIR usage in setup_pw() for Loongson-3
+ - MIPS: OCTEON: irq: Fix potential NULL pointer dereference
+ - ath9k: Handle txpower changes even when TPC is disabled
+ - signal: Extend exec_id to 64bits
+ - x86/entry/32: Add missing ASM_CLAC to general_protection entry
+ - KVM: nVMX: Properly handle userspace interrupt window request
+ - KVM: s390: vsie: Fix region 1 ASCE sanity shadow address checks
+ - KVM: s390: vsie: Fix delivery of addressing exceptions
+ - KVM: x86: Allocate new rmap and large page tracking when moving memslot
+ - KVM: VMX: Always VMCLEAR in-use VMCSes during crash with kexec support
+ - CIFS: Fix bug which the return value by asynchronous read is error
+ - Btrfs: fix crash during unmount due to race with delayed inode workers
+ - btrfs: set update the uuid generation as soon as possible
+ - btrfs: drop block from cache on error in relocation
+ - btrfs: fix missing semaphore unlock in btrfs_sync_file
+ - crypto: mxs-dcp - fix scatterlist linearization for hash
+ - powerpc/pseries: Drop pointless static qualifier in vpa_debugfs_init()
+ - x86/speculation: Remove redundant arch_smt_update() invocation
+ - tools: gpio: Fix out-of-tree build regression
+ - mm: Use fixed constant in page_frag_alloc instead of size + 1
+ - dm verity fec: fix memory leak in verity_fec_dtr
+ - scsi: zfcp: fix missing erp_lock in port recovery trigger for point-to-point
+ - arm64: armv8_deprecated: Fix undef_hook mask for thumb setend
+ - selftests: vm: drop dependencies on page flags from mlock2 tests
+ - rtc: omap: Use define directive for PIN_CONFIG_ACTIVE_HIGH
+ - drm/etnaviv: rework perfmon query infrastructure
+ - NFS: Fix a page leak in nfs_destroy_unlinked_subrequests()
+ - ext4: fix a data race at ino->i_blocks
+ - fs/filesystems.c: downgrade user-reachable WARN_ONCE() to pr_warn_once()
+ - ocfs2: no need try to truncate file beyond i_size
+ - perf tools: Support Python 3.8+ in Makefile
+ - s390/diag: fix display of diagnose call statistics
+ - Input: i8042 - add Acer Aspire 5738z to nomux list
+ - kmod: make request_module() return an error when autoloading is disabled
+ - cpufreq: powernv: Fix use-after-free
+ - hfsplus: fix crash and filesystem corruption when deleting files
+ - ipmi: fix hung processes in __get_guid()
+ - powerpc/powernv/idle: Restore AMR/UMOR/AMOR after idle
+ - powerpc/64/tmc: Don't let userspace set regs->trap via sigreturn
+ - powerpc/hash64/devmap: Use H_PAGE_THP_HUGE when setting up huge devmap PTE
+ - powerpc/xive: Use XIVE_BAD_IRQ instead of zero to catch non configured IPIs
+ - powerpc/kprobes: Ignore traps that happened in real mode
+ - scsi: mpt3sas: Fix kernel panic observed on soft HBA unplug
+ - powerpc: Add attributes for setjmp/longjmp
+ - powerpc: Make setjmp/longjmp signature standard
+ - btrfs: use nofs allocations for running delayed items
+ - dm zoned: remove duplicate nr_rnd_zones increase in dmz_init_zone()
+ - crypto: caam - update xts sector size for large input length
+ - Revert "drm/dp_mst: Remove VCPI while disabling topology mgr"
+ - dm/dp_mst: Fix clearing payload state on topology disable
+ - drm: Remove PageReserved manipulation from drm_pci_alloc
+ - ftrace/kprobe: Show the maxactive number on kprobe_events
+ - powerpc/fsl_booke: Avoid creating duplicate tlb1 entry
+ - misc: echo: Remove unnecessary parentheses and simplify check for zero
+ - etnaviv: perfmon: fix total and idle HI cyleces readout
+ - mfd: dln2: Fix sanity checking for endpoints
+ - efi/x86: Fix the deletion of variables in mixed mode

+ * Panic on suspend/resume Kernel panic - not syncing: stack-protector: Kernel
  stack is corrupted in: sata_pmp_eh_recover+0xa2b/0xa40 (LP: #1821434) //
+ Bionic update: upstream stable patchset 2020-04-23 (LP: #1874502)
+ - libata: Return correct status in sata_pmp_eh_recover_pm() when
  ATA_DFLAG_DETACH is set
+ * Bionic update: upstream stable patchset 2020-04-15 (LP: #1873043)
+ - ipv4: fix a RCU-list lock in fib_triestat_seq_show
+ - net, ip_tunnel: fix interface lookup with no key
+ - scvp: fix refcount bug in scvp_wfree
+ - scvp: fix possibly using a bad saddr with a given dst
+ - drm/bch: downgrade pci_request_region failure from error to warning
+ - initramfs: restore default compression behavior
+ - tools/power turbostat: Fix gcc build warnings
+ - drm/etnaviv: replace MMU flush marker with flush sequence
+ - blk-mq: sync the update nr_hw_queues with blk_mq_queue_tag_busy_iter
+ - blk-mq: Allow blocking queue tag iter callbacks

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+ - misc: pci_endpoint_test: Fix to support > 10 pci-endpoint-test devices
+ - coresight: do not use the BIT() macro in the UAPI header
+ - padata: always acquire cpu_hotplug_lock before pinst->lock
+ - mm: mempolicy: require at least one nodeid for MPOL_PREFERRED
+ - ipv6: don't auto-add link-local address to lag ports
+ - net: dsa: bcm_sf2: Ensure correct sub-node is parsed
+ - net: phy: micrel: kszphy_resume(): add delay after genphy_resume() before
+ accessing PHY registers
+ - net: stm32: dwmac1000: fix out-of-bounds mac address reg setting
+ - random: always use batched entropy for get_random_u{32,64}
+ - tools/accounting/getdelays.c: fix netlink attribute length
+ - hw RNG: imx-rngc - fix an error path
+ - ASoC: jz4740-i2s: Fix divider written at incorrect offset in register
+ - IB/hfi1: Call kobject_put() when kobject_init_and_add() fails
+ - IB/hfi1: Fix memory leaks in sysfs registration and unregistration
+ - ceph: remove the extra slashes in the server path
+ - ceph: canonicalize server path in place
+ - Bluetooth: RFCOMM: fix ODEBUG bug in rfcomm_dev_ioctl
+ - RDMA/cma: Update num_paths in cma_resolve_iboe_route error flow
+ - fbcon: fix null-ptr-deref in fbcon_switch
+ - clk: qcom: rcg: Return failure for RCG update
+ - drm/msm: stop abusing dma_map/unmap for cache
+ - arm64: Fix size of __early_cpu_boot_status
+ - rpmmsg: glink: Remove chunk size word align warning
+ - usb: dwc3: don't set gadget->is_otg flag
+ - drm_dp_mst_topology: fix broken drm_dp_sideband_parse_remote_dpcd_read()
+ - drm/msm: Use the correct dma_sync calls in msm_gem
+ - misc: rtsx: set correct pcr_ops for rts522A
+ - mei: me: add cedara fork device ids
+ - power: supply: axp288_charger: Add special handling for HP Pavilion x2 10
+ - rxrpc: Fix sendmsg(MSG_WAITALL) handling
+ - bitops: protect variables in set_mask_bits() macro
+ - RDMA/acma: Put a lock around every call to the rdma_cm layer
+ - RDMA/cma: Teach lockdep about the order of rtif and lock
+
+ * CVE-2020-11494
+ - slean: Don't transmit uninitialized stack data in padding
+ + * add_key05 from ubuntu_ltp_syscalls failed (LP: #1869644)
+ - KEYS: reaching the keys quotas correctly
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 29 Apr 2020 15:10:37 +0200
+ + linux (4.15.0-99.100) bionic; urgency=medium
+ + * CVE-2020-11884
+ - SAUCE: s390/mm: fix page table upgrade vs 2ndary address mode accesses
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Wed, 22 Apr 2020 15:31:14 -0300
+
+linux (4.15.0-97.98) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-97.98 -proposed tracker (LP: #1871312)
+
+ * All PS/2 ports on PS/2 Serial add-in bracket are not working after S3
+ (LP: #1866734)
+ - SAUCE: Input: i8042 - fix the selftest retry logic
+
+ * Bionic update: upstream stable patchset 2020-04-03 (LP: #1870604)
+ + spi: qup: call spi_qup_pm_resume_runtime before suspending
+ + powerpc: Include .BTF section
+ + ARM: dts: dra7: Add "dma-ranges" property to PCIe RC DT nodes
+ + spi: pxa2xx: Add CS control clock quirk
+ + - drm/exynos: dsi: propagate error value and silence meaningless warning
+ + - drm/exynos: dsi: fix workaround for the legacy clock name
+ + drivers/perf: arm_pmu_acpi: Fix incorrect checking of gicc pointer
+ + altera-stapl: altera_get_note: prevent write beyond end of 'key'
+ + dm bio record: save/restore bi_end_io and bi_integrity
+ + xenbus: req->body should be updated before req->state
+ + xenbus: req->err should be updated before req->state
+ + block, bfq: fix overwrite of bfq_group pointer in bfq_find_set_group()
+ + parse-maintainers: Mark as executable
+ + USB: Disable LPM on WD19's Realtek Hub
+ + usb: quirks: add NO_LPM quirk for RTL8153 based ethernet adapters
+ + USB: serial: option: add ME910G1 ECM composition 0x110b
+ + usb: host: xhci-plat: add a shutdown
+ + USB: serial: pl2303: add device-id for HP LD381
+ + usb: xhci: apply XHCI_SUSPEND_DELAY to AMD XHCI controller 1022:145c
+ + ALSA: line6: Fix endless MIDI read loop
+ + ALSA: seq: virmidi: Fix running status after receiving sysex
+ + ALSA: seq: oss: Fix running status after receiving sysex
+ + ALSA: pcm: oss: Avoid plugin buffer overflow
+ + ALSA: pcm: oss: Remove WARNING from snd_pcm_plug_alloc() checks
+ + iio: trigger: stm32-timer: disable master mode when stopping
+ + iio: magnetometer: ak8974: Fix negative raw values in sysfs
+ + mm: sdhci-of-at91: fix cd-gpios for SAMAC5D2
+ + staging: rtl8188eu: Add device id for MERCUSYS MW150US v2
+ + staging/speakup: fix get_word non-space look-ahead
+ + intel_th: Fix user-visible error codes
+ + intel_th: pci: Add Elkhart Lake CPU support
+ + rtc: max8907: add missing select REGMAP_IRQ
+ + xhci: Do not open code __print_symbolic() in xhci trace events
+ + memcg: fix NULL pointer dereference in __mem_cgroup_usage_unregister_event
+ + mm: slub: be more careful about the double cmpxchg of freelist
+ - mm, slub: prevent kmalloc_node crashes and memory leaks
+ - page-flags: fix a crash at SetPageError(THP_SWAP)
+ - x86/mm: split vmalloc_sync_all()
+ - USB: cdc-acm: fix close_delay and closing_wait units in TIOCSSERIAL
+ - USB: cdc-acm: fix rounding error in TIOCSSERIAL
+ - iio: adc: at91-sama5d2_adc: fix channel configuration for differential channels
+ - iio: adc: at91-sama5d2_adc: fix differential channels in triggered mode
+ - kbuild: Disable -Wpointer-to-enum-cast
+ - futex: Fix inode life-time issue
+ - futex: Unbreak futex hashing
+ - Revert "vrf: mark skb for multicast or link-local as enslaved to VRF"
+ - Revert "ipv6: Fix handling of LLA with VRF and sockets bound to VRF"
+ - arm64: smpi: fix crash_smp_send_stop() behaviour
+ - arm64: smpi: fix crash_smp_send_stop() behaviour
+ - drm/bridge: dw-hdmi: fix AVI frame colorimetry
+ - staging: greybus: loopback_test: fix potential path truncation
+ - staging: greybus: loopback_test: fix potential path truncations
+ - Revert "drm/dp_mst: Skip validating ports during destruction, just ref"
+ - hsr: fix general protection fault in hsr_addr_is_self()
+ - macesc: restrict to ethernet devices
+ - net: dsa: Fix duplicate frames flooded by learning
+ - net: mvneta: Fix the case where the last poll did not process all rx
+ - net/packet: tpacket_rcv: avoid a producer race condition
+ - net: qmi_wwan: add support for ASKEY WWHC050
+ - net_sched: cls_route: remove the right filter from hashtable
+ - net_sched: keep alloc_hash updated after hash allocation
+ - net: stmmac: dwmac-rk: fix error path in rk_gmac_probe
+ - NFC: fdp: Fix a signedness bug in fdp_nci_send_patch()
+ - slcan: not call free_netdev before rtnl_unlock in slcan_open
+ - bnxt_en: fix memory leaks in bnxt_dcbnl_ieee_getets()
+ - net: dsa: mt7530: Change the LINK bit to reflect the link status
+ - vxlan: check return value of gro_cells_init()
+ - hsr: use rcu_read_lock() in hsr_get_node_{list/status}()
+ - hsr: add restart routine into hsr_get_node_list()
+ - hsr: set .netnsok flag
+ - cgroup-v1: cgroup_pidlist_next should update position index
+ - cpupower: avoid multiple definition with gcc -fno-common
+ - drivers/of/of_mdioc:fix_of_mdiobus_register()
+ - cgroup1: don't call release_agent when it is ""
+ - updateconfigs for DPAA_ERRATUM_A050385
+ - dt-bindings: net: FMan erratum A050385
+ - arm64: dt: ls1043a: FMan erratum A050385
+ - fsl/fman: detect FMan erratum A050385
+ - scsi: ipr: Fix softlockup when rescanning devices in petitboot
+ - mac80211: Do not send mesh HWMP PREQ if HWMP is disabled
+ - dpaa_eth: Remove unnecessary boolean expression in dpaa_get_headroom
+ - sxgbe: Fix off by one in samsung driver strncpy size arg
+  - arm64: ptrace: map SPSR_ELx<->PSR for compat tasks
+  - arm64: compat: map SPSR_ELx<->PSR for signals
+  - ftrace/x86: Anotate text_mutex split between
+  - ftrace_arch_code_modify_post_process() and ftrace_arch_code_modify_prepare()
+  - 12c: hix5hd2: add missed clk_disable_unprepare in remove
+  - Input: synaptics - enable RMI on HP Envy 13-ad105ng
+  - Input: avoid BIT() macro usage in the serio.h UAPI header
+  - ARM: dts: dra7: Add bus_dma_limit for L3 bus
+  - ARM: dts: omap5: Add bus_dma_limit for L3 bus
+  - perf probe: Do not depend on dwfl_module_addrsym()
+  - tools: Let O= makes handle a relative path with -C option
+  - scripts/dtc: Remove redundant YYLOC global declaration
+  - scsi: sd: Fix optimal I/O size for devices that change reported values
+  - mac80211: mark station unauthorized before key removal
+  - gpiolib: acpi: Correct comment for HP x2 10 honor_wakeup quirk
+  - gpiolib: acpi: Rework honor_wakeup option into an ignore_wake option
+  - gpiolib: acpi: Add quirk to ignore EC wakeups on HP x2 10 BYT + AXP288 model
+  - RDMA/core: Ensure security pkey modify is not lost
+  - genirq: Fix reference leaks on irq affinity notifiers
+  - xfrm: handle NETDEV_UNREGISTER for xfrm device
+  - vt[6]: fix packet tx through bpf_redirect() in XinY cases
+  - RDMA/mlx5: Block delay drop to unprivileged users
+  - xfrm: fix uctx len check in verify_sec_ctx_len
+  - xfrm: add the missing verify_sec_ctx_len check in xfrm_add_acquire
+  - xfrm: policy: Fix doule free in xfrm_policy_timer
+  - netfilter: nft_fwd_netdev: validate family and chain type
+  - vt6: Fix memory leak of skb if input policy check fails
+  - Input: raydium_i2c_ts - use true and false for boolean values
+  - Input: raydium_i2c_ts - fix error codes in raydium_i2c_boot_trigger()
+  - afs: Fix some tracing details
+  - USB: serial: option: add support for ASKEY WWHC050
+  - USB: serial: option: add BroadMobi BM806U
+  - USB: serial: option: add Wistron Neweb D19Q1
+  - USB: cdc-acm: restore capability check order
+  - USB: serial: io_edgeport: fix slab-out-of-bounds read in
+  - edge_interrupt_callback
+  - usb: musb: fix crash with highmen PIO and usbmon
+  - media: flexcop-usb: fix endpoint sanity check
+  - media: usbtv: fix control-message timeouts
+  - staging: rtl8188eu: Add ASUS USB-N10 Nano B1 to device table
+  - staging: wlan-ng: fix ODEBUG bug in prism2sta_disconnect_usb
+  - staging: wlan-ng: fix use-after-free Read in hfa384x_usbin_callback
+  - libfs: fix infoleak in simple_attr_read()
+  - media: ov519: add missing endpoint sanity checks
+  - media: dib0700: fix rc endpoint lookup
+  - media: stv06xx: add missing descriptor sanity checks
+  - media: xirlink_cit: add missing descriptor sanity checks
+  - mac80211: Check port authorization in the ieee80211_tx_dequeue() case
+ - mac80211: fix authentication with iwlfwifi/mvm
+ - vt: selection, introduce vc_is_sel
+ - vt: ioctl, switch VT_IS_IN_USE and VT_BUSY to inlines
+ - vt: switch vt_dont_switch to bool
+ - vt: vt_ioctl: remove unnecessary console allocation checks
+ - vt: vt_ioctl: fix VT_DISALLOCATE freeing in-use virtual console
+ - platform/x86: pnc_atom: Add Lex 213855W to critclk_systems DMI table
+ - bpf: Explicitly memset the bpf_attr structure
+ - bpf: Explicitly memset some bpf info structures declared on the stack
+ - gpiolib: acpi: Add quirk to ignore EC wakeups on HP x2 10 CHT + AXP288 model
+ - net: ks8851-nl: Fix IO operations, again
+ - arm64: alternative: fix build with clang integrated assembler
+ - perf map: Fix off by one in strncpy() size argument
+ - ARM: dts: oxtas: Fix clear-mask property
+ - ARM: bcm2835-rpi-zero-w: Add missing pinctrl name
+ - arm64: dts: ls1043a-rdb: correct RMII delay mode to rgmii-id
+ - arm64: dts: ls1046ardb: set RMII interfaces to RMII_ID mode
+ - dm integrity: use dm_bio_record and dm_bio_restore
+ - riscv: avoid the PIC offset of static percpu data in module beyond 2G limits
+ - drm/display: Clear link settings on MST disable connector
+ - mmc: rtsx_pci: Fix support for speed-modes that relies on tuning
+ - drm/lease: use WARNING in idr_destroy
+ - mmc: core: Allow host controllers to require R1B for CMD6
+ - mmc: core: Respect MMC_CAP_NEED_RSP_BUSY for erase/trim/discard
+ - mmc: core: Respect MMC_CAP_NEED_RSP_BUSY for eMMC sleep command
+ - mmc: sdhci-tegra: Fix busy detection by enabling MMC_CAP_NEED_RSP_BUSY
+ - mlxsw: spectrum_mr: Fix list iteration in error path
+ - bnx_te: Reset rings if ring reservation fails during open()
+ - net: ip_gre: Separate ERSPAN newlink / changelink callbacks
+ - net: ip_gre: Accept IFLA_INFO_DATA-less configuration
+ - tcp: repair: fix TCP_QUEUE_SEQ implementation
+ - s390/qeth: handle error when backing RX buffer
+ - ahci: Add Intel Comet Lake H RAID PCI ID
+ + * Pop sound from build-in speaker during cold boot and resume from S3
+ + (LP: #1866357) // Bionic update: upstream stable patchset 2020-04-03
+ + (LP: #1870604)
+ - ALSA: hda/realtek: Fix pop noise on ALC225
+ + * Bionic update: upstream stable patchset 2020-03-30 (LP: #1869732)
+ - phy: Revert toggling reset changes.
+ - phy: Avoid multiple suspends
+ - cgroup, netclassid: periodically release file_lock on classid updating
+ - gre: fix uninit-value in __iptunnel_pull_header
+ - ipv6/addrconf: call ipv6_mc_up() for non-Ethernet interface
+ - ipvlan: add cond_resched_rcu() while processing multicast backlog
+ - ipvlan: do not use cond_resched_rcu() in ipvlan_process_multicast()
+ net/link: Use netlink header as base to calculate bad attribute offset
+ net: macsec: update SCI upon MAC address change.
+ net: nfct: fix bounds checking bugs on "pipe"
+ net/packet: tpacket_rcv: do not increment ring index on drop
+ sfc: detach from eb_page in efx_copy_channel()
+ bnxt_en: reinitialize IRQs when MTU is modified
+ cgroup: memcg: net: do not associate sock with unrelated cgroup
+ net: memcg: late association of sock to memcg
+ net: memcg: fix lockdep splat in inet_csk_accept()
+ nl802154: add missing attribute validation for tun_id
+ nl802154: add missing attribute validation for dev_type
+ can: add missing attribute validation for termination
+ macsec: add missing attribute validation for port
+ net: fq: add missing attribute validation for orphan mask
+ team: add missing attribute validation for port ifindex
+ team: add missing attribute validation for array index
+ nfc: add missing attribute validation for SE API
+ net: phy: fix MDIO bus PM PHY resuming
+ bonding/alb: make sure arp header is pulled before accessing it
+ slip: make slhc_compress() more robust against malicious packets
+ net: ec: validate the new settings in fec_enet_set_coalesce()
+ macvlan: add cond_resched() during multicast processing
+ inet_diag: return classid for all socket types
+ ipvlan: do not add hardware address of master to its unicast filter list
+ ipvlan: egress mcast packets are not exceptional
+ ipvlan: don't deref eth hdr before checking it's set
+ cgroup: cgroup_procs_next should increase position index
+ cgroup: Iterate tasks that did not finish do_exit()
+ virtio-blk: fix hw_queue stopped on arbitrary error
+ iommu/vt-d: quirk_iot_internal_iova_to_phys() for huge page
+ pinctrl: meson-gxl: fix GPIOX sdio pins
+ pinctrl: core: Remove extra kref_get which blocks hogs being freed
+ nl80211: add missing attribute validation for critical protocol indication
+ - nl80211: add missing attribute validation for beacon report scanning
+ - nl80211: add missing attribute validation for channel switch
+ - netfilter: cthelper: add missing attribute validation for cthelper
+ - netfilter: nft_payload: add missing attribute validation for payload csum flags
+ - iommu/vt-d: Fix the wrong printing in RHSA parsing
+ - iommu/vt-d: Ignore devices with out-of-spec domain number
+ - i2c: acpi: put device when verifying client fails
+ - ipv6: restrict IPV6_ADDRFORM operation
+ - net/smce: check for valid ib_client_data
+ - efi: Add a sanity check to efiivar_store_raw()
+ - batman-adv: Fix internal interface indices types
+ - batman-adv: update data pointers after skb_cow()
+ - batman-adv: Avoid race in TT TVLV allocator helper
+ - batman-adv: Fix TT sync flags for intermediate TT responses
+ - batman-adv: prevent TT request storms by not sending inconsistent TT TLVLs
+ - batman-adv: Avoid free/alloc race when handling OGM2 buffer
+ - batman-adv: Don't schedule OGM for disabled interface
+ - perf/amd/uncore: Replace manual sampling check with CAP_NO_INTERRUPT flag
+ - ACPI: watchdog: Allow disabling WDAT at boot
+ - HID: apple: Add support for recent firmware on Magic Keyboards
+ - cfg80211: check reg_rule for NULL in handle_channel_custom()
+ - libcfc: free response frame from GPN_ID
+ - net: usb: qmi_wwan: restore mtu min/max values after raw_ip switch
+ - net: ks8851-ml: Fix IRQ handling and locking
+ - mac80211: rx: avoid RCU list traversal under mutex
+ - signal: avoid double atomic counter increments for user accounting
+ - slip: not call free_netdev before rtnl_unlock in slip_open
+ - hnic: fix a bug of setting hw_ioctl
+ - net: rmnet: fix NULL pointer dereference in rmnet_newlink()
+ - jbd2: fix data races at struct journal_head
+ - ARM: 8957/1: VDSO: Match ARMv8 timer in cntvct_functional()
+ - ARM: 8958/1: rename missed success .fixup section
+ - mm: slab: add missing TID bump in kmem_cache_alloc_bulk()
+ - ipv4: ensure rcu_read_lock() in cipso_v4_error()
+ - nfc: add missing attribute validation for deactivate target
+ - netfilter: nf_conntrack: ct_cpu_seq_next should increase position index
+ - netfilter: synproxy: synproxy_cpu_seq_next should increase position index
+ - netfilter: xt_recent: recent_seq_next should increase position index
+ - macintosh: windfarm: fix MODINFO regression
+ - i2c: gpio: suppress error on probe defer
+ - net/smce: cancel event worker during device removal
+ - hnic: fix a irq affinity bug
+ - net: rmnet: fix suspicious RCU usage
+ - net: rmnet: remove rcu_read_lock in rmnet_force_unassociate_device()
+ - net: rmnet: fix packet forwarding in rmnet bridge mode
+ - sfc: fix timestamp reconstruction at 16-bit rollover points
+ - driver core: Fix adding device links to probing suppliers
+ - net: qrtr: fix len of skb_put_padto in qrtr_node_enqueue
+ * This laptop contains a touchpad which is not recognized. (LP: #1858299) //
+ Bionic update: upstream stable patchset 2020-03-30 (LP: #1869732)
+ - HID: i2c-hid: add Trekstor Surfbook E11B to descriptor override
+ * Bionic update: upstream stable patchset 2020-03-23 (LP: #1868623)
+ -iwlwifi: pcie: fix rb_allocator workqueue allocation
+ -ext4: fix potential race between online resizing and write operations
+ -ext4: fix potential race between s_flex_groups online resizing and access
+ -ext4: fix potential race between s_group_info online resizing and access
+ -ipmi:ssif: Handle a possible NULL pointer reference
+ -drm/msm: Set dma maximum segment size for mdss
+ -dax: pass NOWAIT flag to iomap_apply
+ -mac80211: consider more elements in parsing CRC
+ -cfg80211: check wiphy driver existence for drvinfo report
+ -qmi_wwan: re-add DW5821e pre-production variant
+ -qmi_wwan: unconditionally reject 2 ep interfaces
+ -net: ena: fix potential crash when rxfh key is NULL
+ -net: ena: fix uses of round_jiffies()
+ -net: ena: add missing ethtool TX timestamping indication
+ -net: ena: fix incorrect default RSS key
+ -net: ena: rss: fix failure to get indirection table
+ -net: ena: rss: store hash function as values and not bits
+ -net: ena: fix incorrectly saving queue numbers when setting RSS indirection table
+ -net: ena: ethtool: use correct value for crc32 hash
+ -net: ena: ena-com.c: prevent NULL pointer dereference
+ -cifs: Fix mode output in debugging statements
+ -cfg80211: add missing policy for NL80211_ATTR_STATUS_CODE
+ -sysrq: Restore original console_loglevel when sysrq disabled
+ -sysrq: Remove duplicated sysrq message
+ -net: fib_rules: Correctly set table field when table number exceeds 8 bits
+ -net: phy: restore mdio regs in the iproc mdio driver
+ -nfc: pn544: Fix occasional HW initialization failure
+ -sctp: move the format error check out of __sctp_sf_do_9_1_abort
+ -ipv6: Fix nlmsg_flags when splitting a multipath route
+ -ipv6: Fix route replacement with dev-only route
+ -qede: Fix race between rdma destroy workqueue and link change event
+ -net: sched: correct flower port blocking
+ -ext4: potential crash on allocation error in ext4_alloc_flex_bg_array()
+ -audit: fix error handling in audit_data_to_entry()
+ -ACPI: Introduce ACPI_ACCESS_BYTE_WIDTH() macro
+ -ACPI: watchdog: Fix gas->access_width usage
+ -KVM: VMX: check descriptor table exits on instruction emulation
+ -HID: ite: Only bind to keyboard USB interface on Acer SW5-012 keyboard dock
+ -HID: core: fix off-by-one memset in hid_report_raw_event()
+ -HID: core: increase HID report buffer size to 8KiB
+ - tracing: Disable trace_printk() on post poned tests
+ - Revert "PM / devfreq: Modify the device name as devfreq(X) for sysfs"
+ - HID: hiddev: Fix race in in hiddev_disconnect()
+ - MIPS: VPE: Fix a double free and a memory leak in 'release_vpe()'
+ - i2c: altera: Fix potential integer overflow
+ - i2c: jz4780: silence log flood on txabrt
+ - drm/i915/gvt: Separate display reset from ALL_ENGINES reset
+ - usb: charger: assign specific number for enum value
+ - ecryptfs: Fix up bad backport of fe2e082f5da5b4a0a92ae32978f81507ef37ec66
+ - net: netlink: cap max groups which will be considered in netlink_bind()
+ - net: atlantic: fix potential error handling
+ - net: ena: make ena rxth support ETH_RSS_HASH_NO_CHANGE
+ - namei: only return -ECHILD from follow_dotdot_rcu()
+ - mwifiex: drop most magic numbers from mwifiex_process_tdl_action_frame()
+ - KVM: SVM: Override default MMIO mask if memory encryption is enabled
+ - KVM: Check for a bad hva before dropping into the ghc slow path
+ - drivers: net: xgene: Fix the order of the arguments of
  'alloc_etherdev_mqs()' 
+ - kprobes: Set unoptimized flag after unoptimizing code
+ - perf hists browser: Restore ESC as "Zoom out" of DSO/thread/etc
+ - mm/huge_memory.c: use head to check huge zero page
+ - mm, thp: fix defrag setting if newline is not used
+ - audit: always check the netlink payload length in audit_receive_msg()
+ - vhst: Check docket sk_family instead of call getname
+ - EDAC/amd64: Set grain per DIMM
+ - net: dsa: bcm_sf2: Forcibly configure IMP port for 1Gb/sec
+ - RDMA/core: Fix pkey and port assignment in get_new_pps
+ - RDMA/core: Fix use of logical OR in get_new_pps
+ - kprobes: Fix optimize_kprobe()/unoptimize_kprobe() cancellation logic
+ - serial: ar933x_uart: set UART_CS_[RX,TX]_READY_ORIDE
+ - selftests: fix too long argument
+ - usb: gadget: composite: Support more than 500mA MaxPower
+ - usb: gadget: ffs: ffs_aio_cancel(): Save/restore IRQ flags
+ - usb: gadget: serial: fix Tx stall after buffer overflow
+ - drm/msm/mdp5: rate limit pp done timeout warnings
+ - drm: msm: Fix return type of dsi_mngr_connector_mode_valid for kCFI
+ - drm/msm/dsi: save pll state before dsi host is powered off
+ - net: ks8851-ml: Remove 8-bit bus accessors
+ - net: ks8851-ml: Fix 16-bit data access
+ - net: ks8851-ml: Fix 16-bit IO operation
+ - watchdog: da9062: do not ping the hw during stop()
+ - s390/cio: cio_ignore_proc_seq_next should increase position index
+ - x86/boot/compressed: Don't declare __force_order in kaslr_64.c
+ - nvme: Fix uninitialized-variable warning
+ - x86/xen: Distribute switch variables for initialization
+ - net: thunderx: workaround BGX TX Underflow issue
+ - cifs: don't leak -EAGAIN for stat() during reconnect
+ - usb: storage: Add quirk for Samsung Fit flash
+ - usb: quirks: add NO_LPM quirk for Logitech Screen Share
+ - usb: core: hub: fix unhandled return by employing a void function
+ - usb: core: hub: do error out if usb_autopm_get_interface() fails
+ - usb: core: port: do error out if usb_autopm_get_interface() fails
+ - vgacon: Fix a UAF in vgacon_invert_region
+ - mm, numa: fix bad pmd by atomically check for pmd_trans_huge when marking
  page tables prot_numa
+ - fat: fix unint-memory access for partial initialized inode
+ - arm: dts: dra76x: Fix mmc3 max-frequency
+ - tty:serial:mvebu-uart: fix a wrong return
+ - serial: 8250_exar: add support for ACCES cards
+ - vt: selection, close sel_buffer race
+ - vt: selection, push sel_lock up
+ - x86/pkeys: Manually set X86_FEATURE_OSPKE to preserve existing changes
+ - dmaengine: tegra-apb: Fix use-after-free
+ - dmaengine: tegra-apb: Prevent race conditions of tasklet vs free list
+ - dm cache: fix a crash due to incorrect work item cancelling
+ - ARM: dts: ls1021a: Restore MDIO compatible to gianfar
+ - ASoC: topology: Fix memleak in soc_tplg_linkelems_load()
+ - ASoC: intel: skl: Fix pin debug prints
+ - ASoC: intel: skl: Fix possible buffer overflow in debug outputs
+ - ASoC: pcm: Fix possible buffer overflow in dpcm state sysfs output
+ - ASoC: pcm512x: Fix unbalanced regulator enable call in probe error path
+ - ASoC: dapm: Correct DAPM handling of active widgets during shutdown
+ - RDMA/iwcm: Fix iwcm work deallocation
+ - RMDA/cm: Fix missing ib_cm_destroy_id() in ib_cm_insert_listen()
+ - IB/hfi1, qib: Ensure RCU is locked when accessing list
+ - ARM: imx: build v7_cpu_resume() unconditionally
+ - hwmon: (ad7462) Fix an error return in ADT7462_REG_VOLT()
+ - dmaengine: coh901318: Fix a double lock bug in dma_tc_handle()
+ - powerpc: fix hardware PMU exception bug on PowerVM compatibility mode
  systems
+ - dm integrity: fix a deadlock due to offloading to an incorrect workqueue
+ - xhci: handle port status events for removed USB3 hcd
+ - ASoC: topology: Fix memleak in soc_tplg_manifest_load()
+ - ALSA: hda/realtek - Apply quirk for MSI GP63, too
+ - ALSA: hda/realtek - Apply quirk for yet another MSI laptop
+ - USB: core: add endpoint-blacklist quirk
+ - USB: quirks: blacklist duplicate ep on Sound Devices USBPre2
+ - powerpc/tm: Fix clearing MSR[TS] in current when reclaiming on signal
delivery
+ - jbd2: fix ocfs2 corrupt when clearing block group bits
+ - x86/cpu/amd: Enable the fixed Instructions Retired counter IRPERF
+ - genirq/irqdomain: Make sure all irq domain flags are distinct
+ - btrfs: reset fs_root to NULL on error in open_cctree
+ - usb: dwc2: Fix in ISOC request length checking
+ - rxrpc: Fix call RCU cleanup using non-bh-safe locks
+ - s390/zcrypt: fix card and queue total counter wrap
+ - ARM: dts: sti: fixup sound frame-inversion for sti3xxx-b2120.dtsi
+ - macintosh: therm_w single_tunnel: fix regression when instantiating devices
+ - HID: alps: fix an error handling path in 'alps_input_configured()'
+ - hv_netvsc: Fix unwanted wakeup in netvsc_attach()
+ - s390/qeth: vnicc Fix EOPNOTSUPP precedence
+ - net: atlantic: fix use after free kasan warn
+ - sched/fair: Optimize update_blocked_averages()
+ - sched/fair: Fix O(nr_cgroups) in the load balancing path
+ - KVM: x86: Remove spurious kvm_mmu_unload() from vcpu destruction path
+ - KVM: x86: Remove spurious clearing of async #PF MSR
+ - thermal: brcmstb_thermal: Do not use DT coefficients
+ - scsi: megaraid_sas: silence a warning
+ - net: dsa: b53: Ensure the default VID is untagged
+ - s390: make 'install' not depend on vmlinux
+ - s390/qdio: fill SL with absolute addresses
+ - ALSA: hda/realtek - Fix silent output on Gigabyte X570 Aorus Master
+ - ef1/x86: Align GUIDs to their size in the mixed mode runtime wrapper
+ - ef1/x86: Handle by-ref arguments covering multiple pages in mixed mode
+ - scsi: pm80xx: Fixed kernel panic during error recovery for SATA drive
+ * Bionic update: upstream stable patchset 2020-03-17 (LP: #1867837)
+ - iommu/qcom: Fix bogus detach logic
+ - ALSA: hda: Use scnprintf() for printing texts for sysfs/procfs
+ - ASoC: sun8i-codec: Fix setting DAI data format
+ - ecryptfs: fix a memory leak bug in parse_tag_1_packet()
+ - ecryptfs: fix a memory leak bug in ecryptfs_init_messaging()
+ - arm64: nopsimd: Handle TIF_FOREIGN_FPSTATE flag cleanly
+ - ARM: 8723/2: always assume the "unified" syntax for assembly code
+ - serial: imx: ensure that RX irqs are off if RX is off
+ - serial: imx: Only handle irqs that are actually enabled
+ - KVM: nVMX: Use correct root level for nested EPT shadow page tables
+ - drm/gma500: Fixup fbdev stolen size usage evaluation
+ - cpu/hotplug, stop_machine: Fix stop_machine vs hotplug order
+ - brcmfmac: Fix use after free in brcmf_sdio_readframes()
+ - leds: pca9632x: Fix open-drain initialization
+ - ext4: fix ext4_dax_read/write inode locking sequence for IOCB_NOWAIT
+ - ALSA: ctl: allow TLV read operation for callback type of element in locked case
+ - gianfar: Fix TX timestamping with a stacked DSA driver
+ - pinctrl: sh-pfc: sh7264: Fix CAN function GPIOs
+ - pxa168fb: Fix the function used to release some memory in an error handling path
+ - media: i2c: mt9v032: fix enum mbus codes and frame sizes
+ - powerpc/powernv/iov: Ensure the pdn for VFs always contains a valid PE number
+ - gpio: gpio-grgpio: fix possible sleep-in-atomic-context bugs in
grgpio_irq_map/unmap()
+ - media: sti: bdisp: fix a possible sleep-in-atomic-context bug in bdisp_device_run()
+ - pinctrl: baytrail: Do not clear IRQ flags on direct-irq enabled pins
+ - efi/x86: Map the entire EFI vendor string before copying it
+ - MIPS: Loongson: Fix potential NULL dereference in loongson3_platform_init()
+ - sparc: Add .exit.data section.
+ - uio: fix a sleep-in-atomic-context bug in uio_dmem_genirq_irqcontrol()
+ - usb: gadget: udc: fix possible sleep-in-atomic-context bugs in gr_probe()
+ - usb: dwc2: Fix IN FIFO allocation
+ - clocksource/drivers/bcm2835_timer: Fix memory leak of timer
+ - kselftest: Minimise dependency of get_size on C library interfaces
+ - jbd2: clear JBD2_ABORT flag before journal_reset to update log tail info
+ when load journal
+ - x86/sysfb: Fix check for bad VRAM size
+ - tracing: Fix tracing_stat return values in error handling paths
+ - tracing: Fix very unlikely race of registering two stat tracers
+ - ext4, jbd2: ensure panic when aborting with zero errno
+ - ndb: add a flush_workqueue in ndb_start_device
+ - KVM: s390: ENOTSUPP -> EOPNOTSUPP fixups
+ - kconfig: fix broken dependency in randconfig-generated .config
+ - clk: qcom: rcg2: Don't crash if our parent can't be found; return an error
+ - drm/amdgpu: remove 4 set but not used variable in
+ amdgpu_atombios_get_connector_info_from_object_table
+ - regulator: rk808: Lower log level on optional GPIOs being not available
+ - net/wan/fsl_ucc_hdlt: reject muram offsets above 64K
+ - PCI/IOV: Fix memory leak in pci_iov_add_virtfn()
+ - NFC: port100: Convert cpu_to_le16(le16_to_cpu(E1) + E2) to use
+ le16_add_cpu().
+ - arm64: dts: qcom: msm8996: Disable USB2 PHY suspend by core
+ - ARM: dts: imx6: rdu2: Disable WP for USDHC2 and USDHC3
+ - media: v4l2-device.h: Explicitly compare grp{id,mask} to zero in v4l2_device
+ macros
+ - reiserfs: Fix spurious unlock in reiserfs_fill_super() error handling
+ - fore200e: Fix incorrect checks of NULL pointer dereference
+ - ALSA: usx2y: Adjust indentation in snd_usX2Y_hwdep DSP status
+ - b43legacy: Fix -Wcast-function-type
+ - ipw2x00: Fix -Wcast-function-type
+ - iwlegacy: Fix -Wcast-function-type
+ - rtlwifi: rtl_pci: Fix -Wcast-function-type
+ - orinoco: avoid assertion in case of NULL pointer
+ - ACPICA: Disassembler: create buffer fields in ACPI_PARSE_LOAD_PASS1
+ - scsi: ufs: Complete pending requests in host reset and restore path
+ - scsi: aic7xxx: Adjust indentation in aic_find_syncrate
+ - drm/mediatek: handle events when enabling/disabling crtc
+ - ARM: dts: r8a7779: Add device node for ARM global timer
+ - dmaengine: Store module owner in dma_device struct
+ - x86/vdso: Provide missing include file
+ - PM / devfreq: rk3399_dmc: Add COMPILTEST and HAVE_ARM_SMCCC dependency
+ - pinctrl: sh-pfc: sh7269: Fix CAN function GPIOs
+ - RDMA/rxe: Fix error type of mmap_offset
+ - clk: sunxi-ng: add mux and pll notifiers for A64 CPU clock
+ - ALSA: sh: Fix unused variable warnings
+ - ALSA: sh: Fix compile warning wrt const
+ - drm: remove the newline for CRC source name.
+ - ush: Fix unsafe unaligned pointer usage
+ - udf: Fix free space reporting for metadata and virtual partitions
+ - IB/hfi1: Add software counter for cxtt0 seq drop
+ - soc/tegra: fuse: Correct straps' address for older Tegra124 device trees
+ - efi/x86: Don't panic or BUG() on non-critical error conditions
+ - rcu: Use WRITE_ONCE() for assignments to ->pprev for hlist_nulls
+ - Input: edt-ft5x06 - work around first register access error
+ - wan: ipx4xx_hss: fix compile-testing on 64-bit
+ - ASoC: atmel: fix build error with CONFIG_SND_ATMEL_SOC_DMA=m
+ - tty: synclinkmp: Adjust indentation in several functions
+ - tty: synclink_gt: Adjust indentation in several functions
+ - driver core: platform: Prevent resource overflow from causing infinite loops
+ - driver core: Print device when resources present in really_probe()
+ - vme: bridges: reduce stack usage
+ - drm/nouveau/secboot/gm20b: initialize pointer in gm20b_serboot_new()
+ - drm/nouveau/gr/gk20a,gm200: add terminators to method lists read from fw
+ - drm/nouveau: Fix copy-paste error in nouveau_fence_wait_uevent_handler
+ - drm/vmwgfx: prevent memory leak in vmw_cmdbuf_res_add
+ - usb: musb: omap2430: Get rid of musb .set_vbus for omap2430 glue
+ - iommu/arm-smmu-v3: Use WRITE_ONCE() when changing validity of an STE
+ - f2fs: free sysfs kobject
+ - scsi: iscsi: Don't destroy session if there are outstanding connections
+ - arm64: fix alternatives with LLVM's integrated assembler
+ - watchdog/softlockup: Enforce that timestamp is valid on boot
+ - f2fs: fix memleak of kobject
+ - x86/mm: Fix NX bit clearing issue in kernel_map_pages_in_pgd
+ - pwm: omap-dmtimer: Remove PWM chip in .remove before making it unfunctional
+ - cmd64x: potential buffer overflow in cmd64x_program_timings()
+ - ide: serverworks: potential overflow in svwks_set_pio_mode()
+ - pwm: Remove set but not set variable 'pwm'
+ - btrfs: fix possible NULL-pointer dereference in integrity checks
+ - btrfs: safely advance counter when looking up bio csums
+ - btrfs: device stats, log when stats are zeroed
+ - remoteproc: Initialize rproc_class before use
+ - irqchip/mbigen: Set driver .suppress_bind_attrs to avoid remove problems
+ - ALSA: hda/hdmi - add retry logic to parse_intel_hdmi()
+ - x86/decoder: Add TEST opcode to Group3-2
+ - s390/trace: generate traced function stack frame
+ - driver core: platform: fix u32 greater or equal to zero comparison
+ - ALSA: hda - Add docking station support for Lenovo Thinkpad T420s
+ - powerpc/sriov: Remove VF eeh_dev state when disabling SR-IOV
+ - jbd2: switch to use jbd2_journal_abort() when failed to submit the commit record
+ - jbd2: make sure ESHUTDOWN to be recorded in the journal superblock
+ - ARM: 8951/1: Fix Kexec compilation issue.
+ - hostap: Adjust indentation in prism2_hostapd_add_sta
+ - iwllegacy: ensure loop counter addr does not wrap and cause an infinite loop
+ - cifs: fix NULL dereference in match_prepath
+ - ceph: check availability of mds cluster on mount after wait timeout
+ - irqchip/gic-v3: Only provision redistributors that are enabled in ACPI
+ - drm/nouveau/disp/nv50-: prevent oops when no channel method map provided
+ - ftrace: fpid_next() should increase position index
+ - trigger_next should increase position index
+ - radeon: insert 10ms sleep in dce5_crtc_load_lut
+ - ocfs2: fix a NULL pointer dereference when call ocfs2_update_inode_fsync_trans()
+ - lib/scatterlist.c: adjust indentation in __sg_alloc_table
+ - reiserfs: prevent NULL pointer dereference in reiserfs_insert_item()
+ - bcache: explicit type cast in bset_bkey_last()
+ - irqchip/gic-v3-its: Reference to its_invall_cmd descriptor when building INVALL
+ - iwlfwif: mvm: Fix thermal zone registration
+ - microblaze: Prevent the overflow of the start
+ - brd: check and limit max_part par
+ - help_next should increase position index
+ - virtio_balloon: prevent pfn array overflow
+ - mlxsw: spectrum_dpipe: Add missing error path
+ - selinux: ensure we cleanup the internal AVC counters on error in avc_update()
+ - enic: prevent waking up stopped tx queues over watchdog reset
+ - net: dsa: tag_qca: Make sure there is headroom for tag
+ - net/sched: matchall: add missing validation of TCA_MATCHALL_FLAGS
+ - net/sched: flower: add missing validation of TCA_FLOWER_FLAGS
+ - net/smc: fix leak of kernel memory to user space
+ - thunderbolt: Prevent crash if non-active NVMem file is read
+ - USB: misc: iowarrior: add support for 2 OEMed devices
+ - USB: misc: iowarrior: add support for the 28 and 28L devices
+ - USB: misc: iowarrior: add support for the 100 device
+ - floppy: check FDC index for errors before assigning it
+ - vt: selection, handle pending signals in paste_selection
+ - staging: android: ashmem: Disallow ashmem memory from being remapped
+ - staging: vt6656: fix sign of rx_dbm to bb_pre_ed_rssi.
+ - xhci: Force Maximum Packet size for Full-speed bulk devices to valid range.
+ - xhci: fix runtime pm enabling for quirky Intel hosts
+ - usb: host: xhci: update event ring dequeue pointer on purpose
+ - usb: uas: fix a plug & unplug racing
+ - USB: Fix novation SourceControl XL after suspend
+ - USB: hub: Don't record a connect-change event during reset-resume
+ - USB: hub: Fix the broken detection of USB3 device in SMSC hub
+ staging: rtl8188eu: Fix potential security hole
+ staging: rtl8188eu: Fix potential overuse of kernel memory
+ staging: rtl8723bs: Fix potential security hole
+ staging: rtl8723bs: Fix potential overuse of kernel memory
+ x86/mce/amd: Publish the bank pointer only after setup has succeeded
+ x86/mce/amd: Fix kobjet lifetime
+ tty/serial: atmel: manage shutdown in case of RS485 or ISO7816 mode
+ tty: serial: imx: setup the correct sg entry for tx dma
+ serdev: ttyport: restore client ops on deregistration
+ - staging: rtl8188eu: Fix potential security hole
+ - staging: rtl8188eu: Fix potential overuse of kernel memory
+ - staging: rtl8723bs: Fix potential security hole
+ - staging: rtl8723bs: Fix potential overuse of kernel memory
+ MAINTAINERS: Update drm/i915 bug filing URL
+ mm/vmscan.c: don't round up scan size for online memory cgroup
+ drm/amdgpusoc15: fix xclk for raven
+ - KVM: x86: don't notify userspace IOAPIC on edge-triggered interrupt EOI
+ xhci: apply XHCI_PME_STUCK QUIRK to Intel Comet Lake platforms
+ vt: vt_ioctl: fix race in VT_RESIZE
+ serial: 8250: Check UPF_IRQ_SHARED in advance
+ lib/stackdepot.c: fix global out-of-bounds in stack slabs
+ ext4: fix a data race in EXT4_I(inode)->i_disksize
+ ext4: add cond_resched() to __ext4_find_entry()
+ ext4: rename s_journal_flag_rwsem to s_writepages_rwsem
+ ext4: fix race between writepages and enabling EXT4_EXTENTS_FL
+ KVM: nVMX: handle nested posted interrupts when apicv is disabled for L1
+ KVM: apic: avoid calculating pending eoi from an uninitialized val
+ btrfs: fix bytes_may_use underflow in prealloc error condition
+ btrfs: do not check delayed items are empty for single transaction cleanup
+ Btrfs: fix btrfs_wait_ordered_range() so that it waits for all ordered extents
+ scsi: Revert "RDMA/isert: Fix a recently introduced regression related to logout"
+ scsi: Revert "target: iscsi: Wait for all commands to finish before freeing a session"
+ usb: gadget: composite: Fix bMaxPower for SuperSpeedPlus
+ staging: rtl8723bs: fix copy of overlapping memory
+ staging: greybus: use after free in gb_audio_manager_remove_all()
+ cryptofs: replace BUG_ON with error handling code
+ iommu/vt-d: Fix compile warning from intel-svm.h
+ genirq/proc: Reject invalid affinity masks (again)
+ ALSA: rawmidi: Avoid bit fields for state flags
+ ALSA: seq: Avoid concurrent access to queue flags
+ ALSA: seq: Fix concurrent access to queue current tick/time
+ netfilter: xt_hashlimit: limit the max size of hashtable
+ ata: ahci: Add shutdown to freeze hardware resources of ahci
+ xen: Enable interrupts when calling _cond_resched()
+ s390/mm: Explicitly compare PAGE_DEFAULT_KEY against zero in storage_key_init_range
+ arm: dts: allwinner: H3: Add PMU node
+ ARM: dts: imx6: rdu2: Limit USBH1 to Full Speed
+ PCI: iproc: Apply quirk_paxe_bridget() for module as well as built-in
- media: cx23885: Add support for AVerMedia CE310B
- staging: rtl8118: avoid excessive stack usage
- x86/nmi: Remove irq_work from the long duration NMI handler
- visorbus: fix uninitialized variable access
- drm/nouveau/drm/ttm: Remove set but not used variable 'mem'
- 12fs: set I_LINKABLE early to avoid wrong access by vfs
- s390: adjust -mpacked-stack support check for clang 10
- drm/nouveau/mmu: fix comptag memory leak

* Multiple Kexec in AWS Nitro instances fail (LP: #1869948)
* net: ena: Add PCI shutdown handler to allow safe kexec

* Support SMO8840 as LIS2DH12 (LP: #1869694)
* iio: st_sensors: remap SMO8840 to LIS2DH12

* CVE-2019-19768
- blktrace: Protect q->blk_trace with RCU
- blktrace: fix dereference after null check

* No audio output from Dell WD19 HDMI/DP after resumed from S3 or s2idle
  (LP: #1869642)
  - PM / runtime: Rework pm_runtime_force_suspend/resume()

* reuseport_bpf_numa in net from ubuntu_kernel_selftests failed on i386
  (LP: #1812638)
  - selftests: net: reuseport_bpf_numa: don't fail if no numa support

* Sys oopsed with sysfs test in ubuntu_stress_smoke_test on X-hwe ARM64
  (LP: #1866772)
  - SAUCE: ACPI: sysfs: copy ACPI data using io memory copying

* update-version-dkms doesn't add a BugLink (LP: #1867790)
  - [Packaging] Add BugLink to update-version-dkms commit

* Packaging resync (LP: #1786013)
  - update dkms package versions

-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Tue, 07 Apr 2020 11:01:18 +0200

+ - KVM: PPC: Book3S HV: Factor fake-suspend handling out of
  kvmppc_save/restore_tm
+ - KVM: PPC: Book3S PR: Move kvmppc_save_tm/kvmppc_restore_tm to separate file
+ - KVM: PPC: Book3S PR: Add guest MSR parameter for
  kvmppc_save_tm()/kvmppc_restore_tm()
Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Tue, 31 Mar 2020 23:24:38 -0300

+linux (4.15.0-94.95) bionic; urgency=medium
+* bionic/linux: 4.15.0-94.95 -proposed tracker (LP: #1868984)
+* Missing wireless network interface after kernel 5.3.0-43 upgrade with eoan
  (LP: #1868442)
+  - iwlwifi: mvm: Do not require PHYSKU NVM section for 3168 devices
+-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 25 Mar 2020 12:07:10 +0100
+linux (4.15.0-93.94) bionic; urgency=medium
+* bionic/linux: 4.15.0-93.94 -proposed tracker (LP: #1868764)
+* quotactl04 from ubuntu_ltp_syscalls failed with B (LP: #1868665)
  - ext4: fix mount failure with quota configured as module
+-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 24 Mar 2020 17:21:37 +0100
+linux (4.15.0-92.93) bionic; urgency=medium
+* bionic/linux: 4.15.0-92.93 -proposed tracker (LP: #1867272)
+* Packaging resync (LP: #1786013)
  - [Packaging] resync getabis
  - [Packaging] update helper scripts
+* Introduce the new NVIDIA 440 series, and add 5.4 Linux compatibility to the
  340 and 390 series (LP: #1854485)
+  - [Packaging] NVIDIA -- add support for the 435 and the 440 series
+* Stop using get_scalar_status command in Dell AIO uart backlight driver
  (LP: #1865402)
+  - SAUCE: platform/x86: dell-uart-backlight: add get_display_mode command
+* Bionic update: upstream stable patchset 2020-03-12 (LP: #1867194)
+  - RDMA/core: Fix locking in ib_uverbs_event_read
+  - gpio: zynq: Report gpio direction at boot
+  - arm64: ptrace: nofpsimd: Fail FP/SIMD regset operations
+  - KVM: arm: Fix DFSR setting for non-LPAE aarch32 guests
+  - KVM: arm: Make inject_abt32() inject an external abort instead
+  - mtd: onenand_base: Adjust indentation in onenand_read_ops_nolock
+  - mtd: sharpslpart: Fix unsigned comparison to zero
+  - padata: fix null pointer deref of pd->pinst
+  - Input: synaptics - switch T470s to RMI4 by default
+  - Input: synaptics - enable SMBus on ThinkPad L470
+ Input: synaptics - remove the LEN0049 dmi id from topbuttonpad list
+ ALSA: hda/realtek - Fix silent output on MSI-GL73
+ ALSA: usb-audio: Apply sample rate quirk for Audioengine D1
+ arm64: cpufeature: Set the FP/SIMD compat HWCAP bits properly
+ ALSA: usb-audio: sound: usb: usb true/false for bool return type
+ ext4: don't assume that mmp_nodename/bdevname have NUL
+ ext4: fix support for inode sizes > 1024 bytes
+ ext4: fix checksum errors with indexed dirs
+ ext4: add cond_resched() to ext4_protect_reserved_inode
+ ext4: improve explanation of a mount failure caused by a misconfigured
  kernel
+ btrfs: fix race between using extent maps and merging them
+ btrfs: ref-verify: fix memory leaks
+ btrfs: print message when tree-log replay starts
+ btrfs: log message when rw remount is attempted with unclean tree-log
+ arm64: ssbs: Fix context-switch when SSBS is present on all CPUs
+ perf/x86/and: Add missing L2 misses event spec to AMD Family 17h's event map
+ IB/hi1: Close window for pq and request coliding
+ IB/rdmv: Reset all QPs when the device is shut down
+ RDMA/rxe: Fix soft lockup problem due to using tasklets in softirq
+ RDMA/core: Fix protection fault in get_pkey_idx_qp_list
+ s390/time: Fix clk type in get_tod_clock
+ perf/x86/intel: Fix inaccurate period in context switch for auto-reload
+ hwmon: (pmbus/ltc2978) Fix PMBus polling of MFR_COMMON definitions.
+ jbd2: move the clearing of b_modified flag to the journal_unmap_buffer()
+ jbd2: do not clear the BH_Mapped flag when forgetting a metadata buffer
+ KVM: x86/mmu: Fix struct guest_walker arrays for 5-level paging
+ * Bionic update: upstream stable patchset 2020-03-09 (LP: #1866678)
+ kernel/module: Fix memleak in module_add_modinfo_attrs()
+ media: iguana: fix endpoint sanity check
+ x86/cpu: Update cached HLE state on write to TSX_CTRL_CPUID_CLEAR
+ iwlwifi: mvms: fix NVM check for 3168 devices
+ sparc32: fix struct ipc64_perm type definition
+ cls_rsvp: fix rsvp_policy
+ gtp: use __GFP_NOWARN to avoid memalloc warning
+ i2tp: Allow duplicate session creation with UDP
+ net: hsr: fix possible NULL deref in hsr_handle_frame()
+ net_sched: fix an OOB access in cls_teindex
+ bnxt-en: Fix TC queue mapping.
+ tcp: clear tp->total_retrans in tcp_disconnect()
+ tcp: clear tp->delivered in tcp_disconnect()
+ tcp: clear tp->data_segs[<in|out>] in tcp_disconnect()
+ tcp: clear tp->seg[<in|out>] in tcp_disconnect()
+ rxrpc: Fix insufficient receive notification generation
+ rxrpc: Fix NULL pointer deref due to call->conn being cleared on disconnect
+ media: uvcvideo: Avoid cyclic entity chains due to malformed USB descriptors
+ mfd: dln2: More sanity checking for endpoints
+ - tracing: Fix sched switch start/stop recount racy updates
+ - brcmfmac: Fix memory leak in brcmf_usbdev_qinit
+ - usb: gadget: legacy: set max_speed to super-speed
+ - usb: gadget: f_ncm: Use atomic_t to track in-flight request
+ - usb: gadget: f_emc: Use atomic_t to track in-flight request
+ - ALSA: dummy: Fix PCM format loop in proc output
+ - media/v4l2-core: set pages dirty upon releasing DMA buffers
+ - media: v4l2-rect.h: fix v4l2_rect_map_inside() top/left adjustments
+ - lib/test_kasan.c: fix memory leak in kmalloc_oob_krealloc_more()
+ - irqdomain: Fix a memory leak in irq_domain_push_irq()
+ - platform/x86: intel_scu_ipc: Fix interrupt support
+ - KVM: arm64: Only sign-extend MMIO up to register width
+ - MIPS: fix indentation of the 'RELOCS' message
+ - s390/mm: fix dynamic pagetable upgrade for hugetlbfs
+ - powerpc/xmon: don't access ASDR in VMs
+ - powerpc/pseries: Advance pf if section is not present in lmb_is_removable()
+ - mm: spi: Toggle SPI polarity, do not hardcode it
+ - ACPI: video: Do not export a non working backlight interface on MSI MS-7721 boards
+ - alarmtimer: Unregister wakeup source when module get fails
+ - ubifs: Reject unsupported ioctl flags explicitly
+ - ubifs: Fix FS_IOC_SETFLAGS unexpectedly clearing encrypt flag
+ - ubifs: Fix deadlock in concurrent bulk-read and writepage
+ - PCI: keystone: Fix link training retries initiation
+ - mmc: sdhci-of-at91: fix memleak on clk_get failure
+ - ubifs: don't trigger assertion on invalid no-key filename
+ - hv_balloon: Balloon up according to request page number
+ - crypto: api - Check spawn->alg under lock in crypto_drop_spawn
+ - scsi: qla2xxx: Fix mtcpc dump collection failure
+ - power: supply: ltc2941-battery-gauge: fix use-after-free
+ - f2fs: choose hardlimit when softlimit is larger than hardlimit in f2fs_statsfs_project()
+ - f2fs: fix miscounted block limit in f2fs_statsfs_project()
+ - f2fs: code cleanup for f2fs_statsfs_project()
+ - PM: core: Fix handling of devices deleted during system-wide resume
+ - [Config] updateconfigs for CONFIG_OF_DMA_DEFAULT_COHERENT
+ - of: Add OF_DMA_DEFAULT_COHERENT & select it on powerpc
+ - dm zoned: support zone sizes smaller than 128MiB
+ - dm space map common: fix to ensure new block isn't already in use
+ - dm crypt: fix benbi IV constructor crash if used in authenticated mode
+ - tracing: Annotate ftrace_graph_hash pointer with __rcu
+ - tracing: Annotate ftrace_graph_notrace_hash pointer with __rcu
+ - ftrace: Add comment to why rcu_dereference_sched() is open coded
+ - ftrace: Protect ftrace_graph_hash with ftrace_sync
+ - samples/bpf: Don't try to remove user's homedir on clean
+ - crypto: ccp - set max RSA modulus size for v3 platform devices as well
+ - crypto: pcrypt - Do not clear MAY_SLEEP flag in original request
+ - crypto: atmel-aes - Fix counter overflow in CTR mode
- crypto: api - Fix race condition in crypto_spawn_alg
- crypto: picoxcell - adjust the position of tasklet_init and fix missed
  tasklet_kill
- scsi: qla2xxx: Fix unbound NVME response length
- NFS: Fix memory leaks and corruption in readdir
- ARM: tegra: Enable PLLP bypass during Tegra124 LP1
- iwlwifi: don't throw error when trying to remove IGTK
- mwifiex: fix unbalanced locking in mwifiex_process_country_ie()
- sunrpc: expiry_time should be seconds not timeval
- tools/kvm_stat: Fix kvm_exit filter name
- xen/balloon: Support xend-based toolstack take two
- KVM: x86: Refactor picdev_write() to prevent Spectre-v1/L1TF attacks
- KVM: x86: Refactor prefix decoding to prevent Spectre-v1/L1TF attacks
- KVM: x86: Protect DR-based index computations from Spectre-v1/L1TF attacks
- KVM: x86: Protect kvm_lapic_reg_write() from Spectre-v1/L1TF attacks
- KVM: x86: Protect kvm_hv_msr_[get|set]_crash_data() from Spectre-v1/L1TF
  attacks
- KVM: x86: Protect ioapic_write_indirect() from Spectre-v1/L1TF attacks
- KVM: x86: Protect MSR-based index computations in pmu.h from Spectre-v1/L1TF
  attacks
- KVM: x86: Protect ioapic_read_indirect() from Spectre-v1/L1TF attacks
- KVM: x86: Protect MSR-based index computations from Spectre-v1/L1TF attacks
  in x86.c
- KVM: x86: Protect x86_decode_insn from Spectre-v1/L1TF attacks
- KVM: x86: Protect MSR-based index computations in fixed_msr_to_seg_unit()
  from Spectre-v1/L1TF attacks
- KVM: PPC: Book3S HV: Uninit vCPU if vcore creation fails
- KVM: PPC: Book3S PR: Free shared page if mmu initialization fails
- KVM: x86: Free wbinvd_dirty_mask if vCPU creation fails
- clk: tegra: Mark fuse clock as critical
- scsi: qla2xxx: Fix the endianness of the qla82xx_get_fw_size() return type
- scsi: csiostor: Adjust indentation in csio_device_reset
- scsi: qla4xxx: Adjust indentation in qla4xxx_mem_free
- scsi: ufs: Recheck bkops level if bkops is disabled
- phy: qualcomm: Adjust indentation in read_poll_timeout
- ext2: Adjust indentation in ext2_fill_super
- powerpc44x: Adjust indentation in ibm4xx_denali_fixup_memsizw
- NFC: pn544: Adjust indentation in pn544_hci_check_presence
- ppp: Adjust indentation into ppp_async_input
- net: smc911x: Adjust indentation in smc911x_phy_configure
- net: tulip: Adjust indentation in {dmfe, uli526x}.init_module
- IB/mlx5: Fix outstanding_pi index for GSI qps
- IB/core: Fix ODP get user pages flow
- nfsd: fix delay timer on 32-bit architectures
- nfsd: fix jiffies/time_t mixup in LRU list
- ubi: fastmap: Fix inverted logic in seen selfcheck
+ - ubi: Fix an error pointer dereference in error handling code
+ - mfd: da9062: Fix watchdog compatible string
+ - mfd: m5i618: Mark ADC control register volatile
+ - net: dsa: bcm_sf2: Only 7278 supports 2Gb/sec IMP port
+ - net_sched: fix a resource leak in tcindex_set_parms()
+ - net: systemport: Avoid RBUF stuck in Wake-on-LAN mode
+ - net: macb: Remove unnecessary alignment check for TSO
+ - net: macb: Limit maximum GEM TX length in TSO
+ - bonding/alb: properly access headers in bond_alb_xmit()
+ - ext4: fix deadlock allocating crypto bounce page from mempool
+ - btrfs: Get rid of the confusing btrfs_file_extent_inline_len
+ - Btrfs: fix missing hole after hole punching and fsync when using NO_HOLES
+ - btrfs: use bool argument in free_root_pointers()
+ - btrfs: free block groups after free'ing fs trees
+ - btrfs: remove trivial locking wrappers of tree mod log
+ - Btrfs: fix race between adding and putting tree mod seq elements and nodes
+ - drm: atmel-hlcdc: enable clock before configuring timing engine
+ - KVM: x86: Protect pmu_intel.c from Spectre-v1/L1TF attacks
+ - btrfs: flush write bio if we loop in extent_write_cache_pages
+ - KVM: x86: Fix potential put_fpu()/w/o load_fpu() on MPX platform
+ - KVM: x86/mmnu: Apply max PA check for MMIO sptes to 32-bit KVM
+ - KVM: nVMX: vmread should not set rflags to specify success in case of #PF
+ - KVM: Use vcpu-specific gva->hva translation when querying host page size
+ - KVM: Play nice with read-only memslots when querying host page size
+ - KVM: s390: do not clobber registers during guest reset/store status
+ - cifs: fail i/o on soft mounts if sessionsetup errors out
+ - clockssource: Prevent double add_timer_on() for watchdog_timer
+ - perf/core: Fix mlock accounting in perf_mmap()
+ - rxrpc: Fix service call disconnection
+ - ASoC: pcm: update FE/BE trigger order based on the command
+ - hv_sock: Remove the accept port restriction
+ - RDMA/netlink: Do not always generate an ACK for some netlink operations
+ - scsi: ufs: Fix ufshcd_probe_hba() reture value in case
  ufshcd_scsi_add_wlus() fails
+ - PCI/systemc: Fix vep_vector_number ioread width
+ - PCI: Don’t disable bridge BARs when assigning bus resources
+ - nfs: NFS_SWAP should depend on SWAP
+ - NFS/pnfs: Fix pnfs_generic_prepare_to_resend_writes()
+ - NFSv4: try lease recovery on NFS4ERR_EXPIRED
+ - serial: uartps: Add a timeout to the tx empty wait
+ - rtc: hym8563: Return -EINVAL if the time is known to be invalid
+ - rtc: cmos: Stop using shared IRQ
+ - ARC: [plat-axs10x]: Add missing multicast filter number to GMAC node
+ - platform/x86: intel_mid_powerbtn: Take a copy of ddata
+ - ARM: dts: at91: sama5d3: fix maximum peripheral clock rates
+ - ARM: dts: at91: sama5d3: define clock rate range for tcb1
+ - tools/power/acpi: fix compilation error
+ - powerpc/pseries/vio: Fix iommu_table use-after-free refcount warning
- powerpc/pseries: Allow not having ibm, hypertas-functions::hcall-multi-tce for DDW
- KVM: arm/arm64: vgic-its: Fix restoration of unmapped collections
- ARM: 8949/1: mm: mark free_memmap as __init
- arm64: cpufeature: Fix the type of no FP/SIMD capability
- KVM: arm/arm64: Fix young bit from mmu notifier
- crypto: artpec6 - return correct error code for failed setkey()
- crypto: atmel-sha - fix error handling when setting hmac key
- media: i2c: adv748x: Fix unsafe macros
- pinctrl: sh-pfc: r8a7778: Fix duplicate SDSELF_B and SD1_CLK_B
- scsi: megaraid_sas: Do not initiate OCR if controller is not in ready state
- serial: uartps: Move the spinlock after the read of the tx empty
- mwifiex: Fix possible buffer overflows in mwifiex_ret_wmm_get_status()
- mwifiex: Fix possible buffer overflows in mwifiex_cmd_append_vsie_tlv()
- libertas: don't exit from lbs_ibss_join_exsiting() with RCU read lock held
- libertas: make lbs_ibss_join_exsisting() return error code on rates overflow
- udf: Allow writing to 'Rewritable' partitions
- printk: fix exclusive_console replaying
- usb: typec: tcpci: mask event interrupts when remove driver
- ALSA: hda: Add Clevo W65_67SB the power_save blacklist
- KVM: arm/arm64: Correct AArch32 SPSR on exception entry
- crypto: geode-aes - convert to skcipher API and make thread-safe
- mfd: axp20x: Mark AXP20X_VBUS_IPSOUT_MGMT as volatile
- scripts/find-unused-docs: Fix massive false positives
- padata: Remove broken queue flushing
- jbd2_seq_info_next should increase position index
- watchdog: fix UAF in reboot notifier handling in watchdog core code
- bcache: add readahead cache policy options via sysfs interface
- eventfd: track eventfd_signal() recursion depth
- x86/kvm: Be careful not to clear KVM_VCPU_FLUSH_TLB bit
- drm/amd/dm/mst: Ignore payload update failures
- percpu: Separate decrypted varialbes anytime encryption can be enabled
- drm: msm: mdp4: Adjust indentation in mdp4_dsi_encoder_enable
- net: dsa: b53: Always use dev->vlan_enabled in b53_configure_vlan()
- drm/dp_mst: Remove VCPI while disabling topology mgr
- KVM: x86: Use gpa_t for cr2/gpa to fix TDP support on 32-bit KVM
- x86/apic/lsi: Plug non-maskable MSI affinity race

* 5.4.0-11 crash on cryptsetup open (LP: #1860231) // Bionic update: upstream
- dm: fix potential for q->make_request_fn NULL pointer

* r8152 init may take up to 40 seconds at initialization with Dell WD19/WD19DC during hotplug (LP: #1864284)
- UBUNTU SAUCE: r8152: check disconnect status after long sleep

* The voice recording function cannot work while connecting a headset on a Dell machine (LP: #1866581)
+ - SAUCE: ALSA: hda/realtek - Add Headset Mic supported
+ + * xfs fill_fs test in fallocate06 from ubuntu_ltp_syscalls failed
+ (LP: #1865967)
+ + - xfs: Fix tail rounding in xfs_alloc_file_space()
+ + * [hns3-0114]net: hns3: fix ETS bandwidth validation bug (LP: #1859569)
+ + - net: hns3: fix ETS bandwidth validation bug
+ + * als/hda/realtek: fix a mute led regression on Lenovo X1 Carbon
+ (LP: #1864576)
+ + - SAUCE: ALSA: hda/realtek - Fix a regression for mute led on Lenovo Carbon X1
+ + * [hns3-0120]pad the short frame before sending to the hardware (LP: #1860320)
+ + - net: hns3: pad the short frame before sending to the hardware
+ + * ipc/sem.c : process loops infinitely in exit_sem() (LP: #1858834)
+ + - Revert "ipc, sem: remove unneeded sem_undo_list lock usage in exit_sem()"
+ + * frace test in ubuntu_kernel_selftests will timeout randomly (LP: #1864172)
+ + - tracing/selftests: Turn off timeout setting
+ + * quotactl07 from ubuntu_ltp_syscalls failed (LP: #1864092)
+ + - xfs: Sanity check flags of Q__QUOTARM call
+ + * [bionic] updates to Exar USB serial driver (LP: #1863834)
+ + - SAUCE: xr-usb-serial: Update driver for Exar USB serial ports
+ + - SAUCE: xr-usb-serial: re-initialise baudrate after resume from S3/S4
+ + - SAUCE: xr-usb-serial: Changes to support updates in struct gpio_chip
+ + - SAUCE: xr-usb-serial: fix kbuild
+ + * [bionic] hts221 sensor stops working after resume from S3/S4
+ (LP: #1863732)
+ + - SAUCE: iio: humidity: hts221: Fix sensor reads after resume
+ + * Bionic update: upstream stable patchset 2020-02-26 (LP: #1864904)
+ + - orinoco_usb: fix interface sanity check
+ + - rsi_91x_usb: fix interface sanity check
+ + - USB: serial: ir-usb: add missing endpoint sanity check
+ + - USB: serial: ir-usb: fix link-speed handling
+ + - USB: serial: ir-usb: fix IrLAP framing
+ + - usb: dwc3: turn off VBUS when leaving host mode
+ + - staging: most: net: fix buffer overflow
+ + - staging: wlan-ng: ensure error return is actually returned
+ + - staging: vt6656: correct packet types for CTS protect, mode.
+ + - staging: vt6656: use NULLFUCTION stack on mac80211
+ + - staging: vt6656: Fix false Tx excessive retries reporting.
+ + - serial: 8250_bcm2835aux: Fix line mismatch on driver unbind
+ crypto: chelsio - fix writing tfm flags to wrong place
+ ath9k: fix storage endpoint lookup
+ brcmfnac: fix interface sanity check
+ rtl8xxu: fix interface sanity check
+ zd1211rw: fix storage endpoint lookup
+ arc: eznps: fix allmodconfig kconfig warning
+ - HID: tte: Add USB id match for Acer SW5-012 keyboard dock
+ - phy: cpcap-usb: Prevent USB line glitches from waking up modem
+ - watchdog: max77620_wdt: fix potential build errors
+ - watchdog: rn5t618_wdt: fix module aliases
+ - spi: spi-dw: Add lock protect dw_spi rx/tx to prevent concurrent calls
+ - drivers/net/b44: Change to non-atomic bit operations on pwol_mask
+ - net: wan: sdla: Fix cast from pointer to integer of different size
+ - gpio: max77620: Add missing dependency on GPIOLIB_IRQCHIP
+ - atm: eni: fix uninitialized variable warning
+ - PCI: Add DMA alias quirk for Intel VCA NTB
+ - usb-storage: Disable UAS on JMicron SATA enclosure
+ - net_sched: ematch: reject invalid TCF_EM_SIMPLE
+ - rsi: fix use-after-free on probe errors
+ - crypto: af_algorithm: Use bh_lock_sock in sk_destruct
+ - vfs: fix do_last() regression
+ - x86/resctrl: Fix use-after-free when deleting resource groups
+ - x86/resctrl: Fix use-after-free due to inaccurate rcfcount of rdtgroup
+ - x86/resctrl: Fix a deadlock due to inaccurate reference
+ - crypto: pcrypt: Fix user-after-free on module unload
+ - perf c2c: Fix return type for histogram sorting comparision functions
+ - PM / devfreq: Add new name attribute for sysfs
+ - tools lib: Fix builds when glibc contains strlcpy()
+ - arm64: kbuild: remove compressed images on 'make ARCH=arm64 (dist)clean'
+ - ext4: validate the debug want extra isize mount option at parse time
+ - mm/mempolicy.c: Fix out of bounds write in mpol_parse_str()
+ - reiserfs: Fix memory leak of journal device string
+ - media: digitv: don't continue if remote control state can't be read
+ - media: af9005: uninitialized variable printk()
+ - media: gspca: zero usb_buf
+ - media: dvb-usb/dvb-usb-urb.c: initialize actlen to 0
+ - ttyprintk: fix a potential deadlock in interrupt context issue
+ - Bluetooth: Fix race condition in hci_release_sock()
+ - cgroup: Prevent double killing of css when enabling threaded cgroup
+ - media: si470x-i2c: Move free() past last use of 'radio'
+ - ARM: dts: sun8i: a83t: Correct USB3503 GPIOs polarity
+ - ARM: dts: beagle-x15-common: Model 5V0 regulator
+ - soc: ti: wkuip_m3_ipc: Fix race condition with rproc_boot
+ - mac80211: mesh: restrict airtime metric to peered established plinks
+ - clk: mmp2: Fix the order of timer mux parents
+ - ixgbevf: Remove limit of 10 entries for unicast filter list
+ - ixgbe: Fix calculation of queue with VFs and flow director on interface flap
+ - igb: Fix SGMII SFP module discovery for 100FX/LX.
- ASoC: sti: fix possible sleep-in-atomic
- qmi_wwan: Add support for Quectel RM500Q
- wireless: fix enabling channel 12 for custom regulatory domain
- cfg80211: Fix radar event during another phy CAC
- mac80211: Fix TKIP replay protection immediately after key setup
- wireless: wext: avoid gcc -O3 warning
- net: dsa: bcm_sf2: Configure IMP port for 2Gb/sec
- bnx_t_en: Fix ipv6 RFS filter matching logic.
- ARM: dts: am335x-boneblack-common: fix memory size
- vti[6]: fix packet tx through bpf_redirect()
- scsi: fnic: do not queue commands during fwsreset
- ARM: 8955/1: virt: Relax arch timer version check during early boot
- tee: optee: Fix compilation issue with nommu
- airo: Fix possible info leak in AIROOLDIOCTL/SIOCDEVPRIVATE
- airo: Add missing CAP_NET_ADMIN check in AIROOLDIOCTL/SIOCDEVPRIVATE
- r8152: get default setting of WOL before initializing
- qlcnic: Fix CPU soft lockup while collecting firmware dump
- powerpc/fsl/dts: add fsl.erratum-a011043
- net/fsl: treat fsl.erratum-a011043
- net: fsl/fman: rename IF_MODE_XGMII to IF_MODE_10G
- seq_tab_next should increase position index
- I2t_seq_next should increase position index
- net: Fix skb->csum update in inet_proto_csum_replace16().
- btrfs: do not zero f_bavail if we have available space
- perf report: Fix no libunwind compiled warning break s390 issue
- iio: st_gyro: Correct data for LSM9DS0 gyro
- net_sched: fix ops->bind_class() implementations
- HID: Add quirk for Xin-Mo Dual Controller
- HID: Add quirk for incorrect input length on Lenovo Y720
- phy: qcom-qmp: Increase PHY ready timeout
- platform/x86: dell-laptop: disable kbd backlight on Inspiron 10xx
- sched/fair: Add tmp_alone_branch assertion
- sched/fair: Fix insertion in rq->leaf_cfs_rq_list
- random: try to actively add entropy rather than passively wait for it
- block: cleanup __blkdev_issue_discard()
- block: fix 32 bit overflow in __blkdev_issue_discard()
- media: vp7045: do not read uninitialized values if usb transfer fails
- tomoyo: Use atomic_t for statistics counter
- tools lib traceevent: Fix memory leakage in filter_event
- parisc: Use proper printk format for resource_size_t
- riscv: delete temporary files
- ARM: dts: am43x-epos-epm: set data pin directions for spi0 and spi1

* Bionic update: upstream stable patchset 2020-02-21 (LP: #1864261)
- firestream: fix memory leaks
- gtp: make sure only SOCK_DGRAM UDP sockets are accepted
- ipv6: sr: remove SKB_GSO_IPXIP6 on End.D* actions
- net: cxgb3_main: Add CAP_NET_ADMIN check to CHELSIO_GET_MEM
+ - net, ip6_tunnel: fix namespaces move
+ - net, ip_tunnel: fix namespaces move
+ - net_sched: fix datalen for ematch
+ - net-sysfs: Fix reference count leak in rxnetdev_queue_add_kobject
+ - net-sysfs: fix netdev_queue_add_kobject() breakage
+ - net-sysfs: Call dev_hold always in netdev_queue_add_kobject
+ - net-sysfs: Call dev_hold always in rx_queue_add_kobject
+ - net-sysfs: Fix reference count leak
+ - net: usb: lan78xx: Add .ndo_features_check
+ - tcp_bbr: improve arithmetic division in bbr_update_bw()
+ - net: rtnetlink: validate IFLA_MTU attribute in rtnl_create_link()
+ - hwmon: (ad7475) Make volt2reg return same reg as reg2volt input
+ - hwmon: (core) Do not use device managed functions for memory allocations
+ - Input: keyspan-remote - fix control-message timeouts
+ - Revert "Input: synaptics-rmi4 - don't increment rmiaddr for SMBus transfers"
+ - ARM: 8950/1: ftrace/recordmcount: filter relocation types
+ - mmc: tegra: fix SDR50 tuning override
+ - mmc: sdhci: fix minimum clock rate for v3 controller
+ - Documentation: Document arm64 kpti control
+ - Input: pm8xxx-vib - fix handling of separate enable register
+ - Input: sur40 - fix interface sanity checks
+ - Input: gtc0 - fix endpoint sanity check
+ - Input: aiptek - fix endpoint sanity check
+ - Input: pegasus_notetaker - fix endpoint sanity check
+ - Input: sun4i-ts - add a check for devm_thermal_zone_of_sensor_register
+ - hwmon: (nct7802) Fix voltage limits to wrong registers
+ - scsi: RDMA/isert: Fix a recently introduced regression related to logout
+ - tracing: xen: Ordered comparison of function pointers
+ - do_last(): fetch directory ->i_mode and ->i_uid before it's too late
+ - sd: Fix REQ_OP_ZONE_REPORT completion handling
+ - coresight: etb10: Do not call smp_processor_id from preemtible
+ - coresight: tmc-etf: Do not call smp_processor_id from preemtible
+ - libertas: Fix two buffer overflows at parsing bss descriptor
+ - media: v4l2-ioctl.c: zero reserved fields for S/TRY_FMT
+ - scsi: iscsi: Avoid potential deadlock in iscsi_if_rx func
+ - md: Avoid namespace collision with bitmap API
+ - bitmap: Add bitmap_alloc(), bitmap_zalloc() and bitmap_free()
+ - netfilter: ipset: use bitmap infrastructure completely
+ - net/x25: fix nonblocking connect
+ - net: bcmgenet: Use netif_tx_napi_add() for TX NAPI
+ - Revert "udp: do rmem bulk free even if the rx sk queue is empty"
+ - tcp: do not leave dangling pointers in tp->highest_sack
+ - tun: add mutex_unlock() call and napi skb clearing in tun_get_user()
+ - PCI: Mark AMD Navi14 GPU rev 0xc5 ATS as broken
+ - net/sonic: Add mutual exclusion for accessing shared state
+ - net/sonic: Clear interrupt flags immediately
+ - net/sonic: Use MMIO accessors
+ - net/sonic: Fix interface error stats collection
+ -- Khalid Elmously <khalid.elmously@canonical.com> Tue, 25 Feb 2020 20:25:49 -0500
+
+bionic/linux: 4.15.0-89.89 -proposed tracker (LP: #1863350)
+
+ * [SRU][B/OEM-B] Fix multitouch support on some devices (LP: #1862567)
+  - HID: core: move the dynamic quirks handling in core
+  - HID: quirks: move the list of special devices into a quirk
+  - HID: core: move the list of ignored devices in hid-quirks.c
+  - HID: core: remove the absolute need of hid_have_special_driver[]
+
+ * [linux] Patch to prevent possible data corruption (LP: #1848739)
+  - blk-mq: silence false positive warnings in hctx_unlock()
+
+ * Add bpftool to linux-tools-common (LP: #1774815)
+  - tools/bpftool: fix bpftool build with bintutils >= 2.9
+  - bpftool: make libbfd optional
+  - [Debian] Remove bintutils-dev build dependency
+  - [Debian] package bpftool in linux-tools-common

+ * Root can lift kernel lockdown via USB/IP (LP: #1861238)
+  - Revert "UBUNTU: SAUCE: (efi-lockdown) Add a SysRq option to lift kernel
+    lockdown"
+
+ * [Bionic] i915 incomplete fix for CVE-2019-14615 (LP: #1862840) //
+  CVE-2020-8832
+  - drm/i915: Use same test for eviction and submitting kernel context
+  - drm/i915: Define an engine class enum for the uABI
+  - drm/i915: Force the switch to the i915->kernel_context
+  - drm/i915: Move GT powersaving init to i915_gem_init()
+  - drm/i915: Move intel_init_clock_gating() to i915_gem_init()
+  - drm/i915: Inline intel_modeset_gem_init()
+  - drm/i915: Mark the context state as dirty/written
+  - drm/i915: Record the default hw state after reset upon load
+
+ * Bionic update: upstream stable patchset 2020-02-12 (LP: #1863019)
+  - xfs: Sanity check flags of Q_XQUOTARM call
+  - mfd: intel-lpss: Add default I2C device properties for Gemini Lake
+  - powerpc/archrandom: fix arch_get_random_seed_int()
+  - tipc: fix wrong timeout input for tipc_wait_for_cond()
+  - mt7601u: fix bbp version check in mt7601u_wait_bbp_ready
+  - crypto: sun4i-ss - fix big endian issues
+  - drm/sti: do not remove the drm_bridge that was never added
+  - drm/virtio: fix bounds check in virtio_gpu_cmd_get_capset()
+  - ALSA: hda: fix unused variable warning
+  - apparmor: don't try to replace stale label in ptrace access check
+ - PCI: iproc: Remove PAXC slot check to allow VF support
+ - drm/hisilicon: hibmc: Don't overwrite fb helper surface depth
+ - IB/rxe: replace kvfree with vfree
+ - IB/hfi1: Add ntu check for operational data VLs
+ - ALSA: usb-audio: update quirk for B&W PX to remove microphone
+ - staging: comedi: ni_mio_common: protect register write overflow
+ - pwn: ipps: Release runtime-pm reference from the driver's remove callback
+ - drm/sun4i: hdmi: Fix double flag assignation
+ - mlxsw: reg: QEEC: Add minimum shaper fields
+ - NTB: ntb_hw_idt: replace IS_ERR_OR_NULL with regular NULL checks
+ - pcstdio: use format specifier in kobject_add
+ - exportfs: fix 'passing zero to ERR_PTR()' warning
+ - drm/dp_mst: Skip validating ports during destruction, just ref
+ - net: phy: Fix not to call phy_resume() if PHY is not attached
+ - IB/rxe: Fix incorrect cache cleanup in error flow
+ - staging: bcm2835-camera: Abort probe if there is no camera
+ - switchtec: Remove immediate status check after submitting MRPC command
+ - pinctrl: sh-pfc: r8a7740: Add missing REF125CK pin to gather_gmii group
+ - pinctrl: sh-pfc: r8a7740: Add missing LCD0 marks to lcd0_data24_1 group
+ - pinctrl: sh-pfc: r8a7791: Remove bogus ctrl marks from qspi_data4_b group
+ - pinctrl: sh-pfc: r8a7791: Remove bogus marks from vin1_b_data18 group
+ - pinctrl: sh-pfc: sh73a0: Add missing TO pin to tpu4_to3 group
+ - pinctrl: sh-pfc: r8a7794: Remove bogus IPSR9 field
+ - pinctrl: sh-pfc: sh7734: Add missing IPSR11 field
+ - pinctrl: sh-pfc: r8a77995: Remove bogus SEL_PWM[0-3]_3 configurations
+ - pinctrl: sh-pfc: sh7269: Add missing PCIOR0 field
+ - pinctrl: sh-pfc: sh7734: Remove bogus IPSR10 value
+ - vxlan: changelink: Fix handling of default remotes
+ - Input: nomadik-ske-keypad - fix a loop timeout test
+ - clk: highbank: fix refcount leak in hb_clk_init()
+ - clk: qoriq: fix refcount leak in clockgen_init()
+ - clk: socfpga: fix refcount leak
+ - clk: samsung: exynos4: fix refcount leak in exynos4_get_xom()
+ - clk: imx6dq: fix refcount leak in imx6dq_clocks_init()
+ - clk: imx6sx: fix refcount leak in imx6sx_clocks_init()
+ - clk: imx7d: fix refcount leak in imx7d_clocks_init()
+ - clk: vf610: fix refcount leak in vf610_clocks_init()
+ - clk: armada-370: fix refcount leak in a370_clk_init()
+ - clk: kirkwood: fix refcount leak in kirkwood_clk_init()
+ - clk: armada-xp: fix refcount leak in axp_clk_init()
+ - clk: mv98dx3236: fix refcount leak in mv98dx3236_clk_init()
+ - clk: dove: fix refcount leak in dove_clk_init()
+ - MIPS: BCM63XX: drop unused and broken DSP platform device
+ - IB/usnic: Fix out of bounds index check in query pkey
+ - RDMA/ocrdma: Fix out of bounds index check in query pkey
+ - RDMA/qedr: Fix out of bounds index check in query pkey
+ - drm/shmob: Fix return value check in shmob_drm_probe
+ - arm64: dts: apq8016-sbc: Increase load on 111 for SDCARD
- spi: cadence: Correct initialise of runtime PM
- RdMA/iw_cxgb4: Fix the unchecked ep dereference
- drm/etnaviv: NULL vs IS_ERR() buf in etnaviv_core_dump()
- media: s5p-jpeg: Correct step and max values for
- V4L2_CID_JPEG_RESTART_INTERVAL
- kbuild: mark prepare0 as PHONY to fix external module build
- crypto: bcm - Fix some set-but-not-used warning
- crypto: tgr192 - fix unaligned memory access
- AsOc: imx-sgt5000: put of nodes if finding codec fails
- IB/isr: Pass the correct number of entries for dma mapped SGL
- rtc: cmos: ignore bogus century byte
- spi/topcliff_pch: Fix potential NULL dereference on allocation error
- clk: sunxi-ng: sun8i-a23: Enable PLL-MIPI LDOs when ungating it
- iwlwifi: mvm: avoid possible access out of array.
- net/mlx5: Take lock with IQs disabled to avoid deadlock
- iwlwifi: mvm: fix A-MPDU reference assignment
- tty: ipwireless: Fix potential NULL pointer dereference
- driver: uio: fix possible memory leak in _uio_register_device
- driver: uio: fix possible use-after-free in _uio_register_device
- crypto: crypto4xx - Fix wrong ppc4xx_trng_probe()/ppc4xx_trng_remove() arguments
- driver core: Do not resume suppliers under device_links_write_lock()
- ARM: dts: lpc32xx: add required clocks property to keypad device node
- ARM: dts: lpc32xx: reparent keypad controller to SIC1
- ARM: dts: lpc32xx: fix ARM PrimeCell LCD controller variant
- ARM: dts: lpc32xx: fix ARM PrimeCell LCD controller clocks property
- ARM: dts: lpc32xx: phy3250: fix SD card regulator voltage
- iwlwifi: mvm: fix RSS config command
- staging: most: cdev: add missing check for cdev_add failure
- rtc: ds1672: fix unintended sign extension
- thermal: mediatek: fix register index error
- net: phy: fixed_phy: Fix fixed_phy not checking GPIO
- rtc: ds1307: rx8130: Fix alarm handling
- rtc: 88pm860x: fix unintended sign extension
- rtc: 88pm80x: fix unintended sign extension
- rtc: pm8xxx: fix unintended sign extension
- fbdev: chipsfb: remove set but not used variable 'size'
- iw_cxgb4: use tos when importing the endpoint
- iw_cxgb4: use tos when finding ipv6 routes
- drm/etnaviv: potential NULL dereference
- pinctrl: sh-pfc: emev2: Add missing pinnux functions
- pinctrl: sh-pfc: r8a7791: Fix scib2_data_c pin group
- pinctrl: sh-pfc: r8a7792: Fix vin1_data18_b pin group
- pinctrl: sh-pfc: sh73a0: Fix fsic_spdif pin groups
- PCI: endpoint: functions: Use memcpy_fromio()/memcpy_toio()
- usb: phy: twl6030-usb: fix possible use-after-free on remove
- block: don't use bio->bi_vcnt to figure out segment number
- keys: Timestamp new keys
+ - media: tw5864: Fix possible NULL pointer dereference in tw5864_handle_frame
+ - spi: tegra114: clear packed bit for unpacked mode
+ - spi: tegra114: fix for unpacked mode transfers
+ - spi: tegra114: terminate dma and reset on transfer timeout
+ - spi: tegra114: flush fifos
+ - spi: tegra114: configure dma burst size to fifo trig level
+ - soc/fsl/qe: Fix an error code in qe_pin_request()
+ - spi: bcm2835aux: fix driver to not allow 65535 (=1) cs-gpios
+ - ehea: Fix a copy-paste err in ehea_init_port_res
+ - scsi: qla2xxx: Unregister chrdev if module initialization fails
+ - scsi: target/core: Fix a race condition in the LUN lookup code
+ - ARM: pxa: ssp: Fix "WARNING: invalid free of devm_ allocated data"
+ - net: hns3: fix for vport->bw_limit overflow problem
+ - hwmon: (w83627hf) Use request_mixed_region for Super-IO accesses
+ - platform/x86: alienware-wmi: fix kfree on potentially uninitialized pointer
+ - tipc: set sysctl_tipc_rmem and named_timeout right range
+ - selftests/ipc: Fix msgque compiler warnings
+ - powerpc: vdo: Make vdo32 installation conditional in vdso_install
+ - ARM: dts: ls1021: Fix SGMII PCS link remaining down after PHY disconnect
+ - media: ov2659: fix unbalanced mutex_lock/unlock
+ - 6lowpan: Off by one handling ->nexthdr
+ - dmaengine: axi-dmac: Don't check the number of frames for alignment
+ - ALSA: usb-audio: Handle the error from snd_usb_mixer_apply_create_quirk()
+ - NFS: Don't interrupt file writeout due to fatal errors
+ - irqchip/gic-v3-its: fix some definitions of inner cacheability attributes
+ - scsi: qla2xxx: Fix a format specifier
+ - scsi: qla2xxx: Avoid that qlt_send_resp_ctio() corrupts memory
+ - packet: in recvmsg msg_name return at least sizeof sockaddr_ll
+ - ASoC: fix valid stream condition
+ - usb: gadget: fsl: fix link error against usb-gadget module
+ - dwc2: gadget: Fix completed transfer size calculation in DDMA
+ - IB/mlx5: Add missing XRC options to QP optional params mask
+ - iommu/vt-d: Make kernel parameter igfx_off work with vIOMMU
+ - dmaengine: tegra210-adma: restore channel status
+ - mmc: core: fix possible use after free of host
+ - lightnvm: pblk: fix lock order in pblk_rb_tear_down_check
+ - afs: Fix the afs.cell and afs.volume xattr handlers
+ - vfio/mdev: Avoid release parent reference during error path
+ - vfio/mdev: Fix aborting mdev child device removal if one fails
+ - l2tp: Fix possible NULL pointer dereference
+ - media: omap_vout: potential buffer overflow in vidioc_dqbuf()
+ - media: davinci/vpbe: array underflow in vpbe_enum_outputs()
+ - platform/x86: alienware-wmi: printing the wrong error code
+ - crypto: caam - fix caam_dump_sg that iterates through scatterlist
+ - netfilter: ebtables: CONFIG_COMPAT: reject trailing data after last rule
+ - pwm: meson: Consider 128 a valid pre-divider
+ - pwm: meson: Don't disable PWM when setting duty repeatedly
+ - ARM: riscpc: fix lack of keyboard interrupts after irq conversion
+ kdb: do a sanity check on the cpu in kdb_per_cpu()
+ backlight: lm3630a: Return 0 on success in update_status functions
+ thermal: cpu_cooling: Actually trace CPU load in thermal_power_cpu_get_power
+ EDAC/mc: Fix edac_mc_find() in case no device is found
+ ARM: dts: sun8i-h3: Fix wifi in Beelink X2 DT
+ dmaengine: tegra210-adma: Fix crash during probe
+ arm64: dts: meson: librettech-cc: set eMMC as removable
+ RDMA/qedr: Fix incorrect device rate.
+ spi: spi-fsl-spi: call spi_finalize_current_message() at the end
+ crypto: ccp - fix AES CFB error exposed by new test vectors
+ crypto: ccp - Fix 3DES complaint from ccp-crypto module
+ serial: stm32: fix rx error handling
+ serial: stm32: fix transmit_chars when tx is stopped
+ serial: stm32: Add support of TC bit status check
+ serial: stm32: fix wakeup source initialization
+ misc: sgi-xp: Properly initialize buf in xpc_get_rsvd_page_pa
+ iommu: Use right function to get group for device
+ signal/cifs: Fix cifs_put_tcp_session to call send_sig instead of force_sig
+ inet: frags: call inet_frags_fini() after unregister_pernet_subsys()
+ netvsc: unshare skb in VF rx handler
+ cpufreq: brcstm-b-av-f_cpufreq: Fix initial command check
+ cpufreq: brcstm-b-avfcpufrq: Fix types for voltage/frequency
+ media: vivid: fix incorrect assignment operation when setting video mode
+ mpls: fix warning with multi-label encap
+ iommu/vt-d: Duplicate iommu_resv_region objects per device list
+ qed: iWARP - Use READ_ONCE and smp_store_release to access ep->state
+ powerpc/cacheinfo: add cacheinfo_teardown, cacheinfo_rebuild
+ powerpc/pseries/mobility: rebuild cacheinfo hierarchy post-migration
+ drm/msm/mdp5: Fix mdp5_cfn_error return
+ net/netem: fix backlog accounting for corrupted GSO frames
+ net/netcpu: always register net_device notifier
+ ASoC: ti: davinci-mcasip: Fix slot mask settings when using multiple AXRs
+ rtc: pcf8563: Fix interrupt trigger method
+ rtc: pcf8563: Clear event flags and disable interrupts before requesting irq
+ drm/msm/a3xx: remove TPL1 regs from snapshot
+ perf/ioct: Add check for the sample_period value
+ dmaengine: hsi: Revert "set HSU_CH_MTSR to memory width"
+ clk: qcom: Fix -Wunused-const-variable
+ nvmem: imx-ocotp: Ensure WAIT bits are preserved when setting timing
+ bnxet_en: Fix ethtool selftest crash under error conditions.
+ iommu/amd: Make iommu_disable safer
+ mfd: intel-lpss: Release IDA resources
+ rxrpc: Fix uninitialized error code in rxrpc_send_data_packet()
+ devres: allow const resource arguments
+ net: pasemi: fix an use-after-free in pasemi_mac_phy_init()
+ scsi: libfeci: fix null pointer dereference on a null lport
+ clk: sunxi-ng: v3s: add the missing PLL_DDR1
+ PM: sleep: Fix possible overflow in pm_system_cancel_wakeup()
+ - libertas_tf: Use correct channel range in lbtf_geo_init
+ - qed: reduce maximum stack frame size
+ - ush: host: xhci-hub: fix extra endianness conversion
+ - mic: avoid statically declaring a 'struct device'.
+ - x86/kgbd: Use NMI_VECTOR not APIC_DM_NMI
+ - crypto: ccp - Reduce maximum stack usage
+ - ALSA: aoa: onyx: always initialize register read value
+ - tipc: reduce risk of wakeup queue starvation
+ - ARM: dts: stm32: add missing vdda-supply to adc on stm32h743i-eval
+ - net/mlx5: Fix mlx5_ific_query_lag_out_bits
+ - cifs: fix mmmod regression in cifs.ko caused by force_sig changes
+ - crypto: caam - free resources in case caam_rng registration failed
+ - ext4: set error return correctly when ext4_ltree_store_dirent fails
+ - ASoC: es8328: Fix copy-paste error in es8328_right_line_controls
+ - ASoC: cs4349: Use PM ops 'cs4349_runtime_pm'
+ - ASoC: wm8737: Fix copy-paste error in wm8737_snd_controls
+ - net/rdss: Add a few missing rds_stat_names entries
+ - bnx4: Fix handling FRAG_ERR when NVM_INSTALL_UPDATE cmd fails
+ - signal: Allow cifs and drbd to receive their terminating signals
+ - ASoC: sun4i-i2s: RX and TX counter registers are swapped
+ - dmaengine: dw: platform: Switch to acpi_dma_controller_register()
+ - mac80211: minstrel_ht: fix per-group max throughput rate initialization
+ - media: atmel: atmel-isi: fix timeout value for stop streaming
+ - rtc: pcf2127: bugfix: read rtc disables watchdog
+ - mips: avoid explicit UB in assignment of mips_io_port_base
+ - iommu/mediatek: Fix iova_to_phys PA start for 4GB mode
+ - ahci: Do not export local variable ahci_em_messages
+ - Partially revert "kfifo: fix kfifo_alloc() and kfifo_init()"
+ - hwmon: (lm75) Fix write operations for negative temperatures
+ - power: supply: Init device wakeup after device_add()
+ - x86, perf: Fix the dependency of the x86 insn decoder selftest
+ - staging: greybus: light: fix a couple double frees
+ - irqdomain: Add the missing assignment of domain->fwnode for named fwnode
+ - bcm: fix incorrect update of BCMA_CORE_PCI_MIO_DATA
+ - iio: dac: ad5380: fix incorrect assignment to val
+ - ath9k: dynack: fix possible deadlock in ath_dynack_node_ndeinit
+ - tty: serial: fsl_lpuart: Use appropriate lpuart32_* I/O funcs
+ - net: sonic: return NETDEV_TX_OK if failed to map buffer
+ - scsi: fnic: fix msix interrupt allocation
+ - Btrfs: fix hang when loading existing inode cache off disk
+ - Btrfs: fix inode cache waiters hanging on failure to start caching thread
+ - Btrfs: fix inode cache waiters hanging on path allocation failure
+ - btrfs: use correct count in btrfs_file_write_iter()
+ - ixgbe: sync the first fragment unconditionally
+ - hwmon: (shtc1) fix shtc1 and shtw1 id mask
+ - net: sonic: replace dev_kbfree_skb in sonic_send_packet
+ - pinctrl: iproc-gpio: Fix incorrect pinconf configurations
+ - ath10k: adjust skb length in ath10k_sdio_mbox_rx_packet
+ - RDMA/cma: Fix false error message
+ - net/rds: Fix 'ib_evt_handler_call' element in 'rds_ib_stat_names'
+ - iommu/amd: Wait for completion of IOTLB flush in attach_device
+ - net: aquantia: Fix aq_vec_isr_legacy() return value
+ - net: hxsilicon: Fix signedness bug in hix5hd2_dev_probe()
+ - net: broadcom/bcmsysport: Fix signedness in bcm_sysport_probe()
+ - net: stmmac: dwmac-meson8b: Fix signedness bug in probe
+ - net: axienet: fix a signedness bug in probe
+ - of: mdio: Fix a signedness bug in of_phy_get_and_connect()
+ - net: ethernet: stmmac: Fix signedness bug in ipq806x_gmac_of_parse()
+ - nvme: retain split access workaround for capability reads
+ - net: stmmac: gmac4+: Not all Unicast addresses may be available
+ - mac80211: accept deauth frames in IBSS mode
+ - llc: fix another potential sk_buff leak in llc_ui_sendmsg()
+ - llc: fix sk_buff refcounting in llc_conn_state_process()
+ - net: stmmac: fix length of PTP clock's name string
+ - act_mirred: Fix mirred_init_module error handling
+ - net: avoid possible false sharing in sk_leave_memory_pressure()
+ - net: add {READ|WRITE}_ONCE() annotations on ->rskq_accept_head
+ - tcp: annotate lockless access to tcp_memory_pressure
+ - drm/msm/dsi: Implement reset correctly
+ - dmaengine: imx-sdma: fix size check for sdma script_number
+ - net: netem: fix error path for corrupted GSO frames
+ - net: netem: correct the parent's backlog when corrupted packet was dropped
+ - net: qca_spi: Move reset_count to struct qcaspi
+ - afs: Fix large file support
+ - MIPS: Loongson: Fix return value of loongson_hwmon_init
+ - lv_netvsc: flag software created hash value
+ - net: neigh: use long type to store jiffies delta
+ - packet: fix data-race in fanout_flow_is_huge()
+ - mmc: sdio: fix w1251 vendor id
+ - mmc: core: fix w1251 sdio quirks
+ - afs: fix a memory leak in afs_remount
+ - dmaengine: ti: edma: fix missed failure handling
+ - drm/radeon: fix bad DMA from INTERRUPT_CNTL2
+ - arm64: dts: junio: Fix UART frequency
+ - IB/iser: Fix dma_nents type definition
+ - serial: stm32: fix clearing interrupt error flags
+ - m68k: Call timer_interrupt() with interrupts disabled
+ - SUNRPC: Fix svcauth_gss_proxy_init()
+ - perf map: No need to adjust the long name of modules
+ - ipmi: Fix memory leak in __ipmi_bmc_register
+ - apparmor: Fix network performance issue in aa_label_sk_perm
+ - firmware: coreboot: Let OF core populate platform device
+ - bridge: br_arp.nd_proxy: set icmp6��uter if neigh has NTF_ROUTER
+ - signal/ia64: Use the generic force_sigsegv in setup_frame
+ - ASoC: wm9712: fix unused variable warning
+ - genirq/debugfs: Reinstall full OF path for domain name
+ - usb: gadget: fsl_udc_core: check allocation return value and cleanup on failure
+ - cfg80211: regulatory: make initialization more robust
+ - net: socionext: Add dummy PHY register read in phy_write()
+ - mlxsw: spectrum: Set minimum shaper on MC TCs
+ - pinctrl: meson-gxl: remove invalid GPIOX tsin_a pins
+ - drm: rcar-du: Fix vblank initialization
+ - arm64: dts: meson-gx: Add hdmi_5v regulator as hdmi tx supply
+ - IB/hfi1: Correctly process FECN and BECN in packets
+ - OPP: Fix missing debugfs supply directory for OPPs
+ - staging: bcm2835-camera: fix module autoloading
+ - fork,memcg: fix crash in free_thread_stack on memcg charge fail
+ - arm64: deconfig: Re-enable bcm2835-thermal driver
+ - remoteproc: qcom: q6v5-mss: Add missing clocks for MSM8996
+ - remoteproc: qcom: q6v5-mss: Add missing regulator for MSM8996
+ - drm: Fix error handling in drm_legacy_addctx
+ - ARM: dts: r8a7743: Fix vblank initialization
+ - ARM: dts: sun8i-a23-a33: Move NAND controller device node to sort by address
+ - clk: ingenic: jz4740: Fix gating of UDC clock
+ - ntb_hw_switchtec: NT req id mapping table register entry number should be 512
+ - net: dsa: b53: Fix default VLAN ID
+ - net: dsa: b53: Properly account for VLAN filtering
+ - net: dsa: b53: Do not program CPU port's PVID
+ - drm/nouveau: fix missing break in switch statement
+ - net: dsa: fix unintended change of bridge interface STP state
+ - perf: Copy parent's address filter offsets on clone
+ - netfilter: nft_set_hash: bogus element self comparison from deactivation
+ - path
+ - iommu/vt-d: Fix NULL pointer reference in intel_svm_bind_mm()
+ - NFS: Add missing encode / decode sequence_maxsz to v4.2 operations
+ - ARM: dts: sun8i: a33: Reintroduce default pinctrl muxing
+ - ARM: dts: sun9i: optimus: Fix fixed-regulators
+ - bus: ti-sysc: Fix sysc_unprepare() when no clocks have been allocated
+ - arm64/vdso: don't leak kernel addresses
+ - rtc: mt6397: Don't call irq_dispose_mapping.
+ - bpf: Add missed newline in verifier verbose log
+ - ACPI: button: reinitialize button state upon resume
+ - soc: amlogic: meson-gx-pwr-vpu: Fix power on/off register bitmask
+ - net: hns3: fix loop condition of hns3_get_tx_timeo_queue_info()
+ - afs: Fix AFS file locking to allow fine grained locks
+ - afs: Further fix file locking
+ - scsi: qla2xxx: Fix error handling in qlt_alloc_qfull_cmd()
+ - KVM: PPC: Book3S HV: Fix lockdep warning when entering the guest
+ - vfio/mdev: Follow correct remove sequence
+ - ALSA: aica: Fix a long-time build breakage
+ - nfp: bpf: fix static check error through tightening shift amount adjustment
+ - thermal: rcar_gen3_thermal: fix interrupt type
+ - afs: Fix lock-wait/callback-break double locking
+ - afs: Fix double inc of vnode->cb_break
+ - clk: meson: gxbb: no spread spectrum on mpl10
+ - serial: stm32: fix word length configuration
+ - serial: stm32: fix rx data length when parity enabled
+ - net: hns3: fix a memory leak issue for hclge_map_unmap_ring_to_vf_vector
+ - crypto: talitos - fix AEAD processing.
+ - net: don't clear sock->sk early to avoid trouble in strparser
+ - crypto: inside-secure - fix zeroing of the request in ahash_exit_inv
+ - arm64: dts: meson-gxm-khadas-vim2: fix gpio-keys-polled node
+ - arm64: dts: meson-gxm-khadas-vim2: fix Bluetooth support
+ - phy: usb: phy-brcm-usb: Remove sysfs attributes upon driver removal
+ - qed: iWARP - fix uninitialized callback
+ - IB/hfi1: Handle port down properly in pio
+ - net/af_iucv: build proper skbs for HiperTransport
+ - ARM: dts: iwg20d-q7-common: Fix SDHI1 VccQ regularor
+ - ip6_fib: Don't discard nodes with valid routing information in
+ fib6_locate_1()
+ - nvmem: imx-ocotp: Change TIMING calculation to u-boot algorithm
+ - fork,memcg: alloc_thread_stack_node needs to set tsk->stack
+ - PM: ACPI/PCI: Resume all devices during hibernation
+ - ACPI: PM: Simplify and fix PM domain hibernation callbacks
+ - ACPI: PM: Introduce "poweroff" callbacks for ACPI PM domain and LPSS
+ - drm/panel: make drm_panel.h self-contained
+ - cxgb4: smt: Add lock for atomic_dec_and_test
+ - powerpc/64s/radix: Fix memory hot-unplug page table split
+ - rtc: rv3029: revert error handling patch to rv3029_eeprom_write()
+ - i40e: reduce stack usage in i40e_set_fc
+ - ARM: 8896/1: VDSo: Don't leak kernel addresses
+ - rxrpc: Fix lack of conn cleanup when local endpoint is cleaned up [ver #2]
+ - usb: typec: tps6598x: Fix build error without CONFIG_REGMAP_I2C
+ - bcache: Fix an error code in bh_dump_read()
+ - ARM: dts: aspeed-g5: Fixe gpio-ranges upper limit
+ - net: hns3: fix error VF index when setting VLAN offload
+ - mailbox: qcom-apcs: fix max_register value
+ - powerpc/mmc/mce: Keep irqs disabled during lockless page table walk
+ - net: netsec: Fix signedness bug in netsec_probe()
+ - s390/qeth: Fix error handling during VNICc initialization
+ - s390/qeth: Fix initialization of vnicc cmd masks during set online
+ - vhost/test: stop device before reset
+ - arm64: hibernate: check pgd table allocation
+ - afs: Fix missing timeout reset
+ - hwrng: omap3-rom - Fix missing clock by probing with device tree
+ - arm64: dts: meson-gxm-khadas-vim2: fix uart_A bluetooth node
* Bionic update: upstream stable patchset 2020-02-06 (LP: #1862259)
* dt-bindings: reset: meson8b: fix duplicate reset IDs
* clk: Don't try to enable critical clocks if prepare failed
* ASoC: msm8916-wcd-analog: Fix selected events for MIC BIAS External
* ALSA: seq: Fix racy access for queue timer in proc read
* Fix built-in early-load Intel microcode alignment
* block: fix an integer overflow in logical block size
* ARM: dts: am571x-idk: Fix gpios property to have the correct gpio number
* iio: buffer: align the size of scan bytes to size of the largest element
* USB: serial: simple: Add Motorola Solutions TETRA MTP3xxx and MTP85xx
* USB: serial: option: Add support for Quectel RM500Q
* USB: serial: option: fix control-message timeouts
* USB: serial: option: add support for Quectel RM500Q in QDL mode
* USB: serial: suppress driver bind attributes
* USB: serial: ch341: handle unbound port at resetResume
* USB: serial: io_edgeport: add missing active-port sanity check
* USB: serial: keyspan: handle unbound ports
* USB: serial: quatech2: handle unbound ports
* scsi: fnic: fix invalid stack access
* scsi: mptfusion: Fix double fetch bug in ioctl
* ptrace: reintroduce usage of subjective credentials in ptrace_has_cap()
* usb: core: hub: Improved device recognition on remote wakeup
* x86/resctrl: Fix an imbalance in domain_remove_cpu()
* x86/efistub: Disable paging at mixed mode entry
* perf hists: Fix variable name's inconsistency in hists__for_each() macro
* perf report: Fix incorrectly added dimensions as switch perf data file
* mm/shmem.c: thp, shmem: fix conflict of above-47bit hint address and PMD alignment
* btrfs: fix memory leak in qgroup accounting
* mm/page-writeback.c: avoid potential division by zero in wb_min_max_ratio()
* net: stmmac: 16KB buffer must be 16 byte aligned
* net: stmmac: Enable 16KB buffer size
* USB: serial: io_edgeport: use irqsave() in USB's complete callback
* USB: serial: io_edgeport: handle unbound ports on URB completion
* mm/huge_memory.c: make __thp_get_unmapped_area static
* mm/huge_memory.c: thp: fix conflict of above-47bit hint address and PMD alignment
* arm64: dts: aglexis/stratix10: fix pmu interrupt numbers
* cfg80211: fix page refcount issue in A-MSDU decap
* netfilter: fix a use-after-free in mtype_destroy()
* netfilter: arp_tables: init netns pointer in xt_tgdtor_param struct
* NFC: pn533: fix bulk-message timeout
* batman-adv: Fix DAT candidate selection on little endian systems
* macvlan: use skb_reset_mac_header() in macvlan_queue_xmit()
* hv_netvsc: Fix memory leak when removing rndis device
* net: dsa: tag_qca: fix doubled Tx statistics
* net: hns: fix soft lockup when there is not enough memory
+ net: usb: lan78xx: limit size of local TSO packets
+ net/lan/fsl_ucc_hdlc: fix out of bounds write on array utdm_info
+ ptp: free ptp device pin descriptors properly
+ r8152: add missing endpoint sanity check
+ tcp: fix marked lost packets not being retransmitted
+ xen/bkfront: Adjust indentation in xlvd_alloc_gendisk
+ cw1200: Fix a signedness bug in cw1200_load_firmware()
+ arm64: dts: meson-gxl-s905x-khadas-vim: fix gpio-keys-polled node
+ cfg80211: check for set_wiphy_params
+ reiserfs: fix handling of -EOPNOTSUPP in reiserfs_for_each_xattr
+ scsi: esas2r: unlock on error in esas2r_nvram_read_direct()
+ scsi: qla4xxx: fix double free bug
+ scsi: bnx2i: fix potential use after free
+ scsi: target: core: Fix a pr_debug() argument
+ scsi: qla2xxx: Fix qla2x00_request_irqs() for MSI
+ scsi: qla2xxx: fix rports not being mark as lost in sync fabric scan
+ scsi: core: scsi_trace: Use get_unaligned_be*()
+ perf probe: Fix wrong address verification
+ regulator: ab8500: Remove SYCLKREQ from enum ab8505_regulator_id
+ ARM: dts: meson8: fix the size of the PMU registers
+ LSM: generalize flag passing to security_capable
+ drm/i915: Add missing include file linux/math64.h
+ btrfs: do not delete mismatched root refs
+ ARM: dts: imx6ql: Add Engicam i.Core 1.5 MX6
+ ARM: dts: imx7: Fix Toradex Colibri iMX7S 256MB NAND flash support
+ mlxsw: spectrum: Wipe xstats.backlog of down ports
+ tcp: refine rule to allow EPOLLOUT generation under mem pressure
+ mtd: devices: fix mchp23k256 read and write
+ drm/nouveau/bar/nv50: check bar1 vmm return value
+ drm/nouveau/bar/gf100: ensure BAR is mapped
+ drm/nouveau/mmu: qualify vmm during dtor

* Bionic update: upstream stable patchset 2020-02-04 (LP: #1861934)
* chardev: Avoid potential use-after-free in 'chrdev_open()'
* usb: chipidea: host: Disable port power only if previously enabled
* ALSA: usb-audio: Apply the sample rate quirk for Bose Companion 5
* ALSA: hda/realtek - Add new codec supported for ALCS1200A
  + ALSA: hda/realtek - Set EAPD control to default for ALC222
* kernel/trace: Fix do not unregister tracepoints when register
  + sched_migrate_task fail
* tracing: Have stack tracer compile when MCOUNT_INSN_SIZE is not defined
* HID: Fix slab-out-of-bounds read in hid_field_extract
* HID: uhid: Fix returning EPOLLOUT from uhid_char_poll
* can: gs_usb: gs_usb_probe(): use descriptors of current altsetting
  + can: mscan: mscan_rx_poll(): fix rx path lockup when returning from polling
  + to irq mode
- CAN sk_buffs
- gpiolib: acpi: Turn dmi_system_id table into a generic quirk table
- gpiolib: acpi: Add honor_wakeup module-option + quirk mechanism
- staging: vt6656: set usb_set_intfdata on driver fail.
- USB: serial: option: add ZLP support for 0x1bc7/0x9010
- usb: musb: fix idling for suspend after disconnect interrupt
- usb: musb: Disable pullup at init
- usb: musb: dm: Correct parameter passed to IRQ handler
- staging: comedi: adv_pci1710: fix AI channels 16-31 for PCI-1713
- HID: hid-input: clear unmapped usages
- Input: add safety guards to input_set_keycode()
- drm/fb-helper: Round up bits_per_pixel if possible
- drm/dp_mst: correct the shifting in DP_REMOTE_I2C_READ
- staging: rtl8188eu: Add device code for TP-Link TL-WN727N v5.21
- tty: link tty and port before configuring it as console
- tty: always relink the port
- mwifiex: pcle: Fix memory leak in mwifiex_pci_alloc_cmdrsp_buf
- scsi: bfa: release allocated memory in case of error
- rtl8xxxu: prevent leaking urb
- arm64: cpufeature: Avoid warnings due to unused symbols
- HID: hiddev: fix mess in hiddev_open()
- USB: Fix: Don't skip endpoint descriptors with maxpacket=0
- phy: pcap-usb: Fix error path when no host driver is loaded
- phy: pcap-usb: Fix flaky host idling and enumerating of devices
- netfilter: arp_tables: init nets pointer in xt_tchk_param struct
- netfilter: ipset: avoid null deref when IPSET_ATTR_LINENO is present
- ALSA: hda/realtek - Add quirk for the bass speaker on Lenovo Yoga X1 7th gen
- tracing: Change offset type to s32 in preempt/irq tracepoints
- serdev: Don't claim unsupported ACPI serial devices
- netfilter: conntrack: dscp, sctp: handle null timeout argument
- hidraw: Return EPOLLOUT from hidraw_poll
- HID: hidraw: Fix returning EPOLLOUT from hidraw_poll
- HID: hidraw, uhid: Always report EPOLLOUT
- ethtool: reduce stack usage with clang
- fs/select: avoid clang stack usage warning
- arm64: don't open code page table entry creation
- arm64: mm: Change page table pointer name in p[md]_set_huge()
- arm64: Enforce BBM for huge IO/VMAP mappings
- arm64: Make sure permission updates happen for pm/d/pud
- media: usb:zr364xx:Fix KASAN: null-ptr-deref Read in zr364xx_vidioc_querycap
- wimax: i2400: fix memory leak
- wimax: i2400: Fix memory leak in i2400m_op_rfkil_sw_toggle
- iwllwifi: dbg_ini: fix memory leak in alloc_sgtable
- rtc: mt6397: fix alarm register overwrite
- RDMA/bnxt: Fix Send Work Entry state check while polling completions
- ASoC: stm32: spdifr: fix inconsistent lock state
- ASoC: stm32: spdifr: fix race condition in irq handler
+ - gpio: zynq: Fix for bug in zynq_gpio_restore_context API
+ - iommu: Remove device link to group on failure
+ - gpio: Fix error message on out-of-range GPIO in lookup table
+ - hsr: reset network header when supervision frame is created
+ - cifs: Adjust indentation in smb2_open_file
+ - btrfs: simplify inode locking for RWF_NOWAIT
+ - RDMA/mlx5: Return proper error value
+ - RDMA/srpt: Report the SCSI residual to the initiator
+ - scsi: enclosure: Fix stale device oops with hot replug
+ - scsi: sd: Clear sdkp->protection_type if disk is reformatted without PI
+ - platform/x86: asus-wmi: Fix keyboard brightness cannot be set to 0
+ - xprtdma: Fix completion wait during device removal
+ - NFSv4.x: Drop the slot if nfs4_delegreturn_prepare waits for layoutreturn
+ - iio: imu: adis16480: assign bias value only if operation succeeded
+ - mei: fix modalias documentation
+ - clk: samsung: exynos5420: Preserve CPU clocks configuration during
suspend/resume
+ - pinctl: ti: iodelay: fix error checking on pinctrl_count_index_with_args
+ - call
+ - pinctl: lewisburg: Update pin list according to v1.1v6
+ - scsi: sd: enable compat ioctls for sed-opal
+ - arm64: dts: apq8096-db820c: Increase load on l21 for SDCARD
+ - af_unix: add compat_ioctl support
+ - compat_ioctl: handle SIOCOUTQNSD
+ - PCI/PTM: Remove spurious "d" from granularity message
+ - powerpc/powernv: Disable native PCIe port management
+ - tty: serial: imx: use the sg count from dma_map_sg
+ - tty: serial: pch_uart: correct usage of dma_unmap_sg
+ - media: ov6650: Fix incorrect use of JPEG colorspace
+ - media: ov6650: Fix some format attributes not under control
+ - media: ov6650: Fix _get_fmt() V4L2_SUBDEV_FORMAT_TRY support
+ - media: exynos4-is: Fix recursive locking in isp_video_release()
+ - mtd: spi-nor: fix silent truncation in spi_nor_read()
+ - mtd: spi-nor: fix silent truncation in spi_nor_read_raw()
+ - spi: atmel: fix handling of cs_change set on non-last xfer
+ - rtlwifi: Remove unnecessary NULL check in rtl_regd_init
+ - f2fs: fix potential overflow
+ - rtc: msm6242: Fix reading of 10-hour digit
+ - gpio: mpc8xxx: Add platform device to gpiochip->parent
+ - scsi: libcqbi: fix NULL pointer dereference in cqbi_device_destroy()
+ - rseq/selftests: Turn off timeout setting
+ - mips: cacheinfo: report shared CPU map
+ - MIPS: Prevent link failure with kcov instrumentation
+ - dmaengine: k3dma: Avoid null pointer traversal
+ - ioat: ioat_alloc_ring() failure handling.
+ - hexagon: parenthesize registers in asm predicates
+ - hexagon: work around compiler crash
+ - ocfs2: call journal flush to mark journal as empty after journal recovery
+ when mount
+  - r390/qeth: Fix vnicc_is_in_use if rx_bcast not set
+  - drm/ttm: Fix start page for huge page check in ttm_put_pages()
+  - drm/ttm: fix incrementing the page pointer for huge pages
+  - crypto: virtio - implement missing support for output IVs
+  - iommu/mediatek: Correct the flush_iotlb_all callback
+  - rtc: brcmstb-waketime: add missed clk_disable_unprepare
+  - Bionic update: upstream stable patchset 2020-02-03 (LP: #1861739)
+  - USB: dummy-hcd: use usb_urb_dir_in instead of usb_pipein
+  - USB: dummy-hcd: increase max number of devices to 32
+  - locking/spinlock/debug: Fix various data races
+  - netfilter: ctetlink: netns exit must wait for callbacks
+  - libtraceevent: Fix lib installation with O=
+  - x86/efi: Update e820 with reserved EFI boot services data to fix kexec
+  - breakage
+  - efi/gop: Return EFI_NOT_FOUND if there are no usable GOPs
+  - efi/gop: Return EFI_SUCCESS if a usable GOP was found
+  - efi/gop: Fix memory leak in __gop_query32/64()
+  - ARM: vexpress: Set-up shared OPP table instead of individual for each CPU
+  - netfilter: uapi: Avoid undefined left-shift in xt_sctp.h
+  - netfilter: nf_tables: validate NFT_SET_ELEM_INTERVAL_END
+  - ARM: dts: Cygnus: Fix MDIO node address/size cells
+  - spi: spi-cavium-thunderx: Add missing pci_release_regions()
+  - Asoc: topology: Check return value for soc_tplg_pcm_create()
+  - ARM: dts: bcm283x: Fix critical trip point
+  - bpf, mips: Limit to 33 tail calls
+  - ARM: dts: am437x-gp/epos-evm: fix panel compatible
+  - samples: bpf: Replace symbol compare of trace_event
+  - samples: bpf: fix syscall_tp due to unused syscall
+  - powerpc: Ensure that swiotlb buffer is allocated from low memory
+  - bnx2x: Do not handle requests from VFs after parity
+  - bnx2x: Fix logic to get total no. of PFs per engine
+  - net: usb: lan78xx: Fix error message format specifier
+  - rfkill: Fix incorrect check to avoid NULL pointer dereference
+  - Asoc: wm8962: fix lambda value
+  - regulator: m51618: fix module aliases
+  - kconfig: don't crash on NULL expressions in expr_eq()
+  - perf/x86/intel: Fix PT PMI handling
+  - fs: avoid softlockups in s_inodes iterators
+  - net: stmmac: Do not accept invalid MTU values
+  - net: stmmac: RX buffer size must be 16 byte aligned
+  - s390/dasd/cio: Interpret ccw_device_get_mdc return value correctly
+  - s390/dasd: fix memleak in path handling error case
+  - block: fix memleak when __blk_rq_map_user_iov() is failed
+  - parisc: Fix compiler warnings in debug_core.c
+  - llc2: Fix return statement of llc_stat_ev_rx_null_dsap_xid_c (and _test_c)
+  - hv_netvsc: Fix unwanted rx_table reset
+ bpf: Fix passing modified ctx to ld/abs/ind instruction
+ PCI/switchecl: Read all 64 bits of part_event_bitmap
+ gtp: fix bad unlock balance in gtp_encap_enable_socket
+ macvlan: do not assume mac_header is set in macvlan_broadcast()
+ - net: dsa: mv88e6xxx: Preserve priority when setting CPU port.
+ - net: stmmac: dwmac-sun8i: Allow all RGMII modes
+ - net: stmmac: dwmac-sunxi: Allow all RGMII modes
+ - net: usb: lan78xx: fix possible skb leak
+ - pkt_sched: fq: do not accept silly TCA_FQ_QUANTUM
+ - USB: core: fix check for duplicate endpoints
+ - USB: serial: option: add Telit ME910G1 0x110a composition
+ - sctp: free cmd->obj.chunk for the unprocessed SCTP_CMD_REPLY
+ - tcp: fix "old stuff" D-SACK causing SACK to be treated as D-SACK
+ - vxlan: fix tos value before xmit
+ - vlan: vlan_changelink() should propagate errors
+ - net: sch_prio: When ungrafting, replace with FIFO
+ - vlan: fix memory leak in vlan_dev_set_egress_priority
+ - regulator: fix use after free issue
+ - ASoC: max98090: fix possible race conditions
+ - netfilter: nf_tables: validate NFT_DATA_VALUE after nft_data_init()
+ - ARM: dts: BCM5301X: Fix MDIO node address/size cells
+ - bpf: Clear skb->tstamp in bpf_redirect when necessary
+ - parisc: add missing __init annotation
+ - iommu/iova: Init the struct iova to fix the possible memleak
+ - powerpc/spinlocks: Include correct header for static key
+ - ARM: dts: imx6ul: use nvmem-cells for cpu speed grading

+ * Sometimes can't adjust brightness on Dell AIO (LP: #1862885)
+ - SAUCE: platform/x86: dell-uart-backlight: increase retry times
+ * 4.15 kernel hard lockup about once a week (LP: #1799497)
+ - zram: correct flag name of ZRAM_ACCESS
+ - zram: fix lockdep warning of free block handling
+ * Prevent arm64 guest from accessing host debug registers (LP: #1860657)
+ - KVM: arm64: Write arch.mdcr_el2 changes since last vcpu_load on VHE
+ * pty03 from pty in ubuntu_ltp failed on Eoan (LP: #1862114)
+ - can, slip: Protect tty->disc_data in write_wakeup and close with RCU
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Fri, 14 Feb 2020 15:22:46 -0300
+ linux (4.15.0-88.88) bionic; urgency=medium
+ * bionic/linux: 4.15.0-88.88 -proposed tracker (LP: #1862824)
+ * Segmentation fault (kernel oops) with memory-hotplug in
+ ubuntu_kernel_selftests on Bionic kernel (LP: #1862312)
Open Source Used In 5GaaS Edge AC-4  17680

+ - Revert "mm/memory_hotplug: fix online/offline_pages called w.o. mem_hotplug_lock"
+ - mm/memory_hotplug: fix online/offline_pages called w.o. mem_hotplug_lock
+ + -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Tue, 11 Feb 2020 15:53:31 -0300
+ + * linux (4.15.0-87.87) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-87.87 -proposed tracker (LP: #1861165)
+ + * Bionic update: upstream stable patchset 2020-01-22 (LP: #1860602)
+ + - scsi: lpfc: Fix discovery failures when target device connectivity bounces
+ + - scsi: mpt3sas: Fix clear pending bit in ioctl status
+ + - scsi: lpfc: Fix locking on mailbox command completion
+ + - Input: atmel_mxt_ts - disable IRQ across suspend
+ + - iommu/tegra-smu: Fix page tables in > 4 GiB memory
+ + - scsi: target: compare full CHAP_A Algorithm strings
+ + - scsi: lpfc: Fix SLI3 hba in loop mode not discovering devices
+ + - scsi: csiostor: Don't enable IRQs too early
+ + - powerpc/pseries: Mark accumulate_stolen_time() as notrace
+ + - powerpc/pseries: Don't fail hash page table insert for bolted mapping
+ + - powerpc/tools: Don't quote $objdump in scripts
+ + - dma-debug: add a schedule point in debug_dma_dump_mappings()
+ + - clocksource/drivers/asm9260: Add a check for of_clk_get
+ + - powerpc/security/book3s64: Report L1TF status in sysfs
+ + - powerpc/book3s64/hash: Add cond_resched to avoid soft lockup warning
+ + - ext4: update direct I/O read lock pattern for IOCB_NOWAIT
+ + - jbd2: Fix statistics for the number of logged blocks
+ + - scsi: tracing: Fix handling of TRANSFER LENGTH == 0 for READ(6) and WRITE(6)
+ + - scsi: lpfc: Fix duplicate unreg_rpi error in port offline flow
+ + - f2fs: fix to update dir's i_pino during cross_rename
+ + - clk: qcom: Allow constant ratio freq tables for reg
+ + - irqchip/irq-bcm7038-l1: Enable parent IRQ if necessary
+ + - irqchip: ingenic: Error out if IRQ domain creation failed
+ + - fs/quota: handle overflows of sysctl fs.quota.* and report as unsigned long
+ + - scsi: lpfc: fix: Coverity: lpfc_cmpl_els_rsp(): Null pointer dereferences
+ + - scsi: ufs: fix potential bug which ends in system hang
+ + - powerpc/pseries/cmm: Implement release() function for sysfs device
+ + - powerpc/security: Fix wrong message when RFI Flush is disable
+ + - scsi: atari_scsi: sun3_scsi: Set sg_tablesize to 1 instead of SG_NONE
+ + - clk: pxa: fix one of the pxa RTC clocks
+ + - bcache: at least try to shrink 1 node in bch_mca_scan()
+ + - HID: logitech-hidpp: Silence intermittent get_battery_capacity errors
+ + - libnvdimm/btt: fix variable 'rc' set but not used
+ + - HID: Improve Windows Precision Touchpad detection.
+ + - scsi: pm80xx: Fix for SATA device discovery
+ + - scsi: ufs: Fix error handling during hibern8 enter
+ + - scsi: scsi_debug: num_tgts must be >= 0
+ - scsi: NCR5380: Add disconnect_mask module parameter
+ - scsi: iscsi: Don't send data to unbound connection
+ - scsi: target: iscsi: Wait for all commands to finish before freeing a
  session
+ - gpio: mpc8xxx: Don't overwrite default irq_set_type callback
+ - apparmor: fix unsigned len comparison with less than zero
+ - scripts/kallsyms: fix definitely-lost memory leak
+ - cdrom: respect device capabilities during opening action
+ - perf script: Fix brstackinsn for AUXTRACE
+ - perf regs: Make perf_reg_name() return "unknown" instead of NULL
+ - s390/zcrypt: handle new reply code FILTERED_BY_HYPervisor
+ - libfdt: define INT32_MAX and UINT32_MAX in libfdt_env.h
+ - s390/cpum_sf: Check for SDBT and SDB consistency
+ - ocfs2: fix passing zero to 'PTR_ERR' warning
+ - kernel: sysctl: make drop_caches write-only
+ - userfaultfd: require CAP_SYS_PTRACE for UFFD_FEATURE_EVENT_FORK
+ - x86/mce: Fix possibly incorrect severity calculation on AMD
+ - net, sysctl: Fix compiler warning when only cBPF is present
+ - netfilter: nf_queue: enqueue skb's with NULL dst
+ - ALSA: hda - Downgrade error message for single-cmd fallback
+ - bonding: fix active-backup transition after link failure
+ - perf strbuf: Remove redundant va_end() in strbuf_addv()
+ - Make filldir[64]() verify the directory entry filename is valid
+ - filldir[64]: remove WARN_ON_ONCE() for bad directory entries
+ - netfilter: ebtables: compat: reject all padding in matches/watchers
+ - 6pack, mkiss: fix possible deadlock
+ - netfilter: bridge: make sure to pull arp header in br_nf_forward_arp()
+ - inetpeer: fix data-race in inet_putpeer / inet_putpeer
+ - net: add a READ_ONCE() in skb_peek_tail()
+ - net: icmp: fix data-race in cmp_global_allow()
+ - hrtimer: Annotate lockless access to timer->state
+ - spi: fsl: don't map irq during probe
+ - tty/serial: atmel: fix out of range clock divider handling
+ - pinctrl: baytrail: Really serialize all register accesses
+ - net: ena: fix napi handler misbehavior when the napi budget is zero
+ - net/mlxfw: Fix out-of-memory error in mfa2 flash burning
+ - ptp: fix the race between the release of ptp_clock and cdev
+ - udp: fix integer overflow while computing available space in sk_rcvbuf
+ - vhost/vsock: accept only packets with the right dst_cid
+ - net: add bool confirm_neigh parameter for dst_ops.update_pmtu
+ - gtp: do not confirm neighbor when do pmtu update
+ - net/dst: add new function skb_dst_update_pmtu_no_confirm
+ - tunnel: do not confirm neighbor when do pmtu update
+ - vti: do not confirm neighbor when do pmtu update
+ - sit: do not confirm neighbor when do pmtu update
+ - gtp: do not allow adding duplicate tid and ms_addr pdp context
+ - tcp/dccp: fix possible race __inet_lookup_established()
+ - tcp: do not send empty skb from tcp_write_xmit()
+ - gtp: fix wrong condition in gtp_genl_dump_pdp()
+ - gtp: fix an use-after-free in ipv4_pdp_find()
+ - gtp: avoid zero size hashtable
+ - spi: fsl: use platform_get_irq() instead of of_irq_to_resource()
+ - scsi: hisi_sas: Replace in_softirq() check in hisi_sas_task_exec()
+ - clocksource/drivers/timer-of: Use unique device name instead of timer
+ - ext4: iomap that extends beyond EOF should be marked dirty
+ - clk: clk-gpio: propagate rate change to parent
+ - HID: quirks: Add quirk for HP MSU1465 PIXART OEM mouse
+ - HID: rmi: Check that the RMI_STARTED bit is set before unregistering the RMI
+ - transport device
+ - watchdog: Fix the race between the release of watchdog_core_data and cdev
+ - powerpc: Don't add -mabi= flags when building with Clang
+ - tcp: Fix highest_sack and highest_sack_seq
+ - nvme_fc: add module to ops template to allow module references
+ - iio: adc: max9611: Fix too short conversion time delay
+ - PM / devfreq: Don't fail devfreq_dev_release if not in list
+ - RDMA/cma: add missed unregister_pernet_subsys in init failure
+ - rxe: correctly calculate iCRC for unaligned payloads
+ - scsi: lpfc: Fix memory leak on lpfc_bsg_write_ebuf_set func
+ - scsi: qla2xxx: Don't call qlt_async_event twice
+ - scsi: iscsi: qla4xxx: fix double free in probe
+ - scsi: libbsas: stop discovering if oob mode is disconnected
+ - drm/nouveau: Move the declaration of struct nouveau_conn_atom up a bit
+ - usb: gadget: fix wrong endpoint desc
+ - net: make socket read/write_iter() honor IOCB_NOWAIT
+ - md: raid1: check rdev before reference in raid1_sync_request func
+ - s390/cpum_sf: Adjust sampling interval to avoid hitting sample limits
+ - s390/cpum_sf: Avoid SBD overflow condition in irq handler
+ - IB/mlx4: Follow mirror sequence of device add during device removal
+ - xen-blkback: prevent premature module unload
+ - xen/balloon: fix ballooned page accounting without hotplug enabled
+ - xfs: fix mount failure crash on invalid iclog memory access
+ - taskstats: fix data-race
+ - drm: limit to INT_MAX in create_blob ioctl
+ - ALSA: ice1724: Fix sleep-in-atomic in Infrasonic Quartet support code
+ - drm/sun4i: hdmi: Remove duplicate cleanup calls
+ - MIPS: Avoid VDSO ABI breakage due to global register variable
+ - media: pulse8-cec: fix lost cec_transmit_attempt_done() call
+ - media: ccc: CEC 2.0-only bcast messages were ignored
+ - media: ccc: avoid decrementing transmit_queue_sz if it is 0
+ - mm/zmalloc.c: fix the migrated zspage statistics.
+ - memcg: account security cred as well to kmemcg
+ - pstore/ram: Write new dumps to start of recycled zones
+ - locks: print unsigned ino in /proc/locks
+ - dmaengine: Fix access to uninitialized dma_slave_caps
+ - compat_ioctl: block: handle Persistent Reservations
+ - compat_ioctl: block: handle BLKREPORTZONE/BLKRESETZONE
+ - ata: libahci_platform: Export again ahci_platform_<en/dis>able_phys()
+ - ata: ahci_brcm: Allow optional reset controller to be used
+ - ata: ahci_brcm: Fix AHCI resources management
+ - gpiolib: fix up emulated open drain outputs
+ - tracing: Fix lock inversion in trace_event_enable_tgid_record()
+ - tracing: Have the histogram compare functions convert to u64 first
+ - ALSA: cs4236: fix error return comparison of an unsigned integer
+ - ALSA: firewire-motu: Correct a typo in the clock proc string
+ - exit: panic before exit_mm() on global init exit
+ - ftrace: Avoid potential division by zero in function profiler
+ - PM / devfreq: Check NULL governor in available_governors_show
+ - nfsd4: fix up replay_matches_cache()
+ - scsi: qla2xxx: Drop superfluous INIT_WORK of del_work
+ - xfs: don't check for AG deadlock for realtime files in bunmapi
+ - platform/x86: pmc_atom: Add Siemens CONNECT X300 to critclk_systems DMI table
+ - Bluetooth: btusb: fix PM leak in error case of setup
+ - Bluetooth: delete a stray unlock
+ - Bluetooth: Fix memory leak in hci_connect_le_scan
+ - media: flexcop-usb: ensure -EIO is returned on error condition
+ - regulator: ab8500: Remove AB8505 USB regulator
+ - media: usb: fix memory leak in af9005_identify_state
+ - dt-bindings: clock: renesas: rcar-usb2-clock-sel: Fix typo in example
+ - tty: serial: msm_serial: Fix lockup for sysrq and oops
+ - fix compat handling of FICLONERANGE, FIDEDUPERANGE and FS_IOC_FIEMAP
+ - scsi: qedf: Do not retry ELS request if qedf Alloc_cmd fails
+ - drm/mst: Fix MST sideband up-reply failure handling
+ - powerpc/pseries/hvconsole: Fix stack overflow via udbg
+ - selftests: rtnetlink: add addresses with fixed life time
+ - rxrpc: Fix possible NULL pointer access in ICMP handling
+ - ath9k_htc: Modify byte order for an error message
+ - ath9k_htc: Discard undersized packets
+ - arm64: dts: meson: odroid-c2: Disable usb_otg bus to avoid power failed warning
+ - net: add annotations on hh->hh_len lockless accesses
+ - s390/smp: fix physical to logical CPU map for SMT
+ - xen/blkback: Avoid unmapping unmapped grant pages
+ - perf/x86/intel/bts: Fix the use of page_private()
+ - drm/amdgpu: add cache flush workaround to gfx8 emit_fence
+ - drm/amd/display: Fixed kernel panic when booting with DP-to-HDMI dongle
+ - PM / devfreq: Fix devfreq_notifier_call returning errno
+ - PM / devfreq: Set scaling_max_freq to max on OPP notifier error
+ - afs: Fix afs_find_server lookups for ipv4 peers
+ - scsi: qla2xxx: Fix PLOGI payload and ELS IOCBI dump length
+ - scsi: qla2xxx: Send Notify ACK after N2N PLOGI
+ - ALSA: hda - fixup for the bass speaker on Lenovo Carbon X1 7th gen
+ - ALSA: hda/realtek - Add headset Mic no shutup for ALC283
+ - media: cec: check 'transmit_in_progress', not 'transmitting'
+ - HID: i2c-hid: Reset ALPS touchpads on resume
+ - bdev: Factor out bdev revalidation into a common helper
+ - bdev: Refresh bdev size for disks without partitioning
+ - KVM: PPC: Book3S HV: use smp_mb() when setting/clearing host_ipi flag
+ - net: core: limit nested device depth
+ - ubifs: ubifs_tnc_start_commit: Fix OOB in layout_in_gaps

+ * Bionic update: upstream stable patchset 2020-01-14 (LP: #1859712)
+ - af_packet: set default value for tmo
+ - fjes: fix missed check in fjes_acpi_add
+ - mod_devicetable: fix PHY module format
+ - net: dst: Force 4-byte alignment of dst_metrics
+ - net: hisilicon: Fix a BUG triggered by wrong bytes_compl
+ - net: nfc: nci: fix a possible sleep-in-atomic-context bug in
+  nci_uart_tty_receive()
+ - net: qlogic: Fix error paths in ql_alloc_large_buffers()
+ - net: usb: lan78xx: Fix suspend/resume PHY register access error
+ - qede: Fix multicast mac configuration
+ - scctp: fully initialize v4 addr in some functions
+ - btrfs: don't double lock the subvol_sem for rename exchange
+ - btrfs: do not call synchronize_scru() in inode_tree_del
+ - btrfs: skip log replay on orphaned roots
+ - btrfs: do not leak reloc root if we fail to read the fs root
+ - btrfs: handle ENOENT in btrfs_uuid_tree_iterate
+ - Btrfs: fix removal logic of the tree mod log that leads to use-after-free
  issues
+ - ALSA: pcm: Avoid possible info leaks from PCM stream buffers
+ - ALSA: hda/ca0132 - Keep power on during processing DSP response
+ - ALSA: hda/ca0132 - Avoid endless loop
+ - drm: mst: Fix query_payload ack reply struct
+ - drm/bridge: analogix-anx78xx: silence -EPROBE_DEFER warnings
+ - iio: light: bh1750: Resolve compiler warning and make code more readable
+ - spi: Add call to spi_slave_abort() function when spidev driver is released
+ - staging: rtl8192u: fix multiple memory leaks on error path
+ - staging: rtl8188eu: fix possible null dereference
+ - rtlwifi: prevent memory leak in rtl_usb_probe
+ - libertas: fix a potential NULL pointer dereference
+ - IB/iser: bound protection_sg size by data_sg size
+ - media: am437x-vpfe: Setting STD to current value is not an error
+ - media: i2c: ov2659: fix s_stream return value
+ - media: ov6650: Fix crop rectangle alignment not passed back
+ - media: i2c: ov2659: Fix missing 720p register config
+ - media: ov6650: Fix stored frame format not in sync with hardware
+ - media: ov6650: Fix stored crop rectangle not in sync with hardware
+ - tools/power/cpupower: Fix initializer override in hsw_ext_cstates
+ - media: venus: core: Fix msm8996 frequency table
+ - ath10k: fix offchannel tx failure when no ath10k_mac_tx_frm_has_freq
+ - pinctrl: devicetree: Avoid taking direct reference to device name string
+ - selftests/bpf: Correct path to include msg + path
+ - usb: renesas_usbhs: addsuspend event support in gadget mode
+ - hwrng: omap3-rom - Call clk_disable_unprepare() on exit only if not idled
+ - regulator: max8907: Fix the usage of uninitialized in
+ max8907_regulator_probe()
+ - media: flexcop-usb: fix NULL-ptr deref in flexcop_usb_transfer_init()
+ - media: eee-funcs.h: add status_req checks
+ - drm/bridge: dw-hdmi: Refuse DDC/CI transfers on the internal I2C controller
+ - samples: pktgen: fix proc_cmd command result check logic
+ - block: Fix writback throttling W=1 compiler warnings
+ - mwifiex: pcie: Fix memory leak in mwifiex_pcie_init_evt_ring
+ - media: ex88: Fix some error handling path in `ex8800_initdev()
+ - media: ti-vpe: vpe: Fix Motion Vector vpdm stride
+ - media: ti-vpe: vpe: fix a 412-compliance warning about invalid pixel format
+ - media: ti-vpe: vpe: fix a 412-compliance failure about frame sequence
+ number
+ - media: ti-vpe: vpe: Make sure YUYV is set as default format
+ - media: ti-vpe: vpe: fix a 412-compliance failure causing a kernel panic
+ - media: ti-vpe: vpe: ensure buffers are cleaned up properly in abort cases
+ - media: ti-vpe: vpe: fix a 412-compliance failure about invalid sizeimage
+ - extcon: sm5502: Reset registers during initialization
+ - x86/mm: Use the correct function type for native_set_fixmap()
+ - drm/bridge: dw-hdmi: Restore audio when setting a mode
+ - perf test: Report failure for mmap events
+ - perf report: Add warning when libunwind not compiled in
+ - usb: usbfs: Suppress problematic bind and unbind uevents.
+ - iio: adc: max1027: Reset the device at probe time
+ - Bluetooth: missed cpu_to_le16 conversion in hci_init4_req
+ - Bluetooth: hci_core: fix init for HCI_USER_CHANNEL
+ - x86/mce: Lower throttling MCE messages' priority to warning
+ - drm/gma500: fix memory disclosures due to uninitialized bytes
+ - r18xxxu: fix RTL8723BU connection failure issue after warm reboot
+ - x86/ioapic: Prevent inconsistent state when moving an interrupt
+ - arm64: psci: Reduce the waiting time for cpu_psci_cpu_kill()
+ - net: phy: dp83867: enable robust auto-mdix
+ - RDMA/qedr: Fix memory leak in user qp and mr
+ - gpu: host1x: Allocate gather copy for host1x
+ - net: dsa: LAN9303: select REGMAP when LAN9303 enable
+ - phy: gcom-usb-hs: Fix extcon double register after power cycle
+ - s390/time: ensure get_clock_monotonic() returns monotonic values
+ - s390/mm: add mm_pxd_folded() checks to pxd_free()
+ - libata: Ensure ata_port probe has completed before detach
+ - loop: fix no-unmap write-zeroes request behavior
+ - pinctrl: sh-pfc: sh7734: Fix duplicate TCLK1_B
+ - iio: dln2-adc: fix iio_triggered_buffer_postenable() position
+ - Bluetooth: Fix advertising duplicated flags
+ - pinctrl: amd: fix __iomem annotation in amd_gpio_irq_handler()
+ - ixgbe: protect TX timestamping from API misuse
+ - media: rcar_drif: fix a memory disclosure
+ - media: v4l2-core: fix touch support in v4l_g_fmt
+ - rfkill: allocate static minor
+ - bnx2x: Fix PF-VF communication over multi-cos queues.
+ - spi: img-spfi: fix potential double release
+ - ALSA: timer: Limit max amount of slave instances
+ - rtlwifi: fix memory leak in rtl92c_set_fw_rsvdpagepkt()
+ - perf probe: Fix to find range-only function instance
+ - perf probe: Fix to list probe event with correct line number
+ - perf probe: Walk function lines in lexical blocks
+ - perf probe: Fix to probe an inline function which has no entry pc
+ - perf probe: Fix to show ranges of variables in functions without entry_pc
+ - perf probe: Fix to show inline function callsite without entry_pc
+ - libsubcmd: Use -O0 with DEBUG=1
+ - perf probe: Fix to probe a function which has no entry pc
+ - drm/amdgpu: fix potential double drop fence reference
+ - perf parse: If pmu configuration fails free terms
+ - perf probe: Skip overlapped location on searching variables
+ - perf probe: Return a better scope DIE if there is no best scope
+ - perf probe: Fix to show calling lines of inlined functions
+ - perf probe: Skip end-of-sequence and non statement lines
+ - perf probe: Filter out instances except for inlined subroutine and
  subroutine
+ - ath10k: fix get invalid tx rate for Mesh metric
+ - fsi: core: Fix small accesses and unaligned offsets via sysfs
+ - media: pvrusb2: Fix oops on tear-down when radio support is not present
+ - media: si470x-i2c: add missed operations in remove
+ - EDAC/ghes: Fix grain calculation
+ - spi: pxa2xx: Add missed security checks
+ - ASoC: rt5677: Mark reg RT5677_PWR_ANLG2 as volatile
+ - ASoC: Intel: kbl_rt5663_rt5514_max98927: Add dmic format constraint
+ - s390/disassembler: don't hide instruction addresses
+ - parport: load lowlevel driver if ports not found
+ - cpufreq: Register drivers only after CPU devices have been registered
+ - x86/crash: Add a forward declaration of struct kimage
+ - iwlfwifi: mv: fix unaligned read of rx_pkt_status
+ - spi: tegra20-slink: add missed clk_unprepare
+ - crypto: virtio - deal with unsupported input sizes
+ - mmc: tmio: Add MMC_CAP_ERASE to allow erase/discard/trim requests
+ - btrfs: don't prematurely free work in end_workqueue_fn()
+ - btrfs: don't prematurely free work in run_ordered_work()
+ - spi: st-ssc4: add missed pm_runtime_disable
+ - x86/insn: Add some Intel instructions to the opcode map
+ - iwlfwifi: check kasprintf() return value
+ - ftbft: Make sure string is NULL terminated
+ - crypto: sun4i-ss - Fix 64-bit size_t warnings
+ - crypto: sun4i-ss - Fix 64-bit size_t warnings on sun4i-ss-hash.c
+ - mac80211: consider QoS Null frames for STA_NULLFUNC_ACKED
+ - crypto: vmx - Avoid weird build failures
+ - libtraceevent: Fix memory leakage in copy_filter_type
+ - mips: fix build when "48 bits virtual memory" is enabled
+ - net: phy: initialise phydev speed and duplex sanely
+ - btrfs: don't prematurely free work in reada_start_machine_worker()
+ - btrfs: don't prematurely free work in scrub_missing_raid56_worker()
+ - Revert "mmc: sdhci: Fix incorrect switch to HS mode"
+ - mmc: mediatek: fix CMD_TA to 2 for MT8173 HS200/HS400 mode
+ - usb: xhci: Fix build warning seen with CONFIG_PM=n
+ - s390/trace: fix endless recursion in function_graph tracer
+ - btrfs: return error pointer from alloc_test_extent_buffer
+ - btrfs: abort transaction after failed inode updates in create_subvol
+ - usbip: Fix receive error in vhci-hcd when using scatter-gather
+ - usbip: Fix error path of vhci_recv_ret_submit()
+ - USB: EHCI: Do not return -EPIPE when hub is disconnected
+ - intel_th: pci: Add Comet Lake PCH-V support
+ - intel_th: pci: Add Elkhart Lake SOC support
+ - platform/x86: hp-wmi: Make buffer for HPWMI_FEATURE2_QUERY 128 bytes
+ - staging: comedi: gsc_hpdi: check dma_alloc_coherent() return value
+ - ext4: fix ext4_empty_dir() for directories with holes
+ - ext4: check for directory entries too close to block end
+ - ext4: unlock on error in ext4expand_extra_isize()
+ - KVM: arm64: Ensure 'params' is initialised when looking up sys register
+ - x86/MCE/AMD: Do not use rdmsr_safe_on_cpu() in smca_configure()
+ - x86/MCE/AMD: Allow Reserved types to be overwritten in smca_banks[]
+ - powerpc/irq: fix stack overflow verification
  + support”
+ - mmc: sdhci: Update the tuning failed messages to pr_debug level
+ - mmc: sdhci-of-esdhc: fix P2020 errata handling
+ - nbd: fix shutdown and recv work deadlock v2
+ - perf probe: Fix to show function entry line as probe-able
+ - btrfs: send: remove WARN_ON for readonly mount
+ - ALSA: hda/ca0132 - Fix work handling in delayed HP detection
+ - drm/panel: Add missing drm_panel_init() in panel drivers
+ - drm/amdkfd: fix a potential NULL pointer dereference (v2)
+ - drm/drm_vblank: Change EINVAL by the correct errno
+ - Bluetooth: Workaround directed advertising bug in Broadcom controllers
+ - media: smiapp: Register sensor after enabling runtime PM on the device
+ - md/bitmap: avoid race window between md_bitmap_resize and
  bitmap_file_clear_bit
+ - net: hns3: add struct netdev_queue debug info for TX timeout
+ - nvmem: imx-ocotp: reset error status on probe
+ - perf jevents: Fix resource leak in process_mapfile() and main()
+ - perf tools: Splice events onto evlist even on error
+ - crypto: atmel - Fix authenc support when it is set to m
+ - iio: dac: ad5446: Add support for new AD5600 DAC
+ - bcache: fix static checker warning in bcache_device_free()
+ - tun: fix data-race in gro_normal_list()
+ - ASoC: wm2200: add missed operations in remove and probe failure
+ - ASoC: wm5100: add missed pm_runtime_disable
+ - net: ethernet: ti: ale: disable ale from stop()
+ - net: ethernet: ti: ale: clean ale tbl on init and init restart
+ - cpufreq: Rename cpufreq_can_do_remote_dvfs()
+ - cpufreq: Avoid leaving stale IRQ work items during CPU offline
+ - mmc: sdhci: Add a quirk for broken command queuing
+ *
+ * Bionic update: upstream stable patchset 2020-01-10 (LP: #1859249)
+ - net: bridge: deny dev_set_mac_address() when unregistering
+ - net: dsa: fix flow dissection on Tx path
+ - net: thunderx: cpsw: fix extra rx interrupt
+ - net: thunderx:Disable autonegotiation
+ - openswicth: support asymmetric conntrack
+ - tcp: md5: fix potential overestimation of TCP option space
+ - tcp: fix ordering of tipc module init and exit routine
+ - tcp: fix rejected syncookies due to stale timestamps
+ - tcp: tighten acceptance of ACKs not matching a child socket
+ - tcp: Protect accesses to .ts_recent_stamp with {READ,WRITE}_ONCE()
+ - inet: protect against too small mtu values.
+ - nvme: host: core: fix precedence of ternary operator
+ - Revert "regulator: Defer init completion for a while after late_initcall"
+ - PCI/PM: Always return devices to D0 when thawing
+ - PCI: Fix Intel ACS quirk UPDCR register address
+ - PCI/MSI: Fix incorrect MSI-X masking on resume
+ - PCI: Apply Cavium ACS quirk to ThunderX2 and ThunderX3
+ - xtensa: fix TLB sanity checker
+ - rpmmsg: glink: Set tail pointer to 0 at end of FIFO
+ - rpmmsg: glink: Fix reuse intents memory leak issue
+ - rpmmsg: glink: Fix use after free in openAck TIMEOUT case
+ - rpmmsg: glink: Put an extra reference during cleanup
+ - rpmmsg: glink: Fix rpmmsg_register_device err handling
+ - rpmmsg: glink: Don’t send pending rx done during remove
+ - rpmmsg: glink: Free pending deferred work on remove
+ - CIFS: Respect O_SYNC and O_DIRECT flags during reconnect
+ - ARM: dts: s3c64xx: Fix init order of clock providers
+ - ARM: tegra: Fix FLOW_CTLR_HALT register clobbering by tegra_resume()
+ - vfio/pci: call irq_bypass_unregister_producer() before freeing irq
+ - dma-buf: Fix memory leak in sync_file_merge()
+ - dm btree: increase rebalance threshold in __rebalance2()
+ - scsi: iscsi: Fix a potential deadlock in the timeout handler
+ - drm/radeon: fix r1xx/r2xx register checker for POT textures
+ - xhci: fix USB3 device initiated resume race with roothub autosuspend
+ - net: stmmac: use correct DMA buffer size in the RX descriptor
+ - mqprio: Fix out-of-bounds access in mqprio_dump
+ *
+ * fstrim on nvme / AMD CPU fails and produces kernel error messages
+ (LP: #1856603)
+ - nvme: Discard workaround for non-conformant devices
+ + * net selftest psock_fanout fails on xenial s390x due to incorrect queue
+ + lengths (LP: #1853375)
+ + - selftests/net: ignore background traffic in psock_fanout
+ + + * multi-zone raid0 corruption (LP: #1850540)
+ + - md/raid0: avoid RAID0 data corruption due to layout confusion.
+ + - md: add feature flag MD_FEATURE_RAID0_LAYOUT
+ + - md/raid0: fix warning message for parameter default_layout
+ + - md/raid0: Fix an error message in raid0_make_request()
+ + - SAUCE: md/raid0: Link to wiki with guidance on multi-zone RAID0 layout
+ + migration
+ + - SAUCE: md/raid0: Use kernel specific layout
+ + * Dell AIO can't adjust brightness (LP: #1858761)
+ + - SAUCE: platform/x86: dell-uart-backlight: add retry for get scalar status
+ + + * USB key cannot be detected by hotplug on Sunix USB Type-A 3.1 Gen 2 card
+ + [1b21:2142] (LP: #1858988)
+ + - SAUCE: PCI: Avoid ASMedia XHCI USB PME# from D0 defect
+ + + * CVE-2019-5108
+ + - cfg80211/mac80211: make ieee80211_send_layer2_update a public function
+ + - mac80211: Do not send Layer 2 Update frame before authorization
+ + + * [SRU][B/OEM-B/OEM-OSP1/D/E/Unstable] UBUNTU: SAUCE: Use native backlight on
+ + Lenovo E41-25/45 (LP: #1859561)
+ + + * CVE-2019-20996
+ + - dccp: Fix memleak in __feat_register_sp
+ + + * Fix misleading error message: Configuring the VNIC characteristics failed
+ + (LP: #1860523)
+ + - (upstream) s390/qeth: fix false reporting of VNIC CHAR config failure
+ + + * Fix unusable USB hub on Dell TB16 after S3 (LP: #1855312)
+ + - SAUCE: USB: core: Make port power cycle a seperate helper function
+ + - SAUCE: USB: core: Attempt power cycle port when it's in eSS.Disabled state
+ + + * [linux] Patch to prevent possible data corruption (LP: #1848739)
+ + - blk-mq: quiesce queue during switching io sched and updating nr_requests
+ + - blk-mq: move hctx lock/unlock into a helper
+ + - blk-mq: factor out a few helpers from __blk_mq_try_issue_directly
+ + - blk-mq: improve DM's blk-mq IO merging via blk_insert_cloned_request
+ + feedback
+ - dm mpath: fix missing call of path selector type->end_io
+ - blk-mq-sched: remove unused 'can_block' arg from blk_mq_sched_insert_request
+ - blk-mq: don't dispatch request in blk_mq_request_direct_issue if queue is busy
+ - blk-mq: introduce BLK_STS_DEVRESOURCE
+ - blk-mq: Rename blk_mq_request_direct_issue() into blk_mq_request_issue_directly()
+ - blk-mq: don't queue more if we get a busy return
+ - blk-mq: dequeue request one by one from sw queue if hctx is busy
+ - blk-mq: issue directly if hw queue isn't busy in case of 'none'
+ - blk-mq: fix corruption with direct issue
+ - blk-mq: fail the request in case issue failure
+ - blk-mq: punt failed direct issue to dispatch list
+
+ + * [sas-1126]scsi: hisi_sas: Fix out of bound at debug_I_T_nexus_reset() (LP: #1853992)
+ + - scsi: hisi_sas: Fix out of bound at debug_I_T_nexus_reset()
+
+ + * [sas-1126]scsi: hisi_sas: Assign NCQ tag for all NCQ commands (LP: #1853995)
+ + - scsi: hisi_sas: Assign NCQ tag for all NCQ commands
+
+ + * [sas-1126]scsi: hisi_sas: Fix the conflict between device gone and host reset (LP: #1853997)
+ + - scsi: hisi_sas: Fix the conflict between device gone and host reset
+
+ + * scsi: hisi_sas: Check sas_port before using it (LP: #1855952)
+ + - scsi: hisi_sas: Check sas_port before using it
+
+ * CVE-2019-18885
+ - btrfs: refactor btrfs_find_device() take fs_devices as argument
+ - btrfs: merge btrfs_find_device and find_device
+
+ * [SRU][B/OEM-B/OEM-OSP1/D/E/F] Add LG I2C touchscreen multitouch support (LP: #1857541)
+ - SAUCE: HID: multitouch: Add LG MELF0410 I2C touchscreen support
+
+ * usb-audio: the mic can't record any sound after resume on Dell Dock WD19 (LP: #1857496)
+ - ALSA: usb-audio: set the interface format after resume on Dell WD19
+
+ * qede driver causes 100% CPU load (LP: #1855409)
+ - qede: Handle infinite driver spinning for Tx timestamp.
+
+ * [roce-1126]RDMA/hns: bugfix for slab-out-of-bounds when loading hip08 driver (LP: #1853989)
+ - RDMA/hns: Bugfix for slab-out-of-bounds when unloading hip08 driver
+ - RDMA/hns: bugfix for slab-out-of-bounds when loading hip08 driver
+ * [roce-1126]RDMA/hns: Fixs hw access invalid dma memory error (LP: #1853990)
+ - RDMA/hns: Fixs hw access invalid dma memory error
+
+ * [hns-1126] net: hns: add support for vlan TSO (LP: #1853937)
+ - net: hns: add support for vlan TSO
+
+ * mlx5_core reports hardware checksum error for padded packets on Mellanox
+ NICs (LP: #1854842)
+ - net/mlx5e: Rx, Fixup skb checksum for packets with tail padding
+ - net/mlx5e: Rx, Fix checksum calculation for new hardware
+
+ * alsahda/realtek: the line-out jack donets work on a dell AIO
+ (LP: #1855999)
+ - ALSA: hda/realtek - Line-out jack doesn't work on a Dell AIO
+
+ * efivarfs test in ubuntu_kernel_selftest failed on the second run
+ (LP: #1809704)
+ - selftests: efivarfs: return Kselftest Skip code for skipped tests
+ - selftests/efivarfs: clean up test files from test_create*()
+
+ * CVE-2019-19082
+ - drm/amd/display: prevent memory leak
+
+ * CVE-2019-19078
+ - ath10k: fix memory leak
+
+ * Bionic update: upstream stable patchset 2019-12-20 (LP: #1857158)
+ - rsi: release skb if rsi_prepare_beacon fails
+ - arm64: tegra: Fix 'active-low' warning for Jetson TX1 regulator
+ - usb: gadget: u_serial: add missing port entry locking
+ - tty: serial: fsl_lpuart: use the sg count from dma_map_sg
+ - tty: serial: msm_serial: Fix flow control
+ - serial: plo11: Fix DMA ->flush_buffer()
+ - serial: serial_core: Perform NULL checks for break_ctl ops
+ - serial: ifx6x60: add missed pm_runtime_disable
+ - autosfs: fix a leak in autosfs_expire_indirect()
+ - RDMA/hns: Correct the value of HNS_ROCE_HEM_CHUNK_LEN
+ - iwllwifi: pcie: don't consider IV len in A-MSDU
+ - exportfs_decode_fh(): negative pinned may become positive without the parent
+ locked
+ - audit_get_nd(): don't unlock parent too early
+ - NFC: nxe-nci: Fix NULL pointer dereference after I2C communication error
+ - xfrm: release device reference for invalid state
+ - Input: cyttsp4_core - fix use after free bug
+ - sched/core: Avoid spurious lock dependencies
+ - ALSA: pcm: Fix stream lock usage in snd_pcm_period_elapsed()
+ - rsxx: add missed destroy_workqueue calls in remove
+ - net: ep93xx_eth: fix mismatch of request_mem_region in remove
+ i2c: core: fix use after free in of_i2c_notify
+ serial: core: Allow processing sysrq at port unlock time
+ cxgb4vf: fix memleak in mac_hlist initialization
+ iwlwifi: mvm: synchronize TID queue removal
+ iwlwifi: mvm: Send non offchannel traffic via AP sta
+ ARM: 8813/1: Make aligned 2-byte getuser()/putuser() atomic on ARMv6+
+ net/mlx5: Release resource on error flow
+ clk: sunxi-ng: a64+: Fix gate bit of DSI DPHY
+ dlm: fix possible call to kfree() for non-initialized pointer
+ extcon: max8997: Fix lack of path setting in USB device mode
+ net: ethernet: ti: cpts: correct debug for expired txq skb
+ rtc: s3c-rtc: Avoid using broken ALMYEAR register
+ i40e: don't restart nway if autoneg not supported
+ clk: rockchip: fix rk3188 sclk_smc gate data
+ clk: rockchip: fix rk3188 sclk_mac_lbttest parameter ordering
+ ARM: dts: rockchip: Fix rk3288-rock2 vcc_flash name
+ dlm: fix missing idr_destroy for recover_idr
+ MIPS: SiByte: Enable ZONE_DMA32 for LittleSur
+ net: dsa: mv88e66161: Work around mv88e66161 SERDES missing MII_PHYSID2
+ scsi: zfcp: drop default switch case which might paper over missing case
+ crypto: ecc - check for invalid values in the key verification test
+ crypto: bcm - fix normal/non key hash algorithm failure
+ pinctrl: qcom: ssbi-gpio: fix gpio-hog related boot issues
+ Staging: iio: adt7316: Fix i2c data reading, set the data field
+ mm/vmstat.c: fix NUMA statistics updates
+ clk: rockchip: fix I2S1 clock gate register for rk3328
+ clk: rockchip: fix ID of 8ch clock of I2S1 for rk3328
+ regulator: Fix return value of _set_load() stub
+ iomap: sub-block dio needs to zeroout beyond EOF
+ -math-emu/soft-fp.h: (_FP_ROUND_ZERO) cast 0 to void to fix warning
+ rtc: max8997: Fix the returned value in case of error in
  'max8997_rtc_read_alarm()'
+ rtc: dt-binding: abx80x: fix resistance scale
+ ARM: dts: exynos: Use Samsung SoC specific compatible for DWC2 module
+ media: pulse8-ccc: return 0 when invalidating the logical address
+ media: ccc: report Vendor ID after initialization
+ dmaengine: coh901318: Fix a double-lock bug
+ dmaengine: coh901318: Remove unused variable
+ dmaengine: dw-dmac: implement dma protection control setting
+ usb: dwc3: debugfs: Properly print/set link state for HS
+ usb: dwc3: don't log probe deferrals; but do log other error codes
+ ACPI: fix acpi_find_child_device() invocation in acpi_preset_companion()
+ f2fs: fix count of seg_freed to make sec_freed correct
+ f2fs: change segment to section in f2fs_ioc_gc_range
+ ARM: dts: rockchip: Fix the PMU interrupt number for rv1108
+ ARM: dts: rockchip: Assign the proper GPIO clocks for rv1108
+ - f2fs: fix to allow node segment for GC by ioctl path
+ - sparc: Correct ctx->saw_frame_pointer logic.
+ - dma-mapping: fix return type of dma_set_max_seg_size()
+ - altera-stapl: check for a null key before strcasecmp'ing it
+ - serial: imx: fix error handling in console_setup
+ - i2c: imx: don't print error message on probe defer
+ - lockd: fix decoding of TEST results
+ - ASoC: snd: tidyup registering method for snd_kctrl_new()
+ - ARM: dts: sun5i: a10s: Fix HDMI output DTC warning
+ - ARM: dts: sun8i: v3s: Change pinctrl nodes to avoid warning
+ - dlm: NULL check before kmem_cache_destroy is not needed
+ - ARM: debug: enable UART1 for socfpga Cyclone5
+ - nfsd: fix a warning in __cld_pipe_upcall()
+ - ASoC: au8540: use 64-bit arithmetic instead of 32-bit
+ - ARM: OMAP1/2: fix SoC name printing
+ - arm64: dts: meson-gxl-libretech-cc: fix GPIO lines names
+ - arm64: dts: meson-gxbb-nanopi-k2: fix GPIO lines names
+ - arm64: dts: meson-gxbb-odroidc2: fix GPIO lines names
+ - arm64: dts: meson-gxl-khadas-vim: fix GPIO lines names
+ - net/x25: fix called/calling length calculation in x25_parse_address_block
+ - net/x25: fix null_x25_address handling
+ - ARM: dts: mmp2: fix the gpio interrupt cell number
+ - ARM: dts: realview-pbx: Fix duplicate regulator nodes
+ - tcp: fix off-by-one bug on aborting window-probing socket
+ - tcp: fix SNMP under-estimation on failed retransmission
+ - tcp: fix SNMP TCP timeout under-estimation
+ - modpost: skip ELF local symbols during section mismatch check
+ - kbuild: fix single target build for external module
+ - mtd: fix mtd_oobavail() incoherent returned value
+ - clk: sunxi-ng: h3/h5: Fix CSI_MCLK parent
+ - ARM: dts: realview: Fix some more duplicate regulator nodes
+ - dlm: fix invalid cluster name warning
+ - net/mlx4_core: Fix return codes of unsupported operations
+ - pstore/ram: Avoid NULL deref in ftrace merging failure path
+ - powerpc/math-emu: Update macros from GCC
+ - clk: renesas: r8a77995: Correct parent clock of DU
+ - MIPS: OCTEON: cvmx_pko_mem_debug8: use oldest forward compatible definition
+ - nfsd: Return EPERM, not EACCES, in some SETATTR cases
+ - media: stkwebcam: Bugfix for wrong return values
+ - firmware: qcom: scm: fix compilation error when disabled
+ - mlxsw: spectrum_router: Relax GRE decap matching check
+ - IB/hfi1: Ignore LNI errors before DC8051 transitions to Polling state
+ - IB/hfi1: Close VNIC sdma_progress sleep window
+ - mlx4: Use snprintf instead of complicated strcpy
+ - usb: mtu3: fix dbginfo in qmu_tx_zlp_error_handler
+ - ARM: dts: sunxi: Fix PMU compatible strings
+ - media: vimc: fix start stream when link is disabled
- net: aquantia: fix RSS table and key sizes
- sched/fair: Scale bandwidth quota and period without losing quota/period
- fuse: verify nlink
- fuse: verify attributes
- ALSA: pcm: oss: Avoid potential buffer overflows
- ALSA: hda - Add mute led support for HP ProBook 645 G4
- Input: synaptics - switch another X1 Carbon 6 to RMI/SMbus
- Input: synaptics-rmi4 - re-enable IRQs in f34v7_do_reflash
- Input: synaptics-rmi4 - don't increment rmiaddr for SMBus transfers
- Input: goodix - add upside-down quirk for Teclast X89 tablet
- coresight: etm4x: Fix input validation for sysfs.
- Input: Fix memory leak in psxpad_spi_probe
- CIFS: Fix NULL-pointer dereference in smb2_push_mandatory_locks
- CIFS: Fix SMB2 oplock break processing
- tty: vt: keyboard: reject invalid keycodes
- can: slcan: Fix use-after-free Read in slcan_open
- kernfs: fix ino wrap-around detection
- jbd2: Fix possible overflow in jbd2_log_space_left()
- drm/i810: Prevent underflow in ioctl
- KVM: arm/arm64: vgic: Don't rely on the wrong pending table
- KVM: x86: do not modify masked bits of shared MSRs
- KVM: x86: fix presentation of TSX feature in ARCH_CAPABILITIES
- crypto: crypto4xx - fix double-free in crypto4xx_destroy_sdr
- crypto: af_alg - cast ki_complete ternary op to int
- crypto: ccp - fix uninitialized list head
- crypto: ecdh - fix big endian bug in ECC library
- crypto: user - fix memory leak in crypto_report
- spi: atmel: Fix CS high support
- RDMA/qib: Validate ->show() / store() callbacks before calling them
- jmap: Fix pipe page leakage during splicing
- thermal: Fix deadlock in thermal thermal_zone_device_check
- binder: Handle start==NULL in binder_update_page_range()
- ASoC: rsnd: Fixup MIX kctrl registration
- appletalk: Fix potential NULL pointer dereference in unregister_snap_client
- appletalk: Set error code if register_snap_client failed
- usb: gadget: configfs: Fix missing spin_lock_init()
- usb: gadget: pch_udc: fix use after free
- scsi: qla2xxx: Fix driver unload hang
- media: venus: remove invalid compat_ioctl32 handler
- USB: uas: honor flag to avoid CAPACITY16
- USB: uas: heed CAPACITY_HEURISTICS
- USB: documentation: flags on usb-storage versus UAS
- usb: Allow USB device to be warm reset in suspended state
- staging: rtl8188eu: fix interface sanity check
- staging: rtl8712: fix interface sanity check
- staging: gigaset: fix general protection fault on probe
- staging: gigaset: fix illegal free on probe errors
- staging: gigaset: add endpoint-type sanity check
- usb: xhci: only set D3hot for pci device
- xhci: Increase STS_HALT timeout in xhci_suspend()
- xhci: handle some XHCI_TRUST_TX_LENGTH quirks cases as default behaviour.
- ARM: dts: pandora-common: define w11251 as child node of mmc3
- io: humidity: hdc100x: fix IIO_HUMIDITYRELATIVE channel reporting
- USB: atm: ueagle-atm: add missing endpoint check
- USB: idmouse: fix interface sanity checks
- USB: serial: io_edgeport: fix epic endpoint lookup
- USB: adutux: fix interface sanity check
- usb: core: urb: fix URB structure initialization function
- usb: mon: Fix a deadlock in usbmon between mmap and read
- tpm: add check after commands attrs tab allocation
- mtd: spear_smi: Fix Write Burst mode
- virtio-balloon: fix managed page counts when migrating pages between zones
- usb: DWC3: ep0: Clear started flag on completion
- btrfs: check page->mapping when loading free space cache
- btrfs: use refcount_inc_not_zero in kill_all_nodes
- Btrfs: fix negative subv_writers counter and data space leak after buffered write
- btrfs: Remove btrfs_bio::flags member
- Btrfs: send, skip backreference walking for extents with many references
- btrfs: record all roots for rename exchange on a subvol
- rtlwifi: rtl8192de: Fix missing code to retrieve RX buffer address
- rtlwifi: rtl8192de: Fix missing callback that tests for hw release of buffer
- rtlwifi: rtl8192de: Fix missing enable interrupt flag
- lib: raid6: fix awk build warnings
- ovl: relax WARN_ON() on rename to self
- ALSA: hda - Fix pending unsol events at shutdown
- watchdog: aspeed: Fix clock behaviour for ast2600
- hwrng: omap - Fix RNG wait loop timeout
- dm zoned: reduce overhead of backing device checks
- workqueue: Fix spurious sanity check failures in destroy_workqueue()
- workqueue: Fix pqw ref leak in rescuer_thread()
- ASoC: Jack: Fix NULL pointer dereference in snd_soc_jack_report
- blk-mq: avoid sysfs buffer overflow with too many CPU cores
- cgroup: pids: use atomic64_t for pids->limit
- ar5523: check NULL before memcopy() in ar5523_cmd()
- s390/mm: properly clear _PAGE_NOEXEC bit when it is not supported
- media: bdisp: fix memleak on release
- media: radio: w11273: fix interrupt masking on release
- media: ccc: CEC_OP_REC_FLAG_ values were swapped
- cpuidle: Do not unset the driver if it is there already
- intel_th: Fix a double put_device() in error path
- intel_th: pci: Add Ice Lake CPU support
- intel_th: pci: Add Tiger Lake CPU support
- PM / devfreq: Lock devfreq in trans_stat_show
+ - cpufreq: powernv: fix stack bloat and hard limit on number of CPUs
+ - ACPI: OSL: only free map once in osl.c
+ - ACPI: bus: Fix NULL pointer check in acpi_bus_get_private_data()
+ - ACPI: PM: Avoid attaching ACPI PM domain to certain devices
+ - pinctrl: samsung: Add of_node_put() before return in error path
+ - pinctrl: samsung: Fix device node refcount leaks in S3C24xx wakeup
+ controller init
+ - pinctrl: samsung: Fix device node refcount leaks in init code
+ - pinctrl: samsung: Fix device node refcount leaks in S3C64xx wakeup
+ controller init
+ - mmc: host: omap_hsmmc: add code for special init of w11251 to get rid of
  pandora_w11251_init_card
+ - ARM: dts: omap3-tao3530: Fix incorrect MMC card detection GPIO polarity
+ - ppdev: fix PPGETTIME/PPSETTIME ioctls
+ - powerpc: Allow 64bit VDSO __kernel_sync_dicache to work across ranges >4GB
+ - powerpc/xive: Prevent page fault issues in the machine crash handler
+ - powerpc: Allow flush_icache_range to work across ranges >4GB
+ - powerpc/xive: Skip ioremap() of ESB pages for LSI interrupts
+ - video/hdmi: Fix AVI bar unpack
+ - quota: Check that quota is not dirty before release
+ - ext2: check err when partial != NULL
+ - quota: fix livelock in dquot_writeback_dquot
+ - ext4: Fix credit estimate for final inode freeing
+ - reiserfs: fix extended attributes on the root directory
+ - block: fix single range discard merge
+ - scsi: zfcp: trace channel log even for FCP command responses
+ - scsi: qla2xxx: Fix DMA unmap leak
+ - scsi: qla2xxx: Fix session lookup in qlt_abort_work()
+ - scsi: qla2xxx: Fix qla24xx_process_bidir_cmd()
+ - scsi: qla2xxx: Always check the qla2x00_wait_for_hba_online() return value
+ - scsi: qla2xxx: Fix message indicating vectors used by driver
+ - xhci: Fix memory leak in xhci_add_in_port()
+ - xhci: make sure interrupts are restored to correct state
+ - iio: adis16480: Add debugfs_reg_access entry
+ - phy: renesas: rcar-gen3-usb2: Fix sysfs interface of "role"
+ - omap: pdata-quirks: remove openpandora quirks for mmc3 and w11251
+ - lpcf: Cap NPIV vports to 256
+ - scsi: lpcf: Correct code setting non existent bits in sli4 ABORT WQE
+ - drbd: Change drbd_request_detach_interruptible's return type to int
+ - e100: Fix passing zero to 'PTR_ERR' warning in e100_load_ucode_wait
+ - power: supply: cpcap-battery: Fix signed counter sample register
+ - mlxsw: spectrum_router: Refresh nexthop neighbour when it becomes dead
+ - ath10k: fix fw crash by moving chip reset after napi disabled
+ - powerpc: Avoid clang warnings around setjmp and longjmp
+ - powerpc: Fix vDSO clock_getres()
+ - ext4: fix a bug in ext4_wait_for_tail_page_commit
+ - blk-mq: make sure that line break can be printed
+ - workqueue: Fix missing kfree(rescuer) in destroy_workqueue()
+ - sumrpc: fix crash when cache_head become valid before update
+ - net/mlx5e: Fix SFF 8472 eeprom length
+ - gfs2: fix glock reference problem in gfs2_trans_remove_revoke
+ - kernel/module.c: wakeup processes in module_wq on module unload
+ - gpilib: acpi: Add Terra Pad 1061 to the run_edge_events_on_boot_blacklist
+ - raid5: need to set STRIPE_HANDLE for batch head
+ - of: unittest: fix memory leak in attach_node_and_children
+ - scare64: implement ioremap_uc
+ - iwwifi: trans: Clear persistence bit when starting the FW
+ - audit: Embed key into chunk
+ - netfilter: nf_tables: don't use position attribute on rule replacement
+ - ARC: IOC: panic if kernel was started with previously enabled IOC
+ - ARM: dts: exynos: Fix LDO13 min values on Odroid XU3/XU4/HC1
+ - scsi: zfcp: update kernel message for invalid FCP_CMND length, it's not the
  CDB
+ - drivers: soc: Allow building the amlogic drivers without ARCH_MESON
+ - scpt: count sk_wmem_alloc by skb truesize in scpt_packet_transmit
+ - xfs: extent shifting doesn't fully invalidate page cache
+ - iomap: dio data corruption and spurious errors when pipes fill
+ - ravi: Clean up duplex handling
+ - net/ipv6: re-do dad when interface has IFF_NOARP flag change
+ - selftests/powerpc: Allocate base registers
+ - 12fs: fix to account preflush command for noflush_merge mode
+ - nvme: Free ctrl device name on init failure
+ - gpu: host1x: Fix syncpoint ID field size on Tegra186
+ - ARM: dts: sun4i: Fix gpio-keys warning
+ - ARM: dts: sun4i: Fix HDMI output DTC warning
+ - ARM: dts: sun7i: Fix HDMI output DTC warning
+ - ARM: dts: sun8i: a23/a33: Fix OPP DTC warnings
+ - can: xilinx: fix return type of ndo_start_xmit function
+ - clk: mediatek: Drop __init from mtk_clk_register_cpumuxes()
+ - clk: mediatek: Drop more __init markings for driver probe
+ - soc: renesas: r8a77970-syclc: Correct names of A2DP/A2CN power domains
+ - tcp: make tcp_space() aware of socket backlog
+ - clk: meson: meson8b: fix the offset of vid_pll_dco's N value
+ - media: uvcvideo: Abstract streaming object lifetime
+ - clk: renesas: rear-gen3: Set state when registering SD clocks
+ - x86/mm/32: Sync only to VMALLOC_END in vmalloc_sync_all()
+ - crypto: atmel-aes - Fix IV handling when req->nbytes < ivsize
+ - binder: Fix race between mmap() and binder_alloc_print_pages()
+ - perf script: Fix invalid LBR/binary mismatch error
+ - splice: don't read more than available pipe space
+ - iomap: partially revert 4721a601099 (simulated directio short read on
  EFAULT)
+ - xfs: add missing error check in xfs_prepare_shift()
- Btrfs: fix metadata space leak on fixup worker failure to set range as delalloc
- btrfs: Avoid getting stuck during cyclic writebacks
- md: improve handling of bio with REQ_PREFLUSH in md_flush_request()
- pinctrl: armada-37xx: Fix irq mask access in armada_37xx_irq_set_type()
- pinctrl: samsung: Fix device node refcount leaks in Exynos wakeup controller
- init
- scsi: lpfc: Correct topology type reporting on G7 adapters
- pvcalls-front: don't return error when the ring is full
- net: hns3: clear pci private data when unload hns3 driver
- net: hns3: change hnae3_register_ae_dev() to int
- net: hns3: Check variable is valid before assigning it to another
- scsi: hisi_sas: send primitive NOTIFY to SSP situation only
- scsi: hisi_sas: Reject setting programmed minimum linkrate > 1.5G
- regulator: 88pm800: fix warning same module names
- rtc: disable uie before setting time and enable after
- splice: only read in as much information as there is pipe buffer space
- s390/smp,vdso: fix ASCE handling
- PCI: rcar: Fix missing MACCTRL register setting in initialization sequence
- of: overlay: add_changeset_property() memory leak
- scsi: qla2xxx: Change discovery state before PLOGI

* Realtek ALC256M with DTS Audio Processing internal microphone doesn't work on Redmi Book 14 2019 (LP: #1846148) // Bionic update: upstream stable patchset 2019-12-20 (LP: #1857158)
- ALSA: hda/realtek - Enable the headset-mic on a Xiaomi's laptop

* False positive test result in run_afpackettests from net in ubuntu_kernel_selftest (LP: #1825778)
- selftests/net: correct the return value for run_afpackettests

* headphone has noise as not mute on dell machines with alc236/256
  (LP: #1854401)
- SAUCE: ALSA: hda/realtek - Dell headphone has noise on unmute for ALC236

* Bionic update: upstream stable patchset 2019-12-09 (LP: #1855787)
- Revert "KVM: nVMX: reset cache/shadows when switching loaded VMCS"
- clk: meson: gxbb: let sar_adc_clk_div set the parent clock rate
- ASoC: msm8916-wcd-analog: Fix RX1 selection in RDAC2 MUX
- ASoC: compress: fix unsigned integer overflow check
- reset: Fix memory leak in reset_control_array_put()
- ASoC: kirkwood: fix external clock probe defer
- clk: samsung: exynos5420: Preserve PLL configuration during suspend/resume
- reset: fix reset_control_ops kerneldoc comment
- clk: at91: avoid sleeping early
- clk: sunxi-ng: a80: fix the zero'ing of bits 16 and 18
- idr: Fix idr_alloc_u32 on 32-bit systems
- x86/resctrl: Prevent NULL pointer dereference when reading mondata
+ - clk: ti: dra7-atl-clock: Remove ti_clk_add_alias call
+ - net: fec: add missed clk_disable_unprepare in remove
+ - bridge: ebtables: don't crash when using dnat target in output chains
+ - can: peak_usb: report bus recovery as well
+ - can: c_can: D_CAN: c_can_chip_config(): perform a software reset on open
+ - can: rx-offload: can_rx_offload_queue_tail(): fix error handling, avoid skb mem leak
+ - can: rx-offload: can_rx_offload_offload_one(): do not increase the skb_queue beyond skb_queue_len_max
+ - can: rx-offload: can_rx_offload_offload_one(): increment rx_fifo_errors on queue overflow or OOM
+ - can: rx-offload: can_rx_offload_offload_one(): use ERR_PTR() to propagate error value in case of errors
+ - can: rx-offload: can_rx_offload_irq_offload_timestamp(): continue on error
+ - can: rx-offload: can_rx_offload_irq_offload_fifo(): continue on error
+ - watchdog: meson: Fix the wrong value of left time
+ - scripts/gdb: fix debugging modules compiled with hot/cold partitioning
+ - net: bcmgenet: reapply manual settings to the PHY
+ - ceph: return -EINVAL if given fsc mount option on kernel w/o support
+ - mac80211: fix station inactive_time shortly after boot
+ - block: drbd: remove a stray unlock in __drbd_send_protocol()
+ - pwm: bcm-iproc: Prevent unloading the driver module while in use
+ - scsi: lpfc: Fix kernel Oops due to null pring pointers
+ - scsi: lpfc: Fix dif and first burst use in write commands
+ - ARM: dts: Fix up SQ201 flash access
+ - ARM: debug-imx: only define DEBUG_IMX_UART_PORT if needed
+ - [Config] updateconfigs for DEBUG_IMX_UART_PORT
+ - ARM: dts: imx53-voipac-dmm-668: Fix memory node duplication
+ - parisc: Fix serio address output
+ - parisc: Fix HP SDC hpa address output
+ - arm64: mm: Prevent mismatched 52-bit VA support
+ - arm64: smp: Handle errors reported by the firmware
+ - ARM: OMAP1: fix USB configuration for device-only setups
+ - RDMA/vmw_pvrdma: Use atomic memory allocation in create AH
+ - PM / AVS: SmartReflex: NULL check before some freeing functions is not needed
+ - ARM: ks8695: fix section mismatch warning
+ - ACPI / LPSS: Ignore acpi_device_fix_up_power() return value
+ - scsi: lpfc: Enable Management features for IF_TYPE=6
+ - crypto: user - support incremental algorithm dumps
+ - mwifiex: fix potential NULL dereference and use after free
+ - mwifiex: debugfs: correct histogram spacing, formatting
+ - rt818x: fix potential use after free
+ - xfs: require both realtime inodes to mount
+ - ubi: Put MTD device after it is not used
+ - ubi: Do not drop UBI device reference before using
+ - microblaze: adjust the help to the real behavior
+ - microblaze: move "... is ready" messages to arch/microblaze/Makefile
+ - iwlwifi: move iwl_nvm_check_version() into dvm
+ - gpiolib: Fix return value of gpio_to_desc() stub if !GPIOLIB
+ - kvm: vmx: Set IA32_TSC_AUX for legacy mode guests
+ - VSOCK: bind to random port for VMADDR_PORT_ANY
+ - mmc: meson-gx: make sure the descriptor is stopped on errors
+ - mtld: rawnand: sunxi: Write pageprog related opcodes to WCMD_SET
+ - btrfs: only track ref_heads in delayed_ref_updates
+ - HID: intel-std-hid: fixes incorrect error handling
+ - serial: 8250: Rate limit serial port rx interrupts during input overruns
+ - kprobes/x86/xen: blacklist non-attachable xen interrupt functions
+ - xen/pciback: Check dev_data before using it
+ - vfio-mdev/samples: Use u8 instead of char for handle functions
+ - pinctrl: xway: fix gpio-hog related boot issues
+ - net/mlx5: Continue driver initialization despite debugfs failure
+ - exofs_mnt(): fix leaks on failure exits
+ - bnxt_en: Return linux standard errors in bnxt_eth.c
+ - bnxt_en: query force speeds before disabling autoneg mode.
+ - KVM: s390: unregister debug feature on failing arch init
+ - pinctrl: sh-pfc: sh7264: Fix PFCR3 and PFCR0 register configuration
+ - pinctrl: sh-pfc: sh7734: Fix shifted values in IPSR10
+ - HID: doc: fix wrong data structure reference for UHID_OUTPUT
+ - dm flakey: Properly corrupt multi-page bios.
+ - gfs2: take jdata unstuff into account in do_grow
+ - xfs: Align compat attrlist_by_handle with native implementation.
+ - xfs: Fix bulkstat compat ioctl on x32 userspace.
+ - IB/qib: Fix an error code in qib_sdma_verbs_send()
+ - clocksource/drivers/fttmr010: Fix invalid interrupt register access
+ - vxlan: Fix error path in __vxlan_dev_create()
+ - powerpc/book3s/32: fix number of bats in p/v_block_mapped()
+ - powerpc/xmon: fix dump_segments()
+ - drivers/regulator: fix a missing check of return value
+ - Bluetooth: hci_bcm: Handle specific unknown packets after firmware loading
+ - serial: max310x: Fix tx_empty() callback
+ - openisc: Fix broken paths to arch/or32
+ - RDMA/srp: Propagate ib_post_send() failures to the SCSI mid-layer
+ - scsi: qla2xxx: deadlock by configfs_depend_item
+ - scsi: csiostor: fix incorrect dma device in case of vport
+ - ath6kl: Only use match sets when firmware supports it
+ - ath6kl: Fix off by one error in scan completion
+ - powerpc/perf: Fix unit_sel/cache_sel checks
+ - powerpc/prom: fix early DEBUG messages
+ - powerpc/mm: Make NULL pointer deferences explicit on bad page faults.
+ - powerpc/44x/bamboo: Fix PCI range
+ - vfio/spapr_tce: Get rid of possible infinite loop
+ - powerpc/powernv/eeh/npu: Fix uninitialized variables in
  opal_pci_eeh_freeze_status
+ - drbd: ignore "all zero" peer volume sizes in handshake
+ - drbd: reject attach of unsuitable uuids even if connected
+ - drbd: do not block when adjusting "disk-options" while IO is frozen
+ - drbd: fix printk_st_err()'s prototype to match the definition
+ - IB/rxe: Make counters thread safe
+ - regulator: tsps65910: fix a missing check of return value
+ - powerpc/83xx: handle machine check caused by watchdog timer
+ - powerpc/pseries: Fix node leak in update_lmb_associativity_index()
+ - crypto: mxc-scc - fix build warnings on ARM64
+ - pwm: clps711x: Fix period calculation
+ - net/netlink_compat: Fix a missing check of nla_parse_nested
+ - net/net_namespace: Check the return value of register_pernet_subsys()
+ - f2fs: fix to dirty inode synchronously
+ - um: Make GCOV depend on !KCOV
+ - net: (cpts) fix a missing check of clk_prepare
+ - net: stmicro: fix a missing check of clk_prepare
+ - net: dsa: bcm_sf2: Propagate error value from mdio_write
+ - at1le: checking the status of at1le_write_phy_reg
+ - tipc: fix a missing check of genlmsg_put
+ - net/wan/fsl_ucc_hdlc: Avoid double free in ucc_hdlc_probe()
+ - ocfs2: clear journal dirty flag after shutdown journal
+ - vmscan: return NODE_RECLAIM_NOSCAN in node_reclaim() when CONFIG_NUMA is n
+ - lib/genalloc.c: fix allocation of aligned buffer from non-aligned chunk
+ - lib/genalloc.c: use vzalloc_node() to allocate the bitmap
+ - fork: fix some -Wmissing-prototypes warnings
+ - drivers/base/platform.c: kmemleak ignore a known leak
+ - lib/genalloc.c: include vmalloc.h
+ - mtd: Check add_mtd_device() ret code
+ - tipc: fix memory leak in tipc_nl_comapt_publ_dump
+ - net/core/neighbour: tell kmemleak about hash tables
+ - PCI/MSI: Return -ENOSPC from pci_alloc_irq_vectors_affinity()
+ - net/core/neighbour: fix kmemleak minimal reference count for hash tables
+ - serial: 8250: Fix serial8250 initialization crash
+ - gpu: ipu-v3: pre: don’t trigger update if buffer address doesn’t change
+ - sfc: suppress duplicate nvmem partition types in efx_ef10_mtd_probe
+ - ip_tunnel: Make none-tunnel-dst tunnel port work with lwtunnel
+ - decnet: fix DN_IFREQ_SIZE
+ - net/smc: prevent races between smc_lgr_terminate() and smc_conn_free()
+ - blktrace: Show requests without sector
+ - tipc: fix skb may be leaky in tipc_link_input
+ - sfc: initialise found bitmap in efx_ef10_mtd_probe
+ - net: fix possible overflow in __sk_mem_raise_allocated()
+ - scctp: don’t compare hb_timer expire date before starting it
+ - bpf: decrease usercnt if bpf_map_new_fd() fails in bpf_map_get_fd_by_id()
+ - net: dev: Use unsigned integer as an argument to left-shift
+ - kvm: properly check debugfs dentry before using it
+ - bpf: drop refcount if bpf_map_new_fd() fails in map_create()
+ - net: hns3: Change fw error code NOT_EXEC to NOT_SUPPORTED
+ - apparmor: delete the dentry in aafs_remove() to avoid a leak
+ - scsi: libsas: Support SATA PHY connection rate unmatch fixing during
+ - ACPI / APEI: Don’t wait to serialise with oops messages when panic(ing)
+ - ACPI / APEI: Switch estatus pool to use vmalloc memory
+ - scsi: libsas: Check SMP PHY control function result
+ - mtd: Remove a debug trace in mtdpart.c
+ - mm, gup: add missing refcount overflow checks on s390
+ - clk: at91: fix update bit maps on CFG_MOR write
+ - staging: rtl8192e: fix potential use after free
+ - staging: rtl8723bs: Drop ACPI device ids
+ - staging: rtl8723bs: Add 024c:0525 to the list of SDIO device-ids
+ - USB: serial: fdio_sio: add device IDs for U-Blox C099-F9P
+ - mei: bus: prefix device names on bus with the bus name
+ - media: v4l2-ctrl: fix flags for DO_WHITE_BALANCE
+ - net: macb: fix error format in dev_err()
+ - pwm: Clear chip_data in pwm_put()
+ - media: atmel: atmel-isc: fix asd memory allocation
+ - media: atmel: atmel-isc: fix INIT_WORK misplacement
+ - macvlan: schedule bc_work even if error
+ - net: psample: fix skb_over_panic
+ - openvswitch: fix flow command message size
+ - slip: Fix use-after-free Read in slip_open
+ - openvswitch: drop unneeded BUG_ON() in ovs_flow_cmd_build_info()
+ - openvswitch: remove another BUG_ON()
+ - tipc: fix link name length check
+ - scctp: cache netns in sctp_ep_common
+ - ext4: add more paranoia checking in ext4_expand_extra_isize handling
+ - watchdog: sama5d4: fix WDD value to be always set to max
+ - net: macb: Fix SUBNS increment and increase resolution
+ - net: macb driver, check for SKBTX_HW_TSTAMP
+ - mtd: rawnand: atmel: Fix spelling mistake in error message
+ - mtd: rawnand: atmel: fix possible object reference leak
+ - mtd: spi-nor: cast to u64 to avoid uint overflows
+ - y2038: futex: Move compat implementation into futex.c
+ - futex: Prevent robust futex exit race
+ - futex: Move futex exit handling into futex code
+ - futex: Replace PF_EXITPIDONE with a state
+ - exit/exec: Seperate mm_release()
+ - futex: Split futex_mm_release() for exit/exec
+ - futex: Set task::futex_state to DEAD right after handling futex exit
+ - futex: Mark the begin of futex exit explicitly
+ - futex: Sanitize exit state handling
+ - futex: Provide state handling for exec() as well
+ - futex: Add mutex around futex exit
+ - futex: Provide distinct return value when owner is exiting
+ - futex: Prevent exit livelock
+ - HID: core: check whether Usage Page item is after Usage ID items
- crypto: stm32/hash - Fix hmac issue more than 256 bytes
- media: stm32-dcmi: fix DMA corruption when stopping streaming
- hwrng: stm32 - fix unbalanced pm_runtime_enable
- mailbox: mailbox-test: fix null pointer if no mmio
- pinctrl: stm32: fix memory leak issue
- ASoC: stm32: i2s: fix dma configuration
- ASoC: stm32: i2s: fix 16 bit format support
- ASoC: stm32: i2s: fix IRQ clearing
- platform/x86: hp-wmi: Fix ACPI errors caused by too small buffer
- platform/x86: hp-wmi: Fix ACPI errors caused by passing 0 as input size
- net: fec: fix clock count mis-match
- clk: samsung: exynos5433: Fix error paths
- pinctrl: cherryview: Allocate IRQ chip dynamic
- ARM: dts: sun8i-a83t-tbs-a711: Fix WiFi resume from suspend
- samples/bpf: fix build by setting HAVE_ATTR_TEST to zero
- idr: Fix integer overflow in idr_for_each_entry
- can: mcp251x: mcp251x_restart_work_handler(): Fix potential force_quit race
- idr: Fix integer overflow in idr_for_each_entry
- condition
- net: bcmgenet: use RGMII loopback for MAC reset
- RDMA/hns: Fix the bug while use multi-hop of pbl
- s390/crypt: make sysfs reset attribute trigger queue reset
- bcache: do not check if debug dentry is ERR or NULL explicitly on remove
- bcache: do not mark writeback_running too early
- microblaze: fix multiple bugs in arch/microblaze/boot/Makefile
- iwfwifi: pcie: fix erroneous print
- usb: ehci-omap: Fix deferred probe for phy handling
- btrfs: fix ncopies raid_attr for RAID56
- Btrfs: allow clear_extent_dirty() to receive a cached extent state record
- serial: sh-sci: Fix crash in rx_timer_fn() on PIO fallback
- kprobes: Blacklist symbols in arch-defined prohibited area
- kprobes/x86: Show x86-64 specific blacklisted symbols correctly
- memory: omap-gpmc: Get the header of the enum
- netfilter: nf_nat_sip: fix RTP/RTCP source port translations
- bnxt_en: Save ring statistics before reset.
- brcmfmac: Fix access point mode
- powerpc/32: Avoid unsupported flags with clang
- powerpc: Fix HMIs on big-endian with CONFIG_RELOCATABLE=y
- mm/page_alloc.c: free order-0 pages through PCP in page_frag_free()
- mm/page_alloc.c: use a single function to free page
- mm/page_alloc.c: deduplicate __memblock_free_early() and memblock_free()
- infiniband: bnxt_re: qplib: Check the return value of send_message
- infiniband/qedr: Potential null ptr dereference of qp
- firmware: arm_sdei: fix wrong of_node_put() in init function
- firmware: arm_sdei: Fix DT platform device creation
- ata: ahci: mvebu: do Armada 38x configuration only on relevant SoCs
- net/smcc: don't wait for send buffer space when data was already sent
- mm/hotplug: invalid PFNs from pfn_to_online_page()
- ASoC: samsung: i2s: Fix prescaler setting for the secondary DAI
+  - geneve: change NET_UDP_TUNNEL dependency to select
+  - mmc: core: align max segment size with logical block size
+  - net: hns3: fix PFC not setting problem for DCB module
+  - net: hns3: fix an issue for hclgev_f_ae_get_hdev
+  - net: hns3: fix an issue for hns3_update_new_intGl
+  - scsi: hisi_sas: shutdown axi bus to avoid exception CQ returned
+  - RDMA/hns: Bugfix for the scene without receiver queue
+  - RDMA/hns: Fix the state of rereg mr
+  - thunderbolt: Power cycle the router if NVM authentication fails
+  - tcp: exit if nothing to retransmit on RTO timeout
+
+ * Bionic update: upstream stable patchset 2019-12-03 (LP: #1854975)
+  - net/mlx4_en: fix mlx4 ethtool -N insertion
+  - net: rtnetlink: prevent underflows in do_setvfinfo()
+  - sfc: Only cancel the PPS workqueue if it exists
+  - net/mlx5e: Fix set vf link state error flow
+  - net/mlx7fw: Verify FSM error code translation doesn’t exceed array size
+  - net/sched: act_pedit: fix WARN() in the traffic path
+  - vhost/vsock: split packets to send using multiple buffers
+  - gpio: max77620: Fixup debounce delays
+  - tools: gpio: Correctly add make dependencies for gpio_utils
+  - nbd: fix memory leak in nbd_get_socket()
+  - virtio_console: allocate inbufs in add_port() only if it is needed
+  - Revert "fs: cofs2: fix possible null-pointer dereferences in
cofs2_xa_prepare_entry()"
+  - mm/ksm.c: don't WARN if page is still mapped in remove_stable_node()
+  - drm/i915/userptr: Try to acquire the page lock around set_page_dirty()
+  - platform/x86: asus-nb-wmi: Support ALS on the Zenbook UX430UQ
+  - mwifiex: Fix NL80211_TX_POWER_LIMITED
+  - ALSA: isight: fix leak of reference to firewire unit in error path of .probe
callback
+  - printk: fix integer overflow in setup_log_buf()
+  - gfs2: Fix marking bitmaps non-full
+  - pty: fix compat ioctl
+  - synclink_gt(): fix compat_ioctl()
+  - powerpc: Fix signedness bug in update_flash_db()
+  - powerpc/boot: Disable vector instructions
+  - powerpc/eeh: Fix use of EEH_PE_KEEP on wrong field
+  - EDAC, thunderx: Fix memory leak in thunderx_i2c_threaded_isr()
+  - brcmsmac: AP mode: update beacon when TIM changes
+  - ath10k: allocate small size dma memory in ath10k_pci_diag_write_mem
+  - skd: fixup usage of legacy I0 API
+  - cdrom: don't attempt to fiddle with cdo->capability
+  - spi: sh-msiof: fix deferred probing
+  - mmc: mediatek: fix cannot receive new request when msdc_cmd_is_ready fail
+  - btrfs: handle error of get_old_root
+  - gsmi: Fix bug in append_to_eventlog sysfs handler
+  - misc: mic: fix a DMA pool free failure
+ - w1: IAD Register is yet readable trough iad sys file. Fix snprintf (%u for unsigned, count for max size).
+ - m68k: fix command-line parsing when passed from u-boot
+ - RDMA/bnxr_re: Fix qp async event reporting
+ - pinctrl: sunxi: Fix a memory leak in 'sunxi_pinctrl_build_state()'
+ - pwm: lpss: Only set update bit if we are actually changing the settings
+ - amiflop: clean up on errors during setup
+ - qed: Align local and global PTT to propagate through the APIs.
+ - scsi: ips: fix missing break in switch
+ - KVM: nVMX: reset cache/shadows when switching loaded VMCS
+ - KVM/x86: Fix invvpid and invept register operand size in 64-bit mode
+ - scsi: iscsi: Use proper enumerated type in atapi_d2h_reg_frame_handler
+ - scsi: iscsi: Change sci_controller_start_task's return type to sci_status
+ - scsi: iscsi_tcp: Explicitly cast param in iscsi_sw_tcp_host_get_param
+ - crypto: core - avoid implicit enum conversion
+ - nvme-fcloop: suppress a compiler warning
+ - clk: mmp2: fix the clock id for sdh2_clk and sdh3_clk
+ - clk: at91: audio-pll: fix audio pmc type
+ - ASoC: tegra_sgtl5000: fix device_node refcounting
+ - scsi: dc395x: fix dma API usage in srb_done
+ - scsi: dc395x: fix DMA API usage in sg_update_list
+ - net: dsa: mv88e6xxxx: Fix 88E6141/6341 2500mbps SERDES speed
+ - net: fix warning in af_unix
+ - xfs: fix use-after-free race in xfs_buf_rele
+ - kprobes, x86/ptrace.h: Make regs_get_kernel_stack_nth() not fault on bad stack
+ - PM / Domains: Deal with multiple states but no governor in genpd
+ - ALSA: i2c/cx8427: Fix int to char conversion
+ - macintosh/windfarm_smu_sat: Fix debug output
+ - PCI: vmd: Detach resources after stopping root bus
+ - USB: misc: appledisplay: fix backlight update_status return code
+ - ush: tools: fix atoi() on non-null terminated string
+ - dm raid: avoid bitmap with raid4/5/6 journal device
+ - SUNRPC: Fix a compile warning for cmpxchg64()}
+ - sunrpc: safely reallow resvport min/max inversion
+ - atm: zatm: Fix empty body Clang warnings
+ - s390/perf: Return error when debug_register fails
+ - spi: omap2-mcspi: Set FIFO DMA trigger level to word length
+ - sparc: Fix parport build warnings.
+ - powerpc/pseries: Export raw per-CPU VPA data via debugfs
+ - ceph: fix dentry leak in ceph_readdir_prepopulate
+ - rtc: s35390a: Change buf's type to u8 in s35390a_init
+ - f2fs: fix to spread clear_cold_data()
+ - mISDN: Fix type of switch control variable in ctrl_teimanager
+ - qlcnic: fix a return in qlcnic_dcb_get_capability()
+ - net: ethernet: ti: csbw: unsync mcast entries while switch promise mode
+ - mfd: arizona: Correct calling of runtime_put_sync
+ - mfd: mc13xxx-core: Fix PMIC shutdown when reading ADC values
+ - mfd: intel_soc_pmic_bxtwc: Chain power button IRQs as well
+ - mfd: max8997: Enable irq-wakeup unconditionally
+ - selftests/trace: Fix to test kprobe $comm arg only if available
+ - selftests: watchdog: fix message when /dev/watchdog open fails
+ - selftests: watchdog: Fix error message.
+ - thermal: rcar_thermal: Prevent hardware access during system suspend
+ - bpf: devmap: fix wrong interface selection in notifier_call
+ - powerpc/process: Fix flush_all_to_thread for SPE
+ - sparc64: lib: use C string functions with KASAN enabled
+ - fs/ocfs2/dlm/dlmdebug.c: fix a sleep-in-atomic-context bug in
dlm_print_one_mle()
+ - mm/page-writeback.c: fix range_cyclic writeback vs writepages deadlock
+ - macsec: update operstate when lower device changes
+ - macsec: let the administrator set UP state even if lowerdev is down
+ - block: fix the DISCARD request merge
+ - i2c: uniphier-f: make driver robust against concurrency
+ - i2c: uniphier-f: fix occasional timeout error
+ - i2c: uniphier-f: fix race condition when IRQ is cleared
+ - um: Make line/tty semantics use true write IRQ
+ - vfs: avoid problematic remapping requests into partial EOF block
+ - powerpc/xmon: Relax frame size for clang
+ - selftests/powerpc/signal: Fix out-of-tree build
+ - selftests/powerpc/switch_endian: Fix out-of-tree build
+ - linux/bitmap.h: handle constant zero-size bitmaps correctly
+ - linux/bitmap.h: fix type of nbits in bitmap_shift_right()
+ - hfsplus: fix BUG on bnode parent update
+ - hfs: fix BUG on bnode parent update
+ - hfsplus: prevent btree data loss on ENOSPC
+ - hfs: prevent btree data loss on ENOSPC
+ - hfsplus: fix return value of hfsplus_get_block()
+ - hfs: fix return value of hfs_get_block()
+ - hfsplus: update timestamps on truncate()
+ - hfs: update timestamp on truncate()
+ - fs/hfs/extent.c: fix array out of bounds read of array extent
+ - mm/memory_hotplug: make add_memory() take the device_hotplug_lock
+ - ighb: shorten maximum PHC timecounter update interval
+ - ntbd_netdev: fix sleep time mismatch
+ - ntbd: intel: fix return value for ndev_vec_mask()
+ - arm64: makefile fix build of .i file in external module case
+ - ocfs2: don't put and assigning null to bh allocated outside
+ - ocfs2: fix clusters leak in ocfs2_defrag_extent()
+ - net: do not abort bulk send on BQL status
+ - sched/topology: Fix off by one bug
+ - sched/fair: Don't increase sd->balance_interval on newidle balance
+ - openvswitch: fix linking without CONFIG_NF_CONNTRACK_LABELS
+ - clk: sunxi-ng: enable so-said LDOs for A64 SoC's pll-mipi clock
+ - audit: print empty EXECVE args
+ - btrfs: avoid link error with CONFIG_NO_AUTO_INLINE
+ - wil6210: fix locking in wmi_call
+ - wlc: Fix the return value in case of error in
+   'wlc_vendor_cmd_smart_config_start()'
+ - rtl8xxxu: Fix missing break in switch
+ - brcmsmac: never log "tid x is not agg'able" by default
+ - wireless: airo: potential buffer overflow in sprintf()
+ - rtlwifi: rtl8192de: Fix misleading REG_MCUFWDL information
+ - net: dsa: bcm_sf2: Turn on PHY to allow successful registration
+ - scsi: mpt3sas: Fix Sync cache command failure during driver unload
+ - scsi: mpt3sas: Don't modify EEDPTagMode field setting on SAS3.5 HBA devices
+ - scsi: mpt3sas: Fix driver modifying persistent data in Manufacturing page11
+ - scsi: megaraid_sas: Fix msleep granularity
+ - scsi: megaraid_sas: Fix goto labels in error handling
+ - scsi: lpfc: fcoe: Fix link down issue after 1000+ link bounces
+ - scsi: lpfc: Correct loss of fc4 type on remote port address change
+ - dlm: fix invalid free
+ - dlm: don't leak kernel pointer to userspace
+ - vrf: mark skb for multicast or link-local as enslaved to VRF
+ - ACPICA: Use %d for signed int print formatting instead of %u
+ - net: bcmgenet: return correct value 'ret' from bcmgenet_power_down
+ - of: unittest: allow base devicetree to have symbol metadata
+ - cfg80211: Prevent regulatory restore during STA disconnect in concurrent
   interfaces
+ - pinctrl: qcom: spmi-gpio: fix gpio-hog related boot issues
+ - pinctrl: lp1c18xx: Use define directive for PIN_CONFIG_GPIO_PIN_INT
+ - pinctrl: zynq: Use define directive for PIN_CONFIG_IO_STANDARD
+ - PCI: keystone: Use quirk to limit MRRS for K2G
+ - spi: omap2-mcspi: Fix DMA and FIFO event trigger size mismatch
+ - i2c: uniphier-f: fix timeout error after reading 8 bytes
+ - mm/memory_hotplug: Do not unlock when fails to take the device_hotplug_lock
+ - ipv6: Fix handling of LLA with VRF and sockets bound to VRF
+ - cfg80211: call disconnect_wk when AP stops
+ - Bluetooth: Fix invalid-free in bscp_close()
+ - KVM: MMU: Do not treat ZONE_DEVICE pages as being reserved
+ - ath10k: Fix a NULL-ptr-deref bug in ath10k_usb_alloc_urb_from_pipe
+ - ath9k_hw: fix uninitialized variable data
+ - md/raid10: prevent access of uninitialized resync_pages offset
+ - mm/memory_hotplug: don't access uninitialized memmmaps in shrink_zone_span()
+ - net: phy: dp83867: fix speed 10 in sgmmi mode
+ - net: phy: dp83867: increase SGMII autoneg timer duration
+ - cpufreq: Skip cpufreq resume if it's not suspended
+ - ocfs2: remove ocfs2_is_o2cb_active()
+ - ARM: 8904/1: skip nomap memblocks while finding the lowmem/highmem boundary
+ - ARC: perf: Accommodate big-endian CPU
+ - x86/insn: Fix awk regexp warnings
+ - x86/speculation: Fix incorrect MDS/TAAP mitigation status
+ - x86/speculation: Fix redundant MDS mitigation message
+ - nbd: prevent memory leak
+ - nfc: port100: handle command failure cleanly
+ - media: vivid: Set vid_cap_streaming and vid_out_streaming to true
+ - media: vivid: Fix wrong locking that causes race conditions on streaming
+ - media: usbvision: Fix races among open, close, and disconnect
+ - cpufreq: Add NULL checks to show() and store() methods of cpufreq
+ - media: uvcvideo: Fix error path in control parsing failure
+ - media: b2c2-flexcop-usb: add sanity checking
+ - media: cxusb: detect cxusb_ctrl_msg error in query
+ - media: imon: invalid dereference in imon_touch_event
+ - virtio_ring: fix return code on DMA mapping fails
+ - usbip: tools: fix fd leakage in the function of read_attr_usbip_status
+ - usbip: Fix uninitialized symbol 'nents' in stub_recv_cmd_submit()
+ - USB: chaoskey: fix error case of a timeout
+ - appledisplay: fix remote wakeup
+ - USB: serial: mos7720: fix remote wakeup
+ - USB: serial: mos7840: fix remote wakeup
+ - USB: serial: option: add support for DW5821e with eSIM support
+ - USB: serial: option: add support for Foxconn T77W968 LTE modules
+ - staging: comedi: usbduxfast: usbduxfast_ai_cmdtest rounding error
+ - x86/hyperv: mark hyperv_init as __init function
+ - mlxsw: spectrum_router: Fix determining underlay for a GRE tunnel
+ - net/mlx4_en: Fix wrong limitation for number of TX rings
+ - net/mlx5: Fix auto group size calculation
+ - printk: lock/unlock console only for new logbuf entries
+ - powerpc/boot: Fix opal console in boot wrapper
+ - mmc: mediatek: fill the actual clock for mmc debugfs
+ - btrfs: defrag: use btrfs_mod_outstanding_extents in cluster_pages_for_defrag
+ - nvme-pci: fix hot removal during error handling
+ - PCI: mediatek: Fixup MSI enablement logic by enabling MSI before clocks
+ - swiotlb: do not panic on mapping failures
+ - powerpc/mm/radix: Fix off-by-one in split mapping logic
+ - powerpc/mm/radix: Fix overuse of small pages in splitting logic
+ - powerpc/mm/radix: Fix small page at boundary when splitting
+ - tools: bpftool: fix completion for "bpftool map update"
+ - ceph: only allow punch hole mode in fallback
+ - RISC-V: Avoid corrupting the upper 32-bit of phys_addr_t in ioremap
+ - f2fs: spread f2fs_set_inode_flags()
+ - linux: netio: Stop PHY before resetting netsec
+ - tools/testing/selftests/vm/gup_benchmark.c: fix 'write' flag usage
+ - mm: thp: fix MADV_DONTNEED vs migrate_misplaced_transhuge_page race
+ - condition
+ - ipv4/igmp: fix v1/v2 switchback timeout based on RFC3376, 8.12
+ - mm/gup_benchmark.c: prevent integer overflow in ioctl
+ - lib/bitmap.c: fix remaining space computation in bitmap_print_to_pagebuf
+ - kernel/panic.c: do not append newline to the stack protector panic string
+ - mm/memory_hotplug: fix online/offline_pages called w.o. mem_hotplug_lock
+ - fm10k: ensure completer aborts are marked as non-fatal after a resume
+ - irq/matrix: Fix memory overallocation
+ - nvme-pci: fix conflicting p2p resource adds
+ - mm: handle no memcg case in memcg_kmem_charge() properly
+ - ofcs2: without quota support, avoid calling quota recovery
+ - soc: bcm: brcmstb: Fix re-entry point with a THUMB2_KERNEL
+ - media: ov13858: Check for possible null pointer
+ - w16210: fix debugfs memory access alignment
+ - ssci: lpfc: Fix odd recovery in duplicate FLOGIs in point-to-point
+ - usb: typec: tcpm: charge current handling for sink during hard reset
+ - clk: tegra20: Turn EMC clock gate into divider
+ - of: unitest: initialize args before calling of_*parse_*()
+ - tools: bpftool: pass an argument to silence open_obj_pinned()
+ - nvme-pci: fix surprise removal
+ - mm/page_io.c: do not free shared swap slots
+ - PM / devfreq: Fix kernel oops on governor module load
+
+ * Miscellaneous Ubuntu changes
+ - update dkms package versions
+
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Fri, 31 Jan 2020 14:22:28 -0300
+
+linux (4.15.0-76.86) bionic; urgency=medium
+ *
+ * bionic/linux: 4.15.0-76.86 -proposed tracker (LP: #1860123)
+ *
+ * Integrate Intel SGX driver into linux-azure (LP: #1844245)
+ - [Packaging] Add systemd service to load intel_sgx
+ *
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Fri, 17 Jan 2020 10:59:22 -0300
+
+linux (4.15.0-75.85) bionic; urgency=medium
+ *
+ * bionic/linux: 4.15.0-75.85 -proposed tracker (LP: #1859705)
+ *
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Fri, 17 Jan 2020 10:59:22 -0300
+
- drm/i915/gen9: Clear residual context state on context switch
- * PAN is broken for execute-only user mappings on ARMv8 (LP: #1858815)
- arm64: Revert support for execute-only user mappings
- * [Regression] usb usb2-port2: Cannot enable. Maybe the USB cable is bad? (LP: #1856608)
- SAUCE: Revert "usb: handle warm-reset port requests on hub resume"
- * Miscellaneous Ubuntu changes
  - update dkms package versions
- -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Tue, 14 Jan 2020 19:07:38 -0300
  +linux (4.15.0-74.84) bionic; urgency=medium
- + bionic/linux: 4.15.0-74.84 -proposed tracker (LP: #1856749)
- * [Hyper-V] KVP daemon fails to start on first boot of disco VM (LP: #1820063)
- [Packaging] bind hv_kvp_daemon startup to hv_kvp device
- * Unrevert "arm64: Use firmware to detect CPUs that are not affected by Spectre-v2" (LP: #1854207)
- arm64: Get rid of __smccc_workaround_1_hvc_ *
- arm64: Use firmware to detect CPUs that are not affected by Spectre-v2
- * Bionic kernel panic on Cavium ThunderX CN88XX (LP: #1853485)
- irqchip/gic-v3-its: Add missing return value in its_irq_domain_activate()
- -- Khalid Elmously <khalid.elmously@canonical.com> Wed, 18 Dec 2019 17:20:22 -0500
  +linux (4.15.0-73.82) bionic; urgency=medium
- + bionic/linux: 4.15.0-73.82 -proposed tracker (LP: #1854819)
- * CVE-2019-14901
- SAUCE: mwifiex: Fix heap overflow in mmwifiex_process_tdls_action_frame()
- SAUCE: libertas: Fix two buffer overflows at parsing bss descriptor
- * CVE-2019-14895
- SAUCE: mwifiex: fix possible heap overflow in mwifiex_process_country_ie()
- powerpc/64s: support nospectre_v2 cmdline option
- powerpc/book3s64: Fix link stack flush on context switch
+ - KVM: PPC: Book3S HV: Flush link stack on guest exit to host kernel
+ + * Please add patch fixing RK818 ID detection (LP: #1853192)
+ + - SAUCE: mfd: rk808: Fix RK818 ID template
+ + * [SRU]B/OEM-B/OEM-OSP1/D] Enable new Elan touchpads which are not in current
+ + whitelist (LP: #1853246)
+ + - HID: quirks: Fix keyboard + touchpad on Lenovo Miix 630
+ + - Input: elan_i2c - export the device id whitelist
+ + - HID: quirks: Refactor ELAN 400 and 401 handling
+ + * Lenovo dock MAC Address pass through doesn't work in Ubuntu (LP: #1827961)
+ + - r8152: Add macpassthru support for ThinkPad Thunderbolt 3 Dock Gen 2
+ + * s390/dasd: reduce the default queue depth and nr of hardware queues
+ + (LP: #1852257)
+ + - s390/dasd: reduce the default queue depth and nr of hardware queues
+ + * External microphone can't work on some dell machines with the codec alc256
+ + or alc236 (LP: #1853791)
+ + - SAUCE: ALSA: hda/realkte - Move some alc256 pintbls to fallback table
+ + - SAUCE: ALSA: hda/realkte - Move some alc236 pintbls to fallback table
+ + * Memory leak in net/xfrm/xfrm_state.c - 8 pages per ipsec connection
+ + (LP: #1853197)
+ + - xfrm: Fix memleak on xfrm state destroy
+ + * CVE-2019-19083
+ + - drm/amd/display: memory leak
+ + * update ENA driver for DIMLIB dynamic interrupt moderation (LP: #1853180)
+ + - net: ena: add intr_modern_rx_interval to struct ena_com_dev and use it
+ + - net: ena: switch to dim algorithm for rx adaptive interrupt moderation
+ + - net: ena: reimplemnet set/get_coalesce()
+ + - net: ena: enable the interrupt_modernation in driver_supported_features
+ + - net: ena: remove code duplication in
+ + ena_com_update_nonadaptive_moderation_interval_*(
+ + - net: ena: remove old adaptive interrupt moderation code from ena_netdev
+ + - net: ena: remove ena_restore_ethtool_params() and relevant fields
+ + - net: ena: remove all old adaptive rx interrupt moderation code from ena_com
+ + - net: ena: fix update of interrupt moderation register
+ + - net: ena: fix retrieval of nonadaptive interrupt moderation intervals
+ + - net: ena: fix incorrect update of intr_delay_resolution
+ + - net: ena: Select DIMLIB for ENA_ETHERNET
+ + - SAUCE: net: ena: fix issues in setting interrupt moderation params in
+ + ethtool
+ + - SAUCE: net: ena: fix too long default tx interrupt moderation interval
+ +
+ * CONFIG_ARCH_ROCKCHIP is not set in ubuntu 18.04 aarch64.arm64 (LP: #1825222)
+ - [Config] Enable ROCKCHIP support for arm64
+
+ * backport DIMLIB (lib/dim/) to pre-5.2 kernels (LP: #1852637)
+ - include/linux/bitops.h: introduce BITS_PER_TYPE
+ - [Config] enable DIMLIB
+ - linux/dim: import DIMLIB (lib/dim/)
+ - SAUCE: linux/dim: avoid library object filename clash
+
+ * The alsihda driver is not loaded due to the missing of PCIID for Comet Lake-S [8086:a3f0] (LP: #1852070)
+ - SAUCE: ALSA: hda: Add Cometlake-S PCI ID
+
+ * Can't adjust brightness on DELL UHD dGPU AIO (LP: #1813877)
+ - SAUCE: platform/x86: dell-uart-backlight: add missing status command
+ - SAUCE: platform/x86: dell-uart-backlight: load driver by scalar status
+ - SAUCE: platform/x86: dell-uart-backlight: add force parameter
+ - SAUCE: platform/x86: dell-uart-backlight: add quirk for old platforms
+
+ * Enable framebuffer fonts auto selection for HighDPI screen (LP: #1851623)
+ - fonts: Fix coding style
+ - fonts: Prefer a bigger font for high resolution screens
+
+ * Disable unreliable HPET on CFL-H system (LP: #1852216)
+ - SAUCE: x86/intel: Disable HPET on Intel Coffe Lake H platforms
+
+ * i40e: Setting VF MAC address causes General Protection Fault (LP: #1852432)
+ - i40e: Fix crash caused by stress setting of VF MAC addresses
+
+ * Bionic update: upstream stable patchset 2019-11-27 (LP: #1854216)
+ - spi: mediatek: use correct mata->xfer_len when in fifo transfer
+ - tee: optee: add missing of_node_put after of_device_is_available
+ - net: cdc_ncm: Signedness bug in cdc_ncm_set_dgram_size()
+ - i2c: Fix i2c_get_next race with i2c_remove
+ - mm/memory_hotplug: don't access uninitialized memmaps in shrink_pgdat_span()
+ - mm/memory_hotplug: fix updating the node span
+ - arm64: success: Ensure PAN is re-enabled after unhandled uaccess fault
+ - fbdev: Ditch fb_edid_add_monspecs
+ - net: ovs: fix return type of ndo_start_xmit function
+ - net: xen-netback: fix return type of ndo_start_xmit function
+ - ARM: dts: dra7: Enable workaround for errata i870 in PCIe host mode
+ - ARM: dts: omap5: enable OTG role for DWC3 controller
+ - f2fs: return correct errno in f2fs_gc
+ - ARM: dts: sun8i: h3-h5: ir register size should be the whole memory block
+ - SUNRPC: Fix priority queue fairness
+ - IB/hfi1: Ensure ucast_dlid access doesn't exceed bounds
+ - kvm: arm/arm64: Fix stage2_flush_mems lor 4 level page table
+ - arm64/numa: Report correct memblock range for the dummy node
+ - ath10k: fix vdev-start timeout on error
+ - ata: ahci_brcm: Allow using driver or DSL SoCs
+ - ath9k: fix reporting calculated new FFT upper max
+ - usb: gadget: udc: fotg210-udc: Fix a sleep-in-atomic-context bug in
+  fotg210_get_status()
+ - usb: dwc3: gadget: Check ENBLSLPM before sending ep command
+ - nl80211: Fix a GET_KEY reply attribute
+ - irqchip/irq-mvebu-icu: Fix wrong private data retrieval
+ - watchdog: w83627hf_wdt: Support NCT6796D, NCT6797D, NCT6798D
+ - KVM: PPC: Inform the userspace about TCE update failures
+ - dmaengine: ep93xx: Return proper enum in ep93xx_dma_chan_direction
+ - dmaengine: timb_dma: Use proper enum in td_prep_slave_sg
+ - ext4: fix build error when DX_DEBUG is defined
+ - clk: keystone: Enable TISCI clocks if K3_ARCH
+ - sunrpc: Fix connect metrics
+ - mei: samples: fix a signedness bug in amt_host_if_call()
+ - cxgb4: Use proper enum in cxgb4_dcb_handle_rw_update
+ - cxgb4: Use proper enum in IEEE_FAUX_SYNC
+ - powerpc/pseries: Fix DTL buffer registration
+ - powerpc/pseries: Fix how we iterate over the DTL entries
+ - powerpc/xive: Move a dereference below a NULL test
+ - ARM: dts: at91: sama5d4_xplained: fix addressable nand flash size
+ - ARM: dts: at91: at91sam9x5cm: fix addressable nand flash size
+ - mtd: rawnand: sh_flect: Use proper enum for flect_dma_fifo0_transfer
+ - PM / hibernate: Check the success of generating md5 digest before
  hibernation
+ - tools: PCI: Fix compilation warnings
+ - clocksource/drivers/sh_cmt: Fixup for 64-bit machines
+ - clocksource/drivers/sh_cmt: Fix clocksource width for 32-bit machines
+ - md: allow metadata updates while suspending an array - fix
+ - ixgbe: Fix ixgbe TX hangs with XDP_TX beyond queue limit
+ - i40e: Use proper enum in i40e_ndo_set_vf_link_state
+ - ixgbe: Fix crash with VFs and flow director on interface flap
+ - IB/mthca: Fix error return code in __mthca_init_one()
+ - IB/mlx4: Avoid implicit enumerated type conversion
+ - ACPICA: Never run _REG on system_memory and system_IO
+ - powerpc/time: Use clockevents_register_device(), fixing an issue with large
  decrementer
+ - ata: ep93xx: Use proper enums for directions
+ - media: rc: ir-rc6-decoder: enable toggle bit for Kathrein RCU-676 remote
+ - media: pxa_camera: Fix check for pdev->dev.of_node
+ - media: i2c: adv748x: Support probing a single output
+ - ALSA: hda/sigmatel - Disable automute for Elo VuPoint
+ - KVM: PPC: Book3S PR: Exiting split hack mode needs to fixup both PC and LR
+ - USB: serial: cypress_m8: fix interrupt-out transfer length
+ - mtd: phyomap_of: Release resources on error
+ - cpu/SMT: State SMT is disabled even with nosmt and without "+force"
+ - brcmfmac: reduce timeout for action frame scan
+ - brcmfmac: fix full timeout waiting for action frame on-channel tx
+ - qtnfmac: drop error reports for out-of-bounds key indexes
+ - clk: samsung: exynos5420: Define CLK_SECKEY gate clock only or Exynos5420
+ - clk: samsung: Use clk_hw API for calling clk framework from clk notifiers
+ - i2c: brcmstb: Allow enabling the driver on DSL SoCs
+ - NFSv4.x: fix lock recovery during delegation recall
+ - dmaengine: ioat: fix prototype of ioatEnumerateChannels
+ - media: ccc-gpio: select correct Signal Free Time
+ - Input: st1232 - set INPUT_PROP_DIRECT property
+ - Input: silead - try firmware reload after unsuccessful resume
+ - remoteproc: Check for NULL firmwares in sysfs interface
+ - kexec: Allocate decrypted control pages for kdump if SME is enabled
+ - x86/olpc: Fix build error with CONFIG_MFD_CS5535=m
+ - dmaengine: rcar-dmac: set scatter/gather max segment size
+ - crypto: mxc-dcp - Fix SHA null hashes and output length
+ - crypto: mxs-dcp - Fix AES issues
+ - xfrm: use correct size to initialise sp->ovec
+ - ACPI / SBS: Fix rare oops when removing modules
+ - iwliwifi: mvm: don't send keys when entering D3
+ - x86/fsgsbase/64: Fix ptrace() to read the FS/GS base accurately
+ - mmc: tmio: Fix SCC error detection
+ - fbdev: sbuslib: use checked version of put_user()
+ - fbdev: sbuslib: integer overflow in sbusfb_ioctl_helper()
+ - reset: Fix potential use-after-free in __of_reset_control_get()
+ - bcache: recal cached_dev_sectors on detach
+ - media: dw9714: Fix error handling in probe function
+ - s390/kasan: avoid vdso instrumentation
+ - proc/vmcore: Fix i386 build error of missing copyOldmem_page_encrypted()
+ - backlight: lm3639: Unconditionally call led_classdev_unregister
+ - mfd: ti_am335x_tscadc: Keep ADC interface on if child is wakeup capable
+ - printk: Give error on attempt to set log buffer length to over 2G
+ - media: isif: fix a NULL pointer dereference bug
+ - GFS2: Flush the GFS2 delete workqueue before stopping the kernel threads
+ - media: cx231xx: fix potential sign-extension overflow on large shift
+ - x86/kexec: Correct KEXEC_BACKUP_SRC_END off-by-one error
+ - gpio: syscon: Fix possible NULL ptr usage
+ - spi: fsl-lpspi: Prevent FIFO under/overrun by default
+ - pinctrl: gemini: Mask and set properly
+ - spi: spidev: Fix OF tree warning logic
+ - ARM: 8802/1: Call syscall_trace_exit even when system call skipped
+ - orangefs: rate limit the client not running info message
+ - pinctrl: gemini: Fix up TVC clock group
+ - hwmon: (pwm-fan) Silence error on probe deferral
+ - hwmon: (ina3221) Fix INA3221_CONFIG_MODE macros
+ - netfilter: nft_compat: do not dump private area
+ - misc: cxl: Fix possible null pointer dereference
+ - mac80211: minstrel: fix using short preamble CCK rates on HT clients
- mac80211: minstrel: fix CCK rate group streams value
- mac80211: minstrel: fix sampling/reporting of CCK rates in HT mode
- spi: rockchip: initialize dma_slave_config properly
- mlxsw: spectrum_switchdev: Check notification relevance based on upper device
- ARM: dts: omap5: Fix dual-role mode on Super-Speed port
- tools: PCI: Fix broken pcitest compilation
- powerpc/time: Fix clockevent_decrementer initialisation for PR KVM
- mmc: tmio: fix SCC error handling to avoid false positive CRC error
- ARM: dts: sun8i: h3: bpi-m2-plus: Fix address for external RGMII Ethernet
- PHY
- tcp: up initial rmem to 128KB and SYN rwin to around 64KB
- ACPI / LPSS: Resume BYT/CHT I2C controllers from resume_noirq
- f2fs: keep lazytime on remount
- IB/hfi1: Error path MAD response size is incorrect
- PM / devfreq: Fix devfreq_add_device() when drivers are built as modules.
- PM / devfreq: Fix handling of min/max_freq == 0
- PM / devfreq: stopping the governor before device_unregister()
- watchdog: core: fix null pointer dereference when releasing cdev
- watchdog: renesas_wdt: stop when unregistering
- watchdog: sama5d4: fix timeout-sec usage
- printk: Do not miss new messages when replaying the log
- printk: CON_PRINTBUFFER console registration is a bit racy
- ALSA: hda: Fix mismatch for register mask and value in ext controller.
- x86/PCI: Apply VMD's AERSID fixup generically
- IB/rxe: avoid sq memory leak
- RDMA/hns: Bugfix for reserved qp number
- RDMA/hns: Submit bad wr when post send wr exception
- RDMA/hns: Bugfix for CM test
- RDMA/hns: Limit the size of extend sge of sq
- rpmmsg: glink: smem: Support rx peak for size less than 4 bytes
- qed: Avoid implicit enum conversion in qed_ooo_submit_tx_buffers
- clk: samsung: Use NOIIRQ stage for Exynos5433 clocks suspend/resume
- printk: Correct wrong casting
- mmc: renesas_sdhi_internal_dmac: set scatter/gather max segment size
- atmel_lcdfb: support native-mode display-timings
- fdev: fix broken menu dependencies
- bcache: account size of buckets used in uuid write to
- ca->meta_sectors_written
- media: cx18: Don't check for address of video_dev
- lightnvm: pbkl: fix rqd.error return value in pbkl_blk_erase_sync
- scsi: arcmrs: clean up clang warning on extraneous parentheses
- hwmon: (k10temp) Support all Family 15h Model 6xh and Model 7xh processors
- tcp: start receiver buffer autotuning sooner
- ACPI / LPSS: Use acpi_lpsss_* instead of acpi_subsys_* functions for
  hibernate
- PM / devfreq: Fix static checker warning in try_then_request_governor
- x86/resctrl: Fix rdt_find_domain() return value and checks
+ * Bionic update: upstream stable patchset 2019-11-25 (LP: #1853915)
+ - kvm: mmu: Don't read PDPTEs when paging is not enabled
+ - KVM: x86: introduce is_pae_paging
+ - MIPS: BCM63XX: fix switch core reset on BCM6368
+ - scsi: core: Handle drivers which set sg_tablesize to zero
+ - Revert "Input: synaptics-rmi4 - avoid processing unknown IRQs"
+ - ax88172a: fix information leak on short answers
+ - net: usb: qmi_wwan: add support for Foxconn T77W968 LTE modules
+ - slip: Fix memory leak in slip_open error path
+ - ALSA: usb-audio: Fix missing error check at mixer resolution test
+ - ALSA: usb-audio: not submit urb for stopped endpoint
+ - Input: ff-memless - kill timer in destroy()
+ - Input: synaptics-rmi4 - fix video buffer size
+ - Input: synaptics-rmi4 - disable the relative position IRQ in the F12 driver
+ - Input: synaptics-rmi4 - do not consume more data than we have (F11, F12)
+ - Input: synaptics-rmi4 - clear IRQ enables for F54
+ - Input: synaptics-rmi4 - destroy F54 poller workqueue when removing
+ - IB/hfi1: Ensure full Gen3 speed in a Gen4 system
+ - i2c: acpi: Force bus speed to 400KHz if a Silead touchscreen is present
+ - ecryptfs_lookups_interpose(): lower_dentry->d_inode is not stable
+ - ecryptfs_lookups_interpose(): lower_dentry->d_parent is not stable either
+ - iommu/vt-d: Fix QI_DEV_IOTLB_PFSID and QI_DEV_EIOTLB_PFSID macros
+ - mm: memcg: switch to css_tryget() in get_mem_cgroup_from_mm()
+ - mm: hugetlb: switch to css_tryget() in hugetlb_cgroup_charge_cgroup()
+ - mmc: sdhci-of-at91: fix quirk2 overwrite
+ - iio: adc: max9611: explicitly cast gain_selectors
+ - tee: optee: take DT status property into account
+ - ath10k: fix kernel panic by moving pci flush after napi_disable
+ - iio: dac: mcp4922: fix error handling in mcp4922_write_raw
+ - arm64: dts: allwinner: a64: Olinuxino: fix DRAM voltage
+ - arm64: dts: allwinner: a64: NanoPi-A64: Fix DCDC1 voltage
+ - ALSA: pcm: signedness bug in snd_pcm_plug_alloc()
+ - arm64: dts: tegra210-p2180: Correct sdmmc4 vqmmc-supply
+ - ARM: dts: at91/trivial: Fix USART1 definition for at91sam9g45
+ - rtc: rv8803: fix the rv8803 id in the OF table
+ - remoteproc/davinci: Use %zx for formating size_t
+ - extcon: cht-wc: Return from default case to avoid warnings
+ - cfg80211: Avoid regulatory restore when COUNTRY_IE_IGNORE is set
+ - ALSA: seq: Do error checks at creating system ports
+ - ath9k: fix tx99 with monitor mode interface
+ - ath10k: limit available channels via DT iee80211-freq-limit
+ - gfs2: Don't set GFS2_RDF_UPTODATE when the lvb is updated
+ - ASoC: dpcm: Properly initialise hw->rate_max
+ - pinctrl:ingenic: Probe driver at subsys_initcall
+ - MIPS: BCM47XX: Enable USB power on Netgear WNDR3400v3
+ - ARM: dts: exynos: Fix sound in Snow-rev5 Chromebook
+ - liquidio: fix race condition in instruction completion processing
- ARM: dts: exynos: Fix regulators configuration on Peach Pi/Pit Chromebooks
- i40e: use correct length for strncpy
- i40e: hold the rtl lock on clearing interrupt scheme
- i40e: Prevent deleting MAC address from VF when set by PF
- IB/rxe: fixes for rdma read retry
- iwlwifi: don't WARN on trying to dump dead firmware
- iwlwifi: mvm: avoid sending too many BARs
- ARM: dts: pxa: fix the rtc controller
- ARM: dts: pxa: fix power i2c base address
- rt8187: Fix warning generated when strncpy() destination length matches the sixe argument
- soc: imx: gpc: fix PDN delay
- ASoC: rsnd: ssi: Fix issue in dma data address assignment
- net: phy: mscc: read 'vsc8531,vddmac' as an u32
- net: phy: mscc: read 'vsc8531, edge-slowdown' as an u32
- ARM: dts: meson8: fix the clock controller register size
- ARM: dts: meson8b: fix the clock controller register size
- net: lan78xx: Bail out if lan78xx_get_endpoints fails
- ASoC: sgtl5000: avoid division by zero if lo_vag is zero
- ARM: dts: exynos: Disable pull control for S5M8767 PMIC
- ath10k: wmi: disable softirq's while calling ieee80211_rx
- IB/ipoib: Ensure that MTU isn't less than minimum permitted
- RDMA/core: Rate limit MAD error messages
- RDMA/core: Follow correct unregister order between sysfs and cgroup
- mips: txx9: fix iounmap related issue
- ASoC: Intel: hdac_hdmi: Limit sampling rates at dai creation
- of: make PowerMac cache node search conditional on CONFIG_PPC_PMAC
- ARM: dts: omap3-gta04: give spi_lcd node a label so that we can overwrite in other DTS files
- ARM: dts: omap3-gta04: fixes for tvout / venc
- ARM: dts: omap3-gta04: tvout: enable as display1 alias
- ARM: dts: omap3-gta04: fix touchscreen tsc2007
- ARM: dts: omap3-gta04: make NAND partitions compatible with recent U-Boot
- ARM: dts: omap3-gta04: keep vplI2 always on
- sched/debug: Use symbolic names for task state constants
- arm64: dts: rockchip: Fix VCC5V0_HOST_EN on rk3399-sapphire
- dmaengine: dma-jz4780: Don't depend on MACH_JZ4780
- dmaengine: dma-jz4780: Further residue status fix
- EDAC, sb_edac: Return early on ADDRV bit and address type test
- rtc: mt6397: fix possible race condition
- rtc: pl030: fix possible race condition
- ath9k: add back support for using active monitor interfaces for tx99
- IB/hfi1: Missing return value in error path for user sdma
- signal: Always ignore SIGKILL and SIGSTOP sent to the global init
- signal: Properly deliver SIGILL from uprobes
- signal: Properly deliver SIGSEGV from x86 uprobes
- i2fs: fix memory leak of percpu counter in fill_super()
- scsi: qla2xxx: Fix iDMA error
+ - scsi: qla2xxx: Defer chip reset until target mode is enabled
+ - scsi: qla2xxx: Fix dropped srb resource.
+ - scsi: lpfc: Fix errors in log messages.
+ - scsi: sym53c8xx: fix NULL pointer dereference panic in sym_int_sir()
+ - ARM: imx6: register pm_power_off handler if "fsl,pmic-stby-poweroff" is set
+ - scsi: pm80xx: Corrected dma_unmap_sg() parameter
+ - scsi: pm80xx: Fixed system hang issue during kexec boot
+ - kprobes: Don't call BUG_ON() if there is a kprobe in use on free list
+ - Drivers: hv: vmbus: Fix sync per-cpu context initialization
+ - nvmem: core: return error code instead of NULL from nvmem_device_get
+ - media: dt-bindings: adv748x: Fix decimal unit addresses
+ - media: fix: media: pci: meye: validate offset to avoid arbitrary access
+ - media: dvb: fix compat ioctl translation
+ - arm64: dts: meson: librettech: update board model
+ - ALSA: intel8x0m: Register irq handler after register initializations
+ - pinctrl: at91-pio4: fix has_config check in atmel_pctl_dt_subnode_to_map()
+ - llc: avoid blocking in llc_sap_close()
+ - ARM: dts: qcom: ipq4019: fix cpu0's qcom,sa32 reg value
+ - soc: qcom: wnss_ctrl: Avoid string overflow
+ - ARM: dts: socfpga: Fix I2C bus unit-address error
+ - pinctrl: at91: don't use the same irqchip with multiple gpiochips
+ - cxgb4: Fix endianness issue in t4_fwcache()
+ - blok, bfq: do not plug I/O if all queues are weight-raised
+ - arm64: dts: meson: Fix erroneous SPI bus warnings
+ - power: supply: ab8500_fg: silence uninitialized variable warnings
+ - power: reset: at91-poweroff: do not procede if at91_shdwc is allocated
+ - power: supply: max8998-charger: Fix platform data retrieval
+ - component: fix loop condition to call unbind() if bind() fails
+ - kernfs: Fix range checks in kernfs_get_target_path
+ - ip_gre: fix parsing gre header in ipgre_err
+ - ARM: dts: rockchip: Fix erroneous SPI bus dtc warnings on rk3036
+ - ACPI / LPSS: Exclude I2C busses shared with PUNIT from pmc_atom_d3_mask
+ - ath9k: Fix a locking bug in ath9k_add_interface()
+ - s390/qeth: invoke softirqs after napi_schedule()
+ - PCI/ACPI: Correct error message for ASPM disabling
+ - serial: uartps: Fix suspend functionality
+ - serial: samsung: Enable baud clock for UART reset procedure in resume
+ - serial: mxs-auart: Fix potential infinite loop
+ - samples/bpf: fix a compilation failure
+ - spi: mediatek: Don't modify spi_transfer when transfer.
+ - ipmi:DMI: Ignore IPMI SMBIOS entries with a zero base address
+ - net: hns3: fix return type of ndo_start_xmit function
+ - powerpc/iommu: Avoid dereference before pointer check
+ - powerpc/64s/hash: Fix stab_rr off by one initialization
+ - powerpc/pseries: Disable CPU hotplug across migrations
+ - powerpc: Fix duplicate const clang warning in user access code
+ - RDMA/i40iw: Fix incorrect iterator type
+ - libfdt: Ensure INT_MAX is defined in libfdt_env.h
+ - power: supply: twl4030_charger: fix charging current out-of-bounds
+ - power: supply: twl4030_charger: disable eoc interrupt on linear charge
+ - net: toshiba: fix return type of ndo_start_xmit function
+ - net: xilinx: fix return type of ndo_start_xmit function
+ - net: broadcom: fix return type of ndo_start_xmit function
+ - net: amd: fix return type of ndo_start_xmit function
+ - net: sun: fix return type of ndo_start_xmit function
+ - nfp: provide a better warning when ring allocation fails
+ - usb: chipidea: imx: enable OTG overcurrent in case USB subsystem is already started
+ - usb: chipidea: Fix otg event handler
+ - mlxsw: spectrum: Init shaper for TCs 8..15
+ - ARM: dts: am335x-evm: fix number of cpsw
+ - f2fs: fix to recover inode's uid/gid during POR
+ - ARM: dts: ux500: Correct SCU unit address
+ - ARM: dts: ux500: Fix LCDA clock line muxing
+ - ARM: dts: ste: Fix SPI controller node names
+ - spi: pic32: Use proper enum in dmaengine_prep_slave_rg
+ - cpufeature: avoid warning when compiling with clang
+ - crypto: arm/crc32 - avoid warning when compiling with Clang
+ - ARM: dts: marvell: Fix SPI and I2C bus warnings
+ - x86/mce-inject: Reset injection struct after injection
+ - ARM: dts: clearfog: fix sdhci supply property name
+ - bnx2x: Ignore bandwidth attention in single function mode
+ - samples/bpf: fix compilation failure
+ - net: phy: mdio-bcm-unimac: Allow configuring MDIO clock divider
+ - net: micrel: fix return type of ndo_start_xmit function
+ - net: freescale: fix return type of ndo_start_xmit function
+ - x86/CPU: Use correct macros for Cyrix calls
+ - x86/CPU: Change query logic so CPUID is enabled before testing
+ - MIPS: kexec: Relax memory restriction
+ - arm64: dts: rockchip: Fix microSD in rk3399 sapphire board
+ - media: pci: ivtv: Fix a sleep-in-atomic-context bug in ivtv_yuv_init()
+ - media: au0828: Fix incorrect error messages
+ - media: davinci: Fix implicit enum conversion warning
+ - ARM: dts: rockchip: explicitly set vcc_sd0 pin to gpio on rk3188-radxarock
+ - usb: gadget: uvc: configfs: Drop leaked references to config items
+ - usb: gadget: uvc: configfs: Prevent format changes after linking header
+ - i2c: aspeed: fix invalid clock parameters for very large divisors
+ - phy: brcm-sata: allow PHY_BRCM_SATA driver to be built for DSL SoCs
+ - phy: renesas: rcar-gen3-usb2: fix vbus_ctrl for role sysfs
+ - phy: phy-twl4030-usb: fix denied runtime access
+ - usb: gadget: uvc: Factor out video USB request queueing
+ - usb: gadget: uvc: Only halt video streaming endpoint in bulk mode
+ - coresight: Fix handling of sinks
+ - coresight: perf: Fix per cpu path management
+ - coresight: perf: Disable trace path upon source error
+ - coresight: etm4x: Configure EL2 exception level when kernel is running in
+ HYP
+ - coresight: tmc: Fix byte-address alignment for RRP
+ - misc: kgdbts: Fix restrict error
+ - misc: genwqe: should return proper error value.
+ - vfio/pci: Fix potential memory leak in vfio_msi_cap_len
+ - vfio/pci: Mask buggy SR-IOV VF INTx support
+ - scsi: libsas: always unregister the old device if going to discover new
+ - phy: lantiq: Fix compile warning
+ - ARM: dts: tegra30: fix xcvr-setup-use-fuses
+ - ARM: tegra: apalis_t30: fix mmc1 cmd pull-up
+ - ARM: dts: paz00: fix wakeup gpio keycode
+ - net: smsc: fix return type of ndo_start_xmit function
+ - net: faraday: fix return type of ndo_start_xmit function
+ - f2fs: fix to recover inode's project id during POR
+ - f2fs: mark inode dirty explicitly in recover_inode()
+ - EDAC: Raise the maximum number of memory controllers
+ - ARM: dts: realview: Fix SPI controller node names
+ - firmware: dell_rbu: Make payload memory uncacheable
+ - Bluetooth: hci_serdev: clear HCI_UARTPROTO_READY to avoid closing proto
+ - L2CAP: Detect if remote is not able to use the whole MPS
+ - x86/hyperv: Suppress "PCI: Fatal: No config space access function found"
+ - crypto: s5p-sss: Fix Fix argument list alignment
+ - crypto: fix a memory leak in rsa-ks1pad's encryption mode
+ - iwlwifi: dbg: don't crash if the firmware crashes in the middle of a debug
+ - iwlwifi: api: annotate compressed BA notif array sizes
+ - iwlwifi: mvm: Allow TKIP for AP mode
+ - scsi: NCR5380: Clear all unissued commands on host reset
+ - scsi: NCR5380: Have NCR5380_select() return a bool
+ - scsi: NCR5380: Withhold disconnect privilege for REQUEST SENSE
+ - scsi: NCR5380: Use DRIVER_SENSE to indicate valid sense data
+ - scsi: NCR5380: Check for invalid reselection target
+ - scsi: NCR5380: Don't clear busy flag when abort fails
+ - scsi: NCR5380: Don't call dsprintf() following reselection interrupt
+ - scsi: NCR5380: Handle BUS FREE during reselection
+ - scsi: NCR5380: Check for bus reset
+ - arm64: dts: amd: Fix SPI bus warnings
+ - arm64: dts: lg: Fix SPI controller node names
+ - ARM: dts: lpc32xx: Fix SPI controller node names
+ - rtc: armada38x: fix possible race condition
+ - netfilter: masquerade: don't flush all conntracks if only one address
+ - deleted on device
+ - usb: xhci-mtk: fix ISOC error when interval is zero
+ - fuse: use READ_ONCE on congestion_threshold and max_background
+ - IB/iser: Fix possible NULL deref at iser_inv_desc()
+ - net: phy: mdio-bcm-unimac: mark PM functions as __maybe_unused
+ - memfd: Use radix_tree_deref_slot_protected to avoid the warning.
+ - slcan: Fix memory leak in error path
+ - ipmr: Fix skb headroom in ipmr_get_route().
+ - IB/hfi1: Use a common pad buffer for 9B and 16B packets
+ - net: ethernet: dwmac-sun8i: Use the correct function in exit path
+ - mm: mempolicy: fix the wrong return value and potential pages leak of mbind
+ - scsi: bfa: use proper time accessor for stats_reset_time
+ - y2038: make do_gettimeofday() and get_seconds() inline
+ - ARM: dts: rcar: Correct SATA device sizes to 2 MiB
+ - ARM: dts: exynos: Use i2c-gpio for HDMI-DDC on Arndale
+ - ARM: dts: exynos: Fix HDMI-HPD line handling on Arndale
+ - i40evf: Validate the number of queues a PF sends
+ - i40evf: set IFF_UNICAST_FLT flag for the VF
+ - i40evf: cancel workqueue sync for adminq when a VF is removed
+ - IB/rxe: avoid back-to-back retries
+ - brcmfmac: fix wrong strnchr usage
+ - mtd: rawnand: fsl_ifc: check result of SRAM initialization
+ - mtd: rawnand: fsl_ifc: fixup SRAM init for newer ctrl versions
+ - rtnetlink: move type calculation out of loop
+ - udf: Fix crash during mount
+ - sched/debug: Explicitly cast sched_feat() to bool
+ - usb: mtu3: disable vbus rise/fall interrupts of Itssm
+ - dmaengine: at_xdma: remove a stray bottom half unlock
+ - scsi: qla2xxx: Terminate Plogi/PRLI if WWN is 0
+ - scsi: qla2xxx: Fix deadlock between ATIO and HW lock
+ - scsi: qla2xxx: Fix port speed display on chip reset
+ - scsi: lpfc: Correct invalid EQ doorbell write on if_type=6
+ - net: aquantia: fix hw_atl_utils_fw_upload_dwors
+ - ALSA: hda: Fix implicit definition of pci_iomap() on SH
+ - net: bcmgenet: Fix speed selection for reverse MII
+ - arm64: dts: Broadcom: Fix I2C and SPI bus warnings
+ - ARM: dts: bcm: Fix SPI bus warnings
+ - ARM: dts: aspeed: Fix I2C bus warnings
+ - ARM: dts: sunxi: Fix I2C bus warnings
+ - ARM: dts: sun9i: Fix I2C bus warnings
+ - arm64: fix for bad_mode() handler to always result in panic
+ - netfilter: nf_tables: avoid BUG_ON usage
+ - media: vsp1: Fix YCbCr planar formats pitch calculation
+ - PCI: mediatek: Fix unchecked return value
+ - ARM: dts: xilinx: Fix I2C and SPI bus warnings
+ - ipmi_si_pci: fix NULL device in ipmi_si error message
+ - ipmi_si: fix potential integer overflow on large shift
+ - net: cavium: fix return type of ndo_start_xmit function
+ - net: ibm: fix return type of ndo_start_xmit function
+ - selftests/powerpc: Do not fail with reschedule
+ - usb: usbtmc: Fix ioctl USBTMC_IOCTL_ABORT_BULK_OUT
+ - s390/zcrypt: enable AP bus scan without a valid default domain
+ - s390/vdso: avoid 64-bit vdso mapping for compat tasks
+ - brcmsmac: allocate ucode with GFP_KERNEL
- brcsmac: Use kvmalloc() for ucode allocations
- EDAC: Correct DIMM capacity unit symbol
- gpiolib: Fix gpio_direction_* for single direction GPIOs
- arm64: dts: fsl: Fix I2C and SPI bus warnings
- ARM: dts: imx51-zii-rdu1: Fix the rtc compatible string
- I2fs: update i_size after DIO completion
- RDMA: Fix dependencies for rdma_user_mmap_io
- crypto: s5p-sss: Fix race in error handling
- iwllwifi: pcie: gen2: build A-MSDU only for GSO
- iwllwifi: pcie: fit reclaim msg to MAX_MSG_LEN
- usb: usbtmc: uninitialized symbol 'actual' in usbtmc_ioctl_clear
- s390/vdso: correct vdso mapping for compat tasks

* Bionic update: upstream stable patchset 2019-11-21 (LP: #1853519)
- bonding: fix state transition issue in link monitoring
- CDC-NCM: handle incomplete transfer of MTU
- ipv4: Fix table id reference in fib_sync_down_addr
- net: ethernet: octeon_mgmt: Account for second possible VLAN header
- net: fix data-race in neigh_event_send()
- net: qualcomm: rmnet: Fix potential UAF when unregistering
- net: usb: qmi_wwan: add support for DW5821e with eSIM support
- NFC: fdp: fix incorrect free object
- nfc: netlink: fix double device reference drop
- NFC: st21nfca: fix double free
- qede: fix NULL pointer deref in _qede_remove()
- ALSA: timer: Fix incorrectly assigned timer instance
- ALSA: bebob: fix to detect configured source of sampling clock for Focusrite
- Saffire Pro i/o series
- ALSA: hda/ca0132 - Fix possible workqueue stall
- mm: thp: handle page cache THP correctly in PageTransCompoundMap
- mm, vmstat: hide /proc/pagetypeinfo from normal users
- dump_stack: avoid the livelock of the dump_lock
- tools: gpio: Use !building_out_of_srctree to determine srctree
- perf tools: Fix time sorting
- drm/radeon: fix si_enable_smc_cac() failed issue
- HID: wacom: generic: Treat serial number and related fields as unsigned
- arm64: Do not mask out PTE_RDONLY in pte_same()
- ceph: fix use-after-free in __ceph_remove_cap()
- ceph: add missing check in d_revalidate snapdir handling
- iio: adc: stm32-adc: fix stopping dma
- iio: imu: adis16480: make sure provided frequency is positive
- iio: srfo4: fix wrong limitation in distance measuring
- netfilter: nf_tables: Align nft_expr private data to 64-bit
- netfilter: ipset: Fix an error code in ip_set_sockfn_get()
- intel_th: pci: Add Comet Lake PCH support
- intel_th: pci: Add Jasper Lake PCH support
- can: usb_8dev: fix use-after-free on disconnect
- can: c_can: c_can_poll(): only read status register after status IRQ
+ - can: peak_usb: fix a potential out-of-sync while decoding packets
+ - can: rx-offload: can_rx_offload_queue_sorted(): fix error handling, avoid
skb mem leak
+ - can: gs_usb: gs_can_open(): prevent memory leak
+ - can: mcba_usb: fix use-after-free on disconnect
+ - can: peak_usb: fix slab info leak
+ - configs: stash the data we need into configs_buffer at open time
+ - configs_register_group() shouldn't be (and isn't) called in rmdirable parts
+ - configs: new object representing tree fragments
+ - configs: provide exclusion between IO and removals
+ - configs: fix a deadlock in configs_symlink()
+ - usb: dwc3: Allow disabling of metastability workaround
+ - mfd: palmas: Assign the right powerhold mask for tp65917
+ - ASoC: tlv320aic31xx: Handle inverted BCLK in non-DSP modes
+ - ARM: dts: dra7: Disable USB metastability workaround for USB2
+ - [Config] updateconfigs for SGL_ALLOC
+ - lib/scatterlist: Introduce sgl_alloc() and sgl_free()
+ - usbip: Fix vhci Urb_enqueue() URB null transfer buffer error path
+ - usbip: Implement SG support to vhci-hcd and stub driver
+ - PCI: tegra: Enable Relaxed Ordering only for Tegra20 & Tegra30
+ - dmaengine: xilinx_dma: Fix control reg update in vdma_channel_set_config
+ - HID: intel-ish-hid: fix wrong error handling in ishtp_cl_alloc_tx_ring()
+ - RDMA/qedr: Fix reported firmware version
+ - net/mlx5: prevent memory leak in mlx5_fpga_conn_create_cq
+ - scsi: qla2xxx: fixup incorrect usage of host_byte
+ - RDMA/uverbs: Prevent potential underflow
+ - net: openvswitch: free vport unless register_netdevice() succeeds
+ - scsi: lpfc: Honor module parameter lpfc_use_adisc
+ - scsi: qla2xxx: Initialized mailbox to prevent driver load failure
+ - ipvs: don't ignore errors in case reftcounting ip_vs module fails
+ - ipvs: move old_secure_tep into struct netns_ipvs
+ - bonding: fix unexpected IFF_BONDING bit unset
+ - macsec: fix refcnt leak in module exit routine
+ - usb: fsl: Check memory resource before releasing it
+ - usb: gadget: composite: Fix possible double free memory bug
+ - usb: gadget: configs: fix concurrent issue between composite APIs
+ - usb: dwc3: remove the call trace of USBx_GFLADJ
+ - perf/x86/amd/ibs: Fix reading of the IBS OpData register and thus precise
RIP validity
+ - perf/x86/amd/ibs: Handle erratum #420 only on the affected CPU family (10h)
+ - USB: Skip endpoints with 0 maxpacket length
+ - USB: Idusb: use unsigned size format specifiers
+ - RDMA/iw_cxgb4: Avoid freeing skb twice in arp failure case
+ - scsi: qla2xxx: stop timer in shutdown path
+ - fjes: Handle workqueue allocation failure
+ - net: hisilicon: Fix "Trying to free already-free IRQ"
+ - hv_netvsc: Fix error handling in netvsc_attach()
- NFSv4: Don't allow a cached open with a revoked delegation
- net: ethernet: arc: add the missed clk_disable_unprepare
- igb: Fix constant media auto sense switching when no cable is connected
- e1000: fix memory leaks
- x86/apic: Move pending interrupt check code into it's own function
- x86/apic: Drop logical_smp_processor_id() inline
- x86/apic/32: Avoid bogus LDR warnings
- can: flexcan: disable completely the ECC mechanism
- mm/filemap.c: don't initiate writeback if mapping has no dirty pages
- cgroup.writeback: don't switch wbs immediately on dead wbs if the memcg is dead
- ushbp: Fix free of unallocated memory in vhci tx
- net: prevent load/store tearing on sk->sk_stamp
- x86/speculation/taa: Fix printing of TAA_MSG_SMT on IBRS_ALL CPUs
- x86/cpu: Add Tremont to the cpu vulnerability whitelist
- Documentation: Add ITLB_MULTIHIT documentation
- net: hns: Fix the stray netpoll locks causing deadlock in NAPI path
- mm: memcontrol: fix network errors from failing __GFP_ATOMIC charges
- mm, meminit: recalculate pcpu batch and high limits after init completes
- SMB3: Fix persistent handles reconnect
- dmaengine: sprd: Fix the possible memory leak issue
- iw_cxgb4: fix ECN check on the passive accept
- perf/x86/uncore: Fix event group support
- usbip: tools: Fix read_usb_vudec_device() error path handling
- RDMA/hns: Prevent memory leaks of eq->buf_list
- drm/amdgpu: If amdgpu_ib_schedule fails return back the error.
- drm/amd/display: Passive DP->HDMI dongle detection fix
- pinctrl: intel: Initialize GPIO properly when used through irqchip
- pinctrl: intel: Avoid potential glitches if pin is in GPIO mode
- pinctrl: cherryview: Fix irq_valid_mask calculation
- netfilter: ipset: Copy the right MAC address in hash:ip,mac IPv6 sets
- vssock/virtio: fix sock refcnt holding during the shutdown

* Bionic update: upstream stable patchset 2019-11-19 (LP: #1853208)
- arm64: dts: Fix gpio to pinmux mapping
- regulator: ti-abb: Fix timeout in ti_abb_wait_txdone/ti_abb_clear_all_txdone
- regulator: pfuze100-regulator: Variable "val" in pfuze100_regulator_probe()
  could be uninitialized
- ASoC: wm_adsp: Don't generate kcontrols without READ flags
- ASoC: rockchip: i2s: Fix RPM imbalance
- ARM: dts: logicpd-torpedo-som: Remove twl_keypad
- pinctrl: ns2: Fix off by one bugs in ns2_pinmux_enable()
- ARM: mm: fix alignment handler faults under memory pressure
- scsi: scsi_dh_alua: handle RTPG sense code correctly during state transitions
- scsi: sni_53c710: fix compilation error
- scsi: fix kconfig dependency warning related to 53C700_LE_ON_BE
- ARM: dts: imx7s: Correct GPT's ipg clock source
+ perf c2c: Fix memory leak in build_cl_output()
+ perf kmem: Fix memory leak in compact_gfp_flags()
+ ARM: davinci: dm365: Fix McBSP dma_slave_map entry
+ scsi: target: core: Do not overwrite CDB byte 1
+ ARM: 8926/1: v7m: remove register save to stack before svc
+ of: unittest: fix memory leak in unittest_data_add
+ MIPS: bmips: mark exception vectors as char arrays
+ 1c2: stm32f7: remove warning when compiling with W=1
+ cifs: Fix cifsInodeInfo lock_sem deadlock when reconnect occurs
+ nbd: handle racing with error'ed out commands
+ cxgb4: fix panic when attaching to ULD fail
+ dccp: do not leak jiffies on the wire
+ net: annotate accesses to sk->sk_incoming_cpu
+ net: annotate lockless accesses to sk->sk_napi_id
+ net: dsa: bcm_sf2: Fix IMP setup for port different than 8
+ net: ethernet: fgmac100: Fix DMA coherency issue with SW checksum
+ net: fix sk_page_frag() recursion from memory reclaim
+ net: hisilicon: Fix ping latency when deal with high throughput
+ net/mlx4_core: Dynamically set guaranteed amount of counters per VF
+ selftests: net: reuseport_dualstack: fix uninitialized parameter
+ udp: fix data-race in udp_set_dev_scratch()
+ net: add READ_ONCE() annotation in __skb_wait_for_more_packets()
+ net/mlx5e: Fix handling of compressed CQEs in case of low NAPI budget
+ net: dsa: b53: Do not clear existing mirrored port mask
+ net: usb: lan78xx: Connect PHY before registering MAC
+ r8152: add device id for Lenovo ThinkPad USB-C Dock Gen 2
+ net: dsa: fix switch tree list
+ net: bcmgenet: reset 40nm EPHY on energy detect
+ net: add skb_queue_empty_lockless()
+ udp: use skb_queue_empty_lockless()
+ net: use skb_queue_empty_lockless() in poll() handlers
+ net: use skb_queue_empty_lockless() in busy poll contexts
+ vxlan: check tun_info options_len properly
+ erspan: fix the tun_info options_len check for erspan
+ inet: stop leaking jiffies on the wire
+ net/flow_dissector: switch to siphash
+ kbuild: use -fmacro-prefix-map to make __FILE__ a relative path
+ platform/x86: pmc_atom: Add Siemens SIMATIC IPC227E to critclk_systems DMI table
+ iio: adc: stm32-adc: move registers definitions
+ powerpc/book3s64/mm: Don't do tlbie fixup for some hardware revisions
+ powerpc/book3s64/radix: Rename CPU_FTR_P9_TLBIE_BUG feature flag
+ selftests/powerpc: Add test case for tlbie vs mtpidr ordering issue
+ selftests/powerpc: Fix compile error on tlbie_test due to newer gcc
+ arm64: dts: allwinner: a64: pine64-plus: Add PHY regulator delay
+ arm64: dts: allwinner: a64: sopine-baseboard: Add PHY regulator delay
+ scsi: qla2xxx: fix a potential NULL pointer dereference
+ irqchip/gic-v3-its: Use the exact ITSLList for VMOPV
+ - netns: fix GFP flags in rtnl_netotifyid()
+ - net: usb: lan78xx: Disable interrupts before calling generic_handle_irq()
+ - wireless: Skip directory when generating certificates
+ - ASoC: pcm3168a: The codec does not support S32_LE
+ - usb: gadget: udc: core: Fix segfault if udc_bind_to_driver() for pending
+     driver fails
+ +-- Khalid Elmously <khalid.elmously@canonical.com>  Mon, 02 Dec 2019 14:01:36 -0500
+ +linux (4.15.0-72.81) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-72.81 -proposed tracker (LP: #1854027)
+ + * [Regression] Bionic kernel 4.15.0-71.80 can not boot on ThunderX
+     (LP: #1853326)
+ + - Revert "arm64: Use firmware to detect CPUs that are not affected by
+     Spectre-v2"
+ + - Revert "arm64: Get rid of __smccc_workaround_1_hvc_*"
+ + * [Regression] Bionic kernel 4.15.0-71.80 can not boot on ThunderX2 and
+     Kunpeng920 (LP: #1852723)
+ + - SAUCE: arm64: capabilities: Move setup_boot_cpu_capabilities() call to
+     correct place
+ +-- Stefan Bader <stefan.bader@canonical.com>  Tue, 26 Nov 2019 12:18:37 +0100
+ +linux (4.15.0-71.80) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-71.80 -proposed tracker (LP: #1852289)
+ + * Bionic update: upstream stable patchset 2019-10-29 (LP: #1850541)
+ + - panic: ensure preemption is disabled during panic()
+ + - f2fs: use EINVAL for superblock with invalid magic
+ + - [Config] updateconfigs for USB_RIO500
+ + - USB: rio500: Remove Rio 500 kernel driver
+ + - USB: yurex: Don't retry on unexpected errors
+ + - USB: yurex: fix NULL-derefs on disconnect
+ + - USB: usb-skeleton: fix runtime PM after driver unbind
+ + - USB: usb-skeleton: fix NULL-deref on disconnect
+ + - xhci: Fix false warning message about wrong bounce buffer write length
+ + - xhci: Prevent device initiated U1/U2 link pm if exit latency is too long
+ + - xhci: Check all endpoints for LPM timeout
+ + - usb: xhci: wait for CNR controller not ready bit in xhci resume
+ + - USB: adutux: fix use-after-free on disconnect
+ + - USB: adutux: fix NULL-derefs on disconnect
+ + - USB: adutux: fix use-after-free on release
+ + - USB: iowarrior: fix use-after-free on disconnect
+ + - USB: iowarrior: fix use-after-free on release

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+ - USB: iowarrior: fix use-after-free after driver unbind
+ - USB: usblp: fix runtime PM after driver unbind
+ - USB: chaoskey: fix use-after-free on release
+ - USB: ldusb: fix NULL-derefs on driver unbind
+ - serial: uartlite: fix exit path null pointer
+ - USB: serial: keyspec: fix NULL-derefs on open() and write()
+ - USB: serial: ftdi_sio: add device IDs for Sienna and Echelon PL-20
+ - USB: serial: option: add Telit FN980 compositions
+ - USB: serial: option: add support for Cinterion CLS8 devices
+ - USB: serial: fix runtime PM after driver unbind
+ - USB: usblcd: fix I/O after disconnect
+ - USB: microtek: fix info-leak at probe
+ - USB: dummy-hcd: fix power budget for SuperSpeed mode
+ - usb: renesas_usbhs: gadget: Do not discard queues in
+    usb_ep_set_{halt,wedge}()
+ - usb: renesas_usbhs: gadget: Fix usb_ep_set_{halt,wedge}() behavior
+ - USB: legousbtower: fix slab info leak at probe
+ - USB: legousbtower: fix deadlock on disconnect
+ - USB: legousbtower: fix potential NULL-deref on disconnect
+ - USB: legousbtower: fix open after failed reset request
+ - USB: legousbtower: fix use-after-free on release
+ - staging: vt6655: Fix memory leak in vt6655_probe
+ - iio: adc: ad799x: fix probe error handling
+ - iio: adc: axp288: Override TS pin bias current for some models
+ - iio: light: opt3001: fix mutex unlock race
+ - efivar/ssdt: Don't iterate over EFI vars if no SSDT override was specified
+ - perf llvm: Don't access out-of-scope array
+ - perf inject jit: Fix JIT_CODE_MOVE file
+ - CIFS: Gracefully handle QueryInfo errors during open
+ - CIFS: Force revalidate inode when dentry is stale
+ - CIFS: Force reval dentry if LOOKUP_REVAL flag is set
+ - kernel/sysctl.c: do not override max_threads provided by userspace
+ - firmware: google: increment VPD key_len properly
+ - gpiolib: don't clear FLAG_IS_OUT when emulating open-drain/open-source
+ - Staging: fbttf: fix memory leak in fbttf_framebuffer_alloc
+ - iio: hx711: add delay until DOUT is ready
+ - iio: adc: hx711: fix bug in sampling of data
+ - btrfs: fix incorrect updating of log root tree
+ - NFS: Fix O_DIRECT accounting of number of bytes read/written
+ - MIPS: Disable Loongson MMI instructions for kernel build
+ - Fix the locking in dcache_readdir() and friends
+ - media: stkwebcam: fix runtime PM after driver unbind
+ - tracing/hwlat: Report total time spent in all NMI during the sample
+ - tracing/hwlat: Don't ignore outer-loop duration when calculating max_latency
+ - ftrace: Get a reference counter for the trace_array on filter files
+ - tracing: Get trace_array reference for available_tracers files
+ - x86/asm: Fix MWAITX C-state hint value
+ - iio: adc: stm32-adc: fix a race when using several adcs with dma and irq
+ - cifs: use cifsInodeInfo->open_file_lock while iterating to avoid a panic
+ - btrfs: fix uninitialized ret in ref-verify
+ - arm64/sve: Fix wrong free for task->thread.sve_state
+ - [Config] updateconfigs for USB_RIO500

* Bionic update: upstream stable patchset 2019-11-13 (LP: #1852492)
  - dm snapshot: use mutex instead of rw_semaphore
  - dm snapshot: introduce account_start_copy() and account_end_copy()
  - dm snapshot: rework COW throttling to fix deadlock
  - dm: Use kzalloc for all structs with embedded biosets/mempools
  - f2fs: flush quota blocks after turning it off
  - scsi: lpfc: Fix a duplicate 0711 log message number.
  - sc16is7xx: Fix for "Unexpected interrupt: 8"
  - powerpc/powerpc: hold device_hotplug_lock when calling
    memtrace_offline_pages()
  - HID: i2c-hid: add Direkt-Tek DTLAPY133-1 to descriptor override
  - x86/cpu: Add Atom Tremont (Jacobsville)
  - HID: i2c-hid: Add Odys Winbook 13 to descriptor override
  - clk: boston: unregister clks on failure in clk_boston_setup()
  - scripts/setlocalversion: Improve -dirty check with git-status --no-optional-locks
  - HID: Add ASUS T100CHI keyboard dock battery quirks
  - usb: handle warm-reset port requests on hub resume
  - rtc: pcf8523: set xtal load capacitance from DT
  - mlxsw: spectrum: Set LAG port collector only when active
  - ALSA: hda/realtek - Apply ALC294 hp init also for S4 resume
  - media: vimc: Remove unused but set variables
  - exec: load_script: Do not exec truncated interpreter path
  - PCI/PME: Fix possible use-after-free on remove
  - power: supply: max14656: fix potential use-after-free
  - iio: adc: meson_saradc: Fix memory allocation order
  - iio: fix center temperature of bmc150-accel-core
  - libsubcmd: Make _FORTIFY_SOURCE defines dependent on the feature
  - perf tests: Avoid raising SEGV using an obvious NULL dereference
  - perf map: Fix overlapped map handling
  - perf jevents: Fix period for Intel fixed counters
  - staging: rtl8188eu: fix null dereference when kzalloc fails
  - RDMA/hfi1: Prevent memory leak in sdma_init
  - RDMA/iwcm: Fix a lock inversion issue
  - HID: hyperv: Use in-place iterator API in the channel callback
  - nfs: Fix nfsi->nrequests count error on nfs_inode_remove_request
  - arm64: ftrace: Ensure synchronisation in PLT setup for Neoverse-N1 #1542419
  - tty: serial: owl: Fix the link time qualifier of 'owl_uart_exit()'
  - tty: n_hdlc: fix build on SPARC
  - gpio: max77620: Use correct unit for debounce times
  - fs: cifs: mute -Wunused-const-variable message
  - serial: mctrl_gpio: Check for NULL pointer
+ - efi/cper: Fix endianness of PCIe class code
+ - efi/x86: Do not clean dummy variable in kexec path
+ - MIPS: include: Mark __cmpxchg as __always_inline
+ - x86/xen: Return from panic notifier
+ - ocfs2: clear zero in unaligned direct IO
+ - fs: ocfs2: fix possible null-pointer dereferences in
  ocfs2_xa_prepare_entry()
+ - fs: ocfs2: fix a possible null-pointer dereference in
  ocfs2_write_end_nolock()
+ - fs: ocfs2: fix a possible null-pointer dereference in
  ocfs2_info_inode_alloc()
+ - sched/vtime: Fix guest/system mis-accounting on task switch
+ - perf/x86/amd: Change/fixed NMI latency mitigation to use a timestamp
+ - MIPS: include: Mark __xchg as __always_inline
+ - MIPS: fw: sni: Fix out of bounds init of o32 stack
+ - nbd: fix possible sysfs duplicate warning
+ - NFSv4: Fix leak of clp->cl_acceptor string
+ - s390/success: avoid (false positive) compiler warnings
+ - tracing: Initialize iter->seq after zeroing in tracing_read_pipe()
+ - nbd: verify socktet is supported during setup
+ - USB: legousbnet: fix a signedness bug in tower_probe()
+ - thunderbolt: Use 32-bit writes when writing ring producer/consumer
+ - fuse: flush dirty data/metadata before non-truncate setattr
+ - fuse: truncate pending writes on O_TRUNC
+ - ALSA: bebob: Fix prototype of helper function to return negative value
+ - UAS: Revert commit 3ae62a42090f ("UAS: fix alignment of scatter/gather
  segments")
+ - USB: gadget: Reject endpoints with 0 maxpacket value
+ - usb-storage: Revert commit 7476668dbc061 ("usb-storage: Set
  virt_boundary_mask to avoid SG overflows")
+ - USB: ldusb: fix ring-buffer locking
+ - USB: ldusb: fix control-message timeout
+ - USB: serial: whiteheat: fix potential slab corruption
+ - USB: serial: whiteheat: fix line-speed endianness
+ - scsi: target: cxgbit: Fix cxgbit_fw4_ack()
+ - HID: i2e-hid: add Trekstor Primebook C11B to descriptor override
+ - HID: Fix assumption that devices have inputs
+ - HID: Fix error message in hid_open_report()
+ - nl80211: fix validation of mesh path nexthop
+ - s390/cmm: fix information leak in cmm_timeout_handler()
+ - s390/idle: fix cpu idle time calculation
+ - arm64: Ensure VM_WRITE|VM_SHARED ptes are clean by default
+ - dmaengine: cpipi41: Fix cpipi41_dma_prep_slave_sg() when idle
+ - llc: fix sk_buff leak in llc_sap_state_process()
+ - llc: fix sk_buff leak in llc_conn_service()
+ - rxrpc: Fix call ref leak
+ - NFC: pn533: fix use-after-free and memleaks
+ - bonding: fix potential NULL deref in bond_update_slave_arr
+ - net: usb: sr9800: fix uninitialized local variable
+ - sch_netem: fix rcu splat in netem_enqueue()
+ - scct: fix the issue that flags are ignored when using kernel_connect
+ - scct: not bind the socket in scct_connect
+ - xfs: Correctly invert xfs_buftarg LRU isolation logic
+ - ALSA: timer: Simplify error path in snd_timer_open()
+ - ALSA: timer: Fix mutex deadlock at releasing card
+ - Revert "ALSA: hda: Flush interrupts on disabling"
+ - Btrfs: fix inode cache block reserve leak on failure to allocate data space
+ - Btrfs: fix memory leak due to concurrent append writes with fiemap
+ - tools/power turbostat: fix goldmont C-state limit decoding
+ - bcache: fix input overflow to writeback_rate_minimum
+ - netfilter: ipset: Make invalid MAC address checks consistent
+ - platform/x86: Add the VLV ISP PCI ID to atomisp2_pm
+ - platform/x86: Fix config space access for intel_atomisp2_pm
+ - NFSv4: Ensure that the state manager exits the loop on SIGKILL
+ - ALSA: usb-audio: Cleanup DSD whitelist
+ - arm64: Add MIDR encoding for HiSilicon Taishan CPUs
+ - arm64: kpti: Whitelist HiSilicon Taishan v110 CPUs
+ - scti: lpfc: Correct localport timeout duration error
+ - ext4: disallow files with EXT4_JOURNAL_DATA_FL from EXT4_IOC_SWAP_BOOT
+ - net: dsa: mv88e6xxx: Release lock while requesting IRQ
+ - drm/amd/display: fix odm combine pipe reset
+ - perf script brstackinsn: Fix recovery from LBR/binary mismatch
+ - perf tools: Propagate get_cpuid() error
+ - perf annotate: Propagate perf_env__arch() error
+ - perf annotate: Fix the signedness of failure returns
+ - arm64: armv8_deprecated: Checking return value for memory allocation
+ - x86/cpu: Add Comet Lake to the Intel CPU models header
+ - iio: imu: adis16400: release allocated memory on failure
+ - usb: xhci: fix __le32/__le64 accessors in debugfs code
+ - dmaengine: qcom: bam_dma: Fix resource leak
+ - NFS: Fix an RCU lock leak in nfs4_refresh_delegation_stateid()
+ - batman-adv: Avoid free/alloc race when handling OGM buffer
+ - powerpc/powerpc: Fix CPU idle to be called with IRQs disabled
+ + * Dell XPS 13 9350/9360 headphone audio hiss (LP: #1654448) // [XPS 13 9360, Realtek ALC3246, Black Headphone Out, Front] High noise floor
+ + (LP: #1855106) // Bionic update: upstream stable patchset 2019-11-13
+ + * Add GeminiLake support on Intel int340x thermal device (LP: #1851506)
+ + - thermal: int340x: processor_thermal: Add GeminiLake support
+ + * System hangs at early boot (LP: #1851216)
+ + - x86/timer: Skip PIT initialization on modern chipsets
+ 
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Open Source Used In 5GaaS Edge AC-4 17730
+ * Some EFI systems fail to boot in efi_init() when booted via maas
+  (LP: #1851810)
+  - efi: efi_get_memory_map -- increase map headroom
+
+ * dkms artifacts may expire from the pool (LP: #1850958)
+  - [Packaging] dkms -- try launchpad librarian for pool downloads
+  - [Packaging] dkms -- dkms-build quieten wget verbiage
+
+ * update ENA driver to version 2.1.0 (LP: #1850175)
+  - net: ena: fix: set freed objects to NULL to avoid failing future allocations
+  - net: ena: fix swapped parameters when calling
+    ena_com_indirect_table_fill_entry
+  - net: ena: fix: Free napi resources when ena_up() fails
+  - net: ena: fix incorrect test of supported hash function
+  - net: ena: fix return value of ena_com_config_llq_info()
+  - net: ena: improve latency by disabling adaptive interrupt moderation by
default
+  - net: ena: fix ena_com_fill_hash_function() implementation
+  - net: ena: add handling of llq max tx burst size
+  - net: ena: ethtool: add extra properties retrieval via get_priv_flags
+  - net: ena: replace free_tx/rx_ids union with single free_ids field in
+    ena_ring
+  - net: ena: arrange ena_probe() function variables in reverse christmas tree
+  - net: ena: add newline at the end of pr_err prints
+  - net: ena: documentation: update ena.txt
+  - net: ena: allow automatic fallback to polling mode
+  - net: ena: add support for changing max_header_size in LLQ mode
+  - net: ena: optimise calculations for CQ doorbell
+  - net: ena: add good checksum counter
+  - net: ena: use dev_info_once instead of static variable
+  - net: ena: add MAX_QUEUES_EXT get feature admin command
+  - net: ena: enable negotiating larger Rx ring size
+  - net: ena: make ethtool show correct current and max queue sizes
+  - net: ena: allow queue allocation backoff when low on memory
+  - net: ena: add ethtool function for changing io queue sizes
+  - net: ena: remove inline keyword from functions in *.c
+  - net: ena: update driver version from 2.0.3 to 2.1.0
+  - net: ena: Fix bug where ring allocation backoff stopped too late
+  - Revert "net: ena: ethtool: add extra properties retrieval via
+    get_priv_flags"
+  - net: ena: don't wake up tx queue when down
+  - net: ena: clean up indentation issue
+
+ * Skip frame when buffer overflow on UVC camera (LP: #1849871)
+  - media: uvcvideo: Mark buffer error where overflow
+
+ * Handle the skip return code in kernel_selftests on Bionic (LP: #1812352)
+  - selftests: lib.mk set KSFT_TAP_LEVEL to prevent nested TAP headers
+ - selftests: Fix lib.mk run_tests target shell script
+ - selftests: lib.mk: cleanup RUN_TESTS define and make it readable
+ - selftests: lib.mk: add SKIP handling to RUN_TESTS define
+ + * Intel Wireless AC 3168 on Eoan complaints FW error in SYNC CMD
+ + GEO_TX_POWER_LIMIT (LP: #1846016)
+ + - iwlwifi: exclude GEO SAR support for 3168
+ + + * tsc marked unstable after entered PC10 on Intel CoffeeLake (LP: #1840239)
+ + - SAUCE: x86/intel: Disable HPET on Intel Coffee Lake platforms
+ + - SAUCE: x86/intel: Disable HPET on Intel Ice Lake platforms
+ + + * Bionic update: upstream stable patchset 2019-11-08 (LP: #1851876)
+ + - scsi: ufs: skip shutdown if hba is not powered
+ + - scsi: megaraid: disable device when probe failed after enabled device
+ + - scsi: qla2xxx: Fix unbound sleep in fcport delete path.
+ + - ARM: OMAP2+: Fix missing reset done flag for am3 and am43
+ + - ieee802154: ca8210: prevent memory leak
+ + - ARM: dts: am4372: Set memory bandwidth limit for DISPC
+ + - net: dsa: qca8k: Use up to 7 ports for all operations
+ + - MIPS: dts: ar9331: fix interrupt-controller size
+ + - xen/efi: Set nonblocking callbacks
+ + - nl80211: fix null pointer dereference
+ + - mac80211: fix txq null pointer dereference
+ + - mips: Loongson: Fix the link time qualifier of `serial_exit()`
+ + - net: hisilicon: Fix usage of uninitialized variable in function
+ + - mdio_sc_cfg_reg_write()
+ + - namespace: fix namespace.pl script to support relative paths
+ + - Revert "drm/radeon: Fix EEH during kexec"
+ + - ofcs2: fix panic due to ofcs2_wq is null
+ + - ipv4: Return -ENETUNREACH if we can't create route but saddr is valid
+ + - net: bcmgenet: Fix RGMII_MODE_EN value for GENET v1/2/3
+ + - net: bcmgenet: Set phydev->dev_flags only for internal PHYs
+ + - net: i82596: fix dma_alloc_attr for sni_82596
+ + - net: stmmac: disable/enable ptp_ref_clk in suspend/resume flow
+ + - scpt: change scpt_prot .no_autobind with true
+ + - net: avoid potential infinite loop in tc_ctl_action()
+ + - memfd: Fix locking when tagging pins
+ + - USB: legousbtower: fix memleak on disconnect
+ + - ALSA: hda/realtek - Add support for ALC711
+ + - usb: ude: lpc32xx: fix bad bit shift operation
+ + - USB: serial: ti_usb_3410_5052: fix port-close races
+ + - USB: Idusb: fix memleak on disconnect
+ + - USB: usblp: fix use-after-free on disconnect
+ + - USB: Idusb: fix read info leaks
+ + - arm64: v8.4: Support for new floating point multiplication instructions
+ + - arm64: Documentation: cpu-feature-registers: Remove RES0 fields
+ + - arm64: Expose Arm v8.4 features
+ - arm64: move SCTLR_EL[1,2] assertions to <asm/sysreg.h>
+ - arm64: add PSR_AA32_* definitions
+ - arm64: Introduce sysreg_clear_set()
+ - arm64: capabilities: Update prototype for enable call back
+ - arm64: capabilities: Move errata work around check on boot CPU
+ - arm64: capabilities: Move errata processing code
+ - arm64: capabilities: Prepare for fine grained capabilities
+ - arm64: capabilities: Add flags to handle the conflicts on late CPU
+ - arm64: capabilities: Unify the verification
+ - arm64: capabilities: Filter the entries based on a given mask
+ - arm64: capabilities: Prepare for grouping features and errata work arounds
+ - arm64: capabilities: Split the processing of errata work arounds
+ - arm64: capabilities: Allow features based on local CPU scope
+ - arm64: capabilities: Group handling of features and errata workarounds
+ - arm64: capabilities: Introduce weak features based on local CPU
+ - arm64: capabilities: Restrict KPTI detection to boot-time CPUs
+ - arm64: capabilities: Add support for features enabled early
+ - arm64: capabilities: Change scope of VHE to Boot CPU feature
+ - arm64: capabilities: Clean up midr range helpers
+ - arm64: Add helpers for checking CPU MIDR against a range
+ - arm64: Add MIDR encoding for Arm Cortex-A55 and Cortex-A35
+ - arm64: capabilities: Add support for checks based on a list of MIDRs
+ - arm64: KVM: Use SMCCC_ARCH_WORKAROUND_1 for Falkor BP hardening
+ - arm64: don't zero DIT on signal return
+ - arm64: Get rid of __smccc_workaround_1_hvc_ *
+ - arm64: cpufeature: Detect SSBS and advertise to userspace
+ - arm64: ssbd: Add support for PSTATE.SSBS rather than trapping to EL3
+ - KVM: arm64: Set SCTLR_EL2.DSSBS if SSBD is forcefully disabled and !vhe
+ - arm64: fix SSBS sanitization
+ - arm64: Add sysfs vulnerability show for spectre-v1
+ - arm64: add sysfs vulnerability show for meltdown
+ - arm64: enable generic CPU vulnerabilities support
+ - arm64: Always enable ssb vulnerability detection
+ - arm64: Provide a command line to disable spectre_v2 mitigation
+ - arm64: Advertise mitigation of Spectre-v2, or lack thereof
+ - arm64: Always enable spectre-v2 vulnerability detection
+ - arm64: add sysfs vulnerability show for spectre-v2
+ - arm64: add sysfs vulnerability show for speculative store bypass
+ - arm64: ssbs: Don't treat CPUs with SSBS as unaffected by SSB
+ - arm64: Force SSBS on context switch
+ - arm64: Use firmware to detect CPUs that are not affected by Spectre-v2
+ - arm64/speculation: Support 'mitigations=' cmdline option
+ - MIPS: tlbx: Fix build_restore_pagemask KScratch restore
+ - staging: wlan-ng: fix exit return when sme->key_idx >= NUM_WEPKEYS
+ - scsi: sd: Ignore a failure to sync cache due to lack of authorization
+ - scsi: core: save/restore command resid for error handling
+ - scsi: ch: Make it possible to open a ch device multiple times again
+ - Input: da9063 - fix capability and drop KEY_SLEEP
+ - Input: synaptics-ri4 - avoid processing unknown IRQs
+ - ASoC: rsnd: Reinitialize bit clock inversion flag for every format setting
+ - cfg80211: wext: avoid copying malformed SSIDs
+ - mac80211: Reject malformed SSID elements
+ - drm/amdgpu: Bail earlier when amdgpu.cik_/si_support is not set to 1
+ - drivers/base/memory.c: don't access uninitialized memmaps in
  soft_offline_page_store()
+ - fs/proc/page.c: don't access uninitialized memmaps in fs/proc/page.c
+ - scsi: zfcp: fix reaction on bit error threshold notification
+ - mm/slub: fix a deadlock in show_slab_objects()
+ - mm/page_owner: don't access uninitialized memmaps when reading
  /proc/pagetypeinfo
+ - hugetlbfs: don't access uninitialized memmaps in pf_range_valid_gigantic()
+ - xtensa: drop EXPORT_SYMBOL for outs*/ins*
+ - CIFS: avoid using MID 0xFFFF
+ - x86/boot/64: Make level2_kernel_pgt pages invalid outside kernel area
+ - pinctrl: armada-37xx: fix control of pins 32 and up
+ - pinctrl: armada-37xx: swap polarity on LED group
+ - btrfs: block-group: Fix a memory leak due to missing btrfs_put_block_group()
+ - memstick: jmb38x_ms: Fix an error handling path in `jmb38x_ms_probe(')
+ - cpufreq: Avoid cpufreq_suspend() deadlock on system shutdown
+ - xen/netback: fix error path of xenvif_connect_data()
+ - PCI: PM: Fix pci_power_up()
+ - KVM: X86: introduce invalidate_gpa argument to tlb flush
+ - kvm: vmx: Introduce lapic_mode enumeration
+ - kvm: vmx: Basic APIC virtualization controls have three settings
+ - RDMA/cxgb4: Do not dma memory off of the stack
+ - ARM: OMAP2+: Fix warnings with broken omap2_set_init_voltage()
+ - libata/ahci: Fix PCS quirk application
+ - ipv4: fix race condition between route lookup and invalidation
+ - ALSA: hda/realtek - Enable headset mic on Asus MJ401TA
+ - ALSA: hda - Force runtime PM on Nvidia HDMI codecs
+ - ACPI: CPPC: Set pcc_data[pce_ss_id] to NULL in acpi_cppe_processor_exit()
+ - EDAC/ghes: Fix Use after free in ghes_educ remove path
+ - arm64: Enable workaround for Cavium TX2 erratum 219 when running SMT
+ - CIFS: Fix use after free of file info structures
+ - perf/aux: Fix AUX output stopping
+ - dm cache: fix bugs when a GFP_NOWAIT allocation fails
+ - x86/apic/x2apic: Fix a NULL pointer deref when handling a dying cpu
+ - Btrfs: add missing extents release on file extent cluster relocation error
+ * Colour banding in Lenovo G50-80 laptop display (i915) (LP: #1819968) //
+ Bionic update: upstream stable patchset 2019-11-08 (LP: #1851876)
+ - drm/edid: Add 6 bpc quirk for SDC panel in Lenovo G50
+ * cloudimg: no iavf/i40evf module so no network available with SR-IOV enabled
cloud (LP: #1848481)
- [Debian]: include i40evf in generic

* [SRU][B/OEM-B/OEM-OSP1/D/E] UBUNTU: SAUCE: add rtl623 codec support and fix
  mic issues (LP: #1850599)
- SAUCE: ALSA: hda/realtek - Add support for ALC623
- SAUCE: ALSA: hda/realtek - Fix 2 front mics of codec 0x623

+ Add Intel Comet Lake ethernet support (LP: #1848555)
- e1000e: Add support for Comet Lake

+ * Suppress "hid_field_extract() called with n (192) > 32!" message floods
  (LP: #1850600)
- HID: core: reformat and reduce hid_printk macros
- HID: core: Add printk_once variants to hid_warn() etc
- HID: core: fix dmesg flooding if report field larger than 32bit

+ * AMD Prairie Falcon platform failed to boot up (LP: #1850572)
- drm/amdgpu: re-enable CGCG on CZ and disable on ST

+ * UIO: mutex used in interrupt handler causes crash (LP: #1843487)
  - Revert "uio: use request_threaded_irq instead"

+ * root can lift kernel lockdown (LP: #1851380)
  - SAUCE: (efi-lockdown) Really don't allow lifting lockdown from userspace

+ * Suspend stopped working from 4.4.0-157 onwards (LP: #1844021) // Bionic
  update: upstream stable patchset 2019-10-29 (LP: #1850541)
  - xhci: Increase STS_SAVE timeout in xhci_suspend()

+ * Bionic update: upstream stable patchset 2019-10-23 (LP: #1849576)
  - s390/process: avoid potential reading of freed stack
  - KVM: s390: Test for bad access register and size at the start of S390_MEM_OP
  - s390/topology: avoid firing events before kobjs are created
  - s390/cio: avoid calling strlen on null pointer
  - s390/cio: exclude subchannels with no parent from pseudo check
  - KVM: PPC: Book3S HV: Don't lose pending doorbell request on migration on P9
  - PM / devfreq: tegra: Fix kHz to Hz conversion
  - ASoC: Define a set of DAPM pre/post-up events
  - powerpc/powernv: Restrict OPAL symbol map to only be readable by root
  - can: mcp251x: mcp251x_hw_reset(): allow more time after a reset
  - tools lib traceevent: Fix "robust" test of do_generate_dynamic_list_file
  - crypto: qat - Silence smp_processor_id() warning
  - crypto: skcipher - Unmap pages after an external error
  - crypto: cavium/zip - Add missing single_release()
  - crypto: caam - fix concurrency issue in givenencrypt descriptor
  - usercopy: Avoid HIGMEM pfnt warning
  - timer: Read jiffies once when forwarding base clk
+ - watchdog: imx2_wdt: fix min() calculation in imx2_wdt_set_timeout
+ - drm/omap: fix max fclk divisor for omap36xx
+ - mmc: sdhci: improve ADMA error reporting
+ - mmc: sdhci-of-esdhc: set DMA snooping based on DMA coherence
+ - Revert "locking/pvqspinlock: Don't wait if vCPU is preempted"
+ - xen/xenbus: fix self-deadlock after killing user process
+ - ime802154: atusb: fix use-after-free at disconnect
+ - cfg80211: initialize on-stack chandefs
+ - ima: always return negative code for error
+ - fs: nfs: Fix possible null-pointer dereferences in encode_attrs()
+ - 9p: avoid attaching writeback_fid on mmap with type PRIVATE
+ - xen/pci: reserve MCFG areas earlier
+ - ceph: fix directories inode i_blkbits initialization
+ - ceph: reconnect connection if session hang in opening state
+ - watchdog: aspeed: Add support for AST2600
+ - netfilter: nf_tables: allow lookups in dynamic sets
+ - drm/amdgpu: Check for valid number of registers to read
+ - pNFS: Ensure we do clear the return-on-close layout stateid on fatal errors
+ - pwm: stm32-lp: Add check in case requested period cannot be achieved
+ - thermal: Fix use-after-free when unregistering thermal zone device
+ - fuse: fix memleak in cuse_channel_open
+ - sched/core: Fix migration to invalid CPU in __set_cpus_allowed_ptr()
+ - perf build: Add detection of java-11-openjdk-devel package
+ - kernel/elfcore.c: include proper prototypes
+ - perf unwind: Fix libunwind build failure on i386 systems
+ - KVM: PPC: Book3S HV: XIVE: Free escalation interrupts before disabling the
  VP
+ - nbd: fix crash when the blksize is zero
+ - block/nbd: add WQ_UNBOUND to the knbd-recv workqueue
+ - nbd: fix max number of supported devs
+ - powerpc/pseries: Fix cpu_hotplug_lock acquisition in resize_hpt()
+ - tools lib traceevent: Do not free tep->cmdlines in add_new_comm() on failure
+ - tick: broadcast-hrtimer: Fix a race in bc_set_next
+ - perf tools: Fix segfault in cpu_cache_level__read()
+ - perf stat: Fix a segmentation fault when using repeat forever
+ - perf stat: Reset previous counts on repeat with interval
+ - vfs: Fix EOVERFLOW testing in put_compat_statfs64
+ - coresight: etm4x: Use explicit barriers on enable/disable
+ - cfg80211: add and use strongly typed element iteration macros
+ - cfg80211: Use const more consistently in for_each_element macros
+ - nl80211: validate beacon head
+ - ASoC: sgtl5000: Improve VAG power and mute control
+ - KVM: PPC: Book3S HV: Check for MMU ready on piggybacked virtual cores
+ - powerpc/mce: Fix MCE handling for huge pages
+ - powerpc/mce: Schedule work from irq_work
+ - MIPS: Treat Loongson Extensions as ASEs
+ - PCI: Restore Resizable BAR size bits correctly for 1MB BARs
+ - drm/msm/dsi: Fix return value check for clk_get_parent
+ im: fix freeing ongoing ahash_request
+ x86/purgatory: Disable the stackleak GCC plugin for the purgatory
+ thermal_hwmon: Sanitize thermal_zone type
+ libnvdimm/region: Initialize bad block for volatile namespaces
+ drm/radeon: Bail earlier when radeon.cik_/si_support=0 is passed

+ -- Khalid Elmously <khalid.elmously@canonical.com> Wed, 13 Nov 2019 20:20:47 -0500
+ +linux (4.15.0-70.79) bionic; urgency=medium
+ + Ubuntu-5.0.0-33.35 introduces KVM regression with old Intel CPUs and Linux guests (LP: #1851709)
+ + Revert "KVM: x86: Manually calculate reserved bits when loading PDPTRENG" +
+ + Incomplete i915 fix for 64-bit x86 kernels (LP: #1852141) // CVE-2019-0155
+ + SAUCE: drm/i915/cmdparser: Fix jump whitelist clearing
+ + -- Stefan Bader <stefan.bader@canonical.com> Tue, 12 Nov 2019 10:54:50 +0100
+ +linux (4.15.0-69.78) bionic; urgency=medium
+ + * KVM NULL pointer deref (LP: #1851205)
+ + KVM: nVMX: handle page fault in vmread fix
+ + * CVE-2018-12207
+ + KVM: MMU: drop vcpu param in gpte_access
+ + kvm: Convert kvm_lock to a mutex
+ + kvm: x86: Do not release the page inside mmu_set_spte()
+ + KVM: x86: make FNAME(fetch) and __direct_map more similar
+ + KVM: x86: remove now unneeded hugepage gfn adjustment
+ + KVM: x86: change kvm_mmu_page_get_gfn BUG_ON to WARN_ON
+ + KVM: x86: add tracepoints around __direct_map and FNAME(fetch)
+ + kvm: x86, powerpc: do not allow clearing largepages debugfs entry
+ + SAUCE: KVM: vmx, svm: always run with EFER.NXE=1 when shadow paging is active
+ + SAUCE: x86: Add ITLB_MULTIHIT bug infrastructure
+ + SAUCE: kvm: mmu: ITLB_MULTIHIT mitigation
+ + SAUCE: kvm: Add helper function for creating VM worker threads
+ + SAUCE: kvm: x86: mmu: Recovery of shattered NX large pages
+ + SAUCE: cpu/speculation: Uninline and export CPU mitigations helpers
+ + SAUCE: kvm: x86: mmu: Apply global mitigations knob to ITLB_MULTIHIT
+ + * CVE-2019-11135
+ + KVM: x86: use Intel speculation bugs and features as derived in generic x86 code
+ + x86/msr: Add the IA32_TSX_CTRL MSR
+ + x86/cpu: Add a helper function x86_read_arch_cap_msr()
+ + x86/cpu: Add a "tsx=" cmdline option with TSX disabled by default
+ x86/speculation/taa: Add mitigation for TSX Async Abort
+ x86/speculation/taa: Add sysfs reporting for TSX Async Abort
+ kvm/x86: Export MDS_NO=0 to guests when TSX is enabled
+ x86/tsx: Add "auto" option to the tsx= cmdline parameter
+ x86/speculation/taa: Add documentation for TSX Async Abort
+ x86/tsx: Add config options to set tsx=on|off|auto
+ SAUCE: x86/speculation/taa: Call tsx_init()
+ x86/cpu: Include cpu header from bugs.c
+ [Config] Disable TSX by default when possible
+ * CVE-2019-0154
+ SAUCE: drm/i915: Lower RM timeout to avoid DSI hard hangs
+ SAUCE: drm/i915/gen8+: Add RC6 CTX corruption WA
+ * CVE-2019-0155
+ drm/i915/gtt: Add read only pages to gen8_pte_encode
+ drm/i915/gtt: Read-only pages for insert_entries on bdw+
+ drm/i915/gtt: Disable read-only support under GVT
+ drm/i915: Prevent writing into a read-only object via a GGTT mmap
+ drm/i915/cmdparser: Check reg_table_count before dereferencing.
+ drm/i915/cmdparser: Do not check past the cmd length.
+ drm/i915: Silence smatch for cmdparser
+ drm/i915: Move engine->needs_cmd_parser to engine->flags
+ SAUCE: drm/i915: Rename gen7 cmdparser tables
+ SAUCE: drm/i915: Disable Secure Batches for gen6+
+ SAUCE: drm/i915: Remove Master tables from cmdparser
+ SAUCE: drm/i915: Add support for mandatory cmdparsing
+ SAUCE: drm/i915: Support ro ppgtt mapped cmdparser shadow buffers
+ SAUCE: drm/i915: Allow parsing of unsized batches
+ SAUCE: drm/i915: Add gen9 BCS cmdparsing
+ SAUCE: drm/i915/cmdparser: Use explicit goto for error paths
+ SAUCE: drm/i915/cmdparser: Add support for backward jumps
+ SAUCE: drm/i915/cmdparser: Ignore Length operands during command matching
+ -- Stefan Bader <stefan.bader@canonical.com> Wed, 06 Nov 2019 10:28:28 +0100
+ linux (4.15.0-68.77) bionic; urgency=medium
+ * bionic/linux: 4.15.0-68.77 -proposed tracker (LP: #1849855)
+ * [REGRESSION] md/raid0: cannot assemble multi-zone RAID0 with default_layout
+ setting (LP: #1849682)
+ Revert "md/raid0: avoid RAID0 data corruption due to layout confusion."
+ -- Khalid Elmously <khalid.elmously@canonical.com> Fri, 25 Oct 2019 15:34:31 -0400
+ linux (4.15.0-67.76) bionic; urgency=medium
+
* bionic/linux: 4.15.0-67.76 -proposed tracker (LP: #1849035)
* Unexpected CFS throttling (LP: #1832151)
  * sched/fair: Add lsusb_positive() and use it consistently
  * sched/fair: Fix low cpu usage with high throttling by removing expiration of
    cpu-local slices
  * sched/fair: Fix -Wunused-but-set-variable warnings
* [CML] New device IDs for CML-U (LP: #1843774)
  * i2c: i801: Add support for Intel Comet Lake
  * spi: pxa2xx: Add support for Intel Comet Lake
* CVE-2019-17666
  * SAUCE: rtlwifi: rtl8822b: Fix potential overflow on P2P code
  * SAUCE: rtlwifi: Fix potential overflow on P2P code
  * md raid0/linear doesn’t show error state if an array member is removed and
    allows successful writes (LP: #1847773)
  * md raid0/linear: Mark array as 'broken' and fail BIOS if a member is gone
* Change Config Option CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE for s390x from yes
  * to no (LP: #1848492)
  * [Config] Change Config Option CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE for s390x
    from yes to no
* [Packaging] Support building Flattened Image Tree (FIT) kernels
  * (LP: #1847969)
  * [Packaging] add rules to build FIT image
  * [Packaging] force creation of headers directory
* bcache: Performance degradation when querying priority_stats (LP: #1840043)
  * bcache: add cond_resched() in __bch_cache_cmp()
* Add installer support for iwlmvmm adapters (LP: #1848236)
  * d-i: Add iwlmvmm to nic-modules
* Check for CPU Measurement sampling (LP: #1847590)
  * s390/cpumsf: Check for CPU Measurement sampling
* [CML-U] Comet lake platform need ISH driver support (LP: #1843775)
  * HID: intel-ish-hid: Add Comet Lake PCI device ID
* intel-lpss driver conflicts with write-combining MTRR region (LP: #1845584)
  * SAUCE: mfd: intel-lpss: add quirk for Dell XPS 13 7390 2-in-1
* Fix non-working Realtek USB ethernet after system resume (LP: #1847063)
  * r8152: remove extra action copying ethernet address
  * r8152: Refresh MAC address during USBDEVFS_RESET
- r8152: Set macpassthru in reset_resume callback
- *Ubuntu 18.04 - wrong cpu-mf counter number (LP: #1847109)
- s390/cpum Cf: correct counter number of LAST_HOST_TRANSLATIONS
- *PM / hibernate: fix potential memory corruption (LP: #1847118)
- PM / hibernate: memory_bm_find_bit(): Tighten node optimisation
- *Microphone-Mute keyboard LED is always on/off on Dell Latitude 3310
  - (LP: #1846453)
- platform/x86: dell-laptop: Add 2-in-1 devices to the DMI whitelist
- platform/x86: dell-laptop: Removed duplicates in DMI whitelist
- *xHCI on AMD Stoney Ridge cannot detect USB 2.0 or 1.1 devices.
  - (LP: #1846470)
- x86/PCI: Avoid AMD FCH XHCI USB PME# from D0 defect
- *CVE-2019-15098
  - ath6kl: fix a NULL-ptr-deref bug in ath6kl_usb_alloc_urb_from_pipe()
  - tpm: use tpm_try_get_ops() in tpm-sysfs.c.
  - tpm: Fix TPM 1.2 Shutdown sequence to prevent future TPM operations
  - drm/bridge: tc358767: Increase AUX transfer length limit
  - drm/panel: simple: fix AUO g185han01 horizontal blanking
  - video: ssd1307fb: Start page range at page_offset
  - drm/stm: attach gem fence to atomic state
  - drm/radeon: Fix EEH during kexec
  - gpu: drm: radeon: Fix a possible null-pointer dereference in
    radeon_connector_set_property()
  - ipmi_si: Only schedule continuously in the thread in maintenance mode
  - clk: qoriq: Fix -Wunused-const-variable
  - clk: sunxi-ng: v3s: add missing clock slices for MMC2 module clocks
  - clk: sirf: Don't reference clk_init_data after registration
  - clk: zx296718: Don't reference clk_init_data after registration
  - powerpc/xmon: Check for HV mode when dumping XIVE info from OPAL
  - powerpc/rtas: use device model APIs and serialization during LPM
  - powerpc/futex: Fix warning: 'oldval' may be used uninitialized in this function
  - powerpc/pseries/mobility: use cond_resched when updating device tree
  - pinctrl: tegra: Fix write barrier placement in pmx_writel
  - vfio_pci: Restore original state on release
  - drm/nouveau/volt: Fix for some cards having 0 maximum voltage
  - drm/amdgpu/si: fix ASIC tests
  - powerpc/64s/exception: machine check use correct cfar for late handler
  - powerpc/pseries: correctly track irq state in default idle
  - arm64: fix unreachable code issue with cmpxchg
  - clk: at91: select parent if main oscillator or bypass is enabled
- scsi: core: Reduce memory required for SCSI logging
- dma-buf/sw_sync: Synchronize signal vs syncpt free
- MIPS: tbex: Explicitly cast _PAGE_NO_EXEC to a boolean
- i2c-cht-wc: Fix lockdep warning
- PCI: tegra: Fix OF node reference leak
- livepatch: Nullify obj->mod in klp_module_coming()’s error path
- ARM: 8898/1: mm: Don’t treat faults reported from cache maintenance as
  writes
- rtc: snvs: fix possible race condition
- HID: apple: Fix stuck function keys when using FN
- PCI: rockchip: Propagate errors for optional regulators
- PCI: imx6: Propagate errors for optional regulators
- PCI: exynos: Propagate errors for optional PHYs
- security: smack: Fix possible null-pointer dereferences in
  smack_socket_sock_rcv_skb()
- ARM: 8903/1: ensure that usable memory in bank 0 starts from a PMD-aligned
  address
- fat: work around race with userspace’s read via blockdev while mounting
- pktcdvd: remove warning on attempting to register non-passthrough dev
- hypfs: Fix error number left in struct pointer member
- kbuild: clean compressed initramfs image
- ocfs2: wait for recovering done after direct unlock request
- kmemleak: increase DEBUG_KMEMLEAK_EARLY_LOG_SIZE default to 16K
- bpf: fix use after free in prog symbol exposure
- cxgb4: Fix out-of-bounds MSI-X info array access
- erspan: remove the incorrect mtu limit for erspan
- hso: fix NULL-deref on tty open
- ipv6: drop incoming packets having a v4mapped source address
- net: ipv4: avoid mixed n_redirects and rate_tokens usage
- net: qlogic: Fix memory leak in ql_alloc_large_buffers
- net: Unpublish sk from sk_reuseport_cb before call_rcu
- nfc: fix memory leak in llcp_sock_bind()
- qmi_wwan: add support for Cinterion CLS8 devices
- sch_dsmark: fix potential NULL deref in dsmark_init()
- vsock: Fix a lockdep warning in __vsock_release()
- net/rds: Fix error handling in rds_ib_add_one()
- xen-netfront: do not use ~0U as error return value for xennet_fill_frags()
- tipc: fix unlimited bundling of small messages
- sch_cbq: validate TCA_CBQ_WRROPT to avoid crash
- ipv6: Handle missing host route in __ipv6_ifa_notify
- Smack: Don’t ignore other bprm->unsafe flags if LSM_UNSAFE_PTRACE is set
- smack: use GFP_NOFS while holding inode_smack::smk_lock
- NFC: fix attrs checks in netlink interface
- kexec: bail out upon SIGKILL when allocating memory.
- drm/panel: check failure cases in the probe func
- drm/amd/display: reprogram VM config when system resume
- pinctrl: amd: disable spurious-firing GPIO IRQs
- pstore: fs superblock limits
- `pinctrl: meson-gxbb`: Fix wrong pinning definition for uart_c
- `mbox: qcom`: add APCS child device for QCS404
- `ARM: 8875/1`: Kconfig: default to AEABI w/ Clang
- `arm64: consider stack randomization for mmap base only when necessary`
- `mips: properly account for stack randomization and stack guard gap`
- `arm: properly account for stack randomization and stack guard gap`
- `arm: use STACK_TOP when computing mmap base address`

* Bionic update: upstream stable patchset 2019-10-07 (LP: #1847155)
- Revert "Bluetooth: validate BLE connection interval updates"
- `powerpc/xive`: Fix bogus error code returned by OPAL
- `IB/core`: Add an unbound WQ type to the new CQ API
- `HID: prodkeys`: Fix general protection fault during probe
- `HID: sony`: Fix memory corruption issue on cleanup.
- `HID: logitech`: Fix general protection fault caused by Logitech driver
- `HID: hidraw`: Fix invalid read in hidraw_ioctl
- `mtd: cfi_cmdset_0002`: Use chip_good() to retry in do_write_oneword()
- `crypto: talitos`: fix missing break in switch statement
- `iwllwifi: mvm`: send BCAST management frames to the right station
- `media: tvp5150`: fix switch exit in set control handler
- `ASoC: fsl`: Fix of-node refcount unbalance in fsl_ssi_probe_from_dt()
- `arm64: kpti`: Whitelist Cortex-A CPUs that don't implement the CSV3 field
- `ALSA: hda`: Add laptop imic fixup for ASUS M9V laptop
- `ALSA: hda`: Apply AMD controller workaround for Raven platform
- `objtool`: Clobber user CFLAGS variable
- `pinctrl: sprd`: Use define directive for sprd_pinconf_params values
- `power: supply: sysfs`: ratelimit property read error message
- `irqchip/gic-v3-its`: Fix LPI release for Multi-MSI devices
- `f2fs: check`: all the data segments against all node ones
- `PCI: hv`: Avoid use of hv_pci_dev->pci_slot after freeing it
- `blk-mq`: move cancel of requeue_work to the front of blk_exit_queue
- Revert "f2fs: avoid out-of-range memory access"
- `dm zoned`: fix invalid memory access
- `f2fs: fix`: to do sanity check on segment bitmap of LFS curseg
- `drm`: Flush output polling on shutdown
- `net`: don't warn in inet diag when IPv6 is disabled
- `ACPI: video`: Add new hw_changes_brightness quirk, set it on PB Easynote MZ35
- `xfs`: don't crash on null attr fork xfs_bmapi_read
- `Bluetooth: btrtl`: Additional Realtek 8822CE Bluetooth devices
- `f2fs: use`: generic EFSCORRUPTED
- `arcnet: provide`: a buffer big enough to actually receive packets
- `cdc_ncm`: fix divide-by-zero caused by invalid wMaxPacketSize
- `macsec: drop`: skb sk before calling gro_cells_receive
- `net/phy`: fix DP83865 10 Mbps HDX loopback disable function
- `net: qrtr`: Stop rx_worker before freeing node
- `net/sched: act_sample`: don't push mac header on ip6gre ingress
- `net_sched: add`: max len check for TCA_KIND
- `openvswitch: change`: type of UPCALL_PID attribute to NLA_UNSPEC
+ - ppp: Fix memory leak in ppp_write
+ - sch_netem: fix a divide by zero in tabledist()
+ - skge: fix checksum byte order
+ - usbnet: ignore endpoints with invalid wMaxPacketSize
+ - usbnet: sanity checking of packet sizes and device mtu
+ - net/mlx5: Add device ID of upcoming BlueField-2
+ - mlSDN: enforce CAP_NET_RAW for raw sockets
+ - appletalk: enforce CAP_NET_RAW for raw sockets
+ - ax25: enforce CAP_NET_RAW for raw sockets
+ - ieee802154: enforce CAP_NET_RAW for raw sockets
+ - nfc: enforce CAP_NET_RAW for raw sockets
+ - ALSA: hda: Flush interrupts on disabling
+ - regulator: lm363x: Fix off-by-one n_voltages for lm3632 ldo_vpos/ldo_vneg
+ - ASoC: sgtl5000: Fix charge pump source assignment
+ - dmaengine: bcm2835: Print error in case setting DMA mask fails
+ - leds: leds-lp5562 allow firmware files up to the maximum length
+ - media: dib0700: fix link error for dibx000_i2c_set_speed
+ - media: mtk-cir: lower de-glitch counter for rc-mm protocol
+ - media: exynos4-is: fix leaked of_node references
+ - media: hdppwr: Add device num check and handling
+ - media: i2c: ov5640: Check for devm_gpiod_get_optional() error
+ - sched/fair: Fix imbalance due to CPU affinity
+ - sched/core: Fix CPU controller for !RT_GROUP_SCHED
+ - x86/reboot: Always use NMI fallback when shutdown via reboot vector IPI fails
+ - x86/apic: Soft disable APIC before initializing it
+ - ALSA: hda - Show the fatal CORB/RIRB error more clearly
+ - ALSA: i2c: ak4xxx-adda: Fix a possible null pointer dereference in
  + build_ade_controls()
+ - EDAC/mc: Fix grain_bits calculation
+ - media: iguanair: add sanity checks
+ - base: soc: Export soc_device_register/unregister APIs
+ - ALSA: usb-audio: Skip bSynchAddress endpoint check if it is invalid
+ - ia64/unwind: fix double free for mod->arch.init_unw_table
+ - EDAC/altera: Use the proper type for the IRQ status bits
+ - ASoC: rsnd: don't call clk_get_rate() under atomic context
+ - md/raid1: end bio when the device faulty
+ - md: don't call spare_active in md_reap_sync_thread if all member devices
  can't work
+ - md: don't set In_sync if array is frozen
+ - ACPI / processor: don't print errors for processorIDs == 0xff
+ - EDAC, pnd2: Fix ioremap() size in dnv_rd_reg()
+ - efi: cper: print AER info of PCIe fatal error
+ - sched/fair: Use rq_lock/unlock in online_fair_sched_group
+ - media: gspca: zero usb_buf on error
+ - perf test vfs_getname: Disable ~/.perfconfig to get default output
+ - media: mtk-mdp: fix reference count on old device tree
+ - media: fdp1: Reduce FCP not found message level to debug
+ - media: rc: imon: Allow iMON RC protocol for ffdc 7e device
+ - dmaengine: iop-adma: use correct printk format strings
+ - perf record: Support aarch64 random socket_id assignment
+ - media: i2c: ov5645: Fix power sequence
+ - media: omap3isp: Don't set streaming state on random subdevs
+ - media: imx: mipi csi-2: Don't fail if initial state times-out
+ - net: lpc-enet: fix printk format strings
+ - ARM: dts: imx7d: cl-som-imx7: make ethernet work again
+ - media: radio/si470x: kill urb on error
+ - media: hdpvr: add terminating 0 at end of string
+ - nbd: add missing config put
+ - media: dvb-core: fix a memory leak bug
+ - libperf: Fix alignment trap with xyarray contents in 'perf stat'
+ - EDAC/amd64: Recognize DRAM device type ECC capability
+ - EDAC/amd64: Decode syndrome before translating address
+ - PM / devfreq: passive: Use non-devm notifiers
+ - PM / devfreq: exynos-bus: Correct clock enable sequence
+ - media: cec-notifier: clear cec_adap in cec_notifier_unregister
+ - media: saa7146: add cleanup in hexium_attach()
+ - media: cpi2_usb: fix memory leaks
+ - media: saa7134: fix terminology around saa7134_i2c_eeprom_md7134_gate()
+ - perf trace beauty ioctl: Fix off-by-one error in cmd->string table
+ - media: ov9650: add a sanity check
+ - ASoC: es8316: fix headphone mixer volume table
+ - ACPI / CPPC: do not require the _PSD method
+ - arm64: kpti: ensure patched kernel text is fetched from PoU
+ - nvnet: fix data units read and written counters in SMART log
+ - iommu/amd: Silence warnings under memory pressure
+ - iommu/iova: Avoid false sharing on fg_timer_on
+ - libtraceevent: Change users plugin directory
+ - ARM: dts: exynos: Mark LDO10 as always-on on Peach Pit/Pi Chromebooks
+ - ACPI: custom_method: fix memory leaks
+ - ACPI / PCI: fix acpi_pci_irq_enable() memory leak
+ - hwmon: (acpi_power_meter) Change log level for 'unsafe software power cap'
+ - md/raid1: fail run raid1 array when active disk less than one
+ - dmaengine: ti: edma: Do not reset reserved pARAM slots
+ - kprobes: Prohibit probing on BUG() and WARN() address
+ - s390/crypto: xts-aes-s390 fix extra run-time crypto self tests finding
+ - ASoC: dmaengine: Make the pcm->name equal to pcm->id if the name is not set
+ - raid5: don't set STRIPE_HANDLE to stripe which is in batch list
+ - mmc: core: Clarify sdio_irq_pending flag for MMC_CAP2_SDIO_IRQ_NOTHREAD
+ - mmc: sdhci: Fix incorrect switch to HS mode
+ - raid5: don't increment read_errors on EILSEQ return
+ - libertas: Add missing sentinel at end of if_usb.c fw_table
+ - ALSA: hda - Drop unsol event handler for Intel HDMI codecs
+ - drm/amd/powerplay/smu7: enforce minimal VBITimeout (v2)
+ - media: ttusb-dec: Fix info-leak in ttusb_dec_send_command()
+ - ALSA: hda/realtek - Blacklist PC beep for Lenovo ThinkCentre M73/93
+ - btrfs: extent-tree: Make sure we only allocate extents from block groups with the same type
+ - media: omap3isp: Set device on omap3isp subdevs
+ - PM / devfreq: passive: fix compiler warning
+ - ALSA: firewire-tascam: handle error code when getting current source of clock
+ - ALSA: firewire-tascam: check intermediate state of clock status and retry
+ - scsi: scsi_dh_rdac: zero cdb in send_mode_select()
+ - printk: Do not lose last line in kmsg buffer dump
+ - IB/hfi1: Define variables as unsigned long to fix KASAN warning
+ - randstruct: Check member structs in is_pure_ops_struct()
+ - ALSA: hda/realtek - Fixup mute led on HP Spectre x360
+ - fuse: fix missing unlock_page in fuse_writepage()
+ - parisc: Disable HP HSC-PCI Cards to prevent kernel crash
+ - x86/retpolines: Fix up backport of a9d57ef15cbe
+ - KVM: x86: always stop emulation on page fault
+ - KVM: x86: set ctxt->have_exception in x86_decode_insn()
+ - KVM: x86: Manually calculate reserved bits when loading PDPTRS
+ - media: sn9c20x: Add MSI MS-1039 laptop to flip_dmi_table
+ - binfmt_elf: Do not move brk for INTERP-less ET_EXEC
+ - ASoC: Intel: NHLT: Fix debug print format
+ - ASoC: Intel: Skylake: Use correct function to access iomem space
+ - ASoC: Intel: Fix use of potentially uninitialized variable
+ - ARM: samsung: Fix system restart on S3C6410
+ - ARM: zynq: Use memcpy_toio instead of memcpy on smp bring-up
+ - arm64: dts: rockchip: limit clock rate of MMC controllers for RK3328
+ - alarmtimer: Use EOPNOTSUPP instead of ENOTSUPP
+ - regulator: Defer init completion for a while after late_initcall
+ - gfs2: clear buf_in_tr when ending a transaction in sweep_bh_for_rgrps
+ - memcg, oom: don't require __GFP_FS when invoking memcg OOM killer
+ - memcg, knmem: do not fail __GFP_NOFAIL charges
+ - ovl: filter of trusted xattr results in audit
+ - Btrfs: fix use-after-free when using the tree modification log
+ - btrfs: Relinquish CPUs in btrfs_compare_trees
+ - btrfs: qgroup: Fix the wrong target io_tree when freeing reserved data space
+ - md/raid6: Set R5_ReadError when there is read failure on parity disk
+ - md: don't report active array_state until after revalidate_disk() completes.
+ - md: only call set_in_sync() when it is expected to succeed.
+ - cfg80211: Purge frame registrations on iftype change
+ - /dev/mem: Bail out upon SIGKILL.
+ - ext4: fix warning inside ext4_convert_unwritten_extents_endio
+ - ext4: fix punch hole for inline_data file systems
+ - quota: fix wrong condition in is_quota_modification()
+ - hwrg: core - don't wait on add_early_randomness()
+ - i2c: riic: Clear NACK in tend isr
+ - CIFS: fix max ea value size
+ - CIFS: Fix oplock handling for SMB 2.1+ protocols
+ - md/raid0: avoid RAID0 data corruption due to layout confusion.
+ - mm/compaction.c: clear total_{migrate,free}_scanned before scanning a new zone
+ - btrfs/qgroup: Drop quota_root and fs_info parameters from update_qgroup_status_item
+ - Btrfs: fix race setting up and completing qgroup rescan workers
+ - net/ibmvnic: free reset work of removed device from queue
+ - HID: Add quirk for HP X500 PIXART OEM mouse
+ - net/mlx5e: Set ECN for received packets using CQE indication
+ - net/mlx5e: don't set CHECKSUM_COMPLETE on SCTP packets
+ - mlx5: fix get_ip_proto()
+ - net/mlx5e: Allow reporting of checksum unnecessary
+ - net/mlx5e: XDP, Avoid checksum complete when XDP prog is loaded
+ - net/mlx5e: Rx, Check ip headers sanity
+ - bcache: remove redundant LIST_HEAD(journal) from run_cache_set()
+ - initramfs: don't free a non-existent inittrd
+ - blk-mq: change gfp flags to GFP_NOIO in blk_rq_realloc_hw_ctxs
+ - net/ibmvnic: Fix missing } in __ibmvnic_reset
+ - net_sched: check cops->tcf_block in tc_bind_tclass()
+ - loop: Add LOOP_SET_BLOCK_SIZE in compat ioctl
+ - loop: Add LOOP_SET_DIRECT_IO to compat ioctl
+ - perf config: Honour SPERF_CONFIG env var to specify alternate .perconfig
+ - ASoC: sun4i-i2s: Don't use the oversample to calculate BCLK
+ - posix-cpu-timers: Sanitize bogus WARNONS
+ - x86/apic/vector: Warn when vector space exhaustion breaks affinity
+ - x86/mm/pti: Do not invoke PTI functions when PTI is disabled
+ - x86/mm/pti: Handle unaligned address gracefully in pti_clone_pagetable()
+ - libata/ahci: Drop PCS quirk for Denverton and beyond
+ - x86/cpu: Add Tiger Lake to Intel family
+ - platform/x86: intel_pmc_core: Do not ioremap RAM
+ - mmc: core: Add helper function to indicate if SDIO IRQs is enabled
+ - mmc: dwmmc: Re-store SDIO IRQs mask at system resume
+ - iwlwifi: fw: don't send GEO_TX_POWER_LIMIT command to FW version 36
+ - Revert "ceph: use ceph_evict_inode to cleanup inode's resource"
+ - ceph: use ceph_evict_inode to cleanup inode's resource
+ - ALSA: hda/realtek - PCI quirk for Medion E4254
+ - smb3: allow disabling requesting leases
+ - btrfs: fix allocation of free space cache v1 bitmap pages
+ - drm/amd/display: Restore backlight brightness after system resume

-- Khalid Elmously <khalid.elmously@canonical.com>  Mon, 21 Oct 2019 13:02:37 -0400

+ + linux (4.15.0-66.75) bionic; urgency=medium
+ * bionic/linux: 4.15.0-66.75 -proposed tracker (LP: #1846131)
  + * Packaging resync (LP: #1786013)
  + - [Packaging] update helper scripts
+ * CVE-2018-21008
+ - rsi: add fix for crash during assertions
+ * ipv6: fix neighbour resolution with raw socket (LP: #1834465)
+ - ipv6: constify r6_nextmap()
+ - ipv6: fix neighbour resolution with raw socket
+ * run_netsocktests from net in ubuntu_kernel_selftests failed with X-4.15
+ (LP: #1842023)
+ - SAUCE: selftests: net: replace AF_MAX with INT_MAX in socket.c
+ * No sound inputs from the external microphone and headset on a Dell machine
+ (LP: #1842265)
+ - ALSA: hda - Expand pin_match function to match upcoming new tbls
+ - ALSA: hda - Define a fallback_pin_fixup_tbl for alc269 family
+ * Add -fcf-protection=none when using retpoline flags (LP: #1843291)
+ - SAUCE: kbuild: add -fcf-protection=none when using retpoline flags
+ * Enhanced Hardware Support - Finalize Naming (LP: #1842774)
+ - s390: add support for IBM z15 machines
+ * Bionic update: upstream stable patchset 2019-09-24 (LP: #1845266)
+ - bridge/mb: remove wrong use of NLM_F_MULTI
+ - cdc_ether: fix rndis support for Mediatek based smartphones
+ - ipv6: Fix the link time qualifier of 'ping_v6_proc_exit_net()'
+ - isdn/capi: check message length in capi_write()
+ - net: Fix null de-reference of device refcount
+ - net: gso: Fix skb_segment splat when splitting gso_size mangeld skb having
+ - linear-headed frag_list
+ - net: phylink: Fix flow control resolution
+ - sch_hhf: ensure quantum and hhf_non_hh_weight are non-zero
+ - scpt: Fix the link time qualifier of 'scpt_ctrlsock_exit()'
+ - scpt: use transport pf_retrans in scpt_do_8_2_transport_strike
+ - tcp: fix tcp_ecn_withdraw_cwr() to clear TCP_ECNO_QUEUE_CWR
+ - tipc: add NULL pointer check before calling kfree_rcu
+ - tun: fix use-after-free when register netdev failed
+ - btrfs: compression: add helper for type to string conversion
+ - btrfs: correctly validate compression type
+ - Revert "MIPS: SiByte: Enable swiotlb for SWARM, LittleSur and BigSur"
+ - gpilib: acpi: Add gpilib_acpi_run_edge_events_on_boot option and blacklist
+ - gpio: fix line flag validation in linehandle_create
+ - gpio: fix line flag validation in lineevent_create
+ - Btrfs: fix assertion failure during fsync and use of stale transaction
+ - genirq: Prevent NULL pointer dereference in resend_irsq()
+ - KVM: s390: Do not leak kernel stack data in the KVM_S390_INTERRUPT ioctl
+ - KVM: x86: work around leak of uninitialized stack contents
+ - KVM: nVMX: handle page fault in vmread
+  - MIPS: VDSO: Prevent use of smp_processor_id()
+  - MIPS: VDSO: Use same -m%-float cflag as the kernel proper
+  - powerpc: Add barrier_nospec to raw_copy_in_user()
+  - drm/meson: Add support for XBGR8888 & ABGR8888 formats
+  - clk: rockchip: Don't yell about bad mmc phases when getting
+  - mtd: rawnand: mtk: Fix wrongly assigned OOB buffer pointer issue
+  - PCI: Always allow probing with driver_override
+  - uibifs: Correctly use tnc_next() in search_db_cookie()
+  - driver core: Fix use-after-free and double free on glue directory
+  - crypto: talitos - check AES key size
+  - crypto: talitos - fix CTR alg blocksize
+  - crypto: talitos - check data blocksize in ablkcipher.
+  - crypto: talitos - fix ECB alg ivsize
+  - crypto: talitos - Do not modify req->cryptlen on decryption.
+  - crypto: talitos - HMAC SNOOP NO AFEU mode requires SW icv checking.
+  - firmware: ti_sci: Always request response from firmware
+  - drm/mediatek: mtk_drm_drv.c: Add of_node_put() before goto
+  - Revert "Bluetooth: btusb: driver to enable the usb-wakeup feature"
+  - platform/x86: pmc_atom: Add CB4063 Beckhoff Automation board to
+    critclk_systems DMI table
+  - nvmem: Use the same permissions for eceprom as for nvmem
+  - x86/build: Add -Wnoaddress-of-packed-member to REALMODE_CFLAGS, to silence
+    GCC9 build warning
+  - ixgbe: Prevent u8 wrapping of ITR value to something less than 10us
+  - x86/purgatory: Change compiler flags from -mcmodel=kernel to -mcmodel=large
+    to fix kexec relocation errors
+  - modules: fix BUG when load module with rodata=n
+  - modules: fix compile error if don’t have strict module rwx
+  - HID: wacom: generic: read HID_DG_CONTACTMAX from any feature report
+  - Input: elan_i2c - remove Lenovo Legion Y7000 PnpID
+  - powerpc/mm/radix: Use the right page size for vmemmap mapping
+  - USB: usbcore: Fix slab-out-of-bounds bug during device reset
+  - phy: renesas: rcar-gen3-usb2: Disable clearing VBUS in over-current
+  - media: tm6000: double free if usb disconnect while streaming
+  - xen-netfront: do not assume sk_buff_head list is empty in error handling
+  - net_sched: let qdisc_put() accept NULL pointer
+  - KVM: coalesced_mmiio: add bounds checking
+  - firmware: google: check if size is valid when decoding VPD data
+  - serial: sprd: correct the wrong sequence of arguments
+  - tty/serial: atmel: reschedule TX after RX was started
+  - mwifiex: Fix three heap overflow at parsing element in cfg80211_ap_settings
+  - nl80211: Fix possible Spectre-v1 for CQM RSSI thresholds
+  - ARM: OMAP2+: Fix missing SYSC_HAS_RESET_STATUS for dra7 epwmss
+  - s390/bpf: fix lcgr instruction encoding
+  - ARM: OMAP2+: Fix omap4 errata warning on other SoCs
+  - ARM: dts: dra74x: Fix iodelay configuration for mmc3
+  - s390/bpf: use 32-bit index for tail calls
+  - fpga: altera-ps-spi: Fix getting of optional confd gpio
- netfilter: xt_nfacct: Fix alignment mismatch in xt_nfacct_match_info
- NFSv4: Fix return values for nfs4_file_open()
- NFSv4: Fix return value in nfs_finish_open()
- NFS: Fix initialisation of I/O result struct in nfs_pgio_rpcsetup
- Kconfig: Fix the reference to the IDT77105 Phy driver in the description of
  ATM_NICSTAR_USE_IDT77105
- qed: Add cleanup in qed_slowpath_start()
- ARM: 8874/1: mm: only adjust sections of valid mm structures
- batman-adv: Only read OGM2 tvlv_len after buffer len check
- r8152: Set memory to all 0xFFs on failed reg reads
- x86/apic: Fix arch_dynirq_lower_bound() bug for DT enabled machines
- netfilter: nf_contrack_ftp: Fix debug output
- NFSv2: Fix eof handling
- NFSv2: Fix write regression
- kallsyms: Don't let kallsyms_lookup_size_offset() fail on retrieving the
  first symbol
- cifs: set domainName when a domain-key is used in multiuser
- cifs: Use kzfree() to zero out the password
- ARM: 8901/1: add a criteria for pfni_valid of arm
- sky2: Disable MSI on yet another ASUS boards (P6Xxxx)
- i2c: designware: Synchronize IRQs when unregistering slave client
- perf/x86/intel: Restrict period on Nehalem
- perf/x86/amd/ibs: Fix sample bias for dispatched micro-ops
- amd-xgbe: Fix error path in xgbe_mod_init()
- tools/power x86_energy_perf_policy: Fix "uninitialized variable" warnings at
  -O2
- tools/power x86_energy_perf_policy: Fix argument parsing
- tools/power turbostat: fix buffer overrun
- net: seeq: Fix the function used to release some memory in an error handling
  path
- dmaengine: ti: dma-crossbar: Fix a memory leak bug
- dmaengine: ti: omap-dma: Add cleanup in omap_dma_probe()
- x86/uaccess: Don't leak the AC flags into __get_user() argument evaluation
- x86/hyper-v: Fix overflow bug in fill_gva_list()
- keys: Fix missing null pointer check in request_key_auth_describe()
- iommu/amd: Flush old domains in kdump kernel
- iommu/amd: Fix race in increase_address_space()
- PCI: kirin: Fix section mismatch warning
- floppy: fix usercopy direction
- binfmt_elf: move brk out of mmap when doing direct loader exec
- tcp: Reset send_head when removing skb from write-queue
- tcp: Don't dequeue SYN/FIN-segments from write-queue
- media: technisat-usb2: break out of loop at end of buffer
- tools: bptool: close prog FD before exit on showing a single program
- netfilter: xt_physdev: Fix spurious error message in physdev_mt_check
- ihmvnic: Do not process reset during or after device removal
- net: aquantia: fix out of memory condition on rx side
+ * Bionic update: upstream stable patchset 2019-09-18 (LP: #1844558)
+ - ALSA: hda - Fix potential endless loop at applying quirks
+ - ALSA: hda/realtek - Fix overridden device-specific initialization
+ - ALSA: hda/realtek - Fix the problem of two front mics on a ThinkCentre
+ - sched/fair: Don't assign runtime for throttled cfs_rq
+ - drm/vmgfx: Fix double free in vmw_recv_msg()
+ - xfrm: clean up xfrm protocol checks
+ - PCI: designware-ep: Fix find_first_zero_bit() usage
+ - PCI: dra7xx: Fix legacy INTD IRQ handling
+ - vhost/test: fix build for vhost test
+ - batman-adv: fix uninit-value in batadv_netlink_get_ifindex()
+ - batman-adv: Only read OGM tvlv_len after buffer len check
+ - hv_sock: Fix hang when a connection is closed
+ - powerpc64: mark start_here multiplatform as __ref
+ - arm64: dts: rockchip: enable usb-host regulators at boot on rk3328-rock64
+ - scripts/decode_stacktrace: match basepath using shell prefix operator, not regex
+ - clk: s2mps11: Add used attribute to s2mps11_dt_match
+ - kernel/module: Fix mem leak in module_add_modinfo_attrs
+ - ALSA: hda/realtek - Enable internal speaker & headset mic of ASUS UX431FL
+ - [nl,mac]80211: fix interface combinations on crypto controlled devices
+ - x86/ftrace: Fix warning and consolidate ftrace_jmp_replace() and ftrace_call_replace()
+ - media: stm32,dcmi: fix irq = 0 case
+ - modules: always page-align module section allocations
+ - scsi: qla2xxx: Move log messages before issuing command to firmware
+ - keys: Fix the use of the C++ keyword "private" in uapi/linux/keyctl.h
+ - Drivers: hv: kvp: Fix two "this statement may fall through" warnings
+ - remoteproc: qcom: q6v5-mss: add SCM probe dependency
+ - KVM: x86: hyperv: enforce vp_index < KVM_MAX_VCPUS
+ - KVM: x86: hyperv: consistently use 'hv_vcpu' for 'struct kvm_vcpu_hv'
+ - variables
+ - drm/i915: Fix intel_dp_mst_best_encoder()
+ - drm/i915: Rename PLANE_CTL_DECOMPRESSION_ENABLE
+ - drm/i915/gen9+: Fix initial readout for Y tiled framebuffers
+ - drm/atomic_helper: Disallow new modesets on unregistered connectors
+ - Drivers: hv: kvp: Fix the indentation of some "break" statements
+ - Drivers: hv: kvp: Fix the recent regression caused by incorrect clean-up
+ - drm/amd/dm: Understand why attaching path/tile properties are needed
+ - ARM: davinci: da8xx: define gpio interrupts as separate resources
+ - ARM: davinci: dm365: define gpio interrupts as separate resources
+ - ARM: davinci: dm646x: define gpio interrupts as separate resources
+ - ARM: davinci: dm355: define gpio interrupts as separate resources
+ - ARM: davinci: dm644x: define gpio interrupts as separate resources
+ - media: vim2m: use workqueue
+ - media: vim2m: use cancel_delayed_work_sync instead of flush_schedule_work
+ - drm/i915: Restore sane defaults for KMS on GEM error load
+ - KVM: PPC: Book3S HV: Fix race between kvm_unmap_hva_range and MMU mode
Open Source Used In 5GaaS Edge AC-4  17751

+ switch
+ - Btrfs: clean up scrub is_dev_replace parameter
+ - Btrfs: fix deadlock with memory reclaim during scrub
+ - btrfs: Remove extent_io_ops::fill_delalloc
+ - btrfs: Fix error handling in btrfs_cleanun_ordered_extents
+ - scsi: megaraid_sas: Fix combined reply queue mode detection
+ - scsi: megaraid_sas: Add check for reset adapter bit
+ - media: vim2m: only cancel work if it is for right context
+ - ARC: show_regs: lockdep: re-enable preemption
+ - ARC: mm: do_page_fault fixes #1: relinquish mmap_sem if signal arrives while handle_mm_fault
+ - IB/uverbs: Fix OOPs upon device disassociation
+ - drm/vblank: Allow dynamic per-crtc max_vblank_count
+ - drm/i915/ilk: Fix warning when reading emon_status with no output
+ - mfd: Kconfig: Fix I2C_DESIGNWARE_PLATFORM dependencies
+ - tpm: Fix some name collisions with drivers/char/tpm.h
+ - bcache: replace hard coded number with BUCKET_GC_GEN_MAX
+ - bcache: treat stale && dirty keys as bad keys
+ - KVM: VMX: Compare only a single byte for VMCS' "launched" in vCPU-run
+ - iio: adc: exynos-adc: Add S5PV210 variant
+ - iio: adc: exynos-adc: Use proper number of channels for Exynos4x12
+ - drm/nouveau: Don't WARN_ON VCPI allocation failures
+ - x86/kvmclock: set offset for kvm unstable clock
+ - powerpc/kvm: Save and restore host AMR/IAMR/UAMOR
+ - mmc: renesas_sdhi: Fix card initialization failure in high speed mode
+ - btrfs: scrub: pass fs_info to scrub_setup_ctx
+ - btrfs: init csum_list before possible free
+ - PCI: qcom: Don't deassert reset GPIO during probe
+ - drm: add __user attribute to ptr_to_compat()
+ - CIFS: Fix error paths in writeback code
+ - CIFS: Fix leaking locked VFS cache pages in writeback retry
+ - drm/i915: Handle vm_mmap error during I915_GEM_MMAP ioctl with WC set
+ - drm/i915: Sanity check mmap length against object size
+ - IB/mlx5: Reset access mask when looping inside page fault handler
+ - kvm: mmu: Fix overflow on kvm mmu page limit calculation
+ - x86/kvm: move kvm_load/put_guest_xcr0 into atomic context
+ - KVM: x86: Always use 32-bit SMRAM save state for 32-bit kernels
+ - cifs: Fix lease buffer length error
+ - ext4: protect journal inode's blocks using block_validity
+ - dm mpath: fix missing call of path selector type->end_io
+ - blk-mq: free hw queue's resource in hctx's release handler
+ - mmc: sdhci-pci: Add support for Intel ICP
+ - mmc: sdhci-pci: Add support for Intel CML
+ - dm crypt: move detailed message into debug level
+ - kvm: Check irqchip mode before assign irqfd
+ - drm/amdgpu: fix ring test failure issue during s3 in vce 3.0 (V2)
+ - drm/amdgpu/uvd,vcn): fetch ring's read_ptr after alloc
+ - Btrfs: fix race between block group removal and block group allocation
+ - cifs: add spinlock for the openFileList to cifs_inodeInfo
+ - IB/hfi1: Avoid hardlockup with flushlist_lock
+ - apparmor: reset pos on failure to unpack for various functions
+ - staging: wile1000: fix error path cleanup in wile_wlan_initialize()
+ - scsi: zfcp: fix request object use-after-free in send path causing wrong traces
+ - cifs: Properly handle auto disabling of serverino option
+ - ceph: use ceph_evict_inode to cleanup inode's resource
+ - KVM: x86: optimize check for valid PAT value
+ - KVM: VMX: Always signal #GP on WRMSR to MSR_IA32_CR_PAT with bad value
+ - KVM: VMX: Fix handling of #MC that occurs during VM-Entry
+ - KVM: VMX: check CPUID before allowing read/write of IA32_XSS
+ - resource: Include resource end in walk_*() interfaces
+ - resource: Fix find_next_iomem_res() iteration issue
+ - resource: fix locking in find_next_iomem_res()
+ - pstore: Fix double-free in pstore_mkfile() failure path
+ - dm thin metadata: check if in fail io mode when setting needs_check
+ - drm/panel: Add support for Armadeus ST0700 Adapt
+ - ALSA: hda - Fix intermittent CORB/RIRB stall on Intel chips
+ - iommu/iova: Remove stale cached32_node
+ - gpio: don't WARN() on NULL descs if gpiolib is disabled
+ - i2c: at91: disable TXRDY interrupt after sending data
+ - i2c: at91: fix clk_offset for sama5d2
+ - mm/migrate.c: initialize pud_entry in migrate_vma()
+ - iio: adc: gyroadc: fix uninitialized return code
+ - NFSv4: Fix delegation state recovery
+ - bcache: only clear BTREE_NODE_dirty bit when it is set
+ - bcache: add comments for mutex_lock(&b->write_lock)
+ - virtio/s390: fix race on irq_areas[]
+ - ext4: don't perform block validity checks on the journal inode
+ - ext4: fix block validity checks for journal inodes using indirect blocks
+ - ext4: unsigned int compared against zero
+ - powerpc/tm: Remove msr_tm_active()

* Bionic update: upstream stable patchset 2019-09-10 (LP: #1843463)
+ - hv_netvsc: Fix a warning of suspicious RCU usage
+ - net: tc35815: Explicitly check NET_IP_ALIGN is not zero in tc35815_rx
+ - Bluetooth: btqca: Add a short delay before downloading the NVM
+ - ibmveth: Convert multicast list size for little-endian system
+ - gpio: Fix build error of function redefinition
+ - drm/mediatek: use correct device to import PRIME buffers
+ - drm/mediatek: set DMA max segment size
+ - cxgb4: fix a memory leak bug
+ - liquidio: add cleanup in octeon_setup_iq()
+ - net: myri10ge: fix memory leaks
+ - lan78xx: Fix memory leaks
- vfs: fix page locking deadlocks when deduping files
- cx82310_eth: fix a memory leak bug
- net: kalma: fix memory leaks
- wimax/i2400m: fix a memory leak bug
- ravb: Fix use-after-free ravb_tstamp_skb
- kprobes: Fix potential deadlock in kprobe_optimizer()
- HID: cp2112: prevent sleeping function called from invalid context
- Input: hyperv-keyboard: Use in-place iterator API in the channel callback
- Tools: hv: kvp: eliminate 'may be used uninitialized' warning
- IB/mlx4: Fix memory leaks
- ceph: fix buffer free while holding i_ceph_lock in __ceph_setxattr()
- ceph: fix buffer free while holding i_ceph_lock in
  __ceph_build_xattr_blob()
- ceph: fix buffer free while holding i_ceph_lock in fill_inode()
- KVM: arm/arm64: Only skip MMIO insn once
- libceph: allow ceph_buffer_put() to receive a NULL ceph_buffer
- spi: bcm2835aux: unifying code between polling and interrupt driven code
- spi: bcm2835aux: remove dangerous uncontrolled read of fifo
- spi: bcm2835aux: fix corruptions for longer spi transfers
- net: fix skb use after free in netpoll
- net_sched: fix a NULL pointer deref in ipt action
- net: stmmac: dwmac-rk: Don't fail if phy regulator is absent
- tcp: inherit timestamp on mtu probe
- tcp: remove empty skb from write queue in error cases
- net_sched: act_sample: fix psample group handling on overwrite
- mld: fix memory leak in mld_del_delrec()
- x86/boot: Preserve boot_params.secure_boot from sanitizing
- tools: bpftool: fix error message (prog -> object)
- scsi: qla2xxx: Fix gnl.l memory leak on adapter init failure
- afs: Fix leak in afs_lookup_cell_rcu()

* Bionic update: upstream stable patchset 2019-09-09 (LP: #1843338)
- dmaengine: ste_dma40: fix unneeded variable warning
- auxdisplay: panel: need to delete scan_timer when misc_register fails in
  panel_attach
- iommu/dma: Handle SG length overflow better
- usb: gadget: composite: Clear "suspended" on reset/disconnect
- usb: gadget: mass_storage: Fix races between fsg_disable and fsg_set_alt
- xen/blkback: fix memory leaks
- i2c: rcar: avoid race when unregistering slave client
- i2c: emev2: avoid race when unregistering slave client
- drm/ast: Fixed reboot test may cause system hanged
- usb: host: fotg2: restart hcd after port reset
- tools: hv: fix KVP and VSS daemons exit code
- watchdog: bcm2835_wdt: Fix module autolload
- drm/bridge: tlp410: fix memleak in get_modes()
- scsi: ufs: Fix RX_TERMINATION_FORCE_ENABLE define value
- drm/tilcdc: Register cpufreq notifier after we have initialized crtc
+ - ALSA: usb-audio: Fix a stack buffer overflow bug in check_input_term
+ - ALSA: usb-audio: Fix an OOB bug in parse_audio_mixer_unit
+ - net/smc: make sure EPOLLOUT is raised
+ - tcp: make sure EPOLLOUT wont be missed
+ - mm/zmalloc.c: fix build when CONFIG_COMPACTION=n
+ - ALSA: line6: Fix memory leak at line6_init_pcm() error path
+ - ALSA: seq: Fix potential concurrent access to the deleted pool
+ - kvm: x86: skip populating logical dest map if apic is not sw enabled
+ - KVM: x86: Don't update RIP or do single-step on faulting emulation
+ - x86/apic: Do not initialize LDR and DFR for bigsm
+ - ftrace: Fix NULL pointer dereference in t_probe_next()
+ - ftrace: Check for successful allocation of hash
+ - ftrace: Check for empty hash and comment the race with registering probes
+ - usb-storage: Add new JMS567 revision to unusual_devs
+ - USB: cdc-wdm: fix race between write and disconnect due to flag abuse
+ - usb: chipidea: udc: don't do hardware access if gadget has stopped
+ - usb: host: ohci: fix a race condition between shutdown and irq
+ - usb: host: xhci: rear: Fix typo in compatible string matching
+ - USB: storage: ums-realtek: Update module parameter description for
  auto_delink_en
+ - uprobes/x86: Fix detection of 32-bit user mode
+ - mmc: sdhci-of-at91: add quirk for broken HS200
+ - mmc: core: Fix init of SD cards reporting an invalid VDD range
+ - stm class: Fix a double free of stm_source_device
+ - intel_th: pci: Add support for another Lewisburg PCH
+ - intel_th: pci: Add Tiger Lake support
+ - drm/i915: Don't deballon unused ggtt drm_mm_node in linux guest
+ - VMCI: Release resource if the work is already queued
+ - crypto: ccp - Ignore unconfigured CCP device on suspend/resume
+ - Revert "cfg80211: fix processing world regdomain when non modular"
+ - mac80211: fix possible sta leak
+ - KVM: PPC: Book3S: Fix incorrect guest-to-user-translation error handling
+ - KVM: arm/arm64: vgic: Fix potential deadlock when ap_list is long
+ - KVM: arm/arm64: vgic-v2: Handle SGI bits in GICD_I{S,C}PENDR0 as WI
+ - NFS: Clean up list moves of struct nfs_page
+ - NFSv4/pnfs: Fix a page lock leak in nfs_pageio_resend()
+ - NFS: Pass error information to the pgio error cleanup routine
+ - NFS: Ensure O_DIRECT reports an error if the bytes read/written is 0
+ - i2c: piix4: Fix port selection for AMD Family 16h Model 30h
+ - x86/ptrace: fix up botched merge of spectrev1 fix
+ - Revert "ASoC: Fail card instantiation if DAI format setup fails"
+ - nvme-multipath: revalidate nvme_ns_head gendisk in nvme_validate_ns
+ - afs: Fix the CB.ProbeUuid service handler to reply correctly
+ - dmaengine: stm32-mdma: Fix a possible null-pointer dereference in
  stm32_mdma_irq_handler()
+ - omap-dma/omap_vout_vrfb: fix off-by-one fi value
+ - arm64: cpufeature: Don't treat granule sizes as strict
+ - tools: hv: fixed Python pep8/flake8 warnings for lsvmbus
+ - ipv4/icmp: fix rt dst dev null pointer dereference
+ - ALSA: hda - Fixes inverted Conexant GPIO mic mute led
+ - usb: hcd: use managed device resources
+ - lib: logic_pio: Fix RCU usage
+ - lib: logic_pio: Avoid possible overlap for unregistering regions
+ - lib: logic_pio: Add logic_pio_unregister_range()
+ - drm/amdgpu: Add APTX quirk for Dell Latitude 5495
+ - drm/i915: Call dma_set_max_seg_size() in i915_driver_hw_probe()
+ - bus: hisi_lpc: Unregister logical PIO range to avoid potential use-after-free
  
+ * New ID in ums-realtek module breaks cardreader (LP: #1838886) // Bionic
  update: upstream stable patchset 2019-09-09 (LP: #1843338)
+ - USB: storage: ums-realtek: Whitelist auto-delink support
  
+ * TC filters are broken on Mellanox after upstream stable updates
  (LP: #1842502)
+ - net/mlx5e: Remove redundant vport context vlan update
+ - net/mlx5e: Properly order min inline mode setup while parsing TC matches
+ - net/mlx5e: Get the required HW match level while parsing TC flow matches
+ - net/mlx5e: Always use the match level enum when parsing TC rule match
+ - net/mlx5e: Don't match on vlan non-existence if ethertype is wildcarded
  
+ -- Khalid Elmously <khalid.elmously@canonical.com>  Mon, 30 Sep 2019 23:02:24 -0400

+linux (4.15.0-65.74) bionic; urgency=medium

+ * bionic/linux: 4.15.0-65.74 -proposed tracker (LP: #1844403)

+ * arm64: large modules fail to load (LP: #1841109)
+ - arm64/kernel: kaslr: reduce module randomization range to 4 GB
+ - arm64/kernel: don't ban ADRP to work around Cortex-A53 erratum #843419
  
+ - arm64/kernel: fix undefined reference to 'printk'
+ - arm64/kernel: rename module_emit_adrp_veneer->module_emit_veneer_for_adrp
+ - [config] Remove CONFIG_ARM64_MODULE_CMODEL_LARGE

+ * CVE-2018-20976
+ - xfs: clear sb->s_fs_info on mount failure

+ * br_netfilter: namespace sysctl operations (LP: #1836910)
+ - net: bridge: add bitfield for options and convert vlan opts
+ - net: bridge: convert nf call options to bits
+ - netfilter: bridge: port sysctls to use brmf_net
+ - netfilter: bridge: namespace bridge netfilter sysctls
+ - netfilter: bridge: prevent UAF in brmf_exit_net()

+ * tuntap: correctly set SOCKWQ_ASYNC_NOSPACF (LP: #1830756)
+ - tuntap: correctly set SOCKWQ_ASYNC_NOSPACF
+ * Bionic update: upstream stable patchset 2019-08-30 (LP: #1842114)
+ - HID: Add 044f:b320 ThrustMaster, Inc. 2 in 1 DT
+ - MIPS: kernel: only use i8253 clocksource with periodic clockevent
+ - mips: fix cachefifo
+ - netfilter: ebtables: fix a memory leak bug in compat
+ - ASoC: dapm: Fix handling of custom_stop_condition on DAPM graph walks
+ - bonding: Force slave speed check after link state recovery for 802.3ad
+ - can: dev: call netif_carrier_off() in register_candev()
+ - ASoC: Fail card instantiation if DAI format setup fails
+ - st21nfca_connectivity_event_received: null check the allocation
+ - st_nci_hci_connectivity_event_received: null check the allocation
+ - ASoC: ti: davinci-mcasp: Correct slot_width posed constraint
+ - net: usb: qmi_wwan: Add the BroadMobi BM818 card
+ - qed: RDMA - Fix the hw_ver returned in device attributes
+ - isdn: mISDN: fix ISDN null check dereferences in
+ start_isoc_chain()
+ - netfilter: ipset: Fix rename concurrency with listing
+ - isdn: hfcsusb: Fix mISDN driver crash caused by transfer buffer on the stack
+ - perf bench numa: Fix cpu0 binding
+ - can: sja1000: force the string buffer NULL-terminated
+ - can: peak_usb: force the string buffer NULL-terminated
+ - net/ethernet/qlogic/qed: force the string buffer NULL-terminated
+ - NFSv4: Fix sleep while atomic in nfs4_do_reclaim()
+ - HID: input: fix a4tech horizontal wheel custom usage
+ - SMB3: Kernel oops mounting a encryptData share with CONFIG_DEBUG_VIRTUAL
+ - net: cxgb3_main: Fix a resource leak in a error path in 'init_one()'
+ - net: hisilicon: make hip04_tx_reclain non-reentrant
+ - net: hisilicon: fix hip04-xmit never return TX_BUSY
+ - net: hisilicon: Fix dma_map_single failed on arm64
+ - libata: have ata_scsi_rw_xlat() fail invalid passthrough requests
+ - libata: add SG safety checks in SFF pio transfers
+ - x86/lib/cpu: Address missing prototypes warning
+ - drm/vmwgfx: fix memory leak when too many retries have occurred
+ - perf ftrace: Fix failure to set cpumask when only one cpu is present
+ - perf cpumap: Fix writing to illegal memory in handling cpumap mask
+ - perf pmu-events: Fix missing "cpu_clk_unhalted.core" event
+ - selftests: kvm: Adding config fragments
+ - HID: wacom: correct misreported EKR ring values
+ - HID: wacom: Correct distance scale for 2nd-gen Intuos devices
+ - Revert "dm bufio: fix deadlock with loop device"
+ - ceph: don't try fill file_lock on unsuccessful GETFILELOCK reply
+ - libceph: fix PG split vs OSD (re)connect race
+ - drm/nouveau: Don't retry infinitely when receiving no data on i2c over AUX
+ - gpioilib: never report open-drain/source lines as 'input' to user-space
+ - userfaultfd_release: always remove ufffd flags and clear vm_userfaultfd_ctl
+ - x86/retpoline: Don't clobber RFLAGS during CALL_NOSPEC on i386
+ - x86/apic: Handle missing global clockevent gracefully
- x86/CPU/AMD: Clear RDRAND CPUID bit on AMD family 15h/16h
- x86/boot: Save fields explicitly, zero out everything else
- x86/boot: Fix boot regression caused by bootparam sanitizing
- dm kcopyd: always complete failed jobs
- dm btree: fix order of block initialization in btree_split_beneath
- dm space map metadata: fix missing store of apply_bops() return value
- dm table: fix invalid memory accesses with too high sector number
- dm zoned: improve error handling in reclaim
- dm zoned: improve error handling in i/o map code
- dm zoned: properly handle backing device failure
- genirq: Properly pair kobject_del() with kobject_add()
- mm, page_owner: handle THP splits correctly
- mm/zsmalloc.c: migration can leave pages in ZS_EMPTY indefinitely
- mm/zsmalloc.c: fix race condition in zs_destroy_pool
- xfs: fix missing ILOCK unlock when xfs_setattr_nonsize fails due to EDQUOT
- dm zoned: fix potential NULL dereference in dmz_do_reclaim()
- powerpc: Allow flush_(inval_)dcache_range to work across ranges >4GB
- can: mcp251x: add error check when qw alloc failed
- netfilter: ipset: Actually allow destination MAC address for hash:ip,mac
  sets too
- netfilter: ipset: Copy the right MAC address in bitmap:ip,mac and
  hash:ip,mac sets too
- rxrpc: Fix the lack of notification when sendmsg() fails on a DATA packet
- phy: phyLed_trigger: Fix a possible null-pointer dereference in
  phyLed_trigger_change_speed()
- NFS: Fix regression whereby fscache errors are appearing on 'nofsc' mounts
- stmmac: Fix issues when number of Queues >= 4
- KVM: arm64: Don't write junk to sysregs on reset
- KVM: arm: Don't write junk to CP15 registers on reset
- xfs: don't trip over uninitialized buffer on extent read of corrupted inode
- xfs: Add helper function xfs_attr_try_sf_addname
- xfs: Add attribute remove and helper functions

* Bionic update: upstream stable patchset 2019-08-27 (LP: #1841652)
- sh: kernel: hw_breakpoint: Fix missing break in switch statement
- mm/usercopy: use memory range to be accessed for wraparound check
- mm/memcontrol.c: fix use after free in mem_cgroup_iter()
- bpf: get rid of pure_initcall dependency to enable jits
- bpf: restrict access to core bpf sysctls
- bpf: add bpf_jit_limit knob to restrict unpriv allocations
- xtensa: add missing isync to the cpu_reset TLB code
- ALSA: hda - Apply workaround for another AMD chip 1022:1487
- ALSA: hda - Fix a memory leak bug
- HID: holtek: test for sanity of intfdata
- HID: hiddev: avoid opening a disconnected device
- HID: hiddev: do cleanup in failure of opening a device
- Input: kbtab - sanity check for endpoint type
+ - Input: iforce - add sanity checks
+ - net: usb: pegasus: fix improper read if get_registers() fail
+ - netfilter: ebtuples: also count base chain policies
+ - clk: at91: generated: Truncate divisor to GENERATED_MAX_DIV + 1
+ - clk: renesas: cpq-mssr: Fix reset control race condition
+ - xen/pciback: remove set but not used variable 'old_state'
+ - irqchip/gic-v3-its: Free unused vpt_page when alloc vpe table fail
+ - irqchip/irq-imx-gpcv2: Forward irq type to parent
+ - perf header: Fix divide by zero error if f_header.attr_size==0
+ - perf header: Fix use of uninitialized value warning
+ - libata: zpodd: Fix small read overflow in zpodd_get_mech_type()
+ - drm/bridge: lvdsc-encoder: Fix build error while CONFIG_DRM_KMS_HELPER=m
+ - scsi: hpsa: correct scsi command status issue after reset
+ - scsi: qla2xxx: Fix possible fport null-pointer dereferences
+ - ata: libahci: do not complain in case of deferred probe
+ - kbuild: modpost: handle KBUILD_EXTRA_SYMBOLS only for external modules
+ - arm64/efi: fix variable 'si' set but not used
+ - arm64: unwind: Prohibit probing on return_address()
+ - arm64/mm: fix variable 'pud' set but not used
+ - IB/core: Add mitigation for Spectre V1
+ - IB/mad: Fix use-after-free in ib mad completion handling
+ - drm: msm: Fix add_gpu_components
+ - ofcs2: remove set but not used variable 'last_hash'
+ - asm-generic: fix -Wtype-limits compiler warnings
+ - KVM: arm/arm64: Sync ICH_VMCR_EL2 back when about to block
+ - staging: comed: dt3000: Fix signed integer overflow 'divider * base'
+ - staging: comed: dt3000: Fix rounding up of timer divisor
+ - iio: adc: max9611: Fix temperature reading in probe
+ - USB: core: Fix races in character device registration and deregistraion
+ - usb: gadget: udc: renesas_usb3: Fix sysfs interface of "role"
+ - usb: cdc-acm: make sure a refcount is taken early enough
+ - USB: CDC: fix sanity checks in CDC union parser
+ - USB: serial: option: add D-Link DWM-222 device ID
+ - USB: serial: option: Add support for ZTE MF871A
+ - USB: serial: option: add the BroadMobi BM818 card
+ - USB: serial: option: Add Motorola modem UARTs
+ - bpf: fix bpf_jit_limit knob for PAGE_SIZE >= 64K
+ - arm64: ftrace: Ensure module ftrace trampoline is coherent with I-side
+ - netfilter: conntrack: Use consistent ct id hash calculation
+ - Input: psmouse - fix build error of multiple definition
+ - iommu/amd: Move iommu_init_pci() to .init section
+ - bnx2x: Fix VF's VLAN reconfiguration in reload.
+ - net/mlx4_en: fin a memory leak bug
+ - net/packet: fix race in tpacket_snd()
+ - sctp: fix the transport error_count check
+ - xen/netback: Reset nr_frags before freeing skb
+ - net/mlx5e: Only support tx/rx pause setting for port owner
+ - net/mlx5e: Use flow keys dissector to parse packets for ARFS
+ - team: Add vlan tx offload to hw_enc_features
+ - bonding: Add vlan tx offload to hw_enc_features
+ - mmc: sdhci-of-arasan: Do now show error message in case of deffered probe
+ - xfrm: policy: remove pcpu policy cache
+ - mm/hmm: fix bad subpage pointer in try_to_unmap_one
+ - mm: mempolicy: make the behavior consistent when MPOL_MF_MOVE* and MPOL_MF STRICT were specified
+ - mm: mempolicy: handle vma with unmovable pages mapped correctly in mbind
+ - riscv: Make __fstate_clean() work correctly.
+ - Revert "kmemleak: allow to coexist with fault injection"
+ - scpt: fix memleak in sctp_send_reset_streams
+
+ * Bionic update: upstream stable patchset 2019-08-16 (LP: #1840520)
+ - iio: adc: max9611: Fix misuse of GENMASK macro
+ - crypto: ccp - Fix oops by properly managing allocated structures
+ - crypto: ccp - Ignore tag length when decrypting GCM ciphertext
+ - usb: usbfs: fix double-free of usb memory upon submiturb error
+ - usb: iowarrior: fix deadlock on disconnect
+ - sound: fix a memory leak bug
+ - mmc: cavium: Set the correct dma max segment size for mmc_host
+ - mmc: cavium: Add the missing dma unmap when the dma has finished.
+ - loop: set PF_MEMALLOC_NOIO for the worker thread
+ - Input: synaptics - enable RMI mode for HP Spectre X360
+ - ldltm: support llvm-objcopy
+ - crypto: ccp - Validate buffer lengths for copy operations
+ - crypto: ccp - Add support for valid authsize values less than 16
+ - perf annotate: Fix s390 gap between kernel end and module start
+ - perf db-export: Fix thread__exec_comm()
+ - perf record: Fix module size on s390
+ - usb: host: xhci-rcar: Fix timeout in xhci_suspend()
+ - usb: yurex: Fix use-after-free in yurex_delete
+ - can: rcar_confed: fix possible IRQ storm on high load
+ - can: peak_usb: fix potential double kfree_skb()
+ - netfilter: nfnetlink: avoid deadlock due to synchronous request_module
+ - vfio-cw: Set pa_nr to 0 if memory allocation fails for pa_iova_pfn
+ - netfilter: Fix rpfilter dropping vrf packets by mistake
+ - netfilter: nft_hash: fix symhash with modulus one
+ - scripts/sphinx-pre-install: fix script for RHEL/CentOS
+ - iscsi_ibft: make ISCSI_IBFT dependson ACPI instead of ISCSI_IBFT_FIND
+ - mac80211: don't warn about CW params when not using them
+ - hwmon: (nct6775) Fix register address and added missed tolerance for nct6106
+ - drm: silence variable 'conn' set but not used
+ - cpufreq/pasemi: fix use-after-free in pas_cpufreq_cpu_init()
+ - s390/qdio: add sanity checks to the fast-requeue path
+ - ALSA: compress: Fix regression on compressed capture streams
+ - ALSA: compress: Prevent bypasses of set_params
+ - ALSA: compress: Don't allow paritial drain operations on capture streams
+ - ALSA: compress: Be more restrictive about when a drain is allowed
+ - perf tools: Fix proper buffer size for feature processing
+ - perf probe: Avoid calling freeing routine multiple times for same pointer
+ - drbd: dynamically allocate shash descriptor
+ - ACPI/IORT: Fix off-by-one check in iort_dev_find_its_id()
+ - ARM: davinci: fix sleep.S build error on ARMv4
+ - scsi: megaraid_sas: fix panic on loading firmware crashdump
+ - scsi: ibmvfc: fix WARN_ON during event pool release
+ - scsi: scsi_dh_alua: always use a 2 second delay before retrying RTPG
+ - test_firmware: fix a memory leak bug
+ - tty/ldsem, locking/rwsem: Add missing ACQUIRE to read_failed sleep loop
+ - perf/core: Fix creating kernel counters for PMUs that override event->cpu
+ - HID: sony: Fix race condition between rumble and device remove.
+ - can: peak_usb: pcan_usb_pro: Fix info-leaks to USB devices
+ - can: peak_usb: pcan_usb_fd: Fix info-leaks to USB devices
+ - hwmon: (nct7802) Fix wrong detection of in4 presence
+ - drm/i915: Fix wrong escape clock divisor init for GLK
+ - ALSA: firewire: fix a memory leak bug
+ - ALSA: hda - Don't override global PCM hw info flag
+ - ALSA: hda - Workaround for crackled sound on AMD controller (1022:1457)
+ - mac80211: don't WARN on short WMM parameters from AP
+ - SMB3: Fix deadlock in validate negotiate hits reconnect
+ - smb3: send CAP_DFS capability during session setup
+ - NFSv4: Only pass the delegation to setattr if we're sending a truncate
+ - NFSv4: Fix an Oops in nfs4_do_setattr
+ - KVM: Fix leak vCPU's VMCS value into other pCPU
+ - iwifiex: fix 802.11n/WPA detection
+ - iwifiex: don't unmap as page memory that was mapped as single
+ - iwifiex: mvm: fix an out-of-bound access
+ - iwifiex: mvm: don't send GEO_TX_POWER_LIMIT on version < 41
+ - iwifiex: mvm: fix version check for GEO_TX_POWER_LIMIT support
+ - iio: cros_ec_accel_legacy: Fix incorrect channel setting
+ - staging: android: ion: Bail out upon SIGKILL when allocating memory.
+ - x86/purgatory: Use CFLAGS_REMOVE rather than reset KBUILD_CFLAGS
+ - usb: tcep: tcpm: free log buf memory when remove debug file
+ - usb: tcep: tcpm: remove tcpm dir if no children
+ - usb: tcep: tcpm: Add NULL check before dereferencing config
+ - netfilter: conntrack: always store window size un-scaled
+ - drm/amd/display: Wait for backlight programming completion in set backlight level
+ - drm/amd/display: use encoder's engine id to find matched free audio device
+ - drm/amd/display: Fix dc_create failure handling and 666 color depths
+ - drm/amd/display: Only enable audio if speaker allocation exists
+ - drm/amd/display: Increase size of audios array
+ - allocate_flower_entry: should check for null deref
+ - s390/dma: provide proper ARCH_ZONE_DMA_BITS value
+ - ALSA: hiface: fix multiple memory leak bugs

+ * Bionic update: upstream stable patchset 2019-08-15 (LP: #1840378)
- scsi: fcoe: Embed fc_rport_priv in fcoe_rport structure
- ARM: dts: Add pinmuxing for i2c2 and i2c3 for LogicPD SOM-LV
- ARM: dts: Add pinmuxing for i2c2 and i2c3 for LogicPD torpedo
- HID: wacom: fix bit shift for Cintiq Companion 2
- HID: Add quirk for HP X1200 PIXART OEM mouse
- RDMA: Directly cast the sockaddr union to sockaddr
- IB: directly cast the sockaddr union to asockaddr
- atm: iphase: Fix Spectre v1 vulnerability
- ife: error out when nla attributes are empty
- ip6_tunnel: fix possible use-after-free on xmit
- net: bridge: delete local fdb on device init failure
- net: bridge: mcast: don't delete permanent entries when fast leave is enabled
- net: fix ifindex collision during namespace removal
- net/mlx5: Use reversed order when unregister devices
- net: phylink: Fix flow control for fixed-link
- net: sched: Fix a possible null-pointer dereference in dequeue_func()
- NFC: nfcmrvl: fix gpio-handling regression
- tipc: compat: allow tipc commands without arguments
- compat_ioctl: pppoe: fix PPPOEIOCSFWD handling
- net/mlx5e: Prevent encap flow counter update async to user query
- tun: mark small packets as owned by the tap sock
- mvpp2: refactor MTU change code
- bnx2x: Disable multi-cos feature.
- cgroupl: Call cgroupl_release() before __exit_signal()
- cgroupl: Implement css_task_iter_skip()
- cgroupl: Include dying leaders with live threads in PROCS iterations
- cgroupl: css_task_iter_skip()d iterators must be advanced before accessed
- cgroupl: Fix css_task_iter_advance_css_set() cset skip condition
- spi: bcm2835: Fix 3-wire mode if DMA is enabled
- driver core: Establish order of operations for device_add and device_del via bitflag
- drivers/base: Introduce kill_device()
- libnvdimm/bus: Prevent duplicate device_unregister() calls
- libnvdimm/region: Register badblocks before namespaces
- libnvdimm/bus: Prepare the nd_ioctl() path to be re-entrant
- libnvdimm/bus: Fix wait_nvdimm_bus_probe_idle() ABBA deadlock
- ipip: validate header length in ipip_tunnel_xmit
- mvpp2: fix panic on module removal
- net/mlx5: Fix modify_cq_in alignment
- r8169: don't use MSI before RTL8168d

* VIMC module not available (CONFIG_VIDEO_VIMC not set) (LP: #1831482)
* [Config] Enable VIMC module
* reboot will introduce an alarm 'beep ...' during BIOS phase (LP: #1840395)
* ALSA: hda - Let all conexant codec enter D3 when rebooting
* ALSA: hda - Add a generic reboot_notify
+ * Include Sunix serial/parallel driver (LP: #1826716)
+ - serial: 8250_pci: Add support for Sunix serial boards
+ - parport: parport_serial: Add support for Sunix Multi I/O boards
+ + * Intel HDMI audio print "Unable to sync register" errors (LP: #1840394)
+ - ALSA: hda - Don't resume forcibly i915 HDMI/DP codec
+ + * Support cpufreq, thermal sensors & cooling cells on iMX6Q based Nitrogen6x
+ board (LP: #1840437)
+ - arm: imx: Add MODULE_ALIAS for cpufreq
+ - ARM: dts: imx: Add missing OPP properties for CPUs
+ - ARM: dts: imx7d: use operating-points-v2 for cpu
+ - ARM: dts: imx7d: remove "operating-points" property for cpu1
+ - ARM: dts: imx: add cooling-cells for cpufreq cooling device
+ - ARM: dts: imx6: add thermal sensor and cooling cells
+ + * hns3: ring buffer race leads can cause corruption (LP: #1840717)
+ - net: hns3: minor optimization for ring_space
+ - net: hns3: fix data race between ring->next_to_clean
+ - net: hns3: optimize the barrier using when cleaning TX BD
+ + * Bionic build broken if CONFIG_MODVERSIONS enabled (LP: #1840321)
+ - Revert "gensyms: Teach parser about 128-bit built-in types"
+ + * [bionic] drm/i915: softpin broken, needs to be fixed for 32bit mesa
+ (LP: #1815172)
+ - SAUCE: drm/i915: Partially revert d6edad3777c28ea
+ + * Goodix touchpad may drop first input event (LP: #1840075)
+ - mfd: intel-lpss: Remove D3cold delay
+ + * NULL pointer dereference when Inserting the VIMC module (LP: #1840028)
+ - media: vimc: fix component match compare
+ + * Fix touchpad IRQ storm after S3 (LP: #1841396)
+ - pinctrl: intel: remap the pin number to gpio offset for irq enabled pin
+ + * [SRU][B/OEM-B/OEM-OSP1/D] UBUNTU: SAUCE: enable middle button for one more
+ ThinkPad (LP: #1841722)
+ - SAUCE: Input: elantech - enable middle button for one more ThinkPad
+ + * Test 391/u and 391/p from ubuntu_bpf failed on B (LP: #1841704)
+ - SAUCE: Fix "bpf: improve verifier branch analysis"
+ + * crypto/testmgr.o fails to build due to struct cipher_testvec not having data
+ members: ctext, ptext, len (LP: #1841264)
+ - SAUCE: Revert "crypto: testmgr - add AES-CFB tests"
Bionic QEMU with Bionic Kernel hangs in AMD FX-8350 with cpu-host as passthrough (LP: #1834522)
- KVM: SVM: install RSM intercept
- KVM: x86: SVM: Set EMULTYPE_NO_REEXECUTE for RSM emulation

-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 17 Sep 2019 18:12:26 +0200
+linux (4.15.0-64.73) bionic; urgency=medium
+* powerpc/tm: Fix restoring FP/VMX facility incorrectly on interrupts
  (CVE-2019-15031)
  / powerpc/tm: Fix FP/VMX unavailable exceptions inside a transaction
  (CVE-2019-15030) (LP: #1843533)
+ - powerpc/tm: Fix FP/VMX unavailable exceptions inside a transaction
+ - powerpc/tm: Fix restoring FP/VMX facility incorrectly on interrupts
+* CVE-2019-14835
+ - vhost: fix dirty log buffer overflow

-- Stefan Bader <stefan.bader@canonical.com> Thu, 12 Sep 2019 11:30:41 +0200
+linux (4.15.0-62.69) bionic; urgency=medium
+* bionic/linux: 4.15.0-62.69 -proposed tracker (LP: #1842746)
+* Kernel Panic with linux-image-4.15.0-60-generic when specifying nameserver in docker-compose (LP: #1842447)
  - ip: frags: fix crash in ip_do_fragment()

-- Khalid Elmously <khalid.elmously@canonical.com> Wed, 04 Sep 2019 16:11:43 -0400
+linux (4.15.0-60.67) bionic; urgency=medium
+* bionic/linux: 4.15.0-60.67 -proposed tracker (LP: #1841086)
+* [Regression] net test from ubuntu_kernel_selftests failed due to bpf test compilation issue (LP: #1840935)
  - SAUCE: Fix "bpf: relax verifier restriction on BPF_MOV | BPF_ALU"
+* [Regression] failed to compile seccomp test from ubuntu_kernel_selftests
  (LP: #1840932)
  - Revert "selftests: skip seccomp get_metadata test if not real root"
+* Packaging resync (LP: #1786013)
  - [Packaging] resync getabis

-- Stefan Bader <stefan.bader@canonical.com> Thu, 22 Aug 2019 18:32:43 +0200

linux (4.15.0-59.66) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-59.66 -proposed tracker (LP: #1840006)
+
+ * zfs not completely removed from bionic tree (LP: #1840051)
+  - SAUCE: (noup) remove completely the zfs code
+
+ * Packaging resync (LP: #1786013)
+  - [Packaging] update helper scripts
+
+ * [18.04 FEAT] Enhanced hardware support (LP: #1836857)
+  - s390: report new CPU capabilities
+  - s390: add alignment hints to vector load and store
+
+ * [18.04 FEAT] Enhanced CPU-MF hardware counters - kernel part (LP: #1836860)
+  - s390/cpum.cf: Add support for CPU-MF SVN 6
+  - s390/cpumf: Add extended counter set definitions for model 8561 and 8562
+
+ * ideapad_laptop disables WiFi/BT radios on Lenovo Y540 (LP: #1837136)
+  - platform/x86: ideapad-laptop: Remove no_hw_rfkill_list
+
+ * Stacked onexec transitions fail when under NO NEW PRIVS restrictions
+  (LP: #1839037)
+  - SAUCE: apparmor: fix nnp subset check failure when, stacking
+
+ * bcache: bch_allocator_thread(): hung task timeout (LP: #1784665) // Tight
+  timeout for bcache removal causes spurious failures (LP: #1796292)
+  - SAUCE: bcache: fix deadlock in bcache_allocator
+
+ * bcache: bch_allocator_thread(): hung task timeout (LP: #1784665)
+  - bcache: never writeback a discard operation
+  - bcache: improve bcache_reboot()
+  - bcache: fix writeback target calc on large devices
+  - bcache: add journal statistic
+  - bcache: fix high CPU occupancy during journal
+  - bcache: use pr_info() to inform duplicated CACHE_SET_IO_DISABLE set
+  - bcache: fix incorrect sysfs output value of strip size
+  - bcache: fix error return value in memory shrink
+  - bcache: fix using of loop variable in memory shrink
+  - bcache: Fix indentation
+  - bcache: Add __printf annotation to __bch_check_keys()
+  - bcache: Annotate switch fall-through
+  - bcache: Fix kernel-doc warnings
+  - bcache: Remove an unused variable
+  - bcache: Suppress more warnings about set-but-not-used variables
+  - bcache: Reduce the number of sparse complaints about lock imbalances
+  - bcache: Fix a compiler warning in bcache_device_init()
+  - bcache: Move couple of string arrays to sysfs.c
+ - bcache: Move couple of functions to sysfs.c
+ - bcache: Replace bch_read_string_list() by __sysfs_match_string()
+ + * linux hwe i386 kernel 5.0.0-21.22~18.04.1 crashes on Lenovo x220
+ (LP: #1838115)
+ - x86/mm: Check for pfn instead of page in vmalloc_sync_one()
+ - x86/mm: Sync also un mappings in vmalloc_sync_all()
+ - mm/vmalloc.c: add priority threshold to __purge_vmap_area_lazy()
+ - mm/vmalloc: Sync unmappings in __purge_vmap_area_lazy()
+ + * [bionic] drm/i915: softpin broken, needs to be fixed for 32bit mesa
+ (LP: #1815172)
+ - drm/i915: Mark up GTT sizes as u64
+ - drm/i915/gvt: Use I915_GTT_PAGE_SIZE
+ - drm/i915: Compare user's 64b GTT offset even on 32b
+ + + Bionic update: upstream stable patchset 2019-08-07 (LP: #1839376)
+ - ARM: rispc: fix DMA
+ - ARM: dts: rockchip: Make rk3288-veyron-minnie run at hs200
+ - ARM: dts: rockchip: Make rk3288-veyron-mickey's emmc work again
+ - ARM: dts: rockchip: Mark that the rk3288 timer might stop in suspend
+ - ftrace: Enable trampoline when rec count returns back to one
+ - kernel/module.c: Only return -EEXIST for modules that have finished loading
+ - MIPS: lantiq: Fix bitfield masking
+ - dmaengine: rcar-dmac: Reject zero-length slave DMA requests
+ - clk: tegra210: fix PLLU and PLLU_OUT1
+ - fs/adfs: super: fix use-after-free bug
+ - btrfs: fix minimum number of chunk errors for DUP
+ - cifs: Fix a race condition with cifs_echo_request
+ - ceph: fix improper use of smp_mb__before_atomic()
+ - ceph: return -ERANGE if virtual xattr value didn't fit in buffer
+ - ACPI: blacklist: fix clang warning for unused DMI table
+ - scsi: zfcf: fix GCC compiler warning emitted with -Wmaybe-uninitialized
+ - x86: kvm: avoid constant-conversion warning
+ - ACPI: fix false-positive -Wuninitialized warning
+ - be2net: Signal that the device cannot transmit during reconfiguration
+ - x86/apic: Silence -Wtype-limits compiler warnings
+ - x86: math-emu: Hide clang warnings for 16-bit overflow
+ - mm/cma.c: fail if fixed declaration can't be honored
+ - coda: add error handling for fget
+ - coda: fix build using bare-metal toolchain
+ - uapi linux/coda_psdev.h: move upc_req definition from uapi to kernel side
+ - headers
+ - drivers/rapidio/devices/rio_mport_cdev.c: NUL terminate some strings
+ - ipc/mqueue.c: only perform resource calculation if user valid
+ - xen/pv: Fix a boot up hang revealed by int3 self test
+ - x86/kvm: Don't call kvm_spurious_fault() from .fixup
+ - x86/paravirt: Fix callee-saved function ELF sizes
+ - x86, boot: Remove multiple copy of static function sanitize_boot_params()
+ - drm/nouveau: fix memory leak in nouveau_conn_reset()
+ - btrfs: fix incremental send failure after deduplication
+ - btrfs: fix race leading to fs corruption after transaction abort
+ - mmc: dw mmc: Fix occasional hang after tuning on eMMC
+ - gpilib: fix incorrect IRQ requesting of an active-low lineevent
+ - IB/hfi1: Fix Spectre v1 vulnerability
+ - selinux: fix memory leak in policydb_init()
+ - s390/dasd: fix endless loop after read unit address configuration
+ - parisc: Fix build of compressed kernel even with debug enabled
+ - drivers/perf: arm_pmu: Fix failure path in PM notifier
+ - nbd: replace kill_bdev() with __invalidate_device() again
+ - xen/swiotlb: fix condition for calling xen_destroy_contiguous_region()
+ - IB/mlx5: Fix unreg_umr to ignore the mkey state
+ - IB/mlx5: Use direct mkey destroy command upon UMR unreg failure
+ - IB/mlx5: Move MRs to a kernel PD when freeing them to the MR cache
+ - IB/mlx5: Fix RSS Toeplitz setup to be aligned with the HW specification
+ - IB/hfi1: Check for error on call to alloc_rsm_map_table
+ - eeprom: at24: make spd world-readable again
+ - objtool: Support GCC 9 cold subfunction naming scheme
+ - gcc-9: properly declare the {pv,hv}clock_page storage
+ - x86/vdso: Prevent segfaults due to hoisted vclock reads
+ - Documentation: Add swapgs description to the Spectre v1 documentation
+ - firmware/psci: psci_checker: Park kthreads before stopping them
+ - btrfs: qgroup: Don't hold qgroup_ioctl_lock in btrfs_qgroup_inherit()
+ - lib/test_string.c: avoid masking memset16/32/64 failures
+ - mmc: meson-mx-sdio: Fix misuse of GENMASK macro
+ - arm64: compat: Allow single-byte watchpoints on all addresses
+ - arm64: cpufeature: Fix feature comparison for CTR_EL0.{CWG,ERG}
+ - IB/mlx5: Fix clean_mr() to work in the expected order
+ - ARC: enable uboot support unconditionally
+ - scsi: mpt3sas: Use 63-bit DMA addressing on SAS35 HBA

* Bionic update: upstream stable patchset 2019-08-06 (LP: #1839213)
+ - staging: vt6656: use meaningful error code during buffer allocation
+ - drm/amd/display: Fill prescale_params->scale for RGB565
+ - drm/amd/display: Disable ABM before destroy ABM struct
+ - gpu: host1x: Increase maximum DMA segment size
+ - drm/amd/display: Always allocate initial connector state state
+ - drm/amd/display: fix compilation error
+ - mmc: sdhci: sdhci-pci-o2micro: Check if controller supports 8-bit width
+ - i2c: stm32f7: fix the get_irq error cases
+ - genksyms: Teach parser about 128-bit built-in types
+ - powerpc/mmc: Handle page table allocation failures
+ - arm64: assembler: Switch ESB-instruction with a vanilla nop if
+ - !ARM64_HAS_RAS
+ - dlm: check if workqueues are NULL before flushing/destroying
+ proc: use down_read_killable mmap_sem for /proc/pid/pagemap
+ proc: use down_read_killable mmap_sem for /proc/pid/clear_refs
+ proc: use down_read_killable mmap_sem for /proc/pid/map_files
+ proc: use down_read_killable mmap_sem for /proc/pid/maps
+ mm: use down_read_killable for locking mmap_sem in access_remote_vm
+ ALSA: ac97: Fix double free of ac97_codec_device
+ libnvdimm/bus: Stop holding nvdimm_bus_list_mutex over __nd_ioctl()
+ vsck: correct removal of socket from the list
+ NFS: Fix dentry revalidation on NFSv4 lookup
+ -NFS: Refactor nfs_cleanup_revalidate()
+ -NFSv4: Fix lookup revalidate of regular files
+ i2c: qup: fixed releasing dma without flush operation completion
+ arm64: compat: Provide definition for COMPAT_SIGMINSTKSZ
+ binder: fix possible UAF when freeing buffer
+ ISDN: hfcusb: checking idx of ep configuration
+ media: au0828: fix null dereference in error path
+ ath10k: Change the warning message string
+ media: cpi2_usb: first wake up, then free in disconnect
+ media: pvrusb2: use a different format for warnings
+ NFS: Cleanup if nfs_match_client is interrupted
+ media: radio-raremono: change devm_k*alloc to k*alloc
+ iommivt-d: Don't queue_iova() if there is no flush queue
+ iommivova: Fix compilation error with !CONFIG_IOMMU_IOVA
+ hv_sock: Add support for delayed close
+ Bluetooth: hci_uart: check for missing tty operations
+ sched/fair: Don't free p->numa_faults with concurrent readers
+ drivers/pps/pps.c: clear offset flags in PPS_SETPARAMS ioctl
+ Fix allyesconfig output.
+ ip_tunnel: allow not to count pkts on tstats by setting skb's dev to NULL
+ Bionic update: upstream stable patchset 2019-08-05 (LP: #1839036)
+ e1000e: start network tx queue only when link is up
+ Input: synaptics - enable SMBUS on T480 thinkpad trackpad
+ nifs2: do not use unexported cpu_to_le32()/le32_to_cpu() in uapi header
+ drivers: base: cacheinfo: Ensure cpu hotplug work is done before Intel RDT
+ crypto: talitos - rename alternative AEAD algos.
+ samples, bpf: fix to change the buffer size for read()
+ bpf: sockmap, fix use after free from sleep in psck backlog workqueue
+ staging/iio:ad1750: fix threshold mode config bit
+ mac80211: mesh: fix RCU warning
+ mac80211: free peer keys before vif down in mesh
+ iwifi: Fix double-free problems in iw1_req_fw_callback()
+ dt-bindings: can: mcp251x: add mcp25625 support
+ can: mcp251x: add support for mcp25625
+ can: m_can: implement errata "Needless activation of MRAF irq"
+ can: a_f_can: Fix error path of can_init()
+ ibmvnic: Refresh device multicast list after reset
+ ARM: dts: am335x phytec boards: Fix cd-gpios active level
- Input: imx_keypad - make sure keyboard can always wake up system
- KVM: arm/arm64: vgic: Fix kvm_device leak in vgic_its_destroy
- mlxsw: spectrum: Disallow prio-tagged packets when PVID is removed
- ARM: davinci: da850-evm: call regulator_has_full_constraints()
- ARM: davinci: da8xx: specify dma_coherent_mask for lcdc
- mac80211: only warn once on chanctx_conf being NULL
- qmi_wwan: add support for QMAP padding in the RX path
- qmi_wwan: avoid RCU stalls on device disconnect when in QMAP mode
- qmi_wwan: extend permitted QMAP mux_id value range
- nd: fix for divide error in status_resync
- bnx2x: Check if transceiver implements DDM before access
- drm: return -EFAULT if copy_to_user() fails
- ip6_tunnel: allow not to count pkts on tstats by passing dev as NULL
- net: lio_core: fix potential sign-extension overflow on large shift
- quota: fix a problem about transfer quota
- net: dsq: mv88e6xxx: fix shift of FID bits in mv88e6185_g1_vtu_loadpurge()
- net: sunrpc: clnt: Fix xps refcount imbalance on the error path
- fs: crypt: don't set policy for a dead directory
- udf: Fix incorrect final NOT_ALLOCATED (hole) extent length
- ALSA: hda/realtek - Headphone Mic can't record after S3
- block, bpf: NULL out the binc when it's no longer valid
- x86/ptrace: Fix possible spectre-v1 in ptrace_get_debugreg()
- x86/tsx: Fix possible spectre-v1 in do_get_thread_area()
- Documentation: Add section about CPU vulnerabilities for Spectre
- mwifiex: Abort at too short BSS descriptor element
- mwifiex: Don't abort on small, spec-compliant vendor IEs
- USB: serial: ftdi_sio: add ID for isodebug v1
- USB: serial: option: add support for GosunCn ME3630 RNDIS mode
- Revert "serial: 8250: Don't service RX FIFO if interrupts are disabled"
- p54usb: Fix race between disconnect and firmware loading
- usb: gadget: ether: Fix race between gether_disconnect and rx_submit
- usb: renesas_usbhs: add a workaround for a race condition of workqueue
- staging: comedi: dt282x: fix a null pointer deref on interrupt
- staging: comedi: amplc_pci230: fix null pointer deref on interrupt
- binder: fix memory leak in error path
- carl9170: fix misuse of device driver API
- VMCI: Fix integer overflow in VMCI handle arrays
- MIPS: Remove superfluous check for __linux__
- clk: ti: clkctrl: Fix returning uninitialized data
- efi/bg: Fix BGRT status field reserved bits check
- perf/core: Fix perf_sample_regs_user() mm check
- ARM: omap2: remove incorrect __init annotation
- be2net: fix link failure after ethtool offline test
- ppp: mppe: Add softdep to arc4
- sis900: fix TX completion
- dm verity: use message limit for data block corruption message
- x86/boot/64: Fix crash if kernel image crosses page table boundary
- cpu/hotplug: Fix out-of-bounds read when setting fail state
- linux/kernel.h: fix overflow for DIV_ROUND_UP_ULL
- ARC: hide unused function unw_hdr_alloc
- s390: fix stifle zero padding
- s390/qdio: (re-)initialize tiqdio list entries
- s390/qdio: don't touch the dsci in tiqdio_add_input_queues()
- crypto/NX: Set receive window credits to max number of CRBs in RxFIFO
- drm/udl: introduce a macro to convert dev to udl.
- drm/udl: move to embedding drm device inside udl device.
- drm/vmwgfx: fix a warning due to missingdma_parms
- riscv: Fix udelay in RV32.
- mac80211: do not start any work during reconfigure flow
- bpf, devmap: Fix premature entry free on destroying map
- NFS4: Only set creation opendata if O_CREAT
- perf pmu: Fix uncore PMU alias list for ARM64
- Documentation/admin: Remove the vsyscall=native documentation
- drivers/usb/typetypec/tps6598x.c: fix portinfo width
- staging: bcm2835-camera: Ensure all buffers are returned on disable
- staging: bcm2835-camera: Remove check of the number of buffers supplied
- staging: rtl8712: reduce stack usage, again
- irqchip/gic-v3-its: Fix command queue pointer comparison bug
- x86/apic: Fix integer overflow on 10 bit left shift of cpu_khz
- pinctrl: mcp23s08: Fix add_data and irqchip_add_nested call order
- x86/boot/64: Add missing fixup_pointer() for next_early_pgt access
- genirq: Delay deactivation in free_irq()
- genirq: Fix misleading synchronize_irq() documentation
- genirq: Update code comments wrt recycled thread_mask
- genirq: Synchronize only with single thread on free_irq()
- genirq: Add optional hardware synchronization for shutdown
- x86/ioapic: Implement irq_get_irqchip_state() callback
- x86/irq: Handle spurious interrupt after shutdown gracefully
- crypto: talitos - move struct talitos_edesc into talitos.h
- crypto: talitos - fix hash on SEC1.
- regmap-irq: do not write mask register if mask_base is zero
- MIPS: ath79: fix ar933x uart parity mode
- MIPS: fix build on non-linux hosts
- arm64/efi: Mark __efistub_stext_offset as an absolute symbol explicitly
- scsi: iscsi: set auth_protocol back to NULL if CHAP_A value is not supported
- dmaengine: imx-sdma: fix use-after-free on probe error path
- wil6210: fix potential out-of-bounds read
- ath10k: Do not send probe response template for mesh
- ath9k: Check for errors when reading SREV register
- ath6kl: add some bounds checking
- ath: DFS JP domain W56 fixed pulse type 3 RADAR detection
- batman-adv: fix for leaked TVLV handler.
- media: dvb: usb: fix use after free in dvb_usb_device_exit
- media: spi: IR LED: add missing of table registration
- crypto: talitos - fix skcipher failure due to wrong output IV
+ - media: marvell-ccic: fix DMA s/g desc number calculation
+ - media: vpss: fix a potential NULL pointer dereference
+ - media: media_device_enum_links32: clean a reserved field
+ - net: stmmac: dwmac1000: Clear unused address entries
+ - net: stmmac: dwmac4/5: Clear unused address entries
+ - qed: Set the doorbell address correctly
+ - signal/pid_namespace: Fix reboot_pid_ns to use send_sig not force_sig
+ - af_key: fix leaks in key_pol_get_resp and dump_sp.
+ - xfrm: Fix xfrm sel prefix length validation
+ - fscrypt: clean up some BUG_ON()s in block encryption/decryption
+ - media: me-device.c: don't memset __user pointer contents
+ - media: staging: media: davinci_vpfe: - Fix for memory leak if decoder
+    initialization fails.
+ - net: phy: Check against net_device being NULL
+ - crypto: talitos - properly handle split ICV.
+ - crypto: talitos - Align SEC1 accesses to 32 bits boundaries.
+ - tua6100: Avoid build warnings.
+ - locking/lockdep: Fix merging of hlocks with non-zero references
+ - media: w1128x: Fix some error handling in fm_v4l2_init_video_device()
+ - cpupower : frequency-set -r option misses the last cpu in related cpu list
+ - net: stmmac: dwmac4: fix flow control issue
+ - net: fec: Do not use netdev messages too early
+ - net: axienet: Fix race condition causing TX hang
+ - s390/qdio: handle PENDING state for QEBSM devices
+ - RAS/CEC: Fix pfn insertion
+ - net: sfp: add mutex to prevent concurrent state checks
+ - ipset: Fix memory accounting for hash types on resize
+ - perf cs-etm: Properly set the value of 'old' and 'head' in snapshot mode
+ - perf tests: Add valid callback for parse-events test
+ - perf test 6: Fix missing kvm module load for s390
+ - media: fdp1: Support M3N and E3 platforms
+ - iommu: Fix a leak in iommu_insert_resv_region
+ - gpio: omap: fix lack of irqstatus_raw0 for OMAP4
+ - gpio: omap: ensure irq is enabled before wakeup
+ - regmap: fix bulk writes on paged registers
+ - bpf: silence warning messages in core
+ - rcu: Force inlining of rcu_read_lock()
+ - x86/cpufeatures: Add FDP_EXCEPTN_ONLY and ZERO_FCS_FDS
+ - blkcg, writeback: dead memcgs shouldn't contribute to writeback ownership
+ arbitration
+ - xfrm: fix sa selector validation
+ - sched/core: Add __sched tag for io_schedule()
+ - x86/atomic: Fix smp_mb__[before.after]_atomic()
+ - perf evsel: Make perf_evsel__name() accept a NULL argument
+ - vhost_net: disable zerocopy by default
+ - ipoib: correctly show a VF hardware address
+ - EDAC/sysfs: Fix memory leak when creating a csrow object
+ - ipsec: select crypto ciphers for xfrm_algo
+ - ipvs: defer hook registration to avoid leaks
+ - media: s5p-mfc: Make additional clocks optional
+ - media: i2c: fix warning same module names
+ - ntp: Limit TAI-UTC offset
+ - timer_list: Guard procs specific code
+ - acpi/arm64: ignore 5.1 FADTs that are reported as 5.0
+ - media: cosa: fix mpeg2 sequence number handling
+ - media: cosa: fix last buffer handling in V4L2_ENC_CMD_STOP
+ - media: cosa: increment sequence offset for the last returned frame
+ - media: vime: cap: check v4l2_fill_pixfmt return value
+ - media: hdpvr: fix locking and a missing msleep
+ - rtlwifi: rtl8192cu: fix error handle when usb probe failed
+ - mt7601u: do not schedule rx_tasklet when the device has been disconnected
+ - x86/build: Add 'set -e' to mkcapflags.sh to delete broken capflags.c
+ - mt7601u: fix possible memory leak when the device is disconnected
+ - ipvs: fix tinfo memory leak in start_sync_thread
+ - ath10k: add missing error handling
+ - ath10k: fix PCIe device wake up failed
+ - perf tools: Increase MAX_NR_CPUS and MAX_CACHES
+ - libata: don't request sense data on !ZAC ATA devices
+ - clocksource/drivers/exynos_mct: Increase priority over ARM arch timer
+ - rslib: Fix decoding of shortened codes
+ - rslib: Fix handling of of caller provided syndrome
+ - ixgbe: Check DDM existence in transceiver before access
+ - crypto: serpent - mark __serpent_setkey_sbox noinline
+ - crypto: asymmetric_keys - select CRYPTO_HASH where needed
+ - EDAC: Fix global-out-of-bounds write when setting edac_mc_poll_msec
+ - bcache: check c->gc_thread by IS_ERR_OR_NULL in cache_set_flush()
+ - net: hns3: fix a -Wformat-nonliteral compile warning
+ - net: hns3: add some error checking in hclge_tm module
+ - ath10k: destroy sdio workqueue while remove sdio module
+ - iwlwifi: mmv: Drop large non sta frames
+ - perf stat: Make metric event lookup more robust
+ - net: usb: asix: init MAC address buffers
+ - gpiliolib: Fix references to gpio_[g]set_*value_cansleep() variants
+ - Bluetooth: hci_bscp: Fix memory leak in rx_skb
+ - Bluetooth: 6lowpan: search for destination address in all peers
+ - Bluetooth: Check state in l2cap_disconnect_rsp
+ - gtp: add missing gtp_encap_disable_sock() in gtp_encap_enable()
+ - Bluetooth: validate BLE connection interval updates
+ - gtp: fix suspicious RCU usage
+ - gtp: fix Illegal context switch in RCU read-side critical section.
+ - gtp: fix use-after-free in gtp_encap_destroy()
+ - gtp: fix use-after-free in gtp_newlink()
+ - net: mvdio: defer probe of orion-mdio if a clock is not ready
+ - iavl: fix dereference of null rx_buffer pointer
+ - floppy: fix out-of-bounds read in next_valid_format
+ - floppy: fix invalid pointer dereference in drive_name
+ - xen: let alloc_xenballooned_pages() fail if not enough memory free
+ - scsi: NCR5380: Reduce goto statements in NCR5380_select()
+ - scsi: NCR5380: Always re-enable reselection interrupt
+ - Revert "scsi: ncr5380: Increase register polling limit"
+ - scsi: core: Fix race on creating sense cache
+ - scsi: megaraid_sas: Fix calculation of target ID
+ - scsi: mac_scsi: Increase PIO/PDMA transfer length threshold
+ - scsi: mac_scsi: Fix pseudo DMA implementation, take 2
+ - crypto: ghash - fix unaligned memory access in ghash_setkey()
+ - crypto: ccp - Validate the the error value used to index error messages
+ - crypto: arm64/sha1-ce - correct digest for empty data in finup
+ - crypto: arm64/sha2-ce - correct digest for empty data in finup
+ - crypto: chacha20poly1305 - fix atomic sleep when using async algorithm
+ - crypto: ccp - memset structure fields to zero before reuse
+ - crypto: ccp/gem - use const time tag comparison.
+ - crypto: crypto4xx - fix a potential double free in ppc4xx_trng_probe
+ - Input: gtc0 - bounds check collection indent level
+ - Input: alps - don't handle ALPS cs19 trackpoint-only device
+ - Input: synaptics - whitelist Lenovo T580 SMBus intertouch
+ - Input: alps - fix a mismatch between a condition check and its comment
+ - regulator: s2mps11: Fix buck7 and buck8 wrong voltages
+ - arm64: tegra: Update Jetson TX1 GPU regulator timings
+ - iwlwifi: pcie: don't service an interrupt that was masked
+ - iwlwifi: pcie: fix ALIVE interrupt handling for gen2 devices w/o MSI-X
+ - NFSv4: Handle the special Linux file open access mode
+ - pnfs/flexfiles: Fix PTR_ERR() dereferences in ff_layout_track_ds_error
+ - lib/scatterlist: Fix mapping iterator when sg->offset is greater than
+ - PAGE_SIZE
+ - ASoC: dapm: Adapt for debugfs API change
+ - ALSA: seq: Break too long mutex context in the write loop
+ - media: v4l2: Test type instead of cfg->type in v4l2_ctrl_new_custom()
+ - media: coda: Remove unbalanced and unneeded mutex unlock
+ - KVM: x86/PMU: refine kvm_pmu err msg when event creation failed
+ - arm64: tegra: Fix AGIC register range
+ - fs/proc/proc_sysctl.c: fix the default values of i_uid/i_gid on /proc/sys
+ - inodes.
+ - drm/nouveau/i2c: Enable i2c pads & busses during preinit
+ - padata: use smp_mb in padata_reorder to avoid orphaned padata jobs
+ - dm zoned: fix zone state management race
+ - xen/events: fix binding user event channels to cpus
+ - 9p/xen: Add cleanup path in p9_trans_xen_init
+ - 9p/virtio: Add cleanup path in p9_virtio_init
+ - x86/boot: Fix memory leak in default_get_smp_config()
+ - perf/x86/amd/uncore: Do not set 'ThreadMask' and 'SliceMask' for non-L3 PMCs
+ - perf/x86/amd/uncore: Set the thread mask for F17h L3 PMCs
+ - intel_th: pci: Add Ice Lake NNPI support
+ - PCI: Do not poll for PME if the device is in D3cold
+ - Btrfs: fix data loss after inode eviction, renaming it, and fsync it
- Btrfs: fix fsync not persisting dentry deletions due to inode evictions
- Btrfs: add missing inode version, ctime and mtime updates when punching hole
- HID: wacom: generic: only switch the mode on devices with LEDs
- HID: wacom: correct touch resolution x/y typo
- libnvdimm/pfn: fix fsdax-mode namespace info-block zero-fields
- coda: pass the host file in vma->vm_file on mmap
- gpu: ipu-v3: ipu-ic: Fix saturation bit offset in TPMEM
- PCI: hv: Fix a use-after-free bug in hv_eject_device_work()
- crypto: caam - limit output IV to CBC to work around CTR mode DMA issue
- parisc: Ensure userspace privilege for ptraced processes in regset functions
- parisc: Fix kernel panic due invalid values in IAOQ0 or IAOQ1
- powerpc/32s: fix suspend/resume when IBATs 4-7 are used
- powerpc/watchpoint: Restore NV GPRs while returning from exception
- eCryptfs: fix a couple type promotion bugs
- intel_th: msu: Fix single mode with disabled IOMMU
- Bluetooth: Add SMP workaround Microsoft Surface Precision Mouse bug
- usb: Handle USB3 remote wakeup for LPM enabled devices correctly
- net: mvmdio: allow up to four clocks to be specified for orion-mdio
- dt-bindings: allow up to four clocks for orion-mdio
- dm bufio: fix deadlock with loop device
- compiler.h, kasan: Avoid duplicating __read_once_size_nocheck()
- compiler.h: Add read_word_at_a_time() function.
- lib/strscpy: Shut up KASAN false-positives in strscpy()
- bnx2x: Prevent load reordering in tx completion processing
- caif-hsi: fix possible deadlock in cfhsi_exit_module()
- igmp: fix memory leak in igmpv3_del_delrec()
- ipv4: don't set IPv6 only flags to IPv4 addresses
- net: bemgenet: use promisc for unsupported filters
- net: dsa: mv88e66xx: wait after reset deactivation
- net: neigh: fix multiple neigh timer scheduling
- net: openvswitch: fix csum updates for MPLS actions
- nfc: fix potential illegal memory access
- rxrpc: Fix send on a connected, but unbound socket
- sky2: Disable MSI on ASUS P6T
- vrf: make sure skb->data contains ip header to make routing
- macsec: fix use-after-free of skb during RX
- macsec: fix checksumming after decryption
- netrom: fix a memory leak in nr_rx_frame()
- netrom: hold sock when setting skb->destructor
- bonding: validate ip header before check IPPROTO_IGMP
- net: make skb_dst_force return true when dst is refcounted
- tcp: fix tcp_set_congestion_control() use from bpf hook
- tcp: Reset bytes_acked and bytes_received when disconnecting
- net: bridge: mcast: fix stale nsrsc pointer in igmp3/mld2 report handling
- net: bridge: mcast: fix stale ipv6 hdr pointer when handling v6 query
- net: bridge: stp: don't cache eth dest pointer before skb pull
- dma-buf: balance refcount imbalance
- dma-buf: Discard old fence_excl on retrying get_fences_rcu for realloc
+ - MIPS: lb60: Fix pin mappings
+ - ext4: don't allow any modifications to an immutable file
+ - ext4: enforce the immutable flag on open files
+ - mm: add filemap_fdatawait_range_keep_errors()
+ - jbd2: introduce jbd2_inode dirty range scoping
+ - ext4: use jbd2_inode dirty range scoping
+ - ext4: allow directory holes
+ - mm: vmscan: scan anonymous pages on file refaults
+ - hvsock: fix epollout hang from race condition
+ - drm/panel: simple: Fix panel_simple_dsi_probe
+ - usb: core: hub: Disable hub-initiated U1/U2
+ - tty: max310x: Fix invalid baudrate divisors calculator
+ - pinctrl: rockchip: fix leaked of_node references
+ - tty: serial: cpm_uart - fix init when SMC is relocated
+ - drm/edid: Fix a missing-check bug in drm_load_edid_firmware()
+ - PCI: Return error if cannot probe VF
+ - drm/bridge: tc358767: read display_props in get_modes()
+ - drm/bridge: sii902x: clock unit is 10KHz instead of 1KHz
+ - drm/crc-debugfs: User irqsafe spinlock in drm_crtc_add_crc_entry
+ - memstick: Fix error cleanup path of memstick_init
+ - tty:serial: digicolor: Fix digicolor-usart already registered warning
+ - tty: serial: msm_serial: avoid system lockup condition
+ - serial: 8250: Fix TX interrupt handling condition
+ - drm/virtio: Add memory barriers for capset cache.
+ - phy: renesas: rcar-gen2: Fix memory leak at error paths
+ - powerpc/pseries/mobility: prevent cpu hotplug during DT update
+ - drm/rockchip: Properly adjust to a true clock in adjusted_mode
+ - tty: serial_core: Set port active bit in uart_port_activate
+ - usb: gadget: Zero ffs_io_data
+ - powerpc/pci/of: Fix OF flags parsing for 64bit BARs
+ - drm/msm: Depopulate platform on probe failure
+ - serial: mctrl_gpio: Check if GPIO property exists before requesting it
+ - PCI: sysfs: Ignore lockdep for remove attribute
+ - kbuild: Add -Werror=unknown-warning-option to CLANG_FLAGS
+ - PCI: xilinx-nwl: Fix Multi MSI data programming
+ - iio:iio-utils: Fix possible incorrect mask calculation
+ - powerpc/xmon: Fix disabling tracing while in xmon
+ - recordmcount: Fix spurious mcount entries on powerpc
+ - mfd: core: Set fwnode for created devices
+ - mfd: arizona: Fix undefined behavior
+ - mfd: hi655x-pmic: Fix missing return value check for
+ devm_regmap_init_mmio_clk
+ - um: Silence lockdep complaint about mmap_sem
+ - powerpc/4xx/uic: clear pending interrupt after irq type/pol change
+ - RDMA/i40iw: Set queue pair state when being queried
+ - serial: sh-sci: Terminate TX DMA during buffer flushing
+ - serial: sh-sci: Fix TX DMA buffer flushing and workqueue races
+ - kallsyms: exclude kasan local symbols on s390
- perf test mmap-thread-lookup: Initialize variable to suppress memory sanitizer warning
- perf session: Fix potential NULL pointer dereference found by the smatch tool
- perf annotate: Fix dereferencing freed memory found by the smatch tool
- RDMA/rxe: Fill in wc byte_len with IB_WC_RECV_RDMA_WITH_IMM
- PCI: dwc: pci-dra7xx: Fix compilation when !CONFIG_GPIO_LIB
- powerpc/boot: add {get, put}_unaligned_be32 to xz_config.h
- f2fs: avoid out-of-range memory access
- mailbox: handle failed named mailbox channel request
- powerpc/eh: Handle hugepages in ioremap space
- block/bio-integrity: fix a memory leak bug
- sh: prevent warnings when using iounmap
- mm/kmemleak.c: fix check for softirq context
- 9p: pass the correct prototype to read_cache_page
- mm/gup.c: mark undo_dev_pagemap as __maybe_unused
- mm/gup.c: remove some BUG_ONs from get_gate_page()
- mm/mmu_notifier: use hlist_add_head_rcu()
- locking/lockdep: Fix lock used or unused stats error
- locking/lockdep: Hide unused 'class' variable
- drm/crc: Only report a single overflow when a CRC fd is opened
- drm/crc-debugfs: Also sprinkle irqrestore over early exits
- usb: wusbcore: fix unbalanced get/put cluster_id
- usb: pci-quirks: Correct AMD PLL quirk detection
- KVM: nVMX: do not use dangling shadow VMCS after guest reset
- btrfs: inode: Don't compress if NODATASUM or NODATACOW set
- x86/sysfb_efi: Add quirks for some devices with swapped width and height
- x86/speculation/mds: Apply more accurate check on hypervisor platform
- binder: prevent transactions to context manager from its own process.
- fpga-manager: altera-ps-spi: Fix build error
- hpet: Fix division by zero in hpet_time_div()
- powerpc/xive: Fix loop exit-condition in xive_find_target_in_mask()
- powerpc/tm: Fix oops on sigreturn on systems without TM
- access: avoid the RCU grace period for the temporary subjective credentials
- batman-adv: Fix duplicated OGMs on NETDEV_UP
- net: hns3: set ops to null when unregister ad_dev
- x86/cpu: Add Ice Lake NNPI to Intel family
- qed: iWARP - Fix tc for MPA ll2 connection
- net: hns3: fix for skb leak when doing selftest
- sched/sfair: Fix "runnable_avg_yN_inv" not used warnings
- x86/cacheinfo: Fix a -Wtype-limits warning
- nvme-pci: properly report state change failure in nvme_reset_work
- nvme-pci: set the errno on ctrl state change error
- arm64: Do not enable IRQs for ct_user_exit
- net: stmmac: sun8i: force select external PHY when no internal one
- bcache: check CACHE_SET_IO_DISABLE in allocator code
- bcache: check CACHE_SET_IO_DISABLE bit in bch_journal()
- bcache: acquire bch_register_lock later in cached_dev_free()
- bcache: fix potential deadlock in cached_def_free()
- perf stat: Fix group lookup for metric group
- tools: bptool: Fix json dump crash on powerpc
- Bluetooth: Add a new 13d3:3496 QCA_ROME device
- Bluetooth: Add new 13d3:3491 QCA_ROME device
- Bluetooth: Add new 13d3:3501 QCA_ROME device
- bcache: ignore read-ahead request failure on backing device
- bcache: fix mistaken sysfs entry for io_error counter
- bcache: destroy dc->writeback_write_wq if failed to create
dc->writeback_thread
- iwlfwifi: don't WARN when calling iwlf_get_shared_mem_conf with RF-Kill
- iwlfwifi: fix RF-Kill interrupt while FW load for gen2 devices
- ALSA: hda/realtek - Fixed Headphone Mic can't record on Dell platform
- media: videobuf2-core: Prevent size alignment wrapping buffer size to 0
- media: videobuf2-dma-sg: Prevent size from overflowing
- perf/x86/intel: Fix spurious NMI on fixed counter
- drm/edid: parse CEA blocks embedded in DisplayID
- PCI: qcom: Ensure that PERST is asserted for at least 100 ms
- IB/mlx5: Report correctly tag matching rendezvous capability
- include/asm-generic/bug.h: fix "cut here" for WARN_ON for __WARN_TAINT architectures
- xfs: fix pagecache truncation prior to relink
- xfs: flush removing page cache in xfs_relink_remap_prep
- xfs: don't overflow xattr listent buffer
- xfs: don't ever put nlink > 0 inodes on the unlinked list
- xfs: fix reporting supported extra file attributes for statx()
- xfs: serialize unaligned dio writes against all other dio writes
- xfs: abort unaligned nowait directio early
- powerpc/powernv/npu: Fix reference leak
- powerpc/pseries: Fix oops in hotplug memory notifier
- mmc: sdhci-msm: fix mutex while in spinlock
- mtd: rawnand: mtk: Correct low level time calculation of r/w cycle
- blk-throttle: fix zero wait time for iops throttled group
- tcp: be more careful in tcp_fragment()
- net/mlx5e: IPoIB, Add error path in mlx5_rdma_setup_rn
- net_sched: unset TCQ_F_CAN_BYPASS when adding filters
- net: bridge: don't cache ether dest pointer on input
- net: sched: verify that q!=NULL before setting q->flags

* Line 6 POD HD500 driver fault (LP: #1790595) // Bionic update: upstream
stable patchset 2019-08-05 (LP: #1839036)
- ALSA: line6: Fix wrong altsetting for LINE6_PODHD500_1

* Bionic update: upstream stable patchset 2019-08-02 (LP: #1838824)
- rapidio: fix a NULL pointer dereference when create_workqueue() fails
- fs/fat/file.c: issue flush after the writeback of FAT
- sysctl: return -EINVAL if val violates minmax
- ipc: prevent lockup on alloc_msg and free_msg
- ARM: prevent tracing IPI_CPU_BACKTRACE
- mm/hmm: select mmu notifier when selecting HMM
- hugetlbfs: on restore reserve error path retain subpool reservation
- mem-hotplug: fix node spanned pages when we have a node with only
  ZONE_MOVABLE
- mm/cma.c: fix crash on CMA allocation if bitmap allocation fails
- mm/cma.c: fix the bitmap status to show failed allocation reason
- mm/cma_debug.c: fix the break condition in cma_maxchunk_get()
- mm/slab.c: fix an infinite loop in leaks_show()
- kernel/sys.c: prctl: fix false positive in validate_prctl_map()
- thermal: rcar_gen3_thermal: disable interrupt in _remove
- drivers: thermal: tsens: Don't print error message on -EPROBE_DEFER
- mfd: tps65912-spi: Add missing of table registration
- mfd: intel-lpss: Set the device in reset state when init
- drm/nouveaup/dp: respect sink limits when selecting failsafe link
  configuration
- mfd: twl6040: Fix device init errors for ACCCTL register
- perf/x86/intel: Allow PEBS multi-entry in watermark mode
- drm/bridge: adv7511: Fix low refresh rate selection
- objtool: Don't use ignore flag for fake jumps
- EDAC/mpc85xx: Prevent building as a module
- pwm: meson: Use the spin-lock only to protect register modifications
- ntp: Allow TAI-UTC offset to be set to zero
- f2fs: fix to avoid panic in do_recover_data()
- f2fs: fix to clear dirty inode in error path of f2fs_iget()
- f2fs: fix to avoid panic in dec_valid_block_count()
- f2fs: fix to do sanity check on valid block count of segment
- percpu: remove spurious lock dependency between percpu and sched
- configsfs: fix possible use-after-free in configsfs_register_group
- uml: fix a boot splat wrt use of cpu_all_mask
- mmc: mmc: Prevent polling for busy detection in IRQ context
- watchdog: imx2_wdt: Fix set_timeout for big timeout values
- watchdog: fix compile time error of pretimeout governors
- blk-mq: move cancel of requeue_work into blk_mq_release
- iommu/vt-d: Set intel_iommu_gfx_mapped correctly
- misc: pci_endpoint_test: Fix test_reg_bar to be updated in pci_endpoint_test
- nvme-pci: unquiesce admin queue on shutdown
- ALSA: hda - Register irq handler after the chip initialization
- nvmem: core: fix read buffer in place
- fuse: retrieve: cap requested size to negotiated max_write
- nfsd: allow fh.want_write to be called twice
- vio: Fix WARNING "do not call blocking ops when !TASK_RUNNING"
- x86/PCI: Fix PCI IRQ routing table memory leak
- platform/chrome: cros_ec_proto: check for NULL transfer function
- PCI: keystone: Prevent ARM32 specific code to be compiled for ARM64
- soc: mediatek: pwrap: Zero initialize rdata in pwrap_init_cipher
- clk: rockchip: Turn on "aclk_dmac1" for suspend on rk3288
- soc: rockchip: Set the proper PWM for rk3288
+ ARM: dts: imx51: Specify IMX5_CLK_IPG as "ahb" clock to SDMA
+ ARM: dts: imx50: Specify IMX5_CLK_IPG as "ahb" clock to SDMA
+ ARM: dts: imx53: Specify IMX5_CLK_IPG as "ahb" clock to SDMA
+ ARM: dts: imx6sx: Specify IMX6SX_CLK_IPG as "ahb" clock to SDMA
+ ARM: dts: imx7d: Specify IMX7D_CLK_IPG as "ipg" clock to SDMA
+ ARM: dts: imx6ul: Specify IMX6UL_CLK_IPG as "ipg" clock to SDMA
+ ARM: dts: imx6qdl: Specify IMX6QDL_CLK_IPG as "ipg" clock to SDMA
+ PCI: rpadlpar: Fix leaked device_node references in add/remove paths
+ platform/x86: intel_pmc_ipc: adding error handling
+ power: supply: max14656: fix potential use-before-alloc
+ PCI: rcar: Fix a potential NULL pointer dereference
+ PCI: rcar: Fix 64bit MSI message address handling
+ video: hgafb: fix potential NULL pointer dereference
+ video: imstfb: fix potential NULL pointer dereferences
+ block, bfiq: increase idling for weight-raised-queues
+ PCI: xilinx: Check for __get_free_pages() failure
+ gpio: gpio-omap: add check for off wake capable gpios
+ dmaengine: idma64: Use actual device for DMA transfers
+ pwm: tiehrpwm: Update shadow register for disabling PWMs
+ ARM: dts: exynos: Always enable necessary APIO_1V8 and ABB_1V8 regulators on Arndale Octa
+ pwm: Fix deadlock warning when removing PWM device
+ ARM: exynos: Fix undefined instruction during Exynos5422 resume
+ usb: typec: fusb302: Check vconn is off when we start toggling
+ gpio: v610: Do not share irq_chip
+ percpu: do not search past bitmap when allocating an area
+ drm: don't block fb changes for async plane updates
+ ALSA: seq: Cover unsubscribe_port() in list_mutex
+ initramfs: free initrd memory if opening /initrd.image fails
+ bpf: fix undefined behavior in narrow load handling
+ f2fs: fix to avoid panic in f2fs_remove_inode_page()
+ f2fs: fix to use inline space only if inline_xattr is enable
+ netfilter: nf_conntrack_h323: restore boundary check correctness
+ mips: Make sure dt memory regions are valid
+ nvme: sunix_sid: Support SID on A83T and H5
+ nfsd: avoid uninitialized variable warning
+ switchtec: Fix unintended mask of MRPC event
+ net: thunderbolt: Unregister ThunderboltIP protocol handler when suspending
+ i40e: Queues are reserved despite "Invalid argument" error
+ net: hns3: return 0 and print warning when hit duplicate MAC
+ soc: renesas: Identify R-Car M3-W ES1.1
+ soc: renesas: Identify R-Car M3-W ES1.3
+ [Config] updateconfigs for CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT
+ drm/nouvea: add kconfig option to turn off nouveau legacy contexts. (v3)
+ nouveau: Fix build with CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT disabled
+ HID: wacom: Correct button numbering 2nd-gen Intuos Pro over Bluetooth
+ HID: wacom: Sync INTUOSP2_BT touch state after each frame if necessary
+ - ALSA: oxfw: allow PCM capture for Stanton SCS.1m
+ - ALSA: hda/realtek - Update headset mode for ALC256
+ - ALSA: firewire-motu: fix destruction of data for isochronous resources
+ - libata: Extend quirks for the ST1000LM024 drives with NOLPM quirk
+ - mm/list_lru.c: fix memory leak in __memcg_init_list_lru_node
+ - fs/ocfs2: fix race in ocfs2_dentry_attach_lock()
+ - mm/vmscan.c: fix trying to reclaim unevictable LRU page
+ - signal/ptrace: Don't leak uninitialized kernel memory with PTRACE_PEEK_SIGINFO
+ - ptrace: restore smp_rmb() in __ptrace_may_access()
+ - media: v4l2_ioctl: clear fields in s_parm
+ - iommu/arm-smmu: Avoid constant zero in TLBI writes
+ - i2c: acorn: fix i2c warning
+ - bcache: fix stack corruption by PRECEDING_KEY()
+ - cgroupl: Use css_tryget() instead of css_tryget_online() in task_get_css()
+ - ASoC: cs42xx8: Add regcache mask dirty
+ - ASoC: fsl_asrc: Fix the issue about unsupported rate
+ - drm/i915/sdvo: Implement proper HDMI audio support for SDVO
+ - x86/uaccess, kcov: Disable stack protector
+ - ALSA: seq: Protect in-kernel ioctl calls with mutex
+ - ALSA: seq: Fix race of get-subscription call vs port-delete ioctls
+ - Revert "ALSA: seq: Protect in-kernel ioctl calls with mutex"
+ - s390/kasan: fix strncpy_from_user kasan checks
+ - Drivers: misc: fix out-of-bounds access in function param_set_kgdbs_var
+ - scsi: qedi: remove memset/memcpy to nfunc and use func instead
+ - scsi: qedi: remove set but not used variables 'cdev' and 'udev'
+ - scsi: lpfc: add check for loss of ndlp when sending RRQ
+ - arm64/mm: Inhibit huge-vmap with ptdump
+ - nvme: remove the ifdef around nvme_nvm_ioctl
+ - platform/x86: pmc_atom: Add Lex 3I380D industrial PC to critclk_systems DMI table
+ - platform/x86: pmc_atom: Add several Beckhoff Automation boards to critclk_systems DMI table
+ - scsi: bnx2f: fix incorrect cast to u64 on shift operation
+ - libnvdimm: Fix compilation warnings with W=1
+ - selftests/timers: Add missing fflush(stdout) calls
+ - usbnct: ipheth: fix racing condition
+ - KVM: x86/pm: do not mask the value that is written to fixed PMUs
+ - KVM: s390: fix memory slot handling for KVM_SET_USER_MEMORY_REGION
+ - drm/vmwgfx: integer underflow in vmw_cmd_dx_set_shader() leading to an invalid read
+ - drm/vmwgfx: NULL pointer dereference from vmw_cmd_dx_view_define()
+ - x86/microcode, cpuhotplug: Add a microcode loader CPU hotplug callback
+ - x86/kasan: Fix boot with 5-level paging and KASAN
+ - rtc: pcfs523: don't return invalid date when battery is low
+ - HID: wacom: Don't set tool type until we're in range
+ - HID: wacom: Don't report anything prior to the tool entering range
+ - HID: wacom: Send BTN_TOUCH in response to INTUOSP2_BT eraser contact
+ - bcache: only set BCACHE_DEV_WB_RUNNING when cached device attached
+ - f2fs: fix to avoid accessing xattr across the boundary
+ - nvme: fix scu locking on error return in nvme_get_ns_from_disk
+ - nvme: merge nvme_ns_ioctl into nvme_ioctl
+ - nvme: release namespace SRCU protection before performing controller ioecls
+ - nvme: fix memory leak for power latency tolerance
+ - KVM: x86/pm: mask the result of rdpmc according to the width of the counters
+ - tools/kvm_stat: fix fields filter for child events
+ - RAS/CEC: Convert the timer callback to a workqueue
+ - x86/mm/KASLR: Compute the size of the vmemmap section properly
+ - ax25: fix inconsistent lock state in ax25_destroy_timer
+ - be2net: Fix number of Rx queues used for flow hashing
+ - ipv6: flowlabel: fl6_sock_lookup() must use atomic_inc_not_zero
+ - lapb: fixed leak of control-blocks.
+ - neigh: use-after-free read in pneigh_get_next
+ - net: openvswitch: do not free vport if register_netdevice() is failed.
+ - scpt: Free cookie before we memdup a new one
+ - sunhv: Fix device naming inconsistency between sunhv_conslde and sunhv_reg
+ - Staging: vc04_services: Fix a couple error codes
+ - perf/x86/intel/ds: Fix EVENT vs. UEVENT PEBS constraints
+ - netfilter: nf_queue: fix reinject verdict handling
+ - ipvs: Fix use-after-free in ip_vs_in
+ - selftests: netfilter: missing error check when setting up veth interface
+ - clk: ti: clkctrl: Fix clkdm_clk handling
+ - powerpc/powerne: Return for invalid IMC domain
+ - miSDN: make sure device name is NUL terminated
+ - x86/CPU/AMD: Don't force the CPB cap when running under a hypervisor
+ - perf/ring_buffer: Fix exposing a temporarily decreased data_head
+ - perf/ring_buffer: Add ordering to rb->nest increment
+ - perf/ring-buffer: Always use {READ,WRITE}_ONCE() for rb->user_page data
+ - gpio: fix gpio-adp5588 build errors
+ - net: tulip: de4x5: Drop redundant MODULE_DEVICE_TABLE()
+ - net: aquantia: fix LRO with FCS error
+ - i2c: dev: fix potential memory leak in i2cdev_ioctl_rdwr
+ - ALSA: hda - Force polling mode on CNL for fixing codec communication
+ - configfs: Fix use-after-free when accessing sd->s_dentry
+ - perf data: Fix 'strncat may truncate' build failure with recent gcc
+ - perf record: Fix s390 missing module symbol and warning for non-root users
+ - ia64: fix build errors by exporting paddr_to_nid()
+ - KVM: PPC: Book3S: Use new mutex to synchronize access to rtas token list
+ - KVM: PPC: Book3S HV: Don't take kvm->lock around kvm_for_each_vcpu

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+ - net: sh_eth: fix mdio access in sh_eth_close() for R-Car Gen2 and RZ/A1 SoCs
+ - net: phy: dp83867: Set up RGMII TX delay
+ - scsi: libcxgbi: add a check for NULL pointer in cxgbi_check_route()
+ - scsi: smartpqi: properly set both the DMA mask and the coherent DMA mask
+ - scsi: scsi_lb_a: Fix possible null-ptr-deref
+ - scsi: libas: delete sas port if expander discover failed
+ - mlxsw: spectrum: Prevent force of 56G
+ - coredump: fix race condition between collapse_256_page() and core dumping
+ - infiniband: fix race condition between infiniband mlx4, mlx5 driver and core dumping
+ - Abort file_remove_privs() for non-reg. files
+ - tipc: purge deferredq list for each grp member in tipc_group_delete
+ - vsck/virtio: set SOCK_DONE on peer shutdown
+ - usb: xhci: Fix a potential null pointer dereference in
+ xhci_defaps_create_endpoint()
+ - ACPI/PCI: PM: Add missing wakeup.flags.valid checks
+ - drm/etnaviv: lock MMU while dumping core
+ - net: aquantia: tx clean budget logic error
+ - perf namespace: Protect reading thread's namespace
+ - xen/pvcalls: Remove set but not used variable
+ - xen: xenbus: Catch closing of non existent transactions
+ - xen: xenbus_dev_frontend: Verify body of XS_TRANSACTION_END
+ - xenbus: Avoid deadlock during suspend due to open transactions
+ - tracing: Silence GCC 9 array bounds warning
+ - objtool: Support per-function rodata sections
+ - gcc-9: silence 'address-of-packed-member' warning
+ - net: phy: broadcom: Use strlcpy() for ethtool::get_strings
+ - mmc: core: Prevent processing SDIO IRQs when the card is suspended
+ - scsi: ufs: Avoid runtime suspend possibly being blocked forever
+ - usb: chipidea: udc: workaround for endpoint conflict issue
+ - IB/hfi1: Silence txreq allocation warnings
+ - Input: synaptics - Enable SMBus on ThinkPad E480 and E580
+ - Input: uinput - add compat ioctl number translation for UI_*_FF UPLOAD
+ - apparmor: enforce nullbyte at end of tag string
+ - ARC: fix build warnings
+ - ARC: [plat-hsdk]: Add missing multicast filter bins number to GMAC node
+ - ARC: [plat-hsdk]: Add missing FIFO size entry in GMAC node
+ - parport: Fix mem leak in parport_register_dev_model
+ - parisc: Fix compiler warnings in float emulation code
+ - IB/rdmacv: Fix alloc_qpn() WARN_ON()
+ - IB/hfi1: Insure freeze_work work_struct is canceled on shutdown
+ - IB/{qib, hfi1, rdmacv}: Correct ibv_devinfo max_mr value
+ - IB/hfi1: Validate page aligned for a given virtual address
+ - MIPS: uprobes: remove set but not used variable 'epc'
+ - xtensa: Fix section mismatch between memblock_reserve and mem_reserve
+ - net: dsa: mV8e6xxx: avoid error message on remove from VLAN 0
+ - net: hns: Fix loopback test failed at copper ports
+ - mdesc: fix a missing-check bug in get_vdev_port_node_info()
+ - sparc: perf: fix updated event period in response to PERF_EVENT_IOC_PERIOD
+ - net: ethernet: mediatek: Use hw_feature to judge if HWLRO is supported
+ - net: ethernet: mediatek: Use NET_IP_ALIGN to judge if HW RX_2BYTE_OFFSET is enabled
+ - drm/arm/hdlcd: Actually validate CRTC modes
+ - drm/arm/hdlcd: Allow a bit of clock tolerance
+ - scripts/checkstack.pl: Fix arm64 wrong or unknown architecture
+ - scsi: ufs: Check that space was properly allocated in copy_query_response
+ - scsi: smartpqi: unlock on error in pqi_submit RAID_request_synchronous()
+ - net: ipvlan: Fix ipvlan device tso disabled while NETIF_F_IP_CSUM is set
+ - s390/qeth: fix VLAN attribute in bridge_hostnotify udev event
+ - hwmon: (core) add thermal sensors only if dev->of_node is present
+ - hwmon: (pmbus/core) Treat parameters as paged if on multiple pages
+ - nvme: Fix u32 overflow in the number of namespace list calculation
+ - btrfs: start readahead also in seed devices
+ - can: flexcan: fix timeout when set small bitrate
+ - can: purge socket error queue on sock destruct
+ - powerpc/bpf: use unsigned division instruction for 64-bit operations
+ - ARM: imx: cpuidle-imx6sx: Restrict the SW2ISO increase to i.MX6SX
+ - ARM: dts: am57xx-idk: Remove support for voltage switching for SD card
+ - Bluetooth: Align minimum encryption key size for LE and BR/EDR connections
+ - Bluetooth: Fix regression with minimum encryption key size alignment
+ - SMB3: retry on STATUS_INSUFFICIENT_RESOURCES instead of failing write
+ - cfg80211: fix memory leak of wiphy device name
+ - mac80211: drop robust management frames from unknown TA
+ - mac80211: handle deauthentication/disassociation from TDLS peer
+ - mac80211: Do not use stack memory with scatterlist for GMAC
+ - s390/jump_label: Use "jdd" constraint on gcc9
+ - s390/ap: rework assembler functions to use unions for in/out register variables
+ - mmc: core: API to temporarily disable retuning for SDIO CRC errors
+ - mmc: core: Add sdio_retune_hold_now() and sdio_retune_release()
+ - Input: silead - add MSSL0017 to acpi_device_id
+ - selftests: vm: install test_vmalloc.sh for run_vmtests
+ - arm64: Silence gcc warnings about arch ABI drift
+ - riscv: mm: synchronize MMU after pte change
+ - arm64/sve: <uapi/asm/ptrace.h> should not depend on <uapi/linux/prctl.h>
+ - drm/vmwgfx: Use the backdoor port if the HB port is not available
+ - [nl,mac]80211: allow 4addr AP operation on crypto controlled devices
+ - perf ui helpline: Use strlcpy() as a shorter form of strncpy() + explicit set null
+ - perf help: Remove needless use of strncpy()
+ - perf header: Fix unchecked usage of strncpy()
+ - IB/hfi1: Close PSM sdma_progress sleep window
+ - 9p/xen: fix check for xenbus_read error in front_probe
+ - 9p/rdma: do not disconnect on down_interruptible EAGAIN
+ - 9p: acl: fix uninitialized iattr access
+ - 9p/rdma: remove useless check in cm_event_handler
- 9p: p9dirent_read: check network-provided name length
- net/9p: include trans_common.h to fix missing prototype warning.
- qmi_wwan: Fix out-of-bounds read
- fs/proc/array.c: allow reporting eip/esp for all coredumping threads
- mm/mempolicy.c: fix an incorrect rebind node in mpol_rebind_nodemask
- fs/binfmt_flat.c: make load_flat_shared_library() work
- dm log writes: make sure super sector log updates are written in order
- scsi: vmw_pscsi: Fix use-after-free in pvscsi_queue_lck()
- x86/speculation: Allow guests to use SSBD even if host does not
- x86/microcode: Fix the microcode load on CPU hotplug for real
- NFS/flexfiles: Use the correct TCP timeout for flexfiles I/O
- cpu/speculation: Warn on unsupported mitigations= parameter
- tipc: change to use register_pernet_device
- tipc: pass tunnel dev as NULL to udp_tunnel_xmit_skb
- arm64: futex: Avoid copying out uninitialised stack in failed cmpxchg()
- bpf, arm64: use more scalable stadd over ldxr / stxr loop in xadd
- ipv4: Use return value of inet_iif() for __raw_v4_lookup in the while loop
- net/packet: fix memory leak in packet_set_ring()
- net: remove duplicate fetch in sock_getsockopt
- scct: change to hold sk after auth shkey is created successfully
- tipc: change to use register_pernet_device
- tipc: check msg->req data len in tipc_nl_compat_bearer_disable
- tun: wake up waitqueues after IFF_UP is set
- team: Always enable vlan tx offload
- bonding: Always enable vlan tx offload
- bpf: udp: Avoid calling reuseport's bpf_prog from udp_gro
- bpf: ipv6: Avoid running reuseport's bpf_prog from __udp6_lib_err
- arm64: futex: Avoid copying out uninitialised stack in failed cmpxchg()
- bpf, arm64: use more scalable stadd over ldxr / stxr loop in xadd
- futex: Update comments and docs about return values of arch futex code
- tipc: pass tunnel dev as NULL to udp_tunnel(6)_xmit_skb
- arm64: insn: Fix ldadd instruction encoding
- arm64: Don't unconditionally add -Wno-psabi to KBUILD_CFLAGS
- irqchip/mips-gic: Use the correct local interrupt map registers
- Bluetooth: Fix faulty expression for minimum encryption key size check
- ASoC : cs4265 : readable register too low
- ASoC: soc-pcm: BE dai needs prepare when pause release after resume
- spi: bitbang: Fix NULL pointer dereference in spi_unregister_master
- drm/mediatek: fix unbind functions
- drm/mediatek: call drm_atomic_helper_shutdown() when unbinding driver
- drm/mediatek: call mtk_dsi_stop() after mtk_drm_crtc_atomic_disable()
- ASoC: max98090: remove 24-bit format support if RJ is 0
- ASoC: sun4i-i2s: Fix sun8i tx channel offset mask
- ASoC: sun4i-i2s: Add offset to RX channel select
- usb: gadget: fusb300_udc: Fix memory leak of fusb300->ep[i]
- usb: gadget: udc: lpc32xx: allocate descriptor with GFP_ATOMIC
- SoC: rt274: Fix internal jack assignment in set_jack callback
- scsi: hpsa: correct ioaccel2 chaining

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+ - platform/x86: mlx-platform: Fix parent device in i2c-mux-reg device
+ - cpuset: restore sanity to cpuset_cpus_allowed_fallback()
+ - scripts/decode_stacktrace.sh: prefix addr2line with SCROSS_COMPILE
+ - mm/mlock.c: change count_mm_mlocked_page_nr return type
+ - module: Fix livepatch/ftrace module text permissions race
+ - ftrace: Fix NULL pointer dereference in free_ftrace_func_mapper()
+ - MIPS: netlogic: xlr: Remove erroneous check in nlm_fmn_send()
+ - drm/915/dmc: protect against reading random memory
+ - crypto: user - prevent operating on larval algorithms
+ - crypto: cryptd - Fix skcipher instance memory leak
+ - ALSA: seq: fix incorrect order of dest_client/dest_ports arguments
+ - ALSA: firewire-lib/fireworks: fix miss detection of received MIDI messages
+ - ALSA: line6: Fix write on zero-sized buffer
+ - ALSA: usb-audio: fix sign unintended sign extension on left shifts
+ - ALSA: hda/realtek - Change front mic location for Lenovo M710q
+ - lib/mpi: Fix karactx leak in mpi_powm
+ - tracing/snapshot: Resize spare buffer if size changed
+ - arm64: kaslr: keep modules inside module region when KASAN is enabled
+ - drm/amdgpu/gfx9: use reset default for PA_SC_FIFO_SIZE
+ - drm/imx: notify drm core before sending event during crtc disable
+ - drm/imx: only send event on crtc disable if kept disabled
+ - ftrace/x86: Remove possible deadlock between register_kprobe() and
  ftrace_run_update_code()
+ - mm/vmscan.c: prevent useless kswapd loops
+ - btrfs: Ensure replaced device doesn't have pending chunk allocation
+ - vhost-net: set packet weight of tx polling to 2 * vq size
+ - vhost_net: use packet weight for rx handler, too
+ - vhost_net: introduce vhost_exceeds_weight()
+ - vhost: introduce vhost_exceeds_weight()
+ - vhost_net: fix possible infinite loop
+ - vhost: vsoc: add weight support
+ - vhost: scsi: add weight support
+ - tty: rocket: fix incorrect forward declaration of 'rp_init()'
+ - KVM: x86: degrade WARN to pr_warn_ratelimited
+ - KVM: LAPIC: Fix pending interrupt in IRR blocked by software disable LAPIC
+ - svcrdma: Ignore source port when computing DRC hash
+ - MIPS: Fix bounds check virt_addr_valid
+ - MIPS: Add missing EHB in mtc0 -> mfc0 sequence.
+ - dmaengine: imx-sdma: remove BD_INTR for channel0
+ - drm/mediatek: unbind components in mtk_drm_unbind()
+ - drm/mediatek: clear num_pipes when unbind driver
  + x86/CPU: Add more Icelake model numbers
+ - platform/x86: asus-wmi: Only Tell EC the OS will handle display hotkeys from
  asus_nb_wmi
+ - platform/x86: intel-vbtn: Report switch events when event wakes device
+ - i2c: pca-platform: Fix GPIO lookup code
+ - ALSA: hda/realtek: Add quirks for several Clevo notebook barebones
+ ARM: dts: armada-xp-98dx3236: Switch to armada-38x-uart serial node
+ drm/amd/powerplay: use hardware fan control if no powerplay fan table
+ drm/etnaviv: add missing failure path to destroy suballoc
+ mlxsw: spectrum: Handle VLAN device unlinking
+ media: s5p-mfc: fix incorrect bus assignment in virtual child device
+ net: hns: Fixes the missing put_device in positive leg for roce reset
+ ALSA: hda: Initialize power_state field properly
+ rds: Fix warning.
+ ip6: fix skb leak in ip6frag_expire_frag_queue()
+ netfilter: ipv6: nf_defrag: fix leakage of unqueued fragments
+ scl6is7xx: move label 'err_spi' to correct section
+ netfilter: ipv6: nf_defrag: accept duplicate fragments again
+ mlxsw: spectrum: Handle VLAN device unlinking
+ media: s5p-mfc: fix incorrect bus assignment in virtual child device
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+ ALSA: hda: Initialize power_state field properly
+ rds: Fix warning.
+ ip6: fix skb leak in ip6frag_expire_frag_queue()
+ - net: erspan: fix use-after-free
+ - gfs2: Fix lru_count going negative
+ - cxgb4: Fix error path in cxgb4_init_module
+ - NFS: make nfs_match_client killable
+ - IB/hfi1: Fix WQ_MEM_RECLAIM warning
+ - gfs2: Fix occasional glock use-after-free
+ - mmc: core: Verify SD bus width
+ - tools/bpf: fix perf build error with uClibc (seen on ARC)
+ - dmaengine: tegra210-dma: free dma controller in remove()
+ - net: ena: gcc 8: fix compilation warning
+ - pinctrl: zte: fix leaked_of_node references
+ - ASoC: hdmi-codec: unlock the device on startup errors
+ - powerpc/perf: Return accordingly on invalid chip-id in
+ - powerpc/boot: Fix missing check of lseek() return value
+ - ASoC: imx: fix fiq dependencies
+ - spi: pxa2xx: fix SCR (divisor) calculation
+ - brcm80211: potential NULL dereference in
  + brcmf_cfg80211_vndr_cmds_dcmd_handler()
+ - ACPI / property: fix handling of data_nodes in acpi_get_next_subnode()
+ - ARM: vdso: Remove dependency with the arch_timer driver internals
+ - arm64: Fix compiler warning from pte_unmap() with -Wunused-but-set-variable
+ - sched/cpufreq: Fix kobject memleak
+ - scsi: qla2xxx: Fix a qla24xx_enable_msix() error path
+ - scsi: qla2xxx: Fix abort handling in tcm qla2xxx_write_pending()
+ - scsi: qla2xxx: Avoid that lockdep complains about unsafe locking in
  + tcm qla2xxx_close_session()
+ - Btrfs: fix data bytes_may_use underflow with fallocate due to failed quota
  + reserve
+ - btrfs: fix panic during relocation after ENOSPC before writeback happens
+ - btrfs: Don't panic when we can't find a root key
+ - iwlwifi: pcie: don't crash on invalid RX interrupt
+ - rtc: 88pm860x: prevent use-after-free on device remove
+ - scsi: qedi: Abort ep termination if offload not scheduled
+ - w1: fix the resume command API
+ - dmaengine: pl330: _stop: clear interrupt status
+ - mac80211/cfg80211: update bss channel on channel switch
+ - libbpf: fix samples/bpf build failure due to undefined UINT32_MAX
+ - ASoC: fsl_sai: Update is_slave_mode with correct value
+ - mwifiex: prevent an array overflow
+ - net: cw1200: fix a NULL pointer dereference
+ - crypto: sun4i-ss - Fix invalid calculation of hash end
+ - bcache: return error immediately in bch_journal_replay()
+ - bcache: fix failure in journal replay
+ - bcache: add failure check to run_cache_set() for journal replay
+ - bcache: avoid clang -Wuninitialized warning
+ - vfio-ccw: Do not call flush_workqueue while holding the spinlock
+ - vfio-ccw: Release any channel program when releasing/removing vfio-ccw mdev
+ - smpboot: Place the __percpu annotation correctly
- x86/mm: Remove in_nmi() warning from 64-bit implementation of
  vmalloc_fault()
- mm/uaccess: Use 'unsigned long' to placate UBSAN warnings on older GCC
  versions
- HID: logitech-hidpp: use RAP instead of FAP to get the protocol version
- pinctrl: pistachio: fix leaked of_node references
- pinctrl: samsung: fix leaked of_node references
- clk: rockchip: undo several noc and special clocks as critical on rk3288
- dmaengine: at_xdmac: remove BUG_ON macro in tasklet
- media: cosa: clear error return value before picture run
- media: ov6650: Move v4l2_clk_get() to ov6650_video_probe() helper
- media: au0828: stop video streaming only when last user stops
- media: ov2659: make S_FMT succeed even if requested format doesn't match
- audit: fix a memory leak bug
- media: sm32-dcmi: fix crash when subdev do not expose any formats
- media: au0828: Fix NULL pointer dereference in au0828_analog_stream_enable()
- media: pvrsb2: Prevent a buffer overflow
- powerpc/64: Fix booting large kernels with STRICT_KERNEL_RWX
- random: add a spinlock_t to struct batched_entropy
- cgroup: protect cgroup->nr_(dying_)descendants by css_set_lock
- sched/core: Check quota and period overflow at usec to nsec conversion
- sched/rt: Check integer overflow at usec to nsec conversion
- sched/core: Handle overflow in cpu_shares_write_u64
- drm/msm: a5xx: fix possible object reference leak
- USB: core: Don't unbind interfaces following device reset failure
- x86/irq/64: Limit IST stack overflow check to #DB stack
- phy: sun4i-usb: Make sure to disable PHY0 passby for peripheral mode
- i40e: Able to add up to 16 MAC filters on an untrusted VF
- i40e: don't allow changes to HW VLAN stripping on active port VLANs
- arm64: vdo: Fix clock_getres() for CLOCK_REALTIME
- RDMA/cxgb4: Fix null pointer dereference on alloc_skb failure
- hwmon: (vt1211) Use request_muxed_region for Super-IO accesses
- hwmon: (msc47m1) Use request_muxed_region for Super-IO accesses
- hwmon: (msc47b397) Use request_muxed_region for Super-IO accesses
- hwmon: (pc87427) Use request_muxed_region for Super-IO accesses
- hwmon: (fc71805f) Use request_muxed_region for Super-IO accesses
- scsi: libbsas: Do discovery on empty PHY to update PHY info
- mmc: core: make pwrseq_emmc (partially) support sleepy GPIO controllers
- mmc_spi: add a status check for spi_sync_locked
- mmc: sdhci-of-esdhc: add erratum eSDHC5 support
- mmc: sdhci-of-esdhc: add erratum A-009204 support
- mmc: sdhci-of-esdhc: add erratum eSDHC-A001 and A-008358 support
- drm/amdgpu: fix old fence check in amdgpu_fence_emit
- PM / core: Propagate dev->power.wakeup_path when no callbacks
- clk: rockchip: Fix video codec clocks on rk3288
- extcon: arizona: Disable mic detect if running when driver is removed
- clk: rockchip: Make rkpwm a critical clock on rk3288
- s390: zcrypt: initialize variables before_use
+ - x86/microcode: Fix the ancient deprecated microcode loading method
+ - s390: cio: fix cio irb declaration
+ - cpufreq: ppc_cbe: fix possible object reference leak
+ - cpufreq: pasemi: fix possible object reference leak
+ - cpufreq: pmac32: fix possible object reference leak
+ - cpufreq: kirkwood: fix possible object reference leak
+ - block: sed-opal: fix IOC_OPALENABLE_DISABLE_MBR
+ - x86/build: Keep local relocations with ld.lld
+ - iio: ad_sigma_delta: Properly handle SPI bus locking vs CS assertion
+ - iio: hmc5843: fix potential NULL pointer dereferences
+ - iio: common: ssp_sensors: Initialize calculated_time in
+ - ssp_common_process_data
+ - rtlwifi: fix a potential NULL pointer dereference
+ - mwifiex: Fix mem leak in mwifiex_tm_cmd
+ - brcmfmac: fix missing checks for kmemdup
+ - b43: shut up clang -Wuninitialized variable warning
+ - brcmfmac: convert dev_init_lock mutex to completion
+ - brcmfmac: fix WARNING during USB disconnect in case of unempty psq
+ - brcmfmac: fix race during disconnect when USB completion is in progress
+ - brcmfmac: fix Oops when bringing up interface during USB disconnect
+ - rtc: xgene: fix possible race condition
+ - rtlwifi: fix potential NULL pointer dereference
+ - scsi: ufs: Fix regulator load and icc-level configuration
+ - scsi: ufs: Avoid configuring regulator with undefined voltage range
+ - arm64: cpu_ops: fix a leaked reference by adding missing of_node_put
+ - x86/uccess, signal: Fix AC=1 bloat
+ - x86/ia32: Fix ia32_restore_sigcontext() AC leak
+ - chardev: add additional check for minor range overlap
+ - RDMA/hns: Fix bad endianess of port_pd variable
+ - HID: core: move Usage Page concatenation to Main item
+ - ASoC: eukrea-tlv320: fix a leaked reference by adding missing of_node_put
+ - ASoC: fsl_utilis: fix a leaked reference by adding missing of_node_put
+ - cxgb3/f/2l: Fix undefined behaviour
+ - HID: logitech-hidpp: change low battery level threshold from 31 to 30 percent
+ - spi: tegra114: reset controller on probe
+ - kobject: Don't trigger kobject_uevent(KOBJ_REMOVE) twice.
+ - media: video-mux: fix null pointer dereferences
+ - media: w1128x: prevent two potential buffer overflows
+ - scsi: qedf: Add missing return in qedf_post_io_req() in the fport offload
+ - check
+ - virtio_console: initialize vtermno value for ports
+ - tty: ipwireless: fix missing checks for ioremap
+ - x86/mce: Fix machine_check_poll() tests for error types
+ - rcutorture: Fix cleanup path for invalid torture_type strings
+ - rcperf: Fix cleanup path for invalid perf_type strings
+ - usb: core: Add PM runtime calls to usb_hcd_platform_shutdown
+ - scsi: qfa4xxx: avoid freeing unallocated dma memory
+ - batman-adv: allow updating DAT entry timeouts on incoming ARP Replies
+ - dmaengine: tegra210-adma: use devm_clk_*() helpers
+ - hwrg: omap - Set default quality
+ - thunderbolt: Fix to check for kmemdup failure
+ - media: m88ds3103: serialize reset messages in m88ds3103_set_frontend
+ - media: vnic: stream: fix thread state before sleep
+ - media: go7007: avoid clang frame overflow warning with KASAN
+ - media: vnic: zero the media_device on probe
+ - scsi: lpfc: Fix FDMI manufacturer attribute value
+ - scsi: lpfc: Fix fc4type information for FDMI
+ - media: saa7146: avoid high stack usage with clang
+ - scsi: lpfc: Fix SLI3 commands being issued on SLI4 devices
+ - spi: spi-topcliff-pch: Fix to handle empty DMA buffers
+ - spi: rspi: Fix sequencer reset during initialization
+ - spi: Fix zero length xfer bug
+ - ASoC: davinci-mcasp: Fix clang warning without CONFIG_PM
+ - drm/drv: Hold ref on parent device during drm_device lifetime
+ - drm: Wake up next in drm_read() chain if we are forced to putback the event
+ - vfio-ccw: Prevent quiesce function going into an infinite loop
+ - NFS: Fix a double unlock from nfs_match,get_client
+ - ext4: wait for outstanding dio during truncate in nojournal mode
+ - NFSv4.1 fix incorrect return value in copy_file_range
+ - media: vb2: add waiting_in_dqbuf flag
+ - acct_on(): don't mess with freeze protection
+ - hv_netvsc: fix race that may miss tx queue wakeup
+ - Bluetooth: Ignore CC events not matching the last HCI command
+ - powerpc/perf: Fix loop exit condition in nest_imc_event_init
+ - drm/nouveau/bar/nv50: ensure BAR is mapped
+ - media: stm32-dcmi: return appropriate error codes during probe
+ - powerpc/watchdog: Use htimers for per-CPU heartbeat
+ - scsi: qla2xxx: Fix hardirq-unsafe locking
+ - x86/modules: Avoid breaking W^X while loading modules
+ - sched/nohz: Run NOHZ idle load balancer on HK_FLAG_MISC CPUs
+ - s390: qeth: address type mismatch warning
+ - rsi: Fix NULL pointer dereference in kmalloc
+ - nvme: set 0 capacity if namespace block size exceeds PAGE_SIZE
+ - bcache: avoid potential memleak of list of journal_replay(s) in the
  CACHE_SYNC branch of run_cache_set
+ - RDMA/cma: Consider scope_id while binding to ipv6 ll address
+ - block: fix use-after-free on gendisk
+ - staging: vc04_services: handle kalloc failure
+ - irq_work: Do not raise an IPI when queueing work on the local CPU
+ - thunderbolt: Take domain lock in switch sysfs attribute callbacks
+ - drm: etnaviv: avoid DMA API warning when importing buffers
+ - ACPI/IORT: Reject platform device creation on NUMA node mapping failure
+ - perf/x86/msr: Add Iceake support
+ - perf/x86/intel/rapl: Add Iceake support
+ - perf/x86/intel/cstate: Add Iceake support
+ - drm.panel: otm8009a: Add delay at the end of initialization
+ - thunderbolt: property: Fix a missing check of kmalloc
+ - thunderbolt: Fix to check the return value of kmemdup
+ - x86/mce: Handle varying MCA bank counts
+ - scsi: lfc: avoid uninitialized variable warning
+ - thunderbolt: Fix to check return value of ida_simple_get
+ - drm/amd/display: fix releasing planes when exiting odm
+ - thunderbolt: property: Fix a NULL pointer dereference
+ - e1000e: Disable runtime PM on CNP+
+ - igb: Exclude device from suspend direct complete optimization
+ - media: si2165: fix a missing check of return value
+ - drm/amd/display: Fix Divide by 0 in memory calculations
+ - spi: imx: stop buffer overflow in RX FIFO flush
+ - bonding/802.3ad: fix slave link initialization transition states
+ - cxgb4: offload VLAN flows regardless of VLAN ethtype
+ - inet: switch IP ID generator to siphash
+ - ipv4/igmp: fix another memory leak in igmpv3_del_delrec()
+ - ipv4/igmp: fix build error if !CONFIG_IP_MULTICAST
+ - ipv6: Consider sk_bound_dev_if when binding a raw socket to an address
+ - llc: fix skb leak in llc_build_and_send_ui_pkt()
+ - net: dsa: mv88e6xxx: fix handling of upper half of STATS_TYPE_PORT
+ - net: fec: fix the clk mismatch in failed_reset path
+ - net-gro: fix use-after-free read in napi_gro_frag()
+ - net: mvneta: Fix err code path of probe
+ - net: mvpp2: fix bad MVPP2_TXQ_SCHED_TOKEN_CNTR_REG queue value
+ - net: phy: marvell10g: report if the PHY fails to boot firmware
+ - net: stmmac: fix reset/gpio free missing
+ - usbnets: fix kernel crash after disconnect
+ - tipc: Avoid copying bytes beyond the supplied data
+ - net/mlx5: Allocate root ns memory using kmalloc to match kfree
+ - bnxt_en: Fix aggregation buffer leak under OOM condition.
+ - crypto: vmx - ghash: do nosimd fallback manually
+ - include/linux/compiler*.h: define asm_volatile_goto
+ - compiler.h: give up __compiletime_assert_fallback()
+ - xen/pciback: Don't disable PCI_COMMAND on PCI device reset.
+ - tipc: fix modprobe tipc failed after switch order of device registration
+ - sparc64: Fix regression in non-hypervisor TLB flush xcall
+ - include/linux/bitops.h: sanitize rotate primitives
+ - xhci: update bounce buffer with correct sg num
+ - xhci: Use %zu for printing size_t type
+ - xhci: Convert xhci_handshake() to use readl_poll_timeout_atomic()
+ - usb: xhci: avoid null pointer deref when bos field is NULL
+ - usbp: usbp_host: fix BUG: sleeping function called from invalid context
+ - usbp: usbp_host: fix stub_dev lock context imbalance regression
+ - USB: Fix slab-out-of-bounds write in usb_get_bos_descriptor
+ - USB: sisusbvga: fix oops in error path of sisusb_probe
+ - USB: Add LPM quirk for Surface Dock GigE adapter
+ - USB: rio500: refuse more than one device at a time
+ - USB: rio500: fix memory leak in close after disconnect
+ - media: usb: siano: Fix general protection fault in smsusb
+ - media: usb: siano: Fix false-positive "uninitialized variable" warning
+ - media: smsusb: better handle optional alignment
+ - scsi: zfcp: fix missing zfcp_port reference put on -EBUSY from port_remove
+ - scsi: zfcp: fix to prevent port_remove with pure auto scan LUNs (only sdevs)
+ - Btrfs: fix wrong ctime and mtime of a directory after log replay
+ - Btrfs: fix race updating log root item during fsync
+ - Btrfs: fix fsync not persisting changed attributes of a directory
+ - Btrfs: incremental send, fix file corruption when no-holes feature is enabled
+ - KVM: PPC: Book3S HV: XIVE: Do not clear IRQ data of passthrough interrupts
+ - powerpc/perf: Fix MMCRA corruption by bhrb_filter
+ - ALSA: hda/realtek - Set default power save node to 0
+ - KVM: s390: Do not report unused IDs via KVM_CAP_MAX_VCPU_ID
+ - drm/nouveau/i2c: Disable i2c bus access after ->fini()
+ - tty: serial: msm_serial: Fix XON/XOFF
+ - tty: max310x: Fix external crystal register setup
+ - memcg: make it work on sparse non-0-node systems
+ - kernel/signal.c: trace_signal_deliver when signal_group_exit
+ - docs: Fix conf.py for Sphinx 2.0
+ - doc: Cope with the deprecation of AutoReporter
+ - doc: Cope with Sphinx logging deprecations
+ - ima: show rules with IMA_INMASK correctly
+ - serial: sh-sci: disable DMA for uart_console
+ - staging: vc04_services: prevent integer overflow in create_pagelist()
+ - staging: wlan-ng: fix adapter initialization failure
+ - CIFS: cifs_read_allocate_pages: don't iterate through whole page array on ENOMEM
+ - gcc-plugins: Fix build failures under Darwin host
+ - drm/vmwgfx: Don't send drm sysfs hotplug events on initial master set
+ - drm/rockchip: shutdown drm subsystem on shutdown
+ - Compiler Attributes: add support for __copy (gcc >= 9)
+ - include/linux/module.h: copy __init/__exit attrs to init/cleanup_module
+ - binder: fix race between munmap() and direct reclaim
+ - media: uvcvideo: Fix uvc_alloc_entity() allocation alignment
+ - brcmfmac: fix NULL pointer dereference during USB disconnect
+ - iio: dac: ds4422/ds4424 fix chip verification
+ - s390/crypto: fix possible sleep during spinlock acquired
+ - ALSA: line6: Assure canceling delayed work at disconnection
+ - vt/fbcon: deinitialize resources in visual_init() after failed memory allocation
+ - cifs: fix memory leak of pneg_inbuf on -EOPNOTSUPP ioctl case
+ - x86/ftrace: Do not call function graph from dynamic trampolines
+ - x86/ftrace: Set trampoline pages as executable
+ - x86/kprobes: Set instruction page as executable
+ - of: overlay: validate overlay properties #address-cells and #size-cells
+ - of: overlay: set node fields from properties when add new overlay node
+ - ethtool: fix potential userspace buffer overflow
+ - Fix memory leak in sctp_process_init
+ - neighbor: Call __ipv4_neigh_lookup_noref in neigh_xmit
+ - net/mlx4_en: ethtool, Remove unsupported SFP EEPROM high pages query
+ - net: rds: fix memory leak in rds_ib_flush_mr_pool
+ - pktgen: do not sleep with the thread lock held.
+ - ip6: fix EFAULT on sendto with icmpv6 and hdrincl
+ - ip6: use READ_ONCE() for inet->hdrincl as in ipv4
+ - net: sfp: read eeprom in maximum 16 byte increments
+ - ip6: fix the check before getting the cookie in rt6_get_cookie
+ - rcu: locking and unlocking need to always be at least barriers
+ - parisc: Use implicit space register selection for loading the coherence
  + index of I/O pdirs
+ - fuse: fallocate: fix return with locked inode
+ - pstore: Remove needless lock during console writes
+ - pstore: Convert buf_lock to semaphore
+ - pstore/ram: Run without kernel crash dump region
+ - x86/power: Fix 'nosmt' vs hibernation triple fault during resume
+ - i2c: xic: Add max_read_len quirk
+ - MIPS: Bounds check virt_addr_valid
+ - MIPS: pistachio: Build uImage.gz by default
+ - genwqe: Prevent an integer overflow in the ioctl
+ - test_firmware: Use correct snprintf() limit
+ - drm/gma500/cdv: Check vbt config bits when detecting lvds panels
+ - drm/amdgpupsp: move psp version specific function pointers to early_init
+ - drm/i915: Fix I915_EXEC_RING_MASK
+ - drm/i915/fbc: disable framebuffer compression on GeminiLake
+ - TTY: serial_core, add ->install
+ - qmi_wwan: Add quirk for Quectel dynamic config
+ - ipv4: Define __ipv4_neigh_lookup_noref when CONFIG_INET is disabled
+ - ethtool: check the return value of get_regs_len
+ - net: ethernet: ti: cpsw_ethtool: fix ethtool ring param set
+ - net: mvpp2: Use strscpy to handle stat strings
+ - packet: unconditionally free po->rollover
+ - NFSv4.1: Again fix a race where CB_NOTIFY_LOCK fails to wake a waiter
+ - NFSv4.1: Fix bug only first CB_NOTIFY_LOCK is handled
+ - s390/mm: fix address space detection in exception handling
+ - drm/msm: fix fb references in async update
+ - drm: add non-desktop quirk for Valve HMDs
+ - drm: add non-desktop quirk for Sensics and OSVR headsets.
+ - drm/amdgpup: remove ATPX_DGPU_REQ_POWER_FOR_DISPLAYS check when hotplug-in
+ * CVE-2019-14283
  + - floppy: fix out-of-bounds read in copy_buffer
+ * CVE-2019-14284
  + - floppy: fix div-by-zero in setup_format_params
+ * Bionic linux 4.15.0-56.62 fails to build with CONFIG_NVM disabled
+ (LP: #1838533)
+ - Revert "nvme: warn when finding multi-port subsystems without multipathing
+ enabled"
+
+ * Bionic update: upstream stable patchset 2019-07-31 (LP: #1838576)
+ - netfilter: compat: initialize all fields in xt_init
+ - platform/x86: sony-laptop: Fix unintentional fall-through
+ - platform/x86: thinkpad_acpi: Disable Bluetooth for some machines
+ - hwmon: (pwm-fan) Disable PWM if fetching cooling data fails
+ - kernfs: fix barrier usage in __kernfs_new_node()
+ - USB: serial: fix unthrottle races
+ - iio: adc: xilinx: fix potential use-after-free on remove
+ - libnvdimm/namespace: Fix a potential NULL pointer dereference
+ - HID: input: add mapping for Expose/Overview key
+ - HID: input: add mapping for keyboard Brightness Up/Down/Toggle keys
+ - HID: input: add mapping for "Toggle Display" key
+ - libnvdimm/btt: Fix a kmemdup failure check
+ - s390/dasd: Fix capacity calculation for large volumes
+ - mac80211: fix unaligned access in mesh table hash function
+ - mac80211: Increase MAX_MSG_LEN
+ - mac80211: fix memory accounting with A-MSDU aggregation
+ - nl80211: Add NL80211_FLAG_CLEAR_SKB flag for other NL commands
+ - s390/3270: fix lockdep false positive on view->lock
+ - clocksource/drivers/oxnas: Fix OX820 compatible
+ - mISDN: Check address length before reading address family
+ - s390/pkey: add one more argument space for debug feature entry
+ - x86/reboot, efi: Use EFI reboot for Acer TravelMate X514-51T
+ - KVM: fix spectrev1 gadgets
+ - KVM: x86: avoid misreporting level-triggered irqs as edge-triggered in
+ tracing
+ - tools lib traceevent: Fix missing equality check for strcmp
+ - mm: fix inactive list balancing between NUMA nodes and cgroups
+ - init: initialize jump labels before command line option parsing
+ - selftests: netfilter: check icmp pkttooobig errors are set as related
+ - ipv6: do not schedule icmp errors from tunnels
+ - netfilter: ctnetlink: don’t use contrack/expect object addresses as id
+ - s390: ctc: fix ctc_new_device error return code
+ - drm/sun4i: Set device driver data at bind time for use in unbind
+ - gpu: ipu-v3: dp: fix CSC handling
+ - drm/imx: don’t skip DP channel disable for background plane
+ - spi: Micrel eth switch: declare missing of table
+ - spi: ST ST95HF NFC: declare missing of table
+ - Input: synaptics-rmi4 - fix possible double free
+ - MIPS: VDSO: Reduce VDSO_RANDOMIZE_SIZE to 64MB for 64bit
+ - ima: open a new file instance if no read permissions
+ - drm/i915: Disable LP3 watermarks on all SNB machines
+ - net: stmmac: Move debugfs init/exit to ->probe()/->remove()
+ - x86/vdso: Pass --eh-frame-hdr to the linker
+ - mm/memory.c: fix modifying of page protection by insert_pfn()
+ - net: fec: manage ahh clock in runtime pm
+ - mlxsw: spectrum_switchdev: Add MDB entries in prepare phase
+ - mlxsw: core: Do not use WQ_MEM_RECLAIM for EMAD workqueue
+ - mlxsw: core: Do not use WQ_MEM_RECLAIM for mlxsw ordered workqueue
+ - mlxsw: core: Do not use WQ_MEM_RECLAIM for mlxsw workqueue
+ - NFC: nci: Add some bounds checking in nci_hci_cmd_received()
+ - nfc: nci: Potential off by one in ->pipes[] array
+ - x86/kprobes: Avoid kretprobe recursion bug
+ - cw1200: fix missing unlock on error in cw1200_hw_scan()
+ - mw18k: Fix rate_idx underflow
+ - rtlwifi: rt8723ae: Fix missing break in switch statement
+ - bonding: fix arp_validate toggling in active-backup mode
+ - bridge: Fix error path for kobject_init_and_add()
+ - dpaa_eth: fix SG frame cleanup
+ - ipv4: Fix raw socket lookup for local traffic
+ - net: dsa: Fix error cleanup path in dsa_init_module
+ - net: ethernet: stmnic: dwmac-sun8i: enable support of unicast filtering
+ - net: seeq: fix crash caused by not set dev.parent
+ - net: ucc_geth - fix Oops when changing number of buffers in the ring
+ - packet: Fix error path in packet_init
+ - vlan: disable SIOCSHWTSTAMP in container
+ - vrf: sit mtu should not be updated when vrf netdev is the link
+ - tipc: fix hanging clients using poll with EPOLLOUT flag
+ - drivers/virt/fsl_hypervisor.c: dereferencing error pointers in ioctl
+ - drivers/virt/fsl_hypervisor.c: prevent integer overflow in ioctl
+ - powerpc/powermv/idle: Restore IAMR after idle
+ - powerpc/powermv/idle: set RI in default MSR
+ - platform/x86: dell-laptop: fix rfkill functionality
+ - iio: adc: xilinx: fix potential use-after-free on probe
+ - iio: adc: xilinx: prevent touching unclocked h/w on remove
+ - acpi/nfit: Always dump _DSM output payload
+ - libnvdimm/pmem: fix a possible OOB access when read and write pmem
+ - vxge: fix return of a free'd memblock on a failed dma mapping
+ - qede: fix write to free'd pointer error and double free of ptp
+ - afs: Unlock pages for __pagevec_release()
+ - ipmi: ipmi_si_hardcode.c: init si_type array to fix a crash
+ - scsi: aic7xxx: fix EISA support
+ - drm/sun4i: Fix component unbinding and component master deletion
+ - netfilter: fix nf_l4proto_log_invalid to log invalid packets
+ - drm/sun4i: Unbind components before releasing DRM and memory
+ - usb: typec: Fix unchecked return value
+ - netfilter: nf_tables: use-after-free in dynamic operations
+ - um: Don't hardcode path as it is architecture dependent
+ - powerpc/book3s/64: check for NULL pointer in pgd_alloc()
+ - PCI: hv: Add hv_pci_remove_slots() when we unload the driver
+ - PCI: hv: Add pci_destroy_slot() in pci_devices_present_work(), if necessary
- net: core: another layer of lists, around PF_MEMALLOC skb handling
- locking/rwsem: Prevent decrement of reader count before increment
- PCI: hv: Fix a memory leak in hv_eject_device_work()
- x86/speculation/mds: Revert CPU buffer clear on double fault exit
- x86/speculation/mds: Improve CPU buffer clear documentation
- objtool: Fix function fallthrough detection
- ARM: dts: exynos: Fix interrupt for shared EINTs on Exynos5260
- ARM: dts: exynos: Fix audio (microphone) routing on Odroid XU3
- ARM: exynos: Fix a leaked reference by adding missing of_node_put
- power: supply: axp288_charger: Fix unchecked return value
- arm64: compat: Reduce address limit
- arm64: Clear OSDLR_EL1 on CPU boot
- arm64: Save and restore OSDLR_EL1 across suspend/resume
- sched/x86: Save [ER]FLAGS on context switch
- crypto: chacha20poly1305 - set cra_name correctly
- crypto: skcipher - don't WARN on unprocessed data after slow walk step
- crypto: crc10dif-generic - fix use via crypto_shash_digest()
- crypto: x86/crc10dif-pcl - fix use via crypto_shash_digest()
- crypto: gcm - fix incompatibility between "gcm" and "gcm_base"
- crypto: rockchip - update IV buffer to contain the next IV
- crypto: arm/aes-neonbs - don't access already-freed walk.iv
- ALSA: usb-audio: Fix a memory leak bug
- ALSA: hda/realtek - EAPD turn on later
- ASoC: max98090: Fix restore of DAPM Muxes
- ASoC: RT5677-SPI: Disable 16Bit SPI Transfers
- bpf, arm64: remove prefetch insn in xadd mapping
- mm/mincore.c: make mincore() more conservative
- ocfs2: fix ocfs2 read inode data panic in ocfs2_iget
- userfaultfd: use RCU to free the task struct when fork fails
- mfd: da9063: Fix OTP control register names to match datasheets for
DA9063/63L
- mfd: max77620: Fix swapped FPS_PERIOD_MAX_US values
- mtd: spi-nor: intel-spi: Avoid crossing 4K address boundary on read/write
- tty: v.t.c: Fix TIOCL_BLANSCREEn console blanking if blankinterval == 0
- tty/vt: fix write/write race in ioctl(KDSKBSENT) handler
- jbd2: check superblock mapped prior to committing
- ext4: make sanity check in mballoc more strict
- ext4: ignore e_value_offs for xattrs with value-in-ea-inode
- ext4: avoid drop reference to iloc.bh twice
- Btrfs: do not start a transaction during fiemap
- Btrfs: do not start a transaction at iterate_extent_inodes()
- bcache: fix a race between cache register and cacheset unregister
- bcache: never set KEY_PTRS of journal key to 0 in journal_reclaim()
- ext4: fix use-after-free race with debug_want_extra_isize
- ext4: actually request zeroing of inode table after grow
- ext4: fix ext4_show_options for file systems w/o journal
- ipmi:ssif: compare block number correctly for multi-part return messages

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+ crypto: arm64/aes-neonbs - don't access already-freed walk.iv
+ crypto: salsa20 - don't access already-freed walk.iv
+ crypto: ccm - fix incompatibility between "ccm" and "ccm_base"
+ fs/writeback.c: use rcu_barrier() to wait for inflight wb switches going into workqueue when umount
+ ext4: fix data corruption caused by overlapping unaligned and aligned IO
+ ext4: fix use-after-free in dx_release()
+ ALSA: hda/realtalk - Fix for Lenovo B50-70 inverted internal microphone bug
+ KVM: x86: Skip EFER vs. guest CPUID checks for host-initiated writes
+ iov_iter: optimize page_copy_sane()
+ ext4: fix compile error when using BUFFER_TRACE
+ arm64: dts: rockchip: Disable DCMDs on RK3399's eMMC controller.
+ arm64: mmap: Ensure file offset is treated as unsigned
+ arm64: arch_timer: Ensure counter register reads occur with seqlock held
+ crypto: crypto4xx - fix ctr-aes missing output IV
+ crypto: crypto4xx - fix cfb and ofb "overran dst buffer" issues
+ ALSA: line6: toneport: Fix broken usage of timer for delayed execution
+ ASoC: fsl_esai: Fix missing break in switch statement
+ mm/huge_memory: fix vmf_insert_pfn_[pmd, pud]() crash, handle unaligned addresses
+ hugetlb: use same fault hash key for shared and private mappings
+ ACPI: PM: Set enable_for_wake for wakeup GPEs during suspend-to-idle
+ btrfs: Correctly free extent buffer in case btree_read_extent_buffer_pages fails
+ ext4: avoid panic during forced reboot due to aborted journal
+ libnvdimm/namespace: Fix label tracking error
+ ext4: don't update s_rev_level if not required
+ net: avoid weird emergency message
+ net/mlx4_core: Change the error print to info print
+ net: test nouarg before dereferencing zerocopy pointers
+ net: usb: qmi_wwan: add Telit 0x1260 and 0x1261 compositions
+ ppp: deflate: Fix possible crash in deflate_init
+ tipc: switch order of device registration to fix a crash
+ vsck/virtio: free packets during the socket release
+ vsck/virtio: Initialize core virtio vsck before registering the driver
+ net: Always descend into dsa/
+ parisc: Export running_on_qemu symbol for modules
+ parisc: Skip registering LED when running in QEMU
+ parisc: Use PA_ASM_LEVEL in boot code
+ parisc: Rename LEVEL to PA_ASM_LEVEL to avoid name clash with DRBD code
+ stm class: Fix channel free in stm output free path
+ md: add mddev->pers to avoid potential NULL pointer dereference
+ intel_th: msu: Fix single mode with IOMMU
+ p54: drop device reference count if fails to enable device
+ of: fix clang -Wunsequenced for be32_to_cpu()
+ media: ov6650: Fix sensor possibly not detected on probe
+ NFS4: Fix v4.0 client state corruption when mount
+ PNFS fallback to MDS if no deviceid found
+ - clk: hi3660: Mark clk_gate_ufs_subsys as critical
+ - clk: tegra: Fix PLLM programming on Tegra124+ when PMC overrides divider
+ - clk: rockchip: fix wrong clock definitions for rk3328
+ - fuse: fix writepages on 32bit
+ - fuse: honor RLIMIT_FSIZE in fuse_file_fallocate
+ - iommu/tegra-smmu: Fix invalid ASID bits on Tegra30/114
+ - ceph: flush dirty inodes before proceeding with remount
+ - x86_64: Add gap to int3 to allow for call emulation
+ - x86_64: Allow breakpoints to emulate call instructions
+ - ftrace/x86_64: Emulate call function while updating in breakpoint handler
+ - tracing: Fix partial reading of trace event's id file
+ - memory: tegra: Fix integer overflow on tick value calculation
+ - perf intel-pt: Fix instructions sampling rate
+ - perf intel-pt: Fix improved sample timestamp
+ - perf intel-pt: Fix sample timestamp wrt non-taken branches
+ - objtool: Allow AR to be overridden with HOSTAR
+ - fbdev: sm712fb: fix brightness control on reboot, don't set SR30
+ - fbdev: sm712fb: fix VRAM detection, don't set SR70/71/74/75
+ - fbdev: sm712fb: fix white screen of death on reboot, don't set CR3B-CR3F
+ - fbdev: sm712fb: fix boot screen glitch when sm712fb replaces VGA
+ - fbdev: sm712fb: fix crashes during framebuffer writes by correctly mapping VRAM
+ - fbdev: sm712fb: fix support for 1024x768-16 mode
+ - fbdev: sm712fb: use 1024x768 by default on non-MIPS, fix garbled display
+ - fbdev: sm712fb: fix crashes and garbled display during DPMS modesetting
+ - PCI: Mark AMD Stoney Radeon R7 GPU ATS as broken
+ - PCI: Mark Atheros AR9462 to avoid bus reset
+ - PCI: Factor out pcie_retrain_link() function
+ - PCI: Work around Pericom PCIe-to-PCI bridge Retrain Link erratum
+ - dm cache metadata: Fix loading discard bitset
+ - dm zoned: Fix zone report handling
+ - dm delay: fix a crash when invalid device is specified
+ - xfrm: policy: Fix out-of-bound array accesses in __xfrm_policy_unlink
+ - xfrm6_tunnel: Fix potential panic when unloading xfrm6_tunnel module
+ - vti4: ipip tunnel deregistration fixes.
+ - esp4: add length check for UDP encapsulation
+ - xfrm4: Fix uninitialized memory read in _decode_session4
+ - power: supply: cpcap-battery: Fix division by zero
+ - securityfs: fix use-after-free on symlink traversal
+ - apparmorfs: fix use-after-free on symlink traversal
+ - mac80211: Fix kernel panic due to use of txq after free
+ - KVM: arm/arm64: Ensure vcpu target is unset on reset failure
+ - power: supply: sysfs: prevent endless uevent loop with CONFIG_POWER_SUPPLY_DEBUG
+ - iwlwifi: mvm: check for length correctness in iwl_mvm_create_skb()
+ - sched/cpufreq: Fix kobjekt memleak
+ - x86/mm/mem_encrypt: Disable all instrumentation for early SME setup
+ - ufs: fix braino in ufs_get_inode_gid() for solaris UFS flavour
+ perf bench numa: Add define for RUSAGE_THREAD if not present
+ md/raid: raid5 preserve the writeback action after the parity check
+ driver core: Postpone DMA tear-down until after devres release for probe
+ failure
+ bpf: add map_lookup_elem_sys_only for lookups from syscall side
+ bpf, lru: avoid messing with eviction heuristics upon syscall lookup
+ fdev: sm712ib: fix memory frequency by avoiding a switch/case fallthrough
+ nfp: flower: add rcu locks when accessing netdev for tunnels
+ rtntlink: always put IFLA_LINK for links with a link-netnsid
+ brd: re-enable __GFP_HIGMEM in brd_insert_page()
+ proc: prevent changes to overridden credentials
+ md: batch flush requests.
+ phy: ti-pipe3: fix missing bit-wise or operator when assigning val
+ clk: mediatek: Disable tuner_en before change PLL rate
+ PCI: rcar: Add the initialization of PCIe link in resume_noirq()
+ fuse: Add FOPEN_STREAM to use stream_open()
+ qmi_wwan: new Wistron, ZTE and D-Link devices
+ bpf: relax inode permission check for retrieving bpf program

+ Bionic update: upstream stable patchset 2019-07-30 (LP: #1838459)
+ kbuild: simplify ld-option implementation
+ cifs: do not attempt cifs operation on smb2+ rename error
+ tracing: Fix a memory leak by early error exit in trace_pid_write()
+ tracing: Fix buffer_ref pipe ops
+ zram: pass down the bvec we need to read into in the work struct
+ lib/Kconfig.debug: fix build error without CONFIG_BLOCK
+ MIPS: scall64-o32: Fix indirect syscall number load
+ trace: Fix preempt_enable_no_resched() abuse
+ IB/rdma/v: Fix frwr memory registration
+ sched/numa: Fix a possible divide-by-zero
+ ceph: only use d_name directly when parent is locked
+ ceph: ensure d_name stability in ceph_dentry_hash()
+ ceph: fix ci->i_head_snapc leak
+ nfsd: Don't release the callback slot unless it was actually held
+ sunrpc: don't mark uninitialised items as VALID.
+ Input: synaptics-rmi4 - write config register values to the right offset
+ dmaengine: sh: rcar-dmac: With cyclic DMA residue 0 is valid
+ ARM: 8857/1: efi: enable CP15 DMB instructions before cleaning the cache
+ drm/vc4: Fix memory leak during gpu reset.
+ drm/vc4: Fix compilation error reported by kbuild test bot
+ est4: fix some error pointer dereferences
+ vsock/virtio: fix kernel panic from virtio_transport_reset_no_sock
+ tipc: handle the err returned from cmd header function
+ slip: make slhc_free() silently accept an error pointer
+ intel_th: gth: Fix an off-by-one in output unassigning
+ fs/proc/proc_sysctl.c: Fix a NULL pointer dereference
+ ipvs: fix warning on unused variable
+ sched/deadline: Correctly handle active 0-lag timers
+ NFS: Forbid setting AF_INET6 to "struct sockaddr_in"->sin_family.
+ netfilter: ebtables: CONFIG_COMPAT: drop a bogus WARN_ON
+ fm10k: Fix a potential NULL pointer dereference
+ tipc: check bearer name with right length in tipc_nl_compat_bearer_enable
+ tipc: check link name with right length in tipc_nl_compat_link_set
+ x86, retpolines: Raise limit for generating indirect calls from switch-case
+ x86/retpolines: Disable switch jump tables when retpolines are enabled
+ mm: Fix warning in insert_pfn()
+ ipv4: add sanity checks in ipv4_link_failure()
+ mlxsw: spectrum: Fix autoneg status in ethtool
+ net/mlx5e: ethtool, Remove unsupported SFP EEPROM high pages query
+ net: rds: exchange of 8K and 1M pool
+ net: stmmac: move stmmac_check_ether_addr() to driver probe
+ stmmac: pci: Adjust IOT2000 matching
+ team: fix possible recursive locking when add slaves
+ net/rose: fix unbound loop in rose_loophack_timer()
+ ipv4: set the tcp_min_rtt_wlen range from 0 to one day
+ powerpc/fsl: Add FSL_PPC_BOOK3E as supported arch for nospectre_v2 boot arg
+ Documentation: Add nospectre_v1 parameter
+ netfilter: nf_tables: warn when expr implements only one of activate/deactivate
+ net/ibmvnic: Fix RTNL deadlock during device reset
+ drm/rockchip: fix for mailbox read validation.
+ powerpc/vdso32: fix CLOCK_MONOTONIC on PPC64
+ perf/x86/intel: Enable C-state residency events for Cannon Lake
+ perf/x86/intel: Update KBL Package C-state events to also include PC8/PC9/PC10 counters
+ powerpc/mm/radix: Make Radix require HUGETLB_PAGE
+ workqueue: Try to catch flush_work() without INIT_WORK().
+ mlxsw: pci: Reincrease PCI reset timeout
+ mm: make page ref count overflow check tighter and more explicit
+ mm: add 'try_get_page()' helper function
+ mm: prevent get_user_pages() from overflowing page refcount
+ fs: prevent page refcount overflow in pipe_buf_get
+ ARM: dts: bcm283x: Fix hdmi hpd gpio pull
+ s390: limit brk randomization to 32MB
+ qlcnic: Avoid potential NULL pointer dereference
+ netfilter: nft_set_rbtree: check for inactive element after flag mismatch
+ netfilter: bridge: set skb transport_header before entering
+ NF_INET_PRE_ROUTING
+ s390/qeth: fix race when initializing the IP address table
+ sc16is7xx: missing unregister/delete driver on error in sc16is7xx_init()
+ serial: ar933x_uart: Fix build failure with disabled console
+ KVM: arm/arm64: vgic-its: Take the srcu lock when parsing the memslots
+ usb: gadget: net2280: Fix overrun of OUT messages
+ usb: gadget: net2280: Fix net2280_dequeue()
+ usb: gadget: net2272: Fix net2272_dequeue()
+ ARM: dts: pfla02: increase phy reset duration
+ - net: ks8851: Dequeue RX packets explicitly
+ - net: ks8851: Reassert reset pin if chip ID check fails
+ - net: ks8851: Delay requesting IRQ until opened
+ - net: ks8851: Set initial carrier state to down
+ - staging: rtl8118eui: Fix potential NULL pointer dereference of kcalloc
+ - staging: rtlwifi: rtl8822b: fix to avoid potential NULL pointer dereference
+ - staging: rtl8712: uninitialized memory in read_bbreg_hdl()
+ - staging: rtlwifi: Fix potential NULL pointer dereference of kcalloc
+ - net: macb: Add null check for PCLK and HCLK
+ - net/sched: don't dereference a->goto_chain to read the chain index
+ - ARM: dts: imx6qdl: Fix typo in imx6qdl-icore-qs.dtsi
+ - NFS: Fix a typo in nfs_init_timeout_values()
+ - net: xilinx: fix possible object reference leak
+ - net: ibm: fix possible object reference leak
+ - net: ethernet: ti: fix possible object reference leak
+ - gpi: aspeed: fix a potential NULL pointer dereference
+ - drm/meson: Fix invalid pointer in meson_drv_unbind()
+ - drm/meson: Uninstall IRQ handler
+ - scsi: qla4xxx: fix a potential NULL pointer dereference
+ - ush: usb251xb: fix to avoid potential NULL pointer dereference
+ - ush: u132-hcd: fix resource leak
+ - ceph: fix use-after-free on symlink traversal
+ - scsi: zfcp: reduce flood of ferscn1 trace records on multi-element RSCN
+ - libata: fix using DMA buffers on stack
+ - gpi: of: Fix of_gpiochip_add() error path
+ - kconfig/mmcconf: handle backspace (^H) key
+ - ptrace: take into account saved_sigmask in PTRACE{GET,SET}SIGMASK
+ - leds: pca9532: fix a potential NULL pointer dereference
+ - KVM: arm64: Reset the PMU in preemptible context
+ - KVM: arm/arm64: vgic-its: Take the srcu lock when writing to guest memory
+ - scsi: aacraid: Insure we don't access PCIe space during AER/EEH
+ - x86/realmode: Don't leak the trampoline kernel address
+ - x86/mm: Don't exceed the valid physical address space
+ - ipv4: ip_do_fragment: Preserve skb_iif during fragmentation
+ - ipv6/flowlabel: wait rcu grace period before put_pid()
+ - ipv6: invert flowlabel sharing check in process and user mode
+ - l2ip: fix possible use-after-free
+ - l2tp: use rcu_dereference_skb_user_data() in l2tp_udp_encap_recv()
+ - net: dsa: bcm_sf2: fix buffer overflow doing set_rxnfc
+ - net: phy: marvell: Fix buffer overrun with stats counters
+ - scpi: avoid running the scpi state machine recursively
+ - packet: validate msg_namelen in send directly
+ - bnxt_en: Improve multicast address setup logic.
+ - bnxt_en: Free short FW command HWRM memory in error path in bnxt_init_one()
+ - ALSA: line6: use dynamic buffers
+ - rxrpc: Fix net namespace cleanup
+ - kasan: remove redundant initialization of variable 'real_size'
+ - kasan: prevent compiler from optimizing away memset in tests
+ - caif: reduce stack size with KASAN
+ - ALSA: hda/realtek - Add new Dell platform for headset mode
+ - USB: yurex: Fix protection fault after device removal
+ - USB: w1 ds2490: Fix bug caused by improper use of altsetting array
+ - usb: usbip: fix isoc packet num validation in get_pipe
+ - USB: core: Fix unterminated string returned by usb_string()
+ - USB: core: Fix bug caused by duplicate interface PM usage counter
+ - nvme-loop: init nvme_ctrl fatal_err_work when allocate
+ - HID: logitech: check the return value of create_singletread_workqueue
+ - HID: debug: fix race condition with between rdesc_show() and device removal
+ - rtc: sh: Fix invalid alarm warning for non-enabled alarm
+ - batman-adv: Reduce claim hash refcnt only for removed entry
+ - batman-adv: Reduce tt_local hash refcnt only for removed entry
+ - batman-adv: Reduce tt_global hash refcnt only for removed entry
+ - ARM: dts: rockchip: Fix gpu opp node names for rk3288
+ - net/mlx5: E-Switch, Fix esw manager vport indication for more vport commands
+ - bonding: show full hw address in sysfs for slave entries
+ - net: stmmac: ratelimit RX error logs
+ - net: stmmac: don't overwrite discard_frame status
+ - net: stmmac: fix dropping of multi-descriptor RX frames
+ - net: stmmac: don't log oversized frames
+ - jffs2: fix use-after-free on symlink traversal
+ - debugfs: fix use-after-free on symlink traversal
+ - rtc: da9063: set uie_unsupported when relevant
+ - HID: input: add mapping for Assistant key
+ - vfio/pci: use correct format characters
+ - scsi: core: add new RDAC LENOVO/DE_Series device
+ - scsi: storvsc: Fix calculation of sub-channel count
+ - net: hns: Fix WARNING when remove HNS driver with SMMU enabled
+ - kmemleak: powerpc: skip scanning holes in the .bss section
+ - hugetlbfs: fix memory leak for resv_map
+ - sh: fix multiple function definition build errors
+ - xsysace: Fix error handling in ace_setup
+ - ARM: orion: don't use using 64-bit DMA masks
+ - ARM: iop: don't use using 64-bit DMA masks
+ - perf/x86/amd: Update generic hardware cache events for Family 17h
+ - Bluetooth: btusb: request wake pin with NOAUTOEN
+ - staging: iio: adt7316: allow adt751x to use internal vref for all dacs
+ - staging: iio: adt7316: fix the dac read calculation
+ - staging: iio: adt7316: fix the dac write calculation
+ - scsi: RDMA/srpt: Fix a credit leak for aborted commands
+ - ASoC: stm32: fix sai driver name initialisation
+ - IB/core: Unregister notifier before freeing MAD security
+ - IB/core: Fix potential memory leak while creating MAD agents
+ - IB/core: Destroy QP if XRC QP fails
+ - Input: snvs_pwrkey - initialize necessary driver data before enabling IRQ
+ - Input: stmnts - acknowledge that setting brightness is a blocking call
+ - selinux: never allow relabeling on context mounts
+ - powerpc/mm/hash: Handle mmap_min_addr correctly in get_unmapped_area topdown search
+ - x86/mce: Improve error message when kernel cannot recover, p2
+ - clk: x86: Add system specific quirk to mark clocks as critical
+ - i2c: i2c-stm3217: Fix SDADEL minimum formula
+ - media: v4l2: i2c: ov7670: Fix PLL bypass register values
+ - mm/kmemleak.c: fix unused-function warning
+ - mac80211: don't attempt to rename ERR_PTR() debugfs dirs
+ - i2c: Remove unnecessary call to irq_find_mapping
+ - i2c: Clear client->irq in i2c_device_remove
+ - i2c: Allow recovery of the initial IRQ by an I2C client device.
+ - i2c: Prevent runtime suspend of adapter when Host Notify is required
+ - USB: dummy-hcd: Fix failure to give back unlinked URBs
+ - batman-adv: fix warning in function batadv_v_elp_get_throughput
+ - riscv: fix accessing 8-byte variable from RV32
+ - net: stmmac: don't stop NAPI processing when dropping a packet
+ - mfd: twl-core: Disable IRQ while suspended
+ - block: use blk_free_flush_queue() to free hctx->fq in blk_mq_init_hctx
+ - arm/mach-at91/pm : fix possible object reference leak
+ - fs: stream_open - opener for stream-like files so that read and write can
  run simultaneously without deadlock
+ - block: pass no-op callback to INIT_WORK().
+ - platform/x86: intel_pmc_core: Fix PCH IP name
+ - platform/x86: intel_pmc_core: Handle CFL regmap properly
+ - x86/mm: Fix a crash with kmemleak_scan()
+ - Drivers: hv: vmusb: Remove the undesired put_cpu_ptr() in hv_sync_cleanup()
+ - usb: Fix nasty -Wbuiltin-declaration-mismatch GCC-9 warnings
+ - staging: greybus: power_supply: fix prop-descriptor request size
+ - ASoC: hdi-c codec: fix S/PDIF DAI
+ - ASoC:so-c-pcm: fix a codec fixup issue in TDM case
+ - ASoC: nau8824: fix the issue of the widget with prefix name
+ - ASoC: nau8810: fix the issue of widget with prefixed name
+ - ASoC: samsung: odroid: Fix clock configuration for 44100 sample rate
+ - ASoC: wm_adsp: Add locking to wm_adsp2_bus_error
+ - ASoC: cs4270: Set auto-increment bit for register writes
+ - IB/hfi1: Eliminate opcode tests on mr deref
+ - MIPS: KGDB: fix kgdb support for SMP platforms.
+ - ASoC: tlv320aic32x4: Fix Common Pins
+ - drm/mediatek: Fix an error code in mtk_hdmi_dt_parse_pdata()
+ - perf/x86/intel: Fix handling of wakeup_events for multi-entry PEBS
+ - perf/x86/intel: Initialize TFA MSR
+ - linux/kernel.h: Use parentheses around argument in u64_to_user_ptr()
+ - ASoC: rockchip: pdm: fix regmap_ops hang issue
+ - slab: fix a crash by reading /proc/slab_allocators
+ - virtio_pci: fix a NULL pointer reference in vp_del_vqs
+ - RDMA/vmw_pvrdma: Fix memory leak on pvrdma_pci_remove
+ - scsi: csiostor: fix missing data copy in csio_scsi_err_handler()
+ - drm/mediatek: fix possible object reference leak
+ - ASoC: Intel: kbl: fix wrong number of channels
+ - virtio-blk: limit number of hw queues by nr_cpu_ids
+ - platform/x86: pmc_atom: Drop __initconst on dmi table
+ - genirq: Prevent use-after-free and work list corruption
+ - usb: dwc3: Fix default lpm_nyet_threshold value
+ - USB: serial: f81232: fix interrupt worker not stop
+ - USB: cdc-acm: fix unthrottle races
+ - usb-storage: Set virt_boundary_mask to avoid SG overflows
+ - intel_th: pci: Add Comet Lake support
+ - scsi: qla2xxx: Fix incorrect region-size setting in optrom SYSFS routines
+ - UAS: fix alignment of scatter/gather segments
+ - ASoC: Intel: avoid Oops if DMA setup fails
+ - locking/futex: Allow low-level atomic operations to return -EAGAIN
+ - arm64: futex: Bound number of LDXR/STXR loops in FUTEX_WAKE_OP
+ - ASoC: tlv320aic3x: fix reset gpio reference counting
+ - ASoC: stm32: sai: fix exposed capabilities in spdif mode
+ - ASoC:intel:skl:fix a simultaneous playback & capture issue on hda platform
+ - ASoC: dapm: Fix NULL pointer dereference in snd_soc_dapm_free_kcontrol
+ - drm/omap: hdmi4_cec: Fix CEC clock handling for PM
+ - IB/hfi1: Fix the allocation of RSM table
+ - drm/amd/display: fix cursor black issue
+ - objtool: Add machine_real_restart() to the noreturn list
+ - objtool: Add rewind_stack_do_exit() to the noreturn list
+ - RDMA/hns: Fix bug that caused srq creation to fail
+ - perf/core: Fix perf_event_disable_inatomic() race
+ - soc: sunxi: Fix missing dependency on REGMAP_MMIO
+ - scsi: lpfc: change snprintf to scnprintf for possible overflow

* [ZenBook S UX391UA, Realtek ALC294, Mic, Internal] No sound at all
+ (LP: #1838459)
+ - ALSA: hda/realtek - Apply the fixup for ASUS Q325UAR
+ + Bionic update: upstream stable patchset 2019-07-29 (LP: #1838349)
+ - ARC: u-boot args: check that magic number is correct
+ - arc: hsdk_defconfig: Enable CONFIG_BLK_DEV_RAM
+ - perf/core: Restore mmap record type correctly
+ - ext4: add missing brelse() in add_new_gdb_meta_bg()
+ - ext4: report real fs size after failed resize
+ - ALSA: echoaudio: add a check for ioremap_nocache
+ - ALSA: sb8: add a check for request_region
+ - auxdisplay: hd44780: Fix memory leak on ->remove()
+ - IB/mlx4: Fix race condition between catas error reset and aliasguid flows
+ - mmc: davinci: remove extraneous __init annotation
+ - ALSA: opl3: fix mismatch between snd_opl3_drum_switch definition and declaration
+ - thermal/intel_powerclamp: fix __percpu declaration of worker_data
+ - thermal: bcm2835: Fix crash in bcm2835_thermal_debugfs
+ - thermal/int340x_thermal: Add additional UUIDs
+ - thermal/int340x_thermal: fix mode setting
+ - thermal/intel_powerclamp: fix truncated kthread name
+ - scsi: iscsi: flush running unbind operations when removing a session
+ - x86/mm: Don't leak kernel addresses
+ - tools/power turbostat: return the exit status of a command
+ - perf list: Don't forget to drop the reference to the allocated thread_map
+ - perf config: Fix an error in the config template documentation
+ - perf config: Fix a memory leak in collect_config()
+ - perf build-id: Fix memory leak in print_sdt_events()
+ - perf top: Fix error handling in cmd_top()
+ - perf hist: Add missing map__put() in error case
+ - perf evsel: Free evsel->counts in perf_evsel__exit()
+ - perf tests: Fix a memory leak of cpu_map object in the
  openat_syscall_event_on_all_cpus test
+ - perf tests: Fix memory leak by expr__find_other() in test__expr()
+ - perf tests: Fix a memory leak in test__perf_evsel__tp_sched_test()
+ - irqchip/mbigen: Don't clear eventid when freeing an MSI
+ - x86/hpet: Prevent potential NULL pointer dereference
+ - x86/cpu/cyrix: Use correct macros for Cyrix calls on Geode processors
+ - drm/nouveau/debugfs: Fix check of pm_runtime_get_sync failure
+ - iommu/vt-d: Check capability before disabling protected memory
+ - x86/hw_breakpoints: Make default case in hw_breakpoint_arch_parse() return
  an error
+ - fix incorrect error code mapping for OBJECTID_NOT_FOUND
+ - ext4: prohibit fstrim in norecovery mode
+ - gpio: pxa: handle corner case of unprobed device
+ - 9p: do not trust pdu content for stat item size
+ - 9p locks: add mount option for lock retry interval
+ - f2fs: fix to do sanity check with current segment number
+ - netfilter: xt_cgroup: shrink size of v2 path
+ - serial: uartps: console_setup() can't be placed to init section
+ - powerpc/pseries: Remove prrn_work workqueue
+ - media: au0828: cannot kfree dev before usb disconnect
+ - HID: i2c-hid: override HID descriptors for certain devices
+ - ARM: samsung: Limit SAMSUNG_PM_CHECK config option to non-Exynos platforms
+ - [Config] updateconfigs for CONFIG_SAMSUNG_PM_CHECK
+ - usbip: fix vhci_hcd controller counting
+ - ACPI / SBS: Fix GPE storm on recent MacBookPro's
+ - KVM: nVMX: restore host state in nested_vmx_vmexit for VMFail
+ - cifs: fallback to older infolevels on findfirst queryinfo retry
+ - kernel: hung_task.c: disable on suspend
+ - crypto: sha256/arm - fix crash bug in Thumb2 build
+ - crypto: sha512/arm - fix crash bug in Thumb2 build
+ - iommu/dmar: Fix buffer overflow during PCI bus notification
+ - soc/tegra: pmc: Drop locking from tegra_powergate_is_powered()
+ - Ikdtm: Print real addresses
+ - lkdtdm: Add tests for NULL pointer dereference
+ - drm/panel: panel-innolux: set display off in innolux_panel_unprepare
+ - crypto: axis - fix for recursive locking from bottom half
+ - Revert "ACPI / EC: Remove old CLEAR_ON_RESUME quirk"
+ - coresight: cpu-debug: Support for CA73 CPUs
+ - drm/nouveau/volt/gf117: fix speedo readout register
+ - ARM: 8839/1: kprobe: make patch_lock a raw_spinlock_t
+ - drm/amdkfd: use init_mqd function to allocate object for hid_mqd (CI)
+ - appletalk: Fix use-after-free in atalk_proc_exit
+ - lib/div64.c: off by one in shift
+ - include/linux/swap.h: use offsetof() instead of custom __swapoffset macro
+ - bpf: fix use after free in bpf_evict_inode
+ - dm: disable CRYPTO_TFM_REQ_MAY_SLEEP to fix a GFP_KERNEL recursion deadlock
+ - net: stmmac: Set dma ring length before enabling the DMA
+ - mm: hide incomplete nr_indirectly_reclaimable in sysfs
+ - appletalk: Fix compile regression
+ - ext4: avoid panic during forced reboot
+ - i40iw: Avoid panic when handling the inetdev event
+ - sched/core: Fix buffer overflow in cgroup2 property cpu.max
+ - ACPI / utils: Drop reference in test for device presence
+ - PM / Domains: Avoid a potential deadlock
+ - drm/exynos/mixer: fix MIXER shadow registry synchronisation code
+ - Bluetooth: Fix debugfs NULL pointer dereference
+ - f2fs: cleanup dirty pages if recover failed
+ - [Config] updateconfigs for CONFIG_INTEL_ATOMISP2_PM
+ - platform/x86: Add Intel AtomISP2 dummy / power-management driver
+ - drm/ttm: Fix bo_global and mem_global kfree error
+ - ALSA: hda: fix front speakers on Huawei MBXP
+ - ACPI: EC / PM: Disable non-wakeup GPEs for suspend-to-idle
+ - net/rds: fix warn in rds_message_alloc_sgs
+ - scsi: core: Avoid that system resume triggers a kernel warning
+ - PCI: Blacklist power management of Gigabyte X299 DESIGNARE EX PCIe ports
+ - rxrpc: Fix client call connect/disconnect race
+ - f2fs: fix to dirty inode for i_mode recovery
+ - bonding: fix event handling for stacked bonds
+ - net: atm: Fix potential Spectre v1 vulnerabilities
+ - net: bridge: fix per-port af_packet sockets
+ - net: bridge: multicast: use rcu to access port list from
+ - br_multicast_start_querier
+ - net: fou: do not use guedhr after iptunnel_pull_offloads in gue_udp_recv
+ - tcp: tcp_grow_window() needs to respect tcp_space()
+ - team: set slave to promisc if team is already in promisc mode
+ - vhost: reject zero size iova range
+ - ipv4: recompile ip options in ipv4_link_failure
+ - ipv4: ensure rcu_read_lock() in ipv4_link_failure()
+ - net: thunderx: raise XDP MTU to 1508
+ - net: thunderx: don't allow jumbo frames with XDP
+ - KVM: x86: Don't clear EFER during SMM transitions for 32-bit vCPU
+ - KVM: x86: svm: make sure NMI is injected after nmi_singlestep
+ - Staging: iio: meter: fixed typo
+ - staging: iio: ad7192: Fix ad7193 channel address
+ - iio: gyro: mpu3050: fix chip ID reading
+ - iio/gyro/bmg160: Use millidegrees for temperature scale
+ - iio: cros_ec: Fix the maths for gyro scale calculation
+ - iio: ad_sigma_delta: select channel when reading register
+ - iio: dac: mcp4725: add missing powerdown bits in store eeprom
+ - iio: Fix scan mask selection
+ - iio: adc: at91: disable adc channel interrupt in timeout case
+ - iio: core: fix a possible circular locking dependency
+ - iio: accel: kxcjk1013: restore the range after resume.
+ - staging: comedi: vmk80xx: Fix use of uninitialized semaphore
+ - staging: comedi: vmk80xx: Fix possible double-free of ->usb_rx_buf
+ - staging: comedi: ni_usb6501: Fix use of uninitialized mutex
+ - staging: comedi: ni_usb6501: Fix possible double-free of ->usb_rx_buf
+ - ALSA: core: Fix card races between register and disconnect
+ - scsi: core: set result when the command cannot be dispatched
+ - coredump: fix race condition between mmget_not_zero()/get_task_mm() and core dumping
+ - crypto: x86/poly1305 - fix overflow during partial reduction
+ - arm64: futex: Restore oldval initialization to work around buggy compilers
+ - x86/kprobes: Verify stack frame on kretprobe
+ - kprobes: Mark ftrace mcount handler functions nokprobe
+ - kprobes: Fix error check when reusing optimized probes
+ - rt2x00: do not increment sequence number while re-transmitting
+ - mac80211: do not call driver wake_tx_queue op during reconfig
+ - perf/x86/amd: Add event map for AMD Family 17h
+ - x86/cpu/bugs: Use __initconst for 'const' init data
+ - perf/x86: Fix incorrect PEBS_REGS
+ - x86/speculation: Prevent deadlock on ssb_state::lock
+ - crypto: crypto4xx - properly set IV after de- and encrypt
+ - mmc: sdhci: Fix data command CRC error handling
+ - mmc: sdhci: Rename SDHCln_AMDA12_ERR and SDHCln_INT_ACMDA12ERR
+ - mmc: sdhci: Handle auto-command errors
+ - modpost: file2alias: go back to simple devtable lookup
+ - modpost: file2alias: check prototype of handler
+ - tpm/tpm_i2c_atmel: Return -E2BIG when the transfer is incomplete
+ - ipv6: frags: fix a lockdep false positive
+ - Revert "kbuild: use -Oz instead of -Os when using clang"
+ - device_cgroup: fix RCU imbalance in error case
+ - mm/vmstat.c: fix /proc/vmstat format for CONFIG_DEBUG_TLBFLUSH=y
+ CONFIG_SMP=n
+ - ALSA: info: Fix racy addition/deletion of nodes
+ - percpu: stop printing kernel addresses
+ - iomap: report collisions between directio and buffered writes to userspace
+ - i2c-hid: properly terminate i2c_hid_desc_override_table[] array
+ - net: Fix missing meta data in skb with vlan packet
- nfp: flower: replace CFI with vlan present
- nfp: flower: remove vlan CFI bit from push vlan action
- ip: add helpers to process in-order fragments faster.
- net: IP defrag: encapsulate rbtree defrag code into callable functions
- ip: process in-order fragments efficiently
- ipv6: remove dependency of nf_defrag_ipv6 on ipv6 module
- net: IPv6 defrag: use rbtrees for IPv6 defrag
- net: IPv6 defrag: use rbtrees in nf_conntrack_reasm.c
- cifs: fix handle leak in smb2_query_symlink()
- Input: elan_i2c - add hardware ID for multiple Lenovo laptops
- drm/ttm: fix out-of-bounds read in ttm_put_pages() v2
- timers/sched_clock: Prevent generic sched_clock wrap caused by tick_freeze()
- ipmi: Fix the type of the return value in calc_tpm2_event_size()

* Bionic update: upstream stable patchset 2019-07-26 (LP: #1838116)
- mmc: pxamci: fix enum type confusion
- drm/vmwgfx: Don't double-free the mode stored in par->set_mode
- iommu/amd: fix sg->dma_address for sg->offset bigger than PAGE_SIZE
- libceph: wait for latest osdmap in ceph_monc_blacklist_add()
- udfl: Fix crash on IO error during truncate
- mips: loongson64: lemote-2f: Add IRQF_NO_SUSPEND to "cascade" irqaction.
- MIPS: Ensure ELF appended dtb is relocated
- MIPS: Fix kernel crash for R6 in jump label branch function
- scsi: ibmvscri: Protect ibmvscri_head from concurrent modification
- scsi: ibmvscri: Fix empty event pool access during host removal
- futex: Ensure that futex address is aligned in handle_futex_death()
- perf probe: Fix getting the kernel map
- objtool: Move objtool_file struct off the stack
- ALSA: x86: Fix runtime PM for hdmi-lpe-audio
- ext4: fix NULL pointer dereference while journal is aborted
- ext4: fix data corruption caused by unaligned direct AIO
- ext4: brelse all indirect buffer in ext4_ind_remove_space()
- media: v4l2-ctrs.c/uvc: zero v4l2_event
- Bluetooth: hci_uart: Check if socket buffer is ERR_PTR in h4_recv_buf()
- Bluetooth: Fix decrementing reference count twice in releasing socket
- Bluetooth: hci_ldisc: Initialize hci_dev before open()
- Bluetooth: hci_ldisc: Postpone HCI_UART_PROTO_READY bit set in
  hci_uart_set_proto()
- drm: Reorder set_property_atomic to avoid returning with an active ww_ctx
- netfilter: ethtables: remove BUGPRINT messages
- x86/unwind: Handle NULL pointer calls better in frame unwinder
- x86/unwind: Add hardcoded ORC entry for NULL
- locking/lockdep: Add debug_locks check in __lock_downgrade()
- ALSA: hda - Record the current power state before suspend/resume calls
- PCI: designware-ep: dw_pci_ep_set_msi() should only set MMC bits
- PCI: designware-ep: Read-only registers need DBI_RO_WR_EN to be writable
- PCI: endpoint: Use EPC's device in dma_alloc_coherent()/dma_free_coherent()
- rtc: Fix overflow when converting time64_t to rtc_time
+ - sched/cpufreq/schedutil: Fix error path mutex unlock
+ - pwm-backlight: Enable/disable the PWM before/after LCD enable toggle.
+ - power: supply: charger-manager: Fix incorrect return value
+ - ath10k: avoid possible string overflow
+ - mmc: renesas_sdhi: limit block count to 16 bit for old revisions
+ - powerpc/vdso64: Fix CLOCK_MONOTONIC inconsistencies across Y2038
+ - RDMI/cma-rollback source IP address if failing to acquire device
+ - f2fs: fix to avoid deadlock of atomic file operations
+ - loop: access lo_backing_file only when the loop device is Lo_bound
+ - video: fbdev: Set pixclock = 0 in goldfishfb
+ - dcecp: do not use ipv6 header for ipv4 flow
+ - genetlink: Fix a memory leak on error path
+ - m15SDN: hfcpci: Test both vendor & device ID for Digium HFC4S
+ - net: datagram: fix unbounded loop in __skb_try_recv_datagram()
+ - net/packet: Set __GFP_NOWARN upon allocation in alloc_pg_vec
+ - net: rose: fix a possible stack overflow
+ - net: stmmac: fix memory corruption with large MTUs
+ - net/sysfs: call dev_hold if kobject_init_and_add success
+ - packets: Always register packet sk in the same order
+ - rhastable: Still do rehash when we get EEXIST
+ - tcp: do not use ipv6 header for ipv4 flow
+ - thunderx: enable page recycling for non-XDP case
+ - thunderx: eliminate extra calls to put_page() for pages held for recycling
+ - vxlan: Don't call gro_cells_destroy() before device is unregistered
+ - scpt: get scphdr by offset in scpt_compute_cksum
+ - net: aquantia: fix rx checksum offload for UDP/TCP over IPv6
+ - mac8390: Fix mmio access size probe
+ - tun: properly test for IFF_UP
+ - tun: add a missing rcu_read_unlock() in error path
+ - powerpc/fsl: Add barrier_nospec implementation for NXP PowerPC Book3E
+ - powerpc/fsl: Sanitize the syscall table for NXP PowerPC 32 bit platforms
+ - powerpc/fsl: Add infrastructure to fixup branch predictor flush
+ - powerpc/fsl: Add macro to flush the branch predictor
+ - powerpc/fsl: Emulate SPRN_BUCSR register
+ - powerpc/fsl: Flush the branch predictor at each kernel entry (64bit)
+ - powerpc/fsl: Flush the branch predictor at each kernel entry (32 bit)
+ - powerpc/fsl: Flush branch predictor when entering KVM
+ - powerpc/fsl: Enable runtime patching if nospectre_v2 boot arg is used
+ - powerpc/fsl: Fixed warning: orphan section __btb_flush_fixup
+ - powerpc/fsl: Fix the flush of branch predictor.
+ - Btrfs: fix incorrect file size after shrinking truncate and fsync
+ - btrfs: remove WARN_ON in log_dir_items
+ - ARM: imx6q: cpuidle: fix bug that CPU might not wake up at expected time
+ - powerpc: bpf: Fix generation of load/store DW instructions
+ - NFSv4.1 don't free interrupted slot on open
+ - net: dsa: qca8k: remove leftover phy accessors
+ - ALSA: pcm: Fix possible OOB access in PCM oss plugins
+ - ALSA: pcm: Don't suspend stream in unrecoverable PCM state

Open Source Used In 5GaaS Edge AC-4 17808
+ - kbuild: modversions: Fix relative CRC byte order interpretation
+ - fs/open.c: allow opening only regular files during execve()
+ - ocfs2: fix inode bh swapping mixup in ocfs2_reflink_inodes_lock
+ - scsi: sd: Fix a race between closing an sd device and sd I/O
+ - scsi: sd: Quiesce warning if device does not report optimal I/O size
+ - scsi: zfcp: fix rport unblock if deleted SCSI devices on Scsi_Host
+ - scsi: zfcp: fix scsi_6e host reset with port_forced ERP for non-NPIV FCP
+ - tty: atmel_serial: fix a potential NULL pointer dereference
+ - staging: cmdi: ni_mio_common: Fix divide-by-zero for DIO cmdtest
+ - staging: vt6655: Remove vif check from vnt_interrupt
+ - staging: vt6655: Fix interrupt race condition on device start up.
+ - serial: max310x: Fix to avoid potential NULL pointer dereference
+ - serial: sh-sci: Fix setting SCSCR_TIE while transferring data
+ - USB: serial: cp210x: add new device id
+ - USB: serial: ftdi_sio: add additional NovaTech products
+ - USB: serial: mos7720: fix mos_parport refcount imbalance on error path
+ - USB: serial: option: set driver_info for SIM5218 and compatibles
+ - USB: serial: option: add support for Quectel EM12
+ - USB: serial: option: add Olicard 600
+ - Disable kgdboc failed by echo space to /sys/module/kgdboc/parameters/kgdboc
+ - fs/proc/proc_sysct1.c: fix NULL pointer dereference in put_links
+ - drm/vgem: fix use-after-free when drm_gem_handle_create() fails
+ - gpio: exar: add a check for the return value of ida_simple_get fails
+ - gpio: adnp: Fix testing wrong value in adnp_gpio_direction_input
+ - phy: sun-i2cusb: Support set_mode to USB_HOST for non-OTG PHYs
+ - usb: mtu3: fix EXTCON dependency
+ - USB: gadget: f_hid: fix deadlock in f_hidg_write()
+ - usb: common: Consider only available nodes for dr_mode
+ - usb: host: xhci-rcar: Add XHCI_TRUST_TX_LENGTH quirk
+ - xhci: Fix port resume done detection for SS ports with LPM enabled
+ - usb: cdc-acm: fix race during wakeup blocking TX traffic
+ - mm/migrate.c: add missing flush_dcache_page for non-mapped page migrate
+ - perf intel-pt: Fix TSC slip
+ - cpu/hotplug: Prevent crash when CPU bringup fails on CONFIG_HOTPLUG_CPU=n
+ - x86/smp: Enforce CONFIG_HOTPLUG_CPU when SMP=y
+ - KVM: Reject device ioecls from processes other than the VM's creator
+ - KVM: x86: Emulate MSR_IA32_ARCH_CAPABILITIES on AMD hosts
+ - vfs: ccc: only free cp on final interrupt
+ - ipmi_si: Fix crash when using hard-coded device
+ - gtp: change NET_UDP_TUNNEL dependency to select
+ - Btrfs: fix assertion failure on fsync with NO_HOLES enabled
+ - NFS: fix mount/umount race in nlmclnt.
+ - ALSA: hda/realtek: Enable headset MIC of Acer AIO with ALC286
+ - ALSA: hda/realtek: Enable headset MIC of Acer Aspire Z224-890 with ALC286
+ - ALSA: hda/realtek - Add support for Acer Aspire E5-523G/ES1-432 headset mic
+ - ALSA: hda/realtek: Enable ASUS X441MB and X705FD headset MIC with ALC256
+ - ALSA: hda/realtek: Enable headset mic of ASUS P5440FF with ALC256
+ - ALSA: hda/realtek: Enable headset MIC of ASUS X430UN and X512DK with ALC256
+ - ALSA: hda/realtek - Fix speakers on Acer Predator Helios 500 Ryzen laptops
+ - drm/rockchip: Do not use memcpy for MMIO addresses
+ - drm/rockchip: vop: reset scale mode when win is disabled
+ - tty: mxs-auart: fix a potential NULL pointer dereference
+ - staging: speakup_soft: Fix alternate speech with other synths
+ - serial: mvebu-uart: Fix to avoid a potential NULL pointer dereference
+ - drm/i915/gvt: Fix MI_FLUSH_DW parsing with correct index check
+ - usb: xhci: dbc: Don't free all memory with spinlock held
+ - xhci: Don't let USB3 ports stuck in polling state prevent suspend
+ - mm: add support for Knmem caches in DMA32 zone
+ - iommu/io-pgtable-arm-v7s: request DMA32 memory, and improve debugging
+ - mm: mempolicy: make mbind() return -EIO when MPOL_MF_STRICT is specified
+ - perf pmu: Fix parser error for uncore event alias
+ - objtool: Query pkg-config for libelf location
+ - bpf: do not restore dst_reg when cur_state is freed
+ - arm64: debug: Don't propagate UNKNOWN FAR into si_code for debug signals
+ - ext4: cleanup bh release code in ext4_ind_remove_space()
+ - tty/serial: atmel: Add is_half_duplex helper
+ - tty/serial: atmel: RS485 HD w/DMA: enable RX after TX is stopped
+ - CIFS: fix POSIX lock leak and invalid ptr deref
+ - h8300: use cc-cross-prefix instead of hardcoding h8300-unknown-linux-
+ - f2fs: fix to avoid deadlock in f2fs_read_inline_dir()
+ - tracing: kdb: Fix Ftdump to not sleep
+ - net/mlx5: Avoid panic when setting vport rate
+ - net/mlx5: Avoid panic when setting vport mac, getting vport config
+ - gpio: gpio-omap: fix level interrupt idling
+ - include/linux/relay.h: fix percpu annotation in struct rchan
+ - enic: fix build warning without CONFIG_CPUMASK_OFFSTACK
+ - scsi: hisi_sas: Set Phy linkrate when disconnected
+ - iio: adc: Fix warning in Qualcomm PM8xxx HK/XOADC driver
+ - perf c2c: Fix c2c report for empty numa node
+ - mm/cma.c: cma_declare_contiguous: correct err handling
+ - mm/page_ext.c: fix an imbalance with kmemleak
+ - mm, mempolicy: fix uninit memory access
+ - mm/vmalloc.c: fix kernel BUG at mm/vmalloc.c:512!
+ - mm/slab.c: kmemleak no scan alien caches
+ - ocfs2: fix a panic problem caused by o2cb_ctl
+ - f2fs: do not use mutex lock in atomic context
+ - fs/file.c: initialize init_files.resize_wait
+ - page_poison: play nicely with KASAN
+ - cifs: use correct format characters
+ - dm thin: add sanity checks to thin-pool and external snapshot creation
+ - cifs: Fix NULL pointer dereference of devname
+ - jbd2: fix invalid descriptor block checksum
+ - fs: fix guard_bio_eod to check for real EOD errors
+ - tools lib traceevent: Fix buffer overflow in arg_eval
+ - PCI/PME: Fix hotplug/sysfs remove deadlock in pcie_pme_remove()
+ - wil6210: check null pointer in _wil_cfg80211_merge_extra_ies
+ - crypto: crypto4xx - add missing of_node_put after of_device_is_available
+ - crypto: cavium/zip - fix collision with generic cra_driver_name
+ - usb: chipidea: Grab the (legacy) USB PHY by phandle first
+ - scsi: core: replace GFP_ATOMIC with GFP_KERNEL in scsi_scan.c
+ - powerpc/xmon: Fix opcode being uninitialized in print_insn_powerpc
+ - coresight: etm4x: Add support to enable ETMv4.2
+ - serial: 8250_pxa: honor the port number from devicetree
+ - ARM: 8840/1: use a raw_spinlock_t in unwind
+ - iommu/io-pgtable-arm-v7s: Only kmemleak_ignore L2 tables
+ - powerpc/hugetlb: Handle mmap_min_addr correctly in get_unmapped_area
+ - mmc: omap: fix the maximum timeout setting
+ - e1000e: Fix -Wformat-truncation warnings
+ - mlxsw: spectrum: Avoid -Wformat-truncation warnings
+ - IB/mlx4: Increase the timeout for CM cache
+ - clk: fractional-divider: check parent rate only if flag is set
+ - cpufreq: acpi-cpufreq: Report if CPU doesn't support boost technologies
+ - efi: cper: Fix possible out-of-bounds access
+ - scsi: megaraid_sas: return error when create DMA pool failed
+ - scsi: fcoe: make use of fip_mode enum complete
+ - perf test: Fix failure of 'evsel-tp-sched' test on s390
+ - SoC: imx-sgtl5000: add missing put_device()
+ - media: sh_veu: Correct return type for mem2mem buffer helpers
+ - media: s5p-jpeg: Correct return type for mem2mem buffer helpers
+ - media: s5p-g2d: Correct return type for mem2mem buffer helpers
+ - media: mx2 Emmanuel: Correct return type for mem2mem buffer helpers
+ - media: mtj-jpeg: Correct return type for mem2mem buffer helpers
+ - vfs: fix preadv64v2 and pwritev64v2 compat syscalls with offset == -1
+ - HID: intel-ish-hid: avoid binding wrong ishtp_cl_device
+ - jbd2: fix race when writing superblock
+ - leds: lp55xx: fix null deref on firmware load failure
+ - iwlwifi: pcie: fix emergency path
+ - ACPI / video: Refactor and fix dmi_is_desktop()
+ - kprobes: Prohibit probing on bsearch()
+ - netfilter: conntrack: fix cloned unconfirmed skb->_nfct race in
+ - wb_contrack_confirm
+ - ARM: 8833/1: Ensure that NEON code always compiles with Clang
+ - ALSA: PCM: check if ops are defined before suspending PCM
+ - usb: f_fs: Avoid crash due to out-of-scope stack ptr access
+ - sched/topology: Fix percpu data types in struct sd_data & struct s_data
+ - bcache: fix input overflow to cache set sysfs file io_error_halflife
+ - bcache: fix input overflow to sequential_cutoff
+ - bcache: improve sysfs_strtoul Clamp()
+ - genirq: Avoid summation loops for /proc/stat
+ - iw_cxgb4: fix sqidx leak during connection abort
+ - fbdev: fmem: fix memory access if logo is bigger than the screen
+ - cdrom: Fix race condition in cdrom_sysctl_register
+ - platform/x86: intel_pmc_core: Fix PCH IP sts reading
+ - ASoC: fsl-asoc-card: fix object reference leaks in fsl_asoc_card_probe
+ - sched/debug: Initialize sd_sysctl_cpus if !CONFIG_CPUMASK_OFFSTACK
+ - efi/memattr: Don't bail on zero VA if it equals the region's PA
+ - ARM: dts: lpc32xx: Remove leading 0x and 0s from bindings notation
+ - soc: qcom: gsbi: Fix error handling in gsbi_probe()
+ - mt7601u: bump supported EEPROM version
+ - ARM: 8830/1: NOMMU: Toggle only bits in EXC_RETURN we are really care of
+ - ARM: avoid Cortex-A9 livelock on tight dmb loops
+ - bpf: fix missing prototype warnings
+ - cgroup/pids: turn cgroup_subsys->free() into cgroup_subsys->release() to fix
+ - the accounting
+ - backlight: pwm_bl: Use gpiod_get_value_cansleep() to get initial state
+ - tty: increase the default flip buffer limit to 2*640K
+ - powerpc/pseries: Perform full re-add of CPU for topology update post-
+ - migration
+ - usb: dwc3: gadget: Fix OTG events when gadget driver isn't loaded
+ - media: mt9m111: set initial frame size other than 0x0
+ - hwrng: virtio - Avoid repeated init of completion
+ - soc/tegra: fuse: Fix illegal free of IO base address
+ - HID: intel-ish: ipc: handle PIMR before ish_wakeup also clear PISR
+ - busy_clear bit
+ - hpet: Fix missing '=' character in the __setup() code of hpet_mmap_enable
+ - cpu/hotplug: Mute hotplug lockdep during init
+ - dmaengine: imx-dma: fix warning comparison of distinct pointer types
+ - dmaengine: qcom_hidma: assign channel cookie correctly
+ - dmaengine: qcom_hidma: initialize tx flags in hidma_prep_dma_*
+ - netfilter: physdev: relax br_netfilter dependency
+ - media: s5p-jpeg: Check for fmt_ver_flag when doing fmt enumeration
+ - regulator: act8865: Fix act8600_sucdc_voltage_ranges setting
+ - drm: Auto-set allow_fb_modifiers when given modifiers at plane init
+ - drm/nouveau: Stop using drm_crtc_force_disable
+ - x86/build: Specify elf_i386 linker emulation explicitly for i386 objects
+ - selinux: do not override context on context mounts
+ - wlcore: Fix memory leak in case w112xx_fetch_firmware failure
+ - x86/build: Mark per-CPU symbols as absolute explicitly for LLD
+ - clk: rockchip: fix frac settings of GPLL clock for rk3328
+ - dmaengine: tegra: avoid overflow of byte tracking
+ - drm/dp/mst: Configure no_stop_bit correctly for remote i2c xfers
+ - ACPI / video: Extend chassis-type detection with a "Lunch Box" check
+ - f2fs: fix to adapt small inline xattr space in __find_inline_xattr()
+ - net: stmmac: Avoid sometimes uninitialized Clang warnings
+ - libbpf: force fixdep compilation at the start of the build
+ - scsi: hisi_sas: Fix a timeout race of driver internal and SMP IO
+ - x86/hyperv: Fix kernel panic when kexec on HyperV
+ - mm/sparse: fix a bad comparison
+ - mm, swap: bounds check swap_info array accesses to avoid NULL derefs
+ - memcg: killed threads should not invoke memcg OOM killer
+ - cifs: Accept validate negotiate if server return NT_STATUS_NOT_SUPPORTED
+ - netfilter: nf_tables: check the result of dereferencing base_chain->stats
+ - netfilter: conntrack: tcp: only close if RST matches exact sequence
+ - kbuild: invoke syncconfig if include/config/auto.conf.cmd is missing
+ - mwifiex: don't advertise IBSS features without FW support
+ - perf report: Don't shadow inlined symbol with different addr range
+ - media: rockchip/rga: Correct return type for mem2mem buffer helpers
+ - selftests: skip seccomp get_metadata test if not real root
+ - kprobes: Prohibit probing on RCU debug routine
+ - bcache: fix potential div-zero error of writeback_rate_i_term_inverse
+ - drm: rcar-du: add missing of_node_put
+ - perf/aux: Make perf_event accessible to setup_aux()
+ - e1000e: Exclude device from suspend direct complete optimization
+ - i2c: of: Try to find an I2C adapter matching the parent
+ - sched/core: Use READ_ONCE()/WRITE_ONCE() in
+   move_queued_task()/task_rq_lock()
+ - powerpc/64s: Clear on-stack exception marker upon exception return
+ - platform/x86: intel-hid: Missing power button release on some Dell models
+ - pinctrl: meson: meson8b: add the eth_rxd2 and eth_rxd3 pins
+ - net: stmmac: Avoid one more sometimes uninitialized Clang warning
+ - bcache: fix potential div-zero error of writeback_rate_p_term_inverse
+ - net: sfp: move sfp_register_socket call from sfp_remove to sfp_probe
+ - drm/i915/gvt: do not let pin count of shadow mm go negative
+ - powerpc/tm: Limit TM code inside PPC_TRANSACTIONAL_MEM
+ - kbuild: clang: choose GCC_TOOLCHAIN_DIR not on LD
+ - x86: vdso: Use $LD instead of $CC to link
+ - x86/vdso: Drop implicit common-page-size linker flag
+ - lib/string.c: implement a basic bcmp
+ - stating: ccree: revert "staging: ccree: fix leak of import() after init()"
+ - arm64: kaslr: Reserve size of ARM64_MEMSTART_ALIGN in linear region
+ - tty: mark Siemens R3964 line discipline as BROKEN
+ - [Config] updateconfigs for CONFIG_R3964 (BROKEN)
+ - [Config] updateconfigs for CONFIG_LDISC_AUTOLOAD
+ - tty: ldisc: add sysctl to prevent autoloading of ldiscs
+ - ipv6: Fix dangling pointer when ipv6 fragment
+ - ipv6: sit: reset ip header pointer in ipip6_rcv
+ - kcm: switch order of device registration to fix a crash
+ - net-gro: Fix GRO flush when receiving a GSO packet.
+ - net/mlx5: Decrease default mr cache size
+ - net/sched: fix ->get helper of the matchall cls
+ - qmi_wwan: add Olicard 600
+ - scpt: initialize _pad of sockaddr_in before copying to user memory
+ - tcp: Ensure DCTCP reacts to losses
+ - vrf: check accept_source_route on the original netdevice
+ - net/mlx5e: Fix error handling when refreshing TIRs
+ - net/mlx5e: Add a lock on tix list
+ - nfp: validate the return code from dev_queue_xmit()
+ - bnxt_en: Improve RX consumer index validity check.
+ - bnxt_en: Reset device on RX buffer errors.
+ - net/sched: act_sample: fix divide by zero in the traffic path
+ - netns: provide pure entropy for net_hash_mix()
+ - net: ethtool: not call vzalloc for zero sized memory request
+ - ALSA: seq: Fix OOB-reads from strlcpy
+ - ip6_tunnel: Match to ARPHRD_TUNNEL6 for dev type
+ - hv_netvsc: Fix unwanted wakeup after tx_disable
+ - arm64: dts: rockchip: fix rk3328 sdmmc0 write errors
+ - parisc: Detect QEMU earlier in boot process
+ - parisc: regs_return_value() should return gpr28
+ - alrm timer: Return correct remaining time
+ - drm/udl: add a release method and delay modeset teardown
+ - include/linux/bitrev.h: fix constant bitrev
+ - ASoC: fsl_esai: fix channel swap issue when stream starts
+ - btrfs: do not allow trimming when a fs is mounted with the nologreplay
+ - option
+ - btrfs: prop: fix zstd compression parameter validation
+ - btrfs: prop: fix vanished compression property after failed set
+ - block: do not leak memory in bio_copy_user_iov()
+ - block: fix the return errno for direct IO
+ - genirq: Respect IRQCHIP_SKIP_SET_WAKE in irq_chip_set_wake_parent()
+ - genirq: Initialize request_mutex if CONFIG_SPARSE_IRQ=n
+ - virtio: Honour 'may_reduce_num' in rrring_create_virtqueue
+ - ARM: dts: am335x-evmsk: Correct the regulators for the audio codec
+ - ARM: dts: am335x-evm: Correct the regulators for the audio codec
+ - ARM: dts: at91: Fix typo in ISC_D0 on PC9
+ - arm64: futex: Fix FUTEX_WAKE_OP atomic ops with non-zero result value
+ - arm64: dts: rockchip: fix rk3328 rgmii high tx error rate
+ - arm64: backtrace: Don't bother trying to unwind the userspace stack
+ - xen: Prevent buffer overflow in privcmd ioctl
+ - sched/fair: Do not re-read ->h_load_next during hierarchical load
+ - calculation
+ - xtensa: fix return_address
+ - x86/perf/amd: Resolve race condition when disabling PMC
+ - x86/perf/amd: Resolve NMI latency issues for active PMCs
+ - x86/perf/amd: Remove need to check "running" bit in NMI handler
+ - PCI: Add function 1 DMA alias quirk for Marvell 9170 SATA controller
+ - dm table: propagate BDI_CAP_STABLE_WRITES to fix sporadic checksum errors
+ - arm64: dts: rockchip: fix vcc_host1_5v pin assign on rk3328-rock64
+ - arm64: dts: rockchip: Fix vcc_host1_5v GPIO polarity on rk3328-rock64
+ - tcp: fix a potential NULL pointer dereference in tcp_sk_exit
+ - nfp: disable netpoll on representors
+ - r1869: disable default rx interrupt coalescing on RTL8168
+ - kbuild: deb-pkg: fix bindeb-pkg breakage when O= is used
+ - ACPI: Namespace: remove address node from global list after method
+ - termination
+ - ALSA: hda/realtex: Add quirk for Tuxedo XC 1509
+ - mm/huge_memory.c: fix modifying of page protection by insert_pfn_pmd()
+ - riscv: Fix syscall_get_arguments() and syscall_set_arguments()
+ - x86/asm: Remove dead __GNUC__ conditionals
+ - dm integrity: change memcmp to strncmp in dm_integrity_ctr

+ * Bionic update: upstream stable patchset 2019-07-25 (LP: #1837952)
  + - ACPI: Reference Counts: increase max to 0x4000 for large servers
  + - gro_cells: make sure device is up in gro_cells_receive()
  + - ipv4/route: fail early when inet dev is missing
  + - 12tp: fix infoleak in 12tp_ip6_recvmsg()
  + - net: hsr: fix memory leak in hsr_dev_finalize()
  + - net/hsr: fix possible crash in add_timer()
  + - net: sit: fix UBSAN Undefined behaviour in check_6rd
  + - net/x25: fix use-after-free in x25_device_event()
  + - net/x25: reset state in x25_connect()
  + - pptp: dst_release sk_dst_cache in pptp_sock_destruct
  + - ravb: Decrease TxFIFO depth of Q3 and Q2 to one
  + - route: set the deleted fnhe fnhe_daddr to 0 in ip_del_fnhe to fix a race
  + - rxrpc: Fix client call queueing, waiting for channel
  + - tcp: Don't access TCP_SKB_CB before initializing it
  + - tcp: handle inet_csk_reqsq_queue_add() failures
  + - vxlan: Fix GRO cells race condition between receive and link delete
  + - vxlan: test dev->flags & IFF_UP before calling gro_cells_receive()
  + - net/mlx4_core: Fix reset flow when in command polling mode
  + - net/mlx4_core: Fix locking in SRIOV mode when switching between events and poll
  + - net/mlx4_core: Fix qp mtt size calculation
  + - net/x25: fix a race in x25_bind()
  + - net: Set rtm_table to RT_TABLE_COMPAT for ipv6 for tables > 255
  + - bonding: fix PACKET_ORIGDEV regression
  + - missing barriers in some of unix_sock ->addr and ->path accesses
  + - ipvlan: disallow users cap_net_admin to change global mode/flags
  + - perf/x86: Fixup typo in stub functions
  + - ALSA: bebob: use more identical mod_alias for Saffire Pro 10 I/O against Liquid Saffire 56
  + - ALSA: firewire-motu: fix construction of PCM frame for capture direction
  + - perf/x86/intel: Fix memory corruption
  + - perf/x86/intel: Make dev_attr_allow_tsx_force_abort static
  + - It's wrong to add len to sector_nr in raid10 reshape twice
  + - scctp: remove sched init from scctp_stream_init
  + - team: use operstate consistently for linkup
  + - ipv6: route: enforce RCU protection in rt6_update_exception_stamp_rtt()
  + - ALSA: hda - add more quirks for HP Z2 G4 and HP Z240
  + - ALSA: hda/realtek: Enable audio jacks of ASUS UX362FA with ALC294
  + - i40e: report correct statistics when XDP is enabled
  + - 9p: use inode->i_lock to protect i_size_write() under 32-bit
  + - 9p/net: fix memory leak in p9_client_create
  + - ASoC: fsl_esai: fix register setting issue in RIGHT_J mode
  + - iio: adc: exynos-adc: Fix NULL pointer exception on unbind
+ - stm class: Fix an endless loop in channel allocation
+ - crypto: caam - fixed handling of sg list
+ - crypto: ahash - fix another early termination in hash walk
+ - crypto: rockchip - fix scatterlist nents error
+ - crypto: rockchip - update new iv to device in multiple operations
+ - drm/imx: ignore plane updates on disabled crtcs
+ - gpu: ipu-v3: Fix i.MX51 CSI control registers offset
+ - drm/imx: imx-ldb: add missing_of_node_puts
+ - gpu: ipu-v3: Fix CSI offsets for imx53
+ - s390/dasd: fix using offset into zero size array error
+ - Input: pwm-vibra - prevent unbalanced regulator
+ - Input: pwm-vibra - stop regulator after disabling pwm, not before
+ - ARM: OMAP2+: Variable "reg" in function omap4_dsi_mux_pads() could be uninitialized
+ - ASoC: dapm: fix out-of-bounds accesses to DAPM lookup tables
+ - ASoC: rsnd: fixup rsnd_ssi_master_clk_start() user count check
+ - KVM: arm/arm64: Reset the VCPU without preemption and vcpu state loaded
+ - ARM: OMAP2+: fix lack of timer interrupts on CPU1 after hotplug
+ - Input: cap11xx - switch to using set_brightness_blocking()
+ - Input: ps2-gpio - flush TX work when closing port
+ - Input: matrix_keypad - use flush_delayed_work()
+ - mac80211: Fix Tx aggregation session tear down with ITXQs
+ - ipv6: fix dependency on nf_defrag_ipv6
+ - floppy: check_events callback should not return a negative number
+ - NFS: Don't use page_file_mapping after removing the page
+ - mm/gup: fix gup_pmd_range() for dax
+ - Revert "mm: use early_pfn_to_nid in page_ext_init"
+ - mm: page_alloc: fix ref bias in page_frag_alloc() for 1-byte allocs
+ - net: hns: Fix object reference leaks in hns_dsaf_roce_reset()
+ - i2c: cadence: Fix the hold bit setting
+ - i2c: bcm2835: Clear current buffer pointers and counts after a transfer
+ - auxdisplay: ht16k33: fix potential user-after-free on module unload
+ - Input: st-keyscan - fix potential zalloc NULL dereference
+ - clk: sunxi-ng: v3s: Fix TCON reset de-assert bit
+ - clk: sunxi: A31: Fix wrong AHB gate number
+ - esp: Skip TX bytes accounting when sending from a request socket
+ - ARM: 8824/1: fix a migrating irq bug when hotplug cpu
+ - af_key: unconditionally clone on broadcast
+ - assoc_array: Fix shortcut creation
+ - keys: Fix dependency loop between construction record and auth key
+ - scsi: libiscsi: Fix race between iscsi_xmit_task and iscsi_complete_task
+ - net: systemport: Fix reception of BPDUs
+ - picctrl: meson: meson8lb: fix the sdxc_a data 1..3 pins
+ - qmi_wwan: apply SET_DTR quirk to Sierra WP7607
+ - net: mv643xx_eth: disable clk on error path in mv643xx_eth_shared_probe()
+ - mailbox: bcm-flexrm-mailbox: Fix FlexRM ring flush timeout issue
+ - ASoC: topology: free created components in tplg load error
+ - qed: Fix iWARP syn packet mac address validation.
+ - arm64: Relax GIC version check during early boot
+ - net: marvell: mvneta: fix DMA debug warning
+ - tmpfs: fix link accounting when a tmpfile is linked in
+ - ixgbe: fix older devices that do not support IXGBE_MRQC_L3L4TXSWEN
+ - ARCv2: lib: memcpy: fix doing prefetchw outside of buffer
+ - ARC: uaccess: remove lp_start, lp_end from clobber list
+ - ARCv2: support manual regfile save on interrupts
+ - phonet: fix building with clang
+ - mac80211_hwsm: propagate genlmsg_reply return code
+ - net: thunderx: make CFG_DONE message to run through generic send-ack sequence
+ - nfp: bpf: fix code-gen bug on BPF_ALU | BPF_XOR | BPF_K
+ - nfp: bpf: fix ALU32 high bits clearance bug
+ - net: set static variable an initial value in atl2_probe()
+ - tmpfs: fix uninitialized return value in shmem_link
+ - media: videobuf2-v4l2: drop WARN_ON in vb2_warn_zero_bytesused()
+ - stm class: Prevent division by zero
+ - libnvbufdimmlabel: Clear 'updating' flag after label-set update
+ - libnvbdimm, pfn: Fix over-trim in trim_pfn_device()
+ - libnvbdimm/pmem: Honor force_raw for legacy pmem regions
+ - libnvbdimm: Fix altmap reservation size calculation
+ - fix cgroup_do_mount() handling of failure exits
+ - crypto: arm/crct10dif - revert to C code for short inputs
+ - crypto: arm64/crct10dif - revert to C code for short inputs
+ - crypto: hash - set CRYPTO_TFM_NEED_KEY if ->setkey() fails
+ - crypto: testmgr - skip crc32c context test for alhash algorithms
+ - crypto: arm64/aes-ccm - fix logical bug in AAD MAC handling
+ - crypto: arm64/aes-ccm - fix bugs in non-NEON fallback routine
+ - CIFS: Do not reset lease state to NONE on lease break
+ - CIFS: Fix read after write for files with read caching
+ - tracing: Use strncpy instead of memcpby for string keys in hist triggers
+ - tracing: Do not free iter->trace in fail path of tracing_open_pipe()
+ - xen: fix dom0 boot on huge systems
+ - ACPI / device_sysfs: Avoid OF modalias creation for removed device
+ - mmc: sdhci-esdhc-imx: fix HS400 timing issue
+ - spi: ti-qspi: Fix mmap read when more than one CS in use
+ - spi: pxa2xx: Setup maximum supported DMA transfer length
+ - regulator: s2mps11: Fix steps for buck7, buck8 and LDO35
+ - regulator: max77620: Initialize values for DT properties
+ - regulator: s2mpa01: Fix step values for some LDOs
+ - clocksource/drivers/exynos_mct: Move one-shot check from tick clear to ISR
+ - clocksource/drivers/exynos_mct: Clear timer interrupt when shutdown
+ - s390/setup: fix early warning messages
+ - s390/virtio: handle find on invalid queue gracefully
+ - scsi: virtio_scsi: don’t send sc payload with tmfs
+ - scsi: aacraid: Fix performance issue on logical drives
+ - scsi: sd: Optimal I/O size should be a multiple of physical block size
+ - scsi: target/iscsi: Avoid iscsit_release_commands_from_conn() deadlock
+ - fs/devpts: always delete dcache dentry-s in dput()
+ - splice: don't merge into linked buffers
+ - m68k: Add -ffreestanding to CFLAGS
+ - Btrfs: setup a nofs context for memory allocation at __btrfs_set_acl
+ - btrfs: ensure that a DUP or RAID1 block group has exactly two stripes
+ - Btrfs: fix corruption reading shared and compressed extents after hole punching
+ - crypto: pcbc - remove bogus memcpy()s with src == dest
+ - libertas_if: don't set URB_ZERO_PACKET on IN USB transfer
+ - irqchip/gic-v3-its: Avoid parsing _indirect_twice for Device table
+ - x86/kprobes: Prohibit probing on optprobe template code
+ - cpufreq: tegra124: add missing of_node_put()
+ - cpufreq: pxa2xx: remove incorrect __init annotation
+ - ext4: add mask of ext4 flags to swap
+ - ext4: fix crash during online resizing
+ - IB/hfi1: Close race condition on user context disable and close
+ - cxl: Wrap iterations over afu slices inside 'afu_list_lock'
+ - ext2: Fix underflow in ext2_max_size()
+ - clk: uniphier: Fix update register for CPU-gear
+ - clk: clk-tw6040: Fix imprecise external abort for pdmclk
+ - clk: ingenic: Fix round_rate misbehaving with non-integer dividers
+ - clk: ingenic: Fix doc of ingenic_cgu_div_info
+ - usb: chipidea: tegra: Fix missed ci_hdrc_remove_device()
+ - nfit: acpi_nfit_ctl(): Check out_obj->type in the right place
+ - mm: hwpoison: fix thp split handing in soft_offline_in_use_page()
+ - mm/vmalloc: fix size check for remap_vmalloc_range_partial()
+ - kernel/sysctl.c: add missing range check in do_proc_dointvec_minmaxConv()
+ - device property: Fix the length used in PROPERTY_ENTRY_STRING()
+ - intel_th: Don't reference unassigned outputs
+ - parport_pc: fix find_superio io compare code, should use equal test.
+ - i2c: tegra: fix maximum transfer size
+ - crypto: arm64/aes-neons - fix returning final keystream block
+ - drm/i915: Relax mmap VMA check
+ - serial: uartps: Fix stuck ISR if RX disabled with non-empty FIFO
+ - serial: 8250_of: assume reg-shift of 2 for mrvl,mpm-uart
+ - serial: 8250_PCI: Fix number of ports for ACCES serial cards
+ - serial: 8250_PCI: Have ACCES cards that use the four port Pericom PI7C9X7954
  chip use the pci_pericom_setup()
+ - jbd2: clear dirty flag when revoking a buffer from an older transaction
+ - jbd2: fix compile warning when using JBUFFER_TRACE
+ - security/selinux: fix SECURITY_LSM_NATIVE_LABELS on reused superblock
+ - powerpc/32: Clear on-stack exception marker upon exception return
+ - powerpc/wii: properly disable use of BATs when requested.
+ - powerpc/powernv: Make opal log only readable by root
+ - powerpc/83xx: Also save/restore SPRG4-7 during suspend
+ - powerpc: Fix 32-bit KVM-PR lockup and host crash with MacOS guest
+ - powerpc/ptrace: Simplify vr_get/set() to avoid GCC warning
+ - powerpc/hugetlb: Don't do runtime allocation of 16G pages in LPAR
+ configuration
+ - powerpc/traps: fix recoverability of machine check handling on book3s/32
+ - powerpc/traps: Fix the message printed when stack overflows
+ - ARM: s3c24xx: Fix boolean expressions in osiris_dvs_notify
+ - arm64: Fix HCR.TGE status for NMI contexts
+ - arm64: debug: Ensure debug handlers check triggering exception level
+ - arm64: KVM: Fix architecturally invalid reset value for FPEXC32_EL2
+ - dm: fix to_sector() for 32bit
+ - dm integrity: limit the rate of error messages
+ - cpcap-charger: generate events for userspace
+ - NFS: Fix I/O request leakages
+ - NFS: Fix an I/O request leakage in nfs_do_recoalesce
+ - NFS: Don't recoalesce on error in nfs_pageio_complete_mirror()
+ - nfsd: fix memory corruption caused by readdir
+ - nfsd: fix wrong check in write_v4_end_grace()
+ - NFSv4.1: Reinitialise sequence results before retransmitting a request
+ - PM / wakeup: Rework wakeup source timer cancellation
+ - x86/unwind/orc: Fix ORC unwind table alignment
+ - perf intel-pt: Fix CYC timestamp calculation after OVF
+ - perf auxtrace: Define auxtrace record alignment
+ - perf intel-pt: Fix overlap detection to identify consecutive buffers correctly
+ - perf intel-pt: Fix overlap calculation for padding
+ - perf intel-pt: Fix divide by zero when TSC is not available
+ - md: Fix failed allocation of md_register_thread
+ - tpm/tpm_crb: Avoid unaligned reads in crb_recv()
+ - tpm: Unified the send callback behaviour
+ - rcu: Do RCU GP kthread self-wakeup from softirq and interrupt
+ - media: imx: prpencvf: Stop upstream before disabling IDMA channel
+ - media: uvcvideo: Avoid NULL pointer dereference at the end of streaming
+ - media: vimc: Add vimc-streamer for stream control
+ - media: imx: csi: Disable CSI immediately after last EOF
+ - media: imx: csi: Stop upstream before disabling IDMA channel
+ - drm/radeon/evergreen_cs: fix missing break in switch statement
+ - KVM: Call kvm_arch_memslots_updated() before updating memslots
+ - KVM: x86/mmu: Detect MMIO generation wrap in any address space
+ - KVM: x86/mmu: Do not cache MMIO accesses while memslots are in flux
+ - KVM: nVMX: Sign extend displacements of VMX instr's mem operands
+ - KVM: nVMX: Apply addr size mask to effective address for VMX instructions
+ - KVM: nVMX: Ignore limit checks on VMX instructions using flat segments
+ - s390/setup: fix boot crash for machine without EDAT-1
+ - crypto: caam - fix hash context DMA unmap size
+ - crypto: caam - fix DMA mapping of stack memory
+ - KVM: arm/arm64: vgic: Make vgic_dist->lpi_list_lock a raw_spinlock
+ - arm/arm64: KVM: Allow a VCPU to fully reset itself
+ - arm/arm64: KVM: Don't panic on failure to properly reset system registers
+ - ASoC: samsung: Prevent clk_get_rate() calls in atomic context
+ - mac80211: call drv_ibss_join() on restart
+ - blk-mq: insert rq with DONTPREP to hctx dispatch list when requeue
+ - xprtdma: Make sure Send CQ is allocated on an existing compvec
+ - net: dsa: bcm_sf2: potential array overflow in bcm_sf2_sw_suspend()
+ - x86/CPU: Add Icelake model number
+ - kallsyms: Handle too long symbols in kallsyms.c
+ - ARM: 8835/1: dma-mapping: Clear DMA ops on teardown
+ - net: dsa: bcm_sf2: Do not assume DSA master supports WoL
+ - qed: Fix iWARP buffer size provided for syn packet processing.
+ - mm: handle lru_add_drain_all for UP properly
+ - ARCv2: don't assume core 0x54 has dual issue
+ - bpf, lpm: fix lookup bug in map_delete_elem
+ - acpi/nfit: Fix bus command validation
+ - mmc: fix a bug when max_discard is 0
+ - netfilter: ipt_CLUSTERIP: fix warning unused variable cn
+ - [Config] updateconfigs for CONFIG_SUN50I_ERRATUMUNKNOWN
+ - clocksourcetrivers/arch_timer: Workaround for Allwinner A64 timer instability
+ - irqchip/brcmstb-l2: Use _irqsave locking variants in non-interrupt code
+ - ext4: fix check of inode in swap_inode_boot_loader
+ - ext4: cleanup pagecache before swap_i_data
+ - ext4: update quota information while swapping boot loader inode
+ - dmaengine: usb-dmac: Make DMAC system sleep callbacks explicit
+ - mm/memory.c: do_fault: avoid usage of stale vm_area_struct
+ - media: i2c: ov5640: Fix post-reset delay
+ - powerpc/powernv: Don’t reprogram SLW image on every KVM guest entry/exit
+ - mfd: sm501: Fix potential NULL pointer dereference
+ - nfscd: fix performance-limiting session calculation
+ - svec: fix UDP on servers with lots of threads
+ - stable-kernel-rules.rst: add link to networking patch queue
+ - bcache: use (REQ_META|REQ_PRIO) to indicate bio for metadata

+ * Bionic update: upstream stable patchset 2019-07-24 (LP: #1837813)
+ - dt-bindings: eeprom: at24: add "atmel,24c2048" compatible string
+ - eeprom: at24: add support for 24c2048
+ - blk-mq: fix a hung issue when fsync
+ - ARM: 8789/1: signal: copy registers using __copy_to_user()
+ - ARM: 8790/1: signal: always use __copy_to_user to save iwmmxt context
+ - ARM: 8791/1: vfp: use __copy_to_user() when saving VFP state
+ - ARM: 8792/1: oabi-compat: copy oabi events using __copy_to_user()
+ - ARM: 8793/1: signal: replace __put_user_error with __put_user
+ - ARM: 8794/1: uaccess: Prevent speculative use of the current addr_limit
+ - ARM: 8795/1: spectre-v1.1: use put_user() for __put_user()
+ - ARM: 8796/1: spectre-v1,1.1: provide helpers for address sanitization
+ - ARM: 8797/1: spectre-v1.1: harden __copy_to_user
+ - ARM: 8810/1: vfp: Fix wrong assignment to ufpa_exc
+ - ARM: make lookup_processor_type() non-__init
+ - ARM: split out processor lookup
+ - ARM: clean up per-processor check_bridge method call
+ - ARM: add PROC_VTABLE and PROC_TABLE macros
+ - ARM: spectre-v2: per-CPU vtables to work around big.Little systems
+ - ARM: ensure that processor vtables is not lost after boot
+ - ARM: fix the cockup in the previous patch
+ - ACPI NUMA: Use correct type for printing addresses on i386-PAE
+ - perf test shell: Use a fallback to get the path name in vfs_getname
+ - cpufreq: check if policy is inactive early in __cpufreq_get()
+ - drm/bridge: tc35876: add defines for DP1_SRCCTRL & PHY_2LANE
+ - drm/bridge: tc35876: fix single lane configuration
+ - drm/bridge: tc35876: fix initial DP0/1_SRCCTRL value
+ - drm/bridge: tc35876: reject modes which require too much BW
+ - drm/bridge: tc35876: fix output H/V syncs
+ - nvme-pci: use the same attributes when freeing host_mem_desc_bufs.
+ - ARM: dts: da850-evm: Correct the sound card name
+ - ARM: dts: da850-lcdk: Correct the sound card name
+ - ARM: dts: kirkwood: Fix polarity of GPIO fan lines
+ - gpio: pl061: handle failed allocations
+ - drm/nouveau: Don’t disable polling in fallback mode
+ - drm/nouveau/falcon: avoid touching registers if engine is off
+ - cifs: Limit memory used by lock request calls to a page
+ - Revert "Input: elan_i2c - add ACPI ID for touchpad in ASUS Aspire F5-573G"
+ - Input: elan_i2c - add ACPI ID for touchpad in Lenovo V330-15ISK
+ - perf/core: Fix impossible ring-buffer sizes warning
+ - perf/x86: Add check_period PMU callback
+ - ALSA: hda - Add quirk for HP EliteBook 840 G5
+ - ALSA: usb-audio: Fix implicit fb endpoint setup by quirk
+ - kvm: vmx: Fix entry number check for add_atomic_switch_msr()
+ - Input: bma150 - register input device after setting private data
+ - Input: elantech - enable 3rd button support on Fujitsu CELSIUS H780
+ - mm: proc: smaps_rollup: fix pss_locked calculation
+ - alpha: fix page fault handling for r16-r18 targets
+ - alpha: Fix Eiger NR_IRQS to 128
+ - tracing/uprobes: Fix output for multiple string arguments
+ - x86/platform/UV: Use efi_runtime_lock to serialise BIOS calls
+ - signal: Restore the stop PTRACE_EVENT_EXIT
+ - md/raid1: don't clear bitmap bits on interrupted recovery.
+ - x86/a.out: Clear the dump structure initially
+ - dm crypt: don't overallocate the integrity tag space
+ - dm thin: fix bug where bio that overwrites thin block ignores FUA
+ - drm/i915: Prevent a race during I915_GEM_MMAP ioctl with WC set
+ - perf report: Fix wrong iteration count in --branch-history
+ - riscv: fix trace_sys_exit hook
+ - ARM: dts: da850-lcdk: Correct the audio codec regulators
+ - ARM: OMAP5+: Fix inverted nirq pin interrupts with irq_set_type
+ - ASoC: hdmi-codec: fix oops on re-probe
+ - riscv: Add pte bit to distinguish swap from invalid
+ - mmc: sunxi: Filter out unsupported modes declared in the device tree
+ - s390/zcrypt: fix specification exception on z196 during ap probe
+ - drm/i915: Block fbdev HPD processing during suspend
+ - dsa: mv88e66xxx: Ensure all pending interrupts are handled prior to exit
+ - net: fix IPv6 prefix route residue
+ - net: ipv4: use a dedicated counter for icmp_v4 redirect packets
+ - vsco: cope with memory allocation failure at socket creation time
+ - vxlan: test dev->flags & IFF_UP before calling netif_rx()
+ - hwmon: (lm80) Fix missing unlock on error in set_fan_div()
+ - mlxsw: __mlxsw_sp_port Headroom_set(): Fix a use of local variable
+ - net: Fix for_each_netdev_feature on Big endian
+ - net: phy: xgmitorgmii: Support generic PHY status read
+ - net: stmmac: Fix a race in EEE enable callback
+ - net: stmmac: handle endianness in dwmac4_get_timestamp
+ - vhost: correctly check the return value of translate_desc in log_used()
+ - net: Add header for usage of fls64()
+ - net: Do not allocate page fragments that are not skb aligned
+ - tcp: clear icsk_backoff in tcp_write_queue_purge()
+ - sunrpc: fix 4 more call sites that were using stack memory with a scatterlist
+ - net/x25: do not hold the cpu too long in x25_new_lci()
+ - mISDN: fix a race in dev_expire_timer()
+ - ax25: fix possible use-after-free
+ - af_packet: fix raw sockets over 6in4 tunnel
+ - tcp: tcp_v4_err() should be more careful
+ - mmc: meson-gx: fix interrupt name
+ - ARM: 8834/1: Fix: kprobes: optimized kprobes illegal instruction
+ - tracing: Fix number of entries in trace header
+ - MIPS: eBPF: Always return sign extended 32b values
+ - mac80211: Restore vif beacon interval if start ap fails
+ - mac80211: Free mpath object when rhashetable insertion fails
+ - libceph: handle an empty authorize reply
+ - ceph: avoid repeatedly adding inode to mdsc->snap_flush_list
+ - numa: change get_mempolicy() to use nr_node_ids instead of MAX_NUMNODES
+ - proc, oom: do not report alien mms when setting oom_score_adj
+ - KEYS: allow reaching the keys quotas exactly
+ - mfd: ti_am335x_tscadec: Use PLATFORM_DEVID_AUTO while registering mfd cells
+ - pvcalls-back: set -ENOTCONN in pvcalls_conn_back_read
+ - mfd: twl-core: Fix section annotations on {,un}protect_pm_master
+ - mfd: db8500-prcmu: Fix some section annotations
+ - mfd: mt6397: Do not call irq_domain_remove if PMIC unsupported
+ - mfd: db8500-core: Return zero in get_register_interruptible()
+ - mfd: bd9571mww: Add volatile register to make DVFS work
+ - mfd: qcom_rpm: write fw_version to CTRL_REG
+ - mfd: wm5110: Add missing ASRC rate register
+ - mfd: ts85218: Use devm_regmap_add_irq_chip and clean up error path in probe()
+ - mfd: mc13xxx: Fix a missing check of a register-read failure
+ - xen/pvcalls: remove set but not used variable 'intf'
+ - qed: Fix qed_chain_set_prods() for PBL chains with non power of 2 page count
+ qed: Fix qed_ll2_post_rx_buffer_notify_fw() by adding a write memory barrier
+ net: hns: Fix use after free identified by SLUB debug
+ MIPS: ath79: Enable OF serial ports in the default config
+ netfilter: nf_tables: fix leaking object reference count
+ scsi: qla4xxx: check return code of qla4xxx_copy_from_fwddb_param
+ scsi: isci: initialize shost fully before calling scsi_add_host()
+ MIPS: jazz: fix 64bit build
+ bpf: correctly set initial window on active Fast Open sender
+ net: stmmac: Fix PCI module removal leak
+ isdn: i4l: isdn_tty: Fix some concurrency double-free bugs
+ scsi: ufs: Fix system suspend status
+ scsi: qedi: Add ep_state for login completion on un-reachable targets
+ always clear the X2APIC_ENABLE bit for PV guest
+ drm/meson: add missing of_node_put
+ atm: he: fix sign-extension overflow on large shift
+ hwmon: (tmp421) Correct the misspelling of the tmp442 compatible attribute
+ in OF device ID table
+ leds: lp5523: fix a missing check of return value of lp55xx_read
+ bpf: bpf_setsockopt: reset sock dst on SO_MARK changes
+ mlxsw: spectrum_switchdev: Do not treat static FDB entries as sticky
+ net/mlx5e: Fix wrong (zero) TX drop counter indication for representor
+ isdn: avm: Fix string plus integer warning from Clang
+ batman-adv: fix uninit-value in batadv_interface_tx()
+ ipv6: propagate genlmsg_reply return code
+ net/mlx5e: Don't overwrite pedit action when multiple pedit used
+ net/packet: fix 4gb buffer limit due to overflow check
+ net: sfp: do not probe SFP module before we're attached
+ scctp: call gso_reset_checksum when computing checksum in scctp_gso_segment
+ team: avoid complex list operations in team_nl_cmd_options_set()
+ sit: check if IPv6 enabled before calling ip6_err_gen_icmpv6_unreach()
+ net/mlx4_en: Force CHECKSUM_NONE for short ethernet frames
+ inet_diag: fix reporting cgroup classid and fallback to priority
+ RDMA/srp: Rework SCSI device reset handling
+ KEYS: user: Align the payload buffer
+ KEYS: always initialize keyring_index_key::desc_len
+ parisc: Fix ptrace syscall number modification
+ ARCv2: Enable unaligned access in early ASM code
+ ARC: U-boot: check arguments paranoidly
+ ARC: define ARCH_SLAB_MINALIGN = 8
+ net: validate untrusted gso packets without csum offload
+ net: avoid false positives in untrusted gso validation
+ Revert "bridge: do not add port to router list when receives query with
source 0.0.0.0"
+ netfilter: nf_tables: fix flush after rule deletion in the same batch
+ netfilter: nft_comapt: use-after-free when deleting targets
+ netfilter: ipv6: Don't preserve original oif for loopback address
+ pinctrl: max77620: Use define directive for max77620_pinconf_param values
+ phy: tegra: remove redundant self assignment of `map`
+ net: phylink: avoid resolving link state too early
+ gpio: pxa: avoid attempting to set pin direction via pinctrl on MMP2
+ pvcalls-front: read all data before closing the connection
+ pvcalls-front: don't try to free unallocated rings
+ pvcalls-front: properly allocate sk
+ mfd: cros_ec_dev: Add missing mfd_remove_devices() call in remove
+ bpf: Fix [:]: -> [:1] rewrite in sys_sendmsg
+ watchdog: mt7621_wdt/r2880_wdt: Fix compilation problem
+ net/mlx4: Get rid of page operation after dma_alloc_coherent
+ xprtrdma: Double free in rpcrdma_sendctxs_create()
+ RDMA/mthca: Clear QP objects during their allocation
+ powerpc/8xx: fix setting of pagetable for Abatron BDI debug tool.
+ net: stmmac: Fix the logic of checking if RX Watchdog must be enabled
+ scsi: ufs: Fix geometry descriptor size
+ scsi: cxgb4i: add wait_for_completion()
+ afs: Fix key refcounting in file locking code
+ dpaa_eth: NETIF_F_LLTX requires to do our own update of trans_start
+ mlxsw: pci: Return error on PCI reset timeout
+ scctp: set stream ext to NULL after freeing it in scctp_stream_outq_migrate
+ drm/amdgpu: Set DPM_FLAG_NEVER_SKIP when enabling PM-runtime
+ gpu: drm: radeon: Set DPM_FLAG_NEVER_SKIP when enabling PM-runtime
+ drm/amd/display: Fix MST reboot/poweroff sequence
+ mac80211: allocate tailroom for forwarded mesh packets
+ netfilter: ipt_CLUSTERIP: fix sleep-in-atomic bug in clusterip_config_entry_put()
+ net: stmmac: Fix reception of Broadcom switches tags
+ drm/msm: Unblock writer if reader closes file
+ ASoC: Intel: Haswell/Broadwell: fix setting for .dynamic field
+ ALSA: compress: prevent potential divide by zero bugs
+ ASoC: Variable "val" in function rt274_i2c_probe() could be uninitialized
+ clk: vc5: Abort clock configuration without upstream clock
+ thermal: int340x__thermal: Fix a NULL vs IS_ERR() check
+ usb: dwc3: gadget: synchronize_irq dwc irq in suspend
+ usb: dwc3: gadget: Fix the uninitialized link_state when udc starts
+ usb: gadget: Potential NULL dereference on allocation error
+ genirq: Make sure the initial affinity is not empty
+ ASoC: dapm: change snprintf to scnprintf for possible overflow
+ ASoC: imxaudmux: change snprintf to scnprintf for possible overflow
+ selftests: seccomp: use LDLIBS instead of LDFLAGS
+ selftests: gpio-mockup-chardev: Check asprintf() for error
+ ARC: fix __ffs return value to avoid build warnings
+ drivers: thermal: int340x__thermal: Fix sysfs race condition
+ staging: rtl8723bs: Fix build error with Clang when inlining is disabled
+ mac80211: fix miscounting of ttl-dropped frames
+ sched/wait: Fix rcuwait_wake_up() ordering
+ futex: Fix (possible) missed wakeup
+ locking/rwsem: Fix (possible) missed wakeup
+ drm/amd/powerplay: OD setting fix on Vega10
- serial: fsl_lpuart: fix maximum acceptable baud rate with over-sampling
- staging: android: ion: Support cpu access during dma_buf_detach
- direct-io: allow direct writes to empty inodes
- writeback: synchronize sync(2) against cgroup writeback membership switches
- scsi: csiostor: fix NULL pointer dereference in csio_vport_set_state()
- net: altera_tse: fix connect_local_phy error path
- hv_netvtsc: Fix ethtool change hash key error
- net: usb: ax88772_bind return error when hw_reset fail
- net: dev_is_mac_header_xmit() true for ARPHRD_RAWIP
- ibmvtm: Do not process frames after calling napi_reschedule
- mac80211: don't initiate TDLS connection if station is not associated to AP
- mac80211: Add attribute aligned(2) to struct 'action'
- cfg80211: extend range deviation for DMG
- KVM: nSVM: clear events pending from svm_complete_interrups() when exiting
to L1
- mmc: spi: Fix card detection during probe
- mmc: tmio_mmc_core: don't claim spurious interrupts
- mmc: tmio: fix maximum width of Block Count Register
- mmc: sdhci-esdhe-imx: correct the fix of ERR004536
- MIPS: fix truncation in __cmpxchg_small for short values
- MIPS: eBPF: Fix icache flush end address
- x86/usaccess: Don't leak the AC flag into __put_user() value evaluation
- irq/matrix: Split out the CPU selection code into a helper
- irq/matrix: Spread managed interrupts on allocation
- genirq/matrix: Improve target CPU selection for managed interrupts.
- clk: tegra: dfll: Fix a potential Oop in remove()
- selftests/vm/gup_benchmark.c: match gup struct to kernel
- ARC: show_regs: lockdep: avoid page allocator...
- sched/wake_q: Fix wakeup ordering for wake_q
- drm/sun4i: hdmi: Fix usage of TMDS clock
- scsi: lpfc: nvme: avoid hang / use-after-free when destroying localport
- scsi: lpfc: nvmet: avoid hang / use-after-free when destroying targetport
- mmc: core: Fix NULL ptr crash from mmc_should_fail_request
- drm: Block fb changes for async plane updates
- hugetlbf.s: fix races and page leaks during migration
- MIPS: BCM63XX: provide DMA masks for ethernet devices
- cpufreq: Use struct kobj_attribute instead of struct global_attr
- USB: serial: option: add Telit ME910 ECM composition
- USB: serial: cp210x: add ID for Ingenico 3070
- staging: comedi: ni_660x: fix missing break in switch statement
- staging: wile1000: fix to set correct value for 'vif_num'
- staging: android: ion: fix sys heap pool's gfp_flags
- ip6mr: Do not call __IP6_INC_STATS() from preemptible context
- net: dsa: mv88e6xxx: handle unknown duplex modes gracefully in
  mv88e6xxx_port_set_duplex
- net-sysfs: Fix mem leak in netdev_register_kobject
- team: Free BPF filter when unregistering netdev
+ - tipc: fix RDM/DGRAM connect() regression
+ - bnx_t_en: Drop oversize TX packets to prevent errors.
+ - hv_netvsc: Fix IP header checksum for coalesced packets
+ - net: dsa: mv88e6xxx: Fix statistics on mv88e6161
+ - net: dsa: mv88e6xxx: Fix u64 statistics
+ - netlabel: fix out-of-bounds memory accesses
+ - net: netem: fix skb length BUG_ON in __skb_to_sgvec
+ - net: phy: Micrel KSZ8061: link failure after cable connect
+ - net: phy: phylink: fix uninitialized variable in phylink_get_mac_state
+ - net: sit: fix memory leak in sit_init_net()
+ - tcp: fix race condition causing hung sendto
+ - tun: fix blocking read
+ - xen-netback: don't populate the hash cache on XenBus disconnect
+ - xen-netback: fix occasional leak of grant ref mappings under memory pressure
+ - tun: remove unnecessary memory barrier
+ - net: Add __icmp_send helper.
+ - net: avoid use IPCB in cipso_v4_error
+ - ipv4: Return error for RTA_VIA attribute
+ - ipv6: Return error for RTA_VIA attribute
+ - mpls: Return error for RTA_GATEWAY attribute
+ - net/sched: act_ipt: fix refcount leak when replace fails
+ - x86/CPU/AMD: Set the CPB bit unconditionally on F17h
+ - MIPS: irq: Allocate accurate order pages for irq stack
+ - xtensa: fix get_wchan
+ - Bluetooth: Fix locking in bt_accept_enqueue() for BH context
+ - scsi: core: reset host byte in DID_NEXUS_FAILURE case
+ - bpf: fix sanitation rewrite in case of non-pointers
+ - vti4: Fix a ipip packet processing bug in 'IPCOMP' virtual tunnel
+ - perf core: Fix perf_proc_update_handler() bug
+ - perf tools: Handle TOPOLOGY headers with no CPU
+ - IB/(hfi1, qib): Fix WC.byte_len calculation for UD_SEND_WITH_IMM
+ - iommu/amd: Call free_iowa_fast with pfn in map_sg
+ - iommu/amd: Unmap all mapped pages in error path of map_sg
+ - ipvs: Fix signed integer overflow when setsockopt timeout
+ - iommu/amd: Fix IOMMU page flush when detach device from a domain
+ - xtensa: SMP: fix ccount_timer_shutdown
+ - selftests: cpu-hotplug: fix case where CPUs offline > CPUs present
+ - xtensa: SMP: fix secondary CPU initialization
+ - xtensa: smplx200_defconfig: fix vectors clash
+ - xtensa: SMP: mark each possible CPU as present
+ - xtensa: SMP: limit number of possible CPUs by NR_CPUS
+ - net: altera_tse: fix msgdma_tx_completion on non-zero fill_level case
+ - net: hns: Fix for missing of node_put() after of_parse_phandle()
+ - net: hns: Fix wrong read accesses via Clause 45 MDIO protocol
+ - net: stmmac: dwmac-rk: fix error handling in rk_gmac_powerup()
+ - netfilter: ebtables: compat: un-break 32bit setsockopt when no rules are present
+ - gpio: vt610: Mask all GPIO interrupts
+ - selftests: timers: use LDLIBS instead of LDFLAGS
+ - nfs: Fix NULL pointer dereference of dev_name
+ - qed: Fix bug in tx promiscuous mode settings
+ - qed: Fix LACP pdu drops for VFs
+ - qed: Fix VF probe failure while FLR
+ - qed: Fix system crash in ll2 xmit
+ - qed: Fix stack out of bounds bug
+ - scsi: libfc: free skb when receiving invalid flogi resp
+ - scsi: 53c700: pass correct "dev" to dma_alloc_attr()
+ - platform/x86: Fix unmet dependency warning for SAMSUNG_Q10
+ - cifs: fix computation for MAX_SMB2_HDR_SIZE
+ - x86/microcode/amd: Don't falsely trick the late loading mechanism
+ - arm64: kprobe: Always blacklist the KVM world-switch code
+ - apparmor: Fix aa_label_build() error handling for failed merges
+ - x86/kexec: Don't setup EFI info if EFI runtime is not enabled
+ - x86_64: increase stack size for KASAN_EXTRA
+ - mm, memory_hotplug: is_mem_section_removable do not pass the end of a zone
+ - mm, memory_hotplug: test_pages_in_a_zone do not pass the end of zone
+ - lib/test_kmod.c: potential double free in error handling
+ - fs/drop_caches.c: avoid softlockups in drop_pagecache_sha()
+ - autofs: drop dentry reference only when it is never used
+ - autofs: fix error return in autofs_fill_super()
+ - ARM: dts: omap4-droid4: Fix typo in cpcap IRQ flags
+ - arm64: dts: renesas: r8a7796: Enable DMA for SCIF2
+ - soc: fsl: qbman: avoid race in clearing QMan interrupt
+ - bpf: sock recvbuff must be limited by rmem_max in bpf_setsockopt()
+ - ARM: pxa: ssp: unneeded to free devm allocated data
+ - arm64: dts: add msm8996 compatible to gicv3
+ - usb: phy: link errors
+ - irqchip/mmp: Only touch the PJ4 IRQ & FIQ bits on enable/disable
+ - net: stmmac: Fallback to Platform Data clock in Watchdog conversion
+ - net: stmmac: Send TSO packets always from Queue 0
+ - net: stmmac: Disable EEE mode earlier in XMIT callback
+ - irqchip/gic-v3-its: Fix ITT_entry_size accessor
+ - relay: check return of create_buf_file() properly
+ - bpf, selftests: fix handling of sparse CPU allocations
+ - bpf: fix lockdep false positive in percpu_freelist
+ - drm/sun4i: tcon: Prepare and enable TCON channel 0 clock at init
+ - dmaengine: at_xdma: Fix wrongfull report of a channel as in use
+ - vssock/virtio: fix kernel panic after device hot-unplug
+ - vssock/virtio: reset connected sockets on device removal
+ - dmaengine: dnetest: Abort test in case of mapping error
+ - selftests: netfilter: fix config fragment CONFIG_NF_TABLES_INET
+ - selftests: netfilter: add simple masq/redirect test cases
+ - s390/qeth: fix use-after-free in error path
+ - perf symbols: Filter out hidden symbols from labels
+ - perf trace: Support multiple "vfs_getname" probes
+ - MIPS: Remove function size check in get_frame_info()
+ - i2c: omap: Use noirq system sleep pm ops to idle device for suspend
+ - fs: ratelimit __find_get_block_slow() failure message.
+ - qed: Fix EQ full firmware assert.
+ - qed: Consider TX tcs while deriving the max num_queues for PF.
+ - Input: wacom_serial4 - add support for Wacom ArtPad II tablet
+ - Input: elan_i2c - add id for touchpad found in Lenovo s21e-20
+ - iscsi_ibft: Fix missing break in switch statement
+ - scsi: acraid: Fix missing break in switch statement
+ - arm64: dts: hikey: Give wifi some time after power-on
+ - ARM: dts: exynos: Fix pinctrl definition for eMMC RTSN line on Odroid X2/U3
+ - ARM: dts: exynos: Add minimal clkout parameters to Exynos3250 PMU
+ - drm: disable uncached DMA optimization for ARM and arm64
+ - ARM: 8781/1: Fix Thumb-2 syssize return for binutils 2.29+
+ - gfs2: Fix missed wakeups in find_insert_glock
+ - ath9k: Avoid OF no-EEPROM quirks without qca,no-eprom
+ - perf/x86/intel: Make cpuc allocations consistent
+ - perf/x86/intel: Generalize dynamic constraint creation
+ - x86: Add TSX Force Abort CPUID/MSR
+ - perf/x86/intel: Implement support for TSX Force Abort
+ - perf script: Fix crash with printing mixed trace point and other events
+ - clk: ti: Fix error handling in ti_clk_parse_divider_data()
+ - riscv: Adjust mmap base address at a third of task size
+ - IB/iopoib: Fix for use-after-free in iopoib_cm_tx_start
+ - iomap: fix a use after free in iomap_dio_rw
+ - selftests: net: use LDLIBS instead of LDFLAGS
+ - scsi: scsi_debug: fix write_same with virtual_gb problem
+ - scsi: bnx2fc: Fix error handling in probe()
+ - ARM: OMAP: dts: N950/N9: fix onenand timings
+ - ARM: dts: sun8i: h3: Add ethernet0 alias to Beelink X2
+ - ARM: dts: imx6sx: correct backward compatible of gpt
+ - pinctrl: mcp23s08: spi: Fix regmap allocation for mcp23s18
+ - bpftool: Fix prog dump by tag
+ - bpftool: fix percpu maps updating
+ - batman-adv: release station info tidstats
+ - irqchip/gic-v4: Fix occasional VLPI drop
+ - s390/qeth: release cmd buffer in error paths
+ - nvme-pci: add missing unlock for reset error
+ - x86/PCI: Fixup RTIT_BAR of Intel Denteron Trace Hub
+ - ARM: dts: exynos: Fix max voltage for buck8 regulator on Odroid XU3/XU4

* Bionic update: upstream stable patchset 2019-07-23 (LP: #1837664)
  + amd-xgbe: Fix mdio access for non-zero ports and clause 45 PHYs
  + net: bridge: Fix ethernet header pointer before check skb forwardable
  + net: Fix usage of skb_btree_rcsum
  + phy: mdio_bus: add missing device_del() in mdiobus_register() error handling
  + net_sched: refetch skb protocol for each filter
+ - openvswitch: Avoid OOB read when parsing flow nlattrs
+ - vhost: log dirty page correctly
+ - net: ipv4: Fix memory leak in network namespace dismantle
+ - tcp: allow MSG_ZEROCOPY transmission also in CLOSE_WAIT state
+ - mei: me: add denverton innovation engine device IDs
+ - USB: serial: simple: add Motorola Tetra TPG2200 device id
+ - USB: serial: pl2303: add new PID to support PL2303TB
+ - ASoC: atom: fix a missing check of snd_pcm_lib_malloc_pages
+ - ASoC: rt5514-spi: Fix potential NULL pointer dereference
+ - ARC: adjust memblock_reserve of kernel memory
+ - ARC: perf: map generic branches to correct hardware condition
+ - s390/smp: fix CPU hotplug deadlock with CPU rescan
+ - staging: rtl8188eu: Add device code for D-Link DWA-121 rev B1
+ - tty: Handle problem if line discipline does not have receive_buf
+ - uart: Fix crash in uart_write and uart_put_char
+ - tty/hdlc: fix __might_sleep warning
+ - hv_balloon: avoid touching uninitialized struct page during tail onlining
+ - Drivers: hv: vmbus: Check for ring when getting debug info
+ - CIFS: Fix possible hang during async MTU reads and writes
+ - CIFS: Fix credits calculations for reads with errors
+ - CIFS: Fix credit read for encrypted reads with errors
+ - CIFS: Do not reconnect TCP session in add_credits()
+ - Input: xpad - add support for SteelSeries Stratus Duo
+ - compiler.h: enable builtin overflow checkers and add fallback code
+ - Input: uinput - fix undefined behavior in uinput_validate_absinfo()
+ - acpi/nfit: Block function zero DSMs
+ - acpi/nfit: Fix command-supported detection
+ - dm thin: fix passdown_double_checking_shared_status()
+ - dm crypt: fix parsing of extended IV arguments
+ - KVM: x86: Fix single-step debugging
+ - x86/pkeys: Properly copy pkey state at fork()
+ - x86/selftests/pkeys: Fork() to check for state being preserved
+ - x86/kaslr: Fix incorrect i8254 outb() parameters
+ - posix-cpu-timers: Unbreak timer rearming
+ - irqchip/gic-v3-its: Align PCI Multi-MSI allocation on their size
+ - can: dev: __can_get_echo_skb(): fix bogus check for non-existing skb by
  removing it
+ - can: bcm: check timer values before ktime conversion
+ - vt: invoke notifier on screen size change
+ - Revert "seccomp: add a selftest for get_metadata"
+ - s390/smp: Fix calling smcp_call_ipl_cpu() from ipl CPU
+ - nvmet-rdma: Add unlikely for response allocated check
+ - nvmet-rdma: fix null dereference under heavy load
+ - usb: dwc3: gadget: Clear req->needs_extra_trb flag on cleanup
+ - x86/xen/time: Output xen sched_clock time from 0
+ - xen: Fix x86 sched_clock() interface for xen
+ - mlxsw: pci: Increase PCI SW reset timeout
- mlxsw: spectrum_fid: Update dummy FID index
- ASoC: tlv320aic32x4: Kernel OOPS while entering DAPM standby mode
- s390/mm: always force a load of the primary ASCE on context switch
- mmc: meson-gx: Free irq in release() callback
- vgascon: unconfuse vc_origin when using soft scrollback
- drm/amdgpude: Add APTX quirk for Lenovo laptop
- vt: always call notifier with the console lock held
- drm/meson: Fix atomic mode switching regression
- bpf: improve verifier branch analysis
- bpf: add per-insn complexity limit
- ipv6: Consider sk_bound_dev_if when binding a socket to an address
- ipv6: sr: clear IP6CB(skb) on SRH ip4ip6 encapsulation
- l2tp: copy 4 more bytes to linear part if necessary
- net/mlx4_core: Add masking for a few queries on HCA caps
- net: switch to sock timer API
- net/rose: fix NULL ax25_cb kernel panic
- net: set default network namespace in init_dummy_netdev()
- net/mlx5e: Allow MAC invalidation while spoofchk is ON
- Revert "net/mlx5e: E-Switch, Initialize eswitch only if eswitch manager"
- virtio_net: Don't enable NAPI when interface is down
- virtio_net: Don't call free_old_xmit_skbs for xdp_frames
- virtio_net: Fix not restoring real_num_rx_queues
- scrt: improve the events for scrt stream adding
- scrt: improve the events for scrt stream reset
- l2tp: remove l2specific_len dependency in l2tp_core
- l2tp: fix reading optional fields of L2TPv3
- ipvlan, l3mdev: fix broken l3s mode wrt local routes
- CIFS: Do not count -ENODATA as failure for query directory
- fs/dcache: Fix incorrect nr_dentry_unused accounting in shrink_dcache_sb()
- iommu/vt-d: Fix memory leak in intel_iommu_put_resv_regions()
- NFS: Fix up return value on fatal errors in nfs_page_async_flush()
- ARM: cns3xxx: Fix writing to wrong PCI config registers after alignment
- arm64: kaslr: ensure randomized quantities are clean also when kaslr is off
- arm64: hyp-stub: Forbid kprobing of the hyp-stub
- arm64: hibernate: Clean the __hyp_text to PoC after resume
- gpio: altera-a10Sr: Set proper output level for direction_output
- gpio: pcf857x: Fix interrupts on multiple instances
- mmc: bcm2835: Fix DMA channel leak on probe error
- IB/hfi1: Remove overly conservative VM_EXEC flag check
- platform/x86: asus-nb-wmi: Map 0x35 to KEY_SCREENLOCK
- platform/x86: asus-nb-wmi: Drop mapping of 0x33 and 0x34 scan codes
- mmc: sdhci-iproc: handle mmc_of_parse() errors during probe
- kernel/exit.c: release ptraced tasks before zap_pid_ns_processes
- oom, oom_reaper: do not enqueue same task twice
- mm, oom: fix use-after-free in oom_kill_process
- mm: hwpoison: use do_send_sig_info() instead of force_sig()
- mm: migrate: don't rely on __PageMovable() of newpage after unlocking it
- md/raid5: fix 'out of memory' during raid cache recovery
+ - cifs: Always resolve hostname before reconnecting
+ - drivers: core: Remove glue dirs from sysfs earlier
+ - fanotify: fix handling of events on child sub-directory
+ - drm/msm/gpu: fix building without debugfs
+ - ravb: expand rx descriptor data to accommodate hw checksum
+ - tun: move the call to tun_set_real_num_queues
+ - scpt: set flow sport from saddr only when it's 0
+ - virtio_net: Don't process redirected XDP frames when XDP is disabled
+ - CIFS: Do not consider -ENODATA as stat failure for reads
+ - mmc: mediatek: fix incorrect register setting of hs400_cmd_int_delay
+ - ALSA: usb-audio: Add Opus #3 to quirks for native DSD support
+ - Btrfs: fix deadlock when allocating tree block during leaf/node split
+ - mm/hugetlb.c: teach follow_hugetlb_page() to handle FOLL_NOWAIT
+ - mm/memory_hotplug: fix scan_movable_pages() for gigantic hugepages
+ - of: Convert to using %pOFn instead of device_node.name
+ - of: overlay: add tests to validate kfree's from overlay removal
+ - of: overlay: add missing of_node_get() in __of_attach_node_sysfs
+ - of: overlay: use prop add changeset entry for property in new nodes
+ - ucc_geth: Reset BQL queue when stopping device
+ - staging: iio: adc: ad7280a: handle error from __ad7280_read32()
+ - drm/vgem: Fix vgem_init to get drm device available.
+ - pinctrl: bcm2835: Use raw spinlock for RT compatibility
+ - ASoC: Intel: mrfld: fix uninitialized variable access
+ - gpu: ipu-v3: image-convert: Prevent race between run and unprepare
+ - ath9k: dynack: use authentication messages for 'late' ack
+ - scsi: lpfc: Correct LCB RJT handling
+ - scsi: mpt3sas: Call sas_remove_host before removing the target devices
+ - scsi: lpfc: Fix LOGO/PLOGI handling when triggered by ABTS Timeout event
+ - ARM: 8808/1: kexec:offline panic_smp_self_stop CPU
+ - clk: boston: fix possible memory leak in clk_boston_setup()
+ - dlm: Don't swamp the CPU with callbacks queued during recovery
+ - x86/PCI: Fix Broadcom CNB20LE unintended sign extension (redux)
+ - powerpc/pseries: add of_node_put() in dlpar_detach_node()
+ - crypto: aes_t1 - disable interrupts while accessing S-box
+ - drm/vc4: ->x_scaling[1] should never be set to VC4_SCALING_NONE
+ - serial: fsl_lpuart: clear parity enable bit when disable parity
+ - ptp: check gettimeofday return code in PTP_SYS_OFFSET ioctl
+ - MIPS: Boston: Disable EG20T prefetch
+ - staging:iio:ad2s90: Make probe handle spi_setup failure
+ - fpga: altera-cvp: Fix registration for CvP incapable devices
+ - Tools: hv: kvp: Fix a warning of buffer overflow with gcc 8.0.1
+ - platform/chrome: don't report EC_MKBP_EVENT_SENSOR_FIFO as wakeup
+ - staging: iio: ad7780i: update voltage on read
+ - usbnet: smsc95xx: fix rx packet alignment
+ - drm-rockchip: fix for mailbox read size
+ - ARM: OMAP2+: hwmod: Fix some section annotations
+ - net/mlx5: EQ, Use the right place to store/read IRQ affinity hint
+ - modpost: validate symbol names also in find_elf_symbol
+ - perf tools: Add Hygon Dhyana support
+ - soc/tegra: Don't leak device tree node reference
+ - media: mtk-vcodenc: Release device nodes in mtk_vcodec_init_enc_pm()
+ - ptp: Fix pass zero to ERR_PTR() in ptp_clock_register
+ - dmaengine: xilinx_dma: Remove __aligned attribute on zynqmp_dma_desc_ll
+ - iio: adc: meson-saradc: check for devm_kasprintf failure
+ - iio: adc: meson-saradc: fix internal clock names
+ - iio: accel: kcxjk1013: Add KIOX010A ACPI Hardware-ID
+ - media: adv*/tc358743/ths8200: fill in min width/height/pixelclock
+ - ACPI: SPCR: Consider baud rate 0 as preconfigured state
+ - staging: pi433: fix potential null dereference
+ - f2fs: move dir data flush to write checkpoint process
+ - f2fs: fix race between write_checkpoint and write_begin
+ - f2fs: fix wrong return value of f2fs_acl_create
+ - i2c: sh_mobile: add support for r8a77990 (R-Car E3)
+ - arm64: io: Ensure calls to delay routines are ordered against prior readX()
+ - sunvd: Do not spin in an infinite loop when vio ldc_send() returns EAGAIN
+ - soc: bcm: brcmstb: Don't leak device tree node reference
+ - nfsd4: fix crash on writing v4_end_grace before nfsd startup
+ - drm: Clear state->.acquire_ctx before leaving
+ - drm_atomic_helper_commit_duplicated_state()
+ - arm64: io: Ensure value passed to __iormb() is held in a 64-bit register
+ - Thermal: do not clear passive state during system sleep
+ - firmware/efi: Add NULL pointer checks in efivars API functions
+ - s390/zcrypt: improve special ap message cmd handling
+ - arm64: ftrace: don't adjust the LR value
+ - ARM: dts: nmp2: fix TWS12
+ - x86/fpu: Add might_fault() to user_insn()
+ - media: DaVinci-VPBE: fix error handling in vpbe_initialize()
+ - smack: fix access permissions for keyring
+ - usb: dwc3: Correct the logic for checking TRB full in
+ __dwc3_prepare_one_trb()
+ - usb: hub: delay hub autosuspend if USB3 port is still link training
+ - timekeeping: Use proper seqcount initializer
+ - usb: mtu3: fix the issue about SetFeature(U1/U2_Enable)
+ - clk: sunxi-ng: a33: Set CLK_SET_RATE_PARENT for all audio module clocks
+ - driver core: Move async_synchronize_full call
+ - kobject: return error code if writing /sys/.../uevent fails
+ - IB/hfi1: Unreserve a reserved request when it is completed
+ - usb: dwc3: trace: add missing break statement to make compiler happy
+ - pinctrl: sx150x: handle failure case of devm_kstrdup
+ - iommu/amd: Fix amd_iommu=force_isolation
+ - ARM: dts: Fix OMAP4430 SDP Ethernet startup
+ - mips: bpf: fix encoding bug for mm_srlv32_op
+ - media: coda: fix H.264 deblocking filter controls
+ - ARM: dts: Fix up the D-Link DIR-685 MTD partition info
+ - watchdog: renesas_wdt: don't set divider while watchdog is running
+ - usbdwc3: gadget: Disable CSP for stream OUT ep
+ - iommu/arm-smmu: Add support for qcom,smmu-v2 variant
+ - iommu/arm-smmu-v3: Use explicit mb() when moving cons pointer
+ - satara: fix deferred probing
+ - clk: imx6sl: ensure MMDC CH0 handshake is bypassed
+ - cpuidle: big.LITTLE: fix refcount leak
+ - OPP: Use opp_table->regulators to verify no regulator case
+ - i2c-axx:ia: check for error conditions first
+ - phy: sun4i-usb: add support for missing USB PHY index
+ - udf: Fix BUG on corrupted inode
+ - switchtec: Fix SWITCHTEC_IOCTL_EVENT_IDX_ALL flags overwrite
+ - selftests/bpf: use __bpf_constant_htons in test_prog.c
+ - ARM: pxa: avoid section mismatch warning
+ - ASoC: fsl: Fix SND_SOC_EUKREA_TLV320 build error on i.MX8M
+ - KVM: PPC: Book3S: Only report KVM_CAP_SPAPR_TCE_VFIO on powernv machines
+ - mmc: bcm2835: Recover from MMC_SEND_EXT_CSD
+ - mmc: bcm2835: reset host on timeout
+ - mmc: sdhciof-esdhc: Fix timeout checks
+ - mmc: sdhcixenon: Fix timeout checks
+ - tty: serial: samsung: Properly set flags in autoCTS mode
+ - perf test: Fix perf_event_attr test failure
+ - perf header: Fix unchecked usage of strncmp()
+ - perf probe: Fix unchecked usage of strncmp()
+ - arm64: KVM: Skip MMIO insn after emulation
+ - usb: musb: dsps: fix otg state machine
+ - percpu: convert spin_lock_irq to spin_lock_irqsave.
+ - powerpc/uaccess: fix warning/error with access_ok()
+ - mac80211: fix radiotap vendor presence bitmap handling
+ - xfrm6_tunnel: Fix spi check in __xfrm6_tunnel_alloc_spi
+ - mlxsw: spectrum: Properly cleanup LAG uppers when removing port from LAG
+ - scsi: smartpqi: correct host serial num for ssa
+ - scsi: smartpqi: correct volume status
+ - scsi: smartpqi: increase fw status register read timeout
+ - iw1200: Fix concurrency use-after-free bugs in iw1200_hw_scan()
+ - powerpc/perf: Fix thresholding counter data for unknown type
+ - drbd: narrow rcu_read_lock in drbd_sync_handshake
+ - drbd: disconnect, if the wrong UUIDs are attached on a connected peer
+ - drbd: skip spurious timeout (ping-timeo) when failing promote
+ - drbd: Avoid Clang warning about pointless switch statement
+ - video: clps711x-fb: release disp device node in probe()
+ - fbdev: fbmem: behave better with small rotated displays and many CPUs
+ - i40e: define proper net_device::neigh_priv_len
+ - ACPI/APEI: Clear GHS block_status before panic()
+ - fbdev: fbcon: Fix unregister crash when more than one framebuffer
+ - powerpc/mm: Fix reporting of kernel execute faults on the 8xx
+ - pinctrl: meson: meson8: fix the GPIO function for the GPIOAO pins
+ - pinctrl: meson: meson8b: fix the GPIO function for the GPIOAO pins
+ - KVM: x86: svm: report MSR_IA32_MCG_EXT_CTL as unsupported
+ - powerpc/fadump: Do not allow hot-remove memory from fadump reserved area.
+ - kvm: Change offset in kvm_write_guest_offset_cached to unsigned
+ - NFS: nfs_compare_mount_options always compare auth flavors.
+ - hwmom: (lm80) fix a missing check of the status of SMBus read
+ - hwmom: (lm80) fix a missing check of bus read in lm80 probe
+ - seq_buf: Make seq_buf_puts() null-terminate the buffer
+ - crypto: ux500 - Use proper enum in cryp_set_dma_transfer
+ - crypto: ux500 - Use proper enum in hash_set_dma_transfer
+ - MIPS: ralink: Select CONFIG_CPU_MIPSR2_IRQ_VI on MT7620/8
+ - cifs: check ntwrk_buf_start for NULL before dereferencing it
+ - um: Avoid marking pages with "changed protection"
+ - niu: fix missing checks of niu_pci_eeprom_read
+ - f2fs: fix sfi->extent_list corruption issue
+ - cgroup: fix parsing empty mount option string
+ - scripts/decode_stacktrace: only strip base path when a prefix of the path
+ - ocfs2: don't clear bh uptodate for block read
+ - ocfs2: improve ocfs2 Makefile
+ - isdn: hisax: hfc_pci: Fix a possible concurrency use-after-free bug in
  + HFCPCI11hw()
+ - gdrom: fix a memory leak bug
+ - fsl/fman: Use GFP_ATOMIC in {memac,tgec}_add_hash_mac_address()
+ - block/swim3: Fix -EBUSY error when re-opening device after unmount
+ - thermal: bcm2835: enable hwmon explicitly
+ - kdb: Don't back trace on a cpu that didn't round up
+ - thermal: generic-adc: Fix adc to temp interpolation
+ - HID: lenovo: Add checks to fix_of_led_classdev_register
+ - kernel/hung_task.c: break RCU locks based on jiffies
+ - proc/sysctl: fix return error for proc_doulongvec_minmax()
+ - kernel/hung_task.c: force console verbose before panic
+ - fs/epoll: drop ovflist branch prediction
+ - scripts/gdb: fix lx-version string output
+ - thermal: hwmon: inline helpers when CONFIG_THERMAL_HWMON is not set
+ - dcecp: fool proof ccid_hs_[rt]x_parse_options()
+ - enic: fix checksum validation for IPv6
+ - net: dp83640: expire old TX-skbs
+ - rxrpc: bad unlock balance in rxrpc_recvmsg
+ - skge: potential memory corruption in skge_get_regs()
+ - rds: fix refcount bug in rds_sock_addref
+ - net: systemport: Fix WoL with password after deep sleep
+ - net/mix5e: Force CHECKSUM_UNNECESSARY for short ethernet frames
+ - net: dsa: slave: Don't propagate flag changes on down slave interfaces
+ - ALSA: compress: Fix stop handling on compressed capture streams
+ - ALSA: hda - Serialize codec registrations
+ - dmaengine: bcm2835: Fix interrupt race on RT
+ - dmaengine: bcm2835: Fix abort of transactions
+ - dmaengine: imx-dma: fix wrong callback invoke
+ - futqchip/gic-v3-its: Plug allocation race for devices sharing a DEVID
+ - usb: phy: am335x: fix race condition in _probe
+ - usb: dwc3: gadget: Handle 0 xfer length for OUT EP
+ - usb: gadget: udc: net2272: Fix bitwise and boolean operations
+ - usb: gadget: musb: fix short isoc packets with inventra dma
+ - staging: speakup: fix tty-operation NULL derefs
+ - scsi: cxtflash: Prevent deadlock when adapter probe fails
+ - scsi: aie94xx: fix module loading
+ - cpu/hotplug: Fix "SMT disabled by BIOS" detection for KVM
+ - perf/x86/intel/uncore: Add Node ID mask
+ - x86/MCE: Initialize mce.bank in the case of a fatal error in
  mce_no_way_out()
+ - perf/core: Don't WARN() for impossible ring-buffer sizes
+ - perf tests evsel-tp-sched: Fix bitwise operator
+ - serial: fix race between flush_to_ldisc and tty_open
+ - serial: 8250_pci: Make PCI class test non fatal
+ - IB/hfi1: Add limit test for RC/UC send via loopback
+ - perf/x86/intel: Delay memory deallocation until x86_pmu_dead_cpu()
+ - ath9k: dynack: make ewma estimation faster
+ - ath9k: dynack: check da->enabled first in sampling routines
+ - devres: Align data[] to ARCH_KMALLOC_MINALIGN
+ - genirq/affinity: Spread IRQs to all available NUMA nodes
+ - wil6210: fix memory leak in wil_find_tx_bcast_2
+ - fpga: altera-cvp: fix 'bad IO access' on x86_64
+ - drm/amd/display: calculate stream->phy_pix_clk before clock mapping
+ - net: aquantia: return 'err' if set MPI_DEINIT state fails
+ - perf: arm_spe: handle devm_kasprintf() failure
+ - xtensa: xtfpga.dtsi: fix dtc warnings about SPI
+ - media: imx274: select REGMAP_I2C
+ - drm/amd/display: validate extended dongle caps
+ - perf build: Don't unconditionally link the libbfd feature test to -liberty
  and -lz
+ - PCI: imx: Enable MSI from downstream components
+ - arm64/sve: ptrace: Fix SVE_PT_REGS_OFFSET definition
+ - kernel/kcov.c: mark write_comp_data() as notrace
+ - xfs: Fix xqmstats offsets in /proc/fs/xfs/xqmstat
+ - xfs: Fix error code in 'xfs_ioc_getbmap()'  
+ - xfs: fix shared extent data corruption due to missing cow reservation  
+ - xfs: fix transient reference count error in xfs_buf_resubmit_failedBuffers  
+ - xfs: delalloc -> unwritten COW fork allocation can go wrong  
+ - fs/xfs: fix f_ffree value for statfs when project quota is set  
+ - lib/test_rhashtable: Make test_insert_dup() allocate its hash table 
+ dynamically  
+ - net: dsa: Fix lockdep false positive splat  
+ - Revert "net: phy: marvell: avoid pause mode on SGMII-to-Copper for 88e151x"  
+ - ALSA: hda/realtek - Fix lose hp_pins for disable auto mute  
+ - serial: sh-sci: Do not free irqs that have already been freed  
+ - mtd: rawnand: gpmpi: fix MX28 bus master lockup problem  
+ - iio: adc: axp288: Fix TS-pin handling  
+ - iio: chemical: atlas-ph-sensor: correct IIO_TEMP values to millicelsius  
+ - signal: Always notice exiting tasks  
+ - signal: Better detection of synchronous signals  
+ - misc: vexpress: Off by one in vexpress_syscfg_exec()  
+ - samples: mei: use /dev/mei0 instead of /dev/mei  
+ - debugfs: fix debugfs_rename parameter checking  
+ - tracing: uprobes: Fix typo in pr_fmt string  
+ - mips: cm: reprime error cause  
+ - MIPS: OCTEON: don't set octeon_dma_bar_type if PCI is disabled  
+ - MIPS: VDSO: Include $(ccflags-vdso) in o32,n32 .lds builds  
+ - ARM: iop32x/n2100: fix PCI IRQ mapping  
+ - ARM: tango: Improve ARCH_MULTIPLATFORM compatibility  
+ - mac80211: ensure that mgmt tx skbs have tailroom for encryption  
+ - drm/modes: Prevent division by zero htotal  
+ - drm/vmwgfx: Fix setting of dma masks  
+ - drm/vmwgfx: Return error code from vmw_execbuf_copy_fence_user  
+ - HID: debug: fix the ring buffer implementation  
+ - libceph: avoid KEEPALIVE_PENDING races in ceph_con_keeplive()  
+ - xfrm: refine validation of template and selector families  
+ - batman-adv: Avoid WARN on net_device without parent in netns  
+ - batman-adv: Force mac header to start of data on xmit  
+ - uio: Reduce return paths from uio_write()  
+ - uio: Prevent device destruction while fds are open  
+ - uio: change to use the mutex lock instead of the spin lock  
+ - uio: fix crash after the device is unregistered  
+ - uio: fix wrong return value from uio_mmap()  
+ - uio: fix possible circular locking dependency  
+ - mtd: Make sure mtd->erasewrite is valid even if the partition is of size 0  
+ - libata: Add NOLPM quirk for SAMSUNG MZ7TE512HMHP-000L1 SSD  
+ - mips: loongson64: remove unreachable(), fix loongson_poweroff().  
+ - SUNRPC: Always drop the XPRT_LOCK on XPRT_CLOSE_WAIT  
+ - HP ProBook 470 G5, LED's in Hotkeys f5, f8 and f11 without function  
+ (LP: #1811254) // Bionic update: upstream stable patchset 2019-07-23  
+ (LP: #1837664)
- ALSA: hda - Add mute LED support for HP ProBook 470 G5

* Bionic update: upstream stable patchset 2019-07-22 (LP: #1837477)
- pinctrl: meson: fix pull enable register calculation
- powerpc: Fix COFF zImage booting on old powermacs
- powerpc/mm: Fix linux page tables build with some configs
- ARM: imx: update the cpu power up timing setting on i.mx6sx
- ARM: dts: imx7d-nitrogen7: Fix the description of the Wifi clock
- Input: restore EV_ABS ABS_RESERVED
- checkstack.pl: fix for aarch64
- xfrm: Fix error return code in xfrm_output_one()
- xfrm: Fix bucket count reported to userspace
- xfrm: Fix NULL pointer dereference in xfrm_input when skb_dst_force clears
  the dst_entry.
- netfilter: seqadj: re-load tcp header pointer after possible head
  reallocation
- scsi: bnx2fc: Fix NULL dereference in error handling
- Input: omap-keypad - fix idle configuration to not block SoC idle states
- Input: synaptics - enable RMI on ThinkPad T560
- ihmvnix: Fix non-atomic memory allocation in IRQ context
- ieee802154: ca8210: fix possible u8 overflow in ca8210_rx_done
- i40e: fix mac filter delete when setting mac address
- netfilter: ipset: do not call ipset_nest_end after nla_nest_cancel
- netfilter: nat: can’t use dst_hold on noref dst
- bnx2x: Clear fip MAC when fcoe offload support is disabled
- bnx2x: Remove configured vlans as part of unload sequence.
- bnx2x: Send update-svid ramrod with retry/poll flags enabled
- scsi: target: iscsi: cxgbit: add missing spin_lock_init()
- x86, hyperv: remove PCI dependency
- drivers: net: xgene: Remove unnecessary forward declarations
- w90p910_ether: remove incorrect __init annotation
- SUNRPC: Fix a race with XPRT_CONNECTING
- qed: Fix an error code qed_ll2_start_xmit()
- net: macb: fix random memory corruption on RX with 64-bit DMA
- net: macb: fix dropped RX frames due to a race
- lan78xx: Resolve issue with changing MAC address
- vxge: ensure data0 is initialized in when fetching firmware version
  information
- mac80211: free skb fraglist before freeing the skb
- kbuild: fix false positive warning/error about missing libelf
- virtio: fix test build after uio.h change
- gpio: mvebu: only fail on missing clk if pwm is actually to be used
- Input: synaptics - enable SMBus for HP EliteBook 840 G4
- net: netxen: fix a missing check and an uninitialized use
- qmi_wwan: Fix qmap header retrieval in qminux_rx_fixup
- serial/sunsu: fix refcount leak
- scsi: zfcp: fix posting too many status read buffers leading to adapter
- shutdown
- scsi: lpfc: do not set queue->page_count to 0 if pc_sli4_params.wqpcnt is invalid
- tools: fix cross-compile var clobbering
- hwpoison, memory_hotplug: allow hwpoisoned pages to be offlined
- mm, devm_memremap_pages: mark devm_memremap_pages() EXPORT_SYMBOL_GPL
- mm, devm_memremap_pages: kill mapping "System RAM" support
- mm, hmm: use devm semantics for hmm_devmem_[add, remove]
- mm, swap: fix swapoff with KSM pages
- sunrpc: fix cache_head leak due to queued request
- powerpc: Avoid -mno-sched-epilog on GCC 4.9 and newer
- powerpc: Disable -Wbuiltin-requires-header when setjmp is used
- ftrace: Build with CPPFLAGS to get -Qunused-arguments
- kbuild: add -no-integrated-as Clang option unconditionally
- kbuild: consolidate Clang compiler flags
- Makefile: Export clang toolchain variables
- powerpc/boot: Set target when cross-compiling for clang
- raid6/ppc: Fix build for clang
- ALSA: cs46xx: Potential NULL dereference in probe
- ALSA: usb-audio: Avoid access before bLength check in build_audio_procunit()
- ALSA: usb-audio: Fix an out-of-bound read in create_composite_quirks
- dlm: fixed memory leaks after failed ls_remove_names allocation
- dlm: possible memory leak on error path in create_lkb()
- dlm: lost put_lkb on error path in receive_convert() and receive_unlock()
- dlm: memory leaks on error path in dlm_user_request()
- gfs2: Get rid of potential double-freeing in gfs2_create_inode
- b43: Fix error in cordic routine
- selinux: policydb - fix byte order and alignment issues
- scripts/kallsyms: filter arm64's __efistub_symbols
- arm64: drop linker script hack to hide __efistub_symbols
- arm64: relocatable: fix inconsistencies in linker script and options
- powerpc/tm: Set MSR[TS] just prior to recheckpoint
- 9p/net: put a lower bound on msize
- rxr: fix error completion wr_id and qp_num
- iommu/vt-d: Handle domain agaw being less than iommu agaw
- sched/fair: Fix infinite loop in update_blocked_averages() by reverting a9e7f6544b9c
- ceph: don't update importing cap's mseq when handing cap export
- genwqe: Fix size check
- intel_th: msu: Fix an off-by-one in attribute store
- power: supply: olpc_battery: correct the temperature units
- lib: fix build failure in CONFIG_DEBUG_VIRTUAL test
- drm/vc4: Set ->is_yuv to false when num_planes == 1
- bnx2x: Fix NULL pointer dereference in bnx2x_del_all_vlans() on some hw
- tools: power/acpi, revert to LD = gcc
- ARM: dts: sun8i: a83t: bananapi-m3: increase vcc-pd voltage to 3.3V
- arm64: dts: mt7622: fix no more console output on rfb1
- ihmvnic: Convert reset work item mutex to spin lock
- ixgbe: Fix race when the VF driver does a reset
- net: macb: add missing barriers when reading descriptors
- powerpc: remove old GCC version checks
- Fix failure path in alloc_pid()
- block: deactivate blk_stat timer in wbt_disable_default()
- PCI / PM: Allow runtime PM without callback functions
- leds: pwm: silently error out on EPROBE_DEFER
- Revert "powerpc/tm: Unset MSR[TS] if not recheckpointing"
- iio: dac: ad5686: fix bit shift read register
- video: fbdev: pxafb: Fix "WARNING: invalid free of devm_allocated data"
- drivers/perf: hisi: Fixup one DDRC PMU register offset
- drm/nouveau/drm/nouveau: Check rc from drm_dp_mst_topology_mgr_resume()
- drm/rockchip: psr: do not dereference encoder before it is null checked.
- CIFS: Fix adjustment of credits for MTU requests
- CIFS: Do not hide EINTR after sending network packets
- cifs: Fix potential OOB access of lock element array
- usb: cdc-acm: send ZLP for Telit 3G Intel based modems
- USB: storage: don't insert sane sense for SPC3+ when bad sense specified
- USB: storage: add quirk for SMI SM3350
- USB: Add USB_QUIRK_DELAY_CTRL_MSG quirk for Corsair K70 RGB
- slab: alien caches must not be initialized if the allocation of the alien cache failed
- mm: page mapped: don't assume compound page is huge or THP
- mm, memcg: fix reclaim deadlock with writeback
- ACPI: power: Skip duplicate power resource references in _PRx
- ACPI / PMIC: xpower: Fix TS-pin current-source handling
- i2c: dev: prevent adapter retries and timeout being set as minus value
- drm/fb-helper: Partially bring back workaround for bugs of SDL 1.2
- rbd: don't return 0 on unmap if RBD_DEV_FLAG_REMOVING is set
- ext4: make sure enough credits are reserved for dioread_nolock writes
- ext4: fix a potential fiemap/page fault deadlock w/ inline_data
- ext4: avoid kernel warning when writing the superblock to a dead device
- ext4: track writeback errors using the generic tracking infrastructure
- KVM: arm/arm64: Fix VMID alloc race by reverting to lock-less
- Btrfs: fix deadlock when using free space tree due to block group creation
- mm/usercopy.c: no check page span for stack objects
- vfio/type1: Fix unmap overflow off-by-one
- drm/amdgpu: Don't ignore rc from drm_dp_mst_topology_mgr_resume()
- ext4: fix special inode number checks in __ext4_iget()
- Btrfs: fix access to available allocation bits when starting balance
- Btrfs: use nofs context when initializing security xattrs to avoid deadlock
- tty/ldsem: Wake up readers after timed out down_write()
- can: gw: ensure DLC boundaries after CAN frame modification
- mmc: sdhci-msm: Disable CDR function on TX
- media: em28xx: Fix misplaced reset of dev->v4l::field_count
- scsi: target: iscsi: cxgbit: fix csk leak
+ - scsi: target: iscsi: cxgbit: fix csk leak
+ - arm64/kvm: consistently handle host HCR_EL2 flags
+ - arm64: Don't trap host pointer auth use to EL2
+ - ipv6: fix kernel-infoleak in ipv6_local_error()
+ - net: bridge: fix a bug on using a neighbour cache entry without checking its state
+ - packet: Do not leak dev refcounts on error exit
+ - bonding: update nest level on unlink
+ - ip: on queued skb use skb_header_pointer instead of skb_may_pull
+ - crypto: caam - fix zero-length buffer DMA mapping
+ - crypto: authencsn - Avoid twice completion call in decrypt path
+ - crypto: bcm - convert to use crypto_authenc_extractkeys()
+ - btrfs: wait on ordered extents on abort cleanup
+ - Yama: Check for pid death before checking ancestry
+ - scsi: core: Synchronize request queue PM status only on successful resume
+ - scsi: sd: Fix cache_type_store()
+ - crypto: talitos - reorder code in talitos_edesc_alloc()
+ - crypto: talitos - fix ablkcipher for CONFIG_VMAP_STACK
+ - mips: fix n32 compat_ipc_parse_version
+ - MIPS: lantiq: Fix IPI interrupt handling
+ - OF: properties: add missing of_node_put
+ - mfd: tsp6586x: Handle interrupts on suspend
+ - media: v4l: ioclt: Validate num_planes for debug messages
+ - pstore/ram: Avoid allocation and leak of platform data
+ - arm64: kaslr: ensure randomized quantities are clean to the PoC
+ - Disable MSI also when pcie-octeon.pcie_disable on
+ - omap2fb: Fix stack memory disclosure
+ - media: vivid: fix error handling of kthread_run
+ - media: vivid: set min width/height to a value > 0
+ - bpf: in __bpf_redirect_no_mac pull mac only if present
+ - LSM: Check for NULL cred-security on free
+ - media: vb2: vb2_mmap: move lock up
+ - sunrpc: handle ENOMEM in rpcb_getport_async
+ - netfilter: ebtables: account ebt_table_info to kmemcg
+ - selinux: fix GPF on invalid policy
+ - blockdev: Fix livelocks on loop device
+ - scp: allocate sctp_sockaddr_entry with kzalloc
+ - tipc: fix uninit-value in tipc_nl_compat_link_reset_stats
+ - tipc: fix uninit-value in tipc_nl_compat_bearer_enable
+ - tipc: fix uninit-value in tipc_nl_compat_link_set
+ - tipc: fix uninit-value in tipc_nl_compat_name_table_dump
+ - tipc: fix uninit-value in tipc_nl_compat_doit
+ - block/loop: Don't grab "struct file" for vfs_getattr() operation.
+ - loop: drop caches if offset or block_size are changed
+ - drm/fb-helper: Ignore the value of fb_var_screeninfo.pixclock
+ - media: vb2: be sure to unlock mutex on errors
+ - nbd: Use set_blocksize() to set device blocksize
+ - tun: publish tfile after it's fully initialized
+ - crypto: sm3 - fix undefined shift by >= width of value
+ - MIPS: BCM47XX: Setup struct device for the SoC
+ - RDMA/vmw_pvrdma: Return the correct opcode when creating WR
+ - arm64: dts: marvell: armada-ap806: reserve PSCI area
+ - ipv6: make icmp6_send() robust against null skb->dev
+ - block: use rcu_work instead of call_rcu to avoid sleep in softirq
+ - selftests: Fix test errors related to lib.mk khdr target
+ - ipv6: Consider sk_bound_dev_if when binding a socket to a v4 mapped address
+ - mlxsw: spectrum: Disable lag port TX before removing it
+ - mlxsw: spectrum_switchdev: Set PVID correctly during VLAN deletion
+ - net, skbuff: do not prefer skb allocation fails early
+ - qmi_wwan: add MTU default to qmap network interface
+ - ipv6: Take rcu_read_lock in __inet6_bind for mapped addresses
+ - net: dsa: mv88x6xxx: mv88e6390 errata
+ - gpio: pl061: Move irq_chip definition inside struct pl061
+ - platform/x86: asus-wmi: Tell the EC the OS will handle the display off
+ - hotkey
+ - e1000e: allow non-monotonic SYSTIM readings
+ - writeback: don't decrement wb->refcnt if !wb->bdi
+ - serial: set suppress_bind_attr flag only if builtn
+ - ALSA: oxfw: add support for APOGEE duet FireWire
+ - x86/mce: Fix -Wmissing-prototypes warnings
+ - MIPS: SiByte: Enable swiotlb for SWARM, LittleSur and BigSur
+ - arm64: perf: set suppress_bind_attr flag to true
+ - usb: gadget: udc: renesas_usb3: add a safety connection way for
+ - forced_b_device
+ - selinux: always allow mounting submounts
+ - rxe: IB_WR_REG_MR does not capture MR’s iova field
+ - jffs2: Fix use of uninitialized delayed_work, lockdep breakage
+ - clk: imx: make mux parent strings const
+ - pstore/ram: Do not treat empty buffers as valid
+ - powerpc/xmon: Fix invocation inside lock region
+ - powerpc/pseries/cpuidle: Fix preempt warning
+ - media: firewire: Fix app_info parameter type in avc_ca{,_app}_info
+ - media: venus: core: Set dma maximum segment size
+ - net: call sk_dst_reset when set SO_DONTROUTE
+ - scsi: target: use consistent left-aligned ASCII INQUIRY data
+ - selftests: do not macro-expand failed assertion expressions
+ - clk: imx6q: reset exclusive gates on init
+ - arm64: Fix minor issues with the dcache_by_line_op macro
+ - kconfig: fix file name and line number of warn_ignored_character()
+ - kconfig: fix memory leak when EOF is encountered in quotation
+ - mmc: atmel-mci: do not assume idle after atmi_request_end
+ - btrfs: improve error handling of btrfs_add_link
+ - tty/serial: do not free trasnmit buffer page under port lock
+ - perf intel-pt: Fix error with config term "pt=0"
+ - perf svghelper: Fix unchecked usage of strncpy()
+ - perf parse-events: Fix unchecked usage of strncpy()
+ - netfilter: ipt_CLUSTERIP: check MAC address when duplicate config is set
+ - dm crypt: use u64 instead of sector_t to store iv_offset
+ - dm kcopyd: Fix bug causing workqueue stalls
+ - tools lib sbcmd: Don't add the kernel sources to the include path
+ - dm snapshot: Fix excessive memory usage and workqueue stalls
+ - quota: Lock s_umount in exclusive mode for Q_XQUOTA{ON,OFF} quotactls.
+ - clocksource/drivers/integrator-ap: Add missing of_node_put() 
+ - ALSA: bebob: fix model-id of unit for Apogee Ensemble
+ - sysfs: Disable lockdep for driver bind/unbind files
+ - IB/usnic: Fix potential deadlock
+ - scsi: smartpqi: correct lun reset issues
+ - scsi: smartpqi: call pqi_free_interruption() in pqi_shutdown()
+ - scsi: mcraid: fix out-of-bound array accesses
+ - ocfs2: fix panic due to unrecovered local alloc
+ - mm/page-writeback.c: don't break integrity writeback on ->writepage() error
+ - mm/swaps: use nr_node_ids for avail_lists in swap_info_struct
+ - mm, proc: be more verbose about unstable VMA flags in /proc/<pid>/maps
+ - cifs: allow disabling insecure dialects in the config
+ - cifs: In Kconfig CONFIG_CIFS_POSIX needs depends on legacy (insecure cifs)
+ - PCI: dwc: Move interrupt acking into the proper callback
+ - ipmi:ssif: Fix handling of multi-part return messages
+ - net: clear skb->tstamp in bridge forwarding path
+ - netfilter: ipset: Allow matching on destination MAC address for mac and ipmac sets
+ - drm/amdkfd: fix interrupt spin lock
+ - of: overlay: add missing of_node_put() after add new node to changeset
+ - drm/atomic-helper: Complete fake_commit->flip_done potentially earlier
+ - ASoC: pcm3168a: Don't disable pcm3168a when CONFIG_PM defined
+ - efi/libstub: Disable some warnings for x86{,_64}
+ - media: uvcvideo: Refactor teardown of uvc on USB disconnect
+ - arm64: kasan: Increase stack size for KASAN_EXTRA
+ - bpf: relax verifier restriction on BPF_MOV | BPF_ALU
+ - perf vendor events intel: Fix Load_Miss_Real_Latency on SKL/SKX
+ - netfilter: ipt_CLUSTERIP: remove wrong WARN_ON_ONCE in nets exit routine
+ - netfilter: ipt_CLUSTERIP: fix deadlock in nets exit routine
+ - x86/topology: Use total_cpus for max logical packages calculation
+ - perf stat: Avoid segfaults caused by negated options
+ - perf tools: Add missing sigcqueue() prototype for systems lacking it
+ - perf tools: Add missing open_memstream() prototype for systems lacking it
+ - dm: Check for device sector overflow if CONFIG_LBDAF is not set
+ - userfaultfd: clear flag if remap event not enabled
+  
+ * Bionic update: upstream stable patchset 2019-07-19 (LP: #1837257)
+ - pinctrl: sunxi: a83t: Fix IRQ offset typo for PH11
+ - userfaultfd: check VM_MAYWRITE was set after verifying the uffd is registered
+ - arm64: dma-mapping: Fix FORCE_CONTIGUOUS buffer clearing
+ - MMC: OMAP: fix broken MMC on OMAP15XX/OMAP5910/OMAP310
+ - mmc: sdhci: fix the timeout check window for clock and reset
+ - ARM: mmp/mmp2: fix cpu_is_mmp2() on mmp2-dt
+ - dm thin: send event about thin-pool state change _after_ making it
+ - dm cache metadata: verify cache has blocks in
  blocks_are_clean_separate_dirty()
+ - tracing: Fix memory leak in set_trigger_filter()
+ - tracing: Fix memory leak of instance function hash filters
+ - powerpc/msi: Fix NULL pointer access in teardown code
+ - drm/nouveau/kms: Fix memory leak in nv50_mstm_del()
+ - drm/i915/execlists: Apply a full mb before execution for Braswell
+ - drm/amdgpu: update SMC firmware image for polaris10 variants
+ - x86/build: Fix compiler support check for CONFIG_RETPOLINE
+ - locking: Remove smp_read_barrier_depends() from queued_spin_lock_slowpath()
+ - locking/qspinlock: Ensure node is initialised before updating prev->next
+ - locking/qspinlock: Bound spinning on pending->locked transition in slowpath
+ - locking/qspinlock: Merge 'struct __qspinlock' into 'struct qspinlock'
+ - locking/qspinlock: Remove unbounded cmpxchg() loop from locking slowpath
+ - locking/qspinlock: Remove duplicate clear_pending() function from PV code
+ - locking/qspinlock: Kill cmpxchg() loop when claiming lock from head of queue
+ - locking/qspinlock: Re-order code
+ - locking/qspinlock/x86: Increase _Q_PENDING_LOOPS upper bound
+ - locking/qspinlock, x86: Provide liveness guarantee
+ - mac80211: don't WARN on bad WMM parameters from buggy APs
+ - mac80211: Fix condition validating WMM IE
+ - IB/hfi1: Remove race conditions in user_sdma send path
+ - locking/qspinlock: Fix build for anonymous union in older GCC compilers
+ - mac80211_hwsim: fix module init error paths for netlink
+ - Input: hyper-v - fix wakeup from suspend-to-idle
+ - scsi: libiscsi: Fix NULL pointer dereference in iscsi_eh_session_reset
+ - scsi: vmw_pscsi: Rearrange code to avoid multiple calls to free_irq during
  unload
+ - x86/earlyprintk/efi: Fix infinite loop on some screen widths
+ - drm/msm: Grab a vblank reference when waiting for commit_done
+ - ARC: io.h: Implement reads{x}()/writes{x}()
+ - bonding: fix 802.3ad state sent to partner when unbinding slave
+ - bpf: Fix verifier log string check for bad alignment.
+ - nfs: don't dirty kernel pages read by direct-io
+ - SUNRPC: Fix a potential race in xprt_connect()
+ - sbus: char: add_of_node_put()
+ - drivers/sbus/char: add_of_node_put()
+ - drivers/tty: add missing of_node_put()
+ - ide: pmac: add_of_node_put()
+ - drm/msm: Fix error return checking
+ - clk: mvebu: Off by one bugs in cp110_of_clk_get()
+ - clk: mmp: Off by one in mmp_clk_add()
+ - Input: synaptics - enable SMBus for HP 15-ay000
+ - Input: omap-keypad - fix keyboard debounce configuration
+ - libata: whitelist all SAMSUNG MZ7KM* solid-state disks
+ - mv88e6060: disable hardware level MAC learning
+ - net/mlx4_en: Fix build break when CONFIG_INET is off
+ - ARM: 8814/1: mm: improve/fix ARM v7_dma_inv_range() unaligned address handling
+ - ARM: 8815/1: V7M: align v7m_dma_inv_range() with v7 counterpart
+ - ethernet: fman: fix wrong of_node_put() in probe function
+ - drm/ast: Fix connector leak during driver unload
+ - vhost/vsock: fix reset orphans race with close timeout
+ - mlxsw: spectrum_switchdev: Fix VLAN device deletion via ioctl
+ - i2c: axx1a: properly handle master timeout
+ - i2c: scmi: Fix probe error on devices with an empty SMB0001 ACPI device node
+ - i2c: uniphi: fix violation of tLOW requirement for Fast-mode
+ - i2c: uniphier-f: fix violation of tLOW requirement for Fast-mode
+ - nvme-rdma: fix response use after free
+ - rtc: snvs: Add timeouts to avoid kernel lockups
+ - bpf, arm: fix emit_ldx_r and emit_mov_i using TMP_REG_1
+ - scsi: raid_attrs: fix unused variable warning
+ - staging: olpc_dcon: add a missing dependency
+ - ARM: dts: qcom-apq8064-arrow-sd-600eval fix graph_endpoint warning
+ - mmc: core: use mrq->sbc when sending CMD23 for RPMB
+ - dm: call blk_queue_split() to impose device limits onbios
+ - media: vb2: don't call __vb2_queue_cancel if vb2_start_streaming failed
+ - powerpc: Look for "stdout-path" when setting up legacy consoles
+ - dm zoned: Fix target BIO completion handling
+ - ASoC: sta32x: set ->component pointer in private struct
+ - perf record: Synthesize features before events in pipe mode
+ - USB: hso: Fix OOB memory access in hso_probe/hso_get_config_data
+ - xhci: Don't prevent USB2 bus suspend in state check intended for USB3 only
+ - USB: xhci: fix 'broken_suspend' placement in struct xchip_hcd
+ - USB: serial: option: add GosunCn ZTE WeLink ME3630
+ - USB: serial: option: add HP It4132
+ - USB: serial: option: add Simcom SIM7500/SIM7600 (MBIM mode)
+ - USB: serial: option: add Fibocom NL668 series
+ - USB: serial: option: add Telit LN940 series
+ - scsi: sd: use mempool for discard special page
+ - mmc: core: Reset HPI enabled state during re-init and in case of errors
+ - mmc: core: Allow BKOPS and CACHE ctrl even if no HPI support
+ - mmc: core: Use a minimum 1600ms timeout when enabling CACHE ctrl
+ - mmc: omap_hsmmc: fix DMA API warning
+ - gpio: max7301: fix driver for use with CONFIG_VMAP_STACK
+ - gpiolib-aci: Only defer request_irq for GpioInt ACPI event handlers
+ - posix-timers: Fix division by zero bug
+ - kvm: x86: Add AMD's EX_CFG to the list of ignored MSRs
+ - Drivers: hv: vmbus: Return -EINVAL for the sys files for unopened channels
+ - x86/mtttr: Don't copy uninitialized gentry fields back to userspace
+ - panic: avoid deadlocks in re-entrant console drivers
+ - iwltwifi: mvm: don't send GEO_TX_POWER_LIMIT to old firmwares
+ - iwlwifi: add new cards for 9560, 9462, 9461 and killer series
+ - ubifs: Handle re-linking of inodes correctly while recovery
+ - mm: don't miss the last page because of round-off error
+ - proc/sysctl: don't return ENOMEM on lookup when a table is unregistering
+ - i2c: rcar: check bus state before reinitializing
+ - drm/amd/display: Fix 6x4K displays light-up on Vega20 (v2)
+ - drm/msm: Fix task dump in gpu recovery
+ - drm/msm: fix handling of cmdstream offset
+ - net: aquantia: fix rx checksum offload bits
+ - liquidio: read sc->iq_no before release sc
+ - drm/msm/hdmi: Enable HPD after HDMI IRQ is set up
+ - macvlan: return correct error value
+ - bpf: check pending signals while verifying programs
+ - ARM: 8816/1: dma-mapping: fix potential uninitialized return
+ - tools/testing/nvdimm: Align test resources to 128M
+ - Btrfs: fix missing delayed iputs on unmount
+ - ax25: fix a use-after-free in ax25_fillin_cb()
+ - gro_cell: add napi_disable in gro_cells_destroy
+ - ibmveth: fix DMA unmap error in ibmveth_xmit_start error path
+ - ieee802154; lowpan_header_create check must check daddr
+ - ipv6: explicitly initialize udp6_addr in udp_sock_create6()
+ - ipv6: tunnels: fix two use-after-free
+ - isdn: fix kernel-infodek in capi_unlocked_ioctl
+ - net: machr: restart tx after tx used bit read
+ - net: phy: Fix the issue that netif always links up after resuming
+ - netrom: fix locking in nr_find_socket()
+ - net/wan: fix a double free in x25_asy_open_tty()
+ - packet: validate address length
+ - packet: validate address length if non-zero
+ - ptr_ring: wrap back ->producer in __ptr_ring_swap_queue()
+ - qmi_wwan: Added support for Telit LN940 series
+ - scpt: initialize sin6_flowinfo for ipv6 addr in scpt inet6addr_event
+ - tcp: fix a race in inet_diag_dump_icsk()
+ - tipc: fix a double kfree_skb()
+ - vhost: make sure used idx is seen before log in vhost_add_used_n()n
+ - VSOCK: Send reset control packet when socket is partially bound
+ - xen/netfront: tolerate frags with no data
+ - net/mlx5: Typo fix in del_sw_hw_rule
+ - net/mlx5e: RX, Fix wrong early return in receive queue poll
+ - mlxsw: core: Increase timeout during firmware flash process
+ - net/mlx5e: Remove the false indication of software timestamping support
+ - tipc: use lock_sock() in tipc_sk_reinit()
+ - tipc: compare remote and local protocols in tipc_udp_enable()
+ - qmi_wwan: Added support for Fibocom NL668 series
+ - qmi_wwan: Add support for Fibocom NL678 series
+ - net/smc: fix TCP fallback socket release
+ - sock: Make sock->sk_stamp thread-safe
+ - IB/hfi1: Incorrect sizing of sge for PIO will OOPs
+ mtd: atmel-quadspi: disallow building on ebsa110
+ ALSA: hda: add mute LED support for HP EliteBook 840 G4
+ ALSA: fireface: fix for state to fetch PCM frames
+ ALSA: firewire-lib: fix wrong handling payload_length as payload_quadlet
+ ALSA: firewire-lib: fix wrong assignment for 'out_packet_without_header'
+ tracepoint
+ ALSA: firewire-lib: use the same print format for 'without_header'
+ tracepoints
+ ALSA: hda/tegra: clear pending irq handlers
+ USB: serial: pl2303: add ids for Hewlett-Packard HP POS pole displays
+ USB: serial: option: add Fibocom NL678 series
+ usb: r8a66597: Fix a possible concurrency use-after-free bug in
  r8a66597_endpoint_disable()
+ staging: wile1000: fix missing read_write setting when reading data
+ qmi_wwan: apply SET_DTR quirk to the SIMCOM shared device ID
+ s390/pci: fix sleeping in atomic during hotplug
+ x86/speculation/l1tf: Drop the swap storage limit restriction when l1tf=off
+ KVM: x86: Use jmp to invoke kvm_spurious_fault() from .fixup
+ KVM: nVMX: Free the VMREAD/VMWRITE bitmaps if alloc_kvm_area() fails
+ platform-msi: Free descriptors in platform_msi_domain_free()
+ perf pmu: Suppress potential format-truncation warning
+ ext4: add ext4_sb_bread() to disambiguate ENOMEM cases
+ ext4: fix possible use after free in ext4_quota_enable
+ ext4: missing unlock/put_page() in ext4_try_to_write_inline_data()
+ ext4: fix EXT4_IOC_GROUP_ADD ioctl
+ ext4: include terminating u32 in size of xattr entries when expanding inodes
+ ext4: force inode writes when nfsd calls commit_metadata()
+ ext4: check for shutdown and r/o file system in ext4_write_inode()
+ spi: bcm2835: Fix race on DMA termination
+ spi: bcm2835: Fix book-keeping of DMA termination
+ spi: bcm2835: Avoid finishing transfer prematurely in IRQ mode
+ clk: rockchip: fix typo in rk3188 spdif_frac parent
+ crypto: cavium/nitrox - fix a DMA pool free failure
+ cgroup: fix CSS_TASK_ITER_PROCS
+ cdc-acm: Fix abnormal DATA RX issue for Mediatek Preloader.
+ Btrfs: fix fsync of files with multiple hard links in new directories
+ f2fs: fix validation of the block count in sanity_check_raw_super
+ serial: uartps: Fix interrupt mask issue to handle the RX interrupts
  properly
+ media: vivid: free bitmap_cap when updating std/timings/etc.
+ media: v4l2-tpg: array index could become negative
+ MIPS: math-emu: Write-protect delay slot emulation pages
+ MIPS: c-r4k: Add r4k_blast_scach_node for Loongson-3
+ MIPS: Ensure pmd_present() returns false after pmd_mknotpresent()
+ MIPS: Align kernel load address to 64KB
+ MIPS: Expand MIPS32 ASIDs to 64 bits
+ MIPS: OCTEON: mark RGMII interface disabled on OCTEON III
+ CIFS: Fix error mapping for SMB2_LOCK command which caused OFD lock problem
- arm64: KVM: Avoid setting the upper 32 bits of VTCR_EL2 to 1
- arm/arm64: KVM: vgc: Force VM halt when changing the active state of GICv3
- PPIs/SGIs
- rtc: m41t80: Correct alarm month range with RTC reads
- tpm: tpm_i2c_nuvoton: use correct command duration for TPM 2.x
- spi: bcm2835: Unbreak the build of esoteric configs
- MIPS: Only include mmzone.h when CONFIG_NEED_MULTIPLE_NODES=y
- KVM: X86: Fix NULL deref in vcpu_scan_ioapic
- futex: Cure exit race
- x86/mm: Fix decoy address handling vs 32-bit builds
- x86/intel_rdt: Ensure a CPU remains online for the region's pseudo-locking sequence
- mm: add mm_pxd_folded checks to pgttable_bytes accounting functions
- mm: make the __PAGETABLE_PxD_FOLDED defines non-empty
- mm: introduce mm_[p4d|pud|pmd]_folded
- ip: validate header length on virtual device xmit
- net: clear skb->tstamp in forwarding paths
- net/hamradio/6pack: use mod_timer() to rearm timers
- tipc: check tsk->group in tipc_wait_for_cond()
- tipc: check group dests after tipc_wait_for_cond()
- ipv6: frags: Fix bogus skb->sk in reassembled packets
- ALSA: hda/realtek: Enable audio jacks of ASUS UX391UA with ALC294
- ALSA: hda/realtek: Enable the headset mic auto detection for ASUS laptops
- ASoC: intel: cht_bsw_max98090_ti: Add pmc_plt_clk_0 quirk for Chromebook Clapper
- ASoC: intel: cht_bsw_max98090_ti: Add pmc_plt_clk_0 quirk for Chromebook Gnawty
- Input: elan_i2c - add ACPI ID for touchpad in ASUS Aspire F5-573G
- arm64: KVM: Make VHE Stage-2 TLB invalidation operations non-interruptible
- DRM: UDL: get rid of useless vblank initialization
- clocksoure/drivers/arc_timer: Utilize generic sched_clock
- oclxl: Fix endiannes bug in oclxl_link_update_pe()
- oclxl: Fix endiannes bug in read_afu_name()
- ext4: add verifier check for symlink with append/immutable flags
- ext4: avoid declaring fs inconsistent due to invalid file handles
- clk: sunxi-ng: Use u64 for calculation of NM rate
- crypto: testmgr - add AES-CFB tests
- btrfs: dev-replace: go back to suspended state if target device is missing
- btrfs: run delayed items before dropping the snapshot
- powerpc/tm: Unset MSR[TS] if not recheckpointing
- f2fs: read page index before freeing
- f2fs: sanity check of xattr entry size
- media: cce: keep track of outstanding transmits
- media: imx274: fix stack corruption in imx274_read_reg
- media: vb2: check memory model for VIDIOC_CREATE_BUFS
- MIPS: Fix a R10000_LLSC_WAR logic in atomic.h
- KVM: arm/arm64: vgic: Do not cond_resched_lock() with IRQs disabled
- KVM: arm/arm64: vgic: Cap SPIs to the VM-defined maximum
+ * alsahda: neither mute led nor mic-mute led work on several Lenovo laptops
+ (LP: #1837963)
+ - SAUCE: ALSA: hda - Add a conexant codec entry to let mute led work
+ +-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 14 Aug 2019 11:51:40 +0200
+ +linux (4.15.0-58.64) bionic; urgency=medium
+ + * unable to handle kernel NULL pointer dereference at 00000000000000002c (IP:
+ iget5_locked+0x9e/0x1f0) (LP: #1838982)
+ + - Revert "ovl: set I_CREATING on inode being created"
+ + - Revert "new primitive: discard_new_inode()"
+ + +-- Stefan Bader <stefan.bader@canonical.com>  Tue, 06 Aug 2019 12:45:37 +0200
+ + +linux (4.15.0-57.63) bionic; urgency=medium
+ + + * CVE-2019-1125
+ + - x86/cpufeatures: Carve out CQM features retrieval
+ + - x86/cpufeatures: Combine word 11 and 12 into a new scattered features word
+ + - x86/speculation: Prepare entry code for Spectre v1 swapgs mitigations
+ + - x86/speculation: Enable Spectre v1 swapgs mitigations
+ + - x86/entry/64: Use JMP instead of JMPQ
+ + - x86/speculation/swapgs: Exclude ATOMs from speculation through SWAPGS
+ + + * Packaging resync (LP: #1786013)
+ + - update dkms package versions
+ + +-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Thu, 01 Aug 2019 12:25:25 +0200
+ + +linux (4.15.0-56.62) bionic; urgency=medium
+ + + * bionic/linux: 4.15.0-56.62 -proposed tracker (LP: #1837626)
+ + + * Packaging resync (LP: #1786013)
+ + - [Packaging] resync git-ubuntu-log
+ + - [Packaging] update helper scripts
+ + + * CVE-2019-2101
+ + - media: uvcvideo: Fix 'type' check leading to overflow
+ + + * hibmc-drm Causes Unreadable Display for Huawei amd64 Servers (LP: #1762940)
+ + - [Config] Set CONFIG_DRM_HISI_HIBMC to arm64 only
+ + - SAUCE: Make CONFIG_DRM_HISI_HIBMC depend on ARM64
+ + + * Bionic: support for Solarflare X2542 network adapter (sfc driver)
+ + (LP: #1836635)
- sfc: make mem_bar a function rather than a constant
- sfc: support VI strides other than 8k
- sfc: add Medford2 (SFC9250) PCI Device IDs
- sfc: improve PTP error reporting
- sfc: update EF10 register definitions
- sfc: populate the timer reload field
- sfc: update MCDI protocol headers
- sfc: support variable number of MAC stats
- sfc: expose FEC stats on Medford2
- sfc: expose CTPIO stats on NICs that support them
- sfc: basic MCDI mapping of 25/50/100G link speeds
- sfc: support the ethtool ksettings API properly so that 25/50/100G works
- sfc: add bits for 25/50/100G supported/advertised speeds
- sfc: remove tx and MCDI handling from NAPI budget consideration
- sfc: handle TX timestamps in the normal data path
- sfc: use main datapath for TX timestamps if available
- sfc: only enable TX timestamping if the adapter is licensed for it
- sfc: MAC TX timestamp handling on the 8000 series
- sfc: on 8000 series use TX queues for TX timestamps
- sfc: only advertise TX timestamping if we have the license for it
- sfc: simplify RX datapath timestamping
- sfc: support separate PTP and general timestamping
- sfc: support second + quarter ns time format for receive datapath
- sfc: support Medford2 frequency adjustment format
- sfc: add suffix to large constant in ptp
- sfc: mark some unexported symbols as static
- sfc: update MCDI protocol headers
- sfc: support FEC configuration through ethtool
- sfc: remove ctpio_dmabuf_start from stats
- sfc: stop the TX queue before pushing new buffers

* [18.04 FEAT] zKVM: Add hardware CPU Model - kernel part (LP: #1836153)
  - KVM: s390: add debug logging for cpu model subfunctions
  - KVM: s390: implement subfunction processor calls
  - KVM: s390: add vector enhancements facility 2 to cpumodel
  - KVM: s390: add vector BCD enhancements facility to cpumodel
  - KVM: s390: add MSA9 to cpumodel
  - KVM: s390: provide query function for instructions returning 32 byte
  - KVM: s390: add enhanced sort facility to cpu model
  - KVM: s390: add deflate conversion facility to cpu model
  - KVM: s390: enable MSA9 keywrapping functions depending on cpu model

* Intel ethernet I219 has slow RX speed (LP: #1836152)
  - SAUCE: e1000e: add workaround for possible stalled packet
  - SAUCE: e1000e: disable force K1-off feature

* Intel ethernet I219 may wrongly detect connection speed as 10Mbps
* SAUCE: e1000e: Make watchdog use delayed work
* Unhide Nvidia HDA audio controller (LP: #1836308)
* PCI: Enable NVIDIA HDA controllers
* selftests: Remove broken Power9 paste tests and fix compilation issue (LP: #1836715)
* selftests/powerpc: Remove Power9 paste tests
* selftests/powerpc: Fix Makefiles for headers_install change
* ixgbe[vf] - Physical Function gets IRQ when VF checks link state (LP: #1836760)
* Fix nf_contrack races when dealing with same origin requests in NAT environments (LP: #1836816)
* netfilter: nf_contrack: resolve clash for matching contracks
* netfilter: nf_nat: skip nat clash resolution for same-origin entries
* CVE-2018-5383
* crypto: ecdh - add public key verification test
* sched: Prevent CPU lockups when task groups take longer than the period (LP: #1836971)
* sched/fair: Limit sched_cfs_period_timer() loop to avoid hard lockup
* depmod may prefer unsigned l-r-m nvidia modules to signed modules (LP: #1834479)
* zfs/spl build in conjunction with the kernel from DKMS source (LP: #1807378)
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* Build Nvidia drivers in conjunction with kernel (LP: #1764792)
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+ - [Packaging] dkms-build -- add support for unversioned overrides
+ - [Packaging] dkms-build -- backport latest version from disco
+ - [Packaging] nvidia -- build and sign nvidia packages and ship signatures
+ - [Packaging] nvidia -- make nvidia package version explicit
+
+ * CVE-2019-13233
+ - x86/insn-eval: Fix use-after-free access to LDT entry
+
+ * kernel panic using CIFS share in smb2_push_mandatory_locks() (LP: #1795659)
+ - CIFS: keep FileInfo handle live during oplock break
+
+ * cifs set_oplock buffer overflow in strcat (LP: #1824981)
+ - cifs: fix strcat buffer overflow and reduce raciness in
+ smb21_set_oplock_level()
+
+ * CVE-2019-13272
+ - ptrace: Fix ->ptracer_cred handling for PTRACE_TRACEME
+
+ * Bionic update: upstream stable patchset 2019-07-18 (LP: #1837161)
+ - Kbuild: suppress packed-not-aligned warning for default setting only
+ - disable stringop truncation warnings for now
+ - test_hexdump: use memcmp instead of strncpy
+ - kobject: Replace strncpy with memcmp
+ - ALSA: intel_hdmi: Use strlcpy() instead of strncpy()
+ - unifdfe: use memcmp instead of strncpy
+ - kernfs: Replace strncpy with memcmp
+ - ip_tunnel: Fix name string concatenate in __ip_tunnel_create()
+ - scsi: bfa: convert to strlcpy/strlcat
+ - kdb: use memmove instead of overlapping memcmp
+ - iser: set sector for ambiguous mr status errors
+ - uprobes: Fix handle_swbp() vs. unregister() + register() race once more
+ - MIPS: ralink: Fix mt7620 nd_sd pinmux
+ - mips: fix mips_get_syscall_arg o32 check
+ - IB/mlx5: Avoid load failure due to unknown link width
+ - drm/ast: Fix incorrect free on ioregs
+ - drm: set_is_master to 0 upon drm_new_set_master() failure
+ - drm/meson: Enable fast_io in meson_dw_hdmi_regmap_config
+ - drm/meson: Fix OOB memory accesses in meson_viut_set_osd_lut()
+ - ALSA: trident: Suppress gcc string warning
+ - kgdboc: Fix restrict error
+ - kgdboc: Fix warning with module build
+ - svm: Add mutex_lock to protect apic_access_page_done on AMD systems
+ - drm/msm: fix OF child-node lookup
+ - Input: xpad - quirk all PDP Xbox One gamepads
+ - Input: synaptics - add PNP ID for ThinkPad P50 to SMBus
+ - Input: matrix_keypad - check for errors from of_get_named_gpio()
+ - Input: cros_ec_keyb - fix button/switch capability reports
+ - Input: elan_i2c - add ELAN0620 to the ACPI table
+ - Input: elan_i2c - add ACPI ID for Lenovo IdeaPad 330-15ARR
+ - Input: elan_i2c - add support for ELAN0621 touchpad
+ - btrfs: tree-checker: Don't check max block group size as current max chunk size limit is unreliable
+ - ARC: change defconfig defaults to ARCv2
+ - arc: [devboards] Add support of NFSv3 ACL
+ - reset: make device_reset_optional() really optional
+ - reset: remove remaining WARN_ON() in <linux/reset.h>
+ - mm: hide incomplete nr_indirectly_reclaimable in /proc/zoneinfo
+ - net: qed: use correct strncpy() size
+ - tipc: use destination length for copy string
+ - arm64: ftrace: Fix to enable syscall events on arm64
+ - sched, trace: Fix prev_state output in sched_switch tracepoint
+ - tracing/fgraph: Fix set_graph_function from showing interrupts
+ - drm/meson: Fixes for drm_crtc_vblank_on/off support
+ - scsi: lpfc: fix block guard enablement on SLI3 adapters
+ - media: omap3isp: Unregister media device as first
+ - iommu/vt-d: Fix NULL pointer dereference in prq_event_thread()
+ - brcmutil: really fix decoding channel info for 160 MHz bandwidth
+ - iommu/ipmmu-vmsa: Fix crash on early domain free
+ - can: rcar_can: Fix erroneous registration
+ - test_firmware: fix error return getting clobbered
+ - HID: input: Ignore battery reported by Symbol DS4308
+ - batman-adv: Fix erroneous registration
+ - net: qed: Fix PTT leak in qed_drain()
+ - net: qed: Fix reading wrong value in loop condition
+ - net/mlx4_core: Zero out lkey field in SW2HW_MPT fw command
+ - net/mlx4_core: Fix uninitialized variable compilation warning
+ - net/mlx4: Fix UBSAN warning of signed integer overflow
+ - gpio: mockup: fix indicated direction
+ - mtd: rawnand: qcom: Namespace prefix some commands
+ - mtd: spi-nor: Fix Cadence QSPI page fault kernel panic
+ - net/mlx4: Fix bitmap_weight() check
+ - net: qed: Fix QM getters to always return a valid pq
+ - net: faraday: ftmac100: remove netif_running(netdev) check before disabling interrupts
+ - iommu/vt-d: Use memunmap to free memremap
+ - flexfiles: use per-mirror specified stateid for IO
+ - ibmnic: Fix RX queue buffer cleanup
+ - team: no need to do team_notify_peers or team_mcast_rejoin when disabling port
+ - net: amd: add missing of_node_put()
+ - usb: quirk: add no-LPM quirk on SanDisk Ultra Flair device
+ - usb: appledisplay: Add 27" Apple Cinema Display
+ - USB: check usb_get_extra_descriptor for proper size
+ - ALSA: hda: Add support for AMD Stoney Ridge
+ - ALSA: pcm: Fix starvation on down_write_nonblock()
+ - ALSA: pcm: Call snd_pcm_unlink() conditionally at closing
+ - ALSA: pcm: Fix interval evaluation with openmin/max
+ - ALSA: hda/realtek - Fix speaker output regression on Thinkpad T570
+ - SUNRPC: Fix leak of krb5p encode pages
+ - dmaengine: dw: Fix FIFO size for Intel Merrifield
+ - dmaengine: cppi41: delete channel from pending list when stop channel
+ - ARM: 8806/1: kprobes: Fix false positive with FORTIFY_SOURCE
+ - xhci: Prevent U1/U2 link pm states if exit latency is too long
+ - f2fs: fix to do sanity check with block address in main area v2
+ - swiotlb: clean up reporting
+ - Staging: lustre: remove two build warnings
+ - staging: atomisp: remove "fun" strncpy warning
+ - cifs: Fix separator when building path from dentry
+ - staging: rtl8712: Fix possible buffer overrun
+ - Revert commit e9209b642f "staging: rtl8723bs: Fix indenting errors and an
  off-by-one mistake in core/rtw_mlme_ext.c"
+ - drm/amdgpu: update mc firmware image for polaris12 variants
+ - drm/amdgpu/gmc8: update MC firmware for polaris
+ - tty: serial: 8250_mtk: always resume the device in probe.
+ - kgdbsc: fix KASAN global-out-of-bounds bug in param_set_kgdbsc_var()
+ - libnvdimm, pfn: Pad pfn namespaces relative to other regions
+ - mac80211: Clear beacon_int in ieee80211_do_stop
+ - mac80211: ignore tx status for PS stations in ieee80211_tx_status_ext
+ - mac80211: fix reordering of buffered broadcast packets
+ - mac80211: ignore NullFunc frames in the duplicate detection
+ - qed: Fix rdma_info structure allocation
+ - drm/amdgpu: Add amdgpu "max bpc" connector property (v2)
+ - drivers/net/ethernet/qlogic/qed/qed_rdma.h: fix typo
+ - gpio: pxa: fix legacy non pinctrl aware builds again
+ - tc-testing: tdc.py: ignore errors when decoding stdout/stderr
+ - NFSv4: Fix a NFSv4 state manager deadlock
+ - USB: serial: console: fix reported terminal settings
+ - ALSA: usb-audio: Add SMSL D1 to quirks for native DSD support
+ - ALSA: hda/realtek: ALC286 mic and headset-mode fixups for Acer Aspire
  U27-880
+ - ALSA: hda/realtek - Add support for Acer Aspire C24-860 headset mic
+ - ALSA: hda/realtek: Fix mic issue on Acer AIO Veriton Z4660G
+ - ALSA: hda/realtek: Fix mic issue on Acer AIO Veriton Z4860G/Z6860G
+ - media: dvb-pll: don't re-validate tuner frequencies
+ - parisc: Enable -ffunction-sections for modules on 32-bit kernel
+ - Revert "x86/efi: put !E820_TYPE_RAM regions into memblock.reserved"
+ - drm/lease: Send a distinct uevent
+ - drm/msm: Move fence put to where failure occurs
+ - drm/amdgpu/gmc8: always load MC firmware in the driver
+ - drm/i915: Downgrade Gen9 Plane WM latency error
+ - x86/efi: Allocate e820 buffer before calling efi_exit_boot_service
+ - cfg80211: Fix busy loop regression in ieee80211_ie_split_ric()
+ - ipv4: ipv6: netfilter: Adjust the frag mem limit when true size changes
+ - ipv6: Check available head room in ip6_xmit() even without options
+ - neighbour: Avoid writing before skb->head in neigh_hh_output()
+ - ipv6: sr: properly initialize flowi6 prior passing to ip6_route_output
+ - net: 8139cp: fix a BUG triggered by changing mtu with network traffic
+ - net/mlx4_core: Correctly set PFC param if global pause is turned off.
+ - net/mlx4_en: Change min MTU size to ETH_MIN_MTU
+ - net: phy: don't allow __set_phy_supported to add unsupported modes
+ - net: Prevent invalid access to skb->prev in __qdisc_drop_all
+ - rtnetlink: ndo_dflt_fdb_dump() only work for ARPHRD_ETHER devices
+ - scp: kfree_rcu asoc
+ - tcp: Do not underestimate rwnd_limited
+ - tcp: fix NULL ref in tail loss probe
+ - tun: forbid iface creation with rtln ops
+ - virtio-net: keep vnet header zeroed after processing XDP
+ - ARM: OMAP2+: prm44xx: Fix section annotation on
  omap44xx_prm_enable_io_wakeup
+ - ASoC: rnd: fixup clock start checker
+ - staging: rtl8723bs: Fix the return value in case of error in
  'rtw_wx_read32()'
+ - ARM: dts: logicpd-somlv: Fix interrupt on mmc3_dat1
+ - ARM: OMAP1: ams-delta: Fix possible use of uninitialized field
+ - syss: return 'err' instead of 0 in __sysv_write_inode
+ - selftests: add script to stress-test nft packet path vs. control plane
+ - netfilter: nf_tables: fix use-after-free when deleting compat expressions
+ - hwmon (ina2xx) Fix NULL id pointer in probe()
+ - ASoC: wm_adsp: Fix dma-unsafe read of scratch registers
+ - s390/cpum Cf: Reject request for sampling in event initialization
+ - hwmon (ina2xx) Fix current value calculation
+ - ASoC: omap-abe-tw16040: Fix missing audio card caused by deferred probing
+ - ASoC: dapm: Recalculate audio map forcibly when card instantiated
+ - netfilter: xt_hashlimit: fix a possible memory leak in htable_create()
+ - hwmon: (w83795) temp4_type has writable permission
+ - perf tools: Restore proper cwd on return from mnt namespace
+ - PCI: imx6: Fix link training status detection in link up check
+ - objtool: Fix double-free in .cold detection error path
+ - objtool: Fix segfault in .cold detection with -ffunction-sections
+ - ARM: dts: at91: sama5d2: use the divided clock for SMC
+ - Btrfs: send, fix infinite loop due to directory rename dependencies
+ - RDMA/mlx5: Fix fence type for IB_WR_LOCAL_INV WR
+ - RDMA/rdmavt: Fix rvt_create_ah function signature
+ - ASoC: omap-mcbsp: Fix latency value calculation for pm_qos
+ - ASoC: omap-mcbsp: Add pm_qos handling to avoid under/overruns with CPU_IDLE
+ - ASoC: omap-dmic: Add pm_qos handling to avoid overruns with CPU_IDLE
+ - exportfs: do not read dentry after free
+ - bpf: fix check of allowed specifiers in bpf_trace_printk
+ - ipv6: call ip_vs_dst_notifier earlier than ipv6_dev_notf
+ - USB: omap_udc: use devm_request_irq()
+ - USB: omap_udc: fix crashes on probe error and module removal
+ - USB: omap_udc: fix omap_udc_start() on 15xx machines
+ - USB:omap_udc: fix USB gadget functionality on Palm Tungsten E
+ - USB: omap_udc: fix rejection of out transfers when DMA is used
+ - drm/meson: add support for 1080p25 mode
+ - netfilter: ipv6: Preserve link scope traffic original oif
+ - IB/mlx5: Fix page fault handling for MW
+ - KVM: x86: fix empty-body warnings
+ - x86/kvm/mx: fix old-style function declaration
+ - net: thunderx: fix NULL pointer dereference in nic_remove
+ - usb: gadget: u_ether: fix unsafe list iteration
+ - netfilter: nf_tables: deactivate expressions in rule replacement routine
+ - ifb: fix uninitialized variables
+ - ixgbe: recognize 1000BaseLX SFP modules as 1Gbps
+ - net: hisilicon: remove unexpected free_netdev
+ - drm/amdgpu: Add delay after enable RLC ucode
+ - drm/ast: fixed reading monitor EDID not stable issue
+ - xen: xlate_nmu: add missing header to fix 'W=1' warning
+ - Revert "xen/balloong: Mark unallocated host memory as UNUSABLE"
+ - pstore/ram: Correctly calculate usable PRZ bytes
+ - fscache, cachefiles: remove redundant variable 'cache'
+ - nvme: flush namespace scanning work just before removing namespaces
+ - ACPI/IORT: Fix iort_get_platform_device_domain() uninitialized pointer value
+ - ocfs2: fix deadlock caused by ocfs2_defrag_extent()
+ - mm/page_alloc.c: fix calculation of pgdat->nr_zones
+ - hfs: do not free node before using
+ - hfsplus: do not free node before using
+ - debugobjects: avoid recursive calls with kmemleak
+ - ocfs2: fix potential use after free
+ - printk: Add console owner and waiter logic to load balance console writes
+ - printk: Hide console waiter logic into helpers
+ - printk: Never set console_may_schedule in console_trylock()
+ - printk: Wake klogd when passing console_lock owner
+ - flexfiles: enforce per-mirror stateid only for v4 DSes
+ - staging: speakup: Replace strncpy with memcpy
+ - ALSA: fireface: fix reference to wrong register for clock configuration
+ - IB/hfi1: Fix an out-of-bounds access in get_hw_stats
+ - tcp: lack of available data can also cause TSO defer
+ - Revert "net/ibm/emac: wrong bit is used for STA control"
+ - tools: bpftool: prevent infinite loop in get_fdinfo()
+ - ASoC: sun8i-codec: fix crash on module removal
+ - ASoC: acpi: fix: continue searching when machine is ignored
+ - RDMA/bnxt_re: Fix system hang when registration with L2 driver fails
+ - RDMA/bnxt_re: Avoid accessing the device structure after it is freed
+ - RDMA/hns: Bugfix pbl configuration for rereg mr
+ - thunderbolt: Prevent root port runtime suspend during NVM upgrade
+ - netfilter: add missing error handling code for register functions
+ - netfilter: nat: fix double register in masquerade modules
+ - cachefiles: Fix an assertion failure when trying to update a failed object
+ - fscache: Fix race in fscache_op_complete() due to split atomic_sub & read
+ - pvcalls-front: fixes incorrect error handling
+ - nvme: warn when finding multi-port subsystems without multipathing enabled
+ - kernel/kcov.c: markfuncs in __sanitizer_cov_trace_pc() as notrace
+ - ALSA: hda/realtek: ALC294 mic and headset-mode fixups for ASUS X542UN
+ - ALSA: hda/realtek: Enable audio jacks of ASUS UX533FD with ALC294
+ - ALSA: hda/realtek: Enable audio jacks of ASUS UX433FN/UX333FA with ALC294
+
+ * Bionic update: upstream stable patchset 2019-07-17 (LP: #1836968)
+ - flow_dissector: do not dissect l4 ports for fragments
+ - ibmvnic: fix accelerated VLAN handling
+ - ip_tunnel: don't force DF when MTU is locked
+ - ipv6: Fix PMTU updates for UDP/raw sockets in presence of VRF
+ - net-gro: reset skb->pkt_type in napi_reuse_skb()
+ - scpt: not allow to set asoc prsctp_enable by sockopt
+ - tg3: Add PHY reset for 5717/5719/5720 in change ring and flow control paths
+ - tuntap: fix multiqueue rx
+ - net: systemport: Protect stop from timeout
+ - net: qualcomm: rmnet: Fix incorrect assignment of real_dev
+ - net: dsa: microchip: initialize mutex before use
+ - scpt: fix strchange Flags name for Stream Change Event
+ - net: phy: mdio-gpio: Fix working over slow can_sleep GPIOs
+ - scpt: not increase stream's incnt before sending addstrm_in request
+ - mlxsw: spectrum: Fix IP2ME CPU policer configuration
+ - net: smsc95xx: Fix MTU range
+ - usbnet: smsc95xx: disable carrier check while suspending
+ - inet: frags: better deal with smp races
+ - ARM: dts: r8a7791: Correct critical CPU temperature
+ - ARM: dts: r8a7793: Correct critical CPU temperature
+ - net: bcmgenet: protect stop from timeout
+ - tcp: Fix SOF_TIMESTAMPING_RX_HARDWARE to use the latest timestamp during TCP coalescing
+ - tipc: don't assume linear buffer when reading ancillary data
+ - tipc: fix link re-establish failure
+ - net/mlx5e: Claim TC hw offloads support only under a proper build config
+ - net/mlx5e: Adjust to max number of channles when re-attaching
+ - net/mlx5e: Fix selftest for small MTUs
+ - I2tp: fix a sock refcnt leak in I2tp_tunnel_register
+ - net/mlx5e: IPoIB, Reset QP after channels are closed
+ - net: dsa: mv88e6xxx: Fix clearing of stats counters
+ - net: phy: realtek: fix RTL8201F sysfs name
+ - scpt: define SCTP_SS_DEFAULT for Stream schedulers
+ - rxrpc: Fix lockup due to no error backoff after ack transmit error
+ - cifs: don't dereference smb_file_target before null check
+ - cifs: fix return value for cifs_listxattr
+ - arm64: kprobe: make page to RO mode when allocate it
+ - ixgbe: fix MAC anti-spoofing filter after VFLR
+ - reiserfs: propagate errors from fill_with_dentries() properly
+ - hfs: prevent btree data loss on root split
+ - hfsplus: prevent btree data loss on root split
+ - um: Give start_idle_thread() a return code
+ - drm/edid: Add 6 bpc quirk for BOE panel.
+ - platform/x86: intel_telemetry: report debugfs failure
+ - clk: fixed-rate: fix of_node_get-put imbalance
+ - perf symbols: Set PLT entry/header sizes properly on Sparc
+ - fs/exofs: fix potential memory leak in mount option parsing
+ - clk: samsung: exynos5420: Enable PERIS clocks for suspend
+ - apparmor: Fix uninitialized value in aa_split_fqname
+ - x86/earlyprintk: Add a force option for pciserial device
+ - platform/x86: acerhdf: Add BIOS entry for Gateway LT31 v1.3307
+ - arm64: percpu: Initialize ret in the default case
+ - s390/vdso: add missing FORCE to build targets
+ - netfilter: ipset: list/set: Decrease refcount synchronously on deletion and replace
+ - netfilter: ipset: actually allow allowable CIDR 0 in hash:net,port,net
+ - s390/mm: Fix ERROR: "__node_distance" undefined!
+ - netfilter: ipset: Correct rcu_dereference() call in ip_set_put_comment()
+ - netfilter: xt_IDLETIMER: add sysfs filename checking routine
+ - s390/qeth: fix HiperSockets sniffer
+ - hwmon: (ibmpowermv) Remove bogus __init annotations
+ - Revert "drm/exynos/decon5433: implement frame counter"
+ - clk: fixed-factor: fix of_node_get-put imbalance
+ - lib/raid6: Fix arm64 test build
+ - s390/perf: Change CPUM_CF return code in event init function
+ - sched/core: Take the hotplug lock in sched_init_smp()
+ - i40e: restore NETIF_F_GSO_IPXIP[46] to netdev features
+ - qed: Fix memory/entry leak in qed_init_sp_request()
+ - qed: Fix blocking/unlimited SPQ entries leak
+ - qed: Fix potential memory corruption
+ - net: stmmac: Fix RX packet size > 8191
+ - SUNRPC: drop pointless static qualifier in xdr_get_next_encode_buffer()
+ - ACPI / watchdog: Prefer iTCO_wdt always when WDAT table uses RTC SRAM
+ - perf machine: Add machine__is() to identify machine arch
+ - perf tools: Fix kernel_start for PTI on x86
+ - perf machine: Add nr_cpus_avail()
+ - perf machine: Workaround missing maps for x86 PTI entry trampolines
+ - perf test code-reading: Fix perf_env setup for PTI entry trampolines
+ - media: v4l: event: Add subscription to list before calling "add" operation
+ - MIPS: OCTEON: cavium_octeon_defconfig: re-enable OCTEON USB driver
+ - uio: Fix an Ooops on load
+ - usb: cdc-acm: add entry for Hiro (Conexant) modem
+ - usb: quirks: Add delay-init quirk for Corsair K70 LUX RGB
+ - misc: atmel-ssc: Fix section annotation on atmel_ssc_get_driver_data
+ ACPI / platform: Add SMB0001 HID to forbidden_id_list
+ HID: uhid: forbid UHID_CREATE under KERNEL_DS or elevated privileges
+ libceph: fall back to sendmsg for slab pages
+ drm/i915: Replace some PAGE_SIZE with I915_GTT_PAGE_SIZE
+ perf unwind: Take pgoff into account when reporting elf to libdwfl
+ netfilter: bridge: define INT_MIN & INT_MAX in userspace
+ s390/decompressor: add missing FORCE to build targets
+ Revert "HID: add NOGET quirk for Eaton Ellipse MAX UPS"
+ HID: alps: allow incoming reports when only the trackstick is opened
+ s390/mm: fix mis-accounting of pgtable_bytes
+ drm/amd/display: Stop leaking planes
+ drm/amd/amdgpu/dm: Fix dm_dp_create_fake_mst_encoder()
+ ceph: quota: fix null pointer dereference in quota check
+ nvme: make sure ns head inherits underlying device limits
+ i2c: omap: Enable for ARCH_K3
+ net: aquantia: fix potential IOMMU fault after driver unbind
+ net: aquantia: fixed enable unicast on 32 macvlan
+ net: aquantia: invalid checksumm offload implementation
+ mtd: rawnand: atmel: fix OF child-node lookup
+ efi/libstub: arm: support building with clang
+ ARM: 8766/1: drop no-thumb-interwork in EABI mode
+ ARM: 8767/1: add support for building ARM kernel with clang
+ bus: arm-cci: remove unnecessary unreachable()
+ ARM: trusted_foundations: do not use naked function
+ usb: core: Fix hub port connection events lost
+ usb: dwc3: gadget: fix ISOC TRB type on unaligned transfers
+ usb: dwc3: gadget: Properly check last unaligned/zero chain TRB
+ usb: dwc3: core: Clean up ULPI device
+ xhci: Add check for invalid byte size error when UAS devices are connected.
+ ALSA: oss: Use kvzalloc() for local buffer allocations
+ MAINTAINERS: Add Sasha as a stable branch maintainer
+ mmc: sdhci-pci: Try "cd" for card-detect lookup before using NULL
+ gpio: don't free unallocated ida on gpiochip_add_data_with_key() error path
+ iwlwifi: mvm: support sta_statistics() even on older firmware
+ iwlwifi: mvm: fix regulatory domain update when the firmware starts
+ iwlwifi: mvm: don't use SAR Geo if basic SAR is not used
+ brcmfmac: fix reporting support for 160 MHz channels
+ tools/power/cpupower: fix compilation with STATIC=true
+ v9fs_dir_readdir: fix double-free on p9stat_read error
+ selinux: Add __GFP_NOWARN to allocation at str_read()
+ Input: synaptics - avoid using uninitialized variable when probing
+ bfs: add sanity check at bfs_fill_super()
+ scctp_assoc_rm_peer
+ scctp_assoc_rm_peer
+ gfs2: Don't leave s_fs_info pointing to freed memory in init_sbd
+ ilc: do not use sk_eat_skb()
+ mm: don't warn about large allocations for slab
+ mm/memory.c: recheck page table entry with page table lock held
- IB/core: Perform modify QP on real one
- usb: xhci: Prevent bus suspend if a port connect change or polling state is detected
- drm/ast: change resolution may cause screen blurred
- drm/ast: fixed cursor may disappear sometimes
- can: dev: can_get_echo_skb(): factor out non sending code to
  _can_get_echo_skb()
- can: dev: _can_get_echo_skb(): replace struct can_frame by canfd_frame to
  access frame length
- can: dev: _can_get_echo_skb(): Don't crash the kernel if can_priv::echo_skb
  is accessed out of bounds
- can: dev: _can_get_echo_skb(): print error message, if trying to echo non
  existing skb
- can: rx-offload: introduce can_rx_offload_get_echo_skb() and
  can_rx_offload_queue_sorted() functions
- can: rx-offload: rename can_rx_offload_irq_queue_err_skb() to
  can_rx_offload_queue_tail()
- can: raw: check for CAN FD capable netdev in raw_sendmsg()
- can: hi311x: Use level-triggered interrupt
- IB/hfi1: Eliminate races in the SDMA send error path
- pinctrl: meson: fix pinconf bias disable
- KVM: PPC: Move and undef TRACE_INCLUDE_PATH/FILE
- cpufreq: imx6q: add return value check for voltage scale
- rtc: pcf2127: fix a kmemleak caused in pcf2127_i2c_gather_write
- crypto: simd - correctly take reqsize of wrapped skcipher into account
- floppy: fix race condition in __floppy_read_block_0()
- powerpc/io: Fix the IO workarounds code to work with Radix
- perf/x86/intel/uncore: Add more IMC PCI IDs for KabyLake and CoffeeLake CPUs
- SUNRPC: Fix a bogus get/put in generic_key_to_expire()
- kdb: Use strscpy with destination buffer size
- powerpc/numa: Suppress "VPHN is not supported" messages
- tmpfs: make lseek(SEEK_DATA/SEEK_HOLE) return ENXIO with a negative offset
- mm, page_alloc: check for max order in hot path
- arm64: remove no-op -p linker flag
- ubi: fastmap: Check each mapping only once
- Input: xpad - add PDP device id 0x02a4
- Input: xpad - fix some coding style issues
- Input: xpad - avoid using __set_bit() for capabilities
- Input: xpad - add support for Xbox1 PDP Camo series gamepad
- iwlwifi: fix wrong WGDS_WIFI_DATA_SIZE
- kbuild: allow to use GCC toolchain not in Clang search path
- PCI: endpoint: Populate func_no before calling pci_epc_add_epf()
- i40iw: Fix memory leak in error path of create QP
- clk: samsung: exynos5250: Add missing clocks for FIMC LITE SYSMMU devices
- ARM: dts: exynos: Fix invalid node referenced by i2c20 alias in Peach Pit
  and Pi
- include/linux/pfn_t.h: force "-" to be parsed as an unary operator
- tty: wipe buffer.
+ - tty: wipe buffer if not echoing data
+ - lan78xx: Read MAC address from DT if present
+ - s390/mm: Check for valid vma before zapping in gmap_discard
+ - rcu: Make need_resched() respond to urgent RCU-QS needs
+ - net: ieee802154: fix frag reassembly
+ - EVM: Add support for portable signature format
+ - ima: re-introduce own integrity cache lock
+ - ima: re-initialize int->atomic_flags
+ - xhci: Fix leaking USB3 shared_hcd at xhci removal
+ - Documentation/security-bugs: Clarify treatment of embargoed information
+ - Documentation/security-bugs: Postpone fix publication in exceptional cases
+ - ACPI: ACPI: AML interpreter: add region addresses in global list during initialization
+ - fsnotify: generalize handling of extra event flags
+ - pinctrl: meson: fix gxbb ao pull register bits
+ - pinctrl: meson: fix gx1 ao pull register bits
+ - pinctrl: meson: fix meson8 ao pull register bits
+ - pinctrl: meson: fix meson8b ao pull register bits
+ - riscv: add missing vds_o_install target
+ - media: ov5640: fix wrong binning value in exposure calculation
+ - media: ov5640: fix auto controls values when switching to manual mode
+ - mm/huge_memory: rename freeze_page() to unmap_page()
+ - mm/huge_memory.c: reorder operations in __split_huge_page_tail()
+ - mm/huge_memory: splitting set mapping+index before unfreeze
+ - mm/huge_memory: fix lockdep complaint on 32-bit i_size_read()
+ - mm/khugepaged: collapse_shmem() stop if punched or truncated
+ - mm/khugepaged: fix crashes due to misaccounted holes
+ - mm/khugepaged: collapse_shmem() remember to clear holes
+ - mm/khugepaged: minor reorderings in collapse_shmem()
+ - mm/khugepaged: collapse_shmem() without freezing new_page
+ - mm/khugepaged: collapse_shmem() do not crash on Compound
+ - media: em28xx: Fix use-after-free when disconnecting
+ - ubi: Initialize Fastmap checkmapping correctly
+ - libceph: store ceph_auth_handshake pointer in ceph_connection
+ - libceph: factor out __prepare_write_connect()
+ - libceph: factor out __ceph_x_decrypt()
+ - libceph: factor out encrypt_authorizer()
+ - libceph: add authorizer challenge
+ - libceph: implement CEPHX_V2 calculation mode
+ - net/tls: Fixed return value when tls_complete_pending_work() fails
+ - wil6210: missing length check in wmi_set_ie
+ - btrfs: validate type when reading a chunk
+ - btrfs: Verify that every chunk has corresponding block group at mount time
+ - btrfs: tree-checker: Add checker for dir item
+ - btrfs: tree-checker: use %zu format string for size_t
+ - btrfs: tree-check: reduce stack consumption in check_dir_item
+ - btrfs: tree-checker: Verify block_group_item
+ - btrfs: tree-checker: Detect invalid and empty essential trees
+ - btrfs: Check that each block group has corresponding chunk at mount time
+ - btrfs: tree-checker: Check level for leaves and nodes
+ - btrfs: tree-checker: Fix misleading group system information
+ - f2fs: check blkaddr more accurately before issue a bio
+ - f2fs: enhance sanity_check_raw_super() to avoid potential overflow
+ - f2fs: clean up with is_valid_blkaddr()
+ - f2fs: introduce and spread verify_blkaddr
+ - f2fs: fix to do sanity check with secs_per_zone
+ - f2fs: fix to do sanity check with user_block_count
+ - f2fs: fix to do sanity check with node footer and iblocks
+ - f2fs: fix to do sanity check with block address in main area
+ - f2fs: fix to do sanity check with iextra_isize
+ - f2fs: fix to do sanity check with cp_pack_start_sum
+ - net: skb_scrub_packet(): Scrub offload_fwd_mark
+ - net: thundex: set xdp_prog to NULL if bpf_prog_add fails
+ - virtio-net: disable guest csum during XDP set
+ - virtio-net: fail XDP set if guest csum is negotiated
+ - net: thundex: set svo_hdr pointer to NULL in nicvf_free_snd_queue
+ - packet: copy user buffers before orphan or clone
+ - rapidio/ronet: do not free skb before reading its length
+ - usbnet: ipheth: fix potential recvmmsg bug and recvmmsg bug 2
+ - kvm: mmu: Fix race in emulated page table writes
+ - KVM: x86: Fix kernel info-leak in KVM_HC_CLOCKPAIRING hypercall
+ - xtensa: enable coprocessors that are being flushed
+ - xtensa: fix coprocessor context offset definitions
+ - xtensa: fix coprocessor part of ptrace_{get,set}xregs
+ - Btrfs: ensure path name is null terminated at btrfs_control_ioctl
+ - btrfs: relocation: set trans to be NULL after ending transaction
+ - PCI: layerscape: Fix wrong invocation of outbound window disable accessor
+ - arm64: dts: rockchip: Fix PCIe reset polarity for rk3399-puma-haikou.
+ - x86/fpu: Disable bottom halves while loading FPU registers
+ - perf/x86/intel: Move branch tracing setup to the Intel-specific source file
+ - perf/x86/intel: Add generic branch tracing check to intel_pmu_has_bts()
+ - fs: fix lost error code in dio_complete
+ - ALSA: wss: Fix invalid snd_free_pages() at error path
+ - ALSA: ac97: Fix incorrect bit shift at AC97-SPSA control write
+ - ALSA: control: Fix race between adding and removing a user element
+ - ALSA: sparc: Fix invalid snd_free_pages() at error path
+ - ALSA: hda/realtek - Support ALC300
+ - ALSA: hda/realtek - fix headset mic detection for MSI MS-B171
+ - ext2: fix potential use after free
+ - ARM: dts: rockchip: Remove @0 from the veyron memory node
+ - dmaengine: at_hmac: fix memory leak in at_dmac_xlate()
+ - dmaengine: at_hmac: fix module unloading
+ - staging: vchiq_arm: fix compat VCHIQ_IOC_AWAIT_COMPLETION
+ - staging: rtl8723bs: Add missing return for cfg80211_rtw_get_station
+ - usb: core: quirks: add RESET_RESUME quirk for Cherry G230 Stream series
+ - Revert "usb: dwc3: gadget: skip Set/Clear Halt when invalid"
+ - iio:st_magn: Fix enable device after trigger
+ - lib/test_kmod.c: fix rmmod double free
+ - mm: use swp_offset as key in shmem_replace_page()
+ - misc: mic/scif: fix copy-paste error in scif_create_remote_lookup
+ - binder: fix race that allows malicious free of live buffer
+ - libceph: weaken sizeof check in ceph_x_verify_authorizer_reply()
+ - libceph: check authorizer reply/challenge length before reading
+ - lfs: fix missing up_read
+ - net: don't keep lonely packets forever in the gro hash
+ - net: phy: add workaround for issue where PHY driver doesn't bind to the device
+ - KVM: nVMX/nSVM: Fix bug which sets vcpu->arch.tsc_offset to L1 tsc_offset
+ - udf: Allow mounting volumes with incorrect identification strings
+ - btrfs: Always try all copies when reading extent buffers
+ - Btrfs: fix rare chances for data loss when doing a fast fsync
+ - Btrfs: fix race between enabling quotas and subvolume creation
+ - perf/x86/intel: Disallow precise_ip on BTS events
+ - ALSA: hda: Add ASRock H81M-HDS to the power_save blacklist
+ - ALSA: hda: Add ASRock N68C-S UCC the power_save blacklist
+ - function_graph: Create function_graph_enter() to consolidate architecture code
+ - ARM: function_graph: Simplify with function_graph_enter()
+ - microblaze: function_graph: Simplify with function_graph_enter()
+ - x86/function_graph: Simplify with function_graph_enter()
+ - powerpc/function_graph: Simplify with function_graph_enter()
+ - sh/function_graph: Simplify with function_graph_enter()
+ - sparc/function_graph: Simplify with function_graph_enter()
+ - parisc: function_graph: Simplify with function_graph_enter()
+ - s390/function_graph: Simplify with function_graph_enter()
+ - arm64: function_graph: Simplify with function_graph_enter()
+ - MIPS: function_graph: Simplify with function_graph_enter()
+ - function_graph: Make ftrace_push_return_trace() static
+ - function_graph: Use new curr_ret_depth to manage depth instead of curr_ret_stack
+ - function_graph: Have profiler use curr_ret_stack and not depth
+ - function_graph: Move return callback before update of curr_ret_stack
+ - function_graph: Reverse the order of pushing the ret_stack and the callback
+ - ext2: initialize opts.s_mount_opt as zero before using it
+ - ASoC: intel: cht_bsw_max98090_ti: Add quirk for boards using pmc_plt_clk_0
+ - staging: most: use format specifier "%s" in snprintf
+ - iio/hid-sensors: Fix IIO_CHAN_INFO_RAW returning wrong values for signed numbers
+ - mm: cleancache: fix corruption on missed inode invalidation
+ - Bionic update: upstream stable patchset 2019-07-17 (LP: #1836968) //
+ - namei: allow restricted O_CREAT of FIFOs and regular files
* bcache: risk of data loss on I/O errors in backing or caching devices
  (LP: #1829563)
  - bcache: add CACHE_SET_IO_DISABLE to struct cache_set flags
  - bcache: add stop_when_cache_set_failed option to backing device
  - bcache: fix inaccurate io state for detached bcache devices
  - bcache: add backing_request_endio() for bi_end_io
  - bcache: add io_disable to struct cached_dev
  - bcache: store disk name in struct cache and struct cached_dev
  - bcache: count backing device I/O error for writeback I/O
  - bcache: add wait_for_kthread_stop() in bch_allocator_thread()
  - bcache: set dc->io_disable to true in conditional_stop_bcache_device()
  - bcache: stop bcache device when backing device is offline
  - bcache: fix ioctl in flash device

* Bionic update: upstream stable patchset 2019-07-16 (LP: #1836802)
  - mtd: spi-nor: fsl-quadspi: fix read error for flash size larger than 16MB
  - spi: bcm-qspi: switch back to reading flash using smaller chunks
  - bcache: trace missed reading by cache_missed
  - bcache: fix miss key refill->end in writeback
  - hwmon: (pmbus) Fix page count auto-detection.
  - jffs2: free jffs2_sb_info through jffs2_kill_sb()
  - cpufreq: conservative: Take limits changes into account properly
  - pcmcia: Implement CLKRUN protocol disabling for Ricoh bridges
  - parisc: Fix address in HPMC IVA
  - parisc: Fix map_pages() to not overwrite existing pte entries
  - parisc: Fix exported address of os_hpmc handler
  - ALSA: hda - Add quirk for ASUS G751 laptop
  - ALSA: hda - Fix headphone pin config for ASUS G751
  - ALSA: hda - Add mic quirk for the Lenovo G50-30 (17aa:3905)
  - ALSA: ca0106: Disable IZD on SB0570 DAC to fix audio pops
  - x86/xen: Fix boot loader version reported for PVH guests
  - x86/corruption-check: Fix panic in memory_corruption_check() when boot option without value is provided
  - ARM: dts: exynos: Disable pull control for MAX8997 interrupts on Origen
  - bpf: do not blindly change rlim in reuseport net selftest
  - Revert "perf tools: Fix PMU term format max value calculation"
  - xfrm: policy: use hlist rcu variants on insert
  - perf vendor events intel: Fix wrong filter_band* values for uncore events
  - sched/fair: Fix the min_vruntime update logic in dequeue_entity()
  - perf tools: Fix use of alternatives to find JDIR
  - perf cpu_map: Align cpu map synthesized events properly.
  - x86/fpu: Remove second definition of fpu in __fpu__restore_sig()
  - net: qla3xxx: Remove overflowing shift statement
  - selftests: ftrace: Add synthetic event syntax testcase
  - i2c: rear: cleanup DMA for all kinds of failure
  - locking/lockdep: Fix debug_locks off performance problem
  - ataflop: fix error handling during setup
+ - swim: fix cleanup on setup error
+ - nfp: devlink port split support for 1x100G CXP NIC
+ - s390/shyi: Fix machine name validity indication
+ - hwmon: (pwm-fan) Set fan speed to 0 on suspend
+ - lightnvm: pblk: fix two sleep-in-atomic-context bugs
+ - spi: spi-er93xx: Use dma_data_direction for er93xx_spi_dma_{finish,prepare}
+ - perf tools: Free temporary 'sys' string in read_event_files()
+ - perf tools: Cleanup trace-event-info 'data' leak
+ - perf strbuf: Match va_[add,copy] with va_end
+ - cpupower: Fix coredump on VMWare
+ - mmc: sdhci-pci-o2micro: Add quirk for O2 Micro dev 0x8620 rev 0x01
+ - iwlwifi: pcie: avoid empty free RB queue
+ - iwlwifi: mvm: clear HW_RESTART_REQUESTED when stopping the interface
+ - x86/olpc: Indicate that legacy PC XO-1 platform should not register RTC
+ - ACPI / processor: Fix the return value of acpi_processor_ids_walk()
+ - cpufreq: dt: Try freeing static OPPs only if we have added them
+ - mtd: rawnand: atmel: Fix potential NULL pointer dereference
+ - signal: Introduce COMPAT_SIGMINSTKSZ for use in compat_sys_signalstack
+ - Bluetooth: btbcm: Add entry for BCM4335C0 UART bluetooth
+ - x86: boot: Fix EFI stub alignment
+ - pinctrl: qcom: spmi-mpp: Fix err handling of pmic_mpp_set_mux
+ - brcmfmac: fix for proper support of 160MHz bandwidth
+ - net: phy: phylink: ensure the carrier is off when starting phylink
+ - block, bfq: correctly charge and reset entity service in all cases
+ - kprobes: Return error if we fail to reuse kprobe instead of BUG_ON()
+ - ACPI / LPSS: Add alternative ACPI HIDs for Cherry Trail DMA controllers
+ - pinctrl: qcom: spmi-mpp: Fix drive strength setting
+ - pinctrl: spmi-mpp: Fix pmic_mpp_config_get() to be compliant
+ - pinctrl: ssbi-gpio: Fix pm8xxx_pin_config_get() to be compliant
+ - net: dsa: mv88e6xxx: Fix writing to a PHY page.
+ - iwlwifi: mvm: fix BAR seq ctrl reporting
+ - ixgbevf: VF2VF TCP RSS
+ - ath10k: schedule hardware restart if WMI command times out
+ - thermal: da9062/61: Prevent hardware access during system suspend
+ - cgroup, netclassid: add a preemption point to write_classid
+ - scsi: esp_scsi: Track residual for PIO transfers
+ - UAPI: ndctl: Fix g++-unsupported initialisation in headers
+ - KVM: nVMX: Clear reserved bits of #DB exit qualification
+ - scsi: megaraid_sas: fix a missing-check bug
+ - RDMA/core: Do not expose unsupported counters
+ - IB/ipoib: Clear IPCB before icmp_send
+ - RDMA/bnxr: Fix recursive lock warning in debug kernel
+ - usb: host: ohci-at91: fix request of irq for optional gpio
+ - PCI: mediatek: Fix mtk_pci_find_port() endpoint/port matching logic
+ - tpm: suppress transmit cmd error logs when TPM 1.2 is disabled/deactivated
+ - Drivers: hv: vmbus: Use cpumask_var_t for on-stack cpu mask
+ - VMCI: Resource wildcard match fixed
+ - PCI / ACPI: Enable wake automatically for power managed bridges
+ - usb: gadget: udc: atmel: handle at91sam9rl PMC
+ - ext4: fix argument checking in EXT4_IOC_MOVE_EXT
+ - MD: fix invalid stored role for a disk
+ - f2fs: fix to recover inode's i_flags during POR
+ - PCI/MSI: Warn and return error if driver enables MSI/MSI-X twice
+ - coresight: etb10: Fix handling of perf mode
+ - PCI: dwc: pci-dra7xx: Enable errata i870 for both EP and RC mode
+ - crypto: caam: fix implicit casts in endianness helpers
+ - usb: chipidea: Prevent unbalanced IRQ disable
+ - driver/dma/ioat: Call del_timer_sync() without holding prep_lock
+ - uio: ensure class is registered before devices
+ - scsi: lpfc: Correct soft lockup when running mds diagnostics
+ - scsi: lpfc: Correct race with abort on completion path
+ - f2fs: report error if quota off error during umount
+ - signal: Always deliver the kernel's SIGKILL and SIGSTOP to a pid namespace
+ - init
+ - mfd: menelaus: Fix possible race condition and leak
+ - dmaengine: dma-jz4780: Return error if not probed from DT
+ - IB/rxe: fix for duplicate request processing and ack psns
+ - ALSA: hda: Check the non-cached stream buffers more explicitly
+ - cpupower: Fix AMD Family 0x17 msr_pstate size
+ - f2fs: fix to account IO correctly
+ - ARM: dts: exynos: Remove "cooling-{min|max}-level" for CPU nodes
+ - arm: dts: exynos: Add missing cooling device properties for CPUs
+ - ARM: dts: exynos: Convert exynos5250.dtsi to opp-v2 bindings
+ - ARM: dts: exynos: Mark 1 GHz CPU OPP as suspend OPP on Exynos5250
+ - xen-swiotlb: use actually allocated size on check physical continuous
+ - tpm: Restore functionality to xen vtpm driver.
+ - xen/blkfront: avoid NULL blkfront_info dereference on device removal
+ - xen/balloon: Support xend-based toolstack
+ - xen: fix race in xen_qlock_wait()
+ - xen: make xen_qlock_wait() nestable
+ - xen/pvh: increase early stack size
+ - xen/pvh: don't try to unplug emulated devices
+ - libertas: don't set URB_ZERO_PACKET on IN USB transfer
+ - usbip: vude: BUG kmalloc-2048 (Not tainted): Poison overwritten
+ - usb: gadget: udc: renesas_usb3: Fix b-device mode for "workaround"
+ - iwlwifi: mvm: check return value of rs_rate_from_ucode_rate()
+ - net/ipv4: defensive cipso option parsing
+ - dmaengine: ppc4xx: fix off-by-one build failure
+ - dmaengine: stm32-dma: fix incomplete configuration in cyclic mode
+ - libnvdimm: Hold reference on parent while scheduling async init
+ - libnvdimm, region: Fail badblocks listing for inactive regions
+ - ASoC: intel: skylake: Add missing break in skl_tplg_get_token()
+ - IB/mlx5: Fix MR cache initialization
+ - jbd2: fix use after free in jbd2_log_do_checkpoint()
+ - gfs2_meta: ->mount() can get NULL dev_name
- ext4: initialize retries variable in ext4_da_write_inline_data_begin()
- ext4: fix setattr project check in fssetxattr ioctl
- ext4: propagate error from dquot_initialize() in EXT4_IOC_FSSETXATTR
- ext4: fix use-after-free race in ext4_remount()'s error path
- EDAC, amd64: Add Family 17h, models 10h-2fh support
- EDAC, {i7core, sb, skx}_edac: Fix uncorrected error counting
- EDAC, skx_edac: Fix logical channel intermediate decoding
- ARM: dts: dra7: Fix up unaligned access setting for PCIe EP
- PCI/ASPM: Fix link_state teardown on device removal
- PCI: Add Device IDs for Intel GPU "spurious interrupt" quirk
- PCI: vmd: White list for fast interrupt handlers
- signal/GenWQE: Fix sending of SIGKILL
- signal: Guard against negative signal numbers in copy_signalinfo_from_user32
- crypto: lrw - Fix out-of bounds access on counter overflow
- crypto: tcrypt - fix ghash-generic speed test
- mm: /proc/pid/smaps_rollup: fix NULL pointer deref in smaps_pte_range()
- ima: fix showing large 'violations' or 'runtime_measurements_count'
- hugetlbfs: dirty pages as they are added to pagecache
- mm/rmap: map_pte() was not handling private ZONE_DEVICE page properly
- KVM: arm64: Fix caching of host MDCR_EL2 value
- kbuild: fix kernel/bounds.c 'W=1' warning
- iio: ad5064: Fix regulator handling
- iio: adc: imx25-gcq: Fix leak of device_node in mx25_gcq_setup_cfgs()
- iio: adc: at91: fix acking DRDY irq on simple conversions
- iio: adc: at91: fix wrong channel number in triggered buffer mode
- w1: omap-hdq: fix missing bus unregister at removal
- smb3: allow stats which track session and share reconnects to be reset
- smb3: do not attempt cifs operation in smb3 query info error path
- smb3: on kerberos mount if server doesn't specify auth type use krb5
- printk: Fix panic caused by passing log_buf_len to command line
- genirq: Fix race on spurious interrupt detection
- NFSv4.1: Fix the r/wsize checking
- nfs: Fix a missed page unlock after pg_doio()
- nfsd: Fix an Oops in free_session()
- lockd: fix access beyond unterminated strings in prints
- dm iocntl: harden copy_params()'s copy_from_user() from malicious users
- dm zoned: fix metadata block ref counting
- dm zoned: fix various dmz_get_mblock() issues
- powerpc/msi: Fix compile error on mpc83xx
- MIPS: OCTEON: fix out of bounds array access on CN68XX
- iommu/arm-smmu: Ensure that page-table updates are visible before TLBI
- TC: Set DMA masks for devices
- media: v4l2-tpg: fix kernel oops when enabling HFLIP and OSD
- kgdbo: Passing ekgdbo to command line causes panic
- xen: fix xen_qlock_wait()
- xen-blkfront: fix kernel panic with negotiate_mq error path
- media: em28xx: use a default format if TRY_FMT fails
- media: tvp5150: avoid going past array on v4l2_querymenu()
- media: em28xx: fix input name for Terratec AV 350
- media: em28xx: make v4l2-compliance happier by starting sequence on zero
- media: media colorspaces*.rst: rename AdobeRGB to opRGB
- arm64: lse: remove -fcall-used-x0 flag
- rpm: smd: fix memory leak on channel create
- Cramfs: fix abad comparison when wrap-arounds occur
- ARM: dts: socfpga: Fix SDRAM node address for Arria10
- arm64: dts: stratix10: Correct System Manager register size
- soc/tegra: pmc: Fix child-node lookup
- btrfs: qgroup: Avoid calling qgroup functions if qgroup is not enabled
- btrfs: Handle owner mismatch gracefully when walking up tree
- btrfs: locking: Add extra check in btrfs_init_new_buffer() to avoid deadlock
- btrfs: fix error handling in free_log_tree
- btrfs: Enhance btrfs_trim_fs function to handle error better
- btrfs: Ensure btrfs_trim_fs can trim the whole filesystem
- btrfs: iterate all devices during trim, instead of fs_devices::alloc_list
- btrfs: don't attempt to trim devices that don't support it
- btrfs: wait on caching when putting the bg cache
- btrfs: protect space cache inode alloc with GFP_NOFS
- btrfs: reset max_extent_size on clear in a bitmap
- btrfs: make sure we create all new block groups
- Btrfs: fix warning when replaying log after fsync of a tmpfile
- Btrfs: fix wrong dentries after fsync of file that got its parent replaced
- btrfs: qgroup: Dirty all qgroups before rescan
- Btrfs: fix null pointer dereference on compressed write path error
- Btrfs: fix assertion on fsync of regular file when using no-holes feature
- btrfs: set max_extent_size properly
- btrfs: don't use ctl->free_space for max_extent_size
- btrfs: only free reserved extent if we didn't insert it
- btrfs: don't run delayed_iputs in commit
- btrfs: move the dio_sem higher up the callchain
- Btrfs: fix use-after-free during inode eviction
- Btrfs: fix use-after-free when dumping free space
- Btrfs: fix fsync after hole punching when using no-holes feature
- net: sched: Remove TCA_OPTIONS from policy
- bpf: wait for running BPF programs when updating map-in-map
- MD: fix invalid stored role for a disk - try2
- mtd: spi-nor: intel-spi: Add support for Intel Ice Lake SPI serial flash
- mtd: spi-nor: fsl-quadspi: Don't let -EINVAL on the bus
- bcache: correct dirty data statistics
- block: don't deal with discard limit in blkdev_issue_discard()
- block: make sure discard bio is aligned with logical block size
- block: make sure writesame bio is aligned with logical block size
- dma-mapping: fix panic caused by passing empty cma command line argument
- ACPI / OSL: Use 'jiffies' as the time basis for acpi_os_get_timer()
- ACPIICA: AML Parser: fix parse loop to correctly skip erroneous extended opcodes
- kprobes/x86: Use preempt_enable() in optimized_callback()
+ - mailbox: PCC: handle parse error
+ - ALSA: hda: Add 2 more models to the power_save blacklist
+ - drm: fix use of freed memory in drm_mode_setcrtc
+ - nvme: remove ns sibling before clearing path
+ - nfp: flower: fix pedit set actions for multiple partial masks
+ - nfp: flower: use offsets provided by pedit instead of index for ipv6
+ - perf report: Don’t crash on invalid inline debug information
+ - drm: Get ref on CRTC commit object when waiting for flip_done
+ - net: socionext: Reset tx queue in ndo_stop
+ - lightnvm: pblk: fix race on sysfs line state
+ - lightnvm: pblk: fix race condition on metadata I/O
+ - bcache: Populate writeback_rate_minimum attribute
+ - sdhci: acpi: add free_slot callback
+ - mtd: rawnand: denali: set SPARE_AREA_SKIP_BYTES register to 8 if unset
+ - iwlwifi: mvm: check for n_profiles validity in EWRD ACPI
+ - ACPI/PPTT: Handle architecturally unknown cache types
+ - ACPI / PM: LPIT: Register sysfs attributes based on FADT
+ - pinctrl: sunxi: fix 'pctrl->functions' allocation in
sunxi_pinctrl_build_state
+ - arm64: entry: Allow handling of undefined instructions from EL1
+ - bpf verifier: fix verifier instability
+ - gpio: brcmstb: allow 0 width GPIO banks
+ - libata: Apply NOLPM quirk for SAMSUNG MZ7TD256HAFV-000L9
+ - thermal: rcar_thermal: Prevent doing work after unbind
+ - net: stmmac: dwmac-sun8i: fix OF child-node lookup
+ - f2fs: clear PageError on the read path
+ - xprtrdma: Reset credit grant properly after a disconnect
+ - nvmem: check the return value of nvmem_add_cells()
+ - f2fs: avoid sleeping under spin_lock
+ - f2fs: fix to recover cold bit of inode block during POR
+ - OPP: Free OPP table properly on performance state irregularities
+ - IB/rxe: Revise the ib_wr_opcode enum
+ - ext4: fix EXT4_IOC_SWAP_BOOT
+ - selinux: fix mounting of cgroup2 under older policies
+ - KVM: arm/arm64: Ensure only THP is candidate for adjustment
+ - NFC: nfcmrvl_uart: fix OF child-node lookup
+ - media: ov7670: make “xclkl” clock optional
+ - powerpc/tm: Fix HFSRCR bit for no suspend case
+ - powerpc/ar64/hash: Do not use PPC_INVALIDATE_ERAT on CPUs before POWER9
+ - MIPS: memset: Fix CPU_DADDI_WORKAROUNDS ’small_fixup’ regression
+ - power: supply: twl4030-charger: fix OF sibling-node lookup
+ - ocxl: Fix access to the AFU Descriptor Data
+ - net: bcmgenet: fix OF child-node lookup
+ - media: cec: make cec_get_edid_spa_location() an inline function
+ - media: cec: integrate cec_validate_phys_addr() in cec-api.c
+ - media: adv7604: when the EDID is cleared, unconfigure CEC as well
+ - media: adv7842: when the EDID is cleared, unconfigure CEC as well
+ - drm/mediatek: fix OF sibling-node lookup
+ - media: replace ADOBERGB by OPRGB
+ - media: hdmi.h: rename ADOBE_RGB to OPRGB and ADOBE_YCC to OPYCC
+ - btrfs: fix error handling in btrfs_dev_replace_start
+ - btrfs: keep trim from interfering with transaction commits
+ - Btrfs: don't clean dirty pages during buffered writes
+ - btrfs: release metadata before running delayed refs
+ - Btrfs: fix deadlock when writing out free space caches
+ - btrfs: reset max_extent_size properly
+ - btrfs: fix insert_reserved error handling
+ - powerpe/traps: restore recoverability of machine_check interrupts
+ - powerpe/64/module: REL32 relocation range check
+ - powerpe/mm: Fix page table dump to work on Radix
+ - powerpc/eeh: Fix possible null deref in eeh_dump_dev_log()
+ - tty: check name length in tty_find_polling_driver()
+ - ARM: imx_v6_v7_defconfig: Select CONFIG_TMPFS_POSIX_ACL
+ - powerpe/nohash: fix undefined behaviour when testing page size support
+ - powerpe/mm: Don't report hugepage tables as memory leaks when using kmemleak
+ - drm/omap: fix memory barrier bug in DMM driver
+ - drm/hisilicon: hibmc: Do not carry error code in HiBMC framebuffer pointer
+ - media: pci: ex23885: handle adding to list failure
+ - media: coda: don't overwrite h.264 profile_idc on decoder instance
+ - MIPS: kexec: Mark CPU offline before disabling local IRQ
+ - powerpe/boot: Ensure _zimage_start is a weak symbol
+ - powerpe/memtrace: Remove memory in chunks
+ - MIPS/PCI: Call pcie_bus_configure_settings() to set MPS/MRRS
+ - sc16is7xx: Fix for multi-channel stall
+ - media: tvp5150: fix width alignment during set_selection()
+ - powerpe/selftests: Wait all threads to join
+ - staging/iio:ad7606: fix voltage scales
+ - 9p locks: fix glock.client_id leak in do_lock
+ - 9p: clear dangling pointers in p9stat_free
+ - ovl: fix error handling in ovl_verify_set_fh()
+ - scsi: qla2xxx: Fix incorrect port speed being set for FC adapters
+ - scsi: qla2xxx: Fix process response queue for ISP26XX and above
+ - scsi: qla2xxx: Remove stale debug trace message from tcm qla2xxx
+ - scsi: qla2xxx: shutdown chip if reset fail
+ - scsi: qla2xxx: Fix re-using LoopID when handle is in use
+ - ovl: fix recursive oi->lock in ovl_link()
+ - MIPS: Loongson-3: Fix CPU UART irq delivery problem
+ - MIPS: Loongson-3: Fix BRIDGE irq delivery problem
+ - xtensa: add NOTES section to the linker script
+ - xtensa: make sure bFLT stack is 16 byte aligned
+ - xtensa: fix boot parameters address translation
+ - um: Drop own definition of PTRACE_SYSEMUM/_SINGLESTEP
+ - clk: s2mps11: Fix matching when built as module and DT node contains compatible
+ - clk: at91: Fix division by zero in PLL recalc_rate()
+ - clk: rockchip: Fix static checker warning in rockchip_ddrcclk_get_parent call
+ - clk: mvebu: use correct bit for 98DX3236 NAND
+ - mach64: fix display corruption on big endian machines
+ - mach64: fix image corruption due to reading accelerator registers
+ - reset: hisilicon: fix potential NULL pointer dereference
+ - vhost/scsi: truncate T10 PI iov_iter to prot_bytes
+ - scsi: qla2xxx: Initialize port speed to avoid setting lower speed
+ - SCSI: fix queue cleanup race before queue initialization is done
+ - soc: ti: QMSS: Fix usage of irq_set_affinity_hint
+ - ocfs2: fix a misuse a of brelse after failing ocfs2_check_dir_entry
+ - ocfs2: free up write context when direct IO failed
+ - mm: thp: relax __GFP_THISNODE for MADV_HUGEPAGE mappings
+ - netfilter: conntrack: fix calculation of next bucket number in early_drop
+ - ARM: 8809/1: proc-v7: fix Thumb annotation of cpu_v7_hvc_switch_mm
+ - mtd: docg3: don't set conflicting BCH_CONST_PARAMS option
+ - of, numa: Validate some distance map rules
+ - x86/cpu/vmware: Do not trace vmware_sched_clock()
+ - x86/hyper-v: Enable PIT shutdown quirk
+ - termios, tty/tty_baudrate.c: fix buffer overrun
+ - arch/alpha, termios: implement BOTHER, IBSHIFT and termios2
+ - watchdog/core: Add missing prototypes for weak functions
+ - btrfs: fix pinned underflow after transaction aborted
+ - Btrfs: fix cur_offset in the error case for nocow
+ - Btrfs: fix infinite loop on inode eviction after deduplication of eof block
+ - Btrfs: fix data corruption due to cloning of eof block
+ - clockevents/drivers/i8253: Add support for PIT shutdown quirk
+ - ext4: add missing brelse() update_backups()'s error path
+ - ext4: add missing brelse() in set_flexbg_block_bitmap()'s error path
+ - ext4: add missing brelse() add_new_gdb_meta_bg()'s error path
+ - ext4: avoid potential extra brelse in setup_new_flex_group_blocks()
+ - ext4: missing !bh check in ext4_xattr_inode_write()
+ - ext4: fix possible inode leak in the retry loop of ext4_resize_fs()
+ - ext4: avoid buffer leak on shutdown in ext4_mark_iloc_dirty()
+ - ext4: avoid buffer leak in ext4_orphan_add() after prior errors
+ - ext4: fix missing cleanup if ext4_alloc_flex_bg_array() fails while resizing
+ - ext4: avoid possible double brelse() in add_new_gdb() on error path
+ - ext4: fix possible leak of sbi->s_group_desc_leak in error path
+ - ext4: fix possible leak of s_journal_flag_rwsem in error path
+ - ext4: fix buffer leak in ext4_xattr_get_block() on error path
+ - ext4: release bs.bh before re-using in ext4_xattr_block_find()
+ - ext4: fix buffer leak in ext4_xattr_move_to_block() on error path
+ - ext4: fix buffer leak in ext4_expand_extra_isize_ea() on error path
+ - ext4: fix buffer leak in __ext4_read_dirblock() on error path
+ - mount: Prevent MNT_DETACH from disconnecting locked mounts
+ - kdb: use correct pointer when 'btc' calls 'btt'
+ - kdb: print real address of pointers instead of hashed addresses
+ - sunrpc: correct the computation for page_ptr when truncating
+ - rtc: hctosys: Add missing range error reporting
+ - configfs: replace strncpy with memcpy
+ - gfs2: Put bitmap buffers in put_super
+ - lib/ubsan.c: don't mark __ubsan_handle_builtin_unreachable as noreturn
+ - hugetlbfs: fix kernel BUG at fs/hugetlbfs/node.c:444!
+ - mm/swapfile.c: use kvzalloc for swap_info_struct allocation
+ - efi/arm/libstub: Pack FDT after populating it
+ - drm/amdgpu: add missing CHIP_HAINAN in amdgpu_ucode_get_load_type
+ - drm/nouveau: Check backlight IDS are >= 0, not > 0
+ - drm/dp_mst: Check if primary mstb is null
+ - drm/i915: Restore vblank interrupts earlier
+ - drm/i915: Don't unset intel_connector->mst_port
+ - drm/i915: Skip vcpi allocation for MSTB ports that are gone
+ - drm/i915: Large page offsets for pread/pwrite
+ - drm/i915/hdmi: Add HDMI 2.0 audio clock recovery N values
+ - drm/i915: Don't oops during modeset shutdown after lpe audio deinit
+ - drm/i915: Mark pin flags as u64
+ - drm/i915/execlists: Force write serialisation into context image vs execution
+ - CONFIG_XEN_PV breaks xen_create_contiguous_region on ARM
+ - ovl: check whiteout in ovl_create_over_whiteout()
+ - nvme-loop: fix kernel oops in case of unhandled command
+ - Input: wm97xx-ts - fix exit path
+ - powerpc/Makefile: Fix PPC_BOOK3S_64 ASFLAGS
+ - tracing/kprobes: Check the probe on unloaded module correctly
+ - drm/amdgpu/powerplay: fix missing break in switch statements
+ - udf: Prevent write-unsupported filesystem to be remounted read-write
+ - serial: sh-sci: Fix could not remove dev_attr_rx_fifo_timeout
+ - zram: close udev startup race condition as default groups
+ - clk: rockchip: fix wrong mmc sample phase shift for rk3328
+ - bonding/802.3ad: fix link_failure_count tracking
+ - hwmon: (core) Fix double-free in __hwmon_device_register()
+ - perf stat: Handle different PMU names with common prefix
+ - mnt: fix __detach_mounts infinite loop
+ - NFSv4: Don't exit the state manager without clearing
+ - NFS4CLNT_MANAGER_RUNNING
+ - libata: blacklist SAMSUNG MZ7TD256HAFV-000L9 SSD
+ - drm/i915/dp: Link train Fallback on eDP only if fallback link BW can fit
+ - panel's native mode
+ - drm/i915: Fix ilk+ watermarks when disabling pipes
+ - drm/i915: Fix possible race in intel_dp_add_mst_connector()
+ - [SRU][B/B-OEM] Fix resume failure on some TPM chips (LP: #1836031)
+ - tpm: tpm_try_transmit() refactor error flow.
+ - Linux md raid-10 freezes during resync (LP: #1767992)
+ - md: fix raid10 hang issue caused by barrier
+ - hda/realtek: can't detect external mic on a Dell machine (LP: #1836755)
+ - ALSA: hda/realtek: apply ALC891 headset fixup to one Dell machine
+ + * CVE-2019-12614
+ + - powerpc/pseries/dlpar: Fix a missing check in dlpar_parse_cc_property()
+ + * x86: mm: early boot problem on i386 with KPTI enabled (LP: #1827884)
+ + - Revert "perf/core: Make sure the ring-buffer is mapped in all page-tables"
+ + - x86/mm: Clarify hardware vs. software "error_code"
+ + - x86/mm: Break out kernel address space handling
+ + - x86/mm: Break out user address space handling
+ + - x86/mm/fault: Allow stack access below %rsp
+ + * bnx2x driver causes 100% CPU load (LP: #1832082)
+ + - bnx2x: Prevent ptp_task to be rescheduled indefinitely
+ + - Sometimes touchpad detected as mouse(i2c designware fails to get adapter number) (LP: #1835150)
+ + - i2c: i2c-designware-platdrv: Cleanup setting of the adapter number
+ + - i2c: i2c-designware-platdrv: Always use a dynamic adapter number
+ + * HP EliteBook 745 G5 (Ryzen 2500U) fails to boot unless `mce=off` is set on command line (LP: #1796443)
+ + - x86/MCE/AMD: Turn off MC4_MISC thresholding on all family 0x15 models
+ + - x86/MCE/AMD: Carve out the MC4_MISC thresholding quirk
+ + - x86/MCE: Add an MCE-record filtering function
+ + - x86/MCE/AMD: Don't report L1 BTB MCA errors on some family 17h models
+ + - media: af9035: prevent buffer overflow on write
+ + - batman-adv: Avoid probe ELP information leak
+ + - batman-adv: Fix segfault when writing to throughput_override
+ + - batman-adv: Fix segfault when writing to sysfs elp_interval
+ + - batman-adv: Prevent duplicated gateway_node entry
+ + - batman-adv: Prevent duplicated nc_node entry
+ + - batman-adv: Prevent duplicated softif_vlan entry
+ + - batman-adv: Prevent duplicated global TT entry
+ + - batman-adv: Prevent duplicated tvlv handler
+ + - batman-adv: fix backbone_gw refcount on queue_work() failure
+ + - batman-adv: fix hardif_neigh refcount on queue_work() failure
+ + - clocksource/drivers/ti-32k: Add CLOCK_SOURCE_SUSPEND_NONSTOP flag for non-am43 SoCs
+ + - scsi: ibmvscsis: Fix a stringop-overflow warning
+ + - scsi: ibmvscsis: Ensure partition name is properly NUL terminated
+ + - intel_th: pci: Add Ice Lake PCH support
+ + - Input: atakbd - fix Atari keymap
+ + - Input: atakbd - fix Atari CapsLock behaviour
+ + - net: emac: fix fixed-link setup for the RTL8363SB switch
+ + - ravb: do not write 1 to reserved bits
+ - PCI: dwc: Fix scheduling while atomic issues
+ - drm: mali-dp: Call drm_crtc_vblank_reset on device init
+ - scsi: ipr: System hung while dlpar adding primary ipr adapter back
+ - scsi: sd: don't crash the host on invalid commands
+ - net/mlx4: Use cpumask_available for eq->affinity_mask
+ - clocksource/drivers/fttmr010: Fix set_next_event handler
+ - powerpc/tm: Fix userspace r13 corruption
+ - powerpc/tm: Avoid possible userspace r1 corruption on reclaim
+ - jommu/amd: Return devid as alias for ACPI HID devices
+ - ARC: build: Get rid of toolchain check
+ - ARC: build: Don't set CROSS_COMPILE in arch's Makefile
+ - HID: quirks: fix support for Apple Magic Keyboards
+ - staging: ccree: check DMA pool buf !NULL before free
+ - net/sm: fix sizeof to int comparison
+ - qed: Fix populating the invalid stag value in multi function mode.
+ - RDMA/uverbs: Fix validity check for modify QP
+ - bpf: test_maps, only support ESTABLISHED socks
+ - RDMA/bnxt_re: Fix system crash during RDMA resource initialization
+ - RISC-V: include linux/ftrace.h in asm-prototypes.h
+ - powerpc/numa: Use associativity if VPHN hcall is successful
+ - x86/boot: Fix kexec booting failure in the SEV bit detection code
+ - xfrm: Validate address prefix lengths in the xfrm selector.
+ - xfrm6: call kfree_skb when skb is too big
+ - xfrm: reset transport header back to network header after all input transforms have been applied
+ - xfrm: reset crypto_done when iterating over multiple input xfrms
+ - mac80211: Always report TX status
+ - cfg80211: reg: Init wiphy_idx in regulatory_hint_core()
+ - mac80211: fix pending queue hang due to TX_DROP
+ - cfg80211: Address some corner cases in scan result channel updating
+ - mac80211: TDLS: fix skb queue/priority assignment
+ - mac80211: fix TX status reporting for ieee80211s
+ - ARM: 8799/1: mm: fix pci_ioremap_io() offset check
+ - xfrm: validate template mode
+ - netfilter: bridge: Don't sabotage nf_hook calls from an i3mdev
+ - arm64: hugeltb: Fix handling of young ptes
+ - ARM: dts: BCM63xx: Fix incorrect interrupt specifiers
+ - net: macb: Clean 64b dma addresses if they are not detected
+ - soc: fsl: qbman: qman: avoid allocating from non existing gen_pool
+ - soc: fsl: qc: Fix copy/paste bug in ucc_get_tdm_sync_shift()
+ - mac80211_hwsim: do not omit multicast announce of first added radio
+ - Bluetooth: SMP: fix crash in unpairing
+ - pxa168fb: prepare the clock
+ - qed: Avoid implicit enum conversion in qed_set_tunn_cls_info
+ - qed: Fix mask parameter in qed_vf_prep_tunn_req_ipv
+ - qed: Avoid implicit enum conversion in qed_roce_mode_to_flavor
+ - qed: Avoid constant logical operation warning in qed_vf_pf_acquire
+ - qed: Avoid implicit enum conversion in qed_iwarp_parse_rx_pkt
+ asix: Check for supported Wake-on-LAN modes
+ ax88179_178a: Check for supported Wake-on-LAN modes
+ lan78xx: Check for supported Wake-on-LAN modes
+ sr9800: Check for supported Wake-on-LAN modes
+ r8152: Check for supported Wake-on-LAN Modes
+ smsc75xx: Check for Wake-on-LAN modes
+ smsc95xx: Check for Wake-on-LAN modes
+ cfg80211: fix use-after-free in reg_process_hint()
+ perf/core: Fix perf_pmu_unregister() locking
+ perf/ring_buffer: Prevent concurrent ring buffer access
+ perf/x86/intel/uncore: Fix PCI BDF address of M3UPI on SKX
+ perf/x86/amd/uncore: Set ThreadMask and SliceMask for L3 Cache perf events
+ net: fec: fix rare tx timeout
+ declance: Fix continuation with the adapter identification message
+ locking/ww_mutex: Fix runtime warning in the WW mutex selftest
+ be2net: don't flip hw_features when VXLANs are added/deleted
+ net: cxgb3_main: fix a missing-check bug
+ yam: fix a missing-check bug
+ ocfs2: fix crash in ocfs2_duplicate_clusters_by_page()
+ iwlwifi: mvm: check for short GI only for OFDM
+ iwlwifi: dbg: allow wrt collection before ALIVE
+ iwlwifi: fix the ALIVE notification layout
+ usbip: vhci_hcd: update 'status' file header and format
+ net/mlx5: Fix mlx5_get_vector_affinity function
+ powerpc/pseries: Add empty update_numa_cpu_lookup_table() for NUMA=n
+ dm integrity: fail early if required HMAC key is not available
+ net: phy: realtek: Use the dummy stubs for MMD register access for rtl8211b
+ net: phy: Add general dummy stubs for MMD register access
+ scsi: qla2xxx: Avoid double completion of abort command
+ kbuild: set no-integrated-as before incl. arch Makefile
+ IB/mlx5: Avoid passing an invalid QP type to firmware
+ l2tp: remove configurable payload offset
+ cifs: Use ULL suffix for 64-bit constant
+ KVM: x86: Update the exit_qualification access bits while walking an address
+ sparc64: Fix regression in pmdp_invalidate()
+ tpm: move the delay_msec increment after sleep in tpm_transmit()
+ bpf: sockmap, map_release does not hold refcnt for pinned maps
+ tpm: tpm_crb: relinquish locality on error path.
+ IB/usnic: Update with bug fixes from core code
+ mmc: dw_mmc-rockchip: correct property names in debug
+ MIPS: Workaround GCC __builtin_unreachable reordering bug
+ iio: buffer: fix the function signature to match implementation
+ selftests/powerpc: Add ptrace hw breakpoint test
+ scsi: ibmvlc: Avoid unnecessary port relogin
+ scsi: sd: Remember that READ CAPACITY(16) succeeded
+ btrfs: quota: Set rescan progress to (u64)-1 if we hit last leaf
+ net: phy: phylink: Don't release NULL GPIO
+ x86/paravirt: Fix some warning messages
+ - net: stmmac: mark PM functions as __maybe_unused
+ - kconfig: fix the rule of mainmenu_stmnt symbol
+ - libertas: call into generic suspend code before turning off power
+ - compiler.h: Allow arch-specific asm/compiler.h
+ - ARM: dts: imx53-qsb: disable 1.2GHz OPP
+ - perf python: Use -Wno-redundant-decls to build with PYTHON=python3
+ - rxrpc: Don't check RXRPC_CALL_TX_LAST after calling rxrpc_rotate_tx_window()
+ - rxrpc: Only take the rwind and mtu values from latest ACK
+ - rxrpc: Fix connection-level abort handling
+ - selftests: rtnetlink.sh explicitly requires bash.
+ - fs/fat/fatent.c: add cond_resched() to fat_count_free_clusters()
+ - mtd: spi-nor: Add support for is25wp series chips
+ - ARM: dts: r8a7790: Correct critical CPU temperature
+ - media: uvcvideo: Fix driver reference counting
+ - Revert "netfilter: ipv6: nf_defrag: drop skb dst before queueing"
+ - perf tools: Disable parallelism for 'make clean'
+ - drm/i915/gvt: fix memory leak of a cmd_entry struct on error exit path
+ - bridge: do not add port to router list when receives query with source
  0.0.0.0
+ - net: bridge: remove ipv6 zero address check in mcast queries
+ - ipv6: mcast: fix a use-after-free in inet6_mc_check
+ - ipv6/nf: Preserve IPv6 control buffer if protocol error handlers are called
+ - ilc: set SOCK_RCU_FREE in ilc_sap_add_socket()
+ - net: fec: don't dump RX FIFO register when not available
+ - net/ipv6: Fix index counter for unicast addresses in inet6_dump_addr
+ - net: sched: gred: pass the right attribute to gred_change_table_def()
+ - net: socket: fix a missing-check bug
+ - net: stmmac: Fix stmmac_mdio_reset() when building stmmac as modules
+ - net: udp: fix handling of CHECKSUM_COMPLETE packets
+ - r8169: fix NAPI handling under high load
+ - sctp: fix race on sctp_id2asoc
+ - udp6: fix encap return code for resubmitting
+ - virtio_net: avoid using netif_tx_disable() for serializing tx routine
+ - ethtool: fix a privilege escalation bug
+ - bonding: fix length of actor system
+ - ip6_tunnel: Fix encapsulation layout
+ - openvswitch: Fix push/pop ethernet validation
+ - net/mlx5: Take only bit 24-26 of wqe.pftype_wq for page fault type
+ - net: sched: Fix for duplicate class dump
+ - net: drop skb on failure in ip_check_defrag()
+ - net: fix pskb_trim_resum_slow() with odd trim offset
+ - net/mlx5e: fix csum adjustments caused by RXFCS
+ - rtnetlink:Disallow FDB configuration for non-Ethernet device
+ - net: ipmr: fix unresolved entry dumps
+ - net: bcmgenet: Poll internal PHY for GENETv5
+ - net/sched: cls_api: add missing validation of netlink attributes
+ - net/mlx5: Fix build break when CONFIG_SMP=n
- mac80211_hwsim: fix locking when iterating radios during ns exit
- rxcpc: Fix checks as to whether we should set up a new call
- rxcpc: Fix transport sockopts to get IPv4 errors on an IPv6 socket
- thunderbolt: Do not handle ICM events after domain is stopped
- thunderbolt: Initialize after IOMMUs
- RISCV: Fix end PFN for low memory
- drm/and/display: Signal hw_done() after waiting for flip_done()
- powerpc/numa: Skip onlining an offline node in kdump path
- mm/gup_benchmark: fix unsigned comparison to zero in __gup_benchmark_ioctl
- perf report: Don't try to map ip to invalid map
- perf record: Use unmapped IP for inline callchain cursors
- rxcpc: Carry call state out of locked section in rxcpc_rotate_tx_window()
- gpio: Assign gpio_irq_chip::parents to non-stack pointer
- IB/mlx5: Unmap DMA addr from HCA before IOMMU
- rds: RDS (tcp) hangs on sendto() to unresponding address
- sparc64: Export __node_distance.
- sparc64: Make corrupted user stacks more debuggable.
- sparc64: Make proc_id signed.
- sparc64: Set %14 properly on trap return after handling signals.
- sparc: Fix single-pcr perf event counter management.
- sparc: Fix syscall fallback bugs in VDSO.
- sparc: Throttle perf events properly.
- eeprom: at24: Add support for address-width property
- vfs: swap names of {do,vfs}_clone_file_range()
- bpf: fix partial copy of map_ptr when dst is scalar
- gpio: mxs: Get rid of external API call
- xfs: truncate transaction does not modify the inobt
- cachefiles: fix the race between cachefiles_bury_object() and rmdir(2)
- drm/edid: VSDB yCBCr420 Deep Color mode bit definitions
- drm: fb-helper: Reject all pixel format changing requests
- cdc-acm: do not reset notification buffer index upon urb unlinking
- cdc-acm: correct counting of UART states in serial state notification
- cdc-acm: fix race between reset and control messaging
- USB: fix the usbfs flag sanitization for control transfers
- Input: elan_i2c - add ACPI ID for Lenovo IdeaPad 330-15IGM
- sched/fair: Fix throttle_list starvation with low CFS quota
- x86/tsc: Force inlining of cyc2ns bits
- x86, hibernate: Fix nosave_regions setup for hibernation
- x86/percpu: Fix this_cpu_read()
- x86/time: Correct the attribute on jiffies' definition
- x86/fpu: Fix i486 + no387 boot crash by only saving FPU registers on context
- switch if there is an FPU
- clk: sunxi-ng: sun4i: Set VCO and PLL bias current to lowest setting
- drm/sun4i: Fix an ulong overflow in the dotclock driver
- x86/swiotlb: Enable swiotlb for > 4GiG RAM on 32-bit kernels

* Colour banding in HP Pavilion 15-n233sl integrated display (LP: #1794387) //
+ - drm/edid: Add 6 bpc quirk for BOE panel in HP Pavilion 15-n233sl
+
+ * Bionic update: upstream stable patchset 2019-07-12 (LP: #1836426)
+ - drm/amd/pp: initialize result to before or'ing in data
+ - drm/amdgpu: add another ATPX quirk for TOPAZ
+ - tools/power turbostat: fix possible sprintf buffer overflow
+ - mac80211: Run TXQ teardown code before de-registering interfaces
+ - mac80211: hwsim: require at least one channel
+ - btrfs: btrfs_shrink_device should call commit transaction at the end
+ - scsi: csio: add a check for NULL pointer after kmalloc()
+ - mac80211: correct use of IEEE80211_VHT_CAP_RXSTBC_X
+ - mac80211: hwsim: correct use of IEEE80211_VHT_CAP_RXSTBC_X
+ - gpio: adp5588: Fix sleep-in-atomic-context bug
+ - mac80211: mesh: fix HWMP sequence numbering to follow standard
+ - mac80211: avoid kernel panic when building AMSDU from non-linear SKB
+ - gpioilib: acpi: Switch to cansleep version of GPIO library call
+ - gpioilib-acpi: Register GpioInt ACPI event handlers from a late_initcall
+ - cfg80211: nl80211_update_ft_ies() to validate NL80211_ATTR_IE
+ - mac80211: do not convert to A-MSDU if frag/subframe limited
+ - mac80211: always account for A-MSDU header changes
+ - tools/kvm_stat: fix handling of invalid paths in debugfs provider
+ - gpio: Fix crash due to registration race
+ - ARC: atomics: unbock atomic_fetch_##op()
+ - md/raid5-cache: disable reshape completely
+ - RAID10 BUG_ON in raise_barrier when force is true and conf->barrier is 0
+ - i2c: unipher: issue STOP only for last message or I2C_M_STOP
+ - i2c: unipher-f: issue STOP only for last message or I2C_M_STOP
+ - net: cadence: Fix a sleep-in-atomic-context bug in mach_halt_tx()
+ - fs/cifs: don't translate SFM_SLASH (U+F026) to backslash
+ - mac80211: fix an off-by-one issue in A-MSDU max_subframe computation
+ - cfg80211: fix a type issue in ieee80211_chandef_to_operating_class()
+ - mac80211: fix a race between restart and CSA flows
+ - mac80211: Fix station bandwidth setting after channel switch
+ - mac80211: don't Tx a deauth frame if the AP forbade Tx
+ - mac80211: shorten the IBSS debug messages
+ - tools/vm/slabinfo.c: fix sign-compare warning
+ - tools/vm/page-types.c: fix "defined but not used" warning
+ - mm: madvise(MADV_DODUMP): allow hugetlbfs pages
+ - netfilter: xt_cluster: add dependency on conntrack module
+ - HID: add support for Apple Magic Keyboards
+ - usb: gadget: fotg210-udc: Fix memory leak of fotg210->ep[i]
+ - HID: hid-saitek: Add device ID for RAT 7 Contagion
+ - scsi: qed: Add the CRC size within iSCSI NVM image
+ - perf evsel: Fix potential null pointer dereference in perf_evsel__new_idx()
+ - perf util: Fix bad memory access in trace info.
+ - perf probe powerpc: Ignore SyS symbols irrespective of endianness
+ - netfilter: nf_tables: release chain in flushing set
+ - Revert "iio: temperature: maxim_thermocouple: add MAX31856 part"
+ - RDMA/ucma: check fd type in ucma_migrate_id()
+ - HID: sensor-hub: Restore fixup for Lenovo ThinkPad Helix 2 sensor hub report
+ - USB: yurex: Check for truncation in yurex_read()
+ - nvnet-rdma: fix possible bogus dereference under heavy load
+ - net/mlx5: Consider PCI domain in search for next dev
+ - drm/nouveau/TBDdevinit: don't fail when PMU/PRE_OS is missing from VBIOS
+ - drm/nouveau/disp: fix DP disable race
+ - dm raid: fix rebuild of specific devices by updating superblock
+ - fs/cifs: suppress a string overflow warning
+ - perf/x86/intel: Add support/quirk for the MISPREDICT bit on Knights Landing CPUs
+ - dm thin metadata: try to avoid ever aborting transactions
+ - arch/hexagon: fix kernel/dma.c build warning
+ - hexagon: modify ffs() and fls() to return int
+ - arm64: jump_label.h: use asm_volatile_goto macro instead of "asm goto"
+ - drm/amdgpu: fix error handling in amdgpu_cs_user_fence_chunk
+ - r8169: Clear RTL_FLAG_TASK_*_PENDING when clearing RTL_FLAG_TASK_ENABLED
+ - s390/qeth: don't dump past end of unknown HW header
+ - cifs: read overflow in is_valid_oplock_break()
+ - xen/manage: don't complain about an empty value in control/sysrq node
+ - xen: avoid crash in disable_hotplug_cpu
+ - xen: fix GCC warning and remove duplicate EVTCHN_ROW/EVTCHN_COL usage
+ - ovl: fix access beyond unterminanted strings
+ - ovl: fix memory leak on unlink of indexed file
+ - ovl: fix format of setattr debug
+ - sysfs: Do not return POSIX ACL xattrs via listxattr
+ - smb2: fix missing files in root share directory listing
+ - iommu/amd: Clear memory encryption mask from physical address
+ - crypto: qat - Fix KASAN stack-out-of-bounds bug in adf_probe()
+ - crypto: mxs-dcp - Fix wait logic on chan threads
+ - crypto: caam/jr - fix ablkcipher_edesc pointer arithmetic
+ - gpiolib: Free the last requested descriptor
+ - Drivers: hv: vmbus: Use get/put_cpu() in vmbus_connect()
+ - tools: hv: fcopy: set 'error' in case an unknown operation was requested
+ - ocsfs2: fix locking for res->tracking and dlm->tracking_list
+ - ixgbe: check return value of napi_complete_done()
+ - dm thin metadata: fix __udivdi3 undefined on 32-bit
+ - Btrfs: fix unexpected failure of nocow buffered writes after snapshotting
  when low on space
+ - scsi: aacraid: fix a signedness bug
+ - tipc: switch to rhashable iterator
+ - net: mvpv2: initialize port of_node pointer
+ - tc-testing: add test-cases for numeric and invalid control action
+ - tools/kvm_stat: fix updates for dead guests
+ - ibvnio: Include missing return code checks in reset function
+ - net/ibm/emac: wrong emac_calc_base call was used by typo
+ - ceph: avoid a use-after-free in ceph_destroy_options()
+ - afs: Fix cell specification to permit an empty address list
+ - netfilter: xt_checksum: ignore gso skbs
+ - HID: intel-ish-hid: Enable Sunrise Point-H ish driver
+ - iio: imu: st_lsm6dxx: take into account ts samples in wm configuration
+ - riscv: Do not overwrite inittab_start and inittab_end
+ - drm/nouveau: fix oops in client init failure path
+ - drm/nouveau/mmu: don't attempt to dereference vmm without valid instance
+  pointer
+ - drm/nouveau/disp/gm200::: enforce identity-mapped SOR assignment for LVDS/eDP
+  panels
+ - sched/topology: Set correct NUMA topology type
+ - drm/amdgpu: Fix SDMA hang in ptr mode v2
+ - asm-generic: io: Fix ioport_map() for !CONFIG_GENERIC_IOMAP &&
  CONFIG间接PIO
+ - x86/APM: Fix build warning when PROC_FS is not enabled
+ - new primitive: discard_new_inode()
+ - ovl: set I_CREATING on inode being created
+ - perf/core: Add sanity check to deal with pinned event failure
+ - mm: migration: fix migration of huge PMD shared pages
+ - mm, thp: fix mlocking THP page with migration enabled
+ - mm/vmstat.c: skip NR_TLB_REMOTE_FLUSH* properly
+ - KVM: x86: fix LITFs MMIO GFN calculation
+ - blk-mq: I/O and timer unplugs are inverted in blktrace
+ - clocksource/drivers/timer-atmel-pit: Properly handle error cases
+ - fdev/omapfb: fix omapfb_memory_read infoleak
+ - drm/amdgpu: Fix vce work queue was not cancelled when suspend
+ - x86/vdso: Fix asm constraints on vDSO syscall fallbacks
+ - selftests/x86: Add clock_gettime() tests to test_vdso
+ - x86/vdso: Only enable vDSO retpolines when enabled and supported
+ - x86/vdso: Fix vDSO syscall fallback asm constraint regression
+ - mac80211: fix setting IEEE80211_KEY_FLAG_RX_MGMT for AP mode keys
+ - PM / core: Clear the direct_complete flag on errors
+ - dm cache metadata: ignore hints array being too small during resize
+ - dm cache: fix resize crash if user doesn't reload cache table
+ - xhci: Add missing CAS workaround for Intel Sunrise Point xHCI
+ - usb: xhci-nmk: resume USB3 roothub first
+ - USB: serial: simple: add Motorola Tetra MTP6550 id
+ - usb: cdc_acm: Do not leak URB buffers
+ - of: unittest: Disable interrupt node tests for old world MAC systems
+ - perf annotate: Use asprintf when formatting objdump command line
+ - perf tools: Fix python extension build for gcc 8
+ - ath10k: fix use-after-free in ath10k_wmi_cmd_send_nowait
+ - ath10k: fix kernel panic issue during pci probe
+ - nvme_fc: fix ctrl create failures racing with workq items
+ - powerless/lib: fix book3s/32 boot failure due to code patching
+ - ARC: clone syscall to setp r25 as thread pointer
+ - perf utils: Move is_directory() to path.h
+  - f2fs: fix invalid memory access
+  - ucma: fix a use-after-free in ucma_resolve_ip()
+  - ubifs: Check for name being NULL while mounting
+  - rds: rds_ib_recv_alloc_cache() should call alloc_percpu_gfp() instead
+  - ath10k: fix scan crash due to incorrect length calculation
+  - pstore/ram: Fix failure-path memory leak in ramoops_init
+  - mac80211: allocate TXQs for active monitor interfaces
+  - drm: fix use-after-free read in drm_mode_create_lease_ioctl()
+  - USB: serial: option: improve Quectel EP06 detection
+  - USB: serial: option: add two-endpoints device-id flag
+  - tipc: call start and done ops directly in __tipc_nl_compat_dumpit()
+  - bnxt_en: Fix TX timeout during netpoll.
+  - bnxt_en: free hwrm resources, if driver probe fails.
+  - bonding: avoid possible dead-lock
+  - ip6_tunnel: be careful when accessing the inner header
+  - ip_tunnel: be careful when accessing the inner header
+  - ipv4: fix use-after-free in ip_msgrecv_dstaddr()
+  - ipv6: take rcu lock in rawv6_send_hdrinc()
+  - net: dsa: bcm_sf2: Call setup during switch resume
+  - net: hns: fix for unmapping problem when SMMU is on
+  - net: ipv4: update fnhe_pmtu when first hop's MTU changes
+  - net/ipv6: Display all addresses in output of /proc/net/if_inet6
+  - netlabel: check for IPV4MASK in addrinfo_get
+  - net: mvpp2: Extract the correct ethtype from the skb for tx csum ofload
+  - net: mvpp2: fix a txq_done race condition
+  - net: sched: Add policy validation for tc attributes
+  - net: systemport: Fix wake-up interrupt race during resume
+  - net/usd: cancel pending work when unbinding smsc75xx
+  - qmi_wwan: Added support for Gemalto's Cinterion ALASxx WWAN interface
+  - rtnl: limit IFLA_NUM_TX_QUEUES and IFLA_NUM_RX_QUEUES to 4096
+  - scpt: update dst pmtu with the correct daddr
+  - team: Forbid enslaving team device to itself
+  - tipc: fix flow control accounting for implicit connect
+  - udp: Unbreak modules that rely on external __skb_recv_udp() availability
+  - net: stmmac: Fixup the tail addr setting in xmit path
+  - net/packet: fix packet drop as of virtio gso
+  - net: dsa: bcm_sf2: Fix unbind ordering
+  - net/mlx5e: Set vlan masks for all offloaded TC rules
+  - net: aquantia: memory corruption on jumbo frames
+  - net/mlx5: E-Switch, Fix out of bound access when setting vport rate
+  - bonding: pass link-local packets to bonding master also.
+  - bonding: fix warning message
+  - nfp: avoid soft lockups under control message storm
+  - bnxt_en: don't try to offload VLAN 'modify' action
+  - net-ethtool: ETHTOOL_GUFO did not and should not require CAP_NET_ADMIN
+  - tcp/decp: fix lockdep issue when SYN is backlogged
+  - inet: make sure to grab rcu_read_lock before using ireq->ireq_opt
+  - ASoC: rt5514: Fix the issue of the delay volume applied again
+ - ASoC: wm8804: Add ACPI support
+ - ASoC: sigmadsp: safeload should not have lower byte limit
+ - selftests/efivarfs: add required kernel configs
+ - selftests/memory-hotplug: add required configs
+ - ASoC: rsnd: adg: care clock-frequency size
+ - ASoC: rsnd: don't fallback to PIO mode when -EPROBE_DEFER
+ - Bluetooth: hci_ldisc: Free rw_semaphore on close
+ - mfd: omap-usb-host: Fix dts probe of children
+ - scsi: iscsi: target: Don't use stack buffer for scatterlist
+ - scsi: qla2xxx: Fix an endian bug in fpcmd_is_corrupted()
+ - sound: enable interrupt after dma buffer initialization
+ - sound: don't call skl_init_chip() to reset intel skl soc
+ - stmmac: fix valid numbers of unicast filter entries
+ - net: mach: disable scatter-gather for mach on sama5d3
+ - ARM: dts: at91: add new compatibility string for mach on sama5d3
+ - PCI: hv: support reporting serial number as slot information
+ - clk: x86: add "ether_clk" alias for Bay Trail / Cherry Trail
+ - clk: x86: Stop marking clocks as CLK_IS_CRITICAL
+ - x86/kvm/apic: always disable MMIO interface in x2APIC mode
+ - drm/amdgpu: Fix SDMA HQD destroy error on gfx_v7
+ - mm/vmstat.c: fix outdated vmstat_text
+ - MIPS: VDSO: Always map near top of user memory
+ - mach64: detect the dot clock divider correctly on sparc
+ - percpu: stop leaking bitmap metadata blocks
+ - perf script python: Fix export-to-postgresql.py occasional failure
+ - perf script python: Fix export-to-sqlite.py sample columns
+ - s390/cio: Fix how vfio-ccw checks pinned pages
+ - dm cache: destroy migration_cache if cache target registration failed
+ - dm: fix report zone remapping to account for partition offset
+ - dm linear: eliminate linear_end_io call if CONFIG_DM_ZONED disabled
+ - dm linear: fix linear_end_io conditional definition
+ - cgroup: Fix dom_cgrp propagation when enabling threaded mode
+ - mm/nc: block: avoid multiblock reads for the last sector in SPI mode
+ - pinctrl: mcp23s08: fix irq and irqchip setup order
+ - arm64: perf: Reject stand-alone CHAIN events for PMUv3
+ - mm/ntp: fix call to mmu_notifier in set_pmd_migration_entry() v2
+ - mm: Preserve _PAGE_DEVMAP across mprotect() calls
+ - i2c: i2c-scmi: fix for i2c_smbus_write_block_data
+ - xhci: Don't print a warning when setting link state for disabled ports
+ - mm: introduce NR INDIRECTLY_RECLAIMABLE_BYTES
+ - mm: treat indirectly reclaimable memory as available in MemAvailable
+ - dcache: account external names as indirectly reclaimable memory
+ - mm: treat indirectly reclaimable memory as free in overcommit logic
+ - mm: don't show nr_indirectly_reclaimable in /proc/vmstat
+ - ARM: add more CPU part numbers for Cortex and Brahma B15 CPUs
+ - ARM: bugs: prepare processor bug infrastructure
+ - ARM: bugs: hook processor bug checking into SMP and suspend paths
+ - ARM: bugs: add support for per-processor bug checking
+ - [Config] updateconfigs for CPU_SPECTRE
+ - ARM: Spectre: add Kconfig symbol for CPUs vulnerable to Spectre
+ - ARM: Spectre-v2: harden branch predictor on context switches
+ - ARM: Spectre-v2: add Cortex A8 and A15 validation of the IBE bit
+ - ARM: Spectre-v2: harden user aborts in kernel space
+ - ARM: Spectre-v2: add firmware based hardening
+ - ARM: Spectre-v2: warn about incorrect context switching functions
+ - ARM: KVM: invalidate BTB on guest exit for Cortex-A12/A17
+ - ARM: KVM: invalidate icache on guest exit for Cortex-A15
+ - ARM: Spectre-v2: KVM: invalidate icache on guest exit for Brahma B15
+ - ARM: KVM: Add SMCCC_ARCH_WORKAROUND_1 fast handling
+ - ARM: KVM: report support for SMCCC_ARCH_WORKAROUND_1
+ - ARM: Spectre-v1: add speculation barrier (csdb) macros
+ - ARM: Spectre-v1: add array_index_mask_nospec() implementation
+ - ARM: Spectre-v1: fix syscall entry
+ - ARM: signal: copy registers using __copy_from_user()
+ - ARM: vfp: use __copy_from_user() when restoring VFP state
+ - ARM: oabi-compat: copy semops using __copy_from_user()
+ - ARM: use __inttype() in get_user()
+ - ARM: Spectre-v1: use get_user() for __get_user()
+ - ARM: Spectre-v1: mitigate user accesses
+ - perf tools: Fix snprintf warnings for gcc 8
+ - net: sched: cls_u32: fix hnode refcounting
+ - net: qcomm: rmnet: Skip processing loopback packets
+ - net: qcomm: rmnet: Fix incorrect allocation flag in transmit
+ - tun: remove unused parameters
+ - tun: initialize napi_mutex unconditionally
+ - tun: napi flags belong to tfile
+ - net: dsa: b53: Keep CPU port as tagged in all VLANs
+ - rnetlink: Fail dump if target netnsid is invalid
+ - net: ipv4: don't let PMTU updates increase route MTU
+ - ASoC: dapm: Fix NULL pointer deference on CODEC to CODEC DAIs
+ - selftests: android: move config up a level
+ - selftests: add headers_install to lib.mk
+ - Bluetooth: SMP: Fix trying to use non-existent local OOB data
+ - Bluetooth: Use correct tfm to generate OOB data
+ - net: ethernet: ti: add missing GENERIC_ALLOCATOR dependency
+ - afs: Fix afs_server struct leak
+ - afs: Fix clearance of reply

* Volume control not working Dell XPS 27 (7760) (LP: #1775068) // Bionic update: upstream stable patchset 2019-07-12 (LP: #1836426)
* ALSA: hda/realtek - Cannot adjust speaker's volume on Dell XPS 27 7760
* Bionic update: upstream stable patchset 2019-07-11 (LP: #1836287)
* perf tools: Fix undefined symbol snprintf in libperf-jvmti.so
* gso_segment: Reset skb->mac_len after modifying network header
* ip6: fix possible use-after-free in ip6_xmit()
+ - net/appletalk: fix minor pointer leak to userspace in SIOCFINDIPDDPRT
+ - net: hp100: fix always-true check for link up state
+ - pppoe: fix reception of frames with no mac header
+ - qmi_wwan: set DTR for modems in forced USB2 mode
+ - udp4: fix IP_CMSG_CHECKSUM for connected sockets
+ - neighbour: confirm neigh entries when ARP packet is received
+ - udp6: add missing checks on edumux packet processing
+ - net/sched: act_sample: fix NULL dereference in the data path
+ - tls: don't copy the key out of tls12_crypto_info_aes_gcm_128
+ - tls: zero the crypto information from tls_context before freeing
+ - tls: clear key material from kernel memory when do_tls_setssockopt_conf fails
+ - NFC: Fix possible memory corruption when handling SHDLC I-Frame commands
+ - NFC: Fix the number of pipes
+ - ASoC: cs4265: fix MMTLR Data switch control
+ - ASoC: rsnd: fixup not to call clk_get/set under non-atomic
+ - ALSA: bebob: fix memory leak for M-Audio FW1814 and ProjectMix I/O at error path
+ - ALSA: bebob: use address returned by kmalloc() instead of kernel stack for streaming DMA mapping
+ - ALSA: emu10k1: fix possible info leak to userspace on SNDRV_EMU10K1_IOCTL_INFO
+ - ALSA: fireface: fix memory leak in ff400_switch_fetching_mode()
+ - ALSA: firewire-digi00x: fix memory leak of private data
+ - ALSA: firewire-tascam: fix memory leak of private data
+ - ALSA: fireworks: fix memory leak of response buffer at error path
+ - ALSA: oxfw: fix memory leak for model-dependent data at error path
+ - ALSA: oxfw: fix memory leak of discovered stream formats at error path
+ - ALSA: oxfw: fix memory leak of private data
+ - platform/x86: alienware-wmi: Correct a memory leak
+ - xen/netfront: don't bug in case of too many frags
+ - xen/x86/vpmu: Zero struct pt_regs before calling into sample handling code
+ - spi: fix IDR collision on systems with both fixed and dynamic SPI bus numbers
+ - ring-buffer: Allow for rescheduling when removing pages
+ - mm: shmem.c: Correctly annotate new inodes for lockdep
+ - scsi: target: iscsi: Use bin2hex instead of a re-implementation
+ - ocsf2: fix ocsf2 read block panic
+ - drm/nouveau: Fix deadlocks in nouveau_connector_detect()
+ - drm/nouveau/drm/nouveau: Don't forget to cancel hpd_work on suspend/unload
+ - drm/nouveau/drm/nouveau: Fix bogus drm_kms_helper_poll_enable() placement
+ - drm/nouveau/drm/nouveau: Use pm_runtime_get_noresume() in connector_detect()
+ - drm/nouveau/drm/nouveau: Prevent handling ACPI HPD events too early
+ - drm/vc4: Fix the "no scaling" case on multi-planar YUV formats
+ - drm: udl: Destroy framebuffer only if it was initialized
+ - drm/amdgpu: add new polaris pci id
+ - ext4: check to make sure the rename(2)'s destination is not freed
+ - ext4: avoid divide by zero fault when deleting corrupted inline directories
+ - ext4: avoid arithmetic overflow that can trigger a BUG
+ - ext4: recreate superblock checksum after updating free blocks/indents
+ - ext4: fix online resize's handling of a too-small final block group
+ - ext4: fix online resizing for bigalloc file systems with a 1k block size
+ - ext4: don't mark mmp buffer head dirty
+ - ext4: show test_dummy_encryption mount option in /proc_mounts
+ - sched/fair: Fix vruntime_normalized() for remote non-migration wakeup
+ - PCI: aardvark: Size bridges before resources allocation
+ - vmw_balloon: include asm/io.h
+ - iw_cxb4: only allow 1 flush on user qps
+ - tick/nohz: Prevent bogus softirq pending warning
+ - spi: Fix double IDR allocation with DT aliases
+ - hv_netvsc: fix schedule in RCU context
+ - bnxt_env: Fix VF mac address regression.
+ - net: rtnl_configure_link: fix dev flags changes arg to __dev_notify_flags
+ - mtd: rawmd: denali: fix a race condition when DMA is kicked
+ - platform/x86: dell-smbios-wmi: Correct a memory leak
+ - fork: report pid exhaustion correctly
+ - mm: disable deferred struct page for 32-bit arches
+ - libata: mask swap internal and hardware tag
+ - drm/i915/bdw: Increase IPS disable timeout to 100ms
+ - drm/nouveau: Reset MST branching unit before enabling
+ - drm/nouveau: Only write DP_MSTM_CTRL when needed
+ - drm/nouveau: Remove duplicate poll_enable() in pmops_runtime_suspend()
+ - ext4, dax: set ext4_dax_aops for dax files
+ - crypto: scipher - Fix -Wstringop-truncation warnings
+ - iio: adc: ina2xx: avoid kthread_stop() with stale task_struct
+ - ts12550: fix lux1_input error in low light
+ - vmci: type promotion bug in qp_host_get_user_memory()
+ - x86/numa_emulation: Fix emulated-to-physical node mapping
+ - staging: rtsx208: fix missing error check on call to rtxx_write_register
+ - power: supply: axp288_charger: Fix initial constant_charge_current value
+ - misc: sram: enable clock before registering regions
+ - serial: sh-sci: Stop RX FIFO timer during port shutdown
+ - uwb: hwa-rc: fix memory leak at probe
+ - power: vexpress: fix corruption in notifier registration
+ - iommu/amd: make sure TLB to be flushed before IOVA freed
+ - Bluetooth: Add a new Realtek 8723DE ID 0bda:b009
+ - USB: serial: kobil_set: fix modem-status error handling
+ - 6lowpan: iphc: reset mac_header after decompress to fix panic
+ - iommu/msm: Don't call iommu_device_[,un]link from atomic context
+ - s390/mm: correct allocate_pgste proc_handler callback
+ - power: remove possible deadlock when unregistering power_supply
+ - md-cluster: clear another node's suspend_area after the copy is finished
+ - RDMA/bnx3e: Fix a couple off by one bugs
+ - RDMA/i40w: Hold read semaphore while looking after VMA
+ - IB/core: type promotion bug in rdma_rw_init_one_mr()
+ - media: exynos4-is: Prevent NULL pointer dereference in __isp_video_try_fmt()
+ - IB/mlx4: Test port number before querying type.
- powerpc/kdump: Handle crashkernel memory reservation failure
- media: fsl-viu: fix error handling in viu_of_probe()
- media: staging/imx: fill vb2_v4l2_buffer field entry
- x86/tsc: Add missing header to tsc_msr.c
- ARM: hwmod: RTC: Don’t assume lock/unlock will be called with irq enabled
- x86/entry/64: Add two more instruction suffixes
- ARM: dts: ls1021a: Add missing cooling device properties for CPUs
- scsi: target/scsi: Make iscsit_ta_authentication() respect the output buffer size
- scsi: klist: Make it safe to use klists in atomic context
- scsi: ibmvscsi: Improve strings handling
- scsi: target: Avoid that EXTENDED COPY commands trigger lock inversion
- usb: wusbcore: security: cast sizeof to int for comparison
- ath10k: sdio: use same endpoint id for all packets in a bundle
- ath10k: sdio: set skb len for all rx packets
- powerpc/powernv/io2a2: Reduce upper limit for DMA window size
- s390/sysinfo: add missing #ifdef CONFIG_PROC_FS
- alarmtimer: Prevent overflow for relative nanosleep
- s390/dasd: correct numa_node in dasd_alloc_queue
- s390/scm_blk: correct numa_node in scm_blk_dev_setup
- s390/extmem: fix gcc 8 stringop-overflow warning
- mtd: rawnand: atmel: add module param to avoid using dma
- iio: accel: adxl345: convert address field usage in iio_chan_spec
- posix-timers: Make forward callback return s64
- ALSA: snd-aoa: add of_node_put() in error path
- media: s3c-camif: ignore -ENOIOCTLCMD from v4l2_subdev_call for s_power
- media: soc_camera: ov7725: correct setting of banding filter
- media: omap3isp: zero-initialize the isp cam_xclk{a,b} initial data
- staging: android: ashmem: Fix mmap size validation
- drivers/tty: add error handling for pcmcia_loop_config
- media: tm6000: add error handling for dvb_register_adapter
- net: phy: xgiomtorgmii: Check read_status results
- ath10k: protect ath10k_htt_rx_ring_free with rx_ring.lock
- net: phy: xgiomtorgmii: Check phy_driver ready before accessing
- drm/sun4i: Fix releasing node when enumerating enpoints
- ath10k: transmit queued frames after processing rx packets
- rndis_wlan: potential buffer overflow in rndis_wlan_auth_indication()
- brcmsmac: fix wrap around in conversion from constant to s16
- ARM: mvebu: declare asm symbols as character arrays in pmsu.c
- arm: dts: mediatek: Add missing cooling device properties for CPUs
- HID: hid-ntrig: add error handling for sysfs_create_group
- MIPS: boot: fix build rule of vmlinux.its.S
- perf/x86/intel/lbr: Fix incomplete LBR call stack
- scsi: bnx2i: add error handling for ioremap_nocache
- iomap: complete partial direct I/O writes synchronously
- scsi: megaraid_sas: Update controller info during resume
- EDAC, i7core: Fix memleaks and use-after-free on probe and remove
- ASoC: dapm: Fix potential DAI widget pointer deref when linking DAIs
+ - module: exclude SHN_UNDEF symbols from kallsyms api
+ - gpio: Fix wrong rounding in gpio-menzi127
+ - nfsd: fix corrupted reply to badly ordered compound
+ - EDAC: Fix memleak in module init error path
+ - fs/lock: skip lock owner pid translation in case we are in init_pid_ns
+ - Input: xen-kbdfront - fix multi-touch XenStore node's locations
+ - iio: 104-quad-8: Fix off-by-one error in register selection
+ - ARM: dts: dra7: fix DCAN node addresses
+ - x86/mm: Expand static page table for fixmap space
+ - tty: serial: lpuart: avoid leaking struct tty_struct
+ - serial: cpm_uart: return immediately from console poll
+ - intel_th: Fix device removal logic
+ - spi: tegra20-slink: explicitly enable/disable clock
+ - spi: sh-msiof: Fix invalid SPI use during system suspend
+ - spi: sh-msiof: Fix handling of write value for SISTR register
+ - spi: rspi: Fix invalid SPI use during system suspend
+ - spi: rspi: Fix interrupted DMA transfers
+ - regulator: fix crash caused by null driver data
+ - USB: fix error handling in usb_driver_claim_interface()
+ - USB: handle NULL config in usb_find_alt_setting()
+ - usb: musb: dsps: do not disable CPPI41 irq in driver teardown
+ - slub: make ->cpu_partial unsigned int
+ - USB: usbdevfs: sanitize flags more
+ - USB: usbdevfs: restore warning for nonsensical flags
+ - USB: remove LPM management from usb_driver_claim_interface()
+ - IB/srp: Avoid that sg_reset -d ${srp_device} triggers an infinite loop
+ - IB/hfi1: Fix SL array bounds check
+ - IB/hfi1: Invalid user input can result in crash
+ - IB/hfi1: Fix context recovery when PBC has an UnsupportedVL
+ - RDMA/uverbs: Atomically flush and mark closed the comp event queue
+ - ovl: hash non-dir by lower inode for fsnotify
+ - drm/i915: Remove vma from object on destroy, not close
+ - serial: imx: restore handshaking irq for imx1
+ - qed: Wait for ready indication before rereading the shmem
+ - qed: Wait for MCP halt and resume commands to take place
+ - qed: Prevent a possible deadlock during driver load and unload
+ - qed: Avoid sending mailbox commands when MFW is not responsive
+ - thermal: of-thermal: disable passive polling when thermal zone is disabled
+ - isofs: reject hardware sector size > 2048 bytes
+ - tls: possible hang when do_tcp_sendpages hits sndbuf is full case
+ - bpf: sockmap: write_space events need to be passed to TCP handler
+ - net: hns: fix length and page_offset overflow when CONFIG_ARM64_64K_PAGES
+ - e1000: check on netif_running() before calling e1000_up()
+ - e1000: ensure to free old tx/rx rings in set_ringparam()
+ - crypto: cavium/nitrox - fix for command corruption in queue full case with
  backlog submissions.
+ - hwmon: (ina2xx) fix sysfs shunt resistor read access
+ - hwmon: (ad77475) Make ad77475_read_word() return errors
+ - Revert "ARM: dts: imx7d: Invert legacy PCI irq mapping"
+ - drm/amdgpu: Enable/disable gfx PG feature in rlc safe mode
+ - drm/amdgpu: Update power state at the end of smu hw_init.
+ - ata: fttde010: Add a quirk for SQ201
+ - nvme-fcloop: Fix dropped LS's to removed target port
+ - ARM: dts: omap4-droid4: Fix emmc errors seen on some devices
+ - arm/arm64: smcce-1.1: Make return values unsigned long
+ - arm/arm64: smcce-1.1: Handle function result as parameters
+ - i2c: i801: Allow ACPI AML access I/O ports not reserved for SMBus
+ - x86/pti: Fix section mismatch warning/error
+ - media: v4l: Prevent freeing event subscriptions while accessed
+ - drm/amd/display/dc/dce: Fix multiple potential integer overflows
+ - drm/amd/display: fix use of uninitialized memory
+ - RDMA/bnxt_re: Fix a bunch of off by one bugs in qplib_fp.c
+ - vhost_net: Avoid tx vring kicks during busyloop
+ - thermal: i.MX: Allow thermal probe to fail gracefully in case of bad calibration.
+ - platform/x86: asus-wireless: Fix uninitialized symbol usage
+ - ACPI / button: increment wakeup count only when notified
+ - media: ov772x: add checks for register read errors
+ - media: ov772x: allow i2c controllers without I2C_FUNC_PROTOCOL_MANGLING
+ - drm/omap: gem: Fix mm_list locking
+ - ASoC: rnd: SSI parent cares SWSP bit
+ - staging: pi433: fix race condition in pi433_ioctl
+ - perf tests: Fix indexing when invoking subtests
+ - gpio: tegra: Fix tegra_gpio_irq_set_type()
+ - block: fix deadline elevator drain for zoned block devices
+ - serial: mvebu-uart: Fix reporting of effective CSIZE to userspace
+ - intel_th: Fix resource handling for ACPI glue layer
+ - ext2, dax: set ext2_dax_aops for dax files
+ - IB/hfi1: Fix destroy_qp hang after a link down
+ - ARM: OMAP2+: Fix null hwmod for ti-sysc debug
+ - ARM: OMAP2+: Fix module address for modules using mpu_rt_idx
+ - bus: ti-sysc: Fix module register ioremap for larger offsets
+ - drm/amdgpu: fix preamble handling
+ - amdgpu: fix multi-process hang issue
+ - tcp_bbr: add bbr_check_probe_rtt_donet() helper
+ - tcp_bbr: in restart from idle, see if we should exit PROBE_RTT
+ - net: hns3: fix page_offset overflow when CONFIG_ARM64_64K_PAGES
+ - ixgbe: fix driver behaviour after issuing VFLR
+ - powerpc/pseries: Fix uninitialized timer reset on migration

* Kernel 4.15.0-50 or newer wont boot as Xen-DomU with PVH (LP: #1829378)
+ - SAUCE: ACPI / bus: Fix NULL pointer dereference in
  + acpi_quirk_matches_bios_ids()
+ - CVE-2019-10126
+ - mwifiex: Fix heap overflow in mwifiex_uap_parse_tail_ies()
+ * CVE-2019-3846
+  - mwifiex: Fix possible buffer overflows at parsing bss descriptor
+ * CVE-2019-12818
+  - net: nfc: Fix NULL dereference on nfc_llcp Build_tlv fails
+ * CVE-2019-12984
+  - nfc: Ensure presence of required attributes in the deactivate_target handler
+ * Bionic update: upstream stable patchset 2019-07-10 (LP: #1836117)
+  - i2c: xiic: Make the start and the byte count write atomic
+  - i2c: i801: fix DNV's SMBCTRL register offset
+  - scsi: lpfc: Correct MDS diag and nvmet configuration
+  - nbd: don't allow invalid blocksize settings
+  - block: bfq: swap puts in bfqg_and_blkg_put
+  - android: binder: fix the race mmap and alloc_new_buf_locked
+  - MIPS: VDSO: Match data page cache colouring when D5 aliases
+  - SMB3: Backup intent flag missing for directory opens with backupuid mounts
+  - smb3: check for and properly advertise directory lease support
+  - Btrfs: fix data corruption when deduplicating between different files
+  - KVM: s390: vsie: copy wrapping keys to right place
+  - KVM: VMX: Do not allow reexecute_instruction() when skipping MMIO instr
+  - ALSA: hda - Fix cancel_work_sync() stall from jackpoll work
+  - cpu/hotplug: Adjust misplaced smb() in cpuhp_thread_fun()
+  - cpu/hotplug: Prevent state corruption on error rollback
+  - x86/microcode: Make sure boot_cpu_data.microcode is up-to-date
+  - x86/microcode: Update the new microcode revision unconditionally
+  - crypto: aes-generic - fix aes-generic regression on powerpc
+  - tpm: separate cmd_ready/go_idle from runtime_pm
+  - ARC: [plat-axs*]: Enable SWAP
+  - misc: mic: SCIF Fix scif_get_new_port() error handling
+  - ethtool: Remove trailing semicolon for static inline
+  - i2c: aspeed: Add an explicit type casting for *get_CLK_REG_VAL
+  - Bluetooth: h5: Fix missing dependency on BT_HCIUART_SERDEV
+  - gpio: tegra: Move driver registration to subsys_init level
+  - selftests/bpf: fix a typo in map in map test
+  - media: davinci: vpif_display: Mix memory leak on probe error path
+  - media: dw2102: Fix memleak on sequence of probes
+  - net: phy: Fix the register offsets in Broadcom iProc mdio mux driver
+  - blk-mq: fix updating tags depth
+  - scsi: target: fix _transport_register_session locking
+  - md/raid5: fix data corruption of replacements after originals dropped
+  - timers: Clear timer_base::must_forward_clk with timer_base::lock held
+  - media: camss: csid: Configure data type and decode format properly
+  - gpu: ipu-v3: default to id 0 on missing OF alias
+  - misc: ti-st: Fix memory leak in the error path of probe()
+  - uio: potential double frees if _uio_register_device() fails
+ firmware: vpd: Fix section enabled flag on vpd_section_destroy
+ Drivers: hv: vmbus: Cleanup synic memory free path
+ tty: rocket: Fix possible buffer overwrite on register_PCI
+ i2fs: fix to active page in lru list for read path
+ i2fs: do not set free of current section
+ i2fs: fix defined but not used build warnings
+ perf tools: Allow overriding MAX_NR_CPUS at compile time
+ NFSv4.0 fix client reference leak in callback
+ perf c2c report: Fix crash for empty browser
+ macintosh/via-pmu: Add missing mmio accessors
+ ath9k: report tx status on EOSP
+ ath9k_hw: fix channel maximum power level test
+ ath10k: prevent active scans on potential unusable channels
+ wcore: Set rx_status boottime_ns field on rx
+ Mips: Fix ISA virt/bus conversion for non-zero PHYS_OFFSET
+ scsi: 3ware: fix return 0 on the error path of probe
+ tools/testing/nvdimm: kaddr and pfnum can be NULL to ->direct_access()
+ ath10k: disable bundle mgmt tx completion event support
+ Bluetooth: hidp: Fix handling of strncpy for hid->name information
+ pinctrl: imx: off by one in imx_pinconf_group_dbg_show()
+ gpio: ml-ih: Fix buffer underwrite on probe error path
+ pinctrl/amd: only handle irq if it is pending and unmasked
+ net: mvneta: fix mtu change on port without link
+ i2fs: try grabbing node page lock aggressively in sync scenario
+ i2fs: fix to skip GC if type in SSA and SIT is inconsistent
+ tpm_tis_spi: Pass the SPI IRQ down to the driver
+ tpm/ti2c_infineon: switch to i2c_lock_bus(..., I2C_LOCK_SEGMENT)
+ i2fs: fix to do sanity check with reserved blkaddr of inline inode
+ MIPS: Octeon: add missing of_node_put()
+ MIPS: generic: fix missing of_node_put()
+ net: dcb: For wild-card lookups, use priority -1, not 0
+ dm cache: only allow a single io_mode cache feature to be requested
+ Input: atmel_mxt_ts - only use first T9 instance
+ media: s5p-mfc: Fix buffer look up in s5p_mfc_handle_frame_{new, copy_time}
+ functions
+ media: helene: fix xtal frequency setting at power on
+ i2fs: fix to wait on page writeback before updating page
+ i2fs: Fix uninitialized return in i2fs_ioctl_shutdown()
+ iommu/ipmmu-vmsa: Fix allocation in atomic context
+ mfd: ti_am335x_tscadc: Fix struct clk memory leak
+ i2fs: fix to do sanity check with {sit,nat}_ver_bitmap_bytesize
+ NFSv4.1: Fix a potential layoutget/layoutrecall deadlock
+ MIPS: WARN_ON invalid DMA cache maintenance, not BUG_ON
+ RDMA/cma: Do not ignore net namespace for unbound cm_id
+ inet: frags: change inet_frags_init_net() return value
+ inet: frags: add a pointer to struct netns_frags
+ inet: frags: refactor ipfrag_init()
+ - inet: frags: refactor ipv6_frag_init()
+ - inet: frags: refactor lowpan_net_frag_init()
+ - ipv6: export ip6 fragments sysctl to unprivileged users
+ - rhashtable: add schedule points
+ - inet: frags: use rhashtables for reassembly units
+ - inet: frags: remove some helpers
+ - inet: frags: get rif of inet_frag_evicting()
+ - inet: frags: remove inet_frag_maybe_warn_overflow()
+ - inet: frags: break the 2GB limit for frags storage
+ - inet: frags: do not cloneskb in ip_expire()
+ - ipv6: frags: rewrite ip6_expire_frag_queue()
+ - rhashtable: reorganize struct rhashtable layout
+ - inet: frags: reorganize struct netns_frags
+ - inet: frags: get rid of ipfrag_skb_cb/FRAG_CB
+ - inet: frags: fix ip6frag_low_thresh boundary
+ - ip: discard IPv4 datagrams with overlapping segments.
+ - net: modify skb_rbtree_purge to return the true size of all purged skbs.
+ - ipv6: defrag: drop non-last frags smaller than min mtu
+ - net: skb_trim_rcsum() and CHECKSUM_COMPLETE are friends
+ - mtd: ufi: w1: Fix error return code in ufi_w1_init()
+ - tun: fix use after free for ptr_ring
+ - tuntap: fix use after free during release
+ - autofs: fix autofs_sht() does not check super block type
+ - KVM: PPC: Book3S HV: Use correct pagesize in kvm_unmap_radix()
+ - ARC: [plat-axs*/plat-hsdk]: Allow U-Boot to pass MAC-address to the kernel
+ - x86/apic/vector: Make error return value negative
+ - tc-testing: flush gact actions on test teardown
+ - pinctrl: berlin: fix 'pctl->functions' allocation in
  berlin_pinctrl_build_state
+ - powerpc/4xx: Fix error return path in ppc4xx_msi_probe()
+ - scsi: qla2xxx: Fix unintended Logout
+ - iwlwifi: pcie: don't access periphery registers when not available
+ - f2fs: Keep alloc_valid_block_count in sync
+ - f2fs: issue discard align to section in LFS mode
+ - device-dax: avoid hang on error before devmem memremap_pages()
+ - net/tls: Set count of SG entries if sk_alloc_sg returns -ENOSPC
+ - erspan: fix error handling for erspan tunnel
+ - erspan: return PACKET_REJECT when the appropriate tunnel is not found
+ - tcp: really ignore MSG_ZEROCOPY if no SO_ZEROCOPY
+ - usb: dwc3: change stream event enable bit back to 13
+ - iommu/io-ptable-arm-v7s: Abort allocation when table address overflows the
  PTE
+ - ALSA: msnd: Fix the default sample sizes
+ - ALSA: usb-audio: Fix multiple definitions in AU0828_DEVICE() macro
+ - xfrm: fix `passing zero to ERR_PTR()' warning
+ - amd-xgbe: use dma_mapping_error to check map errors
+ - gfs2: Special-case rindex for gfs2_grow
+ - clk: imx6ul: fix missing of_node_put()
+ - clk: core: Potentially free connection id
+ - clk: clk-fixed-factor: Clear OF_POPULATED flag in case of failure
+ - kbuild: add .DELETE_ON_ERROR special target
+ - media: tw686x: Fix oops on buffer alloc failure
+ - dmaengine: pl330: fix irq race with terminate_all
+ - MIPS: ath79: fix system restart
+ - media: videobuf2-core: check for q->error in vb2_core_qbuf()
+ - IB/rxe: Drop QP0 silently
+ - block: allow max_discard_segments to be stacked
+ - IB/ipoib: Fix error return code in ipoib_dev_init()
+ - mtd/maps: fix solutionengine.c printk format warnings
+ - media: ov5645: Supported external clock is 24MHz
+ - perf test: Fix subtest number when showing results
+ - gfs2: Don't reject a supposedly full bitmap if we have blocks reserved
+ - perf tools: Synthesize GROUP_DESC feature in pipe mode
+ - fbdev: omapfb: off by one in omapfb_register_client()
+ - perf tools: Fix struct comm_str removal crash
+ - video: goldfishfb: fix memory leak on driver remove
+ - fbdev/via: fix defined but not used warning
+ - perf powerpc: Fix callchain ip filtering when return address is in a
  register
+ - video: fbdev: pxafb: clear allocated memory for video modes
+ - fbdev: Distinguish between interlaced and progressive modes
+ - ARM: exynos: Clear global variable on init error path
+ - perf powerpc: Fix callchain ip filtering
+ - nvme-rdma: unquiesce queues when deleting the controller
+ - powerpc/powernv: opal_put_chars partial write fix
+ - staging: bcm2835-camera: fix timeout handling in wait_for_completion_timeout
+ - staging: bcm2835-camera: handle wait_for_completion_timeout return properly
+ - ASoC: rt5514: Fix the issue of the delay volume applied
+ - MIPS: jz4740: Bump zload address
+ - mac80211: restrict delayed tailroom needed decrement
+ - Smack: Fix handling of IPv4 traffic received by PF_INET6 sockets
+ - wan/fsl_ucc_hdlc: use IS_ERR_VALUE() to check return value of qe_muram_alloc
+ - reset: imx7: Fix always writing bits as 0
+ - nfp: avoid buffer leak when FW communication fails
+ - xen-netfront: fix queue name setting
+ - arm64: dts: qcom: db410c: Fix Bluetooth LED trigger
+ - ARM: dts: qcom: msm8974-hammerhead: increase load on l20 for sdhci
+ - s390/qeth: fix race in used-buffer accounting
+ - s390/qeth: reset layer2 attribute on layer switch
+ - platform/x86: toshiba_acpi: Fix defined but not used build warnings
+ - KVM: arm/arm64: Fix vgc init race
+ - drivers/base: stop new probing during shutdown
+ - i2c: aspeed: fix initial values of master and slave state
+ - dmaengine: mv_xor_v2: kill the tasklets upon exit
+ - crypto: sharah - Unregister correct algorithms for SAHARA 3
+ - xen-netfront: fix warn message as irq device name has ‘/’
+ - RDMA/cma: Protect cma dev list with lock
+ - pstore: Fix incorrect persistent ram buffer mapping
+ - xen/netfront: fix waiting for xenbus state change
+ - IB/ipoiob: Avoid a race condition between start_xmit and cm_rep_handler
+ - mmc: omap_hsmmc: fix wakeirq handling on removal
+ - ipmi: Fix I2C client removal in the SSIF driver
+ - Tools: hv: Fix a bug in the key delete code
+ - xhci: Fix use after free for URB cancellation on a reallocated endpoint
+ - usb: Don’t die twice if PCI xhci host is not responding in resume
+ - mei: ignore not found client in the enumeration
+ - mei: bus: need to unlink client before freeing
+ - USB: Add quirk to support DJI CineSSD
+ - usb: uas: add support for more quirk flags
+ - usb: Avoid use-after-free by flushing endpoints early in usb_set_interface()
+ - usb: host: u132-hed: Fix a sleep-in-atomic-context bug in u132_get_frame()
+ - USB: add quirk for WORLDE Controller KS49 or Prodipe MIDI 49C USB controller
+ - usb: gadget: udc: renesas_usb3: fix maxpacket size of ep0
+ - USB: net2280: Fix erroneous synchronization change
+ - USB: serial: io_tj: fix array underflow in completion handler
+ - usb: misc: uss720: Fix two sleep-in-atomic-context bugs
+ - USB: serial: ti_usb_3410_5052: fix array underflow in completion handler
+ - USB: yurex: Fix buffer over-read in yurex_write()
+ - Revert "cdc-acm: implement put_char() and flush_chars()"
+ - cifs: prevent integer overflow in nxt_dir_entry()
+ - CIFS: fix wrapping bugs in num_entries()
+ - xtensa: ISS: don’t allocate memory in platform_setup
+ - perf/core: Force USER_DS when recording user stack data
+ - NFSv4.1 fix infinite loop on I/O.
+ - binfoelf: Elf: Respect error return from `regset->active’
+ - net/mlx5: Add missing SET_DRIVER_VERSION command translation
+ - arm64: dts: uniphier: Add missing cooling device properties for CPUs
+ - audit: fix use-after-free in audit_add_watch
+ - mtchar: fix overflows in adjustment of `count’
+ - Bluetooth: Use lock_sock_nested in bt_accept_enqueue
+ - evm: Don't deadlock if a crypto algorithm is unavailable
+ - KVM: PPC: Book3S HV: Add of_node_put() in success path
+ - security: check for kstrdup() failure in lsmp_append()
+ - MIPS: loongson64: cs5536: Fix PCI_OHCI_INT_REG reads
+ - configfs: fix registered group removal
+ - pinctrl: rza1: Fix selector use for groups and functions
+ - sched/core: Use smp_mb() in wake_woken_function()
+ - efi/esrt: Only call efi_mem_reserve() for boot services memory
+ - ARM: hisi: handle of_iomap and fix missing of_node_put
+ - ARM: hisi: fix error handling and missing of_node_put
+ - ARM: hisi: check of_iomap and fix missing of_node_put
+ - liquidio: fix hang when re-binding VF host drv after running DPDK VF driver
+ - gpu: ipu-v3: cs: pass back mbus_code_to_bus_cfg error codes
+ - tty: fix termios input-speed encoding when using OTHER
+ - tty: fix termios input-speed encoding
+ - mmc: sdhci-of-esdhc: set proper dma mask for ls104x chips
+ - mmc: tegra: prevent HS200 on Tegra 3
+ - mmc: sdhci: do not try to use 3.3V signaling if not supported
+ - drm/nouveaux: Fix runtime PM leak in drm_open()
+ - drm/nouveaux/debugfs: Wake up GPU before doing any reclocking
+ - drm/nouveaux: tegra: Detach from ARM DMA/IOMMU mapping
+ - parport: sunbpp: fix error return code
+ - sched/fair: Fix util_avg of new tasks for asymmetric systems
+ - coresight: Handle errors in finding input/output ports
+ - coresight: tpiu: Fix disabling timeouts
+ - coresight: ETM: Add support for Arm Cortex-A73 and Cortex-A35
+ - staging: bcm2835-audio: Don't leak workqueue if open fails
+ - gpio: pxa: Fix potential NULL dereference
+ - gpiolib: Mark gpio_suffixes array with __maybe_unused
+ - mfd: 88pm860x-i2c: switch to i2c_lock_bus(..., I2C_LOCK_SEGMENT)
+ - input: rohm_bu21023: switch to i2c_lock_bus(..., I2C_LOCK_SEGMENT)
+ - drm/amdkfd: Fix error codes in kfd_get_process
+ - rtc: bq4802: add error handling for devm_ioremap
+ - ALSA: pcm: Fix snd_interval_refine first/last with open min/max
+ - scsi: libfc: fixup 'sleeping function called from invalid context'
+ - drm/panel: type promotion bug in s6e8aa0_read_mtp_id()
+ - blk-mq: only attempt to merge bio if there is rq in sw queue
+ - blk-mq: avoid to synchronize rcu inside blk_cleanup_queue()
+ - pinctrl: msm: Fix msm_config_group_get() to be compliant
+ - pinctrl: qcom: spmi-gpio: Fix pmic_gpio_config_get() to be compliant
+ - clk: tegra: bmp: Don't crash when a clock fails to register
+ - mei: bus: type promotion bug in mei_nfc_if_version()
+ - earlycon: Initialize port->uartclk based on clock-frequency property
+ - earlycon: Remove hardcoded port->uartclk initialization in of_setup_earlycon
+ - net/ipv6: prevent use after free in ip6_route_mpath_notify
+ - Partial revert ”e1000e: Avoid receiver overrun interrupt bursts”
+ - e1000e: Fix queue interrupt re-raising in Other interrupt
+ - e1000e: Avoid missed interrupts following ICR read
+ - Revert ”e1000e: Separate signaling for link check/link up”
+ - e1000e: Fix link check race condition
+ - e1000e: Fix check_for_link return value with autoneg off
+ - tipc: orphan sock in tipc_release()
+ - net/mlx5: Fix not releasing read lock when adding flow rules
+ - iommu/arm-smmu-v3: sync the OVACKFLG to PRIQ consumer register
+ - iwlwifi: cancel the injective function between hw pointers to tfd entry
+ - kbuild: do not update config when running install targets
+ - omapfb: rename omap2 module to omap2fb.ko
+ - [Config] Rename omapfb to omap2fb
+ - perf script: Show correct offsets for DWARF-based unwinding
+ - iommu/ipmmu-vmsa: IMUCTRn.TTSEL needs a special usage on R-Car Gen3
+ - ipmi: Move BT capabilities detection to the detect call
+ - ovl: fix oopses in ovl_fill_super() failure paths
+ - usb: xhci: fix interrupt transfer error happened on MTK platforms
+ - usb: mtu3: fix error of xhci port id when enable U3 dual role
+ - dm verity: fix crash on bufio buffer that was allocated with vmalloc
+ - cifs: integer overflow in in SMB2_ioctl()
+ - perf tools: Fix maps__find_symbol_by_name()
+ - NFSv4: Fix a tracepoint Oops in initiate_file_draining()
+ - of: add helper to lookup compatible child node
+ - mmc: meson-mx-sdio: fix OF child-node lookup
+ - bpf: fix rcu annotations in compute_effective_progs()
+ - spi: dw: fix possible race condition
+ - PM / devfreq: use put_device() instead of kfree()
+ - ASoC: hdmi-codec: fix routing
+ - drm/amd/display: support access ddc for mst branch
+ - rcutorture: Use monotonic timestamp for stall detection
+ - selftests: vDSO - fix to return KSFT_SKIP when test couldn't be run
+ - selftests/android: initialize heap_type to avoid compiling warning
+ - scsi: lpfc: Fix NVME Target crash in defer rcv logic
+ - scsi: lpfc: Fix panic if driver unloaded when port is offline
+ - arm64: perf: Disable PMU while processing counter overflows
+ - staging: fsl-dpaa2/eth: Fix DMA mapping direction
+ - block/DAC960.c: fix defined but not used build warnings
+ - IB/mlx5: fix uaccess beyond "count" in debugfs read/write handlers
+ * Bionic update: upstream stable patchset 2019-07-09 (LP: #1835972)
+ - vt6: fix PMTU caching and reporting on xmit
+ - xfrm: fix missing dst_release() after policy blocking lbcast and multicast
+ - xfrm: free skb if nlsk pointer is NULL
+ - esp6: fix memleak on error path in esp6_input
+ - mac80211: add stations tied to AP_VLANs during hw reconfig
+ - ext4: clear mmp sequence number when remounting read-only
+ - nl80211: Add a missing break in parse_station_flags
+ - drm/bridge: adv7511: Reset registers on hotplug
+ - scsi: target: iscsi: cxgbit: fix max iso npdu calculation
+ - scsi: libiscsi: fix possible NULL pointer dereference in case of TMF
+ - drm/imx: disable LDB on driver bind
+ - drm/imx: check if channel is enabled before printing warning
+ - nbd: don't requeue the same request twice.
+ - nbd: handle unexpected replies better
+ - usb: gadget: r8a66597: fix two possible sleep-in-atomic-context bugs in
  init_controller()
+ - usb: gadget: r8a66597: fix a possible sleep-in-atomic-context bugs in
  r8a66597_queue()
+ - usb: gadget: f_uac2: fix error handling in afunc_bind (again)
+ - usb: gadget: u_audio: fix pcm/card naming in g_audio_setup()
+ - usb: gadget: u_audio: update hw_ptr in iso_complete after data copied
+ - usb: gadget: u_audio: remove caching of stream buffer parameters
+ - usb: gadget: u_audio: remove cached period bytes value
+ - usb: gadget: u_audio: protect stream runtime fields with stream spinlock
+ - usb/phy: fix PPC64 build errors in phy-fsl-usb.c
+ - tools: usb: ffs-test: Fix build on big endian systems
+ - usb: gadget: f_uac2: fix endianness of 'struct cntrl_*_lay3'
+ - netfilter: nft_set_hash: add rcu_barrier() in the nft_rhash_destroy()
+ - bpf, ppc64: fix unexpected r0=0 exit path inside bpf_xadd
+ - netfilter: nf_tables: fix memory leaks on chain rename
+ - netfilter: nf_tables: don't allow to rename to already-pending name
+ - KVM: vmx: use local variable for current_vm.ptr when emulating VMPRTRST
+ - tools/power turbostat: fix -S on UP systems
+ - net: caif: Add a missing rcu_read_unlock() in caif_flow_cb
+ - qed: Fix link flap issue due to mismatching EEE capabilities.
+ - qed: Fix possible race for the link state value.
+ - qed: Correct Multicast API to reflect existence of 256 approximate buckets.
+ - atl1c: reserve min skb headroom
+ - net: prevent ISA drivers from building on PPC32
+ - can: mpc5xxx_can: check of_iomap return before use
+ - can: m_can: Move accessing of message ram to after clocks are enabled
+ - i2c: davinci: Avoid zero value of CLKH
+ - perf/x86/amd/ibs: Don't access non-started event
+ - media: staging: omap4iss: Include asm/cacheflush.h after generic includes
+ - bnx2x: Fix invalid memory access in rss hash config path.
+ - net: axienet: Fix double deregister of m dio
+ - locking/rmutex: Allow specifying a subclass for nested locking
+ - i2c/mux, locking/core: Annotate the nested rt_mutex usage
+ - sched/rt: Restore rt_runtime after disabling RT_RUNTIME_SHARE
+ - x86/boo t: Fix if_changed build flip/flop bug
+ - selftests/ftrace: Add snapshot and tracing_on test case
+ - ipc/sem.c: prevent queue.status tearing in semop
+ - zswap: re-check zswap_is_full() after do zswap_shrink()
+ - tools/power turbostat: Read extended processor family from CPUID
+ - ARC: dma [non-IOC] setup SMP_CACHEBYTES and cache_line_size
+ - bpf: use GFP_ATOMIC instead of GFP_KERNEL in bpf_parse_prog()
+ - nfp: flower: fix port metadata conversion bug
+ - enic: handle mtu change for vf properly
+ - ARC: [plat-eznps] Add missing struct nps_host_reg_aux_dpc
+ - arc: [plat-eznps] fix data type errors in platform headers
+ - arc: [plat-eznps] fix printk warning in arc/plat-eznps/mtm.c
+ - arc: fix build errors in arc/include/asm/delay.h
+ - arc: fix type warnings in arc/mm/cache.c
+ - sparc/time: Add missing __init to init_tick_ops()
+ - sparc: use asm-generic version of msi.h
+ - enic: do not call enic_change_mtu in enic_probe
+ - mm: delete historical BUG from zap_pmd_range()
+ - drivers: net: lnc: fix case value for target abort error
+ - memcg: remove memcg_cgroup::id from IDR on mem_cgroup_css_alloc() failure
+ - gpiolib-acpi: make sure we trigger edge events at least once on boot
+ - scsi: fcoc: fix use-after-free in fcoe_ctrl_els_send
+ - scsi: fcoe: drop frames in ELS LOGO error path
+ - scsi: fcoe: fix use-after-free in fcoe_els_send
+ - mm/memory.c: check return value of ioremap_prot
+ - mei: don't update offset in write
+ - cifs: add missing debug entries for kconfig options
+ - cifs: check kmalloc before use
+ - smb3: enumerating snapshots was leaving part of the data off end
+ - smb3: Do not send SMB3 SET_INFO if nothing changed
+ - smb3: don't request leases in symlink creation and query
+ - smb3: fill in staffs ssid and correct namelen
+ - btrfs: use correct compare function of dirty_metadata_bytes
+ - btrfs: don't leak ret from do_chunk_alloc
+ - Btrfs: fix btrfs_write_inode vs delayed iput deadlock
+ - iommu/arm-smu: Error out only if not enough context interrupts
+ - printk: Split the code for storing a message into the log buffer
+ - printk: Create helper function to queue deferred console handling
+ - printk/nmi: Prevent deadlock when accessing the main log buffer in NMI
+ - kprobes/arm64: Fix %p uses in error messages
+ - arm64: mm: check for upper PAGE_SHIFT bits in pfns_valid()
+ - arm64: dts: rockchip: corrected uart1 clock-names for rk3328
+ - KVM: arm/arm64: Skip updating PMD entry if no change
+ - KVM: arm/arm64: Skip updating PTE entry if no change
+ - stop_machine: Reflow cpu_stop_queue_two_works()
+ - ext4: check for NUL characters in extended attribute's name
+ - ext4: sysfs: print ext4_super_block fields as little-endian
+ - ext4: reset error code in ext4_find_entry in fallback
+ - platform/x86: ideapad-laptop: Apply no_hw_rafkill to Y20-151KBM, too
+ - x86/vdso: Fix vDSO build if a retopeline is emitted
+ - x86/process: Re-export start_thread()
+ - x86/kvm/vmx: Remove duplicate 1ld flush definitions
+ - fuse: Add missed unlock_page() to fuse_readpages_fill()
+ - udl-kms: change down_interruptible to down
+ - udl-kms: handle allocation failure
+ - udl-kms: fix crash due to uninitialized memory
+ - udl-kms: avoid division
- b43legacy/leds: Ensure NUL-termination of LED name string
- b43/leds: Ensure NUL-termination of LED name string
- ASoC: dpcm: don't merge format from invalid codec dai
- ASoC: zte: Fix incorrect PCM format bit usages
- ASoC: sirf: Fix potential NULL pointer dereference
- pinctrl: freescale: off by one in imx1_pinconf_group_dbg_show()
- x86/vdso: Fix isl operand order
- x86/irqflags: Mark native_restore_fl extern inline
- x86/entry/64: Wipe KASAN stack shadow before rewind_stack_do_exit()
- s390/mm: fix addressing exception after suspend/resume
- s390/n numa: move initial setup of node_to_cpumask_map
- kprobes/arm: Fix %p uses in error messages
- kprobes: Make list and blacklist root user read only
- MIPS: Correct the 64-bit DSP accumulator register size
- MIPS: Always use -march=<arch>, not -<arch> shortcuts
- MIPS: Change definition of cpu_relax() for Loongson-3
- MIPS: lib: Provide MIPS64r6 __multi3() for GCC < 7
- tsp: Return the actual size when receiving an unsupported command
- scsi: mpt3sas: Fix _transport_smp_handler() error path
- scsi: sysfs: Introduce sysfs_[un,]break_active_protection()
- scsi: core: Avoid that SCSI device removal through sysfs triggers a deadlock
- clk: rockchip: fix clk_i2sout parent selection bits on rk3399
- PM / clk: signedness bug in of_pm_clk_add_clks()
- power: generic-adc-battery: fix out-of-bounds write when copying channel
  properties
- power: generic-adc-battery: check for duplicate properties copied from iio
  channels
- watchdog: Mark watchdog touch functions as notrace
- gcc-plugins: Add include required by GCC release 8
- gcc-plugins: Use dynamic initializers
- Btrfs: fix send failure when root has deleted files still open
- Btrfs: send, fix incorrect file layout after hole punching beyond eof
- hwmon: (k10temp) 27C Offset needed for Threadripper2
- KVM: arm/arm64: Fix potential loss of ptimer interrupts
- KVM: arm/arm64: Fix lost IRQs from emulated physical timer when blocked
- perf kvm: Fix subcommands on s390
- ext4: use ext4_warning() for sb_getblk failure
- platform/x86: wmi: Do not mix pages and kmalloc
- KVM: x86: ensure all MSRs can always be KVM_GET/SET_MSR'd
- lib/vsprintf: Do not handle %pO[^F] as %px
- soc: qcom: rmtfs-mem: fix memleak in probe error paths
- kprobes: Show blacklist addresses as same as kallsyms does
- kprobes: Replace %p with other pointer types
- MIPS: memset.S: Fix byte_fixup for MIPSr6
- mtd: rawnand: qcom: wait for desc completion in all BAM channels
- net: 6lowpan: fix reserved space for single frames
- net: mac802154: tx: expand tailroom if necessary
- 9p/net: Fix zero-copy path in the 9p virtio transport
+ - spi: davinci: fix a NULL pointer dereference
+ - spi: pxa2xx: Add support for Intel Ice Lake
+ - spi: spi-fsl-dspi: Fix imprecise abort on VF500 during probe
+ - spi: cadence: Change usleep_range() to udelay(), for atomic context
+ - mmc: renesas_sdhi_internal_dmac: fix #define RST_RESERVED_BITS
+ - readahead: stricter check for bdi io_pages
+ - block: blk_init_allocated_queue() set q->fq as NULL in the fail case
+ - block: really disable runtime-pm for blk-mq
+ - drm/915/userprr: reject zero user_size
+ - libertas: fix suspend and resume for SDIO connected cards
+ - media: Revert "[media] tvp5150: fix pad format frame height"
+ - mailbox: xgene-slimpro: Fix potential NULL pointer dereference
+ - Replace magic for trusting the secondary keyring with #define
+ - powerpc/fadump: handle crash memory ranges array index overflow
+ - powerpc/psseries: Fix endianness while restoring of r3 in MCE handler.
+ - PCI: Add wrappers for dev_printk()
+ - cxl: Fix wrong comparison in cxl_adapter_context_get()
+ - ib_srpt: Fix a use-after-free in srpt_close_ch()
+ - RDMA/rxe: Set wqe->status correctly if an unexpected response is received
+ - 9p: fix multiple NULL-pointer-dereferences
+ - fs/9p/xattr.c: catch the error of p9_client_clunk when setting xattr failed
+ - 9p/virtio: fix off-by-one error in sg list bounds check
+ - net/9p/client.c: version pointer uninitialized
+ - net/9p/trans_fd.c: fix race-condition by flushing workqueue before the
  kfree()
+ - dm integrity: change 'suspending' variable from bool to int
+ - dm thin: stop no_space_timeout worker when switching to write-mode
+ - dm cache metadata: save in-core policy_hint_size to on-disk superblock
+ - dm cache metadata: set dirty on all cache blocks after a crash
+ - dm crypt: don't decrease device limits
+ - uart: fix race between uart_put_char() and uart_shutdown()
+ - Drivers: hv: vmbus: Reset the channel callback in vmbus_onoffer_rescind()
+ - iio: sca3000: Fix missing return in switch
+ - iio: ad9523: Fix displayed phase
+ - iio: ad9523: Fix return value for ad952x_store()
+ - extcon: Release locking when sending the notification of connector state
+ - vmw_balloon: fix inflation of 64-bit GFNs
+ - vmw_balloon: do not use 2MB without batching
+ - vmw_balloon: VMCI.DOORBELL_SET does not check status
+ - vmw_balloon: fix VMCI use when balloon built into kernel
+ - rtc: omap: fix potential crash on power off
+ - tracing: Do not call start/stop() functions when tracing_on does not change
+ - tracing/blktrace: Fix to allow setting same value
+ - printk/tracing: Do not trace printk_nmi_enter()
+ - livepatch: Validate module/old func name length
+ - uprobes: Use synchronize_rcu() not synchronize_sched()
+ - mfd: hi655x: Fix regmap area declared size for hi655x
+ - ovl: fix wrong use of impure dir cache in ovl_iterate()
- drivers/block/zram/zram_drv.c: fix bug storing backing_dev
- cpufreq: governor: Avoid accessing invalid governor_data
- PM / sleep: wakeup: Fix build error caused by missing SRCU support
- KVM: PPC: Book3S: Fix guest DMA when guest partially backed by THP pages
- xfs: limit offsets in __loop_cache_{all,page}
- xfs: increase ranges in ___invalidate_{i,d}cache_all
- block, blk Audit return nbytes and not zero from struct cftype .write() method
- pnfs/blocklayout: off by one in bl_map_stripe()
- NFSv4 client live hangs after live data migration recovery
- NFSv4: Fix locking in pnfs_generic_recover_commit_reqs
- NFSv4: Fix a sleep in atomic context in nfs4_callback_sequence()
- ARM: tegra: Fix Tegra30 Cardhu PCA954x reset
- iommu/vt-d: Add definitions for PFSID
- iommu/vt-d: Fix dev iotlb pfsize use
- sys: don't hold uts_sem while accessing userspace memory
- usersns: move user access out of the mutex
- ubifs: Fix memory leak in lprobs self-check
- ubifs: Check data node size before truncate
- ubifs: Fix synced_i_size calculation for xattr inodes
- pwm: tiehrpwm: Don't use emulation mode bits to control PWM output
- pwm: tiehrpwm: Fix disabling of output of PWMs
- fb: fix lost console when the user unplugs a USB adapter
- udlfb: set optimal write delay
- libnvdimm: fix ars status output length calculation
- bcache: release dc->writeback_lock properly in bch_writeback_thread()
- perf auxtrace: Fix queue resize
- crypto: caam - fix DMA mapping direction for RSA forms 2 & 3
- crypto: caam/jr - fix descriptor DMA unmapping
- crypto: caam/qi - fix error path in xts setkey
- arm64: mm: always enable CONFIG_HOLES_IN_ZONE
- mmc: renesas_sdhi_internal_dma: mask DMAC interrupts
- blkcg: Introduce blkcg_root_lookup()
- powerpc64/ftrace: Include ftrace.h needed for enable/disable calls
- IB/mlx5: Fix leaking stack memory to userspace
- rtc: omap: fix resource leak in registration error path
- ACPI: AML Parser: skip opcodes that open a scope upon parse failure
- ALSA: ac97: fix device initialization in the compat layer
- ALSA: ac97: fix check of pm_runtime_get_sync failure
- ALSA: ac97: fix unbalanced pm_runtime_enable
- nfsd: fix leaked file lock with nfs exported overlayfs
- ubifs: Fix directory size calculation for symlinks
- mm, dev_pagemap: Do not clear ->mapping on final put
- act_ife: fix a potential use-after-free
- ipv4: tcp: send zero IPID for RST and ACK sent in SYN-RECV and TIME-WAIT
- state
- net: bcmgenet: use MAC link status for fixed phy
- net: mach: do not disable MDIO bus at open/close time
- qlge: Fix netdev features configuration.
- r8169: add support for NCube 8168 network card
- tcp: do not restart timewait timer on rst reception
- vif6: remove skb->ignore_df check from vif6_xmit()
- net/sched: act_pedit: fix dump of extended layered op
- tipc: fix a missing rhashtable_walk_emit()
- nfp: wait for posted reconfigs when disabling the device
- sctp: hold transport before accessing its asoc in sctp_transport_get_next
- mlxsw: spectrum_switchdev: Do not leak RIFs when removing bridge
- vhst: correctly check the iova range when waking virtqueue
- hv_netvscc: ignore devices that are not PCI
- act_ife: move tcfa_lock down to where necessary
- act_ife: fix a potential deadlock
- net: sched: action_ife: take reference to meta module
- cifs: check if SMB2 PDU size has been padded and suppress the warning
- hfsplus: don't return 0 when fill_super() failed
- hfs: prevent crash on exit from failed search
- sunrpc: Don't use stack buffer with scatterlist
- fork: don't copy inconsistent signal handler state to child
- reiserfs: change j_timestamp type to time64_t
- hfsplus: fix NULL dereference in hfsplus_lookup()
- fs/proc/kcore.c: use _pa_symbol() for KCORE_TEXT list entries
- fat: validate -t_start before using
- scripts: modpost: check memory allocation results
- virtio: pci-legacy: Validate queue pfn
- x86/mce: Add notifier_block forward declaration
- IB/hfi1: Invalid NUMA node information can cause a divide by zero
- pwm: meson: Fix mux clock names
- mm/fadvise.c: fix signed overflow UBSAN complaint
- fs/dcache.c: fix kmemcheck splat at take_dentry_name_snapshot()
- platform/x86: intel_punit_ipc: fix build errors
- netfilter: ip6t_rpfilter: set F_IFACE for linklocal addresses
- s390/kdumpp: Fix memleak in nt_vmcoreinfo
- ipvs: fix race between ip_vs_conn_new() and ip_vs_del_dest()
- mfd: sm501: Set coherent_dma_mask when creating subdevices
- platform/x86: asus-nb-wmi: Add keymap entry for lid flip action on UX360
- netfilter: fix memory leaks on netlink_dump_start error
- tcp, ulp: add alias for all ulp modules
- RDMA/hns: Fix usage of bitmap allocation functions return values
- net: hns3: Fix for command format parsing error in
cleg_is_all_function_id_zero
- perf tools: Check for null when copying nsinfo.
- irqchip/bcm7038-11: Hide cpu offline callback when building for !SMP
- net/9p/trans_fd.c: fix race by holding the lock
- net/9p: fix error path of p9_virtio_probe
- powerpc/uaccess: Enable get_user(u64, *p) on 32-bit
- powerpc: Fix size calculation using resource_size()
- perf probe powerpc: Fix trace event post-processing
- block: bvec_nr_vecs() returns value for wrong slab
+ - s390/dasd: fix hanging offline processing due to canceled worker
+ - s390/dasd: fix panic for failed online processing
+ - ACPI / scan: Initialize status to ACPI_STA_DEFAULT
+ - scsi: aic94xx: fix an error code in aic94xx_init()
+ - NFSv4: Fix error handling in nfs4_sp4_select_mode()
+ - Input: do not use WARN() in input_alloc_absinfo()
+ - xen/balloon: fix balloon initialization for PVH Dom0
+ - PCI: mvebu: Fix I/O space end address calculation
+ - dm kcopyd: avoid softlockup in run_complete_job
+ - staging: comedi: ni_mio_common: fix subdevice flags for PFI subdevice
+ - ASoC: rt5677: Fix initialization of rt5677_of_match.data
+ - iommu/omap: Fix cache flushes on L2 table entries
+ - selftests/powerpc: Kill child processes on SIGINT
+ - RDS: IB: fix 'passing zero to ERR_PTR()' warning
+ - cfq: Suppress compiler warnings about comparisons
+ - smb3: fix reset of bytes read and written stats
+ - SMB3: Number of requests sent should be displayed for SMB3 not just CIFS
+ - powerpc/platforms/85xx: fix t1042rdb_diu.c build errors & warning
+ - powerpc/64s: Make rfi_flush_fallback a little more robust
+ - powerpc/pseries: Avoid using the size greater than RTAS_ERROR_LOG_MAX.
+ - clk: rockchip: Add pclk_rpwm_pmu to PMU critical clocks in rk3399
+ - KVM: vmx: track host_state.loaded using a loaded_vmcs pointer
+ - kvm: nVMX: Fix fault vector for VMX operation at CPL > 0
+ - btrfs: Exit gracefully when chunk map cannot be inserted to the tree
+ - btrfs: replace: Reset on-disk dev stats value after replace
+ - btrfs: relocation: Only remove reloc rb_trees if reloc control has been initialized
+ - btrfs: Don't remove block group that still has pinned down bytes
+ - arm64: rockchip: Force CONFIG_PM on Rockchip systems
+ - ARM: rockchip: Force CONFIG_PM on Rockchip systems
+ - drm/i915/lpe: Mark LPE audio runtime pm as "no callbacks"
+ - drm/amdgpu: Fix RLC safe mode test in gfx_v9_0_enter_rlc_safe_mode
+ - drm/amd/pp/Polaris12: Fix a chunk of registers missed to program
+ - drm/amdgpu: update tnr mc address
+ - drm/amdgpu:add tnr mc address into amdgpu_firmware_info
+ - drm/amdgpu: add new firmware id for VCN
+ - drm/amdgpu: add VCN support in PSP driver
+ - drm/amdgpu: add VCN booting with firmware loaded by PSP
+ - debugobjects: Make stack check warning more informative
+ - mm: Fix devm_memremap_pages() collision handling
+ - HID: add quirk for another PIXART OEM mouse used by HP
+ - usb: dwc3: core: Fix ULPI PHYs and prevent phy_get/ulpi_init during suspend/resume
+ - x86/pae: use 64 bit atomic xchg function in native_pstep_get_and_clear
+ - x86/xen: don't write ptes directly in 32-bit PV guests
+ - drm/i915: Increase LSPCON timeout
+ - kbuild: make missing $DEPMOD a Warning instead of an Error
+ - kvm: x86: Set highest physical address bits in non-present/reserved SPTEs
+ - x86: kvm: avoid unused variable warning
+ - arm64: cpu_errata: include required headers
+ - ASoC: wm8994: Fix missing break in switch
+ - arm64: Fix mismatched cache line size detection
+ - arm64: Handle mismatched cache type
+ - tipc: fix the big/little endian issue in tipc_dest
+ - ip6_vti: fix a null pointer deference when destroy vti6 tunnel
+ - workqueue: skip lockdep wq dependency in cancel_work_sync()
+ - workqueue: re-add lockdep dependencies for flushing
+ - apparmor: fix an error code in __aa_create_ns()
+ - tcp, ulp: fix leftover icsk_ulp_ops preventing sock from reattach
+ - netfilter: x_tables: do not fail xt_alloc_table_info too easily
+ - ACPICA: ACPICA: add status check for acpi_hw_read before assigning return value
+ - PCI: Match Root Port's MPS to endpoint's MPSS as necessary
+ - coccicheck: return proper error code on fail
+ - RISC-V: Use KBUILD_CFLAGS instead of KCFLAGS when building the vDSO
+ - blk-mq: count the hctx as active before allocating tag
+ - selinux: cleanup dentry and inodes on error in selinuxfs
+ - drm/amd/display: Read back max backlight value at boot
+ - btrfs: check-integrity: Fix NULL pointer dereference for degraded mount
+ - btrfs: lift uuid_mutex to callers of btrfs_open_devices
+ - btrfs: Fix a C compliance issue
+ - drm/915: Nuke the LVDS lid notifier
+ - drm/edid: Quirk Vive Pro VR headset non-desktop.
+ - drm/amd/display: fix type of variable
+ - drm/amd/display: Don't share clk source between DP and HDMI
+ - drm/amd/display: update clk for various HDMI color depths
+ - drm/amd/display: Use requested HDMI aspect ratio
+ - drm/rockchip: lvds: add missing of_node_put
+ - drm/amd/display: Pass connector id when executing VBIOS CT
+ - drm/amd/display: Check if clock source in use before disabling
+ - drm/amdgp: fix incorrect use of fcheck
+ - drm/amdgp: fix incorrect use of drm_file->pid
+ - drm/915: set DP Main Stream Attribute for color range on DDI platforms
+ - x86/tsc: Prevent result truncation on 32bit

* [Regression] Colour banding appears on Lenovo B50-80 integrated display
  (LP: #1788308) // Bionic update: upstream stable patchset 2019-07-09
  (LP: #1835972)
  - drm/edid: Add 6 bpc quirk for SDC panel in Lenovo B50-80

  * CVE-2019-12819
  - mdio_bus: Fix use-after-free on device_register fails

  * proc_thermal flooding dmesg (LP: #1824690)
  - drivers: thermal: processor_thermal: Downgrade error message
* Bionic update: upstream stable patchset 2019-07-08 (LP: #1835845)
  - bonding: avoid lockdep confusion in bond_get_stats()
  - inet: frag: enforce memory limits earlier
  - ipv4: frags: handle possible skb truesize change
  - net: dsa: Do not suspend/resume closed slave_dev
  - net: stmmac: Fix WoL for PCI-based setups
  - rxrpc: Fix user call ID check in rxrpc_service_prealloc_one
  - can: ems_usb: Fix memory leak on ems_usb_disconnect()
  - virtio_balloon: fix another race between migration and ballooning
  - x86/apic: Future-proof the TSC_DEADLINE quirk for SKX
  - kvm: x86: vmx: fix vpid leak
  - audit: fix potential null dereference 'context->module.name'
  - userfaultfd: remove uffd flags from vma->vm_flags if UFFD_EVENT_FORK fails
  - RDMA/uverbs: Expand primary and alt AV port checks
  - crypto: padlock-aes - Fix Nano workaround data corruption
  - drm/vc4: Reset ->{x, y}_scaling[1] when dealing with uniplanar formats
  - scsi: sg: fix minor memory leak in error path
  - net/mlx5e: E-Switch, Initialize eswitch only if eswitch manager
  - net/mlx5e: Set port trust mode to PCP as default
  - x86/efi: Fix ACPI MMIO data as unencrypted when SEV is active
  - drm/atomic: Check old_plane_state->crtc in drm_atomic_helper_async_check()
  - drm/atomic: Initialize variables in drm_atomic_helper_async_check() to make gcc happy
  - scsi: qla2xxx: Fix uninitialized List head crash
  - scsi: qla2xxx: Fix NPIV deletion by calling wait_for_sess_deletion
  - scsi: qla2xxx: Fix ISP recovery on unload
  - scsi: qla2xxx: Return error when TMF returns
  - genirq: Fix force irq threading setup more robust
  - nohz: Fix local_timer_softirq_pending()
  - nohz: Fix missing tick reprogram when interrupting an inline softirq
  - ring_buffer: tracing: Inherit the tracing setting to next ring buffer
  - i2c: imx: Fix reinit_completion() use
  - Btrfs: fix file data corruption after cloning a range and fsync
  - nvme-pci: allocate device queues storage space at probe
  - nvme-pci: Fix queue double allocations
  - xfs: catch inode allocation state mismatch corruption
  - xfs: validate cached inodes are free when allocated
  - perf/x86/intel/uncore: Fix hardcoded index of Broadwell extra PCI devices
  - parisc: Enable CONFIG_MLONGCALLS by default
  - parisc: Define mb() and add memory barriers to assembler unlock sequences
  - kasan: add no_sanitize attribute for clang builds
  - Mark HI and TASKLET softirq synchronous
  - xen/netfront: don't cache skb_shinfo()
  - scsi: sr: Avoid that opening a CD-ROM hangs with runtime power management enabled
  - scsi: qla2xxx: Fix memory leak for allocating abort IOC B
  - init: rename and re-order boot_cpu_state_init()
  - root dentries need RCU-delayed freeing
+  - make sure that __dentry_kill() always invalidates d_seq, unhashed or not
+  - fix mntput/mntput race
+  - fix __legitimize_mnt()/mntput() race
+  - mtd: nand: qcom: Add a NULL check for devm_kasprintf()
+  - phy: phy-ntk-phy: use auto instead of force to bypass utmi signals
+  - ARM: dts: imx6sx: fix irq for pcie bridge
+  - kprobes/x86: Fix %p uses in error messages
+  - x86/irqflags: Provide a declaration for native_save_fl
+  - x86/apic: Ignore secondary threads if nosmt=force
+  - x86/mm/kmmio: Make the tracer robust against L1TF
+  - tools headers: Synchronise x86 cpufeatures.h for L1TF additions
+  - x86/microcode: Allow late microcode loading with SMT disabled
+  - x86/smp: fix non-SMP broken build due to redefinition of
+    apic_id_is_primary_thread
+  - cpu/hotplug: Non-SMP machines do not make use of booted_once
+  - sched/deadline: Update rq_clock of later_rq when pushing a task
+  - zram: remove BD_CAP_SYNCHRONOUS_IO with writeback feature
+  - x86/l1tf: Fix build error seen if CONFIG_KVM_INTEL is disabled
+  - x86: i8259: Add missing include file
+  - kbuild: verify that $DEPMOD is installed
+  - crypto: x86/sha256-mb - fix digest copy in sha256_mb_mgr_get_comp_job_avx2()
+  - crypto: vmac - require a block cipher with 128-bit block size
+  - crypto: vmac - separate tfm and request context
+  - crypto: blkcipher - fix crash flushing dcache in error path
+  - crypto: ablkcipher - fix crash flushing dcache in error path
+  - crypto: skcipher - fix aligning block size in skcipher_copy_iv()
+  - crypto: skcipher - fix crash flushing dcache in error path
+  - x86/platform/UV: Mark memblock related init code and data correctly
+  - dccp: fix undefined behavior with 'cwnd' shift in ccid2_cwnd_restart()
+  - I2tp: use sk_dst_check() to avoid race on sk->sk_dst_cache
+  - llc: use refcount_inc_not_zero() for llc_sap_find()
+  - uuid: split dwork to avoid reinitializations
+  - net_sched: Fix missing res info when create new tc_index filter
+  - vhost: reset metadata cache when initializing new IOTLB
+  - ip6_tunnel: use the right value for ipv4 min mtu check in ip6_tnl_xmit
+  - net: aquantia: Fix IFF_ALLMULTI flag functionality
+  - ALSA: hda - Sleep for 10ms after entering D3 on Conexant codecs
+  - ALSA: hda - Turn CX8200 into D3 as well upon reboot
+  - ALSA: vx222: Fix invalid endian conversions
+  - ALSA: virmidi: Fix too long output trigger loop
+  - ALSA: cs5535audio: Fix invalid endian conversion
+  - ALSA: hda: Correct Asrock B85M-ITX power_save blacklist entry
+  - ALSA: memalloc: Don't exceed over the requested size
+  - ALSA: vxpocket: Fix invalid endian conversions
+  - USB: serial: sierra: fix potential deadlock at close
+  - USB: serial: pi2303: add a new device id for ATEN
+  - ACPI / PM: save NVS memory for ASUS 1025C laptop
+  - tty: serial: 8250: Revert NXP SC16C2552 workaround
+ - serial: 8250_exar: Read INT0 from slave device, too
+ - serial: 8250_dw: always set baud rate in dw8250_set_termios
+ - serial: 8250_dw: Add ACPI support for uart on Broadcom SoC
+ - misc: sram: fix resource leaks in probe error path
+ - Bluetooth: avoid killing an already killed socket
+ - isdn: Disable IIODBGVAR
+ - cls_matchall: fix tc_f_unbind_filter missing
+ - mlxsw: core_acl_flex_actions: Return error for conflicting actions
+ - ip_vti: fix a null pointer deference when create vti fallback tunnel
+ - net: ethernet: mvneta: Fix napi structure mixup on armada 3700
+ - net: mvneta: fix mvneta_config_rss on armada 3700
+ - EDAC: Add missing MEM_LRDDR4 entry in edac_mem_types[]
+ - pty: fix O_CLOEXEC for TIOCGPTPEER
+ - arm: dts: armada: Fix "#cooling-cells" property's name
+ - vfio: ccc: fix error return in vfio_ccw_sch_event
+ - perf tools: Fix error index for pmu event parser
+ - Input: Synaptics-rmi4 - fix axis-swap behavior
+ - IB/mlx4: Fix an error handling path in 'mlx4_ib_rereg_user_mr()'
+ - drm/bridge/sii8620: fix loops in EDID fetch logic
+ - drm/bridge/sii8620: fix potential buffer overflow
+ - ARC: Explicitly add -mmedium-calls to CFLAGS
+ - hwmon: (nct6775) Fix loop limit
+ - soc: imx: gpcv2: correct PGC offset
+ - usb: dwc3: pci: add support for Intel IceLake
+ - usb: dwc2: gadget: Fix issue in dwc2_gadget_start_isoc()
+ - usb: dwc3: of-simple: fix use-after-free on remove
+ - ACPI / EC: Use ec_no_wakeup on Thinkpad X1 Carbon 6th
+ - netfilter: ipv6: nf_defrag: reduce struct net memory waste
+ - netfilter: nf_ct_helper: Fix possible panic after
+ - nf_conntrack_helper_unregister
+ - selftests: pstore: return Kselftest Skip code for skipped tests
+ - selftests: static_keys: return Kselftest Skip code for skipped tests
+ - selftests: sysctl: return Kselftest Skip code for skipped tests
+ - selftests: zram: return Kselftest Skip code for skipped tests
+ - selftests: vm: return Kselftest Skip code for skipped tests
+ - selftests: sync: add config fragment for testing sync framework
+ - ARM: dts: NSP: Fix i2c controller interrupt type
+ - ARM: dts: NSP: Fix PCIe controllers interrupt types
+ - ARM: dts: BCM5301x: Fix i2c controller interrupt type
+ - ARM: dts: Cygnus: Fix I2C controller interrupt type
+ - ARM: dts: Cygnus: Fix PCIe controller interrupt type
+ - arm64: dts: specify 1.8V EMMC capabilities for bcm958742k
+ - arm64: dts: specify 1.8V EMMC capabilities for bcm958742t
+ - arm64: dts: ns2: Fix I2C controller interrupt type
+ - arm64: dts: ns2: Fix PCIe controller interrupt type
+ - arm64: dts: Stingray: Fix I2C controller interrupt type
+ - drivers/perf: xgene_pmu: Fix IOB SLOW PMU parser error
+ - drm: mali-dp: Enable Global SE interrupts mask for DP500
+ drm/arm/malidp: Preserve LAYER_FORMAT contents when setting format
+ IB/rxe: Fix missing completion for mem_reg work requests
+ usb: dwc2: alloc dma aligned buffer for isoc split in
+ usb: dwc2: fix isoc split in transfer with no data
+ usb: gadget: composite: fix delayed_status race condition when set_interface
+ usb: gadget: dwc2: fix memory leak in gadget_init()
+ dwc2: gadget: Fix ISOC IN DDMA PID bitfield value calculation
+ xen: add error handling for xenbus_printf
+ pNFS: Always free the session slot on error in
+ nfs4_layoutget_handle_exception
+ scsi: xen-sscsifront: add error handling for xenbus_printf
+ xen/sscsiback: add error handling for xenbus_printf
+ arm64: dma-mapping: clear buffers allocated with FORCE_CONTIGUOUS flag
+ arm64: make secondary_start_kernel() notrace
+ qed: Fix possible memory leak in Rx error path handling.
+ qed: Add sanity check for SIMD fastpath handler.
+ qed: Do not advertise DCBX_LLD_MANAGED capability.
+ enic: initialize enic->rfs_h.lock in enic_probe
+ net: hamradio: use eth_broadcas_addr
+ net: propagate dev_get_valid_name return code
+ net: stmmac: socfpga: add additional ocp reset line for Stratix10
+ nvmet: reset keep alive timer in controller enable
+ block: sed-opal: Fix a couple off by one bugs
+ ARC: Enable machine_desc->init_per_cpu for !CONFIG_SMP
+ nbd: Add the nbd NBD_DISCONNECT_ON_CLOSE config flag.
+ net: davinci_emac: match the mdio device against its compatible if possible
+ scpt: fix erroneous inc of snmp SetFragUsrMsgs
+ KVM: arm/arm64: Drop resource size check for GICV window
+ drm/bridge/sii8620: fix display of packed pixel modes in MHL2
+ locking/lockdep: Do not record IRQ state within lockdep code
+ selftests: bpf: notification about privilege required to run test_kmod.sh
+ testing script
+ mtd: dataflash: Use ULL suffix for 64-bit constants
+ x86/microcode/intel: Fix memleak in save_microcode_patch()
+ ipv6: mcast: fix unsolicited report interval after receiving queries
+ smack: Mark inode instant in smack_task_to_inode
+ arm64: dts: msm8916: fix Coresight ETF graph connections
+ batman-adv: Fix bat_ogm_iv best gw refcnt after netlink dump
+ batman-adv: Fix bat_v best gw refcnt after netlink dump
+ batman-adv: Avoid storing non-TT-sync flags on singular entries too
+ batman-adv: Fix multicast TT issues with bogus ROAM flags
+ cxgb4: when disabling dcb set txq dcb priority to 0
+ iio: pressure: bmp280: fix relative humidity unit
+ brcmfmac: stop watchdog before detach and free everything
+ ARM: dts: am437x: make edt-f5x06 a wakeup source
+ ALSA: seq: Fix UBSAN warning at SNDDRV_SEQ_IOCTL_QUERY_NEXT_CLIENT ioctl
+ usb: xhci: remove the code build warning
+ usb: xhci: increase CRS timeout value
+ - NFC: pn533: Fix wrong GFP flag usage
+ - typec: tcpm: Fix a msecs vs jiffies bug
+ - kconfig: fix line numbers for if-entries in menu tree
+ - perf record: Support s390 random socket_id assignment
+ - perf test session topology: Fix test on s390
+ - perf report powerpc: Fix crash if callchain is empty
+ - perf tools: Fix a clang 7.0 compilation error
+ - perf bench: Fix numa report output code
+ - ARM: davinci: board-da850-evm: fix WP pin polarity for MMC/SD
+ - netfilter: nf_log: fix uninit read in nf_log_proc_dostring
+ - net/mlx5: E-Switch, Disallow vlan/spoofcheck setup if not being esw manager
+ - nfp: cast sizeof() to int when comparing with error code
+ - selftests/x86/sigreturn/64: Fix spurious failures on AMD CPUs
+ - selftests/x86/sigreturn: Do minor cleanups
+ - ARM: dts: da850: Fix interrrups property for gpio
+ - ARM64: dts: meson-gxl: fix Mali GPU compatible string
+ - dmaengine: pl330: report BURST residue granularity
+ - dmaengine: k3dma: Off by one in k3_of_dma_simple_xlate()
+ - ath10k: update the phymode along with bandwidth change request
+ - md/raid10: fix that replacement cannot complete recovery after reassemble
+ - dev-dax: check_vma: ratelimit dev_info-s
+ - nl80211: relax ht operation checks for mesh
+ - nl80211: check nla_parse_nested() return values
+ - drm/exynos: gsc: Fix support for NV16/61, YUV420/YVU420 and YUV422 modes
+ - drm/exynos: decon5433: Fix per-plane global alpha for XRGB modes
+ - drm/exynos: decon5433: Fix WINCONx reset value
+ - drbd: Fix drbd_request_prepare() discard handling
+ - bpf, s390: fix potential memleak when later bpf_jit_prog fails
+ - PCI: xilinx: Add missing of_node_put()
+ - PCI: xilinx-nwl: Add missing of_node_put()
+ - PCI: faraday: Add missing of_node_put()
+ - bnx2x: Fix receiving tx-timeout in error or recovery state.
+ - fsl/fman: fix parser reporting bad checksum on short frames
+ - dpaa_eth: DPAA SGT needs to be 256B
+ - acpi/nfit: fix cmd_rc for acpi_nfit_ctl to always return a value
+ - openrisc: entry: Fix delay slot exception detection
+ - m68k: fix "bad page state" oops on ColdFire boot
+ - objtool: Support GCC 8 '-fnoreorder-functions'
+ - ipvlan: call dev_change_flags when ipvlan mode is reset
+ - drm/amdgpu: fix swapped emit_ib_size in vce3
+ - x86/mm/32: Initialize the CR4 shadow before __flush_tlb_all()
+ - HID: wacom: Correct touch maximum XY of 2nd-gen Intuos
+ - ARM: imx_v4_v5_defconfig: Select ULPI support
+ - bpf: hash map: decrement counter on error
+ - tracing: Use __printf markup to silence compiler
+ - kasan: fix shadow_size calculation error in kasan_module_alloc
+ - smsc75xx: Add workaround for gigabit link up hardware errata.
+ - drm/bridge/si8620: Fix display of packed pixel modes
+ - samples/bpf: add missing <linux/if_vlan.h>
+ - samples/bpf: Check the result of system()
+ - samples/bpf: Check the error of write() and read()
+ - ieee802154: 6lowpan: set IFLA_LINK
+ - netfilter: x_tables: set module owner for icmp(6) matches
+ - ipv6: make ipv6_renew_options() interrupt/kernel safe
+ - net: qrtr: Broadcast messages only from control port
+ - sh_eth: fix invalid context bug while calling auto-negotiation by ethtool
+ - sh_eth: fix invalid context bug while changing link options by ethtool
+ - ravb: fix invalid context bug while calling auto-negotiation by ethtool
+ - ravb: fix invalid context bug while changing link options by ethtool
+ - ARM: pxa: irq: fix handling of ICMR registers in suspend/resume
+ - net/sched: act_tunnel_key: fix NULL dereference when `goto chain' is used
+ - nvme: Don't let a NULL cell_id for nvmem_cell_get() crash us
+ - ieee802154: at86rf230: switch from BUG_ON() to WARN_ON() on problem
+ - ieee802154: at86rf230: use __func__ macro for debug messages
+ - ieee802154: fakelb: switch from BUG_ON() to WARN_ON() on problem
+ - gpu: host1x: Check whether size of unpin isn't 0
+ - drm/tegra: Fix comparison operator for buffer size
+ - drm/armada: fix colorkey mode property
+ - drm/armada: fix irq handling
+ - netfilter: nft_compat: explicitly reject ERROR and standard target
+ - netfilter: nf_conntrack: fix possible possible crash on module loading.
+ - ARC: Improve cmpxchg syscall implementation
+ - bnxt_en: Fix inconsistent BNXT_FLAG_REG_RINGS logic.
+ - bnxt_en: Always set output parameters in bnxt_get_max_rings()
+ - bnxt_en: Fix for system hang if request_irq fails
+ - scsi: qedf: Send the driver state to MFW
+ - scsi: qedf: Send driver state to MFW
+ - perf llvm-utils: Remove bashism from kernel include fetch script
+ - perf tools: Fix compilation errors on gcc8
+ - perf script python: Fix dict reference counting
+ - nft: fix unchecked dereference in acpi_nft_ctl
+ - RDMA/mlx5: Fix memory leak in mlx5_ib_create_srq() error path
+ - ARM: 8780/1: ftrace: Only set kernel memory back to read-only after boot
+ - ARM: DRA7/OMAP5: Enable ACTLR[0] (Enable invalidates of BTB) for secondary cores
+ - ARM: dts: am3517.dt: Disable reference to OMAP3 OTG controller
+ - ixgbe: Be more careful when modifying MAC filters
+ - tools: build: Use HOSTLDFLAGS with fixdep
+ - kbuild: suppress warnings from 'getconf LFS_'
+ - packet: reset network header if packet shorter than ll reserved space
+ - ql: check kstrtol() for errors
+ - tcp: remove DELAYED ACK events in DCTCP
+ - pinctrl: ingenic: Fix inverted direction for < JZ4770
+ - pinctrl: nsp: off by ones in nsp_pinnmux_enable()
+ - pinctrl: nsp: Fix potential NULL dereference
+ - drm/nouveau/gem: off by one bugs in nouveau_gem_pushbuf_reloc_apply()
+ - net/ethernet/freescale/fman: fix cross-build error
+ - ihmnic: Fix error recovery on login failure
+ - btrfs: scrub: Don't use inode page cache in scrub_handle_erored_block()
+ - octeon_mgmt: Fix MIX registers configuration on MTU setup
+ - net: usb: rtl8150: demote allmulti message to dev_dbg()
+ - PCI: OF: Fix I/O space page leak
+ - PCI: versatile: Fix I/O space page leak
+ - net: qca_spi: Avoid packet drop during initial sync
+ - net: qca_spi: Make sure the QCA7000 reset is triggered
+ - net: qca_spi: Fix log level if probe fails
+ - tcp: identify cryptic messages as TCP seq # bugs
+ - soc: imx: gpc: restrict register range for regmap access
+ - ACPI / EC: Use ec_no_wakeup on more Thinkpad X1 Carbon 6th systems
+ - ARM: dts: imx6: RDU2: fix irq type for mv88e6xxx switch
+ - nvme: fix handling of metadata_len for NVME_IOCTL_IO_CMD
+ - parisc: Remove ordered stores from syscall.S
+ - xfrm_user: prevent leaking 2 bytes of kernel memory
+ - netfilter: conntrack: dccp: treat SYNC/SYNACK as invalid if no prior state
+ - packet: refine ring v3 block size test to hold one frame
+ - net/smc: no shutdown in state SMC_LISTEN
+ - parisc: Remove unnecessary barriers from spinlock.h
+ - PCI: hotplug: Don't leak pci_slot on registration failure
+ - PCI: Skip MPS logic for Virtual Functions (VF)
+ - PCI: pciehp: Fix use-after-free on unplug
+ - PCI: pciehp: Fix unprotected list iteration in IRQ handler
+ - i2c: core: ACPI: Properly set status byte to 0 for multi-byte writes
+ - i2c: imx: Fix race condition in dma read
+ - reiserfs: fix broken xattr handling (heap corruption, bad retval)
+ - updateconfigs for v4.14.67
+ - IB/rxe: avoid double kfree skb
+ - RDMA/qedr: Fix NULL pointer dereference when running over iWARP without
RDMA-CM
+ - smb3: increase initial number of credits requested to allow write
+ - hwmon: (dell-smm) Disable fan support for Dell XPS13 9333
+ - ARM: dts: HR2: Fix interrupt types for i2c and PCIe
+ - drm/arm/malidp: Ensure that the cRTC's are shutdown before removing any
encoder/connector
+ - drm/mali-dp: Rectify the width and height passed to rotmem_required()
+ - dmaengine: ti: omap-dma: Fix OMAP1510 incorrect residue_granularity
+ - nvme-rdma: fix possible double free condition when failing to create a
controller
+ - nvme-rdma: Fix command completion race at error recovery
+ - nvme-pci: move nvme_kill_queues to nvme_remove_dead_ctl
+ - clk: sunxi-ng: replace lib-y with obj-y
+ - batman-adv: Fix debugfs path for renamed hardif
+ - batman-adv: Fix debugfs path for renamed softif
+ - nfp: bpf: don't stop offload if replace failed
+ - perf tests: Add event parsing error handling to parse events test
Open Source Used In 5GaaS Edge AC-4  17910

+ - perf script: Fix crash because of missing evsel->priv
+ - perf tools: Fix crash caused by accessing feat_ops[HEADER_LAST_FEATURE]
+ - s390/qeth: consistently re-enable device features
+ - sched/fair: Fix bandwidth timer clock drift condition
+ - r8169: fix mac address change
+ - RISC-V: Don't include irq-riscv-intc.h
+ - RISC-V: Fix PTRACE_SETREGSET bug.
+ - net: qrtr: Reset the node and port ID of broadcast messages
+ - cxgb4: assume flash part size to be 4MB, if it can't be determined
+ - bpf: fix sk_skb programs without skb->dev assigned
+ - ipfrag: really prevent allocation on netns exit
+ - gpu: host1x: Skip IOMMU initialization if firewall is enabled
+ - ARC: [plat-hsdk]: Configure APB GPIO controller on ARC HSDK platform
+ - bnxt_en: Do not modify max IRQ count after RDMA driver requests/frees IRQs.
+ - scsi: hpsa: correct enclosure sas address
+ - perf tools: Use python-config --includes rather than --cflags
+ - sfp: ensure we clean up properly on bus registration failure
+ - amd/dc/dce100: On dce100, set clocks to 0 on suspend
+ - tools: build: Fixup host c flags
+ - kvm: nVMX: Restore exit qual for VM-entry failure due to MSR loading
+ - iohynvnic: Revise RX/TX queue error messages
+ - net/smc: reset recv timeout after cle handshake
+ - PCI: xgene: Fix I/O space page leak
+ - PCI: designware: Fix I/O space page leak
+ - PCI: aardvark: Fix I/O space page leak
+ - PCI: faraday: Fix I/O space page leak
+ - PCI: mediatek: Fix I/O space page leak
+ - PCI: v3-semi: Fix I/O space page leak
+ - platform/x86: dell-laptop: Fix backlight detection
+ - mm: use helper functions for allocating and freeing vm_area structs
+ - mm: make vm_area_dup() actually copy the old vma data
+ - mm: make vm_area_alloc() initialize core fields
+ - PCI / ACPI / PM: Resume all bridges on suspend-to-RAM
+
+ -- Sultan Alsawaf <sultan.alsawaf@canonical.com>  Wed, 24 Jul 2019 09:50:49 -0600
+
+linux (4.15.0-55.60) bionic; urgency=medium
+
+ * Linux: 4.15.0-55.60 -proposed tracker (LP: #1834954)
+
+ * Request backport of ceph commits into bionic (LP: #1834235)
+ - ceph: use atomic_t for ceph_inode_info::i_shared_gen
+ - ceph: define argument structure for handle_cap_grant
+ - ceph: flush pending works before shutdown super
+ - ceph: send cap releases more aggressively
+ - ceph: single workqueue for inode related works
+ - ceph: avoid dereferencing invalid pointer during cached readdir
+ - ceph: quota: add initial infrastructure to support cephfs quotas
+ - ceph: quota: support for ceph.quota.max_files
+ - ceph: quota: don't allow cross-quota renames
+ - ceph: fix root quota realm check
+ - ceph: quota: support for ceph.quota.max_bytes
+ - ceph: quota: update MDS when max_bytes is approaching
+ - ceph: quota: add counter for snaprealms with quota
+ - ceph: avoid iput_final() while holding mutex or in dispatch thread
+ + QCA9377 isn't being recognized sometimes (LP: #1757218)
+ - SAUCE: USB: Disable USB2 LPM at shutdown
+ + * hns: fix ICMP6 neighbor solicitation messages discard problem (LP: #1833140)
+ - net: hns: fix ICMP6 neighbor solicitation messages discard problem
+ - net: hns: fix unsigned comparison to less than zero
+ + * Fix occasional boot time crash in hns driver (LP: #1833138)
+ - net: hns: Fix probabilistic memory overwrite when HNS driver initialized
+ + * use-after-free in hns_nic_net_xmit_hw (LP: #1833136)
+ - net: hns: fix KASAN: use-after-free in hns_nic_net_xmit_hw()
+ + * hns: attempt to restart autoneg when disabled should report error
+ (LP: #1833147)
+ - net: hns: Restart autoneg need return failed when autoneg off
+ + * systemd 237-ubuntu10.14 ADT test failure on Bionic ppc64el (test-seccomp)
+ (LP: #1821625)
+ - powerpc: sys_pkey_alloc() and sys_pkey_free() system calls
+ - powerpc: sys_pkey_mprotect() system call
+ + [UBUNTU] pkey: Indicate old mkvp only if old and curr. mkvp are different
+ (LP: #1832625)
+ - pkey: Indicate old mkvp only if old and current mkvp are different
+ + * [UBUNTU] kernel: Fix gcm-aes-s390 wrong scatter-gather list processing
+ (LP: #1832623)
+ - s390/crypto: fix gcm-aes-s390 selftest failures
+ + * System crashes on hot adding a core with drmgr command (4.15.0-48-generic)
+ (LP: #1833716)
+ - powerpc/numa: improve control of topology updates
+ - powerpc/numa: document topology_updates_enabled, disable by default
+ + * Kernel modules generated incorrectly when system is localized to a non-
+ English language (LP: #1828084)
+ - scripts: override locale from environment when running recordmcount.pl
+ + * [UBUNTU] kernel: Fix wrong dispatching for control domain CPRBs
+ (LP: #1832624)
+ - s390/zcrypt: Fix wrong dispatching for control domain CPRBs
+ + * CVE-2019-11815
+ - net: rds: force to destroy connection if t_sock is NULL in
+   rds_tcp_kill_sock().
+ + * Sound device not detected after resume from hibernate (LP: #1826868)
+ - drm/i915: Force 2*96 MHz cdclk on glk/cnl when audio power is enabled
+ - drm/i915: Save the old CDCLK atomic state
+ - drm/i915: Remove redundant store of logical CDCLK state
+ - drm/i915: Skip modeset for cdclk changes if possible
+ + * Handle overflow in proc_get_long of sysctl (LP: #1833935)
+ - sysctl: handle overflow in proc_get_long
+ + * Dell XPS 13 (9370) defaults to s2idle sleep/suspend instead of deep, NVMe
+   drains lots of power under s2idle (LP: #1808957)
+ - Revert "UBUNTU: SAUCE: pci/nvme: prevent WDC PC SN720 NVMe from entering D3
+   and being disabled"
+ - Revert "UBUNTU: SAUCE: nvme: add quirk to not call disable function when
+   suspending"
+ - Revert "UBUNTU: SAUCE: pci: prevent Intel NVMe SSDPEKKF from entering D3"
+ - Revert "SAUCE: nvme: add quirk to not call disable function when suspending"
+ - Revert "SAUCE: pci: prevent sk hynix nvme from entering D3"
+ - PCI: PM: Avoid possible suspend-to-idle issue
+ - PCI: PM: Skip devices in D0 for suspend-to-idle
+ - nvme-pci: Sync queues on reset
+ - nvme: Export get and set features
+ - nvme-pci: Use host managed power state for suspend
+ + * linux v4.15 ftbfs on a newer host kernel (e.g. hwe) (LP: #1823429)
+ - selinux: use kernel linux/socket.h for genheaders and mdp
+ + * 32-bit x86 kernel 4.15.0-50 crash in vmalloc_sync_all (LP: #1830433)
+ - x86/mm/pat: Disable preemption around __flush_tlb_all()
+ - x86/mm: Drop usage of __flush_tlb_all() in kernel_physical_mapping_init()
+ - x86/mm: Disable ioremap free page handling on x86-PAE
+ - ioremap: Update pgtable free interfaces with addr
+ - x86/mm: Add TLB purge to free pmd/pte page interfaces
+ - x86/init: fix build with CONFIG_SWAP=n
+ - x86/mm: provide pmdp_establish() helper
+ - x86/mm: Use WRITE_ONCE() when setting PTEs
+ + * hinic: fix oops due to race in set_rx_mode (LP: #1832048)
+ - hinic: fix a bug in set rx mode
+ + * ubuntu 18.04 flickering screen with Radeon X1600 (LP: #1791312)
+ - drm/radeon: prefer lower reference dividers
+ - drm/vmwgfx: use monotonic event timestamps
+ - [linux-azure] Block Layer Commits Requested in Azure Kernels (LP: #1834499)
  + - block: Clear kernel memory before copying to user
  + - block/bio: Do not zero user pages
+ - CONFIG_LOG_BUF_SHIFT set to 14 is too low on arm64 (LP: #1824864)
  + - [Config] CONFIG_LOG_BUF_SHIFT=18 on all 64bit arches
+ - Handle overflow for file-max (LP: #1834310)
  + - sysctl: handle overflow for file-max
  + - kernel/sysctl.c: fix out-of-bounds access when setting file-max
+ - [ALSA] [PATCH] Headset fixup for System76 Gazelle (gaze14) (LP: #1827555)
  + - ALSA: hda/realtek - Headset fixup for System76 Gazelle (gaze14)
  + - ALSA: hda/realtek - Corrected fixup for System76 Gazelle (gaze14)
+ - crashdump fails on HiSilicon D06 (LP: #1828868)
  + - iommu/arm-smmu-v3: Abort all transactions if SMMU is enabled in kdump kernel
  + - iommu/arm-smmu-v3: Don't disable SMMU in kdump kernel
+ - CVE-2019-11833
  + - ext4: zero out the unused memory region in the extent tree block
+ - zfs 0.7.9 fixes a bug (https://github.com/zfsonlinux/zfs/pull/7343) that
  + - hangs the system completely (LP: #1772412)
  + - SAUCE: (noup) Update zfs to 0.7.5-1ubuntu16.6
+ - does not detect headphone when there is no other output devices
  + (LP: #1831065)
  + - ALSA: hda/realtek - Fixed hp_pin no value
  + - ALSA: hda/realtek - Use a common helper for hp pin reference
+ - kernel crash : net_sched race condition in tcindex_destroy() (LP: #1825942)
  + - net_sched: fix NULL pointer dereference when delete tcindex filter
  + - RCU, workqueue: Implement rcu_work
  + - net_sched: switch to rcu_work
  + - net_sched: fix a race condition in tcindex_destroy()
  + - net_sched: fix a memory leak in cls_tcindex
  + - net_sched: initialize net pointer inside tcf_exts_init()
  + - net_sched: fix two more memory leaks in cls_tcindex
+ - Support new ums-realtek device (LP: #1831840)
  + - USB: usb-storage: Add new ID to ums-realtek
+ * amd_iommu possible data corruption (LP: #1823037)
+ - iommu/amd: Reserve exclusion range in iova-domain
+ - iommu/amd: Set exclusion range correctly
+
+ * Add new sound card PCHID into the alsa driver (LP: #1832299)
+ - ALSA: hda: Add IceLake PCI ID
+ - ALSA: hda/intel: add CometLake PCI IDs
+
+ * sky2 ethernet card doesn't work after returning from suspend
+ (LP: #1807259) // sky2 ethernet card link not up after suspend
+ (LP: #1809843)
+ - sky2: Disable MSI on Dell Inspiron 1545 and Gateway P-79
+
+ * idle-page oopses when accessing page frames that are out of range
+ (LP: #1833410)
+ - mm/page_idle.c: fix oops because end_pfn is larger than max_pfn
+
+ * Add pointstick support on HP ZBook 17 G5 (LP: #1833387)
+ - Revert "HID: multitouch: Support ALPS PTP stick with pid 0x120A"
+ - SAUCE: HID: multitouch: Add pointstick support for ALPS Touchpad
+
+ * [SRU][B/B-OEM/B-OEM-OSP-1/C/D/E] Add trackpoint middle button support of 2
+ new thinpads (LP: #1833637)
+ - Input: elantech - enable middle button support on 2 ThinkPads
+
+ * CVE-2019-11085
+ - drm/i915/gvt: Fix mmap range check
+ - drm/i915: make mappable struct resource centric
+ - drm/i915/gvt: Fix aperture read/write emulation when enable x-no-mmap=on
+
+ * CVE-2019-11884
+ - Bluetooth: hidp: fix buffer overflow
+
+ * af_alg06 test from crypto test suite in LTP failed with kernel oops on B/C
+ (LP: #1829725)
+ - crypto: authenc - fix parsing key with misaligned rta_len
+
+ - SAUCE: Synchronize MDS mitigations with upstream
+ - Documentation: Correct the possible MDS sysfs values
+ - x86/speculation/mds: Fix documentation typo
+
+ * CVE-2019-11091
+ - x86/mds: Add MDSUM variant to the MDS documentation
+
+ * alignment test in powerpc from ubuntu_kernel_selftests failed on B/C Power9
+ (LP: #1813118)
+ - selftests/powerpc: Remove Power9 copy_unaligned test
+ * TRACE_syscall.ptrace_syscall_dropped in seccomp from ubuntu_kernel_selftests
+   failed on B/C PowerPC (LP: #1812796)
+ - selftests/seccomp: Enhance per-arch ptrace syscall skip tests
+ + * Add powerpc/alignment_handler test for selftests (LP: #1828935)
+ - selftests/powerpc: Add alignment handler selftest
+ - selftests/powerpc: Fix to use ucontext_t instead of struct ucontext
+ + * Cannot build kernel 4.15.0-48.51 due to an in-source-tree ZFS module.
+   (LP: #1828763)
+ - SAUCE: (noup) Update zfs to 0.7.5-1ubuntu16.5
+ + * Electrical noise occurred when external headset enter powersaving mode on a
+   Dell machine (LP: #1828798)
+ - ALSA: hda/realtek - Reduce click noise on Dell Precision 5820 headphone
+ - ALSA: hda/realtek - Fixup headphone noise via runtime suspend
+ + * [18.04/18.10] File libperf-jvmti.so is missing in linux-tools-common deb on
+   Ubuntu (LP: #1761379)
+ - [Packaging] Support building libperf-jvmti.so
+ + * TCP: race condition on socket ownership in tcp_close() (LP: #1830813)
+ - tcp: do not release socket ownership in tcp_close()
+ + * bionic: netlink: potential shift overflow in netlink_bind() (LP: #1831103)
+ - netlink: Don't shift on 64 for ngroups
+ + * Add support to Comet Lake LPSS (LP: #1830175)
+ - mfd: intel-lpss: Add Intel Comet Lake PCI IDs
+ + * Reduce NAPI weight in hns driver from 256 to 64 (LP: #1830587)
+ - net: hns: Use NAPI_POLL_WEIGHT for hns driver
+ + * x86: add support for AMD Rome (LP: #1819485)
+ - x86: irq_remapping: Move irq remapping mode enum
+ - iommu/amd: Add support for higher 64-bit IOMMU Control Register
+ - iommu/amd: Add support for IOMMU XT mode
+ - hwmon/k10temp, x86/amd_nb: Consolidate shared device IDs
+ - hwmon/k10temp: Add support for AMD family 17h, model 30h CPUs
+ - x86/amd_nb: Add PCI device IDs for family 17h, model 30h
+ - x86/MCE/AMD: Fix the thresholding machinery initialization order
+ - x86/amd_nb: Add support for newer PCI topologies
+ + * nx842 - CRB request time out (-110) when uninstall NX modules and initiate
+ NX request (LP: #1827755)
+ - crypto/nx: Initialize 842 high and normal RxFIFO control registers
+ * Require improved hypervisor detection patch in Ubuntu 18.04 (LP: #1829972)
+ - s390/early: improve machine detection
+
+-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 02 Jul 2019 18:41:49 +0200
+
+linux (4.15.0-54.58) bionic; urgency=medium
+
+ * linux: 4.15.0-54.58 -proposed tracker (LP: #1833987)
+
+ * Remote denial of service (resource exhaustion) caused by TCP SACK scoreboard
+ manipulation (LP: #1831638) // CVE-2019-11478
+ - tcp: refine memory limit test in tcp_fragment()
+
+ * CVE-2019-11479
+ - SAUCE: tcp: add tcp_min_snd_mss sysctl
+ - SAUCE: tcp: enforce tcp_min_snd_mss in tcp_mtu_probing()
+
+-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Mon, 24 Jun 2019 11:39:50 +0200
+
+linux (4.15.0-52.56) bionic; urgency=medium
+
+ * Remote denial of service (resource exhaustion) caused by TCP SACK scoreboard
+ manipulation (LP: #1831638)
+ - SAUCE: tcp: tcp_fragment() should apply sane memory limits
+
+ * Remote denial of service (system crash) caused by integer overflow in TCP
+ SACK handling (LP: #1831637)
+ - SAUCE: tcp: limit payload size of sacked skbs
+
+-- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Tue, 04 Jun 2019 17:33:24 -0300
+
+linux (4.15.0-51.55) bionic; urgency=medium
+
+ * linux: 4.15.0-51.55 -proposed tracker (LP: #1829219)
+
+ * disable a.out support (LP: #1818552)
+ - [Config] Disable a.out support
+
+ * [UBUNTU] qdio: clear intparm during shutdown (LP: #1828394)
+ - s390/qdio: clear intparm during shutdown
+
+ * ftrace in ubuntu_kernel_selftests hang with Cosmic kernel (LP: #1826385)
+ - kprobes/x86: Fix instruction patching corruption when copying more than one
+ RIP-relative instruction
+
+ * touchpad not working on lenovo yoga 530 (LP: #1787775)
+ - Revert "UBUNTU: SAUCE: i2c:amd Depends on ACPI"
+ - Revert "UBUNTU: SAUCE: i2c:amd move out pointer in union i2c_event_base"
+ - Revert "UBUNTU: SAUCE: i2c:amd I2C Driver based on PCI Interface for upcoming platform"
+ - i2c: add helpers to ease DMA handling
+ - i2c: add a message flag for DMA safe buffers
+ - i2c: add extra check to safe DMA buffer helper
+ - i2c: Add drivers for the AMD PCIe MP2 I2C controller
+ - [Config] Update config for AMD MP2 I2C driver
+ - [Config] Update I2C_AMD_MP2 annotations
+
+ * tm-unavailable in powerpc/tm failed on Bionic Power9 (LP: #1813129)
+ - selftests/powerpc: Check for pthread errors in tm-unavailable
+ - selftests/powerpc: Skip tm-unavailable if TM is not enabled
+
+ * cp_abort in powerpc/context_switch from ubuntu_kernel_selftests failed on Bionic P9 (LP: #1813134)
+ - selftests/powerpc: Remove redundant cp_abort test
+
+ * bionic/linux: completely remove snapdragon files from sources (LP: #1827880)
+ - [Packaging] remove snapdragon dead files
+ - [Config] update configs after snapdragon removal
+
+ * The noise keeps occurring when Headset is plugged in on a Dell machine (LP: #1827972)
+ - ALSA: hda/realtek - Fixed Dell AIO speaker noise
+
+ * Geneve tunnels don't work when ipv6 is disabled (LP: #1794232)
+ - geneve: correctly handle ipv6.disable module parameter
+
+ * There are 4 HDMI/Displayport audio output listed in sound setting without attach any HDMI/DP monitor (LP: #1827967)
+ - ALSA: hda/hdmi - Read the pin sense from register when repolling
+ - ALSA: hda/hdmi - Consider eld_valid when reporting jack event
+
+ * Headphone jack switch sense is inverted: plugging in headphones disables headphone output (LP: #1824259)
+ - ASoC: rt5645: Headphone Jack sense inverts on the LattePanda board
+
+ * CTAUTO:DevOps:860.50:devops4fp1:Error occurred during LINUX Dmesg error Checking for all LINUX clients for devops4p10 (LP: #1766201)
+ - SAUCE: integrity: downgrade error to warning
+
+ * Screen freeze after resume from S3 when HDMI monitor plugged on Dell Precision 7740 (LP: #1825958)
+ - PCI: Restore resized BAR state on resume
+
+ * potential memory corruption on arm64 on dev release (LP: #1827437)
+ - driver core: Postpone DMA tear-down until after devres release
+
* powerpc/pmu/ebb test in ubuntu_kernel_selftest failed with "error while loading shared libraries" on Bionic/Cosmic PowerPC (LP: #1812805)
* - selftests/powerpc/pmu: Link ebb tests with -no-pie

* unnecessary request_queue freeze (LP: #1815733)
  - block: avoid setting nr_requests to current value
  - block: avoid setting none scheduler if it's already none

* Kprobe event string type argument failed in ftrace from ubuntu_kernel_selftests on B/C i386 (LP: #1825780)
  - selftests/ftrace: Fix kprobe string testcase to not probe notrace function

* hns: fix socket accounting (LP: #1826911)
  - net: hns: fix skb->truesize underestimation

* False positive test result in run_netsocktests from net in ubuntu_kernel_selftest (LP: #1825777)
  - selftests/net: correct the return value for run_netsocktests

-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 15 May 2019 14:48:35 +0200

+linux (4.15.0-50.54) bionic; urgency=medium

  - Documentation/l1tf: Fix small spelling typo
  - x86/cpu: Sanitize FAM6_ATOM naming
  - kvm: x86: Report STIBP on GET_SUPPORTED_CPUID

+ locking/atomics, asm-generic: Move some macros from <linux/bitops.h> to a new <linux/bits.h> file
  - tools include: Adopt linux/bits.h
  - x86/msr-index: Cleanup bit defines

+ x86/speculation: Consolidate CPU whitelists
  - x86/speculation/mds: Add basic bug infrastructure for MDS
  - x86/kvm/vmx: Add MDS protection when L1D Flush is not active
  - x86/speculation/mds: Add mds_clear_cpu_buffers()
  - x86/speculation/mds: Clear CPU buffers on exit to user

+ x86/kvm/vmx: Add MDS protection when L1D Flush is not active
  - x86/speculation/mds: Conditionally clear CPU buffers on idle entry
  - x86/speculation/mds: Add mitigation control for MDS
  - x86/speculation/mds: Add sysfs reporting for MDS
  - x86/speculation/mds: Add mitigation mode VMWERV

+ Documentation: Move L1TF to separate directory
  - Documentation: Add MDS vulnerability documentation
  - x86/speculation/mds: Add mds=full,nosmt cmdline option
  - x86/speculation/mds: Move arch_smt_update() call to after mitigation decisions
  - x86/speculation/mds: Add SMT warning message
+ - x86/speculation/mds: Print SMT vulnerable on MSBDS with mitigations off
+ - x86/speculation/mds: Add 'mitigations=' support for MDS
+
+ * CVE-2017-5715 // CVE-2017-5753
+ - s390/speculation: Support 'mitigations=' cmdline option
+
+ - powerpc/speculation: Support 'mitigations=' cmdline option
+
+ CVE-2018-3646
+ - cpu/speculation: Add 'mitigations=' cmdline option
+ - x86/speculation: Support 'mitigations=' cmdline option
+
+ * Packaging resync (LP: #1786013)
+ - [Packaging] resync git-ubuntu-log
+
+ -- Stefan Bader <stefan.bader@canonical.com>  Mon, 06 May 2019 18:59:24 +0200
+
+linux (4.15.0-49.53) bionic; urgency=medium
+
+ * linux: 4.15.0-49.53 -proposed tracker (LP: #1826358)
+
+ * Backport support for software count cache flush Spectre v2 mitigation. (CVE)
+ (required for POWER9 DD2.3) (LP: #1822870)
+ - powerpc/64s: Add support for ori barrier_nospec patching
+ - powerpc/64s: Patch barrier_nospec in modules
+ - powerpc/64s: Enable barrier_nospec based on firmware settings
+ - powerpc: Use barrier_nospec in copy_from_user()
+ - powerpc/64: Use barrier_nospec in syscall entry
+ - powerpc/64: Enhance the information in cpu_show_spectre_v1()
+ - powerpc/64: Disable the speculation barrier from the command line
+ - powerpc/64: Make stf barrier PPC_BOOK3S_64 specific.
+ - powerpc/64: Add CONFIG_PPC_BARRIER_NOSPEC
+ - powerpc/64: Call setup_barrier_nospec() from setup_arch()
+ - powerpc/64: Make meltdown reporting Book3S 64 specific
+ - powerpc/lib/code-patching: refactor patch_instruction()
+ - powerpc/lib/feature-fixups: use raw_patch_instruction()
+ - powerpc/asm: Add a patch_site macro & helpers for patching instructions
+ - powerpc/64s: Add new security feature flags for count cache flush
+ - powerpc/64s: Add support for software count cache flush
+ - powerpc/pseries: Query hypervisor for count cache flush settings
+ - powerpc/powernv: Query firmware for count cache flush settings
+ - powerpc/fsl: Add nospectre_v2 command line argument
+ - KVM: PPC: Book3S: Add count cache flush parameters to kvmppc_get_cpu_char()
+ - [Config] Add CONFIG_PPC_BARRIER_NOSPEC
+
+ * Packaging resync (LP: #1786013)
+  - [Packaging] resync git-ubuntu-log
+  
+  * autopkgtests run too often, too much and don't skip enough (LP: #1823056)
+  - [Debian] Set +x on rebuild testcase.
+  - [Debian] Skip rebuild test, for regression-suite deps.
+  - [Debian] make rebuild use skippable error codes when skipping.
+  - [Debian] Only run regression-suite, if requested to.
+  
+  * bionic: fork out linux-snapdragon into its own topic kernel (LP: #1820868)
+  - [Packaging] remove arm64 snapdragon from getabis
+  - [Config] config changes for snapdragon split
+  - packaging: arm64: disable building the snapdragon flavour
+  - [Packaging] arm64: Drop snapdragon from kernel-versions
+  
+  * CVE-2017-5753
+  - KVM: arm/arm64: vgic: fix possible spectre-v1 in vgic_get_irq()
+  - media: dvb_ca_en50221: prevent using slot_info for Spectre attacks
+  - sysvipc/sem: mitigate semnum index against spectre v1
+  - libahci: Fix possible Spectre-v1 pmp indexing in ahci_led_store()
+  - s390/keyboard: sanitize array index in do_kdsk_ioctl
+  - arm64: fix possible spectre-v1 write in ptrace_hbp_set_event()
+  - KVM: arm/arm64: vgic: Fix possible spectre-v1 write in vgic_mmio_write_apr()
+  - pktcdvd: Fix possible Spectre-v1 for pkt_devs
+  - net: socket: fix potential spectre v1 gadget in socketcall
+  - net: socket: Fix potential spectre v1 gadget in sock_is_registered
+  - drm/amdgpup/pm: Fix potential Spectre v1
+  - netlink: Fix spectre v1 gadget in netlink_create()
+  - ext4: fix spectre gadget in ext4_mb_regular_allocator()
+  - drm/i915/kvmgt: Fix potential Spectre v1
+  - net: sock_diag: Fix spectre v1 gadget in __sock_diag_cmd()
+  - fs/quotactl: Fix spectre gadget in do_quotactl
+  - hwmon: (net7675) Fix potential Spectre v1
+  - mac80211_hwsim: Fix possible Spectre-v1 for hwsim_world_regdom_custom
+  - switchtec: Fix Spectre v1 vulnerability
+  - misc: hmc6352: fix potential Spectre v1
+  - tty: vt_ioctl: fix potential Spectre v1
+  - nl80211: Fix possible Spectre-v1 for NL80211_TXRATE_HT
+  - nl80211: Fix possible Spectre-v1 for CQM RSSI thresholds
+  - IB/ucm: Fix Spectre v1 vulnerability
+  - RDMA/ucma: Fix Spectre v1 vulnerability
+  - drm/bufs: Fix Spectre v1 vulnerability
+  - usb: gadget: storage: Fix Spectre v1 vulnerability
+  - ptp: fix Spectre v1 vulnerability
+  - HID: hiddev: fix potential Spectre v1
+  - vhost: Fix Spectre V1 vulnerability
+  - drivers/misc/sgi-gru: fix Spectre v1 vulnerability
+  - ipv4: Fix potential Spectre v1 vulnerability

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Open Source Used In 5GaaS Edge AC-4 17920
+ aio: fix spectre gadget in lookup_ioctl
+ ALSA: emux: Fix potential Spectre v1 vulnerabilities
+ ALSA: pcm: Fix potential Spectre v1 vulnerability
+ ip6mr: Fix potential Spectre v1 vulnerability
+ ALSA: rme9652: Fix potential Spectre v1 vulnerability
+ KVM: arm/arm64: vgic: Fix off-by-one bug in vgic_get_irq()
+ drm/ioct: Fix Spectre v1 vulnerabilities
+ char/mwave: fix potential Spectre v1 vulnerability
+ applicom: Fix potential Spectre v1 vulnerabilities
+ ipmi: msghandler: Fix potential Spectre v1 vulnerabilities
+ powerpc/ptrace: Mitigate potential Spectre v1
+ cfg80211: prevent speculation on cfg80211_classify8021d() return
+ ALSA: rawmidi: Fix potential Spectre v1 vulnerability
+ ALSA: seq: oss: Fix Spectre v1 vulnerability

+ Bionic: Sync to Xenial (Spectre) (LP: #1822760)
+ x86/speculation/l1tf: Suggest what to do on systems with too much RAM
+ KVM: SVM: Add MSR-based feature support for serializing LFENCE
+ KVM: VMX: fixes for vmentry_l1d_flush module parameter
+ KVM: X86: Allow userspace to define the microcode version
+ SAUCE: [Fix] x86/KVM/VMX: Add L1D flush logic
+ SAUCE: [Fix] x86/speculation: Use ARCH_CAPABILITIES to skip L1D flush on vmentry

+ [SRU] [B/OEM] Fix ACPI bug that causes boot failure (LP: #1819921)
+ SAUCE: ACPI / bus: Add some Lenovo laptops in list of acpi table term list

+ Bionic update: upstream stable patchset for fuse 2019-04-12 (LP: #1824553)
+ fuse: fix double request_end()
+ fuse: fix unlocked access to processing queue
+ fuse: umount should wait for all requests
+ fuse: Fix oops at process_init_reply()
+ fuse: Don't access pipe->buffers without pipe_lock()
+ fuse: Fix use-after-free in fuse_dev_do_read()
+ fuse: Fix use-after-free in fuse_dev_do_write()
+ fuse: set FR_SENT while locked
+ fuse: fix blocked_waitq wakeup
+ fuse: fix leaked notify reply
+ fuse: fix possibly missed wake-up after abort
+ fuse: fix use-after-free in fuse_direct_IO()
+ fuse: continue to send FUSE_RELEASEDIR when FUSE_OPEN returns ENOSYS
+ fuse: handle zero sized retrieve correctly
+ fuse: call pipe_buf_release() under pipe lock
+ fuse: decrement NR_WRITEBACK_TEMP on the right page

+ Backport support for software count cache flush Spectre v2 mitigation. (CVE)
+ (required for POWER9 DD2.3) (LP: #1822870) // Backport support for software
+ count cache flush Spectre v2 mitigation. (CVE) (required for POWER9 DD2.3)
+ (LP: #1822870)
+ - powerpc64s: Show ori31 availability in spectre_v1 sysfs file not v2
+ - powerpc/fsl: Fix spectre_v2 mitigations reporting
+ - powerpc: Avoid code patching freed init sections
+
+ * Backport support for software count cache flush Spectre v2 mitigation. (CVE)
+ (required for POWER9 DD2.3) (LP: #1822870) // Backport support for software count cache flush Spectre v2 mitigation. (CVE) (required for POWER9 DD2.3) (LP: #1822870)
+ - powerpc/security: Fix spectre_v2 reporting
+
+ * CVE-2019-3874
+ - scpt: use sk_wmem_queued to check for writable space
+ - scpt: implement memory accounting on tx path
+ - scpt: implement memory accounting on rx path
+
+ * NULL pointer dereference when using z3fold and zswap (LP: #1814874)
+ - z3fold: fix possible reclaim races
+
+ * Kprobe event argument syntax in ftrace from ubuntu_kernel_selftests failed
+ on B PowerPC (LP: #1812809)
+ - selftests/ftrace: Add ppc support for kprobe args tests
+
+ * The Realtek card reader does not enter PCIe 1.1/1.2 (LP: #1825487)
+ - misc: rtsx: make various functions static
+ - misc: rtsx: Enable OCP for rts522a rts524a rts525a rts5260
+ - SAUCE: misc: rtsx: Fixed rts5260 power saving parameter and sd glitch
+
+ * headset-mic doesn't work on two Dell laptops. (LP: #1825272)
+ - ALSA: hda/realtek - add two more pin configuration sets to quirk table
+
+ * CVE-2018-16884
+ - sunrpc: use SVC_NET() in svcauth_gss_* functions
+ - sunrpc: use-after-free in svc_process_common()
+
+ * sky2 ethernet card don't work after returning from suspension (LP: #1798921)
+ - sky2: Increase D3 delay again
+
+ * CVE-2019-9500
+ - brcmfmac: assure SSID length from firmware is limited
+
+ * CVE-2019-9503
+ - brcmfmac: add subtype check for event handling in data path
+
+ * CVE-2019-3882
+ - vfio/type1: Limit DMA mappings per container
+ * Intel I210 Ethernet card not working after hotplug [8086:1533]
+   (LP: #1818490)
+   - igb: Fix WARN_ONCE on runtime suspend
+   * bionic, xenial/hwe: misses "fuse: fix initial parallel dirops" patch
+   (LP: #1823972)
+   - fuse: fix initial parallel dirops
+   * amdgpudeResume failure: failed to allocate wb slot (LP: #1825074)
+   - drm/amdgpude: fix&cleanups for wb_clear
+   * Pop noise when headset is plugged in or removed from GHS/Line-out jack
+   (LP: #1821290)
+   - ALSA: hda/realtek - Add unplug function into unplug state of Headset Mode
+   for ALC225
+   - ALSA: hda/realtek - Disable headset Mic VREF for headset mode of ALC225
+   - ALSA: hda/realtek - Add support headset mode for DELL WYSE AIO
+   - ALSA: hda/realtek - Add support headset mode for New DELL WYSE NB
+   * mac80211_hwsim unable to handle kernel NULL pointer dereference
+   at0000000000000000 (LP: #1825058)
+   - mac80211_hwsim: Timer should be initialized before device registered
+   * [regression][snd_hda_codec_realtek] repeating crackling noise after 19.04
+   upgrade (LP: #1821663)
+   - ALSA: hda: Add Intel NUC7i3BNB to the power_save blacklist
+   - ALSA: hda - add Lenovo IdeaCentre B550 to the power_save_blacklist
+   - ALSA: hda - Add two more machines to the power_save_blacklist
+   * ubuntu_nbd_smoke_test failed on P9 with Bionic kernel (LP: #1822247)
+   - nbd: fix how we set bd_invalidated
+   * TSC clocksource not available in nested guests (LP: #1822821)
+   - kvmclock: fix TSC calibration for nested guests
+   * 4.15 kernel ip_vs --ops causes performance and hang problem (LP: #1819786)
+   - ipvs: fix refcount usage for conns in ops mode
+   * systemd cause kernel trace "BUG: unable to handle kernel paging request at
+     6db23a14" on Cosmic i386 (LP: #1813244) // systemd cause kernel trace "BUG:
+     unable to handle kernel paging request at 6db23a14" on Cosmic i386
+     (LP: #1813244)
+   - openvswitch: fix flow actions reallocation
+   -- Stefan Bader <stefan.bader@canonical.com> Thu, 25 Apr 2019 10:40:22 +0200
+   + linux (4.15.0-48.51) bionic; urgency=medium
* linux: 4.15.0-48.51 -proposed tracker (LP: #1822820)

* Packaging resync (LP: #1786013)
  - [Packaging] update helper scripts
  - [Packaging] resync retropeline extraction

* 3b080b2564287be91605bfd1d5ee985696e61d3c in ubuntu_btrfs_kernel_fixes
  triggers system hang on i386 (LP: #1812845)

* btrfs: raid56: properly unmap parity page in finish_parity_scrub()

* [P9][LTCTest][Opal][FW910] cpupower monitor shows multiple stop Idle Stats
  (LP: #1719545)
  - cpupower: Fix header name to read idle state name

* [amdGPU] screen corruption when using touchpad (LP: #1818617)
  - drm/amdGPU/gmc: steal the appropriate amount of vram for fw hand-over (v3)
  - drm/amdGPU: Free VGA stolen memory as soon as possible.

* [SRU][B/C/OEM]IOMMU: add kernel dma protection (LP: #1820153)
  - ACPI / AML parser: attempt to continue loading table after error
  - ACPI / property: Allow multiple property compatible _DSD entries
  - PCI / ACPI: Identify untrusted PCI devices
  - iommu/vt-d: Force IOMMU on for platform opt in hint
  - iommu/vt-d: Do not enable ATS for untrusted devices
  - thunderbolt: Export IOMMU based DMA protection support to userspace
  - iommu/vt-d: Disable ATS support on untrusted devices

* Add basic support to NVLink2 passthrough (LP: #1819989)
  - powerpc/powernv/npu: Do not try invalidating 32bit table when 64bit table is enabled
  - powerpc/powernv: call OPAL_QUIESCE before OPAL_SIGNAL_SYSTEM_RESET
  - powerpc/powernv: Export opal_check_token symbol
  - powerpc/powernv: Make possible for user to force a full ipl cec reboot
  - powerpc/powernv/idaa: Remove unnecessary pcdev from pci_dn
  - powerpc/powernv: Move npu struct from pnv_phb to pci_controller
  - powerpc/powernv/npu: Move OPAL calls away from context manipulation
  - powerpc/pseries/iommu: Use memory@ nodes in max RAM address calculation
  - powerpc/pseries/npu: Enable platform support
  - powerpc/pseries: Remove IOMMU API support for non-LPAR systems
  - powerpc/powernv/npu: Check mmio_atsd array bounds when populating
  - powerpc/powernv/npu: Fault user page into the hypervisor's pagetable

* Huawei Hi1822 NIC has poor performance (LP: #1820187)
  - net-next: hinic: fix a problem in free_tx_poll()
  - hinic: remove ndo_poll_controller
  - net-next/hinic: add checksum offload and TSO support
  - hinic: Fix l4_type parameter in hinic_task_set_tunnel_l4
- net-next/hinic: replace multiply and division operators
- net-next/hinic: add rx checksum offload for HiNIC
- net-next/hinic: fix a bug in set mac address
- net-next/hinic: fix a bug in rx data flow
- net: hinic: fix null pointer dereference on pointer hwdev
- hinic: optimize rx refill buffer mechanism
- net-next/hinic: add shutdown callback
- net-next/hinic: replace disable_irq_nosync/enable_irq

+ [CONFIG] please enable highdpi font FONT_TER16x32 (LP: #1819881)
+ Fonts: New Terminus large console font
+ [Config]: enable highdpi Terminus 16x32 font support

+ [19.04 FEAT] qeth: Enhanced link speed - kernel part (LP: #1814892)
+ - s390/qeth: report 25Gbit link speed

+ CVE-2017-5754
+ - x86/nmi: Fix NMI uaccess race against CR3 switching
+ - x86/mm: Fix documentation of module mapping range with 4-level paging
+ - x86/pti: Enable global pages for shared areas
+ - x86/pti: Never implicitly clear _PAGE_GLOBAL for kernel image
+ - x86/pti: Leave kernel text global for !PCID
+ - x86/pti: Fix boot problems from Global-bit setting
+ - x86/pti: Fix boot warning from Global-bit setting
+ - x86/pti: Reduce amount of kernel text allowed to be Global
+ - x86/pti: Disallow global kernel text with RANDSTRUCT
+ - x86/entry/32: Add explicit ‘l’ instruction suffix
+ - x86/asm-offsets: Move TSS_sp0 and TSS_sp1 to asm-offsets.c
+ - x86/entry/32: Rename TSS_sysenter_sp0 to TSS_entry2task_stack
+ - x86/entry/32: Load task stack from x86_tss.sp1 in SYSENTER handler
+ - x86/entry/32: Put ESPFIX code into a macro
+ - x86/entry/32: Unshare NMI return path
+ - x86/entry/32: Split off return-to-kernel path
+ - x86/entry/32: Enter the kernel via trampoline stack
+ - x86/entry/32: Leave the kernel via trampoline stack
+ - x86/entry/32: Introduce SAVE_ALL_NMI and RESTORE_ALL_NMI
+ - x86/entry/32: Handle Entry from Kernel-Mode on Entry-Stack
+ - x86/entry/32: Simplify debug entry point
+ - x86/entry/32: Add PTI cr3 switch to non-NMI entry/exit points
+ - x86/entry/32: Add PTI CR3 switches to NMI handler code
+ - x86/entry: Rename update_sp0 to update_task_stack
+ - x86/pgtable: Rename pti_set_user_pgd() to pti_set_user_pgtbl()
+ - x86/pgtable/pae: Unshare kernel PMDs when PTI is enabled
+ - x86/pgtable/32: Allocate 8k page-tables when PTI is enabled
+ - x86/pgtable: Move pgdp kernel/user conversion functions to pgtbl.h
+ - x86/pgtable: Move pti_set_user_pgtbl() to pgtbl.h
+ - x86/pgtable: Move two more functions from pgtbl_64.h to pgtbl.h
+ - x86/mm/pae: Populate valid user PGD entries
+ - x86/mm/pae: Populate the user page-table with user pgd's
+ - x86/mm/pti: Add an overflow check to pti_clone_pmds()
+ - x86/mm/pti: Define X86_CR3_PTI_PCID_USER_BIT on x86_32
+ - x86/mm/pti: Clone CPU ENTRY_AREA on PMD level on x86_32
+ - x86/mm/pti: Make pti_clone_kernel_text() compile on 32 bit
+ - x86/mm/pti: Keep permissions when cloning kernel text in
  pti_clone_kernel_text()
+ - x86/mm/pti: Introduce pti_finalize()
+ - x86/mm/pti: Clone entry-text again in pti_finalize()
+ - x86/mm/dump_pagetables: Define INIT_PGD
+ - x86/pti: Use separate kernel PMDs for user page-table
+ - x86/ldt: Reserve address-space range on 32 bit for the LDT
+ - x86/ldt: Define LDT_END_ADDR
+ - x86/ldt: Split out sanity check in map_ldt_struct()
+ - x86/ldt: Enable LDT user-mapping for PAE
+ - x86/pti: Allow CONFIG_PAGE_TABLE_ISOLATION for x86_32
+ - [Config] Update PAGE_TABLE_ISOLATION annotations
+ - x86/mm/pti: Add Warning when booting on a PCID capable CPU
+ - x86/entry/32: Add debug code to check entry/exit CR3
+ - x86/pti: Check the return value of pti_user_pagetable_walk_p4d()
+ - x86/pti: Check the return value of pti_user_pagetable_walk_pmd()
+ - perf/core: Make sure the ring-buffer is mapped in all page-tables
+ - x86/entry/32: Check for VM86 mode in slow-path check
+ - x86/mm: Remove in_nmi() warning from vmalloc_fault()
+ - x86/kexec: Allocate 8k PGDs for PTI
+ - x86/mm/pti: Clear Global bit more aggressively
+ - mm: Allow non-direct-map arguments to free_reserved_area()
+ - x86/mm/init: Pass unconverted symbol addresses to free_init_pages()
+ - x86/mm/init: Add helper for freeing kernel image pages
+ - x86/mm/init: Remove freed kernel image areas from alias mapping
+ - x86/mm/pti: Fix 32 bit PCID check
+ - x86/mm/pti: Don't clear permissions in pti_clone_pmd()
+ - x86/mm/pti: Clone kernel-image on PTE level for 32 bit
+ - x86/relocs: Add __end_rodata_aligned to S_REL
+ - x86/mm/pti: Move user W+X check into pti_finalize()
+ - x86/efi: Load fixmap GDT in efi_call_phys_epilog()
+ - x86/efi: Load fixmap GDT in efi_call_phys_epilog() before setting %cr3
+ - x86/mm/doc: Clean up the x86-64 virtual memory layout descriptions
+ - x86/mm/doc: Enhance the x86-64 virtual memory layout descriptions
+ - x86/entry/32: Clear the CS high bits
+ - x86/mm: Move LDT remap out of KASLR region on 5-level paging
+ - x86/ldt: Unmap PTEs for the slot before freeing LDT pages
+ - x86/ldt: Remove unused variable in map_ldt_struct()
+ - x86/mm: Fix guard hole handling
+ - x86/dump_pagetables: Fix LDT remap address marker
+
+ * Avoid potential memory corruption on HiSilicon SoCs (LP: #1819546)
+ - iommu/arm-smmu-v3: Avoid memory corruption from Hisilicon MSI payloads
Ubuntu18.04.01: [Power9] power8 Compat guest(RHEL7.6) crashes during guest boot with > 256G of memory (kernel/kvm) (LP: #1818645)
- [PATCH] KVM: PPC: Book3S HV: Don't truncate HPTE index in xlate function
- Fix for dual Intel NVMes (LP: #1821961)
- SAUCE: nvme: Merge two quirk entries into one for Intel 760p/Pro 7600p

* CVE-2017-5715
- tools headers: Synchronize prctl.h ABI header
- x86/spectre: Add missing family 6 check to microcode check
- x86/speculation: Enable cross-hyperthread spectre v2 STIBP mitigation
- x86/speculation: Apply IBPB more strictly to avoid cross-process data leak
- x86/speculation: Propagate information about RSB filling mitigation to sysfs
- x86/speculation: Add RETPOLINE_AMD support to the inline asm CALL_NOSPEC variant
- x86/retpoline: Make CONFIG_RETPOLINE depend on compiler support
- x86/retpoline: Remove minimal retpoline support
- x86/speculation: Update the TIF_SSBD comment
- x86/speculation: Clean up spectre_v2_parse_cmdline()
- x86/speculation: Remove unnecessary ret variable in cpu_show_common()
- x86/speculation: Move STIPB/IBPB string conditionals out of cpu_show_common()
- x86/speculation: Disable STIBP when enhanced IBRS is in use
- x86/speculation: Rename SSBD update functions
- x86/speculation: Reorganize speculation control MSRs update
- sched/smt: Make sched_smt_present track topology
- x86/Kconfig: Select SCHED_SMT if SMP enabled
- sched/smt: Expose sched_smt_present static key
- x86/speculation: Rework SMT state change
- x86/111f: Show actual SMT state
- x86/speculation: Reorder the spec_v2 code
- x86/speculation: Mark string arrays const correctly
- x86/speculation: Mark command line parser data __initdata
- x86/speculation: Unify conditional spectre v2 print functions
- x86/speculation: Add command line control for indirect branch speculation
- x86/speculation: Prepare for per task indirect branch speculation control
- x86/process: Consolidate and simplify switch_to_xtra() code
- x86/speculation: Avoid __switch_to_xtra() calls
- x86/speculation: Prepare for conditional IBPB in switch_mm()
- ptrace: Remove unused ptrace_may_access_sched() and MODE_IBRS
- x86/speculation: Split out TIF update
- x86/speculation: Prevent stale SPEC_CTRL msr content
- x86/speculation: Prepare arch_smt_update() for PRCTL mode
- x86/speculation: Add prctl() control for indirect branch speculation
- x86/speculation: Enable prctl mode for spectre_v2_user
- x86/speculation: Add seccomp Spectre v2 user space protection mode
- x86/speculation: Provide IBPB always command line options
+ - kvm: svm: Ensure an IBPB on all affected CPUs when freeing a vmcb
+ - x86/speculation: Change misspelled STIPB to STIBP
+ - x86/speculation: Add support for STIBP always-on preferred mode
+ - x86, modpost: Replace last remnants of RETPOLINE with CONFIG_RETPOLINE
+ - s390: remove closing punctuation from spectre messages
+ - x86/speculation: Simplify the CPU bug detection logic
+
+ * CVE-2018-3639
+ - x86/bugs: Add AMD's variant of SSB_NO
+ - x86/bugs: Add AMD's SPEC_CTRL MSR usage
+ - x86/bugs: Switch the selection of mitigation from CPU vendor to CPU features
+ - x86/bugs: Update when to check for the LS_CFG SSBD mitigation
+ - x86/bugs: Fix the AMD SSBD usage of the SPEC_CTRL MSR
+ - KVM: x86: SVM: Call x86_spec_ctrl_set_guest/host() with interrupts disabled
+
+ * [Ubuntu] vfio-ap: add subsystem to matrix device to avoid libudev failures
+ (LP: #1818854)
+ - s390: vfio_ap: link the vfio_ap devices to the vfio_ap bus subsystem
+
+ * Kernel regularly logs: Bluetooth: hci0: last event is not cmd complete
+ (0x0f) (LP: #1748565)
+ - Bluetooth: Fix unnecessary error message for HCI request completion
+
+ * HiSilicon HNS ethernet broken in 4.15.0-45 (LP: #1818294)
+ - net: hns: Fix WARNING when hns modules installed
+
+ * rtl8723be wifi does not work under linux-modules-extra-4.15.0-33-generic
+ (LP: #1788997)
+ - SAUCE: Revert "rtlwifi: cleanup 8723be ant_sel definition"
+
+ * Crash from :i915 module with 4.15.0-46-generic using multi-display
+ (LP: #1819486)
+ - SAUCE: Revert "drm/i915: Fix hotplug irq ack on i965/g4x"
+
+ * kernel linux-image-4.15.0-44 not booting on Hyperv Server 2008R2
+ (LP: #1814069)
+ - hv/netvsc: fix handling of fallback to single queue mode
+ - hv/netvsc: Fix NULL dereference at single queue mode fallback
+
+ * Lenovo ideapad 330-15ICH Wifi rfkill hard blocked (LP: #1811815)
+ - platform/x86: ideapad: Add ideapad 330-15ICH to no_hw_rfkill
+
+ * Qualcomm Atheros QCA9377 wireless does not work (LP: #1818204)
+ - platform/x86: ideapad-laptop: Add Ideapad 530S-14ARR to no_hw_rfkill list
+
+ * fscache: jobs might hang when fscache disk is full (LP: #1821395)
+ - fscache: fix race between enablement and dropping of object
+
+ * hns3: fix oops in hns3_clean_rx_ring() (LP: #1821064)
+ - net: hns3: add dma_mrb() for rx description
+ * Hard lockup in 2 CPUs due to deadlock in cpu_stoppers (LP: #1821259)
+ - stop_machine: Disable preemption after queueing stopper threads
+ - stop_machine: Atomically queue and wake stopper threads
+ * tcm_loop.ko: move from modules-extra into main modules package
+ (LP: #1817786)
+ - [Packaging] move tcm_loop.lo to main linux-modules package
+ * tcmu user space crash results in kernel module hang. (LP: #1819504)
+ - scsi: tcmu: delete unused __wait
+ - scsi: tcmu: track nl commands
+ - scsi: tcmu: simplify nl interface
+ - scsi: tcmu: add module wide block/reset_netlink support
+ * Intel XL710 - i40e driver does not work with kernel 4.15 (Ubuntu 18.04)
+ (LP: #1779756)
+ - i40e: Fix for Tx timeouts when interface is brought up if DCB is enabled
+ - i40e: prevent overlapping tx_timeout recover
+ * some codecs stop working after S3 (LP: #1820930)
+ - ALSA: hda - Enforces runtime_resume after S3 and S4 for each codec
+ * i40e xps management broken when > 64 queues/cpus (LP: #1820948)
+ - i40e: Do not allow use more TC queue pairs than MSI-X vectors exist
+ - i40e: Fix the number of queues available to be mapped for use
+ * 4.15 s390x kernel BUG at /build/linux-
  + Gycr4Z/linux-4.15.0/drivers/block/virtio_blk.c:565! (LP: #1788432)
+ - virtio/s390: avoid race on vcdev->config
+ - virtio/s390: fix race in ccw_io_helper()
+ * [SRU][B/B-OEM/C/D] Fix AMD IOMMU NULL dereference (LP: #1820990)
+ - iommu/amd: Fix NULL dereference bug in match_hid_uid
+ * New Intel Wireless-AC 9260 [8086:2526] card not correctly probed in Ubuntu
  system (LP: #1821271)
+ - iwlwifi: add new card for 9260 series
+ * Add support for MAC address pass through on RTL8153-BD (LP: #1821276)
+ - r8152: Add support for MAC address pass through on RTL8153-BD
+ - r8152: Fix an error on RTL8153-BD MAC Address Passthrough support
+ -- Andrea Righi <andrea.righi@canonical.com> Tue, 02 Apr 2019 18:31:55 +0200
+ +linux (4.15.0-47.50) bionic; urgency=medium
+ * linux: 4.15.0-47.50 -proposed tracker (LP: #1819716)
+ 
+ * Packaging resync (LP: #1786013)
  + - [Packaging] resync getabis
  + - [Packaging] update helper scripts
  + - [Packaging] resync retopline extraction
+ 
+ * C++ demangling support missing from perf (LP: #1396654)
+ - [Packaging] fix a mistype
+ 
+ * arm-smmu-v3 arm-smmu-v3.3.auto: CMD_SYNC timeout (LP: #1818162)
  + - iommu/arm-smmu-v3: Fix unexpected CMD_SYNC timeout
+ 
+ * Crash in nvme_irq_check() when using threaded interrupts (LP: #1818747)
  + - nvme-pci: fix out of bounds access in nvme_cqe_pending
+ 
+ * CVE-2019-9213
  + - mm: enforce min addr even if capable() in expand_downwards()
+ 
+ * CVE-2019-3460
  + - Bluetooth: Check L2CAP option sizes returned from l2cap_get_conf_opt
+ 
+ * amdGPU with mst WARNING on blanking (LP: #1814308)
  + - drm/amd/display: Don’t use dc_link in link_encoder
  + - drm/amd/display: Move wait for hpd ready out from edp power control.
  + - drm/amd/display: eDP sequence BL off first then DP blank.
  + - drm/amd/display: Fix unused variable compilation error
  + - drm/amd/display: Fix warning about misaligned code
  + - drm/amd/display: Fix MST dp_blank REG_WAIT timeout
+ 
+ * tun/tap: unable to manage carrier state from userland (LP: #1806392)
  + - tun: implement carrier change
+ 
+ * CVE-2019-8980
  + - exec: Fix mem leak in kernel_read_file
+ 
+ * raw_skew in timer from the ubuntu_kernel_selftests failed on Bionic
  + (LP: #1811194)
  + - selftest: timers: Tweak raw_skew to SKIP when ADJ_OFFSET/other clock
  + adjustments are in progress
+ 
+ * [Packaging] Allow overlay of config annotations (LP: #1752072)
  + - [Packaging] config-check: Add an include directive
+ 
+ * CVE-2019-7308
  + - bpf: move {prev_,}insn_idx into verifier env
  + - bpf: move tmp variable into ax register in interpreter
+ - bpf: enable access to ax register also from verifier rewrite
+ - bpf: restrict map value pointer arithmetic for unprivileged
+ - bpf: restrict stack pointer arithmetic for unprivileged
+ - bpf: restrict unknown scalars of mixed signed bounds for unprivileged
+ - bpf: fix check_map_access(smin_value test when pointer contains offset
+ - bpf: prevent out-of-bounds speculation on pointer arithmetic
+ - bpf: fix sanitation of alu op with pointer/scalar type from different
  paths
+ - bpf: add various test cases to selftests
+
+ * CVE-2017-5753
+ - bpf: properly enforce index mask to prevent out-of-bounds speculation
+ - bpf: fix inner map masking to prevent oob under speculation
+
+ * BPF: kernel pointer leak to unprivileged userspace (LP: #1815259)
+ - bpf/verifier: disallow pointer subtraction
+
+ * squashfs hardening (LP: #1816756)
+ - squashfs: more metadata hardening
+ - squashfs metadata 2: electric boogaloo
+ - squashfs: more metadata hardening
+ - Squashfs: Compute expected length from inode size rather than block length
+
+ * efi/arm/arm64: Allow SetVirtualAddressMap() to be omitted (LP: #1814982)
+ - efi/arm/arm64: Allow SetVirtualAddressMap() to be omitted
+
+ * Update ENA driver to version 2.0.3K (LP: #1816806)
+ - net: ena: update driver version from 2.0.2 to 2.0.3
+ - net: ena: fix race between link up and device initialization
+ - net: ena: fix crash during failed resume from hibernation
+
+ * ipset kernel error: 4.15.0-43-generic (LP: #1811394)
+ - netfilter: ipset: Fix wraparound in hash:*net* types
+
+ * Silent “Unknown key” message when pressing keyboard backlight hotkey
  (LP: #1817063)
+ - platform/x86: dell-wmi: Ignore new keyboard backlight change event
+
+ * CVE-2018-18021
+ - arm64: KVM: Tighten guest core register access from userspace
  - KVM: arm/arm64: Introduce vcpu_el1_is_32bit
+ - arm64: KVM: Sanitize PSTATE.M when being set from userspace
+
+ * CVE-2018-14678
+ - x86/entry/64: Remove %ebx handling from error_entry/exit
+
+ * CVE-2018-19824
+ - ALSA: usb-audio: Fix UAF decrement if card has no live interfaces in card.c
+ * CVE-2019-3459
+  * Bluetooth: Verify that l2cap_get_conf_opt provides large enough buffer
+  * for: unconditionally clear stack on fork
+  * spi: spi-s3c64xx: Fix system resume support
+  * Input: elan_i2c - add ACPI ID for lenovo ideapad 330
+  * Input: i8042 - add Lenovo LaVie Z to the i8042 reset list
+  * Input: elan_i2c - add another ACPI ID for Lenovo IdeaPad 330-15AST
+  * kmem: account shadow page tables to kmemcg
+  * delayacct: fix crash in delayacct_bkio_end() after delayacct init failure
+  * tracing: Fix double free of event_trigger_data
+  * tracing: Fix possible double free in event_enable_trigger_func()
+  * kthread, tracing: Don't expose half-written comm when creating kthreads
+  * tracing/kprobes: Fix trace probe flags on enable_trace_kprobe() failure
+  * tracing: Quiet gcc warning about maybe unused link variable
+  * arm64: fix vmemmap BUILD_BUG_ON() triggering on !vmemmap setups
+  * mlxsw: spectrum_switchdev: Fix port_vlan refcounting
+  * kcov: ensure irq code sees a valid area
+  * xen/netfront: raise max number of slots in xennet_get_responses()
+  * skip LAYOUTRETURN if layout is invalid
+  * ALSA: emu10k1: add error handling for snd_ctlgota
+  * ALSA: fm801: add error handling for snd_ctlgota
+  * NFSv4.1: Fix the client behaviour on NFS4ERR_SEQ_FALSE_RETRY
+  * nfsd: fix potential use-after-free in nfsd4_decode_getdeviceinfo
+  * vfio: platform: Fix reset module leak in error path
+  * vfio/mdev: Check globally for duplicate devices
+  * vfio/type1: Fix task tracking for QEMU vCPU hotplug
+  * kernel/hung_task.c: show all hung tasks before panic
+  * mm: /proc/pid/pagemap: hide swap entries from unprivileged users
+  * mm: vmalloc: avoid racy handling of debugobjects in vunmap
+  * mm/slub.c: add __printk verification to slab_err()
+  * rtc: ensure rtc_set_alarm fails when alarms are not supported
+  * perf tools: Fix pmu events parsing rule
+  * netfilter: ipset: forbid family for hash:mac sets
+  * netfilter: ipset: List timing out entries with "timeout 1" instead of zero
+  * irqchip/ls- scfg- msi: Map MSIs in the iommu
+  * watchdog: da9063: Fix updating timeout value
+  * printk: drop in_nmi check from printk_safe_flush_on_panic()
+  * bpf, arm32: fix inconsistent naming about emit_a32_lsr_[r64,i64]
+  * ceph: fix alignment of rasize
+  * e1000e: Ignore TSYNCRXCTL when getting I219 clock attributes
+  * powerpc/lib: Adjust .balign inside string functions for PPC32
+  * powerpc/64s: Add barrier_nospec
+  * powerpc/eeh: Fix use-after-release of EEH driver
+  * hvuc_opal: don't set tb_ticks_per_usec in udbg_init_opal_common()
+  * powerpc/64s: Fix compiler store ordering to SLB shadow area
+ - RDMA/mad: Convert BUG_ONs to error flows
+ - lightnvm: pblk: warn in case of corrupted write buffer
+ - netfilter: nf_tables: check msg_type before nft_trans_set(trans)
+ - pnfs: Don't release the sequence slot until we've processed layoutget on
  open
+ - disable loading f2fs module on PAGE_SIZE > 4KB
+ - f2fs: fix error path of move_data_page
+ - f2fs: fix to don't trigger writeback during recovery
+ - f2fs: fix to wait page writeback during revoking atomic write
+ - f2fs: Fix deadlock in shutdown ioctl
+ - f2fs: fix to detect failure of dquot_initialize
+ - f2fs: fix race in between GC and atomic open
+ - block, bfq: remove wrong lock in bfq_requests_merged
+ - usbip: usbip_detach: Fix memory, udev context and udev leak
+ - usbip: dynamically allocate idev by nports found in sysfs
+ - perf/x86/intel/uncore: Correct fixed counter index check in generic code
+ - perf/x86/intel/uncore: Correct fixed counter index check for NHM
+ - selftests/intel_pstate: Improve test, minor fixes
+ - selftests: memfd: return Kselftest Skip code for skipped tests
+ - selftests: intel_pstate: return Kselftest Skip code for skipped tests
+ - PCI: Fix devm_pci_alloc_host_bridge() memory leak
+ - iwllwifi: pcie: fix race in Rx buffer allocator
+ - Bluetooth: hci_qca: Fix "Sleep inside atomic section" warning
+ - Bluetooth: btusb: Add a new Realtek 8723DE ID 2f8b:011
+ - ASOC: dpcm: fix BE dai not hw_free and shutdown
+ - mfd: cros_ec: Fail early if we cannot identify the EC
+ - mwifiex: handle race during mwifiex_usb_disconnect
+ -wlcore: sdio: check for valid platform device data before suspend
+ - media: tw686x: Fix incorrect vb2_mem_ops GFP flags
+ - media: videobuf2-core: don't call memop 'finish' when queueing
+ - Btrfs: don't return ino to ino cache if inode item removal fails
+ - Btrfs: don't BUG_ON() in btrfs_truncate_inode_items()
+ - btrfs: add barriers to btrfs_sync_log before log_commit_wait wakeups
+ - btrfs: ggroup: Finish rescan when hit the last leaf of extent tree
+ - x86/microcode: Make the late update update_lock a raw lock for RT
+ - PM / wakeup: Make s2idle_lock a RAW_SPINLOCK
+ - PCI: Prevent sysfs disable of device while driver is attached
+ - nvme-rdma: stop admin queue before freeing it
+ - nvme-pci: Fix AER reset handling
+ - ath: Add regulatory mapping for FCC3_ETSIC
+ - ath: Add regulatory mapping for ETSI8_WORLD
+ - ath: Add regulatory mapping for APL13_WORLD
+ - ath: Add regulatory mapping for APL2_FCCA
+ - ath: Add regulatory mapping for Uganda
+ - ath: Add regulatory mapping for Tanzania
+ - ath: Add regulatory mapping for Serbia
+ - ath: Add regulatory mapping for Bermuda
+ - ath: Add regulatory mapping for Bahamas
+ - powerpc/32: Add a missing include header
+ - powerpc/chrp/time: Make some functions static, add missing header include
+ - powerpc/powermac: Add missing prototype for note_bootable_part()
+ - powerpc/powermac: Mark variable x as unused
+ - powerpc: Add __printf verification to prom_printf
+ - spi: sh-msiof: Fix setting SIRMDR1.SYNCAC to match SITMDR1.SYNCAC
+ - powerpc/8xx: fix invalid register expression in head_8xx.S
+ - pinctrl: at91-pio4: add missing of_node_put
+ - bpf: powerpc64: pad function address loads with NOPs
+ - PCI: pciehp: Request control of native hotplug only if supported
+ - net: qca8k: Add support for QCA8334 switch
+ - mwifiex: correct histogram data with appropriate index
+ - ima: based on policy verify firmware signatures (pre-allocated buffer)
+ - drivers/perf: arm-ccn: don't log to dmesg in event_init
+ - spi: Add missing pm_runtime_put_noidle() after failed get
+ - fsck: use unbound workqueue for decryption
+ - scsi: ufs: ufshcd: fix possible unclocked register access
+ - scsi: ufs: fix exception event handling
+ - scsi: zfcp: assert that the ERP lock is held when tracing a recovery trigger
+ - drm/newouveau/fifo/gk104: poll for runlist update completion
+ - Bluetooth: btusb: add ID for LiteOn 04ca:301a
+ - rtc: ts6586x: fix possible race condition
+ - rtc: vr41xx: fix possible race condition
+ - rtc: ts65910: fix possible race condition
+ - ALSA: emu10k1: Rate-limit error messages about page errors
+ - regulator: pfuze100: add .is_enable() for pfuze100_swbc_regulator_ops
+ - md/raid1: add error handling of read error from FailFast device
+ - md: fix NULL dereference of mddev->pers in remove_and_add_spares()
+ - ixgbevf: fix MAC address changes through ixgbevf_set_mac()
+ - media: smiapp: fix timeout checking in smiapp_read_nvms
+ - net: ethernet: ti: cpsw-phy-sel: check bus_find_device() ret value
+ - ALSA: usb-audio: Apply rate limit to warning messages in URB complete callback
+ - media: atomisp: ov2680: don't declare unused vars
+ - arm64: cmpwait: Clear event register before arming exclusive monitor
+ - HID: hid-plantronics: Re-resend Update to map button for PTT products
+ - arm64: dts: renesas: salvator-common: use audio-graph-card for Sound
+ - drm/radeon: fix mode_valid's return type
+ - drm/amdgpu: Remove VRAM from shared bo domains.
+ - powerpc/embedded6xx/hlwds-pic: Prevent interrupts from being handled by Starlet
+ - HID: i2c-hid: check if device is there before really probing
+ - EDAC, altera: Fix ARM64 build warning
+ - ARM: dts: stih407-pinctrl: Fix complain about IRQ_TYPE_NONE usage
+ - ARM: dts: emev2: Add missing interrupt-affinity to PMU node
+ - ARM: dts: sh73a0: Add missing interrupt-affinity to PMU node
+ - nvmem: properly handle returned value nvmem_reg_read
+ - i40e: free the skb after clearing the bitlock
- tty: Fix data race in tty_insert_flip_string_fixed_flag
- dma-iommu: Fix compilation when !CONFIG_IOMMU_DMA
- net: phy: phylink: Release link GPIO
- media: rcar_jpu: Add missing clk_disable_unprepare() on error in jpu_open()
- libata: Fix command retry decision
- ACPI / LPSS: Only call pwm_add_table() for Bay Trail PWM if PMIC HRV is 2
- media: media-device: fix ioctl function types
- media: saa7164: Fix driver name in debug output
- mtd: rawnand: fist_ifc: fix FSL NAND driver to read all ONFI parameter pages
- brcmfmac: Add support for bcm43364 wireless chipset
- s390/cpum_sf: Add data entry sizes to sampling trailer entry
- perf: fix invalid bit in diagnostic entry
- bnxt_en: Check unsupported speeds in bnxt_update_link() on PF only.
- scsi: 3w-9xxx: fix a missing-check bug
- scsi: 3w-xxxx: fix a missing-check bug
- scsi: megaraid: silence a static checker bug
- scsi: qdf: Set the UNLOADING flag when removing a vport
- staging: lustre: o2iblncl: fix race at kiblncl_connect_peer
- staging: lustre: o2iblncl: Fix FastReg map/unmap for MLX5
- thermal: exynos: fix setting rising_threshold for Exynos5433
- bpf: fix references to free_bpf_prog_info() in comments
- i2fs: avoid fsync() failure caused by EAGAIN in writepage()
- media: siano: get rid of __le32/__le16 cast warnings
- drm/atomic: Handling the case when setting old ctc for plane
- ALSA: hda/ca0132: fix build failure when a local macro is defined
- mmc: dw_mmc: update actual clock for mmc debugs
- mmc: pwrseq: Use kmalloc_array instead of stack VLA
- dt-bindings: pinctrl: meson: add support for the Meson8m2 SoC
- spi: meson-spicc: Fix error handling in meson_spicc_probe()
- dt-bindings: net: meson-dwmac: new compatible name for AXG SoC
- backlight: pwn_bl: Don't use GPIOF_* with gpio_get_direction
- stop_machine: Use raw spinlocks
- delayacct: Use raw_spinlocks
- memory: tegra: Do not handle spurious interrupts
- memory: tegra: Apply interrupts mask per SoC
- nvme: lightnvnm: add granby support
- arm64: defconfig: Enable Rockchip io-domain driver
- igb: Fix queue selection on MAC filters on i210
- drm/gma500: fix psb_intel_lvds_mode_valid()'s return type
- ipconfig: Correctly initialise ic_nameservers
- rsi: Fix 'invalid vdd' warning in mmc
- rsi: fix nommu_map_sg overflow kernel panic
- audit: allow not equal op for audit by executable
- staging: vchiq_core: Fix missing semaphore release in error case
- staging: lustre: ldlm: correct removexattr detection
- staging: lustre: ldml: free resource when ldml_lock_create() fails.
- serial: core: Make sure compiler barfs for 16-byte earlycon names
- soc: imx: gpcv2: Do not pass static memory as platform data
+ - microblaze: Fix simpleImage format generation
+ - usb: hub: Don't wait for connect state at resume for powered-off ports
+ - crypto: authencsn - don't leak pointers to authenc keys
+ - crypto: authenc: don't leak pointers to authenc keys
+ - media: omap3isp: fix unbalanced dma_iommu_mapping
+ - regulator: Don't return or expect -errno from of_map_mode()
+ - scsi: scsi_dlh: replace too broad "TP9" string with the exact models
+ - scsi: megaraid_sas: Increase timeout by 1 sec for non-RAID fastpath IOs
+ - media: atomisp: compat32: fix __user annotations
+ - media: si470x: fix __be16 annotations
+ - ASoC: topology: Fix bclk and fsync inversion in set_link_hw_format()
+ - ASoC: topology: Add missing clock gating parameter when parsing hw_configs
+ - drm: Add DP PSR2 sink enable bit
+ - drm/atomic-helper: Drop plane->fb references only for
   drm_atomic_helper_shutdown()
+ - drm/dp/mst: Fix off-by-one typo when dump payload table
+ - block: reset bi_iter.bi_done after splitting bio
+ - random: mix rdrand with entropy sent in from userspace
+ - squashfs: be more careful about metadata corruption
+ - ext4: fix inline data updates with checksums enabled
+ - ext4: fix check to prevent initializing reserved inodes
+ - PCI: xgene: Remove leftover pci_scan_child_bus() call
+ - RDMA/uverbs: Protect from attempts to create flows on unsupported QP
+ - net: dsa: qca8k: Force CPU port to its highest bandwidth
+ - net: dsa: qca8k: Enable RXMAC when bringing up a port
+ - net: dsa: qca8k: Add QCA8334 binding documentation
+ - net: dsa: qca8k: Allow overwriting CPU port setting
+ - ipv4: remove BUG_ON() from fib_compute_spec_dst
+ - net: fix amd-xgbe flow-control issue
+ - net: lan78xx: fix rx handling before first packet is send
+ - net: mio-mux: bcm-iproc: fix wrong getter and setter pair
+ - NET: stmmac: align DMA stuff to largest cache line length
+ - tcp_bbr: fix bw probing to raise in-flight data for very small BDPs
+ - xen-netfront: wait xenbus state change when load module manually
+ - netlink: Do not subscribe to non-existent groups
+ - netlink: Don't shift with UB on nlk->ngroups
+ - tcp: do not force quickack when receiving out-of-order packets
+ - tcp: add max_quickacks param to tcp_incr_quickack and
   tcp_enter_quickack_mode
+ - tcp: do not aggressively quick ack after ECN events
+ - tcp: refactor tcp_ecn_check_ce to remove sk type cast
+ - tcp: add one more quick ack after after ECN events
+ - mm: disallow mappings that conflict for devm_memremap_pages()
+ - drm/i915/glk: Add Quirk for GLK NUC HDMI port issues.
+ - mm: check for SIGKILL inside dup_mmap() loop
+ - rxrpc: Fix terminal retransmission connection ID to include the channel
+ - ceph: fix use-after-free in ceph_stats()
+ - lightnvm: proper error handling for pblk_bio_add_pages
+ - f2fs: don't drop dentry pages after fs shutdown
+ - selftests/filesystems: return Kselftest Skip code for skipped tests
+ - selftests/filesystems: devpts_pts included wrong header
+ - iwllwifi: mvm: open BA session only when sta is authorized
+ - drm/amd/display: Do not program interrupt status on disabled crtc
+ - soc: qcom: smem: fix qcom_smem_set_global_partition()
+ - soc: qcom: smem: byte swap values properly
+ - pinctrl: msm: fix gpio-hog related boot issues
+ - net: mvpp2: Add missing VLAN tag detection
+ - drm/nouveaup: remove fence wait code from deferred client work handler
+ - drm/nouveaup/gem: lookup VMAs for buffers referenced by pushbuf ioctl
+ - clocksouc: Move inline keyword to the beginning of function declarations
+ - media: staging: atomisp: Comment out several unused sensor resolutions
+ - IB: Fix RDMA_RXE and INFINIBAND_RDMAVT dependencies for DMA_VIRT_OPS
+ - rsi: Add null check for virtual interfaces in wowlan config
+ - ARM: dts: stih410: Fix complain about IRQ_TYPE_NONE usage
+ - ARM: dts: imx53: Fix LDB OF graph warning
+ - soc/tegra: pmc: Don't allocate struct tegra_powergate on stack
+ - mlxsw: spectrum_router: Return an error for non-default FIB rules
+ - i40e: Add advertising 10G LR mode
+ - i40e: avoid overflow in i40e_ptp_adjfreq()
+ - ath10k: fix kernel panic while reading tpc_stats
+ - ASoC: fsl_ssi: Use u32 variable type when using regmap_read()
+ - platform/x86: dell-smbios: Match on www.dell.com in OEM strings too
+ - staging: ks7010: fix error handling in ks7010_upload_firmware
+ - media: rc: mce_kbd decoder: low timeout values cause double keydowns
+ - ath10k: search all IEs for variant before falling back
+ - PCI/ASPM: Disable ASPM L1.2 Substate if we don't have LTR
+ - ARM: dts: imx6qdl-wandboard: Let the codec control MCLK pinctrl
+ - drm/amdgpu: Avoid reclaim while holding locks taken in MMU notifier
+ - nvmet-fc: fix target sgl list on large transfers
+ - i2c: rear: handle RXDMA HW behaviour on Gen3
+ - gpio: uniphier: set legitimate irq trigger type in .to_irq hook
+ - tcp: ack immediately when a cwr packet arrives
+ - ACPICA: AML Parser: ignore control method status in module-level code
+ * Bionic update: upstream stable patchset 2019-02-05 (LP: #1814813)
+ - MIPS: ath79: fix register address in ath79_ddr_wb_flush()
+ - MIPS: Fix off-by-one in pci_resource_to_user()
+ - xen/PVH: Set up GS segment for stack canary
+ - drm/nouveaup/drm/nouveaup: Fix runtime PM leak in nv50_disp_atomic_commit()
+ - drm/nouveaup: Set DRIVER_ATOMIC cap earlier to fix debugfs
+ - bonding: set default miimon value for non-arp modes if not set
+ - ip: hash fragments consistently
+ - ip: in cmsg IP(V6)_ORIGDSTADDR call pskb_may_pull
+ - net/mlx4_core: Save the qpn from the input modifier in RST2INIT wrapper
+ - net: skb_segment() should not return NULL
+ - net/mlx5: Adjust clock overflow work period
+ - net/mlx5e: Don't allow aRFS for encapsulated packets
+ - net/mlx5e: Fix quota counting in aRFS expire flow
+ - net/ipv6: Fix linklocal to global address with VRF
+ - multicast: do not restore deleted record source filter mode to new one
+ - net/phy: consider PHY_IGNORE_INTERRUPT in phy_start_aneg_priv
+ - sock: fix sg page frag coalescing in sk_alloc_sg
+ - rtnetlink: add rtnl_link_state check in rtnl_configure_link
+ - vxlan: add new fdb alloc and create helpers
+ - vxlan: make netlink notify in vxlan_fdb_destroy optional
+ - vxlan: fix default fdb entry netlink notify ordering during netdev create
+ - tcp: fix dctcp delayed ACK schedule
+ - tcp: helpers to send special DCTCP ack
+ - tcp: do not cancel delay-AcK on DCTCP special ACK
+ - tcp: do not delay ACK in DCTCP upon CE status change
+ - staging: speakup: fix wraparound in uaccess length check
+ - usb: cdc_acm: Add quirk for Castles VEGA3000
+ - usb: core: handle hub C_PORT_OVER_CURRENT condition
+ - usb: dwc2: Fix DMA alignment to start at allocated boundary
+ - usb: gadget: f_fs: Only return delayed status when len is 0
+ - driver core: Partially revert "driver core: correct device's shutdown order"
+ - can: xilinx_can: fix RX loop if RXNEMP is asserted without RXOK
+ - can: xilinx_can: fix power management handling
+ - can: xilinx_can: fix recovery from error states not being propagated
+ - can: xilinx_can: fix device dropping off bus on RX overrun
+ - can: xilinx_can: keep only 1-2 frames in TX FIFO to fix TX accounting
+ - can: xilinx_can: fix incorrect clear of non-processed interrupts
+ - can: xilinx_can: fix RX overflow interrupt not being enabled
+ - can: peak_canfd: fix firmware < v3.3.0: limit allocation to 32-bit DMA addr
    only
+ - can: m_can.c: fix setup of CCCR register: clear CCCR NISO bit before
    checking can.ctrlmode
+ - turn off -Wattribute-alias
+ - net-next/hinic: fix a problem in hinic_xmit_frame()
+ - net/mlx5e: Refine ets validation function
+ - nfp: flower: ensure dead neighbour entries are not offloaded
+ - usb: gadget: Fix OS descriptors support
+ - ACPI: AML Parser: ignore dispatcher error status during table load
+
+ * installer does not support iSCSI iBFT (LP: #1817321)
+ * d-i: add iscsi_ibft to scsi-modules
+
+ * CVE-2019-7222
+ * KVM: x86: work around leak of uninitialized stack contents (CVE-2019-7222)
+
+ * CVE-2019-7221
+ * KVM: nVMX: unconditionally cancel preemption timer in free_nested
    (CVE-2019-7221)
+
+ * CVE-2019-6974
+ - kvm: fix kvm_ioctl_create_device() reference counting (CVE-2019-6974)
+ + * Regular D-state processes impacting LXD containers (LP: #1817628)
+ - mm: do not stall register_shrinker()
+ + * hns3 nic speed may not match optical port speed (LP: #1817969)
+ - net: hns3: Config NIC port speed same as that of optical module
+ + [Hyper-V] srcu: Lock srcu_data structure in srcu_gp_start() (LP: #1802021)
+ - srcu: Prohibit call_srcu() use under raw spinlocks
+ - srcu: Lock srcu_data structure in srcu_gp_start()
+ + * libsas disks can have non-unique by-path names (LP: #1817784)
+ - scsi: libsas: Fix rphy phy_identifier for PHYs with end devices attached
+ + * Bluetooth not working (Intel CyclonePeak) (LP: #1817518)
+ - Bluetooth: btusb: Add support for Intel bluetooth device 8087:0029
+ + * CVE-2019-8912
+ - net: crypto set sk to NULL when af_alg_release.
+ - net: socket: set sock->sk to NULL after calling proto_ops::release()
+ + * Trackpad is not recognized. (LP: #1817200)
+ - pinctrl: cannonlake: Fix gpio base for GPP-E
+ + * [ALSA] [PATCH] System76 darp5 and oryp5 fixups (LP: #1815831)
+ - ALSA: hda/realtek - Headset microphone support for System76 darp5
+ - ALSA: hda/realtek - Headset microphone and internal speaker support for System76 oryp5
+ + * Constant noise in the headphone on Lenovo X1 machines (LP: #1817263)
+ - ALSA: hda/realtek: Disable PC beep in passthrough on alc285
+ + * AC adapter status not detected on Asus ZenBook UX410UAK (LP: #1745032)
+ - Revert "ACPI / battery: Add quirk for Asus GL502VSK and UX305LA"
+ - ACPI / AC: Remove initializer for unused ident dmi_system_id
+ - ACPI / battery: Remove initializer for unused ident dmi_system_id
+ - ACPI / battery: Add handling for devices which wrongly report discharging state
+ - ACPI / battery: Ignore AC state in handle_discharging on systems where it is broken
+ + * TPM intermittently fails after cold-boot (LP: #1762672)
+ - tpm: fix intermittent failure with self tests
+ + * qlcnic: Firmware aborts/hangs in QLogic NIC (LP: #1815033)
+ - qlcnic: fix Tx descriptor corruption on 82xx devices
* linux: 4.15.0-46.49 -proposed tracker (LP: #1814726)
* mprotect fails on ext4 with dax (LP: #1799237)
  - x86/speculation/l1tf: Exempt zeroed PTEs from inversion
* kernel BUG at /build/linux-vxxS7y/linux-4.15.0/mm/slub.c:296! (LP: #1812086)
  - iscsi target: fix session creation failure handling
  - scsi: iscsi: target: Set conn->sess to NULL when iscsi_login_set_conn_values fails
  - scsi: iscsi: target: Fix conn_ops double free
* user_copy in user from ubuntu_kernel_selftests failed on KVM kernel
  (LP: #1812198)
  - selftests: user: return Kselftest Skip code for skipped tests
  - selftests: kselftest: change KSFT_SKIP=4 instead of KSFT_PASS
  - selftests: kselftest: Remove outdated comment
* RTL8822BE WiFi Disabled in Kernel 4.18.0-12 (LP: #1806472)
  - SAUCE: staging: rtlwifi: allow RTLWIFI_DEBUG_ST to be disabled
  - [Config] CONFIG_RTLWIFI_DEBUG_ST=n
  - SAUCE: Add r8822be to signature inclusion list
* kernel oops in bcache module (LP: #1793901)
  - SAUCE: bcache: never writeback a discard operation
* CVE-2018-18397
  - userfaultfd: use ENOENT instead of EFAULT if the atomic copy user fails
  - userfaultfd: shmem: allocate anonymous memory for MAP_PRIVATE shmem
  - userfaultfd: shmem/hugetlbfs: only allow to register VM_MAYWRITE vmas
  - userfaultfd: shmem: add i_size checks
  - userfaultfd: shmem: UFFDIO_COPY: set the page dirty if VM_WRITE is not set
* Ignore "incomplete report" from Elan touchpanels (LP: #1813733)
  - HID: i2c-hid: Ignore input report if there's no data present on Elan touchpanels
* Vsock connect fails with ENODEV for large CID (LP: #1813934)
  - vhost/vsock: fix vhost vsock cid hashing inconsistent
* SRU: Fix thinkpad 11e 3rd boot hang (LP: #1804604)
  - ACPI / LPSS: Force LPSS quirks on boot
* Bionic update: upstream stable patchset 2019-01-17 (LP: #1812229)
- scsi: sd_zbc: Fix variable type and bogus comment
- KVM/Eventfd: Avoid crash when assign and deassign specific eventfd in parallel.
- x86/apm: Don't access __preempt_count with zeroed fs
- x86/events/intel/ds: Fix bts_interrupt_threshold alignment
- x86/MCE: Remove min interval polling limitation
- fat: fix memory allocation failure handling of match_strdup()
- ALSA: hda/realtek - Add Panasonic CF-SZ6 headset jack quirk
- ARCv2: [plat-hsdk]: Save acl reg pair by default
- ARC: Fix CONFIG_SWAP
- ARC: configs: Remove CONFIG_INITRAMFS_SOURCE from defconfigs
- ARC: mm: allow mprotect to make stack mappings executable
- mm: memcg: fix use after free in mem_group_iter()
- mm/huge_memory.c: fix data loss when splitting a file pmd
- cpufreq: intel_pstate: Register when ACPI PCCH is present
- vfio/pci: Fix potential Spectre v1
- stop_machine: Disable preemption when waking two stopper threads
- drm/i915: Fix hotplug irq ack on i965/g4x
- drm/nouvea: Use drm_connector_list_iter_* for iterating connectors
- drm/nouvea: Avoid looping through fake MST connectors
- gen_stats: Fix netlink stats dumping in the presence of padding
- ipv4: Return EINVAL when ping_group_range sysctl doesn't map to user ns
- ipv6: fix useless rol32 call on hash
- ipv6: ila: select CONFIG_DST_CACHE
- lib/rhashtable: consider param->min_size when setting initial table size
- net: diag: Don't double-free TCP_NEW_SYN_RECV sockets in tcp_abort
- net: Don't copy pfmemalloc flag in __copy_skb_header()
- skbuff: Unconditionally copy pfmemalloc in __skb_clone()
- net/ipv4: Set oif in fib_compute_spec_dst
- net: phy: fix flag masking in __set_phy_supported
- ptp: fix missing break in switch
- qmi_wwan: add support for Quectel EG91
- tg3: Add higher cpu clock for 5762.
- hv_netvsc: Fix napi reschedule while receive completion is busy
- net/mlx4_en: Don't reuse RX page when XDP is set
- net: systemport: Fix CRC forwarding check for SYSTEMPORT Lite
- ipv6: make DAD fail with enhanced DAD when nonce length differs
- net: usb: asix: replace mii_nway_restart in resume path
- alpha: fix osf_wait4() breakage
- cx1_getfile(): fix double-put() on alloc_file() failures
- powerpc/powernv: Fix save/restore of SPRG3 on entry/exit from stop (idle)
- xhci: Fix perceived dead host due to runtime suspend race with event handler
- KVM: irqfd: fix race between EPOLLHUP and irq_bypass_register_consumer
- x86/kvmclock: set pvti_cpu0_va after enabling kvmclock
- ALSA: hda/realtek - Yet another Clevo P950 quirk entry
- drm/amdgpu: Reserve VM root shared fence slot for command submission (v3)
- rhashtable: add restart routine in rhashtable_free_and_destroy()
- sch_fq_codel: zero q->flows_cnt when fq_codel_init fails
+ - sctp: introduce sctp_dst_mtu
+ - sctp: fix the issue that pathmtu may be set lower than MINSEGMENT
+ - net: aquantia: vlan unicast address list correct handling
+ - drm_mode_create_lease_ioctl(): fix open-coded filp_clone_open()
+
  + - compiler-gcc.h: Add __attribute__((gnu_inline)) to all inline declarations
  + - x86/asm: Add _ASM_ARG* constants for argument registers to <asm/asm.h>
  + - x86/paravirt: Make native_save_fl() extern inline
  + - Btrfs: fix duplicate extents after fsync of file with prealloc extents
  + - cpufreq / CPPC: Set platform specific transition_delay_us
  + - PCI: exynos: Fix a potential init_clk_resources NULL pointer dereference
  + - alx: take rtln before calling __alx_open from resume
  + - atm: Preserve value of skb->truesize when accounting to vce
  + - atm: zatm: Fix potential Spectre v1
  + - ipv6: sr: fix passing wrong flags to crypto_alloc_shash()
  + - ipvlan: fix IFLA_MTU ignored on NEWLINK
  + - ixgbe: split XDP_TX tail and XDP_REDIRECT map flushing
  + - net: dccp: avoid crash in ccid3_he_rx_send_feedback()
  + - net: dccp: switch rx_tstamp_last_feedback to monotonic clock
  + - net: use-after-free in GRO with ESP
  + - net: mach: Fix ptp time adjustment for large negative delta
  + - net/mlx5e: Avoid dealing with vport representors if not being e-switch manager
  + - net/mlx5: E-Switch, Avoid setup attempt if not being e-switch manager
  + - net/mlx5: Fix command interface race in polling mode
  + - net/mlx5: Fix incorrect raw command length parsing
  + - net/mlx5: Fix required capability for manipulating MPFS
  + - net/mlx5: Fix wrong size allocation for QoS ETC TC registser
  + - net: mvneta: fix the Rx desc DMA address in the Rx path
  + - net/packet: fix use-after-free
  + - net_sched: blackhole: tell upper qdisc about dropped packets
  + - net: sungem: fix rx checksum support
  + - net/tcp: Fix socket lookups with SO_BINDTODEVICE
  + - qede: Adverstise software timestamp caps when PHC is not available.
  + - qed: Fix setting of incorrect eswitch mode.
  + - qed: Fix use of incorrect size in memcpy call.
  + - qed: Limit msix vectors in kdump kernel to the minimum required count.
  + - r8152: napi hangup fix after disconnect
  + - stmmac: fix DMA channel hang in half-duplex mode
  + - strparser: Remove early eaten to fix full tcp receive buffer stall
  + - tcp: fix Fast Open key endianness
  + - tcp: prevent bogus FRTO undos with non-SACK flows
  + - vhost_net: validate sock before trying to put its fd
  + - VSOCK: fix loopback on big-endian systems
  + - net: cxgb3_main: fix potential Spectre v1
  + - rtlwifi: Fix kernel Oops "Fw download fail!!"
  + - rtlwifi: rtl8821ae: fix firmware is not ready to run
+ - net: lan78xx: Fix race in tx pending skb size calculation
+ - crypto: af_alg: Initialize sg_num_bytes in error code path
+ - mtd: rawnand: denali_dt: set clk_x_rate to 200 MHz unconditionally
+ - PCI: hv: Disable/enable IRQs rather than BH in hv-compose_msi_msg()
+ - netfilter: ebtables: reject non-bridge targets
+ - reiserfs: fix buffer overflow with long warning messages
+ - KEYS: DNS: fix parsing multiple options
+ - tls: Stricter error checking in zerocopy sendmsg path
+ - autofs: fix slab out of bounds read in getname_kernel()
+ - crypto: af_alg: Initialize sg_num_bytes in error code path
+ - mtd: denali_dt: set clk_x_rate to 200 MHz unconditionally
+ - reiserfs: fix buffer overflow with long warning messages
+ - netfilter: ebtables: reject non-bridge targets
+ - KEYS: DNS: fix parsing multiple options
+ - tls: Stricter error checking in zerocopy sendmsg path
+ - autofs: fix slab out of bounds read in getname_kernel()
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+ - mtd: denali_dt: set clk_x_rate to 200 MHz unconditionally
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+ - netfilter: ebtables: reject non-bridge targets
+ - KEYS: DNS: fix parsing multiple options
+ - tls: Stricter error checking in zerocopy sendmsg path
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+ - crypto: af_alg: Initialize sg_num_bytes in error code path
+ - mtd: denali_dt: set clk_x_rate to 200 MHz unconditionally
+ - reiserfs: fix buffer overflow with long warning messages
+ - netfilter: ebtables: reject non-bridge targets
+ - KEYS: DNS: fix parsing multiple options
+ - tls: Stricter error checking in zerocopy sendmsg path
+ - autofs: fix slab out of bounds read in getname_kernel()
+ * Fix non-working QCA Rome Bluetooth after S3 (LP: #1812812)
+ - USB: Add new USB LPM helpers
+ - USB: Consolidate LPM checks to avoid enabling LPM twice
+ + * ptrace-tm-spd-gpr in powerpc/ptrace from ubuntu_kerenl_selftests failed on
+ Bionic P8 (LP: #1813127)
+ - selftests/powerpc: Fix ptrace tm failure
+ + * [SRU] IO's are issued with incorrect Scatter Gather Buffer (LP: #1795453)
+ - scsi: megaraid_sas: Use 63-bit DMA addressing
+ + * Consider enabling CONFIG_NETWORK_PHY_TIMESTAMPING (LP: #1785816)
+ - [Config] Enable timestamping in network PHY devices
+ + * CVE-2018-19854
+ - crypto: user - fix leaking uninitialized memory to userspace
+ + * x86/mm: Found insecure W+X mapping at address (ptrval)/0xc00a0000
+ (LP: #1813532)
+ - x86/mm: Do not warn about PCI BIOS W+X mappings
+ + * CVE-2019-6133
+ - fork: record start_time late
+ + * Fix not working Goodix touchpad (LP: #1811929)
+ - HID: i2c-hid: Disable runtime PM on Goodix touchpad
+ + * bluetooth controller not detected with 4.15 kernel (LP: #1810797)
+ - SAUCE: btqcomsmd: introduce BT_QCOMSMD_HACK
+ - [Config] arm64: snapdragon: BT_QCOMSMD_HACK=y
+ + * X1 Extreme: only one of the two SSDs is loaded (LP: #1811755)
+ - nvme-core: rework a NQN copying operation
+ - nvme: pad fake subsys NQN vid and ssvid with zeros
+ - nvme: introduce NVME_QUIRK_IGNORE_DEV_SUBNQN
+ + * Crash on "ip link add foo type ipip" (LP: #1811803)
+ - SAUCE: fan: Fix NULL pointer dereference
+ + -- Khalid Elmously <khalid.elmously@canonical.com> Wed, 06 Feb 2019 04:57:21 +0000
+ +linux (4.15.0-45.48) bionic; urgency=medium
+ + * linux: 4.15.0-45.48 -proposed tracker (LP: #1813779)
+ + * External monitors does not work anymore 4.15.0-44 (LP: #1813663)
+ - SAUCE: Revert "drm/i915/dp: Send DPCD ON for MST before phy_up"
+ * kernel 4.15.0-44 cannot mount ext4 fs with meta_bg enabled (LP: #1813727)
+ * ext4: fix false negatives *and* false positives in ext4_check_descriptors()
+ + Stefan Bader <stefan.bader@canonical.com> Tue, 29 Jan 2019 16:39:15 +0100
+ +linux (4.15.0-44.47) bionic; urgency=medium
+ + linux: 4.15.0-44.47 -proposed tracker (LP: #1811419)
+ + * Packaging resync (LP: #1786013)
+ + - [Packaging] update helper scripts
+ + * CPU hard lockup with rigorous writes to NVMe drive (LP: #1810998)
+ + - blk-wbt: pass in enum wbt_flags to get_rq_wait()
+ + - blk-wbt: Avoid lock contention and thundering herd issue in wbt_wait
+ + - blk-wbt: move disable check into get_limit()
+ + - blk-wbt: use wq_has_sleep() for wq active check
+ + - blk-wbt: fix has-sleeper queueing check
+ + - blk-wbt: abstract out end IO completion handler
+ + - blk-wbt: improve waking of tasks
+ + * To reduce the Realtek USB cardreader power consumption (LP: #1811337)
+ + - mmc: sdhci: Disable 1.8v modes (HS200/HS400/UHS) if controller can't support
+ + 1.8v
+ + - mmc: core: Introduce MMC_CAP_SYNC_RUNTIME_PM
+ + - mmc: rtsx_usb_sdmnc: Don't runtime resume the device while changing led
+ + - mmc: rtsx_usb: Use MMC_CAP2_NO_Sdio
+ + - mmc: rtsx_usb: Enable MMC_CAP_ERASE to allow erase/discard/trim requests
+ + - mmc: rtsx_usb_sdmnc: Re-work runtime PM support
+ + - mmc: rtsx_usb_sdmnc: Re-work card detection/removal support
+ + - memstick: rtsx_usb_ms: Add missing pm_runtime_disable() in probe function
+ + - misc: rtsx_usb: Use USB remote wakeup signaling for card insertion detection
+ + - memstick: Prevent memstick host from getting runtime suspended during card
+ + detection
+ + - memstick: rtsx_usb_ms: Use ms_dev() helper
+ + - memstick: rtsx_usb_ms: Support runtime power management
+ + * Support non-strict iommu mode on arm64 (LP: #1806488)
+ + - iommu/io-pgttable-arm: Fix race handling in split_blk_unmap()
+ + - iommu/arm-smmu-v3: Implement flush_iotlb_all hook
+ + - iommu/dma: Add support for non-strict mode
+ + - iommu: Add "iommu.strict" command line option
+ + - iommu/io-pgttable-arm: Add support for non-strict mode
+ + - iommu/arm-smmu-v3: Add support for non-strict mode
+ + - iommu/io-pgttable-arm-v7s: Add support for non-strict mode
+ + - iommu/arm-smmu: Support non-strict mode
+ + * ELAN900C:00 04F3:2844 touchscreen doesn't work (LP: #1811335)
+ - pinctrl: cannonlake: Fix community ordering for H variant
+ - pinctrl: cannonlake: Fix HOSTSW_OWN register offset of H variant
+
+ * Add Cavium ThunderX2 SoC UNCORE PMU driver (LP: #1811200)
+ - perf: Export perf_event_update_userpage
+ - Documentation: perf: Add documentation for ThunderX2 PMU uncore driver
+ - drivers/perf: Add Cavium ThunderX2 SoC UNCORE PMU driver
+ - [Config] New config CONFIG_THUNDERX2_PMU=m
+
+ * Update hisilicon SoC-specific drivers (LP: #1810457)
+ - SAUCE: Revert "net: hns3: Updates RX packet info fetch in case of multi BD"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: separate rocse from nic when resetting"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: Use rocse handle when calling rocce callback function"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: Add calling rocce callback function when link status change"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: optimize the process of notifying rocce client"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: Add pf reset for hip08 RoCE"
+ - scsi: hisi_sas: Remove depends on HAS_DMA in case of platform dependency
+ - ethernet: hisilicon: hns: hns_dsaf_mac: Use generic eth_broadcast_addr
+ - scsi: hisi_sas: consolidate command check in hisi_sas_get_ata_protocol()
+ - scsi: hisi_sas: remove some unneeded structure members
+ - scsi: hisi_sas: Introduce hisi_sas_phy_set_linkrate()
+ - net: hns: Fix the process of adding broadcast addresses to team
+ - net: hns3: remove redundant variable 'protocol'
+ - scsi: hisi_sas: Drop hisi_sas_slot_abort()
+ - net: hns: Make many functions static
+ - net: hns: make hns_dsaf_roce_reset non static
+ - net: hisilicon: hns: Replace mdelay() with msleep()
+ - net: hns3: fix return value error while hclge_cmd_csq_clean failed
+ - net: hns: remove redundant variables 'max_frm' and 'tmp_mac_key'
+ - net: hns: Mark expected switch fall-through
+ - net: hns3: Mark expected switch fall-through
+ - net: hns3: Remove tx ring BD len register in hns3_enet
+ - net: hns: modify variable type in hns_nic_reuse_page
+ - net: hns: use eth_get_headlen interface instead of hns_nic_get_headlen
+ - net: hns3: modify variable type in hns3_nic_reuse_page
+ - net: hns3: Fix for vf vlan delete failed problem
+ - net: hns3: Fix for multicast failure
+ - net: hns3: Fix error of checking used vlan id
+ - net: hns3: Implement shutdown ops in hns3 pci driver
+ - net: hns3: Fix for loopback selftest failed problem
+ - net: hns3: Fix ping exited problem when doing lp selftest
+ - net: hns3: Preserve vlan 0 in hardware table
+ - net: hns3: Only update mac configuration when necessary
+ - net: hns3: Change the dst mac addr of loopback packet
+ - net: hns3: Remove redundant codes of query advertised flow control ability
+ - net: hns3: Refine hns3_set_link_ksettings()
+ - net: hns: make function hns_gmac_wait_fifo_clean() static
+ - net: hns3: Add default irq affinity
+ - net: hns3: Add unlikely for buf_num check
+ - net: hns3: Remove tx budget to clean more TX descriptors in a napi
+ - net: hns3: Remove packet statistics of public
+ - net: hns3: Add support for hns3_nic_netdev_ops.ndo_do_ioctl
+ - net: hns3: Set STATE_DOWN bit of hdev state when stopping net
+ - net: hns3: Check hdev state when getting link status
+ - net: hns3: Fix for setting speed for phy failed problem
+ - net: hns3: Fix cmdq registers initialization issue for vf
+ - net: hns3: Clear client pointer when initialize client failed or uninitialized
  finished
+ - net: hns3: Fix client initialize state issue when roc6 client initialize
  failed
+ - net: hns3: Fix parameter type for q_id in hclge_tm_q_to_qs_map_cfg()
+ - net: hns3: Fix ets validate issue
+ - net: hns3: Unify the type convert for desc.data
+ - net: hns3: Adjust prefix of tx/rx statistic names
+ - net: hns3: Fix tqp array traversal condition for vf
+ - net: hns3: Unify the prefix of vf functions
+ - net: hns3: Add handle for default case
+ - net: hns3: Add nic state check before calling netif_tx_wait_queue
+ - net: hns3: Add unlikely for dma_mapping_error check
+ - net: hns3: Remove print messages for error packet
+ - net: hns3: Add get_media_type ops support for VF
+ - net: hns3: Fix speed/duplex information loss problem when executing ethtool
  ethx cmd of VF
+ - net: hns3: Remove redundant hclge_get_port_type()
+ - net: hns3: Add support for scvp checksum offload
+ - net: hns3: Set extra mac address of pause param for HW
+ - net: hns3: Rename loop mode
+ - net: hns3: Rename mac loopback to app loopback
+ - net: hns3: Add serdes parallel inner loopback support
+ - net: hns3: Fix for packet buffer setting bug
+ - net: hns3: Fix for netdev not up problem when setting mtu
+ - net: hns3: Change return type of hclge_tm_schd_info_update()
+ - net: hns3: Modify hns3_get_max_available_channels
+ - net: hns3: Fix loss of coal configuration while doing reset
+ - net: hns: remove ndo_poll_controller
+ - hns3: Fix the build.
+ - hns3: Another build fix.
+ - net: hns3: Add flow director initialization
+ - net: hns3: Add input key and action config support for flow director
+ - net: hns3: Add support for rule add/delete for flow director
+ - net: hns3: Add support for rule query of flow director
+ - net: hns3: Add reset handle for flow director
- net: hns3: Remove all flow director rules when unload hns3 driver
- net: hns3: Add support for enable/disable flow director
- net: hns3: Remove the default mask configuration for mac vlan table
- net: hns3: Clear mac vlan table entries when unload driver or function reset
- net: hns3: Optimize for unicast mac vlan table
- net: hns3: Drop deprecated mta table support
- net: hns3: Add egress/ingress vlan filter for revision 0x21
- net: hns3: Fix for rx vlan id handle to support Rev 0x21 hardware
- net: hns3: Add new RSS hash algorithm support for PF
- net: hns3: Add RSS general configuration support for VF
- net: hns3: Add RSS tuples support for VF
- net: hns3: Add HW RSS hash information to RX skb
- net: hns3: Enable promisc mode when mac vlan table is full
- net: hns3: Resume promisc mode and vlan filter status after reset
- net: hns3: Resume promisc mode and vlan filter status after loopback test
- scsi: hisi_sas: Feed back linkrate(max/min) when re-attached
- scsi: hisi_sas: Move evaluation of hisi_hba in hisi_sas_task_prep()
- scsi: hisi_sas: Fix the race between IO completion and timeout for
  SMP/internal IO
- scsi: hisi_sas: Free slot later in slot_complete_vx_hw()
- scsi: hisi_sas: unmask interrupts ent72 and ent74
- scsi: hisi_sas: Use block layer tag instead for IPTT
- scsi: hisi_sas: Update v3 hw AIP_LIMIT and CFG_AGING_TIME register values
- net: hns3: remove hns3_fill_desc_tso
- net: hns3: move DMA map into hns3_fill_desc
- net: hns3: add handling for big TX fragment
- net: hns3: rename hns_nic_dma_unmap
- net: hns3: fix for multiple unmapping DMA problem
- scsi: hisi_sas: Fix spin lock management in slot_index_alloc_quirk_v2_hw()
- scsi: hisi_sas: Fix NULL pointer dereference
- net: hns3: Add PCIe AER callback error_detected
- net: hns3: Add PCIe AER error recovery
- net: hns3: Add support to enable and disable hw errors
- net: hns3: Add enable and process common ecc errors
- net: hns3: Add enable and process hw errors from IGU, EGU and NCSI
- net: hns3: Add enable and process hw errors from PPP
- net: hns3: Add enable and process hw errors of TM scheduler
- net: hns3: Fix for warning uninitialized symbol hw_err_lst3
- net: hns3: fix spelling mistake "intrerrupt" -> "interrupt"
- net: hns3: add error handler for hns3_nic_init_vector_data()
- net: hns3: bugfix for buffer not free problem during resetting
- net: hns3: bugfix for reporting unknown vector0 interrupt repeatedly problem
- net: hns3: bugfix for the initialization of command queue's spin lock
- net: hns3: remove unnecessary queue reset in the hns3_uninit_all_ring()
- net: hns3: bugfix for is_valid_csq_clean_head()
- net: hns3: bugfix for hclge_mdio_write and hclge_mdio_read
- net: hns3: fix incorrect return value/type of some functions
- net: hns3: bugfix for handling mailbox while the command queue reinitialized
+ net: hns3: bugfix for rtnl_lock's range in the hclge_reset()
+ net: hns3: bugfix for rtnl_lock's range in the hclgevf_reset()
+ net: hns3: Fix for out-of-bounds access when setting pfc back pressure
+ scsi: hisi_sas: Remove set but not used variable 'dq_list'
+ net: hns3: bugfix for not checking return value
+ net: hns: Incorrect offset address used for some registers.
+ net: hns: All ports can not work when insmod hns ko after rmmod.
+ net: hns: Some registers use wrong address according to the datasheet.
+ net: hns: Fixed bug that netdev was opened twice
+ net: hns: Clean rx fbd when ae stopped.
+ net: hns: Free irq when exit from abnormal branch
+ net: hns: Avoid net reset caused by pause frames storm
+ net: hns: Fix ntuple-filters status error.
+ net: hns: Add mac pcs config when enable|disable mac
+ net: hns: Fix ping failed when use net bridge and send multicast
+ net: hns3: use HNS3_NIC_STATE.InitEd to indicate the initialization state of
  enet
+ net: hns3: add set_default_reset_request in the hnae3 ae_ops
+ net: hns3: provide some interface & information for the client
+ net: hns3: adjust the location of clearing the table when doing reset
+ net: hns: enable/disable ring in the enet while doing UP/DOWN
+ net: hns3: use HNS3_NIC_STATE_RESETTING to indicate resetting
+ net: hns3: ignore new coming low-level reset while doing high-level reset
+ net: hns3: move some reset information from hnae3_handle into
  hclge_dev/hclgevf_dev
+ net: hns3: adjust the process of PF reset
+ net: hns3: call roce's reset notify callback when resetting
+ net: hns3: add error handler for hclge_reset()
+ net: hns3: fix for cmd queue memory not freed problem during reset
+ net: hns3: Remove set but not used variable 'reset_level'
+ net: hns3: fix spelling mistake, "assertting" -> "asserting"
+ net: hns3: add reset_hdev to reinit the hdev in VF's reset process
+ net: hns3: adjust VF's reset process
+ net: hns3: add reset handling for VF when doing PF reset
+ net: hns3: add reset handling for VF when doing Core/Global/IMP reset
+ net: hns3: stop handling command queue while resetting VF
+ net: hns3: add error handler for hclgevf_reset()
+ net: hns3: stop napi polling when HNS3_NIC_STATE_DOWN is set
+ net: hns3: implement the IMP reset processing for PF
+ net: hns3: add PCIe FLR support for PF
+ net: hns3: do VF's pci re-initialization while PF doing FLR
+ net: hns3: add PCIe FLR support for VF
+ net: hns3: Enable HW GRO for Rev B(=0x21) HNS3 hardware
+ net: hns3: Add handling of GRO Pkts not fully RX'ed in NAPI poll
+ net: hns3: Add skb chain when num of RX buf exceeds MAX_SKB_FRAGS
+ net: hns3: Adds GRO params to SKB for the stack
+ scsi: hisi_sas: use dma_set_mask_and_coherent
+ scsi: hisi_sas: Create separate host attributes per HBA
+ - scsi: hisi_sas: Add support for interrupt converge for v3 hw
+ - scsi: hisi_sas: Add support for interrupt coalescing for v3 hw
+ - scsi: hisi_sas: Relocate some codes to avoid an unused check
+ - scsi: hisi_sas: change the time of SAS SSP connection
+ - net: hns3: fix spelling mistake "failed" -&gt; "failed"
+ - net: hns3: Support two vlan header when setting mtu
+ - net: hns3: Refactor mac mtu setting related functions
+ - net: hns3: Add vport alive state checking support
+ - net: hns3: Add mtu setting support for vf
+ - net: hns3: up/down netdev in hclge module when setting mtu
+ - net: hns3: add common validation in hclge_dcb
+ - net: hns3: Add debugfs framework registration
+ - net: hns3: Add "queue info" query function
+ - net: hns3: Add "FD flow table" info query function
+ - net: hns3: Add "tc config" info query function
+ - net: hns3: Add "tm config" info query function
+ - net: hns3: Add "qos pause" config info query function
+ - net: hns3: Add "qos prio map" info query function
+ - net: hns3: Add "qos buffer" config info query function
+ - net: hns3: Support "ethtool -d" for HNS3 VF driver
+ - net: hns3: Adds support to dump(using ethtool-d) PCIe regs in HNS3 PF driver
+ - net: hns3: remove existing process error functions and reorder hw_blk table
+ - net: hns3: rename enable error interrupt functions
+ - net: hns3: re-enable error interrupts on hw reset
+ - net: hns3: deletes unnecessary settings of the descriptor data
+ - net: hns3: rename process_hw_error function
+ - net: hns3: add optimization in the hclge_hw_error_set_state
+ - net: hns3: add handling of hw ras errors using new set of commands
+ - net: hns3: deleted logging 1 bit errors
+ - net: hns3: add handling of hw errors reported through MSIX
+ - net: hns3: add handling of hw errors of MAC
+ - net: hns3: handle hw errors of PPP PF
+ - net: hns3: handle hw errors of PPU(RCB)
+ - net: hns3: handle hw errors of SSU
+ - net: hns3: add handling of RDMA RAS errors
+ - net: hns3: fix spelling mistake "offser" -&gt; "offset"
+ - scsi: hisi_sas: Fix warnings detected by sparse
+ - scsi: hisi_sas: Relocate some code to reduce complexity
+ - scsi: hisi_sas: Make sg_tablesize consistent value
+ - hns3: prevent building without CONFIG_INET
+ - net: hns3: Add "bd info" query function
+ - net: hns3: Add "manager table" information query function
+ - net: hns3: Add "status register" information query function
+ - net: hns3: Add "dcb register" status information query function
+ - net: hns3: Add "queue map" information query function
+ - net: hns3: Add "tm map" status information query function
+ - net: hns3: fix error handling int the hns3_get_vector_ring_chain
+ - net: hns3: uninitialize pci in the hclgevf_uninit
+ - net: hns3: fix napi_disable not return problem
+ - net: hns3: update some variables while hclge_reset()/hclgevf_reset() done
+ - net: hns3: remove unnecessary configuration recapture while resetting
+ - net: hns3: fix incomplete uninitialization of IRQ in the
  hns3_nic_uninit_vector_data()
+ - net: hns3: update coalesce param per second
+ - net: hns3: remove 1000M/half support of phy
+ - net: hns3: synchronize speed and duplex from phy when phy link up
+ - net: hns3: getting tx and dv buffer size through firmware
+ - net: hns3: aligning buffer size in SSU to 256 bytes
+ - net: hns3: fix a SSU buffer checking bug
+ - scsi: hisi_sas: Add support for DIF feature for v2 hw
+ - net: hns3: refine the handle for hns3_nic_net_open/stop()
+ - net: hns3: change default tc state to close
+ - net: hns3: fix a bug caused by udelay
+ - net: hns3: add max vector number check for pf
+ - net: hns3: reset tqp while doing DOWN operation
+ - net: hns3: fix vf id check issue when add flow director rule
+ - net: hns3: don't restore rules when flow director is disabled
+ - net: hns3: fix the descriptor index when get rss type
+ - net: hns3: remove redundant variable initialization
+ - net: hns3: call hns3_nic_net_open() while doing HNAE3_UP_CLIENT
+ - iptables connlimit allows more connections than the limit when using
  multiple CPUs (LP: #1811094)
+ - SAUCE: netfilter: xt_connlimit: remove the ‘addr’ parameter in add_hlist()
+ - netfilter: nf_conncount: expose connection list interface
+ - netfilter: nf_conncount: Fix garbage collection with zones
+ - netfilter: nf_conncount: fix garbage collection confirm race
+ - netfilter: nf_conncount: don’t skip eviction when age is negative
+ - CVE-2018-16882
+  - KVM: Fix UAF in nested posted interrupt processing
+  *
+  - Cannot initialize ATA disk if IDENTIFY command fails (LP: #1809046)
+  - scsi: libsas: check the ata device status by ata_dev_enabled()
+  *
+  - scsi: libsas: fix a race condition when smp task timeout (LP: #1808912)
+  - scsi: libsas: fix a race condition when smp task timeout
+  *
+  - CVE-2018-14625
+  - vhost/vsock: fix use-after-free in network stack callers
+  *
+  - Fix and issue that LG I2C touchscreen stops working after reboot
  (LP: #1805085)
+  - HID: i2c-hid: Disable runtime PM for LG touchscreen
+  *
+  - powerpc/powernv/pci: Work around races in PCI bridge enabling (LP: #1805245)
+ * Drivers: hv: vmbus: Offload the handling of channels to two workqueues
+ (LP: #1807757)
+ - hv_netvsc: fix network namespace issues with VF support
+ - hv_netvsc: split sub-channel setup into async and sync
+ - Drivers: hv: vmbus: Fix the offer_in_progress in vmbus_process_offer()
+ - hv_netvsc: Fix a deadlock by getting rtnl lock earlier in netvsc_probe()
+ - vmbus: don't return values for uninitialized channels
+ - Drivers: hv: vmbus: check the creation_status in vmbus_establish_gpadi()
+ - Drivers: hv: vmbus: Offload the handling of channels to two workqueues
+
+ * Disable LPM for Raydium Touchscreens (LP: #1802248)
+ - USB: quirks: Add no-lpm quirk for Raydium touchscreens
+ *
+ * Power leakage at S5 with Qualcomm Atheros QCA9377 802.11ac Wireless Network Adapter (LP: #1805607)
+ - SAUCE: ath10k: provide reset function for QCA9377 chip
+
+ * CVE-2018-17972
+ - proc: restrict kernel stack dumps to root
+
+ * CVE-2018-19407
+ - KVM: X86: Fix scan ioapic use-before-initialization
+
+ * CVE-2018-18281
+ - mremap: properly flush TLB before releasing the page
+
+ * Fix USB2 device wrongly detected as USB1 (LP: #1806534)
+ - xhci: Add quirk to workaround the errata seen on Cavium Thunder-X2 Soc
+
+ * armhf guests fail to boot in EFI mode (LP: #1809488)
+ - efi/arm: Revert deferred unmap of early memmap mapping
+
+ * Bionic shows incorrect warning about number of pointers in TFD
+ (LP: #1801102)
+ - iwlwifi: pcie: don't warn if we use all the transmit pointers
+
+ * audio output has constant noise on a Dell machine (LP: #1810891)
+ - ALSA: hda/realtek - Fixed headphone issue for ALC700
+
+ * ldisc crash on reopened tty (LP: #1791758)
+ - tty: Drop tty->count on tty_reopen() failure
+ - tty: Hold tty_ldisc_lock() during tty_reopen()
+ - tty: Don't block on IO when ldisc change is pending
+ - tty: Simplify tty->count math in tty_reopen()
+
+ * SATA device is not going to DEVSLP (LP: #1781533)
+ ahci: Allow setting a default LPM policy for mobile chipsets
+ - ata: libahci: Correct setting of DEVSLP register
+ - ata: libahci: Allow reconfigure of DEVSLP register
+ - ata: ahci: Support state with min power but Partial low power state
+ - ata: ahci: Enable DEVSLP by default on x86 with SLP_S0
+ - [Config] set CONFIG_SATA_MOBILE_LPM_POLICY=0
+ - Console got stuck using serial tty after logout (LP: #1808097)
+ - tty: do not set TTY_IO_ERROR flag if console port
+ - fannotify10 in ubuntu_ltp_syscalls failed (LP: #1802454)
+ - fsnotify: fix ignore mask logic in fsnotify()
+ * SRU: Fix kernel xhci hang when resume from S3 (LP: #1805344)
+ - usb: xhci: fix uninitialized completion when USB3 port got wrong status
+ - usb: xhci: fix timeout for transition from RExit to U0
+ - Add pointstick support for Cirque Touchpad (LP: #1805081)
+ - HID: multitouch: Add pointstick support for Cirque Touchpad
+ - Intel NVMe drives timeout when nvme format is attempted (LP: #1797587)
+ - nvme: Use admin command effects for admin commands
+ - lineout jack can't work on a Dell machine (LP: #1810892)
+ - ALSA: hda/realtek - Support Dell headset mode for New AIO platform
+ - Bionic update: upstream stable patchset 2019-01-04 (LP: #1810554)
+ - MIPS: Call dump_stack() from show_regs()
+ - MIPS: Use async IPIs for arch_trigger_cpumask_backtrace()
+ - MIPS: Fix ioremap() RAM check
+ - mmc: sdhci-esdhc-imx: allow 1.8V modes without 100/200MHz pinctrl states
+ - mmc: dw_mmc: fix card threshold control configuration
+ - ibnasm: don't write out of bounds in read handler
+ - staging: r8723bs: Prevent an underflow in rtw_check_beacon_data().
+ - staging: r8822be: Fix RTL8822be can't find any wireless AP
+ - ata: Fix ZBC_OUT command block check
+ - ata: Fix ZBC_OUT all bit handling
+ - vmw_balloon: fix inflation with batching
+ - ahci: Disable LPM on Lenovo 50 series laptops with a too old BIOS
+ - USB: serial: ch341: fix type promotion bug in ch341_control_in()
+ - USB: serial: cp210x: add another USB ID for Qivicon ZigBee stick
+ - USB: serial: keyspan_pda: fix modem-status error handling
+ - USB: serial: mos7840: fix status-register error handling
+ - usb: quirks: add delay quirks for Corsair Strafe
+ - xhci: xhci-mem: off by one in xhci_stream_id_to_ring()
+ - ALSA: hda - Handle pm failure during hotplug
+ - fs/proc/task_mmu.c: fix Locked field in /proc/pid/smaps*
+ - fs, elf: make sure to page align bss in load_elf_library
- mm: do not bug_on on incorrect length in __mm_populate()
- tracing: Reorder display of TGID to be after PID
- kbuild: delete INSTALL_FW_PATH from kbuild documentation
- arm64: neon: Fix function may_use_simd() return error status
- tools build: fix # escaping in .cmd files for future Make
- IB/hfi1: Fix incorrect mixing of ERR_PTR and NULL return values
- i2c: tegra: Fix NACK error handling
- iw_cxgb4: correctly enforce the max_reg_mr depth
- xen: setup pv irq ops vector earlier
- nvme-pci: Remap CMB SQ entries on every controller reset
- crypto: x86/salsa20 - remove x86 salsa20 implementations
- uprobes/x86: Remove incorrect WARN_ON() in uprobe_init_insn()
- netfilter: nf_queue: augment nfqa_cfg_policy
- netfilter: x_tables: initialise match/target check parameter struct
- loop: add recursion validation to LOOP_CHANGE_FD
- PM / hibernate: Fix oops at snapshot_write()
- RDMA/ucm: Mark UCM interface as BROKEN
- loop: remember whether sysfs_create_group() was done
- f2fs: return error during fill_super
- f2fs: avoid bug_on on corrupted inode
- f2fs: sanity check on sit entry
- f2fs: sanity check for total valid node blocks
- ARM: dts: armada-38x: use the new thermal binding
- mm: don't do zero_resv_unavail if memmap is not allocated

* Blacklist Realtek Virtual IPMI device (LP: #1808353)
* ipmi:pci: Blacklist a Realtek "IPMI" device

* Ethernet[10ec:8136] doesn't work after S3 with kernel 4.15.0.43.64
  (LP: #1809847)
* SAUCE: Revert "r8169: don't use MSI-X on RTL8106e"
* r8169: re-enable MSI-X on RTL8168g

* Killer 802.11ac 2x2 (1550 or 1550i) [8086:2526][1a56:1550] is not supported
  (LP: #1809219)
* iwlwifi: add more card IDs for 9000 series

* Support new Realtek ethernet chips (LP: #1811055)
* r8169: Add support for new Realtek Ethernet

* PC SN720 NVMe WDC 256GB consumes more power in S2Idle than during long idle
  (LP: #1805775)
+ - SAUCE: pci/nvme: prevent WDC PC SN720 NVMe from entering D3 and being disabled
+
+ * Power consumption during s2idle is higher than long idle (Intel SSDPEKSF) (LP: #1804588)
+ - SAUCE: pci: prevent Intel NVMe SSDPEKSF from entering D3
+ - SAUCE: nvme: add quirk to not call disable function when suspending
+
+ * mpt3sas - driver using the wrong register to update a queue index in FW (LP: #1810781)
+ - scsi: mpt3sas: As per MPI-spec, use combined reply queue for SAS3.5 controllers when HBA supports more than 16 MSI-x vectors.
+
+ * HP mobile workstations with hybrid graphics support, can not directly output to external monitors by dGPU (LP: #1810702)
+ - ACPI / OSI: Add OEM _OSI string to enable dGPU direct output
+
+ * broken touchpad after i2c-i801 blacklist change (LP: #1802135)
+ - i2c: i801: Don't restore config registers on runtime PM
+
+ * Enable new Realtek card reader (LP: #1806335)
+ - USB: usb-storage: Add new IDs to ums-realtek
+ - SAUCE: (noup) USB: usb-storage: Make MMC support optional on ums-realtek
+
+ * The line-out on the Dell Dock station can't work (LP: #1806532)
+ - ALSA: usb-audio: Allow to override the longname string
+ - ALSA: usb-audio: Give proper vendor/product name for Dell WD15 Dock
+ - ALSA: usb-audio: Add vendor and product name for Dell WD19 Dock
+
+ * linux-buildinfo: pull out ABI information into its own package (LP: #1806380)
+ - [Packaging] getabis -- handle all known package combinations
+ - [Packaging] getabis -- support parsing a simple version
+
+ * Fix Intel I210 doesn't work when ethernet cable gets plugged (LP: #1806818)
+ - igb: Fix an issue that PME is not enabled during runtime suspend
+
+ * Fix Terminus USB hub that may breaks connected USB devices after S3 (LP: #1806850)
+ - USB: Wait for extra delay time after USB_PORT_FEAT_RESET for quirky hub
+
+ * Add support for Dell DW5821e WWAN/GPS module (LP: #1807342)
+ - qmi_wwan: add support for the Dell Wireless 5821e module
+ - qmi_wwan: fix interface number for DW5821e production firmware
+ - USB: option: add support for DW5821e
+
+ * Add support for 0cf3:535b QCA_ROME device (LP: #1807333)
+ - Bluetooth: btusb: Add support for 0cf3:535b QCA_ROME device
+ * The mute led can't work anymore on the lenovo x1 carbon (LP: #1808465)
+  - ALSA: hda/realtek - Fix the mute LED regresion on Lenovo X1 Carbon
+  
+ * click/pop noise in the headphone on several lenovo laptops (LP: #1805079) //
+  click/pop noise in the headphone on several lenovo laptops (LP: #1805079)
+  - ALSA: hda/realtek - fix the pop noise on headphone for lenovo laptops
+  
+ * Touchpad stops working after reboot on Apollo Lake (LP: #1728244)
+  - HID: i2c-hid: disable runtime PM operations on hantick touchpad
+  
+ * MAC address pass through on RTL8153-BND for docking station (LP: #1808729)
+  - r8152: Add support for MAC address pass through on RTL8153-BND
+  
+ * [Ubuntu] kernel: zcrypt: reinit ap queue state machine (LP: #1805414)
+  - s390/zcrypt: reinit ap queue state machine during device probe
+  
+ * [UBUNTU] qeth: fix length check in SNMP processing (LP: #1805802)
+  - s390/qeth: fix length check in SNMP processing
+  
+ * ASPEED server console output extremely slow after upgrade to 18.04
+  (LP: #1808183)
+  - drm/ast: Remove existing framebuffers before loading driver
+  
+ * Bionic update: upstream stable patchset 2018-12-13 (LP: #1808399)
+  - userfaultfd: hugetlbfs: fix userfaultfd_huge_must_wait() pte access
+  - mm: hugetlb: yield when prepping struct pages
+  - tracing: Fix missing return symbol in function_graph output
+  - scsi: target: Fix truncated PR-in ReadKeys response
+  - s390: Correct register corruption in critical section cleanup
+  - drbd: fix access after free
+  - vfio: Use get_user_pages_longterm correctly
+  - cifs: Fix use after free of a mid_q_entry
+  - cifs: Fix memory leak in smb2_set_ea()
+  - cifs: Fix infinite loop when using hard mount option
+  - drm: Use kvzalloc for allocating blob property memory
+  - drm/udl: fix display corruption of the last line
+  - jbd2: don't mark block as modified if the handle is out of credits
+  - ext4: add corruption check in ext4_xattr_set_entry()
+  - ext4: always verify the magic number in xattr blocks
+  - ext4: make sure bitmaps and the inode table don't overlap with bg descriptors
+  - ext4: always check block group bounds in ext4_init_block_bitmap()
+  - ext4: only look at the bg_flags field if it is valid
+  - ext4: verify the depth of extent tree in ext4_find_extent()
+  - ext4: include the illegal physical block in the bad map ext4_error msg
+  - ext4: never move the system.data xattr out of the inode body
+  - ext4: avoid running out of journal credits when appending to an inline file
+ - ext4: add more inode number paranoia checks
+ - ext4: add more mount time checks of the superblock
+ - ext4: check superblock mapped prior to committing
+ - HID: i2c-hid: Fix "incomplete report" noise
+ - HID: hiddev: fix potential Spectre v1
+ - HID: debug: check length before copy_to_user()
+ - media: vb2: core: Finish buffers at the end of the stream
+ - i2fs: truncate preallocated blocks in error case
+ - Revert "dpaa_eth: fix error in dpaa_remove()"
+ - Kbuild: fix # escaping in .cmd files for future Make
+ - media: cx25840: Use subdev host data for PLL override
+ - fs: allow per-device dax status checking for filesystems
+ - dax: change bdev_dax_supported() to support boolean returns
+ - dax: check for QUEUE_FLAG_DAX in bdev_dax_supported()
+ - dm: set QUEUE_FLAG_DAX accordingly in dm_table_set_restrictions()
+ - dm: prevent DAX mounts if not supported
+ - mtd: cf_i_cmdset_0002: Change definition naming to retry write operation
+ - mtd: cf_i_cmdset_0002: Change erase functions to retry for error
+ - mtd: cf_i_cmdset_0002: Change erase functions to check chip good only
+ - netfilter: nf_log: don't hold nf_log_mutex during user access
+ - staging: comedii: quatech_daqp_cs: fix no-op loop daqp_aqo_insns_write()
+ - sched, tracing: Fix trace_sched_pi_setprio() for deboosting
+ - PCI / ACPI / PM: Resume bridges w/o drivers on suspend-to-RAM
+ - drm/amdgpu: Make struct amdgpu_atif private to amdgpu_acpi.c
+ - scsi: aacraid: Fix PD performance regression over incorrect qd being set
+ - ARM: dts: imx51-zii-rdu1: fix touchscreen pinctrl
+ - drm/amdgpu: Add amdgpu_atpx_get_dhandle()
+ - drm/amdgpu: Dynamically probe for ATIF handle (v2)
+ - i2c: core: smbus: fix a potential missing-check bug

+ * Bionic update: upstream stable patchset 2018-12-12 (LP: #1808185)
+ - usb: cdc_acm: Add quirk for Uniden UBC125 scanner
+ - USB: serial: cp210x: add CESINEL device ids
+ - USB: serial: cp210x: add Silicon Labs IDs for Windows Update
+ - usb: dwc2: fix the incorrect bitmaps for the ports of multi_tt hub
+ - acpi: Add helper for deactivating memory region
+ - usb: typec: ucsi: acpi: Workaround for cache mode issue
+ - usb: typec: ucsi: Fix for incorrect status data issue
+ - xhci: Fix kernel oops in trace_xhci_free_virt_device
+ - n_tty: Fix stall at n_tty_receive_char_special().
+ - n_tty: Access echo_* variables carefully.
+ - staging: android: ion: Return an ERR_PTR in ion_map_kernel
+ - serial: 8250_pci: Remove stalled entries in blacklist
+ - serdev: fix memleak on module unload
+ - vt: prevent leaking uninitialized data to userspace via /dev/vcs*
+ - drm/amdgpu: Add APU support in vi_set_uvd_clocks
+ - drm/amdgpu: Add APU support in vi_set_vce_clocks
+ - drm/amdgpu: fix the missed vcn fw version report
+ - drm/qxl: Call qxl_bo_unref outside atomic context
+ - drm/atmel-hlcdc: check stride values in the first plane
+ - drm/amdgpu: Use kvmalloc_array for allocating VRAM manager nodes array
+ - drm/amdgpu: Refactor amdgpu_vram_mgr_bo_invisible_size helper
+ - drm/i915: Enable provoking vertex fix on Gen9 systems.
+ - netfilter: nf_tables: nft_comapt: fix refcount leak on xt module
+ - netfilter: nft_comapt: prepare for indirect info storage
+ - netfilter: nft_comapt: fix handling of large matchinfo size
+ - netfilter: nf_tables: don't assume chain stats are set when jumplabel is set
+ - netfilter: nf_tables: bogus EBUSY in chain deletions
+ - netfilter: nft_meta: fix wrong value dereference in nft_meta_set_eval
+ - netfilter: nf_tables: disable preemption in nft_update_chain_stats()
+ - netfilter: nf_tables: increase nft_counters_enabled in
  nft_chain_stats_replace()
+ - netfilter: nf_tables: fix memory leak on error exit return
+ - netfilter: nf_tables: add missing netlink attrs to policies
+ - netfilter: nf_tables: fix NULL-ptr in nf_tables_dump_obj()
+ - netfilter: don't set F_IFACE on ipv6 fib lookups
+ - netfilter: ip6t_rpfilter: provide input interface for route lookup
+ - netfilter: nf_tables: use WARN_ON_ONCE instead of BUG_ON in nft_do_chain()
+ - ARM: dts: imx6q: Use correct SDMA script for SPI5 core
+ - xfrm6: avoid potential infinite loop in _decode_session6()
+ - afs: Fix directory permissions check
  - netfilter: etables: handle string from userspace with care
+ - s390/dasd: use blk_rq_rq_from_pdu for per request data
+ - netfilter: nft_limit: fix packet ratelimiting
+ - ipvs: fix buffer overflow with sync daemon and service
+ - iwlwifi: pcie: compare with number of IRQs requested for, not number of CPUs
+ - atm: zatm: fix memccmp casting
+ - net: qmi_wwan: Add Netgear Aircard 779S
+ - perf test: "Session topology" dumps core on s390
+ - perf bpf: Fix NULL return handling in bpf__prepare_load()
+ - fs: clear writeback errors in inode_init_always
+ - sched/core: Fix rules for running on online & active CPUs
+ - sched/core: Require cpu_active() in select_task_rq(), for user tasks
+ - platform/x86: asus-wmi: Fix NULL pointer dereference
+ - net/sonic: Use dma_mapping_error()
+ - net: dsa: b53: Add BCM5389 support
+ - usb: typec: tcpm: fix logbuffer index is wrong if tcpm_log is re-entered
+ - iio: mma8452: Fix ignoring MMA8452_INT_DRDY
+ - drm/amdgpu: fix clear_all and replace handling in the VM (v2)
+ - drm/amd/display: Clear connector's edid pointer
+ - drm/i915/dp: Send DPCD ON for MST before phy_up
+ - drm/amdgpu: remove DC special casing for KB/ML
+ - drm/amdgpu: Don't default to DC support for Kaveri and older
+ - drm/amd/gpu: GPU vs CPU page size fixes in amdgpu_vm_bo_split_mapping
+ - drm/amd/display: release spinlock before committing updates to stream
+ - drm/i915: Fix PIPESTAT irq ack on i965/g4x
- ARM64: dts: meson-gxl-s905x-p212: Add phy-supply for usb0
- x86/mm: Don't free P4D table when it is folded at runtime

* Bionic update: upstream stable patchset 2018-12-07 (LP: #1807469)
- x86/spectre_v1: Disable compiler optimizations over
  - array_index_mask_nospec()
- x86/mce: Improve error message when kernel cannot recover
- x86/mce: Check for alternate indication of machine check recovery on Skylake
- x86/mce: Fix incorrect “Machine check from unknown source” message
- x86/mce: Do not overwrite MCI_STATUS in mce_no_way_out()
- x86: Call fixup_exception() before notify_die() in math_error()
- m68k/mm: Adjust VM area to be unmapped by gap size for __iounmap()
- m68k/mac: Fix SWIM memory resource end address
- serial: sh-sci: Use spin_[try]lock_irqsave instead of open coding version
- signal/xtensa: Consistenly use SIGBUS in do_unaligned_user
- PM / Domains: Fix error path during attach in genpd
- PM / core: Fix supplier device runtime PM usage counter imbalance
- PM / OPP: Update voltage in case freq == old_freq
- usb: do not reset if a low-speed or full-speed device timed out
- 1wire: family module autoload fails because of upper/lower case mismatch.
- ASoC: dapm: delete dapm_kcontrol_data paths list before freeing it
- ASoC: cs35135: Add use_single_rw to regmap config
- ASoC: cirrus: i2s: Fix LRCLK configuration
- ASoC: cirrus: i2s: Fix [TX|RX]LinCtrlData setup
- thermal: bcm2835: Stop using printk format %pCr
- clk: renesas: cpg-mssr: Stop using printk format %pCr
- lib/vsprintf: Remove atomic-unsafe support for %pCr
- ftrace/selftest: Have the reset_trigger code be a bit more careful
- mips: ftrace: fix static function graph tracing
- branch-check: fix long->int truncation when profiling branches
- ipmi:bt: Set the timeout before doing a capabilities check
- Bluetooth: hci_qca: Avoid missing rampatch failure with userspace fw loader
- printk: fix possible reuse of va_list variable
- fuse: fix congested state leak on aborted connections
- fuse: atomic_o_trunc should truncate pagecache
- fuse: don't keep dead fuse_conn at fuse_fill_super().
- fuse: fix control dir setup and teardown
- powerpc/mm/hash: Add missing isync prior to kernel stack SLB switch
- powerpc/trace: Fix setting 512B aligned breakpoints with
  - PTRACE_SET_DEBUGREG
- powerpc/trace: Fix enforcement of DAWR constraints
- powerpc/powernv/ioda2: Remove redundant free of TCE pages
- powerpc/powernv: copy/paste - Mask SO bit in CR
- powerpc/fadump: Unregister fadump on kexec down path.
- soc: rockchip: power-domain: Fix wrong value when power up pd with writemask
- ARM: 8764/1: kdbg: fix NUMREGBYTES so that gdb_regs[] is the correct size
- ARM: dts: Fix SPI node for Arria10
- ARM: dts: socfpga: Fix NAND controller node compatible
+ - ARM: dts: socfpga: Fix NAND controller clock supply
+ - ARM: dts: socfpga: Fix NAND controller node compatible for Arria10
+ - arm64: Fix syscall restarting around signal suppressed by tracer
+ - arm64: kpti: Use early_param for kpti= command-line option
+ - arm64: mm: Ensure writes to swapper are ordered wrt subsequent cache maintenance
+ - ARM64: dts: meson: disable sd-uhs modes on the libretech-cc
+ - of: overlay: validate offset from property fixups
+ - of: unittest: for strings, account for trailing \0 in property length field
+ - of: platform: stop accessing invalid dev in of_platform_device_destroy
+ - tpm: fix use after free in tpm2_load_context()
+ - tpm: fix race condition in tpm_common_write()
+ - IB/qib: Fix DMA api warning with debug kernel
+ - IB/hfi1, qib: Add handling of kernel restart
+ - IB/mlx4: Mark user MR as writable if actual virtual memory is writable
+ - IB/core: Make testing MR flags for writability a static inline function
+ - IB/mlx5: Fetch soft WQE's on fatal error state
+ - IB/isert: Fix for lib/dma_debug_check_sync warning
+ - IB/isert: fix T10-pi check mask setting
+ - IB/hfi1: Fix fault injection init/exit issues
+ - IB/hfi1: Reorder incorrect send context disable
+ - IB/hfi1: Optimize kthread pointer locking when queuing CQ entries
+ - IB/hfi1: Fix user context tail allocation for DMA_RTAIL.
+ - RDMA/mlx4: Discard unknown SQP work requests
+ - xprtdma: Return -ENOBUFS when no pages are available
+ - mtd: cfi_cmdset_0002: Change write buffer to check correct value
+ - mtd: cfi_cmdset_0002: Use right chip in do_ppb_xxlock()
+ - mtd: cfi_cmdset_0002: fix SEGV unlocking multiple chips
+ - mtd: cfi_cmdset_0002: Fix unlocking requests crossing a chip boundary
+ - mtd: cfi_cmdset_0002: Avoid walking all chips when unlocking.
+ - PCI: hv: Make sure the bus domain is really unique
+ - PCI: Add ACS quirk for Intel 7th & 8th Gen mobile
+ - PCI: pciehp: Clear Presence Detect and Data Link Layer Status Changed on resume
+ - auxdisplay: fix broken menu
+ - pinctrl: samsung: Correct EINTG banks order
+ - pinctrl: devicetree: Fix pctldev pointer overwrite
+ - cpufreq: intel_pstate: Fix scaling max/min limits with Turbo 3.0
+ - MIPS: io: Add barrier after register read in inX()
+ - time: Make sure jiffies_to_msecs() preserves non-zero time periods
+ - irqchip/gic-v3-its: Don't bind LPI to unavailable NUMA node
+ - X.509: unpack RSA signatureValue field from BIT STRING
+ - Btrfs: fix return value on rename exchange failure
+ - iio: adc: ad7791: remove sample freq sysfs attributes
+ - iio: sca3000: Fix an error handling path in 'sca3000_probe()'
+ - mm: fix __gup_device_huge vs unmap
+ - scsi: qla2xxx: Fix setting lower transfer speed if GPSC fails
+ - scsi: qla2xxx: Mask off Scope bits in retry delay
+ - scsi: zfcp: fix missing SCSI trace for result of eh_host_reset_handler
+ - scsi: zfcp: fix missing SCSI trace for retry of abort / scsi_eh TMF
+ - scsi: zfcp: fix misleading REC trigger trace where erp_action setup failed
+ - scsi: zfcp: fix missing REC trigger trace on terminate_rport_io early return
+ - scsi: zfcp: fix missing REC trigger trace on terminate_rport_io for ERP_FAILED
+ - scsi: zfcp: fix missing REC trigger trace for all objects in ERP_FAILED
+ - scsi: zfcp: fix missing REC trigger trace on enqueue without ERP thread
+ - lndimms, pnm: Preserve read-only setting for pmem devices
+ - clk: at91: PLL recalc_rate() now using cached MUL and DIV values
+ - rtc: sun6i: Fix bit_idx value for clk_register_gate
+ - md: fix two problems with setting the "re-add" device state.
+ - rpsm: pm: do not use managed resources for endpoints and channels
+ - ubi: fastmap: Cancel work upon detach
+ - ubi: fastmap: Correctly handle interrupted erasures in EBA
+ - backlight: as3711_bl: Fix Device Tree node lookup
+ - backlight: max8925_bl: Fix Device Tree node lookup
+ - backlight: ts65217_bl: Fix Device Tree node lookup
+ - mfd: intel-lpss: Program REMAP register in PIO mode
+ - arm: dts: mt7623: fix invalid memory node being generated
+ - perf tools: Fix symbol and object code resolution for vds032 and vds032
+ - perf intel-pt: Fix sync_switch INTEL_PT_SS_NOT_TRACING
+ - perf intel-pt: Fix decoding to accept CBR between FUP and corresponding TIP
+ - perf intel-pt: Fix MTC timing after overflow
+ - perf intel-pt: Fix "Unexpected indirect branch" error
+ - perf intel-pt: Fix packet decoding of CYC packets
+ - media: vsp1: Release buffers for each video node
+ - media: v4l2-compat-ioctl32: Prevent go past max size
+ - media: dbv_frontend: Fix locking issues at dbv_frontend_get_event()
+ - nfsd: restrict rd_maxcount to svc_max_payload in nfsd_encode_readdir
+ - NFSv4: Fix possible 1-byte stack overflow in
  - nfs_idmap_read_and_verify_message
+ - NFSv4: Revert commit 5f83d86cf531d ("NFSv4.x: Fix wraparound issues.")
+ - NFSv4: Fix a typo in nfs41_sequence_process
+ - ACPI / LPSS: Add missing prv_offset setting for byt/cht PWM devices
+ - Input: elan_i2c - add ELAN0618 (Lenovo v330 15IKB) ACPI ID
+ - pwm: lps: platform: Save/restore the ctrl register over a suspend/resume
+ - rbd: flush rbd_dev->watch_dwork after watch is unregistered
+ - mm/ksm.c: ignore STABLE_FLAG of rmap_item->address in rmap_walk_ksm()
+ - mm: fix devmem_is_allowed() for sub-page System RAM intersections
+ - xen: Remove unnecessary BUG_ON from __unbind_from_irq()
+ - udf: Detect incorrect directory size
+ - Input: xpad - fix GPD Win 2 controller name
+ - Input: elan_i2c_smbus - fix more potential stack buffer overflows
+ - ALSA: timer: Fix USBAN warning at SNDRV_TIMER_IOCTL_NEXT_DEVICE ioctl
+ - ALSA: hda/realtek - Fix pop noise on Lenovo P50 & co
+ - ALSA: hda/realtek - Add a quirk for FSC ESPRIMO U9210
+ - slub: Fix failure when we delete and create a slab cache
+ block: Fix transfer when chunk sectors exceeds max
+ block: Fix cloning of requests with a special payload
+ x86/efi: Fix efi_call_phys_epilog() with CONFIG_X86_5LEVEL=y
+ dm zoned: avoid triggering reclaim from inside dmz_map()
+ dm thin: handle running out of data space vs concurrent discard
+ x86/platform/UV: Use new set memory block size function
+ x86/platform/UV: Add kernel parameter to set memory block size
+ platform/chrome: cros_ec_lpc: Register the driver if ACPI entry is missing.
+ platform/chrome: cros_ec_lpc: do not try DMI match when ACPI device found
+ hwmon: (k10temp) Add support for Stoney Ridge and Bristol Ridge CPUs
+ spi-nor: intel-spi: Remove unused preopcodes field
+ mtd: spi-nor: intel-spi: Fix atomic sequence handling
+ PCI / PM: Do not clear state_saved for devices that remain suspended
+ ASoC: mediatek: preallocate pages use platform device
+ libnvdimm, pmem: Do not flush power-fail protected CPU caches
+ powerpc/64s: Set assembler machine type to POWER4
+ powerpe/e500mc: Set assembler machine type to e500mc
+ hwreg: core - Always drop the RNG in hwreg_unregister()
+ softirq: Reorder trace_softirqs_on to prevent lockdep splat
+ ARM64: dts: meson-gx: fix ATF reserved memory region
+ mtd: rawnand: fix return value check for bad block status
+ mtd: rawnand: mxc: set spare area size register explicitly
+ PCI: Account for all bridges on bus when distributing bus numbers
+ pinctrl: armada-37xx: Fix spurious irq management
+ MIPS: pb44: Fix i2c-gpio GPIO descriptor table
+ locking/rwsem: Fix up_read_non_owner() warning with DEBUG_RWSEMS
+ scsi: scsi_debug: Fix memory leak on module unload
+ scsi: qla2xxx: Spinlock recursion in qla_target
+ libnvdimm, pmem: Unconditionally deep flush on *sync
+ f2fs: don't use GFP_ZERO for page caches
+ mfd: twl-core: Fix clock initialization
+ remoteproc: Prevent incorrect rproc state on xfer mem ownership failure
+ media: rc: mce_kbd decoder: fix stuck keys
+ input: silead - add Chuwi Hi8 support
+ input: silead - add MSSL0002 ACPI HID
+ ALSA: hda - Force to link down at runtime suspend on ATI/AMD HDMI
+ i2c: gpio: initialize SCL to HIGH again
+ kasan: depend on CONFIG_SLUB_DEBUG
+ dm: ensure bio submission follows a depth-first tree walk
+ dm: rename ‘bio’ member of dm_io structure to ‘orig_bio’
+ dm: use bio_split() when splitting out the already processed bio
+ x86/e820: put !E820_TYPE_RAM regions into memblockreserved
+ * Support AverMedia DVD EZMaker 7 USB video capture dongle (LP: #1620762) //
+ Bionic update: upstream stable patchset 2018-12-07 (LP: #1807469)
+ media: cx231xx: Add support for AverMedia DVD EZMaker 7
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 14 Jan 2019 09:38:05 +0000
+ linux (4.15.0-43.46) bionic; urgency=medium
+ *
+ * linux: 4.15.0-43.46 -proposed tracker (LP: #1806659)
+ *
+ * System randomly hangs during suspend when mei_wdt is loaded (LP: #1803942)
+ - SAUCE: base/dd: limit release function changes to vfio driver only
+ *
+ * Workaround CSS timeout on AMD SNPS 3.0 xHC (LP: #1806838)
+ - xhci: Allow more than 32 quirks
+ - xhci: workaround CSS timeout on AMD SNPS 3.0 xHC
+ *
+ * linux-buildinfo: pull out ABI information into its own package
+ (LP: #1806380)
+ - [Packaging] limit preparation to linux-libc-dev in headers
+ - [Packaging] commonise debhelper invocation
+ - [Packaging] ABI -- accumulate abi information at the end of the build
+ - [Packaging] buildinfo -- add basic build information
+ - [Packaging] buildinfo -- add firmware information to the flavour ABI
+ - [Packaging] buildinfo -- add compiler information to the flavour ABI
+ - [Packaging] buildinfo -- add buildinfo support to getabis
+ - [Config] buildinfo -- add retpoline version markers
+ *
+ * linux packages should own /usr/lib/linux/triggers (LP: #1770256)
+ - [Packaging] own /usr/lib/linux/triggers
+ *
+ * CVE-2018-12896
+ - posix-timers: Sanitize overrun handling
+ *
+ * CVE-2018-16276
+ - USB: yurex: fix out-of-bounds uaccess in read handler
+ *
+ * CVE-2018-10902
+ - ALSA: rawmidi: Change resized buffers atomically
+ *
+ * CVE-2018-18710
+ - cdrom: fix improper type cast, which can lead to information leak.
+ *
+ * CVE-2018-18690
+ - xfs: don't fail when converting shortform attr to long form during
+ ATTR_REPLACE
+ *
+ * CVE-2018-14734
+ - infiniband: fix a possible use-after-free bug
+ *
+ * CVE-2018-18445
+ - bpf: 32-bit RSH verification must truncate input before the ALU op
+
+ * Packaging resync (LP: #1786013)
+ - [Packaging] update helper scripts
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Thu, 06 Dec 2018 13:52:12 +0000
+
+ * linux (4.15.0-42.45) bionic; urgency=medium
+
+ * linux: 4.15.0-42.45 -proposed tracker (LP: #1803592)
+ 
+ * [FEAT] Guest-dedicated Crypto Adapters (LP: #1787405)
+ - KVM: s390: reset crypto attributes for all vcpus
+ - KVM: s390: vsie: simulate VCPU SIE entry/exit
+ - KVM: s390: introduce and use KVM_REQ_VSIE_RESTART
+ - KVM: s390: refactor crypto initialization
+ + s390: vfio-ap: base implementation of VFIO AP device driver
+ + s390: vfio-ap: register matrix device with VFIO mdev framework
+ + s390: vfio-ap: sysfs interfaces to configure adapters
+ + s390: vfio-ap: sysfs interfaces to configure domains
+ + s390: vfio-ap: sysfs interfaces to configure control domains
+ + s390: vfio-ap: sysfs interface to view matrix mdev matrix
+ + KVM: s390: interface to clear CRYCB masks
+ + s390: vfio-ap: implement mediated device open callback
+ + s390: vfio-ap: implementVFIO_DEVICE_GET_INFO ioctl
+ + s390: vfio-ap: zeroize the AP queues
+ + s390: vfio-ap: implementVFIO_DEVICE_RESET ioctl
+ + KVM: s390: Clear Crypto Control Block when using vSIE
+ + KVM: s390: vsie: Do the CRYCB validation first
+ + KVM: s390: vsie: Make use of CRYCB FORMAT2 clear
+ + KVM: s390: vsie: Allow CRYCB FORMAT-2
+ + KVM: s390: vsie: allow CRYCB FORMAT-1
+ + KVM: s390: vsie: allow CRYCB FORMAT-0
+ + KVM: s390: vsie: allow guest FORMAT-0 CRYCB on host FORMAT-1
+ + KVM: s390: vsie: allow guest FORMAT-1 CRYCB on host FORMAT-2
+ + KVM: s390: vsie: allow guest FORMAT-0 CRYCB on host FORMAT-2
+ + KVM: s390: device attrs to enable/disable AP interpretation
+ + KVM: s390: CPU model support for AP virtualization
+ + s390: doc: detailed specifications for AP virtualization
+ + KVM: s390: fix locking for crypto setting error path
+ + KVM: s390: Tracing APCB changes
+ + s390: vfio-ap: setup APCB mask using KVM dedicated function
+ + s390/zcrypt: Add ZAPQ inline function.
+ + s390/zcrypt: Review inline assembler constraints.
+ + s390/zcrypt: Integrate ap_asm.h into include/asm/ap.h.
+ + s390/zcrypt: fix ap_instructions_available() returncodes
+ + s390/zcrypt: remove VLA usage from the AP bus
+ + s390/zcrypt: Remove deprecated ioctls.
+ + s390/zcrypt: Remove deprecated zcrypt proc interface.
+ + s390/zcrypt: Support up to 256 crypto adapters.
+ - [Config:] Enable CONFIG_S390_AP_IOMMU and set CONFIG_VFIO_AP to module.
+ + * Bypass of mount visibility through users + mount propagation (LP: #1789161)
+ + mount: Retest MNT_LOCKED in do_umount
+ + mount: Don't allow copying MNT_UNBINDABLE[MNT_LOCKED mounts
+ + * CVE-2018-18955: nested user namespaces with more than five extents
+ * incorrectly grant privileges over inode (LP: #1801924) // CVE-2018-18955
+ + - usersns: also map extents in the reverse map to kernel IDs
+ + * kdump fail due to an IRQ storm (LP: #1797990)
+ + - SAUCE: x86/PCI: Export find_cap() to be used in early PCI code
+ + - SAUCE: x86/quirks: Add parameter to clear MSIs early on boot
+ + - SAUCE: x86/quirks: Scan all busses for early PCI quirks
+ + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Thu, 15 Nov 2018 17:01:46 -0200
+ +linux (4.15.0-40.43) bionic; urgency=medium
+ + * linux: 4.15.0-40.43 -proposed tracker (LP: #1802554)
+ + * crash in ENA driver on removing an interface (LP: #1802341)
+ + - SAUCE: net: ena: fix crash during ena_remove()
+ + * Ubuntu 18.04.1 - [s390x] Kernel panic while stressing network bonding
+ + (LP: #1797367)
+ + - s390/qeth: don't keep track of MAC address's cast type
+ + - s390/qeth: consolidate qeth MAC address helpers
+ + - s390/qeth: avoid using is_multicast_ether_addr_64bits on (u8 * )[6]
+ + - s390/qeth: remove outdated portname debug msg
+ + - s390/qeth: reduce hard-coded access to ccw channels
+ + - s390/qeth: sanitize strings in debug messages
+ + * [18.04 FEAT] zcrypt DD: introduce APQN tags to support deterministic driver
+ + binding (LP: #1799184)
+ + - s390/zcrypt: code beautify
+ + - s390/zcrypt: AP bus support for alternate driver(s)
+ + - s390/zcrypt: hex string mask improvements for apmask and aqmask.
+ + - s390/zcrypt: remove unused functions and declarations
+ + - s390/zcrypt: Show load of cards and queues in sysfs
+ + * [GLK/CLX] Enhanced IBRS (LP: #1786139)
+ + - x86/speculation: Remove SPECTRE_V2_IBRS in enum spectre_v2_mitigation
+ + - x86/speculation: Support Enhanced IBRS on future CPUs
+ + + Allow signed kernels to be kexec'd under lockdown (LP: #1798441)
+ + - Fix kexec forbidding kernels signed with keys in the secondary keyring to
+ + boot

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+ * Overlayfs in user namespace leaks directory content of inaccessible directories (LP: #1793458) // CVE-2018-6559
+ - SAUCE: overlayfs: ensure mounter privileges when reading directories
+ * Update ENA driver to version 2.0.1K (LP: #1798182)
+ - net: ena: remove ndo_poll_controller
+ - net: ena: fix warning in rmmod caused by double iounmap
+ - net: ena: fix rare bug when failed restart/resume is followed by driver removal
+ - net: ena: fix NULL dereference due to untimely napi initialization
+ - net: ena: fix auto casting to boolean
+ - net: ena: minor performance improvement
+ - net: ena: complete host info to match latest ENA spec
+ - net: ena: introduce Low Latency Queues data structures according to ENA spec
+ - net: ena: add functions for handling Low Latency Queues in ena_com
+ - net: ena: add functions for handling Low Latency Queues in ena_netdev
+ - net: ena: use CSUM_CHECKED device indication to report skb's checksum status
+ - net: ena: explicit casting and initialization, and clearer error handling
+ - net: ena: limit refill Rx threshold to 256 to avoid latency issues
+ - net: ena: change rx copybreak default to reduce kernel memory pressure
+ - net: ena: remove redundant parameter in ena_com_admin_init()
+ - net: ena: update driver version to 2.0.1
+ - net: ena: fix indentations in ena_defs for better readability
+ - net: ena: Fix Kconfig dependency on X86
+ - net: ena: enable Low Latency Queues
+ - net: ena: fix compilation error in xtensa architecture
+ * Bionic update: upstream stable patchset 2018-10-29 (LP: #1800537)
+ - bonding: re-evaluate force_primary when the primary slave name changes
+ - cdc_ncm: avoid padding beyond end of skb
+ - ipv6: allow PMTU exceptions to local routes
+ - net: dsa: add error handling for pskb_trim_rcsum
+ - net/sched: act_simple: fix parsing of TCA_DEF_DATA
+ - tcp: verify the checksum of the first data segment in a new connection
+ - udp: fix rx queue len reported by diag and proc interface
+ - net: in virtio_net_hdr only add VLAN_HLEN to csum_start if payload holds
+ - vlan
+ - tls: fix use-after-free in tls_push_record
+ - ext4: fix hole length detection in ext4_ind_map_blocks()
+ - ext4: update mtime in ext4_punch_hole even if no blocks are released
+ - ext4: bubble errors from ext4_find_inline_data_nolock() up to ext4_iget()
+ - ext4: fix fencepost error in check for inode count overflow during resize
+ - driver core: Don't ignore class_dir_create_and_add() failure.
+ - Btrfs: fix clone vs chattr NODATASUM race
+ - Btrfs: fix memory and mount leak in btrfs_ioctl_rm_dev_v2()
+ - btrfs: return error value if create_io_em failed in cow_file_range
+ - btrfs: scrub: Don't use inode pages for device replace
+ - ALSA: hda/conexant - Add fixup for HP Z2 G4 workstation
+ - ALSA: hda - Handle kzalloc() failure in snd_hda_attach_pcm_stream()
+ - ALSA: hda: add dock and led support for HP EliteBook 830 G5
+ - ALSA: hda: add dock and led support for HP ProBook 640 G4
+ - x86/MCE: Fix stack out-of-bounds write in mce-inject.c: Flags_read()
+ - smbd: fix various xid leaks
+ - CIFS: 511c54a2f69195b28af9d119f03787b1625bb4 adds a check for session expiry
+ - cifs: For SMB2 security informaion query, check for minimum sized security descriptor instead of sizeof FileAllInformation class
+ - nbd: fix nbd device deletion
+ - nbd: update size when connected
+ - nbd: use bd_set_size when updating disk size
+ - blk-mq: reinit q->tag_set_list entry only after grace period
+ - bdi: Move cgROUP bdi_writeback to a dedicated low concurrency workqueue
+ - cpufreq: Fix new policy initialization during limits updates via sysfs
+ - cpufreq: governors: Fix long idle detection logic in load calculation
+ - libata: zpodd: small read overflow in eject_tray()
+ - libata: Drop SanDisk SD7UB3Q*G1001 NOLPM quirk
+ - w1: mxc_w1: Enable clock before calling clk_get_rate() on it
+ - x86/intel_rdt: Enable CMT and MBM on new Skylake stepping
+ - iw1wifi: fw: harden page loading code
+ - orangefs: set i_size on new symlink
+ - orangefs: report attributes_mask and attributes for stats
+ - HID: intel_isb-hid: ipc: register more pm callbacks to support hibernation
+ - HID: wacom: Correct logical maximum Y for 2nd-gen Intuos Pro large
+ - mm, page_alloc: do not break __GFP_THISNODE by zonelist reset
+ - net: phy: dp83822: use BMCR_ANENABLE instead of BMSR_ANEGCAPABLE for DP83620
+ - cpufreq: ti-cpufreq: Fix an incorrect error return value
+ - x86/vector: Fix the args of vector_alloc tracepoint
+ - x86/apic/vector: Prevent hlist corruption and leaks
+ - x86/apic: Provide apic_ack_irq()
+ - x86/ioapic: Use apic_ack_irq()
+ - x86/platform/uv: Use apic_ack_irq()
+ - irq_remapping: Use apic_ack_irq()
+ - genirq/generic_pendin: Do not lose pending affinity update
+ - genirq/affinity: Defer affinity setting if irq chip is busy
+ - genirq/migration: Avoid out of line call if pending is not set
+ * [bionic]mlx5: reading SW stats through ifstat cause kernel crash
+ (LP: #1799049)
+ - net/mlx5e: Don't attempt to dereference the ppriv struct if not being eswitch manager
+ * [Bionic][Cosmic] ipmi: Fix timer race with module unload (LP: #1799281)
+ - ipmi: Fix timer race with module unload
+ * [Bionic] ipmi: Remove ACPI SPMI probing from the SSIF (I2C) driver
- ipmi: Remove ACPI SPMI probing from the SSIF (I2C) driver

- * execveat03 in ubuntu_ltp_syscalls failed on X/B (LP: #1786729)
- cap_inode_getsecurity: use d_find_any_alias() instead of d_find_alias()

* Bionic][Cosmic] Fix to ipmi to support vendor specific messages greater than 255 bytes (LP: #1799794)
- - ipmi:ssif: Add support for multi-part transmit messages > 2 parts

* libvirt is unable to configure bridge devices inside of LXD containers
  (LP: #1784501)
- kernfs: allow creating kernfs objects with arbitrary uid/gid
- sysfs, kobject: allow creating kobject belonging to arbitrary users
- kobject: kset_create_and_add() - fetch ownership info from parent
- driver core: set up ownership of class devices in sysfs
- net-sysfs: require net admin in the init ns for setting tx_maxrate
- net-sysfs: make sure objects belong to container's owner
- net: create reusable function for getting ownership info of sysfs inodes
- bridge: make sure objects belong to container's owner
- sysfs: Fix regression when adding a file to an existing group

* [Ubuntu] kvm: fix deadlock when killed by oom (LP: #1800849)
- s390/kvm: fix deadlock when killed by oom

* [Ubuntu] net/af_iucv: fix skb leaks for HiperTransport (LP: #1800639)
- net/af_iucv: drop inbound packets with invalid flags
- net/af_iucv: fix skb handling on HiperTransport xmit error

* Power consumption during s2idle is higher than long idle(sk hynix)
  (LP: #1801875)
- SAUCE: pci: prevent sk hynix nvme from entering D3
- SAUCE: nvme: add quirk to not call disable function when suspending

* Enable keyboard wakeup for S2Idle laptops (LP: #1798552)
- Input: i8042 - enable keyboard wakeups by default when s2idle is used

* NULL pointer dereference at 00000000000000020 when access
  dst_orig->ops->family in function xfrm_lookup_with_ifid() (LP: #1801878)
- xfrm: Fix NULL pointer dereference when skb_dst_force clears the dst_entry.

* [Ubuntu] qdio: reset old sbal_state flags (LP: #1801686)
- s390/qdio: reset old sbal_state flags

* hns3: map tx ring to tc (LP: #1802023)
- net: hns3: Set tx ring’ tc info when netdev is up

* [Ubuntu] qeth: Fix potential array overrun in cmd/rc lookup (LP: #1800641)
+ - s390: qeth_core_mpc: Use ARRAY_SIZE instead of reimplementing its function
+ - s390: qeth: Fix potential array overrun in cmd/rc lookup
+
+ * Vulkan applications cause permanent memory leak with Intel GPU
+  (LP: #1798165)
+ - drm/syncobj: Don't leak fences when WAIT_FOR_SUBMIT is set
+
+ * Mounting SOFS SMB shares fails (LP: #1792580)
+ - cifs: connect to servername instead of IP for IPCS share
+
+ * Packaging resync (LP: #1786013)
+ - [Package] add support for specifying the primary makefile
+
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Fri, 09 Nov 2018 17:29:18 -0200
+
+ linux (4.15.0-39.42) bionic; urgency=medium
+
+ * Linux: insufficient shootdown for paging-structure caches (LP: #1798897)
+  - mm: move tlb_table_flush to tlb_flush_mmu_free
+  - mm/tlb: Remove tlb_remove_table() non-concurrent condition
+  - mm/tlb, x86/mm: Support invalidating TLB caches for RCU_TABLE_FREE
+  - [Config] CONFIG_HAVE_RCU_TABLE_INVALIDATE=y
+
+ * Ubuntu18.04: GPU total memory is reduced (LP: #1792102)
+  - Revert "powerpc/powerpc: Increase memory block size to 1GB on radix"
+
+ * arm64: snapdragon: reduce boot noise (LP: #1797154)
+  - [Config] arm64: snapdragon: DRM_MSM=m
+  - [Config] arm64: snapdragon: SND*=m
+  - [Config] arm64: snapdragon: disable ARM_SDE_INTERFACE
+  - [Config] arm64: snapdragon: disable DRM_I2C_ADV7511_CEC
+  - [Config] arm64: snapdragon: disable VIDEO_ADV7511, VIDEO_COBALT
+
+ * [Bionic] CPPC bug fixes (LP: #1796949)
+  - ACPI / CPPC: Update all pr_(debug/err) messages to log the subspace id
+  - cpufreq: CPPC: Don't set transition_latency
+  - ACPI / CPPC: Fix invalid PCC channel status errors
+
+ * regression in 'ip --family bridge neigh' since linux v4.12 (LP: #1796748)
+  - rtnetlink: fix rtnl_fdb_dump() for ndmsg header
+
+ * screen displays abnormally on the lenovo M715 with the AMD GPU (Radeon Vega
+ 8 Mobile, rev ca, 1002:15dd) (LP: #1796786)
+  - drm/amd/display: Fix takeover from VGA mode
+  - drm/amd/display: early return if not in vga mode in disable_vga
+  - drm/amd/display: Refine disable VGA
* arm64: snapdragon: WARNING: CPU: 0 PID: 1 arch/arm64/kernel/setup.c:271
  reserve_memblock_reserved_regions (LP: #1797139)
  - SAUCE: arm64: Fix /proc/iomem for reserved but not memory regions

* The front MIC can't work on the Lenovo M715 (LP: #1797292)
  - ALSA: hda/realtek - Fix the problem of the front MIC on the Lenovo M715

* Keyboard backlight sysfs sometimes is missing on Dell laptops (LP: #1797304)
  - platform/x86: dell-smbios: Correct some style warnings
  - platform/x86: dell-smbios: Rename dell-smbios source to dell-smbios-base
  - platform/x86: dell-smbios: Link all dell-smbios-* modules together
  - [Config] CONFIG_DELL_SMBIOS_SMM=y, CONFIG_DELL_SMBIOS_WMI=y

* rpi3b+: ethernet not working (LP: #1797406)
  - lan78xx: Don't reset the interface on open

* 87cdf3148b11 was never backported to 4.15  (LP: #1795653)
  - xfrm: Verify MAC header exists before overwriting eth_hdr(skb)->h_proto

* [Ubuntu18.04][Power9][DD2.2]package installation segfaults inside debian
  chroot env in P9 KVM guest with HTM enabled (kvm) (LP: #1792501)
  - KVM: PPC: Book3S HV: Fix guest r11 corruption with POWER9 TM workarounds

* Provide mode where all vCPUs on a core must be the same VM (LP: #1792957)
  - KVM: PPC: Book3S HV: Provide mode where all vCPUs on a core must be the same
  VM

* fscache: bad refcounting in fscache_op_complete leads to OOPS (LP: #1797314)
  - SAUCE: fscache: Fix race in decrementing refcount of op->npages

* CVE-2018-9363
  - Bluetooth: hidp: buffer overflow in hidp_process_report

* CVE-2017-13168
  - scsi: sg: mitigate read/write abuse

* [Bionic] ACPI / PPTT: use ACPI ID whenever ACPI_PPTT_ACPI_PROCESSOR_ID_VALID
  is set (LP: #1797200)
  - ACPI / PPTT: use ACPI ID whenever ACPI_PPTT_ACPI_PROCESSOR_ID_VALID is set

* [Bionic] arm64: topology: Avoid checking numa mask for scheduler MC
  selection (LP: #1797202)
  - arm64: topology: Avoid checking numa mask for scheduler MC selection

* crypto/vmx - Backport of Fix sleep-in-atomic bugs patch for 18.04
  (LP: #1790832)
  - crypto: vmx - Fix sleep-in-atomic bugs
+ * hns3: autoneg settings get lost on down/up (LP: #1797654)
+ - net: hns3: Fix for information of phydev lost problem when down/up
+
+ * not able to unwind the stack from within __kernel_clock_gettime in the Linux
+ vDSO (LP: #1797963)
+ - powerpc/vdso: Correct call frame information
+
+ * Signal 7 error when running GPFS tracing in cluster (LP: #1792195)
+ - powerpc/mm/books3s: Add new pte bit to mark pte temporarily invalid.
+ - powerpc/mm/radix: Only need the Nest MMU workaround for R -> RW transition
+
+ * Support Edge Gateway's WIFI LED (LP: #1798330)
+ - SAUCE: mwifiex: Switch WiFi LED state according to the device status
+
+ * Support Edge Gateway's Bluetooth LED (LP: #1798332)
+ - SAUCE: Bluetooth: Support for LED on Edge Gateways
+
+ * USB cardreader (0bda:0328) make the system can't enter s3 or hang
+ (LP: #1798328)
+ - usb: Don't disable Latency tolerance Messaging (LTM) before port reset
+
+ * CVE-2018-15471
- xen-netback: fix input validation in xenvif_set_hash_mapping()
+
+ * CVE-2018-16658
- cdrom: Fix info leak/OOB read in cdrom_ioctl_drive_status
+
+ * [Bionic] Update ThunderX2 implementation defined pmu core events
+ (LP: #1796904)
+ - perf vendor events arm64: Update ThunderX2 implementation defined pmu core
+ - events
+
+ * the machine of lenovo M715 with the AMD GPU (Radeon Vega 8 Mobile, rev ca,
+ 1002:15dd) often hangs randomly (LP: #1796789)
+ - drm/amd: Add missing fields in atom_integrated_system_info_v1_11
+
+ * [18.04] GLK hang after a while (LP: #1760545)
+ - drm/i915/glk: Add MODULE_FIRMWARE for Geminilake
+
+ * Fix usbcore.quirks when used at boot (LP: #1795784)
+ - usb: core: safely deal with the dynamic quirk lists
+
++-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 23 Oct 2018 14:44:55 +0000
++linux (4.15.0-38.41) bionic; urgency=medium
++
++ * linux: 4.15.0-38.41 -proposed tracker (LP: #1797061)
+ * Silent data corruption in Linux kernel 4.15 (LP: #1796542)
+ - block: add a lower-level bio_add_page interface
+ - block: bio iov_iter_get_pages: fix size of last iovec
+ - blkdev: _blkdev_direct_IO_simple: fix leak in error case
+ - block: bio iov_iter_get_pages: pin more pages for multi-segment IOs
+ -- Stefan Bader <stefan.bader@canonical.com> Wed, 10 Oct 2018 11:20:35 +0200
+ --linux (4.15.0-37.40) bionic; urgency=medium
+ + * linux: 4.15.0-37.40 -proposed tracker (LP: #1795564)
+ + * hns3: enable ethtool rx-vlan-filter on supported hw (LP: #1793394)
+ + - net: hns3: Add vlan filter setting by ethtool command -K
+ + * hns3: Modifying channel parameters will reset ring parameters back to
+ + defaults (LP: #1793404)
+ + - net: hns3: Fix desc num set to default when setting channel
+ + * hisi_sas: Add SATA FIX check for v3 hw (LP: #1794151)
+ + - scsi: hisi_sas: Add SATA FIS check for v3 hw
+ + * Fix potential corruption using SAS controller on HiSilicon arm64 boards
+ + (LP: #1794156)
+ + - scsi: hisi_sas: add memory barrier in task delivery function
+ + * hisi_sas: Reduce unnecessary spin lock contention (LP: #1794165)
+ + - scsi: hisi_sas: Tidy hisi_sas_task_prep()
+ + * Add functional level reset support for the SAS controller on HiSilicon D06
+ + systems (LP: #1794166)
+ + - scsi: hisi_sas: tidy host controller reset function a bit
+ + - scsi: hisi_sas: relocate some common code for v3 hw
+ + - scsi: hisi_sas: Implement handlers of PCIe FLR for v3 hw
+ + * HiSilicon SAS controller doesn't recover from PHY STP link timeout
+ + (LP: #1794172)
+ + - scsi: hisi_sas: tidy channel interrupt handler for v3 hw
+ + - scsi: hisi_sas: Fix the failure of recovering PHY from STP link timeout
+ + * getxattr: always handle namespaced attributes (LP: #1789746)
+ + * getxattr: use correct xattr length
+ + * Fix unusable NVIDIA GPU after S3 (LP: #1793338)
+ + - PCI: Reprogram bridge prefetch registers on resume
+ + * Fails to boot under Xen PV: BUG: unable to handle kernel paging request at
+ edc21fd9 (LP: #1789118)
+ - x86/EISA: Don’t probe EISA bus for Xen PV guests
+ * qeth: use vzalloc for QUERY OAT buffer (LP: #1793086)
+ - s390/qeth: use vzalloc for QUERY OAT buffer
+ * SRU: Enable middle button of touchpad on ThinkPad P72 (LP: #1793463)
+ - Input: elantech - enable middle button of touchpad on ThinkPad P72
+ * Dell new AIO requires a new uart backlight driver (LP: #1727235)
+ - SAUCE: platform/x86: dell-uart-backlight: new backlight driver for DELL AIO
+ - updateconfigs for Dell UART backlight driver
+ * [Ubuntu] s390/crypto: Fix return code checking in cbc_paes_crypt.
  (LP: #1794294)
+ - s390/crypto: Fix return code checking in cbc_paes_crypt()
+ * hns3: Retrieve RoCE MSI-X config from firmware (LP: #1793221)
+ - net: hns3: Fix MSIX allocation issue for VF
+ - net: hns3: Refine the MSIX allocation for PF
+ * net: hns: Avoid hang when link is changed while handling packets
  (LP: #1792209)
+ - net: hns: add the code for cleaning pkt in chip
+ - net: hns: add netif_carrier_off before change speed and duplex
+ * Page leaking in cachefiles_read_backing_file while vmscan is active
  (LP: #1793430)
+ - SAUCE: cachefiles: Page leaking in cachefiles_read_backing_file while vmscan is active
+ * some nvidia p1000 graphic cards hang during the boot (LP: #1791569)
+ - drm/nouveau/gr/grf100-: virtualise tpc_mask + apply fixes from traces
+ * Error reported when creating ZFS pool with "-t" option, despite successful pool creation (LP: #1769937)
+ - SAUCE: (noup) Update zfs to 0.7.5-1ubuntu16.4
+ * Fix I2C touchpanels' interrupt storms after system suspend (LP: #1792309)
+ - HID: i2c-hid: Fix flooded incomplete report after S3 on Rayd touchscreen
+ - HID: i2c-hid: Don't reset device upon system resume
+ * ipmmu is always registered (LP: #1783746)
+ - iommu/ipmmu-vmsa: Don't register as BUS IOMMU if machine doesn't have IPMMU-
  VMSA
+ * Bionic update: upstream stable patchset 2018-09-27 (LP: #1794889)
+ - clocksource/drivers/imx-tpm: Correct some registers operation flow
+ Input: synaptics-rmi4 - fix an unchecked out of memory error path
+ KVM: X86: fix incorrect reference of trace_kvm_pi_rite_update
+ x86: Add check for APIC access address for vmentry of L2 guests
+ MIPS: io: Prevent compiler reordering writeX()
+ nfp: ignore signals when communicating with management FW
+ perf report: Fix switching to another perf.data file
+ fsnotify: fix ignore mask logic in send_to_group()
+ MIPS: io: Add barrier after register read in readX()
+ s390/smsgicucv: disable SMMSG on module unload
+ isoFs: fix potential memory leak in mount option parsing
+ MIPS: dts: Boston: Fix PCI bus dtc warnings
+ spi: sh-msiof: Fix bit field overflow writes to TSCR/RSCR
+ doc: Add vendor prefix for Kieback & Peter GmbH
+ dt-bindings: pinctrl: sunxi: Fix reference to driver
+ dt-bindings: serial: sh-sci: Add support for r8a7965 (H)SCIF
+ - dt-bindings: dmaengine: rcar-dmac: document R8A7965 support
+ clk: honor CLK_MUX_ROUND_CLOSEST in generic clk mux
+ ASoC: r5515: Add the missing register in the readable table
+ eCryptfs: don't pass up plaintext names when using filename encryption
+ soc: bcm: raspberrypi-power: Fix use of __packed
+ soc: bcm2835: Make !RASPBERRYPI_FIRMWARE dummies return failure
+ PCI: kirin: Fix reset gpio name
+ ASoC: topology: Fix bugs of freeing soc topology
+ xen: xenbus_dev_frontend: Really return response string
+ ASoC: topology: Check widget kcontrols before deref.
+ spi: cadence: Add usleep_range() for cdns_spi_fill_tx_fifo()
+ blkcg: don't hold blkcg lock when deactivating policy
+ tipc: fix infinite loop when dumping link monitor summary
+ scsi: iscsi: respond to netlink with unicast when appropriate
+ scsi: megaraid_sas: Do not log an error if FW successfully initializes.
+ scsi: target: fix crash with iscsi target and dvd
+ netfilter: nf_tables: NAT chain and extensions require NF_TABLES
+ netfilter: nf_tables: fix out-of-bounds in nft_chain_commit_update
+ ASoC: msm8916-wcd-analog: use threaded context for mbbce events
+ drm/msm: Fix possible null dereference on failure of get_pages()
+ drm/msm/dsi: use correct enum in dsi_get_cmd_fmt
+ drm/msm: don't deref error pointer in the msm_fbdev_create error path
+ blkcg: init root blkcg_gq under lock
+ vs: Undo an overly zealous MS_RDONLY -> SB_RDONLY conversion
+ parisc: time: Convert read_persistent_clock() to read_persistent_clock64()
+ scsi: storvsc: Set up correct queue depth values for IDE devices
+ scsi: isci: Fix infinite loop in while loop
+ mm, pagemap: fix swap offset value for PMD migration entry
+ proc: revalidate kernel thread inodes to root:root
+ kexec_file: do not add extra alignment to efi memmap
+ mm: memcg: add __GFP_NOWARN in __memcg_schedule_kmem_cache_create()
+ usb: types: ucsi: fix tracepoint related build error
+ ACPI / PM: Blacklist Low Power S0 Idle _DSM for ThinkPad X1 Tablet(2016)
+ - dt-bindings: meson-uart: DT fix s/clocks-names/clock-names/
+ - net: marvell: clear wol event before setting it
+ - ARM: dts: da850: fix W=1 warnings with pinmux node
+ - ACPI / watchdog: Prefer iTCO_wdt on Lenovo Z50-70
+ - drm/amd: fix clock counter retrieval for node without GPU
+ - thermal: int3403_thermal: Fix NULL pointer deref on module load / probe
+ - net: ethtool: Add missing kernel doc for FEC parameters
+ - arm64: ptrace: remove addr_limit manipulation
+ - HID: lenovo: Add support for IBM/Lenovo Scrollpoint mice
+ - HID: wacom: Release device resource data obtained by devres_alloc()
+ - selftests: ftrace: Add a testcase for multiple actions on trigger
+ - rds: ib: Fix missing call to rds_ib_dev_put in rds_ib_setup_qp
+ - perf/x86/intel: Don't enable freeze-on-smi for PerfMon V1
+ - remoteproc: qcom: Fix potential device node leaks
+ - rpm: added MODULE_ALIAS for rpmseg_chr
+ - HID: intel-ish-hid: use put_device() instead of kfree()
+ - blk-mq: fix sysfs inflight counter
+ - arm64: fix possible spectre-v1 in ptrace_hbp_get_event()
+ - KVM: arm/arm64: vgic: fix possible spectre-v1 in vgic_mmio_read_apr()
+ - libahci: Allow drivers to override stop_engine
+ - ata: dhci: nvebu: override dhci_stop_engine for nvebu AHCI
+ - x86/cpu/intel: Add missing TLB cpuid values
+ - bpf: fix uninitialized variable in bpf tools
+ - i2c: sprd: Prevent i2c accesses after suspend is called
+ - i2c: sprd: Fix the i2c count issue
+ - tipc: fix bug in function tipc_nl_node_dump_monitor
+ - nvme: depend on INFINIBAND_ADDR_TRANS
+ - nvme-rdma: depend on INFINIBAND_ADDR_TRANS
+ - ib_srtp: depend on INFINIBAND_ADDR_TRANS
+ - ib_srp: depend on INFINIBAND_ADDR_TRANS
+ - IB: make INFINIBAND_ADDR_TRANS configurable
+ - IB/uverbs: Fix validating mandatory attributes
+ - RDMA/cma: Fix use after destroy access to net namespace for IPoIB
+ - RDMA/iwpm: Fix memory leak on map_info
+ - IB/rxe: add RXE_START_MASK for rxe_opcode IB_OPCODE_RC_SEND_ONLY_INV
+ - IB/rxe: avoid double kfree_skb
+ - /linux/stringhash.h: fix end_name_hash() for 64bit long
+ - IB/core: Make ib_mad_client_id atomic
+ - ARM: davinci: board-da830-evm: fix GPIO lookup for MMC/SD
+ - ARM: davinci: board-da850-evm: fix GPIO lookup for MMC/SD
+ - ARM: davinci: board-omap1138-hawk: fix GPIO numbers for MMC/SD lookup
+ - ARM: davinci: board-dm355-evm: fix broken networking
+ - dt-bindings: panel: lvds: Fix path to display timing bindings
+ - ARM: OMAP2+: powerdomain: use raw_smp_processor_id() for trace
+ - ARM: dts: logicpd-som-iv: Fix WL127x Startup Issues
+ - ARM: dts: logicpd-som-iv: Fix Audio Mute
+ - Input: atmel_mxt_ts - fix the firmware update
+ - hexagon: add memset_io() helper
- hexagon: export csum_partial_copy_nocheck
- scsi: vmv-pvs: return DID_BUS_BUSY for adapter-initiated aborts
- bpf, x64: fix memleak when not converging after image
- parisc: drivers.c: Fix section mismatches
- stop_machine, sched: Fix migrate_swap() vs. active_balance() deadlock
- kthread, sched/wait: Fix kthread_parkme() wait-loop
- arm64: tegra: Make BCM89610 PHY interrupt as active low
- jommu/setText: fix shift-out-of-bounds in bug checking
- nvme: fix potential memory leak in option parsing
- nvme: Set integrity flag for user passthrough commands
- ARM: OMAP1: ams-delta: fix deferred_fiq handler
- smc: fix sendpage() call
- IB/hfi: Use correct type for num_user_context
- IB/hfi: Fix memory leak in exception path in get_irq_affinity()
- RDMA/cma: Do not query GID during QP state transition to RTR
- spi: bcm2835aux: ensure interrupts are enabled for shared handler
- sched/core: Introduce set_special_state()
- sh: fix build failure for J2 cpu with SMP disabled
- tee: check shm references are consistent in offset/size
- mac80211: Adjust SAE authentication timeout
- drm/omap: silence uninitialized variable warning
- drm/omap: fix uninitialized ret variable
- drm/omap: fix possible NULL ref issue in tiler_reserve_2d
- drm/omap: check return value from soc_device_match
- drm/omap: handle alloc failures in omap_connector
- driver core: add __printf verification to __ata_ehi_pushv_desc
- ARM: dts: cygnus: fix irq type for arm global timer
- mac80211: use timeout from the AddBA response instead of the request
- net: aquantia: driver should correctly declare vlan_features bits
- can: dev: increase bus-off message severity
- arm64: Add MIDR encoding for NVIDIA CPUs
- cifs: smb2ops: Fix listxattr() when there are no EAs
- app: uninorth: make two functions static
- tipc: eliminate KMSAN uninit-value in strcmp complaint
- qed: Fix i2 initialization over iWARP personality
- qede: Fix gfp flags sent to rdma event node allocation
- rxrpc: Fix error reception on AF_INET6 sockets
- rxr:Fix the min security level for kernel calls
- KVM: Extend MAX_IRQ_ROUTES to 4096 for all archs
- x86: Delay skip of emulated hypercall instruction
- ixgbe: return error on unsupported SFP module when resetting
- net sched actions: fix invalid pointer dereferencing if skbedit flags missing
- proc/kcore: don't bounds check against address 0
- ocfs2: take inode cluster lock before moving reflinked inode from orphan dir
- kprobes/x86: Prohibit probing on exception masking instructions
- uprobes/x86: Prohibit probing on MOV SS instruction
- objtool, kprobes/x86: Sync the latest <asm/insn.h> header with
tools/objtool/arch/x86/include/asm/insn.h
+ x86/pkeys/selftests: Adjust the self-test to fresh distros that export the pkeys ABI
+ x86/mpx/selftests: Adjust the self-test to fresh distros that export the MPX ABI
+ x86/selftests: Add mov_to_ss test
+ x86/pkeys/selftests: Give better unexpected fault error messages
+ x86/pkeys/selftests: Stop using assert()
+ x86/pkeys/selftests: Remove dead debugging code, fix dprint_in_signal
+ x86/pkeys/selftests: Allow faults on unknown keys
+ x86/pkeys/selftests: Factor out "instruction page"
+ x86/pkeys/selftests: Add PROT_EXEC test
+ x86/pkeys/selftests: Fix pkey exhaustion test off-by-one
+ x86/pkeys/selftests: Fix pointer math
+ x86/pkeys/selftests: Save off 'prot' for allocations
+ x86/pkeys/selftests: Add a test for pkey 0
+ mtd: Fix comparison in map_word_anedual()
+ afs: Fix the non-encryption of calls
+ usb: musb: fix remote wakeup racing with suspend
+ ARM: keystone: fix platform_domain_notifier array overrun
+ i2c: pmcsmp: return message count on master_xfer success
+ i2c: pmcsmp: fix error return from master_xfer
+ i2c: viperboard: return message count on master_xfer success
+ ARM: davinci: dm646x: fix timer interrupt generation
+ ARM: davinci: board-dm646x-evm: pass correct I2C adapter id for VPIF
+ ARM: davinci: board-dm646x-evm: set VPIF capture card name
+ clk: imx6ull: use OSC clock during AXI rate change
+ locking/rwsem: Add a new RWSEM_ANONYMOUSLY_OWNED flag
+ locking/percpu-rwsem: Annotate rwsem ownership transfer by setting RWSEM_OWNER_UNKNOWN
+ drm/dumb-buffers: Integer overflow in drm_mode_create_ioctl()
+ sched/debug: Move the print_rt_rq() and print_dl_rq() declarations to kernel/sched.h
+ sched/debug: Make the grub_reclaim() function static
+ parisc: Move setup_profiling_timer() out of init section
+ cfi/libstub/arm64: Handle randomized TEXT_OFFSET
+ ARM: 8753/1: decompressor: add a missing parameter to the addruart macro
+ ARM: 8758/1: decompressor: restore r1 and r2 just before jumping to the kernel
+ ARM: kexec: fix kdump register saving on panic()
+ Revert "Btrfs: fix scrub to repair raid6 corruption"
+ Btrfs: fix scrub to repair raid6 corruption
+ Btrfs: make raid6 rebuild retry more
+ tcp: do not overshoot window_clamp in tcp_rcv_space_adjust()
+ ibmvnic: Do not notify peers on parameter change resets
+ dt/bindings: net: ravb: Add support for r8a77965 SoC
+ X86/KVM: Properly update 'tsc_offset' to represent the running guest
+ kvm: x86: move MSR_1A32_TSC handling to x86.c
+ ARM: dts: Fix cm2 and prm sizes for omap4
+ powerpc/64s: Default 11d_size to 64K in RFI fallback flush
+ KVM: arm/arm64: vgic: Kick new VCPU on interrupt migration
+ arm64: kasan: avoid pfnto_nid() before page array is initialized
+ ARM64: dts: meson-gxl: add USB host support
+ ARM64: dts: meson-gxm: add GXM specific USB host configuration
+ ARM64: dts: meson-gxl-s905x-p212: enable the USB controller
+ ARM64: dts: meson-gx-p23x-q20x: enable the USB controller
+ ARM64: dts: meson-gxl-s905x-libretech-cc: enable the USB controller
+ ARM64: dts: meson-gxl-nexbox-a95x: enable the USB controller
+ ARM64: dts: meson-gxm-khadas-vim2: enable the USB controller
+ arm64: dts: correct SATA addresses for Stingray
+ afs: Fix server record deletion
+ proc: fix /proc/loadavg regression
+ s390/qeth: fix request-side race during cmd IO timeout
+ ACPI / scan: Initialize watchdog before PNP
+ CIFS: set *resp_buf_type to NO_BUFFER on error
+ arm64: dts: uniphier: fix input delay value for legacy mode of eMMC
+ igh: Fix the transmission mode of queue 0 for Qav mode
+ RISC-V: build vdsdummy.o with -no-pie
+ arm64: only advance singlestep for user instruction traps
+ perf pmu: Fix core PMU alias list for X86 platform
+ bpf, x64: fix JIT emission for dead code
+ powerpc/kvm/booke: Fix altivec related build break
+ reset: uniphier: fix USB clock line for LD20
+ nfp: don't depend on eth_tbl being available
+ net: msv2p2: Fix clk error path in msv2p2_probe
+ kvm: apic: Flush TBL after APIC mode/address change if VPIIDs are in use
+ IB/uverbs: Fix validating mandatory attributes
+ RDMA/hns: Intercept illegal RDMA operation when use inline data
+ pinctrl: cherryview: Associate IRQ descriptors to irqdomain
+ kthread, sched/wait: Fix kthread_parkme() completion issue
+ iommu/vt-d: Fix usage of force parameter in intel_ir_reconfigure_irete()
+ nvme/multipath: Disable runtime writable enabling parameter
+ ARM: dts: correct missing "compatible" entry for ti81xx SoCs
+ usb: typec: tps6598x: handle block reads separately with plain-I2C adapters
+ IB/mlx4: Fix integer overflow when calculating optimal MTT size
+ bpf: add map_alloc_check callback
+ bpf: fix possible spectre-v1 in find_and_alloc_map()
+ drm/exynos/mixer: fix synchronization check in interlaced mode
+ drm/exynos: mixer: avoidOops in vp_video_buffer()
+ bpf: use array_index_nospec in find_prog_type
+ gcc-plugins: fix build condition of SANCCEOV plugin
+ drm/vc4: Fix oops dereferencing DPI's connector since panel_bridge.
+ nvme: fix use-after-free in nvme_free_ns_head
+ powerpc/pseries: Fix CONFIG_NUMA=n build
+ HID: i2c-hid: Add RESEND_REPORT_DESCR quirk for Toshiba Click Mini L9W-B
+ cifc: Allocate validate negotiation request through kmalloc

Open Source Used In 5GaaS Edge AC-4 17978
+ - drm/amdgpu: Switch to interruptable wait to recover from ring hang.
+ - rxrpc: Fix missing start of call timeout
+ - ARM: dts: imx51-zii-rdu1: fix touchscreen bindings
+ - sh: switch to NO_BOOTMEM
+ - lib/find_bit_benchmark.c: avoid soft lockup in test_find_first_bit()
+ - x86/pkeys/selftests: Avoid printf-in-signal deadlocks
+ - afs: Fix address list parsing
+ - afs: Fix refcounting in callback registration
+ - afs: Fix server rotation's handling of filesserver probe failure
+ - afs: Fix VNOVOL handling in address rotation
+ - afs: Fix the handling of CB.InitCallBackState3 to find the server by UUID
+ - afs: Fix afs_find_server search loop
+ - KVM: X86: Lower the default timer frequency limit to 200us
+ - platform/x86: DELL_WMI use depends on instead of select for DELL_SMBIOS
+ - ARM: replace unnecessary perl with sed and the shell $(( )) operator
+ - * Improvements to the kernel source package preparation (LP: #1793461)
+ - [Packaging] startnewrelease: add support for backport kernels
+ - * Kernel 4.15.0-35.38 fails to build with CONFIG_XFS_ONLINE_SCRUB enabled
+ - (LP: #1792393)
+ - SAUCE: xfs: fix build error with CONFIG_XFS_ONLINE_SCRUB enabled
+ - * update ENA driver to latest mainline version (LP: #1792044)
+ - net: ena: add detection and recovery mechanism for handling missed/misrouted
+ - MSI-X
+ - net: ena: increase ena driver version to 1.5.0
+ - net: ena: Eliminate duplicate barriers on weakly-ordered archs
+ - SAUCE: ena: devm_kzalloc() -> devm_kcalloc()
+ - net: ena: Fix use of uninitialized DMA address bits field
+ - net: ena: fix surprise unplug NULL dereference kernel crash
+ - net: ena: fix driver when PAGE_SIZE == 64kB
+ - net: ena: fix device destruction to gracefully free resources
+ - net: ena: fix potential double ena_destroy_device()
+ - net: ena: fix missing lock during device destruction
+ - net: ena: fix missing calls to READ_ONCE
+ - net: ena: fix incorrect usage of memory barriers
+ -- Stefan Bader <stefan.bader@canonical.com> Tue, 02 Oct 2018 14:33:09 +0200
+ + linux (4.15.0-36.39) bionic; urgency=medium
+ + * CVE-2018-14633
+ - iscsi target: Use hex2bin instead of a re-implementation
+ + * CVE-2018-17182
+ - mm: get rid of vmaclash_flush_all() entirely
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 24 Sep 2018 16:08:41 +0200
+
+linux (4.15.0-35.38) bionic; urgency=medium
+
+ * linux: 4.15.0-35.38 -proposed tracker (LP: #1791719)
+
+ * device hotplug of vfio devices can lead to deadlock in vfio_pci_release
+     (LP: #1792099)
+     - SAUCE: vfio -- release device lock before userspace requests
+
+ * L1TF mitigation not effective in some CPU and RAM combinations
+     (LP: #1788563)
+     - x86/speculation/l1tf: Fix overflow in l1tf_pfn_limit() on 32bit
+     - x86/speculation/l1tf: Fix off-by-one error when warning that system has too
+       much RAM
+     - x86/speculation/l1tf: Increase l1tf memory limit for Nehalem+
+
+ * CVE-2018-15594
+     - x86/paravirt: Fix spectre-v2 mitigations for paravirt guests
+
+ * CVE-2017-5715 (Spectre v2 s390x)
+     - KVM: s390: implement CPU model only facilities
+     + s390: detect etoken facility
+     + KVM: s390: add etoken support for guests
+     + s390/lib: use expoline for all bcr instructions
+     + s390: fix br_r1_trampoline for machines without exrl
+     + SAUCE: s390: use expoline thunks for all branches generated by the BPF JIT
+
+ * Ubuntu18.04.1: cpuidle: powernv: Fix promotion from snooze if next state
+     disabled (performance) (LP: #1790602)
+     - cpuidle: powernv: Fix promotion from snooze if next state disabled
+
+ * Watchdog CPU:19 Hard LOCKUP when kernel crash was triggered (LP: #1790636)
+     - powerpc: hard disable irqs in smp_send_stop loop
+     - powerpc: Fix deadlock with multiple calls to smp_send_stop
+     - powerpc: smp_send_stop do not offline stopped CPUs
+     - powerpc/powernv: Fix opal_event_shutdown() called with interrupts disabled
+
+ * Security fix: check if IOMMU page is contained in the pinned physical page
+     (LP: #1785675)
+     - vfs/spapr: Use IOMMU pageshift rather than pagesize
+     - KVM: PPC: Check if IOMMU page is contained in the pinned physical page
+
+ * Missing Intel GPU pci-id's (LP: #1789924)
+     - drm/i915/kbl: Add KBL GT2 sku
+     - drm/i915/whl: Introducing Whiskey Lake platform
+     - drm/i915/aml: Introducing Amber Lake platform
+     - drm/i915/cfl: Add a new CFL PCI ID.
+ * CVE-2018-15572
+ - x86/speculation: Protect against userspace-userspace spectreRSB
+
+ * Support Power Management for Thunderbolt Controller (LP: #1789358)
+ - thunderbolt: Handle NULL boot ACL entries properly
+ - thunderbolt: Notify userspace when boot_acl is changed
+ - thunderbolt: Use 64-bit DMA mask if supported by the platform
+ - thunderbolt: Do not unnecessarily call ICM get route
+ - thunderbolt: No need to take tb->lock in domain suspend/complete
+ - thunderbolt: Use correct ICM commands in system suspend
+ - thunderbolt: Add support for runtime PM
+
+ * random oopses on s390 systems using NVMe devices (LP: #1790480)
+ - s390/pci: fix out of bounds access during irq setup
+
+ * [Bionic] Spectre v4 mitigation (Speculative Store Bypass Disable) support
+ for arm64 using SMC firmware call to set a hardware chicken bit
+ (LP: #1787993) // CVE-2018-3639 (arm64)
+ - arm64: alternatives: Add dynamic patching feature
+ - KVM: arm/arm64: Do not use kern_hyp_va() with kvm_vgic_global_state
+ - KVM: arm64: Avoid storing the vcpu pointer on the stack
+ - arm/arm64: smccc: Add SMCCC-specific return codes
+ - arm64: Call ARCH_WORKAROUND_2 on transitions between EL0 and EL1
+ - arm64: Add per-cpu infrastructure to call ARCH_WORKAROUND_2
+ - arm64: Add ARCH_WORKAROUND_2 probing
+ - arm64: Add 'ssbd' command-line option
+ - arm64: ssbd: Add global mitigation state accessor
+ - arm64: ssbd: Skip apply ssbd if not using dynamic mitigation
+ - arm64: ssbd: Restore mitigation status on CPU resume
+ - arm64: ssbd: Introduce thread flag to control userspace mitigation
+ - arm64: ssbd: Add prctl interface for per-thread mitigation
+ - arm64: KVM: Add HYP per-cpu accessors
+ - arm64: KVM: Add ARCH_WORKAROUND_2 support for guests
+ - arm64: KVM: Handle guest's ARCH_WORKAROUND_2 requests
+ - arm64: KVM: Add ARCH_WORKAROUND_2 discovery through ARCH_FEATURES_FUNC_ID
+ - [Config] ARM64_SSBD=y
+
+ * Reconcile hns3 SAUCE patches with upstream (LP: #1787477)
+ - Revert "UBUNTU: SAUCE: net: hns3: Optimize PF CMDQ interrupt switching
+ process"
+ - Revert "UBUNTU: SAUCE: net: hns3: Fix for VF mailbox receiving unknown
+ message"
+ - Revert "UBUNTU: SAUCE: net: hns3: Fix for VF mailbox cannot receiving PF
+ response"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix comments for
+ hclge_get_ring_chain_from_mbx"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for using wrong mask and
shift in hclge_get_ring_chain_from_mbx"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for reset_level default
- assignment problem"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unnecessary ring
- configuration operation while resetting”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix return value error in
- hns3_reset_notify_down_enet"
- Revert "UBUNTU: SAUCE: net: hns3: Fix for phy link issue when using marvell
- phy driver”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: separate roce from nic when
- resetting”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: correct reset event status
- register”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: prevent to request reset
- frequently”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: reset net device with rtnl_lock”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: modify the order of initializeing
- command queue register”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: prevent sending command during
- global or core reset”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove the warning when clear
- reset cause”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix get_vector ops in
- hclgevf_main module”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix warning bug when doing lp
- selftest”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: Add configure for mac minimal
- frame size”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for mailbox message truncated
- problem”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for l4 checksum offload bug”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for waterline not setting
- correctly”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for mac pause not disable in
- pfc mode”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix tc setup when netdev is first
- up”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: Add SPDX tags to hns3 driver”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unused struct member and
- definition”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix mislead parameter name”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: modify inconsistent bit mask
- macros”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: use decimal for bit offset
- macros”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix unreasonable code comments”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove extra space and brackets”
- Revert "UBUNTU: SAUCE: {topost} net: hns3: standardize the handle of return
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove some redundant assignments"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: fix unused function warning in VF driver"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: modify hnae_ to hnae3_"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: use dma_zalloc_coherent instead of kzalloc/dma_map_single"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: give default option while dependency HNS3 set"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove some unused members of some structures"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove a redundant hclge_cmd_csq_done"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: using modulo for cyclic counters in hclge_cmd_send"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: simplify hclge_cmd_csq_clean"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove some redundant assignments"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove useless code in hclge_cmd_send"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unused hclge_ring_to_dma_dir"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: use lower_32_bits and upper_32_bits"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove back in struct hclge_hw"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: add unlikely for error check in hns3_client_uninit"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: print the ret value in error information"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: extraction an interface for state init|uninit"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unused head file in hnae3.c"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: add l4_type check for both ipv4 and ipv6"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: add vector status check before free vector"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: rename the interface for init_client_instance and uninit_client_instance"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: remove hclge_get_vector_index from hclge_bind_ring_with_vector"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: RX BD information valid only in last BD except VLD bit and buffer size"
- Revert "UBUNTU: SAUCE: {topost} net: hns3: add support for serdes loopback selftest"
- net: hns3: Updates RX packet info fetch in case of multi BD
+ - net: hns3: remove unused hclgevf_cfg_func_mta_filter
+ - net: hns3: Fix for VF mailbox cannot receiving PF response
+ - net: hns3: Fix for VF mailbox receiving unknown message
+ - net: hns3: Optimize PF CMDQ interrupt switching process
+ - net: hns3: remove hclge_get_vector_index from hclge_bind_ring_with_vector
+ - net: hns3: rename the interface for init_client_instance and
  + uninitt_client_instance
+ - net: hns3: add vector status check before free vector
+ - net: hns3: add l4_type check for both ipv4 and ipv6
+ - net: hns3: add unlikely for error check
+ - net: hns3: remove unused head file in hnae3.c
+ - net: hns3: extraction an interface for state init|uninit
+ - net: hns3: print the ret value in error information
+ - net: hns3: remove the Redundant put_vector in hns3_client_uninit
+ - net: hns3: remove back in struct hclge_hw
+ - net: hns3: use lower_32_bits and upper_32_bits
+ - net: hns3: remove unused hclge_ring_to_dma_dir
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+ - net: hns3: remove some redundant assignments
+ - net: hns3: simplify hclge_cmd_csq_clean
+ - net: hns3: remove a redundant hclge_cmd_csq_done
+ - net: hns3: remove some unused members of some structures
+ - net: hns3: give default option while dependency HNS3 set
+ - net: hns3: use dma_zalloc_coherent instead of kzalloc/dma_map_single
+ - net: hns3: modify hnae_ to hnae3_
+ - net: hns3: Fix tc setup when netdev is first up
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+ - net: hns3: Fix for l4 checksum offload bug
+ - net: hns3: Fix for mailbox message truncated problem
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+ - net: hns3: Fix get_vector ops in hclgevf_main module
+ - net: hns3: Remove the warning when clear reset cause
+ - net: hns3: Prevent sending command during global or core reset
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+ - net: hns3: Reset net device with rtnl_lock
+ - net: hns3: Prevent to request reset frequently
+ - net: hns3: Correct reset event status register
+ - net: hns3: Fix return value error in hns3_reset_notify_downenet
+ - net: hns3: remove unnecessary ring configuration operation while resetting
+ - net: hns3: Fix for reset_level default assignment problem
+ - net: hns3: Fix for using wrong mask and shift in
  + hclge_get_ring_chain_from_mbx
+ - net: hns3: Fix comments for hclge_get_ring_chain_from_mbx
+ - net: hns3: Remove some redundant assignments
+ - net: hns3: Standardize the handle of return value
+ - net: hns3: Remove extra space and brackets
+ - net: hns3: Correct unreasonable code comments
+ - net: hns3: Use decimal for bit offset macros
+ - net: hns3: Modify inconsistent bit mask macros
+ - net: hns3: Fix misleading parameter name
+ - net: hns3: Remove unused struct member and definition
+ - net: hns3: Add SPDX tags to HNS3 PF driver
+ - net: hns3: Add support for serdes loopback selftest
+ - net: hns3: Fix for phy link issue when using marvell phy driver
+ - SAUCE: {topost} net: hns3: separate roce from nic when resetting
+ * CVE-2018-6555
+ - SAUCE: irda: Only insert new objects into the global database via setsockopt
+ * CVE-2018-6554
+ - SAUCE: irda: Fix memory leak caused by repeated binds of irda socket
+ * Bionic update: upstream stable patchset 2018-08-31 (LP: #1790188)
+ - netfilter: nf_tables: fix NULL pointer dereference on
+ - blkdev_report_zones_ioctl(): Use vmalloc() to allocate large buffers
+ - af_key: Always verify length of provided sadb_key
+ - gpio: No NULL owner
+ - KVM: X86: Fix reserved bits check for MOV to CR3
+ - KVM: x86: introduce linear_{read,write}_system
+ - KVM: x86: pass kvm_vcpu to kvm_read_guest_virt and
+ - kvm_write_guest_virt_system
+ - staging: android: ion: Switch to pr_warn_once in ion_buffer_destroy
+ - NFC: pn533: don't send USB data off of the stack
+ - usbsp: vhci_sysfs: fix potential Spectre v1
+ - usbstorage: Add support for FL_ALWAYS_SYNC flag in the UAS driver
+ - usbstorage: Add compatibility quirk flags for G-Technologies G-Drive
+ - Input: xpad - add GPD Win 2 Controller USB IDs
+ - phy: qcom-qusb2: Fix crash if nvmem cell not specified
+ - ush: gadget: function: printer: avoid wrong list handling in printer_write()
+ - ush: gadget: udc: renesas_usb3: disable the controller's irqs for
+ - reconnecting
+ - serial: sh-sci: Stop using printk format %pCr
+ - tty/serial: atmel: use port->name as name in request_irq()
+ - serial: samsung: fix maxburst parameter for DMA transactions
+ - serial: 8250: omap: Fix idling of clocks for unused uarts
+ - vmw_balloon: fixing double free when batching mode is off
+ - tty: pl011: Avoid spuriously stuck-off interrupts
+ - kvm: x86: use correct privilege level for sgdt/sidt/fxsave/fxrstor access
+ - Input: goodix - add new ACPI id for GPD Win 2 touch screen
+ - crypto: caam - strip input zeros from RSA input buffer
+ - crypto: caam - fix DMA mapping dir for generated IV
+ - crypto: caam - fix IV DMA mapping and updating
+ - crypto: caam/qi - fix IV DMA mapping and updating
+ crypto: caam - fix size of RSA prime factor q
+ crypto: vmx - Remove overly verbose printk from AES init routines
+ crypto: vmx - Remove overly verbose printk from AES XTS init
+ crypto: omap-sham - fix memleak
+ usb: typec: wcove: Remove dependency on HW FSM
+ usb: gadget: udc: renesas_usb3: fix double phy_put()
+ usb: gadget: udc: renesas_usb3: should remove debugfs
+ usb: gadget: udc: renesas_usb3: should call pm_runtime_enable() before add udc
+ * Bionic update: upstream stable patchset 2018-08-29 (LP: #1789666)
  - scsi: sd_zbc: Avoid that resetting a zone fails sporadically
  - mmap: introduce sane default mmap limits
  - mmap: relax file size limit for regular files
  - btrfs: define SUPER_FLAG_METADUMP_V2
  - kconfig: Avoid format overflow warning from GCC 8.1
  - be2net: Fix error detection logic for BE3
  - bnx2x: use the right constant
  - dccp: don't free ccid2_bc_tx_sock struct in dccp_disconnect()
  - enic: set DMA mask to 47 bit
  - ip6mr: only set ip6mr_table from setsockopt when ip6mr_new_table succeeds
  - ip6_tunnel: remove magic mtu value 0xFFF8
  - ipv4: remove warning in ip_recv_error
  - ipv6: omit traffic class when calculating flow hash
  - isdn: eicon: fix a missing-check bug
  - kcm: Fix use-after-free caused by cloned sockets
  - netdev-FAQ: clarify DaveM's position for stable backports
  - net: ipv4: add missing RTA_TABLE to rtm_ipv4_policy
  - net: metrics: add proper netlink validation
  - net/packet: refine check for priv area size
  - phy: Broadcom: Fix bcm_write_exp()
  - net: usb: cdc_mbim: add flag FLAG_SEND_ZLP
  - packet: fix reserve calculation
  - qed: Fix mask for physical address in ILT entry
  - scct: not allow transport timeout value less than HZ/5 for hb_timer
  - team: use netdev_features_t instead of u32
  - vhst: synchronize IOTLB message with dev cleanup
  - vrf: check the original netdevice for generating redirect
  - ipv6: sr: fix memory OOB access in seg6_do_srh_encap/inline
  - phy: Broadcom: Fix auxiliary control register reads
  - net-sysfs: Fix memory leak in XPS configuration
  - virtio-net: correctly transmit XDP buff after linearizing
  - mlx4: Fix irq-unsafe spinlock usage
  - tun: Fix NULL pointer dereference in XDP redirect
  - virtio-net: correctly check num_buf during err path
+ - net/mlx5e: When RXFCS is set, add FCS data into checksum calculation
+ - virtio-net: fix leaking page for gso packet during mergeable XDP
+ - rtnetlink: validate attributes in do_setlink()
+ - cls_flower: Fix incorrect idr release when failing to modify rule
+ - PCI: hv: Do not wait forever on a device that has disappeared
+ - drm: set FMODE_UNSIGNED_OFFSET for drm files
+ -mlxsw: spectrum: Forbid creation of VLAN 1 over port/LAG
+ - net: ethernet: ti: cpdma: correct error handling for chan create
+ - net: ethernet: davinci_emac: fix error handling in probe()
+ - net: dsa: b53: Fix for brcm tag issue in Cygnus SoC
+ - net : sched: cls_api: deal with egdev path only if needed

+ * Bionic update: upstream stable patchset 2018-08-24 (LP: #1788897)
+ - fix io_destroy()/aio_complete() race
+ - mm: fix the NULL mapping case in __isolate_lru_page()
+ - objtool: Support GCC 8's cold subfunctions
+ - objtool: Support GCC 8 switch tables
+ - objtool: Detect RIP-relative switch table references
+ - objtool: Detect RIP-relative switch table references, part 2
+ - objtool: Fix "noretturn" detection for recursive sibling calls
+ - xfs: convert XFS_AGFL_SIZE to a helper function
+ - xfs: detect agfl count corruption and reset agfl
+ - Input: synaptics - Lenovo Carbon X1 Gen5 (2017) devices should use RMI
+ - Input: synaptics - add Lenovo 80 series ids to SMBus
+ - Input: elan_i2c_smbus - fix corrupted stack
+ - tracing: Fix crash when freeing instances with event triggers
+ - tracing: Make the snapshot trigger work with instances
+ - sselinux: KASAN: slab-out-of-bounds in xattr_getsecurity
+ - cfg80211: further limit wiphy names to 64 bytes
+ - drm/amd/powerplay: Fix enum mismatch
+ - rtlwifi: rtl8192cu: Remove variable self-assignment in rf.c
+ - platform/chrome: cros_ec_lpc: remove redundant pointer request
+ - kbuild: clang: disable unused variable warnings only when constant
+ - tcp: avoid integer overflows in tcp_rcv_space_adjust()
+ - iio: ad7793: implement IIO_CHAN_INFO_SAMP_FREQ
+ - iio:buffer: make length types match kfifo types
+ - iio:kfifo_buf: check for uint overflow
+ - iio: adc: select buffer for at91-sama5d2_adc
+ - MIPS: lantiq: gphy: Drop reboot/remove reset asserts
+ - MIPS: ptrace: Fix PTRACE_PEEKUSR requests for 64-bit FGRs
+ - MIPS: prctl: Disallow FRE without FR with PR_SET_FP_MODE requests
+ - scsi: scsi_transport_sr: Fix shost to rport translation
+ - stm class: Use vmalloc for the master map
+ - hwtracing: stm: fix build error on some arches
+ - IB/core: Fix error code for invalid GID entry
+ - mm/huge_memory.c: __split_huge_page() use atomic ClearPageDirty()
+ - Revert "rt2800: use TXOP_BACKOFF for probe frames"
+ - intel_th: Use correct device when freeing buffers
+ - drm/psr: Fix missed entry in PSR setup time table.
+ - drm/i915/lvds: Move acpi lid notification registration to registration phase
+ - drm/i915: Disable LVDS on Radiant P845
+ - drm/vmwgfx: Use kasprintf
+ - drm/vmwgfx: Fix host logging / guestinfo reading error paths
+ - nvme: fix extended data LBA supported setting
+ - iio: hid-sensor-trigger: Fix sometimes not powering up the sensor after resume
+ - x86/MCE/AMD: Define a function to get SMCA bank type
+ - x86/mce/AMD: Pass the bank number to smca_get_bank_type()
+ - x86/mce/AMD, EDAC/mce_amd: Enumerate Reserved SMCA bank type
+ - x86/mce/AMD: Carve out SMCA get_block_address() code
+ - x86/MCE/AMD: Cache SMCA MISC block addresses
+ * errors when scanning partition table of corrupted AIX disk (LP: #1787281)
+ - partitions/aix: fix usage of uninitialized lv_info and lvname structures
+ - partitions/aix: append null character to print data from disk
+ * tlbie master timeout check stop (using NVidia/GPU) (LP: #1789772)
+ - powerpc/mm/hugetlb: Update huge_ptep_set_access_flags to call __ptep_set_access_flags directly
+ - powerpc/mm/radix: Move function from radix.h to pgtable-radix.c
+ - powerpc/mm: Change function prototype
+ - powerpc/mm/radix: Change pte relax sequence to handle nest MMU hang
+ * performance drop with ATS enabled (LP: #1788097)
+ - powerpc/powernv: Fix concurrency issue with npu->mmio_atsd_usage
+ * [Regression] kernel crashdump fails on arm64 (LP: #1786878)
+ - arm64: export memblock_reserve()d regions via /proc/iomem
+ - drivers: acpi: add dependency of EFI for arm64
+ - efi/arm: preserve early mapping of UEFI memory map longer for BGRT
+ - efi/arm: map UEFI memory map even w/o runtime services enabled
+ - arm64: acpi: fix alignment fault in accessing ACPI
+ - [Config] CONFIG_ARCH_SUPPORTS_ACPI=y
+ - arm64: fix ACPI dependencies
+ - ACPI: fix menuconfig presentation of ACPI submenu
+ * TB 16 issue on Dell Lattitude 7490 with large amount of data (LP: #1785780)
+ - r8152: disable RX aggregation on new Dell TB16 dock
+ * dell_wmi: Unknown key codes (LP: #1762385)
+ - platform/x86: dell-wmi: Ignore new rfkill and fn-lock events
+ * Enable AMD PCIe MP2 for AMDI0011 (LP: #1773940)
+ - SAUCE: i2c:amd I2C Driver based on PCI Interface for upcoming platform
+ - SAUCE: i2c:amd move out pointer in union i2c_event_base
+ - SAUCE: i2c:amd Depends on ACPI
+ - [Config] i2c: CONFIG_I2C_AMD_MP2=y on x86
+
+ * r8169 no internet after suspending (LP: #1779817)
+ - r8169: restore previous behavior to accept BIOS WoL settings
+ - r8169: don't use MSI-X on RTL8168g
+ - r8169: don't use MSI-X on RTL8106e
+
+ * Fix Intel Cannon Lake LPSS I2C input clock (LP: #1789790)
+ - mfd: intel-lpss: Fix Intel Cannon Lake LPSS I2C input clock
+
+ * Microphone cannot be detected with front panel audio combo jack on HP Z8-G4
+ - machine (LP: #1789145)
+ - ALSA: hda/realtek - Fix HP Headset Mic can't record
+
+ * Tango platform uses __initcall without further checks (LP: #1787945)
+ - [Config] disable ARCH_TANGO
+
+ * [18.10 FEAT] Add kernel config option "CONFIG_SCLP_OFB" (LP: #1787898)
+ - [Config] CONFIG_SCLP_OFB=y for s390x
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 12 Sep 2018 11:39:17 +0200
+
+ * linux (4.15.0-34.37) bionic; urgency=medium
+
+ * linux: 4.15.0-34.37 -proposed tracker (LP: #1788744)
+
+ * Bionic update: upstream stable patchset 2018-08-09 (LP: #1786352)
+ - MIPS: c-r4k: Fix data corruption related to cache coherence
+ - MIPS: ptrace: Expose FIR register through FP regset
+ - MIPS: Fix ptrace(2) PTRACE_PEEKUSR and PTRACE_POKERUSR accesses to o32 FGRs
+ - KVM: Fix spelling mistake: "cop_unsuable" -> "cop_unusable"
+ - affs_lookup(): close a race with affs_remove_link()
+ - fs: don't scan the inode cache before SB_BORN is set
+ - aio: fix io_destroy(2) vs. lookup_ioctl() race
+ - ALSA: timer: Fix pause event notification
+ - do_d_instantiate/unlock_new_inode combinations safely
+ - mmc: sdhci-iproc: remove hard coded mmc cap 1.8v
+ - mmc: sdhci-iproc: fix 32bit writes for TRANSFER_MODE register
+ - mmc: sdhci-iproc: add SDHCI_QUIRK2_HOST_OFF_CARD_ON for cygnus
+ - libata: Blacklist some Sandisk SSDs for NCQ
+ - libata: blacklist Micron 500IT SSD with MU01 firmware
+ - xen-swiothbl: fix the check condition for xen_swiotbl_free_coherent
+ - drm/vmwgfx: Fix 32-bit VMW_PORT_HB_[IN|OUT] macros
+ - arm64: lse: Add early clobbers to some input/output asm operands
+ - powerpc/64s: Clear PCR on boot
+ - IB/hfi1: Use after free race condition in send context error path
+ - IB/umem: Use the correct mm during ib_umem_release
+ - idr: fix invalid ptr dereference on item delete
+ - Revert "ipc/shm: Fix shmat mmmap nil-page protection"
+ - ipc/shm: fix shmat() nil address after round-down when remapping
+ - mm/kasan: don't vfree() nonexistent vm_area
+ - kasan: free allocated shadow memory on MEM_CANCEL_ONLINE
+ - kasan: fix memory hotplug during boot
+ - kernel/sys.c: fix potential Spectre v1 issue
+ - KVM: s390: vsie: fix < 8k check for the itdba
+ - KVM: x86: Update cpuid properly when CR4.OSXSAVE or CR4.PKE is changed
+ - kvm: x86: IA32_ARCH_CAPABILITIES is always supported
+ - powerpc/64s: Improve RFI L1-D cache flush fallback
+ - powerpc/series: Restore default security feature flags on setup
+ - powerpc/64s: Fix section mismatch warnings from setup_rfi.Flush()
+ - MIPS: generic: Fix machine compatible matching
+ - mac80211: mesh: fix wrong mesh TTL offset calculation
+ - ARC: Fix malformed ARC_EMUL_UNALIGNED default
+ - ptr_ring: prevent integer overflow when calculating size
+ - arm64: dts: rockchip: fix rock64 mac2io stability issues
+ - arm64: dts: rockchip: correct ep-gpios for rk3399-sapphire
+ - libata: Fix compile warning with ATA_DEBUG enabled
+ - selftests: sync: missing CFLAGS while compiling
+ - selftest/vDSO: fix O=
+ - selftests: pstore: Adding config fragment CONFIG_PSTORE_RAM=m
+ - selftests: memfd: add config fragment for fuse
+ - ARM: OMAP2+: timer: fix a kmemleak caused in omap_get_timer_dt
+ - ARM: OMAP3: Fix pmr wake interrupt for resume
+ - ARM: OMAP2+: Fix sar_base initialization for HS omaps
+ - ARM: OMAP1: clock: Fix debugfs_create_*() usage
+ - tls: re enr the correct IV in getsockopt
+ - xhci: workaround for AMD Promontory disabled ports wakeup
+ - IB/uverbs: Fix method merging in uverbs_ioctl_merge
+ - IB/uverbs: Fix possible oops with duplicate ioctl attributes
+ - IB/uverbs: Fix unbalanced unlock on error path for rdma_explicit_destroy
+ - arm64: dts: rockchip: Fix DWMMC clocks
+ - ARM: dts: rockchip: Fix DWMMC clocks
+ - iwlfwifi: mvm: fix security bug in PN checking
+ - iwlfwifi: mvm: fix IBSS for devices that support station type API
+ - iwlfwifi: mvm: always init rs with 20mhz bandwidth rates
+ - NFC: llcp: Limit size of SDP URI
+ - rxrpc: Work around usercopy check
+ - MD: Free bioset when md_run fails
+ - md: fix md_write_start() deadlock w/o metadata devices
+ - s390/dasd: fix handling of internal requests
+ - xfrm: do not call rcu_read_unlock when afinfo is NULL in xfrm_get_tos
+ - mac80211: round IEEE80211_TX_STATUS_HEADROOM up to multiple of 4
+ - mac80211: fix a possible leak of station stats
+ - mac80211: fix calling sleeping function in atomic context
+ - cfg80211: clear wep keys after disconnection
+ - mac80211: Do not disconnect on invalid operating class
+ - mac80211: Fix sending ADDBA response for an ongoing session
+ - gpu: ipu-v3: pre: fix device node leak in ipu_pre_lookup_by_phandle
+ - gpu: ipu-v3: prg: fix device node leak in ipu_prg_lookup_by_phandle
+ - md raid10: fix NULL deference in handle_write_completed()
+ - drm/exynos: g2d: use monotonic timestamps
+ - drm/exynos: fix comparison to bitshift when dealing with a mask
+ - drm/meson: fix vsync buffer update
+ - arm64: perf: correct PMUVer probing
+ - RDMA/bnxt_re: Unpin SQ and RQ memory if QP create fails
+ - RDMA/bnxt_re: Fix system crash during load/unload
+ - net/mlx5e: Return error if prio is specified when offloading eswitch vlan
  push
+ - locking/xchg/alpha: Add unconditional memory barrier to cmpxchg()
+ - md: raid5: avoid string overflow warning
+ - virtio_net: fix XDP code path in receive_small()
+ - kernel/relay.c: limit kmalloc size to KMALLOC_MAX_SIZE
+ - bug.h: work around GCC PR82365 in BUG()
+ - selftests/memfd: add runFuse_test.sh to TEST_FILES
+ - seccomp: add a selftest for get_metadata
+ - soc: imx: gpc: de-register power domains only if initialized
+ - powerpc/bpf/jit: Fix 32-bit JIT for seccomp_data access
+ - s390/cio: fix ccw_device_start_timeout API
+ - s390/cio: fix return code after missing interrupt
+ - s390/cio: clear timer when terminating driver I/O
+ - selftests/bpf/test_maps: exit child process without error in ENOMEM case
+ - PKCS#7: fix direct verification of SignerInfo signature
+ - arm64: dts: cavium: fix PCI bus dte warnings
+ - nfs: system crashes after NFS4ERR_MOVED recovery
+ - ARM: OMAP: Fix dmtimer init for omap1
+ - smsc75xx: fix smsc75xx_set_features()
+ - regulatory: add NUL to request alpha2
+ - integrity/security: fix digsig.c build error with header file
+ - x86/intel_rdt: Fix incorrect returned value when creating rdgroup sub-
  - directory in resctrl file system
+ - locking/xchg/alpha: Fix xchg() and cmpxchg() memory ordering bugs
+ - x86/topology: Update the 'cpu cores' field in /proc/cpuinfo correctly across
  - CPU hotplug operations
+ - mac80211: drop frames with unexpected DS bits from fast-rx to slow path
+ - arm64: fix unwind_frame() for filtered out fn for function graph tracing
+ - macvlan: fix use-after-free in macvlan_common_newlink()
+ - KVM: nVMX: Don't halt vcpu when L1 is injecting events to L2
+ - kvm: fix warning for CONFIG_HAVE_KVM_EVENTFD builds
+ - ARM: dts: imx6dl: Include correct dti file for Engicam i.CoreM6
  DualLite/Solo RQS
+ - fs: dcache: Avoid livelock between d_alloc_parallel and __d_add
+ - fs: dcache: Use READ_ONCE when accessing i_dir_seq
+ - md: fix a potential deadlock of raid5/raid10 reshape
- md/raid1: fix NULL pointer dereference
- batman-adv: fix packet checksum in receive path
- batman-adv: invalidate checksum on fragment reassembly
- netfilter: ipt_CLUSTERIP: put config struct if we can't increment ct refcount
- netfilter: ipt_CLUSTERIP: put config instead of freeing it
- netfilter: ebtables: convert BUG_ONs to WARN_ONs
- batman-adv: Ignore invalid batadv_iv_gw during netlink send
- batman-adv: Ignore invalid batadv_v_gw during netlink send
- batman-adv: Fix netlink dumping of BLA claims
- batman-adv: Fix netlink dumping of BLA backbones
- nvme-pci: Fix nvme queue cleanup if IRQ setup fails
- clocksource/drivers/fsl_ftm_timer: Fix error return checking
- libceph, ceph: avoid memory leak when specifying same option several times
- ceph: fix dentry leak when failing to init debugfs
- xen/pvcalls: fix null pointer dereference on map->sock
- ARM: orion5x: Revert commit 4904dbda41c8.
- qrtr: add MODULE_ALIAS macro to smd
- selftests/futex: Fix line continuation in Makefile
- r8152: fix tx packets accounting
- virtio-gpu: fix ioctl and expose the fixed status to userspace.
- dmaengine: rcar-dmac: fix max_chunk_size for R-Car Gen3
- bcache: fix kcrashes with fio in RAID5 backend dev
- ip_gre: fix IFLA_MTU ignored on NEWLINK
- ip6_tunnel: fix IFLA_MTU ignored on NEWLINK
- sit: fix IFLA_MTU ignored on NEWLINK
- nbd: fix return value in error handling path
- ARM: dts: NSP: Fix amount of RAM on BCM958625HR
- ARM: dts: bcm283x: Fix unit address of local_intc
- powerpc/boot: Fix random libfdt related build errors
- clocksource/drivers/mips-gic-timer: Use correct shift count to extract data
- gianfar: Fix Rx byte accounting for ndev stats
- net/tcp/illinois: replace broken algorithm reference link
- nvmet: fix PSDT field check in command format
- net/smc: use link_id of server in confirm link reply
- mlxsw: core: Fix flex keys scratchpad offset conflict
- mlxsw: spectrum: Treat IPv6 unregistered multicast as broadcast
- spectrum: Reference count VLAN entries
- ARC: mcip: halt GFRC counter when ARC cores halt
- ARC: mcip: update MCIP debug mask when the new cpu came online
- ARC: setup cpu possible mask according to possible-cpus dts property
- ipvs: remove IPS_NAT_MASK check to fix passive FTP
- IB/mlx: Set slid to zero in Ethernet completion struct
- RDMA/bnxt_re: Unconditionally fence non wire memory operations
- RDMA/bnxt_re: Fix incorrect DB offset calculation
- RDMA/bnxt_re: Fix the ib_reg failure cleanup
- xen/pirq: fix error path cleanup when binding MSIs
- drm/amd/amdgpup: Correct VRAM width for APUs with GMC9
+ - xfrm: Fix ESN sequence number handling for IPsec GSO packets.
+ - arm64: dts: rockchip: Fix rk3399-gru-* s2r (pinctrl hogs, wifi reset)
+ - drm/sun4i: Fix dclk_set_phase
+ - btrfs: use kvzalloc to allocate btrfs_fs_info
+ - Btrfs: send, fix issuing write op when processing hole in no data mode
+ - Btrfs: fix log replay failure after linking special file and fsync
+ - ceph: fix potential memory leak in init_caches()
+ - block: display the correct diskname for bio
+ - selftests/powerpc: Skip the subpage_prot tests if the syscall is unavailable
+ - net: ethtool: don't ignore return from driver get_fecparam method
+ - iwlwifi: mvm: fix TX of CCMP 256
+ - iwlwifi: mvm: Fix channel switch for count 0 and 1
+ - iwlwifi: mvm: fix assert 0x2B00 on older FWs
+ - iwlwifi: avoid collecting firmware dump if not loaded
+ - iwlwifi: mvm: Direct multicast frames to the correct station
+ - iwlwifi: mvm: Correctly set the tid for mcast queue
+ - rds: Incorrect reference counting in TCP socket creation
+ - watchdog: f71808e_wdt: Fix magic close handling
+ - batman-adv: Fix multicast packet loss with a single WANT_ALL_IPV4/6 flag
+ - hv_netvsc: use napi_schedule_irqoff
+ - hv_netvsc: filter multicast/broadcast
+ - hv_netvsc: propagate rx filters to VF
+ - ARM: dts: rockchip: Add missing #sound-dai-cells on rk3288
+ - e1000e: Fix check_for_link return value with autoneg off
+ - e1000e: allocate ring descriptors with dma_zalloc_coherent
+ - ia64/err-inject: Use get_user_pages_fast()
+ - RDMA/qedr: Fix kernel panic when running fio over NFSoRDMA
+ - RDMA/qedr: Fix iWARP write and send with immediate
+ - IB/mlx4: Fix corruption of RoCEv2 IPv4 GIDs
+ - IB/mlx4: Include GID type when deleting GIDs from HW table under RoCE
+ - IB/mlx5: Fix an error code in __mlx5_ib_modify_qp()
+ - fbdev: Fixing arbitrary kernel leak in case FBIOGETCMAP_SPARC in
  sbusfb_ioctl_helper().
+ - fsl/fman: avoid sleeping in atomic context while adding an address
+ - qed: Free RoCE ILT Memory on rmmod qedr
+ - net: qcom/emac: Use proper free methods during TX
+ - net: smsc911x: Fix unload crash when link is up
+ - IB/core: Fix possible crash to access NULL netdev
+ - cxgb4: do not set needs_free_netdev for mgmt dev's
+ - xen-blkfront: move negotiate_mq to cover all cases of new VBDs
+ - xen: xenbus: use put_device() instead of kfree()
+ - hv_netvsc: fix filter flags
+ - hv_netvsc: fix locking for rx_mode
+ - hv_netvsc: fix locking during VF setup
+ - ARM: davinci: fix the GPIO lookup for omapl138-hawk
+ - arm64: Relax ARM_SMCCC_ARCH_WORKAROUND_1 discovery
+ - selftests/vm/run_vmtests: adjust hugetlb size according to nr_cpus
+ - lib/test_kmod.c: fix limit check on number of test devices created
+ - dmaengine: mv_xor_v2: Fix clock resource by adding a register clock
+ - netfilter: ebtables: fix erroneous reject of last rule
+ - can: m_can: change comparison to bitshift when dealing with a mask
+ - can: m_can: select pinctrl state in each suspend/resume function
+ - bnxt-en: Check valid VNIC ID in bnxt_hwrm_vnic_set_tpa().
+ - workqueue: use put_device() instead of kfree()
+ - ipv4: lock mtu in fnhe when received PMTU < net.ipv4.route.min_pmtu
+ - sunvnet: does not support GSO for scvp
+ - KVM: arm/arm64: vgic: Add missing irq.lock to vgic_mmio_read_pending
+ - gpu: ipu-v3: prg: avoid possible array underflow
+ - drm/imx: move arming of the vblank event to atomic_flush
+ - drm/nouveau/bin: fix backlight regression
+ - xfrm: fix rcu_read_unlock usage in xfrm_local_error
+ - iwlwifi: mvm: set the correct tid when we flush the MCAST sta
+ - ip_tables: mvm: Correctly set IGTK for AP
+ - iwlwifi: mvm: fix error checking for multi/broadcast sta
+ - net: Fix vlan untag for bridge and vlan_dev with reorder_hdr off
+ - vlan: Fix out of order vlan headers with reorder header off
+ - batman-adv: fix header size check in batadv_dbg_arp()
+ - batman-adv: Fix skb buf rcsum on packet reroute
+ - vti4: Don't count header length twice on tunnel setup
+ - ip_tunnel: Clamp MTU to bounds on new link
+ - vti6: Fix dev->max_mtu setting
+ - iwlwifi: mvm: Increase session protection time after CS
+ - iwlwifi: mvm: clear tx queue id when unreserving aggregation queue
+ - iwlwifi: mvm: make sure internal station has a valid id
+ - iwlwifi: mvm: fix array out of bounds reference
+ - drm/tegra: Shutdown on driver unbind
+ - perf/cgroup: Fix child event counting bug
+ - brcmfmac: Fix check for ISO3166 code
+ - kbuild: make scripts/adjust_autoksym.sh robust against timestamp races
+ - RDMA/ucma: Correct option size check using optlen
+ - RDMA/qedr: fix QP's ack timeout configuration
+ - RDMA/qedr: Fix rc initialization on CNQ allocation failure
+ - RDMA/qedr: Fix QP state initialization race
+ - net/sched: fix idr leak on the error path of tcf_bpf_init()
+ - net/sched: fix idr leak in the error path of tcf_simp_init()
+ - net/sched: fix idr leak in the error path of tcf_act_police_init()
+ - net/sched: fix idr leak in the error path of tcp_pedit_init()
+ - net/sched: fix idr leak in the error path of __tcp_ipt_init()
+ - net/sched: fix idr leak in the error path of tcf_skbmod_init()
+ - net: dsa: Fix functional dsa-loop dependency on FIXED_PHY
+ - drm/ast: Fixed 1280x800 Display Issue
+ - mm/mempolicy.c: avoid use uninitialized preferred_node
+ - mm, thp: do not cause memcg oom for thp
+ - xfrm: Fix transport mode skb control buffer usage.
+ - selftests: ftrace: Add probe event argument syntax testcase
+ - selftests: ftrace: Add a testcase for string type with kprobe_event
+ selftests: ftrace: Add a testcase for probepoint
+ drm/amdkfd: Fix scratch memory with HWS enabled
+ batman-adv: fix multicast-via-unicast transmission with AP isolation
+ batman-adv: fix packet loss for broadcasted DHCP packets to a server
+ ARM: 8748/1: mm: Define vdsos_start, vdsos_end as array
+ lan78xx: Set ASD in MAC_CR when EEE is enabled.
+ net/qmi_wwan: add BroadMobi BM806U 2020:2033
+ bonding: fix the err path for dev hwaddr sync in bond_enslave
+ net: dsa: mt7530: fix module autoloading for OF platform drivers
+ net/mlx5: Make eswitch support to depend on switchdev
+ perf/x86/intel: Fix linear IP of PEBS real_ip on Haswell and later CPUs
+ x86/alternatives: Fixup alternative_call_2
+ llc: properly handle dev_queue_xmit() return value
+ builddeb: Fix header package regarding dtc source links
+ qede: Fix barrier usage after tx doorbell write.
+ mm, slab: memcgs_link the SLAB's kmem_cache
+ mm/page_owner: fix recursion bug after changing skip entries
+ mm/kmemleak.c: wait for scan completion before disabling free
+ hv_netvsc: enable multicast if necessary
+ qede: Do not drop rx-checksum invalidated packets.
+ net: Fix untag for vlan packets without ethernet header
+ vlan: Fix vlan insertion for packets without ethernet header
+ net: mvenv: fix enable of all initialized RXQs
+ sh: fix debug trap failure to process signals before return to user
+ firmware: dmi_scan: Fix UUID length safety check
+ nvme: don't send keep-alives to the discovery controller
+ Btrfs: clean up resources during umount after trans is aborted
+ Btrfs: fix loss of prealloc extents past i_size after fsync log replay
+ x86/pgtable: Don't set huge PUD/PMD on non-leaf entries
+ fs/proc/proc_sysctl.c: fix potential page fault while unregistering sysctl table
+ swap: divide-by-zero when zero length swap file on ssd
+ zfsfold: fix memory leak
+ sr: get/drop reference to device in revalidate and check_events
+ Force log to disk before reading the AGF during a fstrim
+ cpufreq: CPPC: Initialize shared perf capabilities of CPUs
+ powerpc/fscr: Enable interrupts earlier before calling get_user()
+ perf tools: Fix perf builds with clang support
+ perf clang: Add support for recent clang versions
+ dp83640: Ensure against premature access to PHY registers after reset
+ ibmvnic: Zero used TX descriptor counter on reset
+ mm/ksm: fix interaction with THP
+ mm: fix races between address_space dereference and free in page_evicatable
+ mm: thp: fix potential clearing to referenced flag in
+ page_idle_clear_pte_refs_one()
+ Btrfs: bail out on error during replay_dir_deletes
+ Btrfs: fix NULL pointer dereference in log_dir_items
+ btrfs: Fix possible softlock on single core machines
+ - IB/rxe: Fix for oops in rxe_register_device on ppc64le arch
+ - ocf52/dlm: don't handle migrate lockres if already in shutdown
+ - powerpc/64s/idle: Fix restore of AMOR on POWER9 after deep sleep
+ - sched/rt: Fix rq->clock_update_flags < RQCF_ACT_SKIP warning
+ - x86/mm: Fix bogus warning during EFI bootup, use boot_cpu_has() instead of
  this_cpu_has() in build_cr3_noflush()
+ - KVM: VMX: raise internal error for exception during invalid protected mode
  state
+ - lan78xx: Connect phy early
+ - sparc64: Make atomic_xchg() an inline function rather than a macro.
+ - net: bgmac: Fix endian access in bgmac_dma_tx_ring_free()
+ - net: bgmac: Correctly annotate register space
+ - btrfs: tests/qgroup: Fix wrong tree backref level
+ - Btrfs: fix copy_items() return value when logging an inode
+ - btrfs: fix lockdep splat in btrfs_alloc_subvolume_writers
+ - btrfs: qgroup: Fix root item corruption when multiple same source snapshots
  are created with quota enabled
+ - rxrpc: Fix Tx ring annotation after initial Tx failure
+ - rxrpc: Don't treat call aborts as conn aborts
+ - xen/acpi: off by one in read_acpi_id()
+ - drivers: macintosh: rack-meter: really fix bogus memsets
+ - ACPI: acpi_pad: Fix memory leak in power saving threads
+ - powerpc/mpic: Check if cpu_possible() in mpic_phymskask()
+ - ieee802154: ca8210: fix uninitialised data read
+ - ath10k: advertize beacon_int_min_gcd
+ - iommu/amd: Take into account that alloc_dev_data() may return NULL
+ - intel_th: Use correct method of finding hub
+ - m68k: set dma and coherent masks for platform FEC ethnerts
+ - iwlwifi: mvm: check if mac80211_queue is valid in iwl_mvm_disable_txml
+ - parisc/pci: Switch LBA PCI bus from Hard Fail to Soft Fail mode
+ - hwmon: (nct6775) Fix writing pwmX_mode
+ - powerpc/perf: Prevent kernel address leak to userspace via BHRB buffer
+ - powerpc/perf: Fix kernel address leak via sampling registers
+ - rsi: fix kernel panic observed on 64bit machine
+ - tools/thermal: tmon: fix for segfault
+ - selftests: Print the test we're running to /dev/kmsg
+ - net/mlx5: Protect from command bit overflow
+ - watchdog: davinci_wdt: fix error handling in davinci_wdt_probe()
+ - ath10k: Fix kernel panic while using worker (ath10k_stav_rc_update_wk)
+ - nvme-pci: disable APST for Samsung NVMe SSD 960 EVO + ASUS PRIME Z370-A
+ - ath9k: fix crash in spectral scan
+ - cxgb4: Setup FW queues before registering netdev
+ - ima: Fix Kconfig to select TPM 2.0 CRB interface
+ - ima: Fallback to the builtin hash algorithm
+ - watchdog: aspeed: Allow configuring for alternate boot
+ - arm: dts: socfpga: fix GIC PPI warning
+ - ext4: don't complain about incorrect features when probing
+ - drm/vmwtgfx: Unpin the screen object backup buffer when not used
+ - iommu/mediatek: Fix protect memory setting
+ - cpufreq: cppc_cpufreq: Fix cppc_cpufreq_init() failure path
+ - IB/mlx5: Set the default active rate and width to QDR and 4X
+ - zorro: Set up z->dev.dma_mask for the DMA API
+ - bcache: quit dc->writeback_thread when BCACHE_DEV_DETACHING is set
+ - remoteproc: imx_rproc: Fix an error handling path in 'imx_rproc_probe()'
+ - dt-bindings: add device tree binding for Allwinner H6 main CCU
+ - ACPICA: Events: add a return on failure from acpi_hw_register_read
+ - ACPICA: Fix memory leak on unusual memory leak
+ - ACPICA: acpi: acpi: fix acpi operand cache leak in nseval.c
+ - cxgb4: Fix queue free path of ULD drivers
+ - i2c: mv64xxx: Apply errata delay only in standard mode
+ - KVM: lapic: stop advertising DIRECTED_EOI when in-kernel IOAPIC is in use
+ - perf top: Fix top.call-graph config option reading
+ - perf stat: Fix core dump when flag T is used
+ - IB/core: Honor port_num while resolving GID for IB link layer
+ - drm/amdkgf: add missing include of mm.h
+ - coresight: Use %px to print pcir instead of %p
+ - regulator: gpio: Fix some error handling paths in 'gpio_regulator_probe()'
+ - spi: bcm-qspi: fix some error handling paths
+ - net/smc: pay attention to MAX_ORDER for CQ entries
+ - MIPS: ath79: Fix AR724X_PLL_REG_PCIE_CONFIG offset
+ - watchdog: dw: RMW the control register
+ - watchdog: aspeed: Fix translation of reset mode to ctrl register
+ - drm/meson: Fix some error handling paths in 'meson_driv_bind_master()'
+ - drm/meson: Fix an un-handled error path in 'meson_driv_bind_master()'
+ - powerpc: Add missing prototype for arch_irq_work_raise()
+ - f2fs: fix to set KEEP_SIZE bit in f2fs_zero_range
+ - f2fs: fix to clear CP_TRIMMED_FLAG
+ - f2fs: fix to check extent cache in f2fs_drop_extent_tree
+ - perf/core: Fix perf_output_read_group()不含
+ - perf/core: Fix installing cgroup events on CPU
+ - max17042: propagate of_node to power supply device
+ - perf/core: Fix perf_/output_read_group()
+ - drm/panel: simple: Fix the bus format for the Ontat panel
+ - hwmon: (pmbus/max8688) Accept negative page register values
+ - hwmon: (pmbus/adm1275) Accept negative page register values
+ - perf/x86/intel: Properly save/restore the PMU state in the NMI handler
+ - cdrom: do not call check_disk_change() inside cdrom_open()
+ - efi/arm*: Only register page tables when they exist
+ - perf/x86/intel: Fix large period handling on Broadwell CPUs
+ - perf/x86/intel: Fix event update for auto-reload
+ - arm64: dts: qcom: Fix SPI5 config on MSM8996
+ - soc: qcom: wcnsctrl: Fix increment in NV upload
+ - gfs2: Fix allocate chunk size
+ - x86/devicetree: Initialize device tree before using it
+ - x86/devicetree: Fix device IRQ settings in DT
+ - phy: rockchip-emmc: retry calpad busy trimming
+ - ALSA: vmaster: Propagate slave error
- phy: qcom-qmp: Fix phy pipe clock gating
- drm/bridge: siii92x: Retry status read after DDI 12C
- tools: hv: fix compiler warnings about major/target fname
- block: null_blk: fix 'Invalid parameters' when loading module
- dmaengine: pl330: fix a race condition in case of threadedirqs
- dmaengine: rcar-dmac: Check the done lists in rcar_dmac_chan_get_residue()
- enic: enable rq before updating rq descriptors
- watchdog: asm9260_wdt: fix error handling in asm9260_wdt_probe()
- hwreg: sm32 - add reset during probe
- pinctrl: devicetree: Fix dt_to_map_one_config handling of hogs
- pinctrl: artpcc: dt: add missing pin group uart5noctcs
- vfio-ccw: fence off transport mode
- dmaengine: qcom: bmm_dma: get num-channels and num-ees from dt
- drm: omapdrm: dss: Move initialization code from component bind to probe
- ARM: dts: dra71-evm: Correct evm_sd regulator max voltage
- drm/amdgpu: disable GFX ring and disable PQ wp in hw_fini
- drm/amdgpu: adjust timeout for ib_ring_tests(v2)
- net: stmmac: ensure that the device has released ownership before reading data
- net: stmmac: ensure that the MSS desc is the last desc to set the own bit
- cpufreq: Reorder cpufreq_online() error code path
- dpaa_eth: fix SG mapping
- PCI: Add function 1 DMA alias quirk for Marvell 88SE9220
- udf: Provide saner default for invalid uid / gid
- ixgbe: prevent ptp_rx_hang from running when in FILTER_ALL mode
- sh_eth: fix TSU init on SH7734/R8A7740
- power: supply: ltc2941-battery-gauge: Fix temperature units
- ARM: dts: bcm283x: Fix probing of bcm2835-i2s
- ARM: dts: bcm283x: Fix pin function of JTAG pins
- PCMCIA / PM: Avoid noirq suspend aborts during suspend-to-idle
- audit: return on memory error to avoid null pointer dereference
- net: stmmac: call correct function in stmmac_mac_config_rx_queues_routing()
- rcu: Call touch_nmi_watchdog() while printing stall warnings
- pinctrl: sh-pfc: r8a7796: Fix MOD_SEL register pin assignment for SSI pins
- group
- dpaa_eth: fix pause capability advertisement logic
- MIPS: Octeon: Fix logging messages with spurious periods after newlines
- drm/rockchip: Respect page offset for PRIME mmap calls
- x86/apic: Set up through-local-APIC mode on the boot CPU if 'noapic'
- specified
- perf test: Fix test case inet_phton to accept inlines.
- perf report: Fix wrong jump arrow
- perf tests: Use arch_compare_symbol_names to compare symbols
- perf report: Fix memory corruption in --branch-history mode --branch-history
- perf tests: Fix dwarf unwind for stripped binaries
- selftests/net: fixes psock_fanout BPF test case
- netlabel: If PF_INET6, check sk_buff ip header version
- drm: rcar-du: lvds: Fix LVDS startup on R-Car Gen3
+ - drm: rcar-du: lvds: Fix LVDS startup on R-Car Gen2
+ - ARM: dts: at91: tse850: use the correct compatible for the eeprom
+ - regmap: Correct comparison in regmap_cached
+ - i40e: Add delay after EMP reset for firmware to recover
+ - ARM: dts: imx7d: cl-som-imx7: fix pinctrl_enet
+ - ARM: dts: porter: Fix HDMI output routing
+ - regulator: of: Add a missing `of_node_put()` in an error handling path of
  `of_regulator_match()`
+ - pinctrl: mcp23s08: spi: Fix regmap debugfs entries
+ - kdb: make "mdr" command repeat
+ - drm/vmwgfx: Set dmabuf_size when vmw_dmabuf_init is successful
+ - perf tools: Add trace/beauty/generated/ into .gitignore
+ - tools: sync up .h files with the respective arch and uapi .h files
+ - MIPS: xilpaga: Stop generating useless dtb.o
+ - MIPS: xilpaga: Actually include FDT in fitImage
+ - MIPS: Fix build with DEBUG_ZBOOT and MACH_JZ4770
+ - fix breakage caused by d_find_alias() semantics change
+ - Btrfs: fix error handling in btrfs_truncate()
+ - mmc: block: propagate correct returned value in mmc_rpmb_ioctl
+ - arm64: export tishift functions to modules
+ - bcma: fix buffer size caused crash in bcma_core_mips_print_irq()
+ - PM / core: Fix direct_complete handling for devices with no callbacks
+ - ARM: dts: sun4i: Fix incorrect clocks for displays
+ - bnxt_en: Ignore src port field in decap filter nodes
+ - kasan, slub: fix handling of kasan_slab_free hook
+ - riscv/spinlock: Strengthen implementations with fences
+ - platform/x86: dell-smbios: Fix memory leaks in build_tokens_sysfs()
+ - rxrpc: Fix resed event time calculation
+ - i40e: hold the RTNL lock while changing interrupt schemes
+ - hv_netvsc: Fix the return status in RX path
+ - firmware: fix checking for return values for fw_add_devm_name()
+ - bcache: set writeback_rate_update_seconds in range [1, 60] seconds
+ - bcache: fix cached_dev->count usage for bch_cache_set_error()
+ - bcache: stop dc->writeback_rate_update properly
+ - ibmvnic: Fix reset return from closed state
+ - powerpe/vas: Fix cleanup when VAS is not configured
+ - if2fs: flush cp pack except cp pack 2 page at first
+ - drm/amdgpu: Clean sdma wptr register when only enable wptr polling
+ - powerpe/mm/slice: Remove intermediate bitmap copy
+ - powerpe/mm/slice: create header files dedicated to slices
+ - powerpe/mm/slice: Enhance for supporting PPC32
+ - powerpe/mm/slice: Fix hugepage allocation at hint address on 8xx
+ - ibmvnic: Allocate statistics buffers during probe
+ - dt-bindings: display: msm/dsi: Fix the PHY regulator supply props
+ - drm/amd/display: Set vsc pack revision when DPCD revision is >= 1.2
+ - soc: renesas: r8a77970-syssc: fix power area parents
+ - drm/vblank: Data type fixes for 64-bit vblank sequences.
+ - selftests: Add FIB onlink tests
+ - soc: amlogic: meson-gx-pwrc-vpu: fix error on shutdown when domain is powered off
+
+ * arm-smmu-v3 arm-smmu-v3.1.auto: failed to allocate MSIs (LP: #1785282)
+ - ACPI: iasl: Add SMMUv3 device ID mapping index support
+ - ACPI/IORT: Remove temporary iort_get_id_mapping_index() ACPIA guard
+
+ * Driver iwlwifi for Intel Wireless-AC 9560 is slow and unreliable in kernel 4.15.0-20-generic (LP: #1772467)
+ - scsi: hpsa: disable device during shutdown
+
+ * [Bionic] i2c: xlp9xx: Add SMBAlert support (LP: #1786981)
+ - i2c: xlp9xx: Add support for SMBAlert
+
+ * qeth: don't clobber buffer on async TX completion (LP: #1786057)
+ - s390/qeth: don't clobber buffer on async TX completion
+
+ * Linux 4.15.0-23 crashes during the boot process with a "Unable to handle kernel NULL pointer dereference" message (LP: #1777338)
+ - x86/xen: Add call of speculative_store_bypass_ht_init() to PV paths
+
+ * ThinkPad systems have no HDMI sound when using the nvidia GPU (LP: #1787058)
+ - ACPI / OSI: Add OEM _OSI string to enable NVidia HDMI audio
+
+ * [Bionic] i2c: xlp9xx: Fix case where SSIF read transaction completes early (LP: #1787240)
+ - i2c: xlp9xx: Fix case where SSIF read transaction completes early
+
+ * [Bionic] integrate upstream fix for Cavium zram driver (LP: #1787469)
+ - Revert "UBUNTU: SAUCE: crypto: thunderx_zip: Fix fallout from CONFIG_VMAP_STACK"
+ - crypto: cavium - Fix fallout from CONFIG_VMAP_STACK
+ - crypto: cavium - Limit result reading attempts
+ - crypto: cavium - Prevent division by zero
+ - crypto: cavium - Fix statistics pending request value
+ - crypto: cavium - Fix smp_processor_id() warnings
+
+ * Bugfix for handling of shadow doorbell buffer (LP: #1788222)
+ - nvme-pci: add a memory barrier to nvme_dbuf_update_and_check_event
+
+ * nvme devices namespace assigned to the wrong controller (LP: #1789227)
+ - nvme/multipath: Fix multipath disabled naming collisions
+
+ * linux-cloud-tools-common: Ensure hv-kvp-daemon.service starts before walinuxagent.service (LP: #1739107)
+ - [Debian] hyper-v -- Ensure that hv-kvp-daemon.service starts before walinuxagent.service
+
+ hinic interfaces aren't getting predictable names (LP: #1783138)
+ hinic: Link the logical network device to the pci device in sysfs
+ Suspend fails in Ubuntu and Kubuntu 18.04 but works fine in Ubuntu and
+ Kubuntu 17.10 (and on Kubuntu 18.04 using kernel 4.14.47) (LP: #1774950)
+ ACPI / LPSS: Avoid PM quirks on suspend and resume from S3
+ ACPI / LPSS: Avoid PM quirks on suspend and resume from hibernation
+ [Bionic] Bluetooth: Support RTL8723D and RTL8821C Devices (LP: #1784835)
+ Bluetooth: btred: Add RTL8723D and RTL8821C devices
+ CacheFiles: Error: Overlong wait for old active object to go away.
+ (LP: #1776254)
+ cachefiles: Fix missing clear of the CACHEFILES_OBJECT_ACTIVE flag
+ cachefiles: Wait rather than BUG'ing on "Unexpected object collision"
+ fsccache cookie refcount updated incorrectly during fsccache object allocation
+ (LP: #1776277) // fsccache cookie refcount updated incorrectly during fsccache
+ object allocation (LP: #1776277)
+ fsccache: Fix reference overput in fsccache_attach_object() error handling
+ FS-Cache: Assertion failed: FS-Cache: 6 == 5 is false (LP: #1774336)
+ Revert "UBUNTU: SAUCE: CacheFiles: fix a read_waiter/read_copier race"
+ fsccache: Allow cancelled operations to be enqueued
+ cachefiles: Fix refcounting bug in backing-file read monitoring
+ SMB3: Fix regression in server reconnect detection (LP: #1786110)
+ smb3: on reconnect set PreviousSessionId field
+ CVE-2018-1118
+ vhost: fix info leak due to uninitialized memory
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 27 Aug 2018 16:45:36 +0200
+ linux (4.15.0-33.36) bionic; urgency=medium
+ linux: 4.15.0-33.36 -proposed tracker (LP: #1787149)
+ RTNL assertion failure on ipvlan (LP: #1776927)
+ ipvlan: drop ipv6 dependency
+ ipvlan: use per device spinlock to protect addr list updates
+ SAUCE: fix warning from "ipvlan: drop ipv6 dependency"
+ ubuntu_bpf_jit test failed on Bionic s390x systems (LP: #1753941)
+ test_bpf: flag tests that cannot be jited on s390
+ HDMI/DP audio can’t work on the laptop of Dell Latitude 5495 (LP: #1782689)
+ drm/nouveau: fix nouveau_dsm_get_client_id()’s return type
+ - drm/radeon: fix radeon_atpx_get_client_id()'s return type
+ - drm/amdgpu: fix amdgpu_atpx_get_client_id()'s return type
+ - platform/x86: apple-gmux: fix gmux_get_client_id()'s return type
+ - ALSA: hda: use PCI_BASE_CLASS_DISPLAY to replace PCI_CLASS_DISPLAY_VGA
+ - vga_switcheroo: set audio client id according to bound GPU id
+
+ * locking sockets broken due to missing AppArmor socket mediation patches
+ (LP: #1780227)
+ - UBUNTU SAUCE: apparmor: fix apparmor mediating locking non-fs, unix sockets
+
+ * Update2 for ocxl driver (LP: #1781436)
+ - ocxl: Fix page fault handler in case of fault on dying process
+
+ * netns: unable to follow an interface that moves to another netns
+ (LP: #1774225)
+ - net: core: Expose number of link up/down transitions
+ - dev: always advertise the new nsid when the netns iface changes
+ - dev: advertise the new ifindex when the netns iface changes
+
+ * [Bionic] Disk IO hangs when using BFQ as io scheduler (LP: #1780066)
+ - block, bfq: fix occurrences of request finish method's old name
+ - block, bfq: remove batches of confusing ifdefs
+ - block, bfq: add requeue-request hook
+
+ * HP ProBook 455 G5 needs mute-led-gpio fixup (LP: #1781763)
+ - ALSA: hda: add mute led support for HP ProBook 455 G5
+
+ * [Bionic] bug fixes to improve stability of the ThunderX2 i2c driver
+ (LP: #1781476)
+ - i2c: xlp9xx: Fix issue seen when updating receive length
+ - i2c: xlp9xx: Make sure the transfer size is not more than I2C_SMBUS_BLOCK_SIZE
+
+ * x86/kvm: fix LAPIC timer drift when guest uses periodic mode (LP: #1778486)
+ - x86/kvm: fix LAPIC timer drift when guest uses periodic mode
+
+ * Please include ax88179_178a and r8152 modules in d-i udeb (LP: #1771823)
+ - [Config:] d-i: Add ax88179_178a and r8152 to nic-modules
+
+ * Nvidia fails after switching its mode (LP: #1778658)
+ - PCI: Restore config space on runtime resume despite being unbound
+
+ * Kernel error "task zfs:pid blocked for more than 120 seconds" (LP: #1781364)
+ - SAUCE: (noup) zfs to 0.7.5-1ubuntu16.3
+
+ * CVE-2018-12232
+ - PATCH 1/1] socket: close race condition between sock_close() and sockfs_setattr()
+ * CVE-2018-10323
+  - xfs: set format back to extents if xfs_bmap_extents_to_btree
+  
+ * change front mic location for more lenovo m7/8/9xx machines (LP: #1781316)
+  - ALSA: hda/realtek - Fix the problem of two front mics on more machines
+  - ALSA: hda/realtek - two more lenovo models need fixup of MIC_LOCATION
+  
+ * Cephfs + fscache: unable to handle kernel NULL pointer dereference at
+  0000000000000000 IP: jbd2__journal_start+0x22/0x1f0 (LP: #1783246)
+  - ceph: track read contexts in ceph_file_info
+  
+ * Touchpad of ThinkPad P52 failed to work with message "lost sync at byte"
+  (LP: #1779802)
+  - Input: elantech - fix V4 report decoding for module with middle key
+  - Input: elantech - enable middle button of touchpads on ThinkPad P52
+  
+ * xhci_hcd 0000:00:14.0: Root hub is not suspended (LP: #1779823)
+  - usb: xhci: dbc: Fix lockdep warning
+  - usb: xhci: dbc: Don't decrement runtime PM counter if DBC is not started
+  
+ * CVE-2018-13406
+  - video: uvesafb: Fix integer overflow in allocation
+  
+ * CVE-2018-10840
+  - ext4: correctly handle a zero-length xattr with a non-zero e_value_offs
+  
+ * CVE-2018-11412
+  - ext4: do not allow external inodes for inline data
+  
+ * CVE-2018-10881
+  - ext4: clear i_data in ext4_inode_info when removing inline data
+  
+ * CVE-2018-12233
+  - jfs: Fix inconsistency between memory allocation and ea_buf->max_size
+  
+ * CVE-2018-12904
+  - kvm: nVMX: Enforce cpl=0 for VMX instructions
+  
+ * Error parsing PCC subspaces from PCCT (LP: #1528684)
+  - mailbox: PCC: erroneous error message when parsing ACPI PCCT
+  
+ * CVE-2018-13094
+  - xfs: don't call xfs_da_shrink_inode with NULL bp
+  
+ * other users' coredumps can be read via setgid directory and killpriv bypass
+  (LP: #1779923) // CVE-2018-13405
+  - Fix up non-directory creation in SGID directories
* Invoking obsolete 'firmware_install' target breaks snap build (LP: #1782166)
  - snapcraft.yaml: stop invoking the obsolete (and non-existing)
  - 'firmware_install' target

* snapcraft.yaml: missing ubuntu-retpoline-extract-one script breaks the build
  - snapcraft.yaml: copy retpoline-extract-one to scripts before build

* Allow Raven Ridge's audio controller to be runtime suspended (LP: #1782540)
  - ALSA: hda: Add AZX_DCAPS_PM_RUNTIME for AMD Raven Ridge

* CVE-2018-11506
  - sr: pass down correctly sized SCSI sense buffer

* Bionic update: upstream stable patchset 2018-07-24 (LP: #1783418)
  - net: Fix a bug in removing queues from XPS map
  - net/mlx4_core: Fix error handling in mlx4_init_port_info.
  - net/sched: fix refcnt leak in the error path of tcf_vlan_init()
  - net: sched: red: avoid hashing NULL child
  - net/smc: check for missing nlattrs in SMC_PNETID messages
  - net: test tailroom before appending to linear skb
  - packet: in packet_snd start writing at link layer allocation
  - sock_diag: fix use-after-free read in __sk_free
  - tcp: purge write queue in tcp_connect_init()
  - vmxnet3: set the DMA mask before the first DMA map operation
  - vmxnet3: use DMA memory barriers where required
  - hv_netvsc: empty current transmit aggregation if flow blocked
  - hv_netvsc: Use the num_online_cpus() for channel limit
  - hv_netvsc: avoid retry on send during shutdown
  - hv_netvsc: only wake transmit queue if link is up
  - hv_netvsc: fix error unwind handling if vmbus_open fails
  - hv_netvsc: cancel subchannel setup before halting device
  - hv_netvsc: fix race in napi poll when rescheduling
  - hv_netvsc: defer queue selection to VF
  - hv_netvsc: disable NAPI before channel close
  - hv_netvsc: use RCU to fix concurrent rx and queue changes
  - hv_netvsc: change GPAD teardown order on older versions
  - hv_netvsc: common detach logic
  - hv_netvsc: Use Windows version instead of NVSP version on GPAD teardown
  - hv_netvsc: Split netvsc_revoke_buf() and netvsc_teardown_gpadl()
  - hv_netvsc: Ensure correct teardown message sequence order
  - hv_netvsc: Fix a network regression after ifdown/ifup
  - sparc: vio: use put_device() instead of kfree()
  - ext2: fix a block leak
  - s390: add assembler macros for CPU alternatives
  - s390: move expoline assembler macros to a header
  - s390/crc32-vx: use expoline for indirect branches
+ s390/lib: use expoline for indirect branches
+ s390/trace: use expoline for indirect branches
+ s390/kernel: use expoline for indirect branches
+ s390: move spectre sysfs attribute code
+ s390: extend expoline to BC instructions
+ s390: use expoline thunks in the BPF JIT
+ scsi: sg: allocate with __GFP_ZERO in sg_build_indirect()
+ scsi: zfcp: fix infinite iteration on ERP ready list
+ loop: don't call into filesystem while holding lo_ctl_mutex
+ loop: fix LOOP_GET_STATUS lock imbalance
+ cfg80211: limit wiphy names to 128 bytes
+ hfsplus: stop workqueue when fill_super() failed
+ x86/kexec: Avoid double free_page() upon do_kexec_load() failure
+ usb: gadget: f_uac2: fix bFirstInterface in composite gadget
+ usb: dwc3: Undo PHY init if soft reset fails
+ usb: dwc3: omap: don't miss events during suspend/resume
+ usb: gadget: core: Fix use-after-free of usb_request
+ usb: gadget: fs1_uc: core: fix ep valid checks
+ usb: dwc2: Fix dwc2_hsoc_core_init_disconnected()
+ usb: cdc_acm: prevent race at write to acm while system resumes
+ net: usbnet: fix potential deadlock on 32bit hosts
+ ARM: dts: imx7d-sdb: Fix regulator-usb-otg2-vbus node name
+ usb: host: xhci-plat: revert "usb: host: xhci-plat: enable clk in resume"
+ timing"
+ USB: OHCI: Fix NULL dereference in HCDs using HCD_LOCAL_MEM
+ net/usb/qmi_wwan.c: Add USB id for lt4120 modem
+ net/usb: add qmi_wwan if on lte modem wistron neweb d18q1
+ Bluetooth: btusb: Add USB ID 7392:a611 for Edimax EW-7611ULB
+ ALSA: usb-audio: Add native DSD support for Luxman DA-06
+ usb: dwc3: Add SoftReset PHY synchonization delay
+ usb: dwc3: Update DWC_usb31 GTXFIFOFSIZ reg fields
+ Makefile: fix link error on randconfig
+ xhci: zero usb device slot_id member when disabling and freeing a xhci slot
+ usb: dwc2: Fix interval type issue
+ usb: dwc2: hcd: Fix host channel halt flow
+ usb: dwc2: host: Fix transaction errors in host mode
+ usb: gadget: ffs: Let setup() return USB_GADGET_DELAYED_STATUS
+ usb: gadget: ffs: Execute copy_to_user() with USER_DS set
+ usbip: Correct maximum value of CONFIG_USBIP_VHCI_HC_PORTS
+ usb: gadget: udc: change comparison to bitshift when dealing with a mask
+ usb: gadget: composite: fix incorrect handling of OS desc requests
+ media: ltd3306a: Fix module count mismatch on usb unplug
+ media: em28xx: USB bulk packet size fix
+ Bluetooth: btusb: Add device ID for RTL8822BE
+ xhci: Show what USB release number the xHC supports from protocol capability
+ staging: bcm2835-audio: Release resources on module_exit()
+ staging: lustre: fix bug in osc_enter_cache_try
+ staging: fsl-dpaa2/eth: Fix incorrect casts
* staging: rt8192u: return -ENOMEM on failed allocation of priv->oldaddr
* staging: ks7010: Use constants from ieee80211_eid instead of literal ints.
* staging: lustre: lmv: correctly iput lmo_root
* crypto: inside-secure - wait for the request to complete if in the backlog
* crypto: atmel-aes - fix the keys zeroing on errors
* crypto: ccp - don't disable interrupts while setting up debugfs
* crypto: inside-secure - do not process request if no command was issued
* crypto: inside-secure - fix the cache_len computation
* crypto: inside-secure - fix the extra cache computation
* crypto: sunxi-ss - Add MODULE_ALIAS to sun4i-ss
* crypto: inside-secure - fix the invalidation step during cra_exit
* scsi: mpt3sas: fix an out of bound write
* scsi: ufs: Enable quirk to ignore sending WRITE SAME command
* scsi: bnx2fc: Fix check in SCSI completion handler for timed out request
* scsi: sym53c8xx_2: iterator underflow in sym_getsync()
* scsi: mptfusion: Add bounds check in mptctl_hp_targetinfo()
* scsi: qla2xxx: Avoid triggering undefined behavior in qla2x00_mb_completion()
* scsi: storvsc: Increase cmd_per_lun for higher speed devices
* scsi: qedi: Fix truncation of CHAP name and secret
* scsi: aacraid: fix shutdown crash when init fails
* scsi: qla4xxx: skip error recovery in case of register disconnect.
* scsi: qedi: Fix kernel crash during port toggle
* scsi: mpt3sas: Do not mark fw_event workqueue as WQ_MEM_RECLAIM
* scsi: sd: Keep disk read-only when re-reading partition
* scsi: iscsi_tcp: set BDI_CAP_STABLE_WRITES when data digest enabled
* scsi: aacraid: Insure command thread is not recursively stopped
* scsi: core: Make SCSI Status CONDITION MET equivalent to GOOD
* scsi: nvsas: fix wrong endianness of sgpio api
* ASoC: hdmi-codec: Fix module unloading caused kernel crash
* ASoC: rockchip: rk3288-hdmi-analog: Select needed codecs
* ASoC: samsung: odroid: Fix 32000 sample rate handling
* ASoC: topology: create TLV data for dapm widgets
* ASoC: samsung: i2s: Ensure the RCLK rate is properly determined
* clk: rockchip: Fix wrong parent for SDMMC phase clock for rk3228
* clk: Don't show the incorrect clock phase
* clk: hisilicon: mark wdt_mux_p[] as const
* clk: tegra: Fix pll_u rate configuration
* clk: rockchip: Prevent calculating mmc phase if clock rate is zero
* clk: samsung: s3c2410: Fix PLL rates
* clk: samsung: exynos7: Fix PLL rates
* clk: samsung: exynos5260: Fix PLL rates
* clk: samsung: exynos5433: Fix PLL rates
* clk: samsung: exynos5250: Fix PLL rates
* clk: samsung: exynos3250: Fix PLL rates
* media: dmxdenv: fix error code for invalid ioctls
* media: Don't let tvp5150_get_vbi() go out of vbi_ram_default array
* media: ov5645: add missing of_node_put() in error path
+ - media: cx23885: Override 888 ImpactVCBe crystal frequency
+ - media: cx23885: Set subdev host data to clk_freq pointer
+ - media: s3c-camif: fix out-of-bounds array access
+ - media: lgdt3306a: Fix a double kfree on i2c device remove
+ - media: em28xx: Add Haupppage SoloHD/DualHD bulk models
+ - media: v4l: vsp1: Fix display stalls when requesting too many inputs
+ - media: i2c: adv748x: fix HDMI field heights
+ - media: vb2: Fix videobuf2 to map correct area
+ - media: vivid: fix incorrect capabilities for radio
+ - media: cx25821: prevent out-of-bounds read on array card
+ - serial: xuartps: Fix out-of-bounds access through DT alias
+ - serial: sh-sci: Fix out-of-bounds access through DT alias
+ - serial: samsung: Fix out-of-bounds access through serial port index
+ - serial: mxs-uart: Fix out-of-bounds access through serial port index
+ - serial: imx: Fix out-of-bounds access through serial port index
+ - serial: fsl_lpuart: Fix out-of-bounds access through DT alias
+ - serial: arc_uart: Fix out-of-bounds access through DT alias
+ - serial: 8250: Don't service RX FIFO if interrupts are disabled
+ - serial: altera: ensure port->regshift is honored consistently
+ - rtc: snvs: Fix usage of snvs_rtc_enable
+ - rtc: hctosys: Ensure system time doesn't overflow time_t
+ - rtc: rk808: fix possible race condition
+ - rtc: m41t80: fix race conditions
+ - rtc: tx4939: avoid unintended sign extension on a 24 bit shift
+ - rtc: rp5e01: fix possible race condition
+ - rtc: goldfish: Add missing MODULE_LICENSE
+ - cxbgb: Correct ntuple mask validation for hash filters
+ - net: da: bcm_sf2: Fix RX_CLS_LOC_ANY overwrite for last rule
+ - net: da: Do not register devlink for unused ports
+ - net: da: bcm_sf2: Fix IPv6 rules and chain ID
+ - net: da: bcm_sf2: Fix IPv6 rule half deletion
+ - 3c59x: convert to generic DMA API
+ - net: ip6_gre: Request headroom in __gre6_xmit()
+ - net: ip6_gre: Split up ip6gre_tnl_link_config()
+ - net: ip6_gre: Split up ip6gre_tnl_change()
+ - net: ip6_gre: Split up ip6gre_newlink()
+ - net: ip6_gre: Split up ip6gre_changelink()
+ - qed: LL2 flush isles when connection is closed
+ - qed: Fix possibility of list corruption during rmmod flows
+ - qed: Fix LL2 race during connection terminate
+ - powerpc: Move default security feature flags
+ - Bluetooth: btusb: Add support for Intel Bluetooth device 22560 [8087:0026]
+ - staging: fsl-dpaa2/eth: Fix incorrect kfree
+ - crypto: inside-secure - move the digest to the request context
+ - scsi: lpfc: Fix NVME Initiator FirstBurst
+ - serial: mvebu-uart: fix tx lost characters

* Bionic update: upstream stable patchset 2018-07-20 (LP: #1782846)
+ - usbip: usbip_host: refine probe and disconnect debug msgs to be useful
+ - usbip: usbip_host: delete device from busid_table after rebind
+ - usbip: usbip_host: run rebind from exit when module is removed
+ - usbip: usbip_host: fix NULL-ptr deref and use-after-free errors
+ - usbip: usbip_host: fix bad unlock balance during stub_probe()
+ - ALSA: usb: mixer: volume quirk for CM102-A+/102S+
+ - ALSA: hda: Add Lenovo C50 All in one to the power_save blacklist
+ - ALSA: control: fix a redundant-copy issue
+ - spi: pxa2xx: Allow 64-bit DMA
+ - spi: bcm-qspi: Avoid setting MSPI_CDRAM_PCS for spi-nor master
+ - spi: bcm-qspi: Always read and set BSPI_MAST_N_BOOT_CTRL
+ - KVM: arm/arm64: VGIC/ITS save/restore: protect kvm_read_guest() calls
+ - KVM: arm/arm64: VGIC/ITS: protect kvm_read_guest() calls with SRCU lock
+ - vfio: ccw: fix cleanup if cp_prefetch fails
+ - tracing/x86/xen: Remove zero data size trace events
+ - tee: shm: fix use-after-free via temporarily dropped reference
+ - netfilter: nf_tables: free set name in error path
+ - netfilter: nf_tables: can't fail after linking rule into active rule list
+ - netfilter: nf_socket: can't fail after linking rule into active rule list
+ - i2c: designware: fix poll-after-enable regression
+ - powerpc/powerpc: Fix NVRAM sleep in invalid context when crashing
+ - drm: Match sysfs name in link removal to link creation
+ - lib/test_bitmap.c: fix bitmap optimisation tests to report errors correctly
+ - radix tree: fix multi-order iteration race
+ - mm: don't allow deferred pages with NEED_PER_CPU_KM
+ - drm/i915/gen9: Add WaClearHIZ_WM_CHICKEN3 for bxt and glk
+ - s390/qdio: fix access to uninitialized qdio_q fields
+ - s390/qdio: don't release memory in qdio_setup_irq()
+ - s390: remove indirect branch from do_softirq_own_stack
+ - x86/pkeys: Override pkey when moving away from PROT_EXEC
+ - x86/pkeys: Do not special case protection key 0
+ - efi: Avoid potential crashes, fix the 'struct efi_pci_io_protocol_32'
  + definition for mixed mode
+ - ARM: 8771/1: kprobes: Prohibit kprobes on do_undefinstr
+ - x86/mm: Drop TS_COMPAT on 64-bit exec() syscall
+ - tick/broadcast: Use for_each_cpu() specially on UP kernels
+ - ARM: 8769/1: kprobes: Fix to use get_kprobe_ctlblk after irq-disabled
+ - ARM: 8770/1: kprobes: Prohibit probing on optimized_callback
+ - ARM: 8772/1: kprobes: Prohibit kprobes on get_user functions
+ - Btrfs: fix xattr loss after power failure
+ - Btrfs: send, fix invalid access to commit roots due to concurrent
  + snapshotting
+ - btrfs: property: Set incompat flag if lzo/zstd compression is set
+ - btrfs: fix crash when trying to resume balance without the resume flag
+ - btrfs: Split btrfs_del_delalloc_inode into 2 functions
+ - btrfs: Fix delalloc inodes invalidation during transaction abort
+ - btrfs: fix reading stale metadata blocks after degraded raid1 mounts
- xhci: Fix USB3 NULL pointer dereference at logical disconnect.
- KVM: arm/arm64: Properly protect VGIC locks from IRQs
- KVM: arm/arm64: VGIC/ITS: Promote irq_lock() in update_affinity
- hwmon: (k10temp) Fix reading critical temperature register
- hwmon: (k10temp) Use API function to access System Management Network
- vsprintf: Replace memory barrier with static_key for random_ptr_key update
- x86/amd_nb: Add support for Raven Ridge CPUs
- x86/apic/x2apic: Initialize cluster ID properly

* Bionic update: upstream stable patchset 2018-07-09 (LP: #1780858)
- 8139too: Use disable_irq_nosync() in rtl8139_poll_controller()
- bridge: check iface upper dev when setting master via ioctl
- dccp: fix tasklet usage
- ipv4: fix fnhe usage by non-cached routes
- ipv4: fix memory leaks in udp_sendmsg, ping_v4_sendmsg
- llc: better deal with too small mtu
- net: ethernet: sun: niu set correct packet size in skb
- net: ethernet: ti: cpsw: fix packet leaking in dual_mac mode
- net/mlx4_en: Fix an error handling path in 'mlx4_en_init_netdev()'
- net/mlx4_en: Verify coalescing parameters are in range
- net/mlx5e: Err if asked to offload TC match on frag being first
- net/mlx5: E-Switch, Include VF RDMA stats in vport statistics
- net sched actions: fix refcnt leak in skbmod
- net_sched: fq: take care of throttled flows before reuse
- net: support compat 64-bit time in {s,g}etsockopt
- net/tls: Don't recursively call push_record during tls_write_space callbacks
- net/tls: Fix connection stall on partial tls record
- openvswitch: Don't swap table in nattr_set() after OVS_ATTR_NESTED is found
- r8169: fix powering up RTL8168h
- rds: do not leak kernel memory to user land
- scctp: delay the authentication for the duplicated cookie-echo chunk
- scctp: fix the issue that the cookie-ack with auth can't get processed
- scctp: handle two v4 addr comparison in scctp_inet6_cmp_addr
- scctp: remove scctp_chunk_put from fail_mark err path in
  scctp_ulpevent_make_rcvmsg
- scctp: use the old asoc when making the cookie-ack chunk in dupcook_d
- tcp_bbr: fix to zero idle_restart only upon S/ACKed data
- tcp: ignore Fast Open on repair mode
- tg3: Fix vunmap() BUG_ON() triggered from tg3_free_consistent().
- bonding: do not allow rlb updates to invalid mac
- bonding: send learning packets for vlans on slave
- net: sched: fix error path in tcf_proto_create() when modules are not
  configured
- net/mlx5e: TX, Use correct counter in dma_map error flow
- net/mlx5: Avoid cleaning flow steering table twice during error flow
- hv_netvsc: set master device
- ipv6: fix uninit-value in ip6_multipath_l3_keys()
+ net/mlx5e: Allow offloading ipv4 header re-write for icmp
+ nsh: fix infinite loop
+ udp: fix SO_BINDTODEVICE
+ l2tp: revert "l2tp: fix missing print session offset info"
+ proc: do not access cmdline nor environ from file-backed areas
+ net/smc: restrict non-blocking connect finish
+ mlxsw: spectrum_switchdev: Do not remove nrouter port from MDB's ports list
+ net/mlx5e: DCBNL fix min inline header size for dscp
+ net: systemport: Correctly disambiguate driver instances
+ scctp: clear the new asoc's stream outcnt in scctp_stream_update
+ tcp: restore autocorking
+ tipc: fix one byte leak in tipc_sk_set_orig_addr()
+ hv_netvsc: Fix net device attach on older Windows hosts

* Bionic update: upstream stable patchset 2018-07-06 (LP: #1780499)
+ ext4: prevent right-shifting extents beyond EXT_MAX_BLOCKS
+ ipvs: fix rtnl_lock lockups caused by start_sync_thread
+ netfilter: ebtables: don't attempt to allocate 0-sized compat array
+ kcm: Call strp_stop before strp_done in kcm_attach
+ crypto: af_alg - fix possible uninit-value in alg_bind()
+ netlink: fix uninit-value in netlink_sendmsg
+ net: fix rtnh_ok()
+ net: initialize skb->peeked when cloning
+ net: fix uninit-value in __hw_addr_add_ex()
+ dccp: initialize ireq->ir_mark
+ ipv4: fix uninit-value in ip_route_output_key_hash_rcu()
+ soreuseport: initialise timewait reuseport field
+ inetpeer: fix uninit-value in inet_getpeer
+ memcg: fix per_node_info cleanup
+ perf: Remove superfluous allocation error check
+ tcp: fix TCP_REPAIR_QUEUE bound checking
+ bdi: wake up concurrent wb_shutdown() callers.
+ bdi: Fix oops in wb_workfn()
+ gpioib: do not free unrequested descriptors
+ gpio: fix aspeed_gpio unmask irq
+ gpio: fix error path in lineevent_create
+ rfkill: gpio: fix memory leak in probe error path
+ libata: Apply NOLPM quirk for Sandisk SD7UB3Q*G1001 SSDs
+ dm integrity: use kvmfree for kvmalloc'd memory
+ tracing: Fix regex_match_front() to not over compare the test string
+ z3fold: fix reclaim lock-ups
+ mm: sections are not offlined during memory hotremove
+ mm, oom: fix concurrent munlock and oom reaper umap, v3
+ ceph: fix rsize/owsize capping in ceph_direct_read_write()
+ can: kvaser_usb: Increase correct stats counter in kvaser_usb_rx_can_msg()
+ can: hi311x: Acquire SPI lock on ->do_get_berr_counter
+ can: hi311x: Work around TX complete interrupt erratum
+ drm/vc4: Fix scaling of uni-planar formats
+ - drm/i915: Fix drm:intel_enable_lvds ERROR message in kernel log
+ - drm/atomic: Clean old_state/new_state in drm_atomic_state_default_clear()
+ - drm/atomic: Clean private obj old_state/new_state in
drm_atomic_state_default_clear()
+ - net: atm: Fix potential Spectre v1
+ - atm: zatm: Fix potential Spectre v1
+ - cpufreq: schedutil: Avoid using invalid next_freq
+ - Revert "Bluetooth: btusb: Fix quirk for Atheros 1525/QCA6174"
+ - Bluetooth: btusb: Only check needs_reset_resume DMI table for QCA rome
+ chipsets
+ - thermal: exynos: Reading temperature makes sense only when TMU is turned on
+ - thermal: exynos: Propagate error value from tmu_read()
+ - nvme: add quirk to force medium priority for SQ creation
+ - sched/autogroup: Fix possible Spectre-v1 indexing for sched_prio_to_weight[]
+ - tracing/uprobe_event: Fix strncpy corner case
+ - perf/x86: Fix possible Spectre-v1 indexing for hw_perf_event cache_*
+ - perf/x86/cstate: Fix possible Spectre-v1 indexing for pkg_msr
+ - perf/x86/msr: Fix possible Spectre-v1 indexing in the MSR driver
+ - perf/core: Fix possible Spectre-v1 indexing for ->aux_pages[]
+ - perf/x86: Fix possible Spectre-v1 indexing for x86_pmu::event_map()
+ - i2c: dev: prevent ZERO_SIZE_PTR deref in i2cdev_ioctl_rdwr()
+ - bdi: Fix use after free bug in debugfs_remove()
+ - drm/ttm: Use GFP_TRANSHUGE_LIGHT for allocating huge pages
+ - drm/i915: Adjust eDP's logical vco in a reliable place.
+ - drm/nouveau/ttm: don't dereference nvbo::cli, it can outlive client
+ - sched/core: Fix possible Spectre-v1 indexing for sched_prio_to_weight[]
+
+ * Bionic update: upstream stable patchset 2018-06-26 (LP: #1778759)
+ - percpu: include linux/sched.h for cond_resched()
+ - ACPI / button: make module loadable when booted in non-ACPI mode
+ - USB: serial: option: Add support for Quectel EP06
+ - ALSA: hda - Fix incorrect usage of IS_REACHABLE()
+ - ALSA: pcm: Check PCM state at xfern compat ioctl
+ - ALSA: seq: Fix races at MIDI encoding in snd_virmidi_output_trigger()
+ - ALSA: dice: fix kernel NULL pointer dereference due to invalid calculation
+ for array index
+ - ALSA: aloop: Mark paused device as inactive
+ - ALSA: aloop: Add missing cable lock to ctl API callbacks
+ - tracepoint: Do not warn on ENOMEM
+ - scsi: target: Fix fortify_panic kernel exception
+ - Input: leds - fix out of bound access
+ - Input: atmel_mxt_ts - add touchpad button mapping for Samsung Chromebook Pro
+ - rtlwifi: btoex: Add power_on_setting routine
+ - rtlwifi: cleanup 8723be ant_sel definition
+ - xfs: prevent creating negative-sized file via INSERT_RANGE
+ - RDMA/cxgb4: release hw resources on device removal
+ - RDMA/ucma: Allow resolving address w/o specifying source address
- RDMA/mlx5: Fix multiple NULL-ptr deref errors in rereg_mr flow
- RDMA/mlx5: Protect from shift operand overflow
- NET: usb: qmi_wwan: add support for ulbox R410M PID 0x90b2
- IB/mlx5: Use unlimited rate when static rate is not supported
- IB/hfi1: Fix handling of BECN marked multicast packet
- IB/hfi1: Fix loss of BECN with AHG
- IB/hfi1: Fix NULL pointer dereference when invalid num_vls is used
- iw_cxgb4: Atomically flush per QP HW CQEs
- drm/vmwgfx: Fix a buffer object leak
- drm/bridge: vga-dac: Fix edid memory leak
- test_firmware: fix setting old custom fw path back on exit, second try
- errseq: Always report a writeback error once
- USB: serial: visor: handle potential invalid device configuration
- usb: dwc3: gadget: Fix list_del corruption in dwc3_ep_dequeue
- USB: Accept bulk endpoints with 1024-byte maxpacket
- USB: serial: option: reimplement interface masking
- USB: serial: option: adding support for ulbox R410M
- usb: musb: host: fix potential NULL pointer dereference
- usb: musb: trace: fix NULL pointer dereference in musb_g_tx()
- platform/x86: asus-wireless: Fix NULL pointer dereference
- irqchip/qcom: Fix check for spurious interrupts
- tracing: Fix bad use of igrab in trace_uprobe.c
- [Config] CONFIG_ARM64_ERRATUM_1024718=y
- arm64: Add work around for Arm Cortex-A55 Erratum 1024718
- Input: atmel_mxt_ts - add touchpad button mapping for Samsung Chromebook Pro
- infiniband: mlx5: fix build errors when INFINIBAND_USER_ACCESS=m
- btrfs: Take trans lock before access running trans in check_delayed_ref
- drm/vc4: Make sure vc4_bo_{inc,dec}_usecnt() calls are balanced
- xhci: Fix use-after-free in xhci_free_virt_device
- platform/x86: Kconfig: Fix dell-laptop dependency chain.
- x86: KVM: x86: remove APIC Timer periodic/oneshot spikes
- clocksource: Allow clocksource_mark_unstable() on unregistered clocksources
- clocksource: Initialize cs->wd_list
- clocksource: Consistent de-rate when marking unstable
- Bionic update: upstream stable patchset 2018-06-22 (LP: #1778265)
- ext4: set h_journal if there is a failure starting a reserved handle
- ext4: add MODULE_SOFTDEP to ensure crc32c is included in the initramfs
- ext4: add validity checks for bitmap block numbers
- ext4: fix bitmap position validation
- random: fix possible sleeping allocation from irq context
- random: rate limit unseeded randomness warnings
- usbip: usbip_event: fix to not print kernel pointer address
- usbip: usbip_host: fix to hold parent lock for device_attach() calls
- usbip: vhci_hcd: Fix usb device and sockfd leaks
- usbip: vhci_hcd: check rhport before using in vhci_hub_control()
- Revert "xhci: pla: Register shutdown for xhci_plat"
- USB: serial: simple: add libtransistor console
+ - USB: serial: ftdi_sio: use jtag quirk for Arrow USB Blaster
+ - USB: serial: cp210x: add ID for NI USB serial console
+ - USB: core: Add quirk for HP v222w 16GB Mini
+ - USB: Increment wakeup count on remote wakeup.
+ - ALSA: usb-audio: Skip broken EU on Dell dock USB-audio
+ - virtio: add ability to iterate over vqs
+ - virtio_console: don't tie bufs to a vq
+ - virtio_console: free buffers after reset
+ - virtio_console: drop custom control queue cleanup
+ - virtio_console: move removal code
+ - virtio_console: reset on out of memory
+ - drm/virtio: fix vq wait_event condition
+ - tty: Don't call panic() at tty_ldisc_init()
+ - tty: n_gsm: Fix long delays with control frame timeouts in ADM mode
+ - tty: n_gsm: Fix DLCI handling for ADM mode if debug & 2 is not set
+ - tty: Avoid possible error pointer dereference at tty_ldisc_restore().
+ - tty: Use __GFP_NOFAIL for tty_ldisc_get()
+ - ALSA: dice: fix OUI for TC group
+ - ALSA: dice: fix error path to destroy initialized stream data
+ - ALSA: hda - Skip jack and others for non-existing PCM streams
+ - ALSA: opl3: Hardening for potential Spectre v1
+ - ALSA: asihpi: Hardening for potential Spectre v1
+ - ALSA: hdspm: Hardening for potential Spectre v1
+ - ALSA: rme9652: Hardening for potential Spectre v1
+ - ALSA: control: Hardening for potential Spectre v1
+ - ALSA: pcm: Return negative delays from SNDRV_PCM_IOCTL_DELAY.
+ - ALSA: core: Report audio_tstamp in snd_pcm_sync_ptr
+ - ALSA: seq: oss: Fix unbalanced use lock for synth MIDI device
+ - ALSA: seq: oss: Hardening for potential Spectre v1
+ - ALSA: hda: Hardening for potential Spectre v1
+ - ALSA: hda/realtek - Add some fixes for ALC233
+ - ALSA: hda/realtek - Update ALC255 depop optimize
+ - ALSA: hda/realtek - change the location for one of two front mics
+ - mtd: spi-nor: cadence-quadspi: Fix page fault kernel panic
+ - mtd: cfi: cmdset_0001: Do not allow read/write to suspend erase block.
+ - mtd: cfi: cmdset_0002: Do not allow read/write to suspend erase block.
+ - mtd: rawnand: tango: Fix struct clk memory leak
+ - kobject: don't use WARN for registration failures
+ - scsi: sd: Defer spinning up drive while SANITIZE is in progress
+ - bfq-iosched: ensure to clear bic/bfqq pointers when preparing request
+ - vfio: ccw: process ssch with interrupts disabled
+ - ANDROID: binder: prevent transactions into own process.
+ - PCI: aardvark: Fix logic in advk_pcie_\{rd,wr\}_conf()
+ - PCI: aardvark: Set PIO_ADDR_LSB correctly in advk_pcie_rd_conf()
+ - PCI: aardvark: Use ISR1 instead of ISR0 interrupt in legacy irq mode
+ - PCI: aardvark: Fix PCIe Max Read Request Size setting
+ - ARM: amba: Make driver_override output consistent with other buses
+ - ARM: amba: Fix race condition with driver_override
+ - ARM: amba: Don't read past the end of sysfs "driver_override" buffer
+ - ARM: socfpga_defconfig: Remove QSPI Sector 4K size force
+ - KVM: arm/arm64: Close VMID generation race
+ - crypto: drbg - set freed buffers to NULL
+ - ASoC: fsl_esai: Fix divisor calculation failure at lower ratio
+ - libceph: set up the NUMA crng instances after the CRNG is fully initialized
+ - x86/ipc: Fix x32 version of shmid64_ds and msqid64_ds
+ - x86/smpboot: Don't use mwait_play_dead() on AMD systems
+ - x86/microcode/intel: Save microcode patch unconditionally
+ -drm/numa: ASoC: dmic: Fix clock parenting
+ -PCI / PM: Do not clear state_saved in pci_pm_freeze() when smart suspend is
+ - serial: mvebu-uart: Fix local flags handling on termios update
+ - block: do not use interruptible wait anywhere
+ - ASoC: dmic: Fix clock parenting
+ - PCI / PM: Do not clear state_saved in pci_pm_freeze() when smart suspend is
+ - module: Fix display of wrong module .text address
+ - drm/edid: Reset more of the display info
+ - drm/i915/fbdev: Enable late fbdev initial configuration
+ - drm/i915/audio: set minimum CD clock to twice the BCLK
+ - arm/arm64: KVM: Add PSCI version selection API
+ - powerpc/eeh: Fix race with driver un/bind
+ - serial: mvebu-uart: Fix local flags handling on termios update
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+ - arm/arm64: KVM: Add PSCI version selection API
+ - powerpc/eeh: Fix race with driver un/bind
+ - serial: mvebu-uart: Fix local flags handling on termios update
+ - block: do not use interruptible wait anywhere
+ - ASoC: dmic: Fix clock parenting
+ -PCI / PM: Do not clear state_saved in pci_pm_freeze() when smart suspend is
+ * kernel: Fix arch random implementation (LP: #1775391)
+ - s390/archrandom: Rework arch random implementation.
+ 
+ * kernel: Fix memory leak on CCA and EP11 CPRB processing. (LP: #1775390)
+ 
+ * Various fixes for CXL kernel module (LP: #1774471)
+ - cxl: Remove function write_timebase_ctrl_psl9() for PSL9
+ - cxl: Set the PBCQ Tunnel BAR register when enabling capi mode
+ - cxl: Report the tunneled operations status
+ - cxl: Configure PSL to not use APC virtual machines
+ - cxl: Disable prefault_mode in Radix mode
+ 
+ * Bluetooth not working (LP: #1764645)
+ - Bluetooth: btusb: Apply QCA Rome patches for some ATH3012 models
+ 
+ * linux-snapdragon: wcn36xx: mac address generation on boot (LP: #1776491)
+ - [Config] arm64: snapdragon: WCN36XX_SNAPDRAGON_HACKS=y
+ - SAUCE: wcn36xx: read MAC from file or randomly generate one
+ 
+ * fscache: Fix hanging wait on page discarded by writeback (LP: #1777029)
+ - fscache: Fix hanging wait on page discarded by writeback
+ 
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 15 Aug 2018 14:50:38 +0200
+ 
+ linux (4.15.0-32.35) bionic; urgency=medium
+ 
+ [ Stefan Bader ]
+ + * CVE-2018-3620 // CVE-2018-3646
+ + - x86/Centaur: Initialize supported CPU features properly
+ + - x86/Centaur: Report correct CPU/cache topology
+ + - x86/CPU/AMD: Have smp_num_siblings and cpu_lle_id always be present
+ + - perf/events/amd/uncore: Fix amd_uncore_lle ID to use pre-defined cpu_llc_id
+ + - x86/CPU: Rename intel_cacheinfo.c to cacheinfo.c
+ + - x86/CPU/AMD: Calculate last level cache ID from number of sharing threads
+ + - x86/CPU: Modify detect_extended_topology() to return result
+ + - x86/CPU/AMD: Derive CPU topology from CPUID function 0xB when available
+ + - x86/CPU: Move cpu local function declarations to local header
+ + - x86/CPU: Make intel_num_cpu_cores() generic
+ + - x86/CPU: Move cpu_detect_cache_sizes() into init_intel_cacheinfo()
+ + - x86/CPU: Move x86_cpuinfo::x86_max_cores assignment to
detect_num_cpu_cores()
+ + - x86/CPU/AMD: Fix LLC ID bit-shift calculation
+ + - x86/mm: Factor out pageattr _PAGE_GLOBAL setting
+ + - x86/mm: Undo double _PAGE_PSE clearing
+ + - x86/mm: Introduce "default" kernel PTE mask
+ + - x86/espfix: Document use of _PAGE_GLOBAL
+ + - x86/mm: Do not auto-massage page protections
+ x86/mm: Remove extra filtering in pageattr code
+ x86/mm: Comment _PAGE_GLOBAL mystery
+ x86/mm: Do not forbid _PAGE_RW before init for __ro_after_init
+ x86/ldt: Fix support_pafe_mask filtering in map_ldt_struct()
+ x86/power/64: Fix page-table setup for temporary text mapping
+ x86/pti: Filter at vma->vm_page_prot population
+ x86/boot/64/clang: Use fixup_pointer() to access '__supported_pafe_mask'
+ x86/speculation/l1tf: Increase 32bit PAE __PHYSICAL_PAGE_SHIFT
+ x86/speculation/l1tf: Change order of offset/type in swap entry
+ x86/speculation/l1tf: Protect swap entries against L1TF
+ x86/speculation/l1tf: Protect PROT_NONE PTEs against speculation
+ x86/speculation/l1tf: Make sure the first page is always reserved
+ x86/speculation/l1tf: Add sysfs reporting for l1tf
+ x86/speculation/l1tf: Disable non privileged high MMIO PROT_NONE mappings
+ x86/speculation/l1tf: Limit swap file size to MAX_PA/2
+ x86/bugs: Move the l1tf function and define pr_fmt properly
+ sched/smt: Update sched_smt_present at runtime
+ x86/smp: Provide topology_is_primary_thread()
+ x86/topology: Provide topology_smt_supported()
+ cpu/hotplug: Make bringup/teardown of smp threads symmetric
+ cpu/hotplug: Split do_cpu_down()
+ cpu/hotplug: Provide knobs to control SMT
+ x86/cpu: Remove the pointless CPU printout
+ x86/cpu/AMD: Remove the pointless detect_ht() call
+ x86/cpu/common: Provide detect_ht_early()
+ x86/cpu/topology: Provide detect_extended_topology_early()
+ x86/cpu/intel: Evaluate smp_num_siblings early
+ x86/CPU/AMD: Do not check CPUID max ext level before parsing SMP info
+ x86/cpu/AMD: Evaluate smp_num_siblings early
+ x86/apic: Ignore secondary threads if nosmt=force
+ x86/speculation/l1tf: Extend 64bit swap file size limit
+ x86/cpufeatures: Add detection of L1D cache flush support.
+ x86/CPU/AMD: Move TOPOEXT reenablement before reading smp_num_siblings
+ x86/speculation/l1tf: Protect PAE swap entries against L1TF
+ x86/speculation/l1tf: Fix up pte->pfm conversion for PAE
+ Revert "x86/apic: Ignore secondary threads if nosmt=force"
+ cpu/hotplug: Boot HT siblings at least once
+ x86/KVM: Warn user if KVM is loaded SMT and L1TF CPU bug being present
+ x86/KVM/VMX: Add module argument for L1TF mitigation
+ x86/KVM/VMX: Add L1D flush algorithm
+ x86/KVM/VMX: Add L1D MSR based flush
+ x86/KVM/VMX: Add L1D flush logic
+ x86/KVM/VMX: Split the VMX MSR LOAD structures to have an host/guest numbers
+ x86/KVM/VMX: Add find_msr() helper function
+ x86/KVM/VMX: Separate the VMX AUTOLOAD guest/host number accounting
+ x86/KVM/VMX: Extend add_atomic_switch_msr() to allow VMENTER only MSRs
+ x86/KVM/VMX: Use MSR save list for IA32_FLUSH_CMD if required
+ cpu/hotplug: Online siblings when SMT control is turned on
+ - x86/l1tf: Introduce vmx status variable
+ - x86/kvm: Drop L1TF MSR list approach
+ - x86/l1tf: Handle EPT disabled state properly
+ - x86/kvm: Move l1tf setup function
+ - x86/kvm: Add static key for flush always
+ - x86/kvm: Serialize L1D flush parameter setter
+ - x86/kvm: Allow runtime control of L1D flush
+ - cpu/hotplug: Expose SMT control init function
+ - cpu/hotplug: Set CPU_SMT_NOT_SUPPORTED early
+ - x86/bugs, kvm: Introduce boot-time control of L1TF mitigations
+ - Documentation: Add section about CPU vulnerabilities
+ - x86/speculation/l1tf: Unbreak !__HAVE_ARCH_PFN_MODIFY_ALLOWED architectures
+ - x86/KVM/VMX: Initialize the vmx_l1d_flush_pages' content
+ - Documentation/l1tf: Fix typos
+ - cpu/hotplug: detect SMT disabled by BIOS
+ - x86/KVM/VMX: Don't set l1tf_flush_l1d to true from vmx_l1d_flush()
+ - x86/KVM/VMX: Replace 'vmx_l1d_flush_always' with 'vmx_l1d_flush_cond'
+ - x86/KVM/VMX: Move the l1tf_flush_l1d test to vmx_l1d_flush()
+ - x86/irq: Demote irq_cpustat_t::__softirq_pending to u16
+ - x86/KVM/VMX: Introduce per-host-cpu analogue of l1tf_flush_l1d
+ - x86: Don't include linux/irq.h from asm/hardirq.h
+ - x86/irq: Let interrupt handlers set kvm_cpu_l1tf_flush_l1d
+ - x86/KVM/VMX: Don't set l1tf_flush_l1d from vmx_handle_external_intr()
+ - Documentation/l1tf: Remove Yonah processors from not vulnerable list
+ - x86/speculation: Simplify sysfs report of VMX L1TF vulnerability
+ - x86/speculation: Use ARCH_CAPABILITIES to skip L1D flush on vmentry
+ - KVM: x86: Add a framework for supporting MSR-based features
+ - KVM: X86: Introduce kvm_get_msr_feature()
+ - KVM: VMX: support MSR_IA32_ARCH_CAPABILITIES as a feature MSR
+ - KVM: VMX: Tell the nested hypervisor to skip L1D flush on vmentry
+ - cpu/hotplug: Fix SMT supported evaluation
+ - x86/speculation/l1tf: Invert all not present mappings
+ - x86/speculation/l1tf: Make pmd/pud_mknotpresent() invert
+ - x86/mm/pat: Make set_memory_np() L1TF safe
+ - cpu: Fix per-cpu regression on ARM64
+ * CVE-2018-5391
+ - Revert "net: increase fragment memory usage limits"
+
++ Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 10 Aug 2018 14:22:53 -0300
++
++ linux (4.15.0-30.32) bionic; urgency=medium
++
++ * CVE-2018-5390
+ - tcp: free batches of packets in tcp_prune_ofo_queue()
+ - tcp: avoid collapses in tcp_prune_queue() if possible
+ - tcp: detect malicious patterns in tcp Collapse_ofo_queue()
+ - tcp: call tcp_drop() from tcp_data_queue_ofo()
+ tcp: add tcp_ooo_try_coalesce() helper
+ -- Stefan Bader <stefan.bader@canonical.com> Thu, 26 Jul 2018 17:20:29 +0200
+linux (4.15.0-29.31) bionic; urgency=medium
+ *
linux: 4.15.0-29.31 -proposed tracker (LP: #1782173)
+
+ [SRU Bionic][Cosmic] kernel panic in ipmi_ssif at msg_done_handler
+ (LP: #1777716)
+ - ipmi_ssif: Fix kernel panic at msg_done_handler
+
+ * Update to ocxl driver for 18.04.1 (LP: #1775786)
+ - misc: ocxl: use put_device() instead of device_unregister()
+ - powerpc: Add TIDR CPU feature for POWER9
+ - powerpc: Use TIDR CPU feature to control TIDR allocation
+ - powerpc: use task_pid_nr() for TID allocation
+ - ocxl: Rename pnv_ocxl_spa_remove_pe to clarify it's action
+ - ocxl: Expose the thread_id needed for wait on POWER9
+ - ocxl: Add an IOCTL so userspace knows what OCXL features are available
+ - ocxl: Document new OCXL IOCTLs
+ - ocxl: Fix missing unlock on error in afu_ioctl_enable_p9_wait()
+
+ * Critical upstream bugfix missing in Ubuntu 18.04 - frequent Xorg crash after
+ suspend (LP: #1776887)
+ - ocxl: Document the OCXL_IOCTL_GET_METADATA IOCTL
+
+ * Hard LOCKUP observed on stressing Ubuntu 18 04 (LP: #1777194)
+ - powerpc: use NMI IPI for smp_send_stop
+ - powerpc: Fix smp_send_stop NMI IPI handling
+
+ * IPL: ppc64_cpu --frequency hang with INFO: rcu_sched detected stalls on
+ CPUs/tasks on w34 and wsbmc016 with 920.1714.20170330n (LP: #1773964)
+ - rtc: opal: Fix OPAL RTC driver OPAL_BUSY loops
+
+ * [Regression] EXT4-fs error (device sda2): ext4_validate_block_bitmap:383:
+ comm stress-ng: bg 4705: bad block bitmap checksum (LP: #1781709)
+ - SAUCE: Revert "UBUNTU: SAUCE: ext4: fix ext4_validate_inode_bitmap: comm
+ stress-ng: Corrupt inode bitmap"
+ - SAUCE: ext4: check for allocation block validity with block group locked
+
+ -- Stefan Bader <stefan.bader@canonical.com> Tue, 17 Jul 2018 10:57:50 +0200
+linux (4.15.0-28.30) bionic; urgency=medium
+ *
linux: 4.15.0-28.30 -proposed tracker (LP: #1781433)
+
+ * Cannot set MTU higher than 1500 in Xen instance (LP: #1781413)
+ - xen-netfront: Fix mismatched rtnl_unlock
+ - xen-netfront: Update features after registering netdev
+
+ -- Kamal Mostafa <kamal@canonical.com> Thu, 12 Jul 2018 09:47:07 -0700
+
+ linux (4.15.0-27.29) bionic; urgency=medium
+ *
+ * linux: 4.15.0-27.29 -proposed tracker (LP: #1781062)
+
+ * [Regression] EXT4-fs error (device sda1): ext4_validate_inode_bitmap:99: comm stress-ng: Corrupt inode bitmap (LP: #1780137)
+ - SAUCE: ext4: fix ext4_validate_inode_bitmap: comm stress-ng: Corrupt inode bitmap
+
+ -- Khalid Elmously <khalid.elmously@canonical.com> Tue, 10 Jul 2018 19:05:00 -0400
+
+ linux (4.15.0-26.28) bionic; urgency=medium
+ *
+ * linux: 4.15.0-26.28 -proposed tracker (LP: #1780112)
+
+ * failure to boot with linux-image-4.15.0-24-generic (LP: #1779827) // Cloud-init causes potentially huge boot delays with 4.15 kernels (LP: #1780062)
+ - random: Make getrandom() ready earlier
+
+ -- Stefan Bader <stefan.bader@canonical.com> Wed, 04 Jul 2018 17:52:52 +0200
+
+ linux (4.15.0-25.27) bionic; urgency=medium
+ *
+ * linux: 4.15.0-25.27 -proposed tracker (LP: #1779354)
+
+ * hisi_sas_v3_hw: internal task abort: timeout and not done. (LP: #1777736)
+ - scsi: hisi_sas: Update a couple of register settings for v3 hw
+
+ * hisi_sas: Add missing PHY spinlock init (LP: #1777734)
+ - scsi: hisi_sas: Add missing PHY spinlock init
+
+ * hisi_sas: improve read performance by pre-allocating slot DMA buffers (LP: #1777727)
+ - scsi: hisi_sas: use dma_zalloc_coherent()
+ - scsi: hisi_sas: Use dmam_alloc_coherent()
+ - scsi: hisi_sas: Pre-allocate slot DMA buffers
+
+ * hisi_sas: Failures during host reset (LP: #1777696)
+ - scsi: hisi_sas: Only process broadcast change in phy_bcast_v3_hw()
+ - scsi: hisi_sas: Fix the conflict between dev gone and host reset
+ - scsi: hisi_sas: Adjust task reject period during host reset
+ - scsi: hisi_sas: Add a flag to filter PHY events during reset
+ - scsi: hisi_sas: Release all remaining resources in clear nexus ha
+ * Fake SAS addresses for SATA disks on HiSilicon D05 are non-unique
+ (LP: #1776750)
+ - scsi: hisi_sas: make SAS address of SATA disks unique
+ +* Vcs-Git header on bionic linux source package points to zesty git tree
+ (LP: #1766055)
+ - [Packaging]: Update Vcs-Git
+ +* large KVM instances run out of IRQ routes (LP: #1778261)
+ - SAUCE: kvm -- increase KVM_MAX_IRQ_ROUTES to 2048 on x86
+ +-- Khalid Elmously <khalid.elmously@canonical.com> Sun, 01 Jul 2018 23:10:18 +0000
+ +linux (4.15.0-24.26) bionic; urgency=medium
+ +* linux: 4.15.0-24.26 -proposed tracker (LP: #1776338)
+ +* Bionic update: upstream stable patchset 2018-06-06 (LP: #1775483)
+ - drm: bridge: dw-hdmi: Fix overflow workaround for Amlogic Meson GX SoCs
+ - i40e: Fix attach VF to VM issue
+ - tpm: cmd_ready command can be issued only after granting locality
+ - tpm: tpm-interface: fix tpm_transmit/_cmd kdoc
+ - tpm: add retry logic
+ - Revert "ath10k: send (re)assoc peer command when NSS changed"
+ - bonding: do not set slave_dev npinfo before slave_enable_netpoll in
+ bond_enslave
+ - ipv6: add RTA_TABLE and RTA_PREFSRC to rtm_ipv6_policy
+ - ipv6: sr: fix NULL pointer dereference in seg6_do_srh_encap()- v4 pkts
+ - KEYS: DNS: limit the length of option strings
+ - l2tp: check sockaddr length in pppol2tp_connect()
+ - net: validate attribute sizes in neigh_dump_table()
+ - l2c: delete timers synchronously in llc_sk_free()
+ - tcp: don't read out-of-bounds opsize
+ - net: af_packet: fix race in PACKET_(R|T)X_RING
+ - tcp: md5: reject TCP_MD5SIG or TCP_MD5SIG_EXT on established sockets
+ - net: fix deadlock while clearing neighbor proxy table
+ - team: avoid adding twice the same option to the event list
+ - net/smc: fix shutdown in state SMC_LISTEN
+ - team: fix netconsole setup over team
+ - packet: fix bitfield update race
+ - tipc: add policy for TIPC_NLA_NET_ADDR
+ - pppoe: check sockaddr length in pppoe_connect()
+ - vlan: Fix reading memory beyond skb->tail in skb_vlan_tagged_multi
+ - amd-xgbe: Add pre/post auto-negotiation phy hooks
+ - scct: do not check port in scctp_linet6_cmp_addr
+ - amd-xgbe: Improve KR auto-negotiation and training
+ - strparser: Do not call mod_delayed_work with a timeout of LONG_MAX
+ - amd-xgbe: Only use the SFP supported transceiver signals
+ - strparser: Fix incorrect strp->need_bytes value.
+ - net: sched: ife: signal not finding metaid
+ - tcp: clear tp->packets_out when purging write queue
+ - net: sched: ife: handle malformed tlv length
+ - net: sched: ife: check on metadata length
+ - Iic: hold llc_sap before release_sock()
+ - Iic: fix NULL pointer deref for SOCK_ZAPPED
+ - net: ethernet: ti: cpsw: fix tx vlan priority mapping
+ - virtio_net: split out ctrl buffer
+ - virtio_net: fix adding vids on big-endian
+ - KVM: s390: force bp isolation for VSIE
+ - s390: correct module section names for expoline code revert
+ - microblaze: Setup dependencies for ASM optimized lib functions
+ - commoncap: Handle memory allocation failure.
+ - scsi: nptsas: Disable WRITE SAME
+ - cdrom: information leak in cdrom_ioctl_media_changed()
+ - m68k/mac: Don't remap SWIM MMIO region
+ - block/swim: Check drive type
+ - block/swim: Don't log an error message for an invalid ioctl
+ - block/swim: Remove extra put_disk() call from error path
+ - block/swim: Rename macros to avoid inconsistent inverted logic
+ - block/swim: Select appropriate drive on device open
+ - block/swim: Fix array bounds check
+ - block/swim: Fix IO error at end of medium
+ - tracing: Fix missing tab for hwlat_detector print format
+ - s390/cio: update chpid descriptor after resource accessibility event
+ - s390/dasd: fix IO error for newly defined devices
+ - s390/uprobes: implement arch_uretprobe_is_alive()
+ - ACPI / video: Only default only_lcd to true on Win8-ready _desktops_
+ - docs: ip-sysctl.txt: fix name of some ipv6 variables
+ - net: mvpp2: Fix DMA address mask size
+ - net: stmmac: Disable ACS Feature for GMAC >= 4
+ - l2tp: hold reference on tunnels in netlink dumps
+ - l2tp: hold reference on tunnels printed in pppol2tp proc file
+ - l2tp: hold reference on tunnels printed in l2tp/tunnels debugfs file
+ - l2tp: fix [pppol2tp, l2tp_dfs]_seq_stop() in case of seq_file overflow
+ - s390/qeth: fix error handling in adapter command callbacks
+ - s390/qeth: avoid control IO completion stalls
+ - s390/qeth: handle failure on workqueue creation
+ - bnxt_en: Fix memory fault in bnxt_ethtool_init()
+ - virtio-net: add missing virtqueue kick when flushing packets
+ - VSOCK: make af_vsock.ko removable again
+ - hwmon: (k10temp) Add temperature offset for Ryzen 2700X
+ - hwmon: (k10temp) Add support for AMD Ryzen w/ Vega graphics
+ - s390/cpum_cf: rename IBM z13/z14 counter names
+ - kprobes: Fix random address output of blacklist file
+ - Revert "pinctrl: intel: Initialize GPIO properly when used through irqchip"
+ * Lenovo V330 needs patch in ideapad_laptop module for rfkill (LP: #1774636)
+ * SAUCE: Add Lenovo V330 to the ideapad_laptop rfkill blacklist
+ * bluetooth controller fail after suspend with USB autosuspend on XPS 13 9360
+ (LP: #1775217)
+ * SAUCE: Add Lenovo V330 to the ideapad_laptop rfkill blacklist
+ [Hyper-V] PCI: hv: Fix 2 hang issues in hv_compose_msi_msg (LP: #1758378)
+ * PCI: hv: Only queue new work items in hv_pci_devices_present() if necessary
+ * PCI: hv: Remove the bogus test in hv_eject_device_work()
+ * PCI: hv: Fix a comment typo in _hv_pcifront_read_config()
+ * register on binfmt_misc may overflow and crash the system (LP: #1775856)
+ * fs/binfmt_misc.c: do not allow offset overflow
+ * CVE-2018-11508
+ * Network installs fail on SocioNext board (LP: #1775884)
+ * net: netsec: reduce DMA mask to 40 bits
+ * net: socionext: reset hardware in ndo_stop
+ * net: netsec: enable tx-irq during open callback
+ * r8169 ethernet card don't work after returning from suspension
+ (LP: #1752772)
+ * PCI: Add pcim_set_mwi(), a device-managed pci_set_mwi()
+ * r8169: switch to device-managed functions in probe
+ * r8169: remove netif_napi_del in probe error path
+ * r8169: remove some WOL-related dead code
+ * r8169: disable WOL per default
+ * r8169: improve interrupt handling
+ * r8169: fix interrupt number after adding support for MSI-X interrupts
+ after hotplug CPU add operation. (LP: #1759723)
+ * genirq/affinity: assign vectors to all possible CPUs
+ * genirq/affinity: Don't return with empty affinity masks on error
+ * genirq/affinity: Rename *node_to_possible_cpumask as *node_to_cpumask
+ * genirq/affinity: Move actual irq vector spreading into a helper function
+ * genirq/affinity: Allow irq spreading from a given starting point
+ * genirq/affinity: Spread irq vectors among present CPUs as far as possible
+ * blk-mq: simplify queue mapping & schedule with each possible CPU
+ * blk-mq: make sure hctx->next_cpu is set correctly
+ * blk-mq: Avoid that blk_mq_delay_run_hw_queue() introduces unintended delays
+ * blk-mq: make sure that correct hctx->next_cpu is set
+ * blk-mq: avoid to write intermediate result to hctx->next_cpu
+ * blk-mq: introduce blk_mq_hw_queue_first_cpu() to figure out first cpu
+ blk-mq: don't check queue mapped in __blk_mq_delay_run_hw_queue()
+ nvme: pci: pass max vectors as num_possible_cpus() to pci_alloc_irq_vectors
+ scsi: hpsa: fix selection of reply queue
+ scsi: megaraid_sas: fix selection of reply queue
+ scsi: core: introduce force_blk_mq
+ scsi: virtio_scsi: fix IO hang caused by automatic irq vector affinity
+ scsi: virtio_scsi: unify scsi_host_template

+ * Fix several bugs in RDMA/hns driver (LP: #1770974)
  + RDMA/hns: Use structs to describe the uABI instead of opencoding
  + RDMA/hns: Remove unnecessary platform_get_resource() error check
  + RDMA/hns: Remove unnecessary operator
  + RDMA/hns: Add names to function arguments in function pointers
  + RDMA/hns: Fix misplaced call to hns_roce_cleanup_hem_table
  + RDMA/hns: Fix a bug with modifying mac address
  + RDMA/hns: Use free_pages function instead of free_page
  + RDMA/hns: Replace __raw_write*(cpu_to_le*)() with LE write*()
  + RDMA/hns: Bugfix for init hem table
  + RDMA/hns: Intercept illegal RDMA operation when use inline data
  + RDMA/hns: Fix the qp context state diagram
  + RDMA/hns: Only assign mtu if IB_QP_PATH_MTU bit is set
  + RDMA/hns: Remove some unnecessary attr_mask judgement
  + RDMA/hns: Only assign dqpn if IB_QP_PATH_DEST_QPN bit is set
  + RDMA/hns: Adjust the order of cleanup hem table
  + RDMA/hns: Update assignment method for owner field of send wqe
  + RDMA/hns: Submit bad wr
  + RDMA/hns: Fix a couple misspellings
  + RDMA/hns: Add rq inline flags judgement
  + RDMA/hns: Bugfix for rq record db for kernel
  + RDMA/hns: Load the RoCE dirver automatically
  + RDMA/hns: Update convert function of endian format
  + RDMA/hns: Add return operation when configured global param fail
  + RDMA/hns: Not support qp transition from reset to reset for hip06
  + RDMA/hns: Fix the bug with rq sge
  + RDMA/hns: Set desc_dma_addr for zero when free cmq desc
  + RDMA/hns: Enable inner_pa_vld filed of mpt
  + RDMA/hns: Set NULL for __internal_mr
  + RDMA/hns: Fix the bug with NULL pointer
  + RDMA/hns: Bugfix for cq record db for kernel
  + RDMA/hns: Move the location for initializing tmp_len
  + RDMA/hns: Drop local zgid in favor of core defined variable
  + RDMA/hns: Add 64KB page size support for hip08
  + RDMA/hns: Rename the idx field of db
  + RDMA/hns: Modify uar allocation algorithm to avoid bitmap exhaust
  + RDMA/hns: Increase checking CMQ status timeout value
  + RDMA/hns: Add reset process for RoCE in hip08
  + RDMA/hns: Fix the illegal memory operation when cross page
  + RDMA/hns: Implement the disassociate_ucontext API
+ * powerpc/livepatch: Implement reliable stack tracing for the consistency
  + model (LP: #1771844)
  + - powerpc/livepatch: Implement reliable stack tracing for the consistency
  + model
  +
  + * vmxnet3: update to latest ToT (LP: #1768143)
  + - vmxnet3: avoid xmit reset due to a race in vmxnet3
  + - vmxnet3: use correct flag to indicate LRO feature
  + - vmxnet3: fix incorrect dereference when rxvlan is disabled
  +
  + * 4.15.0-22-generic fails to boot on IBM S822LC (POWER8 (raw), altivec
  + supported) (LP: #1773162)
  + - Revert "powerpc/64s: Add support for a store forwarding barrier at kernel
  + entry/exit"
  + - powerpc/64s: Add support for a store forwarding barrier at kernel entry/exit
  +
  + * Decode ARM CPER records in kernel (LP: #1770244)
  + - [Config] CONFIG_UEFI_CPER_ARM=y
  + - efi: Move ARM CPER code to new file
  + - efi: Parse ARM error information value
  +
  + * Adding back alx WoL feature (LP: #1772610)
  + - SAUCE: Revert "alx: remove WoL support"
  + - SAUCE: alx: add enable_wol parameter
  +
  + * Lancer A0 Asic HBA's won't boot with 18.04 (LP: #1768103)
  + - scsi: lpfc: Fix WQ/CQ creation for older asic's.
  + - scsi: lpfc: Fix 16gb hbas failing cq create.
  +
  + * [LTCTest][OPAL][OP920] cpupower idle-info is not listing stop4 and stop5
  + idle states when all CORES are guarded (LP: #1771780)
  + - SAUCE: cpuidle/powernv : init all present cpus for deep states
  +
  + * Huawei 25G/100G Network Adapters Unsupported (LP: #1770970)
  + - net-next/hinic: add pci device ids for 25ge and 100ge card
  +
  + * [Ubuntu 18.04.1] POWER9 - Nvidia Volta - Kernel changes to enable Nvidia
  + driver on bare metal (LP: #1772991)
  + - powerpc/powernv/npu: Fix deadlock in mmio_invalidate()
  + - powerpc/powernv/mce: Don't silently restart the machine
  + - powerpc/npu-dma.c: Fix crash after __mmu_notifier_register failure
  + - powerpc/mm: Flush cache on memory hot(un)plug
  + - powerpc/powernv/memtrace: Let the arch hotunplug code flush cache
  + - powerpc/powernv/npu: Add lock to prevent race in concurrent context
  + - init/destroy
  + - powerpc/powernv/npu: Prevent overwriting of pnv_npu2_init_contex() callback
  + parameters
+ - powerpc/powernv/npu: Do a PID GPU TLB flush when invalidating a large address range
+ - powerpc/mce: Fix a bug where mce loops on memory UE.
+ * cpum.sf: ensure sample freq is non-zero (LP: #1772593)
+ - s390/cpum.sf: ensure sample frequency of perf event attributes is non-zero
+ * PCIe link speeds of 16 GT/s are shown as "Unknown speed" (LP: #1773243)
+ - PCI: Add decoding for 16 GT/s link speed
+ * False positive ACPI _PRS error messages (LP: #1773295)
+ - ACPI / PCI: pci_link: Allow the absence of _PRS and change log level
+ * Dell systems crash when disabling Nvidia dGPU (LP: #1773299)
+ - ACPI / OSI: Add OEM _OSI strings to disable NVidia RTD3
+ * wlp3s0: failed to remove key (1, ff:ff:ff:ff:ff:ff) from hardware (-22)
  (LP: #1720930)
+ - iwlwifi: mvm: fix "failed to remove key" message
+ * Expose arm64 CPU topology to userspace (LP: #1770231)
+ - ACPI: ACPI 6.2: Additional PPTT flags
  + - drivers: base: cacheinfo: move cache_setup_of_node()
  + - drivers: base: cacheinfo: setup DT cache properties early
  + - cacheinfo: rename of_node to fw_token
  + - arm64/acpi: Create arch specific cpu to ACPI id helper
+ - ACPI/PPTT: Add Processor Properties Topology Table parsing
  + - [Config] CONFIG_ACPI_PPTT=y
+ - ACPI: Enable PPTT support on ARM64
  + - drivers: base cacheinfo: Add support for ACPI based firmware tables
  + - arm64: Add support for ACPI based firmware tables
  + - arm64: topology: rename cluster_id
  + - arm64: topology: enable ACPI/PPTT based CPU topology
+ - ACPI: Add PPTT to injectable table list
+ - arm64: topology: divorce MC scheduling domain from core_siblings
+ * hisi_sas robustness fixes (LP: #1774466)
  + - scsi: hisi_sas: delete timer when removing hisi_sas driver
  + - scsi: hisi_sas: print device id for errors
  + - scsi: hisi_sas: Add some checks to avoid freeing a sas_task twice
  + - scsi: hisi_sas: check host frozen before calling "done" function
  + - scsi: hisi_sas: check sas_dev gone earlier in hisi_sas_abort_task()
  + - scsi: hisi_sas: stop controller timer for reset
  + - scsi: hisi_sas: update PHY linkrate after a controller reset
  + - scsi: hisi_sas: change slot index allocation mode
  + - scsi: hisi_sas: Change common allocation mode of device id
  + - scsi: hisi_sas: Reset disks when discovered
  + - scsi: hisi_sas: Create a scsi_host_template per HW module
+  - scsi: hisi_sas: Init disks after controller reset
+  - scsi: hisi_sas: Try wait commands before before controller reset
+  - scsi: hisi_sas: Include TMF elements in struct hisi_sas_slot
+  - scsi: hisi_sas: Add v2 hw force PHY function for internal ATA command
+  - scsi: hisi_sas: Terminate STP reject quickly for v2 hw
+  - scsi: hisi_sas: Fix return value when get_free_slot() failed
+  - scsi: hisi_sas: Mark PHY as in reset for nexus reset
+  +  * hisi_sas: Support newer v3 hardware (LP: #1774467)
+  +  - scsi: hisi_sas: update RAS feature for later revision of v3 HW
+  +  - scsi: hisi_sas: check IPTT is valid before using it for v3 hw
+  +  - scsi: hisi_sas: fix PI memory size
+  +  - scsi: hisi_sas: config ATA de-reset as an constrained command for v3 hw
+  +  - scsi: hisi_sas: remove redundant handling to event95 for v3
+  +  - scsi: hisi_sas: add readl poll timeout helper wrappers
+  +  - scsi: hisi_sas: workaround a v3 hw hilink bug
+  +  - scsi: hisi_sas: Add LED feature for v3 hw
+  +  * hisi_sas: improve performance by optimizing DQ locking (LP: #1774472)
+  +  - scsi: hisi_sas: initialize dq spinlock before use
+  +  - scsi: hisi_sas: optimise the usage of DQ locking
+  +  - scsi: hisi_sas: relocate smp sg map
+  +  - scsi: hisi_sas: make return type of prep functions void
+  +  - scsi: hisi_sas: allocate slot buffer earlier
+  +  - scsi: hisi_sas: Don't lock DQ for complete task sending
+  +  - scsi: hisi_sas: Use device lock to protect slot alloc/free
+  +  - scsi: hisi_sas: add check of device in hisi_sas_task_exec()
+  +  - scsi: hisi_sas: fix a typo in hisi_sas_task_prep()  
+  +  * Request to revert SAUCE patches in the 18.04 SRU and update with upstream
+  +  +  version (LP: #1768431)
+  +  - scsi: cxlflash: Handle spurious interrupts
+  +  - scsi: cxlflash: Remove commmands from pending list on timeout
+  +  - scsi: cxlflash: Synchronize reset and remove ops
+  +  - SAUCE: (no-up) cxlflash: OCXL diff between v2 and v3
+  +  +  * After update to 4.13-43 Intel Graphics are Laggy (LP: #1773520)
+  +  - SAUCE: Revert "drm/i915/edp: Allow alternate fixed mode for eDP if
+  +  available.”
+  +  +  * ELANPAD ELAN0612 does not work, patch available (LP: #1773509)
+  +  - SAUCE: Input: elan_i2c - add ELAN0612 to the ACPI table
+  +  +  * FS-Cache: Assertion failed: FS-Cache: 6 == 5 is false (LP: #1774336)
+  +  - SAUCE: CacheFiles: fix a read_waiter/read_copier race
+  +  +  * hns3 driver updates (LP: #1768670)
+  +  - net: hns3: VF should get the real rss_size instead of rss_size_max
+ - net: hns3: set the cmdq out_vld bit to 0 after used
+ - net: hns3: fix endian issue when PF get mbx message flag
+ - net: hns3: fix the queue id for tqp enable& reset
+ - net: hns3: set the max ring num when alloc netdev
+ - net: hns3: add support for VF driver inner interface
+ hclgevf_ops.get_tqps_and_rss_info
+ - net: hns3: refactor the hclge_get/set_rss function
+ - net: hns3: refactor the hclge_get/set_rss_tuple function
+ - net: hns3: fix for RSS configuration loss problem during reset
+ - net: hns3: fix for pause configuration lost during reset
+ - net: hns3: fix for use-after-free when setting ring parameter
+ - net: hns3: refactor the get/put_vector function
+ - net: hns3: fix for coalesce configuration lost during reset
+ - net: hns3: refactor the coalesce related struct
+ - net: hns3: fix for coal configuration lost when setting the channel
+ - net: hns3: add existence check when remove old uc mac address
+ - net: hns3: fix for netdev not running problem after calling net_stop and
+ net_open
+ - net: hns3: fix for ipv6 address loss problem after setting channels
+ - net: hns3: unify the pause params setup function
+ - net: hns3: fix rx path skb->truesize reporting bug
+ - net: hns3: add support for querying pfc pause packets statistic
+ - net: hns3: fix for loopback failure when vlan filter is enable
+ - net: hns3: fix for buffer overflow smatch warning
+ - net: hns3: fix error type definition of return value
+ - net: hns3: fix return value error of hclge_get_mac_vlan_cmd_status()
+ - net: hns3: add existence checking before adding unicast mac address
+ - net: hns3: add result checking for VF when modify unicast mac address
+ - net: hns3: reallocate tx/rx buffer after changing mtu
+ - net: hns3: fix the VF queue reset flow error
+ - net: hns3: fix for vlan table lost problem when resetting
+ - net: hns3: increase the max time for IMP handle command
+ - net: hns3: change GL update rate
+ - net: hns3: change the time interval of int_gl calculating
+ - net: hns3: fix for getting wrong link mode problem
+ - net: hns3: add get_link support to VF
+ - net: hns3: add querying speed and duplex support to VF
+ - net: hns3: fix for not returning problem in get_link_ksettings when phy
+ exists
+ - net: hns3: Changes to make enet watchdog timeout func common for PF/VF
+ - net: hns3: Add VF Reset Service Task to support event handling
+ - net: hns3: Add VF Reset device state and its handling
+ - net: hns3: Add support to request VF Reset to PF
+ - net: hns3: Add support to reset the enet/ring mgmt layer
+ - net: hns3: Add support to re-initialize the hclge device
+ - net: hns3: Changes to support ARQ(Asynchronous Receive Queue)
+ - net: hns3: Add *Asserting Reset* mailbox message & handling in VF
+ - net: hns3: Changes required in PF mailbox to support VF reset
- net: hns3: `hclge_inform_reset_assert_to_vf()` can be static
- net: hns3: fix for returning wrong value problem in `hns3_get_rss_key_size`
- net: hns3: fix for returning wrong value problem in `hns3_get_rss_indir_size`
- net: hns3: fix for the wrong shift problem in `hns3_set_txbd_baseinfo`
- net: hns3: fix for not initializing VF `rss_hash_key` problem
- net: hns3: never send command queue message to IMP when reset
- net: hns3: remove unnecessary `pci_set_drvdata()` and `devm_kfree()`
- net: hns3: fix length overflow when `CONFIG_ARM64_64K_PAGES`
- net: hns3: Remove error log when getting pfc stats fails
- net: hns3: fix to correctly fetch l4 protocol outer header
- net: hns3: Fixes the out of bounds access in `hclge_map_tqp`
- net: hns3: Fixes the error legs in `hclge_init_ae_dev` function
- net: hns3: fix for phy_addr error in `hclge_mac_mdio_config`
- net: hns3: Fix to support autoneg only for port attached with phy
- net: hns3: fix a dead loop in `hclge_cmd_csq_clean`
- net: hns3: Fix for packet loss due wrong filter config in VLAN tbls
- net: hns3: Remove packet statistics in the range of 8192~12287
- net: hns3: Add support of hardware rx-vlan-offload to HNS3 VF driver
- net: hns3: Fix for setting mac address when resetting
- net: hns3: remove add/del_tunnel_udp in `hns3_enet` module
- net: hns3: fix for cleaning ring problem
- net: hns3: refactor the loopback related function
- net: hns3: Fix for deadlock problem occurring when unregistering ae_algo
- net: hns3: Fix for the null pointer problem occurring when initializing
- ae_dev failed
- net: hns3: Add a check for client instance init state
- net: hns3: Change return type of `hnae3_register_ae_dev`
- net: hns3: Change return type of `hnae3_register_ae_algo`
- net: hns3: Change return value in `hnae3_register_client`
- net: hns3: Fixes the back pressure setting when sriov is enabled
- net: hns3: Fix for fiber link up problem
- net: hns3: Add support of `.sriov_configure` in HNS3 driver
- net: hns3: Fixes the missing PCI iounmap for various legs
- net: hns3: Fixes error reported by Kbuild and internal review
- net: hns3: Fixes API to fetch ethernet header length with kernel default
- net: hns3: cleanup of return values in `hclge_init_client_instance()`
- net: hns3: Fix the missing client list node initialization
- net: hns3: Fix for `hns3` module is loaded multiple times problem
- net: hns3: Use enums instead of magic number in `hclge_is_special_opcode`
- net: hns3: Fix for netdev not running problem after calling `net_stop` and `net_open`
- net: hns3: Fixes kernel panic issue during `rmmod` `hns3` driver
- net: hns3: Fix for CMDQ and Misc. interrupt init order problem
- net: hns3: Updates RX packet info fetch in case of multi BD
- net: hns3: Add support for `tx_accept_tag2` and `tx_accept_untag2` config
- net: hns3: Add `STRP_TAGP` field support for hardware revision 0x21
- net: hns3: Add support to enable TX/RX promisc mode for H/W rev(0x21)
- net: hns3: Fix for PF mailbox receiving unknown message
+ - net: hns3: Fixes the state to indicate client-type initialization
+ - net: hns3: Fixes the init of the VALID BD info in the descriptor
+ - net: hns3: Removes unnecessary check when clearing TX/RX rings
+ - net: hns3: Clear TX/RX rings when stopping port & un-initializing client
+ - net: hns3: Remove unused led control code
+ - net: hns3: Adds support for led locate command for copper port
+ - net: hns3: Fixes initialization of RoCE handle and makes it conditional
+ - net: hns3: Disable vf vlan filter when vf vlan table is full
+ - net: hns3: Add support for IFF_ALLMULTI flag
+ - net: hns3: Add repeat address checking for setting mac address
+ - net: hns3: Fix setting mac address error
+ - net: hns3: Fix for service_task not running problem after resetting
+ - net: hns3: Fix for hclge_reset running repeatedly problem
+ - net: hns3: Fix for phy not link up problem after resetting
+ - net: hns3: Add missing break in misc_irq_handle
+ - net: hns3: Fix for vxlan tx checksum bug
+ - net: hns3: Optimize the PF's process of updating multicast MAC
+ - net: hns3: Optimize the VF's process of updating multicast MAC
+ - SAUCE: {topost} net: hns3: add support for serdes loopback selftest
+ - SAUCE: {topost} net: hns3: RX BD information valid only in last BD except VLD bit and buffer size
+ - SAUCE: {topost} net: hns3: remove hclge_get_vector_index from hclge_bind_ring_with_vector
+ - SAUCE: {topost} net: hns3: rename the interface for init_client_instance and uninit_client_instance
+ - SAUCE: {topost} net: hns3: add vector status check before free vector
+ - SAUCE: {topost} net: hns3: add l4_type check for both ipv4 and ipv6
+ - SAUCE: {topost} net: hns3: remove unused head file in hnae3.c
+ - SAUCE: {topost} net: hns3: extraction an interface for state state init|uninit
+ - SAUCE: {topost} net: hns3: print the ret value in error information
+ - SAUCE: {topost} net: hns3: remove the Redundant put_vector in hns3_client_uninit
+ - SAUCE: {topost} net: hns3: add unlikely for error check
+ - SAUCE: {topost} net: hns3: remove back in struct hclge_hw
+ - SAUCE: {topost} net: hns3: use lower_32_bits and upper_32_bits
+ - SAUCE: {topost} net: hns3: remove unused hclge_ring_to_dma_dir
+ - SAUCE: {topost} net: hns3: remove useless code in hclge_cmd_send
+ - SAUCE: {topost} net: hns3: remove some redundant assignments
+ - SAUCE: {topost} net: hns3: simplify hclge_cmd_csq_clean
+ - SAUCE: {topost} net: hns3: using modulo for cyclic counters in hclge_cmd_send
+ - SAUCE: {topost} net: hns3: remove a redundant hclge_cmd_csq_done
+ - SAUCE: {topost} net: hns3: remove some unused members of some structures
+ - SAUCE: {topost} net: hns3: give default option while dependency HNS3 set
+ - SAUCE: {topost} net: hns3: use dma_zalloc_coherent instead of kzalloc/dma_map_single
+ - SAUCE: {topost} net: hns3: modify hnae_to hnae3_
+ - SAUCE: {topost} net: hns3: fix unused function warning in VF driver
+ - SAUCE: {topost} net: hns3: remove some redundant assignments
+ - SAUCE: {topost} net: hns3: standardize the handle of return value
+ - SAUCE: {topost} net: hns3: remove extra space and brackets
+ - SAUCE: {topost} net: hns3: fix unreasonable code comments
+ - SAUCE: {topost} net: hns3: use decimal for bit offset macros
+ - SAUCE: {topost} net: hns3: modify inconsistent bit mask macros
+ - SAUCE: {topost} net: hns3: fix mislead parameter name
+ - SAUCE: {topost} net: hns3: remove unused struct member and definition
+ - SAUCE: {topost} net: hns3: Add SPDX tags to hns3 driver
+ - SAUCE: {topost} net: hns3: Add pf reset for hip08 RoCE
+ - SAUCE: {topost} net: hns3: optimize the process of notifying roce client
+ - SAUCE: {topost} net: hns3: Add calling roce callback function when link status change
+ - SAUCE: {topost} net: hns3: fix tc setup when netdev is first up
+ - SAUCE: {topost} net: hns3: fix for mac pause not disable in pfc mode
+ - SAUCE: {topost} net: hns3: fix for waterline not setting correctly
+ - SAUCE: {topost} net: hns3: fix for 14 checksum offload bug
+ - SAUCE: {topost} net: hns3: fix for mailbox message truncated problem
+ - SAUCE: {topost} net: hns3: Add configure for mac minimal frame size
+ - SAUCE: {topost} net: hns3: fix warning bug when doing lp selftest
+ - SAUCE: {topost} net: hns3: fix get_vector ops in hclgevf_main module
+ - SAUCE: {topost} net: hns3: remove the warning when clear reset cause
+ - SAUCE: {topost} net: hns3: Use roce handle when calling roce callback function
+ - SAUCE: {topost} net: hns3: prevent sending command during global or core reset
+ - SAUCE: {topost} net: hns3: modify the order of initializeing command queue register
+ - SAUCE: {topost} net: hns3: reset net device with rtnl_lock
+ - SAUCE: {topost} net: hns3: prevent to request reset frequently
+ - SAUCE: {topost} net: hns3: correct reset event status register
+ - SAUCE: {topost} net: hns3: separate roce from nic when resetting
+ - SAUCE: net: hns3: Fix for phy link issue when using marvell phy driver
+ - SAUCE: {topost} net: hns3: fix return value error in
+ hns3_reset_notify_down_enet
+ - SAUCE: {topost} net: hns3: remove unnecessary ring configuration operation while resetting
+ - SAUCE: {topost} net: hns3: fix for reset_level default assignment probelm
+ - SAUCE: {topost} net: hns3: fix for using wrong mask and shift in
hclge_get_ring_chain_from_mbx
+ - SAUCE: {topost} net: hns3: fix comments for hclge_get_ring_chain_from_mbx
+ - SAUCE: net: hns3: Fix for VF mailbox cannot receiving PF response
+ - SAUCE: net: hns3: Fix for VF mailbox receiving unknown message
+ - SAUCE: net: hns3: Optimize PF CMDQ interrupt switching process
+
* enable mic-mute hotkey and led on Lenovo M820z and M920z (LP: #1774306)
+ - ALSA: hda/realtek - Enable mic-mute hotkey for several Lenovo AIOs
- Bionic update: upstream stable patchset 2018-05-29 (LP: #1774063)
- cifs: do not allow creating sockets except with SMB1 posix extensions
- btrfs: fix unaligned access in readdir
- x86/acpi: Prevent X2APIC id 0xffffffff from being accounted
- clocksource/imx-tpm: Correct -ETIME return condition check
- x86/tsc: Prevent 32bit truncation in calc_hpet_ref()
- drm/vc4: Fix memory leak during BO teardown
- drm/i915/gvt: throw error on unhandled vfio ioctls
- drm/i915/audio: Fix audio detection issue on GLK
- drm/i915: Do no use kfree() to free a kmem_cache_alloc() return value
- drm/i915: Fix LSPCON TMDS output buffer enabling from low-power state
- drm/i915/bxt, glk: Increase PCODE timeouts during CDCLK freq changing
- usb: musb: fix enumeration after resume
- usb: musb: call pm_runtime_[get,put]_sync before reading vbus registers
- usb: musb: Fix external abort in musb_remove on omap2430
- firewire-ohci: work around oversized DMA reads on JMicron controllers
- x86/tsc: Allow TSC calibration without PIT
- NFSv4: always set NFS_LOCK_LOST when a lock is lost.
- ACPI / LPSS: Do not instate platform_dev for devs without MMIO resources
- ALSA: hda - Use IS_REACHABLE() for dependency on input
- ASoC: au1x: Fix timeout tests in au1dac97c_ac97_read()
- kvm: x86: fix KVM_XEN_HVM_CONFIG ioctl
- RDMA/core: Clarify rdma_ah_find_type
- KVM: PPC: Book3S HV: Enable migration of decrementer register
- netfilter: ipv6: nf_defrag: Pass on packets to stack per RFC2460
- tracing/hrtimer: Fix tracing bugs by taking all clock bases and modes into account
- KVM: s390: use created_vcpus in more places
- platform/x86: dell-laptop: Filter out spurious keyboard backlight change events
- xprtrdma: Fix backchannel allocation of extra rpcrdma_reps
- btrfs: Fix to pick text symbols for kprobes
- PCI: Add function 1 DMA alias quirk for Marvell 9128
- Input: psmouse - fix Synaptics detection when protocol is disabled
- libbpf: Makefile set specified permission mode
- Input: synaptics - reset the ABS_X/Y fuzz after initializing MT axes
- i40iw: Free IEQ resources
- i40iw: Zero-out consumer key on allocate stag for FMR
- perf unwind: Do not look just at the global callchain_param.record_mode
- tools lib traceevent: Simplify pointer print logic and fix %pF
- perf callchain: Fix attr.sample_max_stack setting
- tools lib traceevent: Fix get_field_str() for dynamic strings
- perf record: Fix failed memory allocation for get_cpuid_str
- iommu/exynos: Don't unconditionally steal bus ops
- powerpc: System reset avoid interleaving oops using die synchronisation
- iommu/vt-d: Use domain instead of cache fetching
- dm thin: fix documentation relative to low water mark threshold
+ - dm mpath: return DM_MAPIO_REQUEUE on blk-mq rq allocation failure
+ - ubifs: Fix uninitialized variable in search dh_cookie()
+ - net: stmmac: dwmac-meson8b: fix setting the RGMII TX clock on Meson8b
+ - net: stmmac: dwmac-meson8b: propagate rate changes to the parent clock
+ - spi: a3700: Clear DATA_OUT when performing a read
+ - IB/cq: Don't force IB_POLL_DIRECT poll context for ib_process_cq_direct
+ - nfs: Do not convert nfs_idmap_cache_timeout to jiffies
+ - PCI: Add dummy pci_irqd_intx_xlate() for CONFIG_PCI=n build
+ - watchdog: sp5100_tco: Fix watchdog disable bit
+ - kconfig: Don't leak main menus during parsing
+ - kconfig: Fix automatic menu creation mem leak
+ - kconfig: Fix expr_free() E_NOT leak
+ - ipmi/powernv: Fix error return code in ipmi_powernv_probe()
+ - Btrfs: set plug for fsync
+ - btrfs: Fix out of bounds access in btrfs_search_slot
+ - Btrfs: fix scrub to repair raid6 corruption
+ - Btrfs: fail mount when sb flag is not in BTRFS_SUPER_FLAG_SUPP
+ - Btrfs: fix unexpected EEXIST from btrfs_get_extent
+ - Btrfs: raid56: fix race between merge_bio and rbio_orig_end_io
+ - RDMA/cma: Check existence of netdevice during port validation
+ - i2fs: avoid hungtask when GC encrypted block if io_bits is set
+ - scsi: devinfo: fix format of the device list
+ - scsi: fas216: fix sense buffer initialization
+ - Input: stmfts - set IRQ_NOAUTOEN to the irq flag
+ - HID: roccat: prevent an out of bounds read in kovaplus_profile_activated()
+ - nfp: fix error return code in nfp_pci_probe()
+ - block: Set BIO_TRACE_COMPLETION on new bio during split
+ - bpf: test_maps: cleanup sockmaps when test ends
+ - i40evf: Don't schedule reset_task when device is being removed
+ - i40evf: ignore link up if not running
+ - platform/x86: thinkpad_acpi: suppress warning about palm detection
+ - KVM: s390: vsie: use READ_ONCE to access some SCB fields
+ - blk-mq-debugfs: don't allow write on attributes with seq_operations set
+ - ASoC: rockchip: Use dummy_dai for rt5514 dsp dailink
+ - igb: Allow to remove administratively set MAC on VFs
+ - igb: Clear TXSTMP when ptp_tx_work() is timeout
+ - fm10k: fix "failed to kill vid" message for VF
+ - x86/hyperv: Stop suppressing X86_FEATURE_PCID
+ - tty: serial: exar: Relocate sleep wake-up handling
+ - device property: Define type of PROPERTY_ENRTY_*() macros
+ - crypto: artpec6 - remove select on non-existing CRYPTO_SHA384
+ - RDMA/uverbs: Use an unambiguous errno for method not supported
+ - jffs2: Fix use-after-free bug in jffs2_iget()’s error handling path
+ - ixgbe: don't set RXDCTL_RLPML for 82599
+ - i40e: program fragmented IPv4 filter input set
+ - i40e: fix reported mask for ntuple filters
+ - samples/bpf: Partially fixes the bpf.o build
+ powerpc/numa: Use ibm,max-associativity-domains to discover possible nodes
+ powerpc/numa: Ensure nodes initialized for hotplug
+ RDMA/mlx5: Avoid memory leak in case of XRCD dealloc failure
+ ntb_transport: Fix bug with max_mw_size parameter
+ gianfar: prevent integer wrapping in the rx handler
+ x86/hyperv: Check for required privileges in hyperv_init()
+ netfilter: x_tables: fix pointer leaks to userspace
+ tcp_nv: fix potential integer overflow in tcpnv_acked
+ kvm: Map PFN-type memory regions as writable (if possible)
+ x86/kvm/vmx: do not use vm-exit instruction length for fast MMIO when running nested
+ fs/dax.c: release PMD lock even when there is no PMD support in DAX
+ ocs2: return -EROFS to mount.ocfs2 if inode block is invalid
+ ocs2/ac: use 'ip_xattr_sem' to protect getting extended attribute
+ ocs2: return error when we attempt to access a dirty bh in jbd2
+ mm/mempolicy: fix the check of nodemask from user
+ mm/mempolicy: add nodes_empty_check in SYSC_migrate_pages
+ asm-generic: provide generic_pmdp_establish()
+ sparc64: update pmdp_invalidate() to return old pmd value
+ mm: thp: use down_read_trylock() in khugepaged to avoid long block
+ mm: pin address space before dereferencing it while isolating an LRU page
+ mm/fadvise: discard partial page if endbyte is also EOF
+ openswitch: Remove padding from packet before L3+ conntrack processing
+ blk-mq: fix discard merge with scheduler attached
+ IB/hfi1: Re-order IRQ cleanup to address driver cleanup race
+ IB/hfi1: Fix for potential refcount leak in hfi1_open_file()
+ IB/ipoib: Fix for potential no-carrier state
+ IB/core: Map iWarp AH type to undefined in rdma_ab_find_type
+ drm/nouveau/pmuc: don't use movw directly anymore
+ s390/eadm: fix CONFIG_BLOCK include dependency
+ netfilter: ipv6: nf_defrag: Kill frag queue on RFC2460 failure
+ x86/power: Fix swsuspxarch_resume prototype
+ x86/dumpstack: Avoid uninitlized variable
+ firmware: dmi_scan: Fix handling of empty DMI strings
+ ACPI: processor_perflib: Do not send _PPC change notification if not ready
+ ACPI / bus: Do not call _STA on battery devices with unmet dependencies
+ ACPI / scan: Use acpi_bus_get_status() to initialize ACPI_TYPEDEVICE devs
+ MIPS: TXx9: use IS_BUILTIN() for CONFIG_LEDS_CLASS
+ perf record: Fix period option handling
+ MIPS: Generic: Support GIC in EIC mode
+ perf evesl: Fix period/freq terms setup
+ xen-netfront: Fix race between device setup and open
+ xen/grant-table: Use put_page instead of free_page
+ bpf: sockmap, fix leaking maps with attached but not detached progs
+ RDS: IB: Fix null pointer issue
+ arm64: spinlock: Fix theoretical trylock() A-B-A with LSE atomics
+ proc: fix /proc/*/map_files lookup
+ PM / domains: Fix up domain-idle-states OF parsing
- cifs: silence compiler warnings showing up with gcc-8.0.0
- bcache: properly set task state in bch_writeback_thread()
- bcache: fix for allocator and register thread race
- bcache: fix for data collapse after re-attaching an attached device
- bcache: return attach error when no cache set exist
- cpufreq: intel_pstate: Enable HWP during system resume on CPU0
- selftests/trace: Add some missing gloss checks
- rxrpc: Don't put crypto buffers on the stack
- svrdma: Fix Read chunk round-up
- net: Extra '_get' in declaration of arch_get_platform_mac_address
- tools/libbpf: handle issues with bpf ELF objects containing .eh_frames
- SUNRPC: Don't call __UDPX_INC_STATS() from a preemptible context
- net: stmmac: discard disabled flags in interrupt status register
- bpf: fix rlimut in reuseport net selftest
- ACPI / EC: Restore polling during noirq suspend/resume phases
- PM / wakeirq: Fix unbalanced IRQ enable for wakeirq
- vfs/proc/kcore, x86/mm/kcore: Fix SMAP fault when dumping vsyscall user page
- powerpc/mm/hash64: Zero PGD pages on allocation
- x86/platform/UV: Fix GAM Range Table entries less than 1GB
- locking/qspinlock: Ensure node->count is updated before initialising node
- powerpc/powerpc: IMC fix out of bounds memory access at shutdown
- perf test: Fix test trace+probe_libc_inet_pton.sh for s390x
- irqchip/gic-v3: Ignore disabled ITS nodes
- cpumask: Make for_each_cpu_wrap() available on UP as well
- irqchip/gic-v3: Change pr_debug message to pr_devel
- RDMA/core: Reduce poll batch for direct cq polling
- alarmtimer: Init nanosleep alarm timer on stack
- netfilter: x_tables: cap allocations at 512 mbyte
- netfilter: x_tables: add counters allocation wrapper
- netfilter: compat: prepare xt_compat_init_offsets to return errors
- netfilter: compat: reject huge allocation requests
- netfilter: x_tables: limit allocation requests for blob rule heads
- perf: Fix sample_max_stack maximum check
- perf: Return proper values for user stack errors
- RDMA/mlx5: Fix NULL dereference while accessing XRC_TGT QPs
- Revert "KVM: X86: Fix SMRAM accessing even if VM is shutdown"
- mac80211_hwsim: Fix use-after-free bug in hwsim_exit_net
- btrfs: Fix race condition between delayed refs and blockgroup removal
- mm/vmscan: Allow preallocating memory for register_shrinker().

* Bionic update: upstream stable patchset 2018-05-24 (LP: #1773233)
- tty: make n_tty_read() always abort if hangup is in progress
- cpufreq: CPPC: Use transition_delay_us depending transition_latency
- ubifs: Check ubifs_wbuf_sync() return code
- ubi: fastmap: Don't flush fastmap work on detach
- ubi: Fix error for write access
- ubi: Reject MLC NAND
- mm/ksm.c: fix inconsistent accounting of zero pages
+ - mm/hmm: hmm_pfns_bad() was accessing wrong struct
+ - task_struct: only use anon struct under randstruct plugin
+ - fs/reiserfs/journal.c: add missing resierfs_warning() arg
+ - resource: fix integer overflow at reallocation
+ - ipc/shm: fix use-after-free of shm file via remap_file_pages()
+ - mm, slab: reschedule cache_reap() on the same CPU
+ - usb: musb: gadget: misplaced out of bounds check
+ - phy: allwinner: sun4i-usb: poll vbus changes on A23/A33 when driving VBUS
+ - usb: gadget: udc: core: update usb_ep_queue() documentation
+ - ARM64: dts: meson: reduce odroid-c2 eMMC maximum rate
+ - KVM: arm/arm64: vgic-its: Fix potential overrun in vgic_copy_lpi_list
+ - ARM: EXYNOS: Fix coupled CPU idle freeze on Exynos4210
+ - arm: dts: mt7623: fix USB initialization fails on bananapi-r2
+ - ARM: dts: at91: at91sam9g25: fix mux-mask pinctrl property
+ - ARM: dts: exynos: Fix IOMMU support for GScaler devices on Exynos5250
+ - ARM: dts: at91: sama5d4: fix pinctrl compatible string
+ - spi: atmel: init FIFOs before spi enable
+ - spi: Fix scatterlist elements size in spi_map_buf
+ - spi: Fix unregistration of controller with fixed SPI bus number
+ - media: atomisp_fops.c: disable atomisp_compat_ioctl32
+ - media: vivid: check if the cec_adapter is valid
+ - media: vsp1: Fix BRx conditional path in WPF
+ - x86/xen: Delay get_cpu_cap until stack canary is established
+ - regmap: Fix reversed bounds check in regmap_raw_write()
+ - ACPI / video: Add quirk to force acpi-video backlight on Samsung 670Z5E
+ - ACPI / hotplug / PCI: Check presence of slot itself in get_slot_status()
+ - USB: gadget: f_midi: fixing a possible double-free in f_midi
+ - USB: fix USB3 devices behind USB3 hubs not resuming at hibernate thaw
+ - usb: dwc3: prevent setting PRTCAP to OTG from debugfs
+ - usb: dwc3: pci: Properly cleanup resource
+ - usb: dwc3: gadget: never call ->complete() from ->ep_queue()
+ - cifs: fix memory leak in SMB2_opent()
+ - fix smb3-encryption breakage when CONFIG_DEBUG_SG=y
+ - smb3: Fix root directory when server returns inode number of zero
+ - HID: i2c-hid: fix size check and type usage
+ - i2c: i801: Save register SMBISLVCMD value only once
+ - i2c: i801: Restore configuration at shutdown
+ - CIFS: refactor crypto sha3/sdesc allocation&free
+ - CIFS: add sha512 secmech
+ - CIFS: fix sha512 check in cifs_crypto_secmech_release
+ - powerpc/64s: Fix dt_cpu_ftrs to have restore_cpu clear unwanted LPCR bits
+ - powerpc/64: Call H/Register_PROC_TBL when running as a HPT guest on POWER9
+ - powerpc/64: Fix smp_wmb barrier definition use use lwsync consistently
+ - powerpc/kprobes: Fix call trace due to incorrect preempt count
+ - powerpc/kexec_file: Fix error code when trying to load kdump kernel
+ - powerpc/power: define a standard delay for OPAL_BUSY type retry loops
+ - powerpc/power: Fix OPAL NVRAM driver OPAL_BUSY loops
+ - HID: Fix hid_report_len usage
- HID: core: Fix size as type u32
- soc: mediatek: fix the mistaken pointer accessed when subdomains are added
- ASoC: ssm2602: Replace reg_default_raw with reg_default
- ASoC: topology: Fix kcontrol name string handling
- irqchip/gic: Take lock when updating irq type
- random: use a tighter cap in credit_entropy_bits_safe()
- extcon: intel-cht-wc: Set direction and drv flags for V5 boost GPIO
- block: use 32-bit blk_status_t on Alpha
- jbd2: if the journal is aborted then don't allow update of the log tail
- ext4: shutdown should not prevent get_write_access
- ext4: eliminate sleep from shutdown ioctl
- ext4: pass -ESHUTDOWN code to jbd2 layer
- ext4: don't update checksum of new initialized bitmaps
- ext4: protect i_disksize update by i_data_sem in direct write path
- ext4: limit xattr size to INT_MAX
- ext4: always initialize the crc32c checksum driver
- ext4: don't allow r/w mounts if metadata blocks overlap the superblock
- ext4: move call to ext4_error() into ext4_xattr_check_block()
- ext4: add bounds checking to ext4_xattr_find_entry()
- ext4: add extra checks to ext4_xattr_block_get()
- dm crypt: limit the number of allocated pages
- RDMA/ucma: Don't allow setting RDMA_OPTION_IB_PATH without an RDMA device
- RDMA/mlx5: Protect from NULL pointer dereference
- RDMA/rxe: Fix an out-of-bounds read
- ALSA: pcm: Fix UAF at PCM release via PCM timer access
- IB/srp: Fix srp_abort()
- IB/srp: Fix completion vector assignment algorithm
- dmaengine: at_xdmac: fix rare residue corruption
- exl: Fix possible deadlock when processing page faults from cxllib
- tpm: self test failure should not cause suspend to fail
- libnvdimm, dimm: fix dpa reservation vs uninitialized label area
- libnvdimm, namespace: use a safe lookup for dimm device name
- nfit, address-range-scrub: fix scrub in-progress reporting
- nfit: skip region registration for incomplete control regions
- ring-buffer: Check if memory is available before allocation
- um: Compile with modern headers
- um: Use POSIX ucontext_t instead of struct ucontext
- iommu/vt-d: Fix a potential memory leak
- mmc: jz4740: Fix race condition in IRQ mask update
- mmc: tmio: Fix error handling when issuing CMD23
- PCI: Mark Broadcom HT1100 and HT2000 Root Port Extended Tags as broken
- clk: mvebu: armada-38x: add support for missing clocks
- clk: fix false-positive Wmaybe-uninitialized warning
- clk: mediatek: fix PWM clock source by adding a fixed-factor clock
- clk: bcm2835: De-assert/assert PLL reset signal when appropriate
- pwm: rcar: Fix a condition to prevent mismatch value setting to duty
- thermal: imx: Fix race condition in imx_thermal_probe()
- dt-bindings: clock: mediatek: add binding for fixed-factor clock axisel_d4
- watchdog: f71808e_wdt: Fix WD_EN register read
- ALSA: pcm: Use ERESTARTSYS instead of EINTR in OSS emulation
- ALSA: pcm: Avoid potential races between OSS iocts and read/write
- ALSA: pcm: Return -EBUSY for OSS iocts changing busy streams
- ALSA: pcm: Fix mutex unbalance in OSS emulation iocts
- ALSA: pcm: Fix endless loop for XRUN recovery in OSS emulation
- drm/amdgpu: Add an ATPX quirk for hybrid laptop
- drm/amdgpu: Fix always_valid bus multiple LRU insertions.
- drm/amdgpu/sdma: fix mask in emit_pipeline_sync
- drm/amdgpu: Fix PCIe lane width calculation
- drm/amdgpu/si: implement get/set pcie_lanes asic callback
- drm/rockchip: Clear all interrupts before requesting the IRQ
- drm/radeon: add PX quirk for Asus K73TK
- drm/radeon: Fix PCIe lane width calculation
- ALSA: line6: Use correct endpoint type for midi output
- ALSA: rawmidi: Fix missing input substream checks in compat ioctls
- ALSA: hda - New VIA controller suppor no-snoop path
- random: fix crng_ready() test
- random: use a different mixing algorithm for add_device_randomness()
- random: crng_reseed() should lock the crng instance that it is modifying
- random: add new ioctl RNDRESEEDCRNG
- HID: input: fix battery level reporting on BT mice
- HID: hidraw: Fix crash on HIDIOCGFEATURE with a destroyed device
- HID: wacom: bluetooth: send exit report for recent Bluetooth devices
- MIPS: uaccess: Add micromips clobbers to bzero invocation
- MIPS: memset.S: EVA & fault support for small_memset
- MIPS: memset.S: Fix return of __clear_user from Lpartial_fixup
- MIPS: memset.S: Fix clobber of v1 in last_fixup
- powerpc/eeh: Fix enabling bridge MMIO windows
- powerpc/lib: Fix off-by-one in alternate feature patching
- udf: Fix leak of UTF-16 surrogates into encoded strings
- fanotify: fix logic of events on child
- mmc: sdhci-pci: Only do AMD tuning for HS200
- drm/i915: Correctly handle limited range YCbCr data on VLV/CHV
- jffs2_kill_sb(): deal with failed allocations
- hypfs_kill_super(): deal with failed allocations
- orangefs_kill_sb(): deal with allocation failures
- rpc_pipefs: fix double-dput()
- Don't leak MNT_INTERNAL away from internal mounts
- autofs: mount point create should honour passed in mode
- mm/filemap.c: fix NULL pointer in page_cache_tree_insert()
- Revert "media: lirc_zilog: driver only sends LIRCCODE"
- media: staging: lirc_zilog: incorrect reference counting
- writeback: safer lock nesting
- Bluetooth: hci_bcm: Add irq_polarity module option
- mm: hwpoison: disable memory error handling on 1GB hugepage
- media: rc: oops in ir_timer_keyup after device unplug
- acpi, nfit: rework NVDIMM leaf method detection
+ - ceph: always update atime/mtime/ctime for new inode
+ - ext4: fix offset overflow on 32-bit archs in ext4_iomap_begin()
+ - ext4: force revalidation of directory pointer after seekdir(2)
+ - RDMA/core: Avoid that ib_drain_qp() triggers an out-of-bounds stack access
+ - xprtdma: Fix latency regression on NUMA NF/S/DMA clients
+ - xprtdma: Fix corner cases when handling device removal
+ - IB/srpt: Fix an out-of-bounds stack access in srpt_zero_length_write()
+ - drivers/infiniband/core/verbs.c: fix build with gcc-4.4.4
+ - drivers/infiniband/ulp/srpt/ib_srpt.c: fix build with gcc-4.4.4
+ - mmc: core: Prevent bus reference leak in mmc_blk_init()
+ - drm/amd/display: HDMI has no sound after Panel power off/on
+ - trace_uprobe: Use %lx to display offset
+ - clk: tegra: Mark HCLK, SCLK and EMC as critical
+ - pwm: mediatek: Fix up PWM4 and PWM5 malfunction on MT7623
+ - pwm: mediatek: Improve precision in rate calculation
+ - HID: i2c-hid: Fix resume issue on Raydium touchscreen device
+ - s390: add support for IBM z14 Model ZR1
+ - drm/i915: Fix hibernation with ACPI S0 target state
+ - libnvdimm, dimm: handle EACCES failures from label reads
+ - device-dax: allow MAP_SYNC to succeed
+ - HID: i2c-hid: fix inverted return value from i2c_hid_command()
+
+ * CVE-2018-7755
+ - SAUCE: floppy: Do not copy a kernel pointer to user memory in FDGETPRM ioctl
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 12 Jun 2018 18:09:35 +0200
+
+ linux (4.15.0-23.25) bionic; urgency=medium
+
+ * linux: 4.15.0-23.25 -proposed tracker (LP: #1772927)
+
+ * arm64 SDEI support needs trampoline code for KPTI (LP: #1768630)
+ - arm64: mmu: add the entry trampolines start/end section markers into
+  sections.h
+ - arm64: sdei: Add trampoline code for remapping the kernel
+
+ * Some PCIe errors not surfaced through rasdaemon (LP: #1769730)
+ - ACPI: APEI: handle PCIe AER errors in separate function
+ - ACPI: APEI: call into AER handling regardless of severity
+
+ * qla2xxx: Fix page fault at kmem_cache_alloc_node() (LP: #1770003)
+ - scsi: qla2xxx: Fix session cleanup for N2N
+ - scsi: qla2xxx: Remove unused argument from qlt_schedule_sess_for_deletion()
+ - scsi: qla2xxx: Serialize session deletion by using work_lock
+ - scsi: qla2xxx: Serialize session free in qlt_free_session_done
+ - scsi: qla2xxx: Don't call dma_free_coherent with IRQ disabled.
+ - scsi: qla2xxx: Fix warning in qla2x00_async_iocb_timeout()
+ - scsi: qla2xxx: Prevent relogin trigger from sending too many commands
- scsi: qla2xxx: Fix double free bug after firmware timeout
- scsi: qla2xxx: Fixup locking for session deletion

* Several hisi_sas bug fixes (LP: #1768974)
  - scsi: hisi_sas: dt-bindings: add an property of signal attenuation
  - scsi: hisi_sas: support the property of signal attenuation for v2 hw
  - scsi: hisi_sas: fix the issue of link rate inconsistency
  - scsi: hisi_sas: fix the issue of setting linkrate register
  - scsi: hisi_sas: increase timer expire of internal abort task
  - scsi: hisi_sas: remove unused variable hisi_sas_devices.running_req
  - scsi: hisi_sas: fix return value of hisi_sas_task_prep()
  - scsi: hisi_sas: Code cleanup and minor bug fixes

* [bionic] machine stuck and bonding not working well when nvmet_rdma module
  is loaded (LP: #1764982)
  - nvmet-rdma: Don't flush system_wq by default during remove_one
  - nvme-rdma: Don't flush delete_wq by default during remove_one

* Warnings/hang during error handling of SATA disks on SAS controller
  (LP: #1768971)
  - scsi: libsas: defer ata device eh commands to libata

* Hotplugging a SATA disk into a SAS controller may cause crash (LP: #1768948)
  - ata: do not schedule hot plug if it is a sas host

* ISST-LTE:pKVM:Ubuntu1804: rcu_sched self-detected stall on CPU follow by CPU
  ATTEMPT TO RE-ENTER Firmware! (LP: #1767927)
  - powerpc/powernv: Handle unknown OPAL errors in opal_nvram_write()
  - powerpc/64s: return more carefully from sreset NMI
  - powerpc/64s: sreset panic if there is no debugger or crash dump handlers

* fsnotify: Fix fsnotify_mark_connector race (LP: #1765564)
  - fsnotify: Fix fsnotify_mark_connector race

* Hang on network interface removal in Xen virtual machine (LP: #1771620)
  - xen-netfront: Fix hang on device removal

* HiSilicon HNS NIC names are truncated in /proc/interrupts (LP: #1765977)
  - net: hns: Avoid action name truncation

* Ubuntu 18.04 kernel crashed while in degraded mode (LP: #1770849)
  - SAUCE: powerpc/perf: Fix memory allocation for core-imc based on
    num_possible_cpus()

* Switch Build-Depends: transfig to fig2dev (LP: #1770770)
  - [Config] update Build-Depends: transfig to fig2dev

* smp_call_function_single/many core hangs with stop4 alone (LP: #1768898)
+ - cpufreq: powernv: Fix hardlockup due to synchronous smp_call in timer interrupt

+ * Add d-i support for Huawei NICs (LP: #1767490)
  + - d-i: add hinic to nic-modules udeb

+ * unregister_netdevice: waiting for eth0 to become free. Usage count = 5
  + (LP: #1746474)
  + - xfrm: reuse uncached_list to track xdsts

+ * Include nfp driver in linux-modules (LP: #1768526)
  + - [Config] Add nfp.ko to generic inclusion list

+ * Kernel panic on boot (m1.small in cn-north-1) (LP: #1771679)
  + - x86/xen: Reset VCPU0 info pointer after shared_info remap

+ * CVE-2018-3639 (x86)
  + - x86/bugs: Fix the parameters alignment and missing void
  + - KVM: SVM: Move spec control call after restore of GS
  + - x86/speculation: Use synthetic bits for IBRS/IBPB/STIBP
  + - x86/cpufeatures: Disentangle MSR_SPEC_CTRL enumeration from IBRS
  + - x86/cpufeatures: Disentangle SSBD enumeration
  + - x86/cpufeatures: Add FEATURE_ZEN
  + - x86/speculation: Handle HT correctly on AMD
  + - x86/bugs, KVM: Extend speculation control for VIRT_SPEC_CTRL
  + - x86/speculation: Add virtualized speculative store bypass disable support
  + - x86/speculation: Rework speculative_store_bypass_update()
  + - x86/bugs: Unify x86_spec_ctrl_{set_guest,restore_host}
  + - x86/bugs: Expose x86_spec_ctrl_base directly
  + - x86/bugs: Remove x86_spec_ctrl_set()
  + - x86/bugs: Rework spec_ctrl base and mask logic
  + - x86/speculation, KVM: Implement support for VIRT_SPEC_CTRL/LS_CFG
  + - KVM: SVM: Implement VIRT_SPEC_CTRL support for SSBD
  + - x86/bugs: Rename SSBD_NO to SSB_NO
  + - bpf: Prevent memory disambiguation attack
  + - KVM: VMX: Expose SSBD properly to guests.

+ * Suspend to idle: Open lid didn't resume (LP: #1771542)
  + - ACPI / PM: Do not reconfigure GPEs for suspend-to-idle

+ * Fix initialization failure detection in SDEI for device-tree based systems
  + (LP: #1768663)
  + - firmware: arm_sdei: Fix return value check in sdei_present_dt()

+ * No driver for Huawei network adapters on arm64 (LP: #1769899)
  + - net-next/hinic: add arm64 support

+ * CVE-2018-1092
- ext4: fail ext4_iget for root directory if unallocated
+ * kernel 4.15 breaks nouveau on Lenovo P50 (LP: #1763189)
+ - drm/nouveau: Fix deadlock in nv50_mstm_register_connector()
+ + update-initramfs not adding i915 GuC firmware for Kaby Lake, firmware fails
+ to load (LP: #1728238)
+ - Revert "UBUNTU: SAUCE: (no-up) i915: Remove MODULE_FIRMWARE statements for
+ unreleased firmware"
+ + Battery drains when laptop is off (shutdown) (LP: #1745646)
+ - PCI / PM: Check device_may_wakeup() in pci_enable_wake()
+ + * Dell Latitude 5490/5590 BIOS update 1.1.9 causes black screen at boot
+ (LP: #1764194)
+ - drm/i915/bios: filter out invalid DDC pins from VBT child devices
+ + * Intel 9462 A370:42A4 doesn't work (LP: #1748853)
+ - iwlwifi: add shared clock PHY config flag for some devices
+ - iwlwifi: add a bunch of new 9000 PCI IDs
+ + * Fix an issue that some PCI devices get incorrectly suspended (LP: #1764684)
+ - PCI / PM: Always check PME wakeup capability for runtime wakeup support
+ + * [SRU][Bionic/Artful] fix false positives in W+X checking (LP: #1769696)
+ - init: fix false positives in W+X checking
+ + * Bionic update to v4.15.18 stable release (LP: #1769723)
+ - netfilter: ipset: Missing nfnl_lock()/nfnl_unlock() is added to
+ - ip_set_net_exit()
+ - cdc_ether: flag the Cinterion AHS8 modem by gemalto as WWAN
+ - rds: MP-RDS may use an invalid c_path
+ - slip: Check if rstate is initialized before uncompressing
+ - vhost: fix vhost_vq_access_ok() log check
+ - l2tp: fix races in tunnel creation
+ - l2tp: fix race in duplicate tunnel detection
+ - ip_gre: clear feature flags when incompatible o_flags are set
+ - vhost: Fix vhost_copy_to_user()
+ - lan78xx: Correctly indicate invalid OTP
+ - media: v4l2-compat-ioctl32: don't oops on overlay
+ - media: v4l: vsp1: Fix header display list status check in continuous mode
+ - ipmi: Fix some error cleanup issues
+ - parisc: Fix out of array access in match_pci_device()
+ - parisc: Fix HPMC handler by increasing size to multiple of 16 bytes
+ - Drivers: hv: vmbus: do not mark HV_PCIE as perf_device
+ - PCI: hv: Serialize the present and eject work items
+ - PCI: hv: Fix 2 hang issues in hv_compose_msi_msg()
+ - KVM: PPC: Book3S HV: trace_tlbie must not be called in realmode
+ - perf/core: Fix use-after-free in uprobe_perf_close()
+ - x86/mce/AMD: Get address from already initialized block
+ - hwmon: (ina2xx) Fix access to uninitialized mutex
+ - ath9k: Protect queue draining by rcu_read_lock()
+ - x86/apic: Fix signedness bug in APIC ID validity checks
+ - i2fs: fix heap mode to reset it back
+ - block: Change a rcu_read_(lock,unlock)_sched() pair into rcu_read_(lock,unlock)()
+ - nvme: Skip checking heads without namespaces
+ - lib: fix stall in __bitmap_parselist()
+ - blk-mq: order getting budget and driver tag
+ - blk-mq: don't keep offline CPUs mapped to hctx 0
+ - ovl: fix lookup with middle layer opaque dir and absolute path redirects
+ - x: xenbus_dev_frontend: Fix XS TRANSACTION_END handling
+ - hugetlbfs: fix bug in pgoff overflow checking
+ - nlsd: fix incorrect umasks
+ - scsi: qla2xxx: Fix small memory leak in qla2x00_probe_one on probe failure
+ - block/loop: fix deadlock after loop_set_status
+ - s90/ctl: skip checking heads without namespaces
+ - get_user_pages_fast(): return -EFAULT on access_ok failure
+ - mm/gup_benchmark: handle gup failures
+ - getname_kernel() needs to make sure that ->name != ->iname in long case
+ - Bluetooth: Fix connection if directed advertising and privacy is used
+ - Bluetooth: hci_bcm: Treat Interrupt ACPI resources as always being active-low
+ - rtl8187: Fix NULL pointer dereference in priv->conf_mutex
+ - ovl: set lower layer st_dev only if setting lower st_ino
+ - Linux 4.15.18
+
+ * Kernel bug when unplugging Thunderbolt 3 cable, leaves xHCI host controller dead (LP: #1768852)
+ - xhci: Fix Kernel oops in xhci dbgty
+
+ * Incorrect blacklist of bcm2835_wdt (LP: #1766052)
+ - [Packaging] Fix missing watchdog for Raspberry Pi
+
+ * CVE-2018-8087
+ - mac80211_hwsim: fix possible memory leak in hwsim_new_radio_nl()
+
+ * Integrated Webcam Realtek Integrated_Webcam_HD (0bda:58f4) not working in DELL XPS 13 9370 with firmware 1.50 (LP: #1763748)
+ - SAUCE: media: uvcvideo: Support realtek's UVC 1.5 device
+
+ * [ALSA] [PATCH] Clevo P950ER ALC1220 Fixup (LP: #1769721)
+ - SAUCE: ALSA: hda/realtek - Clevo P950ER ALC1220 Fixup
+ * Bionic: Intermittently sent to Emergency Mode on boot with unhandled kernel
+ NULL pointer dereference at 0000000000000980 (LP: #1768292)
+ - thunderbolt: Prevent crash when ICM firmware is not running
+
+ * linux-snapdragon: reduce EPROBEDEFER noise during boot (LP: #1768761)
+ - [Config] snapdragon: DRM_I2C_ADV7511=y
+
+ * regression Aquantia Corp. AQC107 4.15.0-13-generic -> 4.15.0-20-generic
+ (LP: #1767088)
+ - net: aquantia: Regression on reset with 1.x firmware
+ - net: aquantia: oops when shutdown on already stopped device
+
+ * e1000e msix interrupts broken in linux-image-4.15.0-15-generic
+ (LP: #1764892)
+ - e1000e: Remove Other from EIAC
+
+ * Acer Swift sf314-52 power button not managed (LP: #1766054)
+ - SAUCE: platform/x86: acer-wmi: add another KEY_POWER keycode
+
+ * set PINCFG_HEADSET_MIC to parse_flags for Dell precision 3630 (LP: #1766398)
+ - ALSA: hda/realtek - set PINCFG_HEADSET_MIC to parse_flags
+
+ * Change the location for one of two front mics on a lenovo thinkcentre
+ machine (LP: #1766477)
+ - ALSA: hda/realtek - adjust the location of one mic
+
+ * SRU: bionic: apply 50 ZFS upstream bugfixes (LP: #1764690)
+ - SAUCE: (noup) Update zfs to 0.7.5-1ubuntu15 (LP: #1764690)
+
+ * [8086:3e92] display becomes blank after S3 (LP: #1763271)
+ - drm/i915/edp: Do not do link training fallback or prune modes on EDP
+
+ -- Stefan Bader <stefan.bader@canonical.com> Wed, 23 May 2018 18:54:55 +0200
+
+ linux (4.15.0-22.24) bionic; urgency=medium
+
+ * CVE-2018-3639 (powerpc)
+ - powerpc/64s: Add support for a store forwarding barrier at kernel entry/exit
+ - stf-barrier: set eieio instruction bit 6 for future optimisations
+
+ * CVE-2018-3639 (x86)
+ - x86/nospec: Simplify alternative_msr_write()
+ - x86/bugs: Concentrate bug detection into a separate function
+ - x86/bugs: Concentrate bug reporting into a separate function
+ - x86/bugs: Read SPEC_CTRL MSR during boot and re-use reserved bits
+ - x86/bugs, KVM: Support the combination of guest and host IBRS
+ - x86/bugs: Expose /sys/.../spec_store_bypass
+ x86/cpu_features: Add X86_FEATURE_RDS
+ x86/bugs: Provide boot parameters for the spec_store_bypass_disable mitigation
+ x86/bugs/intel: Set proper CPU features and setup RDS
+ x86/bugs: Whitelist allowed SPEC_CTRL MSR values
+ x86/bugs/AMD: Add support to disable RDS on Fam[15,16,17]h if requested
+ x86/KVM/VMX: Expose SPEC_CTRL Bit(2) to the guest
+ x86/speculation: Create spec-ctrl.h to avoid include hell
+ prctl: Add speculation control prctls
+ x86/process: Allow runtime control of Speculative Store Bypass
+ x86/speculation: Add prctl for Speculative Store Bypass mitigation
+ nospec: Allow getting/setting on non-current task
+ proc: Provide details on speculation flaw mitigations
+ seccomp: Enable speculation flaw mitigations
+ x86/bugs: Make boot modes __ro_after_init
+ prctl: Add force disable speculation
+ seccomp: Use PR_SPEC_FORCE_DISABLE
+ seccomp: Add filter flag to opt-out of SSB mitigation
+ seccomp: Move speculation mitigation control to arch code
+ x86/speculation: Make "seccomp" the default mode for Speculative Store Bypass
+ x86/bugs: Rename _RDS to _SSBD
+ proc: Use underscores for SSBD in 'status'
+ Documentation/spec_ctrl: Do some minor cleanups
+ x86/bugs: Fix __ssb_select_mitigation() return type
+ x86/bugs: Make cpu_show_common() static
+ * LSM Stacking prctl values should be redefined as to not collide with upstream prctls (LP: #1769263) // CVE-2018-3639
+ SAUCE: LSM stacking: adjust prctl values
+ -- Stefan Bader <stefan.bader@canonical.com> Tue, 15 May 2018 07:41:28 +0200
+ linux (4.15.0-21.22) bionic; urgency=medium
+ * linux: 4.15.0-21.22 -proposed tracker (LP: #1767397)
+ * initramfs-tools exception during pm.DoInstall with do-release-upgrade from 16.04 to 18.04 (LP: #1766727)
+ Add linux-image-* Breaks on s390-tools (<< 2.3.0-0ubuntu3)
+ * linux-image-4.15.0-20-generic install after upgrade from xenial breaks (LP: #1767133)
+ Packaging: Depends on linux-base that provides the necessary tools
+ * linux-image packages need to Breaks flash-kernel << 3.90ubuntu2 (LP: #1766629)
+ Linux-image-* breaks on flash-kernel (<< 3.90ubuntu2)
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Mon, 30 Apr 2018 14:58:35 -0300
+ linux (4.15.0-20.21) bionic; urgency=medium
+ *
+ * linux: 4.15.0-20.21 -proposed tracker (LP: #1766452)
+ *
+ * package shim-signed (not installed) failed to install/upgrade: installed
+ shim-signed package post-installation script subprocess returned error exit
+ status 5 (LP: #1766391)
+ - [Packaging] fix invocation of header postinst hooks
+ *
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 23 Apr 2018 23:56:17 -0500
+ *
+ linux (4.15.0-19.20) bionic; urgency=medium
+ *
+ * linux: 4.15.0-19.20 -proposed tracker (LP: #1766021)
+ *
+ * Kernel 4.15.0-15 breaks Dell PowerEdge 12th Gen servers (LP: #1765232)
+ - Revert "blk-mq: simplify queue mapping & schedule with each possible CPU"
+ - Revert "genirq/affinity: assign vectors to all possible CPUs"
+ *
+ -- Seth Forshee <seth.forshee@canonical.com> Sat, 21 Apr 2018 17:19:00 -0500
+ *
+ linux (4.15.0-18.19) bionic; urgency=medium
+ *
+ * linux: 4.15.0-18.19 -proposed tracker (LP: #1765490)
+ *
+ * [regression] Ubuntu 18.04:[4.15.0-17-generic #18] KVM Guest Kernel:
+ meltdown: rfi/fallback displacement flush not enabled by default (kvm)
+ (LP: #1765429)
+ - powerpc/pseries: Fix clearing of security feature flags
+ *
+ * signing: only install a signed kernel (LP: #1764794)
+ - [Packaging] update to Debian like control scripts
+ - [Packaging] switch to triggers for postinst.d postrm.d handling
+ - [Packaging] signing -- switch to raw-signing tarballs
+ - [Packaging] signing -- switch to linux-image as signed when available
+ - [Config] signing -- enable Opal signing for ppc64el
+ - [Packaging] printenv -- add signing options
+ *
+ * [18.04 FEAT] Sign POWER host/NV kernels (LP: #1696154)
+ - [Packaging] signing -- add support for signing Opal kernel binaries
+ *
+ * Please cherrypick s390 unwind fix (LP: #1765083)
+ - s390/compat: fix setup_frame32
+ *
+ * Ubuntu 18.04 installer does not detect any IPR based HDD/RAID array [S822L]
+ [ipr] (LP: #1751813)
  + d-i: move ipr to storage-core-modules on ppc64el
+ 
+ * drivers/gpu/drm/bridge/adv7511/adv7511.ko missing (LP: #1764816)
+  + SAUCE: (no-up) rename the adv7511 drm driver to adv7511_drm
+ 
+ * Miscellaneous Ubuntu changes
+  + [Packaging] Add linux-oem to rebuild test blacklist.
+ 
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Thu, 19 Apr 2018 18:06:46 -0300
+ 
+ * drivers/gpu/drm/bridge/adv7511/adv7511.ko missing (LP: #1764816)
+  + SAUCE: (no-up) rename the adv7511 drm driver to adv7511_drm
+ 
+ * Miscellaneous Ubuntu changes
+  + [Packaging] Add linux-oem to rebuild test blacklist.
+ 
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Thu, 19 Apr 2018 18:06:46 -0300
+ 
+ linux (4.15.0-17.18) bionic; urgency=medium
+ 
+ * linux: 4.15.0-17.18 -proposed tracker (LP: #1764498)
+ 
+ * Eventual OOM with profile reloads (LP: #1750594)
  + SAUCE: apparmor: fix memory leak when duplicate profile load
+ 
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 16 Apr 2018 14:48:18 -0500
+ 
+ * linux: 4.15.0-17.18 -proposed tracker (LP: #1764498)
+ 
+ * Eventual OOM with profile reloads (LP: #1750594)
  + SAUCE: apparmor: fix memory leak when duplicate profile load
+ 
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 16 Apr 2018 14:48:18 -0500
+ 
+ linux (4.15.0-16.17) bionic; urgency=medium
+ 
+ * linux: 4.15.0-16.17 -proposed tracker (LP: #1763785)
+ 
+ * [18.04] [bug] CFL-S(CNP)/CNL GPIO testing failed (LP: #1757346)
  + [Config]: Set CONFIG_PINCTRL_CANNONLAKE=y
+ 
+ * [Ubuntu 18.04] USB Type-C test failed on GLK (LP: #1758797)
  + SAUCE: usb: typec: ucsi: Increase command completion timeout value
+ 
+ * Fix trying to "push" an already active pool VP (LP: #1763386)
  + SAUCE: powerpc/xive: Fix trying to "push" an already active pool VP
+ 
+ * Revert and replace SAUCE patches w/ upstream (LP: #1762824)
  + Revert "UBUNTU: SAUCE: scsi: hisi_sas: export device table of v3 hw to userspace"
+ 
+ * Revert "UBUNTU: SAUCE: scsi: hisi_sas: config for hip08 ES"
  + scsi: hisi_sas: modify some register config for hip08
  + scsi: hisi_sas: add v3 hw MODULE_DEVICE_TABLE()
+ 
+ * Realtek card reader - RTS5243 [VEN_10EC&DEV_5260] (LP: #1737673)
  + misc: rttx: Move Realtek Card Reader Driver to misc
  + updateconfigs for Realtek Card Reader Driver
  + misc: rttx: Add support for RTS5260
  + misc: rttx: Fix symbol clashes
+ 
+ * Mellanox [mlx5] [bionic] UBSAN: Undefined behaviour in
  + /include/linux/net_dim.h (LP: #1763269)
+ - net/mlx5e: Fix int overflow
+ + * apparmor bug fixes for bionic (LP: #1763427)
+ + - apparmor: fix logging of the existence test for signals
+ + - apparmor: make signal label match work when matching stacked labels
+ + - apparmor: audit unknown signal numbers
+ + - apparmor: fix memory leak on buffer on error exit path
+ + - apparmor: fix mediation of prlimit
+ + * dangling symlinks to loaded apparmor policy (LP: #1755563) // apparmor bug
+ + fixes for bionic (LP: #1763427)
+ + - apparmor: fix dangling symlinks to policy rawdata after replacement
+ + * [OPAL] Assert fail:
+ + core/mem_region.c:447:lock_held_by_me(&region->free_list_lock)
+ + (LP: #1762913)
+ + - powerpc/watchdog: remove arch_trigger_cpumask_backtrace
+ + * [LTC Test] Ubuntu 18.04: tm_trap_test failed on P8 compat mode guest
+ + (LP: #1762928)
+ + - powerpc/tm: Fix endianness flip on trap
+ + * Add support for RT5660 codec based sound cards on Baytrail (LP: #1657674)
+ + - SAUCE: (no-up) ASoC: Intel: Support machine driver for RT5660 on Baytrail
+ + - SAUCE: (no-up) ASoC: rt5660: Add ACPI support
+ + - SAUCE: (no-up): ASoC: Intel: bytcr-rt5660: Add MCLK, quirks
+ + - [Config] CONFIG_SND_SOC_INTEL_BUTCRT5660_MACH=m, CONFIG_SND_SOC_RT5660=m
+ + */dev/ipmi enumeration flaky on Cavium Sabre nodes (LP: #1762812)
+ + - i2c: xlp9xx: return ENXIO on slave address NACK
+ + - i2c: xlp9xx: Handle transactions with I2C_M_RECV_LEN properly
+ + - i2c: xlp9xx: Check for Bus state before every transfer
+ + - i2c: xlp9xx: Handle NACK on DATA properly
+ + * [18.04 FEAT] Add kvm_stat from kernel tree (LP: #1734130)
+ + - tools/kvm_stat: simplify the sortkey function
+ + - tools/kvm_stat: use a namedtuple for storing the values
+ + - tools/kvm_stat: use a more pythonic way to iterate over dictionaries
+ + - tools/kvm_stat: avoid 'is' for equality checks
+ + - tools/kvm_stat: fix crash when filtering out all non-child trace events
+ + - tools/kvm_stat: print error on invalid regex
+ + - tools/kvm_stat: fix debugfs handling
+ + - tools/kvm_stat: mark private methods as such
+ + - tools/kvm_stat: eliminate extra guest/pid selection dialog
+ + - tools/kvm_stat: separate drilldown and fields filtering
+ + - tools/kvm_stat: group child events indented after parent
+ + - tools/kvm_stat: print 'Total' line for multiple events only
+ + - tools/kvm_stat: Fix python3 syntax
+ - tools/kvm_stat: Don't use deprecated file()
+ - tools/kvm_stat: Remove unused function
+ - [Packaging] Add linux-tools-host package for VM host tools
+ - [Config] do_tools_host=true for amd64
+
+ * Bionic update to v4.15.17 stable release (LP: #1763366)
+ - i40iw: Fix sequence number for the first partial FPDU
+ - i40iw: Correct Q1/XF object count equation
+ - i40iw: Validate correct IRD/ORD connection parameters
+ - clk: meson: mpill: use 64-bit maths in params_from_rate
+ - ARM: dts: ls1021a: add "fsl,ls1021a-esdhc" compatible string to esdhc node
+ - Bluetooth: Add a new 04ca:3015 QCA_ROME device
+ - ipv6: Reinject IPv6 packets if IPsec policy matches after SNAT
+ - thermal: power_allocator: fix one race condition issue for thermal_instances
  + list
+ - perf probe: Find versioned symbols from map
+ - perf probe: Add warning message if there is unexpected event name
+ - perf evsel: Fix swap for samples with raw data
+ - perf evsel: Enable ignore_missing_thread for pid option
+ - 12tp: fix missing print session offset info
+ - rds: Reset rs->rs_bound_addr in rds_add_bound() failure path
+ - ACPI / video: Default lcd_only to true on Win8-ready and newer machines
+ - IB/mlx5: Report inner RSS capability
+ - VFS: close race between getcwd() and d_move()
+ - watchdog: dw_wdt: add stop watchdog operation
+ - clk: divider: fix incorrect usage of container_of
+ - PM / devfreq: Fix potential NULL pointer dereference in governor_store
+ - gpiolib: don't dereference a desc before validation
+ - net_sch: red: Fix the new offload indication
+ - selftests/net: fix bugs in address and port initialization
+ - thermal/drivers/hisi: Remove bogus const from function return type
+ - RDMA/cma: Mark end of CMA ID messages
+ - hwmon: (ina2xx) Make calibration register value fixed
+ - 12fs: fix lock dependency in between dio_rwsem & i_mmap_sem
+ - clk: sunxi-ng: a83t: Add M divider to TCON1 clock
+ - media: videobuf2-core: don't go out of the buffer range
+ - ASoC: Intel: Skylake: Disable clock gating during firmware and library
  + download
+ - ASoC: Intel: cht_bsw_rt5645: Analog Mic support
+ - drm/msm: Fix NULL deref in adreno_load_gpu
+ - IB/ipoib: Fix for notify send CQ failure messages
+ - spi: sh-msiof: Fix timeout failures for TX-only DMA transfers
+ - scsi: mpt3sas: Proper handling of set/clear of "ATA command pending" flag.
+ - irqchip/ompic: fix return value check in ompic_of_init()
+ - irqchip/gic-v3: Fix the driver probe() fail due to disabled GICC entry
+ - ACPI: EC: Fix debugfs_create_"() usage
+ - mac80211: Fix setting TX power on monitor interfaces
+ - vfb: fix video mode and line_length being set when loaded
+ - crypto: crypto4xx - perform aead icv check in the driver
+ - gpio: label descriptors using the device name
+ - arm64: asid: Do not replace active_asids if already 0
+ - powernv-cpufreq: Add helper to extract pstate from PMSR
+ - IB/rdmaevt: Allocate CQ memory on the correct node
+ - blk-mq: avoid to map CPU into stale hw queue
+ - blk-mq: fix race between updating nr_hw_queues and switching io sched
+ - backlight: tdo24m: Fix the SPI CS between transfers
+ - nvme-fabrics: protect against module unload during create_ctrl
+ - nvme-fabrics: don't check for non-NULL module in nvmf_register_transport
+ - pinctrl: baytrail: Enable glitch filter for GPIOs used as interrupts
+ - nvme_fcloo: disassociate local port structs
+ - nvme_fcloo: fix abort race condition
+ - tpm: return a TPM_RC_COMMAND_CODE response if command is not implemented
+ - perf report: Fix a no annotate browser displayed issue
+ - staging: lustre: disable preempt while sampling processor id.
+ - ASoC: Intel: sst: Fix the return value of `sst_send_byte_stream_mrfld()'
+ - power: supply: axp288_charger: Properly stop work on probe-error / remove
+ - rt2x00: do not pause queue unconditionally on error path
+ - w11251: check return from call to w11251_acx_arp_ip_filter
+ - net/mlx5: Fix race for multiple RoCE enable
+ - bcache: ret IOERR when read meets metadata error
+ - bcache: stop writeback thread after detaching
+ - bcache: segregate flash only volume write streams
+ - net: Fix netdev_WARN_ONCE macro
+ - net/mlx5e: IPoIB, Use correct timestamp in child receive flow
+ - blk-mq: fix kernel oops in blk_mq_tag_idle()
+ - tty: n_gsm: Allow ADM response in addition to UA for control dlci
+ - block, bfq: put async queues for root bfq groups too
+ - serdev: Fix serdev_uevent failure on ACPI enumerated serdev-controllers
+ - EDAC, mv64x60: Fix an error handling path
+ - uio_hv_generic: check that host supports monitor page
+ - Bluetooth: hci_bcm: Mandate presence of shutdown and device wake GPIO
+ - Bluetooth: hci_bcm: Validate IRQ before using it
+ - Bluetooth: hci_bcm: Make shutdown and device wake GPIO optional
+ - i40evf: don't rely on netif_running() outside rtnl_lock()
+ - drm/amd/powerplay: fix memory leakage when reload (v2)
+ - cxgb4vf: Fix SGE FL buffer initialization logic for 64K pages
+ - PM / domains: Don't skip driver's ->suspend|resume_noirq() callbacks
+ - scsi: megaraid_sas: Error handling for invalid ldcount provided by firmware
+ in RAID map
+ - scsi: megaraid_sas: unload flag should be set after scsi_remove_host is
called
+ - RDMA/cma: Fix rdma_cm path querying for RoCE
+ - gpio: thunderx: fix error return code in thunderx_gpio_probe()
+ - x86/gart: Exclude GART aperture from vmcore
+ - sdhci: Advertise 2.0v supply on SDIO host controller
+ - Input: goodix - disable IRQs while suspended
- mtd: mtd_oobtest: Handle bitflips during reads
- crypto: aes-generic - build with -Os on gcc-7+
- perf tools: Fix copyfile_offset update of output offset
- iommu: release blocks for partially setup cmds
- thermal: int3400_thermal: fix error handling in int3400_thermal_probe()
- drm/int: Ignore VBT request for know invalid DDC pin.
- drm/int: Properly handle VBT ddc pin out of bounds.
- x86/microcode: Propagate return value from updating functions
- x86/CPU: Add a microcode loader callback
- x86/CPU: Check CPU feature bits after microcode upgrade
- x86/microcode: Get rid of struct apply_microcode_ctx
- x86/microcode/intel: Check microcode revision before updating sibling threads
- x86/microcode/intel: Writeback and invalidate caches before updating microcode
- x86/microcode: Do not upload microcode if CPUs are offline
- x86/microcode/intel: Look into the patch cache first
- x86/microcode: Request microcode on the BSP
- x86/microcode: Synchronize late microcode loading
- x86/microcode: Attempt late loading only when new microcode is present
- x86/microcode: Fix CPU synchronization routine
- arp: fix arp_filter on l3slave devices
- ipv6: the entire IPv6 header chain must fit the first fragment
- lan78xx: Crash in lan78xx_writ_reg (Workqueue: events lan78xx_defered_multicast_write)
- net: dsa: Discard frames from unused ports
- net: fix possible out-of-bound read in skb_network_protocol()
- net/ipv6: Fix route leaking between VRFs
- net/ipv6: Increment OUTxxx counters after netfilter hook
- net/ipv6: make sure nladdr has correct size in netlink_connect()
- net/mlx5e: Verify coalescing parameters in range
- net/sched: fix dumping which requires several messages to user space
- net/sched: fix NULL dereference in the error path of tcf_bpf_init()
- pptp: remove a buggy dst release in pptp_connect()
- r8169: fix setting driver_data after register_netdev
- sctp: do not leak kernel memory to user space
- sctp: sctp_sockaddrr_af must check minimal addr length for AF_INET6
- vhost: correctly remove wait queue during poll failure
- vlan: also check phy_driver ts_info for vlan's real device
- vrf: Fix use after free and double free in vrf_finish_output
- bonding: fix the err path for dev hwaddr sync in bond_enslave
- bonding: move dev_mc_sync after master_upper_dev_link in bond_enslave
- bonding: process the err returned by dev_set_allmulti properly in bond_enslave
- net: fool proof dev_valid_name()
- ip_tunnel: better validate user provided tunnel names
- ipv6: sit: better validate user provided tunnel names
- ip6_gre: better validate user provided tunnel names
+ - ip6_tunnel: better validate user provided tunnel names
+ - v16: better validate user provided tunnel names
+ - net/mlx5e: Set EQE based as default TX interrupt moderation mode
+ - net/sched: fix a missing idr_remove() in u32_delete_key()
+ - net/sched: fix NULL dereference in the error path of tcf_vlan_init()
+ - net/mlx5e: Avoid using the ipv6 stub in the TC offload neigh update path
+ - net/mlx5e: Fix memory usage issues in offloading TC flows
+ - net/sched: fix NULL dereference in the error path of tcf_sample_init()
+ - nfp: use full 40 bits of the NSP buffer address
+ - ipv6: sr: fix seg6 encap performances with TSO enabled
+ - net/mlx5e: Don't override vport admin link state in switchdev mode
+ - net/mlx5e: Sync netdev vxlan ports at open
+ - net/sched: fix NULL dereference in the error path of tunnel_key_init()
+ - net/sched: fix NULL dereference on the error path of tcf_skbmod_init()
+ - strparser: Fix sign of err codes
+ - net/mlx4_en: Fix mixed PFC and Global pause user control requests
+ - net/mlx5e: Fix traffic being dropped on VF representor
+ - vhost: validate log when IOTLB is enabled
+ - route: check sysctl_fib_multipath_use_neigh earlier than hash
+ - team: move dev_mc_sync after master_upper_dev_link in team_port_add
+ - vhost_net: add missing lock nesting notation
+ - net/mlx4_core: Fix memory leak while delete slave's resources
+ - Linux 4.15.17

+ * sky2 gigabit ethernet driver sometimes stops working after lid-open resume
  from sleep (88E8055) (LP: #1758507) // Bionic update to v4.15.17 stable
  release (LP: #1763366)
+ - sky2: Increase D3 delay to sky2 stops working after suspend

+ * [Feature] CNL: Enable RAPL support (LP: #1685712)
+ - powercap: RAPL: Add support for Cannon Lake

+ * System Z [kernel] UBUNTU18.04 wrong kernel config (LP: #1762719)
  + - s390: move nobp parameter functions to nospec-branch.c
  + - s390: add automatic detection of the spectre defense
  + - s390: report spectre mitigation via syslog
  + - s390: add sysfs attributes for spectre
+ - [Config] CONFIG_EXPOLINE_AUTO=y, CONFIG_KERNEL_NOBP=n for s390
+ - s390: correct nospec auto detection init order

+ * Merge the linux-snapdragon kernel into bionic master/snapdragon
  + (LP: #1763040)
  + - drm/msm: fix spelling mistake: "ringubfler" -> "ringbuffer"
    + - drm/msm: fix msm_rd_dump_submit prototype
  + - wcn36xx: set default BTLE coexistence config
  + - wcn36xx: Add hardware scan offload support
  + - wcn36xx: Reduce spinlock in indication handler

Open Source Used In 5GaaS Edge AC-4 18051
+ - wcn36xx: fix incorrect assignment to msg_body.min_ch_time
+ - wcn36xx: release DMA memory in case of error
+ - mailbox: qcom: Convert APCS IPC driver to use regmap
+ - mailbox: qcom: Create APCS child device for clock controller
+ - clk: qcom: Add A53 PLL support
+ - clk: qcom: Add regmap mux-div clocks support
+ - clk: qcom: Add APCS clock controller support
+ - clk: qcom: msm8916: Fix return value check in qcom_apcs_msm8916_clk_probe()
+ - media: venus: venc: set correctly GOP size and number of B-frames
+ - media: venus: venc: configure entropy mode
+ - media: venus: venc: Apply inloop deblocking filter
+ - media: venus: cleanup set_property controls
+ - arm64: defconfig: enable REMOTEPROC
+ - arm64: defconfig: enable QCOM audio drivers for APQ8016 and DB410c
+ - kernel: configs: add distro.config
+ - arm64: configs: enable WCN36xx
+ - kernel: distro.config: enable debug friendly USB network adapter
+ - arm64: configs: enable QCOM Venus
+ - arm64: defconfig: Enable a53/apcs and avs
+ - arm64: defconfig: enable ondemand governor as default
+ - arm64: defconfig: enable QCOM_TSENS
+ - arm64: defconfig: enable new trigger modes for leds
+ - kernel: configs: enable dm_mod and dm_crypt
+ - Force the SMD regulator driver to be compiled-in
+ - arm64: defconfig: enable CFG80211_DEFAULT_PS by default
+ - arm64: configs: enable BT_QCOMSMD
+ - kernel: configs: add more USB net drivers
+ - arm64: defconfig: disable ANALOG_TV and DIGITAL_TV
+ - arm64: configs: Enable camera drivers
+ - kernel: configs: add freq stat to sysfs
+ - arm64: defconfig: enable CONFIG_USB_CONFIGFS_F_FS by default
+ - arm64: defconfig: Enable QRTR features
+ - kernel: configs: set USB_CONFIG_F_FS in distro.config
+ - kernel: distro.config: enable 'schedutil' CPUfreq governor
+ - kernel: distro.config: enable 'fq' and 'fq_codel' qdiscs
+ - kernel: distro.config: enable 'BBR' TCP congestion algorithm
+ - arm64: defconfig: enable LEDS_QCOM_LPG
+ - HACK: drm/msm/iommu: Remove runtime_put calls in map/unmap
+ - power: avs: Add support for CPR (Core Power Reduction)
+ - power: avs: cpr: Use raw mem access for qfprom
+ - power: avs: cpr: fix with new reg_sequence structures
+ - power: avs: cpr: Register with cpufreq-dt
+ - regulator: smd: Add floor and corner operations
+ - PM / OPP: Support adjusting OPP voltages at runtime
+ - PM / OPP: Drop RCU usage in dev_pm_opp_adjust_voltage()
+ - PM / OPP: HACK: Allow to set regulator without opp_list
+ - PM / OPP: Add a helper to get an opp regulator for device
+ - cpufreq: Add apq8016 to cpufreq-dt-platdev blacklist
+ - regulator: smd: Allow REGULATOR_QCOM_SMD_RPM=m
+ - ov5645: I2C address change
+ - i2c: Add Qualcomm Camera Control Interface driver
+ - camss: vfe: Skip first four frames from sensor
+ - camss: Do not register if no cameras are present
+ - i2c-qcom-cci: Fix run queue completion timeout
+ - i2c-qcom-cci: Fix I2C address bug
+ - media: ov5645: Fix I2C address
+ - drm/bridge/adv7511: Delay clearing of HPD interrupt status
+ - HACK: drm/msm/adv7511: Don't rely on interrupts for EDID parsing
+ - leds: Add driver for Qualcomm LPG
+ - wcn36xx: Fix warning due to duplicate scan_completed notification
+ - arm64: dts: Add CPR DT node for msm8916
+ - arm64: dts: add spmi-regulator nodes
+ - arm64: dts: msm8916: Add cpufreq support
+ - arm64: dts: msm8916: Add a shared CPU opp table
+ - arm64: dts: msm8916: Add cpu cooling maps
+ - arm64: dts: pm8916: Mark the s2 regulator as always-on
+ - dt-bindings: mailbox: qcom: Document the APCS clock binding
+ - arm64: dts: qcom: msm8916: Add msm8916 A53 PLL DT node
+ - arm64: dts: qcom: msm8916: Use the new APCS mailbox driver
+ - arm64: dts: qcom: msm8916: Add clock properties to the APCS node
+ - arm64: dts: qcom: apq8016-sbc: Allow USR4 LED to notify kernel panic
+ - dt-bindings: media: Binding document for Qualcomm Camera Control Interface
+ - driver
+ - MAINTAINERS: Add Qualcomm Camera Control Interface driver
+ - DT: leds: Add Qualcomm Light Pulse Generator binding
+ - arm64: dts: qcom: msm8996: Add mpp and lpg blocks
+ - arm64: dts: qcom: Add pwm node for pm8916
+ - arm64: dts: qcom: Add user LEDs on db820c
+ - arm64: dts: qcom: Add WiFi/BT LEDs on db820c
+ - ARM: dts: qcom: Add LPG node to pm8941
+ - ARM: dts: qcom: honami: Add LPG node and RGB LED
+ - arm64: dts: qcom: Add Camera Control Interface support
+ - arm64: dts: qcom: Add apps_iommu vfe child node
+ - arm64: dts: qcom: Add camss device node
+ - arm64: dts: qcom: Add ov5645 device nodes
+ - arm64: dts: msm8916: Fix camera sensors I2C addresses
+ - arm: dts: qcom: db410c: Enable PWM signal on MPP4
+ - packaging: arm64: add a uboot flavour - part1
+ - packaging: arm64: add a uboot flavour - part2
+ - packaging: arm64: add a uboot flavour - part3
+ - packaging: arm64: add a uboot flavour - part4
+ - packaging: arm64: add a uboot flavour - part5
+ - packaging: arm64: rename uboot flavour to snapdragon
+ - [Config] updateconfigs after qcomlt import
+ - [Config] arm64: snapdragon: COMMON_CLK_QCOM=y
+ - [Config] arm64: snapdragon: MSM_GCC_8916=y
+ - [Config] arm64: snapdragon: REGULATOR_FIXED_VOLTAGE=y
+ - [Config] arm64: snapdragon: PINCTRL_MSM8916=y
+ - [Config] arm64: snapdragon: HWSPINLOCK_QCOM=y
+ - [Config] arm64: snapdragon: SPMI=y, SPMI_MSM_PMIC_ARB=y
+ - [Config] arm64: snapdragon: REGMAP_SPMI=y, PINCTRL_QCOM_SPMI_PMIC=y
+ - [Config] arm64: snapdragon: REGULATOR_QCOM_SPMI=y
+ - [Config] arm64: snapdragon: MFD_SPMI_PMIC=y
+ - [Config] arm64: snapdragon: QCOM_SMEM=y
+ - [Config] arm64: snapdragon: REGULATOR_FIXED_VOLTAGE=y
+ - [Config] arm64: snapdragon: RPMSG=y, RPMSG_QCOM_SMD=y
+ - [Config] arm64: snapdragon: QCOM_SMD_RPM=y, REGULATOR_QCOM_SMD_RPM=y
+ - [Config] arm64: snapdragon: QCOM_CLK_SMD_RPM=y
+ - [Config] arm64: snapdragon: QCOM_BAM_DMA=y
+ - [Config] arm64: snapdragon: QCOM_HIDMA=y, QCOM_HIDMA_MGMT=y
+ - [Config] arm64: snapdragon: QCOM_CPR=y
+ - [Config] arm64: snapdragon: QCOM_QFPRM=y, QCOM_TSENS=y
+ - [Config] arm64: snapdragon: MMC_SDHCI=y, MMC_SDHCI_PLTFM=y, MMC_SDHCI_MSM=y
+ - [Config] turn off DRM_MSM_REGISTER_LOGGING
+ - [Config] arm64: snapdragon: I2C_QUP=y
+ - [Config] arm64: snapdragon: SPI_QUP=y
+ - [Config] arm64: snapdragon: USB_ULPI_BUS=y, PHY_QCOM_USB_HS=y
+ - [Config] arm64: snapdragon: QCOM_APCS_IPC=y
+ - [Config] arm64: snapdragon: QCOM_WCNSS_CTRL=y
+ - [Config] arm64: snapdragon: QCOM_SMSM=y
+ - [Config] arm64: snapdragon: QCOM_SMP2P=y
+ - [Config] arm64: snapdragon: DRN_MSM=y
+ - [Config] arm64: snapdragon: SND_SOC=y
+ - [Config] arm64: snapdragon: QCOM_WCNSS_PIL=m
+ - [Config] arm64: snapdragon: ADV7511_PM8941_PWRKEY=y
+ - [Config] arm64: snapdragon: QCOM_CLK_APCS_MSM8916=y
+ - [Config] arm64: snapdragon: MEDIA_SUBDRV_AUTOSELECT=y, VIDEO_OV5645=m
+ - [Config] arm64: snapdragon: SND_SOC_APBQ8016_SBC=y, SND_SOC_LPASS_APBQ8016=y
+ - [Config] arm64: snapdragon: SND_SOC_MSM8916_WCD_ANALOG=y,
+ SND_SOC_MSM8916_WCD_DIGITAL=y
+ - SAUCE: media: ov5645: skip address change if dt addr == default addr
+ - SAUCE: drm/msm/adv7511: wrap hacks under CONFIG_ADV7511_SNAPDRAGON_HACKS
+ - ifndef
+ - [Config] arm64: snapdragon: ADV7511_SNAPDRAGON_HACKS=y
+ - packaging: snapdragon: fixup ABI paths
+ - LSM stacking patches for bionic (LP: #1763062)
+ - SAUCE: LSM stacking: procsfs: add smack subdir to attrs
+ - SAUCE: LSM stacking: LMS: Manage credential security blobs
+ - SAUCE: LSM stacking: LMS: Manage file security blobs
+ - SAUCE: LSM stacking: LMS: Manage task security blobs
+ - SAUCE: LSM stacking: LMS: Manage remaining security blobs
+ - SAUCE: LSM stacking: General stacking
+ - SAUCE: LSM stacking: fixup initialize task->security
+ - SAUCE: LSM stacking: fixup: alloc_task_ctx is dead code
+ SAUCE: LSM stacking: add support for stacking getpeersec_stream
+ SAUCE: LSM stacking: add stacking support to apparmor network hooks
+ SAUCE: LSM stacking: fixup apparmor stacking enablement
+ SAUCE: LSM stacking: fixup stacking kconfig
+ SAUCE: LSM stacking: allow selecting multiple LSMS using kernel boot params
+ SAUCE: LSM stacking: provide prctl interface for setting context
+ SAUCE: LSM stacking: inherit current display LSM
+ SAUCE: LSM stacking: keep an index for each registered LSM
+ SAUCE: LSM stacking: verify display LSM
+ SAUCE: LSM stacking: provide a way to specify the default display LSM
+ SAUCE: LSM stacking: make sure LSM blob align on 64 bit boundaries
+ SAUCE: LSM stacking: add /proc/<pid>/attr/display_lsm
+ SAUCE: LSM stacking: add Kconfig to set default display LSM
+ SAUCE: LSM stacking: add configs for LSM stacking
+ SAUCE: LSM stacking: add apparmor and selinux proc dirs
+ SAUCE: LSM stacking: remove procfs context interface

  (LP: #1720779) // LSM stacking patches for bionic (LP: #1763062)
  SAUCE: LSM stacking: check for invalid zero sized writes

+ RDMA/hns: ensure for-loop actually iterates and free's buffers
  (LP: #1762757)
+ RDMA/hns: ensure for-loop actually iterates and free's buffers

+ Support cq/rq record doorbell for RDMA on HiSilicon hip08 systems
  (LP: #1762755)
+ RDMA/hns: Fix the endian problem for hns
+ RDMA/hns: Support rq record doorbell for the user space
+ RDMA/hns: Support cq record doorbell for the user space
+ RDMA/hns: Support rq record doorbell for kernel space
+ RDMA/hns: Support cq record doorbell for kernel space
+ RDMA/hns: Fix cqn type and init resp
+ RDMA/hns: Fix init resp when alloc ucontext
+ RDMA/hns: Fix cq record doorbell enable in kernel

+ Replace LPC patchset with upstream version (LP: #1762758)
+ Revert "UBUNTU: SAUCE: MAINTAINERS: Add maintainer for HiSilicon LPC driver"
+ Revert "UBUNTU: SAUCE: HSI LPC: Add ACPI support"
+ Revert "UBUNTU: SAUCE: ACPI / scan: do not enumerate Indirect IO host children"
+ Revert "UBUNTU: SAUCE: HSI LPC: Support the LPC host on Hip06/Hip07 with DT bindings"
+ Revert "UBUNTU: SAUCE: OF: Add missing I/O range exception for indirect-IO devices"
+ Revert "UBUNTU: SAUCE: PCI: Apply the new generic I/O management on PCI IO hosts"
+ Revert "UBUNTU: SAUCE: PCI: Add fwnode handler as input param of
+ pci_register_io_range()"
+ - Revert "UBUNTU: SAUCE: PCI: Remove unused __weak attribute in
+ pci_register_io_range()"
+ - Revert "UBUNTU: SAUCE: LIB: Introduce a generic PIO mapping method"
+ - lib: Add generic PIO mapping method
+ - PCI: Remove __weak tag from pci_register_io_range()
+ - PCI: Add fwnode handler as input param of pci_register_io_range()
+ - PCI: Apply the new generic I/O management on PCI IO hosts
+ - of: Add missing I/O range exception for indirect-IO devices
+ - HISI LPC: Support the LPC host on Hip06/Hip07 with DT bindings
+ - ACPI / scan: Rename acpi_is_serial_bus_slave() for more general use
+ - ACPI / scan: Do not enumerate Indirect IO host children
+ - HISI LPC: Add ACPI support
+ - MAINTAINERS: Add John Garry as maintainer for HiSilicon LPC driver

+ * Enable Tunneled Operations on POWER9 (LP: #1762448)
+ - powerpc/powernv: Enable tunneled operations
+ - cxl: read PHB indications from the device tree

+ * PSL traces reset after PERST for debug AFU image (LP: #1762462)
+ - cxl: Enable NORST bit in PSL_DEBUG register for PSL9

+ * NFS + sec=krb5 is broken (LP: #1759791)
+ - sunrpc: remove incorrect HMAC request initialization

+ * Raspberry Pi 3 microSD support missing from the installer (LP: #1729128)
+ - d-i: add bcm2835 to block-modules

+ * Backport USB core quirks (LP: #1762695)
+ - usb: core: Add "quirks" parameter for usbcore
+ - usb: core: Copy parameter string correctly and remove superfluous null check
+ - usb: core: Add USB_QUIRK_DELAY_CTRL_MSG to usbcore quirks

+ * [Ubuntu 18.04] cryptsetup: 'device-mapper: reload ioctl on failed' when
+ setting up a second end-to-end encrypted disk (LP: #1762353)
+ - SAUCE: s390/crypto: Adjust s390 aes and paes cipher

+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5715
+ - powerpc/64s: Wire up cpu_show_spectre_v2()

+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5753
+ - powerpc/64s: Wire up cpu_show_spectre_v1()

+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5754
+ - powerpc/rfi-flush: Move the logic to avoid a redo into the debugfs code
+ - powerpc/rfi-flush: Make it possible to call setup_rfi_flush() again
+ - powerpc/rfi-flush: Always enable fallback flush on pseries
+ - powerpc/rfi-flush: Differentiate enabled and patched flush types
+ - powerpc/rfi-flush: Call setup_rfi_flush() after LPM migration
+ - powerpc/64s: Move cpu_show_meltdown()
+ - powerpc/64s: Enhance the information in cpu_show_meltdown()
+ - powerpc/powerrv: Use the security flags in pnv_setup_rfi_flush()
+ - powerpc/pseries: Use the security flags in pseries_setup_rfi_flush()
+
+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5715 //
+ CVE-2017-5753 // CVE-2017-5754
+ - powerpc/pseries: Add new H_GET_CPU_CHARACTERISTICS flags
+ - powerpc: Add security feature flags for Spectre/Meltdown
+ - powerpc/pseries: Set or clear security feature flags
+ - powerpc/powerrv: Set or clear security feature flags
+
+ * Hisilicon network subsystem 3 support (LP: #1761610)
+ - net: hns3: export pci table of hclge and hclgevf to userspace
+ - d-i: Add hns3 drivers to nic-modules
+
+ * "ip a" command on a guest VM shows UNKNOWN status (LP: #1761534)
+ - virtio-net: Fix operstate for virtio when no VIRTIO_NET_F_STATUS
+
+ * perf vendor events arm64: Enable JSON events for ThunderX2 B0 (LP: #1760712)
+ - perf vendor events aarch64: Add JSON metrics for ARM Cortex-A53 Processor
+ - perf vendor events: Drop incomplete multiple mapfile support
+ - perf vendor events: Fix error code in json_events()
+ - perf vendor events: Drop support for unused topic directories
+ - perf vendor events: Add support for pmu events vendor subdirectory
+ - perf vendor events arm64: Relocate ThunderX2 JSON to cavium subdirectory
+ - perf vendor events arm64: Relocate Cortex A53 JSONs to arm subdirectory
+ - perf vendor events: Add support for arch standard events
+ - perf vendor events arm64: Add armv8-recommended.json
+ - perf vendor events arm64: Fixup ThunderX2 to use recommended events
+ - perf vendor events arm64: fixup A53 to use recommended events
+ - perf vendor events arm64: add HiSilicon hip08 JSON file
+ - perf vendor events arm64: Enable JSON events for ThunderX2 B0
+
+ * Warning "cache flush timed out!" seen when unloading the cxl driver
+ (LP: #1762367)
+ - cxl: Check if PSL data-cache is available before issue flush request
+
+ * Bionic update to 4.15.16 stable release (LP: #1762370)
+ - ARM: OMAP: Fix SRAM W+X mapping
+ - ARM: 8746/1: vfp: Go back to clearing vfp_current_hw_state[]
+ - ARM: dts: sun6i: a31s: bpi-m2: improve pmic properties
+ - ARM: dts: sun6i: a31s: bpi-m2: add missing regulators
+ - mtd: jedec_probe: Fix crash in jedec_read_mfr()
+ - mtd: nand: atmel: Fix get_sectorsize() function
+ - ALSA: usb-audio: Add native DSD support for TEAC UD-301
+ - ALSA: pcm: Use dma_bytes as size parameter in dma_mmap_coherent()
+ - ALSA: pcm: potential uninitialized return values
+ - x86/platform/uv/BAU: Add APIC idt entry
+ - perf/hwbp: Simplify the perf-hwbp code, fix documentation
+ - ceph: only dirty ITER_IOVEC pages for direct read
+ - ipc/shm.c: add split function to shm_vm_ops
+ - i2c: i2c-stm32f7: fix no check on returned setup
+ - powerpc/mm: Add tracking of the number of coprocessors using a context
+ - powerpc/mm: Workaround Nest MMU bug with TLB invalidations
+ - powerpc/64s: Fix i-side SLB miss bad address handler saving nonvolatile GPRs
+ - partitions/msdos: Unable to mount UFS 44bsd partitions
+ - xfrm_user: unconditionally validate esn replay attribute struct
+ - RDMA/ucma: Check AF family prior resolving address
+ - RDMA/ucma: Fix use-after-free access in ucma_close
+ - RDMA/ucma: Ensure that CM_ID exists prior to access it
+ - RDMA/rdma_cm: Fix use after free race with process_one_req
+ - RDMA/ucma: Check that device is connected prior to access it
+ - RDMA/ucma: Check that device exists prior to accessing it
+ - RDMA/ucma: Introduce safer rdma_addr_size() variants
+ - ipv6: fix possible deadlock in rt6_age_examine_exception()
+ - net: xfrm: use preempt-safe this_cpu_read() in ipcomp_alloc_tfms()
+ - xfrm: Refuse to insert 32 bit userspace socket policies on 64 bit systems
+ - percpu: add __GFP_NORETRY semantics to the percpu balancing path
+ - netfilter: x_tables: make allocation less aggressive
+ - netfilter: bridge: ebt_among: add more missing match size checks
+ - l2tp: fix races with ipv4-mapped ipv6 addresses
+ - netfilter: drop template ct when conntrack is skipped.
+ - netfilter: x_tables: add and use xt_check_proc_name
+ - phy: qcom-ufs: add MODULE_LICENSE tag
+ - Bluetooth: Fix missing encryption refresh on Security Request
+ - drm/i915/dp: Write to SET_POWER dpcd to enable MST hub.
+ - bitmap: fix memset optimization on big-endian systems
+ - USB: serial: ftdi_sio: add support for Harman FirmwareHubEmulator
+ - USB: serial: cp210x: add ELDAT Easywave RX09 id
+ - serial: 8250: Add Nuvoton NPCM UART
+ - mei: remove dev_err message on an unsupported ioctl
+ - /dev/mem: Avoid overwriting "err" in read_mem()
+ - media: usbtv: prevent double free in error case
+ - parport_pc: Add support for WCH CH382L PCI-E single parallel port card.
+ - crypto: lrw - Free rectx->ext with kzfree
+ - crypto: talitos - don't persistently map req_ctx->hw_context and
  req_ctx->buf
+ - crypto: inside-secure - fix clock management
+ - crypto: testmgr - Fix incorrect values in PKCS#1 test vector
+ - crypto: talitos - fix IPsec cipher in length
+ - crypto: ahash - Fix early termination in hash walk
+ - crypto: caam - Fix null dereference at error path
+ - crypto: ccp - return an actual key size from RSA max_size callback
- crypto: arm,arm64 - Fix random regeneration of S_shipped
- crypto: x86/cast5-avx - fix ECB encryption when long sg follows short one
- Btrfs: fix unexpected cow in run_delalloc_nocow
- Revert "base: arch_topology: fix section mismatch build warnings"
- Input: ALPS - fix TrackStick detection on Thinkpad L570 and Latitude 7370
- Input: i8042 - add Lenovo ThinkPad L460 to i8042 reset list
- Input: i8042 - enable MUX on Sony VAIO VGN-CS series to fix touchpad
- vt: change SGR 21 to follow the standards
- ARM: dts: DRA76-EVM: Set powerhold property for tps65917
- net: hns: Fix ethtool private flags
- Fix slab name "biovec-(1<<(21-12))"
- Revert "ARM: dts: am335x-pepper: Fix the audio CODEC's reset pin"
- Revert "ARM: dts: omap3-n900: Fix the audio CODEC's reset pin"
- Revert "cpufreq: Fix governor module removal race"
- Revert "ip6_vti: adjust vti mtu according to mtu of lower device"
- Linux 4.15.16

* [18.04][config] regression: nvme and nvme_core couldn't be built as modules
starting 4.15-rc2 (LP: #1759893)
- SAUCE: Revert "lightnvm: include NVM Express driver if OCSSD is selected for build"
- [Config] CONFIG_BLK_DEV_NMVE=m

* Miscellaneous Ubuntu changes
- [Packaging] Only install cloud init files when do_tools_common=true

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Fri, 13 Apr 2018 14:40:52 -0300

* linux (4.15.0-15.16) bionic; urgency=medium
* linux: 4.15.0-15.16 -proposed tracker (LP: #1761177)
* FFe: Enable configuring resume offset via sysfs (LP: #1760106)
* PM / hibernate: Make passing hibernate offsets more friendly
* /dev/bcache/by-uuid links not created after reboot (LP: #1729145)
* SAUCE: (no-up) bcache: decouple emitting a cached_dev CHANGE uevent
* Ubuntu18.04:POWER9:DD2.2 - Unable to start a KVM guest with default machine
type(pseries-bionic) complaining "KVM implementation does not support Transactional Memory, try cap-htm=off" (kvm) (LP: #1752026)
* powerpc: Use feature bit for RTC presence rather than timebase presence
* powerpc: Book E: Remove unused CPU_FTR_L2CSR bit
* powerpc: Free up CPU feature bits on 64-bit machines
* powerpc/powernv: Provide a way to force a core into SMT4 mode
* KVM: PPC: Book3S HV: Work around transactional memory bugs in POWER9
* KVM: PPC: Book3S HV: Work around XER[SO] bug in fake suspend mode
* KVM: PPC: Book3S HV: Work around TEXASR bug in fake suspend state
* Important Kernel fixes to be backported for Power9 (kvm) (LP: #1758910)
* powerpc/mm: Fixup tlbie vs store ordering issue on POWER9

* Ubuntu 18.04 - IO Hang on some namespaces when running HTX with 16
  namespaces (Bolt / NVMe) (LP: #1757497)
* powerpc/64s: Fix lost pending interrupt due to race causing lost update to
  irq_happened

* fwts-efi-runtime-dkms 18.03.00-0ubuntu1: fwts-efi-runtime-dkms kernel module
  failed to build (LP: #1760876)
* [Packaging] include the retropoline extractor in the headers

-- Seth Forshee <seth.forshee@canonical.com>  Wed, 04 Apr 2018 08:26:19 -0500

* linux (4.15.0-14.15) bionic; urgency=medium

* linux: 4.15.0-14.15 -proposed tracker (LP: #1760678)

* [Bionic] mlx4 ETH - mlnx_qos failed when set some TC to vendor
  (LP: #1758662)
* net/mlx4_en: Change default QoS settings

* AT_BASE_PLATFORM in AUXV is absent on kernels available on Ubuntu 17.10
  (LP: #1759312)
* powerpc/64s: Fix NULL AT_BASE_PLATFORM when using DT CPU features

* Bionic update to 4.15.15 stable release (LP: #1760585)
  - net: dsa: Fix dsa_is_user_port() test inversion
  - openvswitch: meter: fix the incorrect calculation of max delta_t
  - qed: Fix MPA unalign flow in case header is split across two packets.
  - tcp: purge write queue upon aborting the connection
  - qed: Fix non TCP packets should be dropped on iWARP ll2 connection
  - sysfs: symlink: export sysfs_create_link_nowarn()
  - net: phy: relax error checking when creating sysfs link netdev->phydev
  - devlink: Remove redundant free on error path
  - macvlan: filter out unsupported feature flags
  - net: ipv6: keep sk status consistent after datagram connect failure
  - ipv6: old_dport should be a __be16 in __ip6_datagram_connect()
  - ipv6: sr: fix NULL pointer dereference when setting encap source address
  - ipv6: sr: fix scheduling in RCU when creating seg6 lwtunnel state
  - mlxsw: spectrum_buffers: Set a minimum quota for CPU port traffic
  - net: phy: Tell caller result of phy_change()
  - ipv6: Reflect MTU changes on PMTU of exceptions for MTU-less routes
  - net sched actions: return explicit error when tunnel_key mode is not
    specified
+ - ppp: avoid loop in xmit recursion detection code
+ - rhashtable: Fix rhlist duplicates insertion
+ - test_rhashtable: add test case for rhlist with duplicate objects
+ - kcm: lock lower socket in kcm_attach
+ - sch_netem: fix skb leak in netem_enqueue()
+ - iee802154: fix possible NULL deref in lowpan_device_event()
+ - net: use skb_to_full_sk() in skb_update_prio()
+ - net: Fix hlist corruptions in inet_evict_bucket()
+ - s390/qeth: free netdevice when removing a card
+ - s390/qeth: when thread completes, wake up all waiters
+ - s390/qeth: lock device while queuing next buffer
+ - s390/qeth: on channel error, reject further cmd requests
+ - soc/fsl/qbman: fix issue in qman_delete_cgr_safe()
+ - dpaa_eth: fix error in dpaa_remove()
+ - dpaa_eth: remove duplicate initialization
+ - dpaa_eth: increment the RX dropped counter when needed
+ - dpaa_eth: remove duplicate increment of the tx_errors counter
+ - dccp: check sk for closed state in dccp_sendmsg()
+ - ipv6: fix access to non-linear packet in ndisc_fill_redirect_hdr_option()
+ - I2tp: do not accept arbitrary sockets
+ - net: ethernet: arc: Fix a potential memory leak if an optional regulator is deferred
+ - net/iucv: Free memory obtained by kzalloc
+ - netlink: avoid a double skb free in genlmsg_mcast()
+ - net: Only honor ifindex in IP_PKTINFO if non-0
+ - net: systemport: Rewrite __bcm_sysport_tx_reclaim()
+ - qede: Fix qedr link update
+ - skbuff: Fix not waking applications when errors are enqueued
+ - team: Fix double free in error path
+ - Linux 4.15.15

+ * Ubuntu 18.04 [ WSP DD2.2 with stop4 and stop5 enabled ]: kdump fails to capture dump when smt=2 or off. (LP: #1758206)
+ - powerpc/crash: Remove the test for cpu_online in the IPI callback
+ - powernv/kdump: Fix cases where the kdump kernel can get HMI's
+ - powerpc/kdump: Fix powernv build break when KEXEC_CORE=n
+ * [Intel Ubuntu 18.04 Bug] Null pointer dereference, when disconnecting RAID rebuild target (LP: #1759279)
+ - md: document lifetime of internal rdev pointer.
+ * [Feature]Crystal Ridge: add support for the platform capabilities NFIT sub-table in ACPI 6.2A (LP: #1730829)
+ - ACPI: ACPI 6.0A: Changes to the NFIT ACPI table
+ - acpi: nfit: Add support for detect platform CPU cache flush on power loss
* acpi: nfit: add persistent memory control flag for nd_region
* libnvdimm: expose platform persistence attribute for nd_region
* libnvdimm: re-enable deep flush for pmem devices via fsync()
* libnvdimm, nfit: fix persistence domain reporting

* Allow multiple mounts of zfs datasets (LP: #1759848)
* SAUCE: Allow mounting datasets more than once (LP: #1759848)

* Update Aquantia driver to fix various issues (LP: #1759303)
  - net: aquantia: Eliminate AQ_DIMOF, replace with ARRAY_SIZE
  - net: aquantia: Cleanup status flags accesses
  - net: aquantia: Cleanup hardware access modules
  - net: aquantia: Remove duplicate hardware descriptors declarations
  - net: aquantia: Add const qualifiers for hardware ops tables
  - net: aquantia: Simplify dependencies between pci modules
  - net: aquantia: Eliminate aq_nic structure abstraction
  - net: aquantia: Fix register definitions to linux style
  - net: aquantia: Prepend hw access functions declarations with prefix
  - net: aquantia: Fix internal stats calculation on rx
  - net: aquantia: Introduce new device ids and constants
  - net: aquantia: Introduce new AQC devices and capabilities
  - net: aquantia: Convert hw and caps structures to const static pointers
  - net: aquantia: Cleanup pci functions module
  - net: aquantia: Remove create/destroy from hw ops
  - net: aquantia: Change confusing no_ff_addr to more meaningful name
  - net: aquantia: Introduce firmware ops callbacks
  - net: aquantia: Introduce support for new firmware on AQC cards
  - net: aquantia: Introduce global AQC hardware reset sequence
  - net: aquantia: Report correct mediatype via ethtool
  - net: aquantia: bump driver version to match aquantia internal numbering
  - net: aquantia: Fix hardware reset when SPI may rarely hangup
  - net: aquantia: Fix a regression with reset on old firmware
  - net: aquantia: Change inefficient wait loop on fw data reads
  - net: aquantia: Add tx clean budget and valid budget handling logic
  - net: aquantia: Allow live mac address changes
  - net: aquantia: Implement pci shutdown callback
  - net: aquantia: driver version bump

* ISST-LTE:KVM:Ubuntu1804:BostonLC:boslcp3: cpu hotplug on boslcp3g4 guest
dumping call traces continuously. (LP: #1759722)
  - blk-mq: turn WARN_ON in __blk_mq_run_hw_queue into printk

* ISST-LTE:KVM:Ubuntu18.04:BostonLC:boslcp3:boslcp3g3:Guest conosle hangs
after hotplug CPU add operation. (LP: #1759723)
  - genirq/affinity: assign vectors to all possible CPUs
  - blk-mq: simplify queue mapping & schedule with each possible CPU

* test_bpf fails (LP: #1756150)
+ - test_bpf: Fix testing with CONFIG_BPF_JIT_ALWAYS_ON=y on other arches
+ + Bionic update to v4.15.14 stable release (LP: #1759655)
+ + - MIPS: ralink: Remove ralink_halt()
+ + - MIPS: ralink: Fix booting on MT7621
+ + - MIPS: lantiq: Fix Danube USB clock
+ + - MIPS: lantiq: Enable AHB Bus for USB
+ + - MIPS: lantiq: ase: Enable MFD_SYSCON
+ + - iio: chemical: ccs811: Corrected firmware boot/application mode transition
+ + - iio: st_pressure: st_accel: pass correct platform data to init
+ + - iio: adc: meson-saradc: unlock on error in meson_sar_adc_lock()
+ + - ALSA: usb-audio: Fix parsing descriptor of UAC2 processing unit
+ + - ALSA: aloop: Sync stale timer before release
+ + - ALSA: aloop: Fix access to not-yet-ready substream via cable
+ + - ALSA: hda - Force polling mode on CFL for fixing codec communication
+ + - ALSA: hda/realtek - Fix speaker no sound after system resume
+ + - ALSA: hda/realtek - Fix Dell headset Mic can't record
+ + - ALSA: hda/realtek - Always immediately update mute LED with pin VREF
+ + - mmc: core: Fix tracepoint print of blk_addr and blkksz
+ + - mmc: core: Disable HPI for certain Micron (Numonyx) eMMC cards
+ + - mmc: block: fix updating ext_csd caches on ioctl call
+ + - mmc: dw_mmc: Fix the DTO/CTO timeout overflow calculation for 32-bit systems
+ + - mmc: dw_mmc: exynos: fix the suspend/resume issue for exynos5433
+ + - mmc: dw_mmc: fix falling from idmac to PIO mode when dw_mci_reset occurs
+ + - PCI: Add function 1 DMA alias quirk for Highpoint RocketRAID 644L
+ + - ahci: Add PCI-id for the Highpoint Rocketraid 644L card
+ + - lockdep: fix fs_reclaim warning
+ + - clk: bcm2835: Fix ana->maskX definitions
+ + - clk: bcm2835: Protect sections updating shared registers
+ + - clk: sunxi-ng: a31: Fix CLK_OUT_* clock ops
+ + - RDMA/mlx5: Fix crash while accessing garbage pointer and freed memory
+ + - Drivers: hv: vmbus: Fix ring buffer signaling
+ + - pinctrl: samsung: Validate alias coming from DT
+ + - Bluetooth: btusb: Remove Yoga 920 from the btusb_needs_reset_resume_table
+ + - Bluetooth: btusb: Add Dell OptiPlex 3060 to btusb_needs_reset_resume_table
+ + - Bluetooth: btusb: Fix quirk for Atheros 1525/QCA6174
+ + - libata: fix length validation of ATAPI-relayed SCSI commands
+ + - libata: remove WARN() for DMA or PIO command without data
+ + - libata: don't try to pass through NCQ commands to non-NCQ devices
+ + - libata: Apply NOLPM quirk to Crucial MX100 512GB SSDs
+ + - libata: Enable queued TRIM for Samsung SSD 860
+ + - libata: Apply NOLPM quirk to Crucial M500 480 and 960GB SSDs
+ + - libata: Make Crucial BX100 500GB LPM quirk apply to all firmware versions
+ + - libata: Modify quirks for MX100 to limit NCQ_TRIM quirk to MU01 version
+ + - sched, cgroup: Don't reject lower cpu.max on ancestors
+ + - cgroup: fix rule checking for threaded mode switching
+ + - nfsd: remove blocked locks on client teardown
+ + - media: tegra-cec: reset rx_buf_ent when start bit detected
+ hugetlbfs: check for pgoff value overflow
+ h8300: remove extraneous __BIG_ENDIAN definition
+ mm/vmalloc: add interfaces to free unmapped page table
+ x86/mm: implement free pmd/pte page interfaces
+ mm/khugepaged.c: convert VM BUG_ON() to collapse fail
+ mm/mm/vmalloc: add interfaces to free unmapped page table
+ mm/thp: do not wait for lock_page() in deferred_split_scan()
+ mm/shmem: do not wait for lock_page() in shmem_unused_huge_shrink()
+ Revert "mm: page_alloc: skip over regions of invalid pfns where possible"
+ drm/vmwgfx: Fix black screen and device errors when running without fbdev
+ drm/vmwgfx: Fix a destroy-while-held mutex problem.
+ drm/radeon: Don't turn off DP sink when disconnected
+ drm/amd/display: We shouldn't set format_default on plane as atomic driver
+ drm/amd/display: Add one to EDID's audio channel count when passing to DC
+ drm: Reject getfb for multi-plane framebuffers
+ drm: udl: Properly check framebuffer mmap offsets
+ mm/vmscan: wake up flushers for legacy cgroups too
+ module: propagate error in modules_open()
+ acpi, numa: fix pxm to online numa node associations
+ ACPI / watchdog: Fix off-by-one error at resource assignment
+ libnvdimm, {btt, blk}: do integrity setup before add_disk()
+ brcmfmac: fix P2P_DEVICE ethernet address generation
+ rtlwifi: rtl8723be: Fix loss of signal
+ tracing: probeevent: Fix to support minus offset from symbol
+ mtdchar: fix usage of mtd_ooblayout_ecc()
+ mtd: nand: fsl_ifc: Fix nand waitfunc return value
+ mtd: nand: fsl_ifc: Fix eccstat array overflow for IFC ver >= 2.0.0
+ mtd: nand: fsl_ifc: Read ECCSTAT0 and ECCSTAT1 registers for IFC 2.0
+ staging: ncpfs: memory corruption in ncp_read_kernel()
+ can: peak/pcie_fd: fix echo_skb is occupied! bug
+ can: peak/pcie_fd: remove useless code when interface starts
+ can: ifi: Repair the error handling
+ can: ifi: Check core revision upon probe
+ can: cc770: Fix stalls on rt-linux, remove redundant IRQ ack
+ can: cc770: Fix queue stall & dropped RTR reply
+ can: cc770: Fix use after free in cc770_tx_interrupt()
+ tty: vt: fix up tabstops properly
+ x86/entry/64: Don't use IST entry for #BP stack
+ selftests/x86/ptrace_syscall: Fix for yet more glibc interference
+ x86/vsyscall/64: Use proper accessor to update P4D entry
+ x86/efi: Free efi_pgd with free_pages()
+ posix-timers: Protect posix clock array access against speculation
+ kvm/x86: fix icebp instruction handling
+ x86/build/64: Force the linker to use 2MB page size
+ x86/boot/64: Verify alignment of the LOAD segment
+ hwmon: (k10temp) Only apply temperature offset if result is positive
+ hwmon: (k10temp) Add temperature offset for Ryzen 1900X
+ perf/x86/intel/uncore: Fix Skylake UPI event format
+ perf stat: Fix CVS output format for non-supported counters
+ - perf/core: Fix ctx_event_type in ctx_resched()
+ - trace/bpf: remove helper bpf_perf_prog_read_value from tracepoint type
+ - perf/x86/intel: Don't accidentally clear high bits in bdw_limit_period()
+ - perf/x86/intel/uncore: Fix multi-domain PCI CHA enumeration bug on Skylake
+ - iio: ABI: Fix name of timestamp sysfs file
+ - iio: imu: st_lsm6dsx: fix endianness in st_lsm6dsx_read_oneshot()
+ - staging: android: ion: Zero CMA allocated memory
+ - kbuild: disable clang's default use of -fmerge-all-constants
+ - bpf: skip unnecessary capability check
+ - Linux 4.15.14

+ * System fails to start (boot) on battery due to read-only root file-system
  + (LP: #1726930) // Bionic update to v4.15.14 stable release (LP: #1759655)
+ - libata: disable LPM for Crucial BX100 SSD 500GB drive

+ * [Feature][CFL][ICL] [CNL]Thunderbolt support (Titan Ridge) (LP: #1730775)
  + - thunderbolt: Resume control channel after hibernation image is created
  + - thunderbolt: Serialize PCIe tunnel creation with PCI rescan
  + - thunderbolt: Handle connecting device in place of host properly
  + - thunderbolt: Do not overwrite error code when domain adding fails
  + - thunderbolt: Wait a bit longer for root switch config space
  + - thunderbolt: Wait a bit longer for ICM to authenticate the active NVM
  + - thunderbolt: Handle rejected Thunderbolt devices
  + - thunderbolt: Factor common ICM add and update operations out
  + - thunderbolt: Correct function name in kernel-doc comment
  + - thunderbolt: Add tb_switch_get()
  + - thunderbolt: Add tb_switch_find_by_route()
  + - thunderbolt: Add tb_xdomain_find_by_route()
  + - thunderbolt: Add constant for approval timeout
  + - thunderbolt: Move driver ready handling to struct icm
  + - thunderbolt: Add 'boot' attribute for devices
  + - thunderbolt: Add support for preboot ACL
  + - Documentation/admin-guide: fixes for thunderbolt.rst
  + - thunderbolt: Introduce USB only (SL4) security level
  + - thunderbolt: Add support for Intel Titan Ridge

+ * QCA9377 requires more IRAM banks for its new firmware (LP: #1748345)
+ - ath10k: update the IRAM bank number for QCA9377

+ * nfp: fix disabling on hw-tc-offload in flower (LP: #1752828)
+ - nfp: bpf: require ETH table
+ - nfp: don't advertise hw-tc-offload on non-port netdevs
+ - nfp: forbid disabling hw-tc-offload on representors while offload active
+ * Fix an issue that when system in S3, USB keyboard can't wake up the system.
+   (LP: #1759511)
+ + - ACPI / PM: Allow deeper wakeup power states with no _SxD nor _SxW
+ + * retпольine hints: primary infrastructure and initial hints (LP: #1758856)
+ + - [Packaging] retпольine -- add safe usage hint support
+ + - [Packaging] retпольine-check -- only report additions
+ + - [Packaging] retпольine -- widen indirect call/jmp detection
+ + - [Packaging] retпольine -- elide %rip relative indirections
+ + - [Packaging] retпольine -- clear hint information from packages
+ + - SAUCE: amп -- annotate indirect calls within
+   firmware_restrict_branch_speculation_{[start, end]}
+ + - SAUCE: EFI -- annotate indirect calls within
+   firmware_restrict_branch_speculation_{[start, end]}
+ + - SAUCE: early/late -- annotate indirect calls in early/late initialisation
+ + code
+ + - SAUCE: vga_set_mode -- avoid jump tables
+ + - [Config] retпольine -- switch to new format
+ + * zfs system process hung on container stop/delete (LP: #1754584)
+ + - SAUCE: Fix non-prefaulted page deadlock (LP: #1754584)
+ + - Revert "UBUNTU: SAUCE: Fix non-prefaulted page deadlock (LP: #1754584)"
+ + - SAUCE: Fix non-prefaulted page deadlock (LP: #1754584)
+ + * Important KVM fixes for ppc64el (LP: #1759045)
+ + - KVM: PPC: Book3S HV: Do SLB load/unload with guest LPCR value loaded
+ + - KVM: PPC: Book3S HV: Fix handling of secondary HPTEG in HPT resizing code
+ + - KVM: PPC: Book3S HV: Make HPT resizing work on POWER9
+ + - KVM: PPC: Book3S: Add MMIO emulation for VMX instructions
+ + - KVM: PPC: Book3S: Fix compile error that occurs with some gcc versions
+ + - KVM: PPC: Book3S HV: Fix trap number return from __kvmppc_vcore_entry
+ + - KVM: PPC: Book3S HV: Fix duplication of host SLB entries
+ + * ubuntu_zram_smoke test will cause soft lockup on Aгtful ThunderX ARM64
+   (LP: #1755073)
+ + - SAUCE: crypto: thunderx_zip: Fix fallout from CONFIG_VMAP_STACK
+ + * Update to ocxl driver (LP: #1755161)
+ + - ocxl: fix signed comparison with less than zero
+ + - ocxl: Fix potential bad errno on irq allocation
+ + - ocxl: Add get_metadata IOCTL to share OCXL information to userspace
+ + * CAPI Flash (cxlflash) update (LP: #1752672)
+ + - scsi: cxlflash: Update cxl-specific arguments to generic cookie
+ + - scsi: cxlflash: Explicitly cache number of interrupts per context
+ + - scsi: cxlflash: Remove embedded CXL work structures
+ + - scsi: cxlflash: Adapter context init can return error
+ + - scsi: cxlflash: Staging to support future accelerators
+ - SAUCE: cxlflash: Preserve number of interrupts for master contexts
+ - SAUCE: cxlflash: Avoid clobbering context control register value
+ - SAUCE: cxlflash: Add argument identifier names
+ - SAUCE: cxlflash: Introduce OCXL backend
+ - SAUCE: cxlflash: Hardware AFU for OCXL
+ - SAUCE: cxlflash: Read host function configuration
+ - SAUCE: cxlflash: Setup function acTag range
+ - SAUCE: cxlflash: Read host AFU configuration
+ - SAUCE: cxlflash: Setup AFU acTag range
+ - SAUCE: cxlflash: Setup AFU PASID
+ - SAUCE: cxlflash: Adapter context support for OCXL
+ - SAUCE: cxlflash: Use IDR to manage adapter contexts
+ - SAUCE: cxlflash: Support adapter file descriptors for OCXL
+ - SAUCE: cxlflash: Support adapter context discovery
+ - SAUCE: cxlflash: Support image reload policy modification
+ - SAUCE: cxlflash: MMIO map the AFU
+ - SAUCE: cxlflash: Support starting an adapter context
+ - SAUCE: cxlflash: Support process specific mappings
+ - SAUCE: cxlflash: Support AFU state toggling
+ - SAUCE: cxlflash: Support reading adapter VPD data
+ - SAUCE: cxlflash: Setup function OCXL link
+ - SAUCE: cxlflash: Setup OCXL transaction layer
+ - SAUCE: cxlflash: Support process element lifecycle
+ - SAUCE: cxlflash: Support AFU interrupt management
+ - SAUCE: cxlflash: Support AFU interrupt mapping and registration
+ - SAUCE: cxlflash: Support starting user contexts
+ - SAUCE: cxlflash: Support adapter context polling
+ - SAUCE: cxlflash: Support adapter context reading
+ - SAUCE: cxlflash: Support adapter context mmap and release
+ - SAUCE: cxlflash: Support file descriptor mapping
+ - SAUCE: cxlflash: Introduce object handle fop
+ - SAUCE: cxlflash: Setup LISNs for user contexts
+ - SAUCE: cxlflash: Setup LISNs for master contexts
+ - SAUCE: cxlflash: Update synchronous interrupt status bits
+ - SAUCE: cxlflash: Introduce OCXL context state machine
+ - SAUCE: cxlflash: Register for translation errors
+ - SAUCE: cxlflash: Support AFU reset
+ - SAUCE: cxlflash: Enable OCXL operations
+
+ * [Feature][CFL] Enable pmc_core driver for H, S, and U SKUs (LP: #1730770)
+ - platform/x86: intel_pmc_core: Remove unused EXPORTED API
+ - platform/x86: intel_pmc_core: Change driver to a module
+ - platform/x86: intel_pmc_core: Fix file permission warnings
+ - platform/x86: intel_pmc_core: Refactor debugfs entries
+ - platform/x86: intel_pmc_core: Substitute PCI with CPUID enumeration
+ - platform/x86: intel_pmc_core: Convert to ICU macro
+ - platform/x86: intel_pmc_core: Remove unused header file
+ - ACPI / LPIT: Export lpit_read_residency_count_address()
+ - platform/x86: intel_pmc_core: Read base address from LPIT
+ - x86/cpu: Add Cannonlake to Intel family
+ - platform/x86: intel_pmc_core: Add CannonLake PCH support
+ - platform/x86: intel_pmc_core: Special case for Coffeelake
+
+ * Cpu utilization showing system time for kvm guests (performance) (sysstat)
+ (LP: #1755979)
+ - KVM: PPC: Book3S HV: Fix guest time accounting with VIRT_CPU_ACCOUNTING_GEN
+
+ * [Artful][Wyse 3040] System hang when trying to enable an offlined CPU core
+ (LP: #1736393)
+ - SAUCE: drm/i915: Don't set chip specific data
+ - SAUCE: drm/i915: make previous commit affects Wyse 3040 only
+
+ * [Bug] ISH support for CFL-H (LP: #1739522)
+ - HID: intel-ish-hid: Enable Cannon Lake and Coffee Lake laptop/desktop
+
+ * ath9k can't connect to wifi AP (LP: #1727228)
+ - ath9k: add MSI support
+ - ath9k: add a quirk to set use_msi automatically
+
+ * [P9,Power NV][Witherspoon][Ubuntu 18.04][Perf] : PMU events by name it is not listed under perf list (LP: #1755470)
+ - iperf vendor events: Use more flexible pattern matching for CPU identification for mapfile.csv
+
+ * zed process consuming 100% cpu (LP: #1751796)
+ - SAUCE: Fix ioctl loop-spin in zed (LP: #1751796)
+
+ * Bionic update to 4.15.13 stable release (LP: #1758886)
+ - scsi: megaraid_sas: Do not use 32-bit atomic request descriptor for Ventura controllers
+ - staging: android: ashmem: Fix possible deadlock in ashmem_ioctl
+ - drm/amdgpu: use polling mem to set SDMA3 wptr for VF
+ - Bluetooth: hci_qca: Avoid setup failure on missing rampatch
+ - Bluetooth: btqcomsmd: Fix skb double free corruption
+ - cpufreq: longhaul: Revert transition_delay_us to 200 ms
+ - media: c8sectpfe: fix potential NULL pointer dereference in c8sectpfe_timer_interrupt
+ - drm/msm: fix leak in failed get_pages
+ - IB/ipoib: Warn when one port fails to initialize
+ - RDMA/iwpm: Fix uninitialized error code in iwpm_send_mapinfo()
+ - hv_netvsc: Fix the receive buffer size limit
+ - hv_netvsc: Fix the TX/RX buffer default sizes
+ - tcp: allow TLP in ECN CWR
+ - spi: sh-misof: Avoid writing to registers from spi_master.setup()
+ - libbpf: prefer global symbols as bpf program name source
+ - rtlwifi: rtl_pci: Fix the bug when inactiveps is enabled.
- rtlwifi: always initialize variables given to RT_TRACE()
- media: bt8xx: Fix err 'bt878_probe()'
- ath10k: handling qos at STA side based on AP WMM enable/disable
- media: [RESEND] media: dvb-frontends: Add delay to Si2168 restart
- qmi_wwan: set FLAG_SEND_ZLP to avoid network initiated disconnect
- tty: goldfish: Enable 'earlycon' only if built-in
- serial: 8250_dw: Disable clock on error
- cros_ec: fix nul-termination for firmware build info
- watchdog: Fix potential kref imbalance when opening watchdog
- watchdog: Fix kref imbalance seen if handle_boot_enabled=0
- platform/chrome: Use proper protocol transfer function
- dmaengine: zynqmp_dma: Fix race condition in the probe
- drm/tilcdc: ensure nonatomic iowrite64 is not used
- mmc: avoid removing non-removable hosts during suspend
- mmc: block: fix logical error to avoid memory leak
- /dev/mem: Add bounce buffer for copy-out
- net: phy: meson-gxl: check phy_write return value
- sfp: fix EEPROM reading in the case of non-SFF8472 SFPs
- sfp: fix non-detection of PHY
- media: s5p-mfc: Fix lock contention - request_firmware() once
- rtc: ac100: Fix multiple race conditions
- IB/ipoib: Avoid memory leak if the SA returns a different DGID
- RDMA/cma: Use correct size when writing netlink stats
- IB/umem: Fix use of npages/nmap fields
- iser-target: avoid reinitializing rdma contexts for isert commands
- bpf/cgroup: fix a verification error for a CGROUP_DEVICE type prog
- vgacon: Set VGA struct resource types
- omapdrm: panel: fix compatible vendor string for td028ttec1
- mmc: sdhci-xenon: wait 5ms after set 1.8V signal enable
- drm/omap: DMM: Check for DMM readiness after successful transaction commit
- pty: cancel pty slave port buf's work in tty_release
- coresight: Fix disabling of CoreSight TPIU
- PCI: designware-ep: Fix ->get_msi() to check MSI_EN bit
- PCI: endpoint: Fix find_first_zero_bit() usage
- PCI: rcar: Handle rcar_pcie_parse_request_of_pci_ranges() failures
- media: davinci: fix a debug printk
- clk: check ops pointer on clock register
- dt-bindings: display: panel: Fix compatible string for Toshiba LT089AC29000
- clk: use round rate to bail out early in set_rate
- pinctrl: Really force states during suspend/resume
- pinctrl: rockchip: enable clock when reading pin direction register
- iommu/vt-d: clean up pr_irq if request_threaded_irq fails
- ip6_vti: adjust vti mtu according to mtu of lower device
- ip_gre: fix error path when erspan_rcv failed
- ip_gre: fix potential memory leak in erspan_rcv
- soc: qcom: smsm: fix child-node lookup
- RDMA/ocrdma: Fix permissions for OCRDMA_RESET_STATS
- ARM: dts: aspeed-evb: Add unit name to memory node
+ - nfsd4: permit layoutget of executable-only files
+ - clk: at91: pmc: Wait for clocks when resuming
+ - clk: Don't touch hardware when reparenting during registration
+ - clk: axi-clkgen: Correctly handle nocount bit in recalc_rate()
+ - clk: si5351: Rename internal plls to avoid name collisions
+ - crypto: artpec6 - set correct iv size for gcm(aes)
+ - hwrng: core - Clean up RNG list when last hwrng is unregistered
+ - dmaengine: ti-dma-crossbar: Fix event mapping for TPCC_EVT_MUX_60_63
+ - IB/mlx5: Fix integer overflows read in create_raw_packet_qp_rq
+ - RDMA/vmw_pvrhma: Fix usage of user response structures in ABI file
+ - serial: 8250_pci: Don't fail on multiport card class
+ - RDMA/core: Do not use invalid destination in determining port reuse
+ - clk: migrate the count of orphaned clocks at init
+ - RDMA/ucma: Fix access to non-initialized CM_ID object
+ - RDMA/ucma: Don't allow join attempts for unsupported AF family
+ - Linux 4.15.13

+ * Ubuntu18.04:PowerPC - Set Transparent Huge Pages (THP) by default to
  "always" (LP: #1753708)
+ - Config: Set TRANSPARENT_HUGEPAGE_ALWAYS=y on ppc64el

+ * Bionic update to 4.15.12 stable release (LP: #1757465)
+ - x86/cpufeatures: Add Intel Total Memory Encryption cpufeature
+ - x86/cpufeatures: Add Intel PCONFIG cpufeature
+ - selftests/x86/entry_from_vm86: Exit with 1 if we fail
+ - selftests/x86/entry_from_vm86: Add test cases for POPF
+ - x86/vm86/32: Fix POPF emulation
+ - x86/speculation, objtool: Annotate indirect calls/jumps for objtool on
  32-bit kernels
+ - x86/speculation: Remove Skylake C2 from Speculation Control microcode
  blacklist
+ - KVM: x86: Fix device passthrough when SME is active
+ - x86/mm: Fix vmalloc_fault to use pXd_large
+ - parisc: Handle case where flush_cache_range is called with no context
+ - ALSA: pcm: Fix UAF in snd_pcm_oss_get_formats()
+ - ALSA: hda - Revert power_save option default value
+ - ALSA: seq: Fix possible UAF in snd_seq_check_queue()
+ - ALSA: seq: Clear client entry before deleting else at closing
+ - drm/nouveau/bl: Fix oops on driver unbind
+ - drm/nouveau/mmu: ALIGN_DOWN correct variable
+ - drm/amdgpudcex: fix prime teardown order
+ - drm/radeon: fix prime teardown order
+ - drm/amdgpudce: Don't turn off DP sink when disconnected
+ - fs: Teach path_connected to handle nfs filesystems with multiple roots.
+ - KVM: arm/arm64: Reduce verbosity of KVM init log
+ - KVM: arm/arm64: Reset mapped IRQs on VM reset
+ - kvm: arm/arm64: vgic-v3: Tighten synchronization for guests using v2 on v3
+ - KVM: arm/arm64: vgic: Don't populate multiple LRs with the same vintid
+ - lock_parent() needs to recheck if dentry got __dentry_kill'ed under it
+ - fs/aio: Add explicit RCU grace period when freeing kiocx
+ - fs/aio: Use RCU accessors for kiocx_table->table[]
+ - RDMAVT: Fix synchronization around percpu_ref
+ - irqchip/gic-v3-its: Ensure nr_ites >= nr_lpis
+ - nvme: fix subsystem multiple controllers support check
+ - xfs: preserve i_rdev when recycling a reclaimable inode
+ - btrfs: Fix NULL pointer exception in find_bio_stripe
+ - btrfs: add missing initialization in btrfs_check_shared
+ - btrfs: alloc_chunk: fix DUP stripe size handling
+ - btrfs: Fix use-after-free when cleaning up fs_devs with a single stale device
+ - btrfs: remove spurious WARN_ON(ref->count < 0) in find_parent_nodes
+ - btrfs: Fix memory barriers usage with device stats counters
+ - scsi: qla2xxx: Fix smatch warning in qla25xx_delete_[rsp|req]_que
+ - scsi: qla2xxx: Fix NULL pointer access for fcport structure
+ - scsi: qla2xxx: Fix logo flag for qlt_free_session_done()
+ - scsi: qla2xxx: Fix crashes in qla2x00_probe_one on probe failure
+ - usb: dwc2: fix STM32F7 USB OTG HS compatible
+ - dt-bindings: usb: fix the STM32F7 DWC2 OTG HS core binding
+ - USB: gadget: udc: Add missing platform_device_put() on error in bdc_pci_probe()
+ - usb: dwc3: Fix GDBGFIFOSPACE_TYPE values
+ - usb: dwc3: core: Power-off core/PHYs on system_suspend in host mode
+ - usb: dwc3: of-simple: fix oops by unbalanced clk disable call
+ - usb: gadget: udc: renesas_usb3: fix oops in renesas_usb3_remove()
+ - phy: phy-brcm-usb: Fix two DT properties to match bindings doc
+ - phy: phy-brcm-usb-init: Some Low Speed keyboards fail on 7271
+ - phy: phy-brcm-usb-init: DRD mode can cause crash on startup
+ - phy: phy-brcm-usb-init: Power down USB 3.0 PHY when XHCI disabled
+ - Linux 4.15.12
+ - xcl: Fix timebase synchronization status on POWER9 missing (CAPI)
  - (LP: #1757228)
- - xcl: Fix timebase synchronization status on P9
+ - [Feature][GLK] Enable L2 CDP (Code and Data Prioritization) (LP: #1737873)
+ - x86/intel_rdt: Enumerate L2 Code and Data Prioritization (CDP) feature
+ - x86/intel_rdt: Add command line parameter to control L2_CDP
+ - [Feature] Crystal Ridge-Restrict DAX to configurations with struct page
  - (LP: #1751724)
+ - mm, dax: introduce pfnt__special()
+ - ext2: auto disable dax instead of failing mount
+ - ext4: auto disable dax instead of failing mount
+ - dax: require 'struct page' by default for filesystem dax
+ - Config: Enable CONFIG_FS_DAX_LIMITED
+ * Bionic update to 4.15.11 stable release (LP: #1756978)
+ - x86: Treat _R_X86_64_PLT32 as _R_X86_64_PC32
+ - ASoC: sun4i-i2s: Fix RX slot number of SUN8I
+ - ASoC: sgtl5000: Fix suspend/resume
+ - ASoC: wm_adsp: For TLV controls only register TLV get/set
+ - ASoC: r5651: Fix regcache sync errors on resume
+ - usb: host: xhci-rкар: add support for r8a77965
+ - xhci: Fix front USB ports on ASUS PRIME B350M-A
+ - xhci: fix endpoint context tracer output
+ - serial: sh-sci: prevent lockup on full TTY buffers
+ - tty/serial: atmel: add new version check for usart
+ - usb: fix comparison for error code
+ - staging: comedи: fix comedи_nsamples_left.
+ - staging: android: ashmem: Fix lockdep issue during llseek
+ - scsi: sd_zbc: Fix potential memory leak
+ - USB: storage: Add JMicron bridge 152d:2567 to unusual_devs.h
+ - usbip: vudc: fix null pointer dereference on udc->lock
+ - usb: quirks: add control message delay for 1b1c:1b20
+ - usb: usbmon: Read text within supplied buffer size
+ - usb: gadget: f_fs: Fix use-after-free in ffs_fs_kill_sb()
+ - usb: dwc3: Fix lock-up on ID change during system suspend/resume
+ - serial: 8250_pci: Add Brainboxes UC-260 4 port serial device
+ - serial: core: mark port as initialized in autoconfig
+ - earlycon: add reg-offset to physical address before mapping
+ - dm mpath: fix passing integrity data
+ - Revert "btrfs: use proper endianness accessors for super_copy"
+ - gfs2: Clean up {lookup,fillup}_metapath
+ - gfs2: Fixes to "Implement iomap for block_map" (2)
+ - drm/panel: rpi-touchscreen: propagate errors in rpi_touchscreen_i2c_read()
+ - spi: imx: Fix failure path leak on GPIO request error correctly
+ - HID: multitouch: Only look at non touch fields in first packet of a frame
+ - KVM: PPC: Book3S HV: Avoid shifts by negative amounts
+ - drm/edid: set ELD connector type in drm_edid_to_eld()
+ - dma-buf/fence: Fix lock inversion within dma-fence-array
+ - video/hdmi: Allow "empty" HDMI infoframes
+ - KVM: PPC: Book3S HV: Fix typo in kvmppc_hv_get_dirty_log_radix()
+ - HID: elo: clear BTN_LEFT mapping
+ - iwlwifi: mvm: rs: don't override the rate history in the search cycle
+ - ARM: dts: koelsch: Move cec_clock to root node
+ - clk: meson: gxbb: fix wrong clock for SARADC/SANA
+ - ARM: dts: exynos: Correct Trats2 panel reset line
+ - drm/amdgpu: fix get_max_engine_clock_in_mhz
+ - staging: rtl8822be: fix missing null check on dev_alloc_skb return
+ - typec: tcpm: fusb302: Resolve out of order messaging events
+ - USB: ledtrig-usbport: fix of-node leak
+ - dt-bindings: serial: Add common rs485 binding for RTS polarity
+ - sched: Stop switched_to_r() from sending IPIs to offline CPUs
+ sched: Stop resched_cpu() from sending IPIs to offline CPUs
+ crypto: chelsio - Fix an error code in chcr_hash_dma_map()
+ crypto: ecc - Fix NULL pointer deref. on no default_rng
+ crypto: keywrap - Add missing ULL suffixes for 64-bit constants
+ crypto: cavium - fix memory leak on info
+ test_firmware: fix setting old custom fw path back on exit
+ drm/vblank: Fix vblank timestamp bugs
+ net: ieee802154: adf7242: Fix bug if defined DEBUG
+ rtc: brcmstb-waketime: fix error handling in brcmstb_waketime_probe()
+ perf report: Fix -D output for user metadata events
+ net: xfrm: allow clearing socket xfrm policies.
+ gpiolib: don't allow OPEN_DRAIN & OPEN_SOURCE flags simultaneously
+ mtd: nand: fix interpretation of NAND_CMD_NONE in nand_command[]
+ net: thunderx: Set max queue count taking XDP_TX into account
+ ARM: dts: am335x-pepper: Fix the audio CODEC's reset pin
+ ARM: dts: omap3-n900: Fix the audio CODEC's reset pin
+ mtd: nand: ifc: update bufnum mask for ver >= 2.0.0
+ usersns: Don't fail follow_automount based on s_user_ns
+ xfrm: Fix xfrm_replay_overflow_offload_esn
+ leds: pm8058: Silence pointer to integer size warning
+ bpf: fix stack state printing in verifier log
+ power: supply: sbs-message: double left shift bug in sbsm_select()
+ power: supply: ab8500_charger: Fix an error handling path
+ power: supply: ab8500_charger: Bail out in case of error in
  'ab8500_charger_init_hw_registers()'
+ drm/etnaviv: make THERMAL selectable
+ iio: adc: ina2xx: Shift bus voltage register to mask flag bits
+ iio: health: max30102: Add power enable parameter to get_temp function
+ ath10k: update tdlss teardown state to target
+ cpufreq: Fix governor module removal race
+ KVM: X86: Restart the guest when insn_len is zero and SEV is enabled
+ drm/amdgpu: fix random missing of FLR NOTIFY
+ scsi: ses: don't ask for diagnostic pages repeatedly during probe
+ pwm: stmpc: Fix wrong register offset for hwpwm=2 case
+ drm/sun4i: Fix format mask in DE2 driver
+ pinctrl: sh-pfic: 8a7791: Add can_clk function
+ pinctrl: sh-pfic: 8a7795-es1: Fix MOD_SEL1 bit[25:24] to 0x3 when using
  STP_ISEN_1_D
+ perf annotate: Fix unnecessary memory allocation for s390x
+ perf annotate: Fix objdump comment parsing for Intel mov disassembly
+ iwlwifi: mvm: avoid dumping assert log when device is stopped
+ drm/amdgpu: fix virtual dce bug
+ drm/amdgpu: fix amdgpu_sync_resv v2
+ bnxt_en: Uninitialized variable in bnxt_tc_parse_actions()
+ clk: qcom: msm8916: fix mmd_width for codec_digcodec
+ mwifiex:cfg80211: do not change virtual interface during scan processing
+ ath10k: fix invalid STS_CAP_OFFSET_MASK
+ tools/usbip: fixes build with musl libc toolchain
+ spi: sun6i: disable/unprepare clocks on remove
+ bnxt_en: Don't print "Link speed -1 no longer supported" messages.
+ scsi: core: scsi_get_device_flags_keyed(): Always return device flags
+ scsi: devinfo: apply to HP XP the same flags as Hitachi VSP
+ dh: add new rdac devices
+ clk: renesas: r8a77970: Add LVDS clock
+ staging: fsl-dpaa2/eth: Fix access to FAS field
+ media: vsp1: Prevent suspending and resuming DRM pipelines
+ dm raid: fix raid set size revalidation
+ media: cpi2: Fix a couple off by one bugs
+ media: davi: scsi_get_device_flags_keyed(): Always return device flags
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+ media: davi: scsi_get_device_flags_keyed(): Always return device flags
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+ media: vsp1: Prevent suspending and resuming DRM pipelines
+ dm raid: fix raid set size revalidation
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+ media: davi: scsi_get_device_flags_keyed(): Always return device flags
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+ staging: fsl-dpaa2/eth: Fix access to FAS field
+ media: vsp1: Prevent suspending and resuming DRM pipelines
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+ media: davi: scsi_get_device_flags_keyed(): Always return device flags
+ scsi: devinfo: apply to HP XP the same flags as Hitachi VSP
+ clk: renesas: r8a77970: Add LVDS clock
+ staging: fsl-dpaa2/eth: Fix access to FAS field
+ media: vsp1: Prevent suspending and resuming DRM pipelines
+ dm raid: fix raid set size revalidation
+ media: cpi2: Fix a couple off by one bugs
+ media: davi: scsi_get_device_flags_keyed(): Always return device flags
+ scsi: devinfo: apply to HP XP the same flags as Hitachi VSP
+ clk: renesas: r8a77970: Add LVDS clock
+ staging: fsl-dpaa2/eth: Fix access to FAS field
+ media: vsp1: Prevent suspending and resuming DRM pipelines
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+ media: davi: scsi_get_device_flags_keyed(): Always return device flags
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+ clk: renesas: r8a77970: Add LVDS clock
+ staging: fsl-dpaa2/eth: Fix access to FAS field
+ media: vsp1: Prevent suspending and resuming DRM pipelines
+ dm raid: fix raid set size revalidation
+ media: cpi2: Fix a couple off by one bugs
+ media: davi: scsi_get_device_flags_keyed(): Always return device flags
+ scsi: devinfo: apply to HP XP the same flags as Hitachi VSP
- x86/mm: add a function to check if a pfn is UC/UC-/WC
- KVM: MMU: consider host cache mode in MMIO page check
- * nfp: read ME frequency from vNIC ctrl memory (LP: #1752818)
- * nfp: fix TLV offset calculation
- * Miscellaneous Ubuntu changes
  - [Packaging] skip cloud tools packaging when not building package
  - [Packaging] final-checks -- remove check for empty retpoline files
- -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Mon, 02 Apr 2018 15:43:20 -0300

+linux (4.15.0-13.14) bionic; urgency=medium
+ * linux: 4.15.0-13.14 -proposed tracker (LP: #1756408)
+ * devpts: handle bind-mounts (LP: #1755857)
- SAUCE: devpts: hoist out check for DEVPTS_SUPER_MAGIC
- SAUCE: devpts: resolve devpts bind-mounts
- SAUCE: devpts: comment devpts_mntget()
- SAUCE: selftests: add devpts selftests
+ * [bionic][arm64] d-i: add hisi_sas_v3_hw to scsi-modules (LP: #1756103)
+ d-i: add hisi_sas_v3_hw to scsi-modules
+ * [Bionic][ARM64] enable ROCE and HNS3 driver support for hip08 SoC
  (LP: #1756097)
- RDMA/hns: Refactor eq code for hip06
+ RDMA/hns: Add eq support of hip08
- RDMA/hns: Add detailed comments for mb() call
- RDMA/hns: Add rq inline data support for hip08 RoCE
+ RDMA/hns: Update the usage of sr_max and rr_max field
- RDMA/hns: Set access flags of hip08 RoCE
- RDMA/hns: Filter for zero length of sge in hip08 kernel mode
- RDMA/hns: Fix QP state judgement before sending work requests
+ RDMA/hns: Assign dest_qp when deregistering mr
- RDMA/hns: Fix endian problems around imm_data and rkey
+ RDMA/hns: Assign the correct value for tx_cqn
+ RDMA/hns: Create gsi qp in hip08
- RDMA/hns: Add gsi qp support for modifying qp in hip08
- RDMA/hns: Fill sq wqe context of ud type in hip08
- RDMA/hns: Assign zero for pkey_index of wc in hip08
+ RDMA/hns: Update the verbs of polling for completion
+ RDMA/hns: Set the guid for hip08 RoCE device
- net: hns3: Refactor of the reset interrupt handling logic
- net: hns3: Add reset service task for handling reset requests
+ - net: hns3: Refactors the requested reset & pending reset handling code
+ - net: hns3: Add mailbox support to VF driver
+ - net: hns3: Add HNS3 VF HCL (Hardware Compatibility Layer) Support
+ - net: hns3: Add mailbox support to PF driver
+ - net: hns3: Change PF to add ring-vect binding & resetQ to mailbox
+ - net: hns3: Add mailbox interrupt handling to PF driver
+ - net: hns3: add support to query tqp number
+ - net: hns3: add support to modify tqp number
+ - net: hns3: change the returned tqp number by ethtool -x
+ - net: hns3: free the ring_data structrue when change tqp
+ - net: hns3: get rss_size_max from configuration but not hardcode
+ - net: hns3: add a mask initialization for mac_vlan table
+ - net: hns3: add vlan offload config command
+ - net: hns3: add ethtool related offload command
+ - net: hns3: add handling vlan tag offload in bd
+ - net: hns3: cleanup mac auto-negotiation state query
+ - net: hns3: fix for getting auto-negotiation state in hclge_get_autoneg
+ - net: hns3: add support for set_pauseparam
+ - net: hns3: add support to update flow control settings after autoneg
+ - net: hns3: add Asym Pause support to phy default features
+ - net: hns3: add support for querying advertised pause frame by ethtool ethx
+ - net: hns3: Increase the default depth of bucket for TM shaper
+ - net: hns3: change TM sched mode to TC-based mode when SRIOV enabled
+ - net: hns3: hns3_get_channels() can be static
+ - net: hns3: Add ethtool interface for vlan filter
+ - net: hns3: Disable VFs change rxvlan offload status
+ - net: hns3: Unify the strings display of packet statistics
+ - net: hns3: Fix spelling errors
+ - net: hns3: Remove repeat statistic of rx_errors
+ - net: hns3: Modify the update period of packet statistics
+ - net: hns3: Mask the packet statistics query when NIC is down
+ - net: hns3: Fix an error of total drop packet statistics
+ - net: hns3: Fix a loop index error of tqp statistics query
+ - net: hns3: Fix an error macro definition of HNS3_TQP_STAT
+ - net: hns3: Remove a useless member of struct hns3_stats
+ - net: hns3: Add packet statistics of netdev
+ - net: hns3: Fix a response data read error of tqp statistics query
+ - net: hns3: fix for updating fc_mode_last_time
+ - net: hns3: fix for setting MTU
+ - net: hns3: fix for changing MTU
+ - net: hns3: add MTU initialization for hardware
+ - net: hns3: fix for not setting pause parameters
+ - net: hns3: remove redundant semicolon
+ - net: hns3: Add more packet size statistics
+ - Revert "net: hns3: Add packet statistics of netdev"
+ - net: hns3: report the function type the same line with hns3_nic_get_stats64
+ - net: hns3: add ethtool_ops.get_channels support for VF
+ - net: hns3: remove TSO config command from VF driver
+ - net: hns3: add ethtool_ops.get_coalesce support to PF
+ - net: hns3: add ethtool_ops.set_coalesce support to PF
+ - net: hns3: refactor interrupt coalescing init function
+ - net: hns3: refactor GL update function
+ - net: hns3: remove unused GL setup function
+ - net: hns3: change the unit of GL value macro
+ - net: hns3: add int_gl_idx setup for TX and RX queues
+ - net: hns3: add ethtool_ops.get_channels support for VF
+ - net: hns3: remove TSO config command from VF driver
+ - net: hns3: add ethtool_ops.get_coalesce support to PF
+ - net: hns3: add ethtool_ops.set_coalesce support to PF
+ - net: hns3: refactor interrupt coalescing init function
+ - net: hns3: refactor GL update function
+ - net: hns3: remove unused GL setup function
+ - net: hns3: change the unit of GL value macro
+ - net: hns3: add int_gl_idx setup for TX and RX queues
+ - net: hns3: add feature check when feature changed
+ - net: hns3: check for NULL function pointer in hns3_nic_set_features
+ - net: hns: Fix for variable may be used uninitialized warnings
+ - net: hns3: add support for get_regs
+ - net: hns3: add manager table initialization for hardware
+ - net: hns3: add ethtool -p support for fiber port
+ - net: hns3: add net status led support for fiber port
+ - net: hns3: converting spaces into tabs to avoid checkpatch.pl warning
+ - net: hns3: add get/set_coalesce support to VF
+ - net: hns3: add int_gl_idx setup for VF
+ - [Config]: enable CONFIG_HNS3_HCLGEVF as module.
+
+ * [Bionic][ARM64] add RAS extension and SDEI features (LP: #1756096)
+ - KVM: arm64: Store vcpu on the stack during __guest_enter()
+ - KVM: arm/arm64: Convert kvm_host_cpu_state to a static per-cpu allocation
+ - KVM: arm64: Change hyp_panic()s dependency on tpidr_el2
+ - arm64: alternatives: use tpidr_el2 on VHE hosts
+ - KVM: arm64: Stop save/restoring host tpidr_el1 on VHE
+ - Docs: dt: add devicetree binding for describing arm64 SDEI firmware
+ - firmware: arm_sdei: Add driver for Software Delegated Exceptions
+ - arm64: Add vmap_stack header file
+ - arm64: uaccess: Add PAN helper
+ - arm64: kernel: Add arch-specific SDEI entry code and CPU masking
+ - firmware: arm_sdei: Add support for CPU and system power states
+ - firmware: arm_sdei: add support for CPU private events
+ - arm64: acpi: Remove __init from acpi_psci_use_hvc() for use by SDEI
+ - firmware: arm_sdei: Discover SDEI support via ACPI
+ - arm64: sysreg: Move to use definitions for all the SCTLR bits
+ - arm64: cpufeature: Detect CPU RAS Extentions
+ - arm64: kernel: Survive corrected RAS errors notified by SError
+ - arm64: Unconditionally enable IESB on exception entry/return for firmware-first
+ - arm64: kernel: Prepare for a DISR user
+ - KVM: arm/arm64: mask/unmask daif around VHE guests
+ - KVM: arm64: Set an impdef ESR for Virtual-SError using VSESР_EL2.
+ - KVM: arm64: Save/Restore guest DISR_EL1
+ - KVM: arm64: Save ESR_EL2 on guest SError
+ - KVM: arm64: Handle RAS SErrors from EL1 on guest exit
+  - KVM: arm64: Handle RAS SErrors from EL2 on guest exit
+  - KVM: arm64: Emulate RAS error registers and set HCR_EL2's TERR & TEA
+  - [Config]: enable RAS_EXTN and ARM_SDE_INTERFACE
+  
+  * [Bionic][ARM64] PCI and SAS driver patches for hip08 SoCs (LP: #1756094)
+  +  - scsi: hisi_sas: fix dma_unmap_sg() parameter
+  +  - scsi: ata: enhance the definition of SET MAX feature field value
+  +  - scsi: hisi_sas: relocate clearing ITCT and freeing device
+  +  - scsi: hisi_sas: optimise port id refresh function
+  +  - scsi: hisi_sas: some optimizations of host controller reset
+  +  - scsi: hisi_sas: modify hisi_sas_dev_gone() for reset
+  +  - scsi: hisi_sas: add an mechanism to do reset work synchronously
+  +  - scsi: hisi_sas: change ncq process for v3 hw
+  +  - scsi: hisi_sas: add RAS feature for v3 hw
+  +  - scsi: hisi_sas: add some print to enhance debugging
+  +  - scsi: hisi_sas: improve int_chnl_int_v2_hw() consistency with v3 hw
+  +  - scsi: hisi_sas: add v2 hw port AXI error handling support
+  +  - scsi: hisi_sas: use an general way to delay PHY work
+  +  - scsi: hisi_sas: do link reset for some CHL_INT2 ints
+  +  - scsi: hisi_sas: judge result of internal abort
+  +  - scsi: hisi_sas: add internal abort dev in some places
+  +  - scsi: hisi_sas: fix SAS_QUEUE_FULL problem while running IO
+  +  - scsi: hisi_sas: re-add the lldd_port_deformed()
+  +  - scsi: hisi_sas: add v3 hw suspend and resume
+  +  - scsi: hisi_sas: Change frame type for SET MAX commands
+  +  - scsi: hisi_sas: make local symbol host_attrs static
+  +  - scsi: hisi_sas: fix a bug in hisi_sas_dev_gone()
+  +  - SAUCE: scsi: hisi_sas: config for hip08 ES
+  +  - SAUCE: scsi: hisi_sas: export device table of v3 hw to userspace
+  +  - PM / core: Add LEAVE_SUSPENDED driver flag
+  +  - PCI / PM: Support for LEAVE_SUSPENDED driver flag
+  +  - PCI/AER: Skip recovery callbacks for correctable errors from ACPI APEI
+  +  - PCI/ASPM: Calculate LTR_L1.2_THRESHOLD from device characteristics
+  +  - PCI/ASPM: Enable Latency Tolerance Reporting when supported
+  +  - PCI/ASPM: Unexport internal ASPM interfaces
+  +  - PCI: Make PCI_SCAN_ALL_PCIE_DEVS work for Root as well as Downstream Ports
+  +  - PCI/AER: Return error if AER is not supported
+  +  - PCI/DPC: Enable DPC only if AER is available
+
+  * [CVE] Spectre: System Z [kernel] UBUNTU18.04 (LP: #1754580)
+  +  - s390: scrub registers on kernel entry and KVM exit
+  +  - s390: add optimized array_index_mask_nospec
+  +  - s390/alternative: use a copy of the facility bit mask
+  +  - s390: add options to change branch prediction behaviour for the kernel
+  +  - s390: run user space and KVM guests with modified branch prediction
+  +  - s390: introduce execute-trampolines for branches
+  +  - s390: Replace IS_ENABLED(EXPOLINE_*) with IS_ENABLED(CONFIG_EXPOLINE_*)
+  +  - s390: do not bypass BPENTER for interrupt system calls

Open Source Used In 5GaaS Edge AC-4 18078
+ - s390/entry.S: fix spurious zeroing of r0
+ * s390/crypto: Fix kernel crash on aes_s390 module remove (LP: #1753424)
+ - SAUCE: s390/crypto: Fix kernel crash on aes_s390 module remove.
+ *
+ [Feature]Update Ubuntu 18.04 lpfc FC driver with 32/64GB HBA support and bug
+ fixes (LP: #1752182)
+ - scsi: lpfc: FLOGI failures are reported when connected to a private loop.
+ - scsi: lpfc: Expand WQE capability of every NVME hardware queue
+ - scsi: lpfc: Handle XRI_ABORTED_CQE in soft IRQ
+ - scsi: lpfc: Fix NVME LS abort_xri
+ - scsi: lpfc: Raise maximum NVME sg list size for 256 elements
+ - scsi: lpfc: Driver fails to detect direct attach storage array
+ - scsi: lpfc: Fix display for debugfs quelInfo
+ - scsi: lpfc: Adjust default value of lpfc_nvmet_mrq
+ - scsi: lpfc: Fix ndlp ref count for pt2pt mode issue RSCN
+ - scsi: lpfc: Linux LPFC driver does not process all RSCNs
+ - scsi: lpfc: correct port registrations with nvme_fc
+ - scsi: lpfc: Correct driver deregistrations with host nvme transport
+ - scsi: lpfc: Fix crash during driver unload with running nvme traffic
+ - scsi: lpfc: Fix driver handling of nvme resources during unload
+ - scsi: lpfc: small sg cnt cleanup
+ - scsi: lpfc: Fix random heartbeat timeouts during heavy IO
+ - scsi: lpfc: update driver version to 11.4.0.5
+ - scsi: lpfc: Fix -EOVERFLOW behavior for NVMET and defer_rcv
+ - scsi: lpfc: Fix receive PRLI handling
+ - scsi: lpfc: Increase SCSI CQ and WQ sizes.
+ - scsi: lpfc: Fix SCSI LUN discovery when SCSI and NVME enabled
+ - scsi: lpfc: Fix issues connecting with nvme initiator
+ - scsi: lpfc: Fix infinite wait when driver unregisters a remote NVME port.
+ - scsi: lpfc: Beef up stat counters for debug
+ - scsi: lpfc: update driver version to 11.4.0.6
+ - scsi: lpfc: correct sg_seg_cnt attribute min vs default
+ - scsi: scsi_transport_fc: fix typos on 64/128 GBit define names
+ - scsi: lpfc: don’t dereference localport before it has been null checked
+ - scsi: lpfc: fix a couple of minor indentation issues
+ - treewide: Use DEVICE_ATTR_RW
+ - treewide: Use DEVICE_ATTR_RO
+ - treewide: Use DEVICE_ATTR_WO
+ - scsi: lpfc: Fix frequency of Release WQE CQEs
+ - scsi: lpfc: Increase CQ and WQ sizes for SCSI
+ - scsi: lpfc: move placement of target destroy on driver detach
+ - scsi: lpfc: correct debug counters for abort
+ - scsi: lpfc: Add WQ Full Logic for NVME Target
+ - scsi: lpfc: Fix PRLI handling when topology type changes
+ - scsi: lpfc: Fix IO failure during hba reset testing with nvme io.
+ - scsi: lpfc: Fix RQ empty firmware trap
+ - scsi: lpfc: Allow set of maximum outstanding SCSI cmd limit for a target
+ - scsi: lpfc: Fix soft lockup in lpfc worker thread during LIP testing
+ - scsi: lpfc: Fix issue_lip if link is disabled
+ - scsi: lpfc: Indicate CONF support in NVMe PRLI
+ - scsi: lpfc: Fix SCSI io host reset causing kernel crash
+ - scsi: lpfc: Validate adapter support for SRIU option
+ - scsi: lpfc: Fix header inclusion in lpfc_nvmet
+ - scsi: lpfc: Treat SCSI Write operation Underruns as an error
+ - scsi: lpfc: Fix nonrecovery of NVME controller after cable swap.
+ - scsi: lpfc: update driver version to 11.4.0.7
+ - scsi: lpfc: Update 11.4.0.7 modified files for 2018 Copyright
+ - scsi: lpfc: Rework lpfc to allow different sl4 cq and eq handlers
+ - scsi: lpfc: Rework sl4 doorbell infrastructure
+ - scsi: lpfc: Add SLI-4 if_type=6 support to the code base
+ - scsi: lpfc: Add push-to-adapter support to sl4
+ - scsi: lpfc: Add PCI Ids for if_type=6 hardware
+ - scsi: lpfc: Add 64G link speed support
+ - scsi: lpfc: Add if_type=6 support for cycling valid bits
+ - scsi: lpfc: Enable fw download on if_type=6 devices
+ - scsi: lpfc: Add embedded data pointers for enhanced performance
+ - scsi: lpfc: Fix nvme embedded io length on new hardware
+ - scsi: lpfc: Work around NVME cmd io SGL type
+ - scsi: lpfc: update driver version to 12.0.0.0
+ - scsi: lpfc: Change Copyright of 12.0.0.0 modified files to 2018
+ - scsi: lpfc: use __raw_writeX on DPP copies
+ - scsi: lpfc: Add missing unlock in WQ full logic

+ * CVE-2018-8043
+ - net: phy: mdio-bcm-unimac: fix potential NULL dereference in
  unimac_mdio_probe()
+
+ * Bionic update to 4.15.10 stable release (LP: #1756100)
+ - Revert "UBUNTU: SAUCE: ALSA: hda/realtek - Add support headset mode for DELL
  WYSE"
+ - RDMA/ucma: Limit possible option size
+ - RDMA/ucma: Check that user doesn't overflow QP state
+ - RDMA/mlx5: Fix integer overflow while resizing CQ
+ - bpf: cpumap: use GFP_KERNEL instead of GFP_ATOMIC in __cpu_map_entry_alloc()
+ - IB/uverbs: Improve lockdep_check
+ - mac80211_hwsim: don't use WQ_MEM_RECLAIM
+ - net/sm: fix NULL pointer dereference on sock_create_kern() error path
+ - regulator: stm32-vrefbuf: fix check on ready flag
+ - drm/i915: Check for fused or unused pipes
+ - drm/i915/audio: fix check for av_enc_map overflow
+ - drm/i915: Fix rsvd2 mask when out-fence is returned
+ - drm/i915: Clear the in-use marker on execbuf failure
+ - drm/i915: Disable DC states around GMBUS on GLK
+ - drm/i915: Update watermark state correctly in sanitize_watermarks
+ - drm/i915: Try EDID bitbanging on HDMI after failed read
+ - drm/i915/perf: fix perf stream opening lock
+ - scsi: core: Avoid that ATA error handling can trigger a kernel hang or oops
+ - scsi: qla2xxx: Fix NULL pointer crash due to active timer for ABTS
+ - drm/i915: Always call to intel_display_set_init_power() in resume_early.
+ - workqueue: Allow retrieval of current task's work struct
+ - drm: Allow determining if current task is output poll worker
+ - drm/nouveau: Fix deadlock on runtime suspend
+ - drm/radeon: Fix deadlock on runtime suspend
+ - drm/amdgpu: Fix deadlock on runtime suspend
+ - drm/nouveau: prefer XBGR2101010 for addfb ioctl
+ - drm/amd/powerplay/smu7: allow mclk switching with no displays
+ - drm/amd/powerplay/vega10: allow mclk switching with no displays
+ - Revert "drm/radeon/pm: auto switch power state when in balanced mode"
+ - drm/amd/display: check for ipp before calling cursor operations
+ - drm/radeon: insist on 32-bit DMA for Cedar on PPC64/PPC64LE
+ - drm/amd/powerplay: fix power over limit on Fiji
+ - drm/amd/display: Default HDMI16G support to true. Log VBIOS table error.
+ - drm/amdgpu: used cached pcie gen info for SI (v2)
+ - drm/amdgpu: Notify sbios device ready before send request
+ - drm/radeon: fix KV harvesting
+ - drm/amdgpu: fix KV harvesting
+ - drm/amdgpu: Correct max uvd handles
+ - drm/amdgpu: Always save uvd vcpu_bo in VM Mode
+ - ovl: redirect_dir=nofollow should not follow redirect for opaque lower
+ - MIPS: BMIPS: Do not mask IPIs during suspend
+ - MIPS: ath25: Check for kzalloc allocation failure
+ - MIPS: OCTEON: irq: Check for null return on kzalloc allocation
+ - PCI: dwc: Fix enumeration end when reaching root subordinate
+ - Input: matrix_keypad - fix race when disabling interrupts
+ - Revert "Input: synaptics - Lenovo Thinkpad T460p devices should use RMI"
+ - bug: use %pB in BUG and stack protector failure
+ - lib/bug.c: exclude non-BUG/WARN exceptions from report_bug()
+ - mm/memblock.c: hardcode the end_pfn being -1
+ - Documentation/sphinx: Fix Directive import error
+ - loop: Fix lost writes caused by missing flag
+ - virtio_ring: fix num_free handling in error case
+ - KVM: s390: fix memory overwrites when not using SCA entries
+ - arm64: mm: fix thinko in non-global page table attribute check
+ - IB/core: Fix missing RDMA cgroups release in case of failure to register device
+ - Revert "nvme: create 'slaves' and 'holders' entries for hidden controllers"
+ - kbuild: Handle builtin dtb file names containing hyphens
+ - dm.bufio: avoid false-positive Wmaybe-uninitialized warning
+ - IB/mlx5: Fix incorrect size of kms in the memory region
+ - bcache: fix crashes in duplicate cache device register
+ - bcache: don't attach backing with duplicate UUID
+ - x86/MCE: Save microcode revision in machine check records
+ - x86/MCE: Serialize sysfs changes
+ - perf tools: Fix trigger class trigger_on()
+ - x86/spectre_v2: Don't check microcode versions when running under hypervisors
+ - ALSA: hda/realtek - Add support headset mode for DELL WYSE
+ - ALSA: hda/realtek - Add headset mode support for Dell laptop
+ - ALSA: hda/realtek: Limit mic boost on T480
+ - ALSA: hda/realtek - Fix dock line-out volume on Dell Precision 7520
+ - ALSA: hda/realtek - Make dock sound work on ThinkPad L570
+ - ALSA: seq: More protection for concurrent write and ioctl races
+ - ALSA: hda: add dock and led support for HP EliteBook 820 G3
+ - ALSA: hda: add dock and led support for HP ProBook 640 G2
+ - scsi: qla2xxx: Fix NULL pointer crash due to probe failure
+ - scsi: qla2xxx: Fix recursion while sending terminate exchange
+ - dt-bindings: Document mti.mips-cpc binding
+ - MIPS: CPC: Map registers using DT in mips_cpc_default_phys_base()
+ - nospec: Kill array_index_nospec_mask_check()
+ - nospec: Include <asm/barrier.h> dependency
+ - x86/entry: Reduce the code footprint of the 'identry' macro
+ - x86/entry/64: Use 'xorl' for faster register clearing
+ - x86/mm: Remove stale comment about KMEMCHECK
+ - x86/asm: Improve how GEN_*_.SUFFIXED_RMWcc() specify clobbers
+ - x86/IO-APIC: Avoid warning in 32-bit builds
+ - x86/LDT: Avoid warning in 32-bit builds with older gcc
+ - x86-64/realmode: Add instruction suffix
+ - Revert "x86/retpoline: Simplify vmexit_fill_RSB()"
+ - x86/speculation: Use IBRS if available before calling into firmware
+ - x86/retpoline: Support retpoline builds with Clang
+ - x86/speculation, objtool: Annotate indirect calls/jumps for objtool
+ - x86/speculation: Move firmware_restrict_branch_speculation_*() from C to CPP
+ - x86/paravirt, objtool: Annotate indirect calls
+ - x86/boot, objtool: Annotate indirect jump in secondary_startup_64()
+ - x86/mm/sme, objtool: Annotate indirect call in sme_encrypt_execute()
+ - objtool: Use existing global variables for options
+ - objtool: Add retpoline validation
+ - objtool: Add module specific retpoline rules
+ - objtool, retpolines: Integrate objtool with retpoline support more closely
+ - objtool: Fix another switch table detection issue
+ - objtool: Fix 32-bit build
+ - x86/kprobes: Fix kernel crash when probing .entry_trampoline code
+ - watchdog: hwpdt: SMBIOS check
+ - watchdog: hwpdt: Check source of NMI
+ - watchdog: hwpdt: fix unused variable warning
+ - watchdog: hwpdt: Remove legacy NMI sourcing.
+ - netfilter: add back stackpointer size checks
+ - netfilter: ipt_CLUSTERIP: fix a race condition of proc file creation
+ - netfilter: xt_hashlimit: fix lock imbalance
+ - netfilter: x_tables: fix missing timer initialization in xt_LED
+ - netfilter: nat: cope with negative port range
- netfilter: IDLETIMER: be syzkaller friendly
- netfilter: ebtables: CONFIG_COMPAT: don't trust userland offsets
- netfilter: bridge: ebt_among: add missing match size checks
- netfilter: ipv6: fix use-after-free Write in nf_nat_ipv6_manip_pkt
- netfilter: use skb_to_full_sk in ip6_route_me_harder
- tpm_tis: Move ilb_base_addr to tpm_tis_data
- tpm: Keep CLKRUN enabled throughout the duration of transmit_cmd()
- tpm: delete the TPM_TIS_CLK_ENABLE flag
- tpm: remove unused variables
- tpm: only attempt to disable the LPC CLKRUN if is already enabled
- x86/xen: Calculate __max_logical_packages on PV domains
- scsi: qla2xxx: Fix system crash for Notify ack timeout handling
- scsi: qla2xxx: Fix gpnid error processing
- scsi: qla2xxx: Move session delete to driver work queue
- scsi: qla2xxx: Skip IRQ affinity for Target QPairs
- scsi: qla2xxx: Fix re-login for Nport Handle in use
- scsi: qla2xxx: Retry switch command on time out
- scsi: qla2xxx: Serialize GPNID for multiple RSCN
- scsi: qla2xxx: Fix login state machine stuck at GPDB
- scsi: qla2xxx: Fix NPIV host cleanup in target mode
- scsi: qla2xxx: Relogin to target port on a cable swap
- scsi: qla2xxx: Fix Relogin being triggered too fast
- scsi: qla2xxx: Fix PRLI state check
- scsi: qla2xxx: Fix abort command deadlock due to spinlock
- scsi: qla2xxx: Replace fcport alloc with qla2x00_alloc_fcport
- scsi: qla2xxx: Fix scan state field for fcport
- scsi: qla2xxx: Clear loop id after delete
- scsi: qla2xxx: Defer processing of GS IOC B calls
- scsi: qla2xxx: Remove aborting ELS IOC B call issued as part of timeout.
- scsi: qla2xxx: Fix system crash in qlt_plogi_ack_unref
- scsi: qla2xxx: Fix memory leak in dual/target mode
- NFS: Fix an incorrect type in struct nfs_direct_req
- NFS: Prevent the layout header refcount going to zero in pnfs_roc()
- NFS: Fix unstable write completion
- Linux 4.15.10
- *
- * ALSA: seq: Don't allow resizing pool in use
- *
- * nfp: prioritize stats updates (LP: #1752061)
- * nfp: flower: prioritize stats updates
- *
- * Ubuntu 18.04 - Kernel crash on nvme subsystem-reset /dev/nvme0 (Bolt / NVMe)
- (LP: #1753371)
- * nvme-pci: Fix EEH failure on ppc
- *
- * sbsa watchdog crashes thunderx2 system (LP: #1755595)
- * watchdog: sbsa: use 32-bit read for WCV
+  * KVM: s390: add vcpu stat counters for many instruction (LP: #1755132)
+  +  - KVM: s390: diagnoses are instructions as well
+  +  - KVM: s390: add vcpu stat counters for many instruction
+  
+  +  * CIFS SMB2/SMB3 does not work for domain based DFS (LP: #1747572)
+  +  - CIFS: make IPC a regular tcon
+  +  - CIFS: use tcon_ipc instead of use_ipc parameter of SMB2_ioctl
+  +  - CIFS: dump IPC tcon in debug proc file
+  
+  +  * i2c-thunderx: erroneous error message "unhandled state: 0" (LP: #1754076)
+  +  - i2c: octeon: Prevent error message on bus error
+  
+  +  * Boston-LC:bos1u1: Stress test on Qlogic Fibre Channel on Ubuntu KVM guest
+  +  that caused KVM host crashed in qlt_free_session_done call (LP: #1750441)
+  +  - scsi: qla2xxx: Fix memory corruption during hba reset test
+  
+  +  * Ubuntu 18.04 - Performance: Radix page fault handler bug in KVM
+  +  (LP: #1752236)
+  +  - KVM: PPC: Book3S HV: Fix handling of large pages in radix page fault handler
+  
+  +  * Fix ARC hit rate (LP: #1755158)
+  +  - SAUCE: Fix ARC hit rate (LP: #1755158)
+  
+  +  * Bionic update to 4.15.9 stable release (LP: #1755275)
+  +  - bpf: fix mlock precharge on arraymaps
+  +  - bpf: fix memory leak in lpm_trie map_free callback function
+  +  - bpf: fix rcu lockdep warning for lpm_trie map_free callback
+  +  - bpf, x64: implement retpoline for tail call
+  +  - bpf, arm64: fix out of bounds access in tail call
+  +  - bpf: add schedule points in percpu arrays management
+  +  - bpf: allow xadd only on aligned memory
+  +  - bpf, ppc64: fix out of bounds access in tail call
+  +  - scsi: mpt3sas: fix oops in error handlers after shutdown/unload
+  +  - scsi: mpt3sas: wait for and flush running commands on shutdown/unload
+  +  - KVM: x86: fix backward migration with async_PF
+  +  - Linux 4.15.9
+  
+  +  * Bionic update to 4.15.8 stable release (LP: #1755179)
+  +  - hrtimer: Ensure POSIX compliance (relative CLOCK_REALTIME hrtimers)
+  +  - ipmi_si: Fix error handling of platform device
+  +  - platform/x86: dell-laptop: Allocate buffer on heap rather than globally
+  +  - powerpc/series: Enable RAS hotplug events later
+  +  - Bluetooth: btusb: Use DMI matching for QCA reset_resume quirkings
+  +  - ixgbe: fix crash in build_skb Rx code path
+  +  - tpm: st33zp24: fix potential buffer overruns caused by bit glitches on the
+  +  bus
+  +  - tpm: fix potential buffer overruns caused by bit glitches on the bus
+ - tpm_i2c_infineon: fix potential buffer overruns caused by bit glitches on
+    the bus
+ - tpm_i2c_nuvoton: fix potential buffer overruns caused by bit glitches on the
+    bus
+ - tpm_tis: fix potential buffer overruns caused by bit glitches on the bus
+ - ALSA: usb-audio: Add a quirck for B&W PX headphones
+ - ALSA: control: Fix memory corruption risk in snd_ctl_elem_read
+ - ALSA: x86: Fix missing spinlock and mutex initializations
+ - ALSA: hda: Add a power_save blacklist
+ - ALSA: hda - Fix pincfg at resume on Lenovo T470 dock
+ - mmcsdhci-pci: Fix SoI3 for Intel BYT-based controllers
+ - mmcsdmmc: dw_mmc-k3: Fix out-of-bounds access through DT alias
+ - mmcsdmmc: dw_mmc: Avoid accessing registers in runtime suspended state
+ - mmcsdmmc: dw_mmc: Factor out dw_mci_init_slot_caps
+ - mmcsdmmc: dw_mmc: Fix out-of-bounds access for slot's caps
+ - timers: Forward timer base before migrating timers
+ - parisc: Use cr16 interval timers unconditionally on qemu
+ - parisc: Reduce irq overhead when run in qemu
+ - parisc: Fix ordering of cache and TLB flushes
+ - parisc: Hide virtual kernel memory layout
+ - btrfs: use proper endianness accessors for super_copy
+ - block: fix the count of PGPGOUT for WRITESAME
+ - block: kyber: fix domain token leak during requeue
+ - block: pass inclusive 'lend' parameter to truncate_inode_pages_range
+ - vfio: disable filesystem-dax page pinning
+ - cpufreq: s3c24xx: Fix broken s3c_cpufreq_init()
+ - dax: fix vma_is_fsdax() helper
+ - direct-io: Fix sleep in atomic due to sync AIO
+ - x86/xen: Zero MSR_IA32_SPEC_CTRL before suspend
+ - x86/platform/intel-mid: Handle Intel Edison reboot correctly
+ - x86/cpu_entry_area: Sync cpu_entry_area to initial_page_table
+ - bridge: check brport attr show in brport_show
+ - fib_semantics: Don't match route with mismatching tclassid
+ - hdle_pcap: carrier detect ok, don't turn off negotiation
+ - ipv6 sit: work around bogus gcc-8 -Wrestrict warning
+ - net: amd-xgbe: fix comparison to bitshift when dealing with a mask
+ - net: ethernet: ti: cpsw: fix net watchdog timeout
+ - net: fix race on decreasing number of TX queues
+ - net: ipv4: don't allow setting net.ipv4.route.min_pmtu below 68
+ - net: netlink: ensure to loop over all netns in genmsg_multicast_allns()
+ - net: sched: report if filter is too large to dump
+ - ppp: prevent unregistered channels from connecting to PPP units
+ - scp: verify size of a new chunk in _sctp_make_chunk()
+ - udplite: fix partial checksum initialization
+ - net/mlx5e: Fix TCP checksum in LRO buffers
+ - scp: fix dst refcnt leak in scctp_v4_get_dst
+ - mlxsw: spectrum_switchdev: Check success of FDB add operation
+ - net/mlx5e: Specify numa node when allocating drop rq
+ - net: phy: fix phy_start to consider PHY_IGNORE_INTERRUPT
+ - tcp: Honor the eor bit in tcp_ntu_probe
+ - rxrpc: Fix send in rxrpc_send_data_packet()
+ - tcp_bbr: better deal with suboptimal GSO
+ - doc: Change the min default value of tcp_wmem/tcp_rmem.
+ - net/mlx5e: Fix loopback self test when GRO is off
+ - net_sched: gen_estimator: fix broken estimators based on percpu stats
+ - net/sched: cls_u32: fix cls_u32 on filter replace
+ - sctp: do not pr_err for the duplicated node in transport rhlist
+ - mlxsw: spectrum_router: Fix error path in mlxsw_sp_vr_create
+ - net: ipv4: Set addr_type in hash_keys for forwarded case
+ - sctp: fix dst refcnt leak in sctp_v6_get_dst()
+ - bridge: Fix VLAN reference count problem
+ - net/mlx5e: Verify inline header size do not exceed SKB linear size
+ - tls: Use correct sk->sk_prot for IPV6
+ - amd-xgbe: Restore PCI interrupt enablement setting on resume
+ - cls_u32: fix use after free in u32_destroy_key()
+ - mlxsw: spectrum_router: Do not unconditionally clear route offload indication
+ - netlink: put module reference if dump start fails
+ - tcp: purge write queue upon RST
+ - tuntap: correctly add the missing XDP flush
+ - tuntap: disable preemption during XDP processing
+ - virtio-net: disable NAPI only when enabled during XDP set
+ - cxgb4: fix trailing zero in CIM LA dump
+ - net/mlx5: Fix error handling when adding flow rules
+ - net: phy: Restore phy_resume() locking assumption
+ - tcp: tracepoint: only call trace_tcp_send_reset with full socket
+ - l2tp: don't use inet_shutdown on tunnel destroy
+ - l2tp: don't use inet_shutdown on ppp session destroy
+ - l2tp: fix races with tunnel socket close
+ - l2tp: fix race in pppol2tp_release with session object destroy
+ - l2tp: fix tunnel lookup use-after-free race
+ - s390/qeth: fix underestimated count of buffer elements
+ - s390/qeth: fix SETIP command handling
+ - s390/qeth: fix overestimated count of buffer elements
+ - s390/qeth: fix IP removal on offline cards
+ - s390/qeth: fix double-free on IP add/remove race
+ - Revert "s390/qeth: fix using of ref counter for rxip addresses"
+ - s390/qeth: fix IP address lookup for L3 devices
+ - s390/qeth: fix IPA command submission race
+ - tcp: revert F-RTO middle-box workaround
+ - tcp: revert F-RTO extension to detect more spurious timeouts
+ - blk-mq: don't call io sched's .requeue_request when requeuing rq to ->dispatch
+ - media: m88ds3103: don't call a non-initialized function
+ - EDAC, sb_edac: Fix out of bound writes during DIMM configuration on KNL
+ - KVM: s390: take care of clock-comparator sign control
+ KVM: s390: provide only a single function for setting the tod (fix SCK)
+ KVM: s390: consider epoch index on hotplugged CPUs
+ KVM: s390: consider epoch index on TOD clock syncs
+ nospec: Allow index argument to have const-qualified type
+ x86/mm: Fix [pmd,pud]_{set,clear} Flags
+ ARM: orion: fix orion_ge00_switch_board_info initialization
+ ARM: dts: rockchip: Remove 1.8 GHz operation point from phycore som
+ ARM: mvebu: Fix broken PL310_ERRATA_753970 selects
+ ARM: kvm: fix building with gcc-8
+ KVM: x86: Fix SMRAM accessing even if VM is shutdown
+ KVM: mmu: Fix overlap between public and private memslots
+ KVM/x86: Remove indirect MSR op calls from SPEC_CTRL
+ KVM: x86: move LAPIC initialization after VMCS creation
+ KVM/VMX: Optimize vmx_vcpu_run() and svm_vcpu_run() by marking the RDMSR path as unlikely()
+ KVM: x86: fix vcpu initialization with usespacelapic
+ KVM/x86: remove WARN_ON() for when vm_munmap() fails
+ ACPI / bus: Parse tables as term_list for Dell XPS 9570 and Precision M5530
+ ARM: dts: LogicPD SOM-LV: Fix I2C1 pinmux
+ ARM: dts: LogicPD Torpedo: Fix I2C1 pinmux
+ powerpc/64s/radix: Boot-time NULL pointer protection using a guard-PID
+ md: only allow remove_and_add_spare when no sync_thread running.
+ platform/x86: dell-laptop: fix kbd_get_state's request value
+ Linux 4.15.8

* ZFS setgid broken on 0.7 (LP: #1753288)
+ SAUCE: Fix ZFS setgid

* /proc/kallsyms prints "(null)" for null addresses in 4.15 (LP: #1754297)
+ vsprintf: avoid misleading "(null)" for %px

* Miscellaneous Ubuntu changes
+ d-i: Add netsec to nic-modules
+ [Config] fix up retpoline abi files
+ [Config] set NOBP and expoline options for s390

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 16 Mar 2018 14:49:27 -0300

+linux (4.15.0-12.13) bionic; urgency=medium
+ linux: 4.15.0-12.13 -proposed tracker (LP: #1754059)
+ CONFIG_EFI=y on armhf (LP: #1726362)
+ [Config] CONFIG_EFI=y on armhf, reconcile secureboot EFI settings
+ ppc64le: Support firmware disable of RFI flush (LP: #1751994)
+ powerpc/pseries: Support firmware disable of RFI flush
+ powerpc/powernv: Support firmware disable of RFI flush
* [Feature] CFL/CNL (PCH:CNP-H): New GPIO Commit added (GPIO Driver needed)
  (LP: #1751714)
+  * gpio / ACPI: Drop unnecessary ACPI GPIO to Linux GPIO translation
+  * pinctrl: intel: Allow custom GPIO base for pad groups
+  * pinctrl: cannonlake: Align GPIO number space with Windows
+  * [Feature] Add xHCI debug device support in the driver (LP: #1730832)
+  * usb: xhci: Make some static functions global
+  * usb: xhci: Add DbC support in xHCI driver
+  * [Config] USB_XHCI_DBGCAP=y for commit mainline dfba2174dc42.
+  * [SRU] Lenovo E41 Mic mute hotkey is not responding (LP: #1753347)
+  * platform/x86: ideapad-laptop: Increase timeout to wait for EC answer
+  * headset mic can't be detected on two Dell machines (LP: #1748807)
+  * ALSA: hda - Fix a wrong FIXUP for alc289 on Dell machines
+  * hisi_sas: Add disk LED support (LP: #1752695)
+  * - scsi: hisi_sas: directly attached disk LED feature for v2 hw
+  * [Feature] [Graphics]Whiskey Lake (Coffelake-U 4+2) new PCI Device ID adds
  (LP: #1742561)
+  * - drm/i915/cfl: Adding more Coffee Lake PCI IDs.
+  * [Bug] [USB Function][CFL-CNL PCH]Stall Error and USB Transaction Error in
  trace, Disable of device-initiated U1/U2 failed and rebind failed: -517
+  * during suspend/resume with usb storage. (LP: #1730599)
+  * - usb: Don't print a warning if interface driver rebind is deferred at resume
+  * retpoline: ignore %cs:0xNNNN constant indirects (LP: #1752655)
+  * - [Packaging] retpoline -- elide %cs:0xNNNN constants on i386
+  * - [Config] retpoline -- clean up i386 retpoline files
+  * hisilicon hibmc regression due to ea642c3216cb ("drm/ttm: add io_mem_pfn
+  * callback") (LP: #1738334)
+  * - drm/ttm: add ttm_bo_io_mem_pfn to check io_mem_pfn
+  * [Asus UX360UA] battery status in unity-panel is not changing when battery is
  being charged (LP: #1661876) // AC adapter status not detected on Asus
+  * ZenBook UX410UAK (LP: #1745032)
+  * - ACPI / battery: Add quirk for Asus UX360UA and UX410UAK
+  * ASUS UX305LA - Battery state not detected correctly (LP: #1482390)
+  * - ACPI / battery: Add quirk for Asus GL502VSK and UX305LA
+  * [18.04 FEAT] Automatically detect layer2 setting in the qeth device driver
  (LP: #1747639)
+ - s390/diag: add diag26c support for VNIC info
+ - s390/qeth: support early setup for z/VM NICs
+
+ * Bionic update to v4.15.7 stable release (LP: #1752317)
+ - netfilter: drop outermost socket lock in getsockopt()
+ - arm64: mm: don't write garbage into TTBR1_EL1 register
+ - kconfig.h: Include compiler types to avoid missed struct attributes
+ - MIPS: boot: Define __ASSEMBLY__ for its,S build
+ - xen: fix high memory/reserved memory collision
+ - scsi: ibmvfc: fix misspelled reserved field in ibmvfc_fcp_rsp_info
+ - MIPS: Drop spurious __unused in struct compat_flock
+ - cfg80211: fix cfg80211 Beacon_dup
+ - i2c: designware: must wait for enable
+ - i2c: bcm2835: Set up the rising/falling edge delays
+ - X.509: fix BUG_ON() when hash algorithm is unsupported
+ - X.509: fix NULL dereference when restricting key with unsupportedSig
+ - PKCS#7: fix certificate chain verification
+ - PKCS#7: fix certificate blacklisting
+ - extcon: int3496: process id-pin first so that we start with the right status
+ - genirq/matrix: Handle CPU offlining properly
+ - RDMA/uverbs: Protect from races between lookup and destroy of uobjects
+ - RDMA/uverbs: Protect from command mask overflow
+ - RDMA/uverbs: Fix bad unlock balance in ib_uverbs_close_xrcd
+ - RDMA/uverbs: Fix circular locking dependency
+ - RDMA/uverbs: Sanitize user entered port numbers prior to access it
+ - iio: adc: stm32: fix stm32h7_adc_enable error handling
+ - iio: srf08: fix link error "devm_iio_triggered_buffer_setup" undefined
+ - iio: buffer: check if a buffer has been set up when poll is called
+ - iio: adis_lib: Initialize trigger before requesting interrupt
+ - Kbuild: always define endianess in kconfig.h
+ - x86/apic/vector: Handle vector release on CPU unplug correctly
+ - x86/oprofile: Fix bogus GCC-8 warning in nmi_setup()
+ - mm, swap, frontswap: fix THP swap if frontswap enabled
+ - mm: don't defer struct page initialization for Xen pv guests
+ - uapi/ifEther.h: move __UAPI_DEF_ETHHDR libc define
+ - irqchip/gic-v3: Use wmb() instead of smb_wmb() in gic_raise_softirq()
+ - irqchip/mips-gic: Avoid spuriously handling masked interrupts
+ - PCI/cxgb4: Extend T3 PCI quirk to T4+ devices
+ - net: thunderbolt: Tear down connection properly on suspend
+ - net: thunderbolt: Run disconnect flow asynchronously when logout is received
+ - ohci-hcd: Fix race condition caused by ohci_urb_enqueue() and
+   io_watchdog_func()
+ - usb: ohci: Proper handling of ed_rm_list to handle race condition between
+   usb_kill_urb() and finish_unlinks()
+ - arm64: Remove unimplemented syscall log message
+ - arm64: Disable unhandled signal log messages by default
+ - arm64: cpufeature: Fix CTR_EL0 field definitions
+ - Add delay-init quirk for Corsair K70 RGB keyboards
- usb: host: ehci: use correct device pointer for dma ops
- usb: dwc3: gadget: Set maxpacket size for ep0 IN
- usb: dwc3: ep0: Reset TRB counter for ep0 IN
- usb: phy: mxs: Fix NULL pointer dereference on i.MX23/28
- usb: ldusb: add PIDs for new CASSY devices supported by this driver
- Revert "usb: musb: host: don't start next rx urb if current one failed"
- usb: gadget: f_fs: Process all descriptors during bind
- usb: gadget: f_fs: Use config_ep_by_speed()
- usb: renesas_usbhs: missed the "running" flag in usb_dmac with rx path
- drm/cirrus: Load lut in crtc_commit
- drm/atomic: Fix memleak on ERESTARTSYS during non-blocking commits
- drm: Handle unexpected holes in color-eviction
- drm/amdgpu: disable MMHUB power gating on raven
- drm/amdgpu: fix VA hole handling on Vega10 v3
- drm/amdgpu: Add dpm quirk for Jet PRO (v2)
- drm/amdgpu: only check mmBIF_IOV_FUNC_ID on tonga/fiji
- drm/amdgpu: Avoid leaking PM domain on driver unbind (v2)
- drm/amdgpu: add new device to use atpx quirk
- arm64: __show_regs: Only resolve kernel symbols when running at EL1
- drm/915/breadcrumbs: Ignore unsubmitted signalers
- microblaze: fix endian handling
- Linux 4.15.7

* [regression] Colour banding and artefacts appear system-wide on an Asus Zenbook UX303LA with Intel HD 4400 graphics (LP: #1749420) // Bionic update to v4.15.7 stable release (LP: #1752317)
- drm/edid: Add bpc quirk for CPT panel in Asus UX303LA

* errors with sas hotplug (LP: #1752146)
- scsi: libsas: fix memory leak in sas_smp_get_phy_events()
- scsi: libsas: fix error when getting phy events
- scsi: libsas: initialize sas PHY status according to response of DISCOVER
- scsi: libsas: Use dynamic alloced work to avoid sas event lost
- scsi: libsas: shut down the PHY if events reached the threshold
- scsi: libsas: make the event threshold configurable
- scsi: libsas: Use new workqueue to run sas event and disco event
- scsi: libsas: use flush_workqueue to process disco events synchronously
- scsi: libsas: direct call probe and destruct
- scsi: libsas: notify event PORTE_BROADCAST_RCVD in sas_enable_revalidation()

* rtnetlink: enable namespace identifying properties in rtnetlink requests
  (LP: #1748232)
  - rtnetlink: enable IFLA_IF_NETNSID in do_setlink()
  - rtnetlink: enable IFLA_IF_NETNSID for RTM_SETLINK
  - rtnetlink: enable IFLA_IF_NETNSID for RTM_DELLINK
  - rtnetlink: enable IFLA_IF_NETNSID for RTM_NEWLINK
  - rtnetlink: remove check for IFLA_IF_NETNSID
  - rtnetlink: require unique netns identifier
Open Source Used In 5GaaS Edge AC-4 18091

+ * Bionic update to v4.15.6 stable release (LP: #1752119)
+  - tun: fix tun_napi_alloc_frags() frag allocator
+  - ptr_ring: fail early if queue occupies more than Kmalloc_MAX_SIZE
+  - ptr_ring: try vmalloc() when kmalloc() fails
+  - selinux: ensure the context is NUL terminated in
+  - selinux: skip bounded transition processing if the policy isn't loaded
+  - media: pvrusb2: properly check endpoint types
+  - crypto: x86/twofish-3way - Fix %rbp usage
+  - staging: android: ion: Add __GFP_NOWARN for system contig heap
+  - staging: android: ion: Switch from WARN to pr_warn
+  - blk_rq_map_user_iov: fix error override
+  - KVM: x86: fix escape of guest dr6 to the host
+  - kcov: detect double association with a single task
+  - netfilter: x_tables: fix int overflow in xt_alloc_table_info()
+  - netfilter: x_tables: avoid out-of-bounds reads in
+  - xt_request_find__[match]target
+  - netfilter: ipt_CLUSTERIP: fix out-of-bounds accesses in clusterip_tg_check()
+  - netfilter: on sockopt() acquire sock lock only in the required scope
+  - netfilter: xt_cgroup: initialize info->priv in cgroup_mt_check_v1()
+  - netfilter: xt_RATEEST: acquire xt_rateest_mutex for hash insert
+  - rds: tcp: correctly sequence cleanup on netns deletion.
+  - rds: tcp: atomically purge entries from rds_tcp_conn_list during netns
+    delete
+  - net: avoid skb_warn_bad_offload on IS_ERR
+  - net_sched: gen_estimator: fix lockdep splat
+  - soc: qcom: mtfs_mem: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+  - ASoC: ux500: add MODULE_LICENSE tag
+  - video: fbdev/mmp: add MODULE_LICENSE
+  - ARM: 8743/1: bl_switcher: add MODULE_LICENSE tag
+  - arm64: dts: add #cooling-cells to CPU nodes
+  - dn_getsockoptdecrenet: move nf_{get/set}sockopt outside sock lock
+  - ANDROID: binder: remove WARN() for redundant txn error
+  - ANDROID: binder: synchronize_rcu() when using POLLFREE.
+  - staging: android: ashmem: Fix a race condition in pin ioctls
+  - binder: check for binder_thread allocation failure in binder_poll()
+  - binder: replace "%p" with "%pK"
+  - staging: fsl-hc: fix build testing on x86
+  - staging: iio: adc: ad7192: fix external frequency setting
+  - staging: iio: ad5933: switch buffer mode to software
+  - xhci: Fix NULL pointer in xhci debugfs
+  - xhci: Fix xhci debugfs devices node disappearance after hibernation
+  - xhci: xhci debugfs device nodes weren't removed after device plugged out
+  - xhci: fix xhci debugfs errors in xhci_stop
+  - usbip: keep usbip_device sockfd state in sync with tcp_socket
+  - crypto: s5p-sss - Fix kernel Oops in AES-ECB mode
+  - mei: me: add cannon point device ids
+ - mei: me: add cannon point device ids for 4th device
+ - vmalloc: fix __GFP_HIGHMEM usage for vmalloc_32 on 32b systems
+ - Linux 4.15.6
+ 
+ * Unable to insert test_bpf module on Bionic s390x (LP: #1751234)
+ - bpf: fix selftests/bpf test_kmod.sh failure when CONFIG_BPF_JIT_ALWAYS_ON=y
+ 
+ * [Ubuntu 18.04 FEAT] OpenCAPI enabling (LP: #1746988)
+ - powerpc/powernv: Introduce new PHB type for opencapi links
+ - powerpc/powernv: Set correct configuration space size for opencapi devices
+ - powerpc/powernv: Add opal calls for opencapi
+ - powerpc/powernv: Add platform-specific services for opencapi
+ - powerpc/powernv: Capture actag information for the device
+ - ocxl: Driver code for 'generic' opencapi devices
+ - ocxl: Add AFU interrupt support
+ - ocxl: Add a kernel API for other opencapi drivers
+ - ocxl: Add trace points
+ - ocxl: Add Makefile and Kconfig
+ - [Config] CONFIG_OCXL=m for ppc64el
+ - cxl: Remove support for "Processing accelerators" class
+ - ocxl: Documentation
+ - ocxl: add MAINTAINERS entry
+ - cxl: Add support for ASB_Notify on POWER9
+ 
+ * Request to update 18.04 kernel aacraid to upstream 4.16 version
+ (LP: #1746801)
+ - scsi: aacraid: remove unused variable managed_request_id
+ - scsi: aacraid: Do not attempt abort when Fw panicked
+ - scsi: aacraid: Do not remove offlined devices
+ - scsi: aacraid: Fix ioctl reset hang
+ - scsi: aacraid: Allow reset_host sysfs var to recover Panicked Fw
+ - scsi: aacraid: Refactor reset_host store function
+ - scsi: aacraid: Move code to wait for IO completion to shutdown func
+ - scsi: aacraid: Create bmic submission function from bmic identify
+ - scsi: aacraid: Change phy luns function to use common bmic function
+ - scsi: aacraid: Refactor and rename to make mirror existing changes
+ - scsi: aacraid: Add target setup helper function
+ - scsi: aacraid: Untangle targets setup from report phy luns
+ - scsi: aacraid: Move function around to match existing code
+ - scsi: aacraid: Create helper functions to get lun info
+ - scsi: aacraid: Save bmic phy information for each phy
+ - scsi: aacraid: Add helper function to set queue depth
+ - scsi: aacraid: Merge func to get container information
+ - scsi: aacraid: Process hba and container hot plug events in single function
+ - scsi: aacraid: Added macros to help loop through known buses and targets
+ - scsi: aacraid: Refactor resolve luns code and scsi functions
+ - scsi: aacraid: Merge adapter setup with resolve luns
+ - scsi: aacraid: Block concurrent hotplug event handling
- scsi: aacraid: Use hotplug handling function in place of scsi_scan_host
- scsi: aacraid: Reschedule host scan in case of failure
- scsi: aacraid: Fix hang while scanning in eh recovery
- scsi: aacraid: Skip schedule rescan in case of kdump
- scsi: aacraid: Remove unused rescan variable
- scsi: aacraid: Remove AAC_HIDE_DISK check in queue command
- scsi: aacraid: Fix driver oops with dead battery
- scsi: aacraid: remove redundant setting of variable c
- scsi: aacraid: Get correct lun count
- scsi: aacraid: Delay for rescan worker needs to be 10 seconds

+ * [18.04] kpatch - Add livepatch hook support for ppc64le (LP: #1741992)
+ powerpc/modules: Add REL24 relocation support of livepatch symbols
+ powerpc/modules: Don't try to restore r2 after a sibling call
+ powerpc/modules: Improve restore_r2() error message

+ * Ubuntu 18.04 - Include latest ibmvnic fixes in Ubuntu kernel (LP: #1748517)
+ ibmvnic: Rename IBMVNIC_MAX_TX_QUEUES to IBMVNIC_MAX_QUEUES
+ ibmvnic: Increase maximum number of RX/TX queues
+ ibmvnic: Include header descriptor support for TX packets
+ ibmvnic: Don't handle RX interrupts when not up.
+ ibmvnic: Wait for device response when changing MAC
+ ibmvnic: fix firmware version when no firmware level has been provided by
  the VIOS server
+ ibmvnic: fix empty firmware version and errors cleanup
+ ibmvnic: Fix rx queue cleanup for non-fatal resets
+ ibmvnic: Ensure that buffers are NULL after free
+ ibmvnic: queue reset when CRQ gets closed during reset
+ ibmvnic: Reset long term map ID counter
+ ibmvnic: Remove skb->protocol checks in ibmvnic_xmit
+ ibmvnic: Wait until reset is complete to set carrier on
+ ibmvnic: Fix login buffer memory leaks
+ ibmvnic: Fix NAPI structures memory leak
+ ibmvnic: Free RX socket buffer in case of adapter error
+ ibmvnic: Clean RX pool buffers during device close
+ ibmvnic: Check for NULL skb's in NAPI poll routine
+ ibmvnic: Fix early release of login buffer

+ * Power9 DD 2.2 needs HMI fixup backport of upstream
  patch(d075745d893c78730e4a3b7a60fca23c2f764081) into kernel (LP: #1751834)
+ KVM: PPC: Book3S HV: Improve handling of debug-trigger HMIs on POWER9

+ * Driver not found in Ubuntu kernel does not detect interface (LP: #1745927)
+ d-i: add cxgb4 to nic-modules

+ * BCM5719/tg3 loses connectivity due to missing heartbeats between fw and
  driver (LP: #1751337)
* tg3: APE heartbeat changes

* Miscellaneous Ubuntu changes
  - ubuntu: vbox -- update to 5.2.6-dfsg-5
  - Revert "UBUNTU: SAUCE: Import aufs driver"
  - SAUCE: Import aufs driver
  - Revert "UBUNTU: SAUCE: (no-up) Convert bnx2x firmware files to ihex format"
  - [Packaging] retpoline-extract: flag *0xNNN(%reg) branches
  - [Config] fix up retpoline abi files
  - ubuntu: vbox -- update to 5.2.8-dfsg-2

-- Seth Forshee <seth.forshee@canonical.com>  Wed, 07 Mar 2018 17:36:23 +0100

+ linux (4.15.0-11.12) bionic; urgency=medium

* linux: 4.15.0-11.12 -proposed tracker (LP: #1751285)

* Support low-pin-count devices on Hisilicon SoCs (LP: #1677319)
  - [Config] CONFIG_INDIRECT_PIO=y
  - SAUCE: LIB: Introduce a generic PIO mapping method
  - SAUCE: PCI: Remove unused __weak attribute in pci_register_io_range()
  - SAUCE: PCI: Add fwnode handler as input param of pci_register_io_range()
  - SAUCE: PCI: Apply the new generic I/O management on PCI IO hosts
  - SAUCE: OF: Add missing I/O range exception for indirect-I0 devices
  - [Config] CONFIG_HISILICON_LPC=y
  - SAUCE: HSI LPC: Support the LPC host on Hip06/Hip07 with DT bindings
  - SAUCE: ACPI / scan: do not enumerate Indirect IO host children
  - SAUCE: HSI LPC: Add ACPI support
  - SAUCE: MAINTAINERS: Add maintainer for HiSilicon LPC driver

* Bionic update to v4.15.5 stable release (LP: #1751131)
  - scsi: smartpqi: allow static build ("built-in")
  - IB/umad: Fix use of unprotected device pointer
  - IB/qib: Fix comparison error with qperf compare/swap test
  - IB/mlx4: Fix incorrectly releasing steerable UD QPs when have only ETH ports
  - IB/core: Fix two kernel warnings triggered by rxe registration
  - IB/core: Fix ib_wc structure size to remain in 64 bytes boundary
  - IB/core: Avoid a potential OOPs for an unused optional parameter
  - selftests: seccomp: fix compile error seccomp_bpf
  - kselftest: fix OOM in memory compaction test
  - RDMA/rxe: Fix a race condition related to the QP error state
  - RDMA/rxe: Fix a race condition in rxe_requester()
  - RDMA/rxe: Fix rxe_qp_cleanup()
  - cpufreq: powernv: Dont assume distinct pstate values for nominal and pmin
  - PM / devfreq: Propagate error from devfreq_add_device()
  - mwifiex: resolve reset vs. remove()/shutdown() deadlocks
  - ocfs2: try a blocking lock before return AOP_TRUNCATED_PAGE
  - trace_uprobe: Display correct offset in uprobe_events
+ - powerpc/radix: Remove trace_tlbie call from radix__flush_tlb_all
+ - powerpc/kernel: Block interrupts when updating TIDR
+ - powerpc/vas: Don't set uses_vas for kernel windows
+ - powerpc/numa: Invalidate numa_cpu_lookup_table on cpu remove
+ - powerpc/mm: Flush radix process translations when setting MMU type
+ - powerpc/xive: Use hw CPU ids when configuring the CPU queues
+ - dma-buf: fix reservation_object_wait_timeout_rcu once more v2
+ - s390: fix handling of -1 in set[.,fs][gu]id16 syscalls
+ - arm64: dts: msm8916: Correct ipc references for smssm
+ - ARM: lpc3250: fix uda1380 gpio numbers
+ - ARM: dts: STi: Add gpio polarity for "hdmi,hpd-gpio" property
+ - ARM: dts: nomadik: add interrupt-parent for clcd
+ - arm: dts: mt7623: fix card detection issue on bananapi-r2
+ - arm: spear600: Add missing interrupt-parent of rtc
+ - arm: spear13xx: Fix dmas cells
+ - arm: spear13xx: Fix spics gpio controller's warning
+ - x86/gpu: add CFL to early quirks
+ - x86/kexec: Make kexec (mostly) work in 5-level paging mode
+ - x86/xen: init %gs very early to avoid page faults with stack protector
+ - x86: PM: Make APM idle driver initialize polling state
+ - mm, memory_hotplug: fix memmap initialization
+ - x86/entry/64: Clear extra registers beyond syscall arguments, to reduce
  speculation attack surface
+ - x86/entry/64/compat: Clear registers for compat syscalls, to reduce
  speculation attack surface
+ - compiler-gcc.h: Introduce __optimize function attribute
+ - compiler-gcc.h: __nostackprotector needs gcc-4.4 and up
+ - crypto: sun4i_ss_prng - fix return value of sun4i_ss_prng_generate
+ - crypto: sun4i_ss_prng - convert lock to _bh in sun4i_ss_prng_generate
+ - powerpc/mm/radix: Split linear mapping on hot-unplug
+ - x86/mm/pti: Fix PTI comment in entry_SYSCALL_64()
+ - x86/speculation: Update Speculation Control microcode blacklist
+ - x86/speculation: Correct Speculation Control microcode blacklist again
+ - Revert "x86/speculation: Simplify indirect_branch_prediction_barrier()"
+ - KVM/x86: Reduce retropine performance impact in slot_handle_level_range(),
  by always inlining iterator helper methods
+ - X86/nVMX: Properly set spec_ctl and pred_cmd before merging MSRs
+ - KVM/nVMX: Set the CPU_BASED_USE_MSR_BITMAPS if we have a valid L02 MSR
+ - bitmap
+ - x86/speculation: Clean up various Spectre related details
+ - PM / runtime: Update links_count also if !CONFIG_SRCU
+ - PM: cpuidle: Fix cpuidle_poll_state_init() prototype
+ - platform/x86: wmi: fix off-by-one write in wmi_dev_probe()
+ - x86/entry/64: Clear registers for exceptions/interrupts, to reduce
  speculation attack surface
+ - x86/entry/64: Merge SAVE_C_REGS and SAVE_EXTRA_REGS, remove unused
  extensions
+ - x86/entry/64: Merge the POP_C_REGS and POP_EXTRA_REGS macros into a single
+ POP_REGS macro
+ - x86/entry/64: Interleave XOR register clearing with PUSH instructions
+ - x86/entry/64: Introduce the PUSH_AND_CLEAN_REGS macro
+ - x86/entry/64: Use PUSH_AND_CLEAN_REGS in more cases
+ - x86/entry/64: Get rid of the ALLOC_PT_GPREGS_ON_STACK and SAVE_AND_CLEAR_REGS macros
+ - x86/entry/64: Indent PUSH_AND_CLEAR_REGS and POP_REGS properly
+ - x86/entry/64: Fix paranoid_entry() frame pointer warning
+ - x86/entry/64: Remove the unused 'icebp' macro
+ - selftests/x86: Fix vDSo selftest segfault for vsyscall=none
+ - selftests/x86: Clean up and document sscanf() usage
+ - selftests/x86/pkeys: Remove unused functions
+ - selftests/x86: Fix build bug caused by the 5lvl test which has been moved to the VM directory
+ - selftests/x86: Do not rely on "int $0x80" in test_mremap_vdso.c
+ - gfs2: Fixes to "Implement iomap for block_map"
+ - selftests/x86: Do not rely on "int $0x80" in single_step_syscall.c
+ - selftests/x86: Disable tests requiring 32-bit support on pure 64-bit systems
+ - objtool: Fix segfault in ignore_unreachable_insn()
+ - x86/debug, objtool: Annotate WARN()-related UD2 as reachable
+ - x86/debug: Use UD2 for WARN()
+ - x86/speculation: Fix up array_index_nospec_mask() asm constraint
+ - nospec: Move array_index_nospec() parameter checking into separate macro
+ - x86/speculation: Add <asm/msr-index.h> dependency
+ - x86/mm: Rename flush_tlb_single() and flush_tlb_one() to __flush_tlb_one_[user|kernel]()
+ - selftests/x86/mpx: Fix incorrect bounds with old _sigfault
+ - x86/cpu: Rename cpu_data.x86_mask to cpu_data.x86_stepping
+ - x86/spectre: Fix an error message
+ - x86/cpu: Change type of x86_cache_size variable to unsigned int
+ - x86/entry/64: Fix CR3 restore in paranoid_exit()
+ - drm/ttm: Don't add swapped BOs to swap-LRU list
+ - drm/ttm: Fix 'buf' pointer update in ttm_bo_vm_access_kmap() (v2)
+ - drm/qxl: unref cursor bo when finished with it
+ - drm/qxl: reapply cursor after resetting primary
+ - drm/amd/powerplay: Fix smu_table_entry.handle type
+ - drm/ast: Load lut in crtc_commit
+ - drm: Check for lessee in DROP_MASTER ioctl
+ - arm64: Add missing Falkor part number for branch predictor hardening
+ - drm/radeon: Add dpm quirk for Jet PRO (v2)
+ - drm/radeon: adjust tested variable
+ - x86/smpboot: Fix uncore_pci_remove() indexing bug when hot-removing a physical CPU
+ - rtc-opal: Fix handling of firmware error codes, prevent busy loops
+ - mbcache: initialize entry->e_referenced in mb_cache_entry_create()
+ - mmc: sdhci: Implement an SDHCI-specific bounce buffer
+ - mmc: bcm2835: Don't overwrite max frequency unconditionally
+ - Revert "mmc: meson-gx: include tx phase in the tuning process"
+ - mlx5: fix mlx5_get_vector_affinity to start from completion vector 0
+ - Revert "apple-gmux: lock iGP IO to protect from vgaarb changes"
+ - jbd2: fix sphinx kernel-doc build warnings
+ - ext4: fix a race in the ext4 shutdown path
+ - ext4: save error to disk in __ext4_grp_locked_error()
+ - ext4: correct documentation for grpid mount option
+ - mm: hide a #warning for COMPILE_TEST
+ - mm: Fix memory size alignment in devm_memremap_pages_release()
+ - MIPS: Fix typo BIG_ENDIAN to CPU_BIG_ENDIAN
+ - MIPS: CPS: Fix MIPS_ISA_LEVEL_RAW fallout
+ - MIPS: Fix incorrect mem=X@Y handling
+ - PCI: Disable MSI for HiSilicon Hip06/Hip07 only in Root Port mode
+ - PCI: iproc: Fix NULL pointer dereference for BCMA
+ - PCI: pcihp: Assume NoCompl+ for Thunderbolt ports
+ - PCI: keystone: Fix interrupt-controller-node lookup
+ - video: fbdev: atmel_lcdfb: fix display-timings lookup
+ - console/dummy: leave .con_font_get set to NULL
+ - rbd: whitelist RBD_FEATURE_OPERATIONS feature bit
+ - xen: Fix [set.clear]_foreign_p2m_mapping on autotranslating guests
+ - xenbus: track caller request id
+ - seq_file: fix incomplete reset on read from zero offset
+ - tracing: Fix parsing of globs with a wildcard at the beginning
+ - mpls, nospec: Sanitize array index in mpls_label_ok()
+ - rtlwifi: rtl8821ae: Fix connection lost problem correctly
+ - arm64: proc: Set PTE/ng for table entries to avoid traversing them twice
+ - xprtdma: Fix calculation of ri_max_send_sges
+ - xprtdma: Fix BUG after a device removal
+ - blk-wbt: account flush requests correctly
+ - target/iscsi: avoid NULL dereference in CHAP auth error path
+ - iscsi-target: make sure to wake up sleeping login worker
+ - dm: correctly handle chained bios in dec_pending()
+ - Btrfs: fix deadlock in run_delalloc_nocow
+ - Btrfs: fix crash due to not cleaning up tree log block's dirty bits
+ - Btrfs: fix extent state leak from tree log
+ - Btrfs: fix btrfs_evict_inode to handle abnormal inodes correctly
+ - Btrfs: fix use-after-free on root->orphan_block_rsv
+ - Btrfs: fix unexpected -EEXIST when creating new inode
+ - 9p/trans_virtio: discard zero-length reply
+ - ALSA: usb-audio: Fix UAC2 get_ctl request with a RANGE attribute
+ - ALSA: hda/realtek - Add headset mode support for Dell laptop
+ - ALSA: hda/realtek - Enable Thinkpad Dock device for ALC298 platform
+ - ALSA: hda/realtek: PCI quirk for Fujitsu U7x7
+ - ALSA: usb-audio: add implicit fb quirk for Behringer UFX1204
+ - ALSA: usb: add more device quirks for USB DSD devices
+ - ALSA: seq: Fix racy pool initializations
+ - mvpp2: fix multicast address filter
+ - usb: Move USB_UHCI_BIG_ENDIAN_* out of USB_SUPPORT
- x86/mm, mm/hwpoison: Don't unconditionally unmap kernel 1:1 pages
- ARM: dts: exynos: fix RTC interrupt for exynos5410
- ARM: pxa/tosabt: add MODULE_LICENSE tag
- arm64: dts: msm8916: Add missing #phy-cells
- ARM: dts: s5pv210: add interrupt-parent for ohci
- arm: dts: mt7623: Update ethsys binding
- arm: dts: mt2701: Add reset-cells
- ARM: dts: Delete bogus reference to the charlcd
- media: r820t: fix r820t_write_reg for KASAN
- mmc: sdhci-of-esdhc: fix eMMC couldn't work after kexec
- mmc: sdhci-of-esdhc: fix the mmc error after sleep on ls1046ardb
- Linux 4.15.5

* retropine abi files are empty on i386 (LP: #1751021)
  - [Packaging] retropine-extract -- instantiate retopline files for i386
  - [Packaging] final-checks -- sanity checking ABI contents
  - [Packaging] final-checks -- check for empty retropine files
  - [Config] Disable i386 retropine check for next upload

* Bionic update to v4.15.4 stable release (LP: #1751064)
  - watchdog: indydog: Add dependency on SGI_HAS_INDYDOG
  - cifs: Fix missing put_xid in cifs_file_strict_mmap
  - cifs: Fix autonegotiate security settings mismatches
  - CIFS: zero sensitive data when freeing
  - cpufreq: mediatek: add mediatek related projects into blacklist
  - dmabengine: dmatest: fix container_of member in dmatest_callback
  - sbb: Do not disable PCI host on non-Mips
  - watchdog: gpio_wdt: set WDOG_HW_RUNNING in gpio_wdt_stop
  - Revert "drm/i915: mark all device info struct with __initconst"
  - sched/rte: Use container_of() to get root domain in rto_push_irq_work_func()
  - sched/rte: Up the root domain ref count when passing it around via IPIs
  - media: dvb-usb-v2: lmedm04: Improve logic checking of warm start
  - media: dvb-usb-v2: lmedm04: move ts2020 attach to dm04_lme2510_tuner
  - media: hdpvr: Fix an error handling path in hdpvr_probe()
  - arm64: mm: Use non-global mappings for kernel space
  - arm64: mm: Temporarily disable ARM64_SW_TTBRO_PAN
  - arm64: mm: Move ASID from TTBRO to TTBRI
  - arm64: mm: Remove pre_ttb0_update_workaround for Falkor erratum #E1003
  - arm64: mm: Rename post_ttb0_update_workaround
  - arm64: mm: Fix and re-enable ARM64_SW_TTBRO_PAN
  - arm64: mm: Allocate ASIDs in pairs
  - arm64: mm: Add arm64_kernel_unmapped_at_el0 helper
  - arm64: mm: Invalidate both kernel and user ASIDs when performing TLBI
  - arm64: entry: Add exception trampoline page for exceptions from EL0
  - arm64: mm: Map entry trampoline into trampoline and kernel page tables
  - arm64: entry: Explicitly pass exception level to kernel_ventry macro
  - arm64: entry: Hook up entry trampoline to exception vectors
  - arm64: erratum: Work around Falkor erratum #E1003 in trampoline code
- arm64: cpu_errata: Add Kryo to Falkor 1003 errata
- arm64: tls: Avoid unconditional zeroing of tpidro_el0 for native tasks
- arm64: entry: Add fake CPU feature for unmapping the kernel at EL0
- arm64: kaslr: Put kernel vectors address in separate data page
- arm64: use RET instruction for exiting the trampoline
- arm64: Kconfig: Add CONFIG_UNMAP_KERNEL_AT_EL0
- arm64: Kconfig: Reword UNMAP_KERNEL_AT_EL0 kconfig entry
- arm64: Take into account ID_AA64PFR0_EL1.CSV3
- arm64: capabilities: Handle duplicate entries for a capability
- arm64: mm: Introduce TTBR_ASID_MASK for getting at the ASID in the TTBR
- arm64: kpti: Fix the interaction between ASID switching and software PAN
- arm64: cpuprobe: Add MIDR values for Cavium ThunderX2 CPUs
- arm64: kpti: Make use of nG dependent on arm64_kernel_unmapped_at_el0()
- arm64: mm: Permit transitioning from Global to Non-Global without BBM
- arm64: kpti: Add ->enable callback to remap swapper using nG mappings
- arm64: Force KPTI to be disabled on Cavium ThunderX
- arm64: entry: Reword comment about post_ttbrr_update_workaround
- arm64: idmap: Use "awx" flags for .idmap.text.pushsection directives
- perf: arm_spe: Fail device probe when arm64_kernel_unmapped_at_el0()
- arm64: barrier: Add CSDB macros to control data-value prediction
- arm64: Implement array_index_mask_nospec()
- arm64: Make USER_DS an inclusive limit
- arm64: Use pointer masking to limit uaccess speculation
- arm64: entry: Ensure branch through syscall table is bounded under speculation
- arm64: uaccess: Prevent speculative use of the current addr_limit
- arm64: uaccess: Don't bother eliding access_ok checks in __arch__(get, put)_user
- arm64: uaccess: Mask __user pointers for __arch__(clear, copy_*)_user
- arm64: futex: Mask __user pointers prior to dereference
- arm64: cpufeature: __this_cpu_has_cap() shouldn't stop early
- arm64: Run enable method for errata work arounds on late CPUs
- arm64: cpufeature: Pass capability structure to ->enable callback
- drivers/firmware: Expose psci_get_version through psci_ops structure
- arm64: Move post_ttbrr_update_workaround to C code
- arm64: Add skeleton to harden the branch predictor against aliasing attacks
- arm64: Move BP hardening to check_and_switch_context
- arm64: KVM: Use per-CPU vector when BP hardening is enabled
- arm64: entry: Apply BP hardening for high-priority synchronous exceptions
- arm64: entry: Apply BP hardening for suspicious interrupts from EL0
- arm64: cpufeature: Add missing MIDR values for Cortex-A72 and Cortex-A75
- arm64: Implement branch predictor hardening for affected Cortex-A CPUs
- arm64: Implement branch predictor hardening for Falkor
- arm64: Branch predictor hardening for Cavium ThunderX2
- arm64: KVM: Increment PC after handling an SMC trap
- arm/arm64: KVM: Consolidate the PSCI include files
- arm/arm64: KVM: Add PSCI_VERSION helper
- arm/arm64: KVM: Add smccc accessors to PSCI code
- arm/arm64: KVM: Implement PSCI 1.0 support
+ - arm/arm64: KVM: Advertise SMCCC v1.1
+ - arm64: KVM: Make PSCI VERSION a fast path
+ - arm/arm64: KVM: Turn kvm_psci_version into a static inline
+ - arm64: KVM: Report SMCCC_ARCH_WORKAROUND_1 BP hardening support
+ - arm64: KVM: Add SMCCC_ARCH_WORKAROUND_1 fast handling
+ - firmware/psci: Expose PSCI conduit
+ - firmware/psci: Expose SMCCC version through psci_ops
+ - arm/arm64: smccc: Make function identifiers an unsigned quantity
+ - arm/arm64: smccc: Implement SMCCC v1.1 inline primitive
+ - arm64: Add ARM_SMCCC_ARCH_WORKAROUND_1 BP hardening support
+ - arm64: Kill PSCI_GET_VERSION as a variant-2 workaround
+ - mtd: cfi: convert inline functions to macros
+ - mtd: nand: brcmnd: Disable prefetch by default
+ - mtd: nand: Fix nand_do_read_oob() return value
+ - mtd: nand: sunix: Fix ECC strength choice
+ - ubi: Fix race condition between ubi volume creation and udev
+ - ubi: fastmap: Erase outdated anchor PEBs during attach
+ - ubi: block: Fix locking for idr_alloc/idr_remove
+ - ubifs: free the encrypted symlink target
+ - nfs/pnfs: fix nfs_direct_req ref leak when i/o falls back to the mds
+ - nfs41: do not return ENOMEM on LAYOUTUNAVAILABLE
+ - NFS: Add a cond_resched() to nfs_commit_release_pages()
+ - NFS: Fix nfsstat breakage due to LOOKUPPP
+ - NFS: commit direct writes even if they fail partially
+ - NFS: request reject for id_legacy key without auxdata
+ - NFS: Fix a race between mmap() and O_DIRECT
+ - nfsd: Detect unhashed stids in nfsd4_verify_open_stid()
+ - kernfs: fix regression in kernfs_fop_write caused by wrong type
+ - ahci: Annotate PCI ids for mobile Intel chipsets as such
+ - ahci: Add PCI ids for Intel Bay Trail, Cherry Trail and Apollo Lake AHCI
+ - ahci: Add Intel Cannon Lake PCH-H PCI ID
+ - crypto: hash - introduce crypto_hash_alg_has_setkey()
+ - crypto: cryptd - pass through absence of ->setkey()
+ - crypto: mcryptd - pass through absence of ->setkey()
+ - crypto: poly1305 - remove ->setkey() method
+ - crypto: hash - annotate algorithms taking optional key
+ - crypto: hash - prevent using keyed hashes without setting key
+ - media: v4l2-ioctl.c: use check_fmt for enum/g/s/try_fmt
+ - media: v4l2-ioctl.c: don't copy back the result for -ENOTTY
+ - media: v4l2-compat-ioctl32.c: add missing VIOIC_PREPARE_BUF
+ - media: v4l2-compat-ioctl32.c: fix the indentation
+ - media: v4l2-compat-ioctl32.c: move 'helper' functions to
+     __get/put_v4l2_format32
+ - media: v4l2-compat-ioctl32.c: drop pr_info for unknown buffer type
+ - media: v4l2-compat-ioctl32.c: don't copy back the result for certain errors
+ - media: v4l2-compat-ioctl32.c: refactor compat ioctl32 logic
+ - media: v4l2-compat-ioctl32.c: make ctrl_is_pointer work for subdevs
+ - crypto: caam - fix endless loop when DECO acquire fails
+ - crypto: sha512-mb - initialize pending lengths correctly
+ - crypto: talitos - fix Kernel Oops on hashing an empty file
+ - arm: KVM: Fix SMCCC handling of unimplemented SMC/HVC calls
+ - KVM: nVMX: Fix races when sending nested PI while dest enters/leaves L2
+ - KVM: nVMX: Fix bug of injecting L2 exception into L1
+ - KVM: PPC: Book3S HV: Make sure we don't re-enter guest without XIVE loaded
+ - KVM: PPC: Book3S HV: Drop locks before reading guest memory
+ - KVM: arm/arm64: Handle CPU_PM_ENTER_FAILED
+ - KVM: PPC: Book3S PR: Fix broken select due to misspelling
+ - ASoC: acpi: fix machine driver selection based on quirk
+ - ASoC: rockchip: i2s: fix playback after runtime resume
+ - ASoC: skl: Fix kernel warning due to zero NHTL entry
+ - ASoC: compress: Correct handling of copy callback
+ - watchdog: imx2_wdt: restore previous timeout after suspend+resume
+ - afs: Add missing afs_put_cell()
+ - afs: Need to clear responded flag in addr cursor
+ - afs: Fix missing cursor clearance
+ - afs: Fix server list handling
+ - btrfs: Handle btrfs_set_extent_delalloc failure in fixup worker
+ - Btrfs: raid56: iterate raid56 internal bio with bio_for_each_segment_all
+ - kasan: don't emit builtin calls when sanitization is off
+ - kasan: rework Kconfig settings
+ - media: dvb_frontend: be sure to init dvb_frontend_handle_ioctl() return code
+ - media: dvb-frontends: fix i2c access helpers for KASAN
+ - media: dt-bindings/media/cec-gpio.txt: mention the CEC/HPD max voltages
+ - media: ts2020: avoid integer overflows on 32 bit machines
+ - media: vivid: fix module load error when enabling fb and no_error_inj=1
+ - media: cxusb, dib0700: ignore XC2028_I2C_FLUSH
+ - fs/proc/kcore.c: use probe_kernel_read() instead of memcpy()
+ - kernel/async.c: revert "async: simplify lowest_in_progress()"
+ - kernel/relay.c: revert "kernel/relay.c: fix potential memory leak"
+ - pipe: actually allow root to exceed the pipe buffer limits
+ - pipe: fix off-by-one error when checking buffer limits
+ - HID: quirks: Fix keyboard + touchpad on Toshiba Click Mini not working
+ - Bluetooth: btsdio: Do not bind to non-removable BCM43341
+ - ipmi: use dynamic memory for DMI driver override
+ - signal/openrisc: Fix do_unaligned_access to send the proper signal
+ - signal/sh: Ensure si_signo is initialized in do_divide_error
+ - alpha: fix crash if pthread_create races with signal delivery
+ - alpha: osf_sys.c: fix put_tv32 regression
+ - alpha: Mix up args in EXC macro in futex operations
+ - alpha: fix reboot on Avanti platform
+ - alpha: fix formatting of stack content
+ - xtensa: fix futex_atomic_cmpxchg_inatomic

Open Source Used In 5GaaS Edge AC-4 18101
+ - EDAC, octeon: Fix an uninitialized variable warning
+ - genirq: Make legacy autoprobing work again
+ - pinctrl: intel: Initialize GPIO properly when used through irqchip
+ - pinctrl: mcp23s08: fix irq setup order
+ - pinctrl: sx150x: Unregister the pinctrl on release
+ - pinctrl: sx150x: Register pinctrl before adding the gpiochip
+ - pinctrl: sx150x: Add a static gpio/pinctrl pin range mapping
+ - pktcdvd: Fix pkt_setup_dev() error path
+ - pktcdvd: Fix a recently introduced NULL pointer dereference
+ - blk-mq: quiesce queue before freeing queue
+ - clocksource/drivers/stm32: Fix kernel panic with multiple timers
+ - lib/ubsan.c: s/missaligned/misaligned/
+ - lib/ubsan: add type mismatch handler for new GCC/Clang
+ - objtool: Fix switch-table detection
+ - arm64: dts: marvell: add Ethernet aliases
+ - drm/i915: Avoid PPS HW/SW state mismatch due to rounding
+ - ACPI: sbshc: remove raw pointer from printk() message
+ - acpi, nfit: fix register dimm error handling
+ - ovl: force r/o mount when index dir creation fails
+ - ovl: fix failure to fsync lower dir
+ - ovl: take mnt_want_write() for work/index dir setup
+ - ovl: take mnt_want_write() for removing impure xattr
+ - ovl: hash directory inodes for fsnotify
+ - mm/300/misalignment: Use SIGSEGV SEGV_MAPERR to report a failed user copy
+ - devpts: fix error handling in devpts_mntget()
+ - ftrace: Remove incorrect setting of glob search field
+ - scsi: core: Ensure that the SCSI error handler gets woken up
+ - scsi: lpfc: Fix crash after bad bar setup on driver attachment
+ - scsi: cxlflash: Reset command ioasc
+ - rcu: Export init_rcu_head() and destroy_rcu_head() to GPL modules
+ - Linux 4.15.4
+ - updateconfigs after v4.14.4 stable updates

+ * Bionic update to v4.15.4 stable release (LP: #1751064) // CVE-2017-5754 and
do not need KPTI when KASLR is off.
+ - arm64: Turn on KPTI only on CPUs that need it
+ * Miscellaneous Ubuntu changes
+ - [Config] fix up removed retpoline call sites

+ -- Seth Forshee <seth.forshee@canonical.com>  Fri, 23 Feb 2018 08:31:06 -0600

+ * linux (4.15.0-10.11) bionic; urgency=medium
+ * linux: 4.15.0-10.11 -proposed tracker (LP: #1749250)
+ * "swiotlb: coherent allocation failed" dmesg spam with linux 4.15.0-9.10
+ (LP: #1749202)
+  - swiotlb: suppress warning when __GFP_NOWARN is set
+  - drm/ttm: specify DMA_ATTR_NO_WARN for huge page pools
+  + linux-tools: perf incorrectly linking libbfd (LP: #1748922)
+  + SAUCE: tools -- add ability to disable libbfd
+  + [Packaging] correct disablement of libbfd
+  +  * Artful] Realtek ALC225: 2 secs noise when a headset plugged in
+  + (LP: #1744058)
+  +  - ALSA: hda/realtek - update ALC225 depop optimize
+  +  + [Artful] Support headset mode for DELL WYSE (LP: #1723913)
+  +  - SAUCE: ALSA: hda/realtek - Add support headset mode for DELL WYSE
+  +  + headset mic can't be detected on two Dell machines (LP: #1748807)
+  +  - ALSA: hda/realtek - Support headset mode for ALC215/ALC285/ALC289
+  +  - ALSA: hda - Fix headset mic detection problem for two Dell machines
+  +  + Bionic update to v4.15.3 stable release (LP: #1749191)
+  +  - ip6mr: fix stale iterator
+  +  - net: igmp: add a missing rcu locking section
+  +  - qlcnic: fix deadlock bug
+  +  - qmi_wwan: Add support for Quectel EP06
+  +  - r8169: fix RTL8168EP take too long to complete driver initialization.
+  +  - tcp: release sk_frag.page in tcp_disconnect
+  +  - vhost_net: stop device during reset owner
+  +  - ipv6: addrconf: break critical section in addrconf_verify_rtnl()
+  +  - ipv6: change route cache aging logic
+  +  - Revert "defer call to mem_cgroup_sk_alloc()"
+  +  - net: ipv6: send unsolicited NA after DAD
+  +  - rocker: fix possible null pointer dereference in rocker_router_fib_event_work
+  +  - tcp_bbr: fix pacing_gain to always be unity when using lt_bw
+  +  - cls_u32: add missing RCU annotation.
+  +  - ipv6: Fix SO_REUSEPORT UDP socket with implicit sk_ipv6only
+  +  - soreuseport: fix mem leak in reseport_add_sock()
+  +  - net_sched: get rid of rcu_barrier() in tcf_block_put_ext()
+  +  - net: sched: fix use-after-free in tcf_block_put_ext
+  +  - media: mtk-vcodec: add missing MODULE_LICENSE/DESCRIPTION
+  +  - media: soc_camera: soc_scale_crop: add missing
+  +  - MODULE_DESCRIPTION/AUTHOR/LICENSE
+  +  - media: tegra-cec: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+  +  - gpio: unphier: fix mismatch between license text and MODULE_LICENSE
+  +  - crypto: t crypt - fix S/G table for test_aead_speed()
+  +  - Linux 4.15.3
+  +  + bnx2x_attn_int_deasserted3:4323 MC assert! (LP: #1715519) //
+  + CVE-2018-1000026
+ - net: create skb_gso_validate_mac_len()
+ - bnx2x: disable GSO where gso_size is too big for hardware
+* ethtool -p fails to light NIC LED on HiSilicon D05 systems (LP: #1748567)
+ - net: hns: add ACPI mode support for ethtool -p
+* CVE-2017-5715 (Spectre v2 Intel)
+ - [Packaging] retpoline files must be sorted
+ - [Packaging] pull in retpoline files
+* [Feature] PXE boot with Intel Omni-Path (LP: #1712031)
+ - d-i: Add hfi1 to nic-modules
+* CVE-2017-5715 (Spectre v2 retpoline)
+ - [Packaging] retpoline -- add call site validation
+ - [Config] disable retpoline checks for first upload
+* Do not duplicate changelog entries assigned to more than one bug or CVE
+ (LP: #1743383)
+ - [Packaging] git-ubuntu-log -- handle multiple bugs/cves better
+
+-- Seth Forshee <seth.forshee@canonical.com>  Tue, 13 Feb 2018 11:33:58 -0600
+
+linux (4.15.0-9.10) bionic; urgency=medium
+
+* linux: 4.15.0-9.10 -proposed tracker (LP: #1748244)
+
+* Miscellaneous Ubuntu changes
+ - [Debian] tests -- remove gcc-multilib dependency for arm64
+
+-- Seth Forshee <seth.forshee@canonical.com>  Thu, 08 Feb 2018 11:25:04 -0600
+
+linux (4.15.0-8.9) bionic; urgency=medium
+
+* linux: 4.15.0-8.9 -proposed tracker (LP: #1748075)
+
+* Bionic update to v4.15.2 stable release (LP: #1748072)
+ - KVM: x86: Make indirect calls in emulator speculation safe
+ - KVM: VMX: Make indirect call speculation safe
+ - module/retpoline: Warn about missing retpoline in module
+ - x86/cpufeatures: Add CPUID_7_EDX CPUID leaf
+ - x86/cpufeatures: Add Intel feature bits for Speculation Control
+ - x86/cpufeatures: Add AMD feature bits for Speculation Control
+ - x86/msr: Add definitions for new speculation control MSRs
+ - x86/pti: Do not enable PTI on CPUs which are not vulnerable to Meltdown
+ - x86/cpufeature: Blacklist SPEC_CTRL/PRED_CMD on early Spectre v2 microcodes
+ - x86/speculation: Add basic IBPB (Indirect Branch Prediction Barrier) support
+ - x86/alternative: Print unadorned pointers
+ - x86/nospec: Fix header guards names
+ - x86/bugs: Drop one "mitigation" from dmesg
+ - x86/cpu/bugs: Make retpoline module warning conditional
+ - x86/cpu/features: Clean up Spectre v2 related CPUID flags
+ - x86/retpoline: Simplify vmexit_fill_RSB()
+ - x86/speculation: Simplify indirect_branch_prediction_barrier()
+ - auxdisplay: img-ascii-lcd: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - iio: adc/accel: Fix up module licenses
+ - pinctrl: pxa: pxa2xx: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - ASoC: pcm512x: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - KVM: nVMX: Eliminate vmcs02 pool
+ - KVM: VMX: introduce alloc_loaded_vmcs
+ - objtool: Improve retpoline alternative handling
+ - objtool: Add support for alternatives at the end of a section
+ - objtool: Warn on stripped section symbol
+ - x86/mm: Fix overlap of i386 CPU_ENTRY_AREA with FIX_BTMAP
+ - x86/spectre: Check CONFIG_RETPOLINE in command line parser
+ - x86/entry/64: Remove the SYSCALL64 fast path
+ - x86/entry/64: Push extra regs right away
+ - x86/asm: Move 'status' from thread_struct to thread_info
+ - Documentation: Document array_index_nospec
+ - array_index_nospec: Sanitize speculative array de-references
+ - x86: Implement array_index_mask_nospec
+ - x86: Introduce barrier_nospec
+ - x86: Introduce __uaccess_begin_nospec() and uaccess_try_nospec
+ - x86/usercopy: Replace open coded stac/clac with __uaccess_{begin, end}
+ - x86/uaccess: Use __uaccess_begin_nospec() and uaccess_try_nospec
+ - x86/get_user: Use pointer masking to limit speculation
+ - x86/syscall: Sanitize syscall table de-references under speculation
+ - vfs, ftable: Prevent bounds-check bypass via speculative execution
+ - nl80211: Sanitize array index in parse_rxq_params
+ - x86/spectre: Report get_user mitigation for spectre_v1
+ - x86/spectre: Fix spelling mistake: "vunerable"-> "vulnerable"
+ - x86/cpuid: Fix up "virtual" IBRS/IBPB/STIBP feature bits on Intel
+ - x86/speculation: Use Indirect Branch Prediction Barrier in context switch
+ - x86/paravirt: Remove 'noreplace-paravirt' cmdline option
+ - KVM: VMX: make MSR bitmaps per-VCPU
+ - x86/kvm: Update spectre-v1 mitigation
+ - x86/retpoline: Avoid retpolines for built-in __init functions
+ - x86/spectre: Simplify spectre_v2 command line parsing
+ - x86/pti: Mark constant arrays as __initconst
+ - x86/speculation: Fix typo IBRS_ATT, which should be IBRS_ALL
+ - KVM/x86: Update the reverse_cpuid list to include CPUID_7_EDX
+ - KVM/x86: Add IBPB support
+ - KVM/VMX: Emulate MSR_IA32_ARCH_CAPABILITIES
+ - KVM/VMX: Allow direct access to MSR_IA32_SPEC_CTRL
+ - KVM/SVM: Allow direct access to MSR_IA32_SPEC_CTRL
+ - serial: core: mark port as initialized after successful IRQ change
+ fpga: region: release of_parse_phandle nodes after use
+ Linux 4.15.2

+ * Add support for the NIC on SynQuacer E-Series boards (LP: #1747792)
  + - net: phy: core: remove now unneeded disabling of interrupts
  + [Config] CONFIG_NET_VENDOR_SOCIONEXT=y & CONFIG_SNI_NETSEC=m
  + - net: socionext: Add Synquacer NetSec driver
  + - net: socionext: include linux/io.h to fix build
  + - net: socionext: Fix error return code in netsec_netdev_open()

+ * [Artful/Bionic] [Config] enable EDAC_GHES for ARM64 (LP: #1747746)
  + - [Config] CONFIG_EDAC_GHES=y

+ * support thunderx2 vendor pmu events (LP: #1747523)
  + - perf pmu: Pass pmu as a parameter to get_cpuid_str()
  + - perf tools arm64: Add support for get_cpuid_str function.
  + - perf pmu: Add helper function is_pmu_core to detect PMU CORE devices
  + - perf vendor events arm64: Add ThunderX2 implementation defined pmu core events
  + - perf pmu: Add check for valid cpuid in perf_pmu__find_map()

+ * linux 4.14.0-7.9 ADT test failure with linux 4.14.0-7.9 (LP: #1732463)
  + - SAUCE: mm: disable vma based swap readahead by default
  + - SAUCE: mm: fix memory hotplug in ZONE_HIGHMEM

+ * Miscellaneous Ubuntu changes
  + - [Config] Fix CONFIG_PROFILE_ALL_BRANCHES annotations

++-- Seth Forshee <seth.forshee@canonical.com> Wed, 07 Feb 2018 21:13:27 -0600
++
++linux (4.15.0-7.8) bionic; urgency=medium
++
++ * Bionic update to v4.15.1 stable release (LP: #1747169)
  + - Bluetooth: hci_serdev: Init hci_uart proto_lock to avoid oops
  + - tools/gpio: Fix build error with musl libc
  + - gpio: stmpe: i2c transfer are forbidden in atomic context
  + - gpio: Fix kernel stack leak to userspace
  + - ALSA: hda - Reduce the suspend time consumption for ALC256
  + - crypto: ecdh - fix typo in KPP dependency of CRYPTO_ECDH
  + - crypto: aesni - handle zero length dst buffer
  + - crypto: aesni - fix typo in generic_gcm_aes_decrypt
  + - crypto: aesni - add wrapper for generic gcm(aes)
  + - crypto: aesni - Fix out-of-bounds access of the data buffer in generic-gcm-aesni
  + - crypto: aesni - Fix out-of-bounds access of the AAD buffer in generic-gcm-aesni
  + - crypto: inside-secure - fix hash when length is a multiple of a block
  + - crypto: inside-secure - avoid unmapping DMA memory that was not mapped
Open Source Used In 5GaaS Edge AC-4  18107

+ crypto: sha3-generic - fixes for alignment and big endian operation
+ crypto: af_alg - whitelist mask and type
+ - HID: wacom: EKR: ensure devres groups at higher indexes are released
+ - HID: wacom: Fix reporting of touch toggle (WACOM_HID_WD_MUTE_DEVICE) events
+ - power: reset: zx-reboot: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - gpio: iop: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - gpio: ath79: add missing MODULE_DESCRIPTION/LICENSE
+ - mtd: nand: denali_pci: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - igb: Free IRQs when device is hotplugged
+ - ima/policy: fix parsing of fsuuid
+ - scsi: aacraid: Fix udev inquiry race condition
+ - scsi: aacraid: Fix hang in kdump
+ - scsi: storvsc: missing error code in storvsc_probe()
+ - staging: lustre: separate a connection destroy from free struct kib_conn
+ - staging: ccree: NULLify backup_info when unused
+ - staging: ccree: fix fips event irq handling build
+ - tty: fix data race between tty_init_dev and flush of buf
+ - usb: option: Add support for FS040U modem
+ - USB: serial: pl2303: new device id for Chilitag
+ - USB: cdc-acm: Do not log urb submission errors on disconnect
+ - CDC-ACM: apply quirk for card reader
+ - USB: serial: io_edgeport: fix possible sleep-in-atomic
+ - usbip: prevent bind loops on devices attached to vhci_hcd
+ - usbip: list: don't list devices attached to vhci_hcd
+ - USB: serial: simple: add Motorola Tetra driver
+ - usb: f_fs: Prevent gadget unbind if it is already unbound
+ - usb: uas: unconditionally bring back host after reset
+ - usb/gadget: Fix "high bandwidth" check in usb_gadget_ep_match_desc()
+ - ANDROID: binder: remove waitqueue when thread exits.
+ - android: binder: use VM_ALLOC to get vm area
+ - mei: me: allow runtime pm for platform with D0i3
+ - serial: 8250_of: fix return code when probe function fails to get reset
+ - serial: 8250_uniphier: fix error return code in uniphier_uart_probe()
+ - serial: 8250_dw: Revert "Improve clock rate setting"
+ - serial: imx: Only wakeup via RTSDEN bit if the system has RTS/CTS
+ - spi: imx: do not access registers while clocks disabled
+ - iio: adc: stm32: fix scan of multiple channels with DMA
+ - iio: chemical: ccs811: Fix output of IIO_CONCENTRATION channels
+ - test_firmware: fix missing unlock on error in config_num_requests_store()
+ - Input: synaptics-rmi4 - unmask F03 interrupts when port is opened
+ - Input: synaptics-rmi4 - do not delete interrupt memory too early
+ - x86/efi: Clarify that reset attack mitigation needs appropriate userspace
+ - Linux 4.15.1

* Dell XPS 13 9360 bluetooth (Atheros) won't connect after resume
  (LP: #1744712)
* Revert "Bluetooth: btusb: fix QCA Rome suspend/resume"
* Bluetooth: btusb: Restore QCA Rome suspend/resume fix with a "rewritten"
version

* apparmor profile load in stacked policy container fails (LP: #1746463)
  - SAUCE: apparmor: fix display of .ns_name for containers

-- Seth Forshee <seth.forshee@canonical.com>  Sun, 04 Feb 2018 11:56:32 +0100
+linux (4.15.0-6.7) bionic; urgency=low

* upload urgency should be medium by default (LP: #1745338)
  - [Packaging] update urgency to medium by default

* Shutdown hang on 16.04 with iscsi targets (LP: #1569925)
  - scsi: libiscsi: Allow sd_shutdown on bad transport

* Miscellaneous Ubuntu changes
  - SAUCE: (noup) Update spl to 0.7.5-1ubuntu1, zfs to 0.7.5-1ubuntu1
  - Revert "UBUNTU: SAUCE: mm: fix memory hotplug in ZONE_HIGHMEM"
  - Revert "UBUNTU: SAUCE: mm: disable vma based swap readahead by default"

[ Upstream Kernel Changes ]

-- Seth Forshee <seth.forshee@canonical.com>  Mon, 29 Jan 2018 08:47:07 -0600
+linux (4.15.0-5.6) bionic; urgency=low

* $(LOCAL_ENV_CC) and $(LOCAL_ENV_DISTCC_HOSTS) should be properly quoted
  (LP: #1744077)
  - [Debian] pass LOCAL_ENV_CC and LOCAL_ENV_DISTCC_HOSTS properly

* Missing install-time driver for QLogic QED 25/40/100Gb Ethernet NIC
  (LP: #1743638)
  - [d-i] Add qede to nic-modules udeb

* boot failure on AMD Raven + WesternXT (LP: #1742759)
  - SAUCE: drm/amdgpu: add atpx quirk handling (v2)

* Unable to handle kernel NULL pointer dereference at isci_task_abort_task
  (LP: #1726519)
  - SAUCE: Revert "scsi: libsas: allow async aborts"

* Update Ubuntu-4.15.0 config to support Intel Atom devices (LP: #1739939)
  - [Config] CONFIG_SERIAL_DEV_BUS=y, CONFIG_SERIAL_DEV_CTRL_TTYPORT=y

* Miscellaneous Ubuntu changes
  - Rebase to v4.15-rc7
+    - [Config] CONFIG_CPU_ISOLATION=y
+    - [Config] Update annotations following config review
+    - Revert "UBUNTU: SAUCE: Import aufs driver"
+    - SAUCE: Import aufs driver
+    - ubuntu: vbox -- update to 5.2.6-dfsg-1
+    - ubuntu: vbox: build fixes for 4.15
+    - ubuntu: vbox -- update to 5.2.6-dfsg-2
+    - hio: updates for timer api changes in 4.15
+    - enable hio build
+    - Rebase to v4.15-rc9
+    
+    + [ Upstream Kernel Changes ]
+    
+    +  * Rebase to v4.15-rc9
+    +    
+    + -- Seth Forshee <seth.forshee@canonical.com> Mon, 22 Jan 2018 10:16:05 -0600
+    +    +linux (4.15.0-4.5) bionic; urgency=low
+    +    +  * [0cf3:e010] QCA6174A XR failed to pair with bt 4.0 device (LP: #1741166)
+    +    +  - SAUCE: Bluetooth: btusb: Add support for 0cf3:e010
+    +    +  * External HDMI monitor failed to show screen on Lenovo X1 series
+    +    + (LP: #1738523)
+    +    +  - SAUCE: drm/i915: Disable writing of TMDS_OE on Lenovo ThinkPad X1 series
+    +    +  * Miscellaneous Ubuntu changes
+    +    +  - [Debian] autoreconstruct - add resoration of execute permissions
+    +    +    
+    +    + [ Upstream Kernel Changes ]
+    +    +  * Rebase to v4.15-rc4
+    +    +    
+    +    + -- Seth Forshee <seth.forshee@canonical.com> Wed, 10 Jan 2018 10:24:22 -0600
+    +    +    +linux (4.15.0-3.4) bionic; urgency=low
+    +    +    +  * ubuntu.xr-usb-serial didn't get built in zesty and artful (LP: #1733281)
+    +    +    +  - SAUCE: make sure ubuntu.xr-usb-serial builds for x86
+    +    +    + [ Upstream Kernel Changes ]
+    +    +    +  * Rebase to v4.15-rc6
+    +    +    +    
+    +    +    + -- Seth Forshee <seth.forshee@canonical.com> Wed, 03 Jan 2018 20:20:43 -0600
+    +    +    +    +linux (4.15.0-2.3) bionic; urgency=low
+    +    +    +    +
+ * nvidia-graphics-drivers-384 384.90-0ubuntu6 ADT test failure with linux
+ 4.15.0-1.2 (LP: #1737752)
+ - x86/mm: Unbreak modules that use the DMA API
+
+ * Ubuntu 17.10 corrupting BIOS - many LENOVO laptops models (LP: #1734147)
+ - [Config] CONFIG_SPI_INTEL_SPI_*=n
+
+ * power: commonise configs IBMVETH/IBMVSCSI and ensure both are in linux-image
+ and udebs (LP: #1521712)
+ - [Config] Include ibmvnic in nic-modules
+
+ * Enable arm64 emulation of removed ARMv7 instructions (LP: #1545542)
+ - [Config] Enable support for emulation of deprecated ARMv8 instructions
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: (noup) Update spl with 4.15 compat fix (LP: #1737761)
+ - Enable zfs build
+ - [Debian] add icp to zfs-modules.ignore
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.15-rc4
+
+- Seth Forshee <seth.forshee@canonical.com> Mon, 18 Dec 2017 09:27:13 -0600
+
+linux (4.15.0-1.2) bionic; urgency=low
+
+ * Disabling zfs does not always disable module checks for the zfs modules
+ (LP: #1737176)
+ - [Packaging] disable zfs module checks when zfs is disabled
+
+ * Miscellaneous Ubuntu changes
+ - [Config] CONFIG_UNWINDER_FRAME_POINTER=y for amd64
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.15-rc3
+
+- Seth Forshee <seth.forshee@canonical.com> Sun, 10 Dec 2017 22:07:19 -0600
+
+linux (4.15.0-0.1) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - ubuntu: vbox -- update to 5.2.2-dfsg-2
+ - ubuntu: vbox: build fixes for 4.15
+ - disable hio build
+ - [Config] Update kernel lockdown options to fix build errors
+ - Disable zfs build
- SAUCE: Import aufs driver
- [Config] Enable AUFS config options

[ Upstream Kernel Changes ]

* Rebase to v4.15-rc2

-- Seth Forshee <seth.forshee@canonical.com> Fri, 08 Dec 2017 13:55:42 -0600

+linux (4.14.0-11.13) bionic; urgency=low

* linux: 4.14.0-11.13 -proposed tracker (LP: #1736168)

* CVE-2017-1000405
  - mm, thp: Do not make page table dirty unconditionally in touch_p[mu]d()

* linux 4.14.0-7.9 ADT test failure with linux 4.14.0-7.9 (LP: #1732463)
  - SAUCE: mm: disable vma based swap readahead by default
  - SAUCE: mm: fix memory hotplug in ZONE_HIGHMEM

* Bionic update to v4.14.3 stable release (LP: #1735843)
  - s390: fix transactional execution control register handling
  - s390/noexec: execute kexec datamover without DAT
  - s390/runtime instrumentation: fix possible memory corruption
  - s390/guarded storage: fix possible memory corruption
  - s390/disassembler: add missing end marker for e7 table
  - s390/disassembler: increase show_code buffer size
  - ACPI / PM: Fix acpi_pm_notifier_lock vs flush_workqueue() deadlock
  - ACPI / EC: Fix regression related to triggering source of EC event handling
  - cpufreq: schedutil: Reset cached_raw_freq when not in sync with next_freq
  - serdev: fix registration of second slave
  - sched: Make resched_cpub() unconditional
  - lib/mpi: call cond_resched() from mpi_powm() loop
  - x86/boon: Fix boot failure when SMP MP-table is based at 0
  - x86/decoder: Add new TEST instruction pattern
  - x86/entry/64: Fix entry_SYSCALL_64_after_hwframe() IRQ tracing
  - x86/entry/64: Add missing irqflags tracing to native_load_gs_index()
  - perf/x86/intel: Hide TSX events when RTM is not supported
  - arm64: Implement arch-specific pte_access_permitted()
  - ARM: 8722/1: mm: make STRICT_KERNEL_RWX effective for LPAE
  - ARM: 8721/1: mm: dump: check hardware RO bit for LPAE
  - uapi: fix linux/tls.h userspace compilation error
  - uapi: fix linux/rxrpc.h userspace compilation errors
  - MIPS: cmpxchg64() and HAVE_VIRT_CPU_ACCOUNTING_GEN don't work for 32-bit SMP
  - MIPS: ralink: Fix MT7628 pinmux
  - MIPS: ralink: Fix typo in mt7628 pinmux function
  - net: mvneta: fix handling of the Tx descriptor counter
  - nbd: wait uninterruptible for the dead timeout
+ nbd: don't start req until after the dead connection logic
+ PM / OPP: Add missing of_node_put(np)
+ PCI/ASPM: Account for downstream device's Port Common_Mode_Restore_Time
+ PCI/ASPM: Use correct capability pointer to program LTR_L1.2_THRESHOLD
+ PCI: hv: Use effective affinity mask
+ PCI: Set Cavium ACS capability quirk flags to assert RR/CR/SV/UF
+ PCI: Apply Cavium ThunderX ACS quirk to more Root Ports
+ ALSA: hda: Add Raven PCI ID
+ dm integrity: allow unaligned bv_offset
+ dm cache: fix race condition in the writeback mode overwrite_bio optimisation
+ dm crypt: allow unaligned bv_offset
+ dm zoned: ignore last smaller runt zone
+ dm mpath: remove annoying message of 'blk_get_request() returned -11'
+ dm bufio: fix integer overflow when limiting maximum cache size
+ ovf: Put upperdentry if ovf_check_origin() fails
+ dm: allocate struct mapped_device with kvzalloc
+ sched/rt: Simplify the IPI based RT balancing logic
+ MIPS: pci: Remove KERN_WARN instance inside the mt7620 driver
+ dm: fix race between dm_get_from_kobject() and __dm_destroy()
+ dm: discard support requires all targets in a table support discards
+ MIPS: Fix odd fp register warnings with MIPS64r2
+ MIPS: Fix MIPS64 FP save/restore on 32-bit kernels
+ MIPS: dts: remove bogus bcm96358nb4ser.dtb from dtb-y entry
+ MIPS: Fix an n32 core file generation regset support regression
+ MIPS: BCM47XX: Fix LED inversion for WRT54GSv1
+ MIPS: math-emu: Fix final emulation phase for certain instructions
+ rt2x00usb: mark device removed when get ENOENT usb error
+ mm/z3fold.c: use kref to prevent page free/compact race
+ autos: don't fail mount for transient error
+ nilfs2: fix race condition that causes file system corruption
+ fsck: lock mutex before checking for bounce page pool
+ eCryptfs: use after free in ecryptfs_release_messaging()
+ libceph: don't WARN() if user tries to add invalid key
+ bcache: check ca->alloc_thread initialized before wake up it
+ fs: guard_bio_eod() needs to consider partitions
+ fanotify: fix fsnotify_prepare_user_wait() failure
+ isofs: fix timestamps beyond 2027
+ btrfs: change how we decide to commit transactions during flushing
+ f2fs: expose some sectors to user in inline data or dentry case
+ NFS: Fix typo in nomigration mount option
+ NFS: Revert "NFS: Move the flock open mode check into nfs_flock()"
+ nfs: Fix ugly referral attributes
+ NFS: Avoid RCU usage in tracepoints
+ NFS: revalidate "." etc correctly on "open".
+ nfsd: deal with revoked delegations appropriately
+ rtlwifi: rtl8192ee: Fix memory leak when loading firmware
+ rtlwifi: fix uninitialized rthal->last_suspend_sec time
- iwlwifi: fix firmware names for 9000 and A000 series hw
- md: fix deadlock error in recent patch.
- md: don't check MD_SB_CHANGE_CLEAN in md_allow_write
- Bluetooth: btqcomsmd: Add support for BD address setup
- md_bitmap: revert a patch
- fsnotify: clean up fsnotify_prepare/finish_user_wait()
- fsnotify: pin both inode and vfs mount mark
- fsnotify: fix pinning group in fsnotify_prepare_user_wait()
- ata: fixes kernel crash while tracing ata eh_link_autopsy event
- ext4: fix interaction between i_size, fallocate, and delalloc after a crash
- ext4: prevent data corruption with inline data + DAX
- ext4: prevent data corruption with journaling + DAX
- ALSA: pcm: update tsamp only if audio_tstamp changed
- ALSA: usb-audio: Add sanity checks to FE parser
- ALSA: usb-audio: Fix potential out-of-bound access at parsing SU
- ALSA: usb-audio: Add sanity checks in v2 clock parsers
- ALSA: timer: Remove kernel warning at compat ioctl error paths
- ALSA: hda/realtek: Fix ALC275 no sound issue
- ALSA: hda: Fix too short HDMI/DP chmap reporting
- ALSA: hda - Fix yet remaining issue with vmaster 0dB initialization
- ALSA: hda/realtek: Fix ALC700 family no sound issue
- ASoC: sun8i-codec: Invert Master / Slave condition
- ASoC: sun8i-codec: Fix left and right channels inversion
- ASoC: sun8i-codec: Set the BCLK divider
- mfd: lpc_ich: Avoton/Rangeley uses SPL_BYT method
- fix a page leak in vhost_scsi iov_to_sgl() error recovery
- 9p: Fix missing commas in mount options
- fs/9p: Compare qid.path in v9fs_test_inode
- net/9p: Switch to wait_event_killable()
- scsi: qla2xxx: Suppress a kernel complaint in qla_init_base_qpair()
- scsi: sd_zbc: Fix sd_zbc_read_zoned_characteristics()
- scsi: lpfc: fix pci hot plug crash in timer management routines
- scsi: lpfc: fix pci hot plug crash in list_add call
- scsi: lpfc: Fix crash receiving ELS while detaching driver
- scsi: lpfc: Fix FCP hba_wqidx assignment
- scsi: lpfc: Fix oops if nvnet_fc_register_targetport fails
- iscsi-target: Make TASK_REASSIGN use proper se_cmd->cmd_kref
- iscsi-target: Fix non-immediate TMR reference leak
- target: fix null pointer regression in core_tmr_drain_tmr_list
- target: fix buffer offset in core_scsi3_pri_read_full_status
- target: Fix QUEUE_FULL + SCSI task attribute handling
- target: Fix caw_sem leak in transport_generic_request_failure
- target: Fix queue during transport_write_pending_qf endless loop
- target: Avoid early CMD_T_PRE_EXECUTE failures during ABORT_TASK
- mtd: Avoid probe failures when mtd->dbg.dfs_dir is invalid
- mtd: nand: Export nand_reset() symbol
- mtd: nand: atmel: Actually use the PM ops
- mtd: nand: omap2: Fix subpage write
+ mtd: nand: mtk: fix infinite ECC decode IRQ issue
+ mailbox: bcm-flexrm-mailbox: Fix FlexRM ring flush sequence
+ p54: don't unregister leds when they are not initialized
+ block: Fix a race between blk_cleanup_queue() and timeout handling
+ raid1: prevent freeze_array/wait_all_barriers deadlock
+ genirq: Track whether the trigger type has been set
+ irqchip/gic-v3: Fix ppi-partitions lookup
+ lockd: double unregister of inetaddr notifiers
+ KVM: PPC: Book3S HV: Don't call real-mode XICS hypercall handlers if not enabled
+ KVM: nVMX: set IDTR and GDTR limits when loading L1 host state
+ KVM: SVM: obey guest PAT
+ kvm: vmx: Reinstate support for CPUs without virtual NMI
+ dax: fix PMD faults on zero-length files
+ dax: fix general protection fault in dax_alloc_inode
+ SUNRPC: Fix tracepoint storage issues with svc_recv and svc_rqst_status
+ clk: ti: dra7-ati-clock: fix child-node lookups
+ libnvmdimm, dimm: clear 'locked' status on successful DIMM enable
+ libnvmdimm, pfn: make 'resource' attribute only readable by root
+ libnvmdimm, namespace: fix label initialization to use valid seq numbers
+ libnvmdimm, region: make 'resource' attribute only readable by root
+ ssvrdma: Preserve CB send buffer across retransmits
+ IB/srpt: Do not accept invalid initiator port names
+ IB/cm: Fix memory corruption in handling CM request
+ IB/hfi1: Fix incorrect available receive user context count
+ IB/srp: Avoid that a cable pull can trigger a kernel crash
+ IB/core: Avoid crash on pkey enforcement failed in received MADs
+ IB/core: Only maintain real QPs in the security lists
+ IBM: fix device-allocation error return
+ spi-nor: intel-spi: Fix broken software sequencing codes
+ i40e: Use smp_rmb rather than read_barrier_depends
+ igb: Use smp_rmb rather than read_barrier_depends
+ igbvf: Use smp_rmb rather than read_barrier_depends
+ ixgbevf: Use smp_rmb rather than read_barrier_depends
+ i40evf: Use smp_rmb rather than read_barrier_depends
+ fm10k: Use smp_rmb rather than read_barrier_depends
+ ixgbe: Fix skb list corruption on Power systems
+ parisc: Fix validity check of pointer size argument in new CAS implementation
+ powerpc: Fix boot on BOOK3S_32 with CONFIG STRICT KERNEL_RWX
+ powerpc/mm/radix: Fix crashes on Power9 DD1 with radix MMU and STRICT_RWX
+ powerpc/perf/icmp: Use cpu_to_node() not topology_physical_package_id()
+ powerpc/signal: Properly handle return value from uprobe_delay_signal()
+ powerpc/64s: Fix masking of SRR1 bits on instruction fault
+ powerpc/64s/radix: Fix 128TB-512TB virtual address boundary case allocation
+ powerpc/64s/hash: Fix 512T hint detection to use >= 128T
* powerpc/64s/hash: Fix 128TB-512TB virtual address boundary case allocation
* powerpc/64s/hash: Fix fork() with 512TB process address space
* powerpc/64s/hash: Allow MAP_FIXED allocations to cross 128TB boundary
* media: Don't do DMA on stack for firmware upload in the AS102 driver
* media: rc: check for integer overflow
* media: rc: nec decoder should not send both repeat and keycode
* cx231xx-cards: fix NULL-deref on missing association descriptor
* media: v4l2-ctrl: Fix flags field on Control events
* media: venus: fix wrong size on dma_free
* media: venus: venc: fix bytesused v4l2_plane field
* media: venus: reimplement decoder stop command
* ARM64: dts: meson-gxl: Add alternate ARM Trusted Firmware reserved memory zone
* iwlwifi: fix wrong struct for a000 device
* iwlwifi: add a new a000 device
* iwlwifi: pcie: sort IDs for the 9000 series for easier comparisons
* iwlwifi: add new cards for a000 series
* iwlwifi: add new cards for 8265 series
* iwlwifi: add new cards for 8260 series
* iwlwifi: fix PCI IDs and configuration mapping for 9000 series
* iwlwifi: mvm: support version 7 of the SCAN_REQ_UMAC FW command
* e1000e: Fix error path in link detection
* e1000e: Fix return value test
* e1000e: Separate signaling for link check/link up
* e1000e: Avoid receiver overrun interrupt bursts
* e1000e: fix buffer overrun while the I219 is processing DMA transactions
* Linux 4.14.3

* Miscellaneous Ubuntu changes
* SAUCE: s390/topology: don't inline cpu_to_node
* SAUCE: (noup) Update spl to 0.7.3-1ubuntu1, zfs to 0.7.3-1ubuntu1

-- Seth Forshee <seth.forshee@canonical.com> Mon, 04 Dec 2017 09:08:07 -0600

+linux (4.14.0-10.12) bionic; urgency=low
+* linux: 4.14.0-10.12 -proposed tracker (LP: #1734901)

* Miscellaneous Ubuntu changes
* SAUCE: Enable the ACPI kernel debugger and acpidbg tool
* [Packaging] Include arch/arm64/kernel/ftrace-mod.o in headers package

-- Seth Forshee <seth.forshee@canonical.com> Tue, 28 Nov 2017 08:46:49 -0600

+linux (4.14.0-9.11) bionic; urgency=low
+* linux: 4.14.0-9.11 -proposed tracker (LP: #1734728)
Open Source Used In 5GasS Edge AC-4  18116

+ * Miscellaneous Ubuntu changes
+ - Revert "UBUNTU: SAUCE: (noup) Update spl to 0.7.3-1ubuntu1, zfs to
  0.7.3-1ubuntu1"
+ 
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 27 Nov 2017 12:44:48 -0600
+ 
+ * Bionic update to v4.14.2 stable release (LP: #1734694)
+ + - bio: ensure __bio_clone_fast copies bi_partno
+ + - af_netlink: ensure that NLMSG_DONE never fails in dumps
+ + - vxlan: fix the issue that neigh proxy blocks all icmpv6 packets
+ + - net: cdc_ncm: GetNtbFormat endian fix
+ + - fealnx: Fix building error on MIPS
+ + - net/scctp: Always set scope_id in sctp_inet6_skb_msgname
+ + - ima: do not update security ima if appraisal status is not INTEGRITY_PASS
+ + - serial: omap: Fix EFR write on RTS deassertion
+ + - serial: 8250_fintek: Fix finding base_port with activated SuperIO
+ + - tpm-dev-common: Reject too short writes
+ + - rcu: Fix up pending cbs check in rcu_prepare_for_idle
+ + - mm/pagewalk.c: report holes in hugetlb ranges
+ + - ocfs2: fix cluster hang after a node dies
+ + - ocfs2: should wait dio before inode lock in ocfs2_setattr()
+ + - ipmi: fix unsigned long underflow
+ + - mm/page_alloc.c: broken deferred calculation
+ + - mm/page_ext.c: check if page_ext is not prepared
+ + - coda: fix 'kernel memory exposure attempt' in fsync
+ + - ipmi: Prefer ACPI system interfaces over SMBIOS ones
+ + - Linux 4.14.2
+ 
+ * Bionic update to v4.14.1 stable release (LP: #1734693)
+ + - EDAC, sb_edac: Don't create a second memory controller if HA1 is not present
+ + - dmaengine: dmatest: warn user when dma test times out
+ + - media: imon: Fix null-ptr-deref in imon_probe
+ + - media: dib0700: fix invalid dvb_detach argument
+ + - crypto: dh - Fix double free of ctx->p
+ + - crypto: dh - Don't permit 'p' to be 0
+ + - crypto: dh - Don't permit 'key' or 'g' size longer than 'p'
+ + - crypto: brcm - Explicity ACK mailbox message
+ + - USB: early: Use new USB product ID and strings for DbC device
+ + - USB: usbfs: compute urb->actual_length for isochronous
+ + - USB: Add delay-init quirk for Corsair K70 LUX keyboards
+ + - usb: gadget: f_fs: Fix use-after-free in ffs_free_inst
+ + - USB: serial: metro-usb: stop I/O after failed open
+ + - USB: serial: Change DbC debug device binding ID
+ + - USB: serial: qcserial: add pid/vid for Sierra Wireless EM7355 fw update
+ - USB: serial: garmin_gps: fix I/O after failed probe and remove
+ - USB: serial: garmin_gps: fix memory leak on probe errors
+ - selftests/x86/protection_keys: Fix syscall NR redefinition warnings
+ - x86/MCE/AMD: Always give panic severity for UC errors in kernel context
+ - platform/x86: peaq-wmi: Add DMI check before binding to the WMI interface
+ - platform/x86: peaq_wmi: Fix missing terminating entry for peaq_dmi_table
+ - HID: cp2112: add HIDRAW dependency
+ - HID: wacom: generic: Recognize WACOM_HID WD PEN as a type of pen collection
+ - rpmsg: glink: Add missing MODULE_LICENSE
+ - staging: wile1000: Fix bssid buffer offset in Txq
+ - staging: sm750fb: Fix parameter mistake in poke32
+ - staging: ccree: fix 64 bit scatter/gather DMA ops
+ - staging: greybus: spilib: fix use-after-free after deregistration
+ - staging: rtl8188eu: Revert 4 commits breaking ARP
+ - spi: fix use-after-free at controller deregistration
+ - sparc32: Add cmpxchg64().
  + - sparc64: mmu_context: Add missing include files
  + - sparc64: Fix page table walk for PUD hugepages
+ - Linux 4.14.1

+ * Set PANIC_TIMEOUT=10 on Power Systems (LP: #1730660)
+ - [Config]: Set PANIC_TIMEOUT=10 on ppc64el
+
+ * enable CONFIG_SND_SOC_INTEL_BYT_CHT_NOCODEC_MACH easily confuse users
  + (LP: #1732627)
+ - [Config] CONFIG_SND_SOC_INTEL_BYT_CHT_NOCODEC_MACH=n
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: (noup) Update spl to 0.7.3-1ubuntu1, zfs to 0.7.3-1ubuntu1
+
+ - Seth Forshee <seth.forshee@canonical.com> Mon, 27 Nov 2017 07:43:44 -0600
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: apparmor: add base infrastructure for socket mediation
  + - SAUCE: apparmor: af_unix mediation
  + - SAUCE: LSM stacking: procfs: add smack subdir to attr
  + - SAUCE: LSM stacking: LSM: manage credential security blobs
  + - SAUCE: LSM stacking: LSM: Manage file security blobs
  + - SAUCE: LSM stacking: LSM: manage task security blobs
  + - SAUCE: LSM stacking: LSM: Infrastructure management of the remaining blobs
  + - SAUCE: LSM stacking: LSM: general but not extreme module stacking
  + - SAUCE: LSM stacking: LSM: Complete task_alloc hook
  + - SAUCE: LSM stacking: fixup procfs: add smack subdir to attr
  + - SAUCE: LSM stacking: fixup initialize task->security
  + - SAUCE: LSM stacking: fixup: alloc_task_ctx is dead code
  + - SAUCE: LSM stacking: add support for stacking getpeersec_stream

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+ - SAUCE: LSM stacking: add stacking support to apparmor network hooks
+ - SAUCE: LSM stacking: fixup apparmor stacking enablement
+ - SAUCE: LSM stacking: fixup stacking kconfig
+ - SAUCE: LSM stacking: allow selecting multiple LSMs using kernel boot params
+ - SAUCE: LSM stacking: provide prctl interface for setting context
+ - SAUCE: LSM stacking: inherit current display LSM
+ - SAUCE: LSM stacking: keep an index for each registered LSM
+ - SAUCE: LSM stacking: verify display LSM
+ - SAUCE: LSM stacking: provide a way to specify the default display lsm
+ - SAUCE: LSM stacking: make sure LSM blob align on 64 bit boundaries
+ - SAUCE: LSM stacking: add /proc/<pid>/attr/display_lsm
+ - SAUCE: LSM stacking: add Kconfig to set default display LSM
+ - SAUCE: LSM stacking: add configs for LSM stacking
+ - SAUCE: LSM stacking: check for invalid zero sized writes
+ - [Config] Run updateconfigs after merging LSM stacking
+ - [Config] CONFIG_AMD_MEM_ENCRYPT=y
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.14
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 13 Nov 2017 08:12:08 -0600
+
+ linux (4.14.0-6.8) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: add workarounds to enable ZFS for 4.14
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.14-rc8
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 06 Nov 2017 11:39:00 -0600
+
+ linux (4.14.0-5.7) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - [Debian] Fix invocation of dh_prep for dbgsym packages
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 31 Oct 2017 07:07:23 -0500
+
+ linux (4.14.0-4.5) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - [Packaging] virtualbox -- reduce in kernel module versions
+ - vbox-update: Fix up KERN_DIR definitions
+ - ubuntu: vbox -- update to 5.2.0-dfsg-2
+ - [Config] CONFIG_AMD_MEM_ENCRYPT=n
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.14-rc7
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 30 Oct 2017 13:29:20 -0500
+
+ * Touchpad and TrackPoint Dose Not Work on Lenovo X1C6 and X280 (LP: #1723986)
+ - SAUCE: Input: synaptics-rmi4 - RMI4 can also use SMBUS version 3
+ - SAUCE: Input: synaptics - Lenovo X1 Carbon 5 should use SMBUS/RMI
+ - SAUCE: Input: synaptics - add Intertouch support on X1 Carbon 6th and X280
+
+ * powerpc/64s: Add workaround for P9 vector CI load issuunext (LP: #1721070)
+ - powerpc/64s: Add workaround for P9 vector CI load issue
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: staging: vboxvideo: Fix reporting invalid suggested-offset-properties
+ - [Config] CONFIG_DRM_VBOXVIDEO=m
+ - SAUCE: Import aufs driver
+ - [Config] Enable aufs
+ - [Config] Reorder annotations file after enabling aufs
+ - vbox-update: Disable imported vboxvideo module
+ - ubuntu: vbox -- update to 5.1.30-dfsg-1
+ - Enable vbox
+ - hio: Use correct sizes when initializing ssd_index_bits* arrays
+ - hio: Update io stat accounting for 4.14
+ - Enable hio
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.14-rc5
+ * Rebase to v4.14-rc6
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 23 Oct 2017 13:53:52 -0500
+
+ * [Bug] USB controller failed to respond on Denverton after loading
+ intel_th_pci module (LP: #1715833)
+ - SAUCE: PCI: Disable broken RTIT_BAR of Intel TH
+
+ * CONFIG_DEBUG_FS is not enabled by "make zfcpdump_defconfig" with Ubuntu
+ 17.10 (kernel 4.13) (LP: #1719290)
+ - SAUCE: s390: update zfcpdump_defconfig
+
+ * Add installer support for Broadcom BCM573xx network drivers. (LP: #1720466)
+ - d-i: Add bnxt_en to nic-modules.
+ 
+ * Miscellaneous Ubuntu changes
+ - [Config] Update annotations for 4.14-rc2
+ 
+ [ Upstream Kernel Changes ]
+ 
+ * Rebase to v4.14-rc3
+ * Rebase to v4.14-rc4
+ 
+ -- Seth Forshee <seth.forshee@canonical.com>  Wed, 11 Oct 2017 16:04:27 -0500
+ 
+ linux (4.14.0-1.2) artful; urgency=low
+ 
+ * [Bug] USB 3.1 Gen2 works as 5Gbps (LP: #1720045)
+ - xhci: set missing SuperSpeedPlus Link Protocol bit in roothub descriptor
+ 
+ * Please make linux-libc-dev Provide: aufs-dev (LP: #1716091)
+ - [Packaging] Add aufs-dev to the Provides: for linux-libc-dev
+ 
+ * Upgrade to 4.13.0-11.12 in artful amd64 VM breaks display on wayland
+ (LP: #1718679)
+ - [Config] CONFIG_DRM_VBOXVIDEO=n
+ 
+ * ipmmu-vmsa driver breaks arm64 boots (LP: #1718734)
+ - [Config] Disable CONFIG_IPMMU_VMSA on arm64
+ 
+ * autopkgtest profile fails to build on armhf (LP: #1717920)
+ - [Packaging] autopkgtest -- disable d-i when dropping flavours
+ 
+ * Miscellaneous Ubuntu changes
+ - [Config] CONFIG_I2C_XLP9XX=m
+ - [Packaging] Use SRCPKGNAME rather than hard-coding the source package name
+ 
+ [ Upstream Kernel Changes ]
+ 
+ * Rebase to v4.14-rc2
+ 
+ -- Seth Forshee <seth.forshee@canonical.com>  Fri, 29 Sep 2017 09:09:11 -0400
+ 
+ linux (4.14.0-0.1) artful; urgency=low
+ 
+ * Miscellaneous Ubuntu changes
+ - Disable vbox build
+ - Disable hio build
+ - Disable zfs build
+ 
+ [ Upstream Kernel Changes ]
+  * Rebase to v4.14-rc1
+  
+  -- Seth Forshee <seth.forshee@canonical.com>  Tue, 19 Sep 2017 20:22:29 -0500
+  
+  linux (4.13.0-11.12) artful; urgency=low
+  
+  * linux: 4.13.0-11.12 -proposed tracker (LP: #1716699)
+  
+  * kernel panic -not syncing: Fatal exception: panic_on_oops (LP: #1708399)
+  - s390/mm: fix local TLB flushing vs. detach of an mm address space
+  - s390/mm: fix race on mm->context.flush_mm
+  
+  * CVE-2017-1000251
+  - Bluetooth: Properly check L2CAP config option output buffer length
+  
+  -- Seth Forshee <seth.forshee@canonical.com>  Tue, 12 Sep 2017 10:18:38 -0500
+  
+  linux (4.13.0-10.11) artful; urgency=low
+  
+  * please add aufs-dkms to the Provides: for the kernel packages (LP: #1716093)
+  - [Packaging] Add aufs-dkms to the Provides: for kernel packages
+  
+  * Artful update to v4.13.1 stable release (LP: #1716284)
+  - usb: quirks: add delay init quirk for Corsair Strafe RGB keyboard
+  - USB: serial: option: add support for D-Link DWM-157 C1
+  - usb: Add device quirk for Logitech HD Pro Webcam C920-C
+  - usb:xhci: Fix regression when ATI chipsets detected
+  - USB: musb: fix external abort on suspend
+  - ANDROID: binder: add padding to binder_fd_array_object.
+  - ANDROID: binder: add hwbinder, vndbinder to BINDER_DEVICES.
+  - USB: core: Avoid race of async_completed() w/ usbdev_release()
+  - staging/rts5208: fix incorrect shift to extract upper nybble
+  - staging: ccree: save ciphertext for CTS IV
+  - staging: fsl-dpaa2/eth: fix off-by-one FD ctrl bitmaks
+  - iio: adc: ti-ads1015: fix incorrect data rate setting update
+  - iio: adc: ti-ads1015: fix scale information for ADS1115
+  - iio: adc: ti-ads1015: enable conversion when CONFIG_PM is not set
+  - iio: adc: ti-ads1015: avoid getting stale result after runtime resume
+  - iio: adc: ti-ads1015: don't return invalid value from buffer setup callbacks
+  - iio: adc: ti-ads1015: add adequate wait time to get correct conversion
+  - driver core: bus: Fix a potential double free
+  - HID: wacom: Do not completely map WACOM_HID_WD_TOUCHRINGSTATUS usage
+  - binder: free memory on error
+  - crypto: caam/qi - fix compilation with CONFIG_DEBUG_FORCE_WEAK_PER_CPU=y
+  - crypto: caam/qi - fix compilation with DEBUG enabled
+ - thunderbolt: Fix reset response_type
+ - fpga: altera-hps2fpga: fix multiple init of l3_remap_lock
+ - intel_th: pci: Add Cannon Lake PCH-H support
+ - intel_th: pci: Add Cannon Lake PCH-LP support
+ - ath10k: fix memory leak in rx ring buffer allocation
+ - drm/vgem: Pin our pages for dmabuf exports
+ - drm/ttm: Fix accounting error when fail to get pages for pool
+ - drm/dp/mst: Handle errors from drm_atomic_get_private_obj_state() correctly
+ - rtlwifi: rtl_pci_probe: Fix fail path of _rtl_pci_find_adapter
+ - Bluetooth: Add support of 13d3:3494 RTL8723BE device
+ - iw1wifi: pci: add new PCI ID for 7265D
+ - dlm: avoid double-free on error path in dlm_device_[register,unregister]
+ - mwifiex: correct channel stat buffer overflows
+ - MCB: add support for SC31 to mcb-lpc
+ - s390/mm: avoid empty zero pages for KVM guests to avoid postcopy hangs
+ - drm/nouveau/pci/msi: disable MSI on big-endian platforms by default
+ - drm/nouveau: Fix error handling in nv50_disp_atomic_commit
+ - workqueue: Fix flag collision
+ - ahci: don't use MSI for devices with the silly Intel NVMe remapping scheme
+ - cs5536: add support for IDE controller variant
+ - scsi: sg: protect against races between mmap() and SG_SET_RESERVED_SIZE
+ - scsi: sg: recheck MMAP_IO request length with lock held
+ - of/device: Prevent buffer overflow in of_device_modalias()
+ - rtlwifi: Fix memory leak when firmware request fails
+ - rtlwifi: Fix fallback firmware loading
+ - Linux 4.13.1

+ * Kernel has trouble recognizing Corsair Strafe RGB keyboard (LP: #1678477)
+ - usb: quirks: add delay init quirk for Corsair Strafe RGB keyboard
+ + * SRIOV: warning if unload VFs (LP: #1715073)
+ - PCI: Disable VF decoding before pcibios_sriov_disable() updates resources
+ + * [Patch] network-i40e:NVM bug fixes (cherrypick from 4.14) (LP: #1715578)
+ - i40e: avoid NVM acquire deadlock during NVM update
+ - i40e: point wb_desc at the nvm_wb_desc during i40e_read_nvm_aq
+ + * [P9,POwer NV] Perf PMU event : pm_br_2path and pm_ld_miss_l1 is counted twice when perf stat is done (perf:) (LP: #1714571)
+ - perf vendor events powerpc: Remove duplicate events
+ + * Unable to install Ubuntu on the NVMe disk under VMD PCI domain
+ + (LP: #1703339)
+ - [Config] Include vmd in storage-core-modules udeb
+ + * 17.10 fails to boot on POWER9 DD2.0 with Deep stop states (LP: #1715064)
+ - powerpc/powernv: Save/Restore additional SPRs for stop4 cpuidle
+ - powerpc/powernv: Clear PECE1 in LPCR via stop-api only on Hotplug
- SAUCE: powerpc/powerenv: Clear LPCR[PECE1] via stop-api only for deep state offline

+ * Miscellaneous Ubuntu changes
+ - SAUCE: selftests/seccomp: Support glibc 2.26 siginfo_t.h
+ - Revert "UBUNTU: SAUCE: Import aufs driver"
+ - SAUCE: Import aufs driver
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Sun, 10 Sep 2017 17:48:59 -0500
+
+linux (4.13.0-9.10) artful; urgency=low
+
+ * linux: 4.13.0-9.10 -proposed tracker (LP: #1715145)
+
+ * EDAC sbridge: Failed to register device with error -22. (LP: #1714112)
+ - [Config] CONFIG_EDAC_GHES=n
+
+ * Miscellaneous Ubuntu changes
+ - ubuntu: vbox -- update to 5.1.26-dfsg-2
+
+
[ Upstream Kernel Changes ]
+
+ * Rebase to v4.13
+
+ -- Seth Forshee <seth.forshee@canonical.com> Tue, 05 Sep 2017 07:51:19 -0500
+
+linux (4.13.0-8.9) artful; urgency=low
+
+ * snapd 2.27.3+17.10 ADT test failure with linux 4.13.0-6.7 (LP: #1713103)
+ - SAUCE: apparmor: fix apparmorfs DAC access, permissions
+
+ * enable ARCH_SUNXI (and friends) in arm64 kernel .config (LP: #1701137)
+ - [Config] Enable CONFIG_ARCH_SUNXI and related options for arm64
+
+ * [Bug] Harrisonville: pnd2_edac always fail to load on B1 stepping
+ Harrisonville SDP (LP: #1709257)
+ - EDAC, pnd2: Build in a minimal sideband driver for Apollo Lake
+ - EDAC, pnd2: Mask off the lower four bits of a BAR
+ - EDAC, pnd2: Conditionally unhide/hide the P2SB PCI device to read BAR
+ - EDAC, pnd2: Properly toggle hidden state for P2SB PCI device
+ - SAUCE: i2c: i801: Restore the presence state of P2SB PCI device after reading BAR
+
+ * Miscellaneous Ubuntu changes
+ - Revert "UBUNTU: SAUCE: Import aufs driver"
+ - SAUCE: Import aufs driver
+ - SAUCE: selftests/powerpc: Disable some ptrace selftests
+ - [Config] CONFIG_CRYPTO_DEV_NITROX_CNN55XX=n for s390x
+ - [Config] CONFIG_I2C_SLAVE=n for amd64, i386, ppc64el
+ - [Config] Disable CONFIG_MDIO_* options for s390x
+ - [Config] CONFIG_SCSI_MQ_DEFAULT=n for s390x
+ - [Config] Update annotations for 4.13

+-- Seth Forshee <seth.forshee@canonical.com>  Thu, 31 Aug 2017 14:27:09 -0500

+ linux (4.13.0-7.8) artful; urgency=low

+ - SAUCE: selftests/powerpc: Use snprintf to construct DSCR sysfs interface
+ * Miscellaneous Ubuntu changes
+ - Revert "UBUNTU: SAUCE: seccomp: log actions even when audit is disabled"
+ * Miscellaneous upstream changes
+ - seccomp: Provide matching filter for introspection
+ - seccomp: Sysctl to display available actions
+ - seccomp: Operation for checking if an action is available
+ - seccomp: Sysctl to configure actions that are allowed to be logged
+ - seccomp: Selftest for detection of filter flag support
+ - seccomp: Filter flag to log all actions except SECCOMP_RET_ALLOW
+ - seccomp: Action to log before allowing

+ [ Upstream Kernel Changes ]

+ * Rebase to v4.13-rc7

+-- Seth Forshee <seth.forshee@canonical.com>  Mon, 28 Aug 2017 08:12:24 -0500

+ linux (4.13.0-6.7) artful; urgency=low

+ * HID: multitouch: Support ALPS PTP Stick and Touchpad devices (LP: #1712481)
+ - SAUCE: HID: multitouch: Support ALPS PTP stick with pid 0x120A
+ * sort ABI files with C.UTF-8 locale (LP: #1712345)
+ - [Packaging] sort ABI files with C.UTF-8 locale
+ * igb: Support using Broadcom 54616 as PHY (LP: #1712024)
+ - SAUCE: igb: add support for using Broadcom 54616 as PHY
+ * RPT related fixes missing in Ubuntu 16.04.3 (LP: #1709220)
+ - powerpc/mm/radix: Improve _tlbiel_pid to be usable for PWC flushes
+ - powerpc/mm/radix: Improve TLB/PWC flushes
+ - powerpc/mm/radix: Avoid flushing the PWC on every flush_tlb_range
+ * Linux 4.12 refuses to load self-signed modules under Secure Boot with
+ properly enrolled keys (LP: #1712168)
+ - SAUCE: (efi-lockdown) MODSIGN: Fix module signature verification
+
+ * [17.10 FEAT] Enable NVMe driver - kernel (LP: #1708432)
+ + - SAUCE: (efi-lockdown) MODSIGN: Fix module signature verification
+
+ * Artful: 4.12.0-11.12: Boot panic in vlv2_plat_configure_clock+0x3b/0xa0
+ (LP: #1711298)
+ + - [Config] CONFIG_INTEL_ATOMISP=n
+
+ * Miscellaneous Ubuntu changes
+ + - SAUCE: apparmor: af_unix mediation
+
+ * Miscellaneous upstream changes
+ + - apparmor: Fix shadowed local variable in unpack_trans_table()
+ + - apparmor: Fix logical error in verify_header()
+ + - apparmor: Fix an error code in aafs_create()
+ + - apparmor: Redundant condition: prev_ns. in [label.c:1498]
+ + - apparmor: add the ability to mediate signals
+ + - apparmor: add mount mediation
+ + - apparmor: cleanup conditional check for label in label_print
+ + - apparmor: add support for absolute root view based labels
+ + - apparmor: make policy_unpack able to audit different info messages
+ + - apparmor: add more debug asserts to apparmorfs
+ + - apparmor: add base infrastructure for socket mediation
+ + - apparmor: move new_null_profile to after profile lookup fns()
+ + - apparmor: fix race condition in null profile creation
+ + - apparmor: ensure unconfined profiles have dfas initialized
+ + - apparmor: fix incorrect type assignment when freeing proxies
+
+ [ Upstream Kernel Changes ]
+
+ + * Rebase to v4.13-rc6
+
+ + -- Seth Forshee <seth.forshee@canonical.com> Wed, 23 Aug 2017 08:10:38 -0500
+
+ +linux (4.13.0-5.6) artful; urgency=low
+
+ + * Ubuntu17.10 - perf: Update Power9 PMU event JSON files (LP: #1708630)
+ + - perf pmu-events: Support additional POWER8+ PVR in mapfile
+ + - perf vendor events: Add POWER9 PMU events
+ + - perf vendor events: Add POWER9 PVRs to mapfile
+ + - SAUCE: perf vendor events powerpc: remove suffix in mapfile
+ + - SAUCE: perf vendor events powerpc: Update POWER9 events
+
+ + * Disable CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE (LP: #1709171)
+ + - [Config] CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE=n for ppc64el
+
* Please only recommend or suggest initramfs-tools | linux-initramfs-tool for kernels able to boot without initramfs (LP: #1700972)
- [Debian] Don't depend on initramfs-tools

* Miscellaneous Ubuntu changes
  - SAUCE: Import aufs driver
  - SAUCE: aufs -- Add missing argument to loop_switch() call
  - [Config] Enable aufs
  - SAUCE: (noup) Update spl to 0.6.5.11-ubuntu1, zfs to 0.6.5.11-1ubuntu3
  - Enable zfs build
  - SAUCE: powerpc: Always initialize input array when calling epapr_hypercall()
  - [Packaging] switch up to debhelper 9

* Upstream Kernel Changes

  * Rebase to v4.13-rc5

-- Seth Forshee <seth.forshee@canonical.com> Tue, 15 Aug 2017 09:24:16 -0500

+linux (4.13.0-4.5) artful; urgency=low

+ * Lenovo Yoga 910 Sensors (LP: #1708120)
  - SAUCE: (no-up) HID: Add quirk for Lenovo Yoga 910 with ITE Chips

+ * Unable to install Ubuntu on the NVMe disk under VMD PCI domain
  - (LP: #1703339)
  - [Config] Add vmd driver to generic inclusion list

+ * Set CONFIG_SATA_Highbank=y on armhf (LP: #1703430)
  - [Config] CONFIG_SATA_Highbank=y

+ * Miscellaneous Ubuntu changes
  - ubuntu: vbox -- update to 5.1.26-dfsg-1
  - SAUCE: hio: Build fixes for 4.13
  - Enable hio build
  - SAUCE: (noup) Update spl to 0.6.5.11-1, zfs to 0.6.5.11-1ubuntu1
  - [debian] use all rather than amd64 dkms debs for sync

+ * Upstream Kernel Changes

+ * Rebase to v4.13-rc4

-- Seth Forshee <seth.forshee@canonical.com> Tue, 08 Aug 2017 11:31:48 -0500

+linux (4.13.0-3.4) artful; urgency=low

+ * Adt tests of src:linux time out often on armhf lxc containers (LP: #1705495)
  - [Packaging] tests -- reduce rebuild test to one flavour
- [Packaging] tests -- reduce rebuild test to one flavour -- use filter
- * snapd 2.26.8+17.10 ADT test failure with linux 4.12.0-6.7 (LP: #1704158)
- * SAUCE: virtio_net: Revert mergeable buffer handling rework
- [ Upstream Kernel Changes ]
- * Rebase to v4.13-rc3
- +-- Seth Forshee <seth.forshee@canonical.com> Mon, 31 Jul 2017 10:08:16 -0500
+ +linux (4.13.0-2.3) artful; urgency=low
+ + * Change CONFIG_IBMVETH to module (LP: #1704479)
+ + - [Config] CONFIG_IBMVETH=m
+ [ Upstream Kernel Changes ]

- Seth Forshee <seth.forshee@canonical.com> Mon, 24 Jul 2017 13:58:08 -0500
+linux (4.13.0-1.2) artful; urgency=low
+ + * Miscellaneous Ubuntu changes
+ + - [Debian] Support sphinx-based kernel documentation
+ +-- Seth Forshee <seth.forshee@canonical.com> Thu, 20 Jul 2017 09:18:33 -0500
+ +linux (4.13.0-0.1) artful; urgency=low
+ + * Miscellaneous Ubuntu changes
+ + - Disable hio
+ + - Disable zfs build
+ + - ubuntu: vbox -- update to 5.1.24-dfsg-1
+ + [ Upstream Kernel Changes ]
+ +-- Seth Forshee <seth.forshee@canonical.com> Wed, 19 Jul 2017 15:09:31 -0500
+ +linux (4.12.0-7.8) artful; urgency=low
+ + * ThunderX: soft lockup on 4.8+ kernels when running qemu-efi with vhost=on
+ + (LP: #1673564)
+ + - arm64: Add a facility to turn an ESR syndrome into a sysreg encoding
+ + - KVM: arm/arm64: vgic-v3: Add accessors for the ICH_APxRn_EL2 registers
+ - KVM: arm64: Make kvm_condition_valid32() accessible from EL2
+ - KVM: arm64: vgic-v3: Add hook to handle guest GICv3 sysreg accesses at EL2
+ - KVM: arm64: vgic-v3: Add ICV_BPR1_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_IGRPEN1_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_IAR1_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_EOIR1_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_HPPIR1_EL1 handler
+ - KVM: arm64: vgic-v3: Enable trapping of Group-1 system registers
+ - KVM: arm64: Enable GICv3 Group-1 sysreg trapping via command-line
+ - KVM: arm64: vgic-v3: Add ICV_BPR0_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICVIGNREN0_EL1 handler
+ - KVM: arm64: vgic-v3: Add misc Group-0 handlers
+ - KVM: arm64: vgic-v3: Enable trapping of Group-0 system registers
+ - KVM: arm64: Enable GICv3 Group-0 sysreg trapping via command-line
+ - arm64: Add MIDR values for Cavium cn83XX SoCs
+ - arm64: Add workaround for Cavium Thunder erratum 30115
+ - KVM: arm64: vgic-v3: Add ICV_DIR_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_RPR_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_CTLR_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_PMR_EL1 handler
+ - KVM: arm64: Enable GICv3 common sysreg trapping via command-line
+ - KVM: arm64: vgic-v3: Log which GICv3 system registers are trapped
+ - KVM: arm64: Log an error if trapping a read-from-write-only GICv3 access
+ - KVM: arm64: Log an error if trapping a write-to-read-only GICv3 access
+ * hns: under heavy load, NIC may fail and require reboot (LP: #1704146)
+ - net: hns: Bugfix for Tx timeout handling in hns driver
+ + * New ACPI identifiers for ThunderX SMMU (LP: #1703437)
+ + - iommu/arm-smmu: Plumb in new ACPI identifiers
+ + * Transparent hugepages should default to enabled=madvise (LP: #1703742)
+ + - SAUCE: use CONFIG_TRANSPARENT_HUGEPAGE_MADVISE=y as default
+ + * Artful update to v4.12.1 stable release (LP: #1703858)
+ + - driver core: platform: fix race condition with driver_override
+ + - RDMA/uverbs: Check port number supplied by user verbs cmds
+ + - usb: dwc3: replace %p with %pK
+ + - USB: serial: cp210x: add ID for CEL EM3588 USB ZigBee stick
+ + - usb: usbp: set buffer pointers to NULL after free
+ + - Add USB quirk for HVR-950q to avoid intermittent device resets
+ + - usb: Fix typo in the definition of Endpoint[out]Request
+ + - USB: core: fix device node leak
+ + - USB: serial: option: add two Longcheer device ids
+ + - USB: serial: qcsserial: new Sierra Wireless EM7305 device ID
+ + - xhci: Limit USB2 port wake support for AMD Promontory hosts
+ + - gfs2: Fix glock rhashtable rcu bug
+ - Add "shutdown" to "struct class".
+ - tpm: Issue a TPM2_Shutdown for TPM2 devices.
+ - tpm: fix a kernel memory leak in tpm-sysfs.c
+ - powerpc/powerpc: Fix CPU_HOTPLUG=n idle.c compile error
+ - x86/xmmuc: Optimize copy_user_enhanced_fast_string() for short strings
+ - sched/fair, cpumask: Export for_each_cpu_wrap()
+ - sched/core: Implement new approach to scale select_idle_cpu()
+ - sched/numa: Use down_read_trylock() for the mmap_sem
+ - sched/numa: Override part of migrate_degrades_locality() when idle balancing
+ - sched/fair: Simplify wake_affine() for the single socket case
+ - sched/numa: Implement NUMA node level wake_affine()
+ - sched/fair: Remove effective_load()
+ - sched/numa: Hide numa_wake_affine() from UP build
+ - xen: avoid deadlock in xenbus driver
+ - crypto: drbg - Fixes panic in wait_for_completion call
+ - Linux 4.12.1
+
+ * cxf1ash update request in the Xenial SRU stream (LP: #1702521)
+ - scsi: cxf1ash: Combine the send queue locks
+ - scsi: cxf1ash: Update cxf1ash_afu_sync() to return errno
+ - scsi: cxf1ash: Reset hardware queue context via specified register
+ - scsi: cxf1ash: Schedule asynchronous reset of the host
+ - scsi: cxf1ash: Handle AFU sync failures
+ - scsi: cxf1ash: Track pending scsi commands in each hardware queue
+ - scsi: cxf1ash: Flush pending commands in cleanup path
+ - scsi: cxf1ash: Add scsi command abort handler
+ - scsi: cxf1ash: Create character device to provide host management interface
+ - scsi: cxf1ash: Separate AFU internal command handling from AFU sync specifics
+ - scsi: cxf1ash: Introduce host ioctl support
+ - scsi: cxf1ash: Refactor AFU capability checking
+ - scsi: cxf1ash: Support LUN provisioning
+ - scsi: cxf1ash: Support AFU debug
+ - scsi: cxf1ash: Support WS16 unmap
+ - scsi: cxf1ash: Remove zeroing of private command data
+ - scsi: cxf1ash: Update TMF command processing
+ - scsi: cxf1ash: Avoid double free of character device
+ - scsi: cxf1ash: Update send_tmf() parameters
+ - scsi: cxf1ash: Update debug prints in reset handlers
+
+ * make snap-pkg support (LP: #1700747)
+ - make snap-pkg support
+
+ * Quirk for non-compliant PCI bridge on HiSilicon D05 board (LP: #1698706)
+ - SAUCE: PCI: Support hibmc VGA cards behind a misbehaving HiSilicon bridge
+
+ * arm64: fix crash reading /proc/kcore (LP: #1702749)
+ - fs/proc: kcore: use kcore_list type to check for vmalloc/module address
+ - arm64: mm: select CONFIG_ARCH_PROC_KCORE_TEXT
+
+ * Opal and POWER9 DD2 (LP: #1702159)
+ - SAUCE: powerpc/powernv: Tell OPAL about our MMU mode on POWER9
+
+ * Data corruption with hio driver  (LP: #1701316)
+ - SAUCE: hio: Fix incorrect use of enum req_opf values
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: (noup) Update spl to 0.6.5.10-1, zfs to 0.6.5.10-1ubuntu2
+ - snapcraft.yaml: Sync with xenial
+ - [Config] CONFIG_CAVIUM_ERRATUM_30115=y
+
+ * Miscellaneous upstream changes
+ - Revert "UBUNTU: SAUCE: (efi-lockdown) efi: Add sysctls for secureboot and
+ MokSBState"
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Fri, 14 Jul 2017 15:25:41 -0500
+
+linux (4.12.0-6.7) artful; urgency=low
+
+ * update ENA driver to 1.2.0k from net-next (LP: #1701575)
+ - net: ena: change return value for unsupported features unsupported return
+ value
+ - net: ena: add hardware hints capability to the driver
+ - net: ena: change sizeof() argument to be the type pointer
+ - net: ena: add reset reason for each device FLR
+ - net: ena: add support for out of order rx buffers refill
+ - net: ena: allow the driver to work with small number of msix vectors
+ - net: ena: use napi_schedule_irqoff when possible
+ - net: ena: separate skb allocation to dedicated function
+ - net: ena: use lower_32_bits()/upper_32_bits() to split dma address
+ - net: ena: update driver's rx drop statistics
+ - net: ena: update ena driver to version 1.2.0
+
+ * APST gets enabled against explicit kernel option (LP: #1699004)
+ - nvme: explicitly disable APST on quirked devices
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: hio: Update to Huawei ES3000_V2 (2.1.0.40)
+ - SAUCE: hio updates for 4.12
+ - SAUCE: Enable hio build
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Wed, 05 Jul 2017 14:23:20 -0500
+
+linux (4.12.0-5.6) artful; urgency=low
+
+ * ERAT invalidate on context switch removal (LP: #1700819)
- powerpc: Only do ERAT invalidate on radix context switch on P9 DD1
- * powerpc: Invalidate ERAT on powersave wakeup for POWER9 (LP: #1700521)
- - SAUCE: powerpc: Invalidate ERAT on powersave wakeup for POWER9
- * Miscellaneous Ubuntu changes
- - d-i: Move qcom-emac from arm64 to shared nic-modules
- [ Upstream Kernel Changes ]
- * Rebase to v4.12
- -- Seth Forshee <seth.forshee@canonical.com>  Mon, 03 Jul 2017 07:52:02 -0500
- linux (4.12.0-4.5) artful; urgency=low
- * aacraid driver may return uninitialized stack data to userspace
  (LP: #1700077)
- - SAUCE: scsi: aacraid: Don't copy uninitialized stack memory to userspace
- * KILLER1435-S[0489:e0a2] BT cannot search BT 4.0 device (LP: #1699651)
  - Bluetooth: btusb: Add support for 0489:e0a2 QCA_ROME device
- * AACRAID for power9 platform (LP: #1689980)
- - scsi: aacraid: Remove __GFP_DMA for raw srb memory
- - scsi: aacraid: Fix DMAR issues with iommu=pt
- - scsi: aacraid: Added 32 and 64 queue depth for arc natives
- - scsi: aacraid: Set correct Queue Depth for HBA1000 RAW disks
- - scsi: aacraid: Remove reset support from check_health
- - scsi: aacraid: Change wait time for fib completion
- - scsi: aacraid: Log count info of scsi cmds before reset
- - scsi: aacraid: Print ctrl status before eh reset
- - scsi: aacraid: Using single reset mask for IOP reset
- - scsi: aacraid: Rework IOP reset
- - scsi: aacraid: Add periodic checks to see IOP reset status
- - scsi: aacraid: Rework SOFTWARE reset code
- - scsi: aacraid: Rework aac_src_restart
- - scsi: aacraid: Use correct function to get ctrl health
- - scsi: aacraid: Make sure ioctl returns on controller reset
- - scsi: aacraid: Enable ctrl reset for both hba and arc
- - scsi: aacraid: Add reset debugging statements
- - scsi: aacraid: Remove reference to Series-9
- - scsi: aacraid: Update driver version to 50834
- * hibmc driver does not include "pci:" prefix in bus ID (LP: #1698700)
- - SAUCE: drm: hibmc: Use set_busid function from drm core
- * HiSilicon D05: installer doesn't appear on VGA (LP: #1698954)
+ - d-i: Add hibmc-drm to kernel-image udeb
+ + * Fix /proc/cpuinfo revision for POWER9 DD2 (LP: #1698844)
+ + - SAUCE: powerpc: Fix /proc/cpuinfo revision for POWER9 DD2
+ + * Miscellaneous Ubuntu changes
+ + - [Config] CONFIG_SATA_MV=n and CONFIG_GENERIC_PHY=n for s390x
+ + - [Config] CONFIG_ATA=n for s390x
+ + - [Config] Update annotations for 4.12
+ + [ Upstream Kernel Changes ]
+ + + * Rebase to v4.12-rc7
+ + + -- Seth Forshee <seth.forshee@canonical.com> Mon, 26 Jun 2017 11:27:29 -0500
+ + + linux (4.12.0-3.4) artful; urgency=low
+ + + * Miscellaneous upstream changes
+ + + - ufs: fix the logics for tail relocation
+ + + [ Upstream Kernel Changes ]
+ + + * Rebase to v4.12-rc6
+ + + -- Seth Forshee <seth.forshee@canonical.com> Mon, 19 Jun 2017 14:50:39 -0500
+ + + linux (4.12.0-2.3) artful; urgency=low
+ + + * CVE-2014-9900
+ + + - SAUCE: (no-up) net: Zeroing the structure ethtool_wolinfo in ethtool_get_wol()
+ + + * System doesn't boot properly on Gigabyte AM4 motherboards (AMD Ryzen)
+ + + (LP: #1671360)
+ + + - pinctrl/amd: Use regular interrupt instead of chained
+ + + * extend-diff-ignore should use exact matches (LP: #1693504)
+ + + - [Packaging] exact extend-diff-ignore matches
+ + + * Miscellaneous Ubuntu changes
+ + + - SAUCE: efi: Don't print secure boot state from the efi stub
+ + + - ubuntu: vbox -- Update to 5.1.22-dfsg-1
+ + + - SAUCE: vbox fixes for 4.12
+ + + - Re-enable virtualbox build
+ + + - [Config] CONFIG_ORANGEFS_FS=m
+ + + - SAUCE: (noup) Update spl to 0.6.5.9-1ubuntu2, zfs to 0.6.5.9-5ubuntu7
+ + + - Enable zfs build
+ [ Upstream Kernel Changes ]
+ * Rebase to v4.12-rc4
+ * Rebase to v4.12-rc5
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Sun, 11 Jun 2017 22:25:13 -0500
+ +linux (4.12.0-1.2) artful; urgency=low
+ * Enable Matrox driver for Ubuntu 16.04.3 (LP: #1693337)
+ - [Config] Enable CONFIG_DRM_MGAG200 as module
+
+ * Support low-pin-count devices on Hisilicon SoCs (LP: #1677319)
+ - [Config] CONFIG_LIBIO=y on arm64 only
+ - SAUCE: LIBIO: Introduce a generic PIO mapping method
+ - SAUCE: OF: Add missing I/O range exception for indirect-I/O devices
+ - [Config] CONFIG_HISILICON_LPC=y
+ - SAUCE: LPC: Support the device-tree LPC host on Hip06/Hip07
+ - SAUCE: LIBIO: Support the dynamically logical PIO registration of ACPI host
+ - I/O
+ - SAUCE: LPC: Add the ACPI LPC support
+ - SAUCE: PCI: Apply the new generic I/O management on PCI IO hosts
+ - SAUCE: PCI: Restore codepath for !CONFIG_LIBIO
+
+ * POWER9: Additional patches for TTY and CPU_IDLE (LP: #1674325)
+ - SAUCE: tty: Fix ldisc crash on reopened tty
+
+ * Miscellaneous Ubuntu changes
+ - [Debian] Add build-dep on libnuma-dev to enable 'perf bench numa'
+ - Rebase to v4.12-rc3
+
+ [ Upstream Kernel Changes ]
+ * Rebase to v4.12-rc3
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 29 May 2017 20:56:29 -0500
+ +linux (4.12.0-0.1) artful; urgency=low
+ * please enable CONFIG_ARM64_LSE_ATOMICS (LP: #1691614)
+ - [Config] CONFIG_ARM64_LSE_ATOMICS=y
+
+ * [Regression] NUMA_BALANCING disabled on arm64 (LP: #1690914)
+ - [Config] CONFIG_NUMA_BALANCING{,_DEFAULT_ENABLED}=y on arm64
+
+ * exec'ing a setuid binary from a threaded program sometimes fails to setuid
+ (LP: #1672819)
+ - SAUCE: exec: ensure file system accounting in check_unsafe_exec is correct
+ * Miscellaneous Ubuntu changes
+ - Update find-missing-sauce.sh to compare to artful
+ - Update dropped.txt
+ - SAUCE: (efi-lockdown) efi: Add EFI_SECURE_BOOT bit
+ - SAUCE: (efi-lockdown) Add the ability to lock down access to the running
+ kernel image
+ - SAUCE: (efi-lockdown) efi: Lock down the kernel if booted in secure boot
+ mode
+ - SAUCE: (efi-lockdown) Enforce module signatures if the kernel is locked down
+ - SAUCE: (efi-lockdown) Restrict /dev/mem and /dev/kmem when the kernel is
+ locked down
+ - SAUCE: (efi-lockdown) Add a sysrq option to exit secure boot mode
+ - SAUCE: (efi-lockdown) kexec: Disable at runtime if the kernel is locked down
+ - SAUCE: (efi-lockdown) Copy secure_boot flag in boot params across kexec
+ reboot
+ - SAUCE: (efi-lockdown) kexec_file: Disable at runtime if securelevel has been
+ set
+ - SAUCE: (efi-lockdown) hibernate: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) uswsusp: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) PCI: Lock down BAR access when the kernel is
+ locked down
+ - SAUCE: (efi-lockdown) x86: Lock down IO port access when the kernel is
+ locked down
+ - SAUCE: (efi-lockdown) x86: Restrict MSR access when the kernel is locked
+ down
+ - SAUCE: (efi-lockdown) asus-wmi: Restrict debugfs interface when the kernel
+ is locked down
+ - SAUCE: (efi-lockdown) ACPI: Limit access to custom_method when the kernel is
+ locked down
+ - SAUCE: (efi-lockdown) acpi: Ignore acpi_rsdp kernel param when the kernel
+ has been locked down
+ - SAUCE: (efi-lockdown) acpi: Disable ACPI table override if the kernel is
+ locked down
+ - SAUCE: (efi-lockdown) acpi: Disable APEI error injection if the kernel is
+ locked down
+ - SAUCE: (efi-lockdown) Enable cold boot attack mitigation
+ - SAUCE: (efi-lockdown) bpf: Restrict kernel image access functions when the
+ kernel is locked down
+ - SAUCE: (efi-lockdown) scsi: Lock down the eata driver
+ - SAUCE: (efi-lockdown) Prohibit PCMCIA CIS storage when the kernel is locked
+ down
+ - SAUCE: (efi-lockdown) Lock down TIOCSSERIAL
+ - SAUCE: (efi-lockdown) KEYS: Allow unrestricted boot-time addition of keys to
+ secondary keyring
+ - SAUCE: (efi-lockdown) efi: Add EFI signature data types
+ - SAUCE: (efi-lockdown) efi: Add an EFI signature blob parser
+ - SAUCE: (efi-lockdown) MODSIGN: Import certificates from UEFI Secure Boot
+ - SAUCE: (efi-lockdown) MODSIGN: Allow the "db" UEFI variable to be suppressed
+ - SAUCE: (efi-lockdown) efi: Sanitize boot_params in efi stub
+ - SAUCE: (efi-lockdown) efi: Add secure_boot state and status bit for MokSBState
+ - SAUCE: (efi-lockdown) efi: Add sysctls for secureboot and MokSBState
+ - [Config] Set values for UEFI secure boot lockdown options
+ - Disable virtualbox build
+ - Disable hio build
+ - SAUCE: securityfs: Replace CURRENT_TIME with current_time()
+ - Disable zfs build
+ - [Debian] Work out upstream tag for use with gen-auto-reconstruct
+ - SAUCE: Import aufs driver
+ - SAUCE: aufs -- Include linux/mm.h in fs/aufs/file.h
+ - [Config] Enable aufs
+ - SAUCE: perf callchain: Include errno.h on x86 unconditionally
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.12-rc2
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Sun, 21 May 2017 23:44:44 -0500
+
+ linux (4.11.0-3.8) artful; urgency=low
+
+ [ Seth Forshee ]
+
+ * Release Tracking Bug
+ - LP: #1690999
+
+ * apparmor_parser hangs indefinitely when called by multiple threads
+ (LP: #1645037)
+ - SAUCE: apparmor: fix lock ordering for mkdir
+
+ * apparmor leaking securityfs pin count (LP: #1660846)
+ - SAUCE: apparmor: fix leak on securityfs pin count
+
+ * apparmor reference count leak when securityfs_setup_d_inode() fails
+ (LP: #1660845)
+ - SAUCE: apparmor: fix reference count leak when securityfs_setup_d_inode()
+
+ * apparmor not checking error if security_pin_fs() fails (LP: #1660842)
+ - SAUCE: apparmor: fix not handling error case when securityfs_pin_fs() fails
+
+ * libvirt profile is blocking global setrlimit despite having no rlimit rule
+ (LP: #1679704)
+ - SAUCE: apparmor: fix complain mode failure for rlimit mediation
- apparmor: update auditing of rlimit check to provide capability information
- apparmor: does not provide a way to detect policy updates (LP: #1678032)
- SAUCE: apparmor: add policy revision file interface
- apparmor does not make support of query data visible (LP: #1678023)
- SAUCE: apparmor: add label data availability to the feature set
- apparmor query interface does not make supported query info available
  (LP: #1678030)
- SAUCE: apparmor: add information about the query interface to the feature set
- change_profile incorrect when using namespaces with a compound stack
  (LP: #1677959)
- SAUCE: apparmor: fix label parse for stacked labels
- Regression in 4.4.0-65-generic causes very frequent system crashes
  (LP: #1669611)
- apparmor: sync of apparmor 3.6+ (17.04)
- Artful update to 4.11.1 stable release (LP: #1690814)
- dm ioctl: prevent stack leak in dm ioctl call
- drm/sti: fix GDP size to support up to UHD resolution
- power: supply: lp8788: prevent out of bounds array access
- brcmfmac: Ensure pointer correctly set if skb data location changes
- brcmfmac: Make skb header writable before use
- sparc64: fix fault handling in NGbzero.S and GENbzero.S
- refcount: change EXPORT_SYMBOL markings
- net: macb: fix phy interrupt parsing
- tcp: fix access to sk->sk_state in tcp_poll()
- geneve: fix incorrect setting of UDP checksum flag
- bpf: enhance verifier to understand stack pointer arithmetic
- bpf, arm64: fix jit branch offset related to ldimm64
- tcp: fix wraparound issue in tcp_Lp
- net: ipv6: Do not duplicate DAD on link up
- net: usb: qmi_wwan: add Telit ME910 support
- tcp: do not inherit fastopen_req from parent
- ipv4, ipv6: ensure raw socket message is big enough to hold an IP header
- rtnetlink: NUL-terminate IFLA_PHYS_PORT_NAME string
- ipv6: initialize route null entry in addrconf_init()
- ipv6: reorder ip6_route_dev_notifier after ipv6_dev_notf
- tcp: randomize timestamps on syncookies
- bmxtn_en: allocate enough space for ->ntp_flt_bmap
- bpf: don't let ldimm64 leak map addresses on unprivileged
- net: mtd-mux: bcm-iproc: call mdiobus_free() in error path
- f2fs: sanity check segment count
- xen/arm,arm64: fix xen_dma_ops after 815dd18 "Consolidate get_dma_ops..."
- xen: Revert commits da72ff5bfc8b0 and 72a9b186292d
+ - block: get rid of blk_integrity_revalidate()
+ - Linux 4.11.1
+
+ * Module signing exclusion for staging drivers does not work properly
+ (LP: #1690908)
+ - SAUCE: Fix module signing exclusion in package builds
+
+ * perf: qcom: Add L3 cache PMU driver (LP: #1689856)
+ - [Config] CONFIG_QCOM_L3_PMU=y
+ - perf: qcom: Add L3 cache PMU driver
+
+ * No PMU support for ACPI-based arm64 systems (LP: #1689661)
+ - drivers/perf: arm_pmu: rework per-cpu allocation
+ - drivers/perf: arm_pmu: manage interrupts per-cpu
+ - drivers/perf: arm_pmu: split irq request from enable
+ - drivers/perf: arm_pmu: remove pointless PMU disabling
+ - drivers/perf: arm_pmu: define armpmu_init_fn
+ - drivers/perf: arm_pmu: fold init into alloc
+ - drivers/perf: arm_pmu: factor out pmu registration
+ - drivers/perf: arm_pmu: simplify cpu_pmu_request_irqs()
+ - drivers/perf: arm_pmu: handle no platform_device
+ - drivers/perf: arm_pmu: rename irq request/free functions
+ - drivers/perf: arm_pmu: split cpu-local irq request/free
+ - drivers/perf: arm_pmu: move irq request/free into probe
+ - drivers/perf: arm_pmu: split out platform device probe logic
+ - arm64: add function to get a cpu's MADT GICC table
+ - [Config] CONFIG_ARM_PMU ACPI=y
+ - drivers/perf: arm_pmu: add ACPI framework
+ - arm64: pmuv3: handle !PMUv3 when probing
+ - arm64: pmuv3: use arm_pmu ACPI framework
+
+ * Fix NVLINK2 TCE route (LP: #1690155)
+ - powerpc/powernv: Fix TCE kill on NVLink2
+
+ * CVE-2017-0605
+ - tracing: Use strlcpy() instead of strcpy() in __trace_find_cmdline()
+
+ * Miscellaneous Ubuntu changes
+ - [Config] Restore powerpc arch to annotations file
+ - [Config] Disable runtime testing modules
+ - [Config] Disable drivers not needed on s390x
+ - [Config] Update annotations for 4.11
+ - [Config] updateconfigs after apparmor updates
+
+ * Miscellaneous upstream changes
+ - apparmor: use SHASH_DESC_ON_STACK
+ - apparmor: fix invalid reference to index variable of iterator line 836
+ - apparmor: fix parameters so that the permission test is bypassed at boot
+ - apparmor: Make path_max parameter readonly
+ - apparmorfs: Combine two function calls into one in aa_fs_seq_raw_abi_show()
+ - apparmorfs: Use seq_putc() in two functions
+ - apparmor: provide information about path buffer size at boot
+ - apparmor: add/use fn's to print hash string hex value
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 16 May 2017 00:39:13 -0500
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 16 May 2017 00:39:13 -0500
+
+ +linux (4.11.0-2.7) artful; urgency=low
+
+ * kernel-wedge fails in artful due to leftover squashfs-modules d-i files
+ (LP: #1688259)
+ - Remove squashfs-modules files from d-i
+ - [Config] as squashfs-modules is builtin kernel-image must Provides: it
+
+ + [Zesty] d-i: replace msm_emac with qcom_emac (LP: #1677297)
+ - Revert "UBUNTU: d-i: initrd needs msm_emac on amberwing platform."
+ - d-i: initrd needs qcom_emac on amberwing platform.
+
+ * update for V3 kernel bits and improved multiple fan slice support
+ (LP: #1470091)
+ - SAUCE: fan: tunnel multiple mapping mode (v3)
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: (noup) Update spl to 0.6.5.9-1ubuntu1, zfs to 0.6.5.9-5ubuntu5
+ - Enable zfs
+ - SAUCE: fan: add VXLAN implementation
+ - SAUCE: (efi-lockdown) efi: Add EFI_SECURE_BOOT bit
+ - SAUCE: (efi-lockdown) Add the ability to lock down access to the running
+ - kernel image
+ - SAUCE: (efi-lockdown) efi: Lock down the kernel if booted in secure boot
+ - mode
+ - SAUCE: (efi-lockdown) Enforce module signatures if the kernel is locked down
+ - SAUCE: (efi-lockdown) Restrict /dev/mem and /dev/kmem when the kernel is
+ - locked down
+ - SAUCE: (efi-lockdown) Add a sysrq option to exit secure boot mode
+ - SAUCE: (efi-lockdown) kexec: Disable at runtime if the kernel is locked down
+ - SAUCE: (efi-lockdown) Copy secure_boot flag in boot params across kexec
+ - reboot
+ - SAUCE: (efi-lockdown) kexec_file: Disable at runtime if securelevel has been
+ - set
+ - SAUCE: (efi-lockdown) hibernate: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) uswsusps: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) PCI: Lock down BAR access when the kernel is locked
+ - down
+ - SAUCE: (efi-lockdown) x86: Lock down IO port access when the kernel is
+ - locked down
+ - SAUCE: (efi-lockdown) x86: Restrict MSR access when the kernel is locked
+ down
+ - SAUCE: (efi-lockdown) asus-wmi: Restrict debugfs interface when the kernel
+   is locked down
+ - SAUCE: (efi-lockdown) ACPI: Limit access to custom_method when the kernel is
+   locked down
+ - SAUCE: (efi-lockdown) acpi: Ignore acpi_rsdtp kernel param when the kernel
+   has been locked down
+ - SAUCE: (efi-lockdown) acpi: Disable ACPI table override if the kernel is
+   locked down
+ - SAUCE: (efi-lockdown) acpi: Disable APEI error injection if the kernel is
+   locked down
+ - SAUCE: (efi-lockdown) Enable cold boot attack mitigation
+ - SAUCE: (efi-lockdown) bpf: Restrict kernel image access functions when the
+   kernel is locked down
+ - SAUCE: (efi-lockdown) scsi: Lock down the eata driver
+ - SAUCE: (efi-lockdown) Prohibit PCMCIA CIS storage when the kernel is locked
down
+ - SAUCE: (efi-lockdown) Lock down TIOCSSERIAL
+ - SAUCE: (efi-lockdown) Add EFI signature data types
+ - SAUCE: (efi-lockdown) Add an EFI signature blob parser and key loader.
+ - SAUCE: (efi-lockdown) KEYS: Add a system blacklist keyring
+ - SAUCE: (efi-lockdown) MODSIGN: Import certificates from UEFI Secure Boot
+ - SAUCE: (efi-lockdown) MODSIGN: Support not importing certs from db
+ - SAUCE: (efi-lockdown) MODSIGN: Don't try secure boot if EFI runtime is
disabled
+ - SAUCE: (efi-lockdown) efi: Sanitize boot_params in efi stub
+ - SAUCE: (efi-lockdown) efi: Add secure_boot state and status bit for
  MokSBState
+ - SAUCE: (efi-lockdown) efi: Add sysctls for secureboot and MokSBState
+ - [Config] Set values for UEFI secure boot lockdown options
+ - Update dropped.txt
+
+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11
+
+ -- Seth Forshee <seth.forshee@canonical.com> Fri, 05 May 2017 07:43:14 -0500
+
+ linux (4.11.0-1.6) artful; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ + [Debian] Use default compression for all packages
+ + SAUCE: (namespace) block_dev: Support checking inode permissions in
  lookup_bdev()
+ + SAUCE: (namespace) block_dev: Check permissions towards block device inode
  when mounting
+ + SAUCE: (namespace) mtd: Check permissions towards mtd block device inode
  when mounting
+ - SAUCE: (namespace) fs: Allow superblock owner to change ownership of inodes
+ - SAUCE: (namespace) fs: Don't remove suid for CAP_FSETID for usersns root
+ - SAUCE: (namespace) fs: Allow superblock owner to access do_remount_sb()
+ - SAUCE: (namespace) capabilities: Allow privileged user in s_user_ns to set security.* xattrs
+ - SAUCE: (namespace) fs: Allow CAP_SYS_ADMIN in s_user_ns to freeze and thaw filesystems
+ - SAUCE: (namespace) fuse: Add support for pid namespaces
+ - SAUCE: (namespace) fuse: Support fuse filesystems outside of init_user_ns
+ - SAUCE: (namespace) fuse: Restrict allow_other to the superblock's namespace or a descendant
+ - SAUCE: (namespace) fuse: Allow user namespace mounts
+ - SAUCE: (namespace) ext4: Add support for unprivileged mounts from user namespaces
+ - SAUCE: (namespace) ext4: Add module parameter to enable user namespace mounts
+ - SAUCE: (namespace) block_dev: Forbid unprivileged mounting when device is opened for writing
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Wed, 26 Apr 2017 10:08:29 -0500
+
+ * [Hyper-V][SAUCE] pci-hyperv: Use only 16 bit integer for PCI domain
+  (LP: #1684971)
+  - SAUCE: pci-hyperv: Use only 16 bit integer for PCI domain
+
+ * [Hyper-V] Ubuntu 14.04.2 LTS Generation 2 SCSI Errors on VSS Based Backups
+  (LP: #1470250)
+  - SAUCE: Tools: hv: vss: Thaw the filesystem and continue after freeze fails
+
+ * Enable virtual scsi server driver for Power (LP: #1615665)
+  - SAUCE: Return TCMU-generated sense data to fabric module
+
+ * include/linux/security.h header syntax error with !CONFIG_SECURITYFS
+  (LP: #1630990)
+  - SAUCE: (no-up) include/linux/security.h -- fix syntax error with CONFIG_SECURITYFS=n
+
+ * Miscellaneous Ubuntu changes
+  - SAUCE: Import aufs driver
+  - [Config] Enable aufs
+  - [Debian] Add script to update virtualbox
+  - ubuntu: vbox -- Update to 5.1.20-dfsg-2
+  - Enable vbox
+  - SAUCE: aufs -- Include linux/mm.h in fs/aufs/file.h
+
+
+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11-rc8
+
++ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 25 Apr 2017 13:42:54 -0500
+
++ linux (4.11.0-0.4) zesty; urgency=low
+
++ * POWER9: Improve performance on memory management (LP: #1681429)
++   - SAUCE: powerpc/mm/radix: Don't do page walk cache flush when doing full mm
++   flush
++   - SAUCE: powerpc/mm/radix: Remove unnecessary ptesync
++
++ * Miscellaneous Ubuntu changes
++   - find-missing-sauce.sh
+
++ [ Upstream Kernel Changes ]
+
++ * rebase to v4.11-rc7
+
++ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 18 Apr 2017 08:19:43 -0500
+
++ linux (4.11.0-0.3) zesty; urgency=low
+
++ * Disable CONFIG_HVC_UDBG on ppc64el (LP: #1680888)
++   - [Config] Disable CONFIG_HVC_UDBG on ppc64el
+
++ * smartpqi driver needed in initram disk and installer (LP: #1680156)
++   - [Config] Add smartpqi to d-i
+
++ * Disable CONFIG_SECURITY_SELINUX_DISABLE (LP: #1680315)
++   - [Config] CONFIG_SECURITY_SELINUX_DISABLE=n
+
++ * Miscellaneous Ubuntu changes
++   - [Config] flash-kernel should be a Breaks
++   - [Config] drop the info directory
++   - [Config] drop NOTES as obsolete
++   - [Config] drop changelog.historical as obsolete
++   - rebase to v4.11-rc6
+
++ [ Upstream Kernel Changes ]
+
++ * rebase to v4.11-rc6
+
++ -- Tim Gardner <tim.gardner@canonical.com>  Tue, 11 Apr 2017 07:16:52 -0600
+
++ linux (4.11.0-0.2) zesty; urgency=low
+
Open Source Used In 5GaaS Edge AC-4  18142

+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11-rc5
+
+ -- Tim Gardner <tim.gardner@canonical.com>  Mon, 03 Apr 2017 08:26:07 +0100
+
+linux (4.11.0-0.1) zesty; urgency=low
+
+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11-rc4
+ - LP: #1591053
+
+ -- Tim Gardner <tim.gardner@canonical.com>  Mon, 03 Apr 2017 08:26:07 +0100
+
+linux (4.11.0-0.0) zesty; urgency=low
+
+ * dummy entry
+
+ -- Tim Gardner <tim.gardner@canonical.com>  Mon, 20 Mar 2017 05:15:32 -0600
--- linux-4.15.0.orig/debian.master/config/amd64/config.common.amd64
+++ linux-4.15.0/debian.master/config/amd64/config.common.amd64
@@ -0,0 +1,523 @@
+
+# Config options for config.common.amd64 automatically generated by splitconfig.pl
+
+CONFIG_64BIT=y
+CONFIG_6LOWPAN=m
+CONFIG_ABX500_CORE=y
+CONFIG_AC97_BUS=m
+CONFIG_ACPI_DEBUG=y
+CONFIG_ACPI_DEBUGGER=y
+# CONFIG_ACPI_REDUCED_HARDWARE_ONLY is not set
+CONFIG_ADFS_FS=m
+CONFIG_AFFS_FS=m
+CONFIG_AIX_PARTITION=y
+CONFIG_ALIM7101_WDT=m
+CONFIG_ALTERA_TSE=m
+CONFIG_AMD_XGBE_HAVE_ECC=y
+CONFIG_AMIGA_PARTITION=y
+CONFIG_APPLICOM=m
+CONFIG_ARCH_DEFCONFIG="arch/x86/configs/x86_64_defconfig"
+CONFIG_ARCH_HAS_STRICT_KERNEL_RWX=y
+CONFIG_ARCH_HAS_STRICT_MODULE_RWX=y
+CONFIG_ARCH_MMAP_RND_BITS=28
+CONFIG_ARCH_MMAP_RND_BITS_MAX=32
+CONFIG_ARCH_MMAP_RND_BITS_MIN=28
+CONFIG_ARCH_MMAP_RND_COMPAT_BITS=8

---
+CONFIG_ARCH_MMAP_RND_COMPAT_BITS_MAX=16
+CONFIG_ARCH_MMAP_RND_COMPAT_BITS_MIN=8
+# CONFIG_ARCH_NEEDS_CPU_IDLE_COUPLED is not set
+# CONFIG_ARCH_OPTIONAL_KERNEL_RWX is not set
+# CONFIG_ARCH_OPTIONAL_KERNEL_RWX_DEFAULT is not set
+CONFIG_ARCH_PHYS_ADDR_T_64BIT=y
+CONFIG_ARCH_SELECT_MEMORY_MODEL=y
+CONFIG_ARCH_SPARSEMEM_DEFAULT=y
+CONFIG_ARCH_WANTS_THP_SWAP=y
+# CONFIG_ARCH_WANTS_UBSAN_NO_NULL is not set
+CONFIG_ARCNET=m
+# CONFIG_ARM_GIC_V3_ITS is not set
+CONFIG_ATA=y
+CONFIG_ATALK=m
+CONFIG_ATARI_PARTITION=y
+CONFIG_ATA_GENERIC=y
+CONFIG_ATA_OVER_ETH=m
+CONFIG_ATA_PIIX=y
+CONFIG_ATM=m
+# CONFIG_AUDIT_ARCH_COMPAT_GENERIC is not set
+CONFIG_AUTOFS4_LS_FS=m
+CONFIG_AUXDISPLAY=y
+CONFIG_BACKLIGHT_LCD_SUPPORT=y
+CONFIG_BATMAN_ADV=m
+CONFIG_BCH=m
+CONFIG_BCMA=m
+CONFIG_BCM_KONA_USB2_PHY=m
+CONFIG_BE2ISCSI=m
+CONFIG_BFS_FS=m
+CONFIG_BFS_FS=m
+CONFIG_BLK_DEV_3W_XXXX_RAID=m
+CONFIG_BLK_DEV_CRYPTOLOOP=m
+CONFIG_BLK_DEV_DAC960=m
+CONFIG_BLK_DEV_PCIESSD_MTIP32XX=m
+CONFIG_BLK_DEV_PCIEXPRESS_MTIP32XX=m
+CONFIG_BLK_DEV_RSXX=m
+CONFIG_BLK_DEV_SKD=m
+CONFIG_BLK_DEV_SX8=m
+CONFIG_BLK_DEV_UMEM=m
+CONFIG_BOUNCE=y
+CONFIG_BSD_DISKLABEL=y
+CONFIG_C2PORT=m
+CONFIG_CADENCE_WATCHDOG=m
+CONFIG_CAIF=m
+CONFIG_CAN=m
+CONFIG_CB710_CORE=m
+CONFIG_CC_STACKPROTECTOR=y
+CONFIG_CDROM_PKTCDVD=m
+CONFIG_CHASH=m
+CONFIG_CMDLINE_PARTITION=y
+CONFIG_CRAMFS=m
  +# CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API_DESC is not set
+CONFIG_CRYPTO_DEV_NITROX_CNN55XX=m
  +# CONFIG_CXL_AFU_DRIVER_OPS is not set
  +# CONFIG_CXL_BASE is not set
  +# CONFIG_CXL_LIB is not set
+CONFIG_DECNET=m
+CONFIG_DEFAULT_MMAP_MIN_ADDR=65536
+CONFIG_DMADEVICES=y
  +# CONFIG_DMA_CMA is not set
  +# CONFIG_DMA_NOOP_OPS is not set
+CONFIG_DMA_VIRTUAL_CHANNELS=m
  +# CONFIG_DM_DEBUG is not set
  +# CONFIG_DM_MQ_DEFAULT is not set
+CONFIG_DNET=m
+CONFIG_DRM=m
+CONFIG_DUMMY_IRQ=m
+CONFIG_DW_WATCHDOG=m
+CONFIG_ECHO=m
+CONFIG_EEPROM_93CX6=m
+CONFIG_EFI_CAPSULE_LOADER=m
+CONFIG_EFI_DEV_PATH_PARSER=y
+CONFIG_EFS_FS=m
  +# CONFIG_EM_TIMER_STI is not set
+CONFIG_ENCLOSURE_SERVICES=m
+CONFIG_ETHOC=m
  +# CONFIG_EVM_LOAD_X509 is not set
+CONFIG_EXOFS_FS=m
+CONFIG_EXTCON=y
+CONFIG_F2FS_FS=m
+CONFIG_FB=y
+CONFIG_FB_BOOT_VESA_SUPPORT=y
  +# CONFIG_FB_CFB_REVPIXELS_IN_BYTE is not set
  +# CONFIG_FB_IBM_GXT4500 is not set
  +# CONFIG_FB_MACMODES is not set
  +# CONFIG_FB_PROVIDE_GET_FB_UNMAPPED_AREA is not set
+CONFIG_FDDI=y
+CONFIG_FEALNX=m
+CONFIG_FIREWIRE=m
+CONFIG_FIREWIRE_NOSY=m
+CONFIG_FIRMWARE_IN_KERNEL=y
+CONFIG_FIXED_PHY=y
+CONFIG_FMC=m
+CONFIG_FRAME_WARN=1024
+CONFIG_FUSION=y
+CONFIG_GAMEPORT=m
+CONFIG_GENERIC_PHY=y
+CONFIG_GPIO_GENERIC=m
+CONFIG_GPIO_GENERIC_PLATFORM=m
+CONFIG_GPIO_MB86S7X=m
+CONFIG_GPIO_TWLI4030=m
+CONFIG_GPIO_TWLI6040=m
+# CONFIG_HAVE_AOUT is not set
+# CONFIG_HAVE_ARCH_BITREVERSE is not set
+CONFIG_HAVE_ARCH_VMAP_STACK=y
+CONFIG_HAVE_BOOTMEM_INFO_NODE=y
+# CONFIG_HAVE_GENERIC_DMA_COHERENT is not set
+CONFIG_HFSPLUS_FS=m
+CONFIG_HFS_FS=m
+CONFIG_HIBERNATION=y
+CONFIG_HIO=m
+CONFIG_HOTPLUG_PCI=y
+CONFIG_HOTPLUG_PCI_SHPC=m
+CONFIG_HPET=y
+CONFIG_HPFS_FS=m
+CONFIG_HP_ILO=m
+CONFIG_HSI=m
+CONFIG_HSR=m
+CONFIG_HTC_PASIC3=m
+CONFIG_HUGETLB_PAGE=y
+CONFIG_HWMON=y
+CONFIG_HWSPINLOCK=y
+CONFIG_HW_RANDOM_TIMERIOMEM=m
+CONFIG_HYPERV_TSCPAGE=y
+# CONFIG_HZ_100 is not set
+CONFIG_I2C=y
+CONFIG_I2C_AMD_MP2=m
+# CONFIG_I2C_EMEV2 is not set
+# CONFIG_I2C_SLAVE is not set
+CONFIG_I6300ESB_WDT=m
+CONFIG_IEEE802154=m
+CONFIG_IIO=m
+CONFIG_ILLEGAL_POINTER_VALUE=0xdead000000000000
+CONFIG_IMA_DEFAULT_HASH="sha1"
+CONFIG_IMA_DEFAULT_HASH_SHA1=y
+# CONFIG_IMA_DEFAULT_HASH_SHA256 is not set
+CONFIG_IMA_DEFAULT_TEMPLATE="ima-ng"
+# CONFIG_IMA_LOAD_X509 is not set
+CONFIG_IMA_NG_TEMPLATE=y
+# CONFIG_IMA_SIG_TEMPLATE is not set
+CONFIG_INFINIBAND_BNXI5_RE=m
+CONFIG_INFINIBAND_NES=m
+CONFIG_INFINIBAND_OCUM=m
+CONFIG_INFINIBAND_QIB=m
+CONFIG_INPUT=y
+CONFIG_MINIX_FS=m
+CONFIG_MINIX_SUBPARTITION=y
+CONFIG_MISR_RTSX=m
+CONFIG_MISR_RTSX_PCI=m
+CONFIG_MMC=y
+CONFIG_MMC_BLOCK=m
+CONFIG_MMC_SDHCI=m
+CONFIG_MMC_SDHCI_PLATFORM=m
+CONFIG_MTD=m
+CONFIG_MTD_BLKDEVS=m
+CONFIG_MTD_BLOCK=m
+CONFIG_MTD_CMDLINE_PARTS=m
+CONFIG_MTD_NAND=m
+CONFIG_MTD_NAND_BCH=m
+CONFIG_MTD_NAND_ECC=m
+# CONFIG_MTD_NAND_OMAP_BCH_BUILD is not set
+CONFIG_NCP_FS=m
+CONFIG_NET_CADENCE=y
+CONFIG_NET_PACKET_ENGINE=y
+CONFIG_NET_SWITCHDEV=y
+CONFIG_NET_VENDOR_3COM=y
+CONFIG_NET_VENDOR_ADAPTEC=y
+CONFIG_NET_VENDOR_AGERE=y
+CONFIG_NET_VENDOR_ALTEON=y
+CONFIG_NET_VENDOR_AMD=y
+CONFIG_NET_VENDOR_ARC=y
+CONFIG_NET_VENDOR_ATHEROS=y
+CONFIG_NET_VENDOR_BROADCOM=y
+CONFIG_NET_VENDOR_BROCADE=y
+CONFIG_NET_VENDOR_CAVIUM=y
+CONFIG_NET_VENDOR_CHELSIO=y
+CONFIG_NET_VENDOR_CISCO=y
+CONFIG_NET_VENDOR_DEC=y
+CONFIG_NET_VENDOR_DLINK=y
+CONFIG_NET_VENDOR_EMULEX=y
+CONFIG_NET_VENDOR_EXAR=y
+CONFIG_NET_VENDOR_EZCHIP=y
+CONFIG_NET_VENDOR_HP=y
+CONFIG_NET_VENDOR_HUAWEI=y
+CONFIG_NET_VENDOR_INTEL=y
+CONFIG_NET_VENDOR_MARVELL=y
+CONFIG_NET_VENDOR_MICREL=y
+CONFIG_NET_VENDOR_MYRI=y
+CONFIG_NET_VENDOR_NATSEMI=y
+CONFIG_NET_VENDOR_NVIDIA=y
+CONFIG_NET_VENDOR_OKI=y
+CONFIG_NET_VENDOR_QLOGIC=y
+CONFIG_NET_VENDOR_QUALCOMM=y
+CONFIG_NET_VENDOR_RDC=y
+CONFIG_NET_VENDOR_REALTEK=y
+CONFIG_NET_VENDOR_RENESAS=y
+CONFIG_NET_VENDOR_ROCKER=y
+CONFIG_NET_VENDOR_SAMSUNG=y
+CONFIG_NET_VENDOR_SEEQ=y
+CONFIG_NET_VENDOR_SILAN=y
+CONFIG_NET_VENDOR_SIS=y
+CONFIG_NET_VENDOR_SMSC=y
+CONFIG_NET_VENDOR_STMICRO=y
+CONFIG_NET_VENDOR_SUN=y
+CONFIG_NET_VENDOR_TEHUTI=y
+CONFIG_NET_VENDOR_TI=y
+CONFIG_NET_VENDOR_VIA=y
+CONFIG_NET_VENDOR_WIZNET=y
+CONFIG_NEW_LEDS=y
+CONFIG_NFC=m
+CONFIG_NFP=m
+CONFIG_NODES_SHIFT=10
+CONFIG_NOP_USB_XCEIV=m
+CONFIG_NOZOMI=m
+CONFIG_NR_CPUS=8192
+CONFIG_NTB=m
+CONFIG_NUMA_BALANCING_DEFAULT_ENABLED=y
+CONFIG_NUMA_EMU is not set
+CONFIG_NVMEM=y
+CONFIG_N_GSM=m
+CONFIG_OCXL_BASE is not set
+CONFIG_OF is not set
+CONFIG_OMFS_FSS=m
+CONFIG_OSF_PARTITION=y
+CONFIG_OUTPUT_FORMAT="elf64-x86-64"
+CONFIG_PAGE_EXTENSION is not set
+CONFIG_PANIC_TIMEOUT=0
+CONFIG_PARAVIRT=y
+CONFIG_PARPORT=m
+CONFIG_PATA_SIS=y
+CONFIG_PCIEPORTBUS=y
+CONFIG_PCI_MSI_IRQ_DOMAIN=y
+CONFIG_PCI_PASID=y
+CONFIG_PCI_PRI=y
+CONFIG_PCI_QUIRKS=y
+CONFIG_PCMCIA=m
+CONFIG_PGTABLE_LEVELS=4
+CONFIG_PGTABLE_MAPPING=y
+CONFIG_PHANTOM=m
+CONFIG_PHONET=m
+CONFIG_PHYLIB=y
+CONFIG_PHYSICAL_ALIGN=0x200000
+CONFIG_PHYSICAL_START=0x1000000
+CONFIG_PHYS_ADDR_T_64BIT=y
+# CONFIG_PHY_EXYNOS5250_USB2 is not set
+CONFIG_PHY_PXA_28NM_HSIC=m
+CONFIG_PHY_PXA_28NM_USB2=m
+CONFIG_PINCTRL=y
+CONFIG_PINCTRL_CHERRYVIEW=y
+CONFIG_PM_DEBUG=y
+CONFIG_PM_DEVFREQ=y
+CONFIG_POWERCAP=y
+CONFIG_POWER_AVS=y
+CONFIG_POWER_SUPPLY=y
+CONFIG_PPP=y
+CONFIG_PPS=m
+CONFIG_PPS_CLIENT_GPIO=m
+CONFIG_PPS_CLIENT_LDISC=m
+# CONFIG_PREEMPT_NONE is not set
+CONFIG_PSTORE=y
+# CONFIG_PSTORE_CONSOLE is not set
+CONFIG_PSTORE_RAM=m
+CONFIG_PTP_1588_CLOCK=m
+CONFIG_PWM=y
+CONFIG_QNX4FS_FS=m
+CONFIG_QNX6FS_FS=m
+CONFIG_RAW_DRIVER=m
+CONFIG_RCU_CPUSTALL_TIMEOUT=60
+CONFIG_REED_SOLOMON=m
+# CONFIG_REFCOUNT_FULL is not set
+CONFIG_REGULATOR=y
+CONFIG_REGULATOR_FIXED_VOLTAGE=m
+CONFIG_REGULATOR_TWLV430=m
+CONFIG_REISERFS_FS=m
+# CONFIG_RESET_BERLIN is not set
+CONFIG_RESET_CONTROLLER=y
+# CONFIG_RESET_IMX7 is not set
+# CONFIG_RESET_MESON is not set
+# CONFIG_RESET_SIMPLE is not set
+# CONFIG_RESET_SUNXI is not set
+CONFIG_RFKILL=y
+CONFIG_ROMFS_FS=m
+CONFIG_RPMSG_VIRTIO=m
+CONFIG_RTC_DRV_CMOs=y
+CONFIG_RTC_DRV_PCIE=m

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+CONFIG_SATA_AHCI_PLATFORM=m
+CONFIG_SCHED_SMT=y
+CONFIG_SCSI_3W_9XXX=m
+CONFIG_SCSI_3W_SAS=m
+CONFIG_SCSI_AACRAID=m
+CONFIG_SCSI_ACARD=m
+CONFIG_SCSI_ADVANsys=m
+CONFIG_SCSI_AIC79XX=m
+CONFIG_SCSI_AIC7XXX=m
+CONFIG_SCSI_AIC94XX=m
+CONFIG_SCSI_AM53C974=m
+CONFIG_SCSI_ARCMsR=m
+CONFIG_SCSI_BFA_FC=m
+CONFIG_SCSI_BNX2X_FCOE=m
+CONFIG_SCSI_BNX2_ISCSI=m
+CONFIG_SCSI_CHELsIO_FCOE=m
+CONFIG_SCSI_CXGB3_ISCsI=m
+CONFIG_SCSI_CXGB4_ISCsI=m
+CONFIG_SCSI_DC395x=m
+CONFIG_SCSI_DMx3191D=m
+CONFIG_SCSI_DPT_120=m
+CONFIG_SCSI_ESAS2R=m
+CONFIG_SCSI_FUTURE_DOMAIN=m
+CONFIG_SCSI_HPSA=m
+CONFIG_SCSI_HPTIOP=m
+CONFIG_SCSI_INIA100=m
+CONFIG_SCSI_INITIO=m
+CONFIG_SCSI_IPS=m
+CONFIG_SCSI_LPFC=m
+# CONFIG_SCSI_MQ_DEFAULT is not set
+CONFIG_SCSI_MVSAS=m
+CONFIG_SCSI_MVUMI=m
+CONFIG_SCSI_PM8001=m
+CONFIG_SCSI_PMCRAID=m
+CONFIG_SCSI_QLA_FC=m
+CONFIG_SCSI_QLA_ISCsI=m
+CONFIG_SCSI_QLOGIC_1280=m
+CONFIG_SCSI_SNIC=m
+CONFIG_SCSI_SRp_ATTRIBS=m
+CONFIG_SCSI_STEX=m
+CONFIG_SCSI_SYM53C8XX_2=m
+CONFIG_SCSI_UFSHCD=m
+CONFIG_SCSI_WD719X=m
+CONFIG_SECURITY_SELINUX_BOOTPARAM=y
+CONFIG_SENSORS_SCH56XX_COMMON=m
+CONFIG_SERIAL_8250=y
+CONFIG_SERIAL_8250_DW=m
+CONFIG_SERIAL_8250_FINTEK=y
+# CONFIG_SERIAL_8250_FSL is not set
+CONFIG_SERIAL_ALTERA_JTAGUART=m
+CONFIG_SERIAL_ALTERA_UART=m
+CONFIG_SERIAL_ARC=m
+CONFIG_SERIAL_CORE=y
+CONFIG_SERIAL_FSL_LPUART=m
+CONFIG_SERIAL_FSL_UART=m
+CONFIG_SERIAL_NONSTANDARD=y
+CONFIG_SERIAL_RP2=m
+CONFIG_SERIAL_SCCNXP=y
+CONFIG_SERIO=y
+CONFIG_SFC=m
+CONFIG_SFC_FALCON=m
+CONFIG_SGI_IOC4=m
+CONFIG_SGI_PARTITION=y
+CONFIG_SGI_ALLOC=y
+# CONFIG_SG_SPLIT is not set
+# CONFIG_SH_TIMER_CMT is not set
+# CONFIG_SH_TIMER_MTU2 is not set
+# CONFIG_SH_TIMER_TMU is not set
+CONFIG_SLIP=m
+CONFIG_SND=m
+CONFIG_SND_COMPRESS_OFFLOAD=m
+CONFIG_SND_DMAENGINE_PCM=m
+CONFIG_SND_EMU10K1_SEQ=m
+# CONFIG_SND_OPL4_LIB_SEQ is not set
+CONFIG_SND_PCM=m
+CONFIG_SND_SOC=m
+CONFIG_SND_SOC_FSL_SSI=m
+CONFIG_SND_SOC_I2C_AND_SPI=m
+CONFIG_SND_SOC_IMX_AUDMUX=m
+CONFIG_SND_SOC_RT5677_SPI=m
+CONFIG_SND_SOC_SGTL5000=m
+CONFIG_SND_TIMER=m
+CONFIG_SOC_TI=y
+CONFIG_SOLARIS_X86_PARTITION=y
+CONFIG_SOUND=m
+CONFIG_SPI=y
+CONFIG_SPI_PXA2XX_PCI=m
+# CONFIG_SPI_ROCKCHIP is not set
+CONFIG_SPMI=m
+CONFIG_SRAM=m
+CONFIG_SSB=m
+CONFIG_STAGING=y
+# CONFIG_STANDALONE is not set
+# CONFIG_SUNXI_SRAM is not set
+CONFIG_SUN_PARTITION=y
+CONFIG_SYSV68_PARTITION=y
+CONFIG_SYSV_FS=m
+CONFIG_SYS_HYPervisor=y
+CONFIG_TCG_TIS_I2C_ATMEL=m
+CONFIG_TCG_TIS_I2C_INFINEON=m
+CONFIG_TCG_TIS_I2C_NUVOTON=m
+CONFIG_THERMAL=y
+CONFIG_TIFM_CORE=m
+CONFIG_TI_CPSW_ALE=m
+CONFIG_TOUCHSCREEN_ELAN=y
+CONFIG_TRACE_SINK=m
+# CONFIG_TRANSPARENT_HUGEPAGE_ALWAYS is not set
+CONFIG_TRANSPARENT_HUGEPAGE_MADVISE=y
+CONFIG_TTY_PRINTK=y
+CONFIG_UFS_FS=m
+CONFIG_UIO_AEC=m
+CONFIG_UIO_CIF=m
+CONFIG_UIO_DMEM_GENIRQ=m
+CONFIG_UIO_MF624=m
+CONFIG_UIO_NETX=m
+CONFIG_UIO_PCI_GENERIC=m
+CONFIG_UIO_PDRV_GENIRQ=m
+CONFIG_UIO_PRUSS=m
+CONFIG_UIO_SERCOS3=m
+CONFIG_ULTRIX_PARTITION=y
+CONFIG_UNIXWARE_DISKLABEL=y
+CONFIG_USB_DWC2_PCI=m
+CONFIG_USB_EHCI_HCD_PLATFORM=y
+CONFIG_USB_GADGET=m
+# CONFIG_USB_G_MULTI is not set
+CONFIG_USB_HCD_BCMA=m
+CONFIG_USB_HCD_SSB=m
+CONFIG_USB_MUSB_HDRC=m
+CONFIG_USB_OHCI_HCD_PLATFORM=y
+CONFIG_USB_SUPPORT=y
+CONFIG_UWB=m
+CONFIG_VFIO=m
+CONFIG_VFIO_IOMMU_TYPE1=m
+CONFIG_VFIO_PCI=m
+CONFIG_VFIO_VIRQFD=m
+CONFIG_VGASTATE=m
+CONFIG_VIRTIO_MMIO=y
+# CONFIG_VM86 is not set
+CONFIG_VME_BUS=y
+CONFIG_VMXNET3=m
+CONFIG_VXFS_FS=m
+CONFIG_W1=m
+CONFIG_WAN=y
+CONFIG_WDTPCI=m
+CONFIG_WIMAX=m
+CONFIG_X25=m
+# CONFIG_X86_INTEL_MID is not set
+CONFIG_X86_MINIMUM_CPU_FAMILY=64
+CONFIG_X86_SPEEDSTEP_LIB=m
+CONFIG_XEN=y
+CONFIG_XEN_BALLOON_MEMORY_HOTPLUG_LIMIT=512
+CONFIG_XILINX_WATCHDOG=m
+CONFIG_XILLYBUS=m
+CONFIG_XZ_DEC_ARM=y
+CONFIG_XZ_DEC_ARMTHUMB=y
+CONFIG_XZ_DEC_BCI=y
+CONFIG_XZ_DEC_IA64=y
+CONFIG_XZ_DEC_POWERPC=y
+CONFIG_XZ_DEC_SPARC=y
+CONFIG_XZ_DEC_TEST=m
+CONFIG_XZ_DEC_X86=y
+CONFIG_ZLIB_DEFLATE=y
--- linux-4.15.0.orig/debian.master/config/amd64/config.flavour.generic
+++ linux-4.15.0/debian.master/config/amd64/config.flavour.generic
@@ -0,0 +1,10 @@
#
# Config options for config.flavour.generic automatically generated by splitconfig.pl
#
+CONFIG_HZ=250
+# CONFIG_HZ_1000 is not set
+CONFIG_HZ_250=y
+# CONFIG_IRQ_FORCED_THREADING_DEFAULT is not set
+# CONFIG_LATENCYTOP is not set
+# CONFIG_PREEMPT is not set
+CONFIG_PREEMPT_VOLUNTARY=y
--- linux-4.15.0.orig/debian.master/config/amd64/config.flavour.lowlatency
+++ linux-4.15.0/debian.master/config/amd64/config.flavour.lowlatency
@@ -0,0 +1,10 @@
#
# Config options for config.flavour.lowlatency automatically generated by splitconfig.pl
#
+CONFIG_HZ=1000
+CONFIG_HZ_1000=y
+# CONFIG_HZ_250 is not set
+# CONFIG_IRQ_FORCED_THREADING_DEFAULT is not set
+# CONFIG_LATENCYTOP is not set
+# CONFIG_PREEMPT is not set
+CONFIG_PREEMPT_VOLUNTARY=y
--- linux-4.15.0.orig/debian.master/config/annotations
+++ linux-4.15.0/debian.master/config/annotations
@@ -0,0 +1,2181 @@
#
# Menu: HEADER
## Open Source Used In 5GaaS Edge AC-4

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+ FORMAT: 2
+ ARCH: x86 arm arm64 s390 powerpc
+ +
+ # Mark debugging symbols.
+ # exceptions
+ CONFIG_DEBUG_FS                      note<required debug option>
+ CONFIG_DEBUG_KERNEL                  note<required debug option>
+ +
+ # Menu: ROOT
+ CONFIG_LIVEPATCH                    policy<['amd64': 'y', 'ppc64le': 'y', 's390x': 'y']>
+
+ # Menu: ACPI (Advanced Configuration and Power Interface) Support
+ CONFIG_ACPI                          policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_DEBUGGER                policy<['amd64': 'y', 'arm64': 'n', 'i386': 'n']>
+ CONFIG_ACPI_DEBUGGER_USER           policy<['amd64': 'y']>
+ CONFIG_ACPI_PROCFS_POWER            policy<['amd64': 'n', 'i386': 'n']>
+ CONFIG_ACPI_REV_OVERRIDE_POSSIBLE   policy<['amd64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_EC_DEBUGFS              policy<['amd64': 'm', 'arm64': 'm', 'i386': 'm']>
+ CONFIG_ACPI_AC                      policy<['amd64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_BATTERY                 policy<['amd64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_BUTTON                  policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_VIDEO                   policy<['amd64': 'm', 'i386': 'm']>
+ CONFIG_ACPI_FAN                     policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_DOCK                    policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_PROCESSOR               policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_IPMI                    policy<['amd64': 'm', 'arm64': 'm', 'i386': 'm']>
+ CONFIG_ACPI_PROCESSOR_AGGREGATOR    policy<['amd64': 'm', 'i386': 'm']>
+ CONFIG_ACPI_THERMAL                 policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_NUMA                    policy<['amd64': 'y', 'arm64': 'y']>
+ CONFIG_ACPI_CUSTOM_DSDT_FILE        policy<['amd64': 'm', 'i386': 'm']>
+ CONFIG_ACPI_TABLE_UPGRADE           policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_DEBUG                   policy<['amd64': 'y', 'arm64': 'n', 'i386': 'n']>
+ CONFIG_ACPI_PCI_SLOT                policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_X86_PM_TIMER                 policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_CONTAINER               policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_HED                     policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_CUSTOM_METHOD           policy<['amd64': 'n', 'arm64': 'n', 'i386': 'n']>
+ CONFIG_ACPI_BGRT                    policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+ CONFIG_ACPI_REduced_HARDWARE_ONLY   policy<['amd64': 'n', 'arm64': 'y', 'i386': 'n']>
+ CONFIG_ACPI_NFIT                    policy<['amd64': 'm', 'arm64': 'm']>
+ CONFIG_DPTF_POWER                   policy<['amd64': 'm', 'i386': 'm']>
+ CONFIG_ACPI_EXTLOG                  policy<['amd64': 'm', 'i386': 'm']>
+ CONFIG_ACPI_CONFIGFS                policy<['amd64': 'm', 'arm64': 'm', 'i386': 'm']>
+ CONFIG_TPS68470_PMIC_OPGregion      policy<['amd64': 'y', 'arm64': 'y', 'i386': 'y']>
+
+ # CONFIG_ACPI_PROCFS_POWER           flag<DEPRECATED>
+CONFIG_ACPI_CUSTOM_METHOD mark<ENFORCED> note<SECURITY: allows arbitrary
execution>
+CONFIG_ACPI_CUSTOM_DSDT_FILE note<might allow hardware damage>
+
+## Menu: ACPI (Advanced Configuration and Power Interface) Support >> ACPI Platform Error Interface (APEI)
+CONFIG_ACPI_APEI policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_ACPI_APEI_GHES policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_ACPI_APEI_PCIEAER policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_ACPI_APEI_SEA policy<{'arm64': 'y'}>
+CONFIG_ACPI_APEI_MEMORY_FAILURE policy<{'amd64': 'y', 'arm64': 'y'}>
+CONFIG_ACPI_APEI_EINJ policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_ACPI_APEI_ERST_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'i386': 'n'}>
+
+## Menu: ACPI (Advanced Configuration and Power Interface) Support >> PMIC (Power Management Integrated
Circuit) operation region support
+CONFIG_PMIC_OPREGION policy<{'amd64': 'n', 'arm64': 'n', 'i386': 'n'}>
+
+## Menu: ARM Accelerated Cryptographic Algorithms
+CONFIG_CRYPTO_CHACHA20_NEON policy<{'arm64': 'm', 'armhf': 'm'}>
+
+## Menu: ARM Accelerated Cryptographic Algorithms >> Architecture: arm
+CONFIG_ARM_CRYPTO policy<{'armhf': 'y'}>
+CONFIG_CRYPTO_SHA1_ARM policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_SHA1_ARM_NEON policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_SHA1_ARM_CE policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_SHA2_ARM_CE policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_SHA256_ARM policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_SHA512_ARM policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_AES_ARM policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_AES_ARM_BS policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_AES_ARM_CE policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_GHASH_ARM_CE policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_CRC32_ARM_CE policy<{'armhf': 'm'}>
+
+## Menu: ARM64 Accelerated Cryptographic Algorithms
+
+## Menu: ARM64 Accelerated Cryptographic Algorithms >> Architecture: arm64
+CONFIG_ARM64_CRYPTO policy<{'arm64': 'y'}>
+CONFIG_CRYPTO_SHA256_ARM64 policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_SHA512_ARM64 policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_SHA1_ARM64_CE policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_SHA1_ARM64_CE policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_SHA2_ARM64_CE policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_GHASH_ARM64_CE policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_CRC32_ARM64_CE policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_AES_ARM64 policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_AES_ARM64_CE policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_AES_ARM64_CE_CCM policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_AES_ARM64_CE_BLK policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_AES_ARM64_NEON_BLK policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_AES_ARM64_BS policy<{'arm64': 'm'}>
+
+## Menu: Advanced setup >> Architecture: powerpc
+
+## Menu: Advanced setup >> Prompt for advanced kernel configuration options
+CONFIG_PHYSICAL_START policy<{'amd64': '0x1000000', 'i386': '0x1000000', 'ppc64le': '0x00000000'}>
+
+## Menu: Advanced setup >> Prompt for advanced kernel configuration options >> Architecture: powerpc
+CONFIG_PAGE_OFFSET policy<{'armhf': '0xC0000000', 'i386': '0xC0000000', 'ppc64le': '0xc000000000000000'}>
+CONFIG_KERNEL_START policy<{'ppc64le': '0xc000000000000000'}>
+
+## Menu: Advanced setup >> Prompt for advanced kernel configuration options >> Pinned Kernel TLBs (860 ONLY) >> Architecture: powerpc
+
+## Menu: Architecture: arm
+CONFIG_ARM_DMA_IOMMU_ALIGNMENT policy<{'armhf': '8'}>
+CONFIG_ARM_PATCH_PHYS_VIRT policy<{'armhf': 'y'}>
+
+## Menu: Architecture: powerpc
+CONFIG_PPC64 policy<{'ppc64le': 'y'}>
+CONFIG_NRIRQS policy<{'ppc64le': '512'}>
+CONFIG_SCOM_DEBUGFS policy<{'ppc64le': 'y'}>
+
+## Menu: Architecture: s390
+CONFIG_KMSG_IDS policy<{'s390x': 'y'}>
+
+## Menu: Architecture: x86
+CONFIG_64BIT policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'n', 'ppc64le': 'y', 's390x': 'y'}>
+
+## Menu: Boot options
+CONFIG_CMDLINE policy<{'arm64': """console=ttyAMA0"", 'armhf': """"}>
+CONFIG_CMDLINE_FORCE policy<{'arm64': 'n'}>
+CONFIG_EFI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_DMI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_KEXEC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CRASH_DUMP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
+## Menu: Boot options >> Architecture: arm

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+CONFIG_USE_OF
  policy<{'armhf': 'y'}>
+CONFIG_ATAGS
  policy<{'armhf': 'y'}>
+CONFIG_DEPRECATED_PARAM_STRUCT
  policy<{'armhf': 'n'}>
+CONFIG_ZBOOT_ROM_TEXT
  policy<{'armhf': '0x0'}>
+CONFIG_ZBOOT_ROM_BSS
  policy<{'armhf': '0x0'}>
+CONFIG_ARM_APPENDED_DTB
  policy<{'armhf': 'y'}>
+CONFIG_ARM_ATAG_DTB_COMPAT
  policy<{'armhf-generic': 'y', 'armhf-generic-lpae': 'n'}>
+CONFIG_ATAGS_PROC
  policy<{'armhf': 'y'}>
+CONFIG_AUTO_ZRELADDR
  policy<{'armhf': 'y'}>
+
+CONFIG_ARM_ATAG_DTB_COMPAT
  flag<REV>
+
+CONFIG_ARM64_ACPI_PARKING_PROTOCOL
  policy<{'arm64': 'y'}>
+
+CONFIG_ARM64_ACPI_PARKING_PROTOCOL
  policy<{'arm64': 'y'}>
+
+CONFIG_ARM_ATAG_DTB_COMPAT_CMDLINE_FROM_BOOTLOADER
  policy<{'armhf-generic': 'n'}>
+CONFIG_ARM_ATAG_DTB_COMPAT_CMDLINE_EXTEND
  policy<{'armhf-generic': 'y'}>
+
+CONFIG_ISA
  policy<{'i386': 'y'}>
+
+CONFIG_ISA
  policy<{'i386': 'y'}>
+
+CONFIG_FSL_LBC
  policy<{'ppc64el': 'y'}>
+CONFIG_PPC_RTAS_FILTER
  policy<{'ppc64el': 'y'}>
+
+CONFIG_PPC_RTAS_FILTER
  mark<ENFORCED> note<CVE-2020-27777>
+
+CONFIG_PPC_RTAS_FILTER
  mark<ENFORCED> note<CVE-2020-27777>
+
+CONFIG_QDIO
  policy<{'s390x': 'm'}>
+CONFIG_CHSC_SCH
  policy<{'s390x': 'm'}>
+CONFIG_SCM_BUS
  policy<{'s390x': 'y'}>
+CONFIG_EADM_SCH
  policy<{'s390x': 'm'}>
+CONFIG_VFIO_CCW
  policy<{'s390x': 'm'}>
+CONFIG_VFIO_AP
  policy<{'s390x': 'm'}>
+
+CONFIG_VFIO_AP
  policy<{'s390x': 'm'}>
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  policy<{'s390x': 'm'}>
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+CONFIG_VFIO_AP
  policy<{'s390x': 'm'}>
+
+CONFIG_VFIO_AP
  policy<{'s390x': 'm'}>
+CONFIG_NET5501          policy<{'i386': 'y'}>
+CONFIG_GEOS            policy<{'i386': 'y'}>
+CONFIG_X86_SYSFB       policy<{'amd64': 'n', 'i386': 'n'}>
+
+CONFIG_X86_SYSFB       flag<REVIEW>
+
+ Menu: Bus options (PCI etc.) >> DesignWare PCI Core Support
+CONFIG_PCI_DRA7XX     policy<{'armhf': 'y'}>
+CONFIG_PCI_DRA7XX_HOST policy<{'armhf': 'y'}>
+CONFIG_PCI_DRA7XX_EP   policy<{'armhf': 'y'}>
+CONFIG_PCIE_DW_PLAT   policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_PCIE_EXYNOS    policy<{'armhf': 'y'}>
+CONFIG_PCI_IMX6        policy<{'armhf-generic': 'y'}>
+CONFIG_PCI_LAYERSCAPE policy<{'arm64': 'y', 'armhf': 'n'}>
+CONFIG_PCI_HISI       policy<{'arm64': 'y'}>
+CONFIG_PCIE_QCOM      policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_PCIE_ARMDADA_8K policy<{'armhf': 'y'}>
+CONFIG_PCIE_KIRIN     policy<{'arm64': 'y'}>
+CONFIG_PCIE_HISI_STB  policy<{'arm64': 'y', 'armhf': 'y'}>
+
+ Menu: Bus options (PCI etc.) >> EISA support
+CONFIG_EISA_VLB_PRIMING policy<{'i386': 'y'}>
+CONFIG_EISA_PCI_EISA   policy<{'i386': 'y'}>
+CONFIG_EISA_VIRTUAL_ROOT policy<{'i386': 'y'}>
+CONFIG_EISAenames     policy<{'i386': 'y'}>
+
+ Menu: Bus options (PCI etc.) >> EISA support >> Architecture: x86
+CONFIG_EISA           policy<{'i386': 'y'}>
+
+ Menu: Bus options (PCI etc.) >> PCCard (PCMCIA/CardBus) support
+CONFIG_PCCARD        policy<{'amd64': 'm', 'armhf': 'n', 'i386': 'm', 'ppc64le': 'n'}>
+CONFIG_CARDBUS       policy<{'amd64': 'y', 'i386': 'y'}>
+
+ Menu: Bus options (PCI etc.) >> PCCard (PCMCIA/CardBus) support >> 16-bit PCMCIA support
+CONFIG_PCMCIA        policy<{'amd64': 'm', 'i386': 'm', 's390x': 'n'}>
+CONFIG_PCMCIA_LOAD_CIS policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PD6729        policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_I82092         policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_I82365         policy<{'i386': 'm'}>
+CONFIG_TCIC          policy<{'i386': 'm'}>
+
+ Menu: Bus options (PCI etc.) >> PCCard (PCMCIA/CardBus) support >> CardBus yenta-compatible bridge support
+CONFIG_YENTAY         policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_YENTAY_O2      policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_YENTAY_RICOH   policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_YENTAY_TI      policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_YENTAY_ENE_TUNE policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_YENTA_TOSHIBA policy<{'amd64': 'y', 'i386': 'y'}>
+
++ Menu: Bus options (PCI etc.) >> PCI Endpoint
+CONFIG_PCI_ENDPOINT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'>
+CONFIG_PCI_ENDPOINT_CONFIGFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64el': 'y', 's390x': 'y'>
+CONFIG_PCI_EPF_TEST policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n',
's390x': 'n'}>
+
++ Menu: Bus options (PCI etc.) >> PCI support
+CONFIG_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+CONFIG_PCI_MSI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+CONFIG_PCI_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n',
's390x': 'n'}>
+CONFIG_PCI_REALLOC_ENABLE_AUTO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_PCI_STUB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'm'}>
+CONFIG_XEN_PCIDEV_FRONTEND policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PCI_IOV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+CONFIG_PCI_PRI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+CONFIG_PCI_PASID policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+CONFIG_PCI_HYPERV policy<{'amd64': 'm'}>
+CONFIG_PCI_QUIRKS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+
++ Menu: Bus options (PCI etc.) >> PCI support >> Architecture: s390
+CONFIG_PCI_NR_FUNCTIONS policy<{'s390x': '64'}>
+
++ Menu: Bus options (PCI etc.) >> PCI support >> Architecture: x86
+CONFIG_PCI_MMCONFIG policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PCI CNB20LE QUIRK policy<{'amd64': 'n', 'i386': 'n'}>
+
++ Menu: Bus options (PCI etc.) >> DesignWare PCI Core Support
+
++ Menu: Bus options (PCI etc.) >> PCI support >> PCI Endpoint
+
++ Menu: Bus options (PCI etc.) >> PCI Express Port Bus support
+CONFIG_PCIEPORTBUS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'n',
's390x': 'y'}>
+CONFIG_HOTPLUG_PCI_PCIE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 's390x': 'y'}>
+CONFIG_PCIEAER policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 's390x': 'y'}>
+CONFIG_PCIE_ECRC policy\{\'amd64\': \'n\', \'arm64\': \'n\', \'armhf\': \'n\', \'i386\': \'n\', \'s390x\': \'n\'}
+CONFIG_PCIEAER_INJECT policy\{\'amd64\': \'n\', \'arm64\': \'n\', \'armhf\': \'n\', \'i386\': \'n\', \'s390x\': \'n\'}
+CONFIG_PCIEASPM policy\{\'amd64\': \'y\', \'arm64\': \'y\', \'armhf\': \'y\', \'i386\': \'y\', \'s390x\': \'y\'}
+CONFIG_PCIEASPM_DEBUG policy\{\'amd64\': \'y\', \'arm64\': \'y\', \'armhf\': \'y\', \'i386\': \'y\', \'s390x\': \'y\'}
+CONFIG_PCIE_DPC policy\{\'amd64\': \'y\', \'arm64\': \'y\', \'armhf\': \'y\', \'i386\': \'y\', \'s390x\': \'y\'}
+CONFIG_PCIE_PTМ policy\{\'amd64\': \'y\', \'arm64\': \'y\', \'armhf\': \'y\', \'i386\': \'y\', \'s390x\': \'y\'}
+
+CONFIG_PCIEPORTBUS mark\<ENFORCED> note\LP#1665404>
+CONFIG_HOTPLUG_PCI_PCIE mark\<ENFORCED> note\LP#1374440>
+CONFIG_PCIEAER_INJECT flag\<TESTING>
+
+# Menu: Bus options (PCI etc.) >> PCI support >> PCI Express Port Bus support >> Default ASPM policy
+CONFIG_PCIEASPM_DEFAULT policy\{\'amd64\': \'y\', \'arm64\': \'y\', \'armhf\': \'y\', \'i386\': \'y\', \'s390x\': \'y\'}
+CONFIG_PCIEASPM POWERSAVE policy\{\'amd64\': \'n\', \'arm64\': \'n\', \'armhf\': \'n\', \'i386\': \'n\', \'s390x\': \'n\'}
+CONFIG_PCIEASPM_POWER_SUPERSAVE policy\{\'amd64\': \'n\', \'arm64\': \'n\', \'armhf\': \'n\', \'i386\': \'n\', \'s390x\': \'n\'}
+CONFIG_PCIEASPM PERFORMANCE policy\{\'amd64\': \'n\', \'arm64\': \'n\', \'armhf\': \'n\', \'i386\': \'n\', \'s390x\': \'n\'}
+
+# Menu: Bus options (PCI etc.) >> PCI support >> PCI access mode >> Architecture: x86
+CONFIG_PCI_GOBIOS policy\{\'i386\': \'n\'}
+CONFIG_PCI_GOMMCONFIG policy\{\'i386\': \'n\'}
+CONFIG_PCI_GODIRECT policy\{\'i386\': \'n\'}
+CONFIG_PCI_GOANY policy\{\'i386\': \'y\'}
+
+# Menu: Bus options (PCI etc.) >> PCI support >> PCI host controller drivers
+CONFIG_PCI_MVEBU policy\{\'armhf\': \'y\'}
+CONFIG_PCIE_XILINX_NWL policy\{\'armhf\': \'y\'}
+CONFIG_PCI_FTPCI100 policy\{\'armhf\': \'y\'}
+CONFIG_PCI_TEGRA policy\{\'armhf-generic\': \'y\'}
+CONFIG_PCI_RCAR_GEN2 policy\{\'armhf\': \'y\'}
+CONFIG_PCIE_RCAR policy\{\'arm64\': \'y\', \'armhf\': \'y\'}
+CONFIG_PCI_HOST_GENERIC policy\{\'arm64\': \'y\', \'armhf\': \'y\'}
+CONFIG_PCIE_XGENE policy\{\'arm64\': \'y\'}
+CONFIG_PCIE_XGENE_MSI policy\{\'arm64\': \'y\'}
+CONFIG_PCIE_V3_SEMI policy\{\'armhf\': \'y\'}
+CONFIG_PCIE_IPROCPLATFORM policy\{\'arm64\': \'m\'}
+CONFIG_PCIE_IPROCP MSI policy\{\'arm64\': \'y\'}
+CONFIG_PCIE_ALTERA policy\{\'armhf\': \'n\'}
+CONFIG_PCIE_HOST_THUNDER PEM policy\{\'arm64\': \'y\'}
+CONFIG_PCIE_HOST_THUNDER_ECAM policy\{\'arm64\': \'y\'}
+CONFIG_PCIE_ROCKCHIP policy\{\'arm64\': \'y\', \'armhf\': \'y\'}
+CONFIG_PCIE_MEDIATEK policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_VMD policy<{'amd64': 'm'}>
+
+- Menu: Bus options (PCI etc.) >> PCI support >> PCI switch controller drivers
+CONFIG_PCI_SW_SWITCHTEC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
+- Menu: Bus options (PCI etc.) >> PCI support >> RapidIO support
+CONFIG_RAPIDIO policy<{'amd64': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_RAPIDIO_TSI721 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_RAPIDIO_DISC_TIMEOUT policy<{'amd64': '30', 'i386': '30', 'ppc64el': '30'}>
+CONFIG_RAPIDIO_ENABLE_RX_TX_PORTS policy<{'amd64': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_RAPIDIO_DMA_ENGINE policy<{'amd64': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_RAPIDIO_DEBUG policy<{'amd64': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_RAPIDIO_CHMAN policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RAPIDIO_MPORT_CDEV policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
++ Menu: Bus options (PCI etc.) >> PCI support >> RapidIO support >> Architecture: powerpc
+
++ Menu: Bus options (PCI etc.) >> PCI support >> RapidIO support >> Enumeration method
+CONFIG_RAPIDIO_ENUM_BASIC policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
++ Menu: Bus options (PCI etc.) >> PCI support >> RapidIO support >> RapidIO Switch drivers
+CONFIG_RAPIDIO_TSI57X policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RAPIDIO_CPS_XX policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RAPIDIO_TSI568 policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RAPIDIO_CPS_GEN2 policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RAPIDIO_RXS_GEN3 policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
++ Menu: Bus options (PCI etc.) >> PCI support >> Support for PCI Hotplug
+CONFIG_HOTPLUG_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'n', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_HOTPLUG_PCI_COMPAQ policy<{'i386': 'm'}>
+CONFIG_HOTPLUG_PCI_COMPAQ_NVRAM policy<{'i386': 'y'}>
+CONFIG_HOTPLUG_PCI_IBM policy<{'i386': 'm'}>
+CONFIG_HOTPLUG_PCI_ACPI policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_HOTPLUG_PCI_ACPI_IBM policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_HOTPLUG_PCI_CPCI policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_HOTPLUG_PCI_CPCI_ZT5550 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HOTPLUG_PCI_CPCI_GENERIC policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_HOTPLUG_PCI_POWERNV policy<{'ppc64el': 'm'}>
+CONFIG_HOTPLUG_PCI_RPA policy<{'ppc64el': 'm'}>
+CONFIG_HOTPLUG_PCI_RPA_DLPAR policy<{'ppc64el': 'm'}>
+CONFIG_HOTPLUG_PCI_S390 policy<{'s390x': 'y'}>
+
++
+CONFIG_HOTPLUG_PCI_SHPC
#
# Menu: Cryptographic API
+CONFIG_CRYPTO
's390x': 'y',
+CONFIG_CRYPTO_RSA
's390x': 'y',
+CONFIG_CRYPTO_DH
's390x': 'y',
+CONFIG_CRYPTO_ECDH
'm', 's390x': 'm',
+CONFIG_CRYPTO_MANAGER
'ppc64le': 'y', 's390x': 'y',
+CONFIG_CRYPTO_USER
'm', 's390x': 'm',
+CONFIG_CRYPTO_MANAGER_DISABLE_TESTS
'ppc64le': 'y', 's390x': 'y',
+CONFIG_CRYPTO_GF128MUL
'y', 's390x': 'y',
+CONFIG_CRYPTO_NULL
's390x': 'y',
+CONFIG_CRYPTO_PCRYPT
'ppc64le': 'm', 's390x': 'm',
+CONFIG_CRYPTO_CRYPTD
'ppc64le': 'm', 's390x': 'm',
+CONFIG_CRYPTO_MCRYPTD
'ppc64le': 'm', 's390x': 'm',
+CONFIG_CRYPTO_AUTHENC
'ppc64le': 'm', 's390x': 'm',
+CONFIG_CRYPTO_TEST
'm', 's390x': 'm',
+CONFIG_CRYPTO_CCM
'm', 's390x': 'm',
+CONFIG_CRYPTO_GCM
's390x': 'y',
+CONFIG_CRYPTO_CHACHA20POLY1305
'ppc64le': 'm', 's390x': 'm',
+CONFIG_CRYPTO_SEQIV
's390x': 'y',
+CONFIG_CRYPTO_ECHAINIV
'ppc64le': 'm', 's390x': 'm',
+CONFIG_CRYPTO_CBC
's390x': 'y',
+CONFIG_CRYPTO_CTR
's390x': 'y',
+CONFIG_CRYPTO_CTS
's390x': 'y',
+CONFIG_CRYPTO_ECB
's390x': 'y',
+CONFIG_CRYPTO_MANAGER
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_RSA
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_DH
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_ECDH
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_MANAGER
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_USER
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_MANAGER_DISABLE_TESTS
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_GF128MUL
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_NULL
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_PCRYPT
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_CRYPTD
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_MCRYPTD
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_AUTHENC
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_TEST
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_CCM
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_GCM
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_CHACHA20POLY1305
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_SEQIV
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_ECHAINIV
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'>
+CONFIG_CRYPTO_CBC
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_CTR
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_CTS
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_ECB
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_CRYPTO_DES policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CRYPTO_DES3_EDE_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_FCRYPT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_KHAZAD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_SALSA20 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_CHACHA20 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_CHACHA20_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_SEED policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_SERPENT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_SERPENT_SSE2_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_SERPENT_SSE2_586 policy<{'i386': 'm'}>
+CONFIG_CRYPTO_SERPENT_AVX_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_SERPENT_AVX2_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_TEA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_TWOFISH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_TWOFISH_586 policy<{'i386': 'm'}>
+CONFIG_CRYPTO_TWOFISH_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_TWOFISH_X86_64_3WAY policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_TWOFISH_AVX_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_TWOFISH_AVX2_X86_64 policy<{'amd64': 'm'}>
+CONFIG_CRYPTO_DEFLATE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_LZO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'}>
+CONFIG_CRYPTO_LZ4 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_LZ4HC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_ANSI_CPRNG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_JITTERENTROPY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'}>
+CONFIG_CRYPTO_USER_API_HASH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_USER_API_SKCIPHER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_USER_API_RNG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CRYPTO_USER_API_AEAD policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `y', `s390x': `y']
+
+CONFIG_CRYPTO_MANAGER_DISABLE_TESTS flag<TESTING>
+CONFIG_CRYPTO_TEST flag<TESTING>
+CONFIG_CRYPTO_SHA512 note<module signing>
+
+ Menu: Cryptographic API >> Asymmetric (public-key cryptographic) key type
+CONFIGASYMMETRIC_KEY_TYPE policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']
+CONFIGASYMMETRIC_PUBLIC_KEY_SUBTYPE policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']
+CONFIG_X509_CERTIFICATE_PARSER policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']
+CONFIG_PKCS7_MESSAGE_PARSER policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']
+CONFIG_PKCS7_TEST_KEY policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `m', `s390x': `m']
+CONFIG_SIGNED_PE_FILE_VERIFICATION policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']
+
+ Menu: Cryptographic API >> Certificates for signature checking
+CONFIG_MODULE_SIG_KEY policy\{"certs/signing_key.pem"", `arm64": "certs/signing_key.pem"", `armhf": "certs/signing_key.pem"", `i386": "certs/signing_key.pem"", `ppc64el": "certs/signing_key.pem"", `s390x": "certs/signing_key.pem""}]
+CONFIG_SYSTEM_BLACKLIST_KEYRING policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']
+CONFIG_SYSTEM_BLACKLIST_HASH_LIST policy\{``", `arm64": ```", `armhf": ```", `i386": ```", `ppc64el": ```", `s390x": ```"}]
+CONFIG_EFI_SIGNATURE_LIST_PARSER policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y']
+CONFIG_LOAD_UEFI_KEYS policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y']
+
+ Menu: Cryptographic API >> Certificates for signature checking >> Provide system-wide ring of trusted keys
+CONFIG_SYSTEM_TRUSTED_KEYRING policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']
+CONFIG_SYSTEM_TRUSTED_KEYS policy\{"debian/canonical-certs.pem"", `arm64": "debian/canonical-certs.pem"", `armhf": "debian/canonical-certs.pem"", `i386": "debian/canonical-certs.pem"", `ppc64el": "debian/canonical-certs.pem"", `s390x": "debian/canonical-certs.pem""}]
+CONFIG_SYSTEM_EXTRA_CERTIFICATE policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y', `s390x': `y']

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+CONFIG_SYSTEM_EXTRA_CERTIFICATE_SIZE policy<{'amd64': '4096', 'arm64': '4096', 'armhf': '4096', 'i386': '4096', 'ppc64le': '4096'}>
+CONFIG_SYSTEM_REVOCATION KEYS policy<{'amd64': 'debian/canonical-revoked-certs.pem', 'arm64': 'debian/canonical-revoked-certs.pem', 'armhf': 'debian/canonical-revoked-certs.pem', 'i386': 'debian/canonical-revoked-certs.pem', 'ppc64le': 'debian/canonical-revoked-certs.pem', 's390x': 'debian/canonical-revoked-certs.pem'}>
+CONFIG_SECONDARY_TRUSTED_KEYRING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
+## Menu: Cryptographic API >> Hardware crypto devices
+CONFIG_CRYPTO_HW policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CRYPTO_DEV_PADLOCK policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_CRYPTO_DEV_PADLOCK_AES policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_DEV_PADLOCK_SHA policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_DEV_GEODE policy<{'i386': 'm'}>
+CONFIG_ZCRYPT policy<{'s390x': 'm'}>
+CONFIG_PKEY policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_PAES_S390 policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_SHA1_S390 policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_SHA256_S390 policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_SHA512_S390 policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_DES_S390 policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_AES_S390 policy<{'s390x': 'm'}>
+CONFIG_S390_PRNG policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_GHASH_S390 policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_CRC32_S390 policy<{'s390x': 'm'}>
+CONFIG_CRYPTO_DEV_MARVELL_CESA policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_HIFN_795X policy<{'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_HIFN_795X_RNG policy<{'armhf-generic': 'y'}>
+CONFIG_CRYPTO_DEV_FSL_CAA M policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAA M_DEBUG policy<{'arm64': 'n', 'armhf-generic': 'n'}>
+CONFIG_CRYPTO_DEV_SAHARA policy<{'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_MXC_SCC policy<{'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_EXYNOS_RNG policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_S5P policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_NX policy<{'ppc64le': 'y'}>
+CONFIG_CRYPTO_DEV_NX_COMPRESS policy<{'ppc64le': 'm'}>
+CONFIG_CRYPTO_DEV_NX_COMPRESS_PSERIES policy<{'ppc64le': 'm'}>
+CONFIG_CRYPTO_DEV_NX_COMPRESS_POWERNV policy<{'ppc64le': 'm'}>
+CONFIG_CRYPTO_DEV_CCP policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_CRYPTO_DEV_CCP_DD policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_DEV_SP_CCP policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_CRYPTO_DEV_CCP_CRYPTO policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_DEV_MXS_DCP policy<{'armhf-generic': 'n'}>
+CONFIG_CRYPTO_DEV_QAT_DH895xCC policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_DEV_QAT_DH895xCC policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_DEV_QAT_DH895xCC policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CRYPTO_DEV_QAT_C3XXXVF policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_CRYPTO_DEV_QAT_C62XVF policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_CAVIUM_CPT policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_DEV_NITROX_CNN55XX policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_CRYPTO_DEV_CAVIUM_ZIP policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_DEV_QCE policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_VMX policy<{'ppc64le': 'y'}>
+CONFIG_CRYPTO_DEV_VMX_ENCRYPT policy<{'ppc64le': 'm'}>
+CONFIG_CRYPTO_DEV_ROCKCHIP policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_CAVIUM_CRYPTO_API policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_JR policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_RINGSIZE policy<{'arm64': '9', 'armhf-generic': '9'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_INTC policy<{'arm64': 'y', 'armhf-generic': 'y'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_INTC_COUNT_THLD policy<{'arm64': '255', 'armhf-generic': '255'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_INTC_TIME_THLD policy<{'arm64': '2048', 'armhf-generic': '2048'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API_QI policy<{'arm64': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_AHASH_API policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_PKC_API policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_RNG_API policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_FSL_CAAM_PKC_API policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_CRYPTO_DEV_OMAP policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_OMAP_SHAM policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_OMAP_AES policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_OMAP_DES policy<{'armhf': 'm'}>
+CONFIG_CRYPTO_DEV_DRBG_MENU policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CRYPTO_DEV_DRBG_HASH policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CRYPTO_DEV_DRBG_CTR policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CHARLCD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}:

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# Menu: Device Drivers >> ATA/ATAPI/MFM/RLL support (DEPRECATED)
+CONFIG_IDE
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

# Menu: Device Drivers >> ATA/ATAPI/MFM/RLL support (DEPRECATED) >> IDE Mode for AMD Alchemy Au1200
+
# Menu: Device Drivers >> Accessibility support
+CONFIG_ACCESSIBILITY
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
# Menu: Device Drivers >> Adaptive Voltage Scaling class support
+CONFIG_POWER_AVS
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_QCOM_CPR
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ROCKCHIP_IODOMAIN
  policy<{'arm64': 'm', 'armhf': 'm'}>
+
# Menu: Device Drivers >> Android
+CONFIG_ANDROID
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+
# Menu: Device Drivers >> Android >> Android Binder IPC Driver
+
# Menu: Device Drivers >> Auxiliary Display support
+CONFIG_ARM_CHARLCD
  policy<{'armhf': 'y'}>
+CONFIG_AUXDISPLAY
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_HD44780
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IMG_ASCII_LCD
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HT16K33
  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+
# Menu: Device Drivers >> Auxiliary Display support >> KS0108 LCD Controller
+CONFIG_KS0108
  policy<{'amd64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KS0108_PORT
  policy<{'amd64': '0x378', 'armhf': '0x378', 'i386': '0x378', 'ppc64le': '0x378'}>
+CONFIG_KS0108_DELAY
  policy<{'amd64': '2', 'armhf': '2', 'i386': '2', 'ppc64le': '2'}>
+CONFIG_CFAQ12864B
  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CFAQ12864B_RATE
  policy<{'amd64': '20', 'i386': '20'}>
+
# Menu: Device Drivers >> Block devices
+CONFIG_BLK_DEV
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

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+CONFIG_BLK_DEV_RAM
+CONFIG_BLK_DEV_RAM_COUNT
+CONFIG_BLK_DEV_RAM_SIZE
+CONFIG_BLK_DEV_U MEM
+CONFIG_CDROM_PKTCDVD_WCACHE
+CONFIG_XEN_BLKDEV_FRONTEND
+CONFIG_VIRTIO_BLK
+CONFIG_BLK_DEV_RAM_SIZE
+CONFIG_PARIDE
+CONFIG_PARIDE_PD
+CONFIG_PARIDE_PCD
+CONFIG_PARIDE_PF
+CONFIG_PARIDE_PT
+CONFIG_PARIDE_PG
+CONFIG_PARIDE_ATEN
+CONFIG_PARIDE_BPCK
+CONFIG_PARIDE_BPCK6
+CONFIG_PARIDE_COMM
+CONFIG_PARIDE_DSTR
+CONFIG_PARIDE_FIT2
+CONFIG_PARIDE_FIT3
+CONFIG_PARIDE_EPAT
+CONFIG_PARIDE_EPATC8
+CONFIG_PARIDE_EPIA
+CONFIG_PARIDE_FRIQ
+CONFIG_PARIDE_FRPW
+CONFIG_PARIDE_KBIC
+CONFIG_PARIDE_KTTI
+CONFIG_PARIDE_ON20
+CONFIG_PARIDE_ON26
+CONFIG_DASD
+CONFIG_DASD_PROFILE
+CONFIG_DASD_ECKD
+CONFIG_DASD_FBA
+CONFIG_DASD_DIAG
+CONFIG_DASD_EER
## Device Drivers

- **Board level reset or power off**

  ```
  +CONFIG_POWER_RESET policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y', 's390x': 'y'}>
  +CONFIG_POWER_RESET_AS3722 policy<{'arm64': 'y', 'armhf': 'y', 'ppc64lel': 'y'}>
  +CONFIG_POWER_RESET_AXXIA policy<{'armhf-generic-lpae': 'y'}>
  +CONFIG_POWER_RESET_BRCMKONA policy<{'armhf': 'y'}>
  +CONFIG_POWER_RESET_BRCMSTB policy<{'arm64': 'n', 'armhf': 'n'}>
  +CONFIG_POWER_RESET_GPIO policy<{'arm64': 'y', 'armhf': 'y', 'ppc64lel': 'y'}>
  +CONFIG_POWER_RESET_GPIO_RESTART policy<{'arm64': 'y', 'armhf': 'y', 'ppc64lel': 'y'}>
  +CONFIG_POWER_RESET_HISI policy<{'arm64': 'y', 'armhf': 'y'}>
  +CONFIG_POWER_RESET_IMX policy<{'armhf-generic': 'n'}>
  +CONFIG_POWER_RESET_MSM policy<{'arm64': 'y', 'armhf': 'y'}>
  +CONFIG_POWER_RESET_LTC2952 policy<{'arm64': 'y', 'armhf': 'y', 'ppc64lel': 'y'}>
  +CONFIG_POWER_RESET_RESTART policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y', 's390x': 'y'}>
  +CONFIG_POWER_RESET_VERSATILE policy<{'armhf': 'y'}>
  +CONFIG_POWER_RESET_VEXPRESS policy<{'arm64': 'y', 'armhf': 'y'}>
  +CONFIG_POWER_RESET_XGENE policy<{'arm64': 'y', 'armhf': 'y'}>
  +CONFIG_POWER_RESET_SYSCON policy<{'arm64': 'y', 'armhf': 'y', 'ppc64lel': 'y'}>
  +CONFIG_POWER_RESET_SYSCON_POWEROFF policy<{'arm64': 'y', 'armhf': 'y', 'ppc64lel': 'y', 's390x': 'y'}>
  +CONFIG_POWER_RESET_RMOBILE policy<{'armhf': 'm'}>
  +CONFIG_SYSCON_REBOOT_MODE policy<{'arm64': 'm', 'armhf': 'm', 'ppc64lel': 'm'}>
  ```

- **Broadcom specific AMBA**

  ```
  +CONFIG_BCMA_HOST_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
  +CONFIG_BCMA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'y', 'ppc64lel': 'm', 's390x': 'n'}>
  +CONFIG_BCMA_HOST_SOC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
  +CONFIG_BCMA_DRIVER_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y', 's390x': 'n'}>
  +CONFIG_BCMA_SFLASH policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
  +CONFIG_BCMA_DRIVER_GMAC_CMN policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
  +CONFIG_BCMA_DRIVER_GPIO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y', 's390x': 'n'}>
  +CONFIG_BCMA_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64lel': 'n'}>
  ```

- **Bus devices**

  ```
  +CONFIG_ARM_CCI400_PMU policy<{'arm64': 'y', 'armhf': 'y'}>
  +CONFIG_ARM_CCI5xx_PMU policy<{'arm64': 'y', 'armhf': 'y'}>
  +CONFIG_ARM_CCN policy<{'arm64': 'y', 'armhf': 'y'}>
  +CONFIG_BRCMSTB_GISB_ARB policy<{'armhf-generic': 'y'}>
  +CONFIG_IMX_WEIM policy<{'armhf-generic': 'y'}>
  ```
+CONFIG_OMAP_INTERCONNECT policy<{'armhf': 'y'}>
+CONFIG_OMAP_OCP2SCP policy<{'armhf': 'm'}>
+CONFIG_QCOM_EBI2 policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SIMPLE_PM_BUS policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+CONFIG_SUNXI_RSB policy<{'arm64': 'm'}>
+CONFIG_Tegra_GMI policy<{'armhf-generic': 'm'}>
+CONFIG_TI_SYSIC policy<{'armhf': 'y'}>
+CONFIG_UNIPHIER_SYSTEM_BUS policy<{'armhf': 'y'}>
+CONFIG_VEXPRESS_CONFIG policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_HISILICON_LPC policy<{'arm64': 'y'}>
+
+ Menu: Device Drivers >> Character devices
+CONFIG_DEVMEM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DEVKMEM policy<{'amd64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_TTY_PRINTK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_PRINTER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PPDEV policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HVC_CONSOLE policy<{'ppc64le': 'y'}>
+CONFIG_HVC_OLD_HVSI policy<{'ppc64le': 'y'}>
+CONFIG_HVC_OPAL policy<{'ppc64le': 'y'}>
+CONFIG_HVC_RTAS policy<{'ppc64le': 'y'}>
+CONFIG_HVC_IUCV policy<{'s390x': 'y'}>
+CONFIG_HVC_XEN policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_HVC_XEN_FRONTEND policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_HVC_UDBG policy<{'ppc64le': 'n'}>
+CONFIG_HVC_DCC policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_HVCS policy<{'ppc64le': 'm'}>
+CONFIG_VIRTIO_CONSOLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_IBM_BSR policy<{'ppc64le': 'm'}>
+CONFIG_POWERNV_OP_PANEL policy<{'ppc64le': 'm'}>
+CONFIG_NVRAM policy<{'amd64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_DTLK policy<{'i386': 'm'}>
+CONFIG_R3964 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_APPLICOM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_SONYPI policy<{'i386': 'm'}>
+CONFIG_MWAVE policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SCx200_GPIO policy<{'i386': 'm'}>
+CONFIG_PC8736x_GPIO policy<{'i386': 'm'}>
+CONFIG_NSC_GPIO policy<{'i386': 'm'}>
+CONFIG_RAW_DRIVER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_MAX_RAW_DEVS policy<{'amd64': '256', 'arm64': '256', 'armhf': '256', 'i386': '256', 'ppc64le': '256', 's390x': '256'}>
+CONFIG_VT_HW_CONSOLE_BINDING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_UNIX98PTY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_LEGACYPTY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_LEGACYPTYCOUNT policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0', 's390x': '0'}>
+CONFIG_NOZOMI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_N_GSM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_TRACE_ROUTER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_TRACE_SINK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_PPC_EPAPR_HV_BYTECHAN policy<{'ppc64le': 'n'}>
+CONFIG_LDISC_AUTOLOAD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_N_GSM note<LP#1404670>
+
+ Menu: Device Drivers >> Character devices >> Enable TTY >> Non-standard serial port support
+CONFIG_SERIAL_NONSTANDARD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_ROCKETPORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_CYCLADES policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CYZ_INTR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_MOXA_INTELLIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_MOXA_SMARTIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_SYNCLINK policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SYNCLINKMMP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_SYNCLINK_GT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_ISI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_N_HDLC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+
+ Menu: Device Drivers >> Character devices >> Hardware Random Number Generator Core support
+CONFIG_HW_RANDOM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_HW_RANDOM_TIMERIOMEM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
# Menu: Device Drivers >> Character devices >> IPMI top-level message handler

+CONFIG_HW_RANDOM_INTEL policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HW_RANDOM_AMD policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HW_RANDOM_BCM2835 policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_HW_RANDOM_IPROC_RNG200 policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_HW_RANDOM_GEODE policy<{'i386': 'm'}>
+CONFIG_HW_RANDOM_VIA policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HW_RANDOM_OMAP policy<{'armhf': 'm'}>
+CONFIG_HW_RANDOM_OMAP3_ROM policy<{'armhf-generic': 'm'}>
+CONFIG_HW_RANDOM_VIRTIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_HW_RANDOM_IMX_RNGC policy<{'armhf-generic': 'm'}>
+CONFIG_HW_RANDOM_PSERIES policy<{'ppc64le': 'm'}>
+CONFIG_HW_RANDOM_POWERNV policy<{'ppc64le': 'm'}>
+CONFIG_HW_RANDOM_LPCC policy<{'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_HW_RANDOM_TPM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_HW_RANDOM_HISI policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_HW_RANDOM_MSM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_HW_RANDOM_XGENE policy<{'arm64': 'm'}>
+CONFIG_HW_RANDOM_MESON policy<{'armhf': 'm'}>
+CONFIG_HWRANDOM_CAVIUM policy<{'arm64': 'm'}>
+CONFIG_HW_RANDOM_MTK policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_HW_RANDOM_S390 policy<{'s390x': 'm'}>

+## Menu: Device Drivers >> Character devices >> PCMCIA character devices

+CONFIG_SYNCLINK_CS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CARDMAN_4000 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_CARDMAN_4040 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SCR24X policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_IPWIRELESS policy<{'amd64': 'm', 'i386': 'm'}>
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+## Menu: Device Drivers >> Character devices >> Serial device bus
+CONFIG_SERIAL_DEV_BUS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'>
+CONFIG_SERIAL_DEV_CTRL_TTYPORT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>

+## Menu: Device Drivers >> Character devices >> Serial drivers
+CONFIG_SERIAL_AMBA_PL010 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SERIAL_AMBA_PL011 policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SERIAL_AMBA_PL011_CONSOLE policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SERIAL_EARLYCON_ARM_SEMIHOST policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SERIAL_KGDB_NMI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SERIAL_MESON policy<{'armhf': 'm'}>
+CONFIG_SERIAL_SAMSUNG policy<{'armhf': 'm'}>
+CONFIG_SERIAL_TEGRA policy<{'armhf-generic': 'm'}>
+CONFIG_SERIAL_MAX3100 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_SERIAL_MAX310X policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SERIAL_IMX policy<{'armhf-generic': 'y'}>
+CONFIG_SERIAL_IMX_CONSOLE policy<{'armhf-generic': 'y'}>
+CONFIG_SERIAL_UARTLITE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_SERIAL_UARTLITE_NR_UARTS policy<{'amd64': '1', 'arm64': '1', 'armhf': '1', 'i386': '1', 'ppc64el': '1', 's390x': '1'}>
+CONFIG_SERIAL_ICOM policy<{'ppc64el': 'm'}>
+CONFIG_SERIAL_JSM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_SERIAL_MSM policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SERIAL_MSM_CONSOLE policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SERIAL_OMAP policy<{'armhf': 'y'}>
+CONFIG_SERIAL_OMAP_CONSOLE policy<{'armhf': 'y'}>
+CONFIG_SERIAL_SCCNXP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_SERIAL_SCCNXP_CONSOLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SERIAL_SC16IS7XX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SERIAL_SC16IS7XX_I2C policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SERIAL_SC16IS7XX_SPI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SERIAL_TIMBERDALE policy<{'i386': 'm'}>
+CONFIG_SERIAL_BCM63XX policy<{'armhf': 'm
+CONFIG_SERIAL_ALTERA_JTAGUART policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_SERIAL_IFX6X60 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_SERIAL_PCH_UART policy<{'i386': 'm'}>
+CONFIG_SERIAL_XILINX_PS_UART policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_ARC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_SERIAL_ARC_NR_PORTS policy<{'amd64': '1', 'arm64': '1', 'armhf': '1', 'i386': '1', 'ppc64le': '1'}>
+CONFIG_SERIAL_RP2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_SERIAL_RP2_NR_UARTS policy<{'amd64': '32', 'arm64': '32', 'armhf': '32', 'i386': '32', 'ppc64le': '32'}>
+CONFIG_SERIAL_FSL_LPUART policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_SERIAL_CONEXANT_DIGICOLOR policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_ST_ASC policy<{'armhf': 'm'}>
+CONFIG_SERIAL_MEN_Z135 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_SPRD policy<{'armhf': 'm'}>
+CONFIG_SERIAL_MVEBU_UART policy<{'armhf': 'y'}>
+CONFIG_SERIAL_MVEBU_CONSOLE policy<{'armhf': 'y'}>
+CONFIG_SERIAL_OWL policy<{'armhf': 'y', 'armhf': 'y'}>
+CONFIG_SERIAL_OWL_CONSOLE policy<{'armhf': 'y', 'armhf': 'y'}>

+ Menu: Device Drivers >> Character devices >> Serial drivers >> 8250/16550 and compatible serial support
+CONFIG_SERIAL_8250 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_SERIAL_8250_DEPRECATED_OPTIONS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_SERIAL_8250_PNP policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_SERIAL_8250_FINTEK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'n', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_SERIAL_8250_CONSOLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SERIAL_8250_DMA policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SERIAL_8250_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SERIAL_8250_EXAR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_8250_CS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SERIAL_8250_MEN_MCB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_8250_NR_UARTS policy<{'amd64': '48', 'arm64': '48', 'armhf': '48', 'i386': '48', 'ppc64le': '48'}>
+CONFIG_SERIAL_8250_RUNTIME_UARTS policy<{'amd64': '32', 'arm64': '32', 'armhf': '32', 'i386': '32', 'ppc64le': '32'}>
+CONFIG_SERIAL_8250_ASPEED_VUART policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_8250_DW policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_8250_EM policy<{'armhf': 'm'}>
+CONFIG_SERIAL_8250_RT288X policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_SERIAL_8250_OMAP policy<{'armhf': 'm'}>
+CONFIG_SERIAL_8250_MT6577 policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SERIAL_8250_UNIPHIER policy<{'armhf': 'm'}>
+CONFIG_SERIAL_8250_LPSS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SERIAL_8250_MID policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SERIAL_8250_MOXA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SERIAL_OF_PLATFORM policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+
+# Menu: Device Drivers >> Character devices >> Serial drivers >> 8250/16550 and compatible serial support >>
Extended 8250/16550 serial driver options
+CONFIG_SERIAL_8250_EXTENDED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SERIAL_8250_SHARE_IRQ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SERIAL_8250_DETECT_IRQ policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'y', 'ppc64le': 'm'}>
+CONFIG_SERIAL_8250_RSA policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_SERIAL_8250_BCM2835AUX policy<{'arm64': 'm'}>
+
+# Menu: Device Drivers >> Character devices >> Serial drivers >> Support more than 4 legacy serial ports
+CONFIG_SERIAL_8250_MANY_PORTS policy<{'arm64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SERIAL_8250_FOURPORT policy<{'i386': 'm'}>
+CONFIG_SERIAL_8250_ACCENT policy<{'i386': 'm'}>
+CONFIG_SERIAL_8250_BOCA policy<{'i386': 'm'}>
+CONFIG_SERIAL_8250_EXAR_ST16C554 policy<{'i386': 'm'}>
+CONFIG_SERIAL_8250_HUB6 policy<{'i386': 'm'}>
+
+# Menu: Device Drivers >> Character devices >> Serial drivers >> AT91 on-chip serial port support
+
+# Menu: Device Drivers >> Character devices >> Serial drivers >> Altera UART support
+CONFIG_SERIAL_ALTERA_UART policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_SERIAL_ALTERA_UART_MAXPORTS policy<{'amd64': '4', 'arm64': '4', 'armhf': '4', 'i386': '4', 'ppc64le': '4'}>
+CONFIG_SERIAL_ALTERA_UART_BAUDRATE policy<{'amd64': '115200', 'arm64': '115200', 'armhf': '115200', 'i386': '115200', 'ppc64le': '115200'}>
+
+## Menu: Device Drivers >> Character devices >> Serial drivers >> Blackfin SPORT emulate UART
+
+## Menu: Device Drivers >> Character devices >> Serial drivers >> Blackfin serial port support
+
+## Menu: Device Drivers >> Character devices >> Serial drivers >> Blackfin serial port support >> UART Mode
+
+## Menu: Device Drivers >> Character devices >> Serial drivers >> SuperH SCI(F) serial port support
+CONFIG_SERIAL_SH_SCI policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SERIAL_SH_SCI_NR_UARTS policy<{'arm64': '2', 'armhf': '2'}>
+CONFIG_SERIAL_SH_SCI_DMA policy<{'arm64': 'y', 'armhf': 'y'}>
+
+## Menu: Device Drivers >> Character devices >> Serial drivers >> TMPTX39XX/49XX SIO support
+
+## Menu: Device Drivers >> Character devices >> TPM Hardware Support
+CONFIG_TCG_TPM policy<{'am64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_TCG_TIS policy<{'am64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_TCG_TIS_SPI policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TCG_TIS_I2C_ATMEL policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TCG_TIS_I2C_INFINEON policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TCG_TIS_I2C_NUVOTON policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TCG_NSC policy<{'am64': 'm', 'i386': 'm'}>
+CONFIG_TCG_ATMEL policy<{'am64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TCG_INFINEON policy<{'am64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_TCG_XEN policy<{'am64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_TCG_CRB policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_TCG_VTPM_PROXY policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_TCG_TIS_ST33ZP24_I2C policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TCG_TIS_ST33ZP24_SPI policy<{'am64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Character devices >> TPM Hardware Support
+CONFIG_TCG_TPM note<needed for early validation>
+CONFIG_TCG_TIS_I2C_ATMEL note<LP:1643652>
+CONFIG_TCG_TIS_I2C_INFINEON note<LP:1643652>
+CONFIG_TCG_TIS_I2C_NUVOTON note<LP:1643652>
+
+## Menu: Device Drivers >> Clock Source drivers
+CONFIG_DW_APB_TIMER policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_ROCKCHIP_TIMER policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARMADA_370_XP_TIMER policy<{'armhf': 'y'}>
+CONFIG_MESON6_TIMER policy<{'armhf': 'y'}>
+CONFIG_ORION_TIMER policy[{'armhf': 'y'}]
+CONFIG_OWL_TIMER policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_Tegra_Timer policy[{'armhf-generic': 'y'}]
+CONFIG_CLKSRC_TI_32K policy[{'armhf': 'y'}]
+CONFIG_ARM_ARCH_TIMER_EVTSTREAM policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_FSL_ERRATUM_A008585 policy[{'arm64': 'y'}]
+CONFIG_HISILICON_ERRATUM_161010101 policy[{'arm64': 'y'}]
+CONFIG_ARM64_ERRATUM_858921 policy[{'arm64': 'y'}]
+CONFIG_SUN50I_ERRATUM_UNKNOWN policy[{'arm64': 'y'}]
+CONFIG_ARM_GLOBAL TIMER policy[{'armhf': 'y'}]
+CONFIG_ARM_TIMER_SP804 policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_CLKSRC_EXYNOS_MCT policy[{'armhf': 'y'}]
+CONFIG_MTK_TIMER policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_SH_TIMER_CMT policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'y', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}]
+CONFIG_SH_TIMER_MTU2 policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'y', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}]
+CONFIG_RENESAS_OSTM policy[{'armhf': 'y'}]
+CONFIG_SH_TIMER_TMU policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'y', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}]
+CONFIG_EM_TIMER_STI policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'y', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}]
+CONFIG_CLKSRC_QCOM policy[{'armhf': 'y'}]
+CONFIG_CLKSRC_VERSATILE policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_CLK_SRC_EXYNOS policy[{'armhf-generic': 'y'}]
+CONFIG_ARM64_ERRATUM_858921 mark[ENFORCED] note[LP#1675509]
+
+## Menu: Device Drivers >> Common Clock Framework
+CONFIG_COMMON_CLK_WM831X policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}]
+CONFIG_COMMON_CLK_VERSATILE policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_CLK_SP810 policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_CLK_VEXPRESS_OSC policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_CLK_HSDK policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_COMMON_CLK_MAX77686 policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_RK808 policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_HI655X policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_SCPI policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_SI5351 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}]
+CONFIG_COMMON_CLK_SI514 policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_SI570 policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_CDCE706 policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_CDCE925 policy[{'arm64': 'm', 'armhf': 'm'}]
+CONFIG_COMMON_CLK_CS2000_CP policy[{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}]
+CONFIG_COMMON_CLK_S2MPS11 policy[{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}]
+CONFIG_CLK_TW6040 policy[{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}]
+CONFIG_CLK_QORIQ policy[{'arm64': 'y', 'armhf': 'y'}]
+CONFIG_COMMON_CLK_XGENE policy[{'arm64': 'y'}]
+CONFIG_COMMON_CLK_PALMAS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_COMMON_CLK_PWM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_COMMON_CLK_VC5 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_CLK_BCM_NS2 policy<{'arm64': 'y'}>
+CONFIG_CLK_BCM_SR policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_HI3516CV300 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_COMMON_CLK_HI3519 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_COMMON_CLK_HI3660 policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_COMMON_CLK_HI3798CV200 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_COMMON_CLK_HI6220 policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_RESET_HISI policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_STUB_CLK_HI6220 policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_COMMON_CLK_MT8135 policy<{'armhf': 'y'}>
+CONFIG_COMMON_CLK_MT8173 policy<{'armhf': 'y'}>
+CONFIG_COMMON_CLK_SAMSUNG policy<{'armhf': 'y'}>
+CONFIG_EXYNOS_AUDSS_CLK_CON policy<{'armhf': 'm'}>
+CONFIG_COMMON_CLK_TI_ADPLL policy<{'armhf': 'y'}>
+CONFIG_CLK_UNIPHIER policy<{'armhf': 'y'}>
+
+## Menu: Device Drivers >> Common Clock Framework >> Clock driver for MediaTek MT7622
+CONFIG_COMMON_CLK_MT7622 policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_COMMON_CLK_MT7622 ETHTSYS policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_COMMON_CLK_MT7622 HIIFSYS policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_COMMON_CLK_MT7622 AUDSYS policy<{'arm64': 'y', 'armhf': 'y'}>
+
+## Menu: Device Drivers >> Common Clock Framework >> Clock driver for Mediatek MT2701
+CONFIG_COMMON_CLK_MT2701 policy<{'armhf': 'n'}>
+
+## Menu: Device Drivers >> Common Clock Framework >> Clock driver for Mediatek MT2712
+CONFIG_COMMON_CLK_MT2712 policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT2712 BDPSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT2712 IMGSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT2712 JPGDECSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT2712 MFGCFG policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT2712 MMSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT2712 VDECSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT2712 VENCSYS policy<{'arm64': 'y'}>
+
+## Menu: Device Drivers >> Common Clock Framework >> Clock driver for Mediatek MT7679
+CONFIG_COMMON_CLK_MT6797 policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT6797 MMSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT6797 IMGSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT6797 VDECSYS policy<{'arm64': 'y'}>
+CONFIG_COMMON_CLK_MT6797 VENCSYS policy<{'arm64': 'y'}>
+
+## Menu: Device Drivers >> Common Clock Framework >> Clock support for Allwinner SoCs
+CONFIG_SUNXI_CCU policy<{'arm64': 'y'}>
+CONFIG_SUN50I_A64_CCU policy<{'arm64': 'y'}>
+CONFIG_SUN8I_A83T_CCU policy<{'arm64': 'y'}>
+CONFIG_SUN8I_H3_CCU policy<{'arm64': 'y'}>
+CONFIG_SUN8I_DE2_CCU policy<{'arm64': 'y'}>
+CONFIG_SUN8I_R_CCU policy<{'arm64': 'y'}>

+## Menu: Device Drivers >> Common Clock Framework >> Renesas SoC clock support
+CONFIG_CLK_RENESAS policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_CLK_RENESAS_LEGACY policy<{'armhf': 'y'}>
+CONFIG_CLK_EMEV2 policy<{'armhf': 'y'}>
+CONFIG_CLK_RZA1 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7740 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7743 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7745 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7778 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7779 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7790 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7791 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7792 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7794 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7795 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A7796 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A77970 policy<{'armhf': 'y'}>
+CONFIG_CLK_R8A77995 policy<{'armhf': 'y'}>
+CONFIG_CLK_SH73A0 policy<{'armhf': 'y'}>
+CONFIG_CLK_RCAR_GEN2 policy<{'armhf': 'y'}>
+CONFIG_CLK_RCAR_GEN2_CPG policy<{'armhf': 'y'}>
+CONFIG_CLK_RCAR_GEN3_CPG policy<{'arm64': 'y'}>
+CONFIG_CLK_RCAR_USB2_CLOCK_SEL policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_CLK_RENESAS_CPG_MSSR policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_CLK_RENESAS_CPG_MSTP policy<{'armhf': 'y'}>
+CONFIG_CLK_RENESAS_DIV6 policy<{'arm64': 'y', 'armhf': 'y'}>

+## Menu: Device Drivers >> Common Clock Framework >> Support for Qualcomm's clock controllers
+CONFIG_COMMON_CLK_QCOM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_A53PLL policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_CLK_APCS_MSM8916 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_CLK_RPM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_CLK_SMD_RPM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_APQ_GCC_8084 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_APQ_MMCC_8084 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_IPQ_GCC_4019 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_IPQ_GCC_806X policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_IPQ_LCC_806X policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_IPQ_GCC_8074 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_GCC_8660 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_GCC_8916 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_GCC_8960 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_LCC_8960 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MDM_GCC_9615            policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MDM_LCC_9615            policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_MMCC_8960           policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_GCC_8974            policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_MMCC_8974           policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_GCC_8994            policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_GCC_8996            policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MSM_MMCC_8996           policy<{'arm64': 'm', 'armhf': 'm'}>
+
+## Menu: Device Drivers >> Connector - unified userspace <-> kernelspace linker
+CONFIG_CONNECTOR               policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_PROC_EVENTS             policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
+## Menu: Device Drivers >> DAX: direct access to differentiated memory
+CONFIG_DAX                     policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DEV_DAX                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf-generic-lpae': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DEV_DAX_PMEM            policy<{'amd64': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> DMA Engine support
+CONFIG_DMADEVICES              policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DMADEVICES_DEBUG        policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ALTERA_MSGDMA           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AMBA_PL08X              policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_BCM_SBA_RAID            policy<{'arm64': 'm'}>
+CONFIG_DMA_BCM2835             policy<{'arm64': 'y'}>
+CONFIG_DMA_OMAP                policy<{'armhf': 'y'}>
+CONFIG_DMA_SUN6I               policy<{'arm64': 'm'}>
+CONFIG_FSL_EDMA                policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_IMX_DMA                 policy<{'armhf-generic': 'm'}>
+CONFIG_IMX_SDMA                policy<{'armhf-generic': 'm'}>
+CONFIG_INTEL_IDMA64            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INTEL_IOATDMA           policy<{'amd64': 'm'}>
+CONFIG_INTEL_MIC_X100_DMA      policy<{'amd64': 'm'}>
+CONFIG_K3_DMA                  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MV_XOR                  policy<{'armhf': 'y'}>
+CONFIG_MV_XOR_V2               policy<{'arm64': 'y'}>
+CONFIG_MXS_DMA                 policy<{'armhf-generic': 'y'}>
+CONFIG_MX3_IPU                 policy<{'armhf-generic': 'y'}>
+CONFIG_MX3_IPU_IRQS            policy<{'armhf-generic': '4'}>
+CONFIG_NBPFAXI_DMA             policy<{'armhf': 'm'}>
+CONFIG_PCH_DMA policy<{'i386': 'm'}>
+CONFIG_PL330_DMA policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SPRD_DMA policy<{'arm64': 'm'}>
+CONFIG_TEGRA20_APB_DMA policy<{'armhf-generic': 'y'}>
+CONFIG_TIMB_DMA policy<{'i386': 'm'}>
+CONFIG_TI_CPII41 policy<{'armhf': 'm'}>
+CONFIG_TI_EDMA policy<{'armhf': 'y'}>
+CONFIG_XGENE_DMA policy<{'arm64': 'm'}>
+CONFIG_XILINX_DMA policy<{'arm64': 'm'}>
+CONFIG_XILINX_ZYNQMP_DMA policy<{'arm64': 'm'}>
+CONFIG_QCOM_BAM_DMA policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_HIDMA_MGMT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_QCOM_HIDMA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DW_DMAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DW_DMAC_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SH_DMAE_BASE policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SH_DMAE policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_RCAR_DMAC policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_RENESAS_USB_DMACE policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SUDMAC policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_ASYNC_TX_DMA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DMATEST policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

# Menu: Device Drivers >> DMABUF options
+CONFIG_SYNC_FILE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_SW_SYNC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

# Menu: Device Drivers >> Dallas's 1-wire support
+CONFIG_W1 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_W1_CON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'y'}>

# Menu: Device Drivers >> Dallas's 1-wire support >> 1-wire Bus Masters
+CONFIG_W1_MASTER_MATROX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_W1_MASTER_DS2490 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_W1_MASTER_DS2482 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_W1_MASTER_MXC       policy<['armhf-generic': 'm']>
+CONFIG_W1_MASTER_DS1WM      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                                         'ppc64le': 'm']>
+CONFIG_W1_MASTER_GPIO       policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                                         'ppc64le': 'm']>
+CONFIG_HDQ_MASTER_OMAP      policy<['armhf': 'm']>
+
+## Menu: Device Drivers >> Dallas's 1-wire support >> 1-wire Slaves
+CONFIG_W1_SLAVE_THERM       policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                                         'ppc64le': 'm']>
+CONFIG_W1_SLAVE_SMEM        policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                                         'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2405      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                                         'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2408      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                                         'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2408_READBACK policy<['arm64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
                                               'ppc64le': 'y']>
+CONFIG_W1_SLAVE_DS2413      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2406      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2423      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2805      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2431      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2433      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2433_CRC  policy<['arm64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
                                               'ppc64le': 'n']>
+CONFIG_W1_SLAVE_DS2438      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2760      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2780      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS2781      policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS28E04     policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+CONFIG_W1_SLAVE_DS28E17     policy<['arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                                               'ppc64le': 'm']>
+
+## Menu: Device Drivers >> Device Tree and Open Firmware support
+CONFIG_OF                    policy<['amd64': 'n', 'arm64': 'y', 'armhf': 'y', 'i386': 'n', 'ppc64le': 'y', 's390x':
                                               'n']>

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+CONFIG_OF_UNITTEST policy<{'arm64': 'n', 'armhf': 'n', 'ppc64le': 'n'}>
+CONFIG_OF_DYNAMIC policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+CONFIG_OF_OVERLAY policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+
+CONFIG_OF_UNITTEST flag<DEBUG>
+
+## Menu: Device Drivers >> EDAC (Error Detection And Correction) reporting
+CONFIG_EDAC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_EDAC_LEGACY_SYSFS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_EDAC_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_EDAC_DECODE_MCE policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_EDAC_GHES policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_EDAC_AMD64 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_EDAC_AMD64_ERROR_INJECTION policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_EDAC_AMD76X policy<{'i386': 'm'}>
+CONFIG_EDAC_E7XXX policy<{'i386': 'm'}>
+CONFIG_EDAC_I520X policy<{'i386': 'm'}>
+CONFIG_EDAC_I8275P policy<{'i386': 'm'}>
+CONFIG_EDAC_I82975X policy<{'i386': 'm'}>
+CONFIG_EDAC_I5000 policy<{'i386': 'm'}>
+CONFIG_EDAC_I5100 policy<{'i386': 'm'}>
+CONFIG_EDAC_I7300 policy<{'i386': 'm'}>
+CONFIG_EDAC_SBRIDGE policy<{'amd64': 'm'}>
+CONFIG_EDAC_Skor policy<{'amd64': 'm'}>
+CONFIG_EDAC_PND2 policy<{'amd64': 'm'}>
+CONFIG_EDAC_LAYERSCAPE policy<{'arm64': 'm'}>
+CONFIG_EDAC_CPC925 policy<{'ppc64le': 'm'}>
+CONFIG_EDAC_HIGHBANK_MC policy<{'armhf': 'm'}>
+CONFIG_EDAC_HIGHBANK_L2 policy<{'armhf': 'm'}>
+CONFIG_EDAC_THUNDERX policy<{'arm64': 'm'}>
+CONFIG_EDAC_XGENE policy<{'arm64': 'm'}>
+
+## Menu: Device Drivers >> EDAC (Error Detection And Correction) reporting >> Altera SOCFPGA ECC
+
+## Menu: Device Drivers >> External Connector Class (extcon) support
+CONFIG_EXTCON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_EXTCON_ADC_JACK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
# Device Drivers >> FMC support

- CONFIG_FMC
- CONFIG_FMC_FAKEDEV
- CONFIG_FMC_TRIVIAL
- CONFIG_FMC_WRITE_EEPROM
- CONFIG_FMC_CHARDEV

# Device Drivers >> FPGA Configuration Framework

- CONFIG_FPGA
- CONFIG_FPGA_REGION
- CONFIG_FPGA_MGR_ICE40_SPI
- CONFIG_FPGA_MGR_ALTERA_CVP
'ppc64le': 'm', 's390x': 'm'}>
-CONFIG_FPGA_MGR_ALTERA_PS_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FPGA_MGR_XILINX_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ALTERA_PR_IP_CORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_ALTERA_PR_IP_CORE_PLAT policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+
## Menu: Device Drivers >> FPGA Configuration Framework >> FPGA Bridge Framework
+CONFIG_FPGA_BRIDGE policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+
## Menu: Device Drivers >> FSI support
+
## Menu: Device Drivers >> FSI support >> FSI support
+CONFIG_FSI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_FSI_MASTER_GPIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_FSI_MASTER_HUB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_FSI_SCOM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+
## Menu: Device Drivers >> Fusion MPT device support
+CONFIG_FUSION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_FUSION_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FUSION_FC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FUSION_SAS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FUSION_MAX_SGE policy<{'amd64': '128', 'arm64': '128', 'armhf': '128', 'i386': '128', 'ppc64le': '128'}>
+CONFIG_FUSION_CTL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FUSION_LAN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FUSION_LOGGING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
## Menu: Device Drivers >> GPIO Support
+CONFIG_GPIOLIB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DEBUG_GPIO policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_GPIO_SYSFS

+CONFIG_GPIO_SYSFS

+ CONFIG_GPIO_SYSFS

# Menu: Device Drivers >> GPIO Support >> I2C GPIO expanders
+CONFIG_GPIO_AD5588

+CONFIG_GPIO_ADNP

+CONFIG_GPIO_MAX7300

+CONFIG_GPIO_MAX732X

+CONFIG_GPIO_PCA953X

+CONFIG_GPIO_PCF857X

+CONFIG_GPIO_TPIC2810

+CONFIG_GPIO_TS4900

+ CONFIG_GPIO_AD5520

+CONFIG_GPIO_ARIZONA

+CONFIG_GPIO_BD9571MWV

+CONFIG_GPIO_CRYSTAL_COVE

+CONFIG_GPIO_CS5535

+CONFIG_GPIO_DA9052

+CONFIG_GPIO_DA9055

+CONFIG_GPIO_DLN2

+CONFIG_GPIO_HTC_EGPIO

+CONFIG_GPIO_JANZ_TTL

+CONFIG_GPIO_KEMPLD

+CONFIG_GPIO_LP3943

+CONFIG_GPIO_LP873X

+CONFIG_GPIO_LP87565

+CONFIG_GPIO_MAX77620

+CONFIG_GPIO_MSIC

+ CONFIG_GPIO_SYSFS

+ CONFIG_GPIO_SYSFS

# Menu: Device Drivers >> GPIO Support >> MFD GPIO expanders
+CONFIG_GPIO_AD5520

+CONFIG_GPIO_ARIZONA

+CONFIG_GPIO_BD9571MWV

+CONFIG_GPIO_CRYSTAL_COVE

+CONFIG_GPIO_CS5535

+CONFIG_GPIO_DA9052

+CONFIG_GPIO_DA9055

+CONFIG_GPIO_DLN2

+CONFIG_GPIO_HTC_EGPIO

+CONFIG_GPIO_JANZ_TTL

+CONFIG_GPIO_KEMPLD

+CONFIG_GPIO_LP3943

+CONFIG_GPIO_LP873X

+CONFIG_GPIO_LP87565

+CONFIG_GPIO_MAX77620

+CONFIG_GPIO_MSIC

+ CONFIG_GPIO_SYSFS

+ CONFIG_GPIO_SYSFS

# Menu: Device Drivers >> GPIO Support >> MFD GPIO expanders
+CONFIG_GPIO_AD5520

+CONFIG_GPIO_ARIZONA

+CONFIG_GPIO_BD9571MWV

+CONFIG_GPIO_CRYSTAL_COVE

+CONFIG_GPIO_CS5535

+CONFIG_GPIO_DA9052

+CONFIG_GPIO_DA9055

+CONFIG_GPIO_DLN2

+CONFIG_GPIO_HTC_EGPIO

+CONFIG_GPIO_JANZ_TTL

+CONFIG_GPIO_KEMPLD

+CONFIG_GPIO_LP3943

+CONFIG_GPIO_LP873X

+CONFIG_GPIO_LP87565

+CONFIG_GPIO_MAX77620

+CONFIG_GPIO_MSIC
+CONFIG_GPIO_PALMAS  policy{amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64el: 'y'}
+CONFIG_GPIO_RC5T583  policy{arm64: 'y', armhf: 'y', i386: 'y', ppc64el: 'y'}
+CONFIG_GPIO_STMPE  policy{arm64: 'y', armhf: 'y', i386: 'y', ppc64el: 'y'}
+CONFIG_GPIO_TC3589X  policy{i386: 'y'}
+CONFIG_GPIO_TIMBERDALE  policy{amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_TPS65086  policy{amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_TPS65218  policy{arm64: 'm', armhf: 'm', ppc64el: 'm'}
+CONFIG_GPIO_TPS6586X  policy{arm64: 'y', armhf: 'y', i386: 'y', ppc64el: 'y'}
+CONFIG_GPIO_TPS65910  policy{arm64: 'y', armhf: 'y', i386: 'y', ppc64el: 'y'}
+CONFIG_GPIO_TPS65912  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_TPS68470  policy{arm64: 'y', armhf: 'y', i386: 'y'}
+CONFIG_GPIO_TWL4030  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_TWL6040  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_TPS6586X  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_UCB1400  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_WHISKEY_COVE  policy{arm64: 'm', i386: 'm'}
+CONFIG_GPIO_WM8311X  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_WM8350  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_WM8994  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+
+CONFIG_GPIO_TWL4030  mark<ENFORCED> note<LP:#921934>
+
+  + Menu: Device Drivers >> GPIO Support >> Memory mapped GPIO drivers
+CONFIG_GPIO_74XX_MMIO  policy{arm64: 'm', armhf: 'm', ppc64el: 'm'}
+CONFIG_GPIO_ALTERA  policy{arm64: 'm', armhf: 'm', ppc64el: 'm'}
+CONFIG_GPIO_AMDPT  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_AXP209  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_BRCMSTB  policy{arm64: 'm'}
+CONFIG_GPIO_DWAPB  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_EM  policy{armhf: 'n'}
+CONFIG_GPIO_EXAR  policy{arm64: 'm', armhf: 'm', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_FTGPIO010  policy{arm64: 'y', armhf: 'y', ppc64el: 'y'}
+CONFIG_GPIO_GENERIC_PLATFORM  policy{arm64: 'm', armhf: 'y', i386: 'm', ppc64el: 'm'}
+CONFIG_GPIO_GRGPIO  policy{arm64: 'm', armhf: 'm', ppc64el: 'm'}
+CONFIG_GPIO_ICH  policy{arm64: 'm', i386: 'm'}
+CONFIG_GPIO_LYNXPOINT          policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_GPIO_MB8657X            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
'm', 's390x': 'm'}>
+CONFIG_GPIO_MENZ127            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
'm'}>
+CONFIG_GPIO_MOCKUP             policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n',
's390x': 'm'}>
+CONFIG_GPIO_MPC8XXX            policy<{'armhf': 'y'}>
+CONFIG_GPIO_OMAP               policy<{'armhf': 'y'}>
+CONFIG_GPIO_PL061              policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_GPIO_RCAR               policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_GPIO_SYSCON             policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_GPIO_TEGRA              policy<{'armhf-generic': 'y'}>
+CONFIG_GPIO_TS4800             policy<{'armhf-generic': 'm'}>
+CONFIG_GPIO_THUNDERX           policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_GPIO_UNIPHIER           policy<{'armhf': 'm'}>
+CONFIG_GPIO_AMD8111            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_GPIO_BT8XX              policy<{'s390x': 'm'}>
+CONFIG_GPIO_INTEL_MID          policy<{'i386': 'y'}>
+CONFIG_GPIO_MERRIFIELD         policy<{'i386': 'n'}>
+CONFIG_GPIO_ML_IOH             policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_GPIO_PCH                policy<{'i386': 'm'}>
+CONFIG_GPIO_PCI_IDIO_16        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
'm', 's390x': 'm'}>
+CONFIG_GPIO_RDC321X             policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
'm', 's390x': 'm'}>
+CONFIG_GPIO_104_DIO_48E         policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_GPIO_104_IDIO_16         policy<{'s390x': 'm'}>
+CONFIG_GPIO_104_IDI_48          policy<{'i386': 'y'}>
+CONFIG_GPIO_CARDIO_24           policy<{'i386': 'n'}>
+CONFIG_GPIO_GPIO_MM             policy<{'i386': 'm'}>
+CONFIG_GPIO_IT87               policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_GPIO_MCHIP              policy<{'i386': 'm'}>
+CONFIG_GPIO_SCH                policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_GPIO_SCH311X            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_GPIO_WS16C48             policy<{'amd64': 'm', 'i386': 'm'}>
# Menu: Device Drivers >> GPIO Support >> SPI GPIO expanders
+CONFIG_GPIO_74X164 policy<['arm64': 'm', 'armhf': 'm', 'ppc64le': 'm']>
+CONFIG_GPIO_MAX3191X policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']>
+CONFIG_GPIO_MAX7301 policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']>
+CONFIG_GPIO_MC33880 policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']>
+CONFIG_GPIO_PISOSR policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']>
+CONFIG_GPIO_XRA1403 policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']>
+
# Menu: Device Drivers >> GPIO Support >> USB GPIO expanders
+CONFIG_GPIO_VIPERBOARD policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']>
+
# Menu: Device Drivers >> Generic Driver Options
+CONFIG_UEVENT_HELPER policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']>
+CONFIG_UEVENT_HELPER_PATH policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']>
+CONFIG_DEVTMPFS policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']>
+CONFIG_DEVTMPFS_MOUNT policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']>
+CONFIG_STANDALONE policy<['amd64': 'n', 'arm64': 'y', 'armhf': 'y', 'i386': 'n', 'ppc64le': 'y']>
+CONFIG_PREVENT_FIRMWARE_BUILD policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']>
+CONFIG_ALLOW_DEV_COREDUMP policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']>
+CONFIG_DEBUG_DRIVER policy<['amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n']>
+CONFIG_DEBUG_DEVRES policy<['amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n']>
+CONFIG_DEBUG_TEST_DRIVER_REMOVE policy<['amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n']>
+CONFIG_DEBUG_ASYNC_DRIVER_PROBE policy<['amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n']>
+CONFIG_DMA_FENCE_TRACE policy<['amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n']>
+
+CONFIG_DEVTMPFS note<ENFORCED> note<upstart requirement>
+CONFIG_DEVTMPFS_MOUNT note<ENFORCED> note<upstart requirement>
+
# Menu: Device Drivers >> Generic Driver Options >> DMA Contiguous Memory Allocator
+CONFIG_DMA_CMA
+CONFIG_CMA_SIZE_MBYES
+CONFIG_CMA_ALIGNMENT
+#
+CONFIG_DMA_CMA
+# Menu: Device Drivers >> Generic Driver Options >> DMA Contiguous Memory Allocator >> Selected region size
+CONFIG_CMA_SIZE_SEL_MBYES
+CONFIG_CMA_SIZE_SEL_PERCENTAGE
+CONFIG_CMA_SIZE_SEL_MIN
+CONFIG_CMA_SIZE_SEL_MAX
+
+# Menu: Device Drivers >> Generic Driver Options >> Userspace firmware loading support
+CONFIG_FW_LOADER
+CONFIG_FW_LOADER_IN_KERNEL
+CONFIG_EXTRA_FIRMWARE
+CONFIG_FW_LOADER_USER_HELPER_FALLBACK
+#
+CONFIG_FW_LOADER_USER_HELPER_FALLBACK
+
# Menu: Device Drivers >> Generic Dynamic Voltage and Frequency Scaling (DVFS) support
+CONFIG_PM_DEVFREQ
+CONFIG_DEVFREQ_GOV_SIMPLE_ONDEMAND
+CONFIG_DEVFREQ_GOV_PERFORMANCE
+CONFIG_DEVFREQ_GOV_POWERSAVE
+CONFIG_DEVFREQ_GOV_USERSPACE
+CONFIG_DEVFREQ_GOV_PASSIVE
+CONFIG_ARM_EXYNOS_BUS_DEVFREQ
+CONFIG_ARM_TEGRA_DEVFREQ
+CONFIG_ARM_RK3399_DMC_DEVFREQ
+
+# Menu: Device Drivers >> Generic Dynamic Voltage and Frequency Scaling (DVFS) support >> DEVFREQ-Event device Support
+CONFIG_PM_DEVFREQ_EVENT
+CONFIG_DEVFREQ_EVENT_EXYNOS_NOCP
+CONFIG_DEVFREQ_EVENT_EXYNOS_PPMU policy<{'armhf': 'y'}>
+CONFIG_DEVFREQ_EVENT_ROCKCHIP_DFI policy<{'arm64': 'm', 'armhf': 'm'}>
+
+# Menu: Device Drivers >> Generic Target Core Mod (TCM) and ConfigFS Infrastructure
+CONFIG_TARGET_CORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_TCM_IBLOCK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_TCM_FILEIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_TCM_PSCSI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_TCM_USER2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_LOOPBACK_TARGET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_TCM_FC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_ISCSI_TARGET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_ISCSI_TARGET_CXGB4 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+CONFIG_SBP_TARGET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'm', 's390x': 'm'}>
+
+# Menu: Device Drivers >> Generic Thermal sysfs driver
+CONFIG_THERMAL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_EMERGENCY_POWEROFF_DELAY_MS policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0'}>
+CONFIG_THERMAL_HWMON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_WRITABLE_TRIPS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_GOV_FAIR_SHARE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_GOV_STEP_WISE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_GOV_BANG_BANG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_GOV_USER_SPACE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_GOV_POWER_ALLOCATOR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CLOCK_THERMAL policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'}>
+CONFIG_DEVFREQ_THERMAL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_THERMAL_EMULATION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+## Menu: Device Drivers >> Generic Thermal sysfs driver >> Qualcomm thermal drivers
+CONFIG_QCOM_TSENS policy<['arm64': 'm', 'armhf': 'm']>
+
+## Menu: Device Drivers >> Generic Thermal sysfs driver >> STMicroelectronics thermal drivers
+
+## Menu: Device Drivers >> Generic Thermal sysfs driver >> Samsung thermal drivers
+CONFIG_EXYNOS_THERMAL policy<['armhf': 'y']>
+
+## Menu: Device Drivers >> Generic Thermal sysfs driver >> Texas Instruments thermal drivers
+
+## Menu: Device Drivers >> Generic Thermal sysfs driver >> Texas Instruments SoCs temperature sensor driver
+CONFIG_TI_SOC_THERMAL policy<['armhf': 'm']>
+CONFIG_TI_THERMAL policy<['armhf': 'y']>
+CONFIG_OMAP3_THERMAL policy<['armhf-generic': 'n']>
+CONFIG_OMAP4_THERMAL policy<['armhf-generic': 'y']>
+CONFIG_DRA752_THERMAL policy<['armhf': 'y']>
+
+## Menu: Device Drivers >> Generic powercap sysfs driver
+CONFIG_POWERCAP policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n']>
+CONFIG_INTEL_RAPL policy<['amd64': 'm', 'i386': 'm']>
+
+## Menu: Device Drivers >> Graphics support
+CONFIG_VGA_ARB policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']>
+CONFIG_VGA_ARB_MAX_GPUS policy<['amd64': '16', 'arm64': '16', 'armhf': '16', 'i386': '16', 'ppc64le': '16']>
+CONFIG_VGA_SWITCHEROO policy<['amd64': 'y', 'i386': 'y']>
+CONFIG_TEGRA_HOST1X policy<['armhf-generic': 'm']>
+CONFIG_TEGRA_HOST1X_FIREWALL policy<['armhf-generic': 'y']>
+CONFIG_IMX_IPUV3_CORE policy<['armhf': 'm']>
+
+## Menu: Device Drivers >> Graphics support >> /dev/agpgart (AGP Support)
+CONFIG_AGP policy<['amd64': 'y', 'i386': 'y', 'ppc64le': 'y']>
+CONFIG_AGP_ALI policy<['i386': 'm']>
+CONFIG_AGP_ATI policy<['i386': 'm']>
+CONFIG_AGP_AMD policy<['i386': 'y']>
+CONFIG_AGP_AMD64 policy<['amd64': 'y', 'i386': 'y']>
+CONFIG_AGP_INTEL policy<['amd64': 'y', 'i386': 'y']>
+CONFIG_AGP_NVIDIA policy<['i386': 'y']>
+CONFIG_AGP_SIS policy<['amd64': 'm', 'i386': 'm']>
+CONFIG_AGP_SWORKS policy<['i386': 'm']>
+CONFIG_AGP_VIA policy<['amd64': 'y', 'i386': 'y']>
+CONFIG_AGP_EFFICEON policy<['i386': 'm']>
+
+## Menu: Device Drivers >> Graphics support >> /dev/agpgart (AGP Support)
+CONFIG_AGP note<not autloadable> flag<REVIEW>
Open Source Used in 5GaaS Edge AC-4  18198

File: /usr/share/doc/file-7.1.0/README

-# Menu: Device Drivers >> Graphics support >> ACP (Audio CoProcessor) Configuration
+CONFIG_DRM_AMD_ACP policy[{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}]
+
-# Menu: Device Drivers >> Graphics support >> AMD Library routines
+CONFIG_CHASH_STATS policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}]
+CONFIG_CHASH_SELFTEST policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}]
+
-# Menu: Device Drivers >> Graphics support >> Backlight & LCD device support
+CONFIG_BACKLIGHT_LCD_SUPPORT policy[{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 'x390x': 'n'}]
+
-# Menu: Device Drivers >> Graphics support >> Backlight & LCD device support >> Lowlevel Backlight controls
+CONFIG_BACKLIGHT_CLASSDEVICE policy[{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}]
+CONFIG_BACKLIGHT_GENERIC policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_LM3533 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_CARILLO_RANCH policy[{'amd64': 'm', 'i386': 'm'}]
+CONFIG_BACKLIGHT_PWM policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_DA903X policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_DA9052 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_MAX8925 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_APPLE policy[{'amd64': 'm', 'i386': 'm'}]
+CONFIG_BACKLIGHT_PM8941_WLED policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_SAHA policy[{'amd64': 'm', 'i386': 'm'}]
+CONFIG_BACKLIGHT_WM831X policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_ADSP5520 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_ADSP8860 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_ADSP8870 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_88PM860X policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_PCF50633 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_AAD2870 policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_BACKLIGHT_LM3630A [ppc64le: 'm']
+CONFIG_BACKLIGHT_LM3639 [ppc64le: 'm']
+CONFIG_BACKLIGHT_LP855X [ppc64le: 'm']
+CONFIG_BACKLIGHT_LP8788 [ppc64le: 'm']
+CONFIG_BACKLIGHT_PANDORA [ppc64le: 'm']
+CONFIG_BACKLIGHT_SKY81452 [ppc64le: 'm']
+CONFIG_BACKLIGHT_TPS65217 [ppc64le: 'm']
+CONFIG_BACKLIGHT_AS3711 [ppc64le: 'm']
+CONFIG_BACKLIGHT_GPIO [ppc64le: 'm']
+CONFIG_BACKLIGHT_LV5207LP [ppc64le: 'm']
+CONFIG_BACKLIGHT_BD6107 [ppc64le: 'm']
+CONFIG_BACKLIGHT_ARCXCNN [ppc64le: 'm']

+CONFIG_LCD_CLASS_DEVICE [ppc64le: 'm']
+CONFIG_LCD_L4F00242T03 [m]
+CONFIG_LCD_LMS283GF05 [m]
+CONFIG_LCD_LTV350QV [m]
+CONFIG_LCD_IL9222X [m]
+CONFIG_LCD_IL9320 [m]
+CONFIG_LCD_TDO24M [m]
+CONFIG_LCD_VGG2432A4 [m]
+CONFIG_LCD_PLATFORM [m]
+CONFIG_LCD_S6E63M0 [m]
+CONFIG_LCD_LD9040 [m]
+CONFIG_LCD_AMS369FG06 [m]
+CONFIG_LCD_LMS501KF03 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64lel': 'm'}>
+CONFIG_LCD_HX8357 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64lel': 'm'}>

+## Menu: Device Drivers >> Graphics support >> Bootup logo
+CONFIG_LOGO policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64lel': 'n'}>

+## Menu: Device Drivers >> Graphics support >> Console display driver support
+CONFIG_VGA_CONSOLE policy<{'amd64': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
+CONFIG_MDA_CONSOLE policy<{'i386': 'm'}>
+CONFIG_DUMMY_CONSOLE_COLUMNS policy<{'amd64': '80', 'arm64': '80', 'armhf': '80', 'i386': '80', 'ppc64lel': '80'}>
+CONFIG_DUMMY_CONSOLE_ROWS policy<{'amd64': '25', 'arm64': '25', 'armhf': '25', 'i386': '25', 'ppc64lel': '25'}>
+CONFIG_FRAMEBUFFER_CONSOLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
+CONFIG_FRAMEBUFFER_CONSOLE_DETECT_PRIMARY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
+CONFIG_FRAMEBUFFER_CONSOLE_ROTATION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>

+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support)
+CONFIG_DRM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64lel': 'm', 's390x': 'n'}>
+CONFIG_DRM_DP_AUX_CHARDEV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
+CONFIG_DRM_DEBUG_MM_SELFTEST policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64lel': 'n'}>
+CONFIG_DRM_FBDEV_EMULATION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
+CONFIG_DRM_FBDEV_OVERALLOC policy<{'amd64': '100', 'arm64': '100', 'armhf': '100', 'i386': '100', 'ppc64lel': '100'}>
+CONFIG_DRM_LOAD_EDID_FIRMWARE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y'}>
+CONFIG_DRM_HDLCD policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DRM_HDLCD_SHOW_UNDERRUN policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_DRM_MALLI_DISPLAY policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DRM_RADEON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64lel': 'm'}>
+CONFIG_DRM_RADEON_USERPTR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64lel': 'n'}>
+CONFIG_DRM_VGEM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64lel': 'm'}>
'm'}>
+CONFIG_DRM_VMWGFX_FBCON policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DRM_UDDL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_AST policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_MGAG200 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_CIRRUS_QEMU policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_ARMADA policy<{'armhf': 'm'}>
+CONFIG_DRM_ATMEL_HLcdc policy<{'armhf': 'm'}>
+CONFIG_DRM_RCAR_Du policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_Rcar_DW_HDMI policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_Rcar_LVDS policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_Rcar_VSP policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_SHMOBILE policy<{'armhf': 'm'}>
+CONFIG_DRM_OMAP policy<{'armhf': 'n'}>
+CONFIG_DRM_TILCDC policy<{'armhf': 'm'}>
+CONFIG_DRM_QXL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_BOCHS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_VIRTIO_GPU policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_FSL_DCU policy<{'armhf': 'm'}>
+CONFIG_DRM_Tegra policy<{'armhf-generic': 'm'}>
+CONFIG_DRM_Tegra_Debug policy<{'armhf-generic': 'n'}>
+CONFIG_DRM_Tegra_Staging policy<{'armhf-generic': 'y'}>
+CONFIG_DRM_STM policy<{'armhf': 'm'}>
+CONFIG_DRM_STM_DSI policy<{'armhf': 'm'}>
+CONFIG_DRM_STI policy<{'armhf': 'n'}>
+CONFIG_DRM_VC4 policy<{'arm64': 'm'}>
+CONFIG_DRM_VC4_HDMI_CEC policy<{'arm64': 'y'}>
+CONFIG_DRM_ETNAVIV policy<{'armhf-generic': 'm'}>
+CONFIG_DRM_ETNAVIV_Thermal policy<{'armhf-generic': 'y'}>
+CONFIG_DRM_ETNAVIV_Register_Logging policy<{'armhf-generic': 'n'}>
+CONFIG_DRM_ARCpgU policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_HIshi_HIBMC policy<{'arm64': 'm'}>
+CONFIG_DRM_HIshi_KIRIN policy<{'arm64': 'm'}>
+CONFIG_DRM_HIshi_KIRIN_DW_DSI policy<{'arm64': 'm'}>
+CONFIG_DRM_Mediatek policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DRM_Mediatek_HDMI policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DRM_MXSFb policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DRM_Meson policy<{'armhf': 'm'}>
+CONFIG_DRM_Meson_DW_HDMI policy<{'armhf': 'm'}>
+CONFIG_DRM_PL111 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DRM_TVE200 policy[{'armhf': 'm'}]
+
+CONFIG_DRM_MGAG200 note[LP#1693337]
+CONFIG_DRM_STI note[LP#1398458]
+CONFIG_DRM_HISI_HIBMC note[LP#1762940]
+CONFIG_DRM_BOCHS mark[ENFORCED] note[LP#1872863] note[LP#1916290]
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> AMD GPU
+CONFIG_DRM_AMDGPU policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}]
+CONFIG_DRM_AMDGPU_SI policy[{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}]
+CONFIG_DRM_AMDGPU_CIK policy[{'amd64': 'y', 'arm64': 'y', 'i386': 'y', 'ppc64le': 'y'}]
+CONFIG_DRM_AMDGPU_USERPTR policy[{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}]
+CONFIG_DRM_AMDGPU_GART_DEBUGFS policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}]
+CONFIG_HSA_AMD policy[{'amd64': 'm'}]
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> AMD GPU >> Display Engine Configuration
+CONFIG_DRM_AMD_DC_PRE_VEGA policy[{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}]
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> AMD GPU >> Display Engine Configuration >> AMD DC - Enable new display engine
+CONFIG_DRM_AMD_DC policy[{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}]
+CONFIG_DRM_AMD_DC_FBC policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}]
+CONFIG_DRM_AMD_DC_DCN1_0 policy[{'amd64': 'y', 'i386': 'y'}]
+CONFIG_DEBUG_KERNEL_DC policy[{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}]
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> DRM Support for Allwinner A10 Display Engine
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> DRM Support for Freescale i.MX
+CONFIG_DRM_IMX policy[{'armhf': 'm'}]
+CONFIG_DRM_IMX_PARALLEL_DISPLAY policy[{'armhf': 'm'}]
+CONFIG_DRM_IMX_TVE policy[{'armhf': 'm'}]
+CONFIG_DRM_IMX_LDB policy[{'armhf': 'm'}]
+CONFIG_DRM_IMX_HDMI          policy<{'armhf': 'm'}>
+
+  # Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> DRM Support for Rockchip
+CONFIG_DRM_ROCKCHIP          policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_ROCKCHIP_ANALOGIX_DP  policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ROCKCHIP_CDN_DP       policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ROCKCHIP_DW_HDMI      policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ROCKCHIP_DW_MIPI_DSI  policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ROCKCHIP_INNO_HDMI    policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ROCKCHIP_LVDS         policy<{'arm64': 'y', 'armhf': 'y'}>
+
+  # Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> DRM Support for Samsung SoC EXYNOS Series
+CONFIG_DRM_EXYNOS            policy<{'armhf': 'm'}>
+CONFIG_DRM_EXYNOS_FIMD       policy<{'armhf': 'n'}>
+CONFIG_DRM_EXYNOS5433_DECON  policy<{'armhf': 'y'}>
+CONFIG_DRM_EXYNOS7_DECON     policy<{'armhf': 'n'}>
+CONFIG_DRM_EXYNOS_MIXER      policy<{'armhf': 'y'}>
+CONFIG_DRM_EXYNOS_DVI        policy<{'armhf': 'n'}>
+CONFIG_DRM_EXYNOS_DSI        policy<{'armhf': 'y'}>
+CONFIG_DRM_EXYNOS_HDMI       policy<{'armhf': 'y'}>
+CONFIG_DRM_EXYNOS_MIX        policy<{'armhf': 'y'}>
+
+  # Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> DRM Support for Samsung SoC EXYNOS Series >> Image Post Processor
+CONFIG_DRM_EXYNOS_IPP        policy<{'armhf': 'n'}>
+
+  # Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> Display Interface Bridges
+CONFIG_DRM_ANALOGIX_ANX78XX   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_DUMB_VGA_DAC       policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_LVDS_ENCODER       policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_MEGACHIPS_STDPIXXX_GE_B850V3_FW policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_NXP_PTN3460        policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_PARADE_PS8622      policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_SIL_SI18620        policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_SILI902X           policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_SI19234            policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_TOSHIBA_TC358767   policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_TIL_TFP410         policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_ADV7511_SNAPDRAGON_HACKS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_DRM_DW_HDMI_AHB_AUDIO  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_DW_HDMI_I2S_AUDIO  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_DW_HDMI_CEC       policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_DRM_I915_ALPHA_SUPPORT policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DRM_I915_CAPTURE_ERROR policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DRM_I915_COMPRESS_ERROR policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DRM_I915_USERPTR policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DRM_I915_GVT policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DRM_I915_GVT_KVMGT policy<{'amd64': 'm'}>
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> Intel 8xx/9xx/G3x/G4x/HD Graphics >> drm/i915 Debugging
+CONFIG_DRM_I915_WERROR policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DRM_I915_DEBUG policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DRM_I915_SW_FENCE_DEBUG_OBJECTS policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DRM_I915_SW_FENCE_CHECK_DAG policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DRM_I915_SELFTEST policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DRM_I915_LOW_LEVEL_TRACEPOINTS policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DRM_I915_DEBUG_VBLANK_EVADE policy<{'amd64': 'n', 'i386': 'n'}>
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> Intel GMA5/600 KMS Framebuffer
+CONFIG_DRM_GMA500 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DRM_GMA600 policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DRM_GMA3600 policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DRM_MEDFIELD policy<{'i386': 'y'}>
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> MSM DRM
+CONFIG_DRM_MSM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DRM_MSM_REGISTER_LOGGING policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_DRM_MSM_HDMI_HDCP policy<{'arm64': 'y', 'armhf': 'y'}>
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> MSM DRM >> Enable DSI support in MSM DRM driver
+CONFIG_DRM_MSM_DSI policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_MSM_DSI_PLL policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_MSM_DSI_28NM_PHY policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_MSM_DSI_20NM_PHY policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_MSM_DSI_28NM_8960_PHY policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_DRM_MSM_DSI_14NM_PHY policy<{'arm64': 'y', 'armhf': 'y'}>
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+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> Nouveau (NVIDIA) cards
+CONFIG_DRM_NOUVEAU policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_NOUVEAU_PLATFORM_DRIVER policy<{'armhf-generic': 'y'}>
+CONFIG_NOUVEAU_DEBUG policy<{'amd64': '5', 'arm64': '5', 'armhf': '5', 'i386': '5', 'ppc64le': '5'}>
+CONFIG_NOUVEAU_DEBUG_DEFAULT        policy<{'amd64': '3', 'arm64': '3', 'armhf': '3', 'i386': '3',
                     'ppc64le': '3'}>
+CONFIG_NOUVEAU_DEBUG_MMU            policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
                     'ppc64le': 'n'}>
+CONFIG_DRM_NOUVEAU_BACKLIGHT        policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
                     'ppc64le': 'y'}>
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> OMAP2+ Display Subsystem support
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> OMAPDRM External Display Device Drivers
+
+## Menu: Device Drivers >> Graphics support >> Direct Rendering Manager (XFree86 4.1.0 and higher DRI support) >> Support for simple displays
+CONFIG_DRM_TINYDRM                   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
                     'm'}>
+CONFIG_TINYDRM_MI0283QT             policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                     'ppc64le': 'm'}>
+CONFIG_TINYDRM_REPAPER              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
                     'ppc64le': 'm'}>
+CONFIG_TINYDRM_ST7586               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
                     'm'}>
+
+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices
+CONFIG_FB_SH_MOBILE_MERAM           policy<{'arm64': 'm', 'armhf': 'm'}>
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+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Marvell MMP Display Subsystem support
+
+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices
+CONFIG_FB                           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le':
                     'y', 's390x': 'y'}>
+CONFIG_FIRMWARE_EDID                 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le':
                     'y'}>
+CONFIG_FB_MODE_HELPERS              policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le':
                     'y'}>
+CONFIG_FB_TILEBLITTING              policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le':
                     'y'}>
+CONFIG_FB_CIRRUS                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
                     'm'}>
+CONFIG_FB_PM2                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
                     'm'}>
+CONFIG_FB_PM2_FIFO_DISCONNECT       policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
                     'ppc64le': 'y'}>
+CONFIG_FB_ARMCLLCD                   policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_FB_IMX                        policy<{'armhf-generic': 'm'}>
+CONFIG_FB_CYBER2000                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le':
                     'm'}>
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+CONFIG_FB_3DFX_ACCEL policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>

+CONFIG_FB_3DFX_I2C policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_VOODOO1 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
'm'}>
+CONFIG_FB_VT8623 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_TRIDENT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_ARC policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_PM3 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_CARMINE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_SH_MOBILE_LCDC policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_FB_TMIO policy<{'armhf': 'n'}>
+CONFIG_FB_TMIO_ACCELL policy<{'armhf': 'y'}>
+CONFIG_FB_S3C policy<{'armhf': 'n'}>
+CONFIG_FB_S3C_DEBUG_REGWRITE policy<{'armhf': 'y'}>
+CONFIG_FB_SM501 policy<{'arm64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
'm'}>
+CONFIG_FB_SMSCUFX policy<{'arm64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_UML policy<{'armhf': 'n'}>
+CONFIG_FB_UML_GXT4500 policy<{'armhf': 'n'}>

+CONFIG_FB_XILINX policy<{'arm64': 'n', 'armhf-generic': 'm'}>
+CONFIG_FB_DA8XX policy<{'armhf-generic': 'm'}>
+CONFIG_FB_VIRTUAL policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_XEN_FBDEV_FRONTEND policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>

+CONFIG_FB_MX3 policy<{'armhf-generic': 'y'}>
+CONFIG_FB_BROADSHEET policy<{'armhf-generic': 'y'}>
+CONFIG_FB_AUO_K1901 policy<{'armhf': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

+CONFIG_FB_MB862XX policy<{'arm64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_MB862XX_I2C policy<{'arm64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>

+CONFIG_FB_MANUFACTURER policy<{'armhf-generic': 'n'}>
+CONFIG_FB_BROADSHEET policy<{'armhf-generic': 'n'}>
+CONFIG_FB_AUO_K1900 policy<{'armhf-generic': 'n'}>
+CONFIG_FB_BROADSHEET policy<{'armhf-generic': 'n'}>
+CONFIG_FB_AUO_K1900 policy<{'armhf-generic': 'n'}>
+CONFIG_FB_AUO_K1901 policy<{'armhf-generic': 'n'}>
+CONFIG_FB_MXS policy<{'armhf-generic': 'n'}>
+CONFIG_FB_HYPERV policy<{'armhf-generic': 'n'}>
+CONFIG_FB_SIMPLE policy<{'armhf-generic': 'n'}>
+CONFIG_FB_SSD1307 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_FB_SM712 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+CONFIG_FB_VIRTUAL flag<TESTING>
+
+% Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> AMD Geode family framebuffer support
+CONFIG_FB_GEODE policy<{'i386': 'y'}>
+CONFIG_FB_GEODE_LX policy<{'i386': 'm'}>
+CONFIG_FB_GEODE_GX policy<{'i386': 'm'}>
+CONFIG_FB_GEODE_GX1 policy<{'i386': 'm'}>
+
+% Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> ATI Mach64 display support
+CONFIG_FB_ATY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FB_ATY_CT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_FB_ATY_GENERIC_LCD policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_FB_ATY_GX policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_FB_ATY_BACKLIGHT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
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+% Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> ATI Radeon display support
+CONFIG_FB_RADEON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FB_RADEON_I2C policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_FB_RADEON_BACKLIGHT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_FB_RADEON_DEBUG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+% Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> Amiga native chipset support
+
+% Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> DRAM timing
+CONFIG_FB_CARMINE_DRAM_EVAL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CARMINE_DRAM_CUSTOM policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
+% Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> Framebuffer foreign endianness support
+CONFIG_FB_FOREIGN_ENDIAN policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+ # Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> Framebuffer foreign endianness support >> Choice endianness support
+
+ # Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> GDC variant
+ CONFIG_FB_MB862XX_PCI_GDC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+ CONFIG_FB_MB862XX_LIME policy<{'ppc64el': 'n'}>
+
+ # Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> Matrox acceleration
+ CONFIG_FB_MATROX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+ CONFIG_FB_MATROX_MILLENIUM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+ CONFIG_FB_MATROX_MYSTIQUE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+ CONFIG_FB_MATROX_G policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+ CONFIG_FB_MATROX_I2C policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+ CONFIG_FB_MATROX_MAVER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
+ # Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> OMAP frame buffer support
+
+ # Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> OMAP2+ frame buffer support
+ CONFIG_FB_OMAP2 policy<{'armhf': 'm'}>
+ CONFIG_FB_OMAP2_DEBUG_SUPPORT policy<{'armhf': 'n'}>
+ CONFIG_FB_OMAP2_NUM_FBS policy<{'armhf': '3'}>
+ CONFIG_FB_OMAP2_DSS_DEBUG policy<{'armhf': 'n'}>
+ CONFIG_FB_OMAP2_DSS_DEBUGFS policy<{'armhf': 'n'}>
+ CONFIG_FB_OMAP2_DSS_DPI policy<{'armhf': 'y'}>
+ CONFIG_FB_OMAP2_DSS_VENC policy<{'armhf': 'y'}>
+ CONFIG_FB_OMAP4_DSS_HDMI policy<{'armhf': 'y'}>
+ CONFIG_FB_OMAP5_DSS_HDMI policy<{'armhf': 'n'}>
+ CONFIG_FB_OMAP2_DSS_SDI policy<{'armhf': 'n'}>
+ CONFIG_FB_OMAP2_DSS_SI policy<{'armhf': 'n'}>
+ CONFIG_FB_OMAP2_DSS_MIN_FCK_PER_PCK policy<{'armhf': '0'}>
+ CONFIG_FB_OMAP2_DSS_SLEEP_AFTER_VENC_RESET policy<{'armhf': 'y'}>
+
+ # Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> OMAP2+ frame buffer support >> OMAPFB Panel and Encoder Drivers
+ CONFIG_FB_OMAP2_ENCODER_OPA362 policy<{'armhf': 'n'}>
+ CONFIG_FB_OMAP2_ENCODER_TFP410 policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_ENCODER_TPD12S015 policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_CONNECTOR_DVI policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_CONNECTOR_HDMI policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_CONNECTOR_ANALOG_TV policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_DPI policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_DSI_CM policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_SONY_ACX565AKM policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_LGPHILIPS_LB035Q02 policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_SHARP_LS037V7DW01 policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_TPO_TD028TTEC1 policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_TPO_TD043MTEA1 policy<{'armhf': 'n'}>
+CONFIG_FB_OMAP2_PANEL_NEC_NL8048HL11 policy<{'armhf': 'n'}>
+
+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> PXA LCD framebuffer support
+
+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> SBUS and UPA framebuffers
+
+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> Size of ADV7393 frame buffer memory Single/Double Size
+
+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> Video mode support
+
+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> nVidia Framebuffer Support
+CONFIG_FB_NVIDIA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_FB_NVIDIA_I2C policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_FB_NVIDIA_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_NVIDIA_BACKLIGHT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
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+## Menu: Device Drivers >> Graphics support >> Frame buffer Devices >> Support for frame buffer devices >> nVidia Riva support
+CONFIG_FB_RIVA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_FB_RIVA_I2C policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_FB_RIVA_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_FB_RIVA_BACKLIGHT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+
+## Menu: Device Drivers >> HID support
+
+## Menu: Device Drivers >> HID support >> HID bus support
+CONFIG_HID
+CONFIG_HID_BATTERY_STRENGTH
+CONFIG_UHID
+CONFIG_HID_GENERIC
+CONFIG_HID_A4TECH
+CONFIG_HID_ACCUTOUCH
+CONFIG_HID_ACRUX
+CONFIG_HID_ACRUX_FF
+CONFIG_HID_APPLE
+CONFIG_HID_APPLEIR
+CONFIG_HID_ASUS
+CONFIG_HID_AUREAL
+CONFIG_HID_BELKIN
+CONFIG_HID_BETOP_FF
+CONFIG_HID_CHERRY
+CONFIG_HID_CHICONY
+CONFIG_HIDCorsAIR
+CONFIG_HID_PRODIKEYS
+CONFIG_HID_CMEDIA
+CONFIG_HID_CP2112
+CONFIG_HID_CYPRESS
+CONFIG_HID_DRAGONRISE
+CONFIG_DRAGONRISE_FF
+CONFIG_HID_EMS_FF
+CONFIG_HID_ELECOM                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_ELO                      policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_EZKEY                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_GEMBIRD                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_GFRM                      policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_HOLTEK                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_HID_HOLTEK_FF             policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_HID_GT683R                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_KEYTOUCH                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_KYE                       policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_UCLOGIC                   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_WALTOP                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_GYRATION                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_ICADE                     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_KENSINGTON               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_LCPOWER                   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_LED                       policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_LENOVO                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_MAGICMOUSE               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_MAYFLASH                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_MICROSOFT                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_MONTEREY                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_MULTITOUCH                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_THINGM
+CONFIG_HID_THRUSTMASTER
+CONFIG_THRUSTMASTER_FF
+CONFIG_HID_UDRAW_PS3
+CONFIG_HID_WACOM
+CONFIG_HID_WIIMOTE
+CONFIG_HID_XINMO
+CONFIG_HID ZEROPLUS
+CONFIG.ZEROPLUS_FF
+CONFIG_HID_ZYDACRON
+CONFIG_HID_SENSOR_HUB
+CONFIG_HID_SENSOR_CUSTOM_SENSOR
+CONFIG_HID_ALPS
+CONFIG_HID_LOGITECH
+CONFIG_HID_LOGITECH_DJ
+CONFIG_HID_LOGITECH HIDPP
+CONFIG_LOGITECH_FF
+CONFIG_LOGIRUMBLEPAD2_FF
+CONFIG_LOGIC940_FF
+CONFIG_LOGIWHEELS_FF
+CONFIG_HID_PICOLCD
+CONFIG_HID_PICOLCD_FB

# Menu: Device Drivers >> HID support >> HID bus support >> Special HID drivers >> Logitech devices
+CONFIG_HID_LOGITECH
+CONFIG_HID_LOGITECH_DJ
+CONFIG_HID_LOGITECH HIDPP
+CONFIG_LOGITECH_FF
+CONFIG_LOGIRUMBLEPAD2_FF
+CONFIG_LOGIC940_FF
+CONFIG_LOGIWHEELS_FF

# Menu: Device Drivers >> HID support >> HID bus support >> Special HID drivers >> PicoLCD (graphic version)
+CONFIG_HID_PICOLCD
+CONFIG_HID_PICOLCD_FB
Open Source Used In 5GaaS Edge AC-4 18216

+y'>
+CONFIG_HID_PICOLCD_BACKLIGHT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_HID_PICOLCD_LCD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_HID_PICOLCD_LEDS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_HID_PICOLCD_CIR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+# Menu: Device Drivers >> HID support >> I2C HID support
+CONFIG_I2C_HID policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+# Menu: Device Drivers >> HID support >> Intel ISH HID support
+CONFIG_INTEL_ISH_HID policy<{'amd64': 'm'}>
+
+# Menu: Device Drivers >> HID support >> USB HID support
+CONFIG_USB_HID policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HID_PID policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_HIDDEV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+# Menu: Device Drivers >> HID support >> USB HID support >> USB HID Boot Protocol drivers
+CONFIG_USB_KBD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_MOUSE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+# Menu: Device Drivers >> HSI support
+CONFIG_HSI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_OMAP_SSI policy<{'armhf-generic': 'm'}>
+CONFIG_NOKIA_MODEM policy<{'armhf-generic': 'm'}>
+CONFIG_CMT_SPEECH policy<{'armhf-generic': 'm'}>
+CONFIG_SSI_PROTOCOL policy<{'armhf-generic': 'm'}>
+CONFIG_HSI_CHAR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+# Menu: Device Drivers >> Hardware Monitoring support
+CONFIG_HWMON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_HWMON_DEBUG_CHIP policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_SENSORS_ABITUUGURU policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SENSORS_ABITUUGURU3 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SENSORS_AD7314 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SENSORS_AD7414 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SENSORS_I5K_AMB
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_F71805F
+CONFIG_SENSORS_F71882FG
+CONFIG_SENSORS_F75375S
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_MC13783_ADC
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_FSCHMD
+CONFIG_SENSORS_FTSTEUTATES
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_GL518SM
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_GL520SM
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_G760A
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_G762
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_GPIO_FAN
+CONFIG_SENSORS_HIH6130
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_IBMAEM
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_IBMPEX
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_IBMPOWERNV
+CONFIG_SENSORS_JC42
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_IIO_HWMON
+CONFIG_SENSORS_IT87
+CONFIG_SENSORS_IT87
+CONFIG_SENSORS_I5500
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_CORETEMP
+CONFIG_SENSORS_LINEAGE
+CONFIG_SENSORS_LINEAGE
+CONFIG_SENSORS_POWR1220
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_LTC2945
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+CONFIG_SENSORS_LTC2990
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_LTC4151
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_LTC4215
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_LTC4222
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_LM78
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+CONFIG_SENSORS_LM87
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+CONFIG_SENSORS_LM93
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+CONFIG_SENSORS_LM95234
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+CONFIG_SENSORS_LM95241
'ppc64le': 'm'}>
+CONFIG_SENSORS_LM95245
'ppc64le': 'm'}>
+CONFIG_SENSORS_PC87360
+CONFIG_SENSORS_PC87427
+CONFIG_SENSORS_NTC_THERMISTOR
'ppc64le': 'm'}>
+CONFIG_SENSORS_NCT6683
'ppc64le': 'm'}>
+CONFIG_SENSORS_NCT7675
'ppc64le': 'm'}>
+CONFIG_SENSORS_NCT7802
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+CONFIG_SENSORS_NCT7904
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+CONFIG_SENSORS_PCF8591
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+CONFIG_SENSORS_PWM_FAN
+CONFIG_SENSORS_SHT15
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+CONFIG_SENSORS_SHT21
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+CONFIG_SENSORS_SHT3x
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+CONFIG_SENSORS_SHTC1
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+CONFIG_SENSORS_SIS5595
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+CONFIG_SENSORS_DME1737
'ppc64le': 'm'}>
+CONFIG_SENSORS_EMC1403
'ppc64le': 'm'}>
+CONFIG_SENSORS_VT1211
+CONFIG_SENSORS_VT8231
+CONFIG_SENSORS_W83781D
+CONFIG_SENSORS_W83791D
+CONFIG_SENSORS_W83792D
+CONFIG_SENSORS_W83793
+CONFIG_SENSORS_W83795
+CONFIG_SENSORS_W83795_FANCTRL
+CONFIG_SENSORS_W83L785TS
+CONFIG_SENSORS_W83L786NG
+CONFIG_SENSORS_W83627HF
+CONFIG_SENSORS_W83627EHF
+CONFIG_SENSORS_WM831X
+CONFIG_SENSORS_WM8350
+CONFIG_SENSORS_XGENE
+CONFIG_SENSORS_ADM1275
+CONFIG_SENSORS_IBM_CFFPS
+CONFIG_SENSORS_IR35221
+CONFIG_SENSORS_LM25066
+CONFIG_SENSORS_LTC2978
+CONFIG_SENSORS_LTC2978_REGULATOR
+CONFIG_SENSORS_LTC3815
+CONFIG_SENSORS_MAX16064

+CONFIG_PMBUS
+CONFIG_SENSORS_PMBUS
+CONFIG_SENSORS_ADM1275
+CONFIG_SENSORS_IBM_CFFPS
+CONFIG_SENSORS_IR35221
+CONFIG_SENSORS_LM25066
+CONFIG_SENSORS_LTC2978
+CONFIG_SENSORS_LTC2978_REGULATOR
+CONFIG_SENSORS_LTC3815
+CONFIG_SENSORS_MAX16064

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+CONFIG_SENSORS_MAX20751
  [ppc64el: 'm']
+CONFIG_SENSORS_MAX31785
  [ppc64el: 'm']
+CONFIG_SENSORS_MAX34440
  [ppc64el: 'm']
+CONFIG_SENSORS_MAX8688
  [ppc64el: 'm']
+CONFIG_SENSORS_TPS40422
  [ppc64el: 'm']
+CONFIG_SENSORS_TPS53679
  [ppc64el: 'm']
+CONFIG_SENSORS_UCD9000
  [ppc64el: 'm']
+CONFIG_SENSORS_UCD9200
  [ppc64el: 'm']
+CONFIG_SENSORS_ZL6100
  [ppc64el: 'm']
+
+# Menu: Device Drivers >> Hardware Spinlock drivers
+CONFIG_HWSPINLOCK
  policy({'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
  's390x': 'n'})
+CONFIG_HWSPINLOCK_OMAP
  policy({'armhf': 'm'})
+CONFIG_HWSPINLOCK_QCOM
  policy({'arm64': 'm', 'armhf': 'm'})
+CONFIG_HWSPINLOCK_SPRD
  policy({'arm64': 'm'})
+
+## Menu: Device Drivers >> I2C support
+
+## Menu: Device Drivers >> I2C support >> I2C support
+CONFIG_I2C
  policy({'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
  's390x': 'n'})
+CONFIG_ACPI_I2C_OPREGION
  policy({'amd64': 'y', 'arm64': 'y', 'i386': 'y'})
+CONFIG_I2C_COMPAT
  policy({'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'})
+CONFIG_I2C_CHARDEV
  policy({'armhf': 'm'})
+CONFIG_I2C_MUX
  policy({'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
  's390x': 'n'})
+CONFIG_I2C_HELPER_AUTO
  policy({'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
  's390x': 'n'})
+CONFIG_I2C_SMBUS
  policy({'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
  's390x': 'n'})
+CONFIG_I2C_SLAVE
  policy({'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
  's390x': 'n'})
+CONFIG_I2C_SLAVE_EEPROM
  policy({'arm64': 'm', 'armhf': 'm'})
+CONFIG_I2C_DEBUG_CORE
  policy({'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'})
```c
+CONFIG_I2C_DEBUG_ALGO
+CONFIG_I2C_DEBUG_BUS
+CONFIG_I2C
+CONFIG_I2C_CHARDEV
+ Menu: Device Drivers >> I2C support >> I2C support >> I2C Algorithms
+CONFIG_I2C_ALGOBJIT
+CONFIG_I2C_ALGOPCA
+ Menu: Device Drivers >> I2C support >> I2C support >> I2C Hardware Bus support
+CONFIG_I2C_ALI1535
+CONFIG_I2C_ALI1563
+CONFIG_I2C_ALI15X3
+CONFIG_I2C_AMD756
+CONFIG_I2C_AMD756_S4882
+CONFIG_I2C_AMD8111
+CONFIG_I2C_AMD_MP2
+CONFIG_I2C_HIX5HD2
+CONFIG_I2C_I801
+CONFIG_I2C_ISCH
+CONFIG_I2C_ISMT
+CONFIG_I2C_PIIX4
+CONFIG_I2C_CHT_WC
+CONFIG_I2C_NFORCE2
+CONFIG_I2C_NFORCE2_S4985
+CONFIG_I2C_SIS5595
+CONFIG_I2C_SIS630
+CONFIG_I2C_SIS96X
+CONFIG_I2C_VIA
+CONFIG_I2C_VIAPRO
+CONFIG_I2C_SCMI
+CONFIG_I2C_AXXIA
+CONFIG_I2C_BCM2835
```
+CONFIG_I2C_XLP9XX policy<{'arm64': 'm'}>
+CONFIG_I2C_RCAR policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_I2C_DIOLAN_U2C 'm']>
+CONFIG_I2C_DLNN2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_PARPORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_PARPORT_LIGHT 'ppc64le': 'm']>
+CONFIG_I2C_ROBOTFUZZ_OSIF policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_TAOS_EVM 'm']>
+CONFIG_I2C_TINY_USB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_VIPERBOARD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MLXCPLD policy<{'amd64': 'm'}>
+CONFIG_I2C_PCA_ISA policy<{'i386': 'm'}>
+CONFIG_I2C_CROS_EC_TUNNEL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_XGENE_SLIMPRO policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_SCx200_ACB policy<{'i386': 'm'}>
+CONFIG_I2C_OPAL policy<{'ppc64le': 'y'}>
+
+## Menu: Device Drivers >> I2C support >> I2C support >> Multiplexer I2C Chip support
+CONFIG_I2C_ARB_GPIO_CHALLENGE policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MUX_GPIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MUX_GPMUX policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MUX_LTC4306 'ppc64le': 'm']>
+CONFIG_I2C_MUX_PCA9541 policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MUX_PCA954x policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MUX_PINCTRL policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MUX_REG policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_DEMUX_PINCTRL policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_I2C_MUX_MLXCPLD policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> IEEE 1394 (FireWire) support
+CONFIG_FIREWIRE_NOSY policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+
+## Menu: Device Drivers >> IEEE 1394 (FireWire) support >> FireWire driver stack
+CONFIG_FIREWIRE                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_FIREWIRE_OHCI              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_FIREWIRE_SBP2              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_FIREWIRE_NET               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
 +
+## Menu: Device Drivers >> IOMMU Hardware Support
+CONFIG_IOMMU_SUPPORT              policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MSM_IOMMU                  policy<{'armhf': 'n'}>
+CONFIG_AMD_IOMMU                  policy<{'amd64': 'y'}>
+CONFIG_AMD_IOMMU_V2               policy<{'amd64': 'm'}>
+CONFIG_IRQ_REMAP                  policy<{'amd64': 'y'}>
+CONFIG_OMAP_IOMMU                 policy<{'armhf': 'y'}>
+CONFIG_OMAP_IOMMU_DEBUG           policy<{'armhf': 'n'}>
+CONFIG_ROCKCHIP_IOMMU             policy<{'armhf-generic': 'y'}>
+CONFIG_TEGRA_IOMMU_GART           policy<{'armhf-generic': 'y'}>
+CONFIG_TEGRA_IOMMU_SMMU           policy<{'armhf-generic': 'y'}>
+CONFIG_EXYNOS_IOMMU               policy<{'armhf': 'y'}>
+CONFIG_EXYNOS_IOMMU_DEBUG         policy<{'armhf': 'n'}>
+CONFIG_IPMMU_VMSA                 policy<{'armhf': 'y'}>
+CONFIG_SPAPR_TCE_IOMMU            policy<{'ppc64le': 'y'}>
+CONFIG_ARM_SMMU                   policy<{'armhf': 'n'}>
+CONFIG_ARM_SMMU_V3                policy<{'armhf': 'y'}>
+CONFIG_S390_CCW_IOMMU             policy<{'s390x': 'y'}>
+CONFIG_S390_AP_IOMMU              policy<{'s390x': 'y'}>
+CONFIG_MTK_IOMMU                  policy<{'armhf': 'n'}>
+CONFIG_MTK_IOMMU_V1               policy<{'armhf': 'n'}>
+CONFIG_QCOM_IOMMU                 policy<{'armhf': 'y'}>
 +
+## CONFIG_IPMMU_VMSA
note<LP:1718734>
 +
+## Menu: Device Drivers >> IOMMU Hardware Support >> Generic IOMMU Pagetable Support
+CONFIG_IOMMU_IO_PGTABLE_LPAE      policy<{'armhf': 'y', 'i386': 'y'}>
+CONFIG_IOMMU_IO_PGTABLE_LPAE_SELFTEST policy<{'armhf': 'n', 'i386': 'n'}>
+CONFIG_IOMMU_IO_PGTABLE_ARMV7S     policy<{'armhf': 'n', 'i386': 'n'}>
 +
+## Menu: Device Drivers >> IOMMU Hardware Support >> Support for Intel IOMMU using DMA Remapping Devices
+CONFIG_INTEL_IOMMU                policy<{'arm64': 'y', 'i386': 'y'}>
+CONFIG_INTEL_IOMMU_SVM            policy<{'arm64': 'y', 'i386': 'y'}>
+CONFIG_INTEL_IOMMU_DEFAULT_ON     policy<{'arm64': 'n', 'i386': 'n'}>
 +
+## CONFIG_INTEL_IOMMU_DEFAULT_ON
note<the IOMMU can trigger boot failures>
flag<REVIEW>
+  +# Menu: Device Drivers >> IRQ chip support
+CONFIG_TS4800_IRQ policy<{'armhf-generic': 'y'}>
+CONFIG_QCOM_IRQ_COMBINER policy<{'arm64': 'y'}>
+CONFIG_IRQ_UNIPHIER_AIDET policy<{'armhf': 'y'}>
+CONFIG_MESON_IRQ_GPIO policy<{'armhf': 'y'}>
+
+  +# Menu: Device Drivers >> ISDN support
+CONFIG_ISDN policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_HYSNDN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HYSNDN_CAPI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+  +# Menu: Device Drivers >> ISDN support >> CAPI 2.0 subsystem
+CONFIG_ISDN_CAPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CAPI_TRACE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ISDN_CAPI_CAPI20 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ISDN_CAPI_MIDDLEWARE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ISDN_CAPI_CAPIDRV policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ISDN_CAPI_CAPIDRV_VERBOSE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
+  +# Menu: Device Drivers >> ISDN support >> CAPI 2.0 subsystem >> Active AVM cards
+CONFIG_CAPI_AVM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ISDN_DRV_AVMB1_B1ISA policy<{'i386': 'm'}>
+CONFIG_ISDN_DRV_AVMB1_B1PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ISDN_DRV_AVMB1_B1PCIV4 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ISDN_DRV_AVMB1_T1ISA policy<{'i386': 'm'}>
+CONFIG_ISDN_DRV_AVMB1_T1PCMCIA policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ISDN_DRV_AVMB1_AVM_CS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ISDN_DRV_AVMB1_T1PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ISDN_DRV_AVMB1_C4 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+  +# Menu: Device Drivers >> ISDN support >> CAPI 2.0 subsystem >> Active Eicon DIVA Server cards
+CONFIG_CAPI_EICON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+  +# Menu: Device Drivers >> ISDN support >> CAPI 2.0 subsystem >> Support Eicon DIVA Server cards
+CONFIG_ISDN_DIVAS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ISDN_DIVAS_BRIPCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
Siemens Chipset driver support

+CONFIG_ISDN_DRV_HISAX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HISAX_I1TR
+CONFIG_HISAX_NI1
+CONFIG_HISAX_MAX_CARDS '8'
+CONFIG_HISAX_16_0
+CONFIG_HISAX_16_3
+CONFIG_HISAX_TELESPCII
+CONFIG_HISAX_S0BOX 'y'
+CONFIG_HISAX_AVM_A1
+CONFIG_HISAX_FRITZPCI
+CONFIG_HISAX_AVM_A1_PCMCIA 'ppc64le': 'y'}>
+CONFIG_HISAX_ELSA
+CONFIG_HISAX_DIAG4MICR02
+CONFIG_HISAX_DIEHLDIVA 'y'
+CONFIG_HISAX_AUSCOM
+CONFIG_HISAX_TELEINT
+CONFIG_HISAX_HFCS
+CONFIG_HISAX_SEDLBAUER 'y'
+CONFIG_HISAX_SPORTSTER
+CONFIG_HISAX_MIC
+CONFIG_HISAX_NETJET
+CONFIG_HISAX_NETJET_U
+CONFIG_HISAX_NICCY 'y'
+CONFIG_HISAX_ISURF
+CONFIG_HISAX_HISTHAPHER
+CONFIG_HISAX_BKM_A4T 'y'
+CONFIG_HISAX_SCT_QUADRO 'ppc64le': 'y'}>
+CONFIG_HISAX_GAZEL 'y'
+CONFIG_HISAX_HFC_PCI
+CONFIG_HISAX_W6692
+CONFIG_HISAX_HFC_SX 'y'
+CONFIG_HISAX_ENTERNOW_PCI
+CONFIG_HISAX_DEBUG 'n'
+CONFIG_HISAX_SEDLBAUER_CS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HISAX_ELSA_CS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HISAX_AVM_A1_CS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HISAX_TELES_CS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HISAX_ST5481 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HISAX_HFCUSB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HISAX_HFC4S8S policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HISAX_FRITZ_PCIPNP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> ISDN support >> Old ISDN4Linux (deprecated) >> Passive cards >> HiSax
SiemensChipSet driver support >> HiSax Support for EURO/DSS1
+CONFIG_HISAX_EURO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_DE_AOC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_HISAX_NO_SENDCOMPLETE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_HISAX_NO_LLC policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_HISAX_NO_KEYPAD policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
+## Menu: Device Drivers >> ISDN support >> Old ISDN4Linux (deprecated) >> Support synchronous PPP
+CONFIG_ISDN_PPP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ISDN_PPP_VJ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ISDN_MPP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_IPPP_FILTER policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ISDN_PPP_BSDCOMP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> ISDN support >> Siemens Gigaset support
+CONFIG_ISDN_DRV_GIGASET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_GIGASET_CAPI policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_GIGASET_BASE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_GIGASET_M105 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_GIGASET_M101 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_GIGASET_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
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+## Menu: Device Drivers >> Industrial I/O support
+CONFIG_IIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
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# Menu: Device Drivers >> Industrial I/O support >> Accelerometers

+CONFIG_IIO_BUFFER
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+CONFIG_IIO_BUFFER_CB
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+CONFIG_IIO_KFIFO_BUF
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_CONFIGFS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_TRIGGER
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_IIO_CONSUMERS_PER_TRIGGER
  policy<{'amd64': '2', 'arm64': '2', 'armhf': '2', 'i386': '2', 'ppc64le': '2'}>
+CONFIG_IIO_SW_DEVICE
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+CONFIG_IIO_SW_TRIGGER
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_CROS_EC_SENSORS_CORE
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_CROS_EC_SENSORS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BMA180
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+CONFIG_BMA220
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+CONFIG_BMC150_ACCEL
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+CONFIG_DA280
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+CONFIG_DA311
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+CONFIG_DMARD06
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+CONFIG_DMARD09
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+CONFIG_DMARD10
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HID_SENSOR_ACCEL_3D
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_CROS_EC_ACCEL_LEGACY
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_ST_ACCEL_3AXIS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KXSD9
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KXSD9_SPI
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+CONFIG_KXSD9_I2C
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+CONFIG_KXCK1013
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+CONFIG_MC3230
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+CONFIG_MMA7455_I2C
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+CONFIG_MMA7455_SPI
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+CONFIG_MMA7660
+CONFIG_MMA8452
+CONFIG_MMA9551
+CONFIG_MMA9553
+CONFIG_MXC4005
+CONFIG_MXC6255
+CONFIG_SCA3000
+CONFIG_STK8312
+CONFIG_STK8BA50
+CONFIG_AD8366
+CONFIG_AD7266
+CONFIG_AD7291
+CONFIG_AD7298
+CONFIG_AD7476
+CONFIG_AD7766
+CONFIG_AD7791
+CONFIG_AD7793
+CONFIG_AD7887
+CONFIG_AD7923
+CONFIG_AD799X
+CONFIG_AXP20X_ADC
+CONFIG_AXP288_ADC
+CONFIG_BCM_IPROC_ADC
+CONFIG_BERLIN2_ADC
+CONFIG_CC10001_ADC
+CONFIG_CPCAP_ADC
+CONFIG_DA9150_GPADC
+CONFIG_DL3N2_ADC
+CONFIG_ENVELOPE_DETECTOR
+CONFIG_EXYNOS_ADC
+CONFIG_H8435
+CONFIG_HX711
+CONFIG_INA2XX_ADC

Policy: {"amd64": "m", "arm64": "m", "armhf": "m", "i386": "m", "ppc64le": "m"}

## Menu: Device Drivers >> Industrial I/O support >> Amplifiers

## Menu: Device Drivers >> Industrial I/O support >> Analog to digital converters
+CONFIG_QCOM_PM8XXX_XOADC
+CONFIG_QCOM_SPMI_IADC
+CONFIG_QCOM_SPMI_VADC
+CONFIG_RCCAR_GYRO_ADC
+CONFIG_ROCKCHIP_SARADC
+CONFIG_STX104
+CONFIG_SUN4I_GPADC
+CONFIG_TI_ADC081C
+CONFIG_TI_ADC0832
+CONFIG_TI_ADC084S021
+CONFIG_TI_ADC12138
+CONFIG_TI_ADC108S102
+CONFIG_TI_ADC128S052
+CONFIG_TI_ADC161S626
+CONFIG_TI_ADCS1015
+CONFIG_TI_ADCS7950
+CONFIG_TI_ADCS8688
+CONFIG_TI_AM335X_ADC
+CONFIG_TI_TLC4541
+CONFIG_TWL4030_MADC
+CONFIG_TWL6030_GPADC
+CONFIG_VF610_ADC
+CONFIG_VIPERBOARD_ADC
+CONFIG_ATLAS_PH_SENSOR
+CONFIG_CCS811
+CONFIG_IAQCORE
+CONFIG_VZ89X
+CONFIG_104_QUAD_8
+CONFIG_ADIS16080
+CONFIG_ADIS16130
+CONFIG_ADIS16136
+CONFIG_ADIS16260
+CONFIG_ADXRS450
+CONFIG_BMG160
+CONFIG_HID_SENSOR_GYRO_3D
+CONFIG_MPU3050_I2C
+CONFIG_IIO_ST_GYRO_3AXIS

+ Menu: Device Drivers >> Industrial I/O support >> Chemical Sensors
+CONFIG_ATLAS_PH_SENSOR
+CONFIG_CCS811
+CONFIG_IAQCORE
+CONFIG_VZ89X

+ Menu: Device Drivers >> Industrial I/O support >> Counters
+CONFIG_104_QUAD_8

+ Menu: Device Drivers >> Industrial I/O support >> Digital gyroscope sensors
+CONFIG_ADIS16080
+CONFIG_ADIS16130
+CONFIG_ADIS16136
+CONFIG_ADIS16260
+CONFIG_ADXRS450
+CONFIG_BMG160
+CONFIG_HID_SENSOR_GYRO_3D
+CONFIG_MPU3050_I2C
+CONFIG_IIO_ST_GYRO_3AXIS
+CONFIG_ITG3200 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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## Menu: Device Drivers >> Industrial I/O support >> Digital potentiometers
+CONFIG_DS1803 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MAX5481 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MAX5487 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MCP4131 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MCP4531 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TPL0102 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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## Menu: Device Drivers >> Industrial I/O support >> Digital potentiostats
+CONFIG_LMP91000 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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## Menu: Device Drivers >> Industrial I/O support >> Digital to analog converters
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+CONFIG_AD5360 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_AD5421 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5446 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5449 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5592R policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5593R policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5504 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5624R_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_LTC2632 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5686 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD5755 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_AD5791 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7303 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CIO_DAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD8801 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DPOT_DAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DS4424 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_M62332 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MAX517 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MAX5821 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MCP4725 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_TL_DAC082S085 policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VF610_DAC policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+## Menu: Device Drivers >> Industrial I/O support >> Frequency Synthesizers DDS/PLL
+
+## Menu: Device Drivers >> Industrial I/O support >> Frequency Synthesizers DDS/PLL >> Clock Generator/Distribution
+CONFIG_AD9523 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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+## Menu: Device Drivers >> Industrial I/O support >> Frequency Synthesizers DDS/PLL >> Phase-Locked Loop (PLL) frequency synthesizers
+CONFIG_ADF4350 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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+## Menu: Device Drivers >> Industrial I/O support >> Health Sensors
+
+## Menu: Device Drivers >> Industrial I/O support >> Health Sensors >> Heart Rate Monitors
+CONFIG_AFE4403 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_AFE4404 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MAX30100 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MAX30102 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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+## Menu: Device Drivers >> Industrial I/O support >> Hid Sensor IIO Common
+CONFIG_HID_SENSOR_IIO_COMMON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_SENSOR_IIO_TRIGGER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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+## Menu: Device Drivers >> Industrial I/O support >> Humidity sensors
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+CONFIG_DHT11 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HDC100X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HID_SENSOR_HUMIDITY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HT221 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HUT21 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SI7005 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SI7020 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
+## Menu: Device Drivers >> Industrial I/O support >> IIO dummy driver
+CONFIG_IIO_SIMPLE_DUMMY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IIO_SIMPLE_DUMMY_EVENTS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_IIO_SIMPLE_DUMMY_BUFFER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+
+## Menu: Device Drivers >> Industrial I/O support >> IIO dummy driver
+CONFIG_IIO_SIMPLE_DUMMY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IIO_SIMPLE_DUMMY_EVENTS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_IIO_SIMPLE_DUMMY_BUFFER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+## Menu: Device Drivers >> Industrial I/O support >> IIO dummy driver
+CONFIG_IIO_SIMPLE_DUMMY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IIO_SIMPLE_DUMMY_EVENTS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_IIO_SIMPLE_DUMMY_BUFFER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
# Menu: Device Drivers >> Industrial I/O support >> Inclinometer sensors
+CONFIG_HID_SENSOR_INCLINOMETER_3D policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HID_SENSOR_DEVICE_ROTATION policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

# Menu: Device Drivers >> Industrial I/O support >> Inertial measurement units
+CONFIG_ADIS16400 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ADIS16480 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BMI160_I2C policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BMI160_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KMX61 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INV_MPU6050_I2C policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INV_MPU6050_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_ST_LSM6DSX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

# Menu: Device Drivers >> Industrial I/O support >> Light sensors
+CONFIG_ACPI_ALS policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_ADJD_S311 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AL3320A policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_APDS9300 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_APDS9960 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BH1750 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BH1780 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CM32181 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CM3232 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CM3323 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CM3605 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_CM36651 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_IIO_CROS_EC_LIGHT_PROX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_GP2AP020A00F policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SENSORS_ISL29018 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SENSORS_ISL29028 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ISL29125 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HID_SENSOR_ALS  
  ['ppc64el': 'm']
+CONFIG_HID_SENSOR_PROX  
  ['ppc64el': 'm']
+CONFIG_JSA1212
+CONFIG_RPR0521
+CONFIG_SENSORS_LM3533  
  ['ppc64el': 'm']
+CONFIG_LTR501
+CONFIG_MAX44000  
  ['m']
+CONFIG_OPT3001
+CONFIG_PA12203001  
  ['m']
+CONFIG_SI1145
+CONFIG_STK3310
+CONFIG_TCS3414
+CONFIG_TCS3472
+CONFIG_SENSORS_TSL2563  
  ['ppc64el': 'm']
+CONFIG_TSL2583
+CONFIG_TSL4531
+CONFIG_US5182D
+CONFIG_VCNL4000  
  ['m']
+CONFIG_VEML6070  
  ['m']
+CONFIG_VL6180
+
+# Menu: Device Drivers >> Industrial I/O support >> Lightning sensors
+CONFIG_AS3935
+
+# Menu: Device Drivers >> Industrial I/O support >> Magnetometer sensors
+CONFIG_AK8974
+CONFIG_AK8975
+CONFIG_AK09911
+CONFIG_BMC150_MAGN_I2C  
  ['ppc64el': 'm']
+CONFIG_BMC150_MAGN_SPI  
  ['ppc64el': 'm']
+CONFIG_MAG3110  
  ['m']
+CONFIG_HID_SENSOR_MAGNETOMETER_3D  
  ['m', 'ppc64el': 'm']
+CONFIG_MMC35240  
  ['m']
+CONFIG_IIO_ST_MAGN_3AXIS  
  ['ppc64el': 'm']
+CONFIG_SENSORS_HMC5843_I2C
+CONFIG_SENSORS_HMC5843_SPI

+ Menu: Device Drivers >> Industrial I/O support >> Multiplexers
+CONFIG_IIO_MUX

+ Menu: Device Drivers >> Industrial I/O support >> Pressure sensors
+CONFIG_ABP060MG
+CONFIG_BMP280
+CONFIG_IIO_CROS_EC_BARO
+CONFIG HID_SENSOR_PRESS
+CONFIG HP03
+CONFIG MPL115_I2C
+CONFIG MPL115_SPI
+CONFIG MPL3115
+CONFIG MS5611
+CONFIG MS5611_I2C
+CONFIG MS5611_SPI
+CONFIG MS5637
+CONFIG IIO ST PRESS
+CONFIG T5403
+CONFIG HP206C
+CONFIG ZPA2326

+ Menu: Device Drivers >> Industrial I/O support >> Proximity and distance sensors
+CONFIG LIDAR_LITE V2
+CONFIG RFD77402
+CONFIG SRF04
+CONFIG SX9500
+CONFIG SRF08

+ Menu: Device Drivers >> Industrial I/O support >> SSP Sensor Common
+CONFIG IIO SSP_SENSORS COMMONS
+CONFIG IIO SSP SENSORHUB

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# Menu: Device Drivers >> Industrial I/O support >> Temperature sensors

+CONFIG_MAXIM_THERMOCOUPLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_HID_SENSOR_TEMP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_MLX90614 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_TMP006 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_TMP007 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_TSYS01 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_TSYS02D policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

# Menu: Device Drivers >> Industrial I/O support >> Triggers - standalone

+CONFIG_IIO_HRTIMER_TRIGGER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_IIO_INTERRUPT_TRIGGER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_IIO_TIGHTLOOP_TRIGGER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_IIO_SYSFS_TRIGGER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

# Menu: Device Drivers >> IndustryPack bus support

+CONFIG_IPACK_BUS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_BOARD_TPCI200 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_SERIAL_IPOCTAL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

# Menu: Device Drivers >> InfiniBand support

+CONFIG_INFINIBAND policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_INFINIBAND_USER_MAD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_INFINIBAND_ON_DEMAND_PAGING policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_INFINIBAND_QIB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_INFINIBAND_QIB_DCA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_INFINIBAND_CXGB3 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_INFINIBAND_CXGB3_DEBUG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>

+CONFIG_INFINIBAND_CXGB4 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
# Menu: Device Drivers >> InfiniBand support >> InfiniBand userspace access (verbs and CM)

+CONFIG_INFINIBAND_USER_ACCESS
[`ppc64le`: 'm', `s390x`: 'm']

+CONFIG_INFINIBAND_EXP_USER_ACCESS
[`ppc64le`: 'm', `s390x`: 'm']

+CONFIG_MLX4_INFINIBAND
[`ppc64le`: 'm', `s390x`: 'm']

+CONFIG_MLX5_INFINIBAND
[`ppc64le`: 'm', `s390x`: 'm']

+CONFIG_INFINIBAND_HNS

+CONFIG_INFINIBAND_HNS_HIP06

+CONFIG_INFINIBAND_HNS_HIP08

+# Menu: Device Drivers >> InfiniBand support >> RDMA/CM

+CONFIG_INFINIBAND_ADDR_TRANS

+CONFIG_INFINIBAND_SRPT

+CONFIG_INFINIBAND_SRPT
'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_INFINIBAND_IsER  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm', 's390x': 'm'}>
+CONFIG_INFINIBAND_IsERT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm', 's390x': 'm'}>
+
+## Menu: Device Drivers >> Input device support
+
+## Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...)
+CONFIG_INPUT  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'n'}>
+CONFIG_INPUT_LEDS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm', 's390x': 'm'}>
+CONFIG_INPUT_FF_MEMLESS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_INPUT_POLLDEV  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_INPUT_SPARSEKMAP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_INPUT_MATRIXKMAP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_INPUT_JOYDEV  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_INPUT_EVDEV  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el':
'm'}>
+CONFIG_INPUT_EVBUG  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+
+## Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >>
Joysticks/Gamepads
+CONFIG_INPUT_JOYSTICK  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el':
'y'}>
+CONFIG_JOYSTICK_ANALOG  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_A3D  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_ADI  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_COBRA  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_GF2K  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_GRIP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_GRIP_MP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_GUILLEMOT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_JOYSTICK_INTERACT
'ppc64el': 'm'}
+CONFIG_JOYSTICK_SIDEWINDER
'ppc64el': 'm'}
+CONFIG_JOYSTICK_TMDC
'm'}
+CONFIG_JOYSTICK_IFORCE
'ppc64el': 'm'}
+CONFIG_JOYSTICK_IFORCE_USB
'ppc64el': 'y'}
+CONFIG_JOYSTICK_IFORCE_232
'ppc64el': 'y'}
+CONFIG_JOYSTICK_WARRIOR
'ppc64el': 'm'}
+CONFIG_JOYSTICK_MAGELLAN
'ppc64el': 'm'}
+CONFIG_JOYSTICK_SPACEORB
'ppc64el': 'm'}
+CONFIG_JOYSTICK_SPACEBALL
'ppc64el': 'm'}
+CONFIG_JOYSTICK_STINGER
'ppc64el': 'm'}
+CONFIG_JOYSTICK_TWIDJOY
'ppc64el': 'm'}
+CONFIG_JOYSTICK_ZHENHUA
'ppc64el': 'm'}
+CONFIG_JOYSTICK_DB9
'm'}
+CONFIG_JOYSTICK_GAMECON
'ppc64el': 'm'}
+CONFIG_JOYSTICK_TURBOGRAFX
'ppc64el': 'm'}
+CONFIG_JOYSTICK_AS5011
'm'}
+CONFIG_JOYSTICK_JOYDUMP
'ppc64el': 'm'}
+CONFIG_JOYSTICK_XPAD
'm'}
+CONFIG_JOYSTICK_XPAD_FF
'y'}
+CONFIG_JOYSTICK_XPAD_LEDS
'ppc64el': 'y'}
+CONFIG_JOYSTICK_WALKERA0701
'ppc64el': 'm'}
+CONFIG_JOYSTICK_PSXPAD_SPI
'ppc64el': 'm'}
+CONFIG_JOYSTICK_PSXPAD_SPI_FF
'ppc64el': 'y'}
# Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >>

**Keyboards**

+**CONFIG_INPUT_KEYBOARD**

+**CONFIG_KEYBOARD_ADC**

+**CONFIG_KEYBOARD_AD5520**

+**CONFIG_KEYBOARD_AD5588**

+**CONFIG_KEYBOARD_AD5589**

+**CONFIG_KEYBOARD_ATKBD**

+**CONFIG_KEYBOARD_QT1070**

+**CONFIG_KEYBOARD_QT2160**

+**CONFIG_KEYBOARD_DLINK_DIR685**

+**CONFIG_KEYBOARD_LKKBD**

+**CONFIG_KEYBOARD_GPIO**

+**CONFIG_KEYBOARD_GPIO POLLED**

+**CONFIG_KEYBOARD_TCA6416**

+**CONFIG_KEYBOARD_TCA8418**

+**CONFIG_KEYBOARD_MATRIX**

+**CONFIG_KEYBOARD_LM8323**

+**CONFIG_KEYBOARD_LM8333**

+**CONFIG_KEYBOARD_MAX7359**

+**CONFIG_KEYBOARD_MCS**

+**CONFIG_KEYBOARD_MPR121**

+**CONFIG_KEYBOARD_SNVS_PWRKEY**

+**CONFIG_KEYBOARD_IMX**

+**CONFIG_KEYBOARD_NEWTON**

+**CONFIG_KEYBOARD_TEGRA**

+**CONFIG_KEYBOARD_ADP5520**

+**CONFIG_KEYBOARD_ADP5588**

+**CONFIG_KEYBOARD_ADP5589**

+**CONFIG_KEYBOARD_ATKBD**

+**CONFIG_KEYBOARD_QT1070**

+**CONFIG_KEYBOARD_QT2160**

+**CONFIG_KEYBOARD_DLINK_DIR685**

+**CONFIG_KEYBOARD_LKKBD**

+**CONFIG_KEYBOARD_GPIO**

+**CONFIG_KEYBOARD_GPIO POLLED**

+**CONFIG_KEYBOARD_TCA6416**

+**CONFIG_KEYBOARD_TCA8418**

+**CONFIG_KEYBOARD_MATRIX**

+**CONFIG_KEYBOARD_LM8323**

+**CONFIG_KEYBOARD_LM8333**

+**CONFIG_KEYBOARD_MAX7359**

+**CONFIG_KEYBOARD_MCS**

+**CONFIG_KEYBOARD_MPR121**

+**CONFIG_KEYBOARD_SNVS_PWRKEY**

+**CONFIG_KEYBOARD_IMX**

+**CONFIG_KEYBOARD_NEWTON**

+**CONFIG_KEYBOARD_TEGRA**
+CONFIG_KEYBOARD_OPENCORES
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'>
+CONFIG_KEYBOARD_PMIC8XXX
    policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_KEYBOARD_SAMSUNG
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_KEYBOARD_STOWAWAY
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_SUNKBD
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_SH_KEYSC
    policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_KEYBOARD_STMPE
    policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_SUN4I_LRADC
    policy<{'arm64': 'n'}>
+CONFIG_KEYBOARD_OMAP4
    policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_TC3589X
    policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_TM2_TOUCHKEY
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_TWL4030
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_XTKBD
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_CROS_EC
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_KEYBOARD_CAP11XX
    policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_KEYBOARD_BCM
    policy<{'arm64': 'm', 'armhf': 'm'}>

+ CONFIG_INPUT_MOUSE
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_MOUSE_SERIAL
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MOUSE_APPLETOUCH
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MOUSE_BCM5974
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MOUSE_CYAPA
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MOUSE_ELAN_I2C
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MOUSE_ELAN_I2C_I2C
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_MOUSE_ELAN_I2C_SMBUS
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_MOUSE_INPORT
    policy<{'i386': 'n'}>
+CONFIG_MOUSE_LOGIBM
    policy<{'i386': 'm'}>
+CONFIG_MOUSE_PCIE110PAD
    policy<{'i386': 'm'}>
+CONFIG_MOUSE_VSXXXAA
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MOUSE_GPIO
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MOUSE_SYNAPSICS_I2C
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
# Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >> Mice

+ CONFIG_MOUSE_PS2
  policy: [amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm']

+ CONFIG_MOUSE_PS2_ALPS
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_BYD
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_LOGIPS2PP
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_SYNAPTICS
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_SYNAPTICS_SMBUS
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_CYPRESS
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_LIFEBOOK
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_TRACKPOINT
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_ELANTECH
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_SENTELIC
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_TOUCHKIT
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_FOCALTECH
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_MOUSE_PS2_VMMOUSE
  policy: [amd64: 'y', i386: 'y']

+ Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >> Miscellaneous devices

+ CONFIG_INPUT_MISC
  policy: [amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y']

+ CONFIG_INPUT_88PM860X_ONKEY
  policy: [amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm']

+ CONFIG_INPUT_88PM800X_ONKEY
  policy: [amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm']

+ CONFIG_INPUT_AD714X
  policy: [amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm']

+ CONFIG_INPUT_AD714X_I2C
  policy: [amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm']

+ CONFIG_INPUT_AD714X_SPI
  policy: [amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm']
+CONFIG_INPUT_ARIZONA_HAPTICS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_ATMEL_CAPTOUCH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_BMA150 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_E3X0_BUTTON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_PCSPKR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_PM8941_PWRKEY policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_INPUT_PM8XXX_VIBRATOR policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_INPUT_PMIC8XXX_PWRKEY policy<{'armhf': 'm'}>
+CONFIG_INPUT_MAX77693_HAPTIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_MAX8925_ONKEY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_MAX8997_HAPTIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_MC13783_PWRBUTTON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_MMA8450 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_APANEL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_GPIO_BEEPER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_GPIO_TILT_POLLED policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_GPIO_DECODER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_CPCAP_PWRBUTTON policy<{'armhf': 'm'}>
+CONFIG_INPUT_WISTRON_BTNS policy<{'i386': 'm'}>
+CONFIG_INPUT_ATLAS_BTNS policy<{'i386': 'm'}>
+CONFIG_INPUT_ATI_REMOTE2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_KEYSPAN_REMOTE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_KXTJ9 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_KXTJ9_POLLED_MODE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_POWERMATE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_YEALINK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_CM109 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_REGULATOR_HAPTIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_INPUT_RETU_PWRBUTTON
+CONFIG_INPUT_TPS65218_PWRBUTTON
+CONFIG_INPUT_AXP20X_PEK
+CONFIG_INPUT_TWLO430_PWRBUTTON
+CONFIG_INPUT_TWLO430_VIBRA
+CONFIG_INPUT_TWLO4040_VIBRA
+CONFIG_INPUT_UINPUT
+CONFIG_INPUT_PALMAS_PWRBUTTON
+CONFIG_INPUT_PCF50633_PMU
+CONFIG_INPUT_PCF8574
+CONFIG_INPUT_PWM_BEEPER
+CONFIG_INPUT_PWM_VIBRA
+CONFIG_INPUT_RK805_PWRKEY
+CONFIG_INPUT_GPIO_ROTARY_ENCODER
+CONFIG_INPUT_DA9052_ONKEY
+CONFIG_INPUT_DA9055_ONKEY
+CONFIG_INPUT_DA9063_ONKEY
+CONFIG_INPUT_WM831X_ON
+CONFIG_INPUT_PCAP
+CONFIG_INPUT_ADXL34X
+CONFIG_INPUT_ADXL34X_I2C
+CONFIG_INPUT_ADXL34X_SPI
+CONFIG_INPUT_IMS_PCIE
+CONFIG_INPUT_CMA3000
+CONFIG_INPUT_CMA3000_I2C
'ppc64el': 'm'}>  
+CONFIG_INPUT_XEN_KBDDEV_FRONTEND policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>  
+CONFIG_INPUT_IDEAPAD_SLIDEBAR policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_INPUT_SOC_BUTTON_ARRAY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_INPUT_DRV260X_HAPTICS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_INPUT_DRV2665_HAPTICS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_INPUT_DRV2667_HAPTICS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_INPUT_HISI_POWERKEY policy<{'arm64': 'm', 'armhf': 'm'}>  
+
+CONFIG_INPUT_UINPUT mark<ENFORCED> note<LP:584812>  
+
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++ Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >>  
Mouse interface  
+CONFIG_INPUT_MOUSEDEV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_INPUT_MOUSEDEV_PSAUX policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_INPUT_MOUSEDEV_SCREEN_X policy<{'amd64': '1024', 'arm64': '1024', 'armhf': '1024', 'i386': '1024', 'ppc64el': '1024'}>  
+CONFIG_INPUT_MOUSEDEV_SCREEN_Y policy<{'amd64': '768', 'arm64': '768', 'armhf': '768', 'i386': '768', 'ppc64el': '768'}>  
+
+
++ Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >>  
Synaptics RMI4 bus support  
+CONFIG_RMI4_CORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_RMI4_I2C policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_RMI4_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_RMI4_SMB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>  
+CONFIG_RMI4_F03 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_RMI4_F11 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_RMI4_F12 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_RMI4_F30 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_RMI4_F34 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_RMI4_F54 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_RMI4_F55 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+
++ Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >>  
Tablets  
+CONFIG_INPUT_TABLET policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>  
+CONFIG_TABLET_USB_ACECAD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_TABLET_USB_AIPTEK  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TABLET_USB_GTCO  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TABLET_USB_HANWANG  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TABLET_USB_KBTAB  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TABLET_USB_PEGASUS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TABLET_SERIAL_WACOM4  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+# Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >> Touchscreens
+CONFIG_INPUT_TOUCHSCREEN  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_TOUCHSCREEN_88PM860X  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_ADS7846  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_AD7877  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_AD7879  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_AD7879_I2C  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_AD7879_SPI  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_AR1021_I2C  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_ATMEL_MXT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_ATMEL_MXT_T37  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_TOUCHSCREEN_AUO_PIXCIR  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG TOUCHSCREEN_BU21013  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG TOUCHSCREEN_CHIPONE_ICN8318  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG TOUCHSCREEN_CY8CTMG110  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG TOUCHSCREEN_CYTTS8_CORE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG TOUCHSCREEN_CYTTS8_I2C  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG TOUCHSCREEN_CYTTS8_SPI  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG TOUCHSCREEN_CYTTS84_CORE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOUCHSCREEN_CYTTSP4_I2C
+CONFIG_TOUCHSCREEN_CYTTSP4_SPI
+CONFIG_TOUCHSCREEN_DA9034
+CONFIG_TOUCHSCREEN_DA9052
+CONFIG_TOUCHSCREEN_DYNAPRO
+CONFIG_TOUCHSCREEN_HAMPSHIRE
+CONFIG_TOUCHSCREEN_EETI
+CONFIG_TOUCHSCREEN_EGALAX
+CONFIG_TOUCHSCREEN_EGALAX_SERIAL
+CONFIG_TOUCHSCREEN_EXC3000
+CONFIG_TOUCHSCREEN_FUJITSU
+CONFIG_TOUCHSCREEN_GOODIX
+CONFIG_TOUCHSCREEN_HIDEEP
+CONFIG_TOUCHSCREEN_ILI210X
+CONFIG_TOUCHSCREEN_IPROC
+CONFIG_TOUCHSCREEN_S6SY761
+CONFIG_TOUCHSCREEN_GUNZE
+CONFIG_TOUCHSCREEN_EKTF2127
+CONFIG_TOUCHSCREEN_ELAN
+CONFIG_TOUCHSCREEN_ELO
+CONFIG TOUCHSCREEN_WACOM_W8001
+CONFIG_TOUCHSCREEN_WACOM_I2C
+CONFIG_TOUCHSCREEN_MAX11801
+CONFIG TOUCHSCREEN_MCS5000
+CONFIG TOUCHSCREEN_MMS114

policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}]

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policy[{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}]
+CONFIG_TOUCHSCREEN_SILEAD
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_SIS_I2C
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_ST1232
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_STMFTS
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_STMPE
    policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_SUR4I
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_SUR40
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_SURFACE3_SPI
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_SX8654
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_TPS6507X
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_ZET6223
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_ZFORCE
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_COLIBRI_VF50
    policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_ROHM_BU21023
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
+CONFIG TOUCHSCREEN_ELAN
    mark<ENFORCED> note<LP #1630238>
+
+## Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >> Touchscreens >> Support for WM97xx AC97 touchscreen controllers
+CONFIG TOUCHSCREEN_WM97XX
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_WM9705
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG TOUCHSCREEN_WM9712
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG TOUCHSCREEN_WM9713
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+
+## Menu: Device Drivers >> Input device support >> Generic input layer (needed for keyboard, mouse, ...) >> Touchscreens >> USB Touchscreen Driver
+CONFIG TOUCHSCREEN_USB_COMPOSITE
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG TOUCHSCREEN_USB_EGALAX
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG TOUCHSCREEN_USB_PANJIT
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG TOUCHSCREEN_USB_3M
    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
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[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_ITM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_ETURBO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_GUNZE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_DMC_TSC10 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_IRTOUCH policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_IDEALTEK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_GENERAL_TOUCH policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_GOTOP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

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+CONFIG_TOUCHSCREEN_USB_JASTEC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_ELO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_E2I policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_ZYTRONIC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_ETT_TC45USB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_NEXIO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

[ppc64el: 'y']>
+CONFIG_TOUCHSCREEN_USB_EASYTOUCH policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

# Menu: Device Drivers >> Input device support >> Hardware I/O ports

# Menu: Device Drivers >> Input device support >> Hardware I/O ports >> Gameport support

+CONFIG_GAMEPORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>

+CONFIG_GAMEPORT_NS558 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

+CONFIG_GAMEPORT_L4 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

+CONFIG_GAMEPORT_EMU10K1 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

+CONFIG_GAMEPORT_FM801 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

# Menu: Device Drivers >> Input device support >> Hardware I/O ports >> Serial I/O support

+CONFIG_SERIO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
's390x': 'n'}>
+CONFIG_SERIO_I8042
+CONFIG_SERIO_SERPORT
+CONFIG_SERIO_CT82C710
+CONFIG_SERIO_PARKBD
+CONFIG_SERIO_AMBAKMI
+CONFIG_SERIO_PCIPS2
+CONFIG_SERIO_LIBPS2
+CONFIG_SERIO_RAW
+CONFIG_SERIO_XILINX_XPS_PS2
+CONFIG_SERIO_ALTERA_PS2
+CONFIG_SERIO_PS2MULT
+CONFIG_SERIO_ARC_PS2
+CONFIG_SERIO_APBPS2
+CONFIG_HYPERV_KEYBOARD
+CONFIG_SERIO_SUN4I_PS2
+CONFIG_USERIO
+
+## Menu: Device Drivers >> Intel(R) Trace Hub controller
+CONFIG_INTEL_TH
+CONFIG_INTEL_TH_PCI
+CONFIG_INTEL_TH_GTH
+CONFIG_INTEL_TH_STH
+CONFIG_INTEL_TH_MSU
+CONFIG_INTEL_TH_PTI
+CONFIG_INTEL_TH_DEBUG
+## Menu: Device Drivers >> LED Support
+CONFIG_NEW_LEDS
+CONFIG_LEDS_LP55XX_COMMON

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+# Menu: Device Drivers >> LED Support >> LED Class Support
+CONFIG_LEDS_CLASS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_LEDS_BRIGHTNESS_HW_CHANGED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_LEDS_S8PM860X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_LEDS_APU policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_LEDS_BCM6328 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_LEDS_BCM6358 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_LEDS_CPCAP policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_LEDS_LM3530 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LM3533 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LM3642 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_MT6323 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_NET48XX policy<{'i386': 'm'}>
+CONFIG_LEDS_WRAP policy<{'i386': 'm'}>
+CONFIG_LEDS_PCA9532 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_PCA9532_GPIO policy<{'arm64': 'y', 'armhf': 'y', 'ppc64el': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_LEDS_GPIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP3944 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP3952 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP5521 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP5523 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP5562 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP8501 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP8788 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_LP8860 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_CLEVO_MAIL policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_LEDS_PCA955X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LEDS_PCA955X_GPIO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_LEDS_PCA963X  
    'm']>
+CONFIG_LEDS_WM831X_STATUS  
    'm']>
+CONFIG_LEDS_WM8350  
    'm']>
+CONFIG_LEDS_DA903X  
    'm']>
+CONFIG_LEDS_DA9052  
    'm']>
+CONFIG_LEDS_DAC124S085  
    'ppc64el': 'm']>
+CONFIG_LEDS_PWM  
    'm']>
+CONFIG_LEDS_REGULATOR  
    'ppc64el': 'm']>
+CONFIG_LEDS_BD2802  
    'm']>
+CONFIG_LEDS_INTEL_SS4200  
+CONFIG_LEDS_LT3593  
    'm']>
+CONFIG_LEDS_AD55520  
    'm']>
+CONFIG_LEDS_MC13783  
    'm']>
+CONFIG_LEDS_NS2  
+CONFIG_LEDS_ASIC3  
+CONFIG_LEDS_TCA6507  
    'm']>
+CONFIG_LEDS_TLC591XX  
    'm']>
+CONFIG_LEDS_MAX8997  
    'm']>
+CONFIG_LEDS_LM355x  
    'm']>
+CONFIG_LEDS_OT200  
+CONFIG_LEDS_MENF21BMC  
    'ppc64el': 'm']>
+CONFIG_LEDS_IS31FL319X  
+CONFIG_LEDS_IS31FL32XX  
+CONFIG_LEDS_BLINKM  
    'm']>
+CONFIG_LEDS_POWERNV  
+CONFIG_LEDS_QCOM_LPG  
    'n']>
+CONFIG_LEDS_SYSCON  
+CONFIG_LEDS_PMS058  
+CONFIG_LEDS_MLXCPLD
# Menu: Device Drivers >> LED Support >> LED Class Support >> LED Flash Class Support
+CONFIG_LEDS_CLASS_FLASH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_AAT1290 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_AS3645A policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_MAX77693 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_KTD2692 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'>

# Menu: Device Drivers >> LED Support >> LED Class Support >> LED Trigger support
+CONFIG_LEDS_TRIGGERS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_LEDS_TRIGGER_TIMER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_ONESHOT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_DISK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_LEDS_TRIGGER_MTD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_LEDS_TRIGGER_HEARTBEAT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_BACKLIGHT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_CPU policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_LEDS_TRIGGER_ACTIVITY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_GPIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_DEFAULT_ON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_TRANSIENT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_CAMERA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_LEDS_TRIGGER_PANIC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>

# Menu: Device Drivers >> MCB support
+CONFIG_MCB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}}
+CONFIG_MCB_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}}
+CONFIG_MCB_LPC  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+# Menu: Device Drivers >> MIPS Platform Specific Device Drivers
+
+# Menu: Device Drivers >> MMC/SD/SDIO card support
+CONFIG_MMC  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_PWRSEQ_EMMC  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_PWRSEQ_SD8787  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_PWRSEQ_SIMPLE  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_BLOCK  policy<{'amd64': 'm', 'arm64': 'y', 'armhf': 'y', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_BLOCK_MINORS  policy<{'amd64': '8', 'arm64': '8', 'armhf': '8', 'i386': '8', 'ppc64le': '8'}>
+CONFIG_SDIO_UART  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_TEST  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_MMC_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_MMC_ARMMMCI  policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_MMC_QCOM_DML  policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_MMC_MESON_GX  policy<{'armhf': 'm'}>
+CONFIG_MMC_MESON_MX_SDIO  policy<{'armhf-generic': 'm'}>
+CONFIG_MMC_OMAP  policy<{'armhf': 'm'}>
+CONFIG_MMC_OMAP_HS  policy<{'armhf': 'y'}>
+CONFIG_MMC_WBSD  policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_MXC  policy<{'armhf-generic': 'm'}>
+CONFIG_MMC_TIFM_SD  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_MVSDIO  policy<{'armhf': 'm'}>
+CONFIG_MMC_SPI  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_SDRICOH_CS  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MMC_TMIO  policy<{'armhf': 'm'}>
+CONFIG_MMC_SDH  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MMC_SDH_SYS_DMA  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MMC_SDH_INTERNAL_DMA  policy<{'arm64': 'm'}>
+CONFIG_MMC_CB710  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_VIA_SDMMC  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_CAVIUM_THUNDERX  policy<{'arm64': 'm'}>
+CONFIG_MMC_SH_MMCIF  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MMC_VUB300  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_USHC  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MMC_USDHI6ROL0
+CONFIG_MMC_REALTEK_PCI
+CONFIG_MMC_REALTEK_USB
+CONFIG_MMC_SUNXI
+CONFIG_MMC_TOSHIBA_PCI
+CONFIG_MMC_BCM2835
+CONFIG_MMC_MTK
+##
+CONFIG_MMC_BLOCK
+CONFIG_MMC_TEST
+CONFIG_MMC_OMAP_HS

# Menu: Device Drivers >> MMC/SD/SDIO card support >> Samsung S3C SD/MMC transfer code

# Menu: Device Drivers >> MMC/SD/SDIO card support >> Secure Digital Host Controller Interface support

+CONFIG_MMC_SDHCI
+CONFIG_MMC_SDHCI_PCI
+CONFIG_MMC_RICOH_MMC
+CONFIG_MMC_SDHCI_ACPI
+CONFIG_MMC_SDHCI_S3C
+CONFIG_MMC_SDHCI_S3C_DMA
+##
+CONFIG_MMC_SDHCI

# Menu: Device Drivers >> MMC/SD/SDIO card support >> Secure Digital Host Controller Interface support >> SDHCI platform and OF driver helper

+CONFIG_MMC_SDHCI_PLTFM
+CONFIG_MMC_SDHCI_OF_ARASAN
+CONFIG_MMC_SDHCI_OF_AT91
+CONFIG_MMC_SDHCI_OF_ESDHC
+CONFIG_MMC_SDHCI_OF_HLWD
+CONFIG_MMC_SDHCI_CADENCE
+CONFIG_MMC_SDHCI_ESDHC_IMX
+CONFIG_MMC_SDHCI_DOVE
+CONFIG_MMC_SDHCI_TEGRA
+CONFIG_MMC_SDHCI_PXAV3
+CONFIG_MMC_SDHCI_F_SDIH30
+CONFIG_MMC_SDHCI_IPROC
+CONFIG_MMC_SDHCI_MSM

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# Menu: Device Drivers >> MMC/SD/SDIO card support >> Synopsys DesignWare Memory Card Interface
+ CONFIG_MMC_SDHCI_BRCMSTB policy<{'arm64': 'm', 'armhf': 'm'}>
+ CONFIG_MMC_SDHCI_XENON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_MMC_SDHCI_OMAP policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+
+ CONFIG_MMC_SDHCI_PLTFM note<boot essential on highbank>
+
+## Menu: Device Drivers >> Macintosh device drivers
+ CONFIG_MACINTOSH_DRIVERS policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+ CONFIG_MAC_EMUMOUSEBTN policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
+## Menu: Device Drivers >> Macintosh device drivers >> Apple Desktop Bus (ADB) support
+
+## Menu: Device Drivers >> Macintosh device drivers >> New PowerMac thermal control infrastructure
+ CONFIG_WINDFARM policy<{'ppc64el': 'm'}>
+
+## Menu: Device Drivers >> Macintosh device drivers >> Support for PMU based PowerMacs
+
+## Menu: Device Drivers >> Mailbox Hardware Support
+ CONFIG_MAILBOX policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+ CONFIG_ARM_MHU policy<{'arm64': 'm', 'armhf': 'm'}>
+ CONFIG_PLATFORM_MHU policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+ CONFIG_PL320_MBOX policy<{'arm64': 'y', 'armhf': 'y'}>
+ CONFIG_OMAP2PLUS_MBOX policy<{'armhf': 'm'}>
+ CONFIG_OMAP_MBOX_KFIFO_SIZE policy<{'armhf': '256'}>
+ CONFIG_ROCKCHIP_MBOX policy<{'arm64': 'y', 'arm64': 'y', 'i386': 'y'}>
+ CONFIG_PCC policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+ CONFIG_ALTERA_MBOX policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 'm'}>
+ CONFIG_BCM2835_MBOX policy<{'arm64': 'y'}>
+ CONFIG_HI6220_MBOX policy<{'arm64': 'm', 'armhf': 'm'}>
+ CONFIG_MAILBOX_TEST policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+ CONFIG_QCOM_APCS_IPC policy<{'arm64': 'm', 'armhf': 'm'}>
+ CONFIG_XGENE_SLIMPRO_MBOX policy<{'arm64': 'm'}>
+ CONFIG_BCM_PDC_MBOX policy<{'arm64': 'm'}>
+ CONFIG_BCM_FLEXRM_MBOX policy<{'arm64': 'm'}>
+
+## Menu: Device Drivers >> Memory Controller drivers
+ CONFIG_MEMORY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 'm'}>
+CONFIG_ARM_PL172_MPMC  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_TI_EMIF        policy<{'armhf': 'm'}>
+CONFIG_OMAP_GPMC_DEBUG policy<{'armhf': 'n'}>
+CONFIG_MVEBU_DEVBUS   policy<{'armhf': 'y'}>
+CONFIG_TEGRA20_MC     policy<{'armhf-generic': 'y'}>
+CONFIG_SAMSUNG_MC     policy<{'armhf': 'y'}>
+CONFIG_EXYNOS_SROM    policy<{'armhf': 'y'}>
+CONFIG_Tegra_MC       policy<{'armhf-generic': 'y'}>
+CONFIG_Tegra124_EMC   policy<{'armhf-generic': 'y'}>
+
# Menu: Device Drivers >> Memory Technology Device (MTD) support
+CONFIG_MTD          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_MTD_TESTS    policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_MTD_CMDLINE_PARTS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MTD_AFS_PARTS policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MTD_OF_PARTS  policy<{'arm64': 'm', 'armhf': 'y', 'ppc64el': 'm'}>
+CONFIG_MTD_AR7_PARTS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MTD_BLOCK     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MTD_BLOCK_RO  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_FTL          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_NFTL         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_NFTL_RW      policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_INFNTL       policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RFD_FTL      policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SSFDC        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SM_FTL       policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MTD_OOPS     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MTD_SWAP     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MTD_PARTITIONED_MASTER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_MTD_NAND_ECC_SMC policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+
# Menu: Device Drivers >> Memory Technology Device (MTD) support >> Enable UBI - Unsorted block images
+CONFIG_MTD_UBI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64el': 'm'}>
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'\m'}>
+CONFIG_MTDPUBLWL_THRESHOLD policy<{'amd64': '4096', 'arm64': '4096', 'armhf': '4096', 'i386': '4096', 'ppc64le': '4096'}>
+CONFIG_MTDPUBLWBEBLIMIT policy<{'amd64': '20', 'arm64': '20', 'armhf': '20', 'i386': '20', 'ppc64le': '20'}>
+CONFIG_MTDPUBLWFASTMAP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MTDPUBLWGLUEBI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTDPUBLWBLOCK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+## Menu: Device Drivers >> Memory Technology Device (MTD) support >> LPDDR & LPDDR2 PCM memory drivers
+CONFIG_MTDLPDDR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTDPKINFOPROBE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTDLPDDR2_NVM policy<{'armhf': 'm'}>
+
+## Menu: Device Drivers >> Memory Technology Device (MTD) support >> Mapping drivers for chip access
+CONFIG_MTDPHYSMAP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTDPHYSMAP_OF policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_MTDPHYSMAP_OF_VERSATILE policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+CONFIG_MTDPHYSMAP_OF_GEMINI policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+CONFIG_MTDSX200DOCFLASH policy<{'i386': 'm'}>
+CONFIG_MTDAAMD76XROM policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MTDIICHXROM policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MTDESBS2ROM policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MTDCS804XRROM policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MTDSX2FLASH policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MTNDNETtel policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MTDL440GX policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MTDIMPA7 policy<{'armhf': 'm'}>
+CONFIG_MTDIINTELVRNOR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTDPHYSMAP_COMPAT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
+## Menu: Device Drivers >> Memory Technology Device (MTD) support >> Mapping drivers for chip access >>
Maximum mappable memory available for flash IO
+
+## Menu: Device Drivers >> Memory Technology Device (MTD) support >> Mapping drivers for chip access >>
Physmap compat support
+CONFIG_MTDPHYSMAP_COMPAT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
# Menu: Device Drivers >> Memory Technology Device (MTD) support >> Mapping drivers for chip access

Support non-linear mappings of flash chips

+ `CONFIG_MTD_COMPLEX_MAPPINGS`
  `policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>`

+ `CONFIG_MTD_SBC_GXX`
  `policy<{'amd64': 'm', 'i386': 'm'}>`

+ `CONFIG_MTD_PCI`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_PCMCIA`
  `policy<{'amd64': 'm', 'i386': 'm'}>`

+ `CONFIG_MTD_PCMCIA_ANONYMOUS`
  `policy<{'amd64': 'm', 'i386': 'm'}>`

+ `CONFIG_MTD_GPIO_ADDR`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_LATCH_ADDR`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_ECC_BCH`
  `policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>`

+ `CONFIG_MTD_NAND_DENALI_PCI`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_DENALI_DT`
  `policy<{'arm64': 'm', 'armhf': 'm'}>`

+ `CONFIG_MTD_NAND_GPIO`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_OMAP2`
  `policy<{'armhf': 'y'}>`

+ `CONFIG_MTD_NAND_OMAP_BCH`
  `policy<{'armhf': 'y'}>`

+ `CONFIG_MTD_NAND_RICOH`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_DISKONCHIP`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_DISKONCHIP_PROBE_ADVANCED`
  `policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>`

+ `CONFIG_MTD_NAND_DISKONCHIP_PROBE_ADDRESS`
  `policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0'}>`

+ `CONFIG_MTD_NAND_DISKONCHIP_BBWRITE`
  `policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>`

+ `CONFIG_MTD_NAND_DOCG4`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_CAFE`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_CS553X`
  `policy<{'i386': 'm'}>`

+ `CONFIG_MTD_NAND_PXA3xx`
  `policy<{'armhf': 'm'}>`

+ `CONFIG_MTD_NAND_TMIO`
  `policy<{'armhf': 'm'}>`

+ `CONFIG_MTD_NAND_NANDSIM`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`

+ `CONFIG_MTD_NAND_GPMI_NAND`
  `policy<{'armhf-generic': 'm'}>`

+ `CONFIG_MTD_NAND_BRCMNAND`
  `policy<{'arm64': 'm', 'armhf': 'm'}>`

+ `CONFIG_MTD_NANDPLATFORM`
  `policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>`
+CONFIG_MTD_NAND_ORION policy[‘armhf’: ‘m’]
+CONFIG_MTD_NAND_FSL_IFC policy[‘arm64’: ‘m’]
+CONFIG_MTD_NAND_VF610_NFC policy[‘armhf-generic’: ‘n’]
+CONFIG_MTD_NAND_MXC policy[‘armhf-generic’: ‘m’]
+CONFIG_MTD_NAND_SUNXI policy[‘arm64’: ‘n’]
+CONFIG_MTD_NAND_HISI504 policy[‘arm64’: ‘m’, ‘armhf’: ‘m’]
+CONFIG_MTD_NAND_QCOM policy[‘arm64’: ‘m’, ‘armhf’: ‘m’]
+CONFIG_MTD_NAND_MTK policy[‘arm64’: ‘m’, ‘armhf’: ‘m’]

+CONFIG_MTD_NAND policy[‘armhf’: ‘m’]
+CONFIG_MTD_NAND_OMAP2 policy[‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_MTD_NAND_OMAP_BCH policy[‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’]
+CONFIG_MTD_NAND_DISKONCHIP_BBTWRITE policy[‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’]

+CONFIG_MTD_ONENAND policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_MTD_ONENAND_VERIFY_WRITE policy[‘amd64’: ‘y’, ‘arm64’: ‘y’, ‘armhf’: ‘y’, ‘i386’: ‘y’, ‘ppc64el’: ‘y’]
+CONFIG_MTD_ONENAND_GENERIC policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_MTD_ONENAND_OMAP2 policy[‘armhf-generic’: ‘m’]
+CONFIG_MTD_ONENAND_OTP policy[‘amd64’: ‘n’, ‘arm64’: ‘n’, ‘armhf’: ‘n’, ‘i386’: ‘n’, ‘ppc64el’: ‘n’]
+CONFIG_MTD_ONENAND_2X_PROGRAM policy[‘amd64’: ‘y’, ‘arm64’: ‘y’, ‘armhf’: ‘y’, ‘i386’: ‘y’, ‘ppc64el’: ‘y’]

+CONFIG_MTD_ONENAND_VERIFY_WRITE policy[‘amd64’: ‘y’, ‘arm64’: ‘y’, ‘armhf’: ‘y’, ‘i386’: ‘y’, ‘ppc64el’: ‘y’]
+CONFIG_MTD_ONENAND_OTP policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]

+CONFIG_MTD_SHARPSL_PARTS policy[‘armhf’: ‘m’]

+CONFIG_MTD_CFI policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_MTD_JEDECPROBE policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_MTD_CFI_INTELEXT policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_MTD_CFI_AMDSTD policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_MTD_RAM policy[‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_SPI_CADENCE_QUADSPI     policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SPI_FSL_QUADSPI         policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_SPI_HISI_SFC            policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SPI_INTEL_SPI_PCI      policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_SPI_INTEL_SPI_PLATFORM policy<{'amd64': 'n', 'i386': 'n'}>
+
+# Menu: Device Drivers >> Memory Technology Device (MTD) support >> Self-contained MTD device drivers
+CONFIG_MTD_PMC551              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD_PMC551_BUGFIX       policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_MTD_PMC551_DEBUG        policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_MTD_DATAFLASH           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD_DATAFLASH_WRITE_VERIFY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_MTD_DATAFLASH_OTP       policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MTD_M25P80              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD_MCHP23K256          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD_SST25L              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD_BCM47XXSFLASH       policy<{'armhf': 'm'}>
+CONFIG_MTD_SLRAM               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD_PHRAM               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD_MTDGRAM             policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTDGRAM_TOTAL_SIZE      policy<{'arm64': '4096', 'ppc64le': '4096'}>
+CONFIG_MTDGRAM_ERASE_SIZE      policy<{'arm64': '128', 'ppc64le': '128'}>
+CONFIG_MTD_BLOCK2MTD          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MTD.Powernv_flash       policy<{'ppc64le': 'm'}>
+CONFIG_MTD_DOCG3               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Microsoft Hyper-V guest support
+CONFIG_HYPERV                  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HYPERV_UTILS            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SRAM                        policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'n'}>
+CONFIG_VEXPRESS_SYSCFG             policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_PCI_ENDPOINT_TEST          policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n',
's390x': 'n'}>
+CONFIG_CB710_CORE                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_CB710_DEBUG                 policy<{'armhf': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_SENSORS_LIS3_SPI            policy<{'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_SENSORS_LIS3_I2C            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_ALTERA_STAPL                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_INTEL_MEI                   policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_MEI_ME                policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_MEI_TXE               policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VMWARE_VMCI                 policy<{'amd64': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_ECHO                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_CXL                         policy<{'ppc64el': 'm'}>
+CONFIG_CXL_BIMODAL                 policy<{'ppc64el': 'y'}>
+CONFIG_OCXL                        policy<{'ppc64el': 'm'}>
+CONFIG_MISC_RTSX_PCI               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_MISC_RTSX_USB               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
++
+CONFIG_CS5535_MFGPT note<should be disabled by default>
+
++ Menu: Device Drivers >> Misc devices >> EEPROM support
+CONFIG_EEPROM_AT24                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_EEPROM_AT25                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_EEPROM_LEGACY               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_EEPROM_MAX6875               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_EEPROM_93CX6                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_EEPROM_93XX46                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_EEPROM_IDT_89HPESX           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm', 's390x': 'n'}>
+
++ Menu: Device Drivers >> Misc devices >> GenWQE PCIe Accelerator
+CONFIG_GENWQE                      policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'n'}>
+CONFIG_GENWQE_PLATFORM_ERROR_RECOVERY policy{"amd64": '0', 'arm64': '0', 'ppc64el': '0', 's390x': '0'}
+
+## Menu: Device Drivers >> Misc devices >> Intel MIC & related support
+CONFIG_INTEL_MIC_BUS policy{"amd64": 'm'}
+CONFIG_SCIF_BUS policy{"amd64": 'm'}
+CONFIG_SCIF policy{"amd64": 'm'}
+CONFIG_MIC_COSM policy{"amd64": 'm'}
+
+## Menu: Device Drivers >> Misc devices >> Intel MIC & related support >> VOP Bus Driver
+CONFIG_VOP_BUS policy{"amd64": 'm'}
+CONFIG_INTEL_MIC_HOST policy{"amd64": 'm'}
+CONFIG_INTEL_MIC_CARD policy{"amd64": 'm'}
+CONFIG_VOP policy{"amd64": 'm'}
+
+## Menu: Device Drivers >> Misc devices >> Silicon Labs C2 port support
+CONFIG_C2PORT policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}
+CONFIG_C2PORT_DURAMAR_2150 policy{"amd64": 'm', 'i386': 'm'}
+
+## Menu: Device Drivers >> Misc devices >> Texas Instruments shared transport line discipline
+CONFIG_TI_ST policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}
+
+## Menu: Device Drivers >> Multifunction device drivers
+CONFIG_MFD_CS5535 policy{"i386": 'm'}
+CONFIG_MFD_ACT8945A policy{"arm64": 'm', 'armhf': 'm', 'ppc64el': 'm'}
+CONFIG_MFD_SUN4I_GPADC policy{"arm64": 'm'}
+CONFIG_MFD_AS3711 policy{"amd64": 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+CONFIG_MFD_AS3722 policy{"arm64": 'y', 'armhf': 'y', 'ppc64el': 'y'}
+CONFIG_PMIC_AD5520 policy{"amd64": 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+CONFIG_MFD_AAT2870_CORE policy{"amd64": 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+CONFIG_MFD_ATMEL_FLEXCOM policy{"arm64": 'm', 'armhf': 'm', 'ppc64el': 'm'}
+CONFIG_MFD_ATMEL_HLCDC policy{"arm64": 'm', 'armhf': 'm', 'ppc64el': 'm'}
+CONFIG_MFD_BCM590XX policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}
+CONFIG_MFD_BD9571MWV policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}
+CONFIG_MFD_AC100 policy{"arm64": 'n'}
+CONFIG_MFD_AXP20X_I2C policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}
+CONFIG_MFD_AXP20X_RSB policy{"arm64": 'm'}
+CONFIG_MFD_CROS_EC policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}
+CONFIG_MFD_CROS_EC_I2C policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}
+CONFIG_MFD_CROS_EC_SPI policy{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}
+CONFIG_MFD_ASIC3 policy{"armhf": 'y'}
+CONFIG_PMIC_DA903X
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+CONFIG_MFD_DA9052_SPI
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+CONFIG_MFD_DA9052_I2C
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+CONFIG_MFD_DA9062
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+CONFIG_MFD_DA9063
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+CONFIG_MFD_DA90150
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+CONFIG_MFD_DLN2
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+CONFIG_MFD_EXYNOS_LPASS
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+CONFIG_MFD_JANZ_CMODIO
+CONFIG_MFD_INTEL_LPSS_PCI
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+CONFIG_MFD_INTEL_SOC_PMIC
+CONFIG_MFD_INTEL_SOC_PMIC_BXTC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTWC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTDC_TI
+CONFIG_MFD_INTEL_LPSS ACPI
+CONFIG_MFD_INTEL_LPSS_PCI
+CONFIG_MFD_INTEL_MSIC
+CONFIG_MFD_JANZ_CMODIO
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+CONFIG_MFD_INTEL_SOC_PMIC
+CONFIG_MFD_INTEL_SOC_PMIC_BXTC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTWC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTDC_TI
+CONFIG_MFD_INTEL_LPSS ACPI
+CONFIG_MFD_INTEL_LPSS_PCI
+CONFIG_MFD_INTEL_MSIC
+CONFIG_MFD_JANZ_CMODIO
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+CONFIG_MFD_88PM800
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+CONFIG_MFD_88PM805
'm'
+CONFIG_MFD_88PM860X
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'y' />
+CONFIG_MFD_INTEL_SOC_PMIC
+CONFIG_MFD_INTEL_SOC_PMIC_BXTC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTWC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTDC_TI
+CONFIG_MFD_INTEL_LPSS ACPI
+CONFIG_MFD_INTEL_LPSS_PCI
+CONFIG_MFD_INTEL_MSIC
+CONFIG_MFD_JANZ_CMODIO
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+CONFIG_MFD_88PM860X
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+CONFIG_MFD_MAX14577
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+CONFIG_MFD_INTEL_SOC_PMIC_BXTC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTWC
+CONFIG_MFD_INTEL_SOC_PMIC_CHTDC_TI
+CONFIG_MFD_INTEL_LPSS ACPI
+CONFIG_MFD_INTEL_LPSS_PCI
+CONFIG_MFD_INTEL_MSIC
+CONFIG_MFD_JANZ_CMODIO
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+CONFIG_MFD_88PM805
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+CONFIG_MFD_88PM860X
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+CONFIG_MFD_ARIZONA_SPI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': y}>
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+CONFIG_MFD_WM8994 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': y}>
+CONFIG_MFD_VEXPRESS_SYSREG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': y}>
+CONFIG_MFD_SM501 policy<boot essential on OMAP4>
+CONFIG_MFD_TPS65217 policy<ENFORCED> note<boot essential on AM335x>
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+ # Menu: Device Drivers >> Multifunction device drivers >> Multimedia Capabilities Port drivers
+ # Menu: Device Drivers >> Multifunction device drivers >> STMicroelectronics STMPE Interface Drivers
+ CONFIG_STMPE_I2C  policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+ CONFIG_STMPE_SPI  policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
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+ # Menu: Device Drivers >> Multimedia support
+ CONFIG_MEDIA_SUPPORT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+ CONFIG_MEDIA_ANALOG_TV_SUPPORT  policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y',
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+ CONFIG.MEDIA_DIGITAL_TV_SUPPORT  policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y',
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+ CONFIG_MEDIA_RADIO_SUPPORT  policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y',
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+ CONFIG.MEDIA_CEC_SUPPORT  policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y',
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+ CONFIG.MEDIA_CEC_RC  policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y',
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+ CONFIG.MEDIA_CONTROLLER  policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y',
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+ CONFIG.MEDIA_CONTROLLER_DVB  policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n',
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+ CONFIG_VIDEO_V4L2_SUBDEV_API  policy<{'arm64': 'y', 'armhf': 'y', 'i386': 'y',
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+ CONFIG_VIDEO_ADV_DEBUG  policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n',
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+ CONFIG_VIDEO_FIXED_MINOR_RANGES  policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n',
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+ CONFIG_VIDEO_PCI_SKELETON  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+ CONFIG_V4L2_FLASH_LED_CLASS  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+ CONFIG_DVB_NET  policy<{'arm64': 'y', 'i386': 'y',
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+ CONFIG_DVB_MAX_ADAPTERS  policy<{'arm64': '8', 'i386': '8',
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+ CONFIG_DVB_DYNAMIC_MINORS  policy<{'arm64': 'y', 'i386': 'y',
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+ CONFIG_DVB_DEMUXSECTIONLOSS_LOG  policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n',
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+ CONFIG_SMS_SDIO_DRV  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+ CONFIG_DVB_FIREDTV  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+ CONFIG_CYPRESS_FIRMWARE  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+ CONFIG_SMS_SIANO_RC  policy<{'arm64': 'y', 'i386': 'y',
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+## Menu: Device Drivers >> Multimedia support >> CEC platform devices
+CONFIG_CEC_PLATFORM_DRIVERS policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}
+CONFIG_VIDEO_MESON_AO_CEC policy{'armhf': 'm'}
+CONFIG_CEC_GPIO policy{'amd64-lowlatency': 'm', 'i386-lowlatency': 'm'}
+CONFIG_VIDEO_SAMSUNG_S5P_CEC policy{'armhf': 'm'}
+CONFIG_VIDEO_TEGRA_HDMI_CEC policy{'armhf-generic': 'm'}
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+## Menu: Device Drivers >> Multimedia support >> Cameras/video grabbers support
+CONFIG_MEDIA_CAMERA_SUPPORT policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}
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+## Menu: Device Drivers >> Multimedia support >> Cameras/video grabbers support >> Media test drivers
+CONFIG_V4L_TEST_DRIVERS policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}
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+CONFIG_VIDEO_VIVID_MAX_DEVS policy{'amd64': '64', 'arm64': '64', 'armhf': '64', 'i386': '64', 'ppc64le': '64'}
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+## Menu: Device Drivers >> Multimedia support >> Cameras/video grabbers support >> Memory-to-memory multimedia devices
+CONFIG_V4L_MEM2MEM_DRIVERS policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}
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+CONFIG_VIDEO_MEDIATEK_VPU policy{'arm64': 'm', 'armhf': 'm'}
+CONFIG_VIDEO_MEM2MEM_DEINTERLACE policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}
+CONFIG_VIDEO_SAMSUNG_S5P_G2D policy{'armhf': 'm'}
+CONFIG_VIDEO_SAMSUNG_S5P_JPEG policy{'armhf': 'm'}
+CONFIG_VIDEO_SAMSUNG_S5P_MFC policy{'armhf': 'm'}
+CONFIG_VIDEO_SAMSUNG_EXYNOS_GSC policy{'armhf': 'm'}
+CONFIG_VIDEO_SH_VEU policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}
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+CONFIG_VIDEO_RENESAS_FCP
+CONFIG_VIDEO_RENESAS_VSP1
+CONFIG_VIDEO_ROCKCHIP_RGA
+CONFIG_VIDEO_TI_VPE
+CONFIG_VIDEO_TI_VPE_DEBUG
+CONFIG_VIDEO_QCOM_VENUS
+
+### Menu: Device Drivers >> Multimedia support >> Cameras/video grabbers support >> V4L platform devices
+CONFIG_V4L_PLATFORM_DRIVERS
+CONFIG_VIDEO_CAFE_CCIC
+CONFIG_VIDEO_VIA_CAMERA
+CONFIG_VIDEO_OMAP2_VOUT
+CONFIG_VIDEO_MUX
+CONFIG_VIDEO_OMAP3
+CONFIG_VIDEO_OMAP3_DEBUG
+CONFIG_VIDEO_QCOM_CAMSS
+CONFIG_SOC_CAMERA
+CONFIG_SOC_CAMERA_PLATFORM
+CONFIG_VIDEO_SH_MOBILE_CEU
+CONFIG_VIDEO_XILINX
+CONFIG_VIDEO_XILINX_TPG
+CONFIG_VIDEO_XILINX_VTC
+CONFIG_VIDEO_RCAR_VIN
+CONFIG_VIDEO_TI_CAL
+
+### Menu: Device Drivers >> Multimedia support >> Cameras/video grabbers support >> Samsung S5P/EXYNOS4 SoC series Camera Subsystem driver
+CONFIG_VIDEO_SAMSUNG_EXYNOS4_IS
+
+### Menu: Device Drivers >> Multimedia support >> Customise DVB Frontends
+CONFIG_DVB_STB0899
+CONFIG_DVB_STB6100
+CONFIG_DVB_STV090x
+CONFIG_DVB_STV0910
+CONFIG_DVB_STV6110x
+CONFIG_DVB_STV6111
+CONFIG_DVB_MXL5XX
+CONFIG_DVB_M88DS3103
+CONFIG_DVB_DRXK
+CONFIG_DVB_TDA18271C2DD
+CONFIG_DVB_SI2165
+CONFIG_DVB_MN88472
+CONFIG_DVB_MN88473
+CONFIG_DVB_CX24110
+CONFIG_DVB_CX24123
+CONFIG_DVB_MT312
+CONFIG_DVB_ZL10036
+CONFIG_DVB_ZL10039
+CONFIG_DVB_S5H1420
+CONFIG_DVB_STV0288
+CONFIG_DVB_STB6000
+CONFIG_DVB_STV0299
+CONFIG_DVB_STV6110
+CONFIG_DVB_STV0900
+CONFIG_DVB_TDA8083
+CONFIG_DVB_TDA10086
+CONFIG_DVB_TDA8261
+CONFIG_DVB_VES1X93
+CONFIG_DVB_TUNER_ITD1000
+CONFIG_DVB_TUNER_CX24113
+CONFIG_DVB_TDA826X
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+CONFIG_DVB_AF9013 'm'>
+CONFIG_DVB_EC100 'm'>
+CONFIG_DVB_STV0367 'm'>
+CONFIG_DVB_CXD2820R 'm'>
+CONFIG_DVB_CXD2841ER 'm'>
+CONFIG_DVB_RTL2830 'm'>
+CONFIG_DVB_RTL2832 'm'>
+CONFIG_DVB_RTL2832_SDR 'ppc64el': 'm'>
+CONFIG_DVB_SI2168 'm'>
+CONFIG_DVB_ZD1301_DEMOD 'ppc64el': 'm'>
+CONFIG_DVB_VES1820 'm'>
+CONFIG_DVB_TDA10021 'm'>
+CONFIG_DVB_TDA10023 'm'>
+CONFIG_DVB_STV0297 'm'>
+CONFIG_DVB_NXT200X 'm'>
+CONFIG_DVB_OR51211 'm'>
+CONFIG_DVB_OR51132 'm'>
+CONFIG_DVB_BCM3510 'm'>
+CONFIG_DVB_LGDT330X 'm'>
+CONFIG_DVB_LGDT3305 'm'>
+CONFIG_DVB_LGDT3306A 'm'>
+CONFIG_DVB_LG2160 'm'>
+CONFIG_DVB_S5H1409 'm'>
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+CONFIG_VIDEO_MYE
+CONFIG_VIDEO_SOLO6X10
+CONFIG_VIDEO_TW5864
+CONFIG_VIDEO_TW68
+CONFIG_VIDEO_TW686X
+CONFIG_VIDEO_ZORAN
+CONFIG_VIDEO_ZORAN_DC30
+CONFIG_VIDEO_HEXIUM_GEMINI
+CONFIG_VIDEO_HEXIUM_ORION
+CONFIG_VIDEO_MXB
+CONFIG_VIDEO_DT3155
+CONFIG_VIDEO_CX18
+CONFIG_VIDEO_CX18_ALSA
+CONFIG_VIDEO_CX23885
+CONFIG_MEDIA_ALTERA_CI
+CONFIG_VIDEO_CX25821
+CONFIG_VIDEO_CX25821_ALSA
+CONFIG_VIDEO_BT848
+CONFIG_DVB_BT8XX
+CONFIG_VIDEO_SAA7164
+CONFIG_VIDEO_COBALT
+CONFIG_DVB_AV7110
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+CONFIG_DVB_B2C2_FLEXCOP_PCI_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
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+CONFIG_DVB_MANTIS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_HOPPER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_NGENE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_DDBRIDGE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_DVB_SMIPCIE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_NETUP_UNIDVB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+# Menu: Device Drivers >> Multimedia support >> Media PCI Adapters >> Conexant 2388x (bt878 successor) support
+CONFIG_VIDEO_CX88 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_CX88_ALSA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_CX88_BLACKBIRD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_CX88_DVB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_CX88_ENABLE_VP3054 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
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+# Menu: Device Drivers >> Multimedia support >> Media PCI Adapters >> Conexant cx23416/cx23415 MPEG encoder/decoder support
+CONFIG_VIDEO_IVTV policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_IVTV_DEPRECATED_IOCTLTS          policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_VIDEO_IVTV_ALSA                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_FB_IVTV                          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Multimedia support >> Media PCI Adapters >> Philips SAA7134 support
+CONFIG_VIDEO_SAA7134                          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_SAA7134_ALSA                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_SAA7134_RC                      policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_VIDEO_SAA7134_DVB                     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_SAA7134_GO7007                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Multimedia support >> Media PCI Adapters >> SAA7146 DVB cards (aka Budget, Nova-PCI)
+CONFIG_DVB_BUDGET_CORE                       policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_BUDGET                           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_BUDGET_CI                         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_BUDGET_AV                         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_BUDGET_PATCH                     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Multimedia support >> Media PCI Adapters >> Zoran ZR36060
+CONFIG_VIDEO_ZORAN_ZR36060                   policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_ZORAN_BUZ                       policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VIDEO_ZORAN_DC10                     policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VIDEO_ZORAN_LML33                    policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VIDEO_ZORAN_LML33R10                  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VIDEO_ZORAN_AVS6EYES                 policy<{'amd64': 'm', 'i386': 'm'}>
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+## Menu: Device Drivers >> Multimedia support >> Media USB Adapters
+CONFIG_MEDIA_USB_SUPPORT                    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_VIDEO_CLASS                     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_VIDEO_CLASS_INPUT_EVDEV          policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_PWC                             policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_PWC_DEBUG
+CONFIG_USB_PWC_INPUT_EVDEV
+CONFIG_VIDEO_CPIA2
+CONFIG_USB_ZR364XX
+CONFIG_USB_STKWEBCAM
+CONFIG_USB_S2255
+CONFIG_VIDEO_USBTV
+CONFIG_VIDEO_PVRUSB2
+CONFIG_VIDEO_PVRUSB2_SYSFS
+CONFIG_VIDEO_PVRUSB2_DVB
+CONFIG_VIDEO_PVRUSB2_DEBUGIFC
+CONFIG_VIDEO_HDPVR
+CONFIG_VIDEO_USBVISION
+CONFIG_VIDEO_STK1160_COMMON
+CONFIG_VIDEO_GO7007
+CONFIG_VIDEO_GO7007_USB
+CONFIG_VIDEO_GO7007_LOADER
+CONFIG_VIDEO_GO7007_USB_S2250_BOARD
+CONFIG_VIDEO_AU0828
+CONFIG_VIDEO_AU0828_V4L2
+CONFIG_VIDEO_AU0828_RC
+CONFIG_VIDEO_TM6000
+CONFIG_VIDEO_TM6000_ALSA
+CONFIG_VIDEO_TM6000_DVB
Open Source Used In 5GaaS Edge AC-4

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```c
+CONFIG_DVB_TTUSB_BUDGET policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_DVB_TTUSB_DEC policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_SMS_USB_DRV policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_DVB_B2C2_FLEXCOP_USB policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_DVB_B2C2_FLEXCOP_USB_DEBUG policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_DVB_AS102 policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_USB_AIRSPY policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_USB_HACKRF policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_USB_MSI2500 policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_USB_PULSE8_CEC policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_USB_RAINSHADOW_CEC policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+
+## Menu: Device Drivers >> Multimedia support >> Media USB Adapters >> Conexant cx231xx USB video capture support
+CONFIG_VIDEO_CX231XX policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_VIDEO_CX231XX_RC policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_VIDEO_CX231XX_ALSA policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_VIDEO_CX231XX_DVB policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+
+## Menu: Device Drivers >> Multimedia support >> Media USB Adapters >> Empia EM28xx USB devices support
+CONFIG_VIDEO_EM28XX policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_VIDEO_EM28XX_V4L2 policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_VIDEO_EM28XX_ALSA policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_VIDEO_EM28XX_DVB policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+CONFIG_VIDEO_EM28XX_RC policy<{'amd64':'m', 'arm64':'m', 'armhf':'m', 'i386':'m', 'ppc64el':'m'}>
+
+## Menu: Device Drivers >> Multimedia support >> Media USB Adapters >> GSPCA based webcams

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Open Source Used In 5GaaS Edge AC-4 18289
+CONFIG_USB_GSPCA_SN9C2028
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SN9C20X
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SONIXB
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SONIXJ
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SPCA500
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SPCA501
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SPCA505
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SPCA506
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+CONFIG_USB_GSPCA_SPCA508
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+CONFIG_USB_GSPCA_SPCA561
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SPCA1528
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SQ905
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SQ905C
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SQ930X
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_STK014
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_STK1135
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_STV0680
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_SUNPLUS
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_T613
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_TOPRO
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_TOUPTEK
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_TV8532
  [ppc64el: 'm']
+CONFIG_USB_GSPCA_VC032X
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+CONFIG_USB_GSPCA_VICAM
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+CONFIG_USB_GSPCA_TV8532
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+CONFIG_USB_GSPCA_VICAM
  [ppc64el: 'm']

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+CONFIG_USB_GSPCA_XIRLINK_CIT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_GSPCA_ZC3XX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+# Menu: Device Drivers >> Multimedia support >> Media USB Adapters >> Support for various USB DVB devices
+CONFIG_DVB_USB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_DVB_USB_A800 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_DIBUSB_MB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_DIBUSB_MB_FAULTY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_DVB_USB_DIBUSB_MC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_DIB0700 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_UMT_010 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_COMIXpolicy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_MPEG2policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_AMD64 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_KMS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_VP7045 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_VP702X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_GP8PSK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_NOVA_T_USB2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_TTUSB2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_DTT2000 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_OPERA1 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_AF9005 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_AF9005_REMOTE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_USB_PCTV452E policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
# Menu: Device Drivers >> Multimedia support >> Media USB Adapters >> Support for various USB DVB devices v2

+ CONFIG_DVB_USB_V2
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_AF9015
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_AF9035
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_ANYSEE
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_AU6610
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_AZ6007
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_CE6230
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_EC168
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_GL861
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_LME2510
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_MXL1111SF
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_RTL28XXU
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_DVBSKY
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>

+ CONFIG_DVB_USB_ZD1301
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+ # Menu: Device Drivers >> Multimedia support >> Radio Adapters

+ CONFIG_RADIO_ADAPTERS
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_RADIO_SI470X policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_SI470X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+I2C_SI470X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_SI476X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_USB_MR800 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_USB_DSBR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_MAXIRADIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_SHARK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_SHARK2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_USB_RAREMONO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_USB_MA901 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_TEA5764 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_SAA7706H policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_TEF6862 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RADIO_TIMBERDALE policy<{'i386': 'm'}>
+CONFIG_RADIO_WL1273 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+V4L_RADIO_ISA_DRIVERS policy<{'i386': 'y'}>
+CONFIG_RADIO_CADET policy<{'i386': 'm'}>
+CONFIG_RADIO_RTRACK policy<{'i386': 'm'}>
+CONFIG_RADIO_RTRACK2 policy<{'i386': 'm'}>
+CONFIG_RADIO_AZTECH policy<{'i386': 'm'}>
+CONFIG_RADIO_GEMTEK policy<{'i386': 'm'}>
+CONFIG_RADIO_MIROPCM20 policy<{'i386': 'm'}>
+CONFIG_RADIO_SF16FMI policy<{'i386': 'm'}>
+CONFIG_RADIO_SF16FMR2 policy<{'i386': 'm'}>
+CONFIG_RADIO_TERRATEC policy<{'i386': 'm'}>
+CONFIG_RADIO_TRUST policy<{'i386': 'm'}>
+CONFIG_RADIO_TYPHOON policy<{'i386': 'm'}>
+CONFIG_RADIO_ZOLTRIX policy<{'i386': 'm'}>
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+ Menu: Device Drivers >> Multimedia support >> Radio Adapters >> Silicon Labs Si4713 FM Radio with RDS Transmitter support
+ CONFIG_RADIO_SI4713 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_USB_SI4713 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_PLATFORM_SI4713 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_I2C_SI4713 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+ Menu: Device Drivers >> Multimedia support >> Radio Adapters >> Texas Instruments WL128x FM driver (ST based)
+ CONFIG_RADIO_WL128X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+ Menu: Device Drivers >> Multimedia support >> SPI helper chips

+ Menu: Device Drivers >> Multimedia support >> Sensors used on soc_camera driver
+ CONFIG_SOC_CAMERA_IMX074 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_MT9M001 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_MT9M111 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_MT9T031 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_MT9T112 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_MT9V022 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_OV5642 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_OV772X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_OV9640 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_OV9740 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_RJ54N1 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_SOC_CAMERA_TW9910 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+ Menu: Device Drivers >> Multimedia support >> Software defined radio support
+ CONFIG_MEDIA_SDR_SUPPORT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+ CONFIG_MEDIA_SUBDRV_AUTOSELECT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

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+CONFIG_VIDEO_IR_I2C
+  
+  +# Menu: Device Drivers >> Multimedia support >> Software defined radio support >> Customize TV tuners
+CONFIG_MEDIA_TUNER_SIMPLE
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_TDA8290
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_TDA827X
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_TDA18271
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_TDA9887
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_TEA5761
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_TEA5767
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MSI001
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MT20XX
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MT2060
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MT2063
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MT2266
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MT2131
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_QT1010
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_XC2028
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_XC5000
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_XC4000
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MXL5005S
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MXL5007T
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MCU44S803
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_MAX2165
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_TDA18218
+  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MEDIA_TUNER_FC0011 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_FC0012 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_FC0013 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_TDA18212 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_E4000 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_FC2580 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_M88RS6000T policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_TUA9001 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_SI2157 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_IT913X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MEDIA_TUNER_R820T policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG.MEDIA_TUNER_MXL301RF policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG.MEDIA_TUNER_QM1D1C0042 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+
+## Menu: Device Drivers >> Multimedia support >> Software defined radio support >> SDR platform devices
+CONFIG_SDR_PLATFORM_DRIVERS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_VIDEO_RCCAR_FRIF policy<{'arm64': 'm', 'armhf': 'm'}>
+
+## Menu: Device Drivers >> Multiple devices driver support (RAID and LVM)
+CONFIG_MD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_BCACHE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_BCACHE_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_BCACHE_CLOSURES_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_DM_DEBUG_BLOCK_MANAGER_LOCKING policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+
+## Menu: Device Drivers >> Multiple devices driver support (RAID and LVM) >> Device mapper support
+CONFIG_BLK_DEV_DM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_DM_MQ_DEFAULT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+'n', 's390x': 'y'}>
+CONFIG_DM_DEBUG
 'm', 's390x': 'm'}>
+CONFIG_DM_CRYPT
 'm', 's390x': 'm'}>
+CONFIG_DM_SNAPSHOT
 'm', 's390x': 'm'}>
+CONFIG_DM_THIN_PROVISIONING
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_CACHE
 'm', 's390x': 'm'}>
+CONFIG_DM_CACHE_SMQ
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_ERA
 'm', 's390x': 'm'}>
+CONFIG_DM_MIRROR
 'm', 's390x': 'm'}>
+CONFIG_DM_LOG_USERSPACE
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_RAID
 'm', 's390x': 'm'}>
+CONFIG_DM_LOG_WRITES
 'm', 's390x': 'm'}>
+CONFIG_DMperia
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_LOG-hover
 'm', 's390x': 'm'}>
+CONFIG_DM_FLAKEY
 'm', 's390x': 'm'}>
+CONFIG_DM_VERITY
 'm', 's390x': 'm'}>
+CONFIG_DM_VERITY_FEC
 'n', 's390x': 'n'}>
+CONFIG_DM_SWITCH
 'm', 's390x': 'm'}>
+CONFIG_DM_LOG_WRITES
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_INTEGRITY
 'm', 's390x': 'm'}>
+CONFIG_DM_ZONED
 'm', 's390x': 'm'}>
+CONFIG_DM(Mouse)
 'm', 's390x': 'm'}>
+CONFIG_DM_DEBUG
 's390x': 'y'}>
+CONFIG_DM_CRYPT
 'm', 's390x': 'm'}>
+CONFIG_DM_SNAPSHOT
 'm', 's390x': 'm'}>
+CONFIG_DM_THIN_PROVISIONING
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_CACHE
 'm', 's390x': 'm'}>
+CONFIG_DM_VERITY_FEC
 'n', 's390x': 'n'}>
+CONFIG_DM_SWITCH
 'm', 's390x': 'm'}>
+CONFIG_DM_LOG_WRITES
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_INTEGRITY
 'm', 's390x': 'm'}>
+CONFIG_DM_ZONED
 'm', 's390x': 'm'}>
+CONFIG_DM_DEBUG
 's390x': 'y'}>
+CONFIG_DM_CRYPT
 'm', 's390x': 'm'}>
+CONFIG_DM_SNAPSHOT
 'm', 's390x': 'm'}>
+CONFIG_DM_THIN_PROVISIONING
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_CACHE
 'm', 's390x': 'm'}>
+CONFIG_DM_VERITY_FEC
 'n', 's390x': 'n'}>
+CONFIG_DM_SWITCH
 'm', 's390x': 'm'}>
+CONFIG_DM_LOG_WRITES
 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DM_INTEGRITY
 'm', 's390x': 'm'}>
+CONFIG_DM_ZONED
 'm', 's390x': 'm'}>
+CONFIG_BLK_DEV_DM
+## Menu: Device Drivers >> Multiple devices driver support (RAID and LVM) >> RAID support
+CONFIG_BLK_DEV_MD
+CONFIG_MD_AUTODETECT
+CONFIG_MD_LINEAR
+CONFIG_MD_RAID0
+CONFIG_MD_RAID1
+CONFIG_MD_RAID10
+CONFIG_MD_RAID456
+CONFIG_MD_MULTIPATH
+CONFIG_MD_FAULTY
+CONFIG_MD_CLUSTER
+## Menu: Device Drivers >> Multiplexer drivers
+CONFIG_MUX_ADG792A
+CONFIG_MUX_GPIO
+CONFIG_MUX_MMIO
+## Menu: Device Drivers >> NVDIMM (Non-Volatile Memory Device) Support
+CONFIG_LIBNVDIMM
+CONFIG_BLK_DEV_PMEM
+CONFIG_ND_BLK
+CONFIG_NVDIMM_PFN
+CONFIG_NVDIMM_DAX
+## Menu: Device Drivers >> NVME Support
+CONFIG_BLK_DEV_NVME
+CONFIG_NVME_MULTIPATH
+CONFIG_NVME_RDMA
+CONFIG_NVME_FC
++
+CONFIG_BLK_DEV_NVME
++
+ Menu: Device Drivers >> NVME Support >> NVMe Target support
+CONFIG_NVME_TARGET
++
+CONFIG_NVME_TARGET_LOOP
++
+CONFIG_NVME_TARGET_RDMA
++
+CONFIG_NVME_TARGET_FC
++
+CONFIG_NVME_TARGET_FCLOOP
++
+ Menu: Device Drivers >> NVMEM Support
+CONFIG_NVMEM
++
+CONFIG_NVMEM_IMX_IIM
++
+CONFIG_NVMEM_IMX_OCOTP
++
+CONFIG_MTK_EFUSE
++
+CONFIG_QCOM_QFPROM
++
+CONFIG_ROCKCHIP_EFUSE
++
+CONFIG_NVMEM_BCM_OCOTP
++
+CONFIG_NVMEM_SUNXI_SID
++
+CONFIG_UNIPHIER_EFUSE
++
+CONFIG_NVMEM_VF610_OCOTP
++
+CONFIG_MESON_MX_EFUSE
++
+CONFIG_NVMEM_SNVS_LPGPR
++
+ Menu: Device Drivers >> Network device support
+CONFIG_NETDEVICES
++
+CONFIG_CAIF_TTY
++
+CONFIG_CAIF_SPI_SLAVE
++
+CONFIG_CAIF_SPI_SYNC
++
+CONFIG_CAIF_HSI
++
+CONFIG_CAIF_VIRTIO
++
+CONFIG_FDDI
++
+ CONFIG_NVME
+ CONFIG_NVMEM_IMX_IIM
+ CONFIG_NVMEM_IMX_OCOTP
+ CONFIG_MTK_EFUSE
+ CONFIG_QCOM_QFPROM
+ CONFIG_ROCKCHIP_EFUSE
+ CONFIG_NVMEM_BCM_OCOTP
+ CONFIG_NVMEM_SUNXI_SID
+ CONFIG_UNIPHIER_EFUSE
+ CONFIG_NVMEM_VF610_OCOTP
+ CONFIG_MESON_MX_EFUSE
+ CONFIG_NVMEM_SNVS_LPGPR
+ CONFIG_NETDEVICES
+ CONFIG_CAIF_TTY
+ CONFIG_CAIF_SPI_SLAVE
+ CONFIG_CAIF_SPI_SYNC
+ CONFIG_CAIF_HSI
+ CONFIG_CAIF_VIRTIO
+ CONFIG_FDDI
++
+CONFIG_DEFXX
+CONFIG_DEFXX_MMIO
+CONFIG_SKFP
+CONFIG_HIPPI
+CONFIG_NET_SB1000
+CONFIG_MDIIO_DEVICE
+CONFIG_MDIIO_BCM_IPROC
+CONFIG_MDIIO_BCM_UNIMAC
+CONFIG_MDIIO_BITBANG
+CONFIG_MDIIO_BUS_MUX_BCM_IPROC
+CONFIG_MDIIO_BUS_MUX_GPIO
+CONFIG_MDIIO_BUS_MUX_MMIOREG
+CONFIG_MDIIO_GPIO
+CONFIG_MDIIO_HISI_FEMAC
+CONFIG_MDIIO_OCTEON
+CONFIG_MDIIO_SUN4I
+CONFIG_MDIIO_THUNDER
+CONFIG_MDIIO_XGENE
+CONFIG_MICREL_KS8995MA
+CONFIG_PLI
+CONFIG_XEN_NETDEV_FRONTEND
+CONFIG_XEN_NETDEV_BACKEND
+CONFIG_VMXNET3
+CONFIG_FUJITSU_ES
+CONFIG_THUNDERBOLT_NET
+CONFIG_HYPERV_NET
+CONFIG_HIPPI
+CONFIG_XEN_NETDEV_FRONTEND
+CONFIG_DEFXX_MMIO
+CONFIG_ARCNET_COM90xx                          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_ARCNET_COM90xxIO                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_ARCNET_RIM_I                           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+
+## Menu: Device Drivers >> Network device support >> ARCnet support >> ARCnet COM20020 chipset driver
+CONFIG_ARCNET_COM20020                         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_ARCNET_COM20020_ISA                     policy<{'i386': 'm'}>
+CONFIG_ARCNET_COM20020_PCI                     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_ARCNET_COM20020_CS                      policy<{'amd64': 'm', 'i386': 'm'}>
+
+## Menu: Device Drivers >> Network device support >> ATM drivers
+CONFIG_ATM_DRIVERS                             policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el':
'y'}>
+CONFIG_ATM_DUMMY                              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_ATM_TCP                                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
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+CONFIG_ATM_LANAI                              policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
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+CONFIG_ATM_ENI                                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_ATM_ENI_DEBUG                          policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el':
'n'}>
+CONFIG_ATM_FIRESTREAM                         policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ATM_ZATM                               policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ATM_ZATM_DEBUG                         policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_ATM_NICSTAR                            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
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+CONFIG_ATM_NICSTAR_USE_SUNI                   policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64el': 'n'}>
+CONFIG_ATM_NICSTAR_USE_IDT77105                policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64el': 'n'}>
+CONFIG_ATM_IDT77252                            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
'm'}>
+CONFIG_ATM_IDT77252_DEBUG                     policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64el': 'n'}>
+CONFIG_ATM_IDT77252_RCV_ALL                   policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64el': 'n'}>
+CONFIG_ATM_AMBASSADOR                         policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ATM_AMBASSADOR_DEBUG                   policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_ATM_HORIZON                            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ATM_HORIZON_DEBUG                      policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_ATM_IA                                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el':
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+CONFIG_ATM_IA_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ATM_HE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATM_HE_USE_SUNI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATM_SOLOS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_ATM_NICSTAR_USE_IDT77105 flag<REVIEW>

+ Menu: Device Drivers >> Network device support >> ATM drivers >> FORE Systems 200E-series
+CONFIG_ATM_FORE200E policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATM_FORE200E_USE_TASKLET policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ATM_FORE200E_TX_RETRY policy<{'amd64': '16', 'arm64': '16', 'armhf': '16', 'i386': '16', 'ppc64le': '16'}>
+CONFIG_ATM_FORE200E_DEBUG policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0'}>

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+ Menu: Device Drivers >> Network device support >> ATM drivers >> Fine-tune burst settings
+CONFIG_ATM_ENI_TUNE_BURST policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

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+ Menu: Device Drivers >> Network device support >> Distributed Switch Architecture drivers
+CONFIG_NET_DSA_BCM_SF2 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_NET_DSA_LOOP policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_NET_DSA_MT7530 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NET_DSA_MV88E6060 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NET_DSA_MV88E6XXX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NET_DSA_MV88E6XXX_GLOBAL2 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_NET_DSA_QCA8K policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NET_DSA_SMSC_LAN9303_I2C policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NET_DSA_SMSC_LAN9303_MDIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
*#
+CONFIG_NET_DSA_LOOP flag<TESTING>

*#
+ Menu: Device Drivers >> Network device support >> Distributed Switch Architecture drivers >> Broadcom BCM53xx managed switch support
+CONFIG_B53
+CONFIG_B53_SPI_DRIVER
+CONFIG_B53_MDMO_DRIVER
+CONFIG_B53_MMAP_DRIVER
+CONFIG_B53_SRAB_DRIVER
+CONFIG_MICROCHIP_KSZ
+CONFIG_MICROCHIP_KSZ_SPI_DRIVER
+CONFIG_NET_VENDOR_ADAPTEC
+CONFIG_NET_VENDOR_AGERE
+CONFIG_NET_VENDOR_ALACRITECH
+CONFIG_NET_VENDOR_ALLWINNER
+CONFIG_NET_VENDOR_ALTEON
+CONFIG_ACENIC
+CONFIG_ACENIC_OMIT_TIGON_I
+CONFIG_ALTERA_TSE
+CONFIG_NET_VENDOR_AMAZON
+CONFIG_ENA_ETHERNET
+CONFIG_NET_XGENCE
+CONFIG_NET_XGENCE_V2
+CONFIG_NET_VENDOR_AQUANTIA

# Menu: Device Drivers >> Network device support >> Distributed Switch Architecture drivers >> Microchip
# Menu: Device Drivers >> Network device support >> Ethernet driver support
[CONFIG_YELLOWFIN]

[CONFIG_NET_VENDOR_RENESAS]

[CONFIG_SH_ETH]

[CONFIG_RAVB]

[CONFIG_NET_VENDOR_RDC]

[CONFIG_R6040]

[CONFIG_NET_VENDOR_ROCKER]

[CONFIG_ROCKER]

[CONFIG_NET_VENDOR_SAMSUNG]

[CONFIG_SXGBE_ETH]

[CONFIG_NET_VENDOR_SEEQ]

[CONFIG_NET_VENDOR_SILAN]

[CONFIG_SC92031]

[CONFIG_NET_VENDOR_SIS]

[CONFIG_NET_VENDOR_SOLARFLARE]

[CONFIG_SFC_FALCON]

[CONFIG_SFC_FALCON_MTD]

[CONFIG_NET_VENDOR_SOCIONEXT]

[CONFIG_SNI_NETSEC]

[CONFIG_NET_VENDOR_STMICRO]

[CONFIG_STMMAC_ETH]

[CONFIG_STMMAC_PCI]

[CONFIG_NET_VENDOR_TEHUTI]

[CONFIG_TEHUTI]

[CONFIG_NET_VENDOR_VIA]

[CONFIG_VIA_RHINE]
+CONFIG_VIA_RHINE_MMIO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 'ppc64el': 'y'}>
+CONFIG_VIA_VELOCITY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'ppc64el': 'm'}>
+CONFIG_NET_VENDOR_WIZNET policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_WIZNET_W5100 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'ppc64el': 'm'}>
+CONFIG_WIZNET_W5300 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'ppc64el': 'm'}>
+CONFIG_WIZNET_W5100_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'ppc64el': 'm'}>
+CONFIG_NET_VENDOR_XIRCOM policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PCMCIA_XIRC2PS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_NET_VENDOR_SYNOPSYS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DWC_XLGMAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DWC_XLGMAC_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_VENDOR_3COM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_EL3 policy<{'i386': 'm'}>
+CONFIG_3C515 policy<{'i386': 'm'}>
+CONFIG_PCMCIA_3C574 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PCMCIA_3C589 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VORTEX policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_TYPHOON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_NET_VENDOR_XIRCOM policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PCMCIA_XIRC2PS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_NET_VENDOR_SYNOPSYS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DWC_XLGMAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DWC_XLGMAC_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_VENDOR_3COM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_EL3 policy<{'i386': 'm'}>
+CONFIG_3C515 policy<{'i386': 'm'}>
+CONFIG_PCMCIA_3C574 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PCMCIA_3C589 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VORTEX policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_TYPHOON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_NET_VENDOR_AMD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_AMD8111_ETH policy<{'i386': 'm'}>
+CONFIG_LANCE policy<{'i386': 'm'}>
+CONFIG_PCMCIA_NMCLAN policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_NI65 policy<{'i386': 'm'}>
+CONFIG_AMD_XGBE policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_AMD_XGBE_DCB policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+ + Menu: Device Drivers >> Network device support >> Ethernet driver support >> Atheros devices
+CONFIG_NET_VENDOR_ATHEROS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_ATL2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATL1 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATL1E policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATL1C policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ALX
+
+ Menu: Device Drivers >> Network device support >> Ethernet driver support >> Blackfin on-chip MAC support
+
+ Menu: Device Drivers >> Network device support >> Ethernet driver support >> Broadcom devices
+CONFIG_NET_VENDOR_BROADCOM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_B44 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BCMGENET policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_BNX2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CNIC
+CONFIG_Tigon3 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_Tigon3_HWMON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BNX2X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BNX2X_SRIOV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BGMAC_PLATFORM policy<{'arm64': 'y'}>
+CONFIG_SYSTEMPORT policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+
+ Menu: Device Drivers >> Network device support >> Broadcom NetXtreme-C/E support
+CONFIG_BNXT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BNXT_SRIOV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BNXT_FLOWER_OFFLOAD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BNXT_DCB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
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+ Menu: Device Drivers >> Network device support >> Cavium ethernet drivers
+CONFIG_NET_VENDOR_CAVIUM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_THUNDER_NIC_PF policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm'}>
+CONFIG_THUNDER_NIC_VF policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm'}>
+CONFIG_THUNDER_NIC_BGX policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm'}>
+CONFIG_THUNDER_NIC_RGX policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm'}>
+CONFIG_LIQUIDIO policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm'}>
+CONFIG_LIQUIDIO_VF policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm'}>
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Chelsio devices
+CONFIG_NET_VENDOR_CHELSIO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'n', 'i386': 'y', 'ppc64le': 'n'}>
+CONFIG_CHELSIO_T1 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CHELSIO_T1_1G policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CHELSIO_T3 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CHELSIO_T4 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CHELSIO_T4_DCB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CHELSIO_T4_FCOE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CHELSIO_T4VF policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Cirrus devices
+CONFIG_NET_VENDOR_CIRRUS policy<{'armhf': 'y', 'i386': 'y'}>
+CONFIG_CS89x0 policy<{'armhf': 'm', 'i386': 'm'}>
+CONFIG_CS89x0_PLATFORM policy<{'armhf': 'y', 'i386': 'y'}>
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+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> DEC - Tulip devices
+CONFIG_NET_TULIP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_DE2104X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DE2104X_DSL policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0'}>
+CONFIG_DE4X5 policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WINBOND_840 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DM9102 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ULI526X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PCMCIA_XIRCOM policy<{'amd64': 'm', 'i386': 'm'}>
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+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> DEC - Tulip devices >> DEChip Tulip (dc2114x) PCI support
+CONFIG_TULIP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TULIP_MWI policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_TULIP_MMIIO policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_TULIP_NAPI policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
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+CONFIG_TULIP_NAPI flag<REVIEW>
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Freescale devices
+CONFIG_NET_VENDOR_FREESCALE policy<{'arm64': 'y', 'armhf-generic': 'y'}>
+CONFIG_FEC policy<{'armhf-generic': 'y'}>
+CONFIG_FSL_FMAN policy<{'arm64': 'y'}>
+CONFIG_FSL_PQ_MDIO policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_FSL_XGMAC_MDI0 policy[\{arm64: 'y', armhf-generic: 'y'}]
+CONFIG_GIANFAR policy[\{arm64: 'm', armhf-generic: 'm'}]
+CONFIG_FSL_DPAA_ETH policy[\{arm64: 'm'}]
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Freescale devices >> Freescale Ethernet Driver
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Hisilicon devices
+CONFIG_NET_VENDOR_HISILICON policy[\{arm64: 'y', armhf: 'y'}]
+CONFIG_HIX5HD2_GMAC policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HISI_FEMAC policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HIP04_ETH policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HNS policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HNS_DSAF policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HNS_ENET policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HNS3 policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HNS3_HCLGE policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HNS3_DCB policy[\{arm64: 'y', armhf: 'y'}]
+CONFIG_HNS3_HCLGEVF policy[\{arm64: 'm', armhf: 'm'}]
+CONFIG_HNS3_ENET policy[\{arm64: 'm'}]
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> IBM devices
+CONFIG_NET_VENDOR_IBM policy[\{ppc64le: 'y'}]
+CONFIG_IBMVETH policy[\{ppc64le: 'm'}]
+CONFIG_IBMVNIC policy[\{ppc64le: 'm'}]
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> IBM devices >> IBM EMAC Ethernet support
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Intel (82586/82593/82596) devices
+CONFIG_NET_VENDOR_I825XX policy[\{amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y'}]
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Intel devices
+CONFIG_NET_VENDOR_INTEL policy[\{amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y', s390x: 'n'}]
+CONFIG_E100 policy[\{amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm'}]
+CONFIG_E1000 policy[\{amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm'}]
+CONFIG_E1000E policy[\{amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm'}]
+CONFIG_E1000E_HWTS policy[\{amd64: 'y', i386: 'y'}]
+CONFIG_IGB policy[\{amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm'}]
+CONFIG_IGB_HWMON policy[\{amd64: 'y', arm64: 'y', armhf: 'y', i386: 'y', ppc64le: 'y'}]
+CONFIG_IGB_DCA policy[\{amd64: 'y'}]
+CONFIG_IGBVVF policy[\{amd64: 'm', arm64: 'm', armhf: 'm', i386: 'm', ppc64le: 'm'}]
+CONFIG_I40E
+CONFIG_I40E_DCB
+CONFIG_I40E_EVF
+CONFIG_FM10K
+
+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> Intel devices >> Intel(R) 10GbE PCI Express adapters support
+CONFIG_IXGB
+CONFIG_IXGBE
+CONFIG_IXGBE_HWMON
+CONFIG_IXGBE_DCA
+CONFIG_IXGBE_DCB
+
+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> Marvell devices
+CONFIG_NET_VENDOR_MARVELL
+CONFIG_MV643XX_ETH
+CONFIG_MVMDIO
+CONFIG_MVNETA_BM_ENABLE
+CONFIG_MVNETA
+CONFIG_MVPP2
+CONFIG_PXA168_ETH
+CONFIG_SKGE
+CONFIG_SKGE_DEBUG
+CONFIG_SKGE_GENESIS
+CONFIG_SKY2
+CONFIG_SKY2_DEBUG
+
+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> Mellanox devices
+CONFIG_NET_VENDOR_MELLANOX
+CONFIG_MLX4_EN
+CONFIG_MLX4_EN_DCB
+CONFIG_MLX4_DEBUG
+CONFIG_MLX4_CORE_GEN2
+CONFIG_MLX5_CORE
+CONFIG_MLX5_FPGA  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MLXFW  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+
+
## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Mellanox devices >> Mellanox Technologies ConnectX-4 Ethernet support
+CONFIG_MLX5_CORE_EN  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MLX5_MPFS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MLX5_ESWITCH  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MLX5_CORE_EN_DCB  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MLX5_CORE_IPOIB  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MLX5_EN_IPSEC  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Mellanox devices >> Mellanox Technologies Switch ASICs support
+CONFIG_MLXSW_CORE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_MLXSW_CORE_HWMON  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MLXSW_CORE_THERMAL  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MLXSW_I2C  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_MLXSW_MINIMAL  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
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## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Micrel devices
+CONFIG_NET_VENDOR_MICREL  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_KS8842 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KS8851 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KS8851_MLL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KSZ884X_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> National Semi-conductor 8390 devices
+CONFIG_NET_VENDOR_8390 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_PCMCIA_AXNET policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_AX88796 policy<{'armhf': 'm'}>
+CONFIG_AX88796_93CX6 policy<{'armhf': 'n'}>
+CONFIG_NE2000 policy<{'i386': 'm'}>
+CONFIG_NE2K_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PCMCIA_PCNET policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_Ultra policy<{'i386': 'm'}>
+CONFIG_WD80x3 policy<{'i386': 'm'}>
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+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> National Semi-conductor devices
+CONFIG_NET_VENDOR_NATSEMI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_NATSEMI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NS83820 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> QLogic devices
+CONFIG_NET_VENDOR_QLOGIC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_QLA3XXX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_QLGE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NETXEN_NIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_QED policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_QED_SRIOV policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_QEDE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> QLogic devices >> QLOGIC QLCNIC 1/10Gb Converged Ethernet NIC Support
+CONFIG_QLCNIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_QLCNIC_SRIOV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_QLCNIC_DCB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_QLCNIC_HWMON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 'ppc64le': 'y', 's390x': 'n'}>
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+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Qualcomm devices
+CONFIG_NET_VENDOR_QUALCOMM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_QCA7000_SPI policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_QCA7000_UART policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_QCOM_EMAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RMNET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Realtek devices
+CONFIG_NET_VENDOR_REALTEK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_ATP policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_8139CP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_R8169 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Realtek devices >> RealTek RTL-8129/8130/8139 PCI Fast Ethernet Adapter support
+CONFIG_8139TOO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_8139TOO_PIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_8139TOO_TUNE_TWISTER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_8139TOO_8129 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_8139_OLD_RX_RESET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> STMMAC Platform bus support
+CONFIG_NET_VENDOR_SMSC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_SMCC9194 policy<{'i386': 'm'}>
+CONFIG_SMCC919X policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PMCIA_SMCC91C92 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_EPIC100 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SMCC911X policy<{'armhf': 'm'}>
+CONFIG_SMSC911X policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SMSC9420 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> STMMAC Platform bus support
+CONFIG_STMMAC_PLATFORM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
# Menu: Device Drivers >> Network device support >> Ethernet driver support >> Solarflare SFC9000/SFC9100 family support

+CONFIG_SFC
+CONFIG_SFC_MTD
+CONFIG_SFC_MCDI_MON
+CONFIG_SFC_SRIOV
+CONFIG_SFC_MCDI_LOGGING

+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Sun devices

+CONFIG_NET_VENDOR_SUN
+CONFIG_HAPPYMEAL
+CONFIG_SUNGEM
+CONFIG_CASSINI
+CONFIG_NIU

+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Texas Instruments (TI) devices

+CONFIG_NET_VENDOR_TI
+CONFIG_TI_DAVINCI_EMAC
+CONFIG_TI_DAVINCI_MDIO
+CONFIG_TI_DAVINCI_CPDMA
+CONFIG_TI_CPSW_ALE
+CONFIG_TI_CPSW
+CONFIG_TI_CPTS
+CONFIG_TLAN

+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> Toshiba devices

+## Menu: Device Drivers >> Network device support >> Ethernet driver support >> WIZnet interface mode

+CONFIG_WIZNET_BUSIRECT
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+CONFIG_WIZNET_BUS_INDIRECT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64el': 'n'}>
+CONFIG_WIZNET_BUS_ANY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el':
'y'}>
+
+# Menu: Device Drivers >> Network device support >> Ethernet driver support >> Xilinx devices
+CONFIG_NET_VENDOR_XILINX policy<{'ppc64el': 'y'}>
+CONFIG_XILINX_LL_TEMAC policy<{'ppc64el': 'm'}>
+
+# Menu: Device Drivers >> Network device support >> IEEE 802.15.4 drivers
+CONFIG_IEEE802154_DRIVERS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_IEEE802154_FAKELB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_IEEE802154_AT86RF230 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_IEEE802154_AT86RF230_DEBUGFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64el': 'y'}>
+CONFIG_IEEE802154_MRF24J40 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_IEEE802154_CC2520 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_IEEE802154_ATUSB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_IEEE802154_ADF7242 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64el': 'm'}>
+CONFIG_IEEE802154_CA8210 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_IEEE802154_CA8210_DEBUGFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+
+# Menu: Device Drivers >> Network device support >> Network core driver support
+CONFIG_NET_CORE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+CONFIG_BONDING policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'm'}>
+CONFIG_DUMMY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'm'}>
+CONFIG_EQUALIZER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
'm', 's390x': 'm'}>
+CONFIG_NET_FC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y',
's390x': 'y'}>
+CONFIG_IFB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'm'}>
+CONFIG_MACVLAN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
'm', 's390x': 'm'}>
+CONFIG_MACVTAP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
's390x': 'm'}>
+CONFIG_IPVLAN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm',
+CONFIG_IPVTAP
+CONFIG_VXLAN
+CONFIG_GENEVE
+CONFIG_GTP
+CONFIG_MACSEC
+CONFIG_NETCONSOLE
+CONFIG_NETCONSOLE_DYNAMIC
+CONFIG_NETCONSOLE_DYNAMIC
+CONFIG_RIONET
+CONFIG_RIONET_TX_SIZE
+CONFIG_RIONET_RX_SIZE
+CONFIG_TUN
+CONFIG_TUN_VNET_CROSS_LE
+CONFIG_VETH
+CONFIG_VIRTIO_NET
+CONFIG_NETMON
+CONFIG_NET_VRF
+CONFIG_VSOCKMON
+
+CONFIG_VIRTIO_NET

+CONFIG_NET_TEAM
+CONFIG_NET_TEAM_MODE_BROADCAST
+CONFIG_NET_TEAM_MODE_ROUNDROBIN
+CONFIG_NET_TEAM_MODE_RANDOM
+CONFIG_NET_TEAM_MODE_ACTIVEBACKUP
+CONFIG_MICRELPHY
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+CONFIG_MICROCHIPPHY
'm', 's390x': 'm'}>
+CONFIG_MICROSEMI PHY
'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NATIONALPHY
'm', 's390x': 'm'}>
+CONFIG_QSEMI PHY
'm', 's390x': 'm'}>
+CONFIG_REALTEK PHY
'm', 's390x': 'm'}>
+CONFIG_RENESAS PHY
'm', 's390x': 'm'}>
+CONFIG_ROCKCHIP PHY
'm', 's390x': 'm'}>
+CONFIG_SMSC PHY
's390x': 'm'}>
+CONFIG_STE10XP
's390x': 'm'}>
+CONFIG_TERANETICS PHY
'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_VITESSE PHY
'm', 's390x': 'm'}>
+CONFIG_XILINX_GMI2RGMII
'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_PPP
'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_PPP_BSDCOMP
'm'}>
+CONFIG_PPP_DEFLATE
'm'}>
+CONFIG_PPP_FILTER
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+CONFIG_PPP_MPPE
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+CONFIG_PPP_MULTILINK
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+CONFIG_PPP_ASYNC
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+CONFIG_PPPOE
'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PPTP
'm'}>
+CONFIG_PPPOATM
'm'}>
+CONFIG_PPPOE
'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PPTP
'm'}>
+CONFIG_PPPOATM
'm'}>
+## Menu: Device Drivers >> Network device support >> S/390 network device drivers
+CONFIG_LCS
  policy<{'s390x': 'm'}>
+CONFIG_CTCM
  policy<{'s390x': 'm'}>
+CONFIG_NETIUCV
  policy<{'s390x': 'm'}>
+CONFIG_SMSGIUCV
  policy<{'s390x': 'y'}>
+CONFIG_SMSGIUCV_EVENT
  policy<{'s390x': 'm'}>
+CONFIG_QETH
  policy<{'s390x': 'm'}>
+CONFIG_QETH_L2
  policy<{'s390x': 'm'}>
+CONFIG_QETH_L3
  policy<{'s390x': 'm'}>
+
+## Menu: Device Drivers >> Network device support >> SLIP (serial line) support
+CONFIG_SLIP
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_SLIP_COMPRESSED
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SLIP_SMART
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SLIP_MODE_SLIP6
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+## Menu: Device Drivers >> Network device support >> USB Network Adapters
+CONFIG_USB_NET_DRIVERS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_CATC
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_KAWETH
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_PEGASUS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_RTL8150
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_RTL8152
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_LAN78XX
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_HSO
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_IPHETH
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Network device support >> USB Network Adapters >> Multi-purpose USB Networking Framework
+CONFIG_USB_USBNET
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_NET_AX8817X
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_NET_AX88179_178A
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+  +# Menu: Device Drivers >> Network device support >> USB Network Adapters >> Multi-purpose USB Networking Framework >> Simple USB Network Links (CDC Ethernet subset)
+CONFIG_USB_NET_CDC_SUBSET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_USB_ALI_M5632 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_AN2720 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_BELKIN policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_ARMLINUX policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_EPSON2888 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_KC2190 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+
+  +# Menu: Device Drivers >> Network device support >> Wan interfaces support
+CONFIG_WAN policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_HOSTESS_SV11 policy<{'i386': 'm'}>
+CONFIG_COSA policy<{'i386': 'm'}>
+CONFIG_LANMEDIA policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SEALEVEL_.4021 policy<{'i386': 'm'}>
+CONFIG_SLIC_DS26522 policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_DLCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_DLCI_MAX policy<{'amd64': '8', 'arm64': '8', 'armhf': '8', 'i386': '8', 'ppc64el': '8'}>
+CONFIG_SDLA policy<{'i386': 'm'}>
+CONFIG_LAPBETHER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_X25_ASY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SBNI policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SBNI_MULTILINE policy<{'amd64': 'm', 'i386': 'm'}>
+
+  +# Menu: Device Drivers >> Network device support >> Wan interfaces support >> Generic HDLC layer
+CONFIG_HDLC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HDLC_RAW policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HDLC_RAW_ETH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HDLC_CISCO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HDLC_FR policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HDLC_PPP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HDLC_X25 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PCI200SYN  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WANXL  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PC300TOO  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_N2  policy<{'i386': 'm'}>
+CONFIG_C101  policy<{'i386': 'm'}>
+CONFIG_FARSYNC  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DSICC4  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DSICC4_PCISYNC  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_DSICC4_PCI_RST  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+# Menu: Device Drivers >> Network device support >> WiMAX Wireless Broadband devices
+CONFIG_WIMAX_I2400M_USB  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WIMAX_I2400M_DEBUG_LEVEL  policy<{'amd64': '8', 'arm64': '8', 'armhf': '8', 'i386': '8', 'ppc64le': '8'}>

+# Menu: Device Drivers >> Network device support >> Wireless LAN
+CONFIG_WLAN  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_WIRELESS_WDS  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_WLAN_VENDOR_ADMTEK  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ADM8211  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WLAN_VENDOR_ATMEL  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PCI_ATMEL  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PCMCIA_ATMEL  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_AT76C50X_USB  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WLAN_VENDOR_CISCO  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_AIRO  policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AIRO_CS  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_WLAN_VENDOR_MEDIATEK  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MT7601U  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WLAN_VENDOR_RALINK  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
# Menu: Device Drivers >> Network device support >> Wireless LAN >> Atheros/Qualcomm devices

+CONFIG_WLAN_VENDOR_RSI  
+CONFIG_WLAN_VENDOR_ST  
+CONFIG_CW1200  
+CONFIG_CW1200_WLAN_SDIO  
+CONFIG_CW1200_WLAN_SPI  
+CONFIG_WLAN_VENDOR_ZYDAS  
+CONFIG_USB_ZD1201  
+CONFIG_ZD1211RW  
+CONFIG_ZD1211RW_DEBUG  
+CONFIG_WLAN_VENDOR_QUANTENNA  
+CONFIG_QTNFMAC_PEARL_PCIE  
+CONFIG_PCMCIA_RAYCS  
+CONFIG_PCMCIA_WL3501  
+CONFIG_MAC80211_HWSIM  
+CONFIG_USB_NET_RNDIS_WLAN

+CONFIG_WLAN_VENDOR_ATH  
+CONFIG_ATH_DEBUG  
+CONFIG_ATH5K_PCI  
+CONFIG_ATH9K_BTCOEX_SUPPORT  
+CONFIG_ATH9K_HTC  
+CONFIG_ATH9K_HTC_DEBUGFS  
+CONFIG_WCN36XX  
+CONFIG_WCN36XX_DEBUGFS  
+CONFIG_WCN36XX_SNAPDRAGON_HACKS

+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Atheros/Qualcomm devices

+CONFIG_WLAN_VENDOR_Atheros/Qualcomm devices
5xxx wireless cards support
+CONFIG_ATH5K policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH5K_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ATH5K_TRACER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
+# Menu: Device Drivers >> Network device support >> Wireless LAN >> Atheros/Qualcomm devices >> Atheros
+## 802.11ac wireless cards support
+CONFIG_ATH10K policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH10K_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH10K_AHB policy<{'arm64': 'y', 'armhf': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH10K_SDIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH10K_USB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH10K_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ATH10K_DEBUGFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH10K_TRACING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
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+## 802.11n wireless cards support
+CONFIG_ATH9K policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH9K_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_AHB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_DEBUGFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_STATION_STATISTICS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_DYNACK policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ATH9K_WOW policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_RFKILL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_CHANNEL_CONTEXT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_PCOEM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_ATH9K_HWRNG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+## Mobile chipsets support
+CONFIG_ATH6KL
+CONFIG_ATH6KL_SDIO
+CONFIG_ATH6KL_USB
+CONFIG_ATH6KL_DEBUG
+CONFIG_ATH6KL_TRACING

+CONFIG_ATH6KL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH6KL_SDIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH6KL_USB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ATH6KL_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_ATH6KL_TRACING policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Atheros/Qualcomm devices >> Linux
Community AR9170 802.11n USB support
+CONFIG_CARL9170
+CONFIG_CARL9170_LEDS
+CONFIG_CARL9170_DEBUGFS
+CONFIG_CARL9170_HWRNG

+CONFIG_CARL9170 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CARL9170_LEDS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CARL9170_DEBUGFS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_CARL9170_HWRNG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Atheros/Qualcomm devices >>
Wilocity 60g WiFi card wil6210 support
+CONFIG_WIL6210
+CONFIG_WIL6210_ISR_COR
+CONFIG_WIL6210_TRACING
+CONFIG_WIL6210_DEBUGFS

+CONFIG_WIL6210 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WIL6210_ISR_COR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_WIL6210_TRACING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_WIL6210_DEBUGFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Broadcom devices
+CONFIG_WLAN_VENDOR_BROADCOM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_B43LEGACY
+CONFIG_B43LEGACY_DEBUG
+CONFIG_BRCMSMAC

+CONFIG_WLAN_VENDOR_BROADCOM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_B43LEGACY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_B43LEGACY_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_BRCMSMAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Broadcom devices >> Broadcom
43xx wireless support (mac80211 stack)
+CONFIG_B43
+CONFIG_B43_SDIO
+CONFIG_B43_PHY_G
+CONFIG_B43_PHY_N
+CONFIG_B43_PHY_LP

+CONFIG_B43 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_B43_SDIO policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_B43_PHY_G policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_B43_PHY_N policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_B43_PHY_LP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_B43_PHY_HT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>
+CONFIG_B43_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
## Menu: Device Drivers >> Network device support >> Wireless LAN >> Broadcom devices >> Broadcom 43xx wireless support (mac80211 stack) >> Supported bus types
+CONFIG_B43_BUSES_BCMA_AND_SSB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_B43_BUSES_BCMA policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_B43_BUSES_SSB policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
## Menu: Device Drivers >> Network device support >> Wireless LAN >> Broadcom devices >> Broadcom 43xx legacy data transfer mode
+CONFIG_B43LEGACY_DMA_AND_PIO_MODE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_B43LEGACY_DMA_MODE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_B43LEGACY_PIO_MODE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
## Menu: Device Drivers >> Network device support >> Wireless LAN >> Broadcom devices >> Broadcom FullMAC WLAN driver
+CONFIG_BRCMFMAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_BRCMFMAC_SDIO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BRCMFMAC_USB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BRCMFMAC_PCIE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BRCM_TRACING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_BRCMDBG flag<DEBUG>
+
## Menu: Device Drivers >> Network device support >> Intel devices
+CONFIG_WLAN_VENDOR_INTEL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_IPW2100 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IPW2100_MONITOR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_IPW2100_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_LIBIPW_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_IWL4965 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IW3945

+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Intel devices >> Intel PRO/Wireless 2200BG and 2915ABG Network Connection
+CONFIG_IPW2200
+CONFIG_IPW2200_MONITOR
+CONFIG_IPW2200_RADIOTAP
+CONFIG_IPW2200_PROMISCIOUS
+CONFIG_IPW2200_QOS
+CONFIG_IPW2200_DEBUG
+
+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Intel devices >> Intel Wireless WiFi Next Gen AGN - Wireless-N/Advanced-N/Ultimate-N (iwlwifi)
+CONFIG_IWLWIFI
+CONFIG_IWLDVM
+CONFIG_IWLMVM
+CONFIG_IWLWIFI_BCAST_FILTERING
+CONFIG_IWLWIFI_PCIE_RTPM
+
+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Intel devices >> Intel Wireless WiFi Next Gen AGN - Wireless-N/Advanced-N/Ultimate-N (iwlwifi) >> Debugging Options
+CONFIG_IWLWIFI_DEBUG
+CONFIG_IWLWIFI_DEBUGFS
+CONFIG_IWLWIFI_DEVICE_TRACING
+
+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Intel devices >> iwl3945 / iwl4965 Debugging Options
+CONFIG_IWLEGACY_DEBUG
+CONFIG_IWLEGACY_DEBUGFS
+
+## Menu: Device Drivers >> Network device support >> Wireless LAN >> Intersil devices
+CONFIG_WLAN_VENDOR_INTERSIL
+CONFIG_PRISM54
+# Menu: Device Drivers >> Network device support >> Wireless LAN >> Intersil devices >> Hermes chipset

802.11b support (Orinoco/Prism2/Symbol)

+CONFIG_HERMES policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
+CONFIG_HERMES_PRISM policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'>
+CONFIG_HERMES_CACHE_FW_ON_INIT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_PLX_HERMES policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TMD_HERMES policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NORTEL_HERMES policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PCMCIA_HERMES policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PCMCIA_SPECTRUM policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ORINOCO_USB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+# Menu: Device Drivers >> Network device support >> Wireless LAN >> Intersil devices >> IEEE 802.11 for Host AP (Prism2/2.5/3 and WEP/Tkip/CCMP)

+CONFIG_HOSTAP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HOSTAP_FIRMWARE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_HOSTAP_FIRMWARE_NVRAM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_HOSTAP_PLX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HOSTAP_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_HOSTAP_CS policy<{'amd64': 'm', 'i386': 'm'}>

+# Menu: Device Drivers >> Network device support >> Wireless LAN >> Intersil devices >> Softmac Prism54 support

+CONFIG_P54_COMMON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_P54_USB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_P54_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_P54_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_P54_SPI_DEFAULT_EEPROM policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

+# Menu: Device Drivers >> Network device support >> Wireless LAN >> Marvell devices

+CONFIG_WLAN_VENDOR_MARVELL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_LIBERTAS_THINFIRM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_LIBERTAS_THINFIRM_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
Libertas WLAN driver support

+CONFIG_LIBERTAS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LIBERTAS_USB
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LIBERTAS_CS
  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_LIBERTAS_SDIO
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LIBERTAS_SPI
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_LIBERTAS_DEBUG
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_LIBERTAS_MESH
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

Driver

+CONFIG_MWIFIEX
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MWIFIEX_SDIO
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MWIFIEX_PCIE
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_MWIFIEX_USB
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

Raillink driver support

+CONFIG_RT2X00
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RT2400PCI
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RT2500PCI
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RT61PCI
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RT2500USB
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RT73USB
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RT2X00_LIB_DEBUGFS
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_RT2X00_DEBUG
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
# Menu: Device Drivers >> Network device support >> Wireless LAN >> Ralink driver support >> Ralink rt27xx/rt28xx/rt30xx (PCI/PCIe/PCMCIA) support
+CONFIG_RT2800PCI                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RT2800PCI_RT33XX           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800PCI_RT35XX           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800PCI_RT53XX           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800PCI_RT3290           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+ Menu: Device Drivers >> Network device support >> Wireless LAN >> Ralink driver support >> Ralink rt27xx/rt28xx/rt30xx (USB) support
+CONFIG_RT2800USB                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RT2800USB_RT33XX           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800USB_RT35XX           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800USB_RT3573           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800USB_RT53XX           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800USB_RT55XX           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RT2800USB_UNKNOWN          policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+ Menu: Device Drivers >> Network device support >> Wireless LAN >> Realtek devices
+CONFIG_WLAN_VENDOR_REALTEK        policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_RTL8180                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8187                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8XXXU                   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8XXXU_UNTESTED          policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+ Menu: Device Drivers >> Network device support >> Wireless LAN >> Realtek devices >> Realtek rtlwifi family of devices
+CONFIG_RTL_CARDS                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8192CE                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8192SE                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8192DE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8723AE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8723BE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8188EE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8192EE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8821AE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTL8192CU  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTLWIFI_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

+ Menu: Device Drivers >> Network device support >> Wireless LAN >> Redpine Signals Inc 91x WLAN driver support
+CONFIG_RSI_91X  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RSI_DEBUGFS  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_RSI_SDIO  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RSI_USB  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+ Menu: Device Drivers >> Network device support >> Wireless LAN >> Texas Instrument devices
+CONFIG_WLAN_VENDOR_TI  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_WL1251  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WL1251_SPI  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WL1251_SDIO  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WL12XX  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WL18XX  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WLCORE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WLCORE_SPI  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_WLCORE_SDIO  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WILINK_PLATFORM_DATA  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+ Menu: Device Drivers >> Non-Transparent Bridge support
+CONFIG_NTB  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
# Menu: Device Drivers >> Open-Channel SSD target support

+CONFIG_NVM                                      policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_NVM_DEBUG                                policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'>
+CONFIG_NVM_RRPC                                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'>
+CONFIG_NVM_PBLK                                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'>

# Menu: Device Drivers >> PHY Subsystem

+CONFIG_GENERIC_PHY                              policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_PHY_XGENE                                policy<{'arm64': 'y'}>
+CONFIG_PHY_SUN4I_USB                            policy<{'arm64': 'y'}>
+CONFIG_PHY_SUN9I_USB                            policy<{'armhf': 'y'}>
+CONFIG_PHY_MESON8B_USB2                         policy<{'armhf': 'm'}>
+CONFIG_PHY_MESON_GXL_USB2                       policy<{'armhf': 'm'}>
+CONFIG_BCM_KONA_USB2_PHY                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_PHY_BCM_NS_USB2                          policy<{'arm64': 'm'}>
+CONFIG_PHY_BCM_NS_USB3                          policy<{'arm64': 'm'}>
+CONFIG_PHY_NS2_PCIE                             policy<{'arm64': 'y'}>
+CONFIG_PHY_NS2_USB_DRD                          policy<{'arm64': 'm'}>
+CONFIG_PHY_BRCM_SATA                            policy<{'arm64': 'y'}>
+CONFIG_PHY_BRCM_USB                             policy<{'arm64': 'm'}>
+CONFIG_PHY_HI6220_USB                           policy<{'arm64': 'm'}>
+CONFIG_PHY_HIX5HD2_SATA                         policy<{'armhf': 'm'}>
+CONFIG_PHY_BRCN_AMCC_SATA                       policy<{'armhf': 'm'}>
+CONFIG_PHY_PXA_28NM_HSIC                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
+CONFIG_PHY_PXA_28NM_USB2                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}>
'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_PHY_MTK_TPHY policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_CPCAP_USB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_PHY_QCOM_APO8064_SATA policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_QCOM_IPQ806X_SATA policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_QCOM_QMP policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_QCOM_QUSB2 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_QCOM_UFS policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PHY_QCOM_USB_HS policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PHY_QCOM_USB_HSIC policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PHY_RCAR_GEN2 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_RCAR_GEN3_USB2 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_RCAR_GEN3_USB3 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_ROCKCHIP_DP policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_ROCKCHIP_EMMC policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_ROCKCHIP_INNO_USB2 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_ROCKCHIP_PCIE policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_ROCKCHIP_TYPEC policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_ROCKCHIP_USB policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PHY_EXYNOS_DP_VIDEO policy<{'armhf': 'y'}>
+CONFIG_PHY_EXYNOS_MIPI_VIDEO policy<{'armhf': 'y'}>
+CONFIG_PHY_EXYNOS_PCIE policy<{'armhf': 'y'}>
+CONFIG_PHY_EXYNOS_USB2 policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PHY_EXYNOS5_USBDRD policy<{'armhf': 'm'}>
+CONFIG_PHY_EXYNOS5250_SATA policy<{'armhf': 'y'}>
+CONFIG_PHY_Tegra_XUSB policy<{'armhf-generic': 'm'}>
+CONFIG_PHY_DM816X_USB policy<{'armhf': 'm'}>
+CONFIG_OMAP_CONTROL_PHY policy<{'armhf': 'm'}>
+CONFIG_OMAP_USB2 policy<{'armhf': 'm'}>
+CONFIG_TI_PIPE3 policy<{'armhf': 'm'}>
+CONFIG_PHY_TUSB1210 policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_TWL4030_USB policy<{'armhf': 'm'}>+
+# Menu: Device Drivers >> PPS support
+CONFIG_PPS policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'y', 'ppc64el': 'y', 's390x': 'm'}>
+CONFIG_PPS_DEBUG policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_PPS_CLIENT_KTIMER policy<{'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_PPS_CLIENT_LDISC policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_PPS_CLIENT_PARPORT policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_PPS_CLIENT_GPIO
+CONFIG_PPS
+ CONFIG_PTP_1588_CLOCK_PCH
+ CONFIG_PTP_1588_CLOCK_DTE
+ CONFIG_PTP_1588_CLOCK_GIANFAR
+ CONFIG_PTP_1588_CLOCK_KVM
+ CONFIG_DP83640_PHY
+ CONFIG_PTP_1588_CLOCK
+ CONFIG_PANEL
+ CONFIG_PANEL_PARPORT
+ CONFIG_PANEL_PROFILE
+ CONFIG_PANEL_CHANGE_MESSAGE
+ CONFIG_PARPORT
+ CONFIG_PARPORT_AX88796
+ CONFIG_PARPORT_1284
+ CONFIG_PARPORT_PC
+ CONFIG_PARPORT_SERIAL
+CONFIG_PARPORT_PC_FIFO
+CONFIG_PARPORT_PC_SUPERIO
+CONFIG_PARPORT_PC_PCMCIA
+
+# Menu: Device Drivers >> Performance monitor support
+CONFIG_ARM_PMU
+CONFIG_HISI_PMU
+CONFIG_QCOM_L2_PMU
+CONFIG_QCOM_L3_PMU
+CONFIG_THUNDERX2_PMU
+CONFIG_XGENE_PMU
+CONFIG_ARM_SPE_PMU
+
+# Menu: Device Drivers >> Pin controllers
+CONFIG_PINCTRL
+CONFIG_PINMUX
+CONFIG_PINCONF
+CONFIG_DEBUG_PINCTRL
+CONFIG_PINCTRL_AS3722
+CONFIG_PINCTRL_AMD
+CONFIG_PINCTRL_MCP23S08
+CONFIG_PINCTRL_RZA1
+CONFIG_PINCTRL_SINGLE
+CONFIG_PINCTRL_SX150X
+CONFIG_PINCTRL_MAX77620
+CONFIG_PINCTRL_PALMAS
+CONFIG_PINCTRL_RK805
+CONFIG_PINCTRL_IPROC_GPIO
+CONFIG_PINCTRL_NS2_MUX
+CONFIG_PINCTRL_BERLIN_BG4CT
+CONFIG_PINCTRL_IMX50
+CONFIG_PINCTRL_IMX51
+CONFIG_PINCTRL_IMX6Q
+CONFIG_PINCTRL_IMX6SL
+CONFIG_PINCTRL_IMX6SX
+CONFIG_PINCTRL_IMX6UL
+CONFIG_PINCTRL_IMX7D
+CONFIG_PINCTRL_VF610
+CONFIG_PINCTRL_BAYTRAIL
+CONFIG_PINCTRL_CHERRYVIEW
+CONFIG_PINCTRL_MERRIFIELD
+CONFIG_PINCTRL_BROXTON
+CONFIG_PINCTRL_CANNONLAKE
+CONFIG_PINCTRL_CEDARFORK policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PINCTRL_DENVERTON policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PINCTRL_GEMINILAKE policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PINCTRL_LEWISBURG policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PINCTRL_SUNRISEPOINT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PINCTRL_APQ8064 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_APQ8084 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_IPQ4019 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_IPQ8064 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_IPQ8074 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_MSM8660 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_MSM8960 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_MDM9615 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_MSM8X74 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_MSM8916 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_MSM8994 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_MSM8996 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_QDF2XXX policy<{'arm64': 'm'}>
+CONFIG_PINCTRL_QCOM_SPMI_PMIC policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_QCOM_SSPMI_PMIC policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PINCTRL_EXYNOS policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_EXYNOS_ARM policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_EXYNOS5440 policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_SPRD policy<{'arm64': 'y'}>
+CONFIG_PINCTRL_SPRD_SC9860 policy<{'arm64': 'y'}>
+CONFIG_PINCTRL_TI_IODELAY policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_MT2701 policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_MT8135 policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_MT8127 policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_MT8173 policy<{'arm64': 'y'}>
+CONFIG_PINCTRL_MT6397 policy<{'arm64': 'y', 'armhf': 'y'}>
+
+CONFIG_PINCTRL_MT8135 flag<REVIEW>
+CONFIG_PINCTRL_MT8127 flag<REVIEW>
+CONFIG_PINCTRL_CHERRYVIEW mark<ENFORCED> note<LP #1630238>
+
+# Menu: Device Drivers >> Pin controllers >> Amlogic SoC pinctrl drivers
+CONFIG_PINCTRL_MESON policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_MESON8 policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_MESON8B policy<{'armhf': 'y'}>
+
+# Menu: Device Drivers >> Pin controllers >> Nomadik pin controller driver
+
+# Menu: Device Drivers >> Pin controllers >> ST-Ericsson ABx500 family Mixed Signal Circuit gpio functions
+
+# Menu: Device Drivers >> Pin controllers >> UniPhier SoC pinctrl drivers
+CONFIG_PINCTRL_UNIPHIER policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_UNIPHIER_LD4 policy<{'armhf': 'y'}>
+CONFIG_PINCTRL_UNIPHIER_PRO4 policy\{"armhf": 'y'\>
+CONFIG_PINCTRL_UNIPHIER_SLD8 policy\{"armhf": 'y'\>
+CONFIG_PINCTRL_UNIPHIER_PRO5 policy\{"armhf": 'y'\>
+CONFIG_PINCTRL_UNIPHIER_PXS2 policy\{"armhf": 'y'\>
+CONFIG_PINCTRL_UNIPHIER_LD6B policy\{"armhf": 'y'\>
+CONFIG_PINCTRL_UNIPHIER_LD11 policy\{"armhf": 'y'\>
+CONFIG_PINCTRL_UNIPHIER_LD20 policy\{"armhf": 'y'\>
+CONFIG_PINCTRL_UNIPHIER_PXS3 policy\{"armhf": 'y'\>

+### Menu: Device Drivers >> Platform support for Chrome hardware
+CONFIG_CHROME_PLATFORMS policy\{"amd64": 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'\>
+CONFIG_CHROMEOS_LAPTOP policy\{"amd64": 'm', 'i386': 'm'\>
+CONFIG_CHROMEOS_PSTORE policy\{"amd64": 'm', 'i386': 'm'\>
+CONFIG_CROS_EC_CHARDEV policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'\>
+CONFIG_CROS_EC_LPC policy\{"amd64": 'm', 'i386': 'm'\>
+CONFIG_CROS_EC_LPC_MEC policy\{"amd64": 'y', 'i386': 'y'\>
+CONFIG_CROS_KBD_LED_BACKLIGHT policy\{"amd64": 'm', 'arm64': 'm', 'i386': 'm'\>

+### Menu: Device Drivers >> Platform support for Goldfish virtual devices
+CONFIG_GOLDFISH policy\{"amd64": 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'\>

+### Menu: Device Drivers >> Plug and Play support
+CONFIG_PNP policy\{"amd64": 'y', 'arm64': 'y', 'i386': 'y'\>
+CONFIG_PNP_DEBUG_MESSAGES policy\{"amd64": 'n', 'arm64': 'n', 'i386': 'n'\>
+CONFIG_ISAPNP policy\{"i386": 'y'\>
+CONFIG_PNPBIOS policy\{"i386": 'y'\>
+CONFIG_PNPBIOS_PROC_FS policy\{"i386": 'y'\>

+### Menu: Device Drivers >> Power supply class support
+CONFIG_POWER_SUPPLY policy\{"amd64": 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'\>
+CONFIG_POWER_SUPPLY_DEBUG policy\{"amd64": 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'\>
+CONFIG_PDA_POWER policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>
+CONFIG_GENERIC_ADC_BATTERY policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>
+CONFIG_MAX8925_POWER policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>
+CONFIG_WM831X_BACKUP policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>
+CONFIG_WM831X_POWER policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>
+CONFIG_WM8350_POWER policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>
+CONFIG_TEST_POWER policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>
+CONFIG_BATTERY_88PM860X policy\{"amd64": 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'\>

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Open Source Used In 5GaaS Edge AC-4  18339
+CONFIG_BATTERY_MAX1721X 'ppc64el': 'm'}
+CONFIG_BATTERY_TW4030_MADC 'ppc64el': 'm'}
+CONFIG_CHARGER_88PM860X 'ppc64el': 'm'}
+CONFIG_CHARGER_PCF50633 'ppc64el': 'm'}
+CONFIG_BATTERY_RX51 'ppc64el': 'm'}
+CONFIG_CHARGER_CPCAP
+CONFIG_CHARGER_ISP1704 'ppc64el': 'm'}
+CONFIG_CHARGER_MAX8903 'ppc64el': 'm'}
+CONFIG_CHARGER_TWL4030 'ppc64el': 'm'}
+CONFIG_CHARGER_LP8727 'ppc64el': 'm'}
+CONFIG_CHARGER_LP8788 'ppc64el': 'm'}
+CONFIG_CHARGER_GPIO 'ppc64el': 'm'}
+CONFIG_CHARGER_MANAGER 'ppc64el': 'y'}
+CONFIG_CHARGER_LTC3651 'ppc64el': 'm'}
+CONFIG_CHARGER_MAX14577 'ppc64el': 'm'}
+CONFIG_CHARGER_DETECTOR_MAX14656 'ppc64el': 'm'}
+CONFIG_CHARGER_MAX77693 'ppc64el': 'm'}
+CONFIG_CHARGER_MAX8997 'ppc64el': 'm'}
+CONFIG_CHARGER_MAX8998 'ppc64el': 'm'}
+CONFIG_CHARGER_QCOM_SMBB
+CONFIG_CHARGER_BQ2415X 'ppc64el': 'm'}
+CONFIG_CHARGER_BQ24190 'ppc64el': 'm'}
+CONFIG_CHARGER_BQ24257 'ppc64el': 'm'}
+CONFIG_CHARGER_BQ24735 'ppc64el': 'm'}
+CONFIG_CHARGER_BQ25890 'ppc64el': 'm'}
+CONFIG_CHARGER_SMB347

Open Source Used In 5GaaS Edge AC-4 18341
Open Source Used In 5GaaS Edge AC-4  18342

charted

policies

policy

[36x36]Open Source Used In 5GaaS Edge AC-4  18342
[91x776]+CONFIG_CHARGER_TPS65090                         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
[91x761]+CONFIG_BATTERY_GAUGE_LTC2941                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
[91x746]+CONFIG_BATTERY_RT5033                           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
[91x731]+CONFIG_BATTERY_RT9455                           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
[91x716]+CONFIG_CHARGER_RT9455                           policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
[91x701]+# Menu: Device Drivers >> Pulse-Width Modulation (PWM) Support
+CONFIG_PWM                                      policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_PWM_ATMEL_HLCDC_PWM                      policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_BCM_IPROC                            policy<{'arm64': 'm'}>
+CONFIG_PWM_BCM2835                              policy<{'arm64': 'm'}>
+CONFIG_PWM_BERLIN                               policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_BRCMSTB                              policy<{'arm64': 'm'}>
+CONFIG_PWM_CRC                                  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PWM_CROS_EC                              policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_PWM_FSL_FTM                              policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_HIBVT                                policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_LP3943                               policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_LPSS_PCI                             policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_LPSS_PLATFORM                        policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_BRCMSTB                              policy<{'arm64': 'm'}>
+CONFIG_PWM_CRC                                  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PWM_CROS_EC                              policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_PWM_FSL_FTM                              policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_HIBVT                                policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_LP3943                               policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_LPSS_PCI                             policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_LPSS_PLATFORM                        policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_BERLIN                               policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_BRCMSTB                              policy<{'arm64': 'm'}>
+CONFIG_PWM_CRC                                  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PWM_CROS_EC                              policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_PWM_FSL_FTM                              policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_HIBVT                                policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_LP3943                               policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_LPSS_PCI                             policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_LPSS_PLATFORM                        policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_Bullet_TPU                           policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_BRCMSTB                              policy<{'arm64': 'm'}>
+CONFIG_PWM_CRC                                  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PWM_CROS_EC                              policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_PWM_FSL_FTM                              policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_HIBVT                                policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_LP3943                               policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_LPSS_PCI                             policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_LPSS_PLATFORM                        policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_BERLIN                               policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_BRCMSTB                              policy<{'arm64': 'm'}>
+CONFIG_PWM_CRC                                  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PWM_CROS_EC                              policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
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+CONFIG_PWM_HIBVT                                policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_PWM_LP3943                               policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_PWM_LPSS_PCI                             policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_PWM_LPSS_PLATFORM                        policy<{'arm64': 'm', 'i386': 'm'}>
+# Menu: Device Drivers >> Real Time Clock

+CONFIG_RTC_CLASS
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'>

+CONFIG_RTC_HCTOSYS
  'y'>

+CONFIG_RTC_HCTOSYSDEVICE
  'i386': "rtc0", 'ppc64le': "rtc0">

+CONFIG_RTC_SYSTOHC
  'y'>

+CONFIG_RTC_SYSTOHCDEVICE
  'i386': "rtc0", 'ppc64le': "rtc0">

+CONFIG_RTC_DEBUG

+CONFIG_RTC_NVMEM
  'y'>

+CONFIG_RTC_INTF_SYSFS
  'y'>

+CONFIG_RTC_INTF_PROC
  'y'>

+CONFIG_RTC_INTF_DEV
  'y'>

+CONFIG_RTC_INTF_DEV_UIE_EMUL
  'ppc64le': 'n'>

+CONFIG_RTC_DRV_TEST
  'n'>

+CONFIG_RTC_DRV_88PM860X
  'ppc64le': 'm'>

+CONFIG_RTC_DRV_88PM80X
  'ppc64le': 'm'>

+CONFIG_RTC_DRV_ABB5ZES3
  'ppc64le': 'm'>

+CONFIG_RTC_DRV_ABX80X
  'ppc64le': 'm'>

+CONFIG_RTC_DRV_AM1805
  'ppc64le': 'm'>

+CONFIG_RTC_DRV_BRCMSTB

+CONFIG_RTC_DRV_DS1307
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+CONFIG_RTC_DRV_DS1307_HWMON
  'ppc64le': 'y'>

+CONFIG_RTC_DRV_DS1307CENTURY
  'ppc64le': 'y'>

+CONFIG_RTC_DRV_DS1374
  'm'>

+CONFIG_RTC_DRV_DS1374WDT
  'ppc64le': 'y'>

+CONFIG_RTC_DRV_DS1672
  'm'>

+CONFIG_RTC_DRV_HYM8563

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Open Source Used In 5GaaS Edge AC-4 18343
+CONFIG_RTC_DRV_LP8788 'm'
+CONFIG_RTC_DRV_MAX6900 'ppc64le': 'm'
+CONFIG_RTC_DRV_MAX8907 'ppc64le': 'm'
+CONFIG_RTC_DRV_MAX8925 'ppc64le': 'm'
+CONFIG_RTC_DRV_MAX8998 'ppc64le': 'm'
+CONFIG_RTC_DRV_MAX8997 'ppc64le': 'm'
+CONFIG_RTC_DRV_MAX77686 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_RK808 'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_RS5C372 'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_ISL1208 'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_X1205 'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_PCF8523 'arm64': 'm', 'armhf-generic': 'y', 'armhf-generic-lpae': 'm'
+CONFIG_RTC_DRV_PCF85063 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_PCF85363 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_PCF8563 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_PCF8583 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_M41T80 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_M41T80_WDT 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'
+CONFIG_RTC_DRV_BQ32K 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_TWL4030 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_PALMAS 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_TPS6586X 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_TPS65910 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_TPS80031 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
+CONFIG_RTC_DRV_RC5T583 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'
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+CONFIG_RTC_DRV_S35390A 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_FM3130 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_RX8010 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_RX8581 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_RX8025 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_EM3027 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_RV8803 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_S5M 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_M41T93 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_M41T94 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_DS1302 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_DS1305 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_DS1343 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_DS1347 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_DS1390 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_MAX6916 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_R9701 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_RX4581 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_RX6110 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_RS5C348 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_MAX6902 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_PCF2123 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_MCP795 'ppc64le': 'm'}>
+CONFIG_RTC_DRV_DS3232

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**Open Source Used In 5GaaS Edge AC-4 18345**
+CONFIG_RTC_DRV_DS3232_HWMON
    'ppc64le': 'y'}
+CONFIG_RTC_DRV_PCF2127
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_RV3029C2
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_RV3029_HWMON
    'ppc64le': 'y'}
+CONFIG_RTC_DRV_CMOS
+CONFIG_RTC_DRV_VRTC
+CONFIG_RTC_DRV_DS1286
    'm'}
+CONFIG_RTC_DRV_DS1511
    'm'}
+CONFIG_RTC_DRV_DS1553
    'm'}
+CONFIG_RTC_DRV_DS1742
    'm'}
+CONFIG_RTC_DRV_DS2404
    'm'}
+CONFIG_RTC_DRV_DA9052
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_DA9055
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_DA9063
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_EFI
+CONFIG_RTC_DRV_STK17TA8
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_M48T86
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_M48T35
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_M48T59
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_MSM6242
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_BQ4802
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_RP5C01
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_V3020
    'm'}
+CONFIG_RTC_DRV_WM831X
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_WM8350
    'ppc64le': 'm'}
+CONFIG_RTC_DRV_SC27XX
+CONFIG_RTC_DRV_PCF50633
+CONFIG_RTC_DRV_AB3100
+CONFIG_RTC_DRV_OPA1
+CONFIG_RTC_DRV_S3C
+CONFIG_RTC_DRV_SH
+CONFIG_RTC_DRV_PL030
+CONFIG_RTC_DRV_PL031
+CONFIG_RTC_DRV_GENERIC
+CONFIG_RTC_DRV_S3C
+CONFIG_RTC_DRV_AM5X
+CONFIG_RTC_DRV_FTRTC010
+CONFIG_RTC_DRV_PCAP
+CONFIG_RTC_DRV_MC133XX
+CONFIG_RTC_DRV_PM8XXX
+CONFIG_RTC_DRV_TEGRA
+CONFIG_RTC_DRV_MXC
+CONFIG_RTC_DRV_SNVS
+CONFIG_RTC_DRV_M76397
+CONFIG_RTC_DRV_MT7622
+CONFIG_RTC_DRV_XGENE
+CONFIG_RTC_DRV_R7301
+CONFIG_RTC_DRV_CPCAP
+CONFIG_RTC_DRV_RTD119X
+CONFIG_RTC_DRV_HID_SENSOR_TIME

+CONFIG_RTC_DRV_TEST
+CONFIG_RTC_DRV_CMOS
+CONFIG_RTC_DRV_EFI
+CONFIG_RTC_DRV_TWL4030

# Menu: Device Drivers >> Real Time Clock >> Dallas/Maxim DS1685 Family
+CONFIG_RTC_DRV_DS1685_FAMILY
+CONFIG_RTC_DRV_DS1685_PROC_REGS
+CONFIG_RTC_DRV_DS1685_SYSFS_REGS
[36x36]Open Source Used In 5GaaS Edge AC-4  18348

'ppc64el': 'n'}>
+

### Menu: Device Drivers >> Real Time Clock >> Dallas/Maxim DS1685 Family >> Subtype
+CONFIG_RTC_DRV_DS1685 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_RTC_DRV_DS1689 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_RTC_DRV_DS17285 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_RTC_DRV_DS17485 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_RTC_DRV_DS17885 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+

### Menu: Device Drivers >> Reliability, Availability and Serviceability (RAS) features
+CONFIG_RAS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 'x390x': 'y'}>
+CONFIG_RAS_CEC policy<{'amd64': 'y'}>
+

### Menu: Device Drivers >> Remote Controller support
+CONFIG_RC_CORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_RC_MAP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+

### Menu: Device Drivers >> Remote Controller support >> Remote Controller devices
+CONFIG_RC_DEVICES policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_RC_ATI_REMOTE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_ENE policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_IR_HIX5HD2 policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_IMON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_MCEUSB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_ITE_CIR policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_IR_FINTEK policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_IR_MESON policy<{'armhf': 'm'}>
+CONFIG_IR_MTK policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_IR_NUVOTON policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_IR_REDRAT3 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_SPI policy<{'arm64': 'm', 'armhf': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_STREAMZAP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_WINBOND_CIR policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_IR_IGORPLUGUSB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_IR_IGUANA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
# Menu: Device Drivers >> Remote Controller support >> Remote Controller devices >> Hardware decoder

- CONFIG_IR_TTUSBIR
- CONFIG_IR_RX51
- CONFIG_RC_LOOPBACK
- CONFIG_IR_GPIO_CIR
- CONFIG_IR_GPIO_TX
- CONFIG_IR_PWM_TX
- CONFIG_IR_SUNXI
- CONFIG_IR_SERIAL
- CONFIG_IR_SERIAL_TRANSMITTER
- CONFIG_IR_SIR
- CONFIG_IR_TANGO

# Menu: Device Drivers >> Remote Controller support >> Remote controller decoders

- CONFIG_RC_DECODERS
- CONFIG_LIRC
- CONFIG_IR_LIRC_CODEC
- CONFIG_IR_NEC_DECODER
- CONFIG_IR_RC5_DECODER
- CONFIG_IR_RC6_DECODER
- CONFIG_IR_JVC_DECODER
- CONFIG_IR_SONY_DECODER
- CONFIG_IR_SANYO_DECODER
- CONFIG_IR_SHARP_DECODER
- CONFIG_IR_MCE_KBD_DECODER
- CONFIG_IR_XMP_DECODER

# Menu: Device Drivers >> Remoteproc drivers

- CONFIG_REMOTEPROC
## Menu: Device Drivers >> SCSI device support

- `CONFIG_RAID_ATTRS` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

## Menu: Device Drivers >> SCSI device support >> SCSI device support

- `CONFIG_SCSI` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
- `CONFIG_SCSI.Marshal` policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
- `CONFIG_SCSI_PROC_FS` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
- `CONFIG_BLK_DEV_SD` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
- `CONFIG_CHR_DEV_ST` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
- `CONFIG_CHR_DEV_OSST` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
- `CONFIG_BLK_DEV_SR` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
- `CONFIG_CHR_DEV_SG` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
- `CONFIG_CHR_DEV_SCH` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
- `CONFIG_SCSI_ENCLOSURE` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
- `CONFIG_SCSI_CONSTANTS` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
- `CONFIG_SCSI_LOGGING` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
- `CONFIG_SCSI_SCAN_ASYNC` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

## Menu: Device Drivers >> SCSI device support >> SCSI device support >> OSD-Initiator library

- `CONFIG_SCSI_OSD_INITIATOR` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
- `CONFIG_SCSI_OSD_ULD` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
- `CONFIG_SCSI_OSD_DPRINT SENSE` policy<{'amd64': '1', 'arm64': '1', 'armhf': '1', 'i386': '1', 'ppc64le': '1', 's390x': '1'}>
- `CONFIG_SCSI_OSD_DEBUG` policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+## Menu: Device Drivers >> SCSI device support >> SCSI device support >> PCMCIA SCSI adapter support
+CONFIG_SCSI_LOWLEVEL_PCMCIA policy{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}
+CONFIG_PCMCIA_AHA152X policy{'amd64': 'm', 'i386': 'm'}
+CONFIG_PCMCIA_FDOMAIN policy{'amd64': 'm', 'i386': 'm'}
+CONFIG_PCMCIA_NINJA_SCSI policy{'i386': 'm'}
+CONFIG_PCMCIA_QLOGIC policy{'amd64': 'm', 'i386': 'm'}
+CONFIG_PCMCIA_SYM53C500 policy{'amd64': 'm', 'i386': 'm'}
+
+## Menu: Device Drivers >> SCSI device support >> SCSI device support >> PCSCSI Device Handlers
+CONFIG_SCSI_DH policy{'amd64': 'y', 'arm64': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}
+CONFIG_SCSI_DH_RDAC policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_DH_HP_SW policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_DH_EMC policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_DH_ALUA policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+
+## Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI Transports
+CONFIG_SCSI_SPI_ATTRS policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_FC_ATTRS policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_ISCSI_ATTRS policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_SAS_ATTRS policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_SAS_LIBSAS policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_SAS_ATA policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}
+CONFIG_SCSI_SAS_HOST_SMP policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}
+CONFIG_SCSI_SRP_ATTRS policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+
+## Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI low-level drivers
+CONFIG_SCSI_LOWLEVEL policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}
+CONFIG_ISCSI_TCP policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_ISCSI_BOOT_SYSFS policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_CXGB3_ISCSI policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_CXGB4_ISCSI policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 'ppc64el': 'm'}>
+CONFIG_SCSI_BNX2_IXCSI
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_BNX2X_FCOE
/ppc64el': 'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_BE2ISCSI
's390x': 'n'}>
policy<{'ppc64el': 'm'}>
+CONFIG_CXLFLASH
+CONFIG_BLK_DEV_3W_XXX_RAID
/ppc64el': 'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_HPSA
's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_3W_9XXX
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_3W_SAS
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_ACARD
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_AHA152X
+CONFIG_SCSI_AHA1542
+CONFIG_SCSI_AHA1740
+CONFIG_SCSI_AACRAID
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_AIC94XX
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_AIC94XX_DEBUG
'n'}>
policy<{'arm64': 'm', 'ppc64el': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_SCSI_HISI_SAS
+CONFIG_SCSI_HISI_SAS_PCI
+CONFIG_SCSI_MVSAS
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_MVSAS_DEBUG
/ppc64el': 'm'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_MVSAS_TASKLET
/ppc64el': 'm'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_MVUMI
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_DPT_I2O
+CONFIG_SCSI_ADVANSYS
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_ARCMSR
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_ESAS2R
'm', 's390x': 'n'}>
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_MEGARAID_NEWGEN
/ppc64el': 'y', 's390x': 'n'}>
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'm', 'ppc64le': 'm'}>
+CONFIG_MEGARAID_MM
/ppc64el': 'm'}>
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's390x': 'n'}>

+CONFIG_SCSI_IBMVSCSI
+CONFIG_SCSI_IBMVSCSIS
+CONFIG_SCSI_IBMVFC
+CONFIG_SCSI_IBMVFC_TRACE
+CONFIG_SCSI_INITIO
's390x': 'n'}>

+CONFIG_SCSI_INIA100
's390x': 'n'}>

+CONFIG_SCSI_PPA
+CONFIG_SCSI_IMM
+CONFIG_SCSI_IBMVFC
+CONFIG_SCSI_IBMVFC_TRACE
+CONFIG_SCSI_STEX
's390x': 'n'}>

+CONFIG_SCSI_IPR
+CONFIG_SCSI_IPR_TRACE
'y'>

+CONFIG_SCSI_IPR_DUMP
'y'>

+CONFIG_SCSI_QLOGIC_FAS
+CONFIG_SCSI_QLOGIC_1280
'ppc64el': 'm', 's390x': 'n'}>

+CONFIG_SCSI_QLOGIC_Q_AFC
'm', 's390x': 'n'}>

+CONFIG_TCM_QLA2XXX
'm'}>

+CONFIG_TCM_QLA2XXX_DEBUG
'ppc64el': 'n'}>

+CONFIG_SCSI_QLOGIC_Q_AISCSI
'm', 's390x': 'n'}>

+CONFIG_QEDI
+CONFIG_SCSI_LPFC
's390x': 'n'}>

+CONFIG_SCSI_LPFC_DEBUG_FS
'ppc64el': 'n'}>

+CONFIG_SCSI_SIM710
+CONFIG_SCSI_SYM53C416
+CONFIG_SCSI_DC395x
'm', 's390x': 'n'}>

+CONFIG_SCSI_AM53C974
'm', 's390x': 'n'}>

+CONFIG_SCSI_NSP32
+CONFIG_SCSI_WD719X
'm', 's390x': 'n'}>

+CONFIG_SCSI_DEBUG
'm', 's390x': 'm'}>
+CONFIG_ZFCP policy{'s390x': 'm'}
+CONFIG_SCSI_PMRAID policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}
+CONFIG_SCSI_PM8001 policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}
+CONFIG_SCSI_BFA_FC policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}
+CONFIG_SCSI_VIRTIO policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}
+CONFIG_SCSI_CHELSIO_FCOE policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}
+# +CONFIG_SCSI_IPR_TRACE note<LP:1343109>
+CONFIG_SCSI_IPR_DUMP note<LP:1343109>
+CONFIG_SCSI_VIRTIO note<tech preview of new feature>
+
+ Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI low-level drivers >> Adaptec AIC79xx U320 support
+CONFIG_SCSI_AIC79XX policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}
+CONFIG_AIC79XX_CMDS_PER_DEVICE policy{'amd64': '32', 'arm64': '32', 'armhf': '32', 'i386': '32', 'ppc64le': '32'}
+CONFIG_AIC79XX_RESET_DELAY_MS policy{'amd64': '5000', 'arm64': '5000', 'armhf': '5000', 'i386': '5000', 'ppc64le': '5000'}
+CONFIG_AIC79XX_DEBUG_ENABLE policy{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}
+CONFIG_AIC79XX_DEBUG_MASK policy{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0'}
+CONFIG_AIC79XX_REGPRETTY_PRINT policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}
+
+ Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI low-level drivers >> Adaptec AIC7xxx Fast -> U160 support (New Driver)
+CONFIG_SCSI_AIC7XXX policy{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'n'}
+CONFIG_AIC7XXX_CMDS_PER_DEVICE policy{'amd64': '8', 'arm64': '8', 'armhf': '8', 'i386': '8', 'ppc64le': '8'}
+CONFIG_AIC7XXX_RESET_DELAY_MS policy{'amd64': '5000', 'arm64': '5000', 'armhf': '5000', 'i386': '5000', 'ppc64le': '5000'}
+CONFIG_AIC7XXX_DEBUG_ENABLE policy{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}
+CONFIG_AIC7XXX_DEBUG_MASK policy{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0'}
+CONFIG_AIC7XXX_REGPRETTY_PRINT policy{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}
+
+ Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI low-level drivers >> EATA ISA/EISA/PCI (DPT and generic EATA/DMA-compliant boards) support
+CONFIG_SCSI_EATA                   policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SCSI_EATA_TAGGED_QUEUE      policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SCSI_EATA_LINKED_COMMANDS   policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SCSI_EATA_MAX_TAGS          policy<{'amd64': '16', 'i386': '16', 'ppc64le': '16'}>
+
+## Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI low-level drivers >> LibFCoE module
+CONFIG_LIBFCOE                     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_FCOE                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_FCOE_FNIC                   policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_QEDF                        policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+
+## Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI low-level drivers >> NCR Quad 720 MCA SCSI support
+
+## Menu: Device Drivers >> SCSI device support >> SCSI device support >> SCSI low-level drivers >> SYM53C8XX Version 2 SCSI support
+CONFIG_SCSI_SYM53C8XX_2            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm', 's390x': 'n'}>
+CONFIG_SCSI_SYM53C8XX_DMA_ADDRESSING_MODE policy<{'amd64': '1', 'arm64': '1', 'armhf': '1', 'i386': '1', 'ppc64le': '1', 's390x': '1'}>
+CONFIG_SCSI_SYM53C8XX_DEFAULT_TAGS  policy<{'amd64': '16', 'arm64': '16', 'armhf': '16', 'i386': '16', 'ppc64le': '16'}>
+CONFIG_SCSI_SYM53C8XX_MAX_TAGS      policy<{'amd64': '64', 'arm64': '64', 'armhf': '64', 'i386': '64', 'ppc64le': '64'}>
+CONFIG_SCSI_SYM53C8XX_MMIO          policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers
+CONFIG_OWL_PM_DOMAINS              policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ROCKCHIP_PM_DOMAINS         policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARCH_TEGRA_2X_SOC            policy<{'armhf-generic': 'y'}>
+CONFIG_ARCH_TEGRA_3X_SOC            policy<{'armhf-generic': 'y'}>
+CONFIG_ARCH_TEGRA_114_SOC           policy<{'armhf-generic': 'y'}>
+CONFIG_ARCH_TEGRA_124_SOC           policy<{'armhf-generic': 'y'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> Amlogic SoC drivers
+CONFIG_MESON_GX_SOCINFO             policy<{'armhf': 'y'}>
+CONFIG_MESON_GX_PM_DOMAINS          policy<{'armhf': 'y'}>
+CONFIG_MESON_MX_SOCINFO             policy<{'armhf': 'y'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> Broadcom SoC drivers
+CONFIG_RASPBERRYPI_POWER            policy<{'arm64': 'y'}>
+CONFIG_SOC_BRCMSTB                  policy<{'arm64': 'y', 'armhf': 'n'}>
+CONFIG_BRCMSTB_PM                   policy<{'arm64': 'y'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> Freescale DPAA 1.x support
+CONFIG_FSL_DPAA  policy<{'arm64': 'y'}>
+CONFIG_FSL_DPAA_CHECKING  policy<{'arm64': 'y'}>
+CONFIG_FSL_BMAN_TEST  policy<{'arm64': 'm'}>
+CONFIG_FSL_BMAN_TEST_API  policy<{'arm64': 'n'}>
+CONFIG_FSL_QMAN_TEST  policy<{'arm64': 'n'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> MediaTek SoC drivers
+CONFIG_MTK_INFRAFCFG  policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_MTK_PMIC_WRAP  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MTK_SCPSYS  policy<{'arm64': 'y', 'armhf': 'y'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> Qualcomm SoC drivers
+CONFIG_QCOM_GLINK_SSR  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_GSBI  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_PM  policy<{'armhf': 'y'}>
+CONFIG_QCOM_RMTFS_MEM  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_SMEM  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_SMD_RPM  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_SMP2P  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_SMSM  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_QCOM_WCNSS_CTRL  policy<{'arm64': 'm', 'armhf': 'm'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> Renesas SoC driver support
+CONFIG_SYSC_R8A7743  policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SYSC_R8A7745  policy<{'arm64': 'y'}>
+CONFIG_SYSC_R8A7799  policy<{'arm64': 'y'}>
+CONFIG_SYSC_R8A7790  policy<{'armhf': 'y'}>
+CONFIG_SYSC_R8A7791  policy<{'armhf': 'y'}>
+CONFIG_SYSC_R8A7792  policy<{'armhf': 'y'}>
+CONFIG_SYSC_R8A7794  policy<{'armhf': 'y'}>
+CONFIG_SYSC_R8A7795  policy<{'arm64': 'y'}>
+CONFIG_SYSC_R8A7796  policy<{'arm64': 'y'}>
+CONFIG_SYSC_R8A77970  policy<{'arm64': 'y'}>
+CONFIG_SYSC_R8A77995  policy<{'arm64': 'y'}>
+CONFIG_RST_RCAR  policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_SYSC_RCAR  policy<{'arm64': 'y', 'armhf': 'y'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> Samsung SoC driver support
+CONFIG_SOC_SAMSUNG  policy<{'armhf': 'y'}>
+CONFIG_EXYNOS_PMU  policy<{'armhf': 'y'}>
+CONFIG_EXYNOS_PMU_ARM_DRIVERS  policy<{'armhf': 'y'}>
+CONFIG_EXYNOS_PM_DOMAINS  policy<{'armhf': 'y'}>
+
+## Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> TI SOC drivers support
+CONFIG_SOC_TI  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
# Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> ZTE SoC driver support

# Menu: Device Drivers >> SOC (System On Chip) specific Drivers >> i.MX SoC drivers

+CONFIG_IMX7_PM_DOMAINS

+## Menu: Device Drivers >> SPI support

+CONFIG_SPI

+CONFIG_SPI_DEBUG

+CONFIG_SPI_ALTERA

+CONFIG_SPI_ARMADA_3700

+CONFIG_SPI_AXI_SPI_ENGINE

+CONFIG_SPI_BCM2835

+CONFIG_SPI_BCM2835AUX

+CONFIG_SPI_BCM_QSPI

+CONFIG_SPI_BITBANG

+CONFIG_SPI_BUTTERFLY

+CONFIG_SPI_CADENCE

+CONFIG_SPI_DESIGNWARE

+CONFIG_SPI_DW_PCI

+CONFIG_SPI_DW_MID_DMA

+CONFIG_SPI_DW_MMIO

+CONFIG_SPI_DLN2

+CONFIG_SPI_FSL_LPSPI

+CONFIG_SPI_FSL_GPIO

+CONFIG_SPI_FSL_IMX

+CONFIG_SPI_FSL_SPI

+CONFIG_SPI_FSL_DSPI

+CONFIG_SPI_MESON_SPICC

+CONFIG_SPI_MESON_SPIFC

+CONFIG_SPI_MT65XX

+CONFIG_SPI_OC_TINY
CONFIG_SPI_OMAP24XX  
CONFIG_SPI_TI_QSPI  
CONFIG_SPI_ORION  
CONFIG_SPI_PLL022  
CONFIG_SPI_PXA2XX  
CONFIG_SPI_ROCKCHIP  
CONFIG_SPI_RSPI  
CONFIG_SPI_QUP  
CONFIG_SPI_S3C64XX  
CONFIG_SPI_SC18IS602  
CONFIG_SPI_SH_MSI0F  
CONFIG_SPI_SH_HSPI  
CONFIG_SPI_SPRD_ADI  
CONFIG_SPI_SUN4I  
CONFIG_SPI_SUN6I  
CONFIG_SPI_Tegra114  
CONFIG_SPI_Tegra20_SFLASH  
CONFIG_SPI_THUNDERX  
CONFIG_SPI_TOPCLIFF_PCH  
CONFIG_SPI_XCOMM  
CONFIG_SPI_XILINX  
CONFIG_SPI_XLP  
CONFIG_SPI_ZYNQMP_GQSPI  
CONFIG_SPI_SPIDEV  
CONFIG_SPI_LOOPBACK_TEST  
CONFIG_SPI_TLE62X0  
CONFIG_SPI_SLAVE  
CONFIG_SPI_SLAVE_TIME  
CONFIG_SPI_SLAVE_SYSTEM_CONTROL  
# Menu: Device Drivers >> SPMI support  
CONFIG_SPMI  
CONFIG_SPMI_MSM_PMIC_ARB  
# Menu: Device Drivers >> Serial ATA and Parallel ATA drivers (libata)
+CONFIG_ATA
+CONFIG_ATA_VERBOUSE_ERROR
+CONFIG_ATA_ACPI
+CONFIG_SATA_ZPODD
+CONFIG_SATA_PMP
+CONFIG_SATA_AHCI
+CONFIG_SATA_MOBILE_LPM_POLICY
+CONFIG_SATA_AHCI_PLATFORM
+CONFIG_AHCI_BRCM
+CONFIG_AHCI_DM816
+CONFIG_AHCI_IMX
+CONFIG_AHCI_CEVA
+CONFIG_AHCI_MTK
+CONFIG_AHCI_MVEBU
+CONFIG_AHCI_SUNXI
+CONFIG_AHCI_Tegra
+CONFIG_AHCI_XGENE
+CONFIG_SATA_AHCIPLATFORM
+CONFIG_SATA_AHCI_SEATTLE
+CONFIG_SATA_INIC162X
+CONFIG_SATA_ACARD_AHCI
+CONFIG_SATA_SIL24

# Menu: Device Drivers >> Serial ATA and Parallel ATA drivers (libata) >> ATA SFF support (for legacy IDE and PATA)
+CONFIG_ATA_SFF
+CONFIG_PDC_ADMA
+CONFIG_SATA_QSTOR
+CONFIG_SATA_SX4
+CONFIG_PATA_CDM640_PCI
+CONFIG_PATA_ISAPNP
+CONFIG_PATA_MPIIX
+CONFIG_PATA_NS87410


+CONFIG_PATA_OPTI
+CONFIG_PATA_PCMCIA
+CONFIG_PATA_PLATFORM
+CONFIG_PATA_OF_PLATFORM
+CONFIG_PATA_QDI
+CONFIG_PATA_RZ1000
+CONFIG_PATA_WINBOND_VLB
+CONFIG_PATA_LEGACY

+ # Menu: Device Drivers >> Serial ATA and Parallel ATA drivers (libata) >> ATA SFF support (for legacy IDE and PATA) >> ATA BMDMA support
+CONFIG_ATA_BMDMA
+CONFIG_ATA_PIIX
+CONFIG_SATA_DWC
+CONFIG_SATA_DWC_OLD_DMA
+CONFIG_SATA_DWC_DEBUG
+CONFIG_SATA_HIGHBANK
+CONFIG_SATA_MV
+CONFIG_SATA_NV
+CONFIG_SATA_PROMISE
+CONFIG_SATA_RCAR
+CONFIG_SATA_SIL
+CONFIG_SATA_SIS
+CONFIG_SATA_SVW
+CONFIG_SATA_ULI
+CONFIG_SATA_VIA
+CONFIG_SATA_VITESSE
+CONFIG_PATA_ALI
+CONFIG_PATA_AMD

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+CONFIG_PATA_ARTOP
+CONFIG_PATA_AWI
+CONFIG_PATA_ATIIXP
+CONFIG_PATA_ATP867X
+CONFIG_PATA_CMD64X
+CONFIG_PATA_CS5520
+CONFIG_PATA_CS5530
+CONFIG_PATA_CS5535
+CONFIG_PATA_CS5536
+CONFIG_PATA_CYPRESS
+CONFIG_PATA_EFAR
+CONFIG_PATA_HPT366
+CONFIG_PATA_HPT37X
+CONFIG_PATA_HPT3X2N
+CONFIG_PATA_HPT3X3
+CONFIG_PATA_HPT3X3_DMA
+CONFIG_PATA_IMX
+CONFIG_PATA_IT8213
+CONFIG_PATA_IT821X
+CONFIG_PATA_JMICRON
+CONFIG_PATA_MARVELL
+CONFIG_PATA_NETCELL
+CONFIG_PATA_NINJA32
+CONFIG_PATA_NS87415
+CONFIG_PATA_OLDPIIX
+CONFIG_PATA_OPTIDMA
+CONFIG_PATA_PDC2027X
+CONFIG_PATA_PDC_OLD
+CONFIG_PATA_RADISYS
+CONFIG_PATA_RDC
+CONFIG_PATA_SC1200
+CONFIG_PATA_SCH
+CONFIG_PATA_SERVERWORKS
+CONFIG_PATA_SIL680
+CONFIG_PATA_SIS
+CONFIG_PATA_TOSHIBA
+CONFIG_PATA_TRIFLEX
+CONFIG_PATA_VIA
+CONFIG_PATA_WINBOND
+CONFIG_PATA_ACPI
+CONFIG_ATA_GENERIC
+
# Menu: Device Drivers >> Sonics Silicon Backplane
+CONFIG_SSB_PCIHOST
+CONFIG_SSB_PCMCIAHOST
+CONFIG_SSB_SDIOHOST
+CONFIG_SSB_DRIVER_PCIECORE
+
# Menu: Device Drivers >> Sony MemoryStick card support
+CONFIG_MEMSTICK
+CONFIG_SND_VERBOSE_PROCFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SND_VERBOSE_PRINTK policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_SND_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_SND_HDA_PREALLOC_SIZE policy<{'amd64': '64', 'arm64': '64', 'armhf': '64', 'i386': '64', 'ppc64le': '64'}>

+CONFIG_SND note<not autoloadable on omap>
+CONFIG_SND_PCM_OSS note<deprecated in favour of pulseaudio emulation>
+
+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support
+CONFIG_SND policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_AMD_ACP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_AMD_CZ_RT5645_MACH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_BCM2835_SOC_I2S policy<{'arm64': 'm'}>
+CONFIG_SND_DESIGNWARE_I2S policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_DESIGNWARE_PCM policy<{'arm64': 'm', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_SND_I2S_HI6210_I2S policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_KIRKWOOD_SOC policy<{'armhf': 'm'}>
+CONFIG_SND_KIRKWOOD_SOC_ARMADA370_DB policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_MEDIATEK policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_SND_SOC_QCOM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_STORM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_QCOM8016_SBC policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_XTTFPGA_I2S policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ZX_TDM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SIMPLE_CARD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SIMPLE_SCU_CARD policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_AUDIO_GRAPH_CARD policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_AUDIO_GRAPH_SCU_CARD policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>

+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> ASoC support for Mediatek MT8173 chip
+CONFIG_SND_SOC_MT8173 policy<{'arm64': 'n', 'armhf': 'n'}>

+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> ASoC support for Rockchip
+CONFIG_SND_SOC_ROCKCHIP policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_ROCKCHIP_I2S policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_ROCKCHIP_PDM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_ROCKCHIP_SPDIF policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_ROCKCHIP_MAX98090 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_ROCKCHIP_RT5645 policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_RK3288_HDMI_ANALOG policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_RK3399_GRU_SOUND policy<{'arm64': 'm', 'armhf': 'm'}>
+
+# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> ASoC support for Samsung
+CONFIG_SND_SOC_SAMSUNG policy<{'armhf': 'm'}>
+CONFIG_SND_SAMSUNG_PCM policy<{'armhf': 'm'}>
+CONFIG_SND_SAMSUNG_SPDIF policy<{'armhf': 'm'}>
+CONFIG_SND_SAMSUNG_I2S policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_SAMSUNG_SMDK_WM8994 policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_SAMSUNG_SMDK_SPDIF policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_SAMSUNG_SMDK_WM8994_PCM policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_SNOW policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_ODROID policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_ARNDALE_RT5631_ALC5631 policy<{'armhf': 'm'}>
+CONFIG_SND_SOC_SAMSUNG_TM2_WM5110 policy<{'armhf': 'm'}>
+
+# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> Allwinner SoC Audio support
+CONFIG_SND_SUN4I_CODEC policy<{'arm64': 'n'}>
+CONFIG_SND_SUN8I_CODEC_ANALOG policy<{'arm64': 'm'}>
+CONFIG_SND_SUN4I_I2S policy<{'arm64': 'n'}>
+CONFIG_SND_SUN4I_SPDIF policy<{'arm64': 'n'}>
+
+# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> Audio support for Imagination Technologies designs
+CONFIG_SND_SOC_IMG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SND_SOC_IMG_I2S_IN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SOC_IMG_I2S_OUT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SOC_IMG_PARALLEL_OUT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SOC_IMG_SPDIF_IN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SOC_IMG_SPDIF_OUT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SOC_IMG_PISTACHIO_INTERNAL_DAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> CODEC drivers

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+CONFIG_SND_SOC_RT5616
  ['m']>
+CONFIG_SND_SOC_RT5631
  ['m']>
+CONFIG_SND_SOC_SGTL5000
generic-1pae: 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_SOC_SIRF_AUDIO_CODEC
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_SPDIF
  ['m']>
+CONFIG_SND_SOC_SSM2602_SPI
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_SSM2602_I2C
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_SSM4567
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_STA32X
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_STA350
  ['m']>
+CONFIG_SND_SOC_STI_SAS
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TAS2552
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TAS5086
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TAS571X
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TAS5720
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TFA9879
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TLV320AIC23_I2C
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TLV320AIC23_SPI
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TLV320AIC31XX
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TLV320AIC3X
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_TS3A227E
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_WM8510
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_WM8523
  ['ppc64le': 'm']>
+CONFIG_SND_SOC_WM8524
  ['ppc64le': 'm']>

policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'>

policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'>

policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'>

policy<{'amd64': 'm', 'arm64': 'm', 'armhf-generic': 'y', 'armhf-

policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'>

policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'>

policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'>

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policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> Intel ASoC SST drivers
+ CONFIG_SND_SOC_INTEL_SST_TOPOLEVEL policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_HASWELL policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BAYTRAIL policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SST_ATOM_HIFI2_PLATFORM policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_SKYLAKE policy<{'amd64': 'm', 'i386': 'm'}>
+
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> Intel ASoC SST drivers >> Intel Audio machine drivers
+ CONFIG_SND_SOC_INTEL_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_MFLD_MACHINE policy<{'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_HASWELL_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BDW_RT5677_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BROADWELL_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BTYCR_RT5640_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BTYCR_RT5651_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BTYCR_RT5660_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_CHT_BSW_RT5672_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_CHT_BSW_RT5645_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_CHT_BSW_MAX98090_TL_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BTY_CHT_DA7213_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BTY_CHT_ES8316_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BTY_CHT_NOCODEC_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_SKL_RT286_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_SKL_NAU88L25_SSM4567_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BXT_DA7219_MAX98357A_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_BXT_RT298_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_KBL_RT5663_MAX98927_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_SND_SOC_INTEL_KBL_RT5663_RT5514_MAX98927_MACH policy<{'amd64': 'm', 'i386': 'm'}>
+
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> STMicroelectronics STM32 SOC audio support
+
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC AC97 Audio for the ADI BF5xx chip
+
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for Freescale CPUs
+ CONFIG_SND_SOC_FSL_ASRC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+ CONFIG_SND_SOC_FSL_SAI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+ CONFIG_SND_SOC_FSL_SSI policy<{'amd64': 'm', 'arm64': 'm', 'armhf-generic': 'y', 'armhf-generic-lpae': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+ CONFIG_SND_SOC_FSL_SPDIF policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',}>

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# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for Freescale CPUs >> SoC Audio for Freescale PowerPC CPUs
+

# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for Freescale CPUs >> SoC Audio for Freescale i.MX CPUs

+CONFIG_SND_IMX_SOC policy {'armhf-generic': 'y'}
+CONFIG_SND_SOC_EUKREA_TLV320 policy {'armhf-generic': 'm'}
+CONFIG_SND_SOC_IMX_WM8962 policy {'armhf-generic': 'm'}
+CONFIG_SND_SOC_IMX_ES8328 policy {'armhf-generic': 'm'}
+CONFIG_SND_SOC_IMX_SGTL5000 policy {'armhf-generic': 'y'}
+CONFIG_SND_SOC_IMX_SPDIF policy {'armhf-generic': 'm'}
+CONFIG_SND_SOC_IMX_MC13783 policy {'armhf-generic': 'm'}
+CONFIG_SND_SOC_FSL_ASOC_CARD policy {'armhf-generic': 'm'}
+

# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for Freescale MXS CPUs
+

# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for Texas Instruments chips using eDMA

+CONFIG_SND_EDMA_SOC policy {'armhf-generic': 'm', 'armhf-generic-lpae': 'n'}
+CONFIG_SND_DAVINCI_SOC_I2S policy {'armhf-generic': 'n'}
+CONFIG_SND_DAVINCI_SOC_MCASP policy {'armhf': 'm'}
+CONFIG_SND_AM33XX_SOC_EVM policy {'armhf-generic': 'm'}
+

# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for Texas Instruments chips using eDMA >> DM365 codec select
+

# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for the Atmel System-on-Chip

+CONFIG_SND_ATMEL_SOC policy {'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}
+

# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for the Intel PXA2xx chip
+

# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for the Tegra System-on-Chip

+CONFIG_SND_SOC_TEGRA policy {'armhf-generic': 'm'}
+CONFIG_SND_SOC_TEGRA20_AC97 policy {'armhf-generic': 'm'}
+CONFIG_SND_SOC_TEGRA20_DAS policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA20_I2S policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA20_SPDIF policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA30_AHUB policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA30_I2S policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_RT5640 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_WM8753 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_WM8903 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_WM9712 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_TRIMSLICE policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_ALC5632 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_MAX98090 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_RT5677 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_SOC_TEGRA_SGTL5000 policy<{'armhf-generic': 'm'}>
+
+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio for the Texas Instruments OMAP chips
+CONFIG_SND_OMAP_SOC policy<{'armhf': 'y'}>
+CONFIG_SND_OMAP_SOC_HDMI_AUDIO policy<{'armhf': 'm'}>
+CONFIG_SND_OMAP_SOC_RX51 policy<{'armhf': 'm'}>
+CONFIG_SND_OMAP_SOC_OMAP_TW4030 policy<{'armhf': 'y'}>
+CONFIG_SND_OMAP_SOC_OMAP_ABE_TW4030 policy<{'armhf-generic': 'm'}>
+CONFIG_SND_OMAP_SOC_OMAP3_PANDORA policy<{'armhf-generic': 'm'}>

## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio support for SuperH
+CONFIG_SND_SOC_SH4_FSI policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SND_SOC_RCAR policy<{'arm64': 'm', 'armhf': 'm'}>
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC Audio support for the Cirrus Logic EP93xx series
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ALSA for SoC audio support >> SoC I2S Audio for the ADI Blackfin chip
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ARM sound devices
+CONFIG_SND_ARM policy<{'armhf': 'y'}>
+CONFIG_SND_ARMAACI policy<{'armhf': 'm'}>
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> Apple Onboard Audio driver
+
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+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> Atmel devices (AT91)
+
+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> FireWire sound devices
+CONFIG_SND_FIREWIRE: policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SND_DICE: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_OXFW: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_ISIGHT: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_FIREWORKS: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_BEBOB: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_FIREWIRE_DIGI00X: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_FIREWIRE_TASCAM: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_FIREWIRE_MOTU: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_FIREFACE: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> GSC sound devices

+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> Generic sound devices
+CONFIG_SND_DRIVERS: policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SND_PCSP: policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SND_DUMMY: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_ALOOP: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_VIRMIDI: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_MTPAV: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_MTS64: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_SERIAL_U16550: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_MPU401: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_PORTMAN2X4: policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SND_AC97_POWER_SAVE: policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'},}
'ppc64el': 'y'}>
+CONFIG_SND_AC97_POWER_SAVE_DEFAULT
  policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64el': '0'}>
+
'ppc64el': 'y'}>
+CONFIG_SND_HDA_INTEL
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_TEGRA
  policy<{'armhf-generic': 'm'}>
+CONFIG_SND_HDA_HWDEP
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SND_HDA_RECONFIG
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SND_HDA_INPUT_BEEP
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SND_HDA_INPUT_BEEP_MODE
  policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64el': '0'}>
+CONFIG_SND_HDA_PATCH_LOADER
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SND_HDA_CODEC_REALTEK
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_ANALOG
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_SIGMATEL
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_VIA
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_HDMI
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_CIRRUS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_CONEXANT
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_CA0110
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_CA0132
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_CA0132_DSP
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_SND_HDA_CODEC_CMEDIA
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_CODEC_SI3054
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_GENERIC
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_SND_HDA_POWER_SAVE_DEFAULT
  policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64el': '0'}>
+
'ppc64el': 'y'}>
+CONFIG_SND_HDA_RECONFIG
  note<allows fixes to be tested live>
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> ISA sound devices
+ CONFIG_SND_ISA policy [{'i386': 'y'}]
+ CONFIG_SND_ADLIB policy [{'i386': 'm'}]
+ CONFIG_SND_AD1816A policy [{'i386': 'm'}]
+ CONFIG_SND_AD1848 policy [{'i386': 'm'}]
+ CONFIG_SND_ALS100 policy [{'i386': 'm'}]
+ CONFIG_SND_AZT1605 policy [{'i386': 'm'}]
+ CONFIG_SND_AZT2316 policy [{'i386': 'm'}]
+ CONFIG_SND_AZT2320 policy [{'i386': 'm'}]
+ CONFIG_SND_CM18328 policy [{'i386': 'm'}]
+ CONFIG_SND_CM18330 policy [{'i386': 'm'}]
+ CONFIG_SND_CS4231 policy [{'i386': 'm'}]
+ CONFIG_SND_CS4236 policy [{'i386': 'm'}]
+ CONFIG_SND_ES1688 policy [{'i386': 'm'}]
+ CONFIG_SND_ES18XX policy [{'i386': 'm'}]
+ CONFIG_SND_SC6000 policy [{'i386': 'm'}]
+ CONFIG_SND_GUSCLASSIC policy [{'i386': 'm'}]
+ CONFIG_SND_GUSEXTREME policy [{'i386': 'm'}]
+ CONFIG_SND_GUSMAX policy [{'i386': 'm'}]
+ CONFIG_SND_INTERWAVE policy [{'i386': 'm'}]
+ CONFIG_SND_INTERWAVE_STB policy [{'i386': 'm'}]
+ CONFIG_SND_JAZZ16 policy [{'i386': 'm'}]
+ CONFIG_SND_OPL3SA2 policy [{'i386': 'm'}]
+ CONFIG_SND_OPTI92X_AD1848 policy [{'i386': 'm'}]
+ CONFIG_SND_OPTI92X_CS4231 policy [{'i386': 'm'}]
+ CONFIG_SND_OPTI93X policy [{'i386': 'm'}]
+ CONFIG_SND_MIRO policy [{'i386': 'm'}]
+ CONFIG_SND_SB8 policy [{'i386': 'm'}]
+ CONFIG_SND_SB16 policy [{'i386': 'm'}]
+ CONFIG_SND_SBAWE policy [{'i386': 'm'}]
+ CONFIG_SND_SB16_CSP policy [{'i386': 'y'}]
+ CONFIG_SND_SSCAPE policy [{'i386': 'm'}]
+ CONFIG_SND_WAVEFRONT policy [{'i386': 'm'}]
+ CONFIG_SND_MSND_PINNACLE policy [{'i386': 'm'}]
+ CONFIG_SND_MSND_CLASSIC policy [{'i386': 'm'}]
+
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> MIPS sound devices
+ # Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> PCI sound devices
+ CONFIG_SND_PCI policy [‘amd64’: ‘y’, ‘arm64’: ‘y’, ‘armhf’: ‘y’, ‘i386’: ‘y’, ‘ppc64el’: ‘y’]
+ CONFIG_SND_AD1889 policy [‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+ CONFIG_SND_ALS300 policy [‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf-generic-lpae’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+ CONFIG_SND_ALS4000 policy [‘amd64’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+ CONFIG_SND_ALI54451 policy [‘amd64’: ‘m’, ‘arm64’: ‘m’, ‘armhf-generic-lpae’: ‘m’, ‘i386’: ‘m’, ‘ppc64el’: ‘m’]
+CONFIG_SND_ASIHPI
+CONFIG_SND_ATIIXP
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+CONFIG_SND_ATIIXP_MODEM
   'ppc64el': 'm'}
+CONFIG_SND_AU8810
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+CONFIG_SND_AU8820
   'm'>
+CONFIG_SND_AU8830
   'm'>
+CONFIG_SND_AW2
   'm'>
+CONFIG_SND_AZT3328
   'm', 'ppc64el': 'm'}
+CONFIG_SND_BT87X
   'm'>
+CONFIG_SND_BT87X_OVERCLOCK
   'ppc64el': 'n'}
+CONFIG_SND_CA0106
   'm'>
+CONFIG_SND_CMIPCI
   'm'>
+CONFIG_SND_OXYGEN
   'm'>
+CONFIG_SND_CS4281
   'm'>
+CONFIG_SND_CS46XX
   'm'>
+CONFIG_SND_CS46XX_NEW_DSP
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+CONFIG_SND_CS5530
+CONFIG_SND_CS5535AUDIO
+CONFIG_SND_CTXFI
   'm'>
+CONFIG_SND_DARLA20
   'm'>
+CONFIG_SND_GINA20
   'm'>
+CONFIG_SND_LAYLA20
   'm'>
+CONFIG_SND_DARLA24
   'm'>
+CONFIG_SND_GINA24
   'm'>
+CONFIG_SND_LAYLA24
   'm'>
+CONFIG_SND_MONA
   policy<{'amd64': 'm', 'i386': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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+CONFIG_SND_MIA
+CONFIG_SND_ECHO3G
+CONFIG_SND_INDIGO
+CONFIG_SND_INDIGOIO
+CONFIG_SND_INDIGODJ
+CONFIG_SND_INDIGOIOX
+CONFIG_SND_INDIGODJX
+CONFIG_SND_EMU10K1
+CONFIG_SND_EMU10K1X
+CONFIG_SND_ENS1370
+CONFIG_SND_ENS1371
+CONFIG_SND_ES1938
+CONFIG_SND_ES1968
+CONFIG_SND_ES1968_INPUT
+CONFIG_SND_ES1968_RADIO
+CONFIG_SND_FM801
+CONFIG_SND_FM801_TEA575X_BOOL
+CONFIG_SND_HDSP
+CONFIG_SND_HDSPM
+CONFIG_SND_ICE1712
+CONFIG_SND_ICE1724
+CONFIG_SND_INTEL8X0
+CONFIG_SND_INTEL8X0M
+CONFIG_SND_KORG1212
# Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> PCMCIA sound devices
+CONFIG_SND_PCMCIA
  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_SND_VXPOCKET
  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SND_PDAUDIOCF
  policy<{'amd64': 'm', 'i386': 'm'}>

+## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> PowerPC sound devices
+CONFIG_SND_PPC
  policy<{'ppc64el': 'y'}>
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> SPI sound devices
+CONFIG_SND_SPI policy[['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']]
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> SUPERH sound devices
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> Sequencer support
+CONFIG_SNDSEQUENCER policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]
+CONFIG_SND_SEQ_DUMMY policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]
+CONFIG_SNDSEQUENCER_OSS policy[['amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n']]
+CONFIG_SND_SEQ_HRTIMER_DEFAULT policy[['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']]
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## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> Sparc sound devices
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> USB sound devices
+CONFIG_SND_USB policy[['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']]
+CONFIG_SND_USB_AUDIO policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_USB_UA101 policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_USB_USX2Y policy[['amd64': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_USB_CAIAQ policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_USB_CAIAQ_INPUT policy[['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y']]
+CONFIG_SND_USB_US122L policy[['amd64': 'm', 'i386': 'm']]}
+CONFIG_SND_USB_6FIRE policy[['amd64': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_USB_HIFACE policy[['amd64': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_BCD2000 policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_USB_POD policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]}
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+CONFIG_SND_USB_TONEPORT policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+CONFIG_SND_USB_VARIAX policy[['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm']]}
+
## Menu: Device Drivers >> Sound card support >> Advanced Linux Sound Architecture >> X86 sound devices
+CONFIG_SND_X86 policy[['amd64': 'y', 'i386': 'y']]}
+CONFIG_HDMI_LPE_AUDIO policy[['amd64': 'm', 'i386': 'm']]

+ # Menu: Device Drivers >> Staging drivers
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+ CONFIG_RTL8192U  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_RTL8723BS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_R8712U  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_R8188EU  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+ CONFIG_RTS5208  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+ CONFIG_FB_SM750  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_FB_XGI  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_USB_EMXX  policy<{'arm64': 'm', 'armhf': 'y'}>
+ CONFIG_STAGING_BOARD  policy<{'arm64': 'n', 'armhf': 'n'}>
+ CONFIG_LTE_GDM724X  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_FIREWIRE_SERIAL  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_FWTTY_MAX_TOTAL_PORTS  policy<{'amd64': '64', 'arm64': '64', 'armhf': '64', 'i386': '64'}>
+ CONFIG_FWTTY_MAX_CARD_PORTS  policy<{'amd64': '32', 'arm64': '32', 'armhf': '32', 'i386': '32'}>
+ CONFIG_MTD_SPINAND_MT29F  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_MTD_SPINAND_ONDIEECC  policy<{'arm64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+ CONFIG_LUSTRE_FS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_LUSTRE_DEBUG_EXPENSIVE_CHECK  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'}>
+ CONFIG_DGNCE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_GS_FPGABOOT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_CRYPTO_SKEIN  policy<{'amd64': 'y'}>
+ CONFIG_COMMON_CLK_XLNX_CLKWZRD  policy<{'arm64': 'n', 'armhf': 'n'}>
+ CONFIG_FSL_MC_BUS  policy<{'arm64': 'y'}>
+ CONFIG_FSL_MC_DPIO  policy<{'arm64': 'm'}>
+CONFIG_FSL_DPAA2 policy\{`arm64': `y'}>
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+CONFIG_DRM_VBOXVIDEO policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `m'}>
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+CONFIG_STAGING flag<REVIEW>
+CONFIG_LUSTRE_FS flag<REVIEW>
+CONFIG_DRM_VBOXVIDEO note<LP:1718679> flag<REVIEW>
+
## Menu: Device Drivers >> Staging drivers >> Android
+
## Menu: Device Drivers >> Staging drivers >> Android >> Ion Memory Manager
+
## Menu: Device Drivers >> Staging drivers >> Broadcom VideoCore support
+CONFIG_BCM_VIDEOCORE policy\{`arm64': `m'}>
+CONFIG_BCM2835_VCHIP policy\{`arm64': `m'}>
+CONFIG_SND_BCM2835 policy\{`arm64': `m'}>
+CONFIG_VIDEO_BCM2835 policy\{`arm64': `m'}>
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## Menu: Device Drivers >> Staging drivers >> Data acquisition support (comedi)
+CONFIG_COMEDI policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `m'}>
+CONFIG_COMEDI_DEBUG policy\{`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64el': `n'}>
+CONFIG_COMEDI_DEFAULT_BUF_SIZE KB policy\{`amd64': `2048', `arm64': `2048', `armhf': `2048', `i386': `2048', `ppc64el': `2048'}>
+CONFIG_COMEDI_DEFAULT_BUF_MAXSIZE KB policy\{`amd64': `20480', `arm64': `20480', `armhf': `20480', `i386': `20480', `ppc64el': `20480'}>
+CONFIG_COMEDI_8255_SA policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `m'}>
+CONFIG_COMEDI_KCOMEDILIB policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `m'}>
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## Menu: Device Drivers >> Staging drivers >> Data acquisition support (comedi) >> Comedi ISA and PC/104 drivers
+CONFIG_COMEDI_ISA_DRIVERS policy\{`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64el': `y'}>
+CONFIG_COMEDI_PCL711 policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `m'}>
+CONFIG_COMEDI_PCL724 policy\{`amd64': `m', `arm64': `m', `armhf': `m', `i386': `m', `ppc64el': `m'}>
# Menu: Device Drivers >> Staging drivers >> Data acquisition support (comedi) >> Comedi PCI drivers

+CONFIG_COMEDI_PCI_DRIVERS

+CONFIG_COMEDI_8255_PCI

+CONFIG_COMEDI_ADDI_APCI_1032

+CONFIG_COMEDI_ADDI_APCI_1500
Open Source Used In 5GaaS Edge AC-4  18386

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+CONFIG_COMEDI_ADDI_APCI_1516 'ppc64le': 'm'}
+CONFIG_COMEDI_ADDI_APCI_1564 'ppc64le': 'm'}
+CONFIG_COMEDI_ADDI_APCI_16XX 'ppc64le': 'm'}
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+CONFIG_COMEDI_ADDI_APCI_3120 'ppc64le': 'm'}
+CONFIG_COMEDI_ADDI_APCI_3501 'ppc64le': 'm'}
+CONFIG_COMEDI_ADDI_APCI_3XXX 'ppc64le': 'm'}
+CONFIG_COMEDI_ADL_PCI6208 'ppc64le': 'm'}
+CONFIG_COMEDI_ADL_PCI7X3X 'ppc64le': 'm'}
+CONFIG_COMEDI_ADL_PCI8164 'ppc64le': 'm'}
+CONFIG_COMEDI_ADL_PCI9111 'ppc64le': 'm'}
+CONFIG_COMEDI_ADL_PCI9118 'ppc64le': 'm'}
+CONFIG_COMEDI_ADV_PCI1710 'ppc64le': 'm'}
+CONFIG_COMEDI_ADV_PCI1720 'ppc64le': 'm'}
+CONFIG_COMEDI_ADV_PCI1723 'ppc64le': 'm'}
+CONFIG_COMEDI_ADV_PCI1724 'ppc64le': 'm'}
+CONFIG_COMEDI_ADV_PCI1760 'ppc64le': 'm'}
+CONFIG_COMEDI_ADV_PCI_DIO 'ppc64le': 'm'}
+CONFIG_COMEDI_AMPLC_DIO200_PCI 'ppc64le': 'm'}
+CONFIG_COMEDI_AMPLC_PC236_PCI 'ppc64le': 'm'}
+CONFIG_COMEDI_AMPLC_PC263_PCI 'ppc64le': 'm'}
+CONFIG_COMEDI_AMPLC_PCI224 'ppc64le': 'm'}
+CONFIG_COMEDI_AMPLC_PCI230
[ppc64le: 'm']>
+CONFIG_COMEDI_RT520          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> Data acquisition support (comedi) >> Comedi PCMCIA drivers
+CONFIG_COMEDI_PCMCIA_DRIVERS  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMEDI_CB_DAS16_CS     policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMEDI_DAS08_CS        policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMEDI_NI_DAQ_700_CS   policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMEDI_NI_DAQ_DIO24_CS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMEDI_NI_LABPC_CS     policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMEDI_NI_MIO_CS       policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMEDI_QUATECH_DAQP_CS policy<{'amd64': 'm', 'i386': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> Data acquisition support (comedi) >> Comedi USB drivers
+CONFIG_COMEDI_USB_DRIVERS     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_DT9812          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_NI_USB6501      policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_USBDUX          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_USBDUXFAST      policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_USBDUXSIGMA     policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_VMK80XX         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> Data acquisition support (comedi) >> Comedi misc drivers
+CONFIG_COMEDI_MISC_DRIVERS    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_COMEDI_BOND            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_TEST            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_PARPORT         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_SERIAL2002      policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_COMEDI_SSV_DNP         policy<{'i386': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> Greybus support
+CONFIG_GREYBUS                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_GREYBUS_ES2
' m'
+CONFIG_GREYBUS_AUDIO
' ppc64le: m'
+CONFIG_GREYBUS_BOOTROM
' ppc64le: m'
+CONFIG_GREYBUS_FIRMWARE
' ppc64le: m'
+CONFIG_GREYBUS_HID
' m'
+CONFIG_GREYBUS_LIGHT
' ppc64le: m'
+CONFIG_GREYBUS_LOG
' m'
+CONFIG_GREYBUS_LOOPBACK
' ppc64le: m'
+CONFIG_GREYBUS_POWER
' ppc64le: m'
+CONFIG_GREYBUS_RAW
' m'
+CONFIG_GREYBUS_VIBRATOR
' ppc64le: m'
+
+## Menu: Device Drivers >> Staging drivers >> Greybus support >> Greybus Bridged PHY Class drivers
+CONFIG_GREYBUS_BRIDGED_PHY
' ppc64le: m'
+CONFIG_GREYBUS_GPIO
' m'
+CONFIG_GREYBUS_I2C
' m'
+CONFIG_GREYBUS_PWM
' m'
+CONFIG_GREYBUS_SDIO
' m'
+CONFIG_GREYBUS_SPI
' m'
+CONFIG_GREYBUS_UART
' ppc64le: m'
+CONFIG_GREYBUS_USB
' m'
+
+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers
+
+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Accelerometers
+CONFIG_ADIS16201
' m'
+CONFIG_ADIS16203
' m'
+CONFIG_ADIS16209  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
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+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Active energy metering IC
+CONFIG_ADE7753    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ADE7754    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_ADE7759    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ADE7854    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ADE7854_I2C policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ADE7854_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Analog digital bi-direction converters
+CONFIG_ADT7316    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ADT7316_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Analog to digital converters
+CONFIG_AD7606    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7606_IFACE_PARALLEL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7606_IFACE_SPI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7780    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7816    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7192    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7280    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Capacitance to digital converters
+CONFIG_AD7150    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7152    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD7746    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Digital gyroscope sensors
+CONFIG_ADIS16060 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'>
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+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Direct Digital Synthesis
+CONFIG_AD9832    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD9834    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+  
+## Menu: Device Drivers >> Staging drivers >> IIO staging drivers >> Light sensors
+CONFIG_TSL2x7x                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
## Menu: Device Drivers >> Staging drivers >> I/O staging drivers >> Network Analyzer, Impedance Converters
+CONFIG_AD5933                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
## Menu: Device Drivers >> Staging drivers >> I/O staging drivers >> Resolver to digital converters
+CONFIG_AD2S90                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD2S1200                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_AD2S1210                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
## Menu: Device Drivers >> Staging drivers >> IrDA (infrared) subsystem support
+CONFIG_IRDA                    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IRLAN                   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IRNET                   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IRCOMM                  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_IRDA_ULTRA              policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_IRDA_CACHE_LAST_LSAP    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_IRDA_FAST_RR            policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_IRDA_DEBUG              policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
## Menu: Device Drivers >> Staging drivers >> IrDA (infrared) subsystem support >> Infrared-port device drivers
+CONFIG_IRTTY_SIR               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KINGSUN_DONGLE          policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KSDAZZLE_DONGLE         policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_KS959_DONGLE            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_IRDA                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SIGMATEL_FIR            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NSC_FIR                 policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_WINBOND_FIR             policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_TOSHIBA_FIR             policy<{'i386': 'm'}>
+CONFIG_SMC_IRCC_FIR            policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_ALI_FIR                 policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VLSI_FIR                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIA_FIR                 policy<{'amd64': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MCS_FIR                 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

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# Menu: Device Drivers >> Staging drivers >> IrDA (infrared) subsystem support >> Infrared-port device drivers

+ Blackfin SIR on UART

+ # Menu: Device Drivers >> Staging drivers >> IrDA (infrared) subsystem support >> Infrared-port device drivers

++ Blackfin SIR on UART >> SIR Mode

++ # Menu: Device Drivers >> Staging drivers >> IrDA (infrared) subsystem support >> Infrared-port device drivers

++ Serial dongle support

+ CONFIG_DONGLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+ CONFIG_ESI_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_ACTISYS_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_TEKRAM_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_TOIM3232_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_LITELINK_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_MA600_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_GIRBIL_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_MCP2120_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_OLD_BELKIN_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_ACT200L_DONGLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+ # Menu: Device Drivers >> Staging drivers >> Lustre networking subsystem (LNet)

+ CONFIG_LNET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_LNET_MAX_PAYLOAD policy<{'amd64': '1048576', 'arm64': '1048576', 'armhf': '1048576', 'i386': '1048576', 'ppc64le': '1048576'}>
+ CONFIG_LNET_SELFTEST policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_LNET_XPRT_IB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+ # Menu: Device Drivers >> Staging drivers >> MOST driver

+ CONFIG_MOST policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_MOSTCORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_AIM_CDEV policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_AIM_NETWORK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+ CONFIG_AIM_SOUND policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
# Menu: Device Drivers >> Staging drivers >> Media staging drivers
+CONFIG_STAGING_MEDIA policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

+CONFIG_I2C_BCM2048 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_DVB_CXD2099 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VIDEO_IMX_MEDIA policy<{'armhf-generic': 'm'}>
+CONFIG_VIDEO_OMAP4 policy<{'armhf-generic': 'm'}>

## Menu: Device Drivers >> Staging drivers >> Media staging drivers >> Enable support to Intel MIPI camera drivers
+CONFIG_INTEL_ATOMISP policy<{'amd64': 'n', 'i386': 'n'}>

## Menu: Device Drivers >> Staging drivers >> Media staging drivers >> Linux Infrared Remote Control IR receiver/transmitter drivers
+CONFIG_LIRC_STAGING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_LIRC_ZILOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

## Menu: Device Drivers >> Staging drivers >> i.MX5/6 Media Sub devices
+CONFIG_VIDEO_IMX_CSI policy<{'armhf-generic': 'm'}>

## Menu: Device Drivers >> Staging drivers >> NV Tegra Embedded Controller SMBus Interface
+CONFIG_MFD_NVEC policy<{'armhf-generic': 'm'}>
+CONFIG_KEYBOARD_NVEC policy<{'armhf-generic': 'm'}>
+CONFIG_SERIO_NVEC_PS2 policy<{'armhf-generic': 'm'}>
+CONFIG_NVEC_POWER policy<{'armhf-generic': 'm'}>
+CONFIG_NVEC_PAZ00 policy<{'armhf-generic': 'm'}>

## Menu: Device Drivers >> Staging drivers >> Speakup console speech

## Menu: Device Drivers >> Staging drivers >> Speakup console speech >> Speakup core
+CONFIG_SPEAKUP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_ACNTSA  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_ACNTPC  policy<{'i386': 'm'}>
+CONFIG_SPEAKUP_SYNTH_Apollo  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_AUDPTR  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_BNS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_DECTLK  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_DECEXT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_DECPC  policy<{'i386': 'm'}>
+CONFIG_SPEAKUP_SYNTH_DTLK  policy<{'i386': 'm'}>
+CONFIG_SPEAKUP_SYNTH_KEYPC  policy<{'i386': 'm'}>
+CONFIG_SPEAKUP_SYNTH_LTLK  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_SOFT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_SPKOUT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_TXPRT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_SPEAKUP_SYNTH_DUMMY  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Staging drivers >> Support for rtllib wireless devices
+CONFIG_RTLLIB  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTLLIB_CRYPTO_CCMP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTLLIB_CRYPTO_TKIP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTLLIB_CRYPTO_WEP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_RTLLIB8192E  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+## Menu: Device Drivers >> Staging drivers >> Support for small TFT LCD display modules
+CONFIG_FB_TFT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FB_TFT_AGM1264K_FL  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FB_TFT_BD663474  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FB_TFT_HX8340BN  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_FB_TFT_HX8347D  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
# Menu: Device Drivers >> Staging drivers >> USB Power Delivery and Type-C drivers
+CONFIG_TYPEC_TCPCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

+## Menu: Device Drivers >> Staging drivers >> Unisys SPAR driver support
+CONFIG_UNISYSSPAR policy<{'amd64': 'y'}>
+CONFIG_UNISYS_VISORBUS policy<{'amd64': 'm'}>
+CONFIG_UNISYS_VISORNIC policy<{'amd64': 'm'}>
+CONFIG_UNISYS_VISORINPUT policy<{'amd64': 'm'}>
+CONFIG_UNISYS_VISORHBA policy<{'amd64': 'm'}>

+## Menu: Device Drivers >> System Trace Module devices
+CONFIG_STM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_STM_DUMMY policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_STM_SOURCE_CONSOLE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_STM_SOURCE_HEARTBEAT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_STM_SOURCE_FTRACE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>

+## Menu: Device Drivers >> TEE drivers
+CONFIG_OPTTEE policy<{'arm64': 'm', 'armhf': 'm'}>

+## Menu: Device Drivers >> TI VLYNQ
+
+## Menu: Device Drivers >> USB support
+CONFIG_USB_SUPPORT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_USB_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_UHCI_HCD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_WHCI_HCD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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'+m']>
+CONFIG_USB_LED_TRIG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
'y']>
+CONFIG_USB_ULPI_BUS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+# mark<ENFORCED> note<ensures USB 2.0/1.1 probe ordering>
flag<REVIEW>
+
+# Menu: Device Drivers >> USB support >> ChipIdea Highspeed Dual Role Controller
+CONFIG_USB_CHIPIDEA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_CHIPIDEA_UDC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CHIPIDEA_HOST policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CHIPIDEA_ULPI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+# Menu: Device Drivers >> USB support >> Support for Host-side USB
+CONFIG_USB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_ANNOUNCE_NEW_DEVICES policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_DEFAULT_PERSIST policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_DYNAMIC_MINORS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_OTG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_OTG_WHITELIST policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_OTG_BLACKLIST_HUB policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_LEDS_TRIGGER_USBPORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_MON policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_WUSB policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_WUSB_CBAF policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_WUSB_CBAF_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_C67X00_HCD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_OXU210HP_HCD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_ISP116X_HCD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_USP1362_HCD 'm' >
+CONFIG_USB_FOTG210_HCD 'ppc64el': 'm' >
+CONFIG_USB_MAX3421_HCD 'ppc64el': 'm' >
+CONFIG_USB_U132_HCD 'm' >
+CONFIG_USB_SL811_HCD 'm' >
+CONFIG_USB_SL811_HCD_ISO 'y' >
+CONFIG_USB_SL811_CS >
+CONFIG_USB_R8A66597_HCD 'ppc64el': 'm' >
+CONFIG_USB_RENESAS_USBHS_HCD >
+CONFIG_USB_HWA_HCD 'ppc64el': 'm' >
+CONFIG_USB_IMX21_HCD 'm' >
+CONFIG_USB_HCD_BCMA 'm' >
+CONFIG_USB_HCD_SSB 'ppc64el': 'n' >
+CONFIG_USB_HCD_TEST_MODE 'ppc64el': 'n' >
+CONFIG_USB_RENESAS_USBHS >
+CONFIG_USB_ACM 'm' >
+CONFIG_USB_PRINTER 'm' >
+CONFIG_USB_WDM 'm' >
+CONFIG_USB_TMC 'm' >
+CONFIG_USB_MDC800 'm' >
+CONFIG_USB_MICROTEK 'm' >
+CONFIG_USB_MTU3 >
+CONFIG_USB_MTU3_DEBUG 'm' >
+CONFIG_USB_ISP1760 'm' >
+CONFIG_USB_US720 'm' >
+CONFIG_USB_EMI62 'm' >
+CONFIG_USB_EMI26 'm'}
+CONFIG_USB_ADUTUX
   'm'\n+CONFIG_USB_SEVSEG
   'm'\n+CONFIG_USB_LEGOTOWER
   'ppc64el': 'm'\n+CONFIG_USB_LCD
   'm'\n+CONFIG_USB_CYPRESS_CY7C63
   'ppc64el': 'm'\n+CONFIG_USB_CYTHERM
   'm'\n+CONFIG_USB_IDMOUSE
   'm'\n+CONFIG_USB_FTDI_ELAN
   'ppc64el': 'm'\n+CONFIG_USB_APPLEDISPLAY
   'ppc64el': 'm'\n+CONFIG_USB_SISUSBVGA
   'm'\n+CONFIG_USB_SISUSBVGA_CON
   'ppc64el': 'n'\n+CONFIG_USB_LD
   'ppc64el': 'm'\n+CONFIG_USB_TRANCEVIBRATOR
   'ppc64el': 'm'\n+CONFIG_USB_IOWARRIOR
   'ppc64el': 'm'\n+CONFIG_USB_TEST
   'm'\n+CONFIG_USB_EHSET_TEST_FIXTURE
   'ppc64el': 'm'\n+CONFIG_USB_ISIGHTFW
   'm'\n+CONFIG_USB_YUREX
   'm'\n+CONFIG_USB_EZUSB_FX2
   'm'\n+CONFIG_USB_HUB_USB251XB
   'ppc64el': 'm'\n+CONFIG_USB_HSIC_USB3503
   'ppc64el': 'm'\n+CONFIG_USB_HSIC_USB4604
   'ppc64el': 'm'\n+CONFIG_USB_LINK_LAYER_TEST
   'ppc64el': 'm'\n+CONFIG_USB_CHAOSKEY
   'ppc64el': 'm'\n+

+CONFIG_USB_OTG
+CONFIG_USB_OTG_WHITELIST
+CONFIG_USB_OTG_BLACKLIST_HUB
+CONFIG_USB_OTG_FSM
+CONFIG_USB_HCD_BCMA
+CONFIG_USB_HCD_SSB

+CONFIG_USB_DWC2
+CONFIG_USB_DWC2_PCI
+CONFIG_USB_DWC2_DEBUG
+CONFIG_USB_DWC2_TRACK_MISSED_SOFS

+CONFIG_USB_DWC2_HOST
+CONFIG_USB_DWC2_PERIPHERAL
+CONFIG_USB_DWC2_DUAL_ROLE

+CONFIG_USB_DWC3
+CONFIG_USB_DWC3_ULPI
+CONFIG_USB_DWC3_OMAP
+CONFIG_USB_DWC3_EXYNOS
+CONFIG_USB_DWC3_PCI
+CONFIG_USB_DWC3_OF_SIMPLE

+CONFIG_USB_DWC3_HOST
+CONFIG_USB_DWC3_GADGET
+CONFIG_USB_DWC3_DUAL_ROLE

+CONFIG_USB_EHCI_HCD
+CONFIG_USB_EHCI_ROOT_HUB_TT

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+CONFIG_USB_EHCI_TT_NEWSCHED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_USB_EHCI_MXC policy<{'armhf-generic': 'm'}>
+CONFIG_USB_EHCI_HCD_OMAP policy<{'armhf': 'm'}>
+CONFIG_USB_EHCI_HCD_ORION policy<{'armhf': 'y'}>
+CONFIG_USB_EHCI_TEGRA policy<{'armhf-generic': 'm'}>
+CONFIG_USB_EHCI_HCD_PPC_OF policy<{'ppc64el': 'y'}>
+CONFIG_USB_EHCI_EXYNOS policy<{'armhf': 'y'}>
+CONFIG_USB_EHCI_HCD_PLATFORM policy<{'amd64': 'y', 'arm64': 'm', 'armhf': 'n', 'i386': 'y', 'ppc64el': 'm'}>
+
+CONFIG_USB_EHCI_HCD_PLATFORM mark<ENFORCED> note<Don't use the generic ehci/ohci code on omap, it doesn't work> flag<REVIEW>
+CONFIG_USB_EHCI_HCD mark<ENFORCED> note<ensures USB 2.0/1.1 probe ordering> flag<REVIEW>
+
+## Menu: Device Drivers >> USB support >> Support for Host-side USB >> ISP1760 Mode Selection
+CONFIG_USB_ISP1760_HOST_ROLE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_USB_ISP1760_GADGET_ROLE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_USB_ISP1760_DUAL_ROLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+
+## Menu: Device Drivers >> USB support >> Support for Host-side USB >> Inventra Highspeed Dual Role Controller (TI, ADI, AW, ...) >> Disable DMA (always use PIO)
+CONFIG_MUSB_PIO_ONLY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+
+## Menu: Device Drivers >> USB support >> Support for Host-side USB >> Inventra Highspeed Dual Role Controller (TI, ADI, AW, ...) >> MUSB Mode Selection
+CONFIG_MUSB_HOST policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_MUSB_GADGET policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_USB_MUSB_DUAL_ROLE          policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'pc64el': 'y'}>
+
## Menu: Device Drivers >> USB support >> Support for Host-side USB >> MTU3 Mode Selection
+CONFIG_USB_MTU3_HOST               policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_USB_MTU3_GADGET             policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_USB_MTU3_DUAL_ROLE          policy<{'arm64': 'y', 'armhf': 'y'}>
+
## Menu: Device Drivers >> USB support >> Support for Host-side USB >> OHCI HCD (USB 1.1) support
+CONFIG_USB_OHCI_HCD               policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'pc64el': 'y'}>
+CONFIG_USB_OHCI_HCD_OMAP3          policy<{'armhf-generic': 'm'}>
+CONFIG_USB_OHCI_HCD_PPC_OF_BE      policy<{'pc64el': 'n'}>
+CONFIG_USB_OHCI_HCD_PPC_OF_LE      policy<{'pc64el': 'n'}>
+CONFIG_USB_OHCI_HCD_PCI            policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'pc64el': 'y'}>
+CONFIG_USB_OHCI_EXYNOS             policy<{'armhf': 'y'}>
+CONFIG_USB_OHCI_HCDPLATFORM       policy<{'amd64': 'y', 'arm64': 'm', 'armhf-generic': 'm', 'armhf-generic-lpae': 'n', 'i386': 'y', 'pc64el': 'm'}>
+
## Menu: Device Drivers >> USB support >> Support for Host-side USB >> USB DSL modem support
+CONFIG_USB_ATM                   policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+CONFIG_USB_SPEEDTOUCH            policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+CONFIG_USB_CXACRU                policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+CONFIG_USB_UEAGLEATM             policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+CONFIG_USB_XUSBATM               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+
## Menu: Device Drivers >> USB support >> Support for Host-side USB >> USB Mass Storage support
+CONFIG_USB_STORAGE               policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+CONFIG_USB_STORAGE_DEBUG         policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'pc64el': 'n'}>
+CONFIG_USB_STORAGE_REALTEK       policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+CONFIG_REALTEK_AUTOPM            policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'pc64el': 'y'}>
+CONFIG_USB_STORAGE_DATAFAB       policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
+CONFIG_USB_STORAGE_FREECOM       policy<{' amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'pc64el': 'm'}>
![Open Source Used In 5GaaS Edge AC-4 18403](image-url)
+CONFIG_USB_SERIAL_QUALCOMM
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_SPCP8X5
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_SAFE
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_SAFE_PADD
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_SERIAL_SIERRAWIRELESS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_SYMBOL
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_TI
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_CYBERJACK
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_XIRCOM
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_OPTION
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_OMNINET
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_OPTICON
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_XSENS_MT
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_WISHBONE
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_SSU100
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_QT2
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_UPD78F0730
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_DEBUG
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

+CONFIG_USB_SERIAL_DEBUG
  note<not actually debug>
+
+## Menu: Device Drivers >> USB support >> Support for Host-side USB >> USB Serial Converter support >> USB Keyspan USA-xxx Serial Driver
+CONFIG_USB_SERIAL_KEYSPAN
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_SERIAL_KEYSPAN_MPR
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA28
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA28X
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA28XA policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA28XB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA19 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA18X policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA19W policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA19QW policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA19QI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA49W policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_SERIAL_KEYSPAN_USA49WLC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

# Menu: Device Drivers >> USB support >> Support for Host-side USB >> USB/IP support
+CONFIG_USBIP_CORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USBIP_VHCI_HCD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USBIP_VHCI_HC_PORTS policy<{'amd64': '8', 'arm64': '8', 'armhf': '8', 'i386': '8', 'ppc64le': '8'}>
+CONFIG_USBIP_VHCI_NR_HCS policy<{'amd64': '1', 'arm64': '1', 'armhf': '1', 'i386': '1', 'ppc64le': '1'}>
+CONFIG_USBIP_HOST policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USBIP_VUDC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USBIP_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

# Menu: Device Drivers >> USB support >> Support for Host-side USB >> xHCI HCD (USB 3.0) support
+CONFIG_USB_XHCI_HCD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_XHCI_DBGCAP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_XHCI_PLATFORM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_XHCI_MTK policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_USB_XHCI_MVEBU policy<{'armhf': 'm'}>
+CONFIG_USB_XHCI_TEGRA policy<{'armhf-generic': 'm'}>
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+CONFIG_USB_XHCI_HCD
  flag<REVIEW>
  +
  +# Menu: Device Drivers >> USB support >> USB Gadget Support
+CONFIG_USB_GADGET
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_GADGET_DEBUG
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_GADGET_DEBUG_FILES
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_GADGET_DEBUG_FS
  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_GADGET_VBUS_DRAW
  policy<{'amd64': '2', 'arm64': '2', 'armhf': '2', 'i386': '2', 'ppc64le': '2'}>
+CONFIG_USB_GADGET_STORAGE_NUM_BUFFERS
  policy<{'amd64': '2', 'arm64': '2', 'armhf': '2', 'i386': '2', 'ppc64le': '2'}>
+CONFIG_U_SERIAL_CONSOLE
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
  +# Menu: Device Drivers >> USB support >> USB Gadget Support >> USB Gadget functions configurable through configs
+CONFIG_USB_CONFIGFS
  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_CONFIGFS_SERIAL
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_ACM
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_OBEX
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_NCM
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_ECM
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_ECM_SUBSET
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_RNDIS
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_EEM
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_PHONET
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_MASS_STORAGE
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_LB_SS
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_FS
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_UAC1
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
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+CONFIG_USB_CONFIGFS_F_UAC1_LEGACY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_UAC2 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_MIDI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_HID policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_UVC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_PRINTER policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_CONFIGFS_F_TCM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+CONFIG_USB_ZERO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_AUDIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_GADGET_UAC1 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_GADGET_UAC1_LEGACY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_ETH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_ETH_RNDIS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_ETH_EEM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_G_NCM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_GADGETFS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_MASS_STORAGE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_GADGET_TARGET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_G_SERIAL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_MIDI_GADGET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_G_PRINTER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_CDC_COMPOSITE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_G_NOKIA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_G_ACM_MS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_G_MULTI  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'm', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_G_MULTI_RNDIS  policy<{'armhf': 'y'}>
+CONFIG_USB_G_MULTI_CDC  policy<{'armhf': 'y'}>
+CONFIG_USB_G_DBGP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_G_WEBCAM  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>

## Menu: Device Drivers >> USB support >> USB Gadget Support >> USB Gadget precomposed configurations

>> EHCI Debug Device mode

+CONFIG_USB_DBGP_PRINTK  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_USB_DBGP_SERIAL  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

## Menu: Device Drivers >> USB support >> USB Gadget Support >> USB Gadget precomposed configurations

>> Function Filesystem

+CONFIG_USB_FUNCTIONFS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_FUNCTIONFS_ETH  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_FUNCTIONFS_RNDIS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_USB_FUNCTIONFS_GENERIC  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

## Menu: Device Drivers >> USB support >> USB Gadget Support >> USB Peripheral Controller

+CONFIG_USB_FSL_USB2  policy<{'armhf-generic': 'm'}>
+CONFIG_USB_FUSB300  policy<{'armhf-generic': 'm'}>
+CONFIG_USB_FOTG210_UDEC  policy<{'armhf-generic': 'm'}>
+CONFIG_USB_GR_UDEC  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_R8A66597  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_RENESAS_USBHS_UDEC  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_USB_RENESAS_USB3  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_USB_PXA27X  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_MV_UDEC  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_USB_MV_U3D  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
'm'}>
+CONFIG_USB_SN52UDC Plat  
+CONFIG_USB_M66592  
+CONFIG_USB_BDC_UDC Plat  
+CONFIG_USB_BDC_PCI  
+CONFIG_USB_AMD5536UDC  
+CONFIG_USB_NET2272  
+CONFIG_USB_NET2272_DMA  
+CONFIG_USB_AMD5536UDC  
+CONFIG_USB_NET2280  
+CONFIG_USB_GOKU  
+CONFIG_USB_EG20T  
+CONFIG_USB_GADGET_XILINX  
+CONFIG_USB_DUMMY_HCD  
+CONFIG_USB_M66592  
+CONFIG_USB_DUMMY_HCD  
+ CONFIG_NOP_USB_XCEIV  
+CONFIG_AM335X_PHY_USB  
+CONFIG_TWL6030_USB  
+CONFIG_USB_GPIO_VBUS  
+CONFIG_TAHVO_USB  
+CONFIG_TAHVO_USB_HOST_BY_DEFAULT  
+CONFIG_USB_ISP1301  
+CONFIG_USB_MXS_PHY  
+CONFIG_USB_ULPI  
+ CONFIG_NOP_USB_XCEIV  

+ Menu: Device Drivers >> USB support >> USB Physical Layer drivers  
+CONFIG_NOP_USB_XCEIV  
+CONFIG_AM335X_PHY_USB  
+CONFIG_TWL6030_USB  
+CONFIG_USB_GPIO_VBUS  
+CONFIG_TAHVO_USB  
+CONFIG_TAHVO_USB_HOST_BY_DEFAULT  
+CONFIG_USB_ISP1301  
+CONFIG_USB_MXS_PHY  
+CONFIG_USB_ULPI  
+ CONFIG_NOP_USB_XCEIV  

+ Menu: Device Drivers >> USB support >> USB Type-C Support  
+CONFIG_TYPEC  
+CONFIG_TYPEC_TCPM  

+CONFIG_TYPEC_FUSB302
+CONFIG_TYPEC_UCSI
+CONFIG_UCSI ACPI
+CONFIG_TYPEC_TPS6598X

+ CONFIG_TYPEC_FUSB302
+ CONFIG_TYPEC_UCSI
+ CONFIG_UCSI ACPI
+ CONFIG_TYPEC_TPS6598X

+ # Menu: Device Drivers >> Ultra Wideband devices
+ CONFIG_UWB
+ CONFIG_UWB_HWA
+ CONFIG_UWB_WHCI
+ CONFIG_UWB_I1480U
+ # Menu: Device Drivers >> Userspace I/O drivers
+ CONFIG_UIO
+ CONFIG_UIO_CIF
+ CONFIG_UIO_PDRV_GENIRQ
+ CONFIG_UIO_DMEM_GENIRQ
+ CONFIG_UIO_AEC
+ CONFIG_UIO_SERCO3
+ CONFIG_UIO_PCI_GENERIC
+ CONFIG_UIO_NETX
+ CONFIG_UIO_FSL_ELBC_GPCM
+ CONFIG_UIO_FSL_ELBC_GPCM_NETX5152
+ CONFIG_UIO_PRUSS
+ CONFIG_UIO_MF624
+ CONFIG_UIO_HV_GENERIC
+ # Menu: Device Drivers >> VFIO Non-Privileged userspace driver framework
+ CONFIG_VFIO
+ CONFIG_VFIO_NOIOMMU

+ CONFIG_TYPEC_FUSB302
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+ CONFIG_TYPEC_UCSI
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+ CONFIG_UCSI ACPI
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+ CONFIG_TYPEC_TPS6598X
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+ CONFIG_UWB
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+ CONFIG_UWB_HWA
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_UWB_WHCI
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_UWB_I1480U
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+ CONFIG_UIO_PDRV_GENIRQ
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_UIO_DMEM_GENIRQ
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+ CONFIG_UIO_PCI_GENERIC
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_UIO_NETX
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_UIO_FSL_ELBC_GPCM
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+ CONFIG_UIO_FSL_ELBC_GPCM_NETX5152
policy<{'ppc64el': 'm'}>
+ CONFIG_UIO_PRUSS
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+ CONFIG_UIO_MF624
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policy<{'amd64': 'm', 'i386': 'm'}>
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+CONFIG_VFIO policy<ENFORCED>note<LP#1636733>
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+## Menu: Device Drivers >> VFIO Non-Privileged userspace driver framework >> VFIO support for platform devices
+CONFIG_VFIO_PLATFORM policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_VFIO_AMBA policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_VFIOPLATFORM_CALXEDAXGMAC_RESET policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_VFIOPLATFORM_AMDXGBE_RESET policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_VFIOPLATFORM_BCMFLEXRM_RESET policy<{'arm64': 'm'}>
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+## Menu: Device Drivers >> VME bridge support
+CONFIG_VME_BUS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'm'}>
+CONFIG_VME_CA91CX42 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VME_TSI148 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_VME_FAKE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_VMIVME_7805 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_VME_USER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
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+## Menu: Device Drivers >> Virtio drivers
+CONFIG_VIRTIO_PCI policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
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+CONFIG_VIRTIO_BALLOON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_VIRTIO_INPUT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
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+## Menu: Device Drivers >> Virtio drivers
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+CONFIG_VIRTIO_MMIO note<LP:1557689>
+## Menu: Device Drivers >> Virtualization drivers
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+## Menu: Device Drivers >> Voltage and Current Regulator Support
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+CONFIG_REGULATOR_VIRTUAL_CONSUMER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_REGULATOR_USERSPACE_CONSUMER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_REGULATOR_ACT8865 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_REGULATOR_AD5398 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_REGULATOR_ANATOP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_REGULATOR_AAT2870 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_REGULATOR_AB3100 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_REGULATOR_ARIZONA_LDO1 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_REGULATOR_AS3711 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_REGULATOR_BCM590XX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_REGULATOR_BD9571MWV policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_REGULATOR_MC13892
+CONFIG_REGULATOR_MT6311
+CONFIG_REGULATOR_MT6323
+CONFIG_REGULATOR_MT6380
+CONFIG_REGULATOR_MT6397
+CONFIG_REGULATOR_PALMAS
+CONFIG_REGULATOR_PBIAS
+CONFIG_REGULATOR_PCAP
+CONFIG_REGULATOR_PCF50633
+CONFIG_REGULATOR_PFUZE100
+CONFIG_REGULATOR_PV88060
+CONFIG_REGULATOR_PV88080
+CONFIG_REGULATOR_PV88090
+CONFIG_REGULATOR_PWM
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+CONFIG_REGULATOR_RN5T618
+CONFIG_REGULATOR_RT5033
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+CONFIG_REGULATOR_TPS51632
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+CONFIG_REGULATOR_VEXPRESS
+CONFIG_REGULATOR_WM831X

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+CONFIG_REGULATOR_WM8350
+CONFIG_REGULATOR_WM8400
+CONFIG_REGULATOR_WM8994
+CONFIG_REGULATOR_FIXED_VOLTAGE
+CONFIG_REGULATOR_TWL4030
+CONFIG_REGULATOR_TPS65217
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+CONFIG_WATCHDOG
+CONFIG_WATCHDOG_CORE
+CONFIG_WATCHDOG_NOWAYOUT
+CONFIG_WATCHDOG_HANDLE_BOOT_ENABLED
+CONFIG_WATCHDOG_SYSFS
+CONFIG_SOFT_WATCHDOG
+CONFIG_SOFT_WATCHDOG_PRETIMEOUT
+CONFIG_DA9052_WATCHDOG
+CONFIG_DA9055_WATCHDOG
+CONFIG_DA9063_WATCHDOG
+CONFIG_DA9062_WATCHDOG
+CONFIG_GPIO_WATCHDOG
+CONFIG_MENF21BMC_WATCHDOG
+CONFIG_TANGOX_WATCHDOG
+CONFIG_MENF21BMC_WATCHDOG
+CONFIG_DA9052_WATCHDOG
+CONFIG_DA9055_WATCHDOG
+CONFIG_DA9063_WATCHDOG
+CONFIG_DA9062_WATCHDOG
+CONFIG_GPIO_WATCHDOG
+CONFIG_MENF21BMC_WATCHDOG
+CONFIG_TANGOX_WATCHDOG
+CONFIG_WDAT_WDT
+CONFIG_WM831X_WATCHDOG
+CONFIG_XILINX_WATCHDOG
+CONFIG_ZIIRAVE_WATCHDOG

+## Menu: Device Drivers >> Watchdog Timer Support

+CONFIG_WATCHDOG
+CONFIG_WATCHDOG_CORE
+CONFIG_WATCHDOG_NOWAYOUT
+CONFIG_WATCHDOG_HANDLE_BOOT_ENABLED
+CONFIG_WATCHDOG_SYSFS
+CONFIG_SOFT_WATCHDOG
+CONFIG_SOFT_WATCHDOG_PRETIMEOUT
+CONFIG_DA9052_WATCHDOG
+CONFIG_DA9055_WATCHDOG
+CONFIG_DA9063_WATCHDOG
+CONFIG_DA9062_WATCHDOG
+CONFIG_GPIO_WATCHDOG
+CONFIG_MENF21BMC_WATCHDOG
+CONFIG_TANGOX_WATCHDOG
+CONFIG_WDAT_WDT
+CONFIG_WM831X_WATCHDOG
+CONFIG_XILINX_WATCHDOG
+CONFIG_ZIIRAVE_WATCHDOG
+CONFIG_ARM_SP805_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_ARM_SBSA_WATCHDOG  policy<{'arm64': 'm'}>
+CONFIG_CADENCE_WATCHDOG  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
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+CONFIG_S3C2410_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_DW_WATCHDOG  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_OMAP_WATCHDOG  policy<{'armhf': 'm'}>
+CONFIG_ONION_WATCHDOG  policy<{'armhf': 'm'}>
+CONFIG_RN5T618_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_SUNXI_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_TW4030_WATCHDOG  policy<{'armhf-generic': 'm'}>
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+CONFIG_TS4800_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_MAX63XX_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
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+CONFIG_MAX77620_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
+CONFIG_IMX2_WDT  policy<{'arm64': 'm', 'armhf-generic': 'm'}>
+CONFIG_RETU_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_TEGRA_WATCHDOG  policy<{'armhf-generic': 'm'}>
+CONFIG_QCOM_WDT  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_MESON_GXBB_WATCHDOG  policy<{'armhf': 'm'}>
+CONFIG_MESON_WATCHDOG  policy<{'armhf': 'm'}>
+CONFIG_MEDIATEK_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_RENESAS_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_RENESAS_RZAWDT  policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_UNIPHIER_WATCHDOG  policy<{'armhf': 'm'}>
+CONFIG_ACQUIRE_WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_ADVANTECH_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_ALIM1535_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_ALIM7101 WATCHDOG  policy<{'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
'm', 's390x': 'n'}>
+CONFIG_EBC_C384_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_F71808E_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_SP5100_TCO  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_SBC_FITPC2_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_EUROTECH_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_IB700_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_IBMASR  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_WAFTER_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_IE6XX_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_SCU_WATCHDOG  policy<{'i386': 'y'}>
+CONFIG_INTEL_MID_WATCHDOG  policy<{'i386': 'm'}>
+CONFIG_ITCO_WATCHDOG  policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_ITCO_VENDOR_SUPPORT  policy<{'arm64': 'y', 'i386': 'y'}>
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+CONFIG_IT8712F_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_IT87_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HP_WATCHDOG policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_KEMPLD_WDT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
+CONFIG_HPWDT_NMI_DECODING policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_SC1200_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_Scx200_WDT policy<{'i386': 'm'}>
+CONFIG_PC87413_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_NV_TCO policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_60XX_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SBC8360_WDT policy<{'i386': 'm'}>
+CONFIG_SBC7240_WDT policy<{'i386': 'm'}>
+CONFIG_CPU5_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SMSC_SCH311X_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SMSC37B787_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VIA_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_W83627HF_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_W83877F_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_W83977F_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MACHZ_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SBC_EPX_C3_WATCHDOG policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_MEI_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_NI903X_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_NIC7018_WDT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_BCM2835_WDT policy<{'arm64': 'm'}>
+CONFIG_BCM7038_WDT policy<{'arm64': 'm'}>
+CONFIG_MEN_A21_WDT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_WATCHDOG_RTAS policy<{'ppc64el': 'm'}>
+CONFIG_DIAG288_WATCHDOG policy<{'s390x': 'm'}>
+CONFIG_XEN_WDT policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_PCWATCHDOG policy<{'i386': 'm'}>
+CONFIG_MIXCOMWD policy<{'i386': 'm'}>
+CONFIG_WDT policy<{'i386': 'm'}>
+CONFIG_PCIEWATCHDOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_WDT_PCI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_USBPCWATCHDOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

+ CONFIG_WATCHDOG_PRETIMEOUT_GOV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+ CONFIG_WATCHDOG_PRETIMEOUT_GOV_NOOP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+ CONFIG_WATCHDOG_PRETIMEOUT_GOV_PANIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+ # Menu: Device Drivers >> Watchdog Timer Support >> Enable watchdog pretimeout governors

+ CONFIG_WATCHDOG_PRETIMEOUT_GOV policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+ CONFIG_WATCHDOG_PRETIMEOUT_GOV_NOOP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+ CONFIG_WATCHDOG_PRETIMEOUT_GOV_PANIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
'+i386: 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
+# Menu: Device Drivers >> Watchdog Timer Support >> Enable watchdog pretimeout governors >> Default
Watchdog Pretimeout Governor
+CONFIG_WATCHDOG_PRETIMEOUT_DEFAULT_GOV_NOOP     policy<{'amd64': 'y', 'arm64': 'y', 'armhf':
'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_WATCHDOG_PRETIMEOUT_DEFAULT_GOV_PANIC     policy<{'amd64': 'n', 'arm64': 'n', 'armhf':
n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+
+# Menu: Device Drivers >> X86 Platform Specific Device Drivers
+CONFIG_X86_PLATFORM_DEVICES                     policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_ACER_WMI                                policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ACERHDF                                  policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ALIENWARE_WMI                           policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ASUS_LAPTOP                              policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_SMBIOS                              policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_SMBIOS_WMI                         policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DELL_SMBIOS_SMM                         policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_DELL_LAPTOP                              policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_WMI                                policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_WMI_AIO                            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_WMI_LED                            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_SMO8800                             policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_RBTN                                policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_DELL_UART_BACKLIGHT                     policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_FUJITSU_LAPTOP                           policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_FUJITSU_TABLET                           policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_AMILO_RFKILL                            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_TC1100_WMI                               policy<{'i386': 'm'}>
+CONFIG_HP_ACCEL                                 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HP_WIRELESS                              policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_HP_WMI                                   policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MSI_LAPTOP                               policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PANASONIC_LAPTOP                         policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_COMPAL_LAPTOP                            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SONY_LAPTOP                              policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SONYPI_COMPAT                            policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_IDEAPAD_LAPTOP                           policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SURFACE3_WMI                             policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SENSORS_HDAPS                            policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_MENLOW                             policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_EEEPC_LAPTOP                             policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ASUS_WMI                                 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ASUS_NB_WMI                              policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_EEEPC_WMI                                policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ASUS_WIRELESS                           policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_TOPSTAR_LAPTOP                           policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_TOSHIBA_BT_RFKILL                        policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_TOSHIBA_HAPS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ACPI_CMPC policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_CHT_INT33FET policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_INT0002_VGPIO policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_HID_EVENT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_VBTN policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_SCU_IPC policy<{'i386': 'y'}>
+CONFIG_INTEL_SCU_IPC_UTIL policy<{'i386': 'm'}>
+CONFIG_INTEL_MID_POWER_BUTTON policy<{'i386': 'm'}>
+CONFIG_INTEL_MFLD_THERMAL policy<{'i386': 'm'}>
+CONFIG_INTEL_IPS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_PMC_CORE policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_IBM_RTL policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SAMSUNG_LAPTOP policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_OAKTRAIL policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SAMSUNG_Q10 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_APPLE_GMUX policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_RST policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_SMARTCONNECT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PVPANIC policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_PMC_IPC policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_BXTWC_PMIC_TMU policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SURFACE_PRO3_BUTTON policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SURFACE_3_BUTTON policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_PUNIT_IPC policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_TELEMETRY policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MLX_PLATFORM policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MLX_CPLD_PLATFORM policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_TURBO_MAX_3 policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_SILEAD_DMI policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_INTEL_ATOMISP2_PM policy<{'amd64': 'n', 'i386': 'n'}>
+
+## Menu: Device Drivers >> X86 Platform Specific Device Drivers >> ThinkPad ACPI Laptop Extras

+CONFIG_THINKPAD_ACPI policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_THINKPAD_ACPI_ALSA_SUPPORT policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_THINKPAD_ACPI_DEBUGFACILITIES policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_THINKPAD_ACPI_DEBUG policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_THINKPAD_ACPI_UNSAFE_LEDS policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_THINKPAD_ACPI_VIDEO policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_THINKPAD_ACPI_HOTKEY_POLL policy<{'amd64': 'y', 'i386': 'y'}>
+
+## Menu: Device Drivers >> X86 Platform Specific Device Drivers >> WMI

+CONFIG_ACPI_WMI policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_WMI_BMOF policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_INTEL_WMI_THUNDERBOLT policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_MSI_WMI policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_PEAQ_WMI policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_ACPI_TOSHIBA policy<{'amd64': 'm', 'i386': 'm'}>

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+CONFIG_TOSHIBA_WMI policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_MXM_WMI policy<{'amd64': 'm', 'i386': 'm'}>
+
## Menu: Device Drivers >> Xen driver support
+CONFIG_XEN_DEV_EVTCHN policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_XENFS policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_XEN_COMPAT_XENFS policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_XEN_SYS_HYPERVERSOR policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_XEN_GNTDEV policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_XEN_GRANT_DEV_ALLOC policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_XEN_PVCALLS_FRONTEND policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_XEN_ACPI_PROCESSOR policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_XEN_MCE_LOG policy<{'amd64': 'y'}>
+CONFIG_XEN_SYMS policy<{'amd64': 'y', 'i386': 'y'}>
+
## CONFIG_XEN_ACPI_PROCESSOR mark<ENFORCED> note<boot essential on XEN host>
+
## Menu: Device Drivers >> Xen driver support >> Backend driver support
+CONFIG_XEN_BACKEND policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_XEN_PCIDEV_BACKEND policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_XEN_PVCALLS_BACKEND policy<{'amd64': 'n', 'arm64': 'n', 'i386': 'n'}>
+CONFIG_XEN_SCSI_BACKEND policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+
## Menu: Device Drivers >> Xen driver support >> Xen memory balloon driver
+CONFIG_XEN_BALLOON policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_XEN_SELFBALLOONING policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_XEN_BALLOON_MEMORY_HOTPLUG policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_XEN_BALLOON_MEMORY_HOTPLUG_LIMIT policy<{'amd64': '512', 'i386': '4'}>
+CONFIG_XEN_SCRUB_PAGES policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+
## Menu: Dump support
#
+
## Menu: Dump support >> Architecture: s390
+
## Menu: Enable loadable module support
+CONFIG_MODULES policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MODULE_FORCE_LOAD policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_MODULE_UNLOAD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MODULE_FORCE_UNLOAD policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_MODVERSIONS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MODULE_SRCVERSION_ALL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
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's390x': 'y'>
+CONFIG_BLK_WBT_SQ policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_BLK_WBT_MQ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_BLK_DEBUG_FS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_BLK_SED_OPAL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+
+CONFIG_BLK_DEV_THROTTLING note<CGROUP disk consumption control>
+
++ Menu: Enable the block layer >> IO Schedulers
+CONFIG_IOSCHED_DEADLINE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_IOSCHED_CFQ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_CFQ_GROUP_IOSCHED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_MQ_IOSCHED_DEADLINE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_MQ_IOSCHED_KYBER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IOSCHED_BFQ policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_BFQ_GROUP_IOSCHED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+
+CONFIG_MQ_IOSCHED_DEADLINE flag<REVIEW>
+
++ Menu: Enable the block layer >> IO Schedulers >> Default I/O scheduler
+CONFIG_DEFAULT_DEADLINE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_DEFAULT_CFQ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_DEFAULT_NOOP policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+
++ Menu: Enable the block layer >> Partition Types
+
++ Menu: Enable the block layer >> Partition Types >> Advanced partition selection
+CONFIG_PARTITION_ADVANCED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_AIX_PARTITION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_OSF_PARTITION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_AMIGA_PARTITION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_PARTITION_ADVANCED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_ACORN_PARTITION policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>

+## Menu: Endianness selection
+CONFIG_CPU_BIG_ENDIAN policy<{'arm64': 'n', 'armhf': 'n', 'ppc64el': 'n', 's390x': 'y'}>

+## Menu: Endianness selection >> Architecture: powerpc
+CONFIG_CPU_LITTLE_ENDIAN  policy{"ppc64el': 'y'}>
+
+## Menu: Executable file formats / Emulations
+CONFIG_BINFMT_ELF  policy{"amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_BINFMT_ELF_FDPIC  policy{"armhf': 'y'}>
+CONFIG_CORE_DUMP_DEFAULT_ELF_HEADERS  policy{"amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_BINFMT_SCRIPT  policy{"amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_BINFMT_FLAT  policy{"armhf': 'y'}>
+CONFIG_BINFMT_ZFLAT  policy{"armhf': 'y'}>
+CONFIG_BINFMT_SHARED_FLAT  policy{"armhf': 'y'}>
+CONFIG_BINFMT_AOUT  policy{"i386': 'n'}>
+CONFIG_BINFMT_MISC  policy{"amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_COREDUMP  policy{"amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SECCOMP  policy{"amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_COMPAT  policy{"amd64': 'y', 'arm64': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+
+## Menu: Executable file formats / Emulations >> Architecture: arm
+
+## Menu: Executable file formats / Emulations >> Architecture: arm64
+
+## Menu: Executable file formats / Emulations >> Architecture: s390
+
+## Menu: Executable file formats / Emulations >> Architecture: x86
+CONFIG_IA32_EMULATION  policy{"amd64': 'y'}>
+CONFIG_IA32_AOUT  policy{"amd64': 'n'}>
+CONFIG_X86_X32  policy{"amd64': 'y'}>
+
+## Menu: Executable file formats / Emulations >> Architecture: x86
+CONFIG_IA32_AOUT  policy{"amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_EXT2_FS  policy{"amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_EXT3_FS  policy{"amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_JBD2_DEBUG  policy{"amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_GFS2_FS  policy{" amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
's390x': 'y'}>
+CONFIG_GFS2_FS_LOCKING_DLM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NILFS2_FS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm',
's390x': 'm'}>
+CONFIG_FS_DAX policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_EXPORTFS_BLOCK_OPS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_FILE_LOCKING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_MANDATORY_FILE_LOCKING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_FS_ENCRYPTION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_DNOTIFY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_INOTIFY_USER policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_FANOTIFY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_FANOTIFY_ACCESS_PERMISSIONS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_QUOTA_NETLINK_INTERFACE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_AUTOFS4_FS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm',
'm', 's390x': 'y'}>
+CONFIG_FUSE_FS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_CUSE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm',
's390x': 'm'}>
+##
+CONFIG_EXT2_FS note<ext4 handling via EXT4_USE_FOR_EXT23>
+CONFIG_EXT3_FS note<ext4 handling via EXT4_USE_FOR_EXT23>
+CONFIG_FUSE_FS note<not autoloadable> flag<REVIEW>
+
+## Menu: File systems >> Btrfs filesystem support
+CONFIG_BTRFS_FS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm',
's390x': 'm'}>
+CONFIG_BTRFS_FS_POSIX_ACL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_BTRFS_FS_CHECK_INTEGRITY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_BTRFS_FS_RUN_SANITY_TESTS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_BTRFS_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n',
's390x': 'n'}>
+CONFIG_BTRFS_ASSERT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n',
's390x': 'n'}>
+CONFIG_BTRFS_FS_REF_VERIFY  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+
## Menu: File systems >> CD-ROM/DVD Filesystems
+CONFIG_ISO9660_FS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_JOLIET  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_ZISOFS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_UDF_FS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
## Menu: File systems >> Caches
+CONFIG_CACHEFILES  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_CACHEFILES_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_CACHEFILES_HISTOGRAM  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+
## Menu: File systems >> Caches >> General filesystem local caching manager
+CONFIG_FSCACHE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_FSCACHE_STATS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_FSCACHE_HISTOGRAM  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_FSCACHE_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_FSCACHE_OBJECT_LIST  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+
## Menu: File systems >> DOS/FAT/NT Filesystems
+CONFIG_MSDOS_FS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_NTFS_FS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_NTFS_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_NTFS_RW  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'y'}>
+
## Menu: File systems >> DOS/FAT/NT Filesystems >> VFAT (Windows-95) fs support
+CONFIG_VFAT_FS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_FAT_DEFAULT_CODEPAGE  policy<{'amd64': '437', 'arm64': '437', 'armhf': '437', 'i386': '437', 'ppc64el': '437', 's390x': '437'}>
+CONFIG_FAT_DEFAULT_IOCHARSET  policy<{'amd64': '"iso8859-1"', 'arm64': '"iso8859-1"', 'armhf': '"iso8859-1"', 'i386': '"iso8859-1"', 'ppc64le': '"iso8859-1"', 's390x': '"iso8859-1"'}>
+CONFIG_FAT_DEFAULT_UTF8  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>

+CONFIG_VFAT_FS  note<needed on arm to ensure we can write the kernel when replacing>
+
++ Menu: File systems >> Distributed Lock Manager (DLM)
+CONFIG_DLM  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_DLM_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>

++ Menu: File systems >> F2FS filesystem support
+CONFIG_F2FS_FS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_F2FS_STAT_FS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_F2FS_CHECK_FS  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_F2FS_IO_TRACE  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_F2FS_FAULT_INJECTION  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>

++ Menu: File systems >> F2FS filesystem support >> F2FS extended attributes
+CONFIG_F2FS_FS_XATTR  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_F2FS_FS_POSIX_ACL  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_F2FS_FS_SECURITY  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_F2FS_FS_ENCRYPTION  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

++ Menu: File systems >> JFS filesystem support
+CONFIG_JFS_FS  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_JFS_POSIX_ACL  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_JFS_SECURITY  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_JFS_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_JFS_STATISTICS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>

++ Menu: File systems >> Miscellaneous filesystems
+CONFIG_MISC_FILESYSTEMS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SYSV_FS
's390x': 'n'>
+CONFIG_UFS_FS
's390x': 'n'>
+CONFIG_UFS_FS_WRITE
'n'>
+CONFIG_UFS_DEBUG
+CONFIG_EXOFS_FS
's390x': 'n'>
+CONFIG_EXOFS_DEBUG
'n'>
+CONFIG_ECRYPT_FS
+# Menu: File systems >> Miscellaneous filesystems >> Aufs (Advanced multi layered unification filesystem) support
+CONFIG_AUFS_FS
's390x': 'm'>
+CONFIG_AUFS_HNOTIFY
's390x': 'n'>
+CONFIG_AUFS_EXPORT
's390x': 'y'>
+CONFIG_AUFS_XATTR
's390x': 'y'>
+CONFIG_AUFS_FHSM
's390x': 'n'>
+CONFIG_AUFS_RDU
's390x': 'n'>
+CONFIG_AUFS_DIRREN
's390x': 'y'>
+CONFIG_AUFS_SHWH
's390x': 'n'>
+CONFIG_AUFS_BR_RAMFS
'n', 's390x': 'n'>
+CONFIG_AUFS_BR_FUSE
's390x': 'n'>
+CONFIG_AUFS_BR_HFSPLUS
'y'>
+CONFIG_AUFS_DEBUG
's390x': 'n'>
+# Menu: File systems >> Miscellaneous filesystems >> Aufs (Advanced multi layered unification filesystem) support >> Maximum number of branches
+CONFIG_AUFS_BRANCH_MAX_1023
'ppc64le': 'n', 's390x': 'n'>
+CONFIG_AUFS_BRANCH_MAX_127
'ppc64le': 'n', 's390x': 'n'>
+CONFIG_AUFS_EXPORT
note<LP:1121699>
# Menu: File systems >> Miscellaneous filesystems >> Aufs (Advanced multi layered unification filesystem) support >> method

+ CONFIG_AUFS_BRANCH_MAX_32767 policy{`amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+ CONFIG_AUFS_BRANCH_MAX_511 policy{`amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}

+ # Menu: File systems >> Miscellaneous filesystems >> Journalling Flash File System v2 (JFFS2) support
+ CONFIG_JFFS2_FS policy{`amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}
+ CONFIG_JFFS2_FS_DEBUG policy{`amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64el': '0'}
+ CONFIG_JFFS2_FS_WRITEBUFFER policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+ CONFIG_JFFS2_FS_WBUF_VERIFY policy{`amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}
+ CONFIG_JFFS2_SUMMARY policy{`amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}
+ CONFIG_JFFS2_FS_XATTR policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+ CONFIG_JFFS2_FS_POSIX_ACL policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+ CONFIG_JFFS2_FS_SECURITY policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}

+ # Menu: File systems >> Miscellaneous filesystems >> Journalling Flash File System v2 (JFFS2) support >> Advanced compression options for JFFS2
+ CONFIG_JFFS2_COMPRESSION_OPTIONS policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+ CONFIG_JFFS2_ZLIB policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+ CONFIG_JFFS2_LZO policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+ CONFIG_JFFS2_RTIME policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
+ CONFIG_JFFS2_RUBIN policy{`amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}

+ # Menu: File systems >> Miscellaneous filesystems >> Persistent store support
+ CONFIG_PSTORE policy{`amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}
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+CONFIG_PSTORE_CONSOLE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'y', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_PSTORE_PMSG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_PSTORE_FTRACE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_PSTORE_RAM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'y', 'i386': 'm', 'ppc64el': 'm'}>

+### Menu: File systems >> Miscellaneous filesystems >> Persistent store support >> Choose compression algorithm
+CONFIG_PSTORE_ZLIB_COMPRESS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_PSTORE_LZO_COMPRESS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_PSTORE_LZ4_COMPRESS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>

+### Menu: File systems >> Miscellaneous filesystems >> RomFS backing stores
+CONFIG_ROMFS_BACKED_BY_BLOCK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_ROMFS_BACKED_BY_MTD policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_ROMFS_BACKED_BY_BOTH policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>

+### Menu: File systems >> Miscellaneous filesystems >> SquashFS 4.0 - Squashed file system support
+CONFIG_SQUASHFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_XATTR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_ZLIB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_LZ4 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_LZO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_XZ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_ZSTD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_4K_DEVBLK_SIZE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_SQUASHFS_EMBEDDED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_SQUASHFS_FRAGMENT_CACHE_SIZE policy<{'amd64': '3', 'arm64': '3', 'armhf': '3', 'i386': '3', 'ppc64el': '3', 's390x': '3'}>

#
+CONFIG_SQUASHFS_4K_DEVBLK_SIZE note<non-default block size>
+CONFIG_SQUASHFS mark<ENFORCED> note<LP#1593134>
+
++ Menu: File systems >> Miscellaneous filesystems >> SquashFS 4.0 - Squashed file system support >> Decompressor parallellisation options
+CONFIG_SQUASHFS_DECOMP_SINGLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SQUASHFS_DECOMP_MULTI policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_SQUASHFS_DECOMP_MULTI_PERCPU policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+
++ Menu: File systems >> Miscellaneous filesystems >> SquashFS 4.0 - Squashed file system support >> File decompression options
+CONFIG_SQUASHFS_FILE_CACHE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_SQUASHFS_FILE_DIRECT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
++ Menu: File systems >> Miscellaneous filesystems >> UBIFS file system support
+CONFIG_UBIFS_FS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_UBIFS_FS_ADVANCED_COMPR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_UBIFS_FS_LZO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_UBIFS_FS_ZLIB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_UBIFS_ATIME_SUPPORT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_UBIFS_FS_ENCRYPTION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_UBIFS_FS_SECURITY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
++ Menu: File systems >> Native language support
+CONFIG_NLS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NLS_DEFAULT policy<{'amd64': '"utf8"', 'arm64': '"utf8"', 'armhf': '"utf8"', 'i386': '"utf8"', 'ppc64le': '"utf8"', 's390x': '"utf8"'}>
+CONFIG_NLS_CODEPAGE_437 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NLS_CODEPAGE_737 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NLS_CODEPAGE_775 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NLS_CODEPAGE_850 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

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# Menu: File systems >> Network File Systems

+CONFIG_NETWORK_FILESYSTEMS
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'm'}>

+##
+## Menu: File systems >> Network File Systems

+CONFIG_NETWORK_FILESYSTEMS
  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'm'}>
+CONFIG_NFSD policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'},
's390x': 'm'>
+CONFIG_NFSD_V3 policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'},
's390x': 'y'>
+CONFIG_NFSD_V3_ACL policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'},
's390x': 'y'>
+CONFIG_RPCSEC_GSS_KRB5 policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_SUNRPC_DEBUG policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'y', 's390x': 'y'>
+CONFIG_SUNRPC_XPRT_RDMA policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64le': 'm', 's390x': 'm'},
's390x': 'm'>
+CONFIG_CEPH_FS policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64le': 'm', 's390x': 'm'},
's390x': 'm'>
+CONFIG_CEPH_FSCACHE policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'y', 's390x': 'y'>
+CONFIG_CEPH_FS_POSIX_ACL policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'y', 's390x': 'y'>
+CONFIG_CODA_FS policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64le': 'm', 's390x': 'm'},
's390x': 'm'>
+CONFIG_AFS_FS policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64le': 'm', 's390x': 'm'},
's390x': 'm'>
+CONFIG_AFS_DEBUG policy:<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64le': 'n'},
'n', 's390x': 'n'>
+CONFIG_AFS_FSCACHE policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'y', 's390x': 'y'>
+## Menu: File systems >> Network File Systems >> NCP file system support (to mount NetWare volumes)
+CONFIG_NCP_FS policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64le': 'm'},
's390x': 'n'>
+CONFIG_NCPFS_PACKET_SIGNING policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'ppc64le': 'y'>
+CONFIG_NCPFS_IOCTL_LOCKING policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'ppc64le': 'y'>
+CONFIG_NCPFS_STRONG policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'ppc64le': 'y'>
+CONFIG_NCPFS_NFS_NS policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'ppc64le': 'y'>
+CONFIG_NCPFS_OS2_NS policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'ppc64le': 'y'>
+CONFIG_NCPFS_SMALLDOS policy:<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n',
'ppc64le': 'n'},
'n', 's390x': 'n'>
+CONFIG_NCPFS_NLS policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'ppc64le': 'y'>
+CONFIG_NCPFS_EXTRAS policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y',
'ppc64le': 'y'},
'ppc64le': 'y'>
+## Menu: File systems >> Network File Systems >> NFS client support
+CONFIG_NFS_FS policy:<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'ppc64le': 'm'},
's390x': 'n'>

+CONFIG_NFS_V2
  policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm']>
+CONFIG_NFS_V3
  policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm']>
+CONFIG_NFS_V3_ACL
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>
+CONFIG_NFS_V4
  policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm']>
+CONFIG_NFS_SWAP
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>
+CONFIG_NFS_FSCACHE
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>
+CONFIG_NFS_USE_LEGACY_DNS
  policy<['amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n']>

+## Menu: File systems >> Network File Systems >> NFS client support >> NFS client support for NFSv4.1
+CONFIG_NFS_V4_1
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>
+CONFIG_NFS_V4_2
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>
+CONFIG_NFS_V4_1_IMPLEMENTATION_ID_DOMAIN
  policy<['amd64': """"kernel.org""", 'arm64': """"kernel.org""", 'armhf': """"kernel.org""", 'i386': """"kernel.org""", 'ppc64el': """"kernel.org""", 's390x': """"kernel.org"""">
+CONFIG_NFS_V4_1_MIGRATION
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>

+CONFIG_9P_FS
  policy<['amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm']>
+CONFIG_9P_FSCACHE
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>
+CONFIG_9P_FS_POSIX_ACL
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>
+CONFIG_9P_FS_SECURITY
  policy<['amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y']>

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+ # Menu: File systems >> Network File Systems >> SMB3 and CIFS support (advanced network filesystem)
+ CONFIG_CIFS policy={'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}
+ CONFIG_CIFS_STATS policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_STATS2 policy={'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+ CONFIG_CIFS_ALLOW_INSECURE_LEGACY policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_WEAK_PW_HASH policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_UPCALL policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_XATTR policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_POSIX policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_ACL policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_DEBUG policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_DEBUG2 policy={'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+ CONFIG_CIFS_DEBUG_DUMP_KEYS policy={'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+ CONFIG_CIFS_DFS_UPCALL policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_SMBS311 policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_CIFS_FSCACHE policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}

+ # Menu: File systems >> OCFS2 file system support
+ CONFIG_OCFS2_FS policy={'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}
+ CONFIG_OCFS2_FS_O2CB policy={'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}
+ CONFIG_OCFS2_FS_USERSPACE_CLUSTER policy={'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}
+ CONFIG_OCFS2_FS_STATS policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_OCFS2_DEBUG MASKLOG policy={'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+ CONFIG_OCFS2_DEBUG_FS policy={'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
++ Menu: File systems >> Overlay filesystem support
+CONFIG_OVERLAY_FS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_OVERLAY_FS_REDIRECT_DIR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_OVERLAY_FS_REDIRECT_ALWAYS_FOLLOW policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_OVERLAY_FS_INDEX policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+
++ Menu: File systems >> Pseudo filesystems
+CONFIG_PROC_CHILDREN policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SYSFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_TMPFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_TMPFS_POSIX_ACL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_TMPFS_XATTR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_HUGETLBFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf-generic-lpae': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_CONFIGFS_FS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_EFIVAR_FS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+
++ Menu: File systems >> /proc file system support
+CONFIG_PROC_FS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_PROC_KCORE policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_PROC_VMCORE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_PROC_SYSCTL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_PROC_PAGE_MONITOR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+
++ Menu: File systems >> Quota support
+CONFIG_QUOTA policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_PRINT_QUOTA_WARNING policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>

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+CONFIG_QUOTA_DEBUG
  'n', 's390x': 'n'}>
+CONFIG_QFMT_V1
  'm', 's390x': 'm'}>
+CONFIG_QFMT_V2
  'm', 's390x': 'm'}>
+
+### Menu: File systems >> Reiserfs support
+CONFIG_REISERFS_FS
  'm', 's390x': 'n'}>
+CONFIG_REISERFS_CHECK
  'n'}>
+CONFIG_REISERFS_PROC_INFO
  'ppc64el': 'n'}>
+CONFIG_REISERFS_FS_XATTR
  'ppc64el': 'y'}>
+CONFIG_REISERFS_FS_POSIX_ACL
  'ppc64el': 'y'}>
+CONFIG_REISERFS_FS_SECURITY
  'ppc64el': 'y'}>
+
+### Menu: File systems >> The Extended 4 (ext4) filesystem
+CONFIG_EXT4_FS
  'y', 's390x': 'y'}>
+CONFIG_EXT4_USE_FOR_EXT2
  'y', 's390x': 'y'}>
+CONFIG_EXT4_FS_POSIX_ACL
  'y', 's390x': 'y'}>
+CONFIG_EXT4_FS_SECURITY
  'y', 's390x': 'y'}>
+CONFIG_EXT4_ENCRYPTION
  'y', 's390x': 'y'}>
+CONFIG_EXT4_DEBUG
  's390x': 'n'}>
+
+### Menu: File systems >> XFS filesystem support
+CONFIG_XFS_FS
  'm', 's390x': 'm'}>
+CONFIG_XFS_QUOTA
  's390x': 'y'}>
+CONFIG_XFS_POSIX_ACL
  's390x': 'y'}>
+CONFIG_XFS_RT
  's390x': 'y'}>
+CONFIG_XFS_ONLINE_SCRUB
  'n', 's390x': 'n'}>
+CONFIG_XFS_WARN
  'n', 's390x': 'n'}>

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's390x': 'n'}>
+CONFIG_XFS_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+

++ Menu: Firmware Drivers
+CONFIG_ARM_PCIE_CHECKER policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_ARM_SCPI_PROTOCOL policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_ARM_SCPI_POWER_DOMAIN policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_ARM_SDE_INTERFACE policy<{'arm64': 'y'}>
+CONFIG_EDD policy<{'arm64': 'y', 'i386': 'y'}>
+CONFIG_EDD_OFF policy<{'arm64': 'y', 'i386': 'y'}>
+CONFIG_FIRMWARE_MEMMAP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_DELL_RBU policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_DCDBAS policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_DMIID policy<{'arm64': 'm', 'i386': 'm'}>
+CONFIG_DMI_SYSFS policy<{'arm64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_ISCSI_IBFT_FIND policy<{'arm64': 'y', 'i386': 'y'}>
+CONFIG_ISCSI_IBFT policy<{'arm64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_RASPBERRYPI_FIRMWARE policy<{'arm64': 'y'}>
+CONFIG_FW_CFG_SYSFS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_FW_CFG_SYSFS_CMDLINE policy<{'amd64': 'n', 'arm64': 'n', 'i386': 'n'}>
+CONFIG_QCOM_SCMDOWNLOAD_MODE_DEFAULT policy<{'arm64': 'n', 'armhf': 'n'}>
+
++ Menu: Firmware Drivers >> EFI (Extensible Firmware Interface) Support
+CONFIG_EFI_RUNTIME_MAP policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_EFI_FAKE_MEMMAP policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_EFI_CAPSULE_LOADER policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'y'}>
+CONFIG_EFI_CAPSULE_QUIRK Quark CSH policy<{'i386': 'y'}>
+CONFIG_EFI_TEST policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_APPLE_PROPERTIES policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_RESET ATTACK MITIGATION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+
++ Menu: Firmware Drivers >> EFI (Extensible Firmware Interface) Support >> EFI Variable Support via sysfs
+CONFIG_EFI_VARS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_EFI_VARS_PSTORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_EFI_VARS_PSTORE_DEFAULT_DISABLE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'}>
+CONFIG_EFI_BOOTLOADER_CONTROL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_EFI_CUSTOM_SSDT OVERLAYS policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+
++ Menu: Firmware Drivers >> EFI (Extensible Firmware Interface) Support >> EFI Variable Support via sysfs
+CONFIG_EFI_VARS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_EFI_VARS_PSTORE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>
+CONFIG_EFI_VARS_PSTORE_DEFAULT_DISABLE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'}>
++ Menu: Firmware Drivers >> Tegra firmware driver
+CONFIG_TEGRA_IVC policy<{'armhf-generic': 'y'}>
+# Menu: Floating point emulation >> Architecture: arm
+CONFIG_VFP policy<{'armhf': 'y'}>
+CONFIG_NEON policy<{'armhf': 'y'}>
+CONFIG_KERNEL_MODE_NEON policy<{'arm64': 'y', 'armhf': 'y'}>
+
#+ Menu: General setup
+CONFIG_CROSS_COMPILE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_LOCALVERSION policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_DEFAULT_HOSTNAME policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_VERSION_SIGNATURE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_SWAP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SYSVIPC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_POSIX_MQUEUE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CROSS_MEMORY_ATTACH policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_USELIB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_AUDIT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_IKCONFIG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_LOG_BUF_SHIFT policy<{'amd64': '18', 'arm64': '18', 'armhf': '17', 'i386': '17', 'ppc64le': '18', 's390x': '18'}>
+CONFIG_LOG_CPU_MAX_BUF_SHIFT policy<{'amd64': '12', 'arm64': '12', 'armhf': '12', 'i386': '12', 'ppc64le': '12', 's390x': '12'}>
+CONFIG_PRINTK_SAFE_LOG_BUF_SHIFT policy<{'amd64': '13', 'arm64': '13', 'armhf': '13', 'i386': '13', 'ppc64le': '13', 's390x': '13'}>
+CONFIG_NUMA_BALANCING policy<{'amd64': 'y', 'arm64': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NUMA_BALANCING_DEFAULT_ENABLED policy<{'amd64': 'y', 'arm64': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SCHED_AUTOGROUP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SYSFS_DEPRECATED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_RELAY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_BPF_SYSCALL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_BPF_JIT_ALWAYS_ON policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
`y', `s390x': `y'>
+CONFIG_BSD_PROCESS_ACCT_V3 policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y',
`s390x': `y'>
+CONFIG_TASKSTATS policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y',
`s390x': `y'>
+CONFIG_TASK_DELAY_ACCT policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y',
`s390x': `y'>
+CONFIG_TASK_XACCT policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y',
`s390x': `y'>
+CONFIG_TASK_IO_ACCOUNTING policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y',
`s390x': `y'>
+CONFIG_TICK_CPU_ACCOUNTING policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y'>
+CONFIG_VIRT_CPU_ACCOUNTING_NATIVE policy<`ppc64le': `n', `s390x': `y'>
+CONFIG_VIRT_CPU_ACCOUNTING_GEN policy<`amd64': `n', `arm64': `n', `armhf': `n', `ppc64le': `n',
`s390x': `n'>
+
+# Menu: General setup >> CPU/Task time and stats accounting >> Cputime accounting
+CONFIG_SLUB policy<`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64le': `n',
`s390x': `n'>
+CONFIG_SLOB policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y',
`s390x': `y'>
+CONFIG_SLAB policy<`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64le': `n',
`s390x': `n'>
+
+# Menu: General setup >> Choose SLAB allocator
+CONFIG_COMPILE_TEST policy<`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64le': `n',
`s390x': `n'>
+CONFIG_LOCALVERSION_AUTO policy<`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64le': `n',
`s390x': `n'>
+CONFIG_CPU_ISOLATION policy<`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64le': `n',
`s390x': `n'>
+
+# Menu: General setup >> Compile also drivers which will not load
+CONFIG_COMPILE_TEST policy<`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64le': `n',
`s390x': `n'>
+CONFIG_LOCALVERSION_AUTO policy<`amd64': `n', `arm64': `n', `armhf': `n', `i386': `n', `ppc64le': `n',
`s390x': `n'>
+CONFIG_CPU_ISOLATION policy<`amd64': `y', `arm64': `y', `armhf': `y', `i386': `y', `ppc64le': `y',
`s390x': `y'>
+
+# Menu: General setup >> Configure standard kernel features (expert users)
+CONFIG_FHANDLE
's390x': 'y'}
+CONFIG_CHECKPOINT_RESTORE
'ppc64le': 'y', 's390x': 'y'}
+CONFIG_EXPERT
's390x': 'y'}
+CONFIG_UID16
+CONFIG_MULTIUSER
's390x': 'y'}
+CONFIG_SGETMASK_SYSCALL
'ppc64le': 'y', 's390x': 'y'}
+CONFIG_SYSCALLS
'y', 's390x': 'y'}
+CONFIG_POSIX_TIMERS
's390x': 'y'}
+CONFIG_KALLSYMS
's390x': 'y'}
+CONFIG_KALLSYMS_ALL
'y', 's390x': 'y'}
+CONFIG_PRINTK
's390x': 'y'}
+CONFIG_BUG
's390x': 'y'}
+CONFIG_ELF_CORE
's390x': 'y'}
+CONFIG_PCSPKR_PLATFORM
+CONFIG_BASE_FULL
's390x': 'y'}
+CONFIG_FUTEX
's390x': 'y'}
+CONFIG_EPOLL
's390x': 'y'}
+CONFIG_SIGNALFD
's390x': 'y'}
+CONFIG_TIMERFD
's390x': 'y'}
+CONFIG_EVENTFD
's390x': 'y'}
+CONFIG_SHMEM
's390x': 'y'}
+CONFIG_AIO
'y'}
+CONFIG_ADVISE_SYSCALLS
'y', 's390x': 'y'}
+CONFIG_MEMBARRIER
's390x': 'y'}

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+CONFIG_VM_EVENT_COUNTERS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SLUB_DEBUG  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SLUB_MEMCG_SYSFS_ON  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_ARCH_MMAP_RND_BITS  policy<{'amd64': '28', 'arm64': '18', 'armhf': '8', 'i386': '8', 'ppc64le': '28'}>
+CONFIG_ARCH_MMAP_RND_COMPAT_BITS  policy<{'amd64': '8', 'arm64': '11', 'ppc64le': '8'}>
+
+##
+CONFIG_FHANDLE  mark<ENFORCED> note<LP:1412543>
+CONFIG_SLUB_MEMCG_SYSFS_ON  flag<REVIEW>
+
+## Menu: General setup >> Control Group support
+CONFIG_CGROUPS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MEMCG  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MEMCG_SWAP  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MEMCG_SWAP_ENABLED  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_BLK_CGROUP  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DEBUG_BLK_CGROUP  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CGROUP_PIDS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CGROUP_RDMA  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CGROUP_FREEZER  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CGROUP_HUGETLB  policy<{'amd64': 'y', 'arm64': 'y', 'armhf-generic-lpae': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CGROUP_BPF  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_CGROUP_DEBUG  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
# Menu: General setup >> Control Group support >> CPU controller
+CONFIG_CGROUP_SCHED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_FAIR_GROUP_SCHED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_CFS_BANDWIDTH policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_RT_GROUP_SCHED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>

# Menu: General setup >> GCOV-based kernel profiling
+CONFIG_GCOV_KERNEL policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>

# Menu: General setup >> GCOV-based kernel profiling >> Specify GCOV format
+

# Menu: General setup >> IRQ subsystem
+CONFIG_IRQ_DOMAIN_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_IRQ_FORCED_THREADING_DEFAULT policy<{'amd64-generic': 'n', 'amd64-lowlatency': 'y', 'arm64': 'n', 'armhf': 'n', 'i386-generic': 'n', 'i386-lowlatency': 'y', 'ppc64el': 'n', 's390x': 'y'}>
+CONFIG_SPARSE_IRQ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_GENERIC_IRQ_DEBUGFS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>

# Menu: General setup >> Initial RAM filesystem and RAM disk (initramfs/initrd) support
+CONFIG_BLK_DEV_INITRD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_RD_GZIP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_RD_BZIP2 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_RD_LZMA policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_RD_XZ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_RD_LZO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_RD_LZ4 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>

# Menu: General setup >> Initial RAM filesystem and RAM disk (initramfs/initrd) support >> Initramfs source
+CONFIG_INITRAMFS_SOURCE  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
+## Menu: General setup >> Initial RAM filesystem and RAM disk (initramfs/initrd) support >> Initramfs source file(s) >> Built-in initramfs compression mode
+
+## Menu: General setup >> Kernel Performance Events And Counters
+CONFIG_PERF_EVENTS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DEBUG_PERF_USE_VMALLOC  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+
## Menu: General setup >> Kernel compression mode
+CONFIG_KERNEL_GZIP  policy<{'amd64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_KERNEL_BZIP2  policy<{'amd64': 'n', 'i386': 'n', 's390x': 'n'}>
+CONFIG_KERNEL_LZMA  policy<{'amd64': 'n', 'armhf': 'n', 'i386': 'n', 's390x': 'n'}>
+CONFIG_KERNEL_LZ4  policy<{'amd64': 'n', 'armhf': 'n', 'i386': 'n', 's390x': 'n'}>
+##
+CONFIG_KERNEL_GZIP  flag<REVIEW> note<does s390x care the format here?>
+
## Menu: General setup >> Namespaces support
+CONFIG_NAMESPACES  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_UTS_NS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_IPC_NS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_USER_NS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_PID_NS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NET_NS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
## Menu: General setup >> RCU Subsystem
## XXX
+CONFIG_CONTEXT_TRACKING_FORCE  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+##
+CONFIG_CONTEXT_TRACKING_FORCE  note<LP:1349028> mark<ENFORCED>
+
## Menu: General setup >> RCU Subsystem >> Make expert-level adjustments to RCU configuration
+CONFIG_RCU_EXPERT  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+##
+CONFIG_RCU_EXPERT flag<REVIEW>
+
+# Menu: General setup >> Stack Protector buffer overflow detection
+CONFIG_CC_STACKPROTECTOR_NONE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'}>
+CONFIG_CC_STACKPROTECTOR_REGULAR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'}>
+CONFIG_CC_STACKPROTECTOR_STRONG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+
+# Menu: General setup >> Stack Protector buffer overflow detection >> Architecture: arm
+
+# Menu: General setup >> Stack Protector buffer overflow detection >> Architecture: arm64
+
+# Menu: General setup >> Stack Protector buffer overflow detection >> Architecture: powerpc
+
+# Menu: General setup >> Stack Protector buffer overflow detection >> Architecture: s390
+
+# Menu: General setup >> Stack Protector buffer overflow detection >> Architecture: x86
+
+# Menu: General setup >> Timers subsystem
+CONFIG_NO_HZ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_HIGH_RES_TIMERS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
+# Menu: General setup >> Timers subsystem >> Timer tick handling
+CONFIG_HZ_PERIODIC policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_NO_HZ_IDLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NO_HZ_FULL policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'ppc64le': 'n'}>
+
+# Menu: General setup >> Timers subsystem >> Timer tick handling
+
+# Menu: Kernel hacking
+CONFIG_MAGIC_SYSRQ policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MAGIC_SYSRQ_DEFAULT_ENABLE policy<{'amd64': '0x01b6', 'arm64': '0x01b6', 'armhf': '0x01b6', 'i386': '0x01b6', 'ppc64le': '0x01b6', 's390x': '0x01b6'}>
+CONFIG_MAGIC_SYSRQ_SERIAL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_KCOV policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 's390x': 'n'}>
+CONFIG_PANIC_ON_OOPS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_PANIC_TIMEOUT policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0', 's390x': '0'}>
+CONFIG_DEBUG_TIMEKEEPING policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>

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+CONFIG_STACKTRACE                               policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_WARN_ALL_UNSEEDED_RANDOM                  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_PROVIDE_OHCI1394_DMA_INIT                  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_DMA_API_DEBUG                              policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_MEMTEST                                    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_BUG_ON_DATA_CORRUPTION                    policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_STRICT_DEVMEM                              policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_IO_STRICT_DEVMEM                           policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_PID_IN_CONTEXTIDR                          policy<{'arm64': 'n', 'armhf': 'n'}>
+CONFIG_DEBUG_WX                                   policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y'}>
+CONFIG_DEBUG_ALIGN_RODATA                         policy<{'arm64': 'n', 'armhf': 'y'}>
+CONFIG_PANIC_ON_OOPS                              note<keep working if at all possible>
+CONFIG_BUG_ON_DATA_CORRUPTION                    flag<REVIEW>
+CONFIG_STRICT_DEVMEM                              mark<ENFORCED>
+
## Menu: Kernel hacking >> Architecture: arm
+CONFIG_ARM_PTDUMP                                  policy<{'armhf': 'n'}>
+CONFIG_ARM_UNWIND                                  policy<{'armhf': 'y'}>
+CONFIG_DEBUG_USER                                  policy<{'armhf': 'n'}>
+CONFIG_DEBUG_IMX_UART_PORT                         policy<{'armhf-generic': '1'}>
+CONFIG_DEBUG_VF_UART_PORT                          policy<{'armhf-generic': '1'}>
+CONFIG_ARM_KPROBES_TEST                            policy<{'armhf': 'm'}>
+
## Menu: Kernel hacking >> Architecture: arm64
+CONFIG_ARM64_PTDUMP_DEBUGFS                        policy<{'arm64': 'n'}>
+CONFIG_ARM64_RANDOMIZE_TEXT_OFFSET                policy<{'arm64': 'n'}>
+CONFIG_DEBUG_EFI                                   policy<{'arm64': 'n'}>
+CONFIG_ARM64_RELOC_TEST                            policy<{'arm64': 'n'}>
+
## Menu: Kernel hacking >> Architecture: powerpc
+CONFIG_PPC_DISABLE_WERROR                          policy<{'ppc64el': 'n'}>
+CONFIG_PRINT_STACK_DEPTH                          policy<{'ppc64el': '64'}>
+CONFIG_HCALL_STATS                                policy<{'ppc64el': 'n'}>
+CONFIG_PPC_EMULATED_STATS                         policy<{'ppc64el': 'n'}>
+CONFIG_CODE_PATCHING_SELFTEST                     policy<{'ppc64el': 'n'}>
+CONFIG_JUMP_LABEL_FEATURE_CHECKS                  policy<{'ppc64el': 'y'}>
+CONFIG_JUMP_LABEL_FEATURE_CHECK_DEBUG             policy<{'ppc64el': 'n'}>
+CONFIG_FTR_FIXUP_SELFTEST                        policy<{'ppc64el': 'n'}>
+CONFIG_MSI_BITMAP_SELFTEST                       policy<{'ppc64el': 'n'}>
+CONFIG_BOOTX_TEXT                                policy<{'ppc64el': 'n'}>
+CONFIG_UNUSED_SYMBOLS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_PAGE_OWNER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'>
+CONFIG_DEBUG_FS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_HEADERS_CHECK policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'>
+CONFIG_DEBUG_SECTION_MISMATCH policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'>
+CONFIG_SECTION_MISMATCH_WARN_ONLY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_FRAME_POINTER policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_STACK_VALIDATION policy<{'amd64': 'y'}>
+CONFIG_DEBUG_FORCE_WEAK_PER_CPU policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'>
+CONFIG_DEBUG_INFO policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_DEBUG_INFO_REDUCED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'>
+CONFIG_DEBUG_INFO_SPLIT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'>
+CONFIG_DEBUG_INFO_DWARF4 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_GDB_SCRIPTS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>

+### Menu: Kernel hacking >> Compile-time checks and compiler options >> Compile the kernel with debug info
+### Menu: Kernel hacking >> CoreSight Tracing Support
+### Menu: Kernel hacking >> CoreSight Tracing Support >> CoreSight Link and Sink drivers
+### Menu: Kernel hacking >> Debug Lockups and Hangs
+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Softlockup Detector
+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Hardlockup Detector
+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Bootparam Hardlockup Panic
+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Bootparam Softlockup Panic
+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Detect Hung Task

+### Menu: Kernel hacking >> Compile-time checks and compiler options >> Compile the kernel with debug info

+### Menu: Kernel hacking >> CoreSight Tracing Support

+### Menu: Kernel hacking >> CoreSight Tracing Support >> CoreSight Link and Sink drivers

+### Menu: Kernel hacking >> Debug Lockups and Hangs

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Softlockup Detector

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Hardlockup Detector

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Bootparam Hardlockup Panic

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Bootparam Softlockup Panic

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Detect Hung Task

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Softlockup Detector

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Hardlockup Detector

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Bootparam Hardlockup Panic

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Bootparam Softlockup Panic

+### Menu: Kernel hacking >> Debug Lockups and Hangs >> Detect Hung Task
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+ # Menu: Kernel hacking >> Early debugging console >> Architecture: powerpc
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+ # Menu: Kernel hacking >> Early printk
+CONFIG_EARLY_PRINTK policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
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+ # Menu: Kernel hacking >> Early printk >> Architecture: x86
+CONFIG_EARLY_PRINTK_DEBUG policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_EARLY_PRINTK_EFI policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_EARLY_PRINTK_USB_XDBC policy<{'amd64': 'n', 'i386': 'n'}>
+
+ # Menu: Kernel hacking >> IO delay type >> Architecture: x86
+CONFIG_IO_DELAY_0x80 policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_IO_DELAY_0xED policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_IO_DELAY_UDELAY policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_IO_DELAY_NONE policy<{'amd64': 'n', 'i386': 'n'}>
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+ # Menu: Kernel hacking >> Include xmon kernel debugger >> Architecture: powerpc
+CONFIG_XMON policy<{'ppc64le': 'y'}>
+CONFIG_XMON_DEFAULT policy<{'ppc64le': 'n'}>
+CONFIG_XMON_DISASSEMBLY policy<{'ppc64le': 'y'}>
+CONFIG_XMON_DEFAULT_RO_MODE policy<{'ppc64le': 'y'}>
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+ # Menu: Kernel hacking >> Kernel debugging
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+## Menu: Kernel hacking >> Kernel debugging >> KGDB: kernel debugger >> KGDB_KDB: include kdb frontend for kgdb
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+## Menu: Kernel hacking >> Kernel low-level debugging functions (read help!)
+
+## Menu: Kernel hacking >> Kernel low-level debugging functions (read help!) >> Architecture: arm
+CONFIG_DEBUG_LL                          policy<{'armhf': 'n'}>
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+## Menu: Kernel hacking >> Kernel low-level debugging functions (read help!) >> Kernel low-level debugging port >> Architecture: arm
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+## Menu: Kernel hacking >> Lock Debugging (spinlocks, mutexes, etc...)
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+CONFIG_LOCK_STAT                          policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
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+## Menu: Kernel hacking >> Memory Debugging
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+CONFIG_DEBUG_RODATA_TEST                  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 's390x': 'n'}>
+CONFIG_SLUB_DEBUG_ON                      policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
# Menu: Kernel hacking >> Memory Debugging >> Debug VM
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+ # Menu: Kernel hacking >> Memory Debugging >> Debug object operations
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+ # Menu: Kernel hacking >> Memory Debugging >> KASan: runtime memory debugger
+CONFIG_KASAN policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'>

+ # Menu: Kernel hacking >> Memory Debugging >> Kernel memory leak detector
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+ # Menu: Kernel hacking >> RCU Debugging
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+## Menu: Kernel hacking >> RCU Debugging
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+ # Menu: Kernel hacking >> Runtime Testing
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+## Menu: Kernel hacking >> Sample kernel code
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+CONFIG_IRQSOFF_TRACER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
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# CONFIG_UPROBE_EVENTS
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# Menu: Kernel hacking >> Tracers >> Branch Profiling

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# CONFIG_FUNCTION_TRACER
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# Open Source Used In 5GaaS Edge AC-4 18460
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+# Menu: Networking support >> Amateur Radio support >> Amateur Radio AX.25 Level 2 protocol
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+CONFIG_AX25_DAMA_SLAVE
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+CONFIG_NETROM
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+CONFIG_ROSE
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+# Menu: Networking support >> Amateur Radio support >> Amateur Radio AX.25 Level 2 protocol >> AX.25 network device drivers
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+CONFIG_BT_6LOWPAN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>
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+## Menu: Networking support >> Bluetooth subsystem support >> Bluetooth Classic (BR/EDR) features
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+## Menu: Networking support >> Bluetooth subsystem support >> Bluetooth device drivers
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+CONFIG_BT_HCIIBCM203X \[m]\>
+CONFIG_BT_HCIBFUSB \[m]\>
+CONFIG_BT_HCIDTL1 \[m]\>
+CONFIG_BT_HCIIBT3C \[m]\>
+CONFIG_BT_HCIIBLUETECARD \[m]\>
+CONFIG_BT_HCIIBTUART \[m]\>
+CONFIG_BT_HCIVHCSI \[m]\>
+CONFIG_BT_MRVL \[m]\>
+CONFIG_BT_MRVL_SDIO \[m]\>
+CONFIG_BT_WILINK \[m]\>
+CONFIG_BT_QCOMSMD \[m]\>
+CONFIG_BT_QCOMSMD_HACK \[m]\>

+Menu: Networking support >> Bluetooth subsystem support >> Bluetooth device drivers >> HCI UART driver
+CONFIG_BT_HCIUART \[m]\>
+CONFIG_BT_HCIUART_H4 \[y]\>
+CONFIG_BT_HCIUART_NOKIA \[ppc64le: \[m]\>
+CONFIG_BT_HCIUART_BCSP \[y]\>
+CONFIG_BT_HCIUART_AH3K \[ppc64le: \[y]\>
+CONFIG_BT_HCIUART_3WIRE \[y]\>
+CONFIG_BT_HCIUART_INTEL \[y]\>
+CONFIG_BT_HCIUART_BCM \[y]\>
+CONFIG_BT_HCIUART_QCA \[y]\>
+CONFIG_BT_HCIUART_AG6XX \[ppc64le: \[y]\>
+CONFIG_BT_HCIUART_MVRL \[y]\>
+CONFIG_BT_HCIBPA10X \[m]\>
+## Menu: Networking support >> Bluetooth subsystem support >> Bluetooth device drivers >> HCI USB driver
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+## Menu: Networking support >> CAN bus subsystem support
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+## Menu: Networking support >> CAN bus subsystem support >> CAN Device Drivers
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+## Menu: Networking support >> CAN bus subsystem support >> CAN Device Drivers >> Platform CAN drivers with Netlink support
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+CONFIG_CAN_GRCAN policy<{'arm64': 'm', 'armhf': 'm', 'ppc64le': 'm'}>
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+CONFIG_CAN_XILINXCAN policy<{'arm64': 'm'}>
+CONFIG_PCH_CAN policy<{'i386': 'm'}>
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+CONFIG_CAN_PEAK_PCIEFD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+CONFIG_CAN_RCAR_CANFD policy<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_CAN_SOFTING policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CAN_SOFTING_CS policy<{'amd64': 'm', 'i386': 'm'}>
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+CONFIG_CAN_CC770_ISA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CAN_CC770_PLATFORM policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
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+## Menu: Networking support >> CAN bus subsystem support >> CAN Device Drivers >> Platform CAN drivers
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+## Menu: Networking support >> CAN bus subsystem support >> CAN Device Drivers >> Platform CAN drivers
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+## Menu: Networking support >> CAN bus subsystem support >> CAN Device Drivers >> Platform CAN drivers
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+CONFIG_CAN_ESD_USB2 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_CAN_GS_USB
+CONFIG_CAN_KVASER_USB
+CONFIG_CAN_PEAK_USB
+CONFIG_CAN_8DEV_USB
+CONFIG_CAN_MCBA_USB
+CONFIG_CAN_SJA1000
+CONFIG_CAN_SJA1000_ISA
+CONFIG_CAN_SJA1000_PLATFORM
+CONFIG_CAN_EMS_PCMCIA
+CONFIG_CAN_EMS_PCI
+CONFIG_CAN_PEAK_PCMCIA
+CONFIG_CAN_PEAK_PCIEC
+CONFIG_CAN_KVASER_PCI
+CONFIG_CAN_PLX_PCI
+CONFIG_CAN_TSCAN1
+CONFIG_NFC
+CONFIG_NFC_DIGITAL
+CONFIG_NFC_NCI
+CONFIG_NFC_NCI_SPI
+CONFIG_NFC_NCI_UART
+CONFIG_NFC_HCI
+CONFIG_NFC_SHDLC

+# Menu: Networking support >> CAN bus subsystem support >> CAN Device Drivers >> Platform CAN drivers with Netlink support >> Philips/NXP SJA1000 devices
+CONFIG_CAN_SJA1000
+CONFIG_CAN_SJA1000_ISA
+CONFIG_CAN_SJA1000_PLATFORM
+CONFIG_CAN_EMS_PCMCIA
+CONFIG_CAN_EMS_PCI
+CONFIG_CAN_PEAK_PCMCIA
+CONFIG_CAN_PEAK_PCI
+CONFIG_CAN_PEAK_PCIEC
+CONFIG_CAN_KVASER_PCI
+CONFIG_CAN_PLX_PCI
+CONFIG_CAN_TSCAN1

+# Menu: Networking support >> NFC subsystem support
+CONFIG_NFC
+CONFIG_NFC_DIGITAL
+CONFIG_NFC_NCI
+CONFIG_NFC_NCI_SPI
+CONFIG_NFC_NCI_UART
+CONFIG_NFC_HCI
+CONFIG_NFC_SHDLC

+# Menu: Networking support >> NFC subsystem support >> Near Field Communication (NFC) devices
+CONFIG_NFC_TRF7970A
+CONFIG_NFC_MEI_PHY
+CONFIG_NFC_SIM
+CONFIG_NFC_PORT100
+CONFIG_NFC_FDP
+CONFIG_NFC_FDP_I2C
+CONFIG_NFC_PN544_I2C
+CONFIG_NFC_PN544_MEI
+CONFIG_NFC_PN533_USB
+CONFIG_NFC_PN533_I2C
+CONFIG_NFC_MICROREAD_I2C
+CONFIG_NFC_MICROREAD_MEI
+CONFIG_NFC_MRVL_USB
+CONFIG_NFC_MRVL_UART
+CONFIG_NFC_MRVL_I2C
+CONFIG_NFC_MRVL_SPI
+CONFIG_NFC_ST21NFCA_I2C
+CONFIG_NFC_ST_NCI_I2C
+CONFIG_NFC_ST_NCI_SPI
+CONFIG_NFC_NXP_NCI
+CONFIG_NFC_NXP_NCI_I2C
+CONFIG_NFC_S3FWRN5_I2C
+CONFIG_NFC_ST95HF

+CONFIG_PACKET
+CONFIG_PACKET_DIAG

+## Menu: Networking support >> Networking options

+CONFIG_PACKET

# Menu: Networking support >> Networking options
+CONFIG_IPX
+CONFIG_IPX_INTERNAL
+CONFIG_ATALK
+CONFIG_X25
+CONFIG_LAPB
+CONFIG_PHONET
+CONFIG_MAC802154
+CONFIG_DCBA
+CONFIG_DNS_RESOLVER
+CONFIG_NETLINK_DIAG
+CONFIG_NET_NSH
+CONFIG_HSR
+CONFIG_QRTR
+CONFIG_QRTR_SMD
+CONFIG_CGROUP_NET_PRIO
+CONFIG_CGROUP_NET_CLASSID
+CONFIG_BPF_JIT
+CONFIG_BPF_STREAM_PARSER
+
+CONFIG_NETWORK_PHY_TIMESTAMPING

+CONFIG_6LOWPAN
+CONFIG_6LOWPAN_DEBUGFS
+
+CONFIG_6LOWPAN_NHC
+CONFIG_6LOWPAN_NHC_DEST
+CONFIG_6LOWPAN_NHC_FRAGMENT
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+CONFIG_6LOWPAN_GHC_EXT_HDR_FRAG
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+CONFIG_6LOWPAN_GHC_EXT_HDR_ROUTE
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+ CONFIG_LTPC
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+ CONFIG_COPS_DAYNA
    policy<{'i386': 'y'}>
+ CONFIG_COPS_TANGENT
    policy<{'i386': 'y'}>
+ CONFIG_IPDDP
    policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>

+ CONFIG_IPDDP
    mark<ENFORCED> note<LP:1559772>

+ CONFIG_ATM
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_ATM_CLIP
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_ATM_CLIP_NO_ICMP
    policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+ CONFIG_ATM_LANE
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_ATM_MPOA
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+ CONFIG_ATM_BR2684
    policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
# Menu: Networking support >> Networking options >> B.A.T.M.A.N. Advanced Meshing Protocol

+CONFIG_BATMAN_ADV policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\"},

+CONFIG_BATMAN_ADV_BATMAN_V policy={\"amd64\": \"n\", \"arm64\": \"n\", \"armhf\": \"n\", \"i386\": \"n\", \"ppc64le\": \"n\"},

+CONFIG_BATMAN_ADV_BLA policy={\"amd64\": \"y\", \"arm64\": \"y\", \"armhf\": \"y\", \"i386\": \"y\", \"ppc64le\": \"y\"},

+CONFIG_BATMAN_ADV_DAT policy={\"amd64\": \"y\", \"arm64\": \"y\", \"armhf\": \"y\", \"i386\": \"y\", \"ppc64le\": \"y\"},

+CONFIG_BATMAN_ADV_NC policy={\"amd64\": \"y\", \"arm64\": \"y\", \"armhf\": \"y\", \"i386\": \"y\", \"ppc64le\": \"y\"},

+CONFIG_BATMAN_ADV_MCAST policy={\"amd64\": \"y\", \"arm64\": \"y\", \"armhf\": \"y\", \"i386\": \"y\", \"ppc64le\": \"y\"},

+CONFIG_BATMAN_ADV_DEBUGFS policy={\"amd64\": \"n\", \"arm64\": \"n\", \"armhf\": \"n\", \"i386\": \"n\", \"ppc64le\": \"n\"},

+ CONFIG_IEEE802154 policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\", \"s390x\": \"n\"},

+ CONFIG_IEEE802154_NL802154_EXPERIMENTAL policy={\"amd64\": \"n\", \"arm64\": \"n\", \"armhf\": \"n\", \"i386\": \"n\", \"ppc64le\": \"n\", \"s390x\": \"n\"},

+ CONFIG_IEEE802154_SOCKET policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\"},

+ CONFIG_IEEE802154_6LOWPAN policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\"},

+ CONFIG_MPLS policy={\"amd64\": \"y\", \"arm64\": \"y\", \"armhf\": \"y\", \"i386\": \"y\", \"ppc64le\": \"y\", \"s390x\": \"y\"},

+ CONFIG_NET_MPLS_GSO policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\", \"s390x\": \"m\"},

+ CONFIG_MPLS_ROUTING policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\", \"s390x\": \"m\"},

+ CONFIG_MPLS_IPTUNNEL policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\", \"s390x\": \"m\"},

+ CONFIG_NETFILTER policy={\"amd64\": \"y\", \"arm64\": \"y\", \"armhf\": \"y\", \"i386\": \"y\", \"ppc64le\": \"y\", \"s390x\": \"y\"},

+ CONFIG_NETFILTER_ADVANCED policy={\"amd64\": \"y\", \"arm64\": \"y\", \"armhf\": \"y\", \"i386\": \"y\", \"ppc64le\": \"y\", \"s390x\": \"y\"},

+ CONFIG_BRIDGE_NETFILTER policy={\"amd64\": \"m\", \"arm64\": \"m\", \"armhf\": \"m\", \"i386\": \"m\", \"ppc64le\": \"m\", \"s390x\": \"m\"}}
+ # Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> Core Netfilter Configuration
+CONFIG_NETFILTER_INGRESS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NETFILTER_NETLINK_ACCT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_NETLINK_QUEUE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_NETLINK_LOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_NETLINK_LOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_INGRESS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_NETLINK_ACCT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_NETLINK_QUEUE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_NETLINK_LOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_NETLINK_LOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NETFILTER_XT_MATCH_CPU
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_DCCP
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_DEVGROUP
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_DSCP
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_ECN
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_ESP
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_HASHLIMIT
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_HELPER
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_HL
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_IPCOMP
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_IPRANGE
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_IPVS
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_L2TP
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_LENGTH
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_LIMIT
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_MAC
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_MARK
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_MULTIPORT
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_NFACCT
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_OSF
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_OWNER
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_POLICY
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_PHYSDEV
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_PKTTYPE
    'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_NETFILTER_XT_MATCH_QUOTA  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_RATEEST  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_REALM  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_RECENT  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_SCTP  
'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_SOCKET  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_STATE  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_STATISTIC  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_STRING  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_TCPMSS  
'm', 'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_TIME  
'ppc64el': 'm', 's390x': 'm'

+CONFIG_NETFILTER_XT_MATCH_U32  
'ppc64el': 'm', 's390x': 'm'

+  
+

+### Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> Core Netfilter Configuration >> Netfilter connection tracking support

+CONFIG_NF_CONNTRACK  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CONNTRACK_MARK  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CONNTRACK_SECMARK  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CONNTRACK_ZONES  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CONNTRACK_PROCS  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CONNTRACK_EVENTS  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CONNTRACK_TIMEOUT  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CONNTRACK_TIMESTAMP  
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm'}>

+CONFIG_NF_CT_PROTO_DCCP  
'y', 's390x': 'y'

+CONFIG_NF_CT_PROTO_SCTP  
'y', 's390x': 'y'

+CONFIG_NF_CT_PROTO_UDPLITE  
'y', 's390x': 'y'
+CONFIG_NF_CONNTRACK_AMANDA
  [ppc64el: 'y', 's390x: 'y']
+CONFIG_NF_CONNTRACK_FTP
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_H323
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_IRC
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_NETBIOS_NS
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_SNMP
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_PPTP
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_SANE
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_SIP
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CONNTRACK_TFTP
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CT_NETLINK
  [m, 's390x: 'm']
+CONFIG_NF_CT_NETLINK_TIMEOUT
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_CT_NETLINK_HELPER
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NETFILTER_NETLINK_GLUE_CT
  [ppc64el: 'y', 's390x: 'y']
+CONFIG_NF_NAT_REDIRECT
  [ppc64el: 'm', 's390x: 'm']

# Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> Core Netfilter Configuration >> Netfilter nf_tables support
+CONFIG_NF_TABLES
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NF_TABLES_INET
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NFT_EXTHDR
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NFT_META
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NFT_RT
  [ppc64el: 'm', 's390x: 'm']
+CONFIG_NFT_NUMGEN
  [ppc64el: 'm', 's390x: 'm']

flag<DEPRECATED>

+#### Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> Core Netfilter Configuration >> Netfilter nf_tables support
+CONFIG_NF_CONNTRACK_PROCFS
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+CONFIG_NFT_CT
's390x': 'm'}
+CONFIG_NFT_SET_RB_TREE
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NFT_SET_HASH
'm', 's390x': 'm'}
+CONFIG_NFT_SET_BITMAP
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NFT_COUNTER
'm', 's390x': 'm'}
+CONFIG_NFT_LOG
's390x': 'm'}
+CONFIG_NFT_LIMIT
's390x': 'm'}
+CONFIG_NFT_MASQ
'm', 's390x': 'm'}
+CONFIG_NFT_REDIR
's390x': 'm'}
+CONFIG_NFT_NAT
's390x': 'm'}
+CONFIG_NFT_OBJREF
'm', 's390x': 'm'}
+CONFIG_NFT_QUEUE
'm', 's390x': 'm'}
+CONFIG_NFT_QUOTA
'm', 's390x': 'm'}
+CONFIG_NFT_REJECT
'm', 's390x': 'm'}
+CONFIG_NFT_COMPAT
'm', 's390x': 'm'}
+CONFIG_NFT_HASH
's390x': 'm'}
+CONFIG_NFT_FIB_INET
'm', 's390x': 'm'}
+
+
+CONFIG_NFT_TABLES_NETDEV
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NFT_DUP_NETDEV
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NFT_FIB_NETDEV
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NFT_FWD_NETDEV
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NFT_FIB_INET
'm', 's390x': 'm'}
+
+# Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> Core
Netfilter Configuration >> Netfilter nf_tables support >> Netfilter nf_tables netdev tables support

+CONFIG_NF_TABLES_NETDEV
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NF_DUP_NETDEV
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NF_FIB_NETDEV
'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NF_FWD_NETDEV
'ppc64le': 'm', 's390x': 'm'}

DECnet: Netfilter Configuration

+CONFIG_DECNET_NF_GRABULATOR  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+
+ # Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >>
Ethernet Bridge nf_tables support

+CONFIG_NF_TABLES_BRIDGE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_NFT_BRIDGE_META  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_NFT_BRIDGE_REJECT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_NF_LOG_BRIDGE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+
+ # Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >>
Ethernet Bridge tables (ebtables) support

+CONFIG_BRIDGE_NF_EBTABLES  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_BROUTE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_T_FILTER  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_T_NAT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_802_3  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_AMONG  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_ARP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_IP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_IP6  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_LIMIT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_MARK  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_PKTTYPE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_STP  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_VLAN  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+CONFIG_BRIDGE_EBT_ARPREPLY  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_BRIDGE_EBT_DNAT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_BRIDGE_EBT_MARK_T policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_BRIDGE_EBT_REDIRECT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_BRIDGE_EBT_SNAT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_BRIDGE_EBT_LOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_BRIDGE_EBT_NFLOG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>

+CONFIG_IP_SET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_MAX policy<{'amd64': '256', 'arm64': '256', 'armhf': '256', 'i386': '256', 'ppc64el': '256', 's390x': '256'}>
+CONFIG_IP_SET_BITMAP_IP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_BITMAP_IPMAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_BITMAP_PORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IPMARK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IPPORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IPPORTNET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IPIFACE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IPMARK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IPPORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_IPPORTNET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_MAC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP_SET_HASH_NETPORTNET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
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+CONFIG_IP_SET_LIST_SET
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+## Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IP
+virtual server support
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+CONFIG_IP_VS_IPV6
's390x': 'y'}>
+CONFIG_IP_VS_DEBUG
's390x': 'n'}>
+CONFIG_IP_VS_TAB_BITS
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+CONFIG_IP_VS_PROTO_TCP
'y', 's390x': 'y'}>
+CONFIG_IP_VS_PROTO_UDP
'y', 's390x': 'y'}>
+CONFIG_IP_VS_PROTO_ESP
'y', 's390x': 'y'}>
+CONFIG_IP_VS_PROTO_AH
'y', 's390x': 'y'}>
+CONFIG_IP_VS_PROTO_SCTP
'y', 's390x': 'y'}>
+CONFIG_IP_VS_RR
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+CONFIG_IP_VS_WRR
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+CONFIG_IP_VS_LC
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+CONFIG_IP_VS_SH
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+CONFIG_IP_VS_SED
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+CONFIG_IP_VS_NQ
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## Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IP: Netfilter Configuration >> IP tables support (required for filtering/masq/NAT) >> Packet mangling
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+`CONFIG_IP_NF_TARGET_CLUSTERIP` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+`CONFIG_IP_NF_TARGET_ECN` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+`CONFIG_IP_NF_TARGET_TTL` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
## Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IP: Netfilter Configuration >> IP tables support (required for filtering/masq/NAT) >> iptables NAT support
+`CONFIG_IP_NF_NAT` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
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+`CONFIG_IP_NF_TARGET_REDIRECT` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
## Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IP: Netfilter Configuration >> IPv4 NAT
+`CONFIG_NF_NAT_IPV4` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
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+`CONFIG_NFT_MASQ_IPV4` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+`CONFIG_NFT_REDIR_IPV4` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+`CONFIG_NF_NAT_SNMP_BASIC` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
## Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IP: Netfilter Configuration >> IPv4 nf_tables support
+`CONFIG_NF_TABLES_IPV4` policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_NFT_CHAIN_ROUTE_IPV4	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NFT_DUP_IPV4	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NFT_FIB_IPV4	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+
+# Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IPv6:
Netfilter Configuration
+CONFIG_NF_CONNTRACK_IPV6	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NF_SOCKET_IPV6	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NF_DUP_IPV6	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NF_REJECT_IPV6	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NF_LOG_IPV6	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NF_NAT_IPV6	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_NF_NAT_MASQUERADE_IPV6	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
'm': 'm', 'ppc64le': 'm', 's390x': 'm'}>
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+# Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IPv6:
Netfilter Configuration >> IP6 tables support (required for filtering)
+CONFIG_IP6_NF_IPTABLES	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_MATCH_AH	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_MATCH_EUI64	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_MATCH_FRAG	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_MATCH_IPV6HEADER	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_MATCH_MH	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_MATCH_RPFILTER	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_TARGET_HL	 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm',
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+CONFIG_IP6_NF_FILTER  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_IP6_NF_TARGET_REJECT  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_IP6_NF_TARGET_SYNPROXY  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_IP6_NF_MANGLE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_IP6_NF_RAW  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_IP6_NF_SECURITY  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
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+# Menu: Networking support >> Networking options >> Network packet filtering framework (Netfilter) >> IPv6: Netfilter Configuration >> IPv6 nf_tables support
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+CONFIG_NFT_REDIR_IPV6  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NF_TABLES_IPV6  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
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+CONFIG_NFT_DUP_IPV6  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NFT_FIB_IPV6  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+# Menu: Networking support >> Networking options >> Network testing
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+CONFIG_NET_TCPPROBE  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_DROP_MONITOR  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>

+# Menu: Networking support >> Networking options >> QoS and/or fair queueing
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+CONFIG_NET_SCH_HFSC
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+CONFIG_NET_SCH_Prio
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+CONFIG_NET_SCH_MULTIQ
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+CONFIG_NET_SCH_TEQL
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+CONFIG_NET_SCH_CBS
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+CONFIG_NET_SCH_GRED
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+CONFIG_NET_SCH_CHOKE
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+CONFIG_NET_SCH_QFQ
'm', 's390x': 'm'>
+CONFIG_NET_SCH_CODEL
'ppc64el': 'm', 's390x': 'm'>
+CONFIG_NET_SCH_FQ_CODEL
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+CONFIG_NET_SCH_FQ
'm', 's390x': 'm'>
+CONFIG_NET_SCH_HHF
'm', 's390x': 'm'>
+CONFIG_NET_SCH_PIE

+CONFIG_NET_SCH_INGRESS
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+CONFIG_NET_SCH_PLUG
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+CONFIG_NET_CLS_TCINDEX
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+CONFIG_NET_CLS_ROUTE4
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+CONFIG_NET_CLS_FW
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+CONFIG_NET_CLS_RSVP
 'm', 's390x': 'm'}
+CONFIG_NET_CLS_RSVP6
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+CONFIG_NET_CLS_CGROUP
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+CONFIG_NET_CLS_BPF
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+CONFIG_NET_CLS_FLOWER
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+CONFIG_NET_CLS_MATCHALL
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# Menu: Networking support >> Networking options >> QoS and/or fair queueing >> Actions
+CONFIG_NET_CLS_ACT
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+CONFIG_NET_ACT_POLICE
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+CONFIG_NET_ACT_GACT
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+CONFIG_GACT_PROB
 's390x': 'y'}
+CONFIG_NET_ACT_MIRRED
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+CONFIG_NET_ACT_SAMPLE
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+CONFIG_NET_ACT_IPT
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+CONFIG_NET_ACT_NAT
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+CONFIG_NET_ACT_CSUM
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+CONFIG_NET_ACT_VLAN
  'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NET_ACT_BPF
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+CONFIG_NET_ACT_CONNMARK
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+CONFIG_NET_ACT_SKBMOD
  'ppc64le': 'm', 's390x': 'm'}
+CONFIG_NET_ACT_TUNNEL_KEY
  'ppc64le': 'm', 's390x': 'm'}
+
+
# Menu: Networking support >> Networking options >> QoS and/or fair queueing >> Actions >> Inter-FE action
based on IETF ForCES InterFE LFB
+CONFIG_NET_ACT_IFE
  policy<{'amd64': 'n', 'arm64': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+
+
# Menu: Networking support >> Networking options >> QoS and/or fair queueing >> Allow override default
queue discipline
+CONFIG_NET_SCH_DEFAULT
  policy<{'amd64': 'n', 'arm64': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+
+
# Menu: Networking support >> Networking options >> QoS and/or fair queueing >> Allow override default
queue discipline >> Default queuing discipline
+
+
# Menu: Networking support >> Networking options >> QoS and/or fair queueing >> Extended Matches
+CONFIG_NET_EMATCH
  policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NET_EMATCH_STACK
  policy<{'amd64': '32', 'arm64': '32', 'i386': '32', 'ppc64le': '32', 's390x': '32'}>
+CONFIG_NET_EMATCH_CMP
  policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_EMATCH_NBYTE
  policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_EMATCH_U32
  policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_EMATCH_META
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+CONFIG_NET_EMATCH_TEXT
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+CONFIG_NET_EMATCH_CANID
  policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_EMATCH_IPSET
  policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
# Menu: Networking support >> Networking options >> QoS and/or fair queueing >> Universal 32bit comparisons w/ hashing (U32)

+CONFIG_NET_CLS_U32 policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_CLS_U32_PERF policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_CLS_U32_MARK policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NET_CLS_IND policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>

+CONFIG_NET_CLS_IND flag<DEPRECATED>

+## Menu: Networking support >> Networking options >> TCP/IP networking

+CONFIG_INET policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
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+CONFIG_NET_IPIP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_IPGRE_DEMUX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_IPGRE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_IPGRE_BROADCAST policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SYN_COOKIES policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NET_IPVTI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_FOU policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_NET_FOU_IP_TUNNELS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_INET_AH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_INET_ESP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_INET_ESP_OFFLOAD policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_INET_IPCOMP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_INET_XFRM_MODE_TRANSPORT policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_INET_XFRM_MODE_TUNNEL policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
+CONFIG_INET_XFRM_MODE_BEET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm', 's390x': 'm'}>
# CONFIG_TCP_MD5SIG
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

# CONFIG_NETLABEL
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

# CONFIG_NET_SWITCHDEV
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

# CONFIG_NET_L3_MASTER_DEV
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

# CONFIG_NET_NCSI
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## # SYN_COOKIES
mark<ENFORCED>

## CONFIG_NET_SWITCHDEV
mark<ENFORCED> note<LP: #1628241, updated to 'y' for 4.11-rc3 except for s390x>

## Menu: Networking support >> Networking options >> TCP/IP networking >> INET: socket monitoring interface

## CONFIG_INET_DIAG
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

## CONFIG_INET_UDP_DIAG
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

## CONFIG_INET_RAW_DIAG
policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm'}>

## CONFIG_INET_DIAG_DESTROY
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## Menu: Networking support >> Networking options >> TCP/IP networking >> IP: advanced router

## CONFIG_IP_ADVANCED_ROUTER
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## CONFIG_IP_FIB_TRIE_STATS
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## CONFIG_IP_MULTIPLE_TABLES
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## CONFIG_IP_ROUTE_MULTIPATH
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## CONFIG_IP_ROUTE_VERBOSE
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## Menu: Networking support >> Networking options >> TCP/IP networking >> IP: kernel level autoconfiguration

## CONFIG_IP_PNP
policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>

## CONFIG_IP_PNP
note<LP:1259861>

## Menu: Networking support >> Networking options >> TCP/IP networking >> IP: multicast routing

## CONFIG_IP_MROUTE
policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>

## CONFIG_IP_MROUTE_MULTIPLE_TABLES
policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n'}>
'+CONFIG_IP_PIMSM_V1 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
'+CONFIG_IP_PIMSM_V2 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+
#+ Menu: Networking support >> Networking options >> TCP/IP networking >> Layer Two Tunneling Protocol (L2TP)
'+CONFIG_L2TP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_L2TP_DEBUGFS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_L2TP_V3 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
'+CONFIG_L2TP_IP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_L2TP_ETH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
#+ Menu: Networking support >> Networking options >> TCP/IP networking >> Open vSwitch
'+CONFIG_OPENVSWITCH policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_OPENVSWITCH_GRE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_OPENVSWITCH_VXLAN policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_OPENVSWITCH_GENEVE policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
#+ Menu: Networking support >> Networking options >> TCP/IP networking >> TCP: advanced congestion control
'+CONFIG_TCP_CONG_ADVANCED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
'+CONFIG_TCP_CONG_BIC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_TCP_CONG_CUBIC policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
'+CONFIG_TCP_CONG_HSTCP policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_TCP_CONG_HYBLA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_TCP_CONG_VEGAS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
'+CONFIG_TCP_CONG_NV policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
# Menu: Networking support >> Networking options >> TCP/IP networking >> TCP: advanced congestion control

## Default TCP congestion control

- `+CONFIG_DEFAULT_CUBIC` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
- `+CONFIG_DEFAULT_RENO` policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>

## The DCCP Protocol

### DCCPs Configuration

- `+CONFIG_IP_DCCP_CCID2_DEBUG` policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
- `+CONFIG_IP_DCCP_CCID3` policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'y'}>
- `+CONFIG_IP_DCCP_CCID3_DEBUG` policy<{'s390x': 'n'}>

### DCCP Kernel Hacking

- `+CONFIG_IP_DCCP_DEBUG` policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>

## The IPv6 protocol

- `+CONFIG_IPV6` policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_IPV6_ROUTER_PREF 'y', 's390x': 'y'}
+CONFIG_IPV6_ROUTE_INFO 'y', 's390x': 'y'}
+CONFIG_IPV6_OPTIMISTIC_DAD 'ppc64el': 'n', 's390x': 'n'}
+CONFIG_INET6_AH 'm', 's390x': 'm'}
+CONFIG_INET6_ESP 'm', 's390x': 'm'}
+CONFIG_INET6_ESP_OFFLOAD 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_INET6_IPCOMP 'm', 's390x': 'm'}
+CONFIG_IPV6_MIP6 'm', 's390x': 'm'}
+CONFIG_IPV6_ILA 'm', 's390x': 'm'}
+CONFIG_INET6_XFRM_MODE_TRANSPORT 'm', 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_INET6_XFRM_MODE_TUNNEL 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_INET6_XFRM_MODE_BEET 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_INET6_XFRM_MODE_ROUTEOPTIMIZATION 'ppc64el': 'm', 's390x': 'm'}
+CONFIG_IPV6_VTI 'm', 's390x': 'm'}
+CONFIG_IPV6_SIT 'm', 's390x': 'm'}
+CONFIG_IPV6_SIT_6RD 's390x': 'y'}
+CONFIG_IPV6_TUNNEL 'm', 's390x': 'm'}
+CONFIG_IPV6_GRE 'm', 's390x': 'm'}
+CONFIG_IPV6_MULTIPLE_TABLES 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_IPV6_SUBTREES 's390x': 'y'}
+CONFIG_IPV6_MROUTE 's390x': 'y'}
+CONFIG_IPV6_MROUTE_MULTIPLE_TABLES 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_IPV6_PIMSM_V2 's390x': 'y'}
+CONFIG_IPV6_SEG6_LWTUNNEL 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_IPV6SEG6_HMAC policy\{amd64:\ y', arm64:\ y', armhf:\ y', i386:\ y', ppc64le:\ y', s390x:\ y'\}
 +
+CONFIG_IPV6_OPTIMISTIC_DAD flag<EXPERIMENTAL>
+CONFIG_IPV6 mark<ENFORCED> note<if this is a module we get a module load for every ipv6 packet>
+
+## Menu: Networking support >> Networking options >> TCP/IP networking >> The RDS Protocol
+CONFIG_RDS policy\{amd64:\ m', arm64:\ m', armhf:\ m', i386:\ m', ppc64le:\ m', s390x:\ m'\}
+CONFIG_RDS_RDMA policy\{amd64:\ m', arm64:\ m', armhf:\ m', i386:\ m', ppc64le:\ m', s390x:\ m'\}
+CONFIG_RDS_TCP policy\{amd64:\ m', arm64:\ m', armhf:\ m', i386:\ m', ppc64le:\ m', s390x:\ m'\}
+CONFIG_RDS_DEBUG policy\{amd64:\ n', arm64:\ n', armhf:\ n', i386:\ n', ppc64le:\ n', s390x:\ n'\}
+
+## Menu: Networking support >> Networking options >> TCP/IP networking >> The SCTP Protocol
+CONFIG_IP_SCTP policy\{amd64:\ m', arm64:\ m', armhf:\ m', i386:\ m', ppc64le:\ m', s390x:\ m'\}
+CONFIG_NET_SCTPPROBE policy\{amd64:\ m', arm64:\ m', armhf:\ m', i386:\ m', ppc64le:\ m', s390x:\ m'\}
+CONFIG_SCTP_DBG_OBJCNT policy\{amd64:\ n', arm64:\ n', armhf:\ n', i386:\ n', ppc64le:\ n', s390x:\ n'\}
+CONFIG_SCTP_COOKIE_HMAC_MD5 policy\{amd64:\ y', arm64:\ y', armhf:\ y', i386:\ y', ppc64le:\ y', s390x:\ y'\}
+CONFIG_SCTP_COOKIE_HMAC_SHA1 policy\{amd64:\ y', arm64:\ y', armhf:\ y', i386:\ y', ppc64le:\ y', s390x:\ y'\}
+
+## Menu: Networking support >> Networking options >> TCP/IP networking >> The SCTP Protocol >> Default SCTP cookie HMAC encoding
+CONFIG_SCTP_DEFAULT_COOKIE_HMAC_MD5 policy\{amd64:\ n', arm64:\ n', armhf:\ n', i386:\ n', ppc64le:\ n', s390x:\ n'\}
+CONFIG_SCTP_DEFAULT_COOKIE_HMAC_SHA1 policy\{amd64:\ y', arm64:\ y', armhf:\ y', i386:\ y', ppc64le:\ y', s390x:\ y'\}
+CONFIG_SCTP_DEFAULT_COOKIE_HMAC_NONE policy\{amd64:\ n', arm64:\ n', armhf:\ n', i386:\ n', ppc64le:\ n', s390x:\ n'\}
+
+## Menu: Networking support >> Networking options >> TCP/IP networking >> The TIPC Protocol
+CONFIG_TIPC policy\{amd64:\ m', arm64:\ m', armhf:\ m', i386:\ m', ppc64le:\ m', s390x:\ m'\}
+CONFIG_TIPC_MEDIA_IB policy\{amd64:\ y', arm64:\ y', armhf:\ y', i386:\ y', ppc64le:\ y', s390x:\ y'\}
+CONFIG_TIPC_MEDIA_UDP policy\{amd64:\ y', arm64:\ y', armhf:\ y', i386:\ y', ppc64le:\ y', s390x:\ y'\}
+# Menu: Networking support >> Networking options >> Virtual Socket protocol
+CONFIG_VSOCKETS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'>
+CONFIG_VSOCKETS_DIAG policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'>
+CONFIG_VMWARE_VMCI_VSOCKETS policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_VIRTIO_VSOCKETS policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_HYPERV_VSOCKETS policy<{'amd64': 'm', 'i386': 'm'}>
+
+# Menu: Networking support >> Plan 9 Resource Sharing Support (9P2000)
+CONFIG_NET_9P policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_NET_9P_VIRTIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_NET_9P_XEN policy<{'amd64': 'm', 'arm64': 'm', 'i386': 'm'}>
+CONFIG_NET_9P_RDMA policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_NET_9P_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+
+# Menu: Networking support >> RF switch subsystem support
+CONFIG_RFKILL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_RFKILL_INPUT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_RFKILL_GPIO policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+
+# Menu: Networking support >> RxRPC session sockets
+CONFIG_AF_RXRPC policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'm'}>
+CONFIG_AF_RXRPC_IPV6 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_AF_RXRPC_INJECT_LOSS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_AF_RXRPC_DEBUG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_RXKAD policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+
+# Menu: Networking support >> WiMAX Wireless Broadband support
+CONFIG_WIMAX policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64el': 'm', 's390x': 'n'}>
+CONFIG_WIMAX_DEBUG_LEVEL policy<{'amd64': '8', 'arm64': '8', 'armhf': '8', 'i386': '8', 'ppc64el': '8'}>
+ # Menu: Networking support >> Wireless
+CONFIG_WIRELESS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_LIB80211_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
+ # Menu: Networking support >> Wireless >> Generic IEEE 802.11 Networking Stack (mac80211)
+CONFIG_MAC80211  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_MAC80211_RC_MINSTREL  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MAC80211_RC_MINSTREL_HT  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MAC80211_RC_MINSTREL_VHT  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MAC80211_MESH  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MAC80211_LEDS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MAC80211_DEBUGFS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_MAC80211_MESSAGE_TRACING  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+ # Menu: Networking support >> Wireless >> Generic IEEE 802.11 Networking Stack (mac80211) >> Default rate control algorithm
+CONFIG_MAC80211_RC_DEFAULT_MINSTREL  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+ # Menu: Networking support >> Wireless >> Generic IEEE 802.11 Networking Stack (mac80211) >> Select mac80211 debugging features
+CONFIG_MAC80211_DEBUG_MENU  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_MAC80211_STA_HASH_MAX_SIZE  policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0'}>
+
+ # Menu: Networking support >> Wireless >> cfg80211 - wireless configuration API
+CONFIG_CFG80211  policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_NL80211_TESTMODE  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_CFG80211 DEVELOPER_WARNINGS  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+CONFIG_CFG80211_DEFAULT_PS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CFG80211_DEBUGFS  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CFG80211_CRDA_SUPPORT  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
'ppc64el': 'y'}>
+CONFIG_CFG80211_WEXT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+#
+CONFIG_CFG80211_WEXT flag<REVIEW>
+
+## Menu: Networking support >> Wireless >> cfg80211 - wireless configuration API >> cfg80211 certification
onus
+CONFIG_CFG80211_CERTIFICATION_ONUS policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_CFG80211_REQUIRE_SIGNED_REGDB policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_CFG80211_USE_KERNEL_REGDB_KEYS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+
+## Menu: Platform selection
+CONFIG_ARCH_VEXPRESS policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARCH_SUNXI policy<{'arm64': 'y', 'armhf': 'n'}>
+CONFIG_ARCH_MESON policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARCH_ACTIONS policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARCH_ALPINE policy<{'arm64': 'n', 'armhf': 'y'}>
+CONFIG_ARCH_HISI policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARCH_ROCKCHIP policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARCH_Tegra policy<{'arm64': 'n', 'armhf-generic': 'y', 'armhf-generic-lpae': 'n'}>
+CONFIG_ARCH_UNIPHIER policy<{'arm64': 'n', 'armhf': 'y'}>
+CONFIG_ARCH_ZX policy<{'arm64': 'n', 'armhf': 'y'}>
+CONFIG_ARCH_BCM2835 policy<{'arm64': 'y'}>
+CONFIG_ARCH_BRCMSTB policy<{'arm64': 'y'}>
+CONFIG_ARCH_BCM_IPROC policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARCH_LAYERSCAPE policy<{'arm64': 'y'}>
+CONFIG_ARCH_LG1K policy<{'arm64': 'y'}>
+CONFIG_ARCH_REALTEK policy<{'arm64': 'y'}>
+CONFIG_ARCH_SEATTLE policy<{'arm64': 'y'}>
+CONFIG_ARCH_SYNQUACER policy<{'arm64': 'y'}>
+CONFIG_ARCH_STRATIX10 policy<{'arm64': 'y'}>
+CONFIG_ARCH_SPRD policy<{'arm64': 'y'}>
+CONFIG_ARCH_THUNDER policy<{'arm64': 'y'}>
+CONFIG_ARCH_THUNDER2 policy<{'arm64': 'y'}>
+CONFIG_ARCH_XGENE                  policy<{'arm64': 'y'}>
+CONFIG_ARCH_ZYNQMP                 policy<{'arm64': 'y'}>
+
+# Menu: Platform selection >> Renesas SoC Platforms
+CONFIG_ARCH_RENESAS                policy<{'arm64': 'y', 'armhf': 'y'}>
+
+# Menu: Platform selection >> Renesas SoC Platforms >> Architecture: arm64
+CONFIG_ARCH_R8A7795                policy<{'arm64': 'y'}>
+CONFIG_ARCH_R8A7796                policy<{'arm64': 'y'}>
+CONFIG_ARCH_R8A77970               policy<{'arm64': 'y'}>
+CONFIG_ARCH_R8A77995               policy<{'arm64': 'y'}>
+
+# Menu: Power management and ACPI options
+CONFIG_SUSPEND                      policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SUSPEND_FREEZER             policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SUSPEND_SKIP_SYNC           policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 's390x': 'n'}>
+CONFIG_HIBERNATION                 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'n', 's390x': 'y'}>
+CONFIG_PM_STD_PARTITION            policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_PM_AUTOSLEEP                policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_PM_WAKELOCKS                policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_PM_WAKELOCKS_LIMIT          policy<{'amd64': '100', 'arm64': '100', 'armhf': '100', 'i386': '100', 'ppc64le': '100', 's390x': '100'}>
+CONFIG_PM_WAKELOCKS_GC             policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_PM                          policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_PM_TRACE_RTC                policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_APM_EMULATION               policy<{'armhf': 'n'}>
+CONFIG_WQ_POWER_EFFICIENT_DEFAULT  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_KVM_GUEST                   policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_SFI                         policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_INTEL_IDLE                  policy<{'amd64': 'y', 'i386': 'y'}>
+
+# Menu: Power management and ACPI options >> 512x-based boards >> Architecture: powerpc
+
+# Menu: Power management and ACPI options >> 52xx-based boards >> Architecture: powerpc
+
+# Menu: Power management and ACPI options >> 82xx-based boards (PQ II) >> Architecture: powerpc
+
+# Menu: Power management and ACPI options >> 83xx-based boards >> Architecture: powerpc
+## Menu: Power management and ACPI options >> 86xx-based boards >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> 8xx Machine Type >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> ACPI (Advanced Configuration and Power Interface) Support
+
## Menu: Power management and ACPI options >> ACPI Platform Error Interface (APEI)
+
## Menu: Power management and ACPI options >> ACPI (Advanced Configuration and Power Interface) Support
>> PMIC (Power Management Integrated Circuit) operation region support
+
## Menu: Power management and ACPI options >> APM (Advanced Power Management) BIOS support >> Architecture: x86
+**CONFIG_APM** policy<{'i386': 'm'}>
+**CONFIG_APM_IGNORE_USER_SUSPEND** policy<{'i386': 'n'}>
+**CONFIG_APM_DO_ENABLE** policy<{'i386': 'n'}>
+**CONFIG_APM_CPU_IDLE** policy<{'i386': 'n'}>
+**CONFIG_APM_DISPLAY_BLANK** policy<{'i386': 'n'}>
+**CONFIG_APM_ALLOW_INTS** policy<{'i386': 'n'}>
+
## Menu: Power management and ACPI options >> Architecture: arm
+
## Menu: Power management and ACPI options >> Architecture: arm64
+
## Menu: Power management and ACPI options >> Architecture: powerpc
+**CONFIG_EPAPR_PARAVIRT** policy<{'ppc64le': 'y'}>
+**CONFIG_PPC_OF_BOOT_TRAMPOLINE** policy<{'ppc64le': 'y'}>
+**CONFIG_PPC_DT_CPU_FTRS** policy<{'ppc64le': 'y'}>
+**CONFIG_UBDBG_RTAS_CONSOLE** policy<{'ppc64le': 'n'}>
+**CONFIG_MPIC_MSGR** policy<{'ppc64le': 'n'}>
+**CONFIG_RTAS_PROC** policy<{'ppc64le': 'y'}>
+**CONFIG_RTAS_FLASH** policy<{'ppc64le': 'm'}>
+**CONFIG_GEN_RTC** policy<{'ppc64le': 'y'}>
+**CONFIG_SIMPLE_GPIO** policy<{'ppc64le': 'n'}>
+
## Menu: Power management and ACPI options >> Architecture: s390
+
## Menu: Power management and ACPI options >> Architecture: x86
+
## Menu: Power management and ACPI options >> CPU Frequency scaling
+
## Menu: Power management and ACPI options >> CPU Frequency scaling >> CPU Frequency scaling
+**CONFIG_CPU_FREQ** policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_STAT          policy:<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_GOV_PERFORMANCE          policy:<{' amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_GOV_POWERSAVE          policy:<{' amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_GOV_USERSPACE          policy:<{' amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_GOV_ONDEMAND          policy:<{' amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_GOV_CONSERVATIVE          policy:<{' amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_GOV_SCHEDUTIL          policy:<{' amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_FREQ_DT          policy:<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_X86_INTEL_PSTATE          policy:<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_PCC_CPUFREQ          policy:<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_SFI_CPUFREQ          policy:<{'i386': 'm'}>
+CONFIG_X86_POWERNOW_K6          policy:<{'i386': 'm'}>
+CONFIG_X86_POWERNOW_K7          policy:<{'i386': 'm'}>
+CONFIG_X86_GX_SUSPMOD          policy:<{'i386': 'm'}>
+CONFIG_X86_SPEEDSTEP_CENTRINO          policy:<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_SPEEDSTEP_CENTRINO_TABLE          policy:<{'i386': 'y'}>
+CONFIG_X86_SPEEDSTEP_ICH          policy:<{'i386': 'y'}>
+CONFIG_X86_SPEEDSTEP_SMI          policy:<{'i386': 'y'}>
+CONFIG_X86_P4_CLOCKMOD          policy:<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_X86_CPUFREQ_NFORCE2          policy:<{'i386': 'y'}>
+CONFIG_X86_LONGRUN          policy:<{'i386': 'm'}>
+CONFIG_X86_LONGHAUL          policy:<{'i386': 'm'}>
+CONFIG_X86_E POWERSAVER          policy:<{'i386': 'm'}>
+CONFIG_X86_SPEEDSTEP_RELAXED_CAP_CHECK          policy:<{'i386': 'y'}>
+CONFIG_ARM_BRCMSTB AVS_CPUFREQ          policy:<{'arm64': 'm'}>
+CONFIG_ARM_BRCMSTB AVS_CPUFREQ_DEBUG          policy:<{'arm64': 'm'}>
+CONFIG_ARM_EXYNOS5440 CPUFREQ          policy:<{'armhf': 'm'}>
+CONFIG_ARM_HIGHBANK_CPUFREQ          policy:<{'armhf': 'm'}>
+CONFIG_ARM_IMX6Q_CPUFREQ          policy:<{'armhf-generic': 'm'}>
+CONFIG_ARM_MEDIATEK_CPUFREQ          policy:<{'arm64': 'm', 'armhf': 'm'}>
+CONFIG_ARM_OMAP2PLUS_CPUFREQ          policy:<{'armhf': 'y'}>
+CONFIG_ARM_TEGRA20 CPUFREQ          policy:<{'armhf-generic': 'y'}>
+CONFIG_ARM_TEGRA124 CPUFREQ          policy:<{'armhf-generic': 'm'}>
+CONFIG_ARM_TI_CPUFREQ          policy:<{'armhf': 'y'}>
+CONFIG_ACPICPPC_CPUFREQ          policy:<{'arm64': 'm'}>
+CONFIG_POWERNV_CPUFREQ          policy:<{'ppc64le': 'y'}>
+CONFIG_QORIQ_CPUFREQ          policy:<{'arm64': 'm', 'armhf': 'm'}>

#  +CONFIG_CPU_FREQ_STAT note:dependency of boot essential>
+CONFIG_CPU_FREQ_GOV_PERFORMANCE note:not autoloadable>
+CONFIG_CPU_FREQ_GOV_POWERSAVE note:not autoloadable>
+CONFIG_CPU_FREQ_GOVERNOR note<not autoloadable>
+CONFIG_CPU_FREQ_GOVERNOR_ONDEMAND note<not autoloadable>
+CONFIG_CPU_FREQ_GOVERNOR_CONSERVATIVE note<not autoloadable>
+CONFIG_X86_PCC_CPUFREQ note<not autoloadable>
+CONFIG_X86_SPEEDSTEP_CENTRINO note<not autoloadable>
+CONFIG_X86_SPEEDSTEP_ICH note<not autoloadable>
+CONFIG_X86_SPEEDSTEP_SMI note<not autoloadable>
+CONFIG_X86_CPUFREQ_NFORCE2 note<not autoloadable>
+CONFIG_CPUFREQ_DT note<not autoloadable>

+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_ACPI_CPUFREQ_CPB policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_AMD_FREQ_SENSITIVITY policy<{'amd64': 'm', 'i386': 'm'}>
+
+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'm', 'i386': 'm'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'm', 'i386': 'm'}>

+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>

+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_ACPI_CPUFREQ_CPB policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_AMD_FREQ_SENSITIVITY policy<{'amd64': 'm', 'i386': 'm'}>
+
+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'y', 'i386': 'y'}>

+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'y', 'i386': 'y'}>

+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'y', 'i386': 'y'}>

+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'y', 'i386': 'y'}>

+ CONFIG_X86_ACPI_CPUFREQ policy<{'amd64': 'y', 'i386': 'y'}>
+ CONFIG_X86_POWERNOW_K8 policy<{'amd64': 'y', 'i386': 'y'}>

# Menu: Power management and ACPI options >> CPU Frequency scaling >> CPU Frequency scaling >> Default
CPUFreq governor
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+ CONFIG_CPU_FREQ_DEFAULT_GOVERNOR policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+
+ CONFIG_ARM_BIG_LITTLE_CPUFREQ policy<{'arm64': 'm', 'armhf': 'm'}>
+ CONFIG_ARM_DT_BL_CPUFREQ policy<{'arm64': 'm', 'armhf': 'm'}>
+ CONFIG_ARM_VEXPRESS_SPC_CPUFREQ policy<{'armhf': 'm'}>
+ CONFIG_ARM_SCPI_CPUFREQ policy<{'arm64': 'm', 'armhf': 'm'}>
+
+## Menu: Power management and ACPI options >> CPU Idle

Open Source Used in 5GaaS Edge AC-4  18502
+  +# Menu: Power management and ACPI options >> CPU Idle >> CPU idle PM support
+CONFIG_CPU_IDLE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'x86_64': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_IDLE_GOV_LADDER policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_CPU_IDLE_GOV_MENU policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+
+  +# Menu: Power management and ACPI options >> CPU Idle >> CPU idle PM support >> ARM CPU Idle Drivers
+CONFIG_ARM_CPUIDLE policy<{'arm64': 'y', 'armhf': 'y'}>
+CONFIG_ARM_BIG_LITTLE_CPUIDLE policy<{'armhf': 'y'}>
+CONFIG_ARM_Highbank_CPUIDLE policy<['armhf-generic': 'n', 'armhf-generic-lpae': 'y']>
+CONFIG_ARM_EXYNOS_CPUIDLE policy<{'armhf': 'y'}>
+CONFIG_ARM_MVEBU_V7_CPUIDLE policy<{'armhf': 'y'}>
+
+CONFIG_ARM_Highbank_CPUIDLE note<broken on ecx-1000>
+
+  +# Menu: Power management and ACPI options >> CPU Idle >> CPU idle PM support >> MIPS CPU Idle Drivers
+
+  +# Menu: Power management and ACPI options >> CPU Idle >> CPU idle PM support >> POWERPC CPU Idle Drivers
+CONFIG_PSeries_CPUIDLE policy<{'ppc64le': 'y'>
+CONFIG_Powernv_CPUIDLE policy<{'ppc64le': 'y'>
+
+  +# Menu: Power management and ACPI options >> CPUIdlde driver >> Architecture: powerpc
+
+  +# Menu: Power management and ACPI options >> CPUIdlde driver >> CPU Idle
+
+  +# Menu: Power management and ACPI options >> CPUIdlde driver >> CPU Idle >> CPU idle PM support
+
+  +# Menu: Power management and ACPI options >> CPUIdlde driver >> CPU Idle >> CPU idle PM support >> ARM CPU Idle Drivers
+##
+
+  +# Menu: Power management and ACPI options >> CPUIdlde driver >> CPU Idle >> CPU idle PM support >> MIPS CPU Idle Drivers
+
+  +# Menu: Power management and ACPI options >> CPUIdlde driver >> CPU Idle >> CPU idle PM support >> POWERPC CPU Idle Drivers
+
+  +# Menu: Power management and ACPI options >> Cell Broadband Engine options >> Architecture: powerpc
+
+  +# Menu: Power management and ACPI options >> Embedded 6xx/7xx/7xxx-based boards >> Architecture: powerpc
+
+  +# Menu: Power management and ACPI options >> Freescale Book-E Machine Type >> Architecture: powerpc
+
+  +# Menu: Power management and ACPI options >> Freescale Ethernet driver platform-specific options >>
Architecture: powerpc
+
## Menu: Power management and ACPI options >> Freescale Ethernet driver platform-specific options >> Second Ethernet channel >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> IBM PowerNV (Non-Virtualized) platform support >> Architecture: powerpc
+CONFIG_PPC_POWERNV policy<{'ppc64el': 'y'}>
+CONFIG_OPAL_PRD policy<{'ppc64el': 'm'}>
+CONFIG_PPC_MEMTRACE policy<{'ppc64el': 'y'}>
+CONFIG_PPC_VAS policy<{'ppc64el': 'y'}>
+
## Menu: Power management and ACPI options >> IBM pSeries & new (POWER5-based) iSeries
+CONFIG_CMM policy<{'ppc64el': 'm', 's390x': 'y'}>
+
## Menu: Power management and ACPI options >> IBM pSeries & new (POWER5-based) iSeries >> Architecture: powerpc
+CONFIG_PPC_PSERIES policy<{'ppc64el': 'y'}>
+CONFIG_PPC_SPLPAR policy<{'ppc64el': 'y'}>
+CONFIG_DTL policy<{'ppc64el': 'y'}>
+CONFIG_PSERIES_ENERGY policy<{'ppc64el': 'm'}>
+CONFIG_SCANLOG policy<{'ppc64el': 'm'}>
+CONFIG_IO_EVENT_IRQ policy<{'ppc64el': 'y'}>
+CONFIG_LPARCFG policy<{'ppc64el': 'y'}>
+CONFIG_PPC_SMLPAR policy<{'ppc64el': 'y'}>
+CONFIG_HV_PERF_CTRS policy<{'ppc64el': 'y'}>
+
## Menu: Power management and ACPI options >> MPC8xx CPM Options >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> MPC8xx CPM Options >> Microcode patch selection >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> PA Semi PWRficient options >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> PS3 Platform Options >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> PS3 Platform Options >> PS3 Advanced configuration options >> Architecture: powerpc
+
## Menu: Power management and ACPI options >> Power Management Debug Support
+CONFIG_PM_DEBUG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_PM_ADVANCED_DEBUG policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y'}>
+CONFIG_PM_TEST_SUSPEND policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n'}>
+CONFIG_DPM_WATCHDOG policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n'}>
+
# Menu: Power management and ACPI options >> Support for 47x variant >> Architecture: powerpc
+
## Menu: Processor support
+CONFIG_SMP policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_NR_CPUS policy<{'amd64': '8192', 'arm64': '256', 'armhf': '4', 'i386': '8', 'ppc64le': '2048', 's390x': '256'}>
+
## Menu: Processor support >> Architecture: powerpc
+CONFIG_ALTIVEC policy<{'ppc64le': 'y'}>
+CONFIG_VSX policy<{'ppc64le': 'y'}>
+CONFIG_PPC_RADIX_MMU policy<{'ppc64le': 'y'}>
+CONFIG_PPC_RADIX_MMU_DEFAULT policy<{'ppc64le': 'y'}>
+
## Menu: Processor support >> CPU selection
+CONFIG_GENERIC_CPU policy<{'amd64': 'y'}>
+
## Menu: Processor support >> CPU selection >> Architecture: powerpc
+CONFIG_POWER7_CPU policy<{'ppc64le': 'n'}>
+CONFIG_POWER8_CPU policy<{'ppc64le': 'y'}>
+
## Menu: Processor support >> Processor Type >> Architecture: powerpc
+CONFIG_PPC_BOOK3S_64 policy<{'ppc64le': 'y'}>
+CONFIG_PPC_BOOK3E_64 policy<{'ppc64le': 'n'}>
+
## Menu: Processor type and features
+CONFIG_ARCH_RANDOM policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_SPAREMEM_VMEMMAP policy<{'amd64': 'y', 'arm64': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_BALLOON_COMPACTION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_COMPACTION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_MIGRATION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_BOUNCE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_KSM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_DEFAULT_MMAP_MIN_ADDR policy<{'amd64': '65536', 'arm64': '32768', 'armhf': '32768', 'i386': '65536', 'ppc64le': '65536', 's390x': '65536'}>
+CONFIG_MEMORY_FAILURE policy<{'amd64': 'y', 'arm64': 'y', 'ppc64le': 'y'}>
+CONFIG_HWPOISON.Inject policy<{'amd64': 'm', 'arm64': 'm', 'ppc64le': 'm'}>
+CONFIG_TRANSPARENT_HUGEPAGE policy<{'amd64': 'y', 'arm64': 'y', 'armhf-generic-iapae': 'y',...
lpae: '11', 'ppc64el': '9', 's390x': '9'}

## CONFIG_DEFAULT_MMAP_MIN_ADDR
mark<ENFORCED> note<LP:1418140 LP:1531327>

## CONFIG_TRANSPARENT_HUGEPAGE
flag<REVIEW>

## CONFIG_MEM_SOFT_DIRTY
flag<REVIEW>

## CONFIG_IDLE_PAGE_TRACKING
flag<REVIEW> note<is there a cost associated with this?>

## CONFIG_PERCPU_STATS
flag<REVIEW>

## CONFIG_RELOCATABLE
flag<REVIEW>

## CONFIG_HOTPLUG_CPU
flag<REVIEW>

## CONFIG_NUMA
note<LP:1543165 LP:1557690>

+## Menu: Processor type and features >> ARM errata workarounds via the alternatives framework >> Architecture: arm64

## CONFIG_ARM64_ERRATUM_826319
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_827319
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_824069
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_819472
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_832075
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_834220
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_845719
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_843419
policy<{'arm64': 'y'}>

## CONFIG_ARM64_ERRATUM_1024718
policy<{'arm64': 'y'}>

## CONFIG_CAVIUM_ERRATUM_22375
policy<{'arm64': 'y'}>

## CONFIG_CAVIUM_ERRATUM_23144
policy<{'arm64': 'y'}>

## CONFIG_CAVIUM_ERRATUM_23154
policy<{'arm64': 'y'}>

## CONFIG_CAVIUM_ERRATUM_27456
policy<{'arm64': 'y'}>

## CONFIG_CAVIUM_ERRATUM_30115
policy<{'arm64': 'y'}>

## CONFIG_QCOM_FALKOR_ERRATUM_1003
policy<{'arm64': 'y'}>

## CONFIG_QCOM_FALKOR_ERRATUM_1009
policy<{'arm64': 'y'}>

## CONFIG_QCOM_QDF2400_ERRATUM_0065
policy<{'arm64': 'y'}>

## CONFIG_SOCIONEXT_SYNQUACER_PREITS
policy<{'arm64': 'y'}>

## CONFIG_HDRILICON_ERRATUM_161600802
policy<{'arm64': 'y'}>

## CONFIG_QCOM_FALKOR_ERRATUM_E1041
policy<{'arm64': 'y'}>

+## Menu: Processor type and features >> ARMv8.1 architectural features >> Architecture: arm64

## CONFIG_ARM64_HW_AFDBM
policy<{'arm64': 'y'}>

## CONFIG_ARM64_PAN
policy<{'arm64': 'y'}>

## CONFIG_ARM64_LSE_ATOMICS
policy<{'arm64': 'y'}>

## CONFIG_ARM64_VHE
policy<{'arm64': 'y'}>

+## Menu: Processor type and features >> ARMv8.2 architectural features >> Architecture: arm64

## CONFIG_ARM64_UAO
policy<{'arm64': 'y'}>

## CONFIG_ARM64_PMEM
policy<{'arm64': 'y'}>
+CONFIG_KERNEL_NOBP policy<{'s390x': 'n'}>
+CONFIG_EXPOLINE policy<{'s390x': 'y'}>
+CONFIG_MAX_PHYSMEM_BITS policy<{'s390x': '46'}>
+CONFIG_PACK_STACK policy<{'s390x': 'y'}>
+CONFIG_CHECK_STACK policy<{'s390x': 'y'}>
+CONFIG_STACK_GUARD policy<{'s390x': '256'}>
+CONFIG_WARN_DYNAMIC_STACK policy<{'s390x': 'n'}>
+
+# Menu: Processor type and features >> Architecture: x86
+CONFIG_ZONE_DMA policy<{'amd64': 'y', 'arm64': 'y', 'armhf-generic-lpae': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_X86_FEATURE_NAMES policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_FAST_FEATURE_TESTS policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_X2APIC policy<{'amd64': 'y'}>
+CONFIG_X86_MPPARSE policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_RETPOLINE policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_INTEL_RDT policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_EXTENDED_PLATFORM policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_INTEL_LPSS policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_IOSF_MBI policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_IOSF_MBI_DEBUG policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_32_IRIS policy<{'i386': 'm'}>
+CONFIG_SCHED_OMIT_FRAME_POINTER policy<{'amd64': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_X86_GENERIC policy<{'i386': 'y'}>
+CONFIG_X86_PPRO_FENCE policy<{'i386': 'y'}>
+CONFIG_HPET_TIMER policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_GART_IOMMU policy<{'amd64': 'y'}>
+CONFIG_CALGARY_IOMMU policy<{'amd64': 'y'}>
+CONFIG_CALGARY_IOMMU_ENABLED_BY_DEFAULT policy<{'amd64': 'y'}>
+CONFIG_X86_REROUTE_FOR_BROKEN_BOOT_IRQS policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_LEGACY_VM86 policy<{'i386': 'y'}>
+CONFIG_X86_16BIT policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_VSYSCALL_EMULATION policy<{'amd64': 'y'}>
+CONFIG_TOSHIBA policy<{'i386': 'n'}>
+CONFIG_I8K policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_X86_REBOOTFIXUPS policy<{'i386': 'y'}>
+CONFIG_MICROCODE policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_MICROCODE_INTEL policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_MICROCODE_AMD policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_MSR policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_X86_CPUID policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_X86_PAE policy<{'i386': 'y'}>
+CONFIG_X86_SLEVEL policy<{'amd64': 'n'}>
+CONFIG_AMD_MEM_ENCRYPT policy<{'amd64': 'y'}>
+CONFIG_AMD_MEM_ENCRYPT_ACTIVE_BY_DEFAULT policy<{'amd64': 'n'}>
+CONFIG_ARCH_MEMORY_PROBE policy<{'amd64': 'y', 'ppc64le': 'y'}>
+CONFIG_X86_PMEM_LEGACY  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_CHECK_BIOS_CORRUPTION  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_BOOTPARAM_MEMORY_CORRUPTION_CHECK  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_reserve_low  policy<{'amd64': '64', 'i386': '64'}>
+CONFIG_MTRR  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_MTRR_SANITIZER  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_MTRR_SANITIZER_ENABLE_DEFAULT  policy<{'amd64': '1', 'i386': '1'}>
+CONFIG_MTRR_SANITIZER_SPARE_REG_NR_DEFAULT  policy<{'amd64': '1', 'i386': '1'}>
+CONFIG_X86_PAT  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_SMAP  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_INTEL_UIMP  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_INTEL_MPX  policy<{'amd64': 'y'}>
+CONFIG_X86_INTEL_MEMORY_PROTECTION_KEYS  policy<{'amd64': 'y'}>
+CONFIG_EFI_STUB  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y'}>
+CONFIG_EFI_MIXED  policy<{'amd64': 'y'}>
+CONFIG_KEXEC_VERIFY_SIG  policy<{'amd64': 'y'}>
+CONFIG_KEXEC_BZIMAGE_VERIFY_SIG  policy<{'amd64': 'y'}>
+CONFIG_KEXEC_JUMP  policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_PHYSICAL_ALIGN  policy<{'amd64': '0x200000', 'i386': '0x1000000'}>
+CONFIG_RANDOMIZE_MEMORY  policy<{'amd64': 'y'}>
+CONFIG_RANDOMIZE_MEMORY_PHYSICAL_PADDING  policy<{'amd64': '0xa'}>
+CONFIG_BOOTPARAM_HOTPLUG_CPU0  policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_DEBUG_HOTPLUG_CPU0  policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_COMPAT_VDSO  policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_MODIFY_LDT_SYSCALL  policy<{'amd64': 'y', 'i386': 'y'}>
+
+# Menu: Processor type and features >> Contiguous Memory Allocator
+CONFIG_CMA  policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y',
's390x': 'y'}>
+CONFIG_CMA_DEBUG  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n',
's390x': 'n'}>
+CONFIG_CMA_DEBUGFS  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n',
's390x': 'n'}>
+CONFIG_CMA_areas  policy<{'amd64': '7', 'arm64': '7', 'armhf': '7', 'i386': '7', 'ppc64le': '7',
's390x': '7'}>
+
+## Menu: Processor type and features >> Emulate deprecated/obsolete ARMv8 instructions >> Architecture: arm64
+CONFIG_ARMV8_DEPRECATED  policy<{'arm64': 'y'}>
+CONFIG_SWP_EMULATION  policy<{'arm64': 'y'}>
+CONFIG_CP15_BARRIER_EMULATION  policy<{'arm64': 'y'}>
+CONFIG_SETEND_EMULATION  policy<{'arm64': 'y'}>
+## Menu: Processor type and features >> Expoline default >> Architecture: s390
+CONFIG_EXPOLINE_OFF policy[‘s390x’: ‘n’]
+CONFIG_EXPOLINE_AUTO policy[‘s390x’: ‘y’]
+CONFIG_EXPOLINE_FULL policy[‘s390x’: ‘n’]
+
+## Menu: Processor type and features >> High Memory Support >> Architecture: x86
+CONFIG_NOHIGHMEM policy[‘i386’: ‘n’]
+CONFIG_HIGHMEM4G policy[‘i386’: ‘n’]
+CONFIG_HIGHMEM64G policy[‘i386’: ‘y’]
+
+## Menu: Processor type and features >> Linux guest support >> Architecture: x86
+CONFIG_HYPERVISOR_GUEST policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+
+## Menu: Processor type and features >> Linux guest support >> Enable paravirtualization code
+
+## Menu: Processor type and features >> Linux guest support >> Enable paravirtualization code >> Architecture: x86
+CONFIG_PARAVIRT_DEBUG policy[‘amd64’: ‘n’, ‘i386’: ‘n’]
+CONFIG_PARAVIRT_SPINLOCKS policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_QUEUE_LLOCK_STAT policy[‘amd64’: ‘n’, ‘i386’: ‘n’]
+CONFIG_KVM_DEBUG_FS policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+
+## Menu: Processor type and features >> Linux guest support >> Enable paravirtualization code >> Xen guest support
+
+## Menu: Processor type and features >> Linux guest support >> Enable paravirtualization code >> Xen guest support >> Architecture: x86
+CONFIG_XEN_PV policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_XEN_DOM0 policy[‘amd64’: ‘y’, ‘arm64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_XEN_PVHVM policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_XEN_512GB policy[‘amd64’: ‘y’]
+CONFIG_XEN_DEBUG_FS policy[‘amd64’: ‘n’, ‘i386’: ‘n’]
+CONFIG_XEN_PVH policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+
+## Menu: Processor type and features >> Machine Check / overheating reporting >> Architecture: x86
+CONFIG_X86_MCE policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_X86_MCELOG_LEGACY policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_X86_MCE_INTEL policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_X86_MCE_AMD policy[‘amd64’: ‘y’, ‘i386’: ‘y’]
+CONFIG_X86_ANCIENT_MCE policy\{i386: 'n'\}
+CONFIG_X86_MCE_INJECT policy\{amd64: 'm', i386: 'm'\}
+
+# Menu: Processor type and features >> Math emulation options >> Architecture: powerpc
+
+# Menu: Processor type and features >> Memory model
+CONFIG_FLATMEM_MANUAL policy\{i386: 'n'\}
+CONFIG_SPARSEMEM_MANUAL policy\{amd64: 'y', arm64: 'y', i386: 'y', ppc64el: 'y', 's390x': 'y'\}
+
+# Menu: Processor type and features >> Memory split
+CONFIG_VMSPLIT_3G policy\{armhf: 'y', i386: 'y'\}
+CONFIG_VMSPLIT_3G_OPT policy\{armhf-generic: 'n'\}
+CONFIG_VMSPLIT_2G policy\{armhf: 'n', i386: 'n'\}
+CONFIG_VMSPLIT_1G policy\{armhf: 'n', i386: 'n'\}
+
+# Menu: Processor type and features >> Memory split >> Architecture: arm
+
+# Menu: Processor type and features >> Memory split >> Architecture: x86
+
+# Menu: Processor type and features >> Page size >> Architecture: arm64
+CONFIG_ARM64_4K_PAGES policy\{arm64: 'y'\}
+CONFIG_ARM64_16K_PAGES policy\{arm64: 'n'\}
+CONFIG_ARM64_64K_PAGES policy\{arm64: 'n'\}
+
+# Menu: Processor type and features >> Page size >> Architecture: powerpc
+CONFIG_PPC_4K_PAGES policy\{ppc64el: 'n'\}
+CONFIG_PPC_64K_PAGES policy\{ppc64el: 'y'\}
+
+# Menu: Processor type and features >> Performance monitoring >> Architecture: x86
+CONFIG_PERF_EVENTS_INTEL_UNCORE policy\{amd64: 'y', i386: 'y'\}
+CONFIG_PERF_EVENTS_INTEL_RAPL policy\{amd64: 'm', i386: 'm'\}
+CONFIG_PERF_EVENTS_INTEL_CSTATE policy\{amd64: 'm', i386: 'm'\}
+CONFIG_PERF_EVENTS_AMD_POWER policy\{amd64: 'n', i386: 'n'\}
+
+# Menu: Processor type and features >> Power Management Debug Support
+
+# Menu: Processor type and features >> Preemption Model
+CONFIG_PREEMPT_NONE policy\{amd64: 'n', arm64: 'n', armhf: 'n', i386: 'n', ppc64el: 'n', 's390x': 'y'\}
+CONFIG_PREEMPT policy\{amd64-generic: 'n', amd64-lowlatency: 'y', 'arm64: 'n', armhf: 'n', i386-generic: 'n', i386-lowlatency: 'y', 'ppc64el: 'n', 's390x: 'n'\}
+
+# Menu: Processor type and features >> Preemption Model
+CONFIG_PREEMPT_NONE note\{LP:1543165\}
+%# Menu: Processor type and features >> Processor family
+
+%# Menu: Processor type and features >> Processor family >> Architecture: x86
+CONFIG_M486 policy{'i386': 'n'}
+CONFIG_M586 policy{'i386': 'n'}
+CONFIG_M586TSC policy{'i386': 'n'}
+CONFIG_M586MMX policy{'i386': 'n'}
+CONFIG_M686 policy{'i386': 'y'}
+CONFIG_MPENTIUMII policy{'i386': 'n'}
+CONFIG_MPENTIUMIII policy{'i386': 'n'}
+CONFIG_MPENTIUMM policy{'i386': 'n'}
+CONFIG_MPENTIUM4 policy{'i386': 'n'}
+CONFIG_MK6 policy{'i386': 'n'}
+CONFIG_MK7 policy{'i386': 'n'}
+CONFIG_MK8 policy{'amd64': 'n', 'i386': 'n'}
+CONFIG_MCRUSOE policy{'i386': 'n'}
+CONFIG_MEFFICEON policy{'i386': 'n'}
+CONFIG_MWINCHIPC6 policy{'i386': 'n'}
+CONFIG_MWINCHIP3D policy{'i386': 'n'}
+CONFIG_MELEAN policy{'i386': 'n'}
+CONFIG_MGEODEGX1 policy{'i386': 'n'}
+CONFIG_MGEODE_LX policy{'i386': 'n'}
+CONFIG_MCYRIXIII policy{'i386': 'n'}
+CONFIG_MVIAC3_2 policy{'i386': 'n'}
+CONFIG_MVIAC7 policy{'i386': 'n'}
+CONFIG_MPCSC policy{'amd64': 'n'}
+CONFIG_MCORE2 policy{'i386': 'n'}
+CONFIG_MATOM policy{'amd64': 'n', 'i386': 'n'}
+
+%# Menu: Processor type and features >> Processor type >> Architecture: x86
+CONFIG_MARCH_Z900 policy{'s390x': 'n'}
+CONFIG_MARCH_Z990 policy{'s390x': 'n'}
+CONFIG_MARCH_Z9_109 policy{'s390x': 'n'}
+CONFIG_MARCH_Z10 policy{'s390x': 'n'}
+CONFIG_MARCH_Z196 policy{'s390x': 'n'}
+CONFIG_MARCH_ZEC12 policy{'s390x': 'y'}
+CONFIG_MARCH_Z13 policy{'s390x': 'n'}
+CONFIG_MARCH_Z14 policy{'s390x': 'n'}
+
+%# Menu: Processor type and features >> Support for extended (non-PC) x86 platforms >> Architecture: x86
+CONFIG_X86_NUMACHIP policy{'amd64': 'y'}
+CONFIG_X86_VSMP policy{'amd64': 'n'}
+CONFIG_X86_UV policy{'amd64': 'n'}
+CONFIG_X86_GOLDFISH policy{'amd64': 'n', 'i386': 'n'}
+CONFIG_X86_INTEL_MID policy{'amd64': 'n', 'i386': 'y'}
+CONFIG_X86_INTEL_QUARK policy{'i386': 'n'}
+CONFIG_X86_RDC321X policy{'i386': 'n'}
+CONFIG_X86_32_NON_STANDARD policy{'i386': 'n'}
+CONFIG_APB_TIMER policy[{'i386': 'y'}]
+
+# Menu: Processor type and features >> Supported processor vendors >> Architecture: x86
+CONFIG_PROCESSOR_SELECT policy[{'amd64': 'y', 'i386': 'y'}]
+CONFIG_CPU_SUP_INTEL policy[{'amd64': 'y', 'i386': 'y'}]
+CONFIG_CPU_SUP_CYRIX_32 policy[{'i386': 'y'}]
+CONFIG_CPU_SUP_AMD policy[{'amd64': 'y', 'i386': 'y'}]
+CONFIG_CPU_SUP_CENTAUR policy[{'i386': 'y'}]
+CONFIG_CPU_SUP_TRANSMETA_32 policy[{'i386': 'y'}]
+CONFIG_CPU_SUP_UMC_32 policy[{'i386': 'y'}]
+
+# Menu: Processor type and features >> Symmetric Multi-Processing
+
+# Menu: Processor type and features >> Symmetric Multi-Processing >> Architecture: arm
+CONFIG_SMP_ON_UP policy[{'armhf': 'y'}]
+CONFIG_ARM_CPU_TOPOLOGY policy[{'armhf': 'y'}]
+CONFIG_MCPM policy[{'armhf': 'y'}]
+CONFIG_BIG_LITTLE policy[{'armhf': 'y'}]
+CONFIG_BL_SWITCHER policy[{'armhf': 'y'}]
+CONFIG_BL_SWITCHER_DUMMY_IF policy[{'armhf': 'm'}]
+
+# Menu: Processor type and features >> Symmetric multi-processing support
+
+# Menu: Processor type and features >> Symmetric multi-processing support >> Architecture: s390
+CONFIG_SCHED_TOPOLOGY policy[{'s390x': 'y'}]
+
+# Menu: Processor type and features >> Symmetric multi-processing support >> Architecture: x86
+CONFIG_X86_BIGSMP policy[{'i386': 'n'}]
+CONFIG_MAXSMP policy[{'amd64': 'y'}]
+CONFIG_SCHED_MC_PRIO policy[{'amd64': 'y', 'i386': 'y'}]
+
+# Menu: Processor type and features >> Symmetric multi-processing support >> Numa Memory Allocation and Scheduler Support
+CONFIG_NUMA_EMU policy[{'amd64': 'n', 's390x': 'y'}]
+
+CONFIG_NUMA_EMU note<LP:1557690> mark<ENFORCED>
+
+# Menu: Processor type and features >> Symmetric multi-processing support >> Numa Memory Allocation and Scheduler Support >> Allow for memory hot-add
+
+
+# Menu: Processor type and features >> Symmetric multi-processing support >> Numa Memory Allocation and Scheduler Support >> Architecture: x86
+CONFIG_AMD_NUMA policy[{'amd64': 'y'}]
+CONFIG_X86_64_ACPI_NUMA policy[{'amd64': 'y'}]
+## Menu: Processor type and features >> Symmetric multi-processing support >> Select NUMA modes
+
+## Menu: Processor type and features >> Symmetric multi-processing support >> Select NUMA modes >> Architecture: s390
+CONFIG_EMU_SIZE policy<{'s390x': '0x10000000'}>
+
+## Menu: Processor type and features >> TSX enable mode >> Architecture: x86
+CONFIG_X86_INTEL_TSX_MODE_OFF policy<{'amd64': 'y', 'i386': 'y'}>
+CONFIG_X86_INTEL_TSX_MODE_ON policy<{'amd64': 'n', 'i386': 'n'}>
+CONFIG_X86_INTEL_TSX_MODE_AUTO policy<{'amd64': 'n', 'i386': 'n'}>
+
+## Menu: Processor type and features >> Timer frequency
+CONFIG_HZ_100 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'y'}>
+CONFIG_HZ_250 policy<{'amd64-generic': 'y', 'amd64-lowlatency': 'n', 'arm64': 'y', 'armhf': 'y', 'i386-generic': 'y', 'i386-lowlatency': 'n', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_HZ_300 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_HZ_1000 policy<{'amd64-generic': 'n', 'amd64-lowlatency': 'y', 'arm64': 'n', 'armhf': 'n', 'i386-generic': 'n', 'i386-lowlatency': 'y', 'ppc64le': 'n', 's390x': 'n'}>
+
+## Menu: Processor type and features >> Transparent Hugepage Support sysfs defaults
+CONFIG_TRANSPARENT_HUGEPAGE_ALWAYS policy<{'amd64': 'n', 'arm64': 'n', 'armhf-generic-lpae': 'n', 'i386': 'n', 'ppc64le': 'y', 's390x': 'n'}>
+CONFIG_TRANSPARENT_HUGEPAGE_MADVISE policy<{'amd64': 'y', 'arm64': 'y', 'armhf-generic-lpae': 'y', 'i386': 'y', 'ppc64le': 'n', 's390x': 'y'}>
+
+## Menu: Processor type and features >> Tune code generation >> Architecture: s390
+CONFIG_TUNE_DEFAULT policy<{'s390x': 'n'}>
+CONFIG_TUNE_Z900 policy<{'s390x': 'n'}>
+CONFIG_TUNE_Z990 policy<{'s390x': 'n'}>
+CONFIG_TUNE_Z9_109 policy<{'s390x': 'n'}>
+CONFIG_TUNE_Z10 policy<{'s390x': 'n'}>
+CONFIG_TUNE_Z196 policy<{'s390x': 'n'}>
+CONFIG_TUNE_ZEC12 policy<{'s390x': 'y'}>
+CONFIG_TUNE_Z13 policy<{'s390x': 'n'}>
+CONFIG_TUNE_Z14 policy<{'s390x': 'n'}>
+
+## Menu: Processor type and features >> Virtual address space size >> Architecture: arm64
+CONFIG_ARM64_VA_BITS_39 policy<{'arm64': 'n'}>
+CONFIG_ARM64_VA_BITS_48 policy<{'arm64': 'y'}>
+
+## Menu: Processor type and features >> Virtual address space size >> Architecture: arm64
+CONFIG_ARM64_VA_BITS_39 policy<{'arm64': 'n'}>
+CONFIG_ARM64_VA_BITS_48 policy<{'arm64': 'y'}>
+
+## Menu: Processor type and features >> Virtual address space size >> Architecture: arm64
+CONFIG_ARM64_VA_BITS_39 policy<{'arm64': 'n'}>
+CONFIG_ARM64_VA_BITS_48 policy<{'arm64': 'y'}>
+
+## Menu: Processor type and features >> Virtual address space size >> Architecture: arm64
+CONFIG_ARM64_VA_BITS_39 policy<{'arm64': 'n'}>
+CONFIG_ARM64_VA_BITS_48 policy<{'arm64': 'y'}>
minimum of 41 bits of VA>

+   
++# Menu: Processor type and features >> vsyscall table for legacy applications >> Architecture: x86
++CONFIG_LEGACY_VSYSCALL_NATIVE policy<{'amd64': 'n'}>
++CONFIG_LEGACY_VSYSCALL_EMULATE policy<{'amd64': 'y'}>
++CONFIG_LEGACY_VSYSCALL_NONE policy<{'amd64': 'n'}>
+
++# Menu: Security options
++CONFIG_SECURITY_DMESG_RESTRICT policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_SECURITY_PERF_EVENTS_RESTRICT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_SECURITYIFS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_PAGE_TABLE_ISOLATION policy<{'amd64': 'y', 'i386': 'y'}>
++CONFIG_INTEL_TXT policy<{'amd64': 'y', 'i386': 'y'}>
++CONFIG_HARDENED_USERCOPY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_HARDENED_USERCOPY_PAGESPAN policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_FORTIFY_SOURCE policy<{'amd64': 'y', 'arm64': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_STATIC_USERMODEHELPER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_LOCK_DOWN_KERNEL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_LOCK_DOWN_IN_EFI_SECURE_BOOT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_SECURITY_SELINUX_STACKED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_SECURITY_SMACK_STACKED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_SECURITY_TOMOYO_STACKED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_SECURITY_APPARMOR_STACKED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_SECURITY_DEFAULT_DISPLAY_APPARMOR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+
++# Menu: Security options >> Default Security Module or Modules
++CONFIG_SECURITY_DEFAULT_DISPLAY_APPARMOR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_FORTIFY_SOURCE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_STATIC_USERMODEHELPER policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_LOCK_DOWN_KERNEL policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_LOCK_DOWN_IN_EFI_SECURE_BOOT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
++CONFIG_SECURITY_SELINUX_STACKED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_SECURITY_SMACK_STACKED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_SECURITY_TOMOYO_STACKED policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
++CONFIG_SECURITY_APPARMOR_STACKED policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
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'+CONFIG_PERSISTENT_KEYRINGs                      policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_BIG_KEYs                                 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_TRUSTED_KEYs                             policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_ENCRYPTED_KEYs                           policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_KEY_DH_OPERATIONS                        policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

+# Menu: Security options >> Enable different security models

'+CONFIG_SECURITY                                 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_SECURITY_STACKING                        policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_SECURITY_LSM_DEBUG                       policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>

'+CONFIG_SECURITY_NETWORK                         policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_SECURITY_INFINIBAND                      policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_SECURITY_NETWORK_XFRM                    policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_SECURITY_PATH                            policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_LSM_MMAP_MIN_ADDR                        policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64le': '0', 's390x': '0'}>

'+CONFIG_SECURITY_APPARMOR                        policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

'+CONFIG_SECURITY_APPARMOR_BOOTPARAM_VALUE        policy<{'amd64': '1', 'arm64': '1', 'armhf': '1', 'i386': '1', 'ppc64le': '1', 's390x': '1'}>

'+CONFIG_SECURITY_APPARMOR_HASH                   policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>

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'+CONFIG_SECURITY_APPARMOR_DEBUG                  policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
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'ppc64le': 'n', 's390x': 'n'}>
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+# Menu: Security options >> Enable different security models >> Integrity subsystem
+CONFIG_INTEGRITY policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_INTEGRITY_SIGNATURE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_INTEGRITYASYMmetric_KEYS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_INTEGRITYTRUSTed_KEYRING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_INTEGRITYAUDIT policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_IMAKEYRINGs_PERMITTED_SIGNED_BY_BUILTIN_OR_SECONDARY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+
+CONFIG_IMAKEYRINGs_PERMITTED_SIGNED_BY_BUILTIN_OR_SECONDARY mark<ENFORCED>
+# Menu: Security options >> Enable different security models >> Integrity subsystem >> EVM support
+CONFIG_EVM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_EVMATTR_FSUID policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_EVMEXTRA_SMACK_XATTRS policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_EVMLOAD_X509 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_EVM_X509_PATH policy<{'ppc64le': '/etc/keys/x509_evm.der'}>
+
+CONFIG_EVM note<LP:1643652>
+CONFIG_EVMATTR_FSUID note<LP:1643652>
+CONFIG_EVMLOAD_X509 note<LP:1643652>
+CONFIG_EVM_X509_PATH note<LP:1643652>
+
+Menu: Security options >> Enable different security models >> Integrity subsystem >> Integrity Measurement Architecture(IMA)
+CONFIG_IMA policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_IMAKEEXEC policy<{'ppc64le': 'y'}>
+CONFIG_IMA_WRITE_POLICY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_IMA_READ_POLICY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_IMA_APPRAISE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_IMA_APPRAISE_BOOTPARAM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'}>
+CONFIG_IMA_TRUSTED_KEYRING policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'>
+CONFIG_IMA_BLACKLIST_KEYRING policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'>
+CONFIG_IMA_LOAD_X509 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'y', 's390x': 'n'>
+CONFIG_IMA_X509_PATH policy<{'ppc64el': '/etc/keys/x509_ima.der'>}
+CONFIG_IMA_APPRAISE_SIGNED_INIT policy<{'ppc64el': 'n'}>
+
+CONFIG_IMA_APPRAISE
+CONFIG_IMA_KEXEC
+CONFIG_IMA_WRITE_POLICY
+CONFIG_IMA_READ_POLICY
+CONFIG_IMA_TRUSTED_KEYRING
+CONFIG_IMA_BLACKLIST_KEYRING
+CONFIG_IMA_LOAD_X509
+CONFIG_IMA_X509_PATH
+CONFIG_IMA_APPRAISE_SIGNED_INIT
+
+##
+CONFIG_IMA
+CONFIG_IMA_KEXEC
+CONFIG_IMA_WRITE_POLICY
+CONFIG_IMA_READ_POLICY
+CONFIG_IMA_TRUSTED_KEYRING
+CONFIG_IMA_BLACKLIST_KEYRING
+CONFIG_IMA_LOAD_X509
+CONFIG_IMA_X509_PATH
+CONFIG_IMA_APPRAISE_SIGNED_INIT
+
+## Menu: Security options >> Enable different security models >> Integrity subsystem >> Integrity Measurement Architecture(IMA) >> Default integrity hash algorithm
+CONFIG_IMA_DEFAULT_HASH_SHA1 policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'n', 's390x': 'y'>
+CONFIG_IMA_DEFAULT_HASH_SHA256 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'y', 's390x': 'n'>
+CONFIG_IMA_DEFAULT_HASH_SHA512 policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'>
+
+## Menu: Security options >> Enable different security models >> Integrity subsystem >> Integrity Measurement Architecture(IMA) >> Default template
+CONFIG_IMA_TEMPLATE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_IMA_NG_TEMPLATE policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'n', 's390x': 'y'}>
+CONFIG_IMA_SIG_TEMPLATE policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'y', 's390x': 'n'}>
+
+## Menu: Security options >> Enable different security models >> NSA SELinux Support
+CONFIG_SECURITY_SELINUX policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+CONFIG_SECURITY_SELINUX_BOOTPARAM policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'n'}>
+CONFIG_SECURITY_SELINUX_BOOTPARAM_VALUE policy<{'amd64': '0', 'arm64': '0', 'armhf': '0', 'i386': '0', 'ppc64el': '0', 's390x': '0'}>
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+CONFIG_SECURITY_SELINUX_DISABLE policy\{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+CONFIG_SECURITY_SELINUX_DEVELOP policy\{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_SECURITY_SELINUX_AVC_STATS policy\{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_SECURITY_SELINUX_CHECKREQPROT_VALUE policy\{'amd64': '1', 'arm64': '1', 'armhf': '1', 'i386': '1', 'ppc64el': '1', 's390x': '1'}>
+##
+CONFIG_SECURITY_SELINUX mark\ENFORCED>
+CONFIG_SECURITY_SELINUX_DISABLE mark\ENFORCED>
+
+## Menu: Security options >> Enable different security models >> Simplified Mandatory Access Control Kernel Support
+CONFIG_SECURITY_SMACK policy\{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_SECURITY_SMACK_BRINGUP policy\{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+CONFIG_SECURITY_SMACK_NETFILTER policy\{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_SECURITY_SMACK_APPEND_SIGNALS policy\{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}>
+##
+CONFIG_SECURITY_SMACK mark\ENFORCED>
+
+## Menu: Security options >> Enable different security models >> TOMOYO Linux Support
+CONFIG_SECURITY_TOMOYO policy\{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64el': 'y', 's390x': 'y'}
+CONFIG_SECURITY_TOMOYO_MAX_ACCEPT_ENTRY policy\{'amd64': '2048', 'arm64': '2048', 'armhf': '2048', 'i386': '2048', 'ppc64el': '2048', 's390x': '2048'}
+CONFIG_SECURITY_TOMOYO_MAX_AUDIT_LOG policy\{'amd64': '1024', 'arm64': '1024', 'armhf': '1024', 'i386': '1024', 'ppc64el': '1024', 's390x': '1024'}
+CONFIG_SECURITY_TOMOYO_OMIT_USERSPACE_LOADER policy\{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+CONFIG_SECURITY_TOMOYO_POLICY_LOADER policy\{'amd64': '/sbin/tomoyo-init', 'arm64': '/sbin/tomoyo-init', 'armhf': '/sbin/tomoyo-init', 'i386': '/sbin/tomoyo-init', 'ppc64el': '/sbin/tomoyo-init', 's390x': '/sbin/tomoyo-init'}
+CONFIG_SECURITY_TOMOYO_ACTIVATION_TRIGGER policy\{'amd64': '/sbin/init', 'arm64': '/sbin/init', 'armhf': '/sbin/init', 'i386': '/sbin/init', 'ppc64el': '/sbin/init', 's390x': '/sbin/init'}>
+
+## Menu: Security options >> Security Module Selection
+
+## Menu: Security options >> Security Module Selection >> Default security module
+CONFIG_DEFAULT_SECURITY_SELINUX policy\{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
+CONFIG_DEFAULT_SECURITY_SMACK policy\{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}
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+CONFIG_DEFAULT_SECURITY_TOMOYO policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
+CONFIG_DEFAULT_SECURITY_APPARMOR policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64lel': 'y', 's390x': 'y'}>
+CONFIG_DEFAULT_SECURITY_DAC policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64el': 'n', 's390x': 'n'}>
 +#
+CONFIG_DEFAULT_SECURITY_APPARMOR mark<ENFORCED>
 +
++ Menu: System Type
++
++ Menu: System Type >> ARM Ltd. Integrator family >> Architecture: arm
 +
++ Menu: System Type >> ARM Ltd. Integrator family >> Support Integrator/AP and Integrator/PP2 platforms >> Architecture: arm
 +
++ Menu: System Type >> ARM Ltd. Integrator family >> Support Integrator/CP platform >> Architecture: arm
 +
++ Menu: System Type >> ARM Ltd. RealView family >> Architecture: arm
+CONFIG_ARCH_REALVIEW policy<{'armhf': 'n'}>
 +
++ Menu: System Type >> ARM Ltd. RealView family >> Support RealView(R) Emulation Baseboard >> Architecture: arm
 +
++ Menu: System Type >> ARM Ltd. Versatile Express family
 +
++ Menu: System Type >> ARM Ltd. Versatile Express family >> Architecture: arm
+CONFIG_ARCH_VEXPRESS_CORTEX_A5_A9_ERRATA policy<{'armhf': 'y'}>
+CONFIG_ARCH_VEXPRESS_DCSCB policy<{'armhf': 'y'}>
+CONFIG_ARCH_VEXPRESS_SPC policy<{'armhf': 'y'}>
+CONFIG_ARCH_VEXPRESS_TC2_PM policy<{'armhf': 'y'}>
 +
++ Menu: System Type >> ARM system type >> Architecture: arm
+CONFIG_ARCH_MULTIPLATFORM policy<{'armhf': 'y'}>
+CONFIG_ARCH_EBSA110 policy<{'armhf': 'n'}>
+CONFIG_ARCH_EP93XX policy<{'armhf': 'n'}>
+CONFIG_ARCH_FOOTBRIDGE policy<{'armhf': 'n'}>
+CONFIG_ARCH_NETX policy<{'armhf': 'n'}>
+CONFIG_ARCH_IOP13XX policy<{'armhf': 'n'}>
+CONFIG_ARCH_IOP32X policy<{'armhf': 'n'}>
+CONFIG_ARCH_IOP33X policy<{'armhf': 'n'}>
+CONFIG_ARCH_IXP4XX policy<{'armhf': 'n'}>
+CONFIG_ARCH_DOVE policy<{'armhf': 'n'}>
+CONFIG_ARCH_KS8695 policy<{'armhf': 'n'}>
+CONFIG_ARCH_W90X900 policy<{'armhf': 'n'}>
+CONFIG_ARCH_LPC32XX policy<{'armhf': 'n'}>
+CONFIG_ARCH_PXA policy<{'armhf': 'n'}>
+CONFIG_ARCH_RPC policy<{'armhf': 'n'}>
+CONFIG_ARCH_SA1100 policy<{'armhf': 'n'}>
+CONFIG_ARCH_S3C24XX policy<{'armhf': 'n'}>
+CONFIG_ARCH_DAVINCI policy<{'armhf': 'n'}>
+CONFIG_ARCH_OMAP1 policy<{'armhf': 'n'}>
+
+
# Menu: System Type >> Allwinner SoCs
+
# Menu: System Type >> Allwinner SoCs >> Architecture: arm
+
# Menu: System Type >> Altera SOCFPGA family >> Architecture: arm
+CONFIG_ARCH_SOFCPGA policy<{'armhf': 'n'}>
+
# Menu: System Type >> Amlogic Meson SoCs
+
# Menu: System Type >> Amlogic Meson SoCs >> Architecture: arm
+CONFIG_MACH_MESON6 policy<{'armhf': 'y'}>
+CONFIG_MACH_MESON8 policy<{'armhf': 'y'}>
+CONFIG_MACH_MESON8B policy<{'armhf': 'y'}>
+
# Menu: System Type >> Architecture: arm
+CONFIG_ARCH_VIRT policy<{'armhf': 'y'}>
+CONFIG_ARCH_AXXIA policy<{'armhf-generic-lpae': 'y'}>
+CONFIG_ARCH_DIGICOLOR policy<{'armhf': 'n'}>
+CONFIG_ARCH_HIGHBANK policy<{'armhf': 'y'}>
+CONFIG_ARCH_KEYSTONE policy<{'armhf': 'n'}>
+CONFIG_ARCH_S5PV210 policy<{'armhf': 'n'}>
+CONFIG_ARCH_TANGO policy<{'armhf': 'n'}>
+CONFIG_ARCH_WM8850 policy<{'armhf': 'n'}>
+CONFIG_ARCH_ZYNQ policy<{'armhf': 'n'}>
+CONFIG_ARM_THUMB policy<{'armhf': 'y'}>
+CONFIG_ARM_THUMBEE policy<{'armhf-generic-lpae': 'y'}>
+CONFIG_SWP_EMULATE policy<{'armhf': 'y'}>
+CONFIG_CPU_ICACHE_DISABLE policy<{'armhf': 'n'}>
+CONFIG_CPU_BPREDICT_DISABLE policy<{'armhf': 'n'}>
+CONFIG_CACHE_FEROCEON_L2 policy<{'armhf': 'y'}>
+CONFIG_CACHE_FEROCEON_L2_WRITETHROUGH policy<{'armhf': 'n'}>
+CONFIG_CACHE_TAURUS2 policy<{'armhf': 'y'}>
+CONFIG_CACHE_UNIPHIER policy<{'armhf': 'y'}>
+CONFIG_ARM_DMA_MEM_BUFFERABLE policy<{'armhf': 'y'}>
+CONFIG_IWMMXT policy<{'armhf': 'y'}>
+CONFIG_PJ4B_ERRATA_4742 policy<{'armhf': 'y'}>
+CONFIG_ARM_ERRATA_430973 policy<{'armhf': 'y'}>
+CONFIG_ARM_ERRATA_643719 policy<{'armhf': 'y'}>
+CONFIG_ARM_ERRATA_720789 policy<{'armhf': 'y'}>
+CONFIG_ARM_ERRATA_754322 policy<{'armhf': 'y'}>
+CONFIG_ARM_ERRATA_754327 policy<{'armhf': 'y'}>
+CONFIG_ARM_ERRATA_764369 policy<{'armhf': 'y'}>
+CONFIG_ARM_ERRATA_775420 policy\{\text{'armhf': 'y'}\}
+CONFIG_ARM_ERRATA_798181 policy\{\text{'armhf': 'y'}\}
+CONFIG_ARM_ERRATA_773022 policy\{\text{'armhf': 'y'}\}
+CONFIG_ARM_ERRATA_818325_852422 policy\{\text{'armhf': 'y'}\}
+CONFIG_ARM_ERRATA_821420 policy\{\text{'armhf': 'y'}\}
+CONFIG_ARM_ERRATA_825619 policy\{\text{'armhf': 'y'}\}
+CONFIG_ARM_ERRATA_852421 policy\{\text{'armhf': 'y'}\}
+CONFIG_ARM_ERRATA_852423 policy\{\text{'armhf': 'y'}\}
+
##
+CONFIG_ARCH_TANGO mark\{\text{ENFORCED}\} note\{LP:1787945\}
+
+## Menu: System Type >> Aspeed BMC architectures >> Architecture: arm
+
+## Menu: System Type >> Atmel SoCs >> Architecture: arm
+CONFIG_ARCH_AT91 policy\{\text{'armhf': 'n'}\}
+
+## Menu: System Type >> Axis Communications ARM based ARTPEC SoCs >> Architecture: arm
+CONFIG_ARCH_ARTPEC policy\{\text{'armhf': 'y'}\}
+CONFIG_MACH_ARTPEC6 policy\{\text{'armhf': 'n'}\}
+
+## Menu: System Type >> Broadcom SoC Support
+
+## Menu: System Type >> Broadcom SoC Support >> Architecture: arm
+CONFIG_ARCH_BCM policy\{\text{'armhf': 'n'}\}
+
+## Menu: System Type >> CSR SiRF >> Architecture: arm
+CONFIG_ARCH_SIRF policy\{\text{'armhf': 'n'}\}
+
+## Menu: System Type >> Cavium Networks CNS3XXX family >> Architecture: arm
+
+## Menu: System Type >> Cirrus EP93xx Implementation Options >> Architecture: arm
+
+## Menu: System Type >> Enable the L2x0 outer cache controller >> Architecture: arm
+CONFIG_CACHE_L2X0 policy\{\text{'armhf': 'y'}\}
+CONFIG_CACHE_L2X0_PMU policy\{\text{'armhf': 'y'}\}
+CONFIG_PL310_ERRATA_588369 policy\{\text{'armhf': 'y'}\}
+CONFIG_PL310_ERRATA_727915 policy\{\text{'armhf': 'y'}\}
+CONFIG_PL310_ERRATA_753970 policy\{\text{'armhf': 'y'}\}
+CONFIG_PL310_ERRATA_769419 policy\{\text{'armhf': 'y'}\}
+
+## Menu: System Type >> Firmware options >> Architecture: arm
+CONFIG_TRUSTED_FOUNDATIONS policy\{\text{'armhf-generic': 'y'}\}
+
+## Menu: System Type >> Footbridge Implementations >> Architecture: arm
+
+## Menu: System Type >> Freescale i.MX family >> Architecture: arm
+CONFIG_ARCH_MXC policy\{\text{'armhf-generic': 'y', 'armhf-generic-lpae': 'n'}\}
+CONFIG_SOC_IMX50 policy\{\text{'armhf-generic': 'y'}\}
+CONFIG_SOC_IMX51 policy<{'armhf-generic': 'y'}>
+CONFIG_SOC_IMX53 policy<{'armhf-generic': 'n'}>
+CONFIG_SOC_IMX5Q policy<{'armhf-generic': 'y'}>
+CONFIG_SOC_IMX6SL policy<{'armhf-generic': 'y'}>
+CONFIG_SOC_IMX6SX policy<{'armhf-generic': 'y'}>
+CONFIG_SOC_IMX6UL policy<{'armhf-generic': 'y'}>
+CONFIG_SOC_IMX7D policy<{'armhf-generic': 'y'}>
+CONFIG_SOC_LS1021A policy<{'armhf-generic': 'n'}>
+CONFIG_SOC_VF610 policy<{'armhf-generic': 'y'}>
+
++ Menu: System Type >> Freescale i.MX family >> Clocksource for scheduler clock >> Architecture: arm
+CONFIG_VF_USE_ARM_GLOBAL_TIMER policy<{'armhf-generic': 'y'}>
+CONFIG_VF_USE_PIT_TIMER policy<{'armhf-generic': 'n'}>
+
++ Menu: System Type >> Hisilicon platform type >> Architecture: arm
+CONFIG_ARCH_HI3xxx policy<{'armhf': 'y'}>
+CONFIG_ARCHHIP01 policy<{'armhf': 'n'}>
+CONFIG_ARCH_HI04 policy<{'armhf': 'y'}>
+CONFIG_ARCH_HIX5HD2 policy<{'armhf': 'y'}>
+
++ Menu: System Type >> IOP13XX Implementation Options >> Architecture: arm
+
++ Menu: System Type >> IOP32x Implementation Options >> Architecture: arm
+
++ Menu: System Type >> IOP33x Implementation Options >> Architecture: arm
+
++ Menu: System Type >> Intel IXP4xx Implementation Options >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> Gumstix Carrier/Expansion Board >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> Motorola EZX Platform >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> PXA based Keith und Koep Trizeps DIMM-Modules >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> PXA based Keith und Koep Trizeps DIMM-Modules >> Select base board for Trizeps module >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> PXA based Palm PDAs >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> PXA based Toshiba e-series PDAs >> Architecture: arm
+
++ Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> PXA based Toshiba e-series PDAs >> Architecture: arm
+
## Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> SHARP Zaurus SL-5600, SL-C7xx and SL-Cxx00 Models >> Architecture: arm
+
## Menu: System Type >> Intel PXA2xx/PXA3xx Implementations >> display on pcm990 >> Architecture: arm
+
## Menu: System Type >> Kendin/Micrel KS8695 Implementations >> Architecture: arm
+
## Menu: System Type >> MMU-based Paged Memory Management Support >> Architecture: arm
+CONFIG_MMU policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y', 's390x': 'y'>
+CONFIG_ARM_LPAE policy<{'armhf-generic': 'n', 'armhf-generic-lpae': 'y'}>
+CONFIG_KUSER_HELPERS policy<{'armhf': 'y'}>
+CONFIG_VDSO policy<{'armhf': 'y'}>
+
## Menu: System Type >> MMU-based Paged Memory Management Support >> Marvell Orion >> Architecture: arm
+
## Menu: System Type >> MMU-based Paged Memory Management Support >> Renesas ARM SoCs
+
## Menu: System Type >> MMU-based Paged Memory Management Support >> Renesas ARM SoCs >> Architecture: arm
+CONFIG_ARCH_EMEV2 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R7S72100 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A73A4 policy<{'armhf': 'n'}>
+CONFIG_ARCH_R8A7740 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7743 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7745 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7778 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7779 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7790 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7791 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7792 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7793 policy<{'armhf': 'y'}>
+CONFIG_ARCH_R8A7794 policy<{'armhf': 'y'}>
+CONFIG_ARCH_SH73A0 policy<{'armhf': 'y'}>
+
## Menu: System Type >> MMU-based Paged Memory Management Support >> ST-Ericsson U300 Series >> Architecture: arm
+
## Menu: System Type >> MMU-based Paged Memory Management Support >> ST-Ericsson U8500 Series >> Architecture: arm
+CONFIG_ARCH_U8500 policy<{'armhf': 'n'}>
+
## Menu: System Type >> MMU-based Paged Memory Management Support >> Set flash/sdram size and base addr >> Architecture: arm
+
+## Menu: System Type >> TI OMAP/AM/DM/DRA Family >> TI OMAP2/3/4 Specific Features >> Architecture: arm
+CONFIG_ARCH_OMAP2PLUS_TYPICAL policy<{'armhf': 'y'}>
+CONFIG_SOC_HAS_OMAP2_SDRC policy<{'armhf': 'y'}>
+CONFIG_SOC_HAS_REALTIME_COUNTER policy<{'armhf': 'y'}>
+CONFIG_SOC_OMAP3430 policy<{'armhf-generic': 'y'}>
+CONFIG_SOC_TI81XX policy<{'armhf-generic': 'y'}>
+CONFIG_MACH_OMAP3517EVM policy<{'armhf-generic': 'n'}>
+CONFIG_MACH_OMAP3_PANDORA policy<{'armhf-generic': 'y'}>
+CONFIG_OMAP3_SDRC_AC_TIMING policy<{'armhf-generic': 'n'}>
+
+## Menu: System Type >> TI OMAP1 specific features >> Architecture: arm
+
+## Menu: System Type >> TI OMAP1 specific features >> OMAP15xx Based System >> Architecture: arm
+
+## Menu: System Type >> TI OMAP1 specific features >> OMAP16xx Based System >> Architecture: arm
+CONFIG_MACH_OMAP_GENERIC policy<{'armhf': 'y'}>
+
+## Menu: System Type >> W90P910 Machines >> Architecture: arm
+
+## Menu: Ubuntu Supplied Third-Party Device Drivers
+CONFIG_HIO policy<{'amd64': 'm', 'arm64': 'n', 'armhf': 'n', 'i386': 'm', 'ppc64le': 'n'}>
+##
+CONFIG_HIO mark<ENFORCED> note<LP:1635594>
+
+## Menu: Virtualization
+CONFIG_VIRTUALIZATION policy<{'amd64': 'y', 'arm64': 'y', 'armhf': 'y', 'i386': 'y', 'ppc64le': 'y'}>
+CONFIG_VHOST_NET policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VHOST_SCSI policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VHOST_VSOCK policy<{'amd64': 'm', 'arm64': 'm', 'armhf': 'm', 'i386': 'm', 'ppc64le': 'm'}>
+CONFIG_VHOST_CROSS_ENDIAN_LEGACY policy<{'amd64': 'n', 'arm64': 'n', 'armhf': 'n', 'i386': 'n', 'ppc64le': 'n', 's390x': 'n'}>
+CONFIG_KVM policy<{'amd64': 'm', 'arm64': 'y', 'armhf-generic-lpae': 'y', 'i386': 'm', 'ppc64le': 'y', 's390x': 'y'}>
+##
+CONFIG_KVM note<LP:1532886>
+
+## Menu: Virtualization >> Architecture: powerpc
+CONFIG_KVM.Book3s_64 policy<{'ppc64le': 'm'}>
+CONFIG_KVM.Book3s_64.HV policy<{'ppc64le': 'm'}>
+CONFIG_KVM.Book3s_64.PR policy<{'ppc64le': 'm'}>
+CONFIG_KVM.Book3s_Hv.Exit.Timing policy<{'ppc64le': 'n'}>
+CONFIG_KVM.XICS policy<{'ppc64le': 'y'}>
+
+## Menu: Virtualization >> Architecture: s390
+CONFIG_PFault policy<{'s390x': 'y'}>
+CONFIG_CMM_IUCV policy<{'s390x': 'y'}>
+CONFIG_S390_HYPFS_FS policy<{'s390x': 'y'}>
+CONFIG_S390_GUEST policy<{'s390x': 'y'}>
+
+## Menu: Virtualization >> KVM
+
+## Menu: Virtualization >> KVM >> Architecture: s390
+CONFIG_KVM_S390_UCONTROL policy<{'s390x': 'n'}>
+
+## Menu: Virtualization >> Kernel-based Virtual Machine (KVM) support
+
+## Menu: Virtualization >> Kernel-based Virtual Machine (KVM) support >> Architecture: x86
+CONFIG_KVM_INTEL policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_KVM_AMD policy<{'amd64': 'm', 'i386': 'm'}>
+CONFIG_KVM_MMU_AUDIT policy<{'amd64': 'n', 'i386': 'n'}>
+
+## Menu: Virtualization >> Linux - VM Monitor Stream, base infrastructure >> Architecture: s390
+CONFIG_APPLDATA_BASE policy<{'s390x': 'y'}>
+CONFIG_APPLDATA_MEM policy<{'s390x': 'm'}>
+CONFIG_APPLDATA_OS policy<{'s390x': 'm'}>
+CONFIG_APPLDATA_NET_SUM policy<{'s390x': 'm'}>
+
+## Menu: FOOTER
+
+# temporarily disabled options -- build failures.
+
+##CONFIG_TI_CPSW					p policy<(arch armel armhf &/ value n) | value m> flag<BUILD FAILURE>
+##CONFIG_USB_MUSB_DSPSp policy<(arch armel armhf &/ value n) | value m> flag<BUILD FAILURE>
+##CONFIG_LIS3L02DQp policy<(arch armel armhf &/ value n) | value m> flag<BUILD FAILURE>
+##CONFIG_EZX_PCAPp policy<(arch armel armhf &/ value n) | value y> flag<BUILD FAILURE>
+##CONFIG_TOUCHSCREEN_EGALAXx policy<(arch armel armhf &/ value n) | value m> flag<BUILD FAILURE> note<FTBS on ti omap4>
+##CONFIG_TOUCHSCREEN_EETIp policy<(arch armel armhf &/ value n) | value m> flag<BUILD FAILURE> note<FTBS on ti omap4>
+##CONFIG_SENSORS_AK8975p policy<(arch armel armhf &/ value n) | value m> flag<BUILD FAILURE> note<FTBS on ti omap4>
+##CONFIG_PPC_EPAPR_HV_BYTECHANn flag<BUILD FAILURE> note<FTBFS on ppc64el>
+
+##
+-
--- linux-4.15.0.orig/debian.master/config/arm64/config.common.arm64
+++ linux-4.15.0/debian.master/config/arm64/config.common.arm64
@@ -0,0 +1,539 @@
CONFIG_64BIT=y
CONFIG_6LOWPAN=m
CONFIG_ABX500_CORE=y
CONFIG_AC97_BUS=m
# CONFIG_ACPI_DEBUG is not set
# CONFIG_ACPI_DEBUGGER is not set
CONFIG_ACPI_REDUCED_HARDWARE_ONLY=y
CONFIG_ADFS_FS=m
CONFIG_AFFS_FS=m
CONFIG_AIX_PARTITION=y
CONFIG_ALIM7101_WDT=m
CONFIG_ALTERA_TSE=m
# CONFIG_AMD_XGBE_HAVE_ECC is not set
CONFIG_AMIGA_PARTITION=y
CONFIG_APPLICOM=m
# CONFIG_ARCH_ALPINE is not set
# CONFIG_ARCH_EXYNOS is not set
CONFIG_ARCH_HAS STRICT KERNEL_RWX=y
CONFIG_ARCH_HAS STRICT MODULE_RWX=y
# CONFIG_ARCH_MESON is not set
CONFIG_ARCH_MMAP RND BITS=18
CONFIG_ARCH_MMAP RND BITS MAX=33
CONFIG_ARCH_MMAP RND BITS MIN=18
CONFIG_ARCH_MMAP RND COMPAT BITS=11
CONFIG_ARCH_MMAP RND COMPAT BITS MAX=16
CONFIG_ARCH_MMAP RND COMPAT BITS MIN=11
# CONFIG_ARCH_MVEBU is not set
# CONFIG_ARCH NEEDS CPU IDLE COUPLED is not set
# CONFIG_ARCH OPTIONAL KERNEL_RWX is not set
# CONFIG_ARCH OPTIONAL KERNEL_RWX DEFAULT is not set
CONFIG_ARCH_PHYS_ADDR T 64BIT=y
CONFIG_ARCH_SELECT_MEMORY MODEL=y
CONFIG_ARCH_SPAREMEM DEFAULT=y
CONFIG_ARCH_SUNXI=y
# CONFIG_ARCH TEGRA is not set
# CONFIG_ARCH UNIPHIER is not set
# CONFIG_ARCH_WANTS THP_SWAP is not set
# CONFIG_ARCH_WANTS UBSAN NO NULL is not set
CONFIG_ARCNET=m
CONFIG_ARM_GIC V3 ITS=y
CONFIG_ARM_SMMU=y
CONFIG_ATA=y
CONFIG_ATALK=m
CONFIG_ATARI_PARTITION=y
CONFIG_ATA GENERIC=m
+CONFIG_ATA_OVER_ETH=m
+CONFIG_ATA_PIIX=m
+CONFIG_ATM=m
+CONFIG_AUDIT_ARCH_COMPAT_GENERIC=y
+CONFIG_AUTOFS4_FS=m
+CONFIG_AUXDISPLAY=y
+CONFIG_BACKLIGHT_LCD_SUPPORT=y
+CONFIG_BATMAN_ADV=m
+CONFIG_BCH=m
+CONFIG_BCMA=m
+CONFIG_BCM_KONA_USB2_PHY=m
+CONFIG_BE2ISCSI=m
+CONFIG_BEFS_FS=m
+CONFIG_BFS_FS=m
+CONFIG_BLK_DEV_3W_XXXX_RAID=m
+CONFIG_BLK_DEV_CRYPTOLOOP=m
+CONFIG_BLK_DEV_DAC960=m
+CONFIG_BLK_DEV_PCIESSD_MTIP32XX=m
+CONFIG_BLK_DEV_RSXX=m
+CONFIG_BLK_DEV_SKD=m
+CONFIG_BLK_DEV_SX8=m
+CONFIG_BLK_DEV_UMEM=m
+CONFIG_BOUNCE=y
+CONFIG_BSD_DISKLABEL=y
+CONFIG_C2PORT=m
+CONFIG_CADENCE_WATCHDOG=m
+CONFIG_CAIF=m
+CONFIG_CAN=m
+CONFIG_CB710_CORE=m
+CONFIG_CC_STACKPROTECTOR=y
+CONFIG_CDROM_PKTCDVD=m
+CONFIG_CHASH=m
+CONFIG_CMDLINE="console=ttyAMA0"
+CONFIG_CMDLINE_PARTITION=y
+## CONFIG_CPU_BIG_ENDIAN is not set
+CONFIG_CRAMFS=m
+CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API_DESC=m
+CONFIG_CRYPTO_DEV_NITROX_CNN55XX=m
+## CONFIG_CXL_AFU_DRIVER_OPS is not set
+## CONFIG_CXL_BASE is not set
+## CONFIG_CXL_LIB is not set
+## CONFIG_DEBUG_ALIGN_RODATA is not set
+CONFIG_DECNET=m
+CONFIG_DEFAULT_MMAP_MIN_ADDR=32768
+CONFIG_DMADEVICES=y
+## CONFIG_DMA_CMA is not set
+## CONFIG_DMA_NOOP_OPS is not set
+CONFIG_DMA_VIRTUAL_CHANNELS=y
+# CONFIG_DM_DEBUG is not set
+# CONFIG_DM_MQ_DEFAULT is not set
+CONFIG_DNET=m
+CONFIG_DRM=m
+CONFIG_DUMMY_IRQ=m
+CONFIG_DW_WATCHDOG=m
+CONFIG_ECHO=m
+CONFIG_EEPROM_93CX6=m
+CONFIG_EFI_CAPSULE_LOADER=m
+# CONFIG_EFI_DEV_PATH_PARSER is not set
+CONFIG_EFS_FS=m
+# CONFIG_EM_TIMER_STI is not set
+CONFIG_ENCLOSURE_SERVICES=m
+CONFIG_ETHOC=m
+# CONFIG_EVM_LOAD_X509 is not set
+CONFIG_EXOFS_FS=m
+CONFIG_EXTCON=y
+CONFIG_F2FS_FS=m
+CONFIG_FB=y
+# CONFIG_FB_BOOT_VESA_SUPPORT is not set
+# CONFIG_FB_CFB_REV_PIXELS_IN_BYTE is not set
+# CONFIG_FB_IBM_GXT4500 is not set
+# CONFIG_FB_MACMODES is not set
+# CONFIG_FB_PROVIDE_GET_FB_UNMAPPED_AREA is not set
+CONFIG_FDDI=y
+CONFIG_FEALNX=m
+CONFIG_FIREWIRE=m
+CONFIG_FIREWIRE_NOSY=m
+CONFIG_FIRMWARE_IN_KERNEL=y
+CONFIG_FIXED_PHY=y
+CONFIG_FMC=m
+CONFIG_FORCE_MAX_ZONEORDER=13
+CONFIG_FRAME_WARN=1024
+CONFIG_FUSION=y
+CONFIG_GAMEPORT=m
+CONFIG_GENERIC_CSUM=y
+CONFIG_GENERIC_PHY=y
+CONFIG_GPIO_GENERIC=y
+CONFIG_GPIO_GENERIC_PLATFORM=y
+CONFIG_GPIO_MB86S7X=m
+CONFIG_GPIO_TWL4030=m
+CONFIG_GPIO_TWL6040=m
+# CONFIG_HAVE_AOUT is not set
+CONFIG_HAVE_ARCH_BITREVERSE=y
+CONFIG_HAVE_ARCH_VMAP_STACK=y
+# CONFIG_HAVE_BOOTMEM_INFO_NODE is not set
+CONFIG_HAVE GENERIC_DMA_COHERENT=y
+CONFIG_HFSPLUS_FS=m
+# CONFIG_IRQ_FORCED_THREADING_DEFAULT is not set
+# CONFIG_IsA_BUSY_API is not set
+CONFIG_JFS_FS=m
+CONFIG_JME=m
+CONFIG_JUMP_LABEL=y
+# CONFIG_KALLSYMS_ABSOLUTE_PERCPU is not set
+CONFIG_KVM=y
+CONFIG_LAPB=m
+# CONFIG_LATENCYTOP is not set
+CONFIG_LDM_PARTITION=y
+CONFIG_LIBNVDIMM=y
+CONFIG_LL2=m
+CONFIG_LOCK_DOWN_KERNEL=y
+CONFIG_LOG_BUF_SHIFT=18
+CONFIG_LPC_ICH=m
+CONFIG_LPC_SCH=m
+CONFIG_MAC_PARTITION=y
+CONFIG_MAILBOX=y
+CONFIG_MAX63XX_WATCHDOG=m
+CONFIG_MCB=m
+CONFIG_MDIO_BITBANG=m
+CONFIG_MDIO_BUS=y
+CONFIG_MDIO_BUS_MUX=y
+CONFIG_MDIO_THUNDER=m
+CONFIG_MD_MULTIPATH=m
+CONFIG_MEDIA_SUPPORT=m
+CONFIG_MEGARAI_LEGACY=m
+CONFIG_MEGARAI_NEWGEN=y
+CONFIG_MEGARAI_SAS=m
+CONFIG_MEMORY=y
+CONFIG_MEMSTICK=m
+CONFIG_MFD_CORE=y
+CONFIG_MFD_JANZ_CMOSIO=m
+CONFIG_MFD_KEMPLD=m
+CONFIG_MFD_MT6397=m
+CONFIG_MFD_SM501=m
+CONFIG_MFD_SYSCON=y
+CONFIG_MFD_TI_AM335X_TSCADC=m
+# CONFIG_MFD_TMIO is not set
+CONFIG_MFD_TPS65217=m
+CONFIG_MII=y
+CONFIG_MINIX_FS=m
+CONFIG_MINIX_SUBPARTITION=y
+CONFIG_MISC_RTSX=y
+CONFIG_MISC_RTSX_PCI=m
+CONFIG_MMC=y
+CONFIG_MMC_BLOCK=y
+CONFIG_MMC_SDHCI=m
+CONFIG_MMC_SDHCI_PLTFM=m
+CONFIG_MTD=m
+CONFIG_MTD_BLKDEVS=m
+CONFIG_MTD_BLOCK=m
+CONFIG_MTD_CMDLINE_PARTS=m
+CONFIG_MTD_NAND=m
+CONFIG_MTD_NAND_BCH=m
+CONFIG_MTD_NAND_ECC=m
+# CONFIG_MTD_NAND_OMAP_BCH_BUILD is not set
+CONFIG_MTD_OF_PARTS=m
+CONFIG_NCP_FS=m
+CONFIG_NET_CADENCE=y
+CONFIG_NET_PACKET_ENGINE=y
+CONFIG_NET_SWITCHDEV=y
+CONFIG_NET_VENDOR_3COM=y
+CONFIG_NET_VENDOR_ADAPTEC=y
+CONFIG_NET_VENDOR_AGERE=y
+CONFIG_NET_VENDOR_ALTEON=y
+CONFIG_NET_VENDOR_AMD=y
+CONFIG_NET_VENDOR_ARC=y
+CONFIG_NET_VENDOR_ATHEROS=y
+CONFIG_NET_VENDOR_BROADCOM=y
+CONFIG_NET_VENDOR_BROCADE=y
+CONFIG_NET_VENDOR_CAVIUM=y
+CONFIG_NET_VENDOR_CHELSIO=y
+CONFIG_NET_VENDOR_CISCO=y
+CONFIG_NET_VENDOR_DEC=y
+CONFIG_NET_VENDOR_DLINK=y
+CONFIG_NET_VENDOR_EMULEX=y
+CONFIG_NET_VENDOR_EXAR=y
+CONFIG_NET_VENDOR_EZCHIP=y
+CONFIG_NET_VENDOR_HP=y
+CONFIG_NET_VENDOR_HUAWEI=y
+CONFIG_NET_VENDOR_INTEL=y
+CONFIG_NET_VENDOR_MARVELL=y
+CONFIG_NET_VENDOR_MICREL=y
+CONFIG_NET_VENDOR_MYRI=y
+CONFIG_NET_VENDOR_NATSEMI=y
+CONFIG_NET_VENDOR_NVIDIA=y
+CONFIG_NET_VENDOR_OKI=y
+CONFIG_NET_VENDOR_QLOGIC=y
+CONFIG_NET_VENDOR_QUALCOMM=y
+CONFIG_NET_VENDOR_RDC=y
+CONFIG_NET_VENDOR_REALTEK=y
+CONFIG_NET_VENDOR_RENESAS=y
+CONFIG_NET_VENDOR_ROCKER=y
+CONFIG_NET_VENDOR_SAMSUNG=y
+CONFIG_NET_VENDOR_SeqQ=y
+CONFIG_NET_VENDOR_SiLAN=y
+CONFIG_NET_VENDOR_SiS=y
+CONFIG_NET_VENDOR_SmSc=y
+CONFIG_NET_VENDOR_StMicRo=y
+CONFIG_NET_VENDOR_Sun=y
+CONFIG_NET_VENDOR_Tehuti=y
+CONFIG_NET_VENDOR_Ti=y
+CONFIG_NET_VENDOR_ViA=y
+CONFIG_NET_VENDOR_WizNet=y
+CONFIG_NEW_LEDS=y
+CONFIG_NFC=m
+CONFIG_NFP=m
+CONFIG_NODES_SHIFT=6
+CONFIG_NOP_USB_XCEIV=m
+CONFIG_NOzomI=m
+CONFIG_NR_CPUS=256
+CONFIG_NTb=m
+# CONFIG_NTFS_RW is not set
+CONFIG_NUMA_BALANCING_DEFAULT_ENABLED=y
+CONFIG_NVMEM=y
+CONFIG_N_GsM=m
+# CONFIG_OCXL_BASE is not set
+CONFIG_OF=y
+CONFIG_OMFS_FS=m
+CONFIG_OsF_PARTITION=y
+# CONFIG_PAGE_EXTENSION is not set
+CONFIG_PANIC_TIMEOUT=0
+CONFIG_PARAVIRT=y
+CONFIG_PARPORT=m
+CONFIG_PATA_SiS=m
+CONFIG_PC104=y
+CONFIG_PCIEPORTBUS=y
+CONFIG_PCIE_WATCHDOG=m
+CONFIG_PCI_LAYERSCAPE=y
+CONFIG_PCI_MSI_IRQ_DOMAIN=y
+CONFIG_PCI_PASID=y
+CONFIG_PCI_PRI=y
+CONFIG_PCI_QUIRKS=y
+CONFIG_PGTABLE_LEVELS=4
+CONFIG_PGTABLE_MAPPING=y
+CONFIG_PHANTOM=m
+CONFIG_PHONEt=m
+CONFIG_PHYLIB=y
+CONFIG_PHYS_ADDR_T_64BIT=y
+# CONFIG_PHY_EXYNOS5250_USB2 is not set
+CONFIG_PHY_PXA_28NM_HSIC=m
+CONFIG_PHY_PXA_28NM_USB2=m
+CONFIG_PINCTRL=y
+# CONFIG_PINCTRL_BERLIN_BG2 is not set
+# CONFIG_PINCTRL_BERLIN_BG2CD is not set
+# CONFIG_PINCTRL_BERLIN_BG2Q is not set
+CONFIG_PM_DEBUG=y
+CONFIG_PM_DEVFREQ=y
+CONFIG_POWERCAP=y
+CONFIG_POWER_AVS=y
+CONFIG_POWER_SUPPLY=y
+CONFIG_PPP=y
+CONFIG_PPS=m
+CONFIG_PPS_CLIENT_GPIO=m
+CONFIG_PPS_CLIENT_LDISC=m
+# CONFIG_PREEMPT is not set
+# CONFIG_PREEMPT_NONE is not set
+CONFIG_PREEMPT_VOLUNTARY=y
+CONFIG_PSTORE=y
+# CONFIG_PSTORE_CONSOLE is not set
+CONFIG_PSTORE_RAM=m
+CONFIG_PTP_1588_CLOCK=m
+CONFIGPWM=y
+CONFIG_QNX4FS_FS=m
+CONFIG_QNX6FS_FS=m
+CONFIG_RAW_DRIVER=m
+CONFIG_RCU_CPU_STALL_TIMEOUT=60
+CONFIG_REED_SOLOMON=m
+CONFIG_REFCOUNT_FULL=y
+CONFIG_REGULATOR=y
+CONFIG_REGULATOR_FIXED_VOLTAGE=m
+CONFIG_REGULATOR_TPS65217=m
+CONFIG_REGULATOR_TWL4030=m
+CONFIG_REISERFS_FS=m
+CONFIG_RESET_BERLIN=y
+CONFIG_RESET_CONTROLLER=y
+# CONFIG_RESET_IMX7 is not set
+# CONFIG_RESET_MESON is not set
+CONFIG_RESET_SIMPLE=y
+CONFIG_RESET_SUNXI=y
+CONFIG_RFKILL=y
+CONFIG_ROMFS_FS=m
+CONFIG_RPMSG_VIRTIO=m
+CONFIG_RTC_DRV_PCF8523=m
+CONFIG_RTC_DRV_PL031=m
+CONFIG_RTC_DRV_TWL4030=m
+CONFIG_SATA_AHCI_PLATFORM=m
+CONFIG_SCHED_SMT=y
+CONFIG_SCSI_3W_9XXX=m
+CONFIG_SCSI_3W_SAS=m
+CONFIG_SCSI_AACRAID=m
+CONFIG_SCSI_ACARD=m
+CONFIG_SCSI_ADVANSYS=m
+CONFIG_SCSI_AIC79XX=m
+CONFIG_SCSI_AIC7XXX=m
+CONFIG_SCSI_AIC94XX=m
+CONFIG_SCSI_AM53C974=m
+CONFIG_SCSI_ARCMSR=m
+CONFIG_SCSI_BFA_FC=m
+CONFIG_SCSI_BNX2X_FCOE=m
+CONFIG_SCSI_BNX2_ISCSI=m
+CONFIG_SCSI_CHELSIO_FCOE=m
+CONFIG_SCSI_CXGB3_ISCSI=m
+CONFIG_SCSI_CXGB4_ISCSI=m
+CONFIG_SCSI_DC395x=m
+CONFIG_SCSI_DMX3191D=m
+CONFIG_SCSI_ESAS2R=m
+CONFIG_SCSI_FUTURE_DOMAIN=m
+CONFIG_SCSI_HPSA=m
+CONFIG_SCSI_HPTIO=m
+CONFIG_SCSI_INIA100=m
+CONFIG_SCSI_INITIO=m
+CONFIG_SCSI_IPS=m
+CONFIG_SCSI_LPFC=m
+# CONFIG_SCSI_MQ_DEFAULT is not set
+CONFIG_SCSI_MVSAS=m
+CONFIG_SCSI_MVUMI=m
+CONFIG_SCSI_PM8001=m
+CONFIG_SCSI_PMCRAID=m
+CONFIG_SCSI_QLA_FC=m
+CONFIG_SCSI_QLA_ISCSI=m
+CONFIG_SCSI_QLOGIC_1280=m
+CONFIG_SCSI_SNIC=m
+CONFIG_SCSI_SRPR_ATTRS=m
+CONFIG_SCSI_STEX=m
+CONFIG_SCSI_SYM53C8XX_2=m
+CONFIG_SCSI_UFSHCD=m
+CONFIG_SCSI_WD719X=m
+CONFIG_SECURITY_SELINUX_BOOTPARAM=y
+CONFIG_SENSORS_SCH56XX_COMMON=m
+CONFIG_SERIAL_8250=y
+CONFIG_SERIAL_8250_DW=y
+CONFIG_SERIAL_8250_FINTEK=y
+CONFIG_SERIAL_8250_FSL=y
+CONFIG_SERIAL_ALTERA_JTAGUART=m
+CONFIG_SERIAL_ALTERA_UART=m
+CONFIG_SERIAL_ARC=m
+CONFIG_SERIAL_CORE=y
+CONFIG_SERIAL_FSL_LPUART=m
+CONFIG_SERIAL_JSM=m
+CONFIG_SERIAL_MCTRL_GPIO=m
+CONFIG_SERIAL_NONSTANDARD=y
+CONFIG_SERIAL_RP2=m
+CONFIG_SERIAL_SCCNX=m
+CONFIG_SERIO=y
+CONFIG_SFC=m
+CONFIG_SFC_FALCON=m
+CONFIG_SGI_IOC4=m
+CONFIG_SGI_PARTITION=y
+CONFIG_SGL_ALLOC=y
+# CONFIG_SG_SPLIT is not set
+# CONFIG_SH_TIMER_CMT is not set
+# CONFIG_SH_TIMER_MTU2 is not set
+# CONFIG_SH_TIMER_TMU is not set
+CONFIG_SLIP=m
+CONFIG_SMC91X=y
+CONFIG_SND=m
+CONFIG_SND_DMAENGINE_PCM=m
+CONFIG_SND_EMU10K1_SEQ=m
+# CONFIG_SND_OPL4_LIB_SEQ is not set
+CONFIG_SND_PCM=m
+CONFIG_SND_SOC=m
+CONFIG_SND_SOC_FSL_SSI=m
+CONFIG_SND_SOC_I2C_AND_SPI=m
+CONFIG_SND_SOC_IMX_AUDMUX=m
+# CONFIG_SND_SOC_RT5677_SPI is not set
+CONFIG_SND_SOC_SGTL5000=m
+CONFIG_SND_TIMER=m
+CONFIG_SOC_BRCMSTB=y
+CONFIG_SOC_TI=y
+CONFIG_SOLARIS_X86_PARTITION=y
+CONFIG_SOUND=m
+CONFIG_SPI=y
+CONFIG_SPI_PXA2XX_PCI=m
+CONFIG_SPI_ROCKCHIP=m
+CONFIG_SPMI=m
+CONFIG_SRAM=y
+CONFIG_SSB=m
+CONFIG_STAGING=y
+CONFIG_STANDALONE=y
+CONFIG_SUNXI_SRAM=y
+CONFIG_SUN_PARTITION=y
+CONFIG_SYSV68_PARTITION=y
+CONFIG_SYSV_FS=m
+CONFIG_SYS_HYPERVERSOR=y
+CONFIG_TCG_TIS_I2C_ATMEL=m
+CONFIG_TCG_TIS_I2C_INFINEON=m
+CONFIG_TCG_TIS_I2C_NUVOTON=m
+CONFIG_THERMAL=y
+CONFIG_TIFM_CORE=m
+CONFIG_TL_CPSW_ALE=m
+CONFIG_TOUCHSCREEN_ELAN=m
+CONFIG_TRACE_SINK=m
+# CONFIG_TRANSPARENT_HUGEPAGE_ALWAYS is not set
+CONFIG_TRANSPARENT_HUGEPAGE_MADVISE=y
+CONFIG_TTY_PRINTF=y
+CONFIG_UFS_FS=m
+CONFIG_UIO_AEC=m
+CONFIG_UIO_CIF=m
+CONFIG_UIO_DMEM_GENIRQ=m
+CONFIG_UIO_MF624=m
+CONFIG_UIO_NETX=m
+CONFIG_UIO_PCI_GENERIC=m
+CONFIG_UIO_PDRV_GENIRQ=m
+CONFIG_UIO_PRUSS=m
+CONFIG_UIO_SERCOS3=m
+CONFIG_ULTRIX_PARTITION=y
+CONFIG_UNIXWARE_DISKLABEL=y
+CONFIG_USB_DWC2_PCI=m
+CONFIG_USB_EHCI_HCD_PLATFORM=m
+CONFIG_USB_EMXX=m
+CONFIG_USB_GADGET=m
+# CONFIG_USB_G_MULTI is not set
+CONFIG_USB_HCD_BCMA=m
+CONFIG_USB_HCD_SSB=m
+CONFIG_USB_MUSB_HDRC=m
+CONFIG_USB_OHCI_HCD_PLATFORM=m
+CONFIG_USB_SUPPORT=y
+CONFIG_UWB=m
+CONFIG_VFIO=m
+CONFIG_VFIO_IOMMU_TYPE1=m
+CONFIG_VFIO_PCI=m
+CONFIG_VFIO_VIRQFD=m
+CONFIG_VGASTATE=m
+CONFIG_VIRTIO_MMIO=y
+CONFIG_VME_BUS=y
+CONFIG_VMXNET3=m
+CONFIG_VXFS_FS=m
+CONFIG_W1=m
+CONFIG_WAN=y
+CONFIG_WDTPCI=m
+CONFIG_WIMAX=m
+CONFIG_X25=m
+CONFIG_XEN=y
+CONFIG_XILINX_WATCHDOG=m
+CONFIG_XILLYBUS=m
+CONFIG_XZ_DEC_ARM=y
+CONFIG_XZ_DEC_ARMTHUMB=y
+CONFIG_XZ_DEC_BCJ=y
+CONFIG_XZ_DEC_IA64=y
+CONFIG_XZ_DEC_POWERPC=y
+CONFIG_XZ_DEC_SPARC=y
+CONFIG_XZ_DEC_TEST=m
+CONFIG_XZ_DEC_X86=y
+CONFIG_ZLIB_DEFLATE=y
--- linux-4.15.0.orig/debian.master/config/arm64/config.flavour.generic
+++ linux-4.15.0/debian.master/config/arm64/config.flavour.generic
@@ -0,0 +1,3 @@
+#
+## Config options for config.flavour.generic automatically generated by splitconfig.pl
+#
--- linux-4.15.0.orig/debian.master/config/armhf/config.common.armhf
+++ linux-4.15.0/debian.master/config/armhf/config.common.armhf
@@ -0,0 +1,506 @@
+#
+## Config options for config.common.armhf automatically generated by splitconfig.pl
+#
+CONFIG_6LOWPAN=m
+CONFIG_ABX500_CORE=y
+CONFIG_AC97_BUS=y
+CONFIG_ADFS_FS=m
+CONFIG_AFFS_FS=m
+CONFIG_AIX_PARTITION=y
+CONFIG_ALIM7101_WDT=m
+CONFIG_ALTERA_TSE=m
+## CONFIG_AMD_XGBE_HAVE_ECC is not set
+CONFIG_AMIGA_PARTITION=y
+CONFIG_APPLICOM=m
+CONFIG_ARCH_ALPINE=y
+CONFIG_ARCH_EXYNOS=y
+CONFIG_ARCH_HAS STRICT KERNEL_RWX=y
+CONFIG_ARCH_HAS STRICT MODULE_RWX=y
+CONFIG_ARCH_MESON=y
+CONFIG_ARCH_MMAP RND BITS=8
+CONFIG_ARCH_MMAP RND BITS MAX=16
+CONFIG_ARCH_MMAP RND BITS MIN=8
+CONFIG_ARCH_MVEBU=y
+CONFIG_ARCH_NEEDS_CPU_IDLE COUPLED=y
+CONFIG_ARCH_OPTIONAL KERNEL_RWX=y
+CONFIG_ARCH_OPTIONAL KERNEL_RWX_DEFAULT=y
+## CONFIG_ARCH_SELECT_MEMORY MODEL is not set
+## CONFIG_ARCH SPARSEMEM_DEFAULT is not set
+# CONFIG_ARCH_SUNXI is not set
+CONFIG_ARCH_UNIPHIER=y
+# CONFIG_ARCH_WANTS_THP_SWAP is not set
+# CONFIG_ARCH_WANTS_UBSAN_NO_NULL is not set
+CONFIG_ARCNET=m
+CONFIG_ARM_GIC_V3_ITS=y
+# CONFIG_ARM_SMMU is not set
+CONFIG_ATA=y
+CONFIG_ATALK=m
+CONFIG_ATARI_PARTITION=y
+CONFIG_ATA_GENERIC=m
+CONFIG_ATA_OVER_ETH=m
+CONFIG_ATA_PHIX=m
+CONFIG_ATM=m
+# CONFIG_AUDIT_ARCH_COMPAT_GENERIC is not set
+CONFIG_AUTOFS4_FS=m
+CONFIG_AUXDISPLAY=y
+CONFIG_BACKLIGHT_LCD_SUPPORT=y
+CONFIG_BATMAN_ADV=m
+CONFIG_BCH=y
+CONFIG_BCMA=m
+CONFIG_BCM_KONA_USB2_PHY=m
+CONFIG_BE2ISCSI=m
+CONFIG_BEFS_FS=m
+CONFIG_BFS_FS=m
+CONFIG_BLK_DEV_3W_XXXX_RAID=m
+CONFIG_BLK_DEV_CRYPTOLOOP=m
+CONFIG_BLK_DEV_DAC960=m
+CONFIG_BLK_DEV_PCIESSD_MTIP32XX=m
+CONFIG_BLK_DEV_RSXX=m
+CONFIG_BLK_DEV_SX8=m
+CONFIG_BLK_DEV_UMEM=m
+CONFIG_BOUNCE=y
+CONFIG_BSD_DISKLABEL=y
+CONFIG_C2PORT=m
+CONFIG_CADENCE_WATCHDOG=m
+CONFIG_CAIF=m
+CONFIG_CAN=m
+CONFIG_CB710_CORE=m
+CONFIG_CC_STACKPROTECTOR=y
+CONFIG_CDROM_PKTCDVD=m
+CONFIG_CHASH=m
+CONFIG_CMDLINE=""
+CONFIG_CMDLINE_PARTITION=y
+# CONFIG_CPU_BIG_ENDIAN is not set
+CONFIG_CRAMFS=m
+# CONFIG_CXL_AFU_DRIVER_OPS is not set
+# CONFIG_CXL_BASE is not set
+CONFIG_CXL_LIB is not set
+CONFIG_DEBUG_ALIGN_RDATA=y
+CONFIG_DECNET=m
+CONFIG_DEFAULT_MMAP_MIN_ADDR=32768
+CONFIG_DMADEVICES=y
+CONFIG_DMA_NOOP_OPS is not set
+CONFIG_DMA_VIRTUAL_CHANNELS=y
+CONFIG_DM_DEBUG is not set
+CONFIG_DM_MQ_DEFAULT is not set
+CONFIG_DNET=m
+CONFIG_DRM=m
+CONFIG_DUMMY_IRQ=m
+CONFIG_DW_WATCHDOG=m
+CONFIG_ECHO=m
+CONFIG_EEPROM_93CX6=m
+CONFIG EFI_CAPSULE_LOADER=m
+CONFIG_EFS_FS=m
+CONFIG_EM_TIMER_STI=y
+CONFIG_ENCLOSURE_SERVICES=m
+CONFIG_ETHOC=m
+CONFIG_EVM_LOAD_X509 is not set
+CONFIG_EXOFS_FS=m
+CONFIG_EXTCON=y
+CONFIG_F2FS_FS=m
+CONFIG_FB=y
+CONFIG_FB_BOOT_VESA_SUPPORT is not set
+CONFIG_FB IBM_GXT4500 is not set
+CONFIG_FB_MACMODES is not set
+CONFIG_FB_PROVIDE_GET_FB_UNMAPPED_AREA=y
+CONFIG_FDDI=y
+CONFIG_FEALNX=m
+CONFIG_FIREWIRE=m
+CONFIG_FIREWIRE NOSY=m
+CONFIG_FIRMWARE_IN_KERNEL=y
+CONFIG_FIXED_PHY=y
+CONFIG_FMC=m
+CONFIG_FRAME_WARN=1024
+CONFIG_FUSION=y
+CONFIG_GAMEPORT=m
+CONFIG_GENERIC PHY=y
+CONFIG_GPIO GENERIC=y
+CONFIG_GPIO GENERIC PLATFORM=y
+CONFIG_GPIO MB86S7X=m
+CONFIG_GPIO TWL4030=y
+CONFIG_GPIO TWL6040=y
+CONFIG_HAVE_AOUT is not set
+CONFIG_HAVE_ARCH_BITREVERSE=y
+CONFIG_HAVE_ARCH_VMAP_STACK is not set
+# CONFIG_HAVE_BOOTMEM_INFO_NODE is not set
+CONFIG_HAVE_GENERIC_DMA_COHERENT=y
+CONFIG_HFSPLUS_FS=m
+CONFIG_HFS_FS=m
+CONFIG_HIBERNATION=y
+# CONFIG_HIO is not set
+CONFIG_HPFS_FS=m
+CONFIG_HP_ILO=m
+CONFIG_HSI=m
+CONFIG_HSR=m
+CONFIG_HTC_PASIC3=m
+CONFIG_HWMON=y
+CONFIG_HWSPINLOCK=y
+CONFIG_HW_RANDOM_TIMERIOMEM=m
+# CONFIG_HYPERV_TSCPAGE is not set
+CONFIG_HZ=250
+# CONFIG_HZ_100 is not set
+# CONFIG_HZ_1000 is not set
+CONFIG_HZ_250=y
+CONFIG_I2C=y
+CONFIG_I2C_EMEV2=m
+CONFIG_I2C_IMX=y
+CONFIG_I2C_SLAVE=y
+CONFIG_I6300ESB_WDT=m
+CONFIG_IEEE802154=m
+CONFIG_IIO=m
+CONFIGIMA_DEFAULT_HASH="sha1"
+CONFIGIMA_DEFAULT_HASH_SHA1=y
+# CONFIGIMA_DEFAULT_HASH_SHA256 is not set
+CONFIGIMA_DEFAULT_TEMPLATE="ima-ng"
+# CONFIGIMA_LOAD_X509 is not set
+CONFIGIMA_NG_TEMPLATE=y
+# CONFIGIMA_SIG_TEMPLATE is not set
+CONFIG_INFINIBAND_BNXT_RE=m
+CONFIG_INFINIBAND_NES=m
+CONFIG_INFINIBAND_OCRDMA=m
+CONFIG_INPUT=y
+CONFIG_IOMMU_IOVA=m
+CONFIG_IPACK_BUS=m
+CONFIG_IPMI_HANDLER=m
+CONFIG_IPMMU_VMSA=y
+CONFIG_IPX=m
+# CONFIG_IP_DCCP_CCID3 is not set
+# CONFIG_IRQ_FORCED_THREADING_DEFAULT is not set
+# CONFIG_ISA_BUS_API is not set
+CONFIG_JFS_FS=m
+CONFIG_JME=m
+# CONFIG_JUMP_LABEL is not set
+# CONFIG_KALLSYMS.Absolute_PERCPU is not set
+CONFIG_KARMA_PARTITION=y
+CONFIG_KERNEL_GZIP=y
+# CONFIG_KERNEL_XZ is not set
+CONFIG_KVM=y
+CONFIG_LAPB=m
+# CONFIG_LATENCYTOP is not set
+CONFIG_LDM_PARTITION=y
+CONFIG_LIBNVDIMM=y
+CONFIG_LL2C=m
+CONFIG_LOCK_DOWN_KERNEL=y
+CONFIG_LOG_BUF_SHIFT=17
+CONFIG_LPC_ICH=m
+CONFIG_LPC_SCH=m
+CONFIG_MAC_PARTITION=y
+CONFIG_MAILBOX=y
+CONFIG_MAX63XX_WATCHDOG=m
+CONFIG_MCB=m
+CONFIG_MDI0_BITBANG=m
+CONFIG_MDI0_BUS=y
+CONFIG_MDI0_BUS_MUX=m
+CONFIG_MD.MULTIPATH=m
+CONFIG.MEDIA_SUPPORT=m
+CONFIG.MEGARAID_LEGACY=m
+CONFIG.MEGARAID_NEWGEN=y
+CONFIG.MEGARAID_SAS=m
+CONFIG_MEMORY=y
+CONFIG_MEMSTICK=m
+CONFIG_MFD_.CORE=y
+CONFIG_MFD_JANZ_KMODIO=m
+CONFIG_MFD_KEMPLD=m
+CONFIG_MFD_MT6397=m
+CONFIG_MFD_SM501=y
+CONFIG_MFD_SYSCON=y
+CONFIG_MFD_TI_AM335X_TSCADC=m
+CONFIG_MFD_TMIO=y
+CONFIG_MFD_TPS65217=y
+CONFIG_MII=m
+CONFIG_MINIX_FS=m
+CONFIG_MINIX_SUBPARTITION=y
+CONFIG_MISC_RTXX=y
+CONFIG_MISC_RTSX_PCI=m
+CONFIG_MMC=y
+CONFIG_MMC_BLOCK=y
+CONFIG_MMC_SDHCI=y
+CONFIG_MMC_SDHCI.PLTFM=y
+CONFIG_MTD=y
+CONFIG_MTD_BLKDEVS=y
+CONFIG_MTD_BLOCK=y
+CONFIG_MTD_CMDLINE_PARTS=y
+CONFIG_MTD_NAND=y
+CONFIG_MTD_NAND_BCH=y
+CONFIG_MTD_NAND_ECC=y
+CONFIG_MTD_NAND_OMAP_BCH_BUILD=y
+CONFIG_MTD_OF_PARTS=y
+CONFIG_NCP_FS=m
+CONFIG_NET_CADENCE=y
+CONFIG_NET_PACKET_ENGINE=y
+CONFIG_NET_SWITCHDEV=y
+CONFIG_NET_VENDOR_3COM=y
+CONFIG_NET_VENDOR_ADAPTEC=y
+CONFIG_NET_VENDOR_AGERE=y
+CONFIG_NET_VENDOR_ALTEON=y
+CONFIG_NET_VENDOR_AMD=y
+CONFIG_NET_VENDOR_ARC=y
+CONFIG_NET_VENDOR_Atheros=y
+CONFIG_NET_VENDOR_BROADCOM=y
+CONFIG_NET_VENDOR_BROCADE=y
+CONFIG_NET_VENDOR_CAVIUM=y
+CONFIG_NET_VENDOR_CHELSIO=y
+CONFIG_NET_VENDOR_CISCO=y
+CONFIG_NET_VENDOR_DEC=y
+CONFIG_NET_VENDOR_DLINK=y
+CONFIG_NET_VENDOR_EMULEX=y
+CONFIG_NET_VENDOR_EXAR=y
+CONFIG_NET_VENDOR_EZCHIP=y
+CONFIG_NET_VENDOR_HP=y
+CONFIG_NET_VENDOR_HUAWEI=y
+CONFIG_NET_VENDOR_INTEL=y
+CONFIG_NET_VENDOR_MARVELL=y
+CONFIG_NET_VENDOR_MICREL=y
+CONFIG_NET_VENDOR_MYRI=y
+CONFIG_NET_VENDOR_NATSEMI=y
+CONFIG_NET_VENDOR_NVIDIA=y
+CONFIG_NET_VENDOR_OKI=y
+CONFIG_NET_VENDOR_QLOGIC=y
+CONFIG_NET_VENDOR_QUALCOMM=y
+CONFIG_NET_VENDOR_RDC=y
+CONFIG_NET_VENDOR_REALTEK=y
+CONFIG_NET_VENDOR_RENESAS=y
+CONFIG_NET_VENDOR_ROCKER=y
+CONFIG_NET_VENDOR_SAMSUNG=y
+CONFIG_NET_VENDOR_SEEQ=y
+CONFIG_NET_VENDOR_SEIQ=y
+CONFIG_NET_VENDOR_SILAN=y
+CONFIG_NET_VENDOR_SIS=y
# CONFIG_PM_DEVFREQ=y
# CONFIG_POWERCAP=y
# CONFIG_POWER_AVS=y
# CONFIG_POWER_SUPPLY=y
CONFIG_PPP=y
CONFIG_PPS=y
CONFIG_PPS_CLIENT_GPIO=m
CONFIG_PPS_CLIENT_LDISC=m
## CONFIG_PREEMPT is not set
## CONFIG_PREEMPT_NONE is not set
CONFIG_PREEMPT_VOLUNTARY=y
CONFIG_PSTORE=y
CONFIG_PSTORE_CONSOLE=y
CONFIG_PSTORE_RAM=y
CONFIG_PTP_1588_CLOCK=y
CONFIG_PWM=y
CONFIG_QNX4FS_FS=m
CONFIG_QNX6FS_FS=m
CONFIG_RAW_DRIVER=m
CONFIG_RCU_CPU_STALL_TIMEOUT=60
CONFIG_REED_SOLOMON=y
## CONFIG_REFCOUNT_FULL is not set
CONFIG_REGULATOR=y
CONFIG_REGULATOR_FIXED_VOLTAGE=y
CONFIG_REGULATOR_TPS65217=y
CONFIG_REISERFS_FS=m
CONFIG_RESET_BERLIN=y
CONFIG_RESET_CONTROLLER=y
CONFIG_RESET_MESON=y
## CONFIG_RESET_SIMPLE is not set
## CONFIG_RESET_SUNXI is not set
CONFIG_RFKILL=y
CONFIG_ROMFS_FS=m
CONFIG_RPMSG_VIRTIO=m
CONFIG_RTC_DRV_CMOS=m
CONFIG_RTC_DRV_PLL031=y
CONFIG_RTC_DRV_TWLO30=y
CONFIG_SATA_AHCI_PLATFORM=y
## CONFIG_SCHED_SMT is not set
CONFIG_SCSI_3W_9XXX=m
CONFIG_SCSI_3W_SAS=m
CONFIG_SCSI_AACRAID=m
CONFIG_SCSI_ACARD=m
CONFIG_SCSI_ADVANSYS=m
CONFIG_SCSI_AIC79XX=m
CONFIG_SCSI_AIC7XXX=m
CONFIG_SCSI_AIC94XX=m
CONFIG_SCSI_AM53C974=m
+CONFIG_SCSI_ARCMSR=m
+CONFIG_SCSI_BFA_FC=m
+CONFIG_SCSI_BNX2X_FCOE=m
+CONFIG_SCSI_BNX2_ISCSI=m
+CONFIG_SCSI_CHELSIO_FCOE=m
+CONFIG_SCSI_CXGB3_ISCSI=m
+CONFIG_SCSI_CXGB4_ISCSI=m
+CONFIG_SCSI_DC395x=m
+CONFIG_SCSI_DMX3191D=m
+CONFIG_SCSI_ESAS2R=m
+CONFIG_SCSI_FUTURE_DOMAIN=m
+CONFIG_SCSI_HPSA=m
+CONFIG_SCSI_HPTIOP=m
+CONFIG_SCSI_INIA100=m
+CONFIG_SCSI_INITIO=m
+CONFIG_SCSI_IPS=m
+CONFIG_SCSI_LPFC=m
+# CONFIG_SCSI_MQ_DEFAULT is not set
+CONFIG_SCSI_MVSAS=m
+CONFIG_SCSI_MVUMI=m
+CONFIG_SCSI_PM8001=m
+CONFIG_SCSI_PCMRAID=m
+CONFIG_SCSI_QLA_FC=m
+CONFIG_SCSI_QLA_ISCSI=m
+CONFIG_SCSI_QLOGIC_1280=m
+CONFIG_SCSI_SNIC=m
+CONFIG_SCSI_SRP_ATTRS=m
+CONFIG_SCSI_STEX=m
+CONFIG_SCSI_SYM53C8XX_2=m
+CONFIG_SCSI_UFSHCD=m
+CONFIG_SCSI_WD719X=m
+CONFIG_SECURITY_SELINUX_BOOTPARAM=y
+CONFIG_SENSORS_SCH56XX_COMMON=m
+CONFIG_SERIAL_8250=y
+CONFIG_SERIAL_8250 DW=m
+# CONFIG_SERIAL_8250_FINTEK is not set
+CONFIG_SERIAL_8250_FSL=y
+CONFIG_SERIAL_ALTERA_JTAGUART=m
+CONFIG_SERIAL_ALTERA_UART=m
+CONFIG_SERIAL_ARC=m
+CONFIG_SERIAL_CORE=y
+CONFIG_SERIAL_FSL_LPUART=m
+CONFIG_SERIAL_JSM=m
+CONFIG_SERIAL_NONSTANDARD=y
+CONFIG_SERIAL_RP2=m
+CONFIG_SERIAL_SCCNXP=y
+CONFIG_SERIO=y
+CONFIG_SFC=m
+CONFIG_SFC_FALCON=m
+CONFIG_SGL_IOC4=m
+CONFIG_SGI_PARTITION=y
+CONFIG_SGL_ALLOC=y
+CONFIG_SG_SPLIT=y
+CONFIG_SH_TIMER_CMT=y
+CONFIG_SH_TIMER_MTU2=y
+CONFIG_SH_TIMER_TMU=y
+CONFIG_SLIP=m
+CONFIG_SMC91X=m
+CONFIG_SND=y
+CONFIG_SND_COMPRESS_OFFLOAD=y
+CONFIG_SND_DMAENGINE_PCM=y
+CONFIG_SND_PCM=y
+CONFIG_SND_SOC=y
+CONFIG_SND_SOC_I2C_AND_SPI=y
+CONFIG_SND_TIMER=y
+CONFIG_SOC_TI=y
+CONFIG_SOLARIS_X86_PARTITION=y
+CONFIG_SOUND=y
+CONFIG_SPI=y
+CONFIG_SPI_PXA2XX_PCI=m
+CONFIG_SPI_ROCKCHIP=m
+CONFIG_SPMI=m
+CONFIG_SRAM=y
+CONFIG_SSB=m
+CONFIG_STAGING=y
+CONFIG_STANDALONE=y
+CONFIG_SUN_PARTITION=y
+CONFIG_SYSV68_PARTITION=y
+CONFIG_SYSV_FS=m
+CONFIG_TCG_TIS_I2C_ATMEL=m
+CONFIG_TCG_TIS_I2C_INFINEON=m
+CONFIG_TCG_TIS_I2C_NUVOTON=m
+CONFIG_THERMAL=y
+CONFIG_TIFM_CORE=m
+CONFIG_TI_CPSW_ALE=y
+CONFIG_TOUCHSCREEN_ELAN=m
+CONFIG_TRACE_SINK=m
+CONFIG_UFS_FS=m
+CONFIG_UIO_AEC=m
+CONFIG_UIO_CIF=m
+CONFIG_UIO_DMEM_GENIRQ=m
+CONFIG_UIO_MF624=m
+CONFIG_UIO_NETX=m
+CONFIG_UIO_PCI_GENERIC=m
+CONFIG_UIO_PDRV_GENIRQ=m
+CONFIG_UIO_PRUSS=m
+CONFIG_UIO_SERCOS3=m
+CONFIG_ULTRIX_PARTITION=y
+CONFIG_UNIXWARE_DISKLABEL=y
+CONFIG_USB_DWC2_PCI=y
+# CONFIG_USB_EHCI_HCD_PLATFORM is not set
+CONFIG_USB_EMXX=y
+CONFIG_USB_GADGET=y
+CONFIG_USB_G_MULTI=m
+# CONFIG_USB_HCD_BCMA is not set
+# CONFIG_USB_HCD_SSB is not set
+CONFIG_USB_MUSB_HDRC=y
+CONFIG_USB_SUPPORT=y
+CONFIG_UWB=m
+CONFIG_VFIO=m
+# CONFIG_VFIO_IOMMU_TYPE1 is not set
+CONFIG_VFIO_PCI=m
+CONFIG_VFIO_VIRQFD=m
+CONFIG_VGASTATE=m
+CONFIG_VIRTIO_MMIO=y
+CONFIG_VME_BUS=y
+CONFIG_VMXNET3=m
+CONFIG_VXFS_FS=m
+CONFIG_W1=m
+CONFIG_WAN=y
+CONFIG_WDTPCI=m
+CONFIG_WIMAX=m
+CONFIG_X25=m
+# CONFIG_XEN is not set
+CONFIG_XILINX_WATCHDOG=m
+CONFIG_XILLYBUS=m
+CONFIG_XZ_DEC_ARM=y
+CONFIG_XZ_DEC_ARMTHUMB=y
+CONFIG_XZ_DEC_BCI=y
+CONFIG_XZ_DEC_IA64=y
+CONFIG_XZ_DEC_POWERPC=y
+CONFIG_XZ_DEC_SPARC=y
+CONFIG_XZ_DEC_TEST=m
+CONFIG_XZ_DEC_X86=y
+CONFIG_ZLIB_DEFLATE=y
--- linux-4.15.0.orig/debian.master/config/armhf/config.flavour.generic
+++ linux-4.15.0/debian.master/config/armhf/config.flavour.generic
# Config options for config.flavour.generic automatically generated by splitconfig.pl

+CONFIG_ARCH_MXC=y
+CONFIG_ARCH_OMAP3=y
+CONFIG_ARCH_OMAP4=y
+CONFIG_ARCH_PHYS_ADDR_T_64BIT is not set
+CONFIG_ARCH_TEGRA=y
+CONFIG_ARM_ATAG_DTB_COMPAT=y
+CONFIG_ARM_HIGHBANK_CPUIDLE is not set
+CONFIG_ARM_LPAE is not set
+CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API_DESC=m
+CONFIG_DMA_CMA=y
+CONFIG_FB_CFB_REV_PIXELS_IN_BYTE=y
+CONFIG_FORCE_MAX_ZONEORDER=12
+CONFIG_HUGETLB_PAGE is not set
+CONFIG_IRQ_BYPASS_MANAGER=m
+CONFIG_PGTABLE_LEVELS=2
+CONFIG_PHYS_ADDR_T_64BIT is not set
+CONFIG_PWM_TIECAP=m
+CONFIG_PWM_TIEHRPWM=m
+CONFIG_REGULATOR_TWLI4030=y
+CONFIG_RESET_IMX7=y
+CONFIG_RTC_DRV_PCF8523=y
+CONFIG_SERIAL_MCTRL_GPIO=y
+CONFIG_SND_EDMA_SOC=m
+CONFIG_SND_EMU10K1_SEQ is not set
+CONFIG_SND_SOC_FSL_SSI=y
+CONFIG_SND_SOC_IMX_AUDMUX=y
+CONFIG_SND_SOC_RT5677_SPI=m
+CONFIG_SND_SOC_SGTL5000=y
+CONFIG_SOC_AM33XX=y
+CONFIG_USB_OHCI_HCD_PLATFORM=m
--- linux-4.15.0.orig/debian.master/config/armhf/config.flavour.generic-lpae
+++ linux-4.15.0/debian.master/config/armhf/config.flavour.generic-lpae
@@ -0,0 +1,33 @@
+# Config options for config.flavour.generic-lpae automatically generated by splitconfig.pl
+#
+CONFIG_ARCH_MXC is not set
+CONFIG_ARCH_OMAP3 is not set
+CONFIG_ARCH_OMAP4 is not set
+CONFIG_ARCH_PHYS_ADDR_T_64BIT=y
+CONFIG_ARCH_TEGRA is not set
+CONFIG_ARM_ATAG_DTB_COMPAT is not set
+CONFIG_ARM_HIGHBANK_CPUIDLE=y
+CONFIG_ARM_LPAE=y
+# CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API_DESC is not set
+# CONFIG_DMA_CMA is not set
+# CONFIG_FB_CFB_REV_PIXELS_IN_BYTE is not set
+CONFIG_FORCE_MAX_ZONEORDER=11
+CONFIG_HUGETLB_PAGE=y
+CONFIG_IRQ_BYPASS_MANAGER=y
+CONFIG_PGTABLE_LEVELS=3
+CONFIG_PHYS_ADDR_T_64BIT=y
+# CONFIG_PWM_TIECAP is not set
+# CONFIG_PWM_TIEHRPWM is not set
+CONFIG_REGULATOR_TWLA030=m
+# CONFIG_RESET_IMX7 is not set
+CONFIG_RTC_DRV_PCF8523=m
+CONFIG_SERIAL_MCTRL_GPIO=m
+# CONFIG_SND_EDMA_SOC is not set
+CONFIG_SND_EMU10K1_SEQ=m
+CONFIG_SND_SOC_FSL_SSI=m
+CONFIG_SND_SOC_IMX_AUDMUX=m
+# CONFIG_SND_SOC_RT5677_SPI is not set
+CONFIG_SND_SOC_SGTL5000=m
+CONFIG_SOC_AM33XX is not set
+CONFIG_USB_OWLC_HCDPLATFORM is not set
--- linux-4.15.0.orig/debian.master/config/config.common.ports
+++ linux-4.15.0/debian.master/config/config.common.ports
@@ -0,0 +1,3 @@
#
# Common config options automatically generated by splitconfig.pl
#
--- linux-4.15.0.orig/debian.master/config/config.common.ubuntu
+++ linux-4.15.0/debian.master/config/config.common.ubuntu
@@ -0,0 +1,10561 @@
#
# Common config options automatically generated by splitconfig.pl
#
+CONFIG_104_QUAD_8=m
+CONFIG_3C515=m
+CONFIG_6XX_WDT=m
+CONFIG_6LOWPAN_DEBUGFS is not set
+CONFIG_6LOWPAN_GHC_EXT_HDR_DEST is not set
+CONFIG_6LOWPAN_GHC_EXT_HDR_FRAG is not set
+CONFIG_6LOWPAN_GHC_EXT_HDR_HOP is not set
+CONFIG_6LOWPAN_GHC_EXT_HDR_ROUTE is not set
+CONFIG_6LOWPAN_GHC_ICMPV6 is not set
+CONFIG_6LOWPAN_GHC_UDP is not set
+CONFIG_6LOWPAN_NHC=m
+CONFIG_6LOWPAN_NHC_DEST=m
+CONFIG_6LOWPAN_NHC_FRAGMENT=m
+CONFIG_6LOWPAN_NHC_HOP=m
+CONFIG_6LOWPAN_NHC_IPV6=m
+CONFIG_6LOWPAN_NHC_MOBILITY=m
+CONFIG_6LOWPAN_NHC_ROUTING=m
+CONFIG_6LOWPAN_NHC_UDP=m
+CONFIG_6PACK=m
+CONFIG_8139CP=m
+CONFIG_8139TOO=m
+CONFIG_8139TOO_8129=y
+CONFIG_8139TOOPIO=y
+CONFIG_8139TOU_TUNE_TWISTER is not set
+CONFIG_8139_OLD_RX_RESET is not set
+CONFIG_842_COMPRESS=m
+CONFIG_842_DECOMPRESS=m
+CONFIG_88EU_AP_MODE=y
+CONFIG_9P_FS=m
+CONFIG_9P_FSCACHE=y
+CONFIG_9P_FS_POSIX_ACL=y
+CONFIG_9P_FS_SECURITY=y
+CONFIG_AB3100_CORE=m
+CONFIG_AB3100_OTP=m
+CONFIG_ABP060MG=m
+CONFIG_ACCESSIBILITY is not set
+CONFIG_ACENIC=m
+CONFIG_ACENIC_OMIT_TIGON_I is not set
+CONFIG_ACERHDF=m
+CONFIG_ACER_WMI=m
+CONFIG_ACORN_PARTITION is not set
+CONFIG_ACPI=y
+CONFIG_ACPI_AC=y
+CONFIG_ACPI_ALS=m
+CONFIG_ACPI_APEI=y
+CONFIG_ACPI_APEI_EINJ=m
+CONFIG_ACPI_APEI_ERST_DEBUG is not set
+CONFIG_ACPI_APEI_GHES=y
+CONFIG_ACPI_APEI_MEMORY_FAILURE=y
+CONFIG_ACPI_APEI_PCIEAER=y
+CONFIG_ACPI_APEI_SEA=y
+CONFIG_ACPI_BATTERY=y
+CONFIG_ACPI_BGRT=y
+CONFIG_ACPI_BUTTON=y
+CONFIG_ACPI_CCA_REQUIRED=y
+CONFIG_ACPI_CMPC=m
+CONFIG_ACPI_CONFIGFS=m
+CONFIG_ACPI_CONTAINER=y
+CONFIG_ACPI_CPPC_CPUFREQ=m
+CONFIG_ACPI_CPPC_LIB=y
+CONFIG_ACPI_CPU_FREQ_PSS=y
+CONFIG_ACPI_CUSTOM_DSDT is not set
+CONFIG_ACPI_CUSTOM_DSDT_FILE=""
+# CONFIG_ACPI_CUSTOM_METHOD is not set
+CONFIG_ACPI_DEBUGGER_USER=y
+CONFIG_ACPI_DOCK=y
+CONFIG_ACPI_EC_DEBUGFS=m
+CONFIG_ACPI_EXTLOG=m
+CONFIG_ACPI_FAN=y
+CONFIG_ACPI_GENERIC_GSI=y
+CONFIG_ACPI_GTDT=y
+CONFIG_ACPI_HED=y
+CONFIG_ACPI_HOTPLUG_CPU=y
+CONFIG_ACPI_HOTPLUG_IOAPIC=m
+CONFIG_ACPI_HOTPLUG_MEMORY=y
+CONFIG_ACPI_I2C_OPREGION=m
+CONFIG_ACPI_IOR=y
+CONFIG_ACPI_IPMI=m
+CONFIG_ACPI_LEGACY_TABLES_LOOKUP=y
+CONFIG_ACPI_LPIT=y
+CONFIG_ACPI_MCFG=y
+CONFIG_ACPI_NFIT=m
+CONFIG_ACPI_NUMA=y
+CONFIG_ACPI_PCI_SLOT=y
+CONFIG_ACPI_PPTT=y
+CONFIG_ACPI_PROCESSOR=y
+CONFIG_ACPI_PROCESSOR_AGGREGATOR=m
+CONFIG_ACPI_PROCESSOR_CSTATE=y
+CONFIG_ACPI_PROCESSOR_IDLE=y
+# CONFIG_ACPI_PROCFS_POWER is not set
+CONFIG_ACPI_REV_OVERRIDE_POSSIBLE=y
+CONFIG_ACPI_SBS=m
+CONFIG_ACPI_SLEEP=y
+CONFIG_ACPI_SPCR_TABLE=y
+CONFIG_ACPI_SYSTEM_POWER_STATES_SUPPORT=y
+CONFIG_ACPI_TABLE_UPGRADE=y
+CONFIG_ACPI_THERMAL=y
+CONFIG_ACPI_THERMAL_REL=m
+CONFIG_ACPI_TOSHIBA=m
+CONFIG_ACPI_VIDEO=m
+CONFIG_ACPI_WATCHDOG=y
+CONFIG_ACPI_WMI=m
+CONFIG_ACQUIRE_WDT=m
+CONFIG_ACT200L_DONGLE=m
+CONFIG_ACTISYS_DONGLE=m
+CONFIG_ACTSYS_DONGLE=m
+CONFIG_AD2S1200=m
+CONFIG_AD2S1210=m
+CONFIG_AD2590=m
+CONFIG_AD5064=m
+CONFIG_AD525X_DPOT=m
+CONFIG_AD525X_DPOT_I2C=m
+CONFIG_AD525X_DPOT_SPI=m
+CONFIG_AD5360=m
+CONFIG_AD5380=m
+CONFIG_AD5421=m
+CONFIG_AD5446=m
+CONFIG_AD5449=m
+CONFIG_AD5504=m
+CONFIG_AD5592R=m
+CONFIG_AD5592R_BASE=m
+CONFIG_AD5593R=m
+CONFIG_AD5624R_SPI=m
+CONFIG_AD5686=m
+CONFIG_AD5755=m
+CONFIG_AD5761=m
+CONFIG_AD5764=m
+CONFIG_AD5791=m
+CONFIG_AD5933=m
+CONFIG_AD7150=m
+CONFIG_AD7152=m
+CONFIG_AD7192=m
+CONFIG_AD7266=m
+CONFIG_AD7280=m
+CONFIG_AD7291=m
+CONFIG_AD7298=m
+CONFIG_AD7303=m
+CONFIG_AD7476=m
+CONFIG_AD7606=m
+CONFIG_AD7606_IFACE_PARALLEL=m
+CONFIG_AD7606_IFACE_SPI=m
+CONFIG_AD7746=m
+CONFIG_AD7766=m
+CONFIG_AD7780=m
+CONFIG_AD7791=m
+CONFIG_AD7793=m
+CONFIG_AD7816=m
+CONFIG_AD7887=m
+CONFIG_AD7923=m
+CONFIG_AD799X=m
+CONFIG_AD8366=m
+CONFIG_AD8801=m
+CONFIG_AD9523=m
+CONFIG_AD9832=m
+CONFIG_AD9834=m
+CONFIG_ADE7753=m
+CONFIG_ADE7754=m
+CONFIG_ADE7758=m

Open Source Used in 5GaaS Edge AC-4 18557
+CONFIG_AGP_SWORKS=m
+CONFIG_AGP_VIA=y
+CONFIG_AHCI_BRCM=m
+CONFIG_AHCI_CEVA=m
+CONFIG_AHCI_DM816=m
+CONFIG_AHCI_IMX=y
+CONFIG_AHCI_MTK=m
+CONFIG_AHCI_MVEBU=m
+CONFIG_AHCI_QORIQ=m
+CONFIG_AHCI_SUNXI is not set
+CONFIG_AHCI_TEGRA=m
+CONFIG_AHCI_XGENE=m
+CONFIG_AIC79XX_CMDS_PER_DEVICE=32
+CONFIG_AIC79XX_DEBUG_ENABLE is not set
+CONFIG_AIC79XX_DEBUG_MASK=0
+CONFIG_AIC79XX_REG_PRETTY_PRINT=y
+CONFIG_AIC79XX_RESET_DELAY_MS=5000
+CONFIG_AIC7XXX_CMDS_PER_DEVICE=8
+CONFIG_AIC7XXX_DEBUG_ENABLE is not set
+CONFIG_AIC7XXX_DEBUG_MASK=0
+CONFIG_AIC7XXX_REG_PRETTY_PRINT=y
+CONFIG_AIC7XXX_RESET_DELAY_MS=5000
+CONFIG_AIC94XX_DEBUG is not set
+CONFIG_AIM_CDEV=m
+CONFIG_AIM_NETWORK=m
+CONFIG_AIM_SOUND=m
+CONFIG_AIM_V4L2=m
+CONFIG_AIO=y
+CONFIG_AIRO=m
+CONFIG_AIRO_CS=m
+CONFIG_AK09911=m
+CONFIG_AK8974=m
+CONFIG_AK8975=m
+CONFIG_AL3320A=m
+CONFIG_ALIENWARE_WMI=m
+CONFIG_ALIGNMENT_TRAP=y
+CONFIG_ALIM1535_WDT=m
+CONFIG_ALIX=y
+CONFIG_ALL_FIR=m
+CONFIG_ALLOW_DEV_COREDUMP=y
+CONFIG_ALPINE_MSI=y
+CONFIG_ALTERA_MBOX=m
+CONFIG_ALTERA_MSGDMA=m
+CONFIG_ALTERA_PR_IP_CORE=m
+CONFIG_ALTERA_PR_IP_CORE_PLAT=m
+CONFIG_ALTERA_STAPL=m
+CONFIG_ALTIVEC=y
+CONFIG_ALX=m
+CONFIG_AM2315=m
+CONFIG_AM335X_CONTROL_USB=m
+CONFIG_AM335X_PHY_USB=m
+CONFIG_AMBA_PL08X=y
+CONFIG_AMD8111_ETH=m
+CONFIG_AMD_IOMMU=y
+CONFIG_AMD_IOMMU_V2=m
+CONFIG_AMD_MEM_ENCRYPT=y
+CONFIG_AMD_NB=y
+CONFIG_AMD_NUMA=y
+CONFIG_AMD_PHY=m
+CONFIG_AMD_XGBE=m
+CONFIG_AMD_XGBE_DCB=y
+CONFIG_AMILO_RFKILL=m
+CONFIG_ANDROID is not set
+CONFIG_ANON_INODES=y
+CONFIG_APB_TIMER=y
+CONFIG_APDS9300=m
+CONFIG_APDS9802ALS=m
+CONFIG_APDS9960=m
+CONFIG_APM=m
+CONFIG_APM_ALLOW_INTS is not set
+CONFIG_APM_CPU_IDLE is not set
+CONFIG_APM_DISPLAY_BLANK is not set
+CONFIG_APM_DO_ENABLE is not set
+CONFIG_APM_EMULATION is not set
+CONFIG_APM_IGNORE_USER_SUSPEND is not set
+CONFIG_APPLDATA_BASE=y
+CONFIG_APPLDATA_MEM=m
+CONFIG_APPLDATA_NET_SUM=m
+CONFIG_APPLDATA_OS=m
+CONFIG_APPLE_GMUX=m
+CONFIG_APPLE_PROPERTIES=y
+CONFIG_APQ_GCC_8084=m
+CONFIG_APQ_MMCC_8084=m
+CONFIG_AQTION=m
+CONFIG_AQUANTIA_PHY=m
+CONFIG_AR5523=m
+CONFIG_ARCH_ACTIONS=y
+CONFIG_ARCH_ARTPEC=y
+CONFIG_ARCH_AT91 is not set
+CONFIG_ARCH_AXXIA=y
+CONFIG_ARCH_BCM is not set
+CONFIG_ARCH_BCM2835=y
+CONFIG_ARCH_BCM_IPROC=y
+CONFIG_ARCH_BERLIN=y
+CONFIG_ARCH_BINFMT_ELF_STATE=y
+CONFIG_ARCH_BRCMSTB=y
+CONFIG_ARCH_CLOCKSOURCE_DATA=y
+CONFIG_ARCH_CPU_PROBE_RELEASE=y
+# CONFIG_ARCH_DAVINCI is not set
+# CONFIG_ARCH_DIGICOLOR is not set
+CONFIG_ARCH_DISCARD_MEMBLOCK=y
+CONFIG_ARCH_DMA_ADDR_T_64BIT=y
+# CONFIG_ARCH_DOVE is not set
+# CONFIG_ARCH_EBSA110 is not set
+CONFIG_ARCH_EMEV2=y
+CONFIG_ARCH_ENABLE_HUGEPAGE_MIGRATION=y
+CONFIG_ARCH_ENABLE_MEMORY_HOTPLUG=y
+CONFIG_ARCH_ENABLE_MEMORY_HOTREMOVE=y
+CONFIG_ARCH_ENABLE_SPLIT_PMD_PTLOCK=y
+CONFIG_ARCH_ENABLE_THP_MIGRATION=y
+# CONFIG_ARCH_EP93XX is not set
+# CONFIG_ARCH_EXYNOS3 is not set
+# CONFIG_ARCH_EXYNOS4 is not set
+CONFIG_ARCH_EXYNOS5=y
+CONFIG_ARCH_FLATMEM_ENABLE=y
+# CONFIG_ARCH_FOOTBRIDGE is not set
+CONFIG_ARCH_HAS_ACPI_TABLE_UPGRADE=y
+CONFIG_ARCH_HAS_ADD_PAGES=y
+CONFIG_ARCH_HAS_BANDGAP=y
+CONFIG_ARCH_HAS_CACHE_LINE_SIZE=y
+CONFIG_ARCH_HAS_CPU_RELAX=y
+CONFIG_ARCH_HAS_DEBUG_VIRTUAL=y
+CONFIG_ARCH_HAS_DEVMEM_IS_ALLOWED=y
+CONFIG_ARCH_HAS_DMA_SET_COHERENT_MASK=y
+CONFIG_ARCH_HAS_ELF_RANDOMIZE=y
+CONFIG_ARCH_HAS_FAST_MULTIPLIER=y
+CONFIG_ARCH_HAS_FILTER_PGPROT=y
+CONFIG_ARCH_HAS_FORTIFY_SOURCE=y
+CONFIG_ARCH_HAS_GCOV_PROFILE_ALL=y
+CONFIG_ARCH_HAS_GIGANTIC_PAGE=y
+CONFIG_ARCH_HAS_HMM=y
+CONFIG_ARCH_HAS_HOLES_MEMORYMODEL=y
+# CONFIG_ARCH_HAS_ILOG2_U32 is not set
+# CONFIG_ARCH_HAS_ILOG2_U64 is not set
+CONFIG_ARCH_HAS_KCOV=y
+CONFIG_ARCH_HAS_MEM_ENCRYPT=y
+CONFIG_ARCH_HAS_PKEYS=y
+CONFIG_ARCH_HAS_PMEM_API=y
+CONFIG_ARCH_HAS_REFCOUNT=y
+CONFIG_ARCH_HAS_RESET_CONTROLLER=y
+CONFIG_ARCH_HAS_SCALED_CPUTIME=y
+CONFIG_ARCH_HAS_SET_MEMORY=y
+CONFIG_ARCH_HAS_SG_CHAIN=y
+CONFIG_ARCH_HAS_TICK_BROADCAST=y
+CONFIG_ARCH_HAS_UACCESS_FLUSHCACHE=y
+CONFIG_ARCH_HAS_UBSAN_SANITIZE_ALL=y
+CONFIG_ARCH_HAS_WALK_MEMORY=y
+CONFIG_ARCH_HAVE_CUSTOM_GPIO_H=y
+CONFIG_ARCH_HAVE_NMI_SAFE_CMPXCHG=y
+CONFIG_ARCH_HI3xxx=y
+CONFIG_ARCH_HIBERNATION_HEADER=y
+CONFIG_ARCH_HIBERNATION_POSSIBLE=y
+CONFIG_ARCH_HIGHBANK=y
+# CONFIG_ARCH_HIP01 is not set
+CONFIG_ARCH_HIP04=y
+CONFIG_ARCH_HISI=y
+CONFIG_ARCH_HIX5HD2=y
+CONFIG_ARCH_INLINE_READ_LOCK=y
+CONFIG_ARCH_INLINE_READ_LOCK_BH=y
+CONFIG_ARCH_INLINE_READ_LOCK_IRQ=y
+CONFIG_ARCH_INLINE_READ_LOCK_IRQSAVE=y
+CONFIG_ARCH_INLINE_READ_TRYLOCK=y
+CONFIG_ARCH_INLINE_READ_UNLOCK=y
+CONFIG_ARCH_INLINE_READ_UNLOCK_BH=y
+CONFIG_ARCH_INLINE_READ_UNLOCK_IRQ=y
+CONFIG_ARCH_INLINE_READ_UNLOCK_IRQRESTORE=y
+CONFIG_ARCH_INLINE_SPIN_LOCK=y
+CONFIG_ARCH_INLINE_SPIN_LOCK_BH=y
+CONFIG_ARCH_INLINE_SPIN_LOCK_IRQ=y
+CONFIG_ARCH_INLINE_SPIN_LOCK_IRQSAVE=y
+CONFIG_ARCH_INLINE_SPIN_TRYLOCK=y
+CONFIG_ARCH_INLINE_SPIN_TRYLOCK_BH=y
+CONFIG_ARCH_INLINE_SPIN_UNLOCK=y
+CONFIG_ARCH_INLINE_SPIN_UNLOCK_BH=y
+CONFIG_ARCH_INLINE_SPIN_UNLOCK_IRQ=y
+CONFIG_ARCH_INLINE_SPIN_UNLOCK_IRQRESTORE=y
+CONFIG_ARCH_INLINE_WRITE_LOCK=y
+CONFIG_ARCH_INLINE_WRITE_LOCK_BH=y
+CONFIG_ARCH_INLINE_WRITE_LOCK_IRQ=y
+CONFIG_ARCH_INLINE_WRITE_LOCK_IRQSAVE=y
+CONFIG_ARCH_INLINE_WRITE_TRYLOCK=y
+CONFIG_ARCH_INLINE_WRITE_UNLOCK=y
+CONFIG_ARCH_INLINE_WRITE_UNLOCK_BH=y
+CONFIG_ARCH_INLINE_WRITE_UNLOCK_IRQ=y
+CONFIG_ARCH_INLINE_WRITE_UNLOCK_IRQRESTORE=y
+# CONFIG_ARCH_IOP13XX is not set
+# CONFIG_ARCH_IOP32X is not set
+# CONFIG_ARCH_IOP33X is not set
+# CONFIG_ARCH_IXP4XX is not set
+# CONFIG_ARCH_KEYSTONE is not set
+CONFIG_ARCH_KS8695 is not set
+CONFIG_ARCH_LAYERSCAPE=y
+CONFIG_ARCH_LG1K=y
+CONFIG_ARCH_MAY_HAVE_PC_FDC=y
+CONFIG_ARCH_MDM9615=y
+CONFIG_ARCH_MEDIATEK=y
+CONFIG_ARCH_MEMORY_PROBE=y
+CONFIG_ARCH_MIGHT_HAVE_ACPI_PDC=y
+CONFIG_ARCH_MIGHT_HAVE_PC_PARPORT=y
+CONFIG_ARCH_MIGHT_HAVE_PC_SERIO=y
+CONFIG_ARCH_MMP is not set
+CONFIG_ARCH_MSM8960=y
+CONFIG_ARCH_MSM8974=y
+CONFIG_ARCH_MSM8X60=y
+CONFIG_ARCH_MULTIPLATFORM=y
+CONFIG_ARCH_MULTI_V6 is not set
+CONFIG_ARCH_MULTI_V6_V7=y
+CONFIG_ARCH_MULTI_V7=y
+CONFIG_ARCH_NETX is not set
+CONFIG_ARCH_NR_GPIO=1024
+CONFIG_ARCH_OMAP=y
+CONFIG_ARCH_OMAP1 is not set
+CONFIG_ARCH_OMAP2PLUS=y
+CONFIG_ARCH_OMAP2PLUS_TYPICAL=y
+CONFIG_ARCH_PROC_KCORE_TEXT=y
+CONFIG_ARCH_PXA is not set
+CONFIG_ARCH_QCOM=y
+CONFIG_ARCH_R7S72100=y
+CONFIG_ARCH_R8A73A4 is not set
+CONFIG_ARCH_R8A7740=y
+CONFIG_ARCH_R8A7743=y
+CONFIG_ARCH_R8A7745=y
+CONFIG_ARCH_R8A7778=y
+CONFIG_ARCH_R8A7779=y
+CONFIG_ARCH_R8A7790=y
+CONFIG_ARCH_R8A7791=y
+CONFIG_ARCH_R8A7792=y
+CONFIG_ARCH_R8A7793=y
+CONFIG_ARCH_R8A7794=y
+CONFIG_ARCH_R8A7795=y
+CONFIG_ARCH_R8A7796=y
+CONFIG_ARCH_R8A77970=y
+CONFIG_ARCH_R8A77995=y
+CONFIG_ARCH_RANDOM=y
+CONFIG_ARCH_RCAR_GEN1=y
+CONFIG_ARCH_RCAR_GEN2=y
+CONFIG_ARCH_REALTEK=y
+CONFIG_ARCH_RENESAS=y
+CONFIG_ARCH_RMOBILE=y
+CONFIG_ARCH_ROCKCHIP=y
+# CONFIG_ARCH_RPC is not set
+# CONFIG_ARCH_S3C24XX is not set
+# CONFIG_ARCH_S5PV210 is not set
+# CONFIG_ARCH_SA1100 is not set
+CONFIG_ARCH_SAVE_PAGE_KEYS=y
+CONFIG_ARCH_SEATTLE=y
+CONFIG_ARCH_SH73A0=y
+CONFIG_ARCH_SHMOBILE=y
+# CONFIG_ARCH_SIRF is not set
+# CONFIG_ARCH_SOCFPGA is not set
+CONFIG_ARCH_SPAREMEM_ENABLE=y
+CONFIG_ARCH_SPRD=y
+# CONFIG_ARCH_STI is not set
+CONFIG_ARCH_STRATIX10=y
+CONFIG_ARCH_SUPPORTS_ACPI=y
+CONFIG_ARCH_SUPPORTS_ATOMIC_RMW=y
+CONFIG_ARCH_SUPPORTS_BIG_ENDIAN=y
+CONFIG_ARCH_SUPPORTS_DEBUG_PAGEALLOC=y
+CONFIG_ARCH_SUPPORTS_DEFERRED_STRUCT_PAGE_INIT=y
+CONFIG_ARCH_SUPPORTS_FIRMWARE=y
+CONFIG_ARCH_SUPPORTS_INT128=y
+CONFIG_ARCH_SUPPORTS_MEMORY_FAILURE=y
+CONFIG_ARCH_SUPPORTS_NUMA_BALANCING=y
+CONFIG_ARCH_SUPPORTS_OPTIMIZED_INLINING=y
+CONFIG_ARCH_SUPPORTS_TRUSTED_FOUNDATIONS=y
+CONFIG_ARCH_SUPPORTS_UPROBES=y
+CONFIG_ARCH_SUSPEND_POSSIBLE=y
+CONFIG_ARCH_SYNQUACER=y
+# CONFIG_ARCH_TANGO is not set
+CONFIG_ARCH_TEGRA_114_SOC=y
+CONFIG_ARCH_TEGRA_124_SOC=y
+CONFIG_ARCH_TEGRA_2x_SOC=y
+CONFIG_ARCH_TEGRA_3x_SOC=y
+CONFIG_ARCH_THUNDER=y
+CONFIG_ARCH_THUNDER2=y
+# CONFIG_ARCH_U8500 is not set
+CONFIG_ARCHUSES_HIGH_VMA_FLAGS=y
+CONFIG_ARCHUSES_PG_UNCACHED=y
+CONFIG_ARCH_USE_BUILTIN_BSWAP=y
+CONFIG_ARCH_USE_CMPXCHG_LOCKREF=y
+CONFIG_ARCH_USE_MEMREMAP_PROT=y
+CONFIG_ARCH_USE_QUEUE_RWLOCKS=y
+CONFIG_ARCH_USE_QUEUE_SPINLOCKS=y
+CONFIG_ARCH_VEXPRESS=y
+CONFIG_ARCH_VEXPRESS_CORTEX_A5_A9_ERRATA=y
+CONFIG_ARCH_VEXPRESS_DCSCB=y
+CONFIG_ARCH_VEXPRESS_SPC=y
+CONFIG_ARCH_VEXPRESS_TC2_PM=y
+CONFIG_ARCH_VIRT=y
+# CONFIG_ARCH_VULCAN is not set
+# CONFIG_ARCH_W90X900 is not set
+CONFIG_ARCH_WANTS_DYNAMIC_TASK_STRUCT=y
+CONFIG_ARCH_WANT_BATCHED_UNMAP_TLB_FLUSH=y
+CONFIG_ARCH_WANT_COMPAT_IPC_PARSE_VERSION=y
+CONFIG_ARCH_WANT_FRAME_POINTERS=y
+CONFIG_ARCH_WANT_GENERAL_HUGETLB=y
+CONFIG_ARCH_WANT_HUGE_PMD_SHARE=y
+CONFIG_ARCH_WANT_IPC_PARSE_VERSION=y
+CONFIG_ARCH_WANT_IRQS_OFF_ACTIVATE_MM=y
+CONFIG_ARCH_WANT_OLD_COMPAT_IPC=y
+CONFIG_ARCH_WEAK_RELEASE_ACQUIRE=y
+# CONFIG_ARCH_WM8850 is not set
+CONFIG_ARCH_XGENE=y
+# CONFIG_ARCH_ZX is not set
++ CONFIG_ARCH_ZYNQ is not set
+CONFIG_ARCH_ZYNQMP=y
+CONFIG_ARCNET_1051=m
+CONFIG_ARCNET_1201=m
+CONFIG_ARCNET_CAP=m
+CONFIG_ARCNET_COM20020=m
+CONFIG_ARCNET_COM20020_CS=m
+CONFIG_ARCNET_COM20020_ISA=m
+CONFIG_ARCNET_COM20020_PCI=m
+CONFIG_ARCNET_COM90xx=m
+CONFIG_ARCNET_COM90xxIO=m
+CONFIG_ARCNET_RAW=m
+CONFIG_ARCNET_RIM_I=m
+CONFIG_ARC_EMAC_CORE=m
+CONFIG_ARM=y
+CONFIG_ARM64=y
++ CONFIG_ARM64_16K_PAGES is not set
+CONFIG_ARM64_4K_PAGES=y
++ CONFIG_ARM64_64K_PAGES is not set
+CONFIG_ARM64 ACPI_PARKING_PROTOCOL=y
+CONFIG_ARM64_CONT_SHIFT=4
+CONFIG_ARM64_CRYPTO=y
+CONFIG_ARM64_ERRATUM_1024718=y
+CONFIG_ARM64_ERRATUM_819472=y
+CONFIG_ARM64_ERRATUM_824069=y
+CONFIG_ARM64_ERRATUM_826319=y
+CONFIG_ARM64_ERRATUM_827319=y
+CONFIG_ARM64_ERRATUM_832075=y
+CONFIG_ARM64_ERRATUM_834220=y
+CONFIG_ARM64_ERRATUM_843419=y
+CONFIG_ARM64_ERRATUM_845719=y
+CONFIG_ARM64_ERRATUM_858921=y
+CONFIG_ARM64_HW_AFDBM=y
+CONFIG_ARM64_LSE_ATOMICS=y
+CONFIG_ARM64_MODULE_PLTS=y
+CONFIG_ARM64_PAGE_SHIFT=12
+CONFIG_ARM64_PAN=y
+CONFIG_ARM64_PMEM=y
+CONFIG_ARM64_PTDUMP_CORE=y
+# CONFIG_ARM64_PTDUMP_DEBUGFS is not set
+# CONFIG_ARM64_RANDOMIZE_TEXT_OFFSET is not set
+CONFIG_ARM64_RAS_EXTN=y
+# CONFIG_ARM64_RELOC_TEST is not set
+CONFIG_ARM64_SSBD=y
+CONFIG_ARM64_SVE=y
+CONFIG_ARM64_SW_TTBR0_PAN=y
+CONFIG_ARM64_UAO=y
+CONFIG_ARM64_VA_BITS=48
+# CONFIG_ARM64_VA_BITS_39 is not set
+CONFIG_ARM64_VA_BITS_48=y
+CONFIG_ARM64_VHE=y
+CONFIG_ARMADA375_USBCLUSTER_PHY=y
+CONFIG_ARMADA_370_CLK=y
+CONFIG_ARMADA_370_XP_IRQ=y
+CONFIG_ARMADA_370_XP_TIMER=y
+CONFIG_ARMADA_375_CLK=y
+CONFIG_ARMADA_38X_CLK=y
+CONFIG_ARMADA_39X_CLK=y
+CONFIG_ARMADA_THERMAL=y
+CONFIG_ARMADA_XP_CLK=y
+CONFIG_ARMV8_DEPRECATED=y
+CONFIG_ARM_AMBA=y
+CONFIG_ARM_APPENDED_DTB=y
+CONFIG_ARM_ARCH_TIMER=y
+CONFIG_ARM_ARCH_TIMER_EVTSTREAM=y
+CONFIG_ARM_ARCH_TIMER_OOL_WORKAROUND=y
+CONFIG_ARM_ATAG_DTB_COMPAT_CMDLINE Extend=y
+# CONFIG_ARM_ATAG_DTB_COMPAT_CMDLINE_FROM_BOOTLOADER is not set
+CONFIG_ARM_BIG_LITTLE_CPUFREQ=m
+CONFIG_ARM_BIG_LITTLE_CPUIDLE=y
+CONFIG_ARM_BRCMSTB_AVS_CPUFREQ=m
+# CONFIG_ARM_BRCMSTB_AVS_CPUFREQ_DEBUG is not set
+CONFIG_ARM_CCI=y
+CONFIG_ARM_CCI400_COMMON=y
+CONFIG_ARM_CCI400_PMU=y
+CONFIG_ARM_CCI400_PORT_CTRL=y
+CONFIG_ARM_CCI5xx_PMU=y
+CONFIG_ARM_CL_CCI_PMU=y
+CONFIG_ARM_CCN=y
+CONFIG_ARM_CHARLCD=y
+CONFIG_ARM_CPUIDLE=y
+CONFIG_ARM_CPU_SUSPEND=y
+CONFIG_ARM_CPU_TOPOLOGY=y
+CONFIG_ARM_CRYPTO=y
+CONFIG_ARM_DMA_IOMMU_ALIGNMENT=8
+CONFIG_ARM_DMA_MEM_BUFFERABLE=y
+CONFIG_ARM_DMA_USE_IOMMU=y
+CONFIG_ARM_DT_BL_CPUFREQ=m
+CONFIG_ARM_ERRATA_430973=y
+CONFIG_ARM_ERRATA_643719=y
+CONFIG_ARM_ERRATA_720789=y
+CONFIG_ARM_ERRATA_754322=y
+CONFIG_ARM_ERRATA_754327=y
+CONFIG_ARM_ERRATA_764369=y
+CONFIG_ARM_ERRATA_773022=y
+CONFIG_ARM_ERRATA_775420=y
+CONFIG_ARM_ERRATA_798181=y
+CONFIG_ARM_ERRATA_818325_852422=y
+CONFIG_ARM_ERRATA_821420=y
+CONFIG_ARM_ERRATA_825619=y
+CONFIG_ARM_ERRATA_852421=y
+CONFIG_ARM_ERRATA_852423=y
+CONFIG_ARM_EXYNOS5440_CPUFREQ is not set
+CONFIG_ARM_EXYNOS_BUS_DEVFREQ=y
+CONFIG_ARM_EXYNOS_CPUIDLE=y
+CONFIG_ARM_GIC=y
+CONFIG_ARM_GIC_MAX_NR=1
+CONFIG_ARM_GIC_V2M=y
+CONFIG_ARM_GIC_V3=y
+CONFIG_ARM_GIC_V3_ITS_PCI=y
+CONFIG_ARM_GLOBAL_TIMER=y
+CONFIG_ARM_HAS_SG_CHAIN=y
+CONFIG_ARM_HEAVY_MB=y
+CONFIG_ARM_HIGHBANK_CPUFREQ=m
+CONFIG_ARM_IMX6Q_CPUFREQ=m
+CONFIG_ARM_KPROBES_TEST=m
+CONFIG_ARM_L1_CACHE_SHIFT=7
+CONFIG_ARM_L1_CACHE_SHIFT_6=y
+CONFIG_ARM_L1_CACHE_SHIFT_7=y
+CONFIG_ARM_MEDIATEK_CPUFREQ=m
+CONFIG_ARM_MHU=m
+CONFIG_ARM_MODULE_PLTS is not set
+CONFIG_ARM_MVEBU_V7_CPUIDLE=y
+CONFIG_ARM_OMAP2PLUS_CPUFREQ=y
+CONFIG_ARM_PATCH_IDIV=y
+CONFIG_ARM_PATCH_PHYS_VIRT=y
+CONFIG_ARM_PL172_MPMC=m
+CONFIG_ARM_PMU=y
+CONFIG_ARM_PMU ACPI=y
+CONFIG_ARM_PSCI=y
+## CONFIG_ARM_PSCI_CHECKER is not set
+CONFIG_ARM_PSCI_FW=y
+## CONFIG_ARM_PTDUMP is not set
+CONFIG_ARM_RK3399_DMC_DEVFREQ=m
+CONFIG_ARM_SBSA_WATCHDOG=m
+CONFIG_ARM_SCPI_CPUFREQ=m
+CONFIG_ARM_SCPI_POWER_DOMAIN=m
+CONFIG_ARM_SCPI_PROTOCOL=m
+CONFIG_ARM_SDE_INTERFACE=y
+CONFIG_ARM_SMMU V3=y
+CONFIG_ARM_SP805_WATCHDOG=m
+CONFIG_ARM_SPE_PMU=m
+CONFIG_ARM_TEGRA124_CPUFREQ=m
+CONFIG_ARM_TEGRA20_CPUFREQ=y
+CONFIG_ARM_Tegra_DEVFREQ=m
+CONFIG_ARM_THUMB=y
+CONFIG_ARM_THUMBEE=y
+CONFIG_ARM_TIMER_SP804=y
+CONFIG_ARM_TI_CPUFREQ=y
+CONFIG_ARM_UNWIND=y
+CONFIG_ARM_VEXPRESS_SPC_CPUFREQ=m
+CONFIG_ARM_VIRT_EXT=y
+CONFIG_AS3935=m
+CONFIG ASN1=y
+CONFIG_ASSOCIATIVE_ARRAY=y
+CONFIG ASUS LAPTOP=m
+CONFIG ASUS NB WMI=m
+CONFIG ASUS WIRELESS=m
+CONFIG ASUS WMI=m
+CONFIG ASYMMETRIC KEY TYPE=y
+CONFIG ASYMMETRIC_PUBLIC KEY SUBTYPE=y
+CONFIG ASYNC CORE=m
+CONFIG ASYNC_MEMCPY=m
+CONFIG ASYNC PQ=m
+CONFIG ASYNC RAID6 RECOV=m
+## CONFIG ASYNC RAID6 TEST is not set
+CONFIG ASYNC TX DISABLE PQ VAL_DMA=y
+CONFIG ASYNC TX DISABLE XOR VAL_DMA=y
+CONFIG ASYNC TX DMA=y
+CONFIG ASYNC TX ENABLE CHANNEL SWITCH=y
+CONFIG_ASYNC_XOR=m
+CONFIG_AT76C50X_USB=m
+CONFIG_AT803X_PHY=m
+CONFIG_ATAGS=y
+CONFIG_ATAGS_PROC=y
+CONFIG_ATA ACPI=y
+CONFIG_ATA_BMDMA=y
+CONFIG_ATA_NONSTANDARD is not set
+CONFIG_ATA_SFF=y
+CONFIG_ATA_VERBOSE_ERROR=y
+CONFIG_ATH10K=m
+CONFIG_ATH10K_AHB=y
+CONFIG_ATH10K_DEBUG is not set
+CONFIG_ATH10K_DEBUGFS=y
+CONFIG_ATH10K_PCI=m
+CONFIG_ATH10K_SDIO=m
+CONFIG_ATH10K_TRACING=y
+CONFIG_ATH10K_USB=m
+CONFIG_ATH5K=m
+CONFIG_ATH5K_DEBUG is not set
+CONFIG_ATH5K_PCI=y
+CONFIG_ATH5K_TRACING is not set
+CONFIG_ATH6KL=m
+CONFIG_ATH6KL_SDIO=m
+CONFIG_ATH6KL_TRACING is not set
+CONFIG_ATH6KL_USB=m
+CONFIG_ATH9K=m
+CONFIG_ATH9K_AHB=y
+CONFIG_ATH9K_BTCOEX_SUPPORT=y
+CONFIG_ATH9K_CHANNEL_CONTEXT=y
+CONFIG_ATH9K_COMMON=m
+CONFIG_ATH9K_COMMON_DEBUG=y
+CONFIG_ATH9K_DEBUGFS=y
+CONFIG_ATH9K_DYNACK is not set
+CONFIG_ATH9K_HTC=m
+CONFIG_ATH9K_HTC_DEBUGFS=y
+CONFIG_ATH9K_HW=m
+CONFIG_ATH9K_HWRNG=y
+CONFIG_ATH9K_PCI=y
+CONFIG_ATH9K_PCOEM=y
+CONFIG_ATH9K_RFKILL=y
+CONFIG_ATH9K_STATION_STATISTICS=y
+CONFIG_ATH9K_WOW=y
+CONFIG_ATH_COMMON=m
+CONFIG_ATH_DEBUG is not set
+CONFIG_ATL1=m
+CONFIG_ATL1C=m
+CONFIG_ATL1E=m
+CONFIG_ATL2=m
+CONFIG_ATLAS_PH_SENSOR=m
+CONFIG_ATMEL=m
+## CONFIG_ATMEL_PIT is not set
+CONFIG_ATM_AMBASSADOR=m
+## CONFIG_ATM_AMBASSADOR_DEBUG is not set
+CONFIG_ATM_BR2684=m
+## CONFIG_ATM_BR2684_IPFILTER is not set
+CONFIG_ATM_CLIP=m
+## CONFIG_ATM_CLIP_NO_ICMP is not set
+CONFIG_ATM_DRIVERS=y
+CONFIG_ATM_DUMMY=m
+CONFIG_ATM_ENI=m
+## CONFIG_ATM_ENI_DEBUG is not set
+## CONFIG_ATM_ENI_TUNE_BURST is not set
+CONFIG_ATM_FIRESTREAM=m
+CONFIG_ATM_FORE200E=m
+CONFIG_ATM_FORE200E_DEBUG=0
+CONFIG_ATM_FORE200E_TX_RETRY=16
+## CONFIG_ATM_FORE200E_USE_TASKLET is not set
+CONFIG_ATM_HE=m
+CONFIG_ATM_HE_USE_SUNI=y
+CONFIG_ATM_HORIZON=m
+## CONFIG_ATM_HORIZON_DEBUG is not set
+CONFIG_ATM_IA=m
+## CONFIG_ATM_IA_DEBUG is not set
+CONFIG_ATM_IDT77252=m
+## CONFIG_ATM_IDT77252_DEBUG is not set
+## CONFIG_ATM_IDT77252_RCV_ALL is not set
+CONFIG_ATM_IDT77252_USE_SUNI=y
+CONFIG_ATM_LANAI=m
+CONFIG_ATM_LANE=m
+CONFIG_ATM_MPOA=m
+CONFIG_ATM_NICSTAR=m
+## CONFIG_ATM_NICSTAR_USE_IDT77105 is not set
+## CONFIG_ATM_NICSTAR_USE_SUNI is not set
+CONFIG_ATM_SOLOS=m
+CONFIG_ATM_TCP=m
+CONFIG_ATM_ZATM=m
+## CONFIG_ATM_ZATM_DEBUG is not set
+## CONFIG_ATOMIC64_SELFTEST is not set
+CONFIG_ATP=m
+CONFIG_AUDIT=y
+CONFIG_AUDITSYSCALL=y
+CONFIG_AUDIT_ARCH=y
+CONFIG_AUDIT_COMPAT_GENERIC=y
+CONFIG_AUDIT_COMPAT_GENERIC=y
+CONFIG_AUDIT_TREE=y
+CONFIG_AUDIT_WATCH=y
+CONFIG_AUFS_BDEV_LOOP=y
+CONFIG_AUFS.Branch_MAX_1023 is not set
+CONFIG_AUFS.Branch_MAX_127=y
+CONFIG_AUFS.Branch_MAX_32767 is not set
+CONFIG_AUFS.Branch_MAX_511 is not set
+CONFIG_AUFS_BR_FUSE is not set
+CONFIG_AUFS_BR_HFSPLUS=y
+CONFIG_AUFS_BR_RAMFS is not set
+CONFIG_AUFS_DEBUG is not set
+CONFIG_AUFS_DIRREN=y
+CONFIG_AUFS_EXPORT=y
+CONFIG_AUFS_FS=m
+CONFIG_AUFS_HNOTIFY is not set
+CONFIG_AUFS_INO_T_64=y
+CONFIG_AUFS_RDU is not set
+CONFIG_AUFS_SBLIST=y
+CONFIG_AUFS_SHWH is not set
+CONFIG_AUFS_XATTR=y
+CONFIG_AURORA_NB8800=m
+CONFIG_AUTO_ZRELADDR=y
+CONFIG_AX25=m
+CONFIG_AX25_DAMA_SLAVE=y
+CONFIG_AX88796=m
+CONFIG_AX88796.93CX6 is not set
+CONFIG_AXP20X_ADC=m
+CONFIG_AXP20X_POWER=m
+CONFIG_AXP288_ADC=m
+CONFIG_AXP288_CHARGER=m
+CONFIG_AXP288_FUEL_GAUGE=m
+CONFIG_B43=m
+CONFIG_B43_LEGACY=m
+CONFIG_B43_LEGACY_DEBUG is not set
+CONFIG_B43_LEGACY_DMA=y
+CONFIG_B43_LEGACY_DMA_ANDPIO_MODE=y
+CONFIG_B43_LEGACY_DMA_MODE is not set
+CONFIG_B43_LEGACY_HWRNG=y
+CONFIG_B43_LEGACY_LEDS=y
+CONFIG_B43_LEGACY_PCIECORE_AUTOSELECT=y
+CONFIG_B43_LEGACY_PCI_AUTOSELECT=y
+CONFIG_B43_LEGACYPIO=y
+CONFIG_B43_LEGACYPIO_MODE is not set
+CONFIG_B43_BCMA=y
+CONFIG_B43_BCMAPIO=y
+CONFIG_B43_BUSES_BCMA is not set
+CONFIG_B43_BUSES_BCMA_AND_SSB=y
+# CONFIG_B43_BUSES_SSB is not set
+# CONFIG_B43_DEBUG is not set
+CONFIG_B43_HWRNG=y
+CONFIG_B43_LEDS=y
+CONFIG_B43_PCICORE_AUTOSELECT=y
+CONFIG_B43_PCI_AUTOSELECT=y
+CONFIG_B43_PHY_G=y
+CONFIG_B43_PHY_HT=y
+CONFIG_B43_PHY_LP=y
+CONFIG_B43_PHY_N=y
+CONFIG_B43PIO=y
+# CONFIG_B43_SDIO is not set
+CONFIG_B43_SSB=y
+CONFIG_B44=m
+CONFIG_B44_PCI=y
+CONFIG_B44_PCICORE_AUTOSELECT=y
+CONFIG_B44_PCI_AUTOSELECT=y
+CONFIG_B53=m
+CONFIG_B53_MDIODRIVER=m
+CONFIG_B53_MMADRIVER=m
+CONFIG_B53_SPI_DRIVER=m
+CONFIG_B53_SRAB_DRIVER=m
+CONFIG_BACKLIGHT_88PM860X=m
+CONFIG_BACKLIGHT_ATT2870=m
+CONFIG_BACKLIGHT_ADPP5520=m
+CONFIG_BACKLIGHT_ADPS860=m
+CONFIG_BACKLIGHT_ADPS8870=m
+CONFIG_BACKLIGHT_APPLE=m
+CONFIG_BACKLIGHT_ARCXCNN=m
+CONFIG_BACKLIGHT_AS3711=m
+CONFIG_BACKLIGHT_BDI6107=m
+CONFIG_BACKLIGHT_CARILLO_RANCH=m
+CONFIG_BACKLIGHT_CLASS_DEVICE=y
+CONFIG_BACKLIGHT_DA903X=m
+CONFIG_BACKLIGHT_DA9052=m
+CONFIG_BACKLIGHT_GENERIC=m
+CONFIG_BACKLIGHT_GPIO=m
+CONFIG_BACKLIGHT_LM3533=m
+CONFIG_BACKLIGHT_LM3630A=m
+CONFIG_BACKLIGHT_LM3639=m
+CONFIG_BACKLIGHT_LP855X=m
+CONFIG_BACKLIGHT_LP8788=m
+CONFIG_BACKLIGHT_LV5207LP=m
+CONFIG_BACKLIGHT_MAX8925=m
+CONFIG_BACKLIGHT_PANDORA=m
+CONFIG_BACKLIGHT_PCF50633=m
+CONFIG_BACKLIGHT_PM8941_WLED=m
+CONFIG_BACKLIGHT_PWM=m
+CONFIG_BACKLIGHT_SAHARA=m
+CONFIG_BACKLIGHT_SKY81452=m
+CONFIG_BACKLIGHT_TPS65217=m
+CONFIG_BACKLIGHT_WM831X=m
+# CONFIG_BACKTRACE_SELF_TEST is not set
+CONFIG_BALLOON_COMPACTION=y
+CONFIG_BASE_FULL=y
+CONFIG_BASE_SMALL=0
+# CONFIG_BATMAN_ADV_BATMAN_V is not set
+CONFIG_BATMAN_ADV_BLA=y
+CONFIG_BATMAN_ADV_DAT=y
+# CONFIG_BATMAN_ADV_DEBUGES is not set
+CONFIG_BATMAN_ADV_MCAST=y
+CONFIG_BATMAN_ADV_NC=y
+CONFIG_BATTERY_88PM860X=m
+CONFIG_BATTERY_ACT8945A=m
+CONFIG_BATTERY_AXP20X=m
+CONFIG_BATTERY_BQ27XXX=m
+# CONFIG_BATTERY_BQ27XXX_DT_UPDATES_NVM is not set
+CONFIG_BATTERY_BQ27XXX_HDQ=m
+CONFIG_BATTERY_BQ27XXX_I2C=m
+CONFIG_BATTERY_CPCAP=m
+CONFIG_BATTERY_DA9030=m
+CONFIG_BATTERY_DA9052=m
+CONFIG_BATTERY_DA9150=m
+CONFIG_BATTERY_DS2760=m
+CONFIG_BATTERY_DS2780=m
+CONFIG_BATTERY_DS2781=m
+CONFIG_BATTERY_DS2782=m
+CONFIG_BATTERY_GAUGE_LTC2941=m
+CONFIG_BATTERY_LEGOL_EV3=m
+CONFIG_BATTERY_MAX17040=m
+CONFIG_BATTERY_MAX17042=m
+CONFIG_BATTERY_MAX1721X=m
+CONFIG_BATTERY_RT5033=m
+CONFIG_BATTERY_RX51=m
+CONFIG_BATTERY_SBS=m
+CONFIG_BATTERY_TWLL4030_MADC=m
+CONFIG_BAYCOM_EPP=m
+CONFIG_BAYCOM_PAR=m
+CONFIG_BAYCOM_SER_FDX=m
+CONFIG_BAYCOM_SER_HDX=m
+CONFIG_BCACHE=m
+# CONFIG_BCACHE_CLOSURES_DEBUG is not set
+# CONFIG_BCACHE_DEBUG is not set
+CONFIG_BCH_CONST_M=14
+CONFIG_BCH_CONST_PARAMS=y
+CONFIG_BCH_CONST_T=4
+CONFIG_BCM2835_MBOX=y
+CONFIG_BCM2835_THERMAL=m
+CONFIG_BCM2835_VCHIQ=m
+CONFIG_BCM2835_WDT=m
+CONFIG_BCM7038_WDT=m
+CONFIG_BCM7XXX_PHY=m
+CONFIG_BCM87XX_PHY=m
+CONFIG_BCMA_BLOCKIO=y
+# CONFIG_BCMA_DEBUG is not set
+CONFIG_BCMA_DRIVER_GMAC_CMN=y
+CONFIG_BCMA_DRIVER_GPIO=y
+CONFIG_BCMA_DRIVER_PCI=y
+CONFIG_BCMA_HOST_PCI=y
+CONFIG_BCMA_HOST_PCI_POSSIBLE=y
+CONFIG_BCMA_HOST_SOC=y
+CONFIG_BCMA_POSSIBLE=y
+CONFIG_BCMA_SFLASH=y
+CONFIG_BCMGENET=m
+CONFIG_BCM_FLEXRM_MBOX=m
+CONFIG_BCM_IPROC_ADC=m
+CONFIG_BCM_NETPHYLIB=m
+CONFIG_BCM_NS_THERMAL=m
+CONFIG_BCM_PDC_MBOX=m
+CONFIG_BCM_SBA_RAID=m
+CONFIG_BCM_VIDEOCORE=m
+CONFIG_BE2NET=m
+CONFIG_BE2NET_HWMON=y
+# CONFIG_BEFSD_DEBUG is not set
+CONFIG_BERLIN2_ADC=m
+CONFIG_BFQ_GROUP_IOSCHED=y
+CONFIG_BGMAC=y
+CONFIG_BGMAC_PLATFORM=y
+CONFIG_BH1750=m
+CONFIG_BH1780=m
+CONFIG_BIG_KEYS=y
+CONFIG_BIG_LITTLE=y
+CONFIG_BINARY_PRINTF=y
+# CONFIG_BINFMT_AOUT is not set
+CONFIG_BINFMT_ELF=y
+CONFIG_BINFMT_ELF_FDPIC=y
+CONFIG_BINFMT_FLAT=y
+CONFIG_BINFMT_MISC=m
+CONFIG_BINFMT_SCRIPT=y
+CONFIG_BINFMT_SHARED_FLAT=y
+CONFIG_BINFMT_ZFLAT=y
+CONFIG_BITREVERSE=y
+CONFIG_BLK_CGROUP=y
+CONFIG_BLK_CMDLINE_PARSER=y
+CONFIG_BLK_DEBUG_FS=y
+CONFIG_BLK_DEV=y
+CONFIG_BLK_DEV_BSG=y
+CONFIG_BLK_DEV_BSGLIB=y
+# CONFIG_BLK_DEV_COW_COMMON is not set
+CONFIG_BLK_DEV_DM=y
+CONFIG_BLK_DEV_DM_BUILTIN=y
+CONFIG_BLK_DEV_DRBD=m
+CONFIG_BLK_DEV_FD=m
+CONFIG_BLK_DEV_INITRD=y
+CONFIG_BLK_DEV_INTEGRITY=y
+CONFIG_BLK_DEV_IO_TRACE=y
+CONFIG_BLK_DEV_LOOP=y
+CONFIG_BLK_DEV_LOOP_MIN_COUNT=8
+CONFIG_BLK_DEV_MD=y
+CONFIG_BLK_DEV_NBD=m
+CONFIG_BLK_DEV_NULL_BLK=m
+CONFIG_BLK_DEV_NVME=m
+CONFIG_BLK_DEV_PMEM=m
+CONFIG_BLK_DEV_RAM=m
+CONFIG_BLK_DEV_RAM_COUNT=16
+CONFIG_BLK_DEV_RAM_SIZE=65536
+CONFIG_BLK_DEV_RBD=m
+CONFIG_BLK_DEV_SD=y
+CONFIG_BLK_DEV_SR=y
+CONFIG_BLK_DEV_THROTTLING=y
+# CONFIG_BLK_DEV_THROTTLING_LOW is not set
+# CONFIG_BLK_DEV_XPRAM is not set
+CONFIG_BLK_DEV_ZONED=y
+CONFIG_BLK_MQ_PCI=y
+CONFIG_BLK_MQ_RDMA=y
+CONFIG_BLK_MQ_VIRTIO=y
+CONFIG_BLK_SCSI_REQUEST=y
+CONFIG_BLK_SED_OPAL=y
+CONFIG_BLK_WBT=y
+CONFIG_BLK_WBT_MQ=y
+# CONFIG_BLK_WBT_SQ is not set
+CONFIG_BLOCK=y
+CONFIG_BLOCK_COMPAT=y
+CONFIG_BL_SWITCHER=y
+CONFIG_BL_SWITCHER_DUMMY_IF=m
+CONFIG_BMA180=m
+CONFIG_BMA220=m
+CONFIG_BMC150_ACCEL=m
+CONFIG_BMC150_ACCEL_I2C=m
+CONFIG_BMC150_ACCEL_SPI=m
+CONFIG_BMC150_MAGN=m
+CONFIG_BMC150_MAGN_I2C=m
+CONFIG_BMC150_MAGN_SPI=m
+CONFIG_BMG160=m
+CONFIG_BMG160_I2C=m
+CONFIG_BMG160_SPI=m
+CONFIG_BMI160=m
+CONFIG_BMI160_I2C=m
+CONFIG_BMI160_SPI=m
+CONFIG_BMP280=m
+CONFIG_BMP280_I2C=m
+CONFIG_BMP280_SPI=m
+CONFIG_BNA=m
+CONFIG_BNX2=m
+CONFIG_BNX2X=m
+CONFIG_BNX2X_SRIOV=y
+CONFIG_BNXT=m
+CONFIG_BNXT_DCB=y
+CONFIG_BNXT_FLOWER_OFFLOAD=y
+CONFIG_BNXT_SRIOV=y
+CONFIG_BOARD_TPCI200=m
+CONFIG_BONDING=m
+# CONFIG_BOOTPARAM_HARDLOCKUP_PANIC is not set
+CONFIG_BOOTPARAM_HARDLOCKUP_PANIC_VALUE=0
+# CONFIG_BOOTPARAM_HOTPLUG_CPU0 is not set
+# CONFIG_BOOTPARAM_HUNG_TASK_PANIC is not set
+CONFIG_BOOTPARAM_HUNG_TASK_PANIC_VALUE=0
+# CONFIG_BOOTPARAM_SOFTLOCKUP_PANIC is not set
+# CONFIG_BOOTPARAM_SOFTLOCKUP_PANIC_VALUE=0
+# CONFIG_BOOTX_TEXT is not set
+CONFIG_BOOT_PRINTK_DELAY=y
+CONFIG_BPF=y
+CONFIG_BPF_EVENTS=y
+CONFIG_BPF_JIT=y
+CONFIG_BPF_JIT_ALWAYS_ON=y
+CONFIG_BPF_STREAM_PARSER=y
+CONFIG_BPF_SYSCALL=y
+CONFIG_BPQETHER=m
+CONFIG_BQL=y
+CONFIG_BRANCH_PROFILE_NONE=y
+# CONFIG_BRCMDBG is not set
+CONFIG_BRCFMAC=m
+CONFIG_BRCFMAC_PCIE=y
+CONFIG_BRCFMAC_PROTO_BCDC=y
+CONFIG_BRCFMAC_PROTO_MSGBUF=y
+CONFIG_BRCFMAC_SDIO=y
+CONFIG_BRCFMAC_USB=y
+CONFIG_BRCMSMAC=m
+CONFIG_BRCMSTB_GISB_ARB=y
+CONFIG_BRCMSTB_L2_IRQ=y
+CONFIG_BRCMSTB_PM=y
+CONFIG_BRCMSTB_THERMAL=m
+CONFIG_BRCMUTIL=m
+CONFIG_BRCM_TRACING=y
+CONFIG_BRIDGE=m
+CONFIG_BRIDGE_EBT_802_3=m
+CONFIG_BRIDGE_EBT_AMONG=m
+CONFIG_BRIDGE_EBT_ARP=m
+CONFIG_BRIDGE_EBT_ARPREPLY=m
+CONFIG_BRIDGE_EBT_BROUTE=m
+CONFIG_BRIDGE_EBT_DNAT=m
+CONFIG_BRIDGE_EBT_IP=m
+CONFIG_BRIDGE_EBT_IP6=m
+CONFIG_BRIDGE_EBT_LIMIT=m
+CONFIG_BRIDGE_EBT_LOG=m
+CONFIG_BRIDGE_EBT_MARK=m
+CONFIG_BRIDGE_EBT_MARK_T=m
+CONFIG_BRIDGE_EBT_NFLOG=m
+CONFIG_BRIDGE_EBT_PKTTYPE=m
+CONFIG_BRIDGE_EBT_REDIRECT=m
+CONFIG_BRIDGE_EBT_SNAT=m
+CONFIG_BRIDGE_EBT_STP=m
+CONFIG_BRIDGE_EBT_T_FILTER=m
+CONFIG_BRIDGE_EBT_T_NAT=m
+CONFIG_BRIDGE_EBT_VLAN=m
+CONFIG_BRIDGE_IGMP_SNOOPING=y
+CONFIG_BRIDGE_NETFILTER=m
+CONFIG_BRIDGE_NF_EBTABLES=m
+CONFIG_BRIDGE_VLAN_FILTERING=y
+CONFIG_BROADCAST_PHY=m
+CONFIG_BSD_PROCESS_ACCT=y
+CONFIG_BSD_PROCESS_ACCT_V3=y
+CONFIG_BT=m
+CONFIG_BTREE=y
+## CONFIG_BTRFS_ASSERT is not set
+## CONFIG_BTRFS_DEBUG is not set
+CONFIG_BTRFS_FS=m
+## CONFIG_BTRFS_FS_CHECK_INTEGRITY is not set
+CONFIG_BTRFS_FS_POSIX_ACL=y
+## CONFIG_BTRFS_FS_REF_VERIFY is not set
+## CONFIG_BTRFS_FS_RUN_SANITY_TESTS is not set
+CONFIG_BTT=y
+CONFIG_BT_6LOWPAN=m
+CONFIG_BT_ATH3K=m
+CONFIG_BT_BCM=m
+CONFIG_BT_BNEP=m
+CONFIG_BT_BNEP_MC_FILTER=y
+CONFIG_BT_BNEP_PROTO_FILTER=y
+CONFIG_BT_BREDR=y
+CONFIG_BT_CMTP=m
+CONFIG_BT_DEBUGFS=y
+CONFIG_BT_HCIBCM203X=m
+CONFIG_BT_HCIBFUSB=m
+CONFIG_BT_HCIBLEUECARD=m
+CONFIG_BT_HCIBPA10X=m
+CONFIG_BT_HCIBT3C=m
+CONFIG_BT_HCIBTSDIO=m
+CONFIG_BT_HCIBTUART=m
+CONFIG_BT_HCIBTUSB=m
+CONFIG_BT_HCIBTUSB_BCM=y
+CONFIG_BT_HCIBTUSB_RTL=y
+CONFIG_BT_HCIDTTL1=m
+CONFIG_BT_HCIUART=m
+CONFIG_BT_HCIUART_3WIRE=y
+CONFIG_BT_HCIUART_AG6XX=y
+CONFIG_BT_HCIUART_ATH3K=y
+CONFIG_BT_HCIUART_BCM=y
+CONFIG_BT_HCIUART_BCSP=y
+CONFIG_BT_HCIUART_H4=y
+CONFIG_BT_HCIUART_INTEL=y
+CONFIG_BT_HCIUART_LL=y
+CONFIG_BT_HCIUART_MRVL=y
+CONFIG_BT_HCIUART_NOKIA=m
+CONFIG_BT_HCIUART_QCA=y
+CONFIG_BT_HCIUART_SERDEV=y
+CONFIG_BT_HCIVHCI=m
+CONFIG_BT_HIDL=m
+# CONFIG_BT_HS is not set
+CONFIG_BT_INTEL=m
+CONFIG_BT_LE=y
+CONFIG_BT_LEDS=y
+CONFIG_BT_MRVL=m
+CONFIG_BT_MRVL_SDIO=m
+CONFIG_BT_QCA=m
+CONFIG_BT_QCOMSMD=m
+# CONFIG_BT_QCOMSMD_HACK is not set
+CONFIG_BT_RFCOMM=m
+CONFIG_BT_RFCOMM_TTY=y
+CONFIG_BT_RTL=m
+# CONFIG_BT_SELFTEST is not set
+CONFIG_BT_WILINK=m
+CONFIG_BUG=y
+# CONFIG_BUG_ON_DATA_CORRUPTION is not set
+CONFIG_BUILDTIME_EXTABLE_SORT=y
+CONFIG_BUILD_BIN2C=y
+CONFIG_C101=m
+CONFIG_C2PORT_DURAMAR_2150=m
+CONFIG_CACHEFILES=m
## CONFIG_CACHEFILES_DEBUG is not set
## CONFIG_CACHEFILES_HISTOGRAM is not set
+CONFIG_CACHE_FEROCEON_L2=y
## CONFIG_CACHE_FEROCEON_L2_WRITEBACK is not set
+CONFIG_CACHE_L2X0=y
+CONFIG_CACHE_L2X0_PMU=y
+CONFIG_CACHE_TAUROS2=y
+CONFIG_CACHE_UNIPHIER=y
## CONFIG CACHE_DEBUG is not set
+CONFIG_CAIF_HSI=m
+CONFIG_CAIF_NETDEV=m
+CONFIG_CAIF_SPI_SLAVE=m
## CONFIG_CAIF_SPI_SYNC is not set
+CONFIG_CAIF_TTY=m
+CONFIG_CAIF_USB=m
+CONFIG_CAIF_VIRTIO=m
+CONFIG_CALGARY_IOMMU=y
+CONFIG_CALGARY_IOMMU_ENABLED_BY_DEFAULT=y
+CONFIG_CAN_8DEV_USB=m
+CONFIG_CAN_BCM=m
+CONFIG_CAN_CALC_BITTIMING=y
+CONFIG_CAN_CC770=m
+CONFIG_CAN_CC770_ISA=m
+CONFIG_CAN_CC770_PLATFORM=m
+CONFIG_CAN_C_CAN=m
+CONFIG_CAN_C_CAN_PCI=m
+CONFIG_CAN_C_CAN_PLATFORM=m
## CONFIG_CAN_DEBUG_DEVICES is not set
+CONFIG_CAN_DEV=m
+CONFIG_CAN_EMS_PCI=m
+CONFIG_CAN_EMS_PCMCIA=m
+CONFIG_CAN_EMS_USB=m
+CONFIG_CAN_ESD_USB2=m
+CONFIG_CAN_FLEXCAN=m
+CONFIG_CAN_GRCAN=m
+CONFIG_CAN_GS_USB=m
+CONFIG_CAN_GW=m
+CONFIG_CAN_HI311X=m
+CONFIG_CAN_IFI_CANFD=m
+CONFIG_CAN_JANZ_ICAN3=m
+CONFIG_CAN_KVASER_PCI=m
+CONFIG_CAN_KVASER_USB=m
+CONFIG_CAN_LEDS=y
+CONFIG_CAN_MCBA_USB=m
+CONFIG_CAN_MCP251X=m
+CONFIG_CAN_MSCAN=m
+CONFIG_CAN_M_CAN=m
+CONFIG_CAN_PEAK_PCI=m
+CONFIG_CAN_PEAK_PCIEC=y
+CONFIG_CAN_PEAK_PCIEFD=m
+CONFIG_CAN_PEAK_PCMCIA=m
+CONFIG_CAN_PEAK_USB=m
+CONFIG_CAN_PLX_PCI=m
+CONFIG_CAN_RAW=m
+CONFIG_CAN_RCAR=m
+CONFIG_CAN_RCAR_CANFD=m
+CONFIG_CAN_SJA1000=m
+CONFIG_CAN_SJA1000_ISA=m
+CONFIG_CAN_SJA1000_PLATFORM=m
+CONFIG_CAN_SLCAN=m
+CONFIG_CAN_SOFTING=m
+CONFIG_CAN_SOFTING_CS=m
+CONFIG_CAN_TI_HECC=m
+CONFIG_CAN_TSCAN1=m
+CONFIG_CAN_VCAN=m
+CONFIG_CAN_VXCAN=m
+CONFIG_CAN_XILINXCAN=m
+CONFIG_CAPI_AVM=y
+CONFIG_CAPI_EICON=y
+CONFIG_CAPI_TRACE=y
+CONFIG_CARDBUS=y
+CONFIG_CARDMAN_4000=m
+CONFIG_CARDMAN_4040=m
+CONFIG_CARL9170=m
+# CONFIG_CARL9170_DEBUGFS is not set
+CONFIG_CARL9170_HWRNG=y
+CONFIG_CARL9170_LEDS=y
+CONFIG_CARL9170_WPC=y
+# CONFIG_CARMINE_DRAM_CUSTOM is not set
+CONFIG_CASSINI=m
+CONFIG_CAVIUM_CPT=m
+CONFIG_CAVIUM_ERRATUM_22375=y
+CONFIG_CAVIUM_ERRATUM_23144=y
+CONFIG_CAVIUM_ERRATUM_23154=y
+CONFIG_CAVIUM_ERRATUM_27456=y
+CONFIG_CAVIUM_ERRATUM_30115=y
+# CONFIG_CB710_DEBUG is not set
+CONFIG_CB710_DEBUG_ASSUMPTIONS=y
+CONFIG_CC10001_ADC=m
+CONFIG_CCS811=m
+CONFIG_CCW=y
+CONFIG_CCWGROUP=m
+CONFIG_CCW_CONSOLE=y
+CONFIG_CC_OPTIMIZE_FOR_PERFORMANCE=y
+CONFIG_CHARGER_BQ2415X=m
+CONFIG_CHARGER_BQ24190=m
+CONFIG_CHARGER_BQ24257=m
+CONFIG_CHARGER_BQ24735=m
+CONFIG_CHARGER_BQ25890=m
+CONFIG_CHARGER_CPCAP=m
+CONFIG_CHARGER_DA9150=m
+CONFIG_CHARGER_DETECTOR_MAX14656=m
+CONFIG_CHARGER_GPIO=m
+CONFIG_CHARGER_ISP1704=m
+CONFIG_CHARGER_LP8727=m
+CONFIG_CHARGER_LP8788=m
+CONFIG_CHARGER_LTC3651=m
+CONFIG_CHARGER_MANAGER=y
+CONFIG_CHARGER_MAX14577=m
+CONFIG_CHARGER_MAX77693=m
+CONFIG_CHARGER_MAX8903=m
+CONFIG_CHARGER_MAX8997=m
+CONFIG_CHARGER_MAX8998=m
+CONFIG_CHARGER_PCF50633=m
+CONFIG_CHARGER_QCOM_SMBB=m
+CONFIG_CHARGER_RT9455=m
+CONFIG_CHARGER_SBS=m
+CONFIG_CHARGER_SMB347=m
+CONFIG_CHARGER_TPS65090=m
+CONFIG_CHARGER_TPS65217=m
+CONFIG_CHARGER_TWL4030=m
+CONFIG_CHARLCD=m
+CONFIG_CHECKPOINT_RESTORE=y
+CONFIG_CHECK_SIGNATURE=y
+CONFIG_CHECK_STACK=y
+CONFIG_CHELSIO_LIB=m
+CONFIG_CHELSIO_T1=m
+CONFIG_CHELSIO_T1_1G=y
+CONFIG_CHELSIO_T3=m
+CONFIG_CHELSIO_T4=m
+CONFIG_CHELSIO_T4_VF=m
+CONFIG_CHELSIO_T4_DCB=y
+CONFIG_CHELSIO_T4_FCOE=y
+CONFIG_CHROMEOS_LAPTOP=m
+CONFIG_CHROMEOS_PSTORE=m
+CONFIG_CHROME_PLATFORMS=y
+CONFIG_chr_dev_osst=m
+CONFIG_chr_dev_sch=m
+CONFIG_chr_dev_sg=y
+CONFIG_chr_dev_st=m
+CONFIG_CHSC_SCH=m
+CONFIG_CICADA_phy=m
+CONFIG_CIFS=m
+CONFIG_CIFS_ACL=y
+CONFIG_CIFS_ALLOW_INSECURE_LEGACY=y
+CONFIG_CIFS_DEBUG=y
+CONFIG_CIFS_DEBUG2 is not set
+CONFIG_CIFS_DEBUG_DUMP_KEYS is not set
+CONFIG_CIFS_DFS_UPCALL=y
+CONFIG_CIFS_FSCACHE=y
+CONFIG_CIFS_POSIX=y
+CONFIG_CIFS_SMB311=y
+CONFIG_CIFS_STATS=y
+CONFIG_CIFS_STATS2 is not set
+CONFIG_CIFS_UPCALL=y
+CONFIG_CIFS_WEAK_PW_HASH=y
+CONFIG_CIFS_XATTR=y
+CONFIG_CIO_DAC=m
+CONFIG_CLEANCACHE=y
+CONFIG_CLKBLD_I8253=y
+CONFIG_CLKDEV_LOOKUP=y
+CONFIG_CLKEVENT_I8253=y
+CONFIG_CLKSRC_ARM_GLOBAL_TIMER_SCHED_CLOCK=y
+CONFIG_CLKSRC_EXYNOS_MCT=y
+CONFIG_CLKSRC_I8253=y
+CONFIG_CLKSRC_IMX_GPT=y
+CONFIG_CLKSRC_MMIO=y
+CONFIG_CLKSRC_QCOM=y
+CONFIG_CLKSRC_TI_32K=y
+CONFIG_CLKSRC_VERSATILE=y
+CONFIG_CLK_BCM_NS2=y
+CONFIG_CLK_BCM_SR=y
+CONFIG_CLK_EMEV2=y
+CONFIG_CLK_HSDK=y
+CONFIG_CLK_QORIQ=y
+CONFIG_CLK_R8A7740=y
+CONFIG_CLK_R8A7743=y
+CONFIG_CLK_R8A7745=y
+CONFIG_CLK_R8A7778=y
+CONFIG_CLK_R8A7779=y
+CONFIG_CLK_R8A7790=y
+CONFIG_CLK_R8A7791=y
+CONFIG_CLK_R8A7792=y
+CONFIG_CLK_R8A7794=y
+CONFIG_CLK_R8A7795=y
+CONFIG_CLK_R8A7796=y
+CONFIG_CLK_R8A77970=y
+CONFIG_CLK_R8A77995=y
+CONFIG_COMEDI_8255_PCI=m
+CONFIG_COMEDI_8255_SA=m
+CONFIG_COMEDI_ADDI_APCI_1032=m
+CONFIG_COMEDI_ADDI_APCI_1500=m
+CONFIG_COMEDI_ADDI_APCI_1516=m
+CONFIG_COMEDI_ADDI_APCI_1564=m
+CONFIG_COMEDI_ADDI_APCI_16XX=m
+CONFIG_COMEDI_ADDI_APCI_2032=m
+CONFIG_COMEDI_ADDI_APCI_2200=m
+CONFIG_COMEDI_ADDI_APCI_3120=m
+CONFIG_COMEDI_ADDI_APCI_3501=m
+CONFIG_COMEDI_ADDI_APCI_3XXX=m
+CONFIG_COMEDI_ADDI_WATCHDOG=m
+CONFIG_COMEDI_ADL_PCI6208=m
+CONFIG_COMEDI_ADL_PCI7X3X=m
+CONFIG_COMEDI_ADL_PCI8164=m
+CONFIG_COMEDI_ADL_PCI9111=m
+CONFIG_COMEDI_ADL_PCI9118=m
+CONFIG_COMEDI_ADQ12B=m
+CONFIG_COMEDI_ADV_PCI1710=m
+CONFIG_COMEDI_ADV_PCI1720=m
+CONFIG_COMEDI_ADV_PCI1723=m
+CONFIG_COMEDI_ADV_PCI1724=m
+CONFIG_COMEDI_ADV_PCI1760=m
+CONFIG_COMEDI_ADV_PCI_DIO=m
+CONFIG_COMEDI_AIO_AIO12_8=m
+CONFIG_COMEDI_AIO_IIRO_16=m
+CONFIG_COMEDI_AMPLC_DIO200=m
+CONFIG_COMEDI_AMPLC_DIO200 ISA=m
+CONFIG_COMEDI_AMPLC_DIO200_PCI=m
+CONFIG_COMEDI_AMPLC_PC236=m
+CONFIG_COMEDI_AMPLC_PC236 ISA=m
+CONFIG_COMEDI_AMPLC_PC236 PCI=m
+CONFIG_COMEDI_AMPLC_PC263 ISA=m
+CONFIG_COMEDI_AMPLC_PC263 PCI=m
+CONFIG_COMEDI_AMPLC_PCI224=m
+CONFIG_COMEDI_AMPLC_PCI230=m
+CONFIG_COMEDI_BOND=m
+CONFIG_COMEDI_C6XDIGIO=m
+CONFIG_COMEDI_CB_DAS16_CS=m
+CONFIG_COMEDI_CB_PCIDAS=m
+CONFIG_COMEDI_CB_PCIDAS64=m
+CONFIG_COMEDI_CB_PCIDDA=m
+CONFIG_COMEDI_CB_PCIMDAS=m
+CONFIG_COMEDI_CB_PCIMDDA=m
+CONFIG_COMEDI_CONTEC_PCI DIO=m
+CONFIG_COMEDI_DAC02=m
+CONFIG_COMEDI_DAQBOARD2000=m
+CONFIG_COMEDI_DAS08=m
+CONFIG_COMEDI_DAS08_CS=m
+CONFIG_COMEDI_DAS08_ISA=m
+CONFIG_COMEDI_DAS08_PCI=m
+CONFIG_COMEDI_DAS16=m
+CONFIG_COMEDI_DAS16M1=m
+CONFIG_COMEDI_DAS1800=m
+CONFIG_COMEDI_DAS6402=m
+CONFIG_COMEDI_DAS800=m
+# CONFIG_COMEDI_DEBUG is not set
+CONFIG_COMEDI_DEFAULT_BUF_MAXSIZE_KB=20480
+CONFIG_COMEDI_DEFAULT_BUF_SIZE_KB=2048
+CONFIG_COMEDI_DMM32AT=m
+CONFIG_COMEDI_DT2801=m
+CONFIG_COMEDI_DT2811=m
+CONFIG_COMEDI_DT2814=m
+CONFIG_COMEDI_DT2815=m
+CONFIG_COMEDI_DT2817=m
+CONFIG_COMEDI_DT282X=m
+CONFIG_COMEDI_DT3000=m
+CONFIG_COMEDI_DT9812=m
+CONFIG_COMEDI_DYNA_PCI10XX=m
+CONFIG_COMEDI_FL512=m
+CONFIG_COMEDI_GSC_HPDI=m
+CONFIG_COMEDI_ICP_MULTI=m
+CONFIG_COMEDI_I2_PCI20KC=m
+CONFIG_COMEDI_ISADMA=m
+CONFIG_COMEDI_ISA_DRIVERS=y
+CONFIG_COMEDI_JR3_PCI=m
+CONFIG_COMEDI_KCOMEDILIB=m
+CONFIG_COMEDI_KCOUNTER=m
+CONFIG_COMEDI_ME4000=m
+CONFIG_COMEDI_ME_DAQ=m
+CONFIG_COMEDI_MF6X4=m
+CONFIG_COMEDI_MISC_DRIVERS=y
+CONFIG_COMEDI_MITE=m
+CONFIG_COMEDI_MPC624=m
+CONFIG_COMEDI_MULTIQ3=m
+CONFIG_COMEDI_NI_6527=m
+CONFIG_COMEDI_NI_65XX=m
+CONFIG_COMEDI_NI_660X=m
+CONFIG_COMEDI_NI_670X=m
+CONFIG_COMEDI_NI_ATMIO=m
+CONFIG_COMEDI_NI_ATMIO16D=m
+CONFIG_COMEDI_NI_AT_A2150=m
+CONFIG_COMEDI_NI_AT_AO=m
+CONFIG_COMEDI_NI_DAQ_700_CS=m
+CONFIG_COMEDI_NI_DAQ_DIO24_CS=m
+CONFIG_COMEDI_NI_LABPC=m
+CONFIG_COMEDI_NI_LABPC_CS=m
+CONFIG_COMEDI_NI_LABPC_ISA=m
+CONFIG_COMEDI_NI_LABPC_ISADMA=m
+CONFIG_COMEDI_NI_LABPC_PCI=m
+CONFIG_COMEDI_NI_MIO_CS=m
+CONFIG_COMEDI_NI_PCI=m
+CONFIG_COMEDI_NI_PCIDIO=m
+CONFIG_COMEDI_NI_PCIMIO=m
+CONFIG_COMEDI_NI_TIO=m
+CONFIG_COMEDI_NI_TIOCMD=m
+CONFIG_COMEDI_NI_USB6501=m
+CONFIG_COMEDI_PARPORT=m
+CONFIG_COMEDI_PCI_DRIVERS=m
+CONFIG_COMEDI_PCL711=m
+CONFIG_COMEDI_PCL724=m
+CONFIG_COMEDI_PCL726=m
+CONFIG_COMEDI_PCL730=m
+CONFIG_COMEDI_PCL812=m
+CONFIG_COMEDI_PCL816=m
+CONFIG_COMEDI_PCL818=m
+CONFIG_COMEDI_PCM3724=m
+CONFIG_COMEDI_PCMAD=m
+CONFIG_COMEDI_PCMCIA_DRIVERS=m
+CONFIG_COMEDI_PCMDA12=m
+CONFIG_COMEDI_PCMMIO=m
+CONFIG_COMEDI_PCMUIO=m
+CONFIG_COMEDI_QUATECH_DAQP_CS=m
+CONFIG_COMEDI_RTD520=m
+CONFIG_COMEDI_KI800=m
+CONFIG_COMEDI_KI802=m
+CONFIG_COMEDI_S526=m
+CONFIG_COMEDI_S626=m
+CONFIG_COMEDI_SERIAL2002=m
+CONFIG_COMEDI_SSV_DNP=m
+CONFIG_COMEDI_TEST=m
+CONFIG_COMEDI_USBUX=m
+CONFIG_COMEDI_USBUXFAST=m
+CONFIG_COMEDI_USBUXSIGMA=m
+CONFIG_COMEDI_USB_DRIVERS=m
+CONFIG_COMEDI_VMK80XX=m
+CONFIG_COMMON_CLK=y
+CONFIG_COMMON_CLK_AMLOGIC=y
+CONFIG_COMMON_CLK_CDCE706=m
+CONFIG_COMMON_CLK_CDCE925=m
+CONFIG_COMMON_CLK_CS2000_CP=m
+CONFIG_COMMON_CLK_HI3516CV300=m
+CONFIG_COMMON_CLK_HI3519=m
+CONFIG_COMMON_CLK_HI3660=y
+CONFIG_COMMON_CLK_HI3798CV200=m
+CONFIG_COMMON_CLK_HI6220=y
+CONFIG_COMMON_CLK_HI655X=m
+CONFIG_COMMON_CLK_IPROC=y
+CONFIG_COMMON_CLK_MAX77686=m
+CONFIG_COMMON_CLK_MEDIATEK=y
+CONFIG_COMMON_CLK_MESON8B=y
+# CONFIG_COMMON_CLK_MT2701 is not set
+CONFIG_COMMON_CLK_MT2712=y
+CONFIG_COMMON_CLK_MT2712_BDPSYS=y
+CONFIG_COMMON_CLK_MT2712_IMGSYS=y
+CONFIG_COMMON_CLK_MT2712_JPGDECSYS=y
+CONFIG_COMMON_CLK_MT2712_MFGCFG=y
+CONFIG_COMMON_CLK_MT2712_MMSYS=y
+CONFIG_COMMON_CLK_MT2712_VDECSYS=y
+CONFIG_COMMON_CLK_MT2712_VENCSYS=y
+CONFIG_COMMON_CLK_MT6797=y
+CONFIG_COMMON_CLK_MT6797_IMGSYS=y
+CONFIG_COMMON_CLK_MT6797_MMSYS=y
+CONFIG_COMMON_CLK_MT6797_VDECSYS=y
+CONFIG_COMMON_CLK_MT6797_VENCSYS=y
+CONFIG_COMMON_CLK_MT7622=y
+CONFIG_COMMON_CLK_MT7622_AUDSYS=y
+CONFIG_COMMON_CLK_MT7622_ETHSYS=y
+CONFIG_COMMON_CLK_MT7622_HIFSYS=y
+CONFIG_COMMON_CLK_MT8135=y
+CONFIG_COMMON_CLK_MT8173=y
+# CONFIG_COMMON_CLK_NXP is not set
+CONFIG_COMMON_CLK_PALMAS=m
+# CONFIG_COMMON_CLK_PIC32 is not set
+CONFIG_COMMON_CLK_PWM=m
+# CONFIG_COMMON_CLK_PXA is not set
+CONFIG_COMMON_CLK_QCOM=m
+CONFIG_COMMON_CLK_RK808=m
+CONFIG_COMMON_CLK_S2MPS11=m
+CONFIG_COMMON_CLK_SAMSUNG=y
+CONFIG_COMMON_CLK_SCPI=m
+CONFIG_COMMON_CLK_SI514=m
+CONFIG_COMMON_CLK_SI5351=m
+CONFIG_COMMON_CLK_SI570=m
+CONFIG_COMMON_CLK_TI_ADPLL=y
+CONFIG_COMMON_CLK_VC5=m
+CONFIG_COMMON_CLK_VERSATILE=y
+CONFIG_COMMON_CLK_WM831X=m
+CONFIG_COMMON_CLK_XGENE=y
+# CONFIG_COMMON_CLK_XLNX_CLKWZRD is not set
+CONFIG_COMMON_RESET_HI3660=m
+CONFIG_COMMON_RESET_HI6220=m
+CONFIGCompraCtion=y
+CONFIGCompal_Laptop=m
+CONFIGCompat=y
+CONFIGCompat_32=y
+CONFIGCompat_BInfMT_ELF=y
+## CONFIGCompat_BrK is not set
+CONFIGCompat_For_U64_Alignment=y
+CONFIGCompat_NetLink_Messages=y
+CONFIGCompat_Old_Sigaction=y
+## CONFIGCompat_VDSO is not set
+## CONFIGCompile_Test is not set
+CONFIGConfigFS=y
+CONFIGConnector=y
+CONFIGConsole_Loglevel_Default=7
+CONFIGConsole_Poll=y
+CONFIGConsole_Translations=y
+CONFIGContext_Switch_Tracer=y
+CONFIGCOP5=m
+CONFIGCOPs_Dayna=y
+CONFIGCOPs_Tangent=y
+CONFIGCordova=m
+CONFIGCoredump=y
+## CONFIGCoresight is not set
+CONFIGCoreDump_Default_ELF_Headers=y
+CONFIGCortina_Phy=m
+CONFIGCOSA=m
+CONFIGCP15_BARRIER_EMULATION=y
+## CONFIGCPADebug is not set
+CONFIGCPCAP_ADC=m
+CONFIGCPU5_WDTh=m
+CONFIGCPUFreq_DT=y
+CONFIGCPUFreq_DT_Platform=y
+CONFIGCPUMask_Offstack=y
+CONFIGCPUSets=y
+CONFIGCPU32v6K=y
+CONFIGCPU32v7=y
+CONFIGCPU_ABORT_EV7=y
+## CONFIGCPU_BPredict_DISABLE is not set
+CONFIGCPU_CACHE_V7=y
+CONFIGCPU_CACHE_Vipt=y
+CONFIGCPU_COPY_V6=y
+CONFIGCPU_CP15=y
+CONFIGCPU_CP15_MMU=y
+CONFIGCPU_FREQ=y
+## CONFIGCPU_FREQ_DEFAULT_Gov_Conservative is not set
+## CONFIGCPU_FREQ_DEFAULT_Gov_Ondemand is not set
+## CONFIGCPU_FREQ_DEFAULT_Gov_Performance=y
+## CONFIGCPU_FREQ_DEFAULT_Gov_Powersave is not set
+## CONFIG_CPU_FREQ_DEFAULT_GOV_SCHEDUTIL is not set
+## CONFIG_CPU_FREQ_DEFAULT_GOV_USERSPACE is not set
+CONFIG_CPU_FREQ_GOV_ATTR_SET=y
+CONFIG_CPU_FREQ_GOV_COMMON=y
+CONFIG_CPU_FREQ_GOV_CONSERVATIVE=y
+CONFIG_CPU_FREQ_GOV_ONDEMAND=y
+CONFIG_CPU_FREQ_GOV_PERFORMANCE=y
+CONFIG_CPU_FREQ_GOV_POWERSAVE=y
+CONFIG_CPU_FREQ_GOV_SCHEDUTIL=y
+CONFIG_CPU_FREQ_GOV_USERSPACE=y
+CONFIG_CPU_FREQ_STAT=y
+CONFIG_CPU_HAS_ASID=y
+## CONFIG_CPU_HOTPLUG_STATE_CONTROL is not set
+## CONFIG_CPU_ICACHE_DISABLE is not set
+CONFIG_CPU_IDLE=y
+CONFIG_CPU_IDLE_GOV_LADDER=y
+CONFIG_CPU_IDLE_GOV_MENU=y
+CONFIG_CPU_IDLE_MULTIPLE_DRIVERS=y
+CONFIG_CPU_ISOLATION=y
+CONFIG_CPU_LITTLE_ENDIAN=y
+## CONFIG_CPU_NO_EFFICIENT_FFS is not set
+CONFIG_CPU_PABRT_V7=y
+CONFIG_CPU_PJ4=y
+CONFIG_CPU_PJ4B=y
+CONFIG_CPU_PM=y
+CONFIG_CPU_RMAP=y
+CONFIG_CPU_SPECTRE=y
+CONFIG_CPU_SUP_AMD=y
+CONFIG_CPU_SUP_CENTAUR=y
+CONFIG_CPU_SUP_CYRIX_32=y
+CONFIG_CPU_SUP_INTEL=y
+CONFIG_CPU_SUP_TRANSMETA_32=y
+CONFIG_CPU_SUP_UMC_32=y
+CONFIG_CPU_SW_DOMAIN_PAN=y
+CONFIG_CPU_THERMAL=y
+CONFIG_CPU_THUMB_CAPABLE=y
+CONFIG_CPU_TLB_V7=y
+CONFIG_CPU_V7=y
+CONFIG_CRAMFS_BLOCKDEV=y
+CONFIG_CRAMFS_MTD=y
+CONFIG_CRASH_COREx=y
+CONFIG_CRASH_DUMP=y
+CONFIG_CRC16=y
+CONFIG_CRC32=y
+## CONFIG_CRC32_BIT is not set
+## CONFIG_CRC32_SARWATE is not set
+## CONFIG_CRC32_SELFTEST is not set
+## CONFIG_CRC32_SLICEBY4 is not set
+CONFIG_CRC32_SLICEBY8=y
+CONFIG_CRC4=m
+CONFIG_CRC7=m
+CONFIG_CRC8=m
+CONFIG_CRC_CCITT=y
+CONFIG_CRC_ITU_T=m
+CONFIG_CROSS_COMPILE=""
+CONFIG_CROSS_MEMORY_ATTACH=y
+CONFIG_CROS_EC_CHARDEV=m
+CONFIG_CROS_EC_LPC=m
+CONFIG_CROS_EC_LPC_MEC=y
+CONFIG_CROS_EC_PROTO=y
+CONFIG_CROS_KBD_LED_BACKLIGHT=m
+CONFIG_CRYPTO=y
+CONFIG_CRYPTO_842=m
+CONFIG_CRYPTO_ABLK_HELPER=m
+CONFIG_CRYPTO_ACOMP2=y
+CONFIG_CRYPTO_AEAD=y
+CONFIG_CRYPTO_AEAD2=y
+CONFIG_CRYPTO_AES=y
+CONFIG_CRYPTO_AES_586=m
+CONFIG_CRYPTO_AES_ARM=m
+CONFIG_CRYPTO_AES_ARM64=m
+CONFIG_CRYPTO_AES_ARM64_BS=m
+CONFIG_CRYPTO_AES_ARM64_CE=m
+CONFIG_CRYPTO_AES_ARM64_CE_BLK=m
+CONFIG_CRYPTO_AES_ARM64_CE_CCM=m
+CONFIG_CRYPTO_AES_ARM64_NEON_BLK=m
+CONFIG_CRYPTO_AES_ARM_BS=m
+CONFIG_CRYPTO_AES_ARM_CE=m
+CONFIG_CRYPTO_AES_NI_INTEL=m
+CONFIG_CRYPTO_AES_S390=m
+CONFIG_CRYPTO_AES_TI=m
+CONFIG_CRYPTO_AES_X86_64=m
+CONFIG_CRYPTO_AKCIPHER=y
+CONFIG_CRYPTO_AKCIPHER2=y
+CONFIG_CRYPTO_ALGAPI=y
+CONFIG_CRYPTO_ALGAPI2=y
+CONFIG_CRYPTO_ANSI_CPRNG=m
+CONFIG_CRYPTO_ANUBIS=m
+CONFIG_CRYPTO_ARC4=m
+CONFIG_CRYPTO_AUTHENC=m
+CONFIG_CRYPTO_BLK_CIPHER=y
+CONFIG_CRYPTO_BLK_CIPHER2=y
+CONFIG_CRYPTO_BLOWFISH=m
+CONFIG_CRYPTO_BLOWFISH_COMMON=m
+CONFIG_CRYPTO_BLOWFISH_X86_64=m
+CONFIG_CRYPTO_CAMELLIA=m
+CONFIG_CRYPTO_CAMELLIA_AESNI_AVX2_X86_64=m
+CONFIG_CRYPTO_CAMELLIA_AESNI_AVX_X86_64=m
+CONFIG_CRYPTO_CAMELLIA_X86_64=m
+CONFIG_CRYPTO_CAST5=m
+CONFIG_CRYPTO_CAST5_AVX_X86_64=m
+CONFIG_CRYPTO_CAST6=m
+CONFIG_CRYPTO_CAST6_AVX_X86_64=m
+CONFIG_CRYPTO_CAST_COMMON=m
+CONFIG_CRYPTO_CBC=y
+CONFIG_CRYPTO_CCM=m
+CONFIG_CRYPTO_CHACHA20=m
+CONFIG_CRYPTO_CHACHA20POLY1305=m
+CONFIG_CRYPTO_CHACHA20_NEON=m
+CONFIG_CRYPTO_CHACHA20_X86_64=m
+CONFIG_CRYPTO_CMAC=m
+CONFIG_CRYPTO_CRC32=m
+CONFIG_CRYPTO_CRC32C=y
+CONFIG_CRYPTO_CRC32C_INTEL=y
+CONFIG_CRYPTO_CRC32C_VPMSUM=m
+CONFIG_CRYPTO_CRC32_ARM64_CE=m
+CONFIG_CRYPTO_CRC32_ARM_CE=m
+CONFIG_CRYPTO_CRC32_PCLMUL=m
+CONFIG_CRYPTO_CRC32_S390=m
+CONFIG_CRYPTO_CRCT10DIF=y
+CONFIG_CRYPTO_CRCT10DIF_ARM64_CE=m
+CONFIG_CRYPTO_CRCT10DIF_ARM_CE=m
+CONFIG_CRYPTO_CRCT10DIF_PCLMUL=m
+CONFIG_CRYPTO_CRCT10DIF_VPMSUM=m
+CONFIG_CRYPTO_CRYPTD=m
+CONFIG_CRYPTO_CTR=y
+CONFIG_CRYPTO_CTS=y
+CONFIG_CRYPTO_DEFLATE=m
+CONFIG_CRYPTO_DES=m
+CONFIG_CRYPTO_DES3_EDE_X86_64=m
+CONFIG_CRYPTO_DES_S390=m
+CONFIG_CRYPTO_DEV_ARTPEC6=m
+CONFIG_CRYPTO_DEV_BCM_SPU=m
+CONFIG_CRYPTO_DEV_CAVIUM_ZIP=m
+CONFIG_CRYPTO_DEV_CCP=y
+CONFIG_CRYPTO_DEV_CCP_CRYPTO=m
+CONFIG_CRYPTO_DEV_CCP_DD=m
+CONFIG_CRYPTO_DEV_CCREE=m
+CONFIG_CRYPTO_DEV_CHELSIO=m
+CONFIG_CRYPTO_DEV_CPT=m
+CONFIG_CRYPTO_DEV_EXYNOS_RNG=m
+CONFIG_CRYPTO_DEV_FSL_CAAM=m
+CONFIG_CRYPTO_DEV_FSL_CAAM_AHASH_API=m
+CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API=m
+CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API_QI=m
+# CONFIG_CRYPTO_DEV_FSL_CAAM_DEBUG is not set
+CONFIG_CRYPTO_DEV_FSL_CAAM_INTC=y
+CONFIG_CRYPTO_DEV_FSL_CAAM_INTC_COUNT_THLD=255
+CONFIG_CRYPTO_DEV_FSL_CAAM_INTC_TIME_THLD=2048
+CONFIG_CRYPTO_DEV_FSL_CAAM_JR=m
+CONFIG_CRYPTO_DEV_FSL_CAAM_PKC_API=m
+CONFIG_CRYPTO_DEV_FSL_CAAM_RINGSIZE=9
+CONFIG_CRYPTO_DEV_FSL_CAAM_RNG_API=m
+CONFIG_CRYPTO_DEV_GEODE=m
+CONFIG_CRYPTO_DEV_HIFN_795X=m
+CONFIG_CRYPTO_DEV_HIFN_795X_RNG=y
+CONFIG_CRYPTO_DEV_MARVELL_CESA=m
+CONFIG_CRYPTO_DEV_MEDIATEK=m
+CONFIG_CRYPTO_DEV_MXC_SCC=m
+# CONFIG_CRYPTO_DEV_MXS_DCP is not set
+CONFIG_CRYPTO_DEV_NITROX=m
+CONFIG_CRYPTO_DEV_NX=y
+CONFIG_CRYPTO_DEV_NX_COMPRESS=m
+CONFIG_CRYPTO_DEV_NX_COMPRESS_POWERNV=m
+CONFIG_CRYPTO_DEV_NX_COMPRESS_PSERIES=m
+CONFIG_CRYPTO_DEV_OMAP=m
+CONFIG_CRYPTO_DEV_OMAP_AES=m
+CONFIG_CRYPTO_DEV_OMAP_DES=m
+CONFIG_CRYPTO_DEV_OMAP_SHAM=m
+CONFIG_CRYPTO_DEV_PADLOCK=y
+CONFIG_CRYPTO_DEV_PADLOCK_AES=m
+CONFIG_CRYPTO_DEV_PADLOCK_SHA=m
+CONFIG_CRYPTO_DEV_QAT=m
+# CONFIG_CRYPTO_DEV_QAT_C3XXX is not set
+# CONFIG_CRYPTO_DEV_QAT_C3XXXVF is not set
+# CONFIG_CRYPTO_DEV_QAT_C62X is not set
+# CONFIG_CRYPTO_DEV_QAT_C62XVF is not set
+CONFIG_CRYPTO_DEV_QAT_DH895xCC=m
+CONFIG_CRYPTO_DEV_QAT_DH895xCCVF=m
+CONFIG_CRYPTO_DEV_QCE=m
+CONFIG_CRYPTO_DEV_ROCKCHIP=m
+CONFIG_CRYPTO_DEV_S5P=m
+CONFIG_CRYPTO_DEV_SAHARA=m
+CONFIG_CRYPTO_DEV_SP_CCP=y
+CONFIG_CRYPTO_DEV_VIRTIO=m
+CONFIG_CRYPTO_DEV_VMX=y
+CONFIG_CRYPTO_DEV_VMX_ENCRYPT=m
+CONFIG_CRYPTO_DH=y
+CONFIG_CRYPTO_DRBG=y
+CONFIG_CRYPTO_DRBG_CTR=y
+CONFIG_CRYPTO_DRBG_HASH=y
+CONFIG_CRYPTO_DRBG_HMAC=y
+CONFIG_CRYPTO_DRBG_MENU=y
+CONFIG_CRYPTO_ECB=y
+CONFIG_CRYPTO_ECDH=m
+CONFIG_CRYPTO_ECHAINIV=m
+CONFIG_CRYPTO_ENGINE=m
+CONFIG_CRYPTO_FCRYPT=m
+CONFIG_CRYPTO_GCM=y
+CONFIG_CRYPTO_GF128MUL=y
+CONFIG_CRYPTO_GHASH=y
+CONFIG_CRYPTO_GHASH_ARM64_CE=m
+CONFIG_CRYPTO_GHASH_ARM_CE=m
+CONFIG_CRYPTO_GHASH_CLMUL_NI_INTEL=m
+CONFIG_CRYPTO_GHASH_S390=m
+CONFIG_CRYPTO_GLUE_HELPER_X86=m
+CONFIG_CRYPTO_HASH=y
+CONFIG_CRYPTO_HASH2=y
+CONFIG_CRYPTO_HASH_INFO=y
+CONFIG_CRYPTO_HMAC=y
+CONFIG_CRYPTO_HW=y
+CONFIG_CRYPTO_JITTERENTROPY=y
+CONFIG_CRYPTO_KEYWRAP=m
+CONFIG_CRYPTO_KHAZAD=m
+CONFIG_CRYPTO_KPP=y
+CONFIG_CRYPTO_KPP2=y
+CONFIG_CRYPTO_LRW=m
+CONFIG_CRYPTO_LZ4=m
+CONFIG_CRYPTO_LZ4HC=m
+CONFIG_CRYPTO_LZO=y
+CONFIG_CRYPTO_MANAGER=m
+CONFIG_CRYPTO_MANAGER2=y
+CONFIG_CRYPTO_MANAGER_DISABLE_TESTS=y
+CONFIG_CRYPTO_MCRYPTD=m
+CONFIG_CRYPTO_MD4=m
+CONFIG_CRYPTO_MD5=y
+CONFIG_CRYPTO_MD5_PPC=m
+CONFIG_CRYPTO_MICHAEL_MIC=m
+CONFIG_CRYPTO_NULL=y
+CONFIG_CRYPTO_NULL2=y
+CONFIG_CRYPTO_PAES_S390=m
+CONFIG_CRYPTO_PCBC=m
+CONFIG_CRYPTO_PCRYPT=m
+CONFIG_CRYPTO_POLY1305=m
+CONFIG_CRYPTO_POLY1305_X86_64=m
+CONFIG_CRYPTO_RMD128=m
+CONFIG_CRYPTO_RMD160=m
+CONFIG_CRYPTO_RMD256=m
+CONFIG_CRYPTO_RMD320=m
+CONFIG_CRYPTO_USER=m
+CONFIG_CRYPTO_USER_API=m
+CONFIG_CRYPTO_USER_API_AEAD=m
+CONFIG_CRYPTO_USER_API_HASH=m
+CONFIG_CRYPTO_USER_API_RNG=m
+CONFIG_CRYPTO_USER_API_SKCIPHER=m
+CONFIG_CRYPTO_VMAC=m
+CONFIG_CRYPTO_VPMSUM_TESTER=m
+CONFIG_CRYPTO_WORKQUEUE=y
+CONFIG_CRYPTO_WP512=m
+CONFIG_CRYPTO_XCBC=m
+CONFIG_CRYPTO_XTS=y
+# CONFIG_CS5535_MFGPT is not set
+CONFIG_CS89x0=m
+CONFIG_CS89x0_PLATFORM=y
+CONFIG_CTCM=m
+CONFIG_CUSE=m
+CONFIG_CW1200=m
+CONFIG_CW1200_WLAN_SDIO=m
+CONFIG_CW1200_WLAN_SPI=m
+CONFIG_CXL=m
+CONFIG_CXLFLASH=m
+CONFIG_CXL_BIMODAL=y
+CONFIG_CX_ECAT=m
+CONFIG_CYCLADES=m
+CONFIG_CYPRESS_FIRMWARE=m
+# CONFIG_CYZ_INTR is not set
+CONFIG_DA280=m
+CONFIG_DA311=m
+CONFIG_DA9052_WATCHDOG=m
+CONFIG_DA9055_WATCHDOG=m
+CONFIG_DA9062_THERMAL=m
+CONFIG_DA9062_WATCHDOG=m
+CONFIG_DA9063_WATCHDOG=m
+CONFIG_DA9150_GPADC=m
+CONFIG_DASD=m
+CONFIG_DASD_DIAG=m
+CONFIG_DASD_ECKD=m
+CONFIG_DASD_EER=y
+CONFIG_DASD_FBA=m
+CONFIG_DASD_PROFILE=y
+CONFIG_DAVICOM_PHY=m
+CONFIG_DAX=y
+CONFIG_DCA=m
+CONFIG_DCACHE_WORD_ACCESS=y
+CONFIG_DCB=y
+CONFIG_DCDBAS=m
+CONFIG_DCSSBLK=m
+CONFIG_DDR=y
+CONFIG_DE2104X=m
+CONFIG_DE2104X_DSL=0
+CONFIG_DE4X5=m
+CONFIG_DEBUGGER=y
+# CONFIG_DEBUG_ATOMIC_SLEEP is not set
+# CONFIG_DEBUG_BLK_CGROUP is not set
+# CONFIG_DEBUG_BLOCK_EXT_DEVT is not set
+# CONFIG_DEBUG_BOOT_PARAMS is not set
+# CONFIG_DEBUG_BUGVERBOSE=y
+# CONFIG_DEBUG_CREDENTIALS is not set
+# CONFIG_DEBUG_DEVRES is not set
+# CONFIG_DEBUG_DRIVER is not set
+# CONFIG_DEBUG_EFI is not set
+# CONFIG_DEBUG_ENTRY is not set
+# CONFIG_DEBUG_FORCE_WEAK_PER_CPU is not set
+CONFIG_DEBUG_FS=y
+# CONFIG_DEBUG_GPIO is not set
+# CONFIG_DEBUG_HIGHMEM is not set
+# CONFIG_DEBUG_HOTPLUG_CPU0 is not set
+CONFIG_DEBUG_INFO=y
+CONFIG_DEBUG_INFO_DWARF4=y
+# CONFIG_DEBUG_INFO_REDUCED is not set
+# CONFIG_DEBUG_INFO_SPLIT is not set
+CONFIG_DEBUG_KERNEL=y
+# CONFIG_DEBUG_KERNEL_DC is not set
+# CONFIG_DEBUG_KMEMLEAK is not set
+# CONFIG_DEBUG_KOBJECT is not set
+# CONFIG_DEBUG_LIST is not set
+# CONFIG_DEBUG_LL is not set
+# CONFIG_DEBUG_LL_INCLUDE="mach/debug-macro.S"
+# CONFIG_DEBUG_LOCKING_API_SELFTESTS is not set
+# CONFIG_DEBUG_LOCK_ALLOC is not set
+# CONFIG_DEBUG_MEMORY_INIT is not set
+# CONFIG_DEBUG_MUTEXES is not set
+# CONFIG_DEBUG_NMI_SELFTEST is not set
+# CONFIG_DEBUG_NOTIFIERS is not set
+# CONFIG_DEBUG_OBJECTS is not set
+# CONFIG_DEBUG_PAGEALLOC is not set
+# CONFIG_DEBUG_PAGE_REF is not set
+# CONFIG_DEBUG_PERF_USE_VMALLOC is not set
+# CONFIG_DEBUG_PER_CPU_MAPS is not set
+# CONFIG_DEBUG_PINCTRL is not set
+# CONFIG_DEBUG_PL_LIST is not set
+# CONFIG_DEBUG_PREEMPT is not set
+# CONFIG_DEBUG_RODATA_TEST is not set
+# CONFIG_DEBUG_RT_MUTEXES is not set
+# CONFIG_DEBUG_SECTION_MISMATCH is not set
+# CONFIG_DEBUG_SG is not set
+# CONFIG_DEBUG_SHIRQ is not set
+# CONFIG_DEBUG_SPINLOCK is not set
+# CONFIG_DEBUG_STACKOVERFLOW is not set
+# CONFIG_DEBUG_STACK_USAGE is not set
+# CONFIG_DEBUG_TEST_DRIVER_REMOVE is not set
+# CONFIG_DEBUG_TIMEKEEPING is not set
+# CONFIG_DEBUG_TLBFLUSH is not set
+# CONFIG_DEBUG_UART_8250 is not set
+# CONFIG_DEBUG_USER is not set
+CONFIG_DEBUG_VF_UART_PORT=1
+# CONFIG_DEBUG_VIRTUAL is not set
+# CONFIG_DEBUG_WQ_FORCE_RR_CPU is not set
+# CONFIG_DEBUG_WW_MUTEX_SLOWPATH is not set
+CONFIG_DEBUG_WX=y
+CONFIG_DECNET_NF_GRABULATOR=m
+# CONFIG_DECNET_ROUTER is not set
+CONFIG_DECOMPRESS_BZIP2=y
+CONFIG_DECOMPRESS_GZIP=y
+CONFIG_DECOMPRESS_LZ4=y
+CONFIG_DECOMPRESS_LZMA=y
+CONFIG_DECOMPRESS_LZO=y
+CONFIG_DECOMPRESS_XZ=y
+CONFIG_DEFAULT CFQ=y
+CONFIG_DEFAULT_CUBIC=y
+# CONFIG_DEFAULT_DEADLINE is not set
+CONFIG_DEFAULT_HOSTNAME="(none)"
+CONFIG_DEFAULT_HUNG_TASK_TIMEOUT=120
+CONFIG_DEFAULT_IOSCHED="cfq"
+CONFIG_DEFAULT_IO_DELAY_TYPE=1
+# CONFIG_DEFAULT_NOOP is not set
+# CONFIG_DEFAULT_RENO is not set
+CONFIG_DEFAULT_SECURITY="apparmor"
+CONFIG_DEFAULT_SECURITY_APPARMOR=y
+CONFIG_DEFAULT_TCP_CONG="cubic"
+# CONFIG_DEFAULT_UIMAGE is not set
+CONFIG_DEFCONFIG_LIST="/lib/modules/$UNAME_RELEASE/.config"
+# CONFIG_DEFERRED_STRUCT_PAGE_INIT is not set
+CONFIG_DEFXX=m
+# CONFIG_DEFXX_MMIO is not set
+CONFIG_DELL_LAPTOP=m
+CONFIG_DELL_RBTN=m
+CONFIG_DELL_RBU=m
+CONFIG_DELL_SMBIOS=m
+CONFIG_DELL_SMBIOS_SMM=y
+CONFIG_DELL_SMBIOS_WMI=y
+CONFIG_DELL_SMO8800=m
+CONFIG_DELL_UART_BACKLIGHT=m
+CONFIG_DELL_WMI=m
+CONFIG_DELL_WMI_AIO=m
+CONFIG_DELL_WMI_DESCRIPTOR=m
+CONFIG_DELL_WMI_LED=m
+# CONFIG_DEPRECATED_PARAM_STRUCT is not set
+CONFIG_DETECT_HUNG_TASK=y
+CONFIG_DEVFREQ_EVENT_EXYNOS_NOCP=y
+CONFIG_DEVFREQ_EVENT_EXYNOS_PPMU=y
+CONFIG_DEVFREQ_EVENT_ROCKCHIP_DFI=m
+CONFIG_DEVFREQ_GOV_PASSIVE=y
+CONFIG_DEVFREQ_GOV_PERFORMANCE=y
+CONFIG_DEVFREQ_GOV_POWERSAVE=y
+CONFIG_DEVFREQ_GOV_SIMPLE_ONDEMAND=y
+CONFIG_DEVFREQ_GOV_USERSPACE=y
+CONFIG_DEVICE_THERMAL=y
+CONFIG_DEVICE_PRIVATE=y
+CONFIG_DEVICE_PUBLIC=y
+# CONFIG_DEVMEM is not set
+CONFIG_DEVMEM=y
+CONFIG_DEVPORT=y
+CONFIG_DEVTMPFS=y
+CONFIG_DEVTMPFS_MOUNT=y
+CONFIG_DEV_APPLETALK=m
+CONFIG_DEV_COREDUMP=y
+CONFIG_DEV_DAX=m
+CONFIG_DEV_DAX_PMEM=m
+CONFIG_DEV_AOC=y
+CONFIG_DGNC=m
+CONFIG_DHT11=m
+CONFIG_DIAG288_WATCHDOG=m
+CONFIG_DIMLIB=y
+# CONFIG_DISABLE_MPROFILE_KERNEL is not set
+CONFIG_DL2K=m
+CONFIG_DLCl=m
+CONFIG_DLCl_MAX=8
+CONFIG_DLM=m
+# CONFIG_DLM_DEBUG is not set
+CONFIG_DL2N2_ADC=m
+CONFIG_DM9000=m
+# CONFIG_DM9000_FORCE_SIMPLE_PHY_POLL is not set
+CONFIG_DM9102=m
+# CONFIG_DMADEVICES_DEBUG is not set
+CONFIG_DMARD06=m
+CONFIG_DMARD09=m
+CONFIG_DMARD10=m
+CONFIG_DMAR_TABLE=y
+# CONFIG_DMATEST is not set
+CONFIG_DMA_ACPI=y
+## CONFIG_DMA_API_DEBUG is not set
+CONFIG_DMA_BCM2835=y
+CONFIG_DMA_ENGINE=y
+CONFIG_DMA_ENGINE_RAID=y
+## CONFIG_DMA_FENCE_TRACE is not set
+CONFIG_DMA_OF=y
+CONFIG_DMA_OMAP=y
+CONFIG_DMA_SHARED_BUFFER=y
+CONFIG_DMA_SUN6i=m
+CONFIG_DMA_VIRT_OPS=y
+CONFIG_DMI=y
+CONFIG_DMIID=y
+CONFIG_DMI_SCAN_MACHINE_NON_EFI_FALLBACK=y
+CONFIG_DMI_SYSFS=m
+CONFIG_DM_BIO_PRISON=m
+CONFIG_DM_BUFIO=m
+CONFIG_DM_CACHE=m
+CONFIG_DM_CACHE_SMQ=m
+CONFIG_DM_CRYPT=m
+## CONFIG_DM_DEBUG_BLOCK_MANAGER_LOCKING is not set
+CONFIG_DM_DELAY=m
+CONFIG_DM_ERA=m
+CONFIG_DM_FLAKEx=m
+CONFIG_DM_INTEGRITY=m
+CONFIG_DM_LOG_USERSPACE=m
+CONFIG_DM_LOG_WRITES=m
+CONFIG_DM_MIRROR=m
+CONFIG_DM_MULTIPATH=m
+CONFIG_DM_MULTIPATH_QL=m
+CONFIG_DM_MULTIPATH_ST=m
+CONFIG_DM_PERSISTENT_DATA=m
+CONFIG_DM_RAID=m
+CONFIG_DM_SNAPSHOT=m
+CONFIG_DM_SWITCH=m
+CONFIG_DM_THIN_PROVISIONING=m
+CONFIG_DM_UEVENT=y
+CONFIG_DM_VERITY=m
+## CONFIG_DM_VERITY_FEC is not set
+CONFIG_DM_ZERO=m
+CONFIG_DM_ZONED=m
+CONFIG_DNOTIFY=y
+CONFIG_DNS_RESOLVER=y
+CONFIG_DONGLE=y
+CONFIG_DOUBLEFAULT=y
+CONFIG_DOVE_CLK=y
+CONFIG_DOVE_THERMAL=m
+CONFIG_DP83640_PHY=m
+CONFIG_DRM_LVDS_ENCODER=m
+CONFIG_DRM_MALI_DISPLAY=m
+CONFIG_DRM_MEDFIELD=y
+CONFIG_DRM_MEDIATEK=m
+CONFIG_DRM_MEDIATEK_HDMI=m
+CONFIG_DRM_MEGACHIPS_STDPPXXX_GE_B850V3_FW=m
+CONFIG_DRM_MESON=m
+CONFIG_DRM_MESON_TW_HDMI=m
+CONFIG_DRM_MGAG200=m
+CONFIG_DRM_MIPI_DSI=y
+CONFIG_DRM_MSM=m
+CONFIG_DRM_MSM_DSI=y
+CONFIG_DRM_MSM_DSI_14NM_PHY=y
+CONFIG_DRM_MSM_DSI_20NM_PHY=y
+CONFIG_DRM_MSM_DSI_28NM_8960_PHY=y
+CONFIG_DRM_MSM_DSI_28NM_PHY=y
+CONFIG_DRM_MSM_DSI_PLL=y
+CONFIG_DRM_MSM_HDMI_HDCP=y
+# CONFIG_DRM_MSM_REGISTER_LOGGING is not set
+CONFIG_DRM_MXS=y
+CONFIG_DRM_MXSFB=m
+CONFIG_DRM_NOUVEAU=m
+CONFIG_DRM_NOUVEAU_BACKLIGHT=y
+CONFIG_DRM_NXP_PTN3460=m
+# CONFIG_DRM_OMAP is not set
+CONFIG_DRM_PANEL=y
+CONFIG_DRM_PANEL_BRIDGE=y
+CONFIG_DRM_PANEL_INNOLUX_P079ZCA=m
+CONFIG_DRM_PANEL_JDI_LT070ME05000=m
+CONFIG_DRM_PANEL_LG_LG4573=m
+CONFIG_DRM_PANEL_LVDS=m
+CONFIG_DRM_PANEL_ORISETECH_OTM8009A=m
+CONFIG_DRM_PANEL_PANASONIC_VVX10F034N00=m
+CONFIG_DRM_PANEL_RASPBERRY.PI TOUCHSCREEN=m
+CONFIG_DRM_PANEL_SAMSUNG_LD9040=m
+CONFIG_DRM_PANEL_SAMSUNG_S6E3HA2=m
+CONFIG_DRM_PANEL_SAMSUNG_S6E63J0X03=m
+CONFIG_DRM_PANEL_SAMSUNG_S6E8AA0=m
+CONFIG_DRM_PANEL_SEIKO_43WVF1G=m
+CONFIG_DRM_PANEL_SHARP_LQ101R1SX01=m
+CONFIG_DRM_PANEL_SHARP_LS043T1LE01=m
+CONFIG_DRM_PANEL_SIMPLE=m
+CONFIG_DRM_PANEL_SIMTRONIX_ST7789V=m
+CONFIG_DRM_PARADE_PS8622=m
+CONFIG_DRM_PLL111=m
+CONFIG_DRM_QXL=m
+CONFIG_DRM_RADEON=m
+# CONFIG_DRM_RADEON_USERPTR is not set
+CONFIG_DRM_RCAR_DU = m
+CONFIG_DRM_RCAR_DW_HDMI = m
+CONFIG_DRM_RCAR_LVDS = y
+CONFIG_DRM_RCAR_VSP = y
+CONFIG_DRM_ROCKCHIP = m
+CONFIG_DRM_SHMOBILE = m
+CONFIG_DRM_SII902X = m
+CONFIG_DRM_SII9234 = m
+CONFIG_DRM_SIL_SI18620 = m
+# CONFIG_DRM_STI is not set
+CONFIG_DRM_STM = m
+CONFIG_DRM_STM_DSI = m
+CONFIG_DRM_TEGRA = m
+# CONFIG_DRM_TEGRA_DEBUG is not set
+CONFIG_DRM_TEGRA_STAGING = y
+CONFIG_DRM_TILCDC = m
+CONFIG_DRM_TINYDRM = m
+CONFIG_DRM_TLI_TFP410 = m
+CONFIG_DRM_TOSHIBA_TC358767 = m
+CONFIG_DRM_TTM = m
+CONFIG_DRM_TVE200 = m
+CONFIG_DRM_UDL = m
+CONFIG_DRM_VBOXVIDEO = m
+CONFIG_DRM_VC4 = m
+CONFIG_DRM_VC4_HDMI_CEC = y
+CONFIG_DRM_VGEM = m
+CONFIG_DRM_VIRTIO_GPU = m
+CONFIG_DRM_VM = y
+CONFIG_DRM_VMWGFX = m
+CONFIG_DRM_VMWGFX_FBCON = y
+CONFIG_DS1682 = m
+CONFIG_DS1803 = m
+CONFIG_DS4424 = m
+CONFIG_DSCC4 = m
+CONFIG_DS_C4_PCI_SYNC = y
+CONFIG_DS_C4_PCI_RST = y
+CONFIG_DST_CACHE = y
+CONFIG_DTC = y
+CONFIG_DTL = y
+CONFIG_DTLK = m
+CONFIG_DT_IDLE_STATES = y
+CONFIG_DUMMY = m
+CONFIG_DUMMY_CONSOLE = y
+CONFIG_DUMMY_CONSOLE_COLUMNS = 80
+CONFIG_DUMMY_CONSOLE_ROWS = 25
+CONFIG_DVB_A8293 = m
+CONFIG_DVB_AF9013 = m
+CONFIG_DVB_AF9033 = m
+CONFIG_DVB_AS102=m
+CONFIG_DVB_AS102_FE=m
+CONFIG_DVB_ASCOT2E=m
+CONFIG_DVB_ATBM8830=m
+CONFIG_DVB_AU8522=m
+CONFIG_DVB_AU8522_DTV=m
+CONFIG_DVB_AU8522_V4L=m
+CONFIG_DVB_AV7110=m
+CONFIG_DVB_AV7110_IR=y
+CONFIG_DVB_AV7110_OSD=y
+CONFIG_DVB_B2C2_FLEXCOP=m
+CONFIG_DVB_B2C2_FLEXCOP_PCI=m
+# CONFIG_DVB_B2C2_FLEXCOP_PCI_DEBUG is not set
+CONFIG_DVB_B2C2_FLEXCOP_USB=m
+# CONFIG_DVB_B2C2_FLEXCOP_USB_DEBUG is not set
+CONFIG_DVB_BCM3510=m
+CONFIG_DVB_BT8XX=m
+CONFIG_DVB_BUDGET=m
+CONFIG_DVB_BUDGET_AV=m
+CONFIG_DVB_BUDGET_CI=m
+CONFIG_DVB_BUDGET_CORE=m
+CONFIG_DVB_BUDGET_PATCH=m
+# CONFIG_DVB_C8SECTPFE is not set
+CONFIG_DVB_CORE=m
+CONFIG_DVB_CX22700=m
+CONFIG_DVB_CX22702=m
+CONFIG_DVB_CX24110=m
+CONFIG_DVB_CX24116=m
+CONFIG_DVB_CX24117=m
+CONFIG_DVB_CX24120=m
+CONFIG_DVB_CX24123=m
+CONFIG_DVB_CXD2099=m
+CONFIG_DVB_CXD2820R=m
+CONFIG_DVB_CXD2841ER=m
+CONFIG_DVB_DDBRIDGE=m
+# CONFIG_DVB_DDBRIDGE_MSIENABLE is not set
+# CONFIG_DVB_DEMUX_SECTION_LOSS_LOG is not set
+CONFIG_DVB_DIB3000MB=m
+CONFIG_DVB_DIB3000MC=m
+CONFIG_DVB_DIB7000M=m
+CONFIG_DVB_DIB7000P=m
+CONFIG_DVB_DIB8000=m
+CONFIG_DVB_DM1105=m
+CONFIG_DVB_DRX39XYJ=m
+CONFIG_DVB_DRXD=m
+CONFIG_DVB_DRXK=m
+CONFIG_DVB_DS3000=m
+# CONFIG_DVB_DUMMY_FE is not set
+CONFIG_DVB_DYNAMIC_MINORS=y
+CONFIG_DVB_EC100=m
+CONFIG_DVB_FIREDTV=m
+CONFIG_DVB_FIREDTV_INPUT=y
+CONFIG_DVB_GP8PSK_FE=m
+CONFIG_DVB_HELENE=m
+CONFIG_DVB_HOPPER=m
+CONFIG_DVB_HORUS3A=m
+CONFIG_DVB_ISL6405=m
+CONFIG_DVB_ISL6421=m
+CONFIG_DVB_ISL6423=m
+CONFIG_DVB_IIX2505V=m
+CONFIG_DVB_L64781=m
+CONFIG_DVB_LG2160=m
+CONFIG_DVB_LGDT3305=m
+CONFIG_DVB_LGDT3306A=m
+CONFIG_DVB_LGDT330X=m
+CONFIG_DVB_LGS8GXX=m
+CONFIG_DVB_LNBH25=m
+CONFIG_DVB_LNPB21=m
+CONFIG_DVB_LNPB22=m
+CONFIG_DVB_M88DS3103=m
+CONFIG_DVB_M88RS2000=m
+CONFIG_DVB_MANTIS=m
+CONFIG_DVB_MAX_ADAPTERS=8
+CONFIG_DVB_MB86A16=m
+CONFIG_DVB_MB86A20S=m
+CONFIG_DVB_MN88472=m
+CONFIG_DVB_MN88473=m
+CONFIG_DVB_MT312=m
+CONFIG_DVB_MT352=m
+CONFIG_DVB_MXL5XX=m
+CONFIG_DVB_NET=y
+CONFIG_DVB_NETUP_UNIDVB=m
+CONFIG_DVB_NGENE=m
+CONFIG_DVB_NXT200X=m
+CONFIG_DVB_NXT6000=m
+CONFIG_DVB_OR51132=m
+CONFIG_DVB_OR51211=m
+CONFIG_DVB_PLATFORM_DRIVERS=y
+CONFIG_DVB_PLL=m
+CONFIG_DVB_PLUTO2=m
+CONFIG_DVB_PT1=m
+CONFIG_DVB_PT3=m
+CONFIG_DVB_RTL2830=m
+CONFIG_DVB_RTL2832=m
+CONFIG_DVB_RTL2832_SDR=m
+CONFIG_DVB_SH1409=m
+CONFIG_DVB_USB_AF9035=m
+CONFIG_DVB_USB_ANYSEE=m
+CONFIG_DVB_USB_AU6610=m
+CONFIG_DVB_USB_AZ6007=m
+CONFIG_DVB_USB_AZ6027=m
+CONFIG_DVB_USB_CE6230=m
+CONFIG_DVB_USB_CINERGY_T2=m
+CONFIG_DVB_USB_CXUSB=m
+# CONFIG_DVB_USB_DEBUG is not set
+CONFIG_DVB_USB_DIB0700=m
+CONFIG_DVB_USB_DIB3000MC=m
+CONFIG_DVB_USB_DIBUSB_MB=m
+# CONFIG_DVB_USB_DIBUSB_MB_FAULTY is not set
+CONFIG_DVB_USB_DIBUSB_MC=m
+CONFIG_DVB_USB_DIGITY=m
+CONFIG_DVB_USB_DTT200U=m
+CONFIG_DVB_USB_DTV5100=m
+CONFIG_DVB_USB_DVBSKY=m
+CONFIG_DVB_USB_ECM21102=m
+CONFIG_DVB_USB_EC168=m
+CONFIG_DVB_USB_FRIIO=m
+CONFIG_DVB_USB_GL861=m
+CONFIG_DVB_USB_GP8PSK=m
+CONFIG_DVB_USB_LME2510=m
+CONFIG_DVB_USB_M920X=m
+CONFIG_DVB_USB_MXL111SF=m
+CONFIG_DVB_USB_NOVA_T_USB2=m
+CONFIG_DVB_USB_OPERA1=m
+CONFIG_DVB_USB_PCTV452E=m
+CONFIG_DVB_USB_RTL28XXU=m
+CONFIG_DVB_USB_TECHNISAT_USB2=m
+CONFIG_DVB_USB_TTUSB2=m
+CONFIG_DVB_USB_UPT_010=m
+CONFIG_DVB_USB_V2=m
+CONFIG_DVB_USB_VP702X=m
+CONFIG_DVB_USB_VP7045=m
+CONFIG_DVB_USB_ZD1301=m
+CONFIG_DVB_VES1820=m
+CONFIG_DVB_VES1X93=m
+CONFIG_DVB_ZD1301_DEMOD=m
+CONFIG_DVB_ZL10036=m
+CONFIG_DVB_ZL10039=m
+CONFIG_DVB_ZL10353=m
+CONFIG_DWC_XLGMAC=m
+CONFIG_DWC_XLGMAC_PCI=m
+CONFIG_DWMAC_DWC_QOS_ETH=m
+CONFIG_DWMAC_GENERIC=m
+CONFIG_DWMAC_IPQ806X=m
+CONFIG_EISA_VLB_PRIMING=y
+CONFIG_EL3=m
+CONFIG_ELF_CORE=y
+CONFIG_EMAC_ROCKCHIP=m
+# CONFIG_EMBEDDED is not set
+CONFIG_EMU_SIZE=0x10000000
+# CONFIG_ENABLE_MUST_CHECK is not set
+# CONFIG_ENABLE_WARN_DEPRECATED is not set
+CONFIG_ENAETHERNET=m
+CONFIG_ENC28J60=m
+# CONFIG_ENC28J60_WRITEVERIFY is not set
+CONFIG_ENCRYPTED_KEYS=y
+CONFIG_ENCX24J600=m
+CONFIG_ENIC=m
+CONFIG_ENVELOPEDETECTOR=m
+CONFIG_EPAPR_BOOT=y
+CONFIG_EPAPR_PARAVIRT=y
+CONFIG_EPIC100=m
+CONFIG_EPOLL=y
+CONFIG_EQUALIZER=m
+CONFIG_ESI_DONGLE=m
+CONFIG_ET131X=m
+CONFIG_Ethernet=y
+CONFIG_EUROTECH_WDT=m
+CONFIG_EVENTFD=y
+CONFIG_EVENTTRACING=y
+CONFIG_EVM=y
+CONFIG_EVM_ATTR_FSUUID=y
+CONFIG_EVM_EXTRA_SMACKXATTRS=y
+CONFIG_EVM_X509_PATH="/etc/keys/x509_evm.der"
+# CONFIG_EXOFS_DEBUG is not set
+CONFIG_EXPERT=y
+CONFIG_EXPOLINE=y
+CONFIG_EXPOLINE_AUTO=y
+# CONFIG_EXPOLINE_FULL is not set
+# CONFIG_EXPOLINE_OFF is not set
+CONFIG_EXPORTFS=y
+CONFIG_EXPORTFS_BLOCK_OPS=y
+# CONFIG_EXT2_FS is not set
+# CONFIG_EXT3_FS is not set
+# CONFIG_EXT4_DEBUG is not set
+CONFIG_EXT4_ENCRYPTION=y
+CONFIG_EXT4_FS=y
+CONFIG_EXT4_FS_ENCRYPTION=y
+CONFIG_EXT4_FS_POSIX_ACL=y
+CONFIG_EXT4_FS_SECURITY=y
+CONFIG_EXT4_USE_FOR_EXT2=y
+CONFIG_EXTCON_ADC_JACK=m
+CONFIG_EXTCON_ARIZONA=m
+CONFIG_EXTCON_AXP288=m
+CONFIG_EXTCON_GPIO=m
+CONFIG_EXTCON_INTEL_CHT_WC=m
+CONFIG_EXTCON_INTEL_INT3496=m
+CONFIG_EXTCON_MAX14577=m
+CONFIG_EXTCON_MAX3355=m
+CONFIG_EXTCON_MAX77693=m
+CONFIG_EXTCON_MAX77843=m
+CONFIG_EXTCON_MAX8997=m
+CONFIG_EXTCON_PALMAS=m
+CONFIG_EXTCON_QCOM_SPMI_MISC=m
+CONFIG_EXTCON_RT8973A=m
+CONFIG_EXTCON_SM5502=m
+CONFIG_EXTCON_USB_CROS_EC=m
+CONFIG_EXTCON_USB_GPIO=m
+CONFIG_EXTRA_FIRMWARE=""
+CONFIG_EXTRA_TARGETS=""
+CONFIG_EXYNOS5420_MCPM=y
+CONFIG_EXYNOS_ADC=m
+CONFIG_EXYNOS_AUDSS_CLK_CON=m
+CONFIG_EXYNOS_CPU_SUSPEND=y
+CONFIG_EXYNOS_IOMMU=y
+CONFIG_EXYNOS_IOMMU_DEBUG is not set
+CONFIG_EXYNOS_PMU=y
+CONFIG_EXYNOS_PMU_ARM_DRIVERS=y
+CONFIG_EXYNOS_PM_DOMAINS=y
+CONFIG_EXYNOS_SROM=y
+CONFIG_EXYNOS_THERMAL=y
+CONFIG_EZCHIP_NPS_MANAGEMENT_ENET=m
+CONFIG_EZX_PCAP=y
+CONFIG_F2FS_CHECK_FS is not set
+CONFIG_F2FS_FAULT_INJECTION is not set
+CONFIG_F2FS_FS_ENCRYPTION=y
+CONFIG_F2FS_FS_POSIX_ACL=y
+CONFIG_F2FS_FS_SECURITY=y
+CONFIG_F2FS_FS_XATTR=y
+CONFIG_F2FS_IO_TRACE is not set
+CONFIG_F2FS_STAT_FS=y
+CONFIG_F71808E_WDT=m
+CONFIG_FAIR_GROUP_SCHED=y
+CONFIG_FANOTIFY=y
+CONFIG_FANOTIFY_ACCESS_PERMISSIONS=y
+CONFIG_FARSYNC=m
+CONFIG_FAT_DEFAULT_CODEPAGE=437
+CONFIG_FAT_DEFAULT_IOCHARSET="iso8859-1"
+CONFIG_FAT_DEFAULT_UTF8 is not set
+CONFIG_FAT_FS=y
+## CONFIG_FAULT_INJECTION is not set
+CONFIG_FA_DUMP=y
+CONFIG_FB_3DFX=m
+## CONFIG_FB_3DFX_ACCEL is not set
+## CONFIG_FB_3DFX_I2C is not set
+CONFIG_FB_ARC=m
+CONFIG_FB_ARK=m
+CONFIG_FB_ARMCLLCD=y
+CONFIG_FB_ASILIANT=y
+CONFIG_FB_ATY=m
+CONFIG_FB_ATY128=m
+CONFIG_FB_ATY128_BACKLIGHT=y
+CONFIG_FB_ATY_BACKLIGHT=y
+CONFIG_FB_ATY_CT=y
+## CONFIG_FB_ATY_GENERIC_LCD is not set
+CONFIG_FB_ATY_GX=y
+CONFIG_FB_AUO_K1900=m
+CONFIG_FB_AUO_K1901=m
+CONFIG_FB_AUO_K190X=m
+CONFIG_FB_BACKLIGHT=y
+CONFIG_FB_BROADSHEET=m
+CONFIG_FB_CARILLO_RANCH=m
+CONFIG_FB_CARMINE=m
+CONFIG_FB_CARMINE_DRAM_EVAL=y
+CONFIG_FB_CFB_COPYAREA=y
+CONFIG_FB_CFB_FILLRECT=y
+CONFIG_FB_CFB_IMAGEBLIT=y
+CONFIG_FB_CIRRUS=m
+CONFIG_FB_CMDLINE=y
+CONFIG_FB_CYBER2000=m
+CONFIG_FB_CYBER2000_DDC=y
+CONFIG_FB_DA8XX=m
+CONFIG_FB_DDC=m
+CONFIG_FB_DEFERRED_IO=y
+CONFIG_FB_EFI=y
+CONFIG_FB_FLEX=m
+## CONFIG_FB_FOREIGN_ENDIAN is not set
+CONFIG_FB_GEODE=y
+CONFIG_FB_GEODE_GX=m
+CONFIG_FB_GEODE_GX1=m
+CONFIG_FB_GEODE_LX=m
+CONFIG_FB_HECUBA=m
+CONFIG_FB_HGA=m
+CONFIG_FB_HYPERV=m
+CONFIG_FB_I740=m
+CONFIG_FB_I810=m
+## CONFIG_FB_I810_GTF is not set
+CONFIG_FB_IMSTT=y
+CONFIG_FB_IMX=m
+CONFIG_FB_INTEL=m
+# CONFIG_FB_INTEL_DEBUG is not set
+CONFIG_FB_INTEL_I2C=y
+CONFIG_FB_KYRO=m
+CONFIG_FB_LE80578=m
+CONFIG_FB_MATROX=m
+CONFIG_FB_MATROX_G=y
+CONFIG_FB_MATROX_I2C=m
+CONFIG_FB_MATROX_MAVER=m
+CONFIG_FB_MATROX_MILLENIUM=y
+CONFIG_FB_MATROX_SIMIQUE=y
+CONFIG_FB_MB862XX=m
+CONFIG_FB_MB862XX_I2C=y
+# CONFIG_FB_MB862XX_LIME is not set
+CONFIG_FB_MB862XX_PCI_GDC=y
+CONFIG_FB_METRONOME=m
+CONFIG_FB_MODE_HELPER=m
+CONFIG_FB_MX3=m
+CONFIG_FB_MXS=m
+CONFIG_FB_N4111=m
+CONFIG_FB_NEOMAGIC=m
+CONFIG_FB_NOTIFY=y
+CONFIG_FB_NVIDIA=m
+CONFIG_FB_NVIDIA_BACKLIGHT=y
+# CONFIG_FB_NVIDIA_DEBUG is not set
+CONFIG_FB_NVIDIA_I2C=y
+CONFIG_FB_OF=y
+CONFIG_FB_OMAP2=m
+# CONFIG_FB_OMAP2_CONNECTOR_ANALOG_TV is not set
+# CONFIG_FB_OMAP2_CONNECTOR_DVI is not set
+# CONFIG_FB_OMAP2_CONNECTOR_HDMI is not set
+# CONFIG_FB_OMAP2_DEBUG_SUPPORT is not set
+CONFIG_FB_OMAP2_DSS=m
+# CONFIG_FB_OMAP2_DSS_DEBUG is not set
+# CONFIG_FB_OMAP2_DSS_DEBUGFS is not set
+CONFIG_FB_OMAP2_DSS_DPI=y
+# CONFIG_FB_OMAP2_DSS_DSI is not set
+CONFIG_FB_OMAP2_DSS_HDMI_COMMON=y
+CONFIG_FB_OMAP2_DSS_INIT=y
+CONFIG_FB_OMAP2_DSS_MIN_FCK_PER_PCK=0
+# CONFIG_FB_OMAP2_DSS_SDI is not set
+CONFIG_FB_OMAP2_DSS_SLEEP_AFTER_RESET=y
+CONFIG_FB_OMAP2_DSS_VENC=y
+# CONFIG_FB_OMAP2_ENCODER_OPA362 is not set
+# CONFIG_FB_OMAP2_ENCODER_TFP410 is not set
+# CONFIG_FB_OMAP2_ENCODER_TPD12S015 is not set
+CONFIG_FB_OMAP2_NUM_FBS=3
+# CONFIG_FB_OMAP2_PANEL_DPI is not set
+# CONFIG_FB_OMAP2_PANEL_DSI_CM is not set
+# CONFIG_FB_OMAP2_PANEL_LGPHILIPS_LB035Q02 is not set
+# CONFIG_FB_OMAP2_PANEL_NEC_NL8048HL11 is not set
+# CONFIG_FB_OMAP2_PANEL_SHARP_LS037V7DW01 is not set
+# CONFIG_FB_OMAP2_PANEL_SONY_ACX565AKM is not set
+# CONFIG_FB_OMAP2_PANEL_TPO_TD028TTEC1 is not set
+# CONFIG_FB_OMAP2_PANEL_TPO_TD043MTEA1 is not set
+CONFIG_FB_OMAP4_DSS_HDMI=y
+# CONFIG_FB_OMAP5_DSS_HDMI is not set
+CONFIG_FB_OPENCORES=m
+CONFIG_FB_PM2=m
+CONFIG_FB_PM2_FIFO_DISCONNECT=y
+CONFIG_FB_PM3=m
+CONFIG_FB_RADEON=m
+CONFIG_FB_RADEON_BACKLIGHT=y
+# CONFIG_FB_RADEON_DEBUG is not set
+CONFIG_FB_RADEON_I2C=y
+CONFIG_FB_RIVA=m
+CONFIG_FB_RIVA_BACKLIGHT=y
+# CONFIG_FB_RIVA_DEBUG is not set
+CONFIG_FB_RIVA_I2C=y
+CONFIG_FB_S1D13XXX=m
+CONFIG_FB_S3=m
+CONFIG_FB_S3C=m
+# CONFIG_FB_S3C_DEBUG_REGWRITE is not set
+CONFIG_FB_S3_DDC=y
+CONFIG_FB_SAVAGE=m
+# CONFIG_FB_SAVAGE_ACCEL is not set
+CONFIG_FB_SAVAGE_I2C=y
+CONFIG_FB_SH_MOBILE_LCDC=m
+CONFIG_FB_SH_MOBILE_MERAM=m
+CONFIG_FB_SIMPLE=y
+CONFIG_FB_SIS=m
+CONFIG_FB_SIS_300=y
+CONFIG_FB_SIS_315=y
+CONFIG_FB_SM501=m
+CONFIG_FB_SM712=m
+CONFIG_FB_SM750=m
+CONFIG_FB_SMSCUFX=m
+CONFIG_FB_SSD1307=m
+CONFIG_FB_SVGA=m
+CONFIG_FB_SYS_COPYAREA=m
+CONFIG_FB_SYS_FILLRECT=m
+CONFIG_FB_SYS_FOPS=m
+CONFIG_FB_SYS_IMAGEBLIT=m
+CONFIG_FB_TFT=m
+CONFIG_FB_TFT_AGM1264K_FL=m
+CONFIG_FB_TFT_BD663474=m
+CONFIG_FB_TFT_FBTFT_DEVICE=m
+CONFIG_FB_TFT_HX8340BN=m
+CONFIG_FB_TFT_HX8347D=m
+CONFIG_FB_TFT_HX8353D=m
+CONFIG_FB_TFT_HX8357D=m
+CONFIG_FB_TFT_ILI9163=m
+CONFIG_FB_TFT_ILI9320=m
+CONFIG_FB_TFT_ILI9325=m
+CONFIG_FB_TFT_ILI9340=m
+CONFIG_FB_TFT_ILI9341=m
+CONFIG_FB_TFT_ILI9481=m
+CONFIG_FB_TFT_ILI9486=m
+CONFIG_FB_TFT_PCD8544=m
+CONFIG_FB_TFT_RA8875=m
+CONFIG_FB_TFT_S6D02A1=m
+CONFIG_FB_TFT_S6D1121=m
+CONFIG_FB_TFT_SH1106=m
+CONFIG_FB_TFT_SSD1289=m
+CONFIG_FB_TFT_SSD1305=m
+CONFIG_FB_TFT_SSD1306=m
+CONFIG_FB_TFT_SSD1325=m
+CONFIG_FB_TFT_SSD1331=m
+CONFIG_FB_TFT_SSD1351=m
+CONFIG_FB_TFT_ST7735R=m
+CONFIG_FB_TFT_ST7789V=m
+CONFIG_FB_TFT_TINYLCD=m
+CONFIG_FB_TFT_TLS8204=m
+CONFIG_FB_TFT_UC1611=m
+CONFIG_FB_TFT_UC1701=m
+CONFIG_FB_TFT_UPD161704=m
+CONFIG_FB_TFT_WATTEROTT=m
+CONFIG_FB_TILEBLITTING=y
+CONFIG_FB_TMIO=m
+CONFIG_FB_TMIO_ACCELL=y
+CONFIG_FB_TRIDENT=y
+CONFIG_FB_UDL=m
+CONFIG_FB_UVESA=m
+CONFIG_FB_VESA=y
+CONFIG_FB_VGA16=m
+CONFIG_FB_VIA=m
+# CONFIG_FB_VIA_DIRECT_PROCFS is not set
+CONFIG_FB_VIA_X_COMPATIBILITY=y
+# CONFIG_FB_VIRTUAL is not set
+CONFIG_FB_VOODOO1=m
+CONFIG_FB_VT8623=m
+CONFIG_FB_XGI=m
+CONFIG_FRAMEBUFFER_CONSOLE_DETECT_PRIMARY=y
+CONFIG_FRAMEBUFFER_CONSOLE_ROTATION=y
+CONFIG_FRAME_POINTER=y
+CONFIG_FRAME_VECTOR=y
+CONFIG_FREEZER=y
+CONFIG_FRONTSWAP=y
+CONFIG_FSCACHE=m
+CONFIG_FSCACHE_DEBUG is not set
+CONFIG_FSCACHE_HISTOGRAM is not set
+CONFIG_FSCACHE_OBJECT_LIST is not set
+CONFIG_FSCACHE_STATS=y
+CONFIG_FSI=m
+CONFIG_FSI_MASTER_GPIO=m
+CONFIG_FSI_MASTER_HUB=m
+CONFIG_FSI_SCOM=m
+CONFIG_FSL_BMAN_TEST=m
+CONFIG_FSL_BMAN_TEST_API is not set
+CONFIG_FSL_DPAA=y
+CONFIG_FSL_DPAA2=y
+CONFIG_FSL_DPAA2_ETH=m
+CONFIG_FSL_DPAA_CHECKING=y
+CONFIG_FSL_DPAA_ETH=m
+CONFIG_FSL_EDMA=m
+CONFIG_FSL_ERRATUM_A008585=y
+CONFIG_FSL_FMAN=y
+CONFIG_FSL_GUTS=y
+CONFIG_FSL_IFC=y
+CONFIG_FSL_LBC=y
+CONFIG_FSL_MC_BUS=y
+CONFIG_FSL_MC_DPIO=m
+CONFIG_FSL_PQ_MDI0=m
+CONFIG_FSL_QMAN_TEST is not set
+CONFIG_FSL_ULI1575 is not set
+CONFIG_FSL_XGMAC_MDI0=y
+CONFIG_FSNOTIFY=y
+CONFIG_FS_DAX=y
+CONFIG_FS_DAX_LIMITED=y
+CONFIG_FS_DAX_PMD=y
+CONFIG_FS_ENCRYPTION=y
+CONFIG_FS_IOMAP=y
+CONFIG_FS_MBCACHE=y
+CONFIG_FS_POSIX_ACL=y
+CONFIG_FTGMAC100=m
+CONFIG_FTL=m
+CONFIG_FTMAC100=m
+CONFIG_FTRACE=y
+CONFIG_FTRACE_MCOUNT_RECORD=y
+CONFIG_FTRACE_STARTUP_TEST is not set
+CONFIG_FTRACE_SYSCALLS=y
+## CONFIG_FTR_FIXUP_SELFTEST is not set
+CONFIG_FUJITSU_ES=m
+CONFIG_FUJITSU_LAPTOP=m
+CONFIG_FUJITSU_TABLET=m
+CONFIG_FUNCTION_GRAPH_TRACER=y
+CONFIG_FUNCTION_PROFILER=y
+CONFIG_FUNCTION_TRACER=y
+CONFIG_FUSE_FS=y
+CONFIG_FUSION_CTL=m
+CONFIG_FUSION_FC=m
+CONFIG_FUSION_LAN=m
+CONFIG_FUSION_LOGGING=y
+CONFIG_FUSION_MAX_SGE=128
+CONFIG_FUSION_SAS=m
+CONFIG_FUSION_SPI=m
+CONFIG_FUTEX=y
+CONFIG_FUTEX_PI=y
+CONFIG_FWTTY_MAX_CARD_PORTS=32
+CONFIG_FWTTY_MAX_TOTAL_PORTS=64
+CONFIG_FW_CFG_SYSFS=m
+## CONFIG_FW_CFG_SYSFS_CMDLINE is not set
+CONFIG_FW_LOADER=y
+CONFIG_FW_LOADER_USER_HELPER=y
+## CONFIG_FW_LOADER_USER_HELPER_FALLBACK is not set
+CONFIG_GACT_PROB=y
+CONFIG_GADGET_UAC1=y
+## CONFIG_GADGET_UAC1_LEGACY is not set
+CONFIG_GAMEPORT_EMU10K1=m
+CONFIG_GAMEPORT_FM801=m
+CONFIG_GAMEPORT_L4=m
+CONFIG_GAMEPORT_NS558=m
+CONFIG_GARP=m
+CONFIG_GART_IOMMU=y
+## CONFIG_GCC_PLUGINS is not set
+## CONFIG_GCOV_KERNEL is not set
+CONFIG_GDB_SCRIPTS=y
+CONFIG_GENERIC_ADC_BATTERY=m
+CONFIG_GENERIC_ADC_THERMAL=m
+CONFIG_GENERIC_ALLOCATOR=y
+CONFIG_GENERIC_ARCH_TOPOLOGY=y
+CONFIG_GENERIC_BUG=y
+CONFIG_GENERIC_BUG_RELATIVE_POINTERS=y
+CONFIG_GENERIC_CALIBRATE_DELAY=y
+CONFIG_GENERIC_CLOCKEVENTS=y
+CONFIG_GENERIC_CLOCKEVENTS_BROADCAST=y
+CONFIG_GENERIC_CLOCKEVENTS_MIN_ADJUST=y
+CONFIG_GENERIC_CMOS_UPDATE=y
+CONFIG_GENERIC_CPU=y
+CONFIG_GENERIC_CPU_AUTOPROBE=y
+# CONFIG_GENERIC_CPU_DEVICES is not set
+CONFIG_GENERIC_CPU_VULNERABILITIES=y
+CONFIG_GENERIC_EARLY_IOREMAP=y
+CONFIG_GENERIC_FIND_FIRST_BIT=y
+CONFIG_GENERIC_HWEIGHT=y
+CONFIG_GENERIC_IDLE_POLL_SETUP=y
+CONFIG GENERIC IOMAP=y
+CONFIG GENERIC IRQ CHIP=y
+# CONFIG GENERIC_IRQ_DEBUGFS is not set
+CONFIG GENERIC IRQ EFFECTIVE_AFF_MASK=y
+CONFIG GENERIC IRQ MATRIX_ALLOCATOR=y
+CONFIG GENERIC IRQ MIGRATION=y
+CONFIG GENERIC IRQ PROBE=y
+CONFIG GENERIC IRQ RESERVATION_MODE=y
+CONFIG GENERIC IRQ SHOW=y
+CONFIG GENERIC IRQ SHOW LEVEL=y
+CONFIG GENERIC ISA_DMA=y
+CONFIG GENERIC MSI IRQ=y
+CONFIG GENERIC MSI IRQ DOMAIN=y
+CONFIG GENERIC_NET_UTILS=y
+CONFIG GENERIC_PCI_IOMAP=y
+CONFIG GENERIC_PENDING_IRQ=y
+CONFIG GENERIC_PINCONF=y
+CONFIG GENERIC_PINCTRL_GROUPS=y
+CONFIG GENERIC PINMUX_FUNCTIONS=y
+CONFIG GENERIC_SCHED_CLOCK=y
+CONFIG GENERIC SMP_IDLE_THREAD=y
+CONFIG GENERIC STRNCPY_FROM_USER=y
+CONFIG GENERIC STRNLEN_USER=y
+# CONFIG GENERIC TBSYNC is not set
+CONFIG GENERIC_TIME_VSYSCALL=y
+CONFIG GENERIC TRACER=y
+CONFIG GENEVE=m
+CONFIG GENWQE=m
+CONFIG GENWQE PLATFORM ERROR RECOVERY=0
+CONFIG GEN_RTC=y
+CONFIG GEOS=y
+# CONFIG GE FPGA is not set
+CONFIG GFS2_FS=m
+CONFIG GFS2_FS LOCKING_DLM=y
+CONFIG GIANFAR=m
+CONFIG GIGASET BASE=m
+# CONFIG GIGASET CAPI is not set
+# CONFIG GIGASET DEBUG is not set
+# CONFIG GIGASET DUMMYLL is not set
+CONFIG GIGASET_I4L=y
+CONFIG_GPIO_MAX3191X=m
+CONFIG_GPIO_MAX7300=m
+CONFIG_GPIO_MAX7301=m
+CONFIG_GPIO_MAX730X=m
+CONFIG_GPIO_MAX77620=m
+CONFIG_GPIO_MC33880=m
+CONFIG_GPIO_MENZ127=m
+CONFIG_GPIO_ML_IOH=m
+CONFIG_GPIO_MPC8XXX=y
+CONFIG_GPIO_MSC=y
+CONFIG_GPIO_MVEBU=y
+CONFIG_GPIO_MXC=y
+CONFIG_GPIO_OMAP=y
+CONFIG_GPIO_PALMAS=y
+CONFIG_GPIO_PCA953X=m
+CONFIG_GPIO_PCF857X=m
+CONFIG_GPIO_PCH=m
+CONFIG_GPIO_PCI_IDIO_16=m
+CONFIG_GPIO_PISOSR=m
+CONFIG_GPIO_PL061=y
+CONFIG_GPIO_RC5T583=y
+CONFIG_GPIO_RCAR=m
+CONFIG_GPIO_RDC321X=m
+CONFIG_GPIO_SCH=m
+CONFIG_GPIO_SCH311X=m
+CONFIG_GPIO_STMPE=y
+CONFIG_GPIO_SYSCON=m
+CONFIG_GPIO_SYSFS=y
+CONFIG_GPIO_TC3589X=y
+CONFIG_GPIO_Tegra=y
+CONFIG_GPIO_THUNDERX=m
+CONFIG_GPIO_TIMBERDALE=y
+CONFIG_GPIO_TPIC2810=m
+CONFIG_GPIO_TPS65086=m
+CONFIG_GPIO_TPS65218=m
+CONFIG_GPIO_TPS6586X=y
+CONFIG_GPIO_TPS65910=y
+CONFIG_GPIO_TPS65912=m
+CONFIG_GPIO_TPS68470=y
+CONFIG_GPIO_TS4800=m
+CONFIG_GPIO_TS4900=m
+CONFIG_GPIO_UCB1400=m
+CONFIG_GPIO_UNIPHIER=m
+CONFIG_GPIO_VF610=y
+CONFIG_GPIO_VIPERBOARD=m
+CONFIG_GPIO_VX855=m
+CONFIG_GPIO_WATCHDOG=m
+CONFIG_GPIO_WHISKEY_COVE=m
+CONFIG_GPIO_WM831X=m
+CONFIG_GPIO_WM8350=m
+CONFIG_GPIO_WM8994=m
+CONFIG_GPIO_WS16C48=m
+CONFIG_GPIO_XGENE=y
+CONFIG_GPIO_XGENE_SB=m
+CONFIG_GPIO_XILINX=y
+CONFIG_GPIO_XLP=m
+CONFIG_GPIO_XRAI403=m
+CONFIG_GPIO_ZEVIO=y
+CONFIG_GPIO_ZYNQ=m
+CONFIG_GRACE_PERIOD=m
+CONFIG_GREENASIA_FF=y
+CONFIG_GREYBUS=m
+CONFIG_GREYBUS_AUDIO=m
+CONFIG_GREYBUS_BOOTROM=m
+CONFIG_GREYBUS_BRIDGED_PHY=m
+CONFIG_GREYBUS_ES2=m
+CONFIG_GREYBUS_FIRMWARE=m
+CONFIG_GREYBUS_GPIO=m
+CONFIG_GREYBUS_HID=m
+CONFIG_GREYBUS_I2C=m
+CONFIG_GREYBUS_LIGHT=m
+CONFIG_GREYBUS_LOG=m
+CONFIG_GREYBUS_LOOPBACK=m
+CONFIG_GREYBUS_POWER=m
+CONFIG_GREYBUS_PWM=m
+CONFIG_GREYBUS_RAW=m
+CONFIG_GREYBUS_SDIO=m
+CONFIG_GREYBUS_SPI=m
+CONFIG_GREYBUS_UART=m
+CONFIG_GREYBUS_USB=m
+CONFIG_GREYBUS_VIBRATOR=m
+CONFIG_GRO_CELLS=y
+CONFIG_GS_FPGABOOT=m
+CONFIG_GTP=m
+## CONFIG_GUP_BENCHMARK is not set
+CONFIG_HAMACHI=m
+CONFIG_HAMRADIO=y
+CONFIG_HANDLE_DOMAIN_IRQ=y
+CONFIG_HANGCHECK_TIMER=m
+CONFIG_HAPPYMEAL=m
+CONFIG_HARDENED_USERCOPY=y
+## CONFIG_HARDENED_USERCOPY_PAGESPAN is not set
+CONFIG_HARDEN_BRANCH_PREDICTOR=y
+CONFIG_HARDIRQS_SW_RESEND=y
+CONFIG_HARDLOCKUP_CHECK_TIMESTAMP=y
+CONFIG_HARDLOCKUP_DETECTOR=y
+CONFIG_HARDLOCKUP_DETECTOR_PERF=y
+CONFIG_HAS_DMA=y
+CONFIG_HAS_IOMEM=y
+CONFIG_HAS_IOPORT_MAP=y
+# CONFIG_HAS_RAPIDIO is not set
+# CONFIG_HAVE_64BIT_ALIGNED_ACCESS is not set
+CONFIG_HAVE_ACPI_APEI=y
+CONFIG_HAVE_ACPI_APEI_NMI=y
+CONFIG_HAVE_ALIGNED_STRUCT_PAGE=y
+CONFIG_HAVE_ARCH_AUDITSYSCALL=y
+CONFIG_HAVE_ARCH_COMPAT_MMAP_BASES=y
+# CONFIG_HAVE_ARCH_HASH is not set
+CONFIG_HAVE_ARCH_HUGE_VMAP=y
+CONFIG_HAVE_ARCH_JUMP_LABEL=y
+CONFIG_HAVE_ARCH_KASAN=y
+CONFIG_HAVE_ARCH_KGDB=y
+CONFIG_HAVE_ARCH_MMAP_RND_BITS=y
+CONFIG_HAVE_ARCH_MMAP_RND_COMPAT_BITS=y
+CONFIG_HAVE_ARCH_PFN_VALID=y
+CONFIG_HAVE_ARCH_SECCOMP_FILTER=y
+CONFIG_HAVE_ARCH_SOFT_DIRTY=y
+CONFIG_HAVE_ARCH_TRACEHOOK=y
+CONFIG_HAVE_ARCH_TRANSPARENT_HUGEPAGE=y
+CONFIG_HAVE_ARCH_TRANSPARENT_HUGEPAGE_PUD=y
+CONFIG_HAVE_ARCH_WITHIN_STACK_FRAMES=y
+CONFIG_HAVE_ARM_ARCH_TIMER=y
+CONFIG_HAVE_ARM_SCU=y
+CONFIG_HAVE_ARM_SMCCC=y
+CONFIG_HAVE_ARM_TWD=y
+CONFIG_HAVE_ATOMIC_IOMAP=y
+CONFIG_HAVE_CC_STACKPROTECTOR=y
+CONFIG_HAVE_CLK=y
+CONFIG_HAVE_CLK_PREPARE=y
+CONFIG_HAVE_CMPXCHG_DOUBLE=y
+CONFIG_HAVE_CMPXCHG_LOCAL=y
+CONFIG_HAVE_CONTEXT_TRACKING=y
+CONFIG_HAVE_COPY_THREAD_TLS=y
+CONFIG_HAVE_C_RECORDMCOUNT=y
+CONFIG_HAVE_DEBUG_BUGVERBOSE=y
+CONFIG_HAVE_DEBUG_KMEMLEAK=y
+CONFIG_HAVE_DEBUG_STACKOVERFLOW=y
+CONFIG_HAVE_DMA_API_DEBUG=y
+CONFIG_HAVE_DMA_CONTIGUOUS=y
+CONFIG_HAVE_DYNAMIC_FTRACE=y
+CONFIG_HAVE_DYNAMIC_FTRACE_WITH_REGS=y
+CONFIG_HAVE_EBPFW_JIT=y
+CONFIG_HAVE_EFFICIENT_UNALIGNED_ACCESS=y
+CONFIG_HAVE_EXIT_THREAD=y
+CONFIG_HAVE_FENTRY=y
+CONFIG_HAVE_FTRACE_MCOUNT_RECORD=y
+CONFIG_HAVE_FUNCTION_GRAPH_TRACER=y
+CONFIG_HAVE_FUNCTION_TRACER=y
+CONFIG_HAVE_FUTEX_CMPXCHG=y
+CONFIG_HAVE_GCC_PLUGINS=y
+CONFIG_HAVE_GENERIC_GUP=y
+CONFIG_HAVE_HARDERED_USERCOPY_ALLOCATOR=y
+CONFIG_HAVE_HARDLOCKUP_DETECTOR_ARCH=y
+CONFIG_HAVE_HARDLOCKUP_DETECTOR_PERF=y
+CONFIG_HAVE_HW_BREAKPOINT=y
+CONFIG_HAVE_IDE=y
+CONFIG_HAVE_IBM_KEXEC=y
+CONFIG_HAVE_IMX_ANATOP=y
+CONFIG_HAVE_IMX_GPC=y
+CONFIG_HAVE_IMX_MMD=y
+CONFIG_HAVE_IMX_SRC=y
+CONFIG_HAVE_INTEL_TXT=y
+CONFIG_HAVE_IOREMAP_PROT=y
+CONFIG_HAVE_IRQ_EXIT_ON_IRQ_STACK=y
+CONFIG_HAVE_IRQ_TIME_ACCOUNTING=y
+CONFIG_HAVE_KERNEL_BZIP2=y
+CONFIG_HAVE_KERNEL_GZIP=y
+CONFIG_HAVE_KERNEL_LZ4=y
+CONFIG_HAVE_KERNEL_LZMA=y
+CONFIG_HAVE_KERNEL_LZO=y
+CONFIG_HAVE_KERNEL_XZ=y
+CONFIG_HAVE_KPROBES=y
+CONFIG_HAVE_KPROBES_ON_FTRACE=y
+CONFIG_HAVE_KRETPROBES=y
+CONFIG_HAVE_KVM=y
+CONFIG_HAVE_KVM_ARCH_TLB_FLUSH_ALL=y
+CONFIG_HAVE_KVM_CPU_RELAX_INTERCEPT=y
+CONFIG_HAVE_KVM_EVENTFD=y
+CONFIG_HAVE_KVM_INVALID_WAKEUPS=y
+CONFIG_HAVE_KVM_IRQCHIP=y
+CONFIG_HAVE_KVM_IRQFD=y
+CONFIG_HAVE_KVM_IRQ_BYPASS=y
+CONFIG_HAVE_KVM_IRQ_ROUTING=y
+CONFIG_HAVE_KVM_MSI=y
+CONFIG_HAVE_LIVEPATCH=y
+CONFIG_HAVE_MARCH_Z10_FEATURES=y
+CONFIG_HAVE_MARCH_Z13_FEATURES is not set
+CONFIG_HAVE_MARCH_Z14_FEATURES is not set
+CONFIG_HAVE_MARCH_Z196_FEATURES=y
+CONFIG_HAVE_MARCH_Z900FEATURES=y
+CONFIG_HAVE_MARCH_Z990FEATURES=y
+CONFIG_HAVE_MARCH_Z9_109FEATURES=y
+CONFIG_HAVE_MARCH_ZEC12FEATURES=y
+CONFIG_HAVE_MEMBLOCK=y
+CONFIG_HAVE_MEMBLOCK_NODE_MAP=y
+CONFIG_HAVE_MEMBLOCK_PHYS_MAP=y
+CONFIG_HAVE_MEMORYLESS_NODES=y
+CONFIG_HAVE_MEMORY_PRESENT=y
+CONFIG_HAVE_MIXED_BREAKPOINTS_REGS=y
+CONFIG_HAVE_MMIOTRACE_SUPPORT=y
+CONFIG_HAVE_MOD_ARCH_SPECIFIC=y
+CONFIG_HAVE_NET_DSA=y
+CONFIG_HAVE_NMI=y
+CONFIG_HAVE_NMI_WATCHDOG=y
+CONFIG_HAVE_OPROFILE=y
+CONFIG_HAVE_OPTPROBES=y
+CONFIG_HAVE_PATA_PLATFORM=y
+CONFIG_HAVE_PCSPKR_PLATFORM=y
+CONFIG_HAVE_PERF_EVENTS=y
+CONFIG_HAVE_PERF_EVENTS_NMI=y
+CONFIG_HAVE_PERF_REGS=y
+CONFIG_HAVE_PERF_USER_STACK_DUMP=y
+CONFIG_HAVE_PROC_CPU=y
+CONFIG_HAVE_RCU_TABLE_FREE=y
+CONFIG_HAVE_RCU_TABLE_INVALIDATE=y
+CONFIG_HAVE_REGS_AND_STACK_ACCESS_API=y
+CONFIG_HAVE_RELIABLE_STACKTRACE=y
+CONFIG_HAVE_S3C2410_I2C=y
+CONFIG_HAVE_S3C2410_WATCHDOG=y
+CONFIG_HAVE_S3C_RTC=y
+CONFIG_HAVE_SETUP_PER_CPU_AREA=y
+CONFIG_HAVE_SMP=y
+CONFIG_HAVE_STACK_VALIDATION=y
+CONFIG_HAVE_SYSCALL_TRACEPOINTS=y
+CONFIG_HAVE_UID16=y
+CONFIG_HAVE_UNSTABLE_SCHED_CLOCK=y
+CONFIG_HAVE_USER_RETURN_NOTIFYER=y
+CONFIG_HAVE_VIRT_CPU_ACCOUNTING=y
+CONFIG_HAVE_VIRT_CPU_ACCOUNTING_GEN=y
+# CONFIG_HCALL_STATS is not set
+CONFIG_HD44780=m
+CONFIG_HDC100X=m
+CONFIG_HDLC=m
+CONFIG_HDLC_CISCO=m
+CONFIG_HDLC_FR=m
+CONFIG_HDLC_PPP=m
+CONFIG_HDLC_RAW=m
+CONFIG_HDLC_RAW_ETH=m
+CONFIG_HDLC_X25=m
+CONFIG_HDMI=y
+CONFIG_HDMI_LPE_AUDIO=m
+CONFIG_HDM_DIM2=m
+CONFIG_HDM_I2C=m
+CONFIG_HDM_USB=m
+CONFIG_HDQ_MASTER_OMAP=m
+# CONFIG_HEADERS_CHECK is not set
+CONFIG_HERMES=m
+CONFIG_HERMES_CACHE_FW_ON_INIT=y
+# CONFIG_HERMES_PRISM is not set
+# CONFIG_HFI1_DEBUG_SDMA_ORDER is not set
+CONFIG_HFSPLUS_FS_POSIX_ACL=y
+CONFIG_HI6220_MBOX=m
+CONFIG_HI8435=m
+CONFIG_HIBERNATE_CALLBACKS=y
+CONFIG_HID=m
+CONFIG_HIDRAW=y
+CONFIG_HID_A4TECH=m
+CONFIG_HID_ACCUTOUCH=m
+CONFIG_HID_ACRUX=m
+CONFIG_HID_ACRUX_FF=y
+CONFIG_HID_ALPS=m
+CONFIG_HID_APPLE=m
+CONFIG_HID_APPLEIR=m
+CONFIG_HID_ASUS=m
+CONFIG_HID_AUREAL=m
+CONFIG_HID_BATTERY_STRENGTH=y
+CONFIG_HID_BELKIN=m
+CONFIG_HID_BETOP_FF=m
+CONFIG_HID_CHERRY=m
+CONFIG_HID_CHICONY=m
+CONFIG_HID_CMEDIA=m
+CONFIG_HID_CORSAIR=m
+CONFIG_HID_CP2112=m
+CONFIG_HID_CYPRESS=m
+CONFIG_HID_DRAGONRISE=m
+CONFIG_HID_ELECOM=m
+CONFIG_HID_ELO=m
+CONFIG_HID_EMS_FF=m
+CONFIG_HID_EZKEY=m
+CONFIG_HID_GEMBIRD=m
+CONFIG_HID GENERIC=m
+CONFIG_HID_GFRM=m
+CONFIG_HID_GREENASIA=m
+CONFIG_HID_GT683R=m
+CONFIG_HID_GYRATION=m
+CONFIG_HID_HOLTEK=m
+CONFIG_HID_HYPERV_MOUSE=m
+CONFIG_HID_ICADE=m
+CONFIG_HID_ITE=m
+CONFIG_HID_KENSINGTON=m
+CONFIG_HID_KEYTOUCH=m
+CONFIG_HID_KYE=m
+CONFIG_HID_LCPOWER=m
+CONFIG_HID_LED=m
+CONFIG_HID_LENOVO=m
+CONFIG_HID_LOGITECH=m
+CONFIG_HID_LOGITECH_DJ=m
+CONFIG_HID_LOGITECH_HIDPP=m
+CONFIG_HID_MAGICMOUSE=m
+CONFIG_HID_MAYFLASH=m
+CONFIG_HID_MICROSOFT=m
+CONFIG_HID_MONTEREY=m
+CONFIG_HID_MULTITOUCH=m
+CONFIG_HID_NTI=m
+CONFIG_HID_NTRIG=m
+CONFIG_HID_ORTEK=m
+CONFIG_HID_PANTHERLORD=m
+CONFIG_HID_PENMOUNT=m
+CONFIG_HID_PETALYNX=m
+CONFIG_HID_PICOLCD=m
+CONFIG_HID_PICOLCD_BACKLIGHT=y
+CONFIG_HID_PICOLCD_CIR=y
+CONFIG_HID_PICOLCD_FB=y
+CONFIG_HID_PICOLCD_LCD=y
+CONFIG_HID_PICOLCD_LEDS=y
+CONFIG_HID_PID=y
+CONFIG_HID_PLANTRONICS=m
+CONFIG_HID_PRIMAX=m
+CONFIG_HID_PRODIKEYS=m
+CONFIG_HID_RETRODE=m
+CONFIG_HID_RMI=m
+CONFIG_HID_ROCCAT=m
+CONFIG_HID_SAITEK=m
+CONFIG_HID_SAMSUNG=m
+CONFIG_HID_SENSOR_ACCEL_3D=m
+CONFIG_HID_SENSOR_ALS=m
+CONFIG_HID_SENSOR_CUSTOM_SENSOR=m
+CONFIG_HID_SENSOR_DEVICE_ROTATION=m
+CONFIG_HID_SENSOR_GYRO_3D=m
+CONFIG_HID_SENSOR_HUB=m
+CONFIG_HID_SENSOR_HUMIDITY=m
+CONFIG_HID_SENSOR_IIO_COMMON=m
+CONFIG_HID_SENSOR_IIO_TRIGGER=m
+CONFIG_HID_SENSOR_INCLINOMETER_3D=m
+CONFIG_HID_SENSOR_MAGNETOMETER_3D=m
+CONFIG_HID_SENSOR_PRESS=m
+CONFIG_HID_SENSOR_PROX=m
+CONFIG_HID_SENSOR_TEMP=m
+CONFIG_HID_SMARTJOYPLUS=m
+CONFIG_HID_SONY=m
+CONFIG_HID_SPEEDLINK=m
+CONFIG_HID_STEELSERIES=m
+CONFIG_HID_SUNPLUS=m
+CONFIG_HID_THINGM=m
+CONFIG_HID_THRUSTMASTER=m
+CONFIG_HID_TIVO=m
+CONFIG_HID_TOPSEED=m
+CONFIG_HID_TWINHAN=m
+CONFIG_HID_UCLOGIC=m
+CONFIG_HID_UDRAW_PS3=m
+CONFIG_HID_WACOM=m
+CONFIG_HID_WALTOP=m
+CONFIG_HID_WIIMOTE=m
+CONFIG_HID_XINMO=m
+CONFIG_HID ZEROPLUS=m
+CONFIG_HID_ZYDACRON=m
+CONFIG_HIGHMEM=y
+# CONFIG_HIGHMEM4G is not set
+CONFIG_HIGHMEM64G=y
+CONFIG_HIGHPTE=y
+CONFIG_HIGH_RES_TIMERS=y
+CONFIG_HINIC=m
+CONFIG_HIP04_ETH=m
+# CONFIG_HIPPI is not set
+CONFIG_HISAX_16_0=y
+CONFIG_HISAX_16_3=y
+CONFIG_HISAX_1TR6=y
+CONFIG_HISAX_ASUSCOM=y
+CONFIG_HISAX_AVM_A1=y
+CONFIG_HISAX_AVM_A1_CS=m
+CONFIG_HISAX_AVM_A1_PCMCIA=y
+CONFIG_HISAX_BKM_A4T=y
+# CONFIG_HISAX_DEBUG is not set
+CONFIG_HISAX_DIEHLDIVA=y
+CONFIG_HISAX_ELSA=y
+CONFIG_HISAX_ELSA_CS=m
+CONFIG_HISAX_ENTERNOW_PCI=y
+CONFIG_HISAX_EURO=y
+CONFIG_HISAX_FRITZPCI=y
+CONFIG_HISAX_FRITZ_PCIPNP=m
+CONFIG_HISAX_GAZEL=y
+CONFIG_HISAX_HFC4S8S=m
+CONFIG_HISAX_HFCS=y
+CONFIG_HISAX_HFCUSB=m
+CONFIG_HISAX_HFC_PCI=y
+CONFIG_HISAX_HFC_SX=y
+CONFIG_HISAX_HSTSAPHIR=y
+CONFIG_HISAX_ISURF=y
+CONFIG_HISAX_IX1MICROR2=y
+CONFIG_HISAX_MAX_CARDS=8
+CONFIG_HISAX_MIC=y
+CONFIG_HISAX_NETJET=y
+CONFIG_HISAX_NETJET_U=y
+CONFIG_HISAX_NI1=y
+CONFIG_HISAX_NICCY=y
+CONFIG_HISAX_NO_KEYPAD is not set
+CONFIG_HISAX_NO_LLC is not set
+CONFIG_HISAX_NO_SENDCOMPLETE is not set
+CONFIG_HISAX_S0BOX=y
+CONFIG_HISAX_SCT_QUADRO=y
+CONFIG_HISAX_SEDLBAUER=y
+CONFIG_HISAX_SEDLBAUER_CS=m
+CONFIG_HISAX_SPORTSTER=y
+CONFIG_HISAX_ST5481=m
+CONFIG_HISAX_TELEINT=y
+CONFIG_HISAX_TELESCPCI=y
+CONFIG_HISAX_TELES_CS=m
+CONFIG_HISAX_W6692=y
+CONFIG_HISILICON_ERRATUM_161010101=y
+CONFIG_HISILICON_ERRATUM_161600802=y
+CONFIG_HISILICON_IRQ_MBIGEN=y
+CONFIG_HISILICON_LPC=y
+CONFIG_HISI_FEMAC=m
+CONFIG_HISI_KIRIN_DW_DSI=m
+CONFIG_HISI_PMU=y
+CONFIG_HISI_THERMAL=m
+CONFIG_HIST_TRIGGERS=y
+CONFIG_HIX5HD2_GMAC=m
+CONFIG_HMC6352=m
+CONFIG_HMC_DRV=m
+CONFIG_HMM=y
+CONFIG_HMM_MIRROR=y
+CONFIG_HNS=m
+CONFIG_HNS3=m
+CONFIG_HNS3_DCB=y
+CONFIG_HNS3_ENET=m
+CONFIG_HNS3_HCLGE=m
+CONFIG_HNS3_HCLGEVF=m
+CONFIG_HNS_DSAF=m
+CONFIG_HNS_ENET=m
+CONFIG_HNS_MDIO=m
+CONFIG_HOLES_IN_ZONE=y
+CONFIG_HOLTEK_FF=y
+CONFIG_HOSTAP=m
+CONFIG_HOSTAP_CS=m
+CONFIG_HOSTAP_FIRMWARE=y
+CONFIG_HOSTAP_FIRMWARE_NVRAM=y
+CONFIG_HOSTAP_PCI=m
+CONFIG_HOSTAP_PLX=m
+CONFIG_HOSTESS_SV11=m
+CONFIG_HOTPLUG_CPU=y
+CONFIG_HOTPLUG_PCI_ACPI=y
+CONFIG_HOTPLUG_PCI_ACPI_IBM=m
+CONFIG_HOTPLUG_PCI_COMPAQ=m
+CONFIG_HOTPLUG_PCI_COMPAQ_NVRAM=y
+CONFIG_HOTPLUG_PCI_CPCI=y
+CONFIG_HOTPLUG_PCI_CPCI_GENERIC=m
+CONFIG_HOTPLUG_PCI_CPCI_ZT5550=m
+CONFIG_HOTPLUG_PCI_PCI_IBM=m
+CONFIG_HOTPLUG_PCI_PCIE=y
+CONFIG_HOTPLUG_PCI_POWERNV=m
+CONFIG_HOTPLUG_PCI_RPA=m
+CONFIG_HOTPLUG_PCI_RPA_DLPAR=m
+CONFIG_HOTPLUG_PCI_S390=y
+CONFIG_HOTPLUG_SMT=y
+CONFIG_HP03=m
+CONFIG_HP100=m
+CONFIG_HP206C=m
+CONFIG_HPET_EMULATE_RTC=y
+CONFIG_HPET_MMiomap=y
+CONFIG_HPET_MMiomap_DEFAULT=y
+CONFIG_HPET_TIMER=y
+CONFIG_HPWDT_NMI_DECODING=y
+CONFIG_HP_ACCEL=m
+CONFIG_HP_WATCHDOG=m
+CONFIG_HP_WIRELESS=m
+CONFIG_HP_WMI=m
+CONFIG_HSA_AMD=m
+CONFIG_HSI_BOARDINFO=y
+CONFIG_HSI_CHAR=m
+CONFIG_HSU_DMA=m
+CONFIG_HSU_DMA_PCI=m
+CONFIG_HT16K33=m
+CONFIG_HTC_EGPIO=y
+CONFIG_HTC_I2CPLD=y
+CONFIG_HTS221=m
+CONFIG_HTS221_I2C=m
+CONFIG_HYPERV=m
+CONFIG_HYPERVISOR_GUEST=y
+CONFIG_HYPERV_BALLOON=m
+CONFIG_HYPERV_KEYBOARD=m
+CONFIG_HYPERV_NET=m
+CONFIG_HYPERV_STORAGE=m
+CONFIG_HYPERV_UTILS=m
+CONFIG_HYPERV_VSOCKETS=m
+CONFIG_HYSDN=m
+CONFIG_HYSDN_CAPI=y
+CONFIG_HZ_FIXED=0
+CONFIG_HZ_PERIODIC is not set
+CONFIG_I2C_ALGOBIT=m
+CONFIG_I2C_ALGOPCA=m
+CONFIG_I2C_ALI1535=m
+CONFIG_I2C_ALI1563=m
+CONFIG_I2C_ALI15X3=m
+CONFIG_I2C_AMD756=m
+CONFIG_I2C_AMD756_S4882=m
+CONFIG_I2C_AMD8111=m
+CONFIG_I2C_ARB_GPIO_CHALLENGE=m
+CONFIG_I2C_AXXIA=m
+CONFIG_I2C_BCM2048=m
+CONFIG_I2C_BCM2835=m
+CONFIG_I2C_BCM_PCIE=m
+CONFIG_I2C_BOARDINFO=y
+CONFIG_I2C_BRCMSTB=m
+CONFIG_I2C_CADENCE is not set
+CONFIG_I2C_CBUS_GPIO=m
+CONFIG_I2C_CHARDEV=y
+CONFIG_I2C_CHT_WC=m
+CONFIG_I2C_COMPAT=y
+CONFIG_I2C_CROS_EC_TUNNEL=m
+CONFIG_I2C_DEBUG_ALGO is not set
+CONFIG_I2C_DEBUG_BUS is not set
+CONFIG_I2C_DEBUG_CORE is not set
+CONFIG_I2C_DEMUX_PINCTRL=m
+CONFIG_I2C_DESIGNWARE_BAYTRAIL=y
+CONFIG_I2C_DESIGNWARE_CORE=y
+CONFIG_I2C_DESIGNWARE_PCI=m
+CONFIG_I2C_DESIGNWARE_PLATFORM=y
+CONFIG_I2C_DIOLAN_U2C=m
+CONFIG_I2C_DLN2=m
+CONFIG_I2C_EG20T=m
+CONFIG_I2C_EXYNOS5=m
+CONFIG_I2C_GPIO=m
+CONFIG_I2C_HELPER_AUTO=y
+CONFIG_I2C_HID=m
+CONFIG_I2C_HIIX5HD2=m
+CONFIG_I2C_I801=m
+CONFIG_I2C_IMX_LP12C=m
+CONFIG_I2C_ISCH=m
+CONFIG_I2C_ISMT=m
+CONFIG_I2C_KEMPLD=m
+CONFIG_I2C_MESON=m
+CONFIG_I2C_MLXCPLD=m
+CONFIG_I2C_MPC=m
+CONFIG_I2C_MT65XX=m
+CONFIG_I2C_MUX=m
+CONFIG_I2C_MUX_GPIO=m
+CONFIG_I2C_MUX_GPMUX=m
+CONFIG_I2C_MUX_LTC4306=m
+CONFIG_I2C_MUX_MLXCPLD=m
+CONFIG_I2C_MUX_PCA9541=m
+CONFIG_I2C_MUX_PCA954x=m
+CONFIG_I2C_MUX_PINCTRL=m
+CONFIG_I2C_MUX_REG=m
+CONFIG_I2C_MV64XXX=m
+CONFIG_I2C_NFORCE2=m
+CONFIG_I2C_NFORCE2_S4985=m
+CONFIG_I2C_NOMADIK=m
+CONFIG_I2C_OCORES=m
+CONFIG_I2C_OMAP=y
+CONFIG_I2C_OPAL=y
+CONFIG_I2C_PARPOR=m
+CONFIG_I2C_PARPOR_LIGHT=m
+CONFIG_I2C_PCA_Isa=m
+CONFIG_I2C_PCA_PLATFORM=m
+CONFIG_I2C_PHX4=m
+CONFIG_I2C_PXA=m
+# CONFIG_I2C_PXA_PCI is not set
+CONFIG_I2C_PXA_SLAVE=y
+# CONFIG_I2C_QCOM_CCI is not set
+CONFIG_I2C_QUP=m
+CONFIG_I2C_RCAR=m
+CONFIG_I2C_RIIC=m
+CONFIG_I2C_RK3X=m
+CONFIG_I2C_ROBOTFUZZ_OSIF=m
+CONFIG_I2C_S3C2410=y
+CONFIG_I2C_SCMI=m
+CONFIG_I2C_SH_MOBILE=m
+CONFIG_I2C_SI470X=m
+CONFIG_I2C_SI4713=m
+CONFIG_I2C_SIMTEC=m
+CONFIG_I2C_SIS5595=m
+CONFIG_I2C_SIS630=m
+CONFIG_I2C_SIS96X=m
+CONFIG_I2C_SLAVE_EEPROM=m
+CONFIG_I2C_SMBUS=m
+CONFIG_I2C_SPRD=y
+CONFIG_I2C_STUB=m
+CONFIG_I2C_TAOS_EVM=m
+CONFIG_I2C_TEGRA=m
+CONFIG_I2C_THUNDERX=m
+CONFIG_I2C_TINY_USB=m
+# CONFIG_I2C_UNIPHIER is not set
+# CONFIG_I2C_UNIPHIER_F is not set
+CONFIG_I2C_VERSATILE=m
+CONFIG_I2C_VIA=m
+CONFIG_I2C_VIAPRO=m
+CONFIG_I2C_VIERBOARD=m
+CONFIG_I2C_XGENE_SLIMPRO=m
+CONFIG_I2C_XILINX=m
+CONFIG_I2C_XLP9XX=m
+CONFIG_I40E=m
+CONFIG_I40EVF=m
+CONFIG_I40E_DCB=y
+CONFIG_I82092=m
+CONFIG_I82365=m
+CONFIG_I8K=m
+# CONFIG_IA32_AOUT is not set
+CONFIG_IA32_EMULATION=y
+CONFIG_IAQCORE=m
+CONFIG_IB700_WDT=m
+CONFIG_IBMASR=m
+CONFIG_IBMVETH=m
+CONFIG_IBMVIO=y
+CONFIG_IBMVNIC=m
+CONFIG_IBM_ASM=m
+CONFIG_IBM_BSR=m
+# CONFIG_IBM_EMAC_EMAC4 is not set
+# CONFIG_IBM_EMAC_MAL_CLR_ICINTSTAT is not set
+# CONFIG_IBM_EMAC_MAL_COMMON_ERR is not set
+# CONFIG_IBM_EMAC_NO_FLOW_CTRL is not set
+# CONFIG_IBM_EMAC_RGMII is not set
+# CONFIG_IBM_EMAC_TAH is not set
+# CONFIG_IBM_EMAC_ZMII is not set
+CONFIG_IBM_PARTITION=y
+CONFIG_IBM_RTL=m
+CONFIG_ICPLUS_PHYM
+CONFIG_IC93254=m
+CONFIG_ICST=y
+# CONFIG_IDE is not set
+CONFIG_IDEAPDLAPTOP=m
+CONFIG_IDLE_PAGE_TRACKING=y
+CONFIG_IE6XX_WDT=m
+CONFIG_IEEE802154_6LOWPAN=m
+CONFIG_IEEE802154_ADF7242=m
+CONFIG_IEEE802154_AT86RF230=m
+CONFIG_IEEE802154_AT86RF230_DEBUGFS=y
+CONFIG_IEEE802154_AT_USB=m
+CONFIG_IEEE802154_CA8210=m
+CONFIG_IEEE802154_CA8210_DEBUGFS=y
+CONFIG_IEEE802154_CC2520=m
+CONFIG_IEEE802154_DRIVERS=m
+CONFIG_IEEE802154_FAKELB=m
+CONFIG_IEEE802154_MRF24J40=m
+# CONFIG_IEEE802154_NL802154_EXPERIMENTAL is not set
+CONFIG_IEEE802154_SOCKET=m
+CONFIG_IFB=m
+CONFIG_IGB=m
+CONFIG_IGBVF=m
+CONFIG_IGB_DCA=y
+CONFIG_IGB_HWMON=y
+CONFIG_IIO_ADIS_LIB=m
+CONFIG_IIO_ADIS_LIB_BUFFER=y
+CONFIG_IIO_BUFFER=y
+CONFIG_IIO_BUFFER_CB=m
+CONFIG_IIO_CONFIGFS=m
+CONFIG_IIO_CONSUMERS_PER_TRIGGER=2
+CONFIG_IIO_CROS_EC_ACCEL_LEGACY=m
+CONFIG_IIO_CROS_EC_BARO=m
+CONFIG_IIO_CROS_EC_LIGHT_PROX=m
+CONFIG_IIO_CROS_EC_SENSORS=m
+CONFIG_IIO_CROS_EC_SENSORS_CORE=m
+CONFIG_IIO_HRTIMER_TRIGGER=m
+CONFIG_IIO_INTERRUPT_TRIGGER=m
+CONFIG_IIO_K_FIFO_BUF=m
+CONFIG_IIO_MS_SENSORS_I2C=m
+CONFIG_IIO_MUX=m
+CONFIG_IIO_SIMPLE_DUMMY=m
+# CONFIG_IIO_SIMPLE_DUMMY_BUFFER is not set
+# CONFIG_IIO_SIMPLE_DUMMY_EVENTS is not set
+CONFIG_IIO_SSP_SENSORHUB=m
+CONFIG_IIO_SSP_SENSORS_COMMONS=m
+CONFIG_IIO_ST_ACCEL_3AXIS=m
+CONFIG_IIO_ST_ACCEL_I2C_3AXIS=m
+CONFIG_IIO_ST_ACCEL_SPI_3AXIS=m
+CONFIG_IIO_ST_GYRO_3AXIS=m
+CONFIG_IIO_ST_GYRO_I2C_3AXIS=m
+CONFIG_IIO_ST_GYRO_SPI_3AXIS=m
+CONFIG_IIO_ST_LSM6DSX=m
+CONFIG_IIO_ST_LSM6DSX_I2C=m
+CONFIG_IIO_ST_LSM6DSX_SPI=m
+CONFIG_IIO_ST_MAGN_3AXIS=m
+CONFIG_IIO_ST_MAGN_I2C_3AXIS=m
+CONFIG_IIO_ST_MAGN_SPI_3AXIS=m
+CONFIG_IIO_ST_PRESS=m
+CONFIG_IIO_ST_PRESS_I2C=m
+CONFIG_IIO_ST_PRESS_SPI=m
+CONFIG_IIO_ST_SENSORS_CORE=m
+CONFIG_IIO_ST_SENSORS_I2C=m
+CONFIG_IIO_ST_SENSORS_SPI=m
+CONFIG_IIO_SW_DEVICE=m
+CONFIG_IIO_SW_TRIGGER=m
+CONFIG_IIO_SYSFS_TRIGGER=m
+CONFIG_IIO_TIGHTLOOP_TRIGGER=m
+CONFIG_IIO_TRIGGER=y
+CONFIG_IIO_TRIGGERED_BUFFER=m
+CONFIG_IIO_TRIGGERED_EVENT=m
+# CONFIG_IKCONFIG is not set
+CONFIG_IIMA=y
+CONFIG_IIMA_APPRAISE=y
+# CONFIG_IIMA_APPRAISE_BOOTPARAM=y
+# CONFIG_IIMA_APPRAISE_SIGNED_INIT is not set
+# CONFIG_IIMA_BLACKLIST_KEYRING is not set
+# CONFIG_IIMA_DEFAULT_HASH_SHA512 is not set
+CONFIG_IIMA_KEXEC=y
+# CONFIG_IIMA_KEYRINGS_PERMIT_SIGNED_BY_BUILTIN_OR_SECONDARY is not set
+CONFIG_IIMA_LSM_RULES=y
+CONFIG_IIMA_MEASURE_PCR_IDX=10
+# CONFIG_IIMA_READ_POLICY is not set
+# CONFIG_IIMA_TEMPLATE is not set
+CONFIG_IIMA_TRUSTED_KEYRING=y
+# CONFIG_IIMA_WRITE_POLICY is not set
+CONFIG_IIMA_X509_PATH="/etc/keys/x509_ima.der"
+CONFIG_IMG_ASCII_LCD=m
+CONFIG_IMX2_WDT=m
+CONFIG_IMX7D_ADC=m
+CONFIG_IMX7_PM_DOMAINS=y
+CONFIG_IMX_DMA=m
+CONFIG_IMX_GPCV2=y
+CONFIG_IMX_IPUV3_CORE=m
+CONFIG_IMX_REMOTEPROC=m
+CONFIG_IMX_SDMA=m
+CONFIG_IMX_THERMAL=m
+CONFIG_IMX_WEIM=y
+CONFIG_INA2XX_ADC=m
+CONFIG_INDIRECTPIO=y
+CONFIG_INET=y
+CONFIG_INET6_AH=m
+CONFIG_INET6_ESP=m
+CONFIG_INET6_ESP_OFFLOAD=m
+CONFIG_INET6_ICMP=m
+CONFIG_INET6_TUNNEL=m
+CONFIG_INET6_XFRM_MODE_BEET=m
+CONFIG_INET6_XFRM_MODE_ROUTEOPTIMIZATION=m
+CONFIG_INET6_XFRM_MODE_TRANSPORT=m
+CONFIG_INET6_XFRM_MODE_TUNNEL=m
+CONFIG_INET6_XFRM_TUNNEL=m
+CONFIG_INET_AH=m
+CONFIG_INET_DCCP_DIAG=m
+CONFIG_INET_DIAG=m
+CONFIG_INET_DIAG_DESTROY=y
+CONFIG_INET_ESP=m
+CONFIG_INET_ESP_OFFLOAD=m
+CONFIG_INET_ICMP=m
+CONFIG_INET_SCTP_DIAG=m
+CONFIG_INET_TCP_DIAG=m
+CONFIG_INET_UDP_DIAG=m
+CONFIG_INET_XFRM_MODE_BEET=m
+CONFIG_INET_XFRM_MODE_TRANSPORT=m
+CONFIG_INET_XFRM_MODE_TUNNEL=m
+CONFIG_INET_XFRM_TUNNEL=m
+CONFIG_INFINIBAND=m
+CONFIG_INFINIBAND_ADDR_TRANS=y
+CONFIG_INFINIBAND_ADDR_TRANS_CONFIGFS=y
+CONFIG_INFINIBAND_CXGB3=m
+# CONFIG_INFINIBAND_CXGB3_DEBUG is not set
+CONFIG_INFINIBAND_CXGB4=m
+# CONFIG_INFINIBAND_EXP_USER_ACCESS is not set
+CONFIG_INFINIBAND_HFI1=m
+CONFIG_INFINIBAND_HNS=m
+CONFIG_INFINIBAND_HNS_HIP06=m
+CONFIG_INFINIBAND_HNS_HIP08=m
+CONFIG_INFINIBAND_I40IW=m
+CONFIG_INFINIBAND_IPOIB=m
+CONFIG_INFINIBAND_IPOIB_CM=y
+# CONFIG_INFINIBAND_IPOIB_DEBUG is not set
+CONFIG_INFINIBAND_ISER=m
+CONFIG_INFINIBAND_ISERT=m
+CONFIG_INFINIBAND_MTHCA=m
+## CONFIG_INFINIBAND_MTHCA_DEBUG is not set
+## CONFIG_INFINIBAND_NES_DEBUG is not set
+CONFIG_INFINIBAND_ON_DEMAND_PAGING=y
+CONFIG_INFINIBAND_OPA_VNIC=m
+CONFIG_INFINIBAND_QEDR=m
+CONFIG_INFINIBAND_QIB_DCA=y
+CONFIG_INFINIBAND_RXMAVT=m
+CONFIG_INFINIBAND_SRPT=m
+CONFIG_INFINIBAND_SRPT_INV=m
+CONFIG_INFINIBAND_USER_ACCESS=m
+CONFIG_INFINIBAND_USER_MAD=m
+CONFIG_INFINIBAND_USER_MEM=y
+CONFIG_INFINIBAND_USNIC=m
+CONFIG_INFINIBAND_VMWARE_PVRDMA=m
+CONFIG_INFTL=m
+CONFIG_INITRAMFS_SOURCE=""
+CONFIG_INIT_ENV_ARG_LIMIT=32
+CONFIG_INLINE_READ_LOCK=y
+CONFIG_INLINE_READ_LOCK_BH=y
+CONFIG_INLINE_READ_LOCK_IRQ=y
+CONFIG_INLINE_READ_LOCK_IRQSAVE=y
+CONFIG_INLINE_READ_TRYLOCK=y
+CONFIG_INLINE_READ_UNLOCK=y
+CONFIG_INLINE_READ_UNLOCK_BH=y
+CONFIG_INLINE_READ_UNLOCK_IRQ=y
+CONFIG_INLINE_READ_UNLOCK_IRQRESTORE=y
+CONFIG_INLINE_SPIN_LOCK=y
+CONFIG_INLINE_SPIN_LOCK_BH=y
+CONFIG_INLINE_SPIN_LOCK_IRQ=y
+CONFIG_INLINE_SPIN_LOCK_IRQSAVE=y
+CONFIG_INLINE_SPIN_TRYLOCK=y
+CONFIG_INLINE_SPIN_TRYLOCK_BH=y
+CONFIG_INLINE_SPIN_UNLOCK_BH=y
+CONFIG_INLINE_SPIN_UNLOCK_IRQ=y
+CONFIG_INLINE_SPIN_UNLOCK_IRQRESTORE=y
+CONFIG_INLINE_WRITE_LOCK=y
+CONFIG_INLINE_WRITE_LOCK_BH=y
+CONFIG_INLINE_WRITE_LOCK_IRQ=y
+CONFIG_INLINE_WRITE_LOCK_IRQSAVE=y
+CONFIG_INLINE_WRITE_TRYLOCK=y
+CONFIG_INLINE_WRITE_UNLOCK=y
+CONFIG_INLINE_WRITE_UNLOCK_BH=y
+CONFIG_INLINE_WRITE_UNLOCK_IRQ=y
+CONFIG_INLINE_WRITE_UNLOCK_IRQRESTORE=y
+CONFIG_INOTIFY_USER=y
+CONFIG_INPUT_88PM80X_ONKEY=m
+CONFIG_INPUT_88PM860X_ONKEY=m
+CONFIG_INPUT_AD714X=m
+CONFIG_INPUT_AD714X_I2C=m
+CONFIG_INPUT_AD714X_SPI=m
+CONFIG_INPUT_ADXL34X=m
+CONFIG_INPUT_ADXL34X_I2C=m
+CONFIG_INPUT_ADXL34X_SPI=m
+CONFIG_INPUT_APEX=m
+CONFIG_INPUT_ARIZONA_HAPTICS=m
+CONFIG_INPUT_ATI_REMOTE2=m
+CONFIG_INPUT_ATLAS_BTNS=m
+CONFIG_INPUT_ATMEL_CAPTOUCH=m
+CONFIG_INPUT_AXP20X_PEK=m
+CONFIG_INPUT_BMA150=m
+CONFIG_INPUT_CM109=m
+CONFIG_INPUT_CMA3000=m
+CONFIG_INPUT_CMA3000_I2C=m
+CONFIG_INPUT_CPCAP_PWRBUTTON=m
+CONFIG_INPUT_DA9052_ONKEY=m
+CONFIG_INPUT_DA9055_ONKEY=m
+CONFIG_INPUT_DA9063_ONKEY=m
+CONFIG_INPUT_DRV260X_HAPTICS=m
+CONFIG_INPUT_DRV2665_HAPTICS=m
+CONFIG_INPUT_DRV2667_HAPTICS=m
+CONFIG_INPUT_E3X0_BUTTON=m
+CONFIG_INPUT_EVBUG=m
+CONFIG_INPUT_EVDEV=y
+CONFIG_INPUT_FF_MEMLESS=m
+CONFIG_INPUT_GP2A=m
+CONFIG_INPUT_GPIO_BEEPER=m
+CONFIG_INPUT_GPIO_DECODER=m
+CONFIG_INPUT_GPIO_ROTARY_ENCODER=m
+CONFIG_INPUT_GPIO_TILT_POLLED=m
+CONFIG_INPUT_HISI_POWERKEY=m
+CONFIG_INPUT_IDEAPAD_SLIDEBAR=m
+CONFIG_INPUT_IMS_PCU=m
+CONFIG_INPUT_JOYDEV=m
+CONFIG_INPUT_JOYSTICK=y
+CONFIG_INPUT_KEYBOARD=y
+CONFIG_INPUT_KEYSPAN_REMOTE=m
+CONFIG_INPUT_KXTJ9=m
+# CONFIG_INPUT_KXTJ9_POLLED_MODE is not set
+CONFIG_INPUT_LEDS=m
+CONFIG_INPUT_MATRIXKMAP=m
+CONFIG_INPUT_MAX77693_HAPTIC=m
+CONFIG_INPUT_MAX8925_ONKEY=m
+CONFIG_INPUT_MAX8997_HAPTIC=m
+CONFIG_INPUT_MC13783_PWRBUTTON=m
+CONFIG_INPUT_MISC=y
+CONFIG_INPUT_MMA8450=m
+CONFIG_INPUT_MOUSE=y
+CONFIG_INPUT_MOUSEDEV=y
+CONFIG_INPUT_MOUSEDEV_PSAUX=y
+CONFIG_INPUT_MOUSEDEV_SCREEN_X=1024
+CONFIG_INPUT_MOUSEDEV_SCREEN_Y=768
+CONFIG_INPUT_PALMAS_PWRBUTTON=m
+CONFIG_INPUT_PCAP=m
+CONFIG_INPUT_PCF50633_PMU=m
+CONFIG_INPUT_PCF8574=m
+CONFIG_INPUT_PCSPKR=m
+CONFIG_INPUT_PM8941_PWRKEY=m
+CONFIG_INPUT_PM8XXX_VIBRATOR=m
+CONFIG_INPUT_PMIC8XXX_PWRKEY=m
+CONFIG_INPUT_POLLDEV=m
+CONFIG_INPUT_POWERMATE=m
+CONFIG_INPUT_PWM_BEEPER=m
+CONFIG_INPUT_PWM_VIBRA=m
+CONFIG_INPUT_REGULATOR_HAPTIC=m
+CONFIG_INPUT_RETU_PWRBUTTON=m
+CONFIG_INPUT_SOC_BUTTON_ARRAY=m
+CONFIG_INPUT_SPARSEKMAP=m
+CONFIG_INPUT_TABLET=y
+CONFIG_INPUT_TOUCHSCREEN=y
+CONFIG_INPUT_TPS65218_PWRBUTTON=m
+CONFIG_INPUT_TWL4030_PWRBUTTON=m
+CONFIG_INPUT_TWL4030_VIBRA=m
+CONFIG_INPUT_TWL6040_VIBRA=m
+CONFIG_INPUT_UINPUT=y
+CONFIG_INPUT_WISTRON_BTNS=m
+CONFIG_INPUT_WM831X_ON=m
+CONFIG_INPUT_XEN_KBDDEV_FRONTEND=m
+CONFIG_INPUT_YEALINK=m
+CONFIG_INSTRUCTION_DECODER=y
+CONFIG_INTEL_BXT_PMIC_THERMAL=m
+CONFIG_INTEL_BXT_PMIC_THERMAL=m
+CONFIG_INTEL_CHT_INT33FE=m
+CONFIG_INTEL_GTT=y

+CONFIG_INTEGRITY=y
+CONFIG_INTEGRITY_ASMMETRIC_KEYS=y
+CONFIG_INTEGRITY_AUDBIT=y
+CONFIG_INTEGRITY_SIGNATURE=y
+CONFIG_INTEGRITY_TRUSTED_KEYRING=y
## CONFIG_INTEL_ATOMISP is not set
## CONFIG_INTEL_ATOMISP2_PM is not set
+CONFIG_INTEL_BXTWC_PMIC_TMU=m
+CONFIG_INTEL_BXT_PMIC_THERMAL=m
+CONFIG_INTEL_CHT_INT33FE=m
+CONFIG_INTEL_GTT=y
+CONFIG_INTEL_HID_EVENT=m
+CONFIG_INTEL_IDLE=y
+CONFIG_INTEL_IDMA64=m
+CONFIG_INTEL_INT0002_VGPIO=m
+CONFIG_INTEL_IOATDMA=m
+CONFIG_INTEL_IOMMU=y
+# CONFIG_INTEL_IOMMU_DEFAULT_ON is not set
+CONFIG_INTEL_IOMMU_FLOPPY_WA=y
+CONFIG_INTEL_IOMMU_SVM=y
+CONFIG_INTEL_IPS=m
+CONFIG_INTEL_ISH_HID=m
+CONFIG_INTEL_MEI=m
+CONFIG_INTEL_MEI_ME=m
+CONFIG_INTEL_MEI_TXE=m
+CONFIG_INTEL_MEI_WDT=m
+CONFIG_INTEL_MENLOW=m
+CONFIG_INTEL_MFLD_THERMAL=m
+CONFIG_INTEL_MIC_BUS=m
+CONFIG_INTEL_MIC_CARD=m
+CONFIG_INTEL_MIC_HOST=m
+CONFIG_INTEL_MIC_X100_DMA=m
+CONFIG_INTEL_MID_POWER_BUTTON=m
+CONFIG_INTEL_MID_PTI=m
+CONFIG_INTEL_MID_WATCHDOG=m
+CONFIG_INTEL_OAKTRAIL=m
+CONFIG_INTEL_PCH_THERMAL=m
+CONFIG_INTEL_PMC_CORE=y
+CONFIG_INTEL_PMC_IPC=m
+CONFIG_INTEL_POWERCLAMP=m
+CONFIG_INTEL_PUNIT_IPC=m
+CONFIG_INTEL_RAPL=m
+CONFIG_INTEL_RDT=y
+CONFIG_INTEL_RST=m
+CONFIG_INTEL_SCU_IPC=y
+CONFIG_INTEL_SCU_IPC_UTIL=m
+CONFIG_INTEL_SCU_WATCHDOG=y
+CONFIG_INTEL_SMARTCONNECT=m
+CONFIG_INTEL_SOC_DTS_IOSF_CORE=m
+CONFIG_INTEL_SOC_DTS_THERMAL=m
+CONFIG_INTEL_SOC_PMIC=y
+CONFIG_INTEL_SOC_PMIC_BXTWC=m
+CONFIG_INTEL_SOC_PMIC_CHTDC_TI=m
+CONFIG_INTEL_SOC_PMIC_CHTWC=y
+CONFIG_INTEL_TELEMETRY=m
+CONFIG_INTEL_TH=m
+# CONFIG_INTEL_TH_DEBUG is not set
+CONFIG_INTEL_TH_GTH=m
+CONFIG_INTEL_TH_MSU=m
+CONFIG_INTEL_TH_PCI=m
+CONFIG_INTEL_TH_PTI=m
+CONFIG_INTEL_TH_STH=m
+CONFIG_INTEL_TURBO_MAX_3=y
+CONFIG_INTEL_TXT=y
+CONFIG_INTEL_VBTN=m
+CONFIG_INTEL_WMI_THUNDERBOLT=m
+CONFIG_INTEL_XWAY_PHY=y
+CONFIG_INTERVAL_TREE=y
+# CONFIG_INTERVAL_TREE_TEST is not set
+CONFIG_INV_MPU6050_I2C=m
+CONFIG_INV_MPU6050_IIO=m
+CONFIG_INV_MPU6050_SPI=m
+CONFIG_IOMMU_API=y
+# CONFIG_IOMMU_DEBUG is not set
+CONFIG_IOMMU_DMA=y
+CONFIG_IOMMU_HELPER=y
+CONFIG_IOMMU_IO_PGTABLE=y
+# CONFIG_IOMMU_IO_PGTABLE_ARMV7S is not set
+CONFIG_IOMMU_IO_PGTABLE_LPAE=y
+# CONFIG_IOMMU_IO_PGTABLE_LPAE_SELFTEST is not set
+# CONFIG_IOMMU_STRESS is not set
+CONFIG_IOMMU_SUPPORT=y
+CONFIG_IOSCHED_BFQ=m
+CONFIG_IOSCHED_CFQ=y
+CONFIG_IOSCHED_DEADLINE=y
+CONFIG_IOSCHED_NOOP=y
+CONFIG_IOSF_MBI=y
+CONFIG_IOSF_MBI_DEBUG=y
+# CONFIG_IO_DELAY_0X80 is not set
+CONFIG_IO_DELAY_0XED=y
+# CONFIG_IO_DELAY_NONE is not set
+CONFIG_IO_DELAY_TYPE_0X80=0
+CONFIG_IO_DELAY_TYPE_0XED=1
+CONFIG_IO_DELAY_TYPE_NONE=3
+CONFIG_IO_DELAY_TYPE_UDELAY=2
+# CONFIG_IO_DELAY_UDELAY is not set
+CONFIG_IO_EVENT_IRQ=y
+# CONFIG_IO_STRICT_DEVMEM is not set
+CONFIG_IP6_NF_FILTER=m
+CONFIG_IP6_NF_IPTABLES=m
+CONFIG_IP6_NF_MANGLE=m
+CONFIG_IP6_NF_MATCH_AH=m
+CONFIG_IP6_NF_MATCH_EUI64=m
+CONFIG_IP6_NF_MATCH_FRAG=m
+CONFIG_IP6_NF_MATCH_HL=m
+CONFIG_IP6_NF_MATCH_IPV6HEADER=m
+CONFIG_IP6_NF_MATCH_MH=m
+CONFIG_IP6_NF_MATCH_OPTS=m
+CONFIG_IP6_NF_MATCH_RPFILTER=m
+CONFIG_IP6_NF_MATCH_RT=m
+CONFIG_IP6_NF_NAT=m
+CONFIG_IP6_NF_RAW=m
+CONFIG_IP6_NF_SECURITY=m
+CONFIG_IP6_NF_TARGET_HL=m
+CONFIG_IP6_NF_TARGET_MASQUERADE=m
+CONFIG_IP6_NF_TARGET_NPT=m
+CONFIG_IP6_NF_TARGET_REJECT=m
+CONFIG_IP6_NF_TARGET_SYNPROXY=m
+CONFIG_IPC_NS=y
+CONFIG_IPDDP is not set
+CONFIG_IPIC is not set
+CONFIG_IPMI_DEVICE_INTERFACE=m
+CONFIG_IPMI_DMI_DECODE=y
+CONFIG_IPMI_PANIC_EVENT is not set
+CONFIG_IPMI_POWERNV=m
+CONFIG_IPMI_POWEROFF=m
+CONFIG_IPMI_PROC_INTERFACE=y
+CONFIG_IPMI_SI=m
+CONFIG_IPMI_SSIF=m
+CONFIG_IPMI_WATCHDOG=m
+CONFIG_IPPP_FILTER=y
+CONFIG_IPQ_GCC_4019=m
+CONFIG_IPQ_GCC_806X=m
+CONFIG_IPQ_GCC_8074=m
+CONFIG_IPQ_LCC_806X=m
+CONFIG_IPQ_LCC=m
+CONFIG_IPQ_MIP6=m
+CONFIG_IPQ_NDISC_NODETYPE=y
+CONFIG_IPQ_ROUTER_PREF=y
+CONFIG_IPQ_ROUTE_INFO=y
+CONFIG_IPQ_SEG6_HMAC=y
+CONFIG_IPQ_SEG6_LWTUNNEL=y
+CONFIG_IPQ_SUBTREES=y
+CONFIG_IPQ_TUNNEL=m
+CONFIG_IP6_FOU=m
+CONFIG_IP6_FOU_TUNNEL=m
+CONFIG_IP6_GRE=m
+CONFIG_IP6_ILA=m
+CONFIG_IP6_MIP6=m
+CONFIG_IP6_MROUTE=y
+CONFIG_IP6_MROUTE_MULTIPLE_TABLES=y
+CONFIG_IP6_MULTIPLE_TABLES=y
+CONFIG_IP6_NDISC_NODETYPE=y
+CONFIG_IP6_OPTIMISTIC_DAD is not set
+CONFIG_IP6_PIMSM_V2=y
+CONFIG_IP6_ROUTER_PREF=y
+CONFIG_IP6_ROUTE_INFO=y
+CONFIG_IP6_SEG6_HMAC=y
+CONFIG_IP6_SEG6_LWTUNNEL=y
+CONFIG_IP6_SIT=m
+CONFIG_IP6_SUBTREES=y
+CONFIG_IP6_TUNNEL=m
+CONFIG_IPV6_VTI=m
+CONFIG_IPVLAN=m
+CONFIG_IPVTAP=m
+CONFIG_IPW2100=m
+# CONFIG_IPW2100_DEBUG is not set
+CONFIG_IPW2100_MONITOR=y
+CONFIG_IPW2200=m
+# CONFIG_IPW2200_DEBUG is not set
+CONFIG_IPW2200_MONITOR=y
+CONFIG_IPW2200_PROMISCUOUS=y
+CONFIG_IPW2200_QOS=y
+CONFIG_IPW2200_RADIOTAP=y
+CONFIG_IPWIRELESS=m
+# CONFIG_IPX_INTERN is not set
+CONFIG_IP_ADVANCED_ROUTER=y
+CONFIG_IP_DCCP=m
+# CONFIG_IP_DCCP_CCID2_DEBUG is not set
+# CONFIG_IP_DCCP_CCID3_DEBUG is not set
+# CONFIG_IP_DCCP_DEBUG is not set
+CONFIG_IP_DCCP_TFRC_LIB=y
+CONFIG_IP_FIB_TRIE_STATS=y
+CONFIG_IP_MROUTE=y
+# CONFIG_IP_MROUTE_MULTIPLE_TABLES is not set
+CONFIG_IP_MULTICAST=y
+CONFIG_IP_MULTIPLE_TABLES=y
+CONFIG_IP_NF_ARPFILTER=m
+CONFIG_IP_NF_ARPTABLES=m
+CONFIG_IP_NF_ARP_MANGLE=m
+CONFIG_IP_NF_FILTER=m
+CONFIG_IP_NF_IPTABLES=m
+CONFIG_IP_NF_MANGLE=m
+CONFIG_IP_NF_MATCH_AH=m
+CONFIG_IP_NF_MATCH_ECN=m
+CONFIG_IP_NF_MATCH_RPFILTER=m
+CONFIG_IP_NF_MATCH_TTL=m
+CONFIG_IP_NF_NAT=m
+CONFIG_IP_NF_RAW=m
+CONFIG_IP_NF_SECURITY=m
+CONFIG_IP_NF_TARGET_CLUSTERIP=m
+CONFIG_IP_NF_TARGET_ECN=m
+CONFIG_IP_NF_TARGET_masquerade=m
+CONFIG_IP_NF_TARGET_NETMAP=m
+CONFIG_IP_NF_TARGET_REDIRECT=m
+CONFIG_IP_NF_TARGET_REJECT=m
+CONFIG_IP_NF_TARGET_SYNPROXY=m
+CONFIG_IP_NF_TARGET_TTL=m
+CONFIG_IP_PIMSM_V1=y
+CONFIG_IP_PIMSM_V2=y
+# CONFIG_IP_PNP is not set
+CONFIG_IP_ROUTE_CLASSID=y
+CONFIG_IP_ROUTE_MULTIPATH=y
+CONFIG_IP_ROUTE_VERBOSE=y
+CONFIG_IP_SCTP=m
+CONFIG_IP_SET=m
+CONFIG_IP_SET_BITMAP_IP=m
+CONFIG_IP_SET_BITMAP_IPMAC=m
+CONFIG_IP_SET_BITMAP_PORT=m
+CONFIG_IP_SET_HASH_IP=m
+CONFIG_IP_SET_HASH_IPMAC=m
+CONFIG_IP_SET_HASH_IPMARK=m
+CONFIG_IP_SET_HASH_IPPORT=m
+CONFIG_IP_SET_HASH_IPPORTIP=m
+CONFIG_IP_SET_HASH_IPPORTNET=m
+CONFIG_IP_SET_HASH_MAC=m
+CONFIG_IP_SET_HASH_NET=m
+CONFIG_IP_SET_HASH_NETINTERFACE=m
+CONFIG_IP_SET_HASH_NETNET=m
+CONFIG_IP_SET_HASH_NETPORT=m
+CONFIG_IP_SET_HASH_NETPORTNET=m
+CONFIG_IP_SET_LIST_SET=m
+CONFIG_IP_SET_MAX=256
+CONFIG_IP_VS=m

+# CONFIG_IP_VS_DEBUG is not set
+CONFIG_IP_VS_DH=m
+CONFIG_IP_VS_FO=m
+CONFIG_IP_VS_FTP=m
+CONFIG_IP_VS_IPV6=y
+CONFIG_IP_VS_LBLC=m
+CONFIG_IP_VS_LBLCR=m
+CONFIG_IP_VS_LC=m
+CONFIG_IP_VS_NFCT=y
+CONFIG_IP_VS_NQ=m
+CONFIG_IP_VS_OVF=m
+CONFIG_IP_VS_PE_SIP=m
+CONFIG_IP_VSPROTO_AH=y
+CONFIG_IP_VS_PROTO_AH_ESP=y
+CONFIG_IP_VS_PROTO_ESP=y
+CONFIG_IP_VS_PROTO_SCTP=y
+CONFIG_IP_VS_PROTO_TCP=y
+CONFIG_IP_VS_PROTO_UDP=y
+CONFIG_IP_VS_RR=m
+CONFIG_IP_VS_SED=m
+CONFIG_IP_VS_SH=m
+CONFIG_IP_VS_SH_TAB_BITS=8
+CONFIG_IP_VS_TAB_BITS=12
+CONFIG_IP_VS_WLC=m
+CONFIG_IR_SERIAL_TRANSMITTER=y
+CONFIG_IR_SHARP_DECODER=m
+CONFIG_IR_SIR=m
+CONFIG_IR_SONY_DECODER=m
+CONFIG_IR_SPI=m
+CONFIG_IR_STREAMZAP=m
+CONFIG_IR_SUNXI=m
+CONFIG_IR_TTUSBIR=m
+CONFIG_IR_WINBOND_CIR=m
+CONFIG_IR_XMP_DECODER=m
+CONFIG_ISA=y
+CONFIG_ISAPNP=y
+CONFIG_ISA_BUS=y
+CONFIG_ISA_DMA_API=y
+CONFIG_ISCSI_BOOT_SYSFS=m
+CONFIG_ISCSI_IBFT=m
+CONFIG_ISCSI_IBFT_FIND=y
+CONFIG_ISCSI_TARGET=m
+CONFIG_ISCSI_TARGET_CXGB4=m
+CONFIG_ISCSI_TCP=m
+CONFIG_ISDN=y
+CONFIG_ISDN_AUDIO=y
+CONFIG_ISDN_CAPI=m
+CONFIG_ISDN_CAPI_CAPI20=m
+CONFIG_ISDN_CAPI_CAPIDRV=m
+CONFIG_ISDN_CAPI_MIDDLEWARE=y
+CONFIG_ISDN_DIVAS=m
+CONFIG_ISDN_DIVAS_BRIPCI=y
+CONFIG_ISDN_DIVAS_DIVACAPI=m
+CONFIG_ISDN_DIVAS_MAINT=m
+CONFIG_ISDN_DIVAS_PRIPCI=y
+CONFIG_ISDN_DIVAS_USERIDI=m
+CONFIG_ISDN_DIVERSION=m
+CONFIG_ISDN_DRV_AVMB1_AVM_CS=m
+CONFIG_ISDN_DRV_AVMB1_B1ISA=m
+CONFIG_ISDN_DRV_AVMB1_B1PCI=m
+CONFIG_ISDN_DRV_AVMB1_B1PCIV4=y
+CONFIG_ISDN_DRV_AVMB1_B1PCMCIA=m
+CONFIG_ISDN_DRV_AVMB1_C4=m
+CONFIG_ISDN_DRV_AVMB1_T1ISA=m
+CONFIG_ISDN_DRV_AVMB1_T1PCI=m
+CONFIG_ISDN_DRV_GIGASET=m
+CONFIG_ISDN_DRV_HISAX=m
+CONFIG_ISDN_HDLC=m
+CONFIG_ISDN_I4L=m
+CONFIG_ISDN_MPP=y
+CONFIG_ISDN_PPP=y
+CONFIG_ISDN_PPP_BSDCOMP=m
+CONFIG_ISDN_PPP_VJ=y
+CONFIG_ISDN_TTY_FAX=y
+CONFIG_ISDN_X25=y
+CONFIG_ISI=m
+CONFIG_ISL29003=m
+CONFIG_ISL29020=m
+CONFIG_ISL29125=m
+CONFIG_ISO9660_FS=m
+CONFIG_IT8712F_WDT=m
+CONFIG_IT87_WDT=m
+CONFIG_ITCO_VENDOR_SUPPORT=y
+CONFIG_ITCO_WDT=m
+CONFIG_ITG3200=m
+CONFIG_IUCV=y
+CONFIG_IW3945=m
+CONFIG_IW4965=m
+CONFIG_IWLDVM=m
+CONFIG_IWLEGACY=m
+# CONFIG_IWLEGACY_DEBUG is not set
+CONFIG_IWLEGACY_DEBUGFS=y
+CONFIG_IWLMVM=m
+CONFIG_IWLWIFI=m
+# CONFIG_IWLMWIFI_BCAST_FILTERING is not set
++ CONFIG_IWLMWIFI_DEBUG is not set
+CONFIG_IWLMWIFI_DEBUGFS=y
+CONFIG_IWLMWIFI_DEVICE_TRACING=y
+CONFIG_IWLMWIFI_LEDS=y
+CONFIG_IWLMWIFI_OPMODE_MODULAR=y
+# CONFIG_IWLMWIFI_PCIE_RTPM is not set
+CONFIG_IWMMXT=y
+CONFIG_IXGB=m
+CONFIG_IXGBE=m
+CONFIG_IXGBEVF=m
+CONFIG_IXGBE_DCA=y
+CONFIG_IXGBE_DCB=y
+CONFIG_IXGBE_HWMON=y
+CONFIG_JBD2=y
+# CONFIG_JBD2_DEBUG is not set
+CONFIG_JFFS2_CMODE_FAVOURIZO=y
++ CONFIG_JFFS2_CMODE_NONE is not set
++ CONFIG_JFFS2_CMODE_PRIORITY is not set
++ CONFIG_JFFS2_CMODE_SIZE is not set
+CONFIG_JFFS2_COMPRESSION_OPTIONS=y
+CONFIG_JFFS2_FS=m
+CONFIG_JFFS2_FS_DEBUG=0
+CONFIG_JFFS2_FS_POSIX_ACL=y
+CONFIG_JFFS2_FS_SECURITY=y
+CONFIG_K3_DMA=m
+CONFIG_KALLSYMS=y
+CONFIG_KALLSYMS_ALL=y
+CONFIG_KALLSYMS_BASE_RELATIVE=y
+# CONFIG_KASAN is not set
+# CONFIG_KCOV is not set
+CONFIG_KDB_CONTINUE_CATASTROPHIC=0
+CONFIG_KDB_DEFAULT_ENABLE=0x1
+CONFIG_KDB_KEYBOARD=y
+CONFIG_KEMPLD_WDT=m
+# CONFIG_KERNEL_BZIP2 is not set
+# CONFIG_KERNEL_LZ4 is not set
+# CONFIG_KERNEL_LZMA is not set
+# CONFIG_KERNEL_LZO is not set
+CONFIG_KERNEL_MODE_NEON=y
+# CONFIG_KERNEL_NOBP is not set
+CONFIG_KERNEL_START=0xc000000000000000
+CONFIG_KERNFS=y
+CONFIG_KEXEC=y
+CONFIG_KEXEC_BZIMAGE_VERIFY_SIG=y
+CONFIG_KEXEC_CORE=y
+CONFIG_KEXEC_FILE=y
+CONFIG_KEXEC_JUMP=y
+CONFIG_KEXEC_VERIY_SIG=y
+CONFIG_KEYBBOARD_ADC=m
+CONFIG_KEYBBOARD_AD5520=m
+CONFIG_KEYBBOARD_AD5588=m
+CONFIG_KEYBBOARD_AD5589=m
+CONFIG_KEYBBOARD_ATKBD=y
+CONFIG_KEYBBOARD_BCM=m
+CONFIG_KEYBBOARD_CAP11XX=m
+CONFIG_KEYBBOARD_CROS_EC=m
+CONFIG_KEYBBOARD_DLINK_DIR685=m
+CONFIG_KEYBBOARD_GPIO=m
+CONFIG_KEYBBOARD_GPIO_POLLED=m
+CONFIG_KEYBBOARD_IMX=m
+CONFIG_KEYBBOARD_KKBD=m
+CONFIG_KEYBBOARD_LMKBD=m
+CONFIG_KEYBBOARD_LM8323=m
+CONFIG_KEYBBOARD_LM8333=m
+CONFIG_KEYBBOARD_MATRIX=m
+CONFIG_KEYBBOARD_MAX7359=m
+CONFIG_KEYBBOARD_MCS=m
+CONFIG_KEYBBOARD_MPR121=m
+CONFIG_KEYBBOARD_NEWTON=m
+CONFIG_KEYBBOARD_NVEC=m
+CONFIG_KEYBBOARD_OMAP4=m
+CONFIG_KEYBBOARD_OPENCORES=m
+CONFIG_KEYBBOARD_PMIC8XXX=m
+CONFIG_KEYBOARD_QT1070=m
+CONFIG_KEYBOARD_QT2160=m
+CONFIG_KEYBOARD_SAMSUNG=m
+CONFIG_KEYBOARD_SH_KEYSC=m
+CONFIG_KEYBOARD_SNVS_PWRKEY=m
+CONFIG_KEYBOARD_STMPE=m
+CONFIG_KEYBOARD_STOWAWAY=m
+# CONFIG_KEYBOARD_SUN4I_LRADC is not set
+CONFIG_KEYBOARD_SUNKBD=m
+CONFIG_KEYBOARD_TC3589X=m
+CONFIG_KEYBOARD_TCA6416=m
+CONFIG_KEYBOARD_TCA8418=m
+CONFIG_KEYBOARD_TEGRA=m
+CONFIG_KEYBOARD_TM2_TOUCHKEY=m
+CONFIG_KEYBOARD_TWL4030=m
+CONFIG_KEYBOARD_XTKBD=m
+CONFIG_KEYS=y
+CONFIG_KEYS_COMPAT=y
+CONFIG_KEY_DH_OPERATIONS=y
+CONFIG_KGDB=y
+CONFIG_KGDB_KDB=y
+CONFIG_KGDB_LOW_LEVEL_TRAP=y
+CONFIG_KGDB_SERIAL_CONSOLE=y
+# CONFIG_KGDB_TESTS is not set
+CONFIG_KINGSUN_DONGLE=m
+CONFIG_KMSG_IDS=y
+CONFIG_KMX61=m
+CONFIG_KPROBES=y
+CONFIG_KPROBES_ON_FTRACE=y
+# CONFIG_KPROBES_SANITY_TEST is not set
+CONFIG_KPROBE_EVENTS=y
+CONFIG_KRETPROBES=y
+CONFIG_KS0108=m
+CONFIG_KS0108_DELAY=2
+CONFIG_KS0108_PORT=0x378
+CONFIG_KS7010=m
+CONFIG_KS8842=m
+CONFIG_KS8851=m
+CONFIG_KS8851_MLL=m
+CONFIG_KS959_DONGLE=m
+CONFIG_KSDAZZLE_DONGLE=m
+CONFIG_KSM=y
+CONFIG_KSZ884X_PCI=m
+CONFIG_KUSER_HELPERS=y
+CONFIG_KVM_AMD=m
+CONFIG_KVM_ARM_HOST=y
+CONFIG_KVM_ARM_PMU=y
+CONFIG_KVM_ASYNC_PF=y
+CONFIG_KVM_ASYNC_PF_SYNC=y
+CONFIG_KVM_BOOK3S_64=m
+CONFIG_KVM_BOOK3S_64_HANDLER=y
+CONFIG_KVM_BOOK3S_64_HV=m
+CONFIG_KVM_BOOK3S_64_PR=m
+CONFIG_KVM_BOOK3S_HANDLER=y
+# CONFIG_KVM_BOOK3S_HV_EXIT_TIMING is not set
+CONFIG_KVM_BOOK3S_HV_POSSIBLE=y
+CONFIG_KVM_BOOK3S_PR_POSSIBLE=y
+CONFIG_KVM_COMPAT=y
+CONFIG_KVM_DEBUG_FS=y
+CONFIG_KVM_GENERIC_DIRTYLOG_READ_PROTECT=y
+CONFIG_KVM_GUEST=y
+CONFIG_KVM_INTEL=m
+CONFIG_KVM_MMMIO=y
+# CONFIG_KVM_MMU_AUDIT is not set
+# CONFIG_KVM_S390_UCONTROL is not set
+CONFIG_KVM_VFIO=y
+CONFIG_KVM_XICS=y
+CONFIG_KVM_XIVE=y
+CONFIG_KXCIK1013=m
+CONFIG_KXSD9=m
+CONFIG_KXSD9_I2C=m
+CONFIG_KXSD9_SPI=m
+CONFIG_L2TP=m
+CONFIG_L2TP_DEBUGFS=m
+CONFIG_L2TP_ETH=m
+CONFIG_L2TP_IP=m
+CONFIG_L2TP_V3=y
+CONFIG_LANCE=m
+CONFIG_LANMEDIA=m
+CONFIG_LAPBETHER=m
+CONFIG_LATTICE_ECP3_CONFIG=m
+CONFIG_LBDAF=y
+CONFIG_LCD_AMS369FG06=m
+CONFIG_LCD_CLASS_DEVICE=m
+CONFIG_LCD_HX8357=m
+CONFIG_LCD_ILI922X=m
+CONFIG_LCD_ILI9320=m
+CONFIG_LCD_L4F00242T03=m
+CONFIG_LCD_LD9040=m
+CONFIG_LCD_LMS283GF05=m
+CONFIG_LCD_LMS501KF03=m
+CONFIG_LCD_LTV350QV=m
+CONFIG_LCD_PLATFORM=m
+CONFIG_LCD_S6E63M0=m
+CONFIG_LCD_TDO24M=m
+CONFIG_LCD_VGG2432A4=m
+CONFIG_LCS=m
+CONFIG_LDISC_AUTOLOAD=y
+# CONFIG_LDM_DEBUG is not set
+# CONFIG_LD_HEAD_STUB_CATCH is not set
+CONFIG_LEDS_88PM860X=m
+CONFIG_LEDS_AAT1290=m
+CONFIG_LEDS_ADP5520=m
+CONFIG_LEDS_APU=m
+CONFIG_LEDS_AS3645A=m
+CONFIG_LEDS_ASCI3=y
+CONFIG_LEDS_BCM6328=m
+CONFIG_LEDS_BCM6358=m
+CONFIG_LEDS_BD2802=m
+CONFIG_LEDS_BLINKM=m
+CONFIG_LEDS_BRIGHTNESS_HW_CHANGED=y
+CONFIG_LEDS_CLASS=y
+CONFIG_LEDS_CLASS_FLASH=m
+CONFIG_LEDS_CLEVO_MAIL=m
+CONFIG_LEDS_CPCAP=m
+CONFIG_LEDS_DA903X=m
+CONFIG_LEDS_DA9052=m
+CONFIG_LEDS_DAC124S085=m
+CONFIG_LEDS_GPIO=m
+CONFIG_LEDS_INTEL_SS4200=m
+CONFIG_LEDS_IS31FL319X=m
+CONFIG_LEDS_IS31FL32XX=m
+CONFIG_LEDS_KTD2692=m
+CONFIG_LEDS_LM3530=m
+CONFIG_LEDS_LM3533=m
+CONFIG_LEDS_LM355x=m
+CONFIG_LEDS_LM3642=m
+CONFIG_LEDS_LP3944=m
+CONFIG_LEDS_LP3952=m
+CONFIG_LEDS_LP5521=m
+CONFIG_LEDS_LP5523=m
+CONFIG_LEDS_LP5562=m
+CONFIG_LEDS_LP55XX_COMMON=m
+CONFIG_LEDS_LP8501=m
+CONFIG_LEDS_LP8788=m
+CONFIG_LEDS_LP8860=m
+CONFIG_LEDS_LT3593=m
+CONFIG_LEDS_MAX77693=m
+CONFIG_LEDS_MAX8997=m
+CONFIG_LEDS_MC13783=m
+CONFIG_LEDS_MENF21BMC=m
+CONFIG_LEDS_MLXCPLD=m
+CONFIG_LEDS_MT6323=m
+CONFIG_LEDS_NET48XX=m
+CONFIG_LEDS_NIC78BX=m
+CONFIG_LEDS_NS2=m
+CONFIG_LEDS_OT200=m
+CONFIG_LEDS_PCA9532=m
+CONFIG_LEDS_PCA9532_GPIO=y
+CONFIG_LEDS_PCA955X=m
+CONFIG_LEDS_PCA955X_GPIO=y
+CONFIG_LEDS_PCA963X=m
+CONFIG_LEDS_PM8058=m
+CONFIG_LEDS_POWERNV=m
+CONFIG_LEDS_PWM=m
+# CONFIG_LEDS_QCOM_LPG is not set
+CONFIG_LEDS_REGULATOR=m
+CONFIG_LEDS_SYSCON=y
+CONFIG_LEDS_TCA6507=m
+CONFIG_LEDS_TLC591XX=m
+CONFIG_LEDS_TRIGGER=y
+CONFIG_LEDS_TRIGGER_ACTIVITY=m
+CONFIG_LEDS_TRIGGER_BACKLIGHT=m
+CONFIG_LEDS_TRIGGER_CAMERA=m
+CONFIG_LEDS_TRIGGER_CPU=y
+CONFIG_LEDS_TRIGGER_DEFAULT_ON=m
+CONFIG_LEDS_TRIGGER_DISK=y
+CONFIG_LEDS_TRIGGER_GPIO=m
+CONFIG_LEDS_TRIGGER_HEARTBEAT=m
+CONFIG_LEDS_TRIGGER_MTD=y
+CONFIG_LEDS_TRIGGER_ONESHOT=m
+CONFIG_LEDS_TRIGGER_PANIC=y
+CONFIG_LEDS_TRIGGER_TIMER=m
+CONFIG_LEDS_TRIGGER_TRANSIENT=m
+CONFIG_LEDS_USER=m
+CONFIG_LEDS_WM831X_STATUS=m
+CONFIG_LEDS_WM8350=m
+CONFIG_LEDS_WRAP=m
+CONFIG_LED_TRIGGER_PHY=y
+CONFIG_LEGACY_PTYS=y
+CONFIG_LEGACY_PTY_COUNT=0
+CONFIG_LEGACY_VSYSCALL_EMULATE=y
+# CONFIG_LEGACY_VSYSCALL_NATIVE is not set
+# CONFIG_LEGACY_VSYSCALL_NONE is not set
+CONFIG_LIB80211=m
+CONFIG_LIB80211_CRYPT_CCMP=m
+CONFIG_LIB80211_CRYPT_TKIP=m
+CONFIG_LIB80211_CRYPT_WEP=m
+# CONFIG_LIB80211_DEBUG is not set
+CONFIG_LIBCRC32C=m
+CONFIG_LIBERTAS=m
+CONFIG_LIBERTAS_CS=m
+# CONFIG_LP_CONSOLE is not set
+CONFIG_LRU_CACHE=m
+CONFIG_LSI_ET1011C_PHY=m
+CONFIG_LSM_MMAP_MIN_ADDR=0
+CONFIG_LS_SCFG_MSI=y
+CONFIG_LTC2471=m
+CONFIG_LTC2485=m
+CONFIG_LTC2497=m
+CONFIG_LTC2632=m
+CONFIG_LTE_GDM724X=m
+CONFIG_LTPC=m
+CONFIG_LTR501=m
+## CONFIG_LUSTRE_DEBUG_EXPENSIVE_CHECK is not set
+CONFIG_LUSTRE_FS=m
+CONFIG_LUSTRE_TRANSLATE_ERRNOS=y
+CONFIG_LWTUNNEL=y
+CONFIG_LWTUNNEL_BPF=y
+CONFIG_LXT_PHY=m
+CONFIG_LZHC_COMPRESS=m
+CONFIG_LZ4_COMPRESS=m
+CONFIG_LZ4_DECOMPRESS=y
+CONFIG_LZO_COMPRESS=y
+CONFIG_LZO_DECOMPRESS=y
+## CONFIG_M486 is not set
+## CONFIG_M586 is not set
+## CONFIG_M586MMX is not set
+## CONFIG_M586TSC is not set
+CONFIG_M62332=m
+CONFIG_M686=y
+CONFIG_MA600_DONGLE=m
+CONFIG_MAC80211=m
+CONFIG_MAC80211_DEBUGFS=y
+## CONFIG_MAC80211_DEBUG_MENU is not set
+CONFIG_MAC80211_HAS_RC=y
+CONFIG_MAC80211_HWSIM=m
+CONFIG_MAC80211_LEDS=y
+CONFIG_MAC80211_MESH=y
+CONFIG_MAC80211_MESSAGE_TRACING=y
+CONFIG_MAC80211_RC_DEFAULT="minstrel_ht"
+CONFIG_MAC80211_RC_DEFAULT_MINSTREL=y
+CONFIG_MAC80211_RC_MINSTREL=y
+CONFIG_MAC80211_RC_MINSTREL_HT=y
+CONFIG_MAC80211_RC_MINSTREL_VHT=y
+CONFIG_MAC80211_STA_HASH_MAX_SIZE=0
+CONFIG_MAC802154=m
+CONFIG_MACB=m
+CONFIG_MACB_PCI=m
+CONFIG_MACB_USE_HWSTAMP=y
+CONFIG_MACH_Z_WDT=m
+CONFIG_MACH_ARMADA_370=y
+CONFIG_MACH_ARMADA_375=y
+CONFIG_MACH_ARMADA_38X=y
+CONFIG_MACH_ARMADA_39X=y
+CONFIG_MACH_ARMADA_XP=y
+CONFIG_MACH_ARTPEC6=y
+CONFIG_MACH_BERLIN_BG2=y
+CONFIG_MACH_BERLIN_BG2CD=y
+CONFIG_MACH_BERLIN_BG2Q=y
+CONFIG_MACH_DOVE=y
+CONFIG_MACH_MESON6=y
+CONFIG_MACH_MESON8=y
+CONFIG_MACH_MESON8B=y
+CONFIG_MACH_MT2701=y
+CONFIG_MACH_MT6589=y
+CONFIG_MACH_MT6592=y
+CONFIG_MACH_MT7623=y
+CONFIG_MACH_MT8127=y
+CONFIG_MACH_MT8135=y
+CONFIG_MACH_MVEBU_ANY=y
+CONFIG_MACH_MVEBU_V7=y
+CONFIG_MACH_OMAP3517EVM=y
+CONFIG_MACH_OMAP3_PANDORA=y
+CONFIG_MACH_OMAP_GENERIC=y
+CONFIG_MACINTOSH_DRIVERS=y
+CONFIG_MACSEC=m
+CONFIG_MAC_VLAN=m
+CONFIG_MAC_VTAP=m
+CONFIG_MAC_EMUMOUSEBTN=m
+CONFIG_MAG3110=m
+CONFIG_MAGIC_SYSRQ=y
+CONFIG_MAGIC_SYSRQ_DEFAULT_ENABLE=0x01b6
+CONFIG_MAGIC_SYSRQ_SERIAL=y
+CONFIG_MAILBOX_TEST=m
+CONFIG_MANAGER_SBS=m
+CONFIG_MANDATORY_FILE_LOCKING=y
+CONFIG_MANTIS_CORE=m
+CONFIG_MARCH_Z10=y
+CONFIG_MARCH_Z10_TUNE=y
+CONFIG_MARCH_Z13=y
+CONFIG_MARCH_Z13_TUNE=y
+CONFIG_MARCH_Z14=y
+CONFIG_MARCH_Z14_TUNE=y
+CONFIG_MARCH_Z196=y
+CONFIG_MARCH_Z196_TUNE=y
+CONFIG_MARCH_Z900=y
+CONFIG_MARCH_Z900_TUNE=y
+CONFIG_MDIO=m
+## CONFIG_MDIO_BCM_IPROC is not set
+CONFIG_MDIO_BCM_UNIMAC=m
+CONFIG_MDIO_BUS_MUX_BCM_IPROC=y
+CONFIG_MDIO_BUS_MUX_GPIO=m
+CONFIG_MDIO_BUS_MUX_MMIOREG=m
+CONFIG_MDIO_CAVIUM=m
+CONFIG_MDIO_DEVICE=y
+CONFIG_MDIO_GPIO=m
+CONFIG_MDIO_HISI_FEMAC=m
+CONFIG_MDIO_OCTEON=m
+## CONFIG_MDIO_SUN4I is not set
+CONFIG_MDIO_XGENE=m
+CONFIG_MDM_GCC_9615=m
+CONFIG_MDM_LCC_9615=m
+CONFIG_MD_AUTODETECT=y
+CONFIG_MD_CLUSTER=m
+CONFIG_MD_FAULTY=m
+CONFIG_MD_LINEAR=m
+CONFIG_MD_RAID0=m
+CONFIG_MD_RAID1=m
+CONFIG_MD_RAID10=m
+CONFIG_MD_RAID456=m
+CONFIG_MEDIATEK_MT6577_AUXADC=m
+CONFIG_MEDIATEK_WATCHDOG=m
+CONFIG_MEDIA_ALTERA_CI=m
+CONFIG_MEDIA_ANALOG_TV_SUPPORT=y
+CONFIG_MEDIA_ATTACH=y
+CONFIGMEDIA_CAMERA_SUPPORT=y
+CONFIG_MEDIA_CEC_RC=y
+CONFIG_MEDIA_CEC_SUPPORT=y
+CONFIG_MEDIA_COMMON_OPTIONS=y
+CONFIG_MEDIA_CONTROLLER=y
+## CONFIG_MEDIA_CONTROLLER_DVB is not set
+CONFIG_MEDIA_DIGITAL_TV_SUPPORT=y
+CONFIG_MEDIA_PCI_SUPPORT=y
+CONFIG_MEDIA_RADIO_SUPPORT=y
+CONFIG_MEDIA_SDR_SUPPORT=y
+CONFIG_MEDIA_SUBDRV_AUTOSELECT=y
+CONFIG_MEDIA_TUNER=m
+CONFIG_MEDIA_TUNER_E4000=m
+CONFIG_MEDIA_TUNER_FC0011=m
+CONFIG_MEDIA_TUNER_FC0012=m
+CONFIG_MEDIA_TUNER_FC0013=m
+CONFIG_MEDIA_TUNER_FC2580=m
+CONFIG_MEDIA_TUNER_IT913X=m
+CONFIG_MEDIA_TUNER_MATH=m
+CONFIG_MEDIA_TUNER_MAX2165=m
+CONFIG_MEDIA_TUNER_MC44S803=m
+CONFIG_MEDIA_TUNER_MSI001=m
+CONFIG_MEDIA_TUNER_MT2060=m
+CONFIG_MEDIA_TUNER_MT2063=m
+CONFIG_MEDIA_TUNER_MT20XX=m
+CONFIG_MEDIA_TUNER_MT2131=m
+CONFIG_MEDIA_TUNER_MT2266=m
+CONFIG_MEDIA_TUNER_MXL301RF=m
+CONFIG_MEDIA_TUNER_MXL5005S=m
+CONFIG_MEDIA_TUNER_MXL5007T=m
+CONFIG_MEDIA_TUNER_QM1D1C0042=m
+CONFIG_MEDIA_TUNER_QT1010=m
+CONFIG_MEDIA_TUNER_R820T=m
+CONFIG_MEDIA_TUNER_SI2157=m
+CONFIG_MEDIA_TUNER_SIMPLE=m
+CONFIG_MEDIA_TUNER_TDA18212=m
+CONFIG_MEDIA_TUNER_TDA18218=m
+CONFIG_MEDIA_TUNER_TDA18271=m
+CONFIG_MEDIA_TUNER_TDA827X=m
+CONFIG_MEDIA_TUNER_TDA8290=m
+CONFIG_MEDIA_TUNER_TDA9887=m
+CONFIG_MEDIA_TUNER_TEA5761=m
+CONFIG_MEDIA_TUNER_TEA5767=m
+CONFIG_MEDIA_TUNER_TUA9001=m
+CONFIG_MEDIA_TUNER_XC2028=m
+CONFIG.MEDIA_TUNER_XC4000=m
+CONFIG.MEDIA_TUNER_XC5000=m
+CONFIG.MEDIA_USB_SUPPORT=y
## CONFIG_MEFFICEON is not set
+CONFIG_MEGARAID_MAILBOX=m
+CONFIG_MEGARAID_MM=m
## CONFIG_MELAN is not set
+CONFIG_MEMBARRIER=y
+CONFIG_MEMCG=y
+CONFIG_MEMCG_SWAP=y
## CONFIG_MEMCG_SWAP_ENABLED is not set
+CONFIG_MEMORY_BALLOON=y
+CONFIG_MEMORY_FAILURE=y
+CONFIG_MEMORY_HOTPLUG=y
+CONFIG_MEMORY_HOTPLUG_SPARSE=y
+CONFIG_MEMORY_HOTREMOVE=y
+CONFIG_MEMORY_ISOLATION=y
+CONFIG_MEMORY_NOTIFIER_ERROR_INJECT=m
## CONFIG_MEMSTICK_DEBUG is not set
+CONFIG_MEMSTICK_JMICRON_38X=m
+CONFIG_MEMSTICK_R592=m
+CONFIG_MEMSTICK_REALTEK_PCI=m
+CONFIG_MEMSTICK_REALTEK_USB=m
+CONFIG_MEMSTICK_TIFM_MSm
+# CONFIG_MEMSTICK_UNSAFE_RESUME is not set
+CONFIG_MEMTEST=y
+CONFIG_MENF21BMC_WATCHDOG=m
+CONFIG_MEN_A21_WDT=m
+CONFIG_MEN_Z188_ADC=m
+CONFIG_MESON6_TIMER=y
+CONFIG_MESON_GXBB_WATCHDOG=m
+CONFIG_MESON_GXL_PHY=m
+CONFIG_MESON_GX_PM_DOMAINS=y
+CONFIG_MESON_GX_SOCINFO=y
+CONFIG_MESON_IRQ_GPIO=y
+CONFIG_MESON_MX_EFUSE=m
+CONFIG_MESON_MX_SOCINFO=y
+CONFIG_MESON_SARADC=m
+# CONFIG_MESON_SM is not set
+CONFIG_MESON_WATCHDOG=m
+CONFIG_MESSAGE_LOGLEVEL_DEFAULT=4
+CONFIG_MFD_88PM800=m
+CONFIG_MFD_88PM805=m
+CONFIG_MFD_88PM860X=y
+CONFIG_MFD_AAT2870_CORE=y
+# CONFIG_MFD_AC100 is not set
+CONFIG_MFD.ACT8945A=m
+CONFIG_MFD_ARIZONA=y
+CONFIG_MFD_ARIZONA_I2C=m
+CONFIG_MFD_ARIZONA_SPI=m
+CONFIG_MFD_AS3711=y
+CONFIG_MFD_AS3722=y
+CONFIG_MFD_ASIC3=y
+CONFIG_MFD_ATMEL_FLEXCOM=m
+CONFIG_MFD_ATMEL_HLCDC=m
+CONFIG_MFD_AXP20X=m
+CONFIG_MFD_AXP20X_I2C=m
+CONFIG_MFD_AXP20X_RSB=m
+CONFIG_MFD_BCM590XX=m
+CONFIG_MFD_BD9571MWV=m
+CONFIG_MFD_CPCAP=m
+CONFIG_MFD_CROS_EC=m
+CONFIG_MFD_CROS_EC_I2C=m
+CONFIG_MFD_CROS_EC_SPI=m
+CONFIG_MFD_CS47L24=y
+CONFIG_MFD_CS5535=m
+CONFIG_MFD_DA9052_I2C=y
+CONFIG_MFD_DA9052_SPI=m
+CONFIG_MFD_DA9055=y
+CONFIG_MFD_DA9062=m
+CONFIG_MFD_DA9063=y
+CONFIG_MFD_DA9150=m
+CONFIG_MFD_DLN2=m
+CONFIG_MFD_EXYNOS_LPASS=m
+CONFIG_MFD_Hi6421_PMIC=m
+CONFIG_MFD_Hi655X_PMIC=m
+CONFIG_MFD_INTEL_LPSS=m
+CONFIG_MFD_INTEL_LPSS ACPI=m
+CONFIG_MFD_INTEL_LPSS_PCIE=m
+CONFIG_MFD_INTEL_MSIC=y
+CONFIG_MFD_INTEL_QUARK_I2C_GPIO=m
+CONFIG_MFD_LM3533=m
+CONFIG_MFD_LP3943=m
+CONFIG_MFD_LP8788=y
+CONFIG_MFD_MAX14577=y
+CONFIG_MFD_MAX7620=y
+CONFIG_MFD_MAX77686=y
+CONFIG_MFD_MAX77693=y
+CONFIG_MFD_MAX77843=y
+CONFIG_MFD_MAX8907=m
+CONFIG_MFD_MAX8925=y
+CONFIG_MFD_MAX8997=y
+CONFIG_MFD_MAX8998=y
+CONFIG_MFD_MC13XXX=m
+CONFIG_MFD_MC13XXX_I2C=m
+CONFIG_MFD_MC13XXX_SPI=m
+CONFIG_MFD_MENF21BMC=m
+CONFIG_MFD_NVEC=m
+CONFIG_MFD_OMAP_USB_HOST=y
+CONFIG_MFD_PALMAS=y
+CONFIG_MFD_PCF50633=m
+CONFIG_MFD_PM8XXX=m
+CONFIG_MFD_QCOM_RPM=m
+CONFIG_MFD_RC5T583=y
+CONFIG_MFD_RDC321X=m
+CONFIG_MFD_RETU=m
+CONFIG_MFD_RK808=m
+CONFIG_MFD_RN5T618=m
+CONFIG_MFD_RT5033=m
+CONFIG_MFD_SC27XX_PMIC=m
+CONFIG_MFD_SEC_CORE=y
+CONFIG_MFD_SI476X_CORE=m
+CONFIG_MFD_SKY81452=m
+CONFIG_MFD_SM501_GPIO=y
+CONFIG_MFD_SMSC=y
+CONFIG_MFD_SPMI_PMIC=m
+CONFIG_MFD_STMPE=y
+CONFIG_MFD_SUN4I_GPADC=m
+CONFIG_MFD_SUN6I_PRCM=y
+CONFIG_MFD_T7L66XB=y
+CONFIG_MFD_TC3589X=y
+CONFIG_MFD_TC6387XB=y
+CONFIG_MFD_TC6393XB=y
+CONFIG_MFD_TIMBERDALE=m
+CONFIG_MFD_TI_LMU=m
+CONFIG_MFD_TI_LP873X=m
+CONFIG_MFD_TI_LP87565=m
+CONFIG_MFD_TPS65086=m
+CONFIG_MFD_TPS65090=y
+CONFIG_MFD_TPS65218=m
+CONFIG_MFD_TPS6586X=y
+CONFIG_MFD_TPS65910=y
+CONFIG_MFD_TPS65912=y
+CONFIG_MFD_TPS65912_I2C=y
+CONFIG_MFD_TPS65912_SPI=y
+CONFIG_MFD_TPS68470=y
+CONFIG_MFD_TPS80031=y
+CONFIG_MFD_TWL4030_AUDIO=y
+CONFIG_MFD_VEXPRESS_SYSREG=y
+CONFIG_MFD_VIPERBOARD=m
+CONFIG_MFD_VX855=m
+CONFIG_MFD_WL1273_CORE=m
+CONFIG_MFD_WM5102=y
+CONFIG_MFD_WM5110=y
+CONFIG_MFD_WM831X=y
+CONFIG_MFD_WM831X_I2C=y
+CONFIG_MFD_WM831X_SPI=y
+CONFIG_MFD_WM8350=y
+CONFIG_MFD_WM8350_I2C=y
+CONFIG_MFD_WM8400=y
+CONFIG_MFD_WM8994=m
+CONFIG_MFD_WM8997=y
+CONFIG_MFD_WM8998=y
+# CONFIG_MGEODEGX1 is not set
+# CONFIG_MGEODE_LX is not set
+CONFIG_MICREL_KS8995MA=m
+CONFIG_MICREL_PHY=m
+CONFIG_MICROCHIP_KSZ=m
+CONFIG_MICROCHIP_KSZ_SPI_DRIVER=m
+CONFIG_MICROCHIP_PHY=m
+CONFIG_MICROCODE=y
+CONFIG_MICROCODE_AMD=y
+CONFIG_MICROCODE_INTEL=y
+CONFIG_MICROCODE_OLD_INTERFACE=y
+CONFIG_MICROSEMI_PHY=m
+CONFIG_MIC_COSM=m
+CONFIG_MIGHT_HAVE_CACHE_L2X0=y
+CONFIG_MIGHT_HAVE_PCI=y
+CONFIG_MIGRATE_VMA_HELPER=y
+CONFIG_MIGRATION=y
+# CONFIG_MINIX_FS_NATIVE_ENDIAN is not set
+CONFIG_MISC_FILESYSTEMS=y
+CONFIG_MISC_RTSX_USB=m
+CONFIG_MISDN=m
+CONFIG_MISDN_AVMFRITZ=m
+CONFIG_MISDN_DSP=m
+CONFIG_MISDN_HFCMULTI=m
+CONFIG_MISDN_HFCPCL=m
+CONFIG_MISDN_HFCUSB=m
+CONFIG_MISDN_INFINEON=m
+CONFIG_MISDN_IPAC=m
+CONFIG_MISDN_ISAR=m
+CONFIG_MISDN_L1OIP=m
+CONFIG_MISDN_NETJET=m
+CONFIG_MISDN_SPEEDFAX=m
+CONFIG_MISDN_W6692=m
+CONFIG_MIXCOMWD=m
+# CONFIG_MK6 is not set
+# CONFIG_MK7 is not set
+# CONFIG_MK8 is not set
+CONFIG_MKISS=m
+CONFIG_MLX4_CORE=m
+CONFIG_MLX4_CORE_GEN2=y
+CONFIG_MLX4_DEBUG=y
+CONFIG_MLX4_EN=m
+CONFIG_MLX4_EN_DCB=y
+CONFIG_MLX4_INFINIBAND=m
+CONFIG_MLX5_ACCEL=y
+CONFIG_MLX5_CORE=m
+CONFIG_MLX5_CORE_EN=y
+CONFIG_MLX5_CORE_EN_DCB=y
+CONFIG_MLX5_CORE_IPOIB=y
+CONFIG_MLX5_EN_IPSEC=y
+CONFIG_MLX5_ESWITCH=y
+CONFIG_MLX5_FPGA=y
+CONFIG_MLX5_INFINIBAND=m
+CONFIG_MLX5_MPFS=m
+CONFIG_MLX90614=m
+CONFIG_MLXFW=m
+CONFIG_MLXSW_CORE=m
+CONFIG_MLXSW_CORE_HWMON=y
+CONFIG_MLXSW_CORE_THERMAL=y
+CONFIG_MLXSW_I2C=m
+CONFIG_MLXSW_MINIMAL=m
+CONFIG_MLXSW_PCI=m
+CONFIG_MLXSW_SPECTRUM=m
+CONFIG_MLXSW_SPECTRUM_DCB=y
+CONFIG_MLXSW_SWITCHIB=m
+CONFIG_MLXSW_SWITCHX2=m
+CONFIG_MLX_CPLD_PLATFORM=m
+CONFIG_MLX_PLATFORM=m
+CONFIG_MMA7455=m
+CONFIG_MMA7455_I2C=m
+CONFIG_MMA7455_SPI=m
+CONFIG_MMA7660=m
+CONFIG_MMA8452=m
+CONFIG_MMA9551=m
+CONFIG_MMA9551_CORE=m
+CONFIG_MMA9553=m
+CONFIG_MMC35240=m
+CONFIG_MMC_ARMMMCI=y
+CONFIG_MMC_BCM2835=m
+CONFIG_MMC_BLOCK_MINORS=8
+CONFIG_MMC_CAVIUM_THUNDERX=m
+CONFIG_MMC_CB710=m
+# CONFIG_MMC_DEBUG is not set
+CONFIG_MMC_DW=m
+CONFIG_MMC_DW_EXYNOS=m
+CONFIG_MMC_DW_K3=m
+CONFIG_MMC_DW_PCI=m
+CONFIG_MMC_DW_PLTFM=m
+CONFIG_MMC_DW_RKCHIP=m
+CONFIG_MMC_MESON_GX=m
+CONFIG_MMC_MESON_MX_SDIO=m
+CONFIG_MMC_MTK=m
+CONFIG_MMC_MVSdio=m
+CONFIG_MMC_MXC=m
+CONFIG_MMC_OMAP=m
+CONFIG_MMC_OMAP_HS=y
+CONFIG_MMC_QCOM_DML=y
+CONFIG_MMC_REALTEK_PCI=m
+CONFIG_MMC_REALTEK_USB=m
+CONFIG_MMC_RICOH_MMC=y
+CONFIG_MMC_SDHCI_ACPm=m
+CONFIG_MMC_SDHCI_BIG_ENDIAN_32BIT_BYTE_SWAPPER=y
+CONFIG_MMC_SDHCI_BRCMSTB=m
+CONFIG_MMC_SDHCI_CADENCE=m
+CONFIG_MMC_SDHCI_DOVE=m
+CONFIG_MMC_SDHCI_ESDHC_IMX=y
+CONFIG_MMC_SDHCI_F_SDH30=m
+CONFIG_MMC_SDHCI_IO_ACCESSORS=y
+CONFIG_MMC_SDHCI_IPROCM=m
+CONFIG_MMC_SDHCI_MSM=m
+CONFIG_MMC_SDHCI_OF_ARASAN=m
+CONFIG_MMC_SDHCI_OF_AT91=m
+CONFIG_MMC_SDHCI_OF_ESDHCI=m
+CONFIG_MMC_SDHCI_OF_HLWD=m
+CONFIG_MMC_SDHCI_OMAP=m
+CONFIG_MMC_SDHCI_PCI=m
+CONFIG_MMC_SDHCI_PXAV3=m
+CONFIG_MMC_SDHCI_S3C=m
+CONFIG_MMC_SDHCI_S3C_DMA=y
+CONFIG_MMC_SDHCI_TEGRA=m
+CONFIG_MMC_SDHCI_XENON=m
+CONFIG_MMC_SDHI=m
+CONFIG_MMC_SDHI_INTERNAL_DMAC=m
+CONFIG_MMC_SDHI_SYS_DMAC=m
+CONFIG_MMC_SDRICOH_CS=m
+CONFIG_MMC_SH_MMCIF=m
+CONFIG_MMC_SPI=m
+CONFIG_MMC_SUNXI=m
+# CONFIG_MMC_TEST is not set
+CONFIG_MMC_TIFM_SD=m
+CONFIG_MMC_TMIO=m
+CONFIG_MMC_TMIO_CORE=m
+CONFIG_MMC_TOSHIBA_PCI=m
+CONFIG_MMC_USDH6ROL0=m
+CONFIG_MMC_USHC=m
+CONFIG_MMC_VIA_SDMMC=m
+CONFIG_MMC_VUB300=m
+CONFIG_MMC_WBSD=m
+CONFIG_MMIOTRACE=y
+# CONFIG_MMIOTRACE_TEST is not set
+# CONFIG_MMIO_NVRAM is not set
+CONFIG_MMU=y
+CONFIG_MMU_NOTIFIER=y
+CONFIG_MODIFY_LDT_SYSCALL=y
+CONFIG_MODULES=y
+CONFIG_MODULES_TREE_LOOKUP=y
+CONFIG_MODULES_USE_ELF_REL=y
+CONFIG_MODULES_USE_ELF_RELA=y
+# CONFIG_MODULE_COMPRESS is not set
+# CONFIG_MODULE_FORCE_LOAD is not set
+# CONFIG_MODULE_FORCE_UNLOAD is not set
+CONFIG_MODULE_REL_CRCs=y
+CONFIG_MODULE_SIG=y
+CONFIG_MODULE_SIG_ALL=y
+# CONFIG_MODULE_SIG_FORCE is not set
+CONFIG_MODULE_SIG_HASH="sha512"
+CONFIG_MODULE_SIG_KEY="certs/signing_key.pem"
+# CONFIG_MODULE_SIG_SHA1 is not set
+# CONFIG_MODULE_SIG_SHA224 is not set
+# CONFIG_MODULE_SIG_SHA256 is not set
+# CONFIG_MODULE_SIG_SHA384 is not set
+CONFIG_MODULE_SIG_SHA512=y
+CONFIG_MODULE_SRCVERSION_ALL=y
+CONFIG_MODULE_UNLOAD=y
+CONFIG_MODVERSIONS=y
+CONFIG_MONREADER=m
+CONFIG_MONWRITER=m
+CONFIG_MOST=m
+CONFIG_MOSTCORE=m
+CONFIG_MOUSE_APPLETOUCH=m
+CONFIG_MOUSE_BCM5974=m
+CONFIG_MOUSE_CYAPA=m
+CONFIG_MOUSE_ELAN_I2C=m
+CONFIG_MOUSE_ELAN_I2C_I2C=y
+CONFIG_MOUSE_ELAN_I2C_SMBUS=y
+CONFIG_MOUSE_GPIO=m
+## CONFIG_MOUSE_INPORT is not set
+CONFIG_MOUSE_LOGIBM=m
+CONFIG_MOUSE_PC110PAD=m
+CONFIG_MOUSE_PS2=m
+CONFIG_MOUSE_PS2_ALPS=y
+CONFIG_MOUSE_PS2_BVD=y
+CONFIG_MOUSE_PS2_CYPRESS=y
+CONFIG_MOUSE_PS2_ELANTECH=y
+CONFIG_MOUSE_PS2_FOCALTECH=y
+CONFIG_MOUSE_PS2_LIFEBOOK=y
+CONFIG_MOUSE_PS2_LOGIPS2PP=y
+CONFIG_MOUSE_PS2_SENTELIC=y
+CONFIG_MOUSE_PS2_SMBUS=y
+CONFIG_MOUSE_PS2_SYNAPTICS=y
+CONFIG_MOUSE_PS2_SYNAPTICS_SMBUS=y
+CONFIG_MOUSE_PS2_TOUCHKIT=y
+CONFIG_MOUSE_PS2_TRACKPOINT=y
+CONFIG_MOUSE_PS2_VMMOUSE=y
+CONFIG_MOUSE_SERIAL=m
+CONFIG_MOUSE_SYNAPTICS_I2C=m
+CONFIG_MOUSE_SYNAPTICS_USB=m
+CONFIG_MOUSE_VSXXXXA=m
+CONFIG_MOXA_INTELLIO=m
+CONFIG_MOXA_SMARTIO=m
+## CONFIG_MPENTIUM4 is not set
+## CONFIG_MPENTIUMII is not set
+## CONFIG_MPENTIUMIII is not set
+## CONFIG_MPENTIUMMM is not set
+CONFIG_MPIC=y
+## CONFIG_MPIC_MSGR is not set
+CONFIG_MPIC_U3_HT_IRQS is not set
+CONFIG_MPIC_WEIRD is not set
+CONFIG_MPILIB=y
+CONFIG_MPL115=m
+CONFIG_MPL115_I2C=m
+CONFIG_MPL115_SPI=m
+CONFIG_MPL3115=m
+CONFIG_MPLS=y
+CONFIG_MPLS_IPTUNNEL=m
+CONFIG_MPLS_ROUTING=m
+CONFIG_MPROFILE_KERNEL=y
+CONFIG_MPSC is not set
+CONFIG_MPU3050=m
+CONFIG_MPU3050_I2C=m
+CONFIG_MQ_IOSCHED_DEADLINE=m
+CONFIG_MQ_IOSCHED_KYBER=m
+CONFIG_MRP=m
+CONFIG_MS5611=m
+CONFIG_MS5611_I2C=m
+CONFIG_MS5611_SPI=m
+CONFIG_MS5637=m
+CONFIG_MSDOS_FS=m
+CONFIG_MSDOS_PARTITION=y
+CONFIG_MSI_BITMAP_SELFTEST is not set
+CONFIG_MSI_LAPTOP=m
+CONFIG_MSI_WMI=m
+CONFIG_MSM_GCC_8660=m
+CONFIG_MSM_GCC_8916=m
+CONFIG_MSM_GCC_8960=m
+CONFIG_MSM_GCC_8974=m
+CONFIG_MSM_GCC_8994=m
+CONFIG_MSM_GCC_8996=m
+CONFIG_MSM_IOMMU is not set
+CONFIG_MSM_LCC_8960=m
+CONFIG_MSM_MMCC_8960=m
+CONFIG_MSM_MMCC_8974=m
+CONFIG_MSM_MMCC_8996=m
+CONFIG_MSPRO_BLOCK=m
+CONFIG_MS_BLOCK=m
+CONFIG_MT7601U=m
+CONFIG_MTDConsulta_163=128
+CONFIG_MTDConsulta_TOTAL_SIZE=4096
+CONFIG_MTD_ABSENT=m
+CONFIG_MTD_AFS_PARTS=m
+CONFIG_MTD_AMD76XROM=m
+CONFIG_MTD_AR7_PARTS=m
+CONFIG_MTD_BCM47XXSFLASH=m
+CONFIG_MTD_BLOCK2MTD=m
+CONFIG_MTD_BLOCK_RO=m
+CONFIG_MTD_CFI=m
+## CONFIG_MTD_CFI_ADV_OPTIONS is not set
+CONFIG_MTD_CFI_AMDSTD=m
+CONFIG_MTD_CFI_I1=y
+CONFIG_MTD_CFI_I2=y
+## CONFIG_MTD_CFI_I4 is not set
+## CONFIG_MTD_CFI_I8 is not set
+CONFIG_MTD_CFI_INTELEXT=m
+CONFIG_MTD_CFI_STAA=m
+CONFIG_MTD_CFI_UTIL=m
+CONFIG_MTD_CK804XROM=m
+CONFIG_MTD_COMPLEX_MAPPINGS=y
+CONFIG_MTD_DATAFLASH=m
+CONFIG_MTD_DATAFLASH_OTP=y
+## CONFIG_MTD_DATAFLASH_WRITE_VERIFY is not set
+CONFIG_MTD_DOCG3=m
+CONFIG_MTD_ESB2ROM=m
+CONFIG_MTD_GEN_PROBE=m
+CONFIG_MTD_GPIO_ADDR=m
+CONFIG_MTD_ICHXROM=m
+CONFIG_MTD_IMPA7=m
+CONFIG_MTD_INTEL_VR_NOR=m
+CONFIG_MTD_JEDECPROBE=m
+CONFIG_MTD_L440GX=m
+CONFIG_MTD_LATCH_ADDR=m
+CONFIG_MTD_LPDDR=m
+CONFIG_MTD_LPDDR2_NVM=m
+CONFIG_MTD_M25P80=m
+## CONFIG_MTD_MAP_BANK_WIDTH_1=y
+## CONFIG_MTD_MAP_BANK_WIDTH_16 is not set
+CONFIG_MTD_MAP_BANK_WIDTH_2=y
+## CONFIG_MTD_MAP_BANK_WIDTH_32 is not set
+## CONFIG_MTD_MAP_BANK_WIDTH_8 is not set
+CONFIG_MTD_MAP_BANK_WIDTH_4=y
+## CONFIG_MTD_MAP_BANK_WIDTH_8 is not set
+CONFIG_MTD_MCHP23K256=m
+CONFIG_MTD_MT81xx_NOR=m
+CONFIG_MTD_MTDGRAM=m
+CONFIG_MTD_NAND_BRCMNAND=m
+CONFIG_MTD_NAND_CAFE=m
+CONFIG_MTD_NAND_CS553X=m
+CONFIG_MTD_NAND_DENALI=m
+CONFIG_MTD_NAND_DENALI_DT=m
+CONFIG_MTD_NAND_DENALI_PCI=m
+CONFIG_MTD_NAND_DISKONCHIP=m
+## CONFIG_MTD_NAND_DISKONCHIP_BBTWRITE is not set
+CONFIG_MTD_NAND_DISKONCHIP_PROBE_ADDRESS=0
+## CONFIG_MTD_NAND_DISKONCHIP_PROBE_ADVANCED is not set
+CONFIG_MTD_NAND_DOCG4=m
+CONFIG_MTD_NAND_ECC_BCH=y
+# CONFIG_MTD_NAND_ECC_SMC is not set
+CONFIG_MTD_NAND_FSL_IFC=m
+CONFIG_MTD_NAND_GPIO=m
+CONFIG_MTD_NAND_GPMI_NAND=m
+CONFIG_MTD_NAND_HISI504=m
+CONFIG_MTD_NAND_MTK=m
+CONFIG_MTD_NAND_MXC=m
+CONFIG_MTD_NAND_NANDSIM=m
+CONFIG_MTD_NAND_OMAP2=y
+CONFIG_MTD_NAND_OMAP_BCH=y
+CONFIG_MTD_NAND_ORION=m
+CONFIG_MTD_NAND_PLATFORM=m
+CONFIG_MTD_NAND_PXA3xx=m
+CONFIG_MTD_NAND_QCOM=m
+CONFIG_MTD_NAND_RICOH=m
+# CONFIG_MTD_NAND_SUNXI is not set
+CONFIG_MTD_NAND_TMIO=m
+# CONFIG_MTD_NAND_VF610_NFC is not set
+CONFIG_MTD_NETtel=m
+CONFIG_MTD_ONENAND=m
+CONFIG_MTD_ONENAND_2X_PROGRAM=y
+CONFIG_MTD_ONENAND_GENERIC=m
+CONFIG_MTD_ONENAND_OMAP2=m
+# CONFIG_MTD_ONENAND_OTP is not set
+CONFIG_MTD_ONENAND_VERIFY_WRITE=y
+CONFIG_MTD_OOPS=m
+# CONFIG_MTD_PARTITIONED_MASTER is not set
+CONFIG_MTD_PCI=m
+CONFIG_MTD_PCMCIA=m
+# CONFIG_MTD_PCMCIA_ANONYMOUS is not set
+CONFIG_MTD_PHRAM=m
+CONFIG_MTD_PHYSMAP=m
+# CONFIG_MTD_PHYSMAP_COMPAT is not set
+CONFIG_MTD_PHYSMAP_OF=m
+CONFIG_MTD_PHYSMAP_OF_GEMINI=y
+CONFIG_MTD_PHYSMAP_OF_VERSATILE=y
+CONFIG_MTD_PLATRAM=m
+CONFIG_MTD_PMC551=m
+# CONFIG_MTD_PMC551_BUGFIX is not set
+# CONFIG_MTD_PMC551_DEBUG is not set
+CONFIG_MTD_POWERNV_FLASH=m
+CONFIG_MTD_QINFO_PROBE=m
+CONFIG_MTD_RAM=m
+CONFIG_MTD_REDBOOT_DIRECTORY_BLOCK=-1
+CONFIG_MTD_REDBOOT_PARTS_READONLY is not set
+# CONFIG_MTD_REDBOOT_PARTS_UNALLOCATED is not set
+CONFIG_MTD_ROM=m
+CONFIG_MTD_SBC_GXX=m
+CONFIG_MTD_SCB2_FLASH=m
+CONFIG_MTD_SCx200_DOCFLASH=m
+CONFIG_MTD_SHARPSL_PARTS=m
+CONFIG_MTD_SLRAM=m
+CONFIG_MTD_SM_COMMON=m
+CONFIG_MTD_SPINAND_MT29F=m
+CONFIG_MTD_SPINAND_ONDIEECC=y
+CONFIG_MTD_SPI_NOR=m
+CONFIG_MTD_SPI_NOR_USE_4K_SECTORS=y
+CONFIG_MTD_SST25L=m
+CONFIG_MTD_SWAP=m
+# CONFIG_MTD_TESTS is not set
+CONFIG_MTD_UBI=m
+CONFIG_MTD_UBI_BEB_LIMIT=20
+CONFIG_MTD_UBI_BLOCK=y
+CONFIG_MTD_UBI_FASTMAP=y
+CONFIG_MTD_UBI_GLUEBI=m
+CONFIG_MTD_UBI_EL_THRESHOLD=4096
+# CONFIG_MTK_EFUSE is not set
+CONFIG_MTK_INFRA_CFG=y
+# CONFIG_MTK_IOMMU is not set
+# CONFIG_MTK_IOMMU_V1 is not set
+CONFIG_MTK_PMIC_WRAP=m
+CONFIG_MTK_SCP_SYS=y
+CONFIG_MTK_SMI=y
+CONFIG_MTK_THERMAL=m
+CONFIG_MTK_TIMER=y
+CONFIG_MTRR=y
+CONFIG_MTRR_SANITIZER=y
+CONFIG_MTRR_SANITIZER_ENABLE_DEFAULT=1
+CONFIG_MTRR_SANITIZER_SPARE_REG_NR_DEFAULT=1
+CONFIG_MULTIPLAYER=m
+CONFIG_MULTIUSER=y
+CONFIG_MULTI_IRQ_HANDLER=y
+CONFIG_MUSB_PIO_ONLY=y
+CONFIG_MUX_SPIN_ON_OWNER=y
+CONFIG_MUX_ADG792A=m
+CONFIG_MUX_GPIO=m
+CONFIG_MUX_MMIO=m
+CONFIG_MV643XX_ETH=m
+CONFIG_MVEBU_CLK_COMMON=y
+CONFIG_MVEBU_CLK_COREDIV=y
+CONFIG_MVEBU_CLK_CPU=y
+CONFIG_MVEBU_DEVBUS=y
+CONFIG_MVEBU_MBUS=y
+# CONFIG_MVIA3_2 is not set
+# CONFIG_MVIA7 is not set
+CONFIG_MVMIO=m
+CONFIG_MVNETA=m
+# CONFIG_MVNETA_BM is not set
+# CONFIG_MVNETA_BM_ENABLE is not set
+CONFIG_MVPP2=m
+CONFIG_MV_XOR=y
+CONFIG_MV_XOR_V2=y
+CONFIG_MWAVE=m
+CONFIG_MWFIIEX=m
+CONFIG_MWFIIEX_PCIE=m
+CONFIG_MWFIIEX_SDIO=m
+CONFIG_MWFIIEX_USB=m
+# CONFIG_MWINCHIP3D is not set
+# CONFIG_MWINCHIPC6 is not set
+CONFIG_MWL8K=m
+CONFIG_MX3_IPU=y
+CONFIG_MX3_IPU_IRQS=4
+CONFIG_MXC4005=m
+CONFIG_MXC6255=m
+CONFIG_MXC_TZIC=y
+CONFIG_MXM_WMI=m
+CONFIG_MXS_DMA=y
+CONFIG_MYR110GE=m
+CONFIG_MYRI110GE_DCA=y
+CONFIG_N2=m
+CONFIG_NAMESPACES=y
+CONFIG_NATIONAL_PHY=m
+CONFIG_NATSEMI=m
+CONFIG_NAU7802=m
+CONFIG_NBPFAXI_DMA=m
+CONFIG_NCPFS_EXTRAS=y
+CONFIG_NCPFS_IOCTL_LOCKING=y
+CONFIG_NCPFS_NFS_NS=y
+CONFIG_NCPFS_NLS=y
+CONFIG_NCPFS_OS2_NS=y
+CONFIG_NCPFS_PACKET_SIGNING=y
+# CONFIG_NCPFS_SMALLDOS is not set
+CONFIG_NCPFS_STRONG=y
+CONFIG_ND_BLK=m
+CONFIG_ND_BTT=m
+CONFIG_ND_CLAIM=y
+CONFIG_ND_PFN=m
+CONFIG_NE2000=m
+CONFIG_NE2K_PCI=m
+CONFIG_NEED_DMA_MAP_STATE=y
+CONFIG_NEED_MULTIPLE_NODES=y
+CONFIG_NEED_NODE_MEMMAP_SIZE=y
+CONFIG_NEED_PER_CPU_EMBED_FIRST CHUNK=y
+CONFIG_NEED_PER_CPU_PAGE_FIRST CHUNK=y
+CONFIG_NEED_SG_DMA_LENGTH=y
+CONFIG_NEON=y
+CONFIG_NET=y
+CONFIG_NET5501=y
+CONFIG_NETCONSOLE=m
+CONFIG_NETCONSOLE_DYNAMIC=y
+CONFIG_NETDEVICES=y
+# CONFIG_NETDEV_NOTIFIER_ERROR_INJECT is not set
+CONFIG_NETFILTER=y
+CONFIG_NETFILTER_ADVANCED=y
+CONFIG_NETFILTER_INGRESS=y
+CONFIG_NETFILTER_NETLINK=m
+CONFIG_NETFILTER_NETLINK_ACCT=m
+CONFIG_NETFILTER_NETLINK_GLUE_CT=y
+CONFIG_NETFILTER_NETLINK_LOG=m
+CONFIG_NETFILTER_NETLINK_QUEUE=m
+CONFIG_NETFILTER_SYNPROXY=m
+CONFIG_NETFILTER_XTABLES=m
+CONFIG_NETFILTER_XT_CONNMARK=m
+CONFIG_NETFILTER_XT_IPS=m
+CONFIG_NETFILTER_XT_MATCH_ADDRTYPE=m
+CONFIG_NETFILTER_XT_MATCH_BPF=m
+CONFIG_NETFILTER_XT_MATCH_CGROUP=m
+CONFIG_NETFILTER_XT_MATCH_CLUSTER=m
+CONFIG_NETFILTER_XT_MATCH_COMMENT=m
+CONFIG_NETFILTER_XT_MATCH_CONNBYTES=m
+CONFIG_NETFILTER_XT_MATCH_CONNLABEL=m
+CONFIG_NETFILTER_XT_MATCH_CONNLIMIT=m
+CONFIG_NETFILTER_XT_MATCH_CONNMARK=m
+CONFIG_NETFILTER_XT_MATCH_CONNTRACK=m
+CONFIG_NETFILTER_XT_MATCH_CPU=m
+CONFIG_NETFILTER_XT_MATCH_DCCP=m
+CONFIG_NETFILTER_XT_MATCH_DEVGROUP=m
+CONFIG_NETFILTER_XT_MATCH_DSCP=m
+CONFIG_NETFILTER_XT_MATCH_ECN=m
+CONFIG_NETFILTER_XT_MATCH_ESP=m
+CONFIG_NETFILTER_XT_MATCH_HASHLIMIT=m
+CONFIG_NETFILTER_XT_MATCH_HELPER=m
+CONFIG_NETFILTER_XT_MATCH_IP=0=m
+CONFIG_NETFILTER_XT_MATCH_IPRANGE=m
+CONFIG_NETFILTER_XT_MATCH_IPVS=m
+CONFIG_NETFILTER_XT_MATCH_L2TP=m
+CONFIG_NETFILTER_XT_MATCH_LENGTH=m
+CONFIG_NETFILTER_XT_MATCH_LIMIT=m
+CONFIG_NETIUCV=m
+CONFIG_NETLABEL=y
+CONFIG_NETLINK_DIAG=m
+CONFIG_NETPOLL=y
+CONFIG_NETROM=m
+CONFIG_NETWORK_FILESYSTEMS=y
+CONFIG_NETWORK_PHY_TIMESTAMPING=y
+CONFIG_NETWORK_SECMARK=y
+CONFIG_NETXEN_NIC=m
+CONFIG_NET_9P=m
+# CONFIG_NET_9P_DEBUG is not set
+CONFIG_NET_9P_RDMA=m
+CONFIG_NET_9P_VIRTIO=m
+CONFIG_NET_9P_XEN=m
+CONFIG_NET_ACT_BPF=m
+CONFIG_NET_ACT_CONNMARK=m
+CONFIG_NET_ACT_CSUM=m
+CONFIG_NET_ACT_GACT=m
+# CONFIG_NET_ACT_IFE is not set
+CONFIG_NET_ACT_IPT=m
+CONFIG_NET_ACT_MIRRED=m
+CONFIG_NET_ACT_NAT=m
+CONFIG_NET_ACT_PEDIT=m
+CONFIG_NET_ACT_POLICE=m
+CONFIG_NET_ACT_SAMPLE=m
+CONFIG_NET_ACT_SIMP=m
+CONFIG_NET_ACT_SKBEDIT=m
+CONFIG_NET_ACT_SKBMOD=m
+CONFIG_NET_ACT_TUNNEL_KEY=m
+CONFIG_NET_ACT_VLAN=m
+CONFIG_NET_CALXEDA_XGMAC=m
+CONFIG_NET_CLS=y
+CONFIG_NET_CLS_ACT=y
+CONFIG_NET_CLS_BASIC=m
+CONFIG_NET_CLS_BPF=m
+CONFIG_NET_CLS_CGROUP=m
+CONFIG_NET_CLS_FLOW=m
+CONFIG_NET_CLS_FLOWER=m
+CONFIG_NET_CLS_FW=m
+# CONFIG_NET_CLS_IND is not set
+CONFIG_NET_CLS_MATCHALL=m
+CONFIG_NET_CLS_ROUTE4=m
+CONFIG_NET_CLS_RSVP=m
+CONFIG_NET_CLS_RSVP6=m
+CONFIG_NET_CLS_TCINDEX=m
+CONFIG_NET_CLS_U32=m
+CONFIG_NET_CORE=y
+CONFIG_NET_DCCPPROBE=m
+CONFIG_NET_DEVLINK=m
+CONFIG_NET_DROP_MONITOR=m
+CONFIG_NET_DSA=m
+CONFIG_NET_DSA_BCM_SF2=m
+# CONFIG_NET_DSA_LOOP is not set
+CONFIG_NET_DSA_MT7530=m
+CONFIG_NET_DSA_MV88E6060=m
+CONFIG_NET_DSA_MV88E6XXX=m
+CONFIG_NET_DSA_MV88E6XXX_GLOBAL2=y
+CONFIG_NET_DSA_QCA8K=m
+CONFIG_NET_DSA_SMSC_LAN9303=m
+CONFIG_NET_DSA_SMSC_LAN9303_I2C=m
+CONFIG_NET_DSA_SMSC_LAN9303_MDIO=m
+CONFIG_NET_DSA_TAG_BRCM=y
+CONFIG_NET_DSA_TAG_BRCM_PREPEND=y
+CONFIG_NET_DSA_TAG_DSA=y
+CONFIG_NET_DSA_TAG_EDSA=y
+CONFIG_NET_DSA_TAG_KSZ=y
+CONFIG_NET_DSA_TAG_LAN9303=y
+CONFIG_NET_DSA_TAG_MTK=y
+CONFIG_NET_DSA_TAG_QCA=y
+CONFIG_NET_DSA_TAG_TRAILER=y
+CONFIG_NET_EGRESS=y
+CONFIG_NET_EMATCH=y
+CONFIG_NET_EMATCH_CANID=m
+CONFIG_NET_EMATCH_CMP=m
+CONFIG_NET_EMATCH_IPSET=m
+CONFIG_NET_EMATCH_META=m
+CONFIG_NET_EMATCH_NBYTE=m
+CONFIG_NET_EMATCH_STACK=32
+CONFIG_NET_EMATCH_TEXT=m
+CONFIG_NET_EMATCH_U32=m
+CONFIG_NET_FC=y
+CONFIG_NET_FLOW_LIMIT=y
+CONFIG_NET_FOU=m
+CONFIG_NET_FOU_IP_TUNNELS=y
+CONFIG_NET_IFE=m
+CONFIG_NET_INGRESS=y
+CONFIG_NET_IPGRE=m
+CONFIG_NET_IPGRE_BROADCAST=y
+CONFIG_NET_IPGRE_DEMUX=m
+CONFIG_NET_IPIP=m
+CONFIG_NET_IPV6=m
+CONFIG_NET_IP_TUNNEL=m
+CONFIG_NET_KEY=m
+# CONFIG_NET_KEY_MIGRATE is not set
+CONFIG_NET_L3_MASTER_DEV=y
+CONFIG_NET_MPLS_GSO=m
+CONFIG_NET_NCSI=y
+CONFIG_NET_NS=y
+CONFIG_NET_NSH=m
+CONFIG_NET_PKTGEN=m
+CONFIG_NET_PTP_CLASSIFY=y
+CONFIG_NET_RX_BUSY_POLL=y
+CONFIG_NET_SB1000=m
+CONFIG_NET_SCHED=y
+CONFIG_NET_SCH_ATM=m
+CONFIG_NET_SCH_CBQ=m
+CONFIG_NET_SCH_CBS=m
+CONFIG_NET_SCH_CHOKE=m
+CONFIG_NET_SCH_CODEL=m
+# CONFIG_NET_SCH_DEFAULT is not set
+CONFIG_NET_SCH_DRR=m
+CONFIG_NET_SCH_DSMARK=m
+CONFIG_NET_SCH_FIFO=y
+CONFIG_NET_SCH_FQ=m
+CONFIG_NET_SCH_FQ_CODEL=m
+CONFIG_NET_SCH_GRED=m
+CONFIG_NET_SCH_HFSC=m
+CONFIG_NET_SCH_HHF=m
+CONFIG_NET_SCH_HTB=m
+CONFIG_NET_SCH_INGRESS=m
+CONFIG_NET_SCH_MQPRIO=m
+CONFIG_NET_SCH_MULTIQ=m
+CONFIG_NET_SCH_NETEM=m
+CONFIG_NET_SCH_PIE=m
+CONFIG_NET_SCH_PLUG=m
+CONFIG_NET_SCH_PRIO=m
+CONFIG_NET_SCH_QFQ=m
+CONFIG_NET_SCH_RED=m
+CONFIG_NET_SCH_SFB=m
+CONFIG_NET_SCH_SFQ=m
+CONFIG_NET_SCH_TBF=m
+CONFIG_NET_SCH_TEQL=m
+CONFIG_NET_SCTPPROBE=m
+CONFIG_NET_TCP_PROBE=m
+CONFIG_NET_TEAM=m
+CONFIG_NET_TEAM_MODE_ACTIVEBACKUP=m
+CONFIG_NET_TEAM_MODE_BROADCAST=m
+CONFIG_NET_TEAM_MODE_LOADBALANCE=m
+CONFIG_NET_TEAM_MODE_RANDOM=m
+CONFIG_NET_TEAM_MODE_ROUNDROBIN=m
+CONFIG_NET_TULIP=y
+CONFIG_NET_UDP_TUNNEL=m
+CONFIG_NET_VENDOR_8390=y
+CONFIG_NET_VENDOR_ALACRITECH=y
+CONFIG_NET_VENDOR_ALLWINNER=y
+CONFIG_NET_VENDOR_AMAZON=y
+CONFIG_NET_VENDOR_AQUANTIA=y
+CONFIG_NET_VENDOR_AURORA=y
+CONFIG_NET_VENDOR_CIRRUS=y
+CONFIG_NET_VENDOR_FARADAY=y
+CONFIG_NET_VENDOR_FREESCALE=y
+CONFIG_NET_VENDOR_FUJITSU=y
+CONFIG_NET_VENDOR_HISILICON=y
+CONFIG_NET_VENDOR_I825XX=y
+CONFIG_NET_VENDOR_IBM=y
+CONFIG_NET_VENDOR_MEDIATEK is not set
+CONFIG_NET_VENDOR_MELLANOX=y
+CONFIG_NET_VENDOR_MICROCHIP=y
+CONFIG_NET_VENDOR_NETRONOME=y
+CONFIG_NET_VENDOR_SOCIONEXT=y
+CONFIG_NET_VENDOR_SOLARFLARE=y
+CONFIG_NET_VENDOR_SYNOPSYS=y
+CONFIG_NET_VENDOR_XILINX=y
+CONFIG_NET_VENDOR_XIRCOM=y
+CONFIG_NET_VRF=m
+CONFIG_NET_XGENE=m
+CONFIG_NET_XGENE_V2=m
+CONFIG_NFC_DIGITAL=m
+CONFIG_NFC_FDP=m
+CONFIG_NFC_FDP_I2C=m
+CONFIG_NFC_HCI=m
+CONFIG_NFC_MEI_PHY=m
+CONFIG_NFC_MICROREAD=m
+CONFIG_NFC_MICROREAD_I2C=m
+CONFIG_NFC_MICROREAD_MEI=m
+CONFIG_NFC_MRVL=m
+CONFIG_NFC_MRVL_I2C=m
+CONFIG_NFC_MRVL_SPI=m
+CONFIG_NFC_MRVL_UART=m
+CONFIG_NFC_MRVL_USB=m
+CONFIG_NFC_NCI=m
+CONFIG_NFC_NCI_SPI=m
+CONFIG_NFC_NCI_UART=m
+CONFIG_NFC_NXP_NCI=m
+CONFIG_NFC_NXP_NCI_I2C=m
+CONFIG_NFC_PN533=m
+CONFIG_NFC_PN533_I2C=m
+CONFIG_NFC_PN533_USB=m
+CONFIG_NFC_PN544=m
+CONFIG_NFC_PN544_I2C=m
+CONFIG_NFC_PN544_MEI=m
+CONFIG_NFC_PORT100=m
+CONFIG_NFC_S3FWRN5=m
+CONFIG_NFC_S3FWRN5_I2C=m
+CONFIG_NFC_SHDLC=y
+CONFIG_NFC_SIM=m
+CONFIG_NFC_ST21NFCA=m
+CONFIG_NFC_ST21NFCA_I2C=m
+CONFIG_NFC_ST95HF=m
+CONFIG_NFC_ST_NCl=m
+CONFIG_NFC_ST_NCl_I2C=m
+CONFIG_NFC_TRF7970A=m
+CONFIG_NFP_APP_FLOWER=y
+## CONFIG_NFP_DEBUG is not set
+CONFIG_NFSD=m
+CONFIG_NFSD_BLOCKLAYOUT=y
+## CONFIG_NFSD_FAULT_INJECTION is not set
+CONFIG_NFSD_FLEXFILELAYOUT=y
+CONFIG_NFSD_PNFS=y
+CONFIG_NFSD_SCSILAYOUT=y
+CONFIG_NFSD_V2_ACL=y
+CONFIG_NFSD_V3=y
+CONFIG_NFSD_V3_ACL=y
+CONFIG_NFSD_V4=y
+CONFIG_NFSD_V4_SECURITY_LABEL=y
+CONFIG_NFS_ACL_SUPPORT=m
+CONFIG_NFS_COMMON=y
+CONFIG_NFS_DEBUG=y
+CONFIG_NFS_FS=m
+CONFIG_NFS_FSCACHE=y
+CONFIG_NFS_SWAP=y
+CONFIG_NFS_USE_KERNEL_DNS=y
+## CONFIG_NFS_USE_LEGACY_DNS is not set
+CONFIG_NFS_V2=m
+CONFIG_NFS_V3=m
+CONFIG_NFS_V3_ACL=y
+CONFIG_NFS_V4=m
+CONFIG_NFS_V4_1=y
+CONFIG_NFS_V4_1_IMPLEMENTATION_ID_DOMAIN="kernel.org"
+CONFIG_NFS_V4_1_MIGRATION=y
+CONFIG_NFS_V4_2=y
+CONFIG_NFS_V4_SECURITY_LABEL=y
+CONFIG_NFTL=m
+CONFIG_NFTL_RW=y
+CONFIG_NFT_BRIDGE_META=m
+CONFIG_NFT_BRIDGE_REJECT=m
+CONFIG_NFT_CHAIN_NAT_IPV4=m
+CONFIG_NFT_CHAIN_NAT_IPV6=m
+CONFIG_NFT_CHAIN_ROUTE_IPV4=m
+CONFIG_NFT_CHAIN_ROUTE_IPV6=m
+CONFIG_NFT_COMPAT=m
+CONFIG_NFT_COUNTER=m
+CONFIG_NFT_CT=m
+CONFIG_NFT_DUP_IPV4=m
+CONFIG_NFT_DUP_IPV6=m
+CONFIG_NFT_DUP_NETDEV=m
+CONFIG_NFT_EXTHDR=m
+CONFIG_NFT_FIB=m
+CONFIG_NFT_FIB_INET=m
+CONFIG_NFT_FIB_IPV4=m
+CONFIG_NFT_FIB_IPV6=m
+CONFIG_NFT_FIB_NETDEV=m
+CONFIG_NFT_FWD_NETDEV=m
+CONFIG_NFT_HASH=m
+CONFIG_NFT_LIMIT=m
+CONFIG_NFT_LOG=m
+CONFIG_NFT_MASQ=m
+CONFIG_NFT_MASQ_IPV4=m
+CONFIG_NFT_MASQ_IPV6=m
+CONFIG_NFT_META=m
+CONFIG_NFT_NAT=m
+CONFIG_NFT_NUMGEN=m
+CONFIG_NFT_OBJREF=m
+CONFIG_NFT_QUEUE=m
+CONFIG_NFT_QUOTA=m
+CONFIG_NFT_REDIR=m
+CONFIG_NFT_REDIR_IPV4=m
+CONFIG_NFT_REDIR_IPV6=m
+CONFIG_NFT_REJECT=m
+CONFIG_NFT_REJECT_INET=m
+CONFIG_NFT_REJECT_IPV4=m
+CONFIG_NFT_REJECT_IPV6=m
+CONFIG_NFT_RT=m
+CONFIG_NFT_SET_BITMAP=m
+CONFIG_NFT_SET_HASH=m
+CONFIG_NFT_SET_RBTREE=m
+CONFIG_NF_CONNTRACK=m
+CONFIG_NF_CONNTRACK_AMANDA=m
+CONFIG_NF_CONNTRACK_BROADCAST=m
+CONFIG_NF_CONNTRACK_EVENTS=y
+CONFIG_NF_CONNTRACK_FTP=m
+CONFIG_NF_CONNTRACK_H323=m
+CONFIG_NF_CONNTRACK_IPV4=m
+CONFIG_NF_CONNTRACK_IPV6=m
+CONFIG_NF_CONNTRACK_IRC=m
+CONFIG_NF_CONNTRACK_LABELS=y
+CONFIG_NF_NAT_TFTP=m
+CONFIG_NF_REJECT_IPV4=m
+CONFIG_NF_REJECT_IPV6=m
+CONFIG_NF_SOCKET_IPV4=m
+CONFIG_NF_SOCKET_IPV6=m
+CONFIG_NF_TABLES=m
+CONFIG_NF_TABLES_ARP=m
+CONFIG_NF_TABLES_BRIDGE=m
+CONFIG_NF_TABLES_INET=m
+CONFIG_NF_TABLES_IPV4=m
+CONFIG_NF_TABLES_IPV6=m
+CONFIG_NF_TABLES_NETDEV=m
+CONFIG_NI65=m
+CONFIG_NI903X_WDT=m
+CONFIG_NIC7018_WDT=m
+CONFIG_NILFS2_FS=m
+CONFIG_NIU=m
+# CONFIG_NL80211_TESTMODE is not set
+CONFIG_NLATTR=y
+CONFIG_NLMON=m
+CONFIG_NLS=y
+CONFIG_NLS_ASCII=m
+CONFIG_NLS_CODEPAGE_1250=m
+CONFIG_NLS_CODEPAGE_1251=m
+CONFIG_NLS_CODEPAGE_437=y
+CONFIG_NLS_CODEPAGE_737=m
+CONFIG_NLS_CODEPAGE_775=m
+CONFIG_NLS_CODEPAGE_850=m
+CONFIG_NLS_CODEPAGE_852=m
+CONFIG_NLS_CODEPAGE_855=m
+CONFIG_NLS_CODEPAGE_857=m
+CONFIG_NLS_CODEPAGE_860=m
+CONFIG_NLS_CODEPAGE_861=m
+CONFIG_NLS_CODEPAGE_862=m
+CONFIG_NLS_CODEPAGE_863=m
+CONFIG_NLS_CODEPAGE_864=m
+CONFIG_NLS_CODEPAGE_865=m
+CONFIG_NLS_CODEPAGE_866=m
+CONFIG_NLS_CODEPAGE_869=m
+CONFIG_NLS_CODEPAGE_874=m
+CONFIG_NLS_CODEPAGE_932=m
+CONFIG_NLS_CODEPAGE_936=m
+CONFIG_NLS_CODEPAGE_949=m
+CONFIG_NLS_CODEPAGE_950=m
+CONFIG_NLS_DEFAULT="utf8"
+CONFIG_NLS_ISO8859_1=m
+CONFIG_NLS_ISO8859_13=m
+CONFIG_NLS_ISO8859_14=m

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+CONFIG_NLS_ISO8859_15=m
+CONFIG_NLS_ISO8859_2=m
+CONFIG_NLS_ISO8859_3=m
+CONFIG_NLS_ISO8859_4=m
+CONFIG_NLS_ISO8859_5=m
+CONFIG_NLS_ISO8859_6=m
+CONFIG_NLS_ISO8859_7=m
+CONFIG_NLS_ISO8859_8=m
+CONFIG_NLS_ISO8859_9=m
+CONFIG_NLS_KOI8_R=m
+CONFIG_NLS_KOI8_U=m
+CONFIG_NLS_MAC_CELTIC=m
+CONFIG_NLS_MAC_CENTEURO=m
+CONFIG_NLS_MAC_CROATIAN=m
+CONFIG_NLS_MAC_CYRILLIC=m
+CONFIG_NLS_MAC_GAELIC=m
+CONFIG_NLS_MAC_GREEK=m
+CONFIG_NLS_MAC_ICELAND=m
+CONFIG_NLS_MAC_INUIT=m
+CONFIG_NLS_MAC_ROMAN=m
+CONFIG_NLS_MAC_ROMANIAN=m
+CONFIG_NLS_MAC_TURKISH=m
+CONFIG_NLS_UTF8=m
+CONFIG_NMI_IPI=y
+CONFIG_NODES_SPAN_OTHER_NODES=y
+# CONFIG_NOHIGHMEM is not set
+CONFIG_NOKIA_MODEM=m
+CONFIG_NONSTATIC_KERNEL=y
+CONFIG_NOP_TRACER=y
+CONFIG_NORTEL_HERMES=m
+CONFIG_NOTIFIER_ERROR_INJECTION=m
+CONFIG_NOUVEAU_DEBUG=5
+CONFIG_NOUVEAU_DEBUG_DEFAULT=3
+# CONFIG_NOUVEAU_DEBUG_MMU is not set
+CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT=y
+CONFIG_NOUVEAU_PLATFORM_DRIVER=y
+CONFIG_NO_BOOTMEM=y
+CONFIG_NO_HZ=y
+CONFIG_NO_HZ_COMMON=y
+# CONFIG_NO_HZ_FULL is not set
+CONFIG_NO_HZ_IDLE=y
+CONFIG_NO_IOPORT_MAP=y
+CONFIG_NR_IRQS=512
+CONFIG_NS83820=m
+CONFIG_NSC_FIR=m
+CONFIG_NSC_GPIO=m
+# CONFIG_NTB_AMD is not set
+CONFIG_NTB_IDT=m
+CONFIG_NTB_INTEL=m
+CONFIG_NTB_NETDEV=m
+CONFIG_NTB_PERF=m
+CONFIG_NTB_PINGPONG=m
+CONFIG_NTB_SWITCHTEC=m
+CONFIG_NTB_TOOL=m
+CONFIG_NTB_TRANSPORT=m
+# CONFIG_NTFS_DEBUG is not set
+CONFIG_NTFS_FS=m
+CONFIG_NUMA=y
+CONFIG_NUMA_BALANCING=y
+CONFIG_NVDIMM_DAX=y
+CONFIG_NVDIMM_PFN=y
+CONFIG_NVEC_PAZ00=m
+CONFIG_NVEC_POWER=m
+CONFIG_NVM=y
+CONFIG_NVMEM_BCM_OCOTP=m
+CONFIG_NVMEM_IMX_IIM=m
+CONFIG_NVMEM_IMX_OCOTP=m
+CONFIG_NVMEM_SNVS_LPGPR=m
+CONFIG_NVMEM_SUNXI_SID=m
+# CONFIG_NVMEM_VF610_OCOTP is not set
+CONFIG_NVME_CORE=m
+CONFIG_NVME_FABRICS=m
+CONFIG_NVME_FC=m
+CONFIG_NVME_MULTIPATH=y
+CONFIG_NVME_RDMA=m
+CONFIG_NVME_TARGET=m
+CONFIG_NVME_TARGET_FC=m
+# CONFIG_NVME_TARGET_FCLOOP is not set
+CONFIG_NVME_TARGET_LOOP=m
+CONFIG_NVME_TARGET_RDMA=m
+# CONFIG_NVM_DEBUG is not set
+CONFIG_NVM_PBLK=m
+CONFIG_NVM_RRPC=m
+CONFIG_NV_RAM=m
+CONFIG_NV_TCO=m
+CONFIG_N_HDLC=m
+# CONFIG_OABI_COMPAT is not set
+# CONFIG_OCFS2_DEBUG_FS is not set
+CONFIG_OCFS2_DEBUG_MASKLOG=y
+CONFIG_OCFS2_FS=m
+CONFIG_OCFS2_FS_O2CB=m
+CONFIG_OCFS2_FS_STATS=y
+CONFIG_OCFS2_FS_USERSPACE_CLUSTER=m
+CONFIG_OCXL=m
+CONFIG_OF_ADDRESS=y
+CONFIG_OF_ADDRESS_PCI=y
+CONFIG_OF_DMA_DEFAULT_COHERENT=y
+CONFIG_OF_DYNAMIC=y
+CONFIG_OF_EARLY_FLATTREE=y
+CONFIG_OF_FLATTREE=y
+CONFIG_OF_GPIO=y
+CONFIG_OF_IOMMU=y
+CONFIG_OF_IRQ=y
+CONFIG_OF_KOBJ=y
+CONFIG_OF_MDIQ=y
+CONFIG_OF_NET=y
+CONFIG_OF_NUMA=y
+CONFIG_OF_OVERLAY=y
+CONFIG_OF_PCI=y
+CONFIG_OF_PCI_IRQ=y
+CONFIG_OF_RECONFIG_NOTIFIER_ERROR_INJECT is not set
+CONFIG_OF_RESERVED_MEM=y
+CONFIG_OF_RESOLVE=y
+CONFIG_OF_UNITTEST is not set
+CONFIG_OID_REGISTRY=y
+CONFIG_OLD_BELKIN_DONGLE=m
+CONFIG_OLD_MCOUNT=y
+CONFIG_OLD_SIGACTION=y
+CONFIG_OLD_SIGSUSPEND=y
+CONFIG_OLD_SIGSUSPEND3=y
+CONFIG_OMAP2PLUS_MBOX=m
+CONFIG_OMAP2_VRFB=y
+CONFIG_OMAP3_L2_AUX_SECURE_SAVE_RESTORE is not set
+CONFIG_OMAP3_SDRC_AC_TIMING is not set
+CONFIG_OMAP3_THERMAL is not set
+CONFIG_OMAP4_THERMAL=y
+CONFIG_OMAP5_ERRATA_801819=y
+CONFIG_OMAP_32K_TIMER=y
+CONFIG_OMAP(Control_PHY)=m
+CONFIG_OMAP_DM_TIMER=y
+CONFIG_OMAP_GPMC=y
+CONFIG_OMAP_GPMC_DEBUG is not set
+CONFIG_OMAP_INTERCONNECT=y
+CONFIG_OMAP_INTERCONNECT_BARRIER=y
+CONFIG_OMAP_IOMMU=y
+CONFIG_OMAP_IOMMU_DEBUG is not set
+CONFIG_OMAP_IRQCHIP=y
+CONFIG_OMAP_MBOX_KFIFO_SIZE=256
+CONFIG_OMAP_OCP2SCP=m
+CONFIG_OMAP_PACKAGE_CBB=y
+CONFIG_OMAP_PM_NOOP=y
+CONFIG_OMAP_REMOTEPROC=m
+CONFIG_OMAP_RESET_CLOCKS=y
+CONFIG_OMAP_SSI=m
+CONFIG_OMAP_USB2=m
+CONFIG_OMAP_WATCHDOG=m
+CONFIG_OPAL_PRD=m
+CONFIG_OPENVSWITCH=m
+CONFIG_OPENVSWITCH_GENEVE=m
+CONFIG_OPENVSWITCH_GRE=m
+CONFIG_OPENVSWITCH_VXLAN=m
+CONFIG_OPROFILE=m
+# CONFIG_OPROFILE_EVENT_MULTIPLEX is not set
+CONFIG_OPROFILE_NMI_TIMER=y
+CONFIG_OPT3001=m
+CONFIG_OPTTEE=m
+CONFIG_OPTIMIZE_INLINING=y
+CONFIG_OPTPROBES=y
+CONFIG_ORANGEFS_FS=m
+CONFIG_ORE=m
+CONFIG_ORINOCO_USB=m
+CONFIG_ORION_IRQCHIP=y
+CONFIG_ORION_TIMER=y
+CONFIG_ORION_WATCHDOG=m
+CONFIG_OUTER_CACHE=y
+CONFIG_OUTER_CACHE_SYNC=y
+CONFIG_OVERLAY_FS=m
+# CONFIG_OVERLAY_FS_INDEX is not set
+CONFIG_OVERLAY_FS_REDIRECT_ALWAYS_FOLLOW=y
+# CONFIG_OVERLAY_FS_REDIRECT_DIR is not set
+CONFIG_OWL_PM_DOMAINS=y
+CONFIG_OWL_PM_DOMAINS_HELPER=y
+CONFIG_OWL_TIMER=y
+CONFIG_P54_COMMON=m
+CONFIG_P54_LEDS=y
+CONFIG_P54_PCI=m
+CONFIG_P54_SPI=m
+# CONFIG_P54_SPI_DEFAULT_EEPROM is not set
+CONFIG_P54_USB=m
+CONFIG_PA12203001=m
+CONFIG_PACKET=y
+CONFIG_PACKET_DIAG=m
+CONFIG_PACK_STACK=y
+CONFIG_PADATA=y
+CONFIG_PAGE_COUNTER=y
+# CONFIG_PAGE_OWNER is not set
+# CONFIG_PAGE_POISONING is not set
+CONFIG_PAGE_TABLE_ISOLATION=y
+CONFIG_PALMAS_GPADC=m
+CONFIG_PANASONIC_LAPTOP=m
+CONFIG_PANEL=m
+# CONFIG_PANEL_CHANGE_MESSAGE is not set
+CONFIG_PANEL_PARPORT=0
+CONFIG_PANEL_PROFILE=5
+# CONFIG_PANIC_ON_OOPS is not set
+CONFIG_PANIC_ON_OOPS_VALUE=0
+CONFIG_PANTHERLORD_FF=y
+CONFIG_PARAVIRT_CLOCK=y
+# CONFIG_PARAVIRT_DEBUG is not set
+CONFIG_PARAVIRT_SPINLOCKS=y
+# CONFIG_PARAVIRT_TIME_ACCOUNTING is not set
+CONFIG_PARIDE=m
+CONFIG_PARIDE_ATEN=m
+CONFIG_PARIDE_BPCK=m
+CONFIG_PARIDE_BPCK6=m
+CONFIG_PARIDE_COMM=m
+CONFIG_PARIDE_DSTR=m
+CONFIG_PARIDE_EPAT=m
+CONFIG_PARIDE_EPATC8=y
+CONFIG_PARIDE_EPIA=m
+CONFIG_PARIDE_FIT2=m
+CONFIG_PARIDE_FIT3=m
+CONFIG_PARIDE_FRIG=m
+CONFIG_PARIDE_FRPW=m
+CONFIG_PARIDE_KBIC=m
+CONFIG_PARIDE_KTTI=m
+CONFIG_PARIDE_ON20=m
+CONFIG_PARIDE_ON26=m
+CONFIG_PARIDE_PCD=m
+CONFIG_PARIDE_PD=m
+CONFIG_PARIDE_PF=m
+CONFIG_PARIDE_PG=m
+CONFIG_PARIDE_PT=m
+CONFIG_PARMAN=m
+CONFIG_PARPORT_1284=y
+CONFIG_PARPORT_AX88796=m
+# CONFIG_PARPORT_GSC is not set
+CONFIG_PARPORT_NOT_PC=y
+CONFIG_PARPORT_PC=m
+CONFIG_PARPORT_PC_FIFO=y
+CONFIG_PARPORT_PC_PCMCIA=m
+# CONFIG_PARPORT_PC_SUPERIO is not set
+CONFIG_PARPORT_SERIAL=m
+CONFIG_PARTITION_ADVANCED=y
+CONFIG_PARTITION_PERCPU=y
+CONFIG_PATA_ACPI=m
+CONFIG_PATA_ALI=m
+CONFIG_PATA_AMD=m
+CONFIG_PATA_ARTOP=m
+CONFIG_PATA_ATIIXP=m
+CONFIG_PATA_ATP867X=m
+CONFIG_PATA_CMD640_PCI=m
+CONFIG_PATA_CMD64X=m
+CONFIG_PATA_CS5520=m
+CONFIG_PATA_CS5530=m
+CONFIG_PATA_CS5535=m
+CONFIG_PATA_CS5536=m
+CONFIG_PATA_CYPRESS=m
+CONFIG_PATA_EFAR=m
+CONFIG_PATA_HPT366=m
+CONFIG_PATA_HPT37X=m
+CONFIG_PATA_HPT3X2N=m
+CONFIG_PATA_HPT3X3=m
 +# CONFIG_PATA_HPT3X3_DMA is not set
 +CONFIG_PATA_IMX=m
 +CONFIG_PATA_ISAPNP=m
 +CONFIG_PATA_IT8213=m
 +CONFIG_PATA_IT821X=m
 +CONFIG_PATA_JMICRON=m
 +CONFIG_PATA_LEGACY=m
 +CONFIG_PATA_MARVELL=m
 +CONFIG_PATA_MPIIX=m
 +CONFIG_PATA_NETCELL=m
 +CONFIG_PATA_NINJA32=m
 +CONFIG_PATA_NS87410=m
 +CONFIG_PATA_NS87415=m
 +CONFIG_PATA_OF_PLATFORM=m
 +CONFIG_PATA_OLDPIIX=m
 +CONFIG_PATA_OPTI=m
 +CONFIG_PATA_OPTIDMA=m
 +CONFIG_PATA_PCMCIA=m
 +CONFIG_PATA_PDC2027X=m
 +CONFIG_PATA_PDC_OLD=m
 +CONFIG_PATA_PLATFORM=m
 +CONFIG_PATA_QDI=m
 +CONFIG_PATA_RADISYS=m
 +CONFIG_PATA_RDC=m
 +CONFIG_PATA_RZ1000=m
 +CONFIG_PATA_SC1200=m
 +CONFIG_PATA_SCH=m
 +CONFIG_PATA_SERVERWORKS=m
 +CONFIG_PATA_SIL680=m
 +CONFIG_PATA_TOSHIBA=m
 +CONFIG_PATA_TRIFLEX=m
 +CONFIG_PATA_VIA=m
 +CONFIG_PATA_WINBOND=m
 +CONFIG_PATA_WINBOND_VLB=m
 +CONFIG_PC300TOO=m
+CONFIG_PCI_DOMAINS_GENERIC=y
+CONFIG_PCI_DRA7XX=y
+CONFIG_PCI_DRA7XX_EP=y
+CONFIG_PCI_DRA7XX_HOST=y
+CONFIG_PCI_ECAM=y
+CONFIG_PCI_ENDPOINT=y
+CONFIG_PCI_ENDPOINT_CONFIGFS=y
+## CONFIG_PCI_ENDPOINT_TEST is not set
+## CONFIG_PCI_EPF_TEST is not set
+CONFIG_PCI_EXYNOS=y
+CONFIG_PCI_FTPCI100=y
+CONFIG_PCI_GOANY=y
+## CONFIG_PCI_GOBIOS is not set
+## CONFIG_PCI_GODIRECT is not set
+## CONFIG_PCI_GOMMCONFIG is not set
+CONFIG_PCI_HISI=y
+CONFIG_PCI_HOST_COMMON=y
+CONFIG_PCI_HOST_GENERIC=y
+CONFIG_PCI_HOST_THUNDER_ECAM=y
+CONFIG_PCI_HOST_THUNDER_PEM=y
+CONFIG_PCI_HYPERV=m
+CONFIG_PCI_IMX6=y
+CONFIG_PCI_IOV=y
+CONFIG_PCI_LABEL=y
+CONFIG_PCI_LOCKLESS_CONFIG=y
+CONFIG_PCI_MMCONFIG=y
+CONFIG_PCI_MSI=y
+CONFIG_PCI_MVEBU=y
+CONFIG_PCI_NR_FUNCTIONS=64
+CONFIG_PCI_RCAR_GEN2=y
+CONFIG_PCI_REALLOC_ENABLE_AUTO=y
+CONFIG_PCI_STUB=m
+CONFIG_PCI_SW_SWITCHTEC=m
+CONFIG_PCI_SYSCALL=y
+CONFIG_PCI_TEGRA=m
+CONFIG_PCI_V3_SEMI=y
+CONFIG_PCI_XEN=y
+CONFIG_PCI_XGENE=y
+CONFIG_PCI_XGENE_MSI=y
+CONFIG_PCMCIA_3C574=m
+CONFIG_PCMCIA_3C589=m
+CONFIG_PCMCIA_AHA152X=m
+CONFIG_PCMCIA_ATMEL=m
+CONFIG_PCMCIA_AXNET=m
+CONFIG_PCMCIA_FDOMAIN=m
+CONFIG_PCMCIA_FMVJ18X=m
+CONFIG_PCMCIA_HERMES=m
+CONFIG_PCMCIA_LOAD_CIS=y
+CONFIG_PCMCIA_NINJA_SCSI=m
+CONFIG_PCMCIA_NMCLAN=m
+CONFIG_PCMCIA_PCNET=m
+CONFIG_PCMCIA_PROBE=y
+CONFIG_PCMCIA_QLOGIC=m
+CONFIG_PCMCIA_RAYCS=m
+CONFIG_PCMCIA_SMC91C92=m
+CONFIG_PCMCIA_SPECTRUM=m
+CONFIG_PCMCIA_SYM53C500=m
+CONFIG_PCMCIA_WL3501=m
+CONFIG_PCMCIA_XIRC2PS=m
+CONFIG_PCMCIA_XIRCOM=m
+CONFIG_PCNET32=m
+CONFIG_PCSPKR_PLATFORM=y
+CONFIG_PCWATCHDOG=m
+CONFIG_PD6729=m
+CONFIG_PDA_POWER=m
+CONFIG_PDC_ADMA=m
+CONFIG_PEAQ_WMI=m
+# CONFIG_PERCPU_STATS is not set
+# CONFIG_PERCPU_TEST is not set
+CONFIG_PERF_EVENTS=y
+# CONFIG_PERF_EVENTS_AMD_POWER is not set
+CONFIG_PERF_EVENTS_INTEL_CSTATE=m
+CONFIG_PERF_EVENTS_INTEL_RAPL=m
+CONFIG_PERF_EVENTS_INTEL_UNCORE=y
+CONFIG_PERF_USE_VMALLOC=y
+CONFIG_PERSISTENT_KEYRINGS=y
+CONFIG_PFFAULT=y
+CONFIG_PGSTE=y
+CONFIG_PHY_BCM_NS_USB2=m
+CONFIG_PHY_BCM_NS_USB3=m
+CONFIG_PHY_BERLIN_SATA=m
+CONFIG_PHY_BERLIN_USB=m
+CONFIG_PHY_BRCM_SATA=y
+CONFIG_PHY_BRCM_USB=m
+CONFIG_PHY_CPCAP_USB=m
+CONFIG_PHY_DM816X_USB=m
+# CONFIG_PHY_EXYNOS4210_USB2 is not set
+# CONFIG_PHY_EXYNOS4X12_USB2 is not set
+CONFIG_PHY_EXYNOS5250_SATA=y
+CONFIG_PHY_EXYNOS5_USBDRD=m
+CONFIG_PHY_EXYNOS_DP_VIDEO=y
+CONFIG_PHY_EXYNOS_MIPI_VIDEO=y
+CONFIG_PHY_EXYNOS_PCIE=y
+CONFIG_PHY_HI6220_USB=m
+CONFIG_PHY_HIX5HD2_SATA=m
+CONFIG_PHY_MESON8B_USB2=m
+CONFIG_PHY_MESON_GXL_USB2=m
+CONFIG_PHY_MTK_TPHY=m
+CONFIG_PHY_MVEBU_CP110_COMPHY=m
+CONFIG_PHY_MVEBU_SATA=y
+CONFIG_PHY_NS2_PCIE=y
+CONFIG_PHY_NS2_USB_DRD=m
+CONFIG_PHY_QCOM_APQ8064_SATA=m
+CONFIG_PHY_QCOM_IPQ806X_SATA=m
+CONFIG_PHY_QCOM_QMP=m
+CONFIG_PHY_QCOM_QUSB2=m
+CONFIG_PHY_QCOM_UFS=m
+CONFIG_PHY_QCOM_USB_HS=m
+CONFIG_PHY_QCOM_USB_HSIC=m
+CONFIG_PHY_RCAR_GEN2=m
+CONFIG_PHY_RCAR_GEN3_USB2=m
+CONFIG_PHY_RCAR_GEN3_USB3=m
+CONFIG_PHY_ROCKCHIP_DP=m
+CONFIG_PHY_ROCKCHIP_EMMC=m
+CONFIG_PHY_ROCKCHIP_INNO_USB2=m
+CONFIG_PHY_ROCKCHIP_PCIE=m
+CONFIG_PHY_ROCKCHIP_TYPEC=m
+CONFIG_PHY_SAMSUNG_USB2=m
+CONFIG_PHY_SUN4I_USB=m
+# CONFIG_PHY_SUN9I_USB is not set
+CONFIG_PHY_TEGRA_XUSB=m
+CONFIG_PHY_TUSB1210=m
+CONFIG_PHY_XGENE=y
+CONFIG_PI433=m
+# CONFIG_PID_IN_CONTEXTIDR is not set
+CONFIG_PID_NS=y
+CONFIG_PINCONF=y
+CONFIG_PINCTRL_AMD=y
+CONFIG_PINCTRL_APQ8064=m
+CONFIG_PINCTRL_APQ8084=m
+CONFIG_PINCTRL_ARMADA_370=y
+CONFIG_PINCTRL_ARMADA_375=y
+CONFIG_PINCTRL_ARMADA_38X=y
+CONFIG_PINCTRL_ARMADA_39X=y
+CONFIG_PINCTRL_ARMADA_XP=y
+CONFIG_PINCTRL_AS3722=y
+CONFIG_PINCTRL_BAYTRAIL=y
+CONFIG_PINCTRL_BCM2835=y
+CONFIG_PINCTRL_BERLIN=y
+CONFIG_PINCTRL_BERLIN_BG4CT=y
+CONFIG_PINCTRL_BROXTON=m
+CONFIG_PINCTRL_CANNONLAKE=y
+CONFIG_PINCTRL_CEDARFORK=m
+CONFIG_PINCTRL_DENVERTON=m
+CONFIG_PINCTRL_DOVE=y
+CONFIG_PINCTRL_EXYNOS=y
+CONFIG_PINCTRL_EXYNOS5440=y
+CONFIG_PINCTRL_EXYNOS_ARM=y
+CONFIG_PINCTRL_GEMINI LAKE=m
+CONFIG_PINCTRL_IMX=y
+CONFIG_PINCTRL_IMX50=y
+CONFIG_PINCTRL_IMX51=y
+CONFIG_PINCTRL_IMX6Q=y
+CONFIG_PINCTRL_IMX6SL=y
+CONFIG_PINCTRL_IMX6SX=y
+CONFIG_PINCTRL_IMX6UL=y
+CONFIG_PINCTRL_IMX7D=y
+CONFIG_PINCTRL_INTEL=y
+CONFIG_PINCTRL_IPQ4019=m
+CONFIG_PINCTRL_IPQ8064=m
+CONFIG_PINCTRL_IPQ8074=m
+CONFIG_PINCTRL_IPRO C_GPIO=y
+CONFIG_PINCTRL_LEWISBURG=m
+CONFIG_PINCTRL_MAX77620=m
+CONFIG_PINCTRL_MCP23S08=m
+CONFIG_PINCTRL_MDM9615=m
+# CONFIG_PINCTRL_MERRIFIELD is not set
+CONFIG_PINCTRL_MESON=y
+CONFIG_PINCTRL_MESON8=y
+CONFIG_PINCTRL_MESON8B=y
+CONFIG_PINCTRL_MESON8_PMX=y
+CONFIG_PINCTRL_MSM=y
+CONFIG_PINCTRL_MSM8660=m
+CONFIG_PINCTRL_MSM8916=m
+CONFIG_PINCTRL_MSM8960=m
+CONFIG_PINCTRL_MSM8994=m
+CONFIG_PINCTRL_MSM8996=m
+CONFIG_PINCTRL_MSM8X74=m
+CONFIG_PINCTRL_MT2701=y
+CONFIG_PINCTRL_MT6397=y
+CONFIG_PINCTRL_MT8127=y
+CONFIG_PINCTRL_MT8135=y
+CONFIG_PINCTRL_MT8173=y
+CONFIG_PINCTRL_MTK=y
+CONFIG_PINCTRL_MVEBU=y
+CONFIG_PINCTRL_NS2_MUX=y
+CONFIG_PINCTRL_PALMAS=y
+CONFIG_PINCTRL_PFC_EMEV2=y
+CONFIG_PINCTRL_PFC_R8A7740=y
+CONFIG_PINCTRL_PFC_R8A7743=y
+CONFIG_PINCTRL_PFC_R8A7745=y
+CONFIG_PINCTRL_PFC_R8A7778=y
+CONFIG_PINCTRL_PFC_R8A7779=y
+CONFIG_PINCTRL_PFC_R8A7790=y
+CONFIG_PINCTRL_PFC_R8A7791=y
+CONFIG_PINCTRL_PFC_R8A7792=y
+CONFIG_PINCTRL_PFC_R8A7793=y
+CONFIG_PINCTRL_PFC_R8A7794=y
+CONFIG_PINCTRL_PFC_R8A7795=y
+CONFIG_PINCTRL_PFC_R8A7796=y
+CONFIG_PINCTRL_PFC_R8A77995=y
+CONFIG_PINCTRL_PFC_SH73A0=y
+CONFIG_PINCTRL_QCOM_SPMI_PMIC=m
+CONFIG_PINCTRL_QCOM_SSBI_PMIC=m
+CONFIG_PINCTRL_QDF2XXX=m
+CONFIG_PINCTRL_RK805=m
+CONFIG_PINCTRL_ROCKCHIP=y
+CONFIG_PINCTRL_RZA1=y
+CONFIG_PINCTRL_SAMSUNG=y
+CONFIG_PINCTRL_SH_PFC=y
+CONFIG_PINCTRL_SH_PFC_GPIO=y
+CONFIG_PINCTRL_SINGLE=y
+CONFIG_PINCTRL_SPRD=y
+CONFIG_PINCTRL_SPRD_SC9860=y
+# CONFIG_PINCTRL_SUN4I_A10 is not set
+CONFIG_PINCTRL_SUN50I_A64=y
+CONFIG_PINCTRL_SUN50I_A64_R=y
+CONFIG_PINCTRL_SUN50I_H5=y
+# CONFIG_PINCTRL_SUN5I is not set
+# CONFIG_PINCTRL_SUN6I_A31 is not set
+# CONFIG_PINCTRL_SUN6I_A31_R is not set
+# CONFIG_PINCTRL_SUN8I_A23 is not set
+# CONFIG_PINCTRL_SUN8I_A23_R is not set
+# CONFIG_PINCTRL_SUN8I_A33 is not set
+# CONFIG_PINCTRL_SUN8I_A83T is not set
+# CONFIG_PINCTRL_SUN8I_A83T_R is not set
+# CONFIG_PINCTRL_SUN8I_H3 is not set
+CONFIG_PINCTRL_SUN8I_H3_R=y
+# CONFIG_PINCTRL_SUN8I_V3S is not set
+# CONFIG_PINCTRL_SUN9I_A80 is not set
+# CONFIG_PINCTRL_SUN9I_A80_R is not set
+CONFIG_PINCTRL_SUNRISEPOINT=m
+CONFIG_PINCTRL_SUNXI=y
+CONFIG_PINCTRL_SX150X=y
+CONFIG_PINCTRL_TEGRA=y
+CONFIG_PINCTRL_TEGRA114=y
+CONFIG_PINCTRL_TEGRA124=y
+CONFIG_PINCTRL_TEGRA20=y
+CONFIG_PINCTRL_TEGRA30=y
+CONFIG_PINCTRL_TEGRA_XUSB=y
+CONFIG_PINCTRL_TI_IODELAY=y
+CONFIG_PINCTRL_UNIPHIER=y
+CONFIG_PINCTRL_UNIPHIER_LD11=y
+CONFIG_PINCTRL_UNIPHIER_LD20=y
+CONFIG_PINCTRL_UNIPHIER_LD4=y
+CONFIG_PINCTRL_UNIPHIER_LD6B=y
+CONFIG_PINCTRL_UNIPHIER_PRO4=y
+CONFIG_PINCTRL_UNIPHIER_PRO5=y
+CONFIG_PINCTRL_UNIPHIER_PXS2=y
+CONFIG_PINCTRL_UNIPHIER_PXS3=y
+CONFIG_PINCTRL_UNIPHIER_SLD8=y
+CONFIG_PINCTRL_VF610=y
+CONFIG_PINMUX=y
+CONFIG_PK4B_ERRATA_4742=y
+CONFIG_PKCS7_MESSAGE_PARSER=y
+CONFIG_PKCS7_TEST_KEY=m
+CONFIG_PKEY=m
+CONFIG_PL310_ERRATA_588369=y
+CONFIG_PL310_ERRATA_727915=y
+CONFIG_PL310_ERRATA_753970=y
+CONFIG_PL310_ERRATA_769419=y
+CONFIG_PL320_MBOX=y
+CONFIG_PL330_DMA=m
+CONFIG_PLATFORM_MHU=m
+CONFIG_PLATFORM_SI4713=m
+CONFIG_PLAT_ORION=y
+CONFIG_PLAT_SAMSUNG=y
+## CONFIG_PLAT_SPEAR is not set
+CONFIG_PLAT_VERSATILE=y
+CONFIG_PLAT_VERSATILE_CLCD=y
+CONFIG_PLIP=m
+CONFIG_PLX_HERMES=m
+CONFIG_PM=y
+CONFIG_PMBUS=m
+CONFIG_PMC_ATOM=y
+CONFIG_PMIC_ADP5520=y
+CONFIG_PMIC_DA903X=y
+CONFIG_PMIC_DA9052=y
+## CONFIG_PMIC_OPREGION is not set
+CONFIG_PM_ADVANCED_DEBUG=y
+## CONFIG_PM_AUTOSLEEP is not set
+CONFIG_PM_CLK=y
+CONFIG_PM_DEVFREQ_EVENT=y
+CONFIG_PM_GENERIC_DOMAINS=y
+CONFIG_PM_GENERIC_DOMAINS_OF=y
+CONFIG_PM_GENERIC_DOMAINS_SLEEP=y
+CONFIG_PM_NOTIFIER_ERROR_INJECT=m
+CONFIG_PM_OPP=y
+CONFIG_PM_RMOBILE=y
+CONFIG_PM_SLEEP=y
+CONFIG_PM_SLEEP_DEBUG=y
+CONFIG_PM_SLEEP_SMP=y
+CONFIG_PM_STD_PARTITION=""
+# CONFIG_PM_TEST_SUSPEND is not set
+CONFIG_PM_TRACE=y
+CONFIG_PM_TRACE_RTC=y
+CONFIG_PM_WAKELOCKS=y
+CONFIG_PM_WAKELOCKS_GC=y
+CONFIG_PM_WAKELOCKS_LIMIT=100
+CONFIG_PNFS_BLOCK=m
+CONFIG_PNFS_FILE_LAYOUT=m
+CONFIG_PNFS_FLEXFILE_LAYOUT=m
+CONFIG_PNP=y
+CONFIG_PNPACPI=y
+CONFIG_PNPBIOS=y
+CONFIG_PNPBIOS_PROC_FS=y
+# CONFIG_PNP_DEBUG_MESSAGES is not set
+CONFIG_POSIX_MQUEUE=y
+CONFIG_POSIX_MQUEUE_SYSCTL=y
+CONFIG_POSIX_TIMERS=y
+# CONFIG_POWER7_CPU is not set
+CONFIG_POWER8_CPU=y
+CONFIG_POWERNV_CPUFREQ=y
+CONFIG_POWERNV_CPUIDLE=y
+CONFIG_POWERNV_OP_PANEL=m
+CONFIG_POWER_AVS_OMAP=y
+CONFIG_POWER_AVS_OMAP_CLASS3=y
+CONFIG_POWER_RESET=y
+CONFIG_POWER_RESET_AS3722=y
+CONFIG_POWER_RESET_AXXIA=y
+CONFIG_POWER_RESET_BRCMKONA=y
+# CONFIG_POWER_RESET_BRCMSTB is not set
+CONFIG_POWER_RESET_GPIO=y
+CONFIG_POWER_RESET_GPIO_RESTART=y
+CONFIG_POWER_RESET_HISI=y
+# CONFIG_POWER_RESET_IMX is not set
+CONFIG_POWER_RESET_LTC2952=y
+CONFIG_POWER_RESET_MSM=y
+# CONFIG_POWER_RESET_QNAP is not set
+CONFIG_POWER_RESET_RESTART=y
+CONFIG_POWER_RESET_RMOBILE=m
+CONFIG_POWER_RESET_SYSCON=y
+CONFIG_POWER_RESET_SYSCON_POWEROFF=y
+CONFIG_POWER_RESET_VERSATILE=y
+CONFIG_POWER_RESET_VEXPRESS=y
+## CONFIG_POWER_RESET_XGENE is not set
+## CONFIG_POWER_SUPPLY_DEBUG is not set
+CONFIG_PPC=y
+CONFIG_PPC64=y
+CONFIG_PPC64_BOOT_WRAPPER=y
+CONFIG_PPC64_SUPPORTS_MEMORY_FAILURE=y
+## CONFIG_PPC_4K_PAGES is not set
+CONFIG_PPC_64K_PAGES=y
+## CONFIG_PPC_970_NAP is not set
+CONFIG_PPC_BARRIER_NOSPEC=y
+## CONFIG_PPC_BOOK3E_64 is not set
+CONFIG_PPC_BOOK3S=y
+CONFIG_PPC_BOOK3S_64=y
+## CONFIG_PPC_CELL is not set
+## CONFIG_PPC_CELL_NATIVE is not set
+CONFIG_PPC_COPRO_BASE=y
+## CONFIG_PPC_DCR_MMIO is not set
+## CONFIG_PPC_DCR_NATIVE is not set
+CONFIG_PPC_DENORMALISATION=y
+## CONFIG_PPCDISABLE_WERROR is not set
+CONFIG_PPC_DOORBELL=y
+CONFIG_PPC_DT_CPU_FTRS=y
+## CONFIG_PPC_EARLY_DEBUG is not set
+## CONFIG_PPC_EMULATED_STATS is not set
+## CONFIG_PPC_EPAPR_HV_BYTECHAN is not set
+## CONFIG_PPC_EPAPR_HV_PIC is not set
+## CONFIG_PPC_FAST_ENDIAN_SWITCH is not set
+CONFIG_PPC_FPU=y
+CONFIG_PPC_HAVE_PMU_SUPPORT=y
+CONFIG_PPC_I8259=y
+CONFIG_PPC_ICP_HV=y
+CONFIG_PPC_ICP_NATIVE=y
+CONFIG_PPC_ICS_RTAS=y
+## CONFIG_PPC INDIRECT_PCI is not set
+CONFIG_PPC INDIRECTPIO=y
+CONFIG_PPC_MEMTRACE=y
+CONFIG_PPC_MM_SLICES=y
+## CONFIG_PPC MPC106 is not set
+CONFIG_PPC_MSI_BITMAP=y
+CONFIG_PPC_NATIVE=y
+CONFIG_PPC OF_BOOT TRAMPOLINE=y
+## CONFIG PPC OF PLATFORM_PCI is not set
+CONFIG_PPC P7_NAP=y
+CONFIG_PPC PERF_CTRS=y
+CONFIG_PPC POWERNV=y
+CONFIG_PPC PSERIES=y
+## CONFIG_PPC PTDUMP is not set
+CONFIG_PPC RADIX_MMU=y
+CONFIG_PPC_RADIX_MMU_DEFAULT=y
+CONFIG_PPC_RTAS=y
+CONFIG_PPC_RTAS_DAEMON=y
+CONFIG_PPC_RTAS_FILTER=y
+CONFIG_PPC_SCOM=y
+CONFIG_PPC_SMLPAR=y
+CONFIG_PPC_SMP_MUXED_IPI=y
+CONFIG_PPC_SPLPAR=y
+CONFIG_PPC_STD_MMU=y
+CONFIG_PPC_SUBPAGE_PROT=y
+CONFIG_PPC_TRANSACTIONAL_MEM=y
+CONFIG_PPC_UDBG_16550=y
+CONFIG_PPC_VAS=y
+CONFIG_PPC_WATCHDOG=y
+CONFIG_PPC_WERROR=y
+CONFIG_PPC_XICS=y
+CONFIG_PPC_XIVE=y
+CONFIG_PPC_XIVE_NATIVE=y
+CONFIG_PPC_XIVE_SPAPR=y
+CONFIG_PPDEV=m
+CONFIG_PPPOATM=m
+CONFIG_PPPOE=m
+CONFIG_PPPOL2TP=m
+CONFIG_PPP_ASYNC=m
+CONFIG_PPP_BSDCOMP=m
+CONFIG_PPP_DEFLATE=m
+CONFIG_PPP_FILTER=y
+CONFIG_PPP_MPPE=m
+CONFIG_PPP_MULTILINK=y
+CONFIG_PPP_SYNC_TTY=m
+# CONFIG_PPS_CLIENT_KTIMER is not set
+CONFIG_PPS_CLIENT_PARPORT=m
+# CONFIG_PPS_DEBUG is not set
+CONFIG_PPTP=m
+# CONFIG_PQ2ADS is not set
+# CONFIG_PREEMPT_IRQ_EVENTS is not set
+CONFIG_PREEMPT_COUNT=y
+CONFIG_PREEMPT_NOTIFYERS=y
+CONFIG_PREEMPT_RCU=y
+# CONFIG_PREEMPT_TRACER is not set
+CONFIG_PREVENT_FIRMWARE_BUILD=y
+CONFIG_PRINTER=m
+CONFIG_PRINTK=y
+CONFIG_PRINTK_NMI=y
+CONFIG_PRINTK_SAFE_LOG_BUF_SHIFT=13
+CONFIG_PRINTK_TIME=y
+# CONFIG_PRINT_QUOTA_WARNING is not set
+CONFIG_PRINT_STACK_DEPTH=64
+CONFIG_PRISM2_USB=m
+## CONFIG_PRISM54 is not set
+CONFIG_PROBE_EVENTS=y
+CONFIG_PROCESSOR_SELECT=y
+CONFIG_PROC_CHILDREN=y
+CONFIG_PROC_EVENTS=y
+CONFIG_PROC_FS=y
+CONFIG_PROC_KCORE=y
+CONFIG_PROC_PAGE_MONITOR=y
+CONFIG_PROC_PID_CPUSET=y
+CONFIG_PROC_SYSCTL=y
+CONFIG_PROC_VMCORE=y
+## CONFIG_PROFILE_ALL_BRANCHES is not set
+## CONFIG_PROFILE_ANNOTATED_BRANCHES is not set
+CONFIG_PROFILING=y
+## CONFIG_PROVE_LOCKING is not set
+## CONFIG_PROVE_RCU is not set
+## CONFIG_PROVIDE_OHCI1394_DMA_INIT is not set
+CONFIG_PSAMPLE=m
+CONFIG_PSERIES_CPUIDLE=y
+## CONFIG_PSERIES_ENERGY is not set
+## CONFIG_PSTORE_FTRACE is not set
+## CONFIG_PSTORE_LZ4_COMPRESS is not set
+## CONFIG_PSTORE_LZO_COMPRESS is not set
+## CONFIG_PSTORE_PMSG is not set
+CONFIG_PSTORE_ZLIB_COMPRESS=y
+CONFIG_PTP_1588_CLOCK_DTE=m
+CONFIG_PTP_1588_CLOCK_GIANFAR=m
+CONFIG_PTP_1588_CLOCK_KVM=m
+CONFIG_PTP_1588_CLOCK_PCH=m
+CONFIG_PUNIT_ATOM_DEBUG=m
+CONFIG_PVPANIC=m
+CONFIG_PWM_ATMEL_HLCDC_PWM=m
+CONFIG_PWM_BCM2835=m
+CONFIG_PWM_BCM_IPROC=m
+CONFIG_PWM_BERLIN=m
+CONFIG_PWM_BRCMSTB=m
+CONFIG_PWM_CRC=y
+CONFIG_PWM_CROS_EC=m
+CONFIG_PWM_FSL_FTM=m
+CONFIG_PWM_HIBVT=m
+CONFIG_PWM_IMX=m
+CONFIG_PWM_LP3943=m
+CONFIG_PWM_LPSS=m
+CONFIG_PWM_LPSS_PCI=m
+CONFIG_PWM_LPSS_PLATFORM=m
+CONFIG_PWM_MEDIATEK=m
+CONFIG_PWM_MESON=m

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+CONFIG_QCOM_QDF2400_ERRATUM_0065=y
+CONFIG_QCOM_QFPROM=m
+CONFIG_QCOM_RMTFS_MEM=m
+CONFIG_QCOM_RPMCC=y
+CONFIG_QCOM_RPROC_COMMON=m
+CONFIG_QCOM_SCM=y
+CONFIG_QCOM_SCM_32=y
+CONFIG_QCOM_SCM_64=y
+# CONFIG_QCOM_SCM_DOWNLOAD_MODE_DEFAULT is not set
+CONFIG_QCOM_SMD_RPM=m
+CONFIG_QCOM_SMEM=m
+CONFIG_QCOM_SMEM_STATE=y
+CONFIG_QCOM_SMP2P=m
+CONFIG_QCOM_SMEMSTATE=m
+CONFIG_QCOM_SPMI_IADC=m
+CONFIG_QCOM_SPMI_TEMP_ALARM=m
+CONFIG_QCOM_SPMI_VADC=m
+CONFIG_QCOM_TSENS=m
+CONFIG_QCOM_VADC_COMMON=m
+CONFIG_QCOM_WCNSS_CTRL=m
+# CONFIG_QCOM_WCNSS_PIL is not set
+CONFIG_QCOM_WDT=m
+CONFIG_QDIO=m
+CONFIG_QED=m
+CONFIG_QEDE=m
+CONFIG_QEDF=m
+CONFIG_QEDI=m
+CONFIG_QED_FCOE=y
+CONFIG_QED_ISCSI=y
+CONFIG_QED_LL2=y
+CONFIG_QED_OOO=y
+CONFIG_QED_RDMA=y
+CONFIG_QED_SRIOV=y
+CONFIG_QETH=m
+CONFIG_QETH_IPV6=y
+CONFIG_QETH_L2=m
+CONFIG_QETH_L3=m
+CONFIG_QFMT_V1=m
+CONFIG_QFMT_V2=m
+CONFIG_QLA3XXX=m
+CONFIG_QLCNIC=m
+CONFIG_QLCNIC_DCB=y
+CONFIG_QLCNIC_HWMON=y
+CONFIG_QLCNIC_SRIOV=y
+CONFIG_QLGE=m
+# CONFIG_QNX6FS_DEBUG is not set
+CONFIG_QORIQ_CPUFREQ=m
+CONFIG_QORIQ_THERMAL=m
+CONFIG_QRTR=m
+CONFIG_QRTR_SMD=m
+CONFIG_QSEMI_PHY=m
+CONFIG_QTNFMAC=m
+CONFIG_QTNFMAC_PEARL_PCIE=m
+CONFIG_QUEUED_RWLOCKS=y
+CONFIG_QUEUED_SPINLOCKS=y
+CONFIG_QUOTA=y
+CONFIG_QUOTACTL=y
+CONFIG_QUOTACTL_COMPAT=y
+CONFIG_QUOTA_NETLINK_INTERFACE=y
+CONFIG_RADIO_ADAPTERS=y
+CONFIG_RADIO_AZTECH=m
+CONFIG_RADIO_CADET=m
+CONFIG_RADIO_GEMTEK=m
+CONFIG_RADIO_ISA=m
+CONFIG_RADIO_MAXIRADIO=m
+CONFIG_RADIO_MIROPCM20=m
+CONFIG_RADIO_RTRACK=m
+CONFIG_RADIO_RTRACK2=m
+CONFIG_RADIO_SAA7706H=m
+CONFIG_RADIO_SF16FMI=m
+CONFIG_RADIO_SF16FMR2=m
+CONFIG_RADIO_SHARK=m
+CONFIG_RADIO_SHARK2=m
+CONFIG_RADIO_SI470X=y
+CONFIG_RADIO_SI4713=m
+CONFIG_RADIO_SI476X=m
+CONFIG_RADIO_TEA575X=m
+CONFIG_RADIO_TEA5764=m
+CONFIG_RADIO_TEF6862=m
+CONFIG_RADIO_TERRATEC=m
+CONFIG_RADIO_TIMBERDALE=m
+CONFIG_RADIO_TRUST=m
+CONFIG_RADIO_TYPHOON=m
+CONFIG_RADIO_WL1273=m
+CONFIG_RADIO_WL128X=m
+CONFIG_RADIO_ZOLTRIX=m
+CONFIG_RADIX_TREE_MULTIORDER=y
+CONFIG_RAID6_PQ=m
+CONFIG_RDS_TCP=m
+CONFIG_RD_BZIP2=y
+CONFIG_RD_GZIP=y
+CONFIG_RD_LZ4=y
+CONFIG_RD_LZMA=y
+CONFIG_RD_LZO=y
+CONFIG_RD_XZ=y
+# CONFIG_READABLE_ASM is not set
+CONFIG_REALTEK_AUTOPM=y
+CONFIG_REALTEK_PHY=m
+CONFIG_REBOOT_MODE=m
+CONFIG_REED_SOLOMON_DEC16=y
+CONFIG_REED_SOLOMON_DEC8=y
+CONFIG_REED_SOLOMON_ENC8=y
+CONFIG_REGMAP=y
+CONFIG_REGMAP_AC97=m
+CONFIG_REGMAP_HWSPINLOCK=y
+CONFIG_REGMAP_I2C=y
+CONFIG_REGMAP_IRQ=y
+CONFIG_REGMAP_MMIO=y
+CONFIG_REGMAP_SPI=y
+CONFIG_REGMAP_SPMI=m
+CONFIG_REGMAP_W1=m
+CONFIG_REGULATOR_88PM800=m
+CONFIG_REGULATOR_88PM8607=m
+CONFIG_REGULATOR_AAT2870=m
+CONFIG_REGULATOR_AB3100=m
+CONFIG_REGULATOR_ACT8865=m
+CONFIG_REGULATOR_ACT8945A=m
+CONFIG_REGULATOR_AD5398=m
+CONFIG_REGULATOR_ANATOP=m
+CONFIG_REGULATOR_ARIZONA_LDO1=m
+CONFIG_REGULATOR_ARIZONA_MICSUPP=m
+CONFIG_REGULATOR_AS3711=m
+CONFIG_REGULATOR_AS3722=m
+CONFIG_REGULATOR_AXP20X=m
+CONFIG_REGULATOR_BCM590XX=m
+CONFIG_REGULATOR_BD9571MW=m
+CONFIG_REGULATOR_CPCAP=m
+CONFIG_REGULATOR_DA903X=m
+CONFIG_REGULATOR_DA9052=m
+CONFIG_REGULATOR_DA9055=m
+CONFIG_REGULATOR_DA9062=m
+CONFIG_REGULATOR_DA9063=m
+CONFIG_REGULATOR_DA9210=m
+CONFIG_REGULATOR_DA9211=m
+# CONFIG_REGULATOR_DEBUG is not set
+CONFIG_REGULATOR_FAN5355=m
+CONFIG_REGULATOR_GPIO=m
+CONFIG_REGULATOR_HI6421=m
+CONFIG_REGULATOR_HI6421V530=m
+CONFIG_REGULATOR_HI655X=m
+CONFIG_REGULATOR_ISL6271A=m
+CONFIG_REGULATOR_ISL9305=m
+CONFIG_REGULATOR_LM363X=m
+CONFIG_REGULATOR_LP3971=m
+CONFIG_REGULATOR_LP3972=m
+CONFIG_REGULATOR_LP872X=m
+CONFIG_REGULATOR_LP873X=m
+CONFIG_REGULATOR_LP8755=m
+CONFIG_REGULATOR_LP87565=m
+CONFIG_REGULATOR_LP8788=m
+CONFIG_REGULATOR_LTC3589=m
+CONFIG_REGULATOR_LTC3676=m
+CONFIG_REGULATOR_MAX14577=m
+CONFIG_REGULATOR_MAX1586=m
+CONFIG_REGULATOR_MAX77620=m
+CONFIG_REGULATOR_MAX77686=m
+CONFIG_REGULATOR_MAX77693=m
+CONFIG_REGULATOR_MAX77802=m
+CONFIG_REGULATOR_MAX8649=m
+CONFIG_REGULATOR_MAX8660=m
+CONFIG_REGULATOR_MAX8907=m
+CONFIG_REGULATOR_MAX8925=m
+CONFIG_REGULATOR_MAX8952=m
+CONFIG_REGULATOR_MAX8973=m
+CONFIG_REGULATOR_MAX8997=m
+CONFIG_REGULATOR_MAX8998=m
+CONFIG_REGULATOR_MC13783=m
+CONFIG_REGULATOR_MC13892=m
+CONFIG_REGULATOR_MC13XXX_CORE=m
+CONFIG_REGULATOR_MT6311=m
+CONFIG_REGULATOR_MT6323=m
+CONFIG_REGULATOR_MT6380=m
+CONFIG_REGULATOR_MT6397=m
+CONFIG_REGULATOR_PALMAS=m
+CONFIG_REGULATOR_PBIAS=m
+CONFIG_REGULATOR_PCAP=m
+CONFIG_REGULATOR_PCF50633=m
+CONFIG_REGULATOR_PFUZE100=m
+CONFIG_REGULATOR_PV88060=m
+CONFIG_REGULATOR_PV88080=m
+CONFIG_REGULATOR_PV88090=m
+CONFIG_REGULATOR_PWM=m
+CONFIG_REGULATOR_QCOM_RPM=m
+CONFIG_REGULATOR_QCOM_SMD_RPM=m
+CONFIG_REGULATOR_QCOM_SPMI=m
+CONFIG_REGULATOR_RC5T583=m
+CONFIG_REGULATOR_RK808=m
+CONFIG_REGULATOR_RN5T618=m
+CONFIG_REGULATOR_RT5033=m
+CONFIG_REGULATOR_S2MPA01=m
+CONFIG_REGULATOR_S2MPS11=m
+CONFIG_REGULATOR_S5M8767=m
+CONFIG_REGULATOR_SKY81452=m
+CONFIG_REGULATOR_TI_ABB=y
+CONFIG_REGULATOR_TPS51632=m
+CONFIG_REGULATOR_TPS6105X=m
+CONFIG_REGULATOR_TPS62360=m
+CONFIG_REGULATOR_TPS65023=m
+CONFIG_REGULATOR_TPS6507X=m
+CONFIG_REGULATOR_TPS65086=m
+CONFIG_REGULATOR_TPS65090=m
+CONFIG_REGULATOR_TPS65132=m
+CONFIG_REGULATOR_TPS65218=m
+CONFIG_REGULATOR_TPS6524X=m
+CONFIG_REGULATOR_TPS6586X=m
+CONFIG_REGULATOR_TPS65910=m
+CONFIG_REGULATOR_TPS65912=m
+CONFIG_REGULATOR_TPS80031=m
+CONFIG_REGULATOR_USERSPACE_CONSUMER=m
+CONFIG_REGULATOR_VCTRL=m
+CONFIG_REGULATOR_VEXPRESS=m
+CONFIG_REGULATOR_VIRTUAL_CONSUMER=m
+CONFIG_REGULATOR_WM831X=m
+CONFIG_REGULATOR_WM8350=m
+CONFIG_REGULATOR_WM8400=m
+CONFIG_REGULATOR_WM8994=m
+CONFIG_REISERFS_CHECK is not set
+CONFIG_REISERFS_FS_POSIX_ACL=y
+CONFIG_REISERFS_FS_SECURITY=y
+CONFIG_REISERFS_FS_XATTR=y
+CONFIG_REISERFS_PROC_INFO is not set
+CONFIG_RELAY=y
+CONFIG_RELOCATABLE=y
+CONFIG_RELOCATABLE_TEST is not set
+CONFIG_REMOTEPROC=m
+CONFIG_RENESAS_DMA=y
+CONFIG_RENESAS_INTC_IRQPIN=y
+CONFIG_RENESAS_IRQC=y
+CONFIG_RENESAS_OSTM=y
+CONFIG_RENESAS_PHY=m
+CONFIG_RENESAS_RZAWDT=m
+CONFIG_RENESAS_USB_DMAC=m
# CONFIG_Renesas_WDT=m
+## CONFIG_RESET_ATH79 is not set
+CONFIG_RESET_ATTACK_MITIGATION=y
+## CONFIG_RESET_AXS10X is not set
+CONFIG_RESET_HISI=y
+## CONFIG_RESET_LANTIQui is not set
+## CONFIG_RESET_LPC18XX is not set
+## CONFIG_RESET_PISTACHIO is not set
+## CONFIG_RESET_Tegra_BMP is not set
+CONFIG_RESET_TI_SYSCON=m
+CONFIG_RESET_UNIPHIER=m
+## CONFIG_RESET_ZYNQ is not set
+CONFIG_RETPOLINE=y
+CONFIG_RETU_WATCHDOG=m
+CONFIG_RFD77402=m
+CONFIG_RFD_FTL=m
+CONFIG_RFKILL_GPIO=m
+CONFIG_RFKILL_INPUT=y
+CONFIG_RFKILL_LEDS=y
+CONFIG_RFS_ACCEL=y
+CONFIG_RING_BUFFER=y
+CONFIG_RING_BUFFER_ALLOW_SWAP=y
+## CONFIG_RING_BUFFER_BENCHMARK is not set
+## CONFIG_RING_BUFFER_STARTUP_TEST is not set
+CONFIG_RIONET=m
+CONFIG_RIONET_RX_SIZE=128
+CONFIG_RIONET_TX_SIZE=128
+CONFIG_RM14_2D_SENSOR=y
+CONFIG_RM14_CORE=m
+CONFIG_RM14_F03=y
+CONFIG_RM14_F03_SERIO=m
+CONFIG_RM14_F11=y
+CONFIG_RM14_F12=y
+CONFIG_RM14_F30=y
+CONFIG_RM14_F34=y
+CONFIG_RM14_F54=y
+CONFIG_RM14_F55=y
+CONFIG_RM14_I2C=m
+CONFIG_RM14_SMB=m
+CONFIG_RM14_SPI=m
+CONFIG_RMNET=m
+CONFIG_RN5T618_WATCHDOG=m
+CONFIG_ROCKCHIP_ANALOGIX_DP=y
+CONFIG_ROCKCHIP_CDN_DP=y
+CONFIG_ROCKCHIP_DW_HDMI=y
+CONFIG_ROCKCHIP_DW_MIPIDSI=y
+CONFIG_ROCKCHIP_EFUSE=m
+CONFIG_ROCKCHIP_GRF=y
+CONFIG_RT2X00=m
+## CONFIG_RT2X00_DEBUG is not set
+CONFIG_RT2X00_LIB=m
+CONFIG_RT2X00_LIB_CRYPTO=y
+## CONFIG_RT2X00_LIB_DEBUGFS is not set
+CONFIG_RT2X00_LIB_FIRMWARE=y
+CONFIG_RT2X00_LIB_LEDS=y
+CONFIG_RT2X00_LIB_MMIO=m
+CONFIG_RT2X00_LIB_PCI=m
+CONFIG_RT2X00_LIB_USB=m
+CONFIG_RT61PCI=m
+CONFIG_RT73USB=m
+CONFIG_RTAS_ERROR_LOGGING=y
+CONFIG_RTAS_FLASH=m
+CONFIG_RTAS_PROC=y
+CONFIG_RTC_CLASS=y
+## CONFIG_RTC_DEBUG is not set
+CONFIG_RTC_DRV_88PM80X=m
+CONFIG_RTC_DRV_88PM860X=m
+CONFIG_RTC_DRV_AB3100=m
+CONFIG_RTC_DRV_ABB5ZES3=m
+CONFIG_RTC_DRV_ABX80X=m
+CONFIG_RTC_DRV_AM1805=m
+CONFIG_RTC_DRV_ARMADA38X=m
+CONFIG_RTC_DRV_AS3722=m
+CONFIG_RTC_DRV_BQ32K=m
+CONFIG_RTC_DRV_BQ4802=m
+CONFIG_RTC_DRV_BRCMSTB=m
+CONFIG_RTC_DRV_CPCAP=m
+CONFIG_RTC_DRV_DA9052=m
+CONFIG_RTC_DRV_DA9055=m
+CONFIG_RTC_DRV_DA9063=m
+CONFIG_RTC_DRV_DS1286=m
+CONFIG_RTC_DRV_DS1302=m
+CONFIG_RTC_DRV_DS1305=m
+CONFIG_RTC_DRV_DS1307=m
+CONFIG_RTC_DRV_DS1307_CENTURY=y
+CONFIG_RTC_DRV_DS1307_HWMON=y
+CONFIG_RTC_DRV_DS1343=m
+CONFIG_RTC_DRV_DS1347=m
+CONFIG_RTC_DRV_DS1374=m
+CONFIG_RTC_DRV_DS1374_WDT=y
+CONFIG_RTC_DRV_DS1390=m
+CONFIG_RTC_DRV_DS1511=m
+CONFIG_RTC_DRV_DS1553=m
+CONFIG_RTC_DRV_DS1672=m
+CONFIG_RTC_DRV_DS1685=y
+CONFIG_RTC_DRV_DS1685_FAMILY=m
+# CONFIG_RTC_DRV_DS1689 is not set
+# CONFIG_RTC_DRV_DS17285 is not set
+CONFIG_RTC_DRV_DS1742=m
+# CONFIG_RTC_DRV_DS17485 is not set
+# CONFIG_RTC_DRV_DS17885 is not set
+CONFIG_RTC_DRV_DS2404=m
+CONFIG_RTC_DRV_DS3232=m
+CONFIG_RTC_DRV_DS3232_HWMON=y
+CONFIG_RTC_DRV_EFI=y
+CONFIG_RTC_DRV_EM3027=m
+CONFIG_RTC_DRV_FM3130=m
+CONFIG_RTC_DRV_FTRTC010=m
+CONFIG_RTC_DRV_GENERIC=y
+CONFIG_RTC_DRV_HID_SENSOR_TIME=m
+CONFIG_RTC_DRV_HYM8563=m
+CONFIG_RTC_DRV_IMXDI=m
+CONFIG_RTC_DRV_ISL12022=m
+CONFIG_RTC_DRV_ISL1208=m
+CONFIG_RTC_DRV_LP8788=m
+CONFIG_RTC_DRV_M41T80=m
+CONFIG_RTC_DRV_M41T80_WDT=y
+CONFIG_RTC_DRV_M41T93=m
+CONFIG_RTC_DRV_M41T94=m
+CONFIG_RTC_DRV_M48T35=m
+CONFIG_RTC_DRV_M48T59=m
+CONFIG_RTC_DRV_M48T86=m
+CONFIG_RTC_DRV_MAX6900=m
+CONFIG_RTC_DRV_MAX6902=m
+CONFIG_RTC_DRV_MAX6916=m
+CONFIG_RTC_DRV_MAX77686=m
+CONFIG_RTC_DRV_MAX8907=m
+CONFIG_RTC_DRV_MAX8925=m
+CONFIG_RTC_DRV_MAX8997=m
+CONFIG_RTC_DRV_MAX8998=m
+CONFIG_RTC_DRV_MC13XXX=m
+CONFIG_RTC_DRV_MCP795=m
+CONFIG_RTC_DRV_MSM6242=m
+CONFIG_RTC_DRV_MT6397=m
+CONFIG_RTC_DRV_MT7622=m
+CONFIG_RTC_DRV_MV=y
+CONFIG_RTC_DRV_MXC=m
+CONFIG_RTC_DRV_OMAP=y
+CONFIG_RTC_DRV_OPAL=y
+CONFIG_RTC_DRV_PALMAS=m
+CONFIG_RTC_DRV_PCAP=m
+CONFIG_RTC_DRV_PCF2123=m
+CONFIG_RTC_DRV_PCF2127=m
+CONFIG_RTC_DRV_PCF50633=m
+# CONFIG_RTC_INTF_DEV_UIE_EMUL is not set
+CONFIG_RTC_INTF_PROC=y
+CONFIG_RTC_INTF_SYSFS=y
+CONFIG_RTC_LIB=y
+CONFIG_RTC_MC146818_LIB=y
+CONFIG_RTC_NVMEM=y
+CONFIG_RTC_SYSTOHC=y
+CONFIG_RTC_SYSTOHC_DEVICE="rtc0"
+CONFIG_RTL8180=m
+CONFIG_RTL8187=m
+CONFIG_RTL8187_LEDS=y
+CONFIG_RTL8188EE=m
+CONFIG_RTL8192CE=m
+CONFIG_RTL8192CU=m
+CONFIG_RTL8192C_COMMON=m
+CONFIG_RTL8192DE=m
+CONFIG_RTL8192E=m
+CONFIG_RTL8192EE=m
+CONFIG_RTL8192SE=m
+CONFIG_RTL8192U=m
+CONFIG_RTL8723AE=m
+CONFIG_RTL8723BE=m
+CONFIG_RTL8723BS=m
+CONFIG_RTL8723_COMMON=m
+CONFIG_RTL8821AE=m
+CONFIG_RTL8XXXU=m
+CONFIG_RTL8XXXU_UNTESTED=y
+CONFIG_RTLBTCOEXIST=m
+CONFIG_RTLHALMAC_ST=m
+CONFIG_RTLLIB=m
+CONFIG_RTLLIB_CRYPTO_CCMP=m
+CONFIG_RTLLIB_CRYPTO_TKIP=m
+CONFIG_RTLLIB_CRYPTO_WEP=m
+CONFIG_RTLPHYDM_ST=m
+CONFIG_RTLWIFI=m
+# CONFIG_RTLWIFI_DEBUG is not set
+# CONFIG_RTLWIFI_DEBUG_ST is not set
+CONFIG_RTLWIFI_PCI=m
+CONFIG_RTLWIFI_USB=m
+CONFIG_RTL_CARDS=m
+CONFIG_RTS5208=m
+# CONFIG_RT_GROUP_SCHED is not set
+CONFIG_RT_MUTEXES=y
+CONFIG_RWSEM_SPIN_ON_OWNER=y
+CONFIG_RWSEM_XCHGADD_ALGORITHM=y
+CONFIG_RXKAD=y
+CONFIG_S2IO=m
+CONFIG_S390=y
+CONFIG_S390_AP_IOMMU=y
+CONFIG_S390_CCW_IOMMU=y
+CONFIG_S390_GUEST=y
+CONFIG_S390_HYPFS_FS=y
+CONFIG_S390_IOMMU=y
+CONFIG_S390_PRNG=m
+CONFIG_S390_PTDUMP=y
+CONFIG_S390_TAPE=m
+CONFIG_S390_TAPE_34XX=m
+CONFIG_S390_TAPE_3590=m
+CONFIG_S390_VMUR=m
+CONFIG_S3C2410_WATCHDOG=m
+CONFIG_S5P_DEV_MFC=y
+# CONFIG_SAMPLES is not set
+# CONFIG_SAMSUNG_ATAGS is not set
+CONFIG_SAMSUNG_LAPTOP=m
+CONFIG_SAMSUNG_MC=y
+CONFIG_SAMSUNG_Q10=m
+CONFIG_SATA_ACARD_AHCI=m
+CONFIG_SATA_AHCI=m
+CONFIG_SATA_AHCI_SEATTELE=m
+CONFIG_SATA_DWC=m
+# CONFIG_SATA_DWC_DEBUG is not set
+CONFIG_SATA_DWC_OLD_DMA=y
+CONFIG_SATA_HIGHBANK=y
+CONFIG_SATA_INIC162X=m
+CONFIG_SATA_MOBILE_LPM_POLICY=0
+CONFIG_SATA_MV=m
+CONFIG_SATA_NV=m
+CONFIG_SATA_PMP=y
+CONFIG_SATA_PROMISE=m
+CONFIG_SATA_QSTOR=m
+CONFIG_SATA_RCAR=m
+CONFIG_SATA_SI=m
+CONFIG_SATA_SI24=m
+CONFIG_SATA_SIS=m
+CONFIG_SATA_SVW=m
+CONFIG_SATA_SX4=m
+CONFIG_SATA_ULI=m
+CONFIG_SATA_VIA=m
+CONFIG_SATA_VITESSE=m
+CONFIG_SATA_ZPODD=y
+CONFIG_SBC7240_WDT=m
+CONFIG_SBC8360_WDT=m
+CONFIG_SBC_EPX_C3_WATCHDOG=m
+CONFIG_SBC_FITPC2_WATCHDOG=m
+CONFIG_SBITMAP=y
+CONFIG_SBNI=m
+# CONFIG_SBNI_MULTILINE is not set
+CONFIG_SBP_TARGET=m
+CONFIG_SC1200_WDT=m
+CONFIG_SC92031=m
+CONFIG_SCA3000=m
+CONFIG_SCANLOG=m
+CONFIG_SCC=m
+# CONFIG_SCC_DELAY is not set
+# CONFIG_SCC_TRXECHO is not set
+CONFIG_SCHEDSTATS=y
+CONFIG_SCHED_AUTOGROUP=y
+CONFIG_SCHED_BOOK=y
+CONFIG_SCHED_DEBUG=y
+CONFIG_SCHED_DRAWER=y
+CONFIG_SCHED_HRTICK=y
+CONFIG_SCHED_INFO=y
+CONFIG_SCHED_MC=y
+CONFIG_SCHED_MC_PRIO=y
+CONFIG_SCHED_OMIT_FRAME_POINTER=y
+CONFIG_SCHED_STACK_END_CHECK=y
+CONFIG_SCHED_TOPOLOGY=y
+CONFIG_SCHED_TRACER=y
+CONFIG_SCIF=m
+CONFIG_SCIF_BUS=m
+CONFIG_SCLP_ASYNC=m
+CONFIG_SCLP_ASYNC_ID="000000000"
+CONFIG_SCLP_CONSOLE=y
+CONFIG_SCLP_OFB=y
+CONFIG_SCLP_TTY=y
+CONFIG_SCLP_VT220_CONSOLE=y
+CONFIG_SCLP_VT220_TTY=y
+CONFIG_SCM_BLOCK=m
+CONFIG_SCM_BUS=y
+CONFIG_SCOM_DEBUGFS=y
+CONFIG_SCR24X=m
+CONFIG_SCSI=y
+CONFIG_SCSI_AHA152X=m
+CONFIG_SCSI_AHA1542=m
+CONFIG_SCSI_AHA1740=m
+CONFIG_SCSI_BUSLOGIC=m
+CONFIG_SCSI_CONSTANTS=y
+CONFIG_SCSI_DEBUG=m
+CONFIG_SCSI_DH=y
+CONFIG_SCSI_DH_ALUA=m
+CONFIG_SCSI_DH EMC=m
+CONFIG_SCSI_DH_HP_SW=m
+CONFIG_SCSI_DH_RDAC=m
+CONFIG_SCSI_DMA=y
+CONFIG_SCSI_EATA=m
+CONFIG_SCSI_EATA_LINKED_COMMANDS=y
+CONFIG_SCSI_EATA_MAX_TAGS=16
+CONFIG_SCSI_EATA_TAGGED_QUEUE=y
+CONFIG_SCSI_ENCLOSEMENT=m
+CONFIG_SCSI_FC_ATTRS=m
+CONFIG_SCSI_FLASHPOINT=y
+CONFIG_SCSI_GDTH=m
+CONFIG_SCSI_GENERIC_NCR5380=m
+CONFIG_SCSI_HISI_SAS=m
+CONFIG_SCSI_HISI_SAS_PCI=m
+CONFIG_SCSI_IBMVFC=m
+CONFIG_SCSI_IBMVFC_TRACE=y
+CONFIG_SCSI_IBMVSCSI=m
+CONFIG_SCSI_IBMVSCSIS=m
+CONFIG_SCSI_IMM=m
+CONFIG_SCSI_IPR=m
+CONFIG_SCSI_IPR_DUMP=y
+CONFIG_SCSI_IPR_TRACE=y
+CONFIG_SCSI_ISCI=m
+CONFIG_SCSI_ISCSI_ATTRIBUTES=m
+# CONFIG_SCSI_IZIP_EPP16 is not set
+# CONFIG_SCSI_IZIP_SLOW_CTR is not set
+CONFIG_SCSI_LOGGING=y
+CONFIG_SCSI_LOWLEVEL=y
+CONFIG_SCSI_LOWLEVEL_PCIE=y
+# CONFIG_SCSI_LPFC_DEBUG_FS is not set
+CONFIG_SCSI_MOD=y
+CONFIG_SCSI_MPT2SAS=m
+CONFIG_SCSI_MPT2SAS_MAX_SGE=128
+CONFIG_SCSI_MPT3SAS=m
+CONFIG_SCSI_MPT3SAS_MAX_SGE=128
+# CONFIG_SCSI_MVSAS_DEBUG is not set
+# CONFIG_SCSI_MVSAS_TASKLET is not set
+CONFIG_SCSI_NCR53C406A=m
+CONFIG_SCSI_NETLINK=y
+CONFIG_SCSI_NSP32=m
+# CONFIG_SCSI_OSD_DEBUG is not set
+CONFIG_SCSI_OSD_DPRINTSENSE=1
+CONFIG_SCSI_OSD_INITIALIZER=m
+CONFIG_SCSI_OSD_ULD=m
+CONFIG_SCSI_PPA=m
+CONFIG_SCSI_PROC_FS=y
+CONFIG_SCSI_QLOGIC_FAS=m
+CONFIG_SCSI_SAS_ATA=y
+CONFIG_SCSI_SAS_ATTRIBUTES=m
+CONFIG_SCSI_SAS_HOST_SMP=y
+CONFIG_SCSI_SAS_LIBSAS=m
+CONFIG_SCSI_SCAN_ASYNC=y
+CONFIG_SCSI_SIM710=m
+CONFIG_SCSI_SMARTQPI=m
+# CONFIG_SCSI_SNIC_DEBUG_FS is not set
+CONFIG_SCSI_SPI_ATTRS=m
+CONFIG_SCSI_SYM53C416=m
+CONFIG_SCSI_SYM53C8XX_DEFAULT_TAGS=16
+CONFIG_SCSI_SYM53C8XX_DMA_ADDRESSING_MODE=1
+CONFIG_SCSI_SYM53C8XX_MAX_TAGS=64
+CONFIG_SCSI_SYM53C8XX_MMIO=y
+CONFIG_SCSI_UFSHCD_PCI=m
+CONFIG_SCSI_UFSHCD_PLATFORM=m
+CONFIG_SCSI_UFS_DWC_TC_PCI=m
+CONFIG_SCSI_UFS_DWC_TC_PLATFORM=m
+# CONFIG_SCSI_UFS_QCOM is not set
+CONFIG_SCSI_VIRTIO=m
+CONFIG_SCTP_COOKIE_HMAC_MD5=y
+CONFIG_SCTP_COOKIE_HMAC_SHA1=y
+# CONFIG_SCTP_DBG_OBJCNT is not set
+# CONFIG_SCTP_DEFAULT_COOKIE_HMAC_MD5 is not set
+# CONFIG_SCTP_DEFAULT_COOKIE_HMAC_NONE is not set
+CONFIG_SCTP_DEFAULT_COOKIE_HMAC_SHA1=y
+CONFIG_SCx200=m
+CONFIG_SCx200HR_TIMER=m
+CONFIG_SCx200_ACB=m
+CONFIG_SCx200_GPIO=m
+CONFIG_SCx200_WDT=m
+CONFIG_SDIO_UART=m
+CONFIG_SDIO_UART=m
+# CONFIG_SDMA_VERBOSITY is not set
+CONFIG_SDR_PLATFORM_DRIVERS=y
+CONFIG_SEALEVEL_4021=m
+CONFIG_SECCOMP=y
+CONFIG_SECCOMP_FILTER=y
+CONFIG_SECONDARY_TRUSTED_KEYRING=y
+CONFIG_SECTION_MISMATCH_WARN_ONLY=y
+CONFIG_SECURITY=y
+CONFIG_SECURITY_APPARMOR=y
+CONFIG_SECURITY_APPARMOR_BOOTPARAM_VALUE=1
+# CONFIG_SECURITY_APPARMOR_DEBUG is not set
+CONFIG_SECURITY_APPARMOR_HASH=y
+CONFIG_SECURITY_APPARMOR_HASH_DEFAULT=y
+CONFIG_SECURITY_APPARMOR_STACKED=y
+CONFIG_SECURITY_DEFAULT_DISPLAY_APPARMOR=y
+CONFIG_SECURITY_DEFAULT_DISPLAY_NAME="apparmor"
+# CONFIG_SECURITY_DMESG_RESTRICT is not set
+CONFIG_SECURITY_INFINIBAND=y
C:\\# CONFIG_SECURITY_LOADPIN is not set
C:\\# CONFIG_SECURITY_LSM_DEBUG is not set
C:\\+CONFIG_SECURITY_NETWORK=y
C:\\+CONFIG_SECURITY_NETWORK_XFRM=y
C:\\+CONFIG_SECURITY_PATH=y
C:\\+CONFIG_SECURITY_PERF_EVENTS_RESTRICT=y
C:\\+CONFIG_SECURITY_SELINUX=y
C:\\+CONFIG_SECURITY_SELINUX_AVC_STATS=y
C:\\+CONFIG_SECURITY_SELINUX_BOOTPARAM_VALUE=0
C:\\+CONFIG_SECURITY_SELINUX_CHECKREQPROT_VALUE=1
C:\\+CONFIG_SECURITY_SELINUX_DEVELOP=y
C:\\+CONFIG_SECURITY_SELINUX_DISABLE is not set
C:\\+CONFIG_SECURITY_SELINUX_STACKED is not set
C:\\+CONFIG_SECURITY_SMACK=y
C:\\+CONFIG_SECURITY_SMACK_APPEND_SIGNALS=y
C:\\+CONFIG_SECURITY_SMACK_BRINGUP is not set
C:\\+CONFIG_SECURITY_SMACK_NETFILTER=y
C:\\+CONFIG_SECURITY_SMACK_STACKED is not set
C:\\+CONFIG_SECURITY_STACKING=y
C:\\+CONFIG_SECURITY_TOMOYO=y
C:\\+CONFIG_SECURITY_TOMOYO_ACTIVATION_TRIGGER="/sbin/init"
C:\\+CONFIG_SECURITY_TOMOYO_MAX_ACCEPT_ENTRY=2048
C:\\+CONFIG_SECURITY_TOMOYO_MAX_AUDIT_LOG=1024
C:\\+CONFIG_SECURITY_TOMOYO_OMIT_USERSPACE_LOADER is not set
C:\\+CONFIG_SECURITY_TOMOYO_POLICY_LOADER="/sbin/tomoyo-init"
C:\\+CONFIG_SECURITY_TOMOYO_STACKED is not set
C:\\+CONFIG_SECURITY_WRITABLE_HOOKS is not set
C:\\+CONFIG_SECURITY_YAMA=y
C:\\+CONFIG_SELECT_MEMORY_MODE=y
C:\\+CONFIG_SENSORS_ABITUGURU=m
C:\\+CONFIG_SENSORS_ABITUGURU3=m
C:\\+CONFIG_SENSORS_ACPI_POWER=m
C:\\+CONFIG_SENSORS_AD7314=m
C:\\+CONFIG_SENSORS_AD7414=m
C:\\+CONFIG_SENSORS_AD7418=m
C:\\+CONFIG_SENSORS_ADC128D818=m
C:\\+CONFIG_SENSORS_ADCXX=m
C:\\+CONFIG_SENSORSADM1021=m
C:\\+CONFIG_SENSORSADM1025=m
C:\\+CONFIG_SENSORSADM1026=m
C:\\+CONFIG_SENSORSADM1029=m
C:\\+CONFIG_SENSORSADM1031=m
C:\\+CONFIG_SENSORSADM1275=m
C:\\+CONFIG_SENSORSADM9240=m
C:\\+CONFIG_SENSORSADSS1015=m
C:\\+CONFIG_SENSORSADSS7828=m
C:\\+CONFIG_SENSORSADSS7871=m
C:\\+CONFIG_SENSORSADTT7310=m
+CONFIG_SENSORS_AD7410=m
+CONFIG_SENSORS_AD7411=m
+CONFIG_SENSORS_AD7462=m
+CONFIG_SENSORS_AD7470=m
+CONFIG_SENSORS_AD7475=m
+CONFIG_SENSORS_AD7TX10=m
+CONFIG_SENSORS_AMC6821=m
+CONFIG_SENSORS_APDS990X=m
+CONFIG_SENSORS_APPLESMC=m
+CONFIG_SENSORS_ARM_SCPI=m
+CONFIG_SENSORS_ASB100=m
+CONFIG_SENSORS_ASC7621=m
+CONFIG_SENSORS_ASPPEED=m
+CONFIG_SENSORS_ATK0110=m
+CONFIG_SENSORS_ATXP1=m
+CONFIG_SENSORS_BH1770=m
+CONFIG_SENSORS_CORETEMP=m
+CONFIG_SENSORS_DA9052_ADC=m
+CONFIG_SENSORS_DA9055=m
+CONFIG_SENSORS_DELL_SMM=m
+CONFIG_SENSORS_DME1737=m
+CONFIG_SENSORS_DS1621=m
+CONFIG_SENSORS_DS620=m
+CONFIG_SENSORS_EMC1403=m
+CONFIG_SENSORS_EMC2103=m
+CONFIG_SENSORS_EMC6W201=m
+CONFIG_SENSORS_F71805F=m
+CONFIG_SENSORS_F71882FG=m
+CONFIG_SENSORS_F75375S=m
+CONFIG_SENSORS_FAM15H_POWER=m
+CONFIG_SENSORS_FSCHMD=m
+CONFIG_SENSORS_FTSTETUTATES=m
+CONFIG_SENSORS_G760A=m
+CONFIG_SENSORS_G762=m
+CONFIG_SENSORS_GL518SM=m
+CONFIG_SENSORS_GL520SM=m
+CONFIG_SENSORS_GPIO_FAN=m
+CONFIG_SENSORS_HDAPS=m
+CONFIG_SENSORS_HIH6130=m
+CONFIG_SENSORS_HMC5843=m
+CONFIG_SENSORS_HMC5843_I2C=m
+CONFIG_SENSORS_HMC5843_SPI=m
+CONFIG_SENSORS_I5K_AMB=m
+CONFIG_SENSORS_IBMAEM=m
+CONFIG_SENSORS_IBMPEX=m
+CONFIG_SENSORS_IBMPOWERNV=m
+CONFIG_SENSORS_IBM_CFPS=m
+CONFIG_SENSORS_IIO_HWMON=m
+CONFIG_SENSORS_INA209=m
+CONFIG_SENSORS_INA2XX=m
+CONFIG_SENSORS_INA3221=m
+CONFIG_SENSORS_IR35221=m
+CONFIG_SENSORS_ISL29018=m
+CONFIG_SENSORS_ISL29028=m
+CONFIG_SENSORS_IT87=m
+CONFIG_SENSORS_JC42=m
+CONFIG_SENSORS_K10TEMP=m
+CONFIG_SENSORS_K8TEMP=m
+CONFIG_SENSORS_LINEAGE=m
+CONFIG_SENSORS_LIS3LV02D=m
+CONFIG_SENSORS_LIS3_I2C=m
+CONFIG_SENSORS_LIS3_SPI=m
+CONFIG_SENSORS_LM25066=m
+CONFIG_SENSORS_LM3533=m
+CONFIG_SENSORS_LM63=m
+CONFIG_SENSORS_LM70=m
+CONFIG_SENSORS_LM73=m
+CONFIG_SENSORS_LM75=m
+CONFIG_SENSORS_LM77=m
+CONFIG_SENSORS_LM78=m
+CONFIG_SENSORS_LM80=m
+CONFIG_SENSORS_LM83=m
+CONFIG_SENSORS_LM85=m
+CONFIG_SENSORS_LM87=m
+CONFIG_SENSORS_LM90=m
+CONFIG_SENSORS_LM92=m
+CONFIG_SENSORS_LM93=m
+CONFIG_SENSORS_LM95234=m
+CONFIG_SENSORS_LM95241=m
+CONFIG_SENSORS_LM95245=m
+CONFIG_SENSORS_LTC2945=m
+CONFIG_SENSORS_LTC2978=m
+CONFIG_SENSORS_LTC2978_REGULATOR=y
+CONFIG_SENSORS_LTC2990=m
+CONFIG_SENSORS_LTC3815=m
+CONFIG_SENSORS_LTC4151=m
+CONFIG_SENSORS_LTC4215=m
+CONFIG_SENSORS_LTC4222=m
+CONFIG_SENSORS_LTC4245=m
+CONFIG_SENSORS_LTC4260=m
+CONFIG_SENSORS_LTC4261=m
+CONFIG_SENSORS_MAX1111=m
+CONFIG_SENSORS_MAX16064=m
+CONFIG_SENSORS_MAX16065=m
+CONFIG_SENSORS_MAX1619=m
+CONFIG_SENSORS_MAX1668=m
+CONFIG_SENSORS_MAX197=m
+CONFIG_SENSORS_MAX20751=m
+CONFIG_SENSORS_MAX31722=m
+CONFIG_SENSORS_MAX31785=m
+CONFIG_SENSORS_MAX31790=m
+CONFIG_SENSORS_MAX34440=m
+CONFIG_SENSORS_MAX6621=m
+CONFIG_SENSORS_MAX6639=m
+CONFIG_SENSORS_MAX6642=m
+CONFIG_SENSORS_MAX6650=m
+CONFIG_SENSORS_MAX6697=m
+CONFIG_SENSORS_MAX8688=m
+CONFIG_SENSORS_MC13783_ADC=m
+CONFIG_SENSORS_MCP3021=m
+CONFIG_SENSORS_MENF21BMC_HWMON=m
+CONFIG_SENSORS_NCT6683=m
+CONFIG_SENSORS_NCT6775=m
+CONFIG_SENSORS_NCT7802=m
+CONFIG_SENSORS_NCT7904=m
+CONFIG_SENSORS_NTC_THERMISTOR=m
+CONFIG_SENSORS_PC87360=m
+CONFIG_SENSORS_PC87427=m
+CONFIG_SENSORS_PCF8591=m
+CONFIG_SENSORS_PMBUS=m
+CONFIG_SENSORS_PWR1220=m
+CONFIG_SENSORS_PWM_FAN=m
+CONFIG_SENSORS_SCH5627=m
+CONFIG_SENSORS_SCH5636=m
+CONFIG_SENSORS_SHT15=m
+CONFIG_SENSORS_SHT21=m
+CONFIG_SENSORS_SHT3x=m
+CONFIG_SENSORS_SHTC1=m
+CONFIG_SENSORS_SIS5595=m
+CONFIG_SENSORS_SMM665=m
+CONFIG_SENSORS_SMSC47B397=m
+CONFIG_SENSORS_SMSC47M1=m
+CONFIG_SENSORS_SMSC47M192=m
+CONFIG_SENSORS_STTS751=m
+CONFIG_SENSORS_TC654=m
+CONFIG_SENSORS_TC74=m
+CONFIG_SENSORS_THMC50=m
+CONFIG_SENSORS_TMP102=m
+CONFIG_SENSORS_TMP103=m
+CONFIG_SENSORS_TMP108=m
+CONFIG_SENSORS_TMP401=m
+CONFIG_SENSORS_TMP421=m
+CONFIG_SENSORS_TPS40422=m
+CONFIG_SENSORS_TPS53679=m
+CONFIG_SENSORS_TSL2550=m
+CONFIG_SENSORS_TSL2563=m
+CONFIG_SENSORS_UCD9000=m
+CONFIG_SENSORS_UCD9200=m
+CONFIG_SENSORS_VEXPRESS=m
+CONFIG_SENSORS_VIA686A=m
+CONFIG_SENSORS_VIA_CPU_TEMP=m
+CONFIG_SENSORS_VT1211=m
+CONFIG_SENSORS_VT8231=m
+CONFIG_SENSORS_W83627EHF=m
+CONFIG_SENSORS_W83627HF=m
+CONFIG_SENSORS_W83781D=m
+CONFIG_SENSORS_W83791D=m
+CONFIG_SENSORS_W83792D=m
+CONFIG_SENSORS_W83793=m
+CONFIG_SENSORS_W83795=m
+# CONFIG_SENSORS_W83795_FANCTRL is not set
+CONFIG_SENSORS_W83L785TS=m
+CONFIG_SENSORS_W83L786NG=m
+CONFIG_SENSORS_WM831X=m
+CONFIG_SENSORS_WM8350=m
+CONFIG_SENSORS_XGENE=m
+CONFIG_SENSORS_ZL6100=m
+CONFIG_SERIAL_8250_ACCENT=m
+CONFIG_SERIAL_8250_ASPPEED_VUART=m
+# CONFIG_SERIAL_8250_BCM2835AUX is not set
+CONFIG_SERIAL_8250_BOCA=m
+CONFIG_SERIAL_8250_CONSOLE=y
+CONFIG_SERIAL_8250_CS=m
+# CONFIG_SERIAL_8250_DEPRECATED_OPTIONS is not set
+# CONFIG_SERIAL_8250_DETECT_IRQ is not set
+CONFIG_SERIAL_8250_DMA=y
+# CONFIG_SERIAL_8250_EM is not set
+CONFIG_SERIAL_8250_EXAR=m
+CONFIG_SERIAL_8250_EXAR_ST16C554=m
+CONFIG_SERIAL_8250_EXTENDED=y
+CONFIG_SERIAL_8250_FOURPORT=m
+CONFIG_SERIAL_8250_HUB6=m
+CONFIG_SERIAL_8250_LPSS=m
+CONFIG_SERIAL_8250_MANY_PORTS=y
+CONFIG_SERIAL_8250_MEN_MCB=m
+CONFIG_SERIAL_8250_MID=m
+CONFIG_SERIAL_8250_MOXA=m
+CONFIG_SERIAL_8250_MT6577=y
+CONFIG_SERIAL_8250_NR_UARTS=48
+CONFIG_SERIAL_8250_OMAP=m
+CONFIG_SERIAL_8250_PCI=y
+CONFIG_SERIAL_8250_PNP=y
+CONFIG_SERIAL_8250_RSA=y
+CONFIG_SERIAL_8250_RT288X=y
+CONFIG_SERIAL_8250_RUNTIME_UARTS=32
+CONFIG_SERIAL_8250_SHARE_IRQ=y
+CONFIG_SERIAL_8250_UNIPHIER=m
+CONFIG_SERIAL_ALTERA_UART_BAUDRATE=115200
+CONFIG_SERIAL_ALTERA_UART_MAXPORTS=4
+CONFIG_SERIAL_AMBA_PL010=m
+CONFIG_SERIAL_AMBA_PL011=y
+CONFIG_SERIAL_AMBA_PL011_CONSOLE=y
+CONFIG_SERIAL_ARC_NR_PORTS=1
+CONFIG_SERIAL_BCM63XX=m
+CONFIG_SERIAL_CONEXANT_DIGICOLOR=m
+CONFIG_SERIAL_CORE_CONSOLE=y
+CONFIG_SERIAL_DEV_BUS=y
+CONFIG_SERIAL_DEV_CTRL_TTYPORT=y
+CONFIG_SERIAL_EARLYCON=y
+CONFIG_SERIAL_EARLYCON_ARM_SEMIHOST=y
+CONFIG_SERIAL_ICOM=m
+# CONFIG_SERIAL_IFX6X60 is not set
+CONFIG_SERIAL_IMX=y
+CONFIG_SERIAL_IMX_CONSOLE=y
+CONFIG_SERIAL_IPOCTAL=m
+CONFIG_SERIAL_KGDB_NMI=y
+CONFIG_SERIAL_MAX3100=m
+CONFIG_SERIAL_MAX310X=y
+CONFIG_SERIAL_MEN_Z135=m
+CONFIG_SERIAL_MESON=m
+CONFIG_SERIAL_MSM=y
+CONFIG_SERIAL_MSM_CONSOLE=y
+CONFIG_SERIAL_MVEBU_CONSOLE=y
+CONFIG_SERIAL_MVEBU UART=y
+CONFIG_SERIAL_OF_PLATFORM=y
+CONFIG_SERIAL_OMAP=y
+CONFIG_SERIAL_OMAP_CONSOLE=y
+CONFIG_SERIAL_OWL=y
+CONFIG_SERIAL_OWL_CONSOLE=y
+CONFIG_SERIAL_PCH_UART=m
+CONFIG_SERIAL_RP2_NR_UARTS=32
+CONFIG_SERIAL_SAMSUNG=m
+CONFIG_SERIAL_SAMSUNG_UARTS=4
+CONFIG_SERIAL_SAMSUNG_UARTS_4=y
+CONFIG_SERIAL_SC16IS7XX=m
+CONFIG_SERIAL_SC16IS7XX_CORE=m
+CONFIG_SERIAL_SC16IS7XX_I2C=y
+CONFIG_SERIAL_SC16IS7XX_SPI=y
+CONFIG_SERIAL_SCCNXP_CONSOLE=y
+CONFIG_SERIAL_SH_SCL=m
+CONFIG_SERIAL_SH_SCL_DMA=y
+CONFIG_SERIAL_SH_SCL_NR_UARTS=2
+CONFIG_SERIAL_SPRD=m
+CONFIG_SERIAL_ST_ASC=m
+CONFIG_SERIAL_TEGRA=m
+CONFIG_SERIAL_TIMBERDALE=m
+CONFIG_SERIAL_UARTLITE=m
+CONFIG_SERIAL_UARTLITE_NR_UARTS=1
+CONFIG_SERIAL_XILINX_PS_UART=m
+CONFIG_SERIO_ALTERA_PS2=m
+CONFIG_SERIO_AMBAKMI=m
+CONFIG_SERIO_APBPS2=m
+CONFIG_SERIO_ARC_PS2=m
+CONFIG_SERIO_CT82C710=m
+CONFIG_SERIO_GPIO_PS2=m
+CONFIG_SERIO_18042=y
+CONFIG_SERIO_LIBPS2=y
+CONFIG_SERIO_NVEC_PS2=m
+CONFIG_SERIO_PARKBD=m
+CONFIG_SERIO_PCIPS2=m
+CONFIG_SERIO_PS2MULT=m
+CONFIG_SERIO_RAW=m
+CONFIG_SERIO_SERPORT=m
+# CONFIG_SERIO_SUN4I_PS2 is not set
+CONFIG_SERIO_XILINX_XPS_PS2=m
+CONFIG_SETEND_EMULATION=y
+CONFIG_SFC_FALCON_MTD=y
+CONFIG_SFC_MCDI_LOGGING=y
+CONFIG_SFC_MCDI_MON=y
+CONFIG_SFC_MTD=y
+CONFIG_SFC_SRIOV=y
+CONFIG_SPI=y
+CONFIG_SGETMASK_SYSCALL=y
+CONFIG_SG_POOL=y
+CONFIG_SHMEM=y
+CONFIG_SH_DMAE=m
+CONFIG_SH_DMAE_BASE=y
+CONFIG_SH_ETH=m
+CONFIG_SI1145=m
+CONFIG_SI7005=m
+CONFIG_SI7020=m
+CONFIG_SIGMATEL_FIR=m
+CONFIG_SIGNALFD=y
+CONFIG_SIGNATURE=y
+CONFIG_SIGNED_PE_FILE_VERIFICATION=y
+CONFIG_SILEAD_DMI=y
+# CONFIG_SIMPLE_GPIO is not set
+CONFIG_SIMPLE_PM_BUS=y
+CONFIG_SIS190=m
+CONFIG_SIS900=m
+CONFIG_SKFP=m
+CONFIG_SKGE=m
+# CONFIG_SKGE_DEBUG is not set
+CONFIG_SKGE_GENESIS=y
+CONFIG_SKY2=m
+# CONFIG_SKY2_DEBUG is not set
+# CONFIG_SLAB is not set
+CONFIG_SLAB_FREELIST_HARDENED=y
+CONFIG_SLAB_FREELIST_RANDOM=y
+CONFIG_SLAB_MERGE_DEFAULT=y
+CONFIG_SLHC=y
+CONFIG_SLICOSS=m
+CONFIG_SLIC_DS26522=m
+CONFIG_SLIP_COMPRESSED=y
+CONFIG_SLIP_MODE_SLIP6=y
+CONFIG_SLIP_SMART=y
+# CONFIG_SLOB is not set
+CONFIG_SLOB=y
+CONFIG_SLOB_CPU_PARTIAL=y
+CONFIG_SLOB_DEBUG=y
+# CONFIG_SLOB_DEBUG_ON is not set
+CONFIG_SLOB_MEMCG_SYSFS_ON=y
+# CONFIG_SLOB_STATS is not set
+CONFIG_SMARTJOYPLUS_FF=y
+CONFIG_SMC=m
+CONFIG_SMC911X=m
+CONFIG_SMC9194=m
+CONFIG_SMC_DIAG=m
+CONFIG_SMC_IRCC_FIR=m
+CONFIG_SMP=y
+CONFIG_SMP_ON_UP=y
+CONFIG_SMSC37B787_WDT=m
+CONFIG_SMSC911X=m
+# CONFIG_SMSC911X_ARCH_HOOKS is not set
+CONFIG_SMSC9420=m
+CONFIG_SMSC_PHY=m
+CONFIG_SMSC_SCH311X_WDT=m
+CONFIG_SMSCIUCV=y
+CONFIG_SMSCIUCV_EVENT=m
+CONFIG_SMS_SDIO_DRV=m
+CONFIG_SMS_SIANO_DEBUGFS=y
+CONFIG_SMS_SIANO_MDTV=m
+CONFIG_SMS_SIANO_RC=y
+CONFIG_SMS_USB_DRV=m
+CONFIG_SM_FTL=m
+CONFIG_SND_AC97_CODEC=m
+CONFIG_SND_AC97_POWER_SAVE=y
+CONFIG_SND_AC97_POWER_SAVE_DEFAULT=0
+CONFIG_SND_AD1816A=m
+CONFIG_SND_AD1848=m
+CONFIG_SND_AD1889=m
+CONFIG_SND_ADLIB=m
+CONFIG_SND_ALI5451=m
+CONFIG_SND_ALOOP=m
+CONFIG_SND_ALS100=m
+CONFIG_SND_ALS300=m
+CONFIG_SND_ALS4000=m
+CONFIG_SND_AM33XX_SOC_EVM=m
+CONFIG_SND_ARM=y
+CONFIG_SND_ARMAACI=m
+CONFIG_SND_ASIIHPI=m
+CONFIG_SND_ATIIXP=m
+CONFIG_SND_ATIIXP_MODEM=m
+CONFIG_SND_ATMEL_SOC=m
+CONFIG_SND_AU8810=m
+CONFIG_SND_AU8820=m
+CONFIG_SND_AU8830=m
+CONFIG_SND_AUDIO_GRAPH_CARD=m
+CONFIG_SND_AUDIO_GRAPH_SCU_CARD=m
+CONFIG_SND_AW2=m
+CONFIG_SND_AZT1605=m
+CONFIG_SND_AZT2316=m
+CONFIG_SND_AZT2320=m
+CONFIG_SND_AZT3328=m
+CONFIG_SND_BCD2000=m
+CONFIG_SND_BCM2835=m
+CONFIG_SND_BCM2835_SOC_I2S=m
+CONFIG_SND_BEBOB=m
+CONFIG_SND_BT87X=m
+# CONFIG_SND_BT87X_OVERCLOCK is not set
+CONFIG_SND_CA0106=m
+CONFIG_SND_CMI8328=m
+CONFIG_SND_CMI8330=m
+CONFIG_SND_CMIPCI=m
+CONFIG_SND_CS4231=m
+CONFIG_SND_CS4236=m
+CONFIG_SND_CS4281=m
+CONFIG_SND_CS46XX=m
+CONFIG_SND_CS46XX_NEW_DSP=y
+CONFIG_SND_CS5530=m
+CONFIG_SND_CS5535AUDIO=m
+CONFIG_SND_CTXFI=m
+CONFIG_SND_DARLA20=m
+CONFIG_SND_DARLA24=m
+CONFIG_SND_DAVINCI_SOC_GENERIC_EVM=m
+# CONFIG_SND_DAVINCI_SOC_I2S is not set
+CONFIG_SND_DAVINCI_SOC_MCASP=m
+# CONFIG_SND_DEBUG is not set
+CONFIG_SND_DESIGNWARE_I2S=m
+CONFIG_SND_DESIGNWARE_PCM=y
+CONFIG_SND_DICE=m
+CONFIG_SND_DMA_SGBUF=y
+CONFIG_SND_DRIVERS=y
+CONFIG_SND_DUMMY=m
+CONFIG_SND_DYNAMIC_MINORS=y
+CONFIG_SND_ECHO3G=m
+CONFIG_SND_EMU10K1=m
+CONFIG_SND_EMU10K1X=m
+CONFIG_SND_ENS1370=m
+CONFIG_SND_ENS1371=m
+CONFIG_SND_ES1688=m
+CONFIG_SND_ES18XX=m
+CONFIG_SND_ES1938=m
+CONFIG_SND_ES1968=m
+CONFIG_SND_ES1968_INPUT=y
+CONFIG_SND_ES1968_RADIO=y
+CONFIG_SND_FIREFACE=m
+CONFIG_SND_FIREWIRE=y
+CONFIG_SND_FIREWIRE_DIGI00X=m
+CONFIG_SND_FIREWIRE_LIB=m
+CONFIG_SND_FIREWIRE_MOTU=m
+CONFIG_SND_FIREWIRE_TASCAM=m
+CONFIG_SND_FIREWORKS=m
+CONFIG_SND_FM801=m
+CONFIG_SND_FM801_TEA575X_BOOL=y
+CONFIG_SND_GINA20=m
+CONFIG_SND_GINA24=m
+CONFIG_SND_GUSCLASSIC=m
+CONFIG_SND_GUSEXTREME=m
+CONFIG_SND_GUSMAX=m
+CONFIG_SND_HDA=m
+CONFIG_SND_HDA_CODEC_ANALOG=m
+CONFIG_SND_HDA_CODEC_CA0110=m
+CONFIG_SND_HDA_CODEC_CA0132=m
+CONFIG_SND_HDA_CODEC_CA0132_DSP=y
+CONFIG_SND_HDA_CODEC_CIRRUS=m
+CONFIG_SND_HDA_CODEC_CMEDIA=m
+CONFIG_SND_HDA_CODEC_CONEXANT=m
+CONFIG_SND_HDA_CODEC_HDMI=m
+CONFIG_SND_HDA_CODEC_REALTEK=m
+CONFIG_SND_HDA_CODEC_SI3054=m
+CONFIG_SND_HDA_CODEC_SIGMATEL=m
+CONFIG_SND_HDA_CODEC_VIA=m
+CONFIG_SND_HDA_CORE=m
+CONFIG_SND_HDA_DSP_LOADER=y
+CONFIG_SND_HDA_EXT_CORE=m
+CONFIG_SND_HDA_GENERIC=m
+CONFIG_SND_HDA_HWDEP=y
+CONFIG_SND_HDA_I915=y
+CONFIG_SND_HDA_INPUT_BEEP=y
+CONFIG_SND_HDA_INPUT_BEEP_MODE=0
+CONFIG_SND_HDA_INTEL=m
+CONFIG_SND_HDA_PATCH_LOADER=y
+CONFIG_SND_HDA_POWER_SAVE_DEFAULT=0
+CONFIG_SND_HDA_PREALLOC_SIZE=64
+CONFIG_SND_HDA_RECONFIG=y
+CONFIG_SND_HDA_TEGRA=m
+CONFIG_SND_HDSP=m
+CONFIG_SND_HDSPM=m
+CONFIG_SND_HRTIMER=m
+CONFIG_SND_HWDEP=m
+CONFIG_SND_I2S_HI6210_I2S=m
+CONFIG_SND_ICE1712=m
+CONFIG_SND_ICE1724=m
+CONFIG_SND_IMX_SOC=y
+CONFIG_SND_INDIGO=m
+CONFIG_SND_INDIGODJ=m
+CONFIG_SND_INDIGODJX=m
+CONFIG_SND_INDIGOIO=m
+CONFIG_SND_INDIGOIOX=m
+CONFIG_SND_INTEL8X0=m
+CONFIG_SND_INTEL8X0M=m
+CONFIG_SND_INTERWAVE=m
+CONFIG_SND_INTERWAVE_STB=m
+CONFIG_SND_ISA=y
+CONFIG_SND_ISIGHT=m
+CONFIG_SND_JACK=y
+CONFIG_SND_JACK_INPUT_DEV=y
+CONFIG_SND_JAZZ16=m
+CONFIG_SND_KIRKWOOD_SOC=m
+CONFIG_SND_KIRKWOOD_SOC_ARMADA370_DB=m
+CONFIG_SND_KORG1212=m
+CONFIG_SND_LAYLA20=m
+CONFIG_SND_LAYLA24=m
+CONFIG_SND_LOLA=m
+CONFIG_SND_LX6464ES=m
+CONFIG_SND_MAESTRO3=m
+CONFIG_SND_MAESTRO3_INPUT=y
+CONFIG_SND_MAX_CARDS=32
+CONFIG_SND_MFLD_MACHINE=m
+CONFIG_SND_MIA=m
+CONFIG_SND_MIRO=m
+CONFIG_SND_MIXART=m
+CONFIG_SND_MIXER_OSS=m
+CONFIG_SND_MONA=m
+CONFIG_SND_MPU401=m
+CONFIG_SND_MPU401_UART=m
+CONFIG_SND_MSD_CLSIC=m
+CONFIG_SND_MSD_PINNACLE=m
+CONFIG_SND_MTPAV=m
+CONFIG_SND_MTS64=m
+CONFIG_SND_NM256=m
+CONFIG_SND_OMAP_SOC=y
+CONFIG_SND_OMAP_SOC_DMIC=m
+CONFIG_SND_OMAP_SOC_HD_MADI_AUDIO=m
+CONFIG_SND_OMAP_SOC_MCBSP=y
+CONFIG_SND_OMAP_SOC_MCPDM=m
+CONFIG_SND_OMAP_SOC_OMAP3_PANDORA=m
+CONFIG_SND_OMAP_SOC_OMAP_ABE_TWIL6040=m
+CONFIG_SND_OMAP_SOC_OMAP_TWIL4030=y
+CONFIG_SND_OMAP_SOC_RX51=m
+CONFIG_SND_OPL3SA2=m
+CONFIG_SND_OPL3_1LIB=m
+CONFIG_SND_OPL3_1LIB_SEQ=m
+CONFIG_SND_OPL4_1LIB=m
+CONFIG_SND_OPTI92X_AD1848=m
+CONFIG_SND_OPTI92X_CS4231=m
+CONFIG_SND_OPTI93X=m
+CONFIG_SND_OSSEMUL=y
+CONFIG_SND_OXFW=m
+CONFIG_SND_OXYGEN=m
+CONFIG_SND_OXYGEN_LIB=m
+CONFIG_SND_PCI=y
+CONFIG_SND_PCMCIA=y
+CONFIG_SND_PCM_ELD=y
+CONFIG_SND_PCM_IEC958=y
+# CONFIG_SND_PCM_OSS is not set
+CONFIG_SND_PCM_TIMER=y
+CONFIG_SND_PCPSP=m
+CONFIG_SND_PCHXR=m
+CONFIG_SND_PDAUDIOCF=m
+CONFIG_SND_PORTMAN2X4=m
+CONFIG_SND_PPC=y
+CONFIG_SND_PROC_FS=y
+CONFIG_SND_RAWMIDI=m
+CONFIG_SND_RIPTIDE=m
+CONFIG_SND_RME32=m
CONFIG_SND_RME96=m
CONFIG_SND_RME9652=m
CONFIG_SND_SAMSUNG_I2S=m
CONFIG_SND_SAMSUNG_PCM=m
CONFIG_SND_SAMSUNG_SPDIF=m
CONFIG_SND_SB16=m
CONFIG_SND_SB16_CSP=y
CONFIG_SND_SB16_DSP=m
CONFIG_SND_SB8=m
CONFIG_SND_SB8_DSP=m
CONFIG_SND_SBAWE=m
CONFIG_SND_SBAWE_SEQ=m
CONFIG_SND_SB_COMMON=m
CONFIG_SND_SC6000=m
CONFIG_SND_SEQUENCER=m
CONFIG_SND_SEQ_DEVICE=m
CONFIG_SND_SEQ_DUMMY=m
CONFIG_SND_SEQ_HRTIMER_DEFAULT=y
CONFIG_SND_SEQ_MIDI=m
CONFIG_SND_SEQ_MIDI_EMUL=m
CONFIG_SND_SEQ_MIDI_EVENT=m
CONFIG_SND_SEQ_VIRMIDI=m
CONFIG_SND_SERIAL_U16550=m
CONFIG_SND_SIMPLE_CARD=m
CONFIG_SND_SIMPLE_CARD_UTILS=m
CONFIG_SND_SIMPLE_SCU_CARD=m
CONFIG_SND_SIS7019=m
CONFIG_SND_SOC_AC97_BUS=y
CONFIG_SND_SOC_AC97_CODEC=m
CONFIG_SND_SOC_ACPI=m
CONFIG_SND_SOC_ACPI_INTEL_MATCH=m
CONFIG_SND_SOC_ADAU1701=m
CONFIG_SND_SOC_ADAU1761=m
CONFIG_SND_SOC_ADAU1761_I2C=m
CONFIG_SND_SOC_ADAU1761_SPI=m
CONFIG_SND_SOC_ADAU17X1=m
CONFIG_SND_SOC_ADAU7002=m
CONFIG_SND_SOC_ADAU_UTILS=m
CONFIG_SND_SOC_AK4104=m
CONFIG_SND_SOC_AK4554=m
CONFIG_SND_SOC_AK4613=m
CONFIG_SND_SOC_AK4642=m
CONFIG_SND_SOC_AK5386=m
CONFIG_SND_SOC_ALC5623=m
CONFIG_SND_SOC_ALC5632=m
CONFIG_SND_SOC_AMD_ACP=m
CONFIG_SND_SOC_AMD_CZ_RT5645_MACH=m
+CONFIG_SND_SOC_APQ8016_SBC=m
+CONFIG_SND_SOC_ARIZONA=m
+CONFIG_SND_SOC_ARNDALE_RT5631_ALC5631=m
+CONFIG_SND_SOC_BT_SCO=m
+CONFIG_SND_SOC_COMPRESS=y
+CONFIG_SND_SOC_CS35L32=m
+CONFIG_SND_SOC_CS35L33=m
+CONFIG_SND_SOC_CS35L34=m
+CONFIG_SND_SOC_CS35L35=m
+CONFIG_SND_SOC_CS4265=m
+CONFIG_SND_SOC_CS4270=m
+CONFIG_SND_SOC_CS4271=m
+CONFIG_SND_SOC_CS4271_I2C=m
+CONFIG_SND_SOC_CS4271_SPI=m
+CONFIG_SND_SOC_CS42L42=m
+CONFIG_SND_SOC_CS42L51=m
+CONFIG_SND_SOC_CS42L51_I2C=m
+CONFIG_SND_SOC_CS42L52=m
+CONFIG_SND_SOC_CS42L56=m
+CONFIG_SND_SOC_CS42L73=m
+CONFIG_SND_SOC_CS42XX8=m
+CONFIG_SND_SOC_CS42XX8_I2C=m
+CONFIG_SND_SOC_CS43130=m
+CONFIG_SND_SOC_CS4349=m
+CONFIG_SND_SOC_CS53L30=m
+CONFIG_SND_SOC_DA7213=m
+CONFIG_SND_SOC_DA7219=m
+CONFIG_SND_SOC_DIO2125=m
+CONFIG_SND_SOC_DMIC=m
+CONFIG_SND_SOC_ES7134=m
+CONFIG_SND_SOC_ES8316=m
+CONFIG_SND_SOC_ES8328=m
+CONFIG_SND_SOC_ES8328_I2C=m
+CONFIG_SND_SOC_ES8328_SPI=m
+CONFIG_SND_SOC_EUKREA_TLV320=m
+CONFIG_SND_SOC_FSL_ASOCKET_CARD=m
+CONFIG_SND_SOC_FSL_ASR=m
+CONFIG_SND_SOC_FSL_ESAI=m
+CONFIG_SND_SOC_FSL_SAI=m
+CONFIG_SND_SOC_FSL_SPDIF=m
+CONFIG_SND_SOC_FSL_UTILS=m
+CONFIG_SND_SOC_GENERIC_DMAENGINE_PCM=y
+CONFIG_SND_SOC_GTM601=m
+CONFIG_SND_SOC_HDAC_HDMI=m
+CONFIG_SND_SOC_HDMI_CODEC=m
+CONFIG_SND_SOC_IMG=y
+CONFIG_SND_SOC_IMG_I2S_IN=m
+CONFIG_SND_SOC_IMG_I2S_OUT=m
+CONFIG_SND_SOC_RT5677=m
+CONFIG_SND_SOC_SAMSUNG=m
+CONFIG_SND_SOC_SAMSUNG_SMDK_SPDIF=m
+CONFIG_SND_SOC_SAMSUNG_SMDK_WM8994=m
+CONFIG_SND_SOC_SAMSUNG_TM2_WM5110=m
+CONFIG_SND_SOC_SH4_FSI=m
+CONFIG_SND_SOC_SI476X=m
+CONFIG_SND_SOC_SIGMADSP=m
+CONFIG_SND_SOC_SIGMADSP_I2C=m
+CONFIG_SND_SOC_SIGMADSP_REGMAP=m
+CONFIG_SND_SOC_SIRF_AUDIO_CODEC=m
+CONFIG_SND_SOC_SMDK_WM8994_PCM=m
+CONFIG_SND_SOC_SN95031=m
+CONFIG_SND_SOC_SNOW=m
+CONFIG_SND_SOC_SPDIF=m
+CONFIG_SND_SOC_SSM2602=m
+CONFIG_SND_SOC_SSM2602_I2C=m
+CONFIG_SND_SOC_SSM2602_SPI=m
+CONFIG_SND_SOC_SSM4567=m
+CONFIG_SND_SOC_STA32X=m
+CONFIG_SND_SOC_STA350=m
+CONFIG_SND_SOC_STI_SAS=m
+CONFIG_SND_SOC_STORM=m
+CONFIG_SND_SOC_TAS2552=m
+CONFIG_SND_SOC_TAS5086=m
+CONFIG_SND_SOC_TAS571X=m
+CONFIG_SND_SOC_TAS5720=m
+CONFIG_SND_SOC_TEGRA=m
+CONFIG_SND_SOC_TEGRA20_AC97=m
+CONFIG_SND_SOC_TEGRA20_DAS=m
+CONFIG_SND_SOC_TEGRA20_I2S=m
+CONFIG_SND_SOC_TEGRA20_SPDIF=m
+CONFIG_SND_SOC_TEGRA30_AHUB=m
+CONFIG_SND_SOC_TEGRA30_I2S=m
+CONFIG_SND_SOC_TEGRA_ALC5632=m
+CONFIG_SND_SOC_TEGRA_MAX98090=m
+CONFIG_SND_SOC_TEGRA_RT5640=m
+CONFIG_SND_SOC_TEGRA_RT5677=m
+CONFIG_SND_SOC_TEGRA_SGTL5000=m
+CONFIG_SND_SOC_TEGRA_TRIMSLICE=m
+CONFIG_SND_SOC_TEGRA_WM8753=m
+CONFIG_SND_SOC_TEGRA_WM8903=m
+CONFIG_SND_SOC_TEGRA_WM9712=m
+CONFIG_SND_SOC_TFA9879=m
+CONFIG_SND_SOC_TLV320AIC23=m
+CONFIG_SND_SOC_TLV320AIC23_I2C=m
+CONFIG_SND_SOC_TLV320AIC23_SPI=m
+CONFIG_SND_SOC_TLV320AIC31XX=m
+CONFIG_SND_SOC_TLV320AIC3X=m
+CONFIG_SND_SOC_TOPOLOGY=y
+CONFIG_SND_SOC_TPA6130A2=m
+CONFIG_SND_SOC_TS3A227E=m
+CONFIG_SND_SOC_TWL4030=y
+CONFIG_SND_SOC_TWL6040=m
+CONFIG_SND_SOC_WM5110=m
+CONFIG_SND_SOC_WM8510=m
+CONFIG_SND_SOC_WM8523=m
+CONFIG_SND_SOC_WM8524=m
+CONFIG_SND_SOC_WM8580=m
+CONFIG_SND_SOC_WM8711=m
+CONFIG_SND_SOC_WM8728=m
+CONFIG_SND_SOC_WM8731=m
+CONFIG_SND_SOC_WM8737=m
+CONFIG_SND_SOC_WM8741=m
+CONFIG_SND_SOC_WM8750=m
+CONFIG_SND_SOC_WM8753=m
+CONFIG_SND_SOC_WM8770=m
+CONFIG_SND_SOC_WM8776=m
+CONFIG_SND_SOC_WM8804=m
+CONFIG_SND_SOC_WM8804_I2C=m
+CONFIG_SND_SOC_WM8804_SPI=m
+CONFIG_SND_SOC_WM8903=m
+CONFIG_SND_SOC_WM8960=m
+CONFIG_SND_SOC_WM8962=m
+CONFIG_SND_SOC_WM8974=m
+CONFIG_SND_SOC_WM8978=m
+CONFIG_SND_SOC_WM8985=m
+CONFIG_SND_SOC_WM8994=m
+CONFIG_SND_SOC_WM9712=m
+CONFIG_SND_SOC_WM_ADSP=m
+CONFIG_SND_SOC_WM_HUBS=m
+CONFIG_SND_SOC_XTTFPGA_I2S=m
+CONFIG_SND_SOC_ZX_AUD96P22=m
+CONFIG_SND_SONICVIBES=m
+CONFIG_SND_SPI=y
+CONFIG_SND_SSCAPE=m
+CONFIG_SND_SST_ATOM_HIFI2_PLATFORM=m
+CONFIG_SND_SST_IPC=m
+CONFIG_SND_SST_IPC_ACPI=m
+CONFIG_SND_SST_IPC_PCI=m
+CONFIG_SND_SUN4I_CODEC is not set
+CONFIG_SND_SUN4I_I2S is not set
+CONFIG_SND_SUN4I_SPDIF is not set
+CONFIG_SND_SUN8I_CODEC_ANALOG=m
+CONFIG_SND_SUPPORT_OLD_API=y
+CONFIG_SND_SYNTH_EMUX=m
+CONFIG_SND_TRIDENT=m
+CONFIG_SND_USB=y
+CONFIG_SND_USB_6FIRE=m
+CONFIG_SND_USB_AUDIO=m
+CONFIG_SND_USB_CAIAQ=m
+CONFIG_SND_USB_CAIAQ_INPUT=y
+CONFIG_SND_USB_HIFACE=m
+CONFIG_SND_USB_LINE6=m
+CONFIG_SND_USB_POD=m
+CONFIG_SND_USB_PODHD=m
+CONFIG_SND_USB_TONEPORT=m
+CONFIG_SND_USB_UA101=m
+CONFIG_SND_USB_US122L=m
+CONFIG_SND_USB_USX2Y=m
+CONFIG_SND_USB_VARIAX=m
+# CONFIG_SND_VERBOSE_PRINTK is not set
+CONFIG_SND_VERBOSE_PROCFS=y
+CONFIG_SND_VIA82XX=m
+CONFIG_SND_VIA82XX_MODEM=m
+CONFIG_SND_VIRMIDI=m
+CONFIG_SND_VIRTUOSO=m
+CONFIG_SND_VMASTER=y
+CONFIG_SND_VX222=m
+CONFIG_SND_VXPOCKET=m
+CONFIG_SND_VX_LIB=m
+CONFIG_SND_WAVEFRONT=m
+CONFIG_SND_WSS_LIB=m
+CONFIG_SND_X86=y
+CONFIG_SND_YMFPCI=m
+CONFIG_SN1_NETSEC=m
+CONFIG_SOCIONEXT_SYNQUACER_PREITS=y
+CONFIG_SOCK_CGROUP_DATA=y
+# CONFIG_SOC_AM43XX is not set
+CONFIG_SOC_BUS=y
+CONFIG_SOC_CAMERA=m
+CONFIG_SOC_CAMERA_IMX074=m
+CONFIG_SOC_CAMERA_MT9M001=m
+CONFIG_SOC_CAMERA_MT9M111=m
+CONFIG_SOC_CAMERA_MT9T031=m
+CONFIG_SOC_CAMERA_MT9T112=m
+CONFIG_SOC_CAMERA_MT9V022=m
+CONFIG_SOC_CAMERA_OV5642=m
+CONFIG_SOC_CAMERA_OV772X=m
+CONFIG_SOC_CAMERA_OV9640=m
+CONFIG_SOC_CAMERA_OV9740=m
+CONFIG_SOC_CAMERAPLATFORM=m
+CONFIG_SOC_CAMERA_RJ54N1=m
+CONFIG_SOC_CAMERA_SCALE_CROP=m
+CONFIG_SOC_CAMERA_TW9910=y
+CONFIG_SOC_DRA7XX=y
+CONFIG_SOC_EXYNOS5250=y
+CONFIG_SOC_EXYNOS5260=y
+CONFIG_SOC_EXYNOS5410=y
+CONFIG_SOC_EXYNOS5420=y
+CONFIG_SOC_EXYNOS5440=y
+CONFIG_SOC_EXYNOS5800=y
+CONFIG_SOC_HAS_OMAP2_SDRC=y
+CONFIG_SOC_HAS_REALTIME_COUNTER=y
+CONFIG_SOC_IMX5=y
+CONFIG_SOC_IMX50=y
+CONFIG_SOC_IMX51=y
+# CONFIG_SOC_IMX53 is not set
+CONFIG_SOC_IMX6=y
+CONFIG_SOC_IMX6Q=y
+CONFIG_SOC_IMX6SL=y
+CONFIG_SOC_IMX6SX=y
+CONFIG_SOC_IMX6UL=y
+CONFIG_SOC_IMX7D=y
+# CONFIG_SOC_LS1021A is not set
+CONFIG_SOC_OMAP3430=y
+# CONFIG_SOC_OMAP5 is not set
+CONFIG_SOC_RENESAS=y
+CONFIG_SOC_SAMSUNG=y
+CONFIG_SOC_TEGRA_FLOWCTRL=y
+CONFIG_SOC_TEGRA_FUSE=y
+CONFIG_SOC_TEGRA_PMC=y
+CONFIG_SOC_TI81XX=y
+CONFIG_SOC_VF610=y
+CONFIG_SOFTLOCKUP_DETECTOR=y
+CONFIG_SOFT_WATCHDOG=m
+CONFIG_SOFT_WATCHDOG_PRETIMEOUT=y
+CONFIG_SONYPI=m
+CONFIG_SONYPI_COMPAT=y
+CONFIG_SONY_FF=y
+CONFIG_SONY_LAPTOP=m
+CONFIG_SOUND_OSS_CORE=y
+# CONFIG_SOUND_OSS_CORE_PRECLAIM is not set
+CONFIG_SP5100_TCO=m
+CONFIG_SPAAPR_TCE_IOMMU=y
+CONFIG_SPARSEMEM=y
+CONFIG_SPARSEMEM_ALLOC_MEM_MAP_TOGETHER=y
+CONFIG_SPARSEMEM_EXTREME=y
+CONFIG_SPARSEMEM_MANUAL=y
+CONFIG_SPARSEMEM_STATIC=y
+CONFIG_SPARSEMEM_VMEMMAP=y
+CONFIG_SPARSEMEM_VMEMMAP_ENABLE=y
+CONFIG_SPARSE_IRQ=y
+CONFIG_SPEAKUP=m
+CONFIG_SPEAKUP_SYNTH_ACNTPC=m
+CONFIG_SPEAKUP_SYNTH_ACNTSA=m
+CONFIG_SPEAKUP_SYNTH_APOLLO=m
+CONFIG_SPEAKUP_SYNTH_AUDPTR=m
+CONFIG_SPEAKUP_SYNTH_BNS=m
+CONFIG_SPEAKUP_SYNTH_DECEXT=m
+CONFIG_SPEAKUP_SYNTH_DECPC=m
+CONFIG_SPEAKUP_SYNTH_DECTLK=m
+CONFIG_SPEAKUP_SYNTH_DTLK=m
+CONFIG_SPEAKUP_SYNTH_DUMMY=m
+CONFIG_SPEAKUP_SYNTH_KEYPC=m
+CONFIG_SPEAKUP_SYNTH_LTLK=m
+CONFIG_SPEAKUP_SYNTH_SOFT=m
+CONFIG_SPEAKUP_SYNTH_SPKOUT=m
+CONFIG_SPEAKUP_SYNTH_TXPRT=m
+CONFIG_SPI_ALTERA=m
+CONFIG_SPI_ARMADA_3700=m
+CONFIG_SPI_AXI_SPI_ENGINE=m
+CONFIG_SPI_BCM2835=m
+CONFIG_SPI_BCM2835AUX=m
+CONFIG_SPI_BCM_QSPI=m
+CONFIG_SPI_BITBANG=m
+CONFIG_SPI_BUTTERFLY=m
+CONFIG_SPI_CADENCE=m
+CONFIG_SPI_CADENCE_QUADSPI=m
+CONFIG_SPI_DEBUG is not set
+CONFIG_SPI_DLN2=m
+CONFIG_SPI_DW_MID_DMA=y
+CONFIG_SPI_DW_MMIOM=m
+CONFIG_SPI_DW_PCI=m
+CONFIG_SPI_DYNAMIC=y
+CONFIG_SPI_FSL_DSPI=m
+CONFIG_SPI_FSL_LIB=y
+CONFIG_SPI_FSL_LPSPIm=m
+CONFIG_SPI_FSL_QUADSPI=m
+CONFIG_SPI_FSL_SPI=y
+CONFIG_SPI_GPIO=m
+CONFIG_SPI_HISI_SFC=m
+CONFIG_SPI_IMX=m
+CONFIG_SPI_INTEL_SPI_PCI is not set
+CONFIG_SPI_INTEL_SPI_PLATFORM is not set
+CONFIG_SPI_LM70_LLP=m
+CONFIG_SPI_LOOPBACK_TEST=m
+CONFIG_SPI_MASTER=y
+CONFIG_SPI_MESON_SPICC=m
+CONFIG_SQUASHFS_ZSTD=y
+CONFIG_SRAM_EXEC=y
+CONFIG_SRCU=y
+CONFIG_SRF04=m
+CONFIG_SRF08=m
+CONFIG_SSB_B43_PCI_BRIDGE=y
+CONFIG_SSB_BLOCKIO=y
+# CONFIG_SSB_DEBUG is not set
+CONFIG_SSB_DRIVER_GPIO=y
+CONFIG_SSB_DRIVER_PCICORE=y
+CONFIG_SSB_DRIVER_PCICORE_POSSIBLE=y
+CONFIG_SSB_PCIHOST=y
+CONFIG_SSB_PCIHOST_POSSIBLE=y
+# CONFIG_SSB_PCMCIAHOST is not set
+CONFIG_SSB_PCMCIAHOST_POSSIBLE=y
+CONFIG_SSB_POSSIBLE=y
+CONFIG_SSB_SDIOHOST=y
+CONFIG_SSB_SDIOHOST_POSSIBLE=y
+# CONFIG_SSB_SILENT is not set
+CONFIG_SSB_SPROM=y
+CONFIG_SSFDC=m
+CONFIG_SSI_PROTOCOL=m
+CONFIG_STACKTRACE=y
+CONFIG_STACKTRACE_SUPPORT=y
+CONFIG_STACK_GUARD=256
+CONFIG_STACK_TRACER=y
+CONFIG_STACK_VALIDATION=y
+# CONFIG_STAGING_BOARD is not set
+CONFIG_STAGING_MEDIA=y
+# CONFIG_STATIC_KEYS_SELFTEST is not set
+# CONFIG_STATIC_USERMODEHELPER is not set
+CONFIG_STE10XP=m
+CONFIG_STK3310=m
+CONFIG_STK8312=m
+CONFIG_STK8BA50=m
+CONFIG_STM=m
+CONFIG_STMMAC_ETH=m
+# CONFIG_STMMAC_PCI is not set
+CONFIG_STMMAC_PLATFORM=m
+CONFIG_STMPE_I2C=y
+CONFIG_STMPE_SPI=y
+CONFIG_STMP_DEVICE=y
+CONFIG_STM_DUMMY=m
+CONFIG_STM_SOURCE_CONSOLE=m
+CONFIG_STM_SOURCE_FTRACE=m
+CONFIG_STM_SOURCE_HEARTBEAT=m
+CONFIG_STP=m
+CONFIG_STREAM_PARSER=y
+CONFIG STRICT DEVMEM=y
+CONFIG STRICT KERNEL_RWX=y
+CONFIG STRICT MODULE_RWX=y
+# CONFIG STRING_SELFTEST is not set
+# CONFIG STRIP_ASM_SYMS is not set
+CONFIG_stub_CLK_HI6220=y
+CONFIG_STX104=m
+CONFIG_SUDMAC=m
+# CONFIG_SUN4I EMAC is not set
+# CONFIG_SUN4I_GPADC is not set
+CONFIG_SUN50I_A64_CCU=y
+CONFIG_SUN50I_ERRATUM_UNKNOWN1=y
+CONFIG_SUN8I_A83T_CCU=y
+CONFIG_SUN8I_DE2_CCU=y
+CONFIG_SUN8I_H3_CCU=y
+CONFIG_SUN8I_R_CCU=y
+CONFIG_SUNDANCE=m
+# CONFIG_SUNDANCE_MMIO is not set
+CONFIG_SUNGEM=m
+CONFIG_SUNGEM_PHY=m
+CONFIG_SUNRPC=m
+CONFIG_SUNRPC_BACKCHANNEL=y
+CONFIG_SUNRPC_DEBUG=y
+CONFIG_SUNRPC_GSS=m
+CONFIG_SUNRPC_SWAP=y
+CONFIG_SUNRPC_XPRT_RDMA=m
+CONFIG_SUNXI_CCU=y
+CONFIG_SUNXI_RSB=m
+CONFIG_SUNXI_WATCHDOG=m
+CONFIG_SURFACE3_WMI=m
+CONFIG_SURFACE_3_BUTTON=m
+CONFIG_SURFACE_PRO3_BUTTON=m
+CONFIG_SUSPEND=y
+CONFIG_SUSPEND_FREEZER=y
+# CONFIG_SUSPEND_SKIP_SYNC is not set
+CONFIG_SWAP=y
+CONFIG_SWIOTLB=y
+CONFIG_SWIOTLB_XEN=y
+CONFIG_SWPHY=y
+CONFIG_SWP_EMULATE=y
+CONFIG_SWP_EMULATION=y
+CONFIG_SW_SYNC=y
+CONFIG_SX9500=m
+CONFIG_SXGBE_ETH=m
+CONFIG_SYNCLINK=m
+CONFIG_SYNCLINKM=m
+CONFIG_SYNCLINK_CS=m
+CONFIG_SYNCLINK_GT=m
+CONFIG_SYNC_FILE=y
+CONFIG_SYN_COOKIES=y
+CONFIG_SYSCON_REBOOT_MODE=m
+CONFIG_SYSCTL=y
+CONFIG_SYSCTL_EXCEPTION_TRACE=y
+CONFIG_SYSCTL_SYSCALL=y
+CONFIG_SYSC_R8A7743=y
+CONFIG_SYSC_R8A7745=y
+CONFIG_SYSC_R8A7779=y
+CONFIG_SYSC_R8A7790=y
+CONFIG_SYSC_R8A7791=y
+CONFIG_SYSC_R8A7792=y
+CONFIG_SYSC_R8A7794=y
+CONFIG_SYSC_R8A7795=y
+CONFIG_SYSC_R8A7796=y
+CONFIG_SYSC_R8A77970=y
+CONFIG_SYSC_R8A77995=y
+CONFIG_SYSC_RCAR=y
+CONFIG_SYSFS=y
+# CONFIG_SYSFS_DEPRECATED is not set
+CONFIG_SYSFS_SYSCALL=y
+CONFIG_SYSTEMPORT=m
+CONFIG_SYSTEM_BLACKLIST_HASH_LIST=""
+CONFIG_SYSTEM_BLACKLIST_KEYRING=y
+CONFIG_SYSTEM_DATA_VERIFICATION=y
+CONFIG_SYSTEM_EXTRA_CERTIFICATE=y
+CONFIG_SYSTEM_EXTRA_CERTIFICATE_SIZE=4096
+CONFIG_SYSTEM_REVOCATION_KEYS="debian/canonical-revoked-certs.pem"
+CONFIG_SYSTEM_REVOCATION_LIST=y
+CONFIG_SYSTEM_TRUSTED_KEYRING=y
+CONFIG_SYSTEM_TRUSTED_KEYS="debian/canonical-certs.pem"
+CONFIG_SYSVIPC=y
+CONFIG_SYSVIPC_COMPAT=y
+CONFIG_SYSVIPC_SYSCALL=y
+CONFIG_SYSVIPC_SYSCTL=y
+CONFIG_SYS_SUPPORTS_APM_EMULATION=y
+CONFIG_SYS_SUPPORTS_EM_STI=y
+CONFIG_SYS_SUPPORTS_HUGETLBFS=y
+CONFIG_SYS_SUPPORTS_SH_CMT=y
+CONFIG_SYS_SUPPORTS_SH_MTU2=y
+CONFIG_SYS_SUPPORTS_SH_TMU=y
+CONFIG_T5403=m
+CONFIG_TABLET_SERIAL_WACOM4=m
+CONFIG_TABLET_USB_ACECAD=m
+CONFIG_TABLET_USB_AIPTEK=m
+CONFIG_TABLET_USB_GTCO=m
+CONFIG_TABLET_USB_HANWANG=m
+CONFIG_TABLET_USB_KBTAB=m
+CONFIG_TABLET_USB_PEGASUS=m
+CONFIG_TAHOVO_USB=m
+CONFIG_TAHOVO_USB_HOST_BY_DEFAULT=y
+CONFIG_TAP=m
+CONFIG_TARGET_CORE=m
+CONFIG_TASKSTATS=y
+CONFIG_TASKS_RCU=y
+CONFIG_TASK_DELAY_ACCT=y
+CONFIG_TASK_IO_ACCOUNTING=y
+CONFIG_TASK_XACCT=y
+CONFIG_TC1100_WMI=m
+CONFIG_TCG_ATMEL=m
+CONFIG_TCG_CRB=y
+CONFIG_TCG_IBMVTPM=y
+CONFIG_TCG_INFINEON=m
+CONFIG_TCG_NS=m
+CONFIG_TCG_TIS=y
+CONFIG_TCG_TIS_CORE=y
+CONFIG_TCG_TIS_SPI=m
+CONFIG_TCG_TIS_ST33ZP24=m
+CONFIG_TCG_TIS_ST33ZP24_I2C=m
+CONFIG_TCG_TIS_ST33ZP24_SPI=m
+CONFIG_TCG_TPM=y
+CONFIG_TCG_VTPM_PROXY=m
+CONFIG_TCG_XEN=m
+CONFIG_TCIC=m
+CONFIG_TCM_FC=m
+CONFIG_TCM_FILEIO=m
+CONFIG_TCM_IBLOCK=m
+CONFIG_TCM_PSCSI=m
+CONFIG_TCM_QLA2XXX=m
+# CONFIG_TCM_QLA2XXX_DEBUG is not set
+CONFIG_TCM_USER2=m
+CONFIG_TCP_CONG_ADVANCED=y
+CONFIG_TCP_CONG_BBR=m
+CONFIG_TCP_CONG_BIC=m
+CONFIG_TCP_CONG_CDG=m
+CONFIG_TCP_CONG_CUBIC=y
+CONFIG_TCP_CONG_DCTCP=m
+CONFIG_TCP_CONG_HSTCP=m
+CONFIG_TCP_CONG_HTCP=m
+CONFIG_TCP_CONG_HYBLA=m
+CONFIG_TCP_CONG_ILLINOIS=m
+CONFIG_TCP_CONG_LP=m
+CONFIG_TCP_CONG_NV=m
+CONFIG_TCP_CONG_SCALABLE=m
+CONFIG_TCP_CONG_VEGAS=m
+CONFIG_TCP_CONG_VENO=m
+CONFIG_TCP_CONG_WESTWOOD=m
+CONFIG_TCP_CONG_YEAH=m
+CONFIG_TCP_MD5SIG=y
+CONFIG_TCS3414=m
+CONFIG_TCS3472=m
+CONFIG_TEE=m
+CONFIG_Tegra124_EMC=y
+CONFIG_Tegra20_APB_DMA=y
+CONFIG_Tegra20_MC=y
+CONFIG_Tegra_AHB=y
+CONFIG_Tegra_CLK_EMC=y
+CONFIG_Tegra_GMI=m
+CONFIG_Tegra_HOST1X=m
+CONFIG_Tegra_HOST1X_FIREWALL=y
+CONFIG_Tegra_IOMMU_GART=y
+CONFIG_Tegra_IOMMU_SMMU=y
+CONFIG_Tegra_IVC=y
+CONFIG_Tegra_MC=y
+# CONFIG_Tegra_SOCTHERM is not set
+CONFIG_Tegra_TIMER=y
+CONFIG_Tegra_WATCHDOG=m
+CONFIG_Tehuti=m
+CONFIG_Tekram_Dongle=m
+CONFIG_TelClock=m
+CONFIG_Teranetics_PHY=m
+# CONFIG_TEST_ASYNC_DRIVER_PROBE is not set
+# CONFIG_TEST_BITMAP is not set
+CONFIG_TEST_BPF=m
+# CONFIG_TEST_FIND_BIT is not set
+CONFIG_TEST_FIRMWARE=m
+# CONFIG_TEST_HASH is not set
+# CONFIG_TEST_HAXDUMP is not set
+# CONFIG_TEST_KMDO is not set
+# CONFIG_TEST_KSTRTOX is not set
+# CONFIG_TEST_LIST_SORT is not set
+CONFIG_TEST_LKM=m
+# CONFIG_TEST_PARMAN is not set
+CONFIG_TEST_POWER=m
+# CONFIG_TEST_PRINTF is not set
+# CONFIG_TEST_RHASHTABLE is not set
+# CONFIG_TEST_SORT is not set
+CONFIG_TEST_STATIC_KEYS=m
+# CONFIG_TEST_STRING_HELPERS is not set
+# CONFIG_TEST_SYSCTL is not set
+CONFIG_TEST_UDelay=m
+CONFIG_TEST_USER_COPY=m
+# CONFIG_TEST_UUID is not set
+CONFIG_TextSearch=y
+CONFIG_TextSearch_Bm=m
+CONFIG_TINYDRM_REPAPER=m
+CONFIG_TINYDRM_ST7586=m
+CONFIG_TIPC=m
+CONFIG_TIPC_MEDIA_IB=y
+CONFIG_TIPC_MEDIA_UDP=y
+CONFIG_TI_ADC081C=m
+CONFIG_TI_ADC0832=m
+CONFIG_TI_ADC084S021=m
+CONFIG_TI_ADC108S102=m
+CONFIG_TI_ADC12138=m
+CONFIG_TI_ADC128S052=m
+CONFIG_TI_ADC161S626=m
+CONFIG_TI ADS1015=m
+CONFIG_TI ADS7950=m
+CONFIG_TI ADS8688=m
+CONFIG_TI_AM335X_ADC=m
+CONFIG_TI_CPP141=m
+CONFIG_TI_CPSW=y
+CONFIG_TI_CPSW_PHY_SEL=y
+CONFIG_TI_CPTS=y
+CONFIG_TI_CPTS_MOD=y
+CONFIG_TI_DAC082S085=m
+CONFIG_TI_DAVINCI_CPDMA=y
+CONFIG_TI_DAVINCI_EMAC=m
+CONFIG_TI_DAVINCI_MDIO=y
+CONFIG_TI_DMA_CROSSBAR=y
+CONFIG_TI_EDMA=y
+CONFIG_TI_EMIF=m
+CONFIG_TI_PIPE3=m
+CONFIG_TI_SOC_THERMAL=m
+CONFIG_TI_ST=m
+CONFIG_TI_SYSC=y
+CONFIG_TI_THERMAL=y
+CONFIG_TI_TLC4541=m
+CONFIG_TI_TLAN=m
+CONFIG_TLS=m
+CONFIG_TMD_HERMES=m
+CONFIG_TMP006=m
+CONFIG_TMP007=m
+CONFIG_TMPFS=y
+CONFIG_TMPFS_POSIX_ACL=y
+CONFIG_TMPFS_XATTR=y
+CONFIG_TN3215=y
+CONFIG_TN3215_CONSOLE=y
+CONFIG_TN3270=y
+CONFIG_TN3270_CONSOLE=y
+CONFIG_TN3270_FS=m
+CONFIG_TN3270_TTY=y
+CONFIG_TOIM3232_DONGLE=m
+CONFIG_TOPSTAR_LAPTOP=m
+CONFIG_TORTURE_TEST=m
+# CONFIG_TOSHIBA is not set
+CONFIG_TOSHIBA_BT_RFKILL=m
+CONFIG_TOSHIBA_FIR=m
+CONFIG_TOSHIBA_HAPS=m
+# CONFIG_TOSHIBA_WMI is not set
+CONFIG_TOUCHSCREEN_88PM860X=m
+CONFIG_TOUCHSCREEN_AD7877=m
+CONFIG_TOUCHSCREEN_AD7879=m
+CONFIG_TOUCHSCREEN_AD7879_I2C=m
+CONFIG_TOUCHSCREEN_AD7879_SPI=m
+CONFIG_TOUCHSCREEN ADS7846=m
+CONFIG_TOUCHSCREEN_AR1021_I2C=m
+CONFIG_TOUCHSCREEN_ATMEL_MXT=m
+CONFIG_TOUCHSCREEN_ATMEL_MXT_T37=y
+CONFIG_TOUCHSCREEN_AUO_PIXCIR=m
+CONFIG_TOUCHSCREEN_BU21013=m
+CONFIG_TOUCHSCREEN_CHIPONE_ICN8318=m
+CONFIG_TOUCHSCREEN_COLIBRI_VF50=m
+CONFIG_TOUCHSCREEN_CY8CTMG110=m
+CONFIG_TOUCHSCREEN_CYTTSP4_CORE=m
+CONFIG_TOUCHSCREEN_CYTTSP4_I2C=m
+CONFIG_TOUCHSCREEN_CYTTSP4_SPI=m
+CONFIG_TOUCHSCREEN_CYTTSP_CORE=m
+CONFIG_TOUCHSCREEN_CYTTSP_I2C=m
+CONFIG_TOUCHSCREEN_CYTTSP_SPI=m
+CONFIG_TOUCHSCREEN_DA9034=m
+CONFIG_TOUCHSCREEN_DA9052=m
+CONFIG_TOUCHSCREEN_DYNAPRO=m
+CONFIG_TOUCHSCREEN_EDT_FT5X06=m
+CONFIG_TOUCHSCREEN_EETI=m
+CONFIG_TOUCHSCREEN_EGALAX=m
+CONFIG_TOUCHSCREEN_EGALAX_SERIAL=m
+CONFIG_TOUCHSCREEN_EKTF2127=m
+CONFIG_TOUCHSCREEN_ELO=m
+CONFIG_TOUCHSCREEN_EXC3000=m
+CONFIG_TOUCHSCREEN_FUJITSU=m
+CONFIG_TOUCHSCREEN_GOODIX=m
+CONFIG_TOUCHSCREEN_GUNZE=m
+CONFIG_TOUCHSCREEN_HAMPSHIRE=m
+CONFIG_TOUCHSCREEN_HIDEEP=m
+CONFIG_TOUCHSCREEN_HTCPEN=m
+CONFIG_TOUCHSCREEN_ILI210X=m
+CONFIG_TOUCHSCREEN_IMX6UL_TSC=m
+CONFIG_TOUCHSCREEN_INEXIO=m
+CONFIG_TOUCHSCREEN_IPROC=m
+CONFIG_TOUCHSCREEN_MAX11801=m
+CONFIG_TOUCHSCREEN_MC13783=m
+CONFIG_TOUCHSCREEN_MCS5000=m
+CONFIG_TOUCHSCREEN_MELFAS_MIP4=m
+CONFIG_TOUCHSCREEN_MK712=m
+CONFIG_TOUCHSCREEN_MMS114=m
+CONFIG_TOUCHSCREEN_MTOUCH=m
+CONFIG_TOUCHSCREEN_PCAP=m
+CONFIG_TOUCHSCREEN_PENMOUNT=m
+CONFIG_TOUCHSCREEN_PIXCIR=m
+CONFIG_TOUCHSCREEN_PROPERTIES=y
+CONFIG_TOUCHSCREEN_RM_TS=m
+CONFIG_TOUCHSCREEN_ROHM_BU21023=m
+CONFIG_TOUCHSCREEN_S6SY761=m
+CONFIG_TOUCHSCREEN_SILEAD=m
+CONFIG_TOUCHSCREEN_SIS_12C=m
+CONFIG_TOUCHSCREEN_ST1232=m
+CONFIG_TOUCHSCREEN_STMFTS=m
+CONFIG_TOUCHSCREEN_STMPE=m
+# CONFIG_TOUCHSCREEN_SUN4I is not set
+CONFIG_TOUCHSCREEN_SUR40=m
+CONFIG_TOUCHSCREEN_SURFACE3_SPI=m
+CONFIG_TOUCHSCREEN_SX8654=m
+CONFIG_TOUCHSCREEN_TI_AM335X_TSC=m
+CONFIG_TOUCHSCREEN_TOUCHIT213=m
+CONFIG_TOUCHSCREEN_TOUCHRIGHT=m
+CONFIG_TOUCHSCREEN_TOUCHWIN=m
+CONFIG_TOUCHSCREEN_TPS6507X=m
+CONFIG_TOUCHSCREEN_TS4800=m
+CONFIG_TOUCHSCREEN_TSC2004=m
+CONFIG_TOUCHSCREEN_TSC2005=m
+CONFIG_TOUCHSCREEN_TSC2007=m
+CONFIG_TOUCHSCREEN_TSC2007_IIO=y
+CONFIG_TOUCHSCREEN_TSC200X_CORE=m
+CONFIG_TOUCHSCREEN_TSC_SERIO=m
+CONFIG_TOUCHSCREEN_UCB1400=m
+CONFIG_TOUCHSCREEN_USB_3M=y
+CONFIG_TOUCHSCREEN_USB_COMPOSITE=m
+CONFIG_TOUCHSCREEN_USB_DMC_TSC10=y
+CONFIG_TOUCHSCREEN_USB_E2I=y
+CONFIG_TOUCHSCREEN_USB_EASYTOUCH=y
+CONFIG_TOUCHSCREEN_USB_EGALAX=y
+CONFIG_TOUCHSCREEN_USB_ELO=y
+CONFIG_TOUCHSCREEN_USB_ETT_TC45USB=y
+CONFIG_TOUCHSCREEN_USB_ETURBO=y
+CONFIG_TOUCHSCREEN_USB_GENERAL_TOUCH=y
+CONFIG_TOUCHSCREEN_USB_GOTOP=y
+CONFIG_TOUCHSCREEN_USB_GUNZE=y
+CONFIG_TOUCHSCREEN_USB_IDEALTEK=y
+CONFIG_TOUCHSCREEN_USB_IRTOUCH=y
+CONFIG_TOUCHSCREEN_USB_ITM=y
+CONFIG_TOUCHSCREEN_USB_JASTEC=y
+CONFIG_TOUCHSCREEN_USB_NEXIO=y
+CONFIG_TOUCHSCREEN_USB_PANJIT=y
+CONFIG_TOUCHSCREEN_USB_ZYTRONIC=y
+CONFIG_TOUCHSCREEN_WACOM_I2C=m
+CONFIG_TOUCHSCREEN_WACOM_W8001=m
+CONFIG_TOUCHSCREEN_WDT87XX_I2C=m
+CONFIG_TOUCHSCREEN_WM831X=m
+CONFIG_TOUCHSCREEN_WM9705=y
+CONFIG_TOUCHSCREEN_WM9712=y
+CONFIG TOUCHSCREEN_WM9713=y
+CONFIG TOUCHSCREEN_WM97XX=m
+CONFIG TOUCHSCREEN_ZET6223=m
+CONFIG TOUCHSCREEN_ZFORCE=m
+CONFIG_TPL0102=m
+CONFIG_TPS6105X=m
+CONFIG_TPS65010=m
+CONFIG_TPS6507X=m
+CONFIG_TPS68470_PMIC_OPREGION=y
+CONFIG TRACEPOINTS=y
+# CONFIG_TRACEPOINT_BENCHMARK is not set
+CONFIG TRACER_MAX_TRACE=y
+CONFIG TRACER_SNAPSHOT=y
+# CONFIG TRACER_SNAPSHOT_PER_CPU_SWAP is not set
+CONFIG TRACE_CLOCK=y
+# CONFIG_TRACE_EVAL_MAP_FILE is not set
+CONFIG TRACE_IRQFLAGS_SUPPORT=y
+CONFIG TRACE ROUTER=m
+CONFIG TRACING=y
+CONFIG TRACING_EVENTS_GPIO=y
+CONFIG TRACING_MAP=y
+CONFIG TRACING_SUPPORT=y
+CONFIG TRANSPARENT_HUGE_PAGE=y
+CONFIG TRANSPARENT_HUGE_PAGECACHE=y
+CONFIG TREE_RCU=y
+CONFIG TREE_SRCU=y
+CONFIG TRUSTED_FOUNDATIONS=y
+CONFIG TRUSTED KEYS=y
+CONFIG TS4800_IRQ=m
+CONFIG TS4800_WATCHDOG=m
+CONFIG TSL2583=m
+CONFIG TSL2x7x=m
+CONFIG TSL4531=m
+CONFIG TSY501=m
+CONFIG TSY502D=m
+CONFIG_TPPC1_EEPROM=m
+CONFIG_TTY=y
+CONFIG_TULIP=m
+# CONFIG_TULIP_MMIO is not set
+# CONFIG_TULIP_MWI is not set
+# CONFIG_TULIP_NAPI is not set
+CONFIG_TUN=y
+# CONFIG_TUNE_DEFAULT is not set
+# CONFIG_TUNE_Z10 is not set
+# CONFIG_TUNE_Z13 is not set
+# CONFIG_TUNE_Z14 is not set
+# CONFIG_TUNE_Z196 is not set
+# CONFIG_TUNE_Z900 is not set
+# CONFIG_TUNE_Z990 is not set
+# CONFIG_TUNE_Z9_109 is not set
+CONFIG_TUNE_ZEC12=y
+# CONFIG_TUN_VNET_CROSS_LE is not set
+CONFIG_TWL4030_CORE=y
+CONFIG_TWL4030_MADC=m
+CONFIG_TWL4030_POWER=y
+CONFIG_TWL4030_USB=m
+CONFIG_TWL4030_WATCHDOG=m
+CONFIG_TWL6030_GPADC=m
+CONFIG_TWL6030_USB=m
+CONFIG_TWL6040_CORE=y
+CONFIG_TYPEC=m
+CONFIG_TYPEC_FUSB302=m
+CONFIG_TYPEC_TCPFC=m
+CONFIG_TYPEC_TCPM=m
+CONFIG_TYPEC_TPS6598X=m
+CONFIG_TYPEC_UCSI=m
+CONFIG_TYPHOON=m
+# CONFIG_U3_DART is not set
+# CONFIG_UACCESS_WITH_MEMCPY is not set
+# CONFIG_UBIFS_ATIME_SUPPORT is not set
+CONFIG_UBIFS_FS=m
+# CONFIG_UBIFS_FS_ADVANCED_COMPR is not set
+CONFIG_UBIFS_FS_ENCRYPTION=y
+CONFIG_UBIFS_FS_LZO=y
+CONFIG_UBIFS_FS_SECURITY=y
+CONFIG_UBIFS_FS_ZLIB=y
+# CONFIG_UBSAN is not set
+CONFIG_UCB1400_CORE=m
+CONFIG_UCS2_STRING=y
+CONFIG_UCS1 ACPI=m
+# CONFIG_UDBG_RTAS_CONSOLE is not set
+CONFIG_UDF_FS=m
+CONFIG_UDF_NLS=y
+CONFIG_UEFI_CPER=y
+CONFIG_UEFI_CPER_ARM=y
+CONFIG_UEVENT_HELPER=y
+CONFIG_UEVENT_HELPER_PATH=""
+# CONFIG_UFS_DEBUG is not set
+# CONFIG_UFS_FS_WRITE is not set
+CONFIG_UHID=m
+CONFIG_UID16=y
+CONFIG_UIO=m
+CONFIG_UIO_FSL_ELBC_GPCM=m
+# CONFIG_UIO_FSL_ELBC_GPCM_NETX5152 is not set
+CONFIG_UIO_HV_GENERIC=m
+CONFIG_ULI526X=m
+CONFIG_ULTRA=m
+CONFIG_UNCOMPRESS_INCLUDE="debug/uncompress.h"
+CONFIG_UNINLINE_SPIN_UNLOCK=y
+CONFIG_UNIPHIER_EFUSE=m
+CONFIG_UNIPHIER_SYSTEM_BUS=y
+CONFIG_UNIPHIER_THERMAL=m
+CONFIG_UNIPHIER_WATCHDOG=m
+CONFIG_UNISYSSPAR=y
+CONFIG_UNISYS_VISORBUS=m
+CONFIG_UNISYS_VISORHBA=m
+CONFIG_UNISYS_VISORINPUT=m
+CONFIG_UNISYS_VISORNIC=m
+CONFIG_UNIX=y
+CONFIG_UNIX98_PTYS=y
+CONFIG_UNIX_DIAG=m
+CONFIG_UNIX_SCM=y
+CONFIG_UNMAP_KERNEL_AT_EL0=y
+CONFIG_UNUSED_SYMBOLS=y
+CONFIG_UNWINDER_FRAME_POINTER=y
+# CONFIG_UNWINDER_GUESS is not set
+# CONFIG_UNWINDER_ORC is not set
+CONFIG_UPROBES=y
+CONFIG_UPROBE_EVENTS=y
+CONFIG_US5182D=m
+CONFIG_USB=y
+CONFIG_USBIP_CORE=m
+# CONFIG_USBIP_DEBUG is not set
+CONFIG_USBIP_HOST=m
+CONFIG_USBIP_VHCL_HCD=m
+CONFIG_USBIP_VHCL_HC_PORTS=8
+CONFIG_USBIP_VHCL_NR_HCS=1
+CONFIG_USBIP_VUDC=m
+CONFIG_USBPCWATCHDOG=m
+CONFIG_USB_ACM=m
+CONFIG_USB_ADUTUX=m
+CONFIG_USB_AIRSPY=m
+CONFIG_USB_ALI_M5632=y
+CONFIG_USB_AMD5536UDC=m
+CONFIG_USB_AN2720=y
+CONFIG_USB_ANNOUNCE_NEW_DEVICES=y
+CONFIG_USB_APPLEDISPLAY=m
+CONFIG_USB_ARCH_HAS_HCD=y
+CONFIG_USB_ARMLINUX=y
+CONFIG_USB_ATM=m
+CONFIG_USB_AUDIO=m
+CONFIG_USB_BDC_UDC=m
+CONFIG_USB_BELKIN=y
+CONFIG_USB_C67X00_HCD=m
+CONFIG_USB_CATC=m
+CONFIG_USB_CDC_COMPOSITE=m
+CONFIG_USB_CDC_PHONET=m
+CONFIG_USB_CHAOSKEY=m
+CONFIG_USB_CHIPIDEA=m
+CONFIG_USB_CHIPIDEA_HOST=y
+CONFIG_USB_CHIPIDEA_OF=m
+CONFIG_USB_CHIPIDEA_PCI=m
+CONFIG_USB_CHIPIDEA_UDC=y
+CONFIG_USB_CHIPIDEA_ULPI=y
+CONFIG_USB_COMMON=y
+CONFIG_USB_CONFIGFS=m
+CONFIG_USB_CONFIGFS_ACM=y
+CONFIG_USB_CONFIGFS_ECM=y
+CONFIG_USB_CONFIGFS_ECM_SUBSET=y
+CONFIG_USB_CONFIGFS_EEM=y
+CONFIG_USB_CONFIGFS_F_FS=y
+CONFIG_USB_CONFIGFS_F_HID=y
+CONFIG_USB_CONFIGFS_F_LB_SS=y
+CONFIG_USB_CONFIGFS_F_MIDI=y
+CONFIG_USB_CONFIGFS_F_PRINTER=y
+CONFIG_USB_CONFIGFS_F_TCM=y
+CONFIG_USB_CONFIGFS_F_UAC1=y
+CONFIG_USB_CONFIGFS_F_UAC1_LEGACY=y
+CONFIG_USB_CONFIGFS_F_UAC2=y
+CONFIG_USB_CONFIGFS_F_UVC=y
+CONFIG_USB_CONFIGFS_MASS_STORAGE=y
+CONFIG_USB_CONFIGFS_NCM=y
+CONFIG_USB_CONFIGFS_OBEX=y
+CONFIG_USB_CONFIGFS_PHONET=y
+CONFIG_USB_CONFIGFS_RNDIS=y
+CONFIG_USB_CONFIGFS_SERIAL=y
+CONFIG_USB_CXACRU=m
+CONFIG_USB_CYPRESS_CY7C63=m
+CONFIG_USB_CYTHERM=m
+CONFIG_USB_F_ECM=m
+CONFIG_USB_F_EEM=m
+CONFIG_USB_F_FS=m
+CONFIG_USB_F_HID=m
+CONFIG_USB_F_MASS_STORAGE=m
+CONFIG_USB_F_MIDI=m
+CONFIG_USB_F_NCM=m
+CONFIG_USB_F_OBEX=m
+CONFIG_USB_F_PHONET=m
+CONFIG_USB_F_PRINTER=m
+CONFIG_USB_F_RNDIS=m
+CONFIG_USB_F_SERIAL=m
+CONFIG_USB_F_SS_LB=m
+CONFIG_USB_F_SUBSET=m
+CONFIG_USB_F_TCM=m
+CONFIG_USB_F_UAC1=m
+CONFIG_USB_F_UAC1_LEGACY=m
+CONFIG_USB_F_UAC2=m
+CONFIG_USB_F_UVC=m
+CONFIG_USB_GADGETFS=m
+# CONFIG_USB_GADGET_DEBUG is not set
+# CONFIG_USB_GADGET_DEBUG_FILES is not set
+# CONFIG_USB_GADGET_DEBUG_FS is not set
+CONFIG_USB_GADGET_STORAGE_NUM_BUFFERS=2
+CONFIG_USB_GADGET_TARGET=m
+CONFIG_USB_GADGET_VBUS_DRAW=2
+CONFIG_USB_GADGET_XILINX=m
+CONFIG_USB_GL860=m
+CONFIG_USB_GOKU=m
+CONFIG_USB_GPIO_VBUS=m
+CONFIG_USB_GR_UDC=m
+CONFIG_USB_GSPCA=m
+CONFIG_USB_GSPCA_BENQ=m
+CONFIG_USB_GSPCA_CONEX=m
+CONFIG_USB_GSPCA_CPIA1=m
+CONFIG_USB_GSPCA_DTCS033=m
+CONFIG_USB_GSPCA_ETOMS=m
+CONFIG_USB_GSPCA_FINEPIX=m
+CONFIG_USB_GSPCA_JEILINJ=m
+CONFIG_USB_GSPCA_IL2005BCD=m
+CONFIG_USB_GSPCA_KINECT=m
+CONFIG_USB_GSPCA_KONICA=m
+CONFIG_USB_GSPCA_MARS=m
+CONFIG_USB_GSPCA_MR97310A=m
+CONFIG_USB_GSPCA_NW80X=m
+CONFIG_USB_GSPCA_OV519=m
+CONFIG_USB_GSPCA_OV534=m
+CONFIG_USB_GSPCA_OV534_9=m
+CONFIG_USB_GSPCA_PAC207=m
+CONFIG_USB_GSPCA_PAC7302=m
+CONFIG_USB_GSPCA_PAC7311=m
+CONFIG_USB_GSPCA_SE401=m
+CONFIG_USB_GSPCA_SN9C2028=m
+CONFIG_USB_GSPCA_SN9C20X=m
+CONFIG_USB_GSPCA_SONIXB=m
+CONFIG_USB_GSPCA_SONIXJ=m
+CONFIG_USB_GSPCA_SPCA1528=m
+CONFIG_USB_GSPCA_SPCA500=m
+CONFIG_USB_GSPCA_SPCA501=m
+CONFIG_USB_GSPCA_SPCA505=m
+CONFIG_USB_GSPCA_SPCA506=m
+CONFIG_USB_GSPCA_SPCA508=m
+CONFIG_USB_GSPCA_SPCA561=m
+CONFIG_USB_GSPCA_SQ905=m
+CONFIG_USB_GSPCA_SQ905C=m
+CONFIG_USB_GSPCA_SQ930X=m
+CONFIG_USB_GSPCA_STK014=m
+CONFIG_USB_GSPCA_STK1135=m
+CONFIG_USB_GSPCA_STV0680=m
+CONFIG_USB_GSPCA_SUNPLUS=m
+CONFIG_USB_GSPCA_T613=m
+CONFIG_USB_GSPCA_TOPRO=m
+CONFIG_USB_GSPCA_TOUPEK=m
+CONFIG_USB_GSPCA_TV8532=m
+CONFIG_USB_GSPCA_VC032X=m
+CONFIG_USB_GSPCA_VICAM=m
+CONFIG_USB_GSPCA_XIRLINK_CIT=m
+CONFIG_USB_GSPCA_ZC3XX=m
+CONFIG_USB_G_ACM_MS=m
+CONFIG_USB_G_DBGP=m
+CONFIG_USB_G_DBGP_PRINTK is not set
+CONFIG_USB_G_DBGP_SERIAL=y
+CONFIG_USB_G_HID=m
+CONFIG_USB_G_MULTI_CDC=y
+CONFIG_USB_G_MULTI_RNDIS=y
+CONFIG_USB_G_NCM=m
+CONFIG_USB_G_NOKIA=m
+CONFIG_USB_G_PRINTER=m
+CONFIG_USB_G_SERIAL=m
+CONFIG_USB_G_WEBCAM=m
+CONFIG_USB_HACKRF=m
+CONFIG_USB_HID=m
+CONFIG_USB_HIDDEV=y
+CONFIG_USB_HSIC_USB3503=m
+CONFIG_USB_HSIC_USB4604=m
+CONFIG_USB_HSO=m
+CONFIG_USB_HUB_USB251XB=m
+CONFIG_USB_HWA_HCD=m
+CONFIG_USB_IDMOUSE=m
+CONFIG_USB_IMX21_HCD=m
+CONFIG_USB_IOWARRIOR=m
+CONFIG_USB_IPHETH=m
+CONFIG_USB_IRDA=m
+CONFIG_USB_ISIGHTFW=m
+CONFIG_USB_ISP116X_HCD=m
+CONFIG_USB_ISP1301=m
+CONFIG_USB_ISP1362_HCD=m
+CONFIG_USB_ISP1760=m
+CONFIG_USB_ISP1760_DUAL_ROLE=y
+# CONFIG_USB_ISP1760_GADGET_ROLE is not set
+CONFIG_USB_ISP1760_HCD=y
+# CONFIG_USB_ISP1760_HOST_ROLE is not set
+CONFIG_USB_ISP1761_UDC=y
+CONFIG_USB_KAWETH=m
+CONFIG_USB_KBD=m
+CONFIG_USB_KC2190=y
+CONFIG_USB KEENE=m
+CONFIG_USB_LAN78XX=m
+CONFIG_USB_LCD=m
+CONFIG_USB_LD=m
+CONFIG_USB_LEDS_TRIGGER_USBPORT=m
+CONFIG_USB_LED_TRIG=y
+CONFIG_USB_LEGOTOWER=m
+CONFIG_USB_LIBCOMPOSITE=m
+CONFIG_USB_LINK_LAYER_TEST=m
+CONFIG_USB_M5602=m
+# CONFIG_USB_M66592 is not set
+CONFIG_USB_MA901=m
+CONFIG_USB_MASS_STORAGE=m
+CONFIG_USB_MAX3421_HCD=m
+CONFIG_USB_MDC800=m
+CONFIG_USB_MICROTEK=m
+CONFIG_USB_MIDI_GADGET=m
+CONFIG_USB_MON=m
+CONFIG_USB_MOUSE=m
+CONFIG_USB_MR800=m
+CONFIG_USB_MSI2500=m
+CONFIG_USB_MU3003=m
+# CONFIG_USB_MU3_DEBUG is not set
+CONFIG_USB_MU3_DUAL_ROLE=y
+# CONFIG_USB_MU3_GADGET is not set
+# CONFIG_USB_MU3_HOST is not set
+CONFIG_USB_MUSB_AM335X_CHILD=m
+CONFIG_USB_MUSB_AM35X=m
+CONFIG_USB_MUSB_DSPS=m
+CONFIG_USB_MUSB_DUAL_ROLE=y
+# CONFIG_USB_MUSB_GADGET is not set
+# CONFIG_USB_MUSB_HOST is not set
+CONFIG_USB_MUSB_OMAP2PLUS=m
+CONFIG_USB_MUSB_SUNXI=m
+CONFIG_USB_MUSB_TUSB6010=m
+CONFIG_USB_MV_U3D=m
+CONFIG_USB_MV_UDC=m
+CONFIG_USB_MXS_PHY=y
+CONFIG_USB_NET2272=m
+CONFIG_USB_NET2272_DMA=y
+CONFIG_USB_NET2280=m
+CONFIG_USB_NET_AX88179_178A=m
+CONFIG_USB_NET_AX8817X=m
+CONFIG_USB_NET_CDCETHER=m
+CONFIG_USB_NET_CDC_EEM=m
+CONFIG_USB_NET_CDC_MBIM=m
+CONFIG_USB_NET_CDC_NCM=m
+CONFIG_USB_NET_CDC_SUBSET=m
+CONFIG_USB_NET_CDC_SUBSET_ENABLE=m
+CONFIG_USB_NET_CH9200=m
+CONFIG_USB_NET_CX82310_ETH=m
+CONFIG_USB_NET_DM9601=m
+CONFIG_USB_NET_DRIVERS=m
+CONFIG_USB_NET_GL620A=m
+CONFIG_USB_NET_HUAWEI_CDC_NCM=m
+CONFIG_USB_NET_INT51X1=m
+CONFIG_USB_NET_KALMIA=m
+CONFIG_USB_NET_MCS7830=m
+CONFIG_USB_NET_NET1080=m
+CONFIG_USB_NET_NET1080=m
+CONFIG_USB_NET_NET2280=m
+CONFIG_USB_NET_QMI_WWAN=m
+CONFIG_USB_NET_QMI_WWAN=m
+CONFIG_USB_NET_RNDIS_HOST=m
+CONFIG_USB_NET_RNDIS_WLAN=m
+CONFIG_USB_NET_SMSGC75XX=m
+CONFIG_USB_NET_SMSGC95XX=m
+CONFIG_USB_NET_SR9700=m
+CONFIG_USB_NET_SR9800=m
+CONFIG_USB_NET_ZAURUS=m
+CONFIG_USB_OHCl_EXYNOS=y
+CONFIG_USB_OHCl_HCD=y
+CONFIG_USB_OHCl_HCD_OMAP3=m
+CONFIG_USB_OHCl_HCD_PCI=y
+# CONFIG_USB_OHCl_HCD_PPC_OF is not set
+# CONFIG_USB_OHCl_HCD_PPC_OF_BE is not set
+# CONFIG_USB_OHCl_HCD_PPC_OF_LE is not set
+CONFIG_USB_OHCI_LITTLE_ENDIAN=y
+# CONFIG_USB_OTG is not set
+# CONFIG_USB_OTG_BLACKLIST_HUB is not set
+# CONFIG_USB_OTG_WHITELIST is not set
+CONFIG_USB_OXU210HP_HCD=m
+CONFIG_USB_PCI=y
+CONFIG_USB_PEGASUS=m
+CONFIG_USB_PHY=y
+CONFIG_USB_PRINTER=m
+CONFIG_USB_PULSE8_CEC=m
+CONFIG_USB_PWC=m
+# CONFIG_USB_PWC_DEBUG is not set
+CONFIG_USB_PWC_INPUT_EVDEV=y
+CONFIG_USB_PXA27X=m
+CONFIG_USB_R8A66597=m
+CONFIG_USB_R8A66597_HCD=m
+CONFIG_USB_RAINSHADOW_CEC=m
+CONFIG_USB_RAREMONO=m
+CONFIG_USB_RENESAS_USB3=m
+CONFIG_USB_RENESAS_USBHS=m
+CONFIG_USB_RENESAS_USBHS_HCD=m
+CONFIG_USB_RENESAS_USBHS_UDC=m
+CONFIG_USB_RTL8150=m
+CONFIG_USB_RTL8152=m
+CONFIG_USB_S2255=m
+CONFIG_USB_SERIAL=m
+CONFIG_USB_SERIAL_AIRCABLE=m
+CONFIG_USB_SERIAL_ARKit16=m
+CONFIG_USB_SERIAL_BELKIN=m
+CONFIG_USB_SERIAL_CH341=m
+CONFIG_USB_SERIAL_CP210X=m
+CONFIG_USB_SERIAL_CYBERJACK=m
+CONFIG_USB_SERIAL_CYPRESS_M8=m
+CONFIG_USB_SERIAL_DEBUG=m
+CONFIG_USB_SERIAL_DIGI_ACCELEPORT=m
+CONFIG_USB_SERIAL_EDGEPORT=m
+CONFIG_USB_SERIAL_EDGEPORT_TI=m
+CONFIG_USB_SERIAL_EMPEG=m
+CONFIG_USB_SERIAL_F81232=m
+CONFIG_USB_SERIAL_F8153X=m
+CONFIG_USB_SERIAL_FTDI_SIO=m
+CONFIG_USB_SERIAL_GARMIN=m
+CONFIG_USB_SERIAL_GENERIC=y
+CONFIG_USB_SERIAL_IPAQ=m
+CONFIG_USB_SERIAL_IPW=m
+CONFIG_USB_SERIAL_IR=m
+CONFIG_USB_SERIAL_IUU=m
+CONFIG_USB_SERIAL_KEYSPAN=m
+CONFIG_USB_SERIAL_KEYSPAN_MPR=y
+CONFIG_USB_SERIAL_KEYSPAN_PDA=m
+CONFIG_USB_SERIAL_KEYSPAN_USA18X=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19QI=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19QW=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19W=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28X=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28XA=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28XB=y
+CONFIG_USB_SERIAL_KEYSPAN_USA49W=y
+CONFIG_USB_SERIAL_KEYSPAN_USA49WLC=y
+CONFIG_USB_SERIAL_KLSI=m
+CONFIG_USB_SERIAL_KOBIL_SCT=m
+CONFIG_USB_SERIAL_MCT_U232=m
+CONFIG_USB_SERIAL_METRO=m
+CONFIG_USB_SERIAL_MOS7715_PARPORT=y
+CONFIG_USB_SERIAL_MOS7720=m
+CONFIG_USB_SERIAL_MOS7840=m
+CONFIG_USB_SERIAL_MXUPORT=m
+CONFIG_USB_SERIAL_NAVMAN=m
+CONFIG_USB_SERIAL_OMNINET=m
+CONFIG_USB_SERIAL_OPTICON=m
+CONFIG_USB_SERIAL_OPTION=m
+CONFIG_USB_SERIAL_OTI6858=m
+CONFIG_USB_SERIAL_PL2303=m
+CONFIG_USB_SERIAL_QCAUX=m
+CONFIG_USB_SERIAL_QT2=m
+CONFIG_USB_SERIAL_QUALCOMM=m
+CONFIG_USB_SERIAL_SAFE=m
+# CONFIG_USB_SERIAL_SAFE_PADDED is not set
+CONFIG_USB_SERIAL_SIERRAWIRELESS=m
+CONFIG_USB_SERIAL_SIMPLE=m
+CONFIG_USB_SERIAL_SPCP8X5=m
+CONFIG_USB_SERIAL_SSU100=m
+CONFIG_USB_SERIAL_SYMBOL=m
+CONFIG_USB_SERIAL_TI=m
+CONFIG_USB_SERIAL_UPD78F0730=m
+CONFIG_USB_SERIAL_VISOR=m
+CONFIG_USB_SERIAL_WHITEHEAT=m
+CONFIG_USB_SERIAL_WISHBONE=m
+CONFIG_USB_SERIAL_WWAN=m
+CONFIG_USB_SERIAL_XIRCOM=m
+CONFIG_USB_SERIAL_XSENS_MT=m
+CONFIG_USB_SERIAL_SEVSEG=m
+CONFIG_USB_SI470X=m
+CONFIG_USB_SI4713=m
+CONFIG_USB_SIERRA_NET=m
+CONFIG_USB_SISUSBVGA=m
+CONFIG_USB_SL811_CS=m
+CONFIG_USB_SL811_HCD=m
+CONFIG_USB_SL811_HCD_ISO=y
+CONFIG_USB_SNAP_CORE=m
+CONFIG_USB_SNAP_UDC_PLAT=m
+CONFIG_USB_SPEEDTOUCH=m
+CONFIG_USB_STKWEBCAM=m
+CONFIG_USB_STORAGE=m
+CONFIG_USB_STORAGE_ALAU=m
+CONFIG_USB_STORAGE_CYPRESS_ATACB=m
+CONFIG_USB_STORAGE_DEBUG=m
+CONFIG_USB_STORAGE_DEBUG is not set
+CONFIG_USB_STORAGE_ENE_UB6250=m
+CONFIG_USB_STORAGE_FREEMO=m
+CONFIG_USB_STORAGE_ISD200=m
+CONFIG_USB_STORAGE_JUMPSHOT=m
+CONFIG_USB_STORAGE_KARMA=m
+CONFIG_USB_STORAGE_ONE=m
+CONFIG_USB_STORAGE_REALTEK=m
+CONFIG_USB_STORAGE_SDD=m
+CONFIG_USB_STORAGE_SDD65=m
+CONFIG_USB_STORAGE_USBAT=m
+CONFIG_USB_STV06XX=m
+CONFIG_USB_SWITCH_FSA9480=m
+CONFIG_USB_TEST=m
+CONFIG_USB_TMC=m
+CONFIG_USB_TRANSCVIBRATOR=m
+CONFIG_USB_U132_HCD=m
+CONFIG_USB_UAS=m
+CONFIG_USB_UAEGLEATM=m
+CONFIG_USB_UHCH=m
+CONFIG_USB_ULPI=m
+CONFIG_USB_ULPI_BUS=m
+CONFIG_USB_ULPI_VIEWPORT=m
+CONFIG_USB_USBNET=m
+CONFIG_USB_USS720=m
+CONFIG_USB_U_AUDIO=m
+CONFIG_USB_U_ETHER=m
+CONFIG_USB_U_SERIAL=m
+CONFIG_USB_VIDEO_CLASS=m
+CONFIG_USB_VIDEO_CLASS_INPUT_EVDE=y
+CONFIG_USB_VL600=m
+CONFIG_USB_WDM=m
+CONFIG_USB_WHCH=m
+CONFIG_USB_WUSB=m
+CONFIG_USB_WUSB_CBAF=m
+ CONFIG_USB_WUSB_CBAF_DEBUG is not set
+ CONFIG_USB_XHCI_DBGCAP=y
+ CONFIG_USB_XHCI_HCD=y
+ CONFIG_USB_XHCI_MTK=m
+ CONFIG_USB_XHCI_MVEBU=m
+ CONFIG_USB_XHCI_PCI=y
+ CONFIG_USB_XHCI_PLATFORM=m
+ CONFIG_USB_XHCI_RCAR=m
+ CONFIG_USB_XHCI_TEGRA=m
+ CONFIG_USB_XUSBATM=m
+ CONFIG_USB_YUREX=m
+ CONFIG_USB_ZD1201=m
+ CONFIG_USB_ZERO=m
+ CONFIG_USB_ZR364XX=m
+ CONFIG_USELIB=y
+ CONFIG_USERFAULTFD=y
+ CONFIG_USERIO=m
+ CONFIG_USER_NS=y
+ CONFIG_USER_RETURN_NOTIFIER=y
+ CONFIG_USER_STACKTRACE_SUPPORT=y
+ CONFIG_USE_OF=y
+ CONFIG_USE_PERCPU_NUMA_NODE_ID=y
+ CONFIG_UTS_NS=y
+ CONFIG_UWB_HWA=m
+ CONFIG_UWB_11480U=m
+ CONFIG_UWB_WHCI=m
+ CONFIG_U_SERIAL_CONSOLE=y
+ CONFIG_V4L2_FLASH_LED_CLASS=m
+ CONFIG_V4L2_FWNODE=m
+ CONFIG_V4L2_MEM2MEM_DEV=m
+ CONFIG_V4L_MEM2MEM_DRIVERS=y
+ CONFIG_V4L_PLATFORM_DRIVERS=y
+ CONFIG_V4L_RADIO_ISA_DRIVERS=y
+ CONFIG_V4L_TEST_DRIVERS=y
+ CONFIG_VCNL4000=m
+ CONFIG_VDSO=y
+ CONFIG_VEML6070=m
+ CONFIG_VERSION_SIGNATURE=""
+ CONFIG_VETH=m
+ CONFIG_VEXPRESS_CONFIG=y
+ CONFIG_VEXPRESS_SYSCFG=y
+ CONFIG_VF610_ADC=m
+ CONFIG_VF610_DAC=m
+ CONFIG_VFAT_FS=y
+ CONFIG_VFIO_AMBA=m
+ CONFIG_VFIO_AP=m
+ CONFIG_VFIO_CCW=m
+ CONFIG_VFIO_IOMMU_SPAPR_TCE=y
+# CONFIG_VIDEO_ADV_DEBUG is not set
+CONFIG_VIDEO_AU0828=m
+CONFIG_VIDEO_AU0828_RC=y
+CONFIG_VIDEO_AU0828_V4L2=y
+CONFIG_VIDEO_BCM2835=m
+CONFIG_VIDEO_BT819=m
+CONFIG_VIDEO_BT848=m
+CONFIG_VIDEO_BT856=m
+CONFIG_VIDEO_BT866=m
+CONFIG_VIDEO_CAFE_CCIC=m
+CONFIG_VIDEO_COBALT=m
+CONFIG_VIDEO_CODA=m
+CONFIG_VIDEO_CPIA2=m
+CONFIG_VIDEO_CS3308=m
+CONFIG_VIDEO_CS5345=m
+CONFIG_VIDEO_CS53L32A=m
+CONFIG_VIDEO_CX18=m
+CONFIG_VIDEO_CX18_ALSA=m
+CONFIG_VIDEO_CX231XX=m
+CONFIG_VIDEO_CX231XX_ALSA=m
+CONFIG_VIDEO_CX231XX_DVB=m
+CONFIG_VIDEO_CX231XX_RC=y
+CONFIG_VIDEO_CX2341X=m
+CONFIG_VIDEO_CX23885=m
+CONFIG_VIDEO_CX25821=m
+CONFIG_VIDEO_CX25821_ALSA=m
+CONFIG_VIDEO_CX25840=m
+CONFIG_VIDEO_CX88=m
+CONFIG_VIDEO_CX88_ALSA=m
+CONFIG_VIDEO_CX88_BLACKBIRD=m
+CONFIG_VIDEO_CX88_DVB=m
+CONFIG_VIDEO_CX88_ENABLE_VP3054=y
+CONFIG_VIDEO_CX88_MPEG=m
+CONFIG_VIDEO_CX88_VP3054=m
+CONFIG_VIDEO_DEV=m
+CONFIG_VIDEO_DT3155=m
+CONFIG_VIDEO_EM28XX=m
+CONFIG_VIDEO_EM28XX_ALSA=m
+CONFIG_VIDEO_EM28XX_DVB=m
+CONFIG_VIDEO_EM28XX_RC=m
+CONFIG_VIDEO_EM28XX_V4L2=m
+CONFIG_VIDEO_FB_IVTV=m
+# CONFIG_VIDEO_FIXED_MINOR_RANGES is not set
+CONFIG_VIDEO_GO7007=m
+CONFIG_VIDEO_GO7007_LOADER=m
+CONFIG_VIDEO_GO7007_USB=m
+CONFIG_VIDEO_GO7007_USB_S2250_BOARD=m
+CONFIG_VIDEO_HDPVR=m
+CONFIG_VIDEO_HEXIUM_GEMINI=m
+CONFIG_VIDEO_HEXIUM_ORION=m
+CONFIG_VIDEO_IMX_CSI=m
+CONFIG_VIDEO_IMX_MEDIA=m
+CONFIG_VIDEO_IMX_VDOA=m
+CONFIG_VIDEO_IR_I2C=m
+CONFIG_VIDEO_IVTV=m
+CONFIG_VIDEO_IVTV_ALSA=m
+# CONFIG_VIDEO_IVTV_DEPRECATED_IOCTL is not set
+CONFIG_VIDEO_KS0127=m
+CONFIG_VIDEO_M52790=m
+CONFIG_VIDEO_MEDIATEK_VPU=m
+CONFIG_VIDEO_MEM2MEM_DEINTERLACE=m
+CONFIG_VIDEO_MESON_AO_CEC=m
+CONFIG_VIDEO_MEYE=m
+CONFIG_VIDEO_MSP3400=m
+CONFIG_VIDEO_MT9M111=m
+CONFIG_VIDEO_MT9V011=m
+CONFIG_VIDEO_MUX=m
+CONFIG_VIDEO_MXB=m
+CONFIG_VIDEO_OMAP2_VOUT=m
+CONFIG_VIDEO_OMAP2_VOUT_VRFB=y
+CONFIG_VIDEO_OMAP3=m
+# CONFIG_VIDEO_OMAP3_DEBUG is not set
+CONFIG_VIDEO_OMAP4=m
+CONFIG_VIDEO_OV2640=m
+CONFIG_VIDEO_OV7640=m
+CONFIG_VIDEO_OV7670=m
+CONFIG_VIDEO_PCI_SKELETON=m
+CONFIG_VIDEO_PVRUSB2=m
+# CONFIG_VIDEO_PVRUSB2_DEBUGIFC is not set
+CONFIG_VIDEO_PVRUSB2_DVB=y
+CONFIG_VIDEO_PVRUSB2_SYSFS=y
+CONFIG_VIDEO_QCOM_CAMSS=m
+CONFIG_VIDEO_QCOM_VENUS=m
+CONFIG_VIDEO_RENESAS_FCP=m
+CONFIG_VIDEO_RENESAS_FDP1=m
+CONFIG_VIDEO_RENESAS_JPU=m
+CONFIG_VIDEO_RENESAS_VSP1=m
+CONFIG_VIDEO_ROCKCHIP_RGA=m
+CONFIG_VIDEO_SAA6588=m
+CONFIG_VIDEO_SAA6752HS=m
+CONFIG_VIDEO_SAA7110=m
+CONFIG_VIDEO_SAA711X=m
+CONFIG_VIDEO_SAA7127=m
+CONFIG_VIDEO_SAA7134=m
+CONFIG_VIDEO_SAA7134_ALSA=m
+CONFIG_VIDEO_SAA7134_DVB=m
+CONFIG_VIDEO_SAA7134_GO7007=m
+CONFIG_VIDEO_SAA7134_RC=y
+CONFIG_VIDEO_SAA7146=m
+CONFIG_VIDEO_SAA7146_VV=m
+CONFIG_VIDEO_SAA7164=m
+CONFIG_VIDEO_SAA717X=m
+CONFIG_VIDEO_SAA7185=m

+# CONFIG_VIDEO_SAMSUNG_EXYNOS4_IS is not set
+CONFIG_VIDEO_SAMSUNG_EXYNOS_GSC=m
+CONFIG_VIDEO_SAMSUNG_S5P_CEC=m
+CONFIG_VIDEO_SAMSUNG_S5P_G2D=m
+CONFIG_VIDEO_SAMSUNG_S5P_JPEG=m
+CONFIG_VIDEO_SAMSUNG_S5P_MFC=m
+CONFIG_VIDEO_SH_MOBILE_CE=m
+CONFIG_VIDEO_SH_VEU=m
+CONFIG_VIDEO_SH_VOU=m
+CONFIG_VIDEO_SOLO6X10=m
+CONFIG_VIDEO_SONY_BTF_MPX=m
+CONFIG_VIDEO_STK1160=m
+CONFIG_VIDEO_STK1160_COMMON=m
+CONFIG_VIDEO_TDA7432=m
+CONFIG_VIDEO_TDA9840=m
+CONFIG_VIDEO_TE6415C=m
+CONFIG_VIDEO_TE6420=m
+CONFIG_VIDEO_TEGRA_HDMI_CEC=m
+CONFIG_VIDEO_TI_CAL=m
+CONFIG_VIDEO_TI_CSC=m
+CONFIG_VIDEO_TI_SC=m
+CONFIG_VIDEO_TI_VPDMA=m
+CONFIG_VIDEO_TI_VPE=m

+# CONFIG_VIDEO_TI_VPE_DEBUG is not set
+CONFIG_VIDEO_TM6000=m
+CONFIG_VIDEO_TM6000_ALSA=m
+CONFIG_VIDEO_TM6000_DVB=m
+CONFIG_VIDEO_TUNER=m
+CONFIG_VIDEO_TVAUDIO=m
+CONFIG_VIDEO_TVEEPROM=m
+CONFIG_VIDEO_TVP5150=m
+CONFIG_VIDEO_TW2804=m
+CONFIG_VIDEO_TW5864=m
+CONFIG_VIDEO_TW68=m
+CONFIG_VIDEO_TW686X=m
+CONFIG_VIDEO_TW9903=m
+CONFIG_VIDEO_TW9906=m
+CONFIG_VIDEO_UDA1342=m
+CONFIG_VIDEO_UPD64031A=m
+CONFIG_VLAN_8021Q_GVRP=y
+CONFIG_VLAN_8021Q_MVRP=y
+CONFIG_VLSI_FIR=m
+CONFIG_VMAP_STACK=y
+CONFIG_VMCP=y
+CONFIG_VMCP_CMA_SIZE=4
+CONFIG_VMD=m
+CONFIG_VME_CA91CX42=m
+CONFIG_VME_FAKE=m
+CONFIG_VME_TSI148=m
+CONFIG_VME_USER=m
+CONFIG_VMIVME_7805=m
+CONFIG_VMLOGRDR=m
+## CONFIG_VMSPLIT_1G is not set
+## CONFIG_VMSPLIT_2G is not set
+CONFIG_VMSPLIT_3G=y
+## CONFIG_VMSPLIT_3G_OPT is not set
+CONFIG_VMWARE_BALLOON=m
+CONFIG_VMWARE_PVSCSI=m
+CONFIG_VMWARE_VMCI=m
+CONFIG_VMWARE_VMCI_VSOCKETS=m
+CONFIG_VM_EVENT_COUNTERS=y
+CONFIG_VOP=m
+CONFIG_VOP_BUS=m
+CONFIG_VORTEX=m
+CONFIG_VSOCKETS=m
+CONFIG_VSOCKETS_DIAG=m
+CONFIG_VSOCKMON=m
+CONFIG_VSX=y
+CONFIG_VT=y
+CONFIG_VT6655=m
+CONFIG_VT6656=m
+CONFIG_VT_CONSOLE=y
+CONFIG_VT_CONSOLE_SLEEP=y
+CONFIG_VT_HW_CONSOLE_BINDING=y
+CONFIG_VXGE=m
+## CONFIG_VXGE_DEBUG_TRACE_ALL is not set
+CONFIG_VXLAN=m
+CONFIG_VZ89X=m
+CONFIG_W1_CON=y
+CONFIG_W1_MASTER_DS1WM=m
+CONFIG_W1_MASTER_DS2482=m
+CONFIG_W1_MASTER_DS2490=m
+CONFIG_W1_MASTER_GPIO=m
+CONFIG_W1_MASTER_MATROX=m
+CONFIG_W1_MASTER_MXC=m
+CONFIG_W1_SLAVE_DS2405=m
+CONFIG_W1_SLAVE_DS2406=m
+CONFIG_W1_SLAVE_DS2408=m
+CONFIG_W1_SLAVE_DS2408_READBACK=y
+CONFIG_W1_SLAVE_DS2413=m
+CONFIG_W1_SLAVE_DS2423=m
+CONFIG_W1_SLAVE_DS2431=m
+CONFIG_W1_SLAVE_DS2433=m
+# CONFIG_W1_SLAVE_DS2433_CRC is not set
+CONFIG_W1_SLAVE_DS2438=m
+CONFIG_W1_SLAVE_DS2760=m
+CONFIG_W1_SLAVE_DS2780=m
+CONFIG_W1_SLAVE_DS2781=m
+CONFIG_W1_SLAVE_DS2805=m
+CONFIG_W1_SLAVE_DS28E04=m
+CONFIG_W1_SLAVE_DS28E17=m
+CONFIG_W1_SLAVE_SMEM=m
+CONFIG_W1_SLAVE_THERM=m
+CONFIG_W83627HF_WDT=m
+CONFIG_W83877F_WDT=m
+CONFIG_W83977F_WDT=m
+CONFIG_WAFTER_WDT=m
+CONFIG_WATCHDOG=y
+CONFIG_WATCHDOG_CORE=y
+CONFIG_WATCHDOG_HANDLE_BOOT_ENABLED=y
+# CONFIG_WATCHDOG_NOWAYOUT is not set
+CONFIG_WATCHDOG_PRETIMEOUT_DEFAULT_GOV_NOOP=y
+# CONFIG_WATCHDOG_PRETIMEOUT_DEFAULT_GOV_PANIC is not set
+CONFIG_WATCHDOG_PRETIMEOUT_GOV=y
+CONFIG_WATCHDOG_PRETIMEOUT_GOV_NOOP=y
+CONFIG_WATCHDOG_PRETIMEOUT_GOV_PANIC=m
+CONFIG_WATCHDOG_RTAS=m
+CONFIG_WATCHDOG_SYSFS=y
+CONFIG_WCN36XX=m
+# CONFIG_WCN36XX_DEBUGFS is not set
+# CONFIG_WCN36XX_SNAPDRAGON_HACKS is not set
+CONFIG_WD80x3=m
+CONFIG_WDAT_WDT=m
+CONFIG_WDT=m
+CONFIG_WEXT_CORE=y
+CONFIG_WEXT_PRIV=y
+CONFIG_WEXT_PROC=y
+CONFIG_WEXT_SPY=y
+CONFIG_WIL6210=m
+CONFIG_WIL6210_DEBUGFS=y
+CONFIG_WIL6210_ISR_COR=y
+CONFIG_WIL6210_TRACING=y
+CONFIG_WILC1000=m
+CONFIG_WILC1000_HW_OOB_INTR=y
+CONFIG_WILC1000_SDIO=m
+CONFIG_WILC1000_SPI=m
+CONFIG_WILINK_PLATFORM_DATA=y
+CONFIG_WIMAX_DEBUG_LEVEL=8
+CONFIG_WIMAX_I2400M=m
+CONFIG_WIMAX_I2400M_DEBUG_LEVEL=8
+CONFIG_WIMAX_I2400M_USB=m
+CONFIG_WINBOND_840=m
+CONFIG_WINBOND_FIR=m
+CONFIG_WINDFARM=m
+CONFIG_WIRELESS=y
+CONFIG_WIRELESS_EXT=y
+CONFIG_WIZNET_BUS_ANY=y
+CONFIG_WIZNET_BUS_DIRECT is not set
+CONFIG_WIZNET_BUS_INDIRECT is not set
+CONFIG_WIZNET_W5100=m
+CONFIG_WIZNET_W5100_SPI=m
+CONFIG_WIZNET_W5300=m
+CONFIG_WKUP_M3_IPC is not set
+CONFIG_WKUP_M3_RPROC=m
+CONFIG_WL1251=m
+CONFIG_WL1251_SDIO=m
+CONFIG_WL1251_SPI=m
+CONFIG_WL12XX=m
+CONFIG_WL18XX=m
+CONFIG_WLAN=y
+CONFIG_WLAN_VENDOR_ADMTEK=y
+CONFIG_WLAN_VENDOR_ATH=y
+CONFIG_WLAN_VENDOR_ATMEL=y
+CONFIG_WLAN_VENDOR_BROADCOM=y
+CONFIG_WLAN_VENDOR_CISCO=y
+CONFIG_WLAN_VENDOR_INTEL=y
+CONFIG_WLAN_VENDOR_INTERSIL=y
+CONFIG_WLAN_VENDOR_MARVELL=y
+CONFIG_WLAN_VENDOR_MEDIATEK=y
+CONFIG_WLAN_VENDOR_QUANTELL%=y
+CONFIG_WLAN_VENDOR_Ralink=y
+CONFIG_WLAN_VENDOR_REALTEK=y
+CONFIG_WLAN_VENDOR_RSI=y
+CONFIG_WLAN_VENDOR_ST=y
+CONFIG_WLAN_VENDOR_TI=y
+CONFIG_WLAN_VENDOR_ZYDAS=y
+CONFIG_WLCore=m
+CONFIG_WLCore_SDIO=m

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+CONFIG_WLCORE_SPI=m
+CONFIG_WM831X_BACKUP=m
+CONFIG_WM831X_POWER=m
+CONFIG_WM831X_WATCHDOG=m
+CONFIG_WM8350_POWER=m
+CONFIG_WM8350_WATCHDOG=m
+CONFIG_WML_BMOF=m
+CONFIG_WQ_POWER_EFFICIENT_DEFAULT=y
+# CONFIG_WQ_WATCHDOG is not set
+# CONFIG_WW_MUTEX_SELFTEST is not set
+CONFIG_X25_ASY=m
+CONFIG_X509_CERTIFICATE_PARSER=y
+CONFIG_X86=y
+CONFIG_X86_16BIT=y
+CONFIG_X86_32=y
+CONFIG_X86_32_IRIS=m
+# CONFIG_X86_32_NON_STANDARD is not set
+CONFIG_X86_32_SMP=y
+# CONFIG_X86_5LEVEL is not set
+CONFIG_X86_64=y
+CONFIG_X86_64_ACPI_NUMA=y
+CONFIG_X86_64_SMP=y
+CONFIG_X86_ACPI_CPUFREQ=y
+CONFIG_X86_ACPI_CPUFREQ_CPB=y
+CONFIG_X86_AMD_FREQ_SENSITIVITY=m
+CONFIG_X86_AMD_PLATFORM_DEVICE=y
+# CONFIG_X86_ANCIENT_MCE is not set
+CONFIG_X86_APM_BOOT=y
+# CONFIG_X86_BIGSMP is not set
+CONFIG_X86_BOOTPARAM_MEMORY_CORRUPTION_CHECK=y
+CONFIG_X86_CHECK_BIOS_CORRUPTION=y
+CONFIG_X86_CMOV=y
+CONFIG_X86_CMPXCHG64=y
+CONFIG_X86_CPUFREQ_NFORCE2=y
+CONFIG_X86_CPUID=m
+CONFIG_X86_DEBUGCTLMSR=y
+CONFIG_X86_DEBUG_FPU=y
+# CONFIG_X86_DECODER_SELFTEST is not set
+CONFIG_X86_DEV_DMA_OPS=y
+CONFIG_X86_DIRECT_GBPAGES=y
+CONFIG_X86_ESPFIX32=y
+CONFIG_X86_ESPFIX64=y
+CONFIG_X86_EXTENDED_PLATFORM=y
+# CONFIG_X86_E POWERSAVER is not set
+CONFIG_X86_FAST_FEATURE_TESTS=y
+CONFIG_X86_FEATURE_NAMES=y
+CONFIG_X86_GENERIC=y
+# CONFIG_X86_GOLDFISH is not set
+CONFIG_X86_GX_SUSPMOD=m
+CONFIG_X86_INTEL_LPSS=y
+CONFIG_X86_INTEL_MEMORY_PROTECTION_KEYS=y
+CONFIG_X86_INTEL_MPX=y
+CONFIG_X86_INTEL_PSTATE=y
+CONFIG_X86_INTEL_QUARK is not set
+CONFIG_X86_INTEL_TSX_MODE_AUTO is not set
+CONFIG_X86_INTEL_TSX_MODE_OFF=y
+CONFIG_X86_INTEL_TSX_MODE_ON is not set
+CONFIG_X86_INTEL_UIMP=y
+CONFIG_X86_INTEL_USERCOPY=y
+CONFIG_X86_INTERNODE_CACHE_SHIFT=6
+CONFIG_X86_IO_APIC=y
+CONFIG_X86_L1_CACHE_SHIFT=6
+CONFIG_X86_LEGACY_VM86=y
+CONFIG_X86_LOCAL_APIC=y
+CONFIG_X86_LONGHAUL=m
+CONFIG_X86_LONGRUN=m
+CONFIG_X86_MCE=y
+CONFIG_X86_MCELOG_LEGACY=y
+CONFIG_X86_MCE_AMD=y
+CONFIG_X86_MCE.Inject=m
+CONFIG_X86_MCE_INTEL=y
+CONFIG_X86_MCE_THRESHOLD=y
+CONFIG_X86_MPPARSE=y
+CONFIG_X86_MSR=m
+CONFIG_X86_NEED_RELOCS=y
+CONFIG_X86_NUMACHIP=y
+CONFIG_X86_P4_CLOCKMOD=m
+CONFIG_X86_PAЕ=y
+CONFIG_X86_PAT=y
+CONFIG_X86_PCC_CPFUFEQ=y
+CONFIG_X86_PKG_TEMP_THERMAL=m
+CONFIG_X86_PLATFORM_DEVICES=y
+CONFIG_X86_PMEM_LEGACY=y
+CONFIG_X86_PMEM_LEGACY_DEVICE=y
+CONFIG_X86_PM_TIMER=y
+CONFIG_X86_POWERNOW_K6=m
+CONFIG_X86_POWERNOW_K7=m
+CONFIG_X86_POWERNOW_K7 ACPI=y
+CONFIG_X86_POWERNOW_K8=y
+CONFIG_X86_PPRO_FENCE=y
+CONFIG_X86_PTDUMP is not set
+CONFIG_X86_PTDUMP_CORE=y
+CONFIG_X86_RDC32I1X is not set
+CONFIG_X86_REBOOTFIXUPS=y
+CONFIG_X86_REROUTE_FOR_BROKEN_BOOT_IRQS=y
+CONFIG_X86_RESERVE_LOW=64
+CONFIG_X86_SFI_CPUFREQ=m
+CONFIG_X86_SMAP=y
+CONFIG_X86_SPEEDSTEP_CENTRINO=y
+CONFIG_X86_SPEEDSTEP_CENTRINO_TABLE=y
+CONFIG_X86_SPEEDSTEP_ICH=y
+CONFIG_X86_SPEEDSTEP_RELAXED_CAP_CHECK=y
+CONFIG_X86_SPEEDSTEP_SMI=y
+CONFIG_X86_SUPPORTS_MEMORY_FAILURE=y
+# CONFIG_X86_SYSFB is not set
+CONFIG_X86_THERMAL_VECTOR=y
+CONFIG_X86_TSC=y
+CONFIG_X86_USE_PPRO_CHECKSUM=y
+# CONFIG_X86_DEBUG_BOOTUP is not set
+# CONFIG_X86_VERBOSE_BOOTUP is not set
+# CONFIG_X86_VSMP is not set
+CONFIG_X86_VSYSCALL_EMULATION=y
+CONFIG_X86_X2APIC=y
+CONFIG_X86_X32=y
+CONFIG_XENFS=m
+CONFIG_XEN_512GB=y
+CONFIG_XEN_ACPI=y
+CONFIG_XEN_ACPI_PROCESSOR=y
+CONFIG_XEN_AUTO_XLATE=y
+CONFIG_XEN_BACKEND=y
+CONFIG_XEN_BALLOON=y
+CONFIG_XEN_BALLOON_MEMORY_HOTPLUG=y
+CONFIG_XEN_BLKDEV_BACKEND=m
+CONFIG_XEN_BLKDEV_FRONTEND=y
+CONFIG_XEN_COMPAT_XENFS=y
+# CONFIG_XEN_DEBUG_FS is not set
+CONFIG_XEN_DEV_EVTCHN=m
+CONFIG_XEN_DOM0=y
+CONFIG_XEN_EFI=y
+CONFIG_XEN_FBDEV_FRONTEND=m
+CONFIG_XEN_GNTDEV=m
+CONFIG_XEN_GRANT_DEV_ALLOC=m
+CONFIG_XEN_HAVE_PVMMU=y
+CONFIG_XEN_HAVE_VPMU=y
+CONFIG_XEN_MCE_LOG=y
+CONFIG_XEN_NETDEV_BACKEND=m
+CONFIG_XEN_NETDEV_FRONTEND=y
+CONFIG_XEN_PCIEDEV_BACKEND=m
+CONFIG_XEN_PCIEDEV_FRONTEND=m
+CONFIG_XEN_PRIVCMD=m
+CONFIG_XEN_PV=y
+# CONFIG_XEN_PVCALLS_BACKEND is not set
+CONFIG_XEN_PVCALLS_FRONTEND=m
+CONFIG_XEN_PVH=y
+CONFIG_XEN_PVHVM=y
+CONFIG_XEN_PVHVM_SMP=y
+CONFIG_XEN_PV_SMP=y
+CONFIG_XEN_SAVE_RESTORE=y
+CONFIG_XEN_SCRUB_PAGES=y
+CONFIG_XEN_SCSI_BACKEND=m
+CONFIG_XEN_SCSI_FRONTEND=m
+CONFIG_XEN_SELFBALLOONING=y
+CONFIG_XEN_SYMS=y
+CONFIG_XEN_SYS_HYPERVISOR=y
+CONFIG_XEN_TMEM=m
+CONFIG_XEN_WDT=m
+CONFIG_XEN_XENBUS_FRONTEND=y
+CONFIG_XFRM=y
+CONFIG_XFRM_ALGO=m
+CONFIG_XFRM_IPCOMP=m
+## CONFIG_XFRM_MIGRATE is not set
+CONFIG_XFRM_OFFLOAD=y
+CONFIG_XFRM_STATISTICS=y
+## CONFIG_XFRM_SUB_POLICY is not set
+CONFIG_XFRM_USER=m
+## CONFIG_XFS_DEBUG is not set
+CONFIG_XFS_FS=m
+## CONFIG_XFS_ONLINE_SCRUB is not set
+CONFIG_XFS_POSIX_ACL=y
+CONFIG_XFS_QUOTA=y
+CONFIG_XFS_RT=y
+## CONFIG_XFS_WARN is not set
+CONFIG_XGENE_DMA=m
+CONFIG_XGENE_PMU=y
+CONFIG_XGENE_SLIMPRO_MBOX=m
+CONFIG_XILINX_DMA=m
+CONFIG_XILINX_GMII2RGMII=m
+CONFIG_XILINX_PR_DECOPPER=m
+CONFIG_XILINX_ZYNQMP_DMA=m
+CONFIG_XILLYBUS_OF=m
+CONFIG_XILLYBUS_PCIE=m
+CONFIG_XMON=y
+## CONFIG_XMON_DEFAULT is not set
+CONFIG_XMON_DEFAULT_RO_MODE=y
+CONFIG_XMON_DISASSEMBLY=y
+CONFIG_XOR_BLOCKS=m
+CONFIG_XPS=y
+CONFIG_XXHASH=y
+CONFIG_XZ_DEC=y
+CONFIG_YAM=m
+CONFIG_YELLOWFIN=m
+CONFIG_YENTA=m
+CONFIG_YENTA_ENE_TUNE=y
+CONFIG_YENTA_O2=y
+CONFIG_YENTA_RICOH=y
+CONFIG_YENTA_TI=y
+CONFIG_YENTA_TOSHIBA=y
+CONFIG_Z3FOLD=m
+CONFIG_ZBOOT_ROM_BSS=0x0
+CONFIG_ZBOOT_ROM_TEXT=0x0
+CONFIG_ZBUD=y
+CONFIG_ZCRYPT=m
+CONFIG_ZD1211RW=m
+# CONFIG_ZD1211RW_DEBUG is not set
+CONFIG_ZEROPLUS_FF=y
+CONFIG_ZFCP=m
+CONFIG_ZIIRAVE_WATCHDOG=m
+CONFIG_ZISOFS=y
+CONFIG_ZLIB_INFLATE=y
+CONFIG_ZONE_DEVICE=y
+CONFIG_ZONE_DMA=y
+CONFIG_ZONE_DMA32=y
+CONFIG_ZPA2326=m
+CONFIG_ZPA2326_I2C=m
+CONFIG_ZPA2326_SPI=m
+CONFIG_ZPOOL=y
+CONFIG_ZPOOL=m
+CONFIG_ZRAM_WRITEBACK=y
+CONFIG_ZSMALLOC=y
+# CONFIG_ZSMALLOC_STAT is not set
+CONFIG_ZSTD_COMPRESS=m
+CONFIG_ZSTD_DECOMPRESS=y
+CONFIG_ZSWAP=y
+CONFIG_ZX_TDM=m
--- linux-4.15.0.orig/debian.master/config/i386/config.common.i386
+++ linux-4.15.0/debian.master/config/i386/config.common.i386
@@ -0,0 +1,515 @@
#
# Config options for config.common.i386 automatically generated by splitconfig.pl
#
# CONFIG_64BIT is not set
+CONFIG_6LOWPAN=m
+CONFIG_ABX500_CORE=y
+CONFIG_AC97_BUS=m
+# CONFIG_ACPI_DEBUG is not set
+# CONFIG_ACPI_DEBUGGER is not set
+# CONFIG_ACPI_REduced_HARDWARE_ONLY is not set
+CONFIG_ADFS_FS=m
+CONFIG_AFFS_FS=m
+CONFIG_AIX_PARTITION=y

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+CONFIG_ALIM7101_WDT=m
+CONFIG_ALTERA_TSE=m
+CONFIG_AMD_XGBE_HAVE_ECC=y
+CONFIG_AMIGA_PARTITION=y
+CONFIG_APPLICOM=m
+CONFIG_ARCH_DEFCONFIG="arch/x86/configs/i386_defconfig"
+CONFIG_ARCH_HAS STRICT KERNEL_RWX=y
+CONFIG_ARCH_HAS STRICT MODULE_RWX=y
+CONFIG_ARCH_MMAP RND BITS=8
+CONFIG_ARCH_MMAP RND BITS_MAX=16
+CONFIG_ARCH_MMAP RND BITS_MIN=8
+CONFIG_ARCH_MMAP RND COMPAT BITS_MAX=16
+CONFIG_ARCH_MMAP RND COMPAT BITS_MIN=8
+# CONFIG_ARCH NEEDS CPU IDLE COUPLED is not set
+# CONFIG_ARCH OPTIONAL KERNEL_RWX is not set
+# CONFIG_ARCH OPTIONAL KERNEL_RWX_DEFAULT is not set
+CONFIG_ARCH_PHYS_ADDR T 64BIT=y
+CONFIG_ARCH_SELECT MEMORY MODEL=y
+# CONFIG_ARCH_WANTS THP_SWAP is not set
+# CONFIG_ARCH_WANTS UBSAN NO NULL is not set
+CONFIG_ARCNET=m
+# CONFIG ARM GIC V3 ITS is not set
+CONFIG_ATA=y
+CONFIG_ATALK=m
+CONFIG_ATARI_PARTITION=y
+CONFIG_ATA GENERIC=y
+CONFIG_ATA OVER ETH=m
+CONFIG_ATA PIIX=y
+CONFIG_ATM=m
+# CONFIG AUDIT ARCH COMPAT GENERIC is not set
+CONFIG_ATOFS4_FS=m
+CONFIG_AUXDISPLAY=y
+CONFIG_BACKLIGHT_LCD_SUPPORT=y
+CONFIG_BATMAN ADV=m
+CONFIG_BCH=m
+CONFIG_BCMA=m
+CONFIG_BCM KONA_USB2 PHY=m
+CONFIG_BE2ISCSI=m
+CONFIG_BEFS FS=m
+CONFIG_BFS FS=m
+CONFIG_BLK_DEV 3W XXXX RAID=m
+CONFIG_BLK_DEV CRYPTOLOOP=m
+CONFIG_BLK_DEV DAC960=m
+CONFIG_BLK_DEV PCIE SSD MTIP32XX=m
+CONFIG_BLK_DEV RSXX=m
+CONFIG_BLK_DEV SX8=m
+CONFIG_BLK_DEV UMEM=m
+CONFIG_BOUNCE=y
+CONFIG_FIREWIRE_NOSY=m
+CONFIG_FIRMWARE_IN_KERNEL=y
+CONFIG_FIXED_PHY=y
+CONFIG_FMC=m
+CONFIG_FRAME_WARN=1024
+CONFIG_FUSION=y
+CONFIG_GAMEPORT=m
+CONFIG_GENERIC_PHY=y
+CONFIG_GPIO_GENERIC=m
+CONFIG_GPIO_GENERIC_PLATFORM=m
+CONFIG_GPIO_MB86S7X=m
+CONFIG_GPIO_TWL4030=m
+CONFIG_GPIO_TWL6040=m
+CONFIG_HAVE_AOUT=y
+CONFIG_HAVE_ARCH_BITREVERSE is not set
+CONFIG_HAVE_ARCH_VMAP_STACK is not set
+CONFIG_HAVE_BOOTMEM_INFO_NODE is not set
+CONFIG_HAVE_GENERIC_DMA_COHERENT=y
+CONFIG_HFSPLUS_FS=m
+CONFIG_HFS_FS=m
+CONFIG_HIBERNATION=y
+CONFIG_HIO=m
+CONFIG_HOTPLUG_PCI=y
+CONFIG_HOTPLUG_PCI_SHPC=m
+CONFIG_HPET=y
+CONFIG_HPFS_FS=m
+CONFIG_HP_ILO=m
+CONFIG_HSI=m
+CONFIG_HSR=m
+CONFIG_HTC_PASIC3=m
+CONFIG_HUGETLB_PAGE=y
+CONFIG_HWMON=y
+CONFIG_HWSPINLOCK=y
+CONFIG_HW_RANDOM_TIMERIOMEM=m
+CONFIG_HYPERV_TSCPAGE is not set
+CONFIG_HZ_100 is not set
+CONFIG_I2C=y
+CONFIG_I2C_AMD_MP2=m
+CONFIG_I2C_EMEV2 is not set
+CONFIG_I2C_SLAVE is not set
+CONFIG_I6300ESB_WDT=m
+CONFIG_IEEE802154=m
+CONFIG_IIO=m
+CONFIG_ILLEGAL_POINTER_VALUE=0
+CONFIG_IAMA_DEFAULT_HASH="sha1"
+CONFIG_IAMA_DEFAULT_HASH_SHA1=y
+CONFIG_IAMA_DEFAULT_HASH_SHA256 is not set
+CONFIG_IAMA_DEFAULT_TEMPLATE="ima-ng"
+# CONFIG_IMA_LOAD_X509 is not set
+CONFIG_IMA_NG_TEMPLATE=y
+# CONFIG_IMA_SIG_TEMPLATE is not set
+CONFIG_INFINIBAND_BNXT_RE=m
+CONFIG_INFINIBAND_NES=m
+CONFIG_INFINIBAND_OCRDMA=m
+CONFIG_INPUT=y
+CONFIG_IOMMU_IOVA=y
+CONFIG_IPACK_BUS=m
+CONFIG_IPMI_HANDLER=m
+CONFIG_IPX=m
+# CONFIG_IP_DCCP_CCID3 is not set
+CONFIG IRQ_BYPASS_MANAGER=m
+CONFIG Isa_BUS_API=y
+CONFIG JFS_FS=m
+CONFIG JME=m
+CONFIG JUMP_LABEL=y
+# CONFIG_KALLSYMS_ABSOLUTE_PERCPU is not set
+CONFIG KARMA_PARTITION=y
+CONFIG KERNEL_GZIP=y
+# CONFIG KERNEL_XZ is not set
+CONFIG KVM=m
+CONFIG LAPB=m
+# CONFIG_LATENCYTOP is not set
+CONFIG LDM_PARTITION=y
+CONFIG LIBNVDIMM=y
+CONFIG LLC2=m
+CONFIG LOCK_DOWN_KERNEL=y
+CONFIG LOG_BUF_SHIFT=17
+CONFIG LPC_ICH=m
+CONFIG LPC_SCH=m
+CONFIG MAC_PARTITION=y
+CONFIG MAILBOX=y
+CONFIG MAX63XX_WATCHDOG=m
+CONFIG MCB=m
+CONFIG MDIO_BITBANG=m
+CONFIG MDIO_BUS=y
+CONFIG MD_MULTIPATH=m
+CONFIG MEDIA_SUPPORT=m
+CONFIG MEGARAID_LEGACY=m
+CONFIG MEGARAID_NEWGEN=m
+CONFIG MEGARAID_SAS=m
+CONFIG MEMORY=y
+CONFIG MEMORY_HOTPLUG_DEFAULT_ONLINE=y
+CONFIG MEMSTICK=m
+CONFIG MFD_CORE=y
+CONFIG MFD_JANZ_CMODIO=m
+CONFIG MFD_KEMPLD=m
+CONFIG_MFD_MT6397=m
+CONFIG_MFD_SM501=m
+CONFIG_MFD_SYSCON=y
+CONFIG_MFD_TI_AM335X_TSCADC=m
+# CONFIG_MFD_TMIO is not set
+CONFIG_MII=m
+CONFIG_MINIX_FS=m
+CONFIG_MINIX_SUBPARTITION=y
+CONFIG_MISC_RTSX=m
+CONFIG_MISC_RTSX_PCI=m
+CONFIG_MMC=y
+CONFIG_MMC_BLOCK=m
+CONFIG_MMC_SDHCI=m
+CONFIG_MMC_SDHCI_PLTFM=m
+CONFIG_MTD=m
+CONFIG_MTD_BLKDEVS=m
+CONFIG_MTD_BLOCK=m
+CONFIG_MTD_CMDLINE_PARTS=m
+CONFIG_MTD_NAND=m
+CONFIG_MTD_NAND_BCH=m
+CONFIG_MTD_NAND_ECC=m
+# CONFIG_MTD_NAND_OMAP_BCH_BUILD is not set
+CONFIG_NCP_FS=m
+CONFIG_NET_CADENCE=y
+CONFIG_NET_PACKET_ENGINE=y
+CONFIG_NET_SWITCHDEV=y
+CONFIG_NET_VENDOR_3COM=y
+CONFIG_NET_VENDOR_ADAPTER=y
+CONFIG_NET_VENDOR_AGERE=y
+CONFIG_NET_VENDOR_ALTEON=y
+CONFIG_NET_VENDOR_AMD=y
+CONFIG_NET_VENDOR_ARC=y
+CONFIG_NET_VENDOR_ATHEROS=y
+CONFIG_NET_VENDOR_BROADCOM=y
+CONFIG_NET_VENDOR_BROCADE=y
+CONFIG_NET_VENDOR_CAVIUM=y
+CONFIG_NET_VENDOR_CHELSIO=y
+CONFIG_NET_VENDOR_CISCO=y
+CONFIG_NET_VENDOR_DEC=y
+CONFIG_NET_VENDOR_DLINK=y
+CONFIG_NET_VENDOR_EMULEX=y
+CONFIG_NET_VENDOR_EXAR=y
+CONFIG_NET_VENDOR_EZCHIP=y
+CONFIG_NET_VENDOR_HP=y
+CONFIG_NET_VENDOR_HUAWEI=y
+CONFIG_NET_VENDOR_INTEL=y
+CONFIG_NET_VENDOR_MARVELL=y
+CONFIG_NET_VENDOR_MICREL=y
+CONFIG_NET_VENDOR_MyRI=y
+CONFIG_NET_VENDOR_NATSEMI=y
+CONFIG_NET_VENDOR_NVIDIA=y
+CONFIG_NET_VENDOR_OKI=y
+CONFIG_NET_VENDOR_QLOGIC=y
+CONFIG_NET_VENDOR_QUALCOMM=y
+CONFIG_NET_VENDOR_RDC=y
+CONFIG_NET_VENDOR_REALTEK=y
+CONFIG_NET_VENDOR_RENESAS=y
+CONFIG_NET_VENDOR_ROCKER=y
+CONFIG_NET_VENDOR_SAMSUNG=y
+CONFIG_NET_VENDOR_SEEQ=y
+CONFIG_NET_VENDOR_SILAN=y
+CONFIG_NET_VENDOR_SIS=y
+CONFIG_NET_VENDOR_SMSC=y
+CONFIG_NET_VENDOR_STMICRO=y
+CONFIG_NET_VENDOR_SUN=y
+CONFIG_NET_VENDOR_TEHUTI=y
+CONFIG_NET_VENDOR_TI=y
+CONFIG_NET_VENDOR_VIA=y
+CONFIG_NET_VENDOR_WIZNET=y
+CONFIG_NEW_LEDS=y
+CONFIG_NFC=m
+CONFIG_NFP=m
+CONFIG_NOP_USB_XCEIV=m
+CONFIG_NOZOMI=m
+CONFIG_NR_CPUS=8
+CONFIG_NTB=m
+CONFIG_SERIAL=y
+CONFIG_SERIAL_BAUDRATE=115200
+CONFIG_SERIAL_CHARMODE=8N1
+CONFIG_SERIAL_DATA =TECHNOLOGIES=y
+CONFIG_SERIAL_FLOWCTRL=y
+CONFIG_SERIAL_PARITY=y
+CONFIG_SERIAL_SPEED=115200
+CONFIG_SERIAL_XON_XOFF=y
+CONFIG_SERIAL_XON_XOFF_MODE=1
+CONFIG_SERIAL_XON_XOFF_SPEED=115200
+CONFIG_SERIAL_XON_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON_XOFF_XON_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON_XOFF_XON_XOFF=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON=0
+CONFIG_SERIAL_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XOFF_XOFF_XOFF_XON_XOFF_XON_XOFF_XON_XOFF_XON_XON=0
+CONF...
+CONFIG_PCI_PRI=y
+CONFIG_PCI_QUIRKS=y
+CONFIG_PCMCIA=m
+CONFIG_PGTABLE_LEVELS=3
+CONFIG_PGTABLE_MAPPING=y
+CONFIG_PHANTOM=m
+CONFIG_PHONET=m
+CONFIG_PHYLIB=y
+CONFIG_PHYSICAL_ALIGN=0x1000000
+CONFIG_PHYSICAL_START=0x1000000
+CONFIG_PHYS_ADDR_T_64BIT=y
+# CONFIG_PHY_EXYNOS5250_USB2 is not set
+CONFIG_PHY_PXA_28NM_HSIC=m
+CONFIG_PHY_PXA_28NM_USB2=m
+CONFIG_PINCTRL=y
+CONFIG_PINCTRL_CHERRYVIEW=m
+CONFIG_PM_DEBUG=y
+CONFIG_PM_DEVFREQ=y
+CONFIG_POWERCAP=y
+CONFIG_POWER_AVS=y
+CONFIG_POWER_SUPPLY=y
+CONFIG_PPP=y
+CONFIG_PPS=m
+CONFIG_PPS_CLIENT_GPIO=m
+CONFIG_PPS_CLIENT_LDISC=m
+# CONFIG_PREEMPT_NONE is not set
+CONFIG_PSTORE=y
+# CONFIG_PSTORE_CONSOLE is not set
+CONFIG_PSTORE_RAM=m
+CONFIG_PTP_1588_CLOCK=m
+CONFIG_PWM=y
+CONFIG_QNX4FS_FS=m
+CONFIG_QNX6FS_FS=m
+CONFIG_RAW_DRIVER=m
+CONFIG_RCU_CPUSTALL_TIMEOUT=60
+CONFIG_REED_SOLOMON=m
+# CONFIG_REFCOUNT_FULL is not set
+CONFIG_REGULATOR=y
+CONFIG_REGULATOR_FIXED_VOLTAGE=m
+CONFIG_REGULATOR_TWL4030=m
+CONFIG_REISERFS_FS=m
+# CONFIG_RESET_BERLIN is not set
+CONFIG_RESET_CONTROLLER=y
+# CONFIG_RESET_IMX7 is not set
+# CONFIG_RESET_MESON is not set
+# CONFIG_RESET_SIMPLE is not set
+# CONFIG_RESET_SUNXI is not set
+CONFIG_RFKILL=y
+CONFIG_ROMFS_FS=m
+CONFIG_RPMMSG_VIRTIO=m
+CONFIG_RTC_DRV_CMOS=y
+CONFIG_RTC_DRV_PCF8523=m
+CONFIG_SATA_AHCI_PLATFORM=m
+CONFIG_SCHED_SMT=y
+CONFIG_SCSI_3W_9XXX=m
+CONFIG_SCSI_3W_SAS=m
+CONFIG_SCSI_AACRAID=m
+CONFIG_SCSI_ACARD=m
+CONFIG_SCSI_ADVANSYS=m
+CONFIG_SCSI_AIC79XX=m
+CONFIG_SCSI_AIC7XXX=m
+CONFIG_SCSI_AIC94XX=m
+CONFIG_SCSI_AM53C974=m
+CONFIG_SCSI_ARCMSR=m
+CONFIG_SCSI_BFA_FC=m
+CONFIG_SCSI_BNX2X_FCOE=m
+CONFIG_SCSI_BNX2X_ISCSI=m
+CONFIG_SCSI_CHELSIO_FCOE=m
+CONFIG_SCSI_CXGB3_1SCSI=m
+CONFIG_SCSI_CXGB4_1SCSI=m
+CONFIG_SCSI_DC395x=m
+CONFIG_SCSI_DMX3191D=m
+CONFIG_SCSI_DPT_12O=m
+CONFIG_SCSI_ESAS2R=m
+CONFIG_SCSI_FUTURE_DOMAIN=m
+CONFIG_SCSI_HPSA=m
+CONFIG_SCSI_HPTIOP=m
+CONFIG_SCSI_INIA100=m
+CONFIG_SCSI_INITIO=m
+CONFIG_SCSI_IPS=m
+CONFIG_SCSI_LPFC=m
+# CONFIG_SCSI_MQ_DEFAULT is not set
+CONFIG_SCSI_MVSAS=m
+CONFIG_SCSI_MVUMI=m
+CONFIG_SCSI_PM8001=m
+CONFIG_SCSI_PMCREAD=m
+CONFIG_SCSI_QLA_FC=m
+CONFIG_SCSI_QLA_1SCSI=m
+CONFIG_SCSI_QLOGIC_1280=m
+CONFIG_SCSI_SNIC=m
+CONFIG_SCSI_SRP_ATTRS=m
+CONFIG_SCSI_STEX=m
+CONFIG_SCSI_SYM53C8XX_2=m
+CONFIG_SCSI_UFSHCD=m
+CONFIG_SCSI_WD719X=m
+CONFIG_SECURITY_SELINUX_BOOTPARAM=y
+CONFIG_SENSORS_SCH56XX_COMMON=m
+CONFIG_SERIAL_8250=y
+CONFIG_SERIAL_8250_dw=m
+CONFIG_SERIAL_8250_FINTEK=y
+CONFIG_SERIAL_ALTERA_JTAGUART=m
+CONFIG_SERIAL_ALTERA_UART=m
+CONFIG_SERIAL_ARC=m
+CONFIG_SERIAL_CORE=y
+CONFIG_SERIAL_FSL_LPUART=m
+CONFIG_SERIAL_JSM=m
+CONFIG_SERIAL_NONSTANDARD=y
+CONFIG_SERIAL_RP2=m
+CONFIG_SERIAL_SCCNXP=y
+CONFIG_SERIO=y
+CONFIG_SFC=m
+CONFIG_SFC_FALCON=m
+CONFIG_SGI_IOC4=m
+CONFIG_SGI_PARTITION=y
+CONFIG_SGL_ALLOC=y
+CONFIG_SG_SPLIT is not set
+CONFIG_SH_TIMER_CMT is not set
+CONFIG_SH_TIMER_MTU2 is not set
+CONFIG_SH_TIMER_TMU is not set
+CONFIG_SLIP=m
+CONFIG_SND=m
+CONFIG_SND_COMPRESS_OFFLOAD=m
+CONFIG_SND_DMAENGINE_PCM=m
+CONFIG_SND_EMU10K1_SEQ=m
+CONFIG_SND_OPL4_1LIB_SEQ=m
+CONFIG_SND_PCM=m
+CONFIG_SND_SOC=m
+CONFIG_SND_SOC_FSL_SSI=m
+CONFIG_SND_SOC_I2C_AND_SPI=m
+CONFIG_SND_SOC_IMX_AUDMUX=m
+CONFIG_SND_SOC_RT5677_SPI=m
+CONFIG_SND_SOC_SGTL5000=m
+CONFIG_SND_TIMER=m
+CONFIG_SOC_TI=y
+CONFIG_SOLARIS_X86_PARTITION=y
+CONFIG_SOUND=m
+CONFIG_SPI=y
+CONFIG_SPI_PXA2XX_PCI=m
+CONFIG_SPI_ROCKCHIP is not set
+CONFIG_SPMI=m
+CONFIG_SRAM=y
+CONFIG_SSB=m
+CONFIG_STAGING=y
+# CONFIG_STANDALONE is not set
+# CONFIG_SUNXI_SRAM is not set
+CONFIG_SYS_Partition=y
+CONFIG_SYSV68_Partition=y
+CONFIG_SYSV_FS=m
+CONFIG_SYS_Partition=y
+CONFIG_TCG_TIS_I2C_ATMEL=m
+CONFIG_TCG_TIS_I2C_INFINEON=m
+CONFIG_TCG_TIS_I2C_NUVOTON=m
+CONFIG_THERMAL=y
+CONFIG_TIFM_Core=m
+CONFIG_TI_CPSW_ALE=m
+CONFIG_TOUCHSCREEN_ELAN=m
+CONFIG_TRACE_SINK=m
+CONFIG_TRANSPARENT_HUGEPAGE_ALWAYS is not set
+CONFIG_TRANSPARENT_HUGEPAGE_MADVISE=y
+CONFIG_TTY_PRINTK=y
+CONFIG_UFS_FS=m
+CONFIG_UIO_AEC=m
+CONFIG_UIO_CIF=m
+CONFIG_UIO_DMEM_GENIRQ=m
+CONFIG_UIO_Mf624=m
+CONFIG_UIO_NETX=m
+CONFIG_UIO_PCI GENERIC=m
+CONFIG_UIO_PDRV_GENIRQ=m
+CONFIG_UIO_PRUSS=m
+CONFIG_UIO_SERCOS3=m
+CONFIG_ULTRIX_Partition=y
+CONFIG_UNIXWARE_DISKLABEL=y
+CONFIG_USB_DWC2_PCI=m
+CONFIG_USB_EHCI_HCD_PLATFORM=y
+CONFIG_USB_GADGET=m
+CONFIG_USB_HCD_BCMA=m
+CONFIG_USB_HCD_SSB=m
+CONFIG_USB_MUSB_HDRC=m
+CONFIG_USB_OHCI_HCD_PLATFORM=y
+CONFIG_USB_SUPPORT=y
+CONFIG_UWB=m
+CONFIG_VFIO=m
+CONFIG_VFIO_IOMMU_TYPE1=m
+CONFIG_VFIO_PCI=m
+CONFIG_VFIO_VIRQFD=m
+CONFIG_VGASTATE=m
+CONFIG_VIRTIO_MMIO=y
+CONFIG_VM86=m
+CONFIG_VME_BUS=m
+CONFIG_VMXNET3=m
+CONFIG_VXFS_FS=m
+CONFIG_W1=m
+CONFIG_WAN=y
+CONFIG_WDTPCI=m
+CONFIG_WIMAX=m
+CONFIG_X25=m
+CONFIG_X86_INTEL_MID=y
+CONFIG_X86_MINIMUM_CPU_FAMILY=5
+CONFIG_X86_SPEEDSTEP_LIB=y
+CONFIG_XEN=y
+CONFIG_XEN_BALLOON_MEMORY_HOTPLUG_LIMIT=4
+CONFIG_XILINX_WATCHDOG=m
+CONFIG_XILLYBUS=m
+CONFIG_XZ_DEC_ARM=y
+CONFIG_XZ_DEC_ARMTHUMB=y
+CONFIG_XZ_DEC_BCJ=y
+CONFIG_XZ_DEC_IA64=y
+CONFIG_XZ_DEC_POWERPC=y
+CONFIG_XZ_DEC_SPARC=y
+CONFIG_XZ_DEC_TEST=m
+CONFIG_XZ_DEC_X86=y
+CONFIG_ZLIB_DEFLATE=y
--- linux-4.15.0.orig/debian.master/config/i386/config.flavour.generic
+++ linux-4.15.0/debian.master/config/i386/config.flavour.generic
@@ -0,0 +1,9 @@
+
+CONFIG_HZ=250
+CONFIG_HZ_1000 is not set
+CONFIG_HZ_250=y
+CONFIG_IRQ_FORCED_THREADING_DEFAULT is not set
+CONFIG_PREEMPT is not set
+CONFIG_PREEMPT_VOLUNTARY=y
--- linux-4.15.0.orig/debian.master/config/i386/config.flavour.lowlatency
+++ linux-4.15.0/debian.master/config/i386/config.flavour.lowlatency
@@ -0,0 +1,9 @@
+
+CONFIG_HZ=1000
+CONFIG_HZ_1000=y
+CONFIG_HZ_250 is not set
+CONFIG_IRQ_FORCED_THREADING_DEFAULT=y
+CONFIG_PREEMPT=y
+CONFIG_PREEMPT_VOLUNTARY is not set
--- linux-4.15.0.orig/debian.master/config/ppc64el/config.common.ppc64el
+++ linux-4.15.0/debian.master/config/ppc64el/config.common.ppc64el

@ @ -0,0 +1,514 @@
+
+# Config options for config.common.ppc64el automatically generated by splitconfig.pl
+#
+CONFIG_64BIT=y
+CONFIG_6LOWPAN=m
+CONFIG_ABX500_CORE=y
+CONFIG_AC97_BUS=m
+CONFIG_ADFS_FS=m
+CONFIG_AFFS_FS=m
+CONFIG_AIX_PARTITION=y
+CONFIG_ALIM7101_WDT=m
+CONFIG_ALTERA_TSE=m
+# CONFIG_AMD_XGBE_HAVE_ECC is not set
+CONFIG_AMIGA_PARTITION=y
+CONFIG_APPLICOM=m
+# CONFIG_ARCH_HAS_STRICT_KERNEL_RWX is not set
+# CONFIG_ARCH_HAS_STRICT_MODULE_RWX is not set
+CONFIG_ARCH_MMAP_RND_BITS=28
+CONFIG_ARCH_MMAP_RND_BITS_MAX=29
+CONFIG_ARCH_MMAP_RND_BITS_MIN=14
+CONFIG_ARCH_MMAP_RND_COMPAT_BITS=8
+CONFIG_ARCH_MMAP_RND_COMPAT_BITS_MAX=13
+CONFIG_ARCH_MMAP_RND_COMPAT_BITS_MIN=7
+# CONFIG_ARCH_NEEDS_CPU_IDLE_COUPLED is not set
+# CONFIG_ARCH_OPTIONAL_KERNEL_RWX is not set
+# CONFIG_ARCH_OPTIONAL_KERNEL_RWX_DEFAULT is not set
+CONFIG_ARCH_PHYS_ADDR_T_64BIT=y
+CONFIG_ARCH_SELECT_MEMORY_MODEL=y
+CONFIG_ARCH_SPARSEMEM_DEFAULT=y
+# CONFIG_ARCH_WANTS_THP_SWAP is not set
+# CONFIG_ARCH_WANTS_UBSAN_NO_NULL is not set
+CONFIG_ARCNET=m
+# CONFIG_ARM_GIC_V3_ITS is not set
+CONFIG_ATA=y
+CONFIG_ATALK=m
+CONFIG_ATARI_PARTITION=y
+CONFIG_ATARI_GENERIC=m
+CONFIG_ATA_OVER_ETH=m
+CONFIG_ATA_PIIX=m
+CONFIG_ATM=m
+# CONFIG_AUDIT_ARCH_COMPAT_GENERIC is not set
+CONFIG_AUTOFS4_FS=m
+CONFIG_AUXDISPLAY=y
+CONFIG_BACKLIGHT_LCD_SUPPORT=y
+CONFIG_BATMAN_ADV=m
+CONFIG_BCH=m
+CONFIG_BCMA=m
+CONFIG_EVM_LOAD_X509=y
+CONFIG_EXOFS_FS=m
+CONFIG_EXTCON=y
+CONFIG_F2FS_FS=m
+CONFIG_FB=y
+CONFIG_FB_BOOT_VESA_SUPPORT is not set
+CONFIG_FB_CFB_REV_PIXELS_IN_BYTE is not set
+CONFIG_FB.ibm_gxt4500=y
+CONFIG_FB_MACMODES=y
+CONFIG_FB_PROVIDE_GET_FB_UNMAPPED_AREA is not set
+CONFIG_FDDI=y
+CONFIG_FEALNX=m
+CONFIG_FIREWIRE=m
+CONFIG_FIREWIRE_NOSY=m
+CONFIG_FIRMWARE_IN_KERNEL=y
+CONFIG_FIXED_PHY=y
+CONFIG_FMC=m
+CONFIG_FORCE_MAX_ZONEORDER=9
+CONFIG_FRAME_WARN=2048
+CONFIG_FUSION=y
+CONFIG_GAMEPORT=m
+CONFIG_GENERIC_CSUM is not set
+CONFIG_GENERIC_PHY=y
+CONFIG_GPIO_GENERIC=y
+CONFIG_GPIO_GENERIC_PLATFORM=m
+CONFIG_GPIO_MB86S7X=m
+CONFIG_GPIO_TWL4030=m
+CONFIG_GPIO_TWL6040=m
+CONFIG_HAVE_AOUT is not set
+CONFIG_HAVE_ARCH_BITREVERSE is not set
+CONFIG_HAVE_ARCH_VMAP_STACK is not set
+CONFIG_HAVE_BOOTMEM_INFO_NODE=y
+CONFIG_HAVE_GENERIC_DMA_COHERENT is not set
+CONFIG_HFSPLUS_FS=m
+CONFIG_HFS_FS=m
+CONFIG_HIBERNATION is not set
+CONFIG_HIO is not set
+CONFIG_HOTPLUG_PCI=y
+CONFIG_HOTPLUG_PCI_SHPC is not set
+CONFIG_HPFS_FS=m
+CONFIG_HP_ILO=m
+CONFIG_HSI=m
+CONFIG_HSR=m
+CONFIG_HTC_PASIC3=m
+CONFIG_HUGETLB_PAGE=y
+CONFIG_HWMON=y
+CONFIG_HWSPINLOCK=y
+CONFIG_HW_RANDOM_TIMERIOMEM=m
```
+## CONFIG_HYPERV_TSCPAGE is not set
+CONFIG_HZ=250
+## CONFIG_HZ_100 is not set
+## CONFIG_HZ_1000 is not set
+CONFIG_HZ_250=y
+CONFIG_I2C=y
+## CONFIG_I2C_SLAVE is not set
+CONFIG_I6300ESB_WDT=m
+CONFIG_IEEE802154=m
+CONFIG_IIO=m
+CONFIG_ILLEGAL_POINTER_VALUE=0x5deadbeef0000000
+CONFIGIMA_DEFAULT_HASH="sha256"
+## CONFIGIMA_DEFAULT_HASH_SHA1 is not set
+CONFIGIMA_DEFAULT_HASH_SHA256=y
+CONFIGIMA_DEFAULT_TEMPLATE="ima-sig"
+CONFIGIMA_LOAD_X509=y
+## CONFIGIMA_DEFAULT_TEMPLATE is not set
+CONFIGIMA_SIG TEMPLATE=y
+CONFIGINFINIBAND_BNXT RE=m
+CONFIGINFINIBAND_NES=m
+CONFIGINFINIBAND_OCRDMA=m
+CONFIGINFINIBAND_QIB=m
+CONFIG INPUT=y
+CONFIGIPACK BUS=m
+CONFIG_IPMI HANDLER=m
+CONFIG IPX=m
+## CONFIG_IP_DCCP_CCID3 is not set
+CONFIG_IRQ_BYPASS_MANAGER=y
+## CONFIG_IRQ_FORCED_THREADED_DEFAULT is not set
+## CONFIGISA_BUS_API is not set
+CONFIGIFS FS=m
+CONFIGIME=m
+CONFIGJUMP_LABEL=y
+## CONFIG_KALLSYMS_ABSOLUTE_PERCPU is not set
+CONFIG KARMA PARTITION=y
+CONFIG_KERNEL_GZIP=y
+## CONFIG_KERNEL_XZ is not set
+CONFIG_KVM=y
+CONFIG_LAPB=m
+## CONFIG_LATENCYTOP is not set
+CONFIG_LDM PARTITION=y
+CONFIG_LIBNVDMIM=m
+CONFIG LLC2=m
+## CONFIG_LOCK_DOWN_KERNEL is not set
+CONFIG_LOG_BUF SHIFT=18
+CONFIG_LPC ICH=m
+CONFIG LPC SCH=m
+CONFIG_MAC_PARTITION=y
```
+CONFIG_MAILBOX=y
+CONFIG_MAX63XX_WATCHDOG=m
+CONFIG_MCB=m
+CONFIG_MDI0_BITBANG=m
+CONFIG_MDI0_BUS=y
+CONFIG_MDI0_BUS_MUX=m
+CONFIG_MDI0_THUNDER=m
+CONFIG_MD_MULTIPATH=m
+CONFIG_MEDIA_SUPPORT=m
+CONFIG_MEGARAID_LEGACY=m
+CONFIG_MEGARAID_NEWGEN=y
+CONFIG_MEGARAID_SAS=m
+CONFIG_MEMORY=y
+## CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE is not set
+CONFIG_MEMSTICK=m
+## CONFIG_MEM_SOFT_DIRTY is not set
+CONFIG_MFD_CORE=y
+CONFIG_MFD_JANZ_CMODIO=m
+CONFIG_MFD_KEMPLD=m
+CONFIG_MFD_MT6397=m
+CONFIG_MFD_SM501=m
+CONFIG_MFD_SYSCON=y
+CONFIG_MFD_TI_AM335X_TSCADC=m
+## CONFIG_MFD_TMIO is not set
+## CONFIG_MFD_TPS65217 is not set
+CONFIG_MII=m
+CONFIG_MINIX_FS=m
+CONFIG_MINIX_SUBPARTITION=y
+CONFIG_MISC_RTSX=m
+CONFIG_MISC_RTSX_PCI=m
+CONFIG_MMC=y
+CONFIG_MMC_BLOCK=m
+CONFIG_MMC_SDHCI=m
+CONFIG_MMC_SDHCI_PLTFM=m
+CONFIG_MTD=m
+CONFIG_MTD_BLKDEVS=m
+CONFIG_MTDgetBlock=m
+CONFIG_MTD_CMDSNARX_PANTS=m
+CONFIG_MTD_NAND=m
+CONFIG_MTD_NAND_BCH=m
+CONFIG_MTD_NAND_ECC=m
+## CONFIG_MTD_NAND_OMAP_BCH_BUILD is not set
+CONFIG_MTD_OF_PANTS=m
+CONFIG_NCP_FS=m
+CONFIG_NET_CADENCE=y
+CONFIG_NET_PACKET_ENGINE=y
+CONFIG_NET_SWITCHDEVM=y
+CONFIG_NET_VENDOR_3COM=y
+CONFIG_NET_VENDOR_ADAPTEC=y
+CONFIG_NET_VENDOR_AGERE=y
+CONFIG_NET_VENDOR_ALTEON=y
+CONFIG_NET_VENDOR_AMD=y
+CONFIG_NET_VENDOR_ARC=y
+CONFIG_NET_VENDOR_ATHEROS=y
+CONFIG_NET_VENDOR_BROADCOM=y
+CONFIG_NET_VENDOR_BROCADE=y
+CONFIG_NET_VENDOR_CAVIUM=y
+CONFIG_NET_VENDOR_CHELSIO=y
+CONFIG_NET_VENDOR_CISCO=y
+CONFIG_NET_VENDOR_DEC=y
+CONFIG_NET_VENDOR_DLINK=y
+CONFIG_NET_VENDOR_EMULEX=y
+CONFIG_NET_VENDOR_EXAR=y
+CONFIG_NET_VENDOR_EZCHIP=y
+CONFIG_NET_VENDOR_HP=y
+CONFIG_NET_VENDOR_HUAWEI=y
+CONFIG_NET_VENDOR_INTEL=y
+CONFIG_NET_VENDOR_MICREL=y
+CONFIG_NET_VENDOR_MYRI=y
+CONFIG_NET_VENDOR_NATSEMI=y
+CONFIG_NET_VENDOR_NVIDIA=y
+CONFIG_NET_VENDOR_OKI=y
+CONFIG_NET_VENDOR_QLOGIC=y
+CONFIG_NET_VENDOR_QUALCOMM=y
+CONFIG_NET_VENDOR_RDC=y
+CONFIG_NET_VENDOR_REALTEK=y
+CONFIG_NET_VENDOR_RENESAS=y
+CONFIG_NET_VENDOR_ROCKER=y
+CONFIG_NET_VENDOR_SAMSUNG=y
+CONFIG_NET_VENDOR_SEEQ=y
+CONFIG_NET_VENDOR_SILAN=y
+CONFIG_NET_VENDOR_SIS=y
+CONFIG_NET_VENDOR_SMSC=y
+CONFIG_NET_VENDOR_STMICRO=y
+CONFIG_NET_VENDOR_SUN=y
+CONFIG_NET_VENDOR_TEHUTI=y
+CONFIG_NET_VENDOR_TI=y
+CONFIG_NET_VENDOR_VIA=y
+CONFIG_NET_VENDOR_WIZNET=y
+CONFIG_NEW_LEDS=y
+CONFIG_NFC=m
+CONFIG_NFP=m
+CONFIG_NODES_SHIFT=8
+CONFIG_NOP_USB_XCEIV=m
+CONFIG_NOZOMI=m
+CONFIG_NR_CPUS=2048
+CONFIG_NTB=m
+# CONFIG_NTFS_RW is not set
+CONFIG_NUMA_BALANCING_DEFAULT_ENABLED=y
+CONFIG_NVMEM=y
+CONFIG_N_GSM=m
+CONFIG_OCXL_BASE=y
+CONFIG_OF=y
+CONFIG_OMFS_FS=m
+CONFIG_OSF_PARTITION=y
+# CONFIG_PAGE_EXTENSION is not set
+CONFIG_PAGE_OFFSET=0xc000000000000000
+CONFIG_PANIC_TIMEOUT=10
+CONFIG_PARPORT=m
+CONFIG_PATA_SIS=m
+CONFIG_PCIEPORTBUS is not set
+CONFIG_PCIPCWATCHDOG=m
+# CONFIG_PCI_MSI_IRQ_DOMAIN is not set
+CONFIG_PCI_PASID=y
+CONFIG_PCI_PRI=y
+CONFIG_PCI_QUIRKS=y
+CONFIG_PGTABLE_LEVELS=4
+CONFIG_PGTABLE_MAPPING=y
+CONFIG_PHANTOM=m
+CONFIG_PHONET=m
+CONFIG_PHYLIB=y
+CONFIG_PHYSICAL_START=0x00000000
+CONFIG_PHYS_ADDR_T_64BIT=y
+# CONFIG_PHY_EXYNOS5250_USB2 is not set
+CONFIG_PHY_PXA_28NM_HSIC=m
+CONFIG_PHY_PXA_28NM_USB2=m
+CONFIG_PINCTRL=y
+CONFIG_PM_DEBUG=y
+CONFIG_PM_DEVFREQ=y
+CONFIG_POWERCAP=y
+CONFIG_POWER_AVS=y
+CONFIG_POWER_SUPPLY=y
+CONFIG_PPP=y
+CONFIG_PPS=y
+CONFIG_PPS_CLIENT_GPIO=m
+CONFIG_PPS_CLIENT_LDISC=m
+# CONFIG_PREEMPT is not set
+# CONFIG_PREEMPT_NONE is not set
+CONFIG_PREEMPT_VOLUNTARY=y
+CONFIG_PSTORE=y
+# CONFIG_PSTORE_CONSOLE is not set
+CONFIG_PSTORE_RAM=m
+CONFIG_PTP_1588_CLOCK=y
+CONFIG_PWM=y
+CONFIG_QNX4FS_FS=m
+CONFIG_QNX6FS_FS=m
+CONFIG_RAW_DRIVER=m
+CONFIG_RCU_CPU_STALL_TIMEOUT=21
+CONFIG_REED_SOLOMON=m
+# CONFIG_REF_COUNT_FULL is not set
+CONFIG_REGULATOR=y
+CONFIG_REGULATOR_FIXED_VOLTAGE=m
+CONFIG_REGULATOR_TWLS4030=m
+CONFIG_REISERFS_FS=m
+# CONFIG_RESET_BERLIN is not set
+CONFIG_RESET_CONTROLLER=y
+# CONFIG_RESET_IMX7 is not set
+# CONFIG_RESET_MESON is not set
+# CONFIG_RESET_SIMPLE is not set
+# CONFIG_RESET_SUNXI is not set
+CONFIG_RFKILL=y
+CONFIG_ROMFS_FS=m
+CONFIG_RPMSG_VIRTIO=m
+CONFIG_RTC_DRV_CMO=m
+CONFIG_RTC_DRV_PCF8523=m
+CONFIG_RTC_DRV_TWLS4030=m
+CONFIG_SATA_AHCI_PLATFORM=m
+CONFIG_SCHED_SMT=y
+CONFIG_SCSI_3W_9XXX=m
+CONFIG_SCSI_3W_SAS=m
+CONFIG_SCSI_AACRAID=m
+CONFIG_SCSI_ACARD=m
+CONFIG_SCSI_ADVANSYS=m
+CONFIG_SCSI_AIC79XX=m
+CONFIG_SCSI_AIC7XXX=m
+CONFIG_SCSI_AIC94XX=m
+CONFIG_SCSI_AM53C974=m
+CONFIG_SCSI_ARCMSR=m
+CONFIG_SCSI_BFA_FC=m
+CONFIG_SCSI_BNX2X_FCOE=m
+CONFIG_SCSI_BNX2_ISCSI=m
+CONFIG_SCSI_CHELSSIO_FCOE=m
+CONFIG_SCSI_CXGB3_ISCSI=m
+CONFIG_SCSI_CXGB4_ISCSI=m
+CONFIG_SCSI_DC395x=m
+CONFIG_SCSI_DMIX3191D=m
+CONFIG_SCSI_ESAS2R=m
+CONFIG_SCSI_FUTURE_DOMAIN=m
+CONFIG_SCSI_HPSA=m
+CONFIG_SCSI_HPTIOP=m
+CONFIG_SCSI_INIA100=m
+CONFIG_SCSI_INITIO=m
+CONFIG_SCSI_IPS=m
+CONFIG_SCSI_LPFC=m
+# CONFIG_SCSI_MQ_DEFAULT is not set
+CONFIG_SCSI_MVSAS=m
+CONFIG_SCSI_MVUMI=m
+CONFIG_SCSI_PM8001=m
+CONFIG_SCSI_PCMRAID=m
+CONFIG_SCSI_QLA_FC=m
+CONFIG_SCSI_QLA_ISCSI=m
+CONFIG_SCSI_QLOGIC_1280=m
+CONFIG_SCSI_SNIC=m
+CONFIG_SCSI_SRPI_ATTRS=y
+CONFIG_SCSI_STEX=m
+CONFIG_SCSI_SYM53C8XX_2=m
+CONFIG_SCSI_UFSHCD=m
+CONFIG_SCSI_WD719X=m
+CONFIG_SECURITY_SELINUX_BOOTPARAM=y
+# CONFIG_SENSORS_SCH56XX_COMMON is not set
+CONFIG_SERIAL_8250=y
+CONFIG_SERIAL_8250_DW=m
+# CONFIG_SERIAL_8250_FINTEK is not set
+CONFIG_SERIAL_8250_FSL=y
+CONFIG_SERIAL_ALTERA_JTAGUART=m
+CONFIG_SERIAL_ALTERA_UART=m
+CONFIG_SERIAL_ARC=m
+CONFIG_SERIAL_CORE=y
+CONFIG_SERIAL_FSL_LPUART=m
+CONFIG_SERIAL_JSM=m
+CONFIG_SERIAL_NONSTANDARD=y
+CONFIG_SERIAL_RP2=m
+CONFIG_SERIAL_SCCNXP=y
+CONFIG_SERIO=y
+CONFIG_SFC=m
+CONFIG_SFC_FALCON=m
+CONFIG_SGI_IOC4=m
+CONFIG_SGI_PARTITION=y
+CONFIG_SGL_ALLOC=y
+# CONFIG_SG_SPLIT is not set
+# CONFIG_SH_TIMER_CMT is not set
+# CONFIG_SH_TIMER_MTMU2 is not set
+# CONFIG_SH_TIMER_TM is not set
+CONFIG_SLIP=m
+CONFIG_SND=m
+CONFIG_SND_DMAENGINE_PCM=m
+CONFIG_SND_EMU10K1_SEQ=m
+# CONFIG_SND_OPL4_LIB_SEQ is not set
+CONFIG_SND_PCM=m
+CONFIG_SND_SOC=m
+CONFIG_SND_SOC_FSL_SSI=m
+CONFIG_SND_SOC_I2C_AND_SPI=m
+CONFIG_SND_SOC_IMX_AUDMUX=m
+# CONFIG_SND_SOC_RT5677_SPI is not set
+CONFIG_SND_SOC_SGTL5000=m
+CONFIG_SND_TIMER=m
+CONFIG_SOC_TI=y
+CONFIG_SOLARIS_X86_PARTITION=y
+CONFIG_SOUND=m
+CONFIG_SPI=y
+# CONFIG_SPI_PXA2XX_PCI is not set
+# CONFIG_SPI_ROCKCHIP is not set
+CONFIG_SPMI=m
+CONFIG_SRAM=y
+CONFIG_SSB=m
+CONFIG_STAGING=y
+CONFIG_STANDALONE=y
+# CONFIG_SUNXI_SRAM is not set
+CONFIG_SUN_PARTITION=y
+CONFIG_SYSV68_PARTITION=y
+CONFIG_SYSV_FS=m
+# CONFIG_SYS_HYPervisor is not set
+CONFIG_TCG_TIS_I2C_ATMEL=y
+CONFIG_TCG_TIS_I2C_INFINEON=y
+CONFIG_TCG_TIS_I2C_NUVOTON=y
+CONFIG_THERMAL=y
+CONFIG_TIFM_CORE=m
+CONFIG_TI_CPSW_ALE=m
+CONFIG_TOUCHSCREEN_ELAN=m
+CONFIG_TRACE_SINK=m
+CONFIG_TRANSPARENT_HUGEPAGE_ALWAYS=y
+# CONFIG_TRANSPARENT_HUGEPAGE_MADVISE is not set
+CONFIG_TTY_PRINTK=y
+CONFIG_UFS_FS=m
+CONFIG_UIO_AEC=m
+CONFIG_UIO_CIF=m
+CONFIG_UIO_DMEm_GEnIRQ=m
+CONFIG_UIO_MF624=m
+CONFIG_UIO_NETX=m
+CONFIG_UIO_PCI_GENERIC=m
+CONFIG_UIO_PDRV_GEnIRQ=m
+CONFIG_UIO_PRUSS=m
+CONFIG_UIO_SERCOs3=m
+CONFIG_ULTRIX_PARTITION=y
+CONFIG_UNIXWARE_DISKLABEL=y
+CONFIG_USB_DWC2_PCI=m
+CONFIG_USB_EHCI_HCD_PLATFORM=m
+CONFIG_USB_GADGET=m
+# CONFIG_USB_G_MULTI is not set
+CONFIG_USB_HCD_BCMA=m
+CONFIG_USB_HCD_SSB=m
+CONFIG_USB_MUSB_HDRC=m
+CONFIG_USB_OHCI_HCD_PLATFORM=m
+CONFIG_USB_SUPPORT=y
+CONFIG_UWB=m
+CONFIG_VFIO=y
+# CONFIG_VFIO_IOMMU_TYPE1 is not set
+CONFIG_VFIO_PCI=y
+CONFIG_VFIO_VIRQFD=y
+CONFIG_VGASTATE=m
+CONFIG_VIRTIO_MMIO=y
+# CONFIG_VIRT_CPU_ACCOUNTING_NATIVE is not set
+CONFIG_VME_BUS=y
+CONFIG_VXFS_FS=m
+CONFIG_W1=m
+CONFIG_WAN=y
+CONFIG_WDTPCI=m
+CONFIG_WIMAX=m
+CONFIG_X25=m
+CONFIG_XILINX_WATCHDOG=m
+CONFIG_XILLYBUS=m
+CONFIG_XZ_DEC_ARM=y
+CONFIG_XZ_DEC_ARMTHUMB=y
+CONFIG_XZ_DEC_BCJ=y
+CONFIG_XZ_DEC_IA64=y
+CONFIG_XZ_DEC_POWERPC=y
+CONFIG_XZ_DEC_SPARC=y
+CONFIG_XZ_DEC_TEST=m
+CONFIG_XZ_DEC_X86=y
+CONFIG_ZLIB_DEFLATE=y
--- linux-4.15.0.orig/debian.master/config/ppc64el/config.flavour.generic
+++ linux-4.15.0/debian.master/config/ppc64el/config.flavour.generic
@@ -0,0 +1,3 @@
+
# Config options for config.flavour.generic automatically generated by splitconfig.pl
+
++
--- linux-4.15.0.orig/debian.master/config/s390x/config.common.s390x
+++ linux-4.15.0/debian.master/config/s390x/config.common.s390x
@@ -0,0 +1,428 @@
+
# Config options for config.common.s390x automatically generated by splitconfig.pl
+
+CONFIG_64BIT=y
+# CONFIG_6LOWPAN is not set
+# CONFIG_ABX500_CORE is not set
+# CONFIG_ADFS_FS is not set
+# CONFIG_AFFS_FS is not set
+# CONFIG_AIX_PARTITION is not set
+# CONFIG_ALIM7101_WDT is not set
+# CONFIG_ALTERA_TSE is not set
+# CONFIG_AMIGA_PARTITION is not set
+# CONFIG_APPLECOM is not set
+CONFIG_ARCH_HAS_STRICT_KERNEL_RWX=y
+CONFIG_ARCH_HAS_STRICT_MODULE_RWX=y
+# CONFIG_ARCH_OPTIONAL_KERNEL_RWX is not set
+# CONFIG_ARCH_OPTIONAL_KERNEL_RWX_DEFAULT is not set
+CONFIG_ARCH_SELECT_MEMORY_MODEL=y
+CONFIG_ARCH_SPARSEMEM_DEFAULT=y
+# CONFIG_ARCH_WANTS_THP_SWAP is not set
+CONFIG_ARCH_WANTS_UBSAN_NO_NULL=y
+# CONFIG_ARCNET is not set
+# CONFIG_ARM_GIC_V3_ITS is not set
+# CONFIG_ATM is not set
+# CONFIG_ATALK is not set
+# CONFIG_ATARI_PARTITION is not set
+# CONFIG_ATA_OVER_ETH is not set
+# CONFIG_ATM is not set
+# CONFIG_AUDIT_ARCH_COMPAT_GENERIC is not set
+CONFIG_AUTOFS4_FS=y
+# CONFIG_AUXDISPLAY is not set
+CONFIG_BACKLIGHT_LCD_SUPPORT is not set
+# CONFIG_BATMAN_ADV is not set
+CONFIG_BCMA is not set
+# CONFIG_BCM_KONA_USB2_PHY is not set
+# CONFIG_BE2ISCSI is not set
+# CONFIG_BEFS_FS is not set
+# CONFIG_BFS_FS is not set
+# CONFIG_BLK_DEV_3W_XXXX_RAID is not set
+# CONFIG_BLK_DEV_CRYPTOLOOP is not set
+# CONFIG_BLK_DEV_DAC960 is not set
+# CONFIG_BLK_DEV_PCIEESS_MTIIP32XX is not set
+# CONFIG_BLK_DEV_PCIEESS_MTIIP32XX is not set
+# CONFIG_BLK_DEV_RSXX is not set
+# CONFIG_BLK_DEV_SKD is not set
+# CONFIG_BLK_DEV_SX8 is not set
+# CONFIG_BLK_DEV_UMEM is not set
+# CONFIG_BOUNCE is not set
+# CONFIG_BSD_DISKLABEL is not set
+# CONFIG_C2PORT is not set
+# CONFIG_CADENCE_WATCHDOG is not set
+# CONFIG_CAIF is not set
+# CONFIG_CAN is not set
+## CONFIG_CB710_CORE is not set
+## CONFIG_CC_STACKPROTECTOR is not set
+## CONFIG_CDROM_PKTCDVD is not set
+## CONFIG_CHASH is not set
+## CONFIG_CMDLINE_PARTITION is not set
+CONFIG_CMM=y
+CONFIG_CPU_BIG_ENDIAN=y
+## CONFIG_CRAMFS is not set
+## CONFIG_CRYPTO_DEV_FSL_CAAM_CRYPTO_API_DESC is not set
+## CONFIG_CRYPTO_DEV_NITROX_CNN55XX is not set
+## CONFIG_CXL_AFU_DRIVER_OPS is not set
+## CONFIG_CXL_BASE is not set
+## CONFIG_CXL_LIB is not set
+## CONFIG_DECNET is not set
+CONFIG_DEFAULT_MMAP_MIN_ADDR=65536
+## CONFIG_DMADEVICES is not set
+## CONFIG_DMA_CMA is not set
+CONFIG_DMA_NOOP_OPS=y
+CONFIG_DM_DEBUG=y
+CONFIG_DM_MQ_DEFAULT=y
+## CONFIG_DNET is not set
+## CONFIG_DRM is not set
+## CONFIG_DUMMY_IRQ is not set
+## CONFIG_DW_WATCHDOG is not set
+## CONFIG_ECHO is not set
+## CONFIG_EEPROM_93CX6 is not set
+## CONFIG_EFS_FS is not set
+## CONFIG_EM_TIMER_STI is not set
+## CONFIG_ENCLOSURE_SERVICES is not set
+## CONFIG_ETHOC is not set
+## CONFIG_EVM_LOAD_X509 is not set
+## CONFIG_EXOFS_FS is not set
+## CONFIG_EXTCON is not set
+## CONFIG_F2FS_FS is not set
+## CONFIG_FB is not set
+## CONFIG_FDDI is not set
+## CONFIG_FEALNX is not set
+## CONFIG_FIRMWARE_IN_KERNEL is not set
+CONFIG_FIXED_PHY=m
+## CONFIG_FMC is not set
+## CONFIG_FORCE_MAX_ZONEORDER=9
+CONFIG_FRAME_WARN=1024
+## CONFIG_FUSION is not set
+## CONFIG_GAMEPORT is not set
+## CONFIG_GENERIC_PHY is not set
+CONFIG_GPIO_Generic=m
+CONFIG_GPIO GENERIC_PLATFORM=m
+CONFIG_GPIO MB86S7X is not set
+CONFIG_HAVE_AOUT is not set
+CONFIG_HAVE_ARCH_BITREVERSE is not set
+CONFIG_HAVE_ARCH_VMAP_STACK is not set
+CONFIG_HAVE_BOOTMEM_INFO_NODE is not set
+CONFIG_HAVE_GENERIC_DMA_COHERENT is not set
+CONFIG_HFSPLUS_FS is not set
+CONFIG_HFS_FS is not set
+CONFIG_HIBERNATION=y
+CONFIG_HOTPLUG_PCI=y
+CONFIG_HOTPLUG_PCI_SHPC is not set
+CONFIG_HPFS_FS is not set
+CONFIG_HP_IL_O is not set
+CONFIG_HSI is not set
+CONFIG_HSR is not set
+CONFIG_HTC_PASIC3 is not set
+CONFIG_HUGETLB_PAGE=y
+CONFIG_HWMON is not set
+CONFIG_HWSPINLOCK is not set
+CONFIG_HW_RANDOM_TIMERIOMEM is not set
+CONFIG_HYPERV_TSCPAGE is not set
+CONFIG_HZ=100
+CONFIG_HZ_100=y
+CONFIG_HZ_1000 is not set
+CONFIG_HZ_250 is not set
+CONFIG_I2C is not set
+CONFIG_I6300ESB_WDT is not set
+CONFIG_IEEE802154 is not set
+CONFIG_IIO is not set
+CONFIG_IMA_DEFAULT_HASH="sha1"
+CONFIG_IMA_DEFAULT_HASH_SHA1=y
+CONFIG_IMA_DEFAULT_HASH_SHA256 is not set
+CONFIG_IMA_DEFAULT TEMPLATE="ima-ng"
+CONFIG_IMA_LOAD_X509 is not set
+CONFIG_IMA_NG TEMPLATE=y
+CONFIG_IMA_SIG TEMPLATE is not set
+CONFIG_INFINIBAND_BNXT RE is not set
+CONFIG_INFINIBAND_NES is not set
+CONFIG_INFINIBAND_OCRDMA is not set
+CONFIG_INFINIBAND_QIB is not set
+CONFIG_INPUT is not set
+CONFIG_IPACK_BUS is not set
+CONFIG_IPMI_HANDLER is not set
+CONFIG_IPX is not set
+CONFIG_IP_DCCP_CCID3=y
+CONFIG_IRQ_BYPASS_MANAGER=m
+CONFIG_ISA_BUS_API is not set
+# CONFIG_JFS_FS is not set
+# CONFIG_JME is not set
+CONFIG_JUMP_LABEL=y
+# CONFIG_KALLSYMS_ABSOLUTE_PERCPU is not set
+# CONFIG_KARMA_PARTITION is not set
+# CONFIG_KERNEL_GZIP is not set
+CONFIG_KERNEL_XZ=y
+# CONFIG_KVM is not set
+# CONFIG_LAPB is not set
+# CONFIG_LATENCYTOP is not set
+# CONFIG_LDM_PARTITION is not set
+# CONFIG_LIBNVDIMM is not set
+# CONFIG_LLC2 is not set
+# CONFIG_LOCK_DOWN_KERNEL is not set
+CONFIG_LOG_BUF_SHIFT=18
+# CONFIG_LPC_ICH is not set
+# CONFIG_LPC_SCH is not set
+# CONFIG_MAC_PARTITION is not set
+# CONFIG_MAILBOX is not set
+# CONFIG_MAX63XX_WATCHDOG is not set
+# CONFIG_MCB is not set
+# CONFIG_MDIO_BITBANG is not set
+CONFIG_MDIO_BUS=m
+# CONFIG_MDIO_THUNDER is not set
+CONFIG_MD_MULTIPATH=y
+# CONFIG_MEDIA_SUPPORT is not set
+# CONFIG_MEGARAID_LEGACY is not set
+# CONFIG_MEGARAID_NEWGEN is not set
+# CONFIG_MEGARAID_SAS is not set
+# CONFIG_MEMORY is not set
+# CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE is not set
+# CONFIG_MEMSTICK is not set
+CONFIG_MEM_SOFT_DIRTY=y
+CONFIG_MFD_CORE=m
+# CONFIG_MFD_JANZ_CMODIO is not set
+# CONFIG_MFD_KEMPLD is not set
+# CONFIG_MFD_MT6397 is not set
+# CONFIG_MFD_SM501 is not set
+# CONFIG_MFD_SYSCON is not set
+# CONFIG_MFD_TI_AM335X_TSCADC is not set
+# CONFIG_MFD_TMIO is not set
+# CONFIG_MINIX_FS is not set
+# CONFIG_MINIX_SUBPARTITION is not set
+# CONFIG_MISC_RTSX is not set
+# CONFIG_MISC_RTSX_PCI is not set
+# CONFIG_MMC is not set
+# CONFIG_MTD is not set
+# CONFIG_NCP_FS is not set
## 5GaaS Edge

- CONFIG_NET_CADENCE is not set
- CONFIG_NET_PACKET_ENGINE is not set
- CONFIG_NET_SWITCHDEV is not set
- CONFIG_NET_VENDOR_AGERE is not set
- CONFIG_NET_VENDOR_ALTEON is not set
- CONFIG_NET_VENDOR_AMD is not set
- CONFIG_NET_VENDOR_ARC is not set
- CONFIG_NET_VENDOR_AHEROS is not set
- CONFIG_NET_VENDOR_BROADCOM is not set
- CONFIG_NET_VENDOR_BROCADE is not set
- CONFIG_NET_VENDOR_CAVIUM is not set
- CONFIG_NET_VENDOR_CHELSIO is not set
- CONFIG_NET_VENDOR_CISCO is not set
- CONFIG_NET_VENDOR_DEC is not set
- CONFIG_NET_VENDOR_DLINK is not set
- CONFIG_NET_VENDOR_EMULEX is not set
- CONFIG_NET_VENDOR_EXAR is not set
- CONFIG_NET_VENDOR_EZCHIP is not set
- CONFIG_NET_VENDOR_HP is not set
- CONFIG_NET_VENDOR_HUAWEI is not set
- CONFIG_NET_VENDOR_INTEL is not set
- CONFIG_NET_VENDOR_MARVELL is not set
- CONFIG_NET_VENDOR_MICREL is not set
- CONFIG_NET_VENDOR_MYRI is not set
- CONFIG_NET_VENDOR_NATSEMI is not set
- CONFIG_NET_VENDOR_NVIDIA is not set
- CONFIG_NET_VENDOR_OKI is not set
- CONFIG_NET_VENDOR_QLOGIC is not set
- CONFIG_NET_VENDOR_QUALCOMM is not set
- CONFIG_NET_VENDOR_RDC is not set
- CONFIG_NET_VENDOR_REALTEK is not set
- CONFIG_NET_VENDOR_RENESAS is not set
- CONFIG_NET_VENDOR_ROCKER is not set
- CONFIG_NET_VENDOR_SAMSUNG is not set
- CONFIG_NET_VENDOR_SEEQ is not set
- CONFIG_NET_VENDOR_SILAN is not set
- CONFIG_NET_VENDOR_SIS is not set
- CONFIG_NET_VENDOR_SMSC is not set
- CONFIG_NET_VENDOR_STMICON is not set
- CONFIG_NET_VENDOR_SUN is not set
- CONFIG_NET_VENDOR_TEHUTI is not set
- CONFIG_NET_VENDOR_TI is not set
- CONFIG_NET_VENDOR_VIA is not set
- CONFIG_NET_VENDOR_WIZNET is not set
- CONFIG_NEW_LEDS is not set
- CONFIG_NFC is not set
+# CONFIG_NFP is not set
+CONFIG_NODES_SHIFT=4
+# CONFIG_NZOMI is not set
+CONFIG_NR_CPUS=256
+# CONFIG_NT is not set
+CONFIG_NTFS_RW=y
+# CONFIG_NUMA_BALANCING_DEFAULT_ENABLED is not set
+CONFIG_NUMA_EMU=y
+# CONFIG_NVMEM is not set
+CONFIG_N_GSM is not set
+# CONFIG_OCXL_BASE is not set
+# CONFIG_OF is not set
+# CONFIG_OMFS_FS is not set
+# CONFIG_OSF_PARTITION is not set
+# CONFIG_PAGE_EXTENSION is not set
+CONFIG_PANIC_TIMEOUT=0
+# CONFIG_PARPORT is not set
+# CONFIG_PC104 is not set
+CONFIG_PCIEPORTBUS=y
+# CONFIG_PCIEWATCHDOG is not set
+# CONFIG_PCI_MSI_IRQ_DOMAIN is not set
+# CONFIG_PCI_PASID is not set
+# CONFIG_PCI_PRI is not set
+# CONFIG_PCI_QUIRKS is not set
+# CONFIG_PCMCIA is not set
+CONFIG_PGTABLE_LEVELS=5
+# CONFIG_PGTABLE_MAPPING is not set
+# CONFIG_PHANTOM is not set
+# CONFIG_PHONET is not set
+CONFIG_PHYLIB=m
+CONFIG_PHYS_ADDR_T_64BIT=y
+# CONFIG_PHY_PXA_28NM_HSIC is not set
+# CONFIG_PHY_PXA_28NM_USB2 is not set
+# CONFIG_PINCTRL is not set
+# CONFIG_PM_DEVFREQ is not set
+# CONFIG_POWERAVS is not set
+# CONFIG_POWER_SUPPLY is not set
+CONFIG_PPP is not set
+CONFIG_PPS=m
+# CONFIG_PPS_CLIENT_GPIO is not set
+# CONFIG_PPS_CLIENT_LDISC is not set
+# CONFIG_PREEMPT is not set
+CONFIG_PREEMPT_NONE=y
+# CONFIG_PREEMPT_VOLUNTARY is not set
+CONFIG_PSTORE is not set
+CONFIG_PTP_1588_CLOCK=m
+# CONFIG_PWM is not set
+# CONFIG_QNX4FS_FS is not set
+# CONFIG_QNX6FS_FS is not set
+# CONFIG_RAW_DRIVER is not set
+CONFIG_RCU_CPU_STALL_TIMEOUT=21
+# CONFIG_REFLECTION_FULL is not set
+# CONFIG_REGULATOR is not set
+# CONFIG_REISERFS_FS is not set
+# CONFIG_RESET_CONTROLLER is not set
+# CONFIG_RFKILL is not set
+# CONFIG_ROMFS_FS is not set
+# CONFIG_RPMSG_VIRTIO is not set
+CONFIG_SCHED_SMT=y
+# CONFIG_SCSI_3W_9XXX is not set
+# CONFIG_SCSI_3W_SAS is not set
+# CONFIG_SCSI_AACRAID is not set
+# CONFIG_SCSI_ACARD is not set
+# CONFIG_SCSI_ADVANSYS is not set
+# CONFIG_SCSI_AIC79XX is not set
+# CONFIG_SCSI_AIC7XXX is not set
+# CONFIG_SCSI_AIC94XX is not set
+# CONFIG_SCSI_AM53C974 is not set
+# CONFIG_SCSI_ARCMSR is not set
+# CONFIG_SCSI_BFA_FC is not set
+# CONFIG_SCSI_BNX2X_FCOE is not set
+# CONFIG_SCSI_BNX2.IsEmpty.ISCSI is not set
+# CONFIG_SCSI_CHELSIO_FCOE is not set
+# CONFIG_SCSI_CXGB3.IsEmpty.ISCSI is not set
+# CONFIG_SCSI_CXGB4.IsEmpty.ISCSI is not set
+# CONFIG_SCSI_DC395x is not set
+# CONFIG_SCSI_DMX3191D is not set
+# CONFIG_SCSI_DPT.IsEmpty.I2O is not set
+# CONFIG_SCSI_ESAS2R is not set
+# CONFIG_SCSI_FUTURE_DOMAIN is not set
+# CONFIG_SCSI_HPSA is not set
+# CONFIG_SCSI_HPTIOP is not set
+# CONFIG_SCSI_INIA100 is not set
+# CONFIG_SCSI_INITIO is not set
+# CONFIG_SCSI_IPS is not set
+# CONFIG_SCSI_LPFC is not set
+CONFIG_SCSI_MQ_DEFAULT=y
+# CONFIG_SCSI_MVSAS is not set
+# CONFIG_SCSI_MVUMI is not set
+# CONFIG_SCSI_PM8001 is not set
+CONFIG_SCSI_PMCRAID is not set
+# CONFIG_SCSI_QLASHARED.FC is not set
+CONFIG_SCSI_QLASHARED.ISCSI is not set
+# CONFIG_SCSI_QLOGIC.IsEmpty.ISCSI is not set
+# CONFIG_SCSI_QLOGIC.IsEmpty.QLOGIC is not set
+# CONFIG_SCSI_SNIC is not set
+CONFIG_SCSI_SRP_ATTRS=m
+# CONFIG_SCSI_STEX is not set
+# CONFIG_SCSI_SYM53C8XX_2 is not set
+# CONFIG_SCSI_UFSHCD is not set
+# CONFIG_SCSI_WD719X is not set
+# CONFIG_SECURITY_SELINUX_BOOTPARAM is not set
+# CONFIG_SERIAL_8250 is not set
+# CONFIG_SERIAL_ALTERA_JTAGUART is not set
+# CONFIG_SERIAL_ALTERA_UART is not set
+# CONFIG_SERIAL_ARC is not set
+CONFIG_SERIAL_CORE=m
+# CONFIG_SERIAL_FSL_LPUART is not set
+# CONFIG_SERIAL_ISM is not set
+# CONFIG_SERIAL_NONSTANDARD is not set
+# CONFIG_SERIAL_RP2 is not set
+# CONFIG_SERIAL_SCCNXP is not set
+# CONFIG_SERIAL_SLIP is not set
+# CONFIG_SFC is not set
+# CONFIG_SFC_FALCON is not set
+# CONFIG_SGI_IOC4 is not set
+# CONFIG_SGL_PARTITION is not set
+# CONFIG_SGL_ALLOC is not set
+# CONFIG_SH_TIMER_CMT is not set
+# CONFIG_SH_TIMER_MTU2 is not set
+# CONFIG_SH_TIMER_TMU is not set
+# CONFIG_SLIP is not set
+# CONFIG_SOC_TI is not set
+# CONFIG_SOLARIS_X86_PARTITION is not set
+# CONFIG_SOUND is not set
+# CONFIG_SPI is not set
+# CONFIG_SPMI is not set
+# CONFIG_SRAM is not set
+# CONFIG_SSB is not set
+# CONFIG_STAGING is not set
+CONFIG_STANDALONE=y
+# CONFIG_SUNXI_SRAM is not set
+# CONFIG_SUN_PARTITION is not set
+# CONFIG_SYSV68_PARTITION is not set
+# CONFIG_SYSV_FS is not set
+CONFIG_SYS_HYPERVERVISOR=y
+# CONFIG_THERMAL is not set
+# CONFIG_TIFM_CORE is not set
+# CONFIG_TRACE_SINK is not set
+# CONFIG_TRANSPARENT_HUGEPAGE_ALWAYS is not set
+CONFIG_TRANSPARENT_HUGEPAGE_MADVISE=y
+# CONFIG_TTY_PRINTK is not set
+# CONFIG_UFS_FS is not set
+# CONFIG_UIO_AEC is not set
+# CONFIG_UIO_CIF is not set
+# CONFIG_UIO_DMEM_GENIRQ is not set
+# CONFIG_UIO_MF624 is not set
+# CONFIG_UIO_NETX is not set
+# CONFIG_UIO_PCI_GENERIC is not set
+# CONFIG_UIO_PDRV_GENIRQ is not set
+# CONFIG_UIO_PRUSS is not set
+# CONFIG_UIO_SERCOS3 is not set
+# CONFIG_ULTRIX_PARTITION is not set
+# CONFIG_UNIXWARE_DISKLABEL is not set
+# CONFIG_USB_SUPPORT is not set
+# CONFIG_UWB is not set
+CONFIG_VFIO=m
+CONFIG_VFIO_IOMMU_TYPE1=m
+CONFIG_VFIO_PCI=m
+CONFIG_VFIO_VIRQFD=m
+# CONFIG_VGASTATE is not set
+# CONFIG_VIRTIO_MMIO is not set
+CONFIG_VIRT_CPU_ACCOUNTING_NATIVE=y
+# CONFIG_VME_BUS is not set
+# CONFIG_VMXNET3 is not set
+# CONFIG_VXFS_FS is not set
+# CONFIG_W1 is not set
+# CONFIG_WAN is not set
+# CONFIG_WDTPCI is not set
+# CONFIG_WIMAX is not set
+# CONFIG_X25 is not set
+# CONFIG_XILINX_WATCHDOG is not set
+# CONFIG_XILLYBUS is not set
+# CONFIG_XZ_DEC_ARM is not set
+# CONFIG_XZ_DEC_ARMTHUMB is not set
+# CONFIG_XZ_DEC_BCI is not set
+# CONFIG_XZ_DEC_IA64 is not set
+# CONFIG_XZ_DEC_POWERPC is not set
+# CONFIG_XZ_DEC_SPARC is not set
+# CONFIG_XZ_DEC_TEST is not set
+# CONFIG_XZ_DEC_X86 is not set
+CONFIG_ZLIB_DEFLATE=m
--- linux-4.15.0.orig/debian.master/config/s390x/config.flavour.generic
+++ linux-4.15.0/debian.master/config/s390x/config.flavour.generic
@@ -0,0 +1,3 @@
# Config options for config.flavour.generic automatically generated by splitconfig.pl
++
"
# nothing here yet

+CONFIG_USB_DWC2_DUAL_ROLE=y
+CONFIG_USB_DWC2_PCI=m
+CONFIG_USB_DWC3_PCI=m
+CONFIG_USB_ETH_EEM=y
+CONFIG_NOP_USB_XCEIV=m
+CONFIG_USB_AMD5536UDC=m
+CONFIG_USB_AUDIO=m
+CONFIG_USB_BDC_UDC=m
+CONFIG_USB_C67X00_HCD=m
+CONFIG_USB_CDC_COMPOSITE=m
+CONFIG_USB_CHIPIDEA=m
+CONFIG_USB_CONFIGFS=m
+CONFIG_USB_DWC2=m
+CONFIG_USB_DWC3=m
+CONFIG_USB_EHCI_HCD_PLATFORM=m
+CONFIG_USB_ETH=m
+CONFIG_USB_FOTG210_HCD=m
+CONFIG_USB_FOTG210_UDC=m
+CONFIG_USB_FUNCTIONFS=m
+CONFIG_USB_GADGETFS=m
+CONFIG_USB_GADGET_TARGET=m
+CONFIG_USB_GADGET_XILINX=m
+CONFIG_USB_GOKU=m
+CONFIG_USB_GPIO_VBUS=m
+CONFIG_USB_GR_UDC=m
+CONFIG_USB_G_ACM_MS=m
+CONFIG_USB_G_DBGP=m
+CONFIG_USB_G_HID=m
+CONFIG_USB_G_MULTI=m
+CONFIG_USB_G_NCM=m
+CONFIG_USB_G_NOKIA=m
+CONFIG_USB_G_PRINTER=m
+CONFIG_USB_G_SERIAL=m
+CONFIG_USB_G_WEBCAM=m
+CONFIG_USB_HCD_BCMA=m
+CONFIG_USB_HCD_SSB=m
+CONFIG_USB_HSIC_USB3503=m
+CONFIG_USB_ISP116X_HCD=m
+CONFIG_USB_ISP1301=m
+CONFIG_USB_ISP1362_HCD=m
+CONFIG_USB_ISP1760=m
+CONFIG_USB_LINK_LAYER_TEST=m
+CONFIG_USB_M66592=m
+CONFIG_USB_MASS_STORAGE=m
+CONFIG_USB_MAX3421_HCD=m
+CONFIG_USB_MIDI_GADGET=m
+CONFIG_USB_MUSB_HDRC=m
+CONFIG_USB_MV_U3D=m
+CONFIG_USB_MV_UDC=m
+CONFIG_USB_NET2272=m
+CONFIG_USB_OHCI_HCD_PLATFORM=m
+CONFIG_USB_OXU210HP_HCD=m
+CONFIG_USB_PXA27X=m
+CONFIG_USB_R8A66597=m
+CONFIG_USB_R8A66597_HCD=m
+CONFIG_USB_SERIAL_KEYSPAN_MPR=y
+CONFIG_USB_SERIAL_KEYSPAN_USA18X=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19QI=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19QW=y
+CONFIG_USB_SERIAL_KEYSPAN_USA19W=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28X=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28XA=y
+CONFIG_USB_SERIAL_KEYSPAN_USA28XB=y
+CONFIG_USB_SERIAL_KEYSPAN_USA49W=y
+CONFIG_USB_SERIAL_KEYSPAN_USA49WLC=y
+CONFIG_USB_SERIAL_SAFE_PADDED=y
+CONFIG_USB_SL811_HCD_ISO=y
+CONFIG_USB_ULPI_BUS=m
+CONFIG_USB_XHCI_PLATFORM=m
+CONFIG_USB_G_MULTI_CDC=y
+CONFIG_USB_G_MULTI_RNDIS=y
--- linux-4.15.0.orig/debian.master/config/x32/config.flavour.generic
+++ linux-4.15.0/debian.master/config/x32/config.flavour.generic
@@ -0,0 +1,74 @@
+nothing here yet
+CONFIG_USB_DWC2_DUAL_ROLE=y
+CONFIG_USB_DWC2_PCI=m
+CONFIG_USB_DWC3_PCI=m
+CONFIG_USB_ETH_EEM=y
+CONFIG_NOP_USB_XCEIV=m
+CONFIG_USB_AMD5536UDC=m
+CONFIG_USB_AUDIO=m
+CONFIG_USB_BDC_UDC=m
+CONFIG_USB_C67X00_HCD=m
+CONFIG_USB_CDC_COMPOSITE=m
+CONFIG_USB_CHIPIDEA=m
+CONFIG_USB_CONFIGFS=m
+CONFIG_USB_DWC2=m
+CONFIG_USB_DWC3=m
+CONFIG_USB_EHCI_HCD_PLATFORM=m
+CONFIG_USB_ETH=m
+CONFIG_USB_FOTG210_HCD=m
+CONFIG_USB_SERIAL_KEYSPAN_USA49W=y
+CONFIG_USB_SERIAL_KEYSPAN_USA49WLC=y
+CONFIG_USB_SERIAL_SAFE_PADDeda=y
+CONFIG_USB_SL811_HCD_ISO=y
+CONFIG_USB_ULPI_BUS=m
+CONFIG_USB_XHCI_PLATFORM=m
+CONFIG_USB_G_MULTI_CDC=y
+CONFIG_USB_G_MULTI_RNDIS=y
--- linux-4.15.0.orig/debian.master/control.d/flavour-control.stub
+++ linux-4.15.0/debian.master/control.d/flavour-control.stub
@@ -0,0 +1,151 @@
+# Items that get replaced:
+# FLAVOUR
+# DESC
+# ARCH
+# SUPPORTED
+# TARGET
+# BOOTLOADER
+# =PROVIDES=
+#
+# Items marked with =FOO= are optional
+#
+# This file describes the template for packages that are created for each flavour
+# in debian/control.d/vars.*
+#
+# This file gets edited in a couple of places. See the debian/control.stub rule in
+# debian/rules. PGGVER, ABINUM, and SRCPKGNAME are all converted in the
+# process of creating debian/control.
+#
+# The flavour specific strings (ARCH, DESC, etc) are converted using values from the various
+# flavour files in debian/control.d/vars.*
+#
+# XXX: Leave the blank line before the first package!!
+
+Package: linux-image=SIGN-ME-PKG=-PKGVER-ABINUM-FLAVOUR
+Build-Profiles: <!stage1>
+Architecture: ARCH
+Section: kernel
+Priority: optional
+Provides: linux-image, fuse-module, aufs-dkms, =PROVIDES=${linux:rprovides}
+Depends: ${misc:Depends}, ${shlibs:Depends}, kmod, linux-base (>= 4.5ubuntu1~16.04.1), linux-modules-
+PKGVER-ABINUM-FLAVOUR
+Recommends: BOOTLOADER, initramfs-tools | linux-initramfs-tool
+Breaks: flash-kernel (<< 3.90ubuntu2) [arm64 armhf], s390-tools (<< 2.3.0-0ubuntu3) [s390x]
+Conflicts: linux-image=SIGN-PEER-PKG=-PKGVER-ABINUM-FLAVOUR
+Suggests: fdutils, SRCPKGNAME-doc-PKGVER | SRCPKGNAME-source-PKGVER, SRCPKGNAME-tools,
+linux-headers-PKGVER-ABINUM-FLAVOUR
+Description: Linux kernel image for version PKGVER on DESC
This package contains the Linux kernel image for version PKGVER on DESC.
+ Supports SUPPORTED processors.
+ TARGET
+ You likely do not want to install this package directly. Instead, install
+ the linux-FLAVOUR meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
+ Package: linux-modules-PKGVER-ABINUM-FLAVOUR
+Build-Profiles: <!stage1>
+Architecture: ARCH
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}
+Description: Linux kernel extra modules for version PKGVER on DESC
+ Contains the corresponding System.map file, the modules built by the
+ packager, and scripts that try to ensure that the system is not left in an
+ unbootable state after an update.
+ Supports SUPPORTED processors.
+ TARGET
+ You likely do not want to install this package directly. Instead, install
+ the linux-FLAVOUR meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
+ Package: linux-modules-extra-PKGVER-ABINUM-FLAVOUR
+Build-Profiles: <!stage1>
+Architecture: ARCH
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}, linux-image-PKGVER-ABINUM-FLAVOUR | linux-image-
+unsigned-PKGVER-ABINUM-FLAVOUR, crda | wireless-crda
+Description: Linux kernel extra modules for version PKGVER on DESC
+ This package contains the Linux kernel extra modules for version PKGVER on
+ DESC.
+ Also includes the corresponding System.map file, the modules built by the
+ packager, and scripts that try to ensure that the system is not left in an
+ unbootable state after an update.
+ Supports SUPPORTED processors.
+ TARGET
+ You likely do not want to install this package directly. Instead, install
+ the linux-FLAVOUR meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
+
+ Package: linux-headers-PKGVER-ABINUM-FLAVOUR
+ Build-Profiles: <!stage1>
+ Architecture: ARCH
+ Section: devel
+ Priority: optional
+ Depends: ${misc:Depends}, SRCPKNAME-headers-PKGVER-ABINUM, ${shlibs:Depends}
+ Provides: linux-headers, linux-headers-3.0
+ Description: Linux kernel headers for version PKGVER on DESC
+ This package provides kernel header files for version PKGVER on
+ DESC.
+ This is for sites that want the latest kernel headers. Please read
+ /usr/share/doc/linux-headers-PKGVER-ABINUM/debian.README.gz for details.
+
+ Package: linux-image=SIGN-ME-PKG=-PKGVER-ABINUM-FLAVOUR-dbgsym
+ Build-Profiles: <!stage1>
+ Architecture: ARCH
+ Section: devel
+ Priority: optional
+ Depends: ${misc:Depends}
+ Provides: linux-debug
+ Description: Linux kernel debug image for version PKGVER on DESC
+ This package provides the=SIGN-ME-TXT= kernel debug image for version PKGVER on
+ DESC.
+ This is for sites that wish to debug the kernel.
+ The kernel image contained in this package is NOT meant to boot from. It
+ is uncompressed, and unstripped. This package also includes the
+ unstripped modules.
+
+ Package: linux-tools-PKGVER-ABINUM-FLAVOUR
+ Build-Profiles: <!stage1>
+ Architecture: ARCH
+ Section: devel
+ Priority: optional
+ Depends: ${misc:Depends}, SRCPKNAME-tools-PKGVER-ABINUM
+ Description: Linux kernel version specific tools for version PKGVER-ABINUM
+ This package provides the architecture dependant parts for kernel
+ version locked tools (such as perf and x86_energy_perf_policy) for
+ version PKGVER-ABINUM on
+ =HUMAN=.
+Package: linux-cloud-tools-PKGVER-ABINUM-FLAVOUR
+Build-Profiles: <!stage1>
+Architecture: ARCH
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, SRCPKGNAME-cloud-tools-PKGVER-ABINUM
+Description: Linux kernel version specific cloud tools for version PKGVER-ABINUM
+ This package provides the architecture dependant parts for kernel
+ version locked tools for cloud for version PKGVER-ABINUM on
+ =HUMAN=.

+Package: linux-udebs-FLAVOUR
+Build-Profiles: <!stage1>
+XC-Package-Type: udeb
+Section: debian-installer
+Architecture: ARCH
+Depends: ${udeb:Depends}
+Description: Metapackage depending on kernel udebs
+ This package depends on the all udebs that the kernel build generated,
+ for easier version and migration tracking.
+ 
--- linux-4.15.0.orig/debian.master/control.d/generic.inclusion-list
+++ linux-4.15.0/debian.master/control.d/generic.inclusion-list
@@ -0,0 +1,254 @@
+arch/*/{crypto,kernel,oprofile}
+arch/*/kvm/kvm.ko
+arch/powerpc/kvm/kvm-hv.ko
+arch/powerpc/kvm/kvm-pr.ko
+arch/powerpc/kvm/vfio.ko
+arch/powerpc/platforms/powernv/opal-prd.ko
+arch/s390/*
+arch/x86/kvm/kvm-amd.ko
+arch/x86/kvm/kvm-intel.ko
+crypto/*
+drivers/acpi/*
+drivers/ata/acard-ahci.ko
+drivers/ata/ahci.ko
+drivers/ata/ahci_platform.ko
+drivers/ata/ata_generic.ko
+drivers/ata/libahci.ko
+drivers/ata/libahci_platform.ko
+drivers/block/brd.ko
+drivers/block/cryptoloop.ko
+drivers/block/floppy.ko
+drivers/block/loop.ko
+drivers/block/nbd.ko
+drivers/block/rbd.ko
+drivers/block/virtio_blk.ko
+drivers/block/xen-blkfront.ko
+drivers/char/hangcheck-timer.ko
+drivers/char/hw_random/powernv-rng.ko
+drivers/char/hw_random/virtio-rng.ko
+drivers/char/ipmi/*
+drivers/char/ipmi/ipmi_msghandler.ko
+drivers/char/lp.ko
+drivers/char/nvram.ko
+drivers/char/ppdev.ko
+drivers/char/raw.ko
+drivers/char/virtio_console.ko
+drivers/crypto/nx/*
+drivers/crypto/vmx/vmx-crypto.ko
+drivers/firmware/efi/*
+drivers/firmware/iscsi_ibft.ko
+drivers/gpu/drm/ast/ast.ko
+drivers/gpu/drm/drm_kms_helper.ko
+drivers/gpu/drm/drm.ko
+drivers/gpu/drm/tdm/tdm.ko
+drivers/hid/hid-generic.ko
+drivers/hid/hid-hyperv.ko
+drivers/hid/hid.ko
+drivers/hid/usbhid/usbhid.ko
+drivers/hw/*
+drivers/hwmon/ibmpowernv.ko
+drivers/infiniband/core/ib_addr.ko
+drivers/infiniband/core/ib_cm.ko
+drivers/infiniband/core/ib_core.ko
+drivers/infiniband/core/ib_mad.ko
+drivers/infiniband/core/ib_sa.ko
+drivers/infiniband/core/ibw_cm.ko
+drivers/infiniband/core/rdma_cm.ko
+drivers/infiniband/ulp/isr/ib_isr.ko
+drivers/infiniband/ulp/isr/ib_isr.ko
+drivers/input/evbug.ko
+drivers/input/gameport/gameport.ko
+drivers/input/input-leds.ko
+drivers/input/joystick.ko
+drivers/input/misc/xen-kbdfront.ko
+drivers/input/mouse/psmouse.ko
+drivers/input/serio/hyperv-keyboard.ko
+drivers/input/serio/serio_raw.ko
+drivers/input/serio/serport.ko
+drivers/input/touchscreen/usbtouchscreen.ko
+drivers/leds/leds-powernv.ko
+drivers/md/*
+drivers/message/fusion*
+drivers/misc/exi/*
+net/bridge/*
+net/can/*
+net/ceph/libceph.ko
+net/core/*
+net/dccp/*
+net/deernet/*
+net/ieee802154/*
+net/ipv4/*
+net/ipv6/*
+net/ir/l/*
+net/key/*
+net/lapb/*
+net/l2tp/*
+net/llc/*
+net/netfilter/*
+net/netlink/netlink_diag.ko
+net/netrom/*
+net/openswitch/*
+net/packet/af_packet_diag.ko
+net/phonet/*
+net/rose/*
+net/rxrpc/*
+net/sched/*
+net/scp/*
+net/sunrpc/auth_gss/auth_rpcgss.ko
+net/sunrpc/auth_gss/rpcsec_gss_krb5.ko
+net/sunrpc/sunrpc.ko
+net/tipc/*
+net/unix/unix_diag.ko
+net/vmw_vsock/*
+net/x25/*
+net/xfr/*
+sound/drivers/pcsp/snd-pcm.ko
+sound/pci/snd-ens1370.ko
+sound/soundcore.ko
+ubuntu/vbox/vboxguest/vboxguest.ko
+ubuntu/vbox/vboxsf/vboxsf.ko
+zfs/*
--- linux-4.15.0.orig/debian.master/control.d/vars.general
+++ linux-4.15.0/debian.master/control.d/vars.generic
@@ -0,0 +1,6 @@
+arch="i386 amd64 armhf arm64 ppc64el s390x"
+supported="Generic"
+target="Geared toward desktop and server systems."
+desc="=HUMAN= SMP"
+bootloader="grub-pc [i386 amd64 x32] | grub-efi-amd64 [amd64 x32] | grub-efi-ia32 [i386 amd64 x32] | grub [i386 amd64 x32] | lilo [i386 amd64 x32] | flash-kernel [armhf arm64] | grub-ieee1275 [ppc64el]"
+provides="kvm-api-4, redhat-cluster-modules, ivtv-modules, virtualbox-guest-modules [i386 amd64 x32]"
--- linux-4.15.0.orig/debian.master/control.d/vars.generic-lpae
+++ linux-4.15.0/debian.master/control.d/vars.generic-lpae
@@ -0,0 +1,6 @@
+arch="armhf"
+supported="Generic LPAE"
+target="Geared toward desktop and server systems."
+desc="=HUMAN= SMP"
+bootloader="flash-kernel [armhf]"
+provides="kvm-api-4, redhat-cluster-modules, ivtv-modules"
--- linux-4.15.0.orig/debian.master/control.d/vars.lowlatency
+++ linux-4.15.0/debian.master/control.d/vars.lowlatency
@@ -0,0 +1,6 @@
+arch="i386 amd64"
+supported="Lowlatency"
+target="Geared toward desktop and server systems."
+desc="=HUMAN= SMP"
+bootloader="grub-pc [i386 amd64 x32] | grub-efi-amd64 [amd64 x32] | grub-efi-ia32 [i386 amd64 x32] | grub [i386 amd64 x32] | lilo [i386 amd64 x32] | flash-kernel [armhf arm64]"
+provides="kvm-api-4, redhat-cluster-modules, ivtv-modules, virtualbox-guest-modules [i386 amd64 x32]"
--- linux-4.15.0.orig/debian.master/control.stub.in
+++ linux-4.15.0/debian.master/control.stub.in
@@ -0,0 +1,174 @@
+Source: SRCPKGNAME
+Section: devel
+Priority: optional
+Maintainer: Ubuntu Kernel Team <kernel-team@lists.ubuntu.com>
+Standards-Version: 3.9.4.0
+Build-Depends:
+  dh-systemd,
+kernel-wedge,
+kmod <!stage1>,
makedumpfile [amd64 i386] <!stage1>,
+libelf-dev <!stage1>,
+libnewt-dev <!stage1>,
+libiberty-dev <!stage1>,
default-jdk-headless <!stage1>,
+java-common <!stage1>,
+rsync <!stage1>,
+libdw-dev <!stage1>,
+libpci-dev <!stage1>,
+pkg-config <!stage1>,
+flex <!stage1>,
bison <!stage1>,
+libunwind8-dev [amd64 arm64 armhf i386 ppc64el] <!stage1>,
+liblzma-dev <!stage1>,
+openssl <!stage1>,
+ libssl-dev <!stage1>,
+ libaudit-dev <!stage1>,
+ bc <!stage1>,
+ python-dev <!stage1>,
+ gawk <!stage1>,
+ libudev-dev <!stage1>,
+ autoconf <!stage1>,
+ automake <!stage1>,
+ libtool <!stage1>,
+ uuid-dev <!stage1>,
+ libnuma-dev [amd64 arm64 i386 ppc64el s390x] <!stage1>,
+ dkms <!stage1>,
+ curl <!stage1>,
+Build-Depends-Indep:
  + xmlto <!stage1>,
  + docbook-utils <!stage1>,
  + ghostscript <!stage1>,
  + fig2dev <!stage1>,
  + bzip2 <!stage1>,
  + sharutils <!stage1>,
  + asciidoc <!stage1>,
  + python-sphinx <!stage1>,
  + python-sphinx-rtd-theme <!stage1>,
  + python3-docutils <!stage1>,
+Vcs-Git: git://git.launchpad.net/~ubuntu-kernel/ubuntu/+source/linux/+git/bionic
+XS-Testsuite: autopkgtest
+#XS-Testsuite-Depends: gcc-4.7 binutils
+
+Package: linux-source-PKGVER
+Build-Profiles: <!stage1>
+Architecture: all
+Section: devel
+Priority: optional
+Provides: linux-source, linux-source-3
+Depends: ${misc:Depends}, binutils, bzip2, coreutils
+Recommends: libc-dev, gcc, make
+Suggests: libncurses-dev | ncurses-dev, kernel-package, libqt3-dev
+Description: Linux kernel source for version PKGVER with Ubuntu patches
  + This package provides the source code for the Linux kernel version
  + PKGVER.
  +
  + This package is mainly meant for other packages to use, in order to build
    + custom flavours.
  +
  + If you wish to use this package to create a custom Linux kernel, then it
    + is suggested that you investigate the package kernel-package, which has
    + been designed to ease the task of creating kernel image packages.
  +
+ If you are simply trying to build third-party modules for your kernel, + you do not want this package. Install the appropriate linux-headers + package instead.

+ Package: SRCPKGNAME-doc
+ Build-Profiles: <stage1>
+ Architecture: all
+ Section: doc
+ Priority: optional
+ Depends: ${misc:Depends}
+ Description: Linux kernel specific documentation for version PKGVER
+ This package provides the various documents in the PKGVER kernel
+ Documentation/ subdirectory. These document kernel subsystems, APIs, device + drivers, and so on. See + /usr/share/doc/SRCPKGNAME-doc/00-INDEX for a list of what is + contained in each file.

+ Package: SRCPKGNAME-headers-PKGVER-ABINUM
+ Build-Profiles: <stage1>
+ Architecture: all
+ Multi-Arch: foreign
+ Section: devel
+ Priority: optional
+ Depends: ${misc:Depends}, coreutils
+ Description: Header files related to Linux kernel version PKGVER
+ This package provides kernel header files for version PKGVER, for sites + that want the latest kernel headers. Please read + /usr/share/doc/SRCPKGNAME-headers-PKGVER-ABINUM/debian.README.gz for details

+ Package: SRCPKGNAME-libc-dev
+ Architecture: i386 amd64 armhf arm64 x32 ppc64le s390x
+ Depends: ${misc:Depends}
+ Conflicts: SRCPKGNAME-kernel-headers
+ Replaces: SRCPKGNAME-kernel-headers
+ Provides: SRCPKGNAME-kernel-headers, aufs-dev
+ Multi-Arch: same
+ Description: Linux Kernel Headers for development
+ This package provides headers from the Linux kernel. These headers + are used by the installed headers for GNU glibc and other system + libraries. They are NOT meant to be used to build third-party modules for + your kernel. Use SRCPKGNAME-headers-* packages for that.

+ Package: SRCPKGNAME-tools-common
+ Build-Profiles: <stage1>
+ Architecture: all
+ Multi-Arch: foreign
+ Section: kernel
+ Priority: optional
+Depends: ${misc:Depends}, lsb-release
+Description: Linux kernel version specific tools for version PKGVER
+ This package provides the architecture independent parts for kernel
+ version locked tools (such as perf and x86_energy_perf_policy) for
+ version PKGVER.
+
+Package: SRCPKGNAME-tools-PKGVER-ABINUM
+Build-Profiles: <!stage1>
+Architecture: i386 amd64 armhf arm64 ppc64el s390x
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}, linux-tools-common
+Description: Linux kernel version specific tools for version PKGVER-ABINUM
+ This package provides the architecture dependant parts for kernel
+ version locked tools (such as perf and x86_energy_perf_policy) for
+ version PKGVER-ABINUM on
+ =HUMAN=.
+ You probably want to install linux-tools-PKGVER-ABINUM-<flavour>.
+
+Package: SRCPKGNAME-cloud-tools-common
+Build-Profiles: <!stage1>
+Architecture: all
+Multi-Arch: foreign
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}
+Description: Linux kernel version specific cloud tools for version PKGVER
+ This package provides the architecture independent parts for kernel
+ version locked tools for cloud tools for version PKGVER.
+
+Package: SRCPKGNAME-cloud-tools-PKGVER-ABINUM
+Build-Profiles: <!stage1>
+Architecture: i386 amd64 armhf
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}, linux-cloud-tools-common
+Description: Linux kernel version specific cloud tools for version PKGVER-ABINUM
+ This package provides the architecture dependant parts for kernel
+ version locked tools for cloud tools for version PKGVER-ABINUM on
+ =HUMAN=.
+ You probably want to install linux-cloud-tools-PKGVER-ABINUM-<flavour>.
+
+Package: SRCPKGNAME-tools-host
+Build-Profiles: <!stage1>
+Architecture: all
+Multi-Arch: foreign
+Section: kernel
+Priority: optional
+Depends: %{misc:Depends}, python3
+Description: Linux kernel VM host tools
+ This package provides kernel tools useful for VM hosts.
+
--- linux-4.15.0.orig/debian.master/copyright
+++ linux-4.15.0/debian.master/copyright
@@ -0,0 +1,29 @@
+This is the Ubuntu prepackaged version of the Linux kernel.
+Linux was written by Linus Torvalds <Linus.Torvalds@cs.Helsinki.FI>
+and others.
+
+This package was put together by the Ubuntu Kernel Team, from
+sources retrieved from upstream linux git.
+The sources may be found at most Linux ftp sites, including
+
+This package is currently maintained by the
+Ubuntu Kernel Team <ubuntu-kernel@lists.ubuntu.com>
+
+Linux is copyrighted by Linus Torvalds and others.
+
+This program is free software; you can redistribute it and/or modify
+it under the terms of the GNU General Public License as published by
+the Free Software Foundation; version 2 dated June, 1991.
+
+This program is distributed in the hope that it will be useful,
+but WITHOUT ANY WARRANTY; without even the implied warranty of
+MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+GNU General Public License for more details.
+
+You should have received a copy of the GNU General Public License
+along with this program; if not, write to the Free Software
+Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA
+
+On Ubuntu Linux systems, the complete text of the GNU General
+Public License v2 can be found in `/usr/share/common-licenses/GPL-2`.
--- linux-4.15.0.orig/debian.master/d-i/firmware/README.txt
+++ linux-4.15.0/debian.master/d-i/firmware/README.txt
@@ -0,0 +1,4 @@
#
# Place the names of udeb modules into this directory that require
# runtime firmware.
#
--- linux-4.15.0.orig/debian.master/d-i/firmware/amd64/README.txt
+++ linux-4.15.0/debian.master/d-i/firmware/amd64/README.txt
@@ -0,0 +1,4 @@
#
# Place the names of udeb modules into this directory that require
+# runtime firmware.

--- linux-4.15.0.orig/debian.master/d-i/firmware/amd64/nic-modules
+++ linux-4.15.0/debian.master/d-i/firmware/amd64/nic-modules
@@ -0,0 +1 @@
+#include <nic-modules>

--- linux-4.15.0.orig/debian.master/d-i/firmware/amd64/scsi-modules
+++ linux-4.15.0/debian.master/d-i/firmware/amd64/scsi-modules
@@ -0,0 +1 @@
+#include <scsi-modules>

--- linux-4.15.0.orig/debian.master/d-i/firmware/arm64/README.txt
+++ linux-4.15.0/debian.master/d-i/firmware/arm64/README.txt
@@ -0,0 +1,4 @@
+#
#: Place the names of udeb modules into this directory that require
#: runtime firmware.

--- linux-4.15.0.orig/debian.master/d-i/firmware/arm64/nic-modules
+++ linux-4.15.0/debian.master/d-i/firmware/arm64/nic-modules
@@ -0,0 +1 @@
+#include <nic-modules>

--- linux-4.15.0.orig/debian.master/d-i/firmware/arm64/scsi-modules
+++ linux-4.15.0/debian.master/d-i/firmware/arm64/scsi-modules
@@ -0,0 +1 @@
+#include <scsi-modules>

--- linux-4.15.0.orig/debian.master/d-i/firmware/armhf/README.txt
+++ linux-4.15.0/debian.master/d-i/firmware/armhf/README.txt
@@ -0,0 +1,4 @@
+#
#: Place the names of udeb modules into this directory that require
#: runtime firmware.

--- linux-4.15.0.orig/debian.master/d-i/firmware/i386/nic-modules
+++ linux-4.15.0/debian.master/d-i/firmware/i386/nic-modules
@@ -0,0 +1 @@
+#include <nic-modules>

--- linux-4.15.0.orig/debian.master/d-i/firmware/i386/scsi-modules
+++ linux-4.15.0/debian.master/d-i/firmware/i386/scsi-modules
@@ -0,0 +1 @@
+#include <scsi-modules>

--- linux-4.15.0.orig/debian.master/d-i/firmware/nic-modules
+++ linux-4.15.0/debian.master/d-i/firmware/nic-modules
+++ linux-4.15.0/debian.master/d-i/firmware/nic-modules
@@ -0,0 +1,14 @@
e100/d101m_ucode.bin ?
e100/d101s_ucode.bin ?
e100/d102e_ucode.bin ?
bnx2/bnx2-mips-09-6.2.1b.fw ?
bnx2/bnx2-rv2p-06-6.0.15.fw ?
bnx2/bnx2-mips-06-6.2.3.fw ?
bnx2/bnx2-rv2p-09-6.0.17.fw ?
bnx2/bnx2-rv2p-09ax-6.0.17.fw ?
bnx2x/bnx2x-e1h-7.12.30.0.fw ?
bnx2x/bnx2x-e1-7.12.30.0.fw ?
bnx2x/bnx2x-e2-7.12.30.0.fw ?
tigon/tg3_tso5.bin ?
tigon/tg3_tso.bin ?
tigon/tg3.bin ?
--- linux-4.15.0.orig/debian.master/d-i/firmware/powerpc/README.txt
+++ linux-4.15.0/debian.master/d-i/firmware/powerpc/README.txt
@@ -0,0 +1,4 @@
#
# Place the names of udeb modules into this directory that require
# runtime firmware.
#
--- linux-4.15.0.orig/debian.master/d-i/firmware/ppc64el/README.txt
+++ linux-4.15.0/debian.master/d-i/firmware/ppc64el/README.txt
@@ -0,0 +1,4 @@
#
# Place the names of udeb modules into this directory that require
# runtime firmware.
#
--- linux-4.15.0.orig/debian.master/d-i/firmware/s390x/README.txt
+++ linux-4.15.0/debian.master/d-i/firmware/s390x/README.txt
@@ -0,0 +1,4 @@

+# Place the names of udeb modules into this directory that require
+# runtime firmware.
+
--- linux-4.15.0.orig/debian.master/d-i/firmware/s390x/nic-modules
+++ linux-4.15.0/debian.master/d-i/firmware/s390x/nic-modules
@ @ -0,0 +1 @ @
+#include <nic-modules>
--- linux-4.15.0.orig/debian.master/d-i/firmware/s390x/scsi-modules
+++ linux-4.15.0/debian.master/d-i/firmware/s390x/scsi-modules
@ @ -0,0 +1 @ @
+#include <scsi-modules>
--- linux-4.15.0.orig/debian.master/d-i/kernel-versions
+++ linux-4.15.0/debian.master/d-i/kernel-versions
@ @ -0,0 +1,16 @ @
+# archversionflavourinstallednamesuffixxbdep
+amd64-generic---
+
+i386-generic---
+
+armhf-generic---
+armhf-generic-lpae---
+
+arm64-generic---
+
+ppc64el-generic---
+
+s390x-generic---
+
+# Ports

+# archversionflavourinstallednamesuffixxbdep
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/block-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/block-modules
@ @ -0,0 +1 @ @
+#include <block-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/crypto-modules
@ @ -0,0 +1 @ @
+#include <crypto-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/fat-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/fat-modules

---
@@ -0,0 +1 @@
+`#include <fat-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/fb-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/fb-modules`
@@ -0,0 +1 @@
+`#include <fb-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/floppy-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/floppy-modules`
@@ -0,0 +1 @@
+`#include <floppy-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/fs-core-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/fs-core-modules`
@@ -0,0 +1 @@
+`#include <fs-core-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/fs-secondary-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/fs-secondary-modules`
@@ -0,0 +1 @@
+`#include <fs-secondary-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/irda-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/irda-modules`
@@ -0,0 +1 @@
+`#include <irda-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/kernel-image`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/kernel-image`
@@ -0,0 +1 @@
+`#include <kernel-image>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/md-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/md-modules`
@@ -0,0 +1 @@
+`#include <md-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/message-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/message-modules`
@@ -0,0 +1 @@
+`#include <message-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/mouse-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/mouse-modules`
@@ -0,0 +1 @@
+`#include <mouse-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/multipath-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/multipath-modules`
@@ -0,0 +1 @@
+`#include <multipath-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/nic-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/nic-modules`
@@ -0,0 +1 @@
+`#include <nic-modules>`
--- `linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/nic-shared-modules`
+++ `linux-4.15.0/debian.master/d-i/modules/amd64-virtual/nic-shared-modules`
#include <nic-shared-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/parport-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/parport-modules
@@ -0,0 +1 @@
+i
+#include <parport-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/scsi-modules
@@ -0,0 +1,2 @@
ipr ?
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/serial-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/serial-modules
@@ -0,0 +1 @@
+i
+#include <serial-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/storage-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/storage-core-modules
@@ -0,0 +1 @@
+i
+#include <storage-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/virtio-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/virtio-modules
@@ -0,0 +1 @@
+i
+#include <virtio-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64-virtual/vlan-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64-virtual/vlan-modules
@@ -0,0 +1 @@
+i
+#include <vlan-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/block-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/block-modules
@@ -0,0 +1 @@
+i
+#include <block-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/crypto-modules
@@ -0,0 +1 @@
+i
+#include <crypto-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/fat-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/fat-modules
@@ -0,0 +1 @@
+i
+#include <fat-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/fb-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/fb-modules
@@ -0,0 +1 @@
+i
+#include <fb-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/firewire-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/firewire-core-modules
@@ -0,0 +1 @@
+i
+#include <firewire-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/floppy-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/floppy-modules
@@ -0,0 +1 @@
+##include <floppy-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/fs-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/fs-core-modules
@@ -0,0 +1 @@
+##include <fs-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/fs-secondary-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/fs-secondary-modules
@@ -0,0 +1 @@
+##include <fs-secondary-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/input-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/input-modules
@@ -0,0 +1 @@
+##include <input-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/ipmi-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/ipmi-modules
@@ -0,0 +1 @@
+##include <ipmi-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/irda-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/irda-modules
@@ -0,0 +1 @@
+##include <irda-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/kernel-image
+++ linux-4.15.0/debian.master/d-i/modules/amd64/kernel-image
@@ -0,0 +1 @@
+##include <kernel-image>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/md-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/md-modules
@@ -0,0 +1 @@
+##include <md-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/message-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/message-modules
@@ -0,0 +1 @@
+##include <message-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/mouse-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/mouse-modules
@@ -0,0 +1 @@
+##include <mouse-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/multipath-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/multipath-modules
@@ -0,0 +1 @@
+##include <multipath-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/nfs-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/nfs-modules
@@ -0,0 +1 @@
+##include <nfs-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/nic-modules
+++ linux-4.15.0/debian/master/d-i/modules/amd64/nic-modules
@ @ -0,0 +1 @ @
+#include <nic-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/nic-pcmcia-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/nic-pcmcia-modules
@ @ -0,0 +1 @ @
+#include <nic-pcmcia-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/nic-shared-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/nic-shared-modules
@ @ -0,0 +1 @ @
+#include <nic-shared-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/nic-usb-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/nic-usb-modules
@ @ -0,0 +1 @ @
+#include <nic-usb-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/parport-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/parport-modules
@ @ -0,0 +1 @ @
+#include <parport-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/pata-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/pata-modules
@ @ -0,0 +1 @ @
+#include <pata-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/pcmcia-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/pcmcia-modules
@ @ -0,0 +1 @ @
+#include <pcmcia-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/pcmcia-storage-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/pcmcia-storage-modules
@ @ -0,0 +1 @ @
+#include <pcmcia-storage-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/plip-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/plip-modules
@ @ -0,0 +1 @ @
+#include <plip-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/ppp-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/ppp-modules
@ @ -0,0 +1 @ @
+#include <ppp-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/sata-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/sata-modules
@ @ -0,0 +1 @ @
+#include <sata-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/amd64/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/amd64/scsi-modules
@ @ -0,0 +1,2 @ @
+#include <scsi-modules>
ipr ?
--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/plip-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/plip-modules
@@ -0,0 +1 @@
+#include <plip-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/ppp-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/ppp-modules
@@ -0,0 +1 @@
+include <ppp-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/sata-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/sata-modules
@@ -0,0 +1 @@
+include <sata-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/scsi-modules
@@ -0,0 +1,2 @@
+include <scsi-modules>
+ipr ?

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/speakup-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/speakup-modules
@@ -0,0 +1 @@
+include <speakup-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/storage-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/storage-core-modules
@@ -0,0 +1 @@
+include <storage-core-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/usb-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/usb-modules
@@ -0,0 +1 @@
+include <usb-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/virtio-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/virtio-modules
@@ -0,0 +1 @@
+include <virtio-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/arm64/vlan-modules
+++ linux-4.15.0/debian.master/d-i/modules/arm64/vlan-modules
@@ -0,0 +1 @@
+include <vlan-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/block-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/block-modules
@@ -0,0 +1 @@
+include <block-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/crypto-modules
@@ -0,0 +1 @@
+include <crypto-modules>

--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/fat-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/fat-modules
@@ -0,0 +1 @@
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/fs-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/fs-core-modules
@@ -0,0 +1 @@
+#include <fs-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/fs-secondary-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/fs-secondary-modules
@@ -0,0 +1 @@
+#include <fs-secondary-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/input-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/input-modules
@@ -0,0 +1 @@
+#include <input-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/ipmi-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/ipmi-modules
@@ -0,0 +1 @@
+#include <ipmi-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/irda-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/irda-modules
@@ -0,0 +1 @@
+#include <irda-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/kernel-image
+++ linux-4.15.0/debian.master/d-i/modules/armhf/kernel-image
@@ -0,0 +1 @@
+#include <kernel-image>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/md-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/md-modules
@@ -0,0 +1 @@
+#include <md-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/mouse-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/mouse-modules
@@ -0,0 +1 @@
+#include <mouse-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/multipath-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/multipath-modules
@@ -0,0 +1 @@
+#include <multipath-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/nfs-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/nfs-modules
@@ -0,0 +1 @@
+#include <nfs-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/nic-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/nic-modules
@@ -0,0 +1 @@
+#include <nic-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/armhf/nic-shared-modules
+++ linux-4.15.0/debian.master/d-i/modules/armhf/nic-shared-modules
@@ -0,0 +1 @@
+\#include <nic-shared-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/nic-usb-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/nic-usb-modules
@@ -0,0 +1 @@
+\#include <nic-usb-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/parport-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/parport-modules
@@ -0,0 +1 @@
+\#include <parport-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/plip-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/plip-modules
@@ -0,0 +1 @@
+\#include <plip-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/ppp-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/ppp-modules
@@ -0,0 +1 @@
+\#include <ppp-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/sata-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/sata-modules
@@ -0,0 +1 @@
+\#include <sata-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/scsi-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/scsi-modules
@@ -0,0 +1,2 @@
+\#include <scsi-modules>
+i+
++
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/speakup-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/speakup-modules
@@ -0,0 +1 @@
+\#include <speakup-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/storage-core-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/storage-core-modules
@@ -0,0 +1 @@
+\#include <storage-core-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/usb-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/usb-modules
@@ -0,0 +1 @@
+\#include <usb-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/armhf/vlan-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/armhf/vlan-modules
@@ -0,0 +1 @@
+\#include <vlan-modules>
--- linux-4.15.0.org/debian.master/d-i/modules/block-modules
+++ linux-4.15.0.org/debian.master/d-i/modules/block-modules
@@ -0,0 +1.43 @@
+aoe ?
+aten ?
+bcm2835 ?
+comm ?
+cpqarray ?
+DAC960 ?
+dstr ?
+epat ?
+epia ?
+fit2 ?
+fit3 ?
+friq ?
+frpw ?
+kbic ?
+ktti ?
+nbd ?
+on20 ?
+on26 ?
+paride ?
+pcd ?
+pd ?
+pf ?
+pg ?
+ps3disk ?
+ps3vram ?
+pt ?
+sx8 ?
+umem ?
+virtio_blk ?
--- linux-4.15.0.orig/debian.master/d-i/modules/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/crypto-modules
@@ -0,0 +1,73 @@
+aesni-intel ?
+aes-x86_64 ?
+af_alg ?
+algif_hash ?
+algif_skcipher ?
+ansi_cprng ?
+anubis ?
+arc4 ?
+async_memcpy ?
+async_pq ?
+async_raid6_recov ?
+async_tx ?
+async_xor ?
+authenc ?
+authencesn ?
+blowfish_common ?
+blowfish_generic ?
+blowfish-x86_64 ?
camellia ?
+jfs
+reiserfs
+xfs
+zfs
--- linux-4.15.0.orig/debian.master/d-i/modules/fs-secondary-modules
+++ linux-4.15.0/debian.master/d-i/modules/fs-secondary-modules
@@ -0,0 +1,5 @@
btrfs
+fuse
+ntfs
+hfs
+hfsplus
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/block-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/block-modules
@@ -0,0 +1 @@
+#include <block-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/crypto-modules
@@ -0,0 +1 @@
+#include <crypto-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/fat-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/fat-modules
@@ -0,0 +1 @@
+#include <fat-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/fb-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/fb-modules
@@ -0,0 +1 @@
+#include <fb-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/floppy-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/floppy-modules
@@ -0,0 +1 @@
+#include <floppy-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/fs-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/fs-core-modules
@@ -0,0 +1 @@
+#include <fs-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/fs-secondary-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/fs-secondary-modules
@@ -0,0 +1 @@
+#include <fs-secondary-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/irda-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/irda-modules
@@ -0,0 +1 @@
+#include <irda-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/kernel-image
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/kernel-image
@@ -0,0 +1 @@
+#include <kernel-image>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/md-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/md-modules
@@ -0,0 +1 @@
+#include <md-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/message-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/message-modules
@@ -0,0 +1 @@
+#include <message-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/mouse-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/mouse-modules
@@ -0,0 +1 @@
+#include <mouse-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/multipath-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/multipath-modules
@@ -0,0 +1 @@
+#include <multipath-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/nic-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/nic-modules
@@ -0,0 +1 @@
+#include <nic-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/nic-shared-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/nic-shared-modules
@@ -0,0 +1 @@
+#include <nic-shared-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/parport-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/parport-modules
@@ -0,0 +1 @@
+#include <parport-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/scsi-modules
@@ -0,0 +1,2 @@
+#include <scsi-modules>
+iipr ?
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/serial-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/serial-modules
@@ -0,0 +1 @@
+#include <serial-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/storage-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/storage-core-modules
@@ -0,0 +1 @@
+#include <storage-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/virtio-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/virtio-modules
@@ -0,0 +1 @@
+#include <virtio-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386-virtual/vlan-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386-virtual/vlan-modules
@@ -0,0 +1 @@
+#include <vlan-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/block-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/block-modules
@@ -0,0 +1 @@
+include <block-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/crypto-modules
@@ -0,0 +1 @@
+include <crypto-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/fat-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/fat-modules
@@ -0,0 +1 @@
+include <fat-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/fb-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/fb-modules
@@ -0,0 +1 @@
+include <fb-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/firewire-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/firewire-core-modules
@@ -0,0 +1 @@
+include <firewire-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/floppy-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/floppy-modules
@@ -0,0 +1 @@
+include <floppy-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/fs-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/fs-core-modules
@@ -0,0 +1 @@
+include <fs-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/fs-secondary-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/fs-secondary-modules
@@ -0,0 +1 @@
+include <fs-secondary-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/input-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/input-modules
@@ -0,0 +1 @@
+include <input-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/ipmi-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/ipmi-modules
@@ -0,0 +1 @@
+include <ipmi-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/irda-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/irda-modules
@@ -0,0 +1 @@
```c
#include <kernel-image>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/md-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/md-modules
@@ -0,0 +1 @@
#include <md-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/message-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/message-modules
@@ -0,0 +1 @@
#include <message-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/mouse-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/mouse-modules
@@ -0,0 +1 @@
#include <mouse-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/multipath-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/multipath-modules
@@ -0,0 +1 @@
#include <multipath-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/nfs-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/nfs-modules
@@ -0,0 +1 @@
#include <nfs-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/nic-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/nic-modules
@@ -0,0 +1 @@
#include <nic-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/nic-pcmcia-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/nic-pcmcia-modules
@@ -0,0 +1 @@
#include <nic-pcmcia-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/nic-shared-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/nic-shared-modules
@@ -0,0 +1 @@
#include <nic-shared-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/nic-usb-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/nic-usb-modules
@@ -0,0 +1 @@
#include <nic-usb-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/parport-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/parport-modules
@@ -0,0 +1 @@
#include <parport-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/pata-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/pata-modules
@@ -0,0 +1 @@
#include <pata-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/pcmcia-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/pcmcia-modules
@@ -0,0 +1 @@
```
+#include <pcmcia-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/pcmcia-storage-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/pcmcia-storage-modules
@@ -0,0 +1 @@
+#include <pcmcia-storage-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/plip-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/plip-modules
@@ -0,0 +1 @@
+#include <plip-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/ppp-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/ppp-modules
@@ -0,0 +1 @@
+#include <ppp-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/sata-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/sata-modules
@@ -0,0 +1 @@
+#include <sata-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/scsi-modules
@@ -0,0 +1,2 @@
+include <scsi-modules>
+i pr ?
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/serial-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/serial-modules
@@ -0,0 +1 @@
+#include <serial-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/speakup-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/speakup-modules
@@ -0,0 +1 @@
+#include <speakup-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/storage-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/storage-core-modules
@@ -0,0 +1 @@
+#include <storage-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/usb-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/usb-modules
@@ -0,0 +1 @@
+#include <usb-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/virtio-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/virtio-modules
@@ -0,0 +1 @@
+#include <virtio-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/i386/vlan-modules
+++ linux-4.15.0/debian.master/d-i/modules/i386/vlan-modules
@@ -0,0 +1 @@
+#include <vlan-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/input-modules
+++ linux-4.15.0/debian.master/d-i/modules/input-modules

hid ?
hid-a4tech ?
hid-apple ?
hid-appleir ?
hid-aureal ?
hid-belkin ?
hid-bright ?
hid-cherry ?
hid-chicony ?
hid-corsair ?
hid-cp2112 ?
hid-cypress ?
hid-dell ?
hid-elecom ?
hid-elo ?
hid-ezkey ?
hid-generic ?
hid-gfrrm ?
hid-gt683r ?
hid-gyration ?
hid-holtek-kbd ?
hid-holtek-mouse ?
hid-hyperv ?
hid-kensington ?
hid-keytouc? ?
hid-kye ?
hid-lcpower ?
hid-lenovo ?
hid-logitech ?
hid-logitech-dj ?
hid-logitech-hidpp ?
hid-magicmouse ?
hid-microsoft ?
hid-monterey ?
hid-multitouch ?
hid-ntrig ?
hid-ortek ?
hid-penmount ?
hid-petalyx ?
hid-picolcd ?
hid-pl ?
hid-plantronics ?
hid-primax ?
hid-rmi ?
hid-roccat ?
hid-roccat-arvo ?
hid-roccat-common ?
+irtty-sir ?
+kingsun-sir ?
+ks959-sir ?
+ksdazzle-sir ?
+litelink-sir ?
+ma600-sir ?
+mcp2120-sir ?
+mcs7780 ?
+nsc-ircc ?
+old_belkin-sir ?
+sir-dev ?
+smsc-ircc2 ?
+stir4200 ?
+tekram-sir ?
+via-ircc ?
+vlsi_ir ?
+w83977af Ir ?

--- linux-4.15.0.orig/debian.master/d-i/modules/kernel-image
+++ linux-4.15.0/debian.master/d-i/modules/kernel-image
@@ -0,0 +1,31 @@
+ast ?
+gpio-pca953x ?
+gpio-regulator ?
+hibmc-drm ?
+i2c-mux ?
+i2c-mux-pinctrl ?
+i2c-tegra ?
+max8907 ?
+max8907-regulator ?
+nvec ?
+nvec_kbd ?
+nvec_paz00 ?
+nvec_power ?
+nvec_ps2 ?
+palmas-regulator ?
+rtc-em3027 ?
+rtc-max8907 ?
+rtc-palmas ?
+rtc-tps6586x ?
+rtc-tps65910 ?
+tps51632-regulator ?
+tps62360-regulator ?
+tps65090-charger ?
+tps65090-regulator ?
+tps6586x-regulator ?
+tps65910-regulator ?
+host1x ?
+tegra-drm ?
+pwm_bl
+pwm-tegra
+panel-simple
--- linux-4.15.0.orig/debian.master/d-i/modules/md-modules
+++ linux-4.15.0/debian.master/d-i/modules/md-modules
@@ -0,0 +1,16 @@
+dm-crypt
+dm-mirror
+dm-raid
+dm-snapshot
+dm-zero
+faulty
+linear
+multipath
+raid0
+raid1
+raid10
+raid456
+
+# Extras
+dm-raid45
+dm-loop
--- linux-4.15.0.orig/debian.master/d-i/modules/message-modules
+++ linux-4.15.0/debian.master/d-i/modules/message-modules
@@ -0,0 +1,9 @@
+mptbase
+mptctl
+mptfc
+mptlan
+mptscsih
+mptspi

--- linux-4.15.0.orig/debian.master/d-i/modules/message-modules.powerpc
+++ linux-4.15.0/debian.master/d-i/modules/message-modules.powerpc
@@ @ -0,0 +1,7 @@
+mptbase
+mptctl
+mptfc
+mptlan
+mptscsih
+mptspi

--- linux-4.15.0.orig/debian.master/d-i/modules/mouse-modules
+++ linux-4.15.0/debian.master/d-i/modules/mouse-modules
@@ @ -0,0 +1,2 @@
+psmouse
+usbmouse ?
--- linux-4.15.0.orig/debian.master/d-i/modules/multipath-modules
+++ linux-4.15.0/debian.master/d-i/modules/multipath-modules
 @@ -0,0 +1,4 @@
+dm-multipath ?
+dm-round-robin ?
+dm-service-time ?
+dm-queue-length ?
--- linux-4.15.0.orig/debian.master/d-i/modules/nfs-modules
+++ linux-4.15.0/debian.master/d-i/modules/nfs-modules
 @@ -0,0 +1,6 @@
+nfs ?
+nfs_acl ?
+nfsv3 ?
+lockd ?
+sunrpc ?
+cifs ?
--- linux-4.15.0.orig/debian.master/d-i/modules/nic-modules
+++ linux-4.15.0/debian.master/d-i/modules/nic-modules
 @@ -0,0 +1,209 @@
+3c359 ?
+3c501 ?
+3c503 ?
+3c505 ?
+3c507 ?
+3c509 ?
+3c515 ?
+3c523 ?
+3c527 ?
+3c59x ?
+8139cp ?
+8139too ?
+82596 ?
+abyss ?
+ac3200 ?
+adm8211 ?
+aibo ?
+airport ?
+alx ?
+amd8111e ?
+amd-xgbe ?
+aquantia ?
+arcnet ?
+arc-rawmode ?
+arc-remi ?
+arlan ?
+at1700 ?
+ath5k ?
Open Source Used In 5GaaS Edge AC-4 18849

+ath9k
+ath9k_htc
+at11
+at11c
+at11e
+at12
+atmel
+atmel_pci
+b44
+bcm87xx
+be2net
+bmac
+bnx2
+bnx2x
+bnxt_en
+bonding
+brcmfmac
+brcmsmac
+broadcom
+xgmac
+cassini
+ccwgroup
+com20020
+com20020-pci
+com90io
+com90xx
+cs89x0
+ctcm
+cxgb4
+de2104x
+de4x5
+de600
+de620
+defxx
+depca
+dl2k
+dmfe
+dummy
+e100
+e1000
+e1000e
+e2100
+eeapro
+eeapro100
+eeexpress
+enic
+epic100
+eql
+es3210?
+eth16i?
+ewrk3?
+fealnx?
+forcedeth?
+fsm?
+ibmveth?
+ibmvnic?
+igb?
+ps3_gelic?
+hamachi?
+hclge?
+hermes?
+hfi1?
+hinic?
+hns_dsaf?
+hns_enet_drv?
+hns_mdio?
+hns3?
+hp?
+hp100?
+hp-plus?
+i40e?
+i40evf?
+ibmtr?
+ipddp?
+ipw2100?
+ipw2200?
+iwl3945?
+iwl4965?
+iwl-legacy?
+iwlvdvm?
+iwlvm?
+iwlwifi?
+ixgb?
+ixgbe?
+lance?
+lanstreamer?
+lcs?
+lasi_82596?
+lnc390?
+lp486e?
+mace?
+marvell?
+mdio-thunder?
+mlx4_core?
+mlx4_en?
+mlx5_core?
+mv643xx_eth ?
+myri_sbus ?
+natsemi ?
+ne ?
+ne2 ?
+ne2k-pci ?
+ne3210 ?
+netconsole ?
+netiucv ?
+netsec ?
+netxen_nic ?
+ni5010 ?
+ni52 ?
+ni65 ?
+nicpf ?
+nicvf ?
+niu ?
+ns83820 ?
+olympic ?
+orinoco ?
+orinoco_pci ?
+orinoco_plx ?
+orinoco_tmd ?
+pcnet32 ?
+qcom-emac ?
+qede ?
+qeth ?
+qeth_l2 ?
+qeth_l3 ?
+qlcnic ?
+r815x ?
+r8169 ?
+rate_control ?
+realtek ?
+rfc1051 ?
+rfc1201 ?
+rrunner ?
+rt2400 ?
+rt2400pci ?
+rt2500 ?
+rt2500pci ?
+rt2800pci ?
+rt61pci ?
+s2io ?
+sfc ?
+shaper ?
+sis190 ?
+sis900 ?
+pcnet32
+ps3_gelic
+r8169
+rate_control
+rfc1051
+rfc1201
+rrunner
+rt2400
+rt2500
+rt61pci
+s2io
+shaper
+sis190
+sis900
+spidernet
+skfp
+skge
+sk98lin
+sky2
+smc9194
+smc-ultra
+smc-ultra32
+starfire
+strip
+sunbmac
+sundance
+sungem
+sungem_phy
+sunhme
+sunlance
+sunqe
+sunvnet
+tg3
+tlan
+tms380tr
+tmspci
+tulip
+tun
+typhoon
+uli526x
+via-rhine
+via-velocity
+virtio_net
+wavelan
+wd
+winbond-840
+yellowfin
+znet
--- linux-4.15.0.orig/debian.master/d-i/modules/nic-pcmcia-modules
+++ linux-4.15.0/debian.master/d-i/modules/nic-pcmcia-modules
@@ -0,0 +1,19 @@
+3c574_cs ?
+3c589_cs ?
+airo_cs ?
+atmel_cs ?
+axnet_cs ?
+com20020_cs ?
+fmvj18x_cs ?
+ibmtr_cs ?
+netwave_cs ?
+nmclan_cs ?
+orinoco_cs ?
+pcnet_cs ?
+ray_cs ?
+smc91c92_cs ?
+wavelan_cs ?
+wl3501_cs ?
+xirc2ps_cs ?
+xircom_cb ?
+xircom_tulip_cb ?
--- linux-4.15.0.orig/debian.master/d-i/modules/nic-shared-modules
+++ linux-4.15.0/debian.master/d-i/modules/nic-shared-modules
@@ -0,0 +1,26 @@
+# PHY
+8390 ?
+mii ?
+
+# CRC modules
+crc-ccitt ?
+crc-itu-t ?
+libcrc32c ?
+
+# mac80211 stuff
+mac80211 ?
+cfg80211 ?
+
+# rt2x00 lib (since rt2x00 is split across usb/pci/cb
+rt2x00lib ?
+rt2800lib ?
+
+# Atheros library (since drivers are split across nic-modules/nic-usb-modules)
+ath ?
+
+# Wireless 802.11 modules
+lib80211 ?
+cfg80211 ?

---
-lib80211_crypt_ccmp
+lib80211_crypt_tkip
+lib80211_crypt_wep

--- linux-4.15.0.orig/debian-master/d-i/modules/nic-usb-modules
+++ linux-4.15.0/debian.master/d-i/modules/nic-usb-modules
@@ -0,0 +1,34 @@
+ax88179_178a
+cattc
+kaweth
+pegasus
+prism2_usb
+rtl8150
+usbnet
+zid1211rw
+zid1201
+rt2500usb
+rt73usb
+rt2570
+rt2800usb
+rt2x00usb
+cdc_ether
+asix
+cdc_eem
+cdc_ether
+cdc-phonet
+cdc_subset
+dm9601
+gl620a
+hso
+int51x1
+mcs7830
+net1080
+plusb
+rndis_host
+r8152
+smsc95xx
+zaurus
+carl9170
+smsc75xx
+smsc95xx

--- linux-4.15.0.orig/debian-master/d-i/modules/parport-modules
+++ linux-4.15.0/debian.master/d-i/modules/parport-modules
@@ -0,0 +1,2 @@
+parport
+parport_pc

--- linux-4.15.0.orig/debian-master/d-i/modules/pata-modules
+++ linux-4.15.0/debian.master/d-i/modules/pata-modules
@@ -0,0 +1,47 @@
+parport
+parport_pc

Open Source Used In 5GaaS Edge AC-4 18857
+pata_ali.ko?
+pata_amd.ko?
+pata_artop.ko?
+pata_atiixp.ko?
+pata_atp867x.ko?
+pata_cmd640.ko?
+pata_cmd64x.ko?
+pata_cs5520.ko?
+pata_cs5530.ko?
+pata_cs5535.ko?
+pata_cs5536.ko?
+pata_cypress.ko?
+pata_efar.ko?
+pata_hpt366.ko?
+pata_hpt37x.ko?
+pata_hpt3x2n.ko?
+pata_hpt3x3.ko?
+pata_isapnp.ko?
+pata_it8213.ko?
+pata_it821x.ko?
+pata_imicron.ko?
+pata_legacy.ko?
+pata_macio.ko?
+pata_marvell.ko?
+pata_mpiix.ko?
+pata_netcell.ko?
+pata_ninja32.ko?
+pata_ns87410.ko?
+pata_ns87415.ko?
+pata_oldpiix.ko?
+pata_optidma.ko?
+pata_opti.ko?
+pata_pcmcia.ko?
+pata_pdc2027x.ko?
+pata_pdc202xx_old.ko?
+pata_qdi.ko?
+pata_radisys.ko?
+pata_rdc.ko?
+pata_rz1000.ko?
+pata_sc1200.ko?
+pata_sch.ko?
+pata_serverworks.ko?
+pata_sil680.ko?
+pata_sl82c105.ko?
+pata_triflex.ko?
+pata_via.ko?
+pata_winbond.ko?
--- linux-4.15.0.orig/debian.master/d-i/modules/pcmcia-modules
+++ linux-4.15.0/debian.master/d-i/modules/pcmcia-modules
@@ -0,0 +1,8 @@
i82092 ?
i82365 ?
+pcmcia ?
+pcmcia_core ?
+pd6729 ?
rsrc_nonstatic ?
tcic ?
yenta_socket ?
--- linux-4.15.0.orig/debian.master/d-i/modules/pcmcia-storage-modules
+++ linux-4.15.0/debian.master/d-i/modules/pcmcia-storage-modules
@@ -0,0 +1,6 @@
pata_pcmcia ?
+qlogic_cs ?
fdomain_cs ?
+aha152x_cs ?
nsp_cs ?
sym53c500_cs ?
--- linux-4.15.0.orig/debian.master/d-i/modules/plip-modules
+++ linux-4.15.0/debian.master/d-i/modules/plip-modules
@@ -0,0 +1 @@
+plip ?
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/block-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/block-modules
@@ -0,0 +1 @@
+#include <block-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/crypto-modules
@@ -0,0 +1 @@
+#include <crypto-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/floppy-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/floppy-modules
@@ -0,0 +1 @@
+#include <floppy-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/fs-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/fs-core-modules
@@ -0,0 +1 @@
+#include <fs-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/fs-secondary-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/fs-secondary-modules
@@ -0,0 +1 @@
+#include <fs-secondary-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/input-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/input-modules
@@ -0,0 +1 @@
+#include <input-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/ipmi-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/ipmi-modules
@@ -0,0 +1 @@
+include <ipmi-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/kernel-image
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/kernel-image
@@ -0,0 +1 @@
+include <kernel-image>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/md-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/md-modules
@@ -0,0 +1 @@
+include <md-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/message-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/message-modules
@@ -0,0 +1 @@
+include <message-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/multipath-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/multipath-modules
@@ -0,0 +1 @@
+include <multipath-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/nfs-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/nfs-modules
@@ -0,0 +1 @@
+include <nfs-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/nic-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/nic-modules
@@ -0,0 +1 @@
+include <nic-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/nic-shared-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/nic-shared-modules
@@ -0,0 +1 @@
+include <nic-shared-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/nic-usb-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/nic-usb-modules
@@ -0,0 +1 @@
+include <nic-usb-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/parport-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/parport-modules
@@ -0,0 +1 @@
+include <parport-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/plip-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/plip-modules
@@ -0,0 +1 @@
+include <plip-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/ppp-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/ppp-modules
@@ -0,0 +1 @@
+include <ppp-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/sata-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/sata-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/sata-modules
@@ -0,0 +1 @@
+###include <sata-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/scsi-modules
@@ -0,0 +1 @@
+###include <scsi-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/storage-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/storage-core-modules
@@ -0,0 +1,2 @@
+###include <storage-core-modules>
+i pr ?
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/virtio-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/virtio-modules
@@ @ -0,0 +1 @@
+###include <virtio-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppc64el/vlan-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppc64el/vlan-modules
@@ @ -0,0 +1 @@
+###include <vlan-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/ppp-modules
+++ linux-4.15.0/debian.master/d-i/modules/ppp-modules
@@ @ -0,0 +1,6 @@
+ppp_async ?
+ppp_deflate ?
+ppp_mppe ?
+pppoe ?
+pppox ?
+ppp_synctty ?
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/block-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/block-modules
@@ @ -0,0 +1 @@
+###include <block-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/crypto-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/crypto-modules
@@ @ -0,0 +1 @@
+###include <crypto-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/dasd-extra-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/dasd-extra-modules
@@ @ -0,0 +1 @@
+###include <dasd-extra-modules.s390x>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/dasd-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/dasd-modules
@@ @ -0,0 +1 @@
+###include <dasd-modules.s390x>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/fat-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/fat-modules
@@ @ -0,0 +1 @@
+include <fs-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/fs-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/fs-core-modules
@@ -0,0 +1 @@
+include <fs-secondary-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/fs-secondary-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/fs-secondary-modules
@@ -0,0 +1 @@
+include <kernel-image>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/kernel-image
+++ linux-4.15.0/debian.master/d-i/modules/s390x/kernel-image
@@ -0,0 +1 @@
+include <md-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/multipath-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/multipath-modules
@@ -0,0 +1 @@
+include <nfs-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/nic-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/nic-modules
@@ -0,0 +1 @@
+include <nic-shared-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/scsi-modules
@@ -0,0 +1,2 @@
+include <scsi-modules>
+ipr ?
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/storage-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/storage-core-modules
@@ -0,0 +1 @@
+include <storage-core-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/virtio-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/virtio-modules
@@ -0,0 +1 @@
+include <virtio-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/s390x/vlan-modules
+++ linux-4.15.0/debian.master/d-i/modules/s390x/vlan-modules
@@ -0,0 +1 @@
+#include <vlan-modules>
--- linux-4.15.0.orig/debian.master/d-i/modules/sata-modules
+++ linux-4.15.0/debian.master/d-i/modules/sata-modules
@@ -0,0 +1,18 @@
+sata_inic162x.ko ?
+sata_nv.ko ?
+sata_promise.ko ?
+sata_qstor.ko ?
+sata_sil24.ko ?
+sata_sil.ko ?
+sata_sis.ko ?
+sata_svw.ko ?
+sata_sx4.ko ?
+sata_uli.ko ?
+sata_via.ko ?
+sata_vsc.ko ?
+ahci_platform ?
+ahci ?
+acard-ahci ?
+libahci ?
+ahci_xgene ?
--- linux-4.15.0.orig/debian.master/d-i/modules/scsi-modules
+++ linux-4.15.0/debian.master/d-i/modules/scsi-modules
@@ -0,0 +1,137 @@
+# SCSI
+raid_class ?
+scsi_transport_spi ?
+scsi_transport_fc ?
+scsi_transport_iscsi ?
+scsi_transport_sas ?
+sr_mod ?
+iscsi_tcp ?
+libiscsi ?
+amiga7xx ?
+a3000 ?
+a2091 ?
+gvp11 ?
+mvme147 ?
+sgiwd93 ?
+cyberstorm ?
+cyberstormII ?
+blz2060 ?
+blz1230 ?
+fastlane ?
+oktagon_esp_mod ?
atari_scsi ?
+mac_scsi?
+mac_esp?
+sun3_scsi?
+mvme16x?
+bvme6000?
+sim710?
+advansys?
+pm80xx?
+psi240i?
+BusLogic?
+dpt_i2o?
+u14-34f?
+ultrastor?
+aha152x?
+aha1542?
+aha1740?
+aic7xxx_old?
+ips?
+fd_mcs?
+fdomain?
+fnic?
+in2000?
+g_NCR5380?
+g_NCR5380_mmio?
+NCR53c406a?
+NCR_D700?
+NCR_Q720_mod?
+sym53c416?
+qllogicfas408?
+qla1280?
+pas16?
+seagate?
+seagate?
+t128?
+dmx3191d?
+dtc?
+zalon7xx?
+eata_pio?
+wd7000?
+mca_53c9x?
+ibmmca?
+eata?
+dc395x?
+tmscsim?
+megaraid?
+atp870u?
+esp?
+gdth?
+ums-cypress ?
+be2iscsi ?
+3w-sas ?
+isci ?
+mlx4_ib ?
+mlx5_ib ?
+zfcp ?
+sd_mod ?
+hisi_sas_v2_hw ?
+hisi_sas_v3_hw ?
+iscsi_ibft ?
+
+# device handlers
+scsi_dh_alua ?
+scsi_dh_emc ?
+scsi_dh_rdac ?
+scsi_dh_hp_sw ?
+
+smartpq ?
--- linux-4.15.0.orig/debian.master/d-i/modules/scsi-modules.powerpc
+++ linux-4.15.0/debian.master/d-i/modules/scsi-modules.powerpc
@@ -0,0 +1,118 @@
+# SCSI
+raid_class ?
+scsi_transport_spi ?
+scsi_transport_fc ?
+scsi_transport_iscsi ?
+scsi_transport_sas ?
+iscsi_tcp ?
+libiscsi ?
+amiga7xx ?
+a3000 ?
+a2091 ?
+gvp11 ?
+mvme147 ?
+sgiwd93 ?
+cyberstorm ?
+cyberstormII ?
+blz2060 ?
+blz1230 ?
+fastlane ?
+oktagon_esp_mod ?
+atari_scsi ?
+mac_scsi ?
+mac_esp ?
+sun3_scsi ?
+mvme16x ?
+bvme6000 ?
+sim710
+advansys
+psi240i
+BusLogic
+dpt_i2o
+u14-34f
+ultrastor
+aha152x
+aha1542
+aha1740
+aic7xxx_old
+ips
+fd_mcs
+fdomain
+in2000
+g_NCR5380
+g_NCR5380_mmio
+NCR53c406a
+NCR_D700
+NCR_Q720_mod
+sym53c416
+qlogicfas408
+qla1280
+pas16
+seagate
+seagate
+t128
+dmx3191d
+dtc
+zalon7xx
+eata_pio
+wd7000
+mca_53c9x
+ibmmca
+ibmvfc
+ibmvscsi
+eata
+dc395x
+tmcsim
+megaraid
+atp870u
+esp
+gdth
+initio
+a100u2w
+qlogicpti
+ide-scsi
+mesh
--- linux-4.15.0.orig/debian.master/d-i/modules/serial-modules
+++ linux-4.15.0/debian.master/d-i/modules/serial-modules
@@ -0,0 +1,4 @@
+generic_serial ?
+mac53c94 ?
+pluto ?
+dec.esp ?
+3w-xxxx ?
+3w-9xxx ?
+ppa ?
+imm ?
+jazz.esp ?
+sun3x.esp ?
+fcal ?
+lasi700 ?
+ns32 ?
+iap ?
+hptiop ?
+stex ?
+osst ?
+sg ?
+ch ?
+scsi.debug ?
+aacraid ?
+aic7xxx ?
+aic79xx ?
+aic94xx ?
+arcmsr ?
+acornsccsi_mod ?
+arxescsi ?
+cumana_1 ?
+cumana_2 ?
+ecoscsi ?
+oak ?
+powertec ?
+eesox ?
+ibmvscsic ?
+libsas ?
+lpfc ?
+megaraid_mm ?
+megaraid_mbox ?
+megaraid_sas ?
+qla2xxx ?
+sym53c8xx ?
+qla4xxx ?
+mvsas ?
+sr_mod ?
+sd_mod ?
+serial_cs ?
+synclink_cs ?
+hyperv-keyboard ?
--- linux-4.15.0.orig/debian.master/d-i/modules/speakup-modules
+++ linux-4.15.0/debian.master/d-i/modules/speakup-modules
@@ -0,0 +1,16 @@
+speakup ?
+speakup_acntpc ?
+speakup_acntsa ?
+speakup_apollo ?
+speakup_audptr ?
+speakup_bns ?
+speakup_deext ?
+speakup_dectlk ?
+speakup_dtlk ?
+speakup_dummy ?
+speakup_keypc ?
+speakup_ltlk ?
+speakup_soft ?
+speakup_spkout ?
+speakup_spkout ?
+speakup_deccpc ?
--- linux-4.15.0.orig/debian.master/d-i/modules/storage-core-modules
+++ linux-4.15.0/debian.master/d-i/modules/storage-core-modules
@@ -0,0 +1,15 @@
+# Core stacks
+usb-storage ?
+
+# Block level
+ata_piix ?
+ata_generic ?
+
+# Loop modules
+cryptoloop ?
+
+# Needs to be here for better cdrom initrd layout
+isofs ?
+
+# Needed for NVMe disks under VMD PCIe domains
+vmd ?
--- linux-4.15.0.orig/debian.master/d-i/modules/storage-core-modules.powerpc
+++ linux-4.15.0/debian.master/d-i/modules/storage-core-modules.powerpc
@@ -0,0 +1,13 @@
+# Core stacks
+usb-storage ?
+
+# Block level
+
+# Loop modules
cryptoloop
+
+# Needs to be here for better cdrom initrd layout
+isofs
+
+ps3stor_lib ?
+ps3rom ?
--- linux-4.15.0.orig/debian.master/d-i/modules/usb-modules
+++ linux-4.15.0/debian.master/d-i/modules/usb-modules
@@ -0,0 +1,15 @@
ehci-hcd ?
+isp116x-hcd ?
+isp1760 ?
+ohci-hcd ?
+r8a66597-hcd ?
+sl811_cs ?
+sl811-hcd ?
+ul32-hcd ?
+uhci-hcd ?
+uxhci-hcd ?
+xhci-plat-hcd ?
+ehci-tegra ?
+ehci-msm ?
+ehci-platform ?
+uas ?
--- linux-4.15.0.orig/debian.master/d-i/modules/virtio-modules
+++ linux-4.15.0/debian.master/d-i/modules/virtio-modules
@@ -0,0 +1,11 @@
+virtio_balloon ?
+virtio_pci ?
+virtio_ring ?
+virtio-rg ?
+virtio_scsi ?
+hv_vmbus ?
+hv_utils ?
+hv_netvsc ?
+hv_mouse ?
+hv_storvsc ?
+hv_balloon ?
--- linux-4.15.0.orig/debian.master/d-i/modules/vlan-modules
+++ linux-4.15.0/debian.master/d-i/modules/vlan-modules
@@ -0,0 +1,3 @@
+slp ?
+garp ?
+8021q ?
--- linux-4.15.0.orig/debian.master/d-i/package-list
+++ linux-4.15.0/debian.master/d-i/package-list
Package: kernel-image
+Provides: ext3-modules, ext4-modules, squashfs-modules
+Provides_amd64: efi-modules, ext3-modules, ext4-modules, squashfs-modules
+Provides_i386: efi-modules, ext3-modules, ext4-modules, squashfs-modules
+Provides_ppc64le: ext3-modules, ext4-modules, fat-modules, squashfs-modules
+Provides_s390x: ext3-modules, ext4-modules, ppp-modules, squashfs-modules
+Description: kernel image and system map

Package: dasd-modules
+Depends: kernel-image, storage-core-modules
+Priority: standard
+Description: DASD storage support

Package: dasd-extra-modules
+Depends: dasd-modules
+Priority: extra
+Description: DASD storage support -- extras

Package: fat-modules
+Depends: kernel-image
+Priority: standard
+Description: FAT filesystem support
+ This includes Windows FAT and VFAT support.

Package: fb-modules
+Depends: kernel-image
+Priority: standard
+Description: Framebuffer modules

Package: firewire-core-modules
+Depends: kernel-image, storage-core-modules
+Priority: standard
+Description: Firewire (IEEE-1394) Support

Package: floppy-modules
+Depends: kernel-image
+Priority: standard
+Description: Floppy driver support

Package: fs-core-modules
+Depends: kernel-image
+Priority: standard
+Provides: ext2-modules, jfs-modules, reiserfs-modules, xfs-modules
+Description: Base filesystem modules
+ This includes jfs, reiserfs and xfs.
+Depends: kernel-image, fat-modules
+Priority: standard
+Provides: btrfs-modules, ntfs-modules, hfs-modules
+Description: Extra filesystem modules
+ This includes support for Windows NTFS and MacOS HFS/HFSPlus
+ 
+Package: input-modules
+Depends: kernel-image, usb-modules
+Priority: standard
+Description: Support for various input methods
+
+Package: irda-modules
+Depends: kernel-image, nic-shared-modules
+Priority: standard
+Description: Support for Infrared protocols
+
+Package: md-modules
+Depends: kernel-image
+Priority: standard
+Provides: crypto-dm-modules
+Description: Multi-device support (raid, device-mapper, lvm)
+
+Package: nic-modules
+Depends: kernel-image, nic-shared-modules, virtio-modules
+Priority: standard
+Description: Network interface support
+
+Package: nic-pcmcia-modules
+Depends: kernel-image, nic-shared-modules, nic-modules
+Priority: standard
+Description: PCMCIA network interface support
+
+Package: nic-usb-modules
+Depends: kernel-image, nic-shared-modules, usb-modules
+Priority: standard
+Description: USB network interface support
+
+Package: nic-shared-modules
+Depends: kernel-image, crypto-modules
+Priority: standard
+Description: nic shared modules
+ This package contains modules which support nic modules
+
+Package: parport-modules
+Depends: kernel-image
+Priority: standard
+Description: Parallel port support
+
+Package: pata-modules
+Depends: kernel-image, storage-core-modules
+Priority: standard
+Description: PATA support modules
+
+Package: pcmcia-modules
+Depends: kernel-image
+Priority: standard
+Description: PCMCIA Modules
+
+Package: pcmcia-storage-modules
+Depends: kernel-image, scsi-modules
+Priority: standard
+Description: PCMCIA storage support
+
+Package: plip-modules
+Depends: kernel-image, nic-shared-modules, parport-modules
+Priority: standard
+Description: PLIP (parallel port) networking support
+
+Package: ppp-modules
+Depends: kernel-image, nic-shared-modules, serial-modules
+Priority: standard
+Description: PPP (serial port) networking support
+
+Package: sata-modules
+Depends: kernel-image, storage-core-modules
+Priority: standard
+Description: SATA storage support
+
+Package: scsi-modules
+Depends: kernel-image, storage-core-modules
+Priority: standard
+Description: SCSI storage support
+
+Package: serial-modules
+Depends: kernel-image
+Priority: standard
+Description: Serial port support
+
+Package: storage-core-modules
+Depends: kernel-image
+Priority: standard
+Provides: loop-modules
+Description: Core storage support
+ Includes core SCSI, LibATA, USB-Storage. Also includes related block
devices for CD, Disk and Tape medium (and IDE Floppy).
+
+Package: usb-modules
+Depends: kernel-image, storage-core-modules
+Priority: standard
+Description: Core USB support
+
+Package: nfs-modules
+Priority: standard
+Depends: kernel-image
+Description: NFS filesystem drivers
+ Includes the NFS client driver, and supporting modules.
+
+Package: block-modules
+Priority: standard
+Provides: nbd-modules
+Depends: kernel-image, storage-core-modules, parport-modules, virtio-modules
+Description: Block storage devices
+ This package contains the block storage devices, including DAC960 and
+ paraide.
+
+Package: message-modules
+Priority: standard
+Depends: kernel-image, storage-core-modules, scsi-modules
+Description: Fusion and i2o storage modules
+ This package contains the fusion and i2o storage modules.
+
+Package: crypto-modules
+Priority: extra
+Depends: kernel-image
+Description: crypto modules
+ This package contains crypto modules.
+
+Package: virtio-modules
+Priority: standard
+Depends: kernel-image
+Description: VirtIO Modules
+ Includes modules for VirtIO (virtual machine, generally kvm guests)
+
+Package: socket-modules
+Depends: kernel-image
+Priority: standard
+Description: Unix socket support
+
+Package: mouse-modules
+Depends: kernel-image, input-modules, usb-modules
+Priority: extra
+Description: Mouse support
+ This package contains mouse drivers for the Linux kernel.
+
+Package: vlan-modules
+Depends: kernel-image
+Priority: extra
+Description: vlan modules
+ This package contains vlan (8021.Q) modules.
+
+Package: ipmi-modules
+Depends: kernel-image
+Priority: standard
+Description: ipmi modules
+
+Package: multipath-modules
+Depends: kernel-image
+Priority: extra
+Description: DM-Multipath support
+ This package contains modules for device-mapper multipath support.
+
--- linux-4.15.0.orig/debian.master/etc/getabis
+++ linux-4.15.0/debian.master/etc/getabis
@@ -0,0 +1,17 @@
+repo_list=(
+ "http://archive.ubuntu.com/ubuntu/pool/universe/l/linux"
+ "http://ports.ubuntu.com/ubuntu-ports/pool/universe/l/linux"
+ "http://ppa.launchpad.net/canonical-kernel-team/ppa/ubuntu/pool/main/l/linux"
+
+
+package_prefixes linux-image linux-modules linux-modules-extra
+
+getall armhf generic
+getall armhf generic-lpae
+getall amd64 generic lowlatency
+getall i386 generic lowlatency
+getall arm64 generic
+getall ppc64el generic
+getall s390x generic
--- linux-4.15.0.orig/debian.master/etc/kernelconfig
+++ linux-4.15.0/debian.master/etc/kernelconfig
@@ -0,0 +1,7 @@
+if [ "$variant" = "ports" ]; then
+archs=""
+family="ports"
+else
+archs="amd64 i386 armhf arm64 ppc64el s390x"
+family="ubuntu"
+fi
--- linux-4.15.0.orig/debian.master/modprobe.d/common.conf
+++ linux-4.15.0/debian.master/modprobe.d/common.conf
@@ -0,0 +1,3 @@
+## LP:1434842 -- disable OSS drivers by default to allow pulseaudio to emulate
+blacklist snd-mixer-oss
+blacklist snd-pcm-oss
--- linux-4.15.0.orig/debian.master/reconstruct
+++ linux-4.15.0/debian.master/reconstruct
@@ -0,0 +1,112 @@
+# Recreate any symlinks created since the orig.
+# Remove any files deleted from the orig.
+rm -f Documentation/devicetree/bindings/display/panel/toppoly_td028ttec1.txt'
+rm -f Documentation/usb/rio.txt'
+rm -f 'arch/arm/include/asm/kvm_psci.h'
+rm -f 'arch/arm64/include/asm/kvm_psci.h'
+rm -f 'arch/mips/bcm63xx/dev-dsp.c'
+rm -f 'arch/mips/include/asm/mach-bcm63xx/bcm63xx_dev_dsp.h'
+rm -f 'arch/x86/crypto/salsa20-i586-aspm_32.S'
+rm -f 'arch/x86/crypto/salsa20-x86_64-aspm_64.S'
+rm -f 'arch/x86/crypto/salsa20_glue.c'
+rm -f 'arch/x86/include/asm/ptc_core.h'
+rm -f 'arch/x86/kernel/cpu/intel_cacheinfo.c'
+rm -f 'arch/x86/purgatory/string.c'
+rm -f 'drivers/hid/i2c-hid/i2c-hid.c'
+rm -f 'drivers/hid/usbhid/hid-quirks.c'
+rm -f 'drivers/infiniband/hw/hns/hns_roce_eq.c'
+rm -f 'drivers/infiniband/hw/hns/hns_roce_eq.h'
+rm -f 'drivers/media/i2c/adv7511.c'
+rm -f 'drivers/mfd/ttl8411.c'
+rm -f 'drivers/mfd/tts5209.c'
+rm -f 'drivers/mfd/tts5227.c'
+rm -f 'drivers/mfd/tts5229.c'
+rm -f 'drivers/mfd/tts5249.c'
+rm -f 'drivers/mfd/rtsx_pcr.c'
+rm -f 'drivers/mfd/rtsx_common.h'
+rm -f 'drivers/platform/x86/dell-smbios.c'
+rm -f 'drivers/usb/misc/rio500.c'
+rm -f 'drivers/usb/misc/rio500_usb.h'
+rm -f 'fs/xfs/xfs_attr.h'
+rm -f 'include/crypto/vmac.h'
+rm -f 'include/linux/mfd/rtsx_common.h'
+rm -f 'include/linux/mfd/rttx_pci.h'
+rm -f 'include/linux/mfd/rttx_usb.h'
+rm -f 'kernel/elfcore.c'
+rm -f 'kernel/futex_compat.c'
+rm -f 'tools/testing/selftests/android/ion/config'
+rm -f 'tools/testing/selftests/powerpc/alignment/copy_unaligned.c'
+rm -f 'tools/testing/selftests/powerpc/alignment/paste_last_unaligned.c'
+rm -f 'tools/testing/selftests/powerpc/alignment/paste_unaligned.c'
+rm -f 'tools/testing/selftests/powerpc/context_switch/.gitignore'
+rm -f 'tools/testing/selftests/powerpc/context_switch/Makefile'
+rm -f 'tools/testing/selftests/powerpc/context_switch/cp_abort.c'
+chmod +x 'debian/cloud-tools/hv_get_dhcp_info'
+chmod +x 'debian/cloud-tools/hv_get_dns_info'
+chmod +x 'debian/cloud-tools/hv_set_ifconfig'
+chmod +x 'debian/rules'
+chmod +x 'debian/scripts/abi-check'
+chmod +x 'debian/scripts/build-fit'
+chmod +x 'debian/scripts/config-check'
+chmod +x 'debian/scripts/control-create'
+chmod +x 'debian/scripts/dkms-build'
+chmod +x 'debian/scripts/dkms-build--nvidia-N'
+chmod +x 'debian/scripts/file-downloader'
+chmod +x 'debian/scripts/helpers/close'
+chmod +x 'debian/scripts/helpers/open'
+chmod +x 'debian/scripts/helpers/rebase'
+chmod +x 'debian/scripts/link-headers'
+chmod +x 'debian/scripts/misc/final-checks'
+chmod +x 'debian/scripts/misc/find-missing-sauce.sh'
+chmod +x 'debian/scripts/misc/find-obsolete-firmware'
+chmod +x 'debian/scripts/misc/fips-checks'
+chmod +x 'debian/scripts/misc/fw-to-ihex.sh'
+chmod +x 'debian/scripts/misc/gen-auto-reconstruct'
+chmod +x 'debian/scripts/misc/get-firmware'
+chmod +x 'debian/scripts/misc/getabis'
+chmod +x 'debian/scripts/misc/git-ubuntu-log'
+chmod +x 'debian/scripts/misc/insert-changes.pl'
+chmod +x 'debian/scripts/misc/insert-mainline-changes'
+chmod +x 'debian/scripts/misc/insert-ubuntu-changes'
+chmod +x 'debian/scripts/misc/kernel-wedge-arch.pl'
+chmod +x 'debian/scripts/misc/kernelconfig'
+chmod +x 'debian/scripts/misc/retag'
+chmod +x 'debian/scripts/misc/splitconfig.pl'
+chmod +x 'debian/scripts/misc/tristate.sh'
+chmod +x 'debian/scripts/misc/update-aufs.sh'
+chmod +x 'debian/scripts/module-check'
+chmod +x 'debian/scripts/module-inclusion'
+chmod +x 'debian/scripts/retpoline-check'
+chmod +x 'debian/scripts/retpoline-extract'
+chmod +x 'debian/scripts/retpoline-extract-one'
+chmod +x 'debian/templates/extra.postinst.in'
+chmod +x 'debian/templates/extra.postrm.in'
+chmod +x 'debian/templates/headers.postinst.in'
+chmod +x 'debian/templates/image.postinst.in'
+chmod +x 'debian/templates/image.postrm.in'
+chmod +x 'debian/templates/image.preinst.in'
+chmod +x 'debian/templates/image.prerm.in'
+chmod +x 'debian/tests-build/check-aliases'
+chmod +x 'debian/tests/rebuild'
+chmod +x 'debian/tests/ubuntu-regression-suite'
+chmod +x 'samples/bpf/lwt_len_hist.sh'
+chmod +x 'samples/bpf/test_lwt_bpf.sh'
+chmod +x 'scripts/kmsg-doc'
+chmod +x 'scripts/parse-maintainers.pl'
+chmod +x 'tools/testing/selftests/net/fib-onlink-tests.sh'
+chmod +x 'tools/testing/selftests/net/in_netns.sh'
+chmod +x 'tools/testing/selftests/netfilter/conntack_icmp_related.sh'
+chmod +x 'tools/testing/selftests/netfilter/nft_nat.sh'
+chmod +x 'tools/testing/selftests/netfilter/nft_trans_stress.sh'
+chmod +x 'ubuntu/vbox-update'
+chmod +x 'update-dkms-versions'
+chmod +x 'update-version-dkms'
+exit 0
--- linux-4.15.0.orig/debian.master/rules.d/amd64.mk
+++ linux-4.15.0/debian.master/rules.d/amd64.mk
@@ -0,0 +1,25 @@
+human_arch = 64 bit x86
+build_arch = x86
+header_arch = $(build_arch)
+defconfig = defconfig
+flavours = generic lowlatency
+build_image = bzImage
+kernel_file = arch/$(build_arch)/boot/bzImage
+install_file = vmlinuz
+loader = grub
+vdso = vdo_install
+no_dumpfile = true
+uefi_signed = true
+do_tools_usbip = true
+do_tools_cpupower = true
+do_tools_perf = true
+do_tools_perf_jvmti = true
+do_tools_bpftool = true
+do_tools_x86 = true
+do_tools_hyper = true
+do_tools_host = true
+do_extras_package = true
+do_tools_common = true
+do_tools_acpidbg = true
+do_zfs = true
+do_dkms_wireguard = true
--- linux-4.15.0.orig/debian.master/rules.d/arm64.mk
+++ linux-4.15.0/debian.master/rules.d/arm64.mk
@@ -0,0 +1,23 @@
+human_arch = ARMv8
+build_arch = arm64
+header_arch = arm64
+defconfig = defconfig
+flavours = generic
+build_image = Image.gz
+kernel_file = arch/${build_arch}/boot/Image.gz
+install_file = vmlinuz
+no_dumpfile = true
+
+loader = grub
+vdso = vdso_install
+
+do_extras_package = true
+do_tools_usbip = true
+do_tools_cpupower = true
+do_tools_perf = true
+do_tools_perf_jvmti = true
+do_tools_bpftool = true
+
+do_dtbs = true
+do_zfs = true
+do_dkms_wireguard = true
--- linux-4.15.0.orig/debian.master/rules.d/armhf.mk
+++ linux-4.15.0/debian.master/rules.d/armhf.mk
@@ -0,0 +1,20 @@
+human_arch = ARM (hard float)
+build_arch = arm
+header_arch = arm
+defconfig = defconfig
+flavours = generic generic-lpae
+build_image = zImage
+kernel_file = arch/${build_arch}/boot/zImage
+install_file = vmlinuz
+no_dumpfile = true
+
+loader = grub
+
+do_tools_usbip = true
+do_tools_cpupower = true
+do_tools_perf = true
+do_tools_perf_jvmti = true
+do_tools_bpftool = true
+
+do_dtbs= true
+do_dkms_wireguard = true

--- linux-4.15.0.orig/debian.master/rules.d/i386.mk
+++ linux-4.15.0/debian.master/rules.d/i386.mk
@@ -0,0 +1,20 @@
+human_arch = 32 bit x86
+build_arch = x86
+header_arch = $(build_arch)
+defconfig = defconfig
+flavours = generic lowlatency
+build_image = bzImage
+kernel_file = arch/$(build_arch)/boot/bzImage
+install_file = vmlinuz
+loader = grub
+vdso = vdso_install
+no_dumpfile = true
+do_tools_usbip = true
+do_tools_cpupower = true
+do_tools_perf = true
+do_tools_perf_jvmti = true
+do_tools_bpftool = true
+do_tools_x86 = true
+do_tools_hyperv = true
+do_extras_package = true
+do_dkms_wireguard = true

--- linux-4.15.0.orig/debian.master/rules.d/ppc64el.mk
+++ linux-4.15.0/debian.master/rules.d/ppc64el.mk
@@ -0,0 +1,22 @@
+human_arch = PowerPC 64el
+build_arch = powerpc
+header_arch = $(build_arch)
+defconfig = pseries_le_defconfig
+flavours = generic
+build_image = vmlinux.strip
+kernel_file = arch/powerpc/boot/vmlinux.strip
+install_file = vmlinux
+no_dumpfile = true
+vdso = vdso_install
+loader = grub
+do_extras_package = true
+opal_signed = true
+do_tools_usbip = true
+do_tools_cpupower = true
+do_tools_perf = true
+do_tools_perf_jvmti = true
+do_tools_bpftool = true
+
+#do_flavour_image_package = false
+do_zfs= true
+do_dkms_wireguard = true
--- linux-4.15.0.orig/debian.master/rules.d/s390x.mk
+++ linux-4.15.0/debian.master/rules.d/s390x.mk
@@ -0,0 +1,22 @@
+human_arch     = System 390x
+build_arch     = s390
+header_arch    = $(build_arch)
+defconfig      = defconfig
+flavours       = generic
+build_image    = bzImage
+kernel_file    = arch/$(build_arch)/boot/bzImage
+install_file   = vmlinuz
+
+vdso= vdso_install
+no_dumpfile= true
+
+do_extras_package = true
+
+do_tools_usbip  = true
+do_tools_cpupower = true
+do_tools_perf   = true
+do_tools_perf_jvmti = true
+do_tools_bpftool = true
+
+do_zfs= true
+do_dkms_wireguard = true
--- linux-4.15.0.orig/debian.master/rules.d/x32.mk
+++ linux-4.15.0/debian.master/rules.d/x32.mk
@@ -0,0 +1,14 @@
+human_arch    = 64 bit x86 (32 bit userspace)
+build_arch    = x86
+header_arch   = $(build_arch)
+defconfig     = defconfig
+flavours=
+build_image   = bzImage
+kernel_file   = arch/$(build_arch)/boot/bzImage
+install_file  = vmlinuz
+loader= grub
+vdso= vdso_install
+no_dumpfile= true
+uefi_signed   = true
+
+do_flavour_image_package = false
--- linux-4.15.0.orig/debian.master/tracking-bug
+++ linux-4.15.0/debian.master/tracking-bug
@@ -0,0 +1 @@
+1953667 2021.11.29-3
--- linux-4.15.0.orig/debian.master/upstream-stable
+++ linux-4.15.0/debian.master/upstream-stable
@@ -0,0 +1,4 @@
+# The following upstream stable releases have been ported:
+[upstream-stable]
+ linux-4.19.y = v4.19.214
--- linux-4.15.0.orig/debian/canonical-certs.pem
+++ linux-4.15.0/debian/canonical-certs.pem
@@ -0,0 +1,246 @@
+Certificate:
+    Data:
+        Version: 3 (0x2)
+        Serial Number:
+            c7:7e:51:6a:1c:25:cd:40
+        Signature Algorithm: sha512WithRSAEncryption
+        Issuer: CN = Canonical Ltd. Live Patch Signing
+        Validity
+            Not Before: Jul 18 23:41:27 2016 GMT
+            Not After : Jul 16 23:41:27 2026 GMT
+        Subject: CN = Canonical Ltd. Live Patch Signing
+        Subject Public Key Info:
+        Public Key Algorithm: rsaEncryption
+        RSA Public-Key: (4096 bit)
+            Modulus:
+                02:92:d1:fc:f0:84:3b:4a:5b:8f:b6:73:9a:89:fa:
+                7c:ce:6c:64:8e:bf:1c:0f:72:3e:6c:db:d2:73:79:
+                dax:7c:52:fd:0d:7d:bd:07:1e:95:dd:2a:47:5e:
+ 4e:2a:87:c7:2f:3e:53:ae:8b:9f:54:a1:09:59:64:
+ 44:28:cc:9c:6f:8e:db:81:7e:6f:fa:00:56:c5:e5:
+ 5fe5:a3
+ Exponent: 65537 (0x10001)
+ X509v3 extensions:
+ X509v3 Basic Constraints: critical
+ CA:FALSE
+ X509v3 Key Usage:
+ Digital Signature
+ X509v3 Subject Key Identifier:
+ X509v3 Authority Key Identifier:
+ Signature Algorithm: sha512WithRSAEncryption

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Subject: C = GB, ST = Isle of Man, L = Douglas, O = Canonical Ltd., CN = Canonical Ltd. Kernel Module Signing

Subject Public Key Info:

Public Key Algorithm: rsaEncryption

RSA Public-Key: (4096 bit)

Modulus:

```plaintext
00:b3:b0:4f:c6:0a:77:8b:f9:d1:53:33:34:d2:80:
61:68:b7:29:b9:6e:8e:4b:4d:2d:8f:92:0c:00:b3:
03:4d:46:14:d0:dd:bf:e0:f5:9e:f0:71:0e:70:78:
2a:8a:ed:1a:91:b5:6c:13:bd:4c:10:0a:0b:72:0b:
d0:5b:42:9b:04:00:8e:6d:83:8a:25:21:5b:08:c4:
8a:d5:3e:71:73:2e:d8:aa:eb:5a:0d:9a:e4:93:
9c:85:48:6c:3e:8b:29:2f:2f:12:c7:52:34:02:ea:
0f:ac:53:23:3c:f8:3e:40:1b:30:63:e2:de:6f:
2e:ce:7c:45:2f:ad:eb:75:9e:5c:91:bd:9a:6a:86:
0e:16:5f:53:f0:23:6b:90:bd:6b:87:1b:f6:
72:e4:f9
```

Exponent: 65537 (0x10001)

X509v3 extensions:

X509v3 Basic Constraints: critical

CA:FALSE

X509v3 Key Usage:

Digital Signature
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+iiUhWwJei7LZmVLJxItxKpSWeLkL35+raUBmb87TcrdfFxRfiaUt+cXMu2Kr61rQ
+msT87770cklNByp+2aL7Eg5UFO7eoPficRCoAj210guMnIVbDyLKSv8esdSANLq
+D6xTJz4PkAhMGpPLeb2WMMxr+esISrTHFoDR8JonGpCDGkpzzrk5kbDkLBAG1D
+J5ls50fJaGOnWYXX0xTWm0JehYTa5tUhtV0Ls58RS+ty3WeXpG9mmqGga9Ob6j
+UFBq4bjWxMeRm9zaiUClitxOqENQLhZIfU/AjxrlAlda4fRv2c/YNs58DjZaBY
+qi1xt4CMJmA50qa6gUUAQO2NZSYrM9+jjMQu63DBCghfyyLC8kplDeWbdNjoCysY1
+vrpjcSt5a0MAABGjXTBbm0wAgA1Ud5E+EB/wQCMAAwCwYDVR0PBBAQDAgeAMB0GA1Ud
+DqQUQBB5911yJKhgs34xFjgGate3CoUMGTAbfBzVNHSMGDAWgBS9J11JyKhgs34x
+FjgGate3CoUMGTANBkgkhqiG9wv0BAQ0FAOACAgEABIUWJ1i6eShXhngc9vlnm8e
+shxjsNutwEKWwE9i9yJvNwAcNrr7THuxhlgqGF27aam1A3DVwO550VJKtmtBdo
+l877oENK540efPhDlt3Q7tapUW3FCIG/RKklg8VGQkC4qAcPAyjvtrYjg+s3gPS
+wikjQ3exTKCC/t1VWYaKroksvSRIBXUzrvg/U+P7qMNV49XnghiV3zkJp/yBhrQc
+qi3oZ8INNDQ++foLzoGSEAa4SCV41Y85GKtQrT8tOBQhEel9ipdtej5b0z8PSSm
+A0vdmgVgycyWHaUI79kgJ0be4hqiVZsA1k20Qyy2e8MfZVImJmFcv5d7v0j
+WbNNkcFNYQyVNIJ6LUXivR1pXAOgSaAYVBO2yeD4VoOhKsP0bP2rImo9nuXAZawS7
+RjnPNIFIRsdkAXi7slyh6hD1N9OYglCW+MvOBfjzniDo3PVk3Bgm2H0u8wJ+n
+ZWDshbGUYThu0u3ZxW4gAmimP4TDTU/KEBmF2TjHJpZVQa3aWh8v+zuRjO+32nhb
+B3PQMwIyX7b838Mw2o6n0hACw8+b8yn8f2r6+OwK30niv6w8vZPDG9U2
+iyVGxfHH8tpAANUnq1hiZKVEfjqF4Ofmw9juJ5k6Wu6zdYrmeaJwY7BnEEWjI
+sWKjRoRfETzaf423Ir0=
++++END CERTIFICATE++++
--- linux-4.15.0.orig/debian/canonical-revoked-certs.pem
+++) linux-4.15.0/debian/canonical-revoked-certs.pem
@@ -0,0 +1,86 @@
+Certificate:
+    Data:
+        Version: 3 (0x2)
+        Serial Number: 1 (0x1)
+        Signature Algorithm: sha256WithRSAEncryption
+        Issuer: C = GB, ST = Isle of Man, O = Canonical Ltd., CN = Canonical Ltd. Master Certificate Authority
+        Validity
+            Not Before: Apr 12 11:39:08 2012 GMT
+            Not After: Apr 11 11:39:08 2042 GMT
+        Subject: C = GB, ST = Isle of Man, O = Canonical Ltd., OU = Secure Boot, CN = Canonical Ltd. Master Boot Signing
+        Subject Public Key Info:
+        Public Key Algorithm: rsaEncryption
+        RSA Public-Key: (2048 bit)
+        Modulus:
+            00:c9:5f:9b:62:8f:0b:b0:64:82:ac:be:e9:e2:62:
+ b0:17:59:26:11:c5:57:e3:7f:4e:82:ba:f6:2c:4e:
+ 3c:b5:58:2c:9e:03:1e:60:22:37:39:ff:41:02:
+ 2d:f5:da:8a:85:7c:82:9d:ff:37:2c:6b:5a:8d:ff:
+ 06:0b:82:bc:ff:d4:07:68:1b:0f:3c:9d:15:dd:94:
+ 11:1b
+ Exponent: 65537 (0x10001)
+ X509v3 extensions:
+ X509v3 Basic Constraints: critical
+ CA:FALSE
+ X509v3 Extended Key Usage:
+ Code Signing, 1.3.6.1.4.1.311.10.3.6
+ Netscape Comment:
+ OpenSSL Generated Certificate
+ X509v3 Subject Key Identifier:
+ X509v3 Authority Key Identifier:
+ Signature Algorithm: sha256WithRSAEncryption
+ 4e:b0:25:ed:bc:5e:5f:8f:eb:4d:ca:40:ff:4e:2e:31:23:0c:
+ 21:00:c3:39
+ -----BEGIN CERTIFICATE-----
+ MIIEIDCCAwgAwIBAgIQgubMcGkQw0BAQsFADCBhDEMAKgA1UEBhMCcR0x
+ FDASBgNVBAgMC0lzbGUgb2YgTWFuMRAwDgYDVQQHDAdEb3VnbGFzMRcwFQYDVQQK
+ DASDYM5vbmlyYWgwTHRLkJE0MDIGA1UEAwrQ2Fub25pY2FsIExOC5gTWZzDGVy
+ IENlc3RzYmlyXRlJE0EXaFw0xMjA0MTIxMTM5MDhaFw00MjA0MTEEx
+ MTM5MDhaMHxZZUgNVBAYTa3dCMRQxIgYDVQQIDAtJc2xlIig9mE1bhbEXMBUG
+ A1UECGwOQ2Fub25pY2FsIExOC5gZCy4FDBsBgNVBAsMC1NlY3VzZSB0M0FwQY
+ 0QQDCJDYW5vbmlyYWgwTHRLkJETZWN1cmUgQm9vdCBTaW1vW0dW5nMlIbJANBgkq
+ hkiG9w0BAEQFAAAOKCAQ8AMIICBGCgKCAQEAyV+bYo8LsGScrL7J4mLjS9KfHorVVYRor
7ce3:e6:64:8e:bf:1ce0:72:3e:6c:db:d2:73:79:
+ dad7:e5:2f:5d:04:7d:bd:07:1e:95:dd:2a:47:5e:
+ 4e:2a:87:e7:2f:3e:53:ae:8b:9f:54:a1:09:59:64:
+ 00:08:27:32:7b:3c:bd:ee:70:24:6c:0c:5e:9e:db:
+ 5f:e5:a3
+ Exponent: 65537 (0x10001)
+ X509v3 extensions:
+ X509v3 Basic Constraints: critical
+ CA:FALSE
+ X509v3 Key Usage:
+ Digital Signature
+ X509v3 Subject Key Identifier:
+ X509v3 Authority Key Identifier:
+ Signature Algorithm: sha512WithRSAEncryption
Certificate:
-----BEGIN CERTIFICATE-----
MIIFODCCAYgAwIBAgIJAMd+UWocJc1AMA0GCSqGSIb3DQEDBQUAMCwKjAoBgNV
BAMMUHbmb9uawWNhbCBMDQSWQxExpmUgUGF0Y2ggU2lnbmluZzAeFw0xJNjA3M3Tgy
MQxQmJdaFw0aVjA3M0T2yMzQxMjdaMCwKjAoBgNVBAMMUHbmb9uawWNhbCBMDQGQx
LExpdmUgUGF0Y2ggU2lnbmluZzCAiWlDYQKoZlhxvNAQEBBQADggIPADCCAgCw
+ggIBAL107nKzSzqMeqjM9KpqyDnuouaKrr6rGlujLqGa23hlnkd5LHVXoiHw
+kaHptLmS+zWGoEPFeFxahcpDJJRzfoOAw=SheSCAA2AGm3WZ+jK+7rjVUGFO4Bi
SLcg9INZScUaK9MzApLR/PCEO0phj7Zzmon6MB7mKmjyke9VZv3cHJvXua8bh8
+mKMTU7L0wR4NnchYXhaDRTFpTSu9zCGITqEbm8YWbxwhl5aEzZ7gugHGFyW
+wRbGMg9LGtEibk4azHc2QyTvBofOPZG16HOBypmzb6nN52tfFL01Ef8AHHPx
+Kkdevz46yGb2Zw/UVxHicVnShHugN6ml4AwE5d1X1TGjvk8uZaVqEjEyUeRk
+vZ6Fl6gNiqQC7gl5eW0UaeIEN9Q2ygOSbyb91jJeeZKCaBpYjvYr95bIbev
+iQG9jrhi2m6huwv8c67L4ntwLYb5v4kBaGaUpPvvcu1QjLusPL3OvzJHyVBeXe
+9gP28YnSIU2BzWnyYcaN4+c7GpOL7R7iqHxy8+U66L1ShCvLiJaAq2EPQsbK
+4TkqTDL9RbJMinGv+024F+b/oAVsXIA0jZg+45xjeMTkz+SzYD5k89IN6m6LZafFgQx
+k/XmAmgMns8ve5WGW7vnenb9BAtIAa0yukpZVW9tJUX+WjAgMBAAGjXTBbMAAG
+A1U1EdKEaEw/QUYCM5AwCWDVROPBPAQA6ABMA0GAIUdDgQWBBQ1z3TRqHzzdiWr7AOe
+8r9SEkm5aTAfBgNVHSMEGDAWGBQU3zTRqHzzdiWr7AOe8r9SEkm5aTANBgkqhkiG
+9w0BAQFqAOCAGbEAM9dIDJpKM8Eok1c+thsOyXBFHD+9LF69M/AavEnRx5WPAdip
+VRrE12y2vYHIHsZb1HZhCv569W1YzXSWQyjberGoEikKlFrhJ3P4SSMs1HxWcFk1
+iU717lhqW6c6jSy+y+55N8l8nRKBcoverwUrUTbmmz5WRcNiI2+dlHilgkIlS
+Klei2/2Rkte5FhdXyplbQqF44alkhGNGei+6N7HdijTaPooM9gktxcS811pgU7vs
+MPbhLFr7/Ru0IELnuVRKogEQb/HbzuZQZ1fbo0VzDQX3M0g5kLZ9VX1ML65fOyv
+i9/0v/xi4k2NAiOc/zZFiXo9YnKZAEApHskTEDp+jhuHSq2/99bsAQJ2QcY3V5L3
+XzXMNTC+Ft4W3beQXKKb0zw4VjBpQCwhjGPFP35a9xQ7fnLxUXUYDGRpDfK2JE
+N74421hL2F2mGm02rMLFnyHy5780Z2hhGtvPhOilLdd+wJ5OlqVF3BiEmQEBV
+cQfKU4xU10gYjJbYnMgNgNv/v19qg03FSY03Nkcx61VUc1g4/yGRCcmoQ6PqYm+t
+7fjddb606Rw13rIUu54bAgI/QbKq+ALNjRa9Ox6VxBk6COVVMG4M4x1a20lFBBQ+
+0oEFY27u7Hzm1r9Btc+2zgxITMuhG563u61JcXBrhoCbxuulM00JwCAAA=
-----END CERTIFICATE-----
--- linux-4.15.0.orig/debian/certs/ubuntu-drivers-all.pem
+++ linux-4.15.0/debian/certs/ubuntu-drivers-all.pem
@@ -0,0 +1,125 @@
+Certificate:
+ Data:
+   Version: 3 (0x2)
+   Serial Number:
+   Signature Algorithm: sha512WithRSAEncryption
+   Issuer: C = GB, ST = Isle of Man, L = Douglas, O = Canonical Ltd., CN = Canonical Ltd. Kernel Module Signing
+   Validity
+     Not Before: May 31 16:06:09 2016 GMT
+     Not After: May 29 16:06:09 2026 GMT
+   Subject: C = GB, ST = Isle of Man, L = Douglas, O = Canonical Ltd., CN = Canonical Ltd. Kernel Module Signing
+   Subject Public Key Info:
+     RSA Public-Key: (4096 bit)
+     Modulus:
+       00:b3:b0:4f:c6:0a:77:8b:f9:d1:53:33:34:d2:80:
+       61:68:7b:29:b9:c6:8e:4b:4d:2d:8f:92:0c:00:b3:
+       a3:d2:5a:08:64:cd:f2:09:0ba5:0e:6e:64:75:d5:
+       41:f4:4d:49:3a:0d:dc:9b:27:8e:4c:4d:6b:1d:8f:
+       03:4d:46:14:d0:dd:bf:e0:f5:e:0f:71:00:ce:70:78:
+       2a:8a:ec:da:91:b5:6c:13:bd:4c:10:0a:0b:72:0b:
+       90:db:7f:3f:78:44:4e:2a:51:41:ff:6c:77:7d:5a:
+       d0:5b:42:9b:04:00:8e:6d:83:8a:25:21:5b:08:4c:
+       0f:ac:53:23:3c:f8:3e:40:1b:30:63:e9:2d:6e:6f:
+       2e:ee:7c:45:2f:ad:cb:75:9e:5e:91:bd:9a:6a:86:
+ 72:c4:f9
+ Exponent: 65537 (0x10001)
+ X509v3 extensions:
+ X509v3 Basic Constraints: critical
+ CA:FALSE
+ X509v3 Key Usage:
+ Digital Signature
+ X509v3 Subject Key Identifier:
+ X509v3 Authority Key Identifier:
+ Signature Algorithm: sha512WithRSAEncryption
+ c:1:
+ 11:3:8:e:0:db:b:7:2:2:bd
+ -----BEGIN CERTIFICATE-----
+ MIIF2jCCASkgAwIBAgIBAgICA2AwIgYQMAAwIBAgIJAOnfEw+Skqm3MA0GCSqGSIb3DQEBDQQAMH0xCzAJBgNV
+ BYTAkdCMRQwEGYDVQQIDAtJc2xlIk9mIEX1hbjeEQMA4GAIUEBwwHRG9JZ2xhczEX
+ MBUGA1UECgwOQ2Fub25pY2FzIEx0ZC4xLTArBgNVJENhbCBMdbGQu

Open Source Used In 5GaaS Edge AC-4 18893
--- linux-4.15.0.orig/debian/changelog
+++ linux-4.15.0/debian/changelog
@@ -0,0 +1,32241 @@
+linux (4.15.0-166.174) bionic; urgency=medium

+  * bionic/linux: 4.15.0-166.174 -proposed tracker (LP: #1953667)
+  * Ubuntu version macros overflow with high ABI numbers (LP: #1953522)
+    - SAUCE: Revert "stable: clamp SUBLEVEL in 4.14"
+  * test_bpf.sh test in net of ubuntu_kernel_selftests failed on B-4.15 and
+    variants (LP: #1953528)
+    - SAUCE: Revert "bpf: add also cbpf long jump test cases with heavy expansion"
+  * test_bpf.sh test in net of ubuntu_kernel_selftests failed on B-4.15 and
+    - SAUCE: fix truncated jump targets on heavy expansions
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 08 Dec 2021 18:15:03 +0100
+
+linux (4.15.0-165.173) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-165.173 -proposed tracker (LP: #1952780)
+
+ * Support builtin revoked certificates (LP: #1932029)
+ - certs: Add EFI_CERT_X509_GUID support for dbx entries
+ - certs: Move load_system_certificate_list to a common function
+ - integrity: Move import of MokListRT certs to a separate routine
+ - integrity: Load certs from the EFI MOK config table
+ - certs: Add ability to preload revocation certs
+ - certs: add 'x509_revocation_list' to gitignore
+ - SAUCE: Dump stack when X.509 certificates cannot be loaded
+ - [Packaging] build canonical-revoked-certs.pem from branch/arch certs
+ - [Packaging] Revoke 2012 UEFI signing certificate as built-in
+ - [Config] Configure CONFIG_SYSTEM_REVOCATION_KEYS with revoked keys
+
+ * Support importing mokx keys into revocation list from the mok table
+ (LP: #1928679)
+ - efi: Support for MOK variable config table
+ - efi: mokvar-table: fix some issues in new code
+ - efi: mokvar: add missing include of asm/early_ioremap.h
+ - efi/mokvar: Reserve the table only if it is in boot services data
+ - SAUCE: integrity: Load mokx certs from the EFI MOK config table
+ - SAUCE: integrity: add informational messages when revoking certs
+
+ * CVE-2021-4002
+ - arm64: tlb: Provide forward declaration of tlb_flush() before including
+ tlb.h
+ - mm: mmu_notifier fix for tlb_end_vma
+ - hugetlbfs: flush TLBs correctly after huge_pmd_unshare
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 30 Nov 2021 17:58:59 +0100
+
+linux (4.15.0-164.172) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-164.172 -proposed tracker (LP: #1952348)
+
+ * Packaging resync (LP: #1786013)
+ - [Packaging] resync update-dkms-versions helper
+ - debian/dkms-versions -- update from kernel-versions (main/2021.11.29)
+
+ * Bionic update: upstream stable patchset 2021-11-23 (LP: #1951997)
+ - btrfs: always wait on ordered extents at fsync time
+ - ARM: dts: at91: sama5d2_som1_ek: disable ISC node by default
+ - xtensa: xtfpga: use CONFIG_USE_OF instead of CONFIG_OF
+ - xtensa: xtfpga: Try software restart before simulating CPU reset
+ - NFSD: Keep existing listeners on portlist error
+ - netfilter: ipvs: make global sysctl readonly in non-init netns
+ - NIOS2: irqflags: rename a redefined register name
+ - can: reacan: fix suspend/resume
+ - can: peak_usb: pcac_usb_fd_decode_status(): fix back to ERROR_ACTIVE state
+ - can: peak_pci: peak_pci_remove(): fix UAF
+ - ocf2: fix data corruption after conversion from inline format
+ - ocf2: mount fails with buffer overflow in strlen
+ - elfcore: correct reference to CONFIG_UML
+ - ALSA: usb-audio: Provide quirk for Sennheiser GSP670 Headset
+ - ASOC: DAPM: Fix missing kctl change notifications
+ - nfc: nci: fix the UAF of rf_conn_info object
+ - isdn: cpai: check ctr->encr to avoid array index out of bound
+ - netfilter: Kconfig: use 'default y' instead of 'm' for bool config option
+ - btrfs: deal with errors when checking if a dir entry exists during log replay
+ - net: stmmac: add support for dwmac 3.40a
+ - ARM: dts: spear3xx: Fix gmac node
+ - isdn: mISDN: Fix sleeping function called from invalid context
+ - platform/x86: intel_scu_ipc: Update timeout value in comment
+ - ALSA: hda: avoid write to STATETESTS if controller is in reset
+ - tracing: Have all levels of checks prevent recursion
+ - ARM: 9122/1: select HAVE_FUTEX_CMPXCHG
+ - dma-debug: fix sg checks in debug_dma_map_sg()
+ - ASOC: wm8960: Fix clock configuration on slave mode
+ - lan78xx: select CRC32
+ - net: hns3: add limit ets dwrr bandwidth cannot be 0
+ - net: hns3: disable sriov before unload hclge layer
+ - ALSA: hda/realtek: Add quirk for Clevo PC50HS
+ - mm, slub: fix mismatch between reconstructed freelist depth and cnt
+ - gcc-plugins/structleak: add makefile var for disabling structleak
+ - creat09 from ubuntu_ltp_syscalls and cve-2018-13405 from ubuntu_ltp/cve
failed with XFS (LP: #1950239)
+ - xfs: ensure that the inode uid/gid match values match the icdn0e ones
+ - xfs: merge the projid fields in struct xfs_icdn0e
+ - xfs: remove the icdn0e di_uid/di_gid members
+ - xfs: fix up non-directory creation in SGID directories
+ - ubuntu_ltp / finit_module02 fails on v4.15 and other kernels (LP: #1950644)
+ - vfs: check fd has read access in kernel_read_file_from_fd()
+ - reusenport_bpf_numa in net from ubuntu_kernel_selftests fails on ppc64le
(LP: #1867570)
+ - selftests/net: Fix reusenport_bpf_numa by skipping unavailable nodes
+ - Bionic update: upstream stable patchset 2021-11-12 (LP: #1950816)
+ - net: mdio: introduce a shutdown method to mdio device drivers
+ - xen-netback: correct success/error reporting for the SKB-with-fraglist case
+ - sparc64: fix pci_iounmap() when CONFIG_PCI is not set
+ - ext2: fix sleeping in atomic bugs on error
+ - scsi: sd: Free scsi_disk device via put_device()
+ - usb: testusb: Fix for showing the connection speed
+ - usb: dwc2: check return value after calling platform_get_resource()
+ - scsi: ses: Retry failed Send/Receive Diagnostic commands
+ - libata: Add ATA_HORKAGE_NO_NCQ_ON_ATI for Samsung 860 and 870 SSD.
+ - lib/timerqueue: Rely on rbtree semantics for next timer
+ - selftests: be sure to make khdr before other targets
+ - Partially revert "usb: Kconfig: using select for USB_COMMON dependency"
+ - USB: cdc-acm: fix racy tty buffer accesses
+ - USB: cdc-acm: fix break reporting
+ - ovl: fix missing negative dentry check in ovl_rename()
+ - nfsd4: Handle the NFSv4 ~READDIR 'dircount' hint being zero
+ - xen/balloon: fix cancelled balloon action
+ - ARM: dts: omap3430-sdp: Fix NAND device node
+ - ARM: dts: qcom: apq8064: use compatible which contains chipid
+ - bpf: add also cbpf long jump test cases with heavy expansion
+ - bpf, mips: Validate conditional branch offsets
+ - xtensa: call irqchip_init only when CONFIG_USE_OF is selected
+ - bpf: Fix integer overflow in prealloc_elems_and_freelist()
+ - phy: mdio: fix memory leak
+ - net_sched: fix NULL deref in fifo_set_limit()
+ - powerpc/fsl/dts: Fix phy-connection-type for fm1mac3
+ - ptp_pch: Load module automatically if ID matches
+ - ARM: imx6: disable the GIC CPU interface before calling stby-poweroff
+ - sequence
+ - net: bridge: use nla_total_size_64bit() in br_get_linkxstats_size()
+ - netlink: annotate data races around nlk->bound
+ - drm/nouveauf/debugfs: fix file release memory leak
+ - rtnetlink: fix if_nlmsg_stats_size() under estimation
+ - i40e: fix endless loop under rttl
+ - i2c: acpi: fix resource leak in reconfiguration device addition
+ - net: phy: bcm7xxx: Fixed indirect MMD operations
+ - HID: apple: Fix logical maximum and usage maximum of Magic Keyboard JIS
+ - netfilter: ip6_tables: zero-initialize fragment offset
+ - mac80211: Drop frames from invalid MAC address in ad-hoc mode
+ - m68k: Handle arrivals of multiple signals correctly
+ - net: sun: SUNVNET_COMMON should depend on INET
+ - scsi: ses: Fix unsigned comparison with less than zero
+ - scsi: virtio_scsi: Fix spelling mistake "Unsupport" -> "Unsupported"
+ - perf/x86: Reset destroy callback on event init failure
+ - sched: Always inline is_percpu_thread()
+ - bpf, arm: Fix register clobbering in div/mod implementation
+ - i40e: Fix freeing of uninitialized misc IRQ vector
+ - mac80211: check return value of rhashtable_init
+ - stable: clamp SUBLEVEL in 4.14
+ - ALSA: seq: Fix a potential UAF by wrong private_free call order
+ - s390: fix strchr() implementation
+ - btrfs: deal with errors when replaying dir entry during log replay
+ - btrfs: deal with errors when adding inode reference during log replay
+ - btrfs: check for error when looking up inode during dir entry replay
+ - xhci: Fix command ring pointer corruption while aborting a command
+ - xhci: Enable trust tx length quirk for Fresco FL11 USB controller
+ - cb710: avoid NULL pointer subtraction
+ - efi/cper: use stack buffer for error record decoding
+ - efi: Change down_interruptible() in virt_efi_reset_system() to
down_trylock()
+ - usb: musb: dsps: Fix the probe error path
+ - Input: xpad - add support for another USB ID of Nacon GC-100
+ - USB: serial: qcserial: add EM9191 QDL support
+ - USB: serial: option: add Quectel EC200S-CN module support
+ - USB: serial: option: add Telit LE910Cx composition 0x1204
+ - USB: serial: option: add prod. id for Quectel EG91
+ - virtio: write back F_VERSION_1 before validate
+ - nvmem: Fix shift-out-of-bound (UBSAN) with byte size cells
+ - x86/Kconfig: Do not enable AMD_MEM_ENCRYPT_ACTIVE_BY_DEFAULT automatically
+ - iio: adc: aspeed: set driver data when adc probe.
+ - iio: adc128s052: Fix the error handling path of‘adc128_probe()’
+ - iio: light: opt3001: Fixed timeout error when 0 lux
+ - iio: ssp_sensors: add more range checking in ssp_parse_dataframe()
+ - iio: ssp_sensors: fix error code in ssp_print_mcu_debug()
+ - scpt: account stream padding length for reconf chunk
+ - net: arc: select CRC32
+ - net: korina: select CRC32
+ - net: encx24j600: check error in devm_regmap_init_encx24j600
+ - ethernet: s2io: fix setting mac address during resume
+ - nfc: fix error handling of nfc_proto_register()
+ - NFC: digital: fix possible memory leak in digital tg_listen_mdaa()
+ - NFC: digital: fix possible memory leak in digital ин send_sdd_req()
+ - pata_legacy: fix a couple uninitialized variable bugs
+ - drm/msm: Fix null pointer dereference on pointer edp
+ - drm/msm/dsi: fix off by one in dsi_bus_clk_enable error handling
+ - acpi/arm64: fix next_platform_timer() section mismatch error
+ - qed: Fix missing error code in qed_slowpath_start()
+ - r8152: select CRC32 and CRYPTO/CRYPTO_HASH/CRYPTO_SHA256
+---

Kelsey Skunberg <kelsey.skunberg@canonical.com> Fri, 26 Nov 2021 17:31:19 -0700

+linux (4.15.0-163.171) bionic; urgency=medium
+ * bionic/linux: 4.15.0-163.171 -proposed tracker (LP: #1949874)
+ * Packaging resync (LP: #1786013)
- [Packaging] update Ubuntu.md
- debian/dkms-versions -- update from kernel-versions (main/2021.11.08)

* Unable to build net/reuseport_bpf and other tests in ubuntu_kernel_selftests on Bionic with make command (LP: #1949889)
  - selftests: Fix loss of test output in run_kselftests.sh
  - selftests: Makefile set KSFT_TAP_LEVEL to prevent nested TAP headers
  - selftests: fix headers_install circular dependency
  - selftests: fix bpf build/test workflow regression when KBUILD_OUTPUT is set
  - selftests: vm: Fix test build failure when built by itself

* KVM emulation failure when booting into VM crash kernel with multiple CPUs (LP: #1948862)
  - KVM: x86: Properly reset MMU context at vCPU RESET/INIT

* aufs: kernel bug with apparmor and fuseblk (LP: #1948470)
  - SAUCE: aufs: bugfix, stop omitting path->mnt

* ebpf: bpf_redirect fails with ip6 gre interfaces (LP: #1947164)
  - net: handle ARPHRD_IP6GRE in dev_is_mac_header_xmit()

* require CAP_NET_ADMIN to attach N_HCI ldisc (LP: #1949516)
  - Bluetooth: hci_ldisc: require CAP_NET_ADMIN to attach N_HCI ldisc

* ACL updates on OCFS2 are not revalidated (LP: #1947161)
  - ocfs2: fix remounting needed after setfacl command

* ppc64 BPF JIT mod by 1 will not return 0 (LP: #1948351)
  - powerpc/bpf: Fix BPF_MOD when imm == 1

* Drop "UBUNTU: SAUCE: cachefiles: Page leaking in cachefiles_read_backing_file while vmscan is active" (LP: #1947709)
  - Revert "UBUNTU: SAUCE: cachefiles: Page leaking in cachefiles_read_backing_file while vmscan is active"
  - cachefiles: Fix page leak in cachefiles_read_backing_file while vmscan is active

* Some test in ubuntu_bpf test_verifier failed on i386 Bionic kernel (LP: #1788578)
  - bpf: fix context access in tracing progs on 32 bit archs

* test_bpf.sh from ubuntu_kernel_selftests.net from linux ADT test failure
  with linux4.15.0-149.153 i386 (Segmentation fault) (LP: #1934414)
  - selftests/bpf: make test_verifier run most programs
  - bpf: add couple of test cases for div/mod by zero
  - bpf: add further test cases around div/mod and others

* Bionic update: upstream stable patchset 2021-11-02 (LP: #1949512)
+ - usb: gadget: r8a66597: fix a loop in set_feature()
+ - usb: musb: tusb6010: uninitialized data in tusb_fifo_write_unaligned()
+ - cifs: fix incorrect check for null pointer in header_assemble
+ - xen/x86: fix PV trap handling on secondary processors
+ - usb-storage: Add quirk for ScanLogic SL11R-IDE older than 2.6c
+ - USB: serial: cp210x: add ID for GW Instek GDM-834x Digital Multimeter
+ - staging: greybus: uart: fix tty use after free
+ - Re-enable UAS for LaCie Rugged USB3-FW with fk quirk
+ - USB: serial: mos7840: remove duplicated 0xac24 device ID
+ - USB: serial: option: add Telit LN920 compositions
+ - USB: serial: option: remove duplicate USB device ID
+ - USB: serial: option: add device id for Foxconn T99W265
+ - mcb: fix error handling in mcb_alloc_bus()
+ - serial: mvebu-uart: fix driver's tx_empty callback
+ - net: hso: fix muxed tty registration
+ - bnxt_en: Fix TX timeout when TX ring size is set to the smallest
+ - net/mlx4_en: Don't allow aRFS for encapsulated packets
+ - scsi: iscsi: Adjust iface sysfs attr detection
+ - thermal/core: Potential buffer overflow in thermal_build_list_of_policies()
+ - irqchip/gic-v3-its: Fix potential VPE leak on error
+ - md: fix a lock order reversal in md_alloc
+ - blktrace: Fix uaf in blk_trace access after removing by sysfs
+ - net: macb: fix use after free on rmmod
+ - net: stmmac: allow CSR clock of 300MHz
+ - m68k: Double cast io functions to unsigned long
+ - xen/balloon: use a kernel thread instead a workqueue
+ - compiler.h: Introduce absolute_pointer macro
+ - net: i825xx: Use absolute_pointer for memcpy from fixed memory location
+ - sparc: avoid stringop-overread errors
+ - qnx4: avoid stringop-overread errors
+ - parisc: Use absolute_pointer() to define PAGE0
+ - arm64: Mark __stack_chk_guard as __ro_after_init
+ - alpha: Declare virt_to_phys and virt_to_bus parameter as pointer to volatile
+ - net: 6pack: Fix tx timeout and slot time
+ - spi: Fix tegra20 build with CONFIG_PM=n
+ - arm64: dts: marvell: armada-37xx: Extend PCIe MEM space
+ - PCI: aardvark: Fix checking for PIO Non-posted Request
+ - PCI: aardvark: Fix checking for PIO status
+ - xen/balloon: fix balloon kthread freezing
+ - qnx4: work around gcc false positive warning bug
+ - tty: Fix out-of-bound vmalloc access in imageblit
+ - cpufreq: schedutil: Use kobject release() method to free sugov_tunables
+ - cpufreq: schedutil: Destroy mutex before kobject_put() frees the memory
+ - mac80211: fix use-after-free in CCMP/GCMP RX
+ - ipvs: check that ip_vs_conn_tab_bits is between 8 and 20
+ - mac80211: Fix iee80211_amsdu_aggregate frag_tail bug
+ - mac80211: limit injected vht mcs/nss in iee80211_parse_tx_radiotap
+ - scvp: break out if skb_header_pointer returns NULL in scvp_rcv_ootb
+  - hwmon: (tmp421) fix rounding for negative values
+  - e100: fix length calculation in e100_get_regs_len
+  - e100: fix buffer overrun in e100_get_regs
+  - scsi: csiostor: Add module softdep on cxgb4
+  - af_unix: fix races in sk_peer_pid and sk_peer_cred accesses
+  - ipack: ipoctal: fix stack information leak
+  - ipack: ipoctal: fix tty registration race
+  - ipack: ipoctal: fix tty-registration error handling
+  - ipack: ipoctal: fix missing allocation-failure check
+  - ipack: ipoctal: fix module reference leak
+  - ext4: fix potential infinite loop in ext4_dx_readdir()
+  - net: udp: annotate data race around udp_sk(sk)->corkflag
+  - EDAC/synopsys: Fix wrong value type assignment for edac_mode
+  - ARM: 9077/1: PLT: Move struct plt_entries definition to header
+  - ARM: 9078/1: Add warn suppress parameter to arm_gen_branch_link()
+  - ARM: 9079/1: ftrace: Add MODULE_PLTS support
+  - ARM: 9098/1: ftrace: MODULE_PLT: Fix build problem without DYNAMIC_FTRACE
+  - arm64: Extend workaround for erratum 1024718 to all versions of Cortex-A55
+  - hso: fix bailout in error case of probe
+  - usb: hso: fix error handling code of hso_create_net_device
+  - usb: hso: remove the bailout parameter
+  - crypto: ccp - fix resource leaks in ccp_run_aes_gcm_cmd()
+  - HID: betop: fix slab-out-of-bounds Write in betop_probe
+  - netfilter: ipset: Fix oversized kvmalloc() calls
+  - HID: usbhid: free raw_report buffers in usbhid_stop
+  - cred: allow get_cred() and put_cred() to be given NULL.
+  - gpio: uniphier: Fix void functions to remove return value
+  - tty: synclink_gt, drop unneeded forward declarations
+  - tty: synclink_gt: rename a conflicting function name
+  - drm/amd/display: Pass PCI deviceid into DC
+  - hwmon: (tmp421) Replace S_<PERMS> with octal values
+  - hwmon: (tmp421) report /PVLD condition as fault
+  + * ACL updates on OCFS2 are not revalidated (LP: #1947161) // Bionic update:
+  + upstream stable patchset 2021-11-02 (LP: #1949512)
+  + - ocfs2: drop acl cache for directories too
+  + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 05 Nov 2021 12:22:08 +0100
+  +linux (4.15.0-162.170) bionic; urgency=medium
+  + * bionic/linux: 4.15.0-162.170 -proposed tracker (LP: #1947293)
+  + * Add final-checks to check certificates (LP: #1947174)
+  + - [Packaging] Add system trusted and revocation keys final check
+  + * CVE-2020-36385
+  + - RDMA/cma: Add missing locking to rdma_accept()
+ - RDMA/ucma: Fix the locking of ctx->file
+ - RDMA/ucma: Rework ucma_migrate_id() to avoid races with destroy
+ + * CVE-2021-28950
+ + - fuse: fix live lock in fuse_iget()
+ + + * CVE-2020-36322
+ + - fuse: fix bad inode
+ + + * Bionic update: upstream stable patchset 2021-10-13 (LP: #1947011)
+ + - rcu: Fix missed wakeup of exp_wq waiters
+ + - apparmor: remove duplicate macro list_entry_is_head()
+ + - crypto: talitos - fix max key size for sha384 and sha512
+ + - scctp: validate chunk size in __rcv_asconf_lookup
+ + - scctp: add param size validation for SCTP_PARAM_SET_PRIMARY
+ + - dmaengine: acpi: Avoid comparison GSI with Linux vIRQ
+ + - thermal/drivers/exynos: Fix an error code in exynos_tmu_probe()
+ + - 9p/trans_virtio: Remove sysfs file on probe failure
+ + - prctl: allow to setup brk for et_dyn executables
+ + - profiling: fix shift-out-of-bounds bugs
+ + - pwm: lpc32xx: Don't modify HW state in .probe() after the PWM chip was registered
+ + - Kconfig.debug: drop selecting non-existing HARDLOCKUP_DETECTOR_ARCH
+ + - parisc: Move pci_dev_is_behind_card_dino to where it is used
+ + - dmaengine: ioat: depends on !UML
+ + - dmaengine: xilinx_dma: Set DMA mask for coherent APIs
+ + - ceph: lockdep annotations for try_nonblocking_invalidate
+ + - nilfs2: fix memory leak in nilfs_sysfs_create_device_group
+ + - nilfs2: fix NULL pointer in nilfs_##name##_attr_release
+ + - nilfs2: fix memory leak in nilfs_sysfs_create_##group
+ + - nilfs2: fix memory leak in nilfs_sysfs_delete_##group
+ + - nilfs2: fix memory leak in nilfs_sysfs_create_snapshot_group
+ + - nilfs2: fix memory leak in nilfs_sysfs_delete_snapshot_group
+ + - pwm: rockchip: Don't modify HW state in .remove() callback
+ + - blk-throttle: fix UAF by deleting timer in blk_throtl_exit()
+ + - drm/nouveau/nvkm: Replace -ENOSYS with -ENODEV
+ + - nilfs2: use refcount_dec_and_lock() to fix potential UAF
+ + - drivers: base: cacheinfo: Get rid of DEFINE_SMP_CALL_CACHE_FUNCTION()
+ + + * Invalid backport to v4.15: missing pgtable_l5_enabled (LP: #1946464)
+ + - SAUCE: Revert "x86/mm: Don't free P4D table when it is folded at runtime"
+ + + * CVE-2021-38199
+ + - NFSv4: Initialise connection to the server in nfs4Alloc_client()
+ + + * CVE-2019-19449
+ + - i2fs: fix wrong total_sections check and fsmeta check
+ + - i2fs: fix to do sanity check on segment/section count
+ * vrf: fix refcnt leak with vxlan slaves (LP: #1945180)
+ - ipv4: Fix device used for dst_alloc with local routes
+
+ * Check for changes relevant for security certifications (LP: #1945989)
+ - [Packaging] Add a new fips-checks script
+ - [Packaging] Add fips-checks as part of finalchecks
+
+ * CVE-2021-3759
+ - memcg: enable accounting of ipc resources
+
+ * Bionic update: upstream stable patchset 2021-09-27 (LP: #1945224)
+ - ARC: Fix CONFIG_STACKDEPOT
+ - can: usb: esd_usb2: esd_usb2_rx_event(): fix the interchange of the CAN RX
+ and TX error counters
+ - Revert "USB: serial: ch341: fix character loss at high transfer rates"
+ - USB: serial: option: add new VID/PID to support Fibocom FG150
+ - usb: dwc3: gadget: Fix dwc3_calc_trbs_left()
+ - usb: dwc3: gadget: Stop EP0 transfers during pullup disable
+ - Ib/hfi1: Fix possible null-pointer dereference in _extend_sdma_tx_descs()
+ - e1000e: Fix the max snoop/no-snoop latency for 10M
+ - ip_ipt: add validation for csum_start
+ - xgene-v2: Fix a resource leak in the error handling path of `xge_probe()'
+ - net: marvell: fix MVNETA_TX_IN_PRGRS bit number
+ - usb: gadget: u_audio: fix race condition on endpoint stop
+ - opp: remove WARN when no valid OPPs remain
+ - virtio: Improve vq->broken access to avoid any compiler optimization
+ - vringl: Use wiov->used to check for read/write desc order
+ - drm: Copy drm_wait_vblank to user before returning
+ - drm/nouveau/disp: power down unused DP links during init
+ - net/rdc: dma_map_sg is entitled to merge entries
+ - vt_kdsetmode: extend console locking
+ - fbmem: add margin check to fb_check_caps()
+ - KVM: x86/mm: Treat NX as used (not reserved) for all !TDP shadow MMUs
+ - Revert "floppy: reintroduce O_NDELAY fix"
+ - net: qtrt: fix another OOB Read in qrtr_endpoint_post
+ - net: hns3: fix get wrong pfc_en when query PFC configuration
+ - xtensa: fix kconfig unmet dependency warning for HAVE_FUTEX_CMPXchg
+ - qed: Fix the VF msix vectors flow
+ - net: macb: Add a NULL check on desc_ptp
+ - qed: Fix memset corruption
+ - perf/x86/intel/pt: Fix mask of num_address_ranges
+ - perf/x86/amd/ibs: Work around erratum #1197
+ - cryptoloop: add a deprecation warning
+ - ARM: 8918/2: only build return_address() if needed
+ - ALSA: pcm: fix divide error in snd_pcm_lib_iocctl
+ - clk: fix build warning for orphan_list
+ - media: stkvideo: fix memory leak in stk_camera_probe
+ - igmp: Add ip_mc_list lock in ip_check_mc_rcu
+ - USB: serial: mos7720: improve OOM-handling in read_mos_reg()
+ - i2fs: fix potential overflow
+ - ath10k: fix recent bandwidth conversion bug
+ - ipv4/icmp: 13mdev: Perform icmp error route lookup on source device routing
+  table (v2)
+ - crypto: talitos - reduce max key size for SEC1
+ - powerpc/module64: Fix comment in R_PPC64_ENTRY handling
+ - powerpc/boot: Delete unneeded .globl _zimage_start
+ - net: ll_temac: Remove left-over debug message
+ - mm/page_alloc: speed up the iteration of max_order
+ - Revert "btrfs: compression: don't try to compress if we don't have enough
+  pages"
+ - usb: host: xhci-rcar: Don't reload firmware after the completion
+ - x86/reboot: Limit Dell Optiplex 990 quirk to early BIOS versions
+ - PCI: Call Max Payload Size-related fixup quirks early
+ - regmap: fix the offset of register error log
+ - crypto: mxs-decp - Check for DMA mapping errors
+ - power: supply: axp288_fuel_gauge: Report register-address on readb / writeb
  errors
+ - crypto: omap-sham - clear dma flags only after omap_sham_update_dma_stop()
+ - udf: Check LVID earlier
+ - isofs: joliet: Fix iocharset=utf8 mount option
+ - nvme-rdma: don't update queue count when failing to set io queues
+ - power: supply: max17042_battery: fix typo in MAx17042_TOFF
+ - s390/cio: add dev_busid sysfs entry for each subchannel
+ - libata: fix ata_host_start()
+ - crypto: qat - do not ignore errors from enable_vf2pf_comms()
+ - crypto: qat - handle both source of interrupt in VF ISR
+ - crypto: qat - fix reuse of completion variable
+ - crypto: qat - fix naming for init/shutdown VF to PF notifications
+ - crypto: qat - do not export adf_iov_putmsg()
+ - udf_get_extendedattr() had no boundary checks.
+ - m68k: emu: Fix invalid free in nfeth_cleanup()
+ - spi: spi-fsl-dspi: Fix issue with uninitialized dma_slave_config
+ - spi: spi-pic32: Fix issue with uninitialized dma_slave_config
+ - clocksources/drivers/sh_cmt: Fix wrong setting if don't request IRQ for clock
  source channel
+ - crypto: qat - use proper type for vf_mask
+ - certs: Trigger creation of RSA module signing key if it's not an RSA key
+ - soc: rockchip: ROCKCHIP_GRF should not default to y, unconditionally
+ - media: dvb-usb: fix uninit-value in dvb_usb_adapter_dvb_init
+ - media: dvb-usb: fix uninit-value in vp702x_read_mac_addr
+ - media: go7007: remove redundant initialization
+ - Bluetooth: sco: prevent information leak in sco_conn_defer_accept()
+ - tcp: seq_file: Avoid skipping sk during tcp_seq_last_pos
+ - net: cipso: fix warnings in netlbl_cipsov4_add_std
+ - i2c: highlander: add IRQ check
+ - PCI: PM: Avoid forcing PCI_D0 for wakeup reasons inconsistently
+ - PCI: PM: Enable PME if it can be signaled from D3cold
+ - soc: qcom: smsm: Fix missed interrupts if state changes while masked
+ - Bluetooth: increase BTNAMSIZ to 21 chars to fix potential buffer overflow
+ - arm64: dts: exynos: correct GIC CPU interfaces address range on Exynos7
+ - Bluetooth: fix repeated calls to sco_sock_kill
+ - drm/msm/dsi: Fix some reference counted resource leaks
+ - usb: gadget: udc: at91: add IRQ check
+ - usb: phy: fsl-usb: add IRQ check
+ - usb: phy: twl6030: add IRQ checks
+ - Bluetooth: Move shutdown callback before flushing tx and rx queue
+ - usb: host: ohci-tmio: add IRQ check
+ - usb: phy: tahvo: add IRQ check
+ - mce80211: Fix insufficient headroom issue for AMSDU
+ - usb: gadget: mv_u3d: request_irq() after initializing UDC
+ - Bluetooth: add timeout sanity check to hci_inquiry
+ - i2c: iop3xx: fix deferred probing
+ - i2c: s3c2410: fix IRQ check
+ - mmc: dw_mmc: Fix issue with uninitialized dma_slave_config
+ - mmc: moxart: Fix issue with uninitialized dma_slave_config
+ - CIFS: Fix a potentially linear read overflow
+ - i2c: mt65xx: fix IRQ check
+ - usb: ehci-orion: Handle errors of clk_prepare_enable() in probe
+ - usb: bdc: Fix an error handling path in 'bdc_probe()' when no suitable DMA
+ - config is available
+ - tty: serial: fsl_lpuart: fix the wrong mapbase value
+ - ath6kl: wmi: fix an error code in ath6kl_wmi_sync_point()
+ - bcmn: Fix memory leak for internally-handled cores
+ - ipv4: make exception cache less predictable
+ - net: sched: Fix qdisc_rate_table refcount leak when get tcf_block failed
+ - net: qualcomm: fix QCA7000 checksum handling
+ - netns: protect netns ID lookups with RCU
+ - tty: Fix data race between tciocti() and flush_to_ldisc()
+ - x86/resctrl: Fix a maybe-uninitialized build warning treated as error
+ - KVM: x86: Update vCPU’s hv_clock before back to guest when tsc_offset is adjusted
+ - IMA: remove -Wmissing-prototypes warning
+ - backlight: pwm_bl: Improve bootloader/kernel device handover
+ - clk: kirkwood: Fix a clocking boot regression
+ - fbmem: don’t allow too huge resolutions
+ - rtc: tsps65910: Correct driver module alias
+ - blk-zoned: allow zone management send operations without CAP_SYS_ADMIN
+ - blk-zoned: allow BLKREPORTZONE without CAP_SYS_ADMIN
+ - PCI/MSI: Skip masking MSI-X on Xen PV
+ - powerpc/perf/hv-gpci: Fix counter value parsing
+ - xen: fix setting of max_pfn in shared_info
+ - include/linux/list.h: add a macro to test if entry is pointing to the head
+ - 9p/xen: Fix end of loop tests for list_for_each_entry
+ - soc: aspeed: lpc-ctrl: Fix boundary check for mmap
+ - crypto: public_key: fix overflow during implicit conversion
+ - block: bfq: fix bfq_set_next_ioprio_data()
+ - power: supply: max17042: handle fails of reading status register
+ - dm crypt: Avoid percpu_counter spinlock contention in crypt_page_alloc()
+ - VMCI: fix NULL pointer dereference when unmapping queue pair
+ - media: uvc: don't do DMA on stack
+ - media: re-loopback: return number of emitters rather than error
+ - libata: add ATA_HORkAGE_NO_NCQ_TRIM for Samsung 860 and 870 SSDs
+ - ARM: 9105/1: atags_to_fdt: don't warn about stack size
+ - PCI: Restrict ASMedia ASM1062 SATA Max Payload Size Supported
+ - PCI: Return ~0 data on pciconfig_read() CAP_SYS_ADMIN failure
+ - PCI: xilinx-nwl: Enable the clock through CCF
+ - PCI: aardvark: Increase polling delay to 1.5s while waiting for PIO response
+ - HID: input: do not report stylus battery state as "full"
+ - RDMA/iwcm: Release resources if iw_cm module initialization fails
+ - docs: Fix infiniband uverbs minor number
+ - pinctrl: samsung: Fix pinctrl bank pin count
+ - vfio: Use config not menuconfig for VFIO NOIOMMU
+ - openrisc: don't printk() unconditionally
+ - pinctrl: single: Fix error return code in pcs_parse_bits_in_pinctrl_entry()
+ - scsi: qedi: Fix error codes in qedi_alloc_global_queues()
+ - MIPS: Malta: fix alignment of the devicetree buffer
+ - media: dib8000: rewrite the init prbs logic
+ - crypto: mxs-dcp: Use sg_mapping_iiter to copy data
+ - PCI: Use pci_update_current_state() in pci_enable_device_flags()
+ - iio: dac: ad5624r: Fix incorrect handling of an optional regulator.
+ - ARM: dts: qcom: apq8064: correct clock names
+ - video: fbdev: kyro: fix a DoS bug by restricting user input
+ - netlink: Deal with ESRCM error in nlmsg_notify()
+ - Smack: Fix wrong semantics in smk_access_entry()
+ - usb: host: fotg210: fix the endpoint's transactional opportunities
+ - calculation
+ - usb: host: fotg210: fix the actual_length of an iso packet
+ - usb: gadget: u_ether: fix a potential null pointer dereference
+ - usb: gadget: composite: Allow bMaxPower=0 if self-powered
+ - staging: board: Fix uninitialized spinlock when attaching genpd
+ - tty: serial: jsm: hold port lock when reporting modem line changes
+ - bpf/tests: Fix copy-and-paste error in double word test
+ - bpf/tests: Do not PASS tests without actually testing the result
+ - video: fbdev: asilantf8: Error out if 'pixclck' equals zero
+ - video: fbdev: kyro: Error out if 'pixclck' equals zero
+ - video: fbdev: riva: Error out if 'pixclck' equals zero
+ - ipv4: ip_output.c: Fix out-of-bounds warning in ip_copy_addrss()
+ - flow_dissector: Fix out-of-bounds warnings
+ - s390/jump_label: print real address in a case of a jump label bug
+ - serial: 8250: Define RX trigger levels for OxSemi 950 devices
+ - xtcnsa: ISS: don't panic in rs_init
+ - hvsi: don't panic on tty_register_driver failure
+ - serial: 8250_pci: make setup_port() parameters explicitly unsigned
+ - staging: ks7010: Fix the initialization of the 'sleep_status' structure
+ - atal: sata_dwc_460ex: No need to call phy_exit() before phy_init()
+ - Bluetooth: skip invalid hci_sync_conn_complete_evt
+ - ASoC: Intel: byter_r5640: Move "Platform Clock" routes to the maps for the
  matching in-/output
+ - media: v4l2-dv-timings.c: fix wrong condition in two for-loops
+ - arm64: dts: qcom: sdmm660: use reg value for memory node
+ - net: ethernet: stmmac: Do not use unreachable() in ipq806x_gmac_probe()
+ - Bluetooth: avoid circular locks in sco_sock_connect
+ - gnu: drm: amd: amdgpu: amdgpu_i2c: fix possible uninitialized-variable
+ - access in amdgpu_i2c_router_select_ddc_port()
+ - ARM: tegra: tamonten: Fix UART pad setting
+ - rpc: fix gss_sve_init cleanup on failure
+ - staging: rts5208: Fix get_ms_information() heap buffer size
+ - gfs2: Don't call dlm after protocol is unmounted
+ - mmc: sdhci-of-arasan: Check return value of non-void funtions
+ - mmc: rt5_pci: Fix long reads when clock is prescaled
+ - selftests/bpf: Enlarge select() timeout for test_maps
+ - cifs: fix wrong release in sess_alloc_buffer() failed path
+ - Revert "USB: xhci: fix U1/U2 handling for hardware with XHCI_INTEL_HOST
  quirk set"
+ - usb: musb: musb_dsps: request_irq() after initializing musb
+ - ush: give back URBs for unsent unlink requests during cleanup
+ - ush:vhci_hcd USB port can get stuck in the disabled state
+ - ASoC: rockchip: i2s: Fix regmap_ops hang
+ - ASoC: rockchip: i2s: Fixup config for DAIFmt_DSP_A/B
+ - parport: remove non-zero check on count
+ - ath9k: fix OOB read ar93000_eeprom_restore_internal
+ - ath9k: fix sleeping in atomic context
+ - net: fix NULL pointer reference in cipso_v4_doi_free
+ - net: w5100: check return value after calling platform_get_resource()
+ - parisc: fix crash with signals and alloca
+ - scsi: BusLogic: Fix missing pr_cont() use
+ - scsi: qla2xxx: Sync queue idx with queue_pair_map idx
+ - cpufreq: powernv: Fix init_chip_info initialization in numa=off
+ - mm/hugetlb: initialize hugetlb usage in mm_init
+ - memcg: enable accounting for pids in nested pid namespaces
+ - platform/chrome: cros_ec_proto: Send command again when timeout occurs
+ - xen: reset legacy rtc flag for PV domU
+ - bnx2x: Fix enabling network interfaces without VFs
+ - PM: base: power: don't try to use non-existing RTC for storing data
+ - x86/mm: Fix kern_addr_valid() to cope with existing but not present entries
+ - net-caif: avoid user-triggerable WARN_ON(1)
+ - ptp: dp83640: don't define PAGE0
- net/l2tp: Fix reference count leak in l2tp_udp_recv_core
- r6040: Restore MDIO clock frequency after MAC reset
- tipc: increase timeout in tipc_skb_queue()
- events: Reuse value read using READ_ONCE instead of re-reading it
- net/af_unix: fix a data-race in unix_dgram_poll
- tcp: fix tp->undo_retrans accounting in tcp_sacktag_one()
- mm/memory_hotplug: use "unsigned long" for PFN in zone_for_pfn_range()
- dt-bindings: mtd: gpmc: Fix the ECC bytes vs. OOB bytes equation
- mfd: Don't use irq_create_mapping() to resolve a mapping
- PCI: Add ACS quirks for Cavium multi-function devices
- net: usb: cdc_mbim: avoid altsetting toggling for Telit LN920
- ethtool: Fix an error code in cxgb2.c
- PCI: Sync __pci_register_driver() stub for CONFIG_PCI=n
- mtd: raw NAND: cafe: Fix a resource leak in the error handling path of
  'cafe_nand_probe()'
- ARC: export clear_user_page() for modules
- net: dsa: b53: Fix calculating number of switch ports
- netfilter: socket: icmp6: fix use-after-scope
- qlcnic: Remove redundant unlock in qlcnic_pinit_from_rom
- net: renesas: sh_eth: Fix freeing wrong tx descriptor
- SUNRPC/nfs: Fix return value for nfs4_callback_compound()
- usb: mtu3: use @mult for HS isoc or intr
- usb: mtu3: fix the wrong HS mult value
- lib/mpi: use kcalloc in mpi_resize
- media: venus: venc: Fix potential null pointer dereference on pointer fmt
- platform/x86: dell-smbios-wmi: Add missing kfree in error-exit from
  run_smbios_call
- f2fs: fix to unmap pages from userspace process in punch_hole()
- userfaultfd: prevent concurrent API initialization
- arm64/sve: Use correct size when reinitialising SVE state
- perf machine: Initialize srcline string member in add_location struct
- net/mlx5: Fix potential sleeping in atomic context
- net: hns3: pad the short tunnel frame before sending to hardware
- mfd: axp20x: Update AXP288 volatile ranges
- KVM: arm64: Handle PSCI resets before userspace touches vCPU state
- ip_gre: validate csum resets before userspace touches vCPU state
- ip_gre: validate csum_start only on pull
- -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Mon, 18 Oct 2021 12:35:58 +0200
- linux (4.15.0-161.169) bionic; urgency=medium
  * bionic/linux: 4.15.0-161.169 -proposed tracker (LP: #1947358)
  * Bionic/linux-aws Boot failure downgrading from Bionic/linux-aws-5.4 on
    r5.metal (LP: #1946149)
  - SAUCE: Revert "PCI/MSI: Enforce MSI[X] entry updates to be visible"
  - SAUCE: Revert "PCI/MSI: Enforce that MSI-X table entry is masked for update"
+ -- Stefan Bader <stefan.bader@canonical.com> Fri, 15 Oct 2021 15:16:33 +0200
+
+linux (4.15.0-160.168) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-160.168 -proposed tracker (LP: #1944933)
+
+ * Packaging resync (LP: #1786013)
+ - debian/dkms-versions -- update from kernel-versions (main/2021.09.27)
+
+ * ext4 journal recovery fails w/ data=journal + mmap (LP: #1847340)
+ - jbd2: introduce/export functions
+  jbd2_journal_submit|finish_inode_data_buffers()
+ - jbd2, ext4, ocfs2: introduce/use journal callbacks
+  j_submit|finish_inode_data_buffers()
+ - ext4: data=journal: fixes for ext4_page_mkwrite()
+ - ext4: data=journal: write-protect pages on j_submit_inode_data_buffers()
+ - ext4: fix mmap write protection for data=journal mode
+
+ * CVE-2021-40490
+ - ext4: fix race writing to an inline_data file while its xattrs are changing
+
+ * Bionic update: upstream stable patchset 2021-09-22 (LP: #1944600)
+ - iio: humidity: hdc100x: Add margin to the conversion time
+ - iio: adc: Fix incorrect exit of for-loop
+ - ASoC: intel: atom: Fix reference to PCM buffer address
+ - i2c: dev: zero out array used for i2c reads from userspace
+ - ACPI: NFIT: Fix support for virtual SPA ranges
+ - ASoC: cs42412: Correct definition of ADC Volume control
+ - ASoC: cs42412: Don't allow SND_SOC_DAIFMT_LEFT_J
+ - ASoC: cs42412: Fix inversion of ADC Notch Switch control
+ - ASoC: cs42412: Remove duplicate control for WNF filter frequency
+ - net: dsa: mt7530: add the missing RxUnicast MIB counter
+ - ppp: Fix generating ifname when empty IFLA_IFNAME is specified
+ - psample: Add a fwd declaration for skbuff
+ - net: Fix memory leak inieee802154_raw_deliver
+ - net: bridge: fix memleak in br_add_if()
+ - tcp_bbr: fix u32 wrap bug in round logic if bbr_init() called after 2B
+ - packets
+ - xen/events: Fix race in set_evtchn_to_irq
+ - vsoc/virtio: avoid potential deadlock when vsoc device remove
+ - powerpc/kprobes: Fix kprobe Oops happens in booke
+ - x86/tools: Fix objdump version check again
+ - x86/resctrl: Fix default monitoring groups reporting
+ - PCI/MSI: Enable and mask MSI-X early
+ - PCI/MSI: Do not set invalid bits in MSI mask
+ - PCI/MSI: Correct misleading comments
+ - PCI/MSI: Use msi_mask_irq() in pci_msi_shutdown()
+ - PCI/MSI: Protect msi_desc::masked for multi-MSI
+ - PCI/MSI: Mask all unused MSI-X entries
+ - PCI/MSI: Enforce that MSI-X table entry is masked for update
+ - PCI/MSI: Enforce MSI[X] entry updates to be visible
+ - vmlinux.lds.h: Handle clang's module.{c,d}tor sections
+ - mac80211: drop data frames without key on encrypted links
+ - x86/fpu: Make init fpstate correct with optimized XSAVE
+ - ath: Use safer key clearing with key cache entries
+ - ath9k: Clear key cache explicitly on disabling hardware
+ - ath: Export ath_hw_keysetmac()
+ - ath: Modify ath_key_delete() to not need full key entry
+ - ath9k: Postpone key cache entry deletion for TX frames reference it
+ - dmaengine: usb-dmac: Fix PM reference leak in usb_dmac_probe()
+ - ARM: dts: am43x-epos-evm: Reduce i2c0 bus speed for tsp5218
+ - dmaengine: of-dma: ofdma: router_xlate to return -EPROBE_DEFER if controller is not yet available
+ - scsi: megaraid_mm: Fix end of loop tests for list_for_each_entry()
+ - scsi: scsi dh rdac: Avoid crash during rdac_bus_attach()
+ - scsi: core: Avoid printing an error if target_alloc() returns -ENXIO
+ - ARM: dts: nomadik: Fix up interrupt controller node names
+ - net: usb: lan78xx: don't modify phy_device state concurrently
+ - Bluetooth: hidp: use correct wait queue when removing ctrl_wait
+ - dcep: add do-while-0 stubs for dcep_pr_debug macros
+ - vhost: Fix the calculation in vhost_overflow()
+ - bnxt: don't lock the tx queue from napi poll
+ - ptp_pch: Restore dependency on PCI
+ - net: qlcnic: add missed unlock in qlcnic_83xx_flash_read32
+ - net: mdo-mux: Don't ignore memory allocation errors
+ - net: mdo-mux: Handle -EPROBE_DEFER correctly
+ - mmc: dw_mmc: Fix hang on data CRC error
+ - ALSA: hda - fix the 'Capture Switch' value change notifications
+ - ipack: tpci200: fix many double free issues in tpci200_pci_probe
+ - btrfs: prevent rename2 from exchanging a subvol with a directory from different parents
+ - ASoC: intel: atom: Fix breakage for PCM buffer address setup
+ - locks: print a warning when mount fails due to lack of "mand" support
+ - fs: warn about impending deprecation of mandatory locks
+ - netfilter: nft_exthdr: fix endianness of tcp option cast
+ - KVM: X86: MMU: Use the correct inherited permissions to get shadow page
+ - ASoC: cs42142: Fix LRCLK frame start edge
+ - net: igmp: fix data-race in igmp_ifc_timer_expire()
+ - net: dsa: lan9303: fix broken backpressure in .port_fdb_dump
+ - genirq: Provide IRQCHIP AFFINITY_PRE_STARTUP
+ - x86/msi: Force affinity setup before startup
+ - x86/ioapic: Force affinity setup before startup
+ - genirq/msi: Ensure deactivation on teardown
+ + -- Stefan Bader <stefan.bader@canonical.com> Fri, 24 Sep 2021 14:37:18 +0200
+linux (4.15.0-159.167) bionic; urgency=medium
+
+ * Packaging resync (LP: #1786013)
+ - debian/dkms-versions -- update from kernel-versions (main/2021.09.06)
+
+ * dell300x: rsi wifi and bluetooth crash after suspend and resume
+ (LP: #1940488)
+ - Revert "rsi: Use resume_noirq for SDIO"
+
+ * LRMv5: switch primary version handling to kernel-versions data set
+ (LP: #1928921)
+ - [Packaging] switch to kernel-versions
+
+ * kvm_unit_tests: emulator test fails on 4.4 / 4.15 kernel, timeout
+ (LP: #1932966)
+ - kvm: Add emulation for movups/movupd
+
+ * memory leaking when removing a profile (LP: #1939915)
+ - security/apparmor/label.c: Clean code by removing redundant instructions
+ - apparmor: Fix memory leak of profile proxy
+
+ * ubuntu_kernel_selftests: memory-hotplug: avoid spamming logs with
dump_page() (LP: #1941829)
+ - selftests: memory-hotplug: avoid spamming logs with dump_page(), ratio limit
+ - hot-remove error test
+
+ * Bionic update: upstream stable patchset 2021-08-27 (LP: #1941916)
+ - btrfs: mark compressed range uptodate only if all bio succeed
+ - regulator: rt5033: Fix n_voltages settings for BUCK and LDO
+ - r8152: Fix potential PM refcount imbalance
+ - qed: fix possible unpaired spin_{un}lock_bh in _qed_mcp_cmd_and_union()
+ - net: Fix zero-copy head len calculation.
+ - Revert "Bluetooth: Shutdown controller after workqueues are flushed or
cancelled"
+ - KVM: do not allow mapping valid but non-reference-counted pages
+ - Revert "watchdog: iTCO_wdt: Account for rebooting on second timeout"
+ - spi: mediatek: Fix fifo transfer
+ - padata: validate cpumask without removed CPU during offline
+ - Revert "ACPI: Fix memory leak caused by _CID repair function"
+ - ALSA: seq: Fix racy deletion of subscriber
+ - clk: stm32f4: fix post divisor setup for I2S/SAI PLLs
+ - omap5-board-common: remove not physically existing vdds_1v8_main fixed-
regulator
+ - scsi: sr: Return correct event when media event code is 3
+ - media: videobuf2-core: dequeue if start_streaming fails
+ - net: natsemi: Fix missing pci_disable_device() in probe and remove
+ - nfp: update ethtool reporting of pauseframe control
+ - mips: Fix non-POSIX regexp
+ - bnx2x: fix an error code in bnx2x_nic_load()
+ - net: pegasus: fix uninit-value in get_interrupt_interval
+ - net: fec: fix use-after-free in fec_drv_remove
+ - net: vxge: fix use-after-free in vxge_device_unregister
+ - Bluetooth: defer cleanup of resources in hci_unregister_dev()
+ - USB: usbtmc: Fix RCU stall warning
+ - USB: serial: option: add Telit FD980 composition 0x1056
+ - USB: serial: ch341: fix character loss at high transfer rates
+ - usb: gadget: f_hid: added GET_IDLE and SET_IDLE handlers
+ - usb: gadget: f_hid: fixed NULL pointer dereference
+ - usb: gadget: f_hid: idle uses the highest byte for duration
+ - usb: otg-fsm: Fix hrtimer list corruption
+ - scripts/tracing: fix the bug that can't parse raw_trace_func
+ - staging: rtl8723bs: Fix a resource leak in sd_int_dpc
+ - media: rtl28xxu: fix zero-length control request
+ - pipe: increase minimum default pipe size to 2 pages
+ - ext4: fix potential htree corruption when growing large_dir directories
+ - serial: 8250: Mask out floating 16/32-bit bus bits
+ - MIPS: Malta: Do not byte-swap accesses to the CBUS UART
+ - pcmcia: i82092: fix a null pointer dereference bug
+ - spi: meson-spice: fix memory leak in meson_spice_remove
+ - perf/x86/amd: Don't touch the AMD64_EVENTSEL_HOSTONLY bit inside the guest
+ - qmi_wwan: add network device usage statistics for qnimux devices
+ - libata: fix ata_pio_sector for CONFIG_HIGHMEM
+ - reiserfs: add check for root_inode in reiserfs_fill_super
+ - reiserfs: check directory items on read from disk
+ - alpha: Send stop IPI to send to online CPUs
+ - net/qla3xxx: fix schedule while atomic in ql_wait_for_drvr_lock and
+ - ql_adapter_reset
+ - USB:ehci:fix Kunpeng920 ehci hardware problem
+ - ppp: Fix generating ppp unit id when ifname is not specified
+ - ovl: prevent private clone if bind mount is not allowed
+ - net: xilinx_emaclite: Do not print real IOMEM pointer
+ - KVM: x86: accept userspace interrupt only if no event is injected
+ - KVM: x86/mmu: Fix per-cpu counter corruption on 32-bit builds
+ - Bionic update: upstream stable patchset 2021-08-17 (LP: #1940315)
+ - selftest: fix build error in tools/testing/selftests/vm/userfaultfd.c
+ - KVM: x86: determine if an exception has an error code only when injecting
+ - it.
+ - net: split out functions related to registering inflight socket files
+ - [Config] updateconfigs for UNIX_SCM
+ - af_unix: fix garbage collect vs MSG_PEEK
+ - net/802/mrp: fix memleak in mrp_request_join()
+ - net/802/garp: fix memleak in garp_request_join()
+ - net: annotate data race around sk_ll_usec
+ - scpt: move 198 addresses from unusable to private scope
+ - hfs: add missing clean-up in hfs_fill_super
+ - hfs: fix high memory mapping in hfs_bnode_read
+ - hfs: add lock nesting notation to hfs_find_init
+ - ARM: dts: versatile: Fix up interrupt controller node names
+ - virtio_net: Do not pull payload in skb->head
+ - gro: ensure frag0 meets IP header alignment
+ - x86/kvm: fix vcpu-id indexed array sizes
+ - ocfs2: fix zero out valid data
+ - ocfs2: issue zeroout to EOF blocks
+ - can: raw: raw_setssockopt(): fix raw_rcv panic for sock UAF
+ - can: mbcu_usb_start(): add missing urb->transfer_dma initialization
+ - can: usb_8dev: fix memory leak
+ - can: ems_usb: fix memory leak
+ - can: esd_usb2: fix memory leak
+ - NIU: fix incorrect error return, missed in previous revert
+ - nfc: nfcism: fix use after free during module unload
+ - x86/asm: Ensure asm/proto.h can be included stand-alone
+ - cfg80211: Fix possible memory leak in function cfg80211_bss_update
+ - netfilter: conntrack: adjust stop timestamp to real expiry value
+ - netfilter: nft_nat: allow to specify layer 4 protocol NAT only
+ - tipc: fix sleeping in tipc accept routine
+ - mlx4: Fix missing error code in mlx4_load_one()
+ - net: llc: fix skb_over_panic
+ - net/mlx5: Fix flow table chaining
+ - scpt: fix return value check in __sctp_rcv_asconf_lookup
+ - tulip: windbond-840: Fix missing pci_disable_device() in probe and remove
+ - sis900: Fix missing pci_disable_device() in probe and remove
+ - can: hi311x: fix a signedness bug in hi3110_cmd()
+ - i40e: Fix log TC creation failure when max num of queues is exceeded
+ - i40e: Add additional info to PHY type error
+ * Bionic update: upstream stable patchset 2021-08-13 (LP: #1939913)
+ - ARM: dts: gemini: add device_type on pci
+ - ARM: dts: rockchip: fix pinctrl sleep nodename for rk3036-kylin and rk3288
+ - arm64: dts: rockchip: fix pinctrl sleep nodename for rk3399.dtsi
+ - ARM: dts: rockchip: Fix the timer clocks order
+ - ARM: dts: rockchip: Fix power-controller node names for rk3288
+ - arm64: dts: rockchip: Fix power-controller node names for rk3328
+ - reset: ti-syscon: fix to_ti_syscon_reset_data macro
+ - ARM: brcmstb: dts: fix NAND nodes names
+ - ARM: Cygnus: dts: fix NAND nodes names
+ - ARM: NSP: dts: fix NAND nodes names
+ - ARM: dts: BCM63xx: Fix NAND nodes names
+ - ARM: dts: imx6: phyFLEX: Fix UART hardware flow control
+ - ARM: imx: pm-imx5: Fix references to imx5_cpu_suspend_info
+ - ARM: dts: stm32: fix RCC node name on stm32f429 MCU
+ - arm64: dts: jun0: Update SCPI nodes as per the YAML schema
+ - arm64: dts: ls208xa: remove bus-num from dspi node
+ - thermal/core: Correct function name thermal_zone_device_unregister()
+ - kbuild: mkcompile_h: consider timestamp if KBUILD_BUILD_TIMESTAMP is set
+ - rtc: max77686: Do not enforce (incorrect) interrupt trigger type
+ - scsi: aic7xxx: Fix unintentional sign extension issue on left shift of u8
+ - scsi: libfc: Fix array index out of bound exception
+ - sched/fair: Fix CFS bandwidth hrtimer expiry type
+ - net: ipv6: fix return value of ip6_skb_dst_mtu
+ - netfilter: ctnetlink: suspicious RCU usage in ctnetlink_dump_helpinfo
+ - net: bridge: sync fdb to new unicast-filtering ports
+ - net: bcmgenet: Ensure all TX/RX queues DMAs are disabled
+ - net: moxa: fix UAF in moxart_mac_probe
+ - net: qcom/emac: fix UAF in emac_remove
+ - net: ti: fix UAF in tlan_remove_one
+ - net: send SYNACK packet with accepted fwmark
+ - net: validate lwtstate->data before returning from skb_tunnel_info()
+ - dma-buf/sync_file: Don't leak fences on merge failure
+ - tcp: annotate data races around tp->ntu_info
+ - ipv6: tcp: drop silly ICMPv6 packet too big messages
+ - igb: Fix use-after-free error during reset
+ - ixgbe: Fix an error handling path in 'ixgbe_probe()'
+ - igb: Fix an error handling path in 'igb_probe()'
+ - fm10k: Fix an error handling path in 'fm10k_probe()'
+ - e1000e: Fix an error handling path in 'e1000e_probe()'
+ - iavf: Fix an error handling path in 'iavf_probe()'
+ - igb: Check if num of q_vectors is smaller than max before array access
+ - perf probe: Fix dso->nsinfo refcounting
+ - perf lzma: Close lzma stream on exit
+ - perf test bpf: Free obj_buf
+ - perf probe-file: Delete namelist in del_events() on the error path
+ - spi: mediatek: fix fifo rx mode
+ - liquidio: Fix unintentional sign extension issue on left shift of u16
+ - s390/bpf: Perform r1 range checking before accessing jit->seen_reg[r1]
+ - net: fix uninit-value in caif_seqpkt_sendmsg
+ - net: decnet: Fix sleeping inside in af_decnet
+ - netrom: Decrease sock refcount when sock timers expire
+ - scsi: iscsi: Fix iface sysfs attr detection
+ - scsi: target: Fix protect handling in WRITE SAME(32)
+ - spi: cadence: Correct initialisation of runtime PM again
+ - Revert "USB: quirks: ignore remote wake-up on Fibocom L850-GL LTE modem"
+ - proc: Avoid mixing integer types in mem_rw()
+ - s390/fTRACE: fix ftrace_update_ftrace_func implementation
+ - ALSA: sb: Fix potential ABBA deadlock in CSP driver
+ - xhci: Fix lost USB 2 remote wake
+ - KVM: PPC: Book3S: Fix H_RTAS rets buffer overflow
+ - usb: hub: Disable USB 3 device initiated lpm if exit latency is too high
+ - USB: usb-storage: Add LaCie Rugged USB3-FW to IGNORE_UAS
+ - usb: max-3421: Prevent corruption of freed memory
+ - usb: renesas_usbhs: Fix superfluous irqs happen after usb_pkt_pop()
+ - USB: serial: option: add support for u-blox LARA-R6 family
+ - USB: serial: cp210x: fix comments for GE CS1000
+ - USB: serial: cp210x: add ID for CEL EM3588 USB ZigBee stick
+ - usb: dwc2: gadget: Fix sending zero length packet in DDMA mode.
+ - tracing: Fix bug in rb_per_cpu_empty() that might cause deadloop.
+ - media: ngene: Fix out-of-bounds bug in ngene_command_config_free_buf()
+ - ixgbe: Fix packet corruption due to missing DMA sync
+ - selftest: use mmap instead of posix_memalign to allocate memory
+ - drm: Return -ENOTTY for non-drm ioctls
+ - net: bcmgenet: ensure EXT_ENERGY_DET_MASK is clear
+ - iio: accel: bma180: Use explicit member assignment
+ - iio: accel: bma180: Fix BMA25x bandwidth register values
+ - btrfs: compression: don't try to compress if we don't have enough pages
+ - spi: spi-fsl-dspi: Fix a resource leak in an error handling path
+ - xhci: add xhci_get_virt_ep() helper
+ - bpftool: Properly close va_list 'ap' by va_end() on error
+ - net: ip_tunnel: fix mtu calculation for ETHER tunnel devices
+ - nvme-pci: do not call nvme_dev_remove_admin from nvme_remove
+ - perf dso: Fix memory leak in dso__new_map()
+ - net/tcp_fastopen: fix data races around tfo_active_disable_stamp
+ -- Kelsey Skunberg <kelsey.skunberg@canonical.com>  Mon, 20 Sep 2021 16:11:14 -0600
+linux (4.15.0-158.166) bionic; urgency=medium
+ * s390x BPF JIT vulnerabilities (LP: #1943960)
+ - SAUCE: s390/bpf: Fix 64-bit subtraction of the -0x80000000 constant
+ - SAUCE: s390/bpf: Fix optimizing out zero-extensions
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Fri, 17 Sep 2021 13:44:16 -0300
+linux (4.15.0-156.163) bionic; urgency=medium
+ * bionic/linux: 4.15.0-156.163 -proposed tracker (LP: #1940162)
+ * linux (LP: #1940564)
+ - SAUCE: Revert "scsi: core: Cap scsi_host cmd_per_lun at can_queue"
+ * fails to launch linux L2 guests on AMD (LP: #1940134) // CVE-2021-3653
+ - KVM: nSVM: avoid picking up unsupported bits from L2 in int_ctl
+ (CVE-2021-3653)
+ * fails to launch linux L2 guests on AMD (LP: #1940134)
+ - SAUCE: Revert "UBUNTU: SAUCE: KVM: nSVM: avoid picking up unsupported bits
+ from L2 in int_ctl"
+
++ Kelsey Skunberg <kelsey.skunberg@canonical.com> Thu, 19 Aug 2021 16:30:31 -0600
++
+linux (4.15.0-155.162) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-155.162 -proposed tracker (LP: #1939833)
+
+ * Packaging resync (LP: #1786013)
+ - debian/dkms-versions -- update from kernel-versions (main/2021.08.16)
+
+ * CVE-2021-3656
+ - SAUCE: KVM: nSVM: always intercept VMLOAD/VMSAVE when nested
+
+ * CVE-2021-3653
+ - SAUCE: KVM: nSVM: avoid picking up unsupported bits from L2 in int_ctl
+
+ * dev_forward_skb: do not scrub skb mark within the same name space
+ (LP: #1935040)
+ - dev_forward_skb: do not scrub skb mark within the same name space
+
+ * 'ptrace trace' needed to readlink() /proc/*/ns/* files on older kernels
+ (LP: #1890848)
+ - apparmor: fix ptrace read check
+
+ * Bionic update: upstream stable patchset 2021-08-03 (LP: #1938824)
+ - ALSA: usb-audio: fix rate on Ozone Z90 USB headset
+ - media: dvb-usb: fix wrong definition
+ - Input: usbtouchscreen - fix control-request directions
+ - net: can: ems_usb: fix use-after-free in ems_usb_disconnect()
+ - usb: gadget: eem: fix echo command packet response issue
+ - USB: cdc-acm: blacklist Heimann USB Appset device
+ - nfts: fix validity check for file name attribute
+ - iov_iter_fault_in_readable() should do nothing in xarray case
+ - Input: joydev - prevent use of not validated data in JSIOCSBTNMAP ioctl
+ - ARM: dts: at91: sama5d4: fix pinctrl muxing
+ - btrfs: send: fix invalid path for unlink operations after parent
+ orphanization
+ - btrfs: clear defrag status of a root if starting transaction fails
+ - ext4: cleanup in-core orphan list if ext4_truncate() failed to get a
+ transaction handle
+ - ext4: fix kernel infoleak via ext4_extent_header
+ - ext4: correct the cache_nr in tracepoint ext4_es_shrink_exit
+ - ext4: remove check for zero nr_to_scan in ext4_es_scan()
+ ext4: fix avfrees in find_group_orlov
+ ext4: use ext4_grp_locked_error in mb_find_extent
+ can: gw: synchronize rcu operations before removing gw job entry
+ can: peak_pciefd: pucan_handle_status(): fix a potential starvation issue in
+ TX path
+ SUNRPC: Fix the batch tasks count wraparound.
+ SUNRPC: Should wake up the privileged task firstly.
+ s390/cio: dont call css_wait_for_slow_path() inside a lock
+ rtc: stm32: Fix unbalanced clk_disable_unprepare() on probe error path
+ iio: ltr501: mark register holding upper 8 bits of ALS_DATA{0,1} and PS_DATA
  as volatile, too
+ iio: ltr501: ltr559: fix initialization of LTR501_ALS_CONTR
+ iio: ltr501: ltr501_read_ps(): add missing endianness conversion
+ -t: Add Option International GSM-Ready 56K/ISDN modem
+ -c: remove wrong GLOBETROTTER.cis entry
+ ath9k: Fix kernel NULL pointer dereference during ath_reset_internal()
+ sbd: Assign beacon rate settings to the correct rate_info descriptor field
+ seq_buf: Make trace_seq_putmem_hex() support data longer than 8
+ seq: check connected before queuing on fpq->io
+ -t: Make of_register_spi_device also set the fwnode
+ -c: spi-loopback-test: Fix 'tx_buf' might be 'rx_buf'
+ -c: spi-topcliff-pch: Fix potential double free in
  pch_spi_process_messages()
+ -t: omap-100k: Fix the length judgment problem
+ -t: crypto: nx - add missing MODULE_DEVICE_TABLE
+ -t: media: cpi2: fix memory leak in cpi2_usb_probe
+ -t: media: cobalt: fix race condition in setting HPD
+ -t: media: pvrusb2: fix warning in pvr2_i2c_core_done
+ -t: crypto: qat - check return code of qat_hal_rd_rd_regress()
+ -t: crypto: qat - remove unused macro in FW loader
+ -t: media: em28xx: Fix possible memory leak of em28xx struct
+ -t: media: v412-core: Avoid the dangling pointer in v412_fh_release
+ -t: media: bt8xx: Fix a missing check bug in bt878_probe
+ -t: media: st-hva: Fix potential NULL pointer dereferences
+ -t: media: dvd_usb: memory leak in cinergyt2_fe_attach
+ -t: mmc: via-sdmmc: add a check against NULL pointer dereference
+ -t: crypto: shash - avoid comparing pointers to exported functions under CFI
+ -t: media: dvb_net: avoid speculation from net slot
+ -t: media: siano: fix device register error path
+ -t: btrfs: fix error handling in __btrfs_update_delayed_inode
+ -t: btrfs: abort transaction if we fail to update the delayed inode
+ -t: btrfs: disable build on platforms having page size 256K
+ -t: regulator: da9052: Ensure enough delay time for .set_voltage_time_sel
+ -t: HID: do not use down_interruptible() when unbinding devices
+ -t: ACPI: processor idle: Fix up C-state latency if not ordered
+ -t: hv_utils: Fix passing zero to 'PTR_ERR' warning
+ - lib: vsprintf: Fix handling of number field widths in vsscanf
+ - ACPI: EC: Make more Asus laptops use ECDT _GPE
+ - block_dump: remove block_dump feature in mark_inode_dirty()
+ - fs: dlm: cancel work sync othercon
+ - random32: Fix implicit truncation warning in prandom_seed_state()
+ - fs: dlm: fix memory leak when fenced
+ - ACPI: Fix memory leak caused by _CID repair function
+ - ACPI: bus: Call kobject_put() in acpi_init() error path
+ - platform/x86: toshiba_acpi: Fix missing error code in
  toshiba_acpi_setup_keyboard()
+ - ACPI: tables: Add custom DSDT file as makefile prerequisite
+ - HID: wacom: Correct base usage for capacitive ExpressKey status bits
+ - ia64: mca_drv: fix incorrect array size calculation
+ - media: s5p_cec: decrement usage count if disabled
+ - crypto: ixp4xx - dma_unmap the correct address
+ - crypto: ux500 - Fix error return code in hash_hw_final()
+ - sata_highbank: fix deferred probing
+ - pata_rb532_cf: fix deferred probing
+ - media: i2c: change 'RST' to "RSET" to fix multiple build errors
+ - pata_octeon Cf: avoid WARN_ON() in ata_host_activate()
+ - crypto: ccp - Fix a resource leak in an error handling path
+ - pata_ep93xx: fix deferred probing
+ - media: exynos4-is: Fix a use after free in isp_video_release
+ - media: tc358743: Fix error return code in tc358743_probe_of()
+ - media: siano: Fix out-of-bounds warnings in smscore_load_firmware_family2()
+ - mmc: usdhifrol0: fix error return code in usdhif6_probe()
+ - media: s5p-g2d: Fix a memory leak on ctx->fh.m2m_ctx
+ - hwmon: (max31722) Remove non-standard ACPI device IDs
+ - hwmon: (max31790) Fix fan speed reporting for fan7..12
+ - btrfs: clear log tree recovering status if starting transaction fails
+ - spi: spi-sun6i: Fix chipselect/clock bug
+ - crypto: nx - Fix RCU warning in nx842_OF_upd_status
+ - ACPI: sysfs: Fix a buffer overrun problem with description_show()
+ - ocfs2: fix snprintf() checking
+ - net: pch_gbe: Propagate error from devm_gpio_request_one()
+ - drm/rockchip: cdn-dp-core: add missing clk_disable_unprepare() on error in
  cdn_dp_grf_write()
+ - ehea: fix error return code in ehea_restart_qps()
+ - RDMA/rxe: Fix failure during driver load
+ - drm: qxl: ensure surf.data is ininitialized
+ - wireless: carl9170: fix LEDs build errors & warnings
+ - brcmsmac: mac80211_if: Fix a resource leak in an error handling path
+ - ath10k: Fix an error code in ath10k_add_interface()
+ - netlabel: Fix memory leak in netlbl_mgmt_add_common
+ - netfilter: nft_exthdr: check for IPv6 packet before further processing
+ - samples/bpf: Fix the error return code of xdp_redirect's main()
+ - net: ethernet: aeroflex: fix UAF in greth_of_remove
+ - net: ethernet: ezchip: fix UAF in nps_enet_remove
+ - net: ethernet: ezchip: fix error handling
+ - pkt_sched: sch_qfq: fix qfq_change_class() error path
+ - vxlan: add missing rcu_read_lock() in neigh_reduce()
+ - net: bcmgenet: Fix attaching to PYH failed on RPi 4B
+ - i40e: Fix error handling in i40e_vsi_open
+ - Revert "ibmvnic: remove duplicate napi_schedule call in open function"
+ - Bluetooth: mgmt: Fix slab-out-of-bounds in tlv_data_is_valid
+ - writeback: fix obtain a reference to a freeing memcg css
+ - net: sched: fix warning in tcindex_alloc_perfect_hash
+ - tty: nozomi: Fix a resource leak in an error handling function
+ - mwifiex: re-fix for unaligned accesses
+ - iio: adis_buffer: do not return ints in irq handlers
+ - iio: accel: bma180: Fix buffer alignment in
  + iio_push_to_buffers_with_timestamp()
+ - iio: accel: bma220: Fix buffer alignment in
  + iio_push_to_buffers_with_timestamp()
+ - iio: accel: hid: Fix buffer alignment in
  + iio_push_to_buffers_with_timestamp()
+ - iio: accel: kxckj-1013: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: accel: stk8312: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: accel: stk8ba50: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: adc: ti-ads1015: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: adc: vf610: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: gyro: bmg160: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: humidity: am2315: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: prox: sr08: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: prox: pulsed-light: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: prox: as3935: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: light: isl29125: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: light: isl29125: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: light: tcs3414: Fix buffer alignment in
  + iio_push_toBuffers_with_timestamp()
+ - iio: potentiostat: Imp91000: Fix alignment of buffer in
  + iio_push_toBuffers_with_timestamp()
+ - ASoC: hisilicon: fix missing clk_disable_unprepare() on error in
  + hi6210.i2s_startup()
+ - Input: hil_kbd - fix error return code in hil_dev_connect()
+ - char: pcmcia: error out if 'num_bytes_read' is greater than 4 in
+ set_protocol()
+ - tty: nozomi: Fix the error handling path of 'nozomi_card_init()'
+ - scsi: FlashPoint: Rename si_flags field
+ - s390: appldata depends on PROC_SYSCTL
+ - eeprom: idt_89hpexx: Put fwnode in matching case during ->probe()
+ - iio: adc: mxx-lradc: Fix buffer alignment in
+ - iio_push_to_buffers_with_timestamp()
+ - staging: gdm724x: check for buffer overflow in gdm_lte_multi_sdut_pkt()
+ - staging: gdm724x: check for overflow in gdm_lte_netif_rx()
+ - ASoC: cs42l42: Correct definition of CS42L42_ADC_PDN_MASK
+ - of: Fix truncation of memory sizes on 32-bit platforms
+ - s390: appldata depends on PROC_SYSCTL
+ - eeprom: idt_89hpexx: Put fwnode in matching case during ->probe()
+ - phy: ti: dm816x: Fix the error handling path in 'dm816x_usb_phy_probe()
+ - extcon: sm5502: Drop invalid register write in sm5502_reg_data
+ - extcon: max98977: Add missing modalias string
+ - configfs: fix memleak in configfs_release_bin_file
+ - leds: as3645a: Fix error return code in as3645a_parse_node()
+ - leds: ktd2692: Fix an error handling path
+ - mm/huge_memory.c: don't discard hugepage if other processes are mapping it
+ - selftests/vm/pkeys: fix alloc_random_pkey() to make it really, really random
+ - mmc: vub3000: fix control-request direction
+ - scsi: core: Retry I/O for Notify (Enable Spinup) Required error
+ - drm/mxsfb: Don't select DRM_KMS_FB_HELPER
+ - drm/zte: Don't select DRM_KMS_FB_HELPER
+ - atm: iphase: Use proper accessor to BE data in pch_ptp_match()
+ - hugetlb: clear huge pte during flush function on mips platform
+ - atm: iphase: fix possible use-after-free in ia_module_exit()
+ - m1SDN: fix possible use-after-free in HFC_cleanup()
+ - atm: nicstar: Fix possible use-after-free in nicstar_cleanup()
+ - net: Treat __napi_schedule_irqoff() as __napi_schedule() on PREEMPT_RT
+ - reiserfs: add check for invalid 1st journal block
+ - drm/virtio: Fix double free on probe failure
+ - udf: Fix NULL pointer dereference in udf_symlink function
+ - e100: handle eeprom as little endian
+ - clk: renesas: r8a77995: Add ZA2 clock
+ - clk: tegra: Ensure that PLLU configuration is applied properly
+ - ipv6: use prandom_u32() for ID generation
+ - RDMA/cxgb4: Fix missing error code in create_qp()
+ - dm space maps: don't reset space map allocation cursor when committing
+ - virtio_net: Remove BUG() to avoid machine dead
+ - net: bcmgenet: check return value after calling platform_get_resource()
+ - net: nicrel: check return value after calling platform_get_resource()
+ - fjes: check return value after calling platform_get_resource()
+ - selinux: use __GFP_NOWARN with GFP_NOWAIT in the AVC
+ - xfrm: Fix error reporting in xfrm_state_construct.
+ - w1core/w112xx: Fix w112xx get_mac error if device is in ELP
+ - w11251: Fix possible buffer overflow in w11251_cmd_scan
- cw1200: add missing MODULE_DEVICE_TABLE
- atm: nicstar: use 'dma_free_coherent' instead of 'kfree'
- atm: nicstar: register the interrupt handler in the right place
- vsoc: notify server to shutdown when client has pending signal
- RDMA/rxe: Don't overwrite errno from ib_umem_get()
- iwlwifi: mvm: don't change band on bound PHY contexts
- sfc: avoid double pci_remove of VFs
- sfc: error code if SRIOV cannot be disabled
- wireless: xxt-spy: Fix out-of-bounds warning
- RDMA/cma: Fix rdma_resolve_route() memory leak
- Bluetooth: Fix the HCI to MGMT status conversion table
- Bluetooth: Shutdown controller after workqueues are flushed or cancelled
- Bluetooth: btusb: fix bt firmware downloading failure issue for qca bt soc.
- scctp: validate from_addr_param return
- scctp: add size validation when walking chunks
- fscrypt: don't ignore minor_hash when hash is 0
- bdi: Do not use freezable workqueue
- fuse: reject internalerrno
- powerpc/barrier: Avoid collision with clang's __lwsync macro
- usb: gadget: f_fsid: Fix setting of device and driver data cross-references
- drm/radeon: Add the missed drm_gem_object_put() in
- radeon_user_framebuffer_create()
- pinctrl/amd: Add device HID for new AMD GPIO controller
- mmc: sdhci: Fix warning message when accessing RPMB in HS400 mode
- mmc: core: core: clear flags before allowing to retune
- mmc: core: Allow UHS-I voltage switch for SDSC cards if supported
- ata: ahci_sunxi: Disable DIPM
-cpu/hotplug: Cure the cpusets trainwreck
- ASoC: tegra: Set driver_name=tegra for all machine drivers
- qemu_fw_cfg: Make fw_cfg_rev_attr a proper kobj_attribute
- ipmi/watchdog: Stop watchdog timer when the current action is 'none'
- power: supply: ab8500: Fix an old bug
- seq_buf: Fix overflow in seq_buf_putmem_hex()
- tracing: Simplify & fix saved_tgids logic
- ipack/carriers/tpci200: Fix a double free in tpci200_pci_probe
- dm btree remove: assign new_root only when removal succeeds
- media: dtv5100: fix control-request directions
- media: zr364xx: fix memory leak in zr364xx_start_readpipe
- media: gspca/sq905: fix control-request direction
- media: gspca/sunplus: fix zero-length control requests
- jfs: fix GPF in diFree
- smackfs: restrict bytes count in smk_set_cipso()
- KVM: x86: Use guest MAXPHYADDR from CPUID.0x8000_0008 iff TDP is enabled
- KVM: X86: Disable hardware breakpoints unconditionally before kvm_x86->run()
- scsi: core: Fix bad pointer dereference when ehandler kthread is invalid
- tracing: Do not reference char * as a string in histograms
- PCI: aardvark: Don't rely on jiffies while holding spinlock
- PCI: aardvark: Fix kernel panic during PIO transfer
+ - tty: serial: fsl_lpuart: fix the potential risk of division or modulo by zero
+ - misc/libasm/module: Fix two use after free in ibmasm_init_one
+ - Revert "ALSA: bebob/oxfw: fix Kconfig entry for Mackie d.2 Pro"
+ - w1: ds2438: fixing bug that would always get page0
+ - scsi: lpfc: Fix "Unexpected timeout" error in direct attach topology
+ - scsi: lpfc: Fix crash when lpfc_sli4_hba_setup() fails to initialize the SGIs
+ - scsi: core: Cap scsi_host cmd_per_lun at can_queue
+ - tty: serial: 8250: serial_cs: Fix a memory leak in error handling path
+ - Is/jfs: Fix missing error code in ImLogInit()
+ - scsi: iscsi: Add iscsi_cls_conn refcount helpers
+ - scsi: iscsi: Fix host->max_id use
+ - scsi: qedt: Fix null ref during abort handling
+ - mfd: da9052/stmpe: Add and modify MODULE_DEVICE_TABLE
+ - s390/scpl_vt220: fix console name to match device
+ - ALSA: sb: Fix potential double-free of CSP mixer elements
+ - powerpc/ps3: Add dma_mask to ps3_dma_region
+ - gpio: zynq: Check return value of pm_runtime_get_sync
+ - ALSA: ppc: fix error return code in snd_pmac_probe()
+ - selftests/powerpc: Fix "no_handler" EBB selftest
+ - ASoC: soc-core: Fix the error return code in
+ - snd_soc_of_parse_audio_routing()
+ - ALSA: bebob: add support for ToneWeal FW66
+ - usb: gadget: f_hid: fix endianness issue with descriptors
+ - usb: gadget: hid: fix error return code in hid_bind()
+ - powerpc/boot: Fixup device-tree on little endian
+ - backlight: lm3630a: Fix return code of .update_status() callback
+ - ALSA: hda: Add IRQ check for platform_get_irq()
+ - staging: rtl8723bs: fix macro value for 2.4Ghz only device
+ - intel_th: Wait until port is in reset before programming it
+ - i2c: core: Disable client irq on reboot/shutdown
+ - lib/decompress_unlz4.c: correctly handle zero-padding around initrds.
+ - pwm: spear: Don’t modify HW state in .remove callback
+ - power: supply: ab8500: Avoid NULL pointers
+ - power: supply: max17042: Do not enforce (incorrect) interrupt trigger type
+ - power: reset: gpio-poweroff: add missing MODULE_DEVICE_TABLE
+ - ARM: 9087/1: kprobes: test-thumb: fix for LLVM_IAS=1
+ - watchdog: Fix possible use-after-free in wdt_startup()
+ - watchdog: sc520_wdt: Fix possible use-after-free in wdt_turnoff()
+ - watchdog: Fix possible use-after-free by calling del_timer_sync()
+ - watchdog: iTCO_wdt: Account for rebooting on second timeout
+ - x86/fpu: Return proper error codes from user access functions
+ - orangefs: fix orangefs df output.
+ - ceph: remove bogus checks and WARN_ONs from ceph_set_page_dirty
+ - NFS: nfs_find_open_context() may only select open files
+ - power: supply: charger-manager: add missing MODULE_DEVICE_TABLE
+ - power: supply: ab8500: add missing MODULE_DEVICE_TABLE
+ - pwm: tegra: Don't modify HW state in .remove callback
+ - ACPI: AMBA: Fix resource name in /proc/iomem
+ - ACPI: video: Add quirk for the Dell Vostro 3350
+ - virtio-blk: Fix memory leak among suspend/resume procedure
+ - virtio_net: Fix error handling in virtnet_restore()
+ - virtio_console: Assure used length from device is limited
+ - f2fs: add MODULE_SOFTDEP to ensure crc32 is included in the initramfs
+ - PCI/sysfs: Fix dsm_label_ut16s_to_ut18s() buffer overrun
+ - power: supply: rt5033_battery: Fix device tree enumeration
+ - um: fix error return code in slip_open()
+ - um: fix error return code in winch_trampoline()
+ - watchdog: aspeed: fix hardware timeout calculation
+ - nfs: fix acl memory leak of posix_acl_create()
+ - ubifs: Set/Clear I_LINKABLE under i_lock for whiteout inode
+ - x86/fpu: Limit xstate copy size in xstatereg_set()
+ - ALSA: isa: Fix error return code in snd_cmi8330_probe()
+ - NFSv4/pNFS: Don't call _nfs4_pnfs_v3_ds_connect multiple times
+ - hexagon: use common DISCARDS macro
+ - reset: a10sr: add missing of_match_table reference
+ - ARM: dts: exynos: fix PWM LED max brightness on Odroid XU/XU3
+ - ARM: dts: exynos: fix PWM LED max brightness on Odroid XU4
+ - memory: atmel-ebi: add missing of_node_put for loop iteration
+ - rtc: fix snprintf() checking in is_rtc_hctosys()
+ - ARM: dt: r8a7779, marzen: Fix DU clock names
+ - ARM: dts: BCM5301X: Fixup SPI binding
+ - reset: bail if try_module_get() fails
+ - memory: fsl_ifc: fix leak of IO mapping on probe failure
+ - memory: fsl_ifc: fix leak of private memory on probe failure
+ - ARM: dts: am335x: align ti,pindir-d0-out-d1-in property with dt-shema
+ - scsi: be2iscsi: Fix an error handling path in beiscsi_dev_probe()
+ - mips: always link byteswap helpers into decompressor
+ - mips: disable branch profiling in boot/decompress.o
+ - MIPS: vdso: Invalid GIC access through VDSO
+ - net: bridge: multicast: fix PIM hello router port marking race
+ - ALSA: usb-audio: Fix OOB access at proc output
+ - iio: light: tcs3472: do not free unallocated IRQ
+ - rsi: fix AP mode with WPA failure due to encrypted EAPOL
+ - evm: Execute evm_inode_init_security() only when an HMAC key is loaded
+ - evm: fix writing <securityfs>/evm overflow
+ - wcn36xx: Move hal_buf allocation to devm_kmalloc in probe
+ - ssb: Fix error return code in ssb_bus_scan()
+ - bcmfmac: fix setting of station info chains bitmask
+ - ipv6: ethhdrs: do not blindly use init_net
+ - i40e: Fix autoneg disabling for non-10GBaseT links
+ - ipv6: fix out-of-bound access in ip6_parse_tlv()
+ - iio: light: tcs3472: Fix buffer alignment in
+   iio_push_to_buffers_with_timestamp()
+ - ASoC: rsnd: tidyup loop on rsnd_adg_clk_query()
+ - visorbus: fix error return code in visorchipset_init()
+ - serial: 8250: Actually allow UPF_MAGIC_MULTIPLIER baud rates
+ - powerpc: Offline CPU in stop_this_cpu()
+ - serial: mebu-uart: correctly calculate minimal possible baudrate
+ - arm64: dts: marvell: armada-37xx: Fix reg for standard variant of UART
+ - vfio/pci: Handle concurrent vma faults
+ - clocksource/arm_arch_timer: Improve Allwinner A64 timer workaround
+ - PCI: Leave Apple Thunderbolt controllers on for s2idle or standby
+ - media: subdev: disallow ioctl for saa6588/davinci
+ - PCI: iproc: Fix multi-MSI base vector number allocation
+ - PCI: iproc: Support multi-MSI only on uniprocessor kernel
+ - virtio_net: move tx_vq operation under tx queue lock
+ - ARM: dts: exynos: fix PWM LED max brightness on Odroid HC1
+ - ARM: dts: am437x: align ti,pindir-d0-out-d1-in property with dt-shema
+ + * Bionic update: upstream stable patchset 2021-07-20 (LP: #1936960)
+ + - include/linux/mmdebug.h: make VM_WARN* non-rvals
+ + - mm: add VM_WARN_ON_ONCE_PAGE() macro
+ + - mm/rmap: remove unneeded semicolon in page_not_mapped()
+ + - mm/rmap: use page_not_mapped in try_to_unmap()  
+ + - mm/thp: try_to_unmap() use TTU_SYNC for safe splitting
+ + - mm/thp: fix vma_address() if virtual address below file offset
+ + - mm/thp: fix page_address_in_vma() on file THP tails
+ + - mm: replace DEBUG_VM BUG with VM_WARN when unmap fails for split
+ + - mm: page_vma_mapped_walk(): use page for pvmw->page
+ + - mm: page_vma_mapped_walk(): settle PageHuge on entry
+ + - mm: page_vma_mapped_walk(): use pmde for *pvmw->pmd
+ + - mm: page_vma_mapped_walk(): prettify PVMW_MIGRATION block
+ + - mm: page_vma_mapped_walk(): crossing page table boundary
+ + - mm: page_vma_mapped_walk(): add a level of indentation
+ + - mm: page_vma_mapped_walk(): use goto instead of while (1)
+ + - mm: page_vma_mapped_walk(): get vma_address_end() earlier
+ + - mm/thp: fix page_vma_mapped_walk() if THP mapped by ptes
+ + - mm/thp: another PVMW_SYNC fix in page_vma_mapped_walk()
+ + - mm: futex: fix shared futex pgoff on shmem huge page
+ + - scsi: sr: Return appropriate error code when disk is ejected
+ + - drm/nouveau: fix dma_address check for CPU/GPU sync
+ + - kfifo: DECLARE_KIFO_PTR(fifo, u64) does not work on arm 32 bit
+ + - kthread_worker: split code for canceling the delayed work timer
+ + - kthread: prevent deadlock when kthread_mod_delayed_work() races with
+ + kthread_cancel_delayed_work_sync()
+ + - xen/events: reset active flag for lateeoi events later
+ + - ARM: dts: imx6qdl-sabresd: Remove incorrect power supply assignment
+ + - ARM: OMAP: replace setup_irq() by request_irq()
+ + - clocksource/drivers/timer-ti-dm: Add clockevent and clocksource support
+ + - clocksource/drivers/timer-ti-dm: Prepare to handle dra7 timer wrap issue
+ +
* Bionic update: upstream stable patchset 2021-07-14 (LP: #1936231)
* Revert "UBUNTU: SAUCE: Revert "proc: Check /proc/$pid/attr/ writes against file opener"
* proc: Track /proc/$pid/attr/ opener mm_struct
* net/ncf/rawsock.c: fix a permission check bug
* ASoC: sti-sas: add missing MODULE_DEVICE_TABLE
* isdn: mISDN: netjet: Fix crash in nj_probe:
* bonding: init notify_work earlier to avoid uninitialized use
* netlink: disable IRQs for netlink_lock_table()
* net: mdibus: get rid of a BUG_ON()
* cgroup: disable controllers at parse time
* q: handle VM suspension in stall detection
* net/qla3xxx: fix schedule while atomic in ql_sem_spinlock
* scsi: vmw_pvscsi: Set correct residual data length
* scsi: target: qla2xxx: Wait for stop_phase1 at WWN removal
* net: macb: ensure the device is available before accessing GEMGXL control registers
* net: appletalk: cops: Fix data race in cops_probe1
* MIPS: Fix kernel hang under FUNCTION_GRAPH_TRACER and PREEMPT_TRACER
* bnx2x: Fix missing error code in bnx2x_init_one()
* powerpc/fsl: set fsl,i2c-erratum-a004447 flag for P2041 i2c controllers
* powerpc/fsl: set fsl,i2c-erratum-a004447 flag for P1010 i2c controllers
* i2c: mpc: Make use of i2c_recover_bus()
* i2c: mpc: implement erratum A-004447 workaround
* drm: Fix use-after-free read in drm_getunique()
* drm: Lock pointer access in drm_master_release()
* kvm: avoid speculation-based attacks from out-of-range memslot accesses
* staging: rtl8723bs: Fix uninitialized variables
* btrfs: return value from btrfs_mark_extent_written() in case of error
* cgroup1: don't allow '\n' in renaming
* USB: f_ncm: ncm_bitrate (speed) is unsigned
* ush: dwc3: ep0: fix NULL pointer exception
* ush: typec: ucsi: Clear PPM capability data in ucsi_init() error path
* ush: gadget: f_fs: Ensure io_completion_wq is idle during unbind
* USB: serial: ftdi_sio: add NovaTech OrionMX product ID
* USB: serial: omninet: add device id for Zyxel Omni 56K Plus
* USB: serial: quatech2: fix control-request directions
* ush: gadget: eem: fix wrong eem header operation
* ush: fix various gadgets null ptr deref on 10gbps cabling.
* ush: fix various gadget panics on 10gbps cabling
* regulator: core: resolve supply for boot-on/always-on regulators
* regulator: max77620: Use device_set_of_node_from_dev()
* perf: Fix data race between pin_count increment/decrement
* NFS: Fix a potential NULL dereference in nfs_get_client()
* perf session: Correct buffer copying when peeking events
* kvm: fix previous commit for 32-bit builds
* NFS: Fix use-after-free in nfs4_init_client()
* NFSv4: nfs4_proc_set_acf needs to restore NFS_CAP_UIDGID_NOMAP on error.
+ - scsi: core: Fix error handling of scsi_host_alloc()
+ - scsi: core: Put .shost_dev in failure path if host state changes to RUNNING
+ - scsi: core: Only put parent device if host state differs from SHOST_CREATED
+ - ftrace: Do not blindly read the ip address in ftrace_bug()
+ - tracing: Correct the length check which causes memory corruption
+ - proc: only require mm_struct for writing
+ - scsi: bnx2fc: Return failure if io_req is already in ABTS processing
+ - ARM: dts: imx6qdl-sabresd: Assign corresponding power supply for LDOs
+ - usb: f_ncm: only first packet of aggregate needs to start timer
+ - RDMA/mlx4: Do not map the core_clock page to user space unless enabled
+ - vmlinux.lds.h: Avoid orphan section with !SMP
+ - sched/fair: Make sure to update tg contrib for blocked load
+ - net: ieee802154: fix null deref in parse dev addr
+ - HID: hid-sensor-hub: Return error for hid_set_field() failure
+ - HID: Add BUS_VIRTUAL to hid_connect logging
+ - HID: ushbid: fix info leak in hid_submit_ctl
+ - ARM: OMAP2+: Fix build warning when mmc_omap is not built
+ - HID: gt683r: add missing MODULE_DEVICE_TABLE
+ - gfs2: Fix use-after-free in gfs2_glock_shrink_scan
+ - scti: core: Fix warning on realtime kernels
+ - ethernet: myri10ge: Fix missing error code in myri10ge_probe()
+ - nvme-loop: reset queue count to 1 in nvme_loop_destroy_io_queues()
+ - nvme-loop: clear NVME_LOOP_Q_LIVE when nvme_loop_configure_admin_queue() fails
+ - nvme-loop: check for NVME_LOOP_Q_LIVE in nvme_loop_destroy_admin_queue()
+ - net/inet_config: Don't override command-line hostnames or domains
+ - rtnetlink: Fix missing error code in rtnl_bridge_notify()
+ - net/x25: Return the correct errno code
+ - net: Return the correct errno code
+ - fib: Return the correct errno code
+ - dmaengine: ALTERA_MSGDMA depends on HAS_IOMEM
+ - dmaengine: QCOM_HIDMA_MGMT depends on HAS_IOMEM
+ - dmaengine: stedma40: add missing iounmap() on error in d40_probe()
+ - mm/memory-failure: make sure wait for page writeback in memory_failure
+ - batman-adv: Avoid WARN_ON timing related checks
+ - net: ipconfig: fix possible use-after-free in smsc75xx_bind
+ - net: ipv4: fix memory leak in ip_mc_add1-src
+ - net/af_unix: fix a data-race in unix_dgram_sendmsg / unix_release_sock
+ - be2net: Fix an error handling path in 'be_probe()'
+ - net: hamradio: fix memory leak in mkiss_close
+ - net: cdc_eem: fix tx fixup skb leak
+ - icmp: don't send out ICMP messages with a source address of 0.0.0.0
+ - net: ethernet: fix potential use-after-free in ec_bhf_remove
+ - radeon: use memcpy_to/fromio for UVD fw upload
+ - hwmon: (scpi-hwmon) shows the negative temperature properly
+ - can: bcm: fix infoleak in struct bcm_msg_head
+ - can: mcba_usb: fix memory leak in mcba_usb
+ - usb: core: hub: Disable autosuspend for Cypress CY7C65632
+ - tracing: Do not stop recording cmdlines when tracing is off
+ - tracing: Do not stop recording comms if the trace file is being read
+ - tracing: Do no increment trace_clock_global() by one
+ - PCI: Mark TI C667X to avoid bus reset
+ - PCI: Mark some NVIDIA GPUs to avoid bus reset
+ - PCI: Add ACS quirk for Broadcom BCM57414 NIC
+ - PCI: Work around Huawei Intelligent NIC VF FLR erratum
+ - ARChv2: save ABI registers across signal handling
+ - dmaengine: pl330: fix wrong usage of spinlock flags in dma_cycle
+ - net: bridge: fix vlan tunnel dst null pointer dereference
+ - net: bridge: fix vlan tunnel dst refcnt when egressing
+ - mm/slub.c: include swab.h
+ - net: fec_ptp: add clock rate zero check
+ - can: bcm/raw/isotp: use per module netdevice notifier
+ - inet: use bigger hash table for IP ID generation
+ - usb: dwc3: core: fix kernel panic when do reboot
+ - x86/fpu: Reset state for all signal restore failures
+ - drm/nouveau: wait for moving fence after pinning v2
+ - drm/radeon: wait for moving fence after pinning
+ - ARM: 9081/1: fix gcc-10 thumb2-kernel regression
+ - Makefile: Move -Wno-unused-but-set-variable out of GCC only block
+ - MIPS: generic: Update node names to avoid unit addresses
+ - Revert "PCI: PM: Do not read power state in pci_enable_device_flags()"
+ - mac80211: remove warning in ieee80211_get_sband()
+ - cfg80211: call cfg80211_leave_ocb when switching away from OCB
+ - mac80211: drop multicast fragments
+ - ping: Check return value of function 'ping_queue_rcv_skb'
+ - inet: annotate date races around sk->sk_txhash
+ - net: caif: fix memory leak in ldisc_open
+ - net/packet: annotate accesses to po->bind
+ - net/packet: annotate accesses to po->ifindex
+ - r8152: Avoid memcpy() over-reading of ETH_SS_STATS
+ - sh_eth: Avoid memcpy() over-reading of ETH_SS_STATS
+ - r8169: Avoid memcpy() over-reading of ETH_SS_STATS
+ - net: qed: Fix memcpy() overflow of qed_dcbx_params()
+ - net: ll_temac: Avoid nndo_start_xmit returning NETDEV_TX_BUSY
+ - pinctrl: stm32: fix the reported number of GPIO lines per bank
+ - nilfs2: fix memory leak in nilfs_sysfs_delete_device_group
+ - f2c: robotfuzz-osif: fix control-request directions
+ - scsi: scsi_devinfo: Add blacklist entry for HPE OPEN-V
+ - net/mlx5e: Remove dependency in IPsec initialization flows
+ - net: add documentation to socket.c
+ - net: make get_net_ns return error if NET_NS is disabled
+ - net: qrtr: fix OOB Read in qrtr_endpoint_post
+ - ptp: ptp_clock: Publish scaled_ppm_to_ppb
+ - ptp: improve max_adj check against unreasonable values
+ - net: fec_ptp: fix issue caused by refactor the fec_devtype
+ - ASoC: rt5659: Fix the lost powers for the HDA header
+ - cfg80211: make certificate generation more robust
+ - mm/slub: clarify verification reporting
+ - net: ethtool: clear heap allocations for ethtool function
+ - PCI: Add AMD RS690 quirk to enable 64-bit DMA
+
+- Stefan Bader <stefan.bader@canonical.com> Fri, 13 Aug 2021 13:47:03 +0200
+
+linux (4.15.0-154.161) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-154.161 -proposed tracker (LP: #1938411)
+
+ * Potential reverts of 4.19.y stable changes in 18.04 (LP: #1938537)
+ - SAUCE: Revert "locking/mutex: clear MUTEX_FLAGS if wait_list is empty due to
  signal"
+ - SAUCE: Revert "drm/amd/amdgpu: fix refcount leak"
+
+ * Packaging resync (LP: #1786013)
+ - [Packaging] resync getabis
+ - [Packaging] update helper scripts
+ - update dkms package versions
+
+ * btrfs: Automatic balance returns -EUCLEAN and leads to forced readonly
  filesystem (LP: #1934709) // CVE-2019-19036
+ - btrfs: Validate child tree block's level and first key
+ - btrfs: Detect unbalanced tree with empty leaf before crashing btree
  operations
+
+ * btrfs: Automatic balance returns -EUCLEAN and leads to forced readonly
  filesystem (LP: #1934709)
+ - Revert "btrfs: Detect unbalanced tree with empty leaf before crashing btree
  operations"
+ - Revert "btrfs: Validate child tree block's level and first key"
+ - btrfs: Only check first key for committed tree blocks
+ - btrfs: Fix wrong first_key parameter in replace_path
+
+ * Enable fib-onlink-tests.sh and msg_zerocopy.sh in kselftests/net on Bionic
+ (LP: #1934759)
+ - selftests: Add fib-onlink-tests.sh to TEST_PROGS
+ - selftests: net: use TEST_PROGS_EXTENDED
+ - selftests/net: enable msg_zerocopy test
+ - SAUCE: selftests: Make fib-onlink-tests.sh executable

+ * Kernel oops due to uninitialized list on kernfs (kernfs_kill_sb)
+ (LP: #1934175)
+ - kernfs: deal with kernfs_fill_super() failures
+ - unfuck sysfs_mount()
+
+ * large_dir in ext4 broken (LP: #1933074)
+ - SAUCE: ext4: fix directory index node split corruption
+
+ * btrfs: Attempting to balance a nearly full filesystem with relocated root
+ nodes fails (LP: #1933172) // CVE-2019-19036
+ - btrfs: reloc: fix reloc root leak and NULL pointer dereference
+
+ * btrfs: Attempting to balance a nearly full filesystem with relocated root
+ nodes fails (LP: #1933172)
+ - Revert ”btrfs: reloc: fix reloc root leak and NULL pointer dereference”
+
+ * Pixel format change broken for Elgato Cam Link 4K (LP: #1932367)
+ - (upstream) media: uvcvideo: Fix pixel format change for Elgato Cam Link 4K
+
+ * Bionic update: upstream stable patchset 2021-06-23 (LP: #1933375)
+ - net: usb: cdc_ncm: don't spew notifications
+ - efi: Allow EFI_MEMORY_XP and EFI_MEMORY_RO both to be cleared
+ - efi: cper: fix snprintf() use in cper_dimm_err_location()
+ - vfio/pci: Fix error return code in vfio_ecap_init()
+ - vfio/pci: zap_vma_ptes() needs MMU
+ - vfio/platform: fix module_put call in error flow
+ - ipvs: ignore IP_VS_SVC_F_HASHED flag when adding service
+ - HID: pidff: fix error return code in hid_pidff_init()
+ - HID: i2c-hid: fix format string mismatch
+ - netfilter: nfnetlink_ethelper: hit EBUSY on updates if size mismatches
+ - iee802154: fix error return code in iee802154_add_iface()
+ - iee802154: fix error return code in iee802154_llsec_getparams()
+ - Bluetooth: fix the erroneous flush_work() order
+ - Bluetooth: use correct lock to prevent UAF of hdev object
+ - net: caif: added cfserl_release function
+ - net: caif: add proper error handling
+ - net: caif: fix memory leak in caif_device_notify
+ - net: caif: fix memory leak in cfusbl_device_notify
+ - ALSA: timer: Fix master timer notification
+ - ext4: fix bug on in ext4_es_cache_extent as ext4_split_extent_at failed
+ - pid: take a reference when initializing `cad_pid`
+ - ocfs2: fix data corruption by fallocate
+ - nfc: fix NULL ptr dereference in llcp_sock_getname() after failed connect
+ - btrfs: fix error handling in btrfs_del_csums
+ - btrfs: fixup error handling in fixup_inode_link_counts
+ - mm, hugetlb: fix simple resv_huge_pages underflow on UFFDIO_COPY
+ - selftests/bpf: make 'dubious pointer arithmetic' test useful
+ - bnxt_en: Remove the setting of dev_port.
+ - KVM: SVM: Truncate GPR value for DR and CR accesses in !64-bit mode
+ - sched/fair: Optimize select_idle_cpu
+ - xen-pciback: redo VF placement in the virtual topology
+ - ALSA: usb: update old-style static const declaration
+ - nl80211: validate key indexes for cfg80211_registered_device
+ - x86/apic: Mark _all_ legacy interrupts when IO/APIC is missing
+ - btrfs: return errors from btrfs_del_csums in cleanup_ref_head
+ - KVM: arm64: Fix debug register indexing

+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 30 Jul 2021 14:39:24 +0200
+ linux (4.15.0-153.160) bionic; urgency=medium
+ *
+ + bionic/linux: 4.15.0-153.160 -proposed tracker (LP: #1938319)
+ *
+ + * 4.15.0-151 is freezing various CPUs (LP: #1938013)
+ + - mac80211: fix memory corruption in EAPOL handling
+ *
+ -- Stefan Bader <stefan.bader@canonical.com> Thu, 29 Jul 2021 08:26:59 +0200
+ linux (4.15.0-151.157) bionic; urgency=medium
+ *
+ + * CVE-2021-33909
+ + - SAUCE: seq_file: Disallow extremely large seq buffer allocations
+ *
+ -- Thadeu Lima de Souza Cascando <cascardo@canonical.com> Fri, 09 Jul 2021 17:19:20 -0300
+ linux (4.15.0-150.155) bionic; urgency=medium
+ *
+ + * bionic/linux: 4.15.0-150.155 -proposed tracker (LP: #1934374)
+ *
+ + * lxd exec fails (LP: #1934187)
+ + - SAUCE: Revert "proc: Check /proc/$pid/attr/ writes against file opener"
+ *
+ -- Kelsey Skunberg <kelsey.skunberg@canonical.com> Sat, 03 Jul 2021 06:59:05 -0600
+ linux (4.15.0-149.153) bionic; urgency=medium
+ *
+ + * bionic/linux: 4.15.0-149.153 -proposed tracker (LP: #1933434)
+ *
+ + * selftests/bpf: test_verifier fixes (LP: #1933385)
+ + - bpf: Update selftests to reflect new error states
+  - bpf, selftests: Adjust few selftest result_unpriv outcomes
+  + CVE-2021-33200
+  - bpf: Fix mask direction swap upon off reg sign change
+  + -- Stefan Bader <stefan.bader@canonical.com> Thu, 24 Jun 2021 11:14:19 +0200
+  + linux (4.15.0-148.152) bionic; urgency=medium
+  +  * bionic/linux: 4.15.0-148.152 -proposed tracker (LP: #1932515)
+  +  * Packaging resync (LP: #1786013)
+  +  - update dkms package versions
+  +  * Upstream v5.9 introduced 'module' patches that removed exported symbols
+  +  (LP: #1932065)
+  +  - SAUCE: Revert "modules: inherit TAINT_PROPRIETARY_MODULE"
+  +  - SAUCE: Revert "modules: return licensing information from find_symbol"
+  +  - SAUCE: Revert "modules: rename the licence field in struct symsearch to license"
+  +  - SAUCE: Revert "modules: unexport __module_address"
+  +  - SAUCE: Revert "modules: unexport __module_text_address"
+  +  - SAUCE: Revert "modules: mark each_symbol_section static"
+  +  - SAUCE: Revert "modules: mark find_symbol static"
+  +  - SAUCE: Revert "modules: mark ref_module static"
+  +  * Disable hv-kvp-daemon.service on certain instance types (LP: #1932081)
+  +  - [Packaging]: Add kernel command line condition to hv-kvp-daemon service
+  +  * Bionic update: upstream stable patchset 2021-06-11 (LP: #1931740)
+  +  - openrisc: Fix a memory leak
+  +  - RDMA/rxe: Clear all QP fields if creation failed
+  +  - scsi: qla2xxx: Fix error return code in qla82xx_write_flash_dword()
+  +  - ptrace: make ptrace() fail if the tracee changed its pid unexpectedly
+  +  - cifs: fix memory leak in smb2_copychunk_range
+  +  - ALSA: line6: Fix racy initialization of LINE6 MIDI
+  +  - ALSA: usb-audio: Validate MS endpoint descriptors
+  +  - ALSA: bebob/oxfw: fix Kconfig entry for Mackie d.2 Pro
+  +  - Revert "ALSA: sb8: add a check for request_region"
+  +  - Revert "rapidio: fix a NULL pointer dereference when create_workqueue() fails"
+  +  - rapidio: handle create_workqueue() failure
+  +  - xen-peiwatch: reconfigure also from backend watch handler
+  +  - dm snapshot: fix crash with transient storage and zero chunk size
+  +  - Revert "video: hgifb: fix potential NULL pointer dereference"
+  +  - Revert "net: stmicro: fix a missing check of clk_prepare"
+  +  - Revert "leds: lp5523: fix a missing check of return value of lp55xx_read"
+  +  - Revert "hwmon: (lm80) fix a missing check of bus read in lm80 probe"
+ - Revert "video: imsttfb: fix potential NULL pointer dereferences"
+ - Revert "ecryptfs: replace BUG_ON with error handling code"
+ - Revert "gdrom: fix a memory leak bug"
+ - cdrom: gdrom: deallocate struct gdrom_unit fields in remove_gdrom
+ - cdrom: gdrom: initialize global variable at init time
+ - Revert "media: rcar_drif: fix a memory disclosure"
+ - Revert "rtlwifi: fix a potential NULL pointer dereference"
+ - Revert "qlcnic: Avoid potential NULL pointer dereference"
+ - Revert "niu: fix missing checks of niu_pci_eeprom_read"
+ - ethernet: sun: niu: fix missing checks of niu_pci_eeprom_read()
+ - net: stmicro: handle clk_prepare() failure during init
+ - net: rtlwifi: properly check for alloc_workqueue() failure
+ - leds: lp5523: check return value of lp5xx_read and jump to cleanup code
+ - qlcnic: Add null check after calling netdev_alloc_skb
+ - video: hgafb: fix potential NULL pointer dereference
+ - vgacon: Record video mode changes with VT_RESIZEX
+ - vt: Fix character height handling with VT_RESIZEX
+ - tty: vt: always invoke vc->vc_sw->con_resize callback
+ - video: hgafb: correctly handle card detect failure during probe
+ - Bluetooth: SMP: Fail if remote and local public keys are identical
+ - firmware: arm_scpi: Prevent the ternary sign expansion bug
+ - platform/x86: dell-smbios-wmi: Fix oops on rmmod dell_smbios
+ - locking/mutex: clear MUTEX_FLAGS if wait_list is empty due to signal
+ - ALSA: hda/realtek: Add some CLOVE SSIDs of ALC293
+ - Revert "serial: mvebu-uart: Fix to avoid a potential NULL pointer dereference"
+ - mm, vmstat: drop zone->lock in /proc/pagetypeinfo
+ - usb: dwc3: gadget: Enable suspend events
+ - NFC: nci: fix memory leak in nci_allocate_device
+ - NFSv4: Fix a NULL pointer dereference in pnfs_mark_matching_lsegs_return()
+ - iommu/vt-d: Fix sysfs leak in alloc_iommu()
+ - perf intel-pt: Fix sample instruction bytes
+ - perf intel-pt: Fix transaction abort handling
+ - proc: Check /proc/Spid/attr/ writes against file opener
+ - net: hso: fix control-request directions
+ - mac80211: assure all fragments are encrypted
+ - mac80211: prevent mixed key and fragment cache attacks
+ - mac80211: properly handle A-MSDUs that start with an RFC 1042 header
+ - cfg80211: mitigate A-MSDU aggregation attacks
+ - mac80211: drop A-MSDUs on old ciphers
+ - mac80211: add fragment cache to sta_info
+ - mac80211: check defrag PN against current frame
+ - mac80211: prevent attacks on TKIP/WEP as well
+ - mac80211: do not accept/forward invalid EAPOL frames
+ - ath10k: Validate first subframe of A-MSDU before processing the list
+ - dm snapshot: properly fix a crash when an origin has no snapshots
+ - kgdb: fix gcc-11 warnings harder
+ - misc/uss720: fix memory leak in uss720_probe
+ - thunderbolt: dma_port: Fix NVM read buffer bounds and offset issue
+ - mei: request autosuspend after sending rx flow control
+ - staging: iio: adc: ad7793: Add missing error code in ad7793_setup()
+ - USB: trancevibrator: fix control-request direction
+ - serial: sh-sci: Fix off-by-one error in FIFO threshold register setting
+ - serial: rp2: use 'request_firmware' instead of 'request_firmware_nowait'
+ - USB: serial: ti_usb_3410_5052: add startech.com device id
+ - USB: serial: option: add Telit LE910-S1 compositions 0x7010, 0x7011
+ - USB: serial: fttd_sio: add IDs for IDS GmbH Products
+ - USB: serial: pl2303: add device id for ADLINK ND-6530 GC
+ - usb: gadget: udc: renesas_usb3: Fix a race in usb3_start_pipen()
+ - net: usb: fix memory leak in smsc75xx_bind
+ - Bluetooth: cmtp: fix file refcount when cmtp_attach_device fails
+ - NFS: fix an incorrect limit in filelayout_decode_layout()
+ - NFS: Don't corrupt the value of pg_bytes_written in nfs_do_recoalesce()
+ - NFSv4: Fix v4.0/v4.1 SEEK_DATA return -ENOTSUPP when set NFS_V4_2 config
+ - drm/meson: fix shutdown crash when component not probed
+ - net/mlx4: Fix EEPROM dump support
+ - Revert "net tipc: Fix a double free in tipc_sk_mcast_rcv"
+ - tipc: skb_linearize the head skb when reassembling msgs
+ - i2c: s3c2410: fix possible NULL pointer deref on read message after write
+ - i2c: i801: Don't generate an interrupt on bus reset
+ - perf jevents: Fix getting maximum number of fds
+ - platform/x86: hp_accel: Avoid invoking _INI to speed up resume
+ - serial: max310x: unregister uart driver in case of failure and abort
+ - net: fujitsu: fix potential null-ptr-deref
+ - net: caif: remove BUG_ON(dev == NULL) in caif_xmit
+ - char: hpet: add checks after calling ioremap
+ - isdn: mISDNinfineon: check/cleanup ioremap failure correctly in setup_io
+ - dmaengine: qcom_hidma: comment platform_driver_register call
+ - libertas: register sysfs groups properly
+ - media: dvb: Add check on sp8870_readreg return
+ - media: gspca: properly check for errors in po1030_probe()
+ - scsi: BusLogic: Fix 64-bit system enumeration error for Buslogic
+ - openrisc: Define memory barrier mb
+ - btrfs: do not BUG_ON in link_to_fixup_dir
+ - platform/x86: hp-wireless: add AMD's hardware id to the supported list
+ - platform/x86: intel_punit_ipc: Append MODULE_DEVICE_TABLE for ACPI
+ - SMB3: incorrect file id in requests compounded with open
+ - drm/amdgp: Fix a use-after-free
+ - net: netcp: Fix an error message
+ - net: mdio: thunder: Fix a double free issue in the .remove function
+ - net: mdio: octeon: Fix some double free issues
+ - net: bnx2: Fix error return code in bnx2_init_board()
+ - mld: fix panic in mld_newpack()
+ - staging: emxx_udc: fix loop in _nbu2ss_nuke()
+ - ASoC: cs35133: fix an error code in probe()
+ - bpf: Set mac_len in bpf_skb_change_head
+ - ixgbe: fix large MTU request from VF
+ - scsi: libas: Use _safe() loop in sas_resume_port()
+ - ipv6: record frag_max_size in atomic fragments in input path
+ - sch_dsmark: fix a NULL deref in qdisc_reset()
+ - MIPS: alchemy: xxs1500: add gpio-au1000.h header file
+ - MIPS: ralink: export rt_sysc_membase for rt2880_wdt.c
+ - hugetlbfs: hugetlb_fault_mutex_hash() cleanup
+ - drivers/net/ethernet: clean up unused assignments
+ - ush: core: reduce power-on-good delay time of root hub
+ - USB: usbfs: Don't WARN about excessively large memory allocations
+ - bpf: extend is_branch_taken to registers
+ - bpf: Move off_reg into sanitize_ptr_alu
+ - bpf: Ensure off_reg has no mixed signed bounds for all types
+ - bpf: Rework ptr_limit into alu_limit and add common error path
+ - bpf: Improve verifier error messages for users
+ - bpf: Refactor and streamline bounds check into helper
+ - bpf: Move sanitize_val_alu out of op switch
+ - bpf: Tighten speculative pointer arithmetic mask
+ - bpf: Fix leakage of uninitialized bpf stack under speculation
+ - bpf: Wrap aux data inside bpfsanitize_info container
+ - bpf: No need to simulate speculative domain for immediates
+ - net: dsa: fix a crash if ->get_sset_count() fails
+ - drm/amd/amdgpu: fix refcount leak
+ - net: dsa: fix error code getting shifted with 4 in dsa_slave_get_sset_count
+ - openswistich: meter: fix race when getting now_ms.
+ - net: hns3: check the return of skb_checksum_help()

+ * Bionic update: upstream stable patchset 2021-06-11 (LP: #1931740) //
+ CVE-2020-24587 for such cases.
+ - mac80211: extend protection against mixed key and fragment cache attacks
+ * [82A1, Realtek ALC287, Speaker, Internal] Underruns, dropouts or crackling
+ sound (LP: #1925057) // Bionic update: upstream stable patchset 2021-06-11
+ (LP: #1931740)
+ - ALSA: hda/realtek: reset eapd coeff to default value for alc287
+ * test_map in ubuntu_bpf failed with "Allowed update sockmap '0:3' not in
+ ESTABLISHED" (LP: #1839912)
+ - SAUCE: Revert "bpf: test_maps, only support ESTABLISHED socks"
+ * Bionic update: upstream stable patchset 2021-06-01 (LP: #1930472)
+ - MIPS: Introduce isa-rev.h to define MIPS_ISA_REV
+ - MIPS: cpu-features.h: Replace __mips_isa_rev with MIPS_ISA_REV
+ - s390/disassembler: increase ebpf disasm buffer size
+ - ACPI: custom_method: fix potential use-after-free issue
+ - ACPI: custom_method: fix a possible memory leak
+ - arm64: dts: mt8173: fix property typo of 'phys' in dsi node
+ - ecryptfs: fix kernel panic with null dev_name
+ - spi: spi-ti-qspi: Free DMA resources
+ - mmc: block: Update ext_csd.cache.ctrl if it was written
+ - mmc: core: Do a power cycle when the CMD11 fails
+ - mmc: core: Set read only for SD cards with permanent write protect bit
+ - cifs: Return correct error code from smb2_get_enc_key
+ - btfrs: fix metadata extent leak after failure to create subvolume
+ - intel_th: pci: Add Rocket Lake CPU support
+ - fbdev: zero-fill color map in fbcmap.c
+ - staging: wimax/i2400m: fix byte-order issue
+ - crypto: api - check for ERR pointers in crypto_destroy_tfm()
+ - usb: gadget: uvc: add bInterval checking for HS mode
+ - usb: gadget: f_uac1: validate input parameters
+ - usb: dwc3: gadget: Ignore EP queue requests during bus reset
+ - usb: xhci: Fix port minor revision
+ - PCI: PM: Do not read power state in pci_enable_device_flags()
+ - x86/build: Propagate $(CLANG_FLAGS) to $(REALMODE_FLAGS)
+ - tee: optee: do not check memref size on return from Secure World
+ - perf/arm_pmu_platform: Fix error handling
+ - spi: dln2: Fix reference leak to master
+ - spi: omap-100k: Fix reference leak to master
+ - intel_th: Consistency and off-by-one fix
+ - phy: phy-tw4030-usb: Fix possible use-after-free in tw4030_usb_remove()
+ - btfrs: convert logic BUG_ON()'s in replace_path to ASSERT()'s
+ - scsi: lpfc: Fix incorrect dbde assignment when building target abts wqe
+ - scsi: lpfc: Fix pt2pt connection does not recover after LOGO
+ - scsi: target: pscsi: Fix warning in pscsi_complete_cmd()
+ - media: iie-cir: check for receive overflow
+ - power: supply: bq27xxx: fix power_avg for newer ICs
+ - extcon: arizona: Fix some issues when HPDET IRQ fires after the jack has been unplugged
+ - media: media/saa7164: fix saa7164_encoder_register() memory leak bugs
+ - media: gspca/sq905.c: fix uninitialized variable
+ - power: supply: Use IRQF_ONESHOT
+ - drm/amdGPU: Fix asic reset regression issue introduce by 8f211fe8ac7c4f
+ - scsi: qla2xxx: Always check the return value of qla24xx_get_isp_stats()
+ - scsi: qla2xxx: Fix use after free in bsg
+ - scsi: scsi_db_alua: Remove check for ASC 24h in alua_rtpg()
+ - media: em28xx: fix memory leak
+ - media: vivid: update EDID
+ - clk: socfpga: arria10: Fix memory leak of socfpga_clk on error return
+ - power: supply: generic-adc-battery: fix possible use-after-free in
+ - gab_remove()
+ - power: supply: s3c_adc_battery: fix possible use-after-free in
+ - s3c_adc_bat_remove()
+ - media: adv7604: fix possible use-after-free in adv76xx_remove()
+ - media: i2c: adv7511-v4l2: fix possible use-after-free in adv7511_remove()
+ - media: i2c: adv7842: fix possible use-after-free in adv7842_remove()
+ - media: dvb-usb: fix memory leak in dvb_usb_adapter_init
+ - media: gscpa/stv06xx: fix memory leak
+ - drm/msm/mdp5: Configure PP_SYNC_HEIGHT to double the vtotal
+ - drm/amdgpu: fix NULL pointer dereference
+ - scsi: lpfc: Fix crash when a REG_RPI mailbox fails triggering a LOGO response
+ - scsi: lpfc: Remove unsupported mbox PORT_CAPABILITIES logic
+ - libf: Fix a format specifier
+ - ALSA: emu8000: Fix a use after free in snd_emu8000_create_mixer
+ - ALSA: hda/conexant: Re-order CX5066 quirk table entries
+ - ALSA: sb: Fix two use after free in snd_sb_qsound_build
+ - btfrs: fix race when picking most recent mod log operation for an old root
+ - arm64/vdso: Discard .note.gnu.property sections in vDSO
+ - opensvswitch: fix stack OOB read while fragmenting IPv4 packets
+ - ACPI: GTDT: Don't corrupt interrupt mappings on watchdog probe failure
+ - NFSv4: Don't discard segments marked for return in _pnfs_return_layout()
+ - jffs2: Fix kasan slab-out-of-bounds problem
+ - powerpc/eeh: Fix EEH handling for hugepages in ioremap space.
+ - powerpc: fix EDEADLOCK redefinition error in uapi/asm/errno.h
+ - intel_th: pci: Add Alder Lake-M support
+ - md/raid1: properly indicate failure when ending a failed write request
+ - security: commoncap: fix -Wstringop-overread warning
+ - misc new gcc warnings
+ - jffs2: check the validity of dstlen in jffs2_zlib_compress()
+ - Revert 337f13046ff0 ("futex: Allow FUTEX_CLOCK_REALTIME with FUTEX_WAIT op")
+ - posix-timers: Preserve return value in clock_adjtime32()
+ - ftrace: Handle commands when closing set_ftrace_filter file
+ - ext4: fix check to prevent false positive report of incorrect used inodes
+ - ext4: fix error code in ext4_commit_super
+ - media: dvbdev: Fix memory leak in dvb_media_device_free()
+ - usb: gadget: dummy_hcd: fix gpf in gadget_setup
+ - usb: gadget: Fix double free of device descriptor pointers
+ - usb: gadget/function/f_fs string table fix for multiple languages
+ - usb: dwc3: gadget: Fix START_TRANSFER link state check
+ - tracing: Map all PID s to command lines
+ - dm persistent data: packed struct should have an aligned() attribute too
+ - dm space map common: fix division bug in sm_ll_find_free_block()
+ - dm rq: fix double free of blk_rq_tag_set in dev remove after table load fails
+ - modules: mark ref_module static
+ - modules: mark find_symbol static
+ - modules: mark each_symbol_section static
+ - modules: unexport __module_text_address
+ - modules: unexport __module_address
+ - modules: rename the licence field in struct symsearch to license
+ - modules: return licensing information from find_symbol
+ - modules: inherit TAINT_PROPRIETARY_MODULE
+ - Bluetooth: verify AMP hci_chan before amp_destroy
+ - hsr: use netdev_err() instead of WARN_ONCE()
+ - bluetooth: eliminate the potential race condition when removing the HCI controller
+ - net/nfc: fix use-after-free llcp_sock_bind/connect
+ - MIPS: pci-rt2880: fix slot 0 configuration
+ - FDDI: defxx: Bail out gracefully with unassigned PCI resource for CSR
+ - misc: lis3lv02d: Fix false-positive WARN on various HP models
+ - misc: vmw_vmci: explicitly initialize vmci_notify_bm_set_msg struct
+ - misc: vmw_vmci: explicitly initialize vmci_datagram payload
+ - tracing: Restructure trace_clock_global() to never block
+ - md-cluster: fix use-after-free issue when removing rdev
+ - md: split mddev_find
+ - md: factor out a mddev_find_locked helper from mddev_find
+ - md: md_open returns -EBUSY when entering racing area
+ - ipw2x00: potential buffer overflow in libipw_wx_set_encodext()
+ - cfg80211: scan: drop entry from hidden_list on overflow
+ - drm/radeon: fix copy of uninitialized variable back to userspace
+ - ALSA: hda/realtek: Re-order ALC882 Acer quirk table entries
+ - ALSA: hda/realtek: Re-order ALC882 Sony quirk table entries
+ - ALSA: hda/realtek: Re-order ALC269 Sony quirk table entries
+ - ALSA: hda/realtek: Re-order ALC269 Lenovo quirk table entries
+ - ALSA: hda/realtek: Remove redundant entry for ALC861 Haier/Uniwill devices
+ - x86/cpu: Initialize MSR_TSC_AUX if RDTSCP *or* RDPID is supported
+ - KVM: s390: split kvm_s390_logical_to_effective
+ - KVM: s390: fix guarded storage control register handling
+ - KVM: s390: split kvm_s390_real_to_abs
+ - usb: gadget: pch_udc: Revert d3cb25a12138 completely
+ - memory: gpmc: fix out of bounds read and dereference on gpmc_[cs]
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Odroid X/U3 family
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on SMDK5250
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Snow
+ - serial: stm32: fix incorrect characters on console
+ - serial: stm32: fix tx_empty condition
+ - usbf: typec: tcpci: Check ROLE_CONTROL while interpreting CC_STATUS
+ - x86/microcode: Check for offline CPUs before requesting new microcode
+ - usb: gadget: pch_udc: Replace cpu_to_le32() by lower_32_bits()
+ - usb: gadget: pch_udc: Check if driver is present before calling ->setup()
+ - usb: gadget: pch_udc: Check for DMA mapping error
+ - crypto: qat - don't release uninitialized resources
+ - crypto: qat - ADF_STATUS_PF_RUNNING should be set after adf_dev_init
+ - fotg210-udc: Fix DMA on EP0 for length > max packet size
+ - fotg210-udc: Fix EP0 IN requests bigger than two packets
+ - fotg210-udc: Remove a dubious condition leading to fotg210_done
+ - fotg210-udc: Mask GRP2 interrupts we don't handle
+ - fotg210-udc: Don't DMA more than the buffer can take
+ - fotg210-udc: Complete OUT requests on short packets
+ - mtd: require write permissions for locking and badblock ioctls
+ - bus: qcom: Put child node before return
+ phy: marvell: ARMADA375_USBCLUSTER_PHY should not default to y, unconditionally
+ - crypto: qat - fix error path in adf_isr_resource_alloc()
+ - USB: gadget: udc: fix wrong pointer passed to IS_ERR() and PTR_ERR()
+ - mtd: rawnand: gpmi: Fix a double free in gpmi_nand_init
+ - staging: rtl8192u: Fix potential infinite loop
+ - staging: greybus: uart: fix unprivileged TIOCCSERIAL
+ - spi: Fix use-after-free with devm_spi_alloc_*
+ - soc: qcom: mdt_loader: Validate that p_filesz < p_nemsz
+ - soc: qcom: mdt_loader: Detect truncated read of segments
+ - ACPI: CPPC: Replace cppc_attr with kobj_attribute
+ - crypto: qat - Fix a double free in adf_create_ring
+ - usb: gadget: r8a66597: Add missing null check on return from platform_get_resource
+ - USB: cdc-acm: fix unprivileged TIOCCSERIAL
+ - tty: fix return value for unsupported ioctls
+ - firmware: qcom-scm: Fix QCOM_SCM configuration
+ - platform/x86: pmc_atom: Match all Beckhoff Automation baytrail boards with critical_systems DMI table
+ - platform/uv: Fix !KEXEC build failure
+ - ttyprintk: Add TTY hangup callback.
+ - media: vivid: fix assignment of dev->dbuf_out_flags
+ - media: omap4iss: return error code when omap4iss_get() failed
+ - media: m88rs6000t: avoid potential out-of-bounds reads on arrays
+ - x86/kprobes: Fix to check non boostable prefixes correctly
+ - pata_arasan_cf: fix IRQ check
+ - pata_ipx4xx_cf: fix IRQ check
+ - sata_nv: add IRQ checks
+ - ata: libahci_platform: fix IRQ check
+ - vfio/mdev: Do not allow a mdev_type to have a NULL parent pointer
+ - clk: uniphier: Fix potential infinite loop
+ - scsi: jazz_esp: Add IRQ check
+ - scsi: sun3x_esp: Add IRQ check
+ - scsi: sni_53c710: Add IRQ check
+ - mfd: stm32-timers: Avoid clearing auto reload register
+ - HSI: core: fix resource leaks in hsi_add_client_from_dt()
+ - x86/events/amd/iommu: Fix sysfs type mismatch
+ - HID: plantronics: Workaround for double volume key presses
+ - perf symbols: Fix dso__fprintf_symbols_by_name() to return the number of printed chars
+ - net: lapbether: Prevent racing when checking whether the netif is running
+ - powerpc/prom: Mark identical_pvr_fixup as __init
+ - powerpc: Fix HAVE_HARDLOCKUP_DETECTOR_ARCH build configuration
+ - ALSA: core: remove redundant spin_lock pair in snd_card_disconnect
+ - bug: Remove redundant condition check in report_bug
+ - nfc: pn533: prevent potential memory corruption
+ - ALSA: usb-audio: Add error checks for usb_driver_claim_interface() calls
+ - liquidio: Fix unintended sign extension of a left shift of a u16
+ - powerpc/perf: Fix PMU constraint check for EBB events
+ - powerpc: iommu: fix build when neither PCI or IBMVIO is set
+ - mac80211: bail out if cipher schemes are invalid
+ - mt7601u: fix always true expression
+ - IB/hfi1: Fix error return code in parse_platform_config()
+ - net: thunderx: Fix unintentional sign extension issue
+ - i2c: cadence: add IRQ check
+ - i2c: emev2: add IRQ check
+ - i2c: jz4780: add IRQ check
+ - i2c: sh7760: add IRQ check
+ - MIPS: pci-legacy: stop using of_pci_range_to_resource
+ - powerpc/pseries: extract host bridge from pci_bus prior to bus removal
+ - rtlwifi: 8821ae: upgrade PHY and RF parameters
+ - i2c: sh7760: fix IRQ error path
+ - mw18k: Fix a double Free in mw18k_probe_hw
+ - vsock/vmci: log once the failed queue pair allocation
+ - RDMA/i40iw: Fix error unwinding when i40iw_hmc_sd_one fails
+ - net: davinci_emac: Fix incorrect masking of tx and rx error channel
+ - ath9k: Fix error check in ath9k_hw_read_revisions() for PCI devices
+ - powerpc/52xx: Fix an invalid ASM expression (‘add’ used instead of ‘add’)  
+ - net/eth/enum-mac: Fix a use after free in emac_mac_tx_buf_send
+ - net/nfc: digital: Fix a double free in digital tg_recv_deq_req
+ - kfifo: fix ternary sign extension bugs
+ - smp: Fix smp_call_function_single_async prototype
+ - Revert "of/fdt: Make sure no-map does not remove already reserved regions"
+ - Revert "fdt: Properly handle "no-map" field in the memory region"
+ - tpm: fix error return code in tpm2_get_cc_attrs_tbl()
+ - fs: dlm: fix debugfs dump
+ - tipc: convert dest node’s address to network order
+ - net: stmmac: Set FIFO sizes for ipq806x
+ - ALSA: hdsp: don’t disable if not enabled
+ - ALSA: hdsp: don’t disable if not enabled
+ - ALSA: rme9652: don’t disable if not enabled
+ - Bluetooth: Set CONF_NOT_COMPLETE as i2cap-chan default
+ - Bluetooth: initialize skb_queue_head at i2cap-chan_create()
+ - Bluetooth: check for zapped sk before connecting
+ - ip6_vti: proper dev_[hold|put] in ndo_[un]init methods
+ - mac80211: clear the beacon’s CRC after channel switch
+ - pinctrl: samsung: use ‘int’ for register masks in Exynos
+ - cuse: prevent clone
+ - selftests: Set CC to clang in lib.mk if LLVM is set
+ - kconfig: nconf: stop endless search loops
+ - scp: Fix out-of-bounds warning in scp_process_asconf_param()
+ - powerpc/smp: Set numa node before updating mask
+ - ASoC: rt286: Generalize support for ALC3263 codec
+ - samples/bpf: Fix broken tracee1 due to kprobe argument change
+ - powerpc/pseries: Stop calling printk in rtas_stop_self()
+ - wl3501_cs: Fix out-of-bounds warnings in wl3501_send_pkt
- wl3501_cs: Fix out-of-bounds warnings in wl3501_mgmtd_join
- powerpc/ionmu: Annotate nested lock for lockdep
- net: ethernet: mtk_eth_soc: fix RX VLAN offload
- ASoC: rt286: Make RT286_SET_GPIO_* readable and writable
- f2fs: fix a redundant call to f2fs_balance_fs if an error occurs
- PCI: Release OF node in pci_scan_device()'s error path
- ARM: 9064/1: hw_breakpoint: Do not directly check the event's
  overflow_handler hook
- rpmkg: qcom_glink_native: fix error return code of qcom_glink_rx_data()
- NFSv4.2: Always flush out writes in nfs42_proc_fallocate()
- NFS: Deal correctly with attribute generation counter overflow
- pNFS/flexfiles: fix incorrect size check in decode_nfs_fh()
- NFSv4.2 fix handling of sr_eof in SEEK’s reply
- rtc: ds1307: Fix wday settings for rx8130
- scpt: fix a SCTP_MIB_CURRESTAB leak in scpt_sfdupcook_b
- drm/radeon: Fix off-by-one power_state index heap overwrite
- khugepaged: fix wrong result value for trace_mm_collapse_huge_page_isolate()
- mm/hugeltb: handle the error case in hugeltb_fix_reserve_counts()
- ksm: fix potential missing rmap_item for stable_node
- net: fix nla_strcmp to handle more than one trailing null character
- kernel: kexec_file: fix error return code of kexec_calculate_store_digests()
- netfilter: nftables: avoid overflows in nft_hash_buckets()
- ARC: entry: fix off-by-one error in syscall number validation
- powerpc/64s: Fix crashes when toggling stf barrier
- powerpc/64s: Fix crashes when toggling entry flush barrier
- squashfs: fix divide error in calculate_skip()
- userfaultfd: release page in error path to avoid BUG_ON
- drm/radeon/dpm: Disable sclk switching on Oland when two 4K 60Hz monitors
  are connected
- iio: proximity: pulsedlight: Fix runtime PM imbalance on error
- usb: fotg210-hcd: Fix an error message
- ACPI: scan: Fix a memory leak in an error handling path
- blk-mq: Swap two calls in blk_mq_exit_queue()
- usb: dwc3: omap: improve extcon initialization
- usb: xhci: Increase timeout for HC halt
- usb: dwc2: Fix gadget DMA unmap direction
- usb: core: hub: fix race condition about TRSMRCY of resume
- iio: gyro: mpu3050: Fix reported temperature value
- iio: tsl2583: Fix division by a zero lux_val
- KVM: x86: Cancel pvclock_gtd_work on module removal
- FDDI: defxx: Make MMIO the configuration default except for EISA
- MIPS: Reinstate platform~__div64_32 handler
- MIPS: Avoid DIVU in ~__div64_32’ is result would be zero
- MIPS: Avoid hardcoded DIVU in ‘~__div64_32’ altogether
- thermal/core/fair share: Lock the thermal zone while looping over instances
- RDMA/i40iw: Avoid panic when reading back the IRQ affinity hint
- kobject_uevent: remove warning in init_uevent_argv()
- netfilter: conntrack: Make global sysctls readonly in non-init nets
+ - clk: exynos7: Mark aclk_fsys1_200 as critical
+ - x86/msr: Fix wr/rdmsr_safe_regs_on_cpu() prototypes
+ - kgdb: fix gcc-11 warning on indentation
+ - usb: sl811-hcd: improve misleading indentation
+ - cxgb4: Fix the -Wmisleading-indentation warning
+ - isdn: capi: fix mismatched prototypes
+ - PCI: thunder: Fix compile testing
+ - ARM: 9066/1: ftrace: pause/unpause function graph tracer in cpu_suspend()
+ - ACPI / hotplug / PCI: Fix reference count leak in enable_slot()
+ - Input: elants_i2c - do not bind to i2c-hid compatible ACPI instantiated devices
+ - Input: silead - add workaround for x86 BIOS-es which bring the chip up in a stuck state
+ - um: Mark all kernel symbols as local
+ - ceph: fix fs cache invalidation
+ - gpilolib: acpi: Add quirk to ignore EC wakeups on Dell Venue 10 Pro 5055
+ - ALSA: hda: generic: change the DAC ctl name for LO+SPK or LO+HP
+ - block: reexpand iov_iter after read/write
+ - lib: stackdepot: turn depot_lock spinlock to raw_spinlock
+ - sit: proper dev_[hold]put in ndo_[un]init methods
+ - ip6_tunnel: sit: proper dev_[hold]put in ndo_[un]init methods
+ - xhci: Do not use GFP_KERNEL in (potentially) atomic context
+ - ipv6: remove extra dev_hold() for fallback tunnels
+ - ARM: 9056/1: decompressor: fix BSS size calculation for LLVM ld.lld
+ - arm64: dts: marvell: armada-37xx: add syscon compatible to NB clk node
+ - mtd: rawnnad: atmel: Update ecc_stats.corrected counter
+ - mmc: sdhci-pci: Fix initialization of some SD cards for Intel BYT-based controllers
+ - genirq/matrix: Prevent allocation counter corruption
+ - usb: xhci-mtk: support quirk to disable usb2 lpm
+ - media: drivers: media: pci: sta2x11: fix Kconfig dependency on GPIOLIB
+ - media: tc358743: fix possible use-after-free in tc358743_remove()
+ - andgpu: avoid incorrect %hu format string
+ - s390/archrandom: add parameter check for s390_arch_random_generate
+ - ALSA: usb-audio: Add dB range mapping for Sennheiser Communications Headset PC 8
+ - ALSA: hda/realtke: Add quirk for Intel Clevo PCx0Dx
+ - ubifs: Only check replay with inode type to judge if inode linked
+ - mlxsw: spectrum_mr: Update egress RIF list before route's action
+ - NFS: Don't discard pNFS layout segments that are marked for return
+ - tpm: vtpm_proxy: Avoid reading host log when using a virtual device
+ - dm raid: fix inconclusive reshape layout on fast raid4/5/6 table reload sequences
+ - arm64: vdso: remove commas between macro name and arguments
+ - ext4: do not set SB_ACTIVE in ext4_orphan_cleanup()
+ - tty: fix memory leak in vc_deallocate
+ - rsi: Use resume_noirq for SDIO
+ - MIPS: pci-mt7620: fix PLL lock check
+ - md: Fix missing unused status line of /proc/mdstat
+ - ALSA: hda/realtek: Re-order ALC882 Clevo quirk table entries
+ - ALSA: hda/realtek: Re-order ALC269 HP quirk table entries
+ - ALSA: hda/realtek: Re-order ALC269 Dell quirk table entries
+ - ARM: dts: exynos: correct fuel gauge interrupt trigger level on Midas family
+ - ARM: dts: exynos: correct MUIC interrupt trigger level on Midas family
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Midas family
+ - regmap: set debugfs_name to NULL after it is freed
+ - mtd: rawnand: fsnc: Fix error code in fsnc_nand_probe()
+ - mtd: rawnand: brcmnd: fix OOB R/W with Hamming ECC
+ - mtd: rawnand: qcom: Return actual error code instead of -ENODEV
+ - usbip: vudc: fix missing unlock on error in usbip_sockfd_store()
+ - clk: qcom: a53-pll: Add missing MODULE_DEVICE_TABLE
+ - scsi: ibmvfc: Fix invalid state machine BUG_ON()
+ - sched/debug: Fix cgroup_path[] serialization
+ - net: hns3: Limiting the scope of vector_ring_chain variable
+ - ALSA: usb: midi: don't return -ENOMEM when usb_urb_ep_type_check fails
+ - net: geneve: modify IP header check in geneve6_xmit_skb and geneve_xmit_skb
+ - RDMA/bnxt_re: Fix a double free in bnxt_qplib_alloc_res
+ - net: Only allow init netns to set default tcp cong to a restricted algo
+ - i2c: bail out early when RDWR parameters are wrong
+ - net: bridge: when suppression is enabled exclude RARP packets
+ - i2c: Add I2C_AQ_NO_REP_START adapter quirk
+ - ethtool: ioctl: Fix out-of-bounds warning in store link ksettings_for_user()
+ - PCI: iproc: Fix return value of iproc_msi_irq_domain_alloc()
+ - PCI: endpoint: Fix missing destroy_workqueue()
+ - net: hns3: disable phy loopback setting in hclge_mac_start_phy
+ - scpt: do asoc update earlier in scpt_sf_do_dupcook_a
+ - ethernet:enic: Fix a use after free bug in enic_hard_start_xmit
+ - netfilter: xt_SECMARK: add new revision to fix structure layout
+ - drm/radeon: Avoid power table parsing memory leaks
+ - sched/fair: Fix unfairness caused by missing load decay
+ - xhci: Add reset resume quirk for AMD xhci controller.
+ - cdc-wdm: untangle a circular dependency between callback and softint
+ - nvme: do not try to reconfigure APST when the controller is not live
+ - pinctrl: ingenic: Improve unreachable code generation
+ - ARM: 9075/1: kernel: Fix interrupted SMC calls
+ - scsi: target: tcmu: Return from tcmu_handle_completions() if cmd_id not found
+ - tweeewide: Fix most Shebang lines
+ - scripts: switch explicitly to Python 3
+ - Stefan Bader <stefan.bader@canonical.com>  Mon, 21 Jun 2021 17:38:37 +0200
+ - linux (4.15.0-147.151) bionic; urgency=medium
+ - CVE-2021-3444
+ - bpf: Fix truncation handling for mod32 dst reg wrt zero

Open Source Used In 5GaaS Edge AC-4 18942
* CVE-2021-3600
  - SAUCE: bpf: Do not use ax register in interpreter on div/mod
  - bpf: fix subprog verifier bypass by div/mod by 0 exception
  - SAUCE: bpf: Fix 32-bit register truncation on div/mod instruction

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Fri, 18 Jun 2021 13:49:56 -0300
+linux (4.15.0-146.150) bionic; urgency=medium

+ * UAF on CAN BCM bcm_rx_handler (LP: #1931855)
+   - SAUCE: can: bcm: delay release of struct bcm_op after synchronize_rcu

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Thu, 17 Jun 2021 14:50:04 -0300
+linux (4.15.0-145.149) bionic; urgency=medium
+ * bionic/linux: 4.15.0-145.149 -proposed tracker (LP: #1929967)
+ * Packaging resync (LP: #1786013)
+   - update dkms package versions

+ * raid10: Block discard is very slow, causing severe delays for mkfs and
  fstrim operations (LP: #1896578)
+   - md: add md_submit_discard_bio() for submitting discard bio
+   - md/raid10: extend r10bio devs to raid disks
+   - md/raid10: pull the code that wait for blocked dev into one function
+   - md/raid10: improve raid10 discard request
+   - md/raid10: improve discard request for far layout

+ * CVE-2021-23133
+   - sctp: delay auto_asconf init until binding the first addr

+ * Bionic update: upstream stable patchset 2021-05-25 (LP: #1929603)
+   - Input: nspire-keypad - enable interrupts only when opened
+   - dmaengine: dw: Make it dependent to HAS_IOMEM
+   - ARM: dts: Fix moving mmc devices with aliases for omap4 & 5
+   - arc: kernel: Return -EFAULT if copy_to_user() fails
+   - neighbour: Disregard DEAD dst in neigh_update
+   - ARM: keystone: fix integer overflow warning
+   - ASoC: fsl_esai: Fix TDM slot setup for I2S mode
+   - scsi: scsi_transport_srp: Don't block target in SRP_PORT_LOST state
+   - net: ieee802154: stop dump llsec keys for monitors
+   - net: iee802154: stop dump llsec devs for monitors
+   - net: iee802154: forbid monitor for add llsec dev
+   - net: iee802154: stop dump llsec devkeys for monitors
+   - net: iee802154: forbid monitor for add llsec devkey
+   - net: iee802154: stop dump llsec seclevels for monitors
+ - net: ieee802154: forbid monitor for add llsec secllevel
+ - pcnet32: Use pci_resource_len to validate PCI resource
+ - mac80211: clear sta->fast_rx when STA removed from 4-addr VLAN
+ - Input: i8042 - fix Pegatron C15B ID entry
+ - HID: wacom: set EV_KEY and EV_ABS only for non-HID_GENERIC type of devices
+ - readdir: make sure to verify directory entry for legacy interfaces too
+ - arm64: fix inline asm in load_unaligned_zeropad()
+ - arm64: alternatives: Move length validation in alternative_[insn, endif]
+ - scsi: libbsas: Reset num_scatter if libata marks qc as NODATA
+ - netfilter: conntrack: do not print icmpv6 as unknown via /proc
+ - netfilter: nft_limit: avoid possible divide error in nft_limit_init
+ - net: davicom: Fix regulator not turned off on failed probe
+ - net: sit: Unregister catch-all devices
+ - i40e: fix the panic when running bpf in xdpdrv mode
+ - ibmvnic: avoid calling napi_disable() twice
+ - ibmvnic: remove duplicate napi_schedule call in do_reset function
+ - ibmvnic: remove duplicate napi_schedule call in open function
+ - ARM: footbridge: fix PCI interrupt mapping
+ - ARM: 9071/1: uprobes: Don't hook on thumb instructions
+ - pinctrl: lewisburg: Update number of pins in community
+ - HID: wacom: Assign boolean values to a bool variable
+ - ARM: dts: Fix swapped mmc order for omap3
+ - net: geneve: check skb is large enough for IPv4/IPv6 header
+ - s390/entry: save the caller of psw_idle
+ - xen-netback: Check for hotplug-status existence before watching
+ - cavium/liquidio: Fix duplicate argument
+ - ia64: fix discontig_c section mismatches
+ - ia64: tools: remove duplicate definition of ia64_inf() on ia64
+ - x86/crash: Fix crash_setup_memmap_entries() out-of-bounds access
+ - net: hso: fix NULL-deref on disconnect regression
+ - USB: CDC-ACM: fix poison/unpoison imbalance
+ - lockdep: Add a missing initialization hint to the "INFO: Trying to register
non-static key" message
+ - drm/msm: Fix a5xx/a6xx timestamps
+ - Input: s6sy761 - fix coordinate read bit shift
+ - net: ip6_tunnel: Unregister catch-all devices
+ - ACPI: tables: x86: Reserve memory occupied by ACPI tables
+ - ACPI: x86: Call acpi_boot_table_init() after acpi_table_upgrade()
+ - net: usb: ax88179_178a: initialize local variables before use
+ - iwlwifi: Fix softirq/hardirq disabling in iwl_pcie_enqueue_hcmd()
+ - mips: Do not include hi and lo in clobber list for R6
+ - bpf: Fix masking negation logic upon negative dst register
+ - iwlwifi: Fix softirq/hardirq disabling in iwl_pcie_gen2_enqueue_hcmd()
+ - ALSA: usb-audio: Add MIDI quirk for Vox ToneLab EX
+ - USB: Add reset-resume quirk for WD19's Realtek Hub
+ - platform/x86: thinkpad_acpi: Correct thermal sensor allocation
+ * r8152 tx status -71 (LP: #1922651) // Bionic update: upstream stable
patchset 2021-05-25 (LP: #1929603)
- USB: Add LPM quirk for Lenovo ThinkPad USB-C Dock2 Ethernet
+ seccomp_bpf: syscall_faked from kselftests fail on s390x (LP: #1928522)
+ selftests/seccomp: s390 shares the syscall and return value register
+ Fix kdump failures (LP: #1927518)
+ video: hyperv_fb: Add ratelimit on error message
+ Drivers: hv: vmbus: Increase wait time for VMbus unload
+ Drivers: hv: vmbus: Initialize unload_event statically
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 28 May 2021 17:37:08 +0200
+ linux (4.15.0-144.148) bionic; urgency=medium
+ * bionic/linux: 4.15.0-144.148 -proposed tracker (LP: #1927648)
+ Introduce the 465 driver series, fabric-manager, and libnvidia-nscq
+ (LP: #1925522)
+ debian/dkms-versions -- add NVIDIA 465 and migrate 450 to 460
+ xfmr_policy.sh / pmtu.sh / udpgso_bench.sh from net in
+ ubuntu_kernel_selftests will fail if running the whole suite (LP: #1856010)
+ selftests/net: bump timeout to 5 minutes
+ locking/qrwlock: Fix ordering in queued_write_lock_slowpath() (LP: #1926184)
+ locking/barriers: Introduce smp_cond_load_relaxed() and
+ atomic_cond_read_relaxed()
+ locking/qrwlock: Fix ordering in queued_write_lock_slowpath()
+ Bionic update: upstream stable patchset 2021-04-30 (LP: #1926808)
+ net: fec: ptp: avoid register access when ipg clock is disabled
+ powerpc/4xx: Fix build errors from mfdcr()
+ atm: eni: dont release is never initialized
+ atm: lanai: dont run lanai_dev_close if not open
+ Revert "r8152: adjust the settings about MAC clock speed down for RTL8153"
+ ixgbe: Fix memleak in ixgbe_configure_clsu32
+ net: tehuti: fix error return code in bdx_probe()
+ sun/niu: fix wrong RXMAC_BC_FRM_CNTL_COUNT count
+ gpiolib: acpi: Add missing IRQF_ONESHOT
+ nfs: fix PNFS_FLEXFILE_LAYOUT Kconfig default
+ NFS: Correct size calculation for create reply length
+ net: hisilicon: hns: fix error return code of hns_nic_clear_all_rx_fetch()
+ net: wan: fix error return code of uhdhc_init()
+ atm: uPD98402: fix incorrect allocation
+ atm: idt77252: fix null-ptr-dereference
+ sparc64: Fix opcode filtering in handling of no fault loads
+ u64_stats,lockdep: Fix u64_stats_init() vs lockdep
+ - drm/radeon: fix AGP dependency
+ - nfs: we don't support removing system.nfs4_acl
+ - ia64: fix ia64_syscall_get_set_arguments() for break-based syscalls
+ - ia64: fix ptrace(PTRACE_SYSCALL_INFO_EXIT) sign
+ - arm64: dts: ls1046a: mark crypto engine dma coherent
+ - arm64: dts: ls1012a: mark crypto engine dma coherent
+ - arm64: dts: ls1043a: mark crypto engine dma coherent
+ - ARM: dts: at91-sama5d27_som1: fix phy address to 7
+ - dm ioecl: fix out of bounds array access when no devices
+ - bus: omap_l3_noc: mark I3 irqs as IRQF_NO_THREAD
+ - libbpf: Fix INSTALL flag order
+ - macvlan: macvlan_count_rx() needs to be aware of preemption
+ - net: dsa: bcm_sf2: Qualify phydev->dev_flags based on port
+ - e1000e: add rtnl_lock() to e1000_reset_task
+ - e1000e: Fix error handling in e1000_set_d0_lplu_state_82571
+ - net/qlcnic: Fix a use after free in qlcnic_83xx_get_minidump_template
+ - ftcmac100: Restart MAC HW once
+ - can: peak_usb: add forgotten supported devices
+ - can: c_can_pci: c_can_pci_remove(): fix use-after-free
+ - can: c_can: move runtime PM enable/disable to c_can_platform
+ - can: m_can: m_can_do_rx_poll(): fix extraneous msg loss warning
+ - mac80211: fix rate mask reset
+ - net: cdc-phonet: fix data-interface release on probe failure
+ - net: stmmac: dmac-sun8i: Provide TX and RX fifo sizes
+ - drm/msm: fix shutdown hook in case GPU components failed to bind
+ - arm64: kdump: update ppos when reading elfcorehdr
+ - net/mlx5e: Fix error path for ethtool set-priv-flag
+ - RDMA/cxgb4: Fix adapter LE hash errors while destroying ipv6 listening
+ - server
+ - ACPI: scan: Rearrange memory allocation in acpi_device_add()
+ - ACPI: scan: Use unique number for instance_no
+ - perf auxtrace: Fix auxtrace queue conflict
+ - scsi: qed: Fix error return code of qedi_alloc_global_queues()
+ - scsi: mpt3sas: Fix error return code of mpt3sas_base_attach()
+ - locking/mutex: Fix non debug version of mutex_lock_io_nested()
+ - can: dev: Move device back to init netns when owning netns delete
+ - net: sched: validate stab values
+ - net: qrtr: fix a kernel-infoleak in qrtr_recvmsg()
+ - mac80211: fix double free in ibss_leave
+ - ext4: add reclaim checks to xattr code
+ - can: peak_usb: Revert "can: peak_usb: add forgotten supported devices"
+ - block: Suppress uevent for hidden device when removed
+ - netsec: restore phy power state after controller reset
+ - can: flexcan: flexcan_chip_freeze(): fix chip freeze for missing bitrate
+ - dm verity: add root hash pkcs#7 signature verification
+ - x86/mem_encrypt: Correct physical address calculation in __set_clr_pte_enc()
+ - selinux: vsock: Set SID for socket returned by accept()
+ - ipv6: weaken the v4mapped source check
+ - ext4: fix bh ref count on error paths
+ - rpc: fix NULL dereference on kmalloc failure
+ - ASoC: rt5640: Fix dac- and adc- vol-tlv values being off by a factor of 10
+ - ASoC: rt5651: Fix dac- and adc- vol-tlv values being off by a factor of 10
+ - ASoC: sgl5000: set DAP_AVC_CTRL register to correct default value on probe
+ - ASoC: es8316: Simplify adc_pga_gain_tlv table
+ - ASoC: cs42442: Fix mixer volume control
+ - ASoC: cs42442: Always wait at least 3ms after reset
+ - vhost: Fix vhost_vq_reset()
+ - scsi: st: Fix a use after free in st_open()
+ - scsi: qla2xxx: Fix broken #endif placement
+ - staging: comed: cb_pciadas: fix request_irq() warn
+ - staging: comed: cb_pciadas64: fix request_irq() warn
+ - ASoC: rt5659: Update MCLK rate in set_sysclk()
+ - ext4: do not iput inode under running transaction in ext4_rename()
+ - brcmfmac: clear EAP/association status bits on linkdown events
+ - net: ethernet: aquantia: Handle error cleanup of start on open
+ - appletalk: Fix skb allocation size in loopback case
+ - net: wan/lmc: unregister device when no matching device is found
+ - bpf: Remove MTU check in __bpf_skb_max_len
+ - ALSA: usb-audio: Apply sample rate quirk to Logitech Connect
+ - ALSA: hda/realtek: fix a determine_headset_type issue for a Dell AIO
+ - ALSA: hda/realtek: call alc_update_headset_mode() in hp_automute_hook
+ - tracing: Fix stack trace event size
+ - mm: fix race by making init_zero_pfn() early_initcall
+ - drm/amdgpu: fix offset calculation in amdgpu_vm_bo_clear_mappings()
+ - drm/amdgpu: check alignment on CPU page for bo map
+ - reiserfs: update reiserfs_xattrs_initialized() condition
+ - mm: memcontrol: fix NR_WRITEBACK leak in memcg and system stats
+ - mem_cgroup: make sure memory.events is uptodate when waking pollers
+ - mem_cgroup: make sure moving_account, move_lock_task and stat_cpu in the
+ same cacheline
+ - mm: fix oom_kill event handling
+ - mm: writeback: use exact memcg dirty counts
+ - pinctrl: rockchip: fix restore error in resume
+ - extcon: Add stubs for extcon_register_notifier_all() functions
+ - extcon: Fix error handling in extcon_dev_register
+ - firewire: nosy: Fix a use-after-free bug in nosy_ioctl()
+ - usbip: vhci_hcd fix shift out-of-bounds in vhci_hub_control()
+ - USB: quirks: ignore remote wake-up on Fibocom L850-GL LTE modem
+ - usb: musb: Fix suspend with devices connected for a64
+ - usb: xhci-mtk: fix broken streams issue on 0.96 xHCI
+ - cdc-acm: fix BREAK rx code path adding necessary calls
+ - USB: cdc-acm: untangle a circular dependency between callback and softint
+ - USB: cdc-acm: downgrade message to debug
+ - USB: cdc-acm: fix use-after-free after probe failure
+ - usb: gadget: udc: amd5536udc_pci fix null-ptr-dereference
+ - staging: rtl8192e: Fix incorrect source in memcpy()
+ - staging: rtl8192e: Change state information from u16 to u8
+ - drivers: video: fbcon: fix NULL dereference in fbcon_cursor()
+ - ARM: dts: am33xx: add aliases for mmc interfaces
+ - net: pxa168_eth: Fix a potential data race in pxa168_eth_remove
+ - mISDN: fix crash in fritzpci
+ - mac80211: choose first enabled channel for monitor
+ - drm/msm: Ratelimit invalid-fence message
+ - platform/x86: thinkpad_acpi: Allow the FnLock LED to change state
+ - x86/build: Turn off -fcf-protection for realmode targets
+ - scsi: target: pscsi: Clean up after failure in pscsi_map_sg()
+ - ia64: mca: allocate early mca with GFP_ATOMIC
+ - cifs: revalidate mapping when we open files for SMB1 POSIX
+ - cifs: Silently ignore unknown oplock break handle
+ - init/Kconfig: make COMPILE_TEST depend on !S390
+ - init/Kconfig: make COMPILE_TEST depend on HAS_IOMEM
+ - ia64: fix format strings for err_inject
+ - ALSA: aloop: Fix initialization of controls
+ - ASoC: intel: atom: Stop advertising non working S24LE support
+ - nfc: fix refcount leak in llcp_sock_bind()
+ - nfc: fix refcount leak in llcp_sock_connect()
+ - nfc: fix memory leak in llcp_sock_connect()
+ - nfc: Avoid endless loops caused by repeated llcp_sock_connect()
+ - xen/evtchn: Change irq_info lock to raw_spinlock_t
+ - net: ipv6: check for validity before dereferencing cfg->fc_nlinfo.nlh
+ - ia64: fix user_stack_pointer() for ptrace()
+ - ocfs2: fix deadlock between setattr and dio_end_io_write
+ - fs: direct-io: fix missing sdio->boundary
+ - parisc: parisc-agp requires SBA IOMMU driver
+ - parisc: avoid a warning on u8 cast for cmpxchg on u8 pointers
+ - ARM: dts: turris-omnia: configure LED[2]/INTn pin as interrupt pin
+ - batman-adv: initialize "struct batadv_tvlv_tt_vlan_data"->reserved field
+ - net: ensure mac header is set in virtio_net_hdr_to_skb()
+ - net: sched: sch_teql: fix null-pointer dereference
+ - usbd: add sysfs_lock to synchronize sysfs code paths
+ - usbd: stub-dev synchronize sysfs code paths
+ - usbd: synchronize event handler with sysfs code paths
+ - i2c: turn recovery error on init to debug
+ - regulator: bd9571mvv: Fix AVS and DVFS voltage range
+ - ASoC: wm8960: Fix wrong belk and IrcIk with pll enabled for some chips
+ - amd-xgbe: Update DMA coherency values
+ - sch_red: fix off-by-one checks in red_check_params()
+ - gianfar: Handle error code at MAC address change
+ - net/teq: Fix a double free in tipe_sk_mcast_rcv
+ - ARM: dts: imx6: pbab01: Set vmmc supply for both SD interfaces
+ - net/ncsi: Avoid channel_monitor hrtimer deadlock
+ - ASoC: sunxi: sun4i-codec: fill ASoC card owner
+ - soc/fsl: qbman: fix conflicting alignment attributes
+ - clk: fix invalid usage of list cursor in register
+ - clk: fix invalid usage of list cursor in unregister
+ - workqueue: Move the position of debug_work_activate() in __queue_work()
+ - s390/cpcmd: fix inline assembly register clobbering
+ - net/mlx5: Fix placement of log_max_flow_counter
+ - RDMA/cxgb4: check for ipv6 address properly while destroying listener
+ - clk: socfpga: fix iomem pointer cast on 64-bit
+ - net/ncsi: Add generic netlink family
+ - net/ncsi: Refactor MAC, VLAN filters
+ - net/ncsi: Avoid GFP_KERNEL in response handler
+ - cfg80211: remove WARN_ON() in cfg80211_sme_connect
+ - net: tun: set tun->addr_len during TUNSETLINK processing
+ - drivers: net: fix memory leak in atusb_probe
+ - drivers: net: fix memory leak in peak_usb_create_dev
+ - net: mac802154: Fix general protection fault
+ - net: ieee802154: nl-mac: fix check on panid
+ - net: ieee802154: fix nl802154 del llsec key
+ - net: ieee802154: fix nl802154 del llsec dev
+ - net: ieee802154: fix nl802154 add llsec key
+ - net: ieee802154: fix nl802154 del llsec devkey
+ - net: ieee802154: forbid monitor for set llsec params
+ - net: ieee802154: forbid monitor for del llsec secelvel
+ - net: ieee802154: stop dump llsec params for monitors
+ - Revert "cifs: Set CIFS_MOUNT_USE_PREFIX_PATH flag on setting
cifs_sb->prepath."
+ - KVM: arm64: Hide system instruction access to Trace registers
+ - KVM: arm64: Disable guest access to trace filter controls
+ - drm/imx: imx-ldb: fix out of bounds array access warning
+ - gfs2: report "already frozen/thawed" errors
+ - block: only update parent bi_status when bio fail
+ - net: phy: broadcom: Only advertise EEE for supported modes
+ - netfilter: x_tables: fix compat match/target pad out-of-bound write
+ - perf map: Tighten snprintf() string precision to pass gcc check on some
  32-bit arches
+ - xen/events: fix setting irq affinity
+ - net: hso: fix null-ptr-deref during tty device unregistration
+ - usbip: vude synchronize sysfs code paths
+ - net: xfrm: Localize sequence counter per network namespace
+ - i40e: Added Asym_Pause to supported link modes
+ - i40e: Fix kernel oops when i40e driver removes VF's
+ - drm/tegra: dc: Don't set PLL clock to 0Hz
+ - riscv,entry: fix misaligned base for excp_vect_table
+
+ * s390x broken with unknown syscall number on kernels < 5.8 (LP: #1895132)
+ - s390/ptrace: return -ENOSYS when invalid syscall is supplied
+ - s390/ptrace: pass invalid syscall numbers to tracing
+
+ * Bionic update: upstream stable patchset 2021-04-14 (LP: #1923897)
+ - uapi: nfnetlink_ethelper.h: fix userspace compilation error
+ - ath9k: fix transmitting to stations in dynamic SMPS mode
+ - net: Fix gro aggregation for udp encaps with zero csum
+ - net: Introduce parse_protocol header_ops callback
+ - net: check if protocol extracted by virtio_net_hdr_set_proto is correct
+ - net: avoid infinite loop in mpls_gso_segment when mpls_hlen == 0
+ - can: skb: can_skb_set_owner(): fix ref counting if socket was closed before
+ setting skb ownership
+ - can: flexcan: assert FRZ bit in flexcan_chip_freeze()
+ - can: flexcan: enable RX FIFO after FRZ/HALT valid
+ - netfilter: x_tables: gpf inside xt_find_revision()
+ - cifs: return proper error code in statfs(2)
+ - scripts/recordmcount.{c,pl}: support -ffunction-sections .text.* section
+ names
+ - Revert "mm, slub: consider rest of partial list if acquire_slab() fails"
+ - sh_eth: fix TRSCER mask for SH771x
+ - net/mlx4_en: update moderation when config reset
+ - net: stmmac: fix incorrect DMA channel intr enable setting of EQoS v4.10
+ - net: sched: avoid duplicates in classes dump
+ - net: usb: qmi_wwan: allow qmiinux add/del with master up
+ - cipso,calipso: resolve a number of problems with the DOI refcounts
+ - net: lapbether: Remove netif_start_queue / netif_stop_queue
+ - net: davicom: Fix regulator not turned off on failed probe
+ - net: davicom: Fix regulator not turned off on driver removal
+ - net: stmmac: stop each tx channel independently
+ - perf traceevent: Ensure read cmdlines are null terminated.
+ - s390/cio: return -EFAULT if copy_to_user() fails again
+ - drm/compat: Clear bounce structures
+ - drm: meson_drv add shutdown function
+ - s390/cio: return -EFAULT if copy_to_user() fails
+ - media: usbtr: Fix deadlock on suspend
+ - net: phy: fix save wrong speed and duplex problem if autoneg is on
+ - udf: fix silent AED tagLocation corruption
+ - mmc: mxs-mmc: Fix a resource leak in an error handling path in
+ 'mxxs_mmc_probe()'
+ - mmc: mediatek: fix race condition between mscd_request_timeout and irq
+ - powerpc: improve handling of unrecoverable system reset
+ - powerpc/perf: Record counter overflow always if SAMPLE_IP is unset
+ - PCI: xgene-msi: Fix race in installing chained irq handler
+ - PCI: mediatek: Add missing of_node_put() to fix reference leak
+ - s390/smp: __smp_rescan_cpus() - move cpumask away from stack
+ - scsi: libiscsi: Fix iscsi_prep_scsi_cmd_pdu() error handling
+ - ALSA: hda/hdmi: Cancel pending works before suspend
+ - ALSA: hda: Drop the BATCH workaround for AMD controllers
+ - ALSA: hda: Avoid spurious unsol event handling during S3/S4
+ - ALSA: usb-audio: Fix "cannot get freq eq" errors on Dell AE515 sound bar
+ - Revert 95ebabde382c ("capabilities: Don't allow writing ambiguous v3 file
+ capabilities")
+ - s390/dasd: fix hanging DASD driver unbind
+ - s390/dasd: fix hanging IO request during DASD driver unbind
+ - mmc: core: Fix partition switch time for eMMC
+ - Goodix Fingerprint device is not a modem
+ - USB: gadget: u_ether: Fix a configfs return code
+ - usb: gadget: f_uac2: always increase endpoint max_packet_size by one audio slot
+ - USB: gadget: f_uac1: stop playback on function disable
+ - usb: renesas_usbhs: Clear PIPECFG for re-enabling pipe with other EPNUM
+ - xhci: Improve detection of device initiated wake signal.
+ - usb: xhci: Fix ASMedia ASM1042A and ASM3242 DMA addressing
+ - USB: serial: io_edgeport: fix memory leak in edge_startup
+ - USB: serial: ch341: add new Product ID
+ - USB: serial: cp210x: add ID for Acuity Brands nLight Air Adapter
+ - USB: serial: cp210x: add some more GE USB IDs
+ - usbip: fix stub_dev to check for stream socket
+ - usbip: fix vhci_hcd to check for stream socket
+ - usbip: fix vudc to check for stream socket
+ - usbip: fix vhci_hcd attach_store() races leading to gpf
+ - staging: rtl8192u: fix ->ssid overflow in r8192_wx_set_scan()
+ - staging: rtl8188eu: prevent ->ssid overflow in rtw_wx_set_scan()
+ - staging: rtl8712: unterminated string leads to read overflow
+ - staging: rtl8188eu: fix potential memory corruption in rtw_check_beacon_data()
+ - staging: ks7010: prevent buffer overflow in ks_wlan_set_scan()
+ - staging: rtl8712: Fix possible buffer overflow in r8712_sitesurvey_cmd()
+ - staging: rtl8192e: Fix possible buffer overflow in _rtl92e_wx_set_scan
+ - staging: comedii: addi_apci_1032: Fix endian problem for COS sample
+ - staging: comedii: addi_apci_1500: Fix endian problem for command sample
+ - staging: comedii: adv_pci1710: Fix endian problem for AI command data
+ - staging: comedii: das6402: Fix endian problem for AI command data
+ - staging: comedii: das800: Fix endian problem for AI command data
+ - staging: comedii: dmm32at: Fix endian problem for AI command data
+ - staging: comedii: me4000: Fix endian problem for AI command data
+ - staging: comedii: pcl711: Fix endian problem for AI command data
+ - staging: comedii: pcl818: Fix endian problem for AI command data
+ - sh_eth: fix TRSCER mask for R7S72100
+ - NFSv4.2: fix return value of _nfs4_get_security_label()
+ - block: rsxx: fix error return code of rsxx_pci_probe()
+ - configfs: fix a use-after-free in __configfs_open_file
+ - stop_machine: mark helpers __always_inline
+ - include/linux/sched/mmm.h: use rcu_dereference in in_vfork()
+ - powerpc/64s: Fix instruction encoding for lis in ppc_function_entry()
+ - binfmt_misc: fix possible deadlock in bm_register_write
+ - hwmon: (Im90) Fix max6658 sporadic wrong temperature reading
+ - KVM: arm64: Fix exclusive limit for IPA size
+ - xen/events: reset affinity of 2-level event when tearing it down
- xen/events: don't unmask an event channel when an eoi is pending
- xen/events: avoid handling the same event on two cpus at the same time
- tcp: add sanity tests to TCP_QUEUE_SEQ
- net: qrtr: fix error return code of qrtr_sendmsg()
- net: stmmac: fix watchdog timeout during suspend/resume stress test
- i2c: reac: optimize cacheline to minimize HW race condition
- powerpc/pci: Add ppc_md.discover_phbs()
- PCI: fix pci_register_io_range() memory leak
- i40e: fix memory leak in i40e_probe
- ALSA: usb: Add Plantronics C320-M USB ctrl msg delay quirk
- ALSA: usb-audio: Apply the control quirk to Plantronics headsets
- mmc: cqhci: Fix random crash when remove mmc module/card
- usbip: fix vudecusbip_sockfd_store races leading to gpf
- net: dsa: b53: Support setting learning on port
- ext4: check journal inode extents more carefully
- perf tools: Use %define api.pure full instead of %pure-parser
- tools build feature: Check if get_current_dir_name() is available
- tools build feature: Check if eventfd() is available
- tools build: Check if getttid() is available before providing helper
- tools build feature: Check if pthread_barrier_t is available
- btrfs: fix race when cloning extent buffer during rewinding of an old root
- nvme: don't check iosqes,ioctls for discovery controllers
- NFSD: Repair misuse of sv_lock in 5.10.16-rt30.
- svrdma: disable timeouts on rdma backchannel
- sunrpc: fix refcount leak for rpc auth modules
- net/qrtr: fix __netdev_alloc_skb call
- scsi: lpfc: Fix some error codes in debugfs
- nvme-rdma: fix possible hang when failing to set io queues
- usb-storage: Add quirk to defeat Kindle's automatic unload
- USB: replace hardcode maximum usb string length by definition
- usb: gadget: configfs: Fix KASAN use-after-free
- iio: adc:stm32-adc: Add HAS_IOMEM dependency
- iio: adc:qcomspmi-vadc: add default scale to LR_MUX2_BAT_ID channel
- iio: adis16400: Fix an error code in adis16400_initial_setup()
- iio: gyro: mpu3050: Fix error handling in mpu3050_trigger_handler
- iio: hid-sensor-humidity: Fix alignment issue of timestamp channel
- iio: hid-sensor-prox: Fix scale not correct issue
- iio: hid-sensor-temperature: Fix issues of timestamp channel
- PCI: rpadlpar: Fix potential drc_name corruption in store functions
- perf/x86/intel: Fix a crash caused by zero PEBS status
- x86/ioapic: Ignore IRQ2 again
- kernel, fs: Introduce and use set_restart_fn() and arch_set_restart_data()
- x86: Move TS_COMPAT back to asm/thread_info.h
- x86: Introduce TS_COMPAT_RESTART to fix get_nr_restart_syscall()
- ext4: find old entry again if failed to rename whiteout
- ext4: do not try to set xattr into ea_inode if value is empty
- ext4: fix potential error in ext4_do_update_inode
- genirq: Disable interrupts for force threaded handlers
- btrfs: fix slab cache flags for free space tree bitmap
- powerpc: Force inlining of cpu_has_feature() to avoid build failure
- usbip: Fix incorrect double assignment to udc->ud.tcp_rx
- x86/apic/of: Fix CPU devicetree-node lookups

-- Kelsey Skunberg <kelsey.skunberg@canonical.com>  Fri, 07 May 2021 18:44:53 -0600

+linux (4.15.0-143.147) bionic; urgency=medium

+ * bionic/linux: 4.15.0-143.147 -proposed tracker (LP: #1923811)
+ * CVE-2021-29650
+ - netfilter: x_tables: Use correct memory barriers.
+ * LRMv4: switch to signing nvidia modules via the Ubuntu Modules signing key
  + (LP: #1918134)
  + - [Packaging] dkms-build[,--nvidia-N] sync back from LRMv4
+ * Security-Fix Xen XSA 371 for Kernel 5.4.0-71 (LP: #1921902) //
  + CVE-2021-28688
  + - xen-blkback: don't leak persistent grants from xen_blkbk_map()
+ * CVE-2021-20292
+ - drm/ttm/nouveau: don't call tt destroy callback on alloc failure.
+ * CVE-2021-29264
+ - gianfar: fix jumbo packets+napi+rx overrun crash
+ * CVE-2021-29265
+ - usbip: fix stub_dev usbip_sockfd_store() races leading to gpf
+ * Bcache bypass writeback on caching device with fragmentation (LP: #1900438)
+ - bcache: consider the fragmentation when update the writeback rate
+ * Bionic update: upstream stable patchset 2021-03-31 (LP: #1922124)
+ - net: usb: qmi_wwan: support ZTE P685M modem
+ - scripts: use pkg-config to locate libcrypto
+ - scripts: set proper OpenSSL include dir also for sign-file
+ - hugetlb: fix update_and_free_page contig page struct assumption
+ - drm/virtio: use kvmalloc for large allocations
+ - virtio/s390: implement virtio-ccw revision 2 correctly
+ - arm64 module: set plt* section addresses to 0x0
+ - arm64: Avoid redundant type conversions in xchg() and cmpxchg()
+ - arm64: cmpxchg: Use "K" instead of "L" for ll/sc immediate constraint
+ - arm64: Use correct ll/sc atomic constraints
+ - JFS: more checks for invalid superblock
+ - media: mceusb: sanity check for prescaler value
+ - xfs: Fix assert failure in xfs_setattr_size()
+ - smackfs: restrict bytes count in smackfs write functions
+ - net: fix up true size of cloned skb in skb_prepare_for_shift()
+ - mm/hugetlb.c: fix unnecessary address expansion of pmd sharing
+ - net: bridge: use switchdev for port flags set through sysfs too
+ - dt/bindings: net: btusb: DT fix s/interrupt-name/interrupt-names/
+ - staging: Fix error handling in fwserial_create
+ - x86/roboot: Add Zotac ZBOX CI327 nano PCI reboot quirk
+ - vt/consolemap: do font sum unsigned
+ - wcore: Fix command execute failure 19 for w112xx
+ - pktgen: fix misuse of BUG_ON() in pktgen_thread_worker()
+ - ath10k: fix wmi mgmt tx queue full due to race condition
+ - x86/build: Treat R_386_PLT32 relocation as R_386_PC32
+ - Bluetooth: Fix null pointer dereference in amp_read_loc_assoc_final_data
+ - staging: most: sound: add sanity check for function argument
+ - media: uvcvideo: Allow entities with no pads
+ - i2fs: handle unallocated section and zone on pinned/atgc
+ - parisc: Bump 64-bit IRQ stack size to 64 KB
+ - Xen/gnttab: handle p2m update errors on a per-slot basis
+ - xen-netback: respect gnttab_map_refs()'s return value
+ - zmalloc: account the number of compacted pages correctly
+ - swap: fix swapfile read/write offset
+ - media: v4l: ioctl: Fix memory leak in video_usercopy
+ - PCI: Add a REBAR size quirk for Sapphire RX 5600 XT Pulse
+ - drm/amd/display: Guard against NULL pointer deref when get_i2c_info fails
+ - i2fs: fix to set/clear I_LINKABLE under i_lock
+ - btrfs: fix error handling in commit_fs_roots
+ - ALSA: hda/realtek: Add quirk for Clevo NH55RZQ
+ - ALSA: hda/realtek: Apply dual codec quirks for MSI Godlike X570 board
+ - btrfs: raid56: simplify tracking of Q stripe presence
+ - btrfs: fix raid6 qstripe kmap
+ - usbip: tools: fix build error for multiple definition
+ - ALSA: ctxfxi: cthw20k2: fix mask on conf to allow 4 bits
+ - rxxx: Return -EFAULT if copy_to_user() fails
+ - dm table: fix iterate_devices based device capability checks
+ - dm table: fix DAX iterate_devices based device capability checks
+ - dm table: fix zoned iterate_devices based device capability checks
+ - iommu/amd: Fix sleeping in atomic in increase_address_space()
+ - mwifiex: pcie: skip cancel_work_sync() on reset failure path
+ - platform/x86: acer-wmi: Cleanup ACER_CAP_FOO defines
+ - platform/x86: acer-wmi: Cleanup accelerometer device handling
+ - platform/x86: acer-wmi: Add new force_caps module parameter
+ - platform/x86: acer-wmi: Add ACER_CAP_SET_FUNCTION_MODE capability flag
+ - platform/x86: acer-wmi: Add support for SW_TABLET_MODE on Switch devices
+ - platform/x86: acer-wmi: Add ACER_CAP_KBD_DOCK quirk for the Aspire Switch
+ - 10E SW3-016
+ - PCI: Add function 1 DMA alias quirk for Marvell 9215 SATA controller
+ - misc: eeprom_93xx46: Add quirk to support Microchip 93LC46B eeprom
+ - drm/msm/a5xx: Remove overwriting A5XX_PCIEDBG_ECO_CNTL register
+ - Revert "zram: close udev startup race condition as default groups"
+ - HID: mf: add support for 0079:1846 Mayflash/Dragonrise USB Gamecube Adapter
+ - Bionic update: upstream stable patchset 2021-03-16 (LP: #1919380)
+ - fgraph: Initialize tracing_graph_pause at task creation
+ - tracing: Do not count ftrace events in top level enable output
+ - tracing: Check length before giving out the filter buffer
+ - arm/xen: Don't probe xenbus as part of an early initcall
+ - MIPS: BMIPS: Fix section mismatch warning
+ - arm64: dts: rockchip: Fix PCIe DT properties on rk3399
+ - platform/x86: hp-wmi: Disable tablet-mode reporting by default
+ - ovl: perform vfs_getxattr() with mounter creds
+ - cap: fix conversions on getxattr
+ - ovl: skip getxattr of security labels
+ - ARM: dts: lp32xx: Revert set default clock rate of HCLK PLL
+ - ARM: ensure the signal page contains defined contents
+ - bpf: Check for integer overflow when using roundup_pow_of_two()
+ - netfilter: xt_recent: Fix attempt to update deleted entry
+ - xen/netback: avoid race in xenvif_rx_ring_slots_available()
+ - netfilter: conntrack: skip identical origin tuple in same zone only
+ - usb: dwc3: ulpi: fix checkpatch warning
+ - usb: dwc3: ulpi: Replace CPU-based busyloop with Protocol-based one
+ - net/vmw_vsock: improve locking in vsck_connect_timeout()
+ - net: watchdog: hold device global xmit lock during tx disable
+ - vsck/virtio: update credit only if socket is not closed
+ - vsck: fix locking in vsck_shutdown()
+ - i2c: sm32f7: fix configuration of the digital filter
+ - h8300: fix PREEMPTION build, TI_PRE_COUNT undefined
+ - x86/build: Disable CET instrumentation in the kernel for 32-bit too
+ - trace: Use -mcount-record for dynamic ftrace
+ - tracing: Fix SKIP_STACK_VALIDATION=1 build due to bad merge with -mrecord-mcount
+ - tracing: Avoid calling cc-option -mrecord-mcount for every Makefile
+ - Xen/x86: don't bail early from clear_foreign_p2m_mapping()
+ - Xen/x86: also check kernel mapping in set_foreign_p2m_mapping()
+ - Xen/gntdev: correct dev_bus_addr handling in gntdev_map_grant_pages()
+ - Xen/gntdev: correct error checking in gntdev_map_grant_pages()
+ - xen/arm: don't ignore return errors from set_phys_to_machine
+ - xen-blkback: don't "handle" error by BUG()
+ - xen-netback: don't "handle" error by BUG()
+ - xen-scsi: don't "handle" error by BUG()
+ - xen-blkback: fix error handling in xen_blkblk_map()
+ - scsi: qla2xxx: Fix crash during driver load on big endian machines
+ - kvm: check tlb's dirty directly
+ - drm/amd/display: Free atomic state after drm_atomic_commit
+ - riscv: virt_addr_valid must check the address belongs to linear mapping
+ - ARM: kexec: fix oops after TLB are invalidated
+ - net: hns3: add a check for queue_id in helge_reset_vf_queue()
+ - firmware_loader: align .builtin_fw to 8
+ - net/rds: restrict iovecs length for RDS_CMSG_RDMA_ARGS
+ - ovfl: expand warning in ovf_d_real()
+ - net: qrtr: Fix port ID for control messages
+ - HID: make arrays usage and value to be the same
+ - usb: quirks: add quirk to start video capture on ELMO L-12F document camera
+ - reliable
+ - ntfs: check for valid standard information attribute
+ - arm64: tegra: Add power-domain for Tegra210 HDA
+ - NET: usb: qmi_wwan: Adding support for Cinterion MV31
+ - cifs: Set CIFS_MOUNT_USE_PREFIX_PATH flag on setting cifs_sb->prepath.
+ - scripts/recordmcount.pl: support big endian for ARCH sh
+ - vmlinux.lds.h: add DWARF v5 sections
+ - kdb: Make memory allocations more robust
+ - MIPS: vmlinux.lds.S: add missing PAGE_ALIGNED_DATA() section
+ - random: fix the RNDRESEEDCRNG ioctl
+ - Bluetooth: btqcomsmd: Fix a resource leak in error handling paths in the
  probe function
+ - Bluetooth: Fix initializing response id after clearing struct
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Monk
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Rinato
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Spring
+ - ARM: dts: exynos: correct PMIC interrupt trigger level on Arndale Octa
+ - arm64: dts: exynos: correct PMIC interrupt trigger level on TM2
+ - arm64: dts: exynos: correct PMIC interrupt trigger level on Espresso
+ - cpufreq: brcmstb-avs-cpufreq: Fix resource leaks in ->remove()
+ - usb: gadget: u_audio: Free requests only after callback
+ - Bluetooth: drop HCI device reference before return
+ - Bluetooth: Put HCI device if inquiry procedure interrupts
+ - ARM: dts: Configure missing thermal interrupt for 4430
+ - usb: dwc2: Do not update data length if it is 0 on inbound transfers
+ - usb: dwc2: Abort transaction after errors with unknown reason
+ - usb: dwc2: Make "trimming xfer length" a debug message
+ - staging: rtl8723bs: wifi_regd.c: Fix incorrect number of regulatory rules
+ - arm64: dts: msm8916: Fix reserved and rfsa nodes unit address
+ - ARM: s3c: fix fiq for clang IAS
+ - bpf_lru_list: Read double-checked variable once without lock
+ - ath9k: fix data bus crash when setting nf_override via debugfs
+ - bnx6: reverse order of TX disable and carrier off
+ - xen/netback: fix spurious event detection for common event case
+ - mac80211: fix potential overflow when multiplying to u32 integers
+ - b43: N-PHY: Fix the update of coef for the PHY revision >= 3case
+ - i4mvnic: skip send_request_unmap for timeout reset
+ - net: amd-xgbe: Reset the PHY rx data path when mailbox command timeout
+ - net: amd-xgbe: Reset link when the link never comes back
+ - net: mvneta: Remove per-cpu queue mapping for Armada 3700
+ - fbdev: aty: SPARC64 requires FB_ATY_CT
+ - drm/gma500: Fix error return code in psb_driver_load()
+ - gma500: clean up error handling in init
+ - crypto: sun4i-ss - fix kmap usage
+ - MIPS: c-r4k: Fix section mismatch for loongson2_sc_init
+ - MIPS: lantiq: Explicitly compare LTQ_EBU_PCC_ISTAT against 0
+ - media: i2c: ov5670: Fix PIXEL_RATE minimum value
+ - media: vsp1: Fix an error handling path in the probe function
+ - media: media/pci: Fix memleak in empress_init
+ - media: tmn6000: Fix memleak in tmn6000_start_stream
+ - ASoC: cs42156: fix up error handling in probe
+ - crypto: bcm - Rename struct device_private to bcm_device_private
+ - media: imedmt04: Fix misuse of comma
+ - media: qm1d1c0042: fix error return code in qm1d1c0042_init()
+ - media: cx25821: Fix a bug when reallocating some dma memory
+ - media: pxa_camera: declare variable when DEBUG is defined
+ - media: uvcvideo: Accept invalid bFormatIndex and bFrameIndex values
+ - ata: ahci_brcm: Add back regulators management
+ - Drivers: hv: vmbus: Avoid use-after-free in vmbus_onoffer_rescind()
+ - btrfs: clarify error returns values in __load_free_space_cache
+ - hwrng: timeriomem - Fix cooldown period calculation
+ - crypto: ecdh_helper - Ensure 'len >= secret.len' in decode_key()
+ - ima: Free IMA measurement buffer on error
+ - ima: Free IMA measurement buffer after kexec syscall
+ - fs/jffs: fix potential integer overflow on shift of a int
+ - jffs2: fix use after free in jffs2_sum_write_data()
+ - capabilities: Don't allow writing ambiguous v3 file capabilities
+ - clk: meson: clk-pll: fix initializing the old rate (fallback) for a PLL
+ - quota: Fix memory leak when handling corrupted quota file
+ - spi: cadence-quadspi: Abort read if dummy cycles required are too many
+ - HID: core: detect and skip invalid inputs to snto32()
+ - dmaengine: fsldma: Fix a resource leak in the remove function
+ - dmaengine: fsldma: Fix a resource leak in an error handling path of the
+ - probe function
+ - dmaengine: hsu: disable spurious interrupt
+ - mfd: bd9571mww: Use devm_mfd_add_devices()
+ - fdt: Properly handle "no-map" field in the memory region
+ - of/fdt: Make sure no-map does not remove already reserved regions
+ - power: reset: at91-sama5d2_shdwc: fix wkupdbc mask
+ - rtc: s5m: select REGMAP_I2C
+ - clocksource/drivers/mxs_timer: Add missing semicolon when DEBUG is defined
+ - regulator: exp20x: Fix reference cout leak
+ - certs: Fix blacklist flag type confusion
+ - spi: atmel: Put allocated master before return
+ - iso/fs: release buffer head before return
+ - auxdisplay: ht16k33: Fix refresh rate handling
+ - IB/umad: Return EIO in case of when device disassociated
+ - powerpc47x: Disable 256k page size
+ - mmc: usdhifrol0: Fix a resource leak in the error handling path of the probe
+ - ARM: 9046/1: decompressor: Do not clear SCTLR.nTLSMD for ARMv7+ cores
- amba: Fix resource leak for drivers without .remove
- tracepoint: Do not fail unregistering a probe due to memory failure
- perf tools: Fix DSO filtering when not finding a map for a sampled address
- RDMA/rxe: Fix coding error in rxe_recv.c
- spi: stm32: properly handle 0 byte transfer
- mfd: wm831x-auxadc: Prevent use after free in wm831x_auxadc_read_irq()
- powerpc/pseries/dlpar: handle ibm, configure-connector delay status
- powerpc/8xx: Fix software emulation interrupt
- spi: pxax2xx: Fix the controller numbering for Wildcat Point
- perf intel-pt: Fix missing CYC processing in PSB
- perf test: Fix unaligned access in sample parsing test
- Input: elo - fix an error code in elo_connect()
- sparc64: only select COMPAT_BINFMT_ELF if BINFMT_ELF is set
- misc: eeprom_93xx46: Fix module alias to enable module auto probing
- misc: eeprom_93xx46: Add module alias to avoid breaking support for non device tree users
- pwm: rockchip: rockchip_pwm_probe(): Remove superfluous clk_unprepare()
- VMCI: Use set_page_dirty_lock() when unregistering guest memory
- PCI: Align checking of syscall user config accessors
- drm/msm/dsi: Correct io_start for MSM8994 (20nm PHY)
- ext4: fix potential htree index checksum corruption
- i40e: Fix flow for IPv6 next header (extension header)
- i40e: Fix overwriting flow control settings during driver loading
- net/mlx4_core: Add missed mlx4_free_cmd_mailbox()
- ocfs2: fix a use after free on error
- mm/memory.c: fix potential pte_unmap_unlock pte error
- mm/hugetlb: fix potential double free in hugetlb_register_node() error path
- arm64: Add missing ISB after invalidating TLB in __primary_switch
- i2c: brcmstb: Fix brcmsdt_send_i2c_cmd condition
- mm/rmap: fix potential pte_unmap on an not mapped pte
- scsi: bnx2fc: Fix Kconfig warning & CNIC build errors
- blk-settings: align max_sectors on "logical_block_size" boundary
- ACPI: property: Fix fwnode string properties matching
- ACPI: configfs: add missing check after configfs_register_default_group()
- HID: wacom: Ignore attempts to overwrite the touch_max value from HID
- Input: raydium_ts_i2c - do not send zero length
- Input: xpad - add support for PowerA Enhanced Wired Controller for Xbox
- Series X|S
- Input: joydev - prevent potential read overflow in ioctl
- Input: i8042 - add ASUS Zenbook Flip to noselftest list
- USB: serial: option: update interface mapping for ZTE P685M
- usb: musb: Fix runtime PM race in musb_queue_resume_work
- USB: serial: mos7840: fix error code in mos7840_write()
- USB: serial: mos7720: fix error code in mos7720_write()
- usb: dwc3: gadget: Fix setting of DEPCFG.blinterval_m1
- usb: dwc3: gadget: Fix dep->interval for fullspeed interrupt
- ALSA: hda/realtek: modify EAPD in the ALC886
- tpm_tis: Fix check_locality for correct locality acquisition
+ - KEYS: trusted: Fix migratable=1 failing
+ - btrfs: abort the transaction if we fail to inc ref in btrfs_copy_root
+ - btrfs: fix reloc root leak with 0 ref reloc roots on recovery
+ - btrfs: fix extent buffer leak on failure to copy root
+ - crypto: sun4i-ss - checking sg length is not sufficient
+ - crypto: sun4i-ss - handle BigEndian for cipher
+ - seccomp: Add missing return in non-void function
+ - drivers/misc/vmw_vmcie: restrict too big queue size in qp_host_alloc_queue
+ - staging: rtl8118eu: Add Edimax EW-7811UN V2 to device table
+ - x86/reboot: Force all cpus to exit VMX root if VMX is supported
+ - floppy: reintroduce O_NDELAY fix
+ - arm64: uprobe: Return EOPNOTSUPP for AARCH32 instruction probing
+ - watchdog: mei_wdt: request stop on unregister
+ - mtd: spi-nor: hisi-sfc: Put child node np on error path
+ - fs/affs: release old buffer head on error path
+ - hugetlb: fix copy_huge_page_from_user contig page struct assumption
+ - mm: hugetlb: fix a race between freeing and dissolving the page
+ - libnvdimm/dimm: Avoid race between probe and available_slots_show()
+ - module: Ignore _GLOBAL_OFFSET_TABLE_ when warning for undefined symbols
+ - mmc: sdhci-esdhc-imx: fix kernel panic when remove module
+ - gpio: pcf8575x: Fix missing first interrupt
+ - printk: fix deadlock when kernel panic
+ - f2fs: fix out-of-repair_setattr_copy()
+ - sparc32: fix a user-triggerable oops in clear_user()
+ - gfs2: Don't skip dlm unlock if glok has an lvb
+ - dm era: Recover committed writeset after crash
+ - dm era: Verify the data block size hasn't changed
+ - dm era: Fix bitset memory leaks
+ - dm era: Use correct value size in equality function of writeset tree
+ - dm era: Reinitialize bitset cache before digesting a new writeset
+ - dm era: only resize metadata in preresume
+ - icmp: introduce helper for nat'd source address in network device context
+ - icmp: allow icmpv6_nndo_send to work with CONFIG_IPV6=n
+ - gtp: use icmp_nndo_send helper
+ - sunvnet: use icmp_nndo_send helper
+ - ipv6: icmp6: avoid indirect call for icmpv6_send()
+ ibmvnic: add memory barrier to protect long term buffer
+ net: amd-xgbe: Fix NETDEV WATCHDOG transmit queue timeout warning
+ drm/amdgpud: Fix macro name _AMGPU_TRACE_H_ in preprocessor if condition
+ drm/amd/display: Fix 10/12 bpc setup in DCE output bit depth reduction.
+ crypto: talitos - Work around SEC6 ERRATA (AES-CTR mode data size error)
+ i2fs: fix to avoid inconsistent quota data
+ regulator: s5m8767: Drop regulators OF node reference
+ mmc: renesas_sdhi_internal_dmac: Fix DMA buffer alignment from 8 to 128-bytes
+ RDMA/rxe: Correct skb on loopback path
+ i40e: Add zero-initialization of AQ command structures
+ i40e: Fix add TC filter for IPv6
+ r8169: fix jumbo packet handling on RTL8168e
+ USB: serial: ftdi_sio: fix FTX sub-integer prescaler
+ crypto: arm64/sha - add missing module aliases
+ misc: rtsx: init of rts522a add OCP power off when no card is present
+ seq_file: document how per-entry resources are managed.
+ x86: fix seq_file iteration for pat/memtype.c

+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 14 Apr 2021 15:15:21 +0200
+ * linux (4.15.0-142.146) bionic; urgency=medium
+ * overlayfs calls vfs_setxattr without cap_convert_nscap
+ - vfs: move cap_convert_nscap() call into vfs_setxattr()
+ * CVE-2021-29154
+ - SAUCE: bpf, x86: Validate computation of branch displacements for x86-64
+ + -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Mon, 12 Apr 2021 18:46:50 -0300
+ * python (4.15.0-141.145) bionic; urgency=medium
+ bionic/linux: 4.15.0-141.145 -proposed tracker (LP: #1919536)
+ * binary assembly failures with CONFIG_MODVERSIONS present (LP: #1919315)
+ - [Packaging] quiet (nomially) benign errors in BUILD script
+ + selftests: bpf verifier fails after sanitize_ptr_alu fixes (LP: #1920995)
+ - bpf: Simplify alu_limit masking for pointer arithmetic
+ - bpf: Add sanity check for upper ptr_limit
+ - bpf, selftests: Fix up some test_verifier cases for unprivileged
+ + * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ + * CVE-2018-13095
+ - xfs: More robust inode extent count validation
+ * i40e PF reset due to incorrect MDD event (LP: #1772675)
+  i40e: change behavior on PF in response to MDD event
+  Bionic update: upstream stable patchset 2021-03-09 (LP: #1918330)
+  ACPI: sysfs: Prefer "compatible" modalias
+  ARM: dts: imx6qdl-gw52xx: fix duplicate regulator naming
+  wext: fix NULL-ptr-dereference with cfg80211's lack of commit()
+  net: usb: qmi_wwan: added support for Thales Cinterion PLSx3 modem family
+  drivers: soc: atmel: Avoid calling at91_soc_init on non AT91 SoCs
+  drivers: soc: atmel: add null entry at the end of at91_soc_allowed_list[]
+  KVM: x86/pm: Fix HW_REF_CPU_CYCLES event pseudo-encoding in
+    intel_arch_events[]
+  KVM: x86: get smi pending status correctly
+  xen: Fix XenStore initialisation for XS_LOCAL
+  leds: trigger: fix potential deadlock with libata
+  mt7601u: fix kernel crash unplugging the device
+  mt7601u: fix rx buffer refcounting
+  xen-blkfront: allow discard-* nodes to be optional
+  ARM: imx: build suspend-imx6.S with arm instruction set
+  netfilter: nft_dynset: add timeout extension to template
+  xfrm: Fix oops in xfrm_replay_advance_bmp
+  RDMA/cxgb4: Fix the reported max_recv_sge value
+  iwlwifi: pcie: use jiffies for memory read spin time limit
+  iwlwifi: pcie: reschedule in long-running memory reads
+  mac80211: pause TX while changing interface type
+  can: dev: prevent potential information leak in can_fill_info()
+  x86/entry/64/compat: Preserve r8-r11 in int $0x80
+  x86/entry/64/compat: Fix "x86/entry/64/compat: Preserve r8-r11 in int $0x80"
+  jommu/vt-d: Gracefully handle DMAR units with no supported address widths
+  jommu/vt-d: Don't dereference jommu_device if IOMMU_API is not built
+  NFC: fix resource leak when target index is invalid
+  NFC: fix possible resource leak
+  team: protect features update by RCU to avoid deadlock
+  tcp: fix TLP timer not set when CA_STATE changes from DISORDER to OPEN
+  kernel: kexec: remove the lock operation of system_transition_mutex
+  PM: hibernate: flush swap writer after marking
+  pNFS/NFSv4: Fix a layout segment leak in pnfs_layout_process()
+  net/mlx5: Fix memory leak on flow table creation error flow
+  rxrpc: Fix memory leak in rxrpc_lookup_local
+  net: dsa: bcm_sf2: put device node before return
+  ibmvnic: Ensure that CRQ entry read are correctly ordered
+  ACPI: thermal: Do not call ACPI_thermal_check() directly
+  net_sched: gen_estimator: support large ewma log
+  phy: pcacap-usb: Fix warning for missing regulator_disable
+  x86: __always_inline __{rd,wr}msr()
+  scsi: scsi_transport_srp: Don't block target in failfast state
+  scsi: libfc: Avoid invoking response handler twice if ep is already
+ completed
+ - mac80211: fix fast-rx encryption check
+ - scsi: ibmvfc: Set default timeout to avoid crash during migration
+ - objtool: Don't fail on missing symbol table
+ - kthread: Extract KTHREAD_IS_PER_CPU
+ - workqueue: Restrict affinity change to rescuer
+ - USB: serial: cp210x: add pid/vid for WSDA-200-USB
+ - USB: serial: cp210x: add new VID/PID for supporting Teraoka AD2000
+ - USB: serial: option: Adding support for Cinterion MV31
+ - arm64: dts: ls1046a: fix dcf1g address range
+ - net: lapb: Copy the skb before sending a packet
+ - elfcore: fix building with clang
+ - USB: gadget: legacy: fix an error code in eth_bind()
+ - USB: usbblp: don't call usb_set_interface if there's a single alt
+ - usb: dwc2: Fix endpoint direction check in ep_from_windex
+ - ovl: fix dentry leak in ovl_get_redirect
+ - mac80211: fix station rate table updates on assoc
+ - kretprobe: Avoid re-registration of the same kretprobe earlier
+ - xhci: fix bounce buffer usage for non-sg list case
+ - cifs: report error instead of invalid when revalidating a dentry fails
+ - smb3: Fix out-of-bounds bug in SMB2_negotiate()
+ - mmc: core: Limit retries when analyse of SDIO tuples fails
+ - nvme-pci: avoid the deepest sleep state on Kingston A2000 SSDs
+ - ARM: footbridge: fix dc21285 PCI configuration accessors
+ - mm: hugetlbfs: fix cannot migrate the allocated HugeTLB page
+ - mm: hugetlb: fix a race between isolating and freeing page
+ - mm: hugetlb: remove VM_BUG_ON_PAGE from page_huge_active
+ - mm: thp: fix MADV_REMOVE deadlock on shmem THP
+ - x86/build: Disable CET instrumentation in the kernel
+ - x86/apic: Add extra serialization for non-serializing MSRs
+ - Input: xpad - sync supported devices with fork on GitHub
+ - iommu/vt-d: Do not use flush-queue when caching-mode is on
+ - net: dsa: mv88e6xxxx: override existent unicast portvec in port_fdb_add
+ - net: mvpp2: TCAM entry enable should be written after SRAM data
+ - memblock: do not start bottom-up allocations with kernel_end
+ - usb: renesas_usbhs: Clear pipe running flag in usbhs_pkt_pop()
+ - genirq/pci: Activate Multi-MSI early when MSI_FLAG_ACTIVATE_EARLY is set
+ - KVM: SVM: Treat SVM as unsupported when running as an SEV guest
+ - md: Set prev_flush_start and flush_bio in an atomic way
+ - net: ip_tunnel: fix mtu calculation
+ - block: fix NULL pointer dereference in register_disk
+ - remoteproc: qcom_q6v5_mss: Validate modem blob firmware size before load
+ - remoteproc: qcom_q6v5_mss: Validate MBA firmware size before load
+ - af_key: relax availability checks for skb size calculation
+ - pNFS/NFSv4: Try to return invalid layout in pfnx_layout_process()
+ - iwlwifi: mvm: take mutex for calling iwl_mvm_get_sync_time()
+ - iwlwifi: pcie: add a NULL check in iwl_pci_txq_unmap
+ - iwlwifi: mvm: guard against device removal in reprobe
+ - SUNRPC: Move simple_get_bytes and simple_get_netobj into private header
+ - SUNRPC: Handle 0 length opaque XDR object data properly
+ - lib/string: Add strncpy_pad() function
+ - include/trace/events/writeback.h: fix -Wstringop-truncation warnings
+ - memcg: fix a crash in wb_workfn when a device disappears
+ - blk-mq: don't hold q->sysfs_lock in blk_mq_map_swqueue
+ - squashfs: add more sanity checks in id lookup
+ - squashfs: add more sanity checks in inode lookup
+ - squashfs: add more sanity checks in xattr id lookup
+ *
+ * SRU: Add FUA support for XFS (LP: #1917918)
+ * block: add blk_queue_fua() helper function
+ * xfs: move generic_write_sync calls inwards
+ * iomap: iomap Dio_rw() handles all sync writes
+ * iomap: Use FUA for pure data O_DSYNC DIO writes
+ *
+ * CVE-2021-3348
+ - nbd: freeze the queue while we're adding connections
+ *
+ * Bionic kernel 4.15.0-136 causes dosemu2 (with kvm mode) freezes due to lack
+ * of KVM patch (LP: #1917138)
+ * KVM: x86: handle !lapic_in_kernel case in kvm_cpu_*_int
+ *
+ * switch LRM to be signed using the Ubuntu Drivers signing key (LP: #1917034)
+ * [Packaging] sync dkms-build to updated API
+ *
+ * Bionic update: upstream stable patchset 2021-02-26 (LP: #1917093)
+ * i2c: bpmp-tegra: Ignore unknown I2C_M flags
+ * ALSA: seq: oss: Fix missing error check in snd_seq_oss_synth_make_info()
+ * ALSA: hda/via: Add minimum mute flag
+ * ACPI: scan: Make acpi_bus_get_device() clear return pointer on error
+ * mmc: sdhci-xenon: fix 1.8v regulator stabilization
+ * dm: avoid filesystem lookup in dm_get_dev_t()
+ * drm/atomic: put state on error path
+ * ASoC: Intel: haswell: Add missing pm_ops
+ * scsi: ufs: Correct the LUN used in eh_device_reset_handler() callback
+ * xen: Fix event channel callback via INTX/GSI
+ * drm/nouveau/bios: fix issue shadowing expansion ROMs
+ * drm/nouveau/privring: ack interrupts the same way as RM
+ * drm/nouveau/i2c/gm200: increase width of aux semaphore owner fields
+ * i2c: octeon: check correct size of maximum RECV LEN packet
+ * can: dev: can_restart: fix use after free bug
+ * can: vxcan: vxcan_xmit: fix use after free bug
+ * iio: ad5504: Fix setting power-down state
+ * irqchip/mips-cpu: Set IPI domain parent chip
+ * intel_th: pci: Add Alder Lake-P support
+ * stm class: Fix module init return on allocation failure
+ * ehci: fix EHCI host controller initialization sequence
- USB: ehci: fix an interrupt calltrace error
- usb: udc: core: Use lock when write to soft_connect
- usb: bdc: Make bdc pci driver depend on BROKEN
- [Config] updateconfigs for USB_BDC_PCI
- xhci: make sure TRB is fully written before giving it to the controller
- xhci: tegra: Delay for disabling LFPS detector
- compiler.h: Raise minimum version of GCC to 5.1 for arm64
- netfilter: rpfilter: mask ecn bits before fib lookup
- sh: dma: fix kconfig dependency for G2_DMA
- sh_eth: Fix power down vs. is_opened flag lookup
- skbuff: back tiny skb with kmalloc() in __netdev_alloc_skb() too
- udp: mask TOS bits in udp_v4_early_demux()
- ipv6: create multicast route with RTPROT_KERNEL
- net_sched: avoid shift-out-of-bounds in tcindex_set_parms()
- net: dsa: b53: fix an off by one in checking "vlan->vid"
- gpio: mvebu: fix pwm .get_state period calculation
- Revert "mm/slub: fix a memory leak in sysfs_slab_add()"
- futex: Ensure the correct return value from futex_lock_pi()
- futex: Replace pointless printk in fixup_owner()
- futex: Provide and use pi_state_update_owner()
- rtmutex: Remove unused argument from rt_mutex_proxy_unlock()
- futex: Use pi_state_update_owner() in put_pi_state()
- futex: Simplify fixup_pi_state_owner()
- futex: Handle faults correctly for PI futexes
- tracing: Fix race in trace_open and buffer resize call
- fs: move I_DIRTY_INODE to fs.h
- writeback: Drop I_DIRTY_TIME_EXPIRE
- fs: fix lazyme time expiration handling in __writeback_single_inode()
- mmc: core: don't initialize block size from ext_csd if not present
- scsi: qed: Correct max length of CHAP secret
- riscv: Fix kernel time_init()
- HID: Ignore battery for Elan touchscreen on ASUS UX550
- clk: tegra30: Add hda clock default rates to clock driver
- drm/nouveau/mmu: fix vram heap sizing
- scsi: megaraid_sas: Fix MEGASAS_IOC_FIRMWARE regression
- can: peak_usb: fix use after free bugs
- serial: mvebu-uart: fix tx lost characters at power off
- driver core: Extend device_is_dependent()
- net_sched: reject silly cell_log in qdisc_get_rtab()
- tools: Factor HOSTCC, HOSTLD, HOSTAR definitions

* Enforce CONFIG_DRM_BOCHS=m (LP: #1916290)
* [Config] Enforce CONFIG_DRM_BOCHS=m

* Please trust Canonical Livepatch Service kmod signing key (LP: #1898716)
* [Config] enable CONFIG_MODVERSIONS=y
* [Packaging] build canonical-certs.pem from branch/arch certs
* [Config] add Canonical Livepatch Service key to SYSTEM_TRUSTED_KEYS
+ [Config] add ubuntu-drivers key to SYSTEM_TRUSTED_KEYS
+ + Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 24 Mar 2021 18:47:50 +0100
+ +linux (4.15.0-140.144) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-140.144 -proposed tracker (LP: #1920169)
+ + * CVE-2020-27170
+ + - bpf: Fix off-by-one for area size in creating mask to left
+ + * CVE-2020-27171
+ + - bpf: Prohibit alu ops for pointer types not defining ptr_limit
+ + Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 19 Mar 2021 09:17:46 -0300
+ +linux (4.15.0-139.143) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-139.143 -proposed tracker (LP: #1919218)
+ + * CVE-2021-27365
+ + - scsi: iscsi: Verify lengths on passthrough PDUs
+ + - sysfs: Add sysfs_emit and sysfs_emit_at to format sysfs output
+ + - scsi: iscsi: Ensure sysfs attributes are limited to PAGE_SIZE
+ + * CVE-2021-27363 // CVE-2021-27364
+ + - scsi: iscsi: Restrict sessions and handles to admin capabilities
+ + Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Mon, 15 Mar 2021 17:54:59 -0300
+ +linux (4.15.0-137.141) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-137.141 -proposed tracker (LP: #1916199)
+ + * Fix oops in skb_segment for Bionic series (LP: #1915552)
+ + - net: permit skb_segment on head_frag frag_list skb
+ + - net: bpf: add a test for skb_segment in test_bpf module
+ + - test_bpf: Fix NULL vs IS_ERR() check in test_skb_segment()
+ + * Bionic update: upstream stable patchset 2021-02-10 (LP: #1915328)
+ + - net: cdc_ncm: correct overhead in delayed_ndp_size
+ + - net: vlan: avoid leaks on register_vlan_dev() failures
+ + - net: ip: always refragment ip defragmented packets
+ + - net: fix pmtu check in nopmtudisc mode
+ + - x86/resctrl: Use an IPI instead of task_work_add() to update PQR_ASSOC MSR
+ + - x86/resctrl: Don't move a task to the same resource group
+ + vmlinux.lds.h: Add PGO and AutoFDO input sections
+ + drm/i915: Fix mismatch between misplaced vma check and vma insert
+ - spi: pxa2xx: Fix use-after-free on unbind
+ - iio: imu: st_lsm6dsx: flip irq return logic
+ - iio: imu: st_lsm6dsx: fix edge-trigger interrupts
+ - ARM: OMAP2+: omap_device: fix idling of devices during probe
+ - i2c: sprd: use a specific timeout to avoid system hang up issue
+ - cpufreq: powernow-k8: pass policy rather than use cpufreq_cpu_get()
+ - spi: stm32: FIFO threshold level - fix align packet size
+ - dmaengine: xilinx_dma: check dma_async_device_register return value
+ - dmaengine: xilinx_dma: fix mixed_enum_type coverity warning
+ - wil6210: select CONFIG_CRC32
+ - block: rsxx: select CONFIG_CRC32
+ - iommu/intel: Fix memleak in intel_irq_remapping_alloc
+ - net/mlx5e: Fix memleak in mlx5e_create_i2_table_groups
+ - net/mlx5e: Fix two double free cases
+ - wan: ds26522: select CONFIG_BITREVERSE
+ - KVM: arm64: Don't access PMCR_EL0 when no PMU is available
+ - block: fix use-after-free in disk_part_iter_next
+ - net: drop bogus skb with CHECKSUM_PARTIAL and offset beyond end of trimmed packet
+ - net: hns3: fix the number of queues actually used by ARQ
+ - net: stmmac: dwmac-sun8i: Balance internal PHY resource references
+ - net: stmmac: dwmac-sun8i: Balance internal PHY power
+ - net/sonic: Fix some resource leaks in error handling paths
+ - net: ipv6: fib: flush exceptions when purging route
+ - dmaengine: xilinx_dma: fix incompatible param warning in _child_probe()
+ - lightnvm: select CONFIG_CRC32
+ - ASoC: dapm: remove widget from dirty list on free
+ - MIPS: boot: Fix unaligned access with CONFIG_MIPS_RAW_APPENDED_DTB
+ - MIPS: relocatable: fix possible boot hangup with KASLR enabled
+ - ACPI: scan: Harden acpi_device_add() against device ID overflows
+ - mm/hugetlb: fix potential missing huge page size info
+ - dm snapshot: flush merged data before committing metadata
+ - r8152: Add Lenovo Powered USB-C Travel Hub
+ - ext4: fix bug for rename with RENAME_WHITEOUT
+ - ARC: build: remove non-existing bootpImage from KBUILD_IMAGE
+ - ARC: build: add uImage.lzma to the top-level target
+ - ARC: build: add boot_targets to PHONY
+ - btrfs: fix transaction leak and crash after RO remount caused by qgroup rescan
+ - ethernet: ucc_geth: fix definition and size of ucc_geth_tx_global_pram
+ - arch/arc: add copy_user_page() to <asm/page.h> to fix build error on ARC
+ - misdn: dsp: select CONFIG_BITREVERSE
+ - net: ethernet: fs_enet: Add missing MODULE_LICENSE
+ - ACPI: scan: add stub acpi_create_platform_device() for !CONFIG_ACPI
+ - ARM: picoxcell: fix missing interrupt-parent properties
+ - dump_common_audit_data(): fix racy accesses to ->d_name
+ - ASOC: Intel: fix error code cnl_set_dsp_D0()
+ - NFS4: Fix use-after-free in trace_event_raw_event_nfs4_set_lock
+ pNFS: Mark layout for return if return-on-close was not sent
+ NFS: nfs_igrab_and_active must first reference the superblock
+ ext4: fix superblock checksum failure when setting password salt
+ RDMA/usnic: Fix memleak in find_free_vf_and_create_qp_grp
+ mm, slab: consider rest of partial list if acquire_slab() fails
+ net: sunrpc: interpret the return value of kstrtou32 correctly
+ dm: eliminate potential source of excessive kernel log noise
+ ALSA: firewire-tascam: Fix integer overflow in midi_port_work()
+ ALSA: fireface: Fix integer overflow in transmit_midi_msg()
+ netfilter: conntrack: fix reading nf_conntrack_buckets
+ usb: ohci: Make distrust_firmware param default to false
+ nfsd4: readdirplus shouldn't return parent of export
+ netxen_nic: fix MSI/MSI-x interrupts
+ rndis_host: set proper input size for OID_GEN_PHYSICAL_MEDIUM request
+ esp: avoid unneeded kmap_atomic call
+ net: dcb: Validate netlink message in DCB handler
+ net: dcb: Accept RTM_GETDCB messages carrying set-like DCB commands
+ net: stmmac: Fixed mtu changed by cache aligned
+ net: sit: unregister_netdevice on newlink's error path
+ net: avoid 32 x truesize under-estimation for tiny skbs
+ rxrpc: Fix handling of an unsupported token type in rxrpc_read()
+ tipc: fix NULL deref in tipc_link_xmit()
+ spi: cadence: cache reference clock rate during probe
+ x86/hyperv: check cpu mask after interrupt has been disabled
+ mtd: rawnand: fsl_ifc: check result of SRAM initialization fixup
+ kbuild: enforce -Werror=return-type
+ crypto: x86/crc32c - fix building with clang ias
+ rxrpc: Call state should be read with READ_ONCE() under some circumstances
+ ssbs-0118] backport SSBS bug (arm64: cpufeature: Detect SSBS and advertise
+ to userspace) (LP: #1911376)
+ SAUCE: Move SSBS snippet from arm64_elf_hwcaps to arm64_features
+ Bionic update: upstream stable patchset 2021-01-25 (LP: #1913214)
+ x86/entry/64: Add instruction suffix
+ md/raid10: initialize r10_bio->read_slot before use.
+ ALSA: usb-audio: simplify set_sync_ep_implicit_fb_quirk
+ ALSA: usb-audio: fix sync-ep altsetting sanity check
+ mm: memcontrol: eliminate raw access to stat and event counters
+ mm: memcontrol: implement lruvec stat functions on top of each other
+ mm: memcontrol: fix excessive complexity in memory.stat reporting
+ vfio/pci: Move dummy_resources_list init in vfio_pci_probe()
+ powerpc/bitsops: Fix possible undefined behaviour with fsl() and fsl64()
+ uapi: move constants from <linux/kernel.h> to <linux/const.h>
+ of: fix linker-section match-table corruption
+ reiserfs: add check for an invalid ih_entry_count
+ misc: vmw_vmci: fix kernel info-leak by initializing dbells in
+ vmci_ctx_get_chkpt_doorbells()
- media: gp8psk: initialize stats at power control logic
- ALSA: seq: Use bool for snd_seq_queue internal flags
- rtc: sun6i: Fix memleak in sun6i_rtc_clk_init
- module: set MODULE_STATE_GOING state when a module fails to load
- quota: Don't overflow quota file offsets
- powerpc: sysdev: add missing iounmap() on error in mpic_msgr_probe()
- module: delay kobject uevent until after module init call
- ALSA: pcm: Clear the full allocated memory at hw_params
- dm: verify: skip verity work if I/O error when system is shutting down
- kdev_t: always inline major/minor helper functions
- iio:imu:bmi160: Fix alignment and data leak issues
- mwifiex: Fix possible buffer overflows in mwifiex_cmd_802_11_ad_hoc_start
- ext4: don't remount read-only with errors=continue on reboot
- KVM: SVM: relax conditions for allowing MSR_IA32_SPEC_CTRL accesses
- KVM: x86: reinstate vendor-agnostic check on SPEC_CTRL cpuid bits
- xen/gntdev.c: Mark pages as dirty
- ALSA: rawmidi: Access runtime->avail always in spinlock
- kbuild: don't hardcode depmod path
- workqueue: Kick a worker based on the actual activation of delayed works
- scsi: ufs-pci: Ensure UFS device is in PowerDown mode for suspend-to-disk
- poweroff()
- scsi: ide: Do not set the RQF_PREEMPT flag for sense requests
- lib/genalloc: fix the overflow when size is too big
- depmod: handle the case of /sbin/depmod without /sbin in PATH
- ethernet: ucc_geth: substitute kalloc with kmalloc
- dmaengine: at_hmac: add missing put_device() call in at_dma_xlate()
- dmamengine: at_hmac: add missing kfree() call in at_dma_xlate()
- kbuild: don't hardcode depmod path
- workqueue: Kick a worker based on the actual activation of delayed works
- scsi: ufs-pci: Ensure UFS device is in PowerDown mode for suspend-to-disk
- poweroff()
- scsi: ide: Do not set the RQF_PREEMPT flag for sense requests
- lib/genalloc: fix the overflow when size is too big
- depmod: handle the case of /sbin/depmod without /sbin in PATH
- ethernet: ucc_geth: fix use-after-free in ucc_geth_remove()
- ethernet: ucc_geth: set dev->max_mtu to 1518
- atm: idt77252: call pci_disable_device() on error path
- qede: fix offload for IPIP tunnel packets
- virtio_net: Fix recursive call to cpus_read_lock()
- net/ncsi: Use real net-device for response handler
- net: ethernet: Fix memleak in ethoc_probe
- net/sysfs: take the rtnl lock when storing xps_cpus
- net: ethernet: ti: cpts: fix ethtool output when no ptp_clock registered
- ipv4: Ignore ECN bits for fib lookups in fib_compute_spec_dst()
- net: hns: fix return value check in __lb_other_process()
- net: hdle_ppp: Fix issues when mod_timer is called while timer is running
- CDC-NCM: remove "connected" log message
- net: usb: qmi_wwan: add Quectel EM160R-GL
- vhost_net: fix ubuf refcount incorrectly when sendmsg fails
- net: sched: prevent invalid Scell_log shift count
- net/sysfs: take the rtnl lock when accessing xps_cpus_map and num_tc
- net: mvpp2: Fix GoP port 3 Networking Complex Control configurations
- net: systemport: set dev->max_mtu to UMAC_MAX_MTU_SIZE
+ - video: hyperv_fb: Fix the mmap() regression for v5.4.y and older
+ - crypto: ecdh - avoid buffer overflow in ecdh_set_secret()
+ - usb: gadget: enable super speed plus
+ - USB: cdc-acm: blacklist another IR Droid device
+ - usb: dwc3: ulpi: Use VStsDone to detect PHY regs access completion
+ - usb: chipidea: ci_hdrc_imx: add missing put_device() call in
+  usbmisc_get_init_data()
+ - USB: xhci: fix U1/U2 handling for hardware with XHCI_INTEL_HOST quirk set
+ - usb: ushp: vhci_hcd: protect shift size
+ - usb: uas: Add PNY USB Portable SSD to unusual_uas
+ - USB: serial: iiuu_phoenix: fix DMA from stack
+ - USB: serial: option: add LongSung M5710 module support
+ - USB: serial: option: add Quectel EM160R-GL
+ - USB: yurex: fix control-URB timeout handling
+ - USB: usblp: fix DMA to stack
+ - ALSA: usb-audio: Fix UBSAN warnings for MIDI jacks
+ - usb: gadget: select CONFIG_CRC32
+ - usb: gadget: f_uac2: reset wMaxPacketSize
+ - usb: gadget: function: printer: Fix a memory leak for interface descriptor
+ - USB: gadget: legacy: fix return error code in acm_ms_bind()
+ - usb: gadget: Fix spinlock lockup on usb_function_deactivate
+ - usb: gadget: confgfs: Preserve function ordering after bind failure
+ - usb: gadget: confgfs: Fix use-after-free issue with udc_name
+ - USB: serial: keysan_pda: remove unused variable
+ - x86/mm: Fix leak of pmd ptlock
+ - ALSA: hda/conexant: add a new hda codec CX11970
+ - ALSA: hda/realtek - Fix speaker volume control on Lenovo C940
+ - Revert "device property: Keep secondary firmware node secondary by type"
+ - netfilter: ipset: fix shift-out-of-bounds in htable_bits()
+ - netfilter: xt_RATEEST: reject non-null terminated string from userspace
+ - x86/mtrr: Correct the range check before performing MTRR type lookups
+ - KVM: x86: fix shift out of bounds reported by UBSAN
+ - i40e: Fix Error I40E_AQ_RC_EINVAL when removing VFs
+ - tun: fix return value when the number of iovs exceeds MAX_SKB_FRAGS
+ - USB: cdc-wdm: Fix use after free in service_outstanding_interrupt()
+ - USB: Gadget Ethernet: Re-enable Jumbo frames.
+ - usb: gadget: u_ether: Fix MTU size mismatch with RX packet size
+ -- Stefan Bader <stefan.bader@canonical.com> Fri, 19 Feb 2021 11:28:35 +0100
+ linux (4.15.0-136.140) bionic; urgency=medium
+ * bionic/linux: 4.15.0-136.140 -proposed tracker (LP: #1913117)
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ - update dkms package versions
+ --
+ * Introduce the new NVIDIA 460-server series and update the 460 series
  (LP: #1913200)
+ - [Config] dkms-versions -- drop NVIDIA 435, 455 and 440-server
+ - [Config] dkms-versions -- add the 460-server nvidia driver
+
+ * switch to an autogenerated nvidia series based core via dkms-versions
  (LP: #1912803)
+ - [Packaging] nvidia -- use dkms-versions to define versions built
+ - [Packaging] update-version-dkms -- maintain flags fields
+ - [Config] dkms-versions -- add transitional/skip information for nvidia packages
+
+ * DMI entry syntax fix for Pegatron / ByteSpeed C15B (LP: #1910639)
+ - Input: i8042 - unbreak Pegatron C15B
+
+ * CVE-2020-29372
+ - mm: check that mm is still valid in madvise()
+
+ * update ENA driver, incl. new ethtool stats (LP: #1910291)
+ - net: ena: change num_queues to num_io_queues for clarity and consistency
+ - net: ena: ethtool: get_channels: use combined only
+ - net: ena: ethtool: support set_channels callback
+ - net: ena: ethtool: remove redundant non-zero check on rc
+ - net/amazon: Ensure that driver version is aligned to the linux kernel
+ - net: ena: ethtool: clean up minor indentation issue
+ - net: ena: remove code that does nothing
+ - net: ena: add unmask interrupts statistics to ethtool
+ - net: ena: cosmetic: change ena_com_stats_admin stats to u64
+ - net: ena: cosmetic: remove unnecessary code
+ - net: ena: ethtool: convert stat_offset to 64 bit resolution
+ - net: ena: ethtool: Add new device statistics
+ - net: ena: Change license into format to SPDX in all files
+ - net: ena: Change RSS related macros and variables names
+
+ * CVE-2020-29374
+ - gup: document and work around "COW can break either way" issue
+
+ * Bionic update: upstream stable patchset 2021-01-12 (LP: #1911331)
+ - spi: bcm2835aux: Fix use-after-free on unbind
+ - spi: bcm2835aux: Restore err assignment in bcm2835aux_spi_probe
+ - iwlwifi: pcie: limit memory read spin time
+ - arm64: dts: rockchip: Assign a fixed index to mmc devices on rk3399 boards.
+ - iwlwifi: mvm: fix kernel panic in case of assert during CSA
+ - ARC: stack unwinding: don't assume non-current task is sleeping
+ - scsi: ufs: Make sure clk scaling happens only when HBA is runtime ACTIVE
+ - soc: fsl: dt: Get the cpumask through cpumask_of(cpu)
+ - platform/x86: acer-wmi: add automatic keyboard background light toggle key
+ as KEY_LIGHTS_TOGGLE
- Input: cm109 - do not stomp on control URB
- Input: i8042 - add Acer laptops to the i8042 reset list
- kbuild: avoid static_assert for genksyms
- scsi: be2scsi: Revert "Fix a theoretical leak in beiscsi_create_eqs()"
- x86/mm/mem_encrypt: Fix definition of PMD_FLAGS_DEC_WP
- PCI: qcom: Add missing reset for ipq806x
- net: stmmac: free tx skb buffer in stmmac_resume()
- tcp: fix cwnd-limited bug for TSO deferral where we send nothing
- net/mlx4_en: Avoid scheduling restart task if it is already running
- net/mlx4_en: Handle TX error CQE
- net: stmmac: delete the eee_ctrl_timer after napi disabled
- net: stmmac: dwmac-meson8b: fix mask definition of the m250_sel mux
- net: bridge: vlan: fix error return code in __vlan_add()
- mac80211: mesh: fix mesh_pathtbl_init() error path
- USB: dummy-hcd: Fix uninitialized array use in init()
- USB: add RESET_RESUME quirk for Snapscan 1212
- ALSA: usb-audio: Fix potential out-of-bounds shift
- ALSA: usb-audio: Fix control ‘access overflow’ errors from chmap
- xhci: Give USB2 ports time to enter U3 in bus suspend
- USB: UAS: introduce a quirk to set no_write_same
- USB: sisusbvga: Make console support depend on BROKEN
- [Config] updateconfigs for USB_SISUSBVGA_CON
- ALSA: pcm: oss: Fix potential out-of-bounds shift
- serial: 8250_omap: Avoid FIFO corruption caused by MDRI1 access
- drm: fix drm_dp_mst_port refcount leaks in drm_dp_mst_allocate_vcp
- pinctrl: merrifield: Set default bias in case no particular value given
- pinctrl: baytrail: Avoid clearing debounce value when turning it off
- ARM: dts: sun8i: v3s: fix GIC node memory range
- gpio: mvebu: fix potential user-after-free on probe
- scsi: bnx2i: Requires MMU
- can: softing: softing_netdev_open(): fix error handling
- RDMA/cm: Fix an attempt to use non-valid pointer when cleaning timewait
- kernel/cpu: add arch override for clear_tasks_mm_cpumask() mm handling
- drm/tegra: sor: Disable clocks on error in tegra_sor_init()
- vxlan: Add needed_headroom for lower device
- vxlan: Copy needed_tailroom from lowerdev
- scsi: mpt3sas: Increase IOCInit request timeout to 30s
- dm table: Remove BUG_ON(in_interrupt())
- soc/tegra: fuse: Fix index bug in get_process_id
- USB: serial: option: add interface-number sanity check to flag handling
- USB: gadget: f_acm: add support for SuperSpeed Plus
- USB: gadget: f_midi: setup SuperSpeed Plus descriptors
- usb: gadget: f_fs: Re-use SS descriptors for SuperSpeedPlus
- USB: gadget: f_rndis: fix bitrate for SuperSpeed and above
- usb: chipidea: ci_hdrc_imx: Pass DISABLE_DEVICE_STREAMING flag to imx6ul
- ARM: dts: exynos: fix roles of USB 3.0 ports on Odroid XU
- ARM: dts: exynos: fix USB 3.0 VBUS control and over-current pins on
  Exynos5410
+ - ARM: dts: exynos: fix USB 3.0 pins supply being turned off on Odroid XU
+ - HID: i2c-hid: add Vero K147 to descriptor override
+ - serial_core: Check for port state when tty is in error state
+ - quota: Sanity-check quota file headers on load
+ - media: msi2500: assign SPI bus number dynamically
+ - crypto: af_alg - avoid undefined behavior accessing salg_name
+ - md: fix a warning caused by a race between concurrent md_ioctl()s
+ - Bluetooth: Fix slab-out-of-bounds read in hci_le_direct_adv_report_evt()
+ - drm/gma500: fix double free of gma_connector
+ - soc: renesas: rmobile-sysc: Fix some leaks in rmobile_init_pm_domains()
+ - soc: mediatek: Check if power domains can be powered on at boot time
+ - RDMA/bnxt_re: Set queue pair state when being queried
+ - selinux: fix error initialization in inode_doinit_with_dentry()
+ - RDMA/rxe: Compute PSN windows correctly
+ - x86/mm/ident_map: Check for errors from ident_pud_init()
+ - ARM: p2v: fix handling of LPAE translation in BE mode
+ - sched/deadline: Fix sched_dl_global_validate()
+ - sched: Reenable interrupts in do_sched_yield()
+ - crypto: talitos - Fix return type of current_desc_hdr()
+ - spi: img-spfi: fix reference leak in img_spfi_resume
+ - ASoC: pcm: DRAIN support reactivation
+ - selinux: fix inode_doinit_with_dentry() LABEL_INVALID error handling
+ - arm64: dts: exynos: Correct psci compatible used on Exynos7
+ - Bluetooth: Fix null pointer dereference in hci_event_packet()
+ - spi: spi-ti-qspi: fix reference leak in ti_qspi_setup
+ - spi: tegra20-slink: fix reference leak in slink ops of tegra20
+ - spi: tegra20-sflash: fix reference leak in tegra_sflash_resume
+ - spi: tegra114: fix reference leak in tegra_spi_ops
+ - mwifiex: fix mwifiex_shutdown_sw() causing sw reset failure
+ - ASoC: wm8998: Fix PM disable depth imbalance on error
+ - ASoC: arizona: Fix a wrong free in wm8997_probe
+ - RDMa/mthca: Work around -Wenum-conversion warning
+ - MIPS: BCM47XX: fix kconfig dependency bug for BCM47XX_BDMA
+ - staging: greybus: codecs: Fix reference counter leak in error handling
+ - media: mtk-vcodec: add missing put_device() call in
+   mtk_vcodec_release_dec_pm()
+ - scsi: core: Fix VPD LUN ID designator priorities
+ - media: solo6x10: fix missing snd_card_free in error handling case
+ - drm/omap: dmm_tiler: fix return error code in omap_dmm_probe()
+ - Input: ads7846 - fix race that causes missing releases
+ - Input: ads7846 - fix integer overflow on Rt calculation
+ - Input: ads7846 - fix unaligned access on 7845
+ - powerpc/feature: Fix CPU_FTRS_ALWAYS by removing CPU_FTRS GENERIC_32
+ - crypto: omap-aes - Fix PM disable depth imbalance in omap_aes_probe
+ - soc: ti: knav_qmss: fix reference leak in knav_queue_probe
+ - soc: ti: Fix reference imbalance in knav_dma_probe
+ - drivers: soc: ti: knav_qmss_queue: Fix error return code in knav_queue_probe
+ - Input: omap4-keypad - fix runtime PM error handling
+ - RDMA/cxgb4: Validate the number of CQEs
+ - memstick: fix a double-free bug in memstick_check
+ - ARM: dts: at91: sama5d4_xplained: add pincontrol for USB Host
+ - ARM: dts: at91: sama5d3_xplained: add pincontrol for USB Host
+ - orinoco: Move context allocation after processing the skb
+ - cw1200: fix missing destroy_workqueue() on error in cw1200_init_common
+ - media: siano: fix memory leak of debugfs members in smsdvb_hotplug
+ - samples: bpf: Fix lwt_len_hist reusing previous BPF map
+ - mips: cdmm: fix use-after-free in mips_cdmm_bus_discover
+ - media: max2175: fix max2175_set_csm_mode() error code
+ - HSI: omap_ssi: Don't jump to free ID in ssi_add_controller()
+ - ARM: dts: Remove non-existent i2c1 from 98dx3236
+ - power: supply: bq24190_charger: fix reference leak
+ - genirq/irqdomain: Don't try to free an interrupt that has no mapping
+ - PCI: iproc: Fix out-of-bound array accesses
+ - ARM: dts: at91: at91sam9rl: fix ADC triggers
+ - ath10k: Fix an error handling path
+ - ath10k: Release some resources in an error handling path
+ - NFSv4.2: condition READDIR's mask for security label based on LSM state
+ - SUNRPC: xprt_load_transport() needs to support the netid "rdma6"
+ - lockd: don't use interval-based rebinding over TCP
+ - NFS: switch nfsiod to be an UNBOUND workqueue.
+ - vfio-pci: Use io_remap_pfn_range() for PCI IO memory
+ - media: saa7146: fix array overflow in vidioc_s_audio()
+ - clocksource/drivers/cadence_ttc: Fix memory leak in ttc_setup_clockevent()
+ - ARM: dts: at91: sama5d2: map securam as device
+ - pinctrl: falcon: add missing put_device() call in pinctrl_falcon_probe()
+ - arm64: dts: rockchip: Fix UART pull-ups on rk3328
+ - memstick: r592: Fix error return in r592_probe()
+ - net/mlx5: Properly convey driver version to firmware
+ - ASoC: jz4740-i2s: add missed checks for clk_get()
+ - dm ioc1: fix error return code in target_message
+ - clocksource/drivers/arm_arch_timer: Correct fault programming of
+   CNTKCTL_EL1.EVNTI
+ - cpufreq: highbank: Add missing MODULE_DEVICE_TABLE
+ - cpufreq: mediatek: Add missing MODULE_DEVICE_TABLE
+ - cpufreq: st: Add missing MODULE_DEVICE_TABLE
+ - cpufreq: loongson1: Add missing MODULE_ALIAS
+ - cpufreq: scpi: Add missing MODULE_ALIAS
+ - scsi: qedi: Fix missing destroy_workqueue() on error in __qedi_probe
+ - scsi: pm80xx: Fix error return in pm8001_pci_probe()
+ - seq_buf: Avoid type mismatch for seq_buf_init
+ - scsi: fnic: Fix error return code in fnic_probe()
+ - powerpc/pseries/hibernation: drop pseries_suspend_begin() from suspend ops
+ - powerpc/pseries/hibernation: remove redundant cacheinfo update
+ - usb: ehci-omap: Fix PM disable depth umbalance in ehci_hcd_omap_probe
+ - usb: oxu210hp-hcd: Fix memory leak in oxu_create
+ - speakup: fix uninitialized flush_lock
+ - nfsd: Fix message level for normal termination
+ - nfs_common: need lock during iterate through the list
+ - x86/kprobes: Restore BTF if the single-stepping is cancelled
+ - clk: tegra: Fix duplicated SE clock entry
+ - extcon: max77693: Fix modaliases string
+ - ASoC: wm_adsp: remove "ctl" from list on error in wm_adsp_create_control()
+ - irqchip/alpine-msi: Fix freeing of interrupts on allocation error path
+ - watchdog: sirfsoc: Add missing dependency on HAS_IOMEM
+ - um: chan_xterm: Fix fd leak
+ - nfc: s3fwrm5: Release the nfc firmware
+ - powerpc/ps3: use dma_mapping_error()
+ - checkpatch: fix unescaped left brace
+ - net: bcmgenet: Fix a resource leak in an error handling path in the probe
  + functin
+ - net: allwinner: Fix some resources leak in the error handling path of the
  + probe and in the remove function
+ - net: korina: fix return value
+ - watchdog: qcom: Avoid context switch in restart handler
+ - watchdog: coh901327: add COMMON_CLK dependency
+ - clk: ti: Fix memleak in ti_fapll_synth_setup
+ - pwm: zx: Add missing cleanup in error path
+ - pwm: lp3943: Dynamically allocate PWM chip base
+ - perf record: Fix memory leak when using '--user-regs=?' to list registers
+ - qlcnic: Fix error code in probe
+ - clk: s2mps11: Fix a resource leak in error handling paths in the probe
  + function
+ - clk: sunxi-ng: Make sure divider tables have sentinel
+ - cfg80211: initialize rekey_data
+ - fix namespaced fscaps when !CONFIG_SECURITY
+ - Input: cros_ec_keyb - send 'scancodes' in addition to key events
+ - Input: goodix - add upside-down quirk for Teclast X98 Pro tablet
+ - media: gspca: Fix memory leak in probe
+ - media: sunxi-cir: ensure IR is handled when it is continuous
+ - media: netup_unidvb: Don't leak SPI master in probe error path
+ - Input: cyapa_gen6 - fix out-of-bounds stack access
+ - PM: ACPI: PCI: Drop acpi_pm_set_bridge_wakeup()
+ - Revert "ACPI / resources: Use AE_CTRL_TERMINATE to terminate resources
  + walks"
+ - ACPI: PNP: compare the string length in the matching_id()
+ - ALSA: hda/realtek - Enable headset mic of ASUS Q524UQK with ALC255
+ - ALSA: pcm: oss: Fix a few more UBSAN fixes
+ - ALSA: usb-audio: Disable sample read check if firmware doesn't give back
+ - s390/smp: perform initial CPU reset also for SMT siblings
+ - s390/dasd: prevent inconsistent LCU device data
+ - s390/dasd: fix list corruption of pavgroup group list
+ - s390/dasd: fix list corruption of lcu list
+ - staging: comedii: mf6x4: Fix AI end-of-conversion detection
+ - powerpc/perf: Exclude kernel samples while counting events in user space.
+ - crypto: ecdh - avoid unaligned accesses in ecdh_set_secret()
+ - EDAC/amd64: Fix PCI component registration
+ - USB: serial: mos7720: fix parallel-port state restore
+ - USB: serial: keysan_pda: fix dropped unhthrottle interrupts
+ - USB: serial: keysan_pda: fix write deadlock
+ - USB: serial: keysan_pda: fix stalled writes
+ - USB: serial: keysan_pda: fix write-wakeupe use-after-free
+ - USB: serial: keysan_pda: fix tx-unthrottle use-after-free
+ - USB: serial: keysan_pda: fix write unthrottling
+ - ext4: fix a memory leak of ext4_free_data
+ - ext4: fix deadlock with fs freezing and EA inodes
+ - KVM: arm64: Introduce handling of AArch32 TTBCR2 traps
+ - ARM: dtc: at91: sama5d2: fix CAN message ram offset and size
+ - powerpc/rtas: Fix typo of ibm,open-errinjct in RTAS filter
+ - powerpc/xmon: Change printk() to pr_cont()
+ - powerpc/powernv/memtrace: Don't leak kernel memory to user space
+ - ima: Don't modify file descriptor mode on the fly
+ - ceph: fix race in concurrent __ceph_remove_cap invocations
+ - jffs2: Fix GC exit abnormally
+ - jfs: Fix array index bounds check in dbAdjTree
+ - drm/dp_aux_dev: check aux_dev before use in drm_dp_aux_dev_get_by_minor()
+ - spi: spi-sh: Fix use-after-free on unbind
+ - spi: davinci: Fix use-after-free on unbind
+ - spi: pic32: Don't leak DMA channels in probe error path
+ - spi: rb4xx: Don't leak SPI master in probe error path
+ - spi: sc18is602: Don't leak SPI master in probe error path
+ - spi: st-ssc4: Fix unbalanced pm_runtime_disable() in probe error path
+ - soc: qcom: smp2p: Safely acquire spinlock without IRQs
+ - mtd: parser: cmdline: Fix parsing of part-names with colons
+ - iio: buffer: Fix demux update
+ - iio: adc: rockchip_saradc: fix missing clk_disable_unprepare() on error in
  rockchip_saradc_resume
+ - iio:pressure:mpl3115: Force alignment of buffer
+ - md/cluster: fix deadlock when node is doing resync job
+ - clk: mvebu: a3700: fix the XTAL MODE pin to MP1_9
+ - xen-blkback: set ring->xenblkd to NULL after kthread_stop()
+ - xen/xenbus: Allow watches discard events before queueing
+ - xen/xenbus: Add `will_handle' callback support in xenbus_watch_path()
+ - xen/xenbus/xen_bus_type: Support will_handle watch callback
+ - xen/xenbus: Count pending messages for each watch
+ - xenbus/xenbus_backend: Disallow pending watch messages
+ - libnvdimm/namespace: Fix reaping of invalidated block-window-namespace
  labels
+ - PCI: Fix pci_slot_release() NULL pointer dereference
+ - Kbuild: do not emit debug info for assembly with LLVM_IAS=1
+ - x86/lib: Change .weak to SYM_FUNC_START_WEAK for arch/x86/lib/mem*_64.S
+ - powerpc: Drop -me200 addition to build flags
+ - platform/x86: thinkpad_acpi: Do not report SW_TABLET_MODE on Yoga 11e
+ - x86/apic/vector: Fix ordering in vector assignment
+ - tcp: select sane initial rcvq_space.space for big MSS
+ - arm64: Change .weak to SYM_FUNC_START_WEAK_PI for arch/arm64/lib/mem*.S
+ - block: factor out requeue handling from dispatch code
+ - ixgbe: avoid premature Rx buffer reuse
+ - scsi: megaraid_sas: Check user-provided offsets
+ - drm/tve200: Fix handling of platform_get_irq() error
+ - x86/apic: Fix x2apic enablement without interrupt remapping
+ - crypto: talitos: Endianess in current_desc_hdr()
+ - arm64: dts: exynos: Include common syscon restart/poweroff for Exynos7
+ - media: tm6000: Fix sizeof() mismatches
+ - video: fbdev: atmel_lcdfb: fix return error code in atmel_lcdfb_of_init()
+ - usb/max3421: fix return error code in max3421_probe()
+ - spi: mxs: fix reference leak in mxs_spi_probe
+ - crypto: crypto4xx: Replace bitwise OR with logical OR in crypto4xx_build_pd
+ - spi: fix resource leak for drivers without .remove callback
+ - dmaengine: mv_xor_v2: Fix error return code in mv_xor_v2_probe()
+ - power: supply: axp288_charger: Fix HP Pavilion x2 10 DMI matching
+ - PCI: Bounds-check command-line resource alignment requests
+ - PCI: Fix overflow in command-line resource alignment requests
+ - arm64: dts: meson: fix spi-max-frequency on Khadas VIM2
+ - platform/x86: dell-smbios-base: Fix error return code in dell_smbios_init
+ - bus: fsl-mc: fix error return code in fsl_mc_object_allocate()
+ - mac80211: don't set set TDLS STA bandwidth wider than possible
+ - watchdog: Fix potential dereferencing of null pointer
+ - um: tty: Fix handling of close in tty lines
+ - libnvdimm/label: Return -ENXIO for no slot in __blk_label_update
+ - ARM: sunxi: Add machine match for the Allwinner V3 SoC
+ - lwt: Disable BH too in run_lwt_bpf()
+ - ALSA: hda: Fix regressions on clear and reconfig sysfs
+ - ALSA: hda/realtek: Enable headset mic of ASUS X430UN with ALC256
+ - ALSA: hda/realtek: Add quirk for MSI-GP73
+ - ALSA: hda/realtek: Apply jack fixup for Quanta NL3
+ - s390/dasd: fix hanging device offline processing
+ - USB: serial: digi_acceleport: fix write-wakeup deadlocks
+ - powerpc: Fix incorrect stw{, ux, u, x} instructions in __set_pte_at
+ - ubifs: wbuf: Don't leak kernel memory to flash
+ - scsi: lpfc: Fix invalid sleeping context in lpfc_sli4_nvnet_alloc()
+ - scsi: lpfc: Re-fix use after free in lpfc_rq_buf_free()
+ - pinctrl: sunxi: Always call chained_irq_\[enter, exit\] in
  + sunxi_pinctrl_irq_handler
+ - * MSFT Touchpad not working on Lenovo Legion-5 15ARH05 (LP: #1887190) //
  + Bionic update: upstream stable patchset 2021-01-12 (LP: #1911331)
+ - pinctrl: amd: remove debounce filter setting in IRQ type setting
+ * Bionic update: upstream stable patchset 2021-01-07 (LP: #1910599)
+ * i2c: imx: use clk notifier for rate changes
+ * i2c: imx: Fix external abort on interrupt in exit paths
+ * gpio: mockup: fix resource leak in error path
+ * powerpc/8xx: Always fault when _PAGE_ACCESSED is not set
+ * Input: sunkbd - avoid use-after-free in teardown paths
+ * mac80211: always wind down STA state
+ * can: proc: can_remove_proc(): silence remove_proc_entry warning
+ * KVM: x86: clflushopt should be treated as a no-op by emulation
+ * ACPI: GED: fix -Wformat
+ * ah6: fix error return code in ah6_input()
+ * atm: nicstar: Unmap DMA on send error
+ * bnxt_en: read EEPROM A2h address using page 0
+ * devlink: Add missing genlmsq_cancel() in devlink_nl_sb_port_pool_fill()
+ * inet_diag: Fix error path to cancel the message in inet_req_diag_fill()
+ * mlxsw: core: Use variable timeout for EMAD retries
+ * net: b44: fix error return code in b44_init_one()
+ * net: bridge: add missing counters tondo_get_stats64 callback
+ * net: dsa: mv88e6xx: Avoid VTU corruption on 6097
+ * net: Have netpoll bring-up DSA management interface
+ * netlabel: fix our progress tracking in netlbl_unlabel_staticlist()
+ * netlabel: fix an uninitialized warning in netlbl_unlabel_staticlist()
+ * net/mlx4_core: Fix init_hca fields offset
+ * net: x25: Increase refcnt of "struct x25_neigh" in x25_rx_call_request
+ * qlcnic: fix error return code in qlnic_83xx_restart_hw()
+ * scpt: change to hold/put transport for proto_unreach_timer
+ * net/mlx5: Disable QoS when min_rates on all VFs are zero
+ * net: usb: qmi_wwan: Set DTR quirk for MR400
+ * tcp: only postpone PROBE_RTT if RTT is < current min_rtt estimate
+ * net: ftgmac100: Fix crash when removing driver
+ * pinctrl: rockchip: enable gpio pclk for rockchip_gpio_to_irq
+ * arm64: psci: Avoid printing in cpu_psci_cpu_die()
+ * vfs: remove lockdep bogosity in__sb_start_write
+ * Input: adxl34x - clean up a data type in adxl34x_probe()
+ * MIPS: export has_transparent_hugepage() for modules
+ * arm: dts: imx6qdl-udoo: fix rgmii phy-mode for ksz9031 phy
+ * ARM: dts: imx50-evk: Fix the chip select 1 IOMUX
+ * perf lock: Don't free "lock_seq_stat" if read_count isn't zero
+ * can: af_can: prevent potential access of uninitialized member in can_rcv()
+ * can: af_can: prevent potential access of uninitialized member in canfd_rcv()
+ * can: dev: can_restart(): post buffer from the right context
+ * can: ti_hecc: Fix memleak in ti_hecc_probe
+ * can: mcba_usb: mcba_usb_start_xmit(): first fill skb, then pass to
+ * can_put_echo_skb()
+ * can: peak_usb: fix potential integer overflow on shift of a int
+ * can: m_can: m_can_handle_state_change(): fix state change
+ * AlSoC: qcom: lpass-platform: Fix memory leak
+ * MIPS: Alchemy: Fix memleak in alchemy_clk_setup_cpu
+ - regulator: ti-abb: Fix array out of bound read access on the first transition
+ - xfs: revert "xfs: fix rmap key and record comparison functions"
+ - libfs: fix error cast of negative value in simple_attr_write()
+ - powerpc/uaccess-flush: fix missing includes in kup-radix.h
+ - speakup: Do not let the line discipline be used several times
+ - ALSA: ctl: fix error path at adding user-defined element set
+ - ALSA: mixart: Fix mutex deadlock
+ - tty: serial: imx: keep console clocks always on
+ - efiavarfs: fix memory leak in efiavarfs_create()
+ - staging: rtl8723bs: Add 024c:0627 to the list of SDIO device-ids
+ - ext4: fix bogus warning in ext4_update_dx_flag()
+ - iio: accel: kxcjk1013: Replace is smo8500_device with an ACPI type enum
+ - iio: accel: kxcjk1013: Add support for KIOX010A ACPI DSM for setting tablet-mode
+ - regulator: fix memory leak with repeated set_machine_constraints()
+ - regulator: avoid resolve_supply() infinite recursion
+ - regulator: workaround self-referent regulators
+ - xtensa: disable preemption around cache alias management calls
+ - mac80211: minstrel: remove deferred sampling code
+ - mac80211: minstrel: fix tx status processing corner case
+ - mac80211: free sta in sta_info_insert_finish() on errors
+ - s390/cpum_sf.c: fix file permission for cpum_sfb_size
+ - s390/dasd: fix null pointer dereference for ERP requests
+ - x86/microcode/intel: Check patch signature before saving microcode for early loading
+ - net: qualcomm: rmnet: Fix incorrect receive packet handling during cleanup
+ - page_frag: Recover from memory pressure
+ - qed: fix error return code in qed_iwarp_l12_start()
+ - scsi: ufs: Fix unbalanced scsi_block_reqs_cnt caused by ufshcd_hold()
+ - arm64: dts: allwinner: a64: Pine64 Plus: Fix ethernet node
+ - arm64: dts: allwinner: h5: OrangePi PC2: Fix ethernet node
+ - Revert "arm: sun8i: orangepi-pc-plus: Set EMAC activity LEDs to active high"
+ - ARM: dts: sun8i: h3: orangepi-plus2e: Enable RGMII RX/TX delay on Ethernet PHY
+ - arm64: dts: allwinner: a64: bananapi-m64: Enable RGMII RX/TX delay on PHY
+ - arm64: dts: allwinner: h5: OrangePi Prime: Fix ethernet node
+ - ALSA: firewire: Clean up a locking issue in copy_resp_to_buf()
+ - ALSA: usb-audio: Add delay quirk for all Logitech USB devices
+ - ALSA: hda/realtek: Add some Clove SSID in the ALC293(ALC1220)
+ - ptrace: Set PF_SUPERPRIV when checking capability
+ - seccomp: Set PF_SUPERPRIV when checking capability
+ - mm/userfaultfd: do not access vma->vm_mm after calling handle_userfault()
+ - perf event: Check ref_reloc_sym before using it
+ - btrfs: fix lockdep splat when reading ggroup config on mount
+ - wireless: Use linux/stdlib.h instead of stddef.h
+ - btrfs: adjust return values of btrfs_inode_by_name
+ - arm64: pgtable: Fix pte_accessible()
- arm64: pgttable: Ensure dirty bit is preserved across pte_wrprotect()
- ALSA: hda/hdmi: Use single mutex unlock in error paths
- ALSA: hda/hdmi: fix incorrect locking in hdmi_pcm_close
- HID: cypress: Support Varmilo Keyboards' media hotkeys
- Input: i8042 - allow insmod to succeed on devices without an i8042 controller
- HID: hid-sensor-hub: Fix issue with devices with no report ID
- dmaengine: xilinx_dma: use readl_poll_timeout_atomic variant
- x86/xen: don't unbind uninitialized lock_kicker_irq
- HID: Add Logitech Dinovo Edge battery quirk
- proc: don't allow async path resolution of /proc/self components
- nvme: free sq/cq dbbuf pointers when dbbuf set fails
- dmaengine: pl330: _prep_dma_memcpy: Fix wrong burst size
- scsi: libiscsi: Fix NOP race condition
- scsi: target: iscsi: Fix cmd abort fabric stop race
- perf/x86: fix sysfs type mismatches
- phy: tegra: xusb: Fix dangling pointer on probe failure
- batman-adv: set .owner to THIS_MODULE
- scsi: ufs: Fix race between shutdown and runtime resume flow
- bnxt_en: fix error return code in bnxt_init_one()
- bnxt_en: fix error return code in bnxt_init_board()
- video: hyperv_fb: Fix the cache type when mapping the VRAM
- bnxt_en: Release PCI regions when DMA mask setup fails during probe.
- IB/mthca: fix return value of error branch in mthca_init_cq()
- nc: s3fwrm5: use signed integer for parsing GPIO numbers
- net: ena: set initial DMA width to avoid intel iommu issue
- ibmvnic: fix NULL pointer dereference in reset_sub_cq_queues
- ibmvnic: fix NULL pointer dereference in ibmnic_reset_cq
- efivarfs: revert "fix memory leak in efivarfs_create()"
- can: gs_usb: fix endianess problem with candleLight firmware
- platform/x86: toshiba_acpi: Fix the wrong variable assignment
- can: m_can: fix nominal bitiming tseg2 min for version >= 3.1
- perf probe: Fix to die_entrypc() returns error correctly
- USB: core: Change %pK for __user pointers to %px
- usb: gadget: f_midi: Fix memleak in f_midi_alloc
- usb: gadget: Fix memleak in gadgetfs_fill_super
- x86/speculation: Fix prctl() when spectre_v2_user=\{seccomp,prctl\},ibpb
- x86/resctrl: Remove superfluous kernfs_get() calls to prevent refcount leak
- x86/resctrl: Add necessary kernfs_put() calls to prevent refcount leak
- USB: core: Fix regression in Hercules audio card
- btrfs: don't access possibly stale fs_info data for printing duplicate device
- KVM: x86: Fix split-irqchip vs interrupt injection window request
- HID: add support for Sega Saturn
- cxgb4: fix the panic caused by non smac rewrite
- s390/qeth: fix tear down of async TX buffers
- platform/x86: thinkpad_acpi: Send tablet mode switch at wakeup time
- USB: quirks: Add USB_QUIRK_DISCONNECT_SUSPEND quirk for Lenovo A630Z TIO
+ built-in usb-audio card
+ - net/af_iucv: set correct sk_protocol for child sockets
+ - rose: Fix Null pointer dereference in rose_send_frame()
+ - sock: set sk_err to ee_errno on dequeue from errq
+ - tcp: Set INET_ECN_xmit configuration in tcp_reinit_congestion_control
+ - tun: honor IOCBB_NOWAIT flag
+ - usbnet: iphet: fix connectivity with iOS 14
+ - bonding: wait for sysfs kobject destruction before freeing struct slave
+ - netfilter: bridge: reset skb->pkt_type after NF_INET_POST_ROUTING traversal
+ - ipv4: Fix tos mask in inet_rtm_getroute()
+ - ibmvnic: Ensure that SCRQ entry reads are correctly ordered
+ - ibmvnic: Fix TX completion error handling
+ - net/x25: prevent a couple of overflows
+ - cxgb3: fix error return code in t3_sge_alloc_qset()
+ - net: pasemi: fix error return code in pasemi_mac_open()
+ - net/mlx5: Fix wrong address reclaim when command interface is down
+ - dt-bindings: net: correct interrupt flags in examples
+ - ALSA: usb-audio: US16x08: fix value count for level meters
+ - Input: xpad - support Ardwiino Controllers
+ - RDMA/i40iw: Address an mmap handler exploit in i40iw
+ - ipv6: addrlabel: fix possible memory leak in ip6addrbl_net_init
+ - ibmvnic: fix call_netdevice_notifiers in do_reset
+ - i40e: Fix removing driver while bare-metal VFs pass traffic
+ - geneve: pull IP header before ECN decapsulation
+ - pinctrl: baytrail: Replace WARN with dev_info_once when setting direct-irq
+ - pin to output
+ - pinctrl: baytrail: Fix pin being driven low for a while on gpiod_get(...,
+ - GPOD_OUT_HIGH)
+ - vlan: consolidate VLAN parsing code and limit max parsing depth
+ - usb: gadget: f_fs: Use local copy of descriptors for userspace copy
+ - USB: serial: kl5kush105: fix memleak on open
+ - USB: serial: ch341: add new Product ID for CH341A
+ - USB: serial: ch341: sort device-id entries
+ - USB: serial: option: add Fibocom NL668 variants
+ - USB: serial: option: add support for Thales Cinterion EXS82
+ - USB: serial: option: fix Quectel BG96 matching
+ - tty: Fix ->pgprp locking in tiocspgrp()
+ - tty: Fix ->session locking
+ - ALSA: hda/realtek - Add new codec supported for ALC897
+ - ALSA: hda/generic: Add option to enforce preferred_dacs pairs
+ - ftrace: Fix updating FTRACE_FL_TRAMP
+ - cifs: fix potential use-after-free in cifs_echo_request()
+ - mm/swapfile: do not sleep with a spin lock held
+ - i2c: imx: Fix reset of I2SR_IAL flag
+ - i2c: imx: Check for I2SR_IAL after every byte
+ - speakup: Reject setting the speakup line discipline outside of speakup
+ - iommu/amd: Set DTE[IntTabLen] to represent 512 IRTEs
+ - spi: Introduce device-managed SPI controller allocation
+ - spi: bcm-qspi: Fix use-after-free on unbind
+ - spi: bcm2835: Fix use-after-free on unbind
+ - spi: bcm2835: Release the DMA channel if probe fails after dma_init
+ - tracing: Fix userstacktrace option for instances
+ - gfs2: check for empty rgp tree in gfs2_ri_update
+ - i2c: qup: Fix error return code in qup_i2c_ham_schedule_desc()
+ - Input: i8042 - fix error return code in i8042_setup_aux()
+ - x86/uprobes: Do not use prefixes.bytes when looping over prefixes.bytes
+ - ALSA: hda/realtek: Add mute LED quirk to yet another HP x360 model
+ - x86/insn-eval: Use new for_each_insn_prefix() macro to loop over prefixes
+ - Revert "geneve: pull IP header before ECN decapsulation"
+  
+ -- Ian May <ian.may@canonical.com>  Wed, 27 Jan 2021 17:31:43 -0600
+
+linux (4.15.0-135.139) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-135.139 -proposed tracker (LP: #1912223)
+
+ * [drm:qxl_enc_commit [qxl]] *ERROR* head number too large or missing monitors
+  config: (LP: #1908219)
+ - qxl: remove qxl_io_log()
+ - qxl: move qxl_send_monitors_config()
+ - qxl: hook monitors_config updates into crtc, not encoder.
+
+ * Touchpad not detected on ByteSpeed C15B laptop (LP: #1906128)
+ - Input: i8042 - add ByteSpeed touchpad to noloop table
+
+ * vmx_nm_test in ubuntu_kvm_unit_tests interrupted on X-oracle-4.15 /
+ B-oracle-4.15 / X-KVM / B-KVM (LP: #1872401)
+ - KVM: nVMX: Always reflect #NM VM-exits to L1
+
+ * stack trace in kernel (LP: #1903596)
+ - net: napi: remove useless stack trace
+
+ * CVE-2020-27777
+ - [Config]: Set CONFIG_PPC_RTAS_FILTER
+
+ * Bionic update: upstream stable patchset 2020-12-04 (LP: #1906875)
+ - regulator: defer probe when trying to get voltage from unresolved supply
+ - ring-buffer: Fix recursion protection transitions between interrupt context
+ - time: Prevent undefined behaviour in timespec64_to_ns()
+ - nbd: don't update block size after device is started
+ - btrfs: sysfs: init devices outside of the chunk_mutex
+ - btrfs: reschedule when cloning lots of extents
+ - genirq: Let GENERIC_IRQ_IPI select IRQ_DOMAIN_HIERARCHY
+ - hv_balloon: disable warning when floor reached
+ - net: xfrm: fix a race condition during allocating spi
- perf tools: Add missing swap for ino_generation
- ALSA: hda: prevent undefined shift in snd_hdac_ext_bus_get_link()
- can: rx-offload: don’t call kfree_skb() from IRQ context
- can: dev: can_get_echo_skb(): prevent call to kfree_skb() in hard IRQ context
- can: dev: __can_get_echo_skb(): fix real payload length return value for RTR frames
- can: can_create_echo_skb(): fix echo skb generation: always use skb_clone()
- can: peak_usb: add range checking in decode operations
- can: peak_usb: peak_usb_get_ts_time(): fix timestamp wrapping
- can: peak_canfd: pucan_handle_can_rx(): fix echo management when loopback is on
- xfs: flush new eof page on truncate to avoid post-eof corruption
- Btrfs: fix missing error return if writeback for extent buffer never started
- ath9k_htc: Use appropriate rx_datalen type
- usb: gadget: goku_udc: fix potential crashes in probe
- gfs2: Free rd_bits later in gfs2_clear_rgrpdpd to fix use-after-free
- gfs2: Add missing truncate_inode_pages_final for sd_aspace
- gfs2: check for live vs. read-only file system in gfs2_fitrim
- scsi: hpsa: Fix memory leak in hpsa_init_one()
- drm/amdGPU: perform srbm soft reset always on SDMA resume
- mac80211: fix use of skb payload instead of header
- cfg80211: regulatory: Fix inconsistent format argument
- scsi: scsi_dh_alua: Avoid crash during alua_bus_detach()
- iommu/amd: Increase interrupt remapping table limit to 512 entries
- pinctrl: intel: Set default bias in case no particular value given
- ARM: 9019/1: kprobes: Avoid fortify_panic() when copying optprobe template
- pinctrl: aspeed: Fix GPI only function problem.
- nbd: fix a block_device refcount leak in nbd_release
- xfs: fix flags argument to rmap lookup when converting shared file rmaps
- xfs: fix rmap key and record comparison functions
- xfs: fix a missing unlock on error in xfs_fs_map_blocks
- of/address: Fix of_node memory leak in of_dma_is_coherent
- cosa: Add missing kfree in error path of cosa_write
- perf: Fix get_recursion_context()
- ext4: correctly report "not supported" for {usr,grp}quota when
  !CONFIG_QUOTA
- ext4: unlock xattr_sem properly in ext4_inline_data_truncate()
- thunderbolt: Add the missed ida_simple_remove() in ring_request_msix()
- iio: Fix use-after-free in iio_unregister_device()
- usb: cdc-acm: Add DISABLE_ECHO for Renesas USB Download mode
- mei: protect mei_cl_mtu from null dereference
- futex: Don't enable IRQs unconditionally in put_pi_state()
- ocfs2: initialize ip_next_orphan
- selinux: Fix error return code in sel_ih_pkey_sid_slow()
- don't dump the threads that had been already exiting when zapped.
- drm/gma500: Fix out-of-bounds access to struct drm_device.vblank[]
- pinctrl: amd: use higher precision for 512 RtcClk
- pinctrl: amd: fix incorrect way to disable debounce filter
- swiotlb: fix "x86: Don't panic if can not alloc buffer for swiotlb"
- IPv6: Set SIT tunnel hard_header_len to zero
- net/af_iucv: fix null pointer dereference on shutdown
- net/x25: Fix null-ptr-deref in x25_connect
- vrf: Fix fast path output packet handling with async Netfilter rules
- r8169: fix potential skb double free in an error path
- net: Update window_clamp if SOCK_RCVBUF is set
- random32: make prandom_u32() output unpredictable
- x86/speculation: Allow IBPB to be conditionally enabled on CPUs with always-
  on STIBP
- perf/core: Fix bad use of igrab()
- perf/core: Fix when using HW tracing kernel filters
- perf/core: Fix a memory leak in perf_event_parse_addr_filter()
- Revert "kernel/reboot.c: convert simple_strtoul to kstrtoint"
- reboot: fix overflow parsing reboot cpu number
- Convert trailing spaces and periods in path components
- xfs: fix scrub flagging rinherit even if there is no rt device
- drm/amd/pm: perform SMC reset on suspend/hibernation
- drm/amd/pm: do not use ixFEATURE_STATUS for checking smc running
- s390/smp: move rcu_cpu_starting() earlier
- tpm_tis: Disable interrupts on ThinkPad T490s
- tick/common: Touch watchdog in tick_unfreeze() on all CPUs
- mfd: sprd: Add wakeup capability for PMIC IRQ
- btrfs: ref-verify: fix memory leak in btrfs_ref_tree_mod
- thunderbolt: Fix memory leak if ida_simple_get() fails in
  enumerate_services()
- btrfs: fix potential overflow in cluster_pages_for_defrag on 32bit arch
- mmc: renesas_sdhi_core: Add missing tmio_mmc_host_free() at remove

-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 18 Jan 2021 18:20:48 +0100

+ linux (4.15.0-134.138) bionic; urgency=medium
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+
+ -- Stefan Bader <stefan.bader@canonical.com>  Fri, 15 Jan 2021 11:30:49 +0100

+ linux (4.15.0-132.136) bionic; urgency=medium
+ * bionic/linux: 4.15.0-132.136 -proposed tracker (LP: #1911147)
+
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+
+ * CVE-2020-28374
+ - SAUCE: target: fix XCOPY NAA identifier lookup
Open Source Used In 5GaaS Edge AC-4  18984

-- Stefan Bader <stefan.bader@canonical.com>  Tue, 12 Jan 2021 14:38:57 +0100

+linux (4.15.0-130.134) bionic; urgency=medium
+
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+
+ * CVE-2021-1052 // CVE-2021-1053
+ - [Packaging] NVIDIA -- Add the NVIDIA 460 driver
+
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Tue, 05 Jan 2021 14:18:33 -0300

+linux (4.15.0-129.132) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-129.132 -proposed tracker (LP: #1907635)
+
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+
+ * Ubuntu 18.04- call trace in kernel buffer when unloading ib_ipoib module
+ (LP: #1904848)
+ - SAUCE: net/mlx5e: IPoIB, initialize update_stat_work for ipoib devices
+
+ * memory is leaked when tasks are moved to net_prio (LP: #1886859)
+ - netprio_egroup: Fix unlimited memory leak of v2 cgroups
+
+ * s390: dbginfo.sh triggers kernel panic, reading from
+ /sys/kernel/mm/page_idlebitmap (LP: #1904884)
+ - mm/page_idle.c: skip offline pages
+
+ * Bionic update: upstream stable patchset 2020-11-23 (LP: #1905333)
+ - drm/i915: Break up error capture compression loops with cond_resched()
+ - tipc: fix use-after-free in tipc_bcast_get_mode
+ - gianfar: Replace skb_realloc_headroom with skb_cow_head for PTP
+ - gianfar: Account for Tx PTP timestamp in the skb headroom
+ - net: usb: qmi_wwan: add Telit LE910Cx 0x1230 composition
+ - sctp: Fix COMM_LOST/CANT_STR_ASSOC err reporting on big-endian platforms
+ - sfp: Fix error handing in sfp_probe()
+ - Blktrace: bail out early if block debugfs is not configured
+ - i40e: Fix of memory leak and integer truncation in i40e_virtchnl.c
+ - Fonts: Replace discarded const qualifier
+ - ALSA: usb-audio: Add implicit feedback quirk for Qu-16
+ - lib/crc32test: remove extra local_irq_disable/enable
+ - kthread_worker: prevent queuing delayed work from timer_fn when it is being canceled
+ - mm: always have io_remap_pfn_range() set pgprot_decrypted()
+ - gfs2: Wake up when sd_glock_disposal becomes zero
+ - ftrace: Fix recursion check for NMI test
+ - ftrace: Handle tracing when switching between context
+ - tracing: Fix out of bounds write in get_trace_buf
+ - futex: Handle transient "ownerless" rmutext state correctly
+ - ARM: dts: sun4i-a10: fix cpu_alert temperature
+ - x86/kexec: Use up-to-dated screen_info copy to fill boot params
+ - of: Fix reserved-memory overlap detection
+ - blk-cgroup: Fix memleak on error path
+ - blk-cgroup: Pre-allocate tree node on blkg_conf_prep
+ - scsi: core: Don't start concurrent async scan on same host
+ - vsock: use ns_capable_noaudit() on socket create
+ - drm/vc4: drv: Add error handning for bind
+ - ACPI: NFIT: Fix comparison to '-ENXIO'
+ - vt: Disable KD_FONT_OP_COPY
+ - fork: fix copy_process(CLONE_PARENT) race with the exiting ->real_parent
+ - serial: 8250_mtk: Fix uart_get_baud_rate warning
+ - serial: txx9: add missing platform_driver_unregister() on error in
  serial_txx9_init
+ - USB: serial: cyberjack: fix write-URB completion race
+ - USB: serial: option: add Quectel EC200T module support
+ - USB: serial: option: add LE910Cx compositions 0x1203, 0x1230, 0x1231
+ - USB: serial: option: add Telit FN980 composition 0x1055
+ - USB: Add NO_LPM quirk for Kingston flash drive
+ - usb: mtu3: fix panic in mtu3_gadget_stop()
+ - ARM: stack unwinding: avoid indefinite looping
+ - Revert "ARC: entry: fix potential EFA clobber when TIF_SYSCALL_TRACE"
+ - PM: runtime: Resume the device earlier in __device_release_driver()
+ - btrfs: extent_io: add proper error handling to lock_extent buffer for io()
+ - Btrfs: fix unwritten extent buffers and hangs on future writeback attempts
+ - btrfs: tree-checker: fix the error message for transid error
+ - mm: mempolicy: fix potential pte_unmap_unlock pte error
+ - tools: perf: Fix build error in v4.19.y
+ - net: dsa: read mac address from DT for slave device
+ - arm64: dts: marvell: espressobin: Add ethernet switch aliases
+ - Bionic update: upstream stable patchset 2020-11-23 (LP: #1905333) //
+ - CVE-2019-19770 which shows this issue is not a core debugfs issue, but
+ - blktrace: fix debugfs use after free
+ - Bionic update: upstream stable patchset 2020-11-18 (LP: #1904791)
+ - scripts/setlocalversion: make git describe output more reliable
+ - arm64: link with -z norelro regardless of CONFIG_RELOCATABLE
+ - gtp: fix an use-before-init in gtp_newlink()
+ - ravb: Fix bit fields checking in ravb_hw_timestamp()
+ - tipc: fix memory leak caused by tipc_buf_append()
+ - arch/x86/amd/ibs: Fix re-arming IBS Fetch
+ - x86/xen: disable Firmware First mode for correctable memory errors
+ - fuse: fix page dereference after free
+ - p54: avoid accessing the data mapped to streaming DMA
+ - mtd: lpddr: Fix bad logic in print_drs_error
+ - ata: sata_rcar: Fix DMA boundary mask
+ - fs/crypt: return -EXDEV for incompatible rename or link into encrypted dir
+ - x86/unwind/orc: Fix inactive tasks with stack pointer in %sp on GCC 10 compiled kernels
+ - mlxsw: core: Fix use-after-free in mlxsw_emad_trans_finish()
+ - futex: Fix incorrect should_fail_futex() handling
+ - powerpc/powerpc/smp: Fix spurious DBG() warning
+ - powerpc: select ARCH_WANT_IRQS_OFF_ACTIVATE_MM
+ - xfs: fix real-time bitmap/summary file truncation when growing rt volume
+ - video: fbdev: pvr2fb: initialize variables
+ - ath10k: start recovery process when payload length exceeds max htc length for sdio
+ - ath10k: fix VHT NSS calculation when STBC is enabled
+ - drm/bridge/megachips: Add checking if ge_b850v3_lvds_init() is working correctly
+ - media: videodev2.h: RGB BT2020 and HSV are always full range
+ - media: platform: Improve queue set up flow for bug fixing
+ - usb: typec: tcpm: During PR_SWAP, source caps should be sent only after tSwapSourceStart
+ - media: tw5864: check status of tw5864_frameinterval_get
+ - mm: via-sdmmc: Fix data race bug
+ - drm/bridge/synopsys: dsi: add support for non-continuous HS clock
+ - printk: reduce LOG_BUF_SHIFT range for H8300
+ - kgdb: Make "kgdbcon" work properly with "kgdb_earlycon"
+ - cpufreq: sti-cpufreq: add stih418 support
+ - USB: adutux: fix debugging
+ - uio: free uio id after uio file node is freed
+ - arm64/mm: return cpu_all_mask when node is NUMA_NO_NODE
+ - ACPI: Add out of bounds and numa_off protections to pxm_to_node()
+ - drivers/net/wan/hdlc_fr: Correctly handle special skb->protocol values
+ - bus/fsl_mc: Do not rely on caller to provide non NULL mc_io
+ - power: supply: test_power: add missing newlines when printing parameters by sysfs
+ - md/bitmap: md_bitmap_get_counter returns wrong blocks
+ - bmxt_en: Log unknown link speed appropriately.
+ - clk: ti: clockdomain: fix static checker warning
+ - net: 9p: initialize sun_server.sun_path to have addr's value only when addr is valid
+ - drivers: watchdog: rdc321x_wdt: Fix race condition bugs
+ - ext4: Detect already used quota file early
+ - gfs2: add validation checks for size of superblock
+ - arm64: dts: renesas: ulcb: add full-pwr-cycle-in-suspend into eMMC nodes
+ - memory: emif: Remove bogus debugfs error handling
+ - ARM: dts: s5pv210: remove DMA controller bus node name to fix dtscema
+  warnings
+ - ARM: dts: s5pv210: move PMU node out of clock controller
+ - ARM: dts: s5pv210: remove dedicated 'audio-subsystem' node
+ - nbd: make the config put is called before the notifying the waiter
+ - sgl_alloc_order: fix memory leak
+ - nvme-rdma: fix crash when connect rejected
+ - md/raid5: fix oops during stripe resizing
+ - perf/x86/amd/ibs: Don't include randomized bits in get_ibs_op_count()
+ - perf/x86/amd/ibs: Fix raw sample data accumulation
+ - leds: bcm6328, bcm6358: use devres LED registering function
+ - fs: Don't invalidate page buffers in block_write_full_page()
+ - NFS: fix nfs_path in case of a rename retry
+ - ACPI / extlog: Check for RDMSR failure
+ - ACPI: debug: don't allow debugging when ACPI is disabled
+ - acpi-cpuinfofreq: Honor _PSD table setting on new AMD CPUs
+ - w1: mxc_w1: Fix timeout resolution problem leading to bus error
+ - scsi: mptfusion: Fix null pointer dereferences in mptscsh_remove()
+ - btrfs: reschedule if necessary when logging directory items
+ - btrfs: send, recompute reference path after orphanization of a directory
+ - btrfs: use kvzalloc() to allocate clone_roots in btrfs_ioctl_send()
+ - btrfs: cleanup cow block on error
+ - btrfs: fix use-after-free on readahead extent after failure to create it
+ - usb: dwc3: ep0: Fix ZLP for OUT ep0 requests
+ - usb: dwc3: core: add phy cleanup for probe error handling
+ - usb: dwc3: core: don't trigger runtime pm when remove driver
+ - usb: cdc-acm: fix cooldown mechanism
+ - usb: host: fsl-mph-dr-of: check return of dma_set_mask()
+ - drm/i915: Force VT'd workarounds when running as a guest OS
+ - vt: keyboard, simplify vt_kdgkbsent
+ - vt: keyboard, extend func_buf_lock to readers
+ - dmaengine: dma-jz4780: Fix race in jz4780_dma_tx_status
+ - iio:adc:ti-adc0832 Fix alignment issue with timestamp
+ - iio:adc:ti-adc12138 Fix alignment issue with timestamp
+ - s390/stp: add locking to sysfs functions
+ - [Config] update config for PPC_RTAS_FILTER
+ - powerpc/rtas: Restrict RTAS requests from userspace
+ - powerpc: Warn about use of smt_snooze_delay
+ - powerpc/powerenv/elog: Fix race while processing OPAL error log event.
+ - NFSv4.2: support EXCHGID4_FLAG_SUPP_FENCE_OPS 4.2 EXCHANGE_ID flag
+ - NFSD: Add missing NFSv2 .pc_func methods
+ - ubifs: dent: Fix some potential memory leaks while iterating entries
+ - perf python scripting: Fix printable strings in python3 scripts
+ - ubi: check kthread_should_stop() after the setting of task state
+ - ia64: fix build error with !COREDUMP
+ - drm/amdgpu: don't map BO in reserved region
+ - ceph: promote to unsigned long long before shifting
+ - libceph: clear con->out_msg on Policy::stateful_server faults
+ - 9P: Cast to loff_t before multiplying
+ - ring-buffer: Return 0 on success from ring_buffer_resize()
+ - vringh: fix __vringh_iov() when riov and wiov are different
+ - ext4: fix leaking sysfs kobject after failed mount
+ - ext4: fix error handling code in add_new_gdb
+ - ext4: fix invalid inode checksum
+ - drm/ttm: fix eviction valuable range check.
+ - rtc: rx8010: don't modify the global rtc ops
+ - tty: make FONTX ioctl use the tty pointer they were actually passed
+ - arm64: berlin: Select DW_APB_TIMER_OF
+ - [Config] update annotations for DW_APB_TIMER
+ - cachefiles: Handle readpage error correctly
+ - hil/parisc: Disable HIL driver when it gets stuck
+ - arm: dts: mt7623: add missing pause for switchport
+ - ARM: samsung: fix PM debug build with DEBUG_LL but !MMU
+ - ARM: s3c24xx: fix missing system reset
+ - device property: Keep secondary firmware node secondary by type
+ - device property: Don't clear secondary pointer for shared primary firmware
| node
+ - KVM: arm64: Fix AArch32 handling of DBGD[CCINT,SCRext] and DBGVCR
+ - staging: comedi: cb_pcidas: Allow 2-channel commands for AO subdevice
+ - staging: octeon: repair "fixed-link" support
+ - staging: octeon: Drop on uncorrectable alignment or FCS error
+ - objtool: Support Clang non-section symbols in ORC generation
+ - arm64: Run ARCH_WORKAROUND_1 enabling code on all CPUs
+ - x86/PCI: Fix intel_mid_pci.c build error when ACPI is not enabled
+ - cxgb4: set up filter action after rewrites
+ - cxl: Rework error message for incompatible slots
+ - serial: pl011: Fix lockdep splat when handling magic-sysrq interrupt
+ - fscrypt: only set dentry_operations on ciphertext dentries
+ - xen/events: don't use chip_data for legacy IRQs
+ - xen/events: avoid removing an event channel while handling it
+ - xen/events: add a proper barrier to 2-level uevent unmasking
+ - xen/events: fix race in evtchn_fifo_unmask()
+ - xen/events: add a new "late EOI" evtchn framework
+ - xen/blkback: use lateeoi irq binding
+ - xen/netback: use lateeoi irq binding
+ - xen/scsiback: use lateeoi irq binding
+ - xen/pvcallsback: use lateeoi irq binding
+ - xen/pcicback: use lateeoi irq binding
+ - xen/events: switch user event channels to lateeoi model
+ - xen/events: use a common cpu hotplug hook for event channels
+ - xen/events: defer eoi in case of excessive number of events
+ - xen/events: block rogue events for some time
- RDMA/qedr: Fix memory leak in iWARP CM
- [Config] update config for ARCH_WANT_IRQS_OFF_ACTIVATE_MM
- mm: fix exec activate_mm vs TLB shutdown and lazy tlb switching race
- f2fs: fix uninit-value in f2fs_lookup
- power: supply: bq27xxx: report "not charging" on all types
- media: imx274: fix frame interval handling
- arm64: topology: Stop using MPIDR for topology information
- ia64: kprobes: Use generic kretprobe trampoline handler
- media: ucevideo: Fix dereference of out-of-bound list iterator
- riscv: Define AT_VECTOR_SIZE_ARCH for ARCH_DLINFO
- usb: xhci: omit duplicate actions when suspending a runtime suspended host.
- drm/amd/display: HDMI remote sink need mode validation for Linux
- btrfs: fix replace of seed device
- rpmsg: glink: Use complete_all for open states
- cifs: handle -EINTR in cifs_setattr
- ACPI: button: fix handling lid state changes when input device closed
- scsi: qla2xxx: Fix crash on session cleanup with unload
- btrfs: improve device scanning messages
- usb: xhci: Workaround for S3 issue on AMD SNPS 3.0 xHC
- usb: typec: tcpm: reset hard_reset_count for any disconnect
- powerpc: Fix undetected data corruption with P9N DD2.1 VSX CI load emulation
- drm/amd/display: Don't invoke kgdb_breakpoint() unconditionally

* [HP 635] Radeon 6310 brightness control does not work (LP: #1894667) //
  Bionic update: upstream stable patchset 2020-11-18 (LP: #1904791)
- ACPI: video: use ACPI backlight for HP 635 Notebook

* Bionic update: upstream stable patchset 2020-11-17 (LP: #1904613)
- RDMA/ena: Remove dead code for kernel rdmacm multicast
- RDMA/hns: Fix missing sqsig_type when querying QP
- rpmsg: smd: Fix a kobj leak in qcom_smd_parse_edge()
- pwm: img: Fix null pointer access in probe
- watchdog: Fix memleak in watchdog_cdev_register
- watchdog: Use put_device on error
- SUNRPC: fix copying of multiple pages in gss_read_proxy_verf()
- netfilter: conntrack: connection timeout after re-register
- netfilter: nf_fwd_netdev: clear timestamp in forwarding path
- ARM: dts: imx6sl: fix rng node
- ARM: dts: sun8i: r40: bananapi-m2-ultra: Fix dccl regulator
- memory: omap-gpmc: Fix build error without CONFIG_OF
- arm64: dts: qcom: pm8916: Remove invalid reg size from wcd_codec
- ip_gre: set dev->hard_header_len and dev->needed_headroom properly
- usb: dwc3: simple: add support for Hikey 970

* Bionic: btrfs: kernel BUG at /build/linux-
  eTBZpZ/linux-4.15.0/fs/btrfs/btree.c:3233! (LP: #1902254)
- btrfs: tree-checker: fix incorrect printk format

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* Bionic update: upstream stable patchset 2020-11-10 (LP: #1903768)
+ Bluetooth: fix kernel oops in store_pending_adv_report
+ Bluetooth: Consolidate encryption handling in hci_encrypt_cfm
+ Bluetooth: Fix update of connection state in `hci_encrypt_cfm`
+ Bluetooth: Disconnect if E0 is used for Level 4
+ media: usbtv: Fix refcounting mixup
+ USB: serial: option: add Cellient MPL200 card
+ USB: serial: option: Add Telit FT980-KS composition
+ staging: comedii: check validity of wMaxPacketSize of usb endpoints found
+ USB: serial: pl2303: add device-id for HP GC device
+ USB: serial: ftdi_sio: add support for FreeCalypso JTAG+UART adapters
+ reiserfs: Initialize inode keys properly
+ - reiserfs: Fix oops during mount
+ drivers/net/ethernet/marvell/mvmdio.c: Fix non OF case
+ crypto: bcm - Verify GCM/CCM key length in setkey
+ crypto: qat - check cipher length for aead AES-CBC-HMAC-SHA
+ ARM: 8858/1: vdso: use $(LD) instead of $(CC) to link VDSO
+ ARM: 8939/1: kbuild: use correct nm executable
+ ARM: 8867/1: vdso: pass --be8 to linker if necessary
+ ibmveth: Switch order of ibmveth_helper calls.
+ ibmveth: Identify ingress large send packets.
+ net/ipv4: Restore flowi4_oif update before call to xfrm_lookup_route
+ mlx4: handle non-napi callers to napi_poll
+ net: usb: qmi_wwan: add Cellient MPL200 card
+ tipc: fix the skb_unshare() in tipc_buf_append()
+ net/ipv4: always honour route mtu during forwarding
+ r8169: fix data corruption issue on RTL8402
+ binder: fix UAF when releasing todo list
+ ALSA: bebob: potential info leak in hwdep_read()
+ net: hdlc: In hdlc_rcv, check to make sure dev is an HDLC device
+ net: hdlc_raw_eth: Clear the IFF_TX_SKB_SHARING flag after calling ether_setup
+ nfc: Ensure presence of NFC_ATTRIB_FIRMWARE_NAME attribute in
+ nfc_genl_fw_download()
+ tcp: fix to update snd_w11 in bulk receiver fast path
+ icmp: randomize the global rate limiter
+ cifs: remove bogus debug code
+ cifs: Return the error from crypt_message when enc/dec key not found.
+ KVM: x86/mmu: Commit zap of remaining invalid pages when recovering lpages
+ KVM: SVM: Initialize prev_ga_tag before use
+ ima: Don't ignore errors from crypto_sha1_update()
+ crypto: algif_aead - Do not set MAY_BACKLOG on the async path
+ EDAC/i5100: Fix error handling order in i5100_init_one()
+ x86/fpu: Allow multiple bits in clearcpuid= parameter
+ drivers/perf: xgene_pmu: Fix uninitialized resource struct
+ crypto: algif_skcipher - EBUSY on aio should be an error
+ crypto: mediatek - Fix wrong return value in mtk_desc_ring_alloc()
+ crypto: iXP4xx - Fix the size used in a 'dma_free_coherent()' call
+ - media: tuner-simple: fix regression in simple_set_radio_freq
+ - media: Revert "media: exynos4-is: Add missed check for
+ pinctrl_lookup_state()"
+ - media: m5mols: Check function pointer in m5mols_sensor_power
+ - media: uvcvideo: Set media controller entity functions
+ - media: omap3isp: Fix memleak in isp_probe
+ - crypto: omap-sham - fix digcnt register handling with export/import
+ - crypto: mediatek - fix leaks in mtk_desc_ring_alloc
+ - media: mx2_emmaprp: Fix memleak in emmaprp_probe
+ - media: tc358743: initialize variable
+ - media: s5p-mfc: Fix a reference count leak
+ - media: ti-vpe: Fix a missing regression check and reference count leak
+ - regulator: resolve supply after creating regulator
+ - ath10k: provide survey info as accumulated data
+ - Bluetooth: hci_uart: Cancel init work before unregistering
+ - ath6kl: prevent potential array overflow in ath6kl_add_new_sta()
+ - ath9k: Fix potential out of bounds in ath9k_htc_txcompletion_cb()
+ - wcn36xx: Fix reported 802.11n rx_highest rate wcn3660/wcn3680
+ - ASoC: qcom: lpass-platform: fix memory leak
+ - ASoC: qcom: lpass-cpu: fix concurrency issue
+ - brcmfmac: check ndev pointer
+ - mwlifiex: Do not use GFP_KERNEL in atomic context
+ - drm/gma500: fix error check
+ - scsi: qla4xxx: Fix an error handling path in 'qla4xxx_get_host_stats()' 
+ - scsi: csiorstor: Fix wrong return value in csio_hw_prep_fw()
+ - backlight: sky81452-backlight: Fix refcount imbalance on error
+ - VMCI: check return value of get_user_pages_fast() for errors
+ - tty: serial: earlycon dependency
+ - pty: do tty_flip_buffer_push without port->lock in pty_write
+ - pwm: lps: Fix off by one error in base_unit math in pwm_lps_prepare()
+ - pwm: lps: Add range limit check for the base_unit register value
+ - drivers/virt/fsl_hypervisor: Fix error handling path
+ - video: fbdev: vga16fb: fix setting of pixclock because a pass-by-value error
+ - video: fbdev: sib: fix null ptr dereference
+ - HID: roccat: add bounds checking in kone_sysfs_write_settings()
+ - pinctrl: mcp23s08: Fix mcp23x17_regmap initialisation
+ - pinctrl: mcp23s08: Fix mcp23x17 precious range
+ - ath6kl: wmi: prevent a shift wrapping bug in ath6kl_wmi_delete_pstream_cmd()
+ - misc: mic: scif: Fix error handling path
+ - ALSA: seq: oss: Avoid mutex lock for a long-time ioctl
+ - usb: dwc2: Fix parameter type in function pointer prototype
+ - quota: clear padding in v2r1_mem2diskdqb()
+ - HID: hid-input: fix stylus battery reporting
+ - qtnfmac: fix resource leaks on unsupported iftype error return path
+ - net: enic: Cure the enic api locking trainwreck
+ - mfd: sm501: Fix leaks in probe()
+ - iwlwifi: mvm: split a print to avoid a WARNING in ROC

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+ - usb: gadget: u Ether: enable qmult on SuperSpeed Plus as well
+ - nl80211: fix non-split wiphy information
+ - usb: dwc2: Fix INTR OUT transfers in DDMA mode.
+ - scsi: be2iscsi: Fix a theoretical leak in beiscsi_create_eqs()
+ - mwiex: fix double free
+ - net: korina: fix kfree of rx/tx descriptor array
+ - mm/memcg: fix device private memcg accounting
+ - mm, oom_adj: don't loop through tasks in __set_oom_adj when not necessary
+ - IB/mlx4: Fix starvation in paravirt mux/demux
+ - IB/mlx4: Adjust delayed work when a dup is observed
+ - powerpc/psseries: Fix missing of_node_put() in rng_init()
+ - powerpc/irk-hv: Fix missing of_node_put() in success path
+ - mtd: lpdfdr: fix excessive stack usage with clang
+ - mtd: mtdops: Don't write panic data twice
+ - ARM: 9007/1: l2c: fix prefetch bits init in L2X0_AUX_CTRL using DT values
+ - arc: plat-hsdk: fix kconfig dependency warning when !RESET_CONTROLLER
+ - xfs: limit entries returned when counting fsmap records
+ - RDMA/qedr: Fix use of uninitialized field
+ - powerpc/tau: Use appropriate temperature sample interval
+ - powerpc/tau: Remove duplicated set_thresholds() call
+ - powerpc/tau: Disable TAU between measurements
+ - perf intel-pt: Fix "context switch event has no tid" error
+ - RDMA/hns: Set the unsupported wr opcode
+ - kdb: Fix pager search for multi-line strings
+ - overflow: Include header file with SIZE_MAX declaration
+ - powerpc/perf: Exclude pmc5/6 from the irrelevant PMU group constraints
+ - powerpc/perf/hv-gpci: Fix starting index value
+ - cpufreq: powernv: Fix frame-size-overflow in powernv_cpufreq_reboot_notifier
+ - IB/rdmaevt: Fix sizeof mismatch
+ - f2fs: wait for sysfs kobject removal before freeing f2fs_sb_info
+ - lib/crc32.c: fix trivial typo in preprocessor condition
+ - ramfs: fix nommu mmap with gaps in the page cache
+ - rapidio: fix error handling path
+ - rapidio: fix the missed put_device() for rio_mport_add_rio_dev
+ - mailbox: avoid timer start from callback
+ - i2c: rear: Auto select RESET_CONTROLLER
+ - PCI: iproc: Set affinity mask on MSI interrupts
+ - clk: at91: clk-main: update key before writing AT91_CKGR_MOR
+ - clk: bcm2835: add missing release if devm_clk_hw_register fails
+ - ext4: limit entries returned when counting fsmap records
+ - vfio/pci: Clear token on bypass registration failure
+ - vfio iommu type1: Fix memory leak in vfio_iommu_type1_pin_pages
+ - Input: imx6ul_tsc - clean up some errors in imx6ul_tsc_resume()
+ - Input: stmnts - fix a & vs && typo
+ - Input: ep93xx_keypad - fix handling of platform_get_irq() error
+ - Input: omap4-keypad - fix handling of platform_get_irq() error
+ - Input: twl4030_keypad - fix handling of platform_get_irq() error
- Input: sun4i-ps2 - fix handling of platform_get_irq() error
- KVM: x86: emulating RDPID failure shall return #UD rather than #GP
- memory: omap-gpmc: Fix a couple off by ones
- memory: fsl-corenet-cf: Fix handling of platform_get_irq() error
- arm64: dts: qcom: msm8916: Fix MDP/DSI interrupts
- ARM: dts: owl-s500: Fix incorrect PPI interrupt specifiers
- arm64: dts: zynqmp: Remove additional compatible string for i2c IPs
- powerpc/powernv/dump: Fix race while processing OPAL dump
- nvme: fix uninitialized work for zero kato
- NTB: hw: amd: fix an issue about leak system resources
- perf: correct SNOOPOX field offset
- i2c: core: Restore acpi_walk_dep_device_list() getting called after registering the ACPI i2c devs
- crypto: ccp - fix error handling
- media: firewire: fix memory leak
- media: ati_remote: sanity check for both endpoints
- media: st-delta: Fix reference count leak in delta_run_work
- media: sti: Fix reference count leaks
- media: exynos4-is: Fix several reference count leaks due to pm_runtime_get_sync
- media: exynos4-is: Fix a reference count leak due to pm_runtime_get_sync
- media: exynos4-is: Fix a reference count leak
- media: vsp1: Fix runtime PM imbalance on error
- media: platform: s3c-camif: Fix runtime PM imbalance on error
- media: platform: sti: Fix runtime PM imbalance on error
- media: bdisp: Fix runtime PM imbalance on error
- media: media/pci: prevent memory leak in bttv_probe
- media: uvcvideo: Ensure all probed info is returned to v4l2
- mmc: sdio: Check for CISTPL_VERS_1 buffer size
- media: saa7134: avoid a shift overflow
- fs: dlm: fix configfs memory leak
- media: venus: core: Fix runtime PM imbalance in venus_probe
- ntfs: add check for mft record size in superblock
- mac80211: handle lack of sband->bitrates in rates
- PM: hibernate: remove the bogus call to get_gendisk() in software_resume()
- scsi: mvumi: Fix error return in mvumi_ioctl()
- scsi: target: core: Add CONTROL field for trace events
- mic: vop: copy data to kernel space then write to io memory
- misc: vop: add round_up(x,4) for vring_size to avoid kernel panic
- usb: gadget: function: printer: fix use-after-free in __lock_acquire
- udf: Limit sparing table size
- udf: Avoid accessing uninitialized data on failed inode read
- USB: cdc-acm: handle broken union descriptors
- can: flexcan: flexcan_chip_stop(): add error handling and propagate error value
- ath9k: hif_usb: fix race condition between usb_get_urb() and usb_kill_anchored_urbs()
- misc: rtsx: Fix memory leak in rtsx_pci_probe
+ - reiserfs: only call unlock_new_inode() if I_NEW
+ - xfs: make sure the rt allocator doesn't run off the end
+ - usb: ohci: Default to per-port over-current protection
+ - Bluetooth: Only mark socket zapped after unlocking
+ - scsi: ibmvfc: Fix error return in ibmvfc_probe()
+ - brcmsmac: fix memory leak in wlc_phy_attach_lcnphy
+ - rt8xxxu: prevent potential memory leak
+ - Fix use after free in get_capset_info callback.
+ - scsi: qed: Protect active command list to avoid list corruption
+ - scsi: qed: Fix list_del corruption while removing active I/O
+ - tty: ipwireless: fix error handling
+ - ipvs: Fix unint-value in do_ip_vs_set_ctl()
+ - reiserfs: Fix memory leak in reiserfs_parse_options()
+ - mwifiex: don't call del_timer_sync() on uninitialized timer
+ - brcm80211: fix possible memleak in brcmf_proto_msgbuf_attach
+ - usb: core: Solve race condition in anchor cleanup functions
+ - scsi: ufs: ufs-qcom: Fix race conditions caused by ufs_qcom_testbus_config()
+ - ath10k: check idx validity in _ath10k_htt_rx_ring_fill_n()
+ - net: korina: cast KSEGO address to pointer in kfree
+ - tty: serial: fsl_lpuart: fix lpuart32_poll_get_char
+ - usb: cdc-acm: add quirk to blacklist ETAS ES58X devices
+ - USB: cdc-wdm: Make wdm_flush() interruptible and add wdm_fsync().
+ - eeprom: at25: set minimum read/write access stride to 1
+ - powerpc/powernv/opal-dump : Use IRQ_HANDLED instead of numbers in interrupt handler
+ - net: fix pos incrementment in ipv6_route_seq_next
+ - ALSA: hda/realtek: Enable audio jacks of ASUS D700SA with ALC887
+ - x86/nmi: Fix nmi_handle() duration miscalculation
+ - x86/events/amd/ioomm: Fix sizeof mismatch
+ - media: uvcvideo: Silence shift-out-of-bounds warning
+ - hwmon: (pmbus/max34440) Fix status register reads for MAX344{51,60,61}
+ - media: tc358743: cleanup tc358743_ccc_isr
+ - pinctrl: bcm: fix kconfig dependency warning when !GPIOLIB
+ - spi: spi-s3c64xx: swap s3c64xx_spi_set_cs() and s3c64xx_enable_datapath()
+ - staging: rtl8192u: Do not use GFP_KERNEL in atomic context
+ - net: stmmac: use netif_rx_start|stop_all_queues() function
+ - scsi: target: tcmu: Fix warning: 'page' may be used uninitialized
+ - ipvs: clear skb->tstamp in forwarding path
+ - netfilter: nf_log: missing vlan offload tag and proto
+ - RDMA/ucma: Fix locking for ctx->events_reported
+ - RDMA/ucma: Add missing locking around rdma_leave_multicast()
+ - RDMA/qedr: Fix inline size returned for iWARP

+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Thu, 10 Dec 2020 12:54:32 +0100

+ +linux (4.15.0-128.131) bionic; urgency=medium

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+ * bionic/linux: 4.15.0-128.131 -proposed tracker (LP: #1907354)
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ * raid10: discard leads to corrupted file system (LP: #1907262)
  + Revert "md/raid10: improve discard request for far layout"
  + Revert "md/raid10: improve raid10 discard request"
  + Revert "md/raid10: pull codes that wait for blocked dev into one function"
  + Revert "md/raid10: extend r10bio devs to raid disks"
  + Revert "md: add md_submit_discard_bio() for submitting discard bio"
+ -- Khalid Elmously <khalid.elmously@canonical.com>  Wed, 09 Dec 2020 01:27:33 -0500
+ * bionic/linux: 4.15.0-126.129 -proposed tracker (LP: #1905305)
+ * CVE-2020-4788
  + SAUCE: powerpc/64s: Define MASKABLE_RELON_EXCEPTION_PSERIES_OOL
  + SAUCE: powerpc/64s: move some exception handlers out of line
  + powerpc/64s: flush L1D on kernel entry
  + SAUCE: powerpc: Add a framework for user access tracking
  + powerpc: Implement user_access_begin and friends
  + powerpc: Fix __clear_user() with KUAP enabled
  + powerpc/uaccess: Evaluate macro arguments once, before user access is allowed
  + powerpc/64s: flush L1D after user accesses
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Mon, 23 Nov 2020 15:01:09 -0300
+ * Update kernel packaging to support forward porting kernels (LP: #1902957)
  + [Debian] Update for leader included in BACKPORT_SUFFIX
+ * Avoid double newline when running insertchanges (LP: #1903293)
  + [Packaging] insertchanges: avoid double newline
+ * EFI: Fails when BootCurrent entry does not exist (LP: #1899993)
  + efivarfs: Replace invalid slashes with exclamation marks in dentries.
+ * CVE-2020-14351
  + perf/core: Fix race in the perf_mmap_close() function
+ * raid10: Block discard is very slow, causing severe delays for mkfs and
+ fstrim operations (LP: #1896578)
+ - md: add md_submit_discard_bio() for submitting discard bio
+ - md/raid10: extend r10bio devs to raid disks
+ - md/raid10: pull codes that wait for blocked dev into one function
+ - md/raid10: improve raid10 discard request
+ - md/raid10: improve discard request for full layout
+
+ + Bionic: btrfs: kernel BUG at /build/linux-
+ eTBZpZ/linux-4.15.0/fs/btrfs/ctree.c:3233! (LP: #1902254)
+ + - btrfs: use offset_in_page instead of open-coding it
+ + - btrfs: use BUG() instead of BUG_ON(1)
+ + - btrfs: drop unnecessary offset_in_page in extent buffer helpers
+ + - btrfs: extent_tree: do extra check for extent buffer read write functions
+ + - btrfs: extent-tree: kill BUG_ON() in __btrfs_free_extent()
+ + - btrfs: extent-tree: kill the BUG_ON() in insert_inline_extent_backref()
+ + - btrfs: ctree: check key order before merging tree blocks
+
+ + Bionic update: upstream stable patchset 2020-11-04 (LP: #1902943)
+ + - USB: gadget: f_ncm: Fix NDP16 datagram validation
+ + - gpio: tc35894: fix up tc35894 interrupt configuration
+ + - vsock/virtio: use RCU to avoid use-after-free on the _virtio_vsock
+ + - vsock/virtio: stop workers during the .remove()
+ + - vsock/virtio: add transport parameter to the
+ _virtio_transport_reset_no_sock()
+ + - net: virtio_vsock: Enhance connection semantics
+ + - Input: i8042 - add nopnp quirk for Acer Aspire 5 A515
+ + - ftrace: Move RCU is watching check after recursion check
+ + - drm/amdgpu: restore proper ref count in amdgpu_display_crtc_set_config
+ + - drivers/net/wan/hdlc_fr: Add needed_headroom for PVC devices
+ + - drm/sun4i: mixer: Extend regmap max_register
+ + - net: dec: de2104x: Increase receive ring size for Tulip
+ + - rndis_host: increase sleep time in the query-response loop
+ + - nvme-core: get/put ctrl and transport module in nvme_dev_open/release()
+ + - drivers/net/wan/lapbether: Make skb-protocol consistent with the header
+ + - drivers/net/wan/hdlc: Set skb-protocol before transmitting
+ + - mac80211: do not allow bigger VHT MPDUs than the hardware supports
+ + - spi: fsl-esp1: Only process interrupts for expected events
+ + - nvme-fc: fail new connections to a deleted host or remote port
+ + - pinctrl: mvebu: Fix i2c sda definition for 98DX3236
+ + - nfs: Fix security label length not being reset
+ + - clk: samsung: exynos4+: mark 'chipid' clock as CLK_IGNORE_UNUSED
+ + - iommu/exynos: add missing put_device() call in exynos_iommu_of_xlate()
+ + - i2c: cpm: Fix i2c_ram structure
+ + - Input: trackpoint - enable Synaptics trackpoints
+ + - random32: Restore __latent_entropy attribute on net_rand_state
+ + - epoll: do not insert into poll queues until all sanity checks are done
+ + - epoll: replace ->visited/visited_list with generation count
+ + - epoll: EPOLL_CTL_ADD: close the race in decision to take fast path
+ - ep_create_wakeup_source(): dentry name can change under you...
+ - netfilter: cnetlink: add a range check for 13/14 protonum
+ - drm/syncobj: Fix drm_syncobj_handle_to_fd refcount leak
+ - fbdev, newport_con: Move FONT_EXTRA_WORDS macros into linux/font.h
+ - Fonts: Support FONT_EXTRA_WORDS macros for built-in fonts
+ - Revert "ravb: Fixed to be able to unload modules"
+ - fbcon: Fix global-out-of-bounds read in fbcon_get_font()
+ - net: wireless: nl80211: fix out-of-bounds access in nl80211_del_key()
+ - usernodehelper: reset umask to default before executing user process
+ - platform/x86: thinkpad_acpi: initialize tp_nvram_state variable
+ - platform/x86: thinkpad_acpi: re-initialize ACPI buffer size when reuse
+ - driver core: Fix probe_count imbalance in really_probe()
+ - perf top: Fix stdio interface input handling with glibc 2.28+
+ - mtd: rawnand: sunxi: Fix the probe error path
+ - macesc: avoid use-after-free in macsec_handle_frame()
+ - mm/khugepaged: fix filemap page_to_pgoff(page) != offset
+ - cifs: Fix incomplete memory allocation on setxattr path
+ - i2c: meson: fix clock setting overwrite
+ - scctp: fix scctp_auth_init_hmacs() error path
+ - team: set dev->needed_headroom in team_setup_by_port()
+ - net: team: fix memory leak in __team_options_register
+ - openvswitch: handle DNAT tuple collision
+ - drm/amdgp: prevent double kfree ttm->sg
+ - xfrm: clone XFRMA_REPLAY_ESN_VAL in xfrm_do_migrate
+ - xfrm: clone XFRMA_SEC_CTX in xfrm_do_migrate
+ - xfrm: clone whole lifetime_cur structure in xfrm_do_migrate
+ - net: stmmac: removed enabling eee in EEE set callback
+ - platform/x86: fix kconfig dependency warning for FUJITSU_LAPTOP
+ - xfrm: Use correct address family in xfrm_state_find
+ - bonding: set dev->needed_headroom in bond_setup_by_slave()
+ - mdio: fix mdio-thunder.c dependency & build error
+ - net: usb: ax88179_178a: fix missing stop entry in driver_info
+ - rxrpc: Fix rxkad token xdr encoding
+ - rxrpc: Downgrade the BUG() for unsupported token type in rxrpc_read()
+ - rxrpc: Fix some missing _bh annotations on locking conn->state_lock
+ - rxrpc: Fix server keyring leak
+ - perf: Fix task_function_call() error handling
+ - mmc: core: don't set limits.discard_granularity as 0
+ - mm: khugepaged: recalculate min_free_kbytes after memory hotplug as expected
  by khugepaged
+ - net: usb: rtl8150: set random MAC address when set_ethernet_addr() fails
+ - drm/nouveau/mem: guard against NULL pointer access in mem_del
+ - i2c: i801: Exclude device from suspend direct complete optimization
+ - nvme-core: put ctrl ref when module ref get fail
+ - i2c: meson: fixup rate calculation with filter delay
+ - xfrm: clone XFRMA_SET_MARK in xfrm_do_migrate
+ - net/mlx5e: Fix VLAN cleanup flow
+ - net/mlx5e: Fix VLAN create flow
+ * kci_test_encap_fou() in rtnetlink.sh from kselftests/net failed with "FAIL:
+ can't add fou port 7777, skipping test" (LP: #1891421)
+ - selftests: rtnetlink: load fou module for kci_test_encap_fou() test
+
+ * Bionic update: upstream stable patchset 2020-10-23 (LP: #1901257)
+ - af_key: pfkey_dump needs parameter validation
+ - KVM: fix memory leak in kvm_io_bus_unregister_dev()
+ - kprobes: fix kill kprobe which has been marked as gone
+ - mm/hp: fix __split_huge_pmd_locked() for migration PMD
+ - cxgb4: Fix offset when clearing filter byte counters
+ - geneve: add transport ports in route lookup for geneve
+ - hdle_ppp: add range checks in ppp_cp_parse_cr()
+ - ip: fix tos reflection in ack and reset packets
+ - net: ipv6: fix kconfig dependency warning for IPV6_SEG6_HMAC
+ - nfp: use correct define to return NONE fec
+ - tipc: Fix memory leak in tipc_group_create_member()
+ - tipc: fix shutdown() of connection oriented socket
+ - tipc: use skb_unshare() instead in tipc_buf_append()
+ - bnxt_en: Protect bnxt_set_eee() and bnxt_set_pauseparam() with mutex.
+ - net: phy: Avoid NPD upon phy_detach() when driver is unbound
+ - net: qrtr: check skb_put_padto() return value
+ - net: add __must_check to skb_put_padto()
+ - ipv4: Update exception handling for multipath routes via same device
+ - MAINTAINERS: add CLANG/LLVM BUILD SUPPORT info
+ - Documentation/llvm: add documentation on building w/ Clang/LLVM
+ - Documentation/llvm: fix the name of llvm-size
+ - net: wan: wanxl: use allow to pass CROSS_COMPILE_M68k for rebuilding
+ firmware
+ - net: wan: wanxl: use $M68KCC instead of $M68KAS for rebuilding firmware
+ - kbuild: replace AS=clang with LLVM_IAS=1
+ - tcp_bbr: refactor bbr_target_cwnd() for general inflight provisioning
+ - tcp_bbr: adapt cwnd based on ack aggregation estimation
+ - serial: 8250: Avoid error message on reprobe
+ - RDMA/ucma: ucma_context reference leak in error path
+ - mm: fix double page fault on arm64 if PTE_AF is cleared
+ - scsi: aacraid: fix illegal IO beyond last LBA
+ - m68k: q40: Fix info-leak in rtc_ioctl
+ - gma/gma500: fix a memoryDisclosure bug due to uninitialized bytes
+ - ASoC: kirkwood: fix IRQ error handling
+ - media: smiapp: Fix error handling at NVM reading
+ - arch/x86/lib/usercopy_64.c: fix __copy_user_flushcache() cache writeback
+ - x86/ioapic: Unbreak check_timer()
+ - ALSA: usb-audio: Add delay quirk for H570e USB headsets
+ - ALSA: hda/realtek - Couldn't detect Mic if booting with headset plugged
+ - PM / devfreq: tegra30: Fix integer overflow on CPU's freq max out
+ - scsi: fnic: fix use after free
+ - clk/ti/adplll: allocate room for terminating null
+ - mtd: cfi_cmdset_0002: don't free cfi->cfiq in error path of
+ - cfi_amdsstd_setup()
+ - mfd: mfd-core: Protect against NULL call-back function pointer
+ - tracing: Adding NULL checks for trace_array descriptor pointer
+ - bcache: fix a lost wake-up problem caused by mca_cannibalize_lock
+ - RDMA/i40iw: Fix potential use after free
+ - xfs: fix attr leaf header freemap.size underflow
+ - RDMA/iw_cgxb4: Fix an error handling path in 'c4iw_connect()'
+ - mmc: core: Fix size overflow for mmc partitions
+ - gfs2: clean up iopen glock mess in gfs2_create_inode
+ - debugfs: Fix !DEBUG_FS debugfs_create_automount
+ - CIFS: Properly process SMB3 lease breaks
+ - kernel/sys.c: avoid copying possible padding bytes in copy_to_user
+ - neigh_stat_seq_next() should increase position index
+ - rt_cpu_seq_next should increase position index
+ - seqlock: Require WRITE_ONCE surrounding raw_seqcount_barrier
+ - media: ti-vpe: cal: Restrict DMA to avoid memory corruption
+ - ACPI: EC: Reference count query handlers under lock
+ - dmaengine: zynqmp_dma: fix burst length configuration
+ - powerpc/eeh: Only dump stack once if an MMIO loop is detected
+ - tracing: Set kernel_stack's caller size properly
+ - ar5523: Add USB ID of SMCWUSBT-G2 wireless adapter
+ - selftests/trace: fix glob selftest
+ - tools/power/x86/intel_pstate_tracer: changes for python 3 compatibility
+ - Bluetooth: Fix refcount use-after-free issue
+ - mm: pagewalk: fix termination condition in walk_pte_range()
+ - Bluetooth: prefetch channel before killing sock
+ - ALSA: hda: Clear RIRB status before reading WP
+ - skb->data: fix a data race in skb_queue_len()
+ - audit: CONFIG_CHANGE don't log internal bookkeeping as an event
+ - selinux: sel_ave_get_stat_idx should increase position index
+ - scsi: lpfc: Fix RQ buffer leakage when no IOCBS available
+ - scsi: lpfc: Fix coverity errors in fmdi attribute handling
+ - drm/omap: fix possible object reference leak
+ - perf test: Fix test trace+probe_vfs_getname.sh on s390
+ - RDMA/rxe: Fix configuration of atomic queue pair attributes
+ - KVM: x86: fix incorrect comparison in trace event
+ - media: staging/imx: Missing assignment in
+ - imx_media_capture_device_register()
+ - x86/pkeys: Add check for pkey "overflow"
+ - bpf: Remove recursion prevention from rcu free callback
+ - dmaengine: tegra-apb: Prevent race conditions on channel's freeing
+ - media: go7007: Fix URB type for interrupt handling
+ - Bluetooth: guard against controllers sending zero'd events
+ - timekeeping: Prevent 32bit truncation in scale64_check_overflow()
+ - ext4: fix a data race at inode->i_disksize
+ - mm: avoid data corruption on CoW fault into PFN-mapped VMA
+ - drm/amdgpu: increase atombios cmd timeout
+ - ath10k: use kzalloc to read for ath10k_sdio_hif_diag_read
+ - scsi: aacraid: Disabling TM path and only processing IOP reset
+ - Bluetooth: L2CAP: handle l2cap config request during open state
+ - media: tda10071: fix unsigned sign extension overflow
+ - xfs: don't ever return a stale pointer from __xfs_dir3_free_read
+ - tpm: ibmvtpm: Wait for buffer to be set before proceeding
+ - rtc: ds1374: fix possible race condition
+ - tracing: Use address-of operator on section symbols
+ - serial: 8250_port: Don't service RX FIFO if throttled
+ - serial: 8250_omap: Fix sleeping function called from invalid context during probe
+ - serial: 8250: 8250_omap: Terminate DMA before pushing data on RX timeout
+ - perf cputask: Fix snprintf overflow check
+ - cpufreq: powernv: Fix frame-size-overflow in powernv_cpufreq_work_fn
+ - tools: gpio-hammer: Avoid potential overflow in main
+ - RDMA/rxe: Set sys_image_guid to be aligned with HW IB devices
+ - SUNRPC: Fix a potential buffer overflow in 'svc_print_xprts()'
+ - svrdma: Fix leak of transport addresses
+ - ubiqufs: Fix out-of-bounds memory access caused by abnormal value of node_len
+ - ALSA: usb-audio: Fix case when USB MIDI interface has more than one extra endpoint descriptor
+ - NFS: Fix races nfs_page_group_destroy() vs nfs_destroy_unlinked_subrequests()
+ - mm/kmemleak.c: use address-of operator on section symbols
+ - mm/filemap.c: clear page error before actual read
+ - mm/vmscan.c: fix data races using kswapd_classzone_idx
+ - mm/mmap.c: initialize align_offset explicitly for vm_unmapped_area
+ - scsi: qedl: Fix termination timeouts in session logout
+ - serial: uartps: Wait for tx_empty in console setup
+ - KVM: Remove CREATE_IRQCHIP/SET_PIT2 race
+ - bdev: Reduce time holding bd_mutex in sync in blkdev_close()
+ - drivers: char: tlclk.c: Avoid data race between init and interrupt handler
+ - staging:r8188eu: avoid skb_clone for amsdru to msdu conversion
+ - sparc64: vcc: Fix error return code in vcc_probe()
+ - arm64: cpufeature: Relax checks for AArch32 support at EL[0-2]
+ - dt-bindings: sound: wm8994: Correct required supplies based on actual implementation
+ - atm: fix a memory leak of vcc->user_back
+ - power: supply: max17040: Correct voltage reading
+ - phy: samsung: s5pv210-usb2: Add delay after reset
+ - Bluetooth: Handle Inquiry Cancel error after Inquiry Complete
+ - USB: EHCI: ehci-mv: fix error handling in mv_ehci_probe()
+ - tty: serial: samsung: Correct clock selection logic
+ - ALSA: hda: Fix potential race in unsol event handler
+ - powerpc/traps: Make unrecoverable NMIs die instead of panic
+ - fuse: don't check refcount after stealing page
+ - USB: EHCI: ehci-mv: fix less than zero comparison of an unsigned int
+ - arm64/cpufeature: Drop TraceFilt feature exposure from ID_DFR0 register
+ - e1000: Do not perform reset in reset_task if we are already down
+ - drm/nouveau/debugfs: fix runtime pm imbalance on error
+ - printk: handle blank console arguments passed in.
+ - btrfs: don't force read-only after error in drop snapshot
+ - vfio/pci: fix memory leaks of eventfd ctx
+ - perf util: Fix memory leak of prefix_if_not_in
+ - perf kcore_copy: Fix module map when there are no modules loaded
+ - mtd: rawnand: omap_elm: Fix runtime PM imbalance on error
+ - drm/vc4/vc4_hdmi: fill ASoC card owner
+ - net: qed: RDMA personality shouldn't fail VF load
+ - batman-adv: mcast: fix duplicate mcast packets in BLA backbone from mesh
+ - ALSA: asihpi: fix iounmap in error handler
+ - perf util: Fix memory leak of prefix_if_not_in
+ - perf kcore_copy: Fix module map when there are no modules loaded
+ - printk: handle blank console arguments passed in.
+ - btrfs: don't force read-only after error in drop snapshot
+ - vfio/pci: fix memory leaks of eventfd ctx
+ - drm/vc4/vc4_hdmi: fill ASoC card owner
+ - net: qed: RDMA personality shouldn't fail VF load
+ - batman-adv: mcast: fix duplicate mcast packets in BLA backbone from mesh
+ - ALSA: asihpi: fix iounmap in error handler
+ - MIPS: Add the missing 'CPU_1074K' into __get_cpu_type()
+ - s390/dasd: Fix zero write for FBA devices
+ - kprobes: Fix to check probe enabled before disarm_kprobe_ftrace()
+ - mm, THP, swap: fix allocating cluster for swapfile by mistake
+ - lib/string.c: implement stpcpy
+ - ata: define AC_ERR_OK
+ - ata: make qc_prep return ata_completion_errors
+ - media: mc-device.c: fix memleak in media_device_register_entity
- tpm_crb: fix fTPM on AMD Zen+ CPUs
- RDMA/qedr: Fix potential use after free
- fix dget_parent() fastpath race
- scsi: pm80xx: Cleanup command when a reset times out
- ASoC: max98090: remove msleep in PLL unlocked workaround
- ipv6_route_seq_next should increase position index
- scsi: ufs: Fix a race condition in the tracing code
- s390/cpum_sf: Use kcalloc and minor changes
- ceph: ensure we have a new cap before continuing in fill_inode
- mm/swapfile.c: swap_next should increase position index
- dmaengine: stm32-mdma: use vchan_terminate_vdesc() in .terminate_all
- dmaengine: stm32-dma: use vchan_terminate_vdesc() in .terminate_all
- drm/amd/display: dal_ddc_i2c_payloads_create can fail causing panic
- firmware: arm_sdei: Use cpus_read_lock() to avoid races with cpuhp
- random: fix data races at timer_rand_state
- bus: hisi_lpc: Fixup IO ports addresses to avoid use-after-free in host removal
- perf jevents: Fix leak of mapfile memory
- xfs: mark dir corrupt when lookup-by-hash fails
- rtc: sal100: fix possible race condition
- nfsd: Don't add locks to closed or closing open stateids
- KVM: PPC: Book3S HV: Treat TM-related invalid form instructions on P9 like the valid ones
- thermal: rcar_thermal: Handle probe error gracefully
- nvme: Fix controller creation races with teardown flow
- scsi: hpsa: correct race condition in offload enabled
- PCI: Use ioremap(), not phys_to_virt() for platform ROM
- KVM: arm64: vgic-its: Fix memory leak on the error path of vgic_add_lpi()
- net: openvswitch: use u64 for meter bucket
- scsi: aacraid: Fix error handling paths in aac_probe_one()
- scsi: cxlflash: Fix error return code in cxlflash_probe()
- drm/nouveau: fix runtime pm imbalance on error
- perf evsel: Fix 2 memory leaks
- perf stat: Fix duration_time value for higher intervals
- perf metricgroup: Free metric_events on error
- ASoC: img-i2s-out: Fix runtime PM imbalance on error
- wcore: fix runtime pm imbalance in w1271_rx_work
- nvme: fix possible deadlock when I/O is blocked
- net: openvswitch: use div_u64() for 64-by-32 divisions
- nvme: explicitly update mpath disk capacity on revalidation
- ASoC: wm8994: Skip setting of the WM8994_MICBIAS register for WM1811
- drm/amdkfd: fix a memory leak issue
- batman-adv: mcast: fix duplicate mcast packets from BLA backbone to mesh
- KVM: x86: Reset MMU context if guest toggles CR4.SMAP or CR4.PKE
- KVM: SVM: Add a dedicated INVD intercept routine
- s390/errno: Fix ZCRYPT_PERDEV_REQCNT ioctl
- kprobes: Fix compiler warning for !CONFIG_KPROBES_ON_FTRACE
- KVM: arm64: Assume write fault on S1PTW permission fault on instruction
+ fetch
+
+ * bcache: Issues with large IO wait in bch_mca_scan() when shrinker is enabled
+ (LP: #1898786)
+ - bcache: remove member accessed from struct btree
+ - bcache: reap c->btree_cache_freeable from the tail in bch_mca_scan()
+ - bcache: reap from tail of c->btree_cache in bch_mca_scan()
+
+ + *-tools-common packages descriptions have typo "PGKVER" (LP: #1898903)
+ - [Packaging] Fix typo in -tools template s/PGKVER/PKGVER/
+
+ * [hns3-0901]add hns3_gro_complete for HW GRO process (LP: #1893711)
+ - net: hns3: add rx multicast packets statistic
+ - net: hns3: minor refactor for hns3_rx_checksum
+ - net: hns3: add hns3_gro_complete for HW GRO process
+
+ * mwifiex stops working after kernel upgrade (LP: #1897299)
+ - mwifiex: Increase AES key storage size to 256 bits
+
+ * Bionic update: upstream stable patchset 2020-09-30 (LP: #1897977)
+ - ARM: dts: socfpga: fix register entry for timer3 on Arria10
+ - RDMA/rxe: Fix memleak in rxe_mem_init_user
+ - RDMA/rxe: Drop pointless checks in rxe_init_ports
+ - scsi: libas: Set data_dir as DMA_NONE if libata marks qc as NODATA
+ - RDMA/core: Fix reported speed and width
+ - mmc: sdhci-msm: Add retries when all tuning phases are found valid
+ - ARM: dts: BCM5301X: Fixed QSPI compatible string
+ - arm64: dts: ns2: Fixed QSPI compatible string
+ - ARC: HSDK: wireup perf irq
+ - dmaengine: acpi: Put the CSRT table after using it
+ - drivers/net/wan/lapbether: Added needed_tailroom
+ - NFC: st95hf: Fix memleak in st95hf_in_send_cmd
+ - firestream: Fix memleak in fs_open
+ - ALSA: hda: Fix 2 channel swapping for Tegra
+ - drivers/net/wan/lapbether: Set network_header before transmitting
+ - xfs: initialize the shortform attr header padding entry
+ - irqchip/eznps: Fix build error for !ARC700 builds
+ - drivers/net/wan/hdlc_cisco: Add hard_header_len
+ - ARC: [plat-hsdk]: Switch ethernet phy-mode to rgmii-id
+ - cpufreq: intel_pstate: Refuse to turn off with HWP enabled
+ - ALSA: hda: fix a runtime pm issue in SOF when integrated GPU is disabled
+ - gcov: Disable gcov build with GCC 10
+ - iio: adc: mcp3422: fix locking scope
+ - iio: adc: mcp3422: fix locking on error path
+ - iio: adc: t-ads1015: fix conversion when CONFIG_PM is not set
+ - iio:accel:i-o-adv084s021 Fix alignment and data leak issues.
+ iio:adc:ina2xx Fix timestamp alignment issue.
+ iio:adc:max1118 Fix alignment of timestamp and data leak issues
+ iio:adc:ti-adc081c Fix alignment and data leak issues.
+ iio:light:max44000 Fix timestamp alignment and prevent data leak.
+ iio:chemical:ccs811: Fix timestamp alignment and prevent data leak.
+ iio:accel:mma7455: Fix timestamp alignment and prevent data leak.
+ iio:accel:mma8452: Fix timestamp alignment and prevent data leak.
+ staging: wlan-ng: fix out of bounds read in prism2sta_probe_usb()
+ btrfs: require only sector size alignment for parent eb bytenr
+ btrfs: fix lockdep splat in add_missing_dev
+ btrfs: fix wrong address when faulting in pages in the search ioctl
+ regulator: push allocation in set_consumer_device_supply() out of lock
+ scsi: target: iscsi: Fix data digest calculation
+ scsi: target: iscsi: Fix hang in iscsit_access_np() when getting
data
+ tpg->np_login_sem
+ rbd: require global CAP_SYS_ADMIN for mapping and unmapping
+ RDMA/rxe: Fix the parent sysfs read when the interface has 15 chars
+ fbcon: remove soft scrollback code
+ fbcon: remove now unused 'softback_lines' cursor() argument
+ vgacon: remove software scrollback support
+ [Config] updateconfs for VGACON_SOFT_SCROLLBACK
+ KVM: VMX: Don't freeze guest when event delivery causes an APIC-access exit
+ ARM: dts: vfxxx: Add syscon compatible with OCOTP
+ video: fbdev: fix OOB read in vga_8planes_imageblit()
+ staging: greybus: audio: fix uninitialized value issue
+ usb: core: fix slab-out-of-bounds Read in read_descriptors
+ USB: serial: ftdi_sio: add IDs for Xsens Mti USB converter
+ USB: serial: option: support dynamic Quectel USB compositions
+ USB: serial: option: add support for SIM7070/SIM7080/SIM7090 modules
+ usb: Fix out of sync data toggle if a configured device is reconfigured
+ usb: typec: ucsi: acpi: Check the _DEP dependencies
+ gcov: add support for GCC 10.1
+ gfs2: initialize transaction tr ailX_lists earlier
+ net: handle the return value of pskb_carve_frag_list() correctly
+ hv_netvsc: Remove "unlikely" from netvsc_select_queue
+ NFSv4.1 handle ERR_DELAY error reclaiming locking state on delegation recall
+ scsi: pm8001: Fix memleak in pm8001_exec_internal_task_abort
+ scsi: libfc: Fix for double free()
+ scsi: lpfc: Fix FLOGI/PLOGI receive race condition in pt2pt discovery
+ spi: spi-loopback-test: Fix out-of-bounds read
+ SUNRPC: stop printk reading past end of string
+ rapidio: Replace 'select' DMAENGINES 'with depends on'
+ nvme-fc: cancel async events before freeing event struct
+ f2fs: fix indefinite loop scanning for free nid
+ i2c: algo: pca: Reapply i2c bus settings after reset
+ spi: Fix memory leak on splited transfers
+ - KVM: MIPS: Change the definition of kvm type
+ - clk: rockchip: Fix initialization of mux_pll_src_4plls_p
+ - Drivers: hv: vmbus: Add timeout to vmbus_wait_for_unload
+ - MIPS: SNI: Fix MIPS_L1_CACHE_SHIFT
+ - perf test: Free formats for perf pmu parse test
+ - fbcon: Fix user font detection test at fbcon_resize().
+ - MIPS: SNI: Fix spurious interrupts
+ - drm/mediatek: Add exception handing in mtk_drm_probe() if component init fail
+ - drm/mediatek: Add missing put_device() call in mtk_hdm_idt_parse_pdata()
+ - USB: quirks: Add USB_QUIRK_IGNORE_REMOTE_WAKEUP quirk for BYD zhaoxin notebook
+ - USB: UAS: fix disconnect by unplugging a hub
+ - usbblp: fix race between disconnect() and read()
+ - i2c: i801: Fix resume bug
+ - percpu: fix first chunk size calculation for populated bitmap
+ - Input: trackpoint - add new trackpoint variant IDs
+ - Input: i8042 - add Entroware Proteus EL07R4 to nomux and reset lists
+ - serial: 8250_pci: Add Realtek 816a and 816b
+ - chci-hcd: Move include to keep CRC stable
+ - powerpe/dma: Fix dma_map_ops::get_required_mask
+ - x86/defconfig: Enable CONFIG_USB_XHCI_HCD=y
+ - RDMA/bnxt_re: Do not report transparent vlan from QPI
+ - ARM: dts: bcm: HR2: Fixed QSPI compatible string
+ - ARM: dts: NSP: Fixed QSPI compatible string
+ - netfilter: conntrack: allow scpt heartbeat after connection re-use
+ - cpufreq: intel_pstate: Fix intel_pstate_get_hwp_max() for turbo disabled
+ - iommu/amd: Do not use IOMMUv2 functionality when SME is active
+ - drm/tve200: Stabilize enable/disable
+ - drm/msm: Disable preemption on all 5xx targets
+ - phy: qcom-qmp: Use correct values for ipq8074 PCIe Gen2 PHY init
+ - dsb: Allow forwarding of redirected IGMP traffic
+ - RDMA/bnxt_re: Restrict the max_gids to 256
+ - regulator: pwm: Fix machine constraints application
+ - openrisc: Fix cache API compile issue when not inlining
+ - f2fs: Return EOF on unaligned end of file DIO read
+ - ASoC: qcom: Set card->owner to avoid warnings
+ - perf test: Fix the "signal" test inline assembly
+ - x86/boot/compressed: Disable relocation relaxation
+ * Bionic update: upstream stable patchset 2020-09-23 (LP: #1896817)
+ - HID: core: Correctly handle ReportSize being zero
+ - HID: core: Sanitize event code and type when mapping input
+ - perf record/stat: Explicitly call out event modifiers in the documentation
+ - drm/msm: add shutdown support for display platform_driver
+ - hwmon: (applesmc) check status earlier.
+ - nvmet: Disable keep-alive timer when kato is cleared to 0h
+ - ceph: don't allow setlease on cephfs
- cpuidle: Fixup IRQ state
- s390: don’t trace preemption in percpu macros
- xen/xenbus: Fix granting of vmalloc’d memory
- dmaengine: of-dma: Fix of_dma_router_xlate’s of_dma_xlate handling
- batman-adv: Avoid uninitialized cchaddr when handling DHCP
- batman-adv: Fix own OGM check in aggregated OGMs
- batman-adv: bla: use netif_rx_ni when not in interrupt context
- dmaengine: at_hmac: check return value of of_find_device_by_node() in
  at_dma_xlate()
- MIPS: mm: BMIPS5000 has inclusive physical caches
- MIPS: BMIPS: Also call bmips_cpu_setup() for secondary cores
- netfilter: nf_tables: add NFTA_SET_USERDATA if not null
- netfilter: nf_tables: incorrect enum nft_list_attributes definition
- netfilter: nf_tables: fix destination register zeroing
- net: hns: Fix memleak in hns_nic_dev_probe
- net: systemport: Fix memleak in arc_mdio_probe
- dmaengine: pl330: Fix burst length if burst size is smaller than bus width
- bnxt_en: Check for zero dir entries in NVRAM.
- bnxt_en: Fix PCI AER error recovery flow
- nvmet-fc: Fix a missed _irqsave version of spin_lock in
  'nvmet_fc_fod_op_done()'
- perf tools: Correct SNOOPX field offset
- net: ethernet: mlx4: Fix memory allocation in mlx4_buddy_init()
- fix regression in "epoll: Keep a reference on files added to the check list"
- tg3: Fix soft lockup when tg3_reset_task() fails.
- iommu/vt-d: Serialize IOMMU GCMD register modifications
- thermal: ti-soc-thermal: Fix bogus thermal shutdowns for omap4430
- include/linux/log2.h: add missing () around n in roundup_pow_of_two()
- btrfs: drop path before adding new uuid tree entry
- btrfs: Remove redundant extent_buffer_get in get_old_root
- btrfs: Remove extraneous extent_buffer_get from tree_mod_log_rewind
- btrfs: set the lockdep class for log tree extent buffers
- uaccess: Add non-pagefault user-space read functions
- uaccess: Add non-pagefault user-space write function
- btrfs: fix potential deadlock in the search ioctl
- net: usb: qmi_wwan: add Telit 0x1050 composition
- usb: qmi_wwan: add D-Link DW2-222 A2 device ID
- ALSA: ca0106: fix error code handling
- ALSA: pcm: oss: Remove superfluous WARN_ON() for mulaw sanity check
- ALSA: hda/hdmi: always check pin power status in i915 pin fixup
- ALSA: firewire-dig00x: exclude Avid Adrenaline from detection
- affs: fix basic permission bits to actually work
- block: allow for_each_bvec to support zero len bvec
- block: Move SECTOR_SIZE and SECTOR_SHIFT definitions into <linux/blkdev.h>
- libata: implement ATA_HORKAGE_MAX_TRIM_128M and apply to Sandisks
- dm cache metadata: Avoid returning cmd->bm wild pointer on error
+ - dm thin metadata: Avoid returning cmd->bm wild pointer on error
+ - mm: slab: fix conversion of freelist_corrupted()
+ - KVM: arm64: Add kvm_extable for vaxorcism code
+ - KVM: arm64: Defer guest entry when an asynchronous exception is pending
+ - KVM: arm64: Survive synchronous exceptions caused by AT instructions
+ - KVM: arm64: Set HCR_EL2.PTW to prevent AT taking synchronous exception
+ - checkpatch: fix the usage of capture group ( ... )
+ - mm/hugetlb: fix a race between hugetlb sysctl handlers
+ - cgroup2111: regulatory: reject invalid hints
+ - net: usb: Fix uninit-was-stored issue in asix_read_phy_addr()
+ - ALSA: firewire-tascam: exclude Tascam FE-8 from detection
+ - block: ensure bdi->io_pages is always initialized
+ - vfio/pci: Fix SR-IOV VF handling with MMIO blocking
+ - bnxt: don't enable NAPI until rings are ready
+ - netlabel: fix problems with mapping removal
+ - net: usb: dm9601: Add USB ID of Keenetic Plus DSL
+ - scp: not disable bh in the whole scp_get_port_local()
+ - tipc: fix shutdown() of connectionless socket
+ - net: disable netpoll on fresh napis
+ - scsi: target: tcmu: Fix size in calls to tcmu_flush_dcache_range
+ - scsi: target: tcmu: Optimize use of flush_dcache_page
+ - selftests/bpf: Fix massive output from test_maps
+ - netfilter: nfnctl: nfnctl_request() reports EAGAIN instead of ENOBUFS
+ - perf jevents: Fix suspicious code in fixregex()
+ - ext2: don't update mtime on COW faults
+ - xfs: don't update mtime on COW faults
+
+ -- Stefan Bader <stefan.bader@canonical.com> Mon, 09 Nov 2020 14:37:17 +0100
+
+linux (4.15.0-124.127) bionic; urgency=medium
+
+ * Packaging resync (LP: #1786013)
+ * update dkms package versions
+
+ * Introduce the new NVIDIA 455 series (LP: #1902093)
+ * [Packaging] NVIDIA -- Add the NVIDIA 455 driver
+
+ -- Stefan Bader <stefan.bader@canonical.com> Thu, 05 Nov 2020 18:43:42 +0100
+
+linux (4.15.0-123.126) bionic; urgency=medium
+
+ * CVE-2020-8694
+ - powercap: make attributes only readable by root
+
+ -- Stefan Bader <stefan.bader@canonical.com> Wed, 21 Oct 2020 11:12:40 +0200
+ * bionic/linux: 4.15.0-122.124 -proposed tracker (LP: #1899941)
+ + * CVE-2020-12351 // CVE-2020-12352 // CVE-2020-24490
+ + - Bluetooth: Disable High Speed by default
+ + - Bluetooth: MGMT: Fix not checking if BT_HS is enabled
+ + - [Config] Disable BlueZ highspeed support
+ + * CVE-2020-12351
+ + - Bluetooth: L2CAP: Fix calling sk_filter on non-socket based channel
+ + * CVE-2020-12352
+ + - Bluetooth: A2MP: Fix not initializing all members
+ + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Thu, 15 Oct 2020 14:39:56 +0200
+ + linux (4.15.0-121.123) bionic; urgency=medium
+ + * Packaging resync (LP: #1786013)
+ + - update dkms package versions
+ + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 05 Oct 2020 16:32:15 +0200
+ + linux (4.15.0-120.122) bionic; urgency=medium
+ + * CVE-2020-16119
+ + - SAUCE: dccp: avoid double free of ccid on child socket
+ + * CVE-2020-16120
+ + - Revert "UBUNTU: SAUCE: overlayfs: ensure mounter privileges when reading
directories"
+ + - ovl: pass correct flags for opening real directory
+ + - ovl: switch to mounter creds in readdir
+ + - ovl: verify permissions in ovl_path_open()
+ + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Tue, 29 Sep 2020 15:07:43 -0300
+ + linux (4.15.0-119.120) bionic; urgency=medium
+ + * Novalink (mkvterm command failure) (LP: #1892546)
- tty: hvcs: Don't NULL tty->driver_data until hvcs_cleanup()
+ rtnetlink.sh in net from ubuntu_kernel_selftests is returning 1 for a skipped test (LP: #1895258)
- selftests: net: return Kselftest Skip code for skipped tests
+ Bionic update: upstream stable patchset 2020-09-16 (LP: #1895873)
- net: Fix potential wrong skb->protocol in skb_vlan_untag()
- tipc: fix uninit skb->data in tipc_nl_comapt_dumpit()
+ ipvlan: fix device features
+ gre6: Fix reception with IP6_TNL_F_RCV_DSCP_COPY
+ ALSA: pci: delete repeated words in comments
- ASoC: tegra: Fix reference count leaks.
- mfd: intel-lpss: Add Intel Emmitsburg PCH PCI IDs
- arm64: dts: qcom: msm8916: Pull down PDM GPIOs during sleep
- powerpc/xive: Ignore kmemleak false positives
- media: pci: tpcci: av7110: fix possible buffer overflow caused by bad DMA value in debirq()
+ blktrace: ensure our debugfs dir exists
- scsi: target: tcru: Fix crash on ARM during cmd completion
- iommu/iova: Don't BUG on invalid PFNs
- drm/radeon: fix multiple reference count leak
- drm/amdgpu: fix ref count leak in amdgpu_driver_open_kms
- drm/amd/display: fix ref count leak in amdgpu_drm_ioctl
- drm/amdgpu: fix ref count leak in amdgpu_display_crtc_set_config
- drm/amdgpu/display: fix ref count leak when pm_runtime_get_sync fails
- scsi: lpfc: Fix shost refcount mismatch when deleting vport
- selftests/powerpc: Purge extra count_pmc() calls of ebb selftests
- omapfb: fix multiple reference count leaks due to pm_runtime_get_sync
- PCI: Fix pci_create_slot() reference count leak
- rtlwifi: rtl8192cu: Prevent leaking urb
- mips/vdso: Fix resource leaks in genvdso.c
- cec-api: prevent leaking memory through hole in structure
- f2fs: fix use-after-free issue
- drm/nouveau/drm/nouvea: fix reference count leak in nouveau_fbcon_open
- drm/nouvea: Fix reference count leak in nouveau_connector_detect
- locking/lockdep: Fix overflow in presentation of average lock-time
- scsi: iscsi: Do not put host in iscsi_set_flashnode_param()
- ceph: fix potential mdsc use-after-free crash
- scsi: fcoe: Memory leak fix in fcoe_sysfs_fcf_del()
- EDAC/eie31200: Fallback if host bridge device is already initialized
- media: davinci: vpif_capture: fix potential double free
- KVM: arm64: Fix symbol dependency in __hyp_call_panic_nvhe
- powerpc/spufs: add CONFIG_COREDUMP dependency
- USB: sisusbvga: Fix a potential UB caused by left shifting a negative value
- efi: provide empty efi_enter_virtual_mode implementation
- Revert "ath10k: fix DMA related firmware crashes on multiple devices"
+ - media: gpio-ir-tx: improve precision of transmitted signal due to scheduling
+ - nvme-fc: Fix wrong return value in __nvme_fc_init_request()
+ - null_blk: fix passing of REQ_FUA flag in null_handle_rq
+ - 12c: re:ar: in slave mode, clear NACK earlier
+ - usb: gadget: f_tcm: Fix some resource leaks in some error paths
+ - jbd2: make sure jh have b_transaction set in refile/unfile_buffer
+ - ext4: don't BUG on inconsistent journal feature
+ - jbd2: abort journal if free a async write error metadata buffer
+ - fs: prevent BUG_ON in submit_bh_wbc()
+ - spi: stm32: fix stm32_spi_prepare_mbr in case of odd clk_rate
+ - s390/cio: add cond_resched() in the slow_eval_known_fn() loop
+ - scsi: ufs: Fix possible infinite loop in ufshcd_hold
+ - scsi: ufs: Improve interrupt handling for shared interrupts
+ - scsi: ufs: Clean up completed request without interrupt notification
+ - net: gianfar: Add of_node_put() before goto statement
+ - powerpc/perf: Fix soft lockups due to missed interrupt accounting
+ - HID: I2c-hid: Always sleep 60ms after I2C_HID_PWR_ON commands
+ - btrfs: fix space cache memory leak after transaction abort
+ - fbcon: prevent user font height or width change from causing potential out-of-bounds access
+ - USB: lvtest: return proper error code in probe
+ - vt: defer kfree() of vc_screenbuf in vc_do_resize()
+ - vt_ioctl: change VT_RESIZEEX ioctl to check for error return from vc_resize()
+ - serial: samsung: Removes the IRQ not found warning
+ - serial: pl011: Fix oops on -EPROBE_DEFER
+ - serial: pl011: Don't leak amba_ports entry on driver register error
+ - serial: 8250_exar: Fix number of ports for Commtech PCIe cards
+ - serial: 8250: change lock order in serial8250_do_startup()
+ - writeback: Protect inode->i_io_list with inode->i_lock
+ - writeback: Avoid skipping inode writeback
+ - writeback: Fix sync livelock due to b_dirty_time processing
+ - XEN uses irqdesc::irq_data_common::handler_data to store a per interrupt XEN data pointer which contains XEN specific information.
+ - xhci: Do warm-reset when both CAS and XDEV_RESUME are set
+ - PM: sleep: core: Fix the handling of pending runtime resume requests
+ - device property: Fix the secondary firmware node handling in
  set_primary_fwnode()
+ - drm/amdgpu: Fix buffer overflow in INFO ioctl
+ - USB: yurex: Fix bad gfp argument
+ - usb: uas: Add quirk for PNY Pro Elite
+ - USB: Ignore UAS for JMicron JMS567 ATA/ATAPI Bridge
+ - usb: host: ohci-exynos: Fix error handling in exynos_ohci_probe()
+ - overflow.h: Add allocation size calculation helpers
+ - USB: gadget: u_f: add overflow checks to VLA macros
+ - USB: gadget: f_ncm: add bounds checks to ncm_unwrap_ntb()
+ - USB: gadget: u_f: Unbreak offset calculation in VLA
+ - USB: cdc-acm: rework notification_buffer resizing
+ - usb: storage: Add unusual_uas entry for Sony PSZ drives
+ btrfs: check the right error variable in btrfs_del_dir_entries_in_log
+ tpn: Unify the mismatching TPM space buffer sizes
+ HID: hiddev: Fix slab-out-of-bounds write in hiddev_ioctl_usage()
+ ALSA: usb-audio: Update documentation comment for MS2109 quirk
+ net: ena: Make missed_tx stat incremental
+ ASoC: img: Fix a reference count leak in img_i2s_in_set_fmt
+ ASoC: img-parallel-out: Fix a reference count leak
+ xfs: Don't allow logging of XFS_ISTALE inodes
+ HID: quirks: add NOGET quirk for Logitech GROUP
+ drm/msm/adreno: fix updating ring fence
+ ext4: handle read only external journal device
+ ext4: handle option set by mount flags correctly
+ ext4: handle error of ext4_setup_system_zone() on remount
+ scsi: qla2xxx: Check if FW supports MQ before enabling
+ scsi: qla2xxx: Fix null pointer access during disconnect from subsystem
+ macvlan: validate setting of multiple remote source MAC addresses
+ block: loop: set discard granularity and alignment for block device backed
+ loop
+ blk-mq: order adding requests to hctx->dispatch and checking SCHED_RESTART
+ btrfs: reset compression level for lzo on remount
+ usb: host: xhci: fix ep context print mismatch in debugfs
+ genirq/matrix: Deal with the sillyness of for_each_cpu() on UP
+ drm/amd/pm: correct Vega10 swctf limit setting
+ USB: quirks: Ignore duplicate endpoint on Sound Devices MixPre-D

* DELL LATITUDE 5491 touchscreen doesn't work (LP: #1889446) // Bionic update:
  upstream stable patchset 2020-09-16 (LP: #1895873)
* USB: quirks: Add no-lpm quirk for another Raydium touchscreen

* Bionic update: upstream stable patchset 2020-09-11 (LP: #1895328)
  - drm/vgem: Replace opencoded version of drm_gem_dumb_map_offset()
  - perf probe: Fix memory leakage when the probe point is not found
  - khugepaged: khugepaged_test_exit() check mmget_still_valid()
  - khugepaged: adjust VM_BUG_ON_MM() in __khugepaged_enter()
  - powerpc/mm: Only read faulting instruction when necessary in do_page_fault()
  - btrfs: export helpers for subvolume name/id resolution
  - btrfs: don't show full path of bind mounts in subvol=
  - btrfs: Move free_pages_out label in inline extent handling branch in compress_file_range
  - btrfs: inode: fix NULL pointer dereference if inode doesn't need compression
  - btrfs: sysfs: use NOFS for device creation
  - ramfs: fix uninitialized memory leak in ramfs_dev_read()
  - kernel/relay.c: fix memleak on destroy relay channel
  - mm: include CMA pages in lowmem_reserve at boot
  - mm, page_alloc: fix core hung in free_pcp_pages_bulk()
  - ext4: fix checking of directory entry validity for inline directories
  - jbd2: add the missing unlock_buffer() in the error path of jbd2_write_superblock()
+ - [Config] updateconfiggs for CONFIG_SPI_DYNAMIC
+ - spi: Prevent adding devices below an unregistering controller
+ - scsi: ufs: Add DELAY_BEFORE_LPM quirk for Micron devices
+ - media: budget-core: Improve exception handling in budget_register()
+ - rtc: goldfish: Enable interrupt in set_alarm() when necessary
+ - media: vps: clean up resources in init
+ - Input: psnouse - add a newline when printing 'proto' by sysfs
+ - m68knommu: fix overwriting of bits in ColdFire V3 cache control
+ - xfs: fix inode quota reservation checks
+ - jffs2: fix UAF problem
+ - cpufreq: intel_pstate: Fix cpuinfo_max_freq when MSR_TURBO_RATIO_LIMIT is 0
+ - scsi: libfc: Free skb in fc_disc_gpn_idResp() for valid cases
+ - virtio_ring: Avoid loop when vq is broken in virtqueue_poll
+ - xfs: Fix UBSAN null-ptr-dered in xfs_sysfs_init
+ - alpha: fix annotation of io[read,write]{16,32}bet()
+ - ext4: fix potential negative array index in do_split()
+ - i40e: Set RX_ONLY mode for unicast promiscuous on VLAN
+ - i40e: Fix crash during removing i40e driver
+ - net: fec: correct the error path for regulator disable in probe
+ - bonding: show saner speed for broadcast mode
+ - bonding: fix a potential double-unregister
+ - ASoC: msm8916-wcd-analog: fix register Interrupt offset
+ - ASoC: intel: Fix memleak in sst_media_open
+ - vfio/type1: Add proper error unwind for vfio_iommu_replay()
+ - bonding: fix active-backup failover for current ARP slave
+ - hv_netvsc: Fix the queue_mapping in netvsc_vf_xmit()
+ - net: dsa: b53: check for timeout
+ - powerpc/pseries: Do Not initiate shutdown when system is running on UPS
+ - epoll: Keep a reference on files added to the check list
+ - do_epoll_ctl(): clean the failure exits up a bit
+ - mm/hugetlb: fix calculation of adjust_range_if_pmd_sharing_possible
+ - xen: don't reschedule in preemption off sections
+ - clk: Evict unregistered clks from parent caches
+ - KVM: arm/arm64: Don't reschedule in unmap_stage2_range()
+ - scsi: zfcp: Fix use-after-free in request timeout handlers
+ - ext4: don't allow overlapping system zones
+ - s390/runtime_instrumentation: fix storage key handling
+ - s390/ptrace: fix storage key handling
+ - kvm: x86: Toggling CR4.SMAP does not load PDPTEs in PAE mode
+ - kvm: x86: Toggling CR4.PKE does not load PDPTEs in PAE mode
+ - Fix build error when CONFIG_ACPI is not set/enabled:
+ - net: ena: Prevent reset after device destruction
+ - Bionic update: upstream stable patchset 2020-09-02 (LP: #1893986)
+ - net/mlx5e: Don't support phys switch id if not in switchdev mode
+ - tracepoint: Mark __tracepoint_string's __used
+ - HID: input: Fix devices that return multiple bytes in battery report
+ - x86/mce/inject: Fix a wrong assignment of i.mce.status
+ - sched: correct SD_flags returned by tl->sd_flags()
+ - arm64: dts: rockchip: fix rk3399-puma vcc5v0-host gpio
+ - arm64: dts: rockchip: fix rk3399-puma gmac reset gpio
+ - EDAC: Fix reference count leaks
+ - arm64: dts: qcom: msm8916: Replace invalid bias-pull-none property
+ - arm64: dts: exynos: Fix silent hang after boot on Espresso
+ - m68k: mac: Don't send IOP message until channel is idle
+ - m68k: mac: Fix IOP status/control register writes
+ - platform/x86: intel-hid: Fix return value check in check_acpi_dev()
+ - platform/x86: intel-vbtn: Fix return value check in check_acpi_dev()
+ - ARM: at91: pm: add missing put_device() call in at91_pm_sram_init()
+ - spi: lantiq: fix: Rx overflow error in full duplex mode
+ - ARM: socfpga: PM: add missing put_device() call in
+ socfpga_setup_ocram_self_refresh()
+ - drm/ti/t1dc: fix leak & null ref in panel_connector_get_modes
+ - Bluetooth: add a mutex lock to avoid UAF in do_enale_set
+ - fs/btrfs: Add cond_resched() for try_release_extent_mapping() stalls
+ - drm/radeon: Fix reference count leaks caused by pm_runtime_get_sync
+ - video: fbdev: neofb: fix memory leak in neo_scan_monitor()
+ - md-cluster: fix wild pointer of unlock_all_bitmaps()
+ - arm64: dts: hisilicon: hikey: fixes to comply with adi, adv7533 DT binding
+ - drm/nouveau: fix multiple instances of reference count leaks
+ - drm/debugfs: fix plain echo to connector "force" attribute
+ - irqchip/irq-mtk-sysirq: Replace spinlock with raw_spinlock
+ - mm/mmap.c: Add cond_resched() for exit_mmap() CPU stalls
+ - brcmfmac: To fix Bss Info flag definition Bug
+ - brcmfmac: set state of hanger slot to FREE when flushing PSQ
+ - iwlegacy: Check the return value of pcie_capability_read_*(())
+ - gpu: host1x: debug: Fix multiple channels emitting messages simultaneously
+ - usb: gadget: net2280: fix memory leak on probe error handling paths
+ - bdc: Fix bug causing crash after multiple disconnects
+ - usb: bdc: Halt controller on suspend
+ - dyndbg: fix a BUG_ON in ddebug_describe_flags
+ - bcache: fix super block seq numbers comparision in register_cache_set()
+ - ACPICA: Do not increment operation_region reference counts for field units
+ - app/intel: Fix a memory leak on module initialisation failure
+ - video: fbdev: sm712fb: fix an issue about iounmap for a wrong address
+ - console: newport_con: fix an issue about leak related system resources
+ - video: pxafb: Fix the function used to balance a 'dma_alloc_coherent()' call
+ - iio: improve IIO_CONCENTRATION channel type description
+ - drm/arm: fix unintentional integer overflow on left shift
+ - leds: lm355x: avoid enum conversion warning
+ - media: omap3isp: Add missed v4l2_ctrl_handler_free() for
+ preview_init_entities()
+ - ASoC: Intel: bxt_rt298: add missing_owner field
+ - scsi: cumana_2: Fix different dev_id between request_irq() and free_irq()
+ - drm/mipi: use dcs write for miipi_dsi_dcs_set_tear_scanline
+ - cxl: Fix kobject memleak
- drm/radeon: fix array out-of-bounds read and write issues
- scsi: powertec: Fix different dev_id between request_irq() and free_irq()
- scsi: eesox: Fix different dev_id between request_irq() and free_irq()
- ipvs: allow connection reuse for unconfirmed conntrack
- media: firewire: Using uninitialized values in node_probe()
- media: exynos4-  is: Add missed check for pinctrl_lookup_state()
- xfs: fix reflink quota reservation accounting error
- PCI: Fix pci_cfg_wait queue locking problem
- leds: core: Flush scheduled work for system suspend
- drm: panel: simple: Fix bpc for LG LB070WV8 panel
- drm/bridge: sil_sii8620: initialize return of sii8620_readb
- scsi: scsi_debug: Add check for sdebug_max_queue during module init
- mwifiex: Prevent memory corruption handling keys
- powerpc/vdso: Fix vdso cpu truncation
- staging: rtl8192u: fix a dubious looking mask before a shift
- PCI/ASPM: Add missing newline in sysfs 'policy'
- drm/imx: tve: fix regulator_disable error path
- USB: serial: iuu Philippines: fix led-activity helpers
- thermal: ti-soc-thermal: Fix reversed condition in
- ti Thermal_expose_sensor()
- coresight: tmc: Fix TMC mode read in tmc_read_unprepare_etb()
- MIPS: OCTEON: add missing put_device() call in dwc3_octeon_device_init()
- usb: dwc2: Fix error path in gadget registration
- scsi: mesh: Fix panic after host or bus reset
- net: dsa: mv88e6xxx: MV88E6097 does not support jumbo configuration
- Smack: fix another vscanf out of bounds
- Smack: prevent underflow in smk_set_cipso()
- power: supply: check if calc_soc succeeded in pm860x_init_battery
- Bluetooth: hci_serdev: Only unregister device if it was registered
- selftests/powerpc: Fix CPU affinity for child process
- PCI: Release IVRS table in AMD ACS quirk
- selftests/powerpc: Fix online CPU selection
- s390/qeth: don't process empty bridge port events
- w1251: fix always return 0 error
- tools, build: Propagate build failures from tools/build/Makefile.build
- net: ethernet: aquantia: Fix wrong return value
- liquidio: Fix wrong return value in cn23xx_get_pf_num()
- net: spider_net: Fix the size used in a 'dma_free_coherent()' call
- fsl/fman: use 32-bit unsigned integer
- fsl/fman: fix dereference null return value
- fsl/fman: fix unreachable code
- fsl/fman: check dereferencing null pointer
- fsl/fman: fix eth hash table allocation
- dlm: Fix kobject memleak
- pinctrl-single: fix pcs_parse_pinconf() return value
- x86/fs/gbase/64: Fix NULL deref in 86_fsgbase_read_task
- crypto: aesni - add compatibility with IAS
- af_packet: TPACKET_V3: fix fill status rwlock imbalance
+ drivers/net/wan/lapbether: Added needed_headroom and a skb->len check
+ net/nfc/rawsock.c: add CAP_NET_RAW check.
+ net: refactor bind_bucket fastreuse into helper
+ net: Set fput_needed iff FDPUT_FPUT is set
+ USB: serial: cp210x: enable usb generic throttle/unthrottle
+ ALSA: usb-audio: Creative USB X-Fi Pro SB1095 volume knob support
+ ALSA: usb-audio: fix overeager device match for MacroSilicon MS2109
+ ALSA: usb-audio: add quirk for Pioneer DDJ-RB
+ crypto: qat - fix double free in qat_uclo_create_batch_init_list
+ crypto: ccp - Fix use of merged scatterlists
+ crypto: cpt - don't sleep of CRYPTO_TFMREQ_MAY_SLEEP was not specified
+ bitfield.h: don't compile-time validate _val in FIELD_FIT
+ fs/minix: check return value of sb_getblk()
+ fs/minix: don't allow getting deleted inodes
+ fs/minix: reject too-large maximum file size
+ ALSA: usb-audio: work around streaming quirk for MacroSilicon MS2109
+ 9p: Fix memory leak in v9fs_mount
+ spi: spidev: Align buffers for DMA
+ mtd: rawnand: qcom: avoid write to unavailable register
+ parisc: Implement __smp_store_release and __smp_load_acquire barriers
+ parisc: mask out enable and reserved bits from sba imask
+ ARM: 8992/1: Fix unwind_frame for clang-built kernels
+ irqdomain/treewide: Free firmware node after domain removal
+ xen/balloon: fix accounting in alloc_xenballooned_pages error path
+ xen/balloon: make the balloon wait interruptible
+ net: initialize fastreuse on inet_inherit_port
+ fs/minix: don't allocate anonymous block device for user invisible roots
+ btrfs: only search for left_info if there is no right_info in
+ try_merge_free_space
+ btrfs: fix memory leaks after failure to lookup checksums during inode
+ logging
+ dt-bindings: iio: io-channel-mux: Fix compatible string in example code
+ iio: dac: ad5592r: fix unbalanced mutex unlocks in ad5592r_read_raw()
+ xtensa: fix xtensa_pmu_setup prototype
+ powerpc: Fix circular dependency between percpu.h and mmu.h
+ net: ethernet: stmmac: Disable hardware multicast filter
+ net: stmmac: dwmac1000: provide multicast filter fallback
+ net/compat: Add missing sock updates for SCM_RIGHTS
+ md/raid5: Fix Force reconstruct-write io stuck in degraded raid5
+ bcache: allocate meta data pages as compound pages
+ mac80211: fix misplaced while instead of if
+ MIPS: CPU#0 is not hotpluggable
+ ext2: fix missing percpu_counter_inc
+ ocfs2: change slot number type s16 to u16
+ ftrace: Setup correct FTRACE_FL_REGS flags for module
+ kprobes: Fix NULL pointer dereference at kprobe_ftrace_handler
+ tracing/hwlat: Honor the tracing_cpumask
+ tracing: Use trace_sched_process_free() instead of exit() for pid tracing
+ watchdog: f71808e_wdt: indicate WDIOF_CARDRESET support in watchdog_info.options
+ watchdog: f71808e_wdt: remove use of wrong watchdog_info option
+ watchdog: f71808e_wdt: clear watchdog timeout occurred flag
+ psseries: Fix 64 bit logical memory block panic
+ perf intel-pt: Fix FUP packet state
+ drm/imx: imx-lkb: Disable both channels for split mode in enc->disable()
+ mfd: arizona: Ensure 32k clock is put on driver unbind and error
+ RDMA/ipoib: Return void from ipoib_ib_dev_stop()
+ USB: serial: ftdi_sio: make process-packet buffer unsigned
+ USB: serial: ftdi_sio: clean up receive processing
+ gpu: ipu-v3: image-convert: Combine rotate/no-rotate irq handlers
+ dm rq: don’t call blk_dynamic_stop() in dm_stop_queue()
+ iommu omap: Check for failure of a call to omap_iommu_dump_ctx
+ iommu vt-d: Enforce PASID devTLB field mask
+ i2c: rcar: slave: only send STOP event when we have been addressed
+ clk: clk-atlas6: fix return value check in atlas6_clk_init()
+ pwm: bcm iproc: handle clk_get_rate() return
+ tools build feature: Use CC and CXX from parent
+ i2c: rcar: avoid race when unregistering slave
+ Input: sentelic - fix error return when fsp_reg_write fails
+ drm/vmwgfx: Use correct vmw_legacy_display_unit pointer
+ drm/vmwgfx: Fix two loop_for_each exit tests
+ net: qcom emac: add missed clk disable_unprepare in error path of
  emac_clks_phasel1_init
+ nfs: Fix getxattr kernel panic and memory overflow
+ fs/ufs: avoid potential u32 multiplication overflow
+ test_kmod: avoid potential double free in trigger_config_run_type()
+ mfd: dln2: Run event handler loop under spinlock
+ ALSA: echoaudio: Fix potential Oops in snd_echo_resume()
+ perf bench mem: Always memset source before memcpy
+ tools build feature: Quote CC and CXX for their arguments
+ sh: landisk: Add missing initialization of sh_io_port_base
+ khugepaged: retract_page_tables() remember to test exit
+ genirq/affinity: Make affinity setting if activated opt-in
+ ARM: dts: gse: Fix ports node name for adv7180
+ ARM: dts: gse: Fix ports node name for adv7612
+ drm/amdGPU: avoid dereferencing a NULL pointer
+ usb: mtu3: clear dual mode of u3port when disable device
+ drm/radeon: disable AGP by default
+ brcmfmac: keep SDIO watchdog running when console_interval is non-zero
+ ath10k: Acquire tx_lock in tx error paths
+ xf: don’t eat an EIO/ENOSPC writeback error when scrubbing data fork
+ RDMA/rx: Skip dgid check in loopback mode
+ RDMA/rx: Prevent access to wr->next ptr after wr is posted to send queue
+  - usb: core: fix quirks_param_set() writing to a const pointer
+  - powerpc/boot: Fix CONFIG_PPC_MPC52XX references
+  - include/asm-generic/vmlinux.lds.h: align ro_after_init
+  - PCI: Mark AMD Navi10 GPU rev 0x00 ATS as broken
+  - PCI: Add device even if driver attach failed
+  - PCI: qcom: Define some PARF params needed for ipq8064 SoC
+  - PCI: qcom: Add support for tx term offset for rev 2.1.0
+  - PCI: Probe bridge window attributes once at enumeration-time
+  - btrfs: ref-verify: fix memory leak in add_block_entry
+  - btrfs: don't traverse into the seed devices in show_devname
+  - btrfs: fix messages after changing compression level by remount
+  - btrfs: fix return value mixup in btrfs_get_extent
+  - powerpc: Allow 4224 bytes of stack expansion for the signal frame
+  - driver core: Avoid binding drivers to dead devices
+  - RDMA/ipoib: Fix ABBA deadlock with ipoib_reap_ah()
+  - media: rockchip: rga: Introduce color fmt macros and refactor CSC mode logic
+  - media: rockchip: rga: Only set output CSC mode for RGB input
+  - mmc: renesas_sdhi_internal_dmac: clean up the code for dma complete
+  - openrisc: Fix oops caused when dumping stack
+  - scsi: lpfc: nvmet: Avoid hang / use-after-free again when destroying targetport
+  - watchdog: initialize device before misc_register
+  - fs/minix: set s_maxbytes correctly
+  - fs/minix: fix block limit check for V1 filesystems
+  - fs/minix: remove expected error message in block_to_path()
+  - arm64: dts: marvell: espressobin: add ethernet alias
+  - drm/amdgpup: Fix bug where DPM is not enabled after hibernate and resume
+  +  * [UBUNTU 20.04] kernel: s390/cpum_cf,perf: changeDFLT_CCERROR counter name
+  +  (LP: #1891454)
+  +  - s390/cpum_cf: Add new extended counters for IBM z15
+  +  +  * CVE-2018-10322
+  +  - xfs: move inode fork verifiers to xfs_dinode_verify
+  +  - xfs: enhance dinode verifier
+  +  +  -- Stefan Bader <stefan.bader@canonical.com> Fri, 18 Sep 2020 10:48:34 +0200
+  +  +linux (4.15.0-118.119) bionic; urgency=medium
+  +  +  * bionic/linux: 4.15.0-118.119 -proposed tracker (LP: #1894697)
+  +  +  * Packaging resync (LP: #1786013)
+  +  +  - update dkms package versions
+  +  +  * Introduce the new NVIDIA 450-server and the 450 UDA series (LP: #1887674)
+  +  +  - [packaging] add signed modules for nvidia 450 and 450-server
* cgroup refcount is bogus when cgroup_sk_alloc is disabled (LP: #1886860)
* cgroup: add missing skcd->no_refcnt check in cgroup_sk_clone()

* CVE-2020-12888
  - vfio/type1: Support faulting PFNMAP vmas
  - vfio-pci: Fault mmaps to enable vma tracking
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  - vfio/type1: Support faulting PFNMAP vmas
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* [Hyper-V] VSS and File Copy daemons intermittently fails to start
  (LP: #1891224)
- [Packaging] Bind hv_vss_daemon startup to hv_vss device
- [Packaging] bind hv_fcopy_daemon startup to hv_fcopy device

* KVM: Fix zero_page reference counter overflow when using KSM on KVM compute
  host (LP: #1837810)
- KVM: fix overflow of zero page refcount with ksm running

* Fix false-negative return value for rtnetlink.sh in kselftests/net
  (LP: #1890136)
  - selftests: rtnetlink: correct the final return value for the test
  - selftests: rtnetlink: make kci_test_encap() return sub-test result

* Bionic update: upstream stable patchset 2020-08-18 (LP: #1892091)
  - USB: serial: qcsserial: add EM7305 QDL product ID
  - USB: iowarrior: fix up report size handling for some devices
  - usb: xhci: define IDs for various ASMedia host controllers
  - usb: xhci: Fix ASMedia ASM1142 DMA addressing
  - Revert "ALSA: hda: call runtime_allow() for all hda controllers"
  - ALSA: seq: oss: Serialize ioctls
  - staging: android: ashmem: Fix lockdep warning for write operation
  - Bluetooth: Fix slab-out-of-bounds read in hci_extended_inquiry_result_evt()
  - Bluetooth: Prevent out-of-bounds read in hci_inquiry_result_evt()
  - Bluetooth: Prevent out-of-bounds read in hci_inquiry_result_with_rssi_evt()
  - omapfb: dss: Fix max fclk divider for omap36xx
  - binder: Prevent context manager from incrementing ref 0
  - vgacon: Fix for missing check in scrollback handling
  - mtd: properly check all write ioctls for permissions
  - leds: wm831x-status: fix use-after-free on unbind
  - leds: da903x: fix use-after-free on unbind
  - leds: lm3533: fix use-after-free on unbind
  - leds: 88pm860x: fix use-after-free on unbind
  - net9p: validate fds in p9_fd_open
  - drm/nouveau/fbcon: fix module unload when fbcon init has failed for some
    reason
  - drm/nouveau/fbcon: zero-initialise the mode_cmd2 structure
  - i2c: slave: improve sanity check when registering
  - i2c: slave: add sanity check when unregistering
  - usb: hso: check for return value in hso_serial_common_create()
+ firmware: Fix a reference count leak.
+ cfg80211: check vendor command doit pointer before use
+ igb: reinit_locked() should be called with rtnl_lock
+ atm: fix atm_dev refcnt leaks in atmcp_remove_persistent
+ tools lib traceevent: Fix memory leak in process_dynamic_array_len
+ Drivers: hv: vmbus: Ignore CHANNELMSG_TL_CONNECT_RESULT(23)
+ xattr: break delegations in {set,remove}xattr
+ ipv4: Silence suspicious RCU usage warning
+ ipv6: fix memory leaks on IPV6_ADDRFORM path
+ net: ethernet: mtk_eth_soc: fix MTU warnings
+ vxlan: Ensure FDB dump is performed under RCU
+ lan78xx: replace bogus endpoint lookup
+ hv_netvsc: do not use VF device if link is down
+ net: gre: recompute gre csum for sctp over gre tunnels
+ openswint: Prevent kernel-infoleak in ovs_ct_put_key()
+ Revert "vxlan: fix tos value before xmit"
+ selftests/net: relax cpu affinity requirement in msg_zerocopy test
+ rxrpc: Fix race between recvmsg and sendmsg on immediate call failure
+ i40e: add num_vectors checker in iwarp handler
+ i40e: Wrong truncation from u16 to u8
+ i40e: Memory leak in i40e_config_iwarp_qvlist
+ Smack: fix use-after-free in smk_write_relabel_self()

* Bionic update: upstream stable patchset 2020-08-11 (LP: #1891228)
+ AX.25: Fix out-of-bounds read in ax25_connect()
+ AX.25: Prevent out-of-bounds read in ax25_sendmsg()
+ dev: Defer free of skb in flush_backlog
+ drivers/net/wan/x25_asy: Fix to make it work
+ net-sysfs: add a newline when printing 'tx_timeout' by sysfs
+ net: udp: Fix wrong clean up for IS_UDPLITE macro
+ rxrpc: Fix sendmsg() returning EPIPE due to recvmsg() returning ENODATA
+ AX.25: Prevent integer overflows in connect and sendmsg
+ ip6_gre: fix null-ptr-deref in ip6gre_init_net()
+ rtnetlink: Fix memory(net_device) leak when ->newlink fails
+ tcp: allow at most one TLP probe per flight
+ regmap: debugfs: check count when read regmap file
+ qrtr: orphan socket in qrtr_release()
+ scctp: shrink stream outq only when new outcnt < old outcnt
+ scctp: shrink stream outq when fails to do addstream reconf
+ crypto: ccp - Release all allocated memory if sha type is invalid
+ media: rc: prevent memory leak in cx23888_ir_probe
+ iio: imu: adis16400: fix memory leak
+ ath9k_htc: release allocated buffer if timed out
+ ath9k: release allocated buffer if timed out
+ PCI/ASPM: Disable ASPM on ASMedia ASM1083/1085 PCIe-to-PCI bridge
+ wireless: Use offsetof instead of custom macro.
+ ARM: 8986/1: hw_breakpoint: Don't invoke overflow handler on uaccess
+ watchpoints
+ - drm/amdgpu: Prevent kernel-infoleak in amdgpu_info_ioctl()
+ - drm: hold gem reference until object is no longer accessed
+ - f2fs: check memory boundary by insane namelen
+ - f2fs: check if file namelen exceeds max value
+ - 9p/trans_fd: abort p9_read_work if req status changed
+ - 9p/trans_fd: Fix concurrency del of req_list in p9_fd_cancelled/p9_read_work
+ - x86/build/lto: Fix truncated .bss with -fdata-sections
+ - rds: Prevent kernel-infoleak in rds_notify_queue_get()
+ - xsf: fix missed wakeup on l_flush_wait
+ - net/x25: Fix x25_neigh refcnt leak when x25 disconnect
+ - net/x25: Fix null-ptr-derref in x25_disconnect
+ - selftests/net: rxtimestamp: fix clang issues for target arch PowerPC
+ - sh: Fix validation of system call number
+ - net: lan78xx: add missing endpoint sanity check
+ - net: lan78xx: fix transfer-buffer memory leak
+ - mlx4: disable device on shutdown
+ - mlxsw: core: Increase scope of RCU read-side critical section
+ - mlxsw: core: Free EMAD transactions using kfree_rcu()
+ - ibmvnic: Fix IRQ mapping disposal in error path
+ - bpf: Fix map leak in HASH_OF_MAPS map
+ - mac80211: mesh: Free ie data when leaving mesh
+ - mac80211: mesh: Free pending skb when destroying a mpath
+ - arm64/alternatives: move length validation inside the subsection
+ - arm64: csum: Fix handling of bad packets
+ - usb: hso: Fix debug compile warning on sparc32
+ - qed: Disable "MFW indication via attention" SPAM every 5 minutes
+ - nfc: s3fwrn5: add missing release on skb in s3fwrn5_recv_frame
+ - parisc: add support for cmpxchg on u8 pointers
+ - net: ethernet: ravb: exit if re-initialization fails in tx timeout
+ - Revert "i2c: cadence: Fix the hold bit setting"
+ - x86/unwind/orc: Fix ORC for newly forked tasks
+ - cxgb4: add missing release on skb in uld_send()
+ - xen-netfront: fix potential deadlock in xennet_remove()
+ - KVM: LAPIC: Prevent setting the tscedline timer if the lapic is hw
+ - ARM: percpu.h: fix build error
+ - random: fix circular include dependency on arm64 after addition of percpu.h
+ - random32: remove net_rand_state from the latent entropy gcc plugin
+ - random32: move the pseudo-random 32-bit definitions to prandom.h
+ - ext4: fix direct I/O read error

+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Tue, 08 Sep 2020 12:09:02 +0200

Open Source Used In 5GaaS Edge AC-4 19020
Open Source Used In 5GaaS Edge AC-4  19021

+linux (4.15.0-117.118) bionic; urgency=medium
+ * bionic/linux: 4.15.0-117.118 -proposed tracker (LP: #1894277)
+ * Packaging resync (LP: #1786013)
+ - [Packaging] update helper scripts
+ * CVE-2020-14386
+ - SAUCE: net/packet: fix overflow in tpacket_rcv
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Fri, 04 Sep 2020 16:23:00 -0300
+ +linux (4.15.0-115.116) bionic; urgency=medium
+ * bionic/linux: 4.15.0-115.116 -proposed tracker (LP: #1893055)
+ * [Potential Regression] dscr_inherit_exec_test from powerpc in ubuntu_kernel_selftests failed on B/E/F (LP: #1888332)
+ - powerpc/64s: Don't init FSCR_DSCR in __init_FSCR()
+ -- Stefan Bader <stefan.bader@canonical.com>  Wed, 26 Aug 2020 15:45:29 +0200
+ +linux (4.15.0-114.115) bionic; urgency=medium
+ * bionic/linux: 4.15.0-114.115 -proposed tracker (LP: #1891052)
+ * ipsec: policy priority management is broken (LP: #1890796)
+ - xfrm: policy: match with both mark and mask on user interfaces
+ -- Stefan Bader <stefan.bader@canonical.com>  Tue, 11 Aug 2020 10:58:21 +0200
+ +linux (4.15.0-113.114) bionic; urgency=medium
+ * bionic/linux: 4.15.0-113.114 -proposed tracker (LP: #1890705)
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ * Reapply "usb: handle warm-reset port requests on hub resume" (LP: #1859873)
+ - usb: handle warm-reset port requests on hub resume
+ * Bionic update: upstream stable patchset 2020-07-29 (LP: #1889474)
+ - gpio: arizona: handle pm_runtime_get_sync failure case
+ - gpio: arizona: put pm_runtime in case of failure
+ - pinctrl: amd: fix npins for uart0 in kerncz_groups
+ - mac80211: allow rx of mesh eapol frames with default rx key
+ - scsi: scsi_transport_spi: Fix function pointer check
+ - xtensa: fix __sync_fetch_and_{and,or}_4 declarations
+ xtensa: update *pos in cpuinfo_op.next
+ drivers/net/wan/lapbether: Fixed the value of hard_header_len
+ net: sky2: initialize return of gm_phy_read
+ drm/nouveaui2c/g94:- increase NV_PMGR_DP_AUXCTL_TRANSACTREQ timeout
+ irqdomain/treewide: Keep firmware node unconditionally allocated
+ SUNRPC reverting d03727b248d0 ("NFSv4 fix CLOSE not waiting for direct IO completion")
+ spi: spi-fsl-dspi: Exit the ISR with IRQ_NONE when it's not ours
+ IB/umem: fix reference count leak in ib_umem_odp_get()
+ uprobes: Change handle_swbp() to send SIGTRAP with si_code=SI_KERNEL, to fix GDB regression
+ ALSA: info: Drop WARN_ON() from buffer NULL sanity check
+ ASoC: rt5670: Correct RT5670_LDO_SEL_MASK
+ btrfs: fix double free on ulist after backref resolution failure
+ btrfs: fix mount failure caused by race with umount
+ btrfs: fix page leaks after failure to lock page for delalloc
+ bnxt_en: Fix race when modifying pause settings.
+ hippi: Fix a size used in a 'pci_free_consistent()' in an error handling path
+ ax88172a: fix ax88172a_unbind() failures
+ net: dp83640: fix SIOCSCHWTIMESTAMP to update the struct with actual configuration
+ drm: sun4i: hdmi: Fix inverted HPD result
+ net: smc91x: Fix possible memory leak in smc_drv_probe()
+ bonding: check error value of register_netdevice() immediately
+ mlxsw: destroy workqueue when trap_register in mlxsw_emad_init
+ ipvs: fix the connection sync failed in some cases
+ i2c: rear: always clear ICSAR to avoid side effects
+ bonding: check return value of register_netdevice() in bond_newlink()
+ serial: exar: Fix GPIO configuration for Sealevel cards based on XR17V35X
+ scripts/decode_stacktrace: strip basepath from all paths
+ HID: i2c-hid: add Mediacom FlexBook edge13 to descriptor override
+ HID: apple: Disable Fn-key key-re-mapping on clone keyboards
+ dmaengine: tegra210-adma: Fix runtime PM imbalance on error
+ Input: add `SW_MACHINE_COVER`
+ spi: mediatek: use correct SPI_CFG2_REG MACRO
+ regmap: dev_get_regmap_match(): fix string comparison
+ hwmon: (aspeed-pwm-tacho) Avoid possible buffer overflow
+ dmaengine: ioat setting ioat timeout as module parameter
+ Input: synaptics: enable InterTouch for ThinkPad X1E 1st gen
+ usb: gadget: udc: gr_udc: fix memleak on error handling path in gr_ep_init()
+ arm64: Use test_tsk_thread_flag() for checking TIF_SINGLESTEP
+ x86: math-emu: Fix up 'cmp' insn for clang ias
+ binder: Don't use mmput() from shrinker function.
+ usb: xhci-mtk: fix the failure of bandwidth allocation
+ usb: xhci: Fix ASM2142/ASM3142 DMA addressing
+ Revert "cifs: Fix the target file was deleted when rename failed."
+ staging: wlan-ng: properly check endpoint types
- staging: comedi: addi_apci_1032: check INSN_CONFIG_DIGITAL_TRIG shift
- staging: comedi: ni_6527: fix INSN_CONFIG_DIGITAL_TRIG support
- staging: comedi: addi_apci_1500: check INSN_CONFIG_DIGITAL_TRIG shift
- staging: comedi: addi_apci_1564: check INSN_CONFIG_DIGITAL_TRIG shift
- serial: 8250: fix null-ptr-deref in serial8250_start_tx()
- serial: 8250_mtk: Fix high-speed baud rates clamping
- fbdev: Detect integer underflow at "struct fbcon_ops"->clear_margins.
- vt: Reject zero-sized screen buffer size.
- Makefile: Fix GCC_TOOLCHAIN_DIR prefix for Clang cross compilation
- mm/memcg: fix refcount error while moving and swapping
- io-mapping: indicate mapping failure
- parisc: Add atomic64_set_release() define to avoid CPU soft lockups
- ath9k: Fix regression with Atheros 9271
- fuse: fix weird page warning
- qed: suppress "don't support RoCE & iWARP" flooding on HW init
- scripts/gdb: fix lx-symbols 'gdb.error' while loading modules
- HID: alps: support devices with report id 2
- RISC-V: Upgrade smp_mb__after_spinlock() to iorw, iorw
- x86, vmlinux.lds: Page-align end of ..page_aligned sections
- ASoC: rt5670: Add new gpio1_is_ext_spk_en quirk and enable it on the Lenovo Miix 2 10

* Bionic update: upstream stable patchset 2020-07-24 (LP: #1888907)
- KVM: s390: reduce number of IO pins to 1
- spi: spi-fsl-dspi: Adding shutdown hook
- spi: spi-fsl-dspi: Fix lockup if device is removed during SPI transfer
- spi: spi-fsl-dspi: use IRQF_SHARED mode to request IRQ
- spi: spi-fsl-dspi: Fix external abort on interrupt in resume or exit paths
- ARM: dts: omap4-droid4: Fix spi configuration and increase rate
- gpu: host1x: Detach driver on unregister
- spi: spidev: fix a race between spidev_release and spidev_remove
- spi: spidev: fix a potential use-after-free in spidev_release()
- ixbge: protect ring accesses with READ- and WRITE_ONCE
- s390/kasan: fix early pgm check handler execution
- cifs: update ctime and mtime during truncate
- ARM: imx6: add missing put_device() call in imx6q_suspend_init()
- scsi: mptscsih: Fix read sense data size
- nvme-rdma: assign completion vector correctly
- x86/entry: Increase entry_stack size to a full page
- net: cxgb4: fix return error value in t4_prep_fw
- smsc95xx: check return value of smsc95xx_reset
- smsc95xx: avoid memory leak in smsc95xx_bind
- ALSA: compress: fix partial_drain completion state
- arm64: kgdb: Fix single-step exception handling oops
- nbd: Fix memory leak in nbd_add_socket
- bnxn_en: fix NULL dereference in case SR-IOV configuration fails
- net: mach: mark device wake capable when "magic-packet" property present
- mlxsw: spectrum_router: Remove inappropriate usage of WARN_ON()
* - ALSA: opl3: fix infoleak in opl3
  * - ALSA: hda - let hs_mic be picked ahead of hp_mic
  * - ALSA: usb-audio: add quirk for MacroSilicon MS2109
  * - KVM: arm64: Fix definition of PAGE_HYPDEVICE
  * - KVM: arm64: Stop clobbering x0 for HVC_SOFT_RESTART
  * - KVM: x86: bit 8 of non-leaf PDPEs is not reserved
  * - KVM: x86: Inject #GP if guest attempts to toggle CR4.LA57 in 64-bit mode
  * - KVM: x86: Mark CR4.TSD as being possibly owned by the guest
  * - btrfs: fix fatal extent_buffer readahead vs releasepage race
  * - drm/radeon: fix double free
  * - dm: use noio when sending kobject event
  * - ARC: entry: fix potential EFA clobber when TIF_SYSCALL_TRACE
  * - ARC: elf: use right ELF_ARCH
  * - s390/mm: fix huge pte soft dirty copying
  * - genetlink: remove genl_bind
  * - ipv4: fill fl4_icmp_[type,code] in ping_v4_sendmsg
  * - i2tp: remove skb_dst_set() from i2tp_xmit_skb()
  * - Iic: make sure applications use ARPHRD ETHER
  * - net: Added pointer check for dst->ops->neigh_lookup in dst_neigh_lookup_skb
  * - tcp: md5: add missing memory barriers in tcp_md5_do_add()/tcp_md5_hash_key()
  * - tcp: md5: refine tcp_md5_do_add()/tcp_md5_hash_key() barriers
  * - tcp: md5: allow changing MD5 keys in all socket states
  * - net_sched: fix a memory leak in atm_tc_init()
  * - tcp: make sure listeners don't initialize congestion-control state
  * - tcp: md5: do not send silly options in SYNCOOKIES
  * - cgrou p: fix cgrou p sk_alloc() for sk_clone_lock()
  * - cgrou p: Fix sock cgrou p_data on big-endian.
  * - drm/exynos: fix ref count leak in mic_pre_enable
  * - arm64/alternatives: use subsections for replacement sequences
  * - tpm_tis: extra chip->ops check on error path in tpm_tis_core_init
  * - gfs2: read-only mounts should grab the sd_freeze_g1 glock
  * - i2c: eg20t: Load module automatically if ID matches
  * - arm64: alternative: Use true and false for boolean values
  * - arm64/alternatives: don't patch up internal branches
  * - iio:magnetometer:ak8974: Fix alignment and data leak issues
  * - iio:humidity:hdcl00x Fix alignment and data leak issues
  * - iio: magnetometer: ak8974: Fix runtime PM imbalance on error
  * - iio: mma8452: Add missed iio_device_unregister() call in mma8452_probe()
  * - iio: pressure: zpa2326: handle pm_runtime_get_sync failure
  * - iio: pressure:ms5611 Fix buffer element alignment
  * - iio:health:afe4403 Fix timestamp alignment and prevent data leak.
  * - spi: spi-fsl-dspi: Fix lockup if device is shutdown during SPI transfer
  * - spi: fix initial SPI_SR value in spi-fsl-dspi
  * - net: dsa: bcm_sf2: Fix node reference count
  * - of: of_mdio: Correct loop scanning logic
  * - Revert "usb/ohci-platform: Fix a warning when hibernating"
  * - Revert "usb/ehci-platform: Set PM runtime as active on resume"
  * - Revert "usb/xhci-platform: Set PM runtime as active on resume"
+ mmc: sdhci: do not enable card detect interrupt for gpio cd type
+ ACPI: video: Use native backlight on Acer Aspire 5783z
+ ACPI: video: Use native backlight on Acer TravelMate 5735Z
+ iio:health:afe4404 Fix timestamp alignment and prevent data leak.
+ phy: suni-usb: fix dereference of pointer phy0 before it is null checked
+ arm64: dt: add missing gxl rng clock
+ spi: spi-sun6i: sun6i_spi_transfer_one(): fix setting of clock rate
+ usb: gadget: udc: atmel: fix uninitialized read in debug printk
+ staging: comedi: verify array index is correct before using it
+ ACPI: video: Use native backlight on Acer Aspire 5783z
+ ACPI: video: Use native backlight on Acer TravelMate 5735Z
+ iio:health:afe4404 Fix timestamp alignment and prevent data leak.
+ phy: suni-usb: fix dereference of pointer phy0 before it is null checked
+ arm64: dt: add missing gxl rng clock
+ spi: spi-sun6i: sun6i_spi_transfer_one(): fix setting of clock rate
+ usb: gadget: udc: atmel: fix uninitialized read in debug printk
+ staging: comedi: verify array index is correct before using it
+ Revert "thermal: mediatek: fix register index error"
+ ARM: dt: socfpga: Align L2 cache-controller nodename with dtschema
+ copy_xstate_to_kernel: Fix typo which caused GDB regression
+ perf stat: Zero all the 'ema' and 'run' array slot stats for interval mode
+ mtd: rawnand: brcmnand: fix CS0 layout
+ mtd: rawnand: oxnas: Keep track of registered devices
+ mtd: rawnand: oxnas: Unregister all devices on error
+ mtd: rawnand: oxnas: Release all devices in the _remove() path
+ HID: magicmouse: do not set up autorepeat
+ ALSA: line6: Perform sanity check for each URB creation
+ ALSA: usb-audio: Fix race against the error recovery URB submission
+ USB: c67x00: fix use after free in c67x00_giveback_urb
+ USB: dwc2: Fix shutdown callback in platform
+ USB: chipidea: core: add wakeup support for excon
+ USB: gadget: function: fix missing spinlock in f_uac1_legacy
+ USB: serial: iuu_phoenix: fix memory corruption
+ USB: serial: cypress_m8: enable Simply Automated UPB PIM
+ USB: serial: ch341: add new Product ID for CH340
+ USB: serial: option: add GosunCn GM500 series
+ virtio: virtio_console: add missing MODULE_DEVICE_TABLE() for rproc serial
+ fuse: Fix parameter for FS_IOC_(GET,SET)FLAGS
+ Revert "ram: convert remaining CLASS_ATTR() to CLASS_ATTR_RO()"
+ mei: bus: don't clean driver pointer
+ Input: i8042 - add Lenovo XiaoXin Air 12 to i8042 nomux list
+ uio_pdrv_genirq: fix use without device tree and no interrupt
+ timer: Fix wheel index calculation on last level
+ MIPS: Fix build for LTS kernel caused by backporting lpj adjustment
+ hwmon: (emc2103) fix unable to change fan pwm1_enable attribute
+ intel_th: pci: Add Jasper Lake CPU support
+ intel_th: pci: Add Tiger Lake PCH-H support
+ intel_th: pci: Add Emmitsburg PCH support
+ dmaengine: fsl-edma: Fix NULL pointer exception in fsl_edma_tx_handler
+ misc: atmel-ssc: lock with mutex instead of spinlock
+ thermal/drivers/cpufreq_cooling: Fix wrong frequency converted from power
+ arm64: ptrace: Override SPRR.SS when single-stepping is enabled
+ sched/fair: handle case of task_h_load() returning 0
+ libceph: don't omit recovery_deletes in target_copy()
+ - rxrpc: Fix trace string
+ - regmap: fix alignment issue
+ - i40e: protect ring accesses with READ- and WRITE_ONCE
+ - usb: dwc3: pci: Fix reference count leak in dwc3_pci_resume_work
+ - net: qrtr: Fix an out of bounds read qrtr_endpoint_post()
+ - drmmediatek: Check plane visibility in atomic_update
+ - net: lns3: fix use-after-free when doing self test
+ - cxgb4: fix all-mask IP address comparison
+ - perf: Make perf able to build with latest libbfd
+ - drm/mediatek: fix potential memleak in error branch
+ - HID: quirks: Remove ITE 8595 entry from hid_have_special_driver
+ - scsi: sr: remove references to BLK_DEV_SR_VENDOR, leave it enabled
+ - [Config] updateconfigs for BLK_DEV_SR_VENDOR
+ - ALSA: usb-audio: Create a registration quirk for Kingston HyperX Amp
  + (0951:16d8)
+ - ALSA: usb-audio: Rewrite registration quirk handling
+ - ALSA: usb-audio: Add registration quirk for Kingston HyperX Cloud Alpha S
+ - ALSA: usb-audio: Add registration quirk for Kingston HyperX Cloud Flight S
+ - regmap: debugfs: Don't sleep while atomic for fast_io regmaps
+ - HID: quirks: Always poll Obins Anne Pro 2 keyboard
+ - HID: quirks: Ignore Simply Automated UPB PIM
+ - ALSA: line6: Sync the pending work cancel at disconnection
+ - ALSA: hda/realtek - change to suitable link model for ASUS platform
+ - ALSA: hda/realtek - Enable Speaker for ASUS UX533 and UX534
+ - timer: Prevent base->clk from moving backward
+ - riscv: use 16KB kernel stack on 64-bit
+ - intel_th: Fix a NULL dereference when hub driver is not loaded
+ - genirq/affinity: Handle affinity setting on inactive interrupts correctly
+ *
+ * NFSv4.1: Interrupted connections cause high bandwidth RPC ping-pong between
  + client and server (LP: #1887607)
+ - NFSv4.1: Avoid false retries when RPC calls are interrupted
+ - NFSv4.x: Handle bad/dead sessions correctly in nfs41_sequence_process()
+ - NFS: Fix interrupted slots by sending a solo SEQUENCE operation
+ + * tap: use after free (LP: #1889735)
+ + - tap: fix use-after-free
+ *
+ + Bionic update: upstream stable patchset 2020-07-17 (LP: #1887990)
+ + - btrfs: fix a block group ref counter leak after failure to remove block
  + group
+ + - btrfs: cow_file_range() num_bytes and disk_num_bytes are same
+ + - btrfs: fix data block group relocation failure due to concurrent scrub
+ + - mm: fix swap cache node allocation mask
+ + - EDAC/amd64: Read back the scrub rate PCI register on F15h
+ + - usbnet: smsc95xx: Fix use-after-free after removal
+ + - mm/slab.c: fix corrupted freechain in deactivate_slab()
+ + - mm/slab: fix stack overruns with SLUB_STATS

Open Source Used In 5GaaS Edge AC-4 19026
- usb: usbstest: fix missing kfree(dev->buf) in usbstest_disconnect
- kgdb: Avoid suspicious RCU usage warning
- cxgb4: use unaligned conversion for fetching timestamp
- cxgb4: parse TC-U32 key values and masks natively
- hwmon: (max6697) Make sure the OVERT mask is set correctly
- hwmon: (acpi_power_meter) Fix potential memory leak in acpi_power_meter_add()
- drm: sun4i: hdmi: Remove extra HPD polling
- virtio-blk: free vblk-vqs in error path of virtblk_probe()
- i2c: algo-pca: Add 0x78 as SCL stuck low status for PCA9665
- nfsd: apply umask on fs without ACL support
- Revert "ALSA: usb-audio: Improve frames size computation"
- SMB3: Honor 'seal' flag for multiuser mounts
- SMB3: Honor persistent/resilient handle flags for multiuser mounts
- cifs: Fix the target file was deleted when rename failed.
- MIPS: Add missing EHB in mtc0 -> mfc0 sequence for DSPen
- irqchip/gic: Atomically update affinity
- dm zoned: assign max_io_len correctly
- [Config] updateconfigs for EFI_CUSTOM_SSDT_OVERLAYS
- efi: Make it possible to disable efivar_ssdtt entirely
- s390/debug: avoid kernel warning on too large number of pages
- cxgb4: use correct type for all-mask IP address comparison
- SMB3: Honor lease disabling for multiuser mounts

* Enable Quectel EG95 LTE modem [2c7c:0195]  (LP: #1886744)
- net: usb: qmi_wwan: add support for Quectel EG95 LTE modem
- USB: serial: option: add Quectel EG95 LTE modem

* kernel oops xr-usb-serial (LP: #1885271)
- SAUCE: Revert "xr-usb-serial: fix kbuild"
- SAUCE: Revert "xr-usb-serial: Changes to support updates in struct gpio_chip"
- SAUCE: Revert "xr-usb-serial: re-initialise baudrate after resume from S3/S4"
- SAUCE: Revert "xr-usb-serial: Update driver for Exar USB serial ports"

* [hns3-0115] add 8 BD limit for tx flow  (LP: #1859756)
- net: hns3: add 8 BD limit for tx flow
- net: hns3: avoid mult + div op in critical data path
- net: hns3: remove some ops in struct hns3_nic_ops
- net: hns3: fix for not calculating tx bd num correctly
- net: hns3: unify maybe_stop_tx for TSO and non-TSO case
- net: hns3: add check for max TX BD num for tso and non-tso case
- net: hns3: fix for TX queue not restarted problem
- net: hns3: fix a use after free problem in hns3_nic_maybe_stop_tx()

* Regression in kernel 4.15.0-91 causes kernel panic with Bcache
  (LP: #1867916)
+ - bcache: check and adjust logical block size for backing devices
+ * use-after-free in af_alg_accept() due to bh_lock_sock() (LP: #1884766)
+ - crypto: af_alg - fix use-after-free in af_alg_accept() due to bh_lock_sock()
+ * Bionic update: upstream stable patchset 2020-07-15 (LP: #1887715)
+ - net: be more gentle about silly gso requests coming from user
+ - block/bio-integrity: don't free 'buf' if bio_integrity_add_page() failed
+ - net: sched: export __netdev_watchdog_up()
+ - fix a braino in "sparc32: fix register window handling in
+ genregs32_[gs]et()"
+ - apparmor: don't try to replace stale label in ptraceme check
+ - ibmveth: Fix max MTU limit
+ - mld: fix memory leak in ipv6_mc_destroy_dev()
+ - net: bridge: enforce alignment for ethernet address
+ - net: fix memleak in register_netdevice()
+ - net: usb: ax88179_178a: fix packet alignment padding
+ - rocker: fix incorrect error handling in dna_rings_init
+ - rxrpc: Fix notification call on completion of discarded calls
+ - scpt: Don't advertise IPv4 addresses if ipv6only is set on the socket
+ - tcp: grow window for OOO packets only for SACK flows
+ - tg3: driver sleeps indefinitely when EEH errors exceed eeh_max_freezes
+ - ip_tunnel: fix use-after-free in ip_tunnel_lookup()
+ - tcp_cubic: fix spurious HYSTART_DELAY exit upon drop in min RTT
+ - ip6_gre: fix use-after-free in ip6gre_tunnel_lookup()
+ - net: Fix the arp error in some cases
+ - net: Do not clear the sock TX queue in sk_set_socket()
+ - net: core: reduce recursion limit value
+ - USB: ohci-sm501: Add missed iounmap() in remove
+ - usb: dwc2: Postponed gadget registration to the udc class driver
+ - usb: add USB_QUIRK_DELAY_INIT for Logitech C922
+ - USB: ehci: reopen solution for Synopsys HC bug
+ - usb: host: xhci-mtk: avoid runtime suspend when removing hcd
+ - usb: host: elci-exynos: Fix error check in exynos_ehci_probe()
+ - ALSA: usb-audio: add quirk for Denon DCD-1500RE
+ - xhci: Fix incorrect EP_STATE_MASK
+ - xhci: Fix enumeration issue when setting max packet size for FS devices.
+ - cdc-acm: Add DISABLE_ECHO quirk for Microchip/SMSC chip
+ - loop: replace kill_bdev with invalidate_bdev
+ - ALSA: usb-audio: Clean up mixer element list traverse
+ - ALSA: usb-audio: Fix OOB access of mixer element list
+ - xhci: Poll for U0 after disabling USB2 LPM
+ - cifs/smb3: Fix data inconsistent when punch hole
+ - cifs/smb3: Fix data inconsistent when zero file range
+ - efi/esrst: Fix reference count leak in esre_create_sysfs_entry.
+ - ARM: dts: NSP: Correct FA2 mailbox node
+ - rxrpc: Fix handling of rwind from an ACK packet
+ - RDMA/cma: Protect bind_list and listen_list while finding matching cm id
+ ASoC: rockchip: Fix a reference count leak.
+ RDMA/mad: Fix possible memory leak in ib_mad_post_receive_mads()
+ net: qed: fix left elements count calculation
+ net: qed: fix NVMe login fails over VFs
+ net: qed: fix excessive QM ILT lines consumption
+ ARM: imx5: add missing put_device() call in imx_suspend_alloc_ocram()
+ usb: gadget: udc: Potential Oops in error handling code
+ netfilter: ipset: fix unaligned atomic access
+ net: bcmgenet: use hardware padding of runt frames
+ sched/core: Fix PI boosting between RT and DEADLINE tasks
+ ata/libata: Fix usage of page address by page_address in
+ ata_scsi_mode_select_xlat function
+ net: alx: fix race condition in alx_remove
+ s390/ptrace: fix setting syscall number
+ kbuild: improve cc-option to clean up all temporary files
+ blktrace: break out of blktrace setup on concurrent calls
+ ALSA: hda: Add NVIDIA codec IDs 9a & 9d through a0 to patch table
+ ACPI: sysfs: Fix pm_profile_attr type
+ KVM: X86: Fix MSR range of APIC registers in X2APIC mode
+ KVM: nVMX: Plumb L2 GPA through to PML emulation
+ btrfs: fix failure of RWF_NOWAIT write into prealloc extent beyond eof
+ mm/slab: use memzero_explicit() in kzfree()
+ ocfs2: load global_inode_alloc
+ ocfs2: fix value of OCFS2_INVALID_SLOT
+ ocfs2: fix panic on nfs server over ocfs2
+ arm64: perf: Report the PC value in REGS_ABI_32 mode
+ tracing: Fix event trigger to accept redundant spaces
+ drm/radeon: fix fb_div check in ni_init_smc_splll_table()
+ Staging: rtl8723bs: prevent buffer overflow in update_sta_support_rate()
+ sunrpc: fixed rollback in rpc_gssd_dummy_populate()
+ SUNRPC: Properly set the @subbuf parameter of xdr_buf_subsegment()
+ pNFS/flexfiles: Fix list corruption if the mirror count changes
+ NFSv4 fix CLOSE not waiting for direct IO completion
+ xfs: add agf freeblocks verify in xfs_agf_verify
+ net: bcmgenet: remove HFB_CTRL access
+ EDAC/amd64: Add Family 17h Model 30h PCI IDs
+ i2c: tegra: Cleanup kerneldoc comments
+ i2c: tegra: Add missing kerneldoc for some fields
+ net: phy: Check harder for errors in get_phy_id()
+ ALSA: usb-audio: add quirk for Samsung USBC Headset (AKG)
+ scsi: zfcp: Fix panic on ERP timeout for previously dismissed ERP action
+ xhci: Return if xHCI doesn't support LPM
+ IB/mad: Fix use after free when destroying MAD agent
+ regmap: Fix memory leak from regmap_register_patch
+ RDMA/qedr: Fix KASAN: use-after-free in ucma_event_handler+0x532
+ cxgb4: move handling L2T ARP failures to caller
+ sched/deadline: Initialize ->dl_boosted
+ s390/vdso: fix vDSO clock_getres()
+ - arm64: sve: Fix build failure when ARM64_SVE=y and SYSCTL=n
+ - ALSA: hda/realtek - Add quirk for MSI GE63 laptop
+ * Bionic update: upstream stable patchset 2020-07-07 (LP: #1886710)
+ - s390: fix syscall_get_error for compat processes
+ - drm/f915: Whitelist context-local timestamp in the gen9 cmdparser
+ - power: supply: bq24257_charger: Replace depends on REGMAP_I2C with select
+ - clk: sunxi: Fix incorrect usage of round_down()
+ - i2c: piiix4: Detect secondary SMBus controller on AMD AM4 chipsets
+ - iio: pressure: bmp280: Tolerate IRQ before registering
+ - remoteproc: Fix IDR initialisation in rproc_alloc()
+ - clk: qcom: msm8916: Fix the address location of pll->config_reg
+ - backlight: lp855x: Ensure regulators are disabled on probe failure
+ - ASoC: davinci-mcasp: Fix dma_chan refcnt leak when getting dma type
+ - ARM: integrator: Add some Kconfig selections
+ - scsi: qedii: Check for buffer overflow in qedii_set_path()
+ - ALSA: isa/wavefront: prevent out of bounds write in ioctl
+ - scsi: qla2xxx: Fix issue with adapter's stopping state
+ - iio: bmp280: fix compensation of humidity
+ - i2fs: report delalloc reserve as non-free in stats for project quota
+ - i2c: pxa: clear all master action bits in i2c_pxa_stop_message()
+ - usbip: poison URBs upon disconnect
+ - dm mpath: switch paths in dm_blk_ioctl() code path
+ - PCI: aardvark: Don't blindly enable ASPM L0s and don't write to read-only register
+ - ps3disk: use the default segment boundary
+ - vfio/pci: fix memory leaks in alloc_perm_bits()
+ - m68k/PCI: Fix a memory leak in an error handling path
+ - mfd: wm8994: Fix driver operation if loaded as modules
+ - scsi: lpfc: Fix lpfc_nodelist leak when processing unsolicited event
+ - clk: clk-flexgen: fix clock-critical handling
+ - powerpc/perf/hv-24x7: Fix inconsistent output values incase multiple hv-24x7 events run
+ - nfsd: Fix svc_xprt refcnt leak when setup callback client failed
+ - powerpc/crashkernel: Take "mem=" option into account
+ - yam: fix possible memory leak in yam_init_driver
+ - NTB: Fix the default port and peer numbers for legacy drivers
+ - mksysmap: Fix the mismatch of `.L` symbols in System.map
+ - apparmor: fix introspection of of task mode for unconfined tasks
+ - scsi: sr: Fix sr_probe() missing deallocate of device minor
+ - scsi: ibmvs慈悲: Don't send host info in adapter info MAD after LPM
+ - staging: greymbus: fix a missing-check bug in gb_lights_light_config()
+ - scsi: qedi: Do not flush ofload work if ARP not resolved
+ - ALSA: usb-audio: Improve frames size computation
+ - s390/qdio: put thinit indicator after early error
+ - thermal/drivers/ti-soc-thermal: Avoid dereferencing ERR_PTR
+ - staging: sm750fb: add missing case while setting FB_VISUAL
+ - i2c: pxa: fix i2c_pxa_scream_blue_murder() debug output
- serial: amba-pl011: Make sure we initialize the port.lock spinlock
- drivers: base: Fix NULL pointer exception in __platform_driver_probe() if a driver developer is foolish
- PCI: rcar: Fix incorrect programming of OB windows
- PCI/ASPM: Allow ASPM on links to PCIe-to-PCI/PCI-X Bridges
- scsi: qla2xxx: Fix warning after FC target reset
- power: supply: lp8788: Fix an error handling path in 'lp8788_charger_probe()'
- power: supply: smb347-charger: IRQSTAT_D is volatile
- scsi: mpt3sas: Fix double free warnings
- dlm: remove BUG() before panic()
- clk: ti: composite: fix memory leak
- PCI: Fix pci_register_host_bridge() device_register() error handling
- tty: n_gsm: Fix SOF skipping
- tty: n_gsm: Fix waking up upper tty layer when room available
- powerpc/pseries/ras: Fix FWNMI_VALID off by one
- powerpc/pseries: Fix double free warnings
- pci: register_host_bridge() device_register() error handling
- clk: bcm2835: Fix return type of bcm2835_register_gate
- PCI/PTM: Inherit Switch Downstream Port PTM settings from Upstream Port
- watchdog: da9062: No need to ping manually before setting timeout
- USB: gadget: move gadget resume after the core is in L0 state
- USB: gadget: udc: s3c2410_udc: Remove pointless NULL check in s3c2410_udc_nuke
- USB: gadget: lpc32xx_udc: don't dereference ep pointer before null check
- USB: gadget: fix potential double-free in m66592_probe.
- USB: gadget: Fix issue with config_ep_by_speed function
- x86/apic: Make TSC deadline timer detection message visible
- clk: bcm2835: Fix return type of bcm2835_register_gate
- scsi: ufs-qcom: Fix scheduling while atomic issue
- net: sunrpc: Fix off-by-one issues in 'rpc_ntop6'
- NFSv4.1 fix rpc_call_done assignment for BINDCONN_TO_SESSION
- powerpc/4xx: Don't unmmap NULL mbase
- extcon: adc-jack: Fix an error handling path in 'adc_jack_probe()'
- ASoC: fsl_asrc_dma: Fix dma_chan leak when config DMA channel failed
- vfio/mdev: Fix reference count leak in add_mdev_supported_type
- openrisc: Fix issue with argument clobbering for clone/fork
- gfs2: Allow lock_nolock mount to specify jid=X
- scsi: iscsi: Fix reference count leak in iscsi_boot_create_kobj
- scsi: ufs: Don't update urgent bkops level when toggling auto bkops
- pinctrl: imx1: Fix an error handling path in 'imx1_pinctrl_core_probe()'

Open Source Used in 5GaaS Edge AC-4 19031
+ pinctrl: freescale: imx: Fix an error handling path in 'imx_pinctrl_probe()'  
+ crypto: omap-sham - add proper load balancing support for multicore  
+ geneve: change from tx_error to tx_dropped on missing metadata  
+ lib/zlib: remove outdated and incorrect pre-increment optimization  
+ include/linux/bitops.h: avoid clang shift-count-overflow warnings  
+ elfnote: mark all .note sections SHF_ALLOC  
+ selftests/vm/pkeys: fix alloc_random_pkey() to make it really random  
+ blktrace: use errno instead of bi_status  
+ blktrace: fix endianness in get_pdu_int()  
+ blktrace: fix endianness for blk_log_remap()  
+ gfs2: fix use-after-free on transaction ail lists  
+ selftests/net: in timestamping, strncpy needs to preserve null byte  
+ drm/sun4i: hdmi ddc clk: Fix size of m divider  
+ scsi: acornscsi: Fix an error handling path in acornscsi_probe()  
+ usb/xhci-plat: Set PM runtime as active on resume  
+ usb/ehci-platform: Set PM runtime as active on resume  
+ perf report: Fix NULL pointer dereference in  
+ hists__fprintf_nr_sample_events()  
+ bcache: fix potential deadlock problem in btree_gc_coalesce  
+ block: Fix use-after-free in blkdev_get()  
+ arm64: hw_breakpoint: Don't invoke overflow handler on uaccess watchpoints  
+ drm: encoder_slave: fix refcounting error for modules  
+ drm/dp_mst: Reformat drm_dp_check_act_status() a bit  
+ drm/qxl: Use correct notify port address when creating cursor ring  
+ selinux: fix double free  
+ ext4: fix partial cluster initialization when splitting extent  
+ drm/dp_mst: Increase ACT retry timeout to 3s  
+ x86/boot/compressed: Relax sed symbol type regex for LLVM ld.lld  
+ block: nr_sects_write(): Disable preemption on seqcount write  
+ mtd: rawnand: Pass a nand_chip object to nand_release()  
+ mtd: rawnand: diskonchip: Fix the probe error path  
+ mtd: rawnand: sharpsl: Fix the probe error path  
+ mtd: rawnand: xway: Fix the probe error path  
+ mtd: rawnand: orion: Fix the probe error path  
+ mtd: rawnand: oxnas: Add of_node_put()  
+ mtd: rawnand: oxnas: Fix the probe error path  
+ mtd: rawnand: socrates: Fix the probe error path  
+ mtd: rawnand: plat_nand: Fix the probe error path  
+ mtd: rawnand: mtk: Fix the probe error path  
+ mtd: rawnand: tmio: Fix the probe error path  
+ crypto: algif_skcipher - Cap recv SG list at ctx->used  
+ crypto: algboss - don't wait during notifier callback  
+ kprobes: Fix to protect kick_kprobe_optimizer() by kprobe_mutex  
+ e1000e: Do not wake up the system via WOL if device wakeup is disabled  
+ kretprobe: Prevent triggering kretprobe from within kprobe_flush_task  
+ sched/drt, net: Use CONFIG_PREAMPTION.patch  
+ net: core: device_rename: Use rwsem instead of a seqcount  
+ kvm: x86: Move kvm_set_mmio_spte_mask() from x86.c to mmu.c
+ - kvm: x86: Fix reserved bits related calculation errors caused by MKTME
+ - KVM: x86/mmu: Set mmio_value to '0' if reserved #PF can't be generated
+ - ASoC: tegra: tegra_wm8903: Support nvidia, headset property
+ - PCI: Allow pci_resize_resource() for devices on root bus
+ - clk: samsung: Mark top ISP and CAM clocks on Exynos542x as critical
+ - serial: 8250: Fix max baud limit in generic 8250 port
+ - gpio: dwapb: Call acpi_gpiochip_free_interrupts() on GPIO chip de-registration
+ - pwm: pm: Call pm_runtime_put() in pm_runtime_get_sync() failed case
+ - x86/purgatory: Disable various profiling and sanitizing options
+ - arm64: dt: mt8173: fix unit name warnings
+ - gpio: dwapb: Append MODULE_ALIAS for platform driver
+ - pinctrl: rza1: Fix wrong array assignment of rza11_swio_entries
+ - ALSA: usb-audio: Fix racy list management in output queue
+ - PCI: v3-semi: Fix a memory leak in v3_pci_probe() error handling paths
+ - pinctrl: rockchip: fix memleak in rockchip_dt_node_to_map
+ - powerpc/64: Don't initialise init_task->thread.regs
+ - HID: Add quirks for Trust Panora Graphic Tablet
+ - RDMA/iw_cxgb4: cleanup device debugfs entries on ULD remove
+ - ASoC: fix incomplete error-handling in img_i2s_in_probe.
+ - of: Fix a refcounting bug in __of_attach_node_sysfs()
+ - NTB: Revert the change to use the NTB device dev for DMA allocations
+ - drivers/perf: hisi: Fix wrong value for all counters enable
+ - x86/idt: Keep spurious entries unset in system_vectors
+ - usb: host: ehci-platform: add a quirk to avoid stuck
+ - afs: Fix non-setting of mtime when writing into mmap
+ - afs: afs_write_end() should change i_size under the right lock
+ - drm/amdgpu: Replace invalid device ID with a valid device ID
+ - ext4: avoid race conditions when remounting with options that change dax
+ - net: octeon: mgmt: Repair filling of RX ring
+ - Revert "dpaa_eth: fix usage as DSA master, try 3"

* Computer is frozen after suspend (LP: #1867983) // Bionic update: upstream
  * stable patchset 2020-07-07 (LP: #1886710)
  * libata: Use per port sync for detach
  * The thread level parallelism would be a bottleneck when searching for the
    shared pmd by using hugetlbfs (LP: #1882039)
  * hugetlbfs: take read_lock on i_mmap for PMD sharing

* Bionic update: upstream stable patchset 2020-06-25 (LP: #1885176)
  * ipv6: fix IPV6_ADDRFORM operation logic
  * vxlan: Avoid infinite loop when suppressing NS messages with invalid options
  * make 'user_access_begin()' do 'access_ok()'
  * Fix 'access_ok()' on alpha and SH
  * arch/openrisc: Fix issues with access_ok()
  * x86: uaccess: Inhibit speculation past access_ok() in user_access_begin()
  * lib: Reduce user_access_begin() boundaries in strncpy_from_user() and
+  strnlen_user()
+  - serial: imx: Fix handling of TC irq in combination with DMA
+  - crypto: talitos - fix ECB and CBC algs ivsize
+  - ARM: 8977/1: ptrace: Fix mask for thumb breakpoint hook
+  - sched/fair: Don't NUMA balance for kthreads
+  - Input: synaptics - add a second working PNP_ID for Lenovo T470s
+  - drivers/net/ibmvnic: Update VNIC protocol version reporting
+  - powerpc/xive: Clear the page tables for the ESB IO mapping
+  - ath9k_htc: Silence undersized packet warnings
+  - perf probe: Accept the instance number of kretprobe event
+  - mm: add kvfree_sensitive() for freeing sensitive data objects
+  - x86_64: Fix jiffies ODR violation
+  - x86/PCI: Mark Intel C620 MROMs as having non-compliant BARs
+  - x86/speculation: Prevent rogue cross-process SSBD shutdown
+  - x86/reboot/quirks: Add MacBook6,1 reboot quirk
+  - efi/efivars: Add missing kobject_put() in sysfs entry creation error path
+  - ALSA: es1688: Add the missed snd_card_free()
+  - ALSA: hda/realtek - add a pintbl quirk for several Lenovo machines
+  - ALSA: usb-audio: Fix inconsistent card PM state after resume
+  - ACPI: sysfs: Fix reference count leak in acpi_sysfs_add_hotplug_profile()
+  - ACPI: CPPC: Fix reference count leak in acpi_cppc_processor_probe()
+  - ACPI: GED: add support for _Exx / _Lxx handler methods
+  - ACPI: PM: Avoid using power resources if there are none for D0
+  - cgroup, blkcg: Prepare some symbols for module and !CONFIG_CGROUP usages
+  - nilfs2: fix null pointer dereference at nilfs_sector_do_construct()
+  - spi: bcm2835aux: Fix controller unregister order
+  - spi: bcm-qspi: when tx/rx buffer is NULL set to 0
+  - crypto: cavium/nitrox - Fix 'nitrox_get_first_device()' when ndevlist is
+    fully iterated
+  - ALSA: pcm: disallow linking stream to itself
+  - kvm: x86: Fix L1TF mitigation for shadow MMU
+  - KVM: x86/mmu: Consolidate "is MMIO SPTE" code
+  - KVM: x86: only do L1TF workaround on affected processors
+  - x86/speculation: Avoid force-disabling IBPB based on STIBP and enhanced
+    IBRS.
+  - x86/speculation: PR_SPEC_FORCE_DISABLE enforcement for indirect branches.
+  - spi: dw: Fix controller unregister order
+  - spi: No need to assign dummy value in spi_unregister_controller()
+  - spi: x86: Fix controller unregister order
+  - spi: pxa2xx: Fix controller unregister order
+  - spi: bcm2835: Fix controller unregister order
+  - crypto: virtio: Fix use-after-free in virtio_crypto_skcipher_finalize_req()
+  - crypto: virtio: Fix src/dst scatterlist calculation in
+    __virtio_crypto_skcipher_do_req()
+  - crypto: virtio: Fix dest length calculation in
+    __virtio_crypto_skcipher_do_req()
+  - selftests/net: in rxtimestamp getopt_long needs terminating null entry
+  - ovl: initialize error in ovl_copy_xattr
+ proc: Use new_inode not new_inode_pseudo
+ video: fbdev: w100fb: Fix a potential double free.
+ KVM: nSVM: fix condition for filtering async PF
+ KVM: nSVM: leave ASID aside in copy_vmbcb_control_area
+ KVM: nVMX: Consult only the "basic" exit reason when routing nested exit
+ KVM: MIPS: Define KVM_ENTRYHI_ASID to cpu_asid_mask(&boot_cpu_data)
+ KVM: MIPS: Fix VPN2_MASK definition for variable cpu_vmbits
+ KVM: arm64: Make vcpu_cp1x() work on Big Endian hosts
+ ath9k: Fix use-after-free Read in ath9k_wmi_ctrl_rx
+ ath9k: Fix use-after-free Write in ath9k_hctc_rx_msg
+ ath9x: Fix stack-out-of-bounds Write in ath9k_hif_usb_rx_cb
+ ath9k: Fix general protection fault in ath9k_hif_usb_rx_cb
+ Smack: slab-out-of-bounds in vsscanf
+ mm/slub: fix a memory leak in sysfs_slab_add()
+ fat: don't allow to mount if the FAT length == 0
+ perf: Add cond_resched() to task_function_call()
+ app/intel: Reinforce the barrier after GTT updates
+ mmc: sdhci-msm: Clear tuning done flag while hs400 tuning
+ mmc: sdio: Fix potential NULL pointer error in mmc_sdio_init_card()
+ can: kvaser_usb: kvaser_usb_leaf: Fix some info-leaks to USB devices
+ xen/pcalls-back: test for errors when calling backend_connect()
+ ACPI: GED: use correct trigger type field in _Exx / _Lxx handling
+ drm: bridge: adv7511: Extend list of audio sample rates
+ crypto: ccp -- don't "select" CONFIG_DMADEVICES
+ media: si2157: Better check for running tuner in init
+ objtool: Ignore empty alternatives
+ spi: pxa2xx: Apply CS clk quirk to BXT
+ net: ena: fix error returning in ena_com_get_hash_function()
+ spi: dw: Zero DMA Tx and Rx configurations on stack
+ ixgbe: Fix XDP redirect on archs with PAGE_SIZE above 4K
+ MIPS: Loongson: Build ATI Radeon GPU driver as module
+ Bluetooth: Add SCO fallback for invalid LMP parameters error
+ kgdb: Prevent infinite recursive entries to the debugger
+ spi: dw: Enable interrupts in accordance with DMA xfer mode
+ clocksource: dw_apb_timer: Make CPU-affiliation being optional
+ clocksource: dw_apb_timer_of: Fix missing clockevent timers
+ btfs: do not ignore error from btfs_next_leaf() when inserting checksums
+ ARM: 8978/1: mm: make act_mmm() respect THREAD_SIZE
+ spi: dw: Fix Rx-only DMA transfers
+ x86/kvm/hyper-v: Explicitly align hcall param for kvm_hyperv_exit
+ net: vmxnet3: fix possible buffer overflow caused by bad DMA value in
   vmxnet3_get_rss()
+ staging: android: ion: use vmap instead of vm_map_ram
+ brcmfmac: fix wrong location to get firmware feature
+ tools api fs: Make xxx__mountpoint() more scalable
+ e1000: Distribute switch variables for initialization
+ dt-bindings: display: mediatek: control dpi pins mode to avoid leakage
+ audit: fix a net reference leak in audit_send_reply()
+ - media: dvb: return -EREMOTEIO on i2c transfer failure.
+ - media: platform: fcp: Set appropriate DMA parameters
+ - MIPS: Make sparse_init() using top-down allocation
+ - audit: fix a net reference leak in audit_list_rules_send()
+ - netfilter: nft_nat: return EOPNOTSUPP if type or flags are not supported
+ - net: bcmgenet: set Rx mode before starting netif
+ - lib/mpi: Fix 64-bit MIPS build with Clang
+ - exit: Move preemption fixup up, move blocking operations down
+ - net: lpc_mii_init(): fix error return code in lpc_mii_init()
+ - media: cec: silence shift wrapping warning in __cec_s_log_addrs()
+ - net: allwinner: Fix use correct return type for ndo_start_xmit()
+ - powerpc/spufs: fix copy_to_user while atomic
+ - Crypto/chcr: fix for ccm(aes) failed test
+ - MIPS: Truncate link address into 32bit for 32bit kernel
+ - mips: cm: Fix an invalid error code of INTVN_*_ERR
+ - kgdb: Fix spurious true from in_dbg_master()
+ - nvme: refine the Qemu Identify CNS quirk
+ - wcn36xx: Fix error handling path in `wcn36xx_probe()`
+ - net: qed*: Reduce RX and TX default ring count when running inside kdump
+ - md: don't flush workqueue unconditionally in md_open
+ - rtlwifi: Fix a double free in _rtl_usb_tx_urb_setup()
+ - mwifiex: Fix memory corruption in dump_station
+ - x86/boot: Correct relocation destination on old linkers
+ - mips: MAAR: Use more precise address mask
+ - mips: Add udelay lpj numbers adjustment
+ - x86/mm: Stop printing BRK addresses
+ - m68k: mac: Don't call via_flush_cache() on Mac IIfx
+ - macvlan: Skip loopback packets in RX handler
+ - PCI: Don't disable decoding when mmio_always_on is set
+ - MIPS: Fix IRQ tracing when call handle_fpe() and handle_msa_fpe()
+ - mmc: sdhci-msm: Set SDHCI_QUIRK_MULTIBLOCK_READ_ACMD12 quirk
+ - staging: greybus: sdio: Respect the cmd->busy_timeout from the mmc core
+ - mmc: via-sdm mmc: Respect the cmd->busy_timeout from the mmc core
+ - ixgbe: fix signed-integer-overflow warning
+ - mmc: sdhci-qed-android: add the mask for tuning start point
+ - spi: dw: Return any value retrieved from the dma_transfer callback
+ - cpuidle: Fix three reference count leaks
+ - platform/x86: hp-wmi: Convert simple_strtoul() to kstrtou32()
+ - string: h: fix incompatibility between FORTIFY_SOURCE and KASAN
+ - btrfs: send: emit file capabilities after chown
+ - mm: thp: make the THP mapcount atomic against __split_huge_pmd_locked()
+ - ima: Fix ima digest hash table key calculation
+ - ima: Directly assign the ima_default_policy pointer to ima_rules
+ - evm: Fix possible memory leak in evm_cale_hmac_or_hash()
+ - ext4: fix EXT_MAX_EXTENT/INDEX to check for zeroed eh_max
+ - ext4: fix error pointer dereference
+ - ext4: fix race between ext4_sync_parent() and rename()
+ - PCI: Add ACS quirk for iProc PAXB
+ - PCI: Add ACS quirk for Ampere root ports
+ - PCI: Make ACS quirk implementations more uniform
+ - vga_switcheroo: Deduplicate power state tracking
+ - vga_switcheroo: Use device link for HDA controller
+ - PCI: Generalize multi-function power dependency device links
+ - PCI: Add ACS quirk for Intel Root Complex Integrated Endpoints
+ - PCI: Unify ACS quirk desired vs provided checking
+ - btrfs: fix error handling when submitting direct I/O bio
+ - btrfs: fix wrong file range cleanup after an error filling dealloc range
+ - blk-mq: move _blk_mq_update_nr_hw_queues synchronize_rcu call
+ - PCI: Program MPS for RCI EP devices
+ - e1000e: Relax condition to trigger reset for ME workaround
+ - carl9170: remove P2P_GO support
+ - media: go7007: fix a miss of snd_card_free
+ - b43legacy: Fix case where channel status is corrupted
+ - b43: Fix connection problem with WPA3
+ - b43_legacy: Fix connection problem with WPA3
+ - media: ov5640: fix use of destroyed mutex
+ - igb: Report speed and duplex as unknown when device is runtime suspended
+ - power: vexpress: add suppress_bind_atr es to true
+ - pinctrl: samsung: Save/restore eint_mask over suspend for EINT_TYPE GPIOs
+ - sparc32: fix register window handling in genregs32_[gs]get()
+ - sparc64: fix misuses of access_process_vm() in genregs32_[sg]get()
+ - dm crypt: avoid truncating the logical block size
+ - kernel/cpu_pm: Fix uninit ted local in cpu_pm
+ - ARM: tegra: Correct PL310 Auxiliary Control Register initialization
+ - drivers/macintosh: Fix memleak in windfarm_pm112 driver
+ - powerpc/64s: Don't let DT CPU features set FSCR_DSCR
+ - powerpc/64s: Save FSCR to init_task.thread.fsc r after feature init
+ - kbuild: force to build vmlinux if CONFIG_MODVERSION=y
+ - sunrpc: svcauth_gss_register_pseudoflavor must reject duplicate
registrations.
+ - sunrpc: clean up properly in gss_mech_unregister()
+ - mtd: rawnand: brcmmand: fix hamming oob layout
+ - mtd: rawnand: pasemi: Fix the probe error path
+ - w1: omap-hdq: cleanup to add missing newline for some dev_dbg
+ - perf probe: Do not show the skipped events
+ - perf probe: Fix to check blacklist address correctly
+ - perf symbols: Fix debuginfo search for Ubuntu
+ - bridge: Avoid infinite loop when suppressing NS messages with invalid
options
+ - tun: correct header offsets in napi frags mode
+ - Input: mms114 - fix handling of mms3451
+ - x86/cpu/amd: Make erratum #1054 a legacy erratum
+ - ALSA: usb-audio: Add vendor, product and profile name for HP Thunderbolt
Dock
+ - PM: runtime: clk: Fix clk_pm_runtime_get() error path
+    - net: atlantic: make hw_get_regs optional
+    - efi/libstub/x86: Work around LLVM ELF quirk build regression
+    - mmcx: meson-mx-sdio: trigger a soft reset after a timeout or CRC error
+    - Bluetooth: btbcm: Add 2 missing models to subver tables
+    - sched/core: Fix illegal RCU from offline CPUs
+    - drivers/perf: hisi: Fix typo in events attribute array
+    - xfs: reset buffer write failure state on successful completion
+    - net/mlx5e: IPoIB, Drop multicast packets that this interface sent
+    - crypto: stm32/crc32 - fix ext4 chksum BUG_ON()
+    - crypto: stm32/crc32 - fix multi-instance
+    - btrfs: qgroup: mark qgroup inconsistent if we're inheriting snapshot to a new
+    - qgroup
+    - bcache: fix refcount underflow in bcache_device_free()
+    - PCI: Avoid Pericom USB controller OHCI/EHCI PME# defect
+    - PCI: Remove unused NFP32xx IDs
+    - PCI: add USR vendor id and use it in r8169 and w6692 driver
+    - PCI: Move Rohm Vendor ID to generic list
+    - misc: pci_endpoint_test: Add the layerscape EP device support
+    - misc: pci_endpoint_test: Add support to test PCI EP in AM654x
+    - x86/amd_nb: Add PCI device IDs for family 17h, model 70h
+    - ALSA: lx6464es - add support for LX6464ESPCI express variant
+    - PCI: Add Genesys Logic, Inc. Vendor ID
+    - PCI: Add Amazon's Annapurna Labs vendor ID
+    - x86/amd_nb: Add Family 19h PCI IDs
+    - PCI: Add Loongson vendor ID
+    - serial: 8250_pci: Move Pericom IDs to pci_ids.h
+    - alpha: fix memory barriers so that they conform to the specification
+    - perf probe: Check address correctness by map instead of _etext
+    - Bionic update: upstream stable patchset 2020-06-12 (LP: #1883314)
+    - libnvdimm: Fix endian conversion issues
+    - spi: dw: use "smp_mb()" to avoid sending spi data error
+    - s390/ftrace: save traced function caller
+    - ARC: Fix ICCM & DCCM runtime size checks
+    - ARC: [plat-eznps]: Restrict to CONFIG_ISA_ARCOMPACT
+    - i2c: altera: Fix race between xfer_msg and isr thread
+    - x86/mmiotrace: Use cpumask_available() for cpumask_var_t variables
+    - net: bmac: Fix read of MAC address from ROM
+    - ethernet/freescale: rework quiesce/activate for ucc_geth
+    - net: ethernet: stmmac: Enable interface clocks on probe for IPQ806x
+    - net: smsc911x: Fix runtime PM imbalance on error
+    - HID: sony: Fix for broken buttons on DS3 USB dongles
+    - HID: i2c-hid: add Schneider SCL142ALM to descriptor override
+    - p54usb: add AirVasT USB stick device-id
+    - mmc: fix compilation of user API
+    - scsi: ufs: Release clock if DMA map fails
+    - airo: Fix read overflows sending packets
+ - devinet: fix memleak in inetdev_init()
+ - l2tp: do not use inet_hash()/inet_unhash()
+ - net: usb: qmi_wwan: add Telit LE910C1-EUX composition
+ - NFC: st21nfca: add missed kfree_skb() in an error path
+ - vsock: fix timeout in vsock_accept()
+ - net: check untrusted gso_size at kernel entry
+ - l2tp: add sk_family checks to l2tp_validate_socket
+ - USB: serial: qcserial: add DW5816e QDL support
+ - USB: serial: usb_wwan: do not resubmit rx urb on fatal errors
+ - USB: serial: option: add Telit LE910C1-EUX compositions
+ - usb: musb: start session in resume for host port
+ - usb: musb: Fix runtime PM imbalance on error
+ - vt: keyboard: avoid signed integer overflow in k_ascii
+ - tty: hvc_console, fix crashes on parallel open/close
+ - staging: rtl8712: Fix IEEE80211_ADDDBA_PARAM_BUF_SIZE MASK
+ - CDC-ACM: heed quirk also in error handling
+ - nvmem: qfprom: remove incorrect write support
+ - iio: vcnl4000: Fix i2c swapped word reading.
+ - uprobes: ensure that uprobe->offset and ->ref_cctr_offset are properly aligned
+ - drm/i915: fix port checks for MST support on gen >= 11
+ - s390/mm: fix set_huge_pte_at() for empty ptes

+ * Bionic update: upstream stable patchset 2020-06-11 (LP: #1883167)
  + - ax25: fix setsockopt(SO_BINDTODEVICE)
  + - net: ipip: fix wrong address family in init error path
  + - net/mlx5: Add command entry handling completion
  + - net: revert "net: get rid of an signed integer overflow in ip_idsents_reserve()"
  + - net sched: fix reporting the first-time use timestamp
  + - r8152: support additional Microsoft Surface Ethernet Adapter variant
  + - scpt: Start shutdown on association restart if in SHUTDOWN-SENT state and socket is closed
  + - mlx5e: Update netdev txq on completions during closure
  + - net: qrtr: Fix passing invalid reference to qrtr_local_enqueue()
  + - net: sun: fix missing release regions in cas_init_one().
  + - net/mlx4_core: fix a memory leak bug.
  + - ARM: dts: rockchip: fix phy nodename for rk3228-evb
  + - arm64: dts: rockchip: swap interrupts interrupt-names rk3399 gpu node
  + - ARM: dts: rockchip: fix pinctrl sub nodename for spi in rk322x.dtsi
  + - gpio: tegra: mask GPIO IRQs during IRQ shutdown
  + - net: microchip: encx24j600: add missed kthread_stop
  + - gfs2: move privileged user check to gfs2_quota_lock_check
  + - cachefiles: Fix race between read_waiter and read_copier involving op->to_do
  + - usb: gadget: legacy: fix redundant initialization warnings
  + - net: freescale: select CONFIG_FIXED_PHY where needed
  + - cifs: Fix null pointer check in cifs_read
  + - samples: bpf: Fix build error
+ - Input: usbtouchscreen - add support for BonXeon TP
+ - Input: evdev - call input_flush_device() on release(), not flush()
+ - Input: xpad - add custom init packet for Xbox One S controllers
+ - Input: dlink-dir685-touchkeys - fix a typo in driver name
+ - Input: i8042 - add ThinkPad S230u to i8042 reset list
+ - Input: synaptics-rci4 - really fix attn_data use-after-free
+ - Input: synaptics-rci4 - fix error return code in rmi_driver_probe()
+ - ARM: 8843/1: use unified assembler in headers
+ - ARM: uaccess: consolidate uaccess asm to asm/uaccess-asm.h
+ - ARM: uaccess: integrate uaccess_save and uaccess_restore
+ - ARM: uaccess: fix DACR mismatch with nested exceptions
+ - gpio: exar: Fix bad handling for ida_simple_get error path
+ - IB/qib: Call kobject_put() when kobject_init_and_add() fails
+ - ARM: dts: imx6q-bx50v3: Add internal switch
+ - ARM: dts/bcm2835-rpi-zero-w: Fix led polarity
+ - mmc: block: Fix use-after-free issue for rpmb
+ - RDMA/pvrdma: Fix missing pci disable in pvrdma_pci_probe()
+ - ALSA: hwdep: fix a left shifting 1 by 31 UB bug
+ - ALSA: usb-audio: mixer: volume quirk for ESS Technology Asus USB DAC
+ - exec: Always set cap_ambient in cap_bprm_set_creds
+ - ALSA: hda/realtek - Add new codec supported for ALC287
+ - libepc: ignore pool overlay and cache logic on redirects
+ - mm: remove VM_BUG_ON(PageSlab()) from page_mapcount()
+ - fs/binfmt_elf.c: allocate initialized memory in fill_thread_core_info()
+ - include/asm-generic/topology.h: guard cpumask_of_node() macro argument
+ - iommu: Fix reference count leak in iommu_group_alloc.
+ - parisc: Fix kernel panic in mem_init()
+ - mac80211: mesh: fix discovery timer re-arming issue / crash
+ - x86/dma: Fix max PFN arithmetic overflow on 32 bit systems
+ - copy_xstate_to_kernel(): don't leave parts of destination uninitialized
+ - xfrm: allow to accept packets with ipv6 NEXTHDR_HOP in xfrm_input
+ - xfrm: call xfrm_output_gso when inner_protocol is set in xfrm_output
+ - xfrm: fix a warning in xfrm_policy_insert_list
+ - xfrm: fix a NULL_ptr deref in xfrm_local_error
+ - xfrm: fix error in comment
+ - vti4: eliminated some duplicate code.
+ - ip_vti: receive ipip packet by calling ip_tunnel_rcv
+ - netfilter: nft_reject_bridge: enable reject with bridge vlan
+ - netfilter: ipset: Fix subcounter update skip
+ - netfilter: nfnetlink_cthelper: unbreak userspace helper support
+ - netfilter: nf_contrack_pptp: prevent buffer overflows in debug code
+ - esp6: get the right proto for transport mode in esp6_gso_encap
+ - qlcnic: fix missing release in qlcnic_83xx_interrupt_test.
+ - netfilter: nf_contrack_pptp: fix compilation warning with W=1 build
+ - mm/vmalloc.c: don't dereference possible NULL pointer in __vunmap()
+ - KVM: VMX: check for existence of secondary exec controls before accessing
+ - dpaa_eth: fix usage as DSA master, try 3
+ - net: dsa: mt7530: fix roaming from DSA user ports
+ - net: inet_csk: Fix so_reuseport bind-address cache in tb->fast*
+ - scpt: Don’t add the shutdown timer if its already been added
+ - arm64: dts: rockchip: fix status for &gmac2phy in rk3328-evb.dts
+ - ARM: dts: rockchip: swap clock-names of gpu nodes
+ - IB/i40iw: Remove bogus call to netdev_master_upper_dev_get()
+ - riscv: stacktrace: Fix undefined reference to `walk_stackframe’
+ - ARM: 8970/1: decompressor: increase tag size
+ - ARM: dts: bcm: HR2: Fix PPI interrupt types
+ - ALSA: hda/realtek - Add a model for Thinkpad T570 without DAC workaround
+ - ALSA: usb-audio: Quirks for Gigabyte TRX40 Aorus Master onboard audio
+ - IB/ipoib: Fix double free of skb in case of multicast traffic in CM mode
+ - bnxt_en: Fix accumulation of bp->net_stats_prev.
+ *
+ * apparmor reference leak causes refcount_t overflow with af_alg_accept()
  (LP: #1883962)
+ - apparmor: check/put label on apparmor_sk_clone_security()
+
+ * Freezing on boot since kernel 4.15.0-72-generic release (LP: #1856387)
+ - x86/timer: Don’t skip PIT setup when APIC is disabled or in legacy mode
+
+ * smpboot: don’t call topology_sane() when Sub-NUMA-Clustering is enabled
  (LP: #1882478)
+ - x86, sched: Allow topologies where NUMA nodes share an LLC
+
+ -- Khalid Elmously <khalid.elmously@canonical.com>  Sun, 09 Aug 2020 02:32:04 -0400
+
+ linux (4.15.0-112.113) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-112.113 -proposed tracker (LP: #1887048)
+
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+
+ * CVE-2020-11935
+ - SAUCE: aufs: do not call i_readcount_inc()
+ - SAUCE: aufs: bugfix, IMA i_readcount
+
+ * CVE-2020-10757
+ - mm: Fix mremap not considering huge pmd devmap
+
+ * Update lockdown patches (LP: #1884159)
+ - efi/efi_test: Lock down /dev/efi_test and require CAP_SYS_ADMIN
+ - efi: Restrict efivar_ssd1_load when the kernel is locked down
+ - powerpc/xmon: add read-only mode
+ - powerpc/xmon: Restrict when kernel is locked down
+ - [Config] CONFIG_XMON_DEFAULT_RO_MODE=y
+ * SAUCE: acpi: disallow loading configfs acpi tables when locked down
+ * seccomp_bpf fails on powerpc (LP: #1885757)
+ * SAUCE: selftests/seccomp: fix ptrace tests on powerpc
+ * Introduce the new NVIDIA 418-server and 440-server series, and update the
  current NVIDIA drivers (LP: #1881137)
+ * [packaging] add signed modules for the 418-server and the 440-server
  flavours
+ -- Khalid Elmously <khalid.elmously@canonical.com> Thu, 09 Jul 2020 19:13:37 -0400
+ +linux (4.15.0-111.112) bionic; urgency=medium
+ * bionic/linux: 4.15.0-111.112 -proposed tracker (LP: #1886999)
+ * Bionic update: upstream stable patchset 2020-05-07 (LP: #1877461)
+ - SAUCE: mlxsw: Add missmerged ERR_PTR hunk
+ * linux 4.15.0-109-generic network DoS regression vs -108 (LP: #1886668)
+ - SAUCE: Revert "netprio_cgroup: Fix unlimited memory leak of v2 cgroups"
+ -- Khalid Elmously <khalid.elmously@canonical.com> Thu, 09 Jul 2020 16:03:14 -0400
+ +linux (4.15.0-109.110) bionic; urgency=medium
+ * Packaging resync (LP: #1786013)
+ - [Packaging] update helper scripts
+ - update dkms package versions
+ * Build and ship a signed wireguard.ko (LP: #1861284)
+ - [Packaging] wireguard -- add support for building signed .ko
+ * CVE-2019-16089
+ - SAUCE: nbd_genl_status: null check for nla_nest_start
+ * CVE-2019-19642
+ - kernel/relay.c: handle alloc_percpu returning NULL in relay_open
+ * CVE-2019-12380
+ - efi/x86/Add missing error handling to old_memmap 1:1 mapping code
+ * CVE-2019-19039 // CVE-2019-19377
+ - btrfs: sink flush_fn to extent_write_cache_pages
+ - btrfs: extent_io: Move the BUG_ON() in flush_write_bio() one level up
+ - btrfs: Don't submit any btree write bio if the fs has errors
+ * CVE-2019-19036

Open Source Used In 5GaaS Edge AC-4 19042
+ - btrfs: volumes: Use more straightforward way to calculate map length
+ - btrfs: tree-checker: Try to detect missing INODE_ITEM
+ - Btrfs: tree-checker: detect file extent items with overlapping ranges
+ - Btrfs: make tree checker detect checksum items with overlapping ranges
+ - btrfs: harden against duplicate fsid on scanned devices
+ - Btrfs: fix missing data checksums after replaying a log tree
+ - btrfs: reloc: fix reloc root link and NULL pointer dereference
+ - btrfs: Validate child tree block's level and first key
+ - btrfs: Detect unbalanced tree with empty leaf before crashing btree
+ operations
+
+ * CVE-2019-19318
+ - btrfs: tree-checker: Replace root parameter with fs_info
+ - btrfs: tree-checker: Check level for leaves and nodes
+ - btrfs: tree-checker: get fs_info from eb in generic_err
+ - btrfs: tree-checker: get fs_info from eb in file_extent_err
+ - btrfs: tree-checker: get fs_info from eb in check_csum_item
+ - btrfs: tree-checker: get fs_info from eb in dir_item_err
+ - btrfs: tree-checker: get fs_info from eb in check_dir_item
+ - btrfs: tree-checker: get fs_info from eb in block_group_err
+ - btrfs: tree-checker: get fs_info from eb in check_block_group_item
+ - btrfs: tree-checker: get fs_info from eb in check_extent_data_item
+ - btrfs: tree-checker: get fs_info from eb in check_leaf_item
+ - btrfs: tree-checker: get fs_info from eb in check_leaf
+ - btrfs: tree-checker: get fs_info from eb in chunk_err
+ - btrfs: tree-checker: get fs_info from eb in dev_item_err
+ - btrfs: tree-checker: get fs_info from eb in check_dev_item
+ - btrfs: tree-checker: get fs_info from eb in check_inode_item
+ - btrfs: tree-checker: Add ROOT_ITEM check
+ - btrfs: tree-checker: Add EXTENT_ITEM and METADATA_ITEM check
+ - btrfs: tree-checker: Add simple keyed refs check
+ - btrfs: tree-checker: Add EXTENT_DATA_REF check
+ - btrfs: tree-checker: Fix wrong check on max devid
+ - Btrfs: fix selftests failure due to uninitialized i_mode in test inodes
+
+ * CVE-2019-19813 // CVE-2019-19816
+ - btrfs: Refactor parameter of BTRFS_MAX_DEVS() from root to fs_info
+ - btrfs: Move btrfs_check_chunk_valid() to tree-check.ch and export it
+ - btrfs: tree-checker: Make chunk item checker messages more readable
+ - btrfs: tree-checker: Make btrfs_check_chunk_valid() return EUCLEAN instead
+ of EIO
+ - btrfs: tree-checker: Check chunk item at tree block read time
+ - btrfs: tree-checker: Verify dev item
+ - btrfs: tree-checker: Enhance chunk checker to validate chunk profile
+ - btrfs: tree-checker: Verify inode item
+ - btrfs: inode: Verify inode mode to avoid NULL pointer dereference
+
+ * CVE-2020-0543
+ - UBUNTU/SAUCE: x86/speculation/srbds: do not try to turn mitigation off when
  not supported

+ * Build Nvidia drivers in conjunction with kernel (LP: #1764792)
+ - [Packaging] disable nvidia dkms builds for mainline

+ * Bionic update: upstream stable patchset 2020-06-02 (LP: #1881801)
+ - i2c: dev: Fix the race between the release of i2c_dev and cdev
+ - ima: Set file->f_mode instead of file->flags in ima_calc_file_hash()
+ - evm: Check also if *tm is an error pointer in init_desc()
+ - ima: Fix return value of ima_write_policy()
+ - fix multiplication overflow in copy_fdttable()
+ - iommu/amd: Fix over-read of ACPI UID from IVRS table
+ - i2c: mux: demux-pinctrl: Fix an error handling path in
  'i2c_demux_pinctrl_probe()'
+ - ubi: Fix seq_file usage in detailed_erase_block_info debugfs file
+ - gcc-common.h: Update for GCC 10
+ - HID: multitouch: add eGalaxTouch P80H84 support
+ - scsi: qla2xxx: Fix hang when issuing nvme disconnect-all in NPIV
+ - configsfs: fix config_item refcnt leak in configsfs_rmdir()
+ - vhost/vsock: fix packet delivery order to monitoring devices
+ - component: Silence bind error on -EPROBE_DEFER
+ - scsi: ibmvscsi: Fix WARN_ON during event pool release
+ - x86/apic: Move TSC deadline timer debug printk
+ - gtp: set NLM_F_MULTI flag in gtp_genl_dump_pdp()
+ - ceph: fix double unlock in handle_cap_export()
+ - USB: core: Fix misleading driver bug report
+ - platform/x86: asus-nb-wmi: Do not load on Asus T100TA and T200TA
+ - ARM: futex: Address build warning
+ - padata: Replace delayed timer with immediate workqueue in padata_reorder
+ - padata: initialize pd->cpu with effective cpumask
+ - padata: purge get_cpu and reorder_via_wq from padata_do_serial
+ - arm64: fix the flush_icache_range arguments in machine_kexec
+ - ALSA: iec1712: Initialize STDSP24 properly when using the model=staudio
  option
+ - ALSA: pcm: fix incorrect hw_base increase
+ - apparmor: Fix aa_label refcnt leak in policy_update
+ - dmaengine: tegra210-adma: Fix an error handling path in 'tegra_adma_probe()' 
+ - powerpc: restore alphabetic order in Kconfig
+ - powerpc: Remove STRICT_KERNEL_RWX incompatibility with RELOCATABLE
+ - powerpc/64s: Disable STRICT_KERNEL_RWX
+ - x86/uccesx, ubsan: Fix UBSAN vs. SMAP
+ - ubsan: build ubsan.c more conservatively
+ - libnvdimm/btt: Remove unnecessary code in btt_freelist_init
+ - libnvdimm/btt: Fix LBA masking during 'free list' population
+ - media: fdp1: Fix R-Car M3-N naming in debug message
+ - cxgb4: free mac_hlist properly
+ - cxgb4/cxgb4vf: Fix mac_hlist initialization and free
+ Revert "gfs2: Don't demote a glock until its revokes are written"
+ - staging: iio: ad2s1210: Fix SPI reading
+ - staging: greybus: Fix uninitialized scalar variable
+ - iio: sca3000: Remove an erroneous 'get_device()' 
+ - iio: dac: vf610: Fix an error handling path in 'vf610_dac_probe()' 
+ - mei: release me_cl object reference
+ - rapidio: fix an error in get_user_pages_fast() error handling
+ - rxrpc: Fix a memory leak in rxkad_verify_response()
+ - x86/unwind/orc: Fix unwind_get_return_address_ptr() for inactive tasks
+ - iio: adc: stm32-adc: Use dma_request_chan() instead
+ - dma_request_slave_channel()
+ - iio: adc: stm32-adc: fix device used to request dma
+ - riscv: set max_pfn to the PFN of the last page
+ - ubifs: remove broken lazytime support
+ - HID: alps: Add AU11657 device ID
+ - HID: alps: ALPS_1657 is too specific; use U1_UNICORN_LEGACY instead
+ - aquantia: Fix the media type of AQC100 ethernet controller in the driver
+ - HID: i2c-hid: reset Synaptics SYNA2393 on resume
+ - HID: quirks: Add HID QUIRK_NO_INIT_REPORTS quirk for Dell K12A keyboard-dock
+ - stmmac: fix pointer check after utilization in stmmac_interrupt
+ - ALSA: hda/realtek - Fix silent output on Gigabyte X570 Aorus Xtreme
+ - ALSA: hda/realtek - Add more fixup entries for Clevo machines
+ - drm/etnaviv: fix perfmon domain interation
+ - nfit: Add Hyper-V NVDIMM DSM command set to white list
+ - thunderbolt: Drop duplicated get_switch_at_route()
+ - net: bcmgenet: code movement
+ - net: bcmgenet: abort suspend on error
+ - misc: rtsx: Add short delay after exit from ASPM
+ 
+ * Bionic update: upstream stable patchset 2020-05-21 (LP: #1880014)
+ - USB: serial: qcserial: Add DW5816e support
+ - dp83640: reverse arguments to list_add_tail
+ - fq_codel: fix TCA_FQ_CODEL_DROP_BATCH_SIZE sanity checks
+ - net: macsec: preserve ingress frame ordering
+ - net/mlx4_core: Fix use of ENOSPC around mlx4_counter_alloc()
+ - net: usb: qmi_wwan: add support for DW5816e
+ - sch_choke: avoid potential panic in choke_reset()
+ - sch_sfq: validate silly quantum values
+ - bnxt_en: Fix VLAN acceleration handling in bnxt_fix_features().
+ - net/mlx5: Fix forced completion access non initialized command entry
+ - net/mlx5: Fix command entry leak in Internal Error State
+ - bnxt_en: Improve AER slot reset.
+ - bnxt_en: Fix VF anti-spoof filter setup.
+ - net: stricter validation of untrusted gso packets
+ - ipv6: fix cleanup ordering for ip6_mr failure
+ - HID: wacom: Read HID DG_CONTACTMAX directly for non-generic devices
+ - HID: usbhid: Fix race between usbhid_close() and usbhid_stop()
+ - USB: uas: add quirk for LaCie 2Big Quadra
+ - USB: serial: garmin_gps: add sanity checking for data length
+ - tracing: Add a vmalloc_sync_mappings() for safe measure
+ - KVM: arm: vgic: Fix limit condition when writing to GICD_I[CS]ACTIVER
+ - mm/page_alloc: fix watchdog soft lockups during set_zone_contiguous()
+ - coredump: fix crash when umh is disabled
+ - batman-adv: fix batadv_nc_random_weight_tq
+ - batman-adv: Fix refcnt leak in batadv_show_throughput_override
+ - batman-adv: Fix refcnt leak in batadv_store_throughput_override
+ - batman-adv: Fix refcnt leak in batadv_v ogsm_process
+ - x86/entry/64: Fix unwind hints in kernel exit path
+ - x86/entry/64: Fix unwind hints in unwind_stack_do_exit()
+ - x86/unwind/orc: Don't skip the first frame for inactive tasks
+ - x86/unwind/orc: Prevent unwinding before ORC initialization
+ - x86/unwind/orc: Fix error path for bad ORC entry type
+ - netfilter: nat: never update the UDP checksum when it's 0
+ - objtool: Fix stack offset tracking for indirect CFAs
+ - scripts/decodecode: fix trapping instruction formatting
+ - net: stmmac: Use mutex instead of spinlock
+ - shmem: fix possible deadlocks on shmlock_user_lock
+ - net/sonic: Fix a resource leak in an error handling path in 'jazz_sonic_probe()'
+ - net: moxa: Fix a potential double 'free_irq()'
+ - drop_monitor: work around gcc-10 stringop-overflow warning
+ - virtio-blk: handle block_device_operations callbacks after hot unplug
+ - scsi: sg: add sg_remove_request in sg_write
+ - dmaengine: pch_dma.c: Avoid data race between probe and irq handler
+ - dmaengine: mmp_tdma: Reset channel error on release
+ - cpufreq: intel_pstate: Only mention the BIOS disabling turbo mode once
+ - ALSA: hda/hdmi: fix race in monitor detection during probe
+ - drm/qxl: lost qx1_bo_kunmap_atomic_page in qx1_image_init_helper()
+ - ipc/pci: sysvipc_find_ipc() incorrectly updates position index
+ - x86/entry/64: Fix unwind hints in register clearing code
+ - ipmi: Fix NULL pointer dereference in ssif_probe
+ - pinctrl: baytrail: Enable pin configuration setting for GPIO chip
+ - pinctrl: cherryview: Add missing spinlock usage in chv_gpio_irq_handler
+ - i40iw: Fix error handling in i40iw_manage_arp_cache()
+ - netfilter: conntrack: avoid gcc-10 zero-length-bounds warning
+ - IB/mlx4: Test return value of calls to ib_get_cached_pkey
+ - hwmon: (da9052) Synchronize access with mfd
+ - pnp: Use list_for_each_entry() instead of open coding
+ - gcc-10 warnings: fix low-hanging fruit
+ - kbuild: compute false-positive -Wmaybe-uninitialized cases in Kconfig
+ - Stop the ad-hoc games with -Wno-maybe-initialized
+ - gcc-10: disable 'zero-length-bounds' warning for now
+ - gcc-10: disable 'array-bounds' warning for now
+ - gcc-10: disable 'stringop-overflow' warning for now
+ - gcc-10: disable 'restrict' warning for now
+ - gcc-10: avoid shadowing standard library 'free()' in crypto
+ - x86/asm: Add instruction suffixes to bitops
+ - net: phy: micrel: Use strlcpy() for ethtool::get_strings
+ - net: fix a potential recursive NETDEV_FEAT_CHANGE
+ - net: phy: fix aneg restart in phy_ethtool_set_eee
+ - Revert "ipv6: add mtu lock check in __ip6_rt_update_pmtu"
+ - hinic: fix a bug of ndo_stop
+ - net: dsa: loop: Add module soft dependency
+ - net: ipv4: really enforce backoff for redirects
+ - netproio_cgroup: Fix unlimited memory leak of v2 cgroups
+ - net: tcp: fix rx timestamp behavior for tcp_recvmss
+ - ALSA: hda/realtek - Limit int mic boost for Thinkpad T530
+ - ALSA: rawmidi: Initialize allocated buffers
+ - ALSA: rawmidi: Fix racy buffer resize under concurrent accesses
+ - ARM: dt: dra7: Fix bus_dma_limit for PCIe
+ - ARM: dt: imx27-phytec-phycard-s-rdk: Fix the I2C1 pinctrl entries
+ - x86: Fix early boot crash on gcc-10, third try
+ - ALSA: usb-audio: Add control message quirk delay for Kingston HyperX headset
+ - usbst: core: hub: limit HUB QUIRK_DISABLE_AUTOSUSPEND to USB5534B
+ - usbst: host: xhci-plat: keep runtime active when removing host
+ - usbst: xhci: Fix NULL pointer dereference when enqueuing trbs from urb sg list
+ - x86/unwind/orc: Fix error handling in __unwind_start()
+ - exec: Move would_dump into flush_old_exec
+ - clk: rockchip: fix incorrect configuration of rk3228 aclk_gpu* clocks
+ - usbst: gadget: net2272: Fix a memory leak in an error handling path in
  'net2272_plat_probe()'
+ - usbst: gadget: audio: Fix a missing error return value in audio_bind()
+ - usbst: gadget: legacy: fix error return code in gncm_bind()
+ - usbst: gadget: legacy: fix error return code in cdc_bind()
+ - arm64: dt: rockchip: Replace RK805 PMIC node name with "pmic" on rk3328
  boards
+ - arm64: dt: rockchip: Rename dwc3 device nodes on rk3399 to make dte happy
+ - ARM: dt: r8a73a4: Add missing CMT1 interrupts
+ - ARM: dt: r8a7740: Add missing extal2 to CPG node
+ - KVM: x86: Fix off-by-one error in kvm_vcpu_ioctl_x86_setup_mce
+ - Makefile: disallow data races on gcc-10 as well
+ - scpt: Fix bundling of SHUTDOWN with COOKIE-ACK
+ - arm64: hugetlb: avoid potential NULL dereference
+ - net: dsa: Do not make user port errors fatal
+ - pppoe: only process PADT targeted at local interfaces
+ - riscv: fix vds o build with lld
+ - netfilter: nft_set_rbtree: Introduce and use nft_rbtree_interval_start()
+ - cifs: fix leaked reference on requeued write
+ - clk: Unlink clock if failed to prepare or enable
+ * upgrading to 4.15.0-99-generic breaks the sound and the trackpad
+ (LP: #1875916)  // Bionic update: upstream stable patchset 2020-05-21
+ (LP: #1880014)
+ - Revert "ALSA: hda/realtek: Fix pop noise on ALC225"
+ * Pop sound from build-in speaker during cold boot and resume from S3
  (LP: #1866357) // Bionic update: upstream stable patchset 2020-05-21
+  (LP: #1880014)
+  - ALSA: hda/realtek - Fix S3 pop noise on Dell Wyse
+  
+  * Bionic update: upstream stable patchset 2020-05-19 (LP: #1879536)
+  - vhost: vsck: kick send_pkt worker once device is started
+  - powerpc/pci/of: Parse unassigned resources
+  - ASoC: topology: Check return value of pcm_new_ver
+  - selftests/ipc: Fix test failure seen after initial test run
+  - ASoC: sgtl5000: Fix VAG power-on handling
+  - ASoC: rsnd: Fix HDMI channel mapping for multi-SSI mode
+  - ASoC: codecs: hdac_hdmi: Fix incorrect use of list_for_each_entry
+  - wimax/i2400m: Fix potential urb refcnt leak
+  - net: stmmac: fix enabling socfpga's ptp_ref_clock
+  - net: stmmac: Fix sub-second increment
+  - cifs: protect updating server->dstaddr with a spinlock
+  - s390/ftrace: fix potential crashes when switching tracers
+  - scripts/config: allow colons in option strings for sed
+  - lib/mpi: Fix building for powerpc with clang
+  - net: bcmgenet: suppress warnings on failed Rx SKB allocations
+  - net: systemport: suppress warnings on failed Rx SKB allocations
+  - scp: Fix SHUTDOWN CTSN Ack in the peer restart case
+  - ALSA: hda: Match both PCI ID and SSID for driver blacklist
+  - mac80211: add ieee80211_is_any_nullfunc()
+  - cgroup, netclassid: remove double cond_resched
+  - ASoC: rsnd: Fix parent SSI start/stop in multi-SSI mode
+  - drm/amdgpu: Correctly initialize thermal controller for GPUs with Powerplay
+  - table v0 (e.g Hawaii)
+  - ASoC: rsnd: Don't treat master SSI in multi SSI setup as parent
+  - ASoC: rsnd: Fix "status check failed" spam for multi-SSI
+  - drm/amdgpu: Fix oops when pp_funcs is unset in ACPI event
+  - hexagon: clean up ioremap
+  - hexagon: define ioremap_uc
+  - drm/atomic: Take the atomic toys away from X
+  
+  * Performing function level reset of AMD onboard USB and audio devices causes
+  system lockup (LP: #1865988)
+  - SAUCE: PCI: Avoid FLR for AMD Matisse HD Audio & USB 3.0
+  - SAUCE: PCI: Avoid FLR for AMD Starship USB 3.0
+  
+  * add 16-bit width registers support for EEPROM at24 device (LP: #1876699)
+  - SAUCE: at24-smbus-16bit-address
+  
+  * qeth: utilize virtual MAC for Layer2 OSD devices (LP: #1880834)
+  - s390/qeth: improve fallback to random MAC address
+  - s390/qeth: utilize virtual MAC for Layer2 OSD devices
* Slow send speed with Intel I219-V on Ubuntu 18.04.1 (LP: #1802691)
  - e1000e: Disable TSO for buffer overrun workaround
+ * CVE-2020-10711
  - netlabel: cope with NULL catmap
+ * CVE-2020-13143
  - USB: gadget: fix illegal array access in binding with UDC
+ * rtl8723bu wifi issue after being turned off (LP: #1878296)
  - rtl8xxxxu: Improve TX performance of RTL8723BU on rtl8xxxxu driver
  - rtl8xxxxu: add bluetooth co-existence support for single antenna
  - rtl8xxxxu: remove set but not used variable 'rate_mask'
  - rtl8xxxxu: Remove set but not used variable 'vif', 'dev', 'len'
+ * Cannot create ipvlans with > 1500 MTU on recent Bionic kernels
  (LP: #1879658)
  - ipvlan: use ETH_MAX_MTU as max mtu
+ * Miscellaneous Ubuntu changes
  - [Config] wireguard -- enable on all architectures
  -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Mon, 22 Jun 2020 23:07:19 -0300
+ linux (4.15.0-108.109) bionic; urgency=medium
+ * Packaging resync (LP: #1786013)
  - update dkms package versions
+ * dkms-build: downloads fail in private PPAs (LP: #1883874)
  - dkms-build: apt-cache policy elides username:password information
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Fri, 19 Jun 2020 13:07:28 +0200
+ linux (4.15.0-106.107) bionic; urgency=medium
+ * CVE-2020-0543
  - SAUCE: x86/cpu: Add a steppings field to struct x86_cpu_id
  - SAUCE: x86/cpu: Add 'table' argument to cpu_matches()
  - SAUCE: x86/speculation: Add Special Register Buffer Data Sampling (SRBDS) mitigation
  - SAUCE: x86/speculation: Add SRBDS vulnerability and mitigation documentation
  - SAUCE: x86/speculation: Add Ivy Bridge to affected list
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Thu, 04 Jun 2020 12:16:05 +0200
+ linux (4.15.0-103.104) bionic; urgency=medium
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 29 May 2020 14:20:17 +0200
+
+linux (4.15.0-102.103) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-102.103 -proposed tracker (LP: #1878856)
+
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+
+ * debian/scripts/file-downloader does not handle positive failures correctly
+ (LP: #1878897)
+ - [Packaging] file-downloader not handling positive failures correctly
+
+ * Kernel log flood "ceph: Failed to find inode for 1" (LP: #1875884)
+ - ceph: don't check quota for snap inode
+ - ceph: quota: cache inode pointer in ceph_snap_realms
+
+ * [UBUNTU 18.04] zpcicctl --reset - contribution for kernel (LP: #1870320)
+ - s390/pci: Recover handle in clp_set_pci_fn()
+ - s390/pci: Fix possible deadlock in recover_store()
+
+ * Bionic update: upstream stable patchset 2020-05-12 (LP: #1878256)
+ - drm/edid: Fix off-by-one in DispID DTD pixel clock
+ - drm/qxl: qxl_release leak in qxl_draw_dirty_fb()
+ - drm/qxl: qxl_release leak in qxl_hw_surface_alloc()
+ - drm/qxl: qxl_release use after free
+ - btrfs: fix block group leak when removing fails
+ - btrfs: fix partial loss of prealloc extent past i_size after fsync
+ - mmc: sdhci-xenon: fix annoying 1.8V regulator warning
+ - mmc: sdhci-pci: fix eMMC driver strength for BYT-based controllers
+ - ALSA: hda/realtek - Two front mics on a Lenovo ThinkCenter
+ - ALSA: hda/hdmi: fix without unlocked before return
+ - ALSA: pcm: oss: Place the plugin buffer overflow checks correctly
+ - PM: ACPI: Output correct message on target power state
+ - PM: hibernate: Freeze kernel threads in software_resume()
+ - dm verity fec: fix hash block number in verity_fec_decode
+ - RDMA/mlx5: Set GRH fields in query QP on RoCE
+ - RDMA/mlx4: Initialize ib_spec on the stack
+ - vfio: avoid possible overflow in vfio_iommu_type1_pin_pages
+ - vfio/type1: Fix VA->PA translation for PFNMAP VMAs in vaddr_get_pfn()
+ - iommu/qcom: Fix local_base status check
+ - scsi: target/iblock: fix WRITE SAME zeroing
+ - iommu/amd: Fix legacy interrupt remapping for x2APIC-enabled system
+ - ALSA: opti9xx: shut up gcc-10 range warning
+ - nfs: Fix potential posix_acl refcnt leak in nfs3_set_acl
+ - dmaboot: dmatest: Fix iteration non-stop logic
+ - selinux: properly handle multiple messages in selinux_netlink_send()
+ - ASoC: tas571x: disable regulators on failed probe
+ - ASoC: wm8960: Fix wrong clock after suspend & resume
+ - xfs: acquire superblock freeze protection on e0fblocks scans
+ - cpumap: Avoid warning when CONFIG_DEBUG_PER_CPU_MAPS is enabled
+ - net: fec: set GPR bit on suspend by DT configuration.
+ - ALSA: hda: Keep the controller initialization even if no codecs found
+ - ALSA: hda: Explicitly permit using autosuspend if runtime PM is supported
+ - ALSA: hda: call runtime_allow() for all hda controllers
+ - scsi: qla2xxx: check UNLOADING before posting async work
+ - RDMA/core: Fix race between destroy and release FD object
+ - btrfs: transaction: Avoid deadlock due to bad initialization timing of
  fs_info::journal_info
+ - mmc: sdhci-msm: Enable host capabilities pertains to R1b response
+ - mmc: meson-mx-sdio: Set MMC_CAP_WAIT_WHILE_BUSY
+ - mmc: meson-mx-sdio: remove the broken ->card_busy() op
+ - Bionic update: upstream stable patchset 2020-05-07 (LP: #1877461)
+ - ext4: fix extent_status fragmentation for plain files
+ - net: ipv4: avoid unused variable warning for sysctl
+ - crypto: mxs-dcp - make symbols 'sha1_null_hash' and 'sha256_null_hash'
  static
+ - vti4: removed duplicate log message.
+ - watchdog: reset last_hw_keepalive time at start
+ - scsi: lpfc: Fix kasan slab-out-of-bounds error in lpfc_unreg_login
+ - ceph: return ceph_mdsc_do_request() errors from __get_parent()
+ - ceph: don't skip updating wanted caps when cap is stale
+ - pwm: rcar: Fix late Runtime PM enablement
+ - scsi: iscsi: Report unbind session event when the target has been removed
+ - ASoC: Intel: atom: Take the drv->lock mutex before calling
  sst_send_slot_map()
+ - kernel/gcov/fs.c: gcov_seq_next() should increase position index
+ - selftests: kmod: fix handling test numbers above 9
+ - ipc/util.c: sysvipc_find_ipc() should increase position index
+ - s390/cio: avoid duplicated 'ADD' uevents
+ - pwm: renesas-tpu: Fix late Runtime PM enablement
+ - pwm: bcm2835: Dynamically allocate base
+ - perf/core: Disable page faults when getting phys address
+ - PCI/ASPM: Allow re-enabling Clock PM
+ - mm, slab: Disable page faults when getting phys address
+ - perf/core: Disable page faults when getting phys address
+ - perf/core: Disable page faults when getting phys address
+ - PCI/ASPM: Allow re-enabling Clock PM
+ - cxgb4: fix large delays in PTP synchronization
+ ipv6: fix restrict IPV6_ADDRFORM operation
+ macsec: avoid to set wrong mtu
+ macvlan: fix null dereference in macvlan_device_event()
+ net: bcmgenet: correct per TX/RX ring statistics
+ net: netrom: Fix potential nr_neigh refcnt leak in nr_add_node
+ net/x25: Fix x25_neigh refcnt leak when receiving frame
+ tcp: cache line align MAX_TCP_HEADER
+ team: fix hang in team_mode_get()
+ net: dsa: b53: Fix ARL register definitions
+ xfrm: Always set XFRM_TRANSFORMED in xfrm{4,6}_output_finish
+ vrf: Check skb for XFRM_TRANSFORMED flag
+ KEYS: Avoid false positive ENOMEM error on key read
+ ALSA: hda: Remove ASUS ROG Zenith from the blacklist
+ iio: adc: stm32-adc: fix sleep in atomic context
+ iio: xilinx-xadce: Fix ADC-B powerdown
+ iio: xilinx-xadce: Fix clearing interrupt when enabling trigger
+ iio: xilinx-xadce: Fix sequencer configuration for aux channels in simultaneous mode
+ fs/namespace.c: fix mountpoint reference counter race
+ USB: sisusbgva: Change port variable from signed to unsigned
+ USB: Add USB_ULIR_DELAY_CTRL_MSG and USB_ULIR_DELAY_INIT for Corsair K70 RGB RAPIDFIRE
+ USB: early: Handle AMD's spec-compliant identifiers, too
+ USB: core: Fix free-while-in-use bug in the USB S-Glibrary
+ USB: hub: Fix handling of connect changes during sleep
+ overflow.h: Add arithmetic shift helper
+ vmalloc: fix remap_vmalloc_range() bounds checks
+ mm/hugetlb: fix a addressing exception caused by huge_pte_offset
+ mm/ksm: fix NULL pointer dereference when KSM zero page is enabled
+ tools/vm: fix cross-compile build
+ ALSA: usb-x2y: Fix potential NULL dereference
+ ALSA: hda/realtek - Add new codec supported for ALC245
+ ALSA: usb-audio: Fix usb audio refcnt leak when getting spdif
+ ALSA: usb-audio: Filter out unsupported sample rates on Focusrite devices
+ tpm/tpm_tis: Free IRQ if probing fails
+ tpm: ibmvtpm: retry on H_CLOSED in tpm_ibmvtpm_send()
+ KVM: Check validity of resolved slot when searching memslots
+ KVM: VMX: Enable machine check support for 32bit targets
+ tty: hvc: fix buffer overflow during hvc_alloc().
+ tty: rocket, avoid OOB access
+ usb-storage: Add unusual_devs entry for JMicron JMS566
+ audit: check the length of userspace generated audit records
+ ASoC: dapm: fixup dapm kcontrol widget
+ hwloc: pcie: actually release queue memory in TVQM
+ ARM: imx: provide v7_cpu_resume() only on ARM_CPU_SUSPEND=y
+ powerpc/setup_64: Set cache-line-size based on cache-block-size
+ staging: comedi: dt2815: fix writing hi byte of analog output
+ staging: comedi: Fix comedi_device refcnt leak in comedi_open
- vt: don't hardcode the mem allocation upper bound
- staging: vt6656: Don't set RCR_MULTICAST or RCR_BROADCAST by default.
- staging: vt6656: Fix calling conditions of vnt_set_bss_mode
- staging: vt6656: Fix pairwise key entry save.
- staging: vt6656: Power save stop wake_up_count wrap around.
- cdc-acm: close race between suspend() and acm_softint
- cdc-acm: introduce a cool down
- UAS: no use logging any details in case of ENODEV
- UAS: fix deadlock in error handling and PM flushing work
- usb: f_fs: Clear OS Extended descriptor counts to zero in ffs_data_reset()
- serial: sh-sci: Make sure status register SCxSR is read in correct sequence
- xfs: Fix deadlock between AGI and AGF with RENAME_WHITEOUT
- remoteproc: Fix wrong rrring index computation
- mtd: cfi: fix deadloop in cfi_cmdset_0002.c do_write_buffer
- binder: take read mode of mmap_sem in binder_alloc_free_page()
- usb: dwc3: gadget: Do link recovery for SS and SSP
- usb: gadget: udc: bdc: Remove unnecessary NULL checks in bdc_req_complete
- iio:ad7797: Use correct attribute_group
- nfsd: memory corruption in nfsd4_lock()
- i2c: altera: use proper variable to hold errno
- net/cxgb4: Check the return from t4_query_params properly
- ARM: dts: bcm283x: Disable dsi0 node
- perf/core: fix parent pid/tid in task exit events
- mm: shmem: disable interrupt when acquiring info->lock in userfaultfd_copy
- path
- bpf, x86: Fix encoding for lower 8-bit registers in BPF_STX BPF_B
- x86: hyperv: report value of misc_features
- xfs: fix partially uninitialized structure in xfs_reflink_remap_extent
- scsi: target: fix PR IN / READ FULL STATUS for FC
- objtool: Fix CONFIG_UBSAN_TRAP unreachable warnings
- objtool: Support Clang non-section symbols in ORC dump
- xen/xenbus: ensure xenbus_map_ring_valloc() returns proper grant status
- arm64: Delete the space separator in __emit_inst
- ext4: use matching invalidatepage in ext4_writepage
- ext4: increase wait time needed before reuse of deleted inode numbers
- ext4: convert BUG_ON's to WARN_ON's in mbitmap.c
- hwmon: (jc42) Fix name to have no illegal characters
- qed: Fix use after free in qed_chain_free
- ext4: check for non-zero journal inum in ext4_calculate_overhead
- propagate_one(): mnt_set_mountpoint() needs mount_lock
- kconfig: qconf: Fix a few alignment issues
- loop: Better discard support for block devices
- drm/amd/display: Not doing optimize bandwidth if flip pending.
- virtio-blk: improve virtqueue error to BLK_STS
- scsi: smartpq: fix call trace in device discovery
- net: ipv6: add net argument to ip6_dst_lookup_flow
- net: ipv6_stub: use ip6_dst_lookup_flow instead of ip6_dst_lookup
+ - f2fs: fix to avoid memory leakage in f2fs_listxattr
+ - KVM: VMX: Zero out *all* general purpose registers after VM-Exit
+ - KVM: Introduce a new guest mapping API
+ - kvm: fix compilation on aarch64
+ - kvm: fix compilation on s390
+ - kvm: fix compile on s390 part 2
+ - KVM: Properly check if “page” is valid in kvm_vcpu_unmap
+ - x86/kvm: Introduce kvm_(un)map_gfn()
+ - x86/kvm: Cache gfn to pfn translation
+ - vrf: Fix IPv6 with qdisc and xfrm
+ - net: dsb: b53: Lookup VID in ARL searches when VLAN is enabled
+ - net: dsb: b53: Rework ARL bin logic
+ - net: dsb: b53: b53_arl_rw_op() needs to select IVL or SVL
+ - mlxsw: Fix some IS_ERR() vs NULL bugs
+ - iio: core: remove extra semi-colon from devm_iio_device_register() macro
+ - iio: st_sensors: rely on odr mask to know if odr can be set
+ - iio: xilinx-xadc: Make sure not exceed maximum samplerate
+ - iwlwifi: mvm: beacon statistics shouldn’t go backwards
+ - xhci: prevent bus suspend if a roothub port detected a over-current
+ condition
+ * Bionic update: upstream stable patchset 2020-04-27 (LP: #1875506)
+ - KVM: VMX: fix crash cleanup when KVM wasn’t used
+ - amd-xgbe: Use __napi_schedule() in BH context
+ - hsr: check protocol version in hsr_newlink()
+ - net: ipv4: devinet: Fix crash when add/del multicast IP with autojoin
+ - net: ipv6: do not consider routes via gateways for anycast address check
+ - net: qrtr: send msgs from local of same id as broadcast
+ - net: revert default NAPI poll timeout to 2 jiffies
+ - net: stmmac: dwmac-sunxi: Provide TX and RX fifo sizes
+ - scsi: ufs: Fix ufshcd_hold() caused scheduling while atomic
+ - jbd2: improve comments about freeing data buffers whose page mapping is NULL
+ - pwm: pca9685: Fix PWM/GPIO inter-operation
+ - ext4: fix incorrect group count in ext4_fill_super error message
+ - ext4: fix incorrect inodes per group in error message
+ - ASoC: Intel: mrfld: fix incorrect check on p->sink
+ - ASoC: Intel: mrfld: return error codes when an error occurs
+ - ALSA: usb-audio: Don’t override ignore_ctl_error value from the map
+ - tracing: Fix the race between registering ‘snapshot’ event trigger and
+ triggering ‘snapshot’ operation
+ - btrfs: check commit root generation in should_ignore_root
+ - mac80211_hwsim: Use kstrndup() in place of kasprintf()
+ - ext4: do not zeroout extents beyond i_disksize
+ - dm flakey: check for null arg_name in parse_features()
+ - kvm: x86: Host feature SSBD doesn’t imply guest feature SPEC_CTRL_SSBD
+ - x86/microcode/AMD: Increase microcode PATCH_MAX_SIZE
+ - x86/intel_rdt: Add two new resources for L2 Code and Data Prioritization
+ - (CDP)
+ - x86/intel_rdt: Enable L2 CDP in MSR IA32_L2_QOS_CFG
+ - x86/resctrl: Preserve CDP enable over CPU hotplug
+ - x86/resctrl: Fix invalid attempt at removing the default resource group
+ - mm/vmalloc.c: move 'area->pages' after if statement
+ - objtool: Fix switch table detection in .text.unlikely
+ - scsi: sg: add sg_remove_request in sg_common_write
+ - ext4: use non-movable memory for superblock readahead
+ - arm, bpf: Fix bugs with ALU64 {RSH, ARSH} BPF_K shift by 0
+ - netfilter: nf_tables: report EOPNOTSUPP on unsupported flags/object type
+ - irqchip/mbigen: Free msi_desc on device teardown
+ - ALSA: hda: Don't release card at firmware loading error
+ - lib/raid6: use vdpuq_n_u8 to avoid endianness warnings
+ - video: fbdev: sis: Remove unnecessary parentheses and commented code
+ - drm: NULL pointer dereference [null-pointer-deref] (CWE 476) problem
+ - clk: Fix debugfs_create_*() usage
+ - Revert "gpio: set up initial state from .get_direction()"
+ - wil6210: increase firmware ready timeout
+ - wil6210: fix temperature debugfs
+ - scsi: ufs: make sure all interrupts are processed
+ - scsi: ufs: ufs-qcom: remove broken hci version quirk
+ - wil6210: rate limit wil_rx_refill error
+ - rpmsg: glink: use put_device() if device_register fail
+ - rtc: pm8xxx: Fix issue in RTC write path
+ - rpmsg: glink: Fix missing mutex_init() in qcom_glink_alloc_channel()
+ - rpmsg: glink: smem: Ensure ordering during tx
+ - wil6210: fix PCIe bus mastering in case of interface down
+ - wil6210: add block size checks during FW load
+ - wil6210: fix length check in __wmi_send
+ - wil6210: abort properly in cfg suspend
+ - rbd: avoid a deadlock on header_rwlock when flushing notifies
+ - rbd: call rbd_dev_unprobe() after unwatching and flushing notifies
+ - of: unittest: kmemleak in of_unittest_platform_populate()
+ - clk: at91: usb: continue if clk_hw_round_rate() return zero
+ - power: supply: bq27xxx_battery: Silence deferred-probe error
+ - clk: tegra: Fix Tegra PMC clock out parents
+ - soc: imx: gpc: fix power up sequencing
+ - rtc: 88pm860x: fix possible race condition
+ - NFSv4/pnfs: Return valid stateids in nfs_layout_find_inode_by_stateid()
+ - NFS: direct.c: Fix memory leak of dreq when nfs_get_lock_context fails
+ - s390/cpuinfo: fix wrong output when CPU0 is offline
+ - powerpc/maple: Fix declaration made after definition
+ - ext4: do not commit super on read-only bdev
+ - include/linux/swapops.h: correct guards for non_swap_entry()
+ -_percpu_counter: fix a data race at vm_committed_as
+ - compiler.h: fix error in BUILD_BUG_ON() reporting
+ - KVM: s390: vsie: Fix possible race when shadowing region 3 tables
+ - x86: ACPI: fix CPU hotplug deadlock
+ - drm/amdkfd: kfree the wrong pointer
+ - NFS: Fix memory leaks in nfs_pageio_stop_mirroring()
+ - iommu/vt-d: Fix mm reference leak
+ - ext2: fix empty body warnings when -Wextra is used
+ - ext2: fix debug reference to ext2_xattr_cache
+ - libnvdimm: Out of bounds read in __nd_ioctl()
+ - iommu/amd: Fix the configuration of GCR3 table root pointer
+ - net: dsa: bcm_sf2: Fix overflow checks
+ - fbdev: potential information leak in do_fb_ioctl()
+ - tty: evh_bytechan: Fix out of bounds accesses
+ - locktorture: Print ratio of acquisitions, not failures
+ - mtd: lpddr: Fix a double free in probe()
+ - mtd: phram: fix a double free issue in error path
+ - KEYS: Use individual pages in big_key for crypto buffers
+ - KEYS: Don't write out to userspace while holding key semaphore
+ - keys: Fix proc_keys_next to increase position index
+ - wil6210: ignore HALP ICR if already handled
+ - wil6210: remove reset file from debugfs
+ - ARM: dts: imx6: Use gpc for FEC interrupt controller to fix wake on LAN.
+ - of: unittest: kmemleak on changeset destroy
+ - of: overlay: kmemleak in dup_and_fixup_symbol_prop()
+ - s390/cpum_sf: Fix wrong page count in error message
+ - f2fs: fix NULL pointer dereference in f2fs_write_begin()

+ * psock_tpacket from the net test in ubuntu_kernel_selftests failed on KVM
+ kernels (LP: #1812176)
+ - selftests/net: skip psock_tpacket test if KALLSYMS was not enabled

+ * Bionic ubuntu ethtool doesn't check ring parameters boundaries
+ (LP: #1874444)
+ - ethtool: Ensure new ring parameters are within bounds during SRINGPARAM

+ * Improve TSC refinement (and calibration) reliability (LP: #1877858)
+ - x86/tsc: Make calibration refinement more robust
+ - x86/tsc: Use CPUID.0x16 to calculate missing crystal frequency

+ * Do not treat unresolved test case in ftrace from ubuntu_kernel_selftests as
+ failure (LP: #1877958)
+ - ftrace/selftest: make unresolved cases cause failure if --fail-unresolved
+ set

+ * Add support for Ambiq micro AM1805 RTC chip (LP: #1876667)
+ - SAUCE: rtc: add am-1805 RTC driver

+ * 'Elan touchpad' not detected on 'Lenovo ThinkBook 15 IIL' (LP: #1861610)
+ - SAUCE: Input: elan_i2c - add more hardware ID for Lenovo laptop

+ * Kdump broken since 4.15.0-65 on secureboot - purgatory cannot load
  (LP: #1869672)
+ - SAUCE: x86/purgatory: Fix Makefile to prevent undefined symbols
+
+- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 15 May 2020 14:47:09 +0200
+
+linux (4.15.0-101.102) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-101.102 -proposed tracker (LP: #1877262)
+
+ * 4.15.0-100.101 breaks userspace builds due to a bug in the headers
+ /usr/include/linux/swab.h of linux-libc-dev (LP: #1877123)
+ - include/uapi/linux/swab.h: fix userspace breakage, use __BITS_PER_LONG for
+ swap
+
+ * bionic snapdragon 4.15 snap failed Certification testing (LP: #1877657)
+ - Revert "drm/msm: Use the correct dma_sync calls in msm_gem"
+ - Revert "drm/msm: stop abusing dma_map/unmap for cache"
+
+- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Mon, 11 May 2020 11:08:26 +0200
+
+linux (4.15.0-100.101) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-100.101 -proposed tracker (LP: #1875878)
+
+ * built-using constraints preventing uploads (LP: #1875601)
+ - temporarily drop Built-Using data
+
+ * Add debian/rules targets to compile/run kernel selftests (LP: #1874286)
+ - [Packaging] add support to compile/run selftests
+
+ * getitimer returns it_value=0 erroneously (LP: #1349028)
+ - [Config] CONTEXT_TRACKING_FORCE policy should be unset
+
+ * QEMU/KVM display is garbled when booting from kernel EFI stub due to missing
+ bochs-drm module (LP: #1872863)
+ - [Config] Enable CONFIG_DRM_BOCHS as module for all archs
+
+ * Backport MPLS patches from 5.3 to 4.15 (LP: #1851446)
+ - net/mlx5e: Report netdevice MPLS features
+ - net: vlan: Inherit MPLS features from parent device
+ - net: bonding: Inherit MPLS features from slave devices
+ - net/mlx5e: Move to HW checksumming advertising
+
+ * LIO hanging in iscsit_free_session and iscsit_stop_session (LP: #1871688)
+ - scsi: target: remove boilerplate code
+ - scsi: target: fix hang when multiple threads try to destroy the same iscsi
+ session
+ - scsi: target: iscsi: calling iscsit_stop_session() inside
+ iscsit_close_session() has no effect
+ * Add hw timestamps to received skb in peak_canfd (LP: #1874124)
+ - can: peak_canfd: provide hw timestamps in rx skb
+
+ * Bionic update: upstream stable patchset 2020-04-23 (LP: #1874502)
+ - ARM: dts: sun8i-a83t-tbs-a711: HM5065 doesn't like such a high voltage
+ - bus: sunxi-rsb: Return correct data when mixing 16-bit and 8-bit reads
+ - net: vxge: fix wrong __VA_ARGS__ usage
+ - hnic: fix a bug of waiting for IO stopped
+ - hnic: fix wrong para of wait_for_completion_timeout
+ - cxbg4/ptp: pass the sign of offset delta in FW CMD
+ - qlcnic: Fix bad kzalloc null test
+ - i2c: st: fix missing struct parameter description
+ - firmware: arm_sdei: fix double-lock on hibernate with shared events
+ - null_blk: Fix the null_add_dev() error path
+ - null_blk: Handle null_add_dev() failures properly
+ - null_blk: fix spurious IO errors after failed past-wp access
+ - xhci: bail out early if driver can't access host in resume
+ - x86: Don't let pgprot_modify() change the page encryption bit
+ - block: keep bdi->io_pages in sync with max_sectors_kb for stacked devices
+ - irqchip/versatile-fpga: Handle chained IRQs properly
+ - sched: Avoid scale real weight down to zero
+ - selftests/x86/ptrace_syscall_32: Fix no-vDSO segfault
+ - PCI/switchece: Fix init_completion race condition with poll_wait()
+ - libata: Remove extra scsi_host_put() in ata_scsi_add_hosts()
+ - gfs2: Don't demote a glock until its revokes are written
+ - x86/boot: Use unsigned comparison for addresses
+ - efi/x86: Ignore the memory attributes table on i386
+ - genirq/irqdomain: Check pointer in irq_domain_alloc_irqs_hierarchy()
+ - block: Fix use-after-free issue accessing struct io_cq
+ - usb: dwc3: core: add support for disabling SS instances in park mode
+ - irqchip/gic-v4: Provide irq_retrigger to avoid circular locking dependency
+ - md: check arrays is suspended in mddev_detach before call quiesce operations
+ - locking/lockdep: Avoid recursion in lockdep_count_{for,back}ward_deps()
+ - block, bfq: fix use-after-free in bfq_idle_slice_timer_body
+ - btrfs: qgroup: ensure qgroup_rescan_running is only set when the worker is
  - at least queued
+ - btrfs: remove a BUG_ON() from merge_reloc_roots()
+ - btrfs: track reloc roots based on their commit root byte
+ - uapi: rename ext2_swab() to swab() and share globally in swab.h
+ - slub: improve bit diffusion for freelist ptr obfuscation
+ - ASoC: fix regwmask
+ - ASoC: dapm: connect virtual mux with default value
+ - ASoC: dpcm: allow start or stop during pause for backend
+ - ASoC: topology: use name_prefix for new kcontrol
+ - usb: gadget: f_fs: Fix use after free issue as part of queue failure
+ - usb: gadget: composite: Inform controller driver of self-powered
+ - ALSA: usb-audio: Add mixer workaround for TRX40 and co
+ - ALSA: hda: Add driver blacklist
+ - ALSA: hda: Fix potential access overflow in beep helper
+ - ALSA: ice1724: Fix invalid access for enumerated ctl items
+ - ALSA: pcm: oss: Fix regression by buffer overflow fix
+ - ALSA: doc: Document PC Beep Hidden Register on Realtek ALC256
+ - ALSA: hda/realtek - Set principled PC Beep configuration for ALC256
+ - ALSA: hda/realtek - Remove now-unnecessary XPS 13 headphone noise fixups
+ - ALSA: hda/realtek - Add quirk for MSI GL63
+ - media: ti-vpe: cal: fix disable_irqs to only the intended target
+ - acpi/x86: ignore unspecified bit positions in the ACPI global lock field
+ - thermal: devfreq Cooling: inline all stubs for CONFIG_DEVFREQ_THERMAL=n
+ - nvme-fc: Revert "add module to ops template to allow module references"
+ - nvme: Treat discovery subsystems as unique subsystems
+ - PCI/ASPM: Clear the correct bits when enabling L1 substates
+ - PCI: Add boot interrupt quirk mechanism for Xeon chipsets
+ - PCI: endpoint: Fix for concurrent memory allocation in OB address region
+ - irqchip/versatile-fpga: Apply clear-mask earlier
+ - pstore: pstore_ftrace_seq_next should increase position index
+ - MIPS/tlbex: Fix LDDIR usage in setup_pw() for Loongson-3
+ - MIPS: OCTEON: irq: Fix potential NULL pointer dereference
+ - ath9k: Handle txpower changes even when TPC is disabled
+ - signal: Extend exec_id to 64bits
+ - x86/entry/32: Add missing ASM_CLAC to general_protection entry
+ - KVM: nVMX: Properly handle userspace interrupt window request
+ - KVM: s390: vsie: Fix region 1 ASCE sanity shadow address checks
+ - KVM: s390: vsie: Fix delivery of addressing exceptions
+ - KVM: x86: Allocate new rmap and large page tracking when moving memslot
+ - KVM: VMX: Always VMCLEAR in-use VMCSes during crash with kexec support
+ - CIFS: Fix bug which the return value by asynchronous read is error
+ - Btrfs: fix crash during unmount due to race with delayed inode workers
+ - btrfs: set update the uid generation as soon as possible
+ - btrfs: drop block from cache on error in relocation
+ - btrfs: fix missing semaphore unlock in btrfs_sync_file
+ - crypto: mxs-dcp - fix scatterlist linearization for hash
+ - powerpc/pseries: Drop pointless static qualifier in vpa_debugfs_init()
+ - x86/speculation: Remove redundant arch_smt_update() invocation
+ - tools: gpio: Fix out-of-tree build regression
+ - mm: Use fixed constant in page_frag_alloc instead of size + 1
+ - dm verity fec: fix memory leak in verity_fec_dtr
+ - scsi: zfc: fix missing erp_lock in port recovery trigger for point-to-point
+ - arm64: armv8_deprecated: Fix undef_hook mask for thumb setend
+ - selftests: vm: drop dependencies on page flags from mlock2 tests
+ - rtc: omap: Use define directive for PIN_CONFIG_ACTIVE_HIGH
+ - drm/etnaviv: rework perfmon query infrastructure
+ - NFS: Fix a page leak in nfs_destroy_unlinked_subrequests()
+ - ext4: fix a data race at inode->i_blocks
+ - fs/filesystems.c: downgrade user-reachable WARN_ONCE() to pr_warn_once()
+ - ocfs2: no need try to truncate file beyond i_size
+  - perf tools: Support Python 3.8+ in Makefile
+  - s390/diag: fix display of diagnose call statistics
+  - Input: i8042 - add Acer Aspire 5738z to nomux list
+  - kmod: make_request_module() return an error when autoloading is disabled
+  - cpufreq: powernv: Fix use-after-free
+  - hfsplus: fix crash and filesystem corruption when deleting files
+  - ipmi: fix hung processes in __get_guid()
+  - powerpc/powernv/idle: Restore AMR/UAMOR/AMOR after idle
+  - powerpc/64/tm: Don't let userspace set reg5->trap via sigreturn
+  - powerpc/hash64/devmap: Use H_PAGE_THP_HUGE when setting up huge devmap PTE entries
+  - powerpc/xive: Use XIVE_BAD_IRQ instead of zero to catch non configured IPIs
+  - powerpc/kprobes: Ignore traps that happened in real mode
+  - scsi: mpt3sas: Fix kernel panic observed on soft HBA unplug
+  - powerpc: Add attributes for setjmp/longjmp
+  - powerpc: Make setjmp/longjmp signature standard
+  - btrfs: use nofs allocations for running delayed items
+  - dm zoned: remove duplicate nr_rnd_zones increase in dmz_init_zone()
+  - crypto: caam - update xts sector size for large input length
+  - Revert "drm/dp_mst: Remove VCPI while disabling topology mgr"
+  - drm/dp_mst: Fix clearing payload state on topology disable
+  - drm: Remove PageReserved manipulation from drm_pci_alloc
+  - ftrace/kprobe: Show the maxactive number on kprobe_events
+  - powerpc/fsl_booke: Avoid creating duplicate tbl1 entry
+  - misc: echo: Remove unnecessary parentheses and simplify check for zero
+  - etnaviv: perfmon: fix total and idle HI cyclec readout
+  - mfd: dln2: Fix sanity checking for endpoints
+  - efi/x86: Fix the deletion of variables in mixed mode
+  
+  * Panic on suspend/resume Kernel panic - not syncing: stack-protector: Kernel stack is corrupted in: sata_pmp_eh Recover+0xa2b/0xa40 (LP: #1821434) //
+  * Bionic update: upstream stable patchset 2020-04-23 (LP: #1874502)
+  * libata: Return correct status in sata_pmp_eh_recover_pm() when ATA_DFLAG_DETACH is set
+  
+  * Bionic update: upstream stable patchset 2020-04-15 (LP: #1873043)
+  * ipv4: fix a RCU-list lock in fib_triestat_seq_show
+  * net, ip_tunnel: fix interface lookup with no key
+  * scpt: fix refcount bug in scpt_wfree
+  * scpt: fix possibly using a bad saddr with a given dst
+  * drm/bochs: downgrade pci_request_region failure from error to warning
+  * initramfs: restore default compression behavior
+  * tools/power turbostat: Fix gcc build warnings
+  * drm/etnaviv: replace MMU flush marker with flush sequence
+  * blk-mq: sync the update nr_hw_queues with blk_mq_queue_tag_busy_iter
+  * blk-mq: Allow blocking queue tag iter callbacks
+  * misc: pci_endpoint_test: Fix to support > 10 pci-endpoint-test devices
+  * coresight: do not use the BIT() macro in the UAPI header
+ - padada: always acquire cpu_hotplug_lock before pinst->lock
+ - mm: mempolicy: require at least one nodeid for MPOL_PREFERRED
+ - ipv6: don’t auto-add link-local address to lag ports
+ - net: dsa: bcm_sf2: Ensure correct sub-node is parsed
+ - net: phy: micrel: kszphy_resume(): add delay after genphy_resume() before
+ accessing PHY registers
+ - net: stmmac: dwmac1000: fix out-of-bounds mac address reg setting
+ - mlxsw: spectrum_flower: Do not stop at FLOW_ACTION_VLAN_MANGLE
+ - random: always use batched entropy for get_random_u{32,64}
+ - tools/accounting/getdelays.c: fix netlink attribute length
+ - hwreq: imx-rncr - fix an error path
+ - ASoC: jz4740-i2s: Fix divider written at incorrect offset in register
+ - IB/hfi1: Call kobject_put() when kobject_init_and_add() fails
+ - IB/hfi1: Fix memory leaks in sysfs registration and unregistration
+ - ceph: remove the extra slashes in the server path
+ - ceph: canonicalize server path in place
+ - Bluetooth: RFCOMM: fix ODEBUG bug in rfcomm_dev_ioctl
+ - RDMA/cm: Update num_paths in cma_resolve_iboe_route error flow
+ - fbcon: fix null-ptr-deref in fbcon_switch
+ - clk: qcom: reg: Return failure for RCG update
+ - drm/msm: stop abusing dma_map/unmap for cache
+ - arm64: Fix size of __early_cpu_boot_status
+ - rpmmsg: glink: Remove chunk size word align warning
+ - usb: dwc3: don’t set gadget->is_otg flag
+ - drm_dp_mst_topology: fix broken drm_dp_sideband_parse_remote_dpcd_read()
+ - drm/msm: Use the correct dma_sync calls in msm_gem
+ - misc: rttx: set correct pcr_ops for rts522A
+ - mei: me: add cedars fork device ids
+ - power: supply: axp288_charger: Add special handling for HP Pavilion x2 10
+ - rxrpc: Fix sendmsg(MSG_WAITALL) handling
+ - bitops: protect variables in set_mask_bits() macro
+ - RDMA/ucma: Put a lock around every call to the rdma_cm layer
+ - RDMA/cma: Teach lockdep about the order of rtnl and lock
+ + * CVE-2020-11494
+ + - slcan: Don’t transmit uninitialized stack data in padding
+ + * add_key05 from ubuntu_ltp_syscalls failed (LP: #1869644)
+ + - KEYS: reaching the keys quotas correctly
+ + -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 29 Apr 2020 15:10:37 +0200
+ +linux (4.15.0-99.100) bionic; urgency=medium
+ + * CVE-2020-11884
+ + - SAUCE: s390/mm: fix page table upgrade vs 2ndary address mode accesses
+ + -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com>  Wed, 22 Apr 2020 15:31:14 -0300
+linux (4.15.0-97.98) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-97.98 -proposed tracker (LP: #1871312)
+
+ * All PS/2 ports on PS/2 Serial add-in bracket are not working after S3
   (LP: #1866734)
+  - SAUCE: Input: i8042 - fix the selftest retry logic
+
+ * Bionic update: upstream stable patchset 2020-04-03 (LP: #1870604)
+  - spi: qup: call spi_qup_pm_resume_runtime before suspending
+  - powerpc: Include .BTF section
+  - ARM: dts: dra7: Add "dma-ranges" property to PCIe RC DT nodes
+  - spi: pxa2xx: Add CS control clock quirk
+  - spi/zynqmp: remove entry that causes a cs glitch
+  - drm/exynos: dsi: propagate error value and silence meaningless warning
+  - drm/exynos: dsi: fix workaround for the legacy clock name
+  - drivers/perf: arm_pmu_acpi: Fix incorrect checking of gicc pointer
+  - altera-stapl: altera_get_note: prevent write beyond end of 'key'
+  - dm bio record: save/restore bi_end_io and bi_integrity
+  - xenbus: req->body should be updated before req->state
+  - xenbus: req->err should be updated before req->state
+  - block, bfq: fix overwrite of bfq_group pointer in bfq_find_set_group()
+  - parse-maintainers: Mark as executable
+  - USB: Disable LPM on WD19's Realtek Hub
+  - usb: quirks: add NO_LPM quirk for RTL8153 based ethernet adapters
+  - USB: serial: option: add ME910G1 ECM composition 0x110b
+  - usb: host: xhci-plat: add a shutdown
+  - USB: serial: pl2303: add device-id for HP LD381
+  - usb: xhci: apply XHCI_SUSPEND_DELAY to AMD XHCI controller 1022:145c
+  - ALSA: line6: Fix endless MIDI read loop
+  - ALSA: seq: virmidi: Fix running status after receiving sysex
+  - ALSA: seq: oss: Fix running status after receiving sysex
+  - ALSA: pcm: oss: Avoid plugin buffer overflow
+  - ALSA: pcm: oss: Remove WARNING from snd_pcm_plug_alloc() checks
+  - iio: trigger: stm32-timer: disable master mode when stopping
+  - iio: magnetometer: ak8974: Fix negative raw values in sysfs
+  - mmc: sdhci-of-at91: fix cd-gpios for SAMASD2
+  - staging: rtl8188eu: Add device id for MERCUSYS MW150US v2
+  - staging/speakup: fix get_word non-space look-ahead
+  - intel_th: Fix user-visible error codes
+  - intel_th: pci: Add Elkhart Lake CPU support
+  - rtc: max8907: add missing select REGMAP_IRQ
+  - xhci: Do not open code __print_symbolic() in xhci trace events
+  - memcg: fix NULL pointer dereference in __mem_cgroup_usage_unregister_event
+  - mm: slab: be more careful about the double cmpxchg of freelist
+  - mm: slab: prevent kmalloc_node crashes and memory leaks
+  - page-flags: fix a crash at SetPageError(THP_SWAP)
+ - x86/mm: split vmalloc_sync_all()
+ - USB: cdc-acm: fix close_delay and closing_wait units in TIOCSERIAL
+ - USB: cdc-acm: fix rounding error in TIOCSERIAL
+ - iio: adc: at91-sama5d2_adc: fix channel configuration for differential
+ channels
+ - iio: adc: at91-sama5d2_adc: fix differential channels in triggered mode
+ - kbuild: Disable -Wpointer-to-enum-cast
+ - futex: Fix inode life-time issue
+ - futex: Unbreak futex hashing
+ - Revert "vrf: mark skb for multicast or link-local as enslaved to VRF"
+ - Revert "ipv6: Fix handling of LLA with VRF and sockets bound to VRF"
+ - arm64: smf: fix smp_send_stop() behaviour
+ - arm64: smp: fix crash_smp_send_stop() behaviour
+ - drm/bridge: dw-hdmi: fix AVI frame colorimetry
+ - staging: greybus: loopback_test: fix potential path truncation
+ - staging: greybus: loopback_test: fix potential path truncations
+ - Revert "drm/dp_mst: Skip validating ports during destruction, just ref"
+ - hsr: fix general protection fault in hsr_addr_is_self()
+ - macsec: restrict to ethernet devices
+ - net: dsa: Fix duplicate frames flooded by learning
+ - net: mvneta: Fix the case where the last poll did not process all rx
+ - net/packet: tpacket_rcv: avoid a producer race condition
+ - net: qmi_wwan: add support for ASKEY WWHC050
+ - net_sched: cls_route: remove the right filter from hashtable
+ - net_sched: keep alloc_hash updated after hash allocation
+ - net: stm mac: dwmac-rk: fix error path in rk_gmac_probe
+ - NFC: fdp: Fix a signedness bug in fdp.nci_send_patch()
+ - s lcan: not call free_netdev before rtln_unlock in slcan_open
+ - bnxt_en: fix memory leaks in bnxt_debnu_.ieee_getets()
+ - net: dsa: mt7530: Change the LINK bit to reflect the link status
+ - vxlan: check return value of gro_cells_init()
+ - hsr: use rcu_read_lock() in hsr_get_node_{list/status}()
+ - hsr: add restart routine into hsr_get_node_list()
+ - hsr: set .netnsok flag
+ - cgroup-v1: cgroup_pidlist_next should update position index
+ - cpupower: avoid multiple definition with gcc -fno-common
+ - drivers/of/of_mdio.c: fix of_mdibus_register()
+ - cgroup1!: don't call release_agent when it is ""
+ - update configs for DPAA_ERRATUM_A050385
+ - dt-bindings: net: FMan erratum A050385
+ - arm64: dts: ls1043a: FMan erratum A050385
+ - fsl/fman: detect FMan erratum A050385
+ - scsi: ipr: Fix softlockup when rescanning devices in petitboot
+ - mac80211: Do not send mesh HWMP PREQ if HWMP is disabled
+ - dpaa_eth: Remove unnecessary boolean expression in dpaa_get_headroom
+ - sxgbe: Fix off by one in samsung driver strtcpy size arg
+ - arm64: ptrace: map SPSR_ELx<->PSR for compat tasks
+ - arm64: compat: map SPSR_ELx<->PSR for signals
+ ftrace/x86: Annotate text_mutex split between
+ ftrace_arch_code_modify_post_process() and ftrace_arch_code_modify_prepare()
+ i2c: hix5bd2: add missed clk_disable_unprepare in remove
+ Input: synaptics - enable RMI on HP Envy 13-ad105ng
+ Input: avoid BIT() macro usage in the serio.h UAPI header
+ ARM: dts: dra7: Add bus_dma_limit for L3 bus
+ ARM: dts: omap5: Add bus_dma_limit for L3 bus
+ perf probe: Do not depend on dwfl_module_addrsym()
+ tools: Let O= makes handle a relative path with -C option
+ scripts/dtc: Remove redundant YYLOC global declaration
+ scsi: sd: Fix optimal I/O size for devices that change reported values
+ mac80211: mark station unauthorized before key removal
+ gpiolib: acpi: Correct comment for HP x2 10 honor_wake_up quirky
+ gpiolib: acpi: Rework honor_wake_up option into an ignore_wake option
+ gpiolib: acpi: Add quirk to ignore EC wakeups on HP x2 10 BYT + AXP288 model
+ RDMA/core: Ensure security pkey modify is not lost
+ genirq: Fix reference leaks onirq affinity notifiers
+ xfrm: handle NETDEV_UNREGISTER for xfrm device
+ vti[6]: fix packet tx through bpf_redirect() in XinY cases
+ RDMA/mlx5: Block delay drop to unprivileged users
+ xfrm: fix uctx len check in verify_sec_ctx_len
+ xfrm: add the missing verify_sec_ctx_len check in xfrm_add_acquire
+ xfrm: policy: Fix double free in xfrm_policy_timer
+ netfilter: nft_fwd_netdev: validate family and chain type
+ vti6: Fix memory leak of skb if input policy check fails
+ Input: raydium_i2c_ts - use true and false for boolean values
+ Input: raydium_i2c_ts - fix error codes in raydium_i2c_boot_trigger()
+ afs: Fix some tracing details
+ USB: serial: option: add support for ASKEY WWHC050
+ USB: serial: option: add BroadMobi BM806U
+ USB: serial: option: add Wistron Neweb D19Q1
+ USB: cdc-acm: restore capability check order
+ USB: serial: io_edgeport: fix slab-out-of-bounds read in
+ edge_interrupt_callback
+ usb: musb: fix crash with highmen PIO and usbmon
+ media: flexcop-usb: fix endpoint sanity check
+ media: usbtv: fix control-message timeouts
+ staging: rts8188eu: Add ASUS USB-N10 Nano B1 to device table
+ staging: wlan-ng: fix ODEBUG bug in prism2sta_disconnect_usb
+ staging: wlan-ng: fix use-after-free Read in hfa384x_usbinfo_callback
+ libfs: fix infoleak in simple_attr_read()
+ media: ov519: add missing endpoint sanity checks
+ media: dlb0700: fix rc endpoint lookup
+ media: stv06xx: add missing descriptor sanity checks
+ media: xirlink_cit: add missing descriptor sanity checks
+ mac80211: Check port authorization in the iee80211_txd_dequeue() case
+ mac80211: fix authentication with iwlwifi/mvm
+ vt: selection, introduce vc_is_sel
+ vt: ioctl, switch VT_IS_IN_USE and VT_BUSY to inlines
+ vt: switch vt_dont_switch to bool
+ vt: ioctl: remove unnecessary console allocation checks
+ vt: ioctl: fix VT_DISALLOCATE freeing in-use virtual console
+ vt: ioctl: fix use-after-free in vt_in_use()
+ platform/x86: pmcAtom: Add Lex 2I385SW to critclk_systems DMI table
+ bpf: Explicitly memset the bpf_attr structure
+ bpf: Explicitly memset some bpf info structures declared on the stack
+ gpiolib: acpi: Add quirk to ignore EC wakeups on HP x2 10 CHT + AXP288 model
+ net: ks8851-ml: Fix IO operations, again
+ arm64: alternative: fix build with clang integrated assembler
+ perf map: Fix off by one in strncpy() size argument
+ ARM: dt: oxsas: Fix clear-mask property
+ ARM: bcm2835-rpi-zero-w: Add missing pinctrl name
+ arm64: dt: ls1043a-rdb: correct RMII delay mode to rgmii-id
+ arm64: dt: ls1046ardb: set RMII interfaces to RMII_ID mode
+ dm integrity: use dm_bio_record and dm_bio_restore
+ riscv: avoid the PIC offset of static percpu data in module beyond 2G limits
+ drm/amd/display: Clear link settings on MST disable connector
+ mmc: rtsc_pci: Fix support for speed-modes that relies on tuning
+ drm/lease: fix WARNING in idr_destroy
+ mmc: core: Allow host controllers to require R1B for CMD6
+ mmc: core: Respect MMC_CAP_NEED_RSP_BUSY for erase/trim/discard
+ mmc: core: Respect MMC_CAP_NEED_RSP_BUSY for eMMC sleep command
+ mmc: sdhci-tegra: Fix busy detection by enabling MMC_CAP_NEED_RSP_BUSY
+ mlxsw: spectrum_mr: Fix list iteration in error path
+ bnx2-en: Reset rings if ring reservation fails during open()
+ ip_gre: Separate ERSPAN newlink / changelink callbacks
+ ip_gre: Accept IFLA_INFO_DATA-less configuration
+ tcp: repair: fix TCP_QUEUE_SEQ implementation
+ s390/qeth: handle error when backing RX buffer
+ ahci: Add Intel Comet Lake H RAID PCI ID

* Pop sound from build-in speaker during cold boot and resume from S3
* (LP: #1866357) // Bionic update: upstream stable patchset 2020-04-03
* (LP: #1870604)
+ ALSA: hda/realtek: Fix pop noise on ALC225

+ * Bionic update: upstream stable patchset 2020-03-30 (LP: #1869732)
+ phy: Revert toggling reset changes.
+ phy: Avoid multiple suspends
+ cgroup, netclassid: periodically release file_lock on classid updating
+ gre: fix unint-init-value in __iptunnel_pull_header
+ ipv6/addrconf: call ipv6_mc_up() for non-Ethernet interface
+ ipvlan: add cond_resched_rcu() while processing muticast backlog
+ ipvlan: do not use cond_resched_rcu() in ipvlan_process_multicast()
+ netlink: Use netlink header as base to calculate bad attribute offset
+ net: macsec: update SCI upon MAC address change.
+ - net: nfc: fix bounds checking bugs on "pipe"
+ - net/packet: tcp_cap: do not increment ring index on drop
+ - sfc: detach from cb_page in efx_copy_channel()
+ - bnx_t_en: reinitialize IRQs when MTU is modified
+ - cgroup: memcg: net: do not associate sock with unrelated cgroup
+ - net: memcg: late association of sock to memcg
+ - net: memcg: fix lockdep splat in inet_csk_accept()
+ - fib: add missing attribute validation for tun_id
+ - nl802154: add missing attribute validation
+ - nl802154: add missing attribute validation for dev_type
+ - can: add missing attribute validation for termination
+ - macsec: add missing attribute validation for port
+ - team: add missing attribute validation for orphan mask
+ - team: add missing attribute validation for port ifindex
+ - team: add missing attribute validation for array index
+ - nfc: add missing attribute validation for SE API
+ - nfc: add missing attribute validation for vendor subcommand
+ - net: phy: fix MDIO bus PM PHY resuming
+ - bonding/alb: make sure arp header is pulled before accessing it
+ - slip: make slhccompress() more robust against malicious packets
+ - net: fec: validate the new settings in fec_enet_set_coalesce()
+ - macvlan: add cond_resched() during multicast processing
+ - inet_diag: return classid for all socket types
+ - ipvlan: do not add hardware address of master to its unicast filter list
+ - ipvlan: egress mcast packets are not exceptional
+ - ipvlan: don't deref eth hdr before checking it's set
+ - cgroup: cgroup_procs_next should increase position index
+ - cgroup: Iterate tasks that did not finish do_exit()
+ - virtio-blk: fix hw_queue stopped on arbitrary error
+ - iommu/vt-d: quirk_iot_snbl_local_iommu: replace WARN_TAINT with pr_warn +
  add_taint
+ - workqueue: don't use wq_select_unbound_cpu() for bound works
+ - drm/amd/display: remove duplicated assignment to grph_obj_type
+ - ktest: Add timeout for ssh sync testing
+ - cifs_atomic_open(): fix double-put on late allocation failure
+ - gfs2_atomic_open(): fix O_EXCL|O_CREAT handling on cold dcache
+ - KVM: x86: clear stale x86_emulate_ctxt->intercept value
+ - ARC: define __ALIGN_STR and __ALIGN symbols for ARC
+ - efi: Fix a race and a buffer overflow while reading efivars via sysfs
+ - x86/mce: Fix logic and comments around MSR_PPIN_CTL
+ - iommu/dma: Fix MSI reservation allocation
+ - iommu/vt-d: dmar: replace WARN_TAINT with pr_warn + add_taint
+ - iommu/vt-d: Fix a bug in intel_iommu_iova_to_phys() for huge page
+ - pinctrl: meson-gxl: fix GPIOX sdio pins
+ - pinctrl: core: Remove extra kref_get which blocks hogs being freed
+ - nl80211: add missing attribute validation for critical protocol indication
+ - nl80211: add missing attribute validation for beacon report scanning
+ - nl80211: add missing attribute validation for channel switch
+ - netfilter: cthelper: add missing attribute validation for cthelper
+ - netfilter: nft_payload: add missing attribute validation for payload csum
+ - flags
+ - iommu/vt-d: Fix the wrong printing in RHSA parsing
+ - iommu/vt-d: Ignore devices with out-of-spec domain number
+ - i2c: acpi: put device when verifying client fails
+ - ipv6: restrict IPV6_ADDRFORM operation
+ - net/smc: check for valid ib_client_data
+ - efi: Add a sanity check to efivar_store_raw()
+ - batman-adv: Fix internal interface indices types
+ - batman-adv: update data pointers after skb_cow()
+ - batman-adv: Avoid race in TT TVLV allocator helper
+ - batman-adv: Fix TT sync flags for intermediate TT responses
+ - batman-adv: prevent TT request storms by not sending inconsistent TT TLVLS
+ - batman-adv: Avoid free/alloc race when handling OGM2 buffer
+ - batman-adv: Don't schedule OGM for disabled interface
+ - perf/amd/uncore: Replace manual sampling check with CAP_NO_INTERRUPT flag
+ - ACPI: watchdog: Allow disabling WDAT at boot
+ - HID: apple: Add support for recent firmware on Magic Keyboards
+ - cfg80211: check reg_rule for NULL in handle_channel_custom()
+ - scsi: libfc: free response frame from GPN_ID
+ - net: usb: qmi_wwan: restore mtu min/max values after raw_ip switch
+ - net: ks8851-ml: Fix IRQ handling and locking
+ - mac80211: rx: avoid RCU list traversal under mutex
+ - signal: avoid double atomic counter increments for user accounting
+ - slip: not call free_netdev before rtl_unlock in slip_open
+ - hinic: fix a bug of setting hw_iocxt
+ - net: rmnet: fix NULL pointer dereference in rmnet_newlink()
+ - jbd2: fix data races at struct journal_head
+ - ARM: 8957/1: VDSO: Match ARMv8 timer in cntvct_functional()
+ - ARM: 8958/1: rename missed uaccess .fixup section
+ - mm: slub: add missing TID bump in kmem_cache_alloc_bulk()
+ - ipv4: ensure rcu_read_lock() in cipso_v4_error()
+ - nfc: add missing attribute validation for deactivate target
+ - netfilter: nf_contrack: ct_cpu_seq_next should increase position index
+ - netfilter: synproxy: synproxy_cpu_seq_next should increase position index
+ - netfilter: xt_recent: recent_seq_next should increase position index
+ - macintosh: windfarm: fix MODINFO regression
+ - i2c: gpiio: suppress error on probe defer
+ - net/smc: cancel event worker during device removal
+ - hinic: fix a irq affinity bug
+ - net: rmnet: fix suspicious RCU usage
+ - net: rmnet: remove rcu_read_lock in rmnet_force_unassociate_device()
+ - net: rmnet: fix packet forwarding in rmnet bridge mode
+ - sfc: fix timestamp reconstruction at 16-bit rollover points
+ - driver core: Fix adding device links to probing suppliers
+ - net: qrtr: fix len of skb_put_padto in qrtr_node_enqueue
+
+ * This laptop contains a touchpad which is not recognized. (LP: #1858299) //
+ Bionic update: upstream stable patchset 2020-03-30 (LP: #1869732)
+ - HID: i2c-hid: add Trekstor Surfbook E11B to descriptor override
+ + Bionic update: upstream stable patchset 2020-03-23 (LP: #1868623)
+ - iwlwifi: pcie: fix rb_allocator workqueue allocation
+ - ext4: fix potential race between online resizing and write operations
+ - ext4: fix potential race between s_flex_groups online resizing and access
+ - ext4: fix potential race between s_group_info online resizing and access
+ - ipmi:ssif: Handle a possible NULL pointer reference
+ - drm/msm: Set dma maximum segment size for mdss
+ - dax: pass NOWAIT flag to iomap_apply
+ - mac80211: consider more elements in parsing CRC
+ - cfg80211: check wiphy driver existence for drvinfo report
+ - qmi_wwan: re-add DW5821e pre-production variant
+ - qmi_wwan: unconditionally reject 2 ep interfaces
+ - net: ena: fix potential crash when rxfh key is NULL
+ - net: ena: fix uses of round_jiffies()
+ - net: ena: add missing ethtool TX timestamping indication
+ - net: ena: fix incorrect default RSS key
+ - net: ena: rss: fix failure to get indirection table
+ - net: ena: rss: store hash function as values and not bits
+ - net: ena: fix incorrectly saving queue numbers when setting RSS indirection table
+ - net: ena: ethtool: use correct value for crc32 hash
+ - net: ena: ena-com.c: prevent NULL pointer dereference
+ - cifs: Fix mode output in debugging statements
+ - cfg80211: add missing policy for NL80211_ATTR_STATUS_CODE
+ - sysrq: Restore original console_loglevel when sysrq disabled
+ - sysrq: Remove duplicated sysrq message
+ - net: fib_rules: Correctly set table field when table number exceeds 8 bits
+ - net: phy: restore mdio regs in the iproc mdio driver
+ - nfc: pn544: Fix occasional HW initialization failure
+ - scgp: move the format error check out of __sctp_sf_do_9_1_abort
+ - ipv6: Fix nlmsg_flags when splitting a multipath route
+ - ipv6: Fix route replacement with dev-only route
+ - qede: Fix race between rdma destroy workqueue and link change event
+ - net: sched: correct flower port blocking
+ - ext4: potential crash on allocation error in ext4_alloc_flex_bg_array()
+ - audit: fix error handling in audit_data_to_entry()
+ - ACPI: ACPI_ACCESS_BYTE_WIDTH() macro
+ - ACPI: watchdog: Fix gas->access_width usage
+ - KVM: VMX: check descriptor table exits on instruction emulation
+ - HID: ite: Only bind to keyboard USB interface on Acer SW5-012 keyboard dock
+ - HID: core: fix off-by-one memset in hid_report_raw_event()
+ - HID: core: increase HID report buffer size to 8KiB
+ - tracing: Disable trace_printk() on post poned tests
+ - Revert "PM / devfreq: Modify the device name as devfreq(X) for sysfs"
- HID: hiddev: Fix race in in hiddev_disconnect()
- MIPS: VPE: Fix a double free and a memory leak in 'release_vpe()'
- i2c: altera: Fix potential integer overflow
- i2c: jz4780: silence log flood on txabort
- drm/i915/gvt: Separate display reset from ALL_ENGINES reset
- usb: charger: assign specific number for enum value
- ecryptfs: Fix up bad backport of fe2e082f5da5b4a0a92ae32978f81507ef37ec66
- net: netlink: cap max groups which will be considered in netlink_bind()
- net: atlantic: fix potential error handling
- net: ena: make ena rxhf support ETH_RSS_HASH_NO_CHANGE
- namei: only return -ECHILD from follow_dotdot_rcu()
- mwifiex: drop most magic numbers from mwifiex_process_tdls_action_frame()
- KVM: SVM: Override default MMIO mask if memory encryption is enabled
- KVM: Check for a bad hva before dropping into the ghc slow path
- drivers: net: xgene: Fix the order of the arguments of alloc_etherdev_mqs()
- kprobes: Set unoptimized flag after unoptimizing code
- perf hists browser: Restore ESC as "Zoom out" of DSO/thread/etc
- mm/huge_memory.c: use head to check huge zero page
- mm, thp: fix defrag setting if newline is not used
- audit: always check the netlink payload length in audit_receive_msg()
- vhost: Check docket sk_family instead of call getname
- EDAC/amd64: Set grain per DIMM
- net: dsa: bcm_sf2: Forcibly configure IMP port for 1Gb/sec
- RDMA/core: Fix pkey and port assignment in get_new_pps
- RDMA/core: Fix use of logical OR in get_new_pps
- kprobes: Fix optimize_kprobe()/unoptimize_kprobe() cancellation logic
- serial: ar933x_uart: set UART_CS_{RX,TX}_READY_ORIDE
- selftests: fix too long argument
- usb: gadget: composite: Support more than 500mA MaxPower
- usb: gadget: ffs: ffs_aio_cancel(): Save/restore IRQ flags
- usb: gadget: serial: fix Tx stall after buffer overflow
- drm/msm/mdp5: rate limit pp done timeout warnings
- drm: msm: Fix return type of dsi_mgr_connector_mode_valid for kCFI
- drm/msm/dsi: save pll state before dsi host is powered off
- net: ks8851-ml: Remove 8-bit bus accessors
- net: ks8851-ml: Fix 16-bit data access
- net: ks8851-ml: Fix 16-bit IO operation
- watchdog: da9062: do not ping the hw during stop()
- s390/cio: cio_ignore_proc_seq_next should increase position index
- x86/boot/compressed: Don't declare __force_order in kaslr_64.c
- nvme: Fix uninitialized-variable warning
- x86/xen: Distribute switch variables for initialization
- net: thunderx: workaround BGX TX Underflow issue
- cifs: don't leak -EAGAIN for stat() during reconnect
- usb: storage: Add quirk for Samsung Fit flash
- usb: quirks: add NO_LPM quirk for Logitech Screen Share
- usb: core: hub: fix unhandled return by employing a void function
+ - usb: core: hub: do error out if usb_autopm_get_interface() fails
+ - usb: core: port: do error out if usb_autopm_get_interface() fails
+ - vgacon: Fix a UAF in vgacon_invert_region
+ - mm, numa: fix bad pmd by atomically check for pmd_trans_huge when marking
+ page tables prot_numa
+ - fat: fix uninit-memory access for partial initialized inode
+ - arm: dts: dra76x: Fix mmc3 max-frequency
+ - tty:serial:mvebu-uart:fix a wrong return
+ - serial: 8250_exar: add support for ACCES cards
+ - vt: selection, close sel_buffer race
+ - vt: selection, push console lock down
+ - vt: selection, push sel_lock up
+ - x86/pkeys: Manually set X86_FEATURE_OSPKE to preserve existing changes
+ - dmaengine: tegra-apb: Fix use-after-free
+ - dmaengine: tegra-apb: Prevent race conditions of tasklet vs free list
+ - dm cache: fix a crash due to incorrect work item cancelling
+ - ARM: dts: ls1021a: Restore MDIO compatible to gianfar
+ - ASoC: topology: Fix memleak in soc_tplg_link_elems_load()
+ - ASoC: intel: skl: Fix pin debug prints
+ - ASoC: intel: skl: Fix possible buffer overflow in debug outputs
+ - ASoC: pcm: Fix possible buffer overflow in dpcm state sysfs output
+ - ASoC: pcm512x: Fix unbalanced regulator enable call in probe error path
+ - ASoC: dapm: Correct DAPM handling of active widgets during shutdown
+ - RDMA/iwcm: Fix iwcm work deallocation
+ - RMDA/cm: Fix missing ib_cm_destroy_id() in ib_cm_insert_listen()
+ - ib/hfi1, qib: Ensure RCU is locked when accessing list
+ - ARM: imx: build v7_cpu_resume() unconditionally
+ - hwmon: (adt7462) Fix an error return in ADT7462_REG_VOLT()
+ - dmaengine: coh901318: Fix a double lock bug in dma_tc_handle()
+ - powerpc: fix hardware PMU exception bug on PowerVM compatibility mode systems
+ - dm integrity: fix a deadlock due to offloading to an incorrect workqueue
+ - xhci: handle port status events for removed USB3 hcd
+ - ASoC: topology: Fix memleak in soc_tplg_manifest_load()
+ - ALSA: hda/realtek - Apply quirk for MSI GP63, too
+ - ALSA: hda/realtek - Apply quirk for yet another MSI laptop
+ - USB: core: add endpoint-blacklist quirk
+ - USB: quirks: blacklist duplicate ep on Sound Devices USBPre2
+ - powerpc/tm: Fix clearing MSR[TS] in current when reclaiming on signal delivery
+ - jbd2: fix ocfs2 corrupt when clearing block group bits
+ - x86/cpu/amd: Enable the fixed Instructions Retired counter IRPERF
+ - genirq/irqdomain: Make sure all irq domain flags are distinct
+ - btrfs: reset fs_root to NULL on error in open_ctree
+ - usb: dwc2: Fix in ISOC request length checking
+ - rxrpc: Fix call RCU cleanup using non-bh-safe locks
+ - s390/zcrypt: fix card and queue total counter wrap
+ - ARM: dts: sti: fixup sound frame-inversion for stihxxx-b2120.dtsi
+ - macintosh: therm_windtunnel: fix regression when instantiating devices
+ - HID: alps: Fix an error handling path in `alps_input_configured()`
+ - hv_netvsc: Fix unwanted wakeup in netvsc_attach()
+ - s390/qeth: vnicc Fix EOPNOTSUPP precedence
+ - net: atlantic: fix use after free kasan warn
+ - sched/fair: Optimize update_blocked_averages()
+ - sched/fair: Fix O(nr_cgroups) in the load balancing path
+ - KVM: x86: Remove spurious kvm_mmu_unload() from vcpu destruction path
+ - KVM: x86: Remove spurious clearing of async #PF MSR
+ - thermal: brcmstb_thermal: Do not use DT coefficients
+ - scsi: megaraid_sas: silence a warning
+ - net: dsa: b53: Ensure the default VID is untagged
+ - s390: make 'install' not depend on vmlinux
+ - s390/qdio: fill SL with absolute addresses
+ - ALSA: hda/realtek - Fix silent output on Gigabyte X570 Aorus Master
+ - efi/x86: Align GUIDs to their size in the mixed mode runtime wrapper
+ - efi/x86: Handle by-ref arguments covering multiple pages in mixed mode
+ - scsi: pm80xx: Fixed kernel panic during error recovery for SATA drive
+ * Bionic update: upstream stable patchset 2020-03-17 (LP: #1867837)
  + - iommu/qcom: Fix bogus detach logic
  + - ALSA: hda: Use scnprintf() for printing texts for sysfs/procfs
  + - ASoC: sun8i-codec: Fix setting DAI data format
  + - ecryptfs: fix a memory leak bug in parse_tag_1_packet()
  + - ecryptfs: fix a memory leak bug in ecryptfs_init_messaging()
  + - arm64: nopfisimd: Handle TIF_FOREIGN_FPSTATE flag cleanly
  + - ARM: 8723/2: always assume the "unified" syntax for assembly code
  + - serial: imx: ensure that RX irqs are off if RX is off
  + - serial: imx: Only handle irqs that are actually enabled
  + - KVM: nVMX: Use correct root level for nested EPT shadow page tables
  + - drm/gma500: Fixup fbdev stolen size usage evaluation
  + - cpu/hotplug, stop_machine: Fix stop_machine vs hotplug order
  + - brcmfmac: Fix use after free in brcmf_sdio_readframes()
  + - leds: pca963x: Fix open-drain initialization
  + - ext4: fix ext4_dax_read/write inode locking sequence for IOCBB_NOWAIT
  + - ALSA: ctl: allow TLV read operation for callback type of element in locked case
  + - gianfar: Fix TX timestamping with a stacked DSA driver
  + - pinctrl: sh-pfic: sh7264: Fix CAN function GPIOs
  + - pxa168fb: Fix the function used to release some memory in an error handling path
  + - media: i2c: mt9v032: fix enum mbus codes and frame sizes
  + - powerpc/powernv/iov: Ensure the pdn for VFs always contains a valid PE number
  + - gpio: gpio-grgpio: fix possible sleep-in-atomic-context bugs in grgpio_irq_map/unmap()
  + - media: sti: bdisp: fix a possible sleep-in-atomic-context bug in bdisp_device_run()
+ pinctrl: baytrail: Do not clear IRQ flags on direct-irq enabled pins
+ efi/x86: Map the entire EFI vendor string before copying it
+ MIPS: Loongson: Fix potential NULL dereference in loongson3_platform_init()
+ sparc: Add .exit.data section.
+ uio: fix a sleep-in-atomic-context bug in uio_dmem_genirq irqcontrol()
+ usb: gadget: udc: fix possible sleep-in-atomic-context bugs in gr_probe()
+ usb: dwc2: Fix IN FIFO allocation
+ clocksource/drivers/bcm2835_timer: Fix memory leak of timer
+ kselftest: Minimise dependency of get_size on C library interfaces
+ jbd2: clear JBD2_ABORT flag before journal_reset to update log tail info
+ when load journal
+ x86/sysfb: Fix check for bad VRAM size
+ tracing: Fix tracing_stat return values in error handling paths
+ tracing: Fix very unlikely race of registering two stat tracers
+ ext4_jbd2: ensure panic when aborting with zero errno
+ nbd: add a flush_workqueue in nbd_start_device
+ KVM: s390: ENOTSUPP -> EOPNOTSUPP fixups
+ kconfig: fix broken dependency in randconfig-generated .config
+ clk: qcom: rcg2: Don't crash if our parent can't be found; return an error
+ drm/amdgpu: remove 4 set but not used variable in
+ amdgpu_atombios_get_connector_info_from_object_table
+ regulator: rk808: Lower log level on optional GPIOs being not available
+ net/wan/fsl_ucc_hdlc: reject muram offsets above 64K
+ PCI/IOV: Fix memory leak in pci_iov_add_virtfn()
+ NFC: port100: Convert cpu_to_le16(le16_to_cpu(E1) + E2) to use
+ le16_add_cpu().
+ arm64: dts: qcom: msm8996: Disable USB2 PHY suspend by core
+ ARM: dts: imx6: rdu2: Disable WP for USDHC2 and USDHC3
+ media: v4l2-device.h: Explicitly compare grp[id,mask] to zero in v4l2_device
+ macros
+ reiserfs: Fix spurious unlock in reiserfs_fill_super() error handling
+ fore200e: Fix incorrect checks of NULL pointer dereference
+ ALSA: usx2y: Adjust indentation in snd_usX2Y_hwdep_dsp_status
+ b43legacy: Fix -Wcast-function-type
+ ipw2x00: Fix -Wcast-function-type
+ iwlegacy: Fix -Wcast-function-type
+ rtlwifi: rtl_pci: Fix -Wcast-function-type
+ orinoco: avoid assertion in case of NULL pointer
+ ACPI: Disassembler: create buffer fields in ACPI_PARSE_LOAD_PASS1
+ scsi: ufs: Complete pending requests in host reset and restore path
+ scsi: aic7xxx: Adjust indentation in aic_find_syncrate
+ drm/mediatek: handle events when enabling/disabling crtc
+ ARM: dts: r8a7779: Add device node for ARM global timer
+ dmaengine: Store module owner in dma_device struct
+ x86/vdso: Provide missing include file
+ PM / devfreq: rk3399_dmc: Add COMPILBTEST and HAVE_ARM_SMCC dependency
+ pinctrl: sh-pfc: sh7269: Fix CAN function GPIOs
+ RDMA/rxe: Fix error type of mmap_offset
+ - clk: sunxi-ng: add mux and pll notifiers for A64 CPU clock
+ - ALSA: sh: Fix unused variable warnings
+ - ALSA: sh: Fix compile warning wrt const
+ - tools lib api fs: Fix gcc9 stringop-truncation compilation error
+ - drm: remove the newline for CRC source name.
+ - udf: Fix unsafe unaligned pointer usage
+ - iod: Fix free space reporting for metadata and virtual partitions
+ - IB/hfi1: Add software counter for cxtf0 seq drop
+ - soc/tegra: fuse: Correct straps' address for older Tegra124 device trees
+ - efi/x86: Don't panic or BUG() on non-critical error conditions
+ - rcu: Use WRITE_ONCE() for assignments to ->pprev for hlist_nulls
+ - Input: edt-ft5x06 - work around first register access error
+ - usbip: Fix unsafe unaligned pointer usage
+ - ALSA: hda/hdmi - add retry logic to parse_intel_hdmi()
+ - x86/decoder: Add TEST opcode to Group3-2
+ - s390/ftrace: generate traced function stack frame
+  - jbd2: make sure ESHUTDOWN to be recorded in the journal superblock
+  - ARM: 8951/1: Fix Kexec compilation issue.
+  - hostap: Adjust indentation in prism2_hostapd_add_sta
+  - iwlegacy: ensure loop counter addr does not wrap and cause an infinite loop
+  - cifs: fix NULL dereference in match_prepath
+  - ceph: check availability of mds cluster on mount after wait timeout
+  - irqchip/gic-v3: Only provision redistributors that are enabled in ACPI
+  - drm/nouveau/disp/nv50:- prevent oops when no channel method map provided
+  - ftrace: fpid_next() should increase position index
+  - trigger_next should increase position index
+  - radeon: insert 10ms sleep in dce5_crtc_load_lut
+  - ocfs2: fix a NULL pointer dereference when call
+  - ocfs2_update_inode_fsync_trans()
+  - lib/scatterlist.c: adjust indentation in __sg_alloc_table
+  - reiserfs: prevent NULL pointer dereference in reiserfs_insert_item()
+  - bcache: explicit type cast in bset_bkey_last()
+  - irqchip/gic-v3-its: Reference to its_invall_cmd descriptor when building
+   INVALL
+  - iwllwifi: mvm: Fix thermal zone registration
+  - microblaze: Prevent the overflow of the start
+  - brd: check and limit max_part par
+  - help_next should increase position index
+  - virtio_balloon: prevent pfn array overflow
+  - mlxsw: spectrum_dpipe: Add missing error path
+  - selinux: ensure we cleanup the internal AVC counters on error in
+   avc_update()
+  - enic: prevent waking up stopped tx queues over watchdog reset
+  - net: dsa: tag_qca: Make sure there is headroom for tag
+  - net/sched: matchall: add missing validation of TCA_MATCHALL_FLAGS
+  - net/sched: flower: add missing validation of TCA_FLOWER_FLAGS
+  - net/smci: fix leak of kernel memory to user space
+  - thunderbolt: Prevent crash if non-active NVMem file is read
+  - USB: misc: iowarrior: add support for 2 OEMed devices
+  - USB: misc: iowarrior: add support for the 28 and 28L devices
+  - USB: misc: iowarrior: add support for the 100 device
+  - floppy: check FDC index for errors before assigning it
+  - vt: selection, handle pending signals in paste_selection
+  - staging: android: ashmem: Disallow ashmem memory from being remapped
+  - staging: vt6656: fix sign of rx_dbm to bb_pre_ed_rssi.
+  - xhci: Force Maximum Packet size for Full-speed bulk devices to valid range.
+  - xhci: fix runtime pm enabling for quirky Intel hosts
+  - usb: host: xhci: update event ring dequeue pointer on purpose
+  - usb: uas: fix a plug & unplug racing
+  - USB: Fix novation SourceControl XL after suspend
+  - USB: hub: Don't record a connect-change event during reset-resume
+  - USB: hub: Fix the broken detection of USB3 device in SMSC hub
+  - staging: rtl8188eu: Fix potential security hole
+  - staging: rtl8188eu: Fix potential overuse of kernel memory
+ - staging: rtl8723bs: Fix potential security hole
+ - staging: rtl8723bs: Fix potential overuse of kernel memory
+ - x86/mce/amd: Publish the bank pointer only after setup has succeeded
+ - x86/mce/amd: Fix kobject lifetime
+ - tty/serial: atmel: manage shutdown in case of RS485 or ISO7816 mode
+ - tty: serial: imx: setup the correct sg entry for tx dma
+ - serdev: ttyport: restore client ops on deregistration
+ - MAINTAINERS: Update drm/i915 bug filing URL
+ - mm/vmscan.c: don't round up scan size for online memory cgroup
+ - drm/amdgpu/soc15: fix xclk for raven
+ - KVM: x86: don't notify userspace IOAPIC on edge-triggered interrupt EOI
+ - xhci: apply XHCI_PME_STUCK_QUIRK to Intel Comet Lake platforms
+ - vt: vt_ioctl: fix race in VT_RESIZE
+ - serial: 8250: Check UPF_IRQ_SHARED in advance
+ - lib/stackdepot.c: fix global out-of-bounds in stack_slabs
+ - ext4: fix a data race in EXT4_L(inode)->i_disksize
+ - ext4: add cond_resched() to __ext4_find_entry()
+ - ext4: rename s_journal_flag_rwsem to s_writepages_rwsem
+ - ext4: fix race between writepages and enabling EXT4_EXTENTS_FL
+ - KVM: nVMX: handle nested posted interrupts when apicv is disabled for L1
+ - KVM: apic: avoid calculating pending eoi from an uninitialized val
+ - btrfs: fix bytes_may_use underflow in prealloc error condition
+ - btrfs: do not check delayed items are empty for single transaction cleanup
+ - Btrfs: fix btrfs_wait_ordered_range() so that it waits for all ordered extents
+ - scsi: Revert "RDMA/isert: Fix a recently introduced regression related to logout"
+ - scsi: Revert "target: iscsi: Wait for all commands to finish before freeing a session"
+ - usb: gadget: composite: Fix bMaxPower for SuperSpeedPlus
+ - staging: rtl8723bs: fix copy of overlapping memory
+ - staging: greybus: use after free in gb_audio_manager_remove_all()
+ - ecryptfs: replace BUG_ON with error handling code
+ - iommu/vt-d: Fix compile warning from intel-svm.h
+ - genirq/proc: Reject invalid affinity masks (again)
+ - ALSA: rawmidi: Avoid bit fields for state flags
+ - ALSA: seq: Avoid concurrent access to queue flags
+ - ALSA: seq: Fix concurrent access to queue current tick/time
+ - netfilter: xt_hashlimit: limit the max size of hashtable
+ - ata: ahci: Add shutdown to freeze hardware resources of ahci
+ - xen: Enable interrupts when calling _cond_resched()
+ - s390/mm: Explicitly compare PAGE_DEFAULT_KEY against zero in storage_key_init_range
+ - arm: dts: allwinner: H3: Add PMU node
+ - ARM: dts: imx6: rdu2: Limit USBH1 to Full Speed
+ - PCI: iopro: Apply quirk_paxc_bridge() for module as well as built-in
+ - media: cx23885: Add support for AVerMedia CE310B
+ - staging: rtl8188: avoid excessive stack usage
+ - x86/nmi: Remove irq_work from the long duration NMI handler
+ - visorbus: fix uninitialized variable access
+ - drm/nouveau/drm/ttm: Remove set but not used variable 'mem'
+ - i2fs: set L_LINKABLE early to avoid wrong access by vfs
+ - s390: adjust -mpacked-stack support check for clang 10
+ - drm/nouveau/mmu: fix comptag memory leak
+ * Multiple Kexec in AWS Nitro instances fail (LP: #1869948)
+ - net: ena: Add PCI shutdown handler to allow safe kexec
+ * Support SMO8840 as LIS2DH12 (LP: #1869694)
+ - iio: st_sensors: remap SMO8840 to LIS2DH12
+ * CVE-2019-19768
+ - blktrace: Protect q->blk_trace with RCU
+ - blktrace: fix dereference after null check
+ * No audio output from Dell WD19 HDMI/DP after resumed from S3 or s2idle
  (LP: #1869642)
+ - PM / runtime: Rework pm_runtime_force_suspend/resume()
+ * reuseport_bpf_numa in net from ubuntu_kernel_selftests failed on i386
  (LP: #1812638)
+ - selftests: net: reuseport_bpf_numa: don't fail if no numa support
+ * Sys oopsed with sysfs test in ubuntu_stress_smoke_test on X-hwe ARM64
  (LP: #1866772)
+ - SAUCE: ACPI: sysfs: copy ACPI data using io memory copying
+ * update-version-dkms doesn't add a BugLink (LP: #1867790)
+ - [Packaging] Add BugLink to update-version-dkms commit
+ * Packaging resync (LP: #1786013)
+ - update dkms package versions
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Tue, 07 Apr 2020 11:01:18 +0200
+ linux (4.15.0-96.97) bionic; urgency=medium
+ * CVE-2020-8834
+ - KVM: PPC: Book3S HV: Factor fake-suspend handling out of
  kvmppc_save/restore_tm
+ - KVM: PPC: Book3S PR: Move kvmppc_save_tm/kvmppc_restore_tm to separate file
+ - KVM: PPC: Book3S PR: Add guest MSR parameter for
  kvmppc_save_tm()/kvmppc_restore_tm()
+linux (4.15.0-94.95) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-94.95 -proposed tracker (LP: #1868984)
+
+ * Missing wireless network interface after kernel 5.3.0-43 upgrade with eoan
+  (LP: #1868442)
+  - iwlwifi: mvm: Do not require PHYSKU NVM section for 3168 devices
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 25 Mar 2020 12:07:10 +0100
+
+linux (4.15.0-93.94) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-93.94 -proposed tracker (LP: #1868764)
+
+ * quotactl04 from ubuntu_ltp_syscalls failed with B (LP: #1868665)
+  - ext4: fix mount failure with quota configured as module
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 24 Mar 2020 17:21:37 +0100
+
+linux (4.15.0-92.93) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-92.93 -proposed tracker (LP: #1867272)
+
+ * Packaging resync (LP: #1786013)
+  - [Packaging] resync getabis
+  - [Packaging] update helper scripts
+
+ * Introduce the new NVIDIA 440 series, and add 5.4 Linux compatibility to the
+  340 and 390 series (LP: #1854485)
+  - [Packaging] NVIDIA -- add support for the 435 and the 440 series
+
+ * Stop using get_scalar_status command in Dell AIO uart backlight driver
+  (LP: #1865402)
+  - SAUCE: platform/x86: dell-uart-backlight: add get_display_mode command
+
+ * Bionic update: upstream stable patchset 2020-03-12 (LP: #1867194)
+  - RDMA/core: Fix locking in ib_uverbs_event_read
+  - gpio: zynq: Report gpio direction at boot
+  - arm64: ptrace: nopsimd: Fail FP/SIMD regset operations
+  - KVM: arm: Fix DFSR setting for non-LPAE aarch32 guests
+  - KVM: arm: Make inject_abt32() inject an external abort instead
+  - mtd: onenand_base: Adjust indentation in onenand_read_ops_nolock
+  - mtd: sharpslpart: Fix unsigned comparison to zero
+  - padata: fix null pointer deref of pd->pinst
+  - Input: synaptics - switch T470s to RMI4 by default
+  - Input: synaptics - enable SMBus on ThinkPad L470
+  - Input: synaptics - remove the LEN0049 dmi id from toptopbuttonpad list
+  - ALSA: hda/realtek - Fix silent output on MSI-GL73
+ - ALSA: usb-audio: Apply sample rate quirk for Audioengine D1
+ - arm64: cpufeature: Set the FP/SIMD compat HWCAP bits properly
+ - ALSA: usb-audio: sound: usb: usb true/false for bool return type
+ - ext4: don't assume that mmp_nodename/bdevname have NUL
+ - ext4: fix support for inode sizes > 1024 bytes
+ - ext4: fix checksum errors with indexed dirs
+ - ext4: add cond_resched() to ext4_protect_reserved_inode
+ - ext4: improve explanation of a mount failure caused by a misconfigured
    kernel
+ - Btrfs: fix race between using extent maps and merging them
+ - btrfs: ref-verify: fix memory leaks
+ - btrfs: print message when tree-log replay starts
+ - btrfs: log message when rw remount is attempted with unclean tree-log
+ - arm64: ssbs: Fix context-switch when SSBS is present on all CPUs
+ - perf/x86/amd: Add missing L2 misses event spec to AMD Family 17h's event map
+ - IB/hfi1: Close window for pq and request cording
+ - IB/rdmavt: Reset all QPs when the device is shut down
+ - RDMA/rxe: Fix soft lockup problem due to using tasklets in softirq
+ - RDMA/core: Fix protection fault in get_pkey_idx_qp_list
+ - s390/time: Fix clk type in get_tod_clock
+ - perf/x86/intel: Fix inaccurate period in context switch for auto-reload
+ - hwmon: (pmbus/ltc2978) Fix PMBus polling of MFR_COMMON definitions.
+ - jbd2: move the clearing of b_modified flag to the journal_unmap_buffer()
+ - jbd2: do not clear the BH_Mapped flag when forgetting a metadata buffer
+ - KVM: x86/mmu: Fix struct guest_walker arrays for 5-level paging
+  
+ * Bionic update: upstream stable patchset 2020-03-09 (LP: #1866678)
+ - kernel/module: Fix memleak in module_add_modinfo_attrs()
+ - media: iguanair: fix endpoint sanity check
+ - x86/cpu: Update cached HLE state on write to TSX_CTRL_CPUID_CLEAR
+ - iwlwifi: mvmm: fix NVM check for 3168 devices
+ - sparc32: fix struct ipc64_perm type definition
+ - cls_rsvp: fix rsvp_policy
+ - gtp: use __GFP_NOWARN to avoid memalloc warning
+ - l2tp: Allow duplicate session creation with UDP
+ - net: hsr: fix possible NULL deref in hsr_handle_frame()
+ - net_sched: fix an OOB access in cls_tcindex
+ - bnxt_en: Fix TC queue mapping.
+ - tcp: clear tp->total_retrans in tcp_disconnect()
+ - tcp: clear tp->delivered in tcp_disconnect()
+ - tcp: clear tp->data_segs{in|out} in tcp_disconnect()
+ - tcp: clear tp->segs_{in|out} in tcp_disconnect()
+ - rxrpc: Fix insufficient receive notification generation
+ - rxrpc: Fix NULL pointer deref due to call->conn being cleared on disconnect
+ - media: uvcvideo: Avoid cyclic entity chains due to malformed USB descriptors
+ - mfd: dln2: More sanity checking for endpoints
+ - tracing: Fix sched switch start/stop recfunc racy updates
+ - brcmfmac: Fix memory leak in brcmf_usbdev_qinit
+ - usb: gadget: legacy: set max_speed to super-speed
+ - usb: gadget: f_ncm: Use atomic_t to track in-flight request
+ - usb: gadget: f_ecm: Use atomic_t to track in-flight request
+ - ALSA: dummy: Fix PCM format loop in proc output
+ - media/v4l2-core: set pages dirty upon releasing DMA buffers
+ - media: v4l2-rect.h: fix v4l2_rect_map_inside() top/left adjustments
+ - lib/test_kasan.c: fix memory leak in kmalloc_oob_krealloc_more()
+ - irqdomain: Fix a memory leak in irq_domain_push_irq()
+ - platform/x86: intel_scu_ipc: Fix interrupt support
+ - KVM: arm64: Only sign-extend MMIO up to register width
+ - MIPS: fix indentation of the 'RELOCS' message
+ - s390/mm: fix dynamic pagetable upgrade for hugetlbfs
+ - powerpc/xmon: don't access ASDR in VMs
+ - powerpc/pseries: Advance pf if section is not present in lmb_is_removable()
+ - mmc: spi: Toggle SPI polarity, do not hardcode it
+ - ACPI: video: Do not export a non working backlight interface on MSI MS-7721 boards
+ - alarmtimer: Unregister wakeup source when module get fails
+ - ubifs: Reject unsupported ioctl flags explicitly
+ - ubifs: Fix FS_IOC_SETFLAGS unexpectedly clearing encrypt flag
+ - ubifs: Fix deadlock in concurrent bulk-read and writepage
+ - PCI: keystone: Fix link training retries initiation
+ - mmc: sdhci-of-at91: fix memleak on clk_get failure
+ - ubifs: don't trigger assertion on invalid no-key filename
+ - hv_balloon: Balloon up according to request page number
+ - crypto: api - Check spawn->alg under lock in crypto_drop_spawn
+ - scsi: qla2xxx: Fix mtcp dump collection failure
+ - power: supply: ltc2941-battery-gauge: fix use-after-free
+ - f2fs: choose hardlimit when softlimit is larger than hardlimit in
  f2fs_statsfs_project()
+ - f2fs: fix miscounted block limit in f2fs_statsfs_project()
+ - f2fs: code cleanup for f2fs_statsfs_project()
+ - [Config] updateconfigs for CONFIG_OF_DMA_DEFAULT_COHERENT
+ - of: Add OF_DMA_DEFAULT_COHERENT & select it on powerpc
+ - dm zoned: support zone sizes smaller than 128MiB
+ - dm space map common: fix to ensure new block isn’t already in use
+ - dm crypt: fix benbi IV constructor crash if used in authenticated mode
+ - tracing: Annotate ftrace_graph_hash pointer with __rcu
+ - tracing: Annotate ftrace_graph_notrace_hash pointer with __rcu
+ - ftrace: Add comment to why rcu_dereference_sched() is open coded
+ - ftrace: Protect ftrace_graph_hash with ftrace_sync
+ - samples/bpf: Don't try to remove user's homedir on clean
+ - crypto: ccp - set max RSA modulus size for v3 platform devices as well
+ - crypto: pycrypt - Do not clear MAY_SLEEP flag in original request
+ - crypto: atmel-aes - Fix counter overflow in CTR mode
+ - crypto: api - Fix race condition in crypto_spawn_alg
+ - crypto: picoxcell - adjust the position of tasklet_init and fix missed
+ tasklet_kill
+ - scsi: qla2xxx: Fix unbound NVME response length
+ - NFS: Fix memory leaks and corruption in readdir
+ - NFS: Directory page cache pages need to be locked when read
+ - btrfs: set trans->drity in btrfs_commit_transaction
+ - ARM: tegra: Enable PLLP bypass during Tegra124 LP1
+ - iwlwifi: don't throw error when trying to remove IGTK
+ - mwifiex: fix unbalanced locking in mwifiex_process_country_ie()
+ - sunrpc: expiry_time should be seconds not timeout
+ - tools/kvm_stat: Fix kvm_exit filter name
+ - xen/balloon: Support xend-based toolstack take two
+ - KVM: x86: Refactor picdev_write() to prevent Spectre-v1/L1TF attacks
+ - KVM: x86: Refactor prefix decoding to prevent Spectre-v1/L1TF attacks
+ - KVM: x86: Protect DR-based index computations from Spectre-v1/L1TF attacks
+ - KVM: x86: Protect kvm_lapic_reg_write() from Spectre-v1/L1TF attacks
+ - KVM: x86: Protect kvm_pv_msr_[get/set]_crash_data() from Spectre-v1/L1TF attacks
+ - KVM: x86: Protect ioapic_write INDIRECT() from Spectre-v1/L1TF attacks
+ - KVM: x86: Protect MSR-based index computations in pmu.h from Spectre-v1/L1TF attacks
+ - KVM: x86: Protect ioapic_read INDIRECT() from Spectre-v1/L1TF attacks
+ - KVM: x86: Protect MSR-based index computations from Spectre-v1/L1TF attacks in x86.c
+ - KVM: x86: Protect x86_decode_insn from Spectre-v1/L1TF attacks
+ - KVM: x86: Protect MSR-based index computations in fixed_msr_to_seg_unit() from Spectre-v1/L1TF attacks
+ - KVM: PPC: Book3S HV: Uninit vCPU if vcore creation fails
+ - KVM: PPC: Book3S PR: Free shared page if mmu initialization fails
+ - KVM: x86: Free wbinvd_dirty_mask if vCPU creation fails
+ - clk: tegra: Mark fuse clock as critical
+ - scsi: qla2xxx: Fix the endianness of the qla82xx_get_fw_size() return type
+ - scsi: csiostor: Adjust indentation in csio_device_reset
+ - scsi: qla4xxx: Adjust indentation in qla4xxx_mem_free
+ - scsi: ufs: Recheck bkops level if bkops is disabled
+ - phy: qualcomm: Adjust indentation in read_poll_timeout
+ - ext2: Adjust indentation in ext2_fill_super
+ - powerpc/44x: Adjust indentation in ibm4xx_denali_fixup_memsize
+ - NFC: pn544: Adjust indentation in pn544_hci_check_presence
+ - ppp: Adjust indentation into ppp_async_input
+ - net: smc911x: Adjust indentation in smc911x_phy_configure
+ - net: tulip: Adjust indentation in {dmfe, uli526x}_init_module
+ - IB/mlx5: Fix outstanding_pi index for GSI qps
+ - IB/core: Fix ODP get user pages flow
+ - nfsd: fix delay timer on 32-bit architectures
+ - nfsd: fix jiffies/time_t mixup in LRU list
+ - ubi: fastmap: Fix inverted logic in seen selfcheck
+ - ubi: Fix an error pointer dereference in error handling code
+ - mfd: da9062: Fix watchdog compatible string
- mfd: m5t618: Mark ADC control register volatile
- net: dsa: bcm_sf2: Only 7278 supports 2Gb/sec IMP port
- net_sched: fix a resource leak in tcindex_set_Parms()
- net: systemport: Avoid RBUF stuck in Wake-on-LAN mode
- net: macb: Remove unnecessary alignment check for TSO
- net: macb: Limit maximum GEM TX length in TSO
- bonding/alb: properly access headers in bond_alb_xmit()
- ext4: fix deadlock allocating crypto bounce page from mempool
- btrfs: Get rid of the confusing btrfs_file_extent_inline_len
- Btrfs: fix missing hole after hole punching and fsync when using NO_HOLES
- btrfs: use bool argument in free_root_pointers()
- btrfs: free block groups after free'ing fs trees
- btrfs: remove trivial locking wrappers of tree mod log
- Btrfs: fix race between adding and putting tree mod seq elements and nodes
- drm: atmel-hlcdc: enable clock before configuring timing engine
- KVM: x86: Protect pmu_intel.c from Spectre-v1/L1TF attacks
- btrfs: flush write bio if we loop in extent_write_cache_pages
- KVM: x86: Fix potential put_fpu() w/o load_fpu() on MPX platform
- KVM: x86/mmu: Apply max PA check for MMIO sptes to 32-bit KVM
- KVM: nVMX: vmread should not set rflags to specify success in case of #PF
- KVM: Use vcpu-specific gva->hva translation when querying host page size
- KVM: Play nice with read-only memslots when querying host page size
- KVM: s390: do not clobber registers during guest reset/store status
- cifs: fail i/o on soft mounts if sessionsetup errors out
- clocksoure: Prevent double add_timer_on() for watchdog_timer
- perf/core: Fix mlock accounting in perf_mmap()
- rxrpc: Fix service call disconnection
- ASoC: pcm: update FE/BE trigger order based on the command
- hv_sock: Remove the accept port restriction
- RDMA/netlink: Do not always generate an ACK for some netlink operations
- scsi: ufs: Fix ufs/hcd_probe_hba() reutre value in case
  ufs/hcd_scsi_add_wlus() fails
- PCI/switchtec: Fix vep_vector_number ioread width
- PCI: Don't disable bridge BARs when assigning bus resources
- nfs: NFS_SWAP should depend on SWAP
- NFS/pnfs: Fix pnfs_generic_prepare_to_resend_writes()
- NFSv4: try lease recovery on NFS4ERR_EXPIRED
- serial: uarts: Add a timeout to the tx empty wait
- rtc: hym8563: Return -EINVAL if the time is known to be invalid
- rtc: cmos: Stop using shared IRQ
- ARC: [plat-axs10x]: Add missing multicast filter number to GMAC node
- platform/x86: intel_mid_powerbtn: Take a copy of ddata
- ARM: dts: at91: sama5d3: fix maximum peripheral clock rates
- ARM: dts: at91: sama5d3: define clock rate range for tcb1
- tools/power/acpi: fix compilation error
- powerpc/pseries/vio: Fix iommu_table use-after-free refcount warning
- powerpc/pseries: Allow not having ibm, hypertas-functions::hcall-multi-tce
  for DDW
+ - KVM: arm/arm64: vgic-its: Fix restoration of unmapped collections
+ - ARM: 8949/1: mm: mark free_memmap as __init
+ - arm64: cpufeature: Fix the type of no FP/SIMD capability
+ - KVM: arm/arm64: Fix young bit from mmu notifier
+ - crypto: artpee6 - return correct error code for failed setkey()
+ - crypto: atmel-sha - fix error handling when setting hmac key
+ - media: i2c: adv748x: Fix unsafe macros
+ - pinctrl: sh-pfc: r8a7778: Fix duplicate SDSELF_B and SD1_CLK_B
+ - scsi: megaraid_sas: Do not initiate OCR if controller is not in ready state
+ - serial: uartps: Move the spinlock after the read of the tx empty
+ - mwifiex: Fix possible buffer overflows in mwifiex_ret_wmm_get_status()
+ - mwifiex: Fix possible buffer overflows in mwifiex_cmd_append_vsie_tlv()
+ - libertas: don't exit from lbs_ibss_join_existing() with RCU read lock held
+ - libertas: make lbs_ibss_join_existing() return error code on rates overflow
+ - udf: Allow writing to 'Rewritable' partitions
+ - printk: fix exclusive_console replaying
+ - usb: typec: tcpci: mask event interrupts when remove driver
+ - ALSA: hda: Add Clevo W65_67SB the power_save blacklist
+ - KVM: arm/arm64: Correct AArch32 SPSR on exception entry
+ - crypto: geode-aes - convert to skcipher API and make thread-safe
+ - mfd: xpl20x: Mark AXP20X_VBUS_IPSOUT_MGMT as volatile
+ - scripts/find-unused-docs: Fix massive false positives
+ - padata: Remove broken queue flushing
+ - jbd2_seq_info_next should increase position index
+ - watchdog: fix UAF in reboot notifier handling in watchdog core code
+ - bcache: add readahead cache policy options via sysfs interface
+ - eventfd: track eventfd_signal() recursion depth
+ - x86/kvm: Be careful not to clear KVM_VCPU_FLUSH_TLB bit
+ - drm/amd/dm/mst: Ignore payload update failures
+ - pinctrl: Separate decrypted varaibles anytime encryption can be enabled
+ - drm: msm: mdp4: Adjust indentation in mdp4_dsi_encoder_enable
+ - net: dsa: b53: Always use dev->vlan_enabled in b53_configure_vlan()
+ - drm/dp_mst: Remove VCPI while disabling topology mgr
+ - KVM: x86: Use gpa_t for cr2/gpa to fix TDP support on 32-bit KVM
+ - x86/apic/msi: Plug non-maskable MSI affinity race
+ + 5.4.0-11 crash on cryptsetup open (LP: #1860231) // Bionic update: upstream
+ + stable patchset 2020-03-09 (LP: #1866678)
+ + - dm: fix potential for q->make_request_fn NULL pointer
+ + * r8152 init may take up to 40 seconds at initialization with Dell WD19/WD19DC
+ + during hotplug (LP: #1864284)
+ + - UBUNTU SAUCE: r8152: check disconnect status after long sleep
+ + * The voice recording function cannot work while connecting a headset on a
+ + Dell machine (LP: #1866581)
+ + - SAUCE: ALSA: hda/realtek - Add Headset Mic supported
+ +
+ * xfs fill_fs test in fallocate06 from ubuntu_ltp_syscalls failed
+  (LP: #1865967)
+  - xfs: Fix tail rounding in xfs_alloc_file_space()
+  + * [hns3-0114]net: hns3: fix ETS bandwidth validation bug  (LP: #1859569)
+  - net: hns3: fix ETS bandwidth validation bug
+  + * alsa/hda/realtek: fix a mute led regression on Lenovo X1 Carbon
+  (LP: #1864576)
+  - SAUCE: ALSA: hda/realtek - Fix a regression for mute led on Lenovo Carbon X1
+  + * [hns3-0120]pad the short frame before sending to the hardware (LP: #1860320)
+  - net: hns3: pad the short frame before sending to the hardware
+  + * ipc/sem.c : process loops infinitely in exit_sem() (LP: #1858834)
+  - Revert "ipc, sem: remove unneeded sem_undo_list lock usage in exit_sem()"
+  + * ftrace test in ubuntu_kernel_selftests will timeout randomly (LP: #1864172)
+  - tracing/selftests: Turn off timeout setting
+  + * quotactl07 from ubuntu_ltp_syscalls failed (LP: #1864092)
+  - xfs: Sanity check flags of Q_XQUOTARM call
+  + * [bionic] updates to Exar USB serial driver (LP: #1863834)
+  - SAUCE: xr-usb-serial: Update driver for Exar USB serial ports
+  - SAUCE: xr-usb-serial: re-initialise baudrate after resume from S3/S4
+  - SAUCE: xr-usb-serial: Changes to support updates in struct gpio_chip
+  - SAUCE: xr-usb-serial: fix kbuild
+  + * [bionic] hts221 sensor stops working after resume from S3/S4
+  (LP: #1863732)
+  - SAUCE: iio: humidity: hts221: Fix sensor reads after resume
+  + * Bionic update: upstream stable patchset 2020-02-26 (LP: #1864904)
+  - orinoco_usb: fix interface sanity check
+  - rsi_91x_usb: fix interface sanity check
+  - USB: serial: ir-usb: add missing endpoint sanity check
+  - USB: serial: ir-usb: fix link-speed handling
+  - USB: serial: ir-usb: fix IrLAP framing
+  - usb: dwc3: turn off VBUS when leaving host mode
+  - staging: most: net: fix buffer overflow
+  - staging: wlan-ng: ensure error return is actually returned
+  - staging: vt6656: correct packet types for CTS protect, mode.
+  - staging: vt6656: use NULLFUCTION stack on mac80211
+  - staging: vt6656: Fix false Tx excessive retries reporting.
+  - serial: 8250 bcm2835aux: Fix line mismatch on driver unbind
+  - crypto: chelsio - fix writing tfm flags to wrong place
+  - ath9k: fix storage endpoint lookup
+ - brcmfmac: fix interface sanity check
+ - rtl8xxxxu: fix interface sanity check
+ - zd1211rw: fix storage endpoint lookup
+ - arc: eznps: fix allmodconfig kconfig warning
+ - HID: ite: Add USB id match for Acer SW5-012 keyboard dock
+ - phy: ccapcap-usb: Prevent USB line glitches from waking up modem
+ - watchdog: max77620_wdt: fix potential build errors
+ - watchdog: rn56618_wdt: fix module aliases
+ - spi: spi-dw: Add lock protect dw_spi rx/tx to prevent concurrent calls
+ - drivers/net/b44: Change to non-atomic bit operations on pwol_mask
+ - net: wan: sdl:a: Fix cast from pointer to integer of different size
+ - gpi: max77620: Add missing dependency on GPIOLIB_IRQCHIP
+ - atm: eni: fix uninitialized variable warning
+ - PCI: Add DMA alias quirk for Intel VCA NTB
+ - ush-storage: Disable UAS on JMicron SATA enclosure
+ - net_sched: ematch: reject invalid TCF_EM_SIMPLE
+ - rsi: fix use-after-free on probe errors
+ - crypto: af_al: - Use bh_lock_sock in sk_destruct
+ - vfs: fix do_last() regression
+ - x86/resctrl: Fix use-after-free when deleting resource groups
+ - x86/resctrl: Fix use-after-free due to inaccurate refcount of rdtgroup
+ - x86/resctrl: Fix a deadlock due to inaccurate reference
+ - crypto: pcrpt - Fix user-after-free on module unload
+ - perf c2c: Fix return type for histogram sorting comparision functions
+ - PM / devfreq: Add new name attribute for sysfs
+ - tools lib: Fix builds when glibc contains strlcpy()
+ - arm64: kbuild: remove compressed images on 'make ARCH=arm64 (dist)clean'
+ - ext4: valdate the debug_want_extra_isize mount option at parse time
+ - mm/mempolicy.c: fix out of bounds write in mpol_parse_str()
+ - reiserfs: Fix memory leak of journal device string
+ - media: digtv: don't continue if remote control state can't be read
+ - media: af9005: uninitialized variable printed
+ - media: gspca: zero usb_buf
+ - media: dvb-usb/dvb-usb-urb.c: initialize actlen to 0
+ - ttyprintk: fix a potential deadlock in interrupt context issue
+ - Bluetooth: Fix race condition in hci_release_sock()
+ - cgroup: Prevent double killing of css when enabling thraeded cgroup
+ - media: si470x-i2c: Move free() past last use of ‘radio’
+ - ARM: dts: sun8i: a83t: Correct USB3503 GPIOs polarity
+ - ARM: dts: beagle-x15-common: Model 5V0 regulator
+ - soc: ti: wkup_m3_ipc: Fix race condition with rproc_boot
+ - mac80211: mesh: restrict airtime metric to peered established plinks
+ - clk: mmp: Fix the order of timer mux parents
+ - ixgbevf: Remove limit of 10 entries for unicast filter list
+ - ixgbe: Fix calculation of queue with VFs and flow director on interface flap
+ - igb: Fix SGMII SFP module discovery for 100FX/LX.
+ - ASOC: sti: fix possible sleep-in-atomic
+ - qmi_wwan: Add support for Quectel RM500Q
+ - wireless: fix enabling channel 12 for custom regulatory domain
+ - cfg80211: Fix radar event during another phy CAC
+ - mac80211: Fix TKIP replay protection immediately after key setup
+ - wireless: wext: avoid gcc -O3 warning
+ - net: dsa: bcm_sf2: Configure IMP port for 2Gb/sec
+ - hnx_t_en: Fix ipv6 RFS filter matching logic.
+ - ARM: dts: am335x-boneblack-common: fix memory size
+ - vt[6]: fix packet tx through bpf_redirect()
+ - scsi: fnic: do not queue commands during fwreset
+ - ARM: 8955/1: virt: Relax arch timer version check during early boot
+ - tee: optee: Fix compilation issue with nommu
+ - airo: Fix possible info leak in AIOOLDIOCTL/SIOCDEVPRIVATE
+ - airo: Add missing CAP_NET_ADMIN check in AIOOLDIOCTL/SIOCDEVPRIVATE
+ - r8152: get default setting of WOL before initializing
+ - qlcnic: Fix CPU soft lockup while collecting firmware dump
+ - powerpc/fsl/dts: add fsl.erratum-a011043
+ - net/fsl: treat fsl.erratum-a011043
+ - net: fsl/fman: rename IF_MODE_XGMII to IF_MODE_10G
+ - seq_tab_next() should increase position index
+ - I2t_seq_next should increase position index
+ - net: Fix skb->csum update in inet_proto_csum_replace16().
+ - btrfs: do not zero f_bavail if we have available space
+ - perf report: Fix no libunwind compiled warning break s390 issue
+ - iio: st_gyro: Correct data for LSM9DS0 gyro
+ - net_sched: fix ops->bind_class() implementations
+ - HID: Add quirk for Xin-Mo Dual Controller
+ - HID: Add quirk for incorrect input length on Lenovo Y720
+ - phy: qcom-qmp: Increase PHY ready timeout
+ - platform/x86: dell-laptop: disable kbd backlight on Inspiron 10XX
+ - sched/fair: Add tmp_alone_branch assertion
+ - sched/fair: Fix insertion in rq->leaf_cfs_rq_list
+ - random: try to actively add entropy rather than passively wait for it
+ - block: cleanup __blkdev_issue_discard()
+ - block: fix 32 bit overflow in __blkdev_issue_discard()
+ - media: vp7045: do not read uninitialized values if usb transfer fails
+ - tomoyo: Use atomic_t for statistics counter
+ - tools lib traceevent: Fix memory leakage in filter_event
+ - parisc: Use proper printk format for resource_size_t
+ - riscv: delete temporary files
+ - ARM: dts: am43x-epos-evm: set data pin directions for spi0 and spi1
+ - Bionic update: upstream stable patchset 2020-02-21 (LP: #1864261)
+ - firestream: fix memory leaks
+ - gtp: make sure only SOCK_DGRAM UDP sockets are accepted
+ - ipv6: sr: remove SKB_GSO_IPXIP6 on End.D* actions
+ - net: cxgb3_main: Add CAP_NET_ADMIN check to CHELSIO_GET_MEM
+ - net, ip6_tun: fix namespaces move
+ - net, ip_tun: fix namespaces move
+ - net_sched: fix datalen for ematch
+ - net-sysfs: Fix reference count leak in rxnetdev_queue_add_kobject
+ - net-sysfs: fix netdev_queue_add_kobject() breakage
+ - net-sysfs: Call dev_hold always in netdev_queue_add_kobject
+ - net-sysfs: Call dev_hold always in rx_queue_add_kobject
+ - net-sysfs: Fix reference count leak
+ - net: usb: lan78xx: Add .ndo_features_check
+ - tcp_bbr: improve arithmetic division in bbr_update_bw()
+ - net: rtnetlink: validate IFLA_MTU attribute in rtnl_create_link()
+ - hwmon: (adt7475) Make volt2reg return same reg as reg2volt input
+ - hwmon: (core) Do not use device managed functions for memory allocations
+ - Input: keyspan-remote - fix control-message timeouts
+ - Revert "Input: synaptics-rmi4 - don't increment rmiaddr for SMBus transfers"
+ - ARM: 8950/l: ftrace/recording姗 aftermath relocation types
+ - mmc: tegra: fix SDR50 tuning override
+ - mmc: sdhci: fix minimum clock rate for v3 controller
+ - Documentation: Document arm64 kpti control
+ - Input: pm8xxx-vib - fix handling of separate enable register
+ - Input: sur40 - fix interface sanity checks
+ - Input: gtco - fix endpoint sanity check
+ - Input: aiptek - fix endpoint sanity check
+ - Input: pegasus_notetaker - fix endpoint sanity check
+ - Input: sun4i-ts - add a check for devm_thermal_zone_of_sensor_register
+ - hwmon: (nct7802) Fix voltage limits to wrong registers
+ - scsi: RDMA/isert: Fix a recently introduced regression related to logout
+ - tracing: xen: Ordered comparison of function pointers
+ - do_last(): fetch directory ->i_mode and ->i_uid before it's too late
+ - sd: Fix REQ_OP_ZONE_REPORT completion handling
+ - coresight: etb10: Do not call smp_processor_id from preemptible
+ - coresight: tmc-etf: Do not call smp_processor_id from preemptible
+ - libertas: Fix two buffer overflows at parsing bss descriptor
+ - media: v4l2-iocl.c: zero reserved fields for S/TRY_FMT
+ - scsi: iscsi: Avoid potential deadlock in iscsi_if_rx func
+ - md: Avoid namespace collision with bitmap API
+ - bitmap: Add bitmap_alloc(), bitmap_zalloc() and bitmap_free()
+ - netfilter: ipset: use bitmap infrastructure completely
+ - net/x25: fix nonblocking connect
+ - net: bcmgenet: Use netif_tx_napi_add() for TX NAPI
+ - Revert "udp: do rmem bulk free even if the rx sk queue is empty"
+ - tcp: do not leave dangling pointers in tp->highest_sack
+ - tun: add mutex_unlock() call and napi.skb clearing in tun_get_user()
+ - PCI: Mark AMD Navi14 GPU rev 0xc5 ATS as broken
+ - net/sonic: Add mutual exclusion for accessing shared state
+ - net/sonic: Clear interrupt flags immediately
+ - net/sonic: Use MMIO accessors
+ - net/sonic: Fix interface error stats collection
+ - net/sonic: Fix receive buffer handling
+ - net/sonic: Avoid needless receive descriptor EOL flag updates
+ - net/sonic: Improve receive descriptor status flag check
+ - net/sonic: Fix receive buffer replenishment
+ - net/sonic: Quiesce SONIC before re-initializing descriptor memory
+ - net/sonic: Fix command register usage
+ - net/sonic: Fix CAM initialization
+ - net/sonic: Prevent tx watchdog timeout
+ - crypto: geode-aes - switch to skcipher for cbc(aes) fallback
+ - mm, sparse: drop pgdat_resize_lock in sparse_add/remove_one_section()
+ - drivers/base/memory.c: remove an unnecessary check on NR_MEM_SECTIONS
+ - drivers/base/memory.c: clean up relics in function parameters
+ - mm, memory_hotplug: update a comment in unregister_memory()
+ - drivers/base/memory: pass a block_id to init_memory_block()

+ * Miscellaneous Ubuntu changes
+ - update dkms package versions

+-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Mon, 16 Mar 2020 15:19:49 +0100
+linux (4.15.0-91.92) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-91.92 -proposed tracker (LP: #1865109)
+
+ * CVE-2020-2732
+ - KVM: x86: emulate RDPID
+ - KVM: nVMX: Don't emulate instructions in guest mode
+ - KVM: nVMX: Refactor IO bitmap checks into helper function
+ - KVM: nVMX: Check IO instruction VM-exit conditions

+-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Fri, 28 Feb 2020 11:45:02 +0100
+linux (4.15.0-90.91) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-90.91 -proposed tracker (LP: #1864753)
+
+ * dkms artifacts may expire from the pool (LP: #1850958)
+ - [Packaging] autoreconstruct -- manage executable debian files
+ - [packaging] handle downloads from the librarian better
+
+-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 26 Feb 2020 10:36:57 +0100
+linux (4.15.0-90.90) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-90.90 -proposed tracker (LP: #1864753)
+
+ * vm-segv from ubuntu_stress_smoke_test failed on B (LP: #1864063)
+ - Revert "apparmor: don't try to replace stale label in ptrace access check"
+
+-- Khalid Elmously <khalid.elmously@canonical.com> Tue, 25 Feb 2020 20:25:49 -0500
+ linux (4.15.0-89.89) bionic; urgency=medium
+ * bionic/linux: 4.15.0-89.89 - proposed tracker (LP: #1863350)
+ + [SRU][B/OEM-B] Fix multitouch support on some devices (LP: #1862567)
+ - HID: core: move the dynamic quirks handling in core
+ - HID: quirks: move the list of special devices into a quirk
+ - HID: core: move the list of ignored devices in hid-quirks.c
+ - HID: core: remove the absolute need of hid_have_special_driver[]
+ + [linux] Patch to prevent possible data corruption (LP: #1848739)
+ - blk-mq: silence false positive warnings in hctx_unlock()
+ + * Add bpftool to linux-tools-common (LP: #1774815)
+ - tools/bpftool: fix bpftool build with bintutils >= 2.9
+ - bpftool: make libbfd optional
+ - [Debian] Remove bintutils-dev build dependency
+ - [Debian] package bpftool in linux-tools-common
+ + * Root can lift kernel lockdown via USB/IP (LP: #1861238)
+ - Revert "UBUNTU: SAUCE: (efi-lockdown) Add a SysRq option to lift kernel lockdown"
+ + * [Bionic] i915 incomplete fix for CVE-2019-14615 (LP: #1862840) // CVE-2020-8832
+ - drm/i915: Use same test for eviction and submitting kernel context
+ - drm/i915: Define an engine class enum for the uABI
+ - drm/i915: Force the switch to the i915->kernel_context
+ - drm/i915: Move GT powersaving init to i915_gem_init()
+ - drm/i915: Move intel_init_clock_gating() to i915_gem_init()
+ - drm/i915: Inline intel_modeset_gem_init()
+ - drm/i915: Mark the context state as dirty/written
+ - drm/i915: Record the default hw state after reset upon load
+ + * Bionic update: upstream stable patchset 2020-02-12 (LP: #1863019)
+ - xfs: Sanity check flags of Q_XQUOTARM call
+ - mfd: intel-lpss: Add default I2C device properties for Gemini Lake
+ - powerpc/archrandom: fix arch_get_random_seed_int()
+ - tipc: fix wrong timeout input for tipc_wait_for_cond()
+ - mt7601u: fix bbp version check in mt7601u_wait_bbp_ready
+ - crypto: sun4i-ss - fix big endian issues
+ - drm/sti: do not remove the drm_bridge that was never added
+ - drm/virtio: fix bounds check in virtio_gpu_cmd_get_capset()
+ - ALSA: hda: fix unused variable warning
+ - apparmor: don't try to replace stale label in ptrace access check
+ - PCI: iproc: Remove PAXC slot check to allow VF support
+ - drm/hisilicon: hibmc: Don't overwrite fb helper surface depth
+ - IB/rxe: replace kvfree with vfree
+ - IB/hfi1: Add mtu check for operational data VLs
+ - ALSA: usb-audio: update quirk for B&W PX to remove microphone
+ - staging: comedi: ni_mio_common: protect register write overflow
+ - pwm: lpsps: Release runtime-pm reference from the driver's remove callback
+ - drm/sun4i: hdmi: Fix double flag assignation
+ - mlxsw: reg: QEEC: Add minimum shaper fields
+ - NTB: nt_hw_idt: replace IS_ERR_OR_NULL with regular NULL checks
+ - pcrypt: use format specifier in kobject_add
+ - exportfs: fix 'passing zero to ERR_PTR()' warning
+ - net: phy: Fix not to call phy_resume() if PHY is not attached
+ - IB/rxe: Fix incorrect cache cleanup in error flow
+ - staging: bcm2835-camera: Abort probe if there is no camera
+ - switchtec: Remove immediate status check after submitting MRPC command
+ - pinctrl: sh-pfc: r8a7740: Add missing REF125CK pin to gather_gmii group
+ - pinctrl: sh-pfc: r8a7740: Add missing LCD0 marks to lcd0_data24_1 group
+ - pinctrl: sh-pfc: r8a7791: Remove bogus ctrl marks from qspi_data4_b group
+ - pinctrl: sh-pfc: r8a7791: Remove bogus marks from vin1_b_data18 group
+ - pinctrl: sh-pfc: sh73a0: Add missing TO pin to tpu4_to3 group
+ - pinctrl: sh-pfc: r8a7794: Remove bogus IPSR9 field
+ - pinctrl: sh-pfc: sh7734: Add missing IPSR11 field
+ - pinctrl: sh-pfc: r8a7795: Remove bogus SEL_PWM[0-3]_3 configurations
+ - pinctrl: sh-pfc: sh7269: Add missing PCIOR0 field
+ - pinctrl: sh-pfc: sh7734: Remove bogus IPSR10 value
+ - vxlan: changelink: Fix handling of default remotes
+ - Input: nomadik-ske-keypad - fix a loop timeout test
+ - clk: highbank: fix refcount leak in hb_clk_init()
+ - clk: qoriq: fix refcount leak in clockgen_init()
+ - clk: socfpga: fix refcount leak
+ - clk: samsung: exynos4: fix refcount leak in exynos4_get_xom()
+ - clk: imx6q: fix refcount leak in imx6q_clocks_init()
+ - clk: imx6sx: fix refcount leak in imx6sx_clocks_init()
+ - clk: imx7d: fix refcount leak in imx7d_clocks_init()
+ - clk: vf610: fix refcount leak in vf610_clocks_init()
+ - clk: armada-370: fix refcount leak in a370_clk_init()
+ - clk: kirkwood: fix refcount leak in kirkwood_clk_init()
+ - clk: armada-xp: fix refcount leak in axp_clk_init()
+ - clk: mv98dx3236: fix refcount leak in mv98dx3236_clk_init()
+ - clk: dove: fix refcount leak in dove_clk_init()
+ - MIPS: BCM63XX: drop unused and broken DSP platform device
+ - IB/usnic: Fix out of bounds index check in query pkey
+ - RDMA/ocrdma: Fix out of bounds index check in query pkey
+ - RDMA/qedr: Fix out of bounds index check in query pkey
+ - drm/shmob: Fix return value check in shmob_drm_probe
+ - arm64: dts: aqpg8016-sbc: Increase load on 111 for SDCARD
+ - spi: cadence: Correct initialisation of runtime PM
+ - RDMA/iw_cxgb4: Fix the unchecked ep dereference
+ - drm/etnaviv: NULL vs IS_ERR() buf in etnaviv_core_dump()
+ - media: s5p-jpeg: Correct step and max values for
+ - V4L2_CID_JPEG_RESTART_INTERVAL
+ - kbuild: mark prepare0 as PHONY to fix external module build
+ - crypto: bcm - Fix some set-but-not-used warning
+ - crypto: tgr192 - fix unaligned memory access
+ - ASoC: imx-sgd5000: put of nodes if finding codec fails
+ - IB/iser: Pass the correct number of entries for dma mapped SGL
+ - rtc: cms: ignore bogus century byte
+ - spi/topcliff_pch: Fix potential NULL dereference on allocation error
+ - clk: sunxi-ng: sun8i-a23: Enable PLL-MIPI LDOs when ungating it
+ - iwwifi: mvm: avoid possible access out of array.
+ - net/mlx5: Take lock with IRQs disabled to avoid deadlock
+ - iwwifi: mvm: fix A-MPDU reference assignment
+ - tty: ipwireless: Fix potential NULL pointer dereference
+ - driver: uio: fix possible memory leak in _uio_register_device
+ - driver: uio: fix possible use-after-free in __uio_register_device
+ - crypto: crypto4xx - Fix wrong ppc4xx_trng_probe()/ppc4xx_trng_remove()
  + arguments
+ - driver core: Do not resume suppliers under device_links_write_lock()
+ - ARM: dts: lpc32xx: add required clocks property to keypad device node
+ - ARM: dts: lpc32xx: reparent keypad controller to SIC1
+ - ARM: dts: lpc32xx: fix ARM PrimeCell LCD controller variant
+ - ARM: dts: lpc32xx: fix ARM PrimeCell LCD controller clocks property
+ - ARM: dts: lpc32xx: phy3250: fix SD card regulator voltage
+ - iwwifi: mvm: fix RSS config command
+ - staging: most: cdev: add missing check for cdev_add failure
+ - rtc: ds1672: fix unintended sign extension
+ - thermal: mediatek: fix register index error
+ - net: phy: fixed_phy: Fix fixed phy not checking GPIO
+ - rtc: ds1307: rx8130: Fix alarm handling
+ - rtc: 88pm860x: fix unintended sign extension
+ - rtc: 88pm80x: fix unintended sign extension
+ - rtc: pm8xxx: fix unintended sign extension
+ - fbdev: chipsfb: remove set but not used variable 'size'
+ - iw_cxgb4: use tos when importing the endpoint
+ - iw_cxgb4: use tos when finding ipv6 routes
+ - drm/etnaviv: potential NULL dereference
+ - pinctrl: sh-pfc: emev2: Add missing pinmux functions
+ - pinctrl: sh-pfc: r8a7791: Fix scibh2_data_c pin group
+ - pinctrl: sh-pfc: r8a7792: Fix vin1_data18_b pin group
+ - pinctrl: sh-pfc: sh73a0: Fix fsic_spdif pin groups
+ - PCI: endpoint: functions: Use memcpy_fromio()/memcpy_toio()
+ - usb: phy: twl6030-usb: fix possible use-after-free on remove
+ - block: don't use bio->bi_vcnt to figure out segment number
+ - keys: Timestamp new keys
+ - vfio_pci: Enable memory accesses before calling pci_map_rom
+ - hwmon: (pmbus/tps53679) Fix driver info initialization in probe routine
+ - KVM: PPC: Release all hardware TCE tables attached to a group
+ - staging: r8822be: check kzalloc return or bail
+ - dmaengine: mv_xor: Use correct device for DMA API
+ - cdc-wdm: pass return value of recover_from_urb_loss
+ - regulator: pv88060: Fix array out-of-bounds access
+ - regulator: pv88080: Fix array out-of-bounds access
+ - regulator: pv88090: Fix array out-of-bounds access
+ - net: dsa: qca8k: Enable delay for RGMII_ID mode
+ - drm/neweau/bios/rmcfg: fix missing parentheses when calculating RON
+ - drm/neweau/pm: don't print reply values if exec is false
+ - ASoC: qcom: Fix of-node refcount unbalance in apq8016_sbc_parse_of()
+ - fs/nfs: Fix nfs_parse_devname to not modify it's argument
+ - staging: rtlwifi: Use proper enum for return in halmac_parse_psd_data_88xx
+ - powerpc/64s: Fix logic when handling unknown CPU features
+ - NFS: Fix a soft lockup in the delegation recovery code
+ - clocksource/drivers/sun5i: Fail gracefully when clock rate is unavailable
+ - clocksource/drivers/exynos_mct: Fix error path in timer resources
+ - initialization
+ - platform/x86: wmi: fix potential null pointer dereference
+ - NFS/pnfs: Bulk destroy of layouts needs to be safe w.r.t. umount
+ - mmc: sdhci-brcmstb: handle mmc_of_parse() errors during probe
+ - ARM: 8847/1: pm: fix HYP/SVC mode mismatch when MPCM is used
+ - ARM: 8848/1: virt: Align GIC version check with arm64 counterpart
+ - regulator: wm831x-dcdc: Fix list of wm831x_dcdc_ilim from mA to uA
+ - netfilter: nft_set_hash: fix lookups with fixed size hash on big endian
+ - NFSv4/flexfiles: Fix invalid deref in FF_LAYOUT_DEVID_NODE()
+ - net: aquantia: fix invalid struct overlow
+ - netfunc/mm: Check secondary hash page table
+ - nios2: ksym: Add missing symbol exports
+ - x86/mm: Remove unused variable 'cpu'
+ - scsi: megaraid_sas: reduce module load time
+ - drivers/rapidio/rio_cm.c: fix potential oops in riocm_ch_listen()
+ - xen, cpu_hotplug: Prevent an out of bounds access
+ - net: sh_eth: fix a missing check of of_get_phy_mode
+ - regulator: lp87565: Fix missing register for LP87565_BUCK_0
+ - media: ivtv: update *pos correctly in ivtv_read_pos()
+ - media: cx18: update *pos correctly in cx18_read_pos()
+ - media: w1128x: Fix an error code in fm_download_firmware()
+ - media: cx23885: check allocation return
+ - regulator: tsp65086: Fix tsp65086_ida01_ranges for selector 0xB
+ - jfs: fix bogus variable self-initialization
+ - tipc: tipc clang warning
+ - m68k: mac: Fix VIA timer counter accesses
+ - arm64: dts: allwinner: a64: Add missing PIO clocks
+ - ARM: OMAP2+: Fix potentially uninitialized return value for _setup_reset()
+ - media: davinci-isif: avoid uninitialized variable use
+ - media: tw5864: Fix possible NULL pointer dereference in tw5864_handle_frame
+ - spi: tegra114: clear packed bit for unpacked mode
- spi: tegra114: fix for unpacked mode transfers
- spi: tegra114: terminate dma and reset on transfer timeout
- spi: tegra114: flush fifos
- spi: tegra114: configure dma burst size to fifo trig level
- soc/fsl/qe: Fix an error code in qe_pin_request()
- spi: bcm2835aux: fix driver to not allow 65535 (=1) cs-gpios
- ehea: Fix a copy-paste err in ehea_init_port_res
- scsi: qla2xxx: Unregister chrdev if module initialization fails
- scsi: target/core: Fix a race condition in the LUN lookup code
- ARM: pxa: sspx: Fix "WARNING: invalid free of devm_allocated data"
- net: hns3: fix for vport->bw_limit overflow problem
- hwmon: (w83627hf) Use request_mixed_region for Super-IO accesses
- platform/x86: alienware-wmi: fix kfree on potentially uninitialized pointer
- tipc: set sysctl_tipc_rmem and named_timeout right range
- selftests/ipc: Fix msgque compiler warnings
- powerpc: vdso: Make vdso32 installation conditional in vdso_install
- ARM: dts: ls1021: Fix SGMII PCS link remaining down after PHY disconnect
- media: ov2659: fix valid stream condition
- NFS: Don't interrupt file writeout due to fatal errors
- irqchip/gic-v3-its: fix some definitions of inner cacheability attributes
- scsi: qla2xxx: Fix a format specifier
- scsi: qla2xxx: Avoid that qlt_sendResp_ctio() corrupts memory
- packet: in recvmsg msg_name return at least sizeof sockaddr_ll
- ASoC: Fix valid stream condition
- usb: gadget: fsl: fix link error against usb-gadget module
- dwc2: gadget: Fix completed transfer size calculation in DDMA
- IB/mlx5: Add missing XRC options to QP optional params mask
- iommu/vt-d: Make kernel parameter igfx_off work with vIOMMU
- dmaengine: tegra210-adma: restore channel status
- mmc: core: fix possible use after free of host
- backlight: lm3630a: Return 0 on success in update_status functions
- thermal: cpu_cooling: Actually trace CPU load in thermal_power_cpu_get_power
- EDAC/mc: Fix edac_mc_find() in case no device is found
- ARM: dts: sun8i-h3: Fix wifi in Beelink X2 DT
- dmaengine: tegra210-adma: Fix crash during probe
- arm64: dts: meson: librettech-cc: set eMMC as removable
- RDMA/qedr: Fix incorrect device rate.
- spi: spi-fsl-spi: call spi_finalize_current_message() at the end
- crypto: ccp - fix AES CFB error exposed by new test vectors
- crypto: ccp - Fix 3DES complaint from ccp-crypto module
- serial: stm32: fix rx error handling
- serial: stm32: fix transmit_chars when tx is stopped
- serial: stm32: Add support of TC bit status check
- serial: stm32: fix wakeup source initialization
- misc: sgi-xp: Properly initialize buf in xpc_get_rsvd_page_pa
- iommu: Use right function to get group for device
- signal/cifs: Fix cifs_put_tcp_session to call send_sig instead of force_sig
- inet: frags: call inet_frags_fini() after unregister_pernet_subsys()
- netvsc: unshare skb in VF rx handler
- cpufreq: bcmstb-avs-cpufreq: Fix initial command check
- cpufreq: bcmstb-avs-cpufreq: Fix types for voltage/frequency
- media: vivid: fix incorrect assignment operation when setting video mode
- mpls: fix warning with multi-label encap
- iommu/vt-d: Duplicate iommu_resv_region objects per device list
- qed: iWARP - Use READ_ONCE and smp_store_release to access ep->state
- powerpc/cacheinfo: add cachinfo_teardown, cachinfo_rebuild
- powerpc/pseries/mobility: rebuild cachinfo hierarchy post-migration
- drm/msm/mdp5: Fix mdp5_cfg_init error return
- net: netem: fix backlog accounting for corrupted GSO frames
- net/af_iucv: always register net_device notifier
- ASoC: ti: davinci-mcasp: Fix slot mask settings when using multiple AXRs
- rtc: pcf8563: Fix interrupt trigger method
- rtc: pcf8563: Clear event flags and disable interrupts before requesting irq
- drm/msm/a3xx: remove TPL1 regs from snapshot
- perf/ioct: Add check for the sample_period value
- dmaengine: hsu: Revert "set HSU_CH_MTSR to memory width"
- clk: qcom: Fix WUnused-const-variable
- nvmem: imx-ocotp: Ensure WAIT bits are preserved when setting timing
- bnxt_en: Fix ethtool selftest crash under error conditions.
- iommu/amd: Make iommu_disable safer
- mfd: intel-lpss: Release IDA resources
- rxrpc: Fix uninitialized error code in rxrpc_send_data_packet()
- devres: allow const resource arguments
- net: pasemi: fix an use-after-free in pasemi_mac_phy_init()
- scsi: libfc: fix null pointer dereference on a null lport
- clk: sunxi-ng: v3s: add the missing PLL_DDR1
- PM: sleep: Fix possible overflow in pm_system_cancel_wakeup()
- libertas_if: Use correct channel range in lbtf_geo_init
- qed: reduce maximum stack frame size
+ - usb: host: xhci-hub: fix extra endianness conversion
+ - mic: avoid statically declaring a 'struct device'.
+ - x86/kgbd: Use NMI_VECTOR not APIC_DM_NMI
+ - crypto: ccp - Reduce maximum stack usage
+ - ALSA: aoa: onyx: always initialize register read value
+ - tipc: reduce risk of wakeup queue starvation
+ - ARM: dts: stm32: add missing vdda-supply to adc on stm32h743i-eval
+ - net/mlx5: Fix mlx5_ifc_query_lag_out_bits
+ - cifs: fix mmmod regression in cifs.ko caused by force_sig changes
+ - crypto: caam - free resources in case caam_rng registration failed
+ - ext4: set error return correctly when ext4_htree_store_dirent fails
+ - ASoC: es8328: Fix copy-paste error in es8328_right_line_controls
+ - ASoC: es4349: Use PM ops 'cs4349_runtime_pm'
+ - ASoC: wm8737: Fix copy-paste error in wm8737_snd_controls
+ - net/rds: Add a few missing rds_stat_names entries
+ - bnxt_en: Fix handling FRAG_ERR when NVM_INSTALL_UPDATE cmd fails
+ - signal: Allow cifs and drbd to receive their terminating signals
+ - ASoC: sun4i-i2s: Use PM ops 'cs4349_runtime_pm'
+ - dmaengine: dw: platform: Switch to acpi_dma_controller_register()
+ - mac80211: minstreli: fix per-group max throughput rate initialization
+ - media: atmel: atmel-isi: fix timeout value for stop streaming
+ - rtc: pcf2127: bugfix: read rtc disables watchdog
+ - smps: avoid explicit UB in assignment of smps_io_port_base
+ - iommumediatek: Fix iova_to_phys PA start for 4GB mode
+ - ahci: Do not export local variable ahci_em_messages
+ - Partially revert "kfifo: fix kfifo_alloc() and kfifo_init()"
+ - hwmon: (lm75) Fix write operations for negative temperatures
+ - power: supply: Init device watchdog after device_add()
+ - x86, perf: Fix the dependency of the x86 insn decoder selftest
+ - staging: greybus: light: fix a couple double frees
+ - irqdomain: Add the missing assignment of domain->fwnode for named fwnode
+ - bcma: fix incorrect update of BCMA_CORE_PCI_MDI0_DATA
+ - iio: dac: ad5380: fix incorrect assignment to val
+ - ath9k: dynack: fix possible deadlock in ath_dynack_node_{de}init
+ - tty: serial: fsl_lpuart: Use appropriate lpuart32_* I/O func
+ - net: sonic: return NETDEV_TX_OK if failed to map buffer
+ - scsi: fnic: fix msix interrupt allocation
+ - Btrfs: fix hang when loading existing inode cache off disk
+ - Btrfs: fix inode cache waiters hanging on failure to start caching thread
+ - Btrfs: fix inode cache waiters hanging on path allocation failure
+ - btrfs: use correct count in btrfs_file_write_iter()
+ - ixgbe: sync the first fragment unconditionally
+ - hwmon: (shtc1) fix shtc1 and shtw1 id mask
+ - net: sonic: replace dev_kfree_skb in sonic_send_packet
+ - pinctrl: iproc-gpio: Fix incorrect pinconf configurations
+ - ath10k: adjust skb length in ath10k_sdio_mbox_rx_packet
+ - RDMA/cma: Fix false error message
+ - net/rds: Fix 'ib_evt_handler_call' element in 'rds_ib_stat_names'
+ - iommu/amd: Wait for completion of IOTLB flush in attach_device
+ - net: aquantia: Fix aq_vec_isr_legacy() return value
+ - net: hisilicon: Fix signedness bug in hix5hd2_dev_probe()
+ - net: broadcom/bcm5sport: Fix signedness in bcm5sport_probe()
+ - net: stmmac: dmac-meson8b: Fix signedness bug in probe
+ - net: axiernet: fix a signedness bug in probe
+ - of: mdio: Fix a signedness bug in of_phy_get_and_connect()
+ - net: ethernet: stmmac: Fix signedness bug in ipq806x_gmac_of_parse()
+ - nvme: retain split access workaround for capability reads
+ - net: stmmac: gmac4+: Not all Unicast addresses may be available
+ - mac80211: accept deauth frames in IBSS mode
+ - ltc: fix another potential sk_buff leak in ltc_ui_sendmsg()
+ - ltc: fix sk_buff refcounting in ltc_conn_state_process()
+ - net: stmmac: fix length of PTP clock's name string
+ - act_mirred: Fix mirred_init_module error handling
+ - net: avoid possible false sharing in sk_leave_memory_pressure()
+ - net: add [READ|WRITE]_ONCE() annotations on ->rskq_accept_head
+ - tcp: annotate lockless access to tcp_memory_pressure
+ - drm/msm/dsi: Implement reset correctly
+ - dmaengine: imx-sdma: fix size check for sdma script_number
+ - net: fix error path for corrupted GSO frames
+ - net: netem: correct the parent's backlog when corrupted packet was dropped
+ - net: qca_spi: Move reset_count to struct qcaspi
+ - afs: Fix large file support
+ - MIPS: Loongson: Fix return value of loongson_hwmon_init
+ - hv_netvsc: flag software created hash value
+ - net: neigh: use long type to store jiffies delta
+ - packet: fix data-race in fanout_flow_is_huge()
+ - mmc: sdio: fix w11251 vendor id
+ - mmc: core: fix w1251 sdio quirks
+ - afs: fix a memory leak in afs_remount
+ - dmaengine: ti: edma: fix missed failure handling
+ - drm/radeon: fix bad DMA from INTERRUPT_CNTL2
+ - arm64: dts: junoo: Fix UART frequency
+ - IB/iser: Fix dma_nents type definition
+ - serial: stm32: fix clearing interrupt error flags
+ - m68k: Call timer_interrupt() with interrupts disabled
+ - SUNRPC: Fix svcauth_gss_proxy_init()
+ - perf map: No need to adjust the long name of modules
+ - ipmi: Fix memory leak in __ipmi_bmc_register
+ - apparmor: Fix network performance issue in aa_label_sk_perm
+ - firmware: coreboot: Let OF core populate platform device
+ - bridge: br_arp_nd_proxy: set icmp6 router if neigh has NTF_ROUTER
+ - signal/a64: Use the generic force_sigsev in setup_frame
+ - ASoC: wm9712: fix unused variable warning
+ - genirq/debugfs: Reinstate full OF path for domain name
+ - usb: gadget: fsl_udc_core: check allocation return value and cleanup on
    failure
- cfg80211: regulatory: make initialization more robust
- net: socionext: Add dummy PHY register read in phy_write()
- mlxsw: spectrum: Set minimum shaper on MC TCs
- pinctrl: meson-gx: remove invalid GPIOX tsin_a pins
- drm: car-du: Fix vblank initialization
- arm64: dts: meson-gx: Add hdmi_5v regulator as hdmi tx supply
- IB/hfi1: Correctly process FECN and BECN in packets
- OPP: Fix missing debugfs supply directory for OPPs
- staging: bcm2835-camera: fix module autoloading
- fork.memcg: fix crash in free_thread_stack on memcg charge fail
- arm64: defconfig: Re-enable bcm2835-thermal driver
- remoteproc: qcom: q6v5-mss: Add missing clocks for MSM8996
- remoteproc: qcom: q6v5-mss: Add missing regulator for MSM8996
- drm: Fix error handling in drm_legacy_addctx
- ARM: dts: r8a7743: Remove generic compatible string from iic3
- drm/etnaviv: fix some off by one bugs
- fork, memcg: fix cached_stacks case
- net: hns3: fix wrong combined count returned by ethtool -l
- net: hns3: fix bug of ethtool_ops.get_channels for VF
- ARM: dts: sun8i-a23-a33: Move NAND controller device node to sort by address
- clk: ingenic: jz4740: Fix gating of UDC clock
- ntb_hw_switchtec: NT req id mapping table register entry number should be
  512
- net: dsa: b53: Fix default VLAN ID
- net: dsa: b53: Properly account for VLAN filtering
- net: dsa: b53: Do not program CPU port's PVID
- drm/nouveaux: fix missing break in switch statement
- net: dsa: fix unintended change of bridge interface STP state
- perf: Copy parent's address filter offsets on clone
- netfilter: nft_set_hash: bogus element self comparison from deactivation
- path
- iommu/vt-d: Fix NULL pointer reference in intel_svm_bind_mm()
- NFS: Add missing encode / decode sequence_maxsz to v4.2 operations
- ARM: dts: sun8i: a33: Reintroduce default pinctrl muxing
- ARM: dts: sun9i: optimus: Fix fixed-regulators
- bus: ti-sysc: Fix sysc_unprepare() when no clocks have been allocated
- arm64/vdso: don't leak kernel addresses
- rtc: mt6397: Don't call irq_dispose_mapping.
- bpf: Add missed newline in verifier verbose log
- ACPI: button: reinitialize button state upon resume
- soc: amlogic: meson-gx-pwrc-vpu: Fix power on/off register bitmask
- net: hns3: fix loop condition of hns3_get_tx_timeo Queue_info()
- afs: Fix AFS file locking to allow fine grained locks
- afs: Further fix file locking
- scsi: qla2xxx: Fix error handling in qlt_alloc_qfull_cmd()
- KVM: PPC: Book3S HV: Fix lockdep warning when entering the guest
- vfio/mdev: Follow correct remove sequence
- ALSA: aica: Fix a long-time build breakage
+  - nfp: bpf: fix static check error through tightening shift amount adjustment
+  - thermal: rcar_gen3_thermal: fix interrupt type
+  - afs: Fix lock-wait/callback-break double locking
+  - afs: Fix double inc of vnode->cb_break
+  - clk: meson: gxbb: no spread spectrum on mpll0
+  - serial: stm32: fix word length configuration
+  - serial: stm32: fix rx data length when parity enabled
+  - net: hns3: fix a memory leak issue for helge_map_unmap_ring_to_vf_vector
+  - crypto: talitos - fix AEAD processing.
+  - net: don't clear sock->sk early to avoid trouble in strparser
+  - crypto: inside-secure - fix zeroing of the request in ahash_exit_inv
+  - arm64: dts: meson-gxm-khadas-vim2: fix gpio-keys-polled node
+  - arm64: dts: meson-gxm-khadas-vim2: fix Bluetooth support
+  - phy: usb: phy-brcm-usb: Remove sysfs attributes upon driver removal
+  - qed: iWARP - fix uninitialized callback
+  - IB/hfi1: Handle port down properly in pio
+  - net/af_iucv: build proper skbs for HiperTransport
+  - ARM: dts: iwg20d-q7-common: Fix SDHI1 VccQ regulator
+  - ip6_fib: Don't discard nodes with valid routing information in fib6_locate_1()
+  - nvmem: imx-ocotp: Change TIMING calculation to u-boot algorithm
+  - fork,memcg: alloc_thread_stack_node needs to set tsk->stack
+  - PM: ACPI/PCI: Resume all devices during hibernation
+  - ACPI: PM: Simplify and fix PM domain hibernation callbacks
+  - ACPI: PM: Introduce "poweroff" callbacks for ACPI PM domain and LPSS
+  - drm/panel: make drm_panel.h self-contained
+  - cxbg4: smt: Add lock for atomic_dec_and_test
+  - powerpc/64s/radix: Fix memory hot-unplug page table split
+  - rtc: rv3029: revert error handling patch to rv3029_eeprom_write()
+  - i40e: reduce stack usage in i40e_set_fc
+  - ARM: 8896/1: VDSO: Don't leak kernel addresses
+  - rxrpc: Fix lack of conn cleanup when local endpoint is cleaned up [ver #2]
+  - usb: typec: tps6598x: Fix build error without CONFIG_REGMAP_I2C
+  - bcache: Fix an error code in bch_dump_read()
+  - ARM: dts: aspeed-g5: Fixe gpio-ranges upper limit
+  - net: hns3: fix error VF index when setting VLAN offload
+  - mailbox: qcom-apcs: fix max_register value
+  - powerpc/mm/mce: Keep irqs disabled during lockless page table walk
+  - net: netsec: Fix signedness bug in netsec_probe()
+  - s390/qeth: Fix error handling during VNICC initialization
+  - s390/qeth: Fix initialization of vnic cmd masks during set online
+  - vhost/test: stop device before reset
+  - arm64: hibernate: check pgd table allocation
+  - afs: Fix missing timeout reset
+  - hwrng: omap3-rom - Fix missing clock by probing with device tree
+  - arm64: dts: meson-gxm-khadas-vim2: fix uart_A bluetooth node
+  * Bionic update: upstream stable patchset 2020-02-06 (LP: #1862259)
+ - dt-bindings: reset: meson8b: fix duplicate reset IDs
+ - clk: Don't try to enable critical clocks if prepare failed
+ - ASoC: msm8916-wcd-analog: Fix selected events for MIC BIAS External1
+ - ALSA: seq: Fix racy access for queue timer in proc read
+ - Fix built-in early-load Intel microcode alignment
+ - block: fix an integer overflow in logical block size
+ - ARM: dts: am571x-idk: Fix gpis property to have the correct gpio number
+ - ioc: buffer: align the size of scan bytes to size of the largest element
+ - USB: serial: simple: Add Motorola Solutions TETRA MTP3xxx and MTP85xx
+ - USB: serial: option: Add support for Quectel RM500Q
+ - USB: serial: option: fix control-message timeouts
+ - USB: serial: option: add support for Quectel RM500Q in QDL mode
+ - USB: serial: suppress driver bind attributes
+ - USB: serial: ch341: handle unbound port at reset_resume
+ - USB: serial: io_edgeport: add missing active-port sanity check
+ - USB: serial: keysran: handle unbound ports
+ - USB: serial: quatech2: handle unbound ports
+ - scsi: fnic: fix invalid stack access
+ - scsi: mptfusion: Fix double fetch bug in ioctl
+ - ptrace: reintroduce usage of subjective credentials in ptrace_has_cap()
+ - usb: core: hub: Improved device recognition on remote wakeup
+ - x86/resctrl: Fix an imbalance in domain_remove_cpu()
+ - x86/efistub: Disable paging at mixed mode entry
+ - perf hists: Fix variable name's inconsistency in hists__for_each() macro
+ - perf report: Fix incorrectly added dimensions as switch perf data file
+ - mm/shmem.c: thp, shmem: fix conflict of above-47bit hint address and PMD
+ - alignment
+ - btrfs: fix memory leak in qgroup accounting
+ - mm/page-writeback.c: avoid potential division by zero in wb_min_max_ratio()
+ - net: stmmac: 16KB buffer must be 16 byte aligned
+ - net: stmmac: Enable 16KB buffer size
+ - USB: serial: io_edgeport: use irqsav() in USB's complete callback
+ - USB: serial: io_edgeport: handle unbound ports on URB completion
+ - mm/huge_memory.c: make __thp_get_unmapped_area static
+ - mm/huge_memory.c: thp: fix conflict of above-47bit hint address and PMD
+ - alignment
+ - arm64: dts: aglexestratix10: fix pmu interrupt numbers
+ - cfg80211: fix page refcount issue in A-MSDU decap
+ - netfilter: fix a use-after-free in mtype_destroy()
+ - netfilter: arp_tables: init netns pointer in xt_tgeditor_param struct
+ - NFC: pn533: fix bulk-message timeout
+ - batman-adv: Fix DAT candidate selection on little endian systems
+ - macvlan: use skb_reset_mac_header() in macvlan_queue_xmit()
+ - hv_netvsc: Fix memory leak when removing rndis device
+ - net: dsa: tag_qca: fix doubled Tx statistics
+ - net: hns: fix soft lockup when there is not enough memory
+ - net: usb: lan78xx: limit size of local TSO packets
+ - net/wan/fsl_ucc_hdlc: fix out of bounds write on array utdm_info
- ptp: free ptp device pin descriptors properly
- r8152: add missing endpoint sanity check
- tcp: fix marked lost packets not being retransmitted
- xen.blkfront: Adjust indentation in xlvd_alloc_gendisk
- cw1200: Fix a signedness bug in cw1200_load_firmware()
- arm64: dts: meson-gxl-s905x-khadas-vim: fix gpio-keys-polled node
- cfg80211: check for set_wiphy_params
- tick/sched: Annotate lockless access to last_jiffies_update
- Revert "arm64: dts: junio: add dma-ranges property"
- reiserfs: fix handling of -EOPNOTSUPP in reiserfs_for_each_xattr
- scsi: esas2r: unlock on error in esas2r_nvram_read_direct()
- scsi: qla4xxx: fix double free bug
- scsi: bnx2i: fix potential use after free
- scsi: target: core: Fix a pr_debug() argument
- scsi: qla2xxx: Fix qla2x00_request_irqs() for MSI
- scsi: qla2xxx: fix rports not being mark as lost in sync fabric scan
- scsi: core: scsi_trace: Use get_unaligned_be*()  
- perf probe: Fix wrong address verification
- regulator: ab8500: Remove SYSCLKREQ from enum ab8505_regulator_id
- ARM: dts: meson8: fix the size of the PMU registers
- LSM: generalize flag passing to security_capable
- drm/i915: Add missing include file <linux/math64.h>
- btrfs: do not delete mismatched root refs
- ARM: dts: imx6qdl: Add Engicam i.Core 1.5 MX6
- ARM: dts: imx7: Fix Toradex Colibri iMX7S 256MB NAND flash support
- mlxsw: spectrum: Wipe xstats.backlog of down ports
- tcp: refine rule to allow EPOLLOUT generation under mem pressure
- mtd: devices: fix mchp23k256 read and write
- drm/nouveaux/bar/nv50: check bar1 vmm return value
- drm/nouveaus/bar/gf100: ensure BAR is mapped
- drm/nouveaus/mm: qualify vmm during dtor

* Bionic update: upstream stable patchset 2020-02-04 (LP: #1861934)
- chardev: Avoid potential use-after-free in 'chrdev_open()'  
- usb: chipidea: host: Disable port power only if previously enabled
- ALSA: usb-audio: Apply the sample rate quirk for Bose Companion 5
- ALSA: hda/realtek - Add new codec supported for ALCS1200A
- ALSA: hda/realtek - Set EAPD control to default for ALC222
- kernel/trace: Fix do not unregister tracepoints when register
- sched_migrate_task fail
- tracing: Have stack tracer compile when MCOUNT_INSN_SIZE is not defined
- HID: Fix slab-out-of-bounds read in hid_field_extract
- HID: uhid: Fix returning EPOLLOUT from uhid_char_poll
- can: gs_usb: gs_usb_probe(): use descriptors of current altsetting
- can: mscanc: mscan_rx_poll(): fix rx path lockup when returning from polling
- to irq mode
- can: can_dropped_invalid_skb(): ensure an initialized headroom in outgoing
  CAN skb_buffs
+ gpiolib: acpi: Turn dmi_system_id table into a generic quirk table
+ gpiolib: acpi: Add honor_wakeup module-option + quirk mechanism
+ staging: vt6656: set usb_set_intfdata on driver fail.
+ USB: serial: option: add ZLP support for 0x1bc7/0x9010
+ usb: musb: fix idling for suspend after disconnect interrupt
+ usb: musb: Disable pullup at init
+ usb: musb: dma: Correct parameter passed to IRQ handler
+ staging: comedii: adv_pci1710: fix AI channels 16-31 for PCI-1713
+ HID: hid-input: clear unmapped usages
+ Input: add safety guards to input_set_keycode()
+ drm/fb-helper: Round up bits_per_pixel if possible
+ drm/dp_mst: correct the shifting in DP_REMOTE_I2C_READ
+ staging: rtl8188eu: Add device code for TP-Link TL-WN727N v5.21
+ tty: link tty and port before configuring it as console
+ tty: always relink the port
+ mwifiex: pcie: Fix memory leak in mwifiex_pcie_alloc_cmdbuf
+ scsi: bfa: release allocated memory in case of error
+ rtl8xxxx: prevent leaking urb
+ arm64: cpufeature: Avoid warnings due to unused symbols
+ HID: hiddev: fix mess in hiddev_open()
+ USB: Fix: Don't skip endpoint descriptors with maxpacket=0
+ phy: cpcap-usb: Fix error path when no host driver is loaded
+ phy: cpcap-usb: Fix flakey host idling and enumerating of devices
+ netfilter: arp_tables: init netns pointer in xt_tgchk_param struct
+ netfilter: ipset: avoid null deref when IPSET_ATTR_LINENO is present
+ ALSA: hda/realtek - Add quirk for the bass speaker on Lenovo Yoga X1 7th gen
+ tracing: Change offset type to s32 in preempt/irq tracepoints
+ serdev: Don’t claim unsupported ACPI serial devices
+ netfilter: conntrack: dce, scp: handle null timeout argument
+ hidraw: Return EPOLLOUT from hidraw_poll
+ HID: hidraw: Fix returning EPOLLOUT from hidraw_poll
+ HID: hidraw, uhid: Always report EPOLLOUT
+ ethtool: reduce stack usage with clang
+ fs/select: avoid clang stack usage warning
+ arm64: don’t open code page table entry creation
+ arm64: mm: Change page table pointer name in p[md]_set_huge()
+ arm64: Enforce BBM for huge IO/VMAP mappings
+ arm64: Make sure permission updates happen for pmd/pud
+ media: usb:zr364xx:Fix KASAN:null-ptr-deref Read in zr364xx_vidioc_querycap
+ iwlmii: i2400: fix memory leak
+ iwlwifi: dbg_ini: fix memory leak in alloc_sgtable
+ rtc: mt6397: fix alarm register overwrite
+ RDMA/bnxt_re: Fix Send Work Entry state check while polling completions
+ ASoC: stm32: spdifrx: fix inconsistent lock state
+ ASoC: stm32: spdifrx: fix race condition in irq handler
+ gpio: zynq: Fix for bug in zynq_gpioRestore_context API
+ iommu: Remove device link to group on failure

Open Source Used In 5GaaS Edge AC-4  19100
+ - gpio: Fix error message on out-of-range GPIO in lookup table
+ - hsr: Reset network header when supervision frame is created
+ - cifs: Adjust indentation in smb2_open_file
+ - btrfs: Simplify inode locking for RWF_NOWAIT
+ - RDMA/mlx5: Return proper error value
+ - RDMA/srpt: Report the SCSI residual to the initiator
+ - scsi: enclosure: Fix stale device oops with hot replug
+ - scsi: sd: Clear sdkp->protection_type if disk is reformatted without PI
+ - platform/x86: asus-wmi: Fix keyboard brightness cannot be set to 0
+ - xprtrdma: Fix completion wait during device removal
+ - NFSv4.x: Drop the slot if nfs4_delegreturn_prepare waits for layoutreturn
+ - iio: imu: adis16480: assign bias value only if operation succeeded
+ - mei: fix modalias documentation
+ - clk: samsung: exynos5420: Preserve CPU clocks configuration during suspend/resume
+ - pinctl: ti: iodelay: fix error checking on pinctrl_count_index_with_args
+ - pinctl: ti: iodelay: call
+ - scsi: lewisburg: Update pin list according to v1.1v6
+ - arm64: dts: apq8096-db820c: Increase load on l21 for SDCARD
+ - af_unix: add compat_ioctl support
+ - compat_ioctl: handle SIOCOUTQNSD
+ - PCI/PTM: Remove spurious "d" from granularity message
+ - powerpc/powerpc: Disable native PCIe port management
+ - tty: serial: imx: use the sg count from dma_map_sg
+ - tty: serial: pch_uart: correct usage of dma_unmap_sg
+ - media: ov6650: Fix incorrect use of JPEG colorspace
+ - media: ov6650: Fix some format attributes not under control
+ - media: ov6650: Fix .getFmt() V4L2_SUBDEV_FORMAT_TRY support
+ - media: exynos4-is: Fix recursive locking in isp_video_release()
+ - mtd: spi-nor: fix silent truncation in spi_nor_read()
+ - mtd: spi-nor: fix silent truncation in spi_nor_read_raw()
+ - spi: atmel: fix handling of cs_change set on non-last xfer
+ - rtlwifi: Remove unnecessary NULL check in rtl_regd_init
+ - f2fs: fix potential overflow
+ - rtc: msm6242: Fix reading of 10-hour digit
+ - gpio: mpc8xxx: Add platform device to gpiochip->parent
+ - scsi: libcxgbi: fix NULL pointer dereference in cxgbi_device_destroy()
+ - rseq/selftests: Turn off timeout setting
+ - mips: cacheinfo: report shared CPU map
+ - MIPS: Prevent link failure with kcov instrumentation
+ - dmaengine: k3dma: Avoid null pointer traversal
+ - iot: iot_alloc_ring() failure handling.
+ - hexagon: parenthesize registers in asm predicates
+ - hexagon: work around compiler crash
+ - ocfs2: call journal flush to mark journal as empty after journal recovery
+ - when mount
+ - s390/qeth: Fix vnic_is_in_use if rx_bcast not set
- drm/ttm: fix start page for huge page check in ttm_put_pages()
- drm/ttm: fix incrementing the page pointer for huge pages
- crypto: virtio - implement missing support for output IVs
- iommu/mediatek: Correct the flush_iotlb_all callback
- rtc: bcmstb-waketime: add missed clk_disable_unprepare

* Bionic update: upstream stable patchset 2020-02-03 (LP: #1861739)
- USB: dummy-hcd: use usb_urb_dir_in instead of usb_pipein
- USB: dummy-hcd: increase max number of devices to 32
- locking/spinlock/debug: Fix various data races
- netfilter: ctinetlink: netsns exit must wait for callbacks
- libtraceevent: Fix lib installation with O=
- x86/efi: Update e820 with reserved EFI boot services data to fix kexec breakage
- efi/gop: Return EFI_NOT_FOUND if there are no usable GOPs
- efi/gop: Return EFI_SUCCESS if a usable GOP was found
- efi/gop: Fix memory leak in __gop_query32/64()
- netfilter: uapi: Avoid undefined left-shift in xt_sctp.h
- netfilter: nf_tables: validate NFT_SET_ELEM_INTERVAL_END
- ARM: dts: Cygnus: Fix MDIO node address/size cells
- spi: spi-cavium-thunderx: Add missing pci_release_regions()
- ASoC: topology: Check return value for soc_tplg_pcm_create()
- ARM: dts: bcm283x: Fix critical trip point
- bpf, mips: Limit to 33 tail calls
- ARM: dts: am437x-gp/epos-evm: fix panel compatible
- samples: bpf: Replace symbol compare of trace_event
- samples: bpf: fix syscall tp due to unused syscall
- powerpc: Ensure that swiotlb buffer is allocated from low memory
- bnx2x: Do not handle requests from VFs after parity
- bnx2x: Fix logic to get total no. of PFs per engine
- net: usb: lan78xx: Fix error message format specifier
- rfkill: Fix incorrect check to avoid NULL pointer dereference
- ASoC: wm8962: fix lambda value
- regulator: m5i618: fix module aliases
- kconfig: don't crash on NULL expressions in expr_eq()
- perf/x86/intel: Fix PT PMI handling
- fs: avoid softlockups in s_inodes iterators
- net: stmmac: Do not accept invalid MTU values
- net: stmmac: RX buffer size must be 16 byte aligned
- s390/dasd/cio: Interpret ccw_device_get_mdc return value correctly
- s390/dasd: fix memleak in path handling error case
- block: fix memleak when __blk_rq_map_user_iov() is failed
- parisc: Fix compiler warnings in debug_core.c
- Iic2: Fix return statement of llo_stat_ev_rx_null_dsap_xid_c (and_test_c)
- hv_netvsc: Fix unwanted rx_table reset
- bpf: Fix passing modified ctx to ld/abs/ind instruction
- PCI/switchtec: Read all 64 bits of part_event_bitmap
+ - gtp: fix bad unlock balance in gtp_encap_enable_socket
+ - macvlan: do not assume mac_header is set in macvlan_broadcast()
+ - net: dsa: mv88e6xx: Preserve priority when setting CPU port.
+ - net: stmmac: dwmac-sun8i: Allow all RGMII modes
+ - net: stmmac: dwmac-sunxi: Allow all RGMII modes
+ - net: usb: lan78xx: fix possible skb leak
+ - pkt_sched: fq: do not accept silly TCA_FQ_QUANTUM
+ - USB: core: fix check for duplicate endpoints
+ - USB: serial: option: add Telit ME910G1 0x110a composition
+ - scpt: free cmd->obj.chunk for the unprocessed SCTP_CMD_REPLY
+ - tcp: fix "old stuff" D-SACK causing SACK to be treated as D-SACK
+ - vxlan: fix tos value before xmit
+ - vlan: vlan_changelink() should propagate errors
+ - net: sch_prio: When ungrafting, replace with FIFO
+ - vlan: fix memory leak in vlan_dev_set_egress_priority
+ - regulator: fix use after free issue
+ - ASoC: max98090: fix possible race conditions
+ - netfilter: nf_tables: validate NFT_DATA_VALUE after nft_data_init()
+ - ARM: dts: BCM5301X: Fix MDIO node address/size cells
+ - bpf: Clear skb->tstamp in bpf_redirect when necessary
+ - parisc: add missing __init annotation
+ - iommu/iova: Init the struct iova to fix the possible memleak
+ - powerpc/spinlocks: Include correct header for static key
+ - ARM: dts: imx6ul: use nvmem-cells for cpu speed grading
+ - ARM: dts: BCM5301X: Fix MDIO node address/size cells
+ - bpf: Clear skb->tstamp in bpf_redirect when necessary
+ - parisc: add missing __init annotation
+ - iommu/iova: Init the struct iova to fix the possible memleak
+ - powerpc/spinlocks: Include correct header for static key
+ - ARM: dts: imx6ul: use nvmem-cells for cpu speed grading
+ - 4.15 kernel hard lockup about once a week (LP: #1799497)
+ - zram: correct flag name of ZRAM_ACCESS
+ - zram: fix lockdep warning of free block handling
+ * Prevent arm64 guest from accessing host debug registers (LP: #1860657)
+ - KVM: arm64: Write arch.mdrer_el2 changes since last vcpu_load on VHE
+ + * pty03 from pty in ubuntu_ltp failed on Eoan (LP: #1862114)
+ + - can, slip: Protect tty->disc_data in write_wakeup and close with RCU
+ + -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Fri, 14 Feb 2020 15:22:46 -0300
+ + * linux (4.15.0-88.88) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-88.88 -proposed tracker (LP: #1862824)
+ + * Segmentation fault (kernel oops) with memory-hotplug in
+ + ubuntu_kernel_selftests on Bionic kernel (LP: #1862312)
+ + - Revert "mm/memory_hotplug: fix online/offline_pages called w.o.
+ + mem_hotplug_lock"
+ * Bionic update: upstream stable patchset 2020-01-22 (LP: #1860602)
+  - scsi: lpfc: Fix discovery failures when target device connectivity bounces
+  - scsi: mpt3sas: Fix clear pending bit in ioctl status
+  - scsi: lpfc: Fix locking on mailbox command completion
+  - Input: atmel_mxt_ts - disable IRQ across suspend
+  - iommu/tegra-smmu: Fix page tables in > 4 GiB memory
+  - scsi: target: compare full CHAP_A Algorithm strings
+  - scsi: lpfc: Fix SLI3 hba in loop mode not discovering devices
+  - scsi: csio: Don't enable IRQs too early
+  - powerpc/pseries: Mark accumulate_stolen_time() as notrace
+  - powerpc/pseries: Don't fail hash page table insert for bolted mapping
+  - powerpc/tools: Don't quote $objdump in scripts
+  - dma-debug: add a schedule point in debug_dma_dump_mappings()
+  - clocksource/drivers/asm9260: Add a check for of_clk_get
+  - powerpc/security/book3s64: Report LIFF status in sysfs
+  - powerpc/book3s64/hash: Add cond_resched to avoid soft lockup warning
+  - ext4: update direct I/O read lock pattern for IOCB_NOWAIT
+  - jbd2: Fix statistics for the number of logged blocks
+  - scsi: tracing: Fix handling of TRANSFER LENGTH == 0 for READ(6) and WRITE(6)
+  - scsi: lpfc: Fix duplicate unreg_rpi error in port offline flow
+  - f2fs: fix to update dir's i_pino during cross_rename
+  - clk: qcom: Allow constant ratio freq tables for rcg
+  - irqchip/irq-bcm7038-l1: Enable parent IRQ if necessary
+  - irqchip: ingenic: Error out if IRQ domain creation failed
+  - fs/quota: handle overflows of sysctl fs.quota.* and report as unsigned long
+  - scsi: lpfc: fix: Coverity: lpfc_cmpl_els_rsp(): Null pointer dereferences
+  - scsi: ufs: fix potential bug which ends in system hang
+  - powerpc/pseries/cmm: Implement release() function for sysfs device
+  - powerpc/security: Fix wrong message when RFI Flush is disable
+  - scsi: atari_scsi: sun3_scsi: Set sg_tablesize to 1 instead of SG_NONE
+  - clk: pxa: fix one of the pxa RTC clocks
+  - bcache: at least try to shrink 1 node in bch_mca_scan()
+  - HID: logitech-hidpp: Silence intermittent get_battery_capacity errors
+  - libnvdimm/btt: fix variable 'rc' set but not used
+  - HID: Improve Windows Precision Touchpad detection.
+  - scsi: pm80xx: Fix for SATA device discovery
+  - scsi: ufs: Fix error handing during hibern8 enter
+  - scsi: scsi_debug: num_tgts must be >= 0
+  - scsi: NCR5380: Add disconnect_mask module parameter
+  - scsi: iscsi: Don't send data to unbound connection
+ - scsi: target: iscsi: Wait for all commands to finish before freeing a
+ session
+ - gpio: mpc8xxx: Don't overwrite default irq_set_type callback
+ - apparmor: fix unsigned len comparison with less than zero
+ - scripts/kallsyms: fix definitely-lost memory leak
+ - cdrom: respect device capabilities during opening action
+ - perf script: Fix brstackinsn for AUXTRACE
+ - perf regs: Make perf_reg_name() return "unknown" instead of NULL
+ - s390/ctru: handle new reply code FILTERED_BY_HYPERVISOR
+ - libfdt: define INT32_MAX and UINT32_MAX in libfdt_env.h
+ - s390/cpus_m: Check for SDBT and SDB consistency
+ - ocfs2: fix passing zero to '_PTR_ERR' warning
+ - kernel: sysctl: make drop_caches write-only
+ - userfaultfd: require CAP_SYS_PTRACE for UFFD_FEATURE_EVENT_FORK
+ - x86/mce: Fix possibly incorrect severity calculation on AMD
+ - net, sysctl: Fix compiler warning when only cBPF is present
+ - netfilter: nf_queue: enqueue skb with NULL dst
+ - ALSA: hda - Downgrade error message for single-cmd fallback
+ - bonding: fix active-backup transition after link failure
+ - perf strbuf: Remove redundant va_end() in strbuf_addv()
+ - Make filldir[64]() verify the directory entry filename is valid
+ - filldir[64]: remove WARN_ON_ONCE() for bad directory entries
+ - netfilter: ebtables: compat: reject all padding in matches/watchers
+ - 6pack,mkiss: fix possible deadlock
+ - netfilter: bridge: make sure to pull arp header in br_nf_forward_arp()
+ - inetpeer: fix data-race in inet_putpeer / inet_putpeer
+ - net: add a READ_ONCE() in skb_peek_tail()
+ - net: icmp: fix data-race in cmp_global_allow()
+ - hrtimer: Annotate lockless access to timer->state
+ - spi: fsl: don't map irq during probe
+ - tty/serial: atmel: fix out of range clock divider handling
+ - pinctrl: bavtrail: Really serialize all register accesses
+ - net: ena: fix napi handler misbehavior when the napi budget is zero
+ - net/mlxfs: Fix out-of-memory error in mfa2 flash burning
+ - ptp: fix the race between the release of ptp_clock and cdev
+ - udp: fix integer overflow while computing available space in sk_rcvbuf
+ - vhost/vsock: accept only packets with the right dst_cid
+ - net: add bool confirm_neigh parameter for dst_ops.update_pmtu
+ - gtp: do not confirm neighbor when do pmtu update
+ - net/dst: add new function skb_dst_update_pmtu_no_confirm
+ - tunnel: do not confirm neighbor when do pmtu update
+ - vti: do not confirm neighbor when do pmtu update
+ - sit: do not confirm neighbor when do pmtu update
+ - gtp: do not allow adding duplicate tid and ms_addr pdp context
+ - tcp/dccp: fix possible race __inet_lookup_established()
+ - tcp: do not send empty skb from tcp_write_xmit()
+ - gtp: fix wrong condition in gtp_genl_dump_pdp()
+ - gtp: fix an use-after-free in ipv4_pdp_find()
- gtp: avoid zero size hashtable
- spi: fsl: use platform_get_irq() instead of of_irq_to_resource()
- scsi: hisi_sas: Replace in_softirq() check in hisi_sas_task_exec()
- clocksource/drivers/timer-of: Use unique device name instead of timer
- ext4: iomap that extends beyond EOF should be marked dirty
- clk: clk-gpio: propagate rate change to parent
- HID: quirks: Add quirk for HP MSU1465 PIXART OEM mouse
- HID: rmi: Check that the RMI_STARTED bit is set before unregistering the RMI
- transport device
- watchdog: Fix the race between the release of watchdog_core_data and cdev
- powerpc: Don't add -mabi= flags when building with Clang
- tcp: Fix highest_sack and highest_sack_seq
- nvme_fc: add module to ops template to allow module references
- iio: adc: max9611: Fix too short conversion time delay
- PM / devfreq: Don't fail devfreq_dev_release if not in list
- RDMA/cma: add missed unregister_pernet_subsys in init failure
- rxe: correctly calculate iCRC for unaligned payloads
- scsi: lpfc: Fix memory leak on lpfc_bsg_write_ebuf_set func
- scsi: qla2xxx: Don't call qlt_async_event twice
- scsi: iscsi: qla4xxx: fix double free in probe
- scsi: libas: stop discovering if oob mode is disconnected
- drm/nouveau: Move the declaration of struct nouveau_conn_atom up a bit
- usb: gadget: fix wrong endpoint desc
- net: make socket read/write_iter() honor IOCB_NOWAIT
- md: raid1: check rdev before reference in raid1_sync_request func
- s900/cpum_sf: Adjust sampling interval to avoid hitting sample limits
- s900/cpum_sf: Avoid SBD overflow condition in irq handler
- IB/mlx4: Follow mirror sequence of device add during device removal
- xen-blkback: prevent premature module unload
- xen/balloon: fix ballooned page accounting without hotplug enabled
- xfs: fix mount failure crash on invalid iclog memory access
- taskstats: fix data-race
- drm: limit to INT_MAX in create_blob ioctl
- ALSA: ice1724: Fix sleep-in-atomic in Infrasonic Quartet support code
- drm/sun4i: hdmi: Remove duplicate cleanup calls
- MIPS: Avoid VDSO ABI breakage due to global register variable
- media: pulse8-cec: fix lost cec_transmit_attempt_done() call
- media: cec: CEC 2.0-only bcast messages were ignored
- media: cec: avoid decrementing transmit_queue_sz if it is 0
- mm/zmalloc.c: fix the migrated zpage statistics.
- memcg: account security cred as well to kmemcg
- pstore/ram: Write new dumps to start of recycled zones
- locks: print unsigned ino in /proc/locks
- dmaengine: Fix access to uninitialized dma_slave_caps
- compat_ioctl: block: handle Persistent Reservations
- compat_ioctl: block: handle BLKREPORTZONE/BLKRESETZONE
- ata: libahci_platform: Export again ahci_platform_en/disnable phys()
- ata: ahci_brcm: Allow optional reset controller to be used
+ - ata: ahci_brcm: Fix AHCI resources management
+ - gpiolib: fix up emulated open drain outputs
+ - tracing: Fix lock inversion in trace_event_enable_tgid_record()
+ - tracing: Have the histogram compare functions convert to u64 first
+ - ALSA: cs4236: fix error return comparison of an unsigned integer
+ - ALSA: firewire-motu: Correct a typo in the clock proc string
+ - exit: panic before exit_nmi() on global init exit
+ - ftrace: Avoid potential division by zero in function profiler
+ - PM / devfreq: Check NULL governor in available_governors_show
+ - nfsd4: fix up replay_matches_cache()
+ - scsi: qla2xxx: Drop superfluous INIT_WORK of del_work
+ - xfs: don't check for AG deadlock for realtime files in bnumapi
+ - platform/x86: pmc_atom: Add Siemens CONNECT X300 to critclk_systems DMI table
+ - Bluetooth: btusb: fix PM leak in error case of setup
+ - Bluetooth: delete a stray unlock
+ - Bluetooth: Fix memory leak in hci_connect_le_scan
+ - media: flexcop-usb: ensure -EIO is returned on error condition
+ - regulator: ab8500: Remove AB8505 USB regulator
+ - media: usb: fix memory leak in af9005_identify_state
+ - dt-bindings: clock: renesas: rcar-usb2-clock-sel: Fix typo in example
+ - tty: serial: msm_serial: Fix lockup for sysrq and oops
+ - fix compat handling of FICLONERANGE, FIFEDUPERANGE and FS_IOC_FIEMAP
+ - scsi: qdf: Do not retry ELS request if qdf_alloc_cmd fails
+ - drm/mst: Fix MST sideband up-reply failure handling
+ - powerpe/pseries/hvconsole: Fix stack overflow via udbg
+ - selftests: rtnetlink: add addresses with fixed life time
+ - rxrpc: Fix possible NULL pointer access in ICMP handling
+ - ath9k_htc: Modify byte order for an error message
+ - ath9k_htc: Discard undersized packets
+ - arm64: dts: meson: odroid-c2: Disable usb_otg bus to avoid power failed
+ - warning
+ - net: add annotations on hh->hh_len lockless accesses
+ - s390/smp: fix physical to logical CPU map for SMT
+ - xen/blkback: Avoid unmapping unmapped grant pages
+ - perf/x86/intel/bts: Fix the use of page_private()
+ - drm/amdgpu: add cache flush workaround to gfx8 emit_fence
+ - drm/amd/display: Fixed kernel panic when booting with DP-to-HDMI dongle
+ - PM / devfreq: Fix devfreq_notifier_call returningerrno
+ - PM / devfreq: Set scaling_max_freq to max on OPP notifier error
+ - afs: Fix afs_find_server lookups for ipv4 peers
+ - scsi: qla2xxx: Fix PLOGI payload and ELS ICB dump length
+ - scsi: qla2xxx: Send Notify ACK after N2N PLOGI
+ - ALSA: hda - fixup for the bass speaker on Lenovo Carbon X1 7th gen
+ - ALSA: hda/realtek - Add headset Mic no shutup for ALC283
+ - media: ccc: check 'transmit_in_progress', not 'transmitting'
+ - HID: i2c-hid: Reset ALPS touchpads on resume
+ - bdev: Factor out bdev revalidation into a common helper
+ bdev: Refresh bdev size for disks without partitioning
+ KVM: PPC: Book3S HV: use smp_mb() when setting/clearing host_ipi flag
+ net: core: limit nested device depth
+ ubifs: ubifs_tnc_start_commit: Fix OOB in layout_in_gaps
+ Bionic update: upstream stable patchset 2020-01-14 (LP: #1859712)
  + af_packet: set default value for tmo
+ fjes: fix missed check in fjes_acpi_add
+ mod_devicetable: fix PHY module format
+ net: dst: Force 4-byte alignment of dst_metrics
+ net: hisilicon: Fix a BUG triggered by wrong bytes_compl
+ nci_uart tty receive
+ net: qlclogic: Fix error paths in ql_alloc_large_buffers()
+ net: usb: lan78xx: Fix suspend/resume PHY register access error
+ quake: Fix multicast mac configuration
+ scpt: fully initialize v4 addr in some functions
+ btrfs: don't double lock the subvol_sem for rename exchange
+ btrfs: do not call synchronize_srcu() in inode_tree_del
+ btrfs: skip log replay on orphaned roots
+ btrfs: do not leak reloc root if we fail to read the fs root
+ btrfs: handle ENOENT in btrfs_uuid_tree_iterate
+ Btrfs: fix removal logic of the tree mod log that leads to use-after-free issues
+ ALSA: pcm: Avoid possible info leaks from PCM stream buffers
+ ALSA: hda/ca0132 - Keep power on during processing DSP response
+ ALSA: hda/ca0132 - Avoid endless loop
+ drm: mst: Fix query_payload ack reply struct
+ drm/bridge: analogix-anx78xx: silence -EPROBE_DEFER warnings
+ iio: light: bh1750: Resolve compiler warning and make code more readable
+ spi: Add call to spi_slave_abort() function when spidev driver is released
+ staging: rtl8192u: fix multiple memory leaks on error path
+ staging: rtl8188eu: fix possible null dereference
+ rtlwifi: prevent memory leak in rtl_usb_probe
+ libertas: fix a potential NULL pointer dereference
+ IB/iser: bound protection_sg size by data_sg size
+ media: am437x-vpfe: Setting STD to current value is not an error
+ media: i2c: ov2659: fix s_stream return value
+ media: ov6650: Fix crop rectangle alignment not passed back
+ media: i2c: ov2659: Fix missing 720p register config
+ media: ov6650: Fix stored frame format not in sync with hardware
+ media: ov6650: Fix stored crop rectangle not in sync with hardware
+ tools/power/cpupower: Fix initializer override in hsw_ext_cstates
+ media: venus: core: Fix msm8996 frequency table
+ ath10k: fix offchannel tx failure when no ath10k_mac_tx_frm_has_freq
+ pinctrl: devicetree: Avoid taking direct reference to device name string
+ selftests/bpf: Correct path to include msg + path
+ usb: renesas_usbhs: add suspend event support in gadget mode
+ - hwrng: omap3-rom - Call clk_disable_unprepare() on exit only if not idled
+ - regulator: max8907: Fix the usage of uninitialized variable in
+ max8907_regulator_probe()
+ - media: flexcop-usb: fix NULL-ptr deref in flexcop_usb_transfer_init()
+ - media: cec-funcs.h: add status_req checks
+ - drm/bridge: dw-hdmi: Refuse DDC/CI transfers on the internal I2C controller
+ - samples: pktgen: fix proc_cmd command result check logic
+ - block: Fix writeback throttling W=1 compiler warnings
+ - mwifiex: pcie: Fix memory leak in mwifiex_pcie_init_evt_ring
+ - media: cx88: Fix some error handling path in 'cx8800_initdev()'
+ - media: ti-vpe: vpe: Fix Motion Vector vpdma stride
+ - media: ti-vpe: vpe: fix a v4l2-compliance warning about invalid pixel format
+ - media: ti-vpe: vpe: fix a v4l2-compliance failure about frame sequence
+ number
+ - media: ti-vpe: vpe: Make sure YUYV is set as default format
+ - media: ti-vpe: vpe: fix a v4l2-compliance failure causing a kernel panic
+ - media: ti-vpe: vpe: ensure buffers are cleaned up properly in abort cases
+ - media: ti-vpe: vpe: fix a v4l2-compliance failure about invalid sizeimage
+ - extcon: sm5502: Reset registers during initialization
+ - x86/mm: Use the correct function type for native_set_fixmap()
+ - drm/bridge: dw-hdmi: Restore audio when setting a mode
+ - perf test: Report failure for mmap events
+ - perf report: Add warning when libunwind not compiled in
+ - usb: usbfs: Suppress problematic bind and unbind uevents.
+ - iio: adc: max1027: Reset the device at probe time
+ - Bluetooth: missed cpu_to_le16 conversion in hci_init4_req
+ - Bluetooth: hci_core: fix init for HCI_USER_CHANNEL
+ - x86/mce: Lower throttling MCE messages' priority to warning
+ - drm/gma500: fix memory disclosures due to uninitialized bytes
+ - rtl8xxxu: fix RTL8723BU connection failure issue after warm reboot
+ - x86/ioapic: Prevent inconsistent state when moving an interrupt
+ - arm64: psci: Reduce the waiting time for cpu_psci_cpu_kill()
+ - net: phy: dp83867: enable robust auto-mdix
+ - RDMA/qedr: Fix memory leak in user qp and mr
+ - gpu: host1x: Allocate gather copy for host1x
+ - net: dsa: LAN9303: select REGMAP when LAN9303 enable
+ - phy: qcom-usb-hs: Fix extcon double register after power cycle
+ - s390/time: ensure get_clock_monotonic() returns monotonic values
+ - s390/mm: add mm_pxd_fowed() checks to pxd_free()
+ - libata: Ensure ata_port probe has completed before detach
+ - loop: fix no-unmap write-zeroes request behavior
+ - pinctrl: sh-pfc: sh7734: Fix duplicate TCLK1_B
+ - iio: dln2-adc: fix iio_triggered_buffer_postenable() position
+ - Bluetooth: Fix advertising duplicated flags
+ - pinctrl: amd: fix __iomem annotation in amd_gpio_irq_handler()
+ - ixgbe: protect TX timestamping from API misuse
+ - media: rcar_drif: fix a memory disclosure
+ - media: v4l2-core: fix touch support in v4l_g_fmt
+ - rfkill: allocate static minor
+ - bnx2x: Fix PF-VF communication over multi-cos queues.
+ - spi: img-spfi: fix potential double release
+ - ALSA: timer: Limit max amount of slave instances
+ - rtlwifi: fix memory leak in rt92c_set_fw_rsvdpagepk()
+ - perf probe: Fix to find range-only function instance
+ - perf probe: Fix to list probe event with correct line number
+ - perf probe: Walk function lines in lexical blocks
+ - perf probe: Fix to probe an inline function which has no entry pc
+ - perf probe: Fix to show ranges of variables in functions without entry_pc
+ - perf probe: Fix to show inlined function callsite without entry_pc
+ - libsubcmd: Use -O0 with DEBUG=1
+ - perf probe: Fix to probe a function which has no entry pc
+ - drm/amdgpu: fix potential double drop fence reference
+ - perf parse: If pmu configuration fails free terms
+ - perf probe: Skip overlapped location on searching variables
+ - perf probe: Return a better scope DIE if there is no best scope
+ - perf probe: Fix to show calling lines of inlined functions
+ - perf probe: Skip end-of-sequence and non statement lines
+ - perf probe: Filter out instances except for inlined subroutine and
  subprogram
+ - ath10k: fix get invalid tx rate for Mesh metric
+ - fsi: core: Fix small accesses and unaligned offsets via sysfs
+ - media: prvusb2: Fix oops on tear-down when radio support is not present
+ - media: si470x-i2c: add missed operations in remove
+ - EDAC/ghes: Fix grain calculation
+ - spi: pxa2xx: Add missed security checks
+ - ASoC: rt5677: Mark reg RT5677_PWR_ANLG2 as volatile
+ - ASoC: Intel: kbl_rt5663_rt5514_max98927: Add dmic format constraint
+ - s390/disassembler: don't hide instruction addresses
+ - parport: load lowlevel driver if ports not found
+ - cpufreq: Register drivers only after CPU devices have been registered
+ - x86/crash: Add a forward declaration of struct kimage
+ - iwlwifi: mvm: fix unaligned read of rx_pkt_status
+ - spi: tegra20-slink: add missed clk_unprepare
+ - crypto: virtio - deal with unsupported input sizes
+ - mmc: tmio: Add MMC_CAP_ERASE to allow erase/discard/trim requests
+ - btrfs: don't prematurely free work in end_workqueue_fn()
+ - btrfs: don't prematurely free work in run_ordered_work()
+ - spi: st-ssc4: add missed pm_runtime_disable
+ - x86/insn: Add some Intel instructions to the opcode map
+ - iwlwifi: check kasprintf() return value
+ - fbft: Make sure string is NULL terminated
+ - crypto: sun4i-ss - Fix 64-bit size_t warnings
+ - crypto: sun4i-ss - Fix 64-bit size_t warnings on sun4i-ss-hash.c
+ - mac80211: consider QoS Null frames for STA_NULLFUNC_ACKED
+ - crypto: vmx - Avoid weird build failures
+ - libtraceevent: Fix memory leakage in copy_filter_type
- mips: fix build when "48 bits virtual memory" is enabled
- net: phy: initialise phydev speed and duplex sanely
- btrfs: don't prematurely free work in reada_start_machine_worker()
- btrfs: don't prematurely free work in scrub_missing_raid56_worker()
- Revert "mmc: sdhci: Fix incorrect switch to HS mode"
- mmc: mediatek: fix CMD_TA to 2 for MT8173 HS200/HS400 mode
- usb: xhci: Fix build warning seen with CONFIG_PM=n
- s390/trace: fix endless recursion in function_graph tracer
- btrfs: return error pointer from alloc_test_extent_buffer
- btrfs: abort transaction after failed inode updates in create_subvol
- usbip: Fix receive error in vhci-hcd when using scatter-gather
- usbip: Fix error path of vhci_recv_ret_submit()
- USB: EHCI: Do not return -EPipe when hub is disconnected
- intel_th: pci: Add Comet Lake PCH-V support
- intel_th: pci: Add Elkhart Lake SOC support
- platform/x86: hp-wmi: Make buffer for HPWMI_FEATURE2_QUERY 128 bytes
- staging: comed: gsc_hpd: check dma_alloc_coherent() return value
- ext4: fix ext4_empty_dir() for directories with holes
- ext4: check for directory entries too close to block end
- ext4: unlock on error in ext4_expanded_extra_isize()
- KVM: arm64: Ensure 'params' is initialised when looking up sys register
- x86/MCE/AMD: Do not use rdmsr_safe_on_cpu() in smca_configure()
- x86/MCE/AMD: Allow Reserved types to be overwritten in smca_banks[]
- powerpc/irq: fix stack overflow verification
- mmc: sdhci: Update the tuning failed messages to pr_debug level
- mmc: sdhci-of-esdhc: fix P2020 errata handling
- nbd: fix shutdown and recv work deadlock v2
- perf probe: Fix to show function entry line as probe-able
- btrfs: send: remove WARN_ON for readonly mount
- ALSA: hda/ca0132 - Fix work handling in delayed HP detection
- drm/panel: Add missing drm_panel_init() in panel drivers
- drm/amdktld: fix a potential NULL pointer dereference (v2)
- drm/drm_vblank: Change EINVAL by the correct errno
- Bluetooth: Workaround directed advertising bug in Broadcom controllers
- media: smiappp: Register sensor after enabling runtime PM on the device
- md/bitmap: avoid race window between md_bitmap_resize and bitmap_file_clear_bit
- net: hns3: add struct netdev_queue debug info for TX timeout
- nvmem: imx-ocotp: reset error status on probe
- perf jevents: Fix resource leak in process_mapfile() and main()
- perf tools: Splice events onto evlist even on error
- crypto: atmel - Fix authenc support when it is set to m
- iio: dac: ad5446: Add support for new AD5600 DAC
- bcache: fix static checker warning in bcache_device_free()
- tun: fix data-race in gro_normal_list()
- ASoC: wm2200: add missed operations in remove and probe failure
+ - ASoC: wm5100: add missed pm_runtime_disable
+ - net: ethernet: ti: ale: disable ale from stop()
+ - net: ethernet: ti: ale: clean ale tbl on init and intf restart
+ - cpufreq: Rename cpufreq_can_do_remote_dvfs()
+ - cpufreq: Avoid leaving stale IRQ work items during CPU offline
+ - mmc: sdhci: Add a quirk for broken command queueing
+
+ * Bionic update: upstream stable patchset 2020-01-10 (LP: #1859249)
+ - net: bridge: deny dev_set_mac_address() when un-registering
+ - net: dsa: fix flow dissection on Tx path
+ - net: ethernet: ti: cpw: fix extra rx interrupt
+ - net: thunderx: start phy before starting autonegotiation
+ - openvswitch: support asymmetric conntrack
+ - tcp: md5: fix potential overestimation of TCP option space
+ - tcp: fix ordering of tipe module init and exit routine
+ - tcp: fix rejected syncookies due to stale timestamps
+ - tcp: tighten acceptance of ACKs not matching a child socket
+ - tcp: Protect accesses to .ts_recent_stamp with [READ,WRITE]_ONCE()
+ - inet: protect against too small mtu values.
+ - nvme: host: core: fix precedence of ternary operator
+ - Revert "regulator: Defer init completion for a while after late_initcall"
+ - PCI/PM: Always return devices to D0 when thawing
+ - PCI: Fix Intel ACS quirk UPDCR register address
+ - PCI/MSI: Fix incorrect MSI-X masking on resume
+ - PCI: Apply Cavium ACS quirk to ThunderX2 and ThunderX3
+ - xtensa: fix TLB sanity checker
+ - rpmsg: glink: Set tail pointer to 0 at end of FIFO
+ - rpmsg: glink: Fix reuse intents memory leak issue
+ - rpmsg: glink: Fix use after free in open_ack TIMEOUT case
+ - rpmsg: glink: Put an extra reference during cleanup
+ - rpmsg: glink: Fix rpmsg_register_device err handling
+ - rpmsg: glink: Don't send pending rx_done during remove
+ - rpmsg: glink: Free pending deferred work on remove
+ - CIFS: Respect O_SYNC and O_DIRECT flags during reconnect
+ - ARM: dtb: s3c64xx: Fix init order of clock providers
+ - ARM: tegra: Fix FLOW_CTRL_HALT register clobbering by tegra_resume()
+ - vio/pici: call irq_bypass_unregister_producer() before freeing irq
+ - dma-buf: Fix memory leak in sync_file_merge()
+ - dm btree: increase rebalance threshold in __rebalance2()
+ - scsi: iscsi: Fix a potential deadlock in the timeout handler
+ - drm/radeon: fix r1xx/r2xx register checker for POT textures
+ - xhci: fix USB3 device initiated resume race with roothub autosuspend
+ - net: stmmac: use correct DMA buffer size in the RX descriptor
+ - mqprio: Fix out-of-bounds access in mqprio_dump
+
+ * fstrim on nvme / AMD CPU fails and produces kernel error messages
  (LP: #1856603)
+ - nvme: Discard workaround for non-conformant devices
- net selftest psock_fanout fails on xenial s390x due to incorrect queue lengths (LP: #1853375)
- selftests/net: ignore background traffic in psock_fanout

- multi-zone raid0 corruption (LP: #1850540)
- md/raid0: avoid RAID0 data corruption due to layout confusion.
- md: add feature flag MD_FEATURE_RAID0_LAYOUT
- md/raid0: fix warning message for parameter default_layout
- md/raid0: Fix an error message in raid0_make_request()
- SAUCE: md/raid0: Link to wiki with guidance on multi-zone RAID0 layout migration
- SAUCE: md/raid0: Use kernel specific layout

- Dell AIO can't adjust brightness (LP: #1858761)
- SAUCE: platform/x86: dell-uart-backlight: add retry for get scalar status

- USB key cannot be detected by hotplug on Sunix USB Type-A 3.1 Gen 2 card
  [1b21:2142]  (LP: #1858988)
- SAUCE: PCI: Avoid ASMedia XHCI USB PME# from D0 defect

- CVE-2019-5108
  - cfg80211/mac80211: make ieee80211_send_layer2_update a public function
  - mac80211: Do not send Layer 2 Update frame before authorization


- CVE-2019-20096
  - dccp: Fix memleak in __feat_register_sp

- Fix misleading error message: Configuring the VNIC characteristics failed
  (LP: #1860523)
- (upstream) s390/qeth: fix false reporting of VNIC CHAR config failure

- Fix unusable USB hub on Dell TB16 after S3 (LP: #1855312)
- SAUCE: USB: core: Make port power cycle a seperate helper function
- SAUCE: USB: core: Attempt power cycle port when it's in eSS.Disabled state

- [linux] Patch to prevent possible data corruption (LP: #1848739)
- blk-mq: quiesce queue during switching io sched and updating nr_requests
- blk-mq: move hctx lock/unlock into a helper
- blk-mq: factor out a few helpers from __blk_mq_try_issue_directly
- blk-mq: improve DM's blk-mq IO merging via blk_insert_cloned_request feedback
- dm mpath: fix missing call of path selector type->end_io
- blk-mq-sched: remove unused 'can_block' arg from blk_mq_sched_insert_request
+ blk-mq: don't dispatch request in blk_mq_request_direct_issue if queue is busy
+ blk-mq: introduce BLK_STS_DEV_RESOURCE
+ blk-mq: Rename blk_mq_request_direct_issue() into blk_mq_request_issue_directly()
+ blk-mq: don't queue more if we get a busy return
+ blk-mq: dequeue request one by one from sw queue if hctx is busy
+ blk-mq: issue directly if hw queue isn't busy in case of 'none'
+ blk-mq: fix corruption with direct issue
+ blk-mq: fail the request in case issue failure
+ blk-mq: punt failed direct issue to dispatch list
+ *
+ scsi: hisi_sas: Fix out of bound at debug_I_T_nexus_reset()
+ (LP: #1853992)
+ scsi: hisi_sas: Fix out of bound at debug_I_T_nexus_reset()
+ *
+ scsi: hisi_sas: Assign NCQ tag for all NCQ commands (LP: #1853995)
+ scsi: hisi_sas: Assign NCQ tag for all NCQ commands
+ *
+ scsi: hisi_sas: Fix the conflict between device gone and host reset (LP: #1853997)
+ scsi: hisi_sas: Fix the conflict between device gone and host reset
+ *
+ scsi: hisi_sas: Check sas_port before using it (LP: #1855952)
+ scsi: hisi_sas: Check sas_port before using it
+ *
+ CVE-2019-18885
+ btrfs: refactor btrfs_find_device() take fs_devices as argument
+ btrfs: merge btrfs_find_device and find_device
+ *
+ [SRU][B/OEM-B/OEM-OSP1/D/E/F] Add LG I2C touchscreen multitouch support (LP: #1857541)
+ SAUCE: HID: multitouch: Add LG MELF0410 I2C touchscreen support
+ *
+ usb-audio: the mic can't record any sound after resume on Dell Dock WD19
+ (LP: #1857496)
+ ALSA: usb-audio: set the interface format after resume on Dell WD19
+ *
+ qede driver causes 100% CPU load (LP: #1855409)
+ qede: Handle infinite driver spinning for Tx timestamp.
+ *
+ [roce-1126]RDMA/hns: bugfix for slab-out-of-bounds when loading hip08 driver
+ (LP: #1853989)
+ RDMA/hns: Bugfix for slab-out-of-bounds when unloading hip08 driver
+ RDMA/hns: bugfix for slab-out-of-bounds when loading hip08 driver
+ *
+ [roce-1126]RDMA/hns: Fixs hw access invalid dma memory error (LP: #1853990)
+ RDMA/hns: Fixs hw access invalid dma memory error
+ * [hns-1126] net: hns: add support for vlan TSO (LP: #1853937)
+ - net: hns: add support for vlan TSO
+ + * mlx5_core reports hardware checksum error for padded packets on Mellanox
+ NICs (LP: #1854842)
+ - net/mlx5e: Rx, Fixup skb checksum for packets with tail padding
+ - net/mlx5e: Rx, Fix checksum calculation for new hardware
+ + * alsa/hda/realtek: the line-out jack doesn't work on a dell AIO
+ (LP: #1855999)
+ - ALSA: hda/realtek - Line-out jack doesn't work on a Dell AIO
+ + * efivarfs test in ubuntu_kernel_selftest failed on the second run
+ (LP: #1809704)
+ - selftests: efivarfs: return Kselftest Skip code for skipped tests
+ - selftests/efivarfs: clean up test files from test_create*()
+ + * CVE-2019-19082
+ - drm/amd/display: prevent memory leak
+ + * CVE-2019-19078
+ - ath10k: fix memory leak
+ + * Bionic update: upstream stable patchset 2019-12-20 (LP: #1857158)
+ - rsi: release skb if rsi_prepare_beacon fails
+ - arm64: tegra: Fix 'active-low' warning for Jetson TX1 regulator
+ - usb: gadget: u_serial: add missing port entry locking
+ - tty: serial: fsl_lpuart: use the sg count from dma_map_sg
+ - tty: serial: msm_serial: Fix flow control
+ - serial: plo11: Fix DMA ->flush_buffer()
+ - serial: serial_core: Perform NULL checks for break_ctl ops
+ - serial: ifx6x60: add missed pm_runtime_disable
+ - autofs: fix a leak in autofs_expire_indirect()
+ - RDMA/hns: Correct the value of HNS_ROCE_HEM_CHUNK_LEN
+ - iwlwifi: pcie: don't consider IV len in A-MSDU
+ - exportfs_decode_fh(): negative pinned may become positive without the parent
+ locked
+ - audit_get_nld(): don't unlock parent too early
+ - NFC: nxp-nci: Fix NULL pointer dereference after I2C communication error
+ - xfrm: release device reference for invalid state
+ - Input: cyttsp4_core - fix use after free bug
+ - sched/core: Avoid spurious lock dependencies
+ - ALSA: pcm: Fix stream lock usage in snd_pcm_period_elapsed()
+ - rsxx: add missed destroy_workqueue calls in remove
+ - net: ep93xx_eth: fix mismatch of request_mem_region in remove
+ - i2c: core: fix use after free in of_i2c_notify
+ - serial: core: Allow processing sysrq at port unlock time
- cxgb4vf: fix memleak in mac_hlist initialization
- iwlwifi: mvm: synchronize TID queue removal
- iwlwifi: mvm: Send non offchannel traffic via AP sta
- ARM: 8131/1: Make aligned 2-byte getuser()/putuser() atomic on ARMv6+
- net/mlx5: Release resource on error flow
- clk: sunxi-ng: a64+: Fix gate bit of DSI DPHY
- dlm: fix possible call to kfree() for non-initialized pointer
- extcon: max8997: Fix lack of path setting in USB device mode
- net: ethernet: ti: cpts: correct debug for expired txq skb
- rtc: s3c rtc: Avoid using broken ALMYEAR register
- i40e: don't restart nway if autoneg not supported
- clk: rockchip: fix rk3188 clk_smc gate data
- clk: rockchip: fix rk3188 sclk_mac_lbtst parameter ordering
- ARM: dts: rockchip: Fix rk3288-rock2 vcc_flash name
- dlm: fix missing idr_destroy for recover_idr
- MIPS: SiByte: Enable ZONE_DMA32 for LittleSur
- net: dsa: mv88e6xxxx: Work around mv886e6161 SERDES missing MII_PHYSID2
- scsi: zfc: drop default switch case which might paper over missing case
- crypto: ecc - check for invalid values in the key verification test
- crypto: bcm - fix normal/non key hash algorithm failure
- pinctrl: qcom: ssbi-gpio: fix gpio-hog related boot issues
- Staging: iio: adt7316: Fix i2c data reading, set the data field
- mm/vmstat.c: fix NUMA statistics updates
- clk: rockchip: fix I2S1 clock gate register for rk3328
- clk: rockchip: fix ID of 8ch clock of I2S1 for rk3328
- regulator: Fix return value of _set_load() stub
- iomap: sub-block dio needs to zeroout beyond EOF
- MIPS: OCTEON: octeon-platform: fix typing
- net/smc: use after free fix in sme_wr_tx_put_slot()
- math-emu/soft-fp.h: (_FP_ROUND_ZERO) cast 0 to void to fix warning
- rtc: max8997: Fix the returned value in case of error in
  `max8997_rtc_read_alarm()`
- rtc: dt-binding: abx80x: fix resistance scale
- ARM: dts: exynos: Use Samsung SoC specific compatible for DWC2 module
- media: pulse8-ccc: return 0 when invalidating the logical address
- media: ccc: report Vendor ID after initialization
- dmaengine: coh901318: Fix a double-lock bug
- dmaengine: coh901318: Remove unused variable
- dmaengine: dw-dmac: implement dma protection control setting
- usb: dwc3: debugfs: Properly print/set link state for HS
- usb: dwc3: don't log probe deferrals; but do log other error codes
- ACPI: fix acpi_find_child_device() invocation in acpi_preset_companion()
- f2fs: fix count of seg_freed to make sec_freed correct
- f2fs: change segment to section in f2fs_ioc_gc_range
- ARM: dts: rockchip: Fix the PMU interrupt number for rv1108
- ARM: dts: rockchip: Assign the proper GPIO clocks for rv1108
- f2fs: fix to allow node segment for GC by ioctl path
-sparc: Correct ctx->saw_frame_pointer logic.
+ - dma-mapping: fix return type of dma_set_max_seg_size()
+ - altera-stapl: check for a null key before strcasecmp’ing it
+ - serial: imx: fix error handling in console_setup
+ - i2c: imx: don’t print error message on probe defer
+ - lockd: fix decoding of TEST results
+ - ASoC: rsnd: tidyup registering method for rsnd_kctrl_new()
+ - ARM: dts: sun5i: a10s: Fix HDMI output DTC warning
+ - ARM: dts: sun8i: v3s: Change pinctrl nodes to avoid warning
+ - dlm: NULL check before kmem_cache_destroy is not needed
+ - ARM: debug: enable UART1 for socfpga Cyclone5
+ - nfsd: fix a warning in __cld_pipe_upcall()
+ - ASoC: au8540: use 64-bit arithmetic instead of 32-bit
+ - ARM: OMAP1/2: fix SoC name printing
+ - arm64: dts: meson-gxl-libretech-cc: fix GPIO lines names
+ - arm64: dts: meson-gxbb-nanopi-k2: fix GPIO lines names
+ - arm64: dts: meson-gxbb-odroidc2: fix GPIO lines names
+ - arm64: dts: meson-gxl-khadas-vim: fix GPIO lines names
+ - net/x25: fix called/calling length calculation in x25_parse_address_block
+ - net/x25: fix null_x25_address handling
+ - ARM: dts: mmp2: fix the gpio interrupt cell number
+ - ARM: dts: realview-pbx: Fix duplicate regulator nodes
+ - tcp: fix off-by-one bug on aborting window-probing socket
+ - tcp: fix SNMP under-estimation on failed retransmission
+ - tcp: fix SNMP TCP timeout under-estimation
+ - modpost: skip ELF local symbols during section mismatch check
+ - kbuild: fix single target build for external module
+ - mtd: fix mtd_oobavail() incoherent returned value
+ - ARM: dts: pxa: clean up USB controller nodes
+ - clk: sunxi-ng: h3/h5: Fix CSI_MCLK parent
+ - ARM: dts: realview: Fix some more duplicate regulator nodes
+ - dlm: fix invalid cluster name warning
+ - net/mlx4_core: Fix return codes of unsupported operations
+ - pstore/ram: Avoid NULL deref in ftrace merging failure path
+ - powerpc/math-emu: Update macros from GCC
+ - clk: renesas: r8a77995: Correct parent clock of DU
+ - MIPS: OCTEON: cvmx_pko_mem_debug8: use oldest forward compatible definition
+ - nfsd: Return EPERM, not EACCES, in some SETATTR cases
+ - media: stkwebcam: Bugfix for wrong return values
+ - firmware: qcom: scm: fix compilation error when disabled
+ - mlxsw: spectrum_router: Relax GRE decap matching check
+ - IB/hfi1: Ignore LNI errors before DC8051 transitions to Polling state
+ - IB/hfi1: Close VNIC sdma_progress sleep window
+ - mlx4: Use snprintf instead of complicated strcpy
+ - usb: mtu3: fix dbginfo in qmu_tx_zlp_error_handler
+ - ARM: dts: sunxi: Fix PMU compatible strings
+ - media: vimc: fix start stream when link is disabled
+ - net: aquantia: fix RSS table and key sizes
+ - sched/fair: Scale bandwidth quota and period without losing quota/period
+ ratio precision
+ - fuse: verify nlink
+ - fuse: verify attributes
+ - ALSA: pcm: oss: Avoid potential buffer overflows
+ - ALSA: hda - Add mute led support for HP ProBook 645 G4
+ - Input: synaptics - switch another X1 Carbon 6 to RMI/SMbus
+ - Input: synaptics-rmi4 - re-enable IRQs in f34v7_do_reflash
+ - Input: synaptics-rmi4 - don't increment rmiaddr for SMBus transfers
+ - Input: goodix - add upside-down quirk for Teclast X89 tablet
+ - coresight: etm4x: Fix input validation for sysfs.
+ - Input: Fix memory leak in psxpad_spi_probe
+ - CIFS: Fix NULL-pointer dereference in smb2_push_mandatory_locks
+ - CIFS: Fix SMB2 oplock break processing
+ - tty: vt: keyboard: reject invalid keycodes
+ - can: slcan: Fix use-after-free Read in slcan_open
+ - kernfs: fix ino wrap-around detection
+ - jbd2: Fix possible overflow in jbd2_log_space_left()
+ - drm/i810: Prevent underflow in ioctl
+ - KVM: arm/arm64: vgic: Don't rely on the wrong pending table
+ - KVM: x86: do not modify masked bits of shared MSRs
+ - KVM: x86: fix presentation of TSX feature in ARCH_CAPABILITIES
+ - crypto: crypto4xx - fix double-free in crypto4xx_destroy_sdr
+ - crypto: af_alg - cast ki_complete ternary op to int
+ - crypto: ccpp - fix uninitialized list head
+ - crypto: ecdh - fix big endian bug in ECC library
+ - crypto: user - fix memory leak in crypto_report
+ - spi: atmel: Fix CS high support
+ - RDMA/qib: Validate ->show()/store() callbacks before calling them
+ - iomap: Fix pipe page leakage during splicing
+ - thermal: Fix deadlock in thermal thermal_zone_device_check
+ - binder: Handle start==NULL in binder_update_page_range()
+ - ASoC: rsnd: fixup MIX kctrl registration
+ - appletalk: Fix potential NULL pointer dereference in unregister_snap_client
+ - appletalk: Set error code if register_snap_client failed
+ - usb: gadget: configs: Fix missing spin_lock_init()
+ - usb: gadget: pch_udc: fix use after free
+ - scsi: qla2xxx: Fix driver unload hang
+ - media: venus: remove invalid compat_ioctl32 handler
+ - USB: uas: honor flag to avoid CAPACITY16
+ - USB: uas: heed CAPACITY_HEURISTICS
+ - USB: documentation: flags on usb-storage versus UAS
+ - usb: Allow USB device to be warm reset in suspended state
+ - staging: rtl8188eu: fix interface sanity check
+ - staging: rtl8712: fix interface sanity check
+ - staging: gigaset: fix general protection fault on probe
+ - staging: gigaset: fix illegal free on probe errors
+ - staging: gigaset: add endpoint-type sanity check
+ - usb: xhci: only set D3hot for pci device
+ - xhci: Increase STS_HALT timeout in xhci_suspend()
+ - xhci: handle some XHCI_TRUST_TX_LENGTH quirks cases as default behaviour.
+ - ARM: dts: pandora-common: define wl1251 as child node of mmc3
+ - iio: humidity: hdc100x: fix IIO_HUMIDITYRELATIVE channel reporting
+ - USB: atm: ueagle-atm: add missing endpoint check
+ - USB: idmouse: fix interface sanity checks
+ - USB: serial: io_edgeport: fix epic endpoint lookup
+ - USB: adutux: fix interface sanity check
+ - usb: core: urb: fix URB structure initialization function
+ - usb: mon: Fix a deadlock in usbmon between mmap and read
+ - tpm: add check after commands attrs tab allocation
+ - mtd: spear_smi: Fix Write Burst mode
+ - virtio-balloons: fix managed page counts when migrating pages between zones
+ - usb: dwc3: ep0: Clear started flag on completion
+ - btrfs: check page->mapping when loading free space cache
+ - btrfs: use refcount inc not zero in kill_all_nodes
+ - Btrfs: fix negative subv_writers counter and data space leak after buffered
+ write
+ - btrfs: Remove btrfs_bio::flags member
+ - Btrfs: send, skip backreference walking for extents with many references
+ - btrfs: record all roots for rename exchange on a subvol
+ - rtlwifi: rtl8192de: Fix missing code to retrieve RX buffer address
+ - rtlwifi: rtl8192de: Fix missing callback that tests for hw release of buffer
+ - rtlwifi: rtl8192de: Fix missing enable interrupt flag
+ - lib: raid6: fix awk build warnings
+ - ovl: relax WARN_ON() on rename to self
+ - ALSA: hda - Fix pending unsol events at shutdown
+ - watchdog: aspeed: Fix clock behaviour for ast2600
+ - hwrng: omap - Fix RNG wait loop timeout
+ - dm zoned: reduce overhead of backing device checks
+ - workqueue: Fix spurious sanity check failures in destroy_workqueue()
+ - workqueue: Fix pqw ref leak in rescuer_thread()
+ - ASoC: Jack: Fix NULL pointer dereference in snd_soc_jack_report
+ - blk-mq: avoid sysfs buffer overflow with too many CPU cores
+ - cgroup: pids: use atomic64_t for pids->limit
+ - ar5523: check NULL before memcpy() in ar5523_cmd()
+ - s390/mm: properly clear _PAGE_NOEXEC bit when it is not supported
+ - media: bdisp: fix memleak on release
+ - media: radio: w11273: fix interrupt masking on release
+ - media: cec.h: CEC_OP_REC_FLAG_ values were swapped
+ - cpuidle: Do not unset the driver if it is there already
+ - intel_th: Fix a double put_device() in error path
+ - intel_th: pci: Add Ice Lake CPU support
+ - intel_th: pci: Add Tiger Lake CPU support
+ - PM / devfreq: Lock devfreq in trans_stat_show
+ - cpufreq: powernv: fix stack bloat and hard limit on number of CPUs
+ - ACPI: OSL: only free map once in osl.c
+ ACPI: bus: Fix NULL pointer check in acpi_bus_get_private_data()
+ ACPI: PM: Avoid attaching ACPI PM domain to certain devices
+ pinctrl: samsung: Add of_node_put() before return in error path
+ pinctrl: samsung: Fix device node refcount leaks in S3C24xx wakeup
    controller init
+ pinctrl: samsung: Fix device node refcount leaks in init code
+ pinctrl: samsung: Fix device node refcount leaks in S3C64xx wakeup
    controller init
+ mmc: host: omap_hsmmc: add code for special init of w11251 to get rid of
    pandora_w11251_init_card
+ ARM: dts: omap3-tao3530: Fix incorrect MMC card detection GPIO polarity
+ ppdev: fix PPGETTIME/PPSETTIME ioctls
+ powerpc: Allow 64bit VDSO __kernel_sync_dcache to work across ranges >4GB
+ powerpc/xive: Prevent page fault issues in the machine crash handler
+ powerpc: Allow flush_icache_range to work across ranges >4GB
+ powerpc/xive: Skip ioremap() of ESB pages for LSI interrupts
+ video/hdmi: Fix AVI bar unpack
+ quota: Check that quota is not dirty before release
+ ext2: check err when partial != NULL
+ quota: fix livelock in dquot_writeback_dquot
+ ext4: Fix credit estimate for final inode freeing
+ reiserfs: fix extended attributes on the root directory
+ block: fix single range discard merge
+ scsi: zfcp: trace channel log even for FCP command responses
+ scsi: qla2xxx: Fix DMA unmmap leak
+ scsi: qla2xxx: Fix session lookup in qlt_abort_work()
+ scsi: qla2xxx: Fix qla24xx_process_bidir_cmd()
+ scsi: qla2xxx: Always check the qla2x00_wait_for_hba_online() return value
+ xhci: Fix memory leak in xhci_add_in_port()
+ xhci: make sure interrupts are restored to correct state
+ iio: adis16480: Add debugfs_reg_access entry
+ phy: renesas: rcar-gen3-usb2: Fix sysfs interface of "role"
+ omap: pdata-quirks: remove openpandora quirks for mmc3 and w11251
+ lpfc: Cap NPIV vports to 256
+ lpfc: Correct code setting non existent bits in sli4 ABORT WQE
+ drbd: Change drbd_request_detach_interruptible's return type to int
+ e100: Fix passing zero to 'PTR_ERR' warning in e100_load_ucode_wait
+ power: supply: cpcap-battery: Fix signed counter sample register
+ mlxsw: spectrum_router: Refresh nexthop neighbour when it becomes dead
+ ath10k: fix fw crash by moving chip reset after napi disabled
+ powerpc: Avoid clang warnings around setjmp and longjmp
+ powerpc: Fix vDSO clock_getres()
+ ext4: work around deleting a file with i_nlink == 0 safely
+ firmware: qcom: scm: Ensure 'a0' status code is treated as signed
+ mm/shmem.c: cast the type of unmap_start to u64
+ ext4: fix a bug in ext4_wait_for_tail_page_commit
+ blk-mq: make sure that line break can be printed
+ - workqueue: Fix missing kfree(rescuer) in destroy_workqueue()
+ - sunrpc: Fix crash when cache_head become valid before update
+ - net/mlx5e: Fix SFF 8472 eeprom length
+ - gfs2: fix glock reference problem in gfs2_trans_remove_revoke
+ - kernel/module.c: wake up processes in module_wq on module unload
+ - gpiolib: acpi: Add Terra Pad 1061 to the run_edge_events_on_boot_blacklist
+ - raid5: need to set STRIPE_HANDLE for batch head
+ - of: unittest: fix memory leak in attach_node_and_children
+ - sparc64: implement ioremap_uc
+ - iwwifi: trans: Clear persistence bit when starting the FW
+ - audit: Embed key into chunk
+ - netfilter: nf_tables: don't use position attribute on rule replacement
+ - ARC: IOC: panic if kernel was started with previously enabled IOC
+ - ARM: dts: exynos: Fix LDO13 min values on Odroid XU3/XU4/HC1
+ - scsi: zfcp: update kernel message for invalid FCP_CMND length, it's not the CDB
+ - drivers: soc: Allow building the amlogic drivers without ARCH MESON
+ - scpt: count sk_wmem_alloc by skb truesize in scpt_packet_transmit
+ - xfs: extent shifting doesn't fully invalidate page cache
+ - iomap: dio data corruption and spurious errors when pipes fill
+ - rvb: Clean up duplex handling
+ - net/ipv6: re-do dad when interface has IFF_NOARP flag change
+ - selftests/powerpc: Allocate base registers
+ - i2fs: fix to account preflush command for nolflush_merge mode
+ - nvme: Free ctrl device name on init failure
+ - gpu: host1x: Fix syncpoint ID field size on Tegra186
+ - ARM: dts: sun4i: Fix gpio-keys warning
+ - ARM: dts: sun4i: Fix HDMI output DTC warning
+ - ARM: dts: sun7i: Fix HDMI output DTC warning
+ - ARM: dts: sun8i: a23/a33: Fix OPP DTC warnings
+ - can: xilinx: Fix return type of ndo_start_xmit function
+ - clk: mediatek: Drop __init from mtk_clk_register_cpumuxes()
+ - clk: mediatek: Drop more __init markings for driver probe
+ - soc: renesas: r8a77970-sy5: Correct names of A2DP/A2CN power domains
+ - tcp: make tcp_space() aware of socket backlog
+ - clk: meson: meson8b: fix the offset of vid_pll_dco's N value
+ - media: ucevideo: Abstract streaming object lifetime
+ - clk: renesas: rcar-gen3: Set state when registering SD clocks
+ - x86/mm/32: Sync only to VMALLOC_END in vmalloc_sync_all()
+ - crypto: atmel-aes - Fix IV handling when req->nbytes < ivsize
+ - binder: Fix race between mmap() and binder_alloc_print_pages()
+ - perf script: Fix invalid LBR/binary mismatch error
+ - splice: don't read more than available pipe space
+ - iomap: partially revert 4721a601099 (simulated directio short read on EFAULT)
+ - xfs: add missing error check in xfs_prepare_shift()
+ - Btrfs: fix metadata space leak on fixup worker failure to set range as delalloc
+ - btrfs: Avoid getting stuck during cyclic writebacks
+ - md: improve handling of bio with REQ_PREFLUSH in md_flush_request()
+ - pinctrl: armada-37xx: Fix irq mask access in armada_37xx_irq_set_type()
+ - pinctrl: samsung: Fix device node refcount leaks in Exynos wakeup controller
  + init
+ - scsi: lpfc: Correct topology type reporting on G7 adapters
+ - pcalls-front: don't return error when the ring is full
+ - net: hns3: clear pci private data when unload hns3 driver
+ - net: hns3: change hnae3_register_ne_dev() to int
+ - net: hns3: Check variable is valid before assigning it to another
+ - scsi: hisi_sas: send primitive NOTIFY to SSP situation only
+ - scsi: hisi_sas: Reject setting programmed minimum linkrate > 1.5G
+ - regulator: 88pm800: fix warning same module names
+ - rtc: disable uie before setting time and enable after
+ - splice: only read in as much information as there is pipe buffer space
+ - s390/smp,vdso: fix ASCE handling
+ - PCI: rcar: Fix missing MACCTRL register setting in initialization sequence
+ - of: overlay: add changedset_property() memory leak
+ - scsi: qla2xxx: Change discovery state before PLOGI
+
+ * Realtek ALC256M with DTS Audio Processing internal microphone doesn't work
  + on Redmi Book 14 2019 (LP: #1846148) // Bionic update: upstream stable
  + patchset 2019-12-20 (LP: #1857158)
  + - ALSA: hda/realtek - Enable the headset-mic on a Xiaomi's laptop
  +
  + * False positive test result in run_apttestests from net in
  + ubuntu_kernel_selftest (LP: #1825778)
  + - selftests/net: correct the return value for run_apttestests
  +
  + * headphone has noise as not mute on dell machines with alc236/256
  + (LP: #1854401)
  + - SAUCE: ALSA: hda/realtek - Dell headphone has noise on unmute for ALC236
  +
  + * Bionic update: upstream stable patchset 2019-12-09 (LP: #1855787)
  + - Revert "KVM: nVMX: reset cache/shadows when switching loaded VMCS"
  + - clk: meson: gxbb: let sar_adc_clk_div set the parent clock rate
  + - ASoC: msm8916-wcd-analog: Fix RX1 selection in RDAC2 MUX
  + - ASoC: compress: fix unsigned integer overflow check
  + - reset: Fix memory leak in reset_control_array_put()
  + - ASoC: kirkwood: fix external clock probe defer
  + - clk: samsung: exynos5420: Preserve PLL configuration during suspend/resume
  + - reset: fix reset_control_ops kerneldoc comment
  + - clk: at91: avoid sleeping early
  + - clk: sunix-ng: a80: fix the zero'ing of bits 16 and 18
  + - idr: Fix idr_alloc_u32 on 32-bit systems
  + - x86/resctrl: Prevent NULL pointer dereference when reading mondata
  + - clk: ti: dra7-atl-clock: Remove ti_clk_add_alias call
  + - net: fec: add missed clk_disable_unprepare in remove

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Open Source Used In 5GaaS Edge AC-4 19122
+ - bridge: ebtables: don't crash when using dnat target in output chains
+ - can: peak_usb: report bus recovery as well
+ - can: c_can: D_CAN: c_can_chip_config(): perform a software reset on open
+ - can: rx-offload: can_rx_offload_queue_tail(): fix error handling, avoid skb mem leak
+ - can: rx-offload: can_rx_offload_offload_one(): do not increase the skb_queue beyond skb_queue_len_max
+ - can: rx-offload: can_rx_offload_offload_one(): increment rx_fifo_errors on queue overflow or OOM
+ - can: rx-offload: can_rx_offload_offload_one(): use ERR_PTR() to propagate error value in case of errors
+ - can: rx-offload: can_rx_offload_irq_offload_timestamp(): continue on error
+ - can: rx-offload: can_rx_offload_irq_offload_fifo(): continue on error
+ - watchdog: meson: Fix the wrong value of left time
+ - scripts/gdb: fix debugging modules compiled with hot/cold partitioning
+ - net: bcmgenet: reapply manual settings to the PHY
+ - ceph: return -EINVAL if given fsc mount option on kernel w/o support
+ - mac80211: fix station inactive_time shortly after boot
+ - block: drbd: remove a stray unlock in __drbd_send_protocol()
+ - pwm: bcm-iproc: Prevent unloading the driver module while in use
+ - scsi: lpfc: Fix kernelOops due to null pring pointers
+ - scsi: lpfc: Fix dif and first burst use in write commands
+ - ARM: dts: Fix up SQ201 flash access
+ - ARM: debug-imx: only define DEBUG_IMX_UART_PORT if needed
+ - [Config] updateconfigs for DEBUG_IMX_UART_PORT
+ - ARM: dts: imx53-voipac-dmm-668: Fix memory node duplication
+ - parisc: Fix serio address output
+ - parisc: Fix HP SDC hpa address output
+ - arm64: mm: Prevent mismatched 52-bit VA support
+ - arm64: smp: Handle errors reported by the firmware
+ - ARM: OMAP1: fix USB configuration for device-only setups
+ - RDMA/vmw_pvrdma: Use atomic memory allocation in create AH
+ - PM / AVS: SmartReflex: NULL check before some freeing functions is not needed
+ - ARM: ks8695: fix section mismatch warning
+ - ACPI / LPSS: Ignore acpi_device_fix_up_power() return value
+ - scsi: lpfc: Enable Management features for IF_TYPE=6
+ - crypto: user - support incremental algorithm dumps
+ - mwifiex: fix potential NULL dereference and use after free
+ - mwifiex: debugfs: correct histogram spacing, formatting
+ - rtl818x: fix potential use after free
+ - xfs: require both realtime inodes to mount
+ - ubi: Put MTD device after it is not used
+ - ubi: Do not drop UBI device reference before using
+ - microblaze: adjust the help to the real behavior
+ - microblaze: move "... is ready" messages to arch/microblaze/Makefile
+ - iwllwifi: move iwl_nvm_check_version() into dvm
+ - gpiolib: Fix return value of gpio_to_desc() stub if !GPIOLIB
- kvm: vmx: Set IA32_TSC_AUX for legacy mode guests
- VSOCK: bind to random port for VMADDR_PORT_ANY
- mmc: meson-gx: make sure the descriptor is stopped on errors
- mtd: rawnand: sunxi: Write pageprog related opcodes to WCMD_SET
- btrfs: only track ref_heads in delayed_ref_updates
- HID: intel-isl-hid: fixes incorrect error handling
- serial: 8250: Rate limit serial port rx interrupts during input overruns
- kprobes/x86/xen: blacklist non-attachable xen interrupt functions
- xen/pciback: Check dev_data before using it
- vfiom-dev/samples: Use u8 instead of char for handle functions
- pinctrl: xway: fix gpio-hog related boot issues
- net/mlx5: Continue driver initialization despite debugfs failure
- exofs_mount(): fix leaks on failure exits
- bnxt_en: Return linux standard errors in bnxt_ethtool.c
- bnxt_en: query force speeds before disabling autoneg mode.
- KVM: s390: unregister debug feature on failing arch init
- pinctrl: sh-pfc: sh7264: Fix PFCR3 and PFCR0 register configuration
- pinctrl: sh-pfc: sh7734: Fix shifted values in IPSR10
- HID: doc: fix wrong data structure reference for UHID_OUTPUT
- dm flakey: Properly corrupt multi-page bios.
- gfs2: take jdata unstuff into account in do_grow
- xfs: Align compat attrlist_by_handle with native implementation.
- xfs: Fix bulkstat compat ioctl on x32 userspace.
- IB/qib: Fix an error code in qib_sdma_verbs_send()
- clocksource/drivers/fttmr010: Fix invalid interrupt register access
- vxlan: Fix error path in __vxlan_dev_create()
- powerpc/book3s/32: fix number of bats in p/v_block_mapped()
- powerpc/xmon: fix dump_segments()
- drivers/regulator: fix a missing check of return value
- Bluetooth: hci_bcm: Handle specific unknown packets after firmware loading
- serial: max310x: Fix tx_empty() callback
- openrisc: Fix broken paths to arch/or32
- RDMA/srp: Propagate ib_post_send() failures to the SCSI mid-layer
- scsi: qla2xxx: deadlock by configfs_depend_item
- scsi: csiostor: fix incorrect dma device in case of vport
- ath6kl: Only use match sets when firmware supports it
- ath6kl: Fix off by one error in scan completion
- powerpc/perf: Fix unit sel/cache sel checks
- powerpc/prom: fix early DEBUG messages
- powerpc/mm: Make NULL pointer deferences explicit on bad page faults.
- powerpc/44x/bamboo: Fix PCI range
- vfio/spapr_tce: Get rid of possible infinite loop
- powerpc/powerv/eeh/npu: Fix uninitialized variables in
opal_pci_eeh_freeze_status
- drbd: ignore "all zero" peer volume sizes in handshake
- drbd: reject attach of unsuitable uuids even if connected
- drbd: do not block when adjusting "disk-options" while IO is frozen
- drbd: fix print_st_err()'s prototype to match the definition
+ - IB/rxe: Make counters thread safe
+ - regulator: tps65910: fix a missing check of return value
+ - powerpc/83xx: handle machine check caused by watchdog timer
+ - powerpc/ppc: Fix node leak in update_inb_associativity_index()
+ - crypto: mxc-scc - fix build warnings on ARM64
+ - pwm: clps711x: Fix period calculation
+ - net/netlink_cmpat: Fix a missing check of nla_parse_nested
+ - net/net_namespace: Check the return value of register_pernet_subsys()
+ - f2fs: fix to dirty inode synchronously
+ - um: Make GCOV depend on !KCOV
+ - net: (cpts) fix a missing check of clk_prepare
+ - net: stmicro: fix a missing check of clk_prepare
+ - net: dsa: bcm_sf2: Propagate error value from mdio_write
+ - at11e: checking the status of at11e_write_phy_reg
+ - tipc: fix a missing check of genmsg_put
+ - net/wan/fsl_ucc_hdlc: Avoid double free in ucc_hdlc_probe()
+ - ofcs2: clear journal dirty flag after shutdown journal
+ - vmscan: return NODE_RECLAIM_NOSCAN in node_reclaim() when CONFIG_NUMA is n
+ - lib/genalloc.c: fix allocation of aligned buffer from non-aligned chunk
+ - lib/genalloc.c: use vzalloc_node() to allocate the bitmap
+ - fork: fix some -Wmissing-prototypes warnings
+ - drivers/base/platform.c: kmemleak ignore a known leak
+ - lib/genalloc.c: include vmalloc.h
+ - mtd: Check add_mtd_device() ret code
+ - tipc: fix memory leak in tipc_nl_compat_publ_dump
+ - net/core/neighbor: tell kmemleak about hash tables
+ - PCI/MSI: Return -ENOSPC from pci_alloc_irq_vectors_affinity()
+ - net/core/neighbor: fix kmemleak minimal reference count for hash tables
+ - serial: 8250: Fix serial8250 initialization crash
+ - gpu: ipu-v3: pre: don't trigger update if buffer address doesn't change
+ - sfc: suppress duplicate nvmem partition types in efx_ef10_mtd_probe
+ - ip_tunnel: Make none-tunnel-dst tunnel port work with lwttunnel
+ - decnet: fix DN_IFREQ_SIZE
+ - net/smc: prevent races between smc_lgr_terminate() and smc_conn_free()
+ - blktrace: Show requests without sector
+ - tipc: fix skb may be leaky in tipc_link_input
+ - sfc: initialise found bitmap in efx_ef10_mtd_probe
+ - net: fix possible overflow in __sk_mem_raise_allocated()
+ - scpt: don't compare hb_timer expire date before starting it
+ - bpf: decrease usercnt if bpf_map_new_fd() fails in bpf_map_get_fd_by_id()
+ - net: dev: Use unsigned integer as an argument to left-shift
+ - kvm: properly check debugfs dentry before using it
+ - bpf: drop refcount if bpf_map_new_fd() fails in map_create()
+ - net: hns3: Change fw error code NOT_EXEC to NOT_SUPPORTED
+ - apparmor: delete the dentry in aafs_remove() to avoid a leak
+ - scsi: libbsas: Support SATA PHY connection rate unmatch fixing during discovery
+ - ACPI / APEI: Don't wait to serialise with oops messages when panic()ing
- ACPI / APEI: Switch estatus pool to use vmalloc memory
- scsi: libsas: Check SMP PHY control function result
- mtd: Remove a debug trace in mtddpart.c
- mm, gup: add missing refcount overflow checks on s390
- clk: at91: fix update bit maps on CFG_MOR write
- clk: at91: generated: set audio_pll_allowed in at91_clk_register_generated()
- staging: rt8192e: fix potential use after free
- staging: rt8723bs: Drop ACPI device ids
- staging: rt8723bs: Add 024c:0525 to the list of SDIO device-ids
- USB: serial: ftdi_sio: add device IDs for U-Blox C099-F9P
- mei: bus: prefix device names on bus with the bus name
- media: v4l2-ctrl: fix flags for DO_WHITE_BALANCE
- net: macb: fix error format in dev_err()
- pwm: Clear chip_data in pwm_put()
- media: atmel: atmel-isc: fix asd memory allocation
- media: atmel: atmel-isc: fix INIT_WORK misplacement
- macvlan: schedule bc_work even if error
- net: psample: fix skb_over_panic
- openvswitch: fix flow command message size
- slip: Fix use-after-free Read in slip_open
- openvswitch: drop unneeded BUG_ON() in ovs_flow_cmd_build_info()
- openvswitch: remove another BUG_ON()
- tipc: fix link name length check
- scpt: cache nets in scpt_ep_common
- net: sched: fix ‘tc -s class show’ no bstats on class with nolock subqueues
- ext4: add more paranoia checking in ext4_expand_extra_isize handling
- watchdog: sama5d4: fix WDD value to be always set to max
- net: macb: Fix SUBNS increment and increase resolution
- net: macb driver, check for SKBTX_HW_TSTAMP
- mtd: rawnand: atmel: Fix spelling mistake in error message
- mtd: rawnand: atmel: fix possible object reference leak
- mtd: spi-nor: cast to u64 to avoid uint overflows
- y2038: futex: Move compat implementation into futex.c
- futex: Prevent robust futex exit race
- futex: Move futex exit handling into futex code
- futex: Replace PF_EXITPIDDONE with a state
- exit/exec: Seperate mm_release()
- futex: Split futex_mm_release() for exit/exec
- futex: Set task::futex_state to DEAD right after handling futex exit
- futex: Mark the begin of futex exit explicitly
- futex: Sanitize exit state handling
- futex: Provide state handling for exec() as well
- futex: Add mutex around futex exit
- futex: Provide distinct return value when owner is exiting
- futex: Prevent exit livelock
- HID: core: check whether Usage Page item is after Usage ID items
- crypto: stm32/hash - Fix hmac issue more than 256 bytes
- media: stm32-demi: fix DMA corruption when stopping streaming
+ hwrng: stm32 - fix unbalanced pm_runtime_enable
+ mailbox: mailbox-test: fix null pointer if no mmio
+ Asoc: stm32: i2s: fix dma configuration
+ Asoc: stm32: i2s: fix 16 bit format support
+ Asoc: stm32: i2s: fix IRQ clearing
+ platform/x86: hp-wmi: Fix ACPI errors caused by too small buffer
+ platform/x86: hp-wmi: Fix ACPI errors caused by passing 0 as input size
+ net: fec: fix clock count mis-match
+ clk: samsung: exynos5433: Fix error paths
+ pinctrl: cherryview: Allocate IRQ chip dynamic
+ ARM: dts: sun8i-a83t-tbs-a711: Fix WiFi resume from suspend
+ samples/bpf: fix build by setting HAVE_ATTR_TEST to zero
+ idr: Fix integer overflow in idr_for_each_entry
+ can: mcp251x: mcp251x_restart_work_handler: Fix potential force_quit race condition
+ net: bcmgenet: use RGMII loopback for MAC reset
+ RDMA/hns: Fix the bug while use multi-hop of pbl
+ s390/zcrypt: make sysfs reset attribute trigger queue reset
+ bcache: do not check if debug dentry is ERR or NULL explicitly on remove
+ bcache: do not mark writeback_running too early
+ microblaze: fix multiple bugs in arch/microblaze/boot/Makefile
+ iwlwifi: pcie: fix erroneous print
+ usb: ehci-omap: Fix deferred probe for phy handling
+ btrfs: fix ncopies raid_attr for RAID56
+ Btrfs: allow clear_extent_dirty() to receive a cached extent state record
+ serial: sh-sci: Fix crash in rx_timer_fn() on PIO fallback
+ kprobes: Blacklist symbols in arch-defined prohibited area
+ kprobes/x86: Show x86-64 specific blacklisted symbols correctly
+ memory: omap-gpmc: Get the header of the enum
+ netfilter: nf_nat_sip: fix RTP/RTCP source port translations
+ bnxt_en: Save ring statistics before reset.
+ brcmfmac: Fix access point mode
+ powerpc/32: Avoid unsupported flags with clang
+ powerpc: Fix HMIs on big-endian with CONFIG_RELOCATABLE=y
+ mm/page_alloc.c: free order-0 pages through PCP in page_frag_free()
+ mm/page_alloc.c: use a single function to free page
+ mm/page_alloc.c: deduplicate __memblock_free_early() and memblock_free()
+ infiniband: bnxt_re: qplib: Check the return value of send_message
+ infiniband/qedr: Potential null ptr dereference of qp
+ firmware: arm_sdei: fix wrong of_node_put() in init function
+ firmware: arm_sdei: Fix DT platform device creation
+ ata: ahci: nvebu: do Armada 38x configuration only on relevant SoCs
+ net/smc: don't wait for send buffer space when data was already sent
+ mm/hotplug: invalid PFNs from pfn_to_online_page()
+ Asoc: samsung: i2s: Fix prescaler setting for the secondary DAI
+ geneve: change NET_UDP_TUNNEL dependency to select
+ mmc: core: align max segment size with logical block size
+ net: hns3: fix PFC not setting problem for DCB module
+ net: hns3: fix an issue for hclgevf_ae_get_hdev
+ net: hns3: fix an issue for hns3_update_new_int_gl
+ scsi: hisi_sas: shutdown axi bus to avoid exception CQ returned
+ RDMA/hns: Bugfix for the scene without receiver queue
+ RDMA/hns: Fix the state of rereg mr
+ thunderbolt: Power cycle the router if NVM authentication fails
+ tcp: exit if nothing to retransmit on RTO timeout
+ * Bionic update: upstream stable patchset 2019-12-03 (LP: #1854975)
  - net/mlx4_en: fix mlx4 ethtool -N insertion
  - net/mlxfw: Verify FSM error code translation doesn't exceed array size
+ - net/sched: act_pedit: fix WARN() in the traffic path
+ - vhost/vsock: split packets to send using multiple buffers
+ - gpio: max77620: Fixup debounce delays
+ - tools: gpio: Correctly add make dependencies for gpio_utils
+ - nbd: fix memory leak in nbd_get_socket()
+ - virtio_console: allocate inbufs in add_port() only if it is needed
+ - Revert "fs: ocfs2: fix possible null-pointer dereferences in ocfs2_xa_prepare_entry()"
+ - mm/ksm.c: don't WARN if page is still mapped in remove_stable_node()
+ - drm/i915/userptr: Try to acquire the page lock around set_page_dirty()
+ - platform/x86: asus-nb-wmi: Support ALS on the Zenbook UX430UQ
+ - mwifiex: Fix NL80211_TX_POWER_LIMITED
+ - ALSA: isight: fix leak of reference to firewire unit in error path of .probe callback
+ - printk: fix integer overflow in setup_log_buf()
+ - gfs2: Fix marking bitmaps non-full
+ - pty: fix compat ioctls
+ - synclink_gt(): fix compat_ioctl()
+ - powerpc: Fix signedness bug in update_flash_db()
+ - powerpc/boot: Disable vector instructions
+ - powerpc/eeh: Fix use of EEH_PE_KEEP on wrong field
+ - EDAC, thunderx: Fix memory leak in thunderx_l2c_threaded_isr()
+ - brcmsmac: AP mode: update beacon when TIM changes
+ - ath10k: allocate small size dma memory in ath10k_pci_diag_write_mem
+ - skd: fixup usage of legacy IO API
+ - cdrom: don't attempt to fiddle with cdo->capability
+ - spi: sh-mdiof: fix deferred probing
+ - mmc: mediatek: fix cannot receive new request when msdc_cmd_is_ready fail
+ - btrfs: handle error of get_old_root
+ - gsmi: Fix bug in append_to_eventlog sysfs handler
+ - misc: mic: fix a DMA pool free failure
+ - w1: IAD Register is yet readable trough iad sys file. Fix snprintf (%u for unsigned, count for max size).
+ - m68k: fix command-line parsing when passed from u-boot
+ - RDMA/bnxr: Fix qp async event reporting
+ - pinctrl: sunxi: Fix a memory leak in 'sunxi_pinctrl_build_state()'
+ - pwm: lps: Only set update bit if we are actually changing the settings
+ - amiflop: clean up on errors during setup
+ - qed: Align local and global PTT to propagate through the APIs.
+ - scsi: ips: fix missing break in switch
+ - KVM: nVMX: reset cache/shadows when switching loaded VMCS
+ - KVM/x86: Fix invvpid and invept register operand size in 64-bit mode
+ - scsi: isci: Use proper enumerated type in atapi_d2h_reg_frame_handler
+ - scsi: isci: Change sci_controller_start_task's return type to sci_status
+ - scsi: iscsi_tcp: Explicitly cast param in iscsi_sw_tcp_host_get_param
+ - crypto: ccree - avoid implicit enum conversion
+ - nvme-fcloop: suppress a compiler warning
+ - clk: mmp2: fix the clock id for sdh2_clk and sdh3_clk
+ - clk: at91: audio-pll: fix audio pmc type
+ - ASoC: tegra_sgtl5000: fix device_node refcounting
+ - scsi: dc395x: fix dma API usage in srb_done
+ - scsi: dc395x: fix DMA API usage in sg_update_list
+ - net: dsa: mv88e6141/6341 2500mbps SERDES speed
+ - net: fix warning in af_unix
+ - xfs: fix use-after-free race in xfs_buf_rele
+ - kprobes, x86/ptrace.h: Make regs_get_kernel_stack_nth() not fault on bad stack
+ - PM / Domains: Deal with multiple states but no governor in genpd
+ - ALSA: i2c/cs8427: Fix int to char conversion
+ - macintosh/windfarm_smu_sat: Fix debug output
+ - PCI: vmd: Detach resources after stopping root bus
+ - USB: misc: appledisplay: fix backlight update_status return code
+ - usbip: tools: fix atoi() on non-null terminated string
+ - dm raid: avoid bitmap with raid4/5/6 journal device
+ - SUNRPC: Fix a compile warning for cmpxchg64()
+ - sunrpc: safely reallow resvport min/max inversion
+ - atm: zatm: Fix empty body Clang warnings
+ - s390/perf: Return error when debug_register fails
+ - spi: omap2-mcspi: Set FIFO DMA trigger level to word length
+ - sparc: Fix parport build warnings.
+ - powerpc/series: Export raw per-CPU VPA data via debugfs
+ - ceph: fix dentry leak in ceph_readdir_prepopulate
+ - rtc: s35390a: Change buf's type to u8 in s35390a_init
+ - l2fs: fix to spread clear_cold_data()
+ - mISDN: Fix type of switch control variable in ctrl_teimanager
+ - qlcnic: fix a return in qlcnic_dcb_get_capability()
+ - net: ethernet: ti: cpsw: unsync mcast entries while switch promise mode
+ - mfd: arizona: Correct calling of runtime_put_sync
+ - mfd: mc13xxx-core: Fix PMIC shutdown when reading ADC values
+ - mfd: intel_soc_pmic_bxtwc: Chain power button IRQs as well
+ - mfd: max8997: Enable irq-wakeup unconditionally
+ - selftests/trace: Fix to test kprobe $comm arg only if available
+ - selftests: watchdog: fix message when /dev/watchdog open fails
+ - selftests: watchdog: Fix error message.
+ - thermal: rcar_thermal: Prevent hardware access during system suspend
+ - bpf: devmap: fix wrong interface selection in notifier_call
+ - powerpc/process: Fix flush_all_to_thread for SPE
+ - sparc64: lib: use C string functions with KASAN enabled
+ - fs/ocfs2/dlm/dlmdebug.c: fix a sleep-in-atomic-context bug in
+ - dlm_print_one_mle()
+ - mm/page-writeback.c: fix range_cyclic writeback vs writepages deadlock
+ - mace: update operstate when lower device changes
+ - macsec: let the administrator set UP state even if lowerdev is down
+ - block: fix the DISCARD request merge
+ - i2c: uniphier-f: make driver robust against concurrency
+ - i2c: uniphier-f: fix occasional timeout error
+ - i2c: uniphier-f: fix race condition when IRQ is cleared
+ - um: Make line/tty semantics use true write IRQ
+ - vfs: avoid problematic remapping requests into partial EOF block
+ - powerpc/xmon: Relax frame size for clang
+ - selftests/powerpc/signal: Fix out-of-tree build
+ - selftests/powerpc/switch_endian: Fix out-of-tree build
+ - selftests/powerpc/cache_shape: Fix out-of-tree build
+ - linux/bitmap.h: handle constant zero-size bitmaps correctly
+ - linux/bitmap.h: fix type of nbits in bitmap_shift_right()
+ - hfsplus: fix BUG on bnodel parent update
+ - hfs: fix BUG on bnodel parent update
+ - hfs: prevent btree data loss on ENOSPC
+ - hfs: prevent btree data loss on ENOSPC
+ - hfsplus: fix return value of hfsplus_get_block()
+ - hfs: fix return value of hfs_get_block()
+ - hfsplus: update timestamps on truncate()
+ - hfs: update timestamp on truncate()
+ - fs/hfs/extent.c: fix array out of bounds read of array extent
+ - mm/memory_hotplug: make add_memory() take the device_hotplug_lock
+ - igb: shorten maximum PHC timecounter update interval
+ - ntb_netdev: fix sleep time mismatch
+ - ntb: intel: fix return value for ndev_vec_mask()
+ - arm64: makefile fix build of .i file in external module case
+ - ocfs2: don’t put and assigning null to bh allocated outside
+ - ocfs2: fix clusters leak in ocfs2_defrag_extent()
+ - net: do not abort bulk send on BQL status
+ - sched/topology: Fix off by one bug
+ - sched/fair: Don’t increase sd->balance_interval on newidle balance
+ - openswitch: fix linking without CONFIG_NF_CONNTRACK_LABELS
+ - clk: sunxi-ng: enable so-said LDOs for A64 SoC’s pll-mipi clock
+ - audit: print empty EXECVE args
+ - btrfs: avoid link error with CONFIG_NO_AUTO_INLINE
- wil6210: fix locking in wmi_call
- wcore: Fix the return value in case of error in 'wcore_vendor_cmd_smart_config_start()'
- rttxxxu: Fix missing break in switch
- brcmsmac: never log "tid x is not agg'able" by default
- wireless: airo: potential buffer overflow in sprintf()
- rtlwifi: rtt1892de: Fix misleading REG_MCUFWDL information
- net: dsa: bcm_sf2: Turn on PHY to allow successful registration
- scsi: mpt3sas: Fix Sync cache command failure during driver unload
- scsi: mpt3sas: Don't modify EEDPTagMode field setting on SAS3.5 HBA devices
- scsi: mpt3sas: Fix driver modifying persistent data in Manufacturing page11
- scsi: megaraid_sas: Fix msleep granularity
- scsi: megaraid_sas: Fix goto labels in error handling
- scsi: lpfc: fcoc: Fix link down issue after 1000+ link bounces
- scsi: lpfc: Correct loss of fc4 type on remote port address change
- dlm: fix invalid free
- dlm: don't leak kernel pointer to userspace
- vrf: mark skb for multicast or link-local as enslaved to VRF
- ACPI: Use %d for signed int print formatting instead of %u
- net: bcmgenet: return correct value 'ret' from bcmgenet_power_down
- of: unittest: allow base devicetree to have symbol metadata
- cfg80211: Prevent regulatory restore during STA disconnect in concurrent interfaces
- pinctrl: qcom: spmi-gpio: fix gpio-hog related boot issues
- pinctrl: LPC18xx: Use define directive for PIN_CONFIG_GPIO_PIN_INT
- pinctrl: Zynq: Use define directive for PIN_CONFIG_IO_STANDARD
- PCI: keystone: Use quirk to limit MRRS for K2G
- spi: omap2-mcspi: Fix DMA and FIFO event trigger size mismatch
- i2c: uniphier-f: fix timeout error after reading 8 bytes
- mm/memory_hotplug: Do not unlock when fails to take the device_hotplug_lock
- ipv6: Fix handling of LLA with VRF and sockets bound to VRF
- cfg80211: call disconnect_wk when AP stops
- Bluetooth: Fix invalid-free in bsctp_close()
- KVM: MMU: Do not treat ZONE_DEVICE pages as being reserved
- ath10k: Fix a NULL-ptr-deref bug in ath10k_usb_alloc_urb_from_pipe
- ath9k_hw: fix uninitialized variable data
- md/raid10: prevent access of uninitialized resync_pages offset
- mm/memory_hotplug: don't access uninitialized memmaps in shrink_zone_span()
- net: phy: dp83867: fix speed 10 in sgmii mode
- net: phy: dp83867: increase SGMII autoneg timer duration
- cpufreq: Skip cpufreq resume if it's not suspended
- ocfs2: remove ocfs2_is_o2cb_active()
- ARM: 8904/1: skip nomap memblocks while finding the lowmem/highmem boundary
- ARC: perf: Accommodate big-endian CPU
- x86/insn: Fix awk regexp warnings
- x86/speculation: Fix incorrect MDS/TAO mitigation status
- x86/speculation: Fix redundant MDS mitigation message
- nbd: prevent memory leak
+ - nfc: port100: handle command failure cleanly
+ - media: vivid: Set vid_cap_streaming and vid_out_streaming to true
+ - media: vivid: Fix wrong locking that causes race conditions on streaming
+ - stop
+ - media: usbvision: Fix races among open, close, and disconnect
+ - cpufreq: Add NULL checks to show() and store() methods of cpufreq
+ - media: uvcvideo: Fix error path in control parsing failure
+ - media: b2c2-flexcop-usb: add sanity checking
+ - media: cxusb: detect cxusb_ctrl_msg error in query
+ - media: imon: invalid dereference in imon_touch_event
+ - virtio_ring: fix return code on DMA mapping fails
+ - usbip: tools: fix fd leakage in the function of read_attr_usbip_status
+ - usbip: Fix uninitialized symbol 'nents' in stub_recv_cmd_submit()
+ - usb(serial): cp201x: support Mark-10 digital force gauge
+ - USB: chaoskey: fix error case of a timeout
+ - appledisplay: fix error handling in the scheduled work
+ - USB: serial: mos7840: add USB ID to support Moxa UPort 2210
+ - USB: serial: mos7720: fix remote wake up
+ - USB: serial: mos7840: fix remote wake up
+ - USB: serial: option: add support for DW5821e with eSIM support
+ - USB: serial: option: add support for Foxconn T77W968 LTE modules
+ - staging: comedi: usbduxfast: usbduxfast_ai_cmdtest rounding error
+ - x86/hyperv: mark hyperv_init as __init function
+ - mlxsw: spectrum_router: Fix determining underlay for a GRE tunnel
+ - net/mlx4_en: Fix wrong limitation for number of TX rings
+ - net/mlx5: Fix auto group size calculation
+ - printk: lock/unlock console only for new logbuf entries
+ - powerpc/boot: Fix opal console in boot wrapper
+ - mmc: mediatek: fill the actual clock for mmc debugfs
+ - btrfs: defrag: use btrfs_mod_outstanding_extents in cluster_pages_for_defrag
+ - nvme-pci: fix hot removal during error handling
+ - PCI: mediatek: Fixup MSI enablement logic by enabling MSI before clocks
+ - swiotlb: do not panic on mapping failures
+ - powerpc/mm/radix: Fix off-by-one in split mapping logic
+ - powerpc/mm/radix: Fix overuse of small pages in splitting logic
+ - powerpc/mm/radix: Fix small page at boundary when splitting
+ - tools: bpftool: fix completion for "bpftool map update"
+ - ceph: only allow punch hole mode in fallback
+ - RISC-V: Avoid corrupting the upper 32-bit of phys_addr_t in ioremap
+ - f2fs: spread f2fs_set_inode_flags()
+ - net: socionext: Stop PHY before resetting netsec
+ - tools/testing/selftests/vm/gup_benchmark.c: fix 'write' flag usage
+ - mm: ttp: fix MADV_DONTNEED vs migrate_misplaced_transhuge_page race
+ - condition
+ - ipv4/igmp: fix v1/v2 switchback timeout based on rfc3376, 8.12
+ - mm/gup_benchmark.c: prevent integer overflow in ioctl
+ - libbitmap.c: fix remaining space computation in bitmap_print_to_pagebuf
+ - kernel/panic.c: do not append newline to the stack protector panic string
+ - mm/memory_hotplug: fix online/offline_pages called w/o. mem_hotplug_lock
+ - irq/matrix: Fix memory overallocation
+ - nvme-pci: fix conflicting p2p resource adds
+ - mm: handle no memcg case in memcg_kmem_charge() properly
+ - ocf2: without quota support, avoid calling quota recovery
+ - soc: bcm: brcmstb: Fix re-entry point with a THUMB2_KERNEL
+ - media: ov13858: Check for possible null pointer
+ - wil6210: fix debugfs memory access alignment
+ - scsi: lpfc: Fix odd recovery in duplicate FLOGIs in point-to-point
+ - usb: typec: tcpm: charge current handling for sink during hard reset
+ - clk: tegra20: Turn EMC clock gate into divider
+ - of: unittest: initialize args before calling of_*parse_*()
+ - tools: bpftool: pass an argument to silence open_obj_pinned()
+ - nvme-pci: fix surprise removal
+ - mm/page_io.c: do not free shared swap slots
+ - PM / devfreq: Fix kernel oops on governor module load

+ * Miscellaneous Ubuntu changes
+ - update dkms package versions

+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Fri, 31 Jan 2020 14:22:28 -0300

+ linux (4.15.0-76.86) bionic; urgency=medium
+ *
+ * bionic/linux: 4.15.0-76.86 -proposed tracker (LP: #1860123)
+ *
+ * Integrate Intel SGX driver into linux-azure (LP: #1844245)
+ - [Packaging] Add systemd service to load intel_sgx
+ *
+ * [Regression] Bionic kernel 4.15.0-71.80 can not boot on ThunderX
+ (LP: #1853326) // Bionic kernel panic on Cavium ThunderX CN88XX
+ (LP: #1853485) // Cavium ThunderX CN88XX crashes on boot (LP: #1857074)
+ - arm64: Check for errata before evaluating cpu features
+ - arm64: add sentinel to kpti_safe_list
+ *
+ -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Fri, 17 Jan 2020 10:59:22 -0300

+ linux (4.15.0-75.85) bionic; urgency=medium
+ *
+ * bionic/linux: 4.15.0-75.85 -proposed tracker (LP: #1859705)
+ *
+ * use-after-free in i915_ppgtt_close (LP: #1859522) // CVE-2020-7053
+ - SAUCE: drm/i915: Fix use-after-free when destroying GEM context
+ *
+ * CVE-2019-14615
+ - drm/i915/gen9: Clear residual context state on context switch
+
• * PAN is broken for execute-only user mappings on ARMv8 (LP: #1858815)
• - arm64: Revert support for execute-only user mappings
•
• + [Regression] usb usb2-port2: Cannot enable. Maybe the USB cable is bad?
• (LP: #1856608)
• - SAUCE: Revert "usb: handle warm-reset port requests on hub resume"
•
• + Miscellaneous Ubuntu changes
• + - update dkms package versions
•
• + -- Marcelo Henrique Cerri <marcelo.cerri@canonical.com> Tue, 14 Jan 2020 19:07:38 -0300
• +
• +linux (4.15.0-74.84) bionic; urgency=medium
• +
• + * bionic/linux: 4.15.0-74.84 -proposed tracker (LP: #1856749)
• +
• + * [Hyper-V] KVP daemon fails to start on first boot of disco VM (LP: #1820063)
• + - [Packaging] bind hv_kvp_daemon startup to hv_kvp device
• +
• + * Unrevert "arm64: Use firmware to detect CPUs that are not affected by
• Spectre-v2" (LP: #1854207)
• + - arm64: Get rid of __smccc_workaround_1_hvc_*
• + - arm64: Use firmware to detect CPUs that are not affected by Spectre-v2
• +
• + * Bionic kernel panic on Cavium ThunderX CN88XX (LP: #1853485)
• + - SAUCE: irqchip/gic-v3-its: Add missing return value in
• its_irq_domain_activate()
• +
• + -- Khalid Elmously <khalid.elmously@canonical.com> Wed, 18 Dec 2019 17:20:22 -0500
• +
• +linux (4.15.0-73.82) bionic; urgency=medium
• +
• + * bionic/linux: 4.15.0-73.82 -proposed tracker (LP: #1854819)
• +
• + * CVE-2019-14901
• + - SAUCE: mwifiex: Fix heap overflow in mmwifiex_process_tdls_action_frame()
• +
• + * CVE-2019-14896 // CVE-2019-14897
• + - SAUCE: libertas: Fix two buffer overflows at parsing bss descriptor
• +
• + * CVE-2019-14895
• + - SAUCE: mwifiex: fix possible heap overflow in mwifiex_process_country_ie()
• +
• + * CVE-2019-18660: patches for Ubuntu (LP: #1853142) // CVE-2019-18660
• + - powerpc64s: support nospectre_v2 cmdline option
• + - powerpc/book3s64: Fix link stack flush on context switch
• + - KVM: PPC: Book3S HV: Flush link stack on guest exit to host kernel
• +
+  * Please add patch fixing RK818 ID detection (LP: #1853192)
+  - SAUCE: mfd: rk808: Fix RK818 ID template
+  +  * [SRU][B/OEM-B/OEM-OSP1/D] Enable new Elan touchpads which are not in current
+  - whitelist (LP: #1853246)
+  - HID: quirks: Fix keyboard + touchpad on Lenovo Miix 630
+  - Input: elan_i2c - export the device id whitelist
+  - HID: quirks: Refactor ELAN 400 and 401 handling

+  +  * Lenovo dock MAC Address pass through doesn't work in Ubuntu (LP: #1827961)
+  - r8152: Add macpassthru support for ThinkPad Thunderbolt 3 Dock Gen 2
+  +  * s390/dasd: reduce the default queue depth and nr of hardware queues
+  (LP: #1852257)
+  - s390/dasd: reduce the default queue depth and nr of hardware queues
+  +  * External microphone can't work on some dell machines with the codec alc256
+  or alc236 (LP: #1853791)
+  - SAUCE: ALSA: hda/realtek - Move some alc256 pintbls to fallback table
+  - SAUCE: ALSA: hda/realtek - Move some alc236 pintbls to fallback table
+  +  * Memory leak in net/xfrm/xfrm_state.c - 8 pages per ipsec connection
+  (LP: #1853197)
+  - xfrm: Fix memleak on xfrm state destroy
+  +  * CVE-2019-19083
+  - drm/amd/display: memory leak
+
+  +  * update ENA driver for DIMLIB dynamic interrupt moderation (LP: #1853180)
+  - net: ena: add intr_moder_rx_interval to struct ena_com_dev and use it
+  - net: ena: switch to dim algorithm for rx adaptive interrupt moderation
+  - net: ena: reimplement set/get_coalesce()
+  - net: ena: enable the interrupt_moderation in driver_supported_features
+  - net: ena: remove code duplication in
+  - ena_com_update_nonadaptive_moderation_interval _*()
+  - net: ena: remove old adaptive interrupt moderation code from ena_netdev
+  - net: ena: remove ena_restore_ethtool_params() and relevant fields
+  - net: ena: remove all old adaptive rx interrupt moderation code from ena_com
+  - net: ena: fix update of interrupt moderation register
+  - net: ena: fix retrieval of nonadaptive interrupt moderation intervals
+  - net: ena: fix incorrect update of intr_delay_resolution
+  - net: ena: Select DIMLIB for ENAETHERNET
+  - SAUCE: net: ena: fix issues in setting interrupt moderation params in
+  ethtool
+  - SAUCE: net: ena: fix too long default tx interrupt moderation interval
+
+  +  * CONFIG_ARCH_ROCKCHIP is not set in ubuntu 18.04 aarch64,arm64 (LP: #1825222)
+  - [Config] Enable ROCKCHIP support for arm64

Open Source Used In 5GaaS Edge AC-4  19135
* backport DIMLIB (lib/dim/) to pre-5.2 kernels (LP: #1852637)
* include/linux/bitops.h: introduce BITS_PER_TYPE
* [Config] enable DIMLIB
* linux/dim: import DIMLIB (lib/dim/)
* SAUCE: linux/dim: avoid library object filename clash

* The alsa hda driver is not loaded due to the missing of PCIID for Comet Lake-S [8086:a3f0] (LP: #1852070)
* SAUCE: ALSA: hda: Add Cometlake-S PCI ID

* Can't adjust brightness on DELL UHD dGPU AIO (LP: #1813877)
* SAUCE: platform/x86: dell-uart-backlight: add missing status command
* SAUCE: platform/x86: dell-uart-backlight: load driver by scalar status
* SAUCE: platform/x86: dell-uart-backlight: add force parameter
* SAUCE: platform/x86: dell-uart-backlight: add quirk for old platforms

* Enable framebuffer fonts auto selection for HighDPI screen (LP: #1851623)
* fonts: Fix coding style
* fonts: Prefer a bigger font for high resolution screens

* Disable unreliable HPET on CFL-H system (LP: #1852216)
* SAUCE: x86/intel: Disable HPET on Intel Coffe Lake H platforms

* i40e: Setting VF MAC address causes General Protection Fault (LP: #1852432)
* i40e: Fix crash caused by stress setting of VF MAC addresses

* Bionic update: upstream stable patchset 2019-11-27 (LP: #1854216)
* spi: mediatek: use correct mata->xfer_len when in fifo transfer
* tee: optee: add missing of_node_put after of_device_is_available
* net: cdc_ncm: Signedness bug in cdc_ncm_set_dgram_size()
* idr: Fix idr_get_next race with idr_remove
* mm/memory_hotplug: don't access uninitialized memmaps in shrink_pgdat_span()
* mm/memory_hotplug: fix updating the node span
* arm64: uaccess: Ensure PAN is re-enabled after unhandled uaccess fault
* f2dev: Ditch fb_edid_add_monspecs
* net: ovs: fix return type of ndo_start_xmit function
* net: xen-netback: fix return type of ndo_start_xmit function
* ARM: dts: dra7: Enable workaround for errata i870 in PCIe host mode
* ARM: dts: omap5: enable OTG role for DWC3 controller
* f2fs: return correct errno in f2fs_gc
* ARM: dts: sun8i: h3-h5: ir register size should be the whole memory block
* SUNRPC: Fix priority queue fairness
* IB/hfi1: Ensure ucast_dlid access doesn't exceed bounds
* kvm: arm/arm64: Fix stage2_flush_memslof for 4 level page table
* arm64/numa: Report correct memblock range for the dummy node
* ath10k: fix vdev-start timeout on error
* ata: ahci_brcm: Allow using driver or DSL SoCs
+ - ath9k: fix reporting calculated new FFT upper max
+ - usb: gadget: udc: fotg210-udc: Fix a sleep-in-atomic-context bug in
+ fotg210_get_status()
+ - usb: dwc3: gadget: Check ENBLSLPM before sending ep command
+ - nl80211: Fix a GET_KEY reply attribute
+ - irqchip/irq-mvebu-icu: Fix wrong private data retrieval
+ - watchdog: w83627hf_wdt: Support NCT6796D, NCT6797D, NCT6798D
+ - KVM: PPC: Inform the userspace about TCE update failures
+ - dmaengine: ep93xx: Return proper enum in ep93xx_dma_chan_direction
+ - dmaengine: timb_dma: Use proper enum in td_prep_slave_sg
+ - ext4: fix build error when DX_DEBUG is defined
+ - clk: keystone: Enable TISCI clocks if K3_ARCH
+ - sunrpc: Fix connect metrics
+ - mei: samples: fix a signedness bug in amt_host_if_call()
+ - cxgb4: Use proper enum in cxgb4_dcb_handle_fw_update
+ - cxgb4: Use proper enum in IEEE_FAUX_SYNC
+ - powerpc/pseries: Fix DTL buffer registration
+ - powerpc/pseries: Fix how we iterate over the DTL entries
+ - powerpc/xive: Move a dereference below a NULL test
+ - ARM: dts: at91: sama5d4_xplained: fix addressable nand flash size
+ - ARM: dts: at91: at91sam9x5cm: fix addressable nand flash size
+ - mtd: rawnand: sh_fctl: Use proper enum for fctl_dma_fifo0_transfer
+ - PM / hibernate: Check the success of generating md5 digest before
+ hibernation
+ - tools: PCI: Fix compilation warnings
+ - clocksource/drivers/sh_cmt: Fixup for 64-bit machines
+ - clocksource/drivers/sh_cmt: Fix clocksource width for 32-bit machines
+ - md: allow metadata updates while suspending an array - fix
+ - ixgbe: Fix ixgbe TX hangs with XDP_TX beyond queue limit
+ - i40e: Use proper enum in i40e_ndo_set_vf_link_state
+ - ixgbe: Fix crash with VFs and flow director on interface flap
+ - IB/mthca: Fix error return code in __mthca_init_one()
+ - IB/mlx4: Avoid implicit enumerated type conversion
+ - ACPI: Never run _REG on system_memory and system_IO
+ - powerpc/time: Use clockevents_register_device(), fixing an issue with large
+ decrementer
+ - ata: ep93xx: Use proper enums for directions
+ - media: rc: ir-rc6-decoder: enable toggle bit for Kathrein RCU-676 remote
+ - media: pxa_camera: Fix check for pdev->dev.of_node
+ - media: i2c: adv748x: Support probing a single output
+ - ALSA: hda/sigmatel - Disable automate for Elo VuPoint
+ - KVM: PPC: Book3S PR: Exiting split hack mode needs to fixup both PC and LR
+ - USB: serial: cypress_m8: fix interrupt-out transfer length
+ - mtd: physsmap_of: Release resources on error
+ - cpu/SMT: State SMT is disabled even with nosmt and without "=force"
+ - brcmfmac: reduce timeout for action frame scan
+ - brcmfmac: fix full timeout waiting for action frame on-channel tx
+ - qtnfmac: pass sgi rate info flag to wireless core
+ - qtnfmac: drop error reports for out-of-bounds key indexes
+ - clk: samsung: exynos5420: Define CLK_SECKEY gate clock only or Exynos5420
+ - clk: samsung: Use clk_hw API for calling clk framework from clk notifiers
+ - i2c: bcmstmh: Allow enabling the driver on DSL SoCs
+ - NFSv4.x: fix lock recovery during delegation recall
+ - dmaengine: iot: fix prototype of iotEnumerateChannels
+ - media: ccc-gpio: select correct Signal Free Time
+ - Input: st1232 - set INPUT_PROP_DIRECT property
+ - Input: silead - try firmware reload after unsuccessful resume
+ - remoteproc: Check for NULL firmwares in sysfs interface
+ - kexec: Allocate decrypted control pages for kdump if SME is enabled
+ - x86/olpc: Fix build error with CONFIG_MFD_CS5535=m
+ - dmaengine: rcar-dmac: set scatter/gather max segment size
+ - crypto: mxs-dcp - Fix SHA null hashes and output length
+ - crypto: mxs-dcp - Fix AES issues
+ - xfrn: use correct size to initialise sp->ovec
+ - ACPI / SBS: Fix rare oops when removing modules
+ - iwlwifi: mvm: don't send keys when entering D3
+ - x86/fsgsbase/64: Fix ptrace() to read the FS/GS base accurately
+ - mmc: tmio: Fix SCC error detection
+ - fbdev: sbuslib: use checked version of put_user()
+ - fbdev: sbuslib: integer overflow in sbusfb_ioctl_helper()
+ - reset: Fix potential use-after-free in __of_reset_control_get()
+ - bcache: recal cached_dev_sectors on detach
+ - media: dw9714: Fix error handling in probe function
+ - x390/kasan: avoid vdso instrumentation
+ - proc/vmcore: Fix i386 build error of missing copy_olddmem_page_encrypted()
+ - backlight: Im3639: Unconditionally call led_classdev_unregister
+ - nfd: ti_am335x_tscadc: Keep ADC interface on if child is wakeup capable
+ - printk: Give error on attempt to set log buffer length to over 2G
+ - media: isif: fix a NULL pointer dereference bug
+ - GFS2: Flush the GFS2 delete workqueue before stopping the kernel threads
+ - media: cx231xx: fix potential sign-extension overflow on large shift
+ - x86/kexec: Correct KEXEC_BACKUP_SRC_END off-by-one error
+ - gpio: syscon: Fix possible NULL ptr usage
+ - spi: fsl-lpss: Prevent FIFO under/overrun by default
+ - pinctrl: gemini: Mask and set properly
+ - spi: spidev: Fix OF tree warning logic
+ - ARM: 8802/1: Call syscall_trace_exit even when system call skipped
+ - orangefs: rate limit the client not running info message
+ - pinctrl: gemini: Fix up TVC clock group
+ - hwmon: (pwm-fan) Silence error on probe deferral
+ - hwmon: (ina3221) Fix INA3221_CONFIG_MODE macros
+ - netfilter: nft_compat: do not dump private area
+ - misc: exl: Fix possible null pointer dereference
+ - mac80211: minstrel: fix using short preamble CCK rates on HT clients
+ - mac80211: minstrel: fix CCK rate group streams value
+ - mac80211: minstrel: fix sampling/reporting of CCK rates in HT mode
- spi: rockchip: initialize dma_slave_config properly
- mlxsw: spectrum_switchdev: Check notification relevance based on upper device
- ARM: dts: omap5: Fix dual-role mode on Super-Speed port
- tools: PCI: Fix broken pcitest compilation
- powerpc/time: Fix clockevent_decrementer initialisation for PR KVM
- mmc: tnie: fix SCC error handling to avoid false positive CRC error
- ARM: dts: sun8i: h3: bpi-m2-plus: Fix address for external RGMII Ethernet PHY
- tcp: up initial rmem to 128KB and SYN rwin to around 64KB
- ACPI / LPSS: Resume BYT/CHT I2C controllers from resume_noirq
- f2fs: keep lazytime on remount
- IB/hfi1: Error path MAD response size is incorrect
- PM / devfreq: Fix devfreq_add_device() when drivers are built as modules.
- PM / devfreq: Fix handling of min/max_freq == 0
- PM / devfreq: stopping the governor before device_unregister()
- watchdog: core: fix null pointer dereference when releasing cdev
- watchdog: renesas_wdt: stop when un registering
- watchdog: sama5d4: fix timeout-sec usage
- printk: Do not miss new messages when replaying the log
- printk: CON_PRINTBUFFER console registration is a bit racy
- ALSA: hda: Fix mismatch for register mask and value in ext controller.
- x86/PCI: Apply VMD's AERSID fixup generically
- IB/rxe: avoid srq memory leak
- RDMA/hns: Bugfix for reserved qp number
- RDMA/hns: Submit bad wr when post send wr exception
- RDMA/hns: Bugfix for CM test
- RDMA/hns: Limit the size of extend sge of sq
- rpmmsg: glink: smem: Support rx peak for size less than 4 bytes
- qed: Avoid implicit enum conversion in qed_ooo_submit_tx_buffers
- clk: samsung: Use NOIRQ stage for Exynos5433 clocks suspend/resume
- printk: Correct wrong casting
- mmc: renesas_sdhi_internal_dmac: set scatter/gather max segment size
- atmel_lcdfb: support native-mode display-timings
- fbdev: fix broken menu dependencies
- bcache: account size of buckets used in uuid write to
- ca->meta_sectors_written
- media: cx18: Don't check for address of video_dev
- lightnvm: blk: fix rqd.error return value in blk_blk_erase_sync
- scsi: armcmr: clean up clang warning on extraneous parentheses
- hwmon: (k10temp) Support all Family 15h Model 6xh and Model 7xh processors
- tcp: start receiver buffer autotuning sooner
- ACPI / LPSS: Use acpi_lpss_* instead of acpi_subsys_* functions for hibernate
- PM / devfreq: Fix static checker warning in try_then_request_governor
- x86/resctrl: Fix rdt_find_domain() return value and checks

* Bionic update: upstream stable patchset 2019-11-25 (LP: #1853915)
- kvm: mmu: Don't read PDPTEs when paging is not enabled
- KVM: x86: introduce is_pae_paging
- MIC: BCM63XX: fix switch core reset on BCM6368
- scsi: core: Handle drivers which set sg_tablesize to zero
- Revert "Input: synaptics-rmi4 - avoid processing unknown IRQs"
- ax88172a: fix information leak on short answers
- net: usb: qmi_wwan: add support for Foxconn T77W968 LTE modules
- slip: Fix memory leak in slip_open error path
- ALSA: usb-audio: Fix missing error check at mixer resolution test
- Input: ff-memless - kill timer in destroy()
- Input: synaptics-rmi4 - fix video buffer size
- Input: synaptics-rmi4 - disable the relative position IRQ in the F12 driver
- Input: synaptics-rmi4 - do not consume more data than we have (F11, F12)
- Input: synaptics-rmi4 - clear IRQ enables for F54
- Input: synaptics-rmi4 - destroy F54 poller workqueue when removing
- IB/hfi1: Ensure full Gen3 speed in a Gen4 system
- i2c: acpi: Force bus speed to 400KHz if a Silead touchscreen is present
- encryptfs_lookup_interpose(): lower_dentry->d_inode is not stable
- encryptfs_lookup_interpose(): lower_dentry->d_parent is not stable either
- iommu/vt-d: Fix QI_DEV_IOTLB_PFSID and QI_DEV_EIOTLB_PFSID macros
- mm: memcg: switch to css_tryget() in get_mem_cgroup_from_mm()
- mm: hugetlb: switch to css_tryget() in hugetlb_cgroup_charge_cgroup()
- mmc: sdhci-of-at91: fix quirk2 overwrite
- iio: adc: max9611: explicitly cast gain_selectors
- tee: optee: take DT status property into account
- ath10k: fix kernel panic by moving pci flush after napi_disable
- iio: dac: mcp4922: fix error handling in mcp4922_write_raw
- arm64: dts: allwinner: a64: Olinuxino: fix DRAM voltage
- arm64: dts: allwinner: a64: NanoPi-A64: Fix DCDC1 voltage
- ALSA: pcm: signedness bug in snd_pcm_plug_alloc()
- arm64: dts: tegra210-p2180: Correct sdmmc4 vqmmc-supply
- ARM: dts: at91/trivial: Fix USART1 definition for at91sam9g45
- rtc: rv8803: fix the rv8803 id in the OF table
- remoteproc/davinci: Use %zx for formatting size_t
- extcon: cht-wc: Return from default case to avoid warnings
- cfg80211: Avoid regulatory restore when COUNTRY_IE_IGNORE is set
- ALSA: seq: Do error checks at creating system ports
- ath9k: fix tx99 with monitor mode interface
- ath10k: limit available channels via DT ieee80211-freq-limit
- gfs2: Don't set GFS2_RDF_UPTODATE when the lvb is updated
- ASoC: dpcm: Properly initialise hw->rate_max
- pinctrl: ingenic: Probe driver at subsys_initcall
- MIPS: BCM47XX: Enable USB power on Netgear WNDR3400v3
- ARM: dts: exynos: Fix sound in Snow-rev5 Chromebook
- liquidio: fix race condition in instruction completion processing
- ARM: dts: exynos: Fix regulators configuration on Peach Pi/Pit Chromebooks
- i40e: use correct length for strncpy
+ -  i40e: hold the rtnl lock on clearing interrupt scheme
+ -  i40e: Prevent deleting MAC address from VF when set by PF
+ -  IB/rxe: fixes for rdma read retry
+ -  iwlwifi: don't WARN on trying to dump dead firmware
+ -  iwlwifi: mvm: avoid sending too many BARs
+ -  ARM: dts: pxa: fix the rtc controller
+ -  ARM: dts: pxa: fix power 12c base address
+ -  rtl8187: Fix warning generated when strncpy() destination length matches the sixe argument
+ -  soc: imx: gpc: fix PDN delay
+ -  ASoC: rsn: ssi: Fix issue in dma data address assignment
+ -  net: phy: mscc: read 'vsc8531,vddmac' as an u32
+ -  net: phy: mscc: read 'vsc8531, edge-slowdown' as an u32
+ -  ARM: dts: meson8: fix the clock controller register size
+ -  ARM: dts: meson8b: fix the clock controller register size
+ -  net: lan78xx: Bail out if lan78xx_get_endpoints fails
+ -  ASoC: sgtl5000: avoid division by zero if lo_vag is zero
+ -  ARM: dts: exynos: Disable pull control for S5M8767 PMIC
+ -  ath10k: wmi: disable softirq's while calling ieee80211_rx
+ -  IB/hfi1: Ensure that MTU isn't less than minimum permitted
+ -  RDMA/core: Rate limit MAD error messages
+ -  RDMA/core: Follow correct unregister order between sysfs and cgroup
+ -  mips: txx9: fix iounmap related issue
+ -  ASoC: Intel: hdac_hdmii: Limit sampling rates at dai creation
+ -  of: make PowerMac cache node search conditional on CONFIG_PPC_PMAC
+ -  ARM: dts: omap3-gta04: give spi_lcd node a label so that we can overwrite in other DTS files
+ -  ARM: dts: omap3-gta04: fixes for tvout / venc
+ -  ARM: dts: omap3-gta04: tvout: enable as display1 alias
+ -  ARM: dts: omap3-gta04: fix touchscreen tsc2007
+ -  ARM: dts: omap3-gta04: make NAND partitions compatible with recent U-Boot
+ -  ARM: dts: omap3-gta04: keep vpl2 always on
+ -  sched/debug: Use symbolic names for task state constants
+ -  arm64: dts: rockchip: Fix VCC5V0_HOST_EN on rk3399-sapphire
+ -  dmaengine: dma-jz4780: Don't depend on MACH_JZ4780
+ -  dmaengine: dma-jz4780: Further residue status fix
+ -  EDAC, sb_edac: Return early on ADDRV bit and address type test
+ -  rtc: mt6397: fix possible race condition
+ -  rtc: pl030: fix possible race condition
+ -  ath9k: add back support for using active monitor interfaces for tx99
+ -  IB/hfi1: Missing return value in error path for user sdma
+ -  signal: Always ignore SIGKILL and SIGSTOP sent to the global init
+ -  signal: Properly deliver SIGILL from uprobes
+ -  signal: Properly deliver SIGSEGV from x86 uprobes
+ -  i2fs: fix memory leak of percpu counter in fill_super()
+ -  scsi: qla2xxx: Fix ilDMA error
+ -  scsi: qla2xxx: Defer chip reset until target mode is enabled
+ -  scsi: qla2xxx: Fix dropped srb resource.
+ scsi: lpfc: Fix errors in log messages.
+ scsi: sym53c8xx: Fix NULL pointer dereference panic in sym_int_sir()
+ ARM: imx6: register pm_power_off handler if "fsl,pmic-stby-poweroff" is set
+ scsi: pm80xx: Corrected dma_unmap_sg() parameter
+ scsi: pm80xx: Fixed system hang issue during kexec boot
+ kprobes: Don't call BUG_ON() if there is a kprobe in use on free list
+ Drivers: hv: vmbus: Fix syncy per-cpu context initialization
+ nvmem: core: return error code instead of NULL from nvmem_device_get
+ media: dt-bindings: adv748x: Fix decimal unit addresses
+ media: fix: media: pci: meye: validate offset to avoid arbitrary access
+ media: dvb: fix compat ioct1 translation
+ arm64: dt: meson: libretech: update board model
+ ALSA: intel8x0m: Register irq handler after register initializations
+ pinctrl: at91-pio4: fix has_config check in atmel_pctl_dt_subnode_to_map()
+ Iic: avoid blocking in llc_sap_close()
+ ARM: dt: qcom: ipq4019: fix cpu0's qcom,saw2 reg value
+ soc: qcom: wcns_ctrl: Avoid string overflow
+ ARM: dt: socfgpa: Fix I2C bus unit-address error
+ pinctrl: at91: don't use the same irqchip with multiple gpiochips
+ cxgb4: Fix endianness issue in t4_fwcache()
+ blk, bfp: do not plug I/O if all queues are weight-raised
+ arm64: dt: meson: Fix erroneous SPI bus warnings
+ power: supply: ab8500_fg: silence uninitialized variable warnings
+ power: reset: at91-poweroff: do not procede if at91_shdwc is allocated
+ power: supply: max8998-charger: Fix platform data retrieval
+ component: fix loop condition to call unbind() if bind() fails
+ kernfs: Fix range checks in kernfs_get_target_path
+ ip_gre: fix parsing gre header in ipgre_err
+ ARM: dt: rockchip: Fix erroneous SPI bus dtc warnings on rk3036
+ ACPI / LPSS: Exclude I2C busses shared with PUNIT from pmc_atom_d3_mask
+ ath9k: Fix a locking bug in ath9k_add_interface()
+ s390/qeth: invoke softirqs after napi_schedule()
+ PCI/ACPI: Correct error message for ASPM disabling
+ serial: uarts: Fix suspend functionality
+ serial: samsung: Enable baud clock for UART reset procedure in resume
+ serial: mxs-auart: Fix potential infinite loop
+ samples/bpf: fix a compilation failure
+ spi: mediatek: Don't modify spi_transfer when transfer.
+ ipmi/dmi: Ignore IPMI SMBIOS entries with a zero base address
+ net: hns3: fix return type of ndo_start_xmit function
+ powerpc/iommu: Avoid dereference before pointer check
+ powerpc/64s/hash: Fix stab_rr off by one initialization
+ powerpc/pseries: Disable CPU hotplug across migrations
+ powerpc: Fix duplicate const clang warning in user access code
+ RDMA/i40iw: Fix incorrect iterator type
+ libfdt: Ensure INT_MAX is defined in libfdt_env.h
+ power: supply: twl4030 Charger: fix charging current out-of-bounds
+ power: supply: twl4030 Charger: disable eoc interrupt on linear charge
+ - net: toshiba: fix return type of ndo_start_xmit function
+ - net: xilinx: fix return type of ndo_start_xmit function
+ - net: broadcom: fix return type of ndo_start_xmit function
+ - net: amd: fix return type of ndo_start_xmit function
+ - net: sun: fix return type of ndo_start_xmit function
+ - nfp: provide a better warning when ring allocation fails
+ - usb: chipidea: imx: enable OTG overcurrent in case USB subsystem is already started
+ - usb: chipidea: Fix otg event handler
+ - mlxsw: spectrum: Init shaper for TCs 8..15
+ - ARM: dts: am335x-evm: fix number of cpsw
+ - i2fs: fix to recover inode's uid/gid during POR
+ - ARM: dts: ux500: Correct SCU unit address
+ - ARM: dts: ux500: Fix LCD clock line muxing
+ - ARM: dts: ste: Fix SPI controller node names
+ - spi: pic32: Use proper enum in dmaengine_prep_slave_rg
+ - cpufeature: avoid warning when compiling with clang
+ - crypto: arm/crc32 - avoid warning when compiling with Clang
+ - ARM: dts: marvell: Fix SPI and I2C bus warnings
+ - x86/mce-inject: Reset injection struct after injection
+ - ARM: dts: clearfog: fix sdhci supply property name
+ - bnx2x: Ignore bandwidth attention in single function mode
+ - samples/bpf: fix compilation failure
+ - net: phy: mdio-bcm-unimac: Allow configuring MDIO clock divider
+ - net: micrel: fix return type of ndo_start_xmit function
+ - net: freescale: fix return type of ndo_start_xmit function
+ - x86/CPU: Use correct macros for Cyrix calls
+ - x86/CPU: Change query logic so CPUID is enabled before testing
+ - MIPS: kexec: Relax memory restriction
+ - arm64: dts: rockchip: Fix microSD in rk3399 sapphire board
+ - media: pci: ivtv: Fix a sleep-in-atomic-context bug in ivtv_yuv_init()
+ - media: au0828: Fix incorrect error messages
+ - media: davinci: Fix implicit enum conversion warning
+ - ARM: dts: rockchip: explicitly set vcc_sd0 pin to gpio on rk3188-radxarock
+ - usb: gadget: uvc: confgfs: Drop leaked references to config items
+ - usb: gadget: uvc: configfs: Prevent format changes after linking header
+ - i2c: aspeed: fix invalid clock parameters for very large divisors
+ - phy: brcm-sata: allow PHY_BRCM_SATA driver to be built for DSL SoCs
+ - phy: renesas: rcar-gen3-usb2: fix vbus_ctrl for role sysfs
+ - phy: phy-tw14030-usb: fix denied runtime access
+ - usb: gadget: uvc: Factor out video USB request queueing
+ - usb: gadget: uvc: Only halt video streaming endpoint in bulk mode
+ - coresight: Fix handling of sinks
+ - coresight: perf: Fix per cpu path management
+ - coresight: perf: Disable trace path upon source error
+ - coresight: etm4x: Configure EL2 exception level when kernel is running in HYP
+ - coresight: tmc: Fix byte-address alignment for RRP
+ - misc: kgdbts: Fix restrict error
+ - misc: genwqe: should return proper error value.
+ - vfio/pci: Fix potential memory leak in vfio_msi_cap_len
+ - vfio/pci: Mask buggy SR-IOV VF INTx support
+ - scsi: libisas: always unregister the old device if going to discover new
+ - phy: lantiq: Fix compile warning
+ - ARM: dts: tegra30: fix xcvr-setup-use-fuses
+ - ARM: tegra: apalis_t30: fix mmc1 cmd pull-up
+ - ARM: dts: paz00: fix wakeup gpio keycode
+ - net: smsc: fix return type of ndo_start_xmit function
+ - net: faraday: fix return type of ndo_start_xmit function
+ - f2fs: fix to recover inode's project id during POR
+ - f2fs: mark inode dirty explicitly in recover_inode()
+ - EDAC: Raise the maximum number of memory controllers
+ - ARM: dts: realview: Fix SPI controller node names
+ - firmware: dell_rbu: Make payload memory uncachable
+ - Bluetooth: hci_serdev: clear HCI_UART_PROTO_READY to avoid closing proto
+ - EDAC: Raise the maximum number of memory controllers
+ - ARM: dts: tegra: apalis_t30: fix mmc1 cmd pull-up
+ - ARM: dts: paz00: fix wakeup gpio keycode
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+ - Bluetooth: hci_serdev: clear HCI_UART_PROTO_READY to avoid closing proto
+ - EDAC: Raise the maximum number of memory controllers
+ - ARM: dts: tegra: apalis_t30: fix mmc1 cmd pull-up
+ - ARM: dts: paz00: fix wakeup gpio keycode
+ - net: smsc: fix return type of ndo_start_xmit function
+ - net: faraday: fix return type of ndo_start_xmit function
+ - f2fs: fix to recover inode's project id during POR
+ - f2fs: mark inode dirty explicitly in recover_inode()
- IB/hfi1: Use a common pad buffer for 9B and 16B packets
- net: ethernet: dwmac-sun8i: Use the correct function in exit path
- mm: mempolicy: fix the wrong return value and potential pages leak of mbind
- y2038: make do_gettimeofday() and get_seconds() inline
- ARM: dts: rcar: Correct SATA device sizes to 2 MiB
- ARM: dts: exynos: Use i2c-gpio for HDMI-DDC on Arndale
- ARM: dts: exynos: Fix HDMI-HPD line handling on Arndale
- i40evf: Validate the number of queues a PF sends
- i40evf: set IFF_UNICAST_FLT flag for the VF
- i40evf: cancel workqueue sync for adminq when a VF is removed
- IB/rxe: avoid back-to-back retries
- brcmfmac: fix wrong strchr usage
- mtd: rawnand: fsl_ifc: check result of SRAM initialization
- mtd: rawnand: fsl_ifc: fixup SRAM init for newer ctrl versions
- rtnetlink: move type calculation out of loop
- udf: Fix crash during mount
- sched/debug: Explicitly cast sched_feat() to bool
- usb: mtu3: disable vbus rise/fall interrupts of ltssm
- dmaengine: at_xdac: remove a stray bottom half unlock
- scsi: qla2xxx: Terminate Plogi/PRLI if WNN is 0
- scsi: qla2xxx: Fix deadlock between ATIO and HW lock
- scsi: qla2xxx: Fix port speed display on chip reset
- scsi: lpfc: Correct invalid EQ doorbell write on if_type=6
- net: aquantia: fix hw_atl_utils_fw_upload_dwords
- ALSA: hda: Fix implicit definition of pci_iomap() on SH
- net: bcmgenet: Fix speed selection for reverse MII
- arm64: dts: Broadcom: Fix I2C and SPI bus warnings
- ARM: dts: bcm: Fix SPI bus warnings
- ARM: dts: aspeed: Fix I2C bus warnings
- ARM: dts: sunxi: Fix I2C bus warnings
- ARM: dts: sun9i: Fix I2C bus warnings
- arm64: fix for bad_mode() handler to always result in panic
- netfilter: nf_tables: avoid BUG_ON usage
- media: vsp1: Fix YCbCr planar formats pitch calculation
- PCI: mediatek: Fix unchecked return value
- ARM: dts: xilinx: Fix I2C and SPI bus warnings
- ipmi_si_pci: fix NULL device in ipmi_si error message
- ipmi_si: fix potential integer overflow on large shift
- net: cavium: fix return type of ndo_start_xmit function
- net: ibm: fix return type of ndo_start_xmit function
- selftests/powerpc: Do not fail with reschedule
- usb: usbtmc: Fix ioctl USBTMC_IOCTL_ABORT_BULK_OUT
- s390/zcrypt: enable AP bus scan without a valid default domain
- s390/vdso: avoid 64-bit vdso mapping for compat tasks
- brcmsmac: allocate ucode with GFP_KERNEL
- brcmsmac: Use kvmalloc() for ucode allocations
- EDAC: Correct DIMM capacity unit symbol
+  - gpiolib: Fix gpio_direction_* for single direction GPIOs
+  - arm64: dts: isl: Fix I2C and SPI bus warnings
+  - ARM: dts: imx51-zii-rdu1: Fix the rtc compatible string
+  - i2fs: update i_size after DIO completion
+  - RDMA: Fix dependencies for rdma_user_mmap_io
+  - crypto: s5p-sss: Fix race in error handling
+  - iwlfwi: pcie: gen2: build A-MSDU only for GSO
+  - iwlfwi: pcie: fit reclaim msg to MAX_MSG_LEN
+  - usb: usbtmc: uninitialized symbol 'actual' in usbtmc_ioctl_clear
+  - s390/vdso: correct vdso mapping for compat tasks
+  
+  * Bionic update: upstream stable patchset 2019-11-21 (LP: #1853519)
+  - bonding: fix state transition issue in link monitoring
+  - CDC-NCM: handle incomplete transfer of MTU
+  - ipv4: Fix table id reference in fib_sync_down_addr
+  - net: ethernet: octeon_mgmt: Account for second possible VLAN header
+  - net: fix data-race in neigh_event_send()
+  - net: qualcomm: mmnet: Fix potential UAF when unregistering
+  - net: usb: qmi_wwan: add support for DW5821e with eSIM support
+  - NFC: fdp: fix incorrect free object
+  - nf: netlink: fix double device reference drop
+  - NFC: st21nfca: fix double free
+  - qede: fix NULL pointer deref in __qede_remove()
+  - ALSA: timer: Fix incorrectly assigned timer instance
+  - ALSA: bebob: fix to detect configured source of sampling clock for Focusrite
+  Saffire Pro i/o series
+  - ALSA: hda/ca0132 - Fix possible workqueue stall
+  - mm: thp: handle page cache THP correctly in PageTransCompoundMap
+  - mm, vmstat: hide /proc/pagetypeinfo from normal users
+  - dump_stack: avoid the livelock of the dump_lock
+  - tools: gpio: Use !building_out_of_srctree to determine srctree
+  - perf tools: Fix time sorting
+  - drm/radeon: fix si_enable_smc_cac() failed issue
+  - HID: wacom: generic: Treat serial number and related fields as unsigned
+  - arm64: Do not mask out PTE_RDONLY in pte_same()
+  - ceph: fix use-after-free in __ceph_remove_cap()
+  - ceph: add missing check in d_revalidate snapdir handling
+  - iio: adc: stm32-acc: fix stopping dma
+  - iio: imu: adis16480: make sure provided frequency is positive
+  - iio: srf04: fix wrong limitation in distance measuring
+  - netfilter: nf_tables: Align nft_expr private data to 64-bit
+  - netfilter: ipset: Fix an error code in ip_set_sockfn_get()
+  - intel_th: pci: Add Comet Lake PCH support
+  - intel_th: pci: Add Jasper Lake PCH support
+  - can: usb_8dev: fix use-after-free on disconnect
+  - can: c_can: c_can_poll(): only read status register after status IRQ
+  - can: peak_usb: fix a potential out-of-sync while decoding packets
+  - can: rx-offload: can_rx_offload_queue_sorted(): fix error handling, avoid
+ skb mem leak
+ - can: gs_usb: gs_can_open(): prevent memory leak
+ - can: mcb_a_usb: fix use-after-free on disconnect
+ - can: peak_usb: fix slab info leak
+ - configfs: stash the data we need into configfs_buffer at open time
+ - configfs_register_group() shouldn't be (and isn't) called in rmdirable parts
+ - configfs: new object representing tree fragments
+ - configfs: provide exclusion between IO and removals
+ - configfs: fix a deadlock in configfs_symlink()
+ - usb: dwc3: Allow disabling of metastability workaround
+ - mfd: palmas: Assign the right powerhold mask for tps65917
+ - ASoC: tl320aic31xx: Handle inverted BCLK in non-DSP modes
+ - ARM: dts: dra7: Disable USB metastability workaround for USB2
+ - [Config] updateconfigs for SGL_ALLOC
+ - lib/scatterlist: Introduce sgl_alloc() and sgl_free()
+ - usbip: Fix vhci_urb_enqueue() URB null transfer buffer error path
+ - usbip: Implement SG support to vhci-hcd and stub driver
+ - PCI: tegra: Enable Relaxed Ordering only for Tegra20 & Tegra30
+ - dmaengine: xilinx_dma: Fix control reg update in vdma_channel_set_config
+ - HID: intel-ish-hid: fix wrong error handling in ishtp_cl_alloc_tx_ring()
+ - RDMA/qedr: Fix reported firmware version
+ - net/mlx5: prevent memory leak in mlx5_fpga_conn_create_cq
+ - scsi: qla2xxx: fixup incorrect usage of host_byte
+ - RDMA/verbs: Prevent potential underflow
+ - net: openvswitch: free vport unless register_netdevice() succeeds
+ - scsi: lpcf: Honor module parameter lpcf_use_adisc
+ - scsi: qla2xxx: Initialized mailbox to prevent driver load failure
+ - ipvs: don't ignore errors in case refcounting ip_vs module fails
+ - ipvs: move old_secure_tcp into struct netns_ipvs
+ - bonding: fix unexpected IFF_BONDING bit unset
+ - macesc: fix refcnt leak in module exit routine
+ - usb: fsl: Check memory resource before releasing it
+ - usb: gadget: composite: Fix possible double free memory bug
+ - usb: gadget: configfs: fix concurrent issue between composite APIs
+ - usb: dwc3: remove the call trace of USBx_GFLADJ
+ - perf/x86/amd/ibs: Fix reading of the IBS OpData register and thus precise RIP validity
+ - perf/x86/amd/ibs: Handle erratum #420 only on the affected CPU family (10h)
+ - USB: Skip endpoints with 0 maxpacket length
+ - USB: Id_usb: use unsigned size format specifiers
+ - RDMA/iw_cxgb4: Avoid freeing skb twice in arp failure case
+ - scsi: qla2xxx: stop timer in shutdown path
+ - fjes: Handle workqueue allocation failure
+ - net: hisilicon: Fix "Trying to free already-free IRQ"
+ - hv_netvsc: Fix error handling in netvsc_attach()
+ - NFSv4: Don't allow a cached open with a revoked delegation
+ - net: ethernet: arc: add the missed clk_disable_unprepare
+ - igb: Fix constant media auto sense switching when no cable is connected
+ - e1000: fix memory leaks
+ - x86/apic: Move pending interrupt check code into its own function
+ - x86/apic: Drop logical_smp_processor_id() inline
+ - x86/apic/32: Avoid bogus LDR warnings
+ - can: flexcan: disable completely the ECC mechanism
+ - mm/filemap.c: don't initiate writeback if mapping has no dirty pages
+ - cgroup,writeback: don't switch wbs immediately on dead wbs if the memcg is dead
+ - usbin: Fix free of unallocated memory in vhci tx
+ - net: prevent load/store tearing on sk->sk_stamp
+ - x86/speculation/taa: Fix printing of TAA_MSG_SMT on IBRS_ALL CPUs
+ - x86/cpu: Add Tremont to the cpu vulnerability whitelist
+ - Documentation: Add ITLB_MULTIHIT documentation
+ - net: hns: Fix the stray netpoll locks causing deadlock in NAPI path
+ - mm: memcontrol: fix network errors from failing __GFP_ATOMIC charges
+ - mm, meminit: recalculate pepu batch and high limits after init completes
+ - SMB3: Fix persistent handles reconnect
+ - dmaengine: sprd: Fix the possible memory leak issue
+ - iw_cxgb4: fix ECN check on the passive accept
+ - perf/x86/uncore: Fix event group support
+ - tools: Fix read_usb_vudc_device() error path handling
+ - RDMA/hns: Prevent memory leaks of eq->buf_list
+ - drm/amdgp: If amdgpqib_schedule fails return back the error.
+ - drm/amd/display: Passive DP->HDMI dongle detection fix
+ - pinctrl: intel: Initialize GPIO properly when used through irqchip
+ - pinctrl: intel: Avoid potential glitches if pin is in GPIO mode
+ - pinctrl: cherryview: Fix irq_valid_mask calculation
+ - netfilter: ipset: Copy the right MAC address in hash:ip,mac IPv6 sets
+ - vsoc/virtio: fix sock refcnt holding during the shutdown

+ Bionic update: upstream stable patchset 2019-11-19 (LP: #1853208)
+ - arm64: dts: Fix gpio to pinmux mapping
+ - regulator: ti-abb: Fix timeout in ti_abb_wait_txdone/ti_abb_clear_all_txdone
+ - regulator: pfuze100-regulator: Variable "val" in pfuze100_regulator_probe() could be uninitialized
+ - ASoc: wm_adsp: Don't generate kcontrols without READ flags
+ - ASoc: rockchip: i2s: Fix RPM imbalance
+ - ARM: dts: logicpd-torpedo-som: Remove twl_keypad
+ - pinctrl: ns2: Fix off by one bugs in ns2_pinmux_enable()
+ - ARM: mm: fix alignment handler faults under memory pressure
+ - scsi: scsi_dh_alua: handle RTPG sense code correctly during state transitions
+ - scsi: sni_53c710: fix compilation error
+ - scsi: fix kconfig dependency warning related to 53C700_LE_ON_BE
+ - ARM: dts: imx7s: Correct GPT's ipg clock source
+ - perf c2c: Fix memory leak in build_cl_output()
+ - perf kmem: Fix memory leak in compact_gfp_flags()
+ - ARM: davinci: dm365: Fix McBSP dma_slave_map entry
+ - scsi: target: core: Do not overwrite CDB byte 1
+ - ARM: 8926/1: v7m: remove register save to stack before svc
+ - of: unittest: fix memory leak in unittest_data_add
+ - MIPS: bmips: mark exception vectors as char arrays
+ - i2c: stm32l7: remove warning when compiling with W=1
+ - cifs: Fix cifsInodeInfo lock_sem deadlock when reconnect occurs
+ - nbd: handle racing with error'ed out commands
+ - cxgb4: fix panic when attaching to ULD fail
+ - dccp: do not leak jiffies on the wire
+ - net: annotate accesses to sk->sk_incoming_cpu
+ - net: annotate lockless accesses to sk->sk_napi_id
+ - net: dsa: bcm_sf2: Fix IMP setup for port different than 8
+ - net: ethernet: fgtmac100: Fix DMA coherency issue with SW checksum
+ - net: fix sk_page_frag() recursion from memory reclaim
+ - net: hisilicon: Fix ping latency when deal with high throughput
+ - net/mlx4_core: Dynamically set guaranteed amount of counters per VF
+ - selftests: net: reuseport_dualstack: fix uninitialized parameter
+ - udp: fix data-race in udp_set_dev_scratch()
+ - net: add READ_ONCE() annotation in __skb_wait_for_more_packets()
+ - net/mlx5e: Fix handling of compressed CQEs in case of low NAPI budget
+ - net: dsa: b53: Do not clear existing mirrored port mask
+ - net: usb: lan78xx: Connect PHY before registering MAC
+ - r8152: add device id for Lenovo ThinkPad USB-C Dock Gen 2
+ - net: dsa: fix switch tree list
+ - net: bcmgenet: reset 40nm EPHY on energy detect
+ - net: add skb_queue_empty_lockless()
+ - udp: use skb_queue_empty_lockless()
+ - net: use skb_queue_empty_lockless() in poll() handlers
+ - net: use skb_queue_empty_lockless() in busy poll contexts
+ - vxlan: check tun_info options_len properly
+ - erspan: fix the tun_info options_len check for erspan
+ - inet: stop leaking jiffies on the wire
+ - net/flow_dissector: switch to siphash
+ - kbuild: use -fmacro-prefix-map to make __FILE__ a relative path
+ - platform/x86: pmc_atom: Add Siemens SIMATIC IPC227E to critclk_systems DMI table
+ - iio: adc: stm32-adc: move registers definitions
+ - powerpc/book3s64/mm: Don't do tblie fixup for some hardware revisions
+ - powerpc/book3s64/radix: Rename CPU_FTR_P9_TLBIE_BUG feature flag
+ - selftests/powerpc: Add test case for tblie vs mtpidr ordering issue
+ - selftests/powerpc: Fix compile error on tblie_test due to newer gcc
+ - arm64: dts: allwinner: a64: pine64-plus: Add PHY regulator delay
+ - arm64: dts: allwinner: a64: sotine-baseboard: Add PHY regulator delay
+ - scsi: qla2xxx: fix a potential NULL pointer dereference
+ - irqchip/gic-v3-its: Use the exact ITSList for VMOVP
+ - netns: fix GFP flags in rtnl_net_notifyid()
+ - net: usb: lan78xx: Disable interrupts before calling generic_handle_irq()
+ - wireless: Skip directory when generating certificates
+ - ASoC: pcm3168a: The codec does not support S32_LE
+ - usb: gadget: udc: core: Fix segfault if udc_bind_to_driver() for pending
+   driver fails
+ + -- Khalid Elmously <khalid.elmously@canonical.com>  Mon, 02 Dec 2019 14:01:36 -0500
+ + linux (4.15.0-72.81) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-72.81 -proposed tracker (LP: #1854027)
+ + * [Regression] Bionic kernel 4.15.0-71.80 can not boot on ThunderX
+   (LP: #1853326)
+   - Revert "arm64: Use firmware to detect CPUs that are not affected by
+     Spectre-v2"
+   - Revert "arm64: Get rid of __smccc_workaround_1_hvc_*"
+ + * [Regression] Bionic kernel 4.15.0-71.80 can not boot on ThunderX2 and
+   Kunpeng920 (LP: #1852723)
+   - SAUCE: arm64: capabilities: Move setup_boot_cpu_capabilities() call to
+     correct place
+ + -- Stefan Bader <stefan.bader@canonical.com>  Tue, 26 Nov 2019 12:18:37 +0100
+ + linux (4.15.0-71.80) bionic; urgency=medium
+ + * bionic/linux: 4.15.0-71.80 -proposed tracker (LP: #1852289)
+ + * Bionic update: upstream stable patchset 2019-10-29 (LP: #1850541)
+ + - panic: ensure preemption is disabled during panic()
+ + - t2fs: use EINVAL for superblock with invalid magic
+ + - [Config] updateconfigs for USB_RIO500
+ + - USB: rio500: Remove Rio 500 kernel driver
+ + - USB: yurex: Don't retry on unexpected errors
+ + - USB: yurex: fix NULL-derefs on disconnect
+ + - USB: usb-skeleton: fix runtime PM after driver unbind
+ + - USB: usb-skeleton: fix NULL-deref on disconnect
+ + - xhci: Fix false warning message about wrong bounce buffer write length
+ + - xhci: Prevent device initiated U1/U2 link pm if exit latency is too long
+ + - xhci: Check all endpoints for LPM timeout
+ + - usb: xhci: wait for CNR controller not ready bit in xhci resume
+ + - USB: adutux: fix use-after-free on disconnect
+ + - USB: adutux: fix NULL-derefs on disconnect
+ + - USB: adutux: fix use-after-free on release
+ + - USB: iowarrior: fix use-after-free on disconnect
+ + - USB: iowarrior: fix use-after-free on release
+ + - USB: iowarrior: fix use-after-free after driver unbind
+ + - USB: usblp: fix runtime PM after driver unbind
- USB: chaoskey: fix use-after-free on release
- USB: ldusb: fix NULL-derefs on driver unbind
- serial: uartlite: fix exit path null pointer
- USB: serial: keyspan: fix NULL-derefs on open() and write()
- USB: serial: ftdi_sio: add device IDs for Sienna and Echelon PL-20
- USB: serial: option: add Telit FN980 compositions
- USB: serial: option: add support for Cinterion CLS8 devices
- USB: serial: fix runtime PM after driver unbind
- USB: usblcd: fix I/O after disconnect
- USB: microtek: fix info-leak at probe
- USB: dummy-hcd: fix power budget for SuperSpeed mode
- usblcd: renesas_usbhs: gadget: Do not discard queues in
  + usb_ep_set_{halt,wedge}()
- USB: renesas_usbhs: gadget: Fix usb_ep_set_{halt,wedge}() behavior
- USB: legousbtower: fix slab info leak at probe
- USB: legousbtower: fix deadlock on disconnect
- USB: legousbtower: fix potential NULL-derefs on disconnect
- USB: legousbtower: fix open after failed reset request
- USB: legousbtower: fix use-after-free on release
- staging: vt6655: Fix memory leak in vt6655_probe
- iio: adc: ad799x: fix probe error handling
- iio: adc: axp288: Override TS pin bias current for some models
- io: light: opt3001: fix mutex unlock race
- efivar/ssdt: Don't iterate over EFI vars if no SSDT override was specified
- perf llvm: Don't access out-of-scope array
- perf inject jit: Fix JIT_CODE_MOVE filename
- CIFS: Gracefully handle QueryInfo errors during open
- CIFS: Force revalidate inode when dentry is stale
- CIFS: Force reval dentry if LOOKUP_REVAL flag is set
- kernel/sysctl.c: do not override max_threads provided by userspace
- firmware: google: increment VPD key_len properly
- gpiolib: don't clear FLAG_IS_OUT when emulating open-drain/open-source
- Staging: fbtft: fix memory leak in fbtft_framebuffer_alloc
- iio: hx711: add delay until DOUT is ready
- iio: adc: hx711: fix bug in sampling of data
- brtf: fix incorrect updating of log root tree
- NFS: Fix O_DIRECT accounting of number of bytes read/written
- MIPS: Disable Loongson MMI instructions for kernel build
- Fix the locking in dcache_readdir() and friends
- media: stkwebcam: fix runtime PM after driver unbind
- tracing/hwlat: Report total time spent in all NMIs during the sample
- tracing/hwlat: Don't ignore outer-loop duration when calculating max_latency
- ftrace: Get a reference counter for the trace_array on filter files
- tracing: Get trace_array reference for available_tracers files
- x86/asm: Fix MWAITX C-state hint value
- iio: adc: stm32-adc: fix a race when using several adcs with dma and irq
- cifs: use cifsInodeInfo->open_file_lock while iterating to avoid a panic
- brtf: fix uninitialized ret in ref-verify
+ - arm64/sve: Fix wrong free for task->thread.sve_state
+ - [Config] updateconfigs for USB_RIO500
+ + * Bionic update: upstream stable patchset 2019-11-13 (LP: #1852492)
+ - zram: fix race between backing_dev_show and backing_dev_store
+ - dm snapshot: use mutex instead of rw_semaphore
+ - dm snapshot: introduce account_start_copy() and account_end_copy()
+ - dm snapshot: rework COW throttling to fix deadlock
+ - dm: Use kmalloc for all structs with embedded biosets/mempools
+ - f2fs: flush quota blocks after turning it off
+ - scsi: lpfc: Fix a duplicate 0711 log message number.
+ - sc16is7xx: Fix for "Unexpected interrupt: 8"
+ - powerpc/powerenv: hold device_hotplug_lock when calling
+ memoriace_offline_pages()
+ - HID: i2c-hid: add Direkt-Tek DTLAPY133-1 to descriptor override
+ - x86/cpu: Add Atom Tremont (Jacobsville)
+ - HID: i2c-hid: Add Odys Winbook 13 to descriptor override
+ - clk: boston: unregister elks on failure in clk_boston_setup()
+ - scripts/setlocalversion: Improve -dirty check with git-status --no-optional-locks
+ - HID: Add ASUS T100CHI keyboard dock battery quirks
+ - usb: handle warm-reset port requests on hub resume
+ - rtc: pcf8523: set xtal load capacitance from DT
+ - mlxsw: spectrum: Set LAG port collector only when active
+ - ALSA: hda/realtek - Apply ALC294 hp init also for S4 resume
+ - media: vmi: Remove unused but set variables
+ - exec: load_script: Do not exec truncated interpreter path
+ - PCI/PME: Fix possible use-after-free on remove
+ - power: supply: max14656: fix potential use-after-free
+ - iio: adc: meson_saradc: Fix memory allocation order
+ - iio: fix center temperature of bmc150-accel-core
+ - libsubcmd: Make _FORTIFY_SOURCE defines dependent on the feature
+ - perf tests: Avoid raising SEGV using an obvious NULL dereference
+ - perf map: Fix overlapped map handling
+ - perf jevents: Fix period for Intel fixed counters
+ - staging: rtl8188eu: fix null dereference when kmalloc fails
+ - RDMA/hfi1: Prevent memory leak in sdma_init
+ - RDMA/iwcm: Fix a lock inversion issue
+ - HID: hyperv: Use in-place iterator API in the channel callback
+ - nfs: Fix nfsi->nrequests count error on nfs_inode_remove_request
+ - arm64: ftrace: Ensure synchronisation in PLT setup for Neoverse-N1 #1542419
+ - tty: serial: owl: Fix the link time qualifier of ’owl_uart_exit()’
+ - tty: n_hdlc: fix build on SPARC
+ - gpio: max77620: Use correct unit for debounce times
+ - fs: cifs: mute -Wunused-const-variable message
+ - serial: metrl_gpio: Check for NULL pointer
+ - efi/cper: Fix endianness of PCIe class code
+ - efi/x86: Do not clean dummy variable in kexec path
- MIPS: include: Mark __cmpxchg as __always_inline
- x86/xen: Return from panic notifier
- ocfs2: clear zero in unaligned direct IO
- fs: ocfs2: fix possible null-pointer dereferences in ocfs2_xa_prepare_entry()
- fs: ocfs2: fix a possible null-pointer dereference in ocfs2_write_end_nolock()
- fs: ocfs2: fix a possible null-pointer dereference in ocfs2_info_scan_inode_alloc()
- sched/vtime: Fix guest/system mis-accounting on task switch
- perf/x86/amd: Change/fix NMI latency mitigation to use a timestamp
- MIPS: include: Mark __xchg as __always_inline
- MIPS: fw: sni: Fix out of bounds init of o32 stack
- nbd: fix possible sysfs duplicate warning
- NFSv4: Fix leak of clp->cl_acceptor string
- s390/uaccess: avoid (false positive) compiler warnings
- tracing: Initialize iter->seq after zeroing in tracing_read_pipe()
- nbd: verify socket is supported during setup
- USB: legousbtower: fix a signedness bug in tower_probe()
- thunderbolt: Use 32-bit writes when writing ring producer/consumer
- fuse: flush dirty data/metadata before non-truncate setattr
- fuse: truncate pending writes on O_TRUNC
- ALSA: bebob: Fix prototype of helper function to return negative value
- UAS: Revert commit 3ae62a42090f ("UAS: fix alignment of scatter/gather segments")
- USB: gadget: Reject endpoints with 0 maxpacket value
- usb-storage: Revert commit 747668d8bc061 ("usb-storage: Set virt_boundary_mask to avoid SG overflows")
- USB: ldusb: fix ring-buffer locking
- USB: ldusb: fix control-message timeout
- USB: serial: whiteheat: fix potential slab corruption
- USB: serial: whiteheat: fix line-speed endianness
- scsi: target: cxgb4: Fix cxgb4_fw4_ack()
- HID: i2c-hid: add Trekstor Primebook C11B to descriptor override
- HID: Fix assumption that devices have inputs
- HID: fix error message in hid_open_report()
- n80211: fix validation of mesh path nexthop
- s390/cmm: fix information leak in cmm_timeout_handler()
- s390/idle: fix cpu idle time calculation
- arm64: Ensure VM_WRITE[VM_SHARED] ptes are clean by default
- dmaengine: cppi41: Fix cppi41_dma_prep_slave_sg() when idle
- Iic: fix sk_buff leak in Iic_sap_state_process()
- Iic: fix sk_buff leak in Iic_conn_service()
- rxrpc: Fix call ref leak
- NFC: pn533: fix use-after-free and memleaks
- bonding: fix potential NULL deref in bond_update_slave_arr
- net: usb: sr9800: fix uninitialized local variable
- sch_netem: fix rcu splat in netem_enqueue()
+ scpt: fix the issue that flags are ignored when using kernel_connect
+ scpt: not bind the socket in sctp_connect
+ xfs: Correctly invert xfs_buftarg LRU isolation logic
+ ALSA: timer: Simplify error path in snd_timer_open()
+ ALSA: timer: Fix mutex deadlock at releasing card
+ Revert "ALSA: hda: Flush interrupts on disabling"
+ Btrfs: fix inode cache block reserve leak on failure to allocate data space
+ Btrfs: fix memory leak due to concurrent append writes with fiemap
+ tools/power turbostat: fix goldmont C-state limit decoding
+ bcache: fix input overflow to writeback_rate_minimum
+ netfilter: ipset: Make invalid MAC address checks consistent
+ platform/x86: Add the VLV ISP PCI ID to atomisp2_pm
+ platform/x86: Fix config space access for intel_atomisp2_pm
+ NFSv4: Ensure that the state manager exits the loop on SIGKILL
+ ALSA: usb-audio: Cleanup DSD whitelist
+ arm64: Add MIDR encoding for HiSilicon Taishan CPUs
+ arm64: kpti: Whitelist HiSilicon Taishan v110 CPUs
+ scsi: lpfc: Correct localport timeout duration error
+ ext4: disallow files with EXT4_JOURNAL_DATA_FL from EXT4_IOC_SWAP_BOOT
+ net: dsa: mv88e6xxx: Release lock while requesting IRQ
+ drm/amd/display: fix odm combine pipe reset
+ perf script brstackinsn: Fix recovery from LBR/binary mismatch
+ perf tools: Propagate get_cpuid() error
+ perf annotate: Propagate perf_env__arch() error
+ perf annotate: Fix the signedness of failure returns
+ arm64: armv8 deprecated: Checking return value for memory allocation
+ x86/cpu: Add Comet Lake to the Intel CPU models header
+ iio: imu: adis16400: release allocated memory on failure
+ usb: xhci: fix __le32/__le64 accessors in debugfs code
+ dmaengine: qcom: bam_dma: Fix resource leak
+ NFS: Fix an RCU lock leak in nfs4_refresh_delegation_stateid()
+ batman-adv: Avoid free/alloc race when handling OGM buffer
+ powerpc/poweroff: Fix CPU idle to be called with IRQs disabled
+ * Dell XPS 13 9350/9360 headphone audio hiss (LP: #1654448) // XPS 13 9360, Realtek ALC3246, Black Headphone Out, Front] High noise floor
+ (LP: #1845810) // Bionic update: upstream stable patchset 2019-11-13
+ (LP: #1852492)
+ ALSA: hda/realtek: Reduce the Headphone static noise on XPS 9350/9360
+ * Add GeminiLake support on Intel int340x thermal device (LP: #1851506)
+ thermal: int340x: processor_thermal: Add GeminiLake support
+ * System hangs at early boot (LP: #1851216)
+ x86/timer: Skip PIT initialization on modern chipsets
+ * Some EFI systems fail to boot in efi_init() when booted via maas
+ (LP: #1851810)
+ - efi: efi_get_memory_map -- increase map headroom
+ + * dkms artifacts may expire from the pool (LP: #1850958)
+ - [Packaging] dkms -- try launchpad librarian for pool downloads
+ - [Packaging] dkms -- dkms-build quieten wget verbiage
+
+ + * update ENA driver to version 2.1.0 (LP: #1850175)
+ - net: ena: fix: set freed objects to NULL to avoid failing future allocations
+ - net: ena: fix swapped parameters when calling
+ ena_com间接_table_fill_entry
+ - net: ena: fix return value of ena_com_config_llq_info()
+ - net: ena: improve latency by disabling adaptive interrupt moderation by
default
+ - net: ena: fix ena_com_fill_hash_function() implementation
+ - net: ena: add handling of llq max tx burst size
+ - net: ena: ethtool: add extra properties retrieval via get_priv_flags
+ - net: ena: replace free_tx/rx_ids union with single free_ids field in
+ ena_ring
+ - net: ena: arrange ena_probe() function variables in reverse christmas tree
+ - net: ena: add newline at the end of pr_err prints
+ - net: ena: documentation: update ena.txt
+ - net: ena: allow automatic fallback to polling mode
+ - net: ena: add support for changing max_header_size in LLQ mode
+ - net: ena: optimise calculations for CQ doorbell
+ - net: ena: add good checksum counter
+ - net: ena: use dev_info_once instead of static variable
+ - net: ena: add MAX_QUEUES_EXT get feature admin command
+ - net: ena: enable negotiating larger Rx ring size
+ - net: ena: make ethtool show correct current and max queue sizes
+ - net: ena: allow queue allocation backoff when low on memory
+ - net: ena: add ethtool function for changing io queue sizes
+ - net: ena: remove inline keyword from functions in *.c
+ - net: ena: update driver version from 2.0.3 to 2.1.0
+ - net: ena: Fix bug where ring allocation backoff stopped too late
+ - Revert "net: ena: ethtool: add extra properties retrieval via
+ get_priv_flags"
+ - net: ena: don't wake up tx queue when down
+ - net: ena: clean up indentation issue
+*
+ + * Skip frame when buffer overflow on UVC camera (LP: #1849871)
+ - media: uvcvideo: Mark buffer error where overflow
+
+ + * Handle the skip return code in kernel_selftests on Bionic (LP: #1812352)
+ - selftests: lib.mk set KSFT_TAP_LEVEL to prevent nested TAP headers
+ - selftests: Fix lib.mk run_tests target shell script
+ - selftests: lib.mk: cleanup RUN_TESTS define and make it readable
+  - selftests: lib.mk: add SKIP handling to RUN_TESTS define
+  +  * Intel Wireless AC 3168 on Eoan complaints FW error in SYNC CMD
+  +  GEO_TX_POWER_LIMIT (LP: #1846016)
+  +  - iwlwifi: exclude GEO SAR support for 3168
+  +  * tsc marked unstable after entered PC10 on Intel CoffeeLake (LP: #1840239)
+  +  - SAUCE: x86/intel: Disable HPET on Intel Coffe Lake platforms
+  +  - SAUCE: x86/intel: Disable HPET on Intel Ice Lake platforms
+  +  * Bionic update: upstream stable patchset 2019-11-08 (LP: #1851876)
+  +  - scsi: ufs: skip shutdown if hba is not powered
+  +  - scsi: megaraid: disable device when probe failed after enabled device
+  +  - scsi: qla2xxx: Fix unbound sleep in fcport delete path.
+  +  - ARM: OMAP2+: Fix missing reset done flag for am3 and am43
+  +  - ieee802154: ca8210: prevent memory leak
+  +  - ARM: dts: am4372: Set memory bandwidth limit for DISPC
+  +  - net: dsa: qca8k: Use up to 7 ports for all operations
+  +  - MIPS: dts: ar9331: fix interrupt-controller size
+  +  - xen/efi: Set nonblocking callbacks
+  +  - nl80211: fix null pointer dereference
+  +  - mac80211: fix txq null pointer dereference
+  +  - mips: Loongson: Fix the link time qualifier of 'serial_exit()'
+  +  - net: hisilicon: Fix usage of uninitialized variable in function
+  +  - mdio_sc_cfg_reg_write()
+  +  - namespace: fix namespace.pl script to support relative paths
+  +  - Revert "drm/radeon: Fix EEH during kexec"
+  +  - ofcs2: fix panic due to ofcs2_wq is null
+  +  - ipv4: Return -ENETUNREACH if we can't create route but saddr is valid
+  +  - net: bcmgenet: Fix RGMII_MODE_EN value for GENET v1/2/3
+  +  - net: bcmgenet: Set phydev->dev_flags only for internal PHYs
+  +  - net: i82596: fix dma Alloc_attr for sni_82596
+  +  - net: stmmac: disable/enable ptp_ref_clk in suspend/resume flow
+  +  - scp: change scp_prot_.no_autobind with true
+  +  - net: avoid potential infinite loop in tc_ctl_action()
+  +  - memfd: Fix locking when tagging pins
+  +  - USB: legousbtower: fix memleak on disconnect
+  +  - ALSA: hda/realtek - Add support for ALC711
+  +  - usb: udc: lpc32xx: fix bad bit shift operation
+  +  - USB: serial: ti_usb_3410_5052: fix port-close races
+  +  - USB: ldusb: fix memleak on disconnect
+  +  - USB: usblp: fix use-after-free on disconnect
+  +  - USB: ldusb: fix read info leaks
+  +  - arm64: v8.4: Support for new floating point multiplication instructions
+  +  - arm64: Documentation: cpu-feature-registers: Remove RES0 fields
+  +  - arm64: Expose Arm v8.4 features
+  +  - arm64: move SCTLR_EL{1,2} assertions to <asm/sysreg.h>
+  +  - arm64: add PSR_AA32_* definitions
+ - arm64: Introduce sysreg_clear_set()
+ - arm64: capabilities: Update prototype for enable call back
+ - arm64: capabilities: Move errata work around check on boot CPU
+ - arm64: capabilities: Move errata processing code
+ - arm64: capabilities: Prepare for fine grained capabilities
+ - arm64: capabilities: Add flags to handle the conflicts on late CPU
+ - arm64: capabilities: Unify the verification
+ - arm64: capabilities: Filter the entries based on a given mask
+ - arm64: capabilities: Prepare for grouping features and errata work arounds
+ - arm64: capabilities: Split the processing of errata work arounds
+ - arm64: capabilities: Allow features based on local CPU scope
+ - arm64: capabilities: Group handling of features and errata workarounds
+ - arm64: capabilities: Introduce weak features based on local CPU
+ - arm64: capabilities: Restrict KPTI detection to boot-time CPUs
+ - arm64: capabilities: Add support for features enabled early
+ - arm64: capabilities: Change scope of VHE to Boot CPU feature
+ - arm64: capabilities: Clean up midr range helpers
+ - arm64: Add helpers for checking CPU MIDR against a range
+ - arm64: Add MIDR encoding for Arm Cortex-A55 and Cortex-A35
+ - arm64: capabilities: Add support for checks based on a list of MIDRs
+ - arm64: KVM: Use SMCCC_ARCH_WORKAROUND_1 for Falkor BP hardening
+ - arm64: don't zero DIT on signal return
+ - arm64: Get rid of __smccc_workaround_1_hvc_ *
+ - arm64: cpufeature: Detect SSBS and advertise to userspace
+ - arm64: ssbd: Add support for PSTATE.SSBS rather than trapping to EL3
+ - KVM: arm64: Set SCTLR_EL2.DSSBS if SSBD is forcefully disabled and !vhe
+ - arm64: fix SSBS sanitization
+ - arm64: Add sysfs vulnerability show for spectre-v1
+ - arm64: add sysfs vulnerability show for meltdown
+ - arm64: enable generic CPU vulnerabilities support
+ - arm64: Always enable ssb vulnerability detection
+ - arm64: Provide a command line to disable spectre_v2 mitigation
+ - arm64: Advertise mitigation of Spectre-v2, or lack thereof
+ - arm64: Always enable spectre-v2 vulnerability detection
+ - arm64: add sysfs vulnerability show for spectre-v2
+ - arm64: add sysfs vulnerability show for speculative store bypass
+ - arm64: ssbs: Don't treat CPUs with SSBS as unaffected by SSB
+ - arm64: Force SSBS on context switch
+ - arm64: Use firmware to detect CPUs that are not affected by Spectre-v2
+ - arm64/speculation: Support 'mitigations=' cmdline option
+ - MIPS: tlbex: Fix build_restore_pagemask KScratch restore
+ - staging: wlan-ng: fix exit return when sme->key_idx >= NUM_WEPKEYS
+ - scsi: sd: Ignore a failure to sync cache due to lack of authorization
+ - scsi: core: save/restore command resid for error handling
+ - scsi: core: try to get module before removing device
+ - scsi: ch: Make it possible to open a ch device multiple times again
+ - Input: da9063 - fix capability and drop KEY_SLEEP
+ - Input: synaptics-rmi4 - avoid processing unknown IRQs
+ - ASoC: rsnd: Reinitialize bit clock inversion flag for every format setting
+ - cfg80211: wext: avoid copying malformed SSIDs
+ - mac80211: Reject malformed SSID elements
+ - drm/amdgpu: Bail earlier when amdgpu.cik_/si_support is not set to 1
+ - drivers/base/memory.c: don't access uninitialized memmaps in
  soft_offline_page_store()
+ - fs/proc/page.c: don't access uninitialized memmaps in fs/proc/page.c
+ - scsi: zfcp: fix reaction on bit error threshold notification
+ - mm/slub: fix a deadlock in show_slab_objects()
+ - mm/page_owner: don't access uninitialized memmaps when reading
  /proc/pagetypeinfo
+ - hugetlbfs: don't access uninitialized memmaps in pf_range_valid_gigantic()
+ - xtensa: drop EXPORT_SYMBOL for outs*/ins*
+ - parisc: Fix vmap memory leak in ioremap()/iounmap()
+ - CIFS: avoid using MID 0xFFFF
+ - x86/boot/64: Make level2_kernel_pgt pages invalid outside kernel area
+ - pinctrl: armada-37xx: fix control of pins 32 and up
+ - pinctrl: armada-37xx: swap polarity on LED group
+ - btrfs: block-group: Fix a memory leak due to missing btrfs_put_block_group()
+ - memstick: jmb38x_ms: Fix an error handling path in 'jmb38x_ms_probe()'
+ - cpufreq: Avoid cpufreq_suspend() deadlock on system shutdown
+ - xen/netback: fix error path of xenvif_connect_data()
+ - PCI: PM: Fix pci_power_up()
+ - KVM: X86: introduce invalidate_gpa argument to tlb flush
+ - kvm: vmx: Introduce apic_mode enumeration
+ - kvm: vmx: Basic APIC virtualization controls have three settings
+ - RDMA/cxgb4: Do not dma memory off of the stack
+ - ARM: OMAP2+: Fix warnings with broken omap2_set_init_voltage()
+ - libata/ahci: Fix PCI quirk application
+ - ipv4: fix race condition between route lookup and invalidation
+ - ALSA: hda/realtek - Enable headset mic on Asus MJ401TA
+ - ALSA: hda - Force runtime PM on Nvidia HDMI codecs
+ - ACPI: CPCC: Set pcc_data[pcc_ss_id] to NULL in acpi_cpcc_processor_exit()
+ - EDAC/ghes: Fix Use after free in ghes_edac remove path
+ - arm64: Enable workaround for Cavium TX2 erratum 219 when running SMT
+ - CIFS: Fix use after free of file info structures
+ - perf/aux: Fix AUX output stopping
+ - dm cache: fix bugs when a GFP_NOWAIT allocation fails
+ - x86/apic/x2apic: Fix a NULL pointer deref when handling a dying cpu
+ - Btrfs: add missing extents release on file extent cluster relocation error
+ - Colour banding in Lenovo G50-80 laptop display (i915) (LP: #1819968) //
+ - Bionic update: upstream stable patchset 2019-11-08 (LP: #1851876)
+ - drm/edid: Add 6 bpc quirk for SDC panel in Lenovo G50
+ - clouding: no iavf/i40evf module so no network available with SR-IOV enabled
+ - cloud (LP: #1848481)
+ - [Debian]: include i40evf in generic
[SRU][B/OEM-B/OEM-OSP1/D/E] UBUNTU: SAUCE: add rtl623 codec support and fix mic issues (LP: #1850599)
- SAUCE: ALSA: hda/realtek - Add support for ALC623
- SAUCE: ALSA: hda/realtek - Fix 2 front mics of codec 0x623

* Add Intel Comet Lake ethernet support (LP: #1848555)
- e1000e: Add support for Comet Lake

* SUPPRESS "hid_field_extract() called with n (192) > 32!" message floods
  (LP: #1850600)
- HID: core: reformat and reduce hid_printk macros
- HID: core: Add printk_once variants to hid_warn() etc
- HID: core: fix dmesg flooding if report field larger than 32bit

* AMD Prairie Falcon platform failed to boot up (LP: #1850572)
- drm/amdgpu: re-enable CGCG on CZ and disable on ST

* UIO: mutex used in interrupt handler causes crash (LP: #1843487)
- Revert "uio: use request_threaded_irq instead"

* root can lift kernel lockdown (LP: #1851380)
- SAUCE: (efi-lockdown) Really don't allow lifting lockdown from userspace

* Suspend stopped working from 4.4.0-157 onwards (LP: #1844021) // Bionic update: upstream stable patchset 2019-10-29 (LP: #1850541)
- xhci: Increase STS_SAVE timeout in xhci_suspend()

* Bionic update: upstream stable patchset 2019-10-23 (LP: #1849576)
- s390/process: avoid potential reading of freed stack
- KVM: s390: Test for bad access register and size at the start of S390_MEM_OP
- s390/topology: avoid firing events before kobjs are created
- s390/cio: avoid calling strlen on null pointer
- s390/cio: exclude subchannels with no parent from pseudo check
- KVM: PPC: Book3S HV: Don't lose pending doorbell request on migration on P9
- PM / devfreq: tegra: Fix kHz to Hz conversion
- ASoC: Define a set of DAPM pre/post-up events
- powerpc/powerpc: Restrict OPAL symbol map to only be readable by root
- can: mcp251x: mcp251x_hw_reset(): allow more time after a reset
- tools lib traceevent: Fix "robust" test of do_generate_dynamic_list_file
- crypto: qat - Silence smp_processor_id() warning
- crypto: skcipher - Unmap pages after an external error
- crypto: cavium/zip - Add missing single_release()
- crypto: caam - fix concurrency issue in givencrypt descriptor
- usercopy: Avoid HIGHMEM pfh warning
- timer: Read jiffies once when forwarding base clk
- watchdog: imx2_wdt: fix min() calculation in imx2_wdt_set_timeout
- drm/omap: fix max fclk divider for omap36xx
- mmc: sdhci: improve ADMA error reporting
- mmc: sdhci-of-esdhc: set DMA snooping based on DMA coherence
- Revert "locking/pvqspinlock: Don't wait if vCPU is preempted"
- xen/xenbus: fix self-deadlock after killing user process
- ieee802154: atusb: fix use-after-free at disconnect
- cfg80211: initialize on-stack chandefs
- ima: always return negative code for error
- fs: nfs: Fix possible null-pointer dereferences in encode_attrs()
- 9p: avoid attaching writeback_fid on mmap with type PRIVATE
- xen/pci: reserve MCFG areas earlier
- xenbus: fix directories inode i_blkbits initialization
- xen/pci: reconnect connection if session hang in opening state
- watchdog: aspeed: Add support for AST2600
- netfilter: nf_tables: allow lookups in dynamic sets
- drm/amdgpu: Check for valid number of registers to read
- pNFS: Ensure we do clear the return-on-close layout stateid on fatal errors
- pwm: stm32-lp: Add check in case requested period cannot be achieved
- thermal: Fix use-after-free when unregistering thermal zone device
- fuse: fix memleak in cuse_channel_open
- sched/core: Fix migration to invalid CPU in __set_cpus_allowed_ptr()
- perf build: Add detection of java-11-openjdk-devel package
- kernel/elfcore.c: include proper prototypes
- perf unwind: Fix libunwind build failure on i386 systems
- KVM: PPC: Book3S HV: XIVE: Free escalation interrupts before disabling the VP
- nbd: fix crash when the blksize is zero
- block/nbd: add WQ_UNBOUND to the knbd-recv workqueue
- nbd: fix max number of supported devs
- powerpc/pseries: Fix cpu_hotplug_lock acquisition in resize_hpt()
- tools/libtraceevent: Do not free tep->cmdlines in add_new_comm() on failure
- tick: broadcast-hrtimer: Fix a race in bc_set_next
- perf tools: Fix segfault in cpu_cache_level__read()
- perf stat: Fix a segmentation fault when using repeat forever
- perf stat: Reset previous counts on repeat with interval
- vfs: Fix EOVERFLOW testing in put_compat_statfs64
- coresight: etm4x: Use explicit barriers on enable/disable
- config80211: add and use strongly typed element iteration macros
- config80211: Use const more consistently in for_each_element macros
- nl80211: validate beacon head
- ASoC: sgtl5000: Improve VAG power and mute control
- KVM: PPC: Book3S HV: Check for MMU ready on piggybacked virtual cores
- powerpc/mce: Fix MCE handling for huge pages
- powerpc/mce: Schedule work from irq_work
- MIPS: Treat Loongson Extensions as ASEs
- PCI: Restore Resizable BAR size bits correctly for 1 MB BARs
- drm/msm/dsi: Fix return value check for clk_get_parent
- ima: fix freeing ongoing ahash_request
- x86/purgatory: Disable the stackleak GCC plugin for the purgatory
+ - thermal_hwmon: Sanitize thermal_zone type
+ - libnvdimm/region: Initialize bad block for volatile namespaces
+ - drm/radeon: Bail earlier when radeon.cik_/si_support=0 is passed
+ ++ -- Khalid Elmously <khalid.elmously@canonical.com> Wed, 13 Nov 2019 20:20:47 -0500
+ +linux (4.15.0-70.79) bionic; urgency=medium
+ + * Ubuntu-5.0.0-33.35 introduces KVM regression with old Intel CPUs and Linux guests (LP: #1851709)
+ + - Revert "KVM: x86: Manually calculate reserved bits when loading PDPTRS"
+ + * Incomplete i915 fix for 64-bit x86 kernels (LP: #1852141) // CVE-2019-0155
+ + - SAUCE: drm/i915/cmdparser: Fix jump whitelist clearing
+ + -- Stefan Bader <stefan.bader@canonical.com> Tue, 12 Nov 2019 10:54:50 +0100
+ +linux (4.15.0-69.78) bionic; urgency=medium
+ + * KVM NULL pointer deref (LP: #1851205)
+ + - KVM: nVMX: handle page fault in vmread fix
+ + * CVE-2018-12207
+ + - KVM: MMU: drop vcpu param in gpte_access
+ + - kvm: Convert kvm_lock to a mutex
+ + - kvm: x86: Do not release the page inside mmu_set_sppte()
+ + - KVM: x86: make FNAME(fetch) and __direct_map more similar
+ + - KVM: x86: remove now unneeded hugepage gfn adjustment
+ + - KVM: x86: change kvm_mmu_page_get_gfn BUG_ON to Warn_ON
+ + - KVM: x86: add tracepoints around __direct_map and FNAME(fetch)
+ + - kvm: x86, powerpc: do not allow clearing largepages debugfs entry
+ + - SAUCE: KVM: vmx, svm: always run with EFER.NXE=1 when shadow paging is active
+ + - SAUCE: x86: Add ITLB_MULTIHIT bug infrastructure
+ + - SAUCE: kvm: mmu: ITLB_MULTIHIT mitigation
+ + - SAUCE: kvm: Add helper function for creating VM worker threads
+ + - SAUCE: kvm: x86: mmu: Recovery of shattered NX large pages
+ + - SAUCE: cpu/speculation: Uninline and export CPU mitigations helpers
+ + - SAUCE: kvm: x86: mmu: Apply global mitigations knob to ITLB_MULTIHIT
+ + * CVE-2019-11135
+ + - KVM: x86: use Intel speculation bugs and features as derived in generic x86 code
+ + - x86/msr: Add the IA32_TSX_CTRL MSR
+ + - x86/cpu: Add a helper function x86_read_arch_cap_msr()
+ + - x86/cpu: Add a "tsx=" cmdline option with TSX disabled by default
+ + - x86/speculation/taa: Add mitigation for TSX Async Abort
+ + - x86/speculation/taa: Add sysfs reporting for TSX Async Abort

Open Source Used In 5GaaS Edge AC-4 19161
+ - kvm/x86: Export MDS_NO=0 to guests when TSX is enabled
+ - x86/tsx: Add "auto" option to the txs= cmdline parameter
+ - x86/tsx: Add documentation for TSX Async Abort
+ - x86/tsx: Add config options to set txs=on|off|auto
+ - SAUCE: x86/tsx: Call txs_init()
+ - SAUCE: x86/cpu: Include cpu header from bugs.c
+ - [Config] Disable TSX by default when possible
+
+ * CVE-2019-0154
+ - SAUCE: drm/i915: Lower RM timeout to avoid DSI hard hangs
+ - SAUCE: drm/i915/gen8+: Add RC6 CTX corruption WA
+
+ * CVE-2019-0155
+ - drm/i915/gtt: Add read only pages to gen8_pte_encode
+ - drm/i915/gtt: Read-only pages for insert Entries on bdw+
+ - drm/i915/gtt: Disable read-only support under GVT
+ - drm/i915: Prevent writing into a read-only object via a GGTt mmap
+ - drm/i915/cmdparser: Check reg_table_count before derefencing.
+ - drm/i915/cmdparser: Do not check past the cmd length.
+ - drm/i915: Silence smatch for cmdparser
+ - drm/i915: Move engine->needs_cmd_parser to engine->flags
+ - SAUCE: drm/i915: Rename gen7 cmdparser tables
+ - SAUCE: drm/i915: Disable Secure Batches for gen6+
+ - SAUCE: drm/i915: Remove Master tables from cmdparser
+ - SAUCE: drm/i915: Add support for mandatory cmdparsing
+ - SAUCE: drm/i915: Support ro ppgtt mapped cmdparser shadow buffers
+ - SAUCE: drm/i915: Allow parsing of unsized batches
+ - SAUCE: drm/i915: Add gen9 BCS cmdparsing
+ - SAUCE: drm/i915/cmdparser: Use explicit goto for error paths
+ - SAUCE: drm/i915/cmdparser: Add support for backward jumps
+ - SAUCE: drm/i915/cmdparser: Ignore Length operands during command matching
+
+ -- Stefan Bader <stefan.bader@canonical.com>  Wed, 06 Nov 2019 10:28:28 +0100
+
+ linux (4.15.0-68.77) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-68.77 -proposed tracker (LP: #1849855)
+
+ * [REGRESSION] md/raid0: cannot assemble multi-zone RAID0 with default_layout
+   setting (LP: #1849682)
+   - Revert "md/raid0: avoid RAID0 data corruption due to layout confusion."
+
+ -- Khalid Elmously <khalid.elmously@canonical.com>  Fri, 25 Oct 2019 15:34:31 -0400
+
+ linux (4.15.0-67.76) bionic; urgency=medium
+
+ * bionic/linux: 4.15.0-67.76 -proposed tracker (LP: #1849035)
+
+ * Unexpected CFS throttling (LP: #1832151)
+ - sched/fair: Add lsub_positive() and use it consistently
+ - sched/fair: Fix low cpu usage with high throttling by removing expiration of
+ cpu-local slices
+ - sched/fair: Fix -Wunused-but-set-variable warnings
+
+ * [CML] New device IDs for CML-U (LP: #1843774)
+ - i2c: i801: Add support for Intel Comet Lake
+ - spi: pxa2xx: Add support for Intel Comet Lake
+
+ * CVE-2019-17666
+ - SAUCE: rtlwifi: rtl8822b: Fix potential overflow on P2P code
+ - SAUCE: rtlwifi: Fix potential overflow on P2P code
+
+ * md raid0/linear doesn't show error state if an array member is removed and
+ allows successful writes (LP: #1847773)
+ - md raid0/linear: Mark array as 'broken' and fail BIOs if a member is gone
+
+ * Change Config Option CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE for s390x from yes
+ to no (LP: #1848492)
+ - [Config] Change Config Option CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE for s390x
+ from yes to no
+
+ * [Packaging] Support building Flattened Image Tree (FIT) kernels
+ (LP: #1847969)
+ - [Packaging] add rules to build FIT image
+ - [Packaging] force creation of headers directory
+
+ * bcache: Performance degradation when querying priority_stats (LP: #1840043)
+ - bcache: add cond_resched() in __bch_cache_cmp()
+
+ * Add installer support for iwlmvm adapters (LP: #1848236)
+ - d-i: Add iwlmvm to nic-modules
+
+ * Check for CPU Measurement sampling (LP: #1847590)
+ - s390/cpumsf: Check for CPU Measurement sampling
+
+ * [CML-U] Comet lake platform need ISH driver support (LP: #1843775)
+ - HID: intel-ish-hid: Add Comet Lake PCI device ID
+
+ * intel-lpss driver conflicts with write-combining MTRR region (LP: #1845584)
+ - SAUCE: mfd: intel-lpss: add quirk for Dell XPS 13 7390 2-in-1
+
+ * Fix non-working Realtek USB ethernet after system resume (LP: #1847063)
+ - r8152: remove extra action copying ethernet address
+ - r8152: Refresh MAC address during USBDEVFS_RESET
+ - r8152: Set macpassthru in reset_resume callback

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Open Source Used In 5GaaS Edge AC-4 19163
* Ubuntu 18.04 - wrong cpu-mf counter number (LP: #1847109)
+  * s390/cpum_cf: correct counter number of LAST_HOST_TRANSLATIONS
+  
+  * PM / hibernate: fix potential memory corruption (LP: #1847118)
+  - PM / hibernate: memory_bm_find_bit(): Tighten node optimisation
+  
+  * Microphone-Mute keyboard LED is always on/off on Dell Latitude 3310
+  (LP: #1846453)
+  - platform/x86: dell-laptop: Add 2-in-1 devices to the DMI whitelist
+  - platform/x86: dell-laptop: Removed duplicates in DMI whitelist
+  
+  * xHCI on AMD Stoney Ridge cannot detect USB 2.0 or 1.1 devices.
+  (LP: #1846470)
+  - x86/PCI: Avoid AMD FCH XHCI USB PME# from D0 defect
+  
+  * CVE-2019-15098
+  - ath6kl: fix a NULL-ptr-deref bug in ath6kl_usb_alloc_urb_from_pipe()
+  
+  * Bionic update: upstream stable patchset 2019-10-15 (LP: #1848274)
+  - tpm: use tpm_try_get_ops() in tpm-sysfs.c.
+  - tpm: Fix TPM 1.2 Shutdown sequence to prevent future TPM operations
+  
+  * drm/bridge: tc358767: Increase AUX transfer length limit
+  
+  * drm/panel: simple: fix AOU g185han01 horizontal blanking
+  
+  * video: ssd1307fb: Start page range at page_offset
+  
+  * drm/stm: attach gem fence to atomic state
+  
+  * pm: drm: radeon: Fix possible null-pointer dereference in
+  radeon_connector_set_property()
+  
+  * ipmi_si: Only schedule continuously in the thread in maintenance mode
+  
+  * clk: qoriq: Fix -Wunused-const-variable
+  
+  * clk: sunxi-ng: v3s: add missing clock slices for MMC2 module clocks
+  
+  * clk: sirf: Don't reference clk_init_data after registration
+  
+  * clk: zx296718: Don't reference clk_init_data after registration
+  
+  * powerpc/xmon: Check for HV mode when dumping XIVE info from OPAL
+  
+  * powerpc/rtas: use device model APIs and serialization during LPM
+  
+  * powerpc/futex: Fix warning: 'oldval' may be used uninitialized in this
+  function
+  
+  * powerpc/pseries/mobility: use cond_resched when updating device tree
+  
+  * pinctrl: tegra: Fix write barrier placement in pmx_writel
+  
+  * vfio_pci: Restore original state on release
+  
+  * drm/nouveau/volt: Fix for some cards having 0 maximum voltage
+  
+  * drm/amdgpu/si: fix ASIC tests
+  
+  * powerpc/64s/exception: machine check use correct cfar for late handler
+  
+  * powerpc/pseries: correctly track irq state in default idle
+  
+  * arm64: fix unreachable code issue with cmpxchg
+  
+  * clk: at91: select parent if main oscillator or bypass is enabled
+  
+  * scsi: core: Reduce memory required for SCSI logging
+  
+  * dma-buf/sw_sync: Synchronize signal vs syncpt free
+ - MIPS: tbx: Explicitly cast _PAGE_NO_EXEC to a boolean
+ - i2c-cht-wc: Fix lockdep warning
+ - PCI: tegra: Fix OF node reference leak
+ - livepatch: Nullify obj->mod in klp_module_coming()'s error path
+ - ARM: 8898/1: mm: Don't treat faults reported from cache maintenance as
  writes
+ - x86: snvs: fix possible race condition
+ - HID: apple: Fix stuck function keys when using FN
+ - PCI: rockchip: Propagate errors for optional regulators
+ - PCI: imx6: Propagate errors for optional regulators
+ - PCI: exynos: Propagate errors for optional PHYs
+ - security: smack: Fix possible null-pointer dereferences in
  smack_socket_sock_rcv_skb()
+ - ARM: 8903/1: ensure that usable memory in bank 0 starts from a PMD-aligned
  address
+ - fat: work around race with userspace's read via blockdev while mounting
+ - pktcdvd: remove warning on attempting to register non-passsthrough dev
+ - hypfs: Fix error number left in struct pointer member
+ - kbuild: clean compressed initramfs image
+ - ofcs2: wait for recovering done after direct unlock request
+ - kmemleak: increase DEBUG_KMEMLEAK_EARLY_LOG_SIZE default to 16K
+ - bpf: fix use after free in prog symbol exposure
+ - cxgb4: Fix out-of-bounds MSI-X info array access
+ - erspan: remove the incorrect mtu limit for erspan
+ - hso: fix NULL-deref on tty open
+ - ipv6: drop incoming packets having a v4mapped source address
+ - net: ipv4: avoid mixed n_redirects and rate_tokens usage
+ - net: qlogic: Fix memory leak in ql_alloc_large_buffers
+ - net: Unpublish sk from sk_reuseport_cb before call_rcu
+ - nfc: fix memory leak in llcp_sock_bind()
+ - qmi_wwan: add support for Cinterion CLS8 devices
+ - sch_dsmark: fix potential NULL deref in dmark_init()
+ - vsck: Fix a lockdep warning in __vsck_release()
+ - net/rds: Fix error handling in rds_ib_add_one()
+ - xen-netfront: do not use ~0U as error return value for xennet_fill_frags()
+ - tipc: fix unlimited bundling of small messages
+ - sch_cbq: validate TCA_CBQ_WRROPT to avoid crash
+ - ipv6: Handle missing host route in __ipv6_ifa_notify
+ - Smack: Don't ignore other bprm->unsafe flags if LSM_UNSAFE_PTRACE is set
+ - smack: use GFP_NOFS while holding inode_smack::smk_lock
+ - NFC: fix attrs checks in netlink interface
+ - kexec: bail out upon SIGKILL when allocating memory.
+ - drm: panel: check failure cases in the probe func
+ - drm/amd/display: reprogram VM config when system resume
+ - pinctrl: amd: disable spurious-firing GPIO IRQs
+ - pstore: 6s superblock limits
+ - pinctrl: meson-gxbb: Fix wrong pinning definition for uart_c
+ - mbox: qcom: add APICS child device for QCS404
+ - ARM: 8875/1: Kconfig: default to AEABI w/ Clang
+ - arm64: consider stack randomization for mmap base only when necessary
+ - mips: properly account for stack randomization and stack guard gap
+ - arm: properly account for stack randomization and stack guard gap
+ - arm: use STACK_TOP when computing mmap base address

+ * Bionic update: upstream stable patchset 2019-10-07 (LP: #1847155)
+ - Revert "Bluetooth: validate BLE connection interval updates"
+ - powerpc/xive: Fix bogus error code returned by OPAL
+ - IB/core: Add an unbound WQ type to the new CQ API
+ - HID: prodkeys: Fix general protection fault during probe
+ - HID: sony: Fix memory corruption issue on cleanup.
+ - HID: logitech: Fix general protection fault caused by Logitech driver
+ - HID: hidraw: Fix invalid read in hidraw_ioctl
+ - mtd: cfi_cmdset_0002: Use chip_good() to retry in do_write_oneword()
+ - crypto: talitos - fix missing break in switch statement
+ - iwluifi: mvm: send BCAST management frames to the right station
+ - media: ttp5150: fix switch exit in set control handler
+ - ASoC: fsI: Fix of-node refcount unbalance in fsI_ssi_probe_from_dt()
+ - arm64: kpti: Whitelist Cortex-A CPUs that don't implement the CSV3 field
+ - ALSA: hda - Add laptop imic fixup for ASUS M9V laptop
+ - ALSA: hda - Apply AMD controller workaround for Raven platform
+ - objtool: Clobber user CFLAGS variable
+ - pinctrl: sprd: Use define directive for sprd_pinconf_params values
+ - power: supply: sysfs: ratelimit property read error message
+ - irqchip/gic-v3-its: Fix LPI release for Multi-MSI devices
+ - i2fs: check all the data segments against all node ones
+ - PCI: hv: Avoid use of hv_pci_dev->pci_slot after freeing it
+ - blk-mq: move cancel of requeue_work to the front of blk_exit_queue
+ - Revert "i2fs: avoid out-of-range memory access"
+ - dm zoned: fix invalid memory access
+ - f2fs: fix to do sanity check on segment bitmap of LFS curseg
+ - drm: Flush output polling on shutdown
+ - net: don't warn in inet diag when IPV6 is disabled
+ - ACPI: video: Add new hw_changes_brightness quirk, set it on PB Easynote MZ35
+ - xfs: don't crash on null attr fork xfs_bmapi_read
+ - Bluetooth: htrtl: Additional Realtek 8822CE Bluetooth devices
+ - f2fs: use generic EFSBADCRC/EFSCORRUPTED
+ - arcnet: provide a buffer big enough to actually receive packets
+ - cdc_ncm: fix divide-by-zero caused by invalid wMaxPacketSize
+ - macsec: drop skb sk before calling gro_cells_receive
+ - net/phy: fix DP83865 10 Mbps HDX loopback disable function
+ - net: qrtr: Stop rx_worker before freeing node
+ - net/sched: act_sample: don't push mac header on ip6gre ingress
+ - net_sched: add max len check for TCA_KIND
+ - openswitch: change type of UPCALL_PID attribute to NLA_UNSPEC
+ - ppp: Fix memory leak in ppp_write
+ - sch_netem: fix a divide by zero in tabledist()
+ - skge: fix checksum byte order
+ - usbnet: ignore endpoints with invalid wMaxPacketSize
+ - usbnet: sanity checking of packet sizes and device mtu
+ - net/mlx5: Add device ID of upcoming BlueField-2
+ - mISDN: enforce CAP_NET_RAW for raw sockets
+ - appletalk: enforce CAP_NET_RAW for raw sockets
+ - ax25: enforce CAP_NET_RAW for raw sockets
+ - ieee802154: enforce CAP_NET_RAW for raw sockets
+ - nfc: enforce CAP_NET_RAW for raw sockets
+ - ALSA: hda: Flush interrupts on disabling
+ - regulator: lm363x: Fix off-by-one n_voltages for lm3632 ldo_vpos/ldo_vneg
+ - ASoC: sgtl5000: Fix charge pump source assignment
+ - dmaengine: bcm2835: Print error in case setting DMA mask fails
+ - leds: leds-lp5562 allow firmware files up to the maximum length
+ - media: dib0700: fix link error for dibx000_i2c_set_speed
+ - media: mtk-cir: lower de-glitch counter for rc-mm protocol
+ - media: exynos4-is: fix leaked of_node references
+ - media: hdprv: Add device num check and handling
+ - media: i2c: ov5640: Check for devm_gpiod_get_optional() error
+ - sched/fair: Fix imbalance due to CPU affinity
+ - sched/core: Fix CPU controller for !RT_GROUP_SCHED
+ - x86/reboot: Always use NMI fallback when shutdown via reboot vector IPI fails
+ - x86/apic: Soft disable APIC before initializing it
+ - ALSA: hda - Show the fatal CORB/RIRB error more clearly
+ - ALSA: i2c: ak4xxx-adda: Fix a possible null pointer dereference in build_adc Controls()
+ - EDAC/mc: Fix grain_bits calculation
+ - media: iguair: add sanity checks
+ - base: soc: Export soc_device_register/unregister APIs
+ - ALSA: usb-audio: Skip bSynchAddress endpoint check if it is invalid
+ - ia64: unwind: fix double free for mod->arch.init_unw_table
+ - EDAC/altera: Use the proper type for the IRQ status bits
+ - ASoC: rsnd: don't call clk_get_rate() under atomic context
+ - md/raid1: end bio when the device faulty
+ - md: don't call spare_active in md_reap_sync_thread if all member devices can't work
+ - md: don't set In_sync if array is frozen
+ - ACPI / processor: don't print errors for processorIDs == 0xff
+ - EDAC, pnd2: Fix ioremap() size in dnv_rd_reg()
+ - efi: cper: print AER info of PCIe fatal error
+ - sched/fair: Use rq_lock/unlock in online_fair_sched_group
+ - media: gspca: zero usb_buf on error
+ - perf test vfs_getname: Disable ~/.perfconfig to get default output
+ - media: mtk-mdp: fix reference count on old device tree
+ - media: fdp1: Reduce FCP not found message level to debug
+ - media: rc: imon: Allow iMON RC protocol for ffdc 7e device
+ - dmaengine: iop-adma: use correct printk format strings
+ - perf record: Support aarch64 random socket_id assignment
+ - media: i2c: ov5645: Fix power sequence
+ - media: omap3isp: Don't set streaming state on random subdevs
+ - media: imx: mipi csi-2: Don't fail if initial state times-out
+ - net: lpc-enet: fix printk format strings
+ - ARM: dts: imx7d: cl-som-imx7: make ethernet work again
+ - media: radio/si470x: kill urb on error
+ - media: hdpvr: add terminating 0 at end of string
+ - nbd: add missing config put
+ - media: dvb-core: fix a memory leak bug
+ - libperf: Fix alignment trap with xyarray contents in 'perf stat'
+ - EDAC/amd64: Recognize DRAM device type ECC capability
+ - EDAC/amd64: Decode syndrome before translating address
+ - PM / devfreq: passive: Use non-devm notifiers
+ - PM / devfreq: exynos-bus: Correct clock enable sequence
+ - media: cec-notifier: clear cec_adap in cec_notifier_unregister
+ - media: saa7146: add cleanup in hexium_attach()
+ - media: cpi2_usb: fix memory leaks
+ - media: saa7134: fix terminology around saa7134_i2c_eeprom_md7134_gate()
+ - perf trace beauty ioctl: Fix off-by-one error in cmd->string table
+ - media: ov9650: add a sanity check
+ - ASoC: es8316: fix headphone mixer volume table
+ - ACPI / CPPC: do not require the _PSD method
+ - arm64: kpti: ensure patched kernel text is fetched from PoU
+ - nvmet: fix data units read and written counters in SMART log
+ - iommu/amd: Silence warnings under memory pressure
+ - iommu/iova: Avoid false sharing on fq_timer_on
+ - libtraceevent: Change users plugin directory
+ - ARM: dts: exynos: Mark LDO10 as always-on on Peach Pit/Pi Chromebooks
+ - ACPI: custom_method: fix memory leaks
+ - ACPI / PCI: fix acpi_pci_irq_enable() memory leak
+ - hwmon: (acpi_power_meter) Change log level for 'unsafe software power cap'
+ - md/raid1: fail run raid1 array when active disk less than one
+ - dmaengine: ti: edma: Do not reset reserved pRAM slots
+ - kprobes: Prohibit probing on BUG() and WARN() address
+ - s390/crypto: xts-aes-s390 fix extra run-time crypto self tests finding
+ - ASoC: dmaengine: Make the pcm->name equal to pcm->id if the name is not set
+ - raid5: don't set STRIPE_HANDLE to stripe which is in batch list
+ - mmc: core: Clarify sdio_irq_pending flag for MMC_CAP2_SDIO_IRQ_NOTTHREAD
+ - mmc: sdhci: Fix incorrect switch to HS mode
+ - raid5: don't increment read_errors on EILSEQ return
+ - libertas: Add missing sentinel at end of if_usb.c fw_table
+ - ALSA: hda - Drop unsol event handler for Intel HDMI codecs
+ - drm/amd/powerplay/smu7: enforce minimal VBITimeout (v2)
+ - media: tusb-dec: Fix info-leak in ttusb_dec_send_command()
+ - ALSA: hda/realtek - Blacklist PC beep for Lenovo ThinkCentre M73/93
+ - btrfs: extent-tree: Make sure we only allocate extents from block groups
+ with the same type
+ - media: omap3isp: Set device on omap3isp subdevs
+ - PM / devfreq: passive: fix compiler warning
+ - ALSA: firewire-tascam: handle error code when getting current source of
clock
+ - ALSA: firewire-tascam: check intermediate state of clock status and retry
+ - scsi: scsi_dh_rdac: zero cdb in send_mode_select()
+ - printk: Do not lose last line in kmmsg buffer dump
+ - IB/hfi1: Define variables as unsigned long to fix KASAN warning
+ - randstruct: Check member structs in is_pure_ops_struct()
+ - ALSA: hda/realtek - Fixup mute led on HP Spectre x360
+ - fuse: fix missing unlock_page in fuse_writepage()
+ - parisc: Disable HP HSC-PCI Cards to prevent kernel crash
+ - x86/retpolines: Fix up backport of a9d57ef15cbe
+ - KVM: x86: always stop emulation on page fault
+ - KVM: x86: set ctxt->have_exception in x86_decode_insn()
+ - KVM: x86: Manually calculate reserved bits when loading PDPTRS
+ - media: sn9c20x: Add MSI MS-1039 laptop to flip_dmi_table
+ - binfmt_elf: Do not move brk for INTERP-less ET_EXEC
+ - ASoC: Intel: NHLT: Fix debug print format
+ - ASoC: Intel: Skylake: Use correct function to access iomem space
+ - ASoC: Intel: Fix use of potentially uninitialized variable
+ - ARM: samsung: Fix system restart on S3C6410
+ - ARM: zynq: Use memcpy_toio instead of memcpy on smp bring-up
+ - arm64: dts: rockchip: limit clock rate of MMC controllers for RK3328
+ - alarmtimer: Use EOPNOTSUPP instead of ENOTSUPP
+ - regulator: Defer init completion for a while after late_initcall
+ - gfs2: clear buf_in_tr when ending a transaction in sweep_bh_for_rgrps
+ - memcg, oom: don't require __GFP_FS when invoking memcg OOM killer
+ - memcg, kmem: do not fail __GFP_NOFAIL charges
+ - ovfl: filter of trusted xattr results in audit
+ - Btrfs: fix use-after-free when using the tree modification log
+ - btrfs: Relinquish CPUs in btrfs_compare_trees
+ - btrfs: qgroup: Fix the wrong target io_tree when freeing reserved data space
+ - md/raid6: Set R5_ReadError when there is read failure on parity disk
+ - md: don't report active array_state until after revalidate_disk() completes.
+ - md: only call set_in_sync() when it is expected to succeed.
+ - cfs80211: Purge frame registrations on iftype change
+ - /dev/mem: Bail out upon SIGKILL.
+ - ext4: fix warning inside ext4_convert_unwritten_extents_endio
+ - ext4: fix punch hole for inline_data file systems
+ - quota: fix wrong condition in is_quota_modification()
+ - hwrng: core - don't wait on add_early_randomness()
+ - i2c: riic: Clear NACK in tend isr
+ - CIFS: fix max ea value size
+ - CIFS: Fix oplock handling for SMB 2.1+ protocols
+ - md/raid0: avoid RAID0 data corruption due to layout confusion.
+ - mm/compaction.c: clear total_{migrate,free}_scanned before scanning a new
  zone
+ - btrfs: qgroup: Drop quota_root and fs_info parameters from
+ update_qgroup_status_item
+ - Btrfs: fix race setting up and completing qgroup rescan workers
+ - net/ibmvnic: free reset work of removed device from queue
+ - HID: Add quirk for HP X500 PIXART OEM mouse
+ - net/mlx5e: Set ECN for received packets using CQE indication
+ - net/mlx5e: don't set CHECKSUM_COMPLETE on SCTP packets
+ - mlx5: fix get_ip_proto()
+ - net/mlx5e: Allow reporting of checksum unnecessary
+ - net/mlx5e: XDP, Avoid checksum complete when XDP prog is loaded
+ - net/mlx5e: Rx, Check ip headers sanity
+ - bcache: remove redundant LIST_HEAD(journal) from run_cache_set()
+ - initramfs: don't free a non-existent initrd
+ - blk-mq: change gfp flags to GFP_NOIO in blk_mq_realloc_hw_ctxs
+ - net/ibmvnic: Fix missing \ in __ibmvnic_reset
+ - net_sched: check cops->tcf_block in tc_bind_tclass()
+ - loop: Add LOOP_SET_BLOCK_SIZE in compat ioctl
+ - loop: Add LOOP_SET_DIRECT_IO to compat ioctl
+ - perf config: Honour SPERF_CONFIG env var to specify alternate .perftool
+ - ASoC: sun4i-i2s: Don't use the oversample to calculate BCLK
+ - posix-cpu-timers: Sanitize bogus WARNONS
+ - x86/apic/vector: Warn when vector space exhaustion breaks affinity
+ - x86/mm/pti: Do not invoke PTI functions when PTI is disabled
+ - x86/mm/pti: Handle unaligned address gracefully in pti_clone_pagetable()
+ - libata/ahci: Drop PCS quirk for Denver and beyond
+ - x86/cpu: Add Tiger Lake to Intel family
+ - platform/x86: intel_pmc_core: Do not ioremap RAM
+ - mmc: core: Add helper function to indicate if SDIO IRQs is enabled
+ - mmc: dw_mmc: Re-store SDIO IRQs mask at system resume
+ - iwlwifi: fw: don't send GEO_TX_POWER_LIMIT command to FW version 36
+ - Revert "ceph: use ceph_evict_inode to cleanup inode's resource"
+ - ceph: use ceph_evict_inode to cleanup inode's resource
+ - ALSA: hda/realtek - PCI quirk for Medion E4254
+ - smb3: allow disabling requesting leases
+ - btrfs: fix allocation of free space cache v1 bitmap pages
+ - drm/amd/display: Restore backlight brightness after system resume
+ -- Khalid Elmously <khalid.elmously@canonical.com> Mon, 21 Oct 2019 13:02:37 -0400
++ +linux (4.15.0-66.75) bionic; urgency=medium
++ + * bionic/linux: 4.15.0-66.75 -proposed tracker (LP: #1846131)
++ + * Packaging resync (LP: #1786013)
++ + * [Packaging] update helper scripts
++ + * CVE-2018-21008
++ + * rsi: add fix for crash during assertions
ipv6: fix neighbour resolution with raw socket (LP: #1834465)
- ipv6: constify rt6_nexthop()
- ipv6: fix neighbour resolution with raw socket

* run_netsocktests from net in ubuntu_kernel_selftests failed with X-4.15
  (LP: #1842023)
- SAUCE: selftests: net: replace AF_MAX with INT_MAX in socket.c

* No sound inputs from the external microphone and headset on a Dell machine
  (LP: #1842265)
- ALSA: hda - Expand pin_match function to match upcoming new tbls
- ALSA: hda - Define a fallback_pin_fixup_tbl for alc269 family

* Add -fcpu-protection=none when using retpolne flags (LP: #1843291)
- SAUCE: kbuild: add -fcpu-protection=none when using retpolne flags

* Enhanced Hardware Support - Finalize Naming (LP: #1842774)
- s390: add support for IBM z15 machines

* Bionic update: upstream stable patchset 2019-09-24 (LP: #1845266)
- bridge/mdb: remove wrong use of NLM_F_MULTI
- cdc_ether: fix rndis support for Mediatek based smartphones
- ipv6: Fix the link time qualifier of ‘ping_v6_proc_exit_net()’
- isdn/capi: check message length in capi_write()
- net: Fix null de-reference of device refcount
- net: gso: Fix skb_segment splat when splitting gso_size splatted skb having
  linear-headed frag_list
- net: phylink: Fix flow control resolution
- sch_hhf: ensure quantum and hhf_non_hh_weight are non-zero
- scpt: Fix the link time qualifier of ‘scpt_ctrlsock_exit()’
- scpt: use transport pf_retrans in scpt_do_8_2_transport_strike
- tcp: fix tcp_ecn_withdraw_cwr() to clear TCP_ECN_QUEUE_CWR
- tipc: add NULL pointer check before calling kfree_rcu
- tun: fix use-after-free when register netdev failed
- btrfs: compression: add helper for type to string conversion
- btrfs: correctly validate compression type
- Revert "MIPS: SiByte: Enable swiotlb for SWARM, LittleSur and BigSur"
- gpioib: acpi: Add gpioib_acpi_run_edge_events_on_boot option and blacklist
- gpio: fix line flag validation in linehandle_create
- gpio: fix line flag validation in lineevent_create
- Btrfs: fix assertion failure during fsync and use of stale transaction
- genirq: Prevent NULL pointer dereference in resend_irqs()
- KVM: s390: Do not leak kernel stack data in the KVM_S390_INTERRUPT ioctl
- KVM: x86: work around leak of uninitialized stack contents
- KVM: nVMX: handle page fault in vmread
- MIPS: VDSO: Prevent use of smp_processor_id()
- MIPS: VDSO: Use same -m%-float cflag as the kernel proper
+ - powerpc: Add barrier_nospec to raw_copy_in_user()
+ - drm/meson: Add support for XBGR8888 & ABGR8888 formats
+ - clk: rockchip: Don't yell about bad mmc phases when getting
+ - mtd: rawnand: mtk: Fix wrongly assigned OOB buffer pointer issue
+ - PCI: Always allow probing with driver_override
+ - ubifs: Correctly use tnc_next() in search_db_cookie()
+ - driver core: Fix use-after-free and double free on glue directory
+ - crypto: talitos - check AES key size
+ - crypto: talitos - fix CTR alg blocksize
+ - crypto: talitos - check data blocksize in ablkcipher.
+ - crypto: talitos - fix ECB algs ivsize
+ - crypto: talitos - Do not modify req->cryptplen on decryption.
+ - crypto: talitos - HMAC SNOOP NO AFEU mode requires SW icv checking.
+ - firmware: ti_sci: Always request response from firmware
+ - drm/mediatek: mtk_drm_drv.c: Add of_node_put() before goto
+ - Revert "Bluetooth: btusb: driver to enable the usb-wakeup feature"
+ - platform/x86: pmc_atom: Add CB4063 Beckhoff Automation board to
critclk_systems DMI table
+ - nvmem: Use the same permissions for eeprom as for nvmem
+ - x86/build: Add -Wnoaddress-of-packed-member to REALMODE_CFLAGS, to silence
GCC9 build warning
+ - ixgbe: Prevent u8 wrapping of ITR value to something less than 10us
+ - x86/purgatory: Change compiler flags from -mcmodel=kernel to -mcmodel=large
+ to fix kexec relocation errors
+ - modules: fix BUG when load module with rodata=n
+ - modules: fix compile error if don't have strict module rwx
+ - HID: wacom: generic: read HID_DG_CONTACTMAX from any feature report
+ - Input: elan_i2c - remove Lenovo Legion Y7000 PnpID
+ - powerpc/mm/radix: Use the right page size for vmemmap mapping
+ - USB: usbcore: Fix slab-out-of-bounds bug during device reset
+ - phy: renesas: rcar-gen3-usb2: Disable clearing VBUS in over-current
+ - media: tm6000: double free if usb disconnect while streaming
+ - xen-netfront: do not assume sk_buff_head list is empty in error handling
+ - net_sched: let qdisc_put() accept NULL pointer
+ - KVM: coalesced_mmmio: add bounds checking
+ - firmware: google: check if size is valid when decoding VPD data
+ - serial: sprd: correct the wrong sequence of arguments
+ - tty/serial: atmel: reschedule TX after RX was started
+ - mwifiex: Fix three heap overflow at parsing element in cfg80211_ap_settings
+ - nl80211: Fix possible Spectre-v1 for CQM RSSI thresholds
+ - ARM: OMAP2+: Fix missing SYSC_HAS_RESET_STATUS for dra7 epwmss
+ - s390/bpf: fix lcgr instruction encoding
+ - ARM: OMAP2+: Fix omap4 errata warning on other SoCs
+ - ARM: dts: dra74x: Fix iodelay configuration for mmc3
+ - s390/bpf: use 32-bit index for tail calls
+ - fpga: altera-ps-spi: Fix getting of optional confd gpio
+ - netfilter: xt_nfacct: Fix alignment mismatch in xt_nfacct_match_info
+ - NFSv4: Fix return values for nfs4_file_open()
+ - NFSv4: Fix return value in nfs_finish_open()
+ - NFS: Fix initialisation of I/O result struct in nfs_pgio_rpcsetup
+ - Kconfig: Fix the reference to the IDT77105 Phy driver in the description of
  ATM_NICSTAR_USE_IDT77105
+ - qed: Add cleanup in qed_slowpath_start()
+ - ARM: 8874/1: mm: only adjust sections of valid mm structures
+ - batman-adv: Only read OGM2 tvlv_len after buffer len check
+ - r8152: Set memory to all 0xFFs on failed reg reads
+ - x86/apic: Fix arch_dynirq_lower_bound() bug for DT enabled machines
+ - netfilter: nf_conntrack_ftp: Fix debug output
+ - NFSv2: Fix eof handling
+ - NFSv2: Fix write regression
+ - kallsyms: Don't let kallsyms_lookup_size_offset() fail on retrieving the
  first symbol
+ - cifs: set domainName when a domain-key is used in multiuser
+ - cifs: Use kzfree() to zero out the password
+ - ARM: 8901/1: add a criteria for pfns_valid of arm
+ - sky2: Disable MSI on yet another ASUS boards (P6Xxxx)
+ - i2c: designware: Synchronize IRQs when unregistering slave client
+ - perf/x86/intel: Restrict period on Nehalem
+ - perf/x86/amd/ibs: Fix sample bias for dispatched micro-ops
+ - amdgpu: Fix error path in xgbe_mod_init()
+ - tools/power x86_energy_perf_policy: Fix "uninitialized variable" warnings at
  -O2
+ - tools/power x86_energy_perf_policy: Fix argument parsing
+ - tools/power turbostat: fix buffer overrun
+ - net: seeq: Fix the function used to release some memory in an error handling
  path
+ - dmaengine: ti: dma-crossbar: Fix a memory leak bug
+ - dmaengine: ti: omap-dma: Add cleanup in omap_dma_probe()
+ - x86/ucore: Don't leak the AC flags into __get_user() argument evaluation
+ - x86/hyper-v: Fix overflow bug in fill_gva_list()
+ - keys: Fix missing null pointer check in request_key_auth_describe()
+ - iommu/amd: Flush old domains in kdump kernel
+ - iommu/amd: Fix race in increase_address_space()
+ - PCI: kirin: Fix section mismatch warning
+ - floppy: fix usercopy direction
+ - binfmt_elf: move brk out of mmap when doing direct loader exec
+ - tcp: Reset send_head when removing skb from write-queue
+ - tcp: Don't dequeue SYN/FIN-segments from write-queue
+ - media: technisat-usb2: break out of loop at end of buffer
+ - tools: bpftool: close prog FD before exit on showing a single program
+ - netfilter: xt_phydev: Fix spurious error message in phydev_mt_check
+ - ibmvnic: Do not process reset during or after device removal
+ - net: aquantia: fix out of memory condition on rx side
+ *
* Bionic update: upstream stable patchset 2019-09-18 (LP: #1844558)
+ - ALSA: hda - Fix potential endless loop at applying quirks
+ - ALSA: hda/realtek - Fix overridden device-specific initialization
+ - ALSA: hda/realtek - Fix the problem of two front mics on a ThinkCentre
+ - sched/fair: Don't assign runtime for throttled cfs_rq
+ - drm/vmwgfx: Fix double free in vmw_revc_msg()
+ - xfr: clean up xfrm protocol checks
+ - PCI: designware-ep: Fix find_first_zero_bit() usage
+ - PCI: dra7xx: Fix legacy INTD IRQ handling
+ - vhost/test: fix build for vhost test
+ - batman-adv: fix uninit-value in batadv_netlink_get_ifindex()
+ - batman-adv: Only read OGM tvlv_len after buffer len check
+ - hv_sock: Fix hang when a connection is closed
+ - powerpc64: mark start_here_multiprocess as __ref
+ - arm64: dts: rockchip: enable usb-host regulators at boot on rk3328-rock64
+ - scripts/decode_stacktrace: match basepath using shell prefix operator, not
  + regex
+ - clk: s2mps11: Add used attribute to s2mps11_dt_match
+ - kernel/module: Fix mem leak in module_add_modinfo_attrs
+ - ALSA: hda/realtek - Enable internal speaker & headset mic of ASUS UX431FL
+ - {nl,mac}80211: fix interface combinations on crypto controlled devices
+ - x86/ftrace: Fix warning and consolidate ftrace_jmp_replace() and
  + ftrace_call_replace()
+ - media: stm32-dcmi: fix irq = 0 case
+ - modules: always page-align module section allocations
+ - scsi: qla2xxx: Move log messages before issuing command to firmware
+ - keys: Fix the use of the C++ keyword "private" in uapi/linux/keyclt.h
+ - Drivers: hv: kvp: Fix two "this statement may fall through" warnings
+ - remoteproc: qcom: q6v5-mss: add SCM probe dependency
+ - KVM: x86: hyperv: enforce vp_index < KVM_MAX_VCPUS
+ - KVM: x86: hyperv: consistently use 'hv_vcpu' for'struct kvm_vcpu_hv'
  + variables
+ - drm/i915: Fix intel_dp_mst_best_encoder()
+ - drm/i915: Rename PLANE_CTL_DECOMPRESSION_ENABLE
+ - drm/i915/gen9+: Fix initial readout for Y tiled framebuffers
+ - drm/atomic_helper: Disallow new modesets on unregistered connectors
+ - Drivers: hv: kvp: Fix the indentation of some "break" statements
+ - Drivers: hv: kvp: Fix the recent regression caused by incorrect clean-up
+ - drm/AMD/dm: Understand why attaching path/tile properties are needed
+ - ARM: davinci: da8xx: define gpio interrupts as separate resources
+ - ARM: davinci: dm365: define gpio interrupts as separate resources
+ - ARM: davinci: dm646x: define gpio interrupts as separate resources
+ - ARM: davinci: dm355: define gpio interrupts as separate resources
+ - ARM: davinci: dm644x: define gpio interrupts as separate resources
+ - media: vim2m: use workqueue
+ - media: vim2m: use cancel_delayed_work_sync instead of flush_schedule_work
+ - drm/i915: Restore sane defaults for KMS on GEM error load
+ - KVM: PPC: Book3S HV: Fix race between kvm_unmap_hva_range and MMU mode
  + switch
+ - Btrfs: clean up scrub is_dev_replace parameter
+ - Btrfs: fix deadlock with memory reclaim during scrub
+ - btrfs: Remove extent_io_ops::fill_delalloc
+ - btrfs: Fix error handling in btrfs_cleanup_ordered_extents
+ - cni: megaraid_sas: Fix combined reply queue mode detection
+ - cni: megaraid_sas: Add check for reset adapter bit
+ - media: vim2m: only cancel work if it is for right context
+ - ARC: show_regs: lockdep: re-enable preemption
+ - ARC: mm: do_page_fault fixes #1: relinquish mmap_sem if signal arrives while handle_mm_fault
+ - IB/uverbs: Fix OOPs upon device disassociation
+ - drm/vblank: Allow dynamic per-crtc max_vblank_count
+ - drm/915/ilk: Fix warning when reading emon_status with no output
+ - mfd: Kconfig: Fix I2C_DESIGNWARE_PLATFORM dependencies
+ - tpn: Fix some name collisions with drivers/char/tpm.h
+ - bcache: replace hard coded number with BUCKET_GC_GEN_MAX
+ - bcache: treat stale && dirty keys as bad keys
+ - KVM: VMX: Compare only a single byte for VMCS' "launched" in vCPU-run
+ - iio: adc: exynos-adc: Add S5PV210 variant
+ - iio: adc: exynos-adc: Use proper number of channels for Exynos4x12
+ - drm/nouveau: Don't WARN_ON VCPI allocation failures
+ - x86/kvmclock: set offset for kvm unstable clock
+ - powerpc/kvm: Save and restore host AMR/IAMR/UAMOR
+ - mmc: renesas_sdhi: Fix card initialization failure in high speed mode
+ - btrfs: scrub: pass fs_info to scrub_setup_ctx
+ - btrfs: init csum_list before possible free
+ - PCI: qcom: Don't deassert reset GPIO during probe
+ - drm: add __user attribute to ptr_to_compat()
+ - CIFS: Fix error paths in writeback code
+ - CIFS: Fix leaking locked VFS cache pages in writeback retry
+ - drm/915: Handle vm_mmap error during I915_GEM_MMAP ioctl with WC set
+ - drm/915: Sanity check mmap length against object size
+ - Btrfs: fix race between block group removal and block group allocation
+ - cifs: add spinlock for the openFileList to cifs_inode_info
+ - IB/hfi1: Avoid hardlockup with flushlist_lock
+ - apparmor: reset pos on failure to unpack for various functions
+ - staging: wile1000: fix error path cleanup in wile_wlan_initialize()
+ - scsi: zfcp: fix request object use-after-free in send path causing wrong
+ traces
+ - cifs: Properly handle auto disabling of serverino option
+ - ceph: use ceph_evict_inode to cleanup inode's resource
+ - KVM: x86: optimize check for valid PAT value
+ - KVM: VMX: Always signal #GP on WRMSR to MSR_IA32_CR_PAT with bad value
+ - KVM: VMX: Fix handling of #MC that occurs during VM-Entry
+ - KVM: VMX: check CPUID before allowing read/write of IA32_XSS
+ - resource: Include resource end in walk_*() interfaces
+ - resource: Fix find_next_iomem_res() iteration issue
+ - resource: fix locking in find_next_iomem_res()
+ - pstore: Fix double-free in pstore_mkfile() failure path
+ - dm thin metadata: check if in fail_io mode when setting needs_check
+ - drm/panel: Add support for Armadeus ST0700 Adapt
+ - ALSA: hda - Fix intermittent CORB/RIRB stall on Intel chips
+ - iommu/iova: Remove stale cached32_node
+ - gpio: don't WARN() on NULL descs if gpiolib is disabled
+ - i2c: at91: disable TXRDY interrupt after sending data
+ - i2c: at91: fix clk_offset for sama5d2
+ - mm/migrate.c: initialize pud_entry in migrate_vma()
+ - iio: adc: gyroadc: fix uninitialized return code
+ - NFSv4: Fix delegation state recovery
+ - NFSv4: only clear BTREE_NODE_dirty bit when it is set
+ - bcache: add comments for mutex_lock(&b->write_lock)
+ - virtio/s390: fix race on airq_areas[]
+ - ext4: don't perform block validity checks on the journal inode
+ - ext4: fix block validity checks for journal inodes using indirect blocks
+ - ext4: unsigned int compared against zero
+ - powerpc/tm: Remove msr_tm_active()

* Bionic update: upstream stable patchset 2019-09-10 (LP: #1843463)
+ context
+ - hv_netvsc: Fix a warning of suspicious RCU usage
+ - net: tc35815: Explicitly check NET_IP_ALIGN is not zero in tc35815_rx
+ - Bluetooth: btqca: Add a short delay before downloading the NVM
+ - ibmveth: Convert multicast list size for little-endian system
+ - gpio: Fix build error of function redefinition
+ - drm/mediatek: use correct device to import PRIME buffers
+ - drm/mediatek: set DMA max segment size
+ - cxgb4: fix a memory leak bug
+ - liquidio: add cleanup in octeon_setup_iq()
+ - net: myri10ge: fix memory leaks
+ - lan78xx: Fix memory leaks
+ - vfs: fix page locking deadlocks when deduping files
+ - cx82310_eth: fix a memory leak bug
+ - net: kalmia: fix memory leaks
+ - wimax/i2400m: fix a memory leak bug
+ - ravb: Fix use-after-free ravb_tstamp_skb
+ - kprobes: Fix potential deadlock in kprobe_optimizer()
+ - HID: cp2112: prevent sleeping function called from invalid context
+ - Input: hyperv-keyboard: Use in-place iterator API in the channel callback
+ - Tools: hv: kvp: eliminate 'may be used uninitialized' warning
+ - IB/mlx4: Fix memory leaks
+ - ceph: fix buffer free while holding i_ceph_lock in __ceph_setxattr()
+ - ceph: fix buffer free while holding i_ceph_lock in __ceph_build_xattr_blob()
+ - ceph: fix buffer free while holding i_ceph_lock in fill_inode()
+ - KVM: arm/arm64: Only skip MMIO insn once
+ - libceph: allow ceph_buffer_put() to receive a NULL ceph_buffer
+ - spi: bcm2835aux: unifying code between polling and interrupt driven code
+ - spi: bcm2835aux: remove dangerous uncontrolled read of fifo
+ - spi: bcm2835aux: fix corruptions for longer spi transfers
+ - net: fix skb use after free in netpoll
+ - net_sched: fix a NULL pointer deref in ipt action
+ - net: stmmac: dwmac-rk: Don't fail if phy regulator is absent
+ - tcp: inherit timestamp on mtu probe
+ - tcp: remove empty skb from write queue in error cases
+ - net: sched: act_sample: fix psample group handling on overwrite
+ - mld: fix memory leak in mld_del_delrec()
+ - x86/boot: Preserve boot_params.secure_boot from sanitizing
+ - tools: bpftool: fix error message (prog -> object)
+ - scsi: qla2xxx: Fix gnl.l memory leak on adapter init failure
+ - afs: Fix leak in afs_lookup_cell_rcu()

+ * Bionic update: upstream stable patchset 2019-09-09 (LP: #1843338)
+ - dmaengine: ste_dma40: fix unneeded variable warning
+ - auxdisplay: panel: need to delete scan_timer when misc_register fails in panel_attach
+ - jommu/dma: Handle SG length overflow better
+ - usb: gadget: composite: Clear "suspended" on reset/disconnect
+ - usb: gadget: mass_storage: Fix races between fsg_disable and fsg_set_alt
+ - xen/blkback: fix memleak in get_modes()
+ - i2c: rcar: avoid race when unregistering slave client
+ - i2c: emev2: avoid race when unregistering slave client
+ - drm/ast: Fixed reboot test may cause system hanged
+ - usb: host: fotg2: restart hcd after port reset
+ - tools: hv: fix KVP and VSS daemons exit code
+ - watchdog: bcm2835_wdt: Fix module autoload
+ - drm/bridge: tftp410: fix memleak in get_modes()
+ - scsi: ufs: Fix RX_TERMINATION_FORCE_ENABLE define value
+ - drm/tilcdc: Register cpufreq notifier after we have initialized crtc
+ - ALSA: usb-audio: Fix a stack buffer overflow bug in check_input_term
+ - ALSA: usb-audio: Fix an OOB bug in parse_audio_mixer_unit
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+ - net/smc: make sure EPOLLOUT is raised
+ - tcp: make sure EPOLLOUT wont be missed
+ - mm/zmalloc.c: fix build when CONFIG_COMPACTION=n
+ - ALSA: line6: Fix memory leak at line6_init_pcm() error path
+ - ALSA: seq: Fix potential concurrent access to the deleted pool
+ - kvm: x86: skip populating logical dest map if apic is not sw enabled
+ - KVM: x86: Don't update RIP or do single-step on faulting emulation
+ - x86/apic: Do not initialize LDR and DFR for bigsm
+ - ftrace: Fix NULL pointer dereference in t_probe_next()
+ - ftrace: Check for successful allocation of hash
+ - ftrace: Check for empty hash and comment the race with registering probes
+ - usb-storage: Add new JMS567 revision to unusual_devs
+ - USB: cdc-wdm: fix race between write and disconnect due to flag abuse
+ - usb: chipidea: udc: don't do hardware access if gadget has stopped
+ - usb: host: ohci: fix a race condition between shutdown and irq
+ - usb: host: xhci: rcar: Fix typo in compatible string matching
+ - USB: storage: ums-realtek: Update module parameter description for
+ auto_delink_en
+ - uprobes/x86: Fix detection of 32-bit user mode
+ - mmc: sdhci-of-at91: add quirk for broken HS200
+ - mmc: core: Fix init of SD cards reporting an invalid VDD range
+ - intel_th: pci: Add support for another Lewisburg PCH
+ - intel_th: pci: Add Tiger Lake support
+ - drm/i915: Don't deballon unused ggtt drm_mm_node in linux guest
+ - VMCI: Release resource if the work is already queued
+ - crypto: ccp - Ignore unconfigured CCP device on suspend/resume
+ - Revert "cfg80211: fix processing world regdomain when non modular"
+ - mac80211: fix possible sta leak
+ - KVM: PPC: Book3S: Fix incorrect guest-to-user-translation error handling
+ - KVM: arm/arm64: vgic: Fix potential deadlock when ap_list is long
+ - KVM: arm/arm64: vgic-v2: Handle SGI bits in GICD_I{S,C}PENDR0 as WI
+ - NFS: Clean up list moves of struct nfs_page
+ - NFSv4/pnfs: Fix a page lock leak in nfs_pageio_resend()
+ - NFS: Pass error information to the pgio error cleanup routine
+ - NFS: Ensure O_DIRECT reports an error if the bytes read/written is 0
+ - i2c: pixx4: Fix port selection for AMD Family 16h Model 30h
+ - x86/ptrace: fix up botched merge of spectrev1 fix
+ - Revert "ASoC: Fail card instantiation if DAI format setup fails"
+ - nvme-multipath: revalidate nvme_ns_head gendisk in nvme_validate_ns
+ - afs: Fix the CB.ProbeUuid service handler to reply correctly
+ - dmaengine: stm32-mdma: Fix a possible null-pointer dereference in
  stm32_mdma_irq_handler()
+ - omap-dma/omap_vout_vrfb: fix off-by-one fi value
+ - arm64: cpufeature: Don't treat granule sizes as strict
+ - tools: hv: fixed Python pep8/flake8 warnings for lsymbus
+ - ipv4/icmp: fix rt dst dev null pointer dereference
+ - ALSA: hda - Fixes inverted Conexant GPIO mic mute led
+ - usb: hcd: use managed device resources
+ - lib: logic_pio: Fix RCU usage
+ - lib: logic_pio: Avoid possible overlap for unregistering regions
+ - lib: logic_pio: Add logic_pio_unregister_range()
+ - drm/amdgpu: Add APTX quirk for Dell Latitude 5495
+ - drm/i915: Call dna_set_max_seg_size() in i915_driver_hw_probe()
+ - bus: hisi_lpc: Unregister logical PIO range to avoid potential use-after-free
+ * New ID in ums-realtek module breaks cardreader (LP: #1838886) // Bionic
  + update: upstream stable patchset 2019-09-09 (LP: #1843338)
  + - USB: storage: ums-realtek: Whitelist auto-delink support
  + * TC filters are broken on Mellanox after upstream stable updates
  + (LP: #1842502)
  + - net/mlx5e: Remove redundant vport context vlan update
  + - net/mlx5e: Properly order min inline mode setup while parsing TC matches
  + - net/mlx5e: Get the required HW match level while parsing TC flow matches
  + - net/mlx5e: Always use the match level enum when parsing TC rule match
  + - net/mlx5e: Don't match on vlan non-existence if ethertype is wildcarded
+ -- Khalid Elmously <khalid.elmously@canonical.com>  Mon, 30 Sep 2019 23:02:24 -0400
+ linux (4.15.0-65.74) bionic; urgency=medium
+ * bionic/linux: 4.15.0-65.74 -proposed tracker (LP: #1844403)
+ + * arm64: large modules fail to load (LP: #1841109)
  + - arm64/kernel: kaslr: reduce module randomization range to 4 GB
  + - arm64/kernel: don't ban ADRP to work around Cortex-A53 erratum #843419
  + - arm64: fix undefined reference to 'printk'
  + - arm64/kernel: rename module_emit_adrp_veneer->module_emit_veneer_for_adrp
  + - [config] Remove CONFIG_ARM64_MODULE_CMODEL_LARGE
+ * CVE-2018-20976
  + - xfs: clear sb->s_fs_info on mount failure
+ * br_netfilter: namespace sysctl operations (LP: #1836910)
  + - net: bridge: add bitfield for options and convert vlan opts
  + - net: bridge: convert nf call options to bits
  + - netfilter: bridge: port sysctls to use brnf_net
  + - netfilter: bridge: namespace bridge netfilter sysctls
  + - netfilter: bridge: prevent UAF in brnf_exit_net() +
+ * tuntap: correctly set SOCKWQ_ASYNC_NOSPACE (LP: #1830756)
  + - tuntap: correctly set SOCKWQ_ASYNC_NOSPACE
+ + * Bionic update: upstream stable patchset 2019-08-30 (LP: #1842114)
+ - HID: Add 044f:b320 ThrustMaster, Inc. 2 in 1 DT
+ - MIPS: kernel: only use i8253 clocksoure with periodic clockevent
+ - mips: fix cacheinfo
+ - netfilter: ebtables: fix a memory leak bug in compat
+ - ASoC: dapm: Fix handling of custom_stop_condition on DAPM graph walks
+ - bonding: Force slave speed check after link state recovery for 802.3ad
+ - can: dev: call netif_carrier_off() in register_candev()
+ - ASoC: Fail card instantiation if DAI format setup fails
+ - st21nfc_a_connectivity_event_received: null check the allocation
+ - st_neihci_connectivity_event_received: null check the allocation
+ - ASoC: ti: davinci-mcasp: Correct slot_width posed constraint
+ - net: usb: qmi_wwan: Add the BroadMobi BM818 card
+ - qed: RDMA - Fix the hw_ver returned in device attributes
+ - isdn: mISDN: hfcsusb: Fix possible null-pointer dereferences in start_isoc_chain()
+ - netfilter: ipset: Fix rename concurrency with listing
+ - isdn: hfcsusb: Fix mISDN driver crash caused by transfer buffer on the stack
+ - perf bench numa: Fix cpuo binding
+ - can: sja1000: force the string buffer NULL-terminated
+ - can: peak_usb: force the string buffer NULL-terminated
+ - net/ethernet/qlogic/qed: force the string buffer NULL-terminated
+ - NFSv4: Fix a potential sleep while atomic in nfs4_do_reclaim()
+ - HID: input: fix a4tech horizontal wheel custom usage
+ - SMB3: Kernel oops mounting a encryptData share with CONFIG_DEBUG_VIRTUAL
+ - net: cxgb3_main: Fix a resource leak in a error path in 'init_one()'
+ - net: hisilicon: make hp04_tx_reclaim non-reentrant
+ - net: hisilicon: fix hp04-xmit never return TX_BUSY
+ - net: hisilicon: Fix dma_map_single failed on arm64
+ - libata: have ata_scsi_rw_xlat() fail invalid passthrough requests
+ - libata: add SG safety checks in SFF pio transfers
+ - x86/lib/cpu: Address missing prototypes warning
+ - drm/vmwgfx: fix memory leak when too many retries have occurred
+ - perf ftrace: Fix failure to set cpumask when only one cpu is present
+ - perf cpumap: Fix writing to illegal memory in handling cpumap mask
+ - perf pmu-events: Fix missing "cpu_clk_unhalted.core" event
+ - selftests: kvm: Adding config fragments
+ - HID: wacom: correct misreported EKR ring values
+ - HID: wacom: Correct distance scale for 2nd-gen Intuos devices
+ - Revert "dm bufio: fix deadlock with loop device"
+ - ceph: don't try fill file_lock on unsuccessful GETFILELOCK reply
+ - libceph: fix PG split vs OSD (re)connect race
+ - drm/nouveaux: Don't retry infinitely when receiving no data on i2c over AUX
+ - gpioilib: never report open-drain/source lines as 'input' to user-space
+ - userfaultfd_release: always remove uffid flags and clear vm_userfaultfd_ctx
+ - x86/retpoline: Don't clobber RFLAGS during CALL_NOSPEC on i386
+ - x86/apic: Handle missing global clockevent gracefully
+ - x86/CPU/AMD: Clear RDRAND CPUID bit on AMD family 15h/16h
+ - x86/boot: Save fields explicitly, zero out everything else

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+ - x86/boot: Fix boot regression caused by bootparam sanitizing
+ - dm kcopyd: always complete failed jobs
+ - dm btree: fix order of block initialization in btree_split_beneath
+ - dm space map metadata: fix missing store of apply_bops() return value
+ - dm table: fix invalid memory accesses with too high sector number
+ - dm zoned: improve error handling in reclaim
+ - dm zoned: improve error handling in i/o map code
+ - dm zoned: properly handle backing device failure
+ - genirq: Properly pair kobject_del() with kobject_add()
+ - mm, page_owner: handle THP splits correctly
+ - mm/zzmalloc.c: migration can leave pages in ZS_EMPTY indefinitely
+ - mm/zzmalloc.c: fix race condition in zs_destroy_pool
+ - xfs: fix missing ILOCK unlock when xfs_setattr_nonsize fails due to EDQUOT
+ - dm zoned: fix potential NULL dereference in dmz_do_reclaim()
+ - powerpc: Allow flush_(inval_idcache_range to work across ranges >4GB
+ - can: mcp251x: add error check when wq alloc failed
+ - netfilter: ipset: Actually allow destination MAC address for hash:ip,mac
+ - sets too
+ - netfilter: ipset: Copy the right MAC address in bitmap:ip,mac and
  hash:ip,mac sets
+ - rxrpc: Fix the lack of notification when sendmsg() fails on a DATA packet
+ - net: phy: phy_led_triggers: Fix a possible null-pointer dereference in
  phy_led_trigger_change_speed()
+ - NFS: Fix regression whereby fscache errors are appearing on 'nofsc' mounts
+ - net: stmmac: Fix issues when number of Queues >= 4
+ - KVM: arm64: Don't write junk to sysregs on reset
+ - KVM: arm: Don't write junk to CP15 registers on reset
+ - xfs: don't trip over uninitialized buffer on extent read of corrupted inode
+ - xfs: Move fs/xfs/xfs_attr.h to fs/xfs/libxfs/xfs_attr.h
+ - xfs: Add helper function xfs_attr_try_sf_addname
+ - xfs: Add attribute remove and helper functions
+ * Bionic update: upstream stable patchset 2019-08-27 (LP: #1841652)
+ - sh: kernel: hw_breakpoint: Fix missing break in switch statement
+ - mm/usercopy: use memory range to be accessed for wraparound check
+ - mm/memcontrol.c: fix use after free in mem_cgroup_iter()
+ - bpf: get rid of pure_initcall dependency to enable jits
+ - bpf: restrict access to core bpf sysctls
+ - bpf: add bpf_jit_limit knob to restrict unpriv allocations
+ - xtensa: add missing isync to the cpu_reset TLB code
+ - ALSA: hda - Apply workaround for another AMD chip 1022:1487
+ - ALSA: hda - Fix a memory leak bug
+ - HID: holtek: test for sanity of intfdata
+ - HID: hiddev: avoid opening a disconnected device
+ - HID: hiddev: do cleanup in failure of opening a device
+ - Input: kbtab - sanity check for endpoint type
+ - Input: iforce - add sanity checks
+ - net: usb: pegasus: fix improper read if get_registers() fail
+ netfilter: ebtables: also count base chain policies
+ clk: at91: generated: Truncate divisor to GENERATED_MAX_DIV + 1
+ clk: renesas: cpg-mssr: Fix reset control race condition
+ xen/pciback: remove set but not used variable 'old_state'
+ irqchip/gic-v3-its: Free unused vpt_page when alloc vpe table fail
+ irqchip/irq-imx-gpcv2: Forward irq type to parent
+ perf header: Fix divide by zero error if f_header.attr_size==0
+ perf header: Fix use of unitialized value warning
+ libata: zpodd: Fix small read overflow in zpodd_getMech_type()
+ drm/bridge: lvds-encoder: Fix build error while CONFIG_DRM_KMS_HELPER=m
+ scsi: hpsa: correct scsi command status issue after reset
+ scsi: qla2xxx: Fix possible fcport null-pointer dereferences
+ ata: libahci: do not complain in case of deferred probe
+ kbuild: modpost: handle KBUILD_EXTRA_SYMBOLS only for external modules
+ arm64/efi: fix variable 'si' set but not used
+ arm64: unwind: Prohibit probing on return_address()
+ arm64/mm: fix variable 'pud' set but not used
+ IB/core: Add mitigation for Spectre V1
+ IB/mad: Fix use-after-free in ib mad completion handling
+ drm: msm: Fix add_gpu_components
+ ocsf2: remove set but not used variable 'last_hash'
+ asm-generic: fix -Wtype-limits compiler warnings
+ KVM: arm/arm64: Sync ICH_VMCR_EL2 back when about to block
+ staging: comed: dt3000: Fix signed integer overflow 'divider * base'
+ staging: comed: dt3000: Fix rounding up of timer divisor
+ iio: adc: max9611: Fix temperature reading in probe
+ USB: core: Fix races in character device registration and deregistration
+ usb: gadget: udc: renesas_usb3: Fix sysfs interface of "role"
+ usb: cdc-acm: make sure a refcount is taken early enough
+ USB: CDC: fix sanity checks in CDC union parser
+ USB: serial: option: add D-Link DWM-222 device ID
+ USB: serial: option: Add support for ZTE MF871A
+ USB: serial: option: add the BroadMobi BM818 card
+ USB: serial: option: Add Motorola modem UARTs
+ bpf: fix bpf_jit_limit knob for PAGE_SIZE >= 64K
+ arm64: ftrace: Ensure module ftrace trampoline is coherent with I-side
+ netfilter: conntrack: Use consistent ct id hash calculation
+ Input: psmouse - fix build error of multiple definition
+ iommu/amd: Move iommu_init_pci() to .init section
+ bnx2x: Fix VF's VLAN reconfiguration in reload.
+ net/mlx4_en: fix a memory leak bug
+ net/packet: fix race in tpacket_snd()
+ scctp: fix the transport error_count check
+ xen/netback: Reset nr_frags before freeing skb
+ net/mlx5e: Only support tx/rx pause setting for port owner
+ net/mlx5e: Use flow keys dissector to parse packets for ARFS
+ team: Add vlan tx offload to hw_enc_features
+ bonding: Add vlan tx offload to hw_enc_features
- mmc: sdhci-of-arsan: Do now show error message in case of deffered probe
- xfrm: policy: remove pcpu policy cache
- mm/hmm: fix bad subpage pointer in try_to_unmap_one
- mm: mempolicy: make the behavior consistent when MPOL_MF_MOVE* and MPOL_MF.Strict were specified
- mm: mempolicy: handle vma with unmovable pages mapped correctly in mbind
- riscv: Make __fstate_clean() work correctly.
- Revert "kmemleak: allow to coexist with fault injection"
- scct: fix memleak in scct_send_reset_streams

* Bionic update: upstream stable patchset 2019-08-16 (LP: #1840520)
- iio: adc: max9611: Fix misuse of GENMASK macro
- crypto: ccp - Fix oops by properly managing allocated structures
- crypto: ccp - Ignore tag length when decrypting GCM ciphertext
- usb: usbfs: fix double-free of usb memory upon submiturb error
- usb: iowarrior: fix deadlock on disconnect
- sound: fix a memory leak bug
- mmc: cavium: Set the correct dma max segment size for mmc_host
- mmc: cavium: Add the missing dma unmmap when the dma has finished.
- loop: set PF_MEMALLOC_NOIO for the worker thread
- Input: synaptics - enable RMI mode for HP Spectre X360
- lkdtm: support llvm-objcopy
- crypto: ccp - Validate buffer lengths for copy operations
- crypto: ccp - Add support for valid authsize values less than 16
- perf annotate: Fix s390 gap between kernel end and module start
- perf db-export: Fix thread__exec_comm()
- perf record: Fix module size on s390
- usb: host: xhci-rkar: Fix timeout in xhci_suspend()
- usb: yurex: Fix use-after-free in yurex_delete
- can: rcar_canfd: Fix possible IRQ storm on high load
- can: peak_usb: fix potential double kfree_skb()
- netfilter: nfnetlink: avoid deadlock due to synchronous request_module
- vfio-cw: Set pa_nr to 0 if memory allocation fails for pa_iova_pfn
- netfilter: Fix rpfilter dropping vf packets by mistake
- netfilter: nft_hash: fix symhash with modulus one
- scripts/sphinx-pre-install: fix script for RHEL/CentOS
- iscsi_ibft: make ISCSI_IBFT dependson ACPI instead of ISCSI_IBFT_FIND
- mac80211: don't warn about CW params when not using them
- hwmon: (nct6775) Fix register address and added missed tolerance for nct6106
- drm: silence variable 'conn' set but not used
- cpufreq/pasemi: fix use-after-free in pas_cpufreq_cpu_init()
- s390qdio: add sanity checks to the fast-reqeuee path
- ALSA: compress: Fix regression on compressed capture streams
- ALSA: compress: Prevent bypasses of set_params
- ALSA: compress: Don't allow parital drain operations on capture streams
- ALSA: compress: Be more restrictive about when a drain is allowed
- perf tools: Fix proper buffer size for feature processing
- perf probe: Avoid calling freeing routine multiple times for same pointer
+ - drbd: dynamically allocate shash descriptor
+ - ACPI/IORT: Fix off-by-one check in iort_dev_find_its_id()
+ - ARM: davinci: fix sleep.S build error on ARMv4
+ - scsi: megaraid_sas: fix panic on loading firmware crashdump
+ - scsi: ibmfc: fix WARN_ON during event pool release
+ - scsi: scsi_dh_alua: always use a 2 second delay before retrying RTPG
+ - test_firmware: fix a memory leak bug
+ - tty/ldsem, locking/rwsem: Add missing ACQUIRE to read_failed sleep loop
+ - perf/core: Fix creating kernel counters for PMUs that override event->cpu
+ - HID: sony: Fix race condition between rumble and device remove.
+ - can: peak_usb: pcan_usb_pro: Fix info-leaks to USB devices
+ - can: peak_usb: pcan_usb_fd: Fix info-leaks to USB devices
+ - hwmon: (nct7802) Fix wrong detection of in4 presence
+ - drm/915: Fix wrong escape clock divisor init for GLK
+ - ALSA: firewire: fix a memory leak bug
+ - ALSA: hda - Don't override global PCM hw info flag
+ - ALSA: hda - Workaround for cracked led sound on AMD controller (1022:1457)
+ - mac80211: don't WARN on short WMM parameters from AP
+ - SMB3: Fix deadlock in validate negotiate hits reconnect
+ - smb3: send CAP_DFS capability during session setup
+ - NFSv4: Only pass the delegation to setattr if we're sending a truncate
+ - NFSv4: Fix an Oops in nfs4_do_setattr
+ - KVM: Fix leak vCPU's VMCS value into other pCPU
+ - mwifiex: fix 802.11n/WPA detection
+ - iwllwifi: don't unmap as page memory that was mapped as single
+ - iwllwifi: mvram: fix an out-of-bound access
+ - iwllwifi: mvram: don't send GEO_TX_POWER_LIMIT on version < 41
+ - iwllwifi: mvram: fix version check for GEO_TX_POWER_LIMIT support
+ - iio: cros_ec_accel_legacy: Fix incorrect channel setting
+ - staging: android: iion: Bail out upon SIGKILL when allocating memory.
+ - x86/purgatory: Use CFLAGS_REMOVE rather than reset KBUILD_CFLAGS
+ - usb: typec: tcpm: free log buf memory when remove debug file
+ - usb: typec: tcpm: remove tcpm dir if no children
+ - usb: typec: tcpm: Add NULL check before dereferencing config
+ - netfilter: conntrack: always store window size un-scaled
+ - drm/amd/display: Wait for backlight programming completion in set backlight level
+ - drm/amd/display: use encoder's engine id to find matched free audio device
+ - drm/amd/display: Fix dc_create failure handling and 666 color depths
+ - drm/amd/display: Only enable audio if speaker allocation exists
+ - drm/amd/display: Increase size of audios array
+ - allocate_flower_entry: should check for null deref
+ - s390/dma: provide proper ARCH_ZONE_DMA_BITS value
+ - ALSA: hiface: fix multiple memory leak bugs

* Bionic update: upstream stable patchset 2019-08-15 (LP: #1840378)
+ - scsi: fcoe: Embed fc_rport_priv in fcoe_rport structure
+ - ARM: dts: Add pinmuxing for i2c2 and i2c3 for LogicPD SOM-LV
+ - ARM: dts: Add pinmuxing for i2c2 and i2c3 for LogicPD torpedo
+ - HID: wacom: fix bit shift for Cintiq Companion 2
+ - HID: Add quirk for HP X1200 PIXART OEM mouse
+ - RDMA: Directly cast the sockaddr union to sockaddr
+ - IB: directly cast the sockaddr union to aockaddr
+ - atm: iphase: Fix Spectre v1 vulnerability
+ - ife: error out when nla attributes are empty
+ - ip6_tunnel: fix possible use-after-free on xmit
+ - net: bridge: delete local fdb on device init failure
+ - net: bridge: mcast: don't delete permanent entries when fast leave is enabled
+ - net: fix ifindex collision during namespace removal
+ - net/mlx5: Use reversed order when unregister devices
+ - net: phylink: Fix flow control for fixed-link
+ - net: sched: Fix a possible null-pointer dereference in dequeue_func()
+ - NFC: nfcmrvl: fix gpio-handling regression
+ - tipc: compat: allow tipc commands without arguments
+ - compat_ioctl: pppoe: fix PPPOEI OCSFWD handling
+ - net/mlx5e: Prevent encap flow counter update async to user query
+ - tun: mark small packets as owned by the tap sock
+ - mvpp2: refactor MTU change code
+ - bnx2x: Disable multi-cos feature.
+ - cgroup: Call cgroup_release() before __exit_signal()
+ - cgroup: Implement css_task_iter_skip()
+ - cgroup: Include dying leaders with live threads in PROCS iterations
+ - cgroup: css_task_iter_skip()’d iterators must be advanced before accessed
+ - cgroup: Fix css_task_iter_advance_css_set() cset skip condition
+ - spi: bcm2835: Fix 3-wire mode if DMA is enabled
+ - driver core: Establish order of operations for device_add and device_del via bitflag
+ - drivers/base: Introduce kill_device()
+ - libnvdimm/bus: Prevent duplicate device_unregister() calls
+ - libnvdimm/region: Register badblocks before namespaces
+ - libnvdimm/bus: Prepare the nd_ioctl() path to be re-entrant
+ - libnvdimm/bus: Fix wait_nvdimm_bus_probe_idle() ABBA deadlock
+ - ipip: validate header length in ipip_tunnel_xmit
+ - mvpp2: fix panic on module removal
+ - net/mlx5: Fix modify_cq_in alignment
+ - r8169: don’t use MSI before RTL8168d

+ * VIMC module not available (CONFIG_VIDEO_VIMC not set) (LP: #1831482)
+ * [Config] Enable VIMC module
+ * reboot will introduce an alarm 'beep …' during BIOS phase (LP: #1840395)
+ * ALSA: hda - Let all conexant codec enter D3 when rebooting
+ * ALSA: hda - Add a generic reboot_notify
+ * Include Sunix serial/parallel driver (LP: #1826716)
+ - serial: 8250_pci: Add support for Sunix serial boards
+ - parport: parport_serial: Add support for Sunix Multi I/O boards
+ + * Intel HDMI audio print "Unable to sync register" errors (LP: #1840394)
+ - ALSA: hda - Don't resume forcibly i915 HDMI/DP codec
+ + * Support cpufreq, thermal sensors & cooling cells on iMX6Q based Nitrogen6x
+ board (LP: #1840437)
+ - arm: imx: Add MODULE_ALIAS for cpufreq
+ - ARM: dts: imx: Add missing OPP properties for CPUs
+ - ARM: dts: imx7d: use operating-points-v2 for cpu
+ - ARM: dts: imx7d: remove "operating-points" property for cpu1
+ - ARM: dts: imx: add cooling-cells for cpufreq cooling device
+ - ARM: dts: imx6: add thermal sensor and cooling cells
+ + * hns3: ring buffer race leads can cause corruption (LP: #1840717)
+ - net: hns3: minor optimization for ring_space
+ - net: hns3: fix data race between ring->next_to_clean
+ - net: hns3: optimize the barrier using when cleaning TX BD
+ + * Bionic build broken if CONFIG_MODVERSIONS enabled (LP: #1840321)
+ - Revert "genksyms: Teach parser about 128-bit built-in types"
+ + * [bionic] drm/i915: softpin broken, needs to be fixed for 32bit mesa
+ (LP: #1815172)
+ - SAUCE: drm/i915: Partially revert d6edad3777c28ea
+ + * Goodix touchpad may drop first input event (LP: #1840075)
+ - mfd: intel-lpss: Remove D3cold delay
+ + * NULL pointer dereference when Inserting the VIMC module (LP: #1840028)
+ - media: vimc: fix component match compare
+ + * Fix touchpad IRQ storm after S3 (LP: #1841396)
+ - pinctrl: intel: remap the pin number to gpio offset for irq enabled pin
+ + * [SRU][B/OEM-B/OEM-OSP1/D] UBUNTU: SAUCE: enable middle button for one more
+ ThinkPad (LP: #1841722)
+ - SAUCE: Input: elantech - enable middle button for one more ThinkPad
+ + * Test 391/u and 391/p from ubuntu_bpf failed on B (LP: #1841704)
+ - SAUCE: Fix "bpf: improve verifier branch analysis"
+ + * crypto/testmgr.o fails to build due to struct cipher_testvec not having data
+ members: ctext, ptext, len (LP: #1841264)
+ - SAUCE: Revert "crypto: testmgr - add AES-CFB tests"
+ + * Bionic QEMU with Bionic Kernel hangs in AMD FX-8350 with cpu-host as
+ passthrough (LP: #1834522)
+ - KVM: SVM: install RSM intercept
+ - KVM: x86: SVM: Set EMULTYPE_NO_REEXECUTE for RSM emulation
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 17 Sep 2019 18:12:26 +0200
+
+ linux (4.15.0-64.73) bionic; urgency=medium
+
+ * powerpc/tm: Fix restoring FP/VMX facility incorrectly on interrupts
+ (CVE-2019-15031) / powerpc/tm: Fix FP/VMX unavailable exceptions inside a
+ - powerpc/tm: Fix FP/VMX unavailable exceptions inside a transaction
+ - powerpc/tm: Fix restoring FP/VMX facility incorrectly on interrupts
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Tue, 17 Sep 2019 18:12:26 +0200
+
+ linux (4.15.0-64.73) bionic; urgency=medium
+
+ * KVM: SVM: install RSM intercept
+ * KVM: x86: SVM: Set EMULTYPE_NO_REEXECUTE for RSM emulation
+
+ Stefan Bader <stefan.bader@canonical.com> Thu, 12 Sep 2019 11:30:41 +0200
+
+ linux (4.15.0-62.69) bionic; urgency=medium
+
+ * powerpc/tm: Fix restoring FP/VMX facility incorrectly on interrupts
+ (CVE-2019-15031) / powerpc/tm: Fix FP/VMX unavailable exceptions inside a
+ - powerpc/tm: Fix FP/VMX unavailable exceptions inside a transaction
+ - powerpc/tm: Fix restoring FP/VMX facility incorrectly on interrupts
+
+ -- Stefan Bader <stefan.bader@canonical.com> Thu, 12 Sep 2019 11:30:41 +0200
+
+ linux (4.15.0-62.69) bionic; urgency=medium
+
+ * KVM: SVM: install RSM intercept
+ * KVM: x86: SVM: Set EMULTYPE_NO_REEXECUTE for RSM emulation
+
+ Khalid Elmously <khalid.elmously@canonical.com> Wed, 04 Sep 2019 16:11:43 -0400
+
+ linux (4.15.0-60.67) bionic; urgency=medium
+
+ * [Regression] net test from ubuntu_kernel_selftests failed due to bpf test
+ compilation issue (LP: #1840935)
+ - SAUCE: Fix "bpf: relax verifier restriction on BPF_MOV | BPF_ALU"
+
+ -- Khalid Elmously <khalid.elmously@canonical.com> Wed, 04 Sep 2019 16:11:43 -0400
+
+ linux (4.15.0-60.67) bionic; urgency=medium
+
+ * [Regression] net test from ubuntu_kernel_selftests failed due to bpf test
+ compilation issue (LP: #1840935)
+ - SAUCE: Fix "bpf: relax verifier restriction on BPF_MOV | BPF_ALU"
+
+ Stefan Bader <stefan.bader@canonical.com> Thu, 22 Aug 2019 18:32:43 +0200
+
+ linux (4.15.0-59.66) bionic; urgency=medium
+ * bionic/linux: 4.15.0-59.66 -proposed tracker (LP: #1840006)
+ + * zfs not completely removed from bionic tree (LP: #1840051)
+ + - SAUCE: (noup) remove completely the zfs code
+ + * Packaging resync (LP: #1786013)
+ + - [Packaging] update helper scripts
+ + * [18.04 FEAT] Enhanced hardware support (LP: #1836857)
+ + - s390: report new CPU capabilities
+ + - s390: add alignment hints to vector load and store
+ + * [18.04 FEAT] Enhanced CPU-MF hardware counters - kernel part (LP: #1836860)
+ + - s390/cpum_cf: Add support for CPU-MF SVN 6
+ + - s390/cpumf: Add extended counter set definitions for model 8561 and 8562
+ + * ideapad_laptop disables WiFi/BT radios on Lenovo Y540 (LP: #1837136)
+ + - platform/x86: ideapad-laptop: Remove no_hw_rflkill_list
+ + * Stacked onexec transitions fail when under NO NEW PRIVS restrictions
+ + (LP: #1839037)
+ + - SAUCE: apparmor: fix nnp subset check failure when, stacking
+ + * bcache: bch_allocator_thread(): hung task timeout (LP: #1784665) // Tight
+ + timeout for bcache removal causes spurious failures (LP: #1796292)
+ + - SAUCE: bcache: fix deadlock in bcache Allocator
+ + * bcache: bch_allocator_thread(): hung task timeout (LP: #1784665)
+ + - bcache: never writeback a discard operation
+ + - bcache: improve bcache_reboot()
+ + - bcache: fix writeback target calc on large devices
+ + - bcache: add journal statistic
+ + - bcache: fix high CPU occupancy during journal
+ + - bcache: use pr_info() to inform duplicated CACHE_SET_IO_DISABLE set
+ + - bcache: fix incorrect sysfs output value of strip size
+ + - bcache: fix error return value in memory shrink
+ + - bcache: fix using of loop variable in memory shrink
+ + - bcache: Fix indentation
+ + - bcache: Add __printf annotation to __bch_check_keys()
+ + - bcache: Annotate switch fall-through
+ + - bcache: Fix kernel-doc warnings
+ + - bcache: Remove an unused variable
+ + - bcache: Suppress more warnings about set-but-not-used variables
+ + - bcache: Reduce the number of sparse complaints about lock imbalances
+ + - bcache: Fix a compiler warning in bcache_device_init()
+ + - bcache: Move couple of string arrays to sysfs.c
+ + - bcache: Move couple of functions to sysfs.c
+ + - bcache: Replace bch_read_string_list() by __sysfs_match_string()
* linux hwe i386 kernel 5.0.0-21.22~18.04.1 crashes on Lenovo x220
  (LP: #1838115)
  - x86/mm: Check for pfn instead of page in vmalloc_sync_one()
  - x86/mm: Sync also un mappings in vmalloc_sync_all()
  - mm/vmalloc.c: add priority threshold to __purge_vmap_area_lazy()
  - mm/vmalloc: Sync un mappings in __purge_vmap_area_lazy()
  
* [bionic] drm/i915: softpin broken, needs to be fixed for 32bit mesa
  (LP: #1815172)
  - drm/i915: Mark up GTT sizes as u64
  - drm/i915/gvt: Use I915_GTT_PAGE_SIZE
  - drm/i915: Compare user's 64b GTT offset even on 32b
  
* Bionic update: upstream stable patchset 2019-08-07 (LP: #1839376)
  - ARM: riscpc: fix DMA
  - ARM: dts: rockchip: Make rk3288-veyron-minnie run at hs200
  - ARM: dts: rockchip: Make rk3288-veyron-mickey's emmc work again
  - ARM: dts: rockchip: Mark that the rk3288 timer might stop in suspend
  - ftrace: Enable trampoline when rec count returns back to one
  - kernel/module.c: Only return -EEXIST for modules that have finished loading
  - MIPS: lantiq: Fix bitfield masking
  - dmaengine: rcar-dmaa: Reject zero-length slave DMA requests
  - clk: tegra210: fix PLLU and PLLU_OUT1
  - fs/adfs: super: fix use-after-free bug
  - btrfs: fix minimum number of chunk errors for DUP
  - cifs: Fix a race condition with cifs_echo_request
  - ceph: fix improper use of smp_mb__before_atomic()
  - ceph: return -ERANGE if virtual xattr value didn't fit in buffer
  - ACPI: blacklist: fix clang warning for unused DMI table
  - scsi: zfcp: fix GCC compiler warning emitted with -Wmaybe-uninitialized
  - x86: kvm: avoid constant-conversion warning
  - ACPI: fix false-positive -Wuninitialized warning
  - be2net: Signal that the device cannot transmit during reconfiguration
  - x86/apic: Silence -Wtype-limits compiler warnings
  - x86: math-emu: Hide clang warnings for 16-bit overflow
  - mm/cma.c: fail if fixed declaration can't be honored
  - coda: add error handling for fget
  - coda: fix build using bare-metal toolchain
  - uapi linux/coda_psdev.h: move upc_req definition from uapi to kernel side
  - drivers/rapidio/devices/rio_mport_cdev.c: NUL terminate some strings
  - ipc/mqueue.c: only perform resource calculation if user valid
  - xen/pv: Fix a boot up hang revealed by int3 self test
  - x86/kvm: Don't call kvm_spurious_fault() from .fixup
  - x86/paravirt: Fix callee-saved function ELF sizes
  - x86, boot: Remove multiple copy of static function sanitize_boot_params()
  - drm/nouveau: fix memory leak in nouveau_conn_reset()
+ kbuild: initialize CLANG_FLAGS correctly in the top Makefile
+ Btrfs: fix incremental send failure after deduplication
+ Btrfs: fix race leading to fs corruption after transaction abort
+ mmc: dwmmc: Fix occasional hang after tuning on eMMC
+ gpioilib: fix incorrect IRQ requesting of an active-low lineevent
+ IB/hfi1: Fix Spectre v1 vulnerability
+ selinux: fix memory leak in policydb_init()
+ s390/dasd: fix endless loop after read unit address configuration
+ parisc: Fix build of compressed kernel even with debug enabled
+ drivers/perf: arm_pmu: Fix failure path in PM notifier
+ nbd: replace kill_bdev() with __invalidate_device() again
+ xen/swiotlb: fix condition for calling xen_destroy_contiguous_region()
+ IB/mlx5: Fix unreg_umr to ignore the mkey state
+ IB/mlx5: Use direct mkey destroy command upon UMR unreg failure
+ IB/mlx5: Move MRs to a kernel PD when freeing them to the MR cache
+ IB/mlx5: Fix RSS Toeplitz setup to be aligned with the HW specification
+ IB/hfi1: Check for error on call to alloc_rsm_map_table
+ eeprom: at24: make spd world-readable again
+ objtool: Support GCC 9 cold subfunction naming scheme
+ gcc-9: properly declare the {pv,hv}clock_page storage
+ x86/vdso: Prevent segfaults due to hoisted vclock reads
+ Documentation: Add swapsgs description to the Spectre v1 documentation
+ firmware/psci: psci_checker: Park kthreads before stopping them
+ btrfs: qgroup: Don't hold qgroup_ioctl_lock in btrfs_qgroup_inherit()
+ lib/test_string.c: avoid masking memset16/32/64 failures
+ mmc: meson-mx-sdio: Fix misuse of GENMASK macro
+ arm64: compat: Allow single-byte watchpoints on all addresses
+ arm64: cpufeature: Fix feature comparison for CTR_EL0.{CWG,ERG}
+ IB/mlx5: Fix clean_mr() to work in the expected order
+ ARC: enable uboot support unconditionally
+ scsi: mpt3sas: Use 63-bit DMA addressing on SAS35 HBA

* Bionic update: upstream stable patchset 2019-08-06 (LP: #1839213)
* staging: vt6656: use meaningful error code during buffer allocation
* drm/amd/display: Fill prescale_params->scale for RGB565
* drm/amd/display: Disable ABM before destroy ABM struct
* gpu: host1x: Increase maximum DMA segment size
* drm/amd/display: Always allocate initial connector state state
* drm/amd/display: fix compilation error
* mmc: sdhci: sdhci-pci-o2micro: Check if controller supports 8-bit width
* i2c: stm32f7: fix the get_irq error cases
* gensyms: Teach parser about 128-bit built-in types
* powerpc/mmc: Handle page table allocation failures
* arm64: assembler: Switch ESB-instruction with a vanilla nop if
  !ARM64_HAS_RAS
* dlm: check if workqueues are NULL before flushing/destroying
* proc: use down_read_killable mmap_sem for /proc/pid/pagemap
* proc: use down_read_killable mmap_sem for /proc/pid/clear_refs
- proc: use down_read_killable mmap_sem for /proc/pid/map_files
- proc: use down_read_killable mmap_sem for /proc/pid/maps
- mm: use down_read_killable for locking mmap_sem in access_remote_vm
- ALSA: ac97: Fix double free of ac97_codec_device
- libnvdimm/bus: Stop holding nvdimm_bus_list_mutex over __nd_ioctl()
- vsoc: correct removal of socket from the list
- NFS: Fix dentry revalidation on NFSv4 lookup
- NFS: Refactor nfs_lookup_revalidate()
- NFSv4: Fix lookup revalidate of regular files
- i2c: qup: fixed releasing dma without flush operation completion
- arm64: compat: Provide definition for COMPAT_SIGMINSTKSZ
- binder: fix possible UAF when freeing buffer
- ISDN: hfcsusb: checking idx of ep configuration
- media: au0828: fix null dereference in error path
- ath10k: Change the warning message string
- media: cpi2_usb: first wake up, then free in disconnect
- media: prvusb2: use a different format for warnings
- NFS: Cleanup if nfs_match_client is interrupted
- media: radio-raremono: change devm_k*alloc to k*alloc
- iommu/vt-d: Don't queue_iova() if there is no flush queue
- iommu/iova: Fix compilation error with CONFIG_IOMMU_IOVA
- hv_sock: Add support for delayed close
- Bluetooth: hci_uart: check for missing tty operations
- sched/fair: Don't free p->numa_faults with concurrent readers
- drivers/pps/pps.c: clear offset flags in PPS_SETPARAMS ioctl
- Fix allyesconfig output.
- ip_tunnel: allow not to count pkts on tstats by setting skb's dev to NULL

* Bionic update: upstream stable patchset 2019-08-05 (LP: #1839036)
- e1000e: start network tx queue only when link is up
- Input: synaptics - enable SMBUS on T480 thinkpad trackpad
- nilfs2: do not use unexported cpu_to_le32()/le32_to_cpu() in uapi header
- drivers: base: cacheinfo: Ensure cpu hotplug work is done before Intel RDT
- crypto: talitos - rename alternative AEAD algos.
- samples, bpf: fix to change the buffer size for read()
- bpf: sockmap, fix use after free from sleep in psock backlog workqueue
- staging:ioo:ad7150: fix threshold mode config bit
- mac80211: mesh: fix RCU warning
- mac80211: free peer keys before vif down in mesh
- iwlwifi: Fix double-free problems in iwl_req_fw_callback()
- dt-bindings: can: mcp251x: add mcp25625 support
- can: mcp251x: add support for mcp25625
- can: m_can: implement errata "Needless activation of MRAF irq"
- can: af_can: Fix error path of can_init()
- ibmvnic: Refresh device multicast list after reset
- ARM: dts: am335x phytec boards: Fix cd-gpios active level
- Input: imx_keypad - make sure keyboard can always wake up system
- KVM: arm/arm64: vgic: Fix kvm_device leak in vgic_its_destroy
+ mlxsw: spectrum: Disallow prio-tagged packets when PVID is removed
+ ARM: davinci: da850-evm: call regulator_has_full_constraints()
+ ARM: davinci: da8xx: specify dma_coherent_mask for lcdc
+ mac80211: only warn once on chanctx_conf being NULL
+ qmi_wwan: add support for QMAP padding in the RX path
+ qmi_wwan: avoid RCU stalls on device disconnect when in QMAP mode
+ qmi_wwan: extend permitted QMAP mux_id value range
+ md: fix for divide error in status_resync
+ bnx2x: Check if transceiver implements DDM before access
+ drm: return -EFAULT if copy_to_user() fails
+ ip6_tunnel: allow not to count pkts on tstats by passing dev as NULL
+ net: lio_core: fix potential sign-extension overflow on large shift
+ quota: fix a problem about transfer quota
+ net: dsa: mv88e6xxx: fix shift of FID bits in mv88e6185_g1_vtu_loadpurge()
+ net: sunrpc: clnt: Fix xps refcount imbalance on the error path
+ fscrypt: don't set policy for a dead directory
+ udf: Fix incorrect final NOT_ALLOCATED (hole) extent length
+ ALSA: hda/realtek - Headphone Mic can't record after S3
+ block, bfq: NULL out the bic when it's no longer valid
+ x86/ptrace: Fix possible spectre-v1 in ptrace_get_debugreg()
+ x86/tls: Fix possible spectre-v1 in do_get_thread_area()
+ Documentation: Add section about CPU vulnerabilities for Spectre
+ mwifiex: Abort at too short BSS descriptor element
+ mwifiex: Don't abort on small, spec-compliant vendor IEs
+ USB: serial: ftdi_sio: add ID for isodebug v1
+ USB: serial: option: add support for GosunCn ME3630 RNDIS mode
+ Revert "serial: 8250: Don't service RX FIFO if interrupts are disabled"
+ p54usb: Fix race between disconnect and firmware loading
+ usb: gadget: ether: Fix race between gether_disconnect and rx_submit
+ usb: renesas_usbhs: add a workaround for a race condition of workqueue
+ staging: comedi: dt282x: fix a null pointer deref on interrupt
+ staging: comedi: amplc_pci230: fix null pointer deref on interrupt
+ binder: fix memory leak in error path
+ carl9170: fix misuse of device driver API
+ VMCI: Fix integer overflow in VMCI handle arrays
+ MIPS: Remove superfluous check for __linux__
+ clk: ti: clkctrl: Fix returning uninitialized data
+ efi/bgrt: Drop BGRT status field reserved bits check
+ perf/core: Fix perf_sample_regs_user() mm check
+ ARM: omap2: remove incorrect __init annotation
+ be2net: fix link failure after ethtool offline test
+ ppp: mppe: Add softdep to arc4
+ sis900: fix TX completion
+ dm verity: use message limit for data block corruption message
+ x86/boot/64: Fix crash if kernel image crosses page table boundary
+ cpu/hotplug: Fix out-of-bounds read when setting fail state
+ linux/kernel.h: fix overflow for DIV_ROUND_UP_ULL
+ - ARC: hide unused function unw_hdr_alloc
+ - s390: fix stifle zero padding
+ - s390/qdio: (re-)initialize tiqdio list entries
+ - s390/qdio: don't touch the dsci in tiqdio_add_input_queues()
+ - crypto/NX: Set receive window credits to max number of CRBs in RxFIFO
+ - drm/udl: introduce a macro to convert dev to udl.
+ - drm/udl: move to embedding drm device inside udl device.
+ - drm/vmwgfx: fix a warning due to missing dma_parms
+ - riscv: Fix udelay in RV32.
+ - mac80211: do not start any work during reconfigure flow
+ - bpf, devmap: Fix premature entry free on destroying map
+ - NFS4: Only set creation open data if O_CREAT
+ - Documentation/admin: Remove the vsyscall=native documentation
+ - drivers/usb/typec/tps6598x.c: fix portinfo width
+ - staging: bcm2835-camera: Ensure all buffers are returned on disable
+ - staging: bcm2835-camera: Remove check of the number of buffers supplied
+ - staging: rtl8712: reduce stack usage, again
+ - irqchip/gic-v3-its: Fix command queue pointer comparison bug
+ - x86/apic: Fix integer overflow on 10 bit left shift of cpu_khz
+ - pinctrl: mcp23s08: Fix add_data and irqchip_add_nested call order
+ - x86/boot/64: Add missing fixup_pointer() for next_early_pgt access
+ - genirq: Delay deactivation in free_irq()
+ - genirq: Fix misleading synchronize_irq() documentation
+ - genirq: Update code comments wrt recycled thread_mask
+ - genirq: Synchronize only with single thread on free_irq()
+ - genirq: Add optional hardware synchronization for shutdown
+ - x86/ioapic: Implement irq_get_irqchip_state() callback
+ - x86/irq: Handle spurious interrupt after shutdown gracefully
+ - crypto: talitos - move struct talitos_edesc into talitos.h
+ - crypto: talitos - fix hash on SEC1.
+ - regmap-irq: do not write mask register if mask_base is zero
+ - MIPS: ath79: fix ar933x uart parity mode
+ - MIPS: fix build on non-linux hosts
+ - arm64/efi: Mark __efistub_stext_offset as an absolute symbol explicitly
+ - scsi: iscsi: set auth_protocol back to NULL if CHAP_A value is not supported
+ - dmaengine: imx-sdma: fix use-after-free on probe error path
+ - wil6210: fix potential out-of-bounds read
+ - ath10k: Do not send probe response template for mesh
+ - ath9k: Check for errors when reading SREV register
+ - ath6kl: add some bounds checking
+ - ath: DFS JP domain W56 fixed pulse type 3 RADAR detection
+ - batman-adv: fix for leaked TVLV handler.
+ - media: dvb: usb: fix use after free in dvb_usb_device_exit
+ - media: spi: IR LED: add missing of table registration
+ - crypto: talitos - fix skcipher failure due to wrong output IV
+ - media: marvell-ccic: fix DMA s/g desc number calculation
+ - media: vpss: fix a potential NULL pointer dereference
+ - media: media_device_enum_links32: clean a reserved field
+ - net: stmmac: dwmac1000: Clear unused address entries
+ - net: stmmac: dwmac4/5: Clear unused address entries
+ - qed: Set the doorbell address correctly
+ - signal/pid_namespace: Fix reboot_pid_ns to use send_sig not force_sig
+ - af_key: fix leaks in key_pol_get_resp and dump_sp.
+ - xfrm: Fix xfrm sel prefix length validation
+ - fs cryptoc: clean up some BUG_ON()s in block encryption/decryption
+ - media: mc-device.c: don't memset __user pointer contents
+ - media: staging: media: davinci_vxpe: - Fix for memory leak if decoder
+ - initialization fails.
+ - net: phy: Check against net_device being NULL
+ - crypto: talitos - properly handle split ICV.
+ - crypto: talitos - Align SEC1 accesses to 32 bits boundaries.
+ - lua6100: Avoid build warnings.
+ - locking/lockdep: Fix merging of hlocks with non-zero references
+ - media: w1128x: Fix some error handling in fm_v4l2_init_video_device()
+ - cpupower : frequency-set -r option misses the last cpu in related cpu list
+ - net: stmmac: dwmac4: fix flow control issue
+ - net: fec: Do not use netdev messages too early
+ - net: axienet: Fix race condition causing TX hang
+ - s390/qdio: handle PENDING state for QEBBM devices
+ - RAS/CEC: Fix pfni insertion
+ - net: sfp: add mutex to prevent concurrent state checks
+ - ipset: Fix memory accounting for hash types on resize
+ - perf cs-etm: Properly set the value of 'old' and 'head' in snapshot mode
+ - perf tests: Add valid callback for parse-events test
+ - perf test 6: Fix missing kvm module load for s390
+ - media: fdp1: Support M3N and E3 platforms
+ - iommu: Fix a leak in iommu_insert_resv_region
+ - gpio: omap: fix lack of irqstatus_raw0 for OMAP4
+ - gpio: omap: ensure irq is enabled before wakeup
+ - regmap: fix bulk writes on paged registers
+ - bpf: silence warning messages in core
+ - rcu: Force inlining of __rcu_read_lock()
+ - x86/cpufeatures: Add FDP_EXCPTNONLY and ZERO_FCS_FDS
+ - blkcg, writeback: dead memcgs shouldn't contribute to writeback ownership
+ - arbitration
+ - xfrm: fix sa selector validation
+ - sched/core: Add __sched tag for io_schedule()
+ - x86.atomic: Fix smp_mb__{before,after} atomic()
+ - perf evsel: Make perf_evsel__name() accept a NULL argument
+ - vhost_net: disable zero copy by default
+ - ipoib: correctly show a VF hardware address
+ - EDAC/sysfs: Fix memory leak when creating a csrow object
+ - ipsec: select crypto ciphers for xfrm algo
+ - ipvs: defer hook registration to avoid leaks
+ - media: s5p-mfc: Make additional clocks optional
+ - media: i2c: fix warning same module names
+ - ntp: Limit TAI-UTC offset
+ - timer_list: Guard procs specific code
+ - acpi/arm64: ignore 5.1 FADTs that are reported as 5.0
+ - media: coda: fix mpeg2 sequence number handling
+ - media: coda: fix last buffer handling in V4L2_ENC_CMD_STOP
+ - media: coda: increment sequence offset for the last returned frame
+ - media: vimc: cap: check v4l2_fill_pixfmt return value
+ - media: hdpvr: fix locking and a missing msleep
+ - rtlwifi: rtl8192cu: fix error handle when usb probe failed
+ - mt7601u: do not schedule rx_tasklet when the device has been disconnected
+ - x86/build: Add 'set -e' to mkcapflags.sh to delete broken capflags.c
+ - mt7601u: fix possible memory leak when the device is disconnected
+ - ipvs: fix info memory leak in start_sync_thread
+ - ath10k: add missing error handling
+ - ath10k: fix PCIE device wake up failed
+ - perf tools: Increase MAX_NR_CPUS and MAX_CACHES
+ - libata: don't request sense data on !ZAC ATA devices
+ - clocks/designers/exynos_mct: Increase priority over ARM arch timer
+ - rslib: Fix decoding of shortened codes
+ - rslib: Fix handling of of caller provided syndrome
+ - ixgbe: Check DDM existence in transceiver before access
+ - crypto: serpent - mark __serpent_setkey_sbox noinline
+ - crypto: asymmetric_keys - select CRYPTO_HASH where needed
+ - EDAC: Fix global-out-of-bounds write when setting edac_mc_poll_msec
+ - bcache: check c->gc_thread by IS_ERR_OR_NULL in cache_set_flush()
+ - net: hns3: fix a -Wformat-nonliteral compile warning
+ - net: hns3: add some error checking in hclge_tm module
+ - ath10k: destroy sdio workqueue while remove sdio module
+ - iwlwifi: mvn: Drop large non sta frames
+ - perf stat: Make metric event lookup more robust
+ - net: usb: axi: init MAC address buffers
+ - gpiolib: Fix references to gpio[ds]et_*value_cansleep() variants
+ - Bluetooth:HCI: Fix memory leak in rx_skb
+ - Bluetooth: 6lowpan: search for destination address in all peers
+ - Bluetooth: Check state in l2cap_disconnect_rsp
+ - gtp: add missing gtp_encap_disable_sock() in gtp_encap_enable()
+ - Bluetooth: validate BLE connection interval updates
+ - gtp: fix suspicious RCU usage
+ - gtp: fix Illegal context switch in RCU read-side critical section.
+ - gtp: fix use-after-free in gtp_encap_destroy()
+ - gtp: fix use-after-free in gtp_newlink()
+ - net: mvmdio: defer probe of orion-mdio if a clock is not ready
+ - iavl: fix dereference of null rx_buffer pointer
+ - floppy: fix out-of-bounds read in next_valid_format
+ - floppy: fix invalid pointer dereference in drive_name
+ - xen: let alloc_xenballooned_pages() fail if not enough memory free
+ - scsi: NCR5380: Reduce goto statements in NCR5380_select()
+ - scsi: NCR5380: Always re-enable reselection interrupt
+ - Revert "scsi: ncr5380: Increase register polling limit"
+ - scsi: core: Fix race on creating sense cache
+ - scsi: megaraid_sas: Fix calculation of target ID
+ - scsi: mac_scsi: Increase PIO/PDMA transfer length threshold
+ - scsi: mac_scsi: Fix pseudo DMA implementation, take 2
+ - crypto: ghash - fix unaligned memory access in ghash_setkey()
+ - crypto: ccp - Validate the the error value used to index error messages
+ - crypto: arm64/sha1-ce - correct digest for empty data in finup
+ - crypto: arm64/sha2-ce - correct digest for empty data in finup
+ - crypto: chacha20poly1305 - fix atomic sleep when using async algorithm
+ - crypto: ccp - memset structure fields to zero before reuse
+ - crypto: ccp/gcm - use const time tag comparison.
+ - crypto: crypto4xx - fix a potential double free in ppc4xx_trng_probe
+ - Input: gtc0 - bounds check collection indent level
+ - Input: alps - don't handle ALPS cs19 trackpoint-only device
+ - Input: synaptics - whitelist Lenovo T580 SMBus intertouch
+ - Input: alps - fix a mismatch between a condition check and its comment
+ - regulator: s2mpsh: Fix buck7 and buck8 wrong voltages
+ - arm64: tegra: Update Jetson TX1 GPU regulator timings
+ - iwlwifi: pcie: don't service an interrupt that was masked
+ - iwlwifi: pcie: fix ALIVE interrupt handling for gen2 devices w/o MSI-X
+ - NFSv4: Handle the special Linux file open access mode
+ - pfns/flexfiles: Fix PTR_ERR() dereferences in ff_layout_track_ds_error
+ - lib/scatterlist: Fix mapping iterator when sg->offset is greater than
+ - PAGE_SIZE
+ - ASoC: dapm: Adapt for debugfs API change
+ - ALSA: seq: Break too long mutex context in the write loop
+ - media: v4l2: Test type instead of cfg->type in v4l2_ctrl_new_custom()
+ - media: coda: Remove unbalanced and unneeded mutex unlock
+ - KVM: x86/PMU: refine kvm_pmum err msg when event creation failed
+ - arm64: tegra: Fix AGIC register range
+ - fs/proc/proc_sysctl.c: fix the default values of i_uid/i_gid on /proc/sys
+ - inodes.
+ - drm/nouveau/i2c: Enable i2c pads & busses during preinit
+ - padata: use smp_mb in padata_reorder to avoid orphaned padata jobs
+ - dm zoned: fix zone state management race
+ - xen/events: fix binding user event channels to cpus
+ - 9p/xen: Add cleanup path in p9_trans_xen_init
+ - 9p/virtio: Add cleanup path in p9_virtio_init
+ - x86/boot: Fix memory leak in default_get_smp_config()
+ - perf/x86/amd/uncore: Do not set 'ThreadMask' and 'SliceMask' for non-L3 PMCs
+ - perf/x86/amd/uncore: Set the thread mask for F17h L3 PMCs
+ - intel_th: pci: Add Ice Lake NNPI support
+ - PCI: Do not poll for PME if the device is in D3cold
+ - Btrfs: fix data loss after inode eviction, renaming it, and fsync it
+ - Btrfs: fix fsync not persisting dentry deletions due to inode evictions
+ - Btrfs: add missing inode version, ctime and mtime updates when punching hole
+ - HID: wacom: generic: only switch the mode on devices with LEDs
+ - HID: wacom: correct touch resolution x/y typo
+ - libnvdimm/pfn: fix fsdax-mode namespace info-block zero-fields
+ - oda: pass the host file in vma->vm_file on mmap
+ - gpu: ipu-v3: ipu-ic: Fix saturation bit offset in TPMEM
+ - PCI: hv: Fix a use-after-free bug in hv_eject_device_work()
+ - crypto: caam - limit output IV to CBC to work around CTR mode DMA issue
+ - parisc: Ensure userspace privilege for ptraced processes in regset functions
+ - parisc: Fix kernel panic due invalid values in IAOQ0 or IAOQ1
+ - powerpc32s: fix suspend/resume when IBATs 4-7 are used
+ - powerpc/watchpoint: Restore NV GPRs while returning from exception
+ - eCryptfs: fix a couple type promotion bugs
+ - intel_th: msu: Fix single mode with disabled IOMMU
+ - Bluetooth: Add SMP workaround Microsoft Surface Precision Mouse bug
+ - usb: Handle USB3 remote wakeup for LPM enabled devices correctly
+ - net: mvmdio: allow up to four clocks to be specified for orion-mdio
+ - dt-bindings: allow up to four clocks for orion-mdio
+ - dm bufio: fix deadlock with loop device
+ - compiler.h, kasan: Avoid duplicating __read_once_size_nocheck()
+ - compiler.h: Add read_word_at_a_time() function.
+ - lib/strscpy: Shut up KASAN false-positives in strscpy()
+ - bnx2x: Prevent load reorderding in tx completion processing
+ - caif-hsi: fix possible deadlock in cfhsi_exit_module()
+ - igmp: fix memory leak in igmpv3_del_delrec()
+ - ipv4: don't set IPv6 only flags to IPv4 addresses
+ - net: bcmgenet: use promisc for unsupported filters
+ - net: dsa: mv88e630xx: wait after reset deactivation
+ - net: neigh: fix multiple neigh timer scheduling
+ - net: openswswitch: fix csum updates for MPLS actions
+ - net: fix potential illegal memory access
+ - netrm: Fix send on a connected, but unbound socket
+ - sky2: Disable MSI on ASUS P6T
+ - vrf: make sure skb->data contains ip header to make routing
+ - macsec: fix use-after-free of skb during RX
+ - macsec: fix checksumming after decryption
+ - netrom: fix a memory leak in nr_rx_frame()
+ - netrom: hold sock when setting skb->destructor
+ - bonding: validate ip header before check IPPROTO IGMP
+ - net: make skb_dst_force return true when dst is refcounted
+ - tcp: fix tcp_set_congestion_control() use from bpf hook
+ - tcp: Reset bytes_acked and bytes_received when disconnecting
+ - net: bridge: mcast: fix stale nsrsc pointer in igmp3/mld2 report handling
+ - net: bridge: mcast: fix stale ipv6 hdr pointer when handling v6 query
+ - net: bridge: stp: don't cache eth dest pointer before skb pull
+ - dma-buf: balance refcount imbalance
+ - dma-buf: Discard old fence_excl on retrying get_fences_rcu for realloc
+ - MIPS: lb60: Fix pin mappings
+ - ext4: don't allow any modifications to an immutable file
+ ext4: enforce the immutable flag on open files
+ mm: add filemap_fdwait_range_keep_errors()
+ jbd2: introduce jbd2_inode dirty range scoping
+ ext4: use jbd2_inode dirty range scoping
+ ext4: allow directory holes
+ mm: vmscan: scan anonymous pages on file refaults
+ hvsock: fix epollout hang from race condition
+ drm/panel: simple: Fix panel_simple_dsi_probe
+ usb: core: hub: Disable hub-initiated U1/U2
+ tty: max310x: Fix invalid baudrate divisors calculator
+ pinctrl: rockchip: fix leaked_of_node references
+ tty: serial: cpm_uart - fix init when SMC is relocated
+ drm/edid: Fix a missing-check bug in drm_load_edid_firmware()
+ PCI: Return error if cannot probe VF
+ drm/bridge: tc358767: read display_props in get_modes()
+ drm/bridge: si902x: pixel clock unit is 10kHz instead of 1kHz
+ drm/crc-debugfs: User irqsafe spinlock in drm_crtc_add_crc_entry
+ mm: vmscan: scan anonymous pages on file refaults
+ drm/bridge: tc358767: read display_props in get_modes()
+ drm/bridge: si902x: pixel clock unit is 10kHz instead of 1kHz
+ drm/crc-debugfs: User irqsafe spinlock in drm_crtc_add_crc_entry
+ memstick: Fix error cleanup path of memstick_init
+ tty/serial: digicolor: Fix digicolor-usart already registered warning
+ tty: serial: msm_serial: avoid system lockup condition
+ serial: 8250: Fix TX interrupt handling condition
+ drm/virtio: Add memory barriers for capset cache.
+ phy: renesas: rcar-gen2: Fix memory leak at error paths
+ powerpc/pseries/mobility: prevent cpu hotplug during DT update
+ drm/rockchip: Properly adjust to a true clock in adjusted_mode
+ tty: serial_core: Set port active bit in uart_port_activate
+ usb: gadget: Zero ffs_io_data
+ powerpc/pci/of: Fix OF flags parsing for 64bit BARs
+ drm/msm: Depopulate platform on probe failure
+ serial: mctrl_gpio: Check if GPIO property exists before requesting it
+ PCI: sysfs: Ignore lockdep for remove attribute
+ kbuild: Add -Werror=unknown-warning-option to CLANG_FLAGS
+ PCI: xilinx-nwl: Fix Multi MSI data programming
+ iio: iio-utils: Fix possible incorrect mask calculation
+ powerpc/xmon: Fix disabling tracing while in xmon
+ recordmcount: Fix spurious mcount entries on powerpc
+ mfd: core: Set fwnode for created devices
+ mfd: arizona: Fix undefined behavior
+ mfd: hi655x-pmic: Fix missing return value check for
+ devm_regmap_init_mmio_clk
+ um: Silence lockdep complaint about mmmap_sem
+ powerpc/4xx/uic: clear pending interrupt after irq type/pol change
+ RDMA/i40iw: Set queue pair state when being queried
+ serial: sh-sci: Terminate TX DMA during buffer flushing
+ serial: sh-sci: Fix TX DMA buffer flushing and workqueue races
+ kallsyms: exclude kasan local symbols on s390
+ perf test mmap-thread-lookupt: Initialize variable to suppress memory
+ sanitizer warning
+ perf session: Fix potential NULL pointer dereference found by the smatch tool
+ perf annotate: Fix dereferencing freed memory found by the smatch tool
+ RDMA/rxe: Fill in wc byte_len with IB_WC_RECV_RDMA_WITH_IMM
+ PCI: dwc: pci-dra7xx: Fix compilation when !CONFIG_GPIOLIB
+ powerpc/boot: add {get, put}_unaligned_be32 to xz_config.h
+ 12fs: avoid out-of-range memory access
+ mailbox: handle failed named mailbox channel request
+ powerpc/eeh: Handle hugepages in ioremap space
+ block/bio-integrity: fix a memory leak bug
+ sh: prevent warnings when using iounmap
+ mm/kmemleak.c: fix check for softirq context
+ 9p: pass the correct prototype to read_cache_page
+ mm/gup.c: mark undo_dev_pagemap as __maybe_unused
+ mm/gup.c: remove some BUG_ONs from get_gate_page()
+ mm/mmu_notifier: use hlist_add_head_rcu()
+ locking/lockdep: Fix lock used or unused stats error
+ locking/lockdep: Hide unused ‘class’ variable
+ drm/crc: Only report a single overflow when a CRC fd is opened
+ drm/crc-debugfs: Also sprinkle irqrestore over early exits
+ usb: wusbcore: fix unbalanced get/put cluster_id
+ usb: pci-quirks: Correct AMD PLL quirk detection
+ KVM: nVMX: do not use dangling shadow VMCS after guest reset
+ btrfs: inode: Don't compress if NODATASUM or NODATACOW set
+ x86/sysfb_efi: Add quirks for some devices with swapped width and height
+ x86/speculation/mds: Apply more accurate check on hypervisor platform
+ binder: prevent transactions to context manager from its own process.
+ fpga-manager: altera-ps-spi: Fix build error
+ hpet: Fix division by zero in hpet_time_div()
+ powerpc/xive: Fix loop exit-condition in xive_find_target_in_mask()
+ powerpc/tm: Fix oops on sigreturn on systems without TM
+ access: avoid the RCU grace period for the temporary subjective credentials
+ batman-adv: Fix duplicated OGMs on NETDEV_UP
+ net: hns3: set ops to null when unregister ad_dev
+ x86/cpu: Add Ice Lake NNPI to Intel family
+ qed: iWARP - Fix tc for MPA ll2 connection
+ net: hns3: fix for skb leak when doing selftest
+ sched/fair: Fix "runnable_avg_yN_inv" not used warnings
+ x86/cachefi: Fix a -Wtype-limits warning
+ nvme-pci: properly report state change failure in nvme_reset_work
+ nvme-pci: set the errno on ctrl state change error
+ arm64: Do not enable IRQs for ct_user_exit
+ net: stmmac: sun8i: force select external PHY when no internal one
+ bcache: check CACHE_SET_IO_DISABLE in allocator code
+ bcache: check CACHE_SET_IO_DISABLE bit in bch_journal()
+ bcache: acquire bch_register_lock later in cached_dev_free()
+ bcache: fix potential deadlock in cached_def_free()
+ perf stat: Fix group lookup for metric group
+ - tools: bpftool: Fix json dump crash on powerpc
+ - Bluetooth: Add a new 13d3:3496 QCA_ROME device
+ - Bluetooth: Add new 13d3:3491 QCA_ROME device
+ - Bluetooth: Add new 13d3:3501 QCA_ROME device
+ - bcache: ignore read-ahead request failure on backing device
+ - bcache: fix mistaken sysfs entry for io_error counter
+ - bcache: destroy dc->writeback_write_wq if failed to create
+ - dc->writeback_thread
+ - iwlwifi: don't WARN when calling iwl_get_shared_mem_conf with RF-Kill
+ - iwlwifi: fix RF-Kill interrupt while FW load for gen2 devices
+ - ALSA: hda/realtek - Fixed Headphone Mic can't record on Dell platform
+ - media: videobuf2-core: Prevent size alignment wrapping buffer size to 0
+ - media: videobuf2-dma-sg: Prevent size from overflowing
+ - perf/x86/intel: Fix spurious NMI on fixed counter
+ - drm/edid: parse CEA blocks embedded in DisplayID
+ - PCI: qcom: Ensure that PERST is asserted for at least 100 ms
+ - IB/mlx5: Report correctly tag matching rendezvous capability
+ - include/asm-generic/bug.h: fix "cut here" for WARN_ON for __WARN_TAINT architectures
+ - xfs: fix pagecache truncation prior to reflink
+ - xfs: flush removing page cache in xfs_relink_remap_prep
+ - xfs: don't overflow xattr listent buffer
+ - xfs: don't ever put nlink > 0 inodes on the unlinked list
+ - xfs: fix reporting supported extra file attributes for statx()
+ - xfs: serialize unaligned dio writes against all other dio writes
+ - xfs: abort unaligned nowait directio early
+ - powerpc/powernv/npu: Fix reference leak
+ - powerpc/pseries: Fix oops in hotplug memory notifier
+ - mmc: sdhci-msm: fix mutex while in spinlock
+ - mtd: rawnand: mtk: Correct low level time calculation of r/w cycle
+ - blk-throttle: fix zero wait time for iops throttled group
+ - tcp: be more careful in tcp_fragment()
+ - net/mlx5e: IPoIB, Add error path in mlx5_rdma_setup_rn
+ - net_sched: unset TCQ_F_CAN_BYPASS when adding filters
+ - net: bridge: don't cache ether dest pointer on input
+ - net: sched: verify that q!=NULL before setting q->flags
+ - Line 6 POD HD500 driver fault (LP: #1790595) // Bionic update: upstream
+ - stable patchset 2019-08-05 (LP: #1839036)
+ - ALSA: line6: Fix wrong altsetting for LINE6_PODHD500_1
+ - Bionic update: upstream stable patchset 2019-08-02 (LP: #1838824)
+ - rapidio: fix a NULL pointer dereference when create_workqueue() fails
+ - fs/fat/file.c: issue flush after the writeback of FAT
+ - sysctl: return -EINVAL if val violates minmax
+ - ipc: prevent lockup on alloc_msg and free_msg
+ - ARM: prevent tracing IPL_CPU_BACKTRACE
+ - mm/hmm: select mmu notifier when selecting HMM
+ - hugetlbfs: on restore reserve error path retain subpool reservation
+ - mem-hotplug: fix node spanned pages when we have a node with only
  ZONE_MOVABLE
+ - mm/cma.c: fix crash on CMA allocation if bitmap allocation fails
+ - mm/cma.c: fix the bitmap status to show failed allocation reason
+ - mm/cma_debug.c: fix the break condition in cma_maxchunk_get()
+ - mm/slab.c: fix an infinite loop in leaks_show()
+ - kernel/sys.c: prctl: fix false positive in validate_prctl_map()
+ - thermal: rcar_gen3_thermal: disable interrupt in _remove
+ - drivers: thermal: tsens: Don't print error message on -EPROBE_DEFER
+ - mfd: tsp65912-spi: Add missing of table registration
+ - mfd: intel-lpss: Set the device in reset state when init
+ - drm/nouveaudispdp: respect sink limits when selecting failsafe link
+ configuration
+ - mfd: twl6040: Fix device init errors for ACCCTL register
+ - perf/x86/intel: Allow PEBS multi-entry in watermark mode
+ - drm/bridge: adv7511: Fix low refresh rate selection
+ - objtool: Don't use ignore flag for fake jumps
+ - EDAC/mpc85xx: Prevent building as a module
+ - pwm: meson: Use the spin-lock only to protect register modifications
+ - ntp: Allow TAI-UTC offset to be set to zero
+ - f2fs: fix to avoid panic in do_recover_data()
+ - f2fs: fix to clear dirty inode in error path of f2fs_iget()
+ - f2fs: fix to avoid panic in dec_valid_block_count()
+ - f2fs: fix to do sanity check on valid block count of segment
+ - percpu: remove spurious lock dependency between percpu and sched
+ - configs: fix possible use-after-free in configs_register_group
+ - uml: fix a boot splat wrt use of cpu_all_mask
+ - mmc: mmc: Prevent polling for busy detection in IRQ context
+ - watchdog: imx2_wdt: Fix set_timeout for big timeout values
+ - watchdog: fix compile time error of pretimeout governors
+ - blk-mq: move cancel of requeue_work into blk_mq_release
+ - iommu/vt-d: Set intel_iommu_gfx_mapped correctly
+ - misc: pci_endpoint_test: Fix test_reg_bar to be updated in pci_endpoint_test
+ - nvme-pci: unquiesce admin queue on shutdown
+ - ALSA: hda - Register irq handler after the chip initialization
+ - nvmem: core: fix read buffer in place
+ - fuse: retrieve: cap requested size to negotiated max_write
+ - nfsd: allow fh_wait_write to be called twice
+ - vio: Fix WARNING "do not call blocking ops when !TASK_RUNNING"
+ - x86/PCI: Fix PCI IRQ routing table memory leak
+ - platform/chrome: cros_ec_proto: check for NULL transfer function
+ - PCI: keystone: Prevent ARM32 specific code to be compiled for ARM64
+ - soc: mediatek: pwrap: Zero initialize rdata in pwrap_init_cipher
+ - clk: rockchip: Turn on "aclk_dmac1" for suspend on rk3288
+ - soc: rockchip: Set the proper PWM for rk3288
+ - ARM: dts: imx51: Specify IMX5_CLK_JPG as "ahb" clock to SDMA
+ - ARM: dts: imx50: Specify IMX5_CLK_JPG as "ahb" clock to SDMA
+ - ARM: dts: imx53: Specify IMX5_CLK_IPG as "ahb" clock to SDMA
+ - ARM: dts: imx6sx: Specify IMX6SX_CLK_IPG as "ahb" clock to SDMA
+ - ARM: dts: imx7d: Specify IMX7D_CLK_IPG as "ipg" clock to SDMA
+ - ARM: dts: imx6ul: Specify IMX6UL_CLK_IPG as "ipg" clock to SDMA
+ - ARM: dts: imx6sx: Specify IMX6SX_CLK_IPG as "ipg" clock to SDMA
+ - ARM: dts: imx6qdl: Specify IMX6QDL_CLK_IPG as "ipg" clock to SDMA
+ - PCI: radm: Fix leaked device_node references in add/remove paths
+ - platform/x86: intel_pmc_ipc: adding error handling
+ - power: supply: max14656: fix potential use-before-alloc
+ - PCI: rcar: Fix a potential NULL pointer dereference
+ - PCI: rcar: Fix 64bit MSI message address handling
+ - video: hgafb: fix potential NULL pointer dereference
+ - video: imx6qdl: fix potential NULL pointer dereferences
+ - block, bfq: increase idling for weight-raised queues
+ - PCI: xilinx: Check for __get_free_pages() failure
+ - gpio: gpio-omap: add check for off wake capable gpis
+ - dmaengine: idma64: Use actual device for DMA transfers
+ - pwm: tiehpwm: Update shadow register for disabling PWMs
+ - ARM: dts: exynos: Always enable necessary APIO_1V8 and ABB_1V8 regulators on
  Arndale Octa
+ - pwm: Fix deadlock warning when removing PWM device
+ - ARM: exynos: Fix undefined instruction during Exynos5422 resume
+ - usb: typec: fusb302: Check vconn is off when we start toggling
+ - gpio: v610: Do not share irq_chip
+ - percpu: do not search past bitmap when allocating an area
+ - drm: don't block fb changes for async plane updates
+ - ALSA: seq: Cover unsubscribe_port() in list_mutex
+ - initransfs: free initrd memory if opening /initrd.image fails
+ - bpf: fix undefined behavior in narrow load handling
+ - f2fs: fix to avoid panic in f2fs_remove_inode_page()
+ - f2fs: fix to use inline space only if inline_xattr is enable
+ - netfilter: nf_conntrack_h323: restore boundary check correctness
+ - mips: Make sure dt memory regions are valid
+ - nvmem: sunxi_sid: Support SID on A83T and H5
+ - nfsd: avoid uninitialized variable warning
+ - switchtec: Fix unintended mask of MRPC event
+ - net: thunderbolt: Unregister ThunderboltIP protocol handler when suspending
+ - i40e: Queues are reserved despite "Invalid argument" error
+ - net: hns3: return 0 and print warning when hit duplicate MAC
+ - soc: renesas: Identify R-Car M3-W ES1.1
+ - soc: renesas: Identify R-Car M3-W ES1.3
+ - [Config] updateconfigs for CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT
+ - drm/nouveau: add kconfig option to turn off nouveau legacy contexts. (v3)
+ - nouveau: Fix build with CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT disabled
+ - HID: wacom: Correct button numbering 2nd-gen Intuos Pro over Bluetooth
+ - HID: wacom: Sync INTUOSP2_BT touch state after each frame if necessary
+ - ALSA: oxfw: allow PCM capture for Stanton SCS.1m
+ - ALSA: hda/realtek - Update headset mode for ALC256
+ ALSA: firewire-motu: fix destruction of data for isochronous resources
+ libata: Extend quirks for the ST1000LM024 drives with NOLPM quirk
+ mm/list_lru.c: fix memory leak in __memcg_init_list_lru_node
+ fs/ocfs2: fix race in ocfs2_dentry_attach_lock()
+ mm/vmscan.c: fix trying to reclaim unevictable LRU page
+ signal/ptrace: Don't leak uninitialized kernel memory with PTRACE_PEEK_SIGINFO
+ ptrace: restore smp_rmb() in __ptrace_may_access()
+ media: v4l2-ioctl: clear fields in s_parm
+ iommu-arm-smmu: Avoid constant zero in TLBI writes
+ i2c: acorn: fix i2c warning
+ bcache: fix stack corruption by PRECEDING_KEY()
+ cgroup: Use css_tryget() instead of css_tryget_online() in task_get_css()
+ ASoC: cs42xx8: Add regcache mask dirty
+ ASoC: fsl_asrc: Fix the issue about unsupported rate
+ drm/i915/sdvo: Implement proper HDMI audio support for SDVO
+ x86/uaccess, kcov: Disable stack protector
+ ALSA: seq: Protect in-kernel ioctl calls with mutex
+ ALSA: seq: Fix race of get-subscription call vs port-delete ioctls
+ Revert "ALSA: seq: Protect in-kernel ioctl calls with mutex"
+ s390/kasan: fix strncpy_from_user kasan checks
+ Drivers: misc: fix out-of-bounds access in function param_set_kgdbts_var
+ scsi: qed: remove memset/memcpy to nfunc and use func instead
+ scsi: qed: remove set but not used variables 'cdev' and 'udev'
+ scsi: lpfc: add check for loss of ndlp when sending RRQ
+ arm64/mm: Inhibit huge-vmap with ptdump
+ nvme: remove the ifdef around nvme_nvm_ioctl
+ platform/x86: pmc_atom: Add Lex 31380D industrial PC to critelk_systems DMI table
+ platform/x86: pmc_atom: Add several Beckhoff Automation boards to critelk_systems DMI table
+ scsi: bnx2fc: fix incorrect cast to u64 on shift operation
+ libnvdimm: Fix compilation warnings with W=1
+ selftests/timers: Add missing fflush(stdout) calls
+ usbnet: ipheth: fix racing condition
+ KVM: x86/pmu: do not mask the value that is written to fixed PMUs
+ KVM: s390: fix memory slot handling for KVM_SET_USER_MEMORY_REGION
+ drm/vmwgfx: integer underflow in vmw_cmd_dx_set_shader() leading to an invalid read
+ drm/vmwgfx: NULL pointer dereference from vmw_cmd_dx_view_define()
+ usb: dwc2: Fix DMA cache alignment issues
+ usb: dwc2: host: Fix wMaxPacketSize handling (fix webcam regression)
+ USB: Fix chipmunk-like voice when using Logitech C270 for recording audio.
+ USB: serial: pl2303: add Allied Telesis VT-Kit3
+ USB: serial: option: add support for Simcom SIM7500/SIM7600 RNDIS mode
+ USB: serial: option: add Telit 0x1260 and 0x1261 compositions
+ RAS/CEC: Fix binary search function
+ x86/microcode, cpuhotplug: Add a microcode loader CPU hotplug callback
+ x86/kasan: Fix boot with 5-level paging and KASAN
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+ - rtc: pcf8523: don't return invalid date when battery is low
+ - HID: wacom: Don't set tool type until we're in range
+ - HID: wacom: Don't report anything prior to the tool entering range
+ - HID: wacom: Send BTN_TOUCH in response to INTUOSP2_BT eraser contact
+ - bcache: only set BCACHE_DEV_WB_RUNNING when cached device attached
+ - i2fs: fix to avoid accessing xattr across the boundary
+ - nvme: fix scru locking on error return in nvme_get_ns_from_disk
+ - nvme: merge nvme_ns_ioctl into nvme_ioctl
+ - nvme: release namespace SRCU protection before performing controller ioclt
+ - nvme: fix memory leak for power latency tolerance
+ - KVM: x86/pmu: mask the result of rdpmc according to the width of the counters
+ - tools/kvm_stat: fix fields filter for child events
+ - RAS/CEC: Convert the timer callback to a workqueue
+ - x86/mm/KASLR: Compute the size of the vmemmap section properly
+ - ax25: fix inconsistent lock state in ax25_destroy_timer
+ - be2net: Fix number of Rx queues used for flow hashing
+ - ipv6: flowlabel: fl6_sock_lookup() must use atomic_inc_not_zero
+ - lapb: fixed leak of control-blocks.
+ - neigh: fix use-after-free read in pneigh_get_next
+ - net: openswitch: do not free vport if register_netdevice() is failed.
+ - scctp: Free cookie before we memdup a new one
+ - sunhv: Fix device naming inconsistency between sunhv_console and sunhv_reg
+ - Staging: vc04_services: Fix a couple error codes
+ - perf/x86/intel/ds: Fix EVENT vs. UEVENT PEBS constraints
+ - netfilter: nf_queue: fix reinject verdict handling
+ - ipvs: Fix use-after-free in ip_vs_in
+ - selftests: netfilter: missing error check when setting up veth interface
+ - clk: ti: clkctrl: Fix clkdm_clk handling
+ - powernv: Return for invalid IMC domain
+ - mISDN: make sure device name is NUL terminated
+ - x86/CPU/AMD: Don't force the CPB cap when running under a hypervisor
+ - perf/ring_buffer: Fix exposing a temporarily decreased data_head
+ - perf/ring_buffer: Add ordering to rb->nest increment
+ - perf/ring-buffer: Always use [READ,WRITE]_ONCE() for rb->user_page data
+ - gpio: fix gpio-adv5588 build errors
+ - net: tulip: de4x5: Drop redundant MODULE_DEVICE_TABLE()
+ - net: aquantia: fix LRO with FCS error
+ - dev: dev: fix potential memory leak in i2cdev_ioctl_rdwr
+ - ALSA: hda - Force polling mode on CNL for fixing codec communication
+ - configfs: Fix use-after-free when accessing sd->s_dentry
+ - perf data: Fix 'strncat may truncate' build failure with recent gcc
+ - perf record: Fix s390 missing module symbol and warning for non-root users
+ - ia64: fix build errors by exporting paddr_to_nid()
+ - KVM: PPC: Book3S: Use new mutex to synchronize access to rtas token list
+ - KVM: PPC: Book3S HV: Don't take kvm->lock around kvm_for_each_vcpu
+ - net: sh_eth: fix mdio access in sh_eth_close() for R-Car Gen2 and RZ/A1 SoCs
+ - net: phy: dp83867: Set up RGMII TX delay
- scsi: libcxbgi: add a check for NULL pointer in cxgbib_check_route()
- scsi: smartpqi: properly set both the DMA mask and the coherent DMA mask
- scsi: scsi_db_alua: Fix possible null-ptr-deref
- scsi: libasas: delete sas port if expander discover failed
- mlxsw: spectrum: Prevent force of 56G
- coredump: fix race condition between collapse_huge_page() and core dumping
- infiniband: fix race condition between infiniband mlx4, mlx5 driver and core dumping
- Abort file_remove_prvys() for non-reg. files
- tipc: purge deferreqd list for each grp member in tipc_group_delete
- vsoc/k/virtio: set SOCK_DONE on peer shutdown
- usb: xhci: Fix a potential null pointer dereference in xhci_debugfs_create_endpoint()
- ACPI/PCI: PM: Add missing wakeup.flags.valid checks
- drm/etnaviv: lock MMU while dumping core
- net: aquantia: tx clean budget logic error
- perf namespace: Protect reading thread's namespace
- xen/pvcalls: Remove set but not used variable
- xen: xenbus: Catch closing of non existent transactions
- xen: xenbus_dev_frontend: Verify body of XS_TRANSACTION_END
- xenbus: Avoid deadlock during suspend due to open transactions
- tracing: Silence GCC 9 array bounds warning
- objtool: Support per-function rodata sections
- gcc-9: silence 'address-of-packed-member' warning
- net: phy: broadcom: Use strlcpy() for ethtool::get_strings
- mmc: core: Prevent processing SDIO IRQs when the card is suspended
- scsi: ufs: Avoid runtime suspend possibly being blocked forever
- ush: chipidea: udc: workaround for endpoint conflict issue
- IB/hfi1: Silence txreq allocation warnings
- Input: synaptics - enable SMBus on ThinkPad E480 and E580
- Input: uinput - add compat ioctl number translation for UI_*_FF_UPLOAD
- apparmor: enforce nullbyte at end of tag string
- ARC: fix build warnings
- ARC: [plat-hsdk]: Add missing multicast filter bins number to GMAC node
- ARC: [plat-hsdk]: Add missing FIFO size entry in GMAC node
- parport: Fix mem leak in parport_register_dev_model
- parisc: Fix compiler warnings in float emulation code
- IB/rdmavt: Fix alloc_qpn() WARN_ON()
- IB/hfi1: Insure freeze_work work_struct is canceled on shutdown
- IB/{qib, hfi1, rdmavt}: Correct ibv_devinfo max_mr value
- IB/hfi1: Validate page aligned for a given virtual address
- MIPS: uprobes: remove set but not used variable 'epc'
- xtensa: Fix section mismatch between memblock_reserve and mem_reserve
- net: dsb: mv88e6xx: avoid error message on remove from VLAN 0
- net: hns: Fix loopback test failed at copper ports
- mdesc: fix a missing-check bug in get_vdev_port_node_info()
- sparc: perf: fix updated event period in response to PERF_EVENT_IOC_PERIOD
- net: ethernet: mediatek: Use hw_feature to judge if HWLRO is supported
+ - net: ethernet: mediatek: Use NET_IP_ALIGN to judge if HW RX_2BYTE_OFFSET is enabled
+ - drm/arm/hdlcd: Actually validate CRTC modes
+ - drm/arm/hdlcd: Allow a bit of clock tolerance
+ - scripts/checkstack.pl: Fix arm64 wrong or unknown architecture
+ - scsi: ufs: Check that space was properly allocated in copy_query_response
+ - scsi: smartpqi: unlock on error in pqi_submit_raid_request_synchronous()
+ - net: ipvlan: Fix ipvlan device tso disabled while NETIF_F_IP_CSUM is set
+ - s390/qeth: fix VLAN attribute in bridge_hostnotify udev event
+ - hwmon: (core) add thermal sensors only if dev->of_node is present
+ - hwmon: (pmbus/core) Treat parameters as paged if on multiple pages
+ - nvme: Fix u32 overflow in the number of namespace list calculation
+ - btrfs: start readahead also in seed devices
+ - can: flexcan: fix timeout when set small bitrate
+ - can: purge socket error queue on sock destruct
+ - powerpc/bpf: use unsigned division instruction for 64-bit operations
+ - ARM: imx: cpuidle-imx6sx: Restrict the SW2ISO increase to i.MX6SX
+ - ARM: dts: am57xx-idk: Remove support for voltage switching for SD card
+ - Bluetooth: Align minimum encryption key size for LE and BR/EDR connections
+ - Bluetooth: Fix regression with minimum encryption key size alignment
+ - SMB3: retry on STATUS_INSUFFICIENT_RESOURCES instead of failing write
+ - cfg80211: fix memory leak of wiphy device name
+ - mac80211: drop robust management frames from unknown TA
+ - mac80211: handle deauthentication/disassociation from TDLS peer
+ - mac80211: Do not use stack memory with scatterlist for GMAC
+ - s390/jump_label: Use "jdd" constraint on gcc9
+ - s390/ap: rework assembler functions to use unions for in/out register variables
+ - mmc: core: API to temporarily disable retuning for SDIO CRC errors
+ - mmc: core: Add sdio_retune_hold_now() and sdio_retune_release()
+ - Input: silead - add MSSL0017 to acpi_device_id
+ - selftests: vm: install test_vmalloc.sh for run_vmtests
+ - arm64: Silence gcc warnings about arch ABI drift
+ - riscv: mm: synchronize MMU after pte change
+ - arm64/sve: <uapi/asm/ptrace.h> should not depend on <uapi/linux/prctl.h>
+ - drm/vmwgfx: Use the backdoor port if the HB port is not available
+ - [nl,mac]80211: allow 4addr AP operation on crypto controlled devices
+ - perf ui helpline: Use strlcpy() as a shorter form of strncpy() + explicit
+ - perf set nul
+ - perf help: Remove needless use of strncpy()
+ - perf header: Fix unchecked usage of strncpy()
+ - IB/hfi1: Close PSM sdma_progress sleep window
+ - 9p/xen: fix check for xenbus_read error in front_probe
+ - 9p/dma: do not disconnect on down_interruptible EAGAIN
+ - 9p: acl: fix uninitialized iattr access
+ - 9p/dma: remove useless check in cm_event_handler
+ - 9p: p9dirent_read: check network-provided name length
+ - net/9p: include trans_common.h to fix missing prototype warning.
+ - qmi_wwan: Fix out-of-bounds read
+ - fs/proc/array.c: allow reporting eip/esp for all coredumping threads
+ - mm/mempolicy.c: fix an incorrect rebind node in mpol_rebind_nodemask
+ - fs/bfs/int_flat.c: make load_flat_shared_library() work
+ - dm log writes: make sure super sector log updates are written in order
+ - scsi: vmw_psci: Fix use-after-free in pvscsi_queue_lck()
+ - x86/speculation: Allow guests to use SSBD even if host does not
+ - x86/microcode: Fix the microcode load on CPU hotspot for real
+ - NFS/flexfiles: Use the correct TCP timeout for flexfiles I/O
+ - cpu/speculation: Warn on unsupported mitigations= parameter
+ - eeprom: at24: fix unexpected timeout under high load
+ - af_packet: Block execution of tasks waiting for transmit to complete in
+ - AF_PACKET
+ - ipv4: Use return value of inet_iif() for __raw_v4_lookup in the while loop
+ - net/packet: fix memory leak in packet_set_ring()
+ - net: remove duplicate fetch in sock_getsockopt
+ - net: stmmac: fixed new system time seconds value calculation
+ - scct: change to hold sk after auth shkey is created successfully
+ - tipc: change to use register_pernet_device
+ - tipc: check msg->req data len in tipc_nl_compat_bearer_disable
+ - tun: wake up waitqueues after IFF_UP is set
+ - team: Always enable vlan tx offload
+ - bonding: Always enable vlan tx offload
+ - bpf: udp: Avoid calling reuseport's bpf_prog from udp_gro
+ - bpf: udp: ipv6: Avoid running reuseport's bpf_prog from __udp6_lib_err
+ - arm64: futex: Avoid copying out uninitialised stack in failed cmpxchg()
+ - bpf, arm64: use more scalable stadd over ldxr / stxr loop in xadd
+ - futex: Update comments and docs about return values of arch futex code
+ - tipc: pass tunnel dev as NULL to udp_tunnel(6)_xmit_skb
+ - arm64: insn: Fix ldadd instruction encoding
+ - arm64: Don't unconditionally add -Wno-psabi to KBUILD_CFLAGS
+ - irqchip/mips-gic: Use the correct local interrupt map registers
+ - Bluetooth: Fix faulty expression for minimum encryption key size check
+ - ASoC: cs4265: readable register too low
+ - ASoC: soc-pcm: BE dai needs prepare when pause release after resume
+ - spi: bitbang: Fix NULL pointer dereference in spi_unregister_master
+ - drm/mediatek: fix unbind functions
+ - drm/mediatek: call drm_atomic_helper_shutdown() when unbinding driver
+ - drm/mediatek: call mtk_dsi_stop() after mtk_drm_crtc_atomic_disable()
+ - ASoC: max98090: remove 24-bit format support if RJ is 0
+ - ASoC: sun4i-i2s: Fix sun8i tx channel offset mask
+ - ASoC: sun4i-i2s: Add offset to RX channel select
+ - usb: gadget: fusb300_udc: Fix memory leak of fusb300->ep[i]
+ - usb: gadget: udc: lpc32xx: allocate descriptor with GFP_ATOMIC
+ - SoC: rt274: Fix internal jack assignment in set_jack callback
+ - scsi: hpsa: correct ioaccel2 chaining
+ - platform/x86: mlx-platform: Fix parent device in i2c-mux-reg device
+ - registration
+ cpuset: restore sanity to cpuset_cpus_allowed_fallback()
+ scripts/decode_stacktrace.sh: prefix addr2line with $CROSS_COMPILE
+ mm/mlock.c: change count_mm_mlocked_page_nr return type
+ module: Fix livepatch/ftrace module text permissions race
+ ftrace: Fix NULL pointer dereference in free_ftrace_func_mapper()
+ MIPS: netlogic: xlr: Remove erroneous check in nlm_fmn_send()
+ drm/i915/dmc: protect against reading random memory
+ crypto: user - prevent operating on larval algorithms
+ crypto: cryptd - Fix skeycipher instance memory leak
+ ALSA: seq: fix incorrect order of dest_client/dest_ports arguments
+ ALSA: firewire-lib/fireworks: fix miss detection of received MIDI messages
+ ALSA: line6: Fix write on zero-sized buffer
+ ALSA: usb-audio: fix sign unintended sign extension on left shifts
+ ALSA: hda/realtek - Change front mic location for Lenovo M710q
+ lib/mpi: Fix karactx leak in mpi_powm
+ tracing/snapshot: Resize spare buffer if size changed
+ arm64: kaslr: keep modules inside module region when KASAN is enabled
+ drm/amd/dpg/gfx9: use reset default for PA_SC_FIFO_SIZE
+ drm/imx: notify drm core before sending event during crtc disable
+ drm/imx: only send event on crtc disable if kept disabled
+ ftrace/x86: Remove possible deadlock between register_kprobe() and
+ ftrace_run_update_code()
+ mm/vmscan.c: prevent useless kswapd loops
+ btrfs: Ensure replaced device doesn't have pending chunk allocation
+ vhost-net: set packet weight of tx polling to 2 * vq size
+ vhost-net: use packet weight for rx handler, too
+ vhost-net: introduce vhost_exceeds_weight()
+ vhost: introduce vhost_exceeds_weight()
+ vhost_net: fix possible infinite loop
+ vhost: socket: add weight support
+ vhost: scsi: add weight support
+ tty: rocket: fix incorrect forward declaration of 'rp_init()'
+ KVM: x86: degrade WARN to pr_warn_ratelimited
+ KVM: LAPIC: Fix pending interrupt in IRR blocked by software disable LAPIC
+ sverdma: Ignore source port when computing DRC hash
+ MIPS: Fix bounds check virt_addr_valid
+ MIPS: Add missing EHB in mtc0 -> mfc0 sequence.
+ dmaengine: imx-dma: remove BD_INTR for channel0
+ drm/mediatek: unbind components in mtk_drm_unbind()
+ drm/mediatek: clear num_pipes when unbind driver
+ x86/CPU: Add more Icelake model numbers
+ platform/x86: asus-wmi: Only Tell EC the OS will handle display hotkeys from
+ asus_nb_wmi
+ platform/x86: intel-vbtd: Report switch events when event wakes device
+ i2c: pca-platform: Fix GPIO lookup code
+ ALSA: hda/realtek: Add quirks for several Clevo notebook barebones
+ ARM: dts: armada-xp-98dx3236: Switch to armada-38x-uart serial node
+ drm/amd/powerplay: use hardware fan control if no powerplay fan table
- drm/etnaviv: add missing failure path to destroy suballoc
- mlxsw: spectrum: Handle VLAN device unlinking
- media: s5p-mfc: fix incorrect bus assignment in virtual child device
- net: hns: Fixes the missing put_device in positive leg for roce reset
- ALSA: hda: Initialize power_state field properly
- rds: Fix warning.
- ip6: fix skb leak in ip6frag_expire_frag_queue()
- netfilter: ipv6: nf_defrag: fix leakage of unqueued fragments
- sc16is7xx: move label 'err_spi' to correct section
- netfilter: ipv6: nf_defrag: accept duplicate fragments again
- net: hns: Fixes the missing put_device in positive leg for roce reset
- MIPS: have "plain" make calls build dtbs for selected platforms
- dmaengine: qcom: bam_dma: Fix completed descriptors count

* Bionic update: upstream stable patchset 2019-08-01 (LP: #1838700)
- x86: Hide the int3_emulate_call/jmp functions from UML
- ext4: do not delete unlinked inode from orphan list on failed truncate
- f2fs: Fix use of number of devices
- KVM: x86: fix return value for reserved EFER
- bio: fix improper use of smp_mb__before_atomic()
- sbitmap: fix improper use of smp_mb__before_atomic()
- Revert "scsi: sd: Keep disk read-only when re-reading partition"
- crypto: vmx - CTR: always increment IV as quadword
- mmc: sdhci-iproc: cygnus: Set NO_HISPD bit to fix HS50 data hold time problem
- mmc: sdhci-iproc: Set NO_HISPD bit to fix HS50 data hold time problem
- kvm: svm/avic: fix off-by-one in checking host APIC ID
- libnvdimm/pmem: Bypass CONFIG_HARDENED_USERCOPY overhead
- arm64/iommu: handle non-remapped addresses in ->mmap and ->get_sgtable
- gfs2: Fix sign extension bug in gfs2_update_stats
- Btrfs: do not abort transaction at btrfs_update_root() after failure to COW path
- Btrfs: avoid fallback to transaction commit during fsync of files with holes
- Btrfs: fix race between ranged fsync and writeback of adjacent ranges
- btrfs: sysfs: Fix error path kobject memory leak
- btrfs: sysfs: don't leak memory when failing add fsid
- fbdev: fix divide error in fb_var_to_videomode
- btrfs: honor path->skip_locking in backref code
- fbdev: fix WARNING in __alloc_pages_nodemask bug
- media: cpio2: Fix use-after-free in cpio2_exit
- media: serial_ir: Fix use-after-free in serial_ir_init_module
- media: vivid: use vfree() instead of kfree() for dev->bitmap_cap
- ssb: Fix possible NULL pointer dereference in ssb_host_pcmcia_exit
- bpf: devmap: fix use-after-free Read in __dev_map_entry_free
- batman-adv: mcast: fix multicast tt/tvlv worker locking
- at76c50x-usb: Don't register led_trigger if usb_register_driver failed
- net: erspan: fix use-after-free
- gfs2: Fix Iru_count going negative
+ cxgb4: Fix error path in cxgb4_init_module
+ - NFS: make nfs_match_client killable
+ - IB/hfi1: Fix WQ_MEM_RECLAIM warning
+ - gfs2: Fix occasional glock use-after-free
+ - mmc: core: Verify SD bus width
+ - tools/bpf: fix perf build error with uClibc (seen on ARC)
+ - dmaengine: tegra210-dma: free dma controller in remove()
+ - net: ena: gcc 8: fix compilation warning
+ - pinctrl: zte: fix leaked of_node references
+ - ASoC: hdmi-codec: unlock the device on startup errors
+ - powerpc/perf: Return accordingly on invalid chip-id in
+ - powerpc/boot: Fix missing check of lseek() return value
+ - ASoC: imx: fix fiq dependencies
+ - spi: pxa2xx: fix SCR (divisor) calculation
+ - brcm80211: potential NULL dereference in
+ - brcmf_cfg80211_vndr_cmds_dcmd_handler()
+ - ACPI / property: fix handling of data_nodes in acpi_get_next_subnode()
+ - ARM: vdso: Remove dependency with the arch_timer driver internals
+ - arm64: Fix compiler warning from pte_unmap() with -Wunused-but-set-variable
+ - sched/cpufreq: Fix kobject memleak
+ - scsi: qla2xxx: Fix a qla24xx_enable_msix() error path
+ - scsi: qla2xxx: Fix abort handling in tcm qla2xxx_write_pending()
+ - scsi: qla2xxx: Avoid that lockdep complains about unsafe locking in
tcm qla2xxx_close_session()
+ - Btrfs: fix data bytes_may_use underflow with fallocate due to failed quota
+ reserve
+ - btrfs: fix panic during relocation after ENOSPC before writeback happens
+ - btrfs: Don't panic when we can't find a root key
+ - iwlwifi: pcie: don't crash on invalid RX interrupt
+ - rtc: 88pm860x: prevent use-after-free on device remove
+ - scsi: qed: Abort ep termination if offload not scheduled
+ - w1: fix the resume command API
+ - dmaengine: pl330: __stop: clear interrupt status
+ - mac80211/cfg80211: update bss channel on channel switch
+ - libbpf: fix samples/bpf build failure due to undefined UINT32_MAX
+ - ASoC: fsl_sai: Update is_slave_mode with correct value
+ - mwifex: prevent an array overflow
+ - net: cw1200: fix a NULL pointer dereference
+ - crypto: sun4i-ss - Fix invalid calculation of hash end
+ - bcache: return error immediately in bch_journal_replay()
+ - bcache: fix failure in journal replay
+ - bcache: add failure check to run_cache_set() for journal replay
+ - bcache: avoid clang -Wuninitialized warning
+ - vfio-ccw: Do not call flush_workqueue while holding the spinlock
+ - vfio-ccw: Release any channel program when releasing/removing vfio-ccw mdev
+ - smpboot: Place the __percpu annotation correctly
+ - x86/mm: Remove in_nmi() warning from 64-bit implementation of
+ vmalloc_fault()
+ - mm/uaccess: Use 'unsigned long' to placate UBSAN warnings on older GCC versions
+ - HID: logitech-hidpp: use RAP instead of FAP to get the protocol version
+ - pinctrl: pistachio: fix leaked of_node references
+ - pinctrl: samsung: fix leaked of_node references
+ - clk: rockchip: undo several noc and special clocks as critical on rk3288
+ - dmaengine: at_xdmac: remove BUG_ON macro in tasklet
+ - media: coda: clear error return value before picture run
+ - media: ov6650: Move v4l2_clk_get() to ov6650_video_probe() helper
+ - media: au0828: stop video streaming only when last user stops
+ - media: ov2659: make S_FMT succeed even if requested format doesn't match
+ - audit: fix a memory leak bug
+ - media: stm32-dcmi: fix crash when subdev do not expose any formats
+ - media: au0828: Fix NULL pointer dereference in au0828_analog_stream_enable()
+ - media: pvrusb2: Prevent a buffer overflow
+ - powerpc/64: Fix booting large kernels with STRICT_KERNEL_RWX
- random: add a spinlock_t to struct batched_entropy
- cgroup: protect cgroup->nr_(dying_descendants by css_set_lock
- sched/core: Check quota and period overflow at usec to nsec conversion
- sched/rt: Check integer overflow at usec to nsec conversion
- sched/core: Handle overflow in cpu_shares_write_u64
- - drm/msm: a5xx: fix possible object reference leak
+ - USB: core: Don't unbind interfaces following device reset failure
- x86/irq/64: Limit IST stack overflow check to #DB stack
- phy: sun4i-usb: Make sure to disable PHY0 passby for peripheral mode
- i40e: Able to add up to 16 MAC filters on an untrusted VF
- i40e: don't allow changes to HW VLAN stripping on active port VLANs
- arm64: vdo: Fix clock_getres() for CLOCK_REALTIME
- - RDMA/cxgb4: Fix null pointer dereference on alloc_skb failure
- hwmon: (vt1211) Use request_mixed_region for Super-IO accesses
+ - hwmon: (smacc47m1) Use request_mixed_region for Super-IO accesses
+ - hwmon: (smacc47b397) Use request_mixed_region for Super-IO accesses
+ - hwmon: (pc87427) Use request_mixed_region for Super-IO accesses
+ - hwmon: (71805f) Use request_mixed_region for Super-IO accesses
+ - scsi: libsas: Do discovery on empty PHY to update PHY info
+ - mmc: core: make pwrseq_emmc (partially) support sleepy GPIO controllers
+ - mmc_spi: add a status check for spi_sync_locked
- mmc: sdhci-of-esdhc: add erratum eSDHC5 support
- mmc: sdhci-of-esdhc: add erratum A-009204 support
- mmc: sdhci-of-esdhc: add erratum eSDHC-A001 and A-008358 support
- drm/amdgpu: fix old fence check in amdgpu_fence_emit
- PM/core: Propagate dev->power.wakeup_path when no callbacks
- clk: rockchip: Fix video codec clocks on rk3288
- extcon: arizona: Disable mic detect if running when driver is removed
- clk: rockchip: Make rkpwm a critical clock on rk3288
- s390: zcrypt: initialize variables before_use
- x86/microcode: Fix the ancient deprecated microcode loading method
- s390: cio: Fix the ancient deprecated microcode loading method
+ - cpufreq: ppc_cbe: fix possible object reference leak
+ - cpufreq/pasemi: fix possible object reference leak
+ - cpufreq: pmac32: fix possible object reference leak
+ - cpufreq: kirkwood: fix possible object reference leak
+ - block: sed-opal: fix IOC_OPAL_ENABLE_DISABLE_MBR
+ - x86/build: Keep local relocations with ld.lld
+ - iio: ad_sigma_delta: Properly handle SPI bus locking vs CS assertion
+ - iio: hmc5843: fix potential NULL pointer dereferences
+ - iio: common: ssp_sensors: Initialize calculated_time in
+ - ssp_common_process_data
+ - rtlwifi: fix a potential NULL pointer dereference
+ - mwifiex: Fix mem leak in mwifiex_tm_cmd
+ - brcmfmac: fix missing checks for kmemdup
+ - b43: shut up clang -Wuninitialized variable warning
+ - brcmfmac: convert dev_init_lock mutex to completion
+ - brcmfmac: fix WARNING during USB disconnect in case of unempty psq
+ - brcmfmac: fix race during disconnect when USB completion is in progress
+ - brcmfmac: fix Oops when bringing up interface during USB disconnect
+ - rtc: xgene: fix possible race condition
+ - rtlwifi: fix potential NULL pointer dereference
+ - scsi: ufs: Fix regulator load and icc-level configuration
+ - scsi: ufs: Avoid configuring regulator with undefined voltage range
+ - arm64: cpu_ops: fix a leaked reference by adding missing of_node_put
+ - x86/uaccess, signal: Fix AC=1 bloat
+ - x86/a32: Fix ia32_restore_sigcontext() AC leak
+ - chardev: add additional check for minor range overlap
+ - RDM/A:ns: Fix bad endianess of port_pd variable
+ - HID: core: move Usage Page concatenation to Main item
+ - ASoC: eukrea-tlv320: fix a leaked reference by adding missing of_node_put
+ - ASoC: fsl_utils: fix a leaked reference by adding missing of_node_put
+ - cxgb3/f2: Fix undefined behaviour
+ - HID: logitech-hidpp: change low battery level threshold from 31 to 30
+ - percent
+ - spi: tegra114: reset controller on probe
+ - kobject: Don't trigger kobject_uevent(KOBJ_REMOVE) twice.
+ - media: video-mux: fix null pointer dereferences
+ - media: w128x: prevent two potential buffer overflows
+ - scsi: qedf: Add missing return in qedf_post_io_req() in the fcport offload
+ - check
+ - virtio_console: initialize vtermno value for ports
+ - tty: ipwireless: fix missing checks for ioremap
+ - x86/mce: Fix machine_check_poll() tests for error types
+ - rcutorture: Fix cleanup path for invalid torture_type strings
+ - rcuperf: Fix cleanup path for invalid perf_type strings
+ - usb: core: Add PM runtime calls to usb_hcd_platform_shutdown
+ - scsi: qla4xxxx: avoid freeing unallocated dma memory
+ - batman-adv: allow updating DAT entry timeouts on incoming ARP Replies
+ - dmaengine: tegra210-adma: use devm_clk_*() helpers
+ hwrng: omap - Set default quality
+ thunderbolt: Fix to check for kmemdup failure
+ media: m88ds3103: serialize reset messages in m88ds3103_set_frontend
+ media: vimc: stream: fix thread state before sleep
+ media: go7007: avoid clang frame overflow warning with KASAN
+ media: vimc: zero the media_device on probe
+ scsi: lpfc: Fix FDMI manufacturer attribute value
+ scsi: lpfc: Fix fc4type information for FDMI
+ media: saa7146: avoid high stack usage with clang
+ scsi: lpfc: Fix SLI3 commands being issued on SLI4 devices
+ spi: spi-topcliff-pch: Fix to handle empty DMA buffers
+ spi: rspi: Fix sequencer reset during initialization
+ spi: Fix zero length xfer bug
+ ASoC: davinci-mcasp: Fix clang warning without CONFIG_PM
+ drm/drv: Hold ref on parent device during drm_device lifetime
+ drm: Wake up next in drm_read() chain if we are forced to putback the event
+ v fifo: Prevent quiesce function going into an infinite loop
+ NFS: Fix a double unlock from nfs_match,get_client
+ ext4: wait for outstanding dio during truncate in nojournal mode
+ NFSv4.1 fix incorrect return value in copy_file_range
+ media: vb2: add waiting_in_dqbuf flag
+ acct_on(): don't mess with freeze protection
+ hv_netvsc: fix race that may miss tx queue wakeup
+ Bluetooth: Ignore CC events not matching the last HCI command
+ powerpc/perf: Fix loop exit condition in nest_imc_event_init
+ drm/nouveau/bar/nv50: ensure BAR is mapped
+ media: stm32-dcmi: return appropriate error codes during probe
+ powerpc/watchdog: Use htimers for per-CPU heartbeat
+ scsi: qla2xxx: Fix hardirq-unsafe locking
+ x86/modules: Avoid breaking W^X while loading modules
+ sched/nowhz: Run NOHZ idle load balancer on HK_FLAG_MISC CPUs
+ s390: qeth: address type mismatch warning
+ rsi: Fix NULL pointer dereference in kmalloc
+ nvme: set 0 capacity if namespace block size exceeds PAGE_SIZE
+ bcache: avoid potential memleak of list of journal_replay(s) in the
  CACHE_SYNC branch of run_cache_set
+ RDMA/cma: Consider scope_id while binding to ipv6 ll address
+ block: fix use-after-free on gendisk
+ staging: vc04_services: handle kcalloc failure
+ irq_work: Do not raise an IPI when queueing work on the local CPU
+ thunderbolt: Take domain lock in switch sysfs attribute callbacks
+ drm: etnaviv: avoid DMA API warning when importing buffers
+ ACPI/IORT: Reject platform device creation on NUMA node mapping failure
+ perf/x86/msr: Add Ice lake support
+ perf/x86/intel/rapl: Add Ice lake support
+ perf/x86/intel/cstate: Add Ice lake support
+ drm/panel: otm8009a: Add delay at the end of initialization
+ thunderbolt: property: Fix a missing check of kcalloc
+ - thunderbolt: Fix to check the return value of kmemdup
+ - x86/mce: Handle varying MCA bank counts
+ - scsi: lpfc: avoid uninitialized variable warning
+ - thunderbolt: Fix to check return value of ida_simple_get
+ - drm/amd/display: fix releasing planes when exiting odm
+ - thunderbolt: property: Fix a NULL pointer dereference
+ - e1000e: Disable runtime PM on CNP+
+ - igb: Exclude device from suspend direct complete optimization
+ - media: si2165: fix a missing check of return value
+ - drm/amd/display: Fix Divide by 0 in memory calculations
+ - spi: imx: stop buffer overflow in RX FIFO flush
+ - bonding/802.3ad: fix slave link initialization transition states
+ - cxgb4: offload VLAN flows regardless of VLAN ethype
+ - inet: switch IP ID generator to siphash
+ - ipv4/igmp: fix another memory leak in igmpv3_del_delrec()
+ - ipv4/igmp: fix build error if !CONFIG_IP_MULTICAST
+ - ipv6: Consider sk_bound_dev_if when binding a raw socket to an address
+ - 1lc: fix skb leak in llc_build_and_send_ui_pkt()
+ - net: dsa: mv88e6xxx: fix handling of upper half of STATS_TYPE_PORT
+ - net: fec: fix the clk mismatch in failed_reset path
+ - net-gro: fix use-after-free read in napi_gro_frags()
+ - net: mveneta: Fix err code path of probe
+ - net: mvpp2: fix bad MVPP2_TXQ_SCHED_TOKEN_CNTR_REG queue value
+ - net: phy: marvell10g: report if the PHY fails to boot firmware
+ - net: stmmac: fix reset gpio free missing
+ - usbnet: fix kernel crash after disconnect
+ - tipc: Avoid copying bytes beyond the supplied data
+ - net/mlx5: Allocate root ns memory using kzalloc to match kfree
+ - bnxt_en: Fix aggregation buffer leak under OOM condition.
+ - crypto: vmx - ghash: do nosimd fallback manually
+ - include/linux/compiler*.h: define asm_volatile_goto
+ - compiler.h: give up __compiletime_assert_fallback()
+ - xen/pciback: Don't disable PCI_COMMAND on PCI device reset.
+ - tipc: fix modprobe tipc failed after switch order of device registration
+ - sparc64: Fix regression in non-hypervisor TLB flush xcall
+ - include/linux/bitops.h: sanitize rotate primitives
+ - xhci: update bounce buffer with correct sg num
+ - xhci: Use %zu for printing size_t type
+ - xhci: Convert xhci_handshake() to use readl_poll_timeout_atomic()
+ - usb: xhci: avoid null pointer deref when bos field is NULL
+ - usbip: usbip_host: fix BUG: sleeping function called from invalid context
+ - usbip: usbip_host: fix stub_dev lock context imbalance regression
+ - USB: Fix slab-out-of-bounds write in usb_get_bos_descriptor
+ - USB: sisusbvga: fix oops in error path of sisusb_probe
+ - USB: Add LPM quirk for Surface Dock GigE adapter
+ - USB: rio500: refuse more than one device at a time
+ - USB: rio500: fix memory leak in close after disconnect
+ - media: usb: siano: Fix general protection fault in smsusb
- media: usb: siano: Fix false-positive "uninitialized variable" warning
- media: msusb: better handle optional alignment
- scsi: zfcp: fix missing zfcp_port reference put on -EBUSY from port_remove
- scsi: zfcp: fix to prevent port_remove with pure auto scan LUNs (only sdevs)
- Btrfs: fix wrong ct ime and mt ime of a directory after log replay
- Btrfs: fix race updating log root item during fsync
- Btrfs: fix fsync not persisting changed attributes of a directory
- Btrfs: incremental send, fix file corruption when no-holes feature is enabled
- KVM: PPC: Book3S HV: XIVE: Do not clear IRQ data of passthrough interrupts
- powerpc/perf: Fix MMCRA corruption by bhrb_filter
- ALSA: hda/realtek - Set default power save node to 0
- KVM: s390: Do not report unusable IDs via KVM_CAP_MAX_VCPU_ID
- drm/nouveau/i2c: Disable i2c bus access after ->fini()
- tty: serial: msm_serial: Fix XON/XOFF
- tty: max310x: Fix external crystal register setup
- memcg: make it work on sparse non-0-node systems
- kernel/signal.c: trace_signal_deliver when signal_group_exit
- docs: Fix conf.py for Sphinx 2.0
- doc: Cope with the deprecation of AutoReporter
- doc: Cope with Sphinx logging deprecations
- ima: show rules with IMA_INMASK correctly
- serial: sh-sci: disable DMA for uart_console
- staging: vc04_services: prevent integer overflow in create_pagelist()
- staging: wlan-ng: fix adapter initialization failure
- CIFS: cifs_read_allocate_pages: don't iterate through whole page array on ENOMEM
- gcc-plugins: Fix build failures under Darwin host
- drm/vmfgx: Don't send drm sysfs hotplug events on initial master set
- drm/rockchip: shutdown drm subsystem on shutdown
- Compiler Attributes: add support for __copy (gcc >= 9)
- include/linux/module.h: copy __init/__exit attrs to init/cleanup_module
- binder: fix race between munmap() and direct reclaim
- media: uvcvideo: Fix uvc_alloc_entity() allocation alignment
- brcmfmac: fix NULL pointer dereference during USB disconnect
- iio: dac: ds4422/ds4424 fix chip verification
- s390/crypto: fix possible sleep during spinlock aquired
- ALSA: line6: Assure canceling delayed work at disconnection
- vt/fbcon: deinitialize resources in visual_init() after failed memory allocation
- cifs: fix memory leak of pneg_inbuf on -EOPNOTSUPP ioctl case
- x86/trace: Do not call function graph from dynamic trampolines
- x86/trace: Set trampoline pages as executable
- x86/kprobes: Set instruction page as executable
- of: overlay: validate overlay properties #address-cells and #size-cells
- of: overlay: set node fields from properties when add new overlay node
- ethtool: fix potential userspace buffer overflow
- Fix memory leak in scpt_process_init
+ - neighbor: Call __ipv4_neigh_lookup_noref in neigh_xmit
+ - net/mlx4_en: ethtool, Remove unsupported SFP EEPROM high pages query
+ - net: rds: fix memory leak in rds_ib_flush_mr_pool
+ - pktgen: do not sleep with the thread lock held.
+ - ipv6: fix EFAULT on sendto with icmpv6 and hdrincl
+ - ipv6: use READ_ONCE() for inet->hdrincl as in ipv4
+ - net: sfp: read eeprom in maximum 16 byte increments
+ - ipv6: fix the check before getting the cookie in rt6_get_cookie
+ - rcu: locking and unlocking need to always be at least barriers
+ - parisc: Use implicit space register selection for loading the coherence
+ - index of I/O pdirs
+ - fuse: fallocate: fix return with locked inode
+ - pstore: Remove needless lock during console writes
+ - pstore: Convert buf_lock to semaphore
+ - pstore/ram: Run without kernel crash dump region
+ - x86/power: Fix 'nosmt' vs hibernation triple fault during resume
+ - i2c: xiic: Add max_read_len quirk
+ - MIPS: Bounds check virt_addr_valid
+ - MIPs: pistachio: Build uImage.gz by default
+ - genwqe: Prevent an integer overflow in the ioctl
+ - test_firmware: Use correct snprintf() limit
+ - drm/gma500/cdv: Check vbt config bits when detecting lvds panels
+ - drm/amdgpu/psp: move psp version specific function pointers to early_init
+ - drm/i915: Fix I915_EXEC_RING_MASK
+ - drm/i915/fbc: disable framebuffer compression on GeminiLake
+ - TTY: serial_core, add ->install
+ - qmi_wwan: Add quirk for Quectel dynamic config
+ - ipv4: Define __ipv4_neigh_lookup_noref when CONFIG_INET is disabled
+ - ethtool: check the return value of get_regs_len
+ - net: ethernet: ti: cpsw_ethtool: fix ethtool ring param set
+ - net: mvpp2: Use strscpy to handle stat strings
+ - packet: unconditionally free po->rollover
+ - NFSv4.1: Again fix a race where CB_NOTIFY_LOCK fails to wake a waiter
+ - NFSv4.1: Fix bug only first CB_NOTIFY_LOCK is handled
+ - s390/mm: fix address space detection in exception handling
+ - drm/msm: fix fb references in async update
+ - drm: add non-desktop quirk for Valve HMDs
+ - drm: add non-desktop quirks to Sensics and OSVR headsets.
+ - drm/amdgpu: remove ATPX_DGPU_REQ_POWER_FOR_DISPLAYS check when hotplug-in
+ * CVE-2019-14283
+ - floppy: fix out-of-bounds read in copy_buffer
+ * CVE-2019-14284
+ - floppy: fix div-by-zero in setup_format_params
+ * Bionic linux 4.15.0-56.62 fails to build with CONFIG_NVM disabled
+ (LP: #1838533)
+ - Revert "nvme: warn when finding multi-port subsystems without multipathing enabled"
+
+ * Bionic update: upstream stable patchset 2019-07-31 (LP: #1838576)
+ - netfilter: compat: initialize all fields in xt_init
+ - platform/x86: sony-laptop: Fix unintentional fall-through
+ - platform/x86: thinkpad_acpi: Disable Bluetooth for some machines
+ - hwmon: (pwm-fan) Disable PWM if fetching cooling data fails
+ - kernfs: fix barrier usage in __kernfs_new_node()
+ - USB: serial: fix unthrottle races
+ - iio: adc: xilinx: fix potential use-after-free on remove
+ - libnvdimm/namespace: Fix a potential NULL pointer dereference
+ - HID: input: add mapping for Expose/Overview key
+ - HID: input: add mapping for keyboard Brightness Up/Down/Toggle keys
+ - HID: input: add mapping for "Toggle Display" key
+ - libnvdimm/btt: Fix a kmemdup failure check
+ - s390/dasd: Fix capacity calculation for large volumes
+ - mac80211: fix unaligned access in mesh table hash function
+ - mac80211: Increase MAX_MSG_LEN
+ - mac80211: fix memory accounting with A-MSDU aggregation
+ - nl80211: Add NL80211_FLAG_CLEAR_SKB flag for other NL commands
+ - s390/3270: fix lockdep false positive on view->lock
+ - clocksource/drivers/oxnas: Fix OX820 compatible
+ - mISDN: Check address length before reading address family
+ - s390/pkey: add one more argument space for debug feature entry
+ - x86/reboot, efi: Use EFI reboot for Acer TravelMate X514-51T
+ - KVM: fix spectreV1 gadgets
+ - KVM: x86: avoid misreporting level-triggered irqs as edge-triggered in tracing
+ - tools lib traceevent: Fix missing equality check for strcmp
+ - mm: fix inactive list balancing between NUMA nodes and cgroups
+ - init: initialize jump labels before command line option parsing
+ - selftests: netfilter: check icmp pkttooog errors are set as related
+ - ipvs: do not schedule icmp errors from tunnels
+ - netfilter: ctinetlink: don't use conntrack/expect object addresses as id
+ - s390: ctcm: fix ctcm_new_device error return code
+ - drm/sun4i: Set device driver data at bind time for use in unbind
+ - gpu: ipu-v3: dp: fix CSC handling
+ - drm/imx: don't skip DP channel disable for background plane
+ - spi: Micrel eth switch: declare missing of table
+ - spi: ST ST95HF NFC: declare missing of table
+ - Input: synaptics-rmi4: fix possible double free
+ - MIPS: VDSO: Reduce VDSO_RANDOMIZE_SIZE to 64MB for 64bit
+ - ima: open a new file instance if no read permissions
+ - drm/i915: Disable LP3 watermarks on all SNB machines
+ - net: stmmac: Move debugfs init/exit to ->probe()/->remove()
+ - x86/vdso: Pass --eh-frame-hdr to the linker
+ - mm/memory.c: fix modifying of page protection by insert_pfn()
+ - net: fec: manage abh clock in runtime pm
+ - mlxsw: spectrum_switchdev: Add MDB entries in prepare phase
+ - mlxsw: core: Do not use WQ_MEM_RECLAIM for EMAD workqueue
+ - mlxsw: core: Do not use WQ_MEM_RECLAIM for mlxsw ordered workqueue
+ - mlxsw: core: Do not use WQ_MEM_RECLAIM for mlxsw workqueue
+ - NFC: nci: Add some bounds checking in nci_hci_cmd_received()
+ - nfc: nci: Potential off by one in ->pipes[] array
+ - x86/kprobes: Avoid kretprobe recursion bug
+ - cw1200: fix missing unlock on error in cw1200_hw_scan()
+ - mwl8k: Fix rate_idx underflow
+ - rtlwifi: rtl8723ae: Fix missing break in switch statement
+ - bonding: fix arp_validate toggling in active-backup mode
+ - bridge: Fix error path for kobject_init_and_add()
+ - dpaa_eth: fix SG frame cleanup
+ - ipv4: Fix raw socket lookup for local traffic
+ - net: dsa: Fix error cleanup path in dsa_init_module
+ - net: ethernet: stmmac: dmac-sun8i: enable support of unicast filtering
+ - net: seeq: fix crash caused by not set dev.parent
+ - net: ucc_geth - fix Oops when changing number of buffers in the ring
+ - packet: Fix error path in packet_init
+ - vlan: disable SIOC SHWTSTAMP in container
+ - vrf: sit mtu should not be updated when vnetd netdev is the link
+ - tipc: fix hanging clients using poll with EPOLLOUT flag
+ - drivers/virt/fsl_hypervisor.c: dereferencing error pointers in ioctl
+ - drivers/virt/fsl_hypervisor.c: prevent integer overflow in ioctl
+ - powerpc/powernv/idle: Restore IAMR after idle
+ - powerpc/book64: set RI in default MSR
+ - platform/x86: dell-laptop: fix rfkill functionality
+ - iio: adc: xilinx: fix potential use-after-free on probe
+ - iio: adc: xilinx: prevent touching unclocked h/w on remove
+ - acpi/nfit: Always dump _DSM output payload
+ - libnvdimm/pmem: fix a possible OOB access when read and write pmem
+ - vxge: fix return of a free'd memblock on a failed dma mapping
+ - qede: fix write to free'd pointer error and double free of ptp
+ - afs: Unlock pages for __pagevec_release()
+ - ipmi: ipmi_si_hardcode.c: init si_type array to fix a crash
+ - scsi: aic7xxx: fix EISA support
+ - drm/sun4i: Fix component unbinding and component master deletion
+ - netfilter: fix nf_i4proto_log_invalid to log invalid packets
+ - drm/sun4i: Unbind components before releasing DRM and memory
+ - usb: typec: Fix unchecked return value
+ - netfilter: nf_tables: use-after-free in dynamic operations
+ - um: Don't hardcode path as it is architecture dependent
+ - powerpc/book3s/64: check for NULL pointer in pgd_alloc()
+ - PCI: lv: Add hv_pci_remove_slots() when we unload the driver
+ - PCI: lv: Add pci_destroy_slot() in pci_devices_present_work(), if necessary
+ - net: core: another layer of lists, around PF_MEMALLOC skb handling
+ - locking/rwsem: Prevent decrement of reader count before increment
+ - PCI: hv: Fix a memory leak in hv_eject_device_work()
+ - x86/speculation/mds: Revert CPU buffer clear on double fault exit
+ - x86/speculation/mds: Improve CPU buffer clear documentation
+ - objtool: Fix function fallthrough detection
+ - ARM: dts: exynos: Fix interrupt for shared EINTs on Exynos5260
+ - ARM: dts: exynos: Fix audio (microphone) routing on Odroid XU3
+ - ARM: exynos: Fix a leaked reference by adding missing of_node_put
+ - power: supply: axp288_charger: Fix unchecked return value
+ - arm64: compat: Reduce address limit
+ - arm64: Clear OSDLR_EL1 on CPU boot
+ - arm64: Save and restore OSDLR_EL1 across suspend/resume
+ - sched/x86: Save [ER]FLAGS on context switch
+ - crypto: chacha20poly1305: set cra_name correctly
+ - crypto: vmx: fix copy-paste error in CTR mode
+ - crypto: skcipher: don't WARN on unprocessed data after slow walk step
+ - crypto: crc10dif-generic: fix use via crypto_shash_digest()
+ - crypto: x86/crc10dif-pcl: fix use via crypto_shash_digest()
+ - crypto: gcm: fix incompatibility between "gcm" and "gcm_base"
+ - crypto: rockchip: update IV buffer to contain the next IV
+ - crypto: arm/aes-neonbs: don't access already-freed walk.iv
+ - ALSA: usb-audio: Fix a memory leak bug
+ - ALSA: hda/realtek: EAPD turn on later
+ - ASoC: max98090: Fix restore of DAPM Muxes
+ - ASoC: RT5677-SPI: Disable 16Bit SPI Transfers
+ - bpf, arm64: remove prefetch insn in xadd mapping
+ - mm/mincore.c: make mincore() more conservative
+ - ofcs2: fix ofcs2 read inode data panic in ofcs2_iget
+ - userfaultfd: use RCU to free the task struct when fork fails
+ - mfd: da9063: Fix OTP control register names to match datasheets for DA9063/63L
+ - mfd: max77620: Fix swapped FPS_PERIOD_MAX_US values
+ - mtd: spi-nor: intel-spi: Avoid crossing 4K address boundary on read/write
+ - tty: vt.c: Fix TIOCL_BLANKSCREEN console blanking if blankinterval == 0
+ - tty/vt: fix write/write race in ioctl(KDSKBSENT) handler
+ - jbd2: check superblock mapped prior to committing
+ - ext4: make sanity check in mballoc more strict
+ - ext4: ignore e_value_offs for xattr with value-in-ea-inode
+ - ext4: avoid drop reference to iloc.bh twice
+ - Btrfs: do not start a transaction during fiemap
+ - Btrfs: do not start a transaction at iterate_extent_inodes()
+ - bcache: fix a race between cache register and cacheset unregister
+ - bcache: never set KEY_PTRS of journal key to 0 in journal_reclaim()
+ - ext4: fix use-after-free race with debug_share_extra_isize
+ - ext4: actually request zeroing of inode table after grow
+ - ext4: fix ext4_sort_file_options for file systems w/o journal
+ - ipmi:ssif: compare block number correctly for multi-part return messages
+ - crypto: arm64/aes-neonbs: don't access already-freed walk.iv
+ - crypto: salsa20: don't access already-freed walk.iv
+ - crypto: ccm - fix incompatibility between "ccm" and "ccm_base"
+ - fs/writeback.c: use rcu_barrier() to wait for inflight wb switches going
  into workqueue when umount
+ - ext4: fix data corruption caused by overlapping unaligned and aligned IO
+ - ext4: fix use-after-free in dx_release()
+ - ALSA: hda/realtek - Fix for Lenovo B50-70 inverted internal microphone bug
+ - KVM: x86: Skip EFER vs. guest CPUID checks for host-initiated writes
+ - iov_iter: optimize page_copy_sane()
+ - ext4: fix compile error when using BUFFER_TRACE
+ - arm64: dts: rockchip: Disable DCMDs on RK3399's eMMC controller.
+ - arm64: mmap: Ensure file offset is treated as unsigned
+ - arm64: arch_timer: Ensure counter register reads occur with seqlock held
+ - crypto: crypto4xx - fix ctr-aes missing output IV
+ - crypto: crypto4xx - fix ofb "overran dst buffer" issues
+ - ALSA: line6: toneport: Fix broken usage of timer for delayed execution
+ - ASoC: fsl_esai: Fix missing break in switch statement
+ - mm/huge_memory: fix vmf_insert_pfn_{pmd, pud}() crash, handle unaligned
  addresses
+ - hugetlb: use same fault hash key for shared and private mappings
+ - ACPI: PM: Set enable_for_wake for wakeup GPEs during suspend-to-idle
+ - btrfs: Correctly free extent buffer in case btree_read_extent_buffer_pages
  fails
+ - ext4: avoid panic during forced reboot due to aborted journal
+ - libnvdimm/namespace: Fix label tracking error
+ - ext4: don't update s_rev_level if not required
+ - net: avoid weird emergency message
+ - net/mlx4_core: Change the error print to info print
+ - net: test nouarg before dereferencing zerocopy pointers
+ - net: usb: qmi_wwan: add Telit 0x1260 and 0x1261 compositions
+ - ppp: deflate: Fix possible crash in deflate_init
+ - tipc: switch order of device registration to fix a crash
+ - vsck/virtio: free packets during the socket release
+ - vsck/virtio: Initialize core virtio vsck before registering the driver
+ - net: Always descend into dsa/
+ - parisc: Export running_on_qemu symbol for modules
+ - parisc: Skip registering LED when running in QEMU
+ - parisc: Use PA_ASM_LEVEL in boot code
+ - parisc: Rename LEVEL to PA_ASM_LEVEL to avoid name clash with DRBD code
+ - stm class: Fix channel free in stm output free path
+ - md: add mddev->pers to avoid potential NULL pointer dereference
+ - intel_th: msu: Fix single mode with IOMMU
+ - p54: drop device reference count if fails to enable device
+ - of: fix clang -Wunsequenced for be32_to_cpu()
+ - media: ov6650: Fix sensor possibly not detected on probe
+ - NFS4: Fix v4.0 client state corruption when mount
+ - PNFS fallback to MDS if no deviceid found
+ - clk: hi3660: Mark clk_gate_ufs_subsys as critical
+ - clk: tegra: Fix PLLM programming on Tegra124+ when PMC overrides divider

Open Source Used In 5GaaS Edge AC-4 19220
+ - clk: rockchip: fix wrong clock definitions for rk3328
+ - fuse: fix writepages on 32bit
+ - fuse: honor RLIMITFSIZE in fuse_file_fallocate
+ - iommu/tegra-smmum: Fix invalid ASID bits on Tegra30/114
+ - ceph: flush dirty inodes before proceeding with remount
+ - x86_64: Add gap to int3 to allow for call emulation
+ - x86_64: Allow breakpoints to emulate call instructions
+ - ftrace/x86_64: Emulate call function while updating in breakpoint handler
+ - tracing: Fix partial reading of trace event's id file
+ - memory: tegra: Fix integer overflow on tick value calculation
+ - perf intel-p: Fix instructions sampling rate
+ - perf intel-p: Fix improved sample timestamp
+ - perf intel-p: Fix sample timestamp wrt non-taken branches
+ - objtool: Allow AR to be overridden with HOSTAR
+ - fbdev: sm712fb: fix brightness control on reboot, don't set SR30
+ - fbdev: sm712fb: fix VRAM detection, don't set SR70/71/74/75
+ - fbdev: sm712fb: fix white screen of death on reboot, don't set CR3B-CR3F
+ - fbdev: sm712fb: fix boot screen glitch when sm712fb replaces VGA
+ - fbdev: sm712fb: fix crashes during framebuffer writes by correctly mapping VRAM
+ - fbdev: sm712fb: fix support for 1024x768-16 mode
+ - fbdev: sm712fb: use 1024x768 by default on non-MIPS, fix garbled display
+ - fbdev: sm712fb: fix crashes and garbled display during DPMS modesetting
+ - PCI: Mark AMD Stoney Radeon R7 GPU ATS as broken
+ - PCI: Mark Atheros AR9462 to avoid bus reset
+ - PCI: Factor out pcie_retrain_link() function
+ - PCI: Work around Pericom PCIe-to-PCI bridge Retrain Link erratum
+ - dm cache metadata: Fix loading discard bitset
+ - dm zoned: Fix zone report handling
+ - dm delay: fix a crash when invalid device is specified
+ - xfrm: policy: Fix out-of-bound array accesses in _xfrm_policy_unlink
+ - xfrm6_tunnel: Fix potential panic when unloading xfrm6_tunnel module
+ - vti4: ipip tunnel deregistration fixes.
+ - esp4: add length check for UDP encapsulation
+ - xfrm4: Fix uninitialized memory read in _decode_session4
+ - power: supply: cpcap-battery: Fix division by zero
+ - securityfs: fix use-after-free on symlink traversal
+ - apparmorfs: fix use-after-free on symlink traversal
+ - mac80211: Fix kernel panic due to use of txq after free
+ - KVM: arm/arm64: Ensure vcpu target is unset on reset failure
+ - power: supply: sysfs: prevent endless uevent loop with CONFIG_POWER_SUPPLY_DEBUG
+ - iwllwifi: mvm: check for length correctness in iwlmvm_create_skb()
+ - sched/cpufreq: Fix kobject memleak
+ - x86/mm/mem_encrypt: Disable all instrumentation for early SME setup
+ - ufs: fix braino in ufs_get_inode_gid() for solaris UFS flavour
+ - perf bench numa: Add define for RUSAGE_THREAD if not present
+ - md/raid: raid5 preserve the writeback action after the parity check

Open Source Used In 5GaaS Edge AC-4 19221
+ - driver core: Postpone DMA tear-down until after devres release for probe
+ - bpf: add bpf_map_lookup_elem_sys_only for lookups from syscall side
+ - bpf, lru: avoid messing with eviction heuristics upon syscall lookup
+ - iio: fix memory frequency by avoiding a switch/case fallthrough
+ - nfp: flower: add rcu locks when accessing netdev for tunnels
+ - rnetlink: always put IFLA_LINK for links with a link-netnsid
+ - brd: re-enable __GFP_HIGHMEM in brd_insert_page()
+ - proc: prevent changes to overridden credentials
+ - md: batch flush requests.
+ - phy: ti-pipe3: fix missing bit-wise or operator when assigning val
+ - clk: mediatek: Disable tuner_en before change PLL rate
+ - PCI: rcar: Add the initialization of PCIe link in resume_noirq()
+ - fuse: Add FOPEN_STREAM to use stream_open()
+ - qmi_wwan: new Wistron, ZTE and D-Link devices
+ - bpf: relax inode permission check for retrieving bpf program
+
+ * Bionic update: upstream stable patchset 2019-07-30 (LP: #1838459)
+ - kbuild: simplify ld-option implementation
+ - cifs: do not attempt cifs operation on smb2+ rename error
+ - tracing: Fix a memory leak by early error exit in trace_pid_write()
+ - tracing: Fix buffer_ref pipe ops
+ - zram: pass down the bvec we need to read into in the work struct
+ - lib/Kconfig.debug: fix build error without CONFIG_BLOCK
+ - MIPS: scall64-o32: Fix indirect syscall number load
+ - trace: Fix preempt_enable_no_resched() abuse
+ - IB/dmaev: Fix frwr memory registration
+ - sched/numa: Fix a possible divide-by-zero
+ - ceph: only use d_name directly when parent is locked
+ - ceph: ensure d_name stability in ceph_dentry_hash()
+ - ceph: fix ci->i_head_snape leak
+ - nfsmd: Don't release the callback slot unless it was actually held
+ - sunrpc: don't mark uninitialised items as VALID.
+ - Input: synaptics-rmi4 - write config register values to the right offset
+ - dmaengine: sh: rcar-dmac: With cyclic DMA residue 0 is valid
+ - ARM: 8857/1: efi: enable CP15 DMB instructions before cleaning the cache
+ - drm/vc4: Fix memory leak during gpu reset.
+ - drm/vc4: Fix compilation error reported by kbuild test bot
+ - ext4: fix some error pointer dereferences
+ - vfscork/virtio: fix kernel panic from virtio_transp_reset_no_sock
+ - tipc: handle the err returned from cmd header function
+ - slip: make slhcfree() silently accept an error pointer
+ - intel_th: gth: Fix an off-by-one in output unassigning
+ - fs/proc/proc_sysctl.c: Fix a NULL pointer dereference
+ - ipvs: fix warning on unused variable
+ - sched/deadline: Correctly handle active 0-lag timers
+ - NFS: Forbid setting AF_INET6 to "struct sockaddr_in"->sin_family.
+ - netfilter: ebtables: CONFIG_COMPAT: drop a bogus WARN_ON
+ - fm10k: Fix a potential NULL pointer dereference
+ - tipc: check bearer name with right length in tipc_nl_compat_bearer_enable
+ - tipc: check link name with right length in tipc_nl_compat_link_set
+ - x86, retpolines: Raise limit for generating indirect calls from switch-case
+ - x86/retpolines: Disable switch jump tables when retpolines are enabled
+ - mm: Fix warning in insert_pfn()
+ - ipv4: add sanity checks in ipv4_link_failure()
+ - mlxsw: spectrum: Fix autoneg status in ethtool
+ - net/mlx5e: ethtool, Remove unsupported SFP EEPROM high pages query
+ - net: rds: exchange of 8K and 1M pool
+ - net: stmmac: move stmmac_check_ether_addr() to driver probe
+ - stmmac: pci: Adjust IOT2000 matching
+ - team: fix possible recursive locking when add slaves
+ - net/rose: fix unbound loop in rose_loopback_timer()
+ - ipv4: set the tcp_min_rtt_wlen range from 0 to one day
+ - powerpc/fsl: Add FSL_PPC_BOOK3E as supported arch for nospectre_v2 boot arg
+ - Documentation: Add nospectre_v1 parameter
+ - netfilter: nf_tables: warn when expr implements only one of activate/deactivate
+ - net/bmvnic: Fix RTNL deadlock during device reset
+ - drm/rockchip: fix for mailbox read validation.
+ - powerpc/vdso32: fix CLOCK_MONOTONIC on PPC64
+ - perf/x86/intel: Enable C-state residency events for Cannon Lake
+ - perf/x86/intel: Update KBL Package C-state events to also include PCs/PC9/PC10 counters
+ - powerpc/mm/radix: Make Radix require HUGETLB_PAGE
+ - workqueue: Try to catch flush_work() without INIT_WORK().
+ - mlxsw: pci: Reincrease PCI reset timeout
+ - mm: make page ref count overflow check tighter and more explicit
+ - mm: add `try_get_page()` helper function
+ - mm: prevent get_user_pages() from overflowing page refcount
+ - fs: prevent page refcount overflow in pipe_buf_get
+ - ARM: dts: bcm283x: Fix hdmi hdpi gpio pull
+ - s390: limit brk randomization to 32MB
+ - qlcnic: Avoid potential NULL pointer dereference
+ - netfilter: nft_set_rbtree: check for inactive element after flag mismatch
+ - netfilter: bridge: set skb transport_header before entering
+ - NF_INET_PRE_ROUTING
+ - s390/qeth: fix race when initializing the IP address table
+ - sc16is7xx: missing unregister/delete driver on error in sc16is7xx_init()
+ - serial: ar933x_uart: Fix build failure with disabled console
+ - KVM: arm/arm64: vgic-its: Take the srcu lock when parsing the memslots
+ - usb: gadget: net2280: Fix overrun of OUT messages
+ - usb: gadget: net2280: Fix net2280_dequeue()
+ - usb: gadget: net2272: Fix net2272_dequeue()
+ - ARM: dts: pfla02: increase phy reset duration
+ - net: ks8851: Dequeue RX packets explicitly
+ - net: ks8851: Reassert reset pin if chip ID check fails
+ - net: ks8851: Delay requesting IRQ until opened
+ - net: ks8851: Set initial carrier state to down
+ - staging: rtl8188eu: Fix potential NULL pointer dereference of kcalloc
+ - staging: rtlwifi: rtl8822b: fix to avoid potential NULL pointer dereference
+ - staging: rtl8712: uninitialized memory in read_bbreg_hdl()
+ - staging: rtlwifi: Fix potential NULL pointer dereference of kcalloc
+ - net: macb: Add null check for PCLK and HCLK
+ - net/sched: don't dereference a->goto_chain to read the chain index
+ - ARM: dts: imx6qdl: Fix typo in imx6qdl-icore-reqs.dtsi
+ - NFS: Fix a typo in nfs_init_timeout_values()
+ - net: xilinx: fix possible object reference leak
+ - net: ibm: fix possible object reference leak
+ - net: ethernet: ti: fix a potential NULL pointer dereference
+ - drm/meson: Fix invalid pointer in meson_drv_unbind()
+ - drm/meson: Uninstall IRQ handler
+ - scsi: qla4xxx: fix a potential NULL pointer dereference
+ - usb: usb251xb: fix to avoid potential NULL pointer dereference
+ - usb: u132-hcd: fix resource leak
+ - ceph: fix use-after-free on symlink traversal
+ - scsi: zfcp: reduce flood of fcrscn1 trace records on multi-element RSCN
+ - libata: fix using DMA buffers on stack
+ - gpio: of: Fix of_gpiochip_add() error path
+ - kconfig[mm]conf: handle backspace (^H) key
+ - ptrace: take into account saved_sigmask in PTRACE{GET,SET}SIGMASK
+ - leds: pca9532: fix a potential NULL pointer dereference
+ - KVM: arm64: Reset the PMU in preemptible context
+ - KVM: arm/arm64: vgic-its: Take the srcu lock when writing to guest memory
+ - scsi: aacraid: Insure we don't access PCIe space during AER/EEH
+ - x86/realmode: Don't leak the trampoline kernel address
+ - x86/mm: Don't exceed the valid physical address space
+ - ipv4: ip_do_fragment: Preserve skb_iif during fragmentation
+ - ipv6/flowlabel: wait rcu grace period before put_pid()
+ - ipv6: invert flowlabel sharing check in process and user mode
+ - l2ip: fix possible use-after-free
+ - l2tp: use rcu_dereference_sk_user_data() in l2tp_udc_encap_recv()
+ - net: dsa: bcm_sf2: fix buffer overflow doing set_rxnfc
+ - net: phy: marvell: Fix buffer overrun with stats counters
+ - scpt: avoid running the setp state machine recursively
+ - packet: validate msg_namelen in send directly
+ - bnxt_en: Improve multicast address setup logic.
+ - bnxt_en: Free short FW command HWRM memory in error path in bnxt_init_one()
+ - ALSA: line6: use dynamic buffers
+ - rxrpc: Fix net namespace cleanup
+ - kasan: remove redundant initialization of variable 'real_size'
+ - kasan: prevent compiler from optimizing away memset in tests
+ - caif: reduce stack size with KASAN
+ - ALSA: hda/realtek - Add new Dell platform for headset mode
+ - USB: yurex: Fix protection fault after device removal
+ - USB: w1 ds2490: Fix bug caused by improper use of altsetting array
+ - usb: usbip: fix isoc packet num validation in get_pipe
+ - USB: core: Fix unterminated string returned by usb_string()
+ - USB: core: Fix bug caused by duplicate interface PM usage counter
+ - nvme-loop: init nvmet_ctrl fatal_err_work when allocate
+ - HID: logitech: check the return value of create_singlethread_workqueue
+ - HID: debug: fix race condition with between rdesc_show() and device removal
+ - rtc: sh: Fix invalid alarm warning for non-enabled alarm
+ - batman-adv: Reduce claim hash refcnt only for removed entry
+ - batman-adv: Reduce tt_local hash refcnt only for removed entry
+ - batman-adv: Reduce tt_global hash refcnt only for removed entry
+ - ARM: dts: rockchip: Fix gpu opp node names for rk3288
+ - net/mlx5: E-Switch, Fix esw manager vport indication for more vport commands
+ - bonding: show full hw address in sysfs for slave entries
+ - net: stmmac: ratelimit RX error logs
+ - net: stmmac: don't overwrite discard_frame status
+ - net: stmmac: fix dropping of multi-descriptor RX frames
+ - net: stmmac: don't log oversized frames
+ - jffs2: fix use-after-free on symlink traversal
+ - debugfs: fix use-after-free on symlink traversal
+ - rtc: da9063: set uie_unsupported when relevant
+ - HID: input: add mapping for Assistant key
+ - vfio/pci: use correct format characters
+ - scsi: core: add new RDAC LENOVO/DE_Series device
+ - scsi: storvsc: Fix calculation of sub-channel count
+ - net: hns: Fix WARNING when remove HNS driver with SMMU enabled
+ - kmemleak: powerpc: skip scanning holes in the .bss section
+ - hugetlbfs: fix memory leak for resv_map
+ - sh: fix multiple function definition build errors
+ - xsysace: Fix error handling in ace_setup
+ - ARM: orion: don't use using 64-bit DMA masks
+ - ARM: iop: don't use using 64-bit DMA masks
+ - perf/x86/amd: Update generic hardware cache events for Family 17h
+ - Bluetooth: btusb: request wake pin with NOAUTOEN
+ - staging: iio: adt7316: allow adt751x to use internal vref for all dacs
+ - staging: iio: adt7316: fix the dac read calculation
+ - staging: iio: adt7316: fix the dac write calculation
+ - scsi: RDMA/srpt: Fix a credit leak for aborted commands
+ - ASoC: stm32: fix sai driver name initialisation
+ - IB/core: Unregister notifier before freeing MAD security
+ - IB/core: Fix potential memory leak while creating MAD agents
+ - IB/core: Destroy QP if XRC QP fails
+ - Input: snvs_pwrkey - initialize necessary driver data before enabling IRQ
+ - Input: stmfts - acknowledge that setting brightness is a blocking call
+ - selinux: never allow relabeling on context mounts
+ - powerpc/mm/hash: Handle mmap_min_addr correctly in get_unmapped_area topdown
+ - search
+ - x86/mce: Improve error message when kernel cannot recover, p2
+ - clk: x86: Add system specific quirk to mark clocks as critical
+ - i2c: i2c-stm32f7: Fix SDADEL minimum formula
+ - media: v4l2: i2c: ov7670: Fix PLL bypass register values
+ - mm/kmemleak.c: fix unused-function warning
+ - mac80211: don't attempt to rename ERR_PTR() debugfs dirs
+ - i2c: Remove unnecessary call to irq_find_mapping
+ - i2c: Clear client->irq in i2c_device_remove
+ - i2c: Allow recovery of the initial IRQ by an I2C client device.
+ - i2c: Prevent runtime suspend of adapter when Host Notify is required
+ - USB: dummy-hcd: Fix failure to give back unlinked URBs
+ - batman-adv: fix warning in function batadv_v_elp_get_throughput
+ - riscv: fix accessing 8-byte variable from RV32
+ - net: stmmac: don't stop NAPI processing when dropping a packet
+ - mfd: twl-core: Disable IRQ while suspended
+ - block: use blk_free_flush_queue() to free hctx->fq in blk mq_init_hctx
+ - arm/mach-at91/pm: fix possible object reference leak
+ - fs: stream_open - opener for stream-like files so that read and write can run simultaneously without deadlock
+ - block: pass no-op callback to INIT_WORK().
+ - platform/x86: intel_pmc_core: Fix PCH IP name
+ - platform/x86: intel_pmc_core: Handle CFL regmap properly
+ - x86/mm: Fix a crash with kmemleak_scan()
+ - Drivers: hv: vmbus: Remove the undesired put_cpu_ptr() in hv_sync_cleanups()
+ - ubsan: Fix nasty -Wbuiltin-declaration-mismatch GCC-9 warnings
+ - staging: greybus: power_supply: fix prop-descriptor request size
+ - ASoC: hifi1: Eliminate opcode tests on mr deref
+ - ASoC: soc-pcm: fix a codec fixup issue in TDM case
+ - ASoC: nau8824: fix the issue of the widget with prefix name
+ - ASoC: nau8810: fix the issue of widget with prefixed name
+ - ASoC: samsung: odroid: Fix clock configuration for 44100 sample rate
+ - ASoC: wm_adsp: Add locking to wm adsp2 bus error
+ - ASoC: cs4270: Set auto-increment bit for register writes
+ - perf/x86/kernel: Use parentheses around argument in u64_to_user_ptr()
+ - ASoC: hifi1: Eliminate opcode tests on mr deref
+ - MIPS: KGDB: fix kgdb support for SMP platforms.
+ - ASoC: tlv320aic32x4: Fix Common Pins
+ - drm/mediatek: Fix an error code in mtk_hdmidt_parse_pdata()
+ - perf/x86/intel: Fix handling of wakeup_events for multi-entry PEBS
+ - perf/x86/intel: Initialize TFA MSR
+ - linux/kernel.h: Use parentheses around argument in u64_to_user_ptr()
+ - ASoC: rockchip: pdm: fix regmap_ops hang issue
+ - slab: fix a crash by reading /proc/slab Allocators
+ - virtio_pci: fix a NULL pointer reference in vp_del_vqs
+ - RDMAvmw_pvrdma: Fix memory leak on pvrdma_pci_remove
+ - scsi: csiostor: fix missing data copy in csi scsi_err_handler()
+ - drm/mediatek: fix possible object reference leak
+ - ASoC: Intel: kbl: fix wrong number of channels
+ - virtio-blk: limit number of hw queues by nr_cpu_ids
- platform/x86: pmc_atom: Drop __initconst on dmi table
- genirq: Prevent use-after-free and work list corruption
- usb: dwc3: Fix default lpm_nyet_threshold value
- USB: serial: f81232: fix interrupt worker not stop
- USB: cdc-acm: fix unthrottle races
- usb-storage: Set virt_boundary_mask to avoid SG overflows
- intel_th: pci: Add Comet Lake support
- scsi: qla2xxx: Fix incorrect region-size setting in optrom SYSFS routines
- UAS: fix alignment of scatter/gather segments
- ASoC: Intel: avoid Oops if DMA setup fails
- locking/futex: Allow low-level atomic operations to return -EAGAIN
- arm64: futex: Bound number of LDXR/STXR loops in FUTEX_WAKE_OP
- ASoC: tv320aic3x: fix reset gpio reference counting
- ASoC: stm32: sai: fix exposed capabilities in splif mode
- ASoC:intel:skl:fix a simultaneous playback & capture issue on hda platform
- ASoC: dapm: Fix NULL pointer dereference in snd_soc_dapm_free_kcontrol
- drm/omap: hdmi4_cec: Fix CEC clock handling for PM
- IB/hfi1: Fix the allocation of RSM table
- drm/amd/display: fix cursor black issue
- objtool: Add machine_real_restart() to the noreturn list
- objtool: Add rewind_stack_do_exit() to the noreturn list
- RDMA/hns: Fix bug that caused srq creation to fail
- perf/core: Fix perf_event_disable_inatomic() race
- soc: sunxi: Fix missing dependency on REGMAP_MMIO
- scsi: lpfc: change snprintf to scnprintf for possible overflow

* [ZenBook S UX391UA, Realtek ALC294, Mic, Internal] No sound at all
  (LP: #1838349)
  - ALSA: hda/realtek - Apply the fixup for ASUS Q325UAR

* Bionic update: upstream stable patchset 2019-07-29 (LP: #1838349)
  - ARC: u-boot args: check that magic number is correct
  - arc: hsdk_defconfig: Enable CONFIG_BLK_DEV_RAM
  - perf/core: Restore mmap record type correctly
  - ext4: add missing brelse() in add_new_gdb_meta_bg()
  - ext4: report real fs size after failed resize
  - ALSA: echoaudio: add a check for ioremap_nocache
  - ALSA: sb8: add a check for request_region
  - auxdisplay: hd44780: Fix memory leak on ->remove()
  - IB/mlx4: Fix race condition between catas error reset and aliasguid flows
  - mmc: davinci: remove extraneous __init annotation
  - ALSA: opl3: fix mismatch between snd_opl3_drum_switch definition and declaration
  - thermal/intel_powerclamp: fix __percpu declaration of worker_data
  - thermal: bcm2835: Fix crash in bcm2835_thermal_debugfs
  - thermal/int340x_thermal: Add additional UUIDs
  - thermal/int340x_thermal: fix mode setting

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Open Source Used In 5GaaS Edge AC-4 19227
+ - thermal/intel_powerclamp: fix truncated kthread name
+ - scsi: scsi: flush running unbind operations when removing a session
+ - x86/mm: Don't leak kernel addresses
+ - tools/power turbostat: return the exit status of a command
+ - perf list: Don't forget to drop the reference to the allocated thread_map
+ - perf config: Fix an error in the config template documentation
+ - perf config: Fix a memory leak in collect_config()
+ - perf build-id: Fix memory leak in print_sdt_events()
+ - perf top: Fix error handling in cmd_top()
+ - perf hist: Add missing map__put() in error case
+ - perf evsel: Free evsel->counts in perf_evsel__exit()
+ - perf tests: Fix a memory leak of cpu_map object in the
  openat_syscall__event_on_all_cpus test
+ - perf tests: Fix memory leak by expr__find_other() in test__expr()
+ - perf tests: Fix a memory leak in test__perf__evsel__tp_sched_test()
+ - irqchip/mbigen: Don't clear eventid when freeing an MSI
+ - x86/hpet: Prevent potential NULL pointer dereference
+ - tools/power turbostat: return the exit status of a command
+ - perf config: Fix an error in the config template documentation
+ - perf config: Fix a memory leak in collect_config()
+ - perf build-id: Fix memory leak in print_sdt_events()
+ - perf top: Fix error handling in cmd_top()
+ - perf hist: Add missing map__put() in error case
+ - perf evsel: Free evsel->counts in perf_evsel__exit()
+ - perf tests: Fix a memory leak of cpu_map object in the
  openat_syscall__event_on_all_cpus test
+ - perf tests: Fix memory leak by expr__find_other() in test__expr()
+ - perf tests: Fix a memory leak in test__perf__evsel__tp_sched_test()
+ - irqchip/mbigen: Don't clear eventid when freeing an MSI
+ - x86/hpet: Prevent potential NULL pointer dereference
+ - x86/cpu/cyrix: Use correct macros for Cyrix calls on Geode processors
+ - drm/nouveau/debugfs: Fix check of pm_runtime_get_sync failure
+ - iommu/vt-d: Check capability before disabling protected memory
+ - x86/hw_breakpoints: Make default case in hw_breakpoint_arch_parse() return
  an error
+ - fix incorrect error code mapping for OBJECTID_NOT_FOUND
+ - ext4: prohibit fstrim in norecovery mode
+ - gpio: pxa: handle corner case of unprobed device
+ - rsi: improve kernel thread handling to fix kernel panic
+ - 9p: do not trust pdu content for stat item size
+ - 9p locks: add mount option for lock retry interval
+ - f2fs: fix to do sanity check with current segment number
+ - netfilter: xt_cgroup: shrink size of v2 path
+ - serial: uartps: console_setup() can't be placed to init section
+ - powerpc/pseries: Remove prrn_work workqueue
+ - media: auto828: cannot kfree dev before usb disconnect
+ - HID: i2c-hid: override HID descriptors for certain devices
+ - ARM: samsung: Limit SAMSUNG_PM_CHECK config option to non-Exynos platforms
+ - [Config] updateconfigs for CONFIG_SAMSUNG_PM_CHECK
+ - usbip: fix vhci_hcd controller counting
+ - ACPI / SBS: Fix GPE storm on recent MacBookPro's
+ - KVM: nVMX: restore host state in nested_vmexit for VMFail
+ - cifs: fallback to older infolevels on findfirst queryinfo retry
+ - kernel: hung_task.c: disable on suspend
+ - crypto: sha256/arm - fix crash bug in Thumb2 build
+ - crypto: sha512/arm - fix crash bug in Thumb2 build
+ - iommu/dmar: Fix buffer overflow during PCI bus notification
+ - soc/tegra: pmc: Drop locking from tegra_powergate_is_powered()
+ - lkdtm: Print real addresses
+ - lkdtm: Add tests for NULL pointer dereference
+ - drm/panel: panel-innolux: set display off in innolux_panel_unprepare
+ - crypto: axis - fix for recursive locking from bottom half
+ - Revert "ACPI / EC: Remove old CLEAR_ON_RESUME quirk"
+ - coresight: cpu-debug: Support for CA73 CPUs
+ - drm/nouveau/volt/gf117: fix speedo readout register
+ - ARM: 8839/1: kprobe: make patch_lock a raw_spinlock_t
+ - drm/amdperf: use init_mqd function to allocate object for hid_mqd (CI)
+ - appletalk: Fix use-after-free in atalk_proc_exit
+ - lib/div64.c: off by one in shift
+ - include/linux/swap.h: use offsetof() instead of custom __swapoffset macro
+ - bpf: fix use after free in bpf_evict_inode
+ - dm: disable CRYPTO_TFM_REQ_MAY_SLEEP to fix a GFP_KERNEL recursion deadlock
+ - net: stmmac: Set dma ring length before enabling the DMA
+ - mm: hide incomplete nr_indirectly_reclaimable in sysfs
+ - appletalk: Fix compile regression
+ - ext4: avoid panic during forced reboot
+ - i40iw: Avoid panic when handling the inetdev event
+ - sched/core: Fix buffer overflow in cgroup2 property cpu.max
+ - ACPI / utils: Drop reference in test for device presence
+ - PM / Domains: Avoid a potential deadlock
+ - drm/exynos/mixer: fix MIXER shadow registry synchronisation code
+ - Bluetooth: Fix debugfs NULL pointer dereference
+ - f2fs: cleanup dirty pages if recover failed
+ - [Config] updateconfigs for CONFIG_INTEL_ATOMISP2_PM
+ - platform/x86: Add Intel AtomISP2 dummy / power-management driver
+ - drm/tnm: Fix bo_global and mem_global kfree error
+ - ALSA: hda: fix front speakers on Huawei MBXP
+ - ACPI / EC / PM: Disable non-wakeup GPEs for suspend-to-idle
+ - net/rds: fix warn in rds_message_alloc_sgs
+ - scsi: core: Avoid that system resume triggers a kernel warning
+ - PCI: Blacklist power management of Gigabyte X299 DESIGNARE EX PCIe ports
+ - rxcpr: Fix client call connect/disconnect race
+ - f2fs: fix to dirty inode for i_mode recovery
+ - bonding: fix event handling for stacked bonds
+ - net: atm: Fix potential Spectre v1 vulnerabilities
+ - net: bridge: fix per-port af_packet sockets
+ - net: bridge: multicast: use rcu to access port list from
+ - br_multicast_start_querier
+ - net: fou: do not use guehdr after iptunnel_pull_offloads in gue_udp_recv
+ - tcp: tcp_grow_window() needs to respect tcp_space()
+ - team: set slave to promisc if team is already in promisc mode
+ - vhost: reject zero size iova range
+ - ipv4: recompile ip options in ipv4_link_failure
+ - ipv4: ensure rcu_read_lock() in ipv4_link_failure()
+ - net: thunderx: raise XDP MTU to 1508
+ - net: thunderx: don't allow jumbo frames with XDP
+ - KVM: x86: Don't clear EFER during SMM transitions for 32-bit vCPU
+ - KVM: x86: svm: make sure NMI is injected after nmi_singlestep
+ - Staging: iio: meter: fixed typo
- ip: add helpers to process in-order fragments faster.
- net: IP defrag: encapsulate rbtree defrag code into callable functions
- ip: process in-order fragments efficiently
- ipv6: remove dependency of nf_defrag_ipv6 on ipv6 module
- net: IP6 defrag: use rbtrees for IPv6 defrag
- net: IP6 defrag: use rbtrees in nf_conntrack_reasm.c
- cifs: fix handle leak in smb2_query_symlink()
- Input: elan_i2c - add hardware ID for multiple Lenovo laptops
- drm/ttm: fix out-of-bounds read in ttm_put_pages() v2
- timers/sched_clock: Prevent generic sched_clock wrap caused by tick_freeze()
- tpm: Fix the type of the return value in calc_tpm2_event_size()

* Bionic update: upstream stable patchset 2019-07-26 (LP: #1838116)
- mmc: pxamci: fix enum type confusion
- drm/vmwgfx: Don't double-free the mode stored in par->set_mode
- iommu/amd: fix sg->dma_address for sg->offset bigger than PAGE_SIZE
- libceph: wait for latest osdmap in ceph_monc_blacklist_add()
- udf: Fix crash on IO error during truncate
- mps: loongson64: lemont-2f: Add IRQF_NO_SUSPEND to "cascade" irqaction.
- MIPS: Ensure ELF appended dtb is relocated
- MIPS: Fix kernel crash for R6 in jump label branch function
- scsi: ibmvscsi: Protect ibmvscsi_head from concurrent modificaiton
- scsi: ibmvscsi: Fix empty event pool access during host removal
- futex: Ensure that futex address is aligned in handle_futex_death()
- perf probe: Fix getting the kernel map
- objtool: Move objtool_file struct off the stack
- ALSA: x86: Fix runtime PM for hdmi-lpe-audio
- ext4: fix NULL pointer dereference while journal is aborted
- ext4: fix data corruption caused by unaligned direct AIO
- ext4: brelse all indirect buffer in ext4_ind_remove_space()
- media: v4l2-ctrls.c/uvc: zero v4l2_event
- Bluetooth: hci_uart: Check if socket buffer is ERR_PTR in h4_recv_buf()
- Bluetooth: Fix decrementing reference count twice in releasing socket
- Bluetooth: hci_ldisc: Initialize hci_dev before open()
- Bluetooth: hci_ldisc: Postpone HCI_UART_PROTO_READY bit set in
- hci_uart_set_proto()
- drm: Reorder set_property_atomic to avoid returning with an active ww_ctx
- netfilter: etbables: remove BUGPRINT messages
- x86/unwind: Handle NULL pointer calls better in frame unwinder
- x86/unwind: Add hardcoded ORC entry for NULL
- locking/lockdep: Add debug_locks check in __lock_downgrade()
- ALSA: hda - Record the current power state before suspend/resume calls
- PCI: designware-ep: dw_pcie_ep_set_msi() should only set MMC bits
- PCI: designware-ep: Read-only registers need DBI_RO_WR_EN to be writable
- PCI: endpoint: Use EPC's device in dma_alloc_coherent()/dma_free_coherent()
- rtc: Fix overflow when converting time64_t to rtc_time
- sched/cpufreq/schedutil: Fix error path mutex unlock
- pwm-backlight: Enable/disable the PWM before/after LCD enable toggle.
+ + power: supply: charger-manager: Fix incorrect return value
+ + ath10k: avoid possible string overflow
+ + mmc: renesas_sdhi: limit block count to 16 bit for old revisions
+ + powerpc/vdso64: Fix CLOCK_MONOTONIC inconsistencies across Y2038
+ + RDMA/cma: Rollback source IP address if failing to acquire device
+ + 12fs: fix to avoid deadlock of atomic file operations
+ + loop: access lo_backing_file only when the loop device is Lo_bound
+ + video: fbdev: Set pixclock = 0 in goldfishfb
+ + dcecp: do not use ipv6 header for ipv4 flow
+ + genetlink: Fix a memory leak on error path
+ + mISDN: hfcpci: Test both vendor & device ID for Digium HFC4S
+ + net: datagram: fix unbounded loop in __skb_try_recv_datagram()
+ + net/packet: Set __GFP_NOWARN upon allocation in alloc_pg_vec
+ + net: rose: fix a possible stack overflow
+ + net: stmmac: fix memory corruption with large MTUs
+ + net/sysfs: call dev_hold if kobject_init_and_add success
+ + packets: Always register packet sk in the same order
+ + rhashtable: Still do rehash when we get EEXIST
+ + tcp: do not use ipv6 header for ipv4 flow
+ + thunderx: enable page recycling for non-XDP case
+ + thunderx: eliminate extra calls to put_page() for pages held for recycling
+ + vxlan: Don't call gro_cells_destroy() before device is unregistered
+ + scpt: get scphdr by offset in scpt_compute_cksum
+ + net: aquantia: fix rx checksum offload for UDP/TCP over IPv6
+ + mac8390: Fix mmio access size probe
+ + tun: properly test for IFF_UP
+ + tun: add a missing rcu_read_unlock() in error path
+ + powerpc/fsl: Add barrier_nospec implementation for NXP PowerPC Book3E
+ + powerpc/fsl: Sanitize the syscall table for NXP PowerPC 32 bit platforms
+ + powerpc/fsl: Add infrastructure to fixup branch predictor flush
+ + powerpc/fsl: Add macro to flush the branch predictor
+ + powerpc/fsl: Emulate SPRN_BUCSR register
+ + powerpc/fsl: Flush the branch predictor at each kernel entry (64bit)
+ + powerpc/fsl: Flush the branch predictor at each kernel entry (32 bit)
+ + powerpc/fsl: Flush branch predictor when entering KVM
+ + powerpc/fsl: Enable runtime patching if nospectre_v2 boot arg is used
+ + powerpc/fsl: Fixed warning: orphan section `__btb_flush_fixup'
+ + powerpc/fsl: Fix the flush of branch predictor.
+ + Btrfs: fix incorrect file size after shrinking truncate and fsync
+ + btrfs: remove WARN_ON in log_dir_items
+ + ARM: imx6q: cpuidle: fix bug that CPU might not wake up at expected time
+ + powerpc: bpf: Fix generation of load/store DW instructions
+ + NFSv4.1 don't free interrupted slot on open
+ + net: dsa: qca8k: remove leftover phy accessors
+ + ALSA: pcm: Fix possible OOB access in PCM oss plugins
+ + ALSA: pcm: Don't suspend stream in unrecoverable PCM state
+ + kbuild: modversions: Fix relative CRC byte order interpretation
+ + fs/open.c: allow opening only regular files during execve()
+ - ocf2: fix inode bh swapping mixup in ocf2_relink_inodes_lock
+ - scsi: sd: Fix a race between closing an sd device and sd I/O
+ - scsi: sd: Quiesce warning if device does not report optimal I/O size
+ - scsi: zfcp: fix rport unblock if deleted SCSI devices on Scsi_Host
+ - scsi: zfcp: fix scsi_eh host reset with port_forced ERP for non-NPIV FCP devices
+ - tty: atmel_serial: fix a potential NULL pointer dereference
+ - staging: comedi: ni_mio_common: Fix divide-by-zero for DIO cmdtest
+ - staging: vt6655: Remove vif check from vnt_interrupt
+ - staging: vt6655: Fix interrupt race condition on device start up.
+ - serial: max310x: Fix to avoid potential NULL pointer dereference
+ - serial: sh-sci: Fix setting SCSCR_TIE while transferring data
+ - USB: serial: cp210x: add new device id
+ - USB: serial: ftdi_sio: add additional NovaTech products
+ - USB: serial: mos7720: fix mos_parport refcount imbalance on error path
+ - USB: serial: option: add driver info for SIM5218 and compatibles
+ - USB: serial: option: add support for Quectel EM12
+ - USB: serial: option: add Olicard 600
+ - Disable kgdboc failed by echo space to /sys/module/kgdboc/parameters/kgdboc
+ - fs/proc/proc_sysctl.c: fix NULL pointer dereference in put_links
+ - drm/vgem: fix use-after-free when drm_gem_handle_create() fails
+ - gpio: exar: add a check for the return value of ida_simple_get fails
+ - gpio: adnp: Fix testing wrong value in adnp_gpio_direction_input
+ - phy: sun4i-usb: Support set_mode to USB_HOST for non-OTG PHYs
+ - usb: mtu3: fix EXTCON dependency
+ - USB: gadget: f_hid: fix deadlock in f_hidg_write()
+ - usb: common: Consider only available nodes for dr_mode
+ - usb: host: xhci-rear: Add XHCI_TRUST_TX_LENGTH quirk
+ - xhci: Fix port resume done detection for SS ports with LPM enabled
+ - usb: cdc-acm: fix race during wakeup blocking TX traffic
+ - mm/migrate.c: add missing flush_dcache_page for non-mapped page migrate
+ - perf intel-pt: Fix TSC slip
+ - cpu/hotplug: Prevent crash when CPU bringup fails on CONFIG_HOTPLUG_CPU=n
+ - x86/smp: Enforce CONFIG_HOTPLUG_CPU when SMP=y
+ - KVM: Reject device ioctls from processes other than the VM's creator
+ - KVM: x86: Emulate MSR_IA32_ARCH_CAPABILITIES on AMD hosts
+ - vio: ccw: only free cp on final interrupt
+ - ipmi_si: Fix crash when using hard-coded device
+ - gtp: change NET_UDP_TUNNEL dependency to select
+ - Btrfs: fix assertion failure on fsync with NO_HOLES enabled
+ - NFS: fix mount/umount race in nlmclnt.
+ - ALSA: hda/realtek: Enable headset MIC of Acer AIO with ALC286
+ - ALSA: hda/realtek: Enable headset MIC of Acer Aspire Z24-890 with ALC286
+ - ALSA: hda/realtek - Add support for Acer Aspire E5-523G/ES1-432 headset mic
+ - ALSA: hda/realtek: Enable ASUS X441MB and X705FD headset MIC with ALC256
+ - ALSA: hda/realtek: Enable headset mic of ASUS P5440FF with ALC256
+ - ALSA: hda/realtek: Enable headset MIC of ASUS X430UN and X512DK with ALC256
+ - ALSA: hda/realtek - Fix speakers on Acer Predator Helios 500 Ryzen laptops
+ - drm/rockchip: Do not use memcpy for MMIO addresses
+ - drm/rockchip: vop: reset scale mode when win is disabled
+ - tty/mxs-uart: fix a potential NULL pointer dereference
+ - staging: speakup_soft: Fix alternate speech with other synths
+ - serial: mvebu-uart: Fix to avoid a potential NULL pointer dereference
+ - drm/i915/gvt: Fix MI_FLUSH_DW parsing with correct index check
+ - usb: xc: dbc: Don't free all memory with spinlock held
+ - xc: Don't let USB3 ports stuck in polling state prevent suspend
+ - mm: add support for kmem caches in DMA32 zone
+ - iommu/io-pgtable-arm-v7s: request DMA32 memory, and improve debugging
+ - mm: mempolicy: add mbind() return -EIO when MPOL_MF STRICT is specified
+ - perf pmu: Fix parser error for uncore event alias
+ - objtool: Query pkg-config for libelf location
+ - bpf: do not restore dst_reg when cur_state is freed
+ - arm64: debug: Don't propagate UNKNOWN FAR into si_code for debug signals
+ - ext4: cleanup bh release code in ext4_ind_remove_space()
+ - tty/serial: atmel: Add is_half_duplex helper
+ - tty/serial: atmel: RS485 HD w/DMA: enable RX after TX is stopped
+ - CIFS: fix POSIX lock leak and invalid ptr deref
+ - h8300: use cc-cross-prefix instead of hardcoded h8300-unknown-linux-
+ - f2fs: fix to avoid deadlock in f2fs_read_inline_dir()
+ - tracing: kdb: Fix ftdump to not sleep
+ - net/mlx5: Avoid panic when setting vport rate
+ - net/mlx5: Avoid panic when setting vport mac, getting vport config
+ - gpio: gpio-omap: fix level interrupt idling
+ - include/linux/relay.h: fix percpu annotation in struct rchan
+ - enic: fix build warning without CONFIG_CPUMASK_OFFSTACK
+ - scsi: hisi_sas: Set PHY linkrate when disconnected
+ - iio: adc: fix warning in Qualcomm PM8xxx HK/XOADC driver
+ - perf c2c: Fix c2c report for empty numa node
+ - mm/cma.c: cma_declare_contiguous: correct err handling
+ - mm/page_ext.c: fix an imbalance with kmemleak
+ - mm, mempolicy: fix uninit memory access
+ - mm/vmalloc.c: fix kernel BUG at mm/vmalloc.c:512!
+ - mm/slab.c: kmemleak no scan alien caches
+ - of: fix a panic problem caused by o2cb_ctl
+ - f2fs: do not use mutex lock in atomic context
+ - fs/file.c: initialize init_files.resize_wait
+ - page_poison: play nicely with KASAN
+ - cifs: use correct format characters
+ - dm thin: add sanity checks to thin-pool and external snapshot creation
+ - cifs: Fix NULL pointer dereference of devname
+ - jbd2: fix invalid descriptor block checksum
+ - fs: fix guard_bio_eod to check for real EOD errors
+ - tools lib traceevent: Fix buffer overflow in arg_eval
+ - PCI/PME: Fix hotplug/sysfs remove deadlock in pcie_pme_remove()
+ - wil6210: check null pointer in _wil_cfg80211_merge_extra_ies
+ - crypto: crypto4xx - add missing of_node_put after of_device_is_available
+ - crypto: cavium/zip - fix collision with generic cra_driver_name
+ - usb: chipidea: Grab the (legacy) USB PHY by phandle first
+ - scsi: core: replace GFP_ATOMIC with GFP_KERNEL in scsi_scan.c
+ - powerpc/xmon: Fix opcode being uninitialized in print_insn_powerpc
+ - coresight: etm4x: Add support to enable ETMv4.2
+ - serial: 8250_pxa: honor the port number from devicetree
+ - ARM: 8840/1: use a raw_spinlock_t in unwind
+ - iommu/io-pgtable-arm-v7s: Only kmemleak_ignore L2 tables
+ - powerpc/hugelib: Handle mmap_min_addr correctly in get_unmapped_area
+ - callback
+ - mmc: omap: fix the maximum timeout setting
+ - c1000e: Fix -Wformat-truncation warnings
+ - mlxsw: spectrum: Avoid -Wformat-truncation warnings
+ - IB/mlx4: Increase the timeout for CM cache
+ - clk: fractional-divider: check parent rate only if flag is set
+ - cpufreq: acpi-cpufreq: Report if CPU doesn't support boost technologies
+ - efi: cper: Fix possible out-of-bounds access
+ - scsi: megaraid_sas: return error when create DMA pool failed
+ - scsi: fcoe: make use of fip_mode enum complete
+ - perf test: Fix failure of 'evsel-tp-sched' test on s390
+ - SoC: imx-sgtl5000: add missing put_device()
+ - media: sh_veu: Correct return type for mem2mem buffer helpers
+ - media: s5p-jpeg: Correct return type for mem2mem buffer helpers
+ - media: s5p-g2d: Correct return type for mem2mem buffer helpers
+ - media: mx2_emmaprp: Correct return type for mem2mem buffer helpers
+ - media: mtk-jpeg: Correct return type for mem2mem buffer helpers
+ - vfs: fix preadv64v2 and pwritev64v2 compat syscalls with offset == -1
+ - HID: intel-ish-hid: avoid binding wrong ishtp_cl_device
+ - jbd2: fix race when writing superblock
+ - leds: lp55xx: fix null deref on firmware load failure
+ - iwwifi: pcie: fix emergency path
+ - ACPI / video: Refactor and fix dmi_is_desktop()
+ - kprobes: Prohibit probing on bsearch()
+ - netfilter: conntrack: fix cloned unconfirmed skb->_nfct race in
  __nf_conntrack_confirm
+ - ARM: 8833/1: Ensure that NEON code always compiles with Clang
+ - ALSA: PCM: check if ops are defined before suspending PCM
+ - usb: f_fs: Avoid crash due to out-of-scope stack ptr access
+ - sched/topology: Fix percpu data types in struct sd_data & struct s_data
+ - bcache: fix input overflow to cache set sysfs file io_error_halflife
+ - bcache: fix input overflow to sequential_cutoff
+ - bcache: improve sysfs_strtoul_clamp()
+ - genirq: Avoid summation loops for /proc/stat
+ - iw_cxgb4: fix sqidx leak during connection abort
+ - fbdev: fbmem: fix memory access if logo is bigger than the screen
+ - cdrom: Fix race condition in cdrom_sysct1_register
+ - platform/x86: intel_pmc_core: Fix PCH IP sts reading
+ - ASoC: fsl-asoc-card: fix object reference leaks in fsl_asoc_card_probe
- sched/debug: Initialize sd_sysctl_cpus if !CONFIG_CPUMASK_OFFSTACK
- efi/memattr: Don't bail on zero VA if it equals the region's PA
- ARM: dts: lpc32xx: Remove leading 0x and 0s from bindings notation
- soc: qcom: gsbi: Fix error handling in gsbi_probe()
- mt7601u: bump supported EEPROM version
- ARM: 8830/1: NOMMU: Toggle only bits in EXC_RETURN we are really care of
- ARM: avoid Cortex-A9 livelock on tight dmb loops
- bpf: fix missing prototype warnings
- cgroup/pids: turn cgroup_subsys->free() into cgroup_subsys->release() to fix the accounting
- backlight: pwm_bl: Use gpiod_get_value_cansleep() to get initial state
- tty: increase the default flip buffer limit to 2*640K
- powerpc/pseries: Perform full re-add of CPU for topology update post-migration
- usb: dwc3: gadget: Fix OTG events when gadget driver isn't loaded
- media: mt9m111: set initial frame size other than 0x0
- hwrg: virtio - Avoid repeated init of completion
- soc/tegra: fuse: Fix illegal free of IO base address
- HID: intel-ish: ipc: handle PIMR before ish_wakeup also clear PISR
  busy_clear bit
- hpet: Fix missing '=' character in the __setup() code of hpet_mmap_enable
- cpu/hotplug: Mute hotplug lockdep during init
- dmaengine: imx-dma: fix warning comparison of distinct pointer types
- dmaengine: qcom_hidma: assign channel cookie correctly
- dmaengine: qcom_hidma: initialize tx flags in hidma_prep_dma_*
- netfilter: physdev: relax br_netfilter dependency
- media: s5p-jpeg: Check for fmt_ver_flag when doing fmt enumeration
- regulator: act8865: Fix act8600_sucdc_voltage_ranges setting
- drm: Auto-set allow_fb_modifiers when given modifiers at plane init
- drm/nouveau: Stop using drm_crtc_force_disable
- x86/build: Specify elf_i386 linker emulation explicitly for i386 objects
- selinux: do not override context on context mounts
- wcore: Fix memory leak in case w112xx_fetch_firmware failure
- x86/build: Mark per-CPU symbols as absolute explicitly for LLD
- clk: rockchip: fix frac settings of PLL clock for rk3328
- dmaengine: tegra: avoid overflow of byte tracking
- drm/dp/mst: Configure no_stop_bit correctly for remote i2c xfers
- ACPI / video: Extend chassis-type detection with a "Lunch Box" check
- f2fs: fix to adapt small inline xattr space in __find_inline_xattr()
- net: stmmac: Avoid sometimes uninitialized Clang warnings
- libbpf: force fixdep compilation at the start of the build
- scsi: hisi_sas: Fix a timeout race of driver internal and SMP IO
- x86/hyperv: Fix kernel panic when kexec on HyperV
- mm/sparse: fix a bad comparison
- mm, swap: bounds check swap_info array accesses to avoid NULL derefs
- memcg: killed threads should not invoke memcg OOM killer
- cifs: Accept validate negotiate if server return NT_STATUS_NOT_SUPPORTED
- netfilter: nf_tables: check the result of dereferencing base_chain->stats
+ netfilter: conntrack: tcp: only close if RST matches exact sequence
+ kbuild: invoke syncconfig if include/config/auto.conf.cmd is missing
+ mwifiex: don't advertise IBSS features without FW support
+ perf report: Don't shadow inlined symbol with different addr range
+ media: rockchip/rga: Correct return type for mem2mem buffer helpers
+ selftests: skip seccomp get_metadata test if not real root
+ kprobes: Prohibit probing on RCU debug routine
+ bcache: fix potential div-zero error of writeback_rate_i_term_inverse
+ drm: rcar-du: add missing of_node_put
+ perf/aux: Make perf_event accessible to setup_aux()
+ e1000e: Exclude device from suspend direct complete optimization
+ i2c: of: Try to find an I2C adapter matching the parent
+ sched/core: Use READ_ONCE()/WRITE_ONCE() in
  move_queued_task()/task_rq_lock()
+ powerpc/64s: Clear on-stack exception marker upon exception return
+ platform/x86: intel-hid: Missing power button release on some Dell models
+ pinctrl: meson: meson8b: add the eth_rxd2 and eth_rxd3 pins
+ net: stmmac: Avoid one more sometimes uninitialized Clang warning
+ bcache: fix potential div-zero error of writeback_rate_p_term_inverse
+ net: sfp: move sfp_register_socket call from sfp_remove to sfp_probe
+ drm/i915/gvt: do not let pin count of shadow mm go negative
+ powerpc/tm: Limit TM code inside PPC_TRANSACTIONAL_MEM
+ kbuild: clang: choose GCC_TOOLCHAIN_DIR not on LD
+ x86: vdso: Use $LD instead of $CC to link
+ x86/vdso: Drop implicit common-page-size linker flag
+ lib/string.c: implement a basic bcmp
+ stating: ccre: revert "staging: ccre: fix leak of import() after init()"
+ arm64: kaslr: Reserve size of ARM64_MEMSTART_ALIGN in linear region
+ tty: mark Siemens R3964 line discipline as BROKEN
+ [Config] updateconfigs for CONFIG_R3964 (BROKEN)
+ [Config] updateconfigs for CONFIG_LDISC_AUTOLOAD
+ tty: ldisc: add sysctl to prevent autoloading of ldiscs
+ ipv6: Fix dangling pointer when ipv6 fragment
+ ipv6: sit: reset ip header pointer in ipip6_rcv
+ km: switch order of device registration to fix a crash
+ net-gro: Fix GRO flush when receiving a GSO packet.
+ net/mlx5: Decrease default mr cache size
+ net/sched: fix ->get helper of the matchall cls
+ qmi_wwan: add Olicard 600
+ scap: initialize _pad of sockaddr_in before copying to user memory
+ tcp: Ensure DCTCP reacts to losses
+ vrf: check accept_source_route on the original netdevice
+ net/mlx5e: Fix error handling when refreshing TIRs
+ net/mlx5e: Add a lock on tir list
+ nfp: validate the return code from dev_queue_xmit()
+ bnxt_en: Improve RX consumer index validity check.
+ bnxt_en: Reset device on RX buffer errors.
+ net/sched: act_sample: fix divide by zero in the traffic path
+ - netns: provide pure entropy for net_hash_mix()
+ - net: ethtool: not call vzalloc for zero sized memory request
+ - ALSA: seq: Fix OOB-reads from strcatpy
+ - ip6_tunnel: Match to ARPHRD_TUNNEL6 for dev type
+ - hv_netvsc: Fix unwanted wakeup after tx_disable
+ - arm64: dts: rockchip: fix rk3328 sdmmc0 write errors
+ - parisc: Detect QEMU earlier in boot process
+ - parisc: regs_return_value() should return gpr28
+ - alarmtimer: Return correct remaining time
+ - drm/udl: add a release method and delay mode set teardown
+ - include/linux/bitrev.h: fix constant bitrev
+ - ASoC: fsl_esai: fix channel swap issue when stream starts
+ - Btrfs: do not allow trimming when a fs is mounted with the nologreplay
  option
+ - btrfs: prop: fix zstd compression parameter validation
+ - btrfs: prop: fix vanished compression property after failed set
+ - block: do not leak memory in bio_copy_user_iov()
+ - block: fix the return errno for direct IO
+ - genirq: Respect IRQCHIP_SKIP_SET_WAKE in irq_chip_set_wake_parent()
+ - genirq: Initialize request_mutex if CONFIG_SPARSE_IRQ=n
+ - virtio: Honour 'may_reduce_num' in vring_create_virtqueue
+ - ARM: dts: am335x-evmsk: Correct the regulators for the audio codec
+ - ARM: dts: am335x-evm: Correct the regulators for the audio codec
+ - ARM: dts: at91: Fix typo in ISC_D0 on PC9
+ - arm64: futex: Fix FUTEX_WAKE_OP atomic ops with non-zero result value
+ - arm64: dts: rockchip: fix rk3328 rgmii high tx error rate
+ - arm64: backtrace: Don't bother trying to unwind the userspace stack
+ - xen: Prevent buffer overflow in privcmd ioctl
+ - sched/fair: Do not re-read ->h_load_next during hierarchical load
  calculation
+ - xtensa: fix return_address
+ - x86/perf/amd: Resolve race condition when disabling PMC
+ - x86/perf/amd: Resolve NMI latency issues for active PMCs
+ - x86/perf/amd: Remove need to check "running" bit in NMI handler
+ - PCI: Add function 1 DMA alias quirk for Marvell 9170 SATA controller
+ - dm table: propagate BDI_CAP_STABLE_WRITES to fix sporadic checksum errors
+ - arm64: dts: rockchip: fix vcc_host1_5v pin assign on rk3328-rock64
+ - arm64: dts: rockchip: Fix vcc_host1_5v GPIO polarity on rk3328-rock64
+ - tcp: fix a potential NULL pointer dereference in tcp_sk_exit
+ - nfp: disable netpoll on representors
+ - r8169: disable default rx interrupt coalescing on RTL8168
+ - kbuild: deb-pkg: fix debindep-pkg breakage when O= is used
+ - ACPI: Namespace: remove address node from global list after method
termination
+ - ALSA: hda/realtek - Add quirk for Tuxedo XC 1509
+ - mm/huge_memory.c: fix modifying of page protection by insert_pfn_pmd()
+ - riscv: Fix syscall_get_arguments() and syscall_set_arguments()
+ - x86/asm: Remove dead __GNUC__ conditionals
+  - dm integrity: change memcmp to strncmp in dm_integrity_ctr
+  * Bionic update: upstream stable patchset 2019-07-25 (LP: #1837952)
+  - ACPICA: Reference Counts: increase max to 0x4000 for large servers
+  - gro_cells: make sure device is up in gro_cells_receive()
+  - ipv4/route: fail early when inet dev is missing
+  - l2tp: fix infoleak in l2tp_ip6_recmmsg()
+  - net: hsr: fix memory leak in hsr_dev_finalize()
+  - net/hsr: fix possible crash in add_timer()
+  - net: sit: fix UBSAN Undefined behaviour in check_6rd
+  - net/x25: fix use-after-free in x25_device_event()
+  - net/x25: reset state in x25_connect()
+  - pptp: dst_release sk_dst_cache in pptp_sock_destruct
+  - ravb: Decrease TxFIFO depth of Q3 and Q2 to one
+  - route: set the deleted fnhe fnhe_daddr to 0 in ip_del_fnhe to fix a race
+  - rxrpc: Fix client call queuing, waiting for channel
+  - tcp: Don't access TCP_SKB_CB before initializing it
+  - tcp: handle inet_csk_reqsck_queue_add() failures
+  - vxlan: Fix GRO cells race condition between receive and link delete
+  - vxlan: test dev->flags & IFF_UP before calling gro_cells_receive()
+  - net/mlx4_core: Fix reset flow when in command polling mode
+  - net/mlx4_core: Fix locking in SRIOV mode when switching between events and polling
+  - net/mlx4_core: Fix qp mtt size calculation
+  - net/x25: fix a race in x25_bind()
+  - net: Set rtm_table to RT_TABLE_COMPAT for ipv6 for tables > 255
+  - bonding: fix PACKET_ORIGDEV regression
+  - missing barriers in some of unix_sock->addr and ->path accesses
+  - ipvlan: disallow users cap_net_admin to change global mode/flags
+  - perf/x86: Fixup typo in stub functions
+  - ALSA: bebob: use more identical mod_alias for Saffire Pro 10 I/O against Liquid Saffire 56
+  - ALSA: firewire-motu: fix construction of PCM frame for capture direction
+  - perf/x86/intel: Fix memory corruption
+  - perf/x86/intel: Make dev_attr_allow_txs_force_abort static
+  - It's wrong to add len to sector_nr in raid10 reshape twice
+  - scpt: remove sched init from scpt_stream_init
+  - team: use operstate consistently for linkup
+  - ipv6: route: enforce RCU protection in rt6_update_exception_stamp_rt()
+  - ALSA: hda - add more quirks for HP Z2 G4 and HP Z240
+  - ALSA: hda/realtek: Enable audio jacks of ASUS UX362FA with ALC294
+  - i40e: report correct statistics when XDP is enabled
+  - 9p: use inode->i_lock to protect i_size_write() under 32-bit
+  - 9p/net: fix memory leak in p9_client_create
+  - ASoC: fsl_esai: fix register setting issue in RIGHT_J mode
+  - iio: adc: exynos-adc: Fix NULL pointer exception on unbind
+  - stm class: Fix an endless loop in channel allocation
+  - crypto: caam - fixed handling of sg list
+ - crypto: ahash - fix another early termination in hash walk
+ - crypto: rockchip - fix scatterlist nents error
+ - crypto: rockchip - update new iv to device in multiple operations
+ - drm/imx: ignore plane updates on disabled crtc
+ - gpu: ipu-v3: Fix i.MX51 CSI control registers offset
+ - drm/imx: imx-ldb: add missing of_node_puts
+ - gpu: ipu-v3: Fix CSI offsets for imx53
+ - s390/dasd: fix using offset into zero size array error
+ - Input: pwm-vibra - prevent unbalanced regulator
+ - Input: pwm-vibra - stop regulator after disabling pwm, not before
+ - ARM: OMAP2+: Variable "reg" in function omap4_dsi_mux_pads() could be uninitialized
+ - ASoC: dapm: fix out-of-bounds accesses to DAPM lookup tables
+ - ASoC: snd: fixup snd_ssi_master_clk_start() user count check
+ - KVM: arm/arm64: Reset the VCPU without preemption and vcpu state loaded
+ - ARM: OMAP2+: fix lack of timer interrupts on CPU1 after hotplug
+ - Input: cap11xx - switch to using set_brightness_blocking()
+ - Input: ps2-gpio - flush TX work when closing port
+ - Input: matrix_keypad - use flush_delayed_work()
+ - mac80211: Fix Tx aggregation session tear down with ITXQs
+ - ipvs: fix dependency on nf_defrag_ipv6
+ - floppy: check_events callback should not return a negative number
+ - NFS: Don't use page_file_mapping after removing the page
+ - mm/gup: fix gup_pmd_range() for dax
+ - Revert "mm: use early_pfn_to_nid in page_ext_init"
+ - mm: page_alloc: fix ref bias in page_frag_alloc() for 1-byte allocs
+ - net: hns: Fix object reference leaks in hns_dsafr_roce_reset()
+ - i2c: cadence: Fix the hold bit setting
+ - i2c: bcm2835: Clear current buffer pointers and counts after a transfer
+ - auxdisplay: ht16k33: fix potential user-after-free on module unload
+ - Input: st-keyscan - fix potential zalloc NULL dereference
+ - clk: sunxi-ng: v3s: Fix TCON reset de-assert bit
+ - clk: sunxi: A31: Fix wrong AHB gate number
+ - esp: Skip TX bytes accounting when sending from a request socket
+ - ARM: 8824/1: fix a migrating irq bug when hotplug cpu
+ - af_key: unconditionally clone on broadcast
+ - assoc_array: Fix shortcut creation
+ - keys: Fix dependency loop between construction record and auth key
+ - scsi: libiscsi: Fix race between iscsi_xmit_task and iscsi_complete_task
+ - net: systemd: Fix reception of BDUs
+ - pinctrl: meson: meson8b: fix the sdxc_a data 1..3 pins
+ - qmi_wwan: apply SET_DTR quirk to Sierra WP7607
+ - net: mv643xx_eth: disable clk on error path in mv643xx_eth_shared_probe()
+ - mailbox: bcm-flexrm-mailbox: Fix FlexRM ring flush timeout issue
+ - ASoC: topology: free created components in tplg load error
+ - qed: Fix IWARP syn packet mac address validation.
+ - arm64: Relax GIC version check during early boot
+ - net: marvell: mvneta: fix DMA debug warning
- tmpfs: fix link accounting when a tmpfile is linked in
- ixbge: fix older devices that do not support IXGBE_MRQC_L3L4TXSWEN
- ARCv2: lib: memcpy: fix doing prefetchw outside of buffer
- ARC: uaccess: remove lp_start, lp_end from clobber list
- ARCv2: support manual regfile save on interrupts
- phonet: fix building with clang
- mac80211_hwsim: propagate genmsg_reply return code
- net: thunderx: make CFG_DONE message to run through generic send-ack sequence
- tmpfs: fix uninitialized return value in shmem_link
- media: videobuf2-v4l2: drop WARN_ON in vb2_warn_zero_bytesused()
- stm class: Prevent division by zero
- libnvdimm/label: Clear 'updating' flag after label-set update
- libnvdimm, pfn: Fix over-trim in trim_pfn_device()
- libnvdimm/pmem: Honor force_raw for legacy pmem regions
- libnvdimm: Fix altmap reservation size calculation
- fix cgroup_do_mount() handling of failure exits
- crypto: arm/crct10dif - revert to C code for short inputs
- crypto: arm64/crct10dif - revert to C code for short inputs
- crypto: hash - set CRYPTO_TFM_NEED_KEY if ->setkey() fails
- crypto: testmgr - skip crc32c context test for ahash algorithms
- crypto: arm64/aes-ccm - fix logical bug in AAD MAC handling
- crypto: arm64/aes-ccm - fix bugs in non-NEON fallback routine
- CIFS: Do not reset lease state to NONE on lease break
- CIFS: Fix read after write for files with read caching
- tracing: Use strncpy instead of memcpy for string keys in hist triggers
- tracing: Do not free iter->trace in fail path of tracing_open_pipe()
- xen: fix dom0 boot on huge systems
- ACPI / device_sysfs: Avoid OF modalias creation for removed device
- mmc: sdhci-esdhc-imx: fix HS400 timing issue
- spi: ti-qspi: Fix mmap read when more than one CS in use
- spi: pxa2xx: Setup maximum supported DMA transfer length
- regulator: s2mps11: Fix steps for buck7, buck8 and LDO35
- regulator: max77620: Initialize values for DT properties
- regulator: s2mpa01: Fix step values for some LDOs
- clocksource/drivers/exynos_mct: Move one-shot check from tick clear to ISR
- clocksource/drivers/exynos_mct: Clear timer interrupt when shutdown
- s390/setup: fix early warning messages
- s390/virtio: handle find on invalid queue gracefully
- scsi: virtio_scsi: don't send sc payload with tmfs
- scsi: aacraid: Fix performance issue on logical drives
- scsi: sd: Optimal I/O size should be a multiple of physical block size
- scsi: target/scsi: Avoid iscsit_release_commands_from_conn() deadlock
- fs/devpts: always delete dcache dentry-s in dput()
- splice: don't merge into linked buffers
- m68k: Add -ffreestanding to CFFLAGS
- Btrfs: setup a nofs context for memory allocation at __btrfs_set_acl
- btrfs: ensure that a DUP or RAID1 block group has exactly two stripes
- Btrfs: fix corruption reading shared and compressed extents after hole punching
- crypto: pcbc - remove bogus memcpy()s with src == dest
- libertas_if: don't set URB_ZERO_PACKET on IN USB transfer
- irqchip/gic-v3-its: Avoid parsing _indirect_twice for Device table
- x86/kprobes: Prohibit probing on optprobe template code
- cpufreq: tegra124: add missing of_node_put()
- cpufreq: px2axx: remove incorrect __init annotation
- ext4: add mask of ext4 flags to swap
- ext4: fix crash during online resizing
- IB/hfi1: Close race condition on user context disable and close
- clk:.Wrap iterations over afu slices inside 'afu_list_lock'
- ext2: Fix underflow in ext2_max_size()
- clk: uniphier: Fix update register for CPU-gear
- clk: clk-twl6040: Fix imprecise external abort for pdmclk
- clk: ingenic: Fix round_rate misbehaving with non-integer dividers
- clk: ingenic: Fix doc of ingenic_cgu_div_info
- usb: chipidea: tegra: Fix missed ci_hdrc_remove_device()
- nfit: acpi_nfit_ctl(): Check out_obj->type in the right place
- mm: lwpoison: fix thp split handing in soft_offline_in_use_page()
- mm/vmalloc: fix size check for remap_vmalloc_range_partial()
- kernel/sysctl.c: add missing range check in do_proc_dointvec_minmax_conv
- device property: Fix the length used in PROPERTY_ENTRY_STRING()
- intel_th: Don't reference unassigned outputs
- parport_pc: fix find_superio io compare code, should use equal test.
- i2c: tegra: fix maximum transfer size
- crypto: arm64/aes-neonbs - fix returning final keystream block
- drm/i915: Relax mmap VMA check
- serial: uartps: Fix stuck ISR if RX disabled with non-empty FIFO
- serial: 8250_of: assume reg-shift of 2 for mrvl,mmp-uart
- serial: 8250_pci: Fix number of ports for ACCES serial cards
- serial: 8250_pci: Have ACCES cards that use the four port Pericom PI7C9X7954
- chip use the pci_pericom_setup()
- jbd2: clear dirty flag when revoking a buffer from an older transaction
- jbd2: fix compile warning when using JBUFFER_TRACE
- security/selinux: fix SECURITY_LSM_NATIVE_LABELS on reused superblock
- powerpc/32: Clear on-stack exception marker upon exception return
- powerpc/wii: properly disable use of BATs when requested.
- powerpc/powernv: Make opal log only readable by root
- powerpc/83xx: Also save/restore SPRG4-7 during suspend
- powerpc: Fix 32-bit KVM-PR lockup and host crash with MacOS guest
- powerpc/ptrace: Simplify vr_get/set() to avoid GCC warning
- powerpc/hugeltb: Don't do runtime allocation of 16G pages in LPAR
- configuration
- powerpc/traps: fix recoverability of machine check handling on book3s/32
- powerpc/traps: Fix the message printed when stack overflows
- ARM: s3c24xx: Fix boolean expressions in osiris_dvs_notify
- arm64: Fix HCR.TGE status for NMI contexts
- arm64: debug: Ensure debug handlers check triggering exception level
- arm64: KVM: Fix architecturally invalid reset value for FPEXC32_EL2
- dm: fix_to_sector() for 32bit
- dm integrity: limit the rate of error messages
- cpacp-charger: generate events for userspace
- NFS: Fix I/O request leakages
- NFS: Fix an I/O request leakage in nfs_do_recoalesce
- NFS: Don't recoalesce on error in nfs_pageio_complete_mirror()
- nfsd: fix memory corruption caused by readdir
- nfsd: fix wrong check in write_v4_end_grace()
- NFSv4.1: Reinitialise sequence results before retransmitting a request
- PM / wakeup: Rework wakeup source timer cancellation
- x86/unwind/orc: Fix ORC unwind table alignment
- perf intel-pt: Fix CYC timestamp calculation after OVF
- perf auxtrace: Define auxtrace record alignment
- perf intel-pt: Fix overlap detection to identify consecutive buffers correctly
- perf intel-pt: Fix overlap calculation for padding
- perf intel-pt: Fix divide by zero when TSC is not available
- md: Fix failed allocation of md_register_thread
- tpm/tpm_crb: Avoid unaligned reads in crb_recv()
- tpm: Unify the send callback behaviour
- rcu: Do RCU GP kthread self-wakeup from softirq and interrupt
- media: inx: pпencvf: Stop upstream before disabling IDMA channel
- media: uvcvideo: Avoid NULL pointer dereference at the end of streaming
- media: vмc: Add vмc-streamer for stream control
- media: inx: csi: Disable CSI immediately after last EOF
- media: inx: csi: Stop upstream before disabling IDMA channel
- drm/radeon/evergreen_cs: fix missing break in switch statement
- KVM: Call kvm_arch_memslots_updated() before updating memslots
- KVM: x86/mmu: Detect MMIO generation wrap in any address space
- KVM: x86/mmu: Do not cache MMIO accesses while memslots are in flux
- KVM: nVMX: Sign extend displacements of VMX instr's mem operands
- KVM: nVMX: Apply addr size mask to effective address for VMX instructions
- KVM: nVMX: Ignore limit checks on VMX instructions using flat segments
- s390/setup: fix boot crash for machine without EDAT-1
- crypto: caam - fix hash context DMA unmap size
- crypto: caam - fix DMA mapping of stack memory
- KVM: arm/arm64: vgic: Make vgic_dist->lpi_list_lock a raw_spinlock
- arm/arm64: KVM: Allow a VCPU to fully reset itself
- arm/arm64: KVM: Don't panic on failure to properly reset system registers
- ASoC: samsung: Prevent clk_get_rate() calls in atomic context
- mac80211: call drv_ibss_join() on restart
- blk-mq: insert rq with DONTPREP to hctx dispatch list when requeue
- xprtdma: Make sure Send CQ is allocated on an existing compvec
- net: dsa: bcm_sf2: potential array overflow in bcm_sf2_sw_suspend()
- x86/CPU: Add Iceake model number
- kallsyms: Handle too long symbols in kallsyms.c
- ARM: 8835/1: dma-mapping: Clear DMA ops on teardown
- net: dsa: bcm_sf2: Do not assume DSA master supports WoL
- qed: Fix iWARP buffer size provided for syn packet processing.
- mm: handle lru_add_drain_all for UP properly
- ARCv2: don't assume core 0x54 has dual issue
- bpf, lpm: fix lookup bug in map_delete_elem
- acpi/nfit: Fix bus command validation
- mmc: fix a bug when max_discard is 0
- netfilter: ipt_CLUSTERIP: fix warning unused variable cn
- [Config] updateconfigs for CONFIG_SUN50I_ERRATUM_UNKNOWN1
- clocksource/drivers/arch_timer: Workaround for Allwinner A64 timer instability
- irqchip/brcmstb-l2: Use _irqsave locking variants in non-interrupt code
- ext4: fix check of inode in swap_inode_boot_loader
- ext4: cleanup pagecache before swap i_data
- ext4: update quota information while swapping boot loader inode
- dmaengine: usb-dmac: Make DMAC system sleep callbacks explicit
- mm/memory.c: do_fault: avoid usage of stale vm_area_struct
- media: i2c: ov5640: Fix post-reset delay
- powerpc/powerpc: Don't reprogram SLW image on every KVM guest entry/exit
- mfd: sm501: Fix potential NULL pointer dereference
- nfsd: fix performance-limiting session calculation
- svcrpc: fix UDP on servers with lots of threads
- stable-kernel-rules.rst: add link to networking patch queue
- bcache: use (REQ_META|REQ_PRIO) to indicate bio for metadata

* Bionic update: upstream stable patchset 2019-07-24 (LP: #1837813)
- dt-bindings: eeprom: at24: add "atmel,24c2048" compatible string
- eeprom: at24: add support for 24c2048
- blk-mq: fix a hung issue when fsync
- ARM: 8789/1: signal: copy registers using __copy_to_user()
- ARM: 8790/1: signal: always use __copy_to_user to save iwmmtx context
- ARM: 8791/1: vfp: use __copy_to_user() when saving VFP state
- ARM: 8792/1: oabi-compact: copy oabi events using __copy_to_user()
- ARM: 8793/1: signal: replace __put_user_error with __put_user
- ARM: 8794/1: uaccess: Prevent speculative use of the current addr_limit
- ARM: 8795/1: spectre-v1.1: use put_user() for __put_user()
- ARM: 8796/1: spectre-v1,v1.1: provide helpers for address sanitization
- ARM: 8797/1: spectre-v1.1: harden __copy_to_user
- ARM: 8810/1: vfp: Fix wrong assignment to ufp_exc
- ARM: make lookup_processor_type() non__init
- ARM: split out processor lookup
- ARM: clean up per-processor check__bugs method call
- ARM: add PROC_VTABLE and PROC_TABLE macros
- ARM: spectre-v2: per-CPU vtables to work around big.Little systems
+ - ARM: ensure that processor vttables is not lost after boot
+ - ARM: fix the cockup in the previous patch
+ - ACPI: NUMA: Use correct type for printing addresses on i386-PAE
+ - perf test shell: Use a fallback to get the pathname in vfs_getname
+ - cpufreq: check if policy is inactive early in __cpufreq_get()
+ - drm/bridge: tc358767: add defines for DP1_SRCCTRL & PHY_2LANE
+ - drm/bridge: tc358767: fix single lane configuration
+ - drm/bridge: tc358767: fix initial DP0/1_SRCCTRL value
+ - drm/bridge: tc358767: reject modes which require too much BW
+ - drm/bridge: tc358767: fix output H/V syncs
+ - nvme-pci: use the same attributes when freeing host_mem_desc_bufs.
+ - ARM: dts: da850-evm: Correct the sound card name
+ - ARM: dts: da850-lcdk: Correct the sound card name
+ - ARM: dts: kirkwood: Fix polarity of GPIO fan lines
+ - gpio: pl061: handle failed allocations
+ - drm/nouveau: Don't disable polling in fallback mode
+ - drm/nouveau/falcon: avoid touching registers if engine is off
+ - cifs: Limit memory used by lock request calls to a page
+ - Revert "Input: elan_i2c - add ACPI ID for touchpad in ASUS Aspire F5-573G"
+ - Input: elan_i2c - add ACPI ID for touchpad in Lenovo V330-15ISK
+ - perf/core: Fix impossible ring-buffer sizes warning
+ - perf/x86: Add check_period PMU callback
+ - ALSA: hda - Add quirk for HP EliteBook 840 G5
+ - ALSA: usb-audio: Fix implicit fb endpoint setup by quirk
+ - kvm: vmx: Fix entry number check for add_atomic_switch_msr()
+ - Input: bma150 - register input device after setting private data
+ - Input: elantech - enable 3rd button support on Fujitsu CELSIUS H780
+ - mm: proc: smaps_rollup: fix pss_locked calculation
+ - alpha: fix page fault handling for r16-r18 targets
+ - alpha: Fix Eiger NR_IRQS to 128
+ - tracing/uprobes: Fix output for multiple string arguments
+ - x86/platform/UV: Use efi_runtime_lock to serialise BIOS calls
+ - signal: Restore the stop PTRACE_EVENT_EXIT
+ - md/raid1: don't clear bitmap bits on interrupted recovery.
+ - x86/a.out: Clear the dump structure initially
+ - dm crypt: don't overallocate the integrity tag space
+ - dm thin: fix bug where bio that overwrites thin block ignores FUA
+ - drm/i915: Prevent a race during I915_GEM_MMAP ioctl with WC set
+ - perf report: Fix wrong iteration count in --branch-history
+ - riscv: fix trace_sys_exit hook
+ - ARM: dts: da850-lcdk: Correct the audio codec regulators
+ - ARM: OMAP5+: Fix inverted irq pin interrupts with irq_set_type
+ - ASoC: hdmi-codec: fix oops on re-probe
+ - riscv: Add pte bit to distinguish swap from invalid
+ - mmc: sunxi: Filter out unsupported modes declared in the device tree
+ - s390/crypt: fix specification exception on x196 during ap probe
+ - drm/i915: Block fbdev HPD processing during suspend
+ - dsa: mv88e66xxx: Ensure all pending interrupts are handled prior to exit
+ - net: fix IPv6 prefix route residue
+ - net: ipv4: use a dedicated counter for icmp_v4 redirect packets
+ - vsoc: cope with memory allocation failure at socket creation time
+ - vxlan: test dev->flags & IFF_UP before calling netif_rx()
+ - hwmon: (lm80) Fix missing unlock on error in set_fan_div()
+ - mlxsw: __mlxsw_sp_port_headroom_set(): Fix a use of local variable
+ - net: Fix for_each_netdev_feature on Big endian
+ - net: phy: xgmiitorgmii: Support generic PHY status read
+ - net: stmmac: Fix a race in EEE enable callback
+ - net: stmmac: handle endianness in dwmac4_get_timestamp
+ - vhost: correctly check the return value of translate_desc() in log_used()
+ - net: Add header for usage of fls64()
+ - net: Do not allocate page fragments that are not skb aligned
+ - tcp: clear icsk_backoff in tcp_write_queue_purge()
+ - sunrpc: fix 4 more call sites that were using stack memory with a scatterlist
+ - net/x25: do not hold the cpu too long in x25_new_lci()
+ - mISDN: fix a race in dev_expire_timer()
+ - ax25: fix possible use-after-free
+ - af_packet: fix raw sockets over 6in4 tunnel
+ - tcp: tcp_v4_err() should be more careful
+ - mmc: meson-gx: fix interrupt name
+ - ARM: 8834/1: Fix: kprobes: optimized kprobes illegal instruction
+ - tracing: Fix number of entries in trace header
+ - MIPS: eBPF: Always return sign extended 32b values
+ - mac80211: Restore vif beacon interval if start ap fails
+ - mac80211: Free mpath object when rhashtable insertion fails
+ - libceph: handle an empty authorize reply
+ - ceph: avoid repeatedly adding inode to mds->snap_flush_list
+ - numa: change get_mempolicy() to use nr_node_ids instead of MAX_NUMNODES
+ - proc, oom: do not report alien mms when setting oom_score_adj
+ - KEYS: allow reaching the keys quotas exactly
+ - mfd: ti_am335x_tsacde: Use PLATFORM_DEVID_AUTO while registering mfd cells
+ - pvcalls-back: set -ENOTCONN in pvcalls_conn_back_read
+ - mfd: twl-core: Fix section annotations on [,un]protect_pm_master
+ - mfd: db8500-prcmu: Fix some section annotations
+ - mfd: mt6397: Do not call irq_domain_remove if PMIC unsupported
+ - mfd: ab8500-core: Return zero in get_register_interruptible()
+ - mfd: bd9571mwv: Add volatile register to make DVFS work
+ - mfd: qcom_rpm: write fw_version to CTRL_REG
+ - mfd: wm5110: Add missing ASRC rate register
+ - mfd: tps65218: Use devm_regmap_add_irq_chip and clean up error path in probe()
+ - mfd: mc13xxx: Fix a missing check of a register-read failure
+ - xen/pvcalls: remove set but not used variable ‘intf’
+ - qed: Fix qed_chain_set_prod() for PBL chains with non power of 2 page count
+ - qed: Fix qed_ll2_post_rx_buffer_notify_fw() by adding a write memory barrier
+ - net: hns: Fix use after free identified by SLUB debug
+ - MIPS: ath79: Enable OF serial ports in the default config
+ - netfilter: nf_tables: fix leaking object reference count
+ - scsi: qla4xxx: check return code of qla4xxx_copy_from_fwddb_param
+ - scsi: isci: initialize host fully before calling scsi_add_host()
+ - MIPS: jazz: fix 64bit build
+ - bpf: correctly set initial window on active Fast Open sender
+ - net: stmnic: Fix PCI module removal leak
+ - isdn: i4l: isdn_tty: Fix some concurrency double-free bugs
+ - scsi: ufs: Fix system suspend status
+ - scsi: qedl: Add ep_state for login completion on un-reachable targets
+ - always clear the X2APIC_ENABLE bit for PV guest
+ - drm/meson: add missing of_node_put
+ - atm: he: fix sign-extension overflow on large shift
+ - hwmon: (tmp421) Correct the misspelling of the tmp442 compatible attribute
  in OF device ID table
+ - leds: lp5523: fix a missing check of return value of lp55xx_read
+ - bpf: bpf_setssockopt: reset sock dst on SO_MARK changes
+ - mlxsw: spectrum_switchdev: Do not treat static FDB entries as sticky
+ - net/mlx5e: Fix wrong (zero) TX drop counter indication for representor
+ - isdn: avm: Fix string plus integer warning from Clang
+ - batman-adv: fix uninit-value in batadv_interface_tx()
+ - ipv6: propagate genlmsg_reply return code
+ - net/mlx5e: Don't overwrite pedit action when multiple pedit used
+ - net/packet: fix 4gb buffer limit due to overflow check
+ - net: sfp: do not probe SFP module before we're attached
+ - scp: call gso_reset_checksum when computing checksum in sctp_gso_segment
+ - team: avoid complex list operations in team_nl_cmd_options_set()
+ - sit: check if IPv6 enabled before calling ip6_err_gen_icmpv6_unreach()
+ - net/mlx4_en: Force CHECKSUM_NONE for short ethernet frames
+ - inet_diag: fix reporting cgroup classid and fallback to priority
+ - RDMA/srp: Rework SCSI device reset handling
+ - KEYS: user: Align the payload buffer
+ - KEYS: always initialize keyring_index_key::desc_len
+ - parisc: Fix ptrace syscall number modification
+ - ARCv2: Enable unaligned access in early ASM code
+ - ARC: U-boot: check arguments paranoidly
+ - ARC: define ARCH_SLAB_MINALIGN = 8
+ - net: validate untrusted gso packets without csum offload
+ - net: avoid false positives in untrusted gso validation
+ - Revert "bridge: do not add port to router list when receives query with
  source 0.0.0.0"
+ - netfilter: nf_tables: fix flush after rule deletion in the same batch
+ - netfilter: nft.compat: use-after-free when deleting targets
+ - netfilter: ipv6: Don't preserve original oif for loopback address
+ - pinctrl: max77620: Use define directive for max77620_pinctrl_param values
+ - phy: tegra: remove redundant self assignment of ‘map’
+ - net: phylink: avoid resolving link state too early
+ - gpio: pxa: avoid attempting to set pin direction via pinctrl on MMP2
- pvcalls-front: read all data before closing the connection
- pvcalls-front: don't try to free unallocated rings
- pvcalls-front: properly allocate sk
- mfd: cros_ec_dev: Add missing mfd_remove_devices() call in remove
- bpf: Fix [:1] -> [:1] rewrite in sys_sendmsg
- watchdog: mt7621_wdt/rt2880_wdt: Fix compilation problem
- net/mlx4: Get rid of page operation after dma_alloc_coherent
- xprtrdma: Double free in rpcrdma_sendctxs_create()
- DMA/mltca: Clear QP objects during their allocation
- powerpc/8xx: fix setting of pagetable for Abatron BDI debug tool.
- net: stmmac: Fix the logic of checking if RX Watchdog must be enabled
- scsi: ufs: Fix geometry descriptor size
- scsi: cxgb4i: add wait_for_completion()
- afs: Fix key refcounting in file locking code
- mlxsw: pci: Return error on PCI reset timeout
- scct: set stream ext to NULL after freeing it in scct_stream_outq_migrate
- drm/amdgpu: Set DPM_FLAG_NEVER_SKIP when enabling PM-runtime
- gpu: drm: radeon: Set DPM_FLAG_NEVER_SKIP when enabling PM-runtime
- drm/amd/display: Fix MST reboot/poweroff sequence
- mac80211: allocate tailroom for forwarded mesh packets
- netfilter: ipt_CLUSTERIP: Fix sleep-in-atomic bug in
- clusterip_config_entry_put()
- net: stmmac: Fix reception of Broadcom switches tags
- drm/msm: Unblock writer if reader closes file
- ASoC: Intel: Haswell/Broadwell: fix setting for .dynamic field
- ALSA: comprss: prevent potential divide by zero bugs
- ASoC: Variable "val" in function rt274_i2c_probe() could be uninitialized
- clk: vc5: Abort clock configuration without upstream clock
- thermal: int340x-thermal: Fix a NULL vs IS_ERR() check
- usb: dwc3: gadget: synchronize_irq dwc irq in suspend
- usb: dwc3: gadget:Fix the uninitialized link_state when udc starts
- usb: gadget: Potential NULL dereference on allocation error
- genirq: Make sure the initial affinity is not empty
- ASoC: dapm: change snprintf to scnprintf for possible overflow
- ASoC: imx-audmux: change snprintf to scnprintf for possible overflow
- selftests: seccomp: use LDLIBS instead of LDFLAGS
- selftests: gpio-mockup-chardev: Check asprintf() for error
- ARC: fix __ffs return value to avoid build warnings
- drivers: thermal: int340x-thermal: Fix sysfs race condition
- staging: rtl8723bs: Fix build error with Clang when inlining is disabled
- mac80211: fix miscounting of t1l-dropped frames
- sched/wait: Fix rcuwait_wake_up() ordering
- futex: Fix (possible) missed wakeup
- locking/rwsem: Fix (possible) missed wakeup
- drm/amd/powerplay: OD setting fix on Vega10
- serial: fsl_lpuart: fix maximum acceptable baud rate with over-sampling
- staging: android: ion: Support cpu access during dma_buf_detach
- direct-io: allow direct writes to empty inodes
- writeback: synchronize sync(2) against cgroup writeback membership switches
- scsi: csiostor: fix NULL pointer dereference in csio_vport_set_state()
- net: altera_tse: fix connect_local_phy error path
- hv_netvsx: Fix ethtool change hash key error
- net: usb: axi88772_bind return error when hw_reset fail
- net: dev_is_mac_header_xmit() true for ARPHRD_RAWIP
- ibmveth: Do not process frames after calling napi_reschedule
- mac80211: don't initiate DTLS connection if station is not associated to AP
- mac80211: Add attribute aligned(2) to struct 'action'
- cfg80211: extend range deviation for DMG
- kvm: nSVM: clear events pending from svm_complete_interrupts() when exiting to L1
- mmc: spi: Fix card detection during probe
- mmc: tmio_mmc_core: don't claim spurious interrupts
- mmc: tmio: fix access width of Block Count Register
- mmc: sdhci-esdhc-imx: correct the fix of ERR004536
- MIPS: fix truncation in __cmpxchg_small for short values
- MIPS: eBPF: Fix icache flush end address
- x86/uccscess: Don't leak the AC flag into __put_user() value evaluation
- irq/matrix: Split out the CPU selection code into a helper
- irq/matrix: Spread managed interrupts on allocation
- genirq/matrix: Improve target CPU selection for managed interrupts.
- clk: tegra: dill: Fix a potential Oop in remove()
- selftests/vm/gup_benchmark.c: match gup struct to kernel
- ARC: show_regs: lockdep: avoid page allocator...
- sched/wake_q: Fix wakeup ordering for wake_q
- drm/sun4i: hdmi: Fix usage of TMDS clock
- scsi: lpfc: nvme: avoid hang / use-after-free when destroying localport
- scsi: lpfc: nvmet: avoid hang / use-after-free when destroying targetport
- mmc: core: Fix NULL ptr crash from mmc_should_fail_request
- drm: Block fb changes for async plane updates
- hugetlbfs: fix races and page leaks during migration
- MIPS: BCM63XX: provide DMA masks for ethernet devices
- cpufreq: Use struct kobj_attribute instead of struct global_attr
- USB: serial: option: add Telit ME910 ECM composition
- USB: serial: cp210x: add ID for Ingenico 3070
- staging: comedi: ni_660x: fix missing break in switch statement
- staging: wilc1000: fix to set correct value for 'vif_num'
- staging: android: ion: fix sys heap pool's gfp_flags
- ip6mr: Do not call __IP6_INC_STATS() from preemtible context
- net: dsa: mv88e6xxx: handle unknown duplex modes gracefully in
  mv88e6xxx_port_set_duplex
- net-sysfs: Fix mem leak in netdev_register_kobject
- team: Free BPF filter when un registering netdev
- tipc: fix RDM/DGRAM connect() regression
- bnxt_en: Drop oversize TX packets to prevent errors.
+ hv_netvsc: Fix IP header checksum for coalesced packets
+ net: dsa: mv88e6xxx: Fix statistics on mv88e6161
+ net: dsa: mv88e6xxx: Fix u64 statistics
+ netlabel: fix out-of-bounds memory accesses
+ net: skb length BUG_ON in ___skb_to_sgvec
+ phy: Micrel KSZ8061: link failure after cable connect
+ phy: phylink: fix uninitialized variable in phylink_get_mac_state
+ net: sit: fix memory leak in sit_init_net()
+ tipc: fix race condition causing hung sendto
+ tun: fixing blocking read
+ xen-netback: don't populate the hash cache on XenBus disconnect
+ xen-netback: fix occasional leak of grant ref mappings under memory pressure
+ tun: remove unnecessary memory barrier
+ net: Add __icmp_send helper.
+ net: avoid use IPCB in cipso_v4_error
+ ipv4: Return error for RTA_VIA attribute
+ ipv6: Return error for RTA_VIA attribute
+ mpls: Return error for RTA_GATEWAY attribute
+ net/sched: act_ipt: fix refcount leak when replace fails
+ x86/CPU/AMD: Set the CPB bit unconditionally on F17h
+ MIPS: irq: Allocate accurate order pages for irq stack
+ xtensa: fix get_wchan
+ Bluetooth: Fix locking in bt_accept_enqueue() for BH context
+ scsi: core: reset host byte in DID_NEXUS_FAILURE case
+ bpf: fix sanitation rewrite in case of non-pointers
+ vti4: Fix a ipip packet processing bug in 'IPCOMP' virtual tunnel
+ perf core: Fix perf_proc_update_handler() bug
+ perf tools: Handle TOPOLOGY headers with no CPU
+ IB/{hfi1, qib}: Fix WC.byte_len calculation for UD_SEND_WITH_IMM
+ iommu/amd: Call free_iova_fast with pfn in map_sg
+ iommu/amd: Unmap all mapped pages in error path of map_sg
+ ipvs: Fix signed integer overflow when setsockopt timeout
+ iommu/amd: Fix IOMMU page flush when detach device from a domain
+ xtensa: SMP: fix ccount_timer_shutdown
+ selftests: cpu-hotplug: fix case where CPUs offline > CPUs present
+ xtensa: SMP: fix secondary CPU initialization
+ smplx200_defconfig: fix vectors clash
+ xtensa: SMP: mark each possible CPU as present
+ xtensa: SMP: limit number of possible CPUs by NR_CPUS
+ net: altera_tse: fix msgdma_tx_completion on non-zero fill_level case
+ net: hns: Fix for missing of_node_put() after of_parse_phandle()
+ net: hns: Fix wrong read accesses via Clause 45 MDIO protocol
+ net: stmmac: dwmac-rk: fix error handling in rk_mac_powerup()
+ netfilter: ebtables: compat: un-break 32bit setsockopt when no rules are present
+ gpio: vf610: Mask all GPIO interrupts
+ selftests: timers: use LDLIBS instead of LDFLAGS
+ nfs: Fix NULL pointer dereference of dev_name
+ - qed: Fix bug in tx promiscuous mode settings
+ - qed: Fix LACP pdu drops for VFs
+ - qed: Fix VF probe failure while FLR
+ - qed: Fix system crash in ll2 xmit
+ - qed: Fix stack out of bounds bug
+ - scsi: libfc: free skb when receiving invalid flogi resp
+ - platform/x86: Fix unmet dependency warning for SAMSUNG_Q10
+ - cifs: fix computation for MAX_SMB2_HDR_SIZE
+ - x86/microcode/amd: Don't falsely trick the late loading mechanism
+ - arm64: kprobe: Always blacklist the KVM world-switch code
+ - apparmor: Fix aa_label_build() error handling for failed merges
+ - x86/kexec: Don't setup EFI info if EFI runtime is not enabled
+ - x86_64: increase stack size for KASAN_EXTRA
+ - mm, memory_hotplug: is_mem_section_removable do not pass the end of a zone
+ - mm, memory_hotplug: test_pages_in_a_zone do not pass the end of zone
+ - lib/test_kmod.c: potential double free in error handling
+ - fs/drop_caches.c: avoid softlockups in drop_pagecache_sb()
+ - autofs: drop dentry reference only when it is never used
+ - autofs: fix error return in autofs_fill_super()
+ - ARM: dtm: omap4-droid4: Fix typo in cpcap IRQ flags
+ - arm64: dtm: renesas: r8a7796: Enable DMA for SCIF2
+ - soc: fsl: qbm: avoid race in clearing QMan interrupt
+ - bpf: sock recvbuff must be limited by rmem_max in bpf_setsockopt()
+ - ARM: pxa: ssp: unneeded to free devm_allocated data
+ - arm64: dtm: add msm8996 compatible to gicv3
+ - usb: phy: fix link errors
+ - irqchip/mmp: Only touch the PJ4 IRQ & FIQ bits on enable/disable
+ - net: stmmac: Fallback to Platform Data clock in Watchdog conversion
+ - net: stmmac: Send TSO packets always from Queue 0
+ - net: stmmac: Disable EEE mode earlier in XMIT callback
+ - irqchip/gic-v3-its: Fix ITT_entry_size accessor
+ - relay: check return of create_buf_file() properly
+ - bpf, selftests: fix handling of sparse CPU allocations
+ - bpf: fix lockdep false positive in percpu_freelist
+ - drm/sun4i: acl: Prepare and enable TCON channel 0 clock at init
+ - dmaengine: at_xdmac: Fix wrongfull report of a channel as in use
+ - vsoc/virtio: fix kernel panic after device hot-unplug
+ - vsoc/virtio: reset connected sockets on device removal
+ - dmaengine: dmaetest: Abort test in case of mapping error
+ - selftests: netfilter: fix config fragment CONFIG_NF_TABLES_INET
+ - selftests: netfilter: add simple masq/redirect test cases
+ - s390/qeth: fix use-after-free in error path
+ - perf symbols: Filter out hidden symbols from labels
+ - perf trace: Support multiple "vfs_getname" probes
+ - MIPS: Remove function size check in get_frame_info()
+ - i2c: omap: Use noirq system sleep pm ops to idle device for suspend
- fs: ratelimit __find_get_block_slow() failure message.
- qed: Fix EQ full firmware assert.
- qed: Consider TX tcs while deriving the max num_queues for PF.
- Input: wacom_serial4 - add support for Wacom ArtPad II tablet
- Input: elan_i2c - add id for touchpad found in Lenovo s21e-20
- iscsi_ibft: Fix missing break in switch statement
- scsi: aacraid: Fix missing break in switch statement
- arm64: dts: hikey: Give wifi some time after power-on
- ARM: dts: exynos: Fix pinctrl definition for eMMC RTSN line on Odroid X2/U3
- ARM: dts: exynos: Add minimal clkout parameters to Exynos3250 PMU
- drm: disable uncached DMA optimization for ARM and arm64
- ARM: 8781/1: Fix Thumb-2 syscall return for binutils 2.29+
- gfs2: Fix missed wakeups in find_insert_block
- ath9k: Avoid OF no-EPPROM quirks without qca,no-eeprom
- perf/x86/intel: Make cpuc allocations consistent
- perf/x86/intel: Generalize dynamic constraint creation
- x86: Add TSX Force Abort CPUID/MSR
- perf/x86/intel: Implement support for TSX Force Abort
- perf script: Fix crash with printing mixed trace point and other events
- clk: ti: Fix error handling in ti_clk_parse_divider_data()
- riscv: Adjust mmap base address at a third of task size
- IB/ipoib: Fix for use-after-free in ipoib_cm_tx_start
- iomap: fix a use after free in iomap_dio_rw
- selftests: net: use LDLIBS instead of LDFLAGS
- scsi: scsi_debug: fix write_same with virtual_gb problem
- scsi: bnx2fc: Fix error handling in probe()
- ARM: OMAP: dts: N950/N9: fix onenand timings
- ARM: dts: sun8i: h3: Add ethernet0 alias to Beelink X2
- ARM: dts: imx6sx: correct backward compatible of gpt
- pinctrl: mcp23s08: spi: Fix regmap allocation for mcp23s18
- bpftool: Fix prog dump by tag
- bpftool: fix percpu maps updating
- batman-adv: release station info tidstats
- irqchip/gic-v4: Fix occasional VLPI drop
- s390/qeth: release cmd buffer in error paths
- nvme-pci: add missing unlock for reset error
- x86/PCI: Fixup RTIT_BAR of Intel Denverton Trace Hub
- ARM: dts: exynos: Fix max voltage for buck8 regulator on Odroid XU3/XU4
- Bionic update: upstream stable patchset 2019-07-23 (LP: #1837664)
- amd-xgbe: Fix mdio access for non-zero ports and clause 45 PHYs
- net: bridge: Fix ethernet header pointer before check skb forwardable
- net: Fix usage of pskb_trim_rcsum
- net: phy: mdio_bus: add missing device_del() in mdiobus_register() error handling
- net_sched: refetch skb protocol for each filter
- openvswitch: Avoid OOB read when parsing flow nlattrs
- vhost: log dirty page correctly
- net: ipv4: Fix memory leak in network namespace dismantle
- tcp: allow MSG_ZEROCOPY transmission also in CLOSE_WAIT state
- mei: me: add denverton innovation engine device IDs
- USB: serial: simple: add Motorola Tetra TPG2200 device id
- USB: serial: pl2303: add new PID to support PL2303TB
- ASoC: atom: fix a missing check of snd_pcm_lib_malloc_pages
- ASoC: r5514-spi: Fix potential NULL pointer dereference
- ARCv2: lib: memset: fix doing prefetchw outside of buffer
- ARC: adjust memblock_reserve of kernel memory
- ARC: perf: map generic branches to correct hardware condition
- s390/smp: fix CPU hotplug deadlock with CPU rescan
- staging: rtl8188eu: Add device code for D-Link DWA-121 rev B1
- tty: Handle problem if line discipline does not have receive_buf
- uart: Fix crash in uart_write and uart_put_char
- tty/tty/rtl: fix __might_sleep warning
- hv_balloon: avoid touching uninitialized struct page during tail onlining
- Drivers: hv: vmbus: Check for ring when getting debug info
- CIFS: Fix possible hang during async MTU reads and writes
- CIFS: Fix credits calculations for reads with errors
- CIFS: Fix credit calculation for encrypted reads with errors
- CIFS: Do not reconnect TCP session in add_credits()
- Input: xpad - add support for SteelSeries Stratus Duo
- compiler.h: enable builtin overflow checkers and add fallback code
- Input: input - fix undefined behavior in input_validate_absinfo()
- acpi/nfit: Block function zero DSMs
- acpi/nfit: Fix command-supported detection
- dm thin: fix passdown_double_checking_shared_status()
- dm crypt: fix parsing of extended IV arguments
- KVM: x86: Fix single-step debugging
- x86/pkeys: Properly copy pkey state at fork()
- x86/selftests/pkeys: Fork() to check for state being preserved
- x86/kaslr: Fix incorrect i8254 outb() parameters
- posix-cpu-timers: Unbreak timer rearming
- irqchip/gic-v3-its: Align PCI Multi-MSI allocation on their size
- can: dev: __can_get_echo_skb(): fix bogus check for non-existing skb by removing it
- can: bcm: check timer values before ktime conversion
- vt: invoke notifier on screen size change
- Revert ”seccomp: add a selftest for get_metadata”
- s390/smp: Fix calling smp_call_ipl_cpu() from ipl CPU
- nvmet-rcdma: Add unlikely for response allocated check
- nvmet-rcdma: fix null dereference under heavy load
- usb: dwc3: gadget: Clear req->needs_extra_trb flag on cleanup
- x86/xen/time: Output xen sched_clock time from 0
- xen: Fix x86 sched_clock() interface for xen
- mlxsw: pci: Increase PCI SW reset timeout
- mlxsw: spectrum_fid: Update dummy FID index
- ASoC: tlv320aic32x4: Kernel OOPS while entering DAPM standby mode
+ s390/mm: always force a load of the primary ASCE on context switch
+ mmc: meson-gx: Free irq in release() callback
+ vgacon: unconfuse vc_origin when using soft scrollback
+ drm/amdgpu: Add APTX quirk for Lenovo laptop
+ vt: always call notifier with the console lock held
+ drm/meson: Fix atomic mode switching regression
+ bpf: improve verifier branch analysis
+ bpf: add per-instr complexity limit
+ ipv6: Consider sk_bound_dev_if when binding a socket to an address
+ ipv6: sr: clear IP6CB(skb) on SRH ip4ip6 encapsulation
+ I2tp: copy 4 more bytes to linear part if necessary
+ net/mlx4_core: Add masking for a few queries on HCA caps
+ netrom: switch to sock timer API
+ net/rose: fix NULL ax25_cb kernel panic
+ net: set default network namespace in init_dummy_netdev()
+ net/mlx5e: Allow MAC invalidation while spoofchk is ON
+ Revert "net/mlx5e: E-Switch, Initialize eswitch only if eswitch manager"
+ virtio_net: Don't enable NAPI when interface is down
+ virtio_net: Don't call free_old_xmit_skb for xdp_frames
+ virtio_net: Fix not restoring real_num_rx_queues
+ scctp: improve the events for scctp stream adding
+ scctp: improve the events for scctp stream reset
+ I2tp: remove I2specific_len dependency in I2tp_core
+ I2tp: fix reading optional fields of L2TPv3
+ I2tp: copy 4 more bytes to linear part if necessary
+ netrom: switch to sock timer API
+ virtio_net: Don't enable NAPI when interface is down
+ virtio_net: Don't call free_old_xmit_skb for xdp_frames
+ virtio_net: Fix not restoring real_num_rx_queues
+ scctp: improve the events for scctp stream adding
+ scctp: improve the events for scctp stream reset
+ I2tp: remove I2specific_len dependency in I2tp_core
+ I2tp: fix reading optional fields of L2TPv3
+ ipvlan, I3mdev: fix broken I3s mode wrt local routes
+ CIFS: Do not count -ENODATA as failure for query directory
+ fs/dcache: Fix incorrect nr_dentry_unused accounting in shrink_dcache_sb()
+ iommuvt-d: Fix memory leak in intel_iommu_put_resv_regions()
+ NFS: Fix up return value on fatal errors in nfs_page_async_flush()
+ ARM: cns3xxx: Fix writing to wrong PCI config registers after alignment
+ arm64: kaslr: ensure randomized quantities are clean also when kaslr is off
+ arm64: hyp-stub: Forbid kprobing of the hyp-stub
+ arm64: hibernate: Clean the __hyp_text to PoC after resume
+ gpio: altera-a10sr: Set proper output level for direction_output
+ gpio: pcf857x: Fix interrupts on multiple instances
+ mmc: bcm2835: Fix DMA channel leak on probe error
+ IB/hfi1: Remove overly conservative VM_EXEC flag check
+ platform/x86: asus-nb-wmi: Map 0x35 to KEY_SCREENLOCK
+ platform/x86: asus-nb-wmi: Drop mapping of 0x33 and 0x34 scan codes
+ mmc: sdcici-iproc: handle mmc_of_parse() errors during probe
+ kernel/exit.c: release ptraced tasks before zap_pid_ns_processes
+ oom, oom_reaper: do not enqueue same task twice
+ mm, oom: fix use-after-free in oom_kill_process
+ mm: hwpoison: use do_send_sig_info() instead of force_sig()
+ mm: migrate: don't rely on __PageMovable() of newpage after unlocking it
+ md/raid5: fix 'out of memory' during raid cache recovery
+ cifs: Always resolve hostname before reconnecting
+ drivers: core: Remove glue dirs from sysfs earlier
fanotify: fix handling of events on child sub-directory
- drm/msm/gpu: fix building without debugfs
- ravi: expand rx descriptor data to accommodate hw checksum
- tun: move the call to tun_set_real_num_queues
- scpt: set chunk transport correctly when it's a new asoc
- scpt: set flow sport from saddr only when it's 0
- virtio_net: Don't process redirected XDP frames when XDP is disabled
- CIFS: Do not consider -ENODATA as stat failure for reads
- mmc: mediatek: fix incorrect register setting of hs400_cmd_int_delay
- ALSA: usb-audio: Add Opus #3 to quirks for native DSD support
- Btrfs: fix deadlock when allocating tree block during leaf/node split
- mm/hugetlb.c: teach follow_hugetlb_page() to handle FOLL_NOWAIT
- mm.memory_hotplug: fix scan_movable_pages() for gigantic hugepages
- of: Convert to using %pOFn instead of device_node.name
- of: overlay: add tests to validate kfrees from overlay removal
- of: overlay: add missing of_node_get() in __of_attach_node_sysfs
- of: overlay: use prop add changeset entry for property in new nodes
- ucc_geth: Reset BQL queue when stopping device
- staging: iio: adc: ad7280a: handle error from __ad7280_read32()
- drm/vgem: Fix vgem_init to get drm device available.
- pinctrl: bcm2835: Use raw spinlock for RT compatibility
- ASoC: Intel: mrfld: fix uninitialized variable access
- gpu: ipu-v3: image-convert: Prevent race between run and unprepare
- ath9k: dynack: use authentication messages for 'late' ack
- scsi: lpfc: Correct LCB RJT handling
- scsi: mpt3sas: Call sas_remove_host before removing the target devices
- scsi: lpfc: Fix LOGO/PLOGI handling when triggered by ABTS Timeout event
- ARM: 8808/1: kexec:offline panic_smp_self_stop CPU
- clk: boston: fix possible memory leak in clk_boston_setup()
- drm: Don't swamp the CPU with callbacks queued during recovery
- x86/PCI: Fix Broadcom CNB20LE unintended sign extension (redux)
- powerpe/pseries: add of_node_put() in dlpar_detach_node()
- crypto: aes_ti - disable interrupts while accessing S-box
- drm/vc4: -x_scaling[1] should never be set to VC4_SCALING_NONE
- serial: fsl_ipcuart: clear parity enable bit when disable parity
- ptp: check gettimeofday return code in PTP_SYS_OFFSET ioctl
- MIPS: Boston: Disable EG20T prefetch
- staging:iio:ad2s90: Make probe handle spi_setup failure
- fpga: altera-cvp: Fix registration for CvP incapable devices
- Tools: hv: kvp: Fix a warning of buffer overflow with gcc 8.0.1
- platform/chrome: don't report EC_MKBP_EVENT_SENSOR_FIFO as wakeup
- staging: iio: ad7780: update voltage on read
- usbnet: smse95xx: fix rx packet alignment
- drm/rockchip: fix for mailbox read size
- ARM: OMAP2+: hwmod: Fix some section annotations
- net/mix5: EQ: Use the right place to store/read IRQ affinity hint
- modpost: validate symbol names also in find_elf_symbol
- perf tools: Add Hygon Dhyana support
- soc/tegra: Don't leak device tree node reference
- media: mtk-vcodec: Release device nodes in mtk_vcodec_init_enc_pm()
- ptp: Fix pass zero to ERR_PTR() in ptp_clock_register
- dmaengine: xilinx_dma: Remove __aligned attribute on zynqmp_dma_descll
- iio: adc: meson-saradc: check for devm_kasprintf failure
- iio: adc: meson-saradc: fix internal clock names
- iio: accel: kxckj1013: Add KIOX010A ACPI Hardware-ID
- media: adv*/tc358743/ths8200: fill in min width/height/pixelclock
- ACPI: SPCR: Consider baud rate 0 as preconfigured state
- staging: pi433: fix potential null dereference
- f2fs: move dir data flush to write checkpoint process
- f2fs: fix race between write_checkpoint and write_begin
- f2fs: fix wrong return value of f2fs_acl_create
- i2c: sh_mobile: add support for r8a77990 (R-Car E3)
- arm64: io: Ensure calls to delay routines are ordered against prior readX()
- sunvdc: Do not spin in an infinite loop when viosembly_send() returns EAGAIN
- soc: bcm: brcmsstb: Don't leak device tree node reference
- nfsd4: fix crash on writing v4_end_grace before nfsd startup
- drm: Clear state->acquire_ctx before leaving
- drm_atomic_helper_commit_duplicated_state()
- arm64: io: Ensure value passed to __iormb() is held in a 64-bit register
- Thermal: do not clear passive state during system sleep
- firmware/efi: Add NULL pointer checks in efivars API functions
- s390/zcrypt: improve special ap message cmd handling
- arm64: ftrace: don't adjust the LR value
- ARM: dts: mmp2: fix TWSI2
- x86/fpu: Add might_fault() to user_insn()
- media: DaVinci-VPBE: fix error handling in vpbe_initialize()
- smack: fix access permissions for keyring
- usb: dwc3: Correct the logic for checking TRB full in
- __dwc3_prepare_one_trb()
- usb: hub: delay hub autosuspend if USB3 port is still link training
- timekeeping: Use proper seqcount initializer
- usb: mtu3: fix the issue about SetFeature(U1/U2_Enable)
- clk: sunxi-ng: a33: Set CLK_SET_RATE_PARENT for all audio module clocks
- driver core: Move async_synchronize_full call
- kobject: return error code if writing /sys/.../uevent fails
- IB/hfi1: Unreserve a reserved request when it is completed
- usb: dwc3: trace: add missing break statement to make compiler happy
- pinctrl: sx150x: handle failure case of devm_kstrdup
- iommu/amd: Fix amd_iommu=force_isolation
- ARM: dts: Fix OMAP4430 SDP Ethernet startup
- mips: bpf: fix encoding bug for mm_slv32_op
- media: coda: fix H.264 deblocking filter controls
- ARM: dts: Fix up the D-Link DIR-685 MTD partition info
- watchdog: renesas_wdt: don't set divider while watchdog is running
- usb: dwc3: gadget: Disable CSP for stream OUT ep
- iommu/arm-smmu: Add support for qcom,smmu-v2 variant
+ - iommu/arm-smmu-v3: Use explicit mb() when moving cons pointer
+ - satas: fix deferred probing
+ - clk: imx6sl: ensure MMDC CH0 handshake is bypassed
+ - cpuidle: big.LITTLE: fix refcount leak
+ - OPP: Use opp_table->regulators to verify no regulator case
+ - i2c-axxias: check for error conditions first
+ - phy: sun4i-usb: add support for missing USB PHY index
+ - udf: Fix BUG on corrupted inode
+ - switchtec: Fix SWITCHTEC_IOCTL_EVENT_IDX_ALL flags overwrite
+ - selftests/bpf: use __bpf_constant_htons in test_prog.c
+ - ARM: px: avoid section mismatch warning
+ - ASoC: fsl: Fix SND_SOC_EUKREA_TLV320 build error on i.MX8M
+ - KVM: PPC: Book3S: Only report KVM_CAP_SPAPR_TCE_VFIO on powernv machines
+ - mmc: bcm2835: Recover from MMC_SEND_EXT_CSD
+ - mmc: bcm2835: reset host on timeout
+ - mmc: sdhci-of-esdhc: Fix timeout checks
+ - mmc: sdhci-xenon: Fix timeout checks
+ - tty: serial: samsung: Properly set flags in autoCTS mode
+ - perf test: Fix perf_event_attr test failure
+ - perf header: Fix unchecked usage of strncpy()
+ - perf probe: Fix unchecked usage of strncpy()
+ - arm64: KVM: Skip MMIO insn after emulation
+ - usb: musb: dsps: fix otg state machine
+ - percpu: convert spin_lock_irq to spin_lock_irqsave.
+ - powerpc/uaccess: fix warning/error with access_ok()
+ - mac80211: fix radiotap vendor presence bitmap handling
+ - xfrm6_tunnel: Fix spi check in __xfrm6_tunnel_alloc_spi
+ - mlxsw: spectrum: Properly cleanup LAG uppers when removing port from LAG
+ - scsi: smartpqiq: correct host serial num for ssa
+ - scsi: smartpqiq: correct volume status
+ - scsi: smartpqiq: increase fw status register read timeout
+ - cw1200: Fix concurrency use-after-free bugs in cw1200_hw_scan()
+ - powerpc/perf: Fix thresholding counter data for unknown type
+ - drbd: narrow rcu_read_lock in drbd_sync_handshake
+ - drbd: disconnect, if the wrong UUIDs are attached on a connected peer
+ - drbd: skip spurious timeout (ping-timeo) when failing promote
+ - drbd: Avoid Clang warning about pointless switch statement
+ - video: clps711x-fb: release disp device node in probe()
+ - fbdev: fbmem: behave better with small rotated displays and many CPUs
+ - i40e: define proper net_device->neigh_priv_len
+ - ACPI/APEI: Clear GHES block_status before panic()
+ - fbdev: fbcon: Fix unregister crash when more than one framebuffer
+ - powerpc/mm: Fix reporting of kernel execute faults on the 8xx
+ - pinctrl: meson: meson8: fix the GPIO function for the GPIOAO pins
+ - pinctrl: meson: meson8b: fix the GPIO function for the GPIOAO pins
+ - KVM: x86: svm: report MSR_IA32_MCG_EXT_CTL as unsupported
+ - powerpc/fadump: Do not allow hot-remove memory from fadump reserved area.
+ - kvm: Change offset in kvm_write_guest_offset_cached to unsigned
+ - NFS: nfs_compare_mount_options always compare auth flavors.
+ - hwmon: (lm80) fix a missing check of the status of SMBus read
+ - hwmon: (lm80) fix a missing check of bus read in lm80 probe
+ - seq_buf: Make seq_buf_puts() null-terminate the buffer
+ - crypto: ux500 - Use proper enum in cryp_set_dma_transfer
+ - crypto: ux500 - Use proper enum in hash_set_dma_transfer
+ - MIPS: ralink: Select CONFIG_CPU_MIPSR2_IRQ_VI on MT7620/8
+ - cifs: check ntwrk_buf_start for NULL before dereferencing it
+ - um: Avoid marking pages with "changed protection"
+ - niu: fix missing checks of niu_pci_eeprom_read
+ - if2fs: fix sib->extent_list corruption issue
+ - cgroup: fix parsing empty mount option string
+ - scripts/decode_stacktrace: only strip base path when a prefix of the path
+ - ocsfs2: don't clear bh uptodate for block read
+ - ocsfs2: improve ocsfs2 Makefile
+ - isdn: hisax: hfc_pci: Fix a possible concurrency use-after-free bug in
  + HFCPCI_I1hw()
+ - gdrm: fix a memory leak bug
+ - fs/flush: Use GFP_ATOMIC in {memac,tgec}_add_hash_mac_address()
+ - block/swim3: Fix -EBUSY error when re-opening device after unmount
+ - thermal: bcm2835: enable hwmon explicitly
+ - kdb: Don't back trace on a cpu that didn't round up
+ - thermal: generic-adc: Fix adc to temp interpolation
+ - HID: lenovo: Add checks to fix ofLed_classdev_register
+ - kernel/hung_task.c: break RCU locks based on jiffies
+ - proc/sysctl: fix return error for proc_doulongvec_minmax()
+ - kernel/hung_task.c: force console verbose before panic
+ - fs/epoll: drop ovflist branch prediction
+ - scripts/gdb: fix lx-version string output
+ - thermal: hwmon: inline helpers when CONFIG_THERMAL_HWMON is not set
+ - dccp: fool proof ccid_hc_[rt]x_parse_options()
+ - enic: fix checksum validation for IPv6
+ - net: dp83640: expire old TX-skb
+ - rxtcp: bad unlock balance in rxtcp_recvmsg
+ - skge: potential memory corruption in skge_get_regs()
+ - rds: fix refcount bug in rds_sock_addr
+ - net: systemport: Fix WoL with password after deep sleep
+ - net/mlx5e: Force CHECKSUM_UNNECESSARY for short ethernet frames
+ - net: dsa: slave: Don't propagate flag changes on down slave interfaces
+ - ALSA: compress: Fix stop handling on compressed capture streams
+ - ALSA: hda - Serialize codec registrations
+ - dmaengine: bcm2835: Fix interrupt race on RT
+ - dmaengine: bcm2835: Fix abort of transactions
+ - dmaengine: imx-dma: fix wrong callback invoke
+ - futex: Handle early deadlock return correctly
+ - irqchip/gic-v3-its: Plug allocation race for devices sharing a DevID
+ - usb: phy: am335x: fix race condition in _probe
+ - usb: dwc3: gadget: Handle 0 xfer length for OUT EP
- usb: gadget: udc: net2272: Fix bitwise and boolean operations
- usb: gadget: musb: fix short isoc packets with inventra dma
- staging: speakup: fix tty-operation NULL derefs
- scsi: cxlflash: Prevent deadlock when adapter probe fails
- scsi: aic94xx: fix module loading
- cpu/hotplug: Fix "SMT disabled by BIOS" detection for KVM
- perf/x86/intel/uncore: Add Node ID mask
- x86/MCE: Initialize mce.bank in the case of a fatal error in
  mce_no_way_out()
- perf/core: Don't WARN() for impossible ring-buffer sizes
- perf tests evsel-tp-sched: Fix bitwise operator
- serial: fix race between flush_to_ldisc and tty_open
- serial: 8250_pci: Make PCI class test non fatal
- IB/hfi1: Add limit test for RC/UC send via loopback
- perf/x86/intel: Delay memory deallocation until x86_pmu_dead_cpu()
- ath9k: dynack: make ewma estimation faster
- ath9k: dynack: check da->enabled first in sampling routines
- devres: Align data[] to ARCH_KMALLOC_MINALIGN
- genirq/affinity: Spread IRQs to all available NUMA nodes
- wil6210: fix memory leak in wil_find_tx_bcast_2
- fpga: altera-cvp: fix 'bad IO access' on x86_64
- drm/amd/display: calculate stream->phy_pix_clk before clock mapping
- net: aquantia: return 'err' if set MPI_DEINIT state fails
- perf: arm_spe: handle devm_kasprintf() failure
- xtensa: xtfpga.dtsi: fix dfe warnings about SPI
- media: imx274: select REGMAP_I2C
- drm/amd питания: fix node keep alive interval calculation
- mmc: meson-mx-sdio: check devm_kasprintf for failure
- mmc: sdhci-omap: Fix timeout checks
- mmc: jz4740: Get CD/WP GPIOs from descriptors
- usb: renesas_usbhs: add support for RZ/G2E
- i2c: sh_mobile: Add support for r8a774c0 (RZ/G2E)
- livepatch: check kmalloc return values
- usb: musb: dsps: fix runtime pm for peripheral mode
- perf header: Fix up argument to ctime()
- drm/amd/display: Add retry to read ddc_clock pin
- Bluetooth: hci_bcm: Handle deferred probing for the clock supply
- mlx5: update timecounter at least twice per counter overflow
- drm/amd/display: validate extended dongle caps
- perf build: Don't unconditionally link the libbfd feature test to -liberty
  and -lz
- PCI: imx: Enable MSI from downstream components
- arm64/sve: pttrace: Fix SVE_PT_REGS_OFFSET definition
- kernel/kcov.c: mark write_comp_data() as notrace
- xfs: Fix xqmstats offsets in /proc/fs/xfs/xqmstat
- xfs: Fix error code in 'xfs_ioc_getbmap()'
- xfs: fix shared extent data corruption due to missing cow reservation
+ - xfs: fix transient reference count error in xfs_buf_resubmit_failed_buffers
+ - xfs: delalloc -> unwritten COW fork allocation can go wrong
+ - fs/xfs: fix f_ffree value for statfs when project quota is set
+ - lib/test_rhashtable: Make test_insert_dup() allocate its hash table
dynamically
+ - net: dsa: Fix lockdep false positive splat
+ - Revert "net: phy: marvell: avoid pause mode on SGMII-to-Copper for 88e151x"
+ - ALSA: hda/realtek - Fix lose hp_pins for disable auto mute
+ - serial: sh-sci: Do not free irqs that have already been freed
+ - mtd: rawnand: gpmi: fix MX28 bus master lockup problem
+ - iio: adc: axp288: Fix TS-pin handling
+ - iio: chemical: atlas-ph-sensor: correct IIO_TEMP values to millicelsius
+ - signal: Always notice exiting tasks
+ - signal: Better detection of synchronous signals
+ - misc: vexpress: Off by one in vexpress_syscfg_exec()
+ - samples: mei: use /dev/mei0 instead of /dev/mei
+ - debugfs: fix debugfs_rename parameter checking
+ - tracing: uprobes: Fix typo in pr_fmt string
+ - mips: cm: reprime error cause
+ - MIPS: OCTEON: don't set octeon_dma_bar_type if PCI is disabled
+ - MIPS: VDSO: Include $(ccflags-vdso) in o32,n32 .lds builds
+ - ARM: iop32x/n2100: fix PCI IRQ mapping
+ - ARM: tango: Improve ARCH_MULTIPLATFORM compatibility
+ - mac80211: ensure that mgmt tx skbs have tailroom for encryption
+ - drm/modes: Prevent division by zero htotal
+ - drm/vmvgfx: Fix setting of dma masks
+ - drm/vmvgfx: Return error code from vmw_execbuf_copy_fence_user
+ - HID: debug: fix the ring buffer implementation
+ - libceph: avoid KEEPALIVE_PENDING races in ceph_con_keepalive()
+ - xfrm: refine validation of template and selector families
+ - batman-adv: Avoid WARN on net_device without parent in netsns
+ - batman-adv: Force mac header to start of data on xmit
+ - uio: Reduce return paths from uio_write()
+ - uio: Prevent device destruction while fds are open
+ - uio: change to use the mutex lock instead of the spin lock
+ - uio: fix crash after the device is unregistered
+ - uio: fix wrong return value from uio_mmap()
+ - uio: fix possible circular locking dependency
+ - mtd: Make sure mtd->erasesize is valid even if the partition is of size 0
+ - libata: Add NOLPM quirk for SAMSUNG MZ7TE512HMHP-000L1 SSD
+ - mips: loongson64: remove unreachable(), fix loongson_poweroff().
+ - SUNRPC: Always drop the XPRT_LOCK on XPRT_CLOSE_WAIT
+ - HP ProBook 470 G5, LED's in Hotkeys f5, f8 and f11 without function
+ - (LP: #1811254) // Bionic update: upstream stable patchset 2019-07-23
+ - (LP: #1837664)
+ - ALSA: hda - Add mute LED support for HP ProBook 470 G5
+
* Bionic update: upstream stable patchset 2019-07-22 (LP: #1837477)
* pinctrl: meson: fix pull enable register calculation
* powerpc: Fix COFF zImage booting on old powermacs
* powerpc/mm: Fix linux page tables build with some configs
* HID: ite: Add USB id match for another ITE based keyboard rfkill key quirk
* ARM: imx: update the cpu power up timing setting on i.mx6sx
* ARM: dts: imx7d-nitrogen7: Fix the description of the Wifi clock
* Input: restore EV_ABS ABS_RESERVED
* checkstack.pl: fix for aarch64
* xfrm: Fix error return code in xfrm_output_one()
* xfrm: Fix bucket count reported to userspace
* xfrm: Fix NULL pointer dereference in xfrm_input when skb_dst_force clears
* the dst_entry.
* netfilter: seqadj: re-load tcp header pointer after possible head
* reallocation
* scsi: bnx2fc: Fix NULL dereference in error handling
* Input: omap-keypad - fix idle configuration to not block SoC idle states
* Input: synaptics - enable RMI on ThinkPad T560
* ibmvnic: Fix non-atomic memory allocation in IRQ context
* ieee802154; ca8210: fix possible u8 overflow in ca8210_rx_done
* i40e: fix mac filter delete when setting mac address
* netfilter: ipset: do not call ipset_nest_end after nla_nest_cancel
* netfilter: nat: can't use dst_hold on noref dst
* bnx2x: Clear fip MAC when fcoe offload support is disabled
* bnx2x: Remove configured vlans as part of unload sequence.
* bnx2x: Send update-vid ramrod with retry/poll flags enabled
* target: iscsi: cxgbit: add missing spin_lock_init()
* x86, hyperv: remove PCI dependency
* drivers: net: xgene: Remove unnecessary forward declarations
* w90p910_ether: remove incorrect __init annotation
* SUNRPC: Fix a race with XPRT_CONNECTING
* qed: Fix an error code qed_ll2_start_xmit()
* net: macb: fix random memory corruption on RX with 64-bit DMA
* net: macb: fix dropped RX frames due to a race
* lan78xx: Resolve issue with changing MAC address
* vxge: ensure data0 is initialized in when fetching firmware version
* information
* mac80211: free skb fraglist before freeing the skb
* kbuild: fix false positive warning/error about missing libelf
* virtio: fix test build after uio.h change
* gpio: mvebu: only fail on missing clk if pwm is actually to be used
* Input: synaptics - enable SMBus for HP EliteBook 840 G4
* net: netxen: fix a missing check and an uninitialized use
* qmi_wwan: Fix qmap header retrieval in qminux_rx_fixup
* serial/sunsu: fix refcount leak
* scsi: zfcp: fix posting too many status read buffers leading to adapter
* shutdown
* scsi: lpfc: do not set queue->page_count to 0 if pc_sli4_params.wqpent is
invalid
- tools: fix cross-compile var clobbering
- zram: fix double free backing device
- hwpoison, memory_hotplug: allow hwpoisoned pages to be offline
- mm, devm_memremap_pages: mark devm_memremap_pages() EXPORT_SYMBOL_GPL
- mm, devm_memremap_pages: kill mapping "System RAM" support
- mm, hhm: use devm semantics for hhm_devmem_{add, remove}
- mm, hhm: mark hhm_devmem_{add, add_resource} EXPORT_SYMBOL_GPL
- mm, swap: fix swapoff with KSM pages
- sunrpc: fix cache_head leak due to queued request
- powerpc: avoid -mno-sched-epilog on GCC 4.9 and newer
- powerpc: Disable -Wbuiltin-requires-header when setjmp is used
- ftrace: Build with CPPFLAGS to get -Qunused-arguments
- kbuild: add -no-integrated-as Clang option unconditionally
- kbuild: consolidate Clang compiler flags
- Makefile: Export clang toolchain variables
- powerpc/boot: Set target when cross-compiling for clang
- raid6/ppc: Fix build for clang
- ALSA: cs46xx: Potential NULL dereference in probe
- ALSA: usb-audio: Avoid access before bLength check in build_audio.procunit()
- ALSA: usb-audio: Fix an out-of-bound read in create_composite_quirks
- dlm: fixed memory leaks after failed ls_remove_names allocation
- dlm: possible memory leak on error path in create_lkb()
- dlm: lost put_lkb on error path in receive_convert() and receive_unlock()
- dlm: memory leaks on error path in dlm_user_request()
- gfs2: Get rid of potential double-freeing in gfs2_create_inode
- b43: Fix error in cordic routine
- selinux: policydb - fix byte order and alignment issues
- script/kallsyms: filter arm64's __efistub_symbols
- arm64: drop linker script hack to hide __efistub_symbols
- arm64: relocatable: fix inconsistencies in linker script and options
- powerpc/tm: Set MSR[TS] just prior to recheckpoint
- 9p/net: put a lower bound on msize
- rxr: fix error completion wr_id and qp_num
- iommu/vt-d: Handle domain agaw being less than iommu agaw
- sched/fair: Fix infinite loop in update_blocked_averages() by reverting
- a9e7f6544b9c
- ceph: don't update importing cap's mseq when handing cap export
- genwqe: Fix size check
- intel_th: msu: Fix an off-by-one in attribute store
- power: supply: olpc_battery: correct the temperature units
- lib: fix build failure in CONFIG_DEBUG_VIRTUAL test
- drm/vc4: Set ->is_yuv to false when num_planes == 1
- bnx2x: Fix NULL pointer dereference in bnx2x_del_all_vlans() on some hw
- tools: power/acpi, revert to LD = gcc
- ARM: dts: sun8i: a83t: bananapi-m3: increase vcc-pd voltage to 3.3V
- arm64: dts: mt7622: fix no more console output on rfb1
- ibmvnic: Convert reset work item mutex to spin lock
+ - ixgbe: Fix race when the VF driver does a reset
+ - net: macb: add missing barriers when reading descriptors
+ - powerpc: remove old GCC version checks
+ - Fix failure path in alloc.pid()
+ - block: deactivate blk_stat timer in wbt_disable_default()
+ - PCI / PM: Allow runtime PM without callback functions
+ - leds: pwm: silently error out on EPROBE_DEFER
+ - Revert "powerpc/tm: Unset MSR[TS] if not recheckpointing"
+ - iio: dac: ad5686: fix bit shift read register
+ - video: fbdev: pxafb: Fix "WARNING: invalid free of devm_allocated data"
+ - drivers/perf: hisi: Fixup one DDRC PMU register offset
+ - drm/nouveau/drm/nouveau: Check rc from drm_dp_mst_topology_mgr_resume()
+ - drm/rockchip: pwr: do not dereference encoder before it is null checked.
+ - CIFS: Fix adjustment of credits for MTU requests
+ - CIFS: Do not hide EINTR after sending network packets
+ - cifs: Fix potential OOB access of lock element array
+ - usb: cdc-acm: send ZLP for Telit 3G Intel based modems
+ - USB: storage: don't insert sane sense for SPC3+ when bad sense specified
+ - USB: storage: add quirk for SMI SM3350
+ - USB: Add USB QUIRK_DELAY_CTRL_MSG quirk for Corsair K70 RGB
+ - slab: alien caches must not be initialized if the allocation of the alien
  cache failed
+ - mm: page_mapped: don't assume compound page is huge or THP
+ - mm, memcg: fix reclaim deadlock with writeback
+ - ACPI: power: Skip duplicate power resource references in _PRx
+ - ACPI / PMIC: xpower: Fix TS-pin current-source handling
+ - i2c: dev: prevent adapter retries and timeout being set as minus value
+ - drm/fb-helper: Partially bring back workaround for bugs of SDL 1.2
+ - rbd: don't return 0 on unmap if RBD_DEV_FLAG_REMOVING is set
+ - ext4: make sure enough credits are reserved for dioread_nolock writes
+ - ext4: fix a potential fiemap/page fault deadlock w/ inline_data
+ - ext4: avoid kernel warning when writing the superblock to a dead device
+ - ext4: track writeback errors using the generic tracking infrastructure
+ - KVM: arm/arm64: Fix VMID alloc race by reverting to lock-less
+ - Btrfs: fix deadlock when using free space tree due to block group creation
+ - mm/usercopy.c: no check page span for stack objects
+ - vio/type1: Fix unmap overflow off-by-one
+ - drm/amdgpu: Don't ignore rc from drm_dp_mst_topology_mgr_resume()
+ - ext4: fix special inode number checks in __ext4_iget()
+ - Btrfs: fix access to available allocation bits when starting balance
+ - Btrfs: use nofs context when initializing security xattrs to avoid deadlock
+ - tty/ldsem: Wake up readers after timed out down_write()
+ - can: gw: ensure DLC boundaries after CAN frame modification
+ - mmc: sdhci-msm: Disable CDR function on TX
+ - media: em28xx: Fix misplaced reset of dev->v4l::field_count
+ - scsi: target: iscsi: cxgb: fix csk leak
+ - scsi: target: iscsi: cxgb: fix csk leak
+ - arm64/kvm: consistently handle host HCR_EL2 flags
+ - arm64: Don't trap host pointer auth use to EL2
+ - ipv6: fix kernel-infoleak in ipv6_local_error()
+ - net: bridge: fix a bug on using a neighbour cache entry without checking its state
+ - packet: Do not leak dev refcounts on error exit
+ - bonding: update nest level on unlink
+ - ip: on queued skb use skb_header_pointer instead of pskb_may_pull
+ - crypto: caam - fix zero-length buffer DMA mapping
+ - crypto: authencsn - Avoid twice completion call in decrypt path
+ - crypto: bcm - convert to use crypto_authenc_extractkeys()
+ - btfrs: wait on ordered extents on abort cleanup
+ - Yama: Check for pid death before checking ancestry
+ - scsi: core: Synchronize request queue PM status only on successful resume
+ - scsi: sd: Fix cache_type_store()
+ - crypto: talitos - reorder code in talitos_edesc_alloc()
+ - crypto: talitos - fix ablkcipher for CONFIG_VMAP_STACK
+ - mips: fix n32 compat_ipc_parse_version
+ - MIPS: lantiq: Fix IPI interrupt handling
+ - OF: properties: add missing of_node_put
+ - mfd: tsps586x: Handle interrupts on suspend
+ - media: v4l: ioctl: Validate num_planes for debug messages
+ - pstore/ram: Avoid allocation and leak of platform data
+ - arm64: kaslr: ensure randomized quantities are clean to the PoC
+ - Disable MSI also when pcie-octeon.pcie_disable on
+ - omap2fb: Fix stack memory disclosure
+ - media: vivid: fix error handling of kthread_run
+ - media: vivid: set min width/height to a value > 0
+ - bpf: in __bpf_redirect_no_mac pull mac only if present
+ - LSM: Check for NULL cred-security on free
+ - media: vb2: vb2_mmap: move lock up
+ - sunrpc: handle ENOMEM in rpcb_getport_async
+ - netfilter: ebtables: account ebt_table_info to kmemcg
+ - selinux: fix GPF on invalid policy
+ - blockdev: Fix livelocks on loop device
+ - scctp: allocate scctp_sockaddr_entry with kzalloc
+ - tipc: fix uninit-value in tipc_nl_compat_link_reset_stats
+ - tipc: fix uninit-value in tipc_nl_compat_bearer_enable
+ - tipc: fix uninit-value in tipc_nl_compat_link_set
+ - tipc: fix uninit-value in tipc_nl_compat_name_table_dump
+ - tipc: fix uninit-value in tipc_nl_compat_doit
+ - block/loop: Don't grab "struct file" for vfs_getattr() operation.
+ - loop: drop caches if offset or block_size are changed
+ - drm/fb-helper: Ignore the value of fb_var_screeninfo.pixclock
+ - media: vb2: be sure to unlock mutex on errors
+ - nbd: Use set_blocksizet() to set device blocksize
+ - tun: publish tfile after it's fully initialized
+ - crypto: sm3 - fix undefined shift by >= width of value
+ - MIPS: BCM47XX: Setup struct device for the SoC
- RDMA/vmw_pvrdma: Return the correct opcode when creating WR
- arm64: dts: marvell: armada-ap806: reserve PSCI area
- ipv6: make icmp6_send() robust against null skb->dev
- block: use rcu_work instead of call_rcu to avoid sleep in softirq
- selftests: Fix test errors related to lib.mk khdr target
- ipv6: Consider sk_bound_dev_if when binding a socket to a v4 mapped address
- mlxsw: spectrum: Disable lag port TX before removing it
- mlxsw: spectrum_switchdev: Set PVID correctly during VLAN deletion
- net, skbuff: do not prefer skb allocation fails early
- qmi_wwan: add MTU default to qmap network interface
- ipv6: Take rcu_read_lock in __inet6_bind for mapped addresses
- net: dsa: mv88x6xxx: mv88e6390 errata
- gpio: pl061: Move irq_chip definition inside struct pl061
- platform/x86: asus-wmi: Tell the EC the OS will handle the display off
- hotkey
- e1000e: allow non-monotonic SYSTIM readings
- writeback: don't decrement wb->rcfcnt if !wb->bdi
- serial: set suppress_bind_attr flag only if builtin
- ALSA: oxfw: add support for APOGEE duet FireWire
- x86/mce: Fix -Wmissing-prototypes warnings
- MIPS: SiByte: Enable swiotlb for SWARM, LittleSur and BigSur
- arm64: perf: set suppress_bind_attr flag to true
- usb: gadget: udc: renesas_usb3: add a safety connection way for
  forced_b_device
- selinux: always allow mounting submounts
- rxe: IB_WR_REG_MR does not capture MR's iova field
- jffs2: Fix use of uninitialized delayed_work, lockdep breakage
- clk: imx: make mux parent strings const
- pstore/ram: Do not treat empty buffers as valid
- powerpc/xmon: Fix invocation inside lock region
- powerpc/pseries/cpuidle: Fix preempt warning
- media: firewire: Fix app_info parameter type in avc_ca[._app]_info
- media: venus: core: Set dma maximum segment size
- net: call sk_dst_reset when set SO_DONTROUTE
- scsi: target: use consistent left-aligned ASCII INQUIRY data
- selftests: do not macro-expand failed assertion expressions
- clk: imx6q: reset exclusive gates on init
- arm64: Fix minor issues with the dcache_by_line_op macro
- kconfig: fix file name and line number of warn_ignored_character()
- kconfig: fix memory leak when EOF is encountered in quotation
- mmc: atmel-mci: do not assume idle after atmci_request_end
- btrfs: improve error handling of btrfs_add_link
- tty/serial: do not free transmit buffer page under port lock
- perf intel-pt: Fix error with config term "pt=0"
- perf svghelper: Fix unchecked usage of strncpy()
- perf parse-events: Fix unchecked usage of strncpy()
- netfilter: ipt_CLUSTERIP: check MAC address when duplicate config is set
- dm crypt: use u64 instead of sector_t to store iv_offset

Open Source Used In 5GaaS Edge AC-4 19265
+ - dm kcopyd: Fix bug causing workqueue stalls
+ - tools lib subcmd: Don't add the kernel sources to the include path
+ - dm snapshot: Fix excessive memory usage and workqueue stalls
+ - quota: Lock s_umount in exclusive mode for Q_XQUOTA{ON,OFF} quotactls.
+ - clocksourc/drivers/integrator-ap: Add missing of_node_put()
+ - ALSA: bebob: fix model-id of unit for Apogee Ensemble
+ - sysfs: Disable lockdep for driver bind/unbind files
+ - IB/usnic: Fix potential deadlock
+ - scsi: smartpqi: correct lun reset issues
+ - scsi: smartpqi: call pqi_free_interruptions() in pqi_shutdown()
+ - scsi: megaraid: fix out-of-bound array accesses
+ - ocfs2: fix panic due to unrecovered local alloc
+ - mm/page-writeback.c: don't break integrity writeback on -rw->writepage() error
+ - mm/swap: use nr_node_ids for avail_lists in swap_info_struct
+ - mm, proc: be more verbose about unstable VMA flags in /proc/<pid>/smaps
+ - cifs: allow disabling insecure dialects in the config
+ - cifs: In Kconfig CONFIG_CIFS_POSIX needs depends on legacy (insecure cifs)
+ - PCI: dwc: Move interrupt acking into the proper callback
+ - ipmi:ssif: Fix handling of multi-part return messages
+ - net: clear skb->ts stamp in bridge forwarding path
+ - netfilter: ipset: Allow matching on destination MAC address for mac and
  ipmac sets
+ - drm/amdkfd: fix interrupt spin lock
+ - of: overlay: add missing of_node_put() after add new node to changeset
+ - drm/atomic-helper: Complete fake_commit->flip_done potentially earlier
+ - ASoC: pcm3168a: Don't disable pcm3168a when CONFIG_PM defined
+ - efi/libstub: Disable some warnings for x86{,_64}
+ - media: uvcvideo: Refactor teardown of uvc on USB disconnect
+ - arm64: kasan: Increase stack size for KASAN_EXTRA
+ - bpf: relax verifier restriction on BPF_MOV | BPF_ALU
+ - perf vendor events intel: Fix Load_Miss_Real_Latency on SKL/SKX
+ - netfilter: ipt_CLUSTERNIP: remove wrong WARN_ON_ONCE in netns exit routine
+ - netfilter: ipt_CLUSTERNIP: fix deadlock in netns exit routine
+ - x86/topology: Use total_cpus for max logical packages calculation
+ - perf stat: Avoid segfaults caused by negated options
+ - perf tools: Add missing sigqueue() prototype for systems lacking it
+ - perf tools: Add missing open_memstream() prototype for systems lacking it
+ - dm: Check for device sector overflow if CONFIG_LBDAF is not set
+ - userfaultfd: clear flag if remap event not enabled

* Bionic update: upstream stable patchset 2019-07-19 (LP: #1837257)
+ - pinctrl: sunxi: a83t: Fix IRQ offset typo for PH11
+ - userfaultfd: check VM_MAYWRITE was set after verifying the uffd is
  registered
+ - arm64: dma-mapping: Fix FORCE_CONTIGUOUS buffer clearing
+ - MMC: OMAP: fix broken MMC on OMAP15XX/OMAP5910/OMAP310
+ - mmc: sdhci: fix the timeout check window for clock and reset
+ - ARM: mmp/mmp2: fix cpu_is_mmp2() on mmap-dt
+ - dm thin: send event about thin-pool state change _after_ making it
+ - dm cache metadata: verify cache has blocks in
  + blocks_are_clean_separate_dirty()
+ - tracing: Fix memory leak in set_trigger_filter()
+ - tracing: Fix memory leak of instance function hash filters
+ - powerpc/msi: Fix NULL pointer access in teardown code
+ - drm/nouveau/kms: Fix memory leak in nv50_mstm_del()
+ - drm/i915/execlists: Apply a full mb before execution for Braswell
+ - drm/amdgpu: update SMC firmware image for polaris10 variants
+ - x86/build: Fix compiler support check for CONFIG_RETPOLINE
+ - locking: Remove smp_read_barrier_depends() from queued_spin_lock_slowpath()
+ - locking/qspinlock: Ensure node is initialised before updating prev->next
+ - locking/qspinlock: Bound spinning on pending->locked transition in slowpath
+ - locking/qspinlock: Merge 'struct __qspinlock' into 'struct qspinlock'
+ - locking/qspinlock: Remove unbounded cmpxchg() loop from locking slowpath
+ - locking/qspinlock: Remove duplicate clear_pending() function from PV code
+ - locking/qspinlock: Kill cmpxchg() loop when claiming lock from head of queue
+ - locking/qspinlock: Re-order code
+ - locking/qspinlock/x86: Increase _Q_PENDING_LOOPS upper bound
+ - locking/qspinlock, x86: Provide liveness guarantee
+ - mac80211: don't WARN on bad WMM parameters from buggy APs
+ - mac80211: Fix condition validating WMM IE
+ - IB/hfi1: Remove race conditions in user_sdma send path
+ - locking/qspinlock: Fix build for anonymous union in older GCC compilers
+ - mac80211_hwsim: fix module init error paths for netlink
+ - Input: hyper-v - fix wakeup from suspend-to-idle
+ - scsi: libiscsi: Fix NULL pointer dereference in iscsi_eh_session_reset
+ - scsi: vmw_pscsi: Rearrange code to avoid multiple calls to free_irq during
  + unload
+ - x86/earlyprintk/efi: Fix infinite loop on some screen widths
+ - drm/msm: Grab a vblank reference when waiting for commit_done
+ - ARC: io.h: Implement reads{x}()/writes{x}()
+ - bonding: fix 802.3ad state sent to partner when unbinding slave
+ - bpf: Fix verifier log string check for bad alignment.
+ - nfs: don't dirty kernel pages read by direct-io
+ - SUNRPC: Fix a potential race in xprt_connect()
+ - sbus: char: add of_node_put()
+ - drivers/sbus/char: add of_node_put()
+ - drivers/tty: add missing of_node_put()
+ - ide: pmac: add of_node_put()
+ - drm/msm: Fix error return checking
+ - clk: mvebu: Off by one bugs in cp110_of_clk_get()
+ - clk: mmp: Off by one in mmp_clk_add()
+ - Input: synaptics - enable SMBus for HP 15-ay000
+ - Input: omap-keypad - fix keyboard debounce configuration
+ - libata: whitelist all SAMSUNG MZ7KM* solid-state disks
+ - mv88e6060: disable hardware level MAC learning
+ - net/mlx4_en: Fix build break when CONFIG_INET is off
+ - ARM: 8814/1: mm: improve/fix ARM v7_dma_inv_range() unaligned address handling
+ - ARM: 8815/1: V7M: align v7m_dma_inv_range() with v7 counterpart
+ - ethernet: fman: fix wrong of_node_put() in probe function
+ - drm/ast: Fix connector leak during driver unload
+ - vhost/vsock: fix reset orphans race with close timeout
+ - mlxsw: spectrum_switchdev: Fix VLAN device deletion via ioctl
+ - i2c: axxia: properly handle master timeout
+ - i2c: seml: Fix probe error on devices with an empty SMB0001 ACPI device node
+ - i2c: uniplier: fix violation of tLOW requirement for Fast-mode
+ - i2c: uniplier-f: fix violation of tLOW requirement for Fast-mode
+ - nvmet- DMA: fix response use after free
+ - rtc: snvs: Add timeouts to avoid kernel lockups
+ - bpf, arm: fix emit_ldx_r and emit_mov_i using TMP_REG_1
+ - scsi: raid_attr: fix unused variable warning
+ - staging: olpc_dcon: add a missing dependency
+ - ARM: dts: qcom-apq8064-arrow-sd-600eval fix graph_endpoint warning
+ - mmc: core: use mrq->sbc when sending CMD23 for RPMB
+ - dm: call blk_queue_split() to impose device limits on bios
+ - media: vb2: don't call __vb2_queue_cancel if vb2_start_streaming failed
+ - powerpc: Look for "stdout-path" when setting up legacy consoles
+ - dm zoned: Fix target BIO completion handling
+ - block: fix infinite loop if the device loses discard capability
+ - ASoC: sta32x: set ->component pointer in private struct
+ - perf record: Synthesize features before events in pipe mode
+ - USB: hso: Fix OOB memory access in hso_probe/hso_get_config_data
+ - xhci: Don't prevent USB2 bus suspend in state check intended for USB3 only
+ - USB: xhci: fix 'broken_suspend' placement in struct xchi_hcd
+ - USB: serial: option: add GosunCn ZTE WeLink ME3630
+ - USB: serial: option: add HP lt4132
+ - USB: serial: option: add Simcom SIM7500/SIM7600 (MBIM mode)
+ - USB: serial: option: add Fibocom NL668 series
+ - USB: serial: option: add Telit LN940 series
+ - scsi: sd: use mempool for discard special page
+ - mmc: core: Reset HPI enabled state during re-init and in case of errors
+ - mmc: core: Allow BKOPS and CACHE ctrl even if no HPI support
+ - mmc: core: Use a minimum 1600ms timeout when enabling CACHE ctrl
+ - mmc: omap_hsmmc: fix DMA API warning
+ - gpio: max7301: fix driver for use with CONFIG_VMAP_STACK
+ - gpio-lib-acpi: Only defer request_irq for GpioInt ACPI event handlers
+ - posix-timers: Fix division by zero bug
+ - kvm: x86: Add AMD's EX_CFG to the list of ignored MSR
+ - Drivers: hv: vmbr: Return -EINVAL for the sys files for unopened channels
+ - x86/mtrr: Don't copy uninitialized gentry fields back to userspace
+ - panic: avoid deadlocks in re-entrant console drivers
+ - iwlwifi: mvm: don't send GEO_TX_POWER_LIMIT to old firmwares
+ - iwlwifi: add new cards for 9560, 9462, 9461 and killer series
+ - usbfs: Handle re-linking of inodes correctly while recovery
+ - mm: don't miss the last page because of round-off error
+ - proc/sysctl: don't return ENOMEM on lookup when a table is unregistering
+ - i2c: rcar: check bus state before reinitializing
+ - drm/amd/display: Fix 6x4K displays light-up on Vega20 (v2)
+ - drm/msm: Fix task dump in gpu recovery
+ - drm/msm: fix handling of cmdstream offset
+ - net: aquantia: fix rx checksum offload bits
+ - liquidio: read sc->iq_no before release sc
+ - drm/msm/hdmi: Enable HPD after HDMI IRQ is set up
+ - macvlan: return correct error value
+ - bpf: check pending signals while verifying programs
+ - ARM: 8816/1: dma-mapping: fix potential uninitialized return
+ - tools/testing/nvdimm: Align test resources to 128M
+ - Btrfs: fix missing delayed iputs on unmount
+ - ax25: fix a use-after-free in ax25_fillin_cb()
+ - gro_cell: add napi_disable in gro_cells_destroy
+ - ibmveth: fix DMA unmap error in ibmveth_xmit_start error path
+ - ieee802154: lowpan_header_create check must check daddr
+ - ipv6: explicitly initialize udp6_addr in udp_sock_create6()
+ - ipv6: tunnels: fix two use-after-free
+ - isn: fix kernel-infoleak in capi_unlocked_ioctl
+ - net: mach: restart tx after tx used bit read
+ - net: phy: Fix the issue that netif always links up after resuming
+ - netrom: fix locking in nr_find_socket()
+ - net/wan: fix a double free in x25_asy_open_tty()
+ - packet: validate address length
+ - packet: validate address length if non-zero
+ - ptr_ring: wrap back->producer in __ptr_ring_swap_queue()
+ - qmi_wwan: Added support for Telit LN940 series
+ - scpt: initialize sin6_flowinfo for ipv6 addrs in scpt_net6addr_event
+ - tcp: fix a race in inet_diag_dump_icsk()
+ - tipc: fix a double kfree_skb()
+ - vhost: make sure used idx is seen before log in vhost_add_used_n()
+ - VSOCK: Send reset control packet when socket is partially bound
+ - xen/netfront: tolerate frags with no data
+ - net/mlx5: Typo fix in del_sw_hw_rule
+ - net/mlx5e: RX, Fix wrong early return in receive queue poll
+ - mlxsw: core: Increase timeout during firmware flash process
+ - net/mlx5e: Remove the false indication of software timestamping support
+ - tipc: use lock_sock() in tipc_sk_reinit()
+ - tipc: compare remote and local protocols in tipc_udp_enable()
+ - qmi_wwan: Added support for Fibocom NL668 series
+ - qmi_wwan: Add support for Fibocom NL678 series
+ - net/smc: fix TCP fallback socket release
+ - sock: Make sock->sk_stamp thread-safe
+ - IB/hfi1: Incorrect sizing of sge for PIO will OOPs
+ - mtd: atmel-quadspi: disallow building on ebsa110
+ - ALSA: hda: add mute LED support for HP EliteBook 840 G4
+ - ALSA: fireface: fix for state to fetch PCM frames
+ - ALSA: firewire-lib: fix wrong handling payload_length as payload_quadlet
+ - ALSA: firewire-lib: fix wrong assignment for 'out_packet_without_header'
+ - tracepoints
+ - ALSA: firewire-lib: use the same print format for 'without_header'
+ - tracepoints
+ - ALSA: hda/tegra: clear pending irq handlers
+ - USB: serial: pl2303: add ids for Hewlett-Packard HP POS pole displays
+ - USB: serial: option: add Fibocom NL678 series
+ - usb: r8a66597: Fix a possible concurrency use-after-free bug in
  r8a66597_endpoint_disable()
+ - staging: wilc1000: fix missing read_write setting when reading data
+ - qmiwwan: apply SET_DTR quirk to the SIMCOM shared device ID
+ - s390/pci: fix sleeping in atomic during hotplug
+ - x86/speculation/l1tf: Drop the swap storage limit restriction when l1tf=off
+ - KVM: x86: Use jmp to invoke kvm_spurious_fault() from .fixup
+ - KVM: nVMX: Free the VMREAD/VWRITE bitmaps if alloc_kvm_area() fails
+ - platform-msi: Free descriptors in platform_msi_domain_free()
+ - perf pmu: Suppress potential format-truncation warning
+ - ext4: add ext4_sb_bread() to disambiguate ENOMEM cases
+ - ext4: fix possible use after free in ext4_quota_enable
+ - ext4: missing unlock/put_page() in ext4_try_to_write_inline_data()
+ - ext4: fix EXT4_IOC_GROUP_ADD ioctl
+ - ext4: include terminating u32 in size of xattr entries when expanding inodes
+ - ext4: force inode writes when nfsd calls commit_metadata()
+ - ext4: check for shutdown and r/o file system in ext4_write_inode()
+ - spi: bcm2835: Fix race on DMA termination
+ - spi: bcm2835: Fix book-keeping of DMA termination
+ - clk: rockchip: fix typo in rk3188 spdif_frac parent
+ - crypto: cavium/nitrox - fix a DMA pool free failure
+ - cgroup: fix CSS_TASK_ITER_PROCS
+ - cdc-acm: fix abnormal DATA RX issue for Mediatek Preloader.
+ - Btrfs: fix fasync of files with multiple hard links in new directories
+ - f2fs: fix validation of the block count in sanity_check_raw_super
+ - serial: uartps: Fix interrupt mask issue to handle the RX interrupts
+ - media: vivid: free bitmap_cap when updating std/timings/etc.
+ - media: v4l2-tpg: array index could become negative
+ - MIPS: math-emu: Write-protect delay slot emulation pages
+ - MIPS: c-r4k: Add r4k_blast_scache_node for Loongson-3
+ - MIPS: Ensure pmd_present() returns false after pmd_mknotpresent()
+ - MIPS: Align kernel load address to 64KB
+ - MIPS: Expand MIPS32 ASIDs to 64 bits
+ - MIPS: OCTEON: mark RGMII interface disabled on OCTEON III
+ - CIFS: Fix error mapping for SMB2_LOCK command which caused OFD lock problem
+ - arm64: KVM: Avoid setting the upper 32 bits of VTCR_EL2 to 1
+ - arm/ arm64: KVM: vgic: Force VM halt when changing the active state of GICv3
+ PPIS/SGIs
+ - rtc: m41t80: Correct alarm month range with RTC reads
+ - tpm: tpm_i2c_nuvoton: use correct command duration for TPM 2.x
+ - spi: bcm2835: Unbreak the build of esoteric configs
+ - MIPS: Only include mmzone.h when CONFIG_NEED_MULTIPLE_NODES=y
+ - KVM: X86: Fix NULL deref in vcpu_scan_ioapic
+ - futex: Cure exit race
+ - x86/mm: Fix decoy address handling vs 32-bit builds
+ - x86/intel_rdt: Ensure a CPU remains online for the region’s pseudo-locking sequence
+ - mm: add mm_pxd_folded checks to pgtable_bytes accounting functions
+ - mm: make the __PAGETABLE_PxD_FOLDED defines non-empty
+ - mm: introduce mm[_p4d|pud|pmd]_folded
+ - ip: validate header length on virtual device xmit
+ - net: clear skb->tstamp in forwarding paths
+ - net/hamradio/6pack: use mod_timer() to rearm timers
+ - tipc: check tsk->group in tipc_wait_for_cond()
+ - tipc: check group dests after tipc_wait_for_cond()
+ - ipv6: frags: Fix bogus skb->sk in reassembled packets
+ - ALSA: hda/realtek: Enable audio jacks of ASUS UX391UA with ALC294
+ - ALSA: hda/realtek: Enable the headset mic auto detection for ASUS laptops
+ - ASoC: intel: cht_bsw_max98090_ti: Add pmc_plt_clk_0 quirk for Chromebook Clapper
+ - ASoC: intel: cht_bsw_max98090_ti: Add pmc_plt_clk_0 quirk for Chromebook Gnaughty
+ - Input: elan_i2c - add ACPI ID for touchpad in ASUS Aspire F5-573G
+ - arm64: KVM: Make VHE Stage-2 TLB invalidation operations non-interruptible
+ - DRM: UDL: get rid of useless vblank initialization
+ - clocksource/drivers/arc_timer: Utilize generic sched_clock
+ - ocxl: Fix endiannes bug in ocxl_link_update_pe()
+ - ocxl: Fix endiannes bug in read_afu_name()
+ - ext4: add verifier check for symlink with append/immutable flags
+ - ext4: avoid declaring fs inconsistent due to invalid file handles
+ - clk: sunxi-ng: Use u64 for calculation of NM rate
+ - crypto: testmgr - add AES-CFB tests
+ - btrfs: dev-replace: go back to suspended state if target device is missing
+ - btrfs: run delayed items before dropping the snapshot
+ - powerpc/tm: Unset MSR[TS] if not recheckpointing
+ - f2fs: read page index before freeing
+ - f2fs: sanity check of xattr entry size
+ - media: ccc: keep track of outstanding transmits
+ - media: imx274: fix stack corruption in imx274_read_reg
+ - media: vb2: check memory model for VIDIOC_CREATE_BUFS
+ - MIPS: Fix a R10000_LLSC_WAR logic in atomic.h
+ - KVM: arm/arm64: vgic: Do not cond_resched_lock() with IRQs disabled
+ - KVM: arm/arm64: vgic: Cap SPIs to the VM-defined maximum
+ - alsahda: neither mute led nor mic-mute led work on several Lenovo laptops
+ (LP: #1837963)
+ - SAUCE: ALSA: hda - Add a conexant codec entry to let mute led work
+ 
+ +-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 14 Aug 2019 11:51:40 +0200
+ +
+ linux (4.15.0-58.64) bionic; urgency=medium
+ +
+ + * unable to handle kernel NULL pointer dereference at 0000000000000002c (IP: iget5_locked+0x9e/0x1f0) (LP: #1838982)
+ + - Revert "ovl: set I_CREATING on inode being created"
+ + - Revert "new primitive: discard_new_inode()"
+ 
+ +-- Stefan Bader <stefan.bader@canonical.com>  Tue, 06 Aug 2019 12:45:37 +0200
+ +
+ linux (4.15.0-57.63) bionic; urgency=medium
+ +
+ + * CVE-2019-1125
+ + - x86/cpufeatures: Carve out CQM features retrieval
+ + - x86/cpufeatures: Combine word 11 and 12 into a new scattered features word
+ + - x86/speculation: Prepare entry code for Spectre v1 swapgs mitigations
+ + - x86/speculation: Enable Spectre v1 swapgs mitigations
+ + - x86/entry/64: Use JMP instead of JMPQ
+ + - x86/speculation/swaps: Exclude ATOMs from speculation through SWAPGS
+ +
+ + * Packaging resync (LP: #1786013)
+ + - update dkms package versions
+ 
+ +-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Thu, 01 Aug 2019 12:25:25 +0200
+ +
+ linux (4.15.0-56.62) bionic; urgency=medium
+ +
+ + * bionic/linux: 4.15.0-56.62 -proposed tracker (LP: #1837626)
+ +
+ + * Packaging resync (LP: #1786013)
+ + - [Packaging] resync git-ubuntu-log
+ + - [Packaging] update helper scripts
+ +
+ + * CVE-2019-2101
+ + - media: uvcvideo: Fix 'type' check leading to overflow
+ +
+ + * hibmc-drm Causes Unreadable Display for Huawei amd64 Servers (LP: #1762940)
+ + - [Config] Set CONFIG_DRM_HISI_HIBMC to arm64 only
+ + - SAUCE: Make CONFIG_DRM_HISI_HIBMC depend on ARM64
+ +
+ + * Bionic: support for Solarflare X2542 network adapter (sfc driver)
+ + (LP: #1836635)
+ + - sfc: make mem_bar a function rather than a constant
+ + - sfc: support VI strides other than 8k

Open Source Used In 5GaaS Edge AC-4 19272
+ - sfc: add Medford2 (SFC9250) PCI Device IDs
+ - sfc: improve PTP error reporting
+ - sfc: update EF10 register definitions
+ - sfc: populate the timer reload field
+ - sfc: update MCDI protocol headers
+ - sfc: support variable number of MAC stats
+ - sfc: expose FEC stats on Medford2
+ - sfc: expose CTPIO stats on NICs that support them
+ - sfc: basic MCDI mapping of 25/50/100G link speeds
+ - sfc: support the ethtool ksettings API properly so that 25/50/100G works
+ - sfc: add bits for 25/50/100G supported/advertised speeds
+ - sfc: remove tx and MCDI handling from NAPI budget consideration
+ - sfc: handle TX timestamps in the normal data path
+ - sfc: add function to determine which TX timestamping method to use
+ - sfc: use main datapath for HW timestamps if available
+ - sfc: only enable TX timestamping if the adapter is licensed for it
+ - sfc: MAC TX timestamp handling on the 8000 series
+ - sfc: on 8000 series use TX queues for TX timestamps
+ - sfc: only advertise TX timestamping if we have the license for it
+ - sfc: simplify RX datapath timestamping
+ - sfc: support separate PTP and general timestamping
+ - sfc: support second + quarter ns time format for receive datapath
+ - sfc: support Medford2 frequency adjustment format
+ - sfc: add suffix to large constant in ptp
+ - sfc: mark some unexported symbols as static
+ - sfc: update MCDI protocol headers
+ - sfc: support FEC configuration through ethtool
+ - sfc: remove ctio_dmabuf_start from stats
+ - sfc: stop the TX queue before pushing new buffers

+ * [18.04 FEAT] zKVM: Add hardware CPU Model - kernel part (LP: #1836153)
+ - KVM: s390: add debug logging for cpu model subfunctions
+ - KVM: s390: implement subfunction processor calls
+ - KVM: s390: add vector enhancements facility 2 to cpumodel
+ - KVM: s390: add vector BCD enhancements facility to cpumodel
+ - KVM: s390: add MSA9 to cpumodel
+ - KVM: s390: provide query function for instructions returning 32 byte
+ - KVM: s390: add enhanced sort facility to cpu model
+ - KVM: s390: add deflate conversion facility to cpu model
+ - KVM: s390: enable MSA9 keywrapping functions depending on cpu model

+ * Intel ethernet I219 has slow RX speed (LP: #1836152)
+ - SAUCE: e1000e: add workaround for possible stalled packet
+ - SAUCE: e1000e: disable force K1-off feature

+ * Intel ethernet I219 may wrongly detect connection speed as 10Mbps
  (LP: #1836177)
+ - SAUCE: e1000e: Make watchdog use delayed work
* Unhide Nvidia HDA audio controller (LP: #1836308)
  - PCI: Enable NVIDIA HDA controllers

* selftests: Remove broken Power9 paste tests and fix compilation issue
  - (LP: #1836715)
  - selftests/powerpc: Remove Power9 paste tests
  - selftests/powerpc: Fix Makefiles for headers_install change

* ixgbe[vf] - Physical Function gets IRQ when VF checks link state
  - (LP: #1836760)
  - ixgbevf: Use cached link state instead of re-reading the value for ethtool

* Fix nf_conntrack races when dealing with same origin requests in NAT
  - environments (LP: #1836816)
  - netfilter: nf_conntrack: resolve clash for matching conntracks
  - netfilter: nf_nat: skip nat clash resolution for same-origin entries

* CVE-2018-5383
  - crypto: ecdh - add public key verification test

* sched: Prevent CPU lockups when task groups take longer than the period
  - (LP: #1836971)
  - sched/fair: Limit sched_cfs_period_timer() loop to avoid hard lockup

* depmod may prefer unsigned l-r-m nvidia modules to signed modules
  - (LP: #1834479)
  - [Packaging] dkms-build--nvidia-N -- clean up unsigned ko files
  - [Packaging] Add update-version-dkms
  - update dkms package versions

* Build Nvidia drivers in conjunction with kernel (LP: #1764792) // zfs/spl
  - build in conjunction with the kernel from DKMS source (LP: #1807378)
  - [Packaging] dkms-build--nvidia-* -- convert to generic -N form

* zfs/spl build in conjunction with the kernel from DKMS source (LP: #1807378)
  - [Packaging] dkms -- dkms package build packaging support
  - [Packaging] dkms -- build zfs/spl packages
  - [Packaging] dkms -- drop zfs/spl source code from kernel

* Build Nvidia drivers in conjunction with kernel (LP: #1764792)
  - [Packaging] dkms -- introduce dkms package versions
  - [Packaging] dkms -- add per package post-process step
  - [Packaging] dkms -- switch to a consistent build prefix length and strip
  - [Packaging] dkms-build -- support building against packages in PPAs
  - [Packaging] dkms-build: do not redownload files on subsequent passes
  - [Packaging] dkms-build -- add support for unversioned overrides
  - [Packaging] dkms-build -- backport latest version from disco
+ - [Packaging] nvidia -- build and sign nvidia packages and ship signatures
+ - [Packaging] nvidia -- make nvidia package version explicit
+
+ * CVE-2019-13233
+ - x86/insn-eval: Fix use-after-free access to LDT entry
+
+ * kernel panic using CIFS share in smb2_push_mandatory_locks() (LP: #1795659)
+ - CIFS: keep FileInfo handle live during oplock break
+
+ * cifs set_oplock buffer overflow in strcat (LP: #1824981)
+ - cifs: fix strcat buffer overflow and reduce raciness in
+ - smb21_set_oplock_level()
+
+ * CVE-2019-13272
+ - ptrace: Fix ->ptracer_cred handling for PTRACE_TRACEME
+
+ * Bionic update: upstream stable patchset 2019-07-18 (LP: #1837161)
+ - Kbuild: suppress packed-not-aligned warning for default setting only
+ - disable stringop truncation warnings for now
+ - test_hexdump: use memcp by instead of strncpy
+ - kobject: Replace strncpy with memcp
+ - ALSA: intel_hdmi: Use strlcpy() instead of strncpy()
+ - unifdef: use memcp by instead of strncpy
+ - kernfs: Replace strncpy with memcp
+ - ip_tunnel: Fix name string concatenate in __ip_tunnel_create()
+ - scsi: bfa: convert to strlcpy/strlcat
+ - kdb: use memmove instead of overlapping memcp
+ - set: sector for ambiguous mr status errors
+ - uprobes: Fix handle_swbp() vs. unregister() + register() race once more
+ - MIPS: ralink: Fix mt7620 nd_sd pinnux
+ - mips: fix mips_get_syscall_arg o32 check
+ - iser: fix for ambiguous mr status errors
+ - drm: set is_master to 0 upon drm_new_set_master() failure
+ - drm/meson: Enable fast_io in meson_dw_hdmi_regmap_config
+ - drm/meson: Fix OOB memory accesses in meson_viu_set_osd_lut()
+ - ALSA: trident: Suppress gcc string warning
* - kgdboc: Fix restrict error
* - kgdboc: Fix warning with module build
* - svm: Add mutex_lock to protect apic_access_page_done on AMD systems
* - drm/msm: fix OF child-node lookup
* - Input: xpad - quirk all PDP Xbox One gamepads
* - Input: synaptics - add PNP ID for ThinkPad P50 to SMBus
* - Input: matrix_keypad - check for errors from of_get_named_gpio()
* - Input: cros_ec_keyb - fix button/switch capability reports
* - Input: elan_i2c - add ELAN0620 to the ACPI table
* - Input: elan_i2c - add ACPI ID for Lenovo IdeaPad 330-15ARR
* - Input: elan_i2c - add support for ELAN0621 touchpad
- btrfs: tree-checker: Don't check max block group size as current max chunk size limit is unreliable
- ARC: change defconfig defaults to ARCv2
- arc: [devboards] Add support of NFSv3 ACL
- reset: make device_resetOptional() really optional
- reset: remove remaining WARN_ON() in <linux/reset.h>
- mm: hide incomplete nr_indirectly_reclaimable in /proc/zoneinfo
- net: qed: use correct strncpy() size
- tipc: use destination length for copy string
- arm64: ftrace: Fix to enable syscall events on arm64
- sched, trace: Fix prev_state output in sched_switch_tracepoint
- tracing/fgraph: Fix set_graph_function from showing interrupts
- drm/meson: Fixes for drm_crtc_vblank_on/off support
- scsi: lpfc: fix block guard enablement on SLI3 adapters
- media: omap3isp: Unregister media device as first
- iommu/vt-d: Fix NULL pointer dereference in prq_event_thread()
- brcmutil: really fix decoding channel info for 160 MHz bandwidth
- iommu/ipmmu-vmsa: Fix crash on early domain free
- can: rcar_can: Fix erroneous registration
- test_firmware: fix error return getting clobbered
- HID: input: Ignore battery reported by Symbol DS4308
- batman-adv: Use explicit tvlv padding for ELP packets
- batman-adv: Expand merged fragment buffer for full packet
- amd/iommu: Fix Guest Virtual APIC Log Tail Address Register
- bnx2x: Assign unique DMAE channel number for FW DMAE transactions.
- qed: Fix PTT leak in qed_drain()
- qed: Fix reading wrong value in loop condition
- net/mlx4_core: Zero out ikey field in SW2HW_MPT fw command
- net/mlx4_core: Fix uninitialized variable compilation warning
- net/mlx4: Fix UBSAN warning of signed integer overflow
- gpio: mockup: fix indicated direction
- mtd: rawnand: qcom: Namespace prefix some commands
- mtd: spi-nor: Fix Cadence QSPI page fault kernel panic
- qed: Fix bitmap_weight() check
- qed: Fix QM getters to always return a valid pq
- net: faraday: fmac100: remove netif_running(netdev) check before disabling interrupts
- iommu/vt-d: Use memunmap to free memremap
- flexfiles: use per-mirror specified stateid for IO
- ibmnic: Fix RX queue buffer cleanup
- team: no need to do team_notify_peers or team_mcast_rejoin when disabling port
- net: amd: add missing of_node_put()
- usb: quirk: add no-LPM quirk on SanDisk Ultra Flair device
- usb: appledisplay: Add 27” Apple Cinema Display
- USB: check usb_get_extra_descriptor for proper size
- ALSA: hda: Add support for AMD Stoney Ridge
- ALSA: pcm: Fix starvation on down_write_nonblock()
+ - ALSA: pcm: Call snd_pcm_unlink() conditionally at closing
+ - ALSA: pcm: Fix interval evaluation with openmin/max
+ - ALSA: hda/realtek - Fix speaker output regression on Thinkpad T570
+ - SUNRPC: Fix leak of krb5p encode pages
+ - dmaengine: dw: Fix FIFO size for Intel Merrifield
+ - dmaengine: cpipi41: delete channel from pending list when stop channel
+ - ARM: 8806/1: kprobes: Fix false positive with FORTIFY_SOURCE
+ - xhci: Prevent U1/U2 link pm states if exit latency is too long
+ - f2fs: fix to do sanity check with block address in main area v2
+ - swiotlb: clean up reporting
+ - Staging: lustre: remove two build warnings
+ - staging: atomisp: remove "fun" strncpy warning
+ - cifs: Fix separator when building path from dentry
+ - staging: rtl8712: Fix possible buffer overrun
+ - Revert commit ef9209b642f "staging: rtl8723bs: Fix indenting errors and an off-by-one mistake in core/rtw_mlme_ext.c"
+ - drm/amdgpu: update mc firmware image for polaris12 variants
+ - drm/amdgpu/gmc8: update MC firmware for polaris
+ - tty: serial: 8250_mtk: always resume the device in probe.
+ - kgdboc: fix KASAN global-out-of-bounds bug in param_set_kgdboc_var()
+ - libnvdimm, pfn: Pad pfn namespaces relative to other regions
+ - mac80211: Clear beacon_int in ieee80211_do_stop
+ - mac80211: ignore tx status for PS stations in ieee80211_tx_status_ext
+ - mac80211: fix reordering of buffered broadcast packets
+ - mac80211: ignore NullFunc frames in the duplicate detection
+ - qed: Fix rdma_info structure allocation
+ - drm/amdgpu: Add amdgpu "max bpc" connector property (v2)
+ - drivers/net/ethernet/qlogic/qed/qed_rdma.h: fix typo
+ - gpio: pxa: fix legacy non pinctrl aware builds again
+ - tc-testing: tdc.py: ignore errors when decoding stdout/stderr
+ - NFSv4: Fix a NFSv4 state manager deadlock
+ - USB: serial: console: fix reported terminal settings
+ - ALSA: usb-audio: Add SMSL D1 to quirks for native DSD support
+ - ALSA: hda/realtek: ALC286 mic and headset-mode fixups for Acer Aspire U27-880
+ - ALSA: hda/realtek - Add support for Acer Aspire C24-860 headset mic
+ - ALSA: hda/realtek: Fix mic issue on Acer AIO Veriton Z4660G
+ - ALSA: hda/realtek: Fix mic issue on Acer AIO Veriton Z4860G/Z6860G
+ - media: dvb-pll: don't re-validate tuner frequencies
+ - parisc: Enable -function-sections for modules on 32-bit kernel
+ - Revert "x86/e820: put !E820_TYPE_RAM regions into memblock.reserved"
+ - drm/lease: Send a distinct uevent
+ - drm/msm: Move fence put to where failure occurs
+ - drm/amdgpu/gmc8: always load MC firmware in the driver
+ - drm/i915: Downgrade Gen9 Plane WM latency error
+ - x86/efi: Allocate e820 buffer before calling efi_exit_boot_service
+ - cfg80211: Fix busy loop regression in ieee80211_ie_split_ric()
+ - ipv4: ipv6: netfilter: Adjust the frag mem limit when truesize changes
+ ipv6: Check available headroom in ip6_xmit() even without options
+ neighour: Avoid writing before skb->head in neigh_hh_output()
+ ipv6: sr: properly initialize flowi6 prior passing to ip6_route_output
+ net: 8199cp: fix a BUG triggered by changing mtu with network traffic
+ net/mlx4_core: Correctly set PFC param if global pause is turned off.
+ net/mlx4_en: Change min MTU size to ETH_MIN_MTU
+ net: phy: don't allow __set_phy_supported to add unsupported modes
+ net: Prevent invalid access to skb->prev in __qdisc_drop_all
+ rtnetlink:ndo_dflt_fdb_dump() only work for ARPHRDETHER devices
+ scpt: kfree_rcu asoc
+ tcp: Do not underestimate rwnd_limited
+ tcp: fix NULL ref in tail loss probe
+ tun: forbid iface creation with rtln ops
+ virtio-net: keep vnet header zeroed after processing XDP
+ ARM: OMAP2+:prm44xx: Fix section annotation on
+ omap44xx_prm_enable_io_wakeup
+ ASoC: rsn: fixup clock start checker
+ staging: rtl8723bs: Fix the return value in case of error in
  \rtw_wx_read32()\
+ ARM: dts:logicpd-somlv: Fix interrupt on mmc3_dat1
+ ARM: OMAP1:ams-delta: Fix possible use of uninitialized field
+ sysv: return 'err' instead of 0 in __sysv_write_inode
+ selftests: add script to stress-test nft packet path vs. control plane
+ netfilter: nf_tables: fix use-after-free when deleting compat expressions
+ hwmon: (ina2xx) Fix NULL id pointer in probe()
+ ASoC: wm_ads: Fix dma-unsafe read of scratch registers
+ s390/cpum_cf: Reject request for sampling in event initialization
+ hwmon: (ina2xx) Fix current value calculation
+ ASoC: omap-abe-twld6040: Fix missing audio card caused by deferred probing
+ ASoC: dapm: Recalculate audio map forcibly when card instantiated
+ netfilter: xt_hashlimit: fix a possible memory leak in htable_create()
+ hwmon: (w83795) temp4_type has writable permission
+ perf tools: Restore proper cwd on return from mnt namespace
+ PCI: imx6: Fix link training status detection in link up check
+ objtool: Fix double-free in .cold detection error path
+ objtool: Fix segfault in .cold detection with -ffunction-sections
+ ARM: dts: at91: sama5d2: use the divided clock for SMC
+ Btrfs: send, fix infinite loop due to directory rename dependencies
+ RDMA/mlx5: Fix fence type for IB_WR_LOCAL_INV WR
+ RDMA/rdmavt: Fix rvt_create_ah function signature
+ ASoC: omap-mcbsp: Fix latency value calculation for pm_qos
+ ASoC: omap-mcpdm: Add pm_qos handling to avoid under/overruns with CPU_IDLE
+ ASoC: omap-dmic: Add pm_qos handling to avoid overruns with CPU_IDLE
+ exportfs: do not read dentry after free
+ bpf: fix check of allowed specifiers in bpf_trace_printk
+ ipvs: call ip_vs_dsl_notifier earlier than ipv6_dev_notf
+ USB: omap_udc: use devm_request_irq()
+ USB: omap_udc: fix crashes on probe error and module removal
+ - USB: omap_udc: fix omap_udc_start() on 15xx machines
+ - USB: omap_udc: fix USB gadget functionality on Palm Tungsten E
+ - USB: omap_udc: fix rejection of out transfers when DMA is used
+ - drm/meson: add support for 1080p25 mode
+ - net/filter: ipv6: Preserve link scope traffic original oif
+ - IB/mlx5: Fix page fault handling for MW
+ - KVM: x86: fix empty-body warnings
+ - x86/kvm/vmx: fix old-style function declaration
+ - net/filter: nf_tables: deactivate expressions in rule replacement routine
+ - igb: fix uninitialized variables
+ - ixgbe: recognize 1000BaseLX SFP modules as 1Gbps
+ - net: hisilicon: remove unexpected free_netdev
+ - drm/amdgpu: Add delay after enable RLC ucode
+ - drm/ast: fixed reading monitor EDID not stable issue
+ - xen: xlate_nmu: add missing header to fix 'W=1' warning
+ - Revert "xen/balloon: Mark unallocated host memory as UNUSABLE"
+ - pstore/ram: Correctly calculate usable PRZ bytes
+ - fs cache, cachefiles: remove redundant variable 'cache'
+ - nvme: flush namespace scanning work just before removing namespaces
+ - ACPI/IORT: Fix iort_get_platform_device_domain() uninitialized pointer value
+ - ocfs2: fix deadlock caused by ocfs2_defrag_extent()
+ - mm/page_alloc.c: fix calculation of pgdat->nr_zones
+ - hfs: do not free node before using
+ - hfsplus: do not free node before using
+ - debugobjects: avoid recursive calls with kmemleak
+ - ocfs2: fix potential use after free
+ - printk: Add console owner and waiter logic to load balance console writes
+ - printk: Hide console waiter logic into helpers
+ - printk: Never set console_may_schedule in console_trylock()
+ - printk: Wake klogd when passing console_lock owner
+ - flexfiles: enforce per-mirror stateid only for v4 DSes
+ - staging: speakup: Replace strncpy with memcpy
+ - ALSA: fireface: fix reference to wrong register for clock configuration
+ - IB/hfi1: Fix an out-of-bounds access in get_hw_stats
+ - tcp: lack of available data can also cause TSO defer
+ - Revert "net/ibm/emac: wrong bit is used for STA control"
+ - tools: bpftool: prevent infinite loop in get_fdinfo()
+ - ASoC: sun8i-codec: fix crash on module removal
+ - ASoC: acpi: fix: continue searching when machine is ignored
+ - RDMA/bnx_nr: Fix system hang when registration with L2 driver fails
+ - RDMA/bnx_nr: Avoid accessing the device structure after it is freed
+ - RDMA/hns: Bugfix pbl configuration for rereg mr
+ - thunderbolt: Prevent root port runtime suspend during NVM upgrade
+ - net/filter: add missing error handling code for register functions
+ - net/filter: nat: fix double register in masquerade modules
+ - cachefiles: Fix an assertion failure when trying to update a failed object
+ - fscache: Fix race in fscache_op_complete() due to split atomic_sub & read
+ - pvcalls-front: fixes incorrect error handling
+ - nvme: warn when finding multi-port subsystems without multipathing enabled
+ - kernel/kcov.c: mark funcs in __sanitizer_cov_trace_pc() as notrace
+ - ALSA: hda/realtek: ALC294 mic and headset-mode fixups for ASUS X542UN
+ - ALSA: hda/realtek: Enable audio jacks of ASUS UX533FD with ALC294
+ - ALSA: hda/realtek: Enable audio jacks of ASUS UX433FN/UX333FA with ALC294
+ * Bionic update: upstream stable patchset 2019-07-17 (LP: #1836968)
+ - flow_dissector: do not dissect l4 ports for fragments
+ - ibmvnic: fix accelerated VLAN handling
+ - ip_tunnel: don't force DF when MTU is locked
+ - ipv6: Fix PMTU updates for UDP/raw sockets in presence of VRF
+ - net-gro: reset skb->pkt_type in napi_reuse_skb()
+ - sctp: not allow to set asoc prsctp_enable by sockopt
+ - tg3: Add PHY reset for 5717/5719/5720 in change ring and flow control paths
+ - tuntap: fix multiqueue rx
+ - net: systemctl: Protect stop from timeout
+ - net: qualcomm: rmnet: Fix incorrect assignment of real_dev
+ - net: dsa: microchip: initialize mutex before use
+ - sctp: fix strchange_flags name for Stream Change Event
+ - net: phy: mdio-gpio: Fix working over slow can_sleep GPIOs
+ - sctp: not increase stream's incnt before sending addstrm_in request
+ - mlxsw: spectrum: Fix IP2ME CPU policer configuration
+ - net: smsc95xx: Fix MTU range
+ - usbnet: smsc95xx: disable carrier check while suspending
+ - inet: frags: better deal with smp races
+ - ARM: dts: r8a7791: Correct critical CPU temperature
+ - ARM: dts: r8a7793: Correct critical CPU temperature
+ - net: bcmgenet: protect stop from timeout
+ - tcp: Fix SOF_TIMESTAMPING_RX_HARDWARE to use the latest timestamp during TCP coalescing
+ - tipc: don't assume linear buffer when reading ancillary data
+ - tipc: fix link re-establish failure
+ - net/mlx5e: Claim TC hw offloads support only under a proper build config
+ - net/mlx5e: Adjust to max number of channles when re-attaching
+ - net/mlx5e: Fix selftest for small MTUs
+ - l2tp: fix a sock refcnt leak in l2tp_tunnel_register
+ - net/mlx5e: IPolB, Reset QP after channels are closed
+ - net: dsa: mv88e6xxx: Fix clearing of stats counters
+ - net: phy: realtek: fix RTL8201F sysfs name
+ - sctp: define SCTP_SS_DEFAULT for Stream schedulers
+ - rxrpc: Fix lockup due to no error backoff after ack transmit error
+ - cifs: don't dereference smb_file_target before null check
+ - cifs: fix return value for cifs_listxattr
+ - arm64: kprobe: make page to RO mode when allocate it
+ - ixgbe: fix MAC anti-spoofing filter after VFLR
+ - reiserfs: propagate errors from fill_with_dentries() properly
+ - hfs: prevent btree data loss on root split
+ - hfsplus: prevent btree data loss on root split
+ - um: Give start_idle_thread() a return code
+ - drm/edid: Add 6 bpc quirk for BOE panel.
+ - platform/x86: intel_telemetry: report debugfs failure
+ - clk: fixed-rate: fix of_node_get-put imbalance
+ - perf symbols: Set PLT entry/header sizes properly on Sparc
+ - fs/exofs: fix potential memory leak in mount option parsing
+ - clk: samsung: exynos5420: Enable PERIS clocks for suspend
+ - apparmor: Fix uninitialized value in aa_split_fqname
+ - x86/earlyprintk: Add a force option for pciserial device
+ - platform/x86: acerdf: Add BIOS entry for Gateway LT31 v1.3307
+ - arm64: percpu: Initialize ret in the default case
+ - s390/vdso: add missing FORCE to build targets
+ - netfilter: ipset: list:set: Decrease refcount synchronously on deletion and replace
+ - netfilter: ipset: actually allow allowable CIDR 0 in hash:net,port,net
+ - s390/mm: Fix ERROR: "__node_distance" undefined!
+ - netfilter: ipset: Correct rcu_dereference() call in ip_set_put_comment()
+ - netfilter: xt_IDLETIMER: add sysfs filename checking routine
+ - s390/qeth: fix HiperSockets sniffer
+ - hwmon: (ibmpowernv) Remove bogus __init annotations
+ - Revert "drm/exynos/decon5433: implement frame counter"
+ - clk: fixed-factor: fix of_node_get-put imbalance
+ - lib/raid6: Fix arm64 test build
+ - s390/perf: Change CPUM_CF return code in event init function
+ - sched/core: Take the hotplug lock in sched_init_smp()
+ - i40e: restore NETIF_F_GSO_IPXIP[46] to netdev features
+ - qed: Fix memory/entry leak in qed_init_sp_request()
+ - qed: Fix blocking/unlimited SPQ entries leak
+ - qed: Fix potential memory corruption
+ - net: stmmac: Fix RX packet size > 8191
+ - SUNRPC: drop pointless static qualifier in xdr_get_next_encode_buffer()
+ - ACPI / watchdog: Prefer iTCO_wdt always when WDAT table uses RTC SRAM
+ - perf machine: Add machine__is() to identify machine arch
+ - perf tools: Fix kernel_start for PTI on x86
+ - perf machine: Add nr_cpus_avail()
+ - perf machine: Workaround missing maps for x86 PTI entry trampolines
+ - perf test code-reading: Fix perf_env setup for PTI entry trampolines
+ - media: v4l: event: Add subscription to list before calling "add" operation
+ - MIPS: OCTEON: cavium_octeon_defconfig: re-enable OCTEON USB driver
+ - uio: Fix an Oops on load
+ - usb: cdc-acm: add entry for Hiro (Conexant) modem
+ - usb: quirks: Add delay-init quirk for Corsair K70 LUX RGB
+ - misc: atmel-ssc: Fix section annotation on atmel_ssc_get_driver_data
+ - ACPI / platform: Add SMB0001 HID to forbidden_id_list
+ - HID: uhid: forbid UHID_CREATE under KERNEL_DS or elevated privileges
+ - libceph: fall back to sendmsg for slab pages
+ - drm/i915: Replace some PAGE_SIZE with I915_GTT_PAGE_SIZE
+ - perf unwind: Take pgoff into account when reporting elf to libdwfl
+ - netfilter: bridge: define INT_MIN & INT_MAX in userspace
+ - s390/decompressor: add missing FORCE to build targets
+ - Revert "HID: add NOGET quirk for Eaton Ellipse MAX UPS"
+ - HID: alps: allow incoming reports when only the trackstick is opened
+ - s390/mm: fix mis-accounting of pgtablen_bytes
+ - drm/amd/display: Stop leaking planes
+ - drm/amd/amdgpu/dm: Fix dm_dp_create_fake_mst_encoder()
+ - ceph: quota: fix null pointer dereference in quota check
+ - nvme: make sure ns head inherits underlying device limits
+ - i2c: omap: Enable for ARCH_K3
+ - net: aquantia: fix potential IOMMU fault after driver unbind
+ - net: aquantia: fixed enable unicast on 32 macvlan
+ - net: aquantia: invalid checksum offload implementation
+ - mtd: rawnd: atmel: fix OF child-node lookup
+ - efi/libstub: arm: support building with clang
+ - ARM: 8766/1: drop no-thumb-interwork in EABI mode
+ - ARM: 8767/1: add support for building ARM kernel with clang
+ - bus: arm-cci: remove unnecessary unreachable()
+ - ARM: trusted_foundations: do not use naked function
+ - usb: core: Fix hub port connection events lost
+ - usb: dwc3: gadget: fix ISOC TRB type on unaligned transfers
+ - usb: dwc3: gadget: Properly check last unaligned/zero chain TRB
+ - usb: dwc3: core: Clean up ULPI device
+ - xhci: Add check for invalid byte size error when UAS devices are connected.
+ - ALSA: oss: Use kvzalloc() for local buffer allocations
+ - MAINTAINERS: Add Sasha as a stable branch maintainer
+ - mmc: sdhci-pci: Try "cd" for card-detect lookup before using NULL
+ - gpio: don't free unallocated ida on gpiochip_add_data_with_key() error path
+ - iwlwifi: mvm: support sta_statistics() even on older firmware
+ - iwlwifi: mvm: fix regulatory domain update when the firmware starts
+ - iwlwifi: mvm: don't use SAR Geo if basic SAR is not used
+ - brcmfmac: fix reporting support for 160 MHz channels
+ - tools/power/cpupower: fix compilation with STATIC=true
+ - v9fs_dir_readdir: fix double-free on p9stat_read error
+ - selinux: Add __GFP_NOWARN to allocation at str_read()
+ - Input: synaptics - avoid using uninitialized variable when probing
+ - bfs: add sanity check at bfs_fill_super()
+ - scctp: clear the transport of some out_chunk_list chunks in
+ - scctp_assoc_rm_peer
+ - gfs2: Don't leave s_fs_info pointing to freed memory in init_sbd
+ - llc: do not use sk_eat_skb()
+ - mm: don't warn about large allocations for slab
+ - mm/memory.c: recheck page table entry with page table lock held
+ - IB/core: Perform modify QP on real one
+ - usb: xhci: Prevent bus suspend if a port connect change or polling state is
+ detected
+ - drm/ast: change resolution may cause screen blurred
+ - drm/ast: fixed cursor may disappear sometimes
+ - can: dev: can_get_echo_skb(): factor out non sending code to
+ __can_get_echo_skb()
+ - can: dev: __can_get_echo_skb(): replace struct can_frame by canfd_frame to
+ access frame length
+ - can: dev: __can_get_echo_skb(): Don't crash the kernel if can_priv::echo_skb
+ is accessed out of bounds
+ - can: dev: __can_get_echo_skb(): print error message, if trying to echo non
+ existing skb
+ - can_rx-offload: introduce can_rx_offload_get_echo_skb() and
+ can_rx_offload_queue_sorted() functions
+ - can_rx-offload: rename can_rx_offload_irq_queue_err_skb() to
+ can_rx_offload_queue_tail()
+ - can: raw: check for CAN FD capable netdev in raw_sendmsg()
+ - can: hi311x: Use level-triggered interrupt
+ - IB/hfi1: Eliminate races in the SDMA send error path
+ - pinctrl: meson: fix pinconf bias disable
+ - KVM: PPC: Move and undef TRACE_INCLUDE_PATH/FILE
+ - cpufreq: imx6q: add return value check for voltage scale
+ - rtc: pcf2127: fix a kmemleak caused in pcf2127_i2c_gather_write
+ - crypto: simd - correctly take reqsize of wrapped skcipher into account
+ - floppy: fix race condition in __floppy_read_block_0()
+ - powerpc/io: Fix the IO workarounds code to work with Radix
+ - perf/x86/intel/uncore: Add more IMC PCI IDs for KabyLake and CoffeeLake CPUs
+ - SUNRPC: Fix a bogus get/put in generic_key_to_expire()
+ - kdb: Use strscpy with destination buffer size
+ - powerpc/numa: Suppress "VPHN is not supported" messages
+ - tmpfs: make lseek(SEEK_DATA/SEEK_HOLE) return ENXIO with a negative offset
+ - mm, page_alloc: check for max order in hot path
+ - arm64: remove no-op -p linker flag
+ - ubi: fastmap: Check each mapping only once
+ - Input: xpad - add PDP device id 0x02a4
+ - Input: xpad - fix some coding style issues
+ - Input: xpad - avoid using __set_bit() for capabilities
+ - Input: xpad - add support for Xbox1 PDP Camo series gamepad
+ - iwlwifi: fix wrong WGDS_WIFI_DATA_SIZE
+ - kbuild: allow to use GCC toolchain not in Clang search path
+ - PCI: endpoint: Populate func_no before calling pci_epc_add_epf()
+ - i40iw: Fix memory leak in error path of create QP
+ - clk: samsung: exynos5250: Add missing clocks for FIMC LITE SYSMMU devices
+ - ARM: dts: exynos: Fix invalid node referenced by i2c20 alias in Peach Pit
+ and Pi
+ - include/linux/pfn_t.h: force ‘~’ to be parsed as an unary operator
+ - tty: wipe buffer.
+ - tty: wipe buffer if not echoing data
+ - lan78xx: Read MAC address from DT if present
+ - s390/mm: Check for valid vma before zapping in gmap_discard
+ - rcu: Make need_resched() respond to urgent RCU-QS needs
+ - net: ieee802154: 6lowpan: fix frag reassembly
+ - EVM: Add support for portable signature format
+ - ima: re-introduce own integrity cache lock
+ - ima: re-initialize int->atomic_flags
+ - xhci: Fix leaking USB3 shared_hcd at xhci removal
+ - Documentation/security-bugs: Clarify treatment of embargoed information
+ - Documentation/security-bugs: Postpone fix publication in exceptional cases
+ - ACPICA: AML interpreter: add region addresses in global list during initialization
+ - fsnotify: generalize handling of extra event flags
+ - pinctrl: meson: fix gxbb ao pull register bits
+ - pinctrl: meson: fix gxl ao pull register bits
+ - pinctrl: meson: fix meson8 ao pull register bits
+ - pinctrl: meson: fix meson8b ao pull register bits
+ - riscv: add missing vdso_install target
+ - media: ov5640: fix wrong binning value in exposure calculation
+ - media: ov5640: fix auto controls values when switching to manual mode
+ - mm/huge_memory: rename freeze_page() to unmap_page()
+ - mm/huge_memory.c: reorder operations in __split_huge_page_tail()
+ - mm/huge_memory: splitting set mapping+index before unfreeze
+ - mm/huge_memory: fix lockdep complaint on 32-bit i_size_read()
+ - mm/khugepaged: collapse_shmem() stop if punched or truncated
+ - mm/khugepaged: fix crashes due to misaccounted holes
+ - mm/khugepaged: collapse_shmem() remember to clear holes
+ - mm/khugepaged: minor reorderings in collapse_shmem()
+ - mm/khugepaged: collapse_shmem() without freezing new_page
+ - mm/khugepaged: collapse_shmem() do not crash on Compound
+ - media: em28xx: Fix use-after-free when disconnecting
+ - ubi: Initialize Fastmap checkmapping correctly
+ - libceph: store ceph_auth_handshake pointer in ceph_connection
+ - libceph: factor out __prepare_write_connect()
+ - libceph: factor out __ceph_x_decrypt()
+ - libceph: factor out encrypt_authorizer()
+ - libceph: add authorizer challenge
+ - libceph: implement CEPHX_V2 calculation mode
+ - net/tls: Fixed return value when tls_complete_pending_work() fails
+ - wil6210: missing length check in wmi_set_ie
+ - btrfs: validate type when reading a chunk
+ - btrfs: Verify that every chunk has corresponding block group at mount time
+ - btrfs: tree-checker: Add checker for dir item
+ - btrfs: tree-checker: use %zu format string for size_t
+ - btrfs: tree-checker: reduce stack consumption in check_dir_item
+ - btrfs: tree-checker: Verify block_group_item
+ - btrfs: tree-checker: Detect invalid and empty essential trees
+ - btrfs: Check that each block group has corresponding chunk at mount time
+ - btrfs: tree-checker: Check level for leaves and nodes
+ - btrfs: tree-checker: Fix misleading group system information
+ - btrfs: check blkaddr more accurately before issue a bio
+ - btrfs: enhance sanity_check_raw_super() to avoid potential overflow
+ - btrfs: clean up with is_valid_blkaddr()
+ - btrfs: introduce and spread verify_blkaddr
+ - btrfs: fix to do sanity check with secs_per_zone
+ - btrfs: fix to do sanity check with user_block_count
+ - btrfs: fix to do sanity check with node footer and iblocks
+ - btrfs: fix to do sanity check with block address in main area
+ - btrfs: fix to do sanity check with i_extra_isize
+ - btrfs: fix to do sanity check with cp_pack_start_sum
+ - net: skb_scrub_packet(): Scrub offload_fwd_mark
+ - net: thunderx: set xdp prog to NULL if bpf_prog_add fails
+ - virtio-net: disable guest csum during XDP set
+ - virtio-net: fail XDP set if guest csum is negotiated
+ - net: thunderx: set tso_hdrs pointer to NULL in nicvf_free_snd_queue
+ - packet: copy user buffers before orphan or clone
+ - rapidio/ironet: do not free skb before reading its length
+ - usbnet: ipheth: fix potential recvmsg bug and recvmsg bug 2
+ - kvm: mmu: Fix race in emulated page table writes
+ - KVM: x86: Fix kernel info-leak in KVM_HC_CLOCK_PAIRING hypercall
+ - xtensa: enable coprocessors that are being flushed
+ - xtensa: fix coprocessor context offset definitions
+ - xtensa: fix coprocessor part of ptrace_{get,set}xregs
+ - Btrfs: ensure path name is null terminated at btrfs_control_ioctl
+ - btrfs: relocation: set trans to be NULL after ending transaction
+ - PCI: layerscape: Fix wrong invocation of outbound window disable accessor
+ - arm64: dts: rockchip: Fix PCIe reset polarity for rk3399-puma-haikou.
+ - x86/fpu: Disable bottom halves while loading FPU registers
+ - perf/x86/intel: Move branch tracing setup to the Intel-specific source file
+ - perf/x86/intel: Add generic branch tracing check to intel_pmu_has_bts()
+ - fs: fix lost error code in dio_complete
+ - ALSA: wss: Fix invalid snd_free_pages() at error path
+ - ALSA: ac97: Fix incorrect bit shift at AC97-SPSA control write
+ - ALSA: control: Fix race between adding and removing a user element
+ - ALSA: sparc: Fix invalid snd_free_pages() at error path
+ - ALSA: hda/realtek - Support ALC300
+ - ALSA: hda/realtek - Fix headset mic detection for MSI MS-B171
+ - ext2: fix potential use after free
+ - ARM: dts: rockchip: Remove @0 from the veyron memory node
+ - dmaengine: at_hdmac: fix memory leak in at_dma_xlate()
+ - dmaengine: at_hdmac: fix module unloading
+ - staging: vchiq_arm: fix compat VCHIQ_IOC_AWAIT_COMPLETION
+ - staging: rtl8723bs: Add missing return for cfg80211_rtw_get_station
+ - usb: core: quirks: add RESET_RESUME quirk for Cherry G230 Stream series
+ - Revert "usb: dwc3: gadget: skip Set/Clear Halt when invalid"
+ - iio:st_magn: Fix enable device after trigger
+ - lib/test_kmod.c: fix rmmod double free
+ - mm: use swp_offset as key in shmem_replace_page()
+ - misc: mic/scif: fix copy-paste error in scif_create_remote_lookup
+ - binder: fix race that allows malicious freeing of live buffer
+ - librados: weaken sizeof check in ceph_x_verify_authorizer_reply()
+ - librados: check authorizer reply/challenge length before reading
+ - rfs: fix missing up_read
+ - net: don’t keep lonely packets forever in the gro hash
+ - net: phy: add workaround for issue where PHY driver doesn’t bind to the device
+ - KVM: nVMX/nSVM: Fix bug which sets vcpu->arch.tsc_offset to L1 tsc_offset
+ - udf: Allow mounting volumes with incorrect identification strings
+ - btrfs: Always try all copies when reading extent buffers
+ - Btrfs: fix rare chances for data loss when doing a fast fsync
+ - Btrfs: fix race between enabling quotas and subvolume creation
+ - perf/x86/intel: Disallow precise_ip on BTS events
+ - ALSA: hda: Add ASRock H81M-HDS to the power_save blacklist
+ - ALSA: hda: Add ASRock N68C-S UCC the power_save blacklist
+ - function_graph: Create function_graph_enter() to consolidate architecture code
+ - ARM: function_graph: Simplify with function_graph_enter()
+ - microblaze: function_graph: Simplify with function_graph_enter()
+ - x86/function_graph: Simplify with function_graph_enter()
+ - powerpc/function_graph: Simplify with function_graph_enter()
+ - sh/function_graph: Simplify with function_graph_enter()
+ -sparc/function_graph: Simplify with function_graph_enter()
+ - parisc: function_graph: Simplify with function_graph_enter()
+ - m390/function_graph: Simplify with function_graph_enter()
+ - arm64: function_graph: Simplify with function_graph_enter()
+ - MIPS: function_graph: Simplify with function_graph_enter()
+ - function_graph: Make ftrace_push_return_trace() static
+ - function_graph: Use new curr_ret_depth to manage depth instead of curr_ret_stack
+ - function_graph: Have profiler use curr_ret_stack and not depth
+ - function_graph: Move return callback before update of curr_ret_stack
+ - function_graph: Reverse the order of pushing the ret_stack and the callback
+ - ext2: initialize opts.s_mount_opt as zero before using it
+ - ASoC: intel: cht_bsw_max98090_i: Add quirk for boards using pmc_plt_clk_0
+ - staging: most: use format specifier "%s" in snprintf
+ - iio/hid-sensors: Fix IIO_CHAN_INFO_RAW returning wrong values for signed numbers
+ - mm: cleanscache: fix corruption on missed inode invalidation
+ - namei: allow restricted O_CREAT of FIFOs and regular files
+ - bcache: risk of data loss on I/O errors in backing or caching devices
+ (LP: #1829563)
+ - bcache: add CACHE_SET_IO_DISABLE to struct cache_set flags
+ - bcache: add stop_when_cache_set_failed option to backing device
+ - bcache: fix inaccurate io state for detached bcache devices
+ - bcache: add backing_request_endio() for bi_end_io
+ - bcache: add io_disable to struct cached_dev
+ - bcache: store disk name in struct cache and struct cached_dev
+ - bcache: count backing device I/O error for writeback I/O
+ - bcache: add wait_for_kthread_stop() in bch_allocator_thread()
+ - bcache: set dc->io_disable to true in conditional_stop_bcache_device()
+ - bcache: stop bcache device when backing device is offline
+ - bcache: fix ioctl in flash device
+ 
+ * Bionic update: upstream stable patchset 2019-07-16 (LP: #1836802)
+ - mtd: spi-nor: fsl-quadspi: fix read error for flash size larger than 16MB
+ - spi: bcm-qspi: switch back to reading flash using smaller chunks
+ - bcache: trace missed reading by cache_missed
+ - bcache: fix miss key refill->end in writeback
+ - hwmon: (pmbus) Fix page count auto-detection.
+ - jffs2: free jffs2_sb_info through jffs2_kill_sb()
+ - cpufreq: conservative: Take limits changes into account properly
+ - pcmcia: Implement CLKRUN protocol disabling for Ricoh bridges
+ - parisc: Fix address in HPMC IVA
+ - parisc: Fix map_pages() to not overwrite existing pte entries
+ - parisc: Fix exported address of os_hpmc handler
+ - ALSA: hda - Add quirk for ASUS G751 laptop
+ - ALSA: hda - Fix headphone pin config for ASUS G751
+ - ALSA: hda - Add mic quirk for the Lenovo G50-30 (17aa:3905)
+ - ALSA: ca0106: Disable IZD on SB0570 DAC to fix audio pops
+ - x86/xen: Fix boot loader version reported for PVH guests
+ - x86/corruption-check: Fix panic in memory_corruption_check() when boot
+ option without value is provided
+ - ARM: dts: exynos: Disable pull control for MAX8997 interrupts on Origen
+ - bpf: do not blindly change rlimit in reuseport net selftest
+ - Revert "perf tools: Fix PMU term format max value calculation"
+ - xfrm: policy: use hlist rcu variants on insert
+ - perf vendor events intel: Fix wrong filter_band* values for uncore events
+ - sched/fair: Fix the min_vruntime update logic in dequeue_entity()
+ - perf tools: Fix use of alternatives to find JDIR
+ - perf cpu_map: Align cpu map synthesized events properly.
+ - x86/fpu: Remove second definition of fpu in __fpu__restore_sig()
+ - net: qla3xxx: Remove overflowing shift statement
+ - selftests: ftrace: Add synthetic event syntax testcase
+ - i2c: rcar: cleanup DMA for all kinds of failure
+ - locking/lockdep: Fix debug_locks off performance problem
+ - ataflp: fix error handling during setup
+ - swim: fix cleanup on setup error
+ - nfp: devlink port split support for 1x100G CXP NIC
+ - tun: Consistently configure generic netdev params via rtnetlink
+ - s390/thyi: Fix machine name validity indication
+ - hwmon: (pwm-fan) Set fan speed to 0 on suspend
+ - hwmon: pblk: fix two sleep-in-atomic-context bugs
+ - s: dep-93xx: Use dma_data_direction for ep93xx_spi_dma_{finish,prepare}
+ - perf tools: Free temporary `sys' string in read_event_files()
+ - perf tools: Cleanup trace-event-info `data' leak
+ - perf strbuf: Match va_(add,copy) with va_end
+ - cpufreq: Fix coredump on VMWare
+ - mmc: sdhci-pci-o2micro: Add quirk for O2 Micro dev 0x8620 rev 0x01
+ - iwlwifi: pcie: avoid empty free RB queue
+ - iwlwifi: mvm: clear HW_RESTART_REQUESTED when stopping the interface
+ - x86/olpc: Indicate that legacy PC XO-1 platform should not register RTC
+ - ACPI / processor: Fix the return value of acpi_processor_ids_walk()
+ - cpufreq: dt: Try freeing static OPPs only if we have added them
+ - mtd: rawnand: atmel: Fix potential NULL pointer dereference
+ - signal: Introduce COMPAT_SIGMINSTKSZ for use in compat_sys_sigaltstack
+ - Bluetooth: btbcm: Add entry for BCM4335C0 UART bluetooth
+ - x86: boot: Fix EFI stub alignment
+ - pinctrl: qcom: spi-mpp: Fix err handling of pmic_mpp_set_mux
+ - brcmfmac: fix for proper support of 160MHz bandwidth
+ - net: phy: phylink: ensure the carrier is off when starting phylink
+ - block, bfq: correctly charge and reset entity service in all cases
+ - kprobes: Return error if we fail to reuse kprobe instead of BUG_ON()
+ - ACPI / LPSS: Add alternative ACPI HIDs for Cherry Trail DMA controllers
+ - pinctrl: qcom: spi-mpp: Fix drive strength setting
+ - pinctrl: spi-mpp: Fix pmic_mpp_config_get() to be compliant
+ - pinctrl: ssbi-gpio: Fix pm8xxx_pin_config_get() to be compliant
+ - net: dsa: m88xxx: Fix writing to a PHY page.
+ - iwlwifi: mvm: fix BAR seq ctrl reporting
+ - ixgbevf: VF2VF TCP RSS
+ - ath10k: schedule hardware restart if WMI command times out
+ - thermal: da9062/61: Prevent hardware access during system suspend
+ - cgroup, netclassid: add a preemption point to write_classid
+ - scsi: esp_scsi: Track residual for PIO transfers
+ - UAPI: ndctl: Fix g++-unsupported initialisation in headers
+ - KVM: nVMX: Clear reserved bits of #DB exit qualification
+ - scsi: megaraid_sas: fix a missing-check bug
+ - RDMA/core: Do not expose unsupported counters
+ - IB/ipoib: Clear IPCB before icmp_send
+ - RDMA/bnx3_re: Fix recursive lock warning in debug kernel
+ - usb: host: ohci-91: fix request of irq for optional gpio
+ - PCI: mediatek: Fix mtk_pci_find_port() endpoint/port matching logic
+ - tpm: suppress transmit cmd error logs when TPM 1.2 is disabled/deactivated
+ - Drivers: hv: vmbus: Use cpumask_var_t for on-stack cpu mask
+ - VMC: Resource wildcard match fixed
+ - PCI / ACPI: Enable wake automatically for power managed bridges
+ - usb: gadget: udc: atmel: handle at91sam9rl PMC
+ - ext4: fix argument checking in EXT4_IOC_MOVE_EXT
+ - MD: fix invalid stored role for a disk
+ - f2fs: fix to recover inode's i_flags during POR
+ - PCI/MSI:Warn and return error if driver enables MSI/MSI-X twice
+ - coresight: etb10: Fix handling of perf mode
+ - PCI: dwc: pci-dra7xx: Enable errata i870 for both EP and RC mode
+ - crypto: caam - fix implicit casts in endianness helpers
+ - usb: chipidea: Prevent unbalanced IRQ disable
+ - driver/dma/ioat: Call del_timer_sync() without holding prep_lock
+ - scsi: lpfc: Correct soft lockup when running mds diagnostics
+ - scsi: lpfc: Correct race with abort on completion path
+ - f2fs: report error if quota off error during umount
+ - signal: Always deliver the kernel's SIGKILL and SIGSTOP to a pid namespace
  + init
+ - mfd: menelaus: Fix possible race condition and leak
+ - dmaengine: dma-jz4780: Return error if not probed from DT
+ - IB/rxe: fix for duplicate request processing and ack psns
+ - ALSA: hda: Check the non-cached stream buffers more explicitly
+ - cpupower: Fix AMD Family 0x17 msr_pstate size
+ - f2fs: fix to account IO correctly
+ - ARM: dts: exynos: Remove "cooling-\{min\|max\}\-level" for CPU nodes
+ - arm: dts: exynos: Add missing cooling device properties for CPUs
+ - ARM: dts: exynos: Convert exynos5250.dtsi to opp-v2 bindings
+ - ARM: dts: exynos: Mark 1 GHz CPU OPP as suspend OPP on Exynos5250
+ - xen-swiotlb: use actually allocated size on check physical continuous
+ - tpm: Restore functionality to xen vtpm driver.
+ - xen/blkfront: avoid NULL blkfront_info dereference on device removal
+ - xen/balloon: Support xend-based toolstack
+ - xen: fix race in xen_qlock_wait()
+ - xen: make xen_qlock_wait() nestable
+ - xen/pvh: increase early stack size
+ - xen/pvh: don't try to unplug emulated devices
+ - libertas: don't set URB_ZERO_PACKET on IN USB transfer
+ - usbip:vudc: BUG kmalloc-2048 (Not tainted): Poison overwritten
+ - usb: gadget: udc: renesas_usb3: Fix b-device mode for "workaround"
+ - iwlwifi: mvm: check return value of rs_rate_from_ucode_rate()
+ - net/ipv4: defensive cipso option parsing
+ - dmaengine: ppe4xx: fix off-by-one build failure
+ - dmaengine: stm32-dma: fix incomplete configuration in cyclic mode
+ - libnvdimm: Hold reference on parent while scheduling async init
+ - libnvdimm, region: Fail badblocks listing for inactive regions
+ - ASoC: intel: skylake: Add missing break in skl_tplg_get_token()
+ - IB/mlx5: Fix MR cache initialization
+ - jbd2: fix use after free in jbd2_log_do_checkpoint()
+ - gfs2_meta: ->mount() can get NULL dev_name
+ - ext4: initialize retries variable in ext4_da_write_inline_data_begin()
+ - ext4: fix setattr project check in fssetxattr ioctl
+ ex4: propagate error from dquot_initialize() in EXT4_IOC_FSSETXATTR
+ ex4: fix use-after-free race in ext4_remount()'s error path
+ EDAC, amd64: Add Family 17h, models 10h-2fh support
+ EDAC, {i7core, sb, skx}_edac: Fix uncorrected error counting
+ EDAC, skx_edac: Fix logical channel intermediate decoding
+ ARM: dts: dra7: Fix up unaligned access setting for PCIe EP
+ PCI/ASPM: Fix link_state teardown on device removal
+ PCI: Add Device IDs for Intel GPU "spurious interrupt" quirk
+ PCI: vmd: White list for fast interrupt handlers
+ signal/GenWQE: Fix sending of SIGKILL
+ signal: Guard against negative signal numbers in copy_siginfo_from_user32
+ crypto: lrw - Fix out-of-bounds access on counter overflow
+ crypto: tcrypt - fix ghash-generic speed test
+ mm: /proc/pid/smaps_rollup: fix NULL pointer deref in smaps_pte_range()
+ ima: fix showing large 'violations' or 'runtime_measurements_count'
+ hugetlfs: dirty pages as they are added to pagecache
+ mm/map: map_pte() was not handling private ZONE_DEVICE page properly
+ KVM: arm64: Fix caching of host MDCR_EL2 value
+ kbuild: fix kernel/bounds.c 'W=l' warning
+ iio: ad5064: Fix regulator handling
+ iio: adc: imx25-gcq: Fix leak of device_node in mx25_gcq_setup_cfgs()
+ iio: adc: at91: fix acking DRDY irq on simple conversions
+ iio: adc: at91: fix wrong channel number in triggered buffer mode
+ w1: omap-hdq: fix missing bus unregister at removal
+ smb3: allow stats which track session and share reconnects to be reset
+ smb3: do not attempt cifs operation in smb3 query info error path
+ smb3: on kerberos mount if server doesn't specify auth type use krb5
+ printk: Fix panic caused by passing log_buf_len to command line
+ genirq: Fix race on spurious interrupt detection
+ NFSv4.1: Fix the r/wsize checking
+ nfs: Fix a missed page unlock after pg_doio()
+ nfsd: Fix an Oops in free_session()
+ lockd: fix access beyond unterminated strings in prints
+ dm ioclt: harden copy_params()'s copy_from_user() from malicious users
+ dm zoned: fix metadata block ref counting
+ dm zoned: fix various dmz_get_mblock() issues
+ powerpc/msi: Fix compile error on mpc83xx
+ MIPS: OCTEON: fix out of bounds array access on CN68XX
+ iommu/arm-smu: Ensure that page-table updates are visible before TLBI
+ TC: Set DMA masks for devices
+ media: v4l2-tpg: fix kernel oops when enabling HFLIP and OSD
+ kgdboc: Passing ekgdboc to command line causes panic
+ xen: fix xen_qlock_wait()
+ xen-blkfront: fix kernel panic with negotiate_mq error path
+ media: em28xx: use a default format if TRY_FMT fails
+ media: tvp5150: avoid going past array on v4l2_querymenu()
+ media: em28xx: fix input name for Terratec AV 350
+ media: em28xx: make v4l2-compliance happier by starting sequence on zero
- media: media colorspaces*.rst: rename AdobeRGB to opRGB
- arm64: lse: remove -fcall-used-x0 flag
- rpmsg: smd: fix memory leak on channel create
- Cramfs: fix abad comparison when wrap-arounds occur
- ARM: dts: socfpga: Fix SDRAM node address for Arria10
- arm64: dts: stratix10: Correct System Manager register size
- soc/tegra: pmc: Fix child-node lookup
- btrfs: qgroup: Avoid calling qgroup functions if qgroup is not enabled
- btrfs: Handle owner mismatch gracefully when walking up tree
- btrfs: locking: Add extra check in btrfs_init_new_buffer() to avoid deadlock
- btrfs: fix error handling in free_log_tree
- btrfs: Enhance btrfs_trim_fs function to handle error better
- btrfs: Ensure btrfs_trim_fs can trim the whole filesystem
- btrfs: iterate all devices during trim, instead of fs_devices::alloc_list
- btrfs: don't attempt to trim devices that don't support it
- btrfs: wait on caching when putting the bg cache
- btrfs: protect space cache inode alloc with GFP_NOFS
- btrfs: reset max_extent_size on clear in a bitmap
- btrfs: make sure we create all new block groups
- Btrfs: fix warning when replaying log after fsync of a tmpfile
- Btrfs: fix wrong dentries after fsync of file that got its parent replaced
- btrfs: qgroup: Dirty all qgroups before rescan
- Btrfs: fix null pointer dereference on compressed write path error
- Btrfs: fix assertion on fsync of regular file when using no-holes feature
- btrfs: set max_extent_size properly
- btrfs: don't use ctl->free_space for max_extent_size
- btrfs: only free reserved extent if we didn't insert it
- btrfs: don't run delayed_iputs in commit
- btrfs: move the dio_sem higher up the callchain
- Btrfs: fix use-after-free during inode eviction
- Btrfs: fix use-after-free when dumping free space
- Btrfs: fix fsync after hole punching when using no-holes feature
- net: sched: Remove TCA_OPTIONS from policy
- bpf: wait for running BPF programs when updating map-in-map
- MD: fix invalid stored role for a disk - try2
- mtd: spi-nor: intel-spi: Add support for Intel Ice Lake SPI serial flash
- mtd: spi-nor: fsl-quadspi: Don't let -EINVAL on the bus
- bcache: correct dirty data statistics
- block: don't deal with discard limit in blkdev_issue_discard()
- block: make sure discard bio is aligned with logical block size
- block: make sure writesame bio is aligned with logical block size
- dma-mapping: fix panic caused by passing empty cma command line argument
- ACPI / OSL: Use 'jiffies' as the time basis for acpi_os_get_timer()
- ACPICA: AML Parser: fix parse loop to correctly skip erroneous extended opcodes
- kprobes/x86: Use preempt_enable() in optimized_callback()
- mailbox: PCC: handle parse error
- ALSA: hda: Add 2 more models to the power_save blacklist
+ - drm: fix use of freed memory in drm_mode_setcrtc
+ - nvme: remove ns sibling before clearing path
+ - nfp: flower: fix pedit set actions for multiple partial masks
+ - nfp: flower: use offsets provided by pedit instead of index for ipv6
+ - perf: Don't crash on invalid inline debug information
+ - drm: Get ref on CRTC commit object when waiting for flip_done
+ - net: socionext: Reset tx queue in ndo_stop
+ - lightnvm: pblk: fix race on sysfs line state
+ - lightnvm: pblk: fix race condition on metadata I/O
+ - bcache: Populate writeback_rate_minimum attribute
+ - sdhci: acpi: add free_slot callback
+ - mtd: rawnand: denali: set SPARE_AREA_SKIP.Bytes register to 8 if unset
+ - iwlwifi: mvm: check for n_profiles validity in EWRD ACPI
+ - ACPI/PPTT: Handle architecturally unknown cache types
+ - ACPI / PM: LPIT: Register sysfs attributes based on FADT
+ - pinctrl: sunxi: fix 'pctrl->functions' allocation in
  sunxi_pinctrl_build_state
+ - arm64: entry: Allow handling of undefined instructions from EL1
+ - bpf/verifier: fix verifier instability
+ - gpio: brcmstb: allow 0 width GPIO banks
+ - libata: Apply NOLPM quirk for SAMSUNG MZ7TD256HAFV-000L9
+ - thermal: rcar_thermal: Prevent doing work after unbind
+ - net: stmmac: dwmac-sun8i: fix OF child-node lookup
+ - f2fs: clear PageError on the read path
+ - xprtrdma: Reset credit grant properly after a disconnect
+ - nvmem: check the return value of nvmem_add_cells()
+ - f2fs: avoid sleeping under spin_lock
+ - f2fs: fix to recover cold bit of inode block during POR
+ - OPP: Free OPP table properly on performance state irregularities
+ - IB/rxe: Revise the ib_wr_opcode enum
+ - ext4: fix EXT4_IOC_SWAP_BOOT
+ - selinux: fix mounting of cgroup2 under older policies
+ - KVM: arm/arm64: Ensure only THP is candidate for adjustment
+ - NFC: nfcmrvl_uart: fix OF child-node lookup
+ - media: ov7670: make "xclk" clock optional
+ - powerpc/tm: Fix HFSCR bit for no suspend case
+ - powerpc/64s/hash: Do not use PPC_INVALIDATE_ERAT on CPUs before POWER9
+ - MIPS: memset: Fix CPU_DADDI_WORKAROUNDS `small_fixup' regression
+ - power: supply: tw4030-charger: fix OF sibling-node lookup
+ - oxcl: Fix access to the AFU Descriptor Data
+ - net: bcmgenet: fix OF child-node lookup
+ - media: ccc: make ccc_get_edid_spa_location() an inline function
+ - media: ccc: integrate ccc_validate_phys_addr() in ccc-api.c
+ - media: adv7604: when the EDID is cleared, unconfigure CEC as well
+ - media: adv7842: when the EDID is cleared, unconfigure CEC as well
+ - drm/mediatek: fix OF child-node lookup
+ - media: replace ADOBERGB by OPRGB
+ - media: hdmi.h: rename ADOBE_RGB to OPRGB and ADOBE_YCC to OPYCC
+ - btrfs: fix error handling in btrfs_dev_replace_start
+ - btrfs: keep trim from interfering with transaction commits
+ - Btrfs: don't clean dirty pages during buffered writes
+ - btrfs: release metadata before running delayed refs
+ - Btrfs: fix deadlock when writing out free space caches
+ - btrfs: reset max_extent_size properly
+ - btrfs: fix insert_reserved error handling
+ - powerpc/traps: restore recoverability of machine_check interrupts
+ - powerpc/64/module: REL32 relocation range check
+ - powerpc/mm: Fix page table dump to work on Radix
+ - powerpc/eh: Fix possible null deref in eeh_dump_dev_log()
+ - tty: check name length in tty_find_polling_driver()
+ - ARM: imx_v6_v7_defconfig: Select CONFIG_TMPFS_POSIX_ACL
+ - powerpc/nohash: fix undefined behaviour when testing page size support
+ - powerpc/mm: Don't report hugepage tables as memory leaks when using kmemleak
+ - drm/omap: fix memory barrier bug in DMM driver
+ - drm/hisilicon: hibmc: Do not carry error code in HiBMC framebuffer pointer
+ - media: pci: ex23885: handle adding to list failure
+ - media: coda: don't overwrite h.264 profile_idc on decoder instance
+ - MIPS: kexec: Mark CPU offline before disabling local IRQ
+ - powerpc/boot: Ensure _zimage_start is a weak symbol
+ - powerpc/memtrace: Remove memory in chunks
+ - MIPS/PCI: Call pcie_bus_configure_settings() to set MPS/MRRS
+ - sc16is7xx: Fix for multi-channel stall
+ - media: tvp5150: fix width alignment during set_selection()
+ - powerpc/selftests: Wait all threads to join
+ - staging:iio:ad7606: fix voltage scales
+ - 9p locks: fix glock.client_id leak in do_lock
+ - 9p: clear dangling pointers in p9stat_free
+ - ovl: fix error handling in ovl_verify_set_fh()
+ - scsi: qla2xxx: Fix incorrect port speed being set for FC adapters
+ - scsi: qla2xxx: Fix process response queue for ISP26XX and above
+ - scsi: qla2xxx: Remove stale debug trace message from tcm_qla2xxx
+ - scsi: qla2xxx: shutdown chip if reset fail
+ - scsi: qla2xxx: Fix re-using LoopID when handle is in use
+ - ovl: fix recursive oi->lock in ovl_link()
+ - MIPS: Loongson-3: Fix CPU UART irq delivery problem
+ - MIPS: Loongson-3: Fix BRIDGE irq delivery problem
+ - xtensa: add NOTES section to the linker script
+ - xtensa: make sure bFLT stack is 16 byte aligned
+ - xtensa: fix boot parameters address translation
+ - um: Drop own definition of PTRACE_SYSEMU/_SINGLESTEP
+ - clk: s2mps11: Fix matching when built as module and DT node contains compatible
+ - clk: at91: Fix division by zero in PLL recalc_rate()
+ - clk: rockchip: Fix static checker warning in rockchip_ddrclk_get_parent call
+ - clk: mvebu: use correct bit for 98DX3236 NAND
+ - libceph: bump CEPH_MSG_MAX_DATA_LEN
- mach64: fix display corruption on big endian machines
- mach64: fix image corruption due to reading accelerator registers
- reset: hisilicon: fix potential NULL pointer dereference
- vhost/scsi: truncate T10 PI iov_iter to prot_bytes
- scsi: qla2xxx: Initialize port speed to avoid setting lower speed
- SCSl: fix queue cleanup race before queue initialization is done
- soc: ti: QMSS: Fix usage of irq_set_affinity_hint
- ocfs2: fix a misuse a of brelse after failing ocfs2_check_dir_entry
- ocfs2: free up write context when direct IO failed
- mm: thp: relax __GFP_THISNODE for MADV_HUGEPAGE mappings
- netfilter: conntrack: fix calculation of next bucket number in early_drop
- ARM: 8809/1: proc-v7: fix Thumb annotation of cpu_v7_svc_hvc_switch_mm
- mtd: docg3: don't set conflicting BCH_CONST_PARAMS option
- of, numa: Validate some distance map rules
- x86/cpu/vmware: Do not trace vmware_sched_clock()
- x86/hyper-v: Enable PIT shutdown quirk
- termios, tty/tty_baudrate.c: fix buffer overrun
- arch/alpha, termios: implement BOTHER, IBSHIFT and termios2
- watchdog/core: Add missing prototypes for weak functions
- btrfs: fix pinned underflow after transaction aborted
- Btrfs: fix cur_offset in the error case for nocow
- Btrfs: fix infinite loop on inode eviction after deduplication of eof block
- Btrfs: fix data corruption due to cloning of eof block
- ext4: add missing brelse() update_backups()'s error path
- ext4: add missing brelse() in set_flexbg_block_bitmap()'s error path
- ext4: add missing brelse() add_new_gdb_meta_bg()'s error path
- ext4: avoid potential extra brelse in setup_new_flex_group_blocks()
- ext4: missing !bh check in ext4_xattr_inode_write()
- ext4: fix possible inode leak in the retry loop of ext4_resize_fs()
- ext4: avoid buffer leak on shutdown in ext4_mark_iloc_dirty()
- ext4: avoid buffer leak in ext4_orphan_add() after prior errors
- ext4: fix missing cleanup if ext4_alloc_flex_bg_array() fails while resizing
- ext4: avoid possible double brelse() in add_new_gdb() on error path
- ext4: fix possible leak of sbi->s_group_desc_leak in error path
- ext4: fix possible leak of s_journal_flag_rwsem in error path
- ext4: fix buffer leak in ext4_xattr_get_block() on error path
- ext4: release bs.bh before re-using in ext4_xattr_block_find()
- ext4: fix buffer leak in ext4_xattr_move_to_block() on error path
- ext4: fix buffer leak in ext4_expand_extra_isize_ea() on error path
- ext4: fix buffer leak in __ext4_read_dirblock() on error path
- mount: Prevent MNT_DETACH from disconnecting locked mounts
- kdb: use correct pointer when 'btc' calls 'btt'
- kdb: print real address of pointers instead of hashed addresses
- sunrpc: correct the computation for page_ptr when truncating
- rtc: hctosys: Add missing range error reporting
- configfs: replace strncpy with memcpy
- gfs2: Put bitmap buffers in put_super
+ - lib/ubsan.c: don't mark __ubsan_handle_builtin_unreachable as noreturn
+ - hugetlbfs: fix kernel BUG at fs/hugetlbfs/inode.c:444!
+ - mm/swapfile.c: use kvzalloc for swap_info_struct allocation
+ - efi/arm/libstub: Pack FDT after populating it
+ - drm/amdgpu: add missing CHIP_HAINAN in amdgpu_udecode_get_load_type
+ - drm/nouveau: Check backlight IDs are >= 0, not > 0
+ - drm/dp_mst: Check if primary mstb is null
+ - drm/i915: Restore vblank interrupts earlier
+ - drm/i915: Don't unset intel_connector->mst_port
+ - drm/i915: Skip vcp allocation for MSTB ports that are gone
+ - drm/i915: Large page offsets for pread/pwrite
+ - drm/i915/hdmi: Add HDMI 2.0 audio clock recovery N values
+ - drm/i915: Don't oops during modeset shutdown after lpe audio deinit
+ - drm/i915: Mark pin flags as u64
+ - drm/i915/execlists: Force write serialisation into context image vs execution
+ - CONFIG_XEN_PV breaks xen_create_contiguous_region on ARM
+ - ovl: check whiteout in ovl_create_over_whiteout()
+ - nvme-loop: fix kernel oops in case of unhandled command
+ - Input: wm97xx-ts - fix exit path
+ - powerpc/Makefile: Fix PPC_BOOK3S_64 ASFLAGS
+ - tracing/kprobes: Check the probe on unloaded module correctly
+ - drm/amdgpu/powerplay: fix missing break in switch statements
+ - udf: Prevent write-unsupported filesystem to be remounted read-write
+ - serial: sh-sci: Fix could not remove dev_attr_rx_fifo_timeout
+ - zram: close udev startup race condition as default groups
+ - clk: rockchip: fix wrong mmc sample phase shift for rk3328
+ - bonding/802.3ad: fix link_failure_count tracking
+ - hwmon: (core) Fix double-free in __hwmon_device_register()
+ - perf stat: Handle different PMU names with common prefix
+ - mnt: fix __detach_mounts infinite loop
+ - NFSv4: Don't exit the state manager without clearing
+ - NFS4CLNT_MANAGER_RUNNING
+ - libata: blacklist SAMSUNG MZ7TD256HAFV-000L9 SSD
+ - drm/i915/dp: Link train Fallback on eDP only if fallback link BW can fit
+ - panel's native mode
+ - drm/i915: Fix ilk+ watermarks when disabling pipes
+ - drm/i915: Fix possible race in intel_dp_add_mst_connector()
+ - [SRU][B/B-OEM]Fix resume failure on some TPM chips (LP: #1836031)
+ - tpm: tpm_try_transmit() refactor error flow.
+ - Linux md raid-10 freezes during resync (LP: #1767992)
+ - md: fix raid10 hang issue caused by barrier
+ - hda/realtek: can't detect external mic on a Dell machine (LP: #1836755)
+ - ALSA: hda/realtek: apply ALC891 headset fixup to one Dell machine
+ Open Source Used In 5GaaS Edge AC-4 19295
+ * CVE-2019-12614
+ - powerpc/pseries/dlpar: Fix a missing check in dlpar_parse_cc_property()
+ + * x86: mm: early boot problem on i386 with KPTI enabled (LP: #1827884)
+ - Revert "perf/core: Make sure the ring-buffer is mapped in all page-tables"
+ - x86/mm: Clarify hardware vs. software "error_code"
+ - x86/mm: Break out kernel address space handling
+ - x86/mm: Break out user address space handling
+ - x86/mm/fault: Allow stack access below %rsp
+ + * bnx2x driver causes 100% CPU load (LP: #1832082)
+ - bnx2x: Prevent ptp_task to be rescheduled indefinitely
+ + * Sometimes touchpad detected as mouse(i2c designware fails to get adapter number) (LP: #1835150)
+ - i2c: i2c-designware-platdrv: Cleanup setting of the adapter number
+ - i2c: i2c-designware-platdrv: Always use a dynamic adapter number
+ + * HP EliteBook 745 G5 (Ryzen 2500U) fails to boot unless `mce=off` is set on command line (LP: #1796443)
+ - x86/MCE/AMD: Turn off MC4_MISC thresholding on all family 0x15 models
+ - x86/MCE/AMD: Carve out the MC4_MISC thresholding quirk
+ - x86/MCE: Add an MCE-record filtering function
+ - x86/MCE/AMD: Don't report L1 BTB MCA errors on some family 17h models
+ - media: af9035: prevent buffer overflow on write
+ - batman-adv: Avoid probe ELP information leak
+ - batman-adv: Fix segfault when writing to throughput_override
+ - batman-adv: Fix segfault when writing to sysfs elp_interval
+ - batman-adv: Prevent duplicated gateway_node entry
+ - batman-adv: Prevent duplicated nc_node entry
+ - batman-adv: Prevent duplicated softif_vlan entry
+ - batman-adv: Prevent duplicated global TT entry
+ - batman-adv: Prevent duplicated tvlv handler
+ - batman-adv: fix backbone_gw refcount on queue_work() failure
+ - batman-adv: fix hardif_neigh refcount on queue_work() failure
+ - clocksource/drivers/ti-32k: Add CLOCK_SOURCE_SUSPEND_NONSTOP flag for non-am43 SoCs
+ - scsi: ibmvscsis: Fix a stringop-overflow warning
+ - scsi: ibmvscsis: Ensure partition name is properly NUL terminated
+ - intel_th: pci: Add Ice Lake PCH support
+ - Input: atakbd - fix Atari keymap
+ - Input: atakbd - fix Atari CapsLock behaviour
+ - net: emac: fix fixed-link setup for the RTL8363SB switch
+ - ravb: do not write 1 to reserved bits
+ - PCI: dwc: Fix scheduling while atomic issues
+ - drm: mali-dp: Call drm_crtc_vblank_reset on device init
- scsi: ipr: System hung while dlpard adding primary ipr adapter back
- scsi: sd: don't crash the host on invalid commands
- net/mlx4: Use cpumask_available for eq->affinity_mask
- clocksource/drivers/fttmr010: Fix set_next_event handler
- powerpc/tm: Fix userspace r13 corruption
- powerpc/tm: Avoid possible userspace r1 corruption on reclaim
- iommu/amd: Return devid as alias for ACPI HID devices
- ARC: build: Get rid of toolchain check
- ARC: build: Don't set CROSS_COMPILE in arch's Makefile
- HID: quirks: fix support for Apple Magic Keyboards
- staging: ccree: check DMA pool buf !NULL before free
- net/smc: fix sizeof to int comparison
- qed: Fix populating the invalid stag value in multi function mode.
- RDMA/uverbs: Fix validity check for modify QP
- bpf: test_maps, only support ESTABLISHED socks
- RDMA/bnxt_re: Fix system crash during RDMA resource initialization
- RISC-V: include linux/ftrace.h in asm-prototypes.h
- powerpc/numa: Use associativity if VPHN hcall is successful
- x86/boot: Fix kexec booting failure in the SEV bit detection code
- xfrm: Validate address prefix lengths in the xfrm selector.
- xfrm6: call kfree_skb when skb is too big
- xfrm: reset transport header back to network header after all input transforms have been applied
- xfrm: reset crypto_done when iterating over multiple input xfrms
- mac80211: Always report TX status
- config80211: reg: Init wiphy_idx in regulatory_hint_core()
- mac80211: fix pending queue hang due to TX_DROP
- config80211: Address some corner cases in scan result channel updating
- mac80211: TDSL: fix skb queue/priority assignment
- mac80211: fix TX status reporting for ieee80211s
- ARM: 8799/1: mm: fix pci_ioremap_iq() offset check
- xfrm: validate template mode
- netfilter: bridge: Don't sabotage nf_hook calls from an l3md
- arm64: hugetlb: Fix handling of young ptes
- ARM: dts: BCM63xx: Fix incorrect interrupt specifiers
- net: macb: Clean 64b dma addresses if they are not detected
- soc: fsl: qbman: qman: avoid allocating from non existing gen_pool
- soc: fsl: qe: Fix copy/paste bug in ucc_get_tdm_sync_shift()
- mac80211_hwsim: do not omit multicast announce of first added radio
- Bluetooth: SMP: fix crash in unpairing
- pxa168fb: prepare the clock
- qed: Avoid implicit enum conversion in qed_set_tunn_cls_info
- qed: Fix mask parameter in qed_vf_prep_tunn_req_tlv
- qed: Avoid implicit enum conversion in qed_roce_mode_to_flavor
- qed: Avoid constant logical operation warning in qed_vf_pf_acquire
- qed: Avoid implicit enum conversion in qed_iwarp_parse_rx_pkt
- asix: Check for supported Wake-on-LAN modes
- ax88179_178a: Check for supported Wake-on-LAN modes
+ lan78xx: Check for supported Wake-on-LAN modes
+ sr9800: Check for supported Wake-on-LAN modes
+ r8152: Check for supported Wake-on-LAN Modes
+ smsc75xx: Check for Wake-on-LAN modes
+ smsc95xx: Check for Wake-on-LAN modes
+ cfg80211: fix use-after-free in reg_process_hint()
+ perf/core: Fix perf_pmu_unregister() locking
+ perf/ring_buffer: Prevent concurrent ring buffer access
+ perf/x86/intel/uncore: Fix PCI BDF address of M3UPI on SKX
+ perf/x86/amd/uncore: Set ThreadMask and SliceMask for L3 Cache perf events
+ net: fec: fix rare tx timeout
+ declance: Fix continuation with the adapter identification message
+ locking/ww_mutex: Fix runtime warning in the WW mutex selftest
+ be2net: don’t flip hw_features when VXLANs are added/deleted
+ net: cxgb3_main: fix a missing-check bug
+ yam: fix a missing-check bug
+ ocf2: fix crash in ocf2_duplicate_clusters_by_page()
+ iwlwifi: mvm: check for short GI only for OFDM
+ iwlwifi: dbg: allow wrt collection before ALIVE
+ iwlwifi: fix the ALIVE notification layout
+ usbip: vhci_hcd: update 'status' file header and format
+ net/mlx5: Fix mlx5_get_vector_affinity function
+ powerpc/pseries: Add empty update_numa_cpu_lookup_table() for NUMA=n
+ dm integrity: fail early if required HMAC key is not available
+ net: phy: realtek: Use the dummy stubs for MMD register access for rtl8211b
+ net: phy: Add general dummy stubs for MMD register access
+ scsi: qla2xxx: Avoid double completion of abort command
+ kbuild: set no-integrated-as before incl. arch Makefile
+ IB/mlx5: Avoid passing an invalid QP type to firmware
+ I2tp: remove configurable payload offset
+ cifs: Use ULL suffix for 64-bit constant
+ KVM: x86: Update the exit_qualification access bits while walking an address
+ spare64: Fix regression in pmdp_invalidate().
+ tpm: move the delay_msec increment after sleep in tpm_transmit()
+ bpf: sockmap, map_release does not hold refcnt for pinned maps
+ tpm: tpm_crb: relinquish locality on error path.
+ IB/usnic: Update with bug fixes from core code
+ mmc: dw_mmc-rockchip: correct property names in debug
+ MIPS: Workaround GCC __builtin_unreachable reordering bug
+ iio: buffer: fix the function signature to match implementation
+ selftests/powerpc: Add ptrace hw breakpoint test
+ scsi: ibmvfc: Avoid unnecessary port relogin
+ scsi: sd: Remember that READ CAPACITY(16) succeeded
+ btrfs: quota: Set rescans progress to (u64)-1 if we hit last leaf
+ net: phy: phylink: Don’t release NULL GPIO
+ x86/paravirt: Fix some warning messages
+ net: stmmac: mark PM functions as __maybe_unused
+ kconfig: fix the rule of mainmenu_stmt symbol
+ - libertas: call into generic suspend code before turning off power
+ - compiler.h: Allow arch-specific asm/compiler.h
+ - ARM: dts: imx53-qsb: disable 1.2GHz OPP
+ - perf python: Use -Wno-redundant-decls to build with PYTHON=python3
+ - rxrpc: Don't check RXRPC_CALL_TX_LAST after calling rxrpc_rotate_tx_window()
+ - rxrpc: Only take the rwind and mtu values from latest ACK
+ - rxrpc: Fix connection-level abort handling
+ - selftests: rnetlink.sh explicitly requires bash.
+ - fs/fat/fatent.c: add cond_resched() to fat_count_free_clusters()
+ - mtd: spi-nor: Add support for is25wp series chips
+ - ARM: dts: r8a7790: Correct critical CPU temperature
+ - media: uvcvideo: Fix driver reference counting
+ - Revert "netfilter: ipv6: nf_defrag: drop skb dst before queueing"
+ - perf tools: Disable parallelism for 'make clean'
+ - drm/i915/gvt: fix memory leak of a cmd_entry struct on error exit path
+ - bridge: do not add port to router list when receives query with source 0.0.0.0
+ - net: bridge: remove ipv6 zero address check in mcast queries
+ - ipv6: mcast: fix a use-after-free in inet6_mc_check
+ - ipv6/ndisc: Preserve IPv6 control buffer if protocol error handlers are called
+ - llc: set SOCK_RCU_FREE in llc_sap_add_socket()
+ - net: fec: don't dump RX FIFO register when not available
+ - net/ipv6: Fix index counter for unicast addresses in ipv6_dump_addr
+ - net: sched: gred: pass the right attribute to gred_change_table_def()
+ - net: socket: fix a missing-check bug
+ - smm: stmmac: Fix stmmac_mdio_reset() when building stmmac as modules
+ - net: udp: fix handling of CHECKSUM_COMPLETE packets
+ - r8169: fix NAPI handling under high load
+ - scp: fix race on scctp_id2asoc
+ - udp: fix encap return code for resubmitting
+ - virtio_net: avoid using netif_tx_disable() for serializing tx routine
+ - ethtool: fix a privilege escalation bug
+ - bonding: fix length of actor system
+ - ip6_tunnel: Fix encapsulation layout
+ - openvswitch: Fix push/pop ethernet validation
+ - net/mlx5: Take only bit 24-26 of qetype_wq for page fault type
+ - net: sched: Fix for duplicate class dump
+ - net: drop skb on failure in ip_check_defrag()
+ - net: pskb_trim_resum_slow() with odd trim offset
+ - net/mlx5: fix csum adjustments caused by RXFCS
+ - rnetlink: Disallow FDB configuration for non-Ethernet device
+ - net: iprm: fix unresolved entry dumps
+ - net: bcmgenet: Poll internal PHY for GENETv5
+ - net/sched: cl_api: add missing validation of netlink attributes
+ - net/mlx5: Fix build break when CONFIG_SMP=n
+ - mac80211_hwsim: fix locking when iterating radios during ns exit
+ - rxrpc: Fix checks as to whether we should set up a new call
+ - rxrpc: Fix transport sockopts to get IPv4 errors on an IPv6 socket
+ - thunderbolt: Do not handle ICM events after domain is stopped
+ - thunderbolt: Initialize after IOMMUs
+ - RISCV: Fix end PFN for low memory
+ - drm/amd/display: Signal hw_done() after waiting for flip_done()
+ - powerpc/numa: Skip onlineing a offline node in kdump path
+ - mm/gup_benchmark: fix unsigned comparison to zero in __gup_benchmark_ioctl
+ - perf report: Don't try to map ip to invalid map
+ - perf record: Use unmapped IP for inline callchain cursors
+ - rxrpc: Carry call state out of locked section in rxrpc_rotate_tx_window()
+ - gpio: Assign gpio_irq_chip::parents to non-stack pointer
+ - IB/mlx5: Unmap DMA addr from HCA before IOMMU
+ - rds: RDS (tcp) hangs on sendto() to unresponding address
+ - sparc64: Export __node_distance.
+ - sparc64: Make corrupted user stacks more debuggable.
+ - sparc64: Make proc_id signed.
+ - sparc64: Set %l4 properly on trap return after handling signals.
+ - sparc: Fix single-pcr perf event counter management.
+ - sparc: Fix syscall fallback bugs in VDSO.
+ - sparc: Throttle perf events properly.
+ - eeprom: at24: Add support for address-width property
+ - vfs: swap names of {do,vfs}_clone_file_range()
+ - bpf: fix partial copy of map_ptr when dst is scalar
+ - gpio: mxs: Get rid of external API call
+ - xfs: truncate transaction does not modify the inobt
+ - e2fs: fix the race between cachefiles_bury_object() and rmdir(2)
+ - drm/edid: VSDB yCBCr420 Deep Color mode bit definitions
+ - drm: fb-helper: Reject all pixel format changing requests
+ - cdc-acm: do not reset notification buffer index upon urb unlinking
+ - cdc-acm: correct counting of UART states in serial state notification
+ - cdc-acm: fix race between reset and control messaging
+ - USB: fix the usbfs flag sanitzation for control transfers
+ - Input: elan_i2c - add ACPI ID for Lenovo IdeaPad 330-15IGM
+ - sched/fair: Fix throttle_list starvation with low CFS quota
+ - x86/tsc: Force inlining of cyc2ns bits
+ - x86, hibernate: Fix nosave_regions setup for hibernation
+ - x86/percpu: Fix this_cpu_read()
+ - x86/time: Correct the attribute on jiffies' definition
+ - x86/fpu: Fix i486 + no387 boot crash by only saving FPU registers on context
+ - switch if there is an FPU
+ - clk: sunxi-ng: sun4i: Set VCO and PLL bias current to lowest setting
+ - drm/sun4i: Fix an ulong overflow in the dotclock driver
+ - x86/swiotlb: Enable swiotlb for > 4GiG RAM on 32-bit kernels
+ - Colour banding in HP Pavilion 15-n233sl integrated display (LP: #1794387) //
+ - drm/edid: Add 6 bpc quirk for BOE panel in HP Pavilion 15-n233sl
+ * Bionic update: upstream stable patchset 2019-07-12 (LP: #1836426)
+ - drm/amd/pp: initialize result to before or'ing in data
+ - drm/amdgpu: add another ATPX quirk for TOPAZ
+ - tools/power turbostat: fix possible sprintf buffer overflow
+ - mac80211: Run TXQ teardown code before de-registering interfaces
+ - mac80211_hwsim: require at least one channel
+ - btrfs: btrfs_shrink_device should call commit transaction at the end
+ - scsi: csiostor: add a check for NULL pointer after kmalloc()
+ - mac80211: correct use of IEEE80211_VHT_CAP_RXSTBC_X
+ - mac80211_hwsim: correct use of IEEE80211_VHT_CAP_RXSTBC_X
+ - gpu: adp5588: Fix sleep-in-atomic-context bug
+ - mac80211: mesh: fix HWMP sequence numbering to follow standard
+ - mac80211: avoid kernel panic when building AMSDU from non-linear SKB
+ - gpiolib: acpi: Switch to cnsleep version of GPIO library call
+ - gpiolib-acpi: Register GpioInt ACPI event handlers from a late_initcall
+ - cfg80211: n80211_update_ft_ies() to validate NL80211_ATTR_IE
+ - mac80211: do not convert to A-MSDU if frag/subframe limited
+ - mac80211: always account for A-MSDU header changes
+ - tools/kvm_stat: fix handling of invalid paths in debugfs provider
+ - gpio: Fix crash due to registration race
+ - ARC: atomic: unbork atomic_fetch_##op()
+ - md/raid5-cache: disable reshape completely
+ - RAID10 BUG_ON in raise_barrier when force is true and conf->barrier is 0
+ - i2c: uniphier: issue STOP only for last message or I2C_M_STOP
+ - i2c: uniphier-f: issue STOP only for last message or I2C_M_STOP
+ - net: cadence: Fix a sleep-in-atomic-context bug in mach_halt_tx()
+ - fs/cifs: don't translate SFM_SLASH (U+F026) to backslash
+ - mac80211: fix an off-by-one issue in A-MSDU max_subframe computation
+ - cfg80211: fix a type issue in ieee80211_chandef_to_operating_class()
+ - mac80211: fix a race between restart and CSA flows
+ - mac80211: Fix station bandwidth setting after channel switch
+ - mac80211: don't Tx a deauth frame if the AP forbade Tx
+ - mac80211: shorten the IBSS debug messages
+ - tools/vm/slabinfo.c: fix sign-compare warning
+ - tools/vm/page-types.c: fix "defined but not used" warning
+ - mm: madvise(MADV_DODUMP): allow hugetlbfs pages
+ - netfilter: xt_cluster: add dependency on conntrack module
+ - HID: add support for Apple Magic Keyboards
+ - usb: gadget: fotg210-udc: Fix memory leak of fotg210->ep[i]
+ - HID: hid-saitek: Add device ID for RAT 7 Contagion
+ - scsi: qedi: Add the CRC size within iSCSI NVM image
+ - perf evsel: Fix potential null pointer dereference in perf_evsel__new_idx()
+ - perf util: Fix bad memory access in trace info.
+ - perf probe powerpc: Ignore SyS symbols irrespective of endianness
+ - netfilter: nf_tables: release chain in flushing set
+ - Revert "iio: temperature: maxim_thermocouple: add MAX31856 part"
+ - RDMA/ucma: check fd type in ucma_migrate_id()
- HID: sensor-hub: Restore fixup for Lenovo ThinkPad Helix 2 sensor hub report
- USB: yurex: Check for truncation in yurex_read()
- nvme-rdma: fix possible bogus dereference under heavy load
- net/mlx5: Consider PCI domain in search for next dev
- drm/nouveau/TBDdevinit: don't fail when PMU/PRE_OS is missing from VBIOS
- drm/nouveaudisp: fix DP disable race
- dm raid: fix rebuild of specific devices by updating superblock
- fs/cifs: suppress a string overflow warning
- perf/x86/intel: Add support/quirk for the MISPREDICT bit on Knights Landing CPUs
- dm thin metadata: try to avoid ever aborting transactions
- arch/hexagon: fix kernel/dma.c build warning
- hexagon: modify ffs() and fls() to return int
- arm64: jump_label.h: use asm_volatile_goto macro instead of "asm goto"
- drm/amdgpu: fix error handling in amdgpu_cs_user_fence_chunk
- r8169: Clear RTL_FLAG_TASK_*_PENDING when clearing RTL_FLAG_TASK_ENABLED
- s390/qeth: don't dump past end of unknown HW header
- cifs: read overflow in is_valid_oplock_break()
- xen/manager: don't complain about an empty value in control/sysrq node
- xen: avoid crash in disable_hotplug_cfu
- xen: fix GCC warning and remove duplicate EVTCHN_ROW/EVTCHN_COL usage
- ovl: fix access beyond unterminated strings
- ovl: fix memory leak on unlink of indexed file
- ovl: fix format of setxattr debug
- sysfs: Do not return POSIX ACL xattrs via listxattr
- smb2: fix missing files in root share directory listing
- iommu/amd: Clear memory encryption mask from physical address
- crypto: qat - Fix KASAN stack-out-of-bounds bug in adf_probe()
- crypto: mxs-dep - Fix wait logic on chan threads
- crypto: caam/jr - fix ablkcipher edesc pointer arithmetic
- gpiolib: Free the last requested descriptor
- Drivers: hv: vmbus: Use get/put_cpu() in vmbus_connect()
- tools: hv: fcopy: set 'error' in case an unknown operation was requested
- ofcs2: fix locking for res->tracking and dlm->tracking_list
- ixgbe: check return value of napi_complete_done()
- dm thin metadata: fix __udivdi3 undefined on 32-bit
- Btrfs: fix unexpected failure of nocow buffered writes after snapshotting when low on space
- scsi:aacraid: fix a signedness bug
- tipc: switch to rhashtable iterator
- net: mvpp2: initialize port of_node pointer
- tc-testing: add test-cases for numeric and invalid control action
- tools/kvm_stat: fix updates for dead guests
- ibmvnic: Include missing return code checks in reset function
- net/ibm/emac: wrong emac_calc_base call was used by typo
- ceph: avoid a use-after-free in ceph_destroy_options()
- afs: Fix cell specification to permit an empty address list
- netfilter: xt_checksum: ignore gso skbs
+ - HID: intel-ish-hid: Enable Sunrise Point-H-ish driver
+ - iio: imu: st_lsm6dxs: take into account ts samples in wm configuration
+ - riscv: Do not overwrite initrd_start and initrd_end
+ - drm/nouveau: fix oops in client init failure path
+ - drm/nouveau/mmu: don't attempt to dereference vmm without valid instance
+ - pointer
+ - drm/nouveau/disp/gm200-: enforce identity-mapped SOR assignment for LVDS/eDP
+ - panels
+ - sched/topology: Set correct NUMA topology type
+ - drm/amdgpu: Fix SDMA hang in prt mode v2
+ - asm-generic: io: Fix ioport_map() for !CONFIG_GENERIC_IOMAP &&
+ CONFIG INDIRECT PIO
+ - x86/APM: Fix build warning when PROC_FS is not enabled
+ - new primitive: discard_new_inode()
+ - ovl: set I_CREATING on inode being created
+ - crypto: chelsio - Fix memory corruption in DMA Mapped buffers.
+ - perf/core: Add sanity check to deal with pinned event failure
+ - mm: migration: fix migration of huge PMD shared pages
+ - mm, thp: fix mlocking THP page with migration enabled
+ - mm/vmstat.c: skip NR_TLB_REMOTE_FLUSH* properly
+ - KVM: x86: fix L1TF's MMIO GFN calculation
+ - blk-mq: I/O and timer unplugs are inverted in blktrace
+ - clocks source/drivers/timer-atmel-pit: Properly handle error cases
+ - fdev omapfb: fix omapfb_memory_read info leak
+ - drm/amdgpu: Fix vce work queue was not cancelled when suspend
+ - x86/vdso: Fix asm constraints on vDSO syscall fallbacks
+ - selftests/x86: Add clock_gettime() tests to test_vdso
+ - x86/vdso: Only enable vDSO retpolines when enabled and supported
+ - x86/vdso: Fix vDSO syscall fallback asm constraint regression
+ - mac80211: fix setting IEEE80211_KEY_FLAG_RX_MGMT for AP mode keys
+ - PM/core: Clear the direct_complete flag on errors
+ - dm cache metadata: ignore hints array being too small during resize
+ - dm cache: fix resize crash if user doesn't reload cache table
+ - xhci: Add missing CAS workaround for Intel Sunrise Point xHCI
+ - usb: xhci-mtk: resume USB3 roothub first
+ - USB: serial: simple: add Motorola Tetra MTP6550 id
+ - usb: cdc_acm: Do not leak URB buffers
+ - of: unittest: Disable interrupt node tests for old world MAC systems
+ - perf annotate: Use asprintf when formatting objdump command line
+ - perf tools: Fix python extension build for gcc 8
+ - ath10k: fix use-after-free in ath10k_wmi_cmd_send_nowait
+ - ath10k: fix kernel panic issue during pci probe
+ - nvme_fc: fix ctrl create failures racing with workq items
+ - powerpc/lib: fix book3s/32 boot failure due to code patching
+ - ARC: clone syscall to setp r25 as thread pointer
+ - perf utils: Move is_directory() to path.h
+ - f2fs: fix invalid memory access
+ - ucma: fix a use-after-free in ucma_resolve_ip()
- ubifs: Check for name being NULL while mounting
- rds: rds_ib_recv_alloc_cache() should call alloc_percpu_gfp() instead
- ath10k: fix scan crash due to incorrect length calculation
- pstore/ram: Fix failure-path memory leak in ramoops_init
- mac80211: allocate TXQs for active monitor interfaces
- drm: fix use-after-free read in drm_mode_create_lease_ioctl()
- USB: serial: option: improve Quectel EP06 detection
- USB: serial: option: add two-endpoints device-id flag
- tipc: call start and done ops directly in __tipc_nl_compat_dumpit()
- bnxt_en: Fix TX timeout during netpoll.
- bnxt_en: free hwrm resources, if driver probe fails.
- bonding: avoid possible deadlock
- ip6_tunnel: be careful when accessing the inner header
- ip_tunnel: be careful when accessing the inner header
- ipv4: fix use-after-free in ip_cmsg_recv_dstaddr()
- ipv6: take rcu lock in rawv6_send_hdrinc()
- net: dsa: bcm_sf2: Call setup during switch resume
- net: hns: fix for unmapping problem when SMMU is on
- net: ipv4: update fnhe_pmtu when first hop's MTU changes
- net/ipv6: Display all addresses in output of /proc/net/if_inet6
- netlabel: check for IPV4MASK in addrinfo_get
- net: mvpp2: Extract the correct ethtype from the skb for tx csum offload
- net: mvpp2: fix a txq_done race condition
- net: sched: Add policy validation for tc attributes
- net: systemport: Fix wake-up interrupt race during resume
- net/usb: cancel pending work when unbinding smisc75xx
- qmi_wwan: Added support for Gemalto's Cinterion ALASxx WWAN interface
- rtnl: limit IFLA_NUM_TX_QUEUES and IFLA_NUM_RX_QUEUES to 4096
- scpf: update dst pmtu with the correct daddr
- team: Forbid enslaving team device to itself
- tipc: fix flow control accounting for implicit connect
- udp: Unbreak modules that rely on external __skb_recv_udp() availability
- net: stmmac: Fixup the tail addr setting in xmit path
- net/packet: fix packet drop as of virtio gso
- net: dsa: bcm_sf2: Fix unbind ordering
- net/mlx5e: Set vlan masks for all offloaded TC rules
- net: aquantia: memory corruption on jumbo frames
- net/mlx5: E-Switch, Fix out of bound access when setting vport rate
- bonding: pass link-local packets to bonding master also.
- bonding: fix warning message
- nfp: avoid soft lockups under control message storm
- bnxt_en: don't try to offload VLAN 'modify' action
- net-ethtool: ETHTOOL GUFO did not and should not require CAP_NET_ADMIN
- tcp/dccp: fix lockdep issue when SYN is backlogged
- inet: make sure to grab rcu_read_lock before using ireq->ireq_opt
- ASoC: rt5514: Fix the issue of the delay volume applied again
- ASoC: wm8804: Add ACPI support
- ASoC: sigmadsp: safeload should not have lower byte limit
- selftests/efivarfs: add required kernel configs
- selftests: memory-hotplug: add required configs
- ASoC: rsnd: adg: care clock-frequency size
- ASoC: rsnd: don't fallback to PIO mode when -EPROBE_DEFER
- Bluetooth: hci_ldisc: Free rw_semaphore on close
- mfd: omap-usb-host: Fix dts probe of children
- scsi: iscsi: target: Don't use stack buffer for scatterlist
- sound: enable interrupt after dma buffer initialization
- sound: don't call skl_init_chip() to reset intel skl soc
- stmmac: fix valid numbers of unicast filter entries
- net: macb: disable scatter-gather for macb on sama5d3
- ARM: dts: at91: add new compatibility string for macb on sama5d3
- PCI: hv: support reporting serial number as slot information
- clk: x86: add "ether_clk" alias for Bay Trail / Cherry Trail
- clk: x86: Stop marking clocks as CLK_IS_CRITICAL
- x86/kvm/lapic: always disable MMIO interface in x2APIC mode
- drm/amdgpu: Fix SDMA HQD destroy error on gfx_v7
- mm/vmstat.c: fix outdated vmstat_text
- MIPS: VDSO: Always map near top of user memory
- mach64: detect the dot clock divider correctly on sparc
- percpu: stop leaking bitmap metadata blocks
- perf script python: Fix export-to-postgresql.py occasional failure
- perf script python: Fix export-to-sqlite.py sample columns
- s390/cio: Fix how vfio-ccw checks pinned pages
- dm cache: destroy migration_cache if cache target registration failed
- dm: fix report zone remapping to account for partition offset
- dm linear: eliminate linear_end_io call if CONFIG_DM_ZONED disabled
- dm linear: fix linear_end_io conditional definition
- cgroup: Fix dom_cgrp propagation when enabling threaded mode
- mm: block: avoid multiblock reads for the last sector in SPI mode
- pinctrl: mcp23s08: fix irq and irqchip setup order
- perf64: perf: Reject stand-alone CHAIN events for PMUv3
- mm/thp: fix call to mmu_notifier in set_pmd_migration_entry() v2
- mm: Preserve _PAGE_DEVMAP across mprotect() calls
- i2c: i2c-smbus: fix for i2c_smbus_write_block_data
- xhci: Don't print a warning when setting link state for disabled ports
- mm: introduce NR INDIRECTLY_RECLAIMABLE_BYTES
- mm: treat indirectly reclaimable memory as available in MemAvailable
- dcache: account external names as indirectly reclaimable memory
- mm: treat indirectly reclaimable memory as free in overcommit logic
- mm: don't show nr_indirectly_reclaimable in /proc/vmstat
- ARM: add more CPU part numbers for Cortex and Brahma B15 CPUs
- ARM: bugs: prepare processor bug infrastructure
- ARM: bugs: hook processor bug checking into SMP and suspend paths
- ARM: bugs: add support for per-processor bug checking
- [Config] updateconfigs for CPU_SPECTRE
- ARM: spectre: add Kconfig symbol for CPUs vulnerable to Spectre
+ - ARM: spectre-v2: harden branch predictor on context switches
+ - ARM: spectre-v2: add Cortex A8 and A15 validation of the IBE bit
+ - ARM: spectre-v2: harden user aborts in kernel space
+ - ARM: spectre-v2: add firmware based hardening
+ - ARM: spectre-v2: warn about incorrect context switching functions
+ - ARM: KVM: invalidate BTB on guest exit for Cortex-A12/A17
+ - ARM: KVM: invalidate icache on guest exit for Cortex-A15
+ - ARM: spectre-v2: KVM: invalidate icache on guest exit for Brahma B15
+ - ARM: KVM: Add SMCCC_ARCH_WORKAROUND_1 fast handling
+ - ARM: KVM: report support for SMCCC_ARCH_WORKAROUND_1
+ - ARM: spectre-v1: add speculation barrier (csdb) macros
+ - ARM: spectre-v1: add array_index_mask_nospec() implementation
+ - ARM: spectre-v1: fix syscall entry
+ - ARM: signal: copy registers using __copy_from_user()
+ - ARM: vfp: use __copy_from_user() when restoring VFP state
+ - ARM: oabi-compat: copy semops using __copy_from_user()
+ - ARM: use __inttype() in get_user()
+ - ARM: spectre-v1: use get_user() for __get_user()
+ - ARM: spectre-v1: mitigate user accesses
+ - perf tools: Fix snprintf warnings for gcc 8
+ - net: sched: cls_u32: fix hnode refcounting
+ - net: qualcomm: rmnet: Skip processing loopback packets
+ - net: qualcomm: rmnet: Fix incorrect allocation flag in transmit
+ - tun: remove unused parameters
+ - tun: initialize napi_mutex unconditionally
+ - tun: napi flags belong to tfile
+ - net: dsa: b53: Keep CPU port as tagged in all VLANs
+ - rtnetlink: Fail dump if target netnsid is invalid
+ - net: ipv4: don't let PMTU updates increase route MTU
+ - ASoC: dapm: Fix NULL pointer deference on CODEC to CODEC DAIs
+ - selftests: android: move config up a level
+ - selftests: add headers_install to lib.mk
+ - Bluetooth: SMP: Fix trying to use non-existent local OOB data
+ - Bluetooth: Use correct tfm to generate OOB data
+ - net: ethernet: ti: add missing GENERIC_ALLOCATOR dependency
+ - afs: Fix afs_server struct leak
+ - afs: Fix clearance of reply
+ * Volume control not working Dell XPS 27 (7760) (LP: #1775068) // Bionic
  + update: upstream stable patchset 2019-07-12 (LP: #1836426)
  + ALSA: hda/realtek - Cannot adjust speaker's volume on Dell XPS 27 7760
  + * Bionic update: upstream stable patchset 2019-07-11 (LP: #1836287)
  + - perf tools: Fix undefined symbol scnprintf in libperf-jvmti.so
  + - gso_segment: Reset skb->mac_len after modifying network header
  + - ipv6: fix possible use-after-free in ip6_xmit()
  + - net/appletalk: fix minor pointer leak to userspace in SIOCFINDIPDPRT
  + - net: hp100: fix always-true check for link up state
+ - pppoe: fix reception of frames with no mac header
+ - qmi_wwan: set DTR for modems in forced USB2 mode
+ - udp4: fix IP_CMSG_CHECKSUM for connected sockets
+ - neighbour: confirm neigh entries when ARP packet is received
+ - udp6: add missing checks on edumux packet processing
+ - net/sched: act_sample: fix NULL dereference in the data path
+ - tls: fix the number of pipes
+ - ASoC: cs4265: fix MMTLR Data switch control
+ - ASoC: rsnd: fixup not to call clk_get/set under non-atomic
+ - ALSA: bebob: fix memory leak for M-Audio FW1814 and ProjectMix I/O at error path
+ - ALSA: bebob: use address returned by kmalloc() instead of kernel stack for streaming DMA mapping
+ - ALSA: emu10k1: fix possible info leak to userspace on SNDRV_EMU10K1_IOCTL_INFO
+ - ALSA: fireface: fix memory leak in ff400_switch_fetching_mode()
+ - ALSA: firewire-digi00x: fix memory leak of private data
+ - ALSA: firewire-tascam: fix memory leak of private data
+ - ALSA: firewalls: fix memory leak of response buffer at error path
+ - ALSA: oxfw: fix memory leak for model-dependent data at error path
+ - ALSA: oxfw: fix memory leak of discovered stream formats at error path
+ - ALSA: oxfw: fix memory leak of private data
+ - platform/x86: alienware-wmi: Correct a memory leak
+ - xen/netfront: don't bug in case of too many frags
+ - xen/x86/vpmu: Zero struct pt_regs before calling into sample handling code
+ - spi: fix IDR collision on systems with both fixed and dynamic SPI bus numbers
+ - ring-buffer: Allow for rescheduling when removing pages
+ - mm: shmem.c: Correctly annotate new inodes for lockdep
+ - scsi: target: iscsi: Use bin2hex instead of a re-implementation
+ - ocfs2: fix ocfs2 read block panic
+ - drm/nouveau: Fix deadlocks in nouveau_connector_detect()
+ - drm/nouveau/drm/nouveau: Don’t forget to cancel hpd_work on suspend/unload
+ - drm/nouveau/drm/nouveau: Fix bogus drm_kms_helper_poll_enable() placement
+ - drm/nouveau/drm/nouveau: Use pm_runtime_get_noresume() in connectorDetect()
+ - drm/nouveau/drm/nouveau: Prevent handling ACPI HPD events too early
+ - drm/vc4: Fix the "no scaling" case on multi-planar YUV formats
+ - drm: udl: Destroy framebuffer only if it was initialized
+ - drm/amdgpu: add new polaris pci id
+ - ext4: check to make sure the rename(2)'s destination is not freed
+ - ext4: avoid divide by zero fault when deleting corrupted inline directories
+ - ext4: avoid arithmetic overflow that can trigger a BUG
+ - ext4: re-calculate superblock checksum after updating free blocks/inodes
+ - ext4: fix online resize's handling of a too-small final block group
+ ext4: fix online resizing for bigalloc file systems with a 1k block size
+ ext4: don't mark mmp buffer head dirty
+ ext4: show test_dummy_encryption mount option in /proc-mounts
+ sched/fair: Fix vruntime_normalized() for remote non-migration wakeup
+ PCI: aardvark: Size bridges before resources allocation
+ vmw_balloon: include asm/io.h
+ iw_cxgb4: only allow 1 flush on user qps
+ tick/nohz: Prevent bogus softirq pending warning
+ sched/fair: Fix double IDR allocation with DT aliases
+ hv_netvsc: fix schedule in RCU context
+ bnxt_en: Fix VF mac address regression.
+ net: rtnl_configure_link: fix dev flags changes arg to __dev_notify_flags
+ mtd: rawndand: denali: fix a race condition when DMA is kicked
+ platform/x86: dell-smbios-wmi: Correct a memory leak
+ fork: report pid exhaustion correctly
+ mm: disabled deferred struct page for 32-bit arches
+ libata: mask swap internal and hardware tag
+ drm/i915/bdw: Increase IPS disable timeout to 100ms
+ drm/nouveau: Reset MST branching unit before enabling
+ drm/nouveau: Only write DP_MSTM_CTRL when needed
+ drm/nouveau: Remove duplicate poll_enable() in pmops_runtime_suspend()
+ ext4, dax: set ext4_dax_aops for dax files
+ crypto: skcipher - Fix -Wstringop-truncation warnings
+ iio: adc: ina2xx: avoid kthread_stop() with stale task_struct
+ ts12550: fix lux1_input error in low light
+ vpci: type promotion bug in qp_host_get_user_memory()
+ x86/numa_emulation: Fix emulated-to-physical node mapping
+ staging: rt5208: fix missing error check on call to rtsx_write_register
+ power: supply: axp288_charger: Fix initial constant_charge_current value
+ misc: sram: enable clock before registering regions
+ serial: sh-sci: Stop RX FIFO timer during port shutdown
+ uwb: hwa-rc: fix memory leak at probe
+ power: vexpress: fix corruption in notifier registration
+ iommu/amd: make sure TLB to be flushed before IOVA freed
+ Bluetooth: Add a new Realtek 8723DE ID 0bda:b009
+ USB: serial: kobil_sct: fix modem-status error handling
+ 6lowpan: iphc: reset mac_header after decompress to fix panic
+ iommu/msm: Don't call iommu_device_[.un]link from atomic context
+ s390/mm: correct allocate_pgste proc_handler callback
+ power: remove possible deadlock when unregistering power_supply
+ md-cluster: clear another node's suspend_area after the copy is finished
+ RDMA/bnxt_re: Fix a couple off by one bugs
+ RDMA/i40w: Hold read semaphore while looking after VMA
+ IB/core: type promotion bug in rdma_rw_init_one_mr()
+ media: exynos4-is: Prevent NULL pointer dereference in __isp_video_try_fmt()
+ IB/mlx4: Test port number before querying type.
+ powerpc/kdump: Handle crashkernel memory reservation failure
+ media: fsl-viu: fix error handling in viu_of_probe()
+ - media: staging/imx: fill vb2_v4l2_buffer field entry
+ - x86/tsc: Add missing header to tsc_msr.c
+ - ARM: hwmod: RTC: Don't assume lock/unlock will be called with irq enabled
+ - x86/entry/64: Add two more instruction suffixes
+ - ARM: dts: ls1021a: Add missing cooling device properties for CPUs
+ - scsi: target/iscsi: Make iscsit_ta_authentication() respect the output buffer size
+ - scsi: klist: Make it safe to use klists in atomic context
+ - scsi: ibmvscsi: Improve strings handling
+ - scsi: target: Avoid that EXTENDED COPY commands trigger lock inversion
+ - usb: wusbcore: security: cast sizeof to int for comparison
+ - ath10k: sdio: use same endpoint id for all packets in a bundle
+ - ath10k: sdio: set skb len for all rx packets
+ - powerpc/powernv/ioda2: Reduce upper limit for DMA window size
+ - s390/sysinfo: add missing #ifdef CONFIG_PROC_FS
+ - alermtimer: Prevent overflow for relative nanosleep
+ - s390/dasd: correct numa_node in dasd_alloc_queue
+ - s390/scm_blk: correct numa_node in scm_blk_dev_setup
+ - s390/extmem: fix gcc 8 stringop-overflow warning
+ - mtd: raw NAND: atmel: add module param to avoid using dma
+ - iio: accel: adxl345: convert address field usage in iio_chan_spec
+ - posix-timers: Make forward callback return s64
+ - ALSA: snd-aoa: add of_node_put() in error path
+ - media: s3c-camif: ignore -ENOIOCTLCMD from v4l2_subdev_call for s_power
+ - media: soc_camera: ov772x: correct setting of banding filter
+ - media: omap3isp: zero-initialize the isp cam_xclk{a,b} initial data
+ - staging: android: ashmem: Fix mmap size validation
+ - drivers/tty: add error handling for pcmcia_loop_config
+ - media: tm6000: add error handling for dvb_register_adapter
+ - net: phy: xgmiitorgmii: Check read_status results
+ - ath10k: protect ath10k_htt rx_ring_free with rx_ring.lock
+ - net: phy: xgmiitorgmii: Check phy_driver ready before accessing
+ - drm/sun4i: Fix releasing node when enumerating endpoints
+ - ath10k: transmit queued frames after processing rx packets
+ - rndis_wlan: potential buffer overflow in rndis_wlan_auth_indication()
+ - brcmsmac: fix wrap around in conversion from constant to s16
+ - ARM: mvebu: declare asm symbols as character arrays in pmsu.c
+ - arm: dts: mediatek: Add missing cooling device properties for CPUs
+ - HID: hid-ntrig: add error handling for sysfs_create_group
+ - MIPS: boot: fix build rule of vmlinux.its.S
+ - perf/x86/intel/lbr: Fix incomplete LBR call stack
+ - scsi: bnx2i: add error handling for ioremap_nocache
+ - iomap: complete partial direct I/O writes synchronously
+ - scsi: megaraid_sas: Update controller info during resume
+ - EDAC, i7core: Fix memleaks and use-after-free on probe and remove
+ - ASoC: dapm: Fix potential DAI widget pointer deref when linking DAIs
+ - module: exclude SHN_UNDEF symbols from kallsyms api
+ - gpio: Fix wrong rounding in gpio-menz127
+ - nfsd: fix corrupted reply to badly ordered compound
+ - EDAC: Fix memleak in module init error path
+ - fs/lock: skip lock owner pid translation in case we are in init_pid_ns
+ - Input: xen-kbdfrontend - fix multi-touch XenStore node's locations
+ - iio: 104-quad-8: Fix off-by-one error in register selection
+ - ARM: dts: dra7: fix DCAN node addresses
+ - x86/mm: Expand static page table for fixmap space
+ - tty: serial: lpuart: avoid leaking struct tty_struct
+ - serial: cpm_uart: return immediately from console poll
+ - intel_th: Fix device removal logic
+ - spi: tegra20-slink: explicitly enable/disable clock
+ - spi: sh-msiof: Fix invalid SPI use during system suspend
+ - spi: rspi: Fix handling of write value for SISTR register
+ - spi: rspi: Fix invalid SPI use during system suspend
+ - regulator: fix crash caused by null driver data
+ - USB: fix error handling in usb_driver_claim_interface()
+ - USB: handle NULL config in usb_find_alt_setting()
+ - usb: musb: dsps: do not disable CPPI41 irq in driver teardown
+ - slub: make ->cpu_partial unsigned int
+ - USB: usbdevfs: sanitize flags more
+ - USB: usbdevfs: restore warning for nonsensical flags
+ - USB: remove LPM management from usb_driver_claim_interface()
+ - IB/srp: Avoid that sg_reset -d $srp_device triggers an infinite loop
+ - IB/hfi1: Fix SL array bounds check
+ - IB/hfi1: Invalid user input can result in crash
+ - RDMA/uverbs: Atomically flush and mark closed the comp event queue
+ - ovl: hash non-dir by lower inode for fsnotify
+ - drm/i915: Remove vma from object on destroy, not close
+ - serial: imx: restore handshaking irq for imx1
+ - qed: Wait for ready indication before rereading the shmem
+ - qed: Wait for MCP halt and resume commands to take place
+ - qed: Prevent a possible deadlock during driver load and unload
+ - qed: Avoid sending mailbox commands when MFW is not responsive
+ - thermal: of-thermal: disable passive polling when thermal zone is disabled
+ -isosfs: reject hardware sector size > 2048 bytes
+ - tls: possible hang when do_tcp_sendpages hits sndbuf is full case
+ - bpf: sockmap: write_space events need to be passed to TCP handler
+ - net: hns: fix length and page_offset overflow when CONFIG_ARM64_64K_PAGES
+ - e1000: check on netif_running() before calling e1000_up()
+ - e1000: ensure to free old tx/rx rings in set_ringparam()
+ - crypto: cavium/nitrox - fix for command corruption in queue full case with
  -tls: possible hang when do_tcp_sendpages hits sndbuf is full case
+ - hwmon: (ina2xx) fix sysfs shunt resistor read access
+ - hwmon: (adt7475) Make adt7475_read_word() return errors
+ - Revert "ARM: dts: imx7d: Invert legacy PCI irq mapping"
+ - drm/amdgpu: Enable/disable gfx PG feature in rlc safe mode

Open Source Used In 5GasS Edge AC-4 19310
+ - drm/amdgpu: Update power state at the end of smu hw_init.
+ - ata: fttde010: Add a quirk for SQ201
+ - nvme-fcloop: Fix dropped LS's to removed target port
+ - ARM: dts: omap4-droid4: Fix emmc errors seen on some devices
+ - arm/arm64: smccc-1.1: Make return values unsigned long
+ - arm/arm64: smccc-1.1: Handle function result as parameters
+ - i2c: i801: Allow ACPI AML access I/O ports not reserved for SMBus
+ - x86/pti: Fix section mismatch warning/error
+ - media: v4l: event: Prevent freeing event subscriptions while accessed
+ - drm/amd/display/dc/dce: Fix multiple potential integer overflows
+ - drm/amd/display: fix use of uninitialized memory
+ - RDMA/bnx: Fix a bunch of off by one bugs in qplib_fp.c
+ - vhost_net: Avoid tx vring kicks during busyloop
+ - thermal: i.MX: Allow thermal probe to fail gracefully in case of bad calibration.
+ - platform/x86: asus-wireless: Fix uninitialized symbol usage
+ - ACPI / button: increment wakeup count only when notified
+ - media: ov772x: add checks for register read errors
+ - media: ov772x: allow i2c controllers without I2C_FUNC_PROTOCOL_MANGLING
+ - drm/omap: gem: Fix mm_list locking
+ - ASoC: rsnd: SSI parent cares SWSP bit
+ - staging: pi433: fix race condition in pi433_ioctl
+ - perf tests: Fix indexing when invoking subtests
+ - gpio: tegra: Fix tegra_gpio_irq_set_type()
+ - block: fix deadlock elevator drain for zoned block devices
+ - serial: mvebu-uart: Fix reporting of effective CSIZE to userspace
+ - intel_th: Fix resource handling for ACPI glue layer
+ - ext2, dax: set ext2_dax_aops for dax files
+ - IB/hfi1: Fix destroy_qp hang after a link down
+ - ARM: OMAP2+: Fix null hwmod for ti-sysc debug
+ - ARM: OMAP2+: Fix module address for modules using mpu_rt_idx
+ - bus: ti-sysc: Fix module register ioremap for larger offsets
+ - drm/amdgpu: fix preamble handling
+ - amdgpu: fix multi-process hang issue
+ - tcp_bbr: add bbr_check_probe_rtt_done() helper
+ - tcp_bbr: in restart from idle, see if we should exit PROBE_RTT
+ - net: hns3: fix page_offset overflow when CONFIG_ARM64_64K_PAGES
+ - ixgbe: fix driver behaviour after issuing VFLR
+ - powerpc/pseries: Fix uninitialized timer reset on migration
+
* Kernel 4.15.0-50 or newer wont boot as Xen-DomU with PVH (LP: #1829378)
+ - SAUCE: ACPI / bus: Fix NULL pointer dereference in ACPI_quirk_matches_bios_ids()
+
* CVE-2019-10126
+ - mwifie: Fix heap overflow in mwifie_uap_parse_tail_ies()
+
* CVE-2019-3846
+ * mwifiex: Fix possible buffer overflows at parsing bss descriptor
+ * CVE-2019-12818
+ - net: nfc: Fix NULL dereference on nfc llcp build tlv fails
+ * CVE-2019-12984
+ - nfc: Ensure presence of required attributes in the deactivate_target handler
+ * Bionic update: upstream stable patchset 2019-07-10 (LP: #1836117)
+ - i2c: xici: Make the start and the byte count write atomic
+ - i2c: i801: fix DNV's SMBCTRL register offset
+ - scsi: lpfc: Correct MDS diag and nvmet configuration
+ - nbd: don't allow invalid blocksize settings
+ - block: bfq: swap puts in bfqg_and_blkq_put
+ - android: binder: fix the race mmap and alloc_new_buffered
+ - MIPS: VDSO: Match data page cache colouring when D5 aliases
+ - SMB3: Backup intent flag missing for directory opens with backupuid mounts
+ - smb3: check for and properly advertise directory lease support
+ - Btrfs: fix data corruption when deduplicating between different files
+ - KVM: s390: vsie: copy wrapping keys to right place
+ - KVM: VMX: Do not allow reexecute_instruction() when skipping MMIO instr
+ - ALSA: hda - Fix cancel_work sync() stall from jackpoll work
+ - cpu/hotplug: Adjust misplaced smb() in cpuph_thread_fun()
+ - cpu/hotplug: Prevent state corruption on error rollback
+ - x86/microcode: Make sure boot_cpu_data.microcode is up-to-date
+ - x86/microcode: Update the new microcode revision unconditionally
+ - crypto: aes-generic - fix aes-generic regression on powerpc
+ - tpm: separate cmd_ready/go_idle from runtime_pm
+ - ARC: [plat-axs*]: Enable SWAP
+ - misc: mic: SCIF Fix scif_get_new_port() error handling
+ - ethtool: Remove trailing semicolon for static inline
+ - i2c: aspeed: Add an explicit type casting for *get_clk_reg_val
+ - Bluetooth: h5: Fix missing dependency on BT_HCIUART_SERDEV
+ - gpio: tegra: Move driver registration to subsys_init level
+ - selftests/bpf: fix a typo in map in map test
+ - media: davinci: vpif_display: Mix memory leak on probe error path
+ - media: dw2102: Fix memleak on sequence of probes
+ - net: phy: Fix the register offsets in Broadcom iProc mdio mux driver
+ - blk-mq: fix updating tags depth
+ - scsi: target: fix __transport_register_session locking
+ - md/raid5: fix data corruption of replacements after originals dropped
+ - timers: Clear timer_base::must_forward_clk with timer_base::lock held
+ - media: camss: csid: Configure data type and decode format properly
+ - gpu: ipu-v3: default to id 0 on missing OF alias
+ - misc: ti-st: Fix memory leak in the error path of probe()
+ - uio: potential double frees if __uio_register_device() fails
+ - firmware: vpd: Fix section enabled flag on vpd_section_destroy
+ - Drivers: hv: vmbus: Cleanup sync memory free path
- tty: rocket: Fix possible buffer overwrite on register_PCI
- f2fs: fix to active page in lru list for read path
- f2fs: do not set free of current section
- f2fs: fix defined but not used build warnings
- perf tools: Allow overriding MAX_NR_CPUS at compile time
- NFSv4.0 fix client reference leak in callback
- perf c2c report: Fix crash for empty browser
- perf evlist: Fix error out while applying initial delay and LBR
- macintosh/via-pmu: Add missing mmio accessors
- ath9k: report tx status on EOSP
- ath9k_hw: fix channel maximum power level test
- ath10k: prevent active scans on potential unusable channels
- wcdev: Set rx_status boottime_ns field on rx
- MIPS: Fix ISA virt/bus conversion for non-zero PHYS_OFFSET
- scsi: 3ware: fix return 0 on the error path of probe
- tools/testing/nvdimm: kaddr and pfnum can be NULL to ->direct_access()
- ath10k: disable bundle mgmt tx completion event support
- Bluetooth: hidp: Fix handling of strncpy for hid->name information
- gpio: ml-iod: Fix buffer underline on probe error path
- pinctrl/amd: only handle irq if it is pending and unmasked
- net: mvneta: fix mtu change on port without link
- f2fs: try grabbing node page lock aggressively in sync scenario
- f2fs: fix to skip GC if type in SSA and SIT is inconsistent
- perf tools: Pass the SPI IRQ down to the driver
- f2fs: fix to do sanity check with reserved blkaddr of inline inode
- MIPS: Octeon: add missing of_node_put()
- MIPS: generic: fix missing of_node_put()
- net: dcb: For wild-card lookups, use priority -1, not 0
- dm cache: only allow a single io_mode cache feature to be requested
- Input: single_t9_ts - only use first T9 instance
- media: s5p-mfc: Fix buffer look up in s5p_mfc_handle_frame_{new, copy_time} functions
- media: helene: fix xtal frequency setting at power on
- f2fs: fix to wait on page writeback before updating page
- f2fs: Fix uninitialized return in f2fs_ioctl_shutdown()
- iommu/ipmmu-vmsa: Fix allocation in atomic context
- md: ti_am335x_tscadc: Fix struct clk memory leak
- f2fs: fix to do sanity check with {sit,nat}_ver_bitmap_bytesize
- NFSv4.1: Fix a potential layoutget/layoutrecall deadlock
- MIPS: WARN_ON invalid DMA cache maintenance, not BUG_ON
- RDMA/cma: Do not ignore net namespace for unbound cm_id
- inet: frags: change inet_frags_init_net() return value
- inet: frags: add a pointer to struct nets_frags
- inet: frags: refactor ipfrag_init()
- inet: frags: refactor ipv6_frag_init()
- inet: frags: refactor lowpan_net_frag_init()
- ipv6: export ip6 fragments sysctl to unprivileged users
- rhashtable: add schedule points
- inet: frags: use rhashtables for reassembly units
- inet: frags: remove some helpers
- inet: frags: get rif of inet_frag_evicting()
- inet: frags: remove inet_frag_maybe_warn_overflow()
- inet: frags: break the 2GB limit for frags storage
- inet: frags: do not clone skb in ip_expire()
- ipv6: frags: rewrite ip6_expire_frag_queue()
- rhashtable: reorganize struct rhashtable layout
- inet: frags: reorganize struct netns_frags
- inet: frags: get rid of ipfrag_skb_cb/FRAG_CB
- inet: frags: fix ip6frag_low_thresh boundary
- ip: discard IPv4 datagrams with overlapping segments.
- net: modify skb_rbtree_purge to return the truesize of all purged skbs.
- ipv6: defrag: drop non-last frags smaller than min mtu
- net: pskb_trim_rcsum() and CHECKSUM_COMPLETE are friends
- mtd: ubi: wl: Fix error return code in ubi_wl_init()
- tun: fix use after free for ptr_ring
- tunutil: fix use after free during release
- autofs: fix autofs_sbi() does not check super block type
- KVM: PPC: Book3S HV: Use correct pagesize in kvm_unmap_radix()
- ARC: [plat-axs*/plat-hsdk]: Allow U-Boot to pass MAC-address to the kernel
- x86/apic/vector: Make error return value negative
- tc-testing: flush gact actions on test teardown
- pinctrl: berlin: fix `pctrl->functions` allocation in
  berlin_pinctrl_build_state
- powerpc4xx: Fix error return path in ppc4xx_msi_probe()
- scsi: qla2xxx: Fix unintended Logout
- iwlwifi: pcie: don't access periphery registers when not available
- f2fs: Keep alloc_valid_block_count in sync
- f2fs: issue discard align to section in LFS mode
- device-dax: avoid hang on error before devm_memremap_pages()
- regulator: tsps65217: Fix NULL pointer dereference on probe
- gpio: px: disable pinctrl calls for PXA3xx
- thermal_hwmon: Sanitize attribute name passed to hwmon
- f2fs: fix to do sanity check with extra_attr feature
- RDMA/hns: Add illegal hop_num judgement
- RDMA/hns: Update the data type of immediate data
- be2net: Fix memory leak in be_cmd_get_profile_config()
- net/mlx5: Fix use-after-free in self-healing flow
- net: qca_spi: Fix race condition in spi transfers
- rds: fix two RCU related problems
- net/mlx5: Check for error in mlx5_attach_interface
- net/mlx5: Fix debugfs cleanup in the device init/remove flow
- net/mlx5: E-Switch, Fix memory leak when creating switchdev mode FDB tables
- net/tls: Set count of SG entries if sk_alloc_sg returns -ENOSPC
- erspan: fix error handling for erspan tunnel
+ - erspan: return PACKET_REJECT when the appropriate tunnel is not found
+ - tcp: really ignore MSG_ZEROCOPY if no SO_ZEROCOPY
+ - usb: dwc3: change stream event enable bit back to 13
+ - iommu/io-ptable-arm-v7s: Abort allocation when table address overflows the
  PTE
+ - ALSA: msnd: Fix the default sample sizes
+ - ALSA: usb-audio: Fix multiple definitions in AU0828_DEVICE() macro
+ - xfrm: fix 'passing zero to ERR_PTR()' warning
+ - amd-xgbe: use dma_mapping_error to check map errors
+ - gfs2: Special-case rindex for gfs2_grow
+ - clk: imx6ul: fix missing of_node_put()
+ - clk: core: Potentially free connection id
+ - clk: clk-fixed-factor: Clear OF_POPULATED flag in case of failure
+ - kbuild: add .DELETE_ON_ERROR special target
+ - media: tw686x: Fix oops on buffer alloc failure
+ - dmaengine: pl330: fix irq race with terminate_all
+ - MIPS: ath79: fix system restart
+ - media: videobuf2-core: check for q->error in vb2_core_qbuf()
+ - IB/rxe: Drop QP0 silently
+ - block: allow max_discard_segments to be stacked
+ - IB/ipoib: Fix error return code in ipoib_dev_init()
+ - mtd/maps: fix solutionengine.c printk format warnings
+ - media: ov5645: Supported external clock is 24MHz
+ - perf test: Fix subtest number when showing results
+ - gfs2: Don't reject a supposedly full bitmap if we have blocks reserved
+ - perf tools: Synthesize GROUP_DESC feature in pipe mode
+ - fbdev: omapfb: off by one in omapfb_register_client()
+ - perf tools: Fix struct comm_str removal crash
+ - video: goldfishfb: fix memory leak on driver remove
+ - fbdev/via: fix defined but not used warning
+ - perf powerpc: Fix callchain ip filtering when return address is in a
  register
+ - video: fbdev: pxafb: clear allocated memory for video modes
+ - fbdev: Distinguish between interlaced and progressive modes
+ - ARM: exynos: Clear global variable on init error path
+ - perf powerpc: Fix callchain ip filtering
+ - nvme-rdma: unquiesce queues when deleting the controller
+ - powerpc/powernv: opal_put_chars partial write fix
+ - staging: bcm2835-camera: fix timeout handling in wait_for_completion_timeout
+ - staging: bcm2835-camera: handle wait_for_completion_timeout return properly
+ - ASoC: rt5514: Fix the issue of the delay volume applied
+ - MIPS: jz4740: Bump zload address
+ - mac80211: restrict delayed tailroom needed decrement
+ - Smack: Fix handling of IPv4 traffic received by PF_INET6 sockets
+ - wan/sat_iuc IntelliJ: use JS_ERR_VALUE() to check return value of qe_muram_alloc
+ - reset: imx7: Fix always writing bits as 0
+ - npf: avoid buffer leak when FW communication fails
+ - xen-netfront: fix queue name setting
+ - arm64: dts: qcom: db410c: Fix Bluetooth LED trigger
+ - ARM: dts: qcom: msm8974-hammerhead: increase load on l20 for sdhci
+ - s390/qeth: fix race in used-buffer accounting
+ - s390/qeth: reset layer2 attribute on layer switch
+ - platform/x86: toshiba_acpi: Fix defined but not used build warnings
+ - KVM: arm/arm64: Fix vgic init race
+ - drivers/base: stop new probing during shutdown
+ - i2c: aspeed: Fix initial values of master and slave state
+ - dmaengine: nv_xor_v2: kill the tasklets upon exit
+ - crypto: sharah - Unregister correct algorithms for SAHARA 3
+ - xen-netfront: fix warn message as irq device name has ’/’
+ - RDMA/cma: Protect cma dev list with lock
+ - pstore: Fix incorrect persistent ram buffer mapping
+ - xen/netfront: fix waiting for xenbus state change
+ - IB/ipoid: Avoid a race condition between start_xmit and cm_rep_handler
+ - mmc: omap_hsmmc: fix wakeirq handling on removal
+ - ipmi: Fix I2C client removal in the SSIF driver
+ - Tools: hv: Fix a bug in the key delete code
+ - xhci: Fix use after free for UR asyn cancellation on a reallocated endpoint
+ - usb: Don’t die twice if PCI xhci host is not responding in resume
+ - mei: ignore not found client in the enumeration
+ - mei: bus: need to unlink client before freeing
+ - USB: Add quirk to support DJI CineSSD
+ - usb: uas: add support for more quirk flags
+ - usb: Avoid use-after-free by flushing endpoints early in usb_set_interface()
+ - usb: host: u132-hcd: Fix a sleep-in-atomic-context bug in u132_get_frame()
+ - USB: add quirk for WORLDE Controller KS49 or Prodipe MIDI 49C USB controller
+ - usb: gadget: udc: renesas_usb3: fix maxpacket size of ep0
+ - USB: net2280: Fix erroneous synchronization change
+ - USB: serial: io_ti: fix array underflow in completion handler
+ - usb: misc: uss720: Fix two sleep-in-atomic-context bugs
+ - USB: serial: ti_usb_3410_5052: fix array underflow in completion handler
+ - USB: yurex: Fix buffer over-read in yurex_write()
+ - Revert “cdc-acm: implement put_char() and flush_chars()”
+ - cifs: prevent integer overflow in nxt_dir_entry()
+ - CIFS: fix wrapping bugs in num_entries()
+ - xtensa: ISS: don’t allocate memory in platform_setup
+ - perf/core: Force USER_DS when recording user stack data
+ - NFSv4.1 fix infinite loop on I/O.
+ - binfmt_elf: Respect error return from `regset->active'
+ - net/mlx5: Add missing SET_DRIVER_VERSION command translation
+ - arm64: dts: uniphi:er: Add missing cooling device properties for CPUs
+ - audit: fix use-after-free in audit_add_watch
+ - mtdchar: fix overflows in adjustment of `count'
+ - Bluetooth: Use lock_sock_nested in bt_accept_enqueue
+ - evm: Don’t deadlock if a crypto algorithm is unavailable
+ - KVM: PPC: Book3S HV: Add of_node_put() in success path
+ - security: check for kstrdup() failure in lsm_append()
+ - MIPS: loongson64: cs5536: Fix PCI_OHCI_INT_REG reads
+ - configs: fix registered group removal
+ - pinctrl: rza1: Fix selector use for groups and functions
+ - sched/core: Use smp_mb() in wake_woken_function()
+ - efi/esrt: Only call efi_mem_reserve() for boot services memory
+ - ARM: hisi: handle of_iomap and fix missing of_node_put
+ - ARM: hisi: fix error handling and missing of_node_put
+ - ARM: hisi: check of_iomap and fix missing of_node_put
+ - liquidio: fix hang when re-binding VF host drv after running DPDK VF driver
+ - gpu: ipu-v3: csi: pass back mbus_code_to_bus_cfg error codes
+ - tty: fix termios input-speed encoding when using OTHER
+ - tty: fix termios input-speed encoding
+ - mmc: sdhci-of-esdhc: set proper dma mask for ls104x chips
+ - mmc: tegra: prevent HS200 on Tegra 3
+ - mmc: sdhci: do not try to use 3.3V signaling if not supported
+ - drm/nouveaux: Fix runtime PM leak in drm_open()
+ - drm/nouveaux/debugfs: Wake up GPU before doing any reclocking
+ - drm/nouveaux: tegra: Detach from ARM DMA/IOMMU mapping
+ - parport: sunbpp: fix error return code
+ - sched/fair: Fix util_avg of new tasks for asymmetric systems
+ - coresight: Handle errors in finding input/output ports
+ - coresight: tpiu: Fix disabling timeouts
+ - coresight: ETM: Add support for Arm Cortex-A73 and Cortex-A35
+ - staging: bcm2835-audio: Don't leak workqueue if open fails
+ - gpio: pxa: Fix potential NULL dereference
+ - gpilolib: Mark gpio_suffixes array with __maybe_unused
+ - mfd: 88pm860x-i2c: switch to i2c_lock_bus(..., I2C_LOCK_SEGMENT)
+ - input: rohm_bb21023: switch to i2c_lock_bus(..., I2C_LOCK_SEGMENT)
+ - drm/amdkfd: Fix error codes in kfd_get_process
+ - rtc: bq4802: add error handling for devm_ioremap
+ - ALSA: pcm: Fix snd_interval_refine first/last with open min/max
+ - scsi: libfc: fixup 'sleeping function called from invalid context'
+ - drm/panel: type promotion bug in s6e8aa0_read_mtp_id()
+ - blk-mq: only attempt to merge bio if there is rq in sw queue
+ - blk-mq: avoid to synchronize rcu inside blk_cleanup_queue()
+ - pinctrl: msm: Fix msm_config_group_get() to be compliant
+ - pinctrl: qcom: spmi-gpio: Fix pmic_gpio_config_get() to be compliant
+ - clk: tegra: bpmp: Don't crash when a clock fails to register
+ - mei: bus: type promotion bug in mei_nfc_if_version()
+ - earlycon: Initialize port->uartclk based on clock-frequency property
+ - earlycon: Remove hardcoded port->uartclk initialization in of_setup_earlycon
+ - net/ipv6: prevent use after free in ip6_route_mpath_notify
+ - Partial revert "e1000e: Avoid receiver overrun interrupt bursts"
+ - e1000e: Fix queue interrupt re-raising in Other interrupt
+ - e1000e: Avoid missed interrupts following ICR read
+ - Revert "e1000e: Separate signaling for link check/link up"
+ - e1000e: Fix link check race condition
+ - e1000e: Fix check_for_link return value with autoneg off

Open Source Used In 5GaaS Edge AC-4  19317
+ tipc: orphan sock in tipc_release()
+ net/mlx5: Fix not releasing read lock when adding flow rules
+ iommu/arm-smmu-v3: sync the OVACKFLG to PRIQ consumer register
+ iwlwifi: cancel the injective function between hw pointers to tfd entry
+ index
+ kbuild: do not update config when running install targets
+ omapfb: rename omap2 module to omap2fb.ko
+ [Config] Rename omapfb to omap2fb
+ perf script: Show correct offsets for DWARF-based unwinding
+ iommu/ipmmu-vmsa: IMUCTRN.TTSEL needs a special usage on R-Car Gen3
+ ipmi: Move BT capabilities detection to the detect call
+ ovf: fix oopses in ovf_fill_super() failure paths
+ usb: xhci: fix interrupt transfer error happened on MTK platforms
+ usb: mtu3: fix error of xhci port id when enable U3 dual role
+ dm verity: fix crash on buffio buffer that was allocated with vmalloc
+ cifs: integer overflow in in SMB2_ioctl()
+ perf tools: Fix maps__find_symbol_by_name()
+ NFSv4: Fix a tracepoint Oops in initiate_file_draining()
+ of: add helper to lookup compatible child node
+ mmc: meson-mx-sdio: fix OF child-node lookup
+ bpf: fix rcu annotations in compute_effective_progs()
+ spi: dw: fix possible race condition
+ PM / devfreq: use put_device() instead of kfree()
+ ASoC: hdmi-codec: fix routing
+ drm/amd/display: support access ddc for mst branch
+ rcutorture: Use monotonic timestamp for stall detection
+ selftests: vDSO - fix to return KSFT_SKIP when test couldn't be run
+ selftests/android: initialize heap_type to avoid compiling warning
+ scsi: lpfc: Fix NVME Target crash in defer rcv logic
+ scsi: lpfc: Fix panic if driver unloaded when port is offline
+ arm64: perf: Disable PMU while processing counter overflows
+ staging: fsl-dpaa2/eth: Fix DMA mapping direction
+ block/DAC960.c: fix defined but not used build warnings
+ IB/mlx5: fix uaccess beyond "count" in debugfs read/write handlers
+ Bionic update: upstream stable patchset 2019-07-09 (LP: #1835972)
+ vt6: fix PMTU caching and reporting on xmit
+ xfrm: fix missing dst_release() after policy blocking lbcast and multicast
+ xfrm: free skb if nlsk pointer is NULL
+ esp6: fix memleak on error path in esp6_input
+ mac80211: add stations tied to AP_VLANs during reconfig
+ ext4: clear mmp sequence number when remounting read-only
+ n80211: Add a missing break in parse_station_flags
+ drm/bridge: adv7511: Reset registers on hotplug
+ scsi: target: iscsi: cxgbit: fix max iso npdu calculation
+ scsi: libiscsi: fix possible NULL pointer dereference in case of TMF
+ drm/imx: imx-ldb: disable LDB on driver bind
+ drm/imx: imx-ldb: check if channel is enabled before printing warning
+ - nbd: don't requeue the same request twice.
+ - nbd: handle unexpected replies better
+ - usb: gadget: r8a66597: Fix two possible sleep-in-atomic-context bugs in
  + init_controller()
+ - usb: gadget: r8a66597: Fix a possible sleep-in-atomic-context bugs in
  + r8a66597_queue()
+ - usb: gadget: f_uac2: fix error handling in afunc_bind (again)
+ - usb: gadget: u_audio: fix pcm/card naming in g_audio_setup()
+ - usb: gadget: u_audio: update hw_ptr in iso_complete after data copied
+ - usb: gadget: u_audio: remove caching of stream_buffer parameters
+ - usb: gadget: u_audio: remove cached period bytes value
+ - usb: gadget: u_audio: protect stream runtime fields with stream spinlock
+ - usb/phy: fix PPC64 build errors in phy-fsl-usb.c
+ - tools: usb: ffs-test: Fix build on big endian systems
+ - usb: gadget: f_uac2: fix endianness of 'struct ctrl_*_lay3'
+ - netfilter: nft_set_hash: add rcu_barrier() in the nft_rhash_destroy()
+ - bpf, ppc64: fix unexpected r0=0 exit path inside bpf_xadd
+ - netfilter: nf_tables: fix memory leaks on chain rename
+ - netfilter: nf_tables: don't allow to rename to already-pending name
+ - KVM: vnx: use local variable for current_vm.ptr when emulating VMPTST
+ - tools/power turbostat: fix -S on UP systems
+ - net: caif: Add a missing rcu_read_unlock() in caif_flow_cb
+ - qed: Fix link flap issue due to mismatching EEE capabilities.
+ - qed: Fix possible race for the link state value.
+ - qed: Correct Multicast API to reflect existence of 256 approximate buckets.
+ - at11c: reserve min skb headroom
+ - net: prevent ISA drivers from building on PPC32
+ - can: mpc5xxx_can: check of_iomap return before use
+ - can: m_can: Move accessing of message ram to after clocks are enabled
+ - i2c: davinci: Avoid zero value of CLKH
+ - perf/x86/amd/ibs: Don't access non-started event
+ - media: staging: omap4iss: Include asm/cacheflush.h after generic includes
+ - bnx2x: Fix invalid memory access in rss hash config path.
+ - net: axienet: Fix double deregister of mdio
+ - locking/rtmutex: Allow specifying a subclass for nested locking
+ - i2c/mux, locking/core: Annotate the nested rt_mutex usage
+ - sched/rt: Restore rt_runtime after disabling RT_RUNTIME_SHARE
+ - x86/boot: Fix if_changed build flip/flop bug
+ - selftests/ftrace: Add snapshot and tracing_on test case
+ - ipc/sem.c: prevent queue.status tearing in semop
+ - zswap: re-check zswap_is_full() after do zswap_shrink()
+ - tools/power turbostat: Read extended processor family from CPUID
+ - ARC: dma [non-IOC] setup SMP_CACHE_BYTES and cache_line_size
+ - bpf: use GFP_ATOMIC instead of GFP_KERNEL in bpf_parse_prog()
+ - nfp: flower: fix port metadata conversion bug
+ - enic: handle mtu change for vf properly
+ - ARC: [plat-eznps] Add missing struct nps_host_reg_aux_dpc
+ - arc: [plat-eznps] fix data type errors in platform headers
+ - arc: [plat-zenia] fix printk warning in arc/plat-zenia/mtm.c
+ - arc: fix build errors in arc/include/asm/delay.h
+ - arc: fix type warnings in arc/mm/cache.c
+ - sparc/time: Add missing __init to init_tick_ops()
+ - sparc: use asm-generic version of msi.h
+ - enic: do not call enic_change_mtu in enic_probe
+ - mm: delete historical BUG on mem_cgroup_css_alloc() failure
+ - drivers: net: lmc: fix case value for target abort error
+ - memcg: remove memcg_cgroup::id from IDR on mem_cgroup_css_alloc() failure
+ - gpiolib-acpi: make sure we trigger edge events at least once on boot
+ - scsi: fcoe: fix use-after-free in fcoe_ctlr_els_send
+ - scsi: fcoe: drop frames in ELS LOGO error path
+ - scsi: vmw_pvscsi: Return DID_RESET for status SAM_STAT_COMMAND_TERMINATED
+ - cifs: memory.c: check return value of ioremap_prot
+ - mei: don't update offset in write
+ - cifs: add missing debug entries for kconfig options
+ - cifs: check kmalloc before use
+ - btrfs: enumerating snapshots was leaving part of the data off end
+ - btrfs: Do not send SMB3 SET_INFO if nothing changed
+ - btrfs: don't leak ret from do_chunk_alloc
+ - Btrfs: fix btrfs_write_inode vs delayed iput deadlock
+ - iommu/arm-smmu: Error out only if not enough context interrupts
+ - printk: Split the code for storing a message into the log buffer
+ - printk: Create helper function to queue deferred console handling
+ - printk/nmi: Prevent deadlock when accessing the main log buffer in NMI
+ - kprobes/arm64: Fix %p uses in error messages
+ - arm64: mm: check for upper PAGE_SHIFT bits in pfn_valid()
+ - arm64: dts: rockchip: corrected uart1 clock-names for rk3328
+ - KVM: arm/arm64: Skip updating PMD entry if no change
+ - KVM: arm/arm64: Skip updating PTE entry if no change
+ - stop_machine: Reflow cpu_stop_queue_two_works()
+ - ext4: check for NUL characters in extended attribute's name
+ - ext4: sysfs: print ext4_super_block fields as little-endian
+ - ext4: reset error code in ext4_find_entry in fallback
+ - platform/x86: ideapad-laptop: Apply no_hw_rfkill to Y20-15IKBM, too
+ - x86/vdso: Fix vDSO build if a retpoline is emitted
+ - x86/process: Re-export start_thread()
+ - x86/kvm/vmx: Remove duplicate l1d flush definitions
+ - fuse: Add missed unlock_page() to fuse_readpages_fill()
+ - udl-kms: change down_interruptible to down
+ - udl-kms: handle allocation failure
+ - udl-kms: fix crash due to uninitialized memory
+ - udl-kms: avoid division
+ - b43legacy/leds: Ensure NUL-termination of LED name string
+ - b43/leds: Ensure NUL-termination of LED name string
- ASoC: dpcm: don't merge format from invalid codec dai
- ASoC: zte: Fix incorrect PCM format bit usages
- ASoC: sirf: Fix potential NULL pointer dereference
- pinctrl: freescale: off by one in imx1_pinconf_group_dbg_show()
- x86/vdso: Fix ls1 operand order
- x86/irqflags: Mark native_restore_fl extern inline
- x86/entry/64: Wipe KASAN stack shadow before rewind_stack_do_exit()
- s390/mm: fix addressing exception after suspend/resume
- s390/numa: move initial setup of node_to_cpumask_map
- kprobes/arm: Fix %p uses in error messages
- kprobes: Make list and blacklist root user read only
- MIPS: Correct the 64-bit DSP accumulator register size
- MIPS: Always use -march=<arch>, not -<arch> shortcuts
- MIPS: Change definition of cpu_relax() for Loongson-3
- MIPS: lib: Provide MIPS64r6 __multi3() for GCC < 7
- tpm: Return the actual size when receiving an unsupported command
- scsi: mpt3sas: Fix _transport_smp_handler() error path
- scsi: sysfs: Introduce sysfs_{un,}break_active_protection()
- scsi: core: Avoid that SCSI device removal through sysfs triggers a deadlock
- clk: rockchip: fix clk_i2sout parent selection bits on rk3399
- PM / clk: signedness bug in of_pm_clk_add_clks()
- power: generic-adc-battery: fix out-of-bounds write when copying channel properties
- power: generic-adc-battery: check for duplicate properties copied from iio channels
- watchdog: Mark watchdog touch functions as notrace
- gcc-plugins: Add include required by GCC release 8
- gcc-plugins: Use dynamic initializers
- Btrfs: fix send failure when root has deleted files still open
- Btrfs: send, fix incorrect file layout after hole punching beyond eof
- hwmon: (k10temp) 27C Offset needed for Threadripper2
- KVM: arm/arm64: Fix potential loss of ptimer interrupts
- KVM: arm/arm64: Fix lost IRQs from emulated physcial timer when blocked
- perf kvm: Fix subcommands on s390
- ext4: use ext4_warning() for sb_getblk failure
- platform/x86: wmi: Do not mix pages and kmalloc
- KVM: x86: ensure all MSRs can always be KVM_GET/SET_MSR’d
- lib/vsprintf: Do not handle %pO[^F] as %px
- soc: qcom: rmtfs-mem: fix memleak in probe error paths
- kprobes: Show blacklist addresses as same as kallsyms does
- kprobes: Replace %p with other pointer types
- MIPS: memset.S: Fix byte_fixup for MIPSr6
- mtd: rawnand: qcom: wait for desc completion in all BAM channels
- net: 6lowpan: fix reserved space for single frames
- net: mac802154: tx: expand tailroom if necessary
- 9p/net: Fix zero-copy path in the 9p virtio transport
- spi: davinci: fix a NULL pointer dereference
- spi: pxa2xx: Add support for Intel Ice Lake
+ - spi: spi-fsl-dspi: Fix imprecise abort on VF500 during probe
+ - spi: cadence: Change usleep_range() to udelay(), for atomic context
+ - mmc: renesas_sdhi_internal_dmac: fix #define RST_RESERVED_BITS
+ - readahead: stricter check for bdi io_pages
+ - block: blk_init_allocated_queue() set q->fq as NULL in the fail case
+ - block: really disable runtime-pm for blk-mq
+ - drm/i915/userpr: reject zero user_size
+ - libertas: fix suspend and resume for SDIO connected cards
+ - media: Revert "[media] tvp5150: fix pad format frame height"
+ - mailbox: xgene-slimpro: Fix potential NULL pointer dereference
+ - Replace magic for trusting the secondary keyring with #define
+ - powerpc/fadump: handle crash memory ranges array index overflow
+ - powerpc/pseries: Fix endianness while restoring of r3 in MCE handler.
+ - PCI: Add wrappers for dev printk()
+ - cxl: Fix wrong comparison in cxl_adapter_context_get()
+ - ib_srpt: Fix a use-after-free in srpt_close_ch()
+ - RDMA/rxe: Set wqe->status correctly if an unexpected response is received
+ - 9p: fix multiple NULL-pointer dereferences
+ - fs/9p/xattr.c: catch the error of p9_client_clunk when setting xattr failed
+ - 9p/virtio: fix off-by-one error in sg list bounds check
+ - net/9p/client.c: version pointer uninitialized
+ - net/9p/trans_fd.c: fix race-condition by flushing workqueue before the
  kfree()
+ - dm integrity: change 'suspending' variable from bool to int
+ - dm thin: stop no_space_timeout worker when switching to write-mode
+ - dm cache metadata: save in-core policy_hint_size to on-disk superblock
+ - dm cache metadata: set dirty on all cache blocks after a crash
+ - dm crypt: don't decrease device limits
+ - uart: fix race between uart_put_char() and uart_shutdown()
+ - Drivers: hv: vmbus: Reset the channel callback in vmbus_onoffr_rescind()
+ - iio: sca3000: Fix missing return in switch
+ - iio: ad9523: Fix displayed phase
+ - iio: ad9523: Fix return value for ad952x_store()
+ - extcon: Release locking when sending the notification of connector state
+ - vmw_balloon: fix inflation of 64-bit GFNs
+ - vmw_balloon: do not use 2MB without batching
+ - vmw_balloon: VMCI_DOORBELL_SET does not check status
+ - vmw_balloon: fix VMCI use when balloon built into kernel
+ -rtc: omap: fix potential crash on power off
+ - tracing: Do not call start/stop() functions when tracing_on does not change
+ - tracing/blkttrace: Fix to allow setting same value
+ - printk/tracing: Do not trace printk_nmi_enter()
+ - livepatch: Validate module/old func name length
+ - uprobes: Use synchronize_rcu() not synchronize_sched()
+ - mfd: hi655x: Fix regmap area declared size for hi655x
+ - ovl: fix wrong use of impure dir cache in ovl_iterate()
+ - drivers/block/zram/zram_drv.c: fix bug storing backing_dev
+ - cpufreq: governor: Avoid accessing invalid governor_data
+ - PM / sleep: wakeup: Fix build error caused by missing SRCU support
+ - KVM: PPC: Book3S: Fix guest DMA when guest partially backed by THP pages
+ - xtensa: limit offsets in __loop_cache_{all,page}
+ - xtensa: increase ranges in ___invalidate_{i,d}cache_all
+ - block, bfq: return nbytes and not zero from struct cftype .write() method
+ - pfn/blocklayout: off by one in bl_map_stripe()
+ - NFSv4 client live hangs after live data migration recovery
+ - NFSv4: Fix locking in pnfs_generic_recover_commit_reqs
+ - NFSv4: Fix a sleep in atomic context in nfs4_callback_sequence()
+ - ARM: tegra: Fix Tegra30 Cardhu PCA954x reset
+ - iommu/vt-d: Add definitions for PFSID
+ - iommu/vt-d: Fix dev iotlb pfsid use
+ - sys: don't hold uts_sem while accessing userspace memory
+ - userns: move user access out of the mutex
+ - ubifs: Fix memory leak in lprobs self-check
+ - ubifs: Check data node size before truncate
+ - ubifs: Fix synced_i_size calculation for xattr inodes
+ - pwm: tiehrpwm: Don't use emulation mode bits to control PWM output
+ - pwm: tiehrpwm: Fix disabling of output of PWMs
+ - fb: fix lost console when the user unplugs a USB adapter
+ - udlfb: set optimal write delay
+ - libnvdimm: fix ars_status output length calculation
+ - bcache: release dc->writeback_lock properly in bch_writeback_thread()
+ - perf auxtrace: Fix queue resize
+ - crypto: caam - fix DMA mapping direction for RSA forms 2 & 3
+ - crypto: caam/jr - fix descriptor DMA unmapping
+ - crypto: caam/qi - fix error path in xts setkey
+ - arm64: mm: always enable CONFIG_HOLES_IN_ZONE
+ - mm: renesas_sdhi_internal_dmac: mask DMAC interrupts
+ - blkcg: Introduce blkg_root_lookup()
+ - powerpc64/trace: Include ftrace.h needed for enable/disable calls
+ - IB/mlx5: Fix leaking stack memory to userspace
+ - rtc: omap: fix resource leak in registration error path
+ - ACPI: AML Parser: skip opcodes that open a scope upon parse failure
+ - ALSA: ac97: fix device initialization in the compat layer
+ - ALSA: ac97: fix check of pm_runtime_get_sync failure
+ - ALSA: ac97: fix unbalanced pm_runtime_enable
+ - nfsd: fix leaked file lock with nfs exported overlayfs
+ - ubifs: Fix directory size calculation for symlinks
+ - mm, dev_pagemap: Do not clear ->mapping on final put
+ - act_ife: fix a potential use-after-free
+ - ipv4: tcp: send zero IPID for RST and ACK sent in SYN-RECV and TIME-WAIT state
+ - net: bcmgenet: use MAC link status for fixed phy
+ - net: macb: do not disable MDIO bus at open/close time
+ - qlge: Fix netdev features configuration.
+ - r8169: add support for NCube 8168 network card
+ - tcp: do not restart timewait timer on rst reception
+ - vt6: remove skb->ignore_df check from vt6_xmit()
+ - net/sched: act_pedit: fix dump of extended layered op
+ - tipc: fix a missing rhashtable_walk_exit()
+ - nfp: wait for posted reconfigs when disabling the device
+ - scpt: hold transport before accessing its asoc in scpt_transport_get_next
+ - mlxsw: spectrum_switchdev: Do not leak RIFs when removing bridge
+ - vhost: correctly check the iova range when waking virtqueue
+ - hv_netvsc: ignore devices that are not PCI
+ - act_ife: move tcfa_lock down to where necessary
+ - act_ife: fix a potential deadlock
+ - net: sched: action_ife: take reference to meta module
+ - cifs: check if SMB2 PDU size has been padded and suppress the warning
+ - hfsplus: don't return 0 when fill_super() failed
+ - hfs: prevent crash on exit from failed search
+ - sunrpc: Don't use stack buffer with scatterlist
+ - fork: don't copy inconsistent signal handler state to child
+ - reiserfs: change j_timestamp type to time64_t
+ - hfsplus: fix NULL dereference in hfsplus_lookup()
+ - fs/proc/kcore.c: use __pa_symbol() for KCORE_TEXT list entries
+ - fat: validate ->i_start before using
+ - scripts: modpost: check memory allocation results
+ - virtio: pci-legacy: Validate queue pf
+ - x86/mce: Add notifier_block forward declaration
+ - IB/hfi1: Invalid NUMA node information can cause a divide by zero
+ - pwm: meson: Fix mux clock names
+ - mm/fadvise.c: fix signed overflow UBSAN complaint
+ - fs/dcache.c: fix kmemcheck splat at take_dentry_name_snapshot()
+ - platform/x86: intel_punit_ipc: fix build errors
+ - netfilter: ip6t_rpfilter: set F_IFACE for linklocal addresses
+ - s390/kdump: Fix memleak in nt_vmcoreinfo
+ - ipvs: fix race between ip_vs_conn_new() and ip_vs_del_dest()
+ - mfd: sm501: Set coherent_dma_mask when creating subdevices
+ - platform/x86: asus-nb-wmi: Add keymap entry for lid flip action on UX360
+ - netfilter: fix memory leaks on netlink_dump_start error
+ - tcp, ulp: add alias for all ulp modules
+ - RDMA/hns: Fix usage of bitmap allocation functions return values
+ - net: hns3: Fix for command format parsing error in
+ - hclge_is_all_function_id_zero
+ - perf tools: Check for null when copying nsinfo.
+ - irqchip/bcm7038-11: Hide cpu offline callback when building for !SMP
+ - net/9p/trans_fd.c: fix race by holding the lock
+ - net/9p: fix error path of p9_virtio_probe
+ - powerpc/uaccess: Enable get_user(u64, *p) on 32-bit
+ - powerpc: Fix size calculation using resource_size()
+ - perf probe powerpc: Fix trace event post-processing
+ - block: bvec_nr_vecs() returns value for wrong slab
+ - s390/dasd: fix hanging offline processing due to canceled worker
+ - s390/dasd: fix panic for failed online processing
- ACPI / scan: Initialize status to ACPI_STA_DEFAULT
- scsi: aic94xx: fix an error code in aic94xx_init()
- NFSv4: Fix error handling in nfs4_sp4_select_mode()
- Input: do not use WARN() in input_alloc_absinfo()
- xen/balloon: fix balloon initialization for PVH Dom0
- PCI: mvebu: Fix I/O space end address calculation
- dm kcopyd: avoid softlockup in run_complete_job
- staging: comedi: ni_mio_common: fix subdevice flags for PFI subdevice
- ASoC: rt5677: Fix initialization of rt5677_of_match.data
- iommu/omap: Fix cache flushes on L2 table entries
- selftests/powerpc: Kill child processes on SIGINT
- RDS: IB: fix 'passing zero to ERR_PTR()' warning
- cfq: Suppress compiler warnings about comparisons
- smb3: fix reset of bytes read and written stats
- SMB3: Number of requests sent should be displayed for SMB3 not just CIFS
- powerpc/platforms/85xx: fix t1042rdb_diu.c build errors & warning
- powerpc/64s: Make rfi_flush_fallback a little more robust
- powerpc/pseries: Avoid using the size greater than RTAS_ERROR_LOG_MAX.
- clk: rockchip: Add pclk_rkpwm_pmu to PMU critical clocks in rk3399
- KVM: vmx: track host_state.loaded using a loaded_vmcs pointer
- kvm: nVMX: Fix fault vector for VMX operation at CPL > 0
- btrfs: Exit gracefully when chunk map cannot be inserted to the tree
- btrfs: replace: Reset on-disk dev stats value after replace
- btrfs: relocation: Only remove reloc rb_trees if reloc control has been initialized
- btrfs: Don't remove block group that still has pinned down bytes
- arm64: rockchip: Force CONFIG_PM on Rockchip systems
- ARM: rockchip: Force CONFIG_PM on Rockchip systems
- drm/i915/lpe: Mark LPE audio runtime pm as "no callbacks"
- drm/amdgpu: Fix RLC safe mode test in gfx_v9_0_enter_rlc_safe_mode
- drm/amd/pp/Polaris12: Fix a chunk of registers missed to program
- drm/amdgpu: update tmr mc address
- drm/amdgpu: add tmr mc address into amdgpu_firmware_info
- drm/amdgpu: add new firmware id for VCN
- drm/amdgpu: add VCN support in PSP driver
- drm/amdgpu: add VCN booting with firmware loaded by PSP
- debugobjects: Make stack check warning more informative
- mm: Fix devm_memremap_pages() collision handling
- HID: add quirk for another PIXART OEM mouse used by HP
- usb: dwc3: core: Fix ULPI PHYs and prevent phy_get/ulpi_init during suspend/resume
- x86/pae: use 64 bit atomic xchg function in native_ptep_get_and_clear
- x86/xen: don't write ptes directly in 32-bit PV guests
- drm/i915: Increase LSPCON timeout
- kbuild: make missing $DEPMOD a Warning instead of an Error
- kvm: x86: Set highest physical address bits in non-present/reserved SPTEs
- x86: kvm: avoid unused variable warning
- arm64: cpu_errata: include required headers
+ - ASoC: wm8994: Fix missing break in switch
+ - arm64: Fix mismatched cache line size detection
+ - arm64: Handle mismatched cache type
+ - tcp: fix the big/little endian issue in tipc_dest
+ - ip6_vti: fix a null pointer dereference when destroy vti6 tunnel
+ - workqueue: skip lockdep wq dependency in cancel_work_sync()
+ - workqueue: re-add lockdep dependencies for flushing
+ - apparmor: fix an error code in __aa_create_ns()
+ - tcp, ulp: fix leftover icsk_ulp_ops preventing sock from reattach
+ - netfilter: x_tables: do not fail xt_alloc_table_info too easily
+ - ACPICA: ACPICA: add status check for acpi_hw_read before assigning return
+ - apparmor: return proper error code on fail
+ - RISC-V: Use KBUILD_CFLAGS instead of KCFLAGS when building the vDSO
+ - blk-mq: count the hctx as active before allocating tag
+ - selinux: cleanup dentry and inodes on error in selinuxfs
+ - drm/amd/display: Read back max backlight value at boot
+ - btrfs: check-integrity: Fix NULL pointer dereference for degraded mount
+ - btrfs: lift uuid_mutex to callers of btrfs_open_devices
+ - btrfs: Fix a C compliance issue
+ - drm/i915: Nuke the LVDS lid notifier
+ - drm/edid: Quirk Vive Pro VR headset non-desktop.
+ - drm/amd/display: fix type of variable
+ - drm/amd/display: Don't share clk source between DP and HDMI
+ - drm/amd/display: update clk for various HDMI color depths
+ - drm/amd/display: Use requested HDMI aspect ratio
+ - drm/rockchip: lvds: add missing of_node_put
+ - drm/amd/display: Pass connector id when executing VBIOS CT
+ - drm/amd/display: Check if clock source in use before disabling
+ - drm/amdgpu: fix incorrect use of fcheck
+ - drm/amdgpu: fix incorrect use of drm_file->pid
+ - drm/i915: set DP Main Stream Attribute for color range on DDI platforms
+ - x86/tsc: Prevent result truncation on 32bit
+ * [Regression] Colour banding appears on Lenovo B50-80 integrated display
  (LP: #1788308) // Bionic update: upstream stable patchset 2019-07-09
  (LP: #1835972)
+ - drm/edid: Add 6 bpc quirk for SDC panel in Lenovo B50-80
+ * CVE-2019-12819
  - mdio_bus: Fix use-after-free on device_register fails
+ * proc_thermal flooding dmesg (LP: #1824690)
  - drivers: thermal: processor_thermal: Downgrade error message
+ * Bionic update: upstream stable patchset 2019-07-08 (LP: #1835845)
  - bonding: avoid lockdep confusion in bond_get_stats()
- inet: frag: enforce memory limits earlier
- ipv4: frags: handle possible skb truesize change
- net: dsa: Do not suspend/resume closed slave_dev
- net: stmmac: Fix WoL for PCI-based setups
- rxrpc: Fix user call ID check in rxrpc_service_prealloc_one
- can: ems_usb: Fix memory leak on ems_usb_disconnect()
- virtio_balloon: fix another race between migration and ballooning
- x86/apic: Future-proof the TSC_DEADLINE quirk for SKX
- kvm: x86: vmx: fix vpid leak
- audit: fix potential null dereference 'context->module.name'
- userfaultfd: remove uffd flags from vma->vm_flags if UFFD_EVENT_FORK fails
- RDMA/uverbs: Expand primary and alt AV port checks
- crypto: padlock-aes - Fix Nano workaround data corruption
- drm/vc4: Reset ->{x, y}_scaling[1] when dealing with uniplanar formats
- scsi: sg: fix minor memory leak in error path
- net/mlx5e: E-Switch, Initialize eswitch only if eswitch manager
- net/mlx5e: Set port trust mode to PCP as default
- x86/efi: Access EFI MMIO data as unencrypted when SEV is active
- drm/atomic: Check old_plane_state->crtc in drm_atomic_helper_async_check()
- drm/atomic: Initialize variables in drm_atomic_helper_async_check() to make
  gcc happy
- scsi: qla2xxx: Fix uninitialized List head crash
- scsi: qla2xxx: Fix NPIV deletion by calling wait_for_sess_deletion
- scsi: qla2xxx: Fix ISP recovery on unload
- scsi: qla2xxx: Return error when TMF returns
- genirq: Make force irq threading setup more robust
- nohz: Fix local_timer_softirq_pending()
- nohz: Fix missing tick reprogram when interrupting an inline softirq
- ring_buffer: tracing: Inherit the tracing setting to next ring buffer
- i2c: imx: Fix reinit_completion() use
- Btrfs: fix file data corruption after cloning a range and fsync
- nvme-pci: allocate device queues storage space at probe
- nvme-pci: Fix queue double allocations
- xfs: catch inode allocation state mismatch corruption
- xfs: validate cached inodes are free when allocated
- perf/x86/intel/uncore: Fix hardcoded index of Broadwell extra PCI devices
- parisc: Enable CONFIG_MLONGCALLS by default
- parisc: Define mb() and add memory barriers to assembler unlock sequences
- kasan: add no_sanitize attribute for clang builds
- Mark HI and TASKLET softirq synchronous
- xen/netfront: don't cache skb_shinfo()
- scsi: sr: Avoid that opening a CD-ROM hangs with runtime power management
  enabled
- scsi: qla2xxx: Fix memory leak for allocating abort IOC
- init: rename and re-order boot_cpu_state_init()
- root dentries need RCU-delayed freeing
- make sure that __dentry_kill() always invalidates d_seq, unhashed or not
- fix mntput/mntput race
+ - fix __legitimize_mnt()/mntput() race
+ - mtd: nand: qcom: Add a NULL check for devm_kasprintf()
+ - phy: phy-mtk-tphy: use auto instead of force to bypass utmi signals
+ - ARM: dts: imx6sx: fix irq for pcie bridge
+ - kprobes/x86: Fix %p uses in error messages
+ - x86/irqflags: Provide a declaration for native_save_fl
+ - x86/apic: Ignore secondary threads if nosmt=force
+ - x86/mm/kmmio: Make the tracer robust against L1TF
+ - tools headers: Synchronise x86 cpufeatures.h for L1TF additions
+ - x86/microcode: Allow late microcode loading with SMT disabled
+ - x86/smp: fix non-SMP broken build due to redefinition of
  + apic_id_is_primary_thread
+ - cpu/hotplug: Non-SMP machines do not make use of booted_once
+ - sched/deadline: Update rq_clock of later_rq when pushing a task
+ - zram: remove BD_CAP_SYNCHRONOUS_IO with writeback feature
+ - x86/l1tf: Fix build error seen if CONFIG_KVM_INTEL is disabled
+ - x86: i8259: Add missing include file
+ - kbuild: verify that $DEPMOD is installed
+ - crypto: x86/sha256-mb - fix digest copy in sha256_mb_mgr_get_comp_job_avx2()
+ - crypto: vmac - require a block cipher with 128-bit block size
+ - crypto: vmac - separate tfm and request context
+ - crypto: blkcipher - fix crash flushing dcache in error path
+ - crypto: ablkcipher - fix crash flushing dcache in error path
+ - crypto: scipher - fix aligning block size in scipher_copy.iv()
+ - crypto: scipher - fix crash flushing dcache in error path
+ - x86/platform/UV: Mark memblock related init code and data correctly
+ - dcep: fix undefined behavior with 'cwnd' shift in ccid2_cwnd_restart()
+ - l2tp: use sk_dst_check() to avoid race on sk->sk_dst_cache
+ - llc: use refcount_inc_not_zero() for llc SAP find()
+ - vsock: split dwork to avoid reinitializations
+ - net_sched: Fix missing res info when create new tc_index filter
+ - vhost: reset metadata cache when initializing new IOTLB
+ - ip6_tunnel: use the right value for ipv4 min mtu check in ip6_tnl_xmit
+ - net: aquantia: Fix IFF_ALLMULTI flag functionality
+ - ALSA: hda - Sleep for 10ms after entering D3 on Conexant codecs
+ - ALSA: hda - Turn CX8200 into D3 as well upon reboot
+ - ALSA: vx222: Fix invalid endian conversions
+ - ALSA: virmidi: Fix too long output trigger loop
+ - ALSA: cs5535audio: Fix invalid endian conversion
+ - ALSA: hda: Correct Asrock B85M-ITX power_save blacklist entry
+ - ALSA: memalloc: Don't exceed over the requested size
+ - ALSA: vxpocket: Fix invalid endian conversions
+ - USB: serial: sierra: fix potential deadlock at close
+ - USB: serial: pl2303: add a new device id for ATEN
+ - ACPI / PM: save NVS memory for ASUS 1025C laptop
+ - tty: serial: 8250: Revert NXP SC16C2552 workaround
+ - serial: 8250_2x: Read INT0 from slave device, too
+ - serial: 8250_dw: always set baud rate in dw8250_set_termios
+ - serial: 8250_dw: Add ACPI support for uart on Broadcom SoC
+ - misc: sram: fix resource leaks in probe error path
+ - Bluetooth: avoid killing an already killed socket
+ - isdn: Disable IOCDBGVAR
+ - cls_matchall: fix tcf_unbind_filter missing
+ - mlxsw: core_acl_flex_actions: Return error for conflicting actions
+ - ip: vti: fix a null pointer deference when create vti fallback tunnel
+ - net: ethernet: mvneta: Fix napi structure mixup on armada 3700
+ - net: mvneta: fix mvneta_config_rss on armada 3700
+ - EDAC: Add missing MEM_LRDDR4 entry in edac_mem_types[]
+ - pty: fix O_CLOEXEC for TIOCGPTPEER
+ - arm: dts: armada: Fix "#cooling-cells" property's name
+ - vfio: ccw: fix error return in vfio_ccw_sch_event
+ - perf tools: Fix error index for pmu event parser
+ - Input: synaptics-rmi4 - fix axis-swap behavior
+ - IB/mlx4: Fix an error handling path in 'mlx4_ib_rereg_user_mr()'
+ - drm/bridge/sii8620: fix loops in EDID fetch logic
+ - drm/bridge/sii8620: fix potential buffer overflow
+ - ARC: Explicitly add -mmedium-calls to CFLAGS
+ - hwmon: (nct6775) Fix loop limit
+ - soc: inx: gpvc2: correct PGC offset
+ - usb: dwc3: pci: add support for Intel IceLake
+ - usb: dwc2: gadget: Fix issue in dwc2_gadget_start_isoc() 
+ - usb: dwc3: of-simple: fix use-after-free on remove
+ - ACPI / EC: Use ec_no_wakeup on Thinkpad X1 Carbon 6th
+ - netfilter: ipv6: nf_defrag: reduce struct net memory waste
+ - netfilter: nf_ctHelper: Fix possible panic after
+ - nf_conntrack_helper_unregister
+ - selftests: pstore: return Kselftest Skip code for skipped tests
+ - selftests: static_keys: return Kselftest Skip code for skipped tests
+ - selftests: sysctl: return Kselftest Skip code for skipped tests
+ - selftests: zram: return Kselftest Skip code for skipped tests
+ - selftests: vm: return Kselftest Skip code for skipped tests
+ - selftests: sync: add config fragment for testing sync framework
+ - ARM: dts: NSP: Fix i2c controller interrupt type
+ - ARM: dts: NSP: Fix PCIe controllers interrupt types
+ - ARM: dts: BCM5301x: Fix i2c controller interrupt type
+ - ARM: dts: Cygnus: Fix I2C controller interrupt type
+ - ARM: dts: Cygnus: Fix PCIe controller interrupt type
+ - arm64: dts: specify 1.8V EMMC capabilities for bcm958742k
+ - arm64: dts: specify 1.8V EMMC capabilities for bcm958742t
+ - arm64: dts: ns2: Fix I2C controller interrupt type
+ - arm64: dts: ns2: Fix PCIe controller interrupt type
+ - arm64: dts: Stingray: Fix I2C controller interrupt type
+ - drivers/perf: xgene_pmu: Fix IOB SLOW PMU parser error
+ - drm: mali-dp: Enable Global SE interrupts mask for DP500
+ - drm/arm/mladlp: Preserve LAYER_FORMAT contents when setting format
+ - IB/rxe: Fix missing completion for mem_reg work requests
+ - usb: dwc2: alloc dma aligned buffer for isoc split in
+ - usb: gadget: composite: fix delayed_status race condition when set_interface
+ - usb: gadget: dwc2: fix memory leak in gadget_init()
+ - dwc2: gadget: Fix ISOC IN DDMA PID bitfield value calculation
+ - xen: add error handling for xenbus_printf
+ - pNFS: Always free the session slot on error in
+ nfs4_layoutget_handle_exception
+ - scsi: xen-scsifront: add error handling for xenbus_printf
+ - scsi/scsiback: add error handling for xenbus_printf
+ - arm64: dma-mapping: clear buffers allocated with FORCE_CONTIGUOUS flag
+ - arm64: make secondary_start_kernel() notrace
+ - qed: Fix possible memory leak in Rx error path handling.
+ - qed: Add sanity check for SIMD fastpath handler.
+ - qed: Do not advertise DCBX_LLD_MANAGED capability.
+ - enic: initialize enic->rfs_h.lock in enic_probe
+ - net: hamradio: use eth_broadcast_addr
+ - net: propagate dev_get_valid_name return code
+ - net: stmmac: socfpga: add additional ocp reset line for Stratix10
+ - nvmem: reset keep alive timer in controller enable
+ - block: sed-opal: Fix a couple off by one bugs
+ - ARC: Enable machine_desc->init_per_cpu for !CONFIG_SMP
+ - nbd: Add the nbd NBD_DISCONNECT_ON_CLOSE config flag.
+ - net: davinci_emac: match the mdio device against its compatible if possible
+ - scctp: fix erroneous inc of snmp SctpFragUsrMsgs
+ - KVM: arm/arm64: Drop resource size check for GICV window
+ - drm/bridge/si8620: fix display of packed pixel modes in MHL2
+ - locking/lockdep: Do not record IRQ state within lockdep code
+ - selftests: bpf: notification about privilege required to run test_kmod.sh
+ - testing script
+ - mtd: dataflash: Use ULL suffix for 64-bit constants
+ - x86/microcode/intel: Fix memleak in save_microcode_patch()
+ - ipv6: mcast: fix unsolicited report interval after receiving queries
+ - Smack: Mark inode instant in smack_task_to_inode
+ - arm64: dts: msm8916: fix Coresight ETF graph connections
+ - batman-adv: Fix bat_ogm_iv best gw refcnt after netlink dump
+ - batman-adv: Fix bat_v best gw refcnt after netlink dump
+ - batman-adv: Avoid storing non-TT-sync flags on singular entries too
+ - batman-adv: Fix multicast TT issues with bogus ROAM flags
+ - cxgb4: when disabling dbw set txq dbw priority to 0
+ - iio: pressure: bmp280: fix relative humidity unit
+ - brcmfmac: stop watchdog before detach and free everything
+ - ARM: dts: am437x: make edt-ft5x06 a wakeup source
+ - ALSA: seq: Fix UBSAN warning at SNDRT_SEQ_IOCTL_QUERY_NEXT_CLIENT ioctl
+ - usb: xhci: remove the code build warning
+ - usb: xhci: increase CRS timeout value
+ - NFC: pn533: Fix wrong GFP flag usage
+ - typec: tcpm: Fix a msecs vs jiffies bug
+ - kconfig: fix line numbers for if-entries in menu tree
+ - perf record: Support s390 random socket_id assignment
+ - perf test session topology: Fix test on s390
+ - perf report powerpc: Fix crash if callchain is empty
+ - perf tools: Fix a clang 7.0 compilation error
+ - perf bench: Fix numa report output code
+ - ARM: davinci: board-da850-evm: fix WP pin polarity for MMC/SD
+ - netfilter: nf_log: fix uninit read in nf_log_proc_dostring
+ - net/mlx5: E-Switch, Disallow vlan/spoofcheck setup if not being esw manager
+ - nf: cast sizeoff() to int when comparing with error code
+ - selftests/x86/sigreturn/64: Fix spurious failures on AMD CPUs
+ - selftests/x86/sigreturn: Do minor cleanups
+ - ARM: dts: da850: Fix interrupts property for gpio
+ - ARM64: dts: meson-gxl: fix Mali GPU compatible string
+ - dmaengine: pl330: report BURST residue granularity
+ - dmaengine: k3dma: Off by one in k3_of_dma_simple_xlate()
+ - ath10k: update the phymode along with bandwidth change request
+ - md/raid10: fix that replacement cannot complete recovery after reassemble
+ - dev-dax: check_vma: ratelimit dev_info-s
+ - nl80211: relax ht operation checks for mesh
+ - nl80211: check nla_parse_nested() return values
+ - drm/exynos: gsc: Fix support for NV16/61, YUV420/YVU420 and YUV422 modes
+ - drm/exynos: decon5433: Fix per-plane global alpha for XRGB modes
+ - drm/exynos: decon5433: Fix WINCONx reset value
+ - drbd: Fix drbd_request_prepare() discard handling
+ - bpf, s390: fix potential memleak when later bpf_jit_prog fails
+ - PCI: xilinx: Add missing of_node_put()
+ - PCI: xilinx-nwl: Add missing of_node_put()
+ - PCI: faraday: Add missing of_node_put()
+ - bnx2x: Fix receiving tx-timeout in error or recovery state.
+ - fsl/fman: fix parser reporting bad checksum on short frames
+ - dpaa_eth: DPAA SGT needs to be 256B
+ - acpi/niit: fix cmd_rc for acpi_nfit_ctl to always return a value
+ - openisc: entry: Fix delay slot exception detection
+ - m68k: fix "bad page state" oops on ColdFire boot
+ - objtool: Support GCC 8 '-fnoreorder-functions'
+ - ipvlan: call dev_change_flags when ipvlan mode is reset
+ - drm/amdgpu: fix swapped emit_ib_size in vce3
+ - x86/mm/32: Initialize the CR4 shadow before __flush_tlb_all()
+ - HID: wacom: Correct touch maximum XY of 2nd-gen Intuos
+ - ARM: imx_v4_v5_defconfig: Select ULPI support
+ - bpf: hash map: decrement counter on error
+ - tracing: Use __printf markup to silence compiler
+ - kasan: fix shadow_size calculation error in kasan_module_alloc
+ - smsc75xx: Add workaround for gigabit link up hardware errata.
+ - drm/bridge/sii8620: Fix display of packed pixel modes
+ - samples/bpf: add missing <linux/if_vlan.h>
+ - samples/bpf: Check the result of system()
+ - samples/bpf: Check the error of write() and read()
+ - netfilter: x_tables: set module owner for icmp(6) matches
+ - ipv6: make ipv6_renew_options() interrupt/kernel safe
+ - net: qrtr: Broadcast messages only from control port
+ - sh_eth: fix invalid context bug while calling auto-negotiation by ethtool
+ - sh_eth: fix invalid context bug while changing link options by ethtool
+ - ravb: fix invalid context bug while calling auto-negotiation by ethtool
+ - ravb: fix invalid context bug while changing link options by ethtool
+ - ARM: pxa: irq: fix handling of ICMR registers in suspend/resume
+ - net/sched: act_tunnel_key: fix NULL dereference when 'goto chain' is used
+ - nvmem: Don't let a NULL cell_id for nvmem_cell_get() crash us
+ - ieee802154: at86rf230: switch from BUG_ON() to WARN_ON() on problem
+ - ieee802154: at86rf230: use __func__ macro for debug messages
+ - ieee802154: fakelb: switch from BUG_ON() to WARN_ON() on problem
+ - gpu: host1x: Check whether size of unpin isn't 0
+ - drm/tegra: Fix comparison operator for buffer size
+ - drm/armada: fix colorkey mode property
+ - drm/armada: fix irq handling
+ - netfilter: nft_comapt: explicitly reject ERROR and standard target
+ - netfilter: nf_conntrack: explicitly reject ERROR and standard target
+ - ARC: Improve cmpxchg syscall implementation
+ - bnx_t_en: Fix inconsistent BNXT_FLAG_AGG_RINGS logic.
+ - bnx_t_en: Always set output parameters in bnx_t_en_get_max_rings().
+ - bnx_t_en: Fix for system hang if request_irq fails
+ - scsi: qedf: Send the driver state to MFW
+ - scsi: qedf: Send the driver state to MFW
+ - perf llvm-utils: Remove bashism from kernel include fetch script
+ - perf tools: Fix compilation errors on gcc8
+ - perf script python: Fix dict reference counting
+ - nft: fix unchecked dereference in acpi_nft_ctl
+ - RDMA/mlx5: Fix memory leak in mlx5_ib_create_sq() error path
+ - ARM: 8780/1: ftrace: Only set kernel memory back to read-only after boot
+ - ARM: DRA7/OMAP5: Enable ACTLR[0] (Enable invalidates of BTB) for secondary cores
+ - ARM: dts: am3517.dtsi: Disable reference to OMAP3 OTG controller
+ - ixgbe: Be more careful when modifying MAC filters
+ - tools: build: Use HOSTLDFLAGS with fixdep
+ - kbuild: suppress warnings from 'getconf LFS_'
+ - packet: reset network header if packet shorter than ll reserved space
+ - qlogic: check kstrtroul() for errors
+ - tcp: remove DELAYED ACK events in DCTCP
+ - pinctrl: ingenic: Fix inverted direction for < IZ4770
+ - pinctrl: nsp: off by ones in nsp_pinnux_enable()
+ - pinctrl: nsp: Fix potential NULL dereference
+ - drm/nouveu/gem: off by one bugs in nouveau_gem_pushbuf_reloc_apply()
+ - net/ethernet/freescale/fman: fix cross-build error
+ - ibmvnic: Fix error recovery on login failure
+ btrfs: scrub: Don't use inode page cache in scrub_handle_errored_block()
+ octeon_mgmt: Fix MIX registers configuration on MTU setup
+ net: usb: rtl8150: demote allmulti message to dev_dbg()
+ PCI: OF: Fix I/O space page leak
+ PCI: versatile: Fix I/O space page leak
+ net: qca_spi: Avoid packet drop during initial sync
+ net: qca_spi: Make sure the QCA7000 reset is triggered
+ net: qca_spi: Fix log level if probe fails
+ tcp: identify cryptic messages as TCP seq # bugs
+ soc: imx: gpc: restrict register range for regmap access
+ ACPI / EC: Use ec_no_wakeup on more Thinkpad X1 Carbon 6th systems
+ ARM: dts: imx6: RDU2: fix irq type for mv88e66xx switch
+ nvme: fix handling of metadata_len for NVME_IOCTL_IO_CMD
+ parisc: Remove ordered stores from syscall.S
+ xfrn_user: prevent leaking 2 bytes of kernel memory
+ netfilter: conntrack: dcecp: treat SYNC/SYNACK as invalid if no prior state
+ packet: refine ring v3 block size test to hold one frame
+ net/smc: no shutdown in state SMC_LISTEN
+ parisc: Remove unnecessary barriers from spinlock.h
+ PCI: hotplug: Don't leak pci_slot on registration failure
+ PCI: Skip MPS logic for Virtual Functions (VFs)
+ PCI: pciehp: Fix use-after-free on unplug
+ PCI: pciehp: Fix unprotected list iteration in IRQ handler
+ i2c: core: ACPI: Properly set status byte to 0 for multi-byte writes
+ i2c: imx: Fix race condition in dma read
+ reiserfs: fix broken xattr handling (heap corruption, bad retval)
+ updateconfigs for v4.14.67
+ IB/rxe: avoid double kfree skb
+ RDMA/qedr: Fix NULL pointer dereference when running over iWARP without ...
+ RDMA-CM
+ smb3: increase initial number of credits requested to allow write
+ hwmon: (dell-smm) Disable fan support for Dell XPS13 9333
+ ARM: dts: HR2: Fix interrupt types for i2c and PCIe
+ drm/arm/malidp: Ensure that the crtc are shutdown before removing any ...
+ encoder/connector
+ drm/mali-dp: Rectify the width and height passed to rotmem_required()
+ dmaengine: ti omap-dma: Fix OMAP1510 incorrect residue_granularity
+ nvme-rdma: fix possible double free condition when failing to create a ...
+ controller
+ nvme-rdma: Fix command completion race at error recovery
+ nvme-pci: move nvme_kill_queues to nvme_remove_dead_ctrl
+ clk: sunxi-ng: replace lib-y with obj-y
+ batman-adv: Fix debugfs path for renamed hardif
+ batman-adv: Fix debugfs path for renamed softif
+ nfp: bpf: don't stop offload if replace failed
+ perf tests: Add event parsing error handling to parse events test
+ perf script: Fix crash because of missing evsel->priv
+ perf tools: Fix crash caused by accessing feat_ops[HEADER_LAST_FEATURE]
+ s390/qeth: consistently re-enable device features
+ - sched/fair: Fix bandwidth timer clock drift condition
+ - r8169: fix mac address change
+ - RISC-V: Don't include irq-riscv-intc.h
+ - RISC-V: Fix PTRACE_SETREGSET bug.
+ - net: qrtr: Reset the node and port ID of broadcast messages
+ - cxgb4: assume flash part size to be 4MB, if it can't be determined
+ - bpf: fix sk_skb programs without skb->dev assigned
+ - ifrag: really prevent allocation on netns exit
+ - gpu: host1x: Skip IOMMU initialization if firewall is enabled
+ - ARC: [plat-hsdk]: Configure APB GPIO controller on ARC HSDK platform
+ - bnxt_en: Do not modify max IRQ count after RDMA driver requests/frees IRQs.
+ - scsi: hpsa: correct enclosure sas address
+ - perf tools: Use python-config --includes rather than --cflags
+ - sfp: ensure we clean up properly on bus registration failure
+ - amd/dc/dce100: On dce100, set clocks to 0 on suspend
+ - tools: build: Fixup host c flags
+ - kvm: nVMX: Restore exit qual for VM-entry failure due to MSR loading
+ - ibmivnic: Revise RX/TX queue error messages
+ - net/smc: reset recv timeout after clc handshake
+ - PCI: xgene: Fix I/O space page leak
+ - PCI: designware: Fix I/O space page leak
+ - PCI: aardvark: Fix I/O space page leak
+ - PCI: faraday: Fix I/O space page leak
+ - PCI: mediatek: Fix I/O space page leak
+ - PCI: v3-semi: Fix I/O space page leak
+ - platform/x86: dell-laptop: Fix backlight detection
+ - mm: use helper functions for allocating and freeing vm_area structs
+ - mm: make vm_area_dup() actually copy the old vma data
+ - mm: make vm_area_alloc() initialize core fields
+ - PCI / ACPI / PM: Resume all bridges on suspend-to-RAM

-- Sultan Alsawaf <sultan.alsawaf@canonical.com>  Wed, 24 Jul 2019 09:50:49 -0600

+linux (4.15.0-55.60) bionic; urgency=medium
+ * linux: 4.15.0-55.60 -proposed tracker (LP: #1834954)
+ * Request backport of ceph commits into bionic (LP: #1834235)
  + ceph: use atomic_t for ceph_inode_info::i_shared_gen
  + ceph: define argument structure for handle_cap_grant
  + ceph: flush pending works before shutdown super
  + ceph: send cap releases more aggressively
  + ceph: single workqueue for inode related works
  + ceph: avoid dereferencing invalid pointer during cached readdir
  + ceph: quota: add initial infrastructure to support cephfs quotas
  + ceph: quota: support for ceph.quota.max_files
  + ceph: quota: don't allow cross-quota renames
+ - ceph: fix root quota realm check
+ - ceph: quota: support for ceph.quota.max_bytes
+ - ceph: quota: update MDS when max_bytes is approaching
+ - ceph: quota: add counter for snaprealms with quota
+ - ceph: avoid iput_final() while holding mutex or in dispatch thread
+ * QCA9377 isn't being recognized sometimes (LP: #1757218)
+ - SAUCE: USB: Disable USB2 LPM at shutdown
+ * hns: fix ICMP6 neighbor solicitation messages discard problem (LP: #1833140)
+ - net: hns: fix ICMP6 neighbor solicitation messages discard problem
+ - net: hns: fix unsigned comparison to less than zero
+ * Fix occasional boot time crash in hns driver (LP: #1833138)
+ - net: hns: Fix probabilistic memory overwrite when HNS driver initialized
+ * use-after-free in hns_nic_net_xmit_hw (LP: #1833136)
+ - net: hns: fix KASAN: use-after-free in hns_nic_net_xmit_hw()
+ * hns: attempt to restart autoneg when disabled should report error
+ (LP: #1833147)
+ - net: hns: Restart autoneg need return failed when autoneg off
+ * systemd 237-3ubuntu10.14 ADT test failure on Bionic ppc64el (test-seccomp)
+ (LP: #1821625)
+ - powerpc: sys_pkey_alloc() and sys_pkey_free() system calls
+ - powerpc: sys_pkey_mprotect() system call
+ * [UBUNTU] pkey: Indicate old mkvp only if old and curr. mkvp are different
+ (LP: #1832625)
+ - pkey: Indicate old mkvp only if old and current mkvp are different
+ * [UBUNTU] kernel: Fix gcm-aes-s390 wrong scatter-gather list processing
+ (LP: #1832623)
+ - s390/crypto: fix gcm-aes-s390 selftest failures
+ * System crashes on hot adding a core with drmgr command (4.15.0-48-generic)
+ (LP: #1833716)
+ - powerpc/numa: improve control of topology updates
+ - powerpc/numa: document topology_updates_enabled, disable by default
+ * Kernel modules generated incorrectly when system is localized to a non-
+ English language (LP: #1828084)
+ - scripts: override locale from environment when running recordmcount.pl
+ * [UBUNTU] kernel: Fix wrong dispatching for control domain CPRBs
+ (LP: #1832624)
+ - s390/zzcrypt: Fix wrong dispatching for control domain CPRBs
+ * CVE-2019-11815
+ - net: rds: force to destroy connection if t_sock is NULL in
+   rds_tcp_kill_sock().
+ *
+ * Sound device not detected after resume from hibernate (LP: #1826868)
+ - drm/i915: Force 2*96 MHz cdclk on glk/cnl when audio power is enabled
+ - drm/i915: Save the old CDCLK atomic state
+ - drm/i915: Remove redundant store of logical CDCLK state
+ - drm/i915: Skip modeset for cdclk changes if possible
+ *
+ * Handle overflow in proc_get_long of sysctl (LP: #1833935)
+ - sysctl: handle overflow in proc_get_long
+ *
+ * Dell XPS 13 (9370) defaults to s2idle sleep/suspend instead of deep, NVMe
+ drains lots of power under s2idle (LP: #1808957)
+ - Revert "UBUNTU: SAUCE: pci/nvme: prevent WDC PC SN720 NVMe from entering D3
+   and being disabled"
+ - Revert "UBUNTU: SAUCE: nvme: add quirk to not call disable function when
+   suspending"
+ - Revert "UBUNTU: SAUCE: pci: prevent Intel NVMe SSDPEKKF from entering D3"
+ - Revert "SAUCE: nvme: add quirk to not call disable function when suspending"
+ - Revert "SAUCE: pci: prevent sk hynix nvme from entering D3"
+ - PCI: PM: Avoid possible suspend-to-idle issue
+ - PCI: PM: Skip devices in D0 for suspend-to-idle
+ - nvme-pci: Sync queues on reset
+ - nvme: Export get and set features
+ - nvme-pci: Use host managed power state for suspend
+ *
+ * linux v4.15 ftbfs on a newer host kernel (e.g. hwe) (LP: #1823429)
+ - selinux: use kernel linux/socket.h for genheaders and mdp
+ *
+ * 32-bit x86 kernel 4.15.0-50 crash in vmalloc_sync_all (LP: #1830433)
+ - x86/mm/pat: Disable preemption around __flush_tlb_all()
+ - x86/mm: Drop usage of __flush_tlb_all() in kernel_physical_mapping_init()
+ - x86/mm: Disable ioremap free page handling on x86-PAE
+ - ioremap: Update pgtable free interfaces with addr
+ - x86/mm: Add TLB purge to free pmd/pte page interfaces
+ - x86/init: fix build with CONFIG_SWAP=n
+ - x86/mm: provide pmdp_establish() helper
+ - x86/mm: Use WRITE_ONCE() when setting PTEs
+ *
+ * hinic: fix oops due to race in set_rx_mode (LP: #1832048)
+ - hinic: fix a bug in set rx mode
+ *
+ * ubuntu 18.04 flickering screen with Radeon X1600 (LP: #1791312)
+ - drm/radeon: prefer lower reference dividers
* Login screen never appears on vmwgfx using bionic kernel 4.15 (LP: #1832138)
  - drm/vmwgfx: use monotonic event timestamps

* [linux-azure] Block Layer Commits Requested in Azure Kernels (LP: #1834499)
  - block: Clear kernel memory before copying to user
  - block/bio: Do not zero user pages

* CONFIG_LOG_BUF_SHIFT set to 14 is too low on arm64 (LP: #1824864)
  - [Config] CONFIG_LOG_BUF_SHIFT=18 on all 64bit arches

* Handle overflow for file-max (LP: #1834310)
  - sysctl: handle overflow for file-max
  - kernel/sysctl.c: fix out-of-bounds access when setting file-max

* [ALSA] [PATCH] Headset fixup for System76 Gazelle (gaze14) (LP: #1827555)
  - ALSA: hda/realtek - Headset fixup for System76 Gazelle (gaze14)
  - ALSA: hda/realtek - Corrected fixup for System76 Gazelle (gaze14)

* crashdump fails on HiSilicon D06 (LP: #1828868)
  - iommu/arm-smmu-v3: Abort all transactions if SMMU is enabled in kdump kernel
  - iommu/arm-smmu-v3: Don't disable SMMU in kdump kernel

* CVE-2019-11833
  - ext4: zero out the unused memory region in the extent tree block

* zfs 0.7.9 fixes a bug (https://github.com/zfsonlinux/zfs/pull/7343) that
  - hangs the system completely (LP: #1772412)
  - SAUCE: (noup) Update zfs to 0.7.5-1ubuntu16.6

* does not detect headphone when there is no other output devices
  - (LP: #1831065)
  - ALSA: hda/realtek - Fixed hp_pin no value
  - ALSA: hda/realtek - Use a common helper for hp pin reference

* kernel crash: net_sched race condition in tcindex_destroy() (LP: #1825942)
  - net_sched: fix NULL pointer dereference when delete tcindex filter
  - RCU, workqueue: Implement rcu_work
  - net_sched: switch to rcu_work
  - net_sched: fix a race condition in tcindex_destroy()
  - net_sched: fix a memory leak in cls_tcindex
  - net_sched: initialize net pointer inside tcf_exts_init()
  - net_sched: fix two more memory leaks in cls_tcindex

* Support new ums-realtek device (LP: #1831840)
  - USB: usb-storage: Add new ID to ums-realtek

* amd_iommu possible data corruption (LP: #1823037)
  - iommu/amd: Reserve exclusion range in iova-domain
+ - iommu/amd: Set exclusion range correctly
+ + * Add new sound card PCI ID into the alsa driver (LP: #1832299)
+ + - ALSA: hda: Add Icealke PCI ID
+ + - ALSA: hda/intel: add CometLake PCI IDs
+ + * sky2 ethernet card doesn't work after returning from suspend
+ + (LP: #1807259) // sky2 ethernet card link not up after suspend
+ + (LP: #1809843)
+ + - sky2: Disable MSI on Dell Inspiron 1545 and Gateway P-79
+ + + idle-page oopses when accessing page frames that are out of range
+ + (LP: #1833410)
+ + - mm/page_idle.c: fix oops because end_pfn is larger than max_pfn
+ + * Add pointstick support on HP ZBook 17 G5 (LP: #1833387)
+ + - Revert "HID: multitouch: Support ALPS PTP stick with pid 0x120A"
+ + - SAUCE: HID: multitouch: Add pointstick support for ALPS Touchpad
+ + * [SRU][B/B-OEM/B-OEM-OSP-1/C/D/E] Add trackpoint middle button support of 2
+ + new thinpads (LP: #1833637)
+ + - Input: elantech - enable middle button support on 2 ThinkPads
+ + * CVE-2019-11085
+ + - drm/i915/gvt: Fix mmap range check
+ + - drm/i915: make mappable struct resource centric
+ + - drm/i915/gvt: Fix aperture read/write emulation when enable x-no-mmap=on
+ + * CVE-2019-11884
+ + - Bluetooth: hidp: fix buffer overflow
+ + * af_alg06 test from crypto test suite in LTP failed with kernel oops on B/C
+ + (LP: #1829725)
+ + - crypto: authenc - fix parsing key with misaligned rta_len
+ + - SAUCE: Synchronize MDS mitigations with upstream
+ + - Documentation: Correct the possible MDS sysfs values
+ + - x86/speculation/mds: Fix documentation typo
+ + * CVE-2019-11091
+ + - x86/mds: Add MDSUM variant to the MDS documentation
+ + * alignment test in powerpc from ubuntu_kernel_selftests failed on B/C Power9
+ + (LP: #1813118)
+ + - selftests/powerpc: Remove Power9 copy_unaligned test
+ + * TRACE_syscall.ptrace_syscall_dropped in seccomp from ubuntu_kernel_selftests
failed on B/C PowerPC (LP: #1812796)
- selftests/seccomp: Enhance per-arch ptrace syscall skip tests

+ * Add powerpc/alignment_handler test for selftests (LP: #1828935)
+ selftests/powerpc: Add alignment handler selftest
- selftests/powerpc: Fix to use ucontext_t instead of struct ucontext

- Cannot build kernel 4.15.0-48.51 due to an in-source-tree ZFS module.
- (LP: #1828763)
- SAUCE: (noup) Update zfs to 0.7.5-1ubuntu16.5

+ Eletrical noise occurred when external headset enter powersaving mode on a
+ DEll machine (LP: #1828798)
- ALSA: hda/realtek - Reduce click noise on Dell Precision 5820 headphone
- ALSA: hda/realtek - Fixup headphone noise via runtime suspend

- [18.04/18.10] File libperf-jvmti.so is missing in linux-tools-common deb on
- Ubuntu (LP: #1761379)
- [Packaging] Support building libperf-jvmti.so

+ TCP: race condition on socket ownership in tcp_close() (LP: #1830813)
- tcp: do not release socket ownership in tcp_close()

+ bionic: netlink: potential shift overflow in netlink_bind() (LP: #1831103)
- netlink: Don't shift on 64 for ngroups

+ Add support to Comet Lake LPSS (LP: #1830175)
+ mfd: intel-lpss: Add Intel Comet Lake PCI IDs

+ Reduce NAPI weight in hns driver from 256 to 64 (LP: #1830587)
+ net: hns: Use NAPI_POLL_WEIGHT for hns driver

+ x86: add support for AMD Rome (LP: #1819485)
+ x86: irq_remapping: Move irq remapping mode enum
+ iommu/amd: Add support for higher 64-bit IOMMU Control Register
+ iommu/amd: Add support for IOMMU XT mode
+ hwmon/k10temp, x86/amd_nb: Consolidate shared device IDs
+ hwmon/k10temp: Add support for AMD family 17h, model 30h CPUs
+ x86/amd_nb: Add PCI device IDs for family 17h, model 30h
+ x86/MCE/AMD: Fix the thresholding machinery initialization order
+ x86/amd_nb: Add support for newer PCI topologies

+ nx842 - CRB request time out (-110) when uninstall NX modules and initiate
  NX request (LP: #1827755)
+ crypto/nx: Initialize 842 high and normal RxFIFO control registers

+ Require improved hypervisor detection patch in Ubuntu 18.04 (LP: #1829972)
+ s390/early: improve machine detection
Remote denial of service (resource exhaustion) caused by TCP SACK scoreboard manipulation (LP: #1831638) // CVE-2019-11478
- tcp: refine memory limit test in tcp_fragment()

Remote denial of service (resource exhaustion) caused by TCP SACK scoreboard manipulation (LP: #1831638)
- SAUCE: tcp: tcp_fragment() should apply sane memory limits

Remote denial of service (system crash) caused by integer overflow in TCP SACK handling (LP: #1831637)
- SAUCE: tcp: limit payload size of sacked skbs

disable a.out support (LP: #1818552)
- [Config] Disable a.out support

[qdio: clear intparm during shutdown (LP: #1828394)
- s390/qdio: clear intparm during shutdown

frace in ubuntu_kernel_selftests hang with Cosmic kernel (LP: #1826385)
- kprobes/x86: Fix instruction patching corruption when copying more than one RIP-relative instruction

touchpad not working on lenovo yoga 530 (LP: #1787775)
- Revert "UBUNTU: SAUCE: i2c:amd Depends on ACPI"
- Revert "UBUNTU: SAUCE: i2c:amd move out pointer in union i2c_event_base"
- Revert "UBUNTU: SAUCE: i2c:amd I2C Driver based on PCI Interface for upcoming platform"
+  - i2c: add helpers to ease DMA handling
+  - i2c: add a message flag for DMA safe buffers
+  - i2c: add extra check to safe DMA buffer helper
+  - i2c: Add drivers for the AMD PCIe MP2 I2C controller
+  - [Config] Update config for AMD MP2 I2C driver
+  - [Config] Update I2C_AMD_MP2 annotations

+  * tm-unavailable in powerpc/tm failed on Bionic Power9 (LP: #1813129)
+  - selftests/powerpc: Check for pthread errors in tm-unavailable
+  - selftests/powerpc: Skip tm-unavailable if TM is not enabled

+  * cp_abort in powerpc/context_switch from ubuntu_kernel_selftests failed on
  Bionic P9 (LP: #1813134)
+  - selftests/powerpc: Remove redundant cp_abort test

+  * cp_abort in powerpc/context_switch from ubuntu_kernel_selftests failed on
  Bionic P9 (LP: #1813134)
+  - selftests/powerpc: Remove redundant cp_abort test

+  * bionic/linux: completely remove snapdragon files from sources (LP: #1827880)
+  - [Packaging] remove snapdragon dead files
+  - [Config] update configs after snapdragon removal

+  * The noise keeps occurring when Headset is plugged in on a Dell machine
  (LP: #1827972)
+  - ALSA: hda/realtek - Fixed Dell AIO speaker noise

+  * Geniue tunnels don't work when ipv6 is disabled (LP: #1794232)
+  - geneve: correctly handle ipv6.disable module parameter

+  * There are 4 HDMI/Displayport audio output listed in sound setting without
  attach any HDMI/DP monitor (LP: #1827967)
+  - ALSA: hda/hdmi - Read the pin sense from register when repolling
+  - ALSA: hda/hdmi - Consider eld_valid when reporting jack event

+  * Headphone jack switch sense is inverted: plugging in headphones disables
  headphone output (LP: #1824259)
+  - ASoC: rt5645: Headphone Jack sense inverts on the LattePanda board

+  * CTAUTO:DevOps:860.50:devops4fp1:Error occurred during LINUX Dmesg error
  Checking for all LINUX clients for devops4p10 (LP: #1766201)
+  - SAUCE: integrity: downgrade error to warning

+  * Screen freeze after resume from S3 when HDMI monitor plugged on Dell
  Precision 7740 (LP: #1825958)
+  - PCI: Restore resized BAR state on resume

+  * potential memory corruption on arm64 on dev release (LP: #1827437)
+  - driver core: Postpone DMA tear-down until after devres release

+  * powerpc/pmu/ebb test in ubuntu_kernel_selftest failed with "error while
  loading shared libraries" on Bionic/Cosmic PowerPC (LP: #1812805)
+ - selftests/powerpc/pmu: Link ebb tests with -no-pie
+
+ * unnecessary request_queue freeze (LP: #1815733)
+ - block: avoid setting nr_requests to current value
+ - block: avoid setting none scheduler if it's already none
+
+ * Kprobe event string type argument failed in ftrace from
+ ubuntu_kernel_selftests on B/C i386 (LP: #1825780)
+ - selftests/ftrace: Fix kprobe string testcase to not probe notrace function
+
+ * hns: fix socket accounting (LP: #1826911)
+ - net: hns: fix skb->truesize underestimation
+
+ * False positive test result in run_netsocktests from net in
+ ubuntu_kernel_selftests (LP: #1825777)
+ - selftests/net: correct the return value for run_netsocktests
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Wed, 15 May 2019 14:48:35 +0200
+
+linux (4.15.0-50.54) bionic; urgency=medium
+
+ - Documentation/l1tf: Fix small spelling typo
+ - x86/cpu: Sanitize FAM6_ATOM naming
+ - kvm: x86: Report STIBP on GET_SUPPORTED_CPUID
+ - locking/atomics, asm-generic: Move some macros from <linux/bitops.h> to a
+ new <linux/bits.h> file
+ - tools include: Adopt linux/bits.h
+ - x86/msr-index: Cleanup bit defines
+ - x86/speculation: Consolidate CPU whitelists
+ - x86/speculation/mds: Add basic bug infrastructure for MDS
+ - x86/speculation/mds: Add BUG_MSBDS_ONLY
+ - x86/kvm: Expose X86_FEATURE_MD_CLEAR to guests
+ - x86/speculation/mds: Add mds_clear_cpu_buffers()
+ - x86/speculation/mds: Clear CPU buffers on exit to user
+ - x86/kvm/vmx: Add MDS protection when L1D Flush is not active
+ - x86/speculation/mds: Conditionally clear CPU buffers on idle entry
+ - x86/speculation/mds: Add mitigation control for MDS
+ - x86/speculation/mds: Add sysfs reporting for MDS
+ - x86/speculation/mds: Add mitigation mode VMWERV
+ - Documentation: Move L1TF to separate directory
+ - Documentation: Add MDS vulnerability documentation
+ - x86/speculation/mds: Add mds=full,nosmt cmdline option
+ - x86/speculation: Move arch_smt_update() call to after mitigation decisions
+ - x86/speculation/mds: Add SMT warning message
+ - x86/speculation/mds: Fix comment
+ - x86/speculation/mds: Print SMT vulnerable on MSBDS with mitigations off
+ - x86/speculation/mds: Add 'mitigations=' support for MDS
* CVE-2017-5715 // CVE-2017-5753
  * s390/speculation: Support 'mitigations=' cmdline option

  * powerpc/speculation: Support 'mitigations=' cmdline option

  * CVE-2018-3646
  * cpu/speculation: Add 'mitigations=' cmdline option
  * x86/speculation: Support 'mitigations=' cmdline option

* Packaging resync (LP: #1786013)
  * [Packaging] resync git-ubuntu-log

-- Stefan Bader <stefan.bader@canonical.com>  Mon, 06 May 2019 18:59:24 +0200

+linux (4.15.0-49.53) bionic; urgency=medium

+ * linux: 4.15.0-49.53 -proposed tracker (LP: #1826358)

+ * Backport support for software count cache flush Spectre v2 mitigation. (CVE)
  * (required for POWER9 DD2.3) (LP: #1822870)
  * powerpc/64s: Add support for ori barrier_nospec patching
  * powerpc/64s: Patch barrier_nospec in modules
  * powerpc/64s: Enable barrier_nospec based on firmware settings
  * powerpc: Use barrier_nospec in copy_from_user()
  * powerpc/64: Use barrier_nospec in syscall entry
  * powerpc/64: Enhance the information in cpu_show_spectre_v1()
  * powerpc/64: Disable the speculation barrier from the command line
  * powerpc/64: Make stf barrier PPC_BOOK3S_64 specific.
  * powerpc/64: Add CONFIG_PPC_BARRIER_NOSPEC
  * powerpc/64: Call setup_barrier_nospec() from setup_arch()
  * powerpc/64: Make meltdown reporting Book3S 64 specific
  * powerpc/lib/code-patching: refactor patch_instruction()
  * powerpc/lib/feature-fixups: use raw_patch_instruction()
  * powerpc/asm: Add a patch_site macro & helpers for patching instructions
  * powerpc/64s: Add new security feature flags for count cache flush
  * powerpc/64s: Add support for software count cache flush
  * powerpc/pseries: Query hypervisor for count cache flush settings
  * powerpc/powernv: Query firmware for count cache flush settings
  * powerpc/fsl: Add nospectre_v2 command line argument
  * KVM: PPC: Book3S: Add count cache flush parameters to kvmppc_get_cpu_char()
  * [Config] Add CONFIG_PPC_BARRIER_NOSPEC

+ * Packaging resync (LP: #1786013)
  * [Packaging] resync git-ubuntu-log
+ * autopkgtests run too often, too much and don't skip enough (LP: #1823056)
+ - [Debian] Set +x on rebuild testcase.
+ - [Debian] Skip rebuild test, for regression-suite deps.
+ - [Debian] make rebuild use skippable error codes when skipping.
+ - [Debian] Only run regression-suite, if requested to.
+
+ * bionic: fork out linux-snapdragon into its own topic kernel (LP: #1820868)
+ - [Packaging] remove arm64 snapdragon from getabis
+ - [Config] config changes for snapdragon split
+ - packaging: arm64: disable building the snapdragon flavour
+ - [Packaging] arm64: Drop snapdragon from kernel-versions
+
+ * CVE-2017-5753
+ - KVM: arm/arm64: vgic: fix possible spectre-v1 in vgic_get_irq()
+ - media: dvb_ca_en50221: prevent using slot_info for Spectre attacks
+ - sysvipc/sem: mitigate semnum index against spectre v1
+ - libahi: Fix possible Spectre-v1 pnp indexing in ahci_led_store()
+ - s390/keyboard: sanitize array index in do_kdsk_ioctl
+ - arm64: fix possible spectre-v1 write in ptrace_hbp_set_event()
+ - KVM: arm/arm64: vgic: Fix possible spectre-v1 write in vgic_mmio_write_apr()
+ - pktcdvd: Fix possible Spectre-v1 for pkt_devs
+ - net: socket: fix potential spectre v1 gadget in sockctcall
+ - net: socket: Fix potential spectre v1 gadget in sock_is_registered
+ - drm/amdGPU/pm: Fix potential Spectre v1
+ - netlink: Fix spectre v1 gadget in netlink_create()
+ - ext4: fix spectre gadget in ext4_mb_regular_allocator()
+ - drm/f915/kvmt: Fix potential Spectre v1
+ - net: sock_diag: Fix spectre v1 gadget in __sock_diag_cmd()
+ - fs/quota: Fix spectre gadget in do_quotaactl
+ - hwmon: (nct6775) Fix potential Spectre v1
+ - mac80211_hwsim: Fix possible Spectre-v1 for hwsim_world_regdom_custom
+ - switchtec: Fix Spectre v1 vulnerability
+ - misc: hmc6352: fix potential Spectre v1
+ - tty: vt_ioctl: fix potential Spectre v1
+ - nl80211: Fix possible Spectre-v1 for NL80211_TXRATE_HT
+ - nl80211: Fix possible Spectre-v1 for CQM RSSI thresholds
+ - IB/ucm: Fix Spectre v1 vulnerability
+ - RDMA/ucma: Fix Spectre v1 vulnerability
+ - drm/bufs: Fix Spectre v1 vulnerability
+ - usb: gadget: storage: Fix Spectre v1 vulnerability
+ - ptp: fix Spectre v1 vulnerability
+ - HID: hiddev: fix potential Spectre v1
+ - vhost: Fix Spectre V1 vulnerability
+ - drivers/misc/sgi-gru: fix Spectre v1 vulnerability
+ - ipv4: Fix potential Spectre v1 vulnerability
+ - aio: fix spectre gadget in lookup_ioctl
+ - ALSA: emux: Fix potential Spectre v1 vulnerabilities
- ALSA: pcm: Fix potential Spectre v1 vulnerability
- ip6mr: Fix potential Spectre v1 vulnerability
- ALSA: rme9652: Fix potential Spectre v1 vulnerability
- ALSA: emu10k1: Fix potential Spectre v1 vulnerabilities
- KVM: arm/arm64: vgic: Fix off-by-one bug in vgic_get_irq()
- drm/iocl: Fix Spectre v1 vulnerabilities
- char/mwave: Fix potential Spectre v1 vulnerability
- applicom: Fix potential Spectre v1 vulnerabilities
- ipmi: msg_handler: Fix potential Spectre v1 vulnerabilities
- powerpc/trace: Mitigate potential Spectre v1
- cfg80211: prevent speculation on cfg80211_classify8021d() return
- ALSA: rawmidi: Fix potential Spectre v1 vulnerability
- ALSA: seq: oss: Fix Spectre v1 vulnerability

* Bionic: Sync to Xenial (Spectre) (LP: #1822760)
* x86/speculation/l1tf: Suggest what to do on systems with too much RAM
* KVM: SVM: Add MSR-based feature support for serializing LFENCE
* KVM: VMX: fixes for vmentry_l1i_1ld_flush module parameter
* KVM: X86: Allow userspace to define the microcode version
* SAUCE: [Fix] x86/KVM/VMX: Add L1D flush logic
* SAUCE: [Fix] x86/speculation: Use ARCH_CAPABILITIES to skip L1D flush on vmentry

* [SRU] [B/OEM] Fix ACPI bug that causes boot failure (LP: #1819921)
* SAUCE: ACPI / bus: Add some Lenovo laptops in list of acpi table term list

* Bionic update: upstream stable patchset for fuse 2019-04-12 (LP: #1824553)
* fuse: fix double request_end()
* fuse: fix unlocked access to processing queue
* fuse: umount should wait for all requests
* fuse: Fix oops at process_init_reply()
* fuse: Don't access pipe->buffers without pipe_lock()
* fuse: Fix use-after-free in fuse_dev_do_read()
* fuse: Fix use-after-free in fuse_dev_do_write()
* fuse: set FR_SENT while locked
* fuse: fix blocked_waitq wakeup
* fuse: fix leaked notify reply
* fuse: fix possibly missed wake-up after abort
* fuse: fix use-after-free in fuse_direct_IO()
* fuse: continue to send FUSE_RELEASEDIR when FUSE_OPEN returns ENOSYS
* fuse: handle zero sized retrieve correctly
* fuse: call pipe_buf_release() under pipe lock
* fuse: decrement NR_WRITEBACK_TEMP on the right page

* Backport support for software count cache flush Spectre v2 mitigation. (CVE)
  (required for POWER9 DD2.3) (LP: #1822870) // Backport support for software count cache flush Spectre v2 mitigation. (CVE) (required for POWER9 DD2.3)
  (LP: #1822870)
+ - powerpc64x: Show ori31 availability in spectre_v1 sysfs file not v2
+ - powerpc/fsl: Fix spectre_v2 mitigations reporting
+ - powerpc: Avoid code patching freed init sections
+
+ * Backport support for software count cache flush Spectre v2 mitigation. (CVE)
+ (required for POWER9 DD2.3) (LP: #1822870) // Backport support for software count cache flush Spectre v2 mitigation. (CVE) (required for POWER9 DD2.3)
+ (LP: #1822870) // Backport support for software count cache flush Spectre v2 mitigation. (CVE) (required for POWER9 DD2.3) (LP: #1822870)
+ - powerpc/security: Fix spectre_v2 reporting
+
+ * CVE-2019-3874
+ - scpt: use sk_wmem_queued to check for writable space
+ - scpt: implement memory accounting on tx path
+ - scpt: implement memory accounting on rx path
+
+ * NULL pointer dereference when using z3fold and zswap (LP: #1814874)
+ - z3fold: fix possible reclaim races
+
+ * Kprobe event argument syntax in ftrace from ubuntu_kernel_selftests failed
+ on B PowerPC (LP: #1812809)
+ - selftests/ftrace: Add ppc support for kprobe args tests
+
+ * The Realtek card reader does not enter PCIe 1.1/1.2 (LP: #1825487)
+ - misc: rtsx: make various functions static
+ - misc: rtsx: Enable OCP for rts522a rts524a rts525a rts5260
+ - SAUCE: misc: rtsx: Fixed rts5260 power saving parameter and sd glitch
+
+ * headset-mic doesn't work on two Dell laptops. (LP: #1825272)
+ - ALSA: hda/realtek - add two more pin configuration sets to quirk table
+
+ * CVE-2018-16884
+ - sunrpc: use SVC_NET() in svcauth_gss_* functions
+ - sunrpc: use-after-free in svc_process_common()
+
+ * sky2 ethernet card don't work after returning from suspension (LP: #1798921)
+ - sky2: Increase D3 delay again
+
+ * CVE-2019-9500
+ - brcmfmac: assure SSID length from firmware is limited
+
+ * CVE-2019-9503
+ - brcmfmac: add subtype check for event handling in data path
+
+ * CVE-2019-3882
+ - vfio/type1: Limit DMA mappings per container
+
+ * Intel I210 Ethernet card not working after hotplug [8086:1533]
+ (LP: #1818490)
+ - igb: Fix WARN_ONCE on runtime suspend
+
+ * bionic, xenial/hwe: misses "fuse: fix initial parallel dirops" patch
+ (LP: #1823972)
+ - fuse: fix initial parallel dirops
+
+ * amdgpu resume failure: failed to allocate wb slot (LP: #1825074)
+ - drm/amdgpu: fix&cleanups for wb_clear
+
+ * Pop noise when headset is plugged in or removed from GHS/Line-out jack
+ (LP: #1821290)
+ - ALSA: hda/realtek - Add unplug function into unplug state of Headset Mode
+ for ALC225
+ - ALSA: hda/realtek - Disable headset Mic VREF for headset mode of ALC225
+ - ALSA: hda/realtek - Add support headset mode for DELL WYSE AIO
+ - ALSA: hda/realtek - Add support headset mode for New DELL WYSE NB
+
+ * mac80211_hwsim unable to handle kernel NULL pointer dereference
+ at0000000000000000 (LP: #1825058)
+ - mac80211_hwsim: Timer should be initialized before device registered
+
+ * [regression][snd_hda_codec_realtek] repeating crackling noise after 19.04
+ upgrade (LP: #1821663)
+ - ALSA: hda: Add Intel NUC7i3BNB to the power_save blacklist
+ - ALSA: hda - add Lenovo IdeaCentre B550 to the power_save_blacklist
+ - ALSA: hda - Add two more machines to the power_save_blacklist
+
+ * ubuntu_nbd_smoke_test failed on P9 with Bionic kernel (LP: #1822247)
+ - nbd: fix how we set bd_invalidated
+
+ * TSC clocksoure not available in nested guests (LP: #1822821)
+ - kvmclock: fix TSC calibration for nested guests
+
+ * 4.15 kernel ip_vs --ops causes performance and hang problem (LP: #1819786)
+ - ipvs: fix refcount usage for conns in ops mode
+
+ * systemd cause kernel trace "BUG: unable to handle kernel paging request at
+ 6db23a14" on Cosmic i386 (LP: #1813244) // systemd cause kernel trace "BUG:
+ unable to handle kernel paging request at 6db23a14" on Cosmic i386
+ (LP: #1813244)
+ - openvswitch: fix flow actions reallocation
+
+ -- Stefan Bader <stefan.bader@canonical.com> Thu, 25 Apr 2019 10:40:22 +0200
+
+linux (4.15.0-48.51) bionic; urgency=medium
+
+ * linux: 4.15.0-48.51 -proposed tracker (LP: #1822820)
+ * Packaging resync (LP: #1786013)
+  - [Packaging] update helper scripts
+  - [Packaging] resync retpoline extraction
+
+ * 3b080b2564287be91605bf0d1d5e985696e61d3c in ubuntu_btrfs_kernel_fixes
+  triggers system hang on i386 (LP: #1812845)
+  - btrfs: raid56: properly unmap parity page in finish_parity_scrub()
+
+ * [P9][LTCTest][Opal][FW910] cpupower monitor shows multiple stop Idle_Stats
+  (LP: #1719545)
+  - cpupower : Fix header name to read idle state name
+
+ * [amdgpu] screen corruption when using touchpad (LP: #1818617)
+  - drm/amdgpu/gmc: steal the appropriate amount of vram for fw hand-over (v3)
+  - drm/amdgpu: Free VGA stolen memory as soon as possible.
+
+ * [SRU][B/C/OEM]IOMMU: add kernel dma protection (LP: #1820153)
+  - ACPI: AML parser: attempt to continue loading table after error
+  - ACPI / property: Allow multiple property compatible _DSD entries
+  - PCI / ACPI: Identify untrusted PCI devices
+  - iommu/vt-d: Force IOMMU on for platform opt in hint
+  - iommu/vt-d: Do not enable ATS for untrusted devices
+  - thunderbolt: Export IOMMU based DMA protection support to userspace
+  - iommu/vt-d: Disable ATS support on untrusted devices
+
+ * Add basic support to NVLink2 passthrough (LP: #1819989)
+  - powerpc/powernv/npu: Do not try invalidating 32bit table when 64bit table is
+    enabled
+  - powerpc/powernv/npu: call OPAL QUIESCE before OPAL SIGNAL SYSTEM RESET
+  - powerpc/powernv/npu: Export opal_check_token symbol
+  - powerpc/powernv: Make possible for user to force a full ipl cec reboot
+  - powerpc/powernv/idoa: Remove unnecessary pci dev from pci_dn
+  - powerpc/powernv: Move npu struct from pnv_phb to pci_controller
+  - powerpc/powernv/npu: Move OPAL calls away from context manipulation
+  - powerpc/pseries/iommu: Use memory@ nodes in max RAM address calculation
+  - powerpc/pseries/npu: Enable platform support
+  - powerpc/pseries: Remove IOMMU API support for non-LPAR systems
+  - powerpc/powernv/npu: Check mmio_atsd array bounds when populating
+  - powerpc/powernv/npu: Fault user page into the hypervisor's pagetable
+
+ * Huawei Hi1822 NIC has poor performance (LP: #1820187)
+  - net-next: hinic: fix a problem in free_tx_poll()
+  - hinic: remove ndo_pmagr_controller
+  - net-next/hinic: add checksum offload and TSO support
+  - hinic: Fix l4_type parameter in hinic_task_set_tunnel_l4
+  - net-next/hinic:replace multiply and division operators
+  - net-next/hinic:add rx checksum offload for HiNIC
+ - net-next/hinic: fix a bug in set mac address
+ - net-next/hinic: fix a bug in rx data flow
+ - net: hinic: fix null pointer dereference on pointer hwdev
+ - hinic: optimize rx refill buffer mechanism
+ - net-next/hinic: add shutdown callback
+ - net-next/hinic: replace disable_irq_nosync/enable_irq
+
+ * [CONFIG] please enable highdpi font FONT_TER16x32 (LP: #1819881)
+ - Fonts: New Terminus large console font
+ - [Config]: enable highdpi Terminus 16x32 font support
+
+ * [19.04 FEAT] qeth: Enhanced link speed - kernel part (LP: #1814892)
+ - s390/qeth: report 25Gbit link speed
+
+ * CVE-2017-5754
+ - x86/nmi: Fix NMI uaccess race against CR3 switching
+ - x86/mm: Fix documentation of module mapping range with 4-level paging
+ - x86/pti: Enable global pages for shared areas
+ - x86/pti: Never implicitly clear _PAGE_GLOBAL for kernel image
+ - x86/pti: Leave kernel text global for !PCID
+ - x86/pti: Fix boot problems from Global-bit setting
+ - x86/pti: Fix boot warning from Global-bit setting
+ - x86/pti: Reduce amount of kernel text allowed to be Global
+ - x86/pti: Disallow global kernel text with RANDSTRUCT
+ - x86/entry/32: Add explicit ‘l’ instruction suffix
+ - x86/asm-offsets: Move TSS_sp0 and TSS_sp1 to asm-offsets.c
+ - x86/entry/32: Rename TSS_sysenter_sp0 to TSS_entry2task_stack
+ - x86/entry/32: Load task stack from x86_tss.sp1 in SYSENTER handler
+ - x86/entry/32: Put ESPFIX code into a macro
+ - x86/entry/32: Unshare NMI return path
+ - x86/entry/32: Split off return-to-kernel path
+ - x86/entry/32: Enter the kernel via trampoline stack
+ - x86/entry/32: Leave the kernel via trampoline stack
+ - x86/entry/32: Introduce SAVE_ALL_NMI and RESTORE_ALL_NMI
+ - x86/entry/32: Handle Entry from Kernel-Mode on Entry-Stack
+ - x86/entry/32: Simplify debug entry point
+ - x86/entry/32: Add PTI cr3 switch to non-NMI entry/exit points
+ - x86/entry/32: Add PTI CR3 switches to NMI handler code
+ - x86/entry: Rename update_sp0 to update_task_stack
+ - x86/pgtable: Rename pti_set_user_pgd() to pti_set_user_ptgtbl()
+ - x86/pgtable/pae: Unshare kernel PMDs when PTI is enabled
+ - x86/pgtable/32: Allocate 8k page-tables when PTI is enabled
+ - x86/pgtable: Move pgdp kernel/user conversion functions to pgtable.h
+ - x86/pgtable: Move pti_set_user_ptgtbl() to pgtable.h
+ - x86/pgtable: Move two more functions from pgtable_64.h to pgtable.h
+ - x86/mm/pae: Populate valid user PGD entries
+ - x86/mm/pae: Populate the user page-table with user pgd's
+ - x86/mm/pti: Add an overflow check to pti_clone_pmds()
+ - x86/mm/pti: Define X86_CR3_PTI_PCID_USER_BIT on x86_32
+ - x86/mm/pti: Clone CPU_ENTRY_AREA on PMD level on x86_32
+ - x86/mm/pti: Make pti_clone_kernel_text() compile on 32 bit
+ - x86/mm/pti: Keep permissions when cloning kernel text in
  pti_clone_kernel_text()
+ - x86/mm/pti: Introduce pti_finalize()
+ - x86/mm/pti: Clone entry-text again in pti_finalize()
+ - x86/mm/dump_pagetables: Define INIT_PGD
+ - x86/phtable/pae: Use separate kernel PMDs for user page-table
+ - x86/ldt: Reserve address-space range on 32 bit for the LDT
+ - x86/ldt: Define LDT_END_ADDR
+ - x86/ldt: Split out sanity check in map_ldt_struct()
+ - x86/ldt: Enable LDT user-mapping for PAE
+ - x86/pti: Allow CONFIG_PAGE_TABLE_ISOLATION for x86_32
+ - [Config] Update PAGE_TABLE_ISOLATION annotations
+ - x86/mm/pti: Add Warning when booting on a PCID capable CPU
+ - x86/entry/32: Add debug code to check entry/exit CR3
+ - x86/pti: Check the return value of pti_user_pagetable_walk_p4d()
+ - x86/pti: Check the return value of pti_user_pagetable_walk_pmd()
+ - perf/core: Make sure the ring-buffer is mapped in all page-tables
+ - x86/entry/32: Check for VM86 mode in slow-path check
+ - x86/mm: Remove in_nmi() warning from vmalloc_fault()
+ - x86/kexec: Allocate 8k PGDs for PTI
+ - x86/mm/pti: Clear Global bit more aggressively
+ - mm: Allow non-direct-map arguments to free_reserved_area()
+ - x86/mm/init: Pass unconverted symbol addresses to free_init_pages()
+ - x86/mm/init: Add helper for freeing kernel image pages
+ - x86/mm/init: Remove freed kernel image areas from alias mapping
+ - x86/mm/pti: Fix 32 bit PCID check
+ - x86/mm/pti: Don't clear permissions in pti_clone_pmd()
+ - x86/mm/pti: Clone kernel-image on PTE level for 32 bit
+ - x86/relocs: Add __end_rodata_aligned to S_REL
+ - x86/mm/pti: Move user W+X check into pti_finalize()
+ - x86/efi: Load fixmap GDT in efi_call_phys_epilog()
+ - x86/efi: Load fixmap GDT in efi_call_phys_epilog() before setting %cr3
+ - x86/mm/doc: Clean up the x86-64 virtual memory layout descriptions
+ - x86/mm/doc: Enhance the x86-64 virtual memory layout descriptions
+ - x86/entry/32: Clear the CS high bits
+ - x86/mm: Move LDT remap out of KASLR region on 5-level paging
+ - x86/ldt: Unmap PTEs for the slot before freeing LDT pages
+ - x86/ldt: Remove unused variable in map_ldt_struct()
+ - x86/mm: Fix guard hole handling
+ - x86/dump_pagetables: Fix LDT remap address marker

+ * Avoid potential memory corruption on HiSilicon SoCs (LP: #1819546)
+ * iommu/arm-smmu-v3: Avoid memory corruption from Hisilicon MSI payloads
+ * Ubuntu18.04.01: [Power9] power8 Compat guest(RHEL7.6) crashes during guest
+ boot with > 256G of memory (kernel/kvm) (LP: #1818645)
+ - [PATCH] KVM: PPC: Book3S HV: Don't truncate HPTE index in xlate function
+ + * Fix for dual Intel NVMe (LP: #1821961)
+ - SAUCE: nvme: Merge two quirk entries into one for Intel 760p/Pro 7600p
+ + * CVE-2017-5715
+ + * tools headers: Synchronize prctl.h ABI header
+ + - x86/spectre: Add missing family 6 check to microcode check
+ + - x86/speculation: Enable cross-thread spectre v2 STIBP mitigation
+ + - x86/speculation: Apply IBPB more strictly to avoid cross-process data leak
+ + - x86/speculation: Propagate information about RSB filling mitigation to sysfs
+ + - x86/speculation: Add RETPOLINE_AMD support to the inline asm CALL_NOSPEC
+ + variant
+ + - x86/retpoline: Make CONFIG_RETPOLINE depend on compiler support
+ + - x86/retpoline: Remove minimal retpoline support
+ + - x86/speculation: Update the TIF_SSBD comment
+ + - x86/speculation: Clean up specv2_parse_command_line()
+ + - x86/speculation: Remove unnecessary ret variable in cpu_show_common()
+ + - x86/speculation: Move STIBP/IBPB string conditionals out of
cpu_show_common()
+ + - x86/speculation: Disable STIBP when enhanced IBRS is in use
+ + - x86/speculation: Rename SSBD update functions
+ + - x86/speculation: Reorganize speculation control MSRs update
+ + - sched/smt: Make sched_smt_present track topology
+ + - x86/Kconfig: Select SCHED_SMT if SMP enabled
+ + - sched/smt: Expose sched_smt_present static key
+ + - x86/speculation: Rework SMT state change
+ + - x86/l1tf: Show actual SMT state
+ + - x86/speculation: Reorder the spec_v2 code
+ + - x86/speculation: Mark string arrays const correctly
+ + - x86/speculataion: Mark command line parser data __initdata
+ + - x86/speculation: Unify conditional spectre v2 print functions
+ + - x86/speculation: Add command line control for indirect branch speculation
+ + - x86/speculation: Prepare for per task indirect branch speculation control
+ + - x86/process: Consolidate and simplify switch_to_xtra() code
+ + - x86/speculation: Avoid __switch_to_xtra() calls
+ + - x86/speculation: Prepare for conditional IBPB in switch_mm()
+ + - ptrace: Remove unused ptrace_may_access_sched() and MODE_IBRS
+ + - x86/speculation: Split out TIF update
+ + - x86/speculation: Prevent stale SPEC_CTRL msr content
+ + - x86/speculation: Prepare arch_smt_update() for PRCTL mode
+ + - x86/speculation: Add prctl() control for indirect branch speculation
+ + - x86/speculation: Enable prctl mode for specv2_user
+ + - x86/speculation: Add seccomp Spectre v2 user space protection mode
+ + - x86/speculation: Provide IBPB always command line options
+ + - kvm: svm: Ensure an IBPB on all affected CPUs when freeing a vmcb
+ + - x86/speculation: Change misspelled STIBP to STIBP
Open Source Used In 5GaaS Edge AC-4  19352

+  - x86/speculation: Add support for STIBP always-on preferred mode
+  - x86, modpost: Replace last remnants of RETPOLINE with CONFIG_RETPOLINE
+  - s390: remove closing punctuation from spectre messages
+  - x86/speculation: Simplify the CPU bug detection logic
+
+  * CVE-2018-3639
+  - x86/bugs: Add AMD's variant of SSB_NO
+  - x86/bugs: Add AMD's SPEC_CTRL MSR usage
+  - x86/bugs: Switch the selection of mitigation from CPU vendor to CPU features
+  - x86/bugs: Update when to check for the LS_CFG SSBD mitigation
+  - x86/bugs: Fix the AMD SSBD usage of the SPEC_CTRL MSR
+  - KVM: x86: SVM: Call x86_spec_ctrl_set_guest/host() with interrupts disabled
+
+  * [Ubuntu] vfio-ap: add subsystem to matrix device to avoid libudev failures
+    (LP: #1818854)
+  - s390: vfio_ap: link the vfio_ap devices to the vfio_ap bus subsystem
+
+  * Kernel regularly logs: Bluetooth: hci0: last event is not cmd complete
+    (0x0f) (LP: #1748565)
+  - Bluetooth: Fix unnecessary error message for HCI request completion
+
+  * HiSilicon HNS ethernet broken in 4.15.0-45 (LP: #1818294)
+  - net: hns: Fix WARNING when hns modules installed
+
+  * rtl8723be wifi does not work under linux-modules-extra-4.15.0-33-generic
+    (LP: #1788997)
+  - SAUCE: Revert "rtlwifi: cleanup 8723be ant_sel definition"
+
+  * Crash from :i915 module with 4.15.0-46-generic using multi-display
+    (LP: #1819486)
+  - SAUCE: Revert "drm/i915: Fix hotplug irq ack on i965/g4x"
+
+  * kernel linux-image-4.15.0-44 not booting on Hyperv Server 2008R2
+    (LP: #1814069)
+  - hv/netvsc: fix handling of fallback to single queue mode
+  - hv/netvsc: Fix NULL dereference at single queue mode fallback
+
+  * Lenovo ideapad 330-15ICH Wifi rfkill hard blocked (LP: #1811815)
+  - platform/x86: ideapad: Add ideapad 330-15ICH to no_hw_rfkill
+
+  * Qualcomm Atheros QCA9377 wireless does not work (LP: #1818204)
+  - platform/x86: ideapad-laptop: Add Ideapad 530S-14ARR to no_hw_rfkill list
+
+  * fscache: jobs might hang when fscache disk is full (LP: #1821395)
+  - fscache: fix race between enablement and dropping of object
+
+  * hns3: fix oops in hns3_clean_rx_ring() (LP: #1821064)
+  - net: hns3: add dma_rmb() for rx description
- Hard lockup in 2 CPUs due to deadlock in cpu_stoppers (LP: #1821259)
- stop_machine: Disable preemption after queuing stopper threads
- stop_machine: Atomically queue and wake stopper threads

- tcm_loop.ko: move from modules-extra into main modules package
  (LP: #1817786)
- [Packaging] move tcm_loop.lo to main linux-modules package

- tcmu user space crash results in kernel module hang. (LP: #1819504)
  - scsi: tcmu: delete unused __wait
  - scsi: tcmu: track nl commands
  - scsi: tcmu: simplify nl interface
  - scsi: tcmu: add module wide block/reset_netlink support

- Intel XL710 - i40e driver does not work with kernel 4.15 (Ubuntu 18.04)
  (LP: #1779756)
  - i40e: Fix for Tx timeouts when interface is brought up if DCB is enabled
  - i40e: prevent overlapping tx_timeout recover

- some codecs stop working after S3 (LP: #1820930)
  - ALSA: hda - Enforces runtime_resume after S3 and S4 for each codec

- i40e xps management broken when > 64 queues/cpus (LP: #1820948)
  - i40e: Do not allow use more TC queue pairs than MSI-X vectors exist
  - i40e: Fix the number of queues available to be mapped for use

- 4.15 s390x kernel BUG at /build/linux-Gycr4Z/linux-4.15.0/drivers/block/virtio_blk.c:565! (LP: #1788432)
  - virtio/s390: avoid race on vcdev->config
  - virtio/s390: fix race in ccw_io_helper()

- [SRU][B/B-OEM/C/D] Fix AMD IOMMU NULL dereference (LP: #1820990)
  - iommu/amd: Fix NULL dereference bug in match_hid_uid

- New Intel Wireless-AC 9260 [8086:2526] card not correctly probed in Ubuntu system (LP: #1821271)
  - iwlwifi: add new card for 9260 series

- Add support for MAC address pass through on RTL8153-BD (LP: #1821276)
  - r8152: Add support for MAC address pass through on RTL8153-BD
  - r8152: Fix an error on RTL8153-BD MAC Address Passthrough support

-- Andrea Righi <andrea.righi@canonical.com> Tue, 02 Apr 2019 18:31:55 +0200

* linux (4.15.0-47.50) bionic; urgency=medium
* linux: 4.15.0-47.50 -proposed tracker (LP: #1819716)
+ * Packaging resync (LP: #1786013)
  + [Packaging] resync getabis
  + [Packaging] update helper scripts
  + [Packaging] resync retpoline extraction
+ * C++ demangling support missing from perf (LP: #1396654)
  + [Packaging] fix a mistype
+ * arm-smmu-v3 arm-smmu-v3.3.auto: CMD_SYNC timeout (LP: #1818162)
  + iommu/arm-smmu-v3: Fix unexpected CMD_SYNC timeout
+ * Crash in nvme_irq_check() when using threaded interrupts (LP: #1818747)
  + nvme-pci: fix out of bounds access in nvme_cqe_pending
+ * CVE-2019-9213
  + mm: enforce min addr even if capable() in expand_downwards()
+ * CVE-2019-3460
  + Bluetooth: Check L2CAP option sizes returned from l2cap_get_conf_opt
+ * amdgpu with mst WARNING on blanking (LP: #1814308)
  + drm/amd/display: Don't use dc_link in link_encoder
  + drm/amd/display: Move wait for hpd ready out from edp power control.
  + drm/amd/display: eDP sequence BL off first then DP blank.
  + drm/amd/display: Fix unused variable compilation error
  + drm/amd/display: Fix warning about misaligned code
  + drm/amd/display: Fix MST dp_blank REG_WAIT timeout
+ * tun/tap: unable to manage carrier state from userland (LP: #1806392)
  + tun: implement carrier change
+ * CVE-2019-8980
  + exec: Fix mem leak in kernel_read_file
+ * raw_skew in timer from the ubuntu_kernel_selftests failed on Bionic
  + (LP: #1811194)
  + selftest: timers: Tweak raw_skew to SKIP when ADJ_OFFSET/other clock
  + adjustments are in progress
+ * [Packaging] Allow overlay of config annotations (LP: #1752072)
  + [Packaging] config-check: Add an include directive
+ * CVE-2019-7308
  + bpf: move {prev_,}insn_idx into verifier env
  + bpf: move tmp variable into ax register in interpreter
  + bpf: enable access to ax register also from verifier rewrite
  + bpf: restrict map value pointer arithmetic for unprivileged
+ - bpf: restrict stack pointer arithmetic for unprivileged
+ - bpf: restrict unknown scalars of mixed signed bounds for unprivileged
+ - bpf: fix check_map_access smin_value test when pointer contains offset
+ - bpf: prevent out of bounds speculation on pointer arithmetic
+ - bpf: fix sanitation of alu op with pointer / scalar type from different
  paths
+ - bpf: add various test cases to selftests
+
+ * CVE-2017-5753
+ - bpf: properly enforce index mask to prevent out-of-bounds speculation
+ - bpf: fix inner map masking to prevent oob under speculation
+
+ * BPF: kernel pointer leak to unprivileged userspace (LP: #1815259)
+ - bpf/verifier: disallow pointer subtraction
+
+ * squashfs hardening (LP: #1816756)
+ - squashfs: more metadata hardening
+ - squashfs metadata 2: electric boogaloo
+ - squashfs: more metadata hardening
+ - Squashfs: Compute expected length from inode size rather than block length
+
+ * efi/arm/arm64: Allow SetVirtualAddressMap() to be omitted (LP: #1814982)
+ - efi/arm/arm64: Allow SetVirtualAddressMap() to be omitted
+
+ * Update ENA driver to version 2.0.3K (LP: #1816806)
+ - net: ena: update driver version from 2.0.2 to 2.0.3
+ - net: ena: fix race between link up and device initialization
+ - net: ena: fix crash during failed resume from hibernation
+
+ * ipset kernel error: 4.15.0-43-generic (LP: #1811394)
+ - netfilter: ipset: Fix wraparound in hash:*net* types
+
+ * Silent "Unknown key" message when pressing keyboard backlight hotkey
  (LP: #1817063)
+ - platform/x86: dell-wmi: Ignore new keyboard backlight change event
+
+ * CVE-2018-18021
+ - arm64: KVM: Tighten guest core register access from userspace
+ - KVM: arm/arm64: Introduce vcpu_el1_is_32bit
+ - arm64: KVM: Sanitize PSTATE.M when being set from userspace
+
+ * CVE-2018-14678
+ - x86/entry/64: Remove %ebx handling from error_entry/exit
+
+ * CVE-2018-19824
+ - ALSA: usb-audio: Fix UAF decrement if card has no live interfaces in card.c
+
+ * CVE-2019-3459
+ Bluetooth: Verify that l2cap_get_conf_opt provides large enough buffer
+ * Bionic update: upstream stable patchset 2019-02-08 (LP: #1815234)
+ fork: unconditionally clear stack on fork
+ spi-s3c64xx: Fix system resume support
+ Input: elan_i2c - add ACPI ID for lenovo ideapad 330
+ Input: i8042 - add Lenovo LaVie Z to the i8042 reset list
+ Input: elan_i2c - add another ACPI ID for Lenovo Ideapad 330-15AST
+ kvm, mm: account shadow page tables to kmemcg
+ delayacct: fix crash in delayacct_bkio_end() after delayacct init failure
+ tracing: Fix double free of event_trigger_data
+ tracing: Fix possible double free in event_enable_trigger_func()
+ kthread, tracing: Don't expose half-written comm when creating kthreads
+ tracing/kprobes: Fix trace probe flags on enable_trace_kprobe() failure
+ tracing: Quiet gcc warning about maybe unused link variable
+ arm64: fix vmemmap BUILD_BUG_ON() triggering on vmemmap setups
+ mlxsw: spectrum_switchdev: Fix system resume support
+ Input: elan_i2c - add another ACPI ID for Lenovo Ideapad 330-15AST
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+ tracing: Quiet gcc warning about maybe unused link variable
+ arm64: fix vmemmap BUILD_BUG_ON() triggering on vmemmap setups
+ mlxsw: spectrum_switchdev: Fix port_vlan refcounting
+ kcov: ensure irq code sees a valid area
+ - xen/netfront: raise max number of slots in xennet_get_responses()
+ - skip LAYOUTRETURN if layout is invalid
+ ALSA: emu10k1: add error handling for snd_ctl_add
+ ALSA: fm801: add error handling for snd_ctl_add
+ NFSv4.1: Fix the client behaviour on NFS4ERR_SEQ_FALSE_RETRY
+ - nfsd: fix potential use-after-free in nfsd4_decode_getdeviceinfo
+ - vfio: platform: Fix reset module leak in error path
+ - vfio/mdev: Check globally for duplicate devices
+ - vfio/type1: Fix task tracking for QEMU vCPU hotplug
+ kernel/hung_task.c: show all hung tasks before panic
+ - mm: /proc/pid/pagemap: hide swap entries from unprivileged users
+ - mm: vmalloc: avoid racy handling of debugobjects in vmunmap
+ - mm/vmalloc: leak
+ rtc: ensure rtc_set_alarm fails when alarms are not supported
+ perf tools: Fix pmu events parsing rule
+ - netfilter: ipset: forbid family for hash:mac sets
+ - netfilter: ipset: List timing out entries with "timeout 1" instead of zero
+ irqchip/ls-iscsi: Map MSIs in the iommu
+ watchdog: da9063: Fix updating timeout value
+ - printk: drop in_num check from printk_safe_flush_on_panic()
+ - bpf, arm32: fix inconsistent naming about emit_a32_lsr_[r64,i64]
+ - ceph: fix alignment of rasize
+ - e1000e: Ignore TSYNCRXCTL when getting I219 clock attributes
+ - powerpc/lib: Adjust _balign inside string functions for PPC32
+ - powerpc/64s: Add barrier_nospec
+ - powerpc/eh: Fix use-after-release of EEH driver
+ - hvq_ocpa: don't set tb_ticks_per_usec in udrg_init_opal_common()
+ - powerpc/64s: Fix compiler store ordering to SLB shadow area
+ - RDMA/mad: Convert BUG_ONs to error flows
+ - lightnvm: pblk: warn in case of corrupted write buffer
+ - netfilter: nf_tables: check msg_type before nft_trans_set(trans)
+ - pfnfs: Don't release the sequence slot until we've processed layoutget on open
+ - disable loading f2fs module on PAGE_SIZE > 4KB
+ - f2fs: fix error path of move_data_page
+ - f2fs: fix to don't trigger writeback during recovery
+ - f2fs: fix to wait page writeback during revoking atomic write
+ - f2fs: Fix deadlock in shutdown ioctl
+ - f2fs: fix to detect failure of dquot_initialize
+ - f2fs: fix race in between GC and atomic open
+ - block, bfq: remove wrong lock in bfq_requests_merged
+ - usbip: usbip_detach: Fix memory, udev context and udev leak
+ - usbip: dynamically allocate idev by nports found in sysfs
+ - perf/x86/intel/uncore: Correct fixed counter index check in generic code
+ - perf/x86/intel/uncore: Correct fixed counter index check for NHM
+ - selftests/intel_pstate: Improve test, minor fixes
+ - selftests: memfd: return Kselftest Skip code for skipped tests
+ - selftests: intel_pstate: return Kselftest Skip code for skipped tests
+ - PCI: Fix devm_pci_alloc_host_bridge() memory leak
+ - iwwifi: pcie: fix race in Rx buffer allocator
+ - Bluetooth: hci_qca: Fix "Sleep inside atomic section" warning
+ - Bluetooth: btusb: Add a new Realtek 8723DE ID 2ff8:b011
+ - ASoC: dpcm: fix BE dai not hw_free and shutdown
+ - mfd: cros_ec: Fail early if we cannot identify the EC
+ - mwifiex: handle race during mwifiex_usb_disconnect
+ - wcore: sdio: check for valid platform device data before suspend
+ - media: tw686x: Fix incorrect vb2_mem_ops GFP flags
+ - media: videobuf2-core: don't call memop 'finish' when queueing
+ - Btrfs: don't return ino to ino cache if inode item removal fails
+ - Btrfs: don't BUG_ON() in btrfs_truncate_inode_items()
+ - btrfs: add barriers to btrfs_sync_log before log_commit_wait wakesups
+ - btrfs: qgroup: Finish rescan when hit the last leaf of extent tree
+ - x86/microcode: Make the late update update_lock a raw lock for RT
+ - PM / wakeup: Make s2idle_lock a RAW_SPINLOCK
+ - PCI: Prevent sysfs disable of device while driver is attached
+ - nvme-rdma: stop admin queue before freeing it
+ - nvme-pci: Fix AER reset handling
+ - ath: Add regulatory mapping for FCC3_ETSIC
+ - ath: Add regulatory mapping for ETSI8_WORLD
+ - ath: Add regulatory mapping for APL13_WORLD
+ - ath: Add regulatory mapping for APL2_FCCA
+ - ath: Add regulatory mapping for Uganda
+ - ath: Add regulatory mapping for Tanzania
+ - ath: Add regulatory mapping for Serbia
+ - ath: Add regulatory mapping for Bermuda
+ - ath: Add regulatory mapping for Bahamas
+ - powerpc/32: Add a missing include header
+ - powerpc/chrp/time: Make some functions static, add missing header include
+ - powerpc/powermac: Add missing prototype for note_bootable_part()
+ - powerpc/powermac: Mark variable x as unused
+ - powerpc: Add __printf verification to prom_printf
+ - spi: sh-msiot: Fix setting SIRMDR1.SYNCAC to match SITMDR1.SYNCAC
+ - powerpc/8xx: fix invalid register expression in head_8xx.S
+ - pinctrl: at91-pio4: add missing of_node_put
+ - bpf: powerpc64: pad function address loads with NOPs
+ - PCI: pciehp: Request control of native hotplug only if supported
+ - net: dsa: qca8k: Add support for QCA8334 switch
+ - mwifiex: correct histogram data with appropriate index
+ - ima: based on policy verify firmware signatures (pre-allocated buffer)
+ - drivers/perf: arm-ccn: don't log to dmesg in event_init
+ - spi: Add missing pm_runtime_put_noidle() after failed get
+ - fs: fscrypt: use unbound workqueue for decryption
+ - scsi: ufs: ufsdev: fix possible unclocked register access
+ - scsi: ufs: fix exception event handling
+ - scsi: zfcp: assert that the ERP lock is held when tracing a recovery trigger
+ - drm/nouveau/fifo/gk104+: poll for runlist update completion
+ - Bluetooth: btusb: add ID for LiteOn 04ca:301a
+ - rt: tp56586x: fix possible race condition
+ - rt: vr41xx: fix possible race condition
+ - rt: tp565910: fix possible race condition
+ - ALSA: emu10k1: Rate-limit error messages about page errors
+ - regulator: pfuze100: add .is_enable() for pfuze100_swb_regulator_ops
+ - md/raid1: add error handling of read error from FailFast device
+ - md: fix NULL dereference of mddev->pers in remove_and_add_spares()
+ - ixgbevf: fix MAC address changes through ixgbevf_set_mac()
+ - media: smiapp: fix timeout checking in smiapp_read_nvram
+ - net: ethernet: ti: cpow-phy-sel: check bus_find_device() ret value
+ - ALSA: usb-audio: Apply rate limit to warning messages in URB complete callback
+ - media: atomisp: ov2680: don't declare unused vars
+ - arm64: cmpwait: Clear event register before arming exclusive monitor
+ - HID: hid-plantronics: Re-resend Update to map button for PTT products
+ - arm64: dts: renesas: salvator-common: use audio-graph-card for Sound
+ - drm/radeon: fix mode_valid's return type
+ - drm/amdgpu: Remove VRAM from shared bo domains.
+ - powerpc/embedded6xx/hlwd-pic: Prevent interrupts from being handled by Starlet
+ - HID: i2c-hid: check if device is there before really probing
+ - EDAC, altera: Fix ARM64 build warning
+ - ARM: dts: stih407-pinctrl: Fix complain about IRQ_TYPE_NONE usage
+ - ARM: dts: emev2: Add missing interrupt-affinity to PMU node
+ - ARM: dts: sh73a0: Add missing interrupt-affinity to PMU node
+ - nvme: properly handle returned value nvme_reg_read
+ - i40e: free the skb after clearing the bitlock
+ - tty: Fix data race in tty_insert_flip_string_fixed_flag
+ - dma-iommu: Fix compilation when !CONFIG_IOMMU_DMA
- net: phy: phyclk: Release link GPIO
- media: rcar_jpu: Add missing clk_disable_unprepare() on error in jpu_open()
- libtta: Fix command retry decision
- ACPI / LPSS: Only call pwm_add_table() for Bay Trail PWM if PMIC HRV is 2
- media: media-device: fix ioctl function types
- media: saa7164: Fix driver name in debug output
- mtd: rawnand: fsl_ifc: fix FSL NAND driver to read all ONFI parameter pages
- brcmfnmac: Add support for bcm43364 wireless chipset
- s390/cpum_sfs: Add data entry sizes to sampling trailer entry
- perf: fix invalid bit in diagnostic entry
- bnxt_en: Check unsupported speeds in bnxt_update_link() on PF only.
- scsi: 3w-xxx: fix a missing-check bug
- scsi: 3w-xxxx: fix a missing-check bug
- scsi: megaraid: silence a static checker bug
- scsi: qedf: Set the UNLOADING flag when removing a vport
- staging: lustre: o2iblnd: fix race at kiblnd_connect_peer
- staging: lustre: o2iblnd: Fix FastReg map/unmap for MLX5
- thermal: exynos: fix setting rising_threshold for Exynos5433
- bpf: fix references to free_bpf_prog_info() in comments
- 12fs: avoid fsync() failure caused by EAGAIN in writepage()
- media: siano: get rid of __le32/__le16 cast warnings
- drm/atomic: Handling the case when setting old crtc for plane
- ALSA: hda/ca0132: fix build failure when a local macro is defined
- mmc: dw_mmc: update actual clock for mmc debugfs
- mmc: pwrseq: Use kmalloc_array instead of stack VLA
- dt-bindings: pinctrl: meson: add support for the Meson8m2 SoC
- spi: meson-spicc: Fix error handling in meson_spicc_probe()
- dt-bindings: net: meson-dwmac: new compatible name for AXG SoC
- backlight: pwm_bl: Don't use GPIOF_* with gpiod_get_direction
- stop_machine: Use raw spinlocks
- delayacct: Use raw_spinlocks
- memory: tegra: Do not handle spurious interrupts
- memory: tegra: Apply interrupts mask per SoC
- nvme: lightnvm: add granby support
- arm64: defconfig: Enable Rockchip io-domain driver
- igb: Fix queue selection on MAC filters on i210
- drm/gma500: fix psb_intel_lvsds_mode_valid()'s return type
- ipconfig: Correctly initialise ic_nameservers
- rsi: Fix 'invalid vdd' warning in mmc
- rsi: fix nommu_map_sg overflow kernel panic
- audit: allow not equal op for audit by executable
- staging: vchiq_core: Fix missing semaphore release in error case
- staging: lustre: llike: correct removalvattr detection
- staging: lustre: ldml: free resource when ldml_lock_create() fails.
- serial: core: Make sure compiler barfs for 16-byte earlycon names
- soc: imx: gpcv2: Do not pass static memory as platform data
- microblaze: Fix simpleImage format generation
- usb: hub: Don't wait for connect state at resume for powered-off ports
+ - crypto: authencesn - don't leak pointers to authenc keys
+ - crypto: authenc - don't leak pointers to authenc keys
+ - media: omap3isp: fix unbalanced dma_iommu_mapping
+ - regulator: Don't return or expect -errno from of_map_mode()
+ - scsi: scsi_dh: replace too broad "TP9" string with the exact models
+ - scsi: megaraid_sas: Increase timeout by 1 sec for non-RAID fastpath IOs
+ - media: atomisp: compat32: fix __user annotations
+ - media: si470x: fix __be16 annotations
+ - ASoC: topology: Fix bclk and fasync inversion in set_link_hw_format()
+ - ASoC: topology: Add missing clock gating parameter when parsing hw_configs
+ - drm: Add DP PSR2 sink enable bit
+ - drm/atomic-helper: Drop plane->fb references only for
+   drm_atomic_helper_shutdown()
+ - drm/dp/mst: Fix off-by-one typo when dump payload table
+ - block: reset bi_iter.bi_done after splitting bio
+ - random: mix rrand with entropy sent in from userspace
+ - squashfs: be more careful about metadata corruption
+ - ext4: fix inline data updates with checksums enabled
+ - ext4: fix check to prevent initializing reserved inodes
+ - PCI: xgene: Remove leftover pci_scan_child_bus() call
+ - RDMA/uverbs: Protect from attempts to create flows on unsupported QP
+ - net: qca8k: Force CPU port to its highest bandwidth
+ - net: qca8k: Enable RXMAC when bringing up a port
+ - net: qca8k: Add QCA8334 binding documentation
+ - net: qca8k: Allow overwriting CPU port setting
+ - ipv4: remove BUG_ON() from fib_compute_spec_dst
+ - net: fix amd-xgbe flow-control issue
+ - net: lan78xx: fix rx handling before first packet is send
+ - net: mdio-mux: bcm-iproc: fix wrong getter and setter pair
+ - NET: stmmac: align DMA stuff to largest cache line length
+ - tcp_bbr: fix bw probing to raise in-flight data for very small BDPs
+ - xen-netfront: wait xenbus state change when load module manually
+ - netlink: Do not subscribe to non-existent groups
+ - netlink: Don't shift with UB on nlk->ngroups
+ - tcp: do not force quickack when receiving out-of-order packets
+ - tcp: add max_quickacks param to tcp_increment_quickack and
+    tcp_enter_quickack_mode
+ - tcp: do not aggressively quick ack after ECN events
+ - tcp: refactor tcp_ecn_check_ce to remove sk type cast
+ - tcp: add one more quick ack after after ECN events
+ - mm: disallow mappings that conflict for devm_memremap_pages()
+ - drm/i915/ogl: Add Quirk for GLK NUC HDMI port issues.
+ - mm: check for SIGKILL inside dup_mmap() loop
+ - rxrpc: Fix terminal retransmission connection ID to include the channel
+ - ceph: fix use-after-free in ceph_statfs()
+ - lightnvm: proper error handling for pblk_bio_add_pages
+ - i2fs: don't drop dentry pages after fs shutdown
+ - selftests: filesystems: return Kselftest Skip code for skipped tests
+ - selftests/filesystems: devpts_pts included wrong header
+ - iwlfwifi: mvm: open BA session only when sta is authorized
+ - drm/amd/display: Do not program interrupt status on disabled crtc
+ - soc: qcom: smem: fix qcom_smem_set_global_partition()
+ - soc: qcom: smem: byte swap values properly
+ - pinctrl: msm: fix gpio-hog related boot issues
+ - net: mvpp2: Add missing VLAN tag detection
+ - drm/nouveaau: remove fence wait code from deferred client work handler
+ - drm/nouveaau/gem: lookup VMAs for buffers referenced by pushbuf ioctl
+ - clocksoure: Move inline keyword to the beginning of function declarations
+ - media: staging: atomisp: Comment out several unused sensor resolutions
+ - IB: Fix RDMA_RXE and INFINIBAND_RDMAVT dependencies for DMA_VIRT_OPS
+ - rsi: Add null check for virtual interfaces in wowlan config
+ - ARM: dts: stih410: Fix complain about IRQ_TYPE_NONE usage
+ - ARM: dts: imx53: Fix LDB OF graph warning
+ - soc/tegra: pmc: Don't allocate struct tegra_powergate on stack
+ - mlxsw: spectrum_router: Return an error for non-default FIB rules
+ - i40e: Add advertising 10G LR mode
+ - i40e: avoid overflow in i40e_ptp_adjfreq()
+ - ath10k: fix kernel panic while reading tpc_stats
+ - ASoC: fi_ssi: Use u32 variable type when using regmap_read()
+ - platform/x86: dell-smbios: Match on www.dell.com in OEM strings too
+ - staging: ks7010: fix error handling in ks7010_upload_firmware
+ - media: rc: mce_kbd decoder: low timeout values cause double keydowns
+ - ath10k: search all IEs for variant before falling back
+ - PCI/ASPM: Disable ASPM L1.2 Substate if we don't have LTR
+ - ARM: dts: imx6qdl-wandboard: Let the codec control MCLK pinctrl
+ - nvmegpu: Avoid reclaim while holding locks taken in MMU notifier
+ - i2c: rcar: handle RXDMA HW behaviour on Gen3
+ - gpio: uniphier: set legitimate irq trigger type in .to_irq hook
+ - tcp: ack immediately when a cwr packet arrives
+ - ACPI: AML Parser: ignore control method status in module-level code

* Bionic update: upstream stable patchset 2019-02-05 (LP: #1814813)
+ - MIPS: ath79: fix register address in ath79_ddr_wb_flush()
+ - MIPS: Fix off-by-one in pci_resource_to_user()
+ - xen/PVH: Set up GS segment for stack canary
+ - drm/nouveaau/drm/nouveaau: Fix runtime PM leak in nv50 DispAtomicCommit()
+ - drm/nouveaau: Set DRIVER_ATOMIC cap earlier to fix debugfs
+ - bonding: set default miiomon value for non-arp modes if not set
+ - ip: hash fragments consistently
+ - ip: in cmsg IPv6 ORIG_DSTADDR call skb_may_pull
+ - net/mlx4_core: Save the qpn from the input modifier in RST2INIT wrapper
+ - net: skb_segment() should not return NULL
+ - net/mlx5: Adjust clock overflow work period
+ - net/mlx5e: Don't allow aRFS for encapsulated packets
+ - net/mlx5e: Fix quota counting in aRFS expire flow
+ - net/ipv6: Fix linklocal to global address with VRF
+ - net: phy: consider PHY_IGNORE_INTERRUPT in phy_start_aneg_priv
+ - sock: fix sg page frag coalescing in sk_alloc_sg
+ - rtnetlink: add rtnl_link_state check in rtnl_configure_link
+ - vxlan: add new fdb alloc and create helpers
+ - vxlan: make netlink notify in vxlan_fdb_destroy optional
+ - vxlan: fix default fdb entry netlink notify ordering during netdev create
+ - tcp: fix dctcp delayed ACK schedule
+ - tcp: helpers to send special DCTCPack
+ - tcp: do not cancel delay-AcK on DCTCP special ACK
+ - tcp: do not delay ACK in DCTCP upon CE status change
+ - staging: speakup: fix wraparound in uaccess length check
+ - usb: cdc_acm: Add quirk for Castles VEGA3000
+ - usb: core: handle hub C_PORT_OVER_CURRENT condition
+ - usb: dwc2: Fix DMA alignment to start at allocated boundary
+ - usb: gadget: f_fs: Only return delayed status when len is 0
+ - driver core: Partially revert "driver core: correct device’s shutdown order"
+ - can: xilinx_can: fix RX loop if RXNEMP is asserted without RXOK
+ - can: xilinx_can: fix power management handling
+ - can: xilinx_can: fix recovery from error states not being propagated
+ - can: xilinx_can: fix device dropping off bus on RX overrun
+ - can: xilinx_can: keep only 1-2 frames in TX FIFO to fix TX accounting
+ - can: xilinx_can: fix incorrect clear of non-processed interrupts
+ - can: xilinx_can: fix RX overflow interrupt not being enabled
+ - can: peak_canfd: fix firmware < v3.3.0: limit allocation to 32-bit DMA addr only
+ - can: m_can.c: fix setup of CCCR register: clear CCCR NISO bit before checking can.ctrlmode
+ - turn off -Wattribute-alias
+ - net-next/hinic: fix a problem in hinic_xmit_frame()
+ - net/mlx5e: Refine ets validation function
+ - nfp: flower: ensure dead neighbour entries are not offloaded
+ - usb: gadget: Fix OS descriptors support
+ - ACPI: AML Parser: ignore dispatcher error status during table load
+ + * installer does not support iSCSI iBFT (LP: #1817321)
+ + - d-i: add iscsi_ibft to scsi-modules
+ + + CVE-2019-7222
+ + - KVM: x86: work around leak of uninitialized stack contents (CVE-2019-7222)
+ + + CVE-2019-7221
+ + - KVM: nVMX: unconditionally cancel preemption timer in free_nested
+ + (CVE-2019-7221)
+ + + CVE-2019-6974
+ + - kvm: fix kvm_ioctl_create_device() reference counting (CVE-2019-6974)
+ * Regular D-state processes impacting LXD containers (LP: #1817628)
+ - mm: do not stall register_shrinker()
+
+ * hns3 nic speed may not match optical port speed (LP: #1817969)
+ - net: hns3: Config NIC port speed same as that of optical module
+
+ * [Hyper-V] srcu: Lock srcu_data structure in srcu_gp_start() (LP: #1802021)
+ - srcu: Prohibit call_srcu() use under raw spinlocks
+ - srcu: Lock srcu_data structure in srcu_gp_start()
+
+ * libdas disks can have non-unique by-path names (LP: #1817784)
+ - scsi: libdas: Fix rphy phy_identifier for PHYs with end devices attached
+
+ * Bluetooth not working (Intel CyclonePeak) (LP: #1817518)
+ - Bluetooth: btusb: Add support for Intel bluetooth device 8087:0029
+
+ * CVE-2019-8912
+ - net: crypto set sk to NULL when af_alg_release.
+ - net: socket: set sock->sk to NULL after calling proto_ops::release()
+
+ * Trackpad is not recognized. (LP: #1817200)
+ - pinctrl: cannonlake: Fix gpio base for GPP-E
+
+ * [ALSA] [PATCH] System76 darp5 and oryp5 fixups (LP: #1815831)
+ - ALSA: hda/realtek - Headset microphone support for System76 darp5
+ - ALSA: hda/realtek - Headset microphone and internal speaker support for System76 oryp5
+
+ * Constant noise in the headphone on Lenovo X1 machines (LP: #1817263)
+ - ALSA: hda/realtek: Disable PC beep in passthrough on al285
+
+ * AC adapter status not detected on Asus ZenBook UX410UAK (LP: #1745032)
+ - Revert "ACPI / battery: Add quirk for Asus GL502VSK and UX305LA"
+ - ACPI / AC: Remove initializer for unused ident dmi_system_id
+ - ACPI / battery: Remove initializer for unused ident dmi_system_id
+ - ACPI / battery: Add handling for devices which wrongly report discharging state
+ - ACPI / battery: Ignore AC state in handle_discharging on systems where it is broken
+
+ * TPM intermittently fails after cold-boot (LP: #1762672)
+ - tpm: fix intermittent failure with self tests
+
+ * qlcnic: Firmware aborts/hangs in QLogic NIC (LP: #1815033)
+ - qlcnic: fix Tx descriptor corruption on 82xx devices
+
+ -- Khalid Elmously <khalid.elmously@canonical.com>  Wed, 13 Mar 2019 04:37:49 +0000
Linux (4.15.0-46.49) Bionic; urgency=medium

* linux: 4.15.0-46.49 - proposed tracker (LP: #1814726)

* mprotect fails on ext4 with dax (LP: #1799237)
  - x86/speculation/l1tf: Exempt zeroed PTEs from inversion

* kernel BUG at /build/linux-vxxS7y/linux-4.15.0/mm/slub.c:296! (LP: #1812086)
  - iscsi target: fix session creation failure handling
  - scsi: iscsi: target: Set conn->sess to NULL when iscsi_login_set_conn_values fails
  - scsi: iscsi: target: Fix conn_ops double free

* user_copy in user from ubuntu_kernel_selftests failed on KVM kernel
  - (LP: #1812198)
  - selftests: user: return Kselftest Skip code for skipped tests
  - selftests: kselftest: change KSFT_SKIP=4 instead of KSFT_PASS
  - selftests: kselftest: Remove outdated comment

* RTL8822BE WiFi Disabled in Kernel 4.18.0-12 (LP: #1806472)
  - SAUCE: staging: rtlwifi: allow RTLWIFI_DEBUG_ST to be disabled
  - [Config] CONFIG_RTLWIFI_DEBUG_ST=n
  - SAUCE: Add r8822be to signature inclusion list

* kernel oops in bcache module (LP: #1793901)
  - SAUCE: bcache: never writeback a discard operation

* CVE-2018-18397
  - userfaultfd: use ENOENT instead of EFAULT if the atomic copy user fails
  - userfaultfd: shmem: allocate anonymous memory for MAP_PRIVATE shmem
  - userfaultfd: shmem/hugetlbfs: only allow to register VM_MAYWRITE vmas
  - userfaultfd: shmem: add i_size checks
  - userfaultfd: shmem: UFFDIO_COPY: set the page dirty if VM_WRITE is not set

* Ignore "incomplete report" from Elan touchpanels (LP: #1813733)
  - HID: i2c-hid: Ignore input report if there's no data present on Elan touchpanels

* Vsock connect fails with ENODEV for large CID (LP: #1813934)
  - vhost/vsock: fix vhost vsock cid hashing inconsistent

* SRU: Fix thinkpad 11e 3rd boot hang (LP: #1804604)
  - ACPI / LPSS: Force LPSS quirks on boot

* Bionic update: upstream stable patchset 2019-01-17 (LP: #1812229)
  - scsi: sd_zbc: Fix variable type and bogus comment
  - KVM/Eventfd: Avoid crash when assign and deassign specific eventfd in
+ parallel.
+ - x86/apm: Don't access __preempt_count with zeroed fs
+ - x86/events/intel/ds: Fix bts_interrupt_threshold alignment
+ - x86/MCE: Remove min interval polling limitation
+ - fat: fix memory allocation failure handling of match_strdup()
+ - ALSA: hda/realtek - Add Panasonic CF-SZ6 headset jack quirk
+ - ARCv2: [plat-hsdk]: Save accl reg pair by default
+ - ARC: Fix CONFIG_SWAP
+ - ARC: configs: Remove CONFIG_INITRAMFS_SOURCE from defconfig
+ - ARC: mm: allow mprotect to make stack mappings executable
+ - mm: memcg: fix use after free in mem_cgroup_iter()
+ - mm/huge_memory.c: fix data loss when splitting a file pmd
+ - cpufreq: intel_pstate: Register when ACPI PCCH is present
+ - vfio/pci: Fix potential Spectre v1
+ - stop_machine: Disable preemption when waking two stopper threads
+ - drm/i915: Fix hotplug irq ack on i965/g4x
+ - drm/nouveau: Use drm_connector_list_iter_* for iterating connectors
+ - drm/nouveau: Avoid looping through fake MST connectors
+ - gen_stats: Fix netlink stats dumping in the presence of padding
+ - ipv4: Return EINVAL when ping_group_range sysctl doesn't map to user ns
+ - ipv6: fix useless rol32 call on hash
+ - ipv6: ila: select CONFIG_DST_CACHE
+ - lib/rhashtable: consider param->min_size when setting initial table size
+ - net: diag: Don't double-free TCP_NEW_SYN_RECV sockets in tcp_abort
+ - net: Don't copy pfmemalloc flag in __copy_skb_header()
+ - skb: Unconditionally copy pfmemalloc in __skb_clone()
+ - net/ipv4: Set oif in fib_compute_spec_dst
+ - net/ipv4: Use CONFIG_DST_CACHE
+ - qmi_wwan: add support for Quectel EG91
+ - tg3: Add higher cpu clock for 5762.
+ - hv_netvsc: Fix napi reschedule while receive completion is busy
+ - net/mlx4_en: Don't reuse RX page when XDP is set
+ - net: systemport: Fix CRC forwarding check for SYSTEMPORT Lite
+ - ipv6: make DAD fail with enhanced DAD when nonce length differs
+ - net: usb: asix: replace mii_nway_restart in resume path
+ - alpha: fix osf_wait4() breakage
+ - cxf_getfile(): fix double-put() on alloc_file() failures
+ - powerpc/powerpc: Fix save/restore of SPRG3 on entry/exit from stop (idle)
+ - xhci: Fix perceived dead host due to runtime suspend race with event handler
+ - KVM: irqfd: fix race between EPOLLHUP and irq_bypass_register_consumer
+ - x86/kvmclock: set pvti_cpu0_va after enabling kvmclock
+ - ALSA: hda/realtek - Yet another Clevo P950 quirk entry
+ - drm/amdgpu: Reserve VM root shared fence slot for command submission (v3)
+ - rhashtable: add restart routine in rhashtable_free_and_destroy()
+ - sch: fq_codel: zero q->flows_cnt when fq_codel_init fails
+ - sctp: introduce sctp_dsr_mtu
+ - sctp: fix the issue that pathmtu may be set lower than MINSEGMENT
+ - net: aquantia: vlan unicast address list correct handling
+ - drm_mode_create_lease_ioctl(): fix open-coded filp_clone_open()

+ - compiler-gcc.h: Add __attribute__((gnu_inline)) to all inline declarations
+ - x86/asm: Add __ASM_ARG* constants for argument registers to <asm/asm.h>
+ - x86/paravirt: Make native_save_files() extern inline
+ - Btrfs: fix duplicate extents after fsync of file with prealloc extents
+ - cpufreq / CPPC: Set platform specific transition_delay_us
+ - PCI: exynos: Fix a potential init_clk_resources NULL pointer dereference
+ - alx: take rtl before calling __alx_open from resume
+ - atm: Preserve value of skb->true_size when accounting to vcc
+ - atm: zatm: Fix potential Spectre v1
+ - ipv6: sr: fix passing wrong flags to crypto_alloc_sha3()
+ - ipvlan: fix IFLA_MTU ignored on NEWLINK
+ - ixgbe: split XDP_TX tail and XDP_REDIRECT map flushing
+ - net: dccp: avoid crash in ccid3_rx_send_feedback()
+ - net: dccp: switch rx_tstamp_last_feedback to monotonic clock
+ - net: fix use-after-free in GRO with ESP
+ - net: macb: Fix ptp time adjustment for large negative delta
+ - net/mlx5e: Avoid dealing with vport representors if not being e-switch manager
+ - net/mlx5: E-Switch, Avoid setup attempt if not being e-switch manager
+ - net/mlx5: Fix command interface race in polling mode
+ - net/mlx5: Fix incorrect raw command length parsing
+ - net/mlx5: Fix required capability for manipulating MPFS
+ - net/mlx5: Fix wrong size allocation for QoS ETC TC register
+ - net: mvneta: fix the Rx desc DMA address in the Rx path
+ - net/packet: fix use-after-free
+ - net/sched: blackhole: tell upper qdisc about dropped packets
+ - net: sungem: fix rx checksum support
+ - net/tcp: Fix socket lookups with SO_BINDTODEVICE
+ - qede: Adverstise software timestamp caps when PHC is not available.
+ - qed: Fix setting of incorrect eswitch mode.
+ - qed: Fix use of incorrect size in memcpy call.
+ - qed: Limit msix vectors in kdump kernel to the minimum required count.
+ - r8152: napi hangup fix after disconnect
+ - stmmac: fix DMA channel hang in half-duplex mode
+ - strparser: Remove early eaten to fix full tcp receive buffer stall
+ - tcp: fix Fast Open key endianness
+ - tcp: prevent bogus FRTO undos with non-SACK flows
+ - vhost_net: validate sock before trying to put its fd
+ - VSOCK: fix loopback on big-endian systems
+ - net: cxgb3_main: fix potential Spectre v1
+ - rtlwifi: Fix kernel Oops "Fw download fail!!!"
+ - rtlwifi: rtl8821ae: fix firmware is not ready to run
+ - net: lan78xx: Fix race in tx pending skb size calculation
+ - crypto: af_alg - Initialize sg_num_bytes in error code path
+ - mtd: rawnand: denali_dt: set clk_x_rate to 200 MHz unconditionally
+ - PCI: hv: Disable/enable IRQs rather than BH in hv_compose_msi_msg()
+ - netfilter: etables: reject non-bridge targets
+ - reiserfs: fix buffer overflow with long warning messages
+ - KEYS: DNS: fix parsing multiple options
+ - tls: Stricter error checking in zero copy sendmsg path
+ - autofs: fix slab out of bounds read in getname_kernel()
+ - nsh: set mac len based on inner packet
+ - bdi: Fix another oops in wb_workfn()
+ - rds: avoid unecessary cong_update in loop transport
+ - net/nfc: Avoid stalls when nfc_alloc_send_skb() returned NULL.
+ - string: drop __must_check from strscpy() and restore strscpy() usages in
cgroup
+ - nfsd: COPY and CLONE operations require the saved filehandle to be set
+ - net/sched: act_ife: fix recursive lock and idr leak
+ - net/sched: act_ife: preserve the action control in case of error
+ - hinic: reset irq affinity before freeing irq
+ - nfp: flower: fix mpls ether type detection
+ - net: macb: initialize bp->queues[0].bp for at91rm9200
+ - enic: do not overwrite error code
+ - virtio_net: fix memory leak in XDP_REDIRECT
+ - netfilter: ipv6: nf_defrag: drop skb dst before queueing
+ - ipv6: initialize tbl->entries after allocation
+ - ipv6: initialize tbl->entries in ip_vs_lblc_init_svc()
+ - bpf: enforce correct alignment for instructions
+ - bpf, arm32: fix to use bpf_jit_binary_lock_ro api
+
* Fix non-working pinctrl-intel (LP: #1811777)
* pinctrl: intel: Implement intel_gpio_get_direction callback
* pinctrl: intel: Do pin translation in other GPIO operations as well

* ip6_gre: fix tunnel list corruption for x-netns (LP: #1812875)
* ip6_gre: fix tunnel list corruption for x-netns

* Userspace break as a result of missing patch backport (LP: #1813873)
* tty: Don't hold ldisc lock in tty_reopen() if ldisc present

* kvm_stat: missing python dependency (LP: #1798776)
* tools/kvm_stat: fix python3 issues
* tools/kvm_stat: switch to python3

* [SRU] Fix Xorg crash with nomodeset when BIOS enable 64-bit fb addr
  (LP: #1812797)
* vgaarb: Add support for 64-bit frame buffer address
* vgaarb: Keep adding VGA device in queue

* Fix non-working QCA Rome Bluetooth after S3 (LP: #1812812)
* USB: Add new USB LPM helpers
+   - USB: Consolidate LPM checks to avoid enabling LPM twice
+   +   * ptrace-tm-spd-gpr in powerpc/ptrace from ubuntu_kerenl_selftests failed on
+   +   Bionic P8 (LP: #1813127)
+   +   - selftests/powerpc: Fix ptrace tm failure
+   +   + [SRU] IO's are issued with incorrect Scatter Gather Buffer (LP: #1795453)
+   +   - scsi: megaraid_sas: Use 63-bit DMA addressing
+   +   + * Consider enabling CONFIG_NETWORK_PHY_TIMESTAMPING (LP: #1785816)
+   +   +   - [Config] Enable timestamping in network PHY devices
+   +   +   * CVE-2018-19854
+   +   +   - crypto: user - fix leaking uninitialized memory to userspace
+   +   +   + x86/mm: Found insecure W+X mapping at address (ptrval)/0xc00a0000
+   +   +   + (LP: #1813532)
+   +   +   - x86/mm: Do not warn about PCI BIOS W+X mappings
+   +   +   + * CVE-2019-6133
+   +   +   - forkl: record start_time late
+   +   +   + * Fix not working Goodix touchpad (LP: #1811929)
+   +   +   - HID: i2c-hid: Disable runtime PM on Goodix touchpad
+   +   +   + * bluetooth controller not detected with 4.15 kernel (LP: #1810797)
+   +   +   - SAUCE: btqcomsmd: introduce BT_QCOMSMD_HACK
+   +   +   - [Config] arm64: snapdragon: BT_QCOMSMD_HACK=y
+   +   +   + * X1 Extreme: only one of the two SSDs is loaded (LP: #1811755)
+   +   +   - nvme-core: rework a NQN copying operation
+   +   +   - nvme: pad fake subsys NQN vid and ssvid with zeros
+   +   +   - nvme: introduce NVME_QUIRK_IGNORE_DEV_SUBNQN
+   +   +   + * Crash on "ip link add foo type ipip" (LP: #1811803)
+   +   +   - SAUCE: fan: Fix NULL pointer dereference
+   +   +   + -- Khalid Elmously <khalid.elmously@canonical.com>  Wed, 06 Feb 2019 04:57:21 +0000
+   +   +   + linux (4.15.0-45.48) bionic; urgency=medium
+   +   +   + * linux: 4.15.0-45.48 -proposed tracker (LP: #1813779)
+   +   +   + * External monitors does not work anymore 4.15.0-44 (LP: #1813663)
+   +   +   - SAUCE: Revert "drm/i915/dp: Send DPCD ON for MST before phy_up"
+   +   +   + * kernel 4.15.0-44 cannot mount ext4 fs with meta_bg enabled (LP: #1813727)
+   +   +   - ext4: fix false negatives *and* false positives in ext4_check_descriptors()
linux (4.15.0-44.47) bionic; urgency=medium

* linux: 4.15.0-44.47 -proposed tracker (LP: #1811419)

* Packaging resync (LP: #1786013)
  - [Packaging] update helper scripts

* CPU hard lockup with rigorous writes to NVMe drive (LP: #1810998)
  - blk-wbt: pass in enum wbt_flags to get_rq_wait()
  - blk-wbt: Avoid lock contention and thundering herd issue in wbt_wait
  - blk-wbt: move disable check into get_limit()
  - blk-wbt: use wq_has_sleeper() for wq active check
  - blk-wbt: fix has-sleeper queueing check
  - blk-wbt: abstract out end IO completion handler
  - blk-wbt: improve waking of tasks

* To reduce the Realtek USB cardreader power consumption (LP: #1811337)
  - mmc: sdhci: Disable 1.8v modes (HS200/HS400/UHS) if controller can't support
  - 1.8v
  - mmc: core: Introduce MMC_CAP_SYNC_RUNTIME_PM
  - mmc: rtsx_usb_sdmmc: Don't runtime resume the device while changing led
  - mmc: rtsx_usb: Use MMC_CAP2_NO_Sdio
  - mmc: rtsx_usb: Enable MMC_CAP_ERASE to allow erase/discard/trim requests
  - mmc: rtsx_usb_sdmmc: Re-work runtime PM support
  - mmc: rtsx_usb_sdmmc: Re-work card detection/removal support
  - memstick: rtsx_usb_ms: Add missing pm_runtime_disable() in probe function
  - misc: rtsx_usb: Use USB remote wakeup signaling for card insertion detection
  - memstick: Prevent memstick host from getting runtime suspended during card
  - detection
  - memstick: rtsx_usb_ms: Use ms_dev() helper
  - memstick: rtsx_usb_ms: Support runtime power management

* Support non-strict iommu mode on arm64 (LP: #1806488)
  - iommu/io-pgtable-arm: Fix race handling in split_blk_unmap()
  - iommu/arm-smmu-v3: Implement flush_iotlb_all hook
  - iommu/dma: Add support for non-strict mode
  - iommu: Add "iommu.strict" command line option
  - iommu/io-pgtable-arm: Add support for non-strict mode
  - iommu/arm-smmu-v3: Add support for non-strict mode
  - iommu/io-pgtable-arm-v7: Add support for non-strict mode
  - iommu/arm-smmu: Support non-strict mode

* ELAN900C:00 04F3:2844 touchscreen doesn't work (LP: #1811335)
  - pinctrl: cannonlake: Fix community ordering for H variant
  - pinctrl: cannonlake: Fix HOSTSW_OWN register offset of H variant
+ Add Cavium ThunderX2 SoC UNCORE PMU driver (LP: #1811200)
+ perf: Export perf_event_update_userpage
+ Documentation: perf: Add documentation for ThunderX2 PMU uncore driver
+ drivers/perf: Add Cavium ThunderX2 SoC UNCORE PMU driver
+ [Config] New config CONFIG_THUNDERX2_PMU=m
+ 
+ Update hisilicon SoC-specific drivers (LP: #1810457)
+ SAUCE: Revert "net: hns3: Updates RX packet info fetch in case of multi BD"
+ Revert "UBUNTU: SAUCE: {topost} net: hns3: separate roce from nic when resetting"
+ Revert "UBUNTU: SAUCE: {topost} net: hns3: Use roce handle when calling roce callback function"
+ Revert "UBUNTU: SAUCE: {topost} net: hns3: Add calling roce callback function when link status change"
+ Revert "UBUNTU: SAUCE: {topost} net: hns3: optimize the process of notifying roce client"
+ Revert "UBUNTU: SAUCE: {topost} net: hns3: Add pf reset for hip08 RoCE"
+ scsi: hisi_sas: Remove depends on HAS_DMA in case of platform dependency
+ ethernet: hisilicon: hns: hns_dsaf_mac: Use generic eth_broadcast_addr
+ scsi: hisi_sas: consolidate command check in hisi_sas_get_ata_protocol()
+ scsi: hisi_sas: remove some unneeded structure members
+ scsi: hisi_sas: Introduce hisi_sas_phy_set_linkrate()
+ net: hns: Fix the process of adding broadcast addresses to tcam
+ net: hns3: remove redundant variable 'protocol'
+ scsi: hisi_sas: Drop hisi_sas_slot_abort()
+ net: hns: Make many functions static
+ net: hns: make hns_dsaf_roce_reset non static
+ net: hisilicon: hns: Replace mdelay() with msleep()
+ net: hns3: fix return value error while hclge_cmd_csq_clean failed
+ net: hns: remove redundant variables 'max_frm' and 'tmp_mac_key'
+ net: hns: Mark expected switch fall-through
+ net: hns3: Mark expected switch fall-through
+ net: hns3: Remove tx ring BD len register in hns3_enet
+ net: hns: modify variable type in hns_nic_reuse_page
+ net: hns: use eth_get_headlen interface instead of hns_nic_get_headlen
+ net: hns3: modify variable type in hns3_nic_reuse_page
+ net: hns3: Fix for vf vlan delete failed problem
+ net: hns3: Fix for multicast failure
+ net: hns3: Fix error of checking used vlan id
+ net: hns3: Implement shutdown ops in hns3 pci driver
+ net: hns3: Fix for loopback selftest failed problem
+ net: hns3: Fix ping exited problem when doing lp selftest
+ net: hns3: Preserve vlan 0 in hardware table
+ net: hns3: Only update mac configuration when necessary
+ net: hns3: Change the dst mac addr of loopback packet
+ net: hns3: Remove redundant codes of query advertised flow control ability
+ net: hns3: Refine hns3_get_link_ksettings()
+ - net: hns: make function hns_gmac_wait_fifo_clean() static
+ - net: hns3: Add default irq affinity
+ - net: hns3: Add unlikely for buf_num check
+ - net: hns3: Remove tx budget to clean more TX descriptors in a napi
+ - net: hns3: Remove packet statistics of public
+ - net: hns3: Add support for hns3_nic_netdev_ops.ndo_do_ioctl
+ - net: hns3: Set STATE_DOWN bit of hdev state when stopping net
+ - net: hns3: Check hdev state when getting link status
+ - net: hns3: Fix for setting speed for phy failed problem
+ - net: hns3: Fix cmdq registers initialization issue for vf
+ - net: hns3: Clear client pointer when initialize client failed or uninitialize finished
+ - net: hns3: Fix client initialize state issue when roce client initialize failed
+ - net: hns3: Fix parameter type for q_id in hclge_tm_q_to_qs_map_cfg() + - net: hns3: Fix ets validate issue
+ - net: hns3: Unify the type convert for desc.data
+ - net: hns3: Adjust prefix of tx/rx statistic names
+ - net: hns3: Fix tqp array traversal condition for vf
+ - net: hns3: Unify the prefix of vf functions
+ - net: hns3: Add handle for default case
+ - net: hns3: Add nic state check before calling netif_tx_wake_queue
+ - net: hns3: Add unlikely for dma_mapping_error check
+ - net: hns3: Remove print messages for error packet
+ - net: hns3: Add get_media_type ops support for VF
+ - net: hns3: Fix speed/duplex information loss problem when executing ethtool+
+ ethx cmd of VF
+ - net: hns3: Remove redundant hclge_get_port_type()
+ - net: hns3: Add support for scp checksum offload
+ - net: hns3: Set extra mac address of pause param for HW
+ - net: hns3: Rename loop mode
+ - net: hns3: Rename mac loopback to app loopback
+ - net: hns3: Add serdes parallel inner loopback support
+ - net: hns3: Fix for packet buffer setting bug
+ - net: hns3: Fix for netdev not up problem when setting mtu
+ - net: hns3: Change return type of hclge_tm_schd_info_update()
+ - net: hns3: Modify hns3_get_max_available_channels
+ - net: hns3: Fix loss of coal configuration while doing reset
+ - net: hns: remove ndo_poll_controller
+ - hns3: Fix the build.
+ - hns3: Another build fix.
+ - net: hns3: Add flow director initialization
+ - net: hns3: Add input key and action config support for flow director
+ - net: hns3: Add support for rule add/delete for flow director
+ - net: hns3: Add support for rule query of flow director
+ - net: hns3: Add reset handle for flow director
+ - net: hns3: Remove all flow director rules when unload hns3 driver
+ - net: hns3: Add support for enable/disable flow director
+ - net: hns3: Remove the default mask configuration for mac vlan table
+ - net: hns3: Clear mac vlan table entries when unload driver or function reset
+ - net: hns3: Optimize for unicast mac vlan table
+ - net: hns3: Drop deprecated mta table support
+ - net: hns3: Add egress/ingress vlan filter for revision 0x21
+ - net: hns3: Fix for rx vlan id handle to support Rev 0x21 hardware
+ - net: hns3: Add new RSS hash algorithm support for PF
+ - net: hns3: Add RSS general configuration support for VF
+ - net: hns3: Add RSS tuples support for VF
+ - net: hns3: Add HW RSS hash information to RX skb
+ - net: hns3: Enable promisc mode when mac vlan table is full
+ - net: hns3: Resume promisc mode and vlan filter status after reset
+ - net: hns3: Resume promisc mode and vlan filter status after loopback test
+ - scsi: hisi_sas: Feed back linkrate(max/min) when re-attached
+ - scsi: hisi_sas: Move evaluation of hisi_hba in hisi_sas_task_prep()
+ - scsi: hisi_sas: Fix the race between IO completion and timeout for
  SMP/internal IO
+ - scsi: hisi_sas: Free slot later in slot_complete_vx_hw()
+ - scsi: hisi_sas: unmask interrupts ent72 and ent74
+ - scsi: hisi_sas: Use block layer tag instead for IPTT
+ - scsi: hisi_sas: Update v3 hw AIP_LIMIT and CFG_AGING_TIME register values
+ - net: hns3: remove hns3_fill_desc_tso
+ - net: hns3: move DMA map into hns3_fill_desc
+ - net: hns3: add handling for big TX fragment
+ - net: hns3: rename hns_nic_dma_unmap
+ - net: hns3: fix for multiple unmapping DMA problem
+ - scsi: hisi_sas: Fix spin lock management in slot_index_alloc_quirk_v2_hw()
+ - scsi: hisi_sas: Fix NULL pointer dereference
+ - net: hns3: Add PCIe AER callback error_detected
+ - net: hns3: Add PCIe AER error recovery
+ - net: hns3: Add support to enable and disable hw errors
+ - net: hns3: Add enable and process common ecc errors
+ - net: hns3: Add enable and process hw errors from IGU, EGU and NCSI
+ - net: hns3: Add enable and process hw errors from PPP
+ - net: hns3: Add enable and process hw errors of TM scheduler
+ - net: hns3: Fix for warning uninitialized symbol hw_err_lst3
+ - net: hns3: fix spelling mistake "intrerrupt" -> "interrupt"
+ - net: hns3: add error handler for hns3_nic_init_vector_data()
+ - net: hns3: bugfix for buffer not free problem during resetting
+ - net: hns3: bugfix for reporting unknown vector0 interrupt repeatedly problem
+ - net: hns3: bugfix for the initialization of command queue's spin lock
+ - net: hns3: remove unnecessary queue reset in the hns3_uninit_all_ring()
+ - net: hns3: bugfix for is_valid_csq_clean_head()
+ - net: hns3: bugfix for hclge_mdio_write and hclge_mdio_read
+ - net: hns3: fix incorrect return value/type of some functions
+ - net: hns3: bugfix for handling mailbox while the command queue reinitialized
+ - net: hns3: bugfix for rtnl_lock's range in the hclge_reset()
+ - net: hns3: bugfix for rtnl_lock's range in the hclgevf_reset()
+ - net: hns3: Fix for out-of-bounds access when setting pfc back pressure
+ - scsi: hisi_sas: Remove set but not used variable 'dq_list'
+ - net: hns3: bugfix for not checking return value
+ - net: hns: Incorrect offset address used for some registers.
+ - net: hns: All ports can not work when insmod hns ko after rmmod.
+ - net: hns: Some registers use wrong address according to the datasheet.
+ - net: hns: Fixed bug that netdev was opened twice
+ - net: hns: Clean rx fbd when ae stopped.
+ - net: hns: Free irq when exit from abnormal branch
+ - net: hns: Avoid net reset caused by pause frames storm
+ - net: hns: Add mac pcs config when enable|disable mac
+ - net: hns: Fix ping failed when use net bridge and send multicast
+ - net: hns3: use HNS3_NIC_STATE_INITED to indicate the initialization state of
  enet
+ - net: hns3: add set_default_reset_request in the hnae3_ae_ops
+ - net: hns3: provide some interface & information for the client
+ - net: hns3: adjust the location of clearing the table when doing reset
+ - net: hns3: enable/disable ring in the enet while doing UP/DOWN
+ - net: hns3: use HNS3_NIC_STATE_RESETTING to indicate resetting
+ - net: hns3: ignore new coming low-level reset while doing high-level reset
+ - net: hns3: move some reset information from hnae3_handle into
  hclge_dev/hclgevf_dev
+ - net: hns3: adjust the process of PF reset
+ - net: hns3: call roc's reset notify callback when resetting
+ - net: hns3: add error handler for hclge_reset()
+ - net: hns3: fix for cmd queue memory not freed problem during reset
+ - net: hns3: Remove set but not used variable 'reset_level'
+ - net: hns3: fix spelling mistake, "assertting" -> "asserting"
+ - net: hns3: add reset_hdev to reinit the hdev in PF's reset process
+ - net: hns3: adjust VF's reset process
+ - net: hns3: add reset handling for VF when doing PF reset
+ - net: hns3: add reset handling for VF when doing Core/Global/IMP reset
+ - net: hns3: stop handling command queue while resetting VF
+ - net: hns3: add error handler for hclgevf_Reset()
+ - net: hns3: stop napi polling when HNS3_NIC_STATE_DOWN is set
+ - net: hns3: implement the IMP reset processing for PF
+ - net: hns3: add PCIe FLR support for PF
+ - net: hns3: do VF's pci re-initialization while PF doing FLR
+ - net: hns3: add PCIe FLR support for VF
+ - net: hns3: Enable HW GRO for Rev B(=0x21) HNS3 hardware
+ - net: hns3: Add handling of GRO Pkts not fully RX'ed in NAPI poll
+ - net: hns3: Add skb chain when num of RX buf exceeds MAX_SKB_FRAGS
+ - net: hns3: Adds GRO params to SKB for the stack
+ - scsi: hisi_sas: use dma_set_mask_and_coherent
+ - scsi: hisi_sas: Create separate host attributes per HBA
+ - scsi: hisi_sas: Add support for interrupt converge for v3 hw
+ - scsi: hisi_sas: Add support for interrupt coalescing for v3 hw
+ - scsi: hisi_sas: Relocate some codes to avoid an unused check
+ - scsi: hisi_sas: change the time of SAS SSP connection
+ - net: hns3: fix spelling mistake "failed" -> "failed"
+ - net: hns3: Support two vlan header when setting mtu
+ - net: hns3: Refactor mac mtu setting related functions
+ - net: hns3: Add vport alive state checking support
+ - net: hns3: Add mtu setting support for vf
+ - net: hns3: up/down netdev in hclge module when setting mtu
+ - net: hns3: add common validation in hclge_dcb
+ - net: hns3: Add debugfs framework registration
+ - net: hns3: Add "queue info" query function
+ - net: hns3: Add "FD flow table" info query function
+ - net: hns3: Add "tc config" info query function
+ - net: hns3: Add "tm config" info query function
+ - net: hns3: Add "qos pause" config info query function
+ - net: hns3: Add "qos prio map" info query function
+ - net: hns3: Add "qos buffer" config info query function
+ - net: hns3: Support "ethtool -d" for HNS3 VF driver
+ - net: hns3: Adds support to dump(using ethool-d) PCIe regs in HNS3 PF driver
+ - net: hns3: remove existing process error functions and reorder hw_blk table
+ - net: hns3: rename enable error interrupt functions
+ - net: hns3: re-enable error interrupts on hw reset
+ - net: hns3: deletes unnecessary settings of the descriptor data
+ - net: hns3: rename process_hw_error function
+ - net: hns3: add optimization in the hclge_hw_error_set_state
+ - net: hns3: add handling of hw ras errors using new set of commands
+ - net: hns3: deleted logging 1 bit errors
+ - net: hns3: add handling of hw errors reported through MSIX
+ - net: hns3: add handling of hw errors of MAC
+ - net: hns3: handle hw errors of PPP PF
+ - net: hns3: handle hw errors of PPU(RCB)
+ - net: hns3: handle hw errors of SSU
+ - net: hns3: add handling of RDMA RAS errors
+ - net: hns3: fix spelling mistake "offser" -> "offset"
+ - scsi: hisi_sas: Fix warnings detected by sparse
+ - scsi: hisi_sas: Relocate some code to reduce complexity
+ - scsi: hisi_sas: Make sg_tablesize consistent value
+ - hns3: prevent building without CONFIG_INET
+ - net: hns3: Add "bd info" query function
+ - net: hns3: Add "manager table" information query function
+ - net: hns3: Add "status register" information query function
+ - net: hns3: Add "dcb register" status information query function
+ - net: hns3: Add "queue map" information query function
+ - net: hns3: Add "tm map" status information query function
+ - net: hns3: fix error handling int the hns3_get_vector_ring_chain
+ - net: hns3: uninitialized pci in the hclgevf_uninit
+ - net: hns3: fix napi_disable not return problem
+ - net: hns3: update some variables while hclge_reset()/hclgevf_reset() done
+ - net: hns3: remove unnecessary configuration recapture while resetting
+ - net: hns3: fix incomplete uninitialization of IRQ in the
+   hns3_nic_uninit_vector_data()
+ - net: hns3: update coalesce param per second
+ - net: hns3: remove 1000M/half support of phy
+ - net: hns3: synchronize speed and duplex from phy when phy link up
+ - net: hns3: getting tx and dv buffer size through firmware
+ - net: hns3: aligning buffer size in SSU to 256 bytes
+ - net: hns3: fix a SSU buffer checking bug
+ - scsi: hisi_sas: Add support for DIF feature for v2 hw
+ - net: hns3: refine the handle for hns3_nic_net_open/stop()
+ - net: hns3: change default tc state to close
+ - net: hns3: fix a bug caused by udelay
+ - net: hns3: add max vector number check for pf
+ - net: hns3: reset tqp while doing DOWN operation
+ - net: hns3: fix vf id check issue when add flow director rule
+ - net: hns3: don't restore rules when flow director is disabled
+ - net: hns3: fix the descriptor index when get rss type
+ - net: hns3: remove redundant variable initialization
+ - net: hns3: call hns3_nic_net_open() while doing HNAE3_UP_CLIENT
+
+ * iptables connlimit allows more connections than the limit when using
+ multiple CPUs (LP: #1811094)
+ - SAUCE: netfilter: xt_connlimit: remove the ‘addr’ parameter in add_hlist()
+ - netfilter: nf_conncount: expose connection list interface
+ - netfilter: nf_conncount: Fix garbage collection with zones
+ - netfilter: nf_conncount: fix garbage collection confirm race
+ - netfilter: nf_conncount: don't skip eviction when age is negative
+
+ * CVE-2018-16882
+ - KVM: Fix UAF in nested posted interrupt processing
+
+ * Cannot initialize ATA disk if IDENTIFY command fails (LP: #1809046)
+ - scsi: libsas: check the ata device status by ata_dev_enabled()
+
+ * scsi: libsas: fix a race condition when smp task timeout (LP: #1808912)
+ - scsi: libsas: fix a race condition when smp task timeout
+
+ * CVE-2018-14625
+ - vhost/vsock: fix use-after-free in network stack callers
+
+ * Fix and issue that LG I2C touchscreen stops working after reboot
+ (LP: #1805085)
+ - HID: i2c-hid: Disable runtime PM for LG touchscreen
+
+ * powerpc/powernv/pci: Work around races in PCI bridge enabling (LP: #1805245)
+ - powerpc/powernv/pci: Work around races in PCI bridge enabling
* Drivers: hv: vmbus: Offload the handling of channels to two workqueues
  (LP: #1807757)
  - hv_netvsc: fix network namespace issues with VF support
  - hv_netvsc: split sub-channel setup into async and sync
  - Drivers: hv: vmbus: Fix the offer_in_progress in vmbus_process_offer()
  - hv_netvsc: Fix a deadlock by getting rtnl lock earlier in netvsc_probe()
  - vmbus: don't return values for uninitialzed channels
  - Drivers: hv: vmbus: check the creation_status in vmbus_establish_gpadl()
  - Drivers: hv: vmbus: Offload the handling of channels to two workqueues

* Disable LPM for Raydium Touchscreens (LP: #1802248)
  - USB: quirks: Add no-lpm quirk for Raydium touchscreens

* Power leakage at S5 with Qualcomm Atheros QCA9377 802.11ac Wireless Network
  Adapter (LP: #1805607)
  - SAUCE: ath10k: provide reset function for QCA9377 chip

* CVE-2018-17972
  - proc: restrict kernel stack dumps to root

* CVE-2018-19407
  - KVM: X86: Fix scan ioapic use-before-initialization

* CVE-2018-18281
  - mremap: properly flush TLB before releasing the page

* Fix USB2 device wrongly detected as USB1 (LP: #1806534)
  - xhci: Add quirk to workaround the errata seen on Cavium Thunder-X2 Soc

* armhf guests fail to boot in EFI mode (LP: #1809488)
  - efi/arm: Revert deferred unmap of early memmap mapping

* Bionic shows incorrect warning about number of pointers in TFD
  (LP: #1801102)
  - iwlwifi: pcie: don't warn if we use all the transmit pointers

* audio output has constant noise on a Dell machine (LP: #1810891)
  - ALSA: hda/realtek - Fixed headphone issue for ALC700

* ldisc crash on reopened tty (LP: #1791758)
  - tty: Drop tty->count on tty_reopen() failure
  - tty: Hold tty_ldiscard_lock() during tty_reopen()
  - tty: Don't block on IO when ldisc change is pending
  - tty: Simplify tty->count math in tty_reopen()

* SATA device is not going to DEVSLP (LP: #1781533)
  - ahci: Allow setting a default LPM policy for mobile chipsets
  - ata: libahci: Correct setting of DEVSLP register
* - ata: libahci: Allow reconfigure of DEVSLP register
+ - ata: ahci: Support state with min power but Partial low power state
+ - ata: ahci: Enable DEVSLP by default on x86 with SLP_S0
+ - [Config] set CONFIG_SATA_MOBILE_LPM_POLICY=0

+ * Console got stuck using serial tty after logout (LP: #1808097)
+ - tty: do not set TTY_IO_ERROR flag if console port
+ - ada: libahci: Allow reconfigure of DEVSLP register

+ - ata: libahci: Allow reconfigure of DEVSLP register
+ * fanotify10 in ubuntu_ltp_syscalls failed (LP: #1802454)
+ - fsnotify: fix ignore mask logic in fsnotify()
+ - fs notify: fix ignore mask logic in fs notify()

+ * SRU: Fix kernel xhci hang when resume from S3 (LP: #1805344)
+ - usb: xhci: fix uninitialized completion when USB3 port got wrong status
+ - usb: xhci: fix timeout for transition from RExit to U0

+ * Add pointstick support for Cirque Touchpad (LP: #1805081)
+ - HID: multitouch: Add pointstick support for Cirque Touchpad

+ * Intel NVMe drives timeout when nvme format is attempted (LP: #1797587)
+ - nvme: Use admin command effects for admin commands

+ * lineout jack can't work on a Dell machine (LP: #1810892)
+ - ALSA: hda/realtek - Support Dell headset mode for New AIO platform

+ * Bionic update: upstream stable patchset 2019-01-04 (LP: #1810554)
+ - MIPS: Call dump_stack() from show_regs()
+ - MIPS: Use async IPIs for arch_trigger_cpumask_backtrace()
+ - MIPS: Fix ioremap() RAM check
+ - mmc: sdhci-esdhc-imx: allow 1.8V modes without 100/200MHz pinctrl states
+ - mmc: dw_mmc: fix card threshold control configuration
+ - ibmasm: don't write out of bounds in read handler
+ - staging: rt8723bs: Prevent an underflow in rtw_check_beacon_data().
+ - staging: r8822be: Fix RTL8822be can't find any wireless AP
+ - ata: Fix ZBC_OUT command block check
+ - at: Fix ZBC_OUT all bit handling
+ - vmw_balloon: fix inflation with batching
+ - ahci: Disable LPM on Lenovo 50 series laptops with a too old BIOS
+ - USB: serial: ch341: fix type promotion bug in ch341_control_in()
+ - USB: serial: cp210x: add another USB ID for Qivicon ZigBee stick
+ - USB: serial: keyspace_pda: fix modem-status error handling
+ - USB: serial: mos7840: fix status-register error handling
+ - usb: quirks: add delay quirks for Corsair Strafe
+ - xhci: xhci-mem: off by one in xhci_stream_id_to_ring()
+ - ALSA: hda - Handle pm failure during hotplug
+ - fs/proc/task_mmu.c: fix Locked field in /proc/pid/smaps*
+ - fs: elf: make sure to page align bss in load_elf_library
+ - mm: do not bug_on on incorrect length in __mm_populate()
+ - tracing: Reorder display of TGID to be after PID
+ kbuild: delete INSTALL_FW_PATH from kbuild documentation
+ arm64: neon: Fix function may_use_simd() return error status
+ tools build: fix # escaping in .cmd files for future Make
+ IB/hfi1: Fix incorrect mixing of ERR_PTR and NULL return values
+ i2c: tegra: Fix NACK error handling
+ iw_cxgb4: correctly enforce the max_reg_mr depth
+ xen: setup pv irq ops vector earlier
+ nvme-pci: Remap CMB SQ entries on every controller reset
+ crypto: x86/salsa20: remove x86 salsa20 implementations
+ uprobes/x86: Remove incorrect WARN_ON () in uprobe_init_insn()
+ netfilter: nf_queue: augment nfqa_cfg_policy
+ netfilter: x_tables: initialise match/target check parameter struct
+ loop: add recursion validation to LOOP_CHANGE_FD
+ PM / hibernate: Fix oops at snapshot_write()
+ RDMA/ucm: Mark UCM interface as BROKEN
+ loop: remember whether sysfs_create_group() was done
+ i2fs: give message and set need_fsck given broken node id
+ mm: do not drop unused pages when userfaultd is running
+ bpf: reject passing modified ctx to helper functions
+ mei: discard messages from not connected client during power down.
+ mm: zero unavailable pages before memmap init
+ xen: remove global bit from __default_kernel_pte_mask for pv guests
+ i2fs: return error during fill_super
+ i2fs: avoid bug_on on corrupted inode
+ i2fs: sanity check on sit entry
+ i2fs: sanity check for total valid node blocks
+ ARM: dts: armada-38x: use the new thermal binding
+ mm: don't do zero_resv_unavail if memmap is not allocated
+ 
+ * Blacklist Realtek Virtual IPMI device (LP: #1808353)
+ ipmi:pci: Blacklist a Realtek "IPMI" device
+ 
+ * Ethernet[10ec:8136] doesn't work after S3 with kernel 4.15.0.43.64
+ (LP: #1809847)
+ SAUCE: Revert "r8169: don't use MSI-X on RTL8106e"
+ r8169: re-enable MSI-X on RTL8168g
+ 
+ * Killer 802.11ac 2x2 (1550 or 1550i) [8086:2526][1a56:1550] is not supported
+ (LP: #1809219)
+ iwlwifi: add more card IDs for 9000 series
+ 
+ * Support new Realtek ethernet chips (LP: #1811055)
+ r8169: Add support for new Realtek Ethernet
+ 
+ * PC SN720 NVMe WDC 256GB consumes more power in S2Idle than during long idle
+ (LP: #1805775)
+ SAUCE: pci/nvme: prevent WDC PC SN720 NVMe from entering D3 and being disabled
+ * Power consumption during s2idle is higher than long idle (Intel SSDPEKKF)
  + (LP: #1804588)
+ - SAUCE: pci: prevent Intel NVMe SSDPEKKF from entering D3
+ - SAUCE: nvme: add quirk to not call disable function when suspending
+ * mpt3sas - driver using the wrong register to update a queue index in FW
  + (LP: #1810781)
+ - scsi: mpt3sas: As per MPI-spec, use combined reply queue for SAS3.5 controllers when HBA supports more than 16 MSI-x vectors.
+ * HP mobile workstations with hybrid graphics support, can not directly output to external monitors by dGPU (LP: #1810702)
+ - ACPI / OSI: Add OEM _OSI string to enable dGPU direct output
+ * broken touchpad after i2c-i801 blacklist change (LP: #1802135)
  + - i2c: i801: Don't restore config registers on runtime PM
+ * Enable new Realtek card reader (LP: #1806335)
  + - USB: usb-storage: Add new IDs to ums-realtek
  + - SAUCE: (noup) USB: usb-storage: Make MMC support optional on ums-realtek
+ * The line-out on the Dell Dock station can’t work (LP: #1806532)
  + - ALSA: usb-audio: Allow to override the longname string
  + - ALSA: usb-audio: Give proper vendor/product name for Dell WD15 Dock
  + - ALSA: usb-audio: Add vendor and product name for Dell WD19 Dock
+ * linux-buildinfo: pull out ABI information into its own package
  + (LP: #1806380)
  + - [Packaging] getabis -- handle all known package combinations
  + - [Packaging] getabis -- support parsing a simple version
+ * Fix Intel I210 doesn’t work when ethernet cable gets plugged (LP: #1806818)
  + - igb: Fix an issue that PME is not enabled during runtime suspend
+ * Fix Terminus USB hub that may breaks connected USB devices after S3
  + (LP: #1806850)
  + - USB: Wait for extra delay time after USB_PORT_FEAT_RESET for quirky hub
+ * Add support for Dell DW5821e WWAN/GPS module (LP: #1807342)
  + - qmi_wwan: add support for the Dell Wireless 5821e module
  + - qmi_wwan: fix interface number for DW5821e production firmware
  + - USB: option: add support for DW5821e
+ * Add support for 0cf3:535b QCA_ROME device (LP: #1807333)
  + - Bluetooth: btusb: Add support for 0cf3:535b QCA_ROME device
+ * The mute led can’t work anymore on the lenovo x1 carbon (LP: #1808465)
+ - ALSA: hda/realtek - Fix the mute LED regression on Lenovo X1 Carbon
+ * click/pop noise in the headphone on several lenovo laptops (LP: #1805079) //
  + click/pop noise in the headphone on several lenovo laptops (LP: #1805079)
  + - ALSA: hda/realtek - fix the pop noise on headphone for lenovo laptops
+  + * Touchpad stops working after reboot on Apollo Lake (LP: #1728244)
  + - HID: i2c-hid: disable runtime PM operations on hantick touchpad
  +  + * MAC address pass through on RTL8153-BND for docking station (LP: #1808729)
  +  + r8152: Add support for MAC address pass through on RTL8153-BND
  +  + [Ubuntu] kernel: zcrypt: reinit ap queue state machine (LP: #1805414)
  +  + s390/zcrypt: reinit ap queue state machine during device probe
  +  + [UBUNTU] qeth: fix length check in SNMP processing (LP: #1805802)
  +  + s390/qeth: fix length check in SNMP processing
  +  + ASPEED server console output extremely slow after upgrade to 18.04
  + (LP: #1808183)
  + - drm/ast: Remove existing framebuffers before loading driver
  +  + * Bionic update: upstream stable patchset 2018-12-13 (LP: #1808399)
  +  + - userspacefd: hugetlbfs: fix userfaultfd_huge_must_wait() pte access
  +  + - mm: hugetlb: yield when prepping struct pages
  +  + - tracing: Fix missing return symbol in function_graph output
  +  + - scsi: target: Fix truncated PR-in ReadKeys response
  +  + s390: Correct register corruption in critical section cleanup
  +  + - drbd: fix access after free
  +  + - vfio: Use get_user_pages_longterm correctly
  +  + - cifs: Fix use after free of a mid_q_entry
  +  + - cifs: Fix memory leak in smb2_set_ea()
  +  + - cifs: Fix infinite loop when using hard mount option
  +  + - drm: Use kvzalloc for allocating blob property memory
  +  + - drm/udl: fix display corruption of the last line
  +  + - jbd2: don't mark block as modified if the handle is out of credits
  +  + - ext4: add corruption check in ext4_xattr_set_entry()
  +  + - ext4: always verify the magic number in xattr blocks
  +  + - ext4: make sure bitmaps and the inode table don't overlap with bg descriptors
  +  + - ext4: always check block group bounds in ext4_init_block_bitmap()
  +  + - ext4: only look at the bg_flags field if it is valid
  +  + - ext4: verify the depth of extent tree in ext4_find_extent()
  +  + - ext4: include the illegal physical block in the bad map ext4_error msg
  +  + - ext4: never move the system.data xattr out of the inode body
  +  + - ext4: avoid running out of journal credits when appending to an inline file
  +  + - ext4: add more inode number paranoia checks
  +  + - ext4: add more mount time checks of the superblock
+ - ext4: check superblock mapped prior to committing
+ - HID: i2c-hid: Fix "incomplete report" noise
+ - HID: hiddev: fix potential Spectre v1
+ - HID: debug: check length before copy_to_user()
+ - media: vb2: core: Finish buffers at the end of the stream
+ - i2fs: truncate preallocated blocks in error case
+ - Revert "dpaa_eth: fix error in dpaa_remove()"
+ - Kbuild: fix # escaping in .cmd files for future Make
+ - media: cx25840: Use subdev host data for PLL override
+ - fs: allow per-device dax status checking for filesystems
+ - dax: change bdev_dax_supported() to support boolean returns
+ - dax: check for QUEUE_FLAG_DAX in bdev_dax_supported()
+ - dm: set QUEUE_FLAG_DAX accordingly in dm_table_set_restrictions()
+ - dm: prevent DAX mounts if not supported
+ - mtd: cfi_cmdset_0002: Change definition naming to retry write operation
+ - mtd: cfi_cmdset_0002: Change erase functions to retry for error
+ - mtd: cfi_cmdset_0002: Change erase functions to check chip good only
+ - netfilter: nf_log: don't hold nf_log_mutex during user access
+ - staging: comedii: quatech_daqp_cs: fix no-op loop daqp_aop_insn_write()
+ - sched, tracing: Fix trace_sched_pi_setprio() for deboosting
+ - PCI / ACPI / PM: Resume bridges w/o drivers on suspend-to-RAM
+ - drm/amdgpu: Make struct amdgpu_atif private to amdgpu_acpi.c
+ - scsi: aacraid: Fix PD performance regression over incorrect qd being set
+ - ARM: dts: imx51-zii-rdul: fix touchscreen pinctrl
+ - drm/amdgpu: Add amdgpu_atfx_get_dhandle()
+ - drm/amdgpu: Add APU support in vi_set_uvd_clocks
+ - drm/amdgpu: Add APU support in vi_set_vce_clocks
+ - drm/amdgpu: fix the missed vcn fw version report
+ - drm/qxl: Call qxl_bo_unref outside atomic context
+ - drm/atmel-hlcde: check stride values in the first plane

+ * Bionic update: upstream stable patchset 2018-12-12 (LP: #1808185)
+ - usb: cdc_acm: Add quirk for Uniden UBC125 scanner
+ - USB: serial: cp210x: add CESINEL device ids
+ - USB: serial: cp210x: add Silicon Labs IDs for Windows Update
+ - usb: dwc2: fix the incorrect bitmaps for the ports of multi_tt hub
+ - acpi: Add helper for deactivating memory region
+ - usb: typec: ucsi: acpi: Workaround for cache mode issue
+ - usb: typec: ucsi: Fix for incorrect status data issue
+ - xhci: Fix kernel oops in trace_xhci_free_virt_device
+ - n_tty: Fix stall at n_tty_receive_char_special().
+ - n_tty: Access echo_* variables carefully.
+ - staging: android: ion: Return an ERR_PTR in ion_map_kernel
+ - serial: 8250_pci: Remove stalled entries in blacklist
+ - serdev: fix memleak on module unload
+ - vt: prevent leaking uninitialized data to userspace via /dev/vcs*
+ - drm/amdgpu: Add APU support in vi_set_uvd_clocks
+ - drm/amdgpu: Add APU support in vi_set_vce_clocks
+ - drm/amdgpu: fix the missed vcn fw version report
+ - drm/qxl: Call qxl_bo_unref outside atomic context
+ - drm/atmel-hlcde: check stride values in the first plane
- drm/amdgpu: Use kvmalloc_array for allocating VRAM manager nodes array
- drm/amdgpu: Refactor amdgpu_vram_mgr_bo_invisible_size helper
- drm/i915: Enable provoking vertex fix on Gen9 systems.
- netfilter: nf_tables: nf_compat: fix refcount leak on xt module
- netfilter: nf_compat: prepare for indirect info storage
- netfilter: nf_compat: fix handling of large matchinfo size
- netfilter: nf_tables: don't assume chain stats are set when jumplabel is set
- netfilter: nf_tables: bogus EBUSY in chain deletions
- netfilter: nf_meta: fix wrong value dereference in nf_meta_set_eval
- netfilter: nf_tables: disable preemption in nft_update_chain_stats()
- netfilter: nf_tables: increase nft_counters_enabled in
  nft_chain_stats_replace()
- netfilter: nf_tables: fix memory leak on error exit return
- netfilter: nf_tables: add missing netlink attrs to policies
- netfilter: nf_tables: fix NULL-ptr in nf_tables_dump_obj()
- netfilter: don't set F_IFACE on ipv6 fib lookups
- netfilter: ip6t_rpfILTER: provide input interface for route lookup
- netfilter: nf_tables: use WARN_ON_ONCE instead of BUG_ON in nft_do_chain()
- ARM: dts: imx6q: Use correct SDMA script for SPI5 core
- xfrm6: avoid potential infinite loop in _decode_session6()
- afs: Fix directory permissions check
- netfilter: ebtables: handle string from userspace with care
- s390/dasd: use blk_rq_rq_from_pdu for per request data
- netfilter: nft_limit: fix packet ratelimiting
- ipvs: fix buffer overflow with sync daemon and service
- iwlmii: pcie: compare with number of IRQs requested for, not number of CPUs
- atm: zatm: fix memcmp casting
- net: qmi_wwan: Add Netgear Aircard 779S
- perf test: "Session topology" dumps core on s390
- perf bpf: Fix NULL return handling in bpf__prepare_load()
- fs: clear writeback errors in inode_init_always
- sched/core: Fix rules for running on online && !active CPUs
- sched/core: Require cpu_active() in select_task_rq(), for user tasks
- platform/x86: asus-wmi: Fix NULL pointer dereference
- net/sonic: Use dma_mapping_error()
- net: dsa: b53: Add BCM5389 support
- usb: typec: tcpm: fix logbuffer index is wrong if _tcpm_log is re-entered
- iio: mma8452: Fix ignoring MMA8452_INT_DRDY
- drm/amdgpu: fix clear_all and replace handling in the VM (v2)
- drm/amd/display: Clear connector's edid pointer
- drm/i915: Send DPCD ON for MST before phy_up
- drm/amdgpu: remove DC special casing for KB/ML
- drm/amdgpu: Don't default to DC support for Kaveri and older
- drm/amdgpu: GPU vs CPU page size fixes in amdgpu_vm_bo_split_mapping
- drm/amd/display: release spinlock before committing updates to stream
- drm/i915: Fix PIPESTAT irq ack on i965/g4x
- ARM64: dts: meson-gxl-s905x-p212: Add phy-supply for usb0
- x86/mm: Don't free P4D table when it is folded at runtime
+ * Bionic update: upstream stable patchset 2018-12-07 (LP: #1807469)
+ - x86/spectre_v1: Disable compiler optimizations over
+ - array_index_mask_nospec()
+ - x86/mce: Improve error message when kernel cannot recover
+ - x86/mce: Check for alternate indication of machine check recovery on Skylake
+ - x86/mce: Fix incorrect "Machine check from unknown source" message
+ - x86/mce: Do not overwrite MCI_STATUS in mce_no_way_out()
+ - x86: Call fixup_exception() before notify_die() in math_error()
+ - m68k/mm: Adjust VM area to be unmapped by gap size for __iounmap()
+ - m68k/mac: Fix SWIM memory resource end address
+ - serial: sh-sci: Use spin_{try}lock_irqsave instead of open coding version
+ - signal/xtensa: Consistenly use SIGBUS in do_unaligned_user
+ - PM / Domains: Fix error path during attach in genpd
+ - PM / core: Fix supplier device runtime PM usage counter imbalance
+ - PM / OPP: Update voltage in case freq == old_freq
+ - usb: do not reset if a low-speed or full-speed device timed out
+ - 1wire: family module autoload fails because of upper/lower case mismatch.
+ - ASoC: dapm: delete dapm_kcontrol_data_paths list before freeing it
+ - ASoC: cs35i35: Add use_single_RW to regmap config
+ - ASoC: cirrus: i2s: Fix LRCLK configuration
+ - ASoC: cirrus: i2s: Fix [TX]RXLinCtrlData setup
+ - thermal: bcm2835: Stop using printk format %pCr
+ - clk: renesas: cpg-mssr: Stop using printk format %pCr
+ - lib/qsprintf: Remove atomic-unsafe support for %pCr
+ - ftrace/selftest: Have the reset_trigger code be a bit more careful
+ - mips: ftrace: fix static function graph tracing
+ - branch-check: fix long->int truncation when profiling branches
+ - ipmi:bt: Set the timeout before doing a capabilities check
+ - Bluetooth: hci_qca: Avoid missing rampatch failure with userspace fw loader
+ - printk: fix possible reuse of va_list variable
+ - fuse: fix congested state leak on aborted connections
+ - fuse: atomic_o_trunc should truncate pagecache
+ - fuse: don't keep dead fuse_conn at fuse_fill_super().
+ - fuse: fix control dir setup and teardown
+ - powerpc/mm/hash: Add missing isync prior to kernel stack SLB switch
+ - powerpc/ptrace: Fix setting 512B aligned breakpoints with
+ PTRACE_SET_DEBUGREG
+ - powerpc/ptrace: Fix enforcement of DAWR constraints
+ - powerpc/powernv/ioda2: Remove redundant free of TCE pages
+ - powerpc/powernv: copy/paste - Mask SO bit in CR
+ - powerpc/fadump: Unregister fadump on kexec down path.
+ - soc: rockchip: power-domain: Fix wrong value when power up pd with writemask
+ - ARM: 8764/1: kgdb: fix NUMREGBYTES so that gdb_regs[] is the correct size
+ - ARM: dts: Fix SPI node for Arria10
+ - ARM: dts: socfpga: Fix NAND controller node compatible
+ - ARM: dts: socfpga: Fix NAND controller clock supply
+ - ARM: dts: socfpga: Fix NAND controller node compatible for Arria10
+ - arm64: Fix syscall restarting around signal suppressed by tracer
+ - arm64: kpti: Use early_param for kpti= command-line option
+ - arm64: mm: Ensure writes to swapper are ordered wrt subsequent cache
t maintenance
+ - ARM64: dts: meson: disable sd-uhs modes on the libretech-cc
+ - of: overlay: validate offset from property fixups
+ - of: unmistak: for strings, account for trailing 0 in property length field
+ - of: platform: stop accessing invalid dev in of_platform_device_destroy
+ - tpm: fix use after free in tpm2_load_context()
+ - tpm: fix race condition in tpm_common_write()
+ - IB/qib: Fix DMA api warning with debug kernel
+ - IB/hfi1, qib: Add handling of kernel restart
+ - IB/mlx4: Mark user MR as writable if actual virtual memory is writable
+ - IB/core: Make testing MR flags for writability a static inline function
+ - IB/mlx5: Fetch soft WQE's on fatal error state
+ - IB/isert: Fix for lib/dma_debug check_sync warning
+ - IB/isert: fix T10-pi check mask setting
+ - IB/hfi1: Fix fault injection init/exit issues
+ - IB/hfi1: Reorder incorrect send context disable
+ - IB/hfi1: Optimize kthread pointer locking when queuing CQ entries
+ - IB/hfi1: Fix user context tail allocation for DMA_RTAIL
+ - RDMA/mlx4: Discard unknown SQP work requests
+ - xprtdma: Return -ENOBUFS when no pages are available
+ - mtd: cfi_cmdset_0002: Change write buffer to check correct value
+ - mtd: cfi_cmdset_0002: Use right chip in do_ppb_xxlock()
+ - mtd: cfi_cmdset_0002: fix SEGV unlocking multiple chips
+ - mtd: cfi_cmdset_0002: Fix unlocking requests crossing a chip boudary
+ - mtd: cfi_cmdset_0002: Avoid walking all chips when unlocking.
+ - PCI: hv: Make sure the bus domain is really unique
+ - PCI: Add ACS quirk for Intel 7th & 8th Gen mobile
+ - PCI: pciehp: Clear Presence Detect and Data Link Layer Status Changed on
  resume
+ - auxdisplay: fix broken menu
+ - pinctrl: samsung: Correct EINTG banks order
+ - pinctrl: devicetree: Fix pctldev pointer overwrite
+ - cpufreq: intel_pstate: Fix scaling max/min limits with Turbo 3.0
+ - MIPS: io: Add barrier after register read in inX()
+ - time: Make sure jiffies_to_msecs() preserves non-zero time periods
+ - irqchip/gic-v3-its: Don't bind LPI to unavailable NUMA node
+ - X.509: unpack RSA signatureValue field from BIT STRING
+ - Btrfs: fix return value on rename exchange failure
+ - pio: adc: ad7791: remove sample freq sysfs attributes
+ - pio: sca3000: Fix an error handling path in 'sca3000_probe()'
+ - mm: fix __gup_device_huge vs unmap
+ - scsi: qla2xxx: Fix setting lower transfer speed if GPSC fails
+ - scsi: qla2xxx: Mask off Scope bits in retry delay
+ - scsi: zfcp: fix missing SCSI trace for result of eh_host_resu_handler
+ - scsi: zfcp: fix missing SCSI trace for retry of abort / scsi_eh TMF
+ - scsi: zfcp: fix misleading REC trigger trace where erp_action setup failed
+ - scsi: zfcp: fix missing REC trigger trace on terminate_rport_io early return
+ - scsi: zfcp: fix missing REC trigger trace on terminate_rport_io for ERP_FAILED
+ - scsi: zfcp: fix missing REC trigger trace for all objects in ERP_FAILED
+ - scsi: zfcp: fix missing REC trigger trace on enqueue without ERP thread
+ - linvdimm, pmem: Preserve read-only setting for pmem devices
+ - clk: at91: PLL recalc_rate() now using cached MUL and DIV values
+ - rtc: sun6i: Fix bit_idx value for clk_register_gate
+ - md: fix two problems with setting the "re-add" device state.
+ - rpmsg: smd: do not use managed resources for endpoints and channels
+ - ubi: fastmap: Cancel work upon detach
+ - ubi: fastmap: Correctly handle interrupted erasures in EBA
+ - backlight: as3711_bl: Fix Device Tree node lookup
+ - backlight: max8925_bl: Fix Device Tree node lookup
+ - backlight: tsps65217_bl: Fix Device Tree node lookup
+ - mfd: intel-lpss: Program REMAP register in PIO mode
+ - arm: dts: mt7623: fix invalid memory node being generated
+ - perf tools: Fix symbol and object code resolution for vdso32 and vdsox32
+ - perf intel-pt: Fix sync_switch INTEL_PT_SS_NOT_TRACING
+ - perf intel-pt: Fix decoding to accept CBR between FUP and corresponding TIP
+ - perf intel-pt: Fix MTC timing after overflow
+ - perf intel-pt: Fix "Unexpected indirect branch" error
+ - perf intel-pt: Fix packet decoding of CYC packets
+ - media: v4l2-compat-ioctl32: prevent go past max size
+ - media: dvb_frontend: fix locking issues at dvb_frontend_get_event()
+ - nfsd: restrict rd_maxcount to svc_max_payload in nfsd_encode readdir
+ - NFSv4: Fix possible 1-byte stack overflow in
+ - NFSv4: Revert commit 5fb3d86cf531d ("NFSv4.x: Fix wraparound issues..")
+ - NFSv4: Fix a typo in nfs41_sequence_process
+ - ACPI / LPSS: Add missing prv_offset setting for byt/cht PWM devices
+ - Input:elan_i2c - add ELAN0618 (Lenovo v330 15IKB) ACPI ID
+ - pwm: lpss: platform: Save/restore the ctrl register over a suspend/resume
+ - rbd: flush rbd_dev->watch_dwork after watch is unregistered
+ - mm/ksm.c: ignore STABLE_FLAG of rmap_item->address in rmap_walk_ksm()
+ - mm: fix devmem_is_allowed() for sub-page System RAM intersections
+ - xen: Remove unnecessary BUG_ON from __unbind_from_irq()
+ - udf: Detect incorrect directory size
+ - Input: xpad - fix GPD Win 2 controller name
+ - Input:elan_i2c_smbus - fix more potential stack buffer overflows
+ - ALSA: timer: Fix USBAN warning at SNDRV_TIMER_IOCTL_NEXT_DEVICE ioctl
+ - ALSA: hda/realtek - Fix pop noise on Lenovo P50 & co
+ - ALSA: hda/realtek - Add a quirk for FSC ESPRIMO U9210
+ - xbl: fix failure when we delete and create a slab cache
+ - block: Fix transfer when chunk sectors exceeds max
+ - block: Fix cloning of requests with a special payload
- x86/efi: Fix efi_call_phys_epilog() with CONFIG_X86_5LEVEL=y
- dm zoned: avoid triggering reclaim from inside dmz_map()
- dm thin: handle running out of data space vs concurrent discard
- x86/platform/UV: Use new set memory block size function
- x86/platform/UV: Add kernel parameter to set memory block size
- platform/chrome: cros_ec_lpc: Register the driver if ACPI entry is missing.
- platform/chrome: cros_ec_lpc: do not try DMI match when ACPI device found
- hwmon: (k10temp) Add support for Stoney Ridge and Bristol Ridge CPUs
- spi-nor: intel-spi: Remove unused preopcodes field
- mtd: spi-nor: Fix atomic sequence handling
- x86/platform/UV: Do not clear state_saved for devices that remain suspended
- ASoC: mediatek: Preallocate pages use platform device
- libnvdimm, pmem: Do not flush power-fail protected CPU caches
- powerpc/64s: Set assembler machine type to POWER4
- powerpc/500mc: Set assembler machine type to e500mc
- hwrng: core - Always drop the RNG in hwrng_unregister()
- softirq: Reorder trace_softirqs_on to prevent lockdep splat
- ARM64: dts: meson-gx: fix ATF reserved memory region
- mtd: rawnd: fix return value check for bad block status
- mtd: rawnd: mxc: set spare area size register explicitly
- PCI: Account for all bridges on bus when distributing bus numbers
- pinctrl: armada-37xx: Fix spurious irq management
- MIPS: pb44: Fix i2c-gpio GPIO descriptor table
- locking/rwsem: Fix up_read_non_owner() warning with DEBUG_RWSEMS
- scsi: scsi_debug: Fix memory leak on module unload
- scsi: qla2xxx: Spinlock recursion in qla_target
- libnvdimm, pmem: Unconditionally deep flush on *sync
- i2fs: don't use GFP_ZERO for page caches
- mfd: twl-core: Fix clock initialization
- remoteproc: Prevent incorrect rproc state on xfer mem ownership failure
- media: rc: nce_kbd decoder: fix stuck keys
- Input: silead - add Chuwi Hi8 support
- Input: silead - add MSSL0002 ACPI HID
- ALSA: hda - Force to link down at runtime suspend on ATI/AMD HDMI
- i2c: gpio: initialize SCL to HIGH again
- kasan: depend on CONFIG_SLUB_DEBUG
- dm: ensure bio submission follows a depth-first tree walk
- dm: rename 'bio' member of dm_io structure to 'orig_bio'
- dm: use bio_split() when splitting out the already processed bio
- x86/e820: put !E820_TYPE_RAM regions into memblock.reserved

- * Support AverMedia DVD EZMaker 7 USB video capture dongle (LP: #1620762) //
- Bionic update: upstream stable patchset 2018-12-07 (LP: #1807469)
- media: cx231xx: Add support for AverMedia DVD EZMaker 7

+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 14 Jan 2019 09:38:05 +0000
+ linux (4.15.0-43.46) bionic; urgency=medium
+ * linux: 4.15.0-43.46 -proposed tracker (LP: #1806659)
+ * System randomly hangs during suspend when mei_wdt is loaded (LP: #1803942)
+   - SAUCE: base/dd: limit release function changes to vfio driver only
+ * Workaround CSS timeout on AMD SNPS 3.0 xHC (LP: #1806838)
+   - xhci: Allow more than 32 quirks
+   - xhci: workaround CSS timeout on AMD SNPS 3.0 xHC
+ * linux-buildinfo: pull out ABI information into its own package
+   (LP: #1806380)
+   - [Packaging] limit preparation to linux-libc-dev in headers
+   - [Packaging] commonise debhelper invocation
+   - [Packaging] ABI -- accumulate abi information at the end of the build
+   - [Packaging] buildinfo -- add basic build information
+   - [Packaging] buildinfo -- add firmware information to the flavour ABI
+   - [Packaging] buildinfo -- add compiler information to the flavour ABI
+   - [Packaging] buildinfo -- add buildinfo support to getabis
+   - [Config] buildinfo -- add retpoline version markers
+ * linux packages should own /usr/lib/linux/triggers (LP: #1770256)
+   - [Packaging] own /usr/lib/linux/triggers
+ * CVE-2018-12896
+   - posix-timers: Sanitize overrun handling
+ * CVE-2018-16276
+   - USB: yurex: fix out-of-bounds uaccess in read handler
+ * CVE-2018-10902
+   - ALSA: rawmidi: Change resized buffers atomically
+ * CVE-2018-18710
+   - cdrom: fix improper type cast, which can leak to information leak.
+ * CVE-2018-18690
+   - xfs: don't fail when converting shortform attr to long form during
+     ATTR_REPLACE
+ * CVE-2018-14734
+   - infiniband: fix a possible use-after-free bug
+ * CVE-2018-18445
+   - bpf: 32-bit RSH verification must truncate input before the ALU op
+ * Packaging resync (LP: #1786013)
+   - [Packaging] update helper scripts
* linux (4.15.0-42.45) bionic; urgency=medium

* [FEAT] Guest-dedicated Crypto Adapters (LP: #1787405)
  - KVM: s390: reset crypto attributes for all vcpus
  - KVM: s390: vsie: simulate VCPU SIE entry/exit
  - KVM: s390: introduce and use KVM_REQ_VSIE_RESTART
  - KVM: s390: refactor crypto initialization
  - s390: vfio-ap: base implementation of VFIO AP device driver
  - s390: vfio-ap: register matrix device with VFIO mdev framework
  - s390: vfio-ap: sysfs interfaces to configure adapters
  - s390: vfio-ap: sysfs interfaces to configure domains
  - s390: vfio-ap: sysfs interfaces to configure control domains
  - s390: vfio-ap: sysfs interface to view matrix mdev matrix
  - KVM: s390: interface to clear CRYCB masks
  - s390: vfio-ap: implement mediated device open callback
  - s390: vfio-ap: implement VFIO_DEVICE_GET_INFO ioctl
  - s390: vfio-ap: zeroize the AP queues
  - s390: vfio-ap: implement VFIO_DEVICE_RESET ioctl
  - KVM: s390: Clear Crypto Control Block when using vsIE
  - KVM: s390: vsie: Do the CRYCB validation first
  - KVM: s390: vsie: Make use of CRYCB FORMAT2 clear
  - KVM: s390: vsie: Allow CRYCB FORMAT-2
  - KVM: s390: vsie: allow CRYCB FORMAT-1
  - KVM: s390: vsie: allow CRYCB FORMAT-0
  - KVM: s390: vsie: allow guest FORMAT-0 CRYCB on host FORMAT-1
  - KVM: s390: vsie: allow guest FORMAT-1 CRYCB on host FORMAT-2
  - KVM: s390: vsie: allow guest FORMAT-0 CRYCB on host FORMAT-2
  - KVM: s390: device attrs to enable/disable AP interpretation
  - KVM: s390: CPU model support for AP virtualization
  - s390: doc: detailed specifications for AP virtualization
  - KVM: s390: fix locking for crypto setting error path
  - KVM: s390: Tracing APCB changes
  - s390: vfio-ap: setup APCB mask using KVM dedicated function
  - s390/zcrypt: Add ZAPQ inline function.
  - s390/zcrypt: Review inline assembler constraints.
  - s390/zcrypt: Integrate ap_asm.h into include/asm/ap.h.
  - s390/zcrypt: fix ap_instructions_available() returncodes
  - s390/zcrypt: remove VLA usage from the AP bus
  - s390/zcrypt: Remove deprecated ioctls.
  - s390/zcrypt: Remove deprecated zcrypt proc interface.
  - s390/zcrypt: Support up to 256 crypto adapters.
  - [Config:] Enable CONFIG_S390_AP_IOMMU and set CONFIG_VFIO_AP to module.
* Bypass of mount visibility through users + mount propagation (LP: #1789161)
  - mount: Retest MNT_LOCKED in do_umount
  - mount: Don’t allow copying MNT_UNBINDABLE|MNT_LOCKED mounts

* CVE-2018-18955: nested user namespaces with more than five extents
  incorrectly grant privileges over inode (LP: #1801924) // CVE-2018-18955
  - userns: also map extents in the reverse map to kernel IDs

* kdump fail due to an IRQ storm (LP: #1797990)
  - SAUCE: x86/PCI: Export find_cap() to be used in early PCI code
  - SAUCE: x86/quirks: Add parameter to clear MSIs early on boot
  - SAUCE: x86/quirks: Scan all busses for early PCI quirks

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Thu, 15 Nov 2018 17:01:46 -0200

+linux (4.15.0-40.43) bionic; urgency=medium

* linux: 4.15.0-40.43 -proposed tracker (LP: #1802554)

* crash in ENA driver on removing an interface (LP: #1802341)
  - SAUCE: net: ena: fix crash during ena_remove()

* Ubuntu 18.04.1 - [s390x] Kernel panic while stressing network bonding
  (LP: #1797367)
  - s390/qeth: don't keep track of MAC address's cast type
  - s390/qeth: consolidate qeth MAC address helpers
  - s390/qeth: avoid using is_multicast Ether_addr_64bits on (u8 *)[6]
  - s390/qeth: remove outdated portname debug msg
  - s390/qeth: reduce hard-coded access to ccw channels
  - s390/qeth: sanitize strings in debug messages

* [18.04 FEAT] zcrypt DD: introduce APQN tags to support deterministic driver
  binding (LP: #1799184)
  - s390/zcrypt: code beautify
  - s390/zcrypt: AP bus support for alternate driver(s)
  - s390/zcrypt: hex string mask improvements for apmask and aqmask.
  - s390/zcrypt: remove unused functions and declarations
  - s390/zcrypt: Show load of cards and queues in sysfs

* [GLK/CLX] Enhanced IBRS (LP: #1786139)
  - x86/speculation: Remove SPECTRE_V2_IBRS in enum spectre_v2_mitigation
  - x86/speculation: Support Enhanced IBRS on future CPUs

* Allow signed kernels to be kexec'ed under lockdown (LP: #1798441)
  - Fix kexec forbidding kernels signed with keys in the secondary keyring to
    boot

* Overlayfs in user namespace leaks directory content of inaccessible
directories (LP: #1793458) // CVE-2018-6559
+ - SAUCE: overlayfs: ensure mounter privileges when reading directories
+
+ * Update ENA driver to version 2.0.1K (LP: #1798182)
+ - net: ena: remove ndo_poll_controller
+ - net: ena: fix warning in rmmod caused by double iounmap
+ - net: ena: fix rare bug when failed restart/resume is followed by driver
+    removal
+ - net: ena: fix NULL dereference due to untimely napi initialization
+ - net: ena: fix auto casting to boolean
+ - net: ena: minor performance improvement
+ - net: ena: complete host info to match latest ENA spec
+ - net: ena: introduce Low Latency Queues data structures according to ENA spec
+ - net: ena: add functions for handling Low Latency Queues in ena_com
+ - net: ena: add functions for handling Low Latency Queues in ena_netdev
+ - net: ena: use CSUM_CHECKED device indication to report skb's checksum status
+ - net: ena: explicit casting and initialization, and clearer error handling
+ - net: ena: limit refill Rx threshold to 256 to avoid latency issues
+ - net: ena: change rx copybreak default to reduce kernel memory pressure
+ - net: ena: remove redundant parameter in ena_com_admin_init()
+ - net: ena: update driver version to 2.0.1
+ - net: ena: fix indentations in ena_defs for better readability
+ - net: ena: Fix Kconfig dependency on X86
+ - net: ena: enable Low Latency Queues
+ - net: ena: fix compilation error in xtensa architecture
+
+ * Bionic update: upstream stable patchset 2018-10-29 (LP: #1800537)
+ - bonding: re-evaluate force_primary when the primary slave name changes
+ - cdc_ncm: avoid padding beyond end of skb
+ - ipv6: allow PMTU exceptions to local routes
+ - net: dsa: add error handling for pskb_trim_rcsum
+ - net/sched: act_simple: fix parsing of TCA_DEF_DATA
+ - tcp: verify the checksum of the first data segment in a new connection
+ - udp: fix rx queue len reported by diag and proc interface
+ - net: in virtio_net_hdr only add VLAN_HLEN to csum_start if payload holds
+ vlan
+ - tls: fix use-after-free in tls_push_record
+ - ext4: fix hole length detection in ext4_ind_map_blocks()
+ - ext4: update mtime in ext4_punch_hole even if no blocks are released
+ - ext4: bubble errors from ext4_find_inline_data_nolock() up to ext4_igetattr()
+ - ext4: fix fencepost error in check for inode count overflow during resize
+ - driver core: Don't ignore class_dir_create_and_add() failure.
+ - Btrfs: fix clone vs chattr NODATASUM race
+ - Btrfs: fix memory and mount leak in btrfs_ioctl_rm_dev_v2()
+ - btrfs: return error value if create_io_em failed in cow_file_range
+ - btrfs: scrub: Don't use inode pages for device replace
+ - ALSA: hda/conexant - Add fixup for HP Z2 G4 workstation
+ - ALSA: hda - Handle kzalloc() failure in snd_hda_attach_pcm_stream()
+ - ALSA: hda: add dock and led support for HP EliteBook 830 G5
+ - ALSA: hda: add dock and led support for HP ProBook 640 G4
+ - x86/MCE: Fix stack out-of-bounds write in mce-inject.c: Flags_read()
+ - smb3: fix various xid leaks
+ - CIFS: 51c54a2f69195b28af9bd119f03787b1625bb4 adds a check for session expiry
+ - cifs: For SMB2 security information query, check for minimum sized security descriptor instead of sizeof FileAllInformation class
+ - nbd: fix nbd device deletion
+ - nbd: update size when connected
+ - nbd: use bd_set_size when updating disk size
+ - blk-mq: reinit q->tag_set_list entry only after grace period
+ - bdi: Move cgroup bdi_writeback to a dedicated low concurrency workqueue
+ - cpufreq: Fix new policy initialization during limits updates via sysfs
+ - cpufreq: governors: Fix long idle detection logic in load calculation
+ - libata: zpodd: small read overflow in eject_tray()
+ - libata: Drop SanDisk SD7UB3Q*G1001 NOLPM quirk
+ - w1: mxc_w1: Enable clock before calling clk_get_rate() on it
+ - x86/intel_rdt: Enable CMT and MBM on new Skylake stepping
+ - iw1wifi: fw: harden page loading code
+ - orangefs: set i_size on new symlink
+ - orangefs: report attributes_mask and attributes for statx
+ - HID: intel_ish-hid: ipc: register more pm callbacks to support hibernation
+ - HID: wacom: Correct logical maximum Y for 2nd-gen Intuos Pro large
+ - mm, page_alloc: do not break __GFP_THISNODE by zonelist reset
+ - net: phy: dp83822: use BMCR_ANENABLE instead of BMSR_ANEGCAPABLE for DP83620
+ - cpufreq: ti-cpufreq: Fix an incorrect error return value
+ - x86/vector: Fix the args of vector_alloc tracepoint
+ - x86/apic/vector: Prevent hlist corruption and leaks
+ - x86/apic: Provide apic_ack_irq()
+ - x86/ioapic: Use apic_ack_irq()
+ - x86/platform/uv: Use apic_ack_irq()
+ - irq_remapping: Use apic_ack_irq()
+ - genirq/generic_pending: Do not lose pending affinity update
+ - genirq/affinity: Defe affinity setting if irq chip is busy
+ - genirq/migration: Avoid out of line call if pending is not set

+ **[bionic]mlx5: reading SW stats through ifstat cause kernel crash**
  + (LP: #1799049)
+ - net/mlx5e: Don't attempt to dereference the ppriv struct if not being eswitch manager

+ **[Bionic][Cosmic] ipmi: Fix timer race with module unload (LP: #1799281)
+ - ipmi: Fix timer race with module unload
+ + **[Bionic] ipmi: Remove ACPI SPMI probing from the SSIF (I2C) driver**
  + (LP: #1799276)
+ + - ipmi: Remove ACPI SPMI probing from the SSIF (I2C) driver
+ * execveat03 in ubuntu_ltp_syscalls failed on X/B (LP: #1786729)
+ - cap_inode_getsecurity: use d_find_any_alias() instead of d_find_alias()
+ + * [Bionic][Cosmic] Fix to ipmi to support vendor specific messages greater
+ than 255 bytes (LP: #1799794)
+ - ipmi:ssif: Add support for multi-part transmit messages > 2 parts
+ + * libvirtd is unable to configure bridge devices inside of LXD containers
+ (LP: #1784501)
+ - kernfs: allow creating kernfs objects with arbitrary uid/gid
+ - sysfs, kobject: allow creating kobject belonging to arbitrary users
+ - kobject: kset_create_and_add() - fetch ownership info from parent
+ - driver core: set up ownership of class devices in sysfs
+ - net-sysfs: require net admin in the init ns for setting tx_maxrate
+ - net-sysfs: make sure objects belong to container's owner
+ - net: create reusable function for getting ownership info of sysfs inodes
+ - bridge: make sure objects belong to container's owner
+ - sysfs: Fix regression when adding a file to an existing group
+ + * [Ubuntu] kvm: fix deadlock when killed by oom (LP: #1800849)
+ - s390/kvm: fix deadlock when killed by oom
+ + * [Ubuntu] net/af_iucv: fix skb leaks for HiperTransport (LP: #1800639)
+ - net/af_iucv: drop inbound packets with invalid flags
+ - net/af_iucv: fix skb handling on HiperTransport xmit error
+ + * Power consumption during s2idle is higher than long idle(sk hynix)
+ (LP: #1801875)
+ - SAUCE: pci: prevent sk hynix nvme from entering D3
+ - SAUCE: nvme: add quirk to not call disable function when suspending
+ + * Enable keyboard wakeup for S2Idle laptops (LP: #1798552)
+ - Input: i8042 - enable keyboard wakesups by default when s2idle is used
+ + * NULL pointer dereference at 0000000000000020 when access
+ dst_orig->ops->family in function xfrm_lookup_with_ifid() (LP: #1801878)
+ - xfrm: Fix NULL pointer dereference when skb_dst_force clears the dst_entry.
+ + * [Ubuntu] qdio: reset old sbal_state flags (LP: #1801686)
+ - s390/qdio: reset old sbal_state flags
+ + * hns3: map tx ring to tc (LP: #1802023)
+ - net: hns3: Set tx ring’ tc info when netdev is up
+ + * [Ubuntu] qeth: Fix potential array overrun in cmd/rc lookup (LP: #1800641)
+ - s390: qeth_core_mpc: Use ARRAY_SIZE instead of reimplementing its function
+ - s390: qeth: Fix potential array overrun in cmd/rc lookup
* Vulkan applications cause permanent memory leak with Intel GPU
  (LP: #1798165)
  - drm/syncobj: Don't leak fences when WAIT_FOR_SUBMIT is set

* Mounting SOFS SMB shares fails (LP: #1792580)
  - cifs: connect to servername instead of IP for IPC$ share

* Packaging resync (LP: #1786013)
  - [Package] add support for specifying the primary makefile

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 09 Nov 2018 17:29:18 -0200

+linux (4.15.0-39.42) bionic; urgency=medium

* linux: 4.15.0-39.42 -proposed tracker (LP: #1799411)

* Linux: insufficient shootdown for paging-structure caches (LP: #1798897)
  - mm: move tlb_table_flush to tlb_flush_mmu_free
  - mm/tlb: Remove tlb_remove_table() non-concurrent condition
  - mm/tlb, x86/mm: Support invalidating TLB caches for RCU_TABLE_FREE
  - [Config] CONFIG_HAVE_RCU_TABLE_INVALIDATE=y

* Ubuntu18.04: GPU total memory is reduced (LP: #1792102)
  - Revert "powerpc/powernv: Increase memory block size to 1GB on radix"

* arm64: snapdragon: reduce boot noise (LP: #1797154)
  - [Config] arm64: snapdragon: DRM_MSM=m
  - [Config] arm64: snapdragon: SND*=m
  - [Config] arm64: snapdragon: disable ARM_SDE_INTERFACE
  - [Config] arm64: snapdragon: disable DRM_I2C_ADV7511_CEC
  - [Config] arm64: snapdragon: disable VIDEO_ADV7511, VIDEO_COBALT

* [Bionic] CPPC bug fixes (LP: #1796949)
  - ACPI / CPPC: Update all pr_(debug/err) messages to log the subspace id
  - cpufreq: CPPC: Don't set transition_latency
  - ACPI / CPPC: Fix invalid PCC channel status errors

* regression in 'ip --family bridge neigh' since linux v4.12 (LP: #1796748)
  - rtnetlink: fix rtnl_fdb_dump() for ndmsg header

* screen displays abnormally on the lenovo M715 with the AMD GPU (Radeon Vega
  8 Mobile, rev ca, 1002:15dd) (LP: #1796786)
  - drm/amd/display: Fix takover from VGA mode
  - drm/amd/display: early return if not in vga mode in disable_vga
  - drm/amd/display: Refine disable VGA

* arm64: snapdragon: WARNING: CPU: 0 PID: 1 arch/arm64/kernel/setup.c:271
reserve_memblock_reserved_regions (LP: #1797139)
- SAUCE: arm64: Fix /proc/iomem for reserved but not memory regions
+ * The front MIC can't work on the Lenovo M715 (LP: #1797292)
+ - ALSA: hda/realtek - Fix the problem of the front MIC on the Lenovo M715
+ * Keyboard backlight sysfs sometimes is missing on Dell laptops (LP: #1797304)
+ - platform/x86: dell-smbios: Correct some style warnings
+ - platform/x86: dell-smbios: Rename dell-smbios source to dell-smbios-base
+ - platform/x86: dell-smbios: Link all dell-smbios-* modules together
+  [Config] CONFIG_DELL_SMBIOS_SMM=y, CONFIG_DELL_SMBIOS_WMI=y
+ * rpi3b+: ethernet not working (LP: #1797406)
+ - lan78xx: Don't reset the interface on open
+ * 87cdf3148b11 was never backported to 4.15 (LP: #1795653)
+ - xfrm: Verify MAC header exists before overwriting eth_hdr(skb)->h_proto
+ * [Ubuntu18.04][Power9][DD2.2]package installation segfaults inside debian
+ chroot env in P9 KVM guest with HTM enabled (kvm) (LP: #1792501)
+ - KVM: PPC: Book3S HV: Fix guest r11 corruption with POWER9 TM workarounds
+ * Provide mode where all vCPUs on a core must be the same VM (LP: #1792957)
+ - KVM: PPC: Book3S HV: Provide mode where all vCPUs on a core must be the same VM
+ + * fs Cache: Bad refcounting in fs Cache_op_complete leads to OOPS (LP: #1797314)
+ - SAUCE: fs cache: Fix race in decrementing refcount of op->npages
+ * CVE-2018-9363
+ - Bluetooth: hidp: buffer overflow in hidp_process_report
+ * CVE-2017-13168
+ - scsi: sg: mitigate read/write abuse
+ * [Bionic] ACPI / PPTT: use ACPI ID whenever ACPI_PPTT_ACPI_PROCESSOR_ID_VALID is set (LP: #1797200)
+ - ACPI / PPTT: use ACPI ID whenever ACPI_PPTT_ACPI_PROCESSOR_ID_VALID is set
+ * [Bionic] arm64: topology: Avoid checking numa mask for scheduler MC selection (LP: #1797202)
+ - arm64: topology: Avoid checking numa mask for scheduler MC selection
+ * crypto/vmx - Backport of Fix sleep-in-atomic bugs patch for 18.04
+ (LP: #1790832)
+ - crypto: vmx - Fix sleep-in-atomic bugs
+ * hns3: autoneg settings get lost on down/up (LP: #1797654)
+ net: hns3: Fix for information of phydev lost problem when down/up
+ *
+ not able to unwind the stack from within __kernel_clock_gettime in the Linux vDSO (LP: #1797963)
+ - powerpc/vdso: Correct call frame information
+ *
+ Signal 7 error when running GPFS tracing in cluster (LP: #1792195)
+ - powerpc/mm/books3s: Add new pte bit to mark pte temporarily invalid.
+ - powerpc/mm/radix: Only need the Nest MMU workaround for R -> RW transition
+ *
+ Support Edge Gateway's WIFI LED (LP: #1798330)
+ - SAUCE: mwifiex: Switch WiFi LED state according to the device status
+ *
+ Support Edge Gateway's Bluetooth LED (LP: #1798332)
+ - SAUCE: Bluetooth: Support for LED on Edge Gateways
+ *
+ USB cardreader (0bda:0328) make the system can't enter s3 or hang
+ (LP: #1798328)
+ - usb: Don't disable Latency tolerance Messaging (LTM) before port reset
+ *
+ CVE-2018-15471
+ - xen-netback: fix input validation in xenvif_set_hash_mapping()
+ *
+ CVE-2018-16658
+ - cdrom: Fix info leak/OOB read in cdrom_ioctl_drive_status
+ *
+ [Bionic] Update ThunderX2 implementation defined pmu core events
+ (LP: #1796904)
+ - perf vendor events arm64: Update ThunderX2 implementation defined pmu core
+    events
+ *
+ the machine of lenovo M715 with the AMD GPU (Radeon Vega 8 Mobile, rev ca,
+ 1002:15dd) often hangs randomly (LP: #1796789)
+ - drm/amd: Add missing fields in atom_integrated_system_info_v1_11
+ *
+ [18.04] GLK hang after a while (LP: #1760545)
+ - drm/i915/glk: Add MODULE_FIRMWARE for Geminilake
+ *
+ Fix usbcore.quirks when used at boot (LP: #1795784)
+ - usb: core: safely deal with the dynamic quirk lists
+ *
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Tue, 23 Oct 2018 14:44:55 +0000
+ *
+ linux (4.15.0-38.41) bionic; urgency=medium
+ *
+ linux: 4.15.0-38.41 -proposed tracker (LP: #1797061)
+ *
+ Silent data corruption in Linux kernel 4.15 (LP: #1796542)
+ - block: add a lower-level bio_add_page interface
+ - block: bio_iov_iter_get_pages: fix size of last iovec
+ - blkdev: __blkdev_direct_IO_simple: fix leak in error case
+ - block: bio_iov_iter_get_pages: pin more pages for multi-segment IOs
+
+ -- Stefan Bader <stefan.bader@canonical.com>  Wed, 10 Oct 2018 11:20:35 +0200

+ linux (4.15.0-37.40) bionic; urgency=medium
+
+ * linux: 4.15.0-37.40 -proposed tracker (LP: #1795564)
+
+ * hns3: enable ethtool rx-vlan-filter on supported hw (LP: #1793394)
+ - net: hns3: Add vlan filter setting by ethtool command -K
+
+ * hns3: Modifying channel parameters will reset ring parameters back to
+ defaults (LP: #1793404)
+ - net: hns3: Fix desc num set to default when setting channel
+
+ * hisi_sas: Add SATA FIX check for v3 hw (LP: #1794151)
+ - scsi: hisi_sas: Add SATA FIS check for v3 hw
+
+ * Fix potential corruption using SAS controller on HiSilicon arm64 boards
+ (LP: #1794156)
+ - scsi: hisi_sas: add memory barrier in task delivery function
+
+ * hisi_sas: Reduce unnecessary spin lock contention (LP: #1794165)
+ - scsi: hisi_sas: Tidy hisi_sas_task_prep()
+
+ * Add functional level reset support for the SAS controller on HiSilicon D06
+ systems (LP: #1794166)
+ - scsi: hisi_sas: tidy host controller reset function a bit
+ - scsi: hisi_sas: relocate some common code for v3 hw
+ - scsi: hisi_sas: Implement handlers of PCIe FLR for v3 hw
+
+ * HiSilicon SAS controller doesn’t recover from PHY STP link timeout
+ (LP: #1794172)
+ - scsi: hisi_sas: tidy channel interrupt handler for v3 hw
+ - scsi: hisi_sas: Fix the failure of recovering PHY from STP link timeout
+
+ * getxattr: always handle namespaced attributes (LP: #1789746)
+ - getxattr: use correct xattr length
+
+ * Fix unusable NVIDIA GPU after S3 (LP: #1793338)
+ - PCI: Reprogram bridge prefetch registers on resume
+
+ * Fails to boot under Xen PV: BUG: unable to handle kernel paging request at
+ edc21fd9 (LP: #1789118)
+ - x86/EISA: Don’t probe EISA bus for Xen PV guests
+ qeth: use vzalloc for QUERY OAT buffer (LP: #1793086)
+ s390/qeth: use vzalloc for QUERY OAT buffer
+
+ SRU: Enable middle button of touchpad on ThinkPad P72 (LP: #1793463)
+ Input: elantech - enable middle button of touchpad on ThinkPad P72
+
+ Dell new AIO requires a new uart backlight driver (LP: #1727235)
+ SAUCE: platform/x86: dell-uart-backlight: new backlight driver for DELL AIO
+ updateconfigs for Dell UART backlight driver
+
+ (LP: #1794294)
+ s390/crypto: Fix return code checking in cbc_paes_crypt()
+
+ hns3: Retrieve RoCE MSI-X config from firmware (LP: #1793221)
+ net: hns3: Fix MSIX allocation issue for VF
+ net: hns3: Refine the MSIX allocation for PF
+
+ net: hns: Avoid hang when link is changed while handling packets
+ (LP: #1792209)
+ net: hns: add the code for cleaning pkt in chip
+ net: hns: add netif_carrier_off before change speed and duplex
+
+ Page leaking in cachefiles_readBacking_file while vmscan is active
+ (LP: #1793430)
+ SAUCE: cachefiles: Page leaking in cachefiles_readBacking_file while vmscan
+ is active
+
+ some nvidia p1000 graphic cards hang during the boot (LP: #1791569)
+ drm/nouveau/gr/gf100-: virtualise tpc_mask + apply fixes from traces
+
+ Error reported when creating ZFS pool with "-t" option, despite successful
+ pool creation (LP: #1769937)
+ SAUCE: (noup) Update zfs to 0.7.5-1ubuntu16.4
+
+ Fix I2C touchpanels' interrupt storms after system suspend (LP: #1792309)
+ HID: i2c-hid: Fix flooded incomplete report after S3 on Rayd touchscreen
+ HID: i2c-hid: Don't reset device upon system resume
+
+ ipmmu is always registered (LP: #1783746)
+ iommu/ipmmu-vmsa: Don't register as BUS IOMMU if machine doesn't have IPMMU-
+ VMSA
+
+ Bionic update: upstream stable patchset 2018-09-27 (LP: #1794889)
+ clocksoure/drivers/imx-tpm: Correct some registers operation flow
+ Input: synaptics-rmi4 - fix an unchecked out of memory error path
+ KVM: X86: fix incorrect reference of trace_kvm_pi_irte_update
+ - x86: Add check for APIC access address for vmentry of L2 guests
+ - MIPS: io: Prevent compiler reordering writeX()
+ - perf: ignore signals when communicating with management FW
+ - perf report: Fix switching to another perf.data file
+ - fsnotify: fix ignore mask logic in send_to_group()
+ - MIPS: io: Add barrier after register read in readX()
+ - s390/smsgiucv: disable SMSG on module unload
+ - isofs: fix potential memory leak in mount option parsing
+ - MIPS: dts: Boston: Fix PCI bus dtc warnings:
+ - spi: sh-msiolf: Fix bit field overflow writes to TSCR/RSCR
+ - doc: Add vendor prefix for Kieback & Peter GmbH
+ - dt-bindings: pinctrl: sunxi: Fix reference to driver
+ - dt-bindings: serial: sh-sci: Add support for r8a77965 (H)SCIF
+ - clk: honor CLK_MUX_ROUND_CLOSEST in generic clk mux
+ - ASoC: rt5514: Add the missing register in the readable table
+ - eCryptfs: don't pass up plaintext names when using filename encryption
+ - soc: bcm: raspberrypi-power: Fix use of __packed
+ - soc: bcm2835: Make !RASPBERRYPI_FIRMWARE dummies return failure
+ - PCI: kirin: Fix reset gpio name
+ - ASoC: topology: Fix bugs of freeing soc topology
+ - xen: xenbus_dev_frontend: Really return response string
+ - ASoC: topology: Check widget kcontrols before deref.
+ - spi: cadence: Add usleep_range() for cdns_spi_fill_txfifo()
+ - blkcg: don't hold blkcg lock when deactivating policy
+ - tipc: fix infinite loop when dumping link monitor summary
+ - scsi: iscsi: respond to netlink with unicast when appropriate
+ - scsi: megaraid_sas: Do not log an error if FW successfully initializes.
+ - scsi: target: fix crash with iscsi target and dvd
+ - netfilter: nf_tables: NAT chain and extensions require NF_TABLES
+ - netfilter: nf_tables: fix out-of-bounds in nft_chain_commit_update
+ - ASoC: msm8916-wcd-analog: use threaded context for mbhc events
+ - drm/msm: Fix possible null dereference on failure of get_pages()
+ - drm/msm/dsi: use correct enum in dsi_get_cmd_fmt
+ - drm/msm/dsi: don't deref error pointer in the msm_fbdev_create error path
+ - blkcg: init root blkcg_gq under lock
+ - vfs: Undo an overly zealous MS_RDONLY -> SB_RDONLY conversion
+ - parisc: time: Convert read_persistent_clock() to read_persistent_clock64()
+ - scsi: storvsc: Set up correct queue depth values for IDE devices
+ - scsi: isci: Fix infinite loop in while loop
+ - mm, pagemap: fix swap offset value for PMD migration entry
+ - proc: revalidate kernel thread inodes to root:root
+ - kexec_file: do not add extra alignment to efi memmap
+ - mm: memcg: add __GFP_NOWARN in __memcg_schedule_kmem_cache_create()
+ - usb: typec: usci: fix tracepoint related build error
+ - ACPI / PM: Blacklist Low Power S0 Idle DSM for ThinkPad X1 Tablet(2016)
+ - dt-bindings: meson-uart: DT fix s/clocks-names/clock-names/
+ - net: phy: marvell: clear wol event before setting it
- ARM: dts: da850: fix W=1 warnings with pmnux node
- ACPI / watchdog: Prefer iTCO_wdt on Lenovo Z50-70
- drm/amdkfd: fix clock counter retrieval for node without GPU
- thermal: int3403_thermal: Fix NULL pointer deref on module load / probe
- net: ethtool: Add missing kernel doc for FEC parameters
- arm64: ptrace: remove addr_limit manipulation
- HID: lenovo: Add support for IBM/Lenovo Scrollpoint mice
- HID: wacom: Release device resource data obtained by devres_alloc()
- selftests: ftrace: Add a testcase for multiple actions on trigger
- rds: ib: Fix missing call to rds_ib_dev_put in rds_ib_setup_qp
- perf/x86/intel: Don't enable freeze-on-smi for PerfMon V1
- remoteproc: qcom: Fix potential device node leaks
- rpmmsg: added MODULE_ALIAS for rpmmsg_char
- HID: intel-ish-hid: use put_device() instead of kfree()
- blk-mq: fix sysfs inflight counter
- arm64: fix possible spectre-v1 in ptrace_hb_p_get_event()
- KVM: arm/arm64: vgic: fix possible spectre-v1 in vgic_mmio_read_apr()
- libahci: Allow drivers to override stop_engine
- ata: ahci: mvebu: override ahci_stop_engine for mvebu AHCI
- x86/cpu/intel: Add missing TLB cpuid values
- bpf: fix uninitialized variable in bpf tools
- i2c: sprd: Prevent i2c accesses after suspend is called
- i2c: sprd: Fix the i2c count issue
- tipc: fix bug in function tipc_nl_node_dump_monitor
- nvme: depend on INFINIBAND_ADDR_TRANS
- nvme-rdma: depend on INFINIBAND_ADDR_TRANS
- ib_srpt: depend on INFINIBAND_ADDR_TRANS
- ib_srtp: depend on INFINIBAND_ADDR_TRANS
- IB: make INFINIBAND_ADDR_TRANS configurable
- IB/uverbs: Fix validating mandatory attributes
- RDMA/cma: Fix use after destroy access to net namespace for IPoIB
- RDMA/swpm: fix memory leak on map_info
- IB/rxe: add RXE_START_MASK for rxe_opcode IB_OPCODE_RC_SEND_ONLY_INV
- IB/rxe: avoid double kfree_skb
- <linux/stringhash.h>: fix end_name_hash() for 64bit long
- IB/core: Make ib_mad_client_id atomic
- ARM: davinci: board-da830-evm: fix GPIO lookup for MMC/SD
- ARM: davinci: board-da850-evm: fix GPIO lookup for MMC/SD
- ARM: davinci: board-omap138-hawk: fix GPIO numbers for MMC/SD lookup
- ARM: davinci: board-dm355-evm: fix broken networking
- dt-bindings: panel: lvds: Fix path to display timing bindings
- ARM: OMAP2+: powerdomain: use raw_smp_processor_id() for trace
- ARM: dts: logicpd-som-lv: Fix WL127x Startup Issues
- ARM: dts: logicpd-som-lv: Fix Audio Mute
- Input: atmel_mxt_ts - fix the firmware update
- hexagon: add memset_io() helper
- hexagon: export csum_partial_copy_nocheck
- scsi: vmw-pvscsi: return DID_BUS_BUSY for adapter-initiated aborts
- bpf, x64: fix memleak when not converging after image
- parisc: drivers.c: Fix section mismatches
- stop_machine, sched: Fix migrate_swap() vs. active_balance() deadlock
- kthread, sched/wait: Fix kthread_parkme() wait-loop
- arm64: tegra: Make BCM89610 PHY interrupt as active low
- iommu/vt-d: fix shift-out-of-bounds in bug checking
- nvme: fix potential memory leak in option parsing
- nvme: Set integrity flag for user passsthrough commands
- ARM: OMAP1: ams-delta: fix deferred_fiq handler
- smc: fix sendpage() call
- IB/hfi1 Use correct type for num_user_context
- IB/hfi1: Fix memory leak in exception path in get_irq_affinity()
- RDMA/cma: Do not query GID during QP state transition to RTR
- spi: bcm2835aux: ensure interrupts are enabled for shared handler
- sched/core: Introduce set_special_state()
- sh: fix build failure for J2 cpu with SMP disabled
- tee: check shm references are consistent in offset/size
- mac80211: Adjust SAE authentication timeout
- drm/omap: silence uninitialized variable warning
- drm/omap: fix uninitialized ret variable
- drm/omap: fix possible NULL ref issue in tiler_reserve_2d
- drm/omap: check return value from soc_device_match
- drm/omap: handle alloc failures in omap_connector
- driver core: add __printf verification to __ata_ehi_pushv_desc
- ARM: dts: cygnus: fix irq type for arm global timer
- mac80211: use timeout from the AddBA response instead of the request
- net: aquantia: driver should correctly declare vlan_features bits
- can: dev: increase bus-off message severity
- arm64: Add MIDR encoding for NVIDIA CPUs
- cifs: smb2ops: Fix listxattr() when there are no EAs
- app: uninorth: make two functions static
- tipc: eliminate KMSAN uninit-value in strcmp complaint
- qed: Fix I2 initializations over iWARP personality
- qede: Fix GFP flags sent to RDMA event node allocation
- rxrpc: Fix error reception on AF_INET6 sockets
- rxrpc: Fix the min security level for kernel calls
- KVM: Extend MAX_IRQ_ROUTES to 4096 for all archs
- x86: Delay skip of emulated hypercall instruction
- ixgbe: return error on unsupported SFP module when resetting
- net sched actions: fix invalid pointer dereferencing if skbedit flags missing
- proc/kcore: don't bounds check against address 0
- ocfs2: take inode cluster lock before moving reflinked inode from orphan dir
- kprobes/x86: Prohibit probing on exception masking instructions
- uprobes/x86: Prohibit probing on MOV SS instruction
- objtool, kprobes/x86: Sync the latest <asm/insn.h> header with tools/objtool/arch/x86/include/asm/insn.h
- x86/pkeys/selftests: Adjust the self-test to fresh distros that export the
+ pkeys ABI
+ - x86/mpx/selftests: Adjust the self-test to fresh distros that export the MPX
+ ABI
+ - x86/selftests: Add mov_to_ss test
+ - x86/pkeys/selftests: Give better unexpected fault error messages
+ - x86/pkeys/selftests: Stop using assert()
+ - x86/pkeys/selftests: Remove dead debugging code, fix dprint_in_signal
+ - x86/pkeys/selftests: Allow faults on unknown keys
+ - x86/pkeys/selftests: Factor out "instruction page"
+ - x86/pkeys/selftests: Add PROT_EXEC test
+ - x86/pkeys/selftests: Fix pkey exhaustion test off-by-one
+ - x86/pkeys/selftests: Fix pointer math
+ - x86/pkeys/selftests: Save off 'prot' for allocations
+ - x86/pkeys/selftests: Add a test for pkey 0
+ - mtd: Fix comparison in map_word_andequal()
+ - afs: Fix the non-encryption of calls
+ - usb: musb: fix remote wakeup racing with suspend
+ - ARM: keystone: fix platform_domain_notifier array overrun
+ - i2c: pmcmsp: return message count on master_xfer success
+ - i2c: pmcmsp: fix error return from master_xfer
+ - i2c: viperboard: return message count on master_xfer success
+ - ARM: davinci: dm646x: fix timer interrupt generation
+ - ARM: davinci: board-dm646x-evm: pass correct I2C adapter id for VPIF
+ - ARM: davinci: board-dm646x-evm: set VPIF capture card name
+ - clk: imx6ull: use OSC clock during AXI rate change
+ - locking/rwsem: Add a new RWSEM_ANONYMOUSLY_OWNED flag
+ - locking/percpu-rwsem: Annotate rwsem ownership transfer by setting RWSEM_OWNER_UNKNOWN
+ - drm/dumb-buffers: Integer overflow in drm_mode_create_ioctl()
+ - sched/debug: Move the print_rt_rq() and print_dl_rq() declarations to kernel/sched/sched.h
+ - sched/deadline: Make the grub_reclaim() function static
+ - parisc: Move setup_profiling_timer() out of init section
+ - efi/libstub/arm64: Handle randomized TEXT_OFFSET
+ - ARM: 8753/1: decompressor: add a missing parameter to the addruart macro
+ - ARM: 8758/1: decompressor: restore r1 and r2 just before jumping to the kernel
+ - ARM: kexec: fix kdump register saving on panic()
+ - Revert "Btrfs: fix scrub to repair raid6 corruption"
+ - Btrfs: fix scrub to repair raid6 corruption
+ - Btrfs: make raid6 rebuild retry more
+ - tcp: do not overshoot window Clamp in tcp_rcv_space_adjust()
+ - ihmnic: Do not notify peers on parameter change resets
+ - dt-bindings: net: ravb: Add support for r8a77965 SoC
+ - X86/KVM: Properly update 'tsc_offset' to represent the running guest
+ - kvm: x86: move MSR_IA32_TSC handling to x86.c
+ - ARM: dts: Fix cm2 and prm sizes for omap4
+ - powerpc/64s: Default liid_size to 64K in RFI fallback flush
+ KVM: arm/arm64: vgic: Kick new VCPU on interrupt migration
+ arm64: kasan: avoid pfn_to_nid() before page array is initialized
+ ARM64: dts: meson-gxl: add USB host support
+ ARM64: dts: meson-gxm: add GXM specific USB host configuration
+ ARM64: dts: meson-gxl-s905x-p212: enable the USB controller
+ ARM64: dts: meson-gx-p23x-q20x: enable the USB controller
+ ARM64: dts: meson-gxl-s905x-libretech-cc: enable the USB controller
+ ARM64: dts: meson-gxl-nexbox-a95x: enable the USB controller
+ ARM64: dts: meson-gxm-khadas-vim2: enable the USB controller
+ arm64: dts: correct SATA addresses for Stingray
+ afs: Fix server record deletion
+ proc: fix /proc/loadavg regression
+ s390/qeth: fix request-side race during cmd IO timeout
+ ACPI / scan: Initialize watchdog before PNP
+ CIFS: set *resp_buf_type to NO_BUFFER on error
+ arm64: dts: uniphier: fix input delay value for legacy mode of eMMC
+ igb: Fix the transmission mode of queue 0 for Qav mode
+ RISC-V: build vdso-dummy.o with -no-pie
+ arm64: only advance singlestep for user instruction traps
+ perf pmu: Fix core PMU alias list for X86 platform
+ x64: fix JIT emission for dead code
+ powerpc/kvm/booke: Fix altivec related build break
+ reset: uniphier: fix USB clock line for LD20
+ npf: don't depend on eth_tbl being available
+ net: mvpp2: Fix clk error path in mvpp2_probe
+ kvm: apic: Flush TLB after APIC mode/address change if VPIDs are in use
+ IB/uverbs: Fix validating mandatory attributes
+ RDMA/hns: Intercept illegal RDMA operation when use inline data
+ pinctrl: cherryview: Associate IRQ descriptors to irqdomain
+ kthread, sched/wait: Fix kthread_parkme() completion issue
+ iommu/vt-d: Fix usage of force parameter in intel_ir_reconfigure_ird()
+ nvme/multipath: Disable runtime writable enabling parameter
+ ARM: dts: correct missing "compatible" entry for tii81xx SoCs
+ usb: typec: ts6598x: handle block reads separately with plain-I2C adapters
+ IB/mlx4: Fix integer overflow when calculating optimal MTT size
+ bpf: add map_alloc_check callback
+ bpf: fix possible spectre-v1 in find_and_alloc_map()
+ drm/exynos/mixer: fix synchronization check in interlaced mode
+ drm/exynos/mixer: avoid Oops in vp_video_buffer()
+ bpf: use array_index_nospec in find_prog_type
+ gcc-plugins: fix build condition of SANCDOV plugin
+ drm/vc4: Fix oops dereferencing DPI's connector since panel_bridge.
+ nvme: fix use-after-free in nvme_free_ns_head
+ powerpc/pseries: Fix CONFIG_NUMA=n build
+ HID: 2c-hid: Add RESEND_REPORT_DESCR quirk for Toshiba Click Mini L9W-B
+ cifs: Allocate validate negotiation request through kmalloc
+ drm/amdgpu: Switch to interruptable wait to recover from ring hang.
+ rxpca: Fix missing start of call timeout
+ - ARM: dts: imx51-zii-rdu1: fix touchscreen bindings
+ - sh: switch to NO_BOOTMEM
+ - lib/find_bit_benchmark.c: avoid soft lockup in test_find_first_bit()
+ - x86/pkeys/selftests: Avoid printf-in-signal deadlocks
+ - afs: Fix address list parsing
+ - afs: Fix recounting in callback registration
+ - afs: Fix server rotation’s handling of fileservlet probe failure
+ - afs: Fix VNOVOL handling in address rotation
+ - afs: Fix the handling of CB.InitCallBackState3 to find the server by UUID
+ - afs: Fix afs_find_server search loop
+ - KVM: X86: Lower the default timer frequency limit to 200us
+ - platform/x86: DELM_WMI use depends on instead of select for DELL_SMBIOS
+ - ARM: replace unnecessary perl with sed and the shell $(( )) operator
+
+ * Improvements to the kernel source package preparation (LP: #1793461)
+ - [Packaging] startnewrelease: add support for backport kernels
+
+ * Kernel 4.15.0-35.38 fails to build with CONFIG_XFS_ONLINE_SCRUB enabled
+ (LP: #1792393)
+ - SAUCE: xfs: fix build error with CONFIG_XFS_ONLINE_SCRUB enabled
+
+ * update ENA driver to latest mainline version (LP: #1792044)
+ - net: ena: add detection and recovery mechanism for handling missed/misrouted
+ - MSI-X
+ - net: ena: increase ena driver version to 1.5.0
+ - net: ena: Eliminate duplicate barriers on weakly-ordered archs
+ - SAUCE: ena: devm_kzalloc() -> devm_kcalloc()
+ - net: ena: Fix use of uninitialized DMA address bits field
+ - net: ena: fix surprise unplug NULL dereference kernel crash
+ - net: ena: fix driver when PAGE_SIZE == 64kB
+ - net: ena: fix device destruction to gracefully free resources
+ - net: ena: fix potential double ena_destroy_device()
+ - net: ena: fix missing lock during device destruction
+ - net: ena: fix missing calls to READ_ONCE
+ - net: ena: fix incorrect usage of memory barriers
+
+ -- Stefan Bader <stefan.bader@canonical.com> Tue, 02 Oct 2018 14:33:09 +0200
+
+ linux (4.15.0-36.39) bionic; urgency=medium
+
+ * CVE-2018-14633
+ - iscsi target: Use hex2bin instead of a re-implementation
+
+ * CVE-2018-17182
+ - mm: get rid of vmacache_flush_all() entirely
+
+ -- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Mon, 24 Sep 2018 16:08:41 +0200
+
+linux (4.15.0-35.38) bionic; urgency=medium
+
+ * linux: 4.15.0-35.38 -proposed tracker (LP: #1791719)
+
+ * device hotplug of vfio devices can lead to deadlock in vfio_pci_release
+ (LP: #1792099)
+ - SAUCE: vfio -- release device lock before userspace requests
+
+ * L1TF mitigation not effective in some CPU and RAM combinations
+ (LP: #1788563)
+ - x86/speculation/l1tf: Fix overflow in l1tf_pfn_limit() on 32bit
+ - x86/speculation/l1tf: Fix off-by-one error when warning that system has too
+   much RAM
+ - x86/speculation/l1tf: Increase l1tf memory limit for Nehalem+
+
+ * CVE-2018-15594
+ - x86/paravirt: Fix spectre-v2 mitigations for paravirt guests
+
+ * CVE-2017-5715 (Spectre v2 s390x)
+ - KVM: s390: implement CPU model only facilities
+ - s390: detect etoken facility
+ - KVM: s390: add etoken support for guests
+ - s390/lib: use expoline for all bcr instructions
+ - s390: fix br_r1_trampoline for machines without exrl
+ - SAUCE: s390: use expoline thunks for all branches generated by the BPF JIT
+
+ * Ubuntu18.04.1: cpuidle: powernv: Fix promotion from snooze if next state
+   disabled (performance) (LP: #1790602)
+ - cpuidle: powernv: Fix promotion from snooze if next state disabled
+
+ * Watchdog CPU:19 Hard LOCKUP when kernel crash was triggered (LP: #1790636)
+ - powerpc: hard disable irqs in smp_send_stop loop
+ - powerpc: Fix deadlock with multiple calls to smp_send_stop
+ - powerpc: smp_send_stop do not offline stopped CPUs
+ - powerpc/powernv: Fix opal_event_shutdown() called with interrupts disabled
+
+ * Security fix: check if IOMMU page is contained in the pinned physical page
+ (LP: #1785675)
+ - vfio/spapr: Use IOMMU pageshift rather than pagesize
+ - KVM: PPC: Check if IOMMU page is contained in the pinned physical page
+
+ * Missing Intel GPU pci-id's (LP: #1789924)
+ - drm/i915/kbl: Add KBL GT2 sku
+ - drm/i915/whl: Introducing Whiskey Lake platform
+ - drm/i915/aml: Introducing Amber Lake platform
+ - drm/i915/cfl: Add a new CFL PCI ID.
+
+ * CVE-2018-15572
* x86/speculation: Protect against userspace-userspace spectreRSB

* Support Power Management for Thunderbolt Controller (LP: #1789358)
  - thunderbolt: Handle NULL boot ACL entries properly
  - thunderbolt: Notify userspace when boot_acl is changed
  - thunderbolt: Use 64-bit DMA mask if supported by the platform
  - thunderbolt: Do not unnecessarily call ICM get route
  - thunderbolt: No need to take tb->lock in domain suspend/complete
  - thunderbolt: Use correct ICM commands in system suspend
  - thunderbolt: Add support for runtime PM

* random oopses on s390 systems using NVMe devices (LP: #1790480)
  - s390/pci: fix out of bounds access during irq setup

* [Bionic] Spectre v4 mitigation (Speculative Store Bypass Disable) support
  for arm64 using SMC firmware call to set a hardware chicken bit
  (LP: #1787993) // CVE-2018-3639 (arm64)
  - arm64: alternatives: Add dynamic patching feature
  - KVM: arm/arm64: Do not use kern_hyp_va() with kvm_vgic_global_state
  - KVM: arm64: Avoid storing the vcpu pointer on the stack
  - arm/arm64: smccc: Add SMCC-specific return codes
  - arm64: Call ARCH_WORKAROUND_2 on transitions between EL0 and EL1
  - arm64: Add per-cpu infrastructure to call ARCH_WORKAROUND_2
  - arm64: Add ARCH_WORKAROUND_2 probing
  - arm64: Add 'ssbd' command-line option
  - arm64: ssbd: Add global mitigation state accessor
  - arm64: ssbd: Skip apply_ssb if not using dynamic mitigation
  - arm64: ssbd: Restore mitigation status on CPU resume
  - arm64: ssbd: Introduce thread flag to control userspace mitigation
  - arm64: ssbd: Add prctl interface for per-thread mitigation
  - arm64: KVM: Add HYP per-cpu accessors
  - arm64: KVM: Add ARCH_WORKAROUND_2 support for guests
  - arm64: KVM: Handle guest's ARCH_WORKAROUND_2 requests
  - arm64: KVM: Add ARCH_WORKAROUND_2 discovery through ARCH_FEATURES_FUNC_ID
  - [Config] ARM64_SSBD=y

* Reconcile hns3 SAUCE patches with upstream (LP: #1787477)
  - Revert "UBUNTU: SAUCE: net: hns3: Optimize PF CMDQ interrupt switching
    process"
  - Revert "UBUNTU: SAUCE: net: hns3: Fix for VF mailbox receiving unknown
    message"
  - Revert "UBUNTU: SAUCE: net: hns3: Fix for VF mailbox cannot receiving PF
    response"
  - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix comments for
    hclge_get_ring_chain_from_mbx"
  - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for using wrong mask and
    shift in hclge_get_ring_chain_from_mbx"
  - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for reset_level default
assignment problem"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unnecessary ring configuration operation while resetting"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix return value error in hns3_reset_notify_down_enet"
+ - Revert "UBUNTU: SAUCE: net: hns3: Fix for phy link issue when using marvell phy driver"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: separate roce from nic when resetting"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: correct reset event status register"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: prevent to request reset frequently"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: reset net device with rtnl_lock"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: modify the order of initializing command queue register"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: prevent sending command during global or core reset"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove the warning when clear reset cause"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix get_vector ops in hclgevf_main module"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix warning bug when doing lp selftest"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: Add configure for mac minimal frame size"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for mailbox message truncated problem"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for l4 checksum offload bug"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for waterline not setting correctly"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix for mac pause not disable in pfc mode"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix tc setup when netdev is first up"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: Add SPDX tags to hns3 driver"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unused struct member and definition"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix mislead parameter name"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: modify inconsistent bit mask macros"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: use decimal for bit offset macros"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix unreasonable code comments"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove extra space and brackets"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: standardize the handle of return value"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove some redundant
+ assignments"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: fix unused function warning in VF
driver"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: modify hnae_ to hnae3_"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: use dma_zalloc_coherent instead
of kzalloc/dma_map_single"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: give default option while
dependency HNS3 set"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove some unused members of
some structures"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove a redundant
hclge_cmd_csq_done"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: using modulo for cyclic counters
in hclge_cmd_send"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: simplify hclge_cmd_csq_clean"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove some redundant
assignments"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove useless code in
hclge_cmd_send"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unused
hclge_ring_to_dma_dir"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: use lower_32_bits and
+ upper_32_bits"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove back in struct hclge_hw"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: add unlikely for error check"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove the Redundant put_vector
in hns3_client_uninit"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: print the ret value in error
information"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: extraction an interface for state
state init|uninit"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove unused head file in
hnae3.c"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: add l4_type check for both ipv4
and ipv6"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: add vector status check before
free vector"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: rename the interface for
init_client_instance and uninit_client_instance"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: remove hclge_get_vector_index
from hclge_bind_ring_with_vector"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: RX BD information valid only in
last BD except VLD bit and buffer size"
+ - Revert "UBUNTU: SAUCE: {topost} net: hns3: add support for serdes loopback
selftest"
+ - net: hns3: Updates RX packet info fetch in case of multi BD
+ - net: hns3: remove unused hclgevf_cfg_func_mta_filter
+ - net: hns3: Fix for VF mailbox cannot receiving PF response
+ - net: hns3: Fix for VF mailbox receiving unknown message
+ - net: hns3: Optimize PF CMDQ interrupt switching process
+ - net: hns3: remove hclge_get_vector_index from hclge_bind_ring_with_vector
+ - net: hns3: rename the interface for init_client_instance and uninit_client_instance
+ - net: hns3: add vector status check before free vector
+ - net: hns3: add l4_type check for both ipv4 and ipv6
+ - net: hns3: add unlikely for error check
+ - net: hns3: remove unused head file in hnae3.c
+ - net: hns3: extraction an interface for state init|uninit
+ - net: hns3: print the ret value in error information
+ - net: hns3: remove the Redundant put_vector in hns3_client_uninit
+ - net: hns3: remove back in struct hclge_hw
+ - net: hns3: use lower_32_bits and upper_32_bits
+ - net: hns3: remove unused hclge_ring_to_dma_dir
+ - net: hns3: remove useless code in hclge_cmd_send
+ - net: hns3: remove some redundant assignments
+ - net: hns3: simplify hclge_cmd_csq_clean
+ - net: hns3: remove a redundant hclge_cmd_csq_done
+ - net: hns3: remove some unused members of some structures
+ - net: hns3: give default option while dependency HNS3 set
+ - net: hns3: use dma_zalloc_coherent instead of kzalloc/dma_map_single
+ - net: hns3: modify hnae__to_hnae3__
+ - net: hns3: Fix tc setup when netdev is first up
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+ - net: hns3: Fix for i4 checksum offload bug
+ - net: hns3: Fix for mailbox message truncated problem
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+ - net: hns3: Fix warning bug when doing lp selftest
+ - net: hns3: Fix get_vector ops in hclgevf_main module
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+ - net: hns3: Prevent sending command during global or core reset
+ - net: hns3: Modify the order of initializing command queue register
+ - net: hns3: Reset net device with rtnl_lock
+ - net: hns3: Prevent to request reset frequently
+ - net: hns3: Correct reset event status register
+ - net: hns3: Fix return value error in hns3_reset_notify_down_enet
+ - net: hns3: remove unnecessary ring configuration operation while resetting
+ - net: hns3: Fix for reset_level default assignment problem
+ - net: hns3: Fix for using wrong mask and shift in hclge_get_ring_chain_from_mbx
+ - net: hns3: Fix comments for hclge_get_ring_chain_from_mbx
+ - net: hns3: Remove some redundant assignments
+ - net: hns3: Standardize the handle of return value
+ - net: hns3: Remove extra space and brackets
+ - net: hns3: Correct unreasonable code comments
+ - net: hns3: Use decimal for bit offset macros
+ - net: hns3: Modify inconsistent bit mask macros
+ - net: hns3: Fix misleading parameter name
+ - net: hns3: Remove unused struct member and definition
+ - net: hns3: Add SPDX tags to HNS3 PF driver
+ - net: hns3: Add support for serdes loopback selftest
+ - net: hns3: Fix for phy link issue when using marvell phy driver
+ - SAUCE: [topost] net: hns3: separate roce from nic when resetting

+ * CVE-2018-6555
+ - SAUCE: irda: Only insert new objects into the global database via setsockopt

+ * CVE-2018-6554
+ - SAUCE: irda: Fix memory leak caused by repeated binds of irda socket

+ * Bionic update: upstream stable patchset 2018-08-31 (LP: #1790188)
+ - netfilter: nf_tables: fix NULL pointer dereference on
  - nlct_helper_obj_dump()
+ - blkdev_report_zones_ioctl(): Use vmalloc() to allocate large buffers
+ - af_key: Always verify length of provided sadb_key
+ - gpio: No NULL owner
+ - KVM: X86: Fix reserved bits check for MOV to CR3
+ - KVM: x86: introduce linear_[read,write]_system
+ - KVM: x86: pass kvm_vcpu to kvm_read_guest_virt and
  - kvm_write_guest_virt_system
+ - staging: android: ion: Switch to pr_warn_once in ion_buffer_destroy
+ - NFC: pn533: don't send USB data off of the stack
+ - usbip: vhci_sysfs: fix potential Spectre v1
+ - usb-storage: Add support for FL_ALWAYS_SYNC flag in the UAS driver
+ - usb-storage: Add compatibility quirk flags for G-Technologies G-Drive
+ - Input: xpad - add GPD Win 2 Controller USB IDs
+ - phy: qcom-qusb2: Fix crash if nvmem cell not specified
+ - usb: gadget: function: printer: avoid wrong list handling in printer_write()
+ - usb: gadget: udc: renesas_usb3: disable the controller's irqs for
  - reconnecting
+ - serial: sh-sci: Stop using printk format %pCr
+ - tty/serial: atmel: use port->name as name in request_irq()
+ - serial: samsung: fix maxburst parameter for DMA transactions
+ - serial: 8250: omap: Fix idling of clocks for unused uarts
+ - vmm_balloon: fixing double free when batching mode is off
+ - tty: pl011: Avoid spuriously stuck-off interrupts
+ - kvm: x86: use correct privilege level for sgdit/sidt/fxsave/fxrstor access
+ - Input: goodix - add new ACPI id for GPD Win 2 touch screen
+ - crypto: caam - strip input zeros from RSA input buffer
+ - crypto: caam - fix DMA mapping dir for generated IV
+ - crypto: caam - fix IV DMA mapping and updating
+ - crypto: caam/qi - fix IV DMA mapping and updating
+ - crypto: caam - fix size of RSA prime factor q
+ - crypto: vmx - Remove overly verbose printk from AES init routines
+ - crypto: vmx - Remove overly verbose printk from AES XTS init
+ - crypto: omap-sham - fix memleak
+ - usb: typec: wcove: Remove dependency on HW FSM
+ - usb: gadget: udc: renesas_usb3: fix double phy_put()
+ - usb: gadget: udc: renesas_usb3: should remove debugfs
+ - usb: gadget: udc: renesas_usb3: should call pm_runtime_enable() before add udc
+ - usb: gadget: udc: renesas_usb3: should call devm_phy_get() before add udc
+ - usb: gadget: udc: renesas_usb3: should fail if devm_phy_get() returns error
+
+ * Bionic update: upstream stable patchset 2018-08-29 (LP: #1789666)
+ - scsi: sd_zbc: Avoid that resetting a zone fails sporadically
+ - mmap: introduce sane default mmap limits
+ - mmap: relax file size limit for regular files
+ - btrfs: define SUPER_FLAG_METADUMP_V2
+ - kconfig: Avoid format overflow warning from GCC 8.1
+ - be2net: Fix error detection logic for BE3
+ - bnx2x: use the right constant
+ - dccp: don't free ccid2_he_tx_sock struct in dccp_disconnect()
+ - enic: set DMA mask to 47 bit
+ - i6pmr: only set ip6mr_table from setsockopt when ip6mr_new_table succeeds
+ - ip6_tunnel: remove magic mtu value 0xFFF8
+ - ipmr: properly check rhtable_init() return value
+ - ipv4: remove warning in ip_recv_error
+ - ipv6: omit traffic class when calculating flow hash
+ - isdn: eicon: fix a missing-check bug
+ - kcm: Fix use-after-free caused by cloned sockets
+ - netdev-FAQ: clarify DaveM's position for stable backports
+ - net: ipv4: add missing RTA_TABLE to rtm_ipv4_policy
+ - net: metrics: add proper netlink validation
+ - net/packet: refine check for priv area size
+ - net: phy: broadcom: Fix bcm_write_exp()
+ - net: usb: cdc_mbim: add flag FLAG_SEND_ZLP
+ - packet: fix reserve calculation
+ - qed: Fix mask for physical address in ILT entry
+ - scpt: not allow transport timeout value less than HZ/5 for hb_timer
+ - team: use netdev_features_t instead of u32
+ - vhost: synchronize IOTLB message with dev cleanup
+ - vrf: check the original netdevice for generating redirect
+ - ipv6: sr: fix memory OOB access in seg6_do_srh_encap/inline
+ - net: phy: broadcom: Fix auxiliary control register reads
+ - net-sysfs: Fix memory leak in XPS configuration
+ - virtio-net: correctly transmit XDP buff after linearizing
+ - net/mlx4: Fix irq-unsafe spinlock usage
+ - tun: Fix NULL pointer dereference in XDP redirect
+ - virtio-net: correctly check num_buf during err path
+ - net/mlx5e: When RXFCS is set, add FCS data into checksum calculation
+ - virtio-net: fix leaking page for gso packet during mergeable XDP
+ - rtnetlink: validate attributes in do_setlink()
+ - cls_flower: Fix incorrect idr release when failing to modify rule
+ - PCI: hv: Do not wait forever on a device that has disappeared
+ - drm: set FMODE_UNSIGNED_OFFSET for drm files
+ - 12tp: fix refcount leakage on PPPoL2TP sockets
+ - mlxsw: spectrum: Forbid creation of VLAN 1 over port/LAG
+ - net: ethernet: ti: cpdma: correct error handling for chan create
+ - net: ethernet: davinci_emac: fix error handling in probe()
+ - net: dsa: b53: Fix for brcm tag issue in Cygnus SoC
+ - net : sched: cls_api: deal with egdev path only if needed
+
+ * Bionic update: upstream stable patchset 2018-08-24 (LP: #1788897)
+ - fix io_destroy()/aio_complete() race
+ - mm: fix the NULL mapping case in __isolate_lru_page()
+ - objtool: Support GCC 8's cold subfunctions
+ - objtool: Support GCC 8 switch tables
+ - objtool: Detect RIP-relative switch table references
+ - objtool: Detect RIP-relative switch table references, part 2
+ - objtool: Fix "noreturn" detection for recursive sibling calls
+ - xfs: convert XFS_AGPL_SIZE to a helper function
+ - xfs: detect agfl count corruption and reset agfl
+ - Input: synaptics - Lenovo Carbon X1 Gen5 (2017) devices should use RMI
+ - Input: synaptics - add Lenovo 80 series ids to SMBus
+ - Input: elan_i2c_smbus - fix corrupted stack
+ - tracing: Fix crash when freeing instances with event triggers
+ - tracing: Make the snapshot trigger work with instances
+ - selinux: KASAN: slab-out-of-bounds in xattr_getsecurity
+ - cfg80211: further limit wiphy names to 64 bytes
+ - drm/amd/powerplay: Fix enum mismatch
+ - rtlwifi: rtl8192cu: Remove variable self-assignment in rf.c
+ - platform/chrome: cros_ec_lpc: remove redundant pointer request
+ - kbuild: clang: disable unused variable warnings only when constant
+ - tcp: avoid integer overflows in tcp_rcv_space_adjust()
+ - iio: ad7793: implement IIO_CHAN_INFO_SAMP_FREQ
+ - iio:buffer: make length types match kfifo types
+ - iio:kfifo_buf: check for uint overflow
+ - iio: adc: select buffer for at91-sama5d2_adc
+ - MIPS: lantiq: gphy: Drop reboot/remove reset asserts
+ - MIPS: ptrace: Fix PTRACE_PEEKUSR requests for 64-bit FGRs
+ - MIPS: prctl: Disallow FRE without FR with PR_SET_FP_MODE requests
+ - scsi: scsi_transport_srp: Fix shost to rport translation
+ - stm class: Use vmalloc for the master map
+ - hwtracing: stm: fix build error on some arches
+ - IB/core: Fix error code for invalid GID entry
+ - mm/huge_memory.c: __split_huge_page() use atomic ClearPageDirty()
+ - Revert "rt2800: use TXOP_BACKOFF for probe frames"
+ - intel_th: Use correct device when freeing buffers
+ - drm/psr: Fix missed entry in PSR setup time table.
+ - drm/i915/lvds: Move acpi lid notification registration to registration phase
+ - drm/i915: Disable LVDS on Radiant P845
+ - drm/vmwgfx: Use kasprintf
+ - drm/vmwgfx: Fix host logging / guestinfo reading error paths
+ - nvme: fix extended data LBA supported setting
+ - iio: hid-sensor-trigger: Fix sometimes not powering up the sensor after resume
+ - x86/MCE/AMD: Define a function to get SMCA bank type
+ - x86/mce/AMD: Pass the bank number to smca_get_bank_type()
+ - x86/mce/AMD, EDAC/mce_amd: Enumerate Reserved SMCA bank type
+ - x86/mce/AMD: Carve out SMCA get_block_address() code
+ - x86/MCE/AMD: Cache SMCA MISC block addresses

+ * errors when scanning partition table of corrupted AIX disk (LP: #1787281)
+ - partitions/aix: fix usage of uninitialized lv_info and lvname structures
+ - partitions/aix: append null character to print data from disk
+ * tlbie master timeout checkstop (using NVidia/GPU) (LP: #1789772)
+ - powerpc/mm/hugetlb: Update huge_ppte_set_access_flags to call
    __ppte_set_access_flags directly
+ - powerpc/mm/radix: Move function from radix.h to pgtable-radix.c
+ - powerpc/mm: Change function prototype
+ - powerpc/mm/radix: Change pte relax sequence to handle nest MMU hang

+ * performance drop with ATS enabled (LP: #1788097)
+ - powerpc/powernv: Fix concurrency issue with npu->mmio_atsd_usage

+ * [Regression] kernel crashdump fails on arm64 (LP: #1786878)
+ - arm64: export memblock_reserve()d regions via /proc/iomem
+ - drivers: acpi: add dependency of EFI for arm64
+ - efi/arm: preserve early mapping of UEFI memory map longer for BGRT
+ - efi/arm: map UEFI memory map even w/o runtime services enabled
+ - arm64: acpi: fix alignment fault in accessing ACPI
+ - [Config] CONFIG_ARCH_SUPPORTS_ACPI=y
+ - arm64: fix ACPI dependencies
+ - ACPI: fix menuconfig presentation of ACPI submenu

+ * TB 16 issue on Dell Latitude 7490 with large amount of data (LP: #1785780)
+ - r8152: disable RX aggregation on new Dell TB16 dock

+ * dell_wmi: Unknown key codes (LP: #1762385)
+ - platform/x86: dell-wmi: Ignore new rfkill and fn-lock events

+ * Enable AMD PCIe MP2 for AMDI0011 (LP: #1773940)
+ - SAUCE: i2c:amd I2C Driver based on PCI Interface for upcoming platform
+ - SAUCE: i2c:amd move out pointer in union i2c_event_base
+ - SAUCE: i2c:amd Depends on ACPI
+ - [Config] i2c: CONFIG_I2C_AMD_MP2=y on x86
* r8169: no internet after suspending (LP: #1779817)
  - r8169: restore previous behavior to accept BIOS WoL settings
  - r8169: don't use MSI-X on RTL8168g
  - r8169: don't use MSI-X on RTL8106e

* Fix Intel Cannon Lake LPSS I2C input clock (LP: #1789790)
  - mfd: intel-lpss: Fix Intel Cannon Lake LPSS I2C input clock

* Microphone cannot be detected with front panel audio combo jack on HP Z8-G4
  machine (LP: #1789145)
  - ALSA: hda/realtek - Fix HP Headset Mic can't record

* Tango platform uses __initcall without further checks (LP: #1787945)
  - [Config] disable ARCH_TANGO

* [18.10 FEAT] Add kernel config option "CONFIG_SCLP_OFB" (LP: #1787898)
  - [Config] CONFIG_SCLP_OFB=y for s390x

Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 12 Sep 2018 11:39:17 +0200
+linux (4.15.0-34.37) bionic; urgency=medium

* linux: 4.15.0-34.37 -proposed tracker (LP: #1788744)

* Bionic update: upstream stable patchset 2018-08-09 (LP: #1786352)
  - MIPS: c-r4k: Fix data corruption related to cache coherence
  - MIPS: ptrace: Expose FIR register through FP regset
  - MIPS: Fix ptrace(2) PTRACE_PEEKUSR and PTRACE_POKERUSR accesses to o32 FGRs
  - KVM: Fix spelling mistake: "cop_unsuable" -> "cop_unusable"
  - affs_lookup(): close a race with affs_remove_link()
  - fs: don't scan the inode cache before SB_BORN is set
  - aio: fix io_destroy(2) vs. lookup_ioctx() race
  - ALSA: timer: Fix pause event notification
  - do d instantiate/unlock new inode combinations safely
  - mmc: sdhci-iproc: remove hard coded mmc cap 1.8v
  - mmc: sdhci-iproc: fix 32bit writes for TRANSFER_MODE register
  - mmc: sdhci-iproc: add SDHCI_QUIRK2_HOST_OFF_CARD_ON for cygnus
  - libata: Blacklist some Sandisk SSDs for NCQ
  - libata: blacklist Micron 500IT SSD with MU01 firmware
  - xen-swiotlb: fix the check condition for xen_swiotlb_free_coherent
  - drm/vmwgfx: Fix 32-bit VMW_PORT_HB_[IN][OUT] macros
  - arm64: lse: Add early clobbers to some input/output asm operands
  - powerpc/64s: Clear PCR on boot
  - IB/hfi1: Use after free race condition in send context error path
  - IB/umem: Use the correct mm during ib_umem_release
  - idr: fix invalid ptr dereference on item delete
  - Revert "ipc/shm: Fix shmat mmap nil-page protection"
+ - ipc/shm: fix shmat() nil address after round-down when remapping
+ - mm/kasan: don't vfree() nonexistent vm_area
+ - kasan: free allocated shadow memory on MEM_CANCEL_ONLINE
+ - kasan: fix memory hotplug during boot
+ - kernel/sys.c: fix potential Spectre v1 issue
+ - KVM: s390: vsie: fix < 8k check for the itdba
+ - KVM: x86: Update cpuid properly when CR4.OSXAVE or CR4.PKE is changed
+ - kvm: x86: IA32_ARCH_CAPABILITIES is always supported
+ - powerpc/64s: Improve RFI L1-D cache flush fallback
+ - powerpc/series: Restore default security feature flags on setup
+ - powerpc/64s: Fix section mismatch warnings from setup_rfi_flush()
+ - MIPS: generic: Fix machine compatible matching
+ - mac80211: mesh: fix wrong mesh TTL offset calculation
+ - ARC: Fix malformed ARC_EMUL_UNALIGNED default
+ - ptr_ring: prevent integer overflow when calculating size
+ - arm64: dts: rockchip: fix rock64 gmac2io stability issues
+ - arm64: dts: rockchip: correct ep-gpios for rk3399-sapphire
+ - libata: Fix compile warning with ATA_DEBUG enabled
+ - selftests: sync: missing CFLAGS while compiling
+ - selftest/vDSO: fix O=  
+ - selftests: pstore: Adding config fragment CONFIG_PSTORE_RAM=m
+ - selftests: memfd: add config fragment for fuse
+ - ARM: OMAP2+: timer: fix a kmemleak caused in omap_get_timer_dt
+ - ARM: OMAP3: Fix prm wake interrupt for resume
+ - ARM: OMAP2+: Fix sar_base initialzation for HS omaps
+ - ARM: OMAP1: clock: Fix debugfs_create_*() usage
+ - tls: retn the correct IV in getsockopt
+ - xhci: workaround for AMD Promontory disabled ports wakeup
+ - IB/uverbs: Fix method merging in uverbs_ioctl_merge
+ - IB/uverbs: Fix possible oops with duplicate ioctl attributes
+ - IB/uverbs: Fix unbalanced unlock on error path for rdma_explicit_destroy
+ - arm64: dts: rockchip: Fix DWMMC clocks
+ - ARM: dts: rockchip: Fix DWMMC clocks
+ - iwlwifi: mvm: fix security bug in PN checking
+ - iwlwifi: mvm: fix IBSS for devices that support station type API
+ - iwlwifi: mvm: always init rs with 20mhz bandwidth rates
+ - NFC: llcp: Limit size of SDP URI
+ - rxrpc: Work around usercopy check
+ - MD: Free biostat when md_run fails
+ - md: fix md_write_start() deadlock w/o metadata devices
+ - s390/dasd: fix handling of internal requests
+ - xfrm: do not call rcu_read_unlock when afinfo is NULL in xfrm_get_tos
+ - mac80211: round IEEE80211_TX_STATUS_HEADROOM up to multiple of 4
+ - mac80211: fix a possible leak of station stats
+ - mac80211: fix calling sleeping function in atomic context
+ - cfg80211: clear wep keys after disconnection
+ - mac80211: Do not disconnect on invalid operating class
+ - mac80211: Fix sending ADDBA response for an ongoing session
+ - gpu: ipu-v3: pre: fix device node leak in ipu_pre_lookup_by_phandle
+ - gpu: ipu-v3: prg: fix device node leak in ipu_prg_lookup_by_phandle
+ - md raid10: fix NULL deference in handle_write_completed()
+ - drm/exynos: g2d: use monotonic timestamps
+ - drm/exynos: fix comparison to bitshift when dealing with a mask
+ - drm/meson: fix vsync buffer update
+ - arm64: perf: correct PMUVer probing
+ - RDMA/bnxt_re: Unpin SQ and RQ memory if QP create fails
+ - RDMA/bnxt_re: Fix system crash during load/unload
+ - net/mlx5e: Return error if prio is specified when offloading eswitch vlan
  push
+ - locking/schg/alpha: Add unconditional memory barrier to cmpxchg()
+ - md: raid5: avoid string overflow warning
+ - virtio_net: fix XDP code path in receive_small()
+ - kernel/relay.c: limit kmalloc size to KMALLOC_MAX_SIZE
+ - bug.h: work around GCC PR82365 in BUG()
+ - selftests/memfd: add run_fuse_test.sh to TEST_FILES
+ - seccomp: add a selftest for get_metadata
+ - soc: imx: gpc: de-register power domains only if initialized
+ - powerpc/bpf/jit: Fix 32-bit JIT for seccomp_data access
+ - s390/cio: fix ccw_device_start_timeout API
+ - s390/cio: fix return code after missing interrupt
+ - s390/cio: clear timer when terminating driver I/O
+ - selftests/bpf/test_maps: exit child process without error in ENOMEM case
+ - PKCS#7: fix direct verification of SignerInfo signature
+ - arm64: dts: cavium: fix PCI bus dtc warnings
+ - nfs: system crashes after NFS4ERRMOVED recovery
+ - ARM: OMAP: Fix dmtimer init for omap1
+ - smsc75xx: fix smsc75xx_set_features()
+ - regulatory: add NUL to request alpha2
+ - integrity/security: fix digsig.c build error with header file
+ - x86/intel_rdt: Fix incorrect returned value when creating rdgroup sub-directory in resctrl file system
+ - locking/schg/alpha: Fix xchg() and cmpxchg() memory ordering bugs
+ - x86/topology: Update the ‘cpu cores’ field in /proc/cpuinfo correctly across CPU hotplug operations
+ - mac80211: drop frames with unexpected DS bits from fast-rx to slow path
+ - arm64: fix unwind_frame() for filtered out fn for function graph tracing
+ - macvlan: fix use-after-free in macvlan_common_newlink()
+ - KVM: nVMX: Don’t halt vcpu when L1 is injecting events to L2
+ - kvm: fix warning for CONFIG_HAVE_KVM_EVENTFD builds
+ - ARM: dts: imx6dl: Include correct dti file for Engicam i.CoreM6
+ DualLite/Solo RQS
+ - fs: dcache: Avoid livelock between d_alloc_parallel and __d_add
+ - fs: dcache: Use READ_ONCE when accessing i_dir_seq
+ - md: fix a potential deadlock of raid5/raid10 reshape
+ - md/raid1: fix NULL pointer dereference
+ - batman-adv: fix packet checksum in receive path
+ - batman-adv: invalidate checksum on fragment reassembly
+ - netfilter: ipt_CLUSTERP: put config struct if we can't increment ct
+ - netfilter: ipt_CLUSTERP: put config instead of freeing it
+ - netfilter: ebtables: convert BUG_ONs to WARN_ONs
+ - batman-adv: Ignore invalid batadv_iv_gw during netlink send
+ - batman-adv: Ignore invalid batadv_v_gw during netlink send
+ - batman-adv: Fix netlink dumping of BLA claims
+ - batman-adv: Fix netlink dumping of BLA backbones
+ - nvme-pci: Fix nvme queue cleanup if IRQ setup fails
+ - clocksorces/drivers/fsl_ftm_timer: Fix error return checking
+ - libceph, ceph: avoid memory leak when specifying same option several times
+ - ceph: fix dentry leak when failing to init debugfs
+ - xen/pvcalls: fix null pointer dereference on map->sock
+ - ARM: Orion5x: Revert commit 4904dbda41c8.
+ - qrtr: add MODULE_ALIAS dereference on map->sock
+ - selftests/futex: Fix line continuations in Makefile
+ - r1512: fix tx packets accounting
+ - virtio-gpu: fix ioctl and expose the fixed status to userspace.
+ - dmaengine: rcar-dma: fix max_chunk_size for R-Car Gen3
+ - bcache: fix kcrashes with fio in RAID5 backend dev
+ - ip_gre: fix IFLA_MTU ignored on NEWLINK
+ - ip6_tunnel: fix IFLA_MTU ignored on NEWLINK
+ - sit: fix IFLA_MTU ignored on NEWLINK
+ - nbd: fix return value in error handling path
+ - ARM: dt->NSP: Fix amount of RAM on BCM958625HR
+ - ARM: dt->bcm283x: Fix unit address of local_intc
+ - powerpc/boot: Fix random libfdi related build errors
+ - clocksorces/drivers/mips-gic-timer: Use correct shift count to extract data
+ - gianfar: Fix Rx byte accounting for ndev stats
+ - net/tcp/illinois: replace broken algorithm reference link
+ - nvmet: fix PSDT field check in command format
+ - net/smc: use link_id of server in confirm link reply
+ - mlxsw: core: Fix flex keys scratchpad offset conflict
+ - mlxsw: spectrum: Treat IPv6 unregistered multicast as broadcast
+ - spectrum: Reference count VLAN entries
+ - ARC: mcip: halt GFRC counter when ARC cores halt
+ - ARC: mcip: update MCIP debug mask when the new cpu came online
+ - ARC: setup cpu possible mask according to possible-cpus dt property
+ - ipvs: remove IPS_NAT_MASK check to fix passive FTP
+ - IB/mlx: Set slid to zero in Ethernet completion struct
+ - RDMA/bnxr_re: Unconditionally fence non wire memory operations
+ - RDMA/bnxr_re: Fix incorrect DB offset calculation
+ - RDMA/bnxr_re: Fix the ib_reg failure cleanup
+ - xen/pirq: fix error path cleanup when binding MSIs
+ - drm/amd/amdgpu: Correct VRAM width for APUs with GMC9
+ - xfrm: Fix ESN sequence number handling for IPsec GSO packets.
+ - arm64: dt->rockchip: Fix rk3399-gru-* s2r (pinctrl hogs, wifi reset)
+ - drm/sun4i: Fix dclk_set_phase
+ - btrfs: use kvzalloc to allocate btrfs_fs_info
+ - Btrfs: send, fix issuing write op when processing hole in no data mode
+ - ceph: fix potential memory leak in init_caches()
+ - block: display the correct diskname for bio
+ - selftests/powerpc: Skip the subpage_prot tests if the syscall is unavailable
+ - net: ethtool: don't ignore return from driver get_fecparam method
+ - iwlwifi: mvmm: fix TX of CCMP 256
+ - iwlwifi: mvmm: Fix channel switch for count 0 and 1
+ - iwlwifi: mvmm: fix assert 0x2B00 on older FWs
+ - iwlwifi: avoid collecting firmware dump if not loaded
+ - iwlwifi: mvmm: Direct multicast frames to the correct station
+ - iwlwifi: mvmm: Correctly set the tid for mcast queue
+ - rds: Incorrect reference counting in TCP socket creation
+ - batman-adv: Fix multicast packet loss with a single WANT_ALL_IPV4/6 flag
+ - hv_netvsc: use napi_schedule_irqoff
+ - hv_netvsc: filter multicast/broadcast
+ - hv_netvsc: propagate rx filters to VF
+ - ARM: dts: rockchip: Add missing #sound-dai-cells on rk3288
+ - e1000e: Fix check_for_link return value with autoneg off
+ - e1000e: allocate ring descriptors with dma_zalloc_coherent
+ - ia64/err-inject: Use get_user_pages_fast()
+ - RDMA/qedr: Fix kernel panic when running fio over NFSoRDMA
+ - RDMA/qedr: Fix iWARP write and send with immediate
+ - IB/mlx4: Fix corruption of RoCEv2 IPv4 GIDs
+ - IB/mlx5: Fix an error code in __mlx5_ib_modify_qp()
+ - fdev: Fixing arbitrary kernel leak in case FBlOGETCMAP_NPARC in
+ sbusfb_ioctl_helper().
+ - fsl/fman: avoid sleeping in atomic context while adding an address
+ - qed: Free RoCE ILT Memory on rmmod qedr
+ - net: qcom/emac: Use proper free methods during TX
+ - net: smsc911x: Fix unload crash when link is up
+ - IB/core: Fix possible crash to access NULL netdev
+ - cxgb4: do not set needs_free_netdev for mgmt dev's
+ - xen-blkfront: move negotiate_mq to cover all cases of new VBDs
+ - xen: xenbus: use put_device() instead of kfree()
+ - hv_netvsc: fix filter flags
+ - hv_netvsc: fix locking for rx_mode
+ - hv_netvsc: fix locking during VF setup
+ - ARM: davinci: fix the GPIO lookup for omapl38-hawk
+ - arm64: Relax ARM_SMCCC_ARCH_WORKAROUND_1 discovery
+ - selftests/vm/run_vmtests: adjust hugetlb size according to nr_cpus
+ - lib/test_kmod.c: fix limit check on number of test devices created
+ - dmaengine: mv_xor_v2: Fix clock resource by adding a register clock
+ - netfilter: ebtables: fix erroneous reject of last rule
+  - can: m_can: change comparison to bitshift when dealing with a mask
+  - can: m_can: select pinctrl state in each suspend/resume function
+  - bnxt_en: Check valid VNIC ID in bnxt_hwrm_vnic_set_tpa().
+  - workqueue: use put_device() instead of kfree()
+  - ipv4: lock mtu in fnhe when received PMTU < net.ipv4.route.min_pmtu
+  - sunvnet: does not support GSO for scp
+  - KVM: arm/arm64: vgic: Add missing irq_lock to vgic_mmio_read_pending
+  - gpu: ipu-v3: prg: avoid possible array underflow
+  - drm/imx: move arming of the vblank event to atomic_flush
+  - drm/nouveau/bl: fix backlight regression
+  - xfrm: fix rcu_read_unlock usage in xfrm_local_error
+  - iwlwifi: mvm: set the correct tid when we flush the MCAST sta
+  - iwlwifi: mvm: Correctly set IGTK for AP
+  - iwlwifi: mvm: fix error checking for multi/broadcast sta
+  - net: Fix vlan untag for bridge and vlan_dev with reorder_hdr off
+  - vlan: Fix out of order vlan headers with reorder header off
+  - batman-adv: fix header size check in batadv_dbg_arp()
+  - batman-adv: Fix skbuff rcsum on packet reroute
+  - vti4: Don’t count header length twice on tunnel setup
+  - ip_tunnel: Clamp MTU to bounds on new link
+  - vti6: Fix dev->max_mtu setting
+  - iwlwifi: mvm: Increase session protection time after CS
+  - iwlwifi: mvm: clear tx queue id when unreserving aggregation queue
+  - iwlwifi: mvm: make sure internal station has a valid id
+  - iwlwifi: mvm: fix array out of bounds reference
+  - drm/tegra: Shutdown on driver unbind
+  - perf/cgroup: Fix child event counting bug
+  - brcmfmac: Fix check for ISO3166 code
+  - kbuild: make scripts/adjust_autosyms.sh robust against timestamp races
+  - RDMA/ucma: Correct option size check using optlen
+  - RDMA/qedr: fix QP's ack timeout configuration
+  - RDMA/qedr: Fix rc initialization on CNQ allocation failure
+  - RDMA/qedr: Fix QP state initialization race
+  - net/sched: fix idr leak on the error path of tcf_bpf_init()
+  - net/sched: fix idr leak in the error path of tcf_simp_init()
+  - net/sched: fix idr leak in the error path of tcf_act_police_init()
+  - net/sched: fix idr leak in the error path of tcp_pedinit()
+  - net/sched: fix idr leak in the error path of __tcp_ipt_init()
+  - net/sched: fix idr leak in the error path of tcp_skbmod_init()
+  - net: dsa: Fix functional dsa-loop dependency on FIXED_PHY
+  - drm/ast: Fixed 1280x800 Display Issue
+  - mm/mempolicy.c: avoid use uninitialized preferred_node
+  - mm, thp: do not cause memcg oom for thp
+  - xfrm: Fix transport mode skb control buffer usage.
+  - selftests: ftrace: Add probe event argument syntax testcase
+  - selftests: ftrace: Add a testcase for string type with kprobe_event
+  - selftests: ftrace: Add a testcase for probepoint
+  - drm/amdkfd: Fix scratch memory with HWS enabled
+ - batman-adv: fix multicast-via-unicast transmission with AP isolation
+ - batman-adv: fix packet loss for broadcasted DHCP packets to a server
+ - ARM: 8748/1: mm: Define vdso_start, vdso_end as array
+ - lan78xx: Set ASD in MAC_CR when EEE is enabled.
+ - net: qmi_wwan: add BroadMobi BM806U 2020:2033
+ - bonding: fix the err path for dev hwaddr sync in bond_enslave
+ - net: dsa: mt7530: fix module autoloading for OF platform drivers
+ - net/mlx5: Make eswitch support to depend on switchdev
+ - perf/x86/intel: Fix linear IP of PEBS real_ip on Haswell and later CPUs
+ - x86/alternatives: Fixup alternative_call_2
+ - llc: properly handle dev_queue_xmit() return value
+ - builddeb: Fix header package regarding dtc source links
+ - qede: Fix barrier usage after tx doorbell write.
+ - mm, slab: memcg_link the SLAB's kmem_cache
+ - mm/page_owner: fix recursion bug after changing skip entries
+ - mm/kmemleak.c: wait for scan completion before disabling free
+ - hv_netvsc: enable multicast if necessary
+ - qede: Do not drop rx-checksum invalidated packets.
+ - net: Fix untag for vlan packets without ethernet header
+ - vlan: Fix vlan insertion for packets without ethernet header
+ - net: mvena: fix enable of all initialized RXQs
+ - sh: fix debug trap failure to process signals before return to user
+ - firmware: dmi_scan: Fix UUID length safety check
+ - nvme: don't send keep-alives to the discovery controller
+ - Btrfs: clean up resources during umount after trans is aborted
+ - Btrfs: fix loss of prealloc extents past i_size after fsync log replay
+ - x86/pgtable: Don't set huge PUD/PMD on non-leaf entries
+ - fs/proc/proc_sysct1.c: fix potential page fault while unregistering sysctl
+ - swap: divide-by-zero when zero length swap file on ssd
+ - zfold: fix memory leak
+ - sr: get/drop reference to device in revalidate and check_events
+ - Force log to disk before reading the AGF during a fstrim
+ - cpufreq: CPPC: Initialize shared perf capabilities of CPUs
+ - powerpc/fscr: Enable interrupts earlier before calling get_user()
+ - perf tools: Fix perf builds with clang support
+ - perf clang: Add support for recent clang versions
+ - dp83640: Ensure against premature access to PHY registers after reset
+ - ibmvnic: Zero used TX descriptor counter on reset
+ - mm/ksm: fix interaction with THP
+ - mm: fix races between address_space dereference and free in page_evictable
+ - mm: thp: fix potential clearing to referenced flag in
+ - page_idle_clear_pte_refs_one()
+ - Btrfs: bail out on error during replay_dir_deletes
+ - Btrfs: fix NULL pointer dereference in log_dir_items
+ - btrfs: Fix possible softlock on single core machines
+ - IB/rxe: Fix for oops in rxe_register_device on ppc64le arch
+ - ocfs2/dlm: don't handle migrate lockres if already in shutdown
- powerpc/64s/idle: Fix restore of AMOR on POWER9 after deep sleep
- sched/rt: Fix rq->clock_update_flags < RQCF_ACT_SKIP warning
- x86/mm: Fix bogus warning during EFI bootup, use boot_cpu_has() instead of	hsis_cpu_has() in build_cr3_noflush()
- KVM: VMX: raise internal error for exception during invalid protected mode
  state
- lan78xx: Connect phy early
- sparc64: Make atomic_xchg() an inline function rather than a macro.
- net: bgmac: Fix endian access in bgmac_dma_tx_ring_free()
- net: bgmac: Correctly annotate register space
- btrfs: tests/qgroup: Fix wrong tree backref level
- Btrfs: fix copy_items() return value when logging an inode
- btrfs: fix lockdep splat in btrfs_alloc_subvolume_writers
- btrfs: qgroup: Fix root item corruption when multiple same source snapshots
  are created with quota enabled
- rxrpc: Fix Tx ring annotation after initial Tx failure
- rxrpc: Don't treat call aborts as conn aborts
- xen/acpi: off by one in read_acpi_id()
- drivers: macintosh: rack-meter: really fix bogus memsets
- ACPI: acpi_pad: Fix memory leak in power saving threads
- powerpc/mpic: Check if cpu_possible() in mpic_physmask()
- ieee802154: ca8210: fix uninitialised data read
- ath10k: advertize beacon_int_min_gcd
- jommu/amd: Take into account that alloc_dev_data() may return NULL
- intel_th: Use correct method of finding hub
- m68k: set dma and coherent masks for platform FEC ethernets
- iwlwifi: mvm: check if mac802111_queue is valid in iwl_mvm_disable_rxq
- parisc/pci: Switch LBA PCI bus from Hard Fail to Soft Fail mode
- hwmon: (nct6775) Fix writing pwmX_mode
- powerpe/perf: Prevent kernel address leak to userspace via BHRB buffer
- powerpe/perf: Fix kernel address leak via sampling registers
- rsi: fix kernel panic observed on 64bit machine
- tools/thermal: tmon: fix for segfault
- selftests: Print the test we're running to /dev/kmsg
- net/mlx5: Protect from command bit overflow
- watchdog: davinci_wdt: fix error handling in davinci_wdt_probe()
- ath10k: Fix kernel panic while using worker (ath10k_sta_rc_update_wk)
- nvme-pci: disable APST for Samsung NVMe SSD 960 EVO + ASUS PRIME Z370-A
- ath9k: fix crash in spectral scan
- cxgb4: Setup FW queues before registering netdev
- ima: Fix Kconfig to select TPM 2.0 CRB interface
- ima: Fallback to the builtin hash algorithm
- watchdog: aspeed: Allow configuring for alternate boot
- arm: dts: socfpga: fix GIC PPI warning
- ext4: don't complain about incorrect features when probing
- drm/vmwhfx: Unpin the screen object backup buffer when not used
- iommu/mediatek: Fix protect memory setting
- cpufreq: cppe_cpufreq: Fix cppe_cpufreq_init() failure path
+ IB/mlx5: Set the default active rate and width to QDR and 4X
+ zorro: Set up z->dev.dma_mask for the DMA API
+ bcache: quit dc->writeback_thread when BCACHE_DEV_DETACHING is set
+ remoteproc: imx_rproc: Fix an error handling path in `imx_rproc_probe()`
+ dt-bindings: add device tree binding for Allwinner H6 main CCU
+ ACPI: Events: add a return on failure from acpi_hw_register_read
+ ACPI: fix memory leak on unusual memory leak
+ ACPI: acpi: acpica: fix acpi operand cache leak in nseval.c
+ cxgb4: fix queue free path of ULD drivers
+ i2c: mv64xxx: Apply errata delay only in standard mode
+ KVM: lapi: stop advertising DIRECTED_EOI when in-kernel IOAPIC is in use
+ perf top: Fix top.call-graph config option reading
+ perf stat: Fix core dump when flag T is used
+ IB/core: Honor port_num while resolving GID for IB link layer
+ drm/amdkfd: add missing include of mm.h
+ coresight: Use %px to print pcscr instead of %p
+ regulator: gpio: Fix some error handling paths in `gpio_regulator_probe()`
+ spi: bcm-qspi: fix some error handling paths
+ net/smc: pay attention to MAX_ORDER for CQ entries
+ MIPS: ath79: Fix AR724X_PLL_REG_PCIE_CONFIG offset
+ watchdog: dw: RMW the control register
+ watchdog: aspeed: Fix translation of reset mode to ctrl register
+ drm/meson: Fix some error handling paths in `meson_driv_bind_master()`
+ drm/meson: Fix an un-handled error path in `meson_driv_bind_master()`
+ powerpc: Add missing prototype for arch_irq_work_raise()
+ i2fs: fix to set KEEP_SIZE bit in f2fs_zero_range
+ i2fs: fix to clear CP_TRIMMED_FLAG
+ i2fs: fix to check extent cache in f2fs_drop_extent_tree
+ perf/core: Fix installing cgroup events on CPU
+ max17042: propagate of_node to power supply device
+ perf/core: Fix perf_output_read_group()
+ drm/panel: simple: Fix the bus format for the Ontat panel
+ hwmon: (pmbus/max8688) Accept negative page register values
+ hwmon: (pmbus/adm1275) Accept negative page register values
+ perf/x86/intel: Properly save/restore the PMU state in the NMI handler
+ cdrom: do not call check_disk_change() inside cdrom_open()
+ efi/arm*: Only register page tables when they exist
+ perf/x86/intel: Fix large period handling on Broadwell CPUs
+ perf/x86/intel: Fix event update for auto-reload
+ arm64: dts: qcom: Fix SPI5 config on MSM8996
+ soc: qcom: wcns Ctrl: Fix increment in NV upload
+ gfs2: Fix fallback chunk size
+ x86/devicetree: Initialize device tree before using it
+ x86/devicetree: Fix device IRQ settings in DT
+ phy: rockchip-emmc: retry calpad busy trimming
+ ALSA: vmaster: Propagate slave error
+ phy: qcom-qmp: Fix phy pipe clock gating
+ drm/bridge: si902x: Retry status read after DDI I2C
+ - tools: hv: fix compiler warnings about major/target_f_name
+ - block: null_blk: fix 'Invalid parameters' when loading module
+ - dmaengine: pl330: fix a race condition in case of threaded irqs
+ - dmaengine: rcar-dmac: Check the done lists in rcar_dmac_chan_get_residue()
+ - enic: enable rq before updating rq descriptors
+ - watchdog: asm9260_wdt: fix error handling in asm9260_wdt_probe()
+ - hwrng: stm32 - add reset during probe
+ - pinctrl: devicetree: Fix dt_to_map_one_config handling of hogs
+ - pinctrl: artpec6: dt: add missing pin group uart5nocts
+ - vfio-ccw: fence off transport mode
+ - dmaengine: qcom: bms_dma: get num-channels and num-ees from dt
+ - drm: omapdrm: dss: Move initialization code from component bind to probe
+ - ARM: dts: dra71-evm: Correct evm_sd regulator max voltage
+ - drm/amdgpu: disable GFX ring and disable PQ wptr in hw_fini
+ - drm/amdgpu: adjust timeout for ib_ring_tests(v2)
+ - net: stmmac: ensure that the device has released ownership before reading
+ - data
+ - net: stmmac: ensure that the MSS desc is the last desc to set the own bit
+ - cpufreq: Reorder cpufreq_online() error code path
+ - dpaa_eth: fix SG mapping
+ - PCI: Add function 1 DMA alias quirk for Marvell 88SE9220
+ - udf: Provide saner default for invalid uid / gid
+ - ixgbe: prevent ptp_rx_hang from running when in FILTER_ALL mode
+ - sh_eth: fix TSU init on SH7734/R8A7740
+ - power: supply: ltc2941-battery-gauge: Fix temperature units
+ - ARM: dts: bcm283x: Fix probing of bcm2835-i2s
+ - ARM: dts: bcm283x: Fix pin function of JTAG pins
+ - PCMCIA / PM: Avoid noirq suspend aborts during suspend-to-idle
+ - audit: return on memory error to avoid null pointer dereference
+ - net: stmmac: call correct function in stmmac_mac_config_rx_queues_routing()
+ - rcu: Call touch_nmi_watchdog() while printing stall warnings
+ - pinctrl: sh-pfc: r8a7796: Fix MOD_SEL register pin assignment for SSI pins
+ - group
+ - dpaa_eth: fix pause capability advertisement logic
+ - MIPS: Octeon: Fix logging messages with spurious periods after newlines
+ - drm/rockchip: Respect page offset for PRIME mmap calls
+ - x86/apic: Set up through-local-APIC mode on the boot CPU if `noapic'
+ - specified
+ - perf test: Fix test case inet_pton to accept inlines.
+ - perf report: Fix wrong jump arrow
+ - perf tests: Use arch__compare_symbol_names to compare symbols
+ - perf report: Fix memory corruption in --branch-history mode --branch-history
+ - perf tests: Fix dwarf unwind for stripped binaries
+ - selftests/net: fixes psock_fanout eBPF test case
+ - netlabel: If PF_INET6, check sk_buff ip header version
+ - drm: rcar-du: lvds: Fix LVDS startup on R-Car Gen3
+ - drm: rcar-du: lvds: Fix LVDS startup on R-Car Gen2
+ - ARM: dts: at91: tse850: use the correct compatible for the eeprom
+ - regmap: Correct comparison in regmap_cached
+ - i40e: Add delay after EMP reset for firmware to recover
+ - ARM: dts: imx7d: cl-som-imx7: fix pinctrl_enet
+ - ARM: dts: porter: Fix HDMI output routing
+ - regulator: of: Add a missing 'of_node_put()' in an error handling path of
  'of_regulator_match()'
+ - pinctrl: mcp23s08: spi: Fix regmap debugfs entries
+ - kdb: make "mdr" command repeat
+ - drm/vmwgfx: Set dmbuf_size when vmw_dmbuf_init is successful
+ - perf tools: Add trace/beauty/generated/ into .gitignore
+ - tools: sync up .h files with the respective arch and uapi .h files
+ - MIPS: xilfpga: Stop generating useless dtb.o
+ - MIPS: xilfpga: Actually include FDT in fitImage
+ - MIPS: Fix build with DEBUG_ZBOOT and MACH_JZ4770
+ - fix breakage caused by d_find_alias() semantics change
+ - Btrfs: fix error handling in btrfs_truncate()
+ - mmc: block: propagate correct returned value in mmc_rpmb_ioctl
+ - arm64: export tishift functions to modules
+ - bcma: fix buffer size caused crash in bcma_core_mips_print_irq()
+ - PM / core: Fix direct_complete handling for devices with no callbacks
+ - ARM: dts: sun4i: Fix incorrect clocks for displays
+ - bnxt_en: Ignore src port field in decap filter nodes
+ - kasan, slub: fix handling of kasan_slab_free hook
+ - riscv/spinlock: Strengthen implementations with fences
+ - platform/x86: dell-smbios: Fix memory leaks in build_tokens_sysfs()
+ - rpcx: Fix resend event time calculation
+ - i40e: hold the RTNL lock while changing interrupt schemes
+ - hv_netvsc: Fix the return status in RX path
+ - firmware: fix checking for return values for fw_add_devm_name()
+ - bcache: set writeback_rate_update_seconds in range [1, 60] seconds
+ - bcache: fix cached_dev->count usage for bch_cache_set_error()
+ - bcma: stop dc->writeback_rate_update properly
+ - ibmvnic: Fix reset return from closed state
+ - powerpc/vas: Fix cleanup when VAS is not configured
+ - f2fs: flush cp pack except cp pack 2 page at first
+ - drm/amdgpu: Clean sdma wptr register when only enable wptr polling
+ - powerpc/mm/slice: Remove intermediate bitmap copy
+ - powerpc/mm/slice: create header files dedicated to slices
+ - powerpc/mm/slice: Enhance for supporting PPC32
+ - powerpc/mm/slice: Fix hugepage allocation at hint address on 8xx
+ - ibmvnic: Allocate statistics buffers during probe
+ - dt-bindings: display: msm/dsi: Fix the PHY regulator supply props
+ - drm/amd/display: Set vsc pack revision when DPCD revision is >= 1.2
+ - soc: renesas: r8a77970-sysc: fix power area parents
+ - drm/vblank: Data type fixes for 64-bit vblank sequences.
+ - selftests: Add FIB onlink tests
+ - soc: amlogic: meson-gx-pwrc-vpu: fix error on shutdown when domain is
  powered off
* arm-smmu-v3 arm-smmu-v3.1.auto: failed to allocate MSIs (LP: #1785282)
* ACPI: iasl: Add SMMUv3 device ID mapping index support
* ACPI/IORT: Remove temporary iort_get_id_mapping_index() ACPI guard

* Driver iwlwifi for Intel Wireless-AC 9560 is slow and unreliable in kernel
  4.15.0-20-generic (LP: #1772467)
* - scsi: hpsa: disable device during shutdown

* [Bionic] i2c: xlp9xx: Add SMBAlert support (LP: #1786981)
* - i2c: xlp9xx: Add support for SMBAlert

* qeth: don't clobber buffer on async TX completion (LP: #1786057)
* - s390/qeth: don't clobber buffer on async TX completion

* Linux 4.15.0-23 crashes during the boot process with a "Unable to handle
  kernel NULL pointer dereference" message (LP: #1777338)
* - x86/xen: Add call of speculative_store_bypass_ht_init() to PV paths

* ThinkPad systems have no HDMI sound when using the nvidia GPU (LP: #1787058)
* - ACPI / OSI: Add OEM _OSI string to enable NVidia HDMI audio

* [Bionic] i2c: xlp9xx: Fix case where SSIF read transaction completes early
  (LP: #1787240)
* - i2c: xlp9xx: Fix case where SSIF read transaction completes early

* [Bionic] integrate upstream fix for Cavium zram driver (LP: #1787469)
* - Revert "UBUNTU: SAUCE: crypto: thunderx_zip: Fix fallout from
  CONFIG_VMAP_STACK"
* - crypto: cavium - Fix fallout from CONFIG_VMAP_STACK
* - crypto: cavium - Limit result reading attempts
* - crypto: cavium - Prevent division by zero
* - crypto: cavium - Fix statistics pending request value
* - crypto: cavium - Fix smp_processor_id() warnings

* Bugfix for handling of shadow doorbell buffer (LP: #1788222)
* - nvme-pci: add a memory barrier to nvme_dbbuf_update_and_check_event

* nvme devices namespace assigned to the wrong controller (LP: #1789227)
* - nvme/multipath: Fix multipath disabled naming collisions

* linux-cloud-tools-common: Ensure hv-kvp-daemon.service starts before
  walinuxagent.service (LP: #1739107)
* - [Debian] hyper-v -- Ensure that hv-kvp-daemon.service starts before
  walinuxagent.service

* hinic interfaces aren't getting predictable names (LP: #1783138)
* - hinic: Link the logical network device to the pci device in sysfs
* Suspend fails in Ubuntu and Kubuntu 18.04 but works fine in Ubuntu and
  Kubuntu 17.10 (and on Kubuntu 18.04 using kernel 4.14.47) (LP: #1774950)
* ACPI / LPSS: Avoid PM quirks on suspend and resume from S3
* ACPI / LPSS: Avoid PM quirks on suspend and resume from hibernation

* [Bionic] Bluetooth: Support RTL8723D and RTL8821C Devices (LP: #1784835)
* - Bluetooth: btocl: Add RTL8723D and RTL8821C devices

* CacheFiles: Error: Overlong wait for old active object to go away.
  (LP: #1776254)
* - cachefiles: Fix missing clear of the CACHEFILES_OBJECT_ACTIVE flag
* - cachefiles: Wait rather than BUG'ing on "Unexpected object collision"

* FS-Cache: Assertion failed: FS-Cache: 6 == 5 is false (LP: #1774336)
  - fscache: Fix reference overput in fscache_attach_object() error handling

* SMB3: Fix regression in server reconnect detection (LP: #1786110)
  - smb3: on reconnect set PreviousSessionId field

* CVE-2018-1118
  - vhost: fix info leak due to uninitialized memory

-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Mon, 27 Aug 2018 16:45:36 +0200

* linux (4.15.0-33.36) bionic; urgency=medium

* linux: 4.15.0-33.36 -proposed tracker (LP: #1787149)

* RTNL assertion failure on ipvlan (LP: #1776927)
  - ipvlan: drop ipv6 dependency
  - ipvlan: use per device spinlock to protect addr list updates
  - SAUCE: fix warning from "ipvlan: drop ipv6 dependency"

* ubuntu_bpf_jit test failed on Bionic s390x systems (LP: #1753941)
  - test_bpf: flag tests that cannot be jited on s390

* HDMI/DP audio can't work on the laptop of Dell Latitude 5495 (LP: #1782689)
  - drm/nouveau: fix nouveau_dsm_get_client_id()'s return type
  - drm/radeon: fix radeon_atpx_get_client_id()'s return type
  - drm/amdgpu: fix amdgpu_atpx_get_client_id()'s return type
- platform/x86: apple-gmux: fix gmux_get_client_id()'s return type
- ALSA: hda: use PCI_BASE_CLASS_DISPLAY to replace PCI_CLASS_DISPLAY_VGA
- vga_switcheroo: set audio client id according to bound GPU id

* locking sockets broken due to missing AppArmor socket mediation patches
  (LP: #1780227)
- UBUNTU SAUCE: apparmor: fix apparmor mediating locking non-fs, unix sockets

* Update2 for ocxl driver (LP: #1781436)
- ocxl: Fix page fault handler in case of fault on dying process

* netns: unable to follow an interface that moves to another netns
  (LP: #1774225)
- net: core: Expose number of link up/down transitions
- dev: always advertise the new nsid when the netns iface changes
- dev: advertise the new ifindex when the netns iface changes

* [Bionic] Disk IO hangs when using BFQ as io scheduler (LP: #1780066)
- block, bfq: fix occurrences of request finish method's old name
- block, bfq: remove batches of confusing ifdefs
- block, bfq: add requeue-request hook

* HP ProBook 455 G5 needs mute-led-gpio fixup (LP: #1781763)
- ALSA: hda: add mute led support for HP ProBook 455 G5

* [Bionic] bug fixes to improve stability of the ThunderX2 i2c driver
  (LP: #1781476)
- i2c: xlp9xx: Fix issue seen when updating receive length
- i2c: xlp9xx: Make sure the transfer size is not more than
  I2C_SMBUS_BLOCK_SIZE

* x86/kvm: fix LAPIC timer drift when guest uses periodic mode (LP: #1778486)
- x86/kvm: fix LAPIC timer drift when guest uses periodic mode

* Please include ax88179_178a and r8152 modules in d-i udeb (LP: #1771823)
- [Config:] d-i: Add ax88179_178a and r8152 to nic-modules

* Nvidia fails after switching its mode (LP: #1778658)
- PCI: Restore config space on runtime resume despite being unbound

* Kernel error "task zfs:pid blocked for more than 120 seconds" (LP: #1781364)
- SAUCE: (noup) zfs to 0.7.5-1ubuntu16.3

* CVE-2018-12232
- PATCH 1/1] socket: close race condition between sock_close() and
  sockfs_setattr()

* CVE-2018-10323
+ - xfs: set format back to extents if xfs_bmap_extents_to_btree
+ + * change front mic location for more lenovo m7/8/9xx machines (LP: #1781316)
+ + - ALSA: hda/realtek - Fix the problem of two front mics on more machines
+ + - ALSA: hda/realtek - two more lenovo models need fixup of MIC_LOCATION
+ + - Cephfs + fscache: unable to handle kernel NULL pointer dereference at
+ + 0000000000000000 IP: jbd2__journal_start+0x22/0x1f0 (LP: #1783246)
+ + - ceph: track read contexts in ceph_file_info
+ + * Touchpad of ThinkPad P52 failed to work with message "lost sync at byte"
+ + (LP: #1779802)
+ + - Input: elantech - fix V4 report decoding for module with middle key
+ + - Input: elantech - enable middle button of touchpads on ThinkPad P52
+ + * xhci_hcd 0000:00:14.0: Root hub is not suspended (LP: #1779823)
+ + - usb: xhci: dvc: Fix lockdep warning
+ + - usb: xhci: dvc: Don't decrement runtime PM counter if DBC is not started
+ + + * CVE-2018-13406
+ + - video: uvesafb: Fix integer overflow in allocation
+ + + * CVE-2018-10840
+ + - ext4: correctly handle a zero-length xattr with a non-zero e_value_offs
+ + + * CVE-2018-11412
+ + - ext4: do not allow external inodes for inline data
+ + + * CVE-2018-10881
+ + - ext4: clear i_data in ext4_inode_info when removing inline data
+ + + * CVE-2018-12233
+ + - jfs: Fix inconsistency between memory allocation and ea_buf->max_size
+ + + * CVE-2018-12904
+ + - kvm: nVMX: Enforce cpl=0 for VMX instructions
+ + + * Error parsing PCC subspaces from PCCT (LP: #1528684)
+ + - mailbox: PCC: erroneous error message when parsing ACPI PCCT
+ + + * CVE-2018-13094
+ + - xfs: don't call xfs_da_shrink_inode with NULL bp
+ + + * other users' coredumps can be read via setgid directory and killpriv bypass
+ + (LP: #1779923) // CVE-2018-13405
+ + - Fix up non-directory creation in SGID directories
+ + + * Invoking obsolete 'firmware_install' target breaks snap build (LP: #1782166)
+ - snapcraft.yaml: stop invoking the obsolete (and non-existing) 
+ 'firmware_install' target
+ + * snapcraft.yaml: missing ubuntu-retpoline-extract-one script breaks the build 
+ (LP: #1782116)
+ - snapcraft.yaml: copy retpoline-extract-one to scripts before build
+ + * Allow Raven Ridge's audio controller to be runtime suspended (LP: #1782540)
+ - ALSA: hda: Add AZX_DCAPS_PM_RUNTIME for AMD Raven Ridge
+ + * CVE-2018-11506
+ - sr: pass down correctly sized SCSI sense buffer
+ + * Bionic update: upstream stable patchset 2018-07-24 (LP: #1783418)
+ - net: Fix a bug in removing queues from XPS map
+ - net/mlx4_core: Fix error handling in mlx4_init_port_info.
+ - net/sched: fix refcnt leak in the error path of tcf_vlan_init()
+ - net/sched: red: avoid hashing NULL child
+ - net/smc: check for missing nlattrs in SMC_PNETID messages
+ - net: test tailroom before appending to linear skb
+ - packet: in packet_snd start writing at link layer allocation
+ - sock_diag: fix use-after-free read in __sk_free
+ - tcp: purge write queue in tcp_connect_init()
+ - vmxnet3: set the DMA mask before the first DMA map operation
+ - vmxnet3: use DMA memory barriers where required
+ - hv_netvsc: empty current transmit aggregation if flow blocked
+ - hv_netvsc: Use the num_online_cpus() for channel limit
+ - hv_netvsc: avoid retry on send during shutdown
+ - hv_netvsc: only wake transmit queue if link is up
+ - hv_netvsc: fix error unwind handling if vmbus_open fails
+ - hv_netvsc: cancel subchannel setup before halting device
+ - hv_netvsc: fix race in napi poll when rescheduling
+ - hv_netvsc: defer queue selection to VF
+ - hv_netvsc: disable NAPI before channel close
+ - hv_netvsc: use RCU to fix concurrent rx and queue changes
+ - hv_netvsc: change GPAD teardown order on older versions
+ - hv_netvsc: common detach logic
+ - hv_netvsc: Use Windows version instead of NVSP version on GPAD teardown
+ - hv_netvsc: Split netvsc_revoke_buf() and netvsc teardown_gpadl()
+ - hv_netvsc: Ensure correct teardown message sequence order
+ - hv_netvsc: Fix a network regression after ifdown/ifup
+ - sparc: vio: use put_device() instead of kfree()
+ - ext2: fix a block leak
+ - s390: add assembler macros for CPU alternatives
+ - s390: move expoline assembler macros to a header
+ - s390/crc32-vx: use expoline for indirect branches
+ - s390/lib: use expoline for indirect branches
+ - s390/trace: use expoline for indirect branches
- s390/kernel: use expoline for indirect branches
- s390: move spectre sysfs attribute code
- s390: extend expoline to BC instructions
- s390: use expoline thunks in the BPF JIT
- scsi: sg: allocate with __GFP_ZERO in sg_build_indirect()
- scsi: zfcp: fix infinite iteration on ERP ready list
- loop: don't call into filesystem while holding lo_ctl_mutex
- loop: fix LOOP_GET_STATUS lock imbalance
- cfg80211: limit wiphy names to 128 bytes
- hfsplus: stop workqueue when fill_super() failed
- x86/kexec: Avoid double free_page() upon do_kexec_load() failure
- usb: gadget: f_uac2: fix bFirstInterface in composite gadget
- usb: dwc3: Undo PHY init if soft reset fails
- usb: dwc3: omap: don't miss events during suspend/resume
- usb: gadget: core: Fix use-after-free of usb_request
- usb: gadget: fsl_udc_core: fix ep valid checks
- usb: dwc2: Fix dwc2_hstg_core_init_disconnected()
- usb: cdc_acm: prevent race at write to acm while system resumes
- net: usbnet: fix potential deadlock on 32bit hosts
- ARM: dts: imx7d-sdb: Fix regulator-usb-otg2-vbus node name
- usb: host: xhci-plat: revert "usb: host: xhci-plat: enable clk in resume timing"
- USB: OHCI: Fix NULL dereference in HCDs using HCD_LOCAL_MEM
- net/usb/qmi_wwan.c: Add USB id for lt4120 modem
- net/usb: add qmi_wwan if on lte modem wistron neweb d18q1
- Bluetooth: btusb: Add USB ID 7392:a611 for Edimax EW-7611ULB
- ALSA: usb-audio: Add native DSD support for Luxman DA-06
- usb: dwc3: Add SoftReset PHY synchronization delay
- usb: dwc3: Update DWC_usb31 GTXFIFOSIZ reg fields
- usb: dwc3: Makefile: fix link error on randconfig
- xhci: zero usb device slot_id member when disabling and freeing a xhci slot
- usb: dwc2: Fix interval type issue
- usb: dwc2: hcd: Fix host channel halt flow
- usb: dwc2: host: Fix transaction errors in host mode
- usb: gadget: ffs: Let setup() return USB_GADGETDELAYED_STATUS
- usb: gadget: ffs: Execute copy_to_user() with USER_DS set
- usbip: Correct maximum value of CONFIG_USBIP_VHCI_HC_PORTS
- usb: gadget: udc: change comparison to bitshift when dealing with a mask
- usb: gadget: composite: fix incorrect handling of OS desc requests
- media: lgdt3306a: Fix module count mismatch on usb unplug
- media: em28xx: USB bulk packet size fix
- Bluetooth: btusb: Add device ID for RTL8822BE
- xhci: Show what USB release number the xHC supports from protocol capability
- staging: bcm2835-audio: Release resources on module_exit()
- staging: lustre: fix bug in osc_enter_cache_try
- staging: fsl-dpaa2/eth: Fix incorrect casts
- staging: rtl8192u: return -ENOMEM on failed allocation of priv->oldaddr
- staging: ks7010: Use constants from iee80211_eid instead of literal ints.
+ staging: lustre: lmv: correctly iput lmo_root
+ crypto: inside-secure - wait for the request to complete if in the backlog
+ crypto: atmel-aes - fix the keys zeroing on errors
+ crypto: ccp - don't disable interrupts while setting up debugfs
+ crypto: inside-secure - do not process request if no command was issued
+ crypto: inside-secure - fix the cache_len computation
+ crypto: inside-secure - fix the extra cache computation
+ crypto: inside-secure - do not process request if no command was issued
+ crypto: inside-secure - fix the invalidation step during cra_exit
+ scsi: mpt3sas: fix an out of bound write
+ scsi: ufs: Enable quirk to ignore sending WRITE_SAME command
+ scsi: bnx2fc: Fix check in SCSI completion handler for timed out request
+ scsi: sym53c8xx_2: iterator underflow in sym_getsync()
+ scsi: mptf3sas: Add bounds check in mptctl_hp_targetinfo()
+ scsi: qla2xxx: Avoid triggering undefined behavior in
+ qla2x00_mbx_completion()
+ scsi: storvsc: Increase cmd_per_lun for higher speed devices
+ scsi: qedi: Fix truncation of CHAP name and secret
+ scsi: aacraid: fix shutdown crash when init fails
+ scsi: qla4xxx: skip error recovery in case of register disconnect.
+ scsi: qedi: Fix kernel crash during port toggle
+ scsi: mpt3sas: Do not mark fw_event workqueue as WQ_MEM_RECLAIM
+ scsi: sd: Keep disk read-only when re-reading partition
+ scsi: iscsi_tcp: set BDI_CAP_STABLE_WRITES when data digest enabled
+ scsi: aacraid: Insure command thread is not recursively stopped
+ scsi: core: Make SCSI Status CONDITION MET equivalent to GOOD
+ mvsas: fix wrong endianness of sgpio api
+ ASoC: hdmi-codec: Fix module unloading caused kernel crash
+ ASoC: rockchip: rk3288-hdmi-analog: Select needed codecs
+ ASoC: samsung: odroid: Fix 32000 sample rate handling
+ ASoC: topology: create TLV data for dapm widgets
+ ASoC: samsung: i2s: Ensure the RCLK rate is properly determined
+ clk: rockchip: Fix wrong parent for SDMMC phase clock for rk3228
+ clk: Don't show the incorrect clock phase
+ clk: hisilicon: mark wdt_mux_p[] as const
+ clk: tegra: Fix pll_u rate configuration
+ clk: rockchip: Prevent calculating mmc phase if clock rate is zero
+ clk: samsung: s3c2410: Fix PLL rates
+ clk: samsung: exynos7: Fix PLL rates
+ clk: samsung: exynos5260: Fix PLL rates
+ clk: samsung: exynos5433: Fix PLL rates
+ clk: samsung: exynos5250: Fix PLL rates
+ clk: samsung: exynos3250: Fix PLL rates
+ media: dmxdev: fix error code for invalid ioctls
+ media: Don't let tvp5150_get_vbi() go out of vbi_ram_default array
+ media: ov5645: add missing of_node_put() in error path
+ media: cx23885: Override 888 ImpactVCBe crystal frequency
+ media: cx23885: Set subdev host data to clk_freq pointer
- media: s3c-camif: fix out-of-bounds array access
- media: lgdt3306a: Fix a double kfree on i2c device remove
- media: em28xx: Add Hauppauge SoloHD/DualHD bulk models
- media: v4l: vsp1: Fix display stalls when requesting too many inputs
- media: i2c: adv748x: fix HDMI field heights
- media: vb2: Fix videobuf2 to map correct area
- media: vivid: fix incorrect capabilities for radio
- media: cx25821: prevent out-of-bounds read on array card
- serial: xuartps: Fix out-of-bounds access through DT alias
- serial: sh-sci: Fix out-of-bounds access through DT alias
- serial: samsung: Fix out-of-bounds access through serial port index
- serial: mxs-auart: Fix out-of-bounds access through serial port index
- serial: imx: Fix out-of-bounds access through serial port index
- serial: fsl_lpuart: Fix out-of-bounds access through DT alias
- serial: arc_uart: Fix out-of-bounds access through DT alias
- serial: 8250: Don't service RX FIFO if interrupts are disabled
- serial: altera: ensure port->regshift is honored consistently
- rtc: snvs: Fix usage of snvs_rtc_enable
- rtc: hctosys: Ensure system time doesn't overflow time_t
- rtc: rk808: fix possible race condition
- rtc: m41680: fix race conditions
- rtc: tx4939: avoid unintended sign extension on a 24 bit shift
- rtc: rp5e01: fix possible race condition
- rtc: goldfish: Add missing MODULE_LICENSE
- cxgb4: Correct ntuple mask validation for hash filters
- net: dsa: bcm_sf2: Fix RX_CLS_LOC_ANY overwrite for last rule
- net: dsa: Do not register devlink for unused ports
- net: dsa: bcm_sf2: Fix IPv6 rules and chain ID
- net: dsa: bcm_sf2: Fix IPv6 rule half deletion
- 3c59x: convert to generic DMA API
- net: ip6_gre: Request headroom in __gre6_xmit()
- net: ip6_gre: Split up ip6gre_tnl_link_config()
- net: ip6_gre: Split up ip6gre_tnl_change()
- net: ip6_gre: Split up ip6gre_newlink()
- net: ip6_gre: Split up ip6gre_changelink()
- qed: LL2 flush isles when connection is closed
- qed: Fix possibility of list corruption during rmmod flows
- qed: Fix LL2 race during connection terminate
- powerpc: Move default security feature flags
- Bluetooth: btusb: Add support for Intel Bluetooth device 22560 [8087:0026]
- staging: fsl-dpaa2/eth: Fix incorrect kfree
- crypto: inside-secure - move the digest to the request context
- scsi: lpfc: Fix NVME Initiator FirstBurst
- serial: mvebu-uart: fix tx lost characters

* Bionic update: upstream stable patchset 2018-07-20 (LP: #1782846)
* usbip: usbip_host: refine probe and disconnect debug msgs to be useful
* usbip: usbip_host: delete device from busid_table after rebind
+ - usbip: usbip_host: run rebind from exit when module is removed
+ - usbip: usbip_host: fix NULL-ptr deref and use-after-free errors
+ - usbip: usbip_host: fix bad unlock balance during stub_probe()
+ - ALSA: usb: mixer: volume quirk for CM102-A+/102S+
+ - ALSA: hda: Add Lenovo C50 All in one to the power_save blacklist
+ - ALSA: control: fix a redundant-copy issue
+ - spi: pxa2xx: Allow 64-bit DMA
+ - spi: bcm-qspi: Avoid setting SPI_CDRAM_PCS for spi-nor master
+ - spi: bcm-qspi: Always read and set SPI_MAST_N_BOOT_CTRL
+ - KVM: arm/arm64: VGIC/ITS save/restore: protect kvm_read_guest() calls
+ - KVM: arm/arm64: VGIC/ITS: protect kvm_read_guest() calls with SRCU lock
+ - vfio: ccw: fix cleanup if cp_prefetch fails
+ - tracing/x86/xen: Remove zero data size trace events
+ - trace_xen_mmu_flush_tlb{[all]}
+ - tee: shm: fix use-after-free via temporarily dropped reference
+ - netfilter: nf_tables: free set name in error path
+ - netfilter: nf_tables: can't fail after linking rule into active rule list
+ - netfilter: nf_socket: Fix out of bounds access in nf_sk_lookup_slow_v[4,6]
+ - i2c: designware: fix poll-after-enable regression
+ - powerpc/powerpc: Fix NVRAM sleep in invalid context when crashing
+ - drm: Match sysfs name in link removal to link creation
+ - lib/test_bitmap.c: fix bitmap optimisation tests to report errors correctly
+ - radix tree: fix multi-order iteration race
+ - mm: don't allow deferred pages with NEED_PER_CPU_KM
+ - drm/i915/gen9: Add WaClearHIZ_WM_CHICKEN3 for bxt and glk
+ - s390/qdio: fix access to uninitialized qdio_q fields
+ - s390/qdio: don't release memory in qdio_setup_irq()
+ - s390: remove indirect branch from do_softirq_own_stack
+ - x86/ipkeys: Override pkey when moving away from PROT_EXEC
+ - x86/pkeys: Do not special case protection key 0
+ - efi: Avoid potential crashes, fix the 'struct efi_pci_io_protocol_32'
+ - definition for mixed mode
+ - ARM: 8771/1: kprobes: Prohibit kprobes on do_undefinstr
+ - x86/mm: Drop TS_COMPAT on 64-bit exec() syscall
+ - tick/broadcast: Use for_each_cpu() specially on UP kernels
+ - ARM: 8769/1: kprobes: Fix to use get_kprobe_ctlblk after irq-disabled
+ - ARM: 8770/1: kprobes: Prohibit probing on optimized_callback
+ - ARM: 8772/1: kprobes: Prohibit kprobes on get_user functions
+ - Btrfs: fix xattr loss after power failure
+ - Btrfs: send, fix invalid access to commit roots due to concurrent snapshotting
+ - btrfs: property: Set incompat flag if lzo/zstd compression is set
+ - btrfs: fix crash when trying to resume balance without the resume flag
+ - btrfs: Split btrfs_del_delalloc_inode into 2 functions
+ - btrfs: Fix delalloc inodes invalidation during transaction abort
+ - btrfs: fix reading stale metadata blocks after degraded raid1 mounts
+ - xhci: Fix USB3 NULL pointer dereference at logical disconnect.
+ - KVM: arm/arm64: Properly protect VGIC locks from IRQs
+ - KVM: arm/arm64: VGIC/ITS: Promote irq_lock() in update_affinity
+ - hwmon: (k10temp) Fix reading critical temperature register
+ - hwmon: (k10temp) Use API function to access System Management Network
+ - vsprintf: Replace memory barrier with static_key for random_ptr_key update
+ - x86/amd_nb: Add support for Raven Ridge CPUs
+ - x86/apic/x2apic: Initialize cluster ID properly
+ * Bionic update: upstream stable patchset 2018-07-09 (LP: #1780858)
+ - 8139too: Use disable_irq_nosync() in rtl8139_poll_controller()
+ - bridge: check iface upper dev when setting master via ioctl
+ - dcecp: fix tasklet usage
+ - ipv4: fix fnhe usage by non-cached routes
+ - ipv4: fix memory leaks in udp_sendmsg, ping_v4_sendmsg
+ - Iic: better deal with too small mtu
+ - net: ethernet: sun: niu set correct packet size in skb
+ - net: ethernet: ti: cpsw: fix packet leaking in dual_mac mode
+ - net/mlx4_en: Fix an error handling path in ‘mlx4_en_init_netdev’
+ - net/mlx4_en: Verify coalescing parameters are in range
+ - net/mlx5e: Err if asked to offload TC match on frag being first
+ - net/mlx5: E-Switch, Include VF RDMA stats in vport statistics
+ - net sched actions: fix refcnt leak in skbmod
+ - net_sched: fq: take care of throttled flows before reuse
+ - net: support compat 64-bit time in {s,g}etsockopt
+ - net/tls: Don't recursively call push_record during tls_write_space callbacks
+ - net/tls: Fix connection stall on partial tls record
+ - openvswitch: Don't swap table in nlattr_set() after OVSAATTR_NESTED is found
+ - qmi_wwan: do not steal interfaces from class drivers
+ - r8169: fix powering up RTL8168h
+ - rds: do not leak kernel memory to user land
+ - scpt: delay the authentication for the duplicated cookie-echo chunk
+ - scpt: fix the issue that the cookie-ack with auth can't get processed
+ - scpt: handle two v4 addr comparison in scpt_inet6_cmp_addr
+ - scpt: remove scpt_chunk_put from fail_mark err path in
  scpt_ulpevent_make_rcvmsg
+ - scpt: use the old asoc when making the cookie-ack chunk in dupcook_d
+ - tcp_bbr: fix to zero idle_restart only upon S/ACKed data
+ - tcp: ignore Fast Open on repair mode
+ - tg3: Fix vunmap() BUG_ON() triggered from tg3_free_consistent().
+ - bonding: do not allow rlb updates to invalid mac
+ - bonding: send learning packets for vlans on slave
+ - net: sched: fix error path in tcf_proto_create() when modules are not
  configured
+ - net/mlx5e: TX, Use correct counter in dma_map error flow
+ - net/mlx5: Avoid cleaning flow steering table twice during error flow
+ - hv_netvsc: set master device
+ - ipv6: fix uninit-value in ip6_multipath_l3_keys()
+ - net/mlx5e: Allow offloading ipv4 header re-write for icmp
+ - nsh: fix infinite loop
+ - udp: fix SO_BINDTODEVICE
+ - l2tp: revert "l2tp: fix missing print session offset info"
+ - proc: do not access cmdline nor environ from file-backed areas
+ - net/smc: restrict non-blocking connect finish
+ - mlxsw: spectrum_switchdev: Do not remove mrouter port from MDB's ports list
+ - net/mlx5e: DCBNL fix min inline header size for dscp
+ - net: systemctl: Correctly disambiguate driver instances
+ - scpt: clear new asoc's stream outcnt in scpt_stream_update
+ - tcp: restore autocorking
+ - tipc: fix one byte leak in tipc_sk_set_orig_addr()
+ - hv_netvsc: Fix net device attach on older Windows hosts
+
+ * Bionic update: upstream stable patchset 2018-07-06 (LP: #1780499)
+ - ext4: prevent right-shifting extents beyond EXT_MAX_BLOCKS
+ - ipvs: fix rtnl_lock lockups caused by start_sync_thread
+ - netfilter: ebtables: don't attempt to allocate 0-sized compat array
+ - kcm: Call strp_stop before strp_done in kcm_attach
+ - crypto: af_alg - fix possible uninit-value in alg_bind()
+ - netlink: fix uninit-value in netlink_sendmsg
+ - net: fix rtnh_ok()
+ - net: initialize skb->peeked when cloning
+ - net: fix uninit-value in __hw_addr_add_ex()
+ - dcpp: initialize irq->ir_mark
+ - ipv4: fix uninit-value in ip_route_output_key_hash_rcu()
+ - soreuseport: initialise timewait reuseport field
+ - inetpeer: fix uninit-value in inet_getpeer
+ - memcg: fix per_node_info cleanup
+ - perf: Remove superfluous allocation error check
+ - tcp: fix TCP_REPAIR_QUEUE bound checking
+ - bdi: wake up concurrent wb_shutdown() callers.
+ - bdi: Fix oops in wb_workfn()
+ - gpioib: do not free unrequested descriptors
+ - gpio: fix aspeed_gpio unmask irq
+ - gpio: fix error path in lineevent_create
+ - rfkill: gpio: fix memory leak in probe error path
+ - libata: Apply NOLPM quirk for SanDisk SD7UB3Q*G1001 SSDs
+ - dm integrity: use kvfree for kvmalloc'd memory
+ - tracing: Fix regex_match_front() to not over compare the test string
+ - z3fold: fix reclaim lock-ups
+ - mm: sections are not offlined during memory hotremove
+ - mm, oom: fix concurrent munlock and oom reaper unmap, v3
+ - ceph: fix rsize/wsize capping in ceph_direct_read_write()
+ - can: kvaser_usb: Increase correct stats counter in kvaser_usb_rx_can_msg()
+ - can: hi311x: Acquire SPI lock on ->do_get_berr_counter
+ - can: hi311x: Work around TX complete interrupt erratum
+ - drm/vc4: Fix scaling of uni-planar formats
+ - drm/i915: Fix drm:intel_enable_lvds ERROR message in kernel log
+ - drm/atomic: Clean old_state/new_state in drm_atomic_state_default_clear()
- drm/atomic: Clean private obj old_state/new_state in
  drm_atomic_state_default_clear()
- net: atm: Fix potential Spectre v1
- atm: zatm: Fix potential Spectre v1
- cpufreq: schedutil: Avoid using invalid next_freq
- Revert "Bluetooth: btusb: Fix quirk for Atheros 1525/QCA6174"
- Bluetooth: btusb: Only check needs_reset_resume DMI table for QCA rome
+ chipsets
- thermal: exynos: Reading temperature makes sense only when TMU is turned on
- thermal: exynos: Propagate error value from tmu_read()
- nvme: add quirk to force medium priority for SQ creation
- smb3: directory sync should not return an error
- sched/autogroup: Fix possible Spectre-v1 indexing for sched_prio_to_weight[]
- tracing/uprobe_event: Fix strncpy corner case
- perf/x86: Fix possible Spectre-v1 indexing for hw_perf_event cache_*
- perf/x86/cstate: Fix possible Spectre-v1 indexing for pkg_msr
- perf/x86/msr: Fix possible Spectre-v1 indexing in the MSR driver
- perf/core: Fix possible Spectre-v1 indexing for ->aux_pages[]
- perf/x86: Fix possible Spectre-v1 indexing for x86_pmu::event_map()
- i2c: dev: prevent ZERO_SIZE_PTR deref in i2cdev_ioctl_rdwr()
- bdi: Fix use after free bug in debugfs_remove()
- drm/ttm: Use GFP_TRANSHUGE_LIGHT for allocating huge pages
- drm/i915: Adjust eDP's logical vco in a reliable place.
- drm/nouveau/ttm: don't dereference nvbo::cli, it can outlive client
- sched/core: Fix possible Spectre-v1 indexing for sched_prio_to_weight[]

* Bionic update: upstream stable patchset 2018-06-26 (LP: #1778759)
  - percpu: include linux/sched.h for cond_resched()
  - ACPI / button: make module loadable when booted in non-ACPI mode
  - USB: serial: option: Add support for Quectel EP06
  - ALSA: hda - Fix incorrect usage of IS_REACHABLE()
  - ALSA: pcm: Check PCM state at xfern compat ioctl
  - ALSA: seq: Fix races at MIDI encoding in snd_virmidi_output_trigger()
  - ALSA: dice: fix kernel NULL pointer dereference due to invalid calculation
  - for array index
  - ALSA: aloop: Mark paused device as inactive
  - ALSA: aloop: Add missing cable lock to ctl API callbacks
  - tracepoint: Do not warn on ENOMEM
  - scsi: target: Fix fortify_panic kernel exception
  - Input: leds - fix out of bound access
  - Input: atmel_mxt_ts - add touchpad button mapping for Samsung Chromebook Pro
  - rtlwifi: btcoex: Add power_on_setting routine
  - rtlwifi: cleanup 8723be ant_sel definition
  - xfs: prevent creating negative-sized file via INSERT_RANGE
  - RDMA/cxgb4: release hw resources on device removal
  - RDMA/ucma: Allow resolving address w/o specifying source address
  - RDMA/mlx5: Fix multiple NULL-ptr deref errors in rereg_mr flow
  - RDMA/mlx5: Protect from shift operand overflow
+ - NET: usb: qmi_wwan: add support for ublox R410M PID 0x90b2
+ - IB/mlx5: Use unlimited rate when static rate is not supported
+ - IB/hfi1: Fix handling of FECN marked multicast packet
+ - IB/hfi1: Fix loss of BECN with AHG
+ - IB/hfi1: Fix NULL pointer dereference when invalid num_vls is used
+ - iw_cxb4: Atomically flush per QP HW CQEs
+ - drm/vmwgfx: Fix a buffer object leak
+ - drm/bridge: vga-dac: Fix edid memory leak
+ - test_firmware: fix setting old custom fw path back on exit, second try
+ - errseq: Always report a writeback error once
+ - USB: serial: visor: handle potential invalid device configuration
+ - usb: dwc3: gadget: Fix list_del corruption in dwc3_ep_dequeue
+ - USB: Accept bulk endpoints with 1024-byte maxpacket
+ - USB: serial: option: reimplement interface masking
+ - USB: serial: option: adding support for ublox R410M
+ - usb: musb: host: fix potential NULL pointer dereference
+ - usb: musb: trace: fix NULL pointer dereference in musb_g_tx()
+ - platform/x86: asus-wireless: Fix NULL pointer dereference
+ - irqchip/qcom: Fix check for spurious interrupts
+ - tracing: Fix bad use of igrab in trace_uprobe.c
+ - [Config] CONFIG_ARM64_ERRATUM_1024718=y
+ - arm64: Add work around for Arm Cortex-A55 Erratum 1024718
+ - Input: atmel_mxt_ts - add touchpad button mapping for Samsung Chromebook Pro
+ - infiniband: mlx5: fix build errors when INFINIBAND_USER_ACCESS=m
+ - btrfs: Take trans lock before access running trans in check_delayed_ref
+ - drm/vc4: Make sure vc4_bo_{inc,dec}_usecnt() calls are balanced
+ - xhci: Fix use-after-free in xhci_free_virt_device
+ - platform/x86: Kconfig: Fix dell-laptop dependency chain.
+ - KVM: x86: remove APIC Timer periodic/oneshot spikes
+ - clocksource: Allow clocksource_mark_unstable() on unregistered clocksources
+ - clocksource: Initialize cs->wd_list
+ - clocksource: Consistent de-rate when marking unstable
+ 
+ * Bionic update: upstream stable patchset 2018-06-22 (LP: #1778265)
+ - ext4: set h_journal if there is a failure starting a reserved handle
+ - ext4: add MODULE_SOFTDEP to ensure crc32c is included in the initramfs
+ - ext4: add validity checks for bitmap block numbers
+ - ext4: fix bitmap position validation
+ - random: fix possible sleeping allocation from irq context
+ - random: rate limit unseeded randomness warnings
+ - usbip: usbip_event: fix to not print kernel pointer address
+ - usbip: usbip_host: fix to hold parent lock for device_attach() calls
+ - usbip: vhci_hcd: Fix usb device and sockfd leaks
+ - usbip: vhci_hcd: check rhport before using in vhci_hub_control()
+ - Revert "xhci: plat: Register shutdown for xhci_plat"
+ - USB: serial: simple: add libtransistor console
+ - USB: serial: ftdi_sio: use jtag quirk for Arrow USB Blaster
+ - USB: serial: cp210x: add ID for NI USB serial console
- usb: core: Add quirk for HP v222w 16GB Mini
- USB: Increment wakeup count on remote wakeup.
- ALSA: usb-audio: Skip broken EU on Dell dock USB-audio
- virtio: add ability to iterate over vqs
- virtio_console: don't tie bufs to a qv
- virtio_console: free buffers after reset
- virtio_console: drop custom control queue cleanup
- virtio_console: move removal code
- virtio_console: reset on out of memory
- drm/virtio: fix qv wait_event condition
- tty: Don't call panic() at tty_ldisc_init()
- tty: Use __GFP_NOFAIL for tty_ldisc_get()
- ALSA: dice: fix OUI for TC group
- ALSA: dice: fix error path to destroy initialized stream data
- ALSA: hda: Skip jack and others for non-existing PCM streams
- ALSA: opl3: Hardening for potential Spectre v1
- ALSA: ashpi: Hardening for potential Spectre v1
- ALSA: hdsmp: Hardening for potential Spectre v1
- ALSA: rme9652: Hardening for potential Spectre v1
- ALSA: control: Hardening for potential Spectre v1
- ALSA: pcm: Return negative delays from SNDRV_PCM_IOCTL_DELAY.
- ALSA: core: Report audio_tstamp in snd_pcm_sync_ptr
- ALSA: seq: oss: Fix unbalanced use lock for synth MIDI device
- ALSA: seq: oss: Hardening for potential Spectre v1
- ALSA: hda: Hardening for potential Spectre v1
- ALSA: hda/realtek - Add some fixes for ALC233
- ALSA: hda/realtek - Update ALC255 depop optimize
- ALSA: hda/realtek - change the location for one of two front mics
- mtd: spi-nor: cadence-quadspi: Fix page fault kernel panic
- mtd: cfi: cmdset_0001: Do not allow read/write to suspend erase block.
- mtd: cfi: cmdset_0002: Do not allow read/write to suspend erase block.
- mtd: rawnand: tango: Fix struct clk memory leak
- kobject: don't use WARN for registration failures
- scsi: sd: Defer spinning up drive while SANITIZE is in progress
- bfq-iosched: ensure to clear bic/bfq pointers when preparing request
- vfiomap: ccw: process sshc with interrupts disabled
- ANDROID: binder: prevent transactions into own process.
- PCI: aardvark: Fix logic in advk_pcie_({rd,wr})_conf()
- PCI: aardvark: Set PIO_ADDR_LS correctly in advk_pcie_rd_conf()
- PCI: aardvark: Use ISR1 instead of ISR0 interrupt in legacy irq mode
- PCI: aardvark: Fix PCIe Max Read Request Size setting
- ARM: amba: Make driver_override output consistent with other buses
- ARM: amba: Fix race condition with driver_override
- ARM: amba: Don't read past the end of sysfs "driver_override" buffer
+ - ARM: socfpga_defconfig: Remove QSPI Sector 4K size force
+ - KVM: arm/arm64: Close VMID generation race
+ - crypto: drm - set freed buffers to NULL
+ - ASoC: fsl_esai: Fix divisor calculation failure at lower ratio
+ - libceph: un-backoff on tick when we have a authenticated session
+ - libceph: reschedule a tick in finish_hunting()
+ - libceph: validate con->state at the top of try_write()
+ - fpga-manager: altera-ps-spi: preserve nCONFIG state
+ - earlycon: Use a pointer table to fix __earlycon_table stride
+ - drm/amdGPU: set COMPUTE_PGM_RSRC1 for SGPR/VGPR clearing shaders
+ - drm/i915: Enable display WA#1183 from its correct spot
+ - objtool, perf: Fix GCC 8 -Wrestrict error
+ - tools/lib/subcmd/pager.c: do not alias select() params
+ - x86/ipc: Fix x32 version of shmid64_ds and msqid64_ds
+ - x86/smpboot: Don't use mwait_play_dead() on AMD systems
+ - x86/microcode/intel: Save microcode patch unconditionally
+ - x86/microcode: Do not exit early from __reload_late()
+ - tick/sched: Do not mess with an enqueued hrtimer
+ - arm/arm64: KVM: Add PSCI version selection API
+ - powerpc/eeh: Fix race with driver un/bind
+ - serial: mvebu-uart: Fix local flags handling on termios update
+ - block: do not use interruptible wait anywhere
+ - ASoC: dmic: Fix clock parenting
+ - PCI / PM: Do not clear state_saved in pci_pm_freeze() when smart suspend is set
+ - module: Fix display of wrong module .text address
+ - drm/edid: Reset more of the display info
+ - drm/i915/fbdev: Enable late fbdev initial configuration
+ - drm/i915/audio: set minimum CD clock to twice the BCLK
+ - drm/amd/display: Fix deadlock when flushing irq
+ - drm/amd/display:Disallow enabling CRTC without primary plane with FB
+ - random: set up the NUMA crng instances after the CRNG is fully initialized
+ - Ryzen/Raven Ridge USB ports do not work (LP: #1756700)
+ - xhci: Fix USB ports for Dell Inspiron 5775
+ - [Ubuntu 1804][boston][ixgbe] EEH causes kernel BUG at /build/linux-
  jWaf/vlinux-4.15.0/drivers/pci/msi.c:352 (i2S) (LP: #1776389)
+ - ixgbe/ixgbevf: Free IRQ when PCI error recovery removes the device
+ - Need fix to aacraid driver to prevent panic (LP: #1770095)
+ - scsi: aacraid: Correct hba_send to include iu_type
+ - * kernel: Fix arch random implementation (LP: #1775391)
+ - x390/archrandom: Rework arch random implementation.
* kernel: Fix memory leak on CCA and EP11 CPRB processing. (LP: #1775390)

* Various fixes for CXL kernel module (LP: #1774471)
  - cxl: Remove function write_timebase_ctrl_psl9() for PSL9
  - cxl: Set the PBCQ Tunnel BAR register when enabling capi mode
  - cxl: Report the tunneled operations status
  - cxl: Configure PSL to not use APC virtual machines
  - cxl: Disable prefault_mode in Radix mode

* Bluetooth not working (LP: #1764645)
  - Bluetooth: btusb: Apply QCA Rome patches for some ATH3012 models

* linux-snapdragon: wcn36xx: mac address generation on boot (LP: #1776491)
  - [Config] arm64: snapdragon: WCN36XX_SNAPDRAGON_HACKS=y
  - SAUCE: wcn36xx: read MAC from file or randomly generate one

* fs cache: Fix hanging wait on page discarded by writeback (LP: #1777029)
  - fs cache: Fix hanging wait on page discarded by writeback

-- Kleber Sacilotto de Souza <kleber.souza@canonical.com> Wed, 15 Aug 2018 14:50:38 +0200

linux (4.15.0-32.35) bionic; urgency=medium

[ Stefan Bader ]
* CVE-2018-3620 // CVE-2018-3646
  - x86/Centaur: Initialize supported CPU features properly
  - x86/Centaur: Report correct CPU/cache topology
  - x86/CPU/AMD: Have smp_num_siblings and cpu_llc_id always be present
  - perf/events/amd/uncore: Fix amd_uncore_llc ID to use pre-defined cpu_llc_id
  - x86/CPU: Rename intel_cacheinfo.c to cacheinfo.c
  - x86/CPU/AMD: Calculate last level cache ID from number of sharing threads
  - x86/CPU: Modify detect_extended_topology() to return result
  - x86/CPU/AMD: Derive CPU topology from CPUID function 0xB when available
  - x86/CPU: Move cpu local function declarations to local header
  - x86/CPU: Make intel_num_cpu_cores() generic
  - x86/CPU: Move cpu_detect_cache_sizes() into init_intel_cacheinfo()
  - x86/CPU: Move x86_cpuinfo::x86_max_cores assignment to
detect_num_cpu_cores()
  - x86/CPU/AMD: Fix LLC ID bit-shift calculation
  - x86/mm: Factor out pageattr_PAGE_GLOBAL setting
  - x86/mm: Undo double_PAGE_PSE clearing
  - x86/mm: Introduce "default" kernel PTE mask
  - x86/espfix: Document use of_PAGE_GLOBAL
  - x86/mm: Do not auto-massage page protections
  - x86/mm: Remove extra filtering in pageattr code
  - x86/mm: Comment_PAGE_GLOBAL mystery
+ x86/mm: Do not forbid _PAGE_RW before init for __ro_after_init
+ x86/ltd: Fix support_pte_mask filtering in map_ldt_struct()
+ x86/power/64: Fix page-table setup for temporary text mapping
+ x86/pti: Filter at vma->vm_page_prot population
+ x86/boot/64/clang: Use fixup_pointer() to access '__supported_pte_mask'
+ x86/speculation/l1tf: Increase 32bit PAE __PHYSICAL_PAGE_SHIFT
+ x86/speculation/l1tf: Change order of offset/type in swap entry
+ x86/speculation/l1tf: Protect swap entries against L1TF
+ x86/speculation/l1tf: Protect PROT_NONE PTEs against speculation
+ x86/speculation/l1tf: Make sure the first page is always reserved
+ x86/speculation/l1tf: Add sysfs reporting for l1tf
+ x86/speculation/l1tf: Disallow non privileged high MMIO PROT_NONE mappings
+ x86/speculation/l1tf: Limit swap file size to MAX_PA/2
+ x86/bugs: Move the l1tf function and define pr_fmt properly
+ sched/smt: Update sched_smt_present at runtime
+ x86/smp: Provide topology_is_primary_thread()
+ x86/topology: Provide topology_smt_supported()
+ cpu/hotplug: Make bringup/teardown of smp threads symmetric
+ cpu/hotplug: Split do_cpu_down()
+ cpu/hotplug: Provide knobs to control SMT
+ x86/cpu: Remove the pointless CPU printout
+ x86/cpu/AMD: Remove the pointless detect_hlt() call
+ x86/cpu/common: Provide detect_hlt_early()
+ x86/cpu/topology: Provide detect_extended_topology_early()
+ x86/cpu/intel: Evaluate smp_num_siblings early
+ x86/CPU/AMD: Do not check CPUID max ext level before parsing SMP info
+ x86/cpu/AMD: Evaluate smp_num_siblings early
+ x86/apic: Ignore secondary threads if nosmt=force
+ x86/speculation/l1tf: Extend 64bit swap file size limit
+ x86/cpu/features: Add detection of L1D cache flush support.
+ x86/CPU/AMD: Move TOPOEXT reenablement before reading smp_num_siblings
+ x86/speculation/l1tf: Protect PAE swap entries against L1TF
+ x86/speculation/l1tf: Fix up pte->pfn conversion for PAE
+ Revert "x86/apic: Ignore secondary threads if nosmt=force"
+ cpu/hotplug: Boot HT siblings at least once
+ x86/KVM: Warn user if KVM is loaded SMT and L1TF CPU bug being present
+ x86/KVM/VMX: Add module argument for L1TF mitigation
+ x86/KVM/VMX: Add L1D flush algorithm
+ x86/KVM/VMX: Add L1D MSR based flush
+ x86/KVM/VMX: Add L1D flush logic
+ x86/KVM/VMX: Split the VMX MSR LOAD structures to have an host/guest numbers
+ x86/KVM/VMX: Add find_msr() helper function
+ x86/KVM/VMX: Separate the VMX AUTOLOAD guest/host number accounting
+ x86/KVM/VMX: Extend add_atomic_switch_msr() to allow VMENTSER only MSRs
+ x86/KVM/VMX: Use MSR save list for IA32_FLUSH_CMD if required
+ cpu/hotplug: Online siblings when SMT control is turned on
+ x86/l1tf: Introduce vmx status variable
+ x86/kvm: Drop L1TF MSR list approach
+ - x86/l1tf: Handle EPT disabled state properly
+ - x86/kvm: Move l1tf setup function
+ - x86/kvm: Add static key for flush always
+ - x86/kvm: Serialize L1D flush parameter setter
+ - x86/kvm: Allow runtime control of L1D flush
+ - cpu/hotplug: Expose SMT control init function
+ - cpu/hotplug: Set CPU_SMT_NOT_SUPPORTED early
+ - x86/bugs, kvm: Introduce boot-time control of L1TF mitigations
+ - Documentation: Add section about CPU vulnerabilities
+ - x86/speculation/l1tf: Unbreak __HAVE_ARCH_PFN_MODIFY_ALLOWED architectures
+ - x86/KVM/VMX: Initialize the vmx_l1d_flush_pages' content
+ - Documentation/l1tf: Fix typos
+ - cpu/hotplug: detect SMT disabled by BIOS
+ - x86/KVM/VMX: Don't set l1tf_flush_l1d to true from vmx_l1d_flush()
+ - x86/KVM/VMX: Replace 'vmx_l1d_flush_always' with 'vmx_l1d_flush_cond'
+ - x86/KVM/VMX: Move the l1tf_flush_l1d test to vmx_l1d_flush()
+ - x86/irq: Demote irq_cpustat_t::__softirq_pending to u16
+ - x86/KVM/VMX: Introduce per-host-cpu analogue of l1tf_flush_l1d
+ - x86: Don't include linux/irq.h from asm/hardirq.h
+ - x86/irq: Let interrupt handlers set kvm_cpu_l1tf_flush_l1d
+ - x86/KVM/VMX: Don't set l1tf_flush_l1d from vmx_handle_external_intr()
+ - Documentation/l1tf: Remove Yonah processors from not vulnerable list
+ - x86/speculation: Simplify sysfs report of VMX L1TF vulnerability
+ - x86/speculation: Use ARCH_CAPABILITIES to skip L1D flush on vmentry
+ - KVM: x86: Add a framework for supporting MSR-based features
+ - KVM: X86: Introduce kvm_get_msr_feature()
+ - KVM: VMX: support MSR_IA32_ARCH_CAPABILITIES as a feature MSR
+ - KVM: VMX: Tell the nested hypervisor to skip L1D flush on vmentry
+ - cpu/hotplug: Fix SMT supported evaluation
+ - x86/speculation/l1tf: Invert all not present mappings
+ - x86/speculation/l1tf: Make pmu/pud_mknnotpresent() invert
+ - x86/mm/pat: Make set_memory_np() L1TF safe
+ - cpu: Fix per-cpu regression on ARM64

+ * CVE-2018-5391
+ - Revert "net: increase fragment memory usage limits"

+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 10 Aug 2018 14:22:53 -0300
+ +linux (4.15.0-30.32) bionic; urgency=medium
+ +
+ + * CVE-2018-5390
+ + - tcp: free batches of packets in tcp_prune_ofo_queue()
+ + - tcp: avoid collapses in tcp_prune_queue() if possible
+ + - tcp: detect malicious patterns in tcpCollapse_ofo_queue()
+ + - tcp: call tcp_drop() from tcp_data_queue_ofo()
+ + - tcp: add tcp_oooTryCoalesce() helper
+
* Critical upstream bugfix missing in Ubuntu 18.04 - frequent Xorg crash after suspend (LP: #1776887)
  - ocxl: Document the OCXL_IOCTL_GET_METADATA IOCTL

* Hard LOCKUP observed on stressing Ubuntu 18.04 (LP: #1777194)
  - powerpc: Fix smp_send_stop NMI IPI handling

* IPL: ppc64_cpu --frequency hang with INFO: rcu_sched detected stalls on CPUs/tasks on w34 and wsbmc016 with 920.1714.20170330n (LP: #1773964)
  - rtc: opal: Fix OPAL RTC driver OPAL_BUSY loops

  - SAUCE: ext4: check for allocation block validity with block group locked

-- Stefan Bader <stefan.bader@canonical.com>  Thu, 26 Jul 2018 17:20:29 +0200

+ Update to ocxl driver for 18.04.1 (LP: #1775786)
  - misc: ocxl: use put_device() instead of device_unregister()
  - powerpc: Add TIDR CPU feature for POWER9
  - powerpc: Use TIDR CPU feature to control TIDR allocation
  - powerpc: use task_pid_nr() for TID allocation
  - ocxl: Rename pnv_ocxl_spa_remove_pe to clarify it's action
  - ocxl: Expose the thread_id needed for wait on POWER9
  - ocxl: Add an IOCTL so userspace knows what OCXL features are available
  - ocxl: Document new OCXL IOCTLs
  - ocxl: Fix missing unlock on error in afu_ioctl_enable_p9_wait()

-- Stefan Bader <stefan.bader@canonical.com>  Tue, 17 Jul 2018 10:57:50 +0200

+ linux (4.15.0-28.30) bionic; urgency=medium

+ * linux: 4.15.0-28.30 -proposed tracker (LP: #1781433)

+ * Cannot set MTU higher than 1500 in Xen instance (LP: #1781413)
  - xen-netfront: Fix mismatched rtnl_unlock
  - xen-netfront: Update features after registering netdev
**Open Source Used In 5GaaS Edge AC-4  19443**

**Kamal Mostafa <kamal@canonical.com>  Thu, 12 Jul 2018 09:47:07 -0700**

```
linux (4.15.0-27.29) bionic; urgency=medium
+ * linux: 4.15.0-27.29 -proposed tracker (LP: #1781062)
+  - SAUCE: ext4: fix ext4_validate_inode_bitmap: comm stress-ng: Corrupt inode bitmap
+
++-- Khalid Elmously <khalid.elmously@canonical.com>  Tue, 10 Jul 2018 19:05:00 -0400
+linux (4.15.0-26.28) bionic; urgency=medium
+  * linux: 4.15.0-26.28 -proposed tracker (LP: #1780112)
+  * failure to boot with linux-image-4.15.0-24-generic (LP: #1779827) // Cloud-init causes potentially huge boot delays with 4.15 kernels (LP: #1780062)
+    - random: Make getrandom() ready earlier
+
++-- Stefan Bader <stefan.bader@canonical.com>  Wed, 04 Jul 2018 17:52:52 +0200
+linux (4.15.0-25.27) bionic; urgency=medium
+  * linux: 4.15.0-25.27 -proposed tracker (LP: #1779354)
+  * hisi_sas_v3_hw: internal task abort: timeout and not done. (LP: #1777736)
+    - scsi: hisi_sas: Update a couple of register settings for v3 hw
+  * hisi_sas: Add missing PHY spinlock init (LP: #1777734)
+    - scsi: hisi_sas: Add missing PHY spinlock init
+  * hisi_sas: improve read performance by pre-allocating slot DMA buffers
+    (LP: #1777727)
+    - scsi: hisi_sas: use dma_zalloc_coherent()
+    - scsi: hisi_sas: Use dmam_alloc_coherent()
+    - scsi: hisi_sas: Pre-allocate slot DMA buffers
+  * hisi_sas: Failures during host reset (LP: #1777696)
+    - scsi: hisi_sas: Only process broadcast change in phy_bcast_v3_hw()
+    - scsi: hisi_sas: Fix the conflict between dev gone and host reset
+    - scsi: hisi_sas: Adjust task reject period during host reset
+    - scsi: hisi_sas: Add a flag to filter PHY events during reset
+    - scsi: hisi_sas: Release all remaining resources in clear nexus ha
+  * Fake SAS addresses for SATA disks on HiSilicon D05 are non-unique
```
+ (LP: #1776750)
+ - scsi: hisi_sas: make SAS address of SATA disks unique
+ + Vcs-Git header on bionic linux source package points to zesty git tree
+ + (LP: #1766055)
+ + - [Packaging]: Update Vcs-Git
+ + * large KVM instances run out of IRQ routes (LP: #1778261)
+ + - SAUCE: kvm -- increase KVM_MAX_IRQ ROUTES to 2048 on x86
+ + -- Khalid Elmously <khalid.elmously@canonical.com>  Sun, 01 Jul 2018 23:10:18 +0000
+ + linux (4.15.0-24.26) bionic; urgency=medium
+ + * linux: 4.15.0-24.26 -proposed tracker (LP: #1776338)
+ + * Bionic update: upstream stable patchset 2018-06-06 (LP: #1775483)
+ + - drm: bridge: dw-hdmi: Fix overflow workaround for Amlogic Meson GX SoCs
+ + - i40e: Fix attach VF to VM issue
+ + - tpm: cmd_ready command can be issued only after granting locality
+ + - tpm: tpm-interface: fix tpm_transmit/_cmd kdoc
+ + - tpm: add retry logic
+ + - Revert "ath10k: send (re)assoc peer command when NSS changed"
+ + - bonding: do not set slave_dev npinfo before slave_enable_netpoll in
+ +   bond_enslave
+ + - ipv6: add RTA_TABLE and RTA_PREFSRC to rtm_ipv6_policy
+ + - ipv6: sr: fix NULL pointer dereference in seg6_do_srh_encap()- v4 pkts
+ + - KEYS: DNS: limit the length of option strings
+ + - l2tp: check sockaddr length in pppol2tp_connect()
+ + - net: validate attribute sizes in neigh_dump_table()
+ + - llc: delete timers synchronously in llc_sk_free()
+ + - tcp: don't read out-of-bounds opsize
+ + - net: af_packet: fix race in PACKET_[R|T]X_RING
+ + - tcp: md5: reject TCP_MD5SIG or TCP_MD5SIG_EXT on established sockets
+ + - net: fix deadlock while clearing neighbor proxy table
+ + - team: avoid adding twice the same option to the event list
+ + - net/smci: fix shutdown in state SMC_LISTEN
+ + - team: fix netconsole setup over team
+ + - packet: fix bitfield update race
+ + - tcp: add policy for TIPC_NLA_NET_ADDR
+ + - pppoe: check sockaddr length in pppoe_connect()
+ + - vlan: Fix reading memory beyond skb->tail in skb_vlan_tagged_multi
+ + - amd-xgbe: Add pre/post auto-negotiation phy hooks
+ + - scp: do not check port in scp_inet6_cmp_addr
+ + - amd-xgbe: Improve KR auto-negotiation and training
+ + - strparser: Do not call mod_delayed_work with a timeout of LONG_MAX
+ + - amd-xgbe: Only use the SFP supported transceiver signals
+ + - strparser: Fix incorrect strp->need_bytes value.
* Lenovo V330 needs patch in ideapad_laptop module for rfkill (LP: #1774636)
+ - SAUCE: Add Lenovo V330 to the ideapad_laptop rfkill blacklist
+ + * bluetooth controller fail after suspend with USB autosuspend on XPS 13 9360
+ + (LP: #1775217)
+ + - Bluetooth: btusb: Add Dell XPS 13 9360 to btusb_needs_reset_resume_table
+ + + [Hyper-V] PCI: hv: Fix 2 hang issues in hv-compose_msi_msg (LP: #1758378)
+ + - PCI: hv: Only queue new work items in hv_pci_devices_present() if necessary
+ + - PCI: hv: Remove the bogus test in hv_eject_devicework()
+ + - PCI: hv: Fix a comment typo in _hv_pcifront_read_config()
+ + + register on binfofmt_misc may overflow and crash the system (LP: #1775856)
+ + - fs/binfofmt_misc.c: do not allow offset overflow
+ + + * CVE-2018-11508
+ + - compat: fix 4-byte infoleak via uninitialized struct field
+ + + * Network installs fail on SocioNext board (LP: #1775884)
+ + - net: netsec: reduce DMA mask to 40 bits
+ + - net: socionext: reset hardware in ndo_stop
+ + - net: netsec: enable tx-irq during open callback
+ + + * r8169 ethernet card don't work after returning from suspension
+ + (LP: #1752772)
+ + - PCI: Add pcim_set_mwi(), a device-managed pci_set_mwi()
+ + - r8169: switch to device-managed functions in probe
+ + - r8169: remove netif_napi_del in probe error path
+ + - r8169: remove some WOL-related dead code
+ + - r8169: disable WOL per default
+ + - r8169: improve interrupt handling
+ + - r8169: fix interrupt number after adding support for MSI-X interrupts
+ + + * ISST-LTE:KVM:Ubuntu18.04:BostonLC:bosclcp3:bosclcp3g3:Guest console hangs
+ + after hotplug CPU add operation. (LP: #1759723)
+ + - genirq/affinity: assign vectors to all possible CPUs
+ + - genirq/affinity: Don't return with empty affinity masks on error
+ + - genirq/affinity: Rename *node_to_possible_cpumask as *node_to_cpumask
+ + - genirq/affinity: Move actual irq vector spreading into a helper function
+ + - genirq/affinity: Allow irq spreading from a given starting point
+ + - genirq/affinity: Spread irq vectors among present CPUs as far as possible
+ + - blk-mq: simplify queue mapping & schedule with each possible CPU
+ + - blk-mq: make sure hctx->next_cpu is set correctly
+ + - blk-mq: Avoid that blk_mq_delay_run_hw_queue() introduces unintended delays
+ + - blk-mq: make sure that correct hctx->next_cpu is set
+ + - blk-mq: avoid to write intermediate result to hctx->next_cpu
+ + - blk-mq: introduce blk_mq_hw_queue_first_cpu() to figure out first cpu
+ + - blk-mq: don't check queue mapped in __blk_mq_delay_run_hw_queue()
+ + - nvme: pci: pass max vectors as num_possible_cpus() to pci_alloc_irq_vectors
- scsi: hpsa: fix selection of reply queue
- scsi: megaraid_sas: fix selection of reply queue
- scsi: core: introduce force_blk_mq
- scsi: virtio_scsi: fix IO hang caused by automatic irq vector affinity
- scsi: virtio_scsi: unify scsi_host_template

* Fix several bugs in RDMA/hns driver (LP: #1770974)
  - RDMA/hns: Use structs to describe the uABI instead of opencoding
  - RDMA/hns: Remove unnecessary platform_get_resource() error check
  - RDMA/hns: Remove unnecessary operator
  - RDMA/hns: Add names to function arguments in function pointers
  - RDMA/hns: Fix misplaced call to hns_roce_cleanup_hem_table
  - RDMA/hns: Fix a bug with modifying mac address
  - RDMA/hns: Use free_pages function instead of free_page
  - RDMA/hns: Replace __raw_write*(cpu_to_le*()) with LE write*()
  - RDMA/hns: Bugfix for init hem table
  - RDMA/hns: Intercept illegal RDMA operation when use inline data
  - RDMA/hns: Fix the qp context state diagram
  - RDMA/hns: Only assign mtu if IB_QP_PATH_MTU bit is set
  - RDMA/hns: Remove some unnecessary attr_mask judgement
  - RDMA/hns: Only assign dqpn if IB_QP_PATH_DEST_QPN bit is set
  - RDMA/hns: Adjust the order of cleanup hem table
  - RDMA/hns: Update assignment method for owner field of send wqe
  - RDMA/hns: Submit bad wr
  - RDMA/hns: Fix a couple misspellings
  - RDMA/hns: Add rq inline flags judgement
  - RDMA/hns: Bugfix for rq record db for kernel
  - RDMA/hns: Load the RoCE driver automatically
  - RDMA/hns: Update convert function of endian format
  - RDMA/hns: Add return operation when configured global param fail
  - RDMA/hns: Not support qp transition from reset to reset for hip06
  - RDMA/hns: Fix the bug with rq sge
  - RDMA/hns: Set desc_dma_addr for zero when free cmq desc
  - RDMA/hns: Enable inner_pa_vld filed of mpt
  - RDMA/hns: Set NULL for __internal_mr
  - RDMA/hns: Fix the bug with NULL pointer
  - RDMA/hns: Bugfix for cq record db for kernel
  - RDMA/hns: Move the location for initializing tmp_len
  - RDMA/hns: Drop local zgid in favor of core defined variable
  - RDMA/hns: Add 64KB page size support for hip08
  - RDMA/hns: Rename the idx field of db
  - RDMA/hns: Modify uar allocation algorithm to avoid bitmap exhaust
  - RDMA/hns: Increase checking CMQ status timeout value
  - RDMA/hns: Add reset process for RoCE in hip08
  - RDMA/hns: Fix the illegal memory operation when cross page
  - RDMA/hns: Implement the disassociate_ucontext API

* powerpc/livepatch: Implement reliable stack tracing for the consistency
+  model (LP: #1771844)
+  - powerpc/livepatch: Implement reliable stack tracing for the consistency
+  model
+
+  * vmxnet3: update to latest ToT (LP: #1768143)
+  - vmxnet3: avoid xmit reset due to a race in vmxnet3
+  - vmxnet3: use correct flag to indicate LRO feature
+  - vmxnet3: fix incorrect dereference when rxvlan is disabled
+
+  * 4.15.0-22-generic fails to boot on IBM S822LC (POWER8 (raw), altivec
+  supported) (LP: #1773162)
+  - Revert "powerpc/64s: Add support for a store forwarding barrier at kernel
+  entry/exit"
+  - powerpc/64s: Add support for a store forwarding barrier at kernel entry/exit
+
+  * Decode ARM CPER records in kernel (LP: #1770244)
+  - [Config] CONFIG_UEFI_CPER_ARM=y
+  - efi: Move ARM CPER code to new file
+  - efi: Parse ARM error information value
+
+  * Adding back alx WoL feature (LP: #1772610)
+  - SAUCE: Revert "alx: remove WoL support"
+  - SAUCE: alx: add enable_wol parameter
+
+  * Lancer A0 Asic HBA's won't boot with 18.04 (LP: #1768103)
+  - scsi: lpfc: Fix WQ/CQ creation for older asics.
+  - scsi: lpfc: Fix 16gb hbas failing cq create.
+
+  * [LTCTest][OPAL][OP920] cpupower idle-info is not listing stop4 and stop5
+  idle states when all CORES are guarded (LP: #1771780)
+  - SAUCE: cpuidle/powernv : init all present cpus for deep states
+
+  * Huawei 25G/100G Network Adapters Unsupported (LP: #1770970)
+  - net-next/hinic: add pci device ids for 25ge and 100ge card
+
+  * [Ubuntu 18.04.1] POWER9 - Nvidia Volta - Kernel changes to enable Nvidia
+  driver on bare metal (LP: #1772991)
+  - powerpc/powernv/npu: Fix deadlock in mmio_invalidate()
+  - powerpc/powernv/mce: Don't silently restart the machine
+  - powerpc/npu-dma.c: Fix crash after __mmu_notifier_register failure
+  - powerpc/mm: Flush cache on memory hot(un)plug
+  - powerpc/powernv/memtrace: Let the arch hotunplug code flush cache
+  - powerpc/powernv/npu: Add lock to prevent race in concurrent context
+  - init/destroy
+  - powerpc/powernv/npu: Prevent overwriting of pnv_npu2_init_contex() callback
+  - parameters
+  - powerpc/powernv/npu: Do a PID GPU TLB flush when invalidating a large
+  address range
- powerpc/mce: Fix a bug where mce loops on memory UE.
- * cpum SF: ensure sample freq is non-zero (LP: #1772593)
- s390/cpum SF: ensure sample frequency of perf event attributes is non-zero
- * PCIe link speeds of 16 GT/s are shown as "Unknown speed" (LP: #1773243)
- PCI: Add decoding for 16 GT/s link speed
- * False positive ACPI _PRS error messages (LP: #1773295)
- ACPI / PCI: pci_link: Allow the absence of _PRS and change log level
- * Dell systems crash when disabling Nvidia dGPU (LP: #1773299)
- ACPI / OSI: Add OEM _OSI strings to disable NVidia RTD3
- * wlp3s0: failed to remove key (1, ff:ff:ff:ff:ff:ff) from hardware (-22)
- (LP: #1720930)
- iwlwifi: mvm: fix "failed to remove key" message
- * Expose arm64 CPU topology to userspace (LP: #1770231)
- ACPI: ACPI 6.2: Additional PPTT flags
- drivers: base: cacheinfo: move cache_setup_of_node()
- drivers: base: cacheinfo: setup DT cache properties early
- cacheinfo: rename of_node to fw_token
- arm64/acpi: Create arch specific cpu to acpi id helper
- ACPI/PPTT: Add Processor Properties Topology Table parsing
- [Config] CONFIG ACPI PPTT=y
- ACPI: Enable PPTT support on ARM64
- drivers: base cacheinfo: Add support for ACPI based firmware tables
- arm64: Add support for ACPI based firmware tables
- arm64: topology: rename cluster_id
- arm64: topology: enable ACPI/PPTT based CPU topology
- ACPI: Add PPTT to injectable table list
- arm64: topology: divorce MC scheduling domain from core_siblings
- * hisi_sas robustness fixes (LP: #1774466)
- scsi: hisi_sas: delete timer when removing hisi_sas driver
- scsi: hisi_sas: print device id for errors
- scsi: hisi_sas: Add some checks to avoid free'ing a sas_task twice
- scsi: hisi_sas: check host frozen before calling "done" function
- scsi: hisi_sas: check sas_dev gone earlier in hisi_sas_abort_task()
- scsi: hisi_sas: stop controller timer for reset
- scsi: hisi_sas: update PHY linkrate after a controller reset
- scsi: hisi_sas: change slot index allocation mode
- scsi: hisi_sas: Change common allocation mode of device id
- scsi: hisi_sas: Reset disks when discovered
- scsi: hisi_sas: Create a scsi_host_template per HW module
- scsi: hisi_sas: Init disks after controller reset
- scsi: hisi_sas: Try wait commands before before controller reset
+ - scsi: hisi_sas: Include TMF elements in struct hisi_sas_slot
+ - scsi: hisi_sas: Add v2 hw force PHY function for internal ATA command
+ - scsi: hisi_sas: Terminate STP reject quickly for v2 hw
+ - scsi: hisi_sas: Fix return value when get_free_slot() failed
+ - scsi: hisi_sas: Mark PHY as in reset for nexus reset

+ * hisi_sas: Support newer v3 hardware (LP: #1774467)
+ - scsi: hisi_sas: update RAS feature for later revision of v3 HW
+ - scsi: hisi_sas: check IPTT is valid before using it for v3 hw
+ - scsi: hisi_sas: fix PI memory size
+ - scsi: hisi_sas: config ATA de-reset as an constrained command for v3 hw
+ - scsi: hisi_sas: remove redundant handling to event95 for v3
+ - scsi: hisi_sas: add readl poll timeout helper wrappers
+ - scsi: hisi_sas: workaround a v3 hw hilink bug
+ - scsi: hisi_sas: Add LED feature for v3 hw

+ * hisi_sas: improve performance by optimizing DQ locking (LP: #1774472)
+ - scsi: hisi_sas: initialize dq spinlock before use
+ - scsi: hisi_sas: optimise the usage of DQ locking
+ - scsi: hisi_sas: relocate smp sg map
+ - scsi: hisi_sas: make return type of prep functions void
+ - scsi: hisi_sas: allocate slot buffer earlier
+ - scsi: hisi_sas: Don't lock DQ for complete task sending
+ - scsi: hisi_sas: Use device lock to protect slot alloc/free
+ - scsi: hisi_sas: add check of device in hisi_sas_task_exec()
+ - scsi: hisi_sas: fix a typo in hisi_sas_task_prep()

+ * Request to revert SAUCE patches in the 18.04 SRU and update with upstream
  version (LP: #1768431)
+ - scsi: cxlflash: Handle spurious interrupts
+ - scsi: cxlflash: Remove commands from pending list on timeout
+ - scsi: cxlflash: Synchronize reset and remove ops
+ - SAUCE: (no-up) cxlflash: OCXL diff between v2 and v3

+ * After update to 4.13-43 Intel Graphics are Laggy (LP: #1773520)
+ - SAUCE: Revert "drm/i915/edp: Allow alternate fixed mode for eDP if availaible."

+ * ELANPAD ELAN0612 does not work, patch available (LP: #1773509)
+ - SAUCE: Input: elan_i2c - add ELAN0612 to the ACPI table

+ * FS-Cache: Assertion failed: FS-Cache: 6 == 5 is false (LP: #1774336)
+ - SAUCE: CacheFiles: fix a read_waiter/read_copier race

+ * hns3 driver updates (LP: #1768670)
+ - net: hns3: VF should get the real rss_size instead of rss_size_max
+ - net: hns3: set the cmdq out_vld bit to 0 after used
+ - net: hns3: fix endian issue when PF get mbx message flag

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Open Source Used In 5GasS Edge AC-4  19450
+ net: hns3: fix the queue id for tqp enable\&\&reset
+ net: hns3: set the max ring num when alloc netdev
+ net: hns3: add support for VF driver inner interface
+ hclgevf_ops.get_tqps_and_rss_info
+ net: hns3: refactor the hclge_get/set_rss function
+ net: hns3: refactor the hclge_get/set_rss_tuple function
+ net: hns3: fix for RSS configuration loss problem during reset
+ net: hns3: fix for pause configuration lost during reset
+ net: hns3: fix for use-after-free when setting ring parameter
+ net: hns3: refactor the get/put_vector function
+ net: hns3: fix for coalesce configuration lost during reset
+ net: hns3: refactor the coalesce related struct
+ net: hns3: fix for coal configuration lost when setting the channel
+ net: hns3: add existence check when remove old uc mac address
+ net: hns3: fix for netdev not running problem after calling net_stop and net_open
+ net: hns3: fix for ipv6 address loss problem after setting channels
+ net: hns3: unify the pause params setup function
+ net: hns3: fix rx path skb->truesize reporting bug
+ net: hns3: add support for querying pf\c pulse packets statistic
+ net: hns3: fix for loopback failure when vlan filter is enable
+ net: hns3: fix for buffer overflow smatch warning
+ net: hns3: fix error type definition of return value
+ net: hns3: fix return value error of hclge_get_mac_vlan_cmd_status()
+ net: hns3: add existence checking before adding unicast mac address
+ net: hns3: add result checking for VF when modify unicast mac address
+ net: hns3: reallocate tx/rx buffer after changing mtu
+ net: hns3: fix the VF queue reset flow error
+ net: hns3: fix for vlan table lost problem when resetting
+ net: hns3: increase the max time for IMP handle command
+ net: hns3: change GL update rate
+ net: hns3: change the time interval of int_gl calculating
+ net: hns3: fix for getting wrong link mode problem
+ net: hns3: add get\_link support to VF
+ net: hns3: add querying speed and duplex support to VF
+ net: hns3: fix for not returning problem in get\_link\_ksettings when phy exists
+ net: hns3: Changes to make enet watchdog timeout func common for PF/VF
+ net: hns3: Add VF Reset Service Task to support event handling
+ net: hns3: Add VF Reset device state and its handling
+ net: hns3: Add support to request VF Reset to PF
+ net: hns3: Add support to reset the enet/ring mgmt layer
+ net: hns3: Add support to re-initialize the helge device
+ net: hns3: Changes to support ARQ(Asynchronous Receive Queue)
+ net: hns3: Add *Asserting Reset* mailbox message & handling in VF
+ net: hns3: Changes required in PF mailbox to support VF reset
+ net: hns3: hclge_inform_reset_assert_to_vf() can be static
+ net: hns3: fix for returning wrong value problem in hns3\_get\_rss\_key\_size
+ - net: hns3: fix for returning wrong value problem in hns3_get_rss_indir_size
+ - net: hns3: fix for the wrong shift problem in hns3_set_txbd_baseinfo
+ - net: hns3: fix for not initializing VF rss_hash_key problem
+ - net: hns3: never send command queue message to IMP when reset
+ - net: hns3: remove unnecessary pci_set_drvdata() and devm_kfree()
+ - net: hns3: fix length overflow when CONFIG_ARM64_64K_PAGES
+ - net: hns3: Remove error log when getting pfc stats fails
+ - net: hns3: fix to correctly fetch l4 protocol outer header
+ - net: hns3: Fixes the out of bounds access in hclge_map_tqp
+ - net: hns3: Fixes the error legs in hclge_init_ae_dev function
+ - net: hns3: fix for phy_addr error in hclge_mac_mdio_config
+ - net: hns3: Fix to support autoneg only for port attached with phy
+ - net: hns3: fix a dead loop in hclge_cmd_csq_clean
+ - net: hns3: Fix for packet loss due wrong filter config in VLAN tbls
+ - net: hns3: Remove packet statistics in the range of 8192~12287
+ - net: hns3: Add support of hardware rx-vlan-offload to HNS3 VF driver
+ - net: hns3: Fix for setting mac address when resetting
+ - net: hns3: remove add/del_tunnel_udp in hns3_enet module
+ - net: hns3: fix for cleaning ring problem
+ - net: hns3: refactor the loopback related function
+ - net: hns3: Fix for deadlock problem occurring when unregistering ae_algo
+ - net: hns3: Fix for the null pointer problem occurring when initializing
+ - net: hns3: fix a dead loop in hclge_cmd_csq_clean
+ - net: hns3: Change return type of hnae3_register_ae_dev
+ - net: hns3: Change return type of hnae3_register_ae_algo
+ - net: hns3: Change return value in hnae3_register_client
+ - net: hns3: Fixes the back pressure setting when sriov is enabled
+ - net: hns3: Fix for fiber link up problem
+ - net: hns3: Add support of .sriov_configure in HNS3 driver
+ - net: hns3: Fixes the missing PCI iounmap for various legs
+ - net: hns3: Fixes error reported by Kbuild and internal review
+ - net: hns3: Fixes API to fetch ethernet header length with kernel default
+ - net: hns3: cleanup of return values in hclge_init_client_instance()
+ - net: hns3: Fix the missing client list node initialization
+ - net: hns3: Fix for hns3 module is loaded multiple times problem
+ - net: hns3: Use enums instead of magic number in hclge_is_special_opcode
+ - net: hns3: Fix for netdev not running problem after calling net_stop and net_open
+ - net: hns3: Fixes kernel panic issue during rmmod hns3 driver
+ - net: hns3: Fix for CMDQ and Misc. interrupt init order problem
+ - net: hns3: Updates RX packet info fetch in case of multi BD
+ - net: hns3: Add support for tx_accept_tag2 and tx_accept_untag2 config
+ - net: hns3: Add STRP_TAGP field support for hardware revision 0x21
+ - net: hns3: Add support to enable TX/RX promisc mode for H/W rev(0x21)
+ - net: hns3: Fix for PF mailbox receiving unknown message
+ - net: hns3: Fixes the state to indicate client-type initialization
+ - net: hns3: Fixes the init of the VALID BD info in the descriptor
- net: hns3: Removes unnecessary check when clearing TX/RX rings
- net: hns3: Clear TX/RX rings when stopping port & un-initializing client
- net: hns3: Remove unused led control code
- net: hns3: Adds support for led locate command for copper port
- net: hns3: Fixes initialization of RoCE handle and makes it conditional
- net: hns3: Disable vf vlan filter when vf vlan table is full
- net: hns3: Add support for IFF_ALLMULTI flag
- net: hns3: Add repeat address checking for setting mac address
- net: hns3: Fix setting mac address error
- net: hns3: Fix for service_task not running problem after resetting
- net: hns3: Fix for hclge_reset running repeatedly problem
- net: hns3: Fix for phy not link up problem after resetting
- net: hns3: Add missing break in misc_irq_handler
- net: hns3: Fix for vxlan tx checksum bug
- net: hns3: Optimize the PF's process of updating multicast MAC
- net: hns3: Optimize the VF's process of updating multicast MAC
- SAUCE: {topost} net: hns3: add support for serdes loopback selftest
- SAUCE: {topost} net: hns3: RX BD information valid only in last BD except VLD bit and buffer size
- SAUCE: {topost} net: hns3: remove hclge_get_vector_index from hclge_bind_ring_with_vector
- SAUCE: {topost} net: hns3: rename the interface for init_client_instance and uninit_client_instance
- SAUCE: {topost} net: hns3: add vector status check before free vector
- SAUCE: {topost} net: hns3: add l4_type check for both ipv4 and ipv6
- SAUCE: {topost} net: hns3: remove unused head file in hnae3.c
- SAUCE: {topost} net: hns3: extraction an interface for state state init|uninit
- SAUCE: {topost} net: hns3: print the ret value in error information
- SAUCE: {topost} net: hns3: remove the Redundant put_vector in hns3_client_uninit
- SAUCE: {topost} net: hns3: add unlikely for error check
- SAUCE: {topost} net: hns3: remove back in struct hclge_hw
- SAUCE: {topost} net: hns3: use lower_32_bits and upper_32_bits
- SAUCE: {topost} net: hns3: remove unused hclge_ring_to_dma_dir
- SAUCE: {topost} net: hns3: remove useless code in hclge_cmd_send
- SAUCE: {topost} net: hns3: remove some redundant assignments
- SAUCE: {topost} net: hns3: simplify hclge_cmd_csq_clean
- SAUCE: {topost} net: hns3: using modulo for cyclic counters in hclge_cmd_send
- SAUCE: {topost} net: hns3: remove a redundant hclge_cmd_csq_done
- SAUCE: {topost} net: hns3: remove some unused members of some structures
- SAUCE: {topost} net: hns3: give default option while dependency HNS3 set
- SAUCE: {topost} net: hns3: use dma_zalloc_coherent instead of kzalloc/dma_map_single
- SAUCE: {topost} net: hns3: modify hnae_ to hnae3_
- SAUCE: {topost} net: hns3: fix unused function warning in VF driver
- SAUCE: {topost} net: hns3: remove some redundant assignments
- SAUCE: {topost} net: hns3: standardize the handle of return value
- SAUCE: {topost} net: hns3: remove extra space and brackets
- SAUCE: {topost} net: hns3: fix unreasonable code comments
- SAUCE: {topost} net: hns3: use decimal for bit offset macros
- SAUCE: {topost} net: hns3: modify inconsistent bit mask macros
- SAUCE: {topost} net: hns3: fix mislead parameter name
- SAUCE: {topost} net: hns3: remove unused struct member and definition
- SAUCE: {topost} net: hns3: Add SPDX tags to hns3 driver
- SAUCE: {topost} net: hns3: Add pf reset for hip08 RoCE
- SAUCE: {topost} net: hns3: optimize the process of notifying roce client
- SAUCE: {topost} net: hns3: Add calling roce callback function when link status change
- SAUCE: {topost} net: hns3: fix tc setup when netdev is first up
- SAUCE: {topost} net: hns3: fix for mac pause not disable in pfc mode
- SAUCE: {topost} net: hns3: fix for waterline not setting correctly
- SAUCE: {topost} net: hns3: fix for l4 checksum offload bug
- SAUCE: {topost} net: hns3: fix for mailbox message truncated problem
- SAUCE: {topost} net: hns3: Add configure for mac minimal frame size
- SAUCE: {topost} net: hns3: fix warning bug when doing lp selftest
- SAUCE: {topost} net: hns3: fix get_vector ops in hclgevf1_main module
- SAUCE: {topost} net: hns3: remove the warning when clear reset cause
- SAUCE: {topost} net: hns3: Use roce handle when calling roce callback function
- SAUCE: {topost} net: hns3: prevent sending command during global or core reset
- SAUCE: {topost} net: hns3: modify the order of initializeing command queue register
- SAUCE: {topost} net: hns3: reset net device with rtnl_lock
- SAUCE: {topost} net: hns3: prevent to request reset frequently
- SAUCE: {topost} net: hns3: correct reset event status register
- SAUCE: {topost} net: hns3: separate roce from nic when resetting
- SAUCE: net: hns3: Fix for phy link issue when using marvell phy driver
- SAUCE: {topost} net: hns3: fix return value error in hns3_reset_notify_down_enet
- SAUCE: {topost} net: hns3: remove unnecessary ring configuration operation while resetting
- SAUCE: {topost} net: hns3: fix for reset_level default assignment problem
- SAUCE: {topost} net: hns3: fix for using wrong mask and shift in hclge_get_ring_chain_from_mbx
- SAUCE: {topost} net: hns3: fix comments for hclge_get_ring_chain_from_mbx
- SAUCE: net: hns3: Fix for VF mailbox cannot receiving PF response
- SAUCE: net: hns3: Fix for VF mailbox receiving unknown message
- SAUCE: net: hns3: Optimize PF CMDQ interrupt switching process

* enable mic-mute hotkey and led on Lenovo M820z and M920z (LP: #1774306)
* ALSA: hda/realtek - Enable mic-mute hotkey for several Lenovo AIOs
* Bionic update: upstream stable patchset 2018-05-29 (LP: #1774063)
+ - cifs: do not allow creating sockets except with SMB1 posix exensions
+ - btrfs: fix unaligned access in readdir
+ - x86/acpi: Prevent X2APIC id 0xffffffff from being accounted
+ - clocksource/imx-tpm: Correct -ETIME return condition check
+ - x86/tsc: Prevent 32bit truncation in calc_hpet_ref()
+ - drm/vc4: Fix memory leak during BO teardown
+ - drm/i915/gvt: throw error on unhandled vfio ioctls
+ - drm/i915/audio: Fix audio detection issue on GLK
+ - drm/i915: Do no use kfree() to free a kmem_cache_alloc() return value
+ - drm/i915: Fix LSPCON TMDS output buffer enabling from low-power state
+ - drm/i915/bxt, glk: Increase PCODE timeouts during CDCLK freq changing
+ - usb: musb: fix enumeration after resume
+ - usb: musb: call pm_runtime_{get,put}_sync before reading vbus registers
+ - usb: musb: Fix external abort in musb_remove on omap2430
+ - firewire-ohci: work around oversized DMA reads on JMicron controllers
+ - x86/tsc: Allow TSC calibration without PIT
+ - NFSv4: always set NFS_LOCK_LOST when a lock is lost.
+ - ACPI / LPSS: Do not instiante platform_dev for devs without MMIO resources
+ - ALSA: hda - Use IS_REACHABLE() for dependency on input
+ - ASoC: au1x: Fix timeout tests in au1xac97c_ac97_read()
+ - kvm: x86: fix KVM_XEN_HVM_CONFIG ioctl
+ - RDMA/core: Clarify rdma_ah_find_type
+ - KVM: PPC: Book3S HV: Enable migration of decrementer register
+ - netfilter: ipv6: nf_defrag: Pass on packets to stack per RFC2460
+ - tracing/hrtimer: Fix tracing bugs by taking all clock bases and modes into account
+ - kvm: s390: use created_vcpus in more places
+ - platform/x86: dell-laptop: Filter out spurious keyboard backlight change events
+ - xprtrdma: Fix backchannel allocation of extra rpcrdma_reps
+ - selftest: ftrace: Fix to pick text symbols for kprobes
+ - PCI: Add function 1 DMA alias quirk for Marvell 9128
+ - Input: psmouse - fix Synaptics detection when protocol is disabled
+ - iio: Makefile set specified permission mode
+ - Input: synaptics - reset the ABS_X/Y fuzz after initializing MT axes
+ - i40iw: Free IEQ resources
+ - i40iw: Zero-out consumer key on allocate stag for FMR
+ - perf unwind: Do not look just at the global callchain_param.record_mode
+ - tools lib traceevent: Simplify pointer print logic and fix %pF
+ - perf callchain: Fix attr.sample_max_stack setting
+ - tools lib traceevent: Fix get_field_str() for dynamic strings
+ - perf record: Fix failed memory allocation for get_cpuid_str
+ - iommu/exynos: Don't unconditionally steal bus ops
+ - powerpc: System reset avoid interleaving oops using die synchronisation
+ - iommu/vt-d: Use domain instead of cache fetching
+ - dm thin: fix documentation relative to low water mark threshold
+ - dm mpath: return DM_MAPIO_REQUEUE on blk-mq rq allocation failure
+ - ubifs: Fix uninitialized variable in search_dh_cookie()
- net: stmmac: dwmac-meson8b: fix setting the RGMII TX clock on Meson8b
- net: stmmac: dwmac-meson8b: propagate rate changes to the parent clock
- spi: a3700: Clear DATA_OUT when performing a read
- IB/cq: Don't force IB_POLL_DIRECT poll context for ib_process_cq_direct
- nfs: Do not convert nfs_idmap_cache_timeout to jiffies
- MIPS: Fix clean of vmlinux.{32,ecoff,bin,srec}
- PCI: Add dummy pci_irqd_intx_xlate() for CONFIG_PCI=n build
- watchdog: sp5100_teo: Fix watchdog disable bit
- kconfig: Don't leak main menus during parsing
- kconfig: Fix automatic menu creation mem leak
- kconfig: Fix expr_free() E_NOT leak
- ipmi/powernv: Fix error return code in ipmi_powernv_probe()
- Btrfs: set plug for fsync
- Btrfs: Fix out of bounds access in btrfs_search_slot
- Btrfs: fix scrub to repair raid6 corruption
- Btrfs: fail mount when sb flag is not in Btrfs_SUPER_FLAG_SUPP
- Btrfs: fix unexpected EEXIST from btrfs_get_extent
- Btrfs: raid56: fix race between merge_bio and rbio_orig_end_io
- RDMA/cma: Check existence of netdevice during port validation
- i2fs: avoid hungtask when GC encrypted block if io_bits is set
- scsi: devinfo: fix format of the device list
- scsi: fas216: fix sense buffer initialization
- Input: stmfts - set IRQ_NOAUTOEN to the irq flag
- HID: roccat: prevent an out of bounds read in kovaplus_profile_activated()
- nfp: fix error return code in nfp_pci_probe()
- block: Set BIO_TRACE_COMPLETION on new bio during split
- bpf: test_maps: cleanup sockmaps when test ends
- i40evf: Don't schedule reset_task when device is being removed
- i40evf: ignore link up if not running
- platform/x86: thinkpad_acpi: suppress warning about palm detection
- KVM: s390: vsie: use READ_ONCE to access some SCB fields
- blk-mq-debugfs: don't allow write on attributes with seq_operations set
- ASoC: rockchip: Use dummy_dai for rt5514 dsp dailink
- igb: Allow to remove administratively set MAC on VFs
- igb: Clear TXSTMP when ptp_tx_work() is timeout
- fm10k: fix "failed to kill vid" message for VF
- x86/hyperv: Stop suppressing X86_FEATURE_PCID
- tty: serial: exar: Relocate sleep wake-up handling
- device property: Define type of PROPERTY ENTRY_*( ) macros
- crypto: artpec6 - remove select on non-existing CRYPTO_SHA384
- RDMA/uverbs: Use an unambiguous errno for method not supported
- jffs2: Fix use-after-free bug in jffs2_iget() 's error handling path
- ixmlb: don't set RXDCTL.RPML for 82599
- i40e: program fragmented IPv4 filter input set
- i40e: fix reported mask for ntuple filters
- samples/bpf: Partially fixes the bpf.o build
- powerpc/numa: Use ibm,max-associativity-domains to discover possible nodes
- powerpc/numa: Ensure nodes initialized for hotplug
+ - RDMA/mlx5: Avoid memory leak in case of XRCD dealloc failure
+ - nb_transport: Fix bug with max_nw_size parameter
+ - gianfar: prevent integer wrapping in the rx handler
+ - x86/hyperv: Check for required privileges in hyperv_init()
+ - netfilter: x_tables: fix pointer leaks to userspace
+ - tcp_nv: fix potential integer overflow in tcpnv_acked
+ - kvm: Map PFN-type memory regions as writable (if possible)
+ - x86/kvm/vmx: do not use vm-exit instruction length for fast MMIO when running nested
+ - fs/dax.c: release PMD lock even when there is no PMD support in DAX
+ - ocfs2: return -EROFS to mount.ocfs2 if inode block is invalid
+ - ocfs2/acl: use 'ip_xattr_sem' to protect getting extended attribute
+ - ocfs2: return error when we attempt to access a dirty bh in jbd2
+ - mm/mempolicy: fix the check of nodemask from user
+ - mm/mempolicy: add nodes_empty check in SYSC_migrate_pages
+ - asm-generic: provide generic_pmdp_establish()
+ - sparc64: update pmdp_invalidate() to return old pmd value
+ - mm: thp: use down_read_trylock() in khugepaged to avoid long lock
+ - mm: pin address_space before dereferencing it while isolating an LRU page
+ - mm/fadvise: discard partial page if endbyte is also EOF
+ - openswitch: Remove padding from packet before L3+ conntrack processing
+ - blk-mq: fix discard merge with scheduler attached
+ - IB/hfi1: Re-order IRQ cleanup to address driver cleanup race
+ - IB/hfi1: Fix for potential refcount leak in hfi1_open_file()
+ - IB/ipoib: Fix for potential no-carrier state
+ - IB/core: Map iWarp AH type to undefined in rdma_ah_find_type
+ - drm/nouveau/pmu/fuc: don't use movw directly anymore
+ - s390/eadm: fix CONFIG_BLOCK include dependency
+ - netfilter: ipv6: nf_defrag: Kill frag queue on RFC2460 failure
+ - x86/power: Fix swsusp_arch_resume prototype
+ - x86/dumpstack: Avoid uniniutlized variable
+ - firmware: dmi_scan: Fix handling of empty DMI strings
+ - ACPI: processor_perflib: Do not send _PPC change notification if not ready
+ - ACPI / bus: Do not call _STA on battery devices with unmet dependencies
+ - ACPI / scan: Use acpi_bus_get_status() to initialize ACPI_TYPE_DEVICE devs
+ - MIPS: TXx9: use IS_BUILTIN() for CONFIG_LEDS_CLASS
+ - perf record: Fix period option handling
+ - MIPS: Generic: Support GIC in EIC mode
+ - perf evsel: Fix period/freq terms setup
+ - xen-netfront: Fix race between device setup and open
+ - xen/grant-table: Use put_page instead of free_page
+ - bpf: sockmap, fix leaking maps with attached but not detached progs
+ - RDS: IB: Fix null pointer issue
+ - arm64: spinlock: Fix theoretical trylock() A-B-A with LSE atomics
+ - proc: fix /proc/*/map_files lookup
+ - PM / domains: Fix up domain-idle-states OF parsing
+ - cifs: silence compiler warnings showing up with gcc-8.0.0
+ - bcache: properly set task state in bch_writeback_thread()
+ bcache: fix for allocator and register thread race
+ bcache: fix for data collapse after re-attaching an attached device
+ bcache: return attach error when no cache set exist
+ cpufreq: intel_pstate: Enable HWP during system resume on CPU0
+ selftests/ftrace: Add some missing glob checks
+ rpc: Don't put crypto buffers on the stack
+ sverdma: Fix Read chunk round-up
+ net: Extra '_get' in declaration of arch_get_platform_mac_address
+ tools/libbpf: handle issues with bpf ELF objects containing .eh_frames
+ SUNRPC: Don't call __UDPX_INC_STATS() from a preemiptible context
+ net: stmmac: discard disabled flags in interrupt status register
+ bpf: fix reimit in reuseport net selftest
+ ACPI / EC: Restore polling during noirq suspend/resume phases
+ PM / wakeirq: Fix unbalanced IRQ enable for wakeirq
+ vfs/proc/kcore, x86/mm/kcore: Fix SMAP fault when dumping vsyscall user page
+ x86/platform/UV: Zero PGD pages on allocation
+ locking/aspinlock: Ensure node->count is updated before initialising node
+ powerpc/powernv: IMC fix out of bounds memory access at shutdown
+ perf test: Fix test trace+probe_libc_inet_pton.sh for s390x
+ irqchip/gic-v3: Ignore disabled ITS nodes
+ cpumask: Make for_each_cpu_wrap() available on UP as well
+ irqchip/gic-v3: Change pr_debug message to pr_devel
+ RDMA/core: Reduce poll batch for direct cq polling
+ alarmtimer: Init nanosleep alarm timer on stack
+ netfilter: x_tables: cap allocations at 512 mbyte
+ netfilter: x_tables: add counters allocation wrapper
+ netfilter: compat: prepare xt_compat_init_offsets to return errors
+ netfilter: compat: reject huge allocation requests
+ netfilter: x_tables: limit allocation requests for blob rule heads
+ perf: Fix sample_max_stack maximum check
+ perf: Return proper values for user stack errors
+ RDMA/mlx5: Fix NULL dereference while accessing XRC_TGT QPs
+ Revert "KVM: X86: Fix SMRAM accessing even if VM is shutdown"
+ mac80211_hwsim: fix use-after-free bug in hwsim_exit_net
+ btrfs: Fix race condition between delayed refs and blockgroup removal
+ mm/vmscan: Allow preallocating memory for register_shrinker().
+ tty: make n_tty_read() always abort if hangup is in progress
+ cpufreq: CPPC: Use transition_delay_us depending transition_latency
+ ubifs: Check ubifs_wbuf_sync() return code
+ ubi: fastmap: Don't flush fastmap work on detach
+ ubi: Fix error for write access
+ ubi: Reject MLC NAND
+ mm/ksm.c: fix inconsistent accounting of zero pages
+ mm/hmm: hmm Pfns_bad() was accessing wrong struct
+ task_struct: only use anon struct under randstruct plugin
+ fs/reiserfs/journal.c: add missing resierfs_warning() arg
+ resource: fix integer overflow at reallocation
+ ipc/shm: fix use-after-free of shm file via remap_file_pages()
+ mm, slab: reschedule cache_reap() on the same CPU
+ usb: musb: gadget: misplaced out of bounds check
+ phy: allwinner: sun4i-usb: poll vbus changes on A23/A33 when driving VBUS
+ usb: gadget: udc: core: update usb_ep_queue() documentation
+ ARM64: dts: meson: reduce odroid-c2 eMMC maximum rate
+ KVM: arm/arm64: vgic-its: Fix potential overrun in vgic_copy_lpi_list
+ ARM: EXYNOS: Fix coupled CPU idle freeze on Exynos4210
+ arm: dts: mt7623: fix USB initialization fails on bananapi-r2
+ ARM: dts: at91: at91sam9g25: fix mux-mask pinctrl property
+ ARM: dts: exynos: Fix IOMMU support for GScaler devices on Exynos5250
+ ARM: dts: at91: sama5d4: fix pinctrl compatible string
+ spi: atmel: init FIFOs before spi enable
+ spi: Fix scatterlist elements size in spi_map_buf
+ spi: Fix unregistration of controller with fixed SPI bus number
+ media: atomisp_fops.c: disable atomisp_comapt_ioctl32
+ media: vivid: check if the cec_adapter is valid
+ media: vsp1: Fix BRx conditional path in WPF
+ x86/xen: Delay get_cpu_cap until stack canary is established
+ regmap: Fix reversed bounds check in regmap_raw_write()
+ ACPI / video: Add quirk to force acpi-video backlight on Samsung 670Z5E
+ ACPI / hotplug / PCI: Check presence of slot itself in get_slot_status()
+ USB: gadget: f_midi: fixing a possible double-free in f_midi
+ USB: fix USB3 devices behind USB3 hubs not resuming at hibernate thaw
+ usb: dwc3: prevent setting PRTCAP to OTG from debugfs
+ usb: dwc3: pci: Properly cleanup resource
+ usb: dwc3: gadget: never call ->complete() from ->ep_queue()
+ cifs: fix memory leak in SMB2_open()
+ fix smb3-encryption breakage when CONFIG_DEBUG_SG=y
+ smb3: Fix root directory when server returns inode number of zero
+ HID: i2c-hid: fix size check and type usage
+ i2c: i801: Save register SMBSLVCMD value only once
+ i2c: i801: Restore configuration at shutdown
+ CIFS: refactor crypto shash/sdesc allocation&free
+ CIFS: add sha512 secmech
+ CIFS: fix sha512 check in cifs_crypto_secmech_release
+ powerpc/64s: Fix dt_cpu_ftrs to have restore_cpu clear unwanted LPCR bits
+ powerpc/64: Call H_REGISTER_PROC_TBL when running as a HPT guest on POWER9
+ powerpc/64: Fix smp_wmb barrier definition use use lwsync consistently
+ powerpc/kprobes: Fix call trace due to incorrect preempt count
+ powerpc/kexec_file: Fix error code when trying to load ldump kernel
+ powerpc/powernv: define a standard delay for OPAL_BUSY type retry loops
+ powerpc/powernv: Fix OPAL NVRAM driver OPAL_BUSY loops
+ HID: Fix hid_report_len usage
+ HID: core: Fix size as type u32
+ soc: mediatek: fix the mistaken pointer accessed when subdomains are added
+ - ASoC: ssm2602: Replace reg_default_raw with reg_default
+ - ASoC: topology: Fix kcontrol name string handling
+ - irqchip/gic: Take lock when updating irq type
+ - random: use a tighter cap in credit_entropy_bits_safe()
+ - extcon: intel-ctf-wc: Set direction and drv flags for V5 boost GPIO
+ - block: use 32-bit blk_status_t on Alpha
+ - jbd2: if the journal is aborted then don't allow update of the log tail
+ - ext4: shutdown should not prevent get_write_access
+ - ext4: eliminate sleep from shutdown ioctl
+ - ext4: don't update checksum of new initialized Bitmaps
+ - ext4: protect i_disksize update by i_data_sem in direct write path
+ - ext4: limit xattr size to INT_MAX
+ - ext4: always initialize the crc32c checksum driver
+ - ext4: don't allow r/w mounts if metadata blocks overlap the superblock
+ - ext4: move call to ext4_error() into ext4_xattr_check_block()
+ - ext4: add bounds checking to ext4_xattr_find_entry()
+ - ext4: add extra checks to ext4_xattr_block_get()
+ - dm crypt: limit the number of allocated pages
+ - RDMA/ucma: Don't allow setting RDMA_OPTION_IB_PATH without an RDMA device
+ - RDMA/mlx5: Protect from NULL pointer dereference
+ - RDMA/rxe: Fix an out-of-bounds read
+ - ALSA: pcm: Fix UAF at PCM release via PCM timer access
+ - IB/srp: Fix srp_abort()
+ - IB/srp: Fix completion vector assignment algorithm
+ - dmaengine: at_xdmac: fix rare residue corruption
+ - cxl: Fix possible deadlock when processing page faults from cxllib
+ - tpm: self test failure should not cause suspend to fail
+ - libnvdimm, dimm: fix dpa reservation vs uninitialized label area
+ - libnvdimm, namespace: use a safe lookup for dimm device name
+ - nfit, address-range-scrub: fix scrub in-progress reporting
+ - nfit: skip region registration for incomplete control regions
+ - ring-buffer: Check if memory is available before allocation
+ - um: Compile with modern headers
+ - um: Use POSIX ucontext_t instead of struct ucontext
+ - iommu/vt-d: Fix a potential memory leak
+ - mmc: jz4740: Fix race condition in IRQ mask update
+ - mmc: tmio: Fix error handling when issuing CMD23
+ - PCI: Mark Broadcom HT1100 and HT2000 Root Port Extended Tags as broken
+ - clk: mvbu: armada-38x: add support for missing clocks
+ - clk: fix false-positive Wmaybe-uninitialized warning
+ - clk: mediatek: fix PWM clock source by adding a fixed-factor clock
+ - clk: bcm2835: De-assert/assert PLL reset signal when appropriate
+ - pwm: rcar: Fix a condition to prevent mismatch value setting to duty
+ - thermal: imx: Fix race condition in imx_thermal_probe()
+ - dt-bindings: clock: mediatek: add binding for fixed-factor clock axisel_d4
+ - watchdog: f71808e_wdt: Fix WD_EN register read
+ - ALSA: pcm: Use ERESTARTSYS instead of EINTR in OSS emulation
+ - ALSA: pcm: Avoid potential races between OSS ioctls and read/write
+ - ALSA: pcm: Return -EBUSY for OSS ioctls changing busy streams
+ - ALSA: pcm: Fix mutex unbalance in OSS emulation ioctls
+ - ALSA: pcm: Fix endless loop for XRUN recovery in OSS emulation
+ - drm/amdgpu: Add an ATPX quirk for hybrid laptop
+ - drm/amdgpu: Fix always_valid bos multiple LRU insertions.
+ - drm/amdgpu/sdma: fix mask in emit_pipeline_sync
+ - drm/amdgpu: Fix PCIe lane width calculation
+ - drm/amdgpu/si: implement get/set pcie_lanes asic callback
+ - drm/rockchip: Clear all interrupts before requesting the IRQ
+ - drm/radeon: add PX quirk for Asus K73TK
+ - drm/radeon: Fix PCIe lane width calculation
+ - ALSA: line6: Use correct endpoint type for midi output
+ - ALSA: rawmidi: Fix missing input substream checks in compat ioctls
+ - ALSA: hda - New VIA controller suppor no-snoop path
+ - random: fix crng_ready() test
+ - random: use a different mixing algorithm for add_device_randomness()
+ - random: crng_reseed() should lock the crng instance that it is modifying
+ - random: add new ioctl RNDRESEEDCRNG
+ - HID: input: fix battery level reporting on BT mice
+ - HID: hidraw: Fix crash on HIDIOCGFEATURE with a destroyed device
+ - HID: wacom: bluetooth: send exit report for recent Bluetooth devices
+ - MIPS: uaccess: Add micromips clobbers to bzero invocation
+ - MIPS: memset.S: EVA & fault support for small_memset
+ - MIPS: memset.S: Fix return of __clear_user from Lpartial_fixup
+ - MIPS: memset.S: Fix clobber of v1 in last_fixup
+ - powerpc/eeh: Fix enabling bridge MMIO windows
+ - powerpe/lib: Fix off-by-one in alternate feature patching
+ - udf: Fix leak of UTF-16 surrogates into encoded strings
+ - fanotify: fix logic of events on child
+ - mmc: sdhci-pci: Only do AMD tuning for HS200
+ - drm/i915: Correctly handle limited range YCbCr data on VLV/CHV
+ - jffs2_kill_sb(): deal with failed allocations
+ - hypfs_kill_super(): deal with failed allocations
+ - orangefs_kill_sb(): deal with allocation failures
+ - rpc_pipes: fix double-dput()
+ - Don't leak MNT_INTERNAL away from internal mounts
+ - autofs: mount point create should honour passed in mode
+ - mm/filemap.c: fix NULL pointer in page_cache_tree_insert()
+ - Revert "media: lirc_zilog: driver only sends LIRCCODE"
+ - media: staging: lirc_zilog: incorrect reference counting
+ - writeback: safer lock nesting
+ - Bluetooth: hci_bcm: Add irq_polarity module option
+ - mm: hwpoison: disable memory error handling on 1GB hugepage
+ - media: rc: oops in ir_timer_keyup after device unplug
+ - acpi, nfit: rework NVDIMM leaf method detection
+ - ceph: always update atime/mtime/ctime for new inode
+ - ext4: fix offset overflow on 32-bit archs in ext4_iomap_begin()
- ext4: force revalidation of directory pointer after seekdir(2)
- RDMA/core: Avoid that ib_drain_qp() triggers an out-of-bounds stack access
- xprtrdma: Fix latency regression on NUMA NFS/RDMA clients
- xprtrdma: Fix corner cases when handling device removal
- IB/srpt: Fix an out-of-bounds stack access in srpt_zerolength_write()
- drivers/infiniband/core/verbs.c: fix build with gcc-4.4.4
- drivers/infiniband/ulp/srpt/ib_srpt.c: fix build with gcc-4.4.4
- mmc: core: Prevent bus reference leak in mmc_blk_init()
- drm/amd/display: HDMI has no sound after Panel power off/on
- trace_uprobe: Use %lx to display offset
- clk: tegra: Mark HCLK, SCLK and EMC as critical
- pwm: mediatek: Fix up PWM4 and PWM5 malfunction on MT7623
- mmc: core: Prevent bus reference leak in mmc_blk_init()
- s390: add support for IBM z14 Model ZR1
- drm/i915: Fix hibernation with ACPI S0 target state
- libnvdimm, dimm: handle EACCES failures from label reads
- device-dax: allow MAP_SYNC to succeed
- HID: i2c-hid: fix inverted return value from i2c_hid_command()

* CVE-2018-7755
  - SAUCE: floppy: Do not copy a kernel pointer to user memory in FDGETPRM ioctl

-- Kleber Sacilotto de Souza <kleber.souza@canonical.com>  Tue, 12 Jun 2018 18:09:35 +0200

+linux (4.15.0-23.25) bionic; urgency=medium

+ * linux: 4.15.0-23.25 -proposed tracker (LP: #1772927)

+ * arm64 SDEI support needs trampoline code for KPTI (LP: #1768630)
  + arm64: mmu: add the entry trampolines start/end section markers into
    sections.h
  + arm64: sdei: Add trampoline code for remapping the kernel

+ * Some PCIe errors not surfaced through rasdaemon (LP: #1769730)
  + ACPI: APEI: handle PCIe AER errors in separate function
  + ACPI: APEI: call into AER handling regardless of severity

+ * qla2xxx: Fix page fault at kmem_cache_alloc_node() (LP: #1770003)
  + scsi: qla2xxx: Fix session cleanup for N2N
  + scsi: qla2xxx: Remove unused argument from qlt_schedule_sess_for_deletion()
  + scsi: qla2xxx: Serialize session deletion by using work_lock
  + scsi: qla2xxx: Serialize session free in qlt_free_session_done
  + scsi: qla2xxx: Don't call dma_free_coherent with IRQ disabled.
  + scsi: qla2xxx: Fix warning in qla2x00_async_iocb_timeout()
  + scsi: qla2xxx: Prevent relogin trigger from sending too many commands
  + scsi: qla2xxx: Fix double free bug after firmware timeout
  + scsi: qla2xxx: Fixup locking for session deletion
+ * Several hisi_sas bug fixes (LP: #1768974)
+ - scsi: hisi_sas: dt-bindings: add an property of signal attenuation
+ - scsi: hisi_sas: support the property of signal attenuation for v2 hw
+ - scsi: hisi_sas: fix the issue of link rate inconsistency
+ - scsi: hisi_sas: fix the issue of setting linkrate register
+ - scsi: hisi_sas: increase timer expire of internal abort task
+ - scsi: hisi_sas: remove unused variable hisi_sas_devices.running_req
+ - scsi: hisi_sas: fix return value of hisi_sas_task_prep()
+ - scsi: hisi_sas: Code cleanup and minor bug fixes

+ * [bionic] machine stuck and bonding not working well when nvmet_rdma module
+ is loaded (LP: #1764982)
+ - nvmet-rdma: Don't flush system_wq by default during remove_one
+ - nvme-rdma: Don't flush delete_wq by default during remove_one

+ * Warnings/hang during error handling of SATA disks on SAS controller
+ (LP: #1768971)
+ - scsi: libsas: defer ata device eh commands to libata

+ * Hotplugging a SATA disk into a SAS controller may cause crash (LP: #1768948)
+ - ata: do not schedule hot plug if it is a sas host

+ * ISST-LTE:pKVM:Ubuntu1804: rcu_sched self-detected stall on CPU follow by CPU
+ ATTEMPT TO RE-ENTER Firmware! (LP: #1767927)
+ - powerpc/powernv: Handle unknown OPAL errors in opal_nvram_write()
+ - powerpc/64s: return more carefully from sreset NMI
+ - powerpc/64s: sreset panic if there is no debugger or crash dump handlers

+ * fsnotify: Fix fsnotify_mark_connector race (LP: #1765564)
+ - fsnotify: Fix fsnotify_mark_connector race

+ * Hang on network interface removal in Xen virtual machine (LP: #1771620)
+ - xen-netfront: Fix hang on device removal

+ * HiSilicon HNS NIC names are truncated in /proc/interrupts (LP: #1765977)
+ - net: hns: Avoid action name truncation

+ * Ubuntu 18.04 kernel crashed while in degraded mode (LP: #1770849)
+ - SAUCE: powerpc/perf: Fix memory allocation for core-imc based on
+ num_possible_cpus()

+ * Switch Build-Depends: transfig to fig2dev (LP: #1770770)
+ - [Config] update Build-Depends: transfig to fig2dev

+ * smp_call_function_single/many core hangs with stop4 alone (LP: #1768898)
+ - cpufreq: powernv: Fix hardlockup due to synchronous smp_call in timer
+ - interrupt
+ * Add d-i support for Huawei NICs (LP: #1767490)
+ - d-i: add hinic to nic-modules udeb
+ + * unregister_netdevice: waiting for eth0 to become free. Usage count = 5
+ (LP: #1746474)
+ - xfrm: reuse uncached_list to track xdsts
+ + * Include nfp driver in linux-modules (LP: #1768526)
+ - [Config] Add nfp.ko to generic inclusion list
+ + * Kernel panic on boot (m1.small in cn-north-1) (LP: #1771679)
+ - x86/xen: Reset VCPU0 info pointer after shared_info remap
+ + * CVE-2018-3639 (x86)
+ - x86/bugs: Fix the parameters alignment and missing void
+ - KVM: SVM: Move spec control call after restore of GS
+ - x86/speculation: Use synthetic bits for IBRS/IBPB/STIBP
+ - x86/cpufeatures: Disentangle MSR_SPEC_CTRL enumeration from IBRS
+ - x86/cpufeatures: Disentangle SSBD enumeration
+ - x86/cpufeatures: Add FEATURE_ZEN
+ - x86/speculation: Handle HT correctly on AMD
+ - x86/bugs, KVM: Extend speculation control for VIRT_SPEC_CTRL
+ - x86/speculation: Add virtualized speculative store bypass disable support
+ - x86/speculation: Rework speculative_store_bypass_update()
+ - x86/bugs: Unify x86_spec_ctrl_{set_guest,restore_host}
+ - x86/bugs: Expose x86_spec_ctrl_base directly
+ - x86/bugs: Remove x86_spec_ctrl_set()
+ - x86/bugs: Rework spec_ctrl base and mask logic
+ - x86/speculation, KVM: Implement support for VIRT_SPEC_CTRL/LS_CFG
+ - KVM: SVM: Implement VIRT_SPEC_CTRL support for SSBD
+ - x86/bugs: Rename SSBD_NO to SSB_NO
+ - bpf: Prevent memory disambiguation attack
+ - KVM: VMX: Expose SSBD properly to guests.
+ + * Suspend to idle: Open lid didn't resume (LP: #1771542)
+ - ACPI / PM: Do not reconfigure GPEs for suspend-to-idle
+ + * Fix initialization failure detection in SDEI for device-tree based systems
+ (LP: #178663)
+ - firmware: arm_sdei: Fix return value check in sdei_present_dt()
+ + * No driver for Huawei network adapters on arm64 (LP: #1769899)
+ - net-next/hinic: add arm64 support
+ + * CVE-2018-1092
+ - ext4: fail ext4_iget for root directory if unallocated
+
+ * kernel 4.15 breaks nouveau on Lenovo P50 (LP: #1763189)
+ - drm/nouveau: Fix deadlock in nv50_mstm_register_connector()
+ 
+ * update-initramfs not adding i915 GuC firmware for Kaby Lake, firmware fails
+ to load (LP: #1728238)
+ - Revert "UBUNTU: SAUCE: (no-up) i915: Remove MODULE_FIRMWARE statements for
+ unreleased firmware”
+ 
+ * Battery drains when laptop is off (shutdown) (LP: #1745646)
+ - PCI / PM: Check device_may_wakeup() in pci_enable_wake()
+ 
+ * Dell Latitude 5490/5590 BIOS update 1.1.9 causes black screen at boot
+ (LP: #1764194)
+ - drm/i915/bios: filter out invalid DDC pins from VBT child devices
+ 
+ * Intel 9462 A370:42A4 doesn't work (LP: #1748853)
+ - iwlwifi: add shared clock PHY config flag for some devices
+ - iwlwifi: add a bunch of new 9000 PCI IDs
+ 
+ * Fix an issue that some PCI devices get incorrectly suspended (LP: #1764684)
+ - PCI / PM: Always check PME wakeup capability for runtime wakeup support
+ 
+ * [SRU][Bionic/Artful] fix false positives in W+X checking (LP: #1769696)
+ - init: fix false positives in W+X checking
+ 
+ * Bionic update to v4.15.18 stable release (LP: #1769723)
+ - netfilter: ipset: Missing nfnl_lock()/nfnl_unlock() is added to
+ - ip_set_net_exit()
+ - edc_ether: flag the Cinterion AHS8 modem by gemalto as WWAN
+ - rds: MP-RDS may use an invalid c_path
+ - slip: Check if rstate is initialized before uncompressing
+ - vhost: fix vhost_vq_access_ok() log check
+ - L2tp: fix races in tunnel creation
+ - L2tp: fix race in duplicate tunnel detection
+ - ip_gre: clear feature flags when incompatible o_flags are set
+ - vhost: Fix vhost_copy_to_user()
+ - Ian78xx: Correctly indicate invalid OTP
+ - media: v4l2-compat-ioctl32: don't oops on overlay
+ - media: v4l: vsp1: Fix header display list status check in continuous mode
+ - ipmi: Fix some error cleanup issues
+ - parisc: Fix out of array access in match_pci_device()
+ - parisc: Fix HPMC handler by increasing size to multiple of 16 bytes
+ - Drivers: hv: vmbus: do not mark HV_PCIE as perf_device
+ - PCI: hv: Serialize the present and eject work items
+ - PCI: hv: Fix 2 hang issues in hv_compose_msi_msg()
+ - KVM: PPC: Book3S HV: trace_tlbie must not be called in realmode
+ - perf/core: Fix use-after-free in uprobes_perf_close()
+ - x86/mce/AMD: Get address from already initialized block
+  - hwmon: (ina2xx) Fix access to uninitialized mutex
+  - ath9k: Protect queue draining by rcu_read_lock()
+  - x86/apic: Fix signedness bug in APIC ID validity checks
+  - i2fs: fix heap mode to reset it back
+  - block: Change a rcu_read_[lock,unlock]_sched() pair into
+    rcu_read_[lock,unlock]()
+  - nvme: Skip checking heads without namespaces
+  - lib: fix stall in __bitmap_parse_list()
+  - blk-mq: order getting budget and driver tag
+  - blk-mq: don't keep offline CPUs mapped to hctx 0
+  - ovl: fix lookup with middle layer opaque dir and absolute path redirects
+  - xenbus_dev_frontend: Fix XS_TRANSACTION_END handling
+  - hugetlbfs: fix bug in pgoff overflow checking
+  - nsfd: fix incorrect umasks
+  - scsi: qla2xxx: Fix small memory leak in qla2x00_probe_one on probe failure
+  - block/loop: fix deadlock after loop_set_status
+  - sblk: fix region registration vs block-data-window ranges
+  - s390/qdio: don't retry EQBS after CCQ 96
+  - s390/qdio: don't merge ERROR output buffers
+  - s390/ipl: ensure loadparm valid flag is set
+  - get_user_pages_fast(): return -EFAULT on access_ok failure
+  - mm/gup_benchmark: handle gup failures
+  - getname_kernel() needs to make sure that ->name != ->iname in long case
+  - Bluetooth: Fix connection if directed advertising and privacy is used
+  - Bluetooth: hci_bcm: Treat Interrupt ACPI resources as always being active-
+    low
+  - rtl8187: Fix NULL pointer dereference in priv->conf_mutex
+  - ovl: set lower layer st_dev only if setting lower st_ino
+  - Linux 4.15.18
+  - Kernel bug when unplugging Thunderbolt 3 cable, leaves xHCI host controller
+    dead (LP: #1768852)
+  - xhci: Fix Kernel oops in xhci dbgty
+  - Incorrect blacklist of bcm2835_wdt (LP: #1766052)
+  - [Packaging] Fix missing watchdog for Raspberry Pi
+  - CVE-2018-8087
+  - mac80211_hwsim: fix possible memory leak in hwsim_new_radio_nl()
+  - Integrated Webcam Realtek Integrated_Webcam_HD (0bda:58f4) not working in
+    DELL XPS 13 9370 with firmware 1.50 (LP: #1763748)
+  - SAUCE: media: uvcvideo: Support realtek's UVC 1.5 device
+  - * [ALSA] [PATCH] Clevo P950ER ALC1220 Fixup (LP: #1769721)
+  - SAUCE: ALSA: hda/realtek - Clevo P950ER ALC1220 Fixup
+  - * Bionic: Intermittently sent to Emergency Mode on boot with unhandled kernel
+ NULL pointer dereference at 0000000000000980 (LP: #1768292)
+ - thunderbolt: Prevent crash when ICM firmware is not running
+ 
+ * linux-snapdragon: reduce EPROBEDEFER noise during boot (LP: #1768761)
+ - [Config] snapdragon: DRM_I2C_ADV7511=y
+ 
+ * regression Aquantia Corp. AQC107 4.15.0-13-generic -> 4.15.0-20-generic ?
+ (LP: #1767088)
+ - net: aquantia: Regression on reset with 1.x firmware
+ - net: aquantia: oops when shutdown on already stopped device
+ 
+ * e1000e msix interrupts broken in linux-image-4.15.0-15-generic
+ (LP: #1764892)
+ - e1000e: Remove Other from EIAC
+ 
+ * Acer Swift sf314-52 power button not managed (LP: #1766054)
+ - SAUCE: platform/x86: acer-wmi: add another KEY_POWER keycode
+ 
+ * set PINCFG_HEADSET_MIC to parse_flags for Dell precision 3630 (LP: #1766398)
+ - ALSA: hda/realtek - set PINCFG_HEADSET_MIC to parse_flags
+ 
+ * Change the location for one of two front mics on a lenovo thinkcentre machine (LP: #1766477)
+ - ALSA: hda/realtek - adjust the location of one mic
+ 
+ * SRU: bionic: apply 50 ZFS upstream bugfixes (LP: #1764690)
+ - SAUCE: (noup) Update zfs to 0.7.5-1ubuntu15 (LP: #1764690)
+ 
+ * [8086:3e92] display becomes blank after S3 (LP: #1763271)
+ - drm/i915/edp: Do not do link training fallback or prune modes on EDP
+ 
+ -- Stefan Bader <stefan.bader@canonical.com> Wed, 23 May 2018 18:54:55 +0200
+ 
+ linux (4.15.0-22.24) bionic; urgency=medium
+ 
+ * CVE-2018-3639 (powerpc)
+ - powerpc/64s: Add support for a store forwarding barrier at kernel entry/exit
+ - stf-barrier: set eieio instruction bit 6 for future optimisations
+ 
+ * CVE-2018-3639 (x86)
+ - x86/nospec: Simplify alternative_msr_write()
+ - x86/bugs: Concentrate bug detection into a separate function
+ - x86/bugs: Concentrate bug reporting into a separate function
+ - x86/bugs: Read SPEC_CTRL MSR during boot and re-use reserved bits
+ - x86/bugs, KVM: Support the combination of guest and host IBRS
+ - x86/bugs: Expose /sys/.../spec_store_bypass
+ - x86/cpufeatures: Add X86_FEATURE_RDS
+ - x86/bugs: Provide boot parameters for the spec_store_bypass_disable
mitigation
- x86/bugs/intel: Set proper CPU features and setup RDS
- x86/bugs: Whitelist allowed SPEC_CTRL MSR values
- x86/bugs/AMD: Add support to disable RDS on Fam[15,16,17]h if requested
- x86/KVM/VMX: Expose SPEC_CTRL Bit(2) to the guest
- x86/speculation: Create spec-ctrl.h to avoid include hell
- prctl: Add speculation control prctls
- x86/process: Allow runtime control of Speculative Store Bypass
- x86/speculation: Add prctl for Speculative Store Bypass mitigation
- nospec: Allow getting/setting on non-current task
- proc: Provide details on speculation flaw mitigations
- seccomp: Enable speculation flaw mitigations
- x86/bugs: Make boot modes __ro_after_init
- prctl: Add force disable speculation
- seccomp: Use PR_SPEC_FORCE_DISABLE
- seccomp: Add filter flag to opt-out of SSB mitigation
- seccomp: Move speculation mitigation control to arch code
- x86/speculation: Make "seccomp" the default mode for Speculative Store Bypass
- x86/bugs: Rename _RDS to _SSBD
- proc: Use underscores for SSB in 'status'
- Documentation/spec_ctrl: Do some minor cleanups
- x86/bugs: Fix __ssb_select_mitigation() return type
- x86/bugs: Make cpu_show_common() static

* LSM Stacking prctl values should be redefined as to not collide with upstream prctls (LP: #1769263) // CVE-2018-3639
  - SAUCE: LSM stacking: adjust prctl values

-- Stefan Bader <stefan.bader@canonical.com>  Tue, 15 May 2018 07:41:28 +0200

+linux (4.15.0-21.22) bionic; urgency=medium
+ * linux: 4.15.0-21.22 -proposed tracker (LP: #1767397)
+ * initramfs-tools exception during pm.DoInstall with do-release-upgrade from 16.04 to 18.04 (LP: #1766727)
+ - Add linux-image-* Breaks on s390-tools (<< 2.3.0-0ubuntu3)
+ * linux-image-4.15.0-20-generic install after upgrade from xenial breaks (LP: #1767133)
+ - Packaging: Depends on linux-base that provides the necessary tools
+ * linux-image packages need to Breaks flash-kernel (<< 3.90ubuntu2)
  (LP: #1766629)
+ * linux-image-* breaks on flash-kernel (<< 3.90ubuntu2)
+ -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com>  Mon, 30 Apr 2018 14:58:35 -0300
+linux (4.15.0-20.21) bionic; urgency=medium
+
+ * linux: 4.15.0-20.21 -proposed tracker (LP: #1766452)
+
+ * package shim-signed (not installed) failed to install/upgrade: installed
+ shim-signed package post-installation script subprocess returned error exit
+ status 5 (LP: #1766391)
+ - [Packaging] fix invocation of header postinst hooks
+
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 23 Apr 2018 23:56:17 -0500
+
+linux (4.15.0-19.20) bionic; urgency=medium
+
+ * linux: 4.15.0-19.20 -proposed tracker (LP: #1766021)
+
+ * Kernel 4.15.0-15 breaks Dell PowerEdge 12th Gen servers (LP: #1765232)
+ - Revert "blk-mq: simplify queue mapping & schedule with each possible CPU"
+ - Revert "genirq/affinity: assign vectors to all possible CPUs"
+
+ -- Seth Forshee <seth.forshee@canonical.com> Sat, 21 Apr 2018 17:19:00 -0500
+
+linux (4.15.0-18.19) bionic; urgency=medium
+
+ * [regression] Ubuntu 18.04: [4.15.0-17-generic #18] KVM Guest Kernel:
+ meltdown: rfi/fallback displacement flush not enabled by default (kvm)
+ (LP: #1765429)
+ - powerpc/pseries: Fix clearing of security feature flags
+
+ * signing: only install a signed kernel (LP: #1764794)
+ - [Packaging] update to Debian like control scripts
+ - [Packaging] switch to triggers for postinst.d postrm.d handling
+ - [Packaging] signing -- switch to raw-signing tarballs
+ - [Packaging] signing -- switch to linux-image as signed when available
+ - [Config] signing -- enable Opal signing for ppc64el
+ - [Packaging] printenv -- add signing options
+
+ * [18.04 FEAT] Sign POWER host/NV kernels (LP: #1696154)
+ - [Packaging] signing -- add support for signing Opal kernel binaries
+
+ * Please cherrypick s390 unwind fix (LP: #1765083)
+ - s390/compat: fix setup_frame32
+
+ * Ubuntu 18.04 installer does not detect any IPR based HDD/RAID array [S822L]
+ [ipr] (LP: #1751813)
+ - d-i: move ipr to storage-core-modules on ppc64el
* drivers/gpu/drm/bridge/adv7511/adv7511.ko missing (LP: #1764816)
- SAUCE: (no-up) rename the adv7511 drm driver to adv7511_drm

* Miscellaneous Ubuntu changes

- [Packaging] Add linux-oem to rebuild test blacklist.

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Thu, 19 Apr 2018 18:06:46 -0300

+linux (4.15.0-17.18) bionic; urgency=medium

+ * linux: 4.15.0-17.18 -proposed tracker (LP: #1764498)

+ * Eventual OOM with profile reloads (LP: #1750594)
- SAUCE: apparmor: fix memory leak when duplicate profile load

-- Seth Forshee <seth.forshee@canonical.com> Mon, 16 Apr 2018 14:48:18 -0500

+linux (4.15.0-16.17) bionic; urgency=medium

+ * linux: 4.15.0-16.17 -proposed tracker (LP: #1763785)

+ * [18.04] [bug] CFL-S(CNP)/CNL GPIO testing failed (LP: #1757346)
- [Config]: Set CONFIG_PINCTRL_CANNONLAKE=y

+ * [Ubuntu 18.04] USB Type-C test failed on GLK (LP: #1758797)
- SAUCE: usb: typec: ucsi: Increase command completion timeout value

+ * Fix trying to "push" an already active pool VP (LP: #1763386)
- SAUCE: powerpc/xive: Fix trying to "push" an already active pool VP

+ * hisi_sas: Revert and replace SAUCE patches w/ upstream (LP: #1762824)
- Revert "UBUNTU: SAUCE: scsi: hisi_sas: export device table of v3 hw to
userspace"
- Revert "UBUNTU: SAUCE: scsi: hisi_sas: config for hip08 ES"
- scsi: hisi_sas: modify some register config for hip08
- scsi: hisi_sas: add v3 hw MODULE_DEVICE_TABLE()

+ * Realtek card reader - RTS5243 [VEN_10EC&DEV_5260] (LP: #1737673)
- misc: rtsx: Move Realtek Card Reader Driver to misc
- updateconfigs for Realtek Card Reader Driver
- misc: rtsx: Add support for RTS5260
- misc: rtsx: Fix symbol clashes

+ * Mellanox [mlx5] [bionic] UBSAN: Undefined behaviour in
.include/linux/net_dim.h (LP: #1763269)
- net/mlx5e: Fix int overflow
+ * apparmor bug fixes for bionic (LP: #1763427)
+ - apparmor: fix logging of the existence test for signals
+ - apparmor: make signal label match work when matching stacked labels
+ - apparmor: audit unknown signal numbers
+ - apparmor: fix memory leak on buffer on error exit path
+ - apparmor: fix mediation of prlimit
+
+ * dangling symlinks to loaded apparmor policy (LP: #1755563) // apparmor bug
+ fixes for bionic (LP: #1763427)
+ - apparmor: fix dangling symlinks to policy rawdata after replacement
+
+ * [OPAL] Assert fail:
+ core/mem_region.c:447:lock_held_by_me(&region->free_list_lock)
+ (LP: #1762913)
+ - powerpc/watchdog: remove arch_trigger_cpumask_backtrace
+
+ * [LTC Test] Ubuntu 18.04: tm_trap_test failed on P8 compat mode guest
+ (LP: #1762928)
+ - powerpc/tm: Fix endianness flip on trap
+
+ * Add support for RT5660 codec based sound cards on Baytrail (LP: #1657674)
+ - SAUCE: (no-up) ASoC: Intel: Support machine driver for RT5660 on Baytrail
+ - SAUCE: (no-up) ASoC: rt5660: Add ACPI support
+ - SAUCE: (no-up): ASoC: Intel: bytcr-rt5660: Add MCLK, quirks
+ - [Config] CONFIG_SND_SOC_INTEL_BYTCR_RT5660_MACH=m, CONFIG_SND_SOC_RT5660=m
+
+ */dev/ipmi enumeration flaky on Cavium Sabre nodes (LP: #1762812)
+ - i2c: xlp9xx: return ENXIO on slave address NACK
+ - i2c: xlp9xx: Handle transactions with I2C_M_RECV_LEN properly
+ - i2c: xlp9xx: Check for Bus state before every transfer
+ - i2c: xlp9xx: Handle NACK on DATA properly
+
+ * [18.04 FEAT] Add kvm_stat from kernel tree (LP: #1734130)
+ - tools/kvm_stat: simplify the sortkey function
+ - tools/kvm_stat: use a namedtuple for storing the values
+ - tools/kvm_stat: use a more pythonic way to iterate over dictionaries
+ - tools/kvm_stat: avoid 'is' for equality checks
+ - tools/kvm_stat: fix crash when filtering out all non-child trace events
+ - tools/kvm_stat: print error on invalid regex
+ - tools/kvm_stat: fix debugfs handling
+ - tools/kvm_stat: mark private methods as such
+ - tools/kvm_stat: eliminate extra guest/pid selection dialog
+ - tools/kvm_stat: separate drilldown and fields filtering
+ - tools/kvm_stat: group child events indented after parent
+ - tools/kvm_stat: print 'Total' line for multiple events only
+ - tools/kvm_stat: Fix python3 syntax
+ - tools/kvm_stat: Don't use deprecated file()
+ - tools/kvm_stat: Remove unused function
+ - [Packaging] Add linux-tools-host package for VM host tools
+ - [Config] do_tools_host=true for amd64
+ + * Bionic update to v4.15.17 stable release (LP: #1763366)
+ + - i40iw: Fix sequence number for the first partial FPDU
+ + - i40iw: Correct Q1/XF object count equation
+ + - i40iw: Validate correct IRD/ORD connection parameters
+ + - clk: meson: mpil: use 64-bit maths in params_from_rate
+ + - ARM: dts: ls1021a: add "fsl,ls1021a-esdhc" compatible string to esdhc node
+ + - Bluetooth: Add a new 04ca:3015 QCA_ROME device
+ + - ipv6: Reinject IPv6 packets if IPsec policy matches after SNAT
+ + - thermal: power_allocator: fix one race condition issue for thermal_instances
+ + list
+ + - perf probe: Find versioned symbols from map
+ + - perf probe: Add warning message if there is unexpected event name
+ + - perf evsel: Fix swap for samples with raw data
+ + - perf evsel: Enable ignore_missing_thread for pid option
+ + - l2tp: fix missing print session offset info
+ + - rds: Reset rs->rs_bound_addr in rds_add_bound() failure path
+ + - ACPI / video: Default lcd_only to true on Win8-ready and newer machines
+ + - IB/mlx5: Report inner RSS capability
+ + - VFS: close race between getcwd() and d_move()
+ + - watchdog: dw_wdt: add stop watchdog operation
+ + - clk: divider: fix incorrect usage of container_of
+ + - PM / devfreq: Fix potential NULL pointer dereference in governor_store
+ + - gpiolib: don't dereference a desc before validation
+ + - net_sch: red: Fix the new offload indication
+ + - selftests/net: fix bugs in address and port initialization
+ + - thermal/drivers/hisi: Remove bogus const from function return type
+ + - RDMA/cma: Mark end of CMA ID messages
+ + - hwmon: (ina2xx) Make calibration register value fixed
+ + - f2fs: fix lock dependency in between dio_rwlock & i_mmap_sem
+ + - clk: sunxi-ng: a83t: Add M divider to TCON1 clock
+ + - media: videobuf2-core: don't go out of the buffer range
+ + - ASoC: Intel: Skylake: Disable clock gating during firmware and library download
+ + - ASoC: Intel: cht_bsw_rt5645: Analog Mic support
+ + - drm/msm: Fix NULL deref in adreno_load_gpu
+ + - IB/ipoib: Fix for notify send CQ failure messages
+ + - spi: sh-msiof: Fix timeout failures for TX-only DMA transfers
+ + - scsi: mpt3sas: Proper handling of set/clear of "ATA command pending" flag.
+ + - irqchip/ompic: fix return value check in ompic_of_init()
+ + - irqchip/gic-v3: Fix the driver probe() fail due to disabled GICC entry
+ + - ACPI: EC: Fix debugfs_create_*() usage
+ + - mac80211: Fix setting TX power on monitor interfaces
+ + - vfb: fix video mode and line_length being set when loaded
+ + - crypto: crypto4xx - perform aead icv check in the driver
+ + - gpio: label descriptors using the device name
+ - arm64: asid: Do not replace active_asids if already 0
+ - powernv-cpufreq: Add helper to extract pstate from PMSR
+ - IB/rdmaevt: Allocate CQ memory on the correct node
+ - blk-mq: avoid to map CPU into stale hw queue
+ - blk-mq: fix race between updating nr_hw_queues and switching io sched
+ - backlight: tdo24m: Fix the SPI CS between transfers
+ - nvme-fabrics: protect against module unload during create_ctrl
+ - nvme-fabrics: don't check for non-NULL module in nvmf_register_transport
+ - pinctrl: baytrail: Enable glitch filter for GPIOs used as interrupts
+ - nvme_fcloop: disassociate local port structs
+ - nvme_fcloop: fix abort race condition
+ - perf: return a TPM_RC_COMMAND_CODE response if command is not implemented
+ - perf report: Fix a no annotate browser displayed issue
+ - staging: lustre: disable preempt while sampling processor id.
+ - ASoC: Intel: sst: Fix the return value of `sst_send_byte_stream_mrfld()`
+ - power: supply: axp288_charger: Properly stop work on probe-error / remove
+ - rt2x00: do not pause queue unconditionally on error path
+ - w11251: check return from call to w11251_acx_arp_ip_filter
+ - net/mlx5: Fix race for multiple RoCE enable
+ - bcache: ret IOERR when read meets metadata error
+ - bcache: stop writeback thread after detaching
+ - bcache: segregate flash only volume write streams
+ - net: Fix netdev_WARN_ONCE macro
+ - net/mlx5e: IPoIB, Use correct timestamp in child receive flow
+ - blk-mq: fix kernel oops in blk_mq_tag_idle()
+ - tty: n_gsm: Allow ADM response in addition to UA for control dlc1
+ - block, bfq: put async queues for root bfq groups too
+ - serdev: Fix serdev_uevent failure on ACPI enumerated serdev-controllers
+ - EDAC, mv64x60: Fix an error handling path
+ - uio_hv_generic: check that host supports monitor page
+ - Bluetooth: hci_bcm: Mandate presence of shutdown and device wake GPIO
+ - Bluetooth: hci_bcm: Validate IRQ before using it
+ - Bluetooth: hci_bcm: Make shutdown and device wake GPIO optional
+ - i40evf: don't rely on netif_running() outside rtnl_lock()
+ - drm/amd/powerplay: fix memory leakage when reload (v2)
+ - cxgb4vf: Fix SGE FL buffer initialization logic for 64K pages
+ - PM / domains: Don't skip driver's ->suspend|resume_noirq() callbacks
+ - scsi: megaraid_sas: Error handling for invalid ldcount provided by firmware
+ - in RAID map
+ - scsi: megaraid_sas: unload flag should be set after scsi_remove_host is called
+ - RDMA/cma: Fix rdma_cm path querying for RoCE
+ - gpio: thunderx: fix error return code in thunderx_gpio_probe()
+ - x86/gart: Exclude GART aperture from vmcore
+ - sdhci: Advertise 2.0v supply on SDIO host controller
+ - Input: goodix - disable IRQs while suspended
+ - ntd: mtd_oobtest: Handle bitflips during reads
+ - Crypto: aes-generic - build with -Os on gcc-7+
+ - perf tools: Fix copyfile_offset update of output offset
+ - tcmu: release blocks for partially setup cmds
+ - thermal: int3400_thermal: fix error handling in int3400_thermal_probe()
+ - drm/i915/cnp: Ignore VBT request for know invalid DDC pin.
+ - drm/i915/cnp: Properly handle VBT ddc pin out of bounds.
+ - x86/microcode: Propagate return value from updating functions
+ - x86/CPU: Add a microcode loader callback
+ - x86/CPU: Check CPU feature bits after microcode upgrade
+ - x86/microcode: Get rid of struct apply_microcode_ctx
+ - x86/microcode/intel: Check microcode revision before updating sibling threads
+ - x86/microcode/intel: Writeback and invalidate caches before updating microcode
+ - x86/microcode: Do not upload microcode if CPUs are offline
+ - x86/microcode/intel: Look into the patch cache first
+ - x86/microcode: Request microcode on the BSP
+ - x86/microcode: Synchronize late microcode loading
+ - x86/microcode: Attempt late loading only when new microcode is present
+ - x86/microcode: Fix CPU synchronization routine
+ - arp: fix arp_filter on l3slave devices
+ - ipv6: the entire IPv6 header chain must fit the first fragment
+ - lan78xx: Crash in lan78xx_writ_reg (Workqueue: events lan78xx_deferred_multicast_write)
+ - net: dsa: Discard frames from unused ports
+ - net: fix possible out-of-bound read in skb_network_protocol()
+ - net/ipv6: Fix route leaking between VRFs
+ - net/ipv6: Increment OUTxxx counters after netfilter hook
+ - netlink: make sure nladdr has correct size in netlink_connect()
+ - net/mlx5e: Verify coalescing parameters in range
+ - net/sched actions: fix dumping which requires several messages to user space
+ - net/sched: fix NULL dereference in the error path of tcf_bpf_init()
+ - pptp: remove a buggy dst release in pptp_connect()
+ - r8169: fix setting driver_data after register_netdev
+ - scpt: do not leak kernel memory to user space
+ - scpt: scet_sockaddr_af must check minimal addr length for AF_INET6
+ - vhost: correctly remove wait queue during poll failure
+ - vlan: also check phy_driver ts_info for vlan's real device
+ - vrf: Fix use after free and double free in vrf_finish_output
+ - bonding: fix the err path for dev hwaddr sync in bond_enslave
+ - bonding: move dev_mc_sync after master_upper_dev_link in bond_enslave
+ - bonding: process the err returned by dev_set_allmulti properly in bond_enslave
+ - net: fool proof dev_valid_name()
+ - ip_tunnel: better validate user provided tunnel names
+ - ipv6: sit: better validate user provided tunnel names
+ - ip6_gre: better validate user provided tunnel names
+ - ip6_tunnel: better validate user provided tunnel names
+ - vti6: better validate user provided tunnel names
- net/mlx5e: Set EQE based as default TX interrupt moderation mode
- net/sched: fix a missing idr_remove() in u32_delete_key()
- net/mlx5e: fix NULL dereference in the error path of tcf_vlan_init()
- net/mlx5e: Avoid using the ipv6 stub in the TC offload neigh update path
- net/mlx5e: Fix memory usage issues in offloading TC flows
- net/sched: fix NULL dereference in the error path of tcf_sample_init()
- nf: use full 40 bits of the NSP buffer address
- ipv6: sr: fix seg6 encap performances with TSO enabled
- net/mlx5e: Don't override vport admin link state in switchdev mode
- net/mlx5e: Sync netdev vxlan ports at open
- net/sched: fix NULL dereference in the error path of tunnel_key_init()
- net/sched: fix NULL dereference on the error path of tcf_skbmod_init()
- stripstr: Fix sign of err codes
- net/mlx4_en: Fix mixed PFC and Global pause user control requests
- net/mlx5e: Fix traffic being dropped on VF representor
- vhost: validate log when IOTLB is enabled
- route: check sysctl_fib_multipath_use_neigh earlier than hash
- team: move dev_mc_sync after master_upper_dev_link in team_port_add
- vhost_net: add missing lock nesting notation
- net/mlx4_core: Fix memory leak while delete slave's resources
- Linux 4.15.17

* sky2 gigabit ethernet driver sometimes stops working after lid-open resume from sleep (88E8055) (LP: #1758507) // Bionic update to v4.15.17 stable release (LP: #1763366)
- sky2: Increase D3 delay to sky2 stops working after suspend

* [Featire] CNL: Enable RAPL support (LP: #1685712)
- powercap: RAPL: Add support for Cannon Lake

* System Z {kernel} UBUNTU18.04 wrong kernel config (LP: #1762719)
- s390: move nobp parameter functions to nospec-branch.c
- s390: add automatic detection of the spectre defense
- s390: report spectre mitigation via syslog
- s390: add sysfs attributes for spectre
- [Config] CONFIG_EXPOLINE_AUTO=y, CONFIG_KERNEL_NOBP=n for s390
- s390: correct nospec auto detection init order

* Merge the linux-snapdragon kernel into bionic master/snapdragon
  (LP: #1763040)
- drm/msm: fix spelling mistake: "ringubffer" -> "ringbuffer"
- drm/msm: fix msm_rd_dump_submit prototype
- drm/msm: gpu: Only sync fences on rings that exist
- wcn36xx: set default BTLE coexistence config
- wcn36xx: Add hardware scan offload support
- wcn36xx: Reduce spinlock in indication handler
- wcn36xx: fix incorrect assignment to msg_body.min_ch_time
- wcn36xx: release DMA memory in case of error
+ - mailbox: qcom: Convert APCS IPC driver to use regmap
+ - mailbox: qcom: Create APCS child device for clock controller
+ - clk: qcom: Add A53 PLL support
+ - clk: qcom: Add regmap mux-div clocks support
+ - clk: qcom: Add APCS clock controller support
+ - clk: qcom: msm8916: Fix return value check in qcom_apcs msm8916_clk_probe()
+ - media: venus: venc: set correctly GOP size and number of B-frames
+ - media: venus: venc: configure entropy mode
+ - media: venus: venc: Apply inloop deblocking filter
+ - media: venus: cleanup set_property controls
+ - arm64: defconfig: enable REMOTEPROC
+ - arm64: defconfig: enable QCOM audio drivers for APQ8016 and DB410c
+ - kernel: configs; add distro.config
+ - arm64: configs: enable WCN36xx
+ - kernel: distro.config: enable debug friendly USB network driver
+ - arm64: configs: enable QCOM Venus
+ - arm64: defconfig: Enable a53/apcs and avs
+ - arm64: defconfig: enable ondemand governor as default
+ - arm64: defconfig: enable QCOM_TSENS
+ - arm64: defconfig: enable new trigger modes for leds
+ - kernel: configs: enable dm_mod and dm_crypt
+ - Force the SMD regulator driver to be compiled-in
+ - arm64: defconfig: enable CFG80211_DEFAULT_PS by default
+ - arm64: configs: enable BT_QCOMSMD
+ - kernel: configs: add more USB net drivers
+ - arm64: defconfig: disable ANALOG_TV and DIGITAL_TV
+ - arm64: configs: Enable camera drivers
+ - kernel: configs: add freq stat to sysfs
+ - arm64: defconfig: enable CONFIG_USB_CONFIGFS_F_FS by default
+ - arm64: defconfig: Enable QRTR features
+ - kernel: configs: set USB_CONFIG_F_FS in distro.config
+ - kernel: distro.config: enable ‘schedutil’ CPUfreq governor
+ - kernel: distro.config: enable ‘fq’ and ‘fq_codel’ qdiscs
+ - kernel: distro.config: enable ‘BBR’ TCP congestion algorithm
+ - arm64: defconfig: enable LEDS_QCOM_LPG
+ - HACK: drm/msm/iommu: Remove runtime_put calls in map/unmap
+ - power: avs: Add support for CPR (Core Power Reduction)
+ - power: avs: cpr: Use raw mem access for qfprrom
+ - power: avs: cpr: fix with new reg_sequence structures
+ - power: avs: cpr: Register with cpufreq-dt
+ - regulator: smd: Add floor and corner operations
+ - PM / OPP: Support adjusting OPP voltages at runtime
+ - PM / OPP: Drop RCU usage in dev_pm_opp_adjust_voltage()
+ - PM / OPP: HACK: Allow to set regulator without opp_list
+ - PM / OPP: Add a helper to get an opp regulator for device
+ - cpufreq: Add apq8016 to cpufreq-dt-platdev blacklist
+ - regulator: smd: Allow REGULATOR_QCOM_SMD_RPM=m
+ - ov5645: I2C address change
+ - i2c: Add Qualcomm Camera Control Interface driver
+ - camss: vfe: Skip first four frames from sensor
+ - camss: Do not register if no cameras are present
+ - i2c-qcom-cci: Fix run queue completion timeout
+ - i2c-qcom-cci: Fix I2C address bug
+ - media: ov5645: Fix I2C address
+ - drm/bridge/adv7511: Delay clearing of HPD interrupt status
+ - HACK: drm/msm/adv7511: Don't rely on interrupts for EDID parsing
+ - leds: Add driver for Qualcomm LPG
+ - wcn36xx: Fix warning due to duplicate scan_completed notification
+ - arm64: dts: Add CPR DT node for msm8916
+ - arm64: dts: add spmi-regulator nodes
+ - arm64: dts: msm8916: Add cpufreq support
+ - arm64: dts: msm8916: Add a shared CPU opp table
+ - arm64: dts: msm8916: Add cpu cooling maps
+ - arm64: dts: pm8916: Mark the s2 regulator as always-on
+ - dt-bindings: mailbox: qcom: Document the APCS clock binding
+ - arm64: dts: qcom: msm8916: Add msm8916 A53 PLL DT node
+ - arm64: dts: qcom: msm8916: Use the new APCS mailbox driver
+ - arm64: dts: qcom: msm8916: Add clock properties to the APCS node
+ - arm64: dts: qcom: apq8016-sbc: Allow USR4 LED to notify kernel panic
+ - dt-bindings: media: Binding document for Qualcomm Camera Control Interface driver
+ - MAINTainers: Add Qualcomm Camera Control Interface driver
+ - DT: leds: Add Qualcomm Light Pulse Generator binding
+ - arm64: dts: qcom: msm8996: Add mpp and lpg blocks
+ - arm64: dts: qcom: Add pwm node for pm8916
+ - arm64: dts: qcom: Add user LEDs on db820c
+ - arm64: dts: qcom: Add WiFi/BT LEDs on db820c
+ - ARM: dts: qcom: Add LPG node to pm8941
+ - ARM: dts: qcom: honami: Add LPG node and RGB LED
+ - arm64: dts: qcom: Add Camera Control Interface support
+ - arm64: dts: qcom: Add apps_iommu vfe child node
+ - arm64: dts: qcom: Add camss device node
+ - arm64: dts: qcom: Add ov5645 device nodes
+ - arm64: dts: msm8916: Fix camera sensors I2C addresses
+ - arm: dts: qcom: db410c: Enable PWM signal on MPP4
+ - packaging: arm64: add a uboot flavour - part1
+ - packaging: arm64: add a uboot flavour - part2
+ - packaging: arm64: add a uboot flavour - part3
+ - packaging: arm64: add a uboot flavour - part4
+ - packaging: arm64: add a uboot flavour - part5
+ - packaging: arm64: rename uboot flavour to snapdragon
+ - [Config] updateconfigs after qcomlt import
+ - [Config] arm64: snapdragon: COMMON_CLK_QCOM=y
+ - [Config] arm64: snapdragon: MSM_GCC_8916=y
+ - [Config] arm64: snapdragon: REGULATOR_FIXED_VOLTAGE=y
+ - [Config] arm64: snapdragon: PINCTRL_MSM8916=y
+ - [Config] arm64: snapdragon: HWSPINLOCK_QCOM=y
+ - [Config] arm64: snapdragon: SPMI=y, SPMI_MSM_PMIC_ARB=y
+ - [Config] arm64: snapdragon: REGMAP_SPMI=y, PINCTRL_QCOM_SPMI_PMIC=y
+ - [Config] arm64: snapdragon: REGULATOR_QCOM_SPMI=y
+ - [Config] arm64: snapdragon: MFD_SPMI_PMIC=y
+ - [Config] arm64: snapdragon: QCOM_SMEM=y
+ - [Config] arm64: snapdragon: RPRMSG=y, RPRMSG_QCOM_SMD=y
+ - [Config] arm64: snapdragon: QCOM_SMD_RPM=y, REGULATOR_QCOM_SMD_RPM=y
+ - [Config] arm64: snapdragon: QCOM_CLK_SMD_RPM=y
+ - [Config] arm64: snapdragon: QCOM_BAM_DMA=y
+ - [Config] arm64: snapdragon: QCOM_HIDMA=y, QCOM_HIDMA_MGMT=y
+ - [Config] arm64: snapdragon: QCOM_CPR=y
+ - [Config] arm64: snapdragon: QCOM_QFPROM=y, QCOM_TSENS=y
+ - [Config] arm64: snapdragon: MMC_SDHCI=y, MMC_SDHCI_PLTFM=y, MMC_SDHCI_MSM=y
+ - [Config] turn off DRM_MSM_REGISTER_LOGGING
+ - [Config] arm64: snapdragon: I2C_QUP=y
+ - [Config] arm64: snapdragon: SPI_QUP=y
+ - [Config] arm64: snapdragon: USB_ULPI_BUS=y, PHY_QCOM_USB_HS=y
+ - [Config] arm64: snapdragon: QCOM_APCS_IPC=y
+ - [Config] arm64: snapdragon: QCOM_WCNSS_CTRL=y
+ - [Config] arm64: snapdragon: QCOM_CPR=y
+ - [Config] arm64: snapdragon: QCOM_A53PLL=y, QCOM_CLK_APCS_MSM8916=y
+ - [Config] arm64: snapdragon: INPUT_PM8941_PWRKEY=y
+ - [Config] arm64: snapdragon: MEDIA_SUBDRV_AUTOSELECT=y, VIDEO_OV5645=m
+ - [Config] arm64: snapdragon: SND_SOC_APQ8016_SBC=y, SND_SOC_LPASS_APQ8016=m
+ - [Config] arm64: snapdragon: SND_SOC_MSM8916_WCD_ANALOG=y, SND_SOC_MSM8916_WCD_DIGITAL=y
+ - SAUCE: media: ov5645: skip address change if dt addr == default addr
+ - SAUCE: drm/msm/adv7511: wrap hacks under CONFIG_ADV7511_SNAPDRAGON_HACKS
+ - #ifdefs
+ - [Config] arm64: snapdragon: ADV7511_SNAPDRAGON_HACKS=y
+ - packaging: snapdragon: fixup ABI paths
+
+ * LSM stacking patches for bionic (LP: #1763062)
+ - SAUCE: LSM stacking: proofs: add smack subdir to attrs
+ - SAUCE: LSM stacking: LSM: Manage credential security blobs
+ - SAUCE: LSM stacking: LSM: Manage file security blobs
+ - SAUCE: LSM stacking: LSM: Manage task security blobs
+ - SAUCE: LSM stacking: LSM: Manage remaining security blobs
+ - SAUCE: LSM stacking: LSM: General stacking
+ - SAUCE: LSM stacking: fixup initialize task->security
+ - SAUCE: LSM stacking: fixup: alloc_task_ctx is dead code
+ - SAUCE: LSM stacking: add support for stacking getpeersec_stream
+ - SAUCE: LSM stacking: add stacking support to apparmor network hooks
+ - SAUCE: LSM stacking: fixup apparmor stacking enablement
+ - SAUCE: LSM stacking: fixup stacking kconfig
+ - SAUCE: LSM stacking: allow selecting multiple LSMS using kernel boot params
+ - SAUCE: LSM stacking: provide prctl interface for setting context
+ - SAUCE: LSM stacking: inherit current display LSM
+ - SAUCE: LSM stacking: keep an index for each registered LSM
+ - SAUCE: LSM stacking: verify display LSM
+ - SAUCE: LSM stacking: provide a way to specify the default display lsm
+ - SAUCE: LSM stacking: make sure LSM blob align on 64 bit boundaries
+ - SAUCE: LSM stacking: add /proc/<pid>/attr/display_lsm
+ - SAUCE: LSM stacking: add Kconfig to set default display LSM
+ - SAUCE: LSM stacking: add configs for LSM stacking
+ - SAUCE: LSM stacking: add apparmor and selinux proc dirs
+ - SAUCE: LSM stacking: remove procs context interface

  (LP: #1720779) // LSM stacking patches for bionic (LP: #1763062)
+ - SAUCE: LSM stacking: check for invalid zero sized writes

+ * RDMA/hns: ensure for-loop actually iterates and free's buffers
  (LP: #1762757)
+ - RDMA/hns: ensure for-loop actually iterates and free's buffers

+ * Support cq/rq record doorbell for RDMA on HSilicon hip08 systems
  (LP: #1762755)
+ - RDMA/hns: Fix the endian problem for hns
+ - RDMA/hns: Support rq record doorbell for the user space
+ - RDMA/hns: Support cq record doorbell for the user space
+ - RDMA/hns: Support rq record doorbell for kernel space
+ - RDMA/hns: Support cq record doorbell for kernel space
+ - RDMA/hns: Fix cqnr type and init resp
+ - RDMA/hns: Fix init resp when alloc ucontext
+ - RDMA/hns: Fix cq record doorbell enable in kernel

+ * Replace LPC patchset with upstream version (LP: #1762758)
+ - Revert "UBUNTU: SAUCE: MAINTAINERS: Add maintainer for HiSilicon LPC driver"
+ - Revert "UBUNTU: SAUCE: HISI LPC: Add ACPI support"
+ - Revert "UBUNTU: SAUCE: ACPI / scan: do not enumerate Indirect IO host
  children"
+ - Revert "UBUNTU: SAUCE: HISI LPC: Support the LPC host on Hip06/Hip07 with DT
  bindings"
+ - Revert "UBUNTU: SAUCE: OF: Add missing I/O range exception for indirect-IO
  devices"
+ - Revert "UBUNTU: SAUCE: PCI: Apply the new generic I/O management on PCI IO
  hosts"
+ - Revert "UBUNTU: SAUCE: PCI: Add fwnode handler as input param of
  pci_register_io_range()"
+ - Revert "UBUNTU: SAUCE: PCI: Remove unused __weak attribute in
+ pci_register_io_range()"
+ - Revert "UBUNTU: SAUCE: LIB: Introduce a generic PIO mapping method"
+ - lib: Add generic PIO mapping method
+ - PCI: Remove __weak tag from pci_register_io_range()
+ - PCI: Add fwnode handler as input param of pci_register_io_range()
+ - PCI: Apply the new generic I/O management on PCI IO hosts
+ - of: Add missing I/O range exception for indirect-IO devices
+ - HISI LPC: Support the LPC host on Hip06/Hip07 with DT bindings
+ - ACPI / scan: Rename acpi_is_serial_bus_slave() for more general use
+ - ACPI / scan: Do not enumerate Indirect IO host children
+ - HISI LPC: Add ACPI support
+ - MAINTAINERS: Add John Garry as maintainer for HiSilicon LPC driver
+
+ * Enable Tunneled Operations on POWER9 (LP: #1762448)
+ - powerpc/powernv: Enable tunneled operations
+ - cxl: read PHB indications from the device tree
+
+ * PSL traces reset after PERST for debug AFU image (LP: #1762462)
+ - cxl: Enable NORST bit in PSL_DEBUG register for PSL9
+
+ * NFS + sec=krb5 is broken (LP: #1759791)
+ - sunrpc: remove incorrect HMAC request initialization
+
+ * Raspberry Pi 3 microSD support missing from the installer (LP: #1729128)
+ - d-i: add bcm2835 to block-modules
+
+ * Backport USB core quirks (LP: #1762695)
+ - usb: core: Add "quirks" parameter for usbcore
+ - usb: core: Copy parameter string correctly and remove superfluous null check
+ - usb: core: Add USB_QUIRK_DELAY_CTRL_MSG to usbcore quirks
+
+ * [Ubuntu 18.04] cryptsetup: 'device-mapper: reload ioctl on failed' when
  setting up a second end-to-end encrypted disk (LP: #1762353)
+ - SAUCE: s390/crypto: Adjust s390 aes and paes cipher
+
+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5715
+ - powerpc/64s: Wire up cpu_show_spectre_v2()
+
+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5753
+ - powerpc/64s: Wire up cpu_show_spectre_v1()
+
+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5754
+ - powerpc/rfi-flush: Move the logic to avoid a redo into the debugfs code
+ - powerpc/rfi-flush: Make it possible to call setup_rfi_flush() again
+ - powerpc/rfi-flush: Always enable fallback flush on pseries
+ - powerpc/rfi-flush: Differentiate enabled and patched flush types
+ - powerpc/rfi-flush: Call setup_rfi_flush() after LPM migration
+ - powerpc/64s: Move cpu_show_meltdown()
+ - powerpc/64s: Enhance the information in cpu_show_meltdown()
+ - powerpc/powerenv: Use the security flags in pnv_setup_rfi_flush()
+ - powerpc/pseries: Use the security flags in pseries_setup_rfi_flush()

+ * Additional spectre and meltdown patches (LP: #1760099) // CVE-2017-5715 //
+ CVE-2017-5753 // CVE-2017-5754
+ - powerpc/pseries: Add new H_GET_CPU_CHARACTERISTICS flags
+ - powerpc: Add security feature flags for Spectre/Meltdown
+ - powerpc/pseries: Set or clear security feature flags
+ - powerpc/powerenv: Set or clear security feature flags

+ * Hisilicon network subsystem 3 support (LP: #1761610)
+ - net: hns3: export pci table of hclge and hclgevf to userspace
+ - d-i: Add hns3 drivers to nic-modules

+ * "ip a" command on a guest VM shows UNKNOWN status (LP: #1761534)
+ - virtio-net: Fix operstate for virtio when no VIRTIO_NET_F_STATUS

+ * perf vendor events arm64: Enable JSON events for ThunderX2 B0 (LP: #1760712)
+ - perf vendor events aarch64: Add JSON metrics for ARM Cortex-A53 Processor
+ - perf vendor events: Drop incomplete multiple mapfile support
+ - perf vendor events: Fix error code in json_events()
+ - perf vendor events: Drop support for unused topic directories
+ - perf vendor events: Add support for pmu events vendor subdirectory
+ - perf vendor events arm64: Relocate ThunderX2 JSON to cavium subdirectory
+ - perf vendor events arm64: Relocate Cortex A53 JSONs to arm subdirectory
+ - perf vendor events: Add support for arch standard events
+ - perf vendor events arm64: Add armv8-recommended.json
+ - perf vendor events arm64: Fixup ThunderX2 to use recommended events
+ - perf vendor events arm64: fixup A53 to use recommended events
+ - perf vendor events arm64: add HiSilicon hip08 JSON file
+ - perf vendor events arm64: Enable JSON events for ThunderX2 B0

+ * Warning "cache flush timed out!" seen when unloading the cxl driver
+ (LP: #1762367)
+ - cxl: Check if PSL data-cache is available before issue flush request

+ * Bionic update to 4.15.16 stable release (LP: #1762370)
+ - ARM: OMAP: Fix SRAM W+X mapping
+ - ARM: 8746/1: vfp: Go back to clearing vfp_current_hw_state[]
+ - ARM: dts: sun6i: a31s: bpi-m2: improve pmic properties
+ - ARM: dts: sun6i: a31s: bpi-m2: add missing regulators
+ - mtd: jedec_probe: Fix crash in jedec_read_mfr()
+ - mtd: nand: atmel: Fix get_sectorsize() function
+ - ALSA: usb-audio: Add native DSD support for TEAC UD-301
+ - ALSA: pcm: Use dma_bytes as size parameter in dma_mmap_coherent()
+ - ALSA: pcm: potential uninitialized return values
+ - x86/platform/uv/BAU: Add APIC idt entry
+ - perf/hwpb: Simplify the perf-hwpb code, fix documentation
+ - ceeph: only dirty ITER_IOVEC pages for direct read
+ - ipc/shm.c: add split function to shm_vm_ops
+ - 12c: i2c-stm32f7: fix no check on returned setup
+ - powerpe/mmm: Add tracking of the number of coprocessors using a context
+ - powerpe/mmm: Workaround Nest MMU bug with TLB invalidations
+ - powerpe/64s: Fix i-side SLB miss bad address handler saving nonvolatile GPRs
+ - partitions/msdos: Unable to mount UFS 44bsd partitions
+ - xfrm_user: unconditionally validate esi replay attribute struct
+ - RDMA/ucma: Check AF family prior resolving address
+ - RDMA/ucma: Fix use-after-free access in ucma_close
+ - RDMA/ucma: Ensure that CM_ID exists prior to access it
+ - RDMA/rdma_cm: Fix use after free race with process_one_req
+ - RDMA/ucma: Check that device is connected prior to accessing it
+ - RDMA/ucma: Check that device exists prior to accessing it
+ - RDMA/ucma: Introduce safer rdma_addr_size() variants
+ - ipv6: fix possible deadlock in rt6_age_examine_exception()
+ - net: xfrm: use preempt-safe this_cpu_read() in ipcomp_alloc_tfms()
+ - xfrm: Refuse to insert 32 bit userspace socket policies on 64 bit systems
+ - percpu: add __GFP_NORETRY semantics to the percpu balancing path
+ - netfilter: x_tables: make allocation less aggressive
+ - netfilter: bridge: ebt_among: add more missing match size checks
+ - I2tp: fix races with ipv4-mapped ipv6 addresses
+ - netfilter: drop template ct when conntrack is skipped.
+ - netfilter: x_tables: add and use xt_check_proc_name
+ - phy: qcom-ufs: add MODULE_LICENSE tag
+ - Bluetooth: Fix missing encryption refresh on Security Request
+ - drm/i915/dp: Write to SET_POWER dpcd to enable MST hub.
+ - bitmap: fix memset optimization on big-endian systems
+ - USB: serial: ftdi_sio: add support for Harman FirmwareHubEmulator
+ - USB: serial: cp210x: add ELDAT Easywave RX09 id
+ - serial: 8250: Add Nuvoton NPCM UART
+ - mei: remove dev_err message on an unsupported ioct1
+ - /dev/mem: Avoid overwriting "err" in read_mem()
+ - media: usbtv: prevent double free in error case
+ - parport_pc: Add support for WCH CH382L PCI-E single parallel port card.
+ - crypto: lrw - Free rectx->ext with kzfree
+ - crypto: talitos - don't persistently map req_ctx->hw_context and
+ - req_ctx->buf
+ - crypto: inside-secure - fix clock management
+ - crypto: testmgr - Fix incorrect values in PKCS#1 test vector
+ - crypto: talitos - fix IPsec cipher in length
+ - crypto: ahash - Fix early termination in hash walk
+ - crypto: caam - Fix null dereference at error path
+ - crypto: ccp - return an actual key size from RSA max_size callback
+ - crypto: arm,arm64 - Fix random regeneration of S_shipped
+ - crypto: x86/cast5-avx - fix ECB encryption when long sg follows short one
+ - Btrfs: fix unexpected cow in run_delallocnocow
+ - Revert "base: arch_topology: fix section mismatch build warnings"
+ - Input: ALPS - fix TrackStick detection on Thinkpad L570 and Latitude 7370
+ - Input: i8042 - add Lenovo ThinkPad L460 to i8042 reset list
+ - Input: i8042 - enable MUX on Sony VAIO VGN-CS series to fix touchpad
+ - vt: change SGR 21 to follow the standards
+ - ARM: dts: DRA76-EVM: Set powerhold property for tps65917
+ - net: hns: Fix ethtool private flags
+ - Fix slab name "biovec-(1<<(21-12))"
+ - Revert "ARM: dts: am335x-pepper: Fix the audio CODEC's reset pin"
+ - Revert "ARM: dts: omap3-n900: Fix the audio CODEC's reset pin"
+ - Revert "cpufreq: Fix governor module removal race"
+ - Revert "ip6_vti: adjust vti mtu according to mtu of lower device"
+ - Linux 4.15.16
+ * [18.04][config] regression: nvme and nvme_core couldn't be built as modules
+ starting 4.15-rc2 (LP: #1759893)
+ - SAUCE: Revert "lightnvm: include NVM Express driver if OCSSD is selected for build"
+ - [Config] CONFIG_BLK_DEV_NMVE=m
+ * Miscellaneous Ubuntu changes
+ - [Packaging] Only install cloud init files when do_tools_common=true
+ + Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 13 Apr 2018 14:40:52 -0300
+ + linux (4.15.0-15.16) bionic; urgency=medium
+ + * linux: 4.15.0-15.16 -proposed tracker (LP: #1761177)
+ + * FFe: Enable configuring resume offset via sysfs (LP: #1760106)
+ + - PM / hibernate: Make passing hibernate offsets more friendly
+ + * /dev/bcache/by-uuid links not created after reboot (LP: #1729145)
+ + - SAUCE: (no-up) bcache: decouple emitting a cached_dev CHANGE uevent
+ + * Ubuntu18.04:POWER9:DD2.2 - Unable to start a KVM guest with default machine type(pseries-bionic) complaining "KVM implementation does not support Transactional Memory, try cap-htm=off" (kvm) (LP: #1752026)
+ + - powerpc: Use feature bit for RTC presence rather than timebase presence
+ + - powerpc: Book E: Remove unused CPU_FTR_L2CSR bit
+ + - powerpc: Free up CPU feature bits on 64-bit machines
+ + - powerpc: Add CPU feature bits for TM bug workarounds on POWER9 v2.2
+ + - powerpc/powerpc: Provide a way to force a core into SMT4 mode
+ + - KVM: PPC: Book3S HV: Work around transactional memory bugs in POWER9
+ + - KVM: PPC: Book3S HV: Work around TEXASR bug in fake suspend state
* Important Kernel fixes to be backported for Power9 (kvm) (LP: #1758910)
  - powerpc/mm: Fixup tlbie vs store ordering issue on POWER9

* Ubuntu 18.04 - IO Hang on some namespaces when running HTX with 16
  namespaces (Bolt / NVMe) (LP: #1757497)
  - irqpe/64s: Fix lost pending interrupt due to race causing lost update to
    irq_happened

* fws-efi-runtime-dkms 18.03.00-0ubuntu1: fws-efi-runtime-dkms kernel module
  failed to build (LP: #1760876)
  - [Packaging] include the retropoline extractor in the headers

-- Seth Forshee <seth.forshee@canonical.com> Wed, 04 Apr 2018 08:26:19 -0500

+linux (4.15.0-14.15) bionic; urgency=medium

* linux: 4.15.0-14.15 -proposed tracker (LP: #1760678)

* [Bionic] mlx4 ETH - mlx_qos failed when set some TC to vendor
  (LP: #1758662)
  - net/mlx4_en: Change default QoS settings

* AT_BASE_PLATFORM in AUXV is absent on kernels available on Ubuntu 17.10
  (LP: #1759312)
  - powerpe/64s: Fix NULL AT_BASE_PLATFORM when using DT CPU features

* Bionic update to 4.15.15 stable release (LP: #1760585)
  - net: dsa: Fix dsa_is_user_port() test inversion
  - openvswitch: meter: fix the incorrect calculation of max delta_t
  - tcp: Fix MPA unalign flow in case header is split across two packets.
  - tcp: purge write queue upon aborting the connection
  - tcp: Fix non TCP packets should be dropped on iWARP l2 connection
  - sysfs: symlink: export sysfs_create_link_nowarn()
  - net: phy: relax error checking when creating sysfs link netdev->phydev
  - devlink: Remove redundant free on error path
  - macvlan: filter out unsupported feature flags
  - net: ipv6: keep sk status consistent after datagram connect failure
  - ipv6: old_dport should be a __be16 in __ip6_datagram_connect()
  - ipv6: sr: fix NULL pointer dereference when setting encap source address
  - ipv6: sr: fix scheduling in RCU when creating seg6 lw tun state
  - mlxsw: spectrum_buffers: Set a minimum quota for CPU port traffic
  - net: phy: Tell caller result of phy_change()
  - ipv6: Reflect MTU changes on PMTU of exceptions for MTU-less routes
  - net sched actions: return explicit error when tunnel_key mode is not
    specified
  - ppp: avoid loop in xmit recursion detection code
  - rhashtable: Fix rlist duplicates insertion
+ - test_rhashtable: add test case for rhtable with duplicate objects
+ - kcm: lock lower socket in kcm_attach
+ - sch_netem: fix skb leak in netem_enqueue()
+ - iee802154; 6lowpan: fix possible NULL deref in lowpan_device_event()
+ - net: use skb_to_full_sk() in skb_update_prio()
+ - net: Fix hlist corruptions in inet_evict_bucket()
+ - s390/qeth: free netdevice when removing a card
+ - s390/qeth: when thread completes, wake up all waiters
+ - s390/qeth: lock read device while queueing next buffer
+ - s390/qeth: on channel error, reject further cmd requests
+ - soc/fsl/qbman: fix issue in qman_delete_cgr_safe()
+ - dpaa_eth: fix error in dpaa_remove()
+ - dpaa_eth: remove duplicate initialization
+ - dpaa_eth: increment the RX dropped counter when needed
+ - dpaa_eth: remove duplicate increment of the tx_errors counter
+ - dccp: check sk for closed state in dccp_sendmsg()
+ - ipv6: fix access to non-linear packet in ndisc_fill_redirect_hdr_option()
+ - I2tp: do not accept arbitrary sockets
+ - net: ethernet: arc: Fix a potential memory leak if an optional regulator is deferred
+ - net: fec: Fix unbalanced PM runtime calls
+ - net/uvc: Free memory obtained by kzalloc
+ - netlink: avoid a double skb free in genlmsg_mcast()
+ - net: Only honor ifindex in IP_PKTINFO if non-0
+ - net: systemport: Rewrite __bcm_sysport_tx_reclaim()
+ - qede: Fix qedr link update
+ - skbuff: Fix not wakening applications when errors are enqueued
+ - team: Fix double free in error path
+ - Linux 4.15.15

+ * Ubuntu 18.04 [ WSP DD2.2 with stop4 and stop5 enabled ]: kdump fails to capture dump when smt=2 or off. (LP: #1758206)
+ - powerpc/crash: Remove the test for cpu_online in the IPI callback
+ - powernv/kdump: Fix cases where the kdump kernel can get HMI's
+ - powernv/kdump: Fix powernv build break when KEXEC_CORE=n

+ * [Intel Ubuntu 18.04 Bug] Null pointer dereference, when disconnecting RAID rebuild target (LP: #1759279)
+ - md: document lifetime of internal rdev pointer.

+ * [Feature]Crystal Ridge:add support for the platform capabilities NFIT sub-table in ACPI 6.2A (LP: #1730829)
+ - ACPI/C: ACPI 6.0A: Changes to the NFIT ACPI table
+ - acpi: nfit: Add support for detect platform CPU cache flush on power loss
+ - acpi: nfit: add persistent memory control flag for nd_region
+ - libnvdimm: expose platform persistence attribute for nd_region

Open Source Used In 5GaaS Edge AC-4 19485
+ - libnvdimm: re-enable deep flush for pmem devices via fsync()
+ - libnvdimm, nfit: fix persistence domain reporting
+
+ * Allow multiple mounts of zfs datasets (LP: #1759848)
+ - SAUCE: Allow mounting datasets more than once (LP: #1759848)
+
+ * Update Aquantia driver to fix various issues (LP: #1759303)
+ - net: aquantia: Eliminate AQ_DIMOF, replace with ARRAY_SIZE
+ - net: aquantia: Cleanup status flags accesses
+ - net: aquantia: Cleanup hardware access modules
+ - net: aquantia: Remove duplicate hardware descriptors declarations
+ - net: aquantia: Add const qualifiers for hardware ops tables
+ - net: aquantia: Simplify dependencies between pci modules
+ - net: aquantia: Eliminate aq_nic structure abstraction
+ - net: aquantia: Fix register definitions to linux style
+ - net: aquantia: Prepend hw access functions declarations with prefix
+ - net: aquantia: Fix internal stats calculation on rx
+ - net: aquantia: Introduce new device ids and constants
+ - net: aquantia: Introduce new AQC devices and capabilities
+ - net: aquantia: Convert hw and caps structures to const static pointers
+ - net: aquantia: Cleanup pci functions module
+ - net: aquantia: Remove create/destroy from hw ops
+ - net: aquantia: Change confusing no_ff_addr to more meaningful name
+ - net: aquantia: Introduce firmware ops callbacks
+ - net: aquantia: Introduce support for new firmware on AQC cards
+ - net: aquantia: Introduce global AQC hardware reset sequence
+ - net: aquantia: Report correct mediatype via ethtool
+ - net: aquantia: bump driver version to match aquantia internal numbering
+ - net: aquantia: Fix hardware reset when SPI may rarely hangup
+ - net: aquantia: Fix a regression with reset on old firmware
+ - net: aquantia: Change inefficient wait loop on fw data reads
+ - net: aquantia: Add tx clean budget and valid budget handling logic
+ - net: aquantia: Allow live mac address changes
+ - net: aquantia: Implement pci shutdown callback
+ - net: aquantia: driver version bump
+
+ * ISST-LTE:KVM:Ubuntu1804:BostonLC:bosclp3: cpu hotplug on bosclp3g4 guest
dumping call traces continuously. (LP: #1759722)
+ - blk-mq: turn WARN_ON in __blk_mq_run_hw_queue into printk
+
+ * ISST-LTE:KVM:Ubuntu18.04:BostonLC:bosclp3: bosclp3g3:Guest conosle hangs
after hotplug CPU add operation. (LP: #1759723)
+ - genirq/affinity: assign vectors to all possible CPUs
+ - blk-mq: simplify queue mapping & schedule with each possiblle CPU
+
+ * test_bpf fails (LP: #1756150)
+ - test_bpf: Fix testing with CONFIG_BPF_JIT_ALWAYS_ON=y on other arches
+
+ * Bionic update to v4.15.14 stable release (LP: #1759655)
+ - MIPS: ralink: Remove ralink_halt()
+ - MIPS: ralink: Fix booting on MT7621
+ - MIPS: lantiq: Fix Danube USB clock
+ - MIPS: lantiq: Enable AHB Bus for USB
+ - MIPS: lantiq: ase: Enable MFD_SYSCON
+ - iio: chemical: ccs811: Corrected firmware boot/application mode transition
+ - iio: st_pressure: st_accel: pass correct platform data to init
+ - iio: adc: meson-saradc: unlock on error in meson_sar_adc_lock()
+ - ALSA: usb-audio: Fix parsing descriptor of UAC2 processing unit
+ - ALSA: aloop: Sync stale timer before release
+ - ALSA: aloop: Fix access to not-yet-ready substream via cable
+ - ALSA: hda - Force polling mode on CFL for fixing codec communication
+ - ALSA: hda/realtek - Fix speaker no sound after system resume
+ - ALSA: hda/realtek - Fix Dell headset Mic can't record
+ - ALSA: hda/realtek - Always immediately update mute LED with pin VREF
+ - mmc: core: Fix tracepoint print of blk_addr and blkpsz
+ - mmc: core: Disable HPI for certain Micron (Numonyx) eMMC cards
+ - mmc: block: fix updating ext_csd caches on ioctl call
+ - mmc: dwmmc: Fix the DTO/CTO timeout overflow calculation for 32-bit systems
+ - mmc: dwmmc: exynos: fix the suspend/resume issue for exynos5433
+ - mmc: dwmmc: fix falling from idmac to PIO mode when dw_mci_reset occurs
+ - PCI: Add function 1 DMA alias quirk for Highpoint RocketRAID 644L
+ - ahci: Add PCI-id for the Highpoint Rocketraider 644L card
+ - lockdep: fix fs_reclaim warning
+ - clk: bcm2835: Fix ana->maskX definitions
+ - clk: bcm2835: Protect sections updating shared registers
+ - clk: sunxi-ng: a31: Fix CLK_OUT_* clock ops
+ - RDMA/mlx5: Fix crash while accessing garbage pointer and freed memory
+ - Drivers: hv: vmbus: Fix ring buffer signaling
+ - pinctrl: samsung: Validate alias coming from DT
+ - Bluetooth: btusb: Remove Yoga 920 from the btusb_needs_reset_resume_table
+ - Bluetooth: btusb: Add Dell OptiPlex 3060 to btusb_needs_reset_resume_table
+ - Bluetooth: btusb: Fix quirk for Atheros 1525/QCA6174
+ - libata: fix length validation of ATAPI-relayed SCSI commands
+ - libata: remove WARN() for DMA or PIO command without data
+ - libata: don't try to pass through NCQ commands to non-NCQ devices
+ - libata: Apply NOLPM quirk to Crucial MX100 512GB SSDs
+ - libata: Enable queued TRIM for Samsung SSD 860
+ - libata: Apply NOLPM quirk to Crucial M500 480 and 960GB SSDs
+ - libata: Make Crucial BX100 500GB LPM quirk apply to all firmware versions
+ - libata: Modify quirks for MX100 to limit NCQ_TRIM quirk to MU01 version
+ - sched, cgroup: Don't reject lower cpu.max on ancestors
+ - cgroup: fix rule checking for threaded mode switching
+ - nfsd: remove blocked locks on client teardown
+ - media: tegra-cec: reset rx_buf_cnt when start bit detected
+ - hugetlbfs: check for pgoff value overflow
+ - b8300: remove extraneous __BIG_ENDIAN definition
+ - mm/vmalloc: add interfaces to free unmapped page table
+ - x86/mm: implement free pmd/pte page interfaces
+ - mm/khugepaged.c: convert VM_BUG_ON() to collapse fail
+ - mm/thp: do not wait for lock_page() in deferred_split_scan()
+ - mm/shmem: do not wait for lock_page() in shmem_unused_huge_shrink()
+ - Revert "mm: page_alloc: skip over regions of invalid pfns where possible"
+ - drm/vmwgfx: Fix black screen and device errors when running without fbdev
+ - drm/vmwgfx: Fix a destroy-while-held mutex problem.
+ - drm/radeon: Don't turn off DP sink when disconnected
+ - drm/amd/display: We shouldn't set format_default on plane as atomic driver
+ - drm/amd/display: Add one to EDID's audio channel count when passing to DC
+ - drm: Reject getfb for multi-plane framebuffers
+ - drm: udl: Properly check framebuffer mmap offsets
+ - mm/vmcs: wake up flushers for legacy cgroups too
+ - module: propagate error in modules_open()
+ - acpi, numa: fix pxm to online numa node associations
+ - ACPI / watchdog: Fix off-by-one error at resource assignment
+ - libnvdimm, {btt, blk}: do integrity setup before add_disk()
+ - brcmfmac: fix P2P_DEVICE ethernet address generation
+ - rtlwifi: rtl8723be: Fix loss of signal
+ - tracing: probeevent: Fix to support minus offset from symbol
+ - mtdchar: fix usage of mtd_ooblayout_ecc()
+ - mtd: nand: fsl_i2c: Fix nand waitfunc return value
+ - mtd: nand: fsl_i2c: Fix eccstat array overflow for IFC ver >= 2.0.0
+ - mtd: nand: fsl_i2c: Read ECCSTAT0 and ECCSTAT1 registers for IFC 2.0
+ - staging: ncpfs: memory corruption in ncp_read_kernel()
+ - can: peak/pcie_fd: fix echo_skb is occupied! bug
+ - can: peak/pcie_fd: remove useless code when interface starts
+ - can: ifi: Repair the error handling
+ - can: ifi: Check core revision upon probe
+ - can: cc770: Fix stalls on rt-linux, remove redundant IRQ ack
+ - can: cc770: Fix queue stall & dropped RTR reply
+ - can: cc770: Fix use after free in cc770_tx_interrupt()
+ - tty: vt: fix up tabstops properly
+ - x86/entry/64: Don't use IST entry for #BP stack
+ - selftests/x86/ptrace_syscall: Fix for yet more glibc interference
+ - x86/syscall/64: Use proper accessor to update P4D entry
+ - x86/efi: Free efi_pgd with free_pages()
+ - posix-timers: Protect posix clock array access against speculation
+ - kvm/x86: fix icebp instruction handling
+ - x86/build/64: Force the linker to use 2MB page size
+ - x86/boot/64: Verify alignment of the LOAD segment
+ - hwmon: (k10temp) Only apply temperature offset if result is positive
+ - hwmon: (k10temp) Add temperature offset for Ryzen 1900X
+ - perf/x86/intel/uncore: Fix Skylake UPI event format
+ - perf stat: Fix CVS output format for non-supported counters
+ - perf/core: Fix ctx_event_type in ctx_resched()
+ - trace/bpf: remove helper bpf_perf_prog_read_value from tracepoint type
+ programs
+ - perf/x86/intel: Don't accidentally clear high bits in bdw_limit_period()
+ - perf/x86/intel/uncore: Fix multi-domain PCI CHA enumeration bug on Skylake
+ servers
+ - iio: ABI: Fix name of timestamp sysfs file
+ - iio: imu: st_lsm6dsx: fix endianness in st_lsm6dsx_read_oneshot()
+ - iio: imu: st_lsm6dsx: introduce conf_lock mutex
+ - staging: android: ion: Zero CMA allocated memory
+ - kbuild: disable clang's default use of -fmerge-all-constants
+ - bpf: skip unnecessary capability check
+ - bpf, x64: increase number of passes
+ - Linux 4.15.14
+
+ * System fails to start (boot) on battery due to read-only root file-system
+  (LP: #1726930) // Bionic update to v4.15.14 stable release (LP: #1759655)
+ - libata: disable LPM for Crucial BX100 SSD 500GB drive
+
+ * [Feature][CFL][ICL] [CNL]Thunderbolt support (Titan Ridge) (LP: #1730775)
+ - thunderbolt: Resume control channel after hibernation image is created
+ - thunderbolt: Serialize PCIe tunnel creation with PCI rescan
+ - thunderbolt: Handle connecting device in place of host properly
+ - thunderbolt: Do not overwrite error code when domain adding fails
+ - thunderbolt: Wait a bit longer for root switch config space
+ - thunderbolt: Wait a bit longer for ICM to authenticate the active NVM
+ - thunderbolt: Handle rejected Thunderbolt devices
+ - thunderbolt: Factor common ICM add and update operations out
+ - thunderbolt: Correct function name in kernel-doc comment
+ - thunderbolt: Add tb_switch_get()
+ - thunderbolt: Add tb_switch_find_by_route()
+ - thunderbolt: Add tb_xdomain_find_by_route()
+ - thunderbolt: Add constant for approval timeout
+ - thunderbolt: Move driver ready handling to struct icm
+ - thunderbolt: Add 'boot' attribute for devices
+ - thunderbolt: Add support for preboot ACL
+ - Documentation/admin-guide: fixes for thunderbolt.rst
+ - thunderbolt: Introduce USB only (SL4) security level
+ - thunderbolt: Add support for Intel Titan Ridge
+
+ * QCA9377 requires more IRAM banks for its new firmware (LP: #1748345)
+ - ath10k: update the IRAM bank number for QCA9377
+
+ * nfp: fix disabling on hw-tc-offload in flower (LP: #1752828)
+ - nfp: bpf: require ETH table
+ - nfp: don't advertise hw-tc-offload on non-port netdevs
+ - nfp: forbid disabling hw-tc-offload on representors while offload active
+
+ * Fix an issue that when system in S3, USB keyboard can't wake up the system.
+  (LP: #1759511)
- ACPI / PM: Allow deeper wakeup power states with no _SxD nor _SxW

* retpoline hints: primary infrastructure and initial hints (LP: #1758856)
- [Packaging] retpoline -- add safe usage hint support
- [Packaging] retpoline-check -- only report additions
- [Packaging] retpoline -- widen indirect call/jmp detection
- [Packaging] retpoline -- elide %rip relative indirections
- [Packaging] retpoline -- clear hint information from packages
- SAUCE: apm -- annotate indirect calls within
  firmware_restrict_branch_speculation_{start,end}
- SAUCE: EFI -- annotate indirect calls within
  firmware_restrict_branch_speculation_{start,end}
- SAUCE: early/late -- annotate indirect calls in early/late initialisation
code
- SAUCE: vga_set_mode -- avoid jump tables
- [Config] retpoine -- switch to new format

* zfs system process hung on container stop/delete (LP: #1754584)
- SAUCE: Fix non-prefaulted page deadlock (LP: #1754584)
- Revert "UBUNTU: SAUCE: Fix non-prefaulted page deadlock (LP: #1754584)"
- SAUCE: Fix non-prefaulted page deadlock (LP: #1754584)

* Important KVM fixes for ppc64el (LP: #1759045)
- KVM: PPC: Book3S HV: Do SLB load/unload with guest LPCR value loaded
- KVM: PPC: Book3S HV: Fix handling of secondary HPTEG in HPT resizing code
- KVM: PPC: Book3S HV: Make HPT resizing work on POWER9
- KVM: PPC: Book3S: Add MMIO emulation for VMX instructions
- KVM: PPC: Book3S: Fix compile error that occurs with some gcc versions
- KVM: PPC: Book3S HV: Fix trap number return from __kvmppc_vcore_entry
- KVM: PPC: Book3S HV: Fix duplication of host SLB entries

* ubuntu_zram_smoke test will cause soft lockup on Artful ThunderX ARM64
  (LP: #1755073)
- SAUCE: crypto: thunderx_zip: Fix fallout from CONFIG_VMAP_STACK

* Update to ocxl driver (LP: #1755161)
- ocxl: fix signed comparison with less than zero
- ocxl: Fix potential bad errno on irq allocation
- ocxl: Add get_metadata IOCTL to share OCXL information to userspace

* CAPI Flash (cxlflash) update (LP: #1752672)
- scsi: cxlflash: Update cxl-specific arguments to generic cookie
- scsi: cxlflash: Explicitly cache number of interrupts per context
- scsi: cxlflash: Remove embedded CXL work structures
- scsi: cxlflash: Adapter context init can return error
- scsi: cxlflash: Staging to support future accelerators
- SAUCE: cxlflash: Preserve number of interrupts for master contexts
- SAUCE: cxlflash: Avoid clobbering context control register value
+ - SAUCE: cxfiash: Add argument identifier names
+ - SAUCE: cxfiash: Introduce OCXL backend
+ - SAUCE: cxfiash: Hardware AFU for OCXL
+ - SAUCE: cxfiash: Read host function configuration
+ - SAUCE: cxfiash: Setup function acTag range
+ - SAUCE: cxfiash: Read host AFU configuration
+ - SAUCE: cxfiash: Setup AFU acTag range
+ - SAUCE: cxfiash: Setup AFU PASID
+ - SAUCE: cxfiash: Adapter context support for OCXL
+ - SAUCE: cxfiash: Use IDR to manage adapter contexts
+ - SAUCE: cxfiash: Support adapter file descriptors for OCXL
+ - SAUCE: cxfiash: Support adapter context discovery
+ - SAUCE: cxfiash: Support image reload policy modification
+ - SAUCE: cxfiash: MMIO map the AFU
+ - SAUCE: cxfiash: Support starting an adapter context
+ - SAUCE: cxfiash: Support process specific mappings
+ - SAUCE: cxfiash: Support AFU state toggling
+ - SAUCE: cxfiash: Support reading adapter VPD data
+ - SAUCE: cxfiash: Setup function OCXL link
+ - SAUCE: cxfiash: Setup OCXL transaction layer
+ - SAUCE: cxfiash: Support process element lifecycle
+ - SAUCE: cxfiash: Support AFU interrupt management
+ - SAUCE: cxfiash: Support AFU interrupt mapping and registration
+ - SAUCE: cxfiash: Support starting user contexts
+ - SAUCE: cxfiash: Support adapter context polling
+ - SAUCE: cxfiash: Support adapter context reading
+ - SAUCE: cxfiash: Support adapter context mmap and release
+ - SAUCE: cxfiash: Support file descriptor mapping
+ - SAUCE: cxfiash: Introduce object handle fop
+ - SAUCE: cxfiash: Setup LISNs for user contexts
+ - SAUCE: cxfiash: Setup LISNs for master contexts
+ - SAUCE: cxfiash: Update synchronous interrupt status bits
+ - SAUCE: cxfiash: Introduce OCXL context state machine
+ - SAUCE: cxfiash: Register for translation errors
+ - SAUCE: cxfiash: Support AFU reset
+ - SAUCE: cxfiash: Enable OCXL operations

+ * [Feature][CFL] Enable pmc_core driver for H, S, and U SKUs (LP: #1730770)
+ - platform/x86: intel_pmc_core: Remove unused EXPORTED API
+ - platform/x86: intel_pmc_core: Change driver to a module
+ - platform/x86: intel_pmc_core: Fix file permission warnings
+ - platform/x86: intel_pmc_core: Refactor debugfs entries
+ - platform/x86: intel_pmc_core: Substitute PCI with CPUID enumeration
+ - platform/x86: intel_pmc_core: Convert to ICPU macro
+ - platform/x86: intel_pmc_core: Remove unused header file
+ - ACPI / LPIT: Export lpit_read_residency_count_address()
+ - platform/x86: intel_pmc_core: Read base address from LPIT
+ - x86/cpu: Add Cannonlake to Intel family
+ - platform/x86: intel_pmc_core: Add CannonLake PCH support
+ - platform/x86: intel_pmc_core: Special case for CoffeeLake
+
+ * Cpu utilization showing system time for kvm guests (performance) (sysstat)
  + (LP: #1755979)
+ - KVM: PPC: Book3S HV: Fix guest time accounting with VIRT_CPU_ACCOUNTING_GEN
+
+ * [Artful][Wyse 3040] System hang when trying to enable an offlined CPU core
  + (LP: #1736393)
+ - SAUCE: drm/i915: Don't set chip specific data
+ - SAUCE: drm/i915: make previous commit affects Wyse 3040 only
+
+ * [Bug] ISH support for CFL-H (LP: #1739522)
+ - HID: intel-ish-hid: Enable Cannon Lake and Coffee Lake laptop/desktop
+
+ * ath9k can't connect to wifi AP (LP: #1727228)
  + - ath9k: add MSI support
  + - ath9k: add a quirk to set use_msi automatically
+
+ * [P9,Power NV][Witherspoon][Ubuntu 18.04][Perf] : PMU events by name it is
  + not listed under perf list (LP: #1755470)
+ - iperf vendor events: Use more flexible pattern matching for CPU
  + identification for mapfile.csv
+
+ * zed process consuming 100% cpu (LP: #1751796)
+ - SAUCE: Fix ioctl loop-spin in zed (LP: #1751796)
+
+ * Bionic update to 4.15.13 stable release (LP: #1758886)
  + - scsi: megaraid_sas: Do not use 32-bit atomic request descriptor for Ventura
    + controllers
  + - staging: android: ashmem: Fix possible deadlock in ashmem_ioctl
  + - drm/amdgpu: use polling mem to set SDMA3 wptr for VF
  + - Bluetooth: hci_qca: Avoid setup failure on missing rampatch
  + - Bluetooth: btqcomsmd: Fix skb double free corruption
  + - cpufreq: longhaul: Revert transition_delay_us to 200 ms
  + - media: c8sectpfe: fix potential NULL pointer dereference in
    + c8sectpfe_timer_interrupt
  + - drm/msm: fix leak in failed get_pages
  + - IB/ipoib: Warn when one port fails to initialize
  + - RDMA/ipwpm: Fix uninitialized error code in iwpm_send_mapinfo()
  + - hv_netvsc: Fix the receive buffer size limit
  + - hv_netvsc: Fix the TX/RX buffer default sizes
  + - tcp: allow TLP in ECN CWR
  + - spi: sh-msiof: Avoid writing to registers from spi_master.setup()
  + - libbpf: prefer global symbols as bpf program name source
  + - rtlwifi: rtl_pci: Fix the bug when inactiveps is enabled.
  + - rtlwifi: always initialize variables given to RT_TRACE()
  + - media: bt8xx: Fix err 'bt878_probe()'
+ - ath10k: handling qos at STA side based on AP WMM enable/disable
+ - media: [RESEND] media: dvb-frontends: Add delay to Si2168 restart
+ - qmi_wwan: set FLAG_SEND_ZLP to avoid network initiated disconnect
+ - tty: goldfish: Enable 'earlycon' only if built-in
+ - serial: 8250_dw: Disable clock on error
+ - cros_ec: fix nul-termination for firmware build info
+ - watchdog: Fix potential kref imbalance when opening watchdog
+ - watchdog: Fix kref imbalance seen if handle_boot_enabled=0
+ - platform/chrome: Use proper protocol transfer function
+ - dmaengine: zynqmp_dma: Fix race condition in the probe
+ - drm/tilcdc: ensure nonatomic iowrite64 is not used
+ - mmc: avoid removing non-removable hosts during suspend
+ - mmc: block: fix logical error to avoid memory leak
+ - /dev/mem: Add bounce buffer for copy-out
+ - net: phy: meson-gxl: check phy_write return value
+ - sfp: fix EEPROM reading in the case of non-SFF8472 SFPs
+ - sfp: fix non-detection of PHY
+ - media: s5p-mfc: Fix lock contention - request_firmware() once
+ - rtc: ac100: Fix multiple race conditions
+ - IB/ipoib: Avoid memory leak if the SA returns a different DGID
+ - RDMA/cma: Use correct size when writing netlink stats
+ - IB/umem: Fix use of npages/nmap fields
+ - iser-target: avoid reinitializing rdma contexts for isert commands
+ - bpf/group: fix a verification error for a CGROUP_DEVICE type prog
+ - vgacon: Set VGA struct resource types
+ - omapdrm: panel: fix compatible vendor string for td028ttce1
+ - mmc: sdhci-xenon: wait 5ms after set 1.8V signal enable
+ - drm/omap: DMM: Check for DMM readiness after successful transaction commit
+ - pty: cancel pty slave port buf's work in tty_release
+ - PCI: designware-ep: Fix ->get_msi() to check MSI_EN bit
+ - PCI: endpoint: Fix find_first_zero_bit() usage
+ - PCI: rcar: Handle rcar_pci_parse_request_of_pci_ranges() failures
+ - media: davinci: fix a debug printk
+ - clk: check ops pointer on clock register
+ - dt-bindings: display: panel: Fix compatible string for Toshiba LT089AC29000
+ - clk: use round rate to bail out early in set_rate
+ - pinctrl: Really force states during suspend/resume
+ - pinctrl: rockchip: enable clock when reading pin direction register
+ - jommu/vt-d: clean up pr_irq if request_threaded_irq fails
+ - ip6_vti: adjust vti mtu according to mtu of lower device
+ - ip_gre: fix error path when erspan_rcv failed
+ - ip_gre: fix potential memory leak in erspan_rcv
+ - soc: qcom: smm: fix child-node lookup
+ - RDMA/ocrdma: Fix permissions for OCRDMA_RESET_STATS
+ - ARM: dts: aspeed-evb: Add unit name to memory node
+ - nfsd4: permit layoutget of executable-only files
+ - clk: at91: pmc: Wait for clocks when resuming

Open Source Used In 5GaaS Edge AC-4 19493
+ - clk: Don't touch hardware when reparenting during registration
+ - clk: axi-clkgen: Correctly handle noclaim bit in recalc_rate()
+ - clk: si5351: Rename internal plls to avoid name collisions
+ - crypto: artp6e - set correct iv size for gcm(aes)
+ - hwrng: core - Clean up RNG list when last hwrng is unregistered
+ - dmaengine: ti-dma-crossbar: Fix event mapping for TPCC_EVT_MUX_60_63
+ - IB/mlx5: Fix integer overflows in mlx5_ib_create_srq
+ - IB/mlx5: Fix out-of-bounds read in create_raw_packet_qp_rq
+ - RDMA/vmw_pvdma: Fix usage of user response structures in ABI file
+ - serial: 8250_pci: Don't fail on multiport card class
+ - RDMA/core: Do not use invalid destination in determining port reuse
+ - clk: migrate the count of orphaned clocks at init
+ - RDMA/ucma: Fix access to non-initialized CM_ID object
+ - RDMA/ucma: Don't allow join attempts for unsupported AF family
+ - Linux 4.15.13

+ * Ubuntu18.04:PowerPC - Set Transparent Huge Pages (THP) by default to
  "always" (LP: #1753708)
+ - Config: Set TRANSPARENT_HUGEPAGE_ALWAYS=y on ppc64el
+ * Bionic update to 4.15.12 stable release (LP: #1757465)
+ - x86/cpufeatures: Add Intel Total Memory Encryption cpufeature
+ - x86/cpufeatures: Add Intel PCONFIG cpufeature
+ - selftests/x86/entry_from_vm86: Exit with 1 if we fail
+ - selftests/x86/entry_from_vm86: Add test cases for POPF
+ - x86/vm86/32: Fix POPF emulation
+ - x86/speculation, objtool: Annotate indirect calls/jumps for objtool on
  32-bit kernels
+ - x86/speculation: Remove Skylake C2 from Speculation Control microcode
+ blacklist
+ - KVM: x86: Fix device passthrough when SME is active
+ - x86/mm: Fix vmalloc_fault to use pXd_large
+ - parisc: Handle case where flush_cache_range is called with no context
+ - ALSA: pcm: Fix UAF in snd_pcm_oss_get_formats()
+ - ALSA: hda - Revert power_save option default value
+ - ALSA: seq: Fix possible UAF in snd_seq_check_queue()
+ - ALSA: seq: Clear client entry before deleting else at closing
+ - drm/nouveau/bl: Fix oops on driver unbind
+ - drm/nouveau/mmu: ALIGN_DOWN correct variable
+ - drm/amdgpu: fix prime teardown order
+ - drm/radeon: fix prime teardown order
+ - drm/amdgpu/dce: Don't turn off DP sink when disconnected
+ - fs: Teach path_connected to handle nfs filesystems with multiple roots.
+ - KVM: arm/arm64: Reduce verbosity of KVM init log
+ - KVM: arm/arm64: Reset mapped IRQs on VM reset
+ - kvm: arm/arm64: vgic-v3: Tighten synchronization for guests using v2 on v3
+ - KVM: arm/arm64: vgic: Don't populate multiple LRs with the same vintid
+ - lock_parent() needs to recheck if dentry got __dentry_kill'ed under it
- fs/aio: Add explicit RCU grace period when freeing kioctx
- fs/aio: Use RCU accessors for kioctx_table->table[]
- RDMAVT: Fix synchronization around percpu_ref
- irqchip/gic-v3-its: Ensure nr_itcs >= nr_lpis
- nvme: fix subsystem multiple controllers support check
- xfs: preserve i_rdev when recycling a reclaimable inode
- btrfs: Fix NULL pointer exception in find_bio_stripe
- btrfs: add missing initialization in btrfs_check_shared
- btrfs: alloc_chunk: fix DUP stripe size handling
- btrfs: Fix use-after-free when cleaning up fs_devs with a single stale device
- btrfs: remove spurious WARN_ON(ref->count < 0) in find_parent_nodes
- btrfs: Fix memory barriers usage with device stats counters
- scsi: qla2xxx: Fix smatch warning in qla25xx_delete_[rsp|req]_que
- scsi: qla2xxx: Fix NULL pointer access for fcport structure
- scsi: qla2xxx: Fix logo flag for qlt_free_session_done()
- scsi: qla2xxx: Fix crashes in qla2x00_probe_one on probe failure
- usb: dwc2: fix STM32F7 USB OTG HS compatible
- dt-bindings: usb: fix the STM32F7 DWC2 OTG HS core binding
- USB: gadget: udc: Add missing platform_device_put() on error in bdc_pci_probe()
- usb: dwc3: Fix GDBGFIOSPACE_TYPE values
- usb: dwc3: core: Power-off core/PHYs on system_suspend in host mode
- usb: dwc3: of-simple: fix oops by unbalanced clk disable call
- usb: gadget: udc: renesas_usb3: fix oops in renesas_usb3_remove()
- phy: phy-brcm-usb: Fix two DT properties to match bindings doc
- phy: phy-brcm-usb-init: Some Low Speed keyboards fail on 7271
- phy: phy-brcm-usb-init: DRD mode can cause crash on startup
- phy: phy-brcm-usb-init: Power down USB 3.0 PHY when XHCI disabled
- Linux 4.15.12

* cxl: Fix timebase synchronization status on POWER9 missing (CAPI)
  (LP: #1757228)
* cxl: Fix timebase synchronization status on P9

* [Feature][GLK] Enable L2 CDP (Code and Data Prioritization) (LP: #1737873)
- x86/intel_rdt: Enumerate L2 Code and Data Prioritization (CDP) feature
- x86/intel_rdt: Add command line parameter to control L2_CDP

* [Feature] Crystal Ridge-Restrict DAX to configurations with struct page
  (LP: #1751724)
- mm, dax: introduce pfnt_i_special()
- ext2: auto disable dax instead of failing mount
- ext4: auto disable dax instead of failing mount
- dax: require 'struct page' by default for filesystem dax
- Config: Enable CONFIG_FS_DAX_LIMITED

* Bionic update to 4.15.11 stable release (LP: #1756978)
+ x86: Treat R_X86_64_PLT32 as R_X86_64_PC32
+ ASoC: sun4i-i2s: Fix RX slot number of SUN8I
+ ASoC: sgtl5000: Fixsuspend/resume
+ ASoC: wm_adspsp: For TLV controls only register TLV get/set
+ ASoC: rt5651: Fix regcache sync errors on resume
+ usb: host: xhci-rear: add support for r8a77965
+ xhci: Fix front USB ports on ASUS PRIME B350M-A
+ xhci: fix endpoint context tracer output
+ serial: sh-sci: prevent lockup on full TTY buffers
+ tty/serial: atmel: add new version check for usart
+ uas: fix comparison for error code
+ staging: comedi: fix comedi_nsamples_left.
+ staging: android: ashmem: Fix lockdep issue during llseek
+ scsi: sd_zbc: Fix potential memory leak
+ USB: storage: Add JMicron bridge 152d:2567 to unusual_devs.h
+ usbip: vudc: fix null pointer dereference on udc->lock
+ usb: quirks: add control message delay for 1b1c:1b20
+ usb: usbmon: Read text within supplied buffer size
+ usb: gadget: f_fs: Fix use-after-free in ffs_fs_kill_sb()
+ usb: dwc3: Fix lock-up on ID change during system suspend/resume
+ serial: 8250_pci: Add Brainboxes UC-260 4 port serial device
+ serial: core: mark port as initialized in autoconfig
+ earlycon: add reg-offset to physical address before mapping
+ dm mpath: fix passing integrity data
+ - Revert "btrfs: use proper endianness accessors for super_copy"
+ gfs2: Clean up {lookup,fillup}_metapath
+ gfs2: Fixes to "Implement iomap for block_map" (2)
+ drm/panel: rpi-touchscreen: propagate errors in rpi_touchscreen_i2c_read()
+ spi: imx: Fix failure path leak on GPIO request error correctly
+ HID: multouch: Only look at non touch fields in first packet of a frame
+ KVM: PPC: Book3S HV: Avoid shifts by negative amounts
+ drm/edid: set ELD connector type in drm_edid_to_eld()
+ dma-buf/fence: Fix lock inversion within dma-fence-array
+ video/hdmi: Allow "empty" HDMI infoframes
+ KVM: PPC: Book3S HV: Fix typo in kvmppc_hv_get_dirty_log_radix()
+ HID: elo: clear BTN_LEFT mapping
+ iwllifi: mvn: rs: don't override the rate history in the search cycle
+ ARM: dts: koelsch: Move cec_clock to root node
+ clk: meson: gxbb: fix wrong clock for SARADC/SANA
+ ARM: dts: exynos: Correct Trats2 panel reset line
+ drm/amdgpus: fix get_max_engine_clock_in_mhz
+ staging: rt8822be: fix missing null check on dev_alloc_skb return
+ typep: tcpm: fusb302: Resolve out of order messaging events
+ USB: ledtrig-usbport: fix of-node leak
+ dt-bindings: serial: Add common rs485 binding for RTS polarity
+ sched: Stop switched_to_rt() from sending IPIs to offline CPUs
+ sched: Stop resched_cpu() from sending IPIs to offline CPUs
+ crypto: chelsio - Fix an error code in chcr_hash_dma_map()
+ - crypto: ecc - Fix NULL pointer deref. on no default_rng
+ - crypto: keywrap - Add missing ULL suffixes for 64-bit constants
+ - crypto: cavium - fix memory leak on info
+ - test_firmware: fix setting old custom fw path back on exit
+ - drm/vblank: Fix vblank timestamp debugs
+ - net: ieee802154: adf7242: Fix bug if defined DEBUG
+ - rtc: brcmstb-waketime: fix error handling in brcmstb_waketmr_probe()
+ - perf report: Fix -D output for user metadata events
+ - net: xfrm: allow clearing socket xfrm policies.
+ - gpiolib: don't allow OPEN_DRAIN & OPEN_SOURCE flags simultaneously
+ - mtd: nand: fix interpretation of NAND_CMD_NONE in nand_command[lp]()
+ - net: thunderx: Set max queue count taking XDP_TX into account
+ - ARM: dts: am335x-pepper: Fix the audio CODEC's reset pin
+ - ARM: dts: omap3-n900: Fix the audio CODEC's reset pin
+ - mtd: nand: ifc: update buflen mask for ver >= 2.0.0
+ - usersns: Don't fail follow_automount based on s_user_ns
+ - xfrm: Fix xfrm_replay_overflow_offload_esn
+ - leds: pm8058: Silence pointer to integer size warning
+ - bpf: fix stack state printing in verifier log
+ - power: supply: sbs-message: double left shift bug in sbsm_select()
+ - power: supply: ab8500_charger: Fix an error handling path
+ - power: supply: ab8500_charger: Bail out in case of error in
    'ab8500_charger_init_hw_registers()
+ - drm/etnaviv: make THERMAL selectable
+ - iio: adc: ina2xx: Shift bus voltage register to mask flag bits
+ - iio: health: max30102: Add power enable parameter to get_temp function
+ - ath10k: update tdlots teardown state to target
+ - cpufreq: Fix governor module removal race
+ - KVM: X86: Restart the guest when insn_len is zero and SEV is enabled
+ - drm/amdgpu:fix random missing of FLR NOTIFY
+ - scsi: ses: don't ask for diagnostic pages repeatedly during probe
+ - pwm: stmpe: Fix wrong register offset for hwpwm=2 case
+ - drm/sun4i: Fix format mask in DE2 driver
+ - pinctrl: sh-pfc: r8a7791: Add can_clk function
+ - pinctrl: sh-pfc: r8a7795-es1: Fix MOD_SEL1 bit[25:24] to 0x3 when using
    STP_PSEN_1_D
+ - perf annotate: Fix unnecessary memory allocation for s390x
+ - perf annotate: Fix objdump comment parsing for Intel mov disassembly
+ - iwlwifi: mvm: avoid dumping assert log when device is stopped
+ - drm/amdgpu:fix virtual dce bug
+ - drm/amdgpu: fix amdgpu_sync_resv v2
+ - bnxt_en: Uninitialized variable in bnxt_tc_parse_actions()
+ - clk: qcom: msm8916: fix mnd_width for codec_digcodec
+ - mwifiex: cfg80211: do not change virtual interface during scan processing
+ - ath10k: fix invalid STS_CAP_OFFSET_MASK
+ - tools/usbip: fixes build with musl libc toolchain
+ - spi: sun6i: disable/unprepare clocks on remove
+ - bnxt_en: Don't print "Link speed -1 no longer supported" messages.
+ - scsi: core: scsi_get_device_flags_keyed(): Always return device flags
+ - scsi: devinfo: apply to HP XP the same flags as Hitachi VSP
+ - scsi: dh: add new rdac devices
+ - clk: renesas: r8a77970: Add LVDS clock
+ - staging: fsl-dpaa2/eth: Fix access to FAS field
+ - media: vsp1: Prevent suspending and resuming DRM pipelines
+ - dm raid: fix raid set size revalidation
+ - media: cpi2: Fix a couple off by one bugs
+ - media: davinci: vpif_capture: add NULL check on devm_kzalloc return value
+ - virtio_net: Disable interrupts if napi_complete_done rescheduled napi
+ - net: sched: drop qdisc_reset from dev_graft_qdisc
+ - veth: set peer GSO values
+ - drm/amdkfd: Fix memory leaks in kfd topology
+ - powerpc/64: Don't trace irqs-off at interrupt return to soft-disabled
+   context
+ - arm64: dts: renesas: salvator-common: Add EthernetAVB PHY reset
+ - apg/intel: Flush all chipset writes after updating the GGTT
+ - mac80211_hwsim: enforce PS_MANUAL_POLL to be set after PS_ENABLED
+ - mac80211: remove BUG() when interface type is invalid
+ - crypto: caam/qi - use correct print specifier for size_t
+ - ASoC: nuc900: Fix a loop timeout test
+ - mmc: mmc_test: Ensure command queue is disabled for testing
+ - Fix misannotated out-of-line _copy_to_user()
+ - ipvlan: add L2 check for packets arriving via virtual devices
+ - rcutorture/confignit: Fix build directory error message
+ - locking/locktorture: Fix num reader/writer corner cases
+ - ima: relax requiring a file signature for new files with zero length
+ - IB/mlx5: revisit -Wmaybe-uninitialized warning
+ - dmaengine: qcom_hidma: check pending interrupts
+ - drm/i915/glk: Disable Guc and HuC on GLK
+ - Linux 4.15.11
+ - Config: Enable CONFIG_DRM_ETNAVIV_THERMAL=y
+ * [FFE][Feature] KVM CLX avx512_vnni (LP: #1739665)
  + - KVM: x86: add support for UMIP
  + - KVM: Expose new cpu features to guest
+ * Ubuntu18.04[P9 DD2.2 Boston]:Unable to boot power8 compat mode
  + guests(ubuntu14.04.5) (kvm) (LP: #1756254)
  + - KVM: PPC: Book3S HV: Allow HPT and radix on the same core for POWER9 v2.2
  + - Allow hugepage backing for “p8compat” mode kvm guests (LP: #1754206)
  + - KVM: PPC: Book3S HV: Fix VRMA initialization with 2MB or 1GB memory backing
+ * [Bug][KVM][Crystal Ridge] Terrible performance of vNVDIMM on QEMU with
  + device DAX backend (LP: #1745899)
  + - x86/mm: add a function to check if a pfno is UC/UC-/WC
  + - KVM: MMU: consider host cache mode in MMIO page check

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Open Source Used In 5GaaS Edge AC-4 19498
* nfp: read ME frequency from vNIC ctrl memory (LP: #1752818)
- nfp: add TLV capabilities to the BAR
- nfp: read ME frequency from vNIC ctrl memory
- nfp: fix TLV offset calculation

* Miscellaneous Ubuntu changes
- [Packaging] skip cloud tools packaging when not building package
- [Packaging] final-checks -- remove check for empty retpoline files

-- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Mon, 02 Apr 2018 15:43:20 -0300

+ linux (4.15.0-13.14) bionic; urgency=medium
+ *
+  * linux: 4.15.0-13.14 -proposed tracker (LP: #1756408)
+ *
+  * devpts: handle bind-mounts (LP: #1755857)
+  - SAUCE: devpts: hoist out check for DEVPTS_SUPER_MAGIC
+  - SAUCE: devpts: resolve devpts bind-mounts
+  - SAUCE: devpts: comment devpts_mntget()
+  - SAUCE: selftests: add devpts selftests

+  * [bionic][arm64] d-i: add hisi_sas_v3_hw to scsi-modules (LP: #1756103)
+  - d-i: add hisi_sas_v3_hw to scsi-modules
+ *
+  * [Bionic][ARM64] enable ROCE and HNS3 driver support for hip08 SoC
+ (LP: #1756097)
+  - RDMA/hns: Refactor eq code for hip06
+  - RDMA/hns: Add eq support of hip08
+  - RDMA/hns: Add detailed comments for mb() call
+  - RDMA/hns: Add rq inline data support for hip08 RoCE
+  - RDMA/hns: Update the usage of sr_max and rr_max field
+  - RDMA/hns: Set access flags of hip08 RoCE
+  - RDMA/hns: Filter for zero length of sge in hip08 kernel mode
+  - RDMA/hns: Fix QP state judgement before sending work requests
+  - RDMA/hns: Assign dest_qp when deregistering mr
+  - RDMA/hns: Fix endian problems around imm_data and rkey
+  - RDMA/hns: Assign the correct value for tx_cqn
+  - RDMA/hns: Create gsi qp in hip08
+  - RDMA/hns: Add gsi qp support for modifying qp in hip08
+  - RDMA/hns: Fill sq wqe context of ud type in hip08
+  - RDMA/hns: Assign zero for pkey_index of wc in hip08
+  - RDMA/hns: Update the verbs of polling for completion
+  - RDMA/hns: Set the guid for hip08 RoCE device
+  - net: hns3: Refactor of the reset interrupt handling logic
+  - net: hns3: Add reset service task for handling reset requests
+  - net: hns3: Refactors the requested reset & pending reset handling code
+ - net: hns3: Add mailbox support to VF driver
+ - net: hns3: Add HNS3 VF HCL (Hardware Compatibility Layer) Support
+ - net: hns3: Add HNS3 VF driver to kernel build framework
+ - net: hns3: Unified HNS3 {VF|PF} Ethernet Driver for hip08 SoC
+ - net: hns3: Add mailbox support to PF driver
+ - net: hns3: Change PF to add ring-vec binding & resetQ to mailbox
+ - net: hns3: Add mailbox interrupt handling to PF driver
+ - net: hns3: add support to query tqp number
+ - net: hns3: add support to modify tqp number
+ - net: hns3: change the returned tqp number by ethtool -x
+ - net: hns3: free the ring_data structure when change tqp
+ - net: hns3: get rss_size_max from configuration but not hardcode
+ - net: hns3: add a mask initialization for mac_vlan table
+ - net: hns3: add vlan offload config command
+ - net: hns3: add ethtool related offload command
+ - net: hns3: add handling vlan tag offload in bd
+ - net: hns3: cleanup mac auto-negotiation state query
+ - net: hns3: fix for getting auto-negotiation state in hclge_get_autoneg
+ - net: hns3: add support for set_pauseparam
+ - net: hns3: add support to update flow control settings after autoneg
+ - net: hns3: add Asym Pause support to phy default features
+ - net: hns3: add support for querying advertised pause frame by ethtool ethx
+ - net: hns3: Increase the default depth of bucket for TM shaper
+ - net: hns3: change TM sched mode to TC-based mode when SRIOV enabled
+ - net: hns3: hns3_get_channels() can be static
+ - net: hns3: Add ethtool interface for vlan filter
+ - net: hns3: Disable VFs change rxvlan offload status
+ - net: hns3: Unify the strings display of packet statistics
+ - net: hns3: Fix spelling errors
+ - net: hns3: Remove repeat statistic of rx_errors
+ - net: hns3: Modify the update period of packet statistics
+ - net: hns3: Mask the packet statistics query when NIC is down
+ - net: hns3: Fix an error of total drop packet statistics
+ - net: hns3: Fix a loop index error of tqp statistics query
+ - net: hns3: Fix an error macro definition of HNS3_TQP_STAT
+ - net: hns3: Remove a useless member of struct hns3_stats
+ - net: hns3: Add packet statistics of netdev
+ - net: hns3: Fix a response data read error of tqp statistics query
+ - net: hns3: fix for updating fc_mode_last_time
+ - net: hns3: fix for setting MTU
+ - net: hns3: fix for changing MTU
+ - net: hns3: add MTU initialization for hardware
+ - net: hns3: fix for not setting pause parameters
+ - net: hns3: remove redundant semicolon
+ - net: hns3: Add more packet size statistics
+ - Revert "net: hns3: Add packet statistics of netdev"
+ - net: hns3: report the function type the same line with hns3_nic_get_stats64
+ - net: hns3: add ethtool_ops.get_channels support for VF
+ - net: hns3: remove TSO config command from VF driver
+ - net: hns3: add ethtool_ops.set_coalesce support to PF
+ - net: hns3: add ethtool_ops.get_coalesce support to PF
+ - net: hns3: refactor interrupt coalescing init function
+ - net: hns3: refactor GL update function
+ - net: hns3: remove unused GL setup function
+ - net: hns3: change the unit of GL value macro
+ - net: hns3: add int_gl_idx setup for TX and RX queues
+ - net: hns3: add feature check when feature changed
+ - net: hns3: check for NULL function pointer in hns3_nic_set_features
+ - net: hns: Fix for variable may be used uninitialized warnings
+ - net: hns3: add support for get_regs
+ - net: hns3: add manager table initialization for hardware
+ - net: hns3: add ethtool -p support for fiber port
+ - net: hns3: add net status led support for fiber port
+ - net: hns3: converting spaces into tabs to avoid checkpatch.pl warning
+ - net: hns3: add get/set_coalesce support to VF
+ - net: hns3: add int_gl_idx setup for VF
+ - [Config]: enable CONFIG_HNS3_HCLGEVF as module.

+ * [Bionic][ARM64] add RAS extension and SDEI features (LP: #1756096)
+ - KVM: arm64: Store vcpu on the stack during __guest_enter()
+ - KVM: arm/arm64: Convert kvm_host_cpu_state to a static per-cpu allocation
+ - KVM: arm64: Change hyp_panic(js dependency on tpidr_el2
+ - arm64: alternatives: use tpidr_el2 on VHE hosts
+ - KVM: arm64: Stop save/restoring host tpidr_el1 on VHE
+ - Docs: dt: add devicetree binding for describing arm64 SDEI firmware
+ - firmware: arm_sdei: Add driver for Software Delegated Exceptions
+ - arm64: Add vmap_stack header file
+ - arm64: uaccess: Add PAN helper
+ - arm64: kernel: Add arch-specific SDEI entry code and CPU masking
+ - firmware: arm_sdei: Add support for CPU and system power states
+ - firmware: arm_sdei: add support for CPU private events
+ - arm64: acpi: Remove __init from acpi_psci_use_hvc() for use by SDEI
+ - firmware: arm_sdei: Discover SDEI support via ACPI
+ - arm64: sysreg: Move to use definitions for all the SCTLR bits
+ - arm64: cpufeature: Detect CPU RAS Extentions
+ - arm64: kernel: Survive corrected RAS errors notified by SError
+ - arm64: Unconditionally enable IESB on exception entry/return for firmware-first
+ - arm64: kernel: Prepare for a DISR user
+ - KVM: arm/arm64: mask/unmask daif around VHE guests
+ - KVM: arm64: Save/Restore guest DISR_EL1
+ - KVM: arm64: Save ESR_EL2 on guest SError
+ - KVM: arm64: Handle RAS SErrors from EL1 on guest exit
+ - KVM: arm64: Handle RAS SErrors from EL2 on guest exit
+ - KVM: arm64: Emulate RAS error registers and set HCR_EL2's TERR & TEA
+ - [Config]: enable RAS_EXTN and ARM_SDE_INTERFACE
+ + * [Bionic][ARM64] PCI and SAS driver patches for hip08 SoCs (LP: #1756094)
   + - scsi: hisi_sas: fix dma_unmap_sg() parameter
   + - scsi: ata: enhance the definition of SET MAX feature field value
   + - scsi: hisi_sas: relocate clearing ITCT and freeing device
   + - scsi: hisi_sas: optimise port id refresh function
   + - scsi: hisi_sas: some optimizations of host controller reset
   + - scsi: hisi_sas: modify hisi_sas_dev_gone() for reset
   + - scsi: hisi_sas: add an mechanism to do reset work synchronously
   + - scsi: hisi_sas: change nq process for v3 hw
   + - scsi: hisi_sas: add RAS feature for v3 hw
   + - scsi: hisi_sas: add some print to enhance debugging
   + - scsi: hisi_sas: improve int_chnl_int_v2_hw() consistency with v3 hw
   + - scsi: hisi_sas: add v2 hw port AXI error handling support
   + - scsi: hisi_sas: use an general way to delay PHY work
   + - scsi: hisi_sas: do link reset for some CHL_INT2 ints
   + - scsi: hisi_sas: judge result of internal abort
   + - scsi: hisi_sas: add internal abort dev in some places
   + - scsi: hisi_sas: fix SAS_QUEUE_FULL problem while running IO
   + - scsi: hisi_sas: re-add the llid_port_deformed()
   + - scsi: hisi_sas: add v3 hw suspend and resume
   + - scsi: hisi_sas: Change frame type for SET MAX commands
   + - scsi: hisi_sas: make local symbol host_attrs static
   + - scsi: hisi_sas: fix a bug in hisi_sas_dev_gone()
   + - SAUCE: scsi: hisi_sas: config for hip08 ES
   + - SAUCE: scsi: hisi_sas: export device table of v3 hw to userspace
   + - PM / core: Add LEAVE_SUSPENDED driver flag
   + - PCI / PM: Support for LEAVE_SUSPENDED driver flag
   + - PCI/AER: Skip recovery callbacks for correctable errors from ACPI APEI
   + - PCI/ASPM: Calculate LTR_L1.2_THRESHOLD from device characteristics
   + - PCI/ASPM: Enable Latency Tolerance Reporting when supported
   + - PCI/ASPM: Unexport internal ASPM interfaces
   + - PCI: Make PCI_SCAN_ALL_PCIE_DEVS work for Root as well as Downstream Ports
   + - PCI/AER: Return error if AER is not supported
   + - PCI/DPC: Enable DPC only if AER is available
+ + + * [CVE] Spectre: System Z {kernel} UBUNTU18.04 (LP: #1754580)
   + - s390: scrub registers on kernel entry and KVM exit
   + - s390: add optimized array_index_mask_nospec
   + - s390/alternative: use a copy of the facility bit mask
   + - s390: add options to change branch prediction behaviour for the kernel
   + - s390: run user space and KVM guests with modified branch prediction
   + - s390: introduce execute-trampolines for branches
   + - s390: Replace IS_ENABLED(EXPOLINE_*) with IS_ENABLED(CONFIG_EXPOLINE_*)
   + - s390: do not bypass BPENTER for interrupt system calls
   + - s390/entry.S: fix spurious zeroing of r0
+ +
* s390/crypto: Fix kernel crash on aes_s390 module remove (LP: #1753424)
+ SAUCE: s390/crypto: Fix kernel crash on aes_s390 module remove.
+ [Feature] Update Ubuntu 18.04 lpfc FC driver with 32/64GB HBA support and bug fixes (LP: #1752182)
+ scsi: lpfc: FLOGI failures are reported when connected to a private loop.
+ scsi: lpfc: Expand WQE capability of every NVME hardware queue
+ scsi: lpfc: Handle XRI_ABORTED_CQE in soft IRQ
+ scsi: lpfc: Fix NVME LS abort_xri
+ scsi: lpfc: Raise maximum NVME sg list size for 256 elements
+ scsi: lpfc: Driver fails to detect direct attach storage array
+ scsi: lpfc: Fix display for debugfs queInfo
+ scsi: lpfc: Adjust default value of lpfc_nvmet_mrq
+ scsi: lpfc: Fix ndlp ref count for pt2pt mode issue RSCN
+ scsi: lpfc: Linux LPFC driver does not process all RSCNs
+ scsi: lpfc: correct port registrations with nvme_fc
+ scsi: lpfc: Correct driver deregistrations with host nvme transport
+ scsi: lpfc: Fix crash during driver unload with running nvme traffic
+ scsi: lpfc: Fix driver handling of nvme resources during unload
+ scsi: lpfc: small sg cnt cleanup
+ scsi: lpfc: Fix random heartbeat timeouts during heavy IO
+ scsi: lpfc: update driver version to 11.4.0.5
+ scsi: lpfc: Fix -EOVERFLOW behavior for NVMET and defer_rcv
+ scsi: lpfc: Fix receive PRLI handling
+ scsi: lpfc: Increase SCSI CQ and WQ sizes.
+ scsi: lpfc: Fix SCSI LUN discovery when SCSI and NVME enabled
+ scsi: lpfc: Fix issues connecting with nvme initiator
+ scsi: lpfc: Fix infinite wait when driver unregisters a remote NVME port.
+ scsi: lpfc: Beef up stat counters for debug
+ scsi: lpfc: update driver version to 11.4.0.6
+ scsi: lpfc: correct sg_seg_cnt attribute min vs default
+ scsi: scsi_transport_fc: fix typos on 64/128 GBit define names
+ scsi: lpfc: don't dereference localport before it has been null checked
+ scsi: lpfc: fix a couple of minor indentation issues
+ treewide: Use DEVICE_ATTR_RW
+ treewide: Use DEVICE_ATTR_RO
+ treewide: Use DEVICE_ATTR_WO
+ scsi: lpfc: Fix frequency of Release WQE CQE
+ scsi: lpfc: Increase CQ and WQ sizes for SCSI
+ scsi: lpfc: move placement of target destroy on driver detach
+ scsi: lpfc: correct debug counters for abort
+ scsi: lpfc: Add WQ Full Logic for NVME Target
+ scsi: lpfc: Fix PRLI handling when topology type changes
+ scsi: lpfc: Fix IO failure during hba reset testing with nvme io.
+ scsi: lpfc: Fix RQ empty firmware trap
+ scsi: lpfc: Allow set of maximum outstanding SCSI cmd limit for a target
+ scsi: lpfc: Fix soft lockup in lpfc worker thread during LIP testing
+ scsi: lpfc: Fix issue_lip if link is disabled
+ - scsi: lpfc: Indicate CONF support in NVMe PRLI
+ - scsi: lpfc: Fix SCSI io host reset causing kernel crash
+ - scsi: lpfc: Validate adapter support for SRIU option
+ - scsi: lpfc: Fix header inclusion in lpfc_nvmet
+ - scsi: lpfc: Treat SCSI Write operation Underruns as an error
+ - scsi: lpfc: Fix nonrecovery of NVME controller after cable swap.
+ - scsi: lpfc: update driver version to 11.4.0.7
+ - scsi: lpfc: Update 11.4.0.7 modified files for 2018 Copyright
+ - scsi: lpfc: Rework lpfc to allow different sli4 cq and eq handlers
+ - scsi: lpfc: Rework sli4 doorbell infrastructure
+ - scsi: lpfc: Add SLI-4 if_type=6 support to the code base
+ - scsi: lpfc: Rework sli4 doorbell infrastructure
+ - scsi: lpfc: Add SLI-4 if_type=6 support to the code base
+ - scsi: lpfc: Add push-to-adapter support to sli4
+ - scsi: lpfc: Add PCI Ids for if_type=6 hardware
+ - scsi: lpfc: Add 64G link speed support
+ - scsi: lpfc: Add if_type=6 support for cycling valid bits
+ - scsi: lpfc: Enable fw download on if_type=6 devices
+ - scsi: lpfc: Add embedded data pointers for enhanced performance
+ - scsi: lpfc: Fix nvme embedded io length on new hardware
+ - scsi: lpfc: Work around NVME cmd iu SGL type
+ - scsi: lpfc: Update driver version to 12.0.0.0
+ - scsi: lpfc: Change Copyright of 12.0.0.0 modified files to 2018
+ - scsi: lpfc: use __raw_writeX on DPP copies
+ - scsi: lpfc: Add missing unlock in WQ full logic
+
+ * CVE-2018-8043
+ - net: phy: mdio-bcm-unimac: fix potential NULL dereference in
  unimac_mdio_probe()
+
+ * Bionic update to 4.15.10 stable release (LP: #1756100)
+ - Revert "UBUNTU: SAUCE: ALSA: hda/realtek - Add support headset mode for DELL
  WYSE"
+ - RDMA/ucma: Limit possible option size
+ - RDMA/ucma: Check that user doesn't overflow QP state
+ - RDMA/mlx5: Fix integer overflow while resizing CQ
+ - bpf: cpumap: use GFP_KERNEL instead of GFP_ATOMIC in __cpu_map_entry_alloc()
+ - IB/uverbs: Improve lockdep_check
+ - mac80211_hwsm: don't use WQ_MEM_RECLAIM
+ - net/sm: fix NULL pointer dereference on sock_create_kern() error path
+ - regulator: stm32-vrefbuf: fix check on ready flag
+ - drm/i915: Check for fused or unused pipes
+ - drm/i915/audio: fix check for av_enc_map overflow
+ - drm/i915: Fix rsvd2 mask when out-fence is returned
+ - drm/i915: Clear the in-use marker on execbuf failure
+ - drm/i915: Disable DC states around GMBUS on GLK
+ - drm/i915: Update watermark state correctly in sanitize_watermarks
+ - drm/i915: Try EDID bitbanging on HDMI after failed read
+ - drm/i915/perf: fix perf stream opening lock
+ - scsi: core: Avoid that ATA error handling can trigger a kernel hang or oops
- scsi: qla2xxx: Fix NULL pointer crash due to active timer for ABTS
- drm/i915: Always call to intel_display_set_init_power() in resume_early.
- workqueue: Allow retrieval of current task's work struct
- drm: Allow determining if current task is output poll worker
- drm/nouveau: Fix deadlock on runtime suspend
- drm/radeon: Fix deadlock on runtime suspend
- drm/amdgpu: Fix deadlock on runtime suspend
- drm/nouveau: prefer XBGR2101010 for addfb ioctl
- drm/amd/powerplay/smu7: allow mclk switching with no displays
- drm/amd/powerplay/vega10: allow mclk switching with no displays
- Revert "drm/radeon/pm: autoswitch power state when in balanced mode"
- drm/amd/display: check for ipp before calling cursor operations
- drm/radeon: insist on 32-bit DMA for Cedar on PPC64/PPC64LE
- drm/amd/powerplay: fix power over limit on Fiji
- drm/amd/display: Default HDMI6G support to true. Log VBIOS table error.
- drm/amdgpu: used cached pcie gen info for SI (v2)
- drm/amdgpu: Notify sbios device ready before send request
- drm/radeon: fix KV harvesting
- drm/amdgpu: fix KV harvesting
- drm/amdgpu:Correct max uvd handles
- drm/amdgpu:Always save uvd vcpu_bo in VM Mode
- ovl: redirect_dir=nofollow should not follow redirect for opaque lower
- MIPS: BMIPS: Do not mask IPIs during suspend
- MIPS: ath25: Check for kzalloc allocation failure
- MIPS: OCTEON: irq: Check for null return on kzalloc allocation
- PCI: dwc: Fix enumeration end when reaching root subordinate
- Input: matrix_keypad - fix race when disabling interrupts
- Revert "Input: synaptics - Lenovo Thinkpad T460p devices should use RMI"
- bug: use %pB in BUG and stack protector failure
- lib/bug.c: exclude non-BUG/WARN exceptions from report_bug()
- mm/memblock.c: hardcode the end_pfn being -1
- Documentation/sphinx: Fix Directive import error
- loop: Fix lost writes caused by missing flag
- virtio_ring: fix num_free handling in error case
- KVM: s390: fix memory overwrites when not using SCA entries
- arm64: mm: fix thinko in non-global page table attribute check
- IB/core: Fix missing RDMA cgroups release in case of failure to register device
- Revert "nvme: create 'slaves' and 'holders' entries for hidden controllers"
- kbuild: Handle builtin dtb file names containing hyphens
- dm bufio: avoid false-positive Wmaybe-uninitialized warning
- IB/mlx5: Fix incorrect size of klms in the memory region
- bcache: fix crashes in duplicate cache device register
- bcache: don't attach backing with duplicate UUID
- x86/MCE: Save microcode revision in machine check records
- x86/MCE: Serialize sysfs changes
- perf tools: Fix trigger class trigger_on()
- x86/spectre_v2: Don't check microcode versions when running under
+ hypervisors
+ - ALSA: hda/realtek - Add support headset mode for DELL WYSE
+ - ALSA: hda/realtek - Add headset mode support for Dell laptop
+ - ALSA: hda/realtek: Limit mic boost on T480
+ - ALSA: hda/realtek - Fix dock line-out volume on Dell Precision 7520
+ - ALSA: hda/realtek - Make dock sound work on ThinkPad L570
+ - ALSA: seq: More protection for concurrent write and ioctl races
+ - ALSA: hda: add dock and led support for HP EliteBook 820 G3
+ - ALSA: hda: add dock and led support for HP ProBook 640 G2
+ - scsi: qla2xxx: Fix NULL pointer crash due to probe failure
+ - scsi: qla2xxx: Fix recursion while sending terminate exchange
+ - dt-bindings: Document mti.mips-cpc binding
+ - MIPS: CPC: Map registers using DT in mips_cpc_default_phys_base()
+ - nospec: Kill array_index_nospec_mask_check()
+ - nospec: Include <asm/barrier.h> dependency
+ - x86/entry: Reduce the code footprint of the 'idtentry' macro
+ - x86/entry/64: Use 'xorl' for faster register clearing
+ - x86/mm: Remove stale comment about KMEMCHECK
+ - x86/asm: Improve how GEN_*_SUFFIXED_RMWcc() specify clobbers
+ - x86/IO-APIC: Avoid warning in 32-bit builds
+ - x86/LDT: Avoid warning in 32-bit builds with older gcc
+ - x86-64/realmode: Add instruction suffix
+ - Revert "x86/retpoline: Simplify vmexit_fill_RSB()"
+ - x86/speculation: Use IBRS if available before calling into firmware
+ - x86/retpoline: Support retpoline builds with Clang
+ - x86/retpoline, objtool: Annotate indirect calls/jumps for objtool
+ - x86/speculation: Move firmware_restrict_branch_speculation_*() from C to CPP
+ - x86/paravirt, objtool: Annotate indirect calls
+ - x86/boot, objtool: Annotate indirect jump in secondary_startup_64()
+ - x86/mm/sme, objtool: Annotate indirect call in sme_encrypt_execute()
+ - objtool: Use existing global variables for options
+ - objtool: Add retpoline validation
+ - objtool: Add module specific retpoline rules
+ - objtool, retpolines: Integrate objtool with retpoline support more closely
+ - objtool: Fix another switch table detection issue
+ - objtool: Fix 32-bit build
+ - x86/kprobes: Fix kernel crash when probing .entry_trampoline code
+ - watchdog: hpwdt: SMBIOS check
+ - watchdog: hpwdt: Check source of NMI
+ - watchdog: hpwdt: fix unused variable warning
+ - watchdog: hpwdt: Remove legacy NMI sourcing.
+ - netfilter: ipt_CLUSTERIP: fix a race condition of proc file creation
+ - netfilter: xt_hashlimit: fix lock imbalance
+ - netfilter: x_tables: fix missing timer initialization in xt_LED
+ - netfilter: normal: cope with negative port range
+ - netfilter: IDLETIMER: be syzkaller friendly
+ - netfilter: ebtables: CONFIG_COMPAT: don't trust userland offsets
+ - netfilter: bridge: ebt_among: add missing match size checks
+ - netfilter: ipv6: fix use-after-free Write in nf_nat_ipv6_manip_pkt
+ - netfilter: use skb_to_full_sk in ip6_route_me_harder
+ - tpm_tis: Move ilb_base_addr to tpm_tis_data
+ - tpm: Keep CLKRUN enabled throughout the duration of transmit_cmd()
+ - tpm: delete the TPM_TIS_CLK_ENABLE flag
+ - tpm: remove unused variables
+ - tpm: only attempt to disable the LPC CLKRUN if is already enabled
+ - x86/xen: Calculate __max_logical_packages on PV domains
+ - scsi: qla2xxx: Fix system crash for Notify ack timeout handling
+ - scsi: qla2xxx: Fix gpnid error processing
+ - scsi: qla2xxx: Move session delete to driver work queue
+ - scsi: qla2xxx: Skip IRQ affinity for Target QPairs
+ - scsi: qla2xxx: Fix re-login for Nport Handle in use
+ - scsi: qla2xxx: Retry switch command on time out
+ - scsi: qla2xxx: Serialize GPNID for multiple RSCN
+ - scsi: qla2xxx: Fix login state machine stuck at GPDB
+ - scsi: qla2xxx: Fix NPIV host cleanup in target mode
+ - scsi: qla2xxx: Relogin to target port on a cable swap
+ - scsi: qla2xxx: Fix Relogin being triggered too fast
+ - scsi: qla2xxx: Fix PRLI state check
+ - scsi: qla2xxx: Fix abort command deadlock due to spinlock
+ - scsi: qla2xxx: Replace fcporal loc with qla2x00_alloc_fcpport
+ - scsi: qla2xxx: Fix scan state field for fcpport
+ - scsi: qla2xxx: Clear loop id after delete
+ - scsi: qla2xxx: Defer processing of GS I/O calls
+ - scsi: qla2xxx: Remove aborting ELS I/O call issued as part of timeout.
+ - scsi: qla2xxx: Fix system crash in qlt_plogi_ack_unref
+ - scsi: qla2xxx: Fix memory leak in dual/target mode
+ - NFS: Fix an incorrect type in struct nfs_direct_req
+ - pNFS: Prevent the layout header refcount going to zero in pnfs_roc()
+ - NFS: Fix unstable write completion
+ - Linux 4.15.10
+
+ * Bionic update to 4.15.10 stable release (LP: #1756100) // CVE-2018-1000004.
+ - ALSA: seq: Don't allow resizing pool in use
+
+ * nfp: prioritize stats updates (LP: #1752061)
+ - nfp: flower: prioritize stats updates
+
+ * Ubuntu 18.04 - Kernel crash on nvme subsystem-reset /dev/nvme0 (Bolt / NVMe)
+ (LP: #1753371)
+ - nvme-pci: Fix EEH failure on ppc
+
+ * sbsa watchdog crashes thunderx2 system (LP: #1755595)
+ - watchdog: sbsa: use 32-bit read for WCV
+
+ * KVM: s390: add vcpu stat counters for many instruction (LP: #1755132)
Open Source Used In 5GaaS Edge AC-4 19508

+ - KVM: s390: diagnoses are instructions as well
+ - KVM: s390: add vcpu stat counters for many instruction
+ + CIFS SMB2/SMB3 does not work for domain based DFS (LP: #1747572)
+ + CIFS: make IPC a regular tcon
+ + CIFS: use tcon_ipc instead of use_ipc parameter of SMB2_ioctl
+ + CIFS: dump IPC tcon in debug proc file
+ + i2c-thunderx: erroneous error message "unhandled state: 0" (LP: #1754076)
+ - i2c: octeon: Prevent error message on bus error
+ + Boston-LC: bos1u1: Stress test on Qlogic Fibre Channel on Ubuntu KVM guest
+ + that caused KVM host crashed in qlt_free_session_done call (LP: #1750441)
+ - scsi: qla2xxx: Fix memory corruption during hba reset test
+ + Ubuntu 18.04 - Performance: Radix page fault handler bug in KVM
+ + (LP: #1752236)
+ - KVM: PPC: Book3S HV: Fix handling of large pages in radix page fault handler
+ + Fix ARC hit rate (LP: #1755158)
+ - SAUCE: Fix ARC hit rate (LP: #1755158)
+ + Bionic update to 4.15.9 stable release (LP: #1755275)
+ - bpf: fix mlock precharge on arraymaps
+ - bpf: fix memory leak in lpm_trie map_free callback function
+ - bpf: fix rcu lockdep warning for lpm_trie map_free callback
+ - bpf, x64: implement retpoline for tail call
+ - bpf, arm64: fix out of bounds access in tail call
+ - bpf: add schedule points in percpu arrays management
+ - bpf: allow xadd only on aligned memory
+ - bpf, ppc64: fix out of bounds access in tail call
+ - scsi: mpt3sas: fix oops in error handlers after shutdown/unload
+ - scsi: mpt3sas: wait for and flush running commands on shutdown/unload
+ + KVM: x86: fix backward migration with async_PF
+ - Linux 4.15.9
+ + Bionic update to 4.15.8 stable release (LP: #1755179)
+ - hrtimer: Ensure POSIX compliance (relative CLOCK_REALTIME hrtimers)
+ - ipmi_si: Fix error handling of platform device
+ - platform/x86: dell-laptop: Allocate buffer on heap rather than globally
+ - powerpc/pseries: Enable RAS hotplug events later
+ - Bluetooth: btusb: Use DMI matching for QCA reset_resume quirkings
+ - ixgbe: fix crash in build_skb Rx code path
+ - tpm: st33zp24: fix potential buffer overruns caused by bit glitches on the
+ bus
+ - tpm: fix potential buffer overruns caused by bit glitches on the bus
+ - tpm_i2c_infineon: fix potential buffer overruns caused by bit glitches on
+ the bus
+  - tpm_i2c_nuvoton: fix potential buffer overruns caused by bit glitches on the
+    bus
+  +  - tpm_iis: fix potential buffer overruns caused by bit glitches on the bus
+  +  - ALSA: usb-audio: Add a quirk for B&W PX headphones
+  +  - ALSA: control: Fix memory corruption risk in snd_ctl_elem_read
+  +  - ALSA: x86: Fix missing spinlock and mutex initializations
+  +  - ALSA: hda: Add a power_save blacklist
+  +  - ALSA: hda - Fix pincfg at resume on Lenovo T470 dock
+  +  - mmc: sdhci-pci: Fix S0i3 for Intel BYT-based controllers
+  +  - mmc: dwmmc-k3: Fix out-of-bounds access through DT alias
+  +  - mmc: dwmmc: Avoid accessing registers in runtime suspended state
+  +  - mmc: dwmmc: Factor out dw_mci_init_slot_caps
+  +  - mmc: dwmmc: Fix out-of-bounds access for slot's caps
+  +  - timers: Forward timer base before migrating timers
+  +  - parisc: Use cr16 interval timers unconditionally on qemu
+  +  - parisc: Reduce irq overhead when run in qemu
+  +  - parisc: Fix ordering of cache and TLB flushes
+  +  - parisc: Hide virtual kernel memory layout
+  +  - btrfs: use proper endianness accessors for super_copy
+  +  - block: fix the count of PGPGOUT for WRITE_SAME
+  +  - block: kyber: fix domain token leak during requeue
+  +  - block: pass inclusive 'lend' parameter to truncate_inode_pages_range
+  +  - vfio: disable filesystem-dax page pinning
+  +  - cpufreq: s3c24xx: Fix broken s3c_cpufreq_init()
+  +  - dax: fix vma_is_fsdax() helper
+  +  - direct-io: Fix sleep in atomic due to sync AIO
+  +  - x86/xen: Zero MSR_IA32_SPEC_CTRL before suspend
+  +  - x86/platform/intel-mid: Handle Intel Edison reboot correctly
+  +  - x86/cpu_entry_area: Sync cpu_entry_area to initial_page_table
+  +  - bridge: check brport attr show in brport_show
+  +  - fib_semantics: Don't match route with mismatching tclassid
+  +  - hdlc_ppp: carrier detect ok, don't turn off negotiation
+  +  - ipv6 sit: work around bogus gcc-8 -Wrestrict warning
+  +  - net: amd-xgbe: fix comparison to bitshift when dealing with a mask
+  +  - net: ethernet: ti: cpsw: fix net watchdog timeout
+  +  - net: fix race on decreasing number of TX queues
+  +  - net: ipv4: don't allow setting net.ipv4.route.min_pmtu below 68
+  +  - netlink: ensure to loop over all netns in genlmsg_multicast_allNs()
+  +  - net: sched: report if filter is too large to dump
+  +  - ppp: prevent unregistered channels from connecting to PPP units
+  +  - scctp: verify size of a new chunk in _sctp_make_chunk()
+  +  - udplite: fix partial checksum initialization
+  +  - mlx5: Fix TCP checksum in LRO buffers
+  +  - sctcp: fix dst refcnt leak in sctcp_v4_get_dst
+  +  - mlxsw: spectrum_switchdev: Check success of FDB add operation
+  +  - net/mlx5e: Specify numa node when allocating drop rq
+  +  - net: phy: fix phy_start to consider PHY_IGNORE_INTERRUPT
+  +  - tcp: Honor the eor bit in tcp_mtu_probe
+ - rxrpc: Fix send in rxrpc_send_data_packet()
+ - tcp_bbr: better deal with suboptimal GSO
+ - doc: Change the min default value of tcp_wmem/tcp_rmem.
+ - net/mlx5e: Fix loopback self test when GRO is off
+ - net_sched: gen_estimator: fix broken estimators based on percpu stats
+ - net/mlx5e: Verify inline header size do not exceed SKB linear size
+ - tnis: Use correct sk->sk_prot for IPV6
+ - amd-xgbe: Restore PCI interrupt enablement setting on resume
+ - cls_u32: fix use after free in u32_destroy_key()
+ - mlxsw: spectrum_router: Do not unconditionally clear route offload indication
+ - netlink: put module reference if dump start fails
+ - tcp: purge write queue upon RST
+ - tunetap: correctly add the missing XDP flush
+ - tunetap: disable preemption during XDP processing
+ - virtio-net: disable NAPI only when enabled during XDP set
+ - cxb4: fix trailing zero in CIM LA dump
+ - net/mlx5: Fix error handling when adding flow rules
+ - net: phy: Restore phy_resume() locking assumption
+ - tcp: tracepoint: only call trace_tcp_send_reset with full socket
+ - I2tp: don't use inet_shutdown on tunnel destroy
+ - I2tp: don't use inet_shutdown on ppp session destroy
+ - I2tp: fix races with tunnel socket close
+ - I2tp: fix race in pppol2tp_release with session object destroy
+ - I2tp: fix tunnel lookup use-after-free race
+ - s390/qeth: fix underestimated count of buffer elements
+ - s390/qeth: fix SETIP command handling
+ - s390/qeth: fix overestimated count of buffer elements
+ - s390/qeth: fix IP removal on offline cards
+ - s390/qeth: fix double-free on IP add/remove race
+ - Revert "s390/qeth: fix using of ref counter for rxip addresses"
+ - s390/qeth: fix IP address lookup for L3 devices
+ - s390/qeth: fix IPA command submission race
+ - tcp: revert F-RTO middle-box workaround
+ - tcp: revert F-RTO extension to detect more spurious timeouts
+ - blk-mq: don't call io sched's .requeue_request when requeueing rq to dispatch
+ - media: m88ds3103: don't call a non-initialized function
+ - EDAC, sb_edac: Fix out of bound writes during DIMM configuration on KNL
+ - KVM: s390: take care of clock-comparator sign control
+ - KVM: s390: provide only a single function for setting the tod (fix SCK)
+ - KVM: s390: consider epoch index on hotplugged CPUs
+ - KVM: s390: consider epoch index on TOD clock syncs
+ - nospec: Allow index argument to have const-qualified type
+ - x86/mm: Fix \{pmd,pud\}\_{set,clear}\_flags()
+ - ARM: orion: fix orion\_get00\_switch\_board\_info initialization
+ - ARM: dts: rockchip: Remove 1.8 GHz operation point from phycore som
+ - ARM: mvebu: Fix broken PL310\_ERRATA\_753970 selects
+ - ARM: kvm: fix building with gcc-8
+ - KVM: X86: Fix SMRAM accessing even if VM is shutdown
+ - KVM: mmu: Fix overlap between public and private memslots
+ - KVM/x86: Remove indirect MSR op calls from SPEC\_CTRL
+ - KVM: x86: move LAPIC initialization after VMCS creation
+ - KVM/VMX: Optimize vmx\_vcpu\_run() and svm\_vcpu\_run() by marking the RDMSR
+ path as unlikely()
+ - KVM: x86: fix vcpu initialization with userspace lapic
+ - KVM/x86: remove WARN\_ON() for when vm\_munmap() fails
+ - ACPI / bus: Parse tables as term\_list for Dell XPS 9570 and Precision M5530
+ - ARM: dts: LogicPD SOM-LV: Fix I2C1 pinmux
+ - ARM: dts: LogicPD Torpedo: Fix I2C1 pinmux
+ - powerpc/64s/radix: Boot-time NULL pointer protection using a guard-PID
+ - md: only allow remove\_and\_add\_spares when no sync\_thread running.
+ - platform/x86: dell-laptop: fix kbd\_get\_state's request value
+ - Linux 4.15.8
+ + * ZFS setgid broken on 0.7 (LP: #1753288)
+ + - SAUCE: Fix ZFS setgid
+ + * /proc/kallsyms prints "(null)" for null addresses in 4.15 (LP: #1754297)
+ + - vsprintf: avoid misleading "(null)" for %px
+ + * Miscellaneous Ubuntu changes
+ + - d-i: Add netsec to nic-modules
+ + - [Config] fix up retpoline abi files
+ + - [Config] set NOBP and expoline options for s390
+ + -- Thadeu Lima de Souza Cascardo <cascardo@canonical.com> Fri, 16 Mar 2018 14:49:27 -0300
+ +linux (4.15.0-12.13) bionic; urgency=medium
+ + * linux: 4.15.0-12.13 -proposed tracker (LP: #1754059)
+ + * CONFIG\_EFI=y on armhf (LP: #1726362)
+ + - [Config] CONFIG\_EFI=y on armhf, reconcile secureboot EFI settings
+ + * ppc64el: Support firmware disable of RFI flush (LP: #1751994)
+ + - powerpc/pseries: Support firmware disable of RFI flush
+ + - powerpc/powernv: Support firmware disable of RFI flush
+ + * [Feature] CFL/CNL (PCH:CNP-H): New GPIO Commit added (GPIO Driver needed)
- gpio / ACPI: Drop unnecessary ACPI GPIO to Linux GPIO translation
- pinctrl: intel: Allow custom GPIO base for pad groups
- pinctrl: cannonlake: Align GPIO number space with Windows

* [Feature] Add xHCI debug device support in the driver (LP: #1730832)
- usb: xhci: Make some static functions global
- usb: xhci: Add DbC support in xHCI driver
- [Config] USB_XHCI_DBGCAp=y for commit mainline dfba217dc42.

* [SRU] Lenovo E41 Mic mute hotkey is not responding (LP: #1753347)
- platform/x86: ideapad-laptop: Increase timeout to wait for EC answer

* headset mic can't be detected on two Dell machines (LP: #1748807)
- ALSA: hda - Fix a wrong FIXUP for alc289 on Dell machines

* hisi_sas: Add disk LED support (LP: #1752695)
- scsi: hisi_sas: directly attached disk LED feature for v2 hw

* [Feature] [Graphics]Whiskey Lake (CoffeeLake-U 4+2) new PCI Device ID adds
  (LP: #1742561)
- drm/i915/cfl: Adding more Coffee Lake PCI IDs.

* [Bug] [USB Function][CFL-CNL PCH]Stall Error and USB Transaction Error in
  trace, Disable of device-initiated U1/U2 failed and rebind failed: -517
  during suspend/resume with usb storage. (LP: #1730599)
- - usb: Don't print a warning if interface driver rebind is deferred at resume

* retpoline: ignore %cs:0xNNN constant indirections (LP: #1752655)
- [Packaging] retpoline -- elide %cs:0xNNNN constants on i386
- [Config] retpoline -- clean up i386 retpoline files

* hisilicon hibmc regression due to ea642c3216cb ("drm/ttm: add io_mem_pfn
  callback") (LP: #1738334)
- drm/ttm: add ttm_bo_io_mem_pfn to check io_mem_pfn

* [Asus UX360UA] battery status in unity-panel is not changing when battery is
  being charged (LP: #1661876) // AC adapter status not detected on Asus
  ZenBook UX410UAK (LP: #1745032)
- ACPI / battery: Add quirk for Asus UX360UA and UX410UAK

* ASUS UX305LA - Battery state not detected correctly (LP: #1482390)
- ACPI / battery: Add quirk for Asus GL502VSK and UX305LA

* [18.04 FEAT] Automatically detect layer2 setting in the qeth device driver
  (LP: #1747639)
- s390/diag: add diag26c support for VNIC info
- s390/qeth: support early setup for z/VM NICs
+ * Bionic update to v4.15.7 stable release (LP: #1752317)
+ - netfilter: drop outermost socket lock in getsockopt()
+ - arm64: mm: don't write garbage into TTBR1_EL1 register
+ - kconfig.h: Include compiler types to avoid missed struct attributes
+ - MIPS: boot: Define __ASSEMBLY__ for its.S build
+ - xtnsa: fix high memory/reserved memory collision
+ - scsi: ibmvfc: fix misdefined reserved field in ibmvfc_fcp_rsp_info
+ - MIPS: Drop spurious __unused in struct compat_flock
+ - cfg80211: fix cfg80211 Beacon dup
+ - i2c: designware: must wait for enable
+ - i2c: bcm2835: Set up the rising/falling edge delays
+ - X.509: fix BUG_ON() when hash algorithm is unsupported
+ - X.509: fix NULL dereference when restricting key with unsupported_sig
+ - PKCS#7: fix certificate chain verification
+ - PKCS#7: fix certificate blacklisting
+ - extcon: int3496: process id-pin first so that we start with the right status
+ - genirq/matrix: Handle CPU offlining proper
+ - RDMA/uverbs: Protect from races between lookup and destroy of uobjects
+ - RDMA/uverbs: Protect from command mask overflow
+ - RDMA/uverbs: Fix bad unlock balance in ib_uverbs_close_xrcd
+ - RDMA/uverbs: Fix circular locking dependency
+ - RDMA/uverbs: Sanitize user entered port numbers prior to access it
+ - iio: adc: stm32: fix stm32h7_adc_enable error handling
+ - iio: srf08: fix link error "devm_iio_triggered_buffer_setup" undefined
+ - iio: buffer: check if a buffer has been set up when poll is called
+ - iio: adis_lib: Initialize trigger before requesting interrupt
+ - Kbuild: always define endianess in kconfig.h
+ - x86/apic/vector: Handle vector release on CPU unplug correctly
+ - x86/oprofile: Fix bogus GCC-8 warning in nmi_setup()
+ - mm, swap, frontswap: fix THP swap if frontswap enabled
+ - mm: don't defer struct page initialization for Xen pv guests
+ - uapi/if_ether.h: move __UAPI_DEF_ETHHDR libc define
+ - irqchip/gic-v3: Use wmb() instead of smb_wmb() in gic_raise_softirq()
+ - irqchip/mips-gic: Avoid spuriously handling masked interrupts
+ - PCI/cxgb4: Extend T3 PCI quirks to T4+ devices
+ - net: thunderbolt: Tear down connection properly on suspend
+ - net: thunderbolt: Run disconnect flow asynchronously when logout is received
+ - ohci-hcd: Fix race condition caused by ohci_urb_enqueue() and
+   io_watchdog_func()
+ - usb: ohci: Proper handling of ed_rm_list to handle race condition between
   usb_kill_urb() and finish_unlinks()
+ - arm64: Remove unimplemented syscall log message
+ - arm64: Disable unhandled signal log messages by default
+ - arm64: cpufeature: Fix CTR_EL0 field definitions
+ - Add delay-init quirk for Corsair K70 RGB keyboards
+ - usb: host: Ohci: use correct device pointer for dma ops
+ - usb: dwc3: gadget: Set maxpacket size for ep0 IN
* [regression] Colour banding and artefacts appear system-wide on an Asus Zenbook UX303LA with Intel HD 4400 graphics (LP: #1749420) // Bionic update to v4.15.7 stable release (LP: #1752317)
  - drm/edid: Add 6 bpc quirk for CPT panel in Asus UX303LA
  + *
  + * errors with sas hotplug (LP: #1752146)
  + - scsi: libsas: fix memory leak in sas_snp_get_phy_events()
  + - scsi: libsas: fix error when getting phy events
  + - scsi: libsas: initialize sas_phy status according to response of DISCOVER
  + - scsi: libsas: Use dynamic allocated work to avoid sas event lost
  + - scsi: libsas: shut down the PHY if events reached the threshold
  + - scsi: libsas: make the event threshold configurable
  + - scsi: libsas: Use new workqueue to run sas event and disco event
  + - scsi: libsas: use flush_workqueue to process disco events synchronously
  + - scsi: libsas: direct call probe and destruct
  + - scsi: libsas: notify event PORTE_BROADCAST_RCVD in sas_enable_revalidation()
  + *
  + * rtnetlink: enable namespace identifying properties in rtnetlink requests
  + (LP: #1748232)
  + - rtnetlink: enable IFLA_IF_NETNSID in do_setlink()
  + - rtnetlink: enable IFLA_IF_NETNSID for RTM_SETLINK
  + - rtnetlink: enable IFLA_IF_NETNSID for RTM_DELLINK
  + - rtnetlink: enable IFLA_IF_NETNSID for RTM_NEWLINK
  + - rtnetlink: remove check for IFLA_IF_NETNSID
  + - rtnetlink: require unique netns identifier
  + *
  + * Bionic update to v4.15.6 stable release (LP: #1752119)
- tun: fix tun_napi_alloc_frags() frag allocator
- ptr_ring: fail early if queue occupies more than KMALLOC_MAX_SIZE
- ptr_ring: try vmalloc() when kmalloc() fails
- selinux: ensure the context is NUL terminated in
- security_context_to_sid_core()
- selinux: skip bounded transition processing if the policy isn't loaded
- media: pvusb2: properly check endpoint types
- crypto: x86/twofish-3way - Fix %rbp usage
- staging: android: ion: Add __GFP_NOWARN for system contig heap
- staging: android: ion: Switch from WARN to pr_warn
- blk_rq_map_user_iov: fix error override
- KVM: x86: fix escape of guest dr6 to the host
- kcov: detect double association with a single task
- netfilter: x_tables: fix int overflow in xt_alloc_table_info()
- netfilter: x_tables: avoid out-of-bounds reads in
- xt_request_find_[match|target]
- netfilter: ipt_CLUSTERIP: fix out-of-bounds accesses in clusteripTp_check()
- netfilter: on sockopt() acquire sock lock only in the required scope
- netfilter: xt_cgroup: initialize info->priv in cgroupMt_check_v1()
- netfilter: xt_RATEEST: acquire xt_rateest_mutex for hash insert
- rds: tcp: correctly sequence cleanup on netns deletion.
- rds: tcp: atomically purge entries from rds_tcp_conn_list during netns
- delete
- net: avoid skb_warn_bad_offload on IS_ERR
- net_sched: gen_estimator: fix lockdep splat
- soc: qcom: rmfs_mem: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
- ASoC: ux500: add MODULE_LICENSE tag
- video: fbdev/mmp: add MODULE_LICENSE
- ARM: 8743/1: bl Switcher: add MODULE_LICENSE tag
- arm64: dts: add #cooling-cells to CPU nodes
- dn_getsockoptdecent: move nf_[get/set]sockopt outside sock lock
- ANDROID: binder: remove WARN() for redundant txn error
- ANDROID: binder: synchronize_rcu() when using POLLFREE.
- staging: android: ashmem: Fix a race condition in pin ioctl
- binder: check for binder_thread allocation failure in binder_poll()
- binder: replace "%p" with "%pK"
- staging: fsl-mc: fix build testing on x86
- staging: iio: adc: ad7192: fix external frequency setting
- staging: iio: ad5933: switch buffer mode to software
- xhci: Fix NULL pointer in xhci debugfs
- xhci: Fix xhci debugfs devices node disappearance after hibernation
- xhci: xhci debugfs device nodes weren't removed after device plugged out
- xhci: fix xhci debugfs errors in xhci_stop
- usbip: keep usbip_device sockfd state in sync with tcp_socket
- crypto: s5p-sss - Fix kernel Oops in AES-ECB mode
- mei: me: add cannon point device ids
- mei: me: add cannon point device ids for 4th device
- vmalloc: fix __GFP_HIGHMEM usage for vmalloc_32 on 32b systems
+ - Linux 4.15.6
+ + * Unable to insert test_bpf module on Bionic s390x (LP: #1751234)
+ + - bpf: fix selftests/bpf test_kmod.sh failure when CONFIG_BPF_JIT_ALWAYS_ON=y
+ + * [Ubuntu 18.04 FEAT] OpenCAPI enabling (LP: #1746988)
+ + - powerpc/powernv: Introduce new PHB type for opencapi links
+ + - powerpc/powernv: Set correct configuration space size for opencapi devices
+ + - powerpc/powernv: Add opal calls for opencapi
+ + - powerpc/powernv: Add platform-specific services for opencapi
+ + - powerpc/powernv: Capture actag information for the device
+ + - ocxl: Driver code for 'generic' opencapi devices
+ + - ocxl: Add AFU interrupt support
+ + - ocxl: Add a kernel API for other opencapi drivers
+ + - ocxl: Add trace points
+ + - ocxl: Add Makefile and Kconfig
+ + - [Config] CONFIG_OCXL=m for ppc64el
+ + - cxl: Remove support for "Processing accelerators" class
+ + - ocxl: Documentation
+ + - ocxl: add MAINTAINERS entry
+ + - cxl: Add support for ASB_Notify on POWER9
+ + * Request to update 18.04 kernel aacraid to upstream 4.16 version
+ + (LP: #1746801)
+ + - scsi: aacraid: remove unused variable managed_request_id
+ + - scsi: aacraid: Do not attempt abort when Fw panicked
+ + - scsi: aacraid: Do not remove offlined devices
+ + - scsi: aacraid: Fix ioctl reset hang
+ + - scsi: aacraid: Allow reset_host sysfs var to recover Panicked Fw
+ + - scsi: aacraid: Refactor reset_host store function
+ + - scsi: aacraid: Move code to wait for IO completion to shutdown func
+ + - scsi: aacraid: Create bmic submission function from bmic identify
+ + - scsi: aacraid: Change phy luns function to use common bmic function
+ + - scsi: aacraid: Refactor and rename to make mirror existing changes
+ + - scsi: aacraid: Add target setup helper function
+ + - scsi: aacraid: Untangle targets setup from report phy luns
+ + - scsi: aacraid: Move function around to match existing code
+ + - scsi: aacraid: Create helper functions to get lun info
+ + - scsi: aacraid: Save bmic phy information for each phy
+ + - scsi: aacraid: Add helper function to set queue depth
+ + - scsi: aacraid: Merge func to get container information
+ + - scsi: aacraid: Process hba and container hot plug events in single function
+ + - scsi: aacraid: Added macros to help loop through known buses and targets
+ + - scsi: aacraid: Refactor resolve luns code and scsi functions
+ + - scsi: aacraid: Merge adapter setup with resolve luns
+ + - scsi: aacraid: Block concurrent hotplug event handling
+ + - scsi: aacraid: Use hotplug handling function in place of scsi_scan_host
+ + - scsi: aacraid: Reschedule host scan in case of failure
+ - scsi: aacraid: Fix hang while scanning in eh recovery
+ - scsi: aacraid: Skip schedule rescan in case of kdump
+ - scsi: aacraid: Remove unused rescan variable
+ - scsi: aacraid: Remove AAC_HIDE_DISK check in queue command
+ - scsi: aacraid: Update driver version to 50877
+ - scsi: aacraid: Fix driver oops with dead battery
+ - scsi: aacraid: remove redundant setting of variable c
+ - scsi: aacraid: Get correct lun count
+ - scsi: aacraid: Delay for rescan worker needs to be 10 seconds

+ * [18.04] kpatch - Add livepatch hook support for ppc64le (LP: #1741992)
+ - powerpc/modules: Add REL24 relocation support of livepatch symbols
+ - powerpc/modules: Don't try to restore r2 after a sibling call
+ - powerpc/modules: Improve restore_r2() error message

+ * Ubuntu 18.04 - Include latest ibmvnic fixes in Ubuntu kernel (LP: #1748517)
+ - ibmvnic: Rename IBMVNIC_MAX_TX_QUEUES to IBMVNIC_MAX_QUEUES
+ - ibmvnic: Increase maximum number of RX/TX queues
+ - ibmvnic: Include header descriptor support for ARP packets
+ - ibmvnic: Don't handle RX interrupts when not up.
+ - ibmvnic: Wait for device response when changing MAC
+ - ibmvnic: fix firmware version when no firmware level has been provided by
+ + the VIOS server
+ - ibmvnic: fix empty firmware version and errors cleanup
+ - ibmvnic: Fix rx queue cleanup for non-fatal resets
+ - ibmvnic: Ensure that buffers are NULL after free
+ - ibmvnic: queue reset when CRQ gets closed during reset
+ - ibmvnic: Reset long term map ID counter
+ - ibmvnic: Remove skb->protocol checks in ibmvnic_xmit
+ - ibmvnic: Wait until reset is complete to set carrier on
+ - ibmvnic: Fix login buffer memory leaks
+ - ibmvnic: Fix NAPI structures memory leak
+ - ibmvnic: Free RX socket buffer in case of adapter error
+ - ibmvnic: Clean RX pool buffers during device close
+ - ibmvnic: Check for NULL skb's in NAPI poll routine
+ - ibmvnic: Fix early release of login buffer

+ * Power9 DD 2.2 needs HMI fixup backport of upstream
+ - patch(d075745d893c78730e4a3b7a60fca23c21f764081) into kernel (LP: #1751834)
+ - KVM: PPC: Book3S HV: Improve handling of debug-trigger HMIIs on POWER9

+ * Driver not found in Ubuntu kernel does not detect interface (LP: #1745927)
+ - d-i: add cxgb4 to nic-modules

+ * BCM5719/tg3 loses connectivity due to missing heartbeats between fw and
+ + driver (LP: #1751337)
+ - tg3: APE heartbeat changes

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Open Source Used In 5GaaS Edge AC-4 19517
+ * Miscellaneous Ubuntu changes
+ - ubuntu: vbox -- update to 5.2.6-dfsg-5
+ - Revert "UBUNTU: SAUCE: Import aufs driver"
+ - SAUCE: Import aufs driver
+ - Revert "UBUNTU: SAUCE: (no-up) Convert bnx2x firmware files to ihex format"
+ - [Packaging] retpoline-extract: flag *0xNNN(%reg) branches
+ - [Config] fix up retpoline abi files
+ - ubuntu: vbox -- update to 5.2.8-dfsg-2
+  
+ -- Seth Forshee <seth.forshee@canonical.com>  Wed, 07 Mar 2018 17:36:23 +0100  
+  
+linux (4.15.0-11.12) bionic; urgency=medium  
+  
+ + * linux: 4.15.0-11.12 -proposed tracker (LP: #1751285)  
+  
+ + * Support low-pin-count devices on Hisilicon SoCs (LP: #1677319)  
+ - [Config] CONFIG_INDIRECTPIO=y  
+ - SAUCE: LIB: Introduce a generic PIO mapping method  
+ - SAUCE: PCI: Remove unused __weak attribute in pci_register_io_range()  
+ - SAUCE: PCI: Add fwnode handler as input param of pci_register_io_range()  
+ - SAUCE: PCI: Apply the new generic I/O management on PCI IO hosts  
+ - SAUCE: OF: Add missing I/O range exception for indirect-I0 devices  
+ - [Config] CONFIG_HISILICON_LPC=y  
+ - SAUCE: HISI LPC: Support the LPC host on Hip06/Hip07 with DT bindings  
+ - SAUCE: ACPI / scan: do not enumerate Indirect IO host children  
+ - SAUCE: HISI LPC: Add ACPI support  
+ - SAUCE: MAINTAINERS: Add maintainer for HiSilicon LPC driver  
+  
+ + * Bionic update to v4.15.5 stable release (LP: #1751131)  
+ - scsi: smartpqi: allow static build ("built-in")  
+ - IB/umad: Fix use of unprotected device pointer  
+ - IB/qib: Fix comparison error with qperf compare/swap test  
+ - IB/mlx4: Fix incorrectly releasing steerable UD QPs when have only ETH ports  
+ - IB/core: Fix two kernel warnings triggered by rxe registration  
+ - IB/core: Fix ib_wc structure size to remain in 64 bytes boundary  
+ - IB/core: Avoid a potential OOPs for an unused optional parameter  
+ - selftests: seccomp: fix compile error seccomp_bpf  
+ - kselftest: fix OOM in memory compaction test  
+ - RDMA/rxe: Fix a race condition related to the QP error state  
+ - RDMA/rxe: Fix a race condition in rxe_requester()  
+ - RDMA/rxe: Fix rxe_qp_cleanup()  
+ - cpufreq: powernv: Dont assume distinct pstate values for nominal and pmin  
+ - PM / devfreq: Propagate error from devfreq_add_device()  
+ - mwifiex: resolve reset vs. remove()/shutdown() deadlocks  
+ - ocfs2: try a blocking lock before return AOP_TRUNCATED_PAGE  
+ - trace_uprobe: Display correct offset in uprobe_events  
+ - powerpc/radix: Remove trace_tlbie call from radix__flush_tlb_all  
+ - powerpc/kernel: Block interrupts when updating TIDR
+ - powerpc/vas: Don't set uses_vas for kernel windows
+ - powerpc/numa: Invalidate numa_cpu_lookup_table on cpu remove
+ - powerpc/mm: Flush radix process translations when setting MMU type
+ - powerpc/xive: Use hw CPU ids when configuring the CPU queues
+ - dma-buf: fix reservation-object_wait_timeout_rcu once more v2
+ - s390: fix handling of -1 in set{,fs}[gu]id16 syscalls
+ - arm64: dts: msm8916: Correct ipc references for smsm
+ - ARM: lp3250: fix uda1380 gpio numbers
+ - ARM: dts: STi: Add gpio property for "hdtmi,hpd-gpio" property
+ - ARM: dts: nomadik: add interrupt-parent for clcd
+ - arm: dts: mt7623: fix card detection issue on bananapi-r2
+ - arm: spear600: Add missing interrupt-parent of rtc
+ - arm: spear13xx: Fix dmas cells
+ - arm: spear13xx: Fix spics gpio controller's warning
+ - x86/gpu: add CFL to early quirks
+ - x86/kexec: Make kexec (mostly) work in 5-level paging mode
+ - x86/xen: init %gs very early to avoid page faults with stack protector
+ - x86: PM: Make APM idle driver initialize polling state
+ - mm, memory_hotplug: fix memmap initialization
+ - x86/entry/64: Clear extra registers beyond syscall arguments, to reduce speculation attack surface
+ - x86/entry/64/compat: Clear registers for compat syscalls, to reduce speculation attack surface
+ - compiler-gcc.h: Introduce __optimize function attribute
+ - compiler-gcc.h: __nostackprotector needs gcc-4.4 and up
+ - crypto: sun4i_ss_prng - fix return value of sun4i_ss_prng_generate
+ - crypto: sun4i_ss_prng - convert lock to _bh in sun4i_ss_prng_generate
+ - powerpc/mm/radix: Split linear mapping on hot-unplug
+ - x86/mm/pti: Fix PTI comment in entry_SYSCALL_64()
+ - x86/speculation: Update Speculation Control microcode blacklist
+ - x86/speculation: Correct Speculation Control microcode blacklist again
+ - Revert "x86/speculation: Simplify indirect_branch_prediction_barrier()"
+ - KVM/x86: Reduce retpoline performance impact in slot_handle_level_range(), by always inlining iterator helper methods
+ - X86/nVMX: Properly set spec_ctrl and pred_cmd before merging MSRs
+ - KVM/nVMX: Set the CPU_BASED_USE_MSRS_BITMAPS if we have a valid L02 MSR bitmap
+ - x86/speculation: Clean up various Spectre related details
+ - PM / runtime: Update links_count also if !CONFIG_SRCU
+ - PM: cpuidle: Fix cpuidle_poll_state_init() prototype
+ - platform/x86: wmi: fix off-by-one write in wmi_dev_probe()
+ - x86/entry/64: Clear registers for exceptions/interrupts, to reduce speculation attack surface
+ - x86/entry/64: Merge SAVE_C_REGS and SAVE_EXTRA_REGS, remove unused extensions
+ - x86/entry/64: Merge the POP_C_REGS and POP_EXTRA_REGS macros into a single POP_REGS macro
+ - x86/entry/64: Interleave XOR register clearing with PUSH instructions
- x86/entry/64: Introduce the PUSH_AND_CLEAN_REGS macro
- x86/entry/64: Use PUSH_AND_CLEAN_REGS in more cases
- x86/entry/64: Get rid of the ALLOC_PT_GPREGS_ON_STACK and SAVE_AND_CLEAR_REGS macros
- x86/entry/64: Indent PUSH_AND_CLEAR_REGS and POP_REGS properly
- x86/entry/64: Fix paranoid_entry() frame pointer warning
- x86/entry/64: Remove the unused ‘icebp’ macro
- selftests/x86: Fix vDSO selftest segfault for vsyscall=none
- selftests/x86: Clean up and document sscanf() usage
- selftests/x86/pkeys: Remove unused functions
- selftests/x86: Fix build bug caused by the 5lvl test which has been moved to the VM directory
- selftests/x86: Do not rely on “int $0x80” in test_mremap_vdso.c
- gfs2: Fixes to “Implement iomap for block_map”
- selftests/x86: Do not rely on “int $0x80” in single_step_syscall.c
- selftests/x86: Disable tests requiring 32-bit support on pure 64-bit systems
- objtool: Fix segfault in ignore_unreachable_insn()
- x86/debug, objtool: Annotate WARN()-related UD2 as reachable
- x86/debug: Use UD2 for WARN()
- x86/speculation: Fix up array_index_nospec_mask() asm constraint
- nospec: Move array_index_nospec() parameter checking into separate macro
- x86/speculation: Add <asm/msr-index.h> dependency
- x86/mm: Rename flush_tlb_single() and flush_tlb_one() to __flush_tlb_one_[user|kernel]()
- selftests/x86/mpx: Fix incorrect bounds with old _sigfault
- x86/cpu: Rename cpu_data.x86_mask to cpu_data.x86_stepping
- x86/specrte: Fix an error message
- x86/cpu: Change type of x86_cache_size variable to unsigned int
- x86/entry/64: Fix CR3 restore in paranoid_exit()
- drm/ttm: Don't add swapped BOs to swap-LRU list
- drm/ttm: Fix 'buf' pointer update in ttm_bo_vm_access_kmap() (v2)
- drm/qxl: unref cursor bo when finished with it
- drm/qxl: reapply cursor after resetting primary
- drm/amd/powerplay: Fix smu_table_entry.handle type
- drm/ast: Load lut in crtc_commit
- drm: Check for lessee in DROP_MASTER ioctl
- arm64: Add missing Falkor part number for branch predictor hardening
- drm/radeon: Add dpm quirk for Jet PRO (v2)
- drm/radeon: adjust tested variable
- x86/smpboot: Fix uncore_pci_remove() indexing bug when hot-removing a physical CPU
- rtc-opal: Fix handling of firmware error codes, prevent busy loops
- mbcache: initialize entry->e_referenced in mb_cache_entry_create()
- mmc: sdhci: Implement an SDHCI-specific bounce buffer
- mmc: bcm2835: Don't overwrite max frequency unconditionally
- Revert "mmc: meson-gx: include tx phase in the tuning process"
- mlx5: fix mlx5_get_vector_affinity to start from completion vector 0
- Revert "apple-gmux: lock iGP IO to protect from vgaarb changes"
+  - jbd2: fix sphinx kernel-doc build warnings
+  - ext4: fix a race in the ext4 shutdown path
+  - ext4: save error to disk in __ext4_grp_locked_error()
+  - ext4: correct documentation for grpid mount option
+  - mm: hide a #warning for COMPILE_TEST
+  - mm: Fix memory size alignment in devm_memremap_pages_release()
+  - MIPS: Fix typo BIG_ENDIAN to CPU_BIG_ENDIAN
+  - MIPS: CPS: Fix MIPS_ISA_LEVEL_RAW fallout
+  - MIPS: Fix incorrect mem=X@Y handling
+  - PCI: Disable MSI for HiSilicon Hip06/Hip07 only in Root Port mode
+  - PCI: iopro: Fix NULL pointer dereference for BCMA
+  - PCI: pciehp: Assume NoCompl+ for Thunderbolt ports
+  - PCI: keystone: Fix interrupt-controller-node lookup
+  - video: fbdev: atmel_lcdfb: fix display-timings lookup
+  - console/dummy: leave _con_font_get set to NULL
+  - rbd: whitelist RBD_FEATURE_OPERATIONS feature bit
+  - xen: Fix {set,clear}_foreign_p2m_mapping on autotranslating guests
+  - xenbus: track caller request id
+  - seq_file: fix incomplete reset on read from zero offset
+  - tracing: Fix parsing of globs with a wildcard at the beginning
+  - mpls, nospec: Sanitize array index in mpls_label_ok()
+  - rtlwifi: rt8821ae: Fix connection lost problem correctly
+  - arm64: proc: Set PTE_NG for table entries to avoid traversing them twice
+  - xprtdma: Fix calculation of ri_max_send_sges
+  - xprtdma: Fix BUG after a device removal
+  - blk-wbt: account flush requests correctly
+  - target/scsi: avoid NULL dereference in CHAP auth error path
+  - iscsi-target: make sure to wake up sleeping login worker
+  - dm: correctly handle chained bios in dec_pending()
+  - Btrfs: fix deadlock in run_delalloc_nocow
+  - Btrfs: fix crash due to not cleaning up tree log block's dirty bits
+  - Btrfs: fix extent state leak from tree log
+  - Btrfs: fix btrfs_evict_inode to handle abnormal inodes correctly
+  - Btrfs: fix use-after-free on root->orphan_block_rsv
+  - Btrfs: fix unexpected -EEXIST when creating new inode
+  - 9p/trans_virtio: discard zero-length reply
+  - ALSA: usb-audio: Fix UAC2 get_ctl request with a RANGE attribute
+  - ALSA: hda/realtek - Add headset mode support for Dell laptop
+  - ALSA: hda/realtek - Enable Thinkpad Dock device for ALC298 platform
+  - ALSA: hda/realtek: PCI quirk for Fujitsu U7x7
+  - ALSA: usb-audio: add implicit fb quirk for Behringer UFX1204
+  - ALSA: usb: add more device quirks for USB DSD devices
+  - ALSA: seq: Fix racy pool initializations
+  - mvp2: fix multicast address filter
+  - usb: Move USB_UHCI_BIG_ENDIAN_* out of USB_SUPPORT
+  - x86/mm, mm/hwpoison: Don't unconditionally unmap kernel 1:1 pages
+  - ARM: dts: exynos: fix RTC interrupt for exynos5410
+ - ARM: pxa/tosa-bt: add MODULE_LICENSE tag
+ - arm64: dts: msm8916: Add missing #phy-cells
+ - ARM: dts: s5pv210: add interrupt-parent for ohci
+ - arm: dts: mt7623: Update ethsys binding
+ - arm: dts: mt2701: Add reset-cells
+ - ARM: dts: Delete bogus reference to the charlcd
+ - media: r820t: fix r820t_write_reg for KASAN
+ - mmc: sdhci-of-esdhc: fix eMMC couldn't work after kexec
+ - mmc: sdhci-of-esdhc: fix the mmc error after sleep on ls1046ardb
+ - Linux 4.15.5

+ * retpoline abi files are empty on i386 (LP: #1751021)
+ - [Packaging] retpoline-extract -- instantiate retpoline files for i386
+ - [Packaging] final-checks -- sanity checking ABI contents
+ - [Packaging] final-checks -- check for empty retpoline files
+ - [Config] Disable i386 retpoline check for next upload

+ * Bionic update to v4.15.4 stable release (LP: #1751064)
+ - watchdog: indydog: Add dependency on SGI_HAS_INDYDOG
+ - cifs: Fix missing put_xid in cifs_file_strict_mmap
+ - cifs: Fix autonegotiate security settings mismatch
+ - CIFS: zero sensitive data when freeing
+ - cpufreq: mediatek: add mediatek related projects into blacklist
+ - dmaengine: dmatest: fix container_of member in dmatest_callback
+ - ssb: Do not disable PCI host on non-Mips
+ - watchdog: gpio_wdt: set WDOG_HW_RUNNING in gpio_wdt_stop
+ - Revert "drm/i915: mark all device info struct with __initconst"
+ - sched/rt: Use container_of() to get root domain in rto_push_irq_work_func()
+ - sched/rt: Up the root domain ref count when passing it around via IPIs
+ - media: dvb-usb-v2: lmedm04: Improve logic checking of warm start
+ - media: dvb-usb-v2: lmedm04: move ts2020 attach to dm04_lme2510_tuner
+ - media: hdhpvr: Fix an error handling path in hdhpvr_probe()
+ - arm64: mm: Use non-global mappings for kernel space
+ - arm64: mm: Temporarily disable ARM64_SW_TTBR0_PAN
+ - arm64: mm: Move ASID from TTBR0 to TTBR1
+ - arm64: mm: Remove pre_ttb0_update_workaround for Falkor erratum #E1003
+ - arm64: mm: Rename post_ttb0_update_workaround
+ - arm64: mm: Fix and re-enable ARM64_SW_TTBR0_PAN
+ - arm64: mm: Allocate ASIDs in pairs
+ - arm64: mm: Add arm64_kernel_unmapped_at_el0 helper
+ - arm64: mm: Invalidate both kernel and user ASIDs when performing TLBI
+ - arm64: entry: Add exception trampoline page for exceptions from EL0
+ - arm64: mm: Map entry trampoline into trampoline and kernel page tables
+ - arm64: entry: Explicitly pass exception level to kernel_ventry macro
+ - arm64: entry: Hook up entry trampoline to exception vectors
+ - arm64: erratum: Work around Falkor erratum #E1003 in trampoline code
+ - arm64: cpu_errata: Add Kryo to Falkor 1003 errata
+ - arm64: tls: Avoid unconditional zeroing of tpidro_el0 for native tasks
+ - arm64: entry: Add fake CPU feature for unmapping the kernel at EL0
+ - arm64: kaslr: Put kernel vectors address in separate data page
+ - arm64: use RET instruction for exiting the trampoline
+ - arm64: Kconfig: Add CONFIG_UNMAP_KERNEL_AT_EL0
+ - arm64: Kconfig: Reword UNMAP_KERNEL_AT_EL0 kconfig entry
+ - arm64: Take into account ID_AA64PFR0_EL1.CSV3
+ - arm64: capabilities: Handle duplicate entries for a capability
+ - arm64: mm: Introduce TTBR_ASID_MASK for getting at the ASID in the TTBR
+ - arm64: kpti: Fix the interaction between ASID switching and software PAN
+ - arm64: cputype: Add MIDR values for Cavium ThunderX2 CPUs
+ - arm64: kpti: Make use of nG dependent on arm64_kernel_unmapped_at_el0()
+ - arm64: mm: Permit transitioning from Global to Non-Global without BBM
+ - arm64: kpti: Add ->enable callback to remap swapper using nG mappings
+ - arm64: Force KPTI to be disabled on Cavium ThunderX
+ - arm64: entry: Reword comment about post_ttbr_update_workaround
+ - arm64: idmap: Use "awx" flags for .idmap.text .pushsection directives
+ - perf: arm_spe: Fail device probe when arm64_kernel_unmapped_at_el0()
+ - arm64: barrier: Add CSDB macros to control data-value prediction
+ - arm64: Implement array_index_mask_nospec()
+ - arm64: Make USER_DS an inclusive limit
+ - arm64: Use pointer masking to limit uaccess speculation
+ - arm64: entry: Ensure branch through syscall table is bounded under speculation
+ - arm64: uaccess: Prevent speculative use of the current addr_limit
+ - arm64: uaccess: Don't bother eliding access_ok checks in __{get, put}_user
+ - arm64: uaccess: Mask __user pointers for __arch_{clear, copy_*}_user
+ - arm64: futex: Mask __user pointers prior to dereference
+ - arm64: cpufeature: __this_cpu_has_cap() shouldn't stop early
+ - arm64: Run enable method for errata work arounds on late CPUs
+ - arm64: cpufeature: Pass capability structure to ->enable callback
+ - drivers/firmware: Expose psci_get_version through psci_ops structure
+ - arm64: Move post_ttbr_update_workaround to C code
+ - arm64: Add skeleton to harden the branch predictor against aliasing attacks
+ - arm64: Move BP hardening to check_and_switch_context
+ - arm64: KVM: Use per-CPU vector when BP hardening is enabled
+ - arm64: entry: Apply BP hardening for high-priority synchronous exceptions
+ - arm64: entry: Apply BP hardening for suspicious interrupts from EL0
+ - arm64: cpufeature: Add missing MIDR values for Cortex-A72 and Cortex-A75
+ - arm64: Implement branch predictor hardening for affected Cortex-A CPUs
+ - arm64: Implement branch predictor hardening for Falkor
+ - arm64: Branch predictor hardening for Cavium ThunderX2
+ - arm64: KVM: Increment PC after handling an SMC trap
+ - arm/arm64: KVM: Consolidate the PSCI include files
+ - arm/arm64: KVM: Add PSCI_VERSION helper
+ - arm/arm64: KVM: Add smccc accessors to PSCI code
+ - arm/arm64: KVM: Implement PSCI 1.0 support
+ - arm/arm64: KVM: Advertise SMCCC v1.1
+ - arm64: KVM: Make PSCI_VERSION a fast path
+ arm/arm64: KVM: Turn kvm_psci_version into a static inline
+ arm/arm64: KVM: Report SMCCC_ARCH_WORKAROUND_1 BP hardening support
+ arm64: KVM: Add SMCCC_ARCH_WORKAROUND_1 fast handling
+ firmware/psci: Expose PSCI conduit
+ firmware/psci: Expose SMCCC version through psci_ops
+ arm/arm64: smccc: Make function identifiers an unsigned quantity
+ arm/arm64: smccc: Implement SMCCC v1.1 inline primitive
+ arm64: KVM: Add SMCCC_ARCH_WORKAROUND_1 fast handling
+ arm64: Kill PSCI_GET_VERSION as a variant-2 workaround
+ mtd: cfi: convert inline functions to macros
+ mtd: nand: brcmnand: Disable prefetch by default
+ mtd: nand: Fix nand_do_read_oob() return value
+ mtd: nand: sunxi: Fix ECC strength choice
+ ubi: Fix race condition between ubi volume creation and udev
+ ubi: fastmap: Erase outdated anchor PEBs during attach
+ ubi: block: Fix locking for idr_alloc/idr_remove
+ ubifs: free the encrypted symlink target
+ nfs/pnfs: fix nfs_direct_req ref leak when i/o falls back to the mds
+ nfs41: do not return ENOMEM on LAYOUTUNAVAILABLE
+ NFS: Add a cond_resched() to nfs_commit_release_pages()
+ NFS: Fix nfsstat breakage due to LOOKUP
+ NFS: commit direct writes even if they fail partially
+ NFS: reject request for id_legacy key without auxdata
+ NFS: Fix a race between mmap() and O_DIRECT
+ nfsd: Detect unhashed stids in nfsd4_verify_open_stid()
+ kernfs: fix regression in kernfs_fop_write caused by wrong type
+ ahci: Annotate PCI ids for mobile Intel chipsets as such
+ ahci: Add PCI ids for Intel Bay Trail, Cherry Trail and Apollo Lake AHCI
+ ahci: Add Intel Cannon Lake PCH-H PCI ID
+ crypto: hash - introduce crypto_hash_alg_has_setkey()
+ crypto: cryptd - pass through absence of ->setkey()
+ crypto: mrcryptd - pass through absence of ->setkey()
+ crypto: poly1305 - remove ->setkey() method
+ crypto: hash - annotate algorithms taking optional key
+ crypto: hash - prevent using keyed hashes without setting key
+ media: v4l2-ioctl.c: use check_fmt for enum/g/s/try_fmt
+ media: v4l2-ioctl.c: don't copy back the result for -ENOTTY
+ media: v4l2-compat-ioctl32.c: add missing VIDIOC_PREPARE_BUF
+ media: v4l2-compat-ioctl32.c: fix the indentation
+ media: v4l2-compat-ioctl32.c: move 'helper' functions to
+ __get/put_v4l2_format32
+ media: v4l2-compat-ioctl32.c: avoid sizeof(type)
+ media: v4l2-compat-ioctl32.c: copy m.userptr in put_v4l2_plane32
+ media: v4l2-compat-ioctl32.c: fix ctrl_is_pointer
+ media: v4l2-compat-ioctl32.c: copy clip list in put_v4l2_window32
+ media: v4l2-compat-ioctl32.c: drop pr_info for unknown buffer type
+ media: v4l2-compat-ioctl32.c: don't copy back the result for certain errors
+ media: v4l2-compat-ioctl32.c: refactor compat ioctl32 logic
+ - media: v4l2-compat-ioctl32.c: make ctrl_is_pointer work for subdevs
+ - crypto: caam - fix endless loop when DECO acquire fails
+ - crypto: sha512-mb - initialize pending lengths correctly
+ - crypto: talitos - fix Kernel Oops on hashing an empty file
+ - arm: KVM: Fix SMCCC handling of unimplemented SMC/HVC calls
+ - KVM: nVMX: Fix races when sending nested PI while dest enters/leaves L2
+ - KVM: nVMX: Fix bug of injecting L2 exception into L1
+ - KVM: PPC: Book3S HV: Make sure we don't re-enter guest without XIVE loaded
+ - KVM: PPC: Book3S HV: Drop locks before reading guest memory
+ - KVM: arm/arm64: Handle CPU_PM_ENTER_FAILED
+ - KVM: PPC: Book3S PR: Fix broken select due to misspelling
+ - ASoC: acpi: fix machine driver selection based on quirk
+ - ASoC: rockchip: i2s: fix playback after runtime resume
+ - ASoC: skl: Fix kernel warning due to zero NHTL entry
+ - ASoC: compress: Correct handling of copy callback
+ - afs: Add missing afs_put_cell()
+ - afs: Need to clear responded flag in addr cursor
+ - afs: Fix missing cursor clearance
+ - afs: Fix server list handling
+ - btrfs: Handle btrfs_set_extent_delalloc failure in fixup worker
+ - Btrfs: raid56: iterate raid56 internal bio with bio_for_each_segment_all
+ - kasan: don't emit builtin calls when sanitization is off
+ - kasan: rework Kconfig settings
+ - media: dvb_frontend: be sure to init dvb_frontend_handle_ioctl() return code
+ - media: dvb-frontends: fix i2c access helpers for KASAN
+ - media: dt-bindings/media/cec-gpio.txt: mention the CEC/HPD max voltages
+ - media: ts2020: avoid integer overflows on 32 bit machines
+ - media: vivid: fix module load error when enabling fb and no_error_inj=1
+ - media: cxusb, dib0700: ignore XC2028_I2C_FLUSH
+ - fs/proc/kcore.c: use probe_kernel_read() instead of memcpy()
+ - kernel/async.c: revert "async: simplify lowest_in_progress()"
+ - kernel/relay.c: revert "kernel/relay.c: fix potential memory leak"
+ - pipe: actually allow root to exceed the pipe buffer limits
+ - pipe: fix off-by-one error when checking buffer limits
+ - HID: quirks: Fix keyboard + touchpad on Toshiba Click Mini not working
+ - Bluetooth: btstdio: Do not bind to non-removable BCM43341
+ - ipmi: use dynamic memory for DMI driver override
+ - signal/openrisc: Fix do_unaligned_access to send the proper signal
+ - signal/sh: Ensure si_signo is initialized in do_divide_error
+ - alpha: fix crash if pthread_create races with signal delivery
+ - alpha: osf_sys.c: fix put_tv32 regression
+ - alpha: Fix mixed up args in EXC macro in futex operations
+ - alpha: fix reboot on Avanti platform
+ - alpha: fix formatting of stack content
+ - xtensa: fix futex_atomic_cmpxchg_inatomic
+ - EDAC, octeon: Fix an uninitialized variable warning
+ - genirq: Make legacy autoprobing work again
+ - pinctrl: intel: Initialize GPIO properly when used through irqchip
+ - pinctrl: mcp23s08: fix irq setup order
+ - pinctrl: sx150x: Unregister the pinctrl on release
+ - pinctrl: sx150x: Register pinctrl before adding the gpiochip
+ - pinctrl: sx150x: Add a static gpio/pinctrl pin range mapping
+ - pktcdvd: Fix pkt_setup_dev() error path
+ - pktcdvd: Fix a recently introduced NULL pointer dereference
+ - blk-mq: quiesce queue before freeing queue
+ - clocksource/drivers/stm32: Fix kernel panic with multiple timers
+ - lib/ubsan.c: s/missaligned/misaligned/
+ - lib/ubsan: add type mismatch handler for new GCC/Clang
+ - objtool: Fix switch-table detection
+ - arm64: dts: marvell: add Ethernet aliases
+ - drm/i915: Avoid PPS HW/SW state mismatch due to rounding
+ - ACPI: sbshc: remove raw pointer from printk() message
+ - acpi, nfit: fix register dimm error handling
+ - ovl: force r/o mount when index dir creation fails
+ - ovl: fix failure to fsync lower dir
+ - ovl: take mnt_want_write() for work/index dir setup
+ - ovl: take mnt_want_write() for removing impure xattr
+ - ovl: hash directory inodes for fsnotify
+ - mm10300/misalignment: Use SIGSEGV SEGV_MAPERR to report a failed user copy
+ - devpts: fix error handling in devpts_mntget()
+ - ftrace: Remove incorrect setting of glob search field
+ - scsi: core: Ensure that the SCSI error handler gets woken up
+ - scsi: lpfc: Fix crash after bad bar setup on driver attachment
+ - scsi: cxlflash: Reset command ioasc
+ - rcu: Export init_rcu_head() and destroy_rcu_head() to GPL modules
+ - Linux 4.15.4
+ - updateconfigs after v4.14.4 stable updates

+ * Bionic update to v4.15.4 stable release (LP: #1751064) // CVE-2017-5754 and
do not need KPTI when KASLR is off.
+ - arm64: Turn on KPTI only on CPUs that need it
+ * Miscellaneous Ubuntu changes
+ - [Config] fix up removed retpoline call sites
+ + -- Seth Forshee <seth.forshee@canonical.com> Fri, 23 Feb 2018 08:31:06 -0600
+ + linux (4.15.0-10.11) bionic; urgency=medium
+ + * linux: 4.15.0-10.11 -proposed tracker (LP: #1749250)
+ + * "swiotlb: coherent allocation failed" dmesg spam with linux 4.15.0-9.10
+ + (LP: #1749202)
+ - swiotlb: suppress warning when __GFP_NOWARN is set
+ - drm/ttm: specify DMA_ATTR_NO_WARN for huge page pools
**Open Source Used in 5GaaS Edge AC-4**

- **linux-tools**: perf incorrectly linking libbfd (LP: #1748922)
- SAUCE: tools -- add ability to disable libbfd
- [Packaging] correct disablement of libbfd

- *Artful* Realtek ALC225: 2 secs noise when a headset plugged in
  - (LP: #1744058)
  - ALSA: hda/realtek - update ALC225 depop optimize

- *Artful* Support headset mode for DELL WYSE (LP: #1723913)
  - SAUCE: ALSA: hda/realtek - Add support headset mode for DELL WYSE

- headset mic can't be detected on two Dell machines (LP: #1748807)
  - ALSA: hda/realtek - Support headset mode for ALC215/ALC285/ALC289
  - ALSA: hda - Fix headset mic detection problem for two Dell machines

- Bionic update to v4.15.3 stable release (LP: #1749191)
  - ip6mr: fix stale iterator
  - net: igmp: add a missing rcu locking section
  - qlcnic: fix deadlock bug
  - qmiwwan: Add support for Quectel EP06
  - r8169: fix RTL8168EP take too long to complete driver initialization.
  - tcp: release sk_frag.page in tcp_disconnect
  - vhost_net: stop device during reset owner
  - ipv6: addrconf: break critical section in addrconf_verify rtnl()
  - ipv6: change route cache aging logic
  - Revert "defer call to mem_cgroup_sk_alloc()"
  - net: ipv6: send unsolicited NA after DAD
  - rocker: fix possible null pointer dereference in
    rocker_router_fib_event_work
  - tcp_bbr: fix pacing_gain to always be unity when using lt_bw
  - clu32: add missing RCU annotation.
  - ipv6: Fix SO_REUSEPORT UDP socket with implicit sk_ipv6only
  - soreuseport: fix mem leak in reuseport_add_sock()
  - net_sched: get rid of rcu_barrier() in tcf_block_put_ext()
  - net sched: fix use-after-free in tcf_block_put_ext
  - media: mtk-vcodee: add missing MODULE_LICENSE/DESCRIPTION
  - media: soc camera: soc_scale_crop: add missing
    MODULE_DESCRIPTION/AUTHOR/LICENSE
  - media: tegra-ccc: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
  - gpio: uniphier: fix mismatch between license text and MODULE_LICENSE
  - crypto: tcrpt: fix S/G table for test_aead_speed()
  - Linux 4.15.3

- bnx2x_attn_int_deasserted3:4323 MC assert! (LP: #1715519) //
  CVE-2018-1000026
  - net: create skb_gso_validate_mac_len()
  - bnx2x: disable GSO where gso_size is too big for hardware

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**Open Source Used in 5GaaS Edge AC-4 19527**
* ethtool -p fails to light NIC LED on HiSilicon D05 systems (LP: #1748567)
* - net: hns: add ACPI mode support for ethtool -p

* CVE-2017-5715 (Spectre v2 Intel)
  * [Packaging] retpoline files must be sorted
  * [Packaging] pull in retpoline files

* [Feature] PXE boot with Intel Omni-Path (LP: #1712031)
  * d-i: Add hfi1 to nic-modules

* CVE-2017-5715 (Spectre v2 retpoline)
  * [Packaging] retpoline -- add call site validation
  * [Config] disable retpoline checks for first upload

* Do not duplicate changelog entries assigned to more than one bug or CVE
  * (LP: #1743383)
  * [Packaging] git-ubuntu-log -- handle multiple bugs/cves better

-- Seth Forshee <seth.forshee@canonical.com>  Tue, 13 Feb 2018 11:33:58 -0600

+linux (4.15.0-9.10) bionic; urgency=medium

+ linux: 4.15.0-9.10 -proposed tracker (LP: #1748244)

+ Miscellaneous Ubuntu changes
  * [Debian] tests -- remove gcc-multilib dependency for arm64

-- Seth Forshee <seth.forshee@canonical.com>  Thu, 08 Feb 2018 11:25:04 -0600

+linux (4.15.0-8.9) bionic; urgency=medium

+ linux: 4.15.0-8.9 -proposed tracker (LP: #1748075)

+ Bionic update to v4.15.2 stable release (LP: #1748072)
  * KVM: x86: Make indirect calls in emulator speculation safe
  * KVM: VMX: Make indirect call speculation safe
  * module/retpoline: Warn about missing retpoline in module
  * x86/cpufeatures: Add CPUID_7_EDX CPUID leaf
  * x86/cpufeatures: Add Intel feature bits for Speculation Control
  * x86/cpufeatures: Add AMD feature bits for Speculation Control
  * x86/msr: Add definitions for new speculation control MSR
  * x86/pti: Do not enable PTI on CPUs which are not vulnerable to Meltdown
  * x86/cpufeature: Blacklist SPEC_CTRL/PRED_CMD on early Spectre v2 microcodes
  * x86/speculation: Add basic IBPB (Indirect Branch Prediction Barrier) support
  * x86/alternative: Print unadorned pointers
  * x86/nospec: Fix header guards names
  * x86/bugs: Drop one "mitigation" from dmesg
- x86/cpu/bugs: Make retpoline module warning conditional
- x86/cpufeatures: Clean up Spectre v2 related CPUID flags
- x86/retpoline: Simplify vmexit_fill_RSB()
- x86/speculation: Simplify indirect_branch_prediction_barrier()
- auxdisplay: img-ascii-led: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
- iio: adc/accel: Fix up module licenses
- pinctrl: pxa: pxa2xx: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
- ASoC: pcm512x: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
- KVM: nVMX: Eliminate vmcs02 pool
- KVM: VMX: introduce alloc_loaded_vmcs
- objtool: Improve retpoline alternative handling
- objtool: Add support for alternatives at the end of a section
- objtool: Warn on stripped section symbol
- x86/mm: Fix overlap of i386 CPU ENTRY AREA with FIX_BTMAP
- x86/spec: Check CONFIG_RETPOLINE in command line parser
- x86/entry/64: Remove the SYSCALL64 fast path
- x86/entry/64: Push extra regs right away
- x86/asm: Move 'status' from thread_struct to thread_info
- Documentation: Document array_index_nospec
- array_index_nospec: Sanitize speculative array de-references
- x86: Implement array_index_mask_nospec
- x86: Introduce barrier_nospec
- x86: Introduce __uaccess_begin_nospec() and uaccess_try_nospec
- x86/usercopy: Replace open coded stac/clac with __uaccess_{begin, end}
- x86/uaccess: Use __uaccess_begin_nospec() and uaccess_try_nospec
- x86/get_user: Use pointer masking to limit speculation
- x86/syscall: Sanitize syscall table de-references under speculation
- vfs, ftable: Prevent bounds-check bypass via speculative execution
- nl80211: Sanitize array index in parse_rxq_params
- x86/spec: Report get_user mitigation for spectre_v1
- x86/spec: Fix spelling mistake: "vunerable" -> "vulnerable"
- x86/cpuuid: Fix up "virtual" IBRS/IBPB/STIBP feature bits on Intel
- x86/speculation: Use Indirect Branch Prediction Barrier in context switch
- x86/paravirt: Remove 'noreplace-paravirt' cmdline option
- KVM: VMX: make MSR bitmaps per-VCPU
- x86/kvm: Update spectre_v1 mitigation
- x86/retpoline: Avoid retpolines for built-in __init functions
- x86/spec: Simplify spectre_v2 command line parsing
- x86/pti: Mark constant arrays as __initconst
- x86/speculation: Fix typo IBRS_ATT, which should be IBRS_ALL
- KVM/x86: Update the reverse_cpuid list to include CPUID_7_EDX
- KVM/x86: Add IBPB support
- KVM/VMX: Emulate MSR_IA32_ARCH_CAPABILITIES
- KVM/VMX: Allow direct access to MSR_IA32_SPEC_CTRL
- KVM/SVM: Allow direct access to MSR_IA32_SPEC_CTRL
- serial: core: mark port as initialized after successful IRQ change
- fpga: region: release of_parse_phandle nodes after use
- Linux 4.15.2
Add support for the NIC on SynQuacer E-Series boards (LP: #1747792)
- net: phy: core: remove now unneeded disabling of interrupts
- [Config] CONFIG_NET_VENDOR_SOCIONEXT=y & CONFIG_SNI_NETSEC=m
- net: socionext: Add Synquacer NetSec driver
- net: socionext: include linux/io.h to fix build
- net: socionext: Fix error return code in netsec_netdev_open()

- [Artful/Bionic] [Config] enable EDAC_GHES for ARM64 (LP: #1747746)
- [Config] CONFIG_EDAC_GHES=y

- support thunderx2 vendor pmu events (LP: #1747523)
  - perf pmu: Pass pmu as a parameter to get_cpuid_str()
  - perf tools arm64: Add support for get_cpuid_str function.
  - perf pmu: Add helper function is_pmu_core to detect PMU CORE devices
  - perf vendor events arm64: Add ThunderX2 implementation defined pmu core events
  - perf pmu: Add check for valid cpuid in perf_pmu__find_map()

  - SAUCE: mm: disable vma based swap readahead by default
  - SAUCE: mm: fix memory hotplug in ZONE_HIGHPAGE

- Miscellaneous Ubuntu changes
  - [Config] Fix CONFIG_PROFILE_ALL_BRANCHES annotations

-- Seth Forshee <seth.forshee@canonical.com>  Wed, 07 Feb 2018 21:13:27 -0600

+linux (4.15.0-7.8) bionic; urgency=medium
+* Bionic update to v4.15.1 stable release (LP: #1747169)
+ Bluetooth: hci_serdev: Init hci_uart proto_lock to avoid oops
+ tools/gpio: Fix build error with musl libc
+ gpio: stmpe: i2c transfer are forbidden in atomic context
+ gpio: Fix kernel stack leak to userspace
+ ALSA: hda - Reduce the suspend time consumption for ALC256
+ crypto: ecdh - fix typo in KPP dependency of CRYPTO_ECDH
+ crypto: aesni - handle zero length dst buffer
+ crypto: aesni - fix typo in generic(gcaes decrypt
+ crypto: aesni - add wrapper for generic gcm(aes)
+ crypto: aesni - Fix out-of-bounds access of the data buffer in generic-gcm-aesni
+ crypto: aesni - Fix out-of-bounds access of the AAD buffer in generic-gcm-aesni
+ crypto: inside-secure - fix hash when length is a multiple of a block
+ crypto: inside-secure - avoid unmapping DMA memory that was not mapped
+ crypto: sha3-generic - fixes for alignment and big endian operation
+ crypto: af_alg - whitelist mask and type
+ - HID: wacom: EKR: ensure devres groups at higher indexes are released
+ - HID: wacom: Fix reporting of touch toggle (WACOM_HID_WD_MUTE_DEVICE) events
+ - power: reset: zx-reboot: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - gpio: iop: add missing MODULE_DESCRIPTION/AUTHOR/LICENSE
+ - gpio: ath79: add missing MODULE_DESCRIPTION/LICENSE
+ - mtd: nand: denali_pci: add missing MODULE_DESCRIPTION/LICENSE
+ - igb: Free IRQs when device is hotplugged
+ - ima/policy: fix parsing of fsuuid
+ - scsi: aacraid: Fix udev inquiry race condition
+ - scsi: aacraid: Fix hang in kdump
+ - scsi: storvsc: missing error code in storvsc_probe()
+ - staging: lustre: separate a connection destroy from free struct kib_conn
+ - staging: ccree: NULLify backup_info when unused
+ - staging: ccree: fix fips event irq handling build
+ - tty: fix data race between tty_init_dev and flush of buf
+ - usb: option: Add support for FS040U modem
+ - USB: serial: pl2303: new device id for Chilitag
+ - USB: cdc-acm: Do not log urb submission errors on disconnect
+ - CDC-ACM: apply quirk for card reader
+ - USB: serial: io_edgeport: fix possible sleep-in-atomic
+ - usbip: prevent bind loops on devices attached to vhci_hcd
+ - usbip: list: don't list devices attached to vhci_hcd
+ - USB: serial: simple: add Motorola Tetra driver
+ - usb: f_fs: Prevent gadget unbind if it is already unbound
+ - usb: uas: unconditionally bring back host after reset
+ - usb/gadget: Fix "high bandwidth" check in usb_gadget_ep_match_desc()
+ - ANDROID: binder: remove waitqueue when thread exits.
+ - android: binder: use VM_ALLOC to get vm area
+ - mei: me: allow runtime pm for platform with D0i3
+ - serial: 8250_of: fix return code when probe function fails to get reset
+ - serial: 8250_uniphier: fix error return code in uniphier_uart_probe()
+ - serial: 8250_dw: Revert "Improve clock rate setting"
+ - serial: imx: Only wakeup via RTSDEN bit if the system has RTS/CTS
+ - spi: imx: do not access registers while clocks disabled
+ - iio: adc: stm32: fix scan of multiple channels with DMA
+ - iio: chemical: ccs811: Fix output of IIO_CONCENTRATION channels
+ - test_firmware: fix missing unlock on error in config_num_requests_store()
+ - Input: synaptics-rmi4 - unmask F03 interrupts when port is opened
+ - Input: synaptics-rmi4 - do not delete interrupt memory too early
+ - x86/efi: Clarify that reset attack mitigation needs appropriate userspace
+ - Linux 4.15.1

+ Dell XPS 13 9360 bluetooth (Atheros) won't connect after resume
+ (LP: #1744712)
+ - Revert "Bluetooth: btusb: fix QCA Rome suspend/resume"
+ - Bluetooth: btusb: Restore QCA Rome suspend/resume fix with a "rewritten"
+ version
+ * apparmor profile load in stacked policy container fails (LP: #1746463)
+ - SAUCE: apparmor: fix display of .ns_name for containers
+
+ -- Seth Forshee <seth.forshee@canonical.com> Sun, 04 Feb 2018 11:56:32 +0100
+
+linux (4.15.0-6.7) bionic; urgency=low
+
+ * upload urgency should be medium by default (LP: #1745338)
+ - [Packaging] update urgency to medium by default
+
+ * Shutdown hang on 16.04 with iscsi targets (LP: #1569925)
+ - scsi: libiscsi: Allow sd_shutdown on bad transport
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: (noup) Update spl to 0.7.5-1ubuntu1, zfs to 0.7.5-1ubuntu1
+ - Revert "UBUNTU: SAUCE: mm: fix memory hotplug in ZONE_HIGMEM"
+ - Revert "UBUNTU: SAUCE: mm: disable vma based swap readahead by default"
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.15
+
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 29 Jan 2018 08:47:07 -0600
+
+linux (4.15.0-5.6) bionic; urgency=low
+
+ * $(LOCAL_ENV_CC) and $(LOCAL_ENV_DISTCC_HOSTS) should be properly quoted
+ (LP: #1744077)
+ - [Debian] pass LOCAL_ENV_CC and LOCAL_ENV_DISTCC_HOSTS properly
+
+ * Missing install-time driver for QLogic QED 25/40/100Gb Ethernet NIC
+ (LP: #1743638)
+ - [d-i] Add qede to nic-modules udeb
+
+ * boot failure on AMD Raven + WesternXT (LP: #1742759)
+ - SAUCE: drm/amdgpu: add atpx quirk handling (v2)
+
+ * Unable to handle kernel NULL pointer dereference at isci_task_abort_task
+ (LP: #1726519)
+ - SAUCE: Revert "scsi: libsas: allow async aborts"
+
+ * Update Ubuntu-4.15.0 config to support Intel Atom devices (LP: #1739939)
+ - [Config] CONFIG_SERIAL_DEV_BUS=y, CONFIG_SERIAL_DEV_CTRL_TTYPORT=y
+
+ * Miscellaneous Ubuntu changes
+ - Rebase to v4.15-rc7
+ - [Config] CONFIG_CPU_ISOLATION=y
+ - [Config] Update annotations following config review
+ - Revert "UBUNTU: SAUCE: Import aufs driver"
+ - SAUCE: Import aufs driver
+ - ubuntu: vbox -- update to 5.2.6-dfsg-1
+ - ubuntu: vbox: build fixes for 4.15
+ - ubuntu: vbox -- update to 5.2.6-dfsg-2
+ - hio: updates for timer api changes in 4.15
+ - enable hio build
+ - Rebase to v4.15-rc9
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.15-rc9
+
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 22 Jan 2018 10:16:05 -0600
+
+ linux (4.15.0-4.5) bionic; urgency=low
+
+ * [0cf3:e010] QCA6174A XR failed to pair with bt 4.0 device (LP: #1741166)
+ - SAUCE: Bluetooth: btusb: Add support for 0cf3:e010
+
+ * External HDMI monitor failed to show screen on Lenovo X1 series
+ (LP: #1738523)
+ - SAUCE: drm/i915: Disable writing of TMDS_OE on Lenovo ThinkPad X1 series
+
+ * Miscellaneous Ubuntu changes
+ - [Debian] autoreconstruct - add resoration of execute permissions
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.15-rc4
+
+ -- Seth Forshee <seth.forshee@canonical.com> Wed, 10 Jan 2018 10:24:22 -0600
+
+ linux (4.15.0-3.4) bionic; urgency=low
+
+ * ubuntu/xr-usb-serial didn't get built in zesty and artful (LP: #1733281)
+ - SAUCE: make sure ubuntu/xr-usb-serial builds for x86
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.15-rc6
+
+ -- Seth Forshee <seth.forshee@canonical.com> Wed, 03 Jan 2018 20:20:43 -0600
+
+ linux (4.15.0-2.3) bionic; urgency=low
+
+ * nvidia-graphics-drivers-384 384.90-0ubuntu6 ADT test failure with linux
+ 4.15.0-1.2 (LP: #1737752)
+ - x86/mm: Unbreak modules that use the DMA API
+ * Ubuntu 17.10 corrupting BIOS - many LENOVO laptops models (LP: #1734147)
+ - [Config] CONFIG_SPI_INTEL_SPI_*=n
+ * power: commonise configs IBMVETH/IBMVSCSI and ensure both are in linux-image
+ and udebs (LP: #1521712)
+ - [Config] Include ibmvnic in nic-modules
+ * Enable arm64 emulation of removed ARMv7 instructions (LP: #1545542)
+ - [Config] Enable support for emulation of deprecated ARMv8 instructions
+ * Miscellaneous Ubuntu changes
+ - SAUCE: (noup) Update spl with 4.15 compat fix (LP:#1737761)
+ - Enable zfs build
+ - [Debian] add icp to zfs-modules.ignore
+ [ Upstream Kernel Changes ]
+ * Rebase to v4.15-rc4
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 18 Dec 2017 09:27:13 -0600
+ linux (4.15.0-1.2) bionic; urgency=low
+ * Disabling zfs does not always disable module checks for the zfs modules
+ (LP: #1737176)
+ - [Packaging] disable zfs module checks when zfs is disabled
+ * Miscellaneous Ubuntu changes
+ - [Config] CONFIG_UNWINDER_FRAME_POINTER=y for amd64
+ [ Upstream Kernel Changes ]
+ * Rebase to v4.15-rc3
+ -- Seth Forshee <seth.forshee@canonical.com>  Sun, 10 Dec 2017 22:07:19 -0600
+ linux (4.15.0-0.1) bionic; urgency=low
+ * Miscellaneous Ubuntu changes
+ - ubuntu: vbox -- update to 5.2.2-dfsg-2
+ - ubuntu: vbox: build fixes for 4.15
+ - disable hio build
+ - [Config] Update kernel lockdown options to fix build errors
+ - Disable zfs build
+ - SAUCE: Import aufs driver
+ - [Config] Enable AUFS config options
Open Source Used In 5GaaS Edge AC-4 19535

+ [ Upstream Kernel Changes ]
+ * Rebase to v4.15-rc2
+ -- Seth Forshee <seth.forshee@canonical.com> Fri, 08 Dec 2017 13:55:42 -0600
+ linux (4.14.0-11.13) bionic; urgency=low
+ * linux: 4.14.0-11.13 -proposed tracker (LP: #1736168)
+ * CVE-2017-1000405
+ - mm, thp: Do not make page table dirty unconditionally in touch_p[mu]d()
+ * linux 4.14.0-7.9 ADT test failure with linux 4.14.0-7.9 (LP: #1732463)
+ - SAUCE: mm: disable vma based swap readahead by default
+ - SAUCE: mm: fix memory hotplug in ZONE_HIGHMEM
+ * Bionic update to v4.14.3 stable release (LP: #1735843)
+ - s390: fix transactional execution control register handling
+ - s390/noexec: execute kexec datamover without DAT
+ - s390/runtime instrumentation: fix possible memory corruption
+ - s390/guarded storage: fix possible memory corruption
+ - s390/disassembler: add missing end marker for e7 table
+ - s390/disassembler: increase show_code buffer size
+ - ACPI / PM: Fix acpi_pm_notifier_lock vs flush_workqueue() deadlock
+ - ACPI / EC: Fix regression related to triggering source of EC event handling
+ - cpufreq: schedutil: Reset cached_raw_freq when not in sync with next_freq
+ - serdev: fix registration of second slave
+ - sched: Make resched_cpu() unconditional
+ - lib/mpi: call cond_resched() from mpi_pown() loop
+ - x86/booth: Fix boot failure when SMP MP-table is based at 0
+ - x86/decoder: Add new TEST instruction pattern
+ - x86/entry/64: Fix entry_SYSCALL_64_after_hwframe() IRQ tracing
+ - perf/x86/intel: Hide TSX events when RTM is not supported
+ - perf: archspecific pte_access_permitted()
+ - ARM: 8722/1: mm: make STRICT_KERNEL_RWX effective for LPAE
+ - ARM: 8721/1: mm: dump: check hardware RO bit for LPAE
+ - uapi: fix linux/tls.h userspace compilation error
+ - uapi: fix linux/rrxcpc.h userspace compilation errors
+ - MIPS: cmpxchg64() and HAVE_VIRT_CPU_ACCOUNTING_GEN don't work for 32-bit SMP
+ - MIPS: ralink: Fix MT7628 pimmux
+ - MIPS: ralink: Fix typo in mt7628 pymux function
+ - net: mvneta: fix handling of the Tx descriptor counter
+ - nbd: wait uninterruptible for the dead timeout
+ - nbd: don't start req until after the dead connection logic
+ - PM / OPP: Add missing of_node_put(np)
+ - PCI/ASPM: Account for downstream device's Port Common_Mode_Restore_Time
+ - PCI/ASPM: Use correct capability pointer to program LTR_L1.2_THRESHOLD
+ - PCI: hv: Use effective affinity mask
+ - PCI: Set Cavium ACS capability quirk flags to assert RR/CR/SV/UF
+ - PCI: Apply Cavium ThunderX ACS quirk to more Root Ports
+ - ALSA: hda: Add Raven PCI ID
+ - dm integrity: allow unaligned bv_offset
+ - dm cache: fix race condition in the writeback mode overwrite_bio
+ - optimisation
+ - dm crypt: allow unaligned bv_offset
+ - dm zoned: ignore last smaller runt zone
+ - dm mpath: remove annoying message of 'blk_get_request() returned -11'
+ - dm bufio: fix integer overflow when limiting maximum cache size
+ - ovl: Put upperdentry if ovl_check_origin() fails
+ - dm: allocate struct mapped_device with kvzalloc
+ - sched/rt: Simplify the IPI based RT balancing logic
+ - MIPS: pci: Remove KERN_WARN instance inside the mt7620 driver
+ - dm: fix race between dm_get_from_kobject() and __dm_destroy()
+ - dm: discard support requires all targets in a table support discards
+ - MIPS: Fix odd fp register warnings with MIPS64r2
+ - MIPS: Fix MIPS64 FP save/restore on 32-bit kernels
+ - MIPS: dts: remove bogus bcm96358nb4ser.dtb from dtb-y entry
+ - MIPS: Fix an n32 core file generation regset support regression
+ - MIPS: BCM47XX: Fix LED inversion for WRT54GSv1
+ - MIPS: math-emu: Fix final emulation phase for certain instructions
+ - rt2x00usb: mark device removed when get ENOENT usb error
+ - mm/z3fold.c: use kref to prevent page free/compact race
+ - autofs: don't fail mount for transient error
+ - nilfs2: fix race condition that causes file system corruption
+ - fscrypt: lock mutex before checking for bounce page pool
+ - eCryptfs: use after free in ecryptfs_release_messaging()
+ - libceph: don't WARN() if user tries to add invalid key
+ - bcache: check ca->alloc_thread initialized before wake up it
+ - fs: guard_bio_eod() needs to consider partitions
+ - fANotify: fix fsnotify_prepare_user_wait() failure
+ - isoFs: fix timestamps beyond 2027
+ - btrfs: change how we decide to commit transactions during flushing
+ - f2fs: expose some sectors to user in inline data or dentry case
+ - NFS: Fix typo in nomigration mount option
+ - NFS: Revert "NFS: Move the flock open mode check into nfs_flock()"
+ - nfs: Fix ugly referral attributes
+ - NFS: Avoid RCU usage in tracepoints
+ - NFS: revalidate ",,” etc correctly on "open".
+ - nfsd: deal with revoked delegations appropriately
+ - rtlwifi: rtl8192ee: Fix memory leak when loading firmware
+ - rtlwifi: fix uninitialized rtlhal->last_suspend_sec time
+ - iwlfwifi: fix firmware names for 9000 and A000 series hw
+ - md: fix deadlock error in recent patch.
+ - md: don't check MD_SB_CHANGE_CLEAN in md_allow_write
+ - Bluetooth: btqcomsmd: Add support for BD address setup
+ - md(bitmap): revert a patch
+ - fsnotify: clean up fsnotify_prepare/finish_user_wait()
+ - fsnotify: pin both inode and vfsmount mark
+ - fsnotify: fix pinning group in fsnotify_prepare_user_wait()
+ - ata: fixes kernel crash while tracing ata eh_link_autopsy event
+ - ext4: fix interaction between i_size, fallocate, and delalloc after a crash
+ - ext4: prevent data corruption with inline data + DAX
+ - ext4: prevent data corruption with journaling + DAX
+ - ALSA: pcm: update tsamp only if audio tsamp changed
+ - ALSA: usb-audio: Add sanity checks to FE parser
+ - ALSA: usb-audio: Fix potential out-of-bound access at parsing SU
+ - ALSA: usb-audio: Add sanity checks in v2 clock parsers
+ - ALSA: timer: Remove kernel warning at compat ioctl error paths
+ - ALSA: hda/realtek - Fix ALC275 no sound issue
+ - ALSA: hda: Fix too short HDMI/DP chmap reporting
+ - ALSA: hda - Fix yet remaining issue with vmaster 0dB initialization
+ - ALSA: hda/realtek - Fix ALC700 family no sound issue
+ - ASoC: sun8i-codec: Invert Master / Slave condition
+ - ASoC: sun8i-codec: Fix left and right channels inversion
+ - ASoC: sun8i-codec: Set the BCLK divider
+ - mfd: lpc_ich: Avoton/Rangeley uses SPI_BYT method
+ - fix a page leak in vhost_scsi iov_to_sgl() error recovery
+ - 9p: Fix missing commas in mount options
+ - fs/9p: Compare qid.path in v9fs_test_inode
+ - net/9p: Switch to wait_event_killable()
+ - scsi: qla2xxx: Suppress a kernel complaint in qla_init_base_qpairo()
+ - scsi: sd_zbc: Fix sd_zbc_read_zoned_characteristics()
+ - scsi: lpfc: fix pci hot plug crash in timer management routines
+ - scsi: lpfc: fix pci hot plug crash in list_add call
+ - scsi: lpfc: Fix crash receiving ELS while detaching driver
+ - scsi: lpfc: Fix FCP hba_wqidx assignment
+ - scsi: lpfc: Fix oops if nvmet_fc_register_targetport fails
+ - iscsi-target: Make TASK_REASSIGN use proper se_cmd->cmd_kref
+ - iscsi-target: Fix non-immediate TMR reference leak
+ - target: fix null pointer regression in core_tmr_drain_tmr_list
+ - target: fix buffer offset in core_scsi3_pri_read_full_status
+ - target: Fix QUEUE_FULL + SCSI task attribute handling
+ - target: Fix caw_sem leak in transport_generic_request_failure
+ - target: Fix quiese during transport write_pending_qf endless loop
+ - target: Avoid early CMD_T_PRE_EXECUTE failures during ABORT_TASK
+ - mtd: Avoid probe failures when mtd->dbg.dfs_dir is invalid
+ - mtd: nand: Export nand_reset() symbol
+ - mtd: nand: atmel: Actually use the PM ops
+ - mtd: nand: omap2: Fix subpage write
- mailbox: bcm-flexrm-mailbox: Fix FlexRM ring flush sequence
- p54: don't unregister leds when they are not initialized
- block: Fix a race between blk_cleanup_queue() and timeout handling
- raid1: prevent freeze_array/wait_all_barriers deadlock
- genirq: Track whether the trigger type has been set
- irqchip/gic-v3: Fix ppi-partitions lookup
- lockd: double unregister of inetaddr notifiers
- KVM: PPC: Book3S HV: Don't call real-mode XICS hypercall handlers if not enabled
- KVM: nVMX: set IDTR and GDTR limits when loading L1 host state
- KVM: SVM: obey guest PAT
- kvm: vmx: Reinstate state for CPUs without virtual NMI
- dax: fix PMD faults on zero-length files
- dax: fix general protection fault in dax_alloc_inode
- SUNRPC: Fix tracepoint storage issues with svc_recv and svc_rqst_status
- clk: ti: dra7-atl-clock: fix child-node lookups
- libnvmm, dimm: clear 'locked' status on successful DIMM enable
- libnvmm, pfn: make 'resource' attribute only readable by root
- libnvmm, namespace: fix label initialization to use valid seq numbers
- libnvmm, region : make 'resource' attribute only readable by root
- libnvmm, namespace: make 'resource' attribute only readable by root
- svcrdma: Preserve CB send buffer across retransmits
- IB/srpt: Do not accept invalid initiator port names
- IB/cm: Fix memory corruption in handling CM request
- IB/hfi1: Fix incorrect available receive user context count
- IB/srp: Avoid that a cable pull can trigger a kernel crash
- IB/core: Avoid crash on pkey enforcement failed in received MADs
- IB/core: Only maintain real QPs in the security lists
- KVM: PPC: Book3S HV: Don't call real-mode XICS hypercall handlers if not enabled
- powerpc: Fix boot on BOOK3S_32 with CONFIG STRICT_KERNEL_RWX
- powerpc/mm/radix: Fix crashes on Power9 DD1 with radix MMU and STRICT_RWX
- powerpc/perf/imc: Use cpu_to_node() not topology_physical_package_id()
- powerpc/signal: Properly handle return value from uprobe_deny_signal()
- powerpc/64s: Fix masking of SRR1 bits on instruction fault
- powerpc/64s/radix: Fix 128TB-512TB virtual address boundary case allocation
- powerpc/64s/hash: Fix 512T hint detection to use >= 128T
- powerpc/64s/hash: Fix 128TB-512TB virtual address boundary case allocation
- powerpc/64s/hash: Fix fork() with 512T process address space
+ - powerpc/64s/hash: Allow MAP_FIXED allocations to cross 128TB boundary
+ - media: Don't do DMA on stack for firmware upload in the AS102 driver
+ - media: rc: check for integer overflow
+ - media: rc: nec decoder should not send both repeat and keycode
+ - ex231xx-cards: fix NULL-deref on missing association descriptor
+ - media: v4l2-ctrl: Fix flags field on Control events
+ - media: venus: fix wrong size on dma_free
+ - media: venus: venc: fix bytesused v4l2_plane field
+ - media: venus: reimplement decoder stop command
+ - ARM64: dts: meson-gxl: Add alternate ARM Trusted Firmware reserved memory zone
+ - iwlwifi: fix wrong struct for a000 device
+ - iwlwifi: add a new a000 device
+ - iwlwifi: pcie: sort IDs for the 9000 series for easier comparisons
+ - iwlwifi: add new cards for a000 series
+ - iwlwifi: add new cards for 8265 series
+ - iwlwifi: add new cards for 8260 series
+ - iwlwifi: fix PCI IDs and configuration mapping for 9000 series
+ - iwlwifi: mvm: support version 7 of the SCAN_REQ_UMAC FW command
+ - e1000e: Fix error path in link detection
+ - e1000e: Fix return value test
+ - e1000e: Separate signaling for link check/link up
+ - e1000e: Avoid receiver overrun interrupt bursts
+ - e1000e: fix buffer overrun while the I219 is processing DMA transactions
+ - Linux 4.14.3
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: s390/topology: don't inline cpu_to_node
+ - SAUCE: (noup) Update spl to 0.7.3-1ubuntu1, zfs to 0.7.3-1ubuntu1
+
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 04 Dec 2017 09:08:07 -0600
+
+ * linux (4.14.0-10.12) bionic; urgency=low
+
+ * linux: 4.14.0-10.12 -proposed tracker (LP: #1734901)
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: Enable the ACPI kernel debugger and acpidbg tool
+ - [Packaging] Include arch/arm64/kernel/ftrace-mod.o in headers package
+
+ -- Seth Forshee <seth.forshee@canonical.com> Tue, 28 Nov 2017 08:46:49 -0600
+
+ * linux (4.14.0-9.11) bionic; urgency=low
+
+ * linux: 4.14.0-9.11 -proposed tracker (LP: #1734728)
+
+ * Miscellaneous Ubuntu changes
+ - Revert "UBUNTU: SAUCE: (noup) Update spl to 0.7.3-1ubuntu1, zfs to
+ 0.7.3-1ubuntu1
+
+-- Seth Forshee <seth.forshee@canonical.com>  Mon, 27 Nov 2017 12:44:48 -0600
+
+linux (4.14.0-8.10) bionic; urgency=low
+
+ * linux: 4.14.0-8.10 -proposed tracker (LP: #1734695)
+
+ * Bionic update to v4.14.2 stable release (LP: #1734694)
+  - bio: ensure __bio_clone_fast copies bi_partno
+  - af_netlink: ensure that NLMSG_DONE never fails in dumps
+  - vxlan: fix the issue that neigh proxy blocks all icmpv6 packets
+  - net: cdc_ncm: GetNtbFormat endian fix
+  - fealnx: Fix building error on MIPS
+  - net/scp: Always set scope_id in sctp_inet6_skb_msgname
+  - ima: do not update security ima if appraisal status is not INTEGRITY_PASS
+  - serial: omap: Fix EFR write on RTS deassertion
+  - serial: 8250_fintek: Fix finding base_port with activated SuperIO
+  - tpmm-dev-common: Reject too short writes
+  - rcu: Fix up pending cbs check in rcu_prepare_for_idle
+  - mm/pagewalk.c: report holes in hugetlb ranges
+  - ocfs2: fix cluster hang after a node dies
+  - ocfs2: should wait dio before inode lock in ocfs2_setattr() 
+  - ipmi: fix unsigned long underflow
+  - mm/page_alloc.c: broken deferred calculation
+  - mm/page_ext.c: check if page_ext is not prepared
+  - coda: fix 'kernel memory exposure attempt' in fsync
+  - ipmi: Prefer ACPI system interfaces over SMBIOS ones
+  - Linux 4.14.2
+
+ * Bionic update to v4.14.1 stable release (LP: #1734693)
+  - EDAC, sb_edac: Don't create a second memory controller if HA1 is not present
+  - dmaengine: dmatest: warn user when dma test times out
+  - media: imon: Fix null-ptr-deref in imon_probe
+  - media: dib0700: fix invalid dvb_detach argument
+  - crypto: dh - Fix double free of ctx->p
+  - crypto: dh - Don't permit 'p' to be 0
+  - crypto: dh - Don't permit 'key' or 'g' size longer than 'p'
+  - crypto: brcm - Explicity ACK mailbox message
+  - USB: early: Use new USB product ID and strings for DbC device
+  - USB: usbfs: compute urb->actual_length for isochronous
+  - USB: Add delay-init quirk for Corsair K70 LUX keyboards
+  - usb: gadget: f_fs: Fix use-after-free in ffs_free_inst
+  - USB: serial: metro-usb: stop I/O after failed open
+  - USB: serial: Change DbC debug device binding ID
+  - USB: serial: qcserial: add pid/vid for Sierra Wireless EM7355 fw update
+  - USB: serial: garmin_gps: fix I/O after failed probe and remove
+  - USB: serial: garmin_gps: fix memory leak on probe errors
+ selftests/x86/protection_keys: Fix syscall NR redefinition warnings
+ x86/MCE/AMD: Always give panic severity for UC errors in kernel context
+ platform/x86: peaq-wmi: Add DMI check before binding to the WMI interface
+ platform/x86: peaq_wmi: Fix missing terminating entry for peaq_dmi_table
+ HID: cp2112: add HIDRAW dependency
+ HID: wacom: generic: Recognize WACOM_HID_WD_PEN as a type of pen collection
+ rpmsg: glink: Add missing MODULE_LICENSE
+ staging: wlc1000: Fix bssid buffer offset in Txq
+ staging: sm750fb: Fix parameter mistake in poke32
+ staging: ccree: fix 64 bit scatter/gather DMA ops
+ staging: greybus: spilib: fix use-after-free after deregistration
+ staging: rtl8188eu: Revert 4 commits breaking ARP
+ spi: fix use-after-free at controller deregistration
+ sparc32: Add cmpxchg64().
+ sparc64: mmu_context: Add missing include files
+ sparc64: Fix page table walk for PUD hugepages
+ Linux 4.14.1

+ * Set PANIC_TIMEOUT=10 on Power Systems (LP: #1730660)
+ [Config]: Set PANIC_TIMEOUT=10 on ppc64le

+ enable CONFIG_SND_SOC_INTEL_BYT_CHT_NOCODEC_MACH easily confuse users
  (LP: #1732627)
+ [Config] CONFIG_SND_SOC_INTEL_BYT_CHT_NOCODEC_MACH=n

+ * Miscellaneous Ubuntu changes
+ SAUCE: (noup) Update spl to 0.7.3-1ubuntu1, zfs to 0.7.3-1ubuntu1

+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 27 Nov 2017 07:43:44 -0600
+ linux (4.14.0-7.9) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ SAUCE: apparmor: add base infrastructure for socket mediation
+ SAUCE: apparmor: af_unix mediation
+ SAUCE: LSM stacking: procsfs: add smack subdir to attrs
+ SAUCE: LSM stacking: LSM: manage credential security blobs
+ SAUCE: LSM stacking: LSM: Manage file security blobs
+ SAUCE: LSM stacking: LSM: manage task security blobs
+ SAUCE: LSM stacking: LSM: Infrastructure management of the remaining blobs
+ SAUCE: LSM stacking: LSM: general but not extreme module stacking
+ SAUCE: LSM stacking: LSM: Complete task_alloc hook
+ SAUCE: LSM stacking: fixup procsfs: add smack subdir to attrs
+ SAUCE: LSM stacking: fixup initialize task->security
+ SAUCE: LSM stacking: fixup: alloc_task_ctx is dead code
+ SAUCE: LSM stacking: add support for stacking getpeersec_stream
+ SAUCE: LSM stacking: add stacking support to apparmor network hooks
+ SAUCE: LSM stacking: fixup apparmor stacking enablement
+ - SAUCE: LSM stacking: fixup stacking kconfig
+ - SAUCE: LSM stacking: allow selecting multiple LSMs using kernel boot params
+ - SAUCE: LSM stacking: provide prctl interface for setting context
+ - SAUCE: LSM stacking: inherit current display LSM
+ - SAUCE: LSM stacking: keep an index for each registered LSM
+ - SAUCE: LSM stacking: verify display LSM
+ - SAUCE: LSM stacking: provide a way to specify the default display lsm
+ - SAUCE: LSM stacking: make sure LSM blob align on 64 bit boundaries
+ - SAUCE: LSM stacking: add /proc/<pid>/attr/display_lsm
+ - SAUCE: LSM stacking: add Kconfig to set default display LSM
+ - SAUCE: LSM stacking: add configs for LSM stacking
+ - SAUCE: LSM stacking: check for invalid zero sized writes
+ - [Config] Run updateconfigs after merging LSM stacking
+ - [Config] CONFIG_AMD_MEM_ENCRYPT=y
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.14
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 13 Nov 2017 08:12:08 -0600
+
+linux (4.14.0-6.8) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: add workarounds to enable ZFS for 4.14
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.14-rc8
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 06 Nov 2017 11:39:00 -0600
+
+linux (4.14.0-5.7) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - [Debian] Fix invocation of dh_prep for dbgsym packages
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 31 Oct 2017 07:07:23 -0500
+
+linux (4.14.0-4.5) bionic; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - [Packaging] virtualbox -- reduce in kernel module versions
+ - vbox-update: Fix up KERN_DIR definitions
+ - ubuntu: vbox -- update to 5.2.0-dfsg-2
+ - [Config] CONFIG_AMD_MEM_ENCRYPT=n
+
+ [ Upstream Kernel Changes ]
+ * Rebase to v4.14-rc7
+
+ * Touchpad and TrackPoint Dose Not Work on Lenovo X1C6 and X280 (LP: #1723986)
+  - SAUCE: Input: synaptics-rmi4 - RMI4 can also use SMBUS version 3
+  - SAUCE: Input: synaptics - Lenovo X1 Carbon 5 should use SMBUS/RMI
+  - SAUCE: Input: synaptics - add Intertouch support on X1 Carbon 6th and X280
+
+ * powerpc/64s: Add workaround for P9 vector CI load issu next (LP: #1721070)
+  - powerpc/64s: Add workaround for P9 vector CI load issue
+
+ * Miscellaneous Ubuntu changes
+  - SAUCE: staging: vboxvideo: Fix reporting invalid suggested-offset-properties
+  - [Config] CONFIG_DRM_VBOXVIDEO=m
+  - SAUCE: Import aufs driver
+  - [Config] Enable aufs
+  - [Config] Reorder annotations file after enabling aufs
+  - vbox-update: Disable imported vboxvideo module
+  - ubuntu: vbox -- update to 5.1.30-dfsg-1
+  - Enable vbox
+  - hio: Use correct sizes when initializing ssd_index_bits* arrays
+  - hio: Update io stat accounting for 4.14
+  - Enable hio
+
+  [ Upstream Kernel Changes ]
+
+ * Rebase to v4.14-rc5
+ * Rebase to v4.14-rc6
+
+ * [Bug] USB controller failed to respond on Denverton after loading
+   intel_th_pci module (LP: #1715833)
+  - SAUCE: PCI: Disable broken RTIT_BAR of Intel TH
+
+ * CONFIG_DEBUG_FS is not enabled by "make zfcpdump_defconfig" with Ubuntu
+   17.10 (kernel 4.13) (LP: #1719290)
+  - SAUCE: s390: update zfcpdump_defconfig
+
+ * Add installer support for Broadcom BCM573xx network drivers. (LP: #1720466)
+  - d-i: Add bnxt_en to nic-modules.
+ * Miscellaneous Ubuntu changes
+ - [Config] Update annotations for 4.14-rc2
+
+ + [ Upstream Kernel Changes ]
+
+ + * Rebase to v4.14-rc3
+ + * Rebase to v4.14-rc4
+
+ + -- Seth Forshee <seth.forshee@canonical.com>  Wed, 11 Oct 2017 16:04:27 -0500
+
+ +linux (4.14.0-1.2) artful; urgency=low
+
+ + * [Bug] USB 3.1 Gen2 works as 5Gbps (LP: #1720045)
+ + - xhci: set missing SuperSpeedPlus Link Protocol bit in roothub descriptor
+
+ + * Please make linux-libc-dev Provide: aufs-dev (LP: #1716091)
+ + - [Packaging] Add aufs-dev to the Provides: for linux-libc-dev
+
+ + * Upgrade to 4.13.0-11.12 in artful amd64 VM breaks display on wayland
+ + (LP: #1718679)
+ + - [Config] CONFIG_DRM_VBOXVIDEO=n
+
+ + * ipmmu-vmsa driver breaks arm64 boots (LP: #1718734)
+ + - [Config] Disable CONFIG_IPMMU_VMSA on arm64
+
+ + * autopkgtest profile fails to build on armhf (LP: #1717920)
+ + - [Packaging] autopkgtest -- disable d-i when dropping flavours
+
+ + * Miscellaneous Ubuntu changes
+ + - [Config] CONFIG_I2C_XLP9XX=m
+ + - [Packaging] Use SRCPKGNAME rather than hard-coding the source package name
+
+ + + [ Upstream Kernel Changes ]
+
+ + + * Rebase to v4.14-rc2
+
+ + -- Seth Forshee <seth.forshee@canonical.com>  Fri, 29 Sep 2017 09:09:11 -0400
+
+ +linux (4.14.0-0.1) artful; urgency=low
+
+ + * Miscellaneous Ubuntu changes
+ + - Disable vbox build
+ + - Disable hio build
+ + - Disable zfs build
+
+ + + [ Upstream Kernel Changes ]
+
+ + + * Rebase to v4.14-rc1
linux (4.13.0-11.12) artful; urgency=low

* linux: 4.13.0-11.12 -proposed tracker (LP: #1716699)

  * kernel panic -not syncing: Fatal exception: panic_on_oops (LP: #1708399)
  + s390/mm: fix local TLB flushing vs. detach of an mm address space
  + s390/mm: fix race on mm->context.flush_mm

  * CVE-2017-1000251
  + Bluetooth: Properly check L2CAP config option output buffer length

linux (4.13.0-10.11) artful; urgency=low

* linux: 4.13.0-10.11 -proposed tracker (LP: #1716287)

  * please add aufs-dkms to the Provides: for the kernel packages (LP: #1716093)

  * Artful update to v4.13.1 stable release (LP: #1716284)
  + USB: quirks: add delay init quirk for Corsair Strafe RGB keyboard
  + USB: serial: option: add support for D-Link DWM-157 C1
  + USB: Add device quirk for Logitech HD Pro Webcam C920-C
  + usb:xhci: Fix regression when ATI chipsets detected
  + USB: musb: fix external abort on suspend
  + ANDROID: binder: add padding to binder_fd_array_object.
  + ANDROID: binder: add hwbounder,vndbinder to BINDER_DEVICES.
  + staging/core: Avoid race of async_completed() w/ usbdev_release()
  + staging/rts5208: fix incorrect shift to extract upper nybble
  + staging: ccre: save ciphertext for CTS IV
  + staging: fsl-dpaa2/eth: fix off-by-one FD ctrl bitmaks
  + iio: adc: ti-ads1015: fix incorrect data rate setting update
  + iio: adc: ti-ads1015: fix scale information for ADS1115
  + iio: adc: ti-ads1015: enable conversion when CONFIG_PM is not set
  + iio: adc: ti-ads1015: avoid getting stale result after runtime resume
  + iio: adc: ti-ads1015: don't return invalid value from buffer setup callbacks
  + iio: adc: ti-ads1015: add adequate wait time to get correct conversion
  + driver core: bus: Fix a potential double free
  + HID: wacom: Do not completely map WACOM_HID_WD_TOUCHRINGSTATUS usage
  + binder: free memory on error
  + crypto: caam/qi - fix compilation with CONFIG_DEBUG_FORCE_WEAK_PER_CPU=y
  + crypto: caam/qi - fix compilation with DEBUG enabled
  + thunderbolt: Fix reset response_type
  + fpga: altera-hps2fpga: fix multiple init of i3_remap_lock
- intel_th: pci: Add Cannon Lake PCH-H support
- intel_th: pci: Add Cannon Lake PCH-LP support
- ath10k: fix memory leak in rx ring buffer allocation
- drm/vgdm: Pin our pages for dmabuf exports
- drm/ttm: Fix accounting error when fail to get pages for pool
- drm/dp/mst: Handle errors from drm_atomic_get_private_obj_state() correctly
- rtlwifi: rtl_pci_probe: Fix fail path of _rtl_pci_find_adapter
- Bluetooth: Add support of 13d3:3494 RTL8723BE device
- iwlwifi: pci: add new PCI ID for 7265D
- dlm: avoid double-free on error path in dlm_device_[register,unregister]
- mwifiex: correct channel stat buffer overflows
- MCB: add support for SC31 to mch-lpc
- s390/mm: avoid empty zero pages for KVM guests to avoid postcopy hangs
- drm/nouveau/pci/msi: disable MSI on big-endian platforms by default
- drm/nouveau: Fix error handling in nv50 Disp_atomic_commit
- workqueue: Fix flag collision
- ahci: don't use MSI for devices with the silly Intel NVMe remapping scheme
- cs5536: add support for IDE controller variant
- scsi: sg: protect against races between mmap() and SG_SET_RESERVED_SIZE
- scsi: sg: recheck MMAP_IO request length with lock held
- of/device: Prevent buffer overflow in of_device_modalias()
- rtlwifi: Fix memory leak when firmware request fails
- rtlwifi: Fix fallback firmware loading
- Linux 4.13.1

* Kernel has trouble recognizing Corsair Strafe RGB keyboard (LP: #1678477)
- usb: quirks: add delay init quirk for Corsair Strafe RGB keyboard

* SROGV: warning if unload VFs (LP: #1715073)
- PCI: Disable VF decoding before pcibios_sriov_disable() updates resources

* [Patch] network-140e:NVM bug fixes (cherrypick from 4.14) (LP: #1715578)
- i40e: avoid NVM acquire deadlock during NVM update
- i40e: point wb_desc at the nvm_wb_desc during i40e_read_nvm_aq

* [P9,POwer NV] Perf PMU event : pm_br_2path and pm_ld_miss_l1 is counted twice when perf stat is done (perf:) (LP: #1714571)
- perf vendor events powerpc: Remove duplicate events

* Unable to install Ubuntu on the NVMe disk under VMD PCI domain
(LP: #1703339)
- [Config] Include vmd in storage-core-modules udeb

* 17.10 fails to boot on POWER9 DD2.0 with Deep stop states (LP: #1715064)
- powerpc/powernv: Save/Restore additional SPRs for stop4 cpuidle
- powerpc/powernv: Clear PECE1 in LPCR via stop-api only on Hotplug
- SAUCE: powerpc/powernv: Clear LPCR[PECE1] via stop-api only for deep state
- offline

Open Source Used In 5GaaS Edge AC-4 19546
+ * Miscellaneous Ubuntu changes
+  - SAUCE: selftests/seccomp: Support glibc 2.26 siginfo_t.h
+  - Revert "UBUNTU: SAUCE: Import aufs driver"
+  - SAUCE: Import aufs driver
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Sun, 10 Sep 2017 17:48:59 -0500
+
+linux (4.13.0-9.10) artful; urgency=low
+
+ * linux: 4.13.0-9.10 -proposed tracker (LP: #1715145)
+
+ * EDAC sbridge: Failed to register device with error -22. (LP: #1714112)
+  - [Config] CONFIG_EDAC_GHES=n
+
+ * Miscellaneous Ubuntu changes
+  - ubuntu: vbox -- update to 5.1.26-dfsg-2
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 05 Sep 2017 07:51:19 -0500
+
+linux (4.13.0-8.9) artful; urgency=low
+
+ * snapd 2.27.3+17.10 ADT test failure with linux 4.13.0-6.7 (LP: #1713103)
+  - SAUCE: apparmor: fix apparmorfs DAC access, permissions
+
+ * enable ARCH_SUNXI (and friends) in arm64 kernel .config (LP: #1701137)
+  - [Config] Enable CONFIG_ARCH_SUNXI and related options for arm64
+
+ * [Bug] Harrisonville: pnd2_edac always fail to load on B1 stepping
+  Harrisonville SDP (LP: #1709257)
+  - EDAC, pnd2: Build in a minimal sideband driver for Apollo Lake
+  - EDAC, pnd2: Mask off the lower four bits of a BAR
+  - EDAC, pnd2: Conditionally unhide/hidden the P2SB PCI device to read BAR
+  - EDAC, pnd2: Properly toggle hidden state for P2SB PCI device
+  - SAUCE: i2c: i801: Restore the presence state of P2SB PCI device after
+    reading BAR
+
+ * Miscellaneous Ubuntu changes
+  - Revert "UBUNTU: SAUCE: Import aufs driver"
+  - SAUCE: Import aufs driver
+  - SAUCE: selftests/powerpc: Disable some ptrace selftests
+  - [Config] CONFIG_CRYPTO_DEV_NITROX_CNN55XX=n for s390x
+  - [Config] CONFIG_I2C_SLAVE=n for amd64, i386, ppc64le
+  - [Config] Disable CONFIG_MDIO_* options for s390x
+ [Config] CONFIG_SCSI_MQ_DEFAULT=n for s390x
+ [Config] Update annotations for 4.13
+
+- Seth Forshee <seth.forshee@canonical.com>  Thu, 31 Aug 2017 14:27:09 -0500
+
+ linux (4.13.0-7.8) artful; urgency=low
+
+ - SAUCE: selftests/powerpc: Use snprintf to construct DSCR sysfs interface
+  paths
+
+ * Miscellaneous Ubuntu changes
+ - Revert "UBUNTU: SAUCE: seccomp: log actions even when audit is disabled"
+
+ * Miscellaneous upstream changes
+ - seccomp: Provide matching filter for introspection
+ - seccomp: Sysctl to display available actions
+ - seccomp: Operation for checking if an action is available
+ - seccomp: Sysctl to configure actions that are allowed to be logged
+ - seccomp: Selftest for detection of filter flag support
+ - seccomp: Filter flag to log all actions except SECCOMP_RET_ALLOW
+ - seccomp: Action to log before allowing
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13-rc7
+
+- Seth Forshee <seth.forshee@canonical.com>  Mon, 28 Aug 2017 08:12:24 -0500
+
+ linux (4.13.0-6.7) artful; urgency=low
+
+ * HID: multitouch: Support ALPS PTP Stick and Touchpad devices (LP: #1712481)
+ - SAUCE: HID: multitouch: Support ALPS PTP stick with pid 0x120A
+
+ * sort ABI files with C.UTF-8 locale (LP: #1712345)
+ - [Packaging] sort ABI files with C.UTF-8 locale
+
+ * igb: Support using Broadcom 54616 as PHY (LP: #1712024)
+ - SAUCE: igb: add support for using Broadcom 54616 as PHY
+
+ * RPT related fixes missing in Ubuntu 16.04.3 (LP: #1709220)
+ - powerpc/mm/radix: Improve _tlbiel_pid to be usable for PWC flushes
+ - powerpc/mm/radix: Improve TLB/PWC flushes
+ - powerpc/mm/radix: Avoid flushing the PWC on every flush_tlb_range
+
+ * Linux 4.12 refuses to load self-signed modules under Secure Boot with
+  properly enrolled keys (LP: #1712168)
+ - SAUCE: (efi-lockdown) MODSIGN: Fix module signature verification
+ * [17.10 FEAT] Enable NVMe driver - kernel (LP: #1708432)
+ - [Config] CONFIG_BLK_DEV_NVME=m for s390
+
+ * Artful: 4.12.0-11.12: Boot panic in vlv2_plat_configure_clock+0x3b/0xa0
+ (LP: #1711298)
+ - [Config] CONFIG_INTEL_ATOMISP=n
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: apparmor: af_unix mediation
+
+ * Miscellaneous upstream changes
+ - apparmor: Fix shadowed local variable in unpack_trans_table()
+ - apparmor: Fix logical error in verify_header()
+ - apparmor: Fix an error code in aafs_create()
+ - apparmor: Redundant condition: prev_ns. in [label.c:1498]
+ - apparmor: add the ability to mediate signals
+ - apparmor: add mount mediation
+ - apparmor: cleanup conditional check for label in label_print
+ - apparmor: add support for absolute root view based labels
+ - apparmor: make policy_unpack able to audit different info messages
+ - apparmor: add more debug asserts to apparmorfs
+ - apparmor: add base infrastructure for socket mediation
+ - apparmor: move new_null_profile to after profile lookup fns()
+ - apparmor: fix race condition in null profile creation
+ - apparmor: ensure unconfined profiles have dfas initialized
+ - apparmor: fix incorrect type assignment when freeing proxies
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13-rc6
+
+ -- Seth Forshee <seth.forshee@canonical.com> Wed, 23 Aug 2017 08:10:38 -0500
+
+ * Ubuntu17.10 - perf: Update Power9 PMU event JSON files (LP: #1708630)
+ - perf pmu-events: Support additional POWER8+ PVR in mapfile
+ - perf vendor events: Add POWER9 PMU events
+ - perf vendor events: Add POWER9 PVRs to mapfile
+ - SAUCE: perf vendor events powerpc: remove suffix in mapfile
+ - SAUCE: perf vendor events powerpc: Update POWER9 events
+
+ * Disable CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE (LP: #1709171)
+ - [Config] CONFIG_MEMORY_HOTPLUG_DEFAULT_ONLINE=n for ppc64el
+
+ * Please only recommend or suggest initramfs-tools | linux-initramfs-tool for
+ kernels able to boot without initramfs (LP: #1700972)
+ - [Debian] Don't depend on initramfs-tools
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: Import aufs driver
+ - SAUCE: aufs -- Add missing argument to loop_switch() call
+ - [Config] Enable aufs
+ - SAUCE: (noup) Update spl to 0.6.5.11-ubuntu1, zfs to 0.6.5.11-1ubuntu1
+ - Enable zfs build
+ - SAUCE: powerpc: Always initialize input array when calling epapr_hypercall()
+ - [Packaging] switch up to debhelper 9
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13-rc5
+
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 15 Aug 2017 09:24:16 -0500
+
+ linux (4.13.0-4.5) artful; urgency=low
+
+ * Lenovo Yoga 910 Sensors (LP: #1708120)
+ - SAUCE: (no-up) HID: Add quirk for Lenovo Yoga 910 with ITE Chips
+
+ * Unable to install Ubuntu on the NVMe disk under VMD PCI domain
+ (LP: #1703339)
+ - [Config] Add vmd driver to generic inclusion list
+
+ * Set CONFIG_SATA_HIGHBANK=y on armhf (LP: #1704340)
+ - [Config] CONFIG_SATA_HIGHBANK=y
+
+ * Miscellaneous Ubuntu changes
+ - ubuntu: vbox -- update to 5.1.26-dfsg-1
+ - SAUCE: hio: Build fixes for 4.13
+ - Enable hio build
+ - SAUCE: (noup) Update spl to 0.6.5.11-1, zfs to 0.6.5.11-1ubuntu1
+ - [debian] use all rather than amd64 dkms debs for sync
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13-rc4
+
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 08 Aug 2017 11:31:48 -0500
+
+ linux (4.13.0-3.4) artful; urgency=low
+
+ * Adt tests of src:linux time out often on armhf lxc containers (LP: #1705495)
+ - [Packaging] tests -- reduce rebuild test to one flavour
+ - [Packaging] tests -- reduce rebuild test to one flavour -- use filter
+
+ * snapd 2.26.8+17.10 ADT test failure with linux 4.12.0-6.7 (LP: #1704158)
+ - SAUCE: virtio_net: Revert mergeable buffer handling rework
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13-rc3
+
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 31 Jul 2017 10:08:16 -0500
+
+ * Change CONFIG_IBMVETH to module (LP: #1704479)
+ - [Config] CONFIG_IBMVETH=m
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13-rc2
+
+ -- Seth Forshee <seth.forshee@canonical.com> Mon, 24 Jul 2017 13:58:08 -0500
+
+ linux (4.13.0-2.3) artful; urgency=low
+
+ * Miscellaneous Ubuntu changes
+ - [Debian] Support sphinx-based kernel documentation
+
+ [ Upstream Kernel Changes ]
+
+ * Rebase to v4.13-rc1
+
+ -- Seth Forshee <seth.forshee@canonical.com> Wed, 19 Jul 2017 15:09:31 -0500
+
+ * ThunderX: soft lockup on 4.8+ kernels when running qemu-efi with vhost=on
+ (LP: #1673564)
+ - arm64: Add a facility to turn an ESR syndrome into a sysreg encoding
+ - KVM: arm/arm64: vgic-v3: Add accessors for the ICH_APxRn_EL2 registers
+ - KVM: arm64: Make kvm_condition_valid32() accessible from EL2
+ - KVM: arm64: vgic-v3: Add hook to handle guest GICv3 sysreg accesses at EL2
+ - KVM: arm64: vgic-v3: Add ICV_BPR1_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_IAR1_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_EOIR1_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_AP1Rn_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_HPPIR1_EL1 handler
+ - KVM: arm64: vgic-v3: Enable trapping of Group-1 system registers
+ - KVM: arm64: Enable GICv3 Group-1 sysreg trapping via command-line
+ - KVM: arm64: vgic-v3: Add ICV_BPR0_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_IGNREN0_EL1 handler
+ - KVM: arm64: Add misc Group-0 handlers
+ - KVM: arm64: vgic-v3: Enable trapping of Group-0 system registers
+ - KVM: arm64: Enable GICv3 Group-0 sysreg trapping via command-line
+ - arm64: Add MIDR values for Cavium cn83XX SoCs
+ - arm64: Add workaround for Cavium Thunder erratum 30115
+ - KVM: arm64: vgic-v3: Add ICV_DIR_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_RPR_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_CTLR_EL1 handler
+ - KVM: arm64: vgic-v3: Add ICV_PMR_EL1 handler
+ - KVM: arm64: Enable GICv3 common sysreg trapping via command-line
+ - KVM: arm64: vgic-v3: Log which GICv3 system registers are trapped
+ - KVM: arm64: Log an error if trapping a read-from-write-only GICv3 access
+ - KVM: arm64: Log an error if trapping a write-to-read-only GICv3 access

+ * hns: under heavy load, NIC may fail and require reboot (LP: #1704146)
+ - net: hns: Bugfix for Tx timeout handling in hns driver

+ * New ACPI identifiers for ThunderX SMMU (LP: #1703437)
+ - iommu/arm-smmu: Plumb in new ACPI identifiers

+ * Transparent hugepages should default to enabled=madvise (LP: #1703742)
+ - SAUCE: use CONFIG_TRANSPARENT_HUGEPAGE_MADVISE=y as default

+ * Artful update to v4.12.1 stable release (LP: #1703858)
+ - driver core: platform: fix race condition with driver_override
+ - RDMA/uverbs: Check port number supplied by user verbs cmds
+ - usb: dwc3: replace %p with %pK
+ - USB: serial: cp210x: add ID for CEL EM3588 USB ZigBee stick
+ - usb: usbip: set buffer pointers to NULL after free
+ - Add USBquirk for HVR-950q to avoid intermittent device resets
+ - usb: Fix typo in the definition of Endpoint[out]Request
+ - USB: core: fix device node leak
+ - USB: serial: option: add two Longcheer device ids
+ - USB: serial: qserial: new Sierra Wireless EM7305 device ID
+ - xhci: Limit USB2 port wake support for AMD Promontory hosts
+ - gfs2: Fix glock rhashtable rcu bug
+ - Add "shutdown" to "struct class".
+ - tpms: Issue a TPM2_Shutdown for TPM2 devices.
+ - tpm: fix a kernel memory leak in tpm-sysfs.c
+ - powerpc/powerenv: Fix CPU_HOTPLUG=n idle.c compile error
+ - x86/ucaccess: Optimize copy_user_enhanced_fast_string() for short strings
+ - sched/fair, cpumask: Export for_each_cpu_wrap()
+ - sched/core: Implement new approach to scale select_idle_cpu()
+ - sched/numa: Use down_read_trylock() for the mmap_sem
+ - sched/numa: Override part of migrate_degrades_locality() when idle balancing
+ - sched/fair: Simplify wake_affine() for the single socket case
+ - sched/numa: Implement NUMA node level wake_affine()
+ - sched/fair: Remove effective_load()
+ - sched/numa: Hide numa_wake_affine() from UP build
+ - xen: avoid deadlock in xenbus driver
+ - crypto: drbg - Fixes panic in wait_for_completion call
+ - Linux 4.12.1

+ * cxlflash update request in the Xenial SRU stream (LP: #1702521)
+ - scsi: cxlflash: Combine the send queue locks
+ - scsi: cxlflash: Update cxlflash_afu_sync() to return errno
+ - scsi: cxlflash: Reset hardware queue context via specified register
+ - scsi: cxlflash: Schedule asynchronous reset of the host
+ - scsi: cxlflash: Handle AFU sync failures
+ - scsi: cxlflash: Track pending scsi commands in each hardware queue
+ - scsi: cxlflash: Flush pending commands in cleanup path
+ - scsi: cxlflash: Add scsi command abort handler
+ - scsi: cxlflash: Create character device to provide host management interface
+ - scsi: cxlflash: Separate AFU internal command handling from AFU sync specifics
+ - scsi: cxlflash: Introduce host ioctl support
+ - scsi: cxlflash: Refactor AFU capability checking
+ - scsi: cxlflash: Support LUN provisioning
+ - scsi: cxlflash: Support AFU debug
+ - scsi: cxlflash: Support WS16 unmap
+ - scsi: cxlflash: Remove zeroing of private command data
+ - scsi: cxlflash: Update TMF command processing
+ - scsi: cxlflash: Avoid double free of character device
+ - scsi: cxlflash: Update send_tmf() parameters
+ - scsi: cxlflash: Update debug prints in reset handlers

+ * make snap-pkg support (LP: #1700747)
+ - make snap-pkg support

+ * Quirk for non-compliant PCI bridge on HiSilicon D05 board (LP: #1698706)
+ - SAUCE: PCI: Support hibmc VGA cards behind a misbehaving HiSilicon bridge

+ * arm64: fix crash reading /proc/kcore (LP: #1702749)
+ - fs/proc: kcore: use kcore_list type to check for vmalloc/module address
+ - arm64: mm: select CONFIG_ARCH_PROC_KCORE_TEXT

Open Source Used In 5GaaS Edge AC-4 19553
* Opal and POWER9 DD2 (LP: #1702159)
  * SAUCE: powerpc/powernv: Tell OPAL about our MMU mode on POWER9

* Data corruption with hio driver (LP: #1701316)
  * SAUCE: hio: Fix incorrect use of enum req_ofp values

* Miscellaneous Ubuntu changes
  * (noup) Update spl to 0.6.5.10-1, zfs to 0.6.5.10-1ubuntu2
  * snapcraft.yaml: Sync with xenial
  * [Config] CONFIG_CAVIUM_ERRATUM_30115=y

* Miscellaneous upstream changes
  * Revert "UBUNTU: SAUCE: (efi-lockdown) efi: Add sysctls for secureboot and MokSBState"

-- Seth Forshee <seth.forshee@canonical.com> Fri, 14 Jul 2017 15:25:41 -0500

linux (4.12.0-6.7) artful; urgency=low

* update ENA driver to 1.2.0k from net-next (LP: #1701575)
  * net: ena: change return value for unsupported features unsupported return value
  * net: ena: add hardware hints capability to the driver
  * net: ena: change sizeof() argument to be the type pointer
  * net: ena: add reset reason for each device FLR
  * net: ena: add support for out of order rx buffers refill
  * net: ena: allow the driver to work with small number of msix vectors
  * net: ena: use napi_schedule_irqoff when possible
  * net: ena: separate skb allocation to dedicated function
  * net: ena: use lower_32_bits()/upper_32_bits() to split dma address
  * net: ena: update driver's rx drop statistics
  * net: ena: update ena driver to version 1.2.0

* APST gets enabled against explicit kernel option (LP: #1699004)
  * nvme: explicitly disable APST on quirked devices

* Miscellaneous Ubuntu changes
  * SAUCE: hio: Update to Huawei ES3000_V2 (2.1.0.40)
  * SAUCE: hio updates for 4.12
  * SAUCE: Enable hio build

-- Seth Forshee <seth.forshee@canonical.com> Wed, 05 Jul 2017 14:23:20 -0500

linux (4.12.0-5.6) artful; urgency=low

* ERAT invalidate on context switch removal (LP: #1700819)
  * powerpc: Only do ERAT invalidate on radix context switch on P9 DD1
+ * powerpc: Invalidate ERAT on powersave wakeup for POWER9 (LP: #1700521)
+ - SAUCE: powerpc: Invalidate ERAT on powersave wakeup for POWER9
+ + * Miscellaneous Ubuntu changes
+ + - d-i: Move qcom-emac from arm64 to shared nic-modules
+ + [ Upstream Kernel Changes ]
+ + + * Rebase to v4.12
+ + + -- Seth Forshee <seth.forshee@canonical.com>  Mon, 03 Jul 2017 07:52:02 -0500
+ + +linux (4.12.0-4.5) artful; urgency=low
+ + + * aacraid driver may return uninitialized stack data to userspace
+ + + (LP: #1700077)
+ + + - SAUCE: scsi: aacraid: Don't copy uninitialized stack memory to userspace
+ + + + * KILLER1435-S[0489:e0a2] BT cannot search BT 4.0 device (LP: #1699651)
+ + + - Bluetooth: btusb: Add support for 0489:e0a2 QCA_ROME device
+ + + * AACRAID for power9 platform (LP: #1689980)
+ + + - scsi: aacraid: Remove __GFP_DMA for raw srb memory
+ + + - scsi: aacraid: Fix DMAR issues with iommu=pt
+ + + - scsi: aacraid: Added 32 and 64 queue depth for arc natives
+ + + - scsi: aacraid: Set correct Queue Depth for HBA1000 RAW disks
+ + + - scsi: aacraid: Remove reset support from check_health
+ + + - scsi: aacraid: Change wait time for fib completion
+ + + - scsi: aacraid: Log count info of scsi cmds before reset
+ + + - scsi: aacraid: Print ctrl status before eh reset
+ + + - scsi: aacraid: Using single reset mask for IOP reset
+ + + - scsi: aacraid: Rework IOP reset
+ + + - scsi: aacraid: Add periodic checks to see IOP reset status
+ + + - scsi: aacraid: Rework SOFT reset code
+ + + - scsi: aacraid: Rework aac_src_restart
+ + + - scsi: aacraid: Use correct function to get ctrl health
+ + + - scsi: aacraid: Make sure ioctl returns on controller reset
+ + + - scsi: aacraid: Enable ctrl reset for both hba and arc
+ + + - scsi: aacraid: Add reset debugging statements
+ + + - scsi: aacraid: Remove reference to Series-9
+ + + - scsi: aacraid: Update driver version to 50834
+ + + * hibmc driver does not include "pci:" prefix in bus ID (LP: #1698700)
+ + - SAUCE: drm: hibmc: Use set_busid function from drm core
+ + + * HiSilicon D05: installer doesn't appear on VGA (LP: #1698954)
+ + - d-i: Add hibmc-drm to kernel-image udeb
+ +
+ * Fix /proc/cpuinfo revision for POWER9 DD2 (LP: #1698844)
+ - SAUCE: powerpc: Fix /proc/cpuinfo revision for POWER9 DD2
+ + * Miscellaneous Ubuntu changes
+ + - [Config] CONFIG_SATA_MV=n and CONFIG_GENERIC_PHY=n for s390x
+ + - [Config] CONFIG_ATA=n for s390x
+ + - [Config] Update annotations for 4.12
+ + [ Upstream Kernel Changes ]
+ + + * Rebase to v4.12-rc7
+ + + -- Seth Forshee <seth.forshee@canonical.com>  Mon, 26 Jun 2017 11:27:29 -0500
+ + + linux (4.12.0-3.4) artful; urgency=low
+ + + * Miscellaneous upstream changes
+ + + - ufs: fix the logics for tail relocation
+ + + [ Upstream Kernel Changes ]
+ + + * Rebase to v4.12-rc6
+ + + -- Seth Forshee <seth.forshee@canonical.com>  Mon, 19 Jun 2017 14:50:39 -0500
+ + + linux (4.12.0-2.3) artful; urgency=low
+ + + * CVE-2014-9900
+ + + - SAUCE: (no-up) net: Zeroing the structure ethtool_wolinfo in
+ + + ethtool_get_wol()
+ + + * System doesn't boot properly on Gigabyte AM4 motherboards (AMD Ryzen)
+ + + (LP: #1671360)
+ + + - pinctrl/amd: Use regular interrupt instead of chained
+ + + * extend-diff-ignore should use exact matches (LP: #1693504)
+ + + - [Packaging] exact extend-diff-ignore matches
+ + + * Miscellaneous Ubuntu changes
+ + + - SAUCE: efi: Don't print secure boot state from the efi stub
+ + + - ubuntu: vbox -- Update to 5.1.22-dfsg-1
+ + + - SAUCE: vbox fixes for 4.12
+ + + - Re-enable virtualbox build
+ + + - [Config] CONFIG_ORANGEFS_FS=m
+ + + - SAUCE: (noup) Update spl to 0.6.5.9-1ubuntu2, zfs to 0.6.5.9-5ubuntu7
+ + + - Enable zfs build
+ + [ Upstream Kernel Changes ]
+ * Rebase to v4.12-rc4
+ * Rebase to v4.12-rc5
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Sun, 11 Jun 2017 22:25:13 -0500
+ +linux (4.12.0-1.2) artful; urgency=low
+ + * Enable Matrox driver for Ubuntu 16.04.3 (LP: #1693337)
+ + - [Config] Enable CONFIG_DRM_MGAG200 as module
+ + * Support low-pin-count devices on Hisilicon SoCs (LP: #1677319)
+ + - [Config] CONFIG_LIBIO=y on arm64 only
+ + - SAUCE: LIBIO: Introduce a generic PIO mapping method
+ + - [Config] CONFIG_LIBIO=y on arm64 only
+ + - SAUCE: LIBIO: Introduce a generic PIO mapping method
+ + - [Config] CONFIG_HISILICON_LPC=y
+ + - SAUCE: LPC: Support the device-tree LPC host on Hip06/Hip07
+ + - SAUCE: LIBIO: Support the dynamically logical PIO registration of ACPI host
+ + I/O
+ + - SAUCE: LPC: Add the ACPI LPC support
+ + - SAUCE: PCI: Apply the new generic I/O management on PCI IO hosts
+ + - SAUCE: PCI: Restore codepath for !CONFIG_LIBIO
+ + * POWER9: Additional patches for TTY and CPU_IDLE (LP: #1674325)
+ + - SAUCE: tty: Fix ldisc crash on reopened tty
+ + * Miscellaneous Ubuntu changes
+ + - [Debian] Add build-dep on libnuma-dev to enable 'perf bench numa'
+ + - Rebase to v4.12-rc3
+ + [ Upstream Kernel Changes ]
+ + * Rebase to v4.12-rc3
+ +
+ -- Seth Forshee <seth.forshee@canonical.com>  Mon, 29 May 2017 20:56:29 -0500
+ +linux (4.12.0-0.1) artful; urgency=low
+ + * please enable CONFIG_ARM64_LSE_ATOMICS (LP: #1691614)
+ + - [Config] CONFIG_ARM64_LSE_ATOMICS=y
+ + * [Regression] NUMA_BALANCING disabled on arm64 (LP: #1690914)
+ + - [Config] CONFIG_NUMA_BALANCING{,_DEFAULT_ENABLED}=y on arm64
+ + * exec'ing a setuid binary from a threaded program sometimes fails to setuid
+ + (LP: #1672819)
+ + - SAUCE: exec: ensure file system accounting in check_unsafe_exec is correct
+ * Miscellaneous Ubuntu changes
+ - Update find-missing-sauce.sh to compare to artful
+ - Update dropped.txt
+ - SAUCE: (efi-lockdown) efi: Add EFI_SECURE_BOOT bit
+ - SAUCE: (efi-lockdown) Add the ability to lock down access to the running kernel image
+ - SAUCE: (efi-lockdown) efi: Lock down the kernel if booted in secure boot mode
+ - SAUCE: (efi-lockdown) Enforce module signatures if the kernel is locked down
+ - SAUCE: (efi-lockdown) Restrict /dev/mem and /dev/kmem when the kernel is locked down
+ - SAUCE: (efi-lockdown) Add a sysrq option to exit secure boot mode
+ - SAUCE: (efi-lockdown) kexec: Disable at runtime if the kernel is locked down
+ - SAUCE: (efi-lockdown) Copy secure_boot flag in boot params across kexec reboot
+ - SAUCE: (efi-lockdown) kexec_file: Disable at runtime if securelevel has been set
+ - SAUCE: (efi-lockdown) hibernate: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) uswsusp: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) PCI: Lock down BAR access when the kernel is locked down
+ - SAUCE: (efi-lockdown) x86: Lock down IO port access when the kernel is locked down
+ - SAUCE: (efi-lockdown) x86: Restrict MSR access when the kernel is locked down
+ - SAUCE: (efi-lockdown) ACPI: Limit access to custom_method when the kernel is locked down
+ - SAUCE: (efi-lockdown) acpi: Ignore acpi_rsdp kernel param when the kernel has been locked down
+ - SAUCE: (efi-lockdown) acpi: Disable ACPI table override if the kernel is locked down
+ - SAUCE: (efi-lockdown) acpi: Disable APEI error injection if the kernel is locked down
+ - SAUCE: (efi-lockdown) Enable cold boot attack mitigation
+ - SAUCE: (efi-lockdown) bpf: Restrict kernel image access functions when the kernel is locked down
+ - SAUCE: (efi-lockdown) scsi: Lock down the eata driver
+ - SAUCE: (efi-lockdown) Prohibit PCMCIA CIS storage when the kernel is locked down
+ - SAUCE: (efi-lockdown) Lock down IOCSERIAL
+ - SAUCE: (efi-lockdown) KEYS: Allow unrestricted boot-time addition of keys to secondary keyring
+ - SAUCE: (efi-lockdown) efi: Add EFI signature data types
+ - SAUCE: (efi-lockdown) efi: Add an EFI signature blob parser
+ - SAUCE: (efi-lockdown) MODSIGN: Import certificates from UEFI Secure Boot
+ - SAUCE: (efi-lockdown) MODSIGN: Allow the "db" UEFI variable to be suppressed
- SAUCE: (efi-lockdown) efi: Sanitize boot_params in efi stub
- SAUCE: (efi-lockdown) efi: Add secure_boot state and status bit for MokSBState
- SAUCE: (efi-lockdown) efi: Add sysctls for secureboot and MokSBState
- [Config] Set values for UEFI secure boot lockdown options
- Disable virtualbox build
- Disable hio build
- SAUCE: securityfs: Replace CURRENT_TIME with current_time()
- Disable zfs build
- [Debian] Work out upstream tag for use with gen-auto-reconstruct
- SAUCE: Importaufs driver
- SAUCE: aufs -- Include linux/mm.h in fs/aufs/file.h
- [Config] Enable aufs
- SAUCE: perf callchain: Include errno.h on x86 unconditionally

[ Upstream Kernel Changes ]

* Rebase to v4.12-rc2

-- Seth Forshee <seth.forshee@canonical.com> Sun, 21 May 2017 23:44:44 -0500

* Release Tracking Bug
  - LP: #1690999

* apparmor_parser hangs indefinitely when called by multiple threads
  (LP: #1645037)
  - SAUCE: apparmor: fix lock ordering for mkdir

* apparmor leaking securityfs pin count (LP: #1660846)
  - SAUCE: apparmor: fix leak on securityfs pin count

* apparmor reference count leak when securityfs_setup_d_inode() fails
  (LP: #1660845)
  - SAUCE: apparmor: fix reference count leak when securityfs_setup_d_inode()
  - fails

* apparmor not checking error if security_pin_fs() fails (LP: #1660842)
  - SAUCE: apparmor: fix not handling error case when securityfs_pin_fs() fails

* libvirt profile is blocking global setrlimit despite having no rlimit rule
  (LP: #1679704)
  - SAUCE: apparmor: fix complain mode failure for rlimit mediation
  - apparmor: update auditing of rlimit check to provide capability information

---
+ * apparmor: does not provide a way to detect policy updates (LP: #1678032)
+ - SAUCE: apparmor: add policy revision file interface
+ + * apparmor does not make support of query data visible (LP: #1678023)
+ - SAUCE: apparmor: add label data availability to the feature set
+ + * apparmor query interface does not make supported query info available
+ (LP: #1678030)
+ - SAUCE: apparmor: add information about the query interface to the feature set
+ + * change_profile incorrect when using namespaces with a compound stack
+ (LP: #1677959)
+ - SAUCE: apparmor: fix label parse for stacked labels
+ + * Regression in 4.4.0-65-generic causes very frequent system crashes
+ (LP: #1669611)
+ - apparmor: sync of apparmor 3.6+ (17.04)
+ + * Artful update to 4.11.1 stable release (LP: #1690814)
+ - dm ioctl: prevent stack leak in dm ioctl call
+ - drm/sti: fix GDP size to support up to UHD resolution
+ - power: supply: lp8788: prevent out of bounds array access
+ - brcmfmac: Ensure pointer correctly set if skb data location changes
+ - brcmfmac: Make skb header writable before use
+ - sparc64: fix fault handling in NGbzero.S and GENbzero.S
+ - refcount: change EXPORT_SYMBOL markings
+ - net: mach: fix phy interrupt parsing
+ - tcp: fix access to sk->sk_state in tcp_poll()
+ - geneve: fix incorrect setting of UDP checksum flag
+ - bpf: enhance verifier to understand stack pointer arithmetic
+ - bpf, arm64: fix jit branch offset related to ldimm64
+ - tcp: fix wraparound issue in tcp_lps
+ - net: ipv6: Do not duplicate DAD on link up
+ - net: usb: qmi_wwan: add Telit ME910 support
+ - tcp: do not inherit fastopen_req from parent
+ - ipv4, ipv6: ensure raw socket message is big enough to hold an IP header
+ - rtnetlink: NUL-terminate IFLA_PHYS_PORT_NAME string
+ - ipv6: initialize route null entry in addrconf_init()
+ - ipv6: reorder ip6_route_dev_notifier after ipv6_dev_notf
+ - tcp: randomize timestamps on synccookies
+ - bnxt_en: allocate enough space for ->ntp_fltr_bmap
+ - bpf: don't let ldimm64 leak map addresses on unprivileged
+ - net: mldo-mux: bcm-iproc: call mdiobus_free() in error path
+ - if2fs: sanity check segment count
+ - xen/arm,arm64: fix xen_dma_ops after 815dd18 "Consolidate get_dma_ops..."
+ - xen: Revert commits da72ff5bfc0 and 72a9b186292d
+ - block: get rid of blk_integrity_revalidate()
+ - Linux 4.11.1
+ * Module signing exclusion for staging drivers does not work properly
  + (LP: #1690908)
+ * SAUCE: Fix module signing exclusion in package builds
+ * perf: qcom: Add L3 cache PMU driver (LP: #1689856)
  + + [Config] CONFIG_QCOM_L3_PMU=y
  + * perf: qcom: Add L3 cache PMU driver
+ * No PMU support for ACPI-based arm64 systems (LP: #1689661)
  + - drivers/perf: arm_pmu: rework per-cpu allocation
  + - drivers/perf: arm_pmu: manage interrupts per-cpu
  + - drivers/perf: arm_pmu: split irq request from enable
  + - drivers/perf: arm_pmu: remove pointless PMU disabling
  + - drivers/perf: arm_pmu: define armpmu_init_fn
  + - drivers/perf: arm_pmu: fold init into alloc
  + - drivers/perf: arm_pmu: factor out pmu registration
  + - drivers/perf: arm_pmu: simplify cpu_pmu_request_irqs()
  + - drivers/perf: arm_pmu: handle no platform_device
  + - drivers/perf: arm_pmu: rename irq request/free functions
  + - drivers/perf: arm_pmu: split cpu-local irq request/free
  + - drivers/perf: arm_pmu: move irq request/free into probe
  + - drivers/perf: arm_pmu: split out platform device probe logic
  + - arm64: add function to get a cpu's MADT GICC table
  + - [Config] CONFIG_ARM_PMU_ACPI=y
  + - drivers/perf: arm_pmu: add ACPI framework
  + - arm64: pmuv3: handle !PMUv3 when probing
  + - arm64: pmuv3: use arm_pmu ACPI framework
+ * Fix NVLINK2 TCE route (LP: #1690155)
  + - powerpc/powerpc: Fix TCE kill on NVLink2
+ * CVE-2017-0605
  + - tracing: Use strlcpy() instead of strcpy() in __trace_find_cmdline()
+ * Miscellaneous Ubuntu changes
  + - [Config] Restore powerpc arch to annotations file
  + - [Config] Disable runtime testing modules
  + - [Config] Disable drivers not needed on s390x
  + - [Config] Update annotations for 4.11
  + - [Config] updateconfigs after apparmor updates
+ * Miscellaneous upstream changes
  + - apparmor: use SHASH_DESC_ON_STACK
  + - apparmor: fix invalid reference to index variable of iterator line 836
  + - apparmor: fix parameters so that the permission test is bypassed at boot
  + - apparmor: Make path_max parameter readonly
  + - apparmorfs: Combine two function calls into one in aa_fs_seq_raw_abi_show()
+ - apparmorfs: Use seq_putc() in two functions
+ - apparmor: provide information about path buffer size at boot
+ - apparmor: add/use fns to print hash string hex value
+
+ -- Seth Forshee <seth.forshee@canonical.com>  Tue, 16 May 2017 00:39:13 -0500
+
+linux (4.11.0-2.7) artful; urgency=low
+
+ * kernel-wedge fails in artful due to leftover squashfs-modules d-i files
+   (LP: #1688259)
+ - Remove squashfs-modules files from d-i
+ - [Config] as squashfs-modules is builtin kernel-image must Provides: it
+
+ * [Zesty] d-i: replace msm_emac with qcom_emac (LP: #1677297)
+ - Revert "UBUNTU: d-i: initrd needs msm_emac on amberwing platform."
+ - d-i: initrd needs qcom_emac on amberwing platform.
+
+ * update for V3 kernel bits and improved multiple fan slice support
+   (LP: #1470091)
+ - SAUCE: fan: tunnel multiple mapping mode (v3)
+
+ * Miscellaneous Ubuntu changes
+ - SAUCE: (noup) Update spl to 0.6.5.9-1ubuntu1, zfs to 0.6.5.9-5ubuntu5
+ - Enable zfs
+ - SAUCE: fan: add VXLAN implementation
+ - SAUCE: (efi-lockdown) efi: Add EFI_SECURE_BOOT bit
+ - SAUCE: (efi-lockdown) Add the ability to lock down access to the running
+   kernel image
+ - SAUCE: (efi-lockdown) efi: Lock down the kernel if booted in secure boot
+   mode
+ - SAUCE: (efi-lockdown) Enforce module signatures if the kernel is locked down
+ - SAUCE: (efi-lockdown) Restrict /dev/mem and /dev/kmem when the kernel is
   locked down
+ - SAUCE: (efi-lockdown) Add a sysrq option to exit secure boot mode
+ - SAUCE: (efi-lockdown) kexec: Disable at runtime if the kernel is locked down
+ - SAUCE: (efi-lockdown) Copy secure_boot flag in boot params across kexec
   reboot
+ - SAUCE: (efi-lockdown) kexec_file: Disable at runtime if securelevel has been
   set
+ - SAUCE: (efi-lockdown) hibernate: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) uswsusp: Disable when the kernel is locked down
+ - SAUCE: (efi-lockdown) PCI: Lock down BAR access when the kernel is locked
   down
+ - SAUCE: (efi-lockdown) x86: Lock down IO port access when the kernel is
   locked down
+ - SAUCE: (efi-lockdown) x86: Restrict MSR access when the kernel is locked
   down
+ - SAUCE: (efi-lockdown) asus-wmi: Restrict debugfs interface when the kernel
+ is locked down
+ SAUCE: (efi-lockdown) ACPI: Limit access to custom_method when the kernel is
  locked down
+ SAUCE: (efi-lockdown) acpi: Ignore acpi_rsdp kernel param when the kernel
  has been locked down
+ SAUCE: (efi-lockdown) acpi: Disable ACPI table override if the kernel is
  locked down
+ SAUCE: (efi-lockdown) acpi: Disable APEI error injection if the kernel is
  locked down
+ SAUCE: (efi-lockdown) Enable cold boot attack mitigation
+ SAUCE: (efi-lockdown) bpf: Restrict kernel image access functions when the
  kernel is locked down
+ SAUCE: (efi-lockdown) scsi: Lock down the eata driver
+ SAUCE: (efi-lockdown) Prohibit PCMCIA CIS storage when the kernel is locked
down
+ SAUCE: (efi-lockdown) Lock down TIOCSSERIAL
+ SAUCE: (efi-lockdown) Add EFI signature data types
+ SAUCE: (efi-lockdown) Add an EFI signature blob parser and key loader.
+ SAUCE: (efi-lockdown) KEYS: Add a system blacklist keyring
+ SAUCE: (efi-lockdown) MODSIGN: Import certificates from UEFI Secure Boot
+ SAUCE: (efi-lockdown) MODSIGN: Support not importing certs from db
+ SAUCE: (efi-lockdown) MODSIGN: Don't try secure boot if EFI runtime is
disabled
+ SAUCE: (efi-lockdown) efi: Sanitize boot_params in efi stub
+ SAUCE: (efi-lockdown) efi: Add secure_boot state and status bit for
  MokSBState
+ SAUCE: (efi-lockdown) efi: Add sysctls for secureboot and MokSBState
+ [Config] Set values for UEFI secure boot lockdown options
+ - Update dropped.txt
+ [ Upstream Kernel Changes ]
+ + * rebase to v4.11
+ + -- Seth Forshee <seth.forshee@canonical.com> Fri, 05 May 2017 07:43:14 -0500
+ + linux (4.11.0-1.6) artful; urgency=low
+ + * Miscellaneous Ubuntu changes
+ + [Debian] Use default compression for all packages
+ + SAUCE: (namespace) block_dev: Support checking inode permissions in
  lookup_bdev()
+ + SAUCE: (namespace) block_dev: Check permissions towards block device inode
  when mounting
+ + SAUCE: (namespace) mtd: Check permissions towards mtd block device inode
  when mounting
+ + SAUCE: (namespace) fs: Allow superblock owner to change ownership of inodes
+ + SAUCE: (namespace) fs: Don't remove suid for CAP_FSETID for users root
+ - SAUCE: (namespace) fs: Allow superblock owner to access do_remount_sb()
+ - SAUCE: (namespace) capabilities: Allow privileged user in s_user_ns to set security.* xattr
+ - SAUCE: (namespace) fs: Allow CAP_SYS_ADMIN in s_user_ns to freeze and thaw filesystems
+ - SAUCE: (namespace) fuse: Add support for pid namespaces
+ - SAUCE: (namespace) fuse: Support fuse filesystems outside of init_user_ns
+ - SAUCE: (namespace) fuse: Restrict allow_other to the superblock's namespace or a descendant
+ - SAUCE: (namespace) fuse: Allow user namespace mounts
+ - SAUCE: (namespace) ext4: Add support for unprivileged mounts from user namespaces
+ - SAUCE: (namespace) evm: Don't update hmacs in user ns mounts
+ - SAUCE: (namespace) ext4: Add module parameter to enable user namespace mounts
+ - SAUCE: (namespace) block_dev: Forbid unprivileged mounting when device is opened for writing

+ -- Seth Forshee <seth.forshee@canonical.com> Wed, 26 Apr 2017 10:08:29 -0500

+ linux (4.11.0-0.5) artful; urgency=low

+ * [Hyper-V][SAUCE] pci-hyperv: Use only 16 bit integer for PCI domain
+   (LP: #1684971)
+   - SAUCE: pci-hyperv: Use only 16 bit integer for PCI domain
+
+ * [Hyper-V] Ubuntu 14.04.2 LTS Generation 2 SCSI Errors on VSS Based Backups
+   (LP: #1470250)
+   - SAUCE: Tools: hv: vss: Thaw the filesystem and continue after freeze fails
+
+ * Enable virtual scsi server driver for Power (LP: #1615665)
+   - SAUCE: Return TCMU-generated sense data to fabric module
+
+ * include/linux/security.h header syntax error with !CONFIG_SECURITYFS
+   (LP: #1630990)
+   - SAUCE: (no-up) include/linux/security.h -- fix syntax error with CONFIG_SECURITYFS=n
+
+ * Miscellaneous Ubuntu changes
+   - SAUCE: Import aufs driver
+   - [Config] Enable aufs
+   - [Debian] Add script to update virtualbox
+   - ubuntu: vbox -- Update to 5.1.20-dfsg-2
+   - Enable vbox
+   - SAUCE: aufs -- Include linux/mm.h in fs/aufs/file.h
+
+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11-rc8
+
+ -- Seth Forshee <seth.forshee@canonical.com> Tue, 25 Apr 2017 13:42:54 -0500
+
+linux (4.11.0-0.4) zesty; urgency=low
+
+ * POWER9: Improve performance on memory management (LP: #1681429)
+ - SAUCE: powerpc/mm/radix: Don't do page walk cache flush when doing full mm
+ flush
+ - SAUCE: powerpc/mm/radix: Remove unnecessary ptesync
+
+ * Miscellaneous Ubuntu changes
+ - find-missing-sauce.sh
+
+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11-rc7
+
+ -- Seth Forshee <seth.forshee@canonical.com> Tue, 18 Apr 2017 08:19:43 -0500
+
+linux (4.11.0-0.3) zesty; urgency=low
+
+ * Disable CONFIG_HVC_UDBG on ppc64el (LP: #1680888)
+ - [Config] Disable CONFIG_HVC_UDBG on ppc64el
+
+ * smartpqi driver needed in initram disk and installer (LP: #1680156)
+ - [Config] Add smartpqi to d-i
+
+ * Disable CONFIG_SECURITY_SELINUX_DISABLE (LP: #1680315)
+ - [Config] CONFIG_SECURITY_SELINUX_DISABLE=n
+
+ * Miscellaneous Ubuntu changes
+ - [Config] flash-kernel should be a Breaks
+ - [Config] drop the info directory
+ - [Config] drop NOTES as obsolete
+ - [Config] drop changelog.historical as obsolete
+ - rebase to v4.11-rc6
+
+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11-rc6
+
+ -- Tim Gardner <tim.gardner@canonical.com> Tue, 11 Apr 2017 07:16:52 -0600
+
+linux (4.11.0-0.2) zesty; urgency=low
+
+ [ Upstream Kernel Changes ]
+ * rebase to v4.11-rc5
+
+ -- Tim Gardner <tim.gardner@canonical.com>  Mon, 03 Apr 2017 08:26:07 +0100
+
+linux (4.11.0-0.1) zesty; urgency=low
+
+ [ Upstream Kernel Changes ]
+
+ * rebase to v4.11-rc4
+ - LP: #1591053
+
+ -- Tim Gardner <tim.gardner@canonical.com>  Mon, 20 Mar 2017 05:15:32 -0600
+
+linux (4.11.0-0.0) zesty; urgency=low
+
+ * dummy entry
+
+ -- Tim Gardner <tim.gardner@canonical.com>  Mon, 20 Mar 2017 05:15:32 -0600
--- linux-4.15.0.orig/debian/cloud-tools/hv_get_dhcp_info
+++ linux-4.15.0/debian/cloud-tools/hv_get_dhcp_info
@@ -0,0 +1,55 @@
+#!/bin/bash
+
# This example script retrieves the DHCP state of a given interface.
## In the interest of keeping the KVP daemon code free of distro specific
## information; the kvp daemon code invokes this external script to gather
## DHCP setting for the specific interface.
#
## Input: Name of the interface
#
## Output: The script prints the string "Enabled" to stdout to indicate
## that DHCP is enabled on the interface. If DHCP is not enabled,
## the script prints the string "Disabled" to stdout.
#
## Each Distro is expected to implement this script in a distro specific
## fashion.
+
+##set -x
+
+##if $IF_FILE="/etc/network/interfaces"
+##NMCMD="nmcli"
+
+function checknetworkmanager {
+    ##Assumes if $NMCMD exists, inteface exists and interface is not
+    ## in $IF_FILE then dhcp is being used by NM
+    if hash $NMCMD >/dev/null 2>&1 ; then
+        if $NMCMD dev status |grep -q "$1" ; then
+            echo "Enabled"
+        else
+            echo "Disabled"
+        fi
+    fi
+}
```bash
if [ -z $1 ] ; then echo "Disabled"; exit; fi
if [ -e $IF_FILE ]; then
grep -v -e "^#" $IF_FILE|grep -q $1 ; then
    #interface exists so
    grep -q -e $1\|^dhcp $IF_FILE; then
echo "Enabled"; exit;
    else
    echo "Disabled"; exit;
    fi
else
    checknetworkmanager $1
    exit
    fi
else
    checknetworkmanager $1
    exit
    fi

--- linux-4.15.0.orig/debian/cloud-tools/hv_get_dns_info
+++ linux-4.15.0/debian/cloud-tools/hv_get_dns_info
@@ -0,0 +1,13 @@
+/bin/bash

#! This example script parses /etc/resolv.conf to retrieve DNS information.
#! In the interest of keeping the KVP daemon code free of distro specific
#! information; the kvp daemon code invokes this external script to gather
#! DNS information.
#! This script is expected to print the nameserver values to stdout.
#! Each Distro is expected to implement this script in a distro specific
#! fashion. For instance on Distros that ship with Network Manager enabled,
#! this script can be based on the Network Manager APIs for retrieving DNS
#! entries.
+cat /etc/resolv.conf 2>/dev/null | awk '/^nameserver/ { print $2 }'
```

--- linux-4.15.0.orig/debian/cloud-tools/hv_set_ifconfig
+++ linux-4.15.0/debian/cloud-tools/hv_set_ifconfig
@@ -0,0 +1,288 @@
+/usr/bin/python3

# Give up
echo "Disabled"
fi

if [ -z $1 ] ; then echo "Disabled"; exit; fi
if [ -e $IF_FILE ]; then
grep -v -e "^#" $IF_FILE|grep -q $1 ; then
    #interface exists so
    grep -q -e $1\|^dhcp $IF_FILE; then
echo "Enabled"; exit;
    else
    echo "Disabled"; exit;
    fi
else
    checknetworkmanager $1
    exit
    fi
else
    checknetworkmanager $1
    exit
    fi
# hv_set_ifconfig <config> -- take the hv_kvp_daemon generated configuration
# file and apply it to the Ubuntu configuration.
#
+
# CONFIG example:
+DEVICE=foo1
+DHCP=yes
+
# CONFIG example:
+DEVICE=foo1
+IPADDR=192.168.99.10
+GATEWAY=192.168.99.1
+DNS1=192.168.88.250
+IPADDR2=192.168.99.11
+IPV6ADDR=2001:DB8:99::10
+IPV6_DEFAULTGW=2001:DB8:99::10
+
+
# set interfaces in hv_kvp_daemon style
+import fileinput
+import sys
+import errno
+import os
+import shutil
+import tempfile
+import subprocess
+
+if_filename="/etc/network/interfaces"
+
+Drop our output (XXX?)
+sys.stdout = open(os.devnull, 'w')
+sys.stderr = open(os.devnull, 'w')
+
+# Confirm we can open the network configuration.
+try:
+  if_file=open(if_filename,"r+")
+except IOError as e:
+  exit(e.errno)
+else:
+  if_file.close()
+
+# Usage: hv_set_ifconfig <config>
+if len(sys.argv) != 2 :
+  exit(errno.EINVAL)
Here is the format of the ip configuration file:

HWADDR=macaddr
DEVICE=interface name
BOOTPROTO=<protocol> (where <protocol> is "dhcp" if DHCP is configured or "none" if no boot-time protocol should be used)

IPADDR0=ipaddr1
IPADDR1=ipaddr2
IPADDRx=ipaddr (where y = x + 1)

NETMASK0=netmask1
NETMASKx=netmasky (where y = x + 1)

GATEWAY=ipaddr1
GATEWAYx=ipaddr (where y = x + 1)

DNSx=ipaddr (where first DNS address is tagged as DNS1 etc)

IPV6 addresses will be tagged as IPV6ADDR, IPV6 gateway will be tagged as IPV6_DEFAULTGW and IPV6 NETMASK will be tagged as IPV6NETMASK.

kvp=dict(line.strip().split("=")) for line in fileinput.input())

+ Setting the hwaddress to something azure is not expecting is fatal to networking.
+ if not "HWADDR" in kvp :
  exit(errno.EPROTO)
+
+ Confirm we have a device specified.
+ if not "DEVICE" in kvp :
  exit(1)
+
+ autolist = []
+ output=[]
+ basename=kvp["DEVICE"]
+
+ DNS entries will go with the first interface and there can be a max of three. These will be emitted with the first interface.
+ dns = []
+ for count in (1, 2, 3):
  + key = "DNS" + str(count)
  + if key in kvp:
    + dns += [kvp[key]]
  + dns_emitted = False
IPV4 may either be dhcp or static.

```python
if ('DHCP' in kvp and kvp['DHCP'] == 'yes') or ('BOOTPROTO' in kvp and kvp['BOOTPROTO'] == 'dhcp'):
    autolist.append(basename)
    output += ['iface ' + basename + ' inet dhcp']
    output += ['
']
else:
    # Matchup the interface specific lines
    
    # No real max for the number of interface + aliases ...
    # only required is the address (but mate everything up that comes in.
    
    # IPv4 -- ensure we sort by numeric suffixes.
    v4names = [ int(name[6:]) for name in kvp.keys() if name.startswith('IPADDR') ]
    v4names.sort()
    
    for if_count in v4names:
        ifname = basename
        which = str(if_count)
        
        if if_count:
            ifname += ':' + str(if_count)
            which_gw = which
        else:
            which_gw = ''
        
        if not ifname in autolist:
            autolist += [ifname]
        
        output += ['iface ' + ifname + ' inet static']
        output += ['	' + 'address ' + kvp['IPADDR' + which]]
        if 'NETMASK' + which in kvp:
            output += ['	netmask ' + kvp['NETMASK' + which]]
        if 'GATEWAY' + which_gw in kvp:
            output += ['	gateway ' + kvp['GATEWAY' + which_gw]]
        
        if not dns_emitted:
            dns_emitted = True
            output += ['	dns-nameservers ' + ' '.join(dns)]
        output += ['
']
```

IPv6 requires a netmask

```python
# If an ipv6 exists, you'll want to turn off /proc/sys/net/ipv6/conf/all/autoconf with
# echo 0 > /proc/sys/net/ipv6/conf/all/autoconf
v6names = [ int(name[8:]) for name in kvp.keys() if name.startswith('IPV6ADDR') ]
v6names.sort()
```
+for if6_count in v6names:
  + ifname = basename
  + which = str(if6_count)
  +
  + if if6_count:
    + ifname += "." + str(if6_count)
    + which_gw = which
  + else:
    + which_gw = ""

+ if not ifname in autolist:
  + autolist += [ifname]

+ if "IPV6NETMASK" + which in kvp:
  + output += [ "iface " + ifname + " inet6 static"]
  + output += [ "\taddress " + kvp["IPV6ADDR" + which]]
  + output += [ "\tnetmask " + kvp["IPV6NETMASK" + which]]
  + if "IPV6_DEFAULTGW" + which_gw in kvp:
    + output += [ "\tgateway " + kvp["IPV6_DEFAULTGW" + which_gw] ]
  + if not dns_emitted:
    + dns_emitted = True
    + output += ["\tdns-nameservers " + ".join(dns)]
    + output += [""

+## Mark this new interface for automatic up.
+if len(autolist):
  + output = ["auto " + join(autolist)] + output
  +
  +print("===================================")
  +print(output)
  +print("===================================")
+
+## Time to clean out the existing interface file
+
+## Markers.
+start_mark = "## The following stanza(s) added by hv_set_ifconfig"
+end_mark = "##End of hv_set_ifconfig stanzas"
+
f=open(if_filename,"r")
+flines=f.readlines()
+f.close()
+newfile=[]
+pitchstanza=0
+inastanza=0
+stanza=[]
+prev_line=None
+for line in flines:
if line.startswith("auto"):  
    if inastanza:  
        if not pitchstanza:  
            newfile.extend(stanza)  
        stanza=[]  
    inastanza=0  
    newline=""  
    autoline=line.strip().split(" ")  
    for word in autoline:  
        if (not word == basename) and (not word.startswith(basename+":")):  
            newline+=word + " "  
        newline = newline.strip()  
    if not newline == "auto":  
        newfile += [newline.strip()]  
elif line.startswith(\"iface\",\"mapping\",\"source\"):
    """Read a stanza""  
    """A Stanza can also start with allow- ie allow-hotplug""  
    if inastanza:  
        if not pitchstanza:  
            newfile.extend(stanza)  
        stanza=[]  
    inastanza=1  
    pitchstanza=0  
    autoline=line.strip().split(" ")  
    for word in autoline:  
        if (word == basename) or (word.startswith(basename+":")):  
            pitchstanza=1  
        if not pitchstanza:  
            stanza+=[line.strip()]  
    elif line.strip() in (start_mark, end_mark):  
        if inastanza:  
            if not pitchstanza:  
                newfile.extend(stanza)  
            stanza=[]  
        inastanza = 0  
        pitchstanza = 0  
        # Deduplicate markers.  
        if line != prev_line:  
            newfile += [line.strip()]  
    else:  
        if inastanza:  
            if not pitchstanza:  
                stanza+=[line.strip()]  
        else:  
            if not pitchstanza:  
                newfile += [line.strip()]  
        prev_line=line  
+
```python
+## Include pending stanza if any.
+if inastanza and not pitchstanza:
+    newfile.extend(stanza)
+
+def emit(line):
+    print(line)
+    output = line + "\n"
+    os.write(fd, output.encode('utf-8'))
+
+## Insert the new output at the end and inside the existing markers if found.
+emitted = False
+fd, path = tempfile.mkstemp()
+for line in newfile:
+    if line == end_mark:
+        emit("\n".join(output))
+        emitted = True
+        emit(line)
+if not emitted:
+    emit(start_mark)
+    emit("\n".join(output))
+    emit(end_mark)
+os.close(fd)
+
+shutil.copy(path, if_filename)
+os.chmod(if_filename,0o644)
+
+##print("TMPFILE is at: " + path)
+##print("Copied file is at: " + if_filename)
+
+try:
+    retcode = subprocess.call("ifdown " + basename , shell=True)
+    if retcode < 0:
+        print("Child was terminated by signal", -retcode, file=sys.stderr)
+    else:
+        print("Child returned", retcode, file=sys.stderr)
+except OSError as e:
+    print("Execution failed:", e, file=sys.stderr)
+
+try:
+    retcode = subprocess.call("ifup " + basename , shell=True)
+    if retcode < 0:
+        print("Child was terminated by signal", -retcode, file=sys.stderr)
+    else:
+        print("Child returned", retcode, file=sys.stderr)
+except OSError as e:
+    print("Execution failed:", e, file=sys.stderr)
```

--- linux-4.15.0.orig/debian/commit-templates/bumpabi
+++ linux-4.15.0/debian/commit-templates/bumpabi
@@ -0,0 +1,3 @@
+UBUNTU: Bump ABI
+
+Ignore: yes
--- linux-4.15.0.orig/debian/commit-templates/config-updates
+++ linux-4.15.0/debian/commit-templates/config-updates
@@ -0,0 +1,15 @@
+#
+# This template is used for commit messages that don't need to
+# show up in debian/changelog. Administrative stuff like config
+# updates, ABI bumps, etc. Setting 'Ignore: yes' prevents
+# 'debian/rules insertchanges' from inserting this commit message
+# as a changelog entry.
+#
+# Please give a one-line description of the config change followed
+# by a detailed explanation if necessary
+
+UBUNTU: [Config] XXXX
+
+# BugLink: http://bugs.launchpad.net/bugs/<enter bug# here>
+Ignore: yes
+# Other text below here.
--- linux-4.15.0.orig/debian/commit-templates/external-driver
+++ linux-4.15.0/debian/commit-templates/external-driver
@@ -0,0 +1,20 @@
# Ubuntu external driver commit.
#
# NOTE: This gets reformatted for README.Ubuntu-External-Drivers and
# debian/changelog.
#
# This is only needed when a driver is added, updated or removed. It is
# not needed when patches or fixes are applied to the driver. If the
# driver is being removed, add the line:
+
+# Removing: yes
+
+# to the commit, and you can remove all other tags (except UBUNTU:).
+
+UBUNTU:
+
+ExternalDriver:
+Description:
+Url:
+Mask:
+Version:
--- linux-4.15.0.orig/debian/commit-templates/missing-modules
+++ linux-4.15.0/debian/commit-templates/missing-modules
@@ -0,0 +1,3 @@
+UBUNTU: build/modules: Add modules that have intentionally gone missing
+
+Ignore: yes
--- linux-4.15.0.orig/debian/commit-templates/newrelease
+++ linux-4.15.0/debian/commit-templates/newrelease
@@ -0,0 +1,3 @@
+UBUNTU: Start new release
+
+Ignore: yes
--- linux-4.15.0.orig/debian/commit-templates/sauce-patch
+++ linux-4.15.0/debian/commit-templates/sauce-patch
@@ -0,0 +1,40 @@
+# Ubuntu commit template.
+
+# NOTE: This gets reformatted for debian/changelog
+
+# SAUCE refers to the fact that this patch might not go upstream, but we need to
+# carry it to successive releases. In most cases you DONOT want to use this
+# template.
+
+# An example of a SAUCE patch is the ACPI DSDT-in-initramfs patch which has been
+# refused upstream, but still provides useful functionality to users with broken
+# BIOSes.
+
+# The initial UBUNTU is a flag that this is an Ubuntu commit. It will be
+# referenced to the Author in the debian/changelog entry.
+
+# The text following is the short message that will be placed in the
+# changelog. Extra text on the following lines will be ignored, but left
+# in the git commit. Lines with # will be ignored in the commit.
+
+# OriginalAuthor allows for alternate attribution.
+
+# OriginalLocation allows for a URL or description of where the patch came
+# from.
+
+# BugLink is a URL to a Malone bug.
+
+# Ignore: yes will keep this commit from showing up in the changelog.
+
+UBUNTU: SAUCE:
+
+<Why is this patch not going upstream?>
+ debhelper (>= 9),
+ dh-systemd,
+ cpio,
+ kernel-wedge,
+ kmod <stage1>,
+ makedumpfile [amd64 i386] <stage1>,
+ libelf-dev <stage1>,
+ libnewt-dev <stage1>,
+ libiberty-dev <stage1>,
+ default-jdk-headless <stage1>,
+ java-common <stage1>,
+ rsync <stage1>,
+ libdw-dev <stage1>,
+ libpci-dev <stage1>,
+ pkg-config <stage1>,
+ flex <stage1>,
+ bison <stage1>,
+ libunwind8-dev [amd64 arm64 armhf i386 ppc64el] <stage1>,
+ liblzma-dev <stage1>,
+ openssl <stage1>,
+ libssl-dev <stage1>,
+ libaudit-dev <stage1>,
+ bc <stage1>,
+ python-dev <stage1>,
+ gawk <stage1>,
+ libudev-dev <stage1>,
+ libtool <stage1>,
+ uuid-dev <stage1>,
+ libnuma-dev [amd64 arm64 i386 ppc64el s390x] <stage1>,
+ dkms <stage1>,
+ curl <stage1>,
+ xmlto <stage1>,
+ docbook-utils <stage1>,
+ ghostscript <stage1>,
+ fig2dev <stage1>,
+ bzip2 <stage1>,
+ sharutils <stage1>,
+ asciidoc <stage1>,
+ python-sphinx <stage1>,
+ python-sphinx-rtd-theme <stage1>,
+ python3-docutils <stage1>,
+ Vcs-Git: git://git.launchpad.net/~ubuntu-kernel/ubuntu/+source/linux/+git/bionic
+ XS-Testsuite: autopkgtest
+ XS-Testsuite-Depends: gcc-4.7 binutils
Package: linux-source-4.15.0
Build-Profiles: <!stage1>
Architecture: all
Section: devel
Priority: optional
Provides: linux-source, linux-source-3
Depends: ${misc:Depends}, binutils, bzip2, coreutils
Recommends: libc-dev, gcc, make
Suggests: libncurses-dev | ncurses-dev, kernel-package, libqt3-dev
Description: Linux kernel source for version 4.15.0 with Ubuntu patches
This package provides the source code for the Linux kernel version 4.15.0.
This package is mainly meant for other packages to use, in order to build custom flavours.

If you wish to use this package to create a custom Linux kernel, then it is suggested that you investigate the package kernel-package, which has been designed to ease the task of creating kernel image packages.

If you are simply trying to build third-party modules for your kernel, you do not want this package. Install the appropriate linux-headers package instead.

Package: linux-doc
Build-Profiles: <!stage1>
Architecture: all
Section: doc
Priority: optional
Depends: ${misc:Depends}
Description: Linux kernel specific documentation for version 4.15.0
This package provides the various documents in the 4.15.0 kernel Documentation/ subdirectory. These document kernel subsystems, APIs, device drivers, and so on. See /usr/share/doc/linux-doc/00-INDEX for a list of what is contained in each file.

Package: linux-headers-4.15.0-166
Build-Profiles: <!stage1>
Architecture: all
Multi-Arch: foreign
Section: devel
Priority: optional
Depends: ${misc:Depends}, coreutils
Description: Header files related to Linux kernel version 4.15.0
This package provides kernel header files for version 4.15.0, for sites that want the latest kernel headers. Please read /usr/share/doc/linux-headers-4.15.0-166/debian.README.gz for details.
+ Package: linux-libc-dev
+ Architecture: i386 amd64 armhf arm64 x32 ppc64el s390x
+ Depends: ${misc:Depends}
+ Conflicts: linux-kernel-headers
+ Replaces: linux-kernel-headers
+ Provides: linux-kernel-headers, aufs-dev
+ Multi-Arch: same
+ Description: Linux Kernel Headers for development
  + This package provides headers from the Linux kernel. These headers
  + are used by the installed headers for GNU glibc and other system
  + libraries. They are NOT meant to be used to build third-party modules for
  + your kernel. Use linux-headers-* packages for that.
  +
  + Package: linux-tools-common
  + Build-Profiles: <!stage1>
  + Architecture: all
  + Multi-Arch: foreign
  + Section: kernel
  + Priority: optional
  + Depends: ${misc:Depends}, lsb-release
  + Description: Linux kernel version specific tools for version 4.15.0
    + This package provides the architecture independent parts for kernel
    + version locked tools (such as perf and x86_energy_perf_policy) for
    + version 4.15.0.
    +
    + Package: linux-tools-4.15.0-166
      + Build-Profiles: <!stage1>
      + Architecture: i386 amd64 armhf arm64 ppc64el s390x
      + Section: devel
      + Priority: optional
      + Depends: ${misc:Depends}, ${shlibs:Depends}, linux-tools-common
      + Description: Linux kernel version specific tools for version 4.15.0-166
        + This package provides the architecture dependant parts for kernel
        + version locked tools (such as perf and x86_energy_perf_policy) for
        + version 4.15.0-166 on
        + 64 bit x86.
        + You probably want to install linux-tools-4.15.0-166-<flavour>.
        +
        + Package: linux-cloud-tools-common
          + Build-Profiles: <!stage1>
          + Architecture: all
          + Multi-Arch: foreign
          + Section: kernel
          + Priority: optional
          + Depends: ${misc:Depends}
          + Description: Linux kernel version specific cloud tools for version 4.15.0
            + This package provides the architecture independent parts for kernel
version locked tools for cloud tools for version 4.15.0.

Package: linux-cloud-tools-4.15.0-166
Build-Profiles: <!stage1>
Architecture: i386 amd64 armf
Section: devel
Priority: optional
Depends: ${misc:Depends}, ${shlibs:Depends}, linux-cloud-tools-common
Description: Linux kernel version specific cloud tools for version 4.15.0-166
This package provides the architecture dependant parts for kernel
version locked tools for cloud tools for version 4.15.0-166 on
64 bit x86.
You probably want to install linux-cloud-tools-4.15.0-166-<flavour>.

Package: linux-tools-host
Build-Profiles: <!stage1>
Architecture: all
Multi-Arch: foreign
Section: kernel
Priority: optional
Depends: ${misc:Depends}, python3
Description: Linux kernel VM host tools
This package provides kernel tools useful for VM hosts.

Package: linux-image-unsigned-4.15.0-166-generic
Build-Profiles: <!stage1>
Architecture: i386 amd64 armf arm64 ppc64el s390x
Section: kernel
Priority: optional
Provides: linux-image, fuse-module, aufs-dkms, kvm-api-4, redhat-cluster-modules, ivtv-modules, virtualbox-guest-modules [i386 amd64 x32] $[linux:rprovides]
Depends: ${misc:Depends}, ${shlibs:Depends}, kmod, linux-base (>= 4.5ubuntu1~16.04.1), linux-modules-4.15.0-166-generic
Recommends: grub-pc [i386 amd64 x32] | grub-efi-amd64 [amd64 x32] | grub-efi-ia32 [i386 amd64 x32] | grub [i386 amd64 x32] | lilo [i386 amd64 x32] | flash-kernel [armhf arm64] | grub-ieee1275 [ppc64el], initramfs-tools | linux-initramfs-tool
Breaks: flash-kernel (<< 3.90ubuntu2) [arm64 armhf], s390-tools (<< 2.3.0-0ubuntu3) [s390x]
Conflicts: linux-image-4.15.0-166-generic
Suggests: fdutils, linux-doc-4.15.0 | linux-source-4.15.0, linux-tools, linux-headers-4.15.0-166-generic
Description: Linux kernel image for version 4.15.0 on 64 bit x86 SMP
This package contains the unsigned Linux kernel image for version 4.15.0 on
64 bit x86 SMP.
Supports Generic processors.

Geared toward desktop and server systems.
You likely do not want to install this package directly. Instead, install the linux-generic meta-package, which will ensure that upgrades work correctly, and that supporting packages are also installed.

Package: linux-modules-4.15.0-166-generic
Build-Profiles: <!stage1>
Architecture: i386 amd64 armhf arm64 ppc64el s390x
Section: kernel
Priority: optional
Depends: ${misc:Depends}, ${shlibs:Depends}
Description: Linux kernel extra modules for version 4.15.0 on 64 bit x86 SMP
Contains the corresponding System.map file, the modules built by the packager, and scripts that try to ensure that the system is not left in an unbootable state after an update.

Supports Generic processors.

Geared toward desktop and server systems.

You likely do not want to install this package directly. Instead, install the linux-generic meta-package, which will ensure that upgrades work correctly, and that supporting packages are also installed.

Package: linux-modules-extra-4.15.0-166-generic
Build-Profiles: <!stage1>
Architecture: i386 amd64 armhf arm64 ppc64el s390x
Section: kernel
Priority: optional
Depends: ${misc:Depends}, ${shlibs:Depends}, linux-image-4.15.0-166-generic | linux-image-unsigned-4.15.0-166-generic, crda | wireless-crda
Description: Linux kernel extra modules for version 4.15.0 on 64 bit x86 SMP
This package contains the Linux kernel extra modules for version 4.15.0 on 64 bit x86 SMP.

Also includes the corresponding System.map file, the modules built by the packager, and scripts that try to ensure that the system is not left in an unbootable state after an update.

Supports Generic processors.

Geared toward desktop and server systems.

You likely do not want to install this package directly. Instead, install the linux-generic meta-package, which will ensure that upgrades work correctly, and that supporting packages are also installed.

Package: linux-headers-4.15.0-166-generic
Build-Profiles: <!stage1>
+Architecture: i386 amd64 armhf arm64 ppc64el s390x
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, linux-headers-4.15.0-166, ${shlibs:Depends}
+Provides: linux-headers, linux-headers-3.0
+Description: Linux kernel headers for version 4.15.0 on 64 bit x86 SMP
+ This package provides kernel header files for version 4.15.0 on
+ 64 bit x86 SMP.
+ .
+ This is for sites that want the latest kernel headers. Please read
+ /usr/share/doc/linux-headers-4.15.0-166/debian.README.gz for details.
+
+Package: linux-image-unsigned-4.15.0-166-generic-dbgsym
+Build-Profiles: <!stage1>
+Architecture: i386 amd64 armhf arm64 ppc64el s390x
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}
+Provides: linux-debug
+Description: Linux kernel debug image for version 4.15.0 on 64 bit x86 SMP
+ This package provides the unsigned kernel debug image for version 4.15.0 on
+ 64 bit x86 SMP.
+ .
+ This is for sites that wish to debug the kernel.
+ .
+ The kernel image contained in this package is NOT meant to boot from. It
+ is uncompressed, and unstripped. This package also includes the
+ unstripped modules.
+
+Package: linux-tools-4.15.0-166-generic
+Build-Profiles: <!stage1>
+Architecture: i386 amd64 armhf arm64 ppc64el s390x
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, linux-tools-4.15.0-166
+Description: Linux kernel version specific tools for version 4.15.0-166
+ This package provides the architecture dependant parts for kernel
+ version locked tools (such as perf and x86_energy_perf_policy) for
+ version 4.15.0-166 on
+ 64 bit x86.
+
+Package: linux-cloud-tools-4.15.0-166-generic
+Build-Profiles: <!stage1>
+Architecture: i386 amd64 armhf arm64 ppc64el s390x
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, linux-cloud-tools-4.15.0-166
+Description: Linux kernel version specific cloud tools for version 4.15.0-166
This package provides the architecture dependant parts for kernel version locked tools for cloud for version 4.15.0-166 on 64 bit x86.

+ Package: linux-udebs-generic
+ Build-Profiles: <!stage1>
+ XC-Package-Type: udeb
+ Section: debian-installer
+ Architecture: i386 amd64 armhf arm64 ppc64el s390x
+ Depends: ${udeb:Depends}
+ Description: Metapackage depending on kernel udebs
+ This package depends on the all udebs that the kernel build generated,
+ for easier version and migration tracking.
+
+ Package: linux-buildinfo-4.15.0-166-generic
+ Build-Profiles: <!stage1>
+ Architecture: i386 amd64 armhf arm64 ppc64el s390x
+ Section: kernel
+ Priority: optional
+ Depends: ${misc:Depends}, ${shlibs:Depends}
+ Built-Using: ${linux:BuiltUsing}
+ Description: Linux kernel buildinfo for version 4.15.0 on 64 bit x86 SMP
+ This package contains the Linux kernel buildinfo for version 4.15.0 on 64 bit x86 SMP.
+.
+ You likely do not want to install this package.
+
+ Package: linux-image-unsigned-4.15.0-166-generic-lpae
+ Build-Profiles: <!stage1>
+ Architecture: armhf
+ Section: kernel
+ Priority: optional
+ Provides: linux-image, fuse-module, aufs-dkms, kvm-api-4, redhat-cluster-modules, ivtv-modules${linux:rprovides}
+ Depends: ${misc:Depends}, ${shlibs:Depends}, kmod, linux-base (>= 4.5ubuntu1~16.04.1), linux-modules-4.15.0-166-generic-lpae
+ Recommends: flash-kernel [armhf], initramfs-tools | linux-initramfs-tool
+ Breaks: flash-kernel (<< 3.90ubuntu2) [arm64 armhf], s390-tools (<< 2.3.0-0ubuntu3) [s390x]
+ Conflicts: linux-image-4.15.0-166-generic-lpae
+ Suggests: fdutils, linux-doc-4.15.0 | linux-source-4.15.0, linux-tools, linux-headers-4.15.0-166-generic-lpae
+ Description: Linux kernel image for version 4.15.0 on 64 bit x86 SMP
+ This package contains the unsigned Linux kernel image for version 4.15.0 on 64 bit x86 SMP.
+.
+ Supports Generic LPAE processors.
+.
+ Geared toward desktop and server systems.
Package: linux-modules-4.15.0-166-generic-lpae
+Build-Profiles: <!stage1>
+Architecture: armhf
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}
+Description: Linux kernel extra modules for version 4.15.0 on 64 bit x86 SMP
+ Contains the corresponding System.map file, the modules built by the
+ packager, and scripts that try to ensure that the system is not left in an
+ unbootable state after an update.
+
+ Supports Generic LPAE processors.
+
+ Geared toward desktop and server systems.
+
+ You likely do not want to install this package directly. Instead, install
+ the linux-generic-lpae meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
+
+ Package: linux-modules-extra-4.15.0-166-generic-lpae
+Build-Profiles: <!stage1>
+Architecture: armhf
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}, linux-image-4.15.0-166-generic-lpae | linux-image-unsigned-
4.15.0-166-generic-lpae, crda | wireless-crda
+Description: Linux kernel extra modules for version 4.15.0 on 64 bit x86 SMP
+ This package contains the Linux kernel extra modules for version 4.15.0 on
+ 64 bit x86 SMP.
+
+ Also includes the corresponding System.map file, the modules built by the
+ packager, and scripts that try to ensure that the system is not left in an
+ unbootable state after an update.
+
+ Supports Generic LPAE processors.
+
+ Geared toward desktop and server systems.
+
+ You likely do not want to install this package directly. Instead, install
+ the linux-generic-lpae meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
+
+ Package: linux-headers-4.15.0-166-generic-lpae
Open Source Used In 5GaaS Edge AC-4

Package: linux-image-unsigned-4.15.0-166-generic-lpae-dbgsym
+Build-Profiles: <!stage1>
+Architecture: armhf
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}
+Provides: linux-debug
+Description: Linux kernel debug image for version 4.15.0 on 64 bit x86 SMP
+ This package provides the unsigned kernel debug image for version 4.15.0 on
+ 64 bit x86 SMP.
+.
+ This is for sites that wish to debug the kernel.
+.
+ The kernel image contained in this package is NOT meant to boot from. It
+ is uncompressed, and unstripped. This package also includes the
+ unstripped modules.
+
Package: linux-tools-4.15.0-166-generic-lpae
+Build-Profiles: <!stage1>
+Architecture: armhf
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}
+Provides: linux-debug
+Description: Linux kernel version specific tools for version 4.15.0-166
+ This package provides the architecture dependant parts for kernel
+ version locked tools (such as perf and x86_energy_perf_policy) for
+ version 4.15.0-166 on
+ 64 bit x86.
+
Package: linux-cloud-tools-4.15.0-166-generic-lpae
+Build-Profiles: <!stage1>
+Architecture: armhf
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}
+Provides: linux-cloud-tools-4.15.0-166
+Description: Linux kernel version specific tools for version 4.15.0-166
+ This package provides the architecture dependant parts for kernel
+ version locked tools (such as perf and x86_energy_perf_policy) for
+ version 4.15.0-166 on
+ 64 bit x86.

This package provides kernel header files for version 4.15.0 on
+ 64 bit x86 SMP.
+.
+ This is for sites that want the latest kernel headers. Please read
+ /usr/share/doc/linux-headers-4.15.0-166/debian.README.gz for details.
+
+Description: Linux kernel version specific cloud tools for version 4.15.0-166
+ This package provides the architecture dependant parts for kernel
+ version locked tools for cloud for version 4.15.0-166 on
+ 64 bit x86.
+
+Package: linux-udebs-generic-lpae
+Build-Profiles: <!stage1>
+XC-Package-Type: udeb
+Section: debian-installer
+Architecture: armhf
+Depends: ${udeb:Depends}
+Description: Metapackage depending on kernel udebs
+ This package depends on the all udebs that the kernel build generated,
+ for easier version and migration tracking.
+
+Package: linux-buildinfo-4.15.0-166-generic-lpae
+Build-Profiles: <!stage1>
+Architecture: armhf
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}
+Built-Using: ${linux:BuiltUsing}
+Description: Linux kernel buildinfo for version 4.15.0 on 64 bit x86 SMP
+ This package contains the Linux kernel buildinfo for version 4.15.0 on
+ 64 bit x86 SMP.
+ .
+ You likely do not want to install this package.
+
+Package: linux-image-unsigned-4.15.0-166-lowlatency
+Build-Profiles: <!stage1>
+Architecture: i386 amd64
+Section: kernel
+Priority: optional
+Provides: linux-image, fuse-module, aufs-dkms, kvm-api-4, redhat-cluster-modules, ivtv-modules, virtualbox-guest-modules [i386 amd64 x32] [linux:rprovides]
+Depends: ${misc:Depends}, ${shlibs:Depends}, kmod, linux-base (>= 4.5ubuntu1~16.04.1), linux-modules-4.15.0-166-lowlatency
+Recommends: grub-pc [i386 amd64 x32] | grub-efi-amd64 [amd64 x32] | grub-efi-ia32 [i386 amd64 x32] | grub [i386 amd64 x32] | lilo [i386 amd64 x32] | flash-kernel [armhf arm64], initramfs-tools | linux-initramfs-tool
+Breaks: flash-kernel (<< 3.90ubuntu2) [arm64 armhf], s390-tools (<< 2.3.0-0ubuntu3) [s390x]
+Conflicts: linux-image-4.15.0-166-lowlatency
+Suggests: fdutils, linux-doc-4.15.0 | linux-source-4.15.0, linux-tools, linux-headers-4.15.0-166-lowlatency
+Description: Linux kernel image for version 4.15.0 on 64 bit x86 SMP
+ This package contains the unsigned Linux kernel image for version 4.15.0 on
+ 64 bit x86 SMP.
+ .
+ Supports Lowlatency processors.
+ Geared toward desktop and server systems.
+ You likely do not want to install this package directly. Instead, install
+ the linux-lowlatency meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
+
+ Package: linux-modules-4.15.0-166-lowlatency
+ Build-Profiles: <stage1>
+ Architecture: i386 amd64
+ Section: kernel
+ Priority: optional
+ Depends: ${misc:Depends}, ${shlibs:Depends}
+ Description: Linux kernel extra modules for version 4.15.0 on 64 bit x86 SMP
+ Contains the corresponding System.map file, the modules built by the
+ packager, and scripts that try to ensure that the system is not left in an
+ unbootable state after an update.
+ +
+ Supports Lowlatency processors.
+ +
+ Geared toward desktop and server systems.
+ +
+ You likely do not want to install this package directly. Instead, install
+ the linux-lowlatency meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
+
+ Package: linux-modules-extra-4.15.0-166-lowlatency
+ Build-Profiles: <stage1>
+ Architecture: i386 amd64
+ Section: kernel
+ Priority: optional
+ Depends: ${misc:Depends}, ${shlibs:Depends}, linux-image-4.15.0-166-lowlatency | linux-image-unsigned-
+ 4.15.0-166-lowlatency, crda | wireless-crda
+ Description: Linux kernel extra modules for version 4.15.0 on 64 bit x86 SMP
+ This package contains the Linux kernel extra modules for version 4.15.0 on
+ 64 bit x86 SMP.
+ +
+ Also includes the corresponding System.map file, the modules built by the
+ packager, and scripts that try to ensure that the system is not left in an
+ unbootable state after an update.
+ +
+ Supports Lowlatency processors.
+ +
+ Geared toward desktop and server systems.
+ +
+ You likely do not want to install this package directly. Instead, install
+ the linux-lowlatency meta-package, which will ensure that upgrades work
+ correctly, and that supporting packages are also installed.
Package: linux-headers-4.15.0-166-lowlatency
+Build-Profiles: <!stage1>
+Architecture: i386 amd64
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, linux-headers-4.15.0-166, ${shlibs:Depends}
+Provides: linux-headers, linux-headers-3.0
+Description: Linux kernel headers for version 4.15.0 on 64 bit x86 SMP
+ This package provides kernel header files for version 4.15.0 on
+ 64 bit x86 SMP.
+ .
+ This is for sites that want the latest kernel headers. Please read
+ /usr/share/doc/linux-headers-4.15.0-166/debian.README.gz for details.
+
Package: linux-image-unsigned-4.15.0-166-lowlatency-dbgsym
+Build-Profiles: <!stage1>
+Architecture: i386 amd64
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}
+Provides: linux-debug
+Description: Linux kernel debug image for version 4.15.0 on 64 bit x86 SMP
+ This package provides the unsigned kernel debug image for version 4.15.0 on
+ 64 bit x86 SMP.
+ .
+ This is for sites that wish to debug the kernel.
+ .
+ The kernel image contained in this package is NOT meant to boot from. It
+ is uncompressed, and unstripped. This package also includes the
+ unstripped modules.
+
Package: linux-tools-4.15.0-166-lowlatency
+Build-Profiles: <!stage1>
+Architecture: i386 amd64
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, linux-tools-4.15.0-166
+Description: Linux kernel version specific tools for version 4.15.0-166
+ This package provides the architecture dependant parts for kernel
+ version locked tools (such as perf and x86_energy_perf_policy) for
+ version 4.15.0-166 on
+ 64 bit x86.
+
Package: linux-cloud-tools-4.15.0-166-lowlatency
+Build-Profiles: <!stage1>
+Architecture: i386 amd64
+Section: devel
+Priority: optional
+Depends: ${misc:Depends}, linux-cloud-tools-4.15.0-166
+Description: Linux kernel version specific cloud tools for version 4.15.0-166
+ This package provides the architecture dependant parts for kernel
+ version locked tools for cloud for version 4.15.0-166 on
+ 64 bit x86.
+
+Package: linux-udebs-lowlatency
+Build-Profiles: <!stage1>
+XC-Package-Type: udeb
+Section: debian-installer
+Architecture: i386 amd64
+Depends: ${udeb:Depends}
+Description: Metapackage depending on kernel udebs
+ This package depends on the all udebs that the kernel build generated,
+ for easier version and migration tracking.
+
+Package: linux-buildinfo-4.15.0-166-lowlatency
+Build-Profiles: <!stage1>
+Architecture: i386 amd64
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}
+Built-Using: ${linux:BuiltUsing}
+Description: Linux kernel buildinfo for version 4.15.0 on 64 bit x86 SMP
+ This package contains the Linux kernel buildinfo for version 4.15.0 on
+ 64 bit x86 SMP.
+ You likely do not want to install this package.
--- linux-4.15.0.orig/debian/control.d/flavour-buildinfo.stub
+++ linux-4.15.0/debian/control.d/flavour-buildinfo.stub
@@ -0,0 +1,13 @@
+Package: linux-buildinfo-PKGVER-ABINUM-FLAVOUR
+Build-Profiles: <!stage1>
+Architecture: ARCH
+Section: kernel
+Priority: optional
+Depends: ${misc:Depends}, ${shlibs:Depends}
+Built-Using: ${linux:BuiltUsing}
+Description: Linux kernel buildinfo for version PKGVER on DESC
+ This package contains the Linux kernel buildinfo for version PKGVER on
+ DESC.
+ You likely do not want to install this package.
--- linux-4.15.0.orig/debian/copyright
+++ linux-4.15.0/debian/copyright

+This is the Ubuntu prepackaged version of the Linux kernel.
+Linux was written by Linus Torvalds <Linus.Torvalds@cs.Helsinki.FI>
+and others.
+
+This package was put together by the Ubuntu Kernel Team, from
+sources retrieved from upstream linux git.
+The sources may be found at most Linux ftp sites, including
+
+This package is currently maintained by the
+Ubuntu Kernel Team <ubuntu-kernel@lists.ubuntu.com>
+
+Linux is copyrighted by Linus Torvalds and others.
+
+This program is free software; you can redistribute it and/or modify
+it under the terms of the GNU General Public License as published by
+the Free Software Foundation; version 2 dated June, 1991.
+
+This program is distributed in the hope that it will be useful,
+but WITHOUT ANY WARRANTY; without even the implied warranty of
+MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+GNU General Public License for more details.
+
+You should have received a copy of the GNU General Public License
+along with this program; if not, write to the Free Software
+Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA
+
+On Ubuntu Linux systems, the complete text of the GNU General
+Public License v2 can be found in `/usr/share/common-licenses/GPL-2`.

--- linux-4.15.0.orig/debian/debian.env
+++ linux-4.15.0/debian/debian.env
@@ -0,0 +1 @@
+DEBIAN=debian.master
--- linux-4.15.0.orig/debian/dkms-versions
+++ linux-4.15.0/debian/dkms-versions
@@ -0,0 +1,3 @@
+spl-linux 0.7.5-1ubuntu2.2
+zfs-linux 0.7.5-1ubuntu16.12
+wireguard-linux-compat 1.0.20201112-1-18.04.1
--- linux-4.15.0.orig/debian/docs/README.inclusion-list
+++ linux-4.15.0/debian/docs/README.inclusion-list
@@ -0,0 +1,51 @@
+This README describes the reason for, and the use of, module
+inclusion lists.
+
+The original Hardy release had the notion of sub-flavours,
+e.g., a flavour that was constructed as a subset of an existing flavour.
For example, the virtual flavour was extracted from the server flavour using a subset of the server flavour modules. However, there were some difficult maintenance issues with regard to packaging, make rules, and scripts. This re-implementation of the sub-flavours philosophy is hopefully simpler, and retrofittable to all releases.

A module inclusion list looks at the problem of constructing a package from the perspective of what modules do we _want_ in the package, as opposed to what modules we _don't_ want. As the kernel matures, more and more devices are added which makes the problem of configuration maintenance a real pain in the ass.

If we took the approach of disabling all of the config options that we don't want, then the differences between flavours will quickly become quite large, making it difficult to quickly compare the individual flavour configs. Each time a new config option is added then we also have to make a decision about disabling in order to continue to keep the minimal number of modules.

A module inclusion list is applied on a per-flavour basis. For example, debian.<BRANCH>/control.d/${flavour}.inclusion-list. For example, the config for virtual is very close to server and generic, but the inclusion list causes the virtual package to be constructed with _only_ the modules described in the inclusion list.

The inclusion list format is a simple bash regular expression list of files. For example,

```
+arch/*/\{crypto,kernel,oprofile\}
+drivers/acpi/\*
+drivers/ata/ahci.ko
```

These 3 regular expression forms are suitable for expansion by bash and as inputs to 'find'. See debian/scripts/module-inclusion for details.

There are 2 log files created as a side effect of the application of the module inclusion list; $(flavour).inclusion-list.log and $(flavour).depmod.log.

$(flavour).inclusion-list.log : This log is created while the inclusion list modules are being copied. If any are missing, then those warnings go in this log. While its not considered a fatal error, you should endeavour to correct your inclusion list such that there are no missing modules.

$(flavour).depmod.log : The log is created as a result of running depmod on the resulting set of modules. If there are missing symbols then you'll find that information here. Again, you should modify your inclusion list such that there are no missing symbols.

Tim Gardner <tim.gardner@canonical.com>
June 2, 2010
--- linux-4.15.0.orig/debian/gbp.conf
+++ linux-4.15.0/debian/gbp.conf
@@ -0,0 +1,2 @@
+[buildpackage]
+debian-tag = Ubuntu-%(version)s
--- linux-4.15.0.orig/debian/linux-cloud-tools-common.hv-fcopy-daemon.service
+++ linux-4.15.0/debian/linux-cloud-tools-common.hv-fcopy-daemon.service
@@ -0,0 +1,14 @@
+# On Azure/Hyper-V systems start the hv_fcopy_daemon
+#
+## author "Andy Whitcroft <apw@canonical.com>"
+[Unit]
+Description=Hyper-V File Copy Protocol Daemon
+Condition.Virtualization=microsoft
+Condition.PathExists=/dev/vmbus/hv_fcopy
+BindsTo=sys-devices-virtual-misc-vmbus\x21hv_fcopy.device
+ [+ [Service]
+ExecStart=/usr/sbin/hv_fcopy_daemon -n
+ + [+ [Install]
+WantedBy=multi-user.target
--- linux-4.15.0.orig/debian/linux-cloud-tools-common.hv-fcopy-daemon.udev
+++ linux-4.15.0/debian/linux-cloud-tools-common.hv-fcopy-daemon.udev
@@ -0,0 +1 @@
+SUBSYSTEM=="misc", KERNEL=="vmbus/hv_fcopy", TAG+="systemd", ENV{SYSTEMD_WANTS}+="hv-fcopy-daemon.service"
--- linux-4.15.0.orig/debian/linux-cloud-tools-common.hv-fcopy-daemon.upstart
+++ linux-4.15.0/debian/linux-cloud-tools-common.hv-fcopy-daemon.upstart
@@ -0,0 +1,22 @@
+# On Azure/Hyper-V systems start the hv_fcopy_daemon
+#
+description "Hyper-V File Copy Protocol Daemon"
+author "Andy Whitcroft <apw@canonical.com>"
+
+start on runlevel [2345]
+stop on runlevel [!2345]
+console log
+
+pre-start script
+ if [ -e "/etc/default/hv-kvp-daemon-init" ]; then
+ . /etc/default/hv-kvp-daemon-init
+ fi
+ if [ "$RUN_FCOPY_DAEMON" -eq 0 ] & & [ stop; exit 0; ]
+if [ -d /sys/class/dmi/id/ ]; then
+read company < /sys/class/dmi/id/sys_vendor
+read product < /sys/class/dmi/id/product_name
+if [ "$company:$product" = 'Microsoft Corporation:Virtual Machine' ] & & [ stop; exit 0; ]
+fi
+end script
+
+exec /usr/sbin/hv_fcopy_daemon -n
--- linux-4.15.0.orig/debian/linux-cloud-tools-common.hv-kvp-daemon.service
+++ linux-4.15.0/debian/linux-cloud-tools-common.hv-kvp-daemon.service
@@ -0,0 +1,19 @@
+# On Azure/Hyper-V systems start the hv_kvp_daemon
+#
+# author "Andy Whitcroft <apw@canonical.com>"
+[Unit]
+Description=Hyper-V KVP Protocol Daemon
+ConditionVirtualization=microsoft
+ConditionKernelCommandLine=!snapd_recovery_mode
+DefaultDependencies=no
+BindsTo=sys-devices-virtual-misc-vmbus\x21hv_kvp.device
+After=sys-devices-virtual-misc-vmbus\x21hv_kvp.device systemd-remount-fs.service
+Before=shutdown.target cloud-init-local.service walinuxagent.service
+Conflicts=shutdown.target
+RequiresMountsFor=/var/lib/hyperv
+
+[Service]
+ExecStart=/usr/sbin/hv_kvp_daemon -n
+
+[Install]
+WantedBy=multi-user.target
--- linux-4.15.0.orig/debian/linux-cloud-tools-common.hv-kvp-daemon.udev
+++ linux-4.15.0/debian/linux-cloud-tools-common.hv-kvp-daemon.udev
@@ -0,0 +1 @@
+SUBSYSTEM=="misc", KERNEL=="vmbus/hv_kvp", TAG+="systemd", ENV{SYSTEMD_WANTS}+="hvkvp-daemon.service"
--- linux-4.15.0.orig/debian/linux-cloud-tools-common.hv-kvp-daemon.upstart
+++ linux-4.15.0/debian/linux-cloud-tools-common.hv-kvp-daemon.upstart
@@ -0,0 +1,22 @@
+# On Azure/Hyper-V systems start the hv_kvp_daemon
+#
+description "Hyper-V KVP Protocol Daemon"
+author "Adam Conrad <adconrad@canonical.com>"
+
+start on runlevel [2345]
+stop on runlevel [!2345]
+console log
+
+pre-start script
+
if [ -e "/etc/default/hv-kvp-daemon-init" ]; then
+
. /etc/default/hv-kvp-daemon-init
+
fi
+
[ "$RUN_KVP_DAEMON" = 0 ] && { stop; exit 0; }
+if [ -d /sys/class/dmi/id/. ]; then
+read company </sys/class/dmi/id/sys_vendor

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+read product </sys/class/dmi/id/product_name
+[
    "Scompany:$product" = 'Microsoft Corporation:Virtual Machine' ] || { stop; exit 0; }
+fi
+end script
+
+exec /usr/sbin/hv_kvp_daemon -n
--- linux-4.15.0.org/debian/linux-cloud-tools-common hv-vss-daemon.service
+++ linux-4.15.0/debian/linux-cloud-tools-common hv-vss-daemon.service
@@ -0,0 +1,14 @@
+# On Azure/Hyper-V systems start the hv_vss_daemon
++
+## author "Andy Whitcroft <apw@canonical.com>"
+[Unit]
+Description=Hyper-V VSS Protocol Daemon
+ConditionVirtualization=microsoft
+ConditionPathExists=/dev/vmbus/hv_vss
+BindsTo=sys-devices-virtual-misc-vmbus\x21hv_vss.device
+
+[Service]
+ExecStart=/usr/sbin/hv_vss_daemon -n
+
+[Install]
+WantedBy=multi-user.target
--- linux-4.15.0.org/debian/linux-cloud-tools-common hv-vss-daemon.udev
+++ linux-4.15.0/debian/linux-cloud-tools-common hv-vss-daemon.udev
@@ -0,0 +1 @@
+SUBSYSTEM=="misc", KERNEL=="vmbus/hv_vss", TAG="$systemd", ENV\{SYSTEMD_WANTS\}+="hv-vss-daemon.service"
--- linux-4.15.0.org/debian/linux-cloud-tools-common hv-vss-daemon.upstart
+++ linux-4.15.0/debian/linux-cloud-tools-common hv-vss-daemon.upstart
@@ -0,0 +1,22 @@
+# On Azure/Hyper-V systems start the hv_vss_daemon
++
+## description "Hyper-V VSS Protocol Daemon"
+## author "Ben Howard <ben.howard@canonical.com>"
+
+start on runlevel [2345]
+stop on runlevel ![2345]
+
+console log
+
+pre-start script
+    if [ -e "/etc/default/hv-kvp-daemon-init" ]; then
+        . /etc/default/hv-kvp-daemon-init
+    fi
+    [ "$RUN_VSS_DAEMON" -eq 0 ] && { stop; exit 0; }
+if [ -d /sys/class/dmi/id/ ]; then
+read company </sys/class/dmi/id/sys_vendor
+read product </sys/class/dmi/id/product_name

+[ "$company:$product" = 'Microsoft Corporation:Virtual Machine' ] || { stop; exit 0; }
+fi
+end script
+
+exec /usr/sbin/hv_vss_daemon -n
--- linux-4.15.0.org/debian/linux-cloud-tools-common.intel-sgx-load-module.service
+++ linux-4.15.0/debian/linux-cloud-tools-common.intel-sgx-load-module.service
@@ -0,0 +1,13 @@
+[Unit]
+Description=Install SGX kernel module
+DefaultDependencies=false
+ConditionVirtualization=microsoft
+
+.[Service]
+Type=oneshot
+RemainAfterExit=true
+ExecStart=/sbin/modprobe intel_sgx
+ExecStop=/sbin/modprobe -r intel_sgx
+
+.[Install]
+WantedBy=multi-user.target
--- linux-4.15.0.org/debian/revoked-certs/canonical-uefi-2012-all.pem
+++ linux-4.15.0/debian/revoked-certs/canonical-uefi-2012-all.pem
@@ -0,0 +1,86 @@
+Certificate:
+  Data:
+    Version: 3 (0x2)
+    Serial Number: 1 (0x1)
+    Signature Algorithm: sha256WithRSAEncryption
+    Issuer: C = GB, ST = Isle of Man, L = Douglas, O = Canonical Ltd., CN = Canonical Ltd. Master Certificate Authority
+    Validity
+      Not Before: Apr 12 11:39:08 2012 GMT
+      Not After : Apr 11 11:39:08 2042 GMT
+    Subject: C = GB, ST = Isle of Man, O = Canonical Ltd., OU = Secure Boot, CN = Canonical Ltd. Secure Boot Signing
+    Subject Public Key Info:
+      Public Key Algorithm: rsaEncryption
+      RSA Public-Key: (2048 bit)
+      Modulus:
+        00:c9:5f:9b:62:8f:0b:b0:64:82:ac:be:e9:e2:62:
#!/usr/bin/make -f
#
# $(DEBIAN)/rules for Ubuntu linux
#
# Use this however you want, just give credit where credit is due.
#
# Copyright (c) 2007 Ben Collins <bcollins@ubuntu.com>
#
DEBIAN=$(shell awk -F= '($$1 == "DEBIAN") { print $$2 }' <debian/debian.env)

# dpkg-buildpackage passes options that are incomptatible with the kernel build.
unexport CFLAGS
unexport LDFLAGS

export LC_ALL=C
export SHELL=/bin/bash -e

# Where do we find the common configuration.
export DROOT=debian

# Common variables for all architectures
+include $(DROOT)/rules.d/0-common-vars.mk
+
# Pull in some arch specific stuff
+include $(DEBIAN)/rules.d/$(arch).mk
+
# Pull in some branch specific stuff. Used by LTS backport
+IQQDDQ==

-----END CERTIFICATE-----
--- linux-4.15.0.orig/debian/rules
+++ linux-4.15.0/debian/rules
@@ -0,0 +1,236 @@
+${DEBIAN}/rules.d/0-common-vars.mk
+${DEBIAN}/rules.d/$(arch).mk
+IQQDDQ==
+## branches to override master branch settings such as do_tools_common.
+include $(DEBIAN)/rules.d/hooks.mk
+
+## Maintainer targets
+include $(DROOT)/rules.d/1-maintainer.mk
+
+do_linux_tools=$(sort $(filter-out false,$(do_tools_usbip) $(do_tools_cpupower) $(do_tools_perf)
$(do_tools_bpf_tool) $(do_tools_x86)))
+do_cloud_tools=$(sort $(filter-out false,$(do_tools_hyper_v)))
+do_tools_common?=true
+do_tools_host?=false
+do_tools_perf_jvmti?=false
+
+## Don't build tools or udebs in a cross compile environment.
+ifneq ($(DEB_HOST_ARCH),$(DEB_BUILD_ARCH))
+do_tools=false
+disable_d_i=true
+do_zfs=false
+do_dkms_nvidia=false
+do_dkms_nvidia_server=false
+do_dkms_wireguard=false
+endif
+
+## Are any of the kernel signing options enabled.
+any_signed=$(sort $(filter-out false,$(uefi_signed) $(fit_signed) $(opal_signed)))
+ifeq ($(any_signed),true)
+bin_pkg_name=$(bin_pkg_name_unsigned)
+else
+bin_pkg_name=$(bin_pkg_name_signed)
+endif
+
+## Stages -- support both DEB_STAGE=stage1 and DEB_BUILD_PROFILE=bootstrap
+ifeq ($(DEB_STAGE),stage1)
+    DEB_BUILD_PROFILES=stage1
+endif
+ifneq ($(DEB_BUILD_PROFILE),)
+    DEB_BUILD_PROFILES=$(DEB_BUILD_PROFILE)
+endif
+ifneq ($(filter stage1,$(DEB_BUILD_PROFILES)),)
+    do_tools=false
+    do_doc_package=false
+    do_source_package=false
+    do_flavour_image_package=false
+    do_flavour_header_package=false
+endif
+
+## Being used to build a mainline build -- turn off things which do not work.
+ifeq ($(do_mainline_build),true)
## Debian Build System targets

+binary: binary-indep binary-arch
+
+build: build-arch build-indep
+
+clean: debian/control debian/canonical-certs.pem debian/canonical-revoked-certs.pem
dh_testdir
dh_testroot
dh_clean
+
+# d-i stuff
+rm -rf $(DEBIAN)/d-i-$arch

+## Generated on the fly.
+rm -f $(DEBIAN)/d-i/firmware/$(arch)/kernel-image
+
+## Normal build junk
+rm -rf $(DEBIAN)/abi/$(release)-$(revision)
+rm -rf $(builddir)
+rm -f $(stampdir)/stamp-*
+rm -rf $(DEBIAN)/linux-*
+
+## This gets rid of the d-i packages in control
+cp -f $(DEBIAN)/control.stub $(DROOT)/control
cp $(DEBIAN)/changelog debian/changelog
+
+## Install the copyright information.
cp $(DEBIAN)/copyright debian/copyright
+
+## Install the retpoline extractor.
cp $(DROOT)/scripts/retpoline-extract-one scripts/ubuntu-retpoline-extract-one
+
+## If we have a reconstruct script use it.
+[-f $(DEBIAN)/reconstruct ] && bash $(DEBIAN)/reconstruct
+
+## Remove generated intermediate files
+rm -f $(DROOT)/control.stub $(DEBIAN)/control.stub
+rm -f $(DROOT)/scripts/fix-filenames
+
+## Removes all intermediate files defined above.
distclean: clean
+rm -rf $(DROOT)/control debian/changelog debian/control debian/control.stub debian/copyright
+scripts/ubuntu-retpoline-extract-one
+
+## Builds the image, arch headers and debug packages
+include $(DROOT)/rules.d/2-binary-arch.mk
+
+## Rules for building the udebs ($(DEBIAN)-installer)
+include $(DROOT)/rules.d/5-udebs.mk
+  +# Builds the source, doc and linux-headers indep packages
+  +include $(DROOT)/rules.d/3-binary-indep.mk
+  +
+  +# Various checks to be performed on builds
+  +include $(DROOT)/rules.d/4-checks.mk
+  +
+  +# Misc stuff
+  +.PHONY: $(DEBIAN)/control.stub
+  +$(DEBIAN)/control.stub:
+  +$(DEBIAN)/scripts/control-create
+  +$(DEBIAN)/control.stub.in
+  +$(DEBIAN)/changelog
+  +$(wildcard $(DEBIAN)/control.d/* $(DEBIAN)/sub-flavours/*.*)
+  +for i in $(DEBIAN)/control.stub.in; do
+  + new=`echo $i | sed 's/A.in$/f/';
+  + cat $i | sed -e 's/PKGVER/$release/g'
+  + -e 's/ABINUM/$abinum/g'
+  + -e 's/SRCPKGNAME/$src_pkg_name/g'
+  + -e 's/=HUMAN=/$(human_arch)/g'
+  + > $new;
+  +done
+  +flavours="$(sort $(wildcard $(DEBIAN)/control.d/* $(DEBIAN)/sub-flavours/*.*))";
+  +for i in $flavours; do
+  + $(SHELL) $(DROOT)/scripts/control-create $i "$any_signed"
+  +sed -e 's/PKGVER/$release/g'
+  + -e 's/ABINUM/$abinum/g'
+  + -e 's/SRCPKGNAME/$src_pkg_name/g'
+  + -e 's/=HUMAN=/$(human_arch)/g'
+  + >> $(DEBIAN)/control.stub;
+  +done
+  +
+  +.PHONY: debian/control
+  +debian/control: $(DEBIAN)/control.stub
+  +echo "# placebo control.stub for kernel-wedge flow change" >debian/control.stub
+  +cp $(DEBIAN)/control.stub debian/control
+  +export KW_DEFCONFIG_DIR=$(DEBIAN)/d-i &&
+  +export KW_CONFIG_DIR=$(DEBIAN)/d-i &&
+  +LANG=C kernel-wedge gen-control $release-$abinum | 
+  +perl -f $(DROOT)/scripts/misc/kernel-wedge-arch.pl $arch | 
+  +$(CURDIR)/debian/control
+  +
+  +debian/canonical-certs.pem: $(wildcard $(DROOT)/certs/*-all.pem) $(wildcard $(DROOT)/certs/*-$arch.pem) $(wildcard $(DEBIAN)/certs/*-$arch.pem) $(wildcard $(DEBIAN)/certs/*-all.pem)
+  +for in $(notdir $*));
+  +do
+  +for dir in $(DEBIAN) $(DROOT);
+  +do

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if [-f "$dir/certs/$cert" ]; then
    cat "$dir/certs/$cert";
    break;
fi;

for dir in $(DEBIAN) $(DROOT); do
    if [-f "$dir/revoked-certs/$cert" ]; then
        cat "$dir/revoked-certs/$cert";
        break;
    fi;
    done >"$@

debian/canonical-revoked-certs.pem: $(wildcard $(DROOT)/revoked-certs/*-all.pem) $(wildcard $(DROOT)/revoked-certs/*-$(arch).pem) $(wildcard $(DEBIAN)/revoked-certs/*-all.pem) $(wildcard $(DEBIAN)/revoked-certs/*-$(arch).pem)

for cert in $(sort $(notdir $^)); do
    for dir in $(DEBIAN) $(DROOT); do
        if [-f "$dir/revoked-certs/$cert" ]; then
            cat "$dir/revoked-certs/$cert";
            break;
        fi;
        done >"$@"
This is an internally used mechanism for the daily kernel builds. It creates packages whose ABI is suffixed with a minimal representation of the current git HEAD sha. If .git/HEAD is not present, then it uses the uuidgen program.

AUTOBUILD can also be used by anyone wanting to build a custom kernel image, or rebuild the entire set of Ubuntu packages using custom patches or configs.

AUTOBUILD=
+
+ifneq ($(AUTOBUILD),)
+skipabi= true
+skipmodule= true
+skipretpoline= true
+skipdbg= true
+gitver=$(shell if test -f .git/HEAD; then cat .git/HEAD; else uuidgen; fi)
+gitverpre=$(shell echo $(gitver) | cut -b -3)
+gitverpost=$(shell echo $(gitver) | cut -b 38-40)
+abi_suffix = -$(gitverpre)$(gitverpost)
+endif
+
+ifneq ($(NOKERNLOG),)
+ubuntu_log_opts += --no-kern-log
+endif
+ifneq ($(PRINTSHAS),)
+ubuntu_log_opts += --print-shas
+endif
+
+# Get the kernels own extra version to be added to the release signature.
+raw_kernelversion=$(shell make kernelversion)
+
+# full_build -- are we doing a full build style build
+
+# The debug packages are ginormous, so you probably want to skip building them (as a developer).
+ifneq ($(full_build),false)
+skipdbg=true
+endif
+
+abinum:= $(shell echo $(revision) | sed -r 's/([^\+~]+\+\*\+\*\+)/\1\+\*\+\*\+\*/g')$(abi_suffix)
+prev_abinum:= $(shell echo $(prev_revision) | sed -r 's/([^\+~]+\+\*\+\*\+)/\1\+\*\+\*\+\*/g')$(abi_suffix)
+abi_release:= $(release)-$(abinum)
+
+uploadnum:= $(shell echo $(revision) | sed -r 's/[^\+~]+\-([^\+~]+\+\*\+\*\+)/\1\+\*\+\*\+\*/g')
+ifneq ($(full_build),false)
  uploadnum:= $(uploadnum)-Ubuntu
+endif
+
+## XXX: linux-libc-dev got bumped to -803.N inadvertently by a ti-omap4 upload
+## shift our version higher for this package only. Ensure this only
+## occurs for the v2.6.35 kernel so that we do not propogate this into
+## any other series.
+raw_uploadnum:= $(shell echo $(revision) | sed -e 's/^.\+/\1/')
+libc_dev_version :=
+ifeq ($(DEBIAN),debian.master)
+ifeq ($(release),2.6.35)
+libc_dev_version := -v$(release)-$(shell expr "$(abinum)" + 1000).$(raw_uploadnum)
+endif
+endif
+
+DEB_HOST_MULTIARCH = $(shell dpkg-architecture -qDEB_HOST_MULTIARCH)
+DEB_HOST_GNU_TYPE = $(shell dpkg-architecture -qDEB_HOST_GNU_TYPE)
+DEB_BUILD_GNU_TYPE = $(shell dpkg-architecture -qDEB_BUILD_GNU_TYPE)
+DEB_HOST_ARCH = $(shell dpkg-architecture -qDEB_HOST_ARCH)
+DEB_BUILD_ARCH = $(shell dpkg-architecture -qDEB_BUILD_ARCH)
+
+## Detect invocations of the form 'fakeroof debian/rules binary arch=armhf'
+## within an x86/en schroot. This only gets you part of the way since the
+## packaging phase fails, but you can at least compile the kernel quickly.
+##
+arch := $(DEB_HOST_ARCH)
+ifneq ($(arch),$(DEB_HOST_ARCH))
+CROSS_COMPILE ?= $(DEB_HOST_ARCH)'
+endif
+
+## Detect invocations of the form 'dpkg-buildpackage -B -aarmhf' within
+## an x86/en schroot. This is the only way to build all of the packages
+## (except for tools).
+##
+ifeq ($(DEB_BUILD_GNU_TYPE),$(DEB_HOST_GNU_TYPE))
+CROSS_COMPILE ?= $(DEB_HOST_GNU_TYPE)' -I 2>/dev/null)
+endif
+
+abidir:= $(CURDIR)/$(DEBIAN)/abi/$(release)-$(revision)/$(arch)
+prev_abidir:= $(CURDIR)/$(DEBIAN)/abi/$(release)-$(prev_revision)/$(arch)

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# add a 'full source' mode
+do_full_source=false
+
# build tools
+ifneq ($(wildcard $(CURDIR)/tools),)
+ifeq ($(do_tools),)
+ifneq ($(DEB_BUILD_GNU_TYPE),$(DEB_HOST_GNU_TYPE))
+do_tools=false
+endif
+endif
+do_tools?=true
+else
+do_tools?=false
+endif
+tools_pkg_name=$(src_pkg_name)-tools-$(abi_release)
+tools_common_pkg_name=$(src_pkg_name)-tools-common
+tools_flavour_pkg_name=linux-tools-$(abi_release)
+cloud_pkg_name=$(src_pkg_name)-cloud-tools-$(abi_release)
+cloud_common_pkg_name=$(src_pkg_name)-cloud-tools-common
+cloud_flavour_pkg_name=linux-cloud-tools-$(abi_release)
+hosttools_pkg_name=$(src_pkg_name)-tools-host
+
# The general flavour specific image package.
+do_flavour_image_package=true
+
# The general flavour specific header package.
+do_flavour_header_package=true
+
# DTBs
+do_dtbs=false
+
# FIPS check
+do_fips_checks=false
+
# Support parallel=<n> in DEB_BUILD_OPTIONS (see #209008)
++
# These 2 environment variables set the -j value of the kernel build. For example,
# CONCURRENCY_LEVEL=16 fakeroot $(DEBIAN)/rules binary-debs
# or
# DEB_BUILD_OPTIONS=parallel=16 fakeroot $(DEBIAN)/rules binary-debs
#
# The default is to use the number of CPUs.
#
+COMMA=,
+DEB_BUILD_OPTIONS_PARA = $(subst parallel=,,$(filter parallel=%,$(subst $(COMMA),,$(DEB_BUILD_OPTIONS))))
+ifneq ($(DEB_BUILD_OPTIONS_PARA))
+ CONCURRENCY_LEVEL := $(DEB_BUILD_OPTIONS_PARA)
+endif
+
+ifeq ($(CONCURRENCY_LEVEL),)
+  # Check the environment
+  CONCURRENCY_LEVEL := $(shell echo $$CONCURRENCY_LEVEL)
+  # No? Then build with the number of CPUs on the host.
+  ifeq ($(CONCURRENCY_LEVEL),)
+    CONCURRENCY_LEVEL := $(shell expr `getconf _NPROCESSORS_ONLN` \* 1)
+  endif
+  # Oh hell, give 'em one
+  ifeq ($(CONCURRENCY_LEVEL),)
+    CONCURRENCY_LEVEL := 1
+  endif
+endif
+
+conc_level		= -j$(CONCURRENCY_LEVEL)
+
+# target_flavour is filled in for each step
+kmake = make ARCH=$(build_arch) \ 
+CROSS_COMPILE=$(CROSS_COMPILE) \ 
+KERNELVERSION=$(abi_release)-$(target_flavour) \ 
+CONFIG_DEBUG_SECTION_MISMATCH=y \ 
+KBUILD_BUILD_VERSION="$(uploadnum)" \ 
+LOCAL_VERSION= localver-extra= \ 
+CFLAGS_MODULE="-DPKG_ABI=$(abinum)"
+ifeq ($(LOCAL_ENV_CC),)
+kmake += CC="$(LOCAL_ENV_CC)" DISTCC_HOSTS="$(LOCAL_ENV_DISTCC_HOSTS)"
+endif
+
+# Locking is required in parallel builds to prevent loss of contents
+# of the debian/files.
+lockme_file = $(CURDIR)/debian/.LOCK
+lockme_cmd = flock -w 60
+lockme = $(lockme_cmd) $(lockme_file)
+
+# Don't fail if a link already exists.
+LN = ln -sf
+
+# Checks if a var is overridden by the custom rules. Called with var and
+# flavour as arguments.
+custom_override = \
+  $(shell if [ -n "$($(1)_$(2))" ]; then echo "$($(1)_$(2))"; else echo "$($(1))"; fi)
+
+# selftests that Ubuntu cares about
+ubuntu_selftests = breakpoints bpf cpu-hotplug efivarfs memfd memory-hotplug mount net ptrace seccomp timers powerpc user ftrace
--- linux-4.15.0.orig/debian/rules.d/1-maintainer.mk
+++ linux-4.15.0/debian/rules.d/1-maintainer.mk
The following targets are for the maintainer only! do not run if you don’t know what they do.
+
+.PHONY: printenv updateconfigs printchanges insertchanges startnewrelease diffupstream help updateportsconfigs editportsconfigs autoreconstruct finalchecks
+
+help:
+@echo "These are the targets in addition to the normal $(DEBIAN) ones:"
+@echo
+@echo "  printenv        : Print some variables used in the build"
+@echo
+@echo "  updateconfigs        : Update core arch configs"
+@echo
+@echo "  editconfigs          : Update core arch configs interractively"
+@echo
+@echo "  genconfigs           : Generate core arch configs in CONFIGS/*"
+@echo
+@echo "  updateportsconfigs   : Update ports arch configs"
+@echo
+@echo "  editportsconfigs     : Update ports arch configs interactivly"
+@echo
+@echo "  genportconfigs       : Generate ports arch configs in CONFIGS/*"
+@echo
+@echo "  printchanges    : Print the current changelog entries (from git)"
+@echo
+@echo "  insertchanges   : Insert current changelog entries (from git)"
+@echo
+@echo "  startnewrelease : Start a new changelog set"
+@echo
+@echo "  diffupstream    : Diff stock kernel code against upstream (git)"
+@echo
+@echo "  compileselftests : Only compile the selftests listed on ubuntu_selftests variable"
+@echo
+@echo "  runselftests    : Run the selftests listed on ubuntu_selftests variable"
+@echo
+@echo "  help            : If you are kernel hacking, you need the professional version of this"
+@echo
+@echo "Environment variables:"
+@echo
+@echo "  NOKERNLOG       : Do not add upstream kernel commits to changelog"
+@echo "  CONCURRENCY_LEVEL=X"
+@echo "  PRINTSHAS       : Include SHAs for commits in changelog"
+
+printdebian:
+@echo "$(DEBIAN)"
+
+updateconfigs defaultconfigs editconfigs genconfigs dumpconfigs:
+dh_testdir;
+$(SHELL) $(DROOT)/scripts/misc/kernelconfig $@
+rm -rf build
+
+updateportsconfigs defaultportsconfigs editportsconfigs genportsconfigs askconfigs:
+dh_testdir;
+$(SHELL) $(DROOT)/scripts/misc/kernelconfig $@ ports
+rm -rf build
+
+printenv:
+dh_testdir
+@echo "src package name  = $(src_pkg_name)"
+@echo "release       = $(release)"
+@echo "revisions     = $(revisions)"
+@echo "revision      = $(revision)"
+@echo "uploadnum     = $(uploadnum)"
+@echo "prev_revisions = $(prev_revisions)"
+@echo "prev_revision  = $(prev_revision)"
+@echo "abinum        = $(abinum)"
+@echo "upstream_tag  = $(upstream_tag)"
+@echo "gitver        = $(gitver)"
+@echo "flavours      = $(flavours)"
+@echo "skipabi       = $(skipabi)"
+@echo "skipmodule    = $(skipmodule)"
+@echo "skipdbg       = $(skipdbg)"
+@echo "ubuntu_log_opts = $(ubuntu_log_opts)"
+@echo "CONCURRENCY_LEVEL = $(CONCURRENCY_LEVEL)"
+@echo "ubuntu_selftests = $(ubuntu_selftests)"
+@echo "bin package name   = $(bin_pkg_name)"
+@echo "hdr package name = $(hdrs_pkg_name)"
+@echo "doc package name  = $(doc_pkg_name)"
+@echo "do_doc_package    = $(do_doc_package)"
+@echo "do_doc_package_content = $(do_doc_package_content)"
+@echo "do_source_package    = $(do_source_package)"
+@echo "do_source_package_content = $(do_source_package_content)"
+@echo "do_libc_dev_package = $(do_libc_dev_package)"
+@echo "do_flavour_image_package = $(do_flavour_image_package)"
+@echo "do_flavour_header_package = $(do_flavour_header_package)"
+@echo "do_common_headers_indep = $(do_common_headers_indep)"
+@echo "do_full_source = $(do_full_source)"
+@echo "do_tools        = $(do_tools)"
+@echo "do_any_tools    = $(do_any_tools)"
+@echo "do_linux_tools  = $(do_linux_tools)"
+@echo "do_tools_cpupower = $(do_tools_cpupower)"
+@echo "do_tools_perf   = $(do_tools_perf)"
+@echo "do_tools_bpftool = $(do_tools_bpftool)"
+@echo "do_tools_x86    = $(do_tools_x86)"
+@echo "do_tools_host   = $(do_tools_host)"
+ver="${ver%.}.$(( ${ver##*.} +1 ))"; \
+fi; \
+else \n+ver="$(release)-$(echo "$\(revision\)" | \n+perl -ne 'if (/\(^d\).\(^d\).\(^d\)/?SS/) { printf("%d.%d%\n", $$1 + 1, $$2 +1, $$3) }')"; \
+fi; \
+now="$(shell date -R)"; \
+echo "Creating new changelog set for $\(ver\)..."; \
+echo -e "$\(src\_pkg\_name\) ($\(ver\)) UNRELEASED; urgency=medium\n" > $(DEBIAN)/c changelog.new; \
+echo " CHANGELOG: Do not edit directly. Autogenerated at release." >> \n+$\(DEBIAN\)/c changelog.new; \
+echo " CHANGELOG: Use the printchanges target to see the curent changes." \n+>> $(DEBIAN)/c changelog.new; \ 
+echo " CHANGELOG: Use the insertchanges target to create the final log." \n+>> $(DEBIAN)/c changelog.new; \ 
+echo -e "\n -- $\(DEBFULLNAME\) <$\(DEBEMAIL\)> $\(now\)\n" >> \n+$\(DEBIAN\)/c changelog.new ; \
+cat $(DEBIAN)/c changelog >> $(DEBIAN)/c changelog \n+mv $(DEBIAN)/c changelog.new $(DEBIAN)/c changelog \n+compileselftests: \n+## a loop is needed here to fail on errors \n+for test in $(ubuntu\_selftests); do \n+$\(kmake\) -C tools/testing/selftests TARGETS="$\test"; \n+done; \n+runselftests: \n+$\(kmake\) -C tools/testing/selftests TARGETS="$(ubuntu\_selftests)" run\_tests \n--- linux-4.15.0.orig/debian/rules.d/2-binary-arch.mk \n+++ linux-4.15.0/debian/rules.d/2-binary-arch.mk \n@@ -0,0 +1,807 @@ \n+## We don't want make removing intermediary stamps \n+.SECONDARY: \n+## Prepare the out-of-tree build directory \n+ifeq ($(do\_full\_source),true) \n+build\_cd = cd $(builddir)/build-$*; # \n+build\_O = \n+else \n+build\_cd = \n+build\_O = O=$(builddir)/build-$* \n+endif \n+## Typically supplied from the arch makefile, e.g., debian.master/control.d/armhf.mk \n+ifeq ($(gcc),) \n+kmake += CC=\$(CROSS\_COMPILE)\$(gcc) \n+endif \n+
+shlibdeps_opts = $(if $(CROSS_COMPILE),-- -l$(CROSS_COMPILE:%-=/usr/%)/lib)
+
+debian/scripts/fix-filenames: debian/scripts/fix-filenames.c
+$(CC) -o $@ $^ 
+
+$($(stampdir)/stamp-prepare-%: config-prepare-check-%
+@echo Debug: $@
+@touch $@
+$($(stampdir)/stamp-prepare-tree-%: target_flavour = $* 
+$($(stampdir)/stamp-prepare-tree-%: $(commonconfdir)/config.common.$(family) 
$(archconfdir)/config.common.$(arch) $(archconfdir)/config.flavour.$% debian/scripts/fix-filenames 
+@echo Debug: $@
+install -d $(builddir)/build-$*
+touch $(builddir)/build-$*/ubuntu-build
+[ "$do_full_source" != 'true' ] && true || 
+rsync -a --exclude debian --exclude debian.master --exclude $(DEBIAN) * $(builddir)/build-$*
+cat $(wordlist 1,3,$^) | sed -e \
'/./*CONFIG_VERSION_SIGNATURE.*/CONFIG_VERSION_SIGNATURE="Ubuntu ${release}-${revision}-${* 
$(raw_kernelversion)="/" > $(builddir)/build-$*/.config 
+find $(builddir)/build-$* -name "*.*" | xargs rm -f 
+$($(builddir)/build-$* $(kmake) $(build_O) -j1 silentoldconfig prepare scripts 
+touch $@
+
+# Used by developers as a shortcut to prepare a tree for compilation.
+prepare-%: $(stampdir)/stamp-prepare-%
+@echo Debug: $@
+# Used by developers to allow efficient pre-building without fakeroot.
+build-%: $(stampdir)/stamp-build-%
+@echo Debug: $@
+
+# Do the actual build, including image and modules
+$(stampdir)/stamp-build-%: target_flavour = $* 
+$(stampdir)/stamp-build-%: bldimg = $(call custom_override,build_image,$* 
+$(stampdir)/stamp-build-%: $(stampdir)/stamp-prepare-%
+@echo Debug: $@ build_image $(build_image) bldimg $(bldimg) 
+$($(builddir)/build-$* $(kmake) $(build_O) $(conc_level) $(bldimg) modules $(if $(filter true,$(do_dtbs)),dtbs) 
+ 
+@touch $@
+
+define build_dkms_sign = 
+$($(shell set -x; if grep -q CONFIG_MODULE_SIG=y $(1)/.config; then 
+echo $(1)/scripts/sign-file $(MODHASHALGO) $(MODECKEY) $(MODPUBKEY); 
+else 
+echo "-";
+fi 
+))
+endif
+define build_dkms =
+CROSS_COMPILE=$(CROSS_COMPILE) $(SHELL) $(DROOT)/scripts/dkms-build $(dkms_dir)
$(abi_release)-$* $(call build_dkms_sign,$(builddir)/build-$*) $(1) $(2) $(3) $(4) $(5)
+endef
+
#+ nvidia_build_payload 450 450 450_450.102.04-0ubuntu0.20.04.1
++ nvidia_build_payload 450-server 50.102.04-0ubuntu0.20.04.1
+define nvidia_build_payload =
+$(call build_dkms, $(bldinfo_pkg_name)-$*, $(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*/signatures, ",
 nvidia-$(2), pool/restricted/n/nvidia-graphics-drivers-$(1)/nvidia-kernel-source-$(1)_$(3)_$(arch).deb
 pool/restricted/n/nvidia-graphics-drivers-$(1)/nvidia-dkms-$(1)_$(3)_$(arch).deb)
+endif
++ nvidia_build 450
++ nvidia_build 450-server
+define nvidia_build =
+$(call nvidia_build_payload,$(1),$(shell echo $(1) | sed -e 's/-server/srv/'),$(shell awk '/^nvidia-graphics-drivers-
 $(1) / {print($$2);}' debian/dkms-versions))
+endef
+
+define install_control =
+for which in $(3);
+do
+template="$(DROOT)/templates/$(2).$$which.in";
+script="$(DROOT)/$(1).$$which"
+sed -e 's/@abiname@/$(abi_release)/g'
+ -e 's/@localversion@/-$*/g'
+ -e 's/@image-stem@/$(instfile)/g'
+ "$script"
+done
+endef
+
+## Ensure the directory prefix is exactly 100 characters long so pathnames are the
+## exact same length in any binary files produced by the builds. These will be
+## commonised later.
+dkms_20d=....................
+dkms_100d=$(dkms_20d)$(dkms_20d)$(dkms_20d)$(dkms_20d)$(dkms_20d)
+dkms_100c=$(shell echo '$(dkms_100d)' | sed -e 's/./_/g')
+define dkms_dir_prefix =
+$(shell echo $(1)/$(dkms_100c) | \
+sed -e 's/(\$(dkms_100d)).*/\1dkms/')
+endif
+
+## Install the finished build
+install-%: pkgdir_bin = $(CURDIR)/debian/$(bin_pkg_name)-$*
+install-%: pkgdir = $(CURDIR)/debian/$(mods_pkg_name)-$*
+install-%: pkgdir_extra = $(CURDIR)/debian/$(mods_extra_pkg_name)-$*
+install-%: pkgdir_bldinfo = $(CURDIR)/debian/$(bldinfo_pkg_name)-$*
+install-%: bindoc = $(pkgdir)/usr/share/doc/$(bin_pkg_name)-$*
+$(signingv)/$(instfile)-$(abi_release)-$*.efi; 
+fi
+endif
+ifeq ($opal_signed),true)
+install -d $(signingv)
+cp -p $(pkgdir)/boot/$(instfile)-$(abi_release)-$* \ 
+$(signingv)/$(instfile)-$(abi_release)-$*.opal;
+endif
+
+install -d $(pkgdir)/boot
+install -m644 $(builddir)/build-$*/.config \ 
+$(pkgdir)/boot/config-$(abi_release)-$*
+install -m600 $(builddir)/build-$*/System.map \ 
+$(pkgdir)/boot/System.map-$(abi_release)-$*
+if [ "$(filter true,$(do_dtbs))" ]; then 
+$(build_cd) $(kmake) $(build_O) $(conc_level) dtbs_install \ 
+INSTALL_DTBS_PATH=$(pkgdir)/lib/firmware/$(abi_release)-$*/device-tree; \
+( cd $(pkgdir)/lib/firmware/$(abi_release)-$*/ && find device-tree -print ) | \ 
+while read dtb_file; do \ 
+echo "$dtb_file ?" >> $(DEBIAN)/d-i/firmware/$(arch)/kernel-image; \ 
+done; \ 
+fi
+ifeq ($(no_dumpfile),)
+makedumpfile -g $(pkgdir)/boot/vmcoreinfo-$(abi_release)-$* \ 
+x $(builddir)/build-$*/vmlinux
+chmod 0600 $(pkgdir)/boot/vmcoreinfo-$(abi_release)-$*
+endif
+
+$(build_cd) $(kmake) $(build_O) $(conc_level) modules_install $(vdso) \ 
+INSTALL_MOD_STRIP=1 INSTALL_MOD_PATH=$(pkgdir)/ \ 
+INSTALL_FW_PATH=$(pkgdir)/lib/firmware/$(abi_release)-$*
+
#
# Build module blacklists:
#
+ install -d $(pkgdir)/lib/modprobe.d
+echo "# Kernel supplied blacklist for $(src_pkg_name) $(abi_release)-$* $(arch)"
+ $(pkgdir)/lib/modprobe.d/blacklist_$src_pkg_name_$(abi_release)-$*.conf
+for conf in $(arch)-$* $(arch) common.conf; do 
+ if [ -f $(DEBIAN)/modprobe.d/$$conf ]; then 
+ echo "# modprobe.d/$$conf"
+ cat $(DEBIAN)/modprobe.d/$$conf;
+ done;
+fi;
+
+ls -l $(pkgdir)/lib/modules/$(abi_release)/kernel/drivers/watchdog/ | 
+
+grep -v '^bcm2835_wdt$$' | \
+sed -e 's/\/*/blacklist / -e 's/.ko//' | \
+sort -u \
+>>$(pkgdir)/lib/modprobe.d/blacklist_$($src_pkg_name)_$(abi_release)-$*.conf 
+
+ifeq ($(do_extras_package),true) 
+#
+# Remove all modules not in the inclusion list. 
+#
+if [ -f $(DEBIAN)/control.d/$(target_flavour).inclusion-list ] ; then \
+/sbin/depmod -v -b $(pkgdir) $(abi_release)-$* | \ 
+sed -e "s@$(pkgdir)/lib/modules/$(abi_release)-$*/kernel/@@g" | \ 
+awk '{ print $$1 " "$NF}' >$(build_dir)/module-inclusion.depmap; \
+mkdir -p $(pkgdir_ex)/lib/modules/$(abi_release)-$*/kernel; \ 
+$($SHELL) $(DROOT)/scripts/module-inclusion --master \
+$($pkgdir_ex)/lib/modules/$(abi_release)-$*/kernel; \ 
+$($DEBIAN)/control.d/$(target_flavour).inclusion-list \
+$build_dir/module-inclusion.depmap 2>&1 | \ 
+tee $(target_flavour).inclusion-list.log; \
+/sbin/depmod -b $(pkgdir) $(abi_release)-$* $(abi_release)-$* 2>&1 |tee $(target_flavour).depmod.log; \
+if [ `grep -c 'unknown symbol' $(target_flavour).depmod.log` -gt 0 ]; then \ 
+echo "EE: Unresolved module dependencies in base package!"; \ 
+exit 1; \ 
+fi \ 
+fi 
+endif 
+
+ifeq ($(no_dumpfile),)
+makedumpfile -g $(pkgdir)/boot/vmcoreinfo-$(abi_release)-$* \
+x $(builddir)/build-$*/vmlinux 
+chmod 0600 $(pkgdir)/boot/vmcoreinfo-$(abi_release)-$* 
+endif 
+
+rm -f $(pkgdir)/lib/modules/$(abi_release)-$*/build 
+rm -f $(pkgdir)/lib/modules/$(abi_release)-$*/source 
+ 
+## Some initramfs-tools specific modules 
+install -d $(pkgdir)/lib/modules/$(abi_release)-$*/initrd 
+if [ -f $(pkgdir)/lib/modules/$(abi_release)-$*/kernel/drivers/video/vesafb.ko ]; then\ 
+ $($(LN) $(pkgdir)/lib/modules/$(abi_release)-$*/kernel/drivers/video/vesafb.ko \ 
+$builddir/build-$*/vmlinux 
+endif 
+
+echo "interest linux-update-$(abi_release)-$*" >"$(DROOT)/$(bin_pkg_name)-$*.triggers" 
+install -d $(pkgdir_bin)/usr/lib/linux/triggers
+$(call install_control,$(bin_pkg_name)-$*,image,postinst postrm preinst prerm)
+install -d $(pkgdir)/usr/lib/linux/triggers
+$(call install_control,$(mods_pkg_name)-$*,extra,postinst postrm)
+ifeq ($(do_extras_package),true)
+Install the postinit/postrm scripts in the extras package.
+if [-f $(DEBIAN)/control.d/$(target_flavour).inclusion-list ]; then
+install -d $(pkgdir)/usr/lib/linux/triggers; \\
+$(call install_control,$(mods_extra_pkg_name)-$*,extra,postinst postrm);
+fi
+endif
+
+# Install the full changelog.
+ifeq ($(do_doc_package),true)
+install -d $(bindoc)
+cat $(DEBIAN)/changelog $(DEBIAN)/changelog.historical | \\
+gzip -9 >$(bindoc)/changelog.Debian.old.gz
+chmod 644 $(bindoc)/changelog.Debian.old.gz
+endif
+
+ifneq ($(skipsub),true)
+for sub in $($(*)_sub); do \\
+if ! (TO=$$sub FROM=$* ABI_RELEASE=$(abi_release) $(SHELL)
+$(DROOT)/scripts/sub-flavour); then exit 1; fi; \ 
+/sbin/depmod -b debian/$(bin_pkg_name)-$$sub
+$(call install_control,$(bin_pkg_name)--$$sub,image,postinst postrm); \\
+done
+endif
+
+ifneq ($(skipdbg),true)
+# Debug image is simple
+install -m644 -D $(builddir)/build-$*/vmlinux \\
+$(dbgpkgdir)/usr/lib/debug/boot/vmlinux-$(abi_release)-$* \\
+$(build_cd) $(kmake) $(build_O) modules_install $(vdso) \\
+INSTALL_MOD_PATH=$(dbgpkgdir)/usr/lib/debug
+rm -f $(dbgpkgdir)/usr/lib/debug/lib/modules/$(abi_release)-*/build \\
+rm -f $(dbgpkgdir)/usr/lib/debug/lib/modules/$(abi_release)-*/source \\
+rm -f $(dbgpkgdir)/usr/lib/debug/lib/modules/$(abi_release)-*/modules.*
+endif
+
+# The flavour specific headers image
+# TODO: Would be nice if we didn't have to dupe the original builddir
+install -d $($(hdir)dir)
+cat $(builddir)/build-$*/.config | \\
+sed -e 's/.*CONFIG_DEBUG_INFO=.*/# CONFIG_DEBUG_INFO is not set/g' > \\
+"Open Source Used In 5GasS Edge AC-4 19617
+$(hdrdir)/.config
+chmod 644 $(hdrdir)/.config
+$($make) O=$(hdrdir) -j1 silentoldconfig prepare scripts
+# We'll symlink this stuff
+rm -f $(hdrdir)/include2 $(hdrdir)/source
+# We do not need the retpoline information.
+find $(hdrdir) -name \*.o.ur-\* | xargs rm -f
+# Copy over the compilation version.
+cp "$(builddir)/build-$*/include/generated/compile.h" \n+"$(hdrdir)/include/generated/compile.h"
+# Add UTS_UBUNTU_RELEASE_ABI since UTS_RELEASE is difficult to parse.
+echo "#define UTS_UBUNTU_RELEASE_ABI $(abinum)" >> $(hdrdir)/include/generated/utsrelease.h
+# powerpc kernel arch seems to need some .o files for external module linking. Add them in.
+ifeq ($(build_arch),powerpc)
+mkdir -p $(hdrdir)/arch/powerpc/lib
+cp $(builddir)/build-$*/arch/powerpc/lib/*.o $(hdrdir)/arch/powerpc/lib
+endif
+## Copy over the new retpoline extractor.
+## Script to symlink everything up
+$(SHELL) $(DROOT)/scripts/link-headers "$(hdrdir)" "$(indeppkg)" "$*"
+# The build symlink
+install -d debian/$basepkg-$*/lib/modules/$abi_release-$*
+$(LN) /usr/src/$basepkg-$*/lib/* $(hdrdir)/arch/powerpc/lib
+% And finally the symvers
+install -m644 $(builddir)/build-$*/Module.symvers 
+$(hdrdir)/Module.symvers
+
+## Now the header scripts
+$(call install_control,$(hdrs_pkg_name)-$*,headers,postinst)
+
+## At the end of the package prep, call the tests
+DPKG_ARCH="$(arch)" KERN_ARCH="$(build_arch)" FLAVOUR="$*"
+ VERSION="$(abi_release)" REVISION="$(revision)"
+ PREV_REVISION="$(prev_revision)" ABI_NUM="$(abinum)"
+ PREV_ABI_NUM="$(prev_abinum)" BUILD_DIR="$(builddir)/build-$*"
+ INSTALL_DIR="$($(pkgdir))" SOURCE_DIR="$($(CURDIR))"
+ run-parts -v $(DROOT)/tests-build
+
+## Remove files which are generated at installation by postinst,
+## except for modules.order and modules.builtin
+##
+## NOTE: need to keep this list in sync with postrm
+
+mkdir $(pkgdir)/lib/modules/$abi_release-$*/
+mv $(pkgdir)/lib/modules/$(abi_release)-$*/modules.order \
+$(pkgdir)/lib/modules/$(abi_release)-$*/__/
+if [ -f $(pkgdir)/lib/modules/$(abi_release)-$*/modules.builtin ] ; then \
+ mv $(pkgdir)/lib/modules/$(abi_release)-$*/modules.builtin \
+$(pkgdir)/lib/modules/$(abi_release)-$*/__; \
+fi
+rm -f $(pkgdir)/lib/modules/$(abi_release)-$*/modules.*
+mv $(pkgdir)/lib/modules/$(abi_release)-$*/_/* \
+$(pkgdir)/lib/modules/$(abi_release)-$*
+rmdir $(pkgdir)/lib/modules/$(abi_release)-$*/_
+
+ifeq ($(do_linux_tools),true)
+# Create the linux-tools tool links
+install -d $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+ifeq ($(do_tools_usbip),true)
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/usbip $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+ifeq ($(do_tools_acpidbg),true)
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/acpidbg $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+ifeq ($(do_tools_cpupower),true)
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/cpupower $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+ifeq ($(do_tools_perf),true)
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/perf $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+ifeq ($(do_tools_perf_jvmti),true)
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/libperf-jvmti.so $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+endif
+ifeq ($(do_tools_bpftool),true)
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/bpftool $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+ifeq ($(do_tools_x86),true)
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/x86_energy_perf_policy $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/turbostat $(toolspkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+endif
+ifeq ($(do_cloud_tools),true)
+ifeq ($(do_tools_hyper),true)
+# Create the linux-hyperv tool links
+install -d $(cloudpkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/hv_kvp_daemon $(cloudpkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+$(LN) ../../$(src_pkg_name)-tools-$(abi_release)/hv_vss_daemon $(cloudpkgdir)/usr/lib/linux-tools/$(abi_release)-$*
+endif
+endif
+ifeq ($(do_tools_hyper),true)
+ifeq ($(do_cloud_tools),true)
+ifeq ($(do_tools_hyper),true)
+ifeq ($(do_cloud_tools),true)
+$(LN) ../$(src_pkg_name)-tools-$(*Release)/hv_fcopy_daemon $(cloudpkgdir)/usr/lib/linux-tools/$(*Release)-*$
+$(LN) ../$(src_pkg_name)-tools-$(*Release)/lsvmbus $(cloudpkgdir)/usr/lib/linux-tools/$(*Release)-*$
+endif
+endif
+
+## Build a temporary "installed headers" directory.
+install -d $(dkms_dir) $(dkms_dir)/headers $(dkms_dir)/build $(dkms_dir)/source
+cp -rp "$(*hdrdir)" "$(indep_hdrdir)" "$(*dkms_dir)/headers"
+
+$(if $(filter true,$(enable_zfs)),$(call build_dkms, $(mods_pkg_name)-$*, $(pkgdir)/lib/modules/$(*Release)-$*/kernel, "", spl, pool/universe/s/spl-linux/spl-dkms $(dkms_spl_linux_version)_all.deb))
+$(if $(filter true,$(enable_zfs)),$(call build_dkms, $(mods_pkg_name)-$*, $(pkgdir)/lib/modules/$(*Release)-$*/kernel, "", zfs, pool/universe/z/zfs-linux/zfs-dkms $(dkms_zfs_linux_version)_all.deb))
+
+$(if $(filter true,$(do_dkms_wireguard)),$(call build_dkms, $(mods_pkg_name)-$*, $(pkgdir)/lib/modules/$(*Release)-$*/kernel, "", wireguard, pool/universe/w/wireguard-linux-compat/wireguard-dkms $(dkms_wireguard_version)_all.deb))
+
+ifeq ($(do_dkms_nvidia),true)
+$(foreach series,$(nvidia_desktop_series),$(call nvidia_build,$(series)))
+endif
+ifeq ($(do_dkms_nvidia_server),true)
+$(foreach series,$(nvidia_server_series),$(call nvidia_build,$(series)))
+endif
+
+ifneq ($(skipdbg),true)
+## Add .gnu_debuglink sections to each stripped .ko
+## pointing to unstripped versio
+find $(pkgdir) 
+ $(if $(filter true,$(do_extras_package)),$(pkgdir_ex)) 
+ +name "*.ko" | while read path_module ; do 
+module="/lib/modules/$${path_module#*/lib/modules/}"; 
+if [[ -f "$(dbgpkgdir)/usr/lib/debug/$$module" ]] ; then 
+$(CROSS_COMPILE)objcopy 
+ --add-gnu-debuglink="$(dbgpkgdir)/usr/lib/debug/$$module" 
+ $$path_module; 
+fi; 
+else 
+echo "WARNING: Missing debug symbols for module '$$module'."; 
+fi; 
+done
+endif
+  +# Build the final ABI information.
+  +install -d $(abidir)
+  +sed -e 's/\(\([^\(\)]*\)\)\([\s\S]+\)\([^\(\)]*\)\)/\2 \1/'
+  +$(builddir)/build-$*/Module.symvers | sort > $(abidir)/$*
+  +  +# Build the final ABI modules information.
+  +find $(pkgdir_bin) $(pkgdir) $(pkgdir_ex) -name ".*.ko" | 
+  +sed -e 's/\([^/\[\]*\)\([^/\[\]*\)\([^/\[\]*\)/\2/"/g' | sort -u >$(abidir)/$*.modules
+  +  +# Build the final ABI firmware information.
+  +find $(pkgdir_bin) $(pkgdir) $(pkgdir_ex) -name ".*.ko" | 
+  +while read ko; do 
+  +/sbin/modinfo $ko | grep ^firmware || true; 
+  +done | sort -u >$(abidir)/$*.fwinfo
+  +  +# Build the final ABI compiler information.
+  +ko=$(find $(pkgdir_bin) $(pkgdir) $(pkgdir_ex) -name ".*.ko" | head -1); 
+  +readelf -p .comment "$ko" | gawk '{
+  +print("%s", $3);
+  +for (n=4; n<=NF; n++) { 
+  +print(" %s", $n);
+  +}
+  +print ""
+  +}' | sort -u >$(abidir)/$*.compiler
+  +  +# Build the final ABI retpoline information.
+  +# if grep -q CONFIG_RETPOLINE=$(builddir)/build-$*/.config; then
+  +# echo "# retpoline v1.0" >$(abidir)/$*.retpoline;
+  +# $(SHELL) $(DROOT)/scripts/retpoline-extract $(builddir)/build-$* $(CURDIR) | 
+  +sort >>$(abidir)/$*.retpoline;
+  +#else
+  +# echo "# RETPOLINE NOT ENABLED" >$(abidir)/$*.retpoline;
+  +#fi
+  +  +# Build the buildinfo package content.
+  +install -d $(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*
+  +install -m644 $(builddir)/build-$*/.config 
+  +$(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*/config
+  +install -m644 $(abidir)/$*
+  +$(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*/abi
+  +install -m644 $(abidir)/$*.modules 
+  +$(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*/modules
+  +install -m644 $(abidir)/$*.fwinfo 
+  +$(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*/fwinfo
+  +install -m644 $(abidir)/$*.retpoline 
+  +$(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*/retpoline
install -m644 $(abidir)/$*.compiler \
$(pkgdir_bldinfo)/usr/lib/linux/$(abi_release)-$*/compiler
+
ifeq ($(fit_signed),true)
+install -d $(signingv)
+cp -p $(pkgdir_bin)/boot/$*(instfile)-$(abi_release)-$* \
$(signingv)/$*(instfile)-$(abi_release)-$*;
+# Build FIT image now that the modules folder exists
+$(SHELL) $(DROOT)/scripts/build-fit \
+$(CURDIR)/$(DEBIAN)/$(fit_its) \
+"$foreach f, $(fit_dtb_files), $(builddir)/build-$*/$*(f)" \
+$(abi_release)-$(target_flavour) \
+$(CURDIR)/$(DROOT)/linux-modules-$(abi_release)-$* \
+$(signingv)
+cp -p $(signingv)/fit-$(abi_release)-$*.fit $(pkgdir_bin)/boot/
+endif
+
headers_tmp := $(CURDIR)/debian/tmp-headers
+headers_dir := $(CURDIR)/debian/linux-libc-dev
+
headers := $(MAKE) -C $(CURDIR) O=$(headers_tmp) \
KERNELVERSION=$(abi_release) INSTALL_HDR_PATH=$(headers_tmp)/install \nSHELL="$(SHELL)" ARCH=$(header_arch)
+
install-arch-headers:
+@echo Debug: $@
+dh_testdir
+dh_testroot
+ifeq ($(do_libc_dev_package),true)
+dh_prep -plinux-libc-dev
+endif
+
rm -rf $(headers_tmp)
+install -d $(headers_tmp) $(headers_dir)/usr/include/
+
$(headers) $(defconfig)
+mv $($(headers_tmp)/.config/).config.old
+sed -e 's/# \!\!(CONFIG_MODVERSIONS) is not set$/A=y/ \n+ e 's/# CONFIG_LOCALVERSION_AUTO.*# CONFIG_LOCALVERSION_AUTO is not set/\n+ $(headers_tmp)/.config.old > $(headers_tmp)/.config
+$($(headers) silentoldconfig
+$($(headers) headers_install
+
( cd $(headers_tmp)/install/include/ & & \n+find . -name "." -o -name ".*" -prune -o -print | \n+ cpio -pvd --preserve-modification-time \n+$($(headers_dir)/usr/include/ )
+mkdir -p $(headers_dir)/usr/include/$(DEB_HOST_MULTIARCH)


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+rm -rf $(headers_dir)/usr/include/$(DEB_HOST_MULTIARCH)/asm
+mv $(headers_dir)/usr/include/asm $(headers_dir)/usr/include/$(DEB_HOST_MULTIARCH)/
+
+rm -rf $(headers_tmp)
+
+define dh_all
+dh_installichangelogs -p$(1)
+dh_installdocs -p$(1)
+dh_compress -p$(1)
+dh_fixperms -p$(1) -X/boot/
+dh_shlibdeps -p$(1) $(shlibdeps_opts)
+dh_installdeb -p$(1)
+dh_installdebcfg -p$(1)
+$(lockme) dh_gencontrol -p$(1) -- -Vlinux:provides='$(rprovides)'
+dh_md5sums -p$(1)
+dh_builddeb -p$(1)
+endif
+define newline
+
+endif
+define dh_all_inline
+ $(subst ${newline},; \${newline},$(call dh_all,$(1)))
+endif
+
+binary-arch-headers: install-arch-headers
+@echo Debug: $@
+dh_testdir
+dh_testroot
+ifeq ($(do_libc_dev_package),true)
+ifneq ($(DEBIAN),debian.master)
+echo "non-master branch building linux-libc-dev, aborting"
+exit 1
+endif
+$call dh_all,linux-libc-dev)
+endif
+
+binary-%: pkgimg = $(bin_pkg_name)-$*
+binary-%: pkgimg_mods = $(mods_pkg_name)-$*
+binary-%: pkgimg_ex = $(mods_extra_pkg_name)-$*
+binary-%: pkgdir_ex = $(CURDIR)/debian/$(extra_pkg_name)-$*
+binary-%: bldinfo = $(bldinfo_pkg_name)-$*
+binary-%: pkgheaders = $(hdrs_pkg_name)-$*
+binary-%: dbgpkg = $(bin_pkg_name)-$*-dbgsym
+binary-%: dbgpkgdir = $(CURDIR)/debian/$(bin_pkg_name)-$*-dbgsym
+binary-%: pkgtools = $(tools_flavour_pkg_name)-$*
+binary-%: pkgcloud = $(cloud_flavour_pkg_name)-$*
+binary-%: rprovides = $(if $(filter true,$(call custom_override,do_zfs,$*)),$(comma) spl-modules$(comma) spl-
dkms$(comma) zfs-modules$(comma) zfs-dkms)
+binary-%: target_flavour = $*
+binary-%: checks-%
+@echo Debug: $@
+dh_testdir
+dh_testroot
+
+$call dh_all,$(pkgimg))
+$call dh_all,$(pkgimg_mods))
+
+ifeq ($do_extras_package),true)
+ ifeq ($ship_extras_package),false)
+## If $ship_extras_package is explicitly set to false, then do not
+## construct the linux-image-extra package; instead just log all of the
+## "extra" modules which were pointlessly built yet won't be shipped.
+find $pkgdir_ex -name "*.ko" | sort |
+| sed 's|^$(pkgdir_ex)/NOT-SHIPPED |'
+| tee -a $(target_flavour).not-shipped.log;
+ else
+if [ -f $(DEBIAN)/control.d/$target_flavour.inclusion-list ] ; then 
+$call dh_all_inline,$(pkgimg_ex)); 
+fi
+ endif
+endif
+
+$call dh_all,$(pkgbldinfo))
+$call dh_all,$(pkghdr))
+
+ifneq ($skipsub),true)
+ @set -e; for sub in $(*)_sub; do
+ pkg=$(bin_pkg_name)-$$sub;
+ $(call dh_all_inline,$$pkg);
+ done
+endif
+
+ifneq ($skipdbg),true)
+ $call dh_all,$(dbgpkg))
+
+## Hokay...here's where we do a little twiddling...
+## Renaming the debug package prevents it from getting into
+## the primary archive, and therefore prevents this very large
+## package from being mirrored. It is instead, through some
+##
+mv ../$(dbgpkg)_$(release)-$(revision)_$(arch).deb \
+.../$(dbgpkg)_$(release)-$(revision)_$(arch).ddeb
+set -e;
++
\$(lockme_cmd) 9 || exit 1;
+if grep -qs '^Build-Debug-Symbols: yes$' /CurrentlyBuilding; then 
+sed -i '/^\$\(dbgpkg\)_/s/.deb /.ddeb / debian/files;
+else 
+grep -v '^\$\(dbgpkg\)_.*$' debian/files > debian/files.new;
+mv debian/files.new debian/files;
+fi;
+\) 9>$\(lockme_file\)
+# Now, the package wont get into the archive, but it will get put
+# into the debug system.
+endif
+
+ifeq ($\(do_linux_tools\),true)
+\$(call dh_all,$\(pkgtools\))
+endif

+ifeq ($\(do_cloud_tools\),true)
+\$(call dh_all,$\(pkgcloud\))
+endif
+
+ifneq ($\(full_build\),false)
+## Clean out this flavours build directory.
++rm -rf $(builddir)/build-$*
+## Clean out the debugging package source directory.
++rm -rf $(dbgpkgdir)
+endif
+
+## per-architecture packages
++
+builddirpa = $(builddir)/tools-perarch
+
+$\(stampdir\)/stamp-prepare-perarch:
+@echo Debug: $@
+ifeq ($\(do_any_tools\),true)
+rm -rf $(builddirpa)
+install -d $(builddirpa)
+rsync -a --exclude debian --exclude debian.master --exclude $(DEBIAN) --exclude .git -a /$(builddirpa)/
+touch $@
+
+$\(stampdir\)/stamp-build-perarch: $\(stampdir\)/stamp-prepare-perarch install-arch-headers
+@echo Debug: $@
+ifeq ($\(do_linux_tools\),true)
+ifeq ($\(do_tools_usbip\),true)
+chmod 755 $(builddirpa)/tools/usb/usbip/autogen.sh
+cd $(builddirpa)/tools/usb/usbip && ./autogen.sh
+chmod 755 $(builddirpa)/tools/usb/usbip/configure
+cd $(builddirpa)/tools/usb/usbip && ./configure --prefix=$(builddirpa)/tools/usb/usbip/bin
#@echo Debug: $@
+# Add the tools.
+ifeq ($(do_linux_tools),true)
+install -d $(toolspkgdir)/usr/lib
+install -d $(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+ifeq ($(do_tools_usbip),true)
+install -m755 $(builddirpa)/tools/usb/usbip/bin/sbin/usbip \ 
+$($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/usb/usbip/bin/sbin/usbipd \ 
+$($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+endif
+ifeq ($(do_tools_acpidbg),true)
+install -m755 $(builddirpa)/tools/power/acpi/acpidbg \ 
+$($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+endif
+ifeq ($(do_tools_cpupower),true)
+install -m755 $(builddirpa)/tools/power/cpupower/cpupower \ 
+$($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+# Install only the full versioned libcpupower.so.$(abi_release), not 
+# the usual symlinks to it.
+install -m644 $(builddirpa)/tools/power/cpupower/libcpupower.so.$(abi_release) \ 
+$($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+endif
+ifeq ($(do_tools_perf),true)
+install -m755 $(builddirpa)/tools/perf/perf $($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+ifeq ($(do_tools_perf_jvmti),true)
+install -m755 $(builddirpa)/tools/perf/libperf-jvmti.so $($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+endif
+endif
+ifeq ($(do_tools_bpftool),true)
+install -m755 $(builddirpa)/tools/bpf/bpftool/bpftool $($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+endif
+ifeq ($(do_tools_x86),true)
+install -m755 $(builddirpa)/tools/power/x86/x86_energy_perf_policy/x86_energy_perf_policy \ 
+$($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/power/x86/turbostat/turbostat \ 
+$($(toolspkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+endif
+endif
+ifeq ($(do_cloud_tools),true)
+ifeq ($(do_tools_hyperv),true)
+install -d $(cloudpkgdir)/usr/lib
+install -d $(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_kvp_daemon \ 
+$($(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_vss_daemon \ 
+$($(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_fcopy_daemon \ 
+endif
+endif
+ifeq ($(do_tools_hyperv),true)
+install -d $(cloudpkgdir)/usr/lib
+install -d $(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_kvp_daemon \ 
+$($(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_vss_daemon \ 
+$($(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_fcopy_daemon \ 
+endif
+endif
+ifeq ($(do_cloud_tools),true)
+ifeq ($(do_tools_hyperv),true)
+install -d $(cloudpkgdir)/usr/lib
+install -d $(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_kvp_daemon \ 
+$($(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_vss_daemon \ 
+$($(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/hv_fcopy_daemon \ 
+endif
+endif

+$(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+install -m755 $(builddirpa)/tools/hv/lsvmbus \
+$(cloudpkgdir)/usr/lib/$(src_pkg_name)-tools-$(abi_release)
+endif
+endif
+
+binary-perarch: toolspkg = $(tools_pkg_name)
+binary-perarch: cloudpkg = $(cloud_pkg_name)
+binary-perarch: install-perarch
+@echo Debug: $@
+ifeq ($(do_linux_tools),true)
+$call dh_all,$(toolspkg))
+endif
+ifeq ($(do_cloud_tools),true)
+$call dh_all,$(cloudpkg))
+endif
+
+binary-debs: signing = $(CURDIR)/debian/$bin_pkg_name signing
+binary-debs: signingv = $(CURDIR)/debian/$bin_pkg_name signing/$(release)-$(revision)
+binary-debs: signing_tar = $(src_pkg_name)_$(release)-$(revision)_$(arch).tar.gz
+binary-debs: binary-perarch $(addprefix binary-,$(flavours))
+@echo Debug: $@
+ifeq ($(any_signed),true)
+install -d $(signingv)/control
+{ echo "tarball"; } >$(signingv)/control/options
+cd $(signing) && tar czvf ../../../$(signing_tar) .
+dpkg-distaddfile $(signing_tar) raw-signing -
+endif
+
+build-arch-deps-$(do_flavour_image_package) += $(addprefix $(stampdir)/stamp-build-,$(flavours))
+build-arch: $(build-arch-deps-true)
+@echo Debug: $@
+
+ifeq ($AUTOBUILD,)
+binary-arch-deps-$(do_flavour_image_package) += binary-udebs
+else
+binary-arch-deps-$(do_flavour_image_package) = binary-debs
+endif
+binary-arch-deps-$(do_libc_dev_package) += binary-arch-headers
+ifeq ($(do_common_headers_indep),true)
+binary-arch-deps-$(do_flavour_header_package) += binary-headers
+endif
+binary-arch: $(binary-arch-deps-true)
+@echo Debug: $@
+
--- linux-4.15.0.orig/debian/rules.d/3-binary-indep.mk
+++ linux-4.15.0/debian/rules.d/3-binary-indep.mk
@@ -0,0 +1,220 @@
+build-indep:
+@echo Debug: $@
+
+## The binary-indep dependency chain is:
+##
+## install-headers <- install-doc <- install-source <- install-tools <- install-indep <- binary-independ
+## install-headers <- binary-headers
+##
+indep_hdrpkg = $(indep_hdrs_pkg_name)
indep_hdrdir = $(CURDIR)/debian/${indep_hdrpkg}/usr/src/${indep_hdrpkg})
+install-headers: prepare-indep
+@echo Debug: $@
+dh_testdir
+dh_testroot
+
+ifeq ($(do_flavour_header_package),true)
+install -d $(indep_hdrdir)
+find -path './debian' -prune -o -path './$DEBIAN' -prune
+ -o -path './include/*' -prune
+ -o -path './scripts/*' -prune -o -type f
+ -name Makefile* -o -name Kconfig* -o -name Kbuild* -o -name '*.sh' -o -name '*.pl' -o -name '*.lds' \n+  -print | cpio -pd --preserve-modification-time $(indep_hdrdir)
+cp -a scripts include $(indep_hdrdir)
+(find arch -name include -type d -print | \n+xargs -n1 -i: find : -type f) | \n+cpio -pd --preserve-modification-time $(indep_hdrdir)
+endif
+
+docpkg = $(doc_pkg_name)
docdir = $(CURDIR)/debian/${docpkg})/usr/share/doc/${docpkg}
+install-doc: prepare-indep
+@echo Debug: $@
+ifeq ($(do_doc_package),true)
+dh_testdir
+dh_testroot
+
+install -d $(docdir)
+ifeq ($(do_doc_package_content),true)
+# First the html docs. We skip these for autobuilds
+if [ -z "$(AUTOBUILD)" ]; then \n+install -d $(docdir)/$(doc_pkg_name)-tmp; \n+$(kmake) O=$(docdir)/$(doc_pkg_name)-tmp htmldocs; \n+install -d $(docdir)/html; \n+rsync -aL $(docdir)/$(doc_pkg_name)-tmp/Documentation/output/ $(docdir)/html/; \n+$($(docdir)/html/; \n+rm -rf $(docdir)/$(doc_pkg_name)-tmp; \n+fi
+endif
+# Copy the rest
+cp -a Documentation/* $(docdir)
+find $(docdir) -name .gitignore | xargs rm -f
+endif
+
+srcpkg = linux-source-$release
+srcdir = $(CURDIR)/debian/$srcpkg/usr/src/$srcpkg
+balldir = $(CURDIR)/debian/$srcpkg/usr/src/$srcpkg/$(srcpkg)
+install-source: prepare-indep
+@echo Debug: $@
+ifeq ($(do_source_package),true)
+
+install -d $(srcdir)
+ifeq ($(do_source_package_content),true)
+find . -path './debian' -prune -o -path './$(DEBIAN)' -prune -o -path '././*' -prune -o -path './$(DEBIAN)*/.*' -prune -o -print \ 
cpio -pd --preserve-modification-time $(balldir)
+(cd $(srcdir); tar cf - $(srcpkg)) | bzip2 -9c > $(srcdir)/$(srcpkg).tar.bz2
+rm -rf $(balldir)
+find './debian' '.*\$(DEBIAN)' 
+path './debian/linux-*' -prune -o 
+path './debian/$src_pkg_name-*' -prune -o 
+path './debian/build' -prune -o 
+path './debian/files' -prune -o 
+path './debian/stamps' -prune -o 
+path './debian/tmp' -prune -o 
+print \ 
cpio -pd --preserve-modification-time $(srcdir)
+$ (LN) $(srcpkg)/$(srcpkg).tar.bz2 $(srcdir)/..
+endif
+endif
+
+install-tools: toolspkg = $(tools_common_pkg_name)
+install-tools: toolsbin = $(CURDIR)/debian/$toolspkg/usr/bin
+install-tools: toolssbin = $(CURDIR)/debian/$toolspkg/usr/sbin
+install-tools: toolsman = $(CURDIR)/debian/$toolspkg/usr/share/man
+install-tools: toolsbashcomp = $(CURDIR)/debian/$toolspkg/usr/share/bash-completion/completions
+install-tools: hosttoolspkg = $(hosttools_pkg_name)
+install-tools: hosttoolsbin = $(CURDIR)/debian/$hosttoolspkg/usr/bin
+install-tools: hosttoolsman = $(CURDIR)/debian/$hosttoolspkg/usr/share/man
+install-tools: cloudpkg = $(cloud_common_pkg_name)
+install-tools: cloudbin = $(CURDIR)/debian/$cloudpkg/usr/bin
+install-tools: cloudsbin = $(CURDIR)/debian/$cloudpkg/usr/sbin
+install-tools: cloudman = $(CURDIR)/debian/$cloudpkg/usr/share/man
+install-tools: prepare-indep $(stampdir)/stamp-build-perarch
+@echo Debug: $@
+ifeq (do_tools_common),true
+rm -rf $(builddir)/tools
+install -d $(builddir)/tools
+for i in *; do $(LN) $(CURDIR)/$$i $(builddir)/tools/; done
+rm $(builddir)/tools/tools
+rsync -a tools/ $(builddir)/tools/tools/
+
+install -d $(toolsbin)
+install -d $(toolssbin)
+install -d $(toolsman)/man1
+install -d $(toolsman)/man8
+install -d $(toolsbashcomp)
+
+install -m755 debian/tools/generic $(toolsbin)/usbip
+install -m755 debian/tools/generic $(toolsbin)/usbipd
+install -m644 $(CURDIR)/tools/usb/usbip/doc/*.8 $(toolsman)/man1/
+
+install -m755 debian/tools/generic $(toolsbin)/cpupower
+install -m644 $(CURDIR)/tools/power/cpupower/man/*.1 $(toolsman)/man1/
+
+install -m755 debian/tools/generic $(toolsbin)/perf
+
+install -m755 debian/tools/generic $(toolssbin)/bpftool
+make -C $(builddir)/tools/tools/bpf/bpftool doc
+install -m644 $(builddir)/tools/tools/bpf/bpftool/Documentation/*.8 \ 
+$($(toolsman)/man8
+install -m644 $(builddir)/tools/tools/bpf/bpftool/bash-completion/bpftool \ 
+$($(toolsbashcomp)
+
+install -m755 debian/tools/generic $(toolsbin)/x86_energy_perf_policy
+install -m755 debian/tools/generic $(toolsbin)/turbostat
+
+cd $(builddir)/tools/tools/perf && make man
+install -m644 $(builddir)/tools/tools/perf/Documentation/*.1 \ 
+$($(toolsman)/man1
+
+install -m644 $(CURDIR)/tools/power/x86/x86_energy_perf_policy/*.8 $(toolsman)/man8
+install -m644 $(CURDIR)/tools/power/x86/turbostat/*.8 $(toolsman)/man8
+
+ifeq ($(do_cloud_tools),true)
+ifeq ($(do_tools_hyperv),true)
+
+install -d $(cloudsbin)
+install -m755 debian/tools/generic $(cloudsbin)/hv_kvp_daemon
+install -m755 debian/tools/generic $(cloudsbin)/hv_vss_daemon
+install -m755 debian/tools/generic $(cloudsbin)/hv_fcopy_daemon
+install -m755 debian/tools/generic $(cloudsbin)/lsvmbus
+install -m755 debian/cloud-tools/hv_get_dhcp_info $(cloudsbin)
+install -m755 debian/cloud-tools/hv_get_dns_info $(cloudsbin)
+install -m755 debian/cloud-tools/hv_set_ifconfig $(cloudsbin)
+
+install -d $(cloudman)/man8
+install -m644 $(CURDIR)/tools/hv/* .8 $(cloudman)/man8
+endif
+endif
+
+ifeq ($(do_tools_acpidbg),true)
+install -m755 debian/tools/generic $(toolsbin)/acpidbg
+endif
+
+endif
+
+ifeq ($(do_tools_host),true)
+install -d $(hosttoolsbin)
+install -d $(hosttoolsman)/man1
+
+install -m 755 $(CURDIR)/tools/kvm/kvm_stat/kvm_stat $(hosttoolsbin)/
+
+cd $(builddir)/tools/tools/kvm/kvm_stat && make man
+install -m644 $(builddir)/tools/tools/kvm/kvm_stat/*.1 \n+$($(hosttoolsman)/man1
+endif
+
+prepare-indep:
+@echo Debug: $@
+dh_prep -i
+
+install-indep: install-headers install-doc install-source install-tools
+@echo Debug: $@
+
+# This is just to make it easy to call manually. Normally done in
+# binary-indep target during builds.
+binary-headers: prepare-indep install-headers
+@echo Debug: $@
+dh_installchangelogs -p$(indep_hdrpkg)
+dh_installdocs -p$(indep_hdrpkg)
+dh_compress -p$(indep_hdrpkg)
+dh_fixperms -p$(indep_hdrpkg)
+dh_installdoc -p$(indep_hdrpkg)
+$($(lockme) dh_gencontrol -p$(indep_hdrpkg)
+dh_md5sums -p$(indep_hdrpkg)
+dh_builddeb -p$(indep_hdrpkg)
+
+binary-indep: cloudpkg = $(cloud_common_pkg_name)
+binary-indep: install-indep
+@echo Debug: $@
+dh_installchangelogs -i
+dh_installdocs -i
+dh_compress -i
+dh_fixperms -i
+ifeq (${do_tools_common},true)
+ifeq (${do_cloud_tools},true)
+ifeq (${do_tools_hyperv},true)
+dh_installinit -p$(cloudpkg) -n --name hv-kvp-daemon
+dh_installinit -p$(cloudpkg) -n --name hv-vss-daemon
+dh_installinit -p$(cloudpkg) -n --name hv-fcopy-daemon
+dh_installudev -p$(cloudpkg) -n --name hv-kvp-daemon
+dh_installudev -p$(cloudpkg) -n --name hv-vss-daemon
+dh_installudev -p$(cloudpkg) -n --name hv-fcopy-daemon
+dh_systemd_enable -p$(cloudpkg)
+dh_installinit -p$(cloudpkg) -o --name hv-kvp-daemon
+dh_installinit -p$(cloudpkg) -o --name hv-vss-daemon
+dh_installinit -p$(cloudpkg) -o --name hv-fcopy-daemon
+dh_systemd_start -p$(cloudpkg)
+endif
+# Keep intel_sgx service disabled by default, so add it after dh_systemd_enable
+# and dh_systemd_start are called:
+dh_installinit -p$(cloudpkg) --no-start --no-enable --name intel-sgx-load-module
+endif
+endif
+dh_installdeb -i
+$(lockme) dh_gencontrol -i
+dh_md5sums -i
+dh_builddeb -i
--- linux-4.15.0.orig/debian/rules.d/4-checks.mk
+++ linux-4.15.0/debian/rules.d/4-checks.mk
@@ -0,0 +1,27 @@
+abi-check-%: install-%
+ @ echo Debug: $@
+ @ perl -f $(DROOT)/scripts/abi-check "$*" "$prev_abinum" "$abidir" "$skipabi"
+   "$prev_abidir" "$abi" "$skipmodule"
+   
+module-check-%: install-%
+ @ echo Debug: $@
+ @ perl -f $(DROOT)/scripts/module-check "$*" "$prev_abinum" "$abidir" "$skipmodule"
+   "$prev_abidir" "$abi" "$skipmodule"
+   
+retpoline-check-%: install-%
+ @ echo Debug: $@
+ $(SHELL) $(DROOT)/scripts/retpoline-check "$*" "$prev_abidir" "$abi" "$skipretpoline" "$builddir/build-"
+ checks-%: module-check-% abi-check-% retpole-check-%
+ @echo Debug: $@
+
+ # Check the config against the known options list.
+ config-prepare-check-%: $(stampdir)/stamp-prepare-tree-%
+ @echo Debug: $@
+ @perl -f $(DROOT)/scripts/config-check \ 
+ $(builddir)/build-$*/config "$$(arch)" "$*" "$(commonconfdir)" "$(skipconfig)"
+
--- linux-4.15.0.orig/debian/rules.d/5-udebs.mk
+++ linux-4.15.0/debian/rules.d/5-udebs.mk
@@ -0,0 +1,79 @@
+# Do udebs if not disabled in the arch-specific makefile
+binary-udebs: binary-debs
+ @echo Debug: $@
+ifeq ($(disable_d_i),)
+ @$(MAKE) --no-print-directory -f $(DROOT)/rules DEBIAN=$(DEBIAN) \ 
+ do-binary-udebs
+endif
+
+ do-binary-udebs: linux_udeb_name=$(shell if echo $(src_pkg_name)|egrep -q '(linux-lts|linux-hwe)'; then echo $(src_pkg_name); else echo linux; fi)
+ do-binary-udebs: debian/control
+ @echo Debug: $@
+ dh_testdir
+ dh_testroot
+
+ # unpack the kernels into a temporary directory
+ mkdir -p debian/d-i-$[arch]
+
+ imagelist=\$$(cat $(CURDIR)/$(DEBIAN)/d-i/kernel-versions | grep ^$(arch) | gawk '{print $$3}') && 
+ for f in $$imagelist; do 
+ i=$(release)-$(abinum)-$$f; 
+ for f in ../linux-image-$$i_$(release)-$(revision)_${arch}.deb 
+ ../linux-image-unsigned-$$i_$(release)-$(revision)_${arch}.deb 
+ ../linux-modules-$$i_$(release)-$(revision)_${arch}.deb 
+ ../linux-modules-extra-$$i_$(release)-$(revision)_${arch}.deb; 
+ do 
+ [ -f $$f ] && dpkg -x $$f debian/d-i-$[arch]; 
+ done; 
+ /sbin/depmod -b debian/d-i-$[arch] $$i; 
+ done
+
+ # kernel-wedge will error if no modules unless this is touched
+ touch $(DEBIAN)/d-i/no-modules
+

touch $(CURDIR)/$(DEBIAN)/d-i/ignore-dups
+export KW_DEFCONFIG_DIR=$(CURDIR)/$(DEBIAN)/d-i &
+export KW_CONFIG_DIR=$(CURDIR)/$(DEBIAN)/d-i &
+export SOURCEDIR=$(CURDIR)/debian/d-i-${arch} &
+ kernel-wedge install-files $(release)-$(abinum) &
+ kernel-wedge check
+
+        # Build just the udebs
+dilist=$$(dh_listpackages -s | grep "^-di$$") &
+[ -z "dilist" ] ||
+for i in $$dilist; do
+  dh_fixperms -p$$i;
+  $(lockme) dh_gencontrol -p$$i;
+  dh_builddeb -p$$i;
+done
+
+        # Generate the meta-udeb dependancy lists.
+@gawk "
+ /*Package:/
+  package=$$2; flavour=""; parch="" \n
+  /*Package-Type: udeb/ && package !~ /^$(linux_udeb_name)-udebs-/) { \
+    match(package, "^$(release)-$(abinum)\-.*(\-di\)?", bits)
+    +flavour = bits[1];
+    }
+    (^Architecture:/ && $$0 " " ~ /'$(arch)'/) {
+      parch=$$0;
+    }
+    (flavour != "" && parch != "") { \
+      udebs[flavour] = udebs[flavour] package ", ";
+      +flavour=""; parch="";
+    }
+  }
+  END { \
+    for (flavour in udebs) {
+      package="$(linux_udeb_name)-udebs-" flavour; 
+      file="debian/" package ".substvars";
+      print("udeb:Depends= udebs[flavour]) > file;
+      metas="$(builddir)/udeb-meta-packages";
+      print(package) > metas
+    }
+  }
+  */\n+for (flavour in udebs) {
+  package="$\{linux_udeb_name\}-udebs-" flavour;
+  file="debian/" package ".substvars";
+  print("udeb:Depends= udebs[flavour]) > file;
+  metas="$(builddir)/udeb-meta-packages";
+  print(package) > metas
+}
+@
+<$(CURDIR)/debian/control
+@while read i; do
+  $(lockme) dh_gencontrol -p$$i;
+  dh_builddeb -p$$i;
+done <$(builddir)/udeb-meta-packages
--- linux-4.15.0.orig/debian/scripts/abi-check
+++ linux-4.15.0/debian/scripts/abi-check
@@ -0,0 +1,210 @@
+#!/usr/bin/perl -w
+
+my $flavour = shift;
+my $prev_abinum = shift;
+my $abinum = shift;
+my $prev_abidir = shift;
+my $abidir = shift;
+my $skipabi = shift;
+
+my $fail_exit = 1;
+my $EE = "EE:";
+my $errors = 0;
+my $abiskip = 0;
+
+my $count;
+
+print "II: Checking ABI for $flavour...
";
+
+if (-f "$prev_abidir/ignore"
+ or -f "$prev_abidir/$flavour.ignore" or "$skipabi" eq "true") {
+print "WW: Explicitly asked to ignore ABI, running in no-fail mode\n";
+$fail_exit = 0;
+$abiskip = 1;
+$EE = "WW:";
+
+
+if ($prev_abinum != $abinum) {
+print "II: Different ABI's, running in no-fail mode\n";
+$fail_exit = 0;
+$EE = "WW:";
+
+
+if (not -f "$abidir/$flavour" or not -f "$prev_abidir/$flavour") {
+print "EE: Previous or current ABI file missing\n";
+
+
+print "  $abidir/$flavour\n" if not -f "$abidir/$flavour";
+print "  $prev_abidir/$flavour\n" if not -f "$prev_abidir/$flavour";
+
+
+# Exit if the ABI files are missing, but return status based on whether
+# skip ABI was indicated.
+if ("$abiskip" eq "1") {
+exit(0);
+} else {
+exit(1);
+}
+
+
+my %symbols;
+my %symbols_ignore;
+my %modules_ignore;
+my %module_syms;
+
+# See if we have any ignores
+my $ignore = 0;
+
+print " Reading symbols/modules to ignore...";
+
+for $file ("$prev_abidir/../blacklist", "$prev_abidir/../../perm-blacklist") {
+if (-f $file) {
+open(IGNORE, "< $file") or
+die "Could not open $file";
+while (<IGNORE>) {
+chomp;
+if ($_ =~ m/M: (.*)/) {
+$modules_ignore{$1} = 1;
+} else {
+$symbols_ignore{$_} = 1;
+}
+$ignore++;
+}
+close(IGNORE);
+}
+
+sub is_ignored($$) {
+my ($mod, $sym) = @_; 
+
+die "Missing module name in is_ignored()" if not defined($mod);
+die "Missing symbol name in is_ignored()" if not defined($sym);
+
+if (defined($symbols_ignore{$sym}) or defined($modules_ignore{$mod})) {
+return 1;
+}
+return 0;
+}
+
+# Read new syms first
+
+print " Reading new symbols ($abinum)...";
+$count = 0;
+
+open(NEW, "< $abidir/$flavour") or
+die "Could not open $abidir/$flavour";
+while (<NEW>) {
+chomp;
+my ($mod, $sym) =~ /\S+\s+(.+)\s+(0x[0-9a-f]+)\s+(.+)$/;
+$symbols{$_}{’type’} = $1;
+$symbols{$_}{’loc’} = $2;
+$symbols{$_}{’hash’} = $3;
+$module_sym$s{2} = 0;
+$count++;
+
+close(NEW);
+print "read $count symbols\n";
+
+# Now the old symbols, checking for missing ones
+print "    Reading old symbols ($prev_abinum)...";
+$count = 0;
+open(OLD, "< $prev_abidir/$flavour") or
+die "Could not open $prev_abidir/$flavour";
+while (<OLD>) {
+chomp;
+my/^(S+)s(.+)s(0x[0-9a-f]+)s(.+)$/;
+$symbols{$4}{'old_type'} = $1;
+$symbols{$4}{'old_loc'} = $2;
+$symbols{$4}{'old_hash'} = $3;
+$count++;
+
+close(OLD);
+
+print "read $count symbols\n";
+
+print "II: Checking for missing symbols in new ABI...";
+$count = 0;
+foreach $sym (keys(%symbols)) {
+if (!defined($symbols{$sym}{'type'})) {
+print "\n" if not $count;
+printf("MISS : %s\n", $sym,
+is_ignored($symbols{$sym}{'old_loc'}, $sym) ? " (ignored)" : "";
+$count++ if !is_ignored($symbols{$sym}{'old_loc'}, $sym);
+
+print "    " if $count;
+print "found $count missing symbols\n";
+if ($count) {
+print "$EE Symbols gone missing (what did you do!?!)\n";
+$errors++;
+
+}
+
+print "II: Checking for new symbols in new ABI...";
+$count = 0;
+foreach $sym (keys(%symbols)) {
+if (!defined($symbols{$sym}{'old_type'})) {
+print "\n" if not $count;
+print "    NEW : $sym\n";
+$count++;
+}
+} +
+print "    " if $count;
+print "found $count new symbols\n";
+if ($count and $prev_abinum == $abinum) {
+print "WW: Found new symbols within same ABI. Not recommended\n";
+
+print "II: Checking for changes to ABI...\n";
+$count = 0;
+my $moved = 0;
+my $changed_type = 0;
+my $changed_hash = 0;
+foreach $sym (keys(%symbols)) {
+if (!defined($symbols{$sym}{'old_type'}) or
+    !defined($symbols{$sym}{'type'})) {
+    next;
+
+    # Changes in location don't hurt us, but log it anyway
+    if ($symbols{$sym}{'loc'} ne $symbols{$sym}{'old_loc'}) {
+        printf("    MOVE : %-40s : %s => %s\n", $sym,
+            $symbols{$sym}{'old_loc'},
+            $symbols{$sym}{'loc'});
+        $moved++;
+
+    # Changes to export type are only bad if new type isn't
+    EXPORT_SYMBOL. Changing things to GPL are bad.
+    if ($symbols{$sym}{'type'} ne $symbols{$sym}{'old_type'}) {
+        printf("    TYPE : %-40s : %s => %s%s\n", $sym,
+            $symbols{$sym}{'old_type'},
+            $symbols{$sym}{'type'}, is_ignored($symbols{$sym}{'loc'}, $sym)
+                ? " (ignored)" : ");
+        $changed_type++ if $symbols{$sym}{'type'} ne "EXPORT_SYMBOL"
+            and !is_ignored($symbols{$sym}{'loc'}, $sym);
+
+    # Changes to the hash are always bad
+    if ($symbols{$sym}{'hash'} ne $symbols{$sym}{'old_hash'}) {
+        printf("    HASH : %-40s : %s => %s%s\n", $sym,
+            $symbols{$sym}{'old_hash'},
+            $symbols{$sym}{'hash'}, is_ignored($symbols{$sym}{'loc'}, $sym)
+                ? " (ignored)" : ");
+        $changed_hash++ if !is_ignored($symbols{$sym}{'loc'}, $sym);
+        $module_syms{$symbols{$sym}{'loc'}}++;
+
+    } +
+    +
+    +print "WW: $moved symbols changed location\n" if $moved;
+    +print "SEE $changed_type symbols changed export type and weren't ignored\n" if $changed_type;
+$print "$EE $changed_hash symbols changed hash and weren't ignored\n" if $changed_hash;
+
+$errors++ if $changed_hash or $changed_type;
+if ($changed_hash) {
+print "II: Module hash change summary...\n";
+foreach $mod (sort { $module_syms{$b} <=> $module_syms{$a} } keys %module_syms) {
+next if ! $module_syms{$mod};
+printf(" %.-40s: %d\n", $mod, $module_syms{$mod});
+}
+
+print "II: Done\n";
+
+if ($errors) {
+exit($fail_exit);
+} else {
+exit(0);
+
--- linux-4.15.0.orig/debian/scripts/build-fit
+++ linux-4.15.0/debian/scripts/build-fit
@@ -0,0 +1,40 @@
+#!/bin/sh -e
+## Creates a FIT image
+## $1: ITS file (FIT components description)
+## $2: list of space-separated dtb files
+## $3: kernel version
+## $4: kernel modules directory
+## $5: destination directory
++
+. debian/debian.env
+
+echo "Creating FIT image"
+fit_its="$1"
+dtb_files="$2"
+KERNEL_VERSION="$3"
+KERNEL_MODULES_D="$4"
+dest_d="$5"
+
+set -x
+fit_d=$dest_d
+mkdir -p "$fit_d"
+## Export variables to be used by hooks
+export KERNEL_VERSION
+export KERNEL_MODULES_D
+initrd_f=initrd.img
+mknitramfs -o "$initrd_f"
+mv "$initrd_f" "$fit_d"
+
+mkdir -p "$fit_d"/dtbs/
+for dtb in $dtb_files; do
+    cp -f "$dtb" "$fit_d"/dtbs/
+done
+
+cp -f "$dest_d"/vmlinuz-* "$fit_d"/zImage
+cp -f "$fit_its" "$fit_d"
+
+cd "$fit_d"
+mkimage -D "-I dts -O dtb -p 2000" -f "${fit_its##*/}" fit-"${KERNEL_VERSION}".fit
+cd -
+
+rm -rf "$fit_d"/$initrd_f "$fit_d"/dtbs/ "$fit_d"/zImage "${fit_its##*/}"}

--- linux-4.15.0.orig/debian/scripts/config-check
+++ linux-4.15.0/debian/scripts/config-check
@@ -0,0 +1,159 @@
+#!/usr/bin/perl
+
+use strict;
+use File::Basename;
+use File::Spec;
+
+my $P = 'check-config';
+
+my $test = -1;
+if ($ARGV[0] eq '--test') {
+    $test = $ARGV[1] + 0;
+} elsif ($#ARGV != 4) {
+    die "Usage: $P <config> <arch> <flavour> <commonconfig> <warn-only>\n";
+}
+
+my ($configfile, $arch, $flavour, $commonconfig, $warn_only) = @ARGV;
+
+my %values = ();
+
+# If we are in overridden then still perform the checks and emit the messages
+# but do not return failure. Those items marked FATAL will alway trigger
+# failure.
+my $fail_exit = 1;
+$fail_exit = 0 if ($warn_only eq 'true' || $warn_only eq '1');
+my $exit_val = 0;
+
+# Load up the current configuration values -- FATAL if this fails
+print "SP: $configfile: loading config\n";
+open(CONFIG, "<$configfile") || die "SP: $configfile: open failed -- $! -- aborting\n";
+while (<CONFIG>) {

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+/# Pull out values.
+/#+([^#]*)(CONFIG_\w+)[\s=][\(\)*]$ or next;
+if ($2 eq 'is not set') {
+#values{$1} = 'n';
+} else {
+#values{$1} = $2;
+}
+}
+close(CONFIG);
+
+sub read_annotations {
+    my ($filename) = @_;
+    my %annot;
+    my $form = 1;
+    my ($config, $value, $options);
+
+    # Keep track of the configs that shouldn't be appended because
+    # they were include_annot from another annotations file.
+    # That's a hash of undefs, aka a set.
+    my %noappend;
+    
+    print "$P: $filename loading annotations\n";
+    open(my $fd, "<$filename") ||
+    die "$P: $filename: open failed -- $! -- aborting\n";
+    while (<$fd>) {
+        if (/^# FORMAT: \(\S+\)/) {
+            die "$P: $1: unknown annotations format\n" if ($1 != 2 && $1 != 3);
+            $form = $1;
+        }
+
+        # Format #3 adds the include directive on top of format #2:
+        if ($form == 3 && /\(\^\s*include\(\s|$\)/) {
+            # Include quoted or unquoted files:
+            if (/\(\^\s*include\s+"(.*)"\s*$/ || /\(\^\s*include\s+(.*)$/) {
+                # The include is relative to the current file
+                my $include_filename = File::Spec->joindirname($filename), $1);
+                # Append the include files
+                my %include_annot = read_annotations($include_filename);
+                %annot = ( %annot, %include_annot );
+                # And marked them to not be appended:
+                %noappend = ( %noappend, %included_noappend );
+            }
+            die "$P: Invalid include: "$_;
+        }
+    }
+}
+
+/^#/ && next;
+chomp;
+/^$/ && next;
+/^CONFIG_/ || next;
+
+if ($form == 1) {
+ ($config, $value, $options) = split(' ', $_, 3);
+} elsif ($form >= 2) {
+ ($config, $options) = split(' ', $_, 2);
+}
+
+if (exists $noappend{$config}) {
+ delete $annot{$config};
+ delete $noappend{$config};
+}
+$annot{$config} = $annot{$config} . ' ' . $options;
+ }
+ close($fd);
+ return %annot;
+}
+
+# ANNOTATIONS: check any annotations marked for enforcement
+my $annotations = "$commonconfig/annotations";
+my %annot = read_annotations($annotations);
+
+my $pass = 0;
+my $total = 0;
+my ($config, $value, $options, $option, $check, $policy);
+for $config (keys %annot) {
+$check = 0;
+$options = $annot{$config};
+
+$policy = undef;
+while ($options =~ /\s*([^\s<]+)<(.*?)?>/g) {
+($option, $value) = ($1, $2);
+
+if ($option eq 'mark' && $value eq 'ENFORCED') {
+$check = 1;
+
+} elsif ($option eq 'policy') {
+if ($value =~ /^{/) {
+$value =~ s/:/=>/g;
+$policy = eval($value);
+warn "$config: $@" if ($@);
+} else {
+$policy = undef;

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+}
+
+if ($check == 1 && !defined($policy)) {
+print "$P: INVALID POLICY (use policy<...>) $config$options";
+}$total++;
+$check = 0;
+}
+if ($check) {
+my $is = '-';
+$is = $values{$config} if (defined $values{$config});
+
+my $value = '-';
+for my $which (' arch-$flavour", "$arch-", "*-$flavour", "$arch", "*") {
+if (defined $policy->[$which]) {
+$value = $policy->[$which];
+last;
+}
+}
+if ($is eq $value) {
+$pass++;
+} else {
+print "$P: FAIL ($is != $value): $config$options";
+$exit_val = $fail_exit;
+}
+$total++;
+}
+
+print "$P: $pass/$total checks passed -- exit $exit_val
";
+exit $exit_val;
--- linux-4.15.0.orig/debian/scripts/control-create
+++ linux-4.15.0/debian/scripts/control-create
@@ -0,0 +1,38 @@
+#!/bin/bash
+
+. debian/debian.env
+
+vars=$1
+any_signed=$2
+
+. $vars
+
+if [ "$is_sub" = "" ]; then
+flavour=$(basename $vars | sed 's/[^/]/\//g')
+stub="$DEBIAN/control.d/flavour-control.stub debian/control.d/flavour-buildinfo.stub"
+if [ "$any_signed" = 'true' ]; then
+sign_me_pkg="-unsigned"
+sign_me_txt=" unsigned"
+sign_peer_pkg=""
+else
+sign_me_pkg=""
+sign_me_txt=""
+sign_peer_pkg="-unsigned"
+fi
+else
+flavour=\$(basename $vars .vars)
+stub=\${DEBIAN}/sub-flavours/control.stub
+fi
+
cat $stub | grep -v '^#' | sed \n+e "s#FLAVOUR#$flavour#g"
+e "s#DESC#$desc#g"
+e "s#ARCH#$arch#g"
+e "s#SUPPORTED#$supported#g"
+e "s#TARGET#$target#g"
+e "s#BOOTLOADER#$bootloader#g"
+e "s#PROVIDES=#$provides#g"
+e "s#CONFLICTS=#$conflicts#g"
+e "s#SIGN-ME-PKG=#$sign_me_pkg#g"
+e "s#SIGN-ME-TXT=#$sign_me_txt#g"
+e "s#SIGN-PEER-PKG=#$sign_peer_pkg#g"
--- linux-4.15.0.orig/debian/scripts/dkms-build
+++ linux-4.15.0/debian/scripts/dkms-build
@@ -0,0 +1,259 @@
+#!/bin/bash
+set -e
+
+dkms_dir="$1"
+abi_flavour="$2"
+sign="$3"
+pkgname="$4"
+pkgdir="$5"
+dbgpkgdir="$6"
+package="$7"
+shift 7
+
+here=\$(dirname "$(readlink -f "$0")")
+
+sourcedir=\$(pwd)
+cd "$dkms_dir" || exit 1
+
+built_using_record()
+{
+local subst="$1"
+local built_using="$2"
+if [ ! -f "$subst" ]; then
+touch "$subst"
+fi
+if ! grep -q -s "^linux:BuiltUsing=" "$subst"; then
+echo "linux:BuiltUsing=" >>"$subst"
+fi
+sed -i -e "s/(linux:BuiltUsing=.*\$built_using, /" "$subst"
+}
+
+# ABI: returns present in $? and located path in lpackage_path when found.
+package_present()
+
+for lpackage_path in "$1"_*.deb
+do
+break
+done
+[
+   -f "$lpackage_path"
+]
+
+# Download and extract the DKMS package -- note there may be more
+# than one package to install.
+for package_path in "$@"
+do
+package_file=$(basename "$package_path")
+echo "II: dkms-build downloading $package ($package_file)"
+rpackage=$( echo "$package_path" | sed -e 's@.*/@@' -e 's_.*@@' )
+lpackage=$( echo "$rpackage" | sed -e 's@=.*@@' )
+while true
+do
+if package_present "$lpackage"; then
+break
+fi
+case "$package_path" in
+pool/*)
+ Attempt download from the launchpad librarian first.
+"here/file-downloader" "https://launchpad.net/ubuntu/+archive/primary/+files/$package_file" || true
+if package_present "$lpackage"; then
+break
+fi
+ +# Download from the available pools.
+for pool in $( grep -h "^deb " /etc/apt/sources.list /etc/apt/sources.list.d/* | awk '{print $2}' | sort -u )
+do
+if package_present "$lpackage"; then
+break
+fi
+url="$pool/$package_path"
"$here/file-downloader" "$url" && break || true
+# No components in PPAs.
+url=$(echo "$url" | sed -e 's@/pool/[^/]*@/pool/main/@')
"$here/file-downloader" "$package_path"
+;
+*/
+cp -p "$package_path" .
+;
+)*
+apt-get download "$package"
+:
+esac
+break
+done
+if ! package_present "$lpackage"; then
+echo "EE: $lpackage not found"
+exit 1
+fi
+
+dpkg -x "$lpackage"_*.deb "$package"
+
+lversion=$( echo "$lpackage_path" | sed -e 's@.*/@@' -e 's@_[^_]*$@@' -e 's@.*_@@')
+#built_using_record "$srcdir/debian/$pkgname.substvars" "$built_using$lpackage (= $lversion)"
+done
+
+# Pick out the package/version from the dkms.conf.
+for dkms_conf in "$package/usr/src"/*/*dkms.conf"
+do
+break
+done
+
+# It seems some packages have a # in the name which works fine if the
+# package is installed directly, but not so much if we build it out
+# of the normal location.
+sed -i -e '/^PACKAGE_NAME=/ s/#//g' "$dkms_conf"
+
+# Run any dkms-package specific configuration steps
+dkms_config_specific="$srcdir/$0-configure--$package"
+dkms_config_generic=$(echo "$dkms_config_specific" | sed -e 's/-[0-9][0-9]*/-N/')
+for dkms_config in "$dkms_config_specific" "$dkms_config_generic"
+do
+if [ -z "$dkms_config" -o ! -e "$dkms_config" ]; then
+continue
+fi

+echo "II: dkms-build-configure $(basename "$dkms_config") found, executing" 
+SHELL "$dkms_config" \ 
+"Ssrcdir" \ 
+"Sdkms_conf" \ 
+"Sdkms_dir" \ 
+"Sab_flavour" \ 
+"Ssign" \ 
+"Spkgname" \ 
+"Spkgdir" \ 
+"Sdbgpkgdir" \ 
+"Spackage" \ 
+"S@" || exit 1 
+break 
+done 
+
cat - <<'EOF' >>"$dkms_conf" 
+POST_BUILD="ubuntu-save-objects $dkms_tree/$PACKAGE_NAME/$PACKAGE_VERSION/build 
$dkms_tree/$PACKAGE_NAME/$PACKAGE_VERSION/objects $POST_BUILD" 
+EOF 
+ubuntu_script="$(dirname "$dkms_conf")/ubuntu-save-objects" 
+cat - <<'EOF' >"$ubuntu_script" 
+#!/bin/sh 
+from="$1" 
+to="$2" 
+script="$3" 
+shift 2 
+ 
+## Copy the objects. 
+echo "II: copying objects to '$to'" 
+mkdir -p "$to" 
+(cd "$from" && find -name ".*.o -o -name ".*.o.ur-" | cpio -Lpd "$to") 
+ 
+## Call the original post_install script if there is one. 
+[ "$script" = "" ] && exit 0 
+ 
+shift 
+exec "$dirname "$0" "$script" "$@" 
+EOF 
+chmod +x "$ubuntu_script" 
+dkms_package=$( sed -ne 's/PACKAGE_NAME="(.*)"/\1/p' "$dkms_conf" ) 
+dkms_version=$( sed -ne 's/PACKAGE_VERSION="(.*)"/\1/p' "$dkms_conf" ) 
+ 
+## Build the DKMS binaries. 
+echo "II: dkms-build building $package" 
+rc=0 
+;/usr/sbin/dkms build --no-prepare-kernel --no-clean-kernel \ 
+\ -k "Sab_flavour" \ 
+-source $dkms_dir/source" 

+-dkmstree "$dkms_dir/build"
+-kernelsourcedir "$dkms_dir/headers/linux-headers-$abi_flavour"
+"$dkms_conf" || rc=1
+
+# Find the log and add it to our own.
+for log in "$dkms_dir/build/$dkms_package/$dkms_version/$abi_flavour"/"log"/*"log"
+"$dkms_dir/build/$dkms_package/$dkms_version/build/make.log"
+do
+  	[ -f "$log" ] && break
+done
+sed -e "s@$dkms_dir@<<DKMSDIR>>@g" <"$log"
+
+# This build failed then exit here.
+[ "$rc" != 0 ] && exit "$rc"
+
+# Install the modules with debug symbols we possibly built,
+# and strip the original modules for the next install step.
+if [ -n "$dbgpkgdir" ]; then
+  dbgpkgdir="$dbgpkgdir/$package"
+  echo "II: dkms-build installing $package into $dbgpkgdir (debug symbols)"
+  install -d "$dbgpkgdir"
+  find "$dkms_dir/build/$dkms_package/$dkms_version/$abi_version" -name ".*.ko" |
+    while read module; do
+      vmodule=$( basename "$module" )
+      # Check for ".debug_info" section in order to copy module.
+      # Useful if debug symbols are requested but not built for
+      # any reason (including not yet supported by DKMS package).
+      # Strip module just in case even if section isn't present.
+      if $(CROSS_COMPILE)objdump -h -j ".debug_info" "$module" >/dev/null 2>&1
+        then
+          echo "copying $vmodule"
+          cp "$module" "$dbgpkgdir"
+        else
+          echo "ignoring $vmodule (missing debug symbols)"
+        fi
+    done
+fi
+
+# Just `strip -g` as `/usr/sbin/dkms` does.
+echo "stripping $vmodule"
+strip -g "$module"
+done
+fi
+
+# Install and optionally sign the modules we have built.
+pkgdir="$pkgdir/$package"
+echo "II: dkms-build installing $package into $pkgdir"
+install -d "$pkgdir"
+find "$dkms_dir/build/$dkms_package/$dkms_version/$abi_version" -name ".*.ko" |
+while read module; do
+  vmodule=$( basename "$module" )
+  case "$sign" in
+    --*)
+    
+      echo "copying $vmodule"
+      cp "$module" "$pkgdir"
+    
+    ;;
+    *)
+    
+      echo "signing $vmodule"
+      $sign "$module" "$pkgdir/$vmodule"
+    
+    esac
+  done
+
+find "$dkms_dir/build/$dkms_package/$dkms_version/objects" -name *.o -print | 
+while read object
+do
+  "$srcdir/debian/scripts/fix-filenames" "$object" "$dkms_dir"
+done
+
+## Finally see if there is a dkms-package specific post processor present.  Hand
+## it the original source directory, destination package directory, the objects
+## as squirreled away, and the log in case it is useful.  Finally pass a formed
+## signing command line in case we need to do that.
+dkms_build_specific="$srcdir/$0--$package"
+dkms_build_generic=$(echo "$dkms_build_specific" | sed -n -e 's/-[0-9][0-9]*[a-z]*$/-N/p')
+for dkms_build in "$dkms_build_specific" "$dkms_build_generic"
+do
+  if [ -z "$dkms_build" -o ! -e "$dkms_build" ]; then
+    continue
+  fi
+  echo "II: dkms-build override $(basename "$dkms_build") found, executing"
+  "$SHELL" "$dkms_build" \
+  "$srcdir" \
+  "$dkms_dir/build/$dkms_package/$dkms_version/objects" \
+  "$log" \
+  "$dkms_dir" \
+  "$Sabi_flavour" \
+  "$sign" \
+  "$Spkgnname" \
+  "$Spkgdir" \
+  "$dbgpkgdir" \
+  "$Package" \
+  "$@" || exit 1
+  break
+done
+
+echo "II: dkms-build build $package complete"
--- linux-4.15.0.orig/debian/scripts/dkms-build--nvidia-N
+++ linux-4.15.0/debian/scripts/dkms-build--nvidia-N
@@ -0,0 +1,112 @@
+#!/bin/sh
+
+srcdir="$1"
+objects="$2"
+log="$3"
+shift 3
+
+dkms_dir="$1"
+abi_flavour="$2"
+sign="$3"
+pkgname="$4"
+pkgdir="$5"
+dbgpkgdir="$6"
+package="$7"
+shift 7
+
+build="$( dirname "$objects" )/build"
+
+# Copy over the objects ready for reconstruction. The objects copy contains
+# the *.o files and the *.o-ur* retpoline files to allow the kernel to track
+# any retpoline sequences therein. For our purposes we only want the *.o
+# files, elide the rest.
+mkdir -p "$pkgdir/bits/scripts"
+(
+gcc_variant1=$(gcc --version | head -1 | sed -e 's/^gcc/GCC:/')
+gcc_variant2=$(gcc --version | head -1 | sed -e 's/^\(gcc\) \((.*)\) \(.*\)$/\1 version \3 \2/')
+cd "$objects" || exit 1
+find -name \*.o | \
+while read file
+do
+cp --parents "$file" "$pkgdir/bits"
+"$srcdir/debian/scripts/fix-filenames" "$pkgdir/bits/$file" "$gcc_variant1"
+"$srcdir/debian/scripts/fix-filenames" "$pkgdir/bits/$file" "$gcc_variant2"
+done
+)
+
+# Install the support files we need.
+echo "II: copying support files ..."
+for lds_src in \
+"$dkms_dir/headers/linux-headers-$abi_flavour/scripts/module.lds" \
+"/usr/src/linux-headers-$abi_flavour/scripts/module.lds" \
+"$dkms_dir/headers/linux-headers-$abi_flavour/scripts/module-common.lds" \
+"/usr/src/linux-headers-$abi_flavour/scripts/module-common.lds"
+do
+[ ! -f "$lds_src" ] && continue

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+echo "II: copying support files ... found $lds_src"
+cp "$lds_src" "$pkgdir/bits/scripts"
+break
+done
+
+# Build helper scripts.
+cat - <<'EOL' >"$pkgdir/bits/BUILD"
+{ "$1" = "unsigned" } && { signed_only=; shift; }
+{ "$1" = "nocheck" } && { check_only=; shift; }
+EOL
+grep /usr/bin/ld.bfd "$log" | grep -v scripts/genksyms/genksyms | sed -e "s@$build/@@g"
>>"$pkgdir/bits/BUILD"
+sed -e 's/.*/tools/"$pkgdir/bits/BUILD" >"$pkgdir/bits/CLEAN"
+
+# As the builds contain the absolute filenames as used. Use RECONSTRUCT to
+# rebuild the .ko's, sign them, pull off the signatures and then finally clean
+# up again.
+
+( cd "$pkgdir/bits" || exit 1
+
+# Add checksum check.
+echo "\Scheck_only sha256sum -c SHA256SUMS || exit 1" >>"$pkgdir/bits/BUILD"
+
+# Add .ko handling to the CLEAN/BUILD dance.
+for ko in "$pkgdir/*.ko"
+do
+ko=$(basename "$ko")
+echo "$signed_only cat '$ko' '$ko.sig' >'../$ko'" >>"$pkgdir/bits/BUILD"
+echo "$signed_only rm -f '$ko'" >>"$pkgdir/bits/BUILD"
+echo "rm -f '../$ko'" >>"$pkgdir/bits/CLEAN"
+done
+
+# Clear out anything we are not going to distribute and build unsigned .kos.
+sh ./CLEAN
+sh ./BUILD unsigned nocheck
+
+# We are building for and archive custom signing upload. Keep everything.
+: 
+elif [ "$sign" = "--custom" ]; then
+# We are in the LRM build; grab sha256 checksums and clean up.
+sha256sum -b *.ko >"SHA256SUMS"
+sh ./CLEAN
+
+else
+# We are in the main kernel, put the .kos together as we will
+# on the users machine, sign them, and keep just the signature.
+: >"SHA256SUMS"
+for ko in *.ko
+do
+echo "detached-signature $ko"
+$sign "$ko" "$ko.signed"
+length=$( stat --format %s "$ko" )
+dd if="$ko.signed" of="$ko.sig" bs=1 skip="$length" 2>/dev/null
+
+rm -f "$ko.signed"
+# Keep a checksum of the pre-signed object so we can check it is
+# built correctly in LRM.
+sha256sum -b "$ko" >>"SHA256SUMS"
+done
+
+# Clean out anything which not a signature.
+mv "$pkgdir/bits/"*.sig "$pkgdir"
+mv "$pkgdir/bits/SHA256SUMS" "$pkgdir"
+find "$pkgdir" -name \*.sig -prune -o -name SHA256SUMS -prune -o -type f -print | xargs rm -f
+find "$pkgdir" -depth -type d -print | xargs rmdir --ignore-fail-on-non-empty
+fi
+) || exit "$?"
--- linux-4.15.0.orig/debian/scripts/file-downloader
+++ linux-4.15.0/debian/scripts/file-downloader
@@ -0,0 +1,34 @@
+#!/bin/sh
+
+if [ "$#" -ne 1 ]; then
+echo "Usage: $0 <url>" 1>&2
+exit 1
+fi
+url="$1"
+
+to=$(basename "$url")
+
+count=0
+what='fetching'
+while :
+do
+if [ "$count" -eq 20 ]; then
+echo "EE: excessive redirects" 1>&2
+exit 1
+fi
+count=$(($count+1))
+
+echo "II: $what $url"
+
+curl --silent --fail --show-error "$url" -o "$to" -D "$to.hdr" || exit 1
+redirect=$(awk '/^Location: / {gsub(/^[[:space:]]+|[[:space:]]+$/,"",$2); print $2;}' "$to.hdr")
+[ -z "$redirect" ] && break

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+what=` following`
+
+url=$(echo "$redirect" | sed 's@https://launchpadlibrarian.net/@http://launchpadlibrarian.net/@')
+if [ "$redirect" != "$url" ]; then
+echo "II: fixing $redirect"
+fi
+done
+
+exit 0

--- linux-4.15.0.orig/debian/scripts/fix-filenames.c
+++ linux-4.15.0/debian/scripts/fix-filenames.c
@@ -0,0 +1,80 @@
+/*
+ * fix-filenames: find a specified pathname prefix and remove it from
+ *                C strings.
+ *
+ * Copyright (C) 2018 Canonical Ltd.
+ * Author: Andy Whitcroft <apw@canonical.com>
+ */
+#include <stdlib.h>
+#include <stdio.h>
+#include <errno.h>
+#include <fcntl.h>
+#include <string.h>
+#include <sys/mman.h>
+#include <sys/types.h>
+#include <sys/stat.h>
+#include <unistd.h>
+
+int
+main(int argc, char *argv[])
+{
+int rc;
+char *in_name;
+char *prefix;
+int prefix_len;
+int in_fd;
+struct stat in_info;
+char *in;
+off_t size;
+int length;
+
+if (argc != 3) {
+fprintf(stderr, "Usage: %s <file> <prefix>
", argv[0]);
+exit(1);
+}
+in_name = argv[1];
+prefix = argv[2];
prefix_len = strlen(prefix);
+
in_fd = open(in_name, O_RDWR);
+if (in_fd < 0) {
+perror("open input failed");
+exit(1);
+
+rc = fstat(in_fd, &in_info);
+if (rc < 0) {
+perror("fstat input failed");
+exit(1);
+
+size = in_info.st_size;
+
in = mmap((void *)0, size, PROT_READ|PROT_WRITE, MAP_SHARED, in_fd, (off_t)0);
+if (!in) {
+perror("mmap failed");
+exit(1);
+
+for (; size > 0; size--, in++) {
+if (*in != *prefix)
+continue;
+if (strncmp(in, prefix, prefix_len) != 0)
+continue;
+/* In the case of an exact match there is nothing to move. */
+if (in[prefix_len] == '0')
+length = 0;
+/* If this is a filename, strip the leading slash. */
+else if (in[prefix_len] == '/')
+length = strlen(in + prefix_len + 1) + 1;
+/* Otherwise just keep the suffix. */
+else
+length = strlen(in + prefix_len) + 1;
+
+/* Copy the suffix portion down to the start and clear
+ * the remainder of the space to 0.
+ */
+memmove(in, in + prefix_len + 1, length);
+memset(in + length, '\0', prefix_len);
+
--- linux-4.15.0.orig/debian/scripts/helpers/close
+++ linux-4.15.0/debian/scripts/helpers/close
@@ -0,0 +1,195 @@
+#!/bin/bash -eu
```bash
+export LC_ALL=C.UTF-8
+
+usage() {
+  cat << EOF
+  Usage: ${P:-$(basename "$0")} [-h|--help] [-d|--dry-run] [-c|--include-config] [-s|--skip-master] [-b BASE_VERSION]
+
+  Prepare the closing release commit. Include all the changelog entries
+  in the current release, including the changes from the base
+  kernel. Also close the changelog entry and check for config changes.
+
+  Optional arguments:
+    -d, --dry-run         Perform a trial run with no changes made
+                        printing the commands instead.
+    -c, --include-config  Include config changes in the closing commit.
+    -s, --skip-master     Skip master kernel changelog entries (used when
+                        bootstraping new kernels).
+    -b BASE_VERSION       For derivatives and backports, force the changelog
+                        entries to have the base version as provided (used
+                        when changing the base derivative version of a
+                        backport).
+    -h, --help            Show this help message and exit.
+
+Examples:
+  Simply close a release:
+    \$ cranky close
+
+  Also include any config changes to the closing commit:
+    \$ cranky close -c
+
+EOF
+
+dry_run=0
+commit_configs=0
+skip_master_entries=0
+base_version=
+while [ "$#" -gt 0 ]; do
+  case "$1" in
+    -h|--help)
+      usage
+      exit 0
+      ;;
+    -d|--dry-run)
+      dry_run=1
+      ;;
+    -c|--include-config)
+      commit_configs=1
```
+-s|--skip-master)
+skip_master_entries=1
+-b)
+shift
+base_version="$1"
+-*
+usage
+exit 1
+-esac
+shift
+done
+
+hl() { echo -e \"\e[1m$*\e[0m\"; }
+
+run() {
  +# Quote args for echo or eval
  +local quoted=()
  +for token; do
  +  quoted+==($(printf '%q' "$token") )
  +done
  +# Run
  +if [ "$dry_run" -eq 1 ]; then
  +  hl "DRY RUN: ${quoted[*]}"
  +else
  +  hl "${quoted[*]}""
  +"$@
  +echo
  +fi
  +}
+
  +# Trick shellcheck so it doesn't complain every time it's necessary to
  +# use `run SCROOT`. Use `chroot_run` instead.
  +shopt -s expand_aliases
  +alias chroot_run='run ${CHROOT:-}'
  +DEBIAN=
  +# shellcheck disable=SC1091
  +. debian/debian.env
  +
  +# Check if the "$DEBIAN" directory exists.
  +if [ ! -d "$DEBIAN" ]; then
  +  echo "You must run this script from the top directory of this repository."
  +  exit 1
  +fi
+CONF=$DEBIAN/etc/update.conf
+if [ -f "CONF" ]; then
+  +shellcheck disable=SC1090
+  +"CONF"
+fi
+
+  #=> Check if changelog is open
+series=$(dpkg-parsechangelog -l"$DEBIAN/changelog" -SDistribution)
+if [ "$series" != 'UNRELEASED' ]; then
+  echo "The last entry of the changelog is already released."
+  exit 1
+fi
+
+  #=> Update configs
+if [ -d "$DEBIAN/config" ]; then
+  chroot_run fakeroot debian/rules clean updateconfigs
+  changes=$(git diff HEAD -- "./$DEBIAN/config")
+  if [ "$commit_configs" -eq 0 ] && [ -n "$changes" ]; then
+    echo "Config has changed! please, review it and commit."
+    exit 1
+  fi
+  fi
+
+  #=> For normal trees the fact that the update.conf file exists means that they are rebase
+  #=> kernels. There are some special trees which started with uc20-efi, which have that
+  #=> file because they logically depend on another source but do not have the directory
+  #=> which DEBIAN_MASTER points to.
+  #=> Skip inserting parent source entries if this is not a rebase tree.
+if [ ! -f "$DEBIAN/etc/update.conf" ]; then
+  skip_master_entries=1
+elif [ "$DEBIAN_MASTER" != "" -a ! -d "$DEBIAN_MASTER" ]; then
+  skip_master_entries=1
+fi
+if [ $skip_master_entries == 0 ]; then
+  if [ "$DEBIAN_MASTER" = "" ]; then
+    echo "DEBIAN_MASTER should be defined either in $DEBIAN/etc/update.conf or the environment"
+    exit 1
+  fi
+
+  if [ -z "$base_version" ]; then
+    offset=0
+    if [ -z "$offset" ]; then
+      offset=0
+    fi
+    while true; do
+      changes=$(dpkg-parsechangelog -l"$DEBIAN/changelog" -SChanges -c1 -o"$offset")
+      if [ "$changes" ]; then

+prefix="Ubuntu$(echo "$package" | sed -r 's/linux(-?)/\1/')"+
+version=$(dpkg-parsechangelog -l"$DEBIAN/changelog" -SVVersion)
+run git commit -sam "UBUNTU: $prefixVERSION"
--- linux-4.15.0.orig/debian/scripts/helpers/open
+++ linux-4.15.0/debian/scripts/helpers/open
@@ -0,0 +1,233 @@
+#!/bin/bash -eu
+export LC_ALL=C.UTF-8
+
+out()
+{
+local rc=${?}
+
+trap - EXIT INT TERM HUP
+若有 "$rc" -eq 0 ] || echo "Error: Script failed" >&2
+新陈代谢 "$rc"
+
+hl() {
+echo -e "\e[1m$*\e[0m"
+
+
+run() {
+# Quote args for echo or eval
+local quoted=()
+for token; do
++quoted+=("$(printf '%q' "$token")")
+done
+done
+# Run
+if ├── "Sdry_run" -eq 1 ]; then
+hl "DRY RUN: ${quoted[*]}"
+else
+hl "${quoted[*]}"
+"$@
+echo
+fi
+
+usage() {
+cat << EOF
+Usage: ${P:-$(basename "$0")} [-h|--help] [-d|--dry-run] [-r|--reuse-abi]
+
+Create a "start new release" commit. The new commit will contain ABI
+changes and any customization required by backport kernels.
+
+Optional arguments:
+ -d, --dry-run      Perform a trial run with no changes made

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printing the commands instead.
- Do not download the previous release ABI files
- for the new release and just rename the
- current ABI directory. This might cause the
- build to fail if the module list or the
- retpoline information has changed.
- Show this help message and exit.

+ Environment variable:
+ CRANKY_MAILENFORCE Regular expression used to validate $DEBEMAIL. If not
+ set, it defaults to "@canonical.com$".

+ Examples:
+ Simply start a new release (that will fetch the ABI files from the
+ archive repositories):
+ $ cranky open
+
+ Start a new release re-using the ABI files already present in the
+ tree:
+ $ cranky open --reuse-abi
+
+EOF
+
+dry_run=0
+reuse_abi=0
+while [ $# -gt 0 ]; do
+case "$1" in
+-h|--help)
+usage
+exit 0
+;;
+-d|--dry-run)
+dry_run=1
+;;
+-r|--reuse-abi)
+reuse_abi=1
+;;
+*)
+usage
+exit 1
+;;
+esac
+shift
+done
+
+trap out EXIT INT TERM HUP
+

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Trick shellcheck so it doesn't complain every time it's necessary to use `run SCHROOT`. Use `chroot_run` instead.

```bash
+shopt -s expand_aliases
+alias chroot_run='run ${CHROOT:-}'

+# Check DEBEMAIL (used to create the new changelog stanza):
+DEBEMAIL="${DEBEMAIL:-}"
+CRANKY_MAILENFORCE="${CRANKY_MAILENFORCE:-@canonical.com}$"
+if [ -z "DEBEMAIL" ] || ! echo "$DEBEMAIL" | grep -qE "CRANKY_MAILENFORCE"; then
+echo "$DEBEMAIL is unset, or does not contain \"CRANKY_MAILENFORCE\": $DEBEMAIL\" >&2
+exit 1
+fi
+
+# Check the debian directory
+if [ ! -e debian/debian.env ]; then
+echo "Not a git repository!" >&2
+exit 1
+fi
+
+DEBIAN=
+## shellcheck disable=SC1091
+. debian/debian.env
+if [ -z "$DEBIAN" ] || [ ! -d "$DEBIAN" ]; then
+echo "Invalid DEBIAN directory: $DEBIAN" >&2
+exit 1
+fi
+
+## Abort if changes or untracked files are found in the debian directory (ie, in "debian/master"). cranky open is expected to change and commit files in this directory.
+if ! git diff-index --quiet HEAD -- "$DEBIAN/" ||
+[ -n "$(git ls-files --others -- "$DEBIAN/"""]; then
+echo "\"$DEBIAN\" is not clean!" >&2
+exit 1
+fi
+
+## Check changelog
+series=$(dpkg-parsechangelog -l"$DEBIAN/changelog" -SDistribution)
+if [ "$series" == 'UNRELEASED' ]; then
+echo "$DEBIAN/changelog is not closed!" >&2
+exit 1
+fi
+
+## Check DEBEMAIL (used to create the new changelog stanza):
+DEBEMAIL="${DEBEMAIL:-}"
+CRANKY_MAILENFORCE="${CRANKY_MAILENFORCE:-@canonical.com}$"
+if [ -z "DEBEMAIL" ] || ! echo "$DEBEMAIL" | grep -qE "CRANKY_MAILENFORCE"; then
+echo "$DEBEMAIL is unset, or does not contain \"CRANKY_MAILENFORCE\": $DEBEMAIL\" >&2
+exit 1
+fi
+
+## Check DEBEMAIL (used to create the new changelog stanza):
+DEBEMAIL="${DEBEMAIL:-}"
+CRANKY_MAILENFORCE="${CRANKY_MAILENFORCE:-@canonical.com}$"
+if [ -z "DEBEMAIL" ] || ! echo "$DEBEMAIL" | grep -qE "CRANKY_MAILENFORCE"; then
+echo "$DEBEMAIL is unset, or does not contain \"CRANKY_MAILENFORCE\": $DEBEMAIL\" >&2
+exit 1
+fi

```

Open Source Used In 5GaaS Edge AC-4 19662
## Load the info about derivative

```bash
+BACKPORT_SUFFIX=
+derivative_conf="$DEBIAN/etc/update.conf"
+if [ -f "$derivative_conf" ]; then
+    # shellcheck disable=SC1090
+    . "$derivative_conf"
+fi
```

## Run the update script used for backport kernels

```bash
+if [ -n "$BACKPORT_SUFFIX" ]; then
+    update_from_master_script="$DEBIAN/scripts/helpers/copy-files"
+    if [ ! -x "$update_from_master_script" ]; then
+        echo "Backport kernel is missing the"
+        echo ""$update_from_master_script" script!";
+        exit 1
+    fi
+
+    # The tree should be clean at this point, since that is enforced at
+    # the beginning of the script. Because of that, it's safe to git add
+    # "$DEBIAN/".
+    run env CHROOT="$CHROOT" "$update_from_master_script"
+    run git add "$DEBIAN"
+    # Update configs after the necessary files were copied from
+    # the base kernel. It's not expected that `fdr updateconfigs`
+    # will fail at this point, because the base kernel's
+    # configuration and annotations file are expected to be in a
+    # correct state. `fdr updateconfigs` should only change a few
+    # configuration options that depend on the userspace tooling
+    # version, such as gcc.
+    if ! chroot_run fakeroot debian/rules clean updateconfigs; then
+        echo "Failed to update configs. Please review the previous"
+        echo "rebase operation and "$update_from_master_script";"
+        exit 1
+    fi
+    run git add "$DEBIAN/config"
+fi
```

## fdr clean should be called after copy-files, that way we can git add
## any changes in "debian.<branch>/" (fdr clean` in trusty will
## usually generate changes in "debian.<branch>/"). Also, fdr clean
## removes an ABI that matches the current version in the
## changelog. Since `fdr startnewrelease` requires `fdr clean`, we need
## to call it before getabis.

```bash
+chroot_run fakeroot debian/rules clean
+
+## Update ABI
+if [ -d "$DEBIAN/abi" ]; then
+    # The new ABI directory should use the current version in the
+    # changelog since `fdr startnewrelease` was` called at this
```
#+ point yet:
+new=$(dpkg-parsechangelog -l"$DEBIAN/changelog" -SVersion)
+
+if [ "$reuse_abi" -ne 0 ]; then
+if [ -f "$DEBIAN/abi/version" ]; then
+#+ This is an unversioned ABI directory, so simply update the
+#+ version file
+echo "$new" > "$DEBIAN/abi/version"
+git add "$DEBIAN/abi/version"
+else
+#+ Get the old ABI directory:
+old=$(find "$DEBIAN/abi/" -mindepth 1 -maxdepth 1 -type d | \
+if [ -z "$(echo "$old" | wc -l)" ]; then
+echo "Failed to find the previous ABI directory." \ 
+ "Please check "$DEBIAN/abi/"!" >&2
+exit 1
+elif [ "$old" -gt 1 ]; then
+echo "Failed to rename the current ABI directory." \ 
+ "Multiple directories found. Please check "$DEBIAN/abi/"!" >&2
+exit 1
+fi
+new="$DEBIAN/abi/$new"
+## Rename the ABI directory
+run git mv "$old" "$new"
+fi
+else
+## Call in-tree getabis:
+## Use the single argument form since getabis is now
+## updated by cranky fix.
+run debian/scripts/misc/getabis "$new"
+## getabis already handles the necessary git add/rm calls.
+fi
+fi
+
+## Create the new changelog entry:
+run fakeroot debian/rules startnewrelease
+run git add "$DEBIAN/changelog"
+
+## Create the commit
+run git commit -s -F debian/commit-templates/newrelease
+
+## Mimic maint-startnewrelease
+"$dry_run" -eq 0 ] && \
+hl "\n**** Now please inspect the commit before pushing ******"
+
+exit 0
---
+++ linux-4.15.0/debian/scripts/helpers/rebase
@@ -0,0 +1,141 @@
+#!/bin/bash -e
+#
+ This script is intended as a helper when rebasing from its master branch.
+#
+LOCAL_BRANCH=
+RELEASE_REPO=
+SOURCE_RELEASE_BRANCH=
+
+function out()
+{
+ local rc="${?}"
+ trap - EXIT INT TERM HUP
+ [ "$rc" -eq 0 ] || echo "Error: Script failed"
+ exit "$rc"
+}
+
+trap out EXIT INT TERM HUP
+
+if [ -f debian/debian.env ]; then
+ # shellcheck disable=SC1091
+ . debian/debian.env
+fi
+
+if [ ! -d "${DEBIAN}" ]; then
+ echo You must run this script from the top directory of this repository.
+ exit 1
+fi
+
+CONF="${DEBIAN}/etc/update.conf"
+if [ -f "${CONF}" ]; then
+ # shellcheck disable=SC1090
+ . "${CONF}"
+fi
+
+usage="$0 [-r RELEASE_REPO] [-b REMOTE_BRANCH] [-l LOCAL_BRANCH] [-d]"$'
+usage="-r RELEASE_REPOGit repository to fetch the reference branch from."$'
+usage="-b REMOTE_BRANCHRemote branch to fetch from."$'
+usage="-l LOCAL_BRANCHUse LOCAL_BRANCH as the reference branch."$'
+usage="-d Dry run (do not rebase)."$
+
+# command line options:
+[-r RELEASE_REPO] - override default git repository.
+[-b REMOTE_BRANCH] - override default remote branch.
+[-l LOCAL_BRANCH] - do not fetch from remote repo, use a local branch.
while getopts "r:b:l:d" opt; do
    case $opt in
        r ) RELEASE_REPO="$OPTARG" ;;
        b ) SOURCE_RELEASE_BRANCH="$OPTARG" ;;
        l ) LOCAL_BRANCH="$OPTARG" ;;
        d ) DRY_RUN=1 ;;
        ? ) echo "usage: ${usage}"; exit ;;
esac
done
shift $((OPTIND - 1))

# For normal trees the fact that the update.conf file exists means that they are rebase
# kernels. There are some special trees which started with uc20-efi, which have that
# file because they logically depend on another source but do not have the directory
# which DEBIAN_MASTER points to.
IS_REBASE_KERNEL=true
if [ ! -f "$DEBIAN/etc/update.conf" ]; then
    IS_REBASE_KERNEL=false
elif [ "$DEBIAN_MASTER" != "" -a ! -d "$DEBIAN_MASTER" ]; then
    IS_REBASE_KERNEL=false
fi
if ! $IS_REBASE_KERNEL; then
    echo "This is not a rebase kernel, no rebase should be needed, please report if otherwise"
    exit 0
fi
if [ "$DEBIAN_MASTER" = "" ]; then
    echo "DEBIAN_MASTER should be defined either in ${DEBIAN}/etc/update.conf or the environment"
    exit 1
fi
if [ -z "${LOCAL_BRANCH}" ]; then
    if [ -z "${RELEASE_REPO}" ] || [ -z "${SOURCE_RELEASE_BRANCH}" ]; then
        echo Missing update.conf or missing parameters for remote repo and branch.
        exit 1
    fi
    # Fetch the upstream branch.
    #
    git fetch "$RELEASE_REPO"
    git fetch "$RELEASE_REPO" "$SOURCE_RELEASE_BRANCH"
    LOCAL_BRANCH=FETCH_HEAD
    fi
    #
    # Find the most recent tag on given upstream branch, then
    # rebase against it. This avoids the case where there have been some
+## commits since the last official tag.
+##
+MASTER_COMMIT=$(git log --pretty=one "${LOCAL_BRANCH}" "${DEBIAN_MASTER}" | \
+    awk’
+/Ubuntu-/ { 
+if (match($0, /UBUNTU: Ubuntu-/)) { 
+print $1
+exit
+    } 
+    } 
+    )
+
+MASTER_VERSION=$(git show --format=%s -s "$MASTER_COMMIT"
+    sed 's/^UBUNTU: //')
+
+BASE_COMMIT=$(git log --pretty=one "${DEBIAN_MASTER}" |
+    awk’
+/Ubuntu-/ { 
+if (match($0, /UBUNTU: Ubuntu-/)) { 
+print $1
+exit
+    } 
+    )
+
+BASE_VERSION=$(git show --format=%s -s "$BASE_COMMIT"
+    sed 's/^UBUNTU: //')
+
+if [ "$MASTER_COMMIT" = "$BASE_COMMIT" ]; then
+echo Already up to date.
+exit 0
+fi
+
+if [ -z "$MASTER_COMMIT" ] || [ -z "$BASE_COMMIT" ]; then
+echo "Could not find either master or base commit."
+echo "master commit: "$MASTER_COMMIT"
+echo "base commit: "$BASE_COMMIT"
+exit 1
+fi
+
+MASTER_VERSION=$(git show --format=%s -s "$MASTER_COMMIT"
    sed 's/^UBUNTU: //')
+BASE_VERSION=$(git show --format=%s -s "$BASE_COMMIT"
    sed 's/^UBUNTU: //')
+
+if [ "$DRY_RUN" ]; then
+echo "DRY RUN: git rebase --onto "$MASTER_COMMIT" "$BASE_COMMIT"
+exit 0
+fi
+
+git rebase --onto "$MASTER_COMMIT" "$BASE_COMMIT"
--- linux-4.15.0.orig/debian/scripts/link-headers
```bash
#!/bin/bash -e
.

debian/debian.env

dir="$1"
symdir="$2"
flavour="$3"

echo "Symlinking and copying headers for $flavour..."

ecludes="( -path ./debian -prune -o -path ./$DEBIAN -prune -o -path ./.git ) -prune -o"
(+
+((
+find . $excludes -type f | 
+\(-name 'Makefile*' -o -name 'Kconfig*' -o -name 'Kbuild*' -o -name '*.sh' -o -name '*.pl' -o -name '*.lds' \) -print 
+find ./include ./scripts -name .gitignore -prune -o -type f -print 
+find ./include -mindepth 1 -maxdepth 1 $excludes -type d -print 
+) )
while read file; do
dir=$file
lastdir=$file

if [ -e "$hdrdir/$file" -o -L "$hdrdir/$file" ]; then
continue
fi

to

while [ ! -e "$hdrdir/"$file" -o ! -L "$hdrdir/"$file" ]; do
dir=$file
done

if [ ! -L "$hdrdir/"$dir" ]; then
# Turns things like "/foo" into "../"
deref=""echo -n $lastdir | sed -e 's/\^/\^/ -e s/[/[/^/]*\^/\^/"" 
+item=""echo -n $lastdir | sed -e 's/\[/[/\]^/\""
+ln -s $deref$symdir/Sitem $hdrdir/Sitem
fi
done
)
exit
```
+debian="$1"
+abi="$2"
+abi=${abi%~*}
+
+. "$debian/etc/kernelconfig"
+
+fail=0
+
+failure()
+
+
+abi_check()
+
+
+local abidir="$1"
+local arch="$2"
+local flavour="$3"
+
+local abidir="$abidir/$arch"
+
+if [ ! -f "$abidir/$flavour" -a \
+    ! -f "$abidir/$flavour.ignore" -a \
+    ! -f "$abidir/ignore" ]
+then
+    failure "$arch/$flavour ABI symbol file missing"
+fi
+
+if [ ! -f "$abidir/$flavour.modules" -a \
+    ! -f "$abidir/$flavour.ignore.modules" -a \
+    ! -f "$abidir/ignore.modules" ]
+then
+    failure "$arch/$flavour ABI modules file missing"
+fi
+
+if [ ! -f "$abidir/$flavour.retpoline" -a \
+    ! -f "$abidir/$flavour.ignore.retpoline" -a \
+    ! -f "$abidir/ignore.retpoline" ]
+then
+    failure "$arch/$flavour ABI retpoline file missing"
+fi
+
+if [ -d debian/certs ]; then
+    if ! grep -q "^CONFIG_SYSTEM_TRUSTED_KEYS="debian/canonical-certs.pem"$"
+    $debian/config/config.common.ubuntu; then


+ failure "CONFIG_SYSTEM_TRUSTED_KEYS="debian/canonical-certs.pem"" is required"
+ fi
+fi
+
+if [ -d debian/revoked-certs ]; then
+ if ! grep -q "CONFIG_SYSTEM_REVOCATION_KEYS="debian/canonical-revoked-certs.pem""$'
$debian/config/config.common.ubuntu; then
+ failure "CONFIG_SYSTEM_REVOCATION_KEYS="debian/canonical-revoked-certs.pem"" is required"
+ fi
+fi
+
+for arch in $archs
+do
+if [ ! -f "$debian/rules.d/$arch.mk" ]; then
+continue
+fi
+flavours=$(awk '/^flavours *=/ {
+sub("^\s*flavours *=\s*", ",");
+print $1"$debian/rules.d/$arch.mk"")
+for flavour in $flavours
+do
+flavour=$(echo "$flavour" | sed -e 's@.*/config.flavour.@@')
+abi_check "$debian/abi/$abi" "$arch" "$flavour"
+done
+done
+
+exit "$fail"

--- linux-4.15.0.orig/debian/scripts/misc/find-missing-sauce.sh
+++ linux-4.15.0/debian/scripts/misc/find-missing-sauce.sh
@@ -0,0 +1,15 @@
+#!/bin/bash
+#
+# Find the 'UBUNTU: SAUCE:' patches that have been dropped from
+# the previous release.
+#
+PREV_REL=artful
+PREV_REPO=git://kernel.ubuntu.com/ubuntu/ubuntu-$PREV_REL.git
+
+git fetch $PREV_REPO master-next
+git log --pretty=oneline FETCH_HEAD|grep SAUCE|while read c m;do echo $m;done |sort > $$.prev-rel
+git log --pretty=oneline |grep SAUCE|while read c m;do echo $m;done |sort > $$.curr-rel
+
diff -u $$.prev-rel $$.curr-rel |grep "^-" 
+rm -f $$.prev-rel $$.curr-rel
+
--- linux-4.15.0.orig/debian/scripts/misc/find-obsolete-firmware
+++ linux-4.15.0/debian/scripts/misc/find-obsolete-firmware
@@ -0,0 +1,91 @@
+#!/bin/bash
 +#
 +# Find all duplicate or obsolete firmware that is being carried
 +# in the kernel firmware directory. Compare these files against
 +# the linux-firmware package for the appropriate release. For example,
 +# assuming this is raring, then compare the kernel firmware files
 +# against the raring branch of linux-firmware.
 +#
 +# Example: $0 ~/ubuntu/linux-firmware-raring
 +
 +USEAGE="$0 LINUX-FIRMWARE"
 +
 +. debian/debian.env
 +
 +NFWINFO="`find $DEBIAN -name fwinfo|wc -l`"
 +if [ ! "$NFWINFO" = "1" ]
 +then
 +echo Your repo is hosed. There can only be one fwinfo file.
 +find $DEBIAN -name fwinfo
 +exit 1
 +fi
 +
 +FWINFO="" pwd / find $DEBIAN -name fwinfo"
 +
 +if [ "$1" = "" ]
 +then
 +echo $USEAGE
 +exit 1
 +fi
 +FW="$1"
 +
 +if [ ! -f $FW/WHENCE ]
 +then
 +echo Bogus linux-firmware directory
 +exit 1
 +fi
 +if ! egrep -q "firmware:" $FWINFO
 +then
 +echo Bogus firmware info file
 +exit 1
 +fi
 +
 +## Prepare the tree and make firmware.
 +##
 +TEE="tee -a"
+LO=’pwd’/firmware.txt
+LF=’pwd’/lib/firmware
+rm -rf debian/build $LF $LO
+fakeroot debian/rules clean prepare-generic
+cp debian/build/build-generic/.config
+mkdir -p $LF
+make firmware_install INSTALL_MOD_PATH=’pwd’
+
+(cd $LF
+find . -type f | while read f
+do
+BN="`basename $f`"
+
+if ! grep -q $BN $FWINFO
+then
+echo "Unused firmware: $f" | $TEE $LO
+else
+if [ -f $FW/$f ]
+then
+if ! cmp $FW/$f $f
+then
+echo "$f differs" | $TEE $LO
+else
+echo "$f is duplicated" | $TEE $LO
+fi
+else
+echo "$f does not exist in $FW" | $TEE $LO
+fi
+fi
+done)
+
+# Check for firmware files referenced by the kernel
+# that do not exist in either location.
+#
+cat $FWINFO | while read fwi f
+do
+if [ -s lib/firmware/$f ] || [ -s $FW/$f ]
+then
+continue
+else
+echo "Missing firmware $f" | $TEE $LO
+fi
+done
+
--- linux-4.15.0.orig/debian/scripts/misc/fips-checks
+++ linux-4.15.0/debian/scripts/misc/fips-checks
@@ -0,0 +1,138 @@
#!/bin/bash -eu
+export LC_ALL=C.UTF-8
+
+usage() {
+cat << EOF
+Usage: ${P:-$(basename "$0"')} [-h|--help]
+
+Check if there are any FIPS relevant changes since the last
+release. Any change that is identified should have a justification in
+the justifications file or the check will fail.
+
+Optional arguments:
+  -h, --help    Show this help message and exit.
+  -p, --previous Version to use as the previous base version.
+  -c, --current Version to use as the current base version.
+
+EOF
+
+
+prev_base_version=
+curr_base_version=
+crypto_files=( crypto arch/x86/crypto drivers/char/random.c lib/sha* )
+
+c_red='\033[0;31m'
+c_green='\033[0;32m'
+c_off='\033[0m'
+
+# Parse arguments
+while [ "#$" -gt 0 ]; do
+case "$1" in
+  -h|--help)
+    usage
+    exit 0
+
+  *)
+    end
+    shift
+    prev_base_version="$1"
+    shift
+    curr_base_version="$1"
+
+esac
+shift
+
+exit 1
+
+shift
+done
+
+DEBIAN=
+## shellcheck disable=SC1091
+
+## Check if the "$DEBIAN" directory exists.
+if [ ! -d "$DEBIAN" ]; then
+echo "You must run this script from the top directory of this repository."
+exit 1
+fi
+
+CONF="$DEBIAN/etc/update.conf"
+if [ ! -f "$CONF" ]; then
+echo "Missing file: $CONF"
+exit 1
+fi
+
+## shellcheck disable=SC1090
+
+## Check if the "$DEBIAN_MASTER" variable is defined.
+if [ "$DEBIAN_MASTER" = "" ]; then
+echo "DEBIAN_MASTER should be defined either in $DEBIAN/etc/update.conf or the environment"
+exit 1
+fi
+
+## Find the base kernel version used by the previous version
+if [ -z "$prev_base_version" ]; then
+offset=1
+
+## Loop through each entry of the current changelog, searching for an
++ entry that refers to the master version used as base (ie a line
++ containing "[ Ubuntu: 4.15.0-39.42 ]"):
+while true; do
+changes=$(dpkg-parsechangelog -l"$DEBIAN/changelog" -SChanges -c1 -o"$offset")
+if ! [ "$changes" ]; then
+echo "Failed to retrieve base master version from changelog file: $DEBIAN/changelog"
+exit 1
+fi
+
+## Find the current base kernel version

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+if [ -z "$curr_base_version" ]; then
+curr_base_version=$(dpkg-parsechangelog -l"${DEBIAN_MASTER}/changelog" -SVersion)
+if ! [ "$curr_base_version" ]; then
+echo "Failed to retrieve current master version from changelog: $DEBIAN_MASTER/changelog"
+exit 1
+fi
+fi
+
+# Check base kernel tags
+tag_prefix="Ubuntu-${DEBIAN_MASTER#debian.}-"
+prev_tag="${tag_prefix}${prev_base_version}"
+curr_tag="${tag_prefix}${curr_base_version}"
+for tag in "$prev_tag" "$curr_tag"; do
+if ! git rev-parse --verify "$tag" &> /dev/null; then
+echo "Missing tag \"$tag\". Please fetch tags from base kernel."
+exit 1
+fi
+done
+
+# Check all the changes
+fails=0
+justifications_file="$DEBIAN/fips.justifications"
+justifications=$(grep -P '^[^#\s]' "$justifications_file" 2> /dev/null || true)
+while read -r id; do
+short_msg=$(git log --format=%s --max-count=1 "$id")
+if echo "$justifications" | grep -q -x -F "$short_msg"; then
+echo -e "${c_green}OK${c_off} | ${id::12} ${short_msg}"
+continue
+fi
+echo -e "${c_red}FAIL${c_off} | ${id::12} ${short_msg}"
+fails=$(( fails + 1 ))
+done < <(git rev-list "${prev_tag}..${curr_tag}" -- "${crypto_files[@]}")
+
+echo
+if [ "$fails" -gt 0 ]; then
+echo "FIPS relevant changes were found without justification: ${fails} change(s)."
+echo "Please, check the commits above and update the file \"${justifications_file}\"."
+exit 1
+fi
+
+echo "Check completed without errors."
+exit 0
--- linux-4.15.0.orig/debian/scripts/misc/fw-to-ihex.sh
+++ linux-4.15.0/debian/scripts/misc/fw-to-ihex.sh
@@ -0,0 +1,18 @@
+#!/bin/bash
+
+F=$1

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if [ "$F" = "" ]
then
  echo You must supply a firmware file.
  exit 1
fi

echo "unsigned char d[] = {" > $F.c
hexdump -v -e \""8/1 "0x%02x, " \"\" $F >> $F.c
echo "];" >> $F.c
sed -i 's/0x .*$//' $F.c

O=""`dirname $F`/`basename $F`.o"
gcc -o $O -c $F.c
objcopy -Oihex $F.o $F.ihex

--- linux-4.15.0.orig/debian/scripts/misc/gen-auto-reconstruct
+++ linux-4.15.0/debian/scripts/misc/gen-auto-reconstruct
@@ -0,0 +1,84 @@
+#!/bin/bash
+
+if [ "$#" -ne 3 ]; then
+  echo "Usage: $0 <orig tag>|<base release> <reconstruct> <options>" 1>&2
+  exit 1
+fi
+tag="$1"
+reconstruct="$2"
+options="$3"
+
+case "$tag" in
+v*)
+  ;;
*)
tag="v${tag%.*}" 
  ;;
esac
+
+# Validate the tag.
+count=$( git tag -l "$tag" | wc -l )
+if [ "$count" != 1 ]; then
+  echo "$0: $tag: tag invalid" 1>&2
+  exit 1
+fi
+
+# Identify all new symlinks since the proffered tag.
+git ls-tree -r --full-tree HEAD | grep ^120 | 
+  while read mode type blobid name
+  do
+    # Recreate any symlinks created since the orig.
+    git diff "$tag.." --raw --no-renames | awk '/^:/000000 120000/ && $5 == "A"} { print $NF }' 
+  while read name

+do
+link=$( readlink "$name" )
+
+echo "[ ! -L '$name' ] && ln -sf '$link' '$name"
+done
+
+%# Identify all removed files since the proffered tag.
+echo "# Remove any files deleted from the orig."
+git diff "$tag.." --raw --no-renames | awk '{/^-/ && $5 == "D"} { print $NF }' | \
+while read name
+do
+echo "rm -rf '$name'"
+done
+
+%# Identify all new symlinks since the proffered tag.
+echo "# Ignore any symlinks created since the orig which are rebuilt by reconstruct."
+git diff "$tag.." --raw --no-renames | awk ' /^:000000 120000/ && $5 == "A"} { print $NF }' | \
+while read name
+do
+echo "extend-diff-ignore=^$name$"
+done
+
+%# All done, make sure this does not complete in error.
+echo "exit 0"
+
) >">$reconstruct"
+
+
+%# Identify all new symlinks since the proffered tag.
+echo "# Ignore any symlinks created since the orig which are rebuilt by reconstruct."
+git diff "$tag.." --raw --no-renames | awk ' /^:000000 120000/ && $5 == "A"} { print $NF }' | \
+while read name
+do
+echo "extend-diff-ignore=^$name$"
+done
+
>} "$options.update"
+
+
+head='^## autoreconstruct -- begin$'
+foot='^## autoreconstruct -- end$'
+sed -i -e " 
+$head/.+$foot/"
+$head/
+p;
+r $options.update
+};
+/sfoot/p;
+d
+}
+"$options"
+rm -f "$options.update"
--- linux-4.15.0.orig/debian/scripts/misc/get-firmware
+++ linux-4.15.0/debian/scripts/misc/get-firmware
@@ -0,0 +1,62 @@
+#!/bin/bash
+
+# Find all files in linux-firmware that are new or different since the previous release
+# and copy them into the kernel firmware directory. You should only do this on the
+# backport branch since it would be redundant on the released kernel. It assumed you've
+# unpacked linux-firmware from each release into separate directories.
+#
+# Example: $0 ~/ubuntu/linux-firmware-precise ~/ubuntu/linux-firmware-quantal
+
+if [ "$1" = "" ] || [ "$2" = "" ] || [ ! -f $1/WHENCE ] || [ ! -f $2/WHENCE ]
+then
+echo You must supply 2 firmware directories.
+exit 1
+fi
+
+if [ ! -f debian/debian.env ]
+then
+echo You must run this script from the root of the repo
+exit 1
+fi
+. debian/debian.env
+
+NFWINFO=`find $DEBIAN -name fwinfo|wc -l`
+if [ ! "$NFWINFO" = "1" ]
+then
+echo Your repo is hosed. There can only be one fwinfo file.
+find $DEBIAN -name fwinfo
+exit 1
+fi
+
+OFW=$1
+NFW=$2
+
+cd $NFW
+
+## Find all files in $NFW that are new or different from $1

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+(find . -type f | egrep -v "debian|git[LICEN|WHEN|READ|Make|configure" | sed 's:\./:;:' | \\
+while read f 
+do 
+if grep -q $f $FWINFO 
+then 
+if [ ! -f $OFW/$f ] 
+then 
+echo $f 
+elif ! cmp $f $OFW/$f > /dev/null 
+then 
+echo $f 
+fi 
+fi 
+done) | \\
+while read f 
+do 
+mkdir -p $CDIR/firmware/`dirname $f` 
+if [ ! -f $CDIR/firmware/`dirname $f`/`basename $f`.ihex ] 
+then 
+cp -v $f $CDIR/firmware/`dirname $f` 
+fi 
+done 
--- linux-4.15.0.orig/debian/scripts/misc/getabis 
+++ linux-4.15.0/debian/scripts/misc/getabis 
@@ -0,0 +1,211 @@ 
+#!/bin/bash 
+ 
+export LC_ALL=C.UTF-8 
+ 
+if [ "$#" = "1" ]; then 
+set - $(echo "$1" | sed -e 's/-/ /') 
+fi 
+if [ "$#" != "2" ]; then 
+echo "Usage: $0 <version>" 1>&2 
+echo "Usage: $0 <release> <revision>" 1>&2 
+exit 1 
+fi 
+ 
+if [ "SDEBIAN" = "" ]; then 
+. debian/debian.env 
+fi 
+ 
+ver=$1 
+revision=$2 
+abi=$(echo $revision | sed -r -e 's/([^\+-]*).[^\-]*/\1\+(.-)?(\.+)?$/1/') 
+ 
+verabi=$ver-$abi
+verfull=$ver-$revision
+
+WGET="wget --tries=1 --timeout=10 --quiet -c"
+
+# Check if we use a flat (unversioned) ABI directory
+if [-f "$({DEBIAN}/abi/version"
+  grep -qP '^abidir=+.*\_abi.current/\' debian/rules.d/0-common-vars.mk"
+echo "Using flat ABI directory"
+flat_abi=1
+abidir=$(pwd)/$({DEBIAN}/abi
+else
+echo "Using versioned ABI directory"
+flat_abi=0
+abidir=$(pwd)/$({DEBIAN}/abi/$verfull
+fi
+
+tmpdir="`pwd`/abi-tmp-$verfull"
+origdir="`pwd`"
+fwinfo=${abidir}/fwinfo
+
+test -d $tmpdir || mkdir $tmpdir
+
+package_prefixes() {
+  : # no longer used ...
+}
+
+getall() {
+  arch=$1
+  shift
+
+  mkdir -p $abidir/$arch
+
+  for sub in $@; do
+    if [ -f $abidir/$arch/$sub ]; then
+      echo "Existing $sub($arch)..."
+      continue
+    fi
+    echo "Fetching $sub($arch)"
+    getall_set "linux-buildinfo" "$arch" "$sub"
+    getall_set "linux-image-unsigned linux-modules linux-modules-extra" "$arch" "$sub"
+    getall_set "linux-image-unsigned linux-modules" "$arch" "$sub"
+    getall_set "linux-image linux-modules linux-modules-extra" "$arch" "$sub"
+    getall_set "linux-image linux-modules" "$arch" "$sub"
+    getall_set "linux-image linux-image-extra" "$arch" "$sub"
+    getall_set "linux-image" "$arch" "$sub"
+    { echo "FAILED"; exit 1; }
+    done
+  }
+
+getall_set()
+
+prefixes="$1"
+arch="$2"
+sub="$3"
+
+echo -n " set:"
+filenames=""
+cd $tmpdir
+found=1
+for prefix in $prefixes
+do
+echo -n " $prefix=
+if [ "$found" = 0 ]; then
+echo -n "."
+continue
+fi
+filename=${prefix}-${verabi}-${sub}_${verfull}_${arch}.deb
+for r in "$${repo_list[@]}"
+do
+if ! [-f $filename ]; then
+$WGET $r/$filename
+rc="$?
+## If this was not successful or a valid error
+## return from the server all bets are off, bail.
+[ "$rc" != 0 -a "$rc" != 8 ] && return 2
+fi
+if ! [-f $filename ]; then
+echo -n "y"
+filenames="$filenames $filename"
+break
+fi
+done
+if [ ! -f "$filename" ]; then
+echo -n "n"
+found=0
+fi
+done
+echo ""
+if [ "$found" = 0 ]; then
+return 1
+fi
+echo " extracting..."
+for filename in $filenames
+do
+dpkg-deb --extract $filename tmp
+done
+# FORM 1: linux-image et al extracted here.
if [-d tmp/boot ]; then
  echo "  images..."
  find tmp -name ".*.ko" | while read f; do
    modinfo $f | grep '^firmware' >> $fwinfo
  done
  if [ -f tmp/boot/abi-* ]; then
    mv tmp/boot/abi-* $abidir/$arch/$sub
  else
    echo "    NO ABI FILE"
  fi
  if [ -f tmp/boot/retpoline-* ]; then
    mv tmp/boot/retpoline-* $abidir/$arch/$sub.retpoline
  else
    echo "    NO RETPOLINE FILE"
  fi
  cd tmp;
  find lib/modules/$verabi-$sub/kernel -name '*.ko' | \
  sed -e 's/[^/]*\(\[^/]*\)\.ko/\1/' | sort > \
  $abidir/$arch/$sub.modules
  (cd tmp;
   ko=$(find lib/modules/$verabi-$sub/kernel -name '*.ko' | head -1)
   readelf -p .comment "$ko" | gawk
   {($1 == "[") {
     printf("%,", $3);
     for (n=4; n<=NF; n++) {
       printf(" %s", $n);
     } } }
   printf ""
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   printf ""
+echo " done"
+
+rc=""$rc"
+if [ "$rc" = 2 ]; then
+echo "ERROR: downloads are reporting network failures" 1>&2
+exit 1
+fi
+return "$rc"
+
### MAIN
+
### Setup abi directory
+rm -rf "$abidir"
+mkdir -p $abidir
+echo $abi > $abidir/abiname
+if [ ${flat_abi} -eq 1 ]; then
+echo "${verfull}" > "$abidir"/version
+fi
+
### NOTE: The flavours are hardcoded, because they may have changed from the
### current build.
+
+. $DEBIAN/etc/getabis
+
# Extract compiler source package version from e.g.:
# GCC: (Ubuntu/Linaro 4.8.2-19ubuntu1) 4.8.2
+compilers=`sed 's/^.*(.* \(.*\)).*$/\1/' $abidir/*/*.compiler | sort -u` $abidir/*/*.compiler | sort -u | wc -l
+if [ "$compilers" != 1 ]; then
+echo "WARNING: inconsistent compiler versions detected:" 1>&2
+sort -u $abidir/*/*.compiler | sed 's/^/WARNING:    /' 1>&2
+fi
+
+sort < $fwinfo | uniq > fwinfo.tmp
+mv fwinfo.tmp $fwinfo
+
+rmrmdir $tmpdir
+
+if [ -d ".git" ]; then
+git add "$abidir"
+fi
+
+if [ ${flat_abi} -eq 0 ]; then
+find "$SDEBIAN"/abi/* -maxdepth 0 -type d | grep -v "$verfull" | while read f; do git rm -rf "$f"; done
+fi
+
--- linux-4.15.0.orig/debian/scripts/misc/git-ubuntu-log
+++ linux-4.15.0/debian/scripts/misc/git-ubuntu-log
@@ -0,0 +1,166 @@
+#!/usr/bin/python3
+
+import sys
+
+import codecs
+import urllib.request
+import json
+
+import textwrap
+
+sys.stdin = codecs.getreader("utf-8")(sys.stdin.detach())
+sys.stdout = codecs.getwriter("utf-8")(sys.stdout.detach())
+
+entries = []
+
+
+def add_entry(entry):
+ if entry and 'ignore' not in entry:
+
combo = []
+
for bug in set(entry.get('bugs', [])):
+
combo.append(bug)
+
for cve in set(entry.get('cves', [])):
+
combo.append(cve)
+
combo = sorted(combo)
+
+
if len(combo) == 0:
+
if entry.get('subject', "").startswith('UBUNTU'):
+
combo = '__packaging__'
+
else:
+
combo = '__mainline__'
+
else:
+
if entry.get('subject', "") == 'UBUNTU: link-to-tracker: update tracking bug':
+
# Construct a key with '__trackingbug__' on the first position
+
# and the tracking bug number afterwards
+
combo.insert(0, '__trackingbug__')
+
# Tracking bug goes at the top
+
keys.insert(0, combo)
+
else:
+
if combo not in keys:
+
keys.append(combo)
+
+
entry['key'] = combo
+
entries.append(entry)
+
+
+# Suck up the git log output and extract the information we need.
+keys = []
+entry = None

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subject_wait = False
for line in sys.stdin:
    if line.startswith('commit '):
        add_entry(entry)
        entry = {}
        subject_wait = True

    elif line.startswith('Author: '):
        bits = line.strip().split(maxsplit=1)
        entry['author'] = bits[1]

    elif subject_wait and line.startswith('    '):
        subject_wait = False
        entry['subject'] = line.strip()

    elif line.startswith('    BugLink: '):
        bits = line.strip().split(maxsplit=2)
        if len(bits) > 2:
            entry.setdefault('bugs', []).append(bits[2][1:-1])
        elif 'launchpad.net' in bits[1]:
            bits = bits[1].split('/
            entry.setdefault('bugs', []).append(bits[-1])

    elif line.startswith('    CVE- '):
        entry.setdefault('cves', []).append(line.strip())

    elif line.startswith('    Ignore: '):
        entry['ignore'] = True

    elif line.startswith('    Properties: '):
        for prop in line.strip().split()[1:]:
            if prop in ('ignore', 'no-changelog'):
                entry['ignore'] = True

add_entry(entry)
entries.reverse()

# Go through the entries and clear out authors for upstream commits.
for entry in entries:
    if entry['subject'].startswith('UBUNTU: '):
        entry['subject'] = entry['subject'][7:].strip()
    else:
        del entry['author']
+ Lump everything without a bug at the bottom.
+ keys.append('__packaging__')
+ keys.append('__mainline__')
+
+ emit_nl = False
+
+
+ for key in keys:
+     if key == '__packaging__':
+         title_set = ['Miscellaneous Ubuntu changes']
+     elif key == '__mainline__':
+         title_set = ['Miscellaneous upstream changes']
+     else:
+         title_set = []
+         for bug in key:
+             if bug.startswith('CVE-'):
+                 title_set.append(bug)
+             elif bug == '__trackingbug__':
+                 continue
+             elif bug.isdigit():
+                 bug_info = None
+                 try:
+                     request = urllib.request.Request('https://api.launchpad.net/devel/bugs/' + bug)
+                     request.add_header('Cache-Control', 'max-age=0')
+                     with urllib.request.urlopen(request) as response:
+                         data = response.read()
+                         bug_info = json.loads(data.decode('utf-8'))
+                 except urllib.error.HTTPError:
+                     title = 'INVALID or PRIVATE BUG'
+                 title += ' (LP###' + bug + ')'
+                 title_set.append(title)
+             else:
+                 title_set.append(bug)
+         emit_title = True
+         for entry in entries:
+             try:
+                 # urllib.request.urlcleanup()
+                 request = urllib.request.Request('https://api.launchpad.net/devel/bugs/' + bug)
+                 request.add_header('Cache-Control', 'max-age=0')
+                 with urllib.request.urlopen(request) as response:
+                     data = response.read()
+                     bug_info = json.loads(data.decode('utf-8'))
+                     title = bug_info['title']
+                     if 'description' in bug_info:
+                         for line in bug_info['description'].split('
'):
+                             if line.startswith('Kernel-Description: '):
+                                 title = line.split(' ', 1)[1]
+                     except urllib.error.HTTPError:
+                         title = 'INVALID or PRIVATE BUG'
+                     title += ' (LP###' + bug + ')'
+                     title_set.append(title)
+                 else:
+                     # Finally treat 'bug' itself as the title
+                     title_set.append(bug)
+             emit_title = True
+             for entry in entries:
if entry['key'] != key:
    continue

if emit_title:
    if emit_nl:
        print()
    emit_nl = True

    title_lines = textwrap.wrap('#// '.join(title_set), 76)
    print('  * ' + title_lines[0].replace('LP###', 'LP: #').replace('#//', ' //'))
    for line in title_lines[1:]:
        line = line.replace('LP###', 'LP: #').replace('#//', ' //')
        print('    ' + line)

    emit_title = False

if key[0] != '__trackingbug__':
    title_lines = textwrap.wrap(entry['subject'], 76)
    print('    - ' + title_lines[0])
    for line in title_lines[1:]:
        line = line.replace('LP###', 'LP: #')
        print('      ' + line)
--- linux-4.15.0.orig/debian/scripts/misc/insert-changes.pl
+++ linux-4.15.0/debian/scripts/misc/insert-changes.pl
@@ -0,0 +1,43 @@
#!/usr/bin/perl -w

my $debian;
$droot = $ARGV[0] if (defined $ARGV[0]);
$droot = 'debian' if (!defined $droot);
$debian = $ARGV[1] if (defined $ARGV[1]);
$debian = 'debian.master' if (!defined $debian);

system("make -s -f $droot/rules printchanges > $debian/changes");

+open(CHANGELOG, "< $debian/changelog") or die "Cannot open changelog";
+open(CHANGES, "< $debian/changes") or die "Cannot open new changes";
+open(NEW, "> $debian/changelog.new") or die "Cannot open new changelog";
+
+$printed = 0;
+my $skip_newline = 0;
+
+while (<CHANGELOG>) {
+    if (/^  CHANGELOG: /) {
+        next if $printed;
+        $skip_newline = 1;
+    }
+    print();
+}

+my $skip_newline = 1;
+while (<CHANGES>) {
+    if (/^  CHANGELOG: /) {
+        next if $printed;
+        $skip_newline = 1;
+    }
+    print();
+}
+$skip_newline = 0;
+$print NEW;
+
+$printed = 1;
+} else {
+  if (!$/ && $skip_newline == 1) {
+    $skip_newline = 0;
+    next;
+  }
+  $print NEW;
+}
+
+close(NEW);
+close(CHANGES);
+close(CHANGELOG);
+
+rename("$debian/changelog.new", "$debian/changelog");
+unlink("$debian/changes");
--- linux-4.15.0.orig/debian/scripts/misc/insert-mainline-changes
+++ linux-4.15.0/debian/scripts/misc/insert-mainline-changes
@@ -0,0 +1,42 @@
+#!/usr/bin/perl
+
+if ($#ARGV != 2) {
+  warn "Usage: $0 <changelog> <to> <range>
";
+  die "       $0 debian.master/changelog v3.2.3 v3.2.2..v3.2.3\n";
+}
+my ($changelog, $to, $range) = @ARGV;
+
+my @changes = ();
+
+push(@changes, "\n");
+push(@changes, "  [ Upstream Kernel Changes ]\n");
+push(@changes, "  * rebase to $to\n");
+
+open(LOG, "git log $range") || die "$0: git log failed: - $\n";
+while (<LOG>) {
+  if (m@BugLink: .*launchpad.net/.*/([0-9]+)\s$@) {
+    push(@changes, "    - LP: #$1\n");
+  }
+}
+close(LOG);
+
+open(CHANGELOG, "< $changelog") || die "Cannot open changelog: "$changelog.new") || die "Cannot open new changelog: "$changelog.new");
```perl
+&print = 3;
+while (<CHANGELOG>) {
+if (/^[^\-]+ \[\S+\] ) {
+&print--;
+print NEW;
+if ($print == 0) {
+print NEW @changes;
+}
+next;
+}
+print NEW;
+}
+
+close(NEW);
+close(CHANGELOG);
+
+rename("Schangelog.new", "$changelog");
--- linux-4.15.0.orig/debian/scripts/misc/insert-ubuntu-changes
+++ linux-4.15.0/debian/scripts/misc/insert-ubuntu-changes
@@ -0,0 +1,83 @@
+#!/usr/bin/perl
+
+if ($#ARGV != 2 && $#ARGV != 3) {
+die "Usage: $0 <changelog> <stop at> <start at> [<source changelog>]\n";
+
+if ($#ARGV == 2) {
+push(@ARGV, "debian.master/changelog")
+
+my ($changelog, $end, $start, $source_changelog) = @ARGV;
+
+$end =~ s/\D+//;
+$start =~ s/\D+//;
+
+sub version_cmp($$) {
+my @a = split(/\S+\[\S+\]/, $$_[0]);
+my @b = split(/\S+\[\S+\]/, $$_[1]);
+for (my $i = 1; $i <= $#a; $i++) {
+if (!defined $a[$i]) {
+if (!defined $b[$i]) {
+return 0;
+}
+return -1;
+
+if (!defined $b[$i]) {
+return 1;
+}
+if ($a[$i] < $b[$i]) {
+return -1;
+
+if ($a[$i] > $b[$i]) {
+return 1;
+}
+}
```

if ($a[$i] > $b[$i]) {
    return 1;
}
}
}

my @changes = ();
my $output = 0;
open(CHG, "<$source_changelog") ||
open(CHG, "<debian/changelog") ||
die "$0: debian/changelog: open failed - "$!
;
while (<CHG>) {
    if (/\S+\s+\((.*)\)/) {
        if (version_cmp($1, $end) <= 0) {
            last;
        } else if ($1 eq $start) {
            $output = 1;
        } else if ($output) {
            push(@changes, "\n [ Ubuntu: $1 ]\n\n");
            next;
        }
    }
    next if ($output == 0);
    next if (/\s*$/);
    next if (/\s--$/);
    next if (/\s+\[\s*\]/);
    push(@changes, $_);
}
close(CHG);

open(CHANGELOG, "< $changelog") or die "Cannot open changelog";
open(NEW, "> $changelog.new") or die "Cannot open new changelog";

$printed = 3;
while (<CHANGELOG>) {
    if (/^  CHANGELOG: /) {
        $printed--;
        print NEW;
        if ($printed == 0) {
            print NEW @changes;
        }
        next;
    }
}
close(CHG);

open(CHANGELOG, "< $changelog") or die "Cannot open changelog";
open(NEW, "> Schangelog.new") or die "Cannot open new changelog";

+$printed = 3;
while (<CHANGELOG>) {
    if (/\^ CHANGELOG: /) {
        $printed--;
        print NEW;
        if ($printed == 0) {
            print NEW @changes;
        }
        next;
    }
}
+print NEW;
+
+close(NEW);
+close(CHANGELOG);
+
+rename("Changelog.new", "Changelog");
--- linux-4.15.0.orig/debian/scripts/misc/kernel-wedge-arch.pl
+++ linux-4.15.0/debian/scripts/misc/kernel-wedge-arch.pl
@@ -0,0 +1,26 @@
+#!/usr/bin/perl
+
+# kernel-wedge-arch.pl -- select only specifiers for the supplied arch.
+#
+use strict;
+
+require Dpkg::Control;
+require Dpkg::Deps;
+
+my $fh = \*STDIN;
+
+my @entries;
+
+my $wanted = $ARGV[0];
+
+my $entry;
+while (!eof($fh)) {
+ $entry = Dpkg::Control->new();
+ $entry->parse($fh, '???');
+
+ if ($entry->{'Architecture'} eq $wanted) {
+ print("n", $entry);
+ } else {
+ close($fh);
+ }
+
+close($fh);
--- linux-4.15.0.orig/debian/scripts/misc/kernelconfig
+++ linux-4.15.0/debian/scripts/misc/kernelconfig
@@ -0,0 +1,176 @@
+#!/bin/bash
+
+. debian/debian.env
+
# Script to merge all configs and run 'make silentoldconfig' on it to wade out bad juju.
# Then split the configs into distro-common and flavour-specific parts
+
# We have to be in the top level kernel source directory
+if [ ! -f MAINTAINERS ] || [ ! -f Makefile ]; then
echo "This does not appear to be the kernel source directory." 1>&2
exit 1
fi

if [ -z "$mode" ]; then
    echo "$0 called with invalid mode" 1>&2
    exit 1
fi

kerneldir="`pwd`"
confdir="$kerneldir/${DEBIAN}/config"
variant="$2"

bindir="`pwd`/${DROOT}/scripts/misc"
common_conf="$confdir/config.common.$family"
tmpdir=`mktemp -d`
mkdir "$tmpdir/CONFIGS"

if [ "$mode" = "genconfigs" ]; then
    keep=1
    mode="oldconfig"
test -d CONFIGS || mkdir CONFIGS
fi

for arch in $archs; do
    rm -rf build
    mkdir build
    # Map debian archs to kernel archs
    case "$arch" in
        ppc64|ppc64el) kernarch="powerpc";;
        amd64) kernarch="x86_64";;
        lpia) kernarch="x86" ;;
        sparc) kernarch="sparc64" ;;
        armel|armhf) kernarch="arm" ;;
        s390x) kernarch="s390x" ;;
        *) kernarch="Sarch" ;;
    esac
    archconfdir=$confdir/$arch

    . $DEBIAN/etc/kernelconfig

    bindir="`pwd`/_scripts/misc"
    common_conf="config.common.$family"
    tmpdir=`mktemp -d`
    mkdir "$tmpdir/CONFIGS"

    if [ "$mode" = "genconfigs" ]; then
        keep=1
        mode="oldconfig"
        test -d CONFIGS || mkdir CONFIGS
        fi

    for arch in $archs; do
        rm -rf build
        mkdir build
        # Map debian archs to kernel archs
        case "$arch" in
            ppc64|ppc64el) kernarch="powerpc";;
            amd64) kernarch="x86_64";;
            lpia) kernarch="x86" ;;
            sparc) kernarch="sparc64" ;;
            armel|armhf) kernarch="arm" ;;
            s390x) kernarch="s390x" ;;
            *) kernarch="Sarch" ;;
        esac
        archconfdir=$confdir/$arch

+flavourconfigs=$(cd $archconfdir && & ls config.flavour.*)
+
+# Merge configs
+# We merge config.common.ubuntu + config.common.<arch> +
+# config.flavour.<flavour>
+
+for config in $flavourconfigs; do
+fullconf="$tmpdir/$arch-$config-full"
+case $config in
+*)
+>"$fullconf"
+if [ -f $common_conf ]; then
+cat $common_conf >> "$fullconf"
+fi
+if [ -f $archconfdir/config.common.$arch ]; then
+cat $archconfdir/config.common.$arch >> "$fullconf"
+fi
+cat "$archconfdir/$config" >>"$fullconf"
+if [ -f $confdir/OVERRIDES ]; then
+cat $confdir/OVERRIDES >> "$fullconf"
+fi
+;;
+ esac
+done
+
+for config in $flavourconfigs; do
+if [ -f $archconfdir/$config ]; then
+fullconf="$tmpdir/$arch-$config-full"
+cat "$fullconf" > build/.config
+
+case "$mode" in
+    editconfigs)
+      # Interactively edit config parameters
+      while : : do
+        echo -n "Do you want to edit config: $arch/$config? [Y/n] "
+        read choice
+        case "$choice" in
+          y* | Y* | "" )
+          make O=`pwd`/build ARCH=$kernarch menuconfig
+          break ;
+          n* | N* )
+          "silentoldconfig" prevents
+          # errors for '-' options set
+          # in common config fragments
+          make O=`pwd`/build ARCH=$kernarch silentoldconfig
+          break ;
+          *)
+      esac
+      esac
+      # Call oldconfig or menuconfig
+      # Case "$mode" in
+      # editconfigs)
+      esac
+    esac
+esac
+done

Open Source Used In 5GaaS Edge AC-4  19693
+echo "Entry not valid"
+esac
+done
+;;
+ *)
+echo "# Run $mode (yes=$yes) on $arch/$config ..."
+if [ "$yes" -eq 1 ]; then
+yes "" | make O=`pwd`/build ARCH=$kernarch "$mode"
+else
+make O=`pwd`/build ARCH=$kernarch "$mode"
+fi ;;
+esac
+cat build/.config > $archconfdir/$config
+cat build/.config > "$tmpdir/CONFIGS/$arch-$config"
+fi
+else
+echo "!! Config not found $archconfdir/$config..."
+fi
+done
+
+echo "Running splitconfig.pl for $arch"
+echo
+
+### Can we make this more robust by avoiding $tmpdir completely?
+### This approach was used for now because I didn't want to change
+### splitconfig.pl
+(cd $archconfdir; $bindir/splitconfig.pl config.flavour.*; mv config.common \ + config.common.$arch; cp config.common.$arch $tmpdir)
+done
+
+rm -f $common_conf
+
+### Now run splitconfig.pl on all the config.common.<arch> copied to
+### $tmpdir
+(cd $tmpdir; $bindir/splitconfig.pl *)
+( cd $confdir;
+ rm -f *.full
+ grep -v 'is UNMERGABLE' <$tmpdir/config.common >$common_conf
+ for arch in $archs; do
+ grep -v 'is UNMERGABLE' <$tmpdir/config.common.$arch \ + >$arch/config.common.$arch
+ done
+
+ echo ""
+echo "Running config-check for all configurations ..."
+echo ""
+fail=0
+for arch in $archs; do
+archconfdir=$confdir/$arch
+flavourconfigs=$(cd $archconfdir && ls config.flavour.*)
+for config in $flavourconfigs; do
+flavour="${config##*.}"
+if [ -f $archconfdir/$config ]; then
+fullconf="$tmpdir/CONFIGS/$arch-$flavour"
+"$bindir/../config-check" "$fullconf" "$arch" "$flavour" "$confdir" "0" || let "fail=$fail+1"
+fi
+done
+done
+
+if [ "$fail" != 0 ]; then
+echo ""
+echo "*** ERROR: $fail config-check failures detected"
+echo ""
+fi
+
+rm -rf build
+
--- linux-4.15.0.orig/debian/scripts/misc/retag
+++ linux-4.15.0/debian/scripts/misc/retag
@@ -0,0 +1,34 @@
+#!/usr/bin/perl -w
+
+open(TAGS, "git tag -l ") or die "Could not get list of tags";
+@tags = <TAGS>;
+close(TAGS);
+
+open(LOGS, "git log --pretty=short ") or die "ERROR: Calling git log";
+my $commit = ""
+
+while (<LOGS>) {
+my $origtag;
+
+if (m|^commit (.*)$|) {
+$commit = $1;
+next;
+}
+
+if (m|UBUNTU: (Ubuntu-2.6..)|) or next;
+
+$tag = $1;
+
+($origtag) = grep(/$tag.orig$/ @tags);
+if (!defined($origtag)) {
+print "I: Adding original tag for $tag
";
+system("git tag -m $tag $tag.orig $tag");
+}
+
+print "I: Tagging $tag => $commit
";
+system("git tag -f -m $tag $tag $commit");
+}
+
+close(LOGS);
--- linux-4.15.0.orig/debian/scripts/misc/splitconfig.pl
+++ linux-4.15.0/debian/scripts/misc/splitconfig.pl
@@ -0,0 +1,107 @@
+#!/usr/bin/perl -w
+
+%allconfigs = ();
+%common = ();
+
+print "Reading config's ...
";
+
+for $config (@ARGV) {
+  # Only config.*
+  next if $config !~ /^config\.*$/;
+  # Nothing that is disabled, or remnant
+  next if $config =~ /.*\.(default|disabled|stub)$/;
+  +%{$allconfigs{$config}} = ();
+  +
+  +print "  processing $config ...
";
+  +open(CONFIG, "< $config");
+  +
+  +while (<CONFIG>) {
+    # Skip comments
+    +/\s*\w*\(w+)\[\s=\](.*)$/ or next;
+    +
+    +$({$allconfigs{$config}})[$1] = $2;
+    +
+    +$common[$1] = $2;
+    +}
+  +
+  +close(CONFIG);
+  +
+  +print "done
";
+  +
+  +}
+print "\n";
+
+print "Merging lists ... \n";
+
+## %options - pointer to flavour config inside the allconfigs array
+for $config (keys(%allconfigs)) {
+my %options = %{$allconfigs{$config}};
+
+print "   processing $config ... ";
+
+for $key (keys(%common)) {
+next if not defined $common{$key};
+
+## If we don't have the common option, then it isn't
+## common. If we do have that option, it must have the same
+## value. EXCEPT where this file does not have a value at all
+## which may safely be merged with any other value; the value
+## will be elided during recombination of the parts.
+if (!defined($options{$key})) {
+## Its ok really ... let it merge
+} elsif (not defined($options{$key}))) {
+undef $common{$key};
+} elsif ($common{$key} ne $options{$key}) {
+undef $common{$key};
+}
+
+print "done.\n";
+}
+
+print "\n";
+
+print "Creating common config ... ";
+
+open(COMMON, " > config.common");
+print COMMON "#\n# Common config options automatically generated by splitconfig.pl\n#\n";
+
+for $key (sort(keys(%common))) {
+if (not defined $common{$key}) {
+print COMMON "# CONFIG_${key} is UNMERGABLE\n";
+} elsif ($common{$key} eq "is not set") {
+print COMMON "# CONFIG_${key} is not set\n";
+} else {
+print COMMON "CONFIG_${key}=$common{$key}\n";
+}
+
+close(COMMON);
+}
+print "done
\n"
+
+print "Creating stub configs ...
"
+
+for $config (keys(%allconfigs)) {
+  my %options = %{$allconfigs{$config}};
+
+  print "  processing $config ...
"
+
+  open(STUB, "> $config");
+  print STUB "#\n# Config options for $config automatically generated by splitconfig.pl\n#\n";
+
+  for $key (sort(keys(%options))) {
+    next if defined $common{$key};
+    if ($options{$key} =~ /^is /) {
+      print STUB "# CONFIG_$key $options{$key}\n";
+    } else {
+      print STUB "CONFIG_$key=$options{$key}\n";
+    }
+  }
+
+  close(STUB);
+
+  print "done.
"
+}

--- linux-4.15.0.orig/debian/scripts/misc/tristate.sh
+++ linux-4.15.0/debian/scripts/misc/tristate.sh
@@ -0,0 +1,26 @@
+#!/bin/bash
+
+## Find config variables that might be able to transition from =y to =m
+##
+## Example: debian/scripts/misc/tristate.sh debian.master/config/config.common.ubuntu
+##
+
+KC=Kconfig.tmp
+rm -f $[KC]
+find .|grep Kconfig | while read f
+do
+  cat $f >> $[KC]
+done
+
+grep =y $1 | sed -e 's/CONFIG_// -e 's/=y// | while read c
+do
+  cat <<EOF > tristate.awk
+BEGIN { tristate=0; }
```bash
#!/bin/bash

AUFS=aufs4-standalone

# Before you run this be sure you've removed or reverted the 'UBUNTU: SAUCE: AUFS' patch.
#
# Make sure the current working directory is at the top of the
# linux tree.
#
if ! grep PATCHLEVEL Makefile
then
    echo "You must run this script from the top of the linux tree"  
    exit 1
fi

clean=0
if [ "$#" = 1 ]; then
    AUFS="$1"
else
    clean=1
    rm -rf $AUFS
    git clone https://github.com/sfjro/aufs4-standalone.git $AUFS
    (cd $AUFS; git checkout -b aufs4.x-rcN remotes/origin/aufs4.x-rcN)
fi

cp $AUFS/include/uapi/linux/aufs_type.h include/uapi/linux
rsync -av $AUFS/fs/ fs/
rsync -av $AUFS/Documentation/ Documentation/

PATCHES="${PATCHES} aufs4-kbuild.patch"
PATCHES="${PATCHES} aufs4-base.patch"
PATCHES="${PATCHES} aufs4-mmap.patch"
PATCHES="${PATCHES} aufs4-standalone.patch"
PATCHES="${PATCHES} aufs4-loopback.patch"
PATCHES="${PATCHES} vfs-ino.patch"
PATCHES="${PATCHES} tmpfs-idr.patch"
```

---

--- linux-4.15.0.orig/debian/scripts/misc/update-aufs.sh
+++ linux-4.15.0/debian/scripts/misc/update-aufs.sh
@@ -0,0 +1,50 @@
+#!/bin/bash
+
+AUFS=aufs4-standalone
+
+##
+## Before you run this be sure you've removed or reverted the 'UBUNTU: SAUCE: AUFS' patch.
+##
+## Make sure the current working directory is at the top of the
+## linux tree.
+##
+if ! grep PATCHLEVEL Makefile
+then
+    echo "You must run this script from the top of the linux tree"
+    exit 1
+fi
+
+clean=0
+if [ "$#" = 1 ]; then
+    AUFS="$1"
+else
+    clean=1
+    rm -rf $AUFS
+    git clone https://github.com/sfjro/aufs4-standalone.git $AUFS
+    (cd $AUFS; git checkout -b aufs4.x-rcN remotes/origin/aufs4.x-rcN)
+fi
+
cp $AUFS/include/uapi/linux/aufs_type.h include/uapi/linux
rsync -av $AUFS/fs/ fs/
rsync -av $AUFS/Documentation/ Documentation/

PATCHES="${PATCHES} aufs4-kbuild.patch"
PATCHES="${PATCHES} aufs4-base.patch"
PATCHES="${PATCHES} aufs4-mmap.patch"
PATCHES="${PATCHES} aufs4-standalone.patch"
PATCHES="${PATCHES} aufs4-loopback.patch"
PATCHES="${PATCHES} vfs-ino.patch"
PATCHES="${PATCHES} tmpfs-idr.patch"
```
+ for i in ${PATCHES}
+ do
+ patch -p1 < ${AUFS}/${i}
+ done
+
+ [ "$clean" = 1 ] && rm -rf ${AUFS}
+ git add mm/profile.c
+ git add -u
+ find . -name "*.*orig" | xargs rm
+ find . | grep aufs | xargs git add
+ git commit -s -m "UBUNTU: SAUCE: AUFS"

--- linux-4.15.0.orig/debian/scripts/module-check
+++ linux-4.15.0/debian/scripts/module-check
@@ -0,0 +1,120 @@
+#!/usr/bin/perl -w
+
+$flavour = shift;
+$prev_abidir = shift;
+$abidir = shift;
+$skipmodule = shift;
+
+print "II: Checking modules for $flavour...";
+
+if (-f "$prev_abidir/ignore.modules"
+ or -f "$prev_abidir/$flavour.ignore.modules") {
+print "explicitly ignoring modules\n";
+exit(0);
+}
+
+if (not -f "$abidir/$flavour.modules" or not -f
+ "$prev_abidir/$flavour.modules") {
+print "previous or current modules file missing!\n";
+print "$abidir/$flavour.modules\n";
+print "$prev_abidir/$flavour.modules\n";
+if (defined($skipmodule)) {
+exit(0);
+} else {
+exit(1);
+}
+
+print "\n";
+
+print "$modules"
+
+my @modules;
+my @modules_ignore;
+my $missing = 0;
+my $new = 0;
+my $errors = 0;
+
+# See if we have any ignores
+if (-f "$prev_abidir/../modules.ignore") {
+my $ignore = 0;
+open(IGNORE, "< $prev_abidir/../modules.ignore") or
+die "Could not open $prev_abidir/../modules.ignore";
+print "  reading modules to ignore...";
+while (<IGNORE>) {
+chomp;
+next if /^$/;
+$modules_ignore{$_} = 1;
+$ignore++;
+}
+close(IGNORE);
+print "read $ignore modules."
+}
+
+# Read new modules first
+print "  reading new modules...";
+$new_count = 0;
+open(NEW, "< $abidir/$flavour.modules") or
+die "Could not open $abidir/$flavour.modules";
+while (<NEW>) {
+chomp;
+$modules{$_} = 1;
+$new_count++;
+}
+close(NEW);
+print "read $new_count modules."
+
+# Now the old modules, checking for missing ones
+print "  reading old modules...";
+$old_count = 0;
+open(OLD, "< $prev_abidir/$flavour.modules") or
+die "Could not open $prev_abidir/$flavour.modules";
+while (<OLD>) {
+chomp;
+if (not defined($modules{$_})) {
+print " \n" if not $missing;
+$missing++;
+if (not defined($modules_ignore{$_})) {
+print "  MISS: $_
+$errors++;
+} else {
+print "  MISS: $_ (ignored)\n";
+}
+} else {

#!/bin/bash

#
# Build a new directory of modules based on an inclusion list.
# The inclusion list format must be a bash regular expression.
#
$modules{$_}++;
+
$old_count++;
+
close(OLD);
+
# Check for new modules
+foreach $mod (keys(%modules)) {
+    if ($modules{$mod} < 2) {
+        print "\n" if not $missing and not $new;
+        print "      NEW : $mod\n";
+        $new++;
+    }
+}
+
+if ($new or $missing) {
+    print "      read $old_count modules : new($new)  missing($missing)\n";
+} else {
+    print "read $old_count modules.\n";
+}
+
+# Let's see where we stand...
+if ($errors) {
+    if (defined($skipmodule)) {
+        print "WW: Explicitly asked to ignore failures (probably not good)\n";
+    } else {
+        print "EE: Missing modules (start begging for mercy)\n";
+        exit 1
+    }
+}
+
+if ($new) {
+    print "II: New modules (you've been busy, wipe the poop off your nose)\n";
+} else {
+    print "II: No new modules (hope you're happy, slacker)\n";
+}
+
+print "II: Done\n";
+
+exit(0);

--- linux-4.15.0.orig/debian/scripts/module-inclusion
+++ linux-4.15.0/debian/scripts/module-inclusion
@@ -0,0 +1,104 @@

# Build a new directory of modules based on an inclusion list.
# The inclusion list format must be a bash regular expression.
##
# usage: $0 ROOT INCLUSION_LIST
# example: $0 \
#     debian/build/build-virtual-ALL debian/build/build-virtual \
#debian.master/control.d/virtual.inclusion-list \
#virtual.depmap
+master=0
+if [ "$1" = "--master" ]; then
+master=1
+shift
+fi
+
+ROOT=$1
+NROOT=$2
+ILIST=$3
+DEPMAP=$4
+
+tmp="/tmp/module-inclusion.$$"
+
+# Prep a destination directory.
+
+mkdir -p ${NROOT}
+
+{ 
+    # Copy over the framework into the master package.
+    if [ "$master" -eq 1 ]; then
+        (cd ${ROOT}; find . ! -name ".*.ko" -type f)
+    fi
+
+    # Copy over modules by name or pattern.
+    while read -r i
+    do
+        # 'find' blurs a warning if it cannot find any ko files.
+        #
+        #case "$i" in
+        #    \!*)
+        #        (cd ${ROOT}; find "$i" -name "*.ko" || true)
+        #    *
+        #    \*)
+        #        (cd ${ROOT}; eval find "$i" -name "*.ko" || true)
+        #    *)
+        #echo "$i"
+        #    esac
+        done <"${ILIST}"
+
+} "$tmp"
+  +# Copy over the listed modules.
+  +while read i
+  +do
+  +# If this is already moved over, all is good.
+  +if [ -f "${NROOT}/$i" ]; then
+  +:
+  +
+  +# If present in the source, moved it over.
+  +elif [ -f "${ROOT}/$i" ]; then
+  +  mkdir -p "${NROOT}/`dirname $i`"
+  +  mv "${ROOT}/$i" "${NROOT}/$i"
+  +
+  +# Otherwise, it is missing.
+  +else
+  +  echo "Warning: Could not find ${ROOT}/$i" 1>&2
+  +fi
+  +done <"$tmp"
+  +
+  +# Copy over any dependancies, note if those are missing
+  +# we know they are in a pre-requisite package as they must
+  +# have existed at depmap generation time, and can only have
+  +# moved into a package.
+  +let n=0 || true
+  +while [ -s "$tmp" ]
+  +do
+  +  let n="$n+1" || true
+  +  [ "$n" = "20" ] &&& break || true
+  +
+  +  echo "NOTE: pass $n: dependency scan" 1>&2
+  +  +while read i
+  +  +do
+  +  +  grep "^$i " "$DEPMAP" | \
+  +  +while read m d
+  +  +do
+  +  +  if [ -f "$ROOT/$d" ]; then
+  +  +  echo "NOTE: pass $n: $i pulls in $d" 1>&2
+  +  +  echo "$d"
+  +  +  mv "$ROOT/$d" "$NROOT/$d"
+  +  +fi
+  +  +done
+  +done <"$tmp" >"$tmp.new"
+  +mv -f "$tmp.new" "$tmp"
+  +done
+  +rm -f "$tmp"
#!/bin/bash

flavour="$1"
prev_abidir="$2"
curr_abidir="$3"
skipretpoline="$4"

echo "II: Checking retpoline indirections for $flavour...";
+if [ "$skipretpoline" = 'true' ]; then
+echo "manual request ignoring retpoline delta"
+fi
+
+if [ -f "$prev_abidir/ignore.retpoline" -o \
+     -f "$prev_abidir/$flavour.ignore.retpoline" ]; then
+echo "explicitly ignoring retpoline delta"
+skipretpoline='true'
+fi
+
+prev="$prev_abidir/$flavour.retpoline"
curr="$curr_abidir/$flavour.retpoline"
+if [ ! -f "$prev" ]; then
+echo "previous retpoline file missing!"
+echo "   "$prev"
+prev="/dev/null"
+fi
+
+if [ ! -f "$curr" ]; then
+echo "current retpoline file missing!"
+echo "   "$curr"
+curr="/dev/null"
+fi
+
+echo "II: retpoline delta in this package..."
+rc=0
+diff -u "$prev" "$curr" || true
+count=$( diff -u "$prev" "$curr" | grep '^[^+]' | wc -l )
+if [ "$count" != 0 ]; then
+rc=1
+echo "WW: $count new retpoline sequences detected"
+fi
+
+echo "II: Done";
+if [ "$skipretpoline" = 'true' -a "$rc" -ne 0 ]; then
```bash
+echo "II: ignoring errors"
+exit 0
+fi
+exit "$rc"
```

---

```bash
#!/bin/bash

cd "$1" || exit 1

# Find all valid retpoline information, collate the detected and
# safe information together. Join the result to find the detected
# but non-safe elements. These are our concern.
ur_detected=$(mktemp --tmpdir "retpoline-check-XXXXXX.ur-detected")
ur_safe=$(mktemp --tmpdir "retpoline-check-XXXXXX.ur-safe")

find "." -path './drivers/firmware/efi/libstub' -prune -o 
  -path './arch/x86/boot' -prune -o 
  -path './arch/x86/purgatory' -prune -o 
  -name /*.ur-detected -print0 | xargs -0 cat |
  sed -e "s@$1@" -e "s@ $2/ @" -e "s@^/@" | 
  sort -k 1b,1 >"$ur_detected"

find "." -name /*.ur-safe -print0 | xargs -0 cat |
  sed -e "s@$1@" -e "s@^/@" | 
  sort -k 1b,1 >"$ur_safe"

+join -v 1 -j 1 "$ur_detected" "$ur_safe" | sed -s /^[^ ]*/ #/
```

---

```bash
#!/bin/bash

execl /dev/null

+object="$1"
+src="$2"
+bit16="$3"
+
+SECTION=".discard.retpoline_safe"
+
+# Form an associative lookup for the symbol numbers in the ELF symbol table.
+# Uses 8 character 0 expanded hexadecimal key for ease of consumption.
+__symbolmap_init()
+[
+readelf -W --syms "$1" |
awk '($4 == "SECTION" && $1 ~ /^[0-9]*:/) { printf("%08x %08x\n", int($1), int($7)); }' | \
+while read symbol_num section_num
+do
+echo "symbolmap_$symbol_num='$section_num"
+done
+symbolmap_init()
+
+symbolmap()
+
case "$section_type" in
+REL|RELA) section_relocation="$section_type" ;;
+ esac
+done
+echo "section_relocation='$section_relocation"
+
+sectionmap_init()
+
+sectionmap()
+
+sectionmap()
+echo "sectionmap: $1: invalid section" 1>&2
+exit 1
+fi
+}
+sectionvma()
+{
+eval RET="\$sectionvma_$1"
+if [ "$RET" = '' ]; then
+echo "sectionvma: $1: invalid section" 1>&2
+exit 1
+fi
+}
+
+# Read and parse the hex-dump output.
+hex="[0-9a-f]"
+hex_8="$hex$hex$hex$hex$hex$hex$hex$hex"
+hexspc="[0-9a-f ]"
+hexspc_8="$hexspc$hexspc$hexspc$hexspc$hexspc$hexspc$hexspc$hexspc"
+
+raw32()
+{
+readelf --hex-dump "$2" "$1" 2>/dev/null |
+sed \
+-e '/^Hex/d' -e '/^$/d' -e '/^ *NOTE/d' \
+-e 's/ *[^ ][^ ]* *\('"$hex_8"'\) \('"$hexspc_8"'\) \('"$hexspc_8"'\) \('"$hexspc_8"'\) .*/\1 \2 \3 \4 /' \
+-e 's/\('"$hex$hex"'\)\('"$hex$hex"'\)\('"$hex$hex"'\)\('"$hex$hex"'\) /\4\3\2\1 /g' \
+-e 's/ $//g' -e 's/ /\n/g'
+}
+#-e 's/\([^ ][^ ][^ ][^ ][^ ][^ ][^ ][^ ]\) \([^ ][^ ][^ ][^ ][^ ][^ ][^ ][^ ]\) /\2\1 /g' \
+
+rela()
+{
+#file="$(basename "$1")"
+file="$1"
+
+# Read relocation information for a 64bit binary. Each relocation entry
+# is 3 long longs so we collect 6 quads here. Note that the dump is in
+# listed in increasing byte order not withstanding the quad split.
+#
+# The record says to take the value of <symbol> add <symbol offset> and
+# shove that into <write offset> in the segment of the <symbol>.
+#
+# Format:
+# <write offset>64 bits
+# <symbol number>32 bits
+# <relocation type>32 bits
+# <symbol offset>64 bits
+raw32 "$1" ".rela$SECTION" | \

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+contentmap()
+
+eval RET="$contentmap_$1"
+if [ "SRET" = "" ]; then
+echo "contentmap: $1: invalid offset" 1>&2
+exit 1
+fi
+
+rel()
+
+# Load up the current contents of the $SECTION segment
+# as the offsets (see below) are recorded there and we will need
+# those to calculate the actual address.
+contentmap_init "$1" "$SECTION"
+
+#file="$(basename "$1")"
+file="$1"
+
+# Read relocation information for a 32bit binary. Each relocation entry
+# is 3 longs so we collect 3 quads here. Note that the dump is in
+# listed in increasing byte order not withstanding the quad split.
+#
+# The record says to take the value of <symbol> and add that to the
+# existing contents of <write offset> in the segment of the <symbol>.
+#
+# Format:
+#  <write offset> 32 bits
+#  <symbol number> 24 bits
+#  <relocation type> 8 bits
+raw32 "$1" ".rel$SECTION" |
+
+{ 
+  a1="" 
+  while read a2 
+    do 
+      [ "$a1" = "" ] && { a1="$a2"; continue; } 
+      +
+      +#echo ">$a1< >$a2<"
+      +contentmap "$a1"; offset="SRET"
+      +symbolmap "00${a2%??}"; section_num="$RET"
+      +
+      +sectionmap "$section_num"; section="SRET"
+      +sectionvma "$section_num"; vma="SRET"
+      +#echo ">$a1< >$a2< >$offset< >$section<"
+      +
+      +echo "$file-$section-$offset"
+      +
+      +a1="" 
+  done 
+
+}
+done
+} | sed -e 's/-00\([0-9a-f]\)/-\1/'
+
+
tmp=$(mktemp --tmpdir "retpoline-extract-XXXXXX")
+
+disassemble()
+
{+
+local object="$1"
+local src="$2"
+local options="$3"
+local selector="$4"
+
+objdump $options --disassemble --no-show-raw-insn "$object" | \
+awk -F ' ' +
+BEGIN{ file=""$object""; src=""$src""; } +
+Disassembly of section/ { segment=$4; sub(";","", segment); } +
+*/[0-9a-f-][0-9a-f]* <,*/: { tag=$0; sub(".*<","","", tag); sub(".*",","", tag); } +
+$0="/\(call|jmp\)q? *0x[0-9a-f]*\(\%rip\)\" { +
+next +
+} +
+$0="/\(call\)q? \%.*\/ { +
+sub(";","","", $1);
+if ("$selector") { +
+offset=$1
+$1=tag
+print(file ":","segment ":","offset ":" src ":" segment ":" $0);
+
+} +
+} +
+*' +
+
+# Accumulate potentially vunerable indirect call/jmp sequences. We do this
+# by examining the raw disassembly for affected forms, recording the location
+# of each.
+case "$bit16" in
+*)disassemble "$object" "$src" "segment != ".init.text" ;;
+*)disassemble "$object" "$src" --disassembler-options=i8086 'segment != ".init.text" && segment != ".text32" && segment != ".text64"
+disassemble "$object" "$src" --disassembler-options=i386 'segment == ".text32"
+disassemble "$object" "$src" --disassembler-options=x86-64 'segment == ".text64"
+;+
esac | sort -k 1b,1 >"$object.ur-detected"
+[ ! -s "$object.ur-detected" ] && rm -f "$object.ur-detected"
+
+# Load up the symbol table and section mappings.
+symbolmap_init "$object"
+sectionmap_init "$object"
Accumulate annotated safe indirect call/jmp sequences. We do this by examining the $SECTION sections (and their associated relocation information), each entry represents the address of an instruction which has been marked as ok.

```bash
+case "$section_relocation" in
+REL|rel "$object" ;;
+RELA|rela "$object" ;;
+esac | sort -k 1b,1 >"$object.ur-safe"
+[ ! -s "$object.ur-safe" ] && rm -f "$object.ur-safe"
+
+# We will perform the below join on the summarised and sorted fragments
+# formed above. This is performed in retpoline-check.
+#join -v 1 -j 1 "$tmp.extracted" "$tmp.safe" | sed -s 's/[^ ]*  */ */'
+
+rm -f "$tmp"
```

--- linux-4.15.0.orig/debian/scripts/sub-flavour
+++ linux-4.15.0/debian/scripts/sub-flavour
@@ -0,0 +1,69 @@

```bash
#!/bin/bash
.

debian/debian.env

echo "SUB_PROCESS $FROM => $TO"
+
export from_pkg="linux-image-$ABI_RELEASE-$FROM"
export to_pkg="linux-image-$ABI_RELEASE-$TO"
+
+from_moddir="debian/$from_pkg/lib/modules/$ABI_RELEASE-$FROM"
+to_moddir="debian/$to_pkg/lib/modules/$ABI_RELEASE-$FROM"
+
+install -d "debian/$to_pkg/boot"
+install -m444 debian/$from_pkg/boot/config-$ABI_RELEASE-$FROM \
+debian/$to_pkg/boot/
+install -m600 debian/$from_pkg/boot/{vmlinuz,System.map}-$ABI_RELEASE-$FROM \
+debian/$to_pkg/boot/
+
+# Print some warnings if there are files in the sub-flavours list
+# that do not actually exist.
+#
+cat ${DEBIAN}/sub-flavours/$TO.list | while read line
+do
+  cd debian/$from_pkg/lib/modules/$ABI_RELEASE-$FROM/kernel;
+#
+  # If its a wildcard, then check that there are files that match.
+  
```
if echo "$line" | grep "^" > /dev/null
then
if [ `eval find "$line" -name "*.ko" 2>/dev/null|wc -l` -lt 1 ]
then
  echo SUB_INST Warning - No files in $line
fi
#
# Else it should be a single file reference.
#
elif [ ! -f "$line" ]
then
echo SUB_INST Warning - could not find "$line"
fi
fi
done

cat ${DEBIAN}/sub-flavours/$TO.list | while read line; do
  ( cd debian/$from_pkg/lib/modules/$ABI_RELEASE-$FROM/kernel;
  if echo "$line" | grep "^" > /dev/null
  then
    eval find "$line" -name "*.ko" 2>/dev/null || true
  elif [ -f "$line" ]
  then
    echo "$line"
  fi
  );
  done | while read mod; do
    echo "SUB_INST checking: $mod"
    fromdir="/lib/modules/$ABI_RELEASE-$FROM/"
    egrep ""(\$fromdir)?/kernel/$mod:" "
    \%
    \$from_moddir/modules.dep | sed -e "s|^$fromdir||" -e 's/://' -e 's/\#/\n/g' | \n    while read m; do
      m="\$\{fromdir\}$m"
      test -f debian/$to_pkg/$m && continue
      echo "SUB_INST installing: $m"
      install -D -m644 debian/$from_pkg/$m
debian/$to_pkg/$m
    done
  done

--- linux-4.15.0.orig/debian/snapcraft.mk
+++ linux-4.15.0/debian/snapcraft.mk
@@ -0,0 +1,11 @@
+ifeq ($(ARCH),)
+  arch := $(shell uname -m | sed -e s/i.86/i386/ -e s/x86_64/amd64/ \
+                   -e s/arm.*/armhf/ -e s/s390/s390x/ -e s/ppc.*/powerpc/ \
+                   -e s/aarch64.*/arm64/ )
+else ifeq ($\{ARCH\},arm)
+ arch := armhf
+ else
+ arch := $(ARCH)
+ endif
+config:
+cat debian.$(branch)/config/config.common.ubuntu debian.$(branch)/config/$(arch)/config.common.$(arch)
debian.$(branch)/config/$(arch)/config.flavour.$(flavour) > .config
--- linux-4.15.0.orig/debian/source/format
+++ linux-4.15.0/debian/source/format
@@ -0,0 +1 @@
+1.0
--- linux-4.15.0.orig/debian/source/options
+++ linux-4.15.0/debian/source/options
@@ -0,0 +1,8 @@
+# Ignore vbox symlinks, we will regenerate these at clean (LP:1426113)
++# autoreconstruct -- begin
++# Ignore any symlinks created since the orig which are rebuilt by reconstruct.
++# autoreconstruct -- end
+
+## Ignore vbox symlinks, we will regenerate these at clean (LP:1426113)
+## autoreconstruct -- begin
+## Ignore any symlinks created since the orig which are rebuilt by reconstruct.
+## autoreconstruct -- end
+
+force "dpkg-source -i -i" behavior
+diff-ignore
tar-ignore
--- linux-4.15.0.orig/debian/stamps/keep-dir
+++ linux-4.15.0/debian/stamps/keep-dir
@@ -0,0 +1 @@
+Place holder
--- linux-4.15.0.orig/debian/templates/extra.postinst.in
+++ linux-4.15.0/debian/templates/extra.postinst.in
@@ -0,0 +1,20 @@
+#!/bin/sh
+set -e
+
+version=@abiname@@localversion@
+image_path=/boot/@image-stem@-$version
+
+if [ "$1" != configure ]; then
+ exit 0
+fi
+
+depmod -a -F /boot/System.map-$version $version || true
+if [ -d /etc/kernel/postinst.d ]; then
+ cat - >/usr/lib/linux/triggers/$version <<EOF
+DEB_MAINT_PARAMS="$*" run-parts --report --exit-on-error --arg=$version \
+ --arg="$image_path" /etc/kernel/postinst.d
+EOF
+ dpkg-trigger --no-await linux-update-$version
+fi
+
+exit 0
--- linux-4.15.0.orig/debian/templates/extra.postrm.in
+++
@@ -0,0 +1,31 @@
+#!/bin/sh
+set -e
+
+version=@abiname@@localversion@
+image_path=/boot/@image-stem@-$version
+
+if [ "$1" != remove ]; then
+  exit 0
+fi
+
+depmod -a -F /boot/System.map-$version $version 2>/dev/null || true
#
  # We should be rebuilding the initramfs here on removal to pare down the
  # initramfs if it contains any of the objects we just removed. But people
  # commonly remove kernels in order to free space in /boot, and rebuilding the
  +# initramfs now risks ENOSPC when we are trying to make space. The files we
  +# leave lying about could be confusing, but we trade that against safety on
  +# removal.
  +#
+  +# if [ -d /etc/kernel/postinst.d ]; then
+  +#  # We want to behave as if linux-image (without us) was installed, therefore
+  +#  # we do not want the postinst support to know we are being removed, claim
+  +#  # this is an installation event.
+  +#  cat - >/usr/lib/linux/triggers/$version <<EOF
+  #DEB_MAINT_PARAMS="configure" run-parts --report --exit-on-error --arg=$version -
+  #--arg="$image_path" /etc/kernel/postinst.d
+  #EOF
+  #dpkg-trigger --no-await linux-update-$version
+  +fi
+
+exit 0
--- linux-4.15.0.orig/debian/templates/headers.postinst.in
+++
@@ -0,0 +1,15 @@
+#!/bin/sh
+set -e
+
+version=@abiname@@localversion@
+
+if [ "$1" != configure ]; then
+  exit 0
+fi
+
+exit 0
+ DEB_MAINT_PARAMS="" run-parts --report --exit-on-error --arg=$version \n+ /etc/kernel/header_postinst.d
+fi
+
+exit 0
--- linux-4.15.0.orig/debian/templates/image.postinst.in
+++ linux-4.15.0/debian/templates/image.postinst.in
@@ -0,0 +1,62 @@
+#!/bin/sh
+set -e
+
+version=@abiname@@localversion@
+image_path=/boot/@image-stem@-$version
+
+# When we install linux-image we have to run kernel postinst.d support to
+# generate the initramfs, create links etc. Should it have an associated
+# linux-image-extra package and we install that we also need to run kernel
+# postinst.d, to regenerate the initramfs. If we are installing both at the
+# same time, we necessarily trigger kernel postinst.d twice. As this includes
+# rebuilding the initramfs and reconfiguring the boot loader this is very time
+# consuming.
+#
+# Similarly for removal when we remove the linux-image-extra package we need to
+# run kernel postinst.d handling in order to pare down the initramfs to
+# linux-image contents only. When we remove the linux-image need to remove the
+# now redundant initramfs. If we are removing both at the same time, then
+# we will rebuilt the initramfs and then immediately remove it.
+#
+# Switches to using a trigger against the linux-image package for all
+# postinst.d and postrm.d handling. On installation postinst.d gets triggered
+# twice once by linux-image and once by linux-image-extra. As triggers are
+# non-cumulative we will only run this processing once. When removing both
+# packages we will trigger postinst.d from linux-image-extra and then in
+# linux-image postrm.d we effectively ignore the pending trigger and simply run
+# the postrm.d. This prevents us from rebuilding the initramfs.
+#
+if [ "$1" = triggered ]; then
+  trigger=/usr/lib/linux/triggers/$version
+  if [ ! -f "$trigger" ]; then
+    sh "$trigger"
+    rm -f "$trigger"
+  fi
+  exit 0
+fi
+
+#if [ "$1" != configure ]; then
+  exit 0

```bash
+fi
+
+depmod $version
+
+if [ -f /lib/modules/$version/.fresh-install ]; then
+    change=install
+else
+    change=upgrade
+fi
+
+linux-update-symlinks $change $version $image_path
+rm -f /lib/modules/$version/.fresh-install
+
+if [ -d /etc/kernel/postinst.d ]; then
+    mkdir -p /usr/lib/linux/triggers
+    cat - >>/usr/lib/linux/triggers/$version
+    EOF
+    dpkg-trigger --no-await linux-update-$version
+fi
+
+exit 0
--- linux-4.15.0.orig/debian/templates/image.postrm.in
+++ linux-4.15.0/debian/templates/image.postrm.in
@@ -0,0 +1,40 @@
+#!/bin/sh
+set -e
+
+version=@abiname@@localversion@
+image_path=/boot/@image-stem@-$version
+
+rm -f /lib/modules/$version/.fresh-install
+
+if [ "$1" != upgrade ] && command -v linux-update-symlinks >/dev/null; then
+    linux-update-symlinks remove $version $image_path
+fi
+
+if [ -d /etc/kernel/postrm.d ]; then
+    # We cannot trigger ourselves as at the end of this we will no longer
+    # exist and can no longer respond to the trigger. The trigger would
+    # then become lost. Therefore we clear any pending trigger and apply
+    # postrm directly.
+    if [ -f /usr/lib/linux/triggers/$version ]; then
+        echo "$0 ... removing pending trigger"
+        rm -f /usr/lib/linux/triggers/$version
+    fi
+    DEB_MAINT_PARAMS="*$" run-parts --report --exit-on-error --arg=$version \
+    --arg=$image_path /etc/kernel/postrm.d
+    EOF
```

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+fi
+
+if [ "$1" = purge ]; then
+ for extra_file in modules.dep modules.isapnpmap modules.pcinmap \ 
+     modules.usbmap modules.parportmap \ 
+     modules.generic_string modules.ieee1394map \ 
+     modules.ieee1394map modules.pnpbiosmap \ 
+     modules.alias modules.ccwmap modules.inputmap \ 
+     modules.symbols modules.ofmap \ 
+     modules.seriomap modules.*.bin \ 
+     modules.softdep modules.devname; do
+     eval rm -f /lib/modules/$version/$extra_file
+     done
+     rmdir /lib/modules/$version || true
+fi
+
+exit 0
--- linux-4.15.0.orig/debian/templates/image.preinst.in
+++ linux-4.15.0/debian/templates/image.preinst.in
@@ -0,0 +1,22 @@
+#!/bin/sh
+set -e
+
+version=@abiname@@localversion@
+image_path=/boot/@image-stem@-$version
+
+if [ "$1" = abort-upgrade ]; then
+    exit 0
+fi
+
+if [ -d /etc/kernel/preinst.d ]; then
+    DEB_MAINT_PARAMS="$*" run-parts --report --exit-on-error --arg=$version \ 
+        --arg=$image_path /etc/kernel/preinst.d
+fi
+
+exit 0
--- linux-4.15.0.orig/debian/templates/image.prerm.in
+++ linux-4.15.0/debian/templates/image.prerm.in
@@ -0,0 +1,18 @@
+#!/bin/sh
+set -e
+
version=@abiname@@localversion@
+image_path=/boot/@image-stem@-$version
+
+if [ "$1" != remove ]; then
+    exit 0
+fi
+
+linux-check-removal $version
+
+if [ -d /etc/kernel/prerm.d ]; then
+    DEB_MAINT_PARAMS="$*" run-parts --report --exit-on-error --arg=$version \
+    --arg=$image_path /etc/kernel/prerm.d
+fi
+
+exit 0
--- linux-4.15.0.orig/debian/tests-build/README
+++ linux-4.15.0/debian/tests-build/README
@@ -0,0 +1,21 @@
+Scripts placed in this directory get called one at a time by run-parts(8).
+The scripts are expected to perform some sort of sanity checks on the
+finished build. Scripts will be called once for each flavour.
+
+Some environment variables are exported to make life a little easier:
+
+DPKG_ARCH     : The dpkg architecture (e.g. "amd64")
+KERN_ARCH     : The kernel architecture (e.g. "x86_64")
+FLAVOUR       : The specific flavour for this run (e.g. "generic")
+VERSION       : The full version of this build (e.g. 2.6.22-1)
+REVISION      : The exact revision of this build (e.g. 1.3)
+PREV_REVISION : The revision prior to this one
+ABI_NUM       : The specific ABI number for this build (e.g. 2)
+PREV_ABI_NUM  : The previous ABI number. Can be the same as ABI_NUM.
+BUILD_DIR     : The directory where this build took place
+INSTALL_DIR   : The directory where the package is prepared
+SOURCE_DIR    : Where the main kernel source is
+
+Scripts are expected to have a zero exit status when no problems occur,
+and non-zero when an error occurs that should stop the build. Scripts
+should print whatever info they deem needed to deduce the problem.
--- linux-4.15.0.orig/debian/tests-build/check-aliases
+++ linux-4.15.0/debian/tests-build/check-aliases
@@ -0,0 +1,24 @@
+#!/usr/bin/perl -w
+
+my %map;
+
+print "Checking for dupe aliases in $ENV{FLAVOUR}...\n";
+$aliases =
+  "$ENV{'INSTALL_DIR'}/lib/modules/$ENV{'VERSION'}-$ENV{'FLAVOUR'}/modules.alias";
+
+open(ALIASES, "< $aliases") or die "Could not open $aliases";
+
+while (<ALIASES>) {
+  chomp;
+  my ($junk, $alias, $module) = split;
+
+  if (defined($map{$alias})) {
+    printf("%s %20s / %-20s : %s\n", ($map{$alias} eq $module) ? "INT" : "   ", $map{$alias}, $module, $alias);
+  } else {
+    $map{$alias} = $module;
+  }
+}
+
+exit(0);

--- linux-4.15.0.orig/debian/tests/control
+++ linux-4.15.0/debian/tests/control
@@ -0,0 +1,7 @@
+Tests: rebuild
+Depends: @builddeps@, fakeroot
+Restrictions: allow-stderr, skippable
+
+Tests: ubuntu-regression-suite
+Depends: build-essential, gcc-multilib [amd64 armhf i386], gdb, git, bzr
+Restrictions: allow-stderr, isolation-machine, breaks-testbed, skippable

--- linux-4.15.0.orig/debian/tests/rebuild
+++ linux-4.15.0/debian/tests/rebuild
@@ -0,0 +1,20 @@
+#!/bin/sh
+
+# If we are triggering for just linux or linux-meta we know we have
+# just built the kernel and there is no point in repeating that
+# build, it just wastes time. (LP: #1498862)
+build_needed=0
+for trigger in ${ADT_TEST_TRIGGERS:-force}
+do
+  case "$trigger" in
+    linux/*|linux-lts-*|linux-meta*|linux-oem*|fakeroot*/[^gdb[^git[/[^bzr[^gcc-multilib*/]]]]]]
+    *)build_needed=1 ;;
+  esac
+done
+if [ "$build_needed" -eq 0 ]; then
+  echo "rebuild: short circuiting build for $ADT_TEST_TRIGGERS"
+  exit 77
+fi
+set -e
+dpkg-buildpackage -rfakeroot -us -uc -b -Pautopkgtest
--- linux-4.15.0.orig/debian/tests/ubuntu-regression-suite
+++ linux-4.15.0/debian/tests/ubuntu-regression-suite
@@ -0,0 +1,45 @@
+#!/bin/sh
+set -e
+
+# Only run regression-suite on kernels we can boot in canonistack
+source=`dpkg-parsechangelog -SSource`
+case $source in
+    linux|linux-hwe|linux-kvm|linux-oem)
+    ;;
+    *)
+    +echo "ubuntu-regression-suite is pointless, if one cannot boot the kernel"
+    +exit 77
+    ;;
+    +esac
+
+# Only run regression-suite if we were requested to
+have_meta=0
+for trigger in ${ADT_TEST_TRIGGERS}
+    do
+        case "$trigger" in
+        linux-meta/*|linux-meta-*/*)
+        +have_meta=1
+        + ;;
+        + esac
+    done
+if [ -n "$ADT_TEST_TRIGGERS" ] && [ "$have_meta" -eq 0 ]; then
+    echo "ubuntu-regression-suite is not requested, as there is no linux-meta trigger"
+    +exit 77
+fi
+
+sver=`dpkg-parsechangelog -SVersion`
+read x rver x </proc/version_signature
+
+flavour=${rver#*-*-}
+rver=${rver%-$flavour}
+
+echo "Source Package Version: $sver"
+echo "Running Kernel Version: $rver"
+
+if [ "$sver" != "$rver" ]; then
+    +echo "$ERROR: running version does not match source package" 1>&2
+    +exit 1
+fi
+git clone git://kernel.ubuntu.com/ubuntu/kernel-testing
+kernel-testing/run-dep8-tests
--- linux-4.15.0.orig/debian/tools/generic
+++ linux-4.15.0/debian/tools/generic
@@ -0,0 +1,60 @@
+#!/bin/bash
+full_version=`uname -r`
+
+# First check for a fully qualified version.
+this="/usr/lib/linux-tools/`basename $0`"
+if [ -f "$this" ]; then
+exec "$this" "$@
+fi
+
+# Removing flavour from version i.e. generic or server.
+flavour_abi=${full_version#*-}
+flavour=${flavour_abi#*-}
+version=${full_version%-$flavour}
+this="$0_$version"
+if [ -f "$this" ]; then
+exec "$this" "$@" 
+fi
+
+# Before saucy kernels we had no flavour linkage.
+if dpkg --compare-versions "$version" lt "3.11.0"; then
+flavour=""
+else
+flavour="-$flavour"
+fi
+
+# Hint at the cloud tools if they exist (trusty and later)
+if dpkg --compare-versions "$version" ge "3.13.0"; then
+cld=""
+else
+cld="."
+fi
+
+# Work out if this is an LTS backport or not.
+codename="lsb_release -cs"
+case "$codename" in
+precise)base='3.2.0-9999' ;;
+trusty)base='3.13.0-9999' ;;
+*)base="" ;;
+esac
+std=""
+lts="."
+if [ "$base" != "" ]; then
+if dpkg --compare-versions "$version" gt "$base"; then
+std="."
+else
+std="" 
+fi
+echo $std $lts $cld $this
+fi
+
+lts="" \\
lts="" \\
+fi \\
+fi \\
+
 +# Give them a hint as to what to install.
+echo "WARNING: `basename $0` not found for kernel $version" >&2 \\
+echo "" >&2 \\
+echo " You may need to install the following packages for this specific kernel:" >&2 \\
+echo " linux-tools-$version$flavour" >&2 \\
+$cld+echo " linux-cloud-tools-$version$flavour" >&2 \\
+echo "" >&2 \\
+echo " You may also want to install one of the following packages to keep up to date:" >&2 \\
+$std $cld+echo " linux-tools$flavour" >&2 \\
+$std $cld+echo " linux-cloud-tools$flavour" >&2 \\
+$lts $cld+echo " linux-tools$flavour-lts-<series>" >&2 \\
+$lts $cld+echo " linux-cloud-tools$flavour-lts-<series>" >&2 \\
+
+exit 2 \\
--- linux-4.15.0.orig/debian/wireguard-modules.ignore \\
+++ linux-4.15.0/debian/wireguard-modules.ignore \\
@@ -0,0 +1 @@ \\
+wireguard \\
--- linux-4.15.0.orig/debian/zfs-modules.ignore \\
+++ linux-4.15.0/debian/zfs-modules.ignore \\
@@ -0,0 +1,9 @@ \\
+icp \\
+spl \\
+splat \\
+zavl \\
+zcommon \\
+zfs \\
+znvpair \\
+zpios \\
+zunicode \\
--- linux-4.15.0.orig/drivers/Makefile \\
+++ linux-4.15.0/drivers/Makefile \\
@@ -61,14 +61,9 @@
 # iommu/ comes before gpu as gpu are using iommu controllers \\
 obj-$$(CONFIG_IOMMU_SUPPORT) += iommu/ \\
 
 -# gpu/ comes after char for AGP vs DRM startup and after iommu \\
 -obj-y += gpu/ \\
 
 obj-$$(CONFIG_CONNECTOR) += connector/ \\
 
 -# i810fb and intelfb depend on char/agp/ \\
 -obj-$$(CONFIG_FB_I810) += video/fbdev/i810/ \\
 -obj-$$(CONFIG_FB_INTEL) += video/fbdev/intelfb/
obj-$(CONFIG_PARPORT) += parport/
obj-$(CONFIG_NVM) += lightnvm/
@@ -82,6 +77,12 @@
obj-$(CONFIG_SCSI) += scsi/
obj-y += nvme/
obj-$(CONFIG_ATA) += ata/
+
+# gpu/ comes after char for AGP vs DRM startup and after iommu
+obj-y += gpu/
+# i810fb and intelfb depend on char/agp/
+obj-$(CONFIG_FB_I810) += video/fbdev/i810/
+obj-$(CONFIG_FB_INTEL) += video/fbdev/intelfb/
obj-$(CONFIG_TARGET_CORE) += target/
obj-$(CONFIG_MTD) += mtd/
obj-$(CONFIG_SPI) += spi/
--- linux-4.15.0.orig/drivers/acpi/Kconfig
+++ linux-4.15.0/drivers/acpi/Kconfig
@@ -3,13 +3,15 @@
# ACPI Configuration
#
+config ARCH_SUPPORTS_ACPI
+bool
+
+menuconfig ACPI
bool "ACPI (Advanced Configuration and Power Interface) Support"
-depends on !IA64_HP_SIM
-depends on IA64 || X86 || ARM64
+depends on ARCH_SUPPORTS_ACPI
depends on PCI
select PNP
-default y if (IA64 || X86)
+default y if X86
help
Advanced Configuration and Power Interface (ACPI) support for
Linux requires an ACPI-compliant platform (hardware/firmware),
@@ -545,6 +547,9 @@
if ARM64
source "drivers/acpi/arm64/Kconfig"
+
+config ACPI_PPTT
+bool
endif

cfg=TPS68470_PMIC_OPREGION
--- linux-4.15.0.orig/drivers/acpi/Makefile
+++ linux-4.15.0/drivers/acpi/Makefile
@@ -8,6 +8,11 @@
# ACPI Boot-Time Table Parsing
#
+ifeq ($(CONFIG_ACPI_CUSTOM_DSDT),y)
+tables.o: $(src)/../../include/$(subst $",,$(CONFIG_ACPI_CUSTOM_DSDT_FILE)) ;
+
+endif
+
obj-$(CONFIG_ACPI) += tables.o
obj-$(CONFIG_X86) += blacklist.o

@@ -87,6 +92,7 @@
obj-$(CONFIG_ACPI_CPPC_LIB) += cppc_acpi.o
obj-$(CONFIG_ACPI_SPCR_TABLE) += spcr.o
obj-$(CONFIG_ACPI_DEBUGGER_USER) += acpi_dbg.o
+obj-$(CONFIG_ACPI_PPTT) += pptt.o

# processor has its own "processor." module_param namespace
processor-y := processor_driver.o
--- linux-4.15.0.orig/drivers/acpi/ac.c
+++ linux-4.15.0/drivers/acpi/ac.c
@@ -318,8 +318,8 @@
static const struct dmi_system_id ac_dmi_table[] = {
 {
+/* Thinkpad e530 */
 .callback = thinkpad_e530_quirk,
 - .ident = "thinkpad e530",
 - .matches = {
 DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
 DMI_MATCH(DMI_PRODUCT_NAME, "32597CG"),
 --- linux-4.15.0.orig/drivers/acpi/acpi_amba.c
 +++ linux-4.15.0/drivers/acpi/acpi_amba.c
 @@ -70,6 +70,7 @@
 case IORESOURCE_MEM:
 if (!address_found) {
 dev->res = *rentry->res;
+dev->res.name = dev_name(&dev->dev);
 address_found = true;
 }
 break;
 --- linux-4.15.0.orig/drivers/acpi/acpi_configfs.c
 +++ linux-4.15.0/drivers/acpi/acpi_configfs.c
 @@ -31,8 +31,12 @@
 {
 const struct acpi_table_header *header = data;

struct acpi_table *table;
bool locked_down = kernel_is_locked_down("modifying ACPI tables");
int ret;

if (locked_down)
+return -EPERM;
+
+table = container_of(cfg, struct acpi_table, cfg);
+
if (table->header) {
@@ -269,7 +273,12 @@
acpi_table_group = configfs_register_default_group(root, "table",
 &acpi_tables_type);
-return PTR_ERR_OR_ZERO(acpi_table_group);
+if (IS_ERR(acpi_table_group)) {
+configfs_unregister_subsystem(&acpi_configfs);
+return PTR_ERR(acpi_table_group);
+}
+
+return 0;
}
module_init(acpi_configfs_init);

--- linux-4.15.0.orig/drivers/acpi/acpi_dbg.c
+++ linux-4.15.0/drivers/acpi/acpi_dbg.c
@@ -757,6 +757,9 @@
 goto err_exit;
 }

+if (acpi_disabled)
+return -ENODEV;
+
 /* Initialize AML IO interface */
 mutex_init(&acpi_aml_io.lock);
 init_waitqueue_head(&acpi_aml_io.wait);
--- linux-4.15.0.orig/drivers/acpi/acpi_extlog.c
+++ linux-4.15.0/drivers/acpi/acpi_extlog.c
@@ -224,9 +224,9 @@
 u64 cap;
 int rc;

 -rdmsr(MSR_IA32_MCG_CAP, cap);
 -
-!((cap & MCG_ELOG_P) || !extlog_get_l1addr())
+if (rdmsr_safe(MSR_IA32_MCG_CAP, &cap) ||
+!((cap & MCG_ELOG_P) ||
+!extlog_get_l1addr()))
return -ENODEV;

if (edac_get_report_status() == EDAC_REPORTING_FORCE) {
    return 0;
}

EXPORT_SYMBOL_GPL(lpit_read_residency_count_address);

static void lpit_update_residency(struct lpit_residency_info *info,
    struct acpi_lpit_native *lpit_native)
{
    if (!info->iomem_addr)
        return;
    if (!(acpi_gbl_FADT.flags & ACPI_FADT_LOW_POWER_S0))
        return;
    /* Silently fail, if cpuidle attribute group is not present */
    sysfs_add_file_to_group(&cpu_subsys.dev_root->kobj,
        &dev_attr_low_power_idle_system_residency_us.attr,
        "cpuidle");
    } else if (info->gaddr.space_id == ACPI_ADR_SPACE_FIXED_HARDWARE) {
        return;
    /* Silently fail, if cpuidle attribute group is not present */
    sysfs_add_file_to_group(&cpu_subsys.dev_root->kobj,
        &dev_attr_low_power_idle_cpu_residency_us.attr,
        "cpuidle");
    }
}

#include <linux/pm_domain.h>
#include <linux/pm_runtime.h>
#include <linux/pwm.h>
+#include <linux/suspend.h>
#include <linux/delay.h>

#include "internal.h"

#define LPSS_SAVE_CTX		BIT(4)
#define LPSS_NO_D3_DELAY		BIT(5)

/* Crystal Cove PMIC shares same ACPI ID between different platforms */
+#define BYT_CRC_HRV2
+#define CHT_CRC_HRV3
+ struct lpss_private_data;

struct lpss_device_desc {
  size_t prv_size_override;
  struct property_entry *properties;
  void (*setup)(struct lpss_private_data *pdata);
  bool resume_from_noirq;
};

static const struct lpss_device_desc lpss_dma_desc = {
  u32 prv_reg_ctx[LPSS_PRV_REG_COUNT];
};

/* Devices which need to be in D3 before lpss_iosf_enter_d3_state() proceeds */
+static u32 pmc_atom_d3_mask = 0xfe000ffe;
+
/* LPSS run time quirks */
static unsigned int lpss_quirks;

/* Expected to always be true, but better safe then sorry */
@if (uid_str)
  uid = simple_strtol(uid_str, NULL, 10);
@end

/* Detect I2C bus shared with PUNIT and ignore its d3 status */
+static void byt_i2c_setup(struct lpss_private_data *pdata)
  ++const char *uid_str = acpi_device_uid(pdata->addev);
  +acpi_handle handle = pdata->addev->handle;
  +unsigned long long shared_host = 0;
  +acpi_status status;
  ++long uid = 0;
  +
  +/* Expected to always be true, but better safe then sorry */
  +if (uid_str)
    +uid = simple_strtol(uid_str, NULL, 10);
  +
  +/* Detect I2C bus shared with PUNIT and ignore its d3 status */
  +status = acpi Evaluate_integer(handle, "_SEM", NULL, &shared_host);
  +if (ACPI_SUCCESS(status) && shared_host && uid)
+pmc_atom_d3_mask &= ~(BIT_LPSS2_F1_I2C1 << (uid - 1));
+
lpss_deassert_reset(pdata);

if (readl(pdata->mmio_base + pdata->dev_desc->prv_offset))
@@ -229,11 +253,13 @@
    .flags = LPSS_SAVE_CTX,
    .prv_offset = 0x800,
    .setup = byt_pwm_setup,
};

static const struct lpss_device_desc bsw_pwm_dev_desc = {
    .flags = LPSS_SAVE_CTX | LPSS_NO_D3_DELAY,
    .prv_offset = 0x800,
    .setup = bsw_pwm_setup,
};

@@ -267,12 +293,14 @@
    .flags = LPSS_CLK | LPSS_SAVE_CTX | LPSS_NO_D3_DELAY,
    .prv_offset = 0x800,
    .setup = byt_i2c_setup,
    .resume_from_noirq = true,
};

static const struct lpss_device_desc bsw_i2c_dev_desc = {
    .flags = LPSS_CLK | LPSS_SAVE_CTX | LPSS_NO_D3_DELAY,
    .prv_offset = 0x800,
    .setup = byt_i2c_setup,
    .resume_from_noirq = true,
};

static const struct lpss_device_desc bsw_spi_dev_desc = {
    .flags = LPSS_CLK | LPSS_SAVE_CTX | LPSS_NO_D3_DELAY,
    .prv_offset = 0x800,
    .setup = byt_i2c_setup,
    .resume_from_noirq = true,
};

static const struct x86_cpu_id lpss_cpu_ids[] = {
#define ICPU(model)	{ X86_VENDOR_INTEL, 6, model, X86_FEATURE_ANY, }
    ICPU(INTEL_FAM6_ATOM_AIRMONT),/* Braswell, Cherry Trail */
    ICPU(INTEL_FAM6_ATOM_AIRMONT),/* Braswell, Cherry Trail */
    ICPU(INTEL_FAM6_ATOM_SILVERMONT1),/* Valleyview, Bay Trail */
    ICPU(INTEL_FAM6_ATOM_SILVERMONT1),/* Valleyview, Bay Trail */
};

/* Braswell LPSS devices */
+{ "80862286", LPSS_ADDR(lpss_dma_desc) },

/* Braswell LPSS devices */
{ "80862288", LPSS_ADDR(bsw_pwm_dev_desc) },
{ "8086228A", LPSS_ADDR(bsw_uart_dev_desc) },
{ "8086228E", LPSS_ADDR(bsw_spi_dev_desc) },
{ "808622C0", LPSS_ADDR(lpss_dma_desc) },
{ "808622C1", LPSS_ADDR(bsw_i2c_dev_desc) },

/* Broadwell LPSS devices */
@@ -465,6 +495,8 @ @
acpi_dev_free_resource_list(&resource_list);

if (!pdata->mmio_base) {
+/* Avoid acpi_bus_attach() instantiating a pdev for this dev. */
+audev->type.platform_id = 0;
/* Skip the device, but continue the namespace scan. */
ret = 0;
goto err_out;
@@ -490,12 +522,7 @@
* have _PS0 and _PS3 without _PSC (and no power resources), so
* acpi_bus_init_power() will assume that the BIOS has put them into D0.
*/
-ret = acpi_device_fix_up_power(audev);
-if (ret) {
-/* Skip the device, but continue the namespace scan. */
-ret = 0;
-goto err_out;
-}
+acpi_device_fix_up_power(audev);

adev->driver_data = pdata;
pdev = acpi_create_platform_device(audev, dev_desc->properties);
@@ -733,6 +760,7 @ @
#define LPSS_GPIODEF0_DMA_LLPBIT	BIT(13)
static DEFINE_MUTEX(lpss_iosf_mutex);
static bool lpss_iosf_d3_entered = true;
static void lpss_iosf_enter_d3_state(void)
{
@@ -745,7 +773,7 @ @
* Here we read the values related to LPSS power island, i.e. LPSS
* devices, excluding both LPSS DMA controllers, along with SCC domain.
*/
-ret = pmc_atom_read(PMC_FUNC_DIS, &func_dis);
+u32 func_dis, d3_sts_0, pmc_status, pmc_mask = 0x000ffe;
-int ret;

ret = pmc_atom_read(PMC_FUNC_DIS, &func_dis);

* Shutdown both LPSS DMA controllers if and only if all other devices
* are already in D3hot.
*/
-pmc_status = (~d3_sts_0 & func_dis) & pmc_mask;
+pmc_status = (~d3_sts_0 & func_dis) & pmc_atom_d3_mask;
if (pmc_status)
goto exit;

iosf_mbi_modify(LPSS_IOSF_UNIT_LPIOEP, MBI_CR_WRITE,
LPSS_IOSF_GPIODEF0, value1, mask1);
+
+lpss_iosf_d3_entered = true;
+
exit:
mutex_unlock(&lpss_iosf_mutex);
}

mutex_lock(&lpss_iosf_mutex);

+if (!lpss_iosf_d3_entered)
+goto exit;
+
+lpss_iosf_d3_entered = false;
+
iosf_mbi_modify(LPSS_IOSF_UNIT_LPIOEP, MBI_CR_WRITE,
LPSS_IOSF_GPIODEF0, value1, mask1);

iosf_mbi_modify(LPSS_IOSF_UNIT_LPIO1, MBI_CFG_WRITE,
LPSS_IOSF_PMCSR, value2, mask2);
+
exit:
mutex_unlock(&lpss_iosf_mutex);

*/
-if (lpss_quirks & LPSS_QUIRK_ALWAYS_POWER_ON && iosf_mbi_available())
+if (acpi_target_system_state() == ACPI_STATE_S0 &&
+lpss_quirks & LPSS_QUIRK_ALWAYS_POWER_ON && iosf_mbi_available())
lpss_iosf_enter_d3_state();

return ret;
```c
#ifdef CONFIG_PM_SLEEP
-static int acpi_lpss_suspend_late(struct device *dev)
+static int acpi_lpss_do_suspend_late(struct device *dev)
{
    int ret;

    return ret ? ret : acpi_lpss_suspend(dev, device_may_wakeup(dev));
}

-static int acpi_lpss_resume_early(struct device *dev)
+static int acpi_lpss_suspend_late(struct device *dev)
{
    struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
    
    if (pdata->dev_desc->resume_from_noirq)
        return 0;
    
    return acpi_lpss_do_suspend_late(dev);
+
+static int acpi_lpss_suspend_noirq(struct device *dev)
{
    struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
    int ret;
    
    if (pdata->dev_desc->resume_from_noirq) {
        /*
        * The driver's ->suspend_late callback will be invoked by
        * acpi_lpss_do_suspend_late(), with the assumption that the
        * driver really wanted to run that code in ->suspend_noirq, but
        * it could not run after acpi_dev_suspend() and the driver
        * expected the latter to be called in the "late" phase.
        */
        ret = acpi_lpss_do_suspend_late(dev);
        if (ret)
            return ret;
    }
    
    return acpi_subsys_suspend_noirq(dev);
+
+static int acpi_lpss_do_resume_early(struct device *dev)
{
    int ret = acpi_lpss_resume(dev);
```
return ret ? ret : pm_generic_resume_early(dev);
}
+
+static int acpi_lpss_resume_early(struct device *dev)
+{
+struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
+
+if (pdata->dev_desc->resume_from_noirq)
+return 0;
+
+return acpi_lpss_do_resume_early(dev);
+}
+
+static int acpi_lpss_resume_noirq(struct device *dev)
+{
+struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
+
+int ret;
+
+/* Follow acpi_subsys_resume_noirq(). */
+if (dev_pm_may_skip_resume(dev))
+return 0;
+
+if (dev_pm_smart_suspend_and_suspended(dev))
+pm_runtime_set_active(dev);
+
+ret = pm_generic_resume_noirq(dev);
+if (ret)
+return ret;
+
+if (!pdata->dev_desc->resume_from_noirq)
+
+/* The driver's ->resume_early callback will be invoked by
+ * acpi_lpss_do_resume_early(), with the assumption that the driver
+ * really wanted to run that code in ->resume_noirq, but it could not
+ * run before acpi_dev_resume() and the driver expected the latter to be
+ * called in the "early" phase.
+ */
+return acpi_lpss_do_resume_early(dev);
+
+static int acpi_lpss_do_restore_early(struct device *dev)
+{
+int ret = acpi_lpss_resume(dev);
+
+return ret ? ret : pm_generic_restore_early(dev);
+}
+
+static int acpi_lpss_restore_early(struct device *dev)
+{
+struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
+
+if (pdata->dev_desc->resume_from_noirq)
+return 0;
+
+return acpi_lpss_do_restore_early(dev);
+}
+
+static int acpi_lpss_restore_noirq(struct device *dev)
+{
+struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
+
+int ret;
+
+ret = pm_generic_restore_noirq(dev);
+if (ret)
+return ret;
+
+if (!pdata->dev_desc->resume_from_noirq)
+return 0;
+
+/* This is analogous to what happens in acpi_lpss_resume_noirq(). */
+return acpi_lpss_do_restore_early(dev);
+}
+
+static int acapi_lpss_do_poweroff_late(struct device *dev)
+{
+int ret = pm_generic_poweroff_late(dev);
+
+return ret ? ret : acpi_lpss_suspend(dev, device_may_wakeup(dev));
+}
+
+static int acpi_lpss_poweroff_late(struct device *dev)
+{
+struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
+
+if (dev_pm_smart_suspend_and_suspended(dev))
+return 0;
+
+if (pdata->dev_desc->resume_from_noirq)
+return 0;
+
+return acpi_lpss_do_poweroff_late(dev);
+}
+static int acpi_lpss_poweroff_noirq(struct device *dev)
+{
+    struct lpss_private_data *pdata = acpi_driver_data(ACPI_COMPANION(dev));
+
+    if (dev->pm_smart_suspend_and_suspended(dev))
+        return 0;
+
+    if (pdata->dev_desc->resume_from_noirq) {
+        /* This is analogous to the acpi_lpss_suspend_noirq() case. */
+        int ret = acpi_lpss_do_poweroff_late(dev);
+        if (ret)
+            return ret;
+    }
+
+    return pm_generic_poweroff_noirq(dev);
+}
#
endif /* CONFIG_PM_SLEEP */

static int acpi_lpss_runtime_suspend(struct device *dev)
@@ -893,18 +1071,15 @@
.atan complete = acpi_subsys_complete,
.atan suspend = acpi_subsys_suspend,
.atan suspend_late = acpi_lpss_suspend_late,
.atan suspend_noirq = acpi_subsys_suspend_noirq,
.atan resume_noirq = acpi_subsys_resume_noirq,
.atan suspend_noirq = acpi_lpss_suspend_noirq,
.atan resume_noirq = acpi_lpss_resume_noirq,
.atan resume_early = acpi_lpss_resume_early,
.atan freeze = acpi_subsys_freeze,
.atan freeze_late = acpi_subsys_freeze_late,
.atan freeze_noirq = acpi_subsys_freeze_noirq,
.atan thaw_noirq = acpi_subsys_thaw_noirq,
.atan poweroff = acpi_subsys_suspend,
.atan poweroff_late = acpi_lpss_suspend_late,
.atan poweroff_noirq = acpi_subsys_suspend_noirq,
.atan restore_noirq = acpi_subsys_resume_noirq,
.atan restore_early = acpi_lpss_resume_early,
.atan runtime_suspend = acpi_lpss_runtime_suspend,
.atan runtime_resume = acpi_lpss_runtime_resume,
.atan --- linux-4.15.0.orig/drivers/acpi/acpi_memhotplug.c
.atan +++ linux-4.15.0/drivers/acpi/acpi_memhotplug.c
.atan @@ -228,7 +228,7 @@
if (node < 0)
node = memory_add_physaddr_to_nid(info->start_addr);

-result = add_memory(node, info->start_addr, info->length);
+result = __add_memory(node, info->start_addr, info->length);

/*
 * If the memory block has been used by the kernel, add_memory()
--- linux-4.15.0.orig/drivers/acpi/acpi_pad.c
+++ linux-4.15.0/drivers/acpi/acpi_pad.c
@@ -110,6 +110,7 @@
cpumask_andnot(tmp, cpu_online_mask, pad_busy_cpus);
if (cpumask_empty(tmp)) {
    mutex_unlock(&round_robin_lock);
    +free_cpumask_var(tmp);
    return;
}
for_each_cpu(cpu, tmp) {
@@ -127,6 +128,8 @@
    mutex_unlock(&round_robin_lock);

    set_cpus_allowed_ptr(current, cpumask_of(preferred_cpu));
    +
    +free_cpumask_var(tmp);
}

static void exit_round_robin(unsigned int tsk_index)
--- linux-4.15.0.orig/drivers/acpi/acpi_platform.c
+++ linux-4.15.0/drivers/acpi/acpi_platform.c
@@ -30,6 +30,7 @@
    {"PNP0200", 0}, /* AT DMA Controller */
    {"ACPI0009", 0}, /* IOxAPIC */
    {"ACPI000A", 0}, /* IOAPIC */
+    {"SMB0001", 0}, /* ACPI SMBUS virtual device */
    {"", 0},
};

--- linux-4.15.0.orig/drivers/acpi/acpi_pnp.c
+++ linux-4.15.0/drivers/acpi/acpi_pnp.c
@@ -320,6 +320,9 @@
{
    int i;

    +if (strlen(idstr) != strlen(list_id))
    +return false;
    +
    if (memcmp(idstr, list_id, 3))
return false;
if (acpi_duplicate_processor_id(pr->acpi_id)) {
    if (pr->acpi_id == 0xff)
        dev_info_once(&device->dev,
            +"Entry not well-defined, consider updating BIOS\n");
else
    dev_err(&device->dev,
        +"Failed to get unique processor _UID (0x%x)\n",
            -pr->acpi_id);
    return -ENODEV;
}

status = acpi_get_type(handle, &acpi_type);
if (ACPI_FAILURE(status))
    -return false;
+return status;

switch (acpi_type) {
    case ACPI_TYPE_PROCESSOR:
        @ -663,11 +667,12 @@

        processor_validated_ids_update(uid);
        -return true;
+return AE_OK;

err:
+/* Exit on error, but don't abort the namespace walk */
acpi_handle_info(handle, "Invalid processor object\n");
    -return false;
+return AE_OK;

}
"0: none, 1: output changes, 2: brightness changes, 3: all";  

+static int hw_changes_brightness = -1;  
+module_param(hw_changes_brightness, int, 0644);  
+MODULE_PARM_DESC(hw_changes_brightness,  
+"Set this to 1 on buggy hw which changes the brightness itself when "  
+"a hotkey is pressed: -1: auto, 0: normal 1: hw-changes-brightness");  
+  
/*  
* Whether the struct acpi_video_device_attrib::device_id_scheme bit should be  
* assumed even if not actually set.  
@@ -80,8 +86,8 @@
static bool device_id_scheme = false;  
module_param(device_id_scheme, bool, 0444);  
-static bool only_lcd = false;  
-module_param(only_lcd, bool, 0444);  
+static int only_lcd = -1;  
+module_param(only_lcd, int, 0444);  

static int register_count;  
static DEFINE_MUTEX(register_count_mutex);  
@@ -418,6 +424,14 @@
return 0;  
}  

+static int video_hw_changes_brightness(  
+const struct dmi_system_id *d)  
+{  
+if (hw_changes_brightness == -1)  
+hw_changes_brightness = 1;  
+return 0;  
+}  
+
static const struct dmi_system_id video_dmi_table[] = {
/*  
* Broken _BQC workaround http://bugzilla.kernel.org/show_bug.cgi?id=13121  
@@ -542,6 +556,30 @@
DMI_MATCH(DMI_PRODUCT_NAME, "Vostro V131"),  
},  
},  
+{  
+.callback = video_set_report_key_events,  
+.driver_data = (void *)((uintptr_t)REPORT_BRIGHTNESS_KEY_EVENTS),  
+.ident = "Dell Vostro 3350",  
+.matches = {  
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),  
+DMI_MATCH(DMI_PRODUCT_NAME, "Vostro 3350"),
Some machines change the brightness themselves when a brightness hotkey gets pressed, despite us telling them not to. In this case, `acpi_video_device_notify()` should only call `backlight_force_update(backlight, BACKLIGHT_UPDATE_HOTKEY)` and not do anything else.

```c
+ /* https://bugzilla.kernel.org/show_bug.cgi?id=204077 */
+ .callback = video_hw_changes_brightness,
+ .ident = "Packard Bell EasyNote MZ35",
+ .matches = {
+     DMI_MATCH(DMI_SYS_VENDOR, "Packard Bell"),
+     DMI_MATCH(DMI_PRODUCT_NAME, "EasyNote MZ35"),
+ },
+ },
+ }
+
+ switch (event) {
+ case ACPI_VIDEO_NOTIFY_CYCLE_BRIGHTNESS: /* Cycle brightness */
+ brightness_switch_event(video_device, event);
+ return;
+ }
+
+ /* Check if the chassis-type indicates there is no builtin LCD panel */
+ static bool dmi_is_desktop(void)
+ {
+     const char *chassis_type;
+     unsigned long type;
+     chassis_type = dmi_get_system_info(DMI_CHASSIS_TYPE);
+     if (!chassis_type)
+         return false;
```
# We're seeing a lot of bogus backlight interfaces on newer machines
# without a LCD such as desktops, servers and HDMI sticks. Checking
# the lcd flag fixes this, so enable this on any machines which are
# win8 ready (where we also prefer the native backlight driver, so
# normally the acpi_video code should not register there anyways).
*
+ if (only_lcd == -1) {
+     if (dmi_is_desktop() && acpi_osi_is_win8())
+         only_lcd = true;
+     else
+         only_lcd = false;
+ }
+
+ ret = acpi_bus_register_driver(&acpi_video_bus);
+#ifdef CONFIG_RTC_MC146818_LIB
+#include <linux/mc146818rtc.h>
+
+/#*
+ * There are several systems where the WDAT table is accessing RTC SRAM to
+ * store persistent information. This does not work well with the Linux RTC
+ * driver so on those systems we skip WDAT driver and prefer iTCO_wdt
+ * instead.
+ */
+ * See also https://bugzilla.kernel.org/show_bug.cgi?id=199033.
+ */
+
+static bool acpi_watchdog_uses_rtc(const struct acpi_table_wdat *wdat)
+{
+const struct acpi_wdat_entry *entries;
+int i;
+
+entries = (struct acpi_wdat_entry *)(wdat + 1);
+for (i = 0; i < wdat->entries; i++) {
+const struct acpi_generic_address *gas;
+
+gas = &entries[i].register_region;
+if (gas->space_id == ACPI_ADR_SPACE_SYSTEM_IO) {
+switch (gas->address) {
+case RTC_PORT(0):
+case RTC_PORT(1):
+case RTC_PORT(2):
+case RTC_PORT(3):
+return true;
+}
+}
+}
+
+return false;
+}
+#else
+static bool acpi_watchdog_uses_rtc(const struct acpi_table_wdat *wdat)
+{
+return false;
+}
+#endif
+
+static bool acpi_no_watchdog;
+
+static const struct acpi_table_wdat *acpi_watchdog_get_wdat(void)
+{
+const struct acpi_table_wdat *wdat = NULL;
+acpi_status status;
+}
+if (acpi_disabled || acpi_no_watchdog)
+return NULL;
+
+status = acpi_get_table(ACPI_SIG_WDAT, 0,
+(struct acpi_table_header **)&wdat);
+if (ACPI_FAILURE(status)) {
+ /* It is fine if there is no WDAT */
+return NULL;
+}
+
+if (acpi_watchdog_uses_rtc(wdat)) {
+pr_info("Skipping WDAT on this system because it uses RTC SRAM\n");
+return NULL;
+}
+
+return wdat;
+
+/*
 * Returns true if this system should prefer ACPI based watchdog instead of
 * the native one (which are typically the same hardware).
 */
bool acpi_has_watchdog(void)
{
    struct acpi_table_header hdr;

    -if (acpi_disabled)
    return false;
    -
    -return ACPI_SUCCESS(acpi_get_table_header(ACPI_SIG_WDAT, 0, &hdr));
+return !!acpi_watchdog_get_wdat();
}
EXPORT_SYMBOL_GPL(acpi_has_watchdog);

+/*
 ACPI watchdog can be disabled on boot command line */
+static int __init disable_acpi_watchdog(char *str)
+
+{  
+    acpi_no_watchdog = true;
+    return 1;
+  }
+__setup("acpi_no_watchdog", disable_acpi_watchdog);
+
+void __init acpi_watchdog_init(void)
+
+{  
+    const struct acpi_wdat_entry *entries;
+    @ @ -41,12 +110,10 @@
+    struct platform_device *pdev;
+    struct resource *resources;


size_t nresources = 0;
-acpi_status status;
int i;

-status = acpi_get_table(ACPI_SIG_WDAT, 0,
-(struct acpi_table_header **)&wdat);
-if (ACPI_FAILURE(status)) {
+wdat = acpi_watchdog_get_wdat();
+if (!wdat) {
  /* It is fine if there is no WDAT */
  return;
}

@@ -72,12 +139,11 @@
  gas = &entries[i].register_region;

  res.start = gas->address;
+res.end = res.start + ACPI_ACCESS_BYTE_WIDTH(gas->access_width) - 1;
  if (gas->space_id == ACPI_ADR_SPACE_SYSTEM_MEMORY) {
    res.flags = IORESOURCE_MEM;
    -res.end = res.start + ALIGN(gas->access_width, 4);
+    res.end = res.start + gas->access_width;
  } else if (gas->space_id == ACPI_ADR_SPACE_SYSTEM_IO) {
    res.flags = IORESOURCE_IO;
    -res.end = res.start + gas->access_width;
  } else {
    pr_warn("Unsupported address space: %u\n",
          gas->space_id);
--- linux-4.15.0.orig/drivers/acpi/acpica/acevents.h
+++ linux-4.15.0/drivers/acpi/acpica/acevents.h
@@ -245,6 +245,8 @@
acpi_status acpi_ev_initialize_region(union acpi_operand_object *region_obj);

+u8 acpi_ev_is_pci_root_bridge(struct acpi_namespace_node *node);
+
/*
 * evsci - SCI (System Control Interrupt) handling/dispatch
 */
--- linux-4.15.0.orig/drivers/acpi/acpica/aclocal.h
+++ linux-4.15.0/drivers/acpi/acpica/aclocal.h
@@ -429,9 +429,9 @@
/* Info for running the _REG methods */

struct acpi_reg_walk_info {
-  acpi adr space type space id;
  u32 function;
  u32 reg run count;
+  acpi adr space type space id;
};
--- linux-4.15.0.orig/drivers/acpi/acpica/dsfield.c
+++ linux-4.15.0/drivers/acpi/acpica/dsfield.c
 @@ -273,7 +273,7 @@
 * FUNCTION: acpi_ds_get_field_names
 *
 * PARAMETERS: info - create_field info structure
- *\ ` walk_state - Current method state
+ *\ ` walk_state - Current method state
  *\ arg - First parser arg for the field name list
 *
 * RETURN: Status

--- linux-4.15.0.orig/drivers/acpi/acpica/dsopcode.c
+++ linux-4.15.0/drivers/acpi/acpica/dsopcode.c
 @@ -451,6 +451,10 @@
 ACPI_FORMAT_UINT64(obj_desc->region.address),
 ACPI_FORMAT_UINT64(obj_desc->region.address,
 ACPI_FORMAT_UINT64(obj_desc->region.address, node);
+ /* Now the address and length are valid for this oregion */

 obj_desc->region.flags |= AOPOBJ_DATA_VALID;
--- linux-4.15.0.orig/drivers/acpi/acpica/dswload.c
+++ linux-4.15.0/drivers/acpi/acpica/dswload.c
 @@ -444,6 +444,27 @@
 ACPI_DEBUG_PRINT((ACPI_DB_DISPATCH, "Op=%p State=%p\n", op,
 walk_state));

+/*
+ * Disassembler: handle create field operators here.
+ *
+ * create_buffer_field is a deferred op that is typically processed in load
+ * pass 2. However, disassembly of control method contents walk the parse
+ * tree with ACPI_PARSE_LOAD_PASS1 and AML_CREATE operators are processed
+ * in a later walk. This is a problem when there is a control method that
+ * has the same name as the AML_CREATE object. In this case, any use of the
+ * name segment will be detected as a method call rather than a reference
+ * to a buffer field.
+ *
+ * This earlier creation during disassembly solves this issue by inserting
+ * the named object in the ACPI namespace so that references to this name
+ * would be a name string rather than a method call.
+ */
+if ((walk_state->parse_flags & ACPI_PARSE_DISASSEMBLE) &&
+ (walk_state->op_info->flags & AML_CREATE)) {
+ status = acpi_ds_create_buffer_field(op, walk_state);
+ return_ACPI_STATUS(status);
+ }
+
/* We are only interested in opcodes that have an associated name */

if (!((walk_state->op_info->flags & (AML_NAMED | AML_FIELD)))
--- linux-4.15.0.orig/drivers/acpi/acpica/evevent.c
+++ linux-4.15.0/drivers/acpi/acpica/evevent.c
@@ -204,6 +204,7 @@
  u32 fixed_status;
  u32 fixed_enable;
  u32 i;
+acpi_status status;

ACPI_FUNCTION_NAME(ev_fixed_event_detect);

@@ -211,8 +212,12 @@
 * Read the fixed feature status and enable registers, as all the cases
 * depend on their values. Ignore errors here.
 */
-(void)acpi_hw_register_read(ACPI_REGISTER_PM1_STATUS, &fixed_status);
-(void)acpi_hw_register_read(ACPI_REGISTER_PM1_ENABLE, &fixed_enable);
+status = acpi_hw_register_read(ACPI_REGISTER_PM1_STATUS, &fixed_status);
+status |=
+    acpi_hw_register_read(ACPI_REGISTER_PM1_ENABLE, &fixed_enable);
+if (ACPI_FAILURE(status)) {
+    return (int_status);
+}

ACPI_DEBUG_PRINT((ACPI_DB_INTERRUPTS,
    "Fixed Event Block: Enable %08X Status %08Xn",
--- linux-4.15.0.orig/drivers/acpi/acpica/evregion.c
+++ linux-4.15.0/drivers/acpi/acpica/evregion.c
@@ -677,6 +677,19 @@
ACPI_FUNCTION_TRACE(ev_execute_reg_methods);

+/*
+ * These address spaces do not need a call to _REG, since the ACPI
+ * specification defines them as: "must always be accessible". Since
+ * they never change state (never become unavailable), no need to ever
+ * call _REG on them. Also, a data_table is not a "real" address space,
+ * so do not call _REG. September 2018.
+ */
+if ((space_id == ACPI_ADR_SPACE_SYSTEM_MEMORY) ||
+    (space_id == ACPI_ADR_SPACE_SYSTEM_IO) ||
+ (space_id == ACPI_ADR_SPACE_DATA_TABLE)) {
+ return_VOID;
+}
+
+ info.space_id = space_id;
+ info.function = function;
+ info.reg_run_count = 0;
+ @ @ -738,8 +751,8 @@
+}

/*
 * We only care about regions and objects that are allowed to have address
 * space handlers
 * We only care about regions and objects that are allowed to have
 * address space handlers
 */
if ((node->type != ACPI_TYPE_REGION) && (node != acpi_gbl_root_node)) {
    return (AE_OK);
}

--- linux-4.15.0.orig/drivers/acpi/acpica/evrgnini.c
+++ linux-4.15.0/drivers/acpi/acpica/evrgnini.c
@@ -50,9 +50,6 @@
#define _COMPONENT          ACPI_EVENTS
ACPI_MODULE_NAME("evrgnini")

-/* Local prototypes */
-static u8 acpi_ev_is_pci_root_bridge(struct acpi_namespace_node *node);
-
-******************************************************************************
- *
- * FUNCTION:      acpi_ev_system_memory_region_setup
- * @ @ -67,7 +64,6 @@
- * DESCRIPTION: Setup a system_memory operation region
- *
- ******************************************************************************/
-
-acpi_status
-acpi_ev_system_memory_region_setup(acpi_handle handle,
-  u32 function,
- @ @ -347,7 +343,7 @@
- *
-******************************************************************************/
-
-static u8 acpi_ev_is_pci_root_bridge(struct acpi_namespace_node *node)
+u8 acpi_ev_is_pci_root_bridge(struct acpi_namespace_node *node)
{
    acpi_status status;
    struct acpi_pnp_device_id *hid;
    --- linux-4.15.0.orig/drivers/acpi/acpica/evxfregn.c
region_obj =
    handler_obj->address_space.region_list;
-
/* Remove this Handler object from the list */
--- linux-4.15.0.orig/drivers/acpi/acpica/exprep.c
+++ linux-4.15.0/drivers/acpi/acpica/exprep.c
@@ -507,10 +507,6 @@
    (u8)access_byte_width;
 }
}
-
-# An additional reference for the container */
-
-acpi_ut_add_reference(obj_desc->field.region_obj);
-
ACPI_DEBUG_PRINT((ACPI_DB_BFIELD,
    "RegionField: BitOff %X, Off %X, Gran %X, Region %p\n",
    obj_desc->field.start_field_bit_offset,
--- linux-4.15.0.orig/drivers/acpi/acpica/hwregs.c
+++ linux-4.15.0/drivers/acpi/acpica/hwregs.c
@@ -564,13 +564,18 @@
    case ACPI_REGISTER_PM_TIMER:	/* 32-bit access */
    status =
        acpi_hw_read(&value64, &acpi_gbl_FADT.xpm2_control_block);
-    value = (u32)value64;
+    if (ACPI_SUCCESS(status)) {
+        value = (u32)value64;
+    }
    break;

    case ACPI_REGISTER_SMI_COMMAND_BLOCK:/* 8-bit access */
    status = acpi_hw_read(&value64, &acpi_gbl_FADT.xpm_timer_block);
-    value = (u32)value64;
+    if (ACPI_SUCCESS(status)) {
+        value = (u32)value64;
+    }
+    +
    break;

    case ACPI_REGISTER_SMI_COMMAND_BLOCK:/* 8-bit access */
--- linux-4.15.0.orig/drivers/acpi/acpica/nseval.c
+++ linux-4.15.0/drivers/acpi/acpica/nseval.c
@@ -308,6 +308,14 @@
/* Map AE_CTRL_RETURN_VALUE to AE_OK, we are done with it */

status = AE_OK;
+} else if (ACPI_FAILURE(status)) {
+
+/* If return_object exists, delete it */
+
+if (info->return_object) {
+acpi_ut_remove_reference(info->return_object);
+info->return_object = NULL;
+
}

ACPI_DEBUG_PRINT((ACPI_DB_NAMES,
--- linux-4.15.0.orig/drivers/acpi/acpica/nsobject.c
+++ linux-4.15.0/drivers/acpi/acpica/nsobject.c
@@ -222,6 +222,10 @@
}
}

+if (obj_desc->common.type == ACPI_TYPE_REGION) {
+acpi_ut_remove_address_range(obj_desc->region.space_id, node);
+
+/* Clear the Node entry in all cases */
+
node->object = NULL;
--- linux-4.15.0.orig/drivers/acpi/acpica/psargs.c
+++ linux-4.15.0/drivers/acpi/acpica/psargs.c
@@ -890,6 +890,10 @@
 ACPI_POSSIBLE_METHOD_CALL);

if (arg->common.aml_opcode == AML_INT_METHODCALL_OP) {
+
+/* Free method call op and corresponding namestring sub-ob */
+
+acpi_ps_free_op(arg->common.value.arg);
acpi_ps_free_op(arg);
arg = NULL;
walk_state->arg_count = 1;
--- linux-4.15.0.orig/drivers/acpi/acpica/psloop.c
+++ linux-4.15.0/drivers/acpi/acpica/psloop.c
@@ -56,6 +56,7 @@
#include "acdispat.h"
#include "amlcode.h"
#include "acconvert.h"
#include "acnamesp.h"
+#include "acnamesp.h"
```c
#define _COMPONENT ACPI_PARSER
ACPI_MODULE_NAME("psloop")

union acpi_parse_object *op = NULL; /* current op */
struct acpi_parse_state *parser_state;

u8 *aml_op_start = NULL;
+u8 opcode_length;

ACPI_FUNCTION_TRACE_PTR(ps_parse_loop, walk_state);

status =
    acpi_ps_create_op(walk_state, aml_op_start, &op);
if (ACPI_FAILURE(status)) {
    /* ACPI_PARSE_MODULE_LEVEL means that we are loading a table by
       executing it as a control method. However, if we encounter
       an error while loading the table, we need to keep trying to
       load the table rather than aborting the table load. Set the
       status to AE_OK to proceed with the table load.
    */
    if ((walk_state->
        parse_flags & ACPI_PARSE_MODULE_LEVEL)
        && status == AE_ALREADY_EXISTS) {        
        status = AE_OK;
    }
    if (status == AE_CTRL.Parse_CONTINUE) {
        continue;
    }
}@ -513.6 +515.18 @
if (ACPI_FAILURE(status)) {
    return_ACPI_STATUS(status);
}
+if (acpi_ns_opens_scope
    (acpi_ps_get_opcode_info
        (walk_state->opcode)->object_type)) {
    /* If the scope/device op fails to parse, skip the body of
       the scope op because the parse failure indicates that
       the device may not exist.
    */
    ACPI_ERROR((AE_INFO,
        "Skip parsing opcode %s",
        acpi_ps_get_opcode_name
            (walk_state->opcode));
+
    /* Determine the opcode length before skipping the opcode.
    */
```
+ * An opcode can be 1 byte or 2 bytes in length.
+ */
+ opcode_length = 1;
+ if ((walk_state->opcode & 0xFF00) ==
+    AML_EXTENDED_OPCODE) {
+    opcode_length = 2;
+ }
+ walk_state->parser_state.aml =
+    walk_state->aml + opcode_length;
+ walk_state->parser_state.aml =
+    acpi_ps_get_next_package_end
+    (&walk_state->parser_state);
+ walk_state->aml =
+    walk_state->parser_state.aml;
+}
+
+continue;
}
@@ -573,7 +618,40 @@
+    return_ACPI_STATUS(status);
+
+if ((walk_state->control_state) &&
+    ((walk_state->control_state->control.
+    opcode == AML_IF_OP)
+     || (walk_state->control_state->control.
+    opcode == AML_WHILE_OP))} {
+    /*
+     * If the if/while op fails to parse, we will skip parsing
+     * the body of the op.
+     */
+    parser_state->aml =
+    walk_state->control_state->control.
+    aml_predicate_start + 1;
+    parser_state->aml =
+    acpi_ps_get_next_package_end
+    (parser_state);
+    walk_state->aml = parser_state->aml;
+    +ACPI_ERROR((AE_INFO,
+       "Skipping While/If block");
+    if (*walk_state->aml == AML_ELSE_OP) {
+      +ACPI_ERROR((AE_INFO,
+       "Skipping Else block");
+    walk_state->parser_state.aml =
+    walk_state->aml + 1;
+walk_state->parser_state.aml =
+ acpi_ps_get_next_package_end
+ (parser_state);
+walk_state->aml =
+ parser_state->aml;
+
+ACPI_FREE(acpi_ut_pop_generic_state
+ (&walk_state->control_state));
+
+op = NULL;
continue;
}

@@ -661,6 +739,25 @@
 acpi_ps_next_parse_state(walk_state, op, status);
if (status == AE_CTRL_PENDING) {
 status = AE_OK;
+} else
+ if (((walk_state->
+ parse_flags & ACPI_PARSE_MODULE_LEVEL)
+&& status != AE_CTRL_TRANSFER
+&& ACPI_FAILURE(status)) {
+/**
+ * ACPI_PARSE_MODULE_LEVEL flag means that we are currently
+ * loading a table by executing it as a control method.
+ * However, if we encounter an error while loading the table,
+ * we need to keep trying to load the table rather than
+ * aborting the table load (setting the status to AE_OK
+ * continues the table load). If we get a failure at this
+ * point, it means that the dispatcher got an error while
+ * processing Op (most likely an AML operand error) or a
+ * control method was called from module level and the
+ * dispatcher returned AE_CTRL_TRANSFER. In the latter case,
+ * leave the status alone, there's nothing wrong with it.
+ */
+status = AE_OK;
+}

--- linux-4.15.0.orig/drivers/acpi/acpica/psobject.c
+++ linux-4.15.0/drivers/acpi/acpica/psobject.c
@@ -46,6 +46,7 @@
 #include "acparser.h"
 #include "amlcode.h"
 #include "acconvert.h"
+#include "acnamesp.h"

 #define _COMPONENT ACPI_PARSER
do {
if (*op) {
+/*
+ * These Opcodes need to be removed from the namespace because they
+ * get created even if these opcodes cannot be created due to
+ * errors.
+ */
+if (((*op)->common.aml_opcode == AML_REGION_OP)
+ || ((*op)->common.aml_opcode ==
+AML_DATA_REGION_OP)) {
+acpi_ns_delete_children(*op)->common.
+node);
+acpi_ns_remove_node(*op)->common.node);
+(*op)->common.node = NULL;
+acpi_ps_delete_parse_tree(*op);
+}
+
+status2 =
+ acpi_ps_complete_this_op(walk_state, *op);
if (ACPI_FAILURE(status2)) {
@@ -612,6 +628,20 @@
endif
walk_state->prev_op = NULL;
walk_state->prev_arg_types = walk_state->arg_types;
+
+if (walk_state->parse_flags & ACPI_PARSE_MODULE_LEVEL) {
+/*
+ * There was something that went wrong while executing code at the
+ * module-level. We need to skip parsing whatever caused the
+ * error and keep going. One runtime error during the table load
+ * should not cause the entire table to not be loaded. This is
+ * because there could be correct AML beyond the parts that caused
+ * the runtime error.
+ */
+ACPI_ERROR((AE_INFO,
+ "Ignore error and continue table load"));
+return_ACPI_STATUS(AE_OK);
+
} return_ACPI_STATUS(status);
}

--- linux-4.15.0.orig/drivers/acpi/acpica/utdelete.c
+++ linux-4.15.0/drivers/acpi/acpica/utdelete.c
@@ -593,11 +593,6 @@
next_object = object->buffer_field.buffer_obj;
break;

-case ACPI_TYPE_LOCAL_REGION_FIELD:
-   next_object = object->field.region_obj;
-   break;
-
-case ACPI_TYPE_LOCAL_BANK_FIELD:

   next_object = object->bank_field.bank_obj;
   @@ -638,6 +633,7 @@
 }
 break;

+case ACPI_TYPE_LOCAL_REGION_FIELD:
+case ACPI_TYPE_REGION:
+default:

--- linux-4.15.0.orig/drivers/acpi/apei/einj.c
+++ linux-4.15.0/drivers/acpi/apei/einj.c
 @@ -518,6 +518,9 @@
     rc;
     u64 base_addr, size;

+if (kernel_is_locked_down("ACPI error injection"))
+return -EPERM;
+
/* If user manually set "flags", make sure it is legal */
if (flags && (flags &
~(SETWA_FLAGS_APICID|SETWA_FLAGS_MEM|SETWA_FLAGS_PCIE_SBDF)))
--- linux-4.15.0.orig/drivers/acpi/apei/erst.c
+++ linux-4.15.0/drivers/acpi/apei/erst.c
 @@ -1175,7 +1175,6 @@
     "Error Record Serialization Table (ERST) support is initialized.
     
     buf = kmalloc(erst_erange.size, GFP_KERNEL);
--- linux-4.15.0.orig/drivers/acpi/apei/ghes.c
+++ linux-4.15.0/drivers/acpi/apei/ghes.c
@@ -33,7 +33,6 @@
 #include <linux/interrupt.h>
 #include <linux/timer.h>
 #include <linux/cper.h>
-#include <linux/kdebug.h>
+#include <linux/platform_device.h>
#include <linux/mutex.h>
#include <linux/ratelimit.h>
@@ -171,40 +170,40 @@
return 0;
}

-static void ghes_estatus_pool_free_chunk_page(struct gen_pool *pool,
+static void ghes_estatus_pool_free_chunk(struct gen_pool *pool,
    struct gen_pool_chunk *chunk,
    void *data)
{
    -free_page(chunk->start_addr);
+    vfree((void *)chunk->start_addr);
}

static void ghes_estatus_pool_exit(void)
{
    gen_pool_for_each_chunk(ghes_estatus_pool,
    -ghes_estatus_pool_free_chunk_page, NULL);
+    ghes_estatus_pool_free_chunk, NULL);
    gen_pool_destroy(ghes_estatus_pool);
}

static int ghes_estatus_pool_expand(unsigned long len)
{
    -unsigned long i, pages, size, addr;
    -int ret;
    +unsigned long size, addr;

    ghes_estatus_pool_size_request += PAGE_ALIGN(len);
    size = gen_pool_size(ghes_estatus_pool);
    if (size >= ghes_estatus_pool_size_request)
        return 0;
    -pages = (ghes_estatus_pool_size_request - size) / PAGE_SIZE;
    -for (i = 0; i < pages; i++) {
        -addr = __get_free_page(GFP_KERNEL);
        -if (!addr)
            -return -ENOMEM;
        -ret = gen_pool_add(ghes_estatus_pool, addr, PAGE_SIZE, -1);
        -if (ret)
            -return ret;
    -}

    -return 0;
    +addr = (unsigned long)vmalloc(PAGE_ALIGN(len));
    +if (!addr)
        +return -ENOMEM;
    +


+/
+ * New allocation must be visible in all pgd before it can be found by
+ * an NMI allocating from the pool.
+ */
+vmalloc_sync_mappings();
+
+return gen_pool_add(ghes_estatus_pool, addr, PAGE_ALIGN(len), -1);
}

static int map_gen_v2(struct ghes *ghes)
@@ -414,6 +413,51 @@
#endif
}

+/
+ * PCIe AER errors need to be sent to the AER driver for reporting and
+ * recovery. The GHES severities map to the following AER severities and
+ * require the following handling:
+ *
+ * GHES_SEV_CORRECTABLE -> AER_CORRECTABLE
+ * These need to be reported by the AER driver but no recovery is
+ * necessary.
+ * GHES_SEV_RECOVERABLE -> AER_NONFATAL
+ * GHES_SEV_RECOVERABLE && CPER_SEC_RESET -> AER_FATAL
+ * These both need to be reported and recovered from by the AER driver.
+ * GHES_SEV_PANIC does not make it to this handling since the kernel must
+ * panic.
+ */
+static void ghes_handle_aer(struct acpi_hest_generic_data *gdata)
{+
#ifdef CONFIG_ACPI_APEI_PCIEAER
+struct cper_sec_pcie *pcie_err = acpi_hest_get_payload(gdata);
+
+if (pcie_err->validation_bits & CPER_PCIE_VALID_DEVICE_ID &&
+ pcie_err->validation_bits & CPER_PCIE_VALID_AER_INFO) {
+unsigned int devfn;
+int aer_severity;
+
+devfn = PCI_DEVFN(pcie_err->device_id.device,
+ pcie_err->device_id.function);
+aer_severity = cper_severity_to_aer(gdata->error_severity);
+
+/*
+ * If firmware reset the component to contain
+ * the error, we must reinitialize it before
+ * use, so treat it as a fatal AER error.
+ */
+if (gdata->flags & CPER_SEC_RESET)
+aer_severity = AER_FATAL;
+
+aer_recover_queue(pcie_err->device_id.segment,
+ pcie_err->device_id.bus,
+ devfn, aer_severity,
+ (struct aer_capability_regs *)
+ pcie_err->aer_info);
+}
+#endif
+
+static void ghes_do_proc(struct ghes *ghes,
  const struct acpi_hest_generic_status *estatus)
{

  arch_apei_report_mem_error(sev, mem_err);
  ghes_handle_memory_failure(gdata, sev);
}

#ifdef CONFIG_ACPI_APEI_PCIEAER
else if (guid_equal(sec_type, &CPER_SEC_PCIE)) {
  struct cper_sec_pcie *pcie_err = acpi_hest_get_payload(gdata);

  -if (sev == GHES_SEV_RECOVERABLE &&
    sec_sev == GHES_SEV_RECOVERABLE &&
    pcie_err->validation_bits & CPER_PCIE_VALID_DEVICE_ID &&
    pcie_err->validation_bits & CPER_PCIE_VALID_AER_INFO) {

    unsigned int devfn;

    -int aer_severity;

    -devfn = PCI_DEVFN(pcie_err->device_id.device,
      - pcie_err->device_id.function);

    -aer_severity = cper_severity_to_aer(gdata->error_severity);

      /*
      * If firmware reset the component to contain
      * the error, we must reinitialize it before
      * use, so treat it as a fatal AER error.
      */
      -if (gdata->flags & CPER_SEC_RESET)
          -aer_severity = AER_FATAL;

          -aer_recover_queue(pcie_err->device_id.segment,
            - pcie_err->device_id.bus,
            - devfn, aer_severity,
            - (struct aer_capability_regs *)
            - pcie_err->aer_info);
  -}
  -
  -}
+ghes_handle_aer(gdata);
}
-#endif
else if (guid_equal(sec_type, &PER_SEC_PROC_ARM)) {
    struct cper_sec_proc_arm *err = acpi_hest_get_payload(gdata);

@@ -675,6 +690,8 @@
{
    __ghes_print_estatus(KERN_EMERG, ghes->generic, ghes->estatus);

+ghes_clear_estatus(ghes);
+
/* reboot to log the error! */
    if (!panic_timeout)
        panic_timeout = ghes_panic_timeout;
@@ -934,7 +951,6 @@
    sev = ghes_severity(ghes->estatus->error_severity);
    if (sev >= GHES_SEV_PANIC) {
        -oops_begin();
            ghes_print_queued_estatus();
    __ghes_panic(ghes);
    }
--- linux-4.15.0.orig/drivers/acpi/arm64/gtdt.c
+++ linux-4.15.0/drivers/acpi/arm64/gtdt.c
@@ -39,7 +39,7 @@
static struct acpi_gtdt_descriptor acpi_gtdt_desc __initdata;

-static inline void *next_platform_timer(void *platform_timer)
+static inline __init void *next_platform_timer(void *platform_timer)
{
    struct acpi_gtdt_header *gh = platform_timer;

@@ -332,7 +332,7 @@
    struct platform_device *pdev;
    -int irq = map_gt_gsi(wd->timer_interrupt, wd->timer_flags);
    +int irq;
/*
     * According to SBSA specification the size of refresh and control
@@ -341,7 +341,7 @@
     structure res[] = {
         DEFINE_RES_MEM(wd->control_frame_address, SZ_4K),
         DEFINE_RES_MEM(wd->refresh_frame_address, SZ_4K),
         -DEFINE_RESIRQ(irq),
-
int nr_res = ARRAY_SIZE(res);

@@ -351,10 +351,11 @@

if (!(wd->refresh_frame_address && wd->control_frame_address)) {
    pr_err(FW_BUG "failed to get the Watchdog base address."
    -acpi_unregister_gsi(wd->timer_interrupt);
    return -EINVAL;
}

+irq = map_gt_gsi(wd->timer_interrupt, wd->timer_flags);
+res[2] = (struct resource)DEFINE_RES_IRQ(irq);
if (irq <= 0) {
    pr_warn("failed to map the Watchdog interrupt."
    nr_res--;
    @@ -367,7 +368,8 @@
    */
    pdev = platform_device_register_simple("sbsa-gwdt", index, res, nr_res);
    if (IS_ERR(pdev)) {
        -acpi_unregister_gsi(wd->timer_interrupt);
        +if (irq > 0)
        +acpi_unregister_gsi(wd->timer_interrupt);
        return PTR_ERR(pdev);
    }

--- linux-4.15.0.orig/drivers/acpi/arm64/iort.c
+++ linux-4.15.0/drivers/acpi/arm64/iort.c
@@ -366,7 +366,6 @@
      return NULL;
}

-#if (ACPI_CA_VERSION > 0x20170929)
static int iort_get_id_mapping_index(struct acpi_iort_node *node)
{
    struct acpi_iort_smmu_v3 *smmu;
    @@ -400,12 +399,6 @@
    return -EINVAL;
}
#else
-#static inline int iort_get_id_mapping_index(struct acpi_iort_node *node)
-{
-    -return -EINVAL;
-}
-#endif
static struct acpi_iort_node *iort_node_map_id(struct acpi_iort_node *node,  
u32 id_in, u32 *id_out,  
@@ -606,8 +599,8 @@  
     /* Move to ITS specific data */  
    its = (struct acpi_iort_its_group *)node->node_data;  
    -if (idx > its->its_count) {  
-      dev_err(dev, "requested ITS ID index [%d] is greater than available [%d]n",  
+      if (idx >= its->its_count) {  
+        dev_err(dev, "requested ITS ID index [%d] overruns ITS entries [%d]n",  
        idx, its->its_count);  
        return -ENXIO;  
    }  
@@ -690,7 +683,7 @@  
 */  
 static struct irq_domain *iort_get_platform_device_domain(struct device *dev)  
 {  
-    struct acpi_iort_node *node, *msi_parent;  
+    struct acpi_iort_node *node, *msi_parent = NULL;  
    struct fwnode_handle *iort_fwnode;  
    struct acpi_iort_its_group *its;  
    int i;  
@@ -1115,18 +1108,24 @@  
    /*  
     * set numa proximity domain for smmuv3 device  
    */  
    -static void  __init arm_smmu_v3_set_proximity(struct device *dev,  
+static int  __init arm_smmu_v3_set_proximity(struct device *dev,  
         struct acpi_iort_node *node)  
    {  
    struct acpi_iort_smmu_v3 *smmu;  
    
    smmu = (struct acpi_iort_smmu_v3 *)node->node_data;  
    if (smmu->flags & ACPI_IORT_SMMU_V3_PXM_VALID) {  
        -set_dev_node(dev, acpi_map_pxm_to_node(smmu->pxm));  
+        int node = acpi_map_pxm_to_node(smmu->pxm);  
        +if (node != NUMA_NO_NODE && !node_online(node))  
        +return -EINVAL;  
        +set_dev_node(dev, node);  
        pr_info("SMMU-v3[\%llx] Mapped to Proximity domain \%d\n",  
            smmu->base_address,  
            smmu->pxm);  
    }  
    +return 0;  
    }  
#else
```c
#define arm_smmu_v3_set_proximity NULL

int (*dev_count_resources)(struct acpi_iort_node *node);
void (*dev_init_resources)(struct resource *res,
    struct acpi_iort_node *node);
-void (*dev_set_proximity)(struct device *dev,
+int (*dev_set_proximity)(struct device *dev,
    struct acpi_iort_node *node);
};

if (!pdev)
return -ENOMEM;

@if (ops->dev_set_proximity)
-ops->dev_set_proximity(&pdev->dev, node);
+if (ops->dev_set_proximity) {
+    ret = ops->dev_set_proximity(&pdev->dev, node);
+    if (ret)
+        goto dev_put;
+}

count = ops->dev_count_resources(node);

static bool battery_driver_registered;
static int battery_bix_broken_package;
static int battery_notification_delay_ms;
+static int battery_ac_is_broken;
static unsigned int cache_time = 1000;
module_param(cache_time, uint, 0644);
 MODULE_PARM_DESC(cache_time, "cache time in milliseconds");
return 0;

+static int acpi_battery_handle_discharging(struct acpi_battery *battery)
+{
+/*
+ * Some devices wrongly report discharging if the battery's charge level
+ * was above the device's start charging threshold atm the AC adapter
+ * was plugged in and the device thus did not start a new charge cycle.
+ */
+if ((battery_ac_is_broken || power_supply_is_system_supplied()) &&
    battery->rate_now == 0)
+return POWER_SUPPLY_STATUS_NOT_CHARGING;
```
static int acpi_battery_get_property(struct power_supply *psy, 
    enum power_supply_property psp, 
    union power_supply_propval *val)
@@ -215,7 +230,7 @@
    switch (psp) {
    case POWER_SUPPLY_PROP_STATUS:
        if (battery->state & ACPI_BATTERY_STATE_DISCHARGING)
-            val->intval = POWER_SUPPLY_STATUS_DISCHARGING;
+            val->intval = acpi_battery_handle_discharging(battery);
        else if (battery->state & ACPI_BATTERY_STATE_CHARGING)
            val->intval = POWER_SUPPLY_STATUS_CHARGING;
        else if (acpi_battery_is_charged(battery))
@@ -1166,23 +1181,41 @@
            return 0;
    }

+static int __init
+battery_ac_is_broken_quirk(const struct dmi_system_id *d)
+{
+    +battery_ac_is_broken = 1;
+    +return 0;
+    +}
+
+static const struct dmi_system_id bat_dmi_table[] __initconst = {
+    { /* NEC LZ750/LS */
+        .callback = battery_bix_broken_package_quirk,
+        .ident = "NEC LZ750/LS",
+        .matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "NEC"),
+            DMI_MATCH(DMI_PRODUCT_NAME, "PC-LZ750LS"),
+        },
+    },
+    { /* Acer Aspire V5-573G */
+        .callback = battery_notification_delay_quirk,
+        .ident = "Acer Aspire V5-573G",
+        .matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+            DMI_MATCH(DMI_PRODUCT_NAME, "Aspire V5-573G"),
+        },
+    },
+    { /* Point of View mobii wintab p800w */
+        .callback = battery_notification_delay_quirk,
+        .ident = "Point of View mobii wintab p800w",
+        .matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "Point of View"),
+            DMI_MATCH(DMI_PRODUCT_NAME, "mobii wintab p800w"),
+        },
+    },
+};
.callback = battery_ac_is_broken_quirk,
.matches = {
+DMI_MATCH(DMI_BOARD_VENDOR, "AMI Corporation"),
+DMI_MATCH(DMI_BOARD_NAME, "Aptio CRB"),
+DMI_MATCH(DMI_BIOS_VERSION, "3BAIR1013"),
/* Above matches are too generic, add bios-date match */
+DMI_MATCH(DMI_BIOS_DATE, "08/22/2014"),
},
	},
	{};

--- linux-4.15.0.orig/drivers/acpi/blacklist.c
+++ linux-4.15.0/drivers/acpi/blacklist.c
@@ -30,7 +30,9 @@
#include "internal.h"

+ifdef CONFIG_DMI
static const struct dmi_system_id acpi_rev_dmi_table[] __initconst;
+endif

/* POLICY: If *anything* doesn't work, put it on the blacklist.
@@ -74,7 +76,9 @@
}

(void)early_acpi_osi_init();
+ifdef CONFIG_DMI
dmi_check_system(acpi_rev_dmi_table);
+endif

return blacklisted;
}
--- linux-4.15.0.orig/drivers/acpi/bus.c
+++ linux-4.15.0/drivers/acpi/bus.c
@@ -66,10 +66,37 @@
return 0;
}
+static int set_gbl_term_list(const struct dmi_system_id *id)
+{
+acpi_gbl_parse_table_as_term_list = 1;
+return 0;
+}

-static const struct dmi_system_id dsdt_dmi_table[] __initconst = {
+static const struct dmi_system_id acpi_quirks_dmi_table[] __initconst = {
+static const struct dmi_system_id acpi_bios_dmi_table[] __initconst = 

+/
+ * Touchpad on Dell XPS 9570/Precision M5530 doesn't work under I2C
+ * mode.
+ * https://bugzilla.kernel.org/show_bug.cgi?id=198515
+ */
+
+{callback = set_gbl_term_list,
+ .ident = "Dell Precision M5530",
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_PRODUCT_NAME, "Precision M5530"),
+ },
+ },
+
+{callback = set_gbl_term_list,
+ .ident = "Dell XPS 15 9570",
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_PRODUCT_NAME, "XPS 15 9570"),
+ },
+ },
*/

* Invoke DSDT corruption work-around on all Toshiba Satellite.
+ * DSDT will be copied to memory.
* https://bugzilla.kernel.org/show_bug.cgi?id=14679
*/
{
@@ -82,10 +109,46 @@
},
},
};
+
+static const char * const acpi_quirk_lenovo_bios_ids[] = {
+ "N2H", /* first 3 bytes of Lenovo BIOS version */
+ NULL
+};
+
+bool acpi_quirk_matches_bios_ids(const char * const ids[])
+{
+const char *bios_vendor = dmi_get_system_info(DMI_BIOS_VENDOR);
+const char *bios_ver = dmi_get_system_info(DMI_BIOS_VERSION);
+int i;
+
+if (!bios_vendor || !bios_ver)
+return false;
+
+if (strncmp(bios_vendor, "LENOVO", 6))
+return false;
for (i = 0; ids[i]; i++)
+if (!strncmp(bios_ver, ids[i], 3)) {
+acpi_gbl_parse_table_as_term_list = 1;
+return true;
+}
+
+return false;
+
#else
+static const struct dmi_system_id dsdt_dmi_table[] __initconst = {
+static const struct dmi_system_id acpi_quirks_dmi_table[] __initconst = {
+
+static const char * const acpi_quirk_lenovo_bios_ids[] = {
+NULL
+};
+
+bool acpi_quirk_matches_bios_ids(const char * const ids[])
+{
+return false;
+}
+
#endif

*/
/*------------------------------------------------------------------------------------------*/
@@ -119,6 +182,12 @@
return 0;
}

+/* Battery devices must have their deps met before calling _STA */
+if (acpi_device_is_battery(device) && device->dep_unmet) {
+acpi_set_device_status(device, 0);
+return 0;
+}
+
+status = acpi_bus_get_status_handle(device->handle, &sta);
+if (ACPI_FAILURE(status))
+return -ENODEV;
+@ -163,7 +232,7 @@
+
+acpi_status status;

+!data)
+!data)
+return -EINVAL;
status = acpi_get_data(handle, acpi_bus_private_data_handler, data);
@@ -1001,11 +1070,9 @@
    acpi_permanent_mmap = true;

-/*
- * If the machine falls into the DMI check table,
- * DSDT will be copied to memory
- */
-dmi_check_system(dsdt_dmi_table);
+/* Check machine-specific quirks */
+dm_i_check_system(acpi_quirks_dmi_table);
+acpi_quirk_matches_bios_ids(acpi_quirk_lenovo_bios_ids);

status = acpi_reallocate_root_table();
if (ACPI_FAILURE(status)) {
    init_acpi_device_notify();
    result = acpi_bus_init();
    if (result) {
        kobject_put(acpi_kobj);
        disable_acpi();
        return result;
    }
    --- linux-4.15.0.orig/drivers/acpi/button.c
+++ linux-4.15.0/drivers/acpi/button.c
@@ -109,6 +109,7 @@
    int last_state;
    ktime_t last_time;
    bool suspended;
+    bool lid_state_initialized;
    }

static BLOCKING_NOTIFIER_HEAD(acpi_lid_notifier);
@@ -216,9 +217,6 @@
    button->last_time = ktime_get();
    }

-if (state)
-acpi_pm_wakeup_event(&device->dev);
-
ret = blocking_notifier_call_chain(&acpi_lid_notifier, state, device);
if (ret == NOTIFY_DONE)
    ret = blocking_notifier_call_chain(&acpi_lid_notifier, state,
@@ -360,7 +358,8 @@
    EXPORT_SYMBOL(acpi_lid_open);
static int acpi_lid_update_state(struct acpi_device *device)
{
    int state;

    if (state < 0)
        return state;

    if (state && signal_wakeup)
        acpi_pm_wakeup_event(&device->dev);
    return acpi_lid_notify_state(device, state);
}

static void acpi_lid_initialize_state(struct acpi_device *device)
{
    struct acpi_button *button = acpi_driver_data(device);
    switch (lid_init_state) {
    case ACPI_BUTTON_LID_INIT_OPEN:
        (void)acpi_lid_notify_state(device, 1);
        break;
    case ACPI_BUTTON_LID_INIT_METHOD:
        (void)acpi_lid_update_state(device);
        +(void)acpi_lid_update_state(device, false);
        break;
    case ACPI_BUTTON_LID_INIT_IGNORE:
        default:
        break;
    }
    +
    +button->lid_state_initialized = true;
}

static void acpi_button_notify(struct acpi_device *device, u32 event)
{
    struct acpi_button *button = acpi_driver_data(device);
    struct input_dev *input;
    int users;

    switch (event) {
    case ACPI_FIXED_HARDWARE_EVENT:
        @ @ -399,11 +404,8 @@
    case ACPI_BUTTON_NOTIFY_STATUS:
        input = button->input;
        if (button->type == ACPI_BUTTON_TYPE_LID) {
mutex_lock(&button->input->mutex);
users = button->input->users;
mutex_unlock(&button->input->mutex);

if (users)
    ACPI_LID_UPDATE_STATE(device);
if (button->lid_state_initialized)
    ACPI_LID_UPDATE_STATE(device, true);
} else {
    int keycode;

    if (button->lid_state_initialized)
        ACPI_LID_UPDATE_STATE(device, true);

    struct acpi_button *button = acpi_driver_data(device);

    button->suspended = false;
    if (button->type == ACPI_BUTTON_TYPE_LID && button->input->users) {
        button->last_state = !!ACPI_LID_EVALUATE_STATE(device);
        button->last_time = ktime_get();
        ACPI_LID_INITIALIZE_STATE(device);
    }
    return 0;
}
#endif

module_acpi_driver(acpi_button_driver);

static int acpi_button_register_driver(struct acpi_driver *driver)
{
    /*
     * Modules such as nouveau.ko and i915.ko have a link time dependency
     * on acpi_lid_open(), and would therefore not be loadable on ACPI
     * if ACPI_capable kernels booted in non-ACPI mode if the return value of
     * acpi_bus_register_driver() is returned from here with ACPI disabled
     * when this driver is built as a module.
     */
    if (acpi_disabled)
        return 0;
    return acpi_bus_register_driver(driver);
}

static void acpi_button_unregister_driver(struct acpi_driver *driver)
{
    if (!acpi_disabled)
        acpi_bus_unregister_driver(driver);
}
+module_driver(acpi_button_driver, acpi_button_register_driver,
+    acpi_button_unregister_driver);

--- linux-4.15.0.orig/drivers/acpi/cppc_acpi.c
+++ linux-4.15.0/drivers/acpi/cppc_acpi.c
@@ -39,6 +39,7 @@
#include <linux/cpufreq.h>
#include <linux/delay.h>
+#include <linux/iopoll.h>
#include <linux/ktime.h>
#include <linux/rwsem.h>
#include <linux/wait.h>
@@ -49,7 +50,7 @@
struct mbox_chan *pcc_channel;
void __iomem *pcc_comm_addr;
bool pcc_channel_acquired;
-#define ktime_t deadline;
+unsigned int deadline_us;
unsigned int pcc_mpar, pcc_mrtt, pcc_nominal;
bool pending_pcc_write_cmd;/* Any pending/batched PCC write cmds? */
@@ -121,23 +122,15 @@
*/
#define define_one_cppc_ro(_name) 																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
show_cppc_data(cppc_get_perf_ctrs, cppc_perf_fb_ctrs, wraparound_time);

static ssize_t show_feedback_ctrs(struct kobject *kobj,
+struct kobj_attribute *attr, char *buf)
	{
struct cpc_desc *cpc_ptr = to_cpc_desc(kobj);
struct cppc_perf_fb_ctrs fb_ctrs = {0};
}

static int check_pcc_chan(int pcc_ss_id, bool chk_err_bit)
{
-int ret = -EIO, status = 0;
+int ret, status;
struct cppc_pcc_data *pcc_ss_data = pcc_data[pcc_ss_id];
struct acpi_pcct_shared_memory __iomem *generic_comm_base =
pcc_ss_data->pcc_comm_addr;
-ktime_t next_deadline = ktime_add(ktime_get(),
- pcc_ss_data->deadline);

if (!pcc_ss_data->platform_owns_pcc)
return 0;

-/* Retry in case the remote processor was too slow to catch up. */
-while (!ktime_after(ktime_get(), next_deadline)) {
-/*
- * Per spec, prior to boot the PCC space will be initialized by
- * platform and should have set the command completion bit when
- * PCC can be used by OSPM
- */
-status = readw_relaxed(&generic_comm_base->status);
-if (status & PCC_CMD_COMPLETE_MASK) {
-ret = 0;
-if (chk_err_bit && (status & PCC_ERROR_MASK))
-ret = -EIO;
-break;
-}
-/*
- * Reducing the bus traffic in case this loop takes longer than
- * a few retries.
- */
-udelay(3);
-}
+/*
+ * Poll PCC status register every 3us(delay_us) for maximum of
+ * deadline_us(timeout_us) until PCC command complete bit is set(cond)
+ */

ret = readw_relaxed_poll_timeout(&generic_comm_base->status, status, +status & PCC_CMD_COMPLETE_MASK, 3, +pcc_ss_data->deadline_us);

-if (likely(!ret))
+if (likely(!ret)) {
 pcc_ss_data->platform_owns_pcc = false;
-else
-  pr_err("PCC check channel failed. Status=%x\n", status);
+  if (chk_err_bit && (status & PCC_ERROR_MASK))
+    ret = -EIO;
+  }
+
+if (unlikely(ret))
+  pr_err("PCC check channel failed for ss: %d. ret=%d\n", + pcc_ss_id, ret);

return ret;
}
@@ -291,7 +274,8 @@
time_delta = ktime_ms_delta(ktime_get(), +pcc_ss_data->last_mpar_reset);
if ((time_delta < 60 * MSEC_PER_SEC) && pcc_ss_data->last_mpar_reset) {
-  pr_debug("PCC cmd not sent due to MPAR limit");
+  pr_debug("PCC cmd for subspace %d not sent due to MPAR limit", + pcc_ss_id);
  ret = -EIO;
  goto end;
}
@@ -312,8 +296,8 @@ /* Ring doorbell */
ret = mbox_send_message(pcc_ss_data->pcc_channel, &cmd);
if (ret < 0) {
-  pr_err("Err sending PCC mbox message. cmd:%d, ret:%d\n", -cmd, ret);
+  pr_err("Err sending PCC mbox message. ss: %d cmd:%d, ret:%d\n", + pcc_ss_id, cmd, ret);
  goto end;
}
@@ -372,8 +356,10 @@
union acpi_object  *psd = NULL;
struct acpi_psd_package *pdomain;
-status = acpi_evaluate_object_typed(handle, "_PSD", NULL, &buffer, +ACPI_TYPE_PACKAGE);
+status = acpi_evaluate_object_typed(handle, "_PSD", NULL, + &buffer, ACPI_TYPE_PACKAGE);
+if (status == AE_NOT_FOUND)/* _PSD is optional */
+return 0;
if (ACPI_FAILURE(status))
return -ENODEV;

@@ -553,7 +539,8 @@
pcc_mbox_request_channel(&cppc_mbox_cl,pcc_ss_idx);
if (IS_ERR(pcc_data[pcc_ss_idx]->pcc_channel)) {
-    pr_err("Failed to find PCC communication channel\n");
+    pr_err("Failed to find PCC channel for subspace %d\n",
       pcc_ss_idx);
    return -ENODEV;
}

@@ -566,7 +553,8 @@
cppc_ss = (pcc_data[pcc_ss_idx]->pcc_channel)->con_priv;
if (!cppc_ss) {
-    pr_err("No PCC subspace found for CPPC\n");
+    pr_err("No PCC subspace found for %d CPPC\n",
       pcc_ss_idx);
    return -ENODEV;
}

@@ -576,7 +564,7 @@
*/ So add an arbitrary amount of wait on top of Nominal.
* /
usecs_lat = NUM_RETRIES * cppc_ss->latency;
-pcc_data[pcc_ss_idx]->deadline = ns_to_ktime(usecs_lat * NSEC_PER_USEC);
+pcc_data[pcc_ss_idx]->deadline_us = usecs_lat;
pcc_data[pcc_ss_idx]->pcc_mrtt = cppc_ss->min_turnaround_time;
pcc_data[pcc_ss_idx]->pcc_mpar = cppc_ss->max_access_rate;
pcc_data[pcc_ss_idx]->pcc_nominal = cppc_ss->latency;
@@ -584,7 +572,8 @@
pcc_data[pcc_ss_idx]->pcc_comm_addr =
acpi_os_ioremap(cppc_ss->base_address, cppc_ss->length);
if (!pcc_data[pcc_ss_idx]->pcc_comm_addr) {
-    pr_err("Failed to ioremap PCC comm region mem\n");
+    pr_err("Failed to ioremap PCC comm region mem for %d\n",
       pcc_ss_idx);
    return -ENOMEM;
}

@@ -838,6 +827,7 @@
"acpi_cppc");
if (ret) {
    per_cpu(cpc_desc_ptr, pr->id) = NULL;
}
+kobject_put(&cpc_ptr->kobj);
goto out_free;
}

@@ -878,8 +868,8 @@
pcc_data[pcc_ss_id]->refcount--;
if (!pcc_data[pcc_ss_id]->refcount) {
  pcc_mbox_free_channel(pcc_data[pcc_ss_id]->pcc_channel);
-  pcc_data[pcc_ss_id]->pcc_channel_acquired = 0;
  kfree(pcc_data[pcc_ss_id]);
+  pcc_data[pcc_ss_id] = NULL;
}
}
}

@@ -973,8 +963,8 @@
*val = readq_relaxed(vaddr);
break;
default:
-  pr_debug("Error: Cannot read %u bit width from PCC\n",
-            reg->bit_width);
+  pr_debug("Error: Cannot read %u bit width from PCC for ss: %d\n",
+            reg->bit_width, pcc_ss_id);
  ret_val = -EFAULT;
}

@@ -1012,8 +1002,8 @@
writeq_relaxed(val, vaddr);
break;
default:
-  pr_debug("Error: Cannot write %u bit width to PCC\n",
-            reg->bit_width);
+  pr_debug("Error: Cannot write %u bit width to PCC for ss: %d\n",
+            reg->bit_width, pcc_ss_id);
  ret_val = -EFAULT;
break;
}
--- linux-4.15.0.orig/drivers/acpi/custom_method.c
+++ linux-4.15.0/drivers/acpi/custom_method.c
@@ -29,6 +29,9 @@
struct acpi_table_header table;
acpi_status status;

+if (kernel_is_locked_down("ACPI custom methods"))
+return -EPERM;
+
if (!(*ppos)) {
  /* parse the table header to get the table length */
  if (count <= sizeof(struct acpi_table_header))
sizeof(struct acpi_table_header))
return -EFAULT;
uncopied_bytes = max_size = table.length;
+/* make sure the buf is not allocated */
+kfree(buf);
buf = kzalloc(max_size, GFP_KERNEL);
if (!buf)
return -ENOMEM;
+/* make sure the buf is not allocated */
+kfree(buf);
+buf = NULL;
return -EINVAL;
+
if (copy_from_user(buf + (*ppos), user_buf, count)) {
+kfree(buf);
--- linux-4.15.0.orig/drivers/acpi/device_pm.c
+++ linux-4.15.0/drivers/acpi/device_pm.c
@@ -172,7 +172,7 @@
    /* If _PR3 is not available, use D3hot as the target state. */
    if (!device->power.states[ACPI_STATE_D3_COLD].flags.valid)
        target_state = state;
-} else if (!device->power.states[state].flags.valid) {
+} else if (!device->power.states[state].flags.valid) {
    end:
    if (result) {
        dev_warn(&device->dev, "Failed to change power state to %s\n",
-acpi_power_state_string(state));
+acpi_power_state_string(target_state));
    } else {
        device->power.state = target_state;
        ACPI_DEBUG_PRINT((ACPI_DB_INFO,
            "Device [%s] transitioned to %s\n",
            device->pnp.bus_id,
            - acpi_power_state_string(state));
+ acpi_power_state_string(target_state));
    }
}
return result;
@@ -543,6 +543,7 @@
unsigned long long ret;
int d_min, d_max;
bool wakeup = false;
+bool has_sxd = false;
acpi_status status;

/*
@@ -581,6 +582,10 @@
else
return -ENODATA;
}
+
+if (status == AE_OK)
+has_sxd = true;
+
d_min = ret;
wakeup = device_may_wakeup(dev) && adev->wakeup.flags.valid
&& adev->wakeup.sleep_state >= target_state;
@@ -599,7 +604,11 @@
method[3] = 'W';
status = acpi_evaluate_integer(handle, method, NULL, &ret);
if (status == AE_NOT_FOUND) {
-@if (target_state > ACPI_STATE_S0)
+@if (has_sxd && target_state > ACPI_STATE_S0)
    d_max = d_min;
} else if (ACPI_SUCCESS(status) && ret <= ACPI_STATE_D3_COLD) {
/* Fall back to D3cold if ret is not a valid state. */
@@ -693,7 +702,7 @@
static DEFINE_MUTEX(acpi_wakeup_lock);

static int __acpi_device_wakeup_enable(struct acpi_device *adev,
- u32 target_state, int max_count)
+ u32 target_state)
{
    struct acpi_device_wakeup *wakeup = &adev->wakeup;
    acpi_status status;
@@ -701,9 +710,10 @@
mutex_lock(&acpi_wakeup_lock);

-@if (wakeup->enable_count >= max_count)
+if (wakeup->enable_count >= INT_MAX) {

+acpi_handle_info(adev->handle, "Wakeup enable count out of bounds!");
goto out;
-
+
if (wakeup->enable_count > 0)
goto inc;

@@ -740,7 +750,7 @@
 *
 static int acpi_device_wakeup_enable(struct acpi_device *adev, u32 target_state)
 {
- return __acpi_device_wakeup_enable(adev, target_state, 1);
+ return __acpi_device_wakeup_enable(adev, target_state);
 }

/ **
@@ -770,8 +780,12 @@
 mutex_unlock(&acpi_wakeup_lock);
 }

- static int __acpi_pm_set_device_wakeup(struct device *dev, bool enable,
- int max_count)
-/**
-+ * acpi_pm_set_device_wakeup - Enable/disable remote wakeup for given device.
-+ * @dev: Device to enable/disable to generate wakeup events.
-+ * @enable: Whether to enable or disable the wakeup functionality.
-+ */
+int acpi_pm_set_device_wakeup(struct device *dev, bool enable)
+ {
 struct acpi_device *adev;
 int error;
@@ -791,37 +805,15 @@
 return 0;
 }

- error = __acpi_device_wakeup_enable(adev, acpi_target_system_state(),
- max_count);
+error = __acpi_device_wakeup_enable(adev, acpi_target_system_state());
 if (!error)
 dev_dbg(dev, "Wakeup enabled by ACPI!");

 return error;
 }
-
-/**
- * acpi_pm_set_device_wakeup - Enable/disable remote wakeup for given device.
- * @dev: Device to enable/disable to generate wakeup events.
- * @enable: Whether to enable or disable the wakeup functionality.
- int acpi_pm_set_device_wakeup(struct device *dev, bool enable)
- {
  -return __acpi_pm_set_device_wakeup(dev, enable, 1);
- }
EXPORT_SYMBOL_GPL(acpi_pm_set_device_wakeup);

/**
 * acpi_pm_set_bridge_wakeup - Enable/disable remote wakeup for given bridge.
 * @dev: Bridge device to enable/disable to generate wakeup events.
 * @enable: Whether to enable or disable the wakeup functionality.
 * */
-int acpi_pm_set_bridge_wakeup(struct device *dev, bool enable)
- {
  -return __acpi_pm_set_device_wakeup(dev, enable, INT_MAX);
  -} 
-EXPORT_SYMBOL_GPL(acpi_pm_set_bridge_wakeup);

* acpi_dev_pm_low_power - Put ACPI device into a low-power state.
* @dev: Device to put into a low-power state.
* @adev: ACPI device node corresponding to @dev.
@@ -939,8 +931,8 @@
  u32 sys_target = acpi_target_system_state();
  int ret, state;

  if (!pm_runtime_suspended(dev) || !adev || (adev->wakeup.flags.valid &&
+   device_may_wakeup(dev) != !!adev->wakeup.prepare_count))
    return true;

  if (sys_target == ACPI_STATE_S0)
@@ -1050,7 +1042,7 @@
 * acpi_subsys_resume_noirq - Run the device driver's "noirq" resume callback.
 * @dev: Device to handle.
 */
-int acpi_subsys_resume_noirq(struct device *dev)
+static int acpi_subsys_resume_noirq(struct device *dev)
  { 
    /* Devices with DPM_FLAG_SMART_SUSPEND may be left in runtime suspend
@@ -1062,7 +1054,6 @@
      return pm_generic_resume_noirq(dev);
    }
-EXPORT_SYMBOL_GPL(acpi_subsys_resume_noirq);
*/
* acpi_subsys_resume_early - Resume device using ACPI.
@@ -1072,12 +1063,11 @@ *
* generic early resume procedure for it during system transition into the *
* working state.
*/
-int acpi_subsys_resume_early(struct device *dev)
+static int acpi_subsys_resume_early(struct device *dev)
 { 
  int ret = acpi_dev_resume(dev);
  return ret ? ret : pm_generic_resume_early(dev);
}
-EXPORT_SYMBOL_GPL(acpi_subsys_resume_early);

/**
 * acpi_subsys_freeze - Run the device driver's freeze callback.
 @@ -1086,65 +1076,81 @@ int acpi_subsys_freeze(struct device *dev)
 { 
 /*
 - * This used to be done in acpi_subsys_prepare() for all devices and
 - * some drivers may depend on it, so do it here. Ideally, however,
 - * runtime-suspended devices should not be touched during freeze/thaw
 - * transitions.
 + * Resume all runtime-suspended devices before creating a snapshot
 + * image of system memory, because the restore kernel generally cannot
 + * be expected to always handle them consistently and they need to be
 + * put into the runtime-active metastate during system resume anyway,
 + * so it is better to ensure that the state saved in the image will be
 + * always consistent with that.
 */
- if (!dev_pm_test_driver_flags(dev, DPM_FLAG_SMART_SUSPEND))
- pm_runtime_resume(dev);
+ pm_runtime_resume(dev);

 return pm_generic_freeze(dev);
 }
 EXPORT_SYMBOL_GPL(acpi_subsys_freeze);

/**
 - * acpi_subsys_freeze_late - Run the device driver's "late" freeze callback.
 - * @dev: Device to handle.
 + * acpi_subsys_restore_early - Restore device using ACPI.
 + * @dev: Device to restore.
 */
-int acpi_subsys_freeze_late(struct device *dev)
+int acpi_subsys_restore_early(struct device *dev)
 {
+int ret = acpi_dev_resume(dev);
+return ret ? ret : pm_generic_restore_early(dev);
+
+EXPORT_SYMBOL_GPL(acpi_subsys_restore_early);

-if (dev.pm_smart_suspend_and_suspended(dev))
-  return 0;
+/**
+ * acpi_subsys_poweroff - Run the device driver's poweroff callback.
+ * @dev: Device to handle.
+ *
+ * Follow PCI and resume devices from runtime suspend before running their
+ * system poweroff callbacks, unless the driver can cope with runtime-suspended
+ * devices during system suspend and there are no ACPI-specific reasons for
+ * resuming them.
+ */
+int acpi_subsys_poweroff(struct device *dev)
+{
+  if (!dev_pm_test_driver_flags(dev, DPM_FLAG_SMART_SUSPEND) ||
+      acpi_dev_needs_resume(dev, ACPI_COMPANION(dev)))
+    pm_runtime_resume(dev);
-
-  return pm_generic_freeze_late(dev);
+  ret = pm_generic_poweroff(dev);
+  if (ret)
+    return ret;
+
+EXPORT_SYMBOL_GPL(acpi_subsys_freeze_late);
+EXPORT_SYMBOL_GPL(acpi_subsys_poweroff);

/**
- * acpi_subsys_freeze_noirq - Run the device driver's "noirq" freeze callback.
- * acpi_subsys_poweroff_late - Run the device driver's poweroff callback.
- * @dev: Device to handle.
- *
- * Carry out the generic late poweroff procedure for @dev and use ACPI to put
- * it into a low-power state during system transition into a sleep state.
- */
-int acpi_subsys_freeze_noirq(struct device *dev)
+static int acpi_subsys_poweroff_late(struct device *dev)
+
+int ret;

if (dev.pm_smart_suspend_and_suspended(dev))
  return 0;

-  return pm_generic_freeze_noirq(dev);
+ret = pm_generic_poweroff_late(dev);
+if (ret)
+  return ret;
+return acpi_dev_suspend(dev, device_may_wakeup(dev));
}
-EXPORT_SYMBOL_GPL(acpi_subsys_freeze_noirq);

/**
 * acpi_subsys_freeze_noirq - Run the device driver's "noirq" freeze callback.
 * @dev: Device to handle.
 * + * acpi_subsys_poweroff_noirq - Run the driver's "noirq" poweroff callback.
 * + * @dev: Device to suspend.
 * */
-int acpi_subsys_freeze_noirq(struct device *dev)
+static int acpi_subsys_poweroff_noirq(struct device *dev)
{
  -/*
  - * If the device is in runtime suspend, the "thaw" code may not work
  - * correctly with it, so skip the driver callback and make the PM core
  - * skip all of the subsequent "thaw" callbacks for the device.
  - */
  -if (dev_pm_smart_suspend_and_suspended(dev)) {
  -dev_pm_skip_next_resume_phases(dev);
  +if (dev_pm_smart_suspend_and_suspended(dev))
  return 0;
  -}

  -return pm_generic_thaw_noirq(dev);
  +return pm_generic_poweroff_noirq(dev);
}
-EXPORT_SYMBOL_GPL(acpi_subsys_thaw_noirq);
#endif /* CONFIG_PM_SLEEP */

static struct dev_pm_domain acpi_general_pm_domain = {
  @ @ -1160,14 +1166,10 @ @
  .resume_noirq = acpi_subsys_resume_noirq,
  .resume_early = acpi_subsys_resume_early,
  .freeze = acpi_subsys_freeze,
  -.freeze_late = acpi_subsys_freeze_late,
  -.freeze_noirq = acpi_subsys_freeze_noirq,
  -.thaw_noirq = acpi_subsys_thaw_noirq,
  -.poweroff = acpi_subsys_suspend,
  -.poweroff_late = acpi_subsys_suspend_late,
  -.poweroff_noirq = acpi_subsys_suspend_noirq,
  -.restore_noirq = acpi_subsys_resume_noirq,
  -.restore_early = acpi_subsys_resume_early,
  +.poweroff = acpi_subsys_poweroff,
  +.poweroff_late = acpi_subsys_poweroff_late,
  +.poweroff_noirq = acpi_subsys_poweroff_noirq,
  +.restore_early = acpi_subsys_restore_early,
#endif

int acpi_dev_pm_attach(struct device *dev, bool power_on)
{
    /*
     * Skip devices whose ACPI companions match the device IDs below,
     * because they require special power management handling incompatible
     * with the generic ACPI PM domain.
     * /
     *static const struct acpi_device_id special_pm_ids[] = {
     *    {"PNP0C0B", }, /* Generic ACPI fan */
     *    {"INT3404", }, /* Fan */
     *};
    struct acpi_device *adev = ACPI_COMPANION(dev);

    if (!adev || !acpi_match_device_ids(adev, special_pm_ids))
        return -ENODEV;

    if (dev->pm_domain)
        return -ENODEV;

    struct acpi_buffer buf = { ACPI_ALLOCATE_BUFFER };
    const union acpi_object *of_compatible, *obj;
    acpi_status status;
    int len, count;
    int i, nval;
    char *c;

    -acpi_get_name(acpi_dev->handle, ACPI_SINGLE_NAME, &buf);
    +status = acpi_get_name(acpi_dev->handle, ACPI_SINGLE_NAME, &buf);
    +if (ACPI_FAILURE(status))
        return -ENODEV;
    +* DT strings are all in lower case */
    for (c = buf.pointer; *c != '\0'; c++)
        *c = tolower(*c);
    if (add_uevent_var(env, "MODALIAS="))
        return -ENOMEM;

    -len = create_pnp_modalias(adev, &env->buf[env->buflen - 1],

- sizeof(env->buf) - env->buflen);
-if (len < 0)
-return len;
-
-env->buflen += len;
-if (!adev->data.of_compatible)
-return 0;
-
-if (len > 0 && add_uevent_var(env, "MODALIAS="))
-return -ENOMEM;
-
-len = create_of_modalias(adev, &env->buf[env->buflen - 1],
- sizeof(env->buf) - env->buflen);
+if (adev->data.of_compatible)
+len = create_of_modalias(adev, &env->buf[env->buflen - 1],
+ sizeof(env->buf) - env->buflen);
+else
+len = create_pnp_modalias(adev, &env->buf[env->buflen - 1],
+ sizeof(env->buf) - env->buflen);
-if (len < 0)
return len;

@@ -357,7 +353,7 @@
return sprintf(buf, "%%s
", acpi_power_state_string(state));
 }

-static DEVICE_ATTR(real_power_state, 0444, real_power_state_show, NULL);
+static DEVICE_ATTR_RO(real_power_state);

static ssize_t power_state_show(struct device *dev, struct device_attribute *attr, char *buf)
@@ -367,7 +363,7 @@
return sprintf(buf, "%%s
", acpi_power_state_string(adev->power.state));
 }

-static DEVICE_ATTR(power_state, 0444, power_state_show, NULL);
+static DEVICE_ATTR_RO(power_state);

static ssize_t acpi_eject_store(struct device *d, struct device_attribute *attr,
@@ -456,13 +452,13 @@
UTF16_LITTLE_ENDIAN, buf,
-PAGE_SIZE);
+PAGE_SIZE - 1);

buf[result++] = '\n';
static ssize_t
acpi_device_sun_show(struct device *dev, struct device_attribute *attr,
--- linux-4.15.0.orig/drivers/acpi/ec.c
+++ linux-4.15.0/drivers/acpi/ec.c
@@ -194,6 +194,7 @@
static int EC_FLAGS_QUERY_HANDSHAKE; /* Needs QR_EC issued when SCI_EVT set */
static int EC_FLAGS_CORRECT_ECDT; /* Needs ECDT port address correction */
static int EC_FLAGS_IGNORE_DSDT_GPE; /* Needs ECDT GPE as correction setting */
+static int EC_FLAGS_CLEAR_ON_RESUME; /* Needs acpi_ec_clear() on boot/resume */

/* --------------------------------------------------------------------------
 *                           Logging/Debugging
@@ -499,6 +500,26 @@
 ec_log_drv("event blocked");
 }

+/*
+ * Process _Q events that might have accumulated in the EC.
+ * Run with locked ec mutex.
+ */
+static void acpi_ec_clear(struct acpi_ec *ec)
+{
+int i, status;
+u8 value = 0;
+
+for (i = 0; i < ACPI_EC_CLEAR_MAX; i++) {
+status = acpi_ec_query(ec, &value);
+if (status || !value)
++break;
+}
+if (unlikely(i == ACPI_EC_CLEAR_MAX))
+pr_warn("Warning: Maximum of %d stale EC events cleared\n", i);
+else
+pr_info("%d stale EC events cleared\n", i);
+}
+
static void acpi_ec_enable_event(struct acpi_ec *ec)
{
unsigned long flags;
@@ -507,6 +528,10 @@
if (acpi_ec_started(ec))
__acpi_ec_enable_event(ec);
spin_unlock_irqrestore(&ec->lock, flags);
+
+/* Drain additional events if hardware requires that */
+if (EC_FLAGS_CLEAR_ON_RESUME)
+acpi_ec_clear(ec);
+
#endif CONFIG_PM_SLEEP
@@ -1034,32 +1059,36 @@
acpi_ec_start(first_ec, true);
}

/* --------------------------------------------------------------------------
     Event Management
- -------------------------------------------------------------------------- */
static struct acpi_ec_query_handler *
- acpi_ec_get_query_handler(struct acpi_ec_query_handler *handler)
+void acpi_ec_mark_gpe_for_wake(void)
{
    if (handler)
        kref_get(&handler->kref);
    return handler;
}

+void acpi_ec_set_gpe_wake_mask(u8 action)
+{
+    if (first_ec && !ec_no_wakeup)
+        acpi_set_gpe_wake_mask(NULL, first_ec->gpe, action);
+}
+
+/* --------------------------------------------------------------------------
     Event Management
+ -------------------------------------------------------------------------- */
static struct acpi_ec_query_handler *
acpi_ec_get_query_handler_by_value(struct acpi_ec *ec, u8 value)
{
    struct acpi_ec_query_handler *handler;
    bool found = false;

    mutex_lock(&ec->mutex);
    list_for_each_entry(handler, &ec->list, node) {
        if (value == handler->query_bit) {
            -found = true;
            -break;
        +kref_get(&handler->kref);
        +mutex_unlock(&ec->mutex);

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+return handler;
}

mutex_unlock(&ec->mutex);
}-return found ? acpi_ec_get_query_handler(handler) : NULL;
+return NULL;
}

static void acpi_ec_query_handler_release(struct kref *kref)
@@ -1516,7 +1545,7 @@
acpi_handle_info(ec->handle,
- "GPE=0x%lx, EC_CMD/EC_SC=0x%lx, EC_DATA=0x%lx\n",
+ "GPE=0x%x, EC_CMD/EC_SC=0x%lx, EC_DATA=0x%lx\n",
ec->gpe, ec->command_addr, ec->data_addr);
return ret;
}
@@ -1803,6 +1832,31 @@
#endif
/*
 + * On some hardware it is necessary to clear events accumulated by the EC during
 + * sleep. These ECs stop reporting GPEs until they are manually polled, if too
 + * many events are accumulated. (e.g. Samsung Series 5/9 notebooks)
 + *
 + * https://bugzilla.kernel.org/show_bug.cgi?id=44161
 + *
 + * Ideally, the EC should also be instructed NOT to accumulate events during
 + * sleep (which Windows seems to do somehow), but the interface to control this
 + * behaviour is not known at this time.
 + *
 + * Models known to be affected are Samsung 530Uxx/535Uxx/540Uxx/550Pxx/900Xxx,
 + * however it is very likely that other Samsung models are affected.
 + *
 + * On systems which don't accumulate _Q events during sleep, this extra check
 + * should be harmless.
 + */
+static int ec_clear_on_resume(const struct dmi_system_id *id)
+{
+pr_debug("Detected system needing EC poll on resume.\n");
+EC_FLAGS_CLEAR_ON_RESUME = 1;
+ec_event_clearing = ACPI_EC_EVT_TIMING_STATUS;
+return 0;
+}
+
+/*
 * Some ECDTs contain wrong register addresses.
DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
DMI_MATCH(DMI_PRODUCT_NAME, "GL702VMK"), NULL},
{
    +ec_honor_ecdt_gpe, "ASUSTeK COMPUTER INC. X505BA", {
        +DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
        +DMI_MATCH(DMI_PRODUCT_NAME, "X505BA"), NULL},
    +
    +ec_honor_ecdt_gpe, "ASUSTeK COMPUTER INC. X505BP", {
        +DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
        +DMI_MATCH(DMI_PRODUCT_NAME, "X505BP"), NULL},
    +
    +ec_honor_ecdt_gpe, "ASUSTeK COMPUTER INC. X542BA", {
        +DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
        +DMI_MATCH(DMI_PRODUCT_NAME, "X542BA"), NULL},
    +
    +ec_honor_ecdt_gpe, "ASUSTeK COMPUTER INC. X542BP", {
        +DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
        +DMI_MATCH(DMI_PRODUCT_NAME, "X542BP"), NULL},
    +
    ec_honor_ecdt_gpe, "ASUS X550VXK", {
        DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
        DMI_MATCH(DMI_PRODUCT_NAME, "X550VXK"), NULL},
    @ @ -1851,6 +1921,9 @@
    ec_honor_ecdt_gpe, "ASUS X580VD", {
        DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
        DMI_MATCH(DMI_PRODUCT_NAME, "X580VD"), NULL},
    +
    +ec_clear_on_resume, "Samsung hardware", {
        +DMI_MATCH(DMI_SYS_VENDOR, "SAMSUNG ELECTRONICS CO., LTD."), NULL},
    |
    |
    |
    |
    @ @ -1927,6 +2000,9 @@
    ec->reference_count >= 1)
    ACPI_GPE_DISABLE);
    +if (acpi_sleep_no_ec_events())
    +acpi_ec_enter_noirq(ec);
    +
    return 0;
}

//@ -1934,6 +2010,9 @@
{ struct acpi_ec *ec = acpi_driver_data(to_acpi_device(dev));
+if (acpi_sleep_no_ec_events())
+acpi_ec_leave_noirq(ec);
+
+if (ec_no_wakeup && test_bit(EC_FLAGS_STARTED, &ec->flags) &&
    ec->reference_count >= 1)
acpi_set_gpe(NULL, ec->gpe, ACPI_GPE_ENABLE);
@@ -2025,6 +2104,17 @@}
}
}

+static const struct dmi_system_id acpi_ec_no_wakeup[] = {
+{ +
+.ident = "Thinkpad X1 Carbon 6th",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_PRODUCT_FAMILY, "Thinkpad X1 Carbon 6th"),
+},
+},
+{ },
+};
+
+int __init acpi_ec_init(void)
+{
+int result;
@@ -2035,6 +2125,15 @@}
+if (result)
+return result;
+
+/*
+ * Disable EC wakeup on following systems to prevent periodic
+ * wakeup from EC GPE.
+ */
+if (dmi_check_system(acpi_ec_no_wakeup)) {
+ec_no_wakeup = true;
+pr_debug("Disabling EC wakeup on suspend-to-idle\n");
+}
+
+ /* Drivers must be started after acpi_ec_query_init() */
dsdt_fail = acpi_bus_register_driver(&acpi_ec_driver);
/*
--- linux-4.15.0.orig/drivers/acpi/ec_sys.c
+++ linux-4.15.0/drivers/acpi/ec_sys.c
@@ -128,7 +128,7 @@
return -ENOMEM;
}"debugfs_create_x32("gpe", 0444, dev_dir, (u32 *)&first_ec->gpe))
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```c
if (!debugfs_create_x32("gpe", 0444, dev_dir, &first_ec->gpe))
goto error;

if (!debugfs_create_bool("use_global_lock", 0444, dev_dir,
&first_ec->global_lock))
--- linux-4.15.0.orig/drivers/acpi/evged.c
+++ linux-4.15.0/drivers/acpi/evged.c
@@ -82,6 +82,8 @@
    struct resource r;
    struct acpi_resource_irq *p = &ares->data irq;
    struct acpi_resource_extended_irq *pext = &ares->data extended irq;
+    char ev_name[5];
+    u8 trigger;
    
    if (ares->type == ACPI_RESOURCE_TYPE_END_TAG)
    return AE_OK;

-    if (ares->type == ACPI_RESOURCE_TYPE_IRQ)
+    if (ares->type == ACPI_RESOURCE_TYPE_IRQ) {
        gsi = p->interrupts[0];
-      else
+      } else {
          trigger = p->triggering;
+            } else {
          gsi = pext->interrupts[0];
+            trigger = pext->triggering;
+            }

    irq = r.start;

    -if (ACPI_FAILURE(acpi_get_handle(handle, "_EVT", &evt_handle))) {
    +switch (gsi) {
      +case 0 ... 255:
        +sprintf(ev_name, "_%c%02X",
          trigger == ACPI_EDGE_SENSITIVE ? 'E' : 'L', gsi);
        +
      +if (ACPI_SUCCESS(acpi_get_handle(handle, ev_name, &evt_handle)))
        +break;
      +/\* fall through */
      +default:
      +if (ACPI_SUCCESS(acpi_get_handle(handle, "._EVT", &evt_handle)))
        +break;
      +
        dev_err(dev, "cannot locate _EVT method\n");
    return AE_ERROR;
    }
--- linux-4.15.0.orig/drivers/acpi/internal.h
```
+++ linux-4.15.0/drivers/acpi/internal.h
@@ -18,6 +18,8 @@
 #ifndef _ACPI_INTERNAL_H_
 #define _ACPI_INTERNAL_H_
+
+  #include <linux/idr.h>
+
+  #define ACPI_MAX_DEVICE_INSTANCES 4096

 struct acpi_device_bus_id {
-   char bus_id[15];
-   unsigned int instance_no;
+   const char *bus_id;
+   struct ida instance_ida;
   struct list_head node;
  }

@@ -97,9 +99,11 @@
 extern struct list_head acpi_bus_id_list;
+
+  #define ACPI_MAX_DEVICE_INSTANCES 4096

@@ -159,7 +163,7 @@
 
 struct acpi_ec {
   acpi_handle handle;
-   unsigned long gpe;
+   u32 gpe;
   unsigned long command_addr;
   unsigned long data_addr;
   bool global_lock;
@@ -188,6 +192,8 @@
 
 int acpi_ec_dsdt_probe(void);
 void acpi_ec_block_transactions(void);
void acpi_ec_unblock_transactions(void);
+void acpi_ec_mark_gpe_for_wake(void);
+void acpi_ec_set_gpe_wake_mask(u8 action);
 int acpi_ec_add_query_handler(struct acpi_ec *ec, u8 query_bit,
   acpi_ec_query_func func,
   void *data);
--- linux-4.15.0.orig/drivers/acpi/nfit/core.c
+++ linux-4.15.0/drivers/acpi/nfit/core.c
@@ -188,6 +192,8 @@
 
 /* In the _LSI, _LSR, _LSW case the locked status is
   * communicated via the read/write commands
   */
if (nfit_mem->has_lsi)
+if (nfit_mem->has_lsr)
break;

if (status >> 16 & ND_CONFIG_LOCKED)
@@ -396,6 +396,36 @@ return id;
 }

+static int cmd_to_func(struct nfit_mem *nfit_mem, unsigned int cmd,
+struct nd_cmd_pkg *call_pkg)
+{
+if (call_pkg) {
+int i;
+
+if (nfit_mem && nfit_mem->family != call_pkg->nd_family)
+return -ENOTTY;
+
+for (i = 0; i < ARRAY_SIZE(call_pkg->nd_reserved2); i++)
+if (call_pkg->nd_reserved2[i])
+return -EINVAL;
+
+return call_pkg->nd_command;
+}
+
+/* In the !call_pkg case, bus commands == bus functions */
+if (!nfit_mem)
+return cmd;
+
+/* Linux ND commands == NVDIMM_FAMILY_INTEL function numbers */
+if (nfit_mem->family == NVDIMM_FAMILY_INTEL)
+return cmd;
+
+ /* Force function number validation to fail since 0 is never
+ published as a valid function in dsm_mask.
+ */
+return 0;
+}
+
+int acpi_nfit_ctl(struct nvdimm_bus_descriptor *nd_desc, struct nvdimm *nvdimm,
+unsigned int cmd, void *buf, unsigned int buf_len, int *cmd_rc)
+
+ unsigned long cmd_mask, dsm_mask;
+ u32 offset, fw_status = 0;
+ acpi_handle handle;
+ const guid_t *guid;
int rc, i;
+int func, rc, i;

-int rc, i;
+int func, rc, i;

-int rc, i;
+int func, rc, i;

-func = cmd;
-if (cmd == ND_CMD_CALL) {
-call_pkg = buf;
-func = call_pkg->nd_command;
+if (cmd_rc)
+*cmd_rc = -EINVAL;

-for (i = 0; i < ARRAY_SIZE(call_pkg->nd_reserved2); i++)
-if (call_pkg->nd_reserved2[i])
-return -EINVAL;
-}
+if (cmd == ND_CMD_CALL)
+call_pkg = buf;
+func = cmd_to_func(nfit_mem, cmd, call_pkg);
+if (func < 0)
+return func;

if (nvdimm) {
 struct acpi_device *adev = nfit_mem->adev;

 if (!adev)
 return -ENOTTY;
-if (call_pkg && &nfit_mem->family != call_pkg->nd_family)
-return -ENOTTY;

dimm_name = nvdim_name(nvdimm);
 cmd_name = nvdimm_cmd_name(cmd);
@@ -443,9 +469,7 @@
 cmd_name = nvdimm_bus_cmd_name(cmd);
 cmd_mask = nd_desc->cmd_mask;
 -dsm_mask = cmd_mask;
- if (cmd == ND_CMD_CALL)
- dsm_mask = nd_desc->bus_dsm_mask;
 +dsm_mask = nd_desc->bus_dsm_mask;
 desc = nd_cmd_bus_desc(cmd);
 guid = to_nfit_uuid(NFIT_DEV_BUS);
 handle = adev->handle;
@@ -455,7 +479,13 @@
 if (!desc || (cmd && (desc->out_num + desc->in_num == 0)))
 return -ENOTTY;

-if (!test_bit(cmd, &cmd_mask) || !test_bit(func, &dsm_mask))
+/*
+ * Check for a valid command. For ND_CMD_CALL, we also have to
+ * make sure that the DSM function is supported.
+ *
+if (cmd == ND_CMD_CALL && !test_bit(func, &dsm_mask))
+return -ENOTTY;
+else if (!test_bit(cmd, &cmd_mask))
return -ENOTTY;

in_obj.type = ACPI_TYPE_PACKAGE;
@@ -483,7 +513,7 @@
min_t(u32, 256, in_buf.buffer.length), true);

/* call the BIOS, prefer the named methods over _DSM if available */
-if (nvdimm && cmd == ND_CMD_GET_CONFIG_SIZE && nfit_mem->has_lsi)
+if (nvdimm && cmd == ND_CMD_GET_CONFIG_SIZE && nfit_mem->has_lsr)
out_obj = acpi_label_info(handle);
else if (nvdimm && cmd == ND_CMD_GET_CONFIG_DATA && nfit_mem->has_lsr) {
struct nd_cmd_get_config_data_hdr *p = buf;
@@ -511,6 +541,19 @@
return -EINVAL;
}

+if (out_obj->type != ACPI_TYPE_BUFFER) {
+dev_dbg(dev, "%s unexpected output object type cmd: %s type: %d\n",
+dimm_name, cmd_name, out_obj->type);
+rc = -EINVAL;
+goto out;
+}
+
+dev_dbg(dev, "%s;%s cmd: %s output length: %d\n", __func__, dimm_name,
+cmd_name, out_obj->buffer.length);
+print_hex_dump_debug(cmd_name, DUMP_PREFIX_OFFSET, 4, 4,
+out_obj->buffer.pointer,
+min_t(u32, 128, out_obj->buffer.length), true);
+
if (call_pkg) {
call_pkg->nd_fw_size = out_obj->buffer.length;
memcpypcall_pkg->nd_payload + call_pkg->nd_size_in,
@@ -524,22 +567,19 @@
* If we return an error (like elsewhere) then caller wouldn't
* be able to rely upon data returned to make calculation.
*/
+if (cmd_rc)
+*cmd_rc = 0;
return 0;
}

-if (out_obj->package.type != ACPI_TYPE_BUFFER) {
-dev_dbg(dev, "%s;%s unexpected output object type cmd: %s type: %d\n",

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- __func__, dimm_name, cmd_name, out_obj->type);
-rc = -EINVAL;
-goto out;
-
-dev_dbg(dev, "%s:%s cmd: %s output length: %d\n", __func__, dimm_name,
-cmd_name, out_obj->buffer.length);
-print_hex_dump_debug(cmd_name, DUMP_PREFIX_OFFSET, 4, 4,
-out_obj->buffer.pointer,
-min_t(u32, 128, out_obj->buffer.length), true);
-
for (i = 0, offset = 0; i < desc->out_num; i++) {
  u32 out_size = nd_cmd_out_size(nvdimm, cmd, desc, i, buf,
(u32 *) out_obj->buffer.pointer,
  @ @ -838,6 +870,18 @@
  return true;
}

+static bool add_platform_cap(struct acpi_nfit_desc *acpi_desc,
+struct acpi_nfit_capabilities *pcap)
+{
+  struct device *dev = acpi_desc->dev;
+  u32 mask;
+  +mask = (1 << (pcap->highest_capability + 1)) - 1;
+  acpi_desc->platform_cap = pcap->capabilities & mask;
+  dev_dbg(dev, "%s: cap: %#x\n", __func__, acpi_desc->platform_cap);
+  return true;
+}
+
+static void *add_table(struct acpi_nfit_desc *acpi_desc,
 struct nfit_table_prev *prev, void *table, const void *end)
{
  @ @ -883,6 +927,10 @@
  case ACPI_NFIT_TYPE_SMBIOS:
  dev_dbg(dev, "%s: smbios\n", __func__);
  break;
+  case ACPI_NFIT_TYPE_CAPABILITIES:
+    if (!add_platform_cap(acpi_desc, table))
+      return err;
+    break;
  default:
-dev_err(dev, "unknown table '%%d' parsing nfit\n", hdr->type);
  break;
  @ @ -1234,8 +1282,11 @@
  if (nd_desc) {
    struct acpi_nfit_desc *acpi_desc = to_acpi_desc(nd_desc);
mutex_lock(&acpi_desc->init_mutex);
rc = sprintf(buf, "%d", acpi_desc->scrub_count,
-(work_busy(&acpi_desc->work)) ? "+\n" : "\n");
+work_busy(&acpi_desc->work)
+&!acpi_desc->cancel ? "+\n" : "\n");
mutex_unlock(&acpi_desc->init_mutex);
}
device_unlock(dev);
return rc;
@@ -1450,7 +1501,7 @@
le16_to_cpu(nfit_dcr->dcr->code));
break;
}
-if (rc != ENXIO)
+if (rc != -ENXIO)
break;
 mutex_unlock(&acpi_desc->init_mutex);
@@ -1638,12 +1689,23 @@
device_unlock(dev->parent);
}

+static bool acpi_nvdimm_has_method(struct acpi_device *adev, char *method)
+{
+acpi_handle handle;
+acpi_status status;
+status = acpi_get_handle(adev->handle, method, &handle);
+ if (ACPI_SUCCESS(status))
+return true;
+return false;
+
+static int acpi_nfit_add_dimm(struct acpi_nfit_desc *acpi_desc,
struct nfit_mem *nfit_mem, u32 device_handle)
{
 struct acpi_device *adev, *adev_dimm;
 struct device *dev = acpi_desc->dev;
-union acpi_object *obj;
 unsigned long dsm_mask;
 const guid_t *guid;
 int i;
@@ -1677,9 +1739,17 @@
dev_set_drvdata(&adev_dimm->dev, nfit_mem);
/*
 - * Until standardization materializes we need to consider 4

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* different command sets. Note that checking for function0 (bit0) tells us if any commands are reachable through this GUID.
+ * There are 4 "legacy" NVDIMM command sets
+ * (NVDIMM_FAMILY_{INTEL,MSFT,HPE1,HPE2}) that were created before
+ * and an EFI working group was established to constrain this
+ * proliferation. The nfit driver probes for the supported command
+ * set by GUID. Note, if you're a platform developer looking to add
+ * a new command set to this probe, consider using an existing set,
+ * or otherwise seek approval to publish the command set at
+ * http://www.uefi.org/RFIC_LIST.
+ *
+ * Note, that checking for function0 (bit0) tells us if any commands
+ * are reachable through this GUID.
+ */
for (i = 0; i < NVDIMM_FAMILY_MAX; i++)
if (acpi_check_dsm(adev_dimm->handle, to_nfit_uuid(i), 1, 1))
@@ -1702,6 +1772,8 @@
dsm_mask &= ~(1 << 8);
} else if (nfit_mem->family == NVDIMM_FAMILY_MSFT) {
dsm_mask = 0xffffffff;
+} else if (nfit_mem->family == NVDIMM_FAMILY_HYPERV) {
+    dsm_mask = 0x1f;
} else {
    dev_dbg(dev, "unknown dimm command family\n");
nfit_mem->family = -1;
@@ -1709,6 +1781,13 @@
return 0;
}
+
+/*
+ * Function 0 is the command interrogation function, don't
+ * export it to potential userspace use, and enable it to be
+ * used as an error value in acpi_nfit_ctl().
+ */
+dsm_mask &= ~1UL;
+
+guid = to_nfit_uuid(nfit_mem->family);
+for_each_set_bit(i, &dsm_mask, BITS_PER_LONG)
+if (acpi_check_dsm(adev_dimm->handle, guid, 
@@ -1716,25 +1795,15 @@
+ULLL << i))
+    set_bit(i, &nfit_mem->dsm_mask);
+
-obj = acpi_label_info(adev_dimm->handle);
-if (obj) {
-ACPI_FREE(obj);
-nfit_mem->has_lsi = 1;
-dev_dbg(dev, "%s: has _LSI\n", dev_name(&adev_dimm->dev));
-obj = acpi_label_read(adev_dimm->handle, 0, 0);
-if (obj) {
- ACPI_FREE(obj);
-nfit_mem->has_lsr = 1;
+if (acpi_nvdimm_has_method(adev_dimm, "_LSI")
+&& acpi_nvdimm_has_method(adev_dimm, "_LSR")) {
 dev_dbg(dev, "%s: has _LSR\n", dev_name(&adev_dimm->dev));
+nfit_mem->has_lsr = true;
}

-obj = acpi_label_write(adev_dimm->handle, 0, 0, NULL);
-if (obj) {
- ACPI_FREE(obj);
-nfit_mem->has_lsw = 1;
+if (acpi_nvdimm_has_method(adev_dimm, "_LSI")
+&& acpi_nvdimm_has_method(adev_dimm, "_LSW")) {
 dev_dbg(dev, "%s: has _LSW\n", dev_name(&adev_dimm->dev));
+nfit_mem->has_lsw = true;
}

return 0;
@@ -1823,10 +1892,10 @@
cmd_mask |= nfit_mem->dsm_mask & NVDIMM_STANDARD_CMDMASK;
 }

-if (nfit_mem->has_lsi)
+if (nfit_mem->has_lsr) {
 set_bit(ND_CMD_GET_CONFIG_SIZE, &cmd_mask);
-if (nfit_mem->has_lsr)
+set_bit(ND_CMD_GET_CONFIG_DATA, &cmd_mask);
-if (nfit_mem->has_lsw)
+set_bit(ND_CMD_SET_CONFIG_DATA, &cmd_mask);
+
@@ -1867,6 +1936,9 @@
 struct kernfs_node *nfit_kernfs;

 nvdimm = nfit_mem->nvdimm;
+if (!nvdimm)
+continue;
+
 nfit_kernfs = sysfs_get_dirent(nvdimm_kobj(nvdimm)->sd, "nfit");
 if (nfit_kernfs)
 nfit_mem->flags_attr = sysfs_get_dirent(nfit_kernfs,
@@ -2560,7 +2632,7 @@
 struct acpi_nfit_system_address *spa = nfit_spa->spa;
 struct nd_blk_region_desc *ndbr_desc;

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struct nfit_mem *nfit_mem;
-int blk_valid = 0, rc;
+int rc;

if (!nvdimm) {
    dev_err(acpi_desc->dev, "spa%d dimm: %#x not found\n",
@@ -2580,15 +2652,14 @@
    if (!nfit_mem || !nfit_mem->bdw) {
        dev_dbg(acpi_desc->dev, "spa%d %s missing bdw\n",
spa->range_index, nvdimm_name(nvdimm));
-} else {
-    mapping->size = nfit_mem->bdw->capacity;
-    mapping->start = nfit_mem->bdw->start_address;
-    ndr_desc->num_lanes = nfit_mem->bdw->windows;
-    blk_valid = 1;
-    break;
-}
+    mapping->size = nfit_mem->bdw->capacity;
+    mapping->start = nfit_mem->bdw->start_address;
+    ndr_desc->num_lanes = nfit_mem->bdw->windows;
    ndr_desc->mapping = mapping;
    ndr_desc->num_mappings = blk_valid;
    ndr_desc->num_mappings = 1;
    ndbr_desc = to_blk_region_desc(ndr_desc);
    ndbr_desc->enable = acpi_nfit_blk_region_enable;
    ndbr_desc->do_io = acpi_desc->blk_do_io;
@@ -2656,10 +2727,23 @@
else
    ndr_desc->numa_node = NUMA_NO_NODE;

+/*
+ * Persistence domain bits are hierarchical, if
+ * ACPI_NFIT_CAPABILITY_CACHE_FLUSH is set then
+ * ACPI_NFIT_CAPABILITY_MEM_FLUSH is implied.
+ */
+if (acpi_desc->platform_cap & ACPI_NFIT_CAPABILITY_CACHE_FLUSH)
+    set_bit(ND_REGION_PERSIST_CACHE, &ndr_desc->flags);
+else if (acpi_desc->platform_cap & ACPI_NFIT_CAPABILITY_MEM_FLUSH)
+    set_bit(ND_REGION_PERSIST_MEMCTRL, &ndr_desc->flags);
+list_for_each_entry(nfit_memdev, &acpi_desc->memdevs, list) {
+    struct acpi_nfit_memory_map *memdev = nfit_memdev->memdev;
+    struct nd_mapping_desc *mapping;
+
+/* range index 0 == unmapped in SPA or invalid-SPA */
+if (memdev->range_index == 0 || spa->range_index == 0)
+    continue;
if (memdev->range_index != spa->range_index)
continue;
if (count >= ND_MAX_MAPPINGS) {
@@ -2995,15 +3079,21 @@
static int acpi_nfit_register_regions(struct acpi_nfit_desc *acpi_desc)
{
struct nfit_spa *nfit_spa;
-int rc;

-list_for_each_entry(nfit_spa, &acpi_desc->spas, list)
-if (nfit_spa_type(nfit_spa->spa) == NFIT_SPA_DCR) {
-/* BLK regions don't need to wait for ars results */
-rc = acpi_nfit_register_region(acpi_desc, nfit_spa);
-if (rc)
-return rc;
-}
+list_for_each_entry(nfit_spa, &acpi_desc->spas, list) {
+int rc, type = nfit_spa_type(nfit_spa->spa);
+
+/* PMEM and VMEM will be registered by the ARS workqueue */
+if (type == NFIT_SPA_PM || type == NFIT_SPA_VOLATILE)
+continue;
+/* BLK apertures belong to BLK region registration below */
+if (type == NFIT_SPA_BDW)
+continue;
+/* BLK regions don't need to wait for ARS results */
+rc = acpi_nfit_register_region(acpi_desc, nfit_spa);
+if (rc)
+return rc;
+}

acpi_desc->ars_start_flags = 0;
if (!acpi_desc->cancel)
@@ -3464,6 +3554,7 @@
BUILD_BUG_ON(sizeof(struct acpi_nfit_smbios) != 9);
BUILD_BUG_ON(sizeof(struct acpi_nfit_control_region) != 80);
BUILD_BUG_ON(sizeof(struct acpi_nfit_data_region) != 40);
+BUILD_BUG_ON(sizeof(struct acpi_nfit_capabilities) != 16);

guid_parse(UUID_VOLATILE_MEMORY, &nfit_uuid[NFIT_SPA_VOLATILE]);
guid_parse(UUID_PERSISTENT_MEMORY, &nfit_uuid[NFIT_SPA_PM]);
@@ -3478,6 +3569,7 @@
guid_parse(UUID_NFIT_DIMM_N_HPE1, &nfit_uuid[NFIT_DEV_DIMM_N_HPE1]);
guid_parse(UUID_NFIT_DIMM_N_HPE2, &nfit_uuid[NFIT_DEV_DIMM_N_HPE2]);
guid_parse(UUID_NFIT_DIMM_N_MSFT, &nfit_uuid[NFIT_DEV_DIMM_N_MSFT]);
+guid_parse(UUID_NFIT_DIMM_N_HYPERV, &nfit_uuid[NFIT_DEV_DIMM_N_HYPERV]);

nfit_wq = create_singlethread_workqueue("nfit");
if (!nfit_wq)
--- linux-4.15.0.orig/drivers/acpi/nfit/nfit.h
+++ linux-4.15.0/drivers/acpi/nfit/nfit.h
@@ -34,11 +34,14 @@
    /* https://msdn.microsoft.com/library/windows/hardware/mt604741 */
#define UUID_NFIT_DIMM_N_MSFT "1ee68b36-d4bd-4a1a-9a16-4f8e53d46e05"
+/* http://www.uefi.org/RFIC_LIST (see "Virtual NVDIMM 0x1901") */
+#define UUID_NFIT_DIMM_N_HYPERV "5746c5f2-a9a2-4264-ad0e-e4ddc9e09e80"
+
#define ACPI_NFIT_MEM_FAILED_MASK (ACPI_NFIT_MEM_SAVE_FAILED |
    ACPI_NFIT_MEM_RESTORE_FAILED | ACPI_NFIT_MEM_FLUSH_FAILED |
    ACPI_NFIT_MEM_NOT_ARMED | ACPI_NFIT_MEM_MAP_FAILED)

-#define NVDIMM_FAMILY_MAX NVDIMM_FAMILY_MSFT
+#define NVDIMM_FAMILY_MAX NVDIMM_FAMILY_HYPERV

#define NVDIMM_STANDARD_CMDMASK
(1 << ND_CMD_SMART | 1 << ND_CMD_SMART_THRESHOLD | 1 << ND_CMD_DIMM_FLAGS
@@ -75,6 +78,7 @@
NFIT_DEV_DIMM_N_HPE1 = NVDIMM_FAMILY_HPE1,
NFIT_DEV_DIMM_N_HPE2 = NVDIMM_FAMILY_HPE2,
NFIT_DEV_DIMM_N_MSFT = NVDIMM_FAMILY_MSFT,
+NFIT_DEV_DIMM_N_HYPERV = NVDIMM_FAMILY_HYPERV,
NFIT_SPA_VOLATILE,
NFIT_SPA_PM,
NFIT_SPA_DCR,
@@ -171,9 +175,8 @@
struct resource *flush_wpq;
unsigned long dsm_mask;
int family;
-  u32 has_lsi:1;
-  u32 has_lsr:1;
-  u32 has_lsw:1;
+  bool has_lsr;
+  bool has_lsw;
};

struct acpi_nfit_desc {
@@ -202,6 +205,7 @@
    unsigned long dimm_cmd_force_en;
    unsigned long bus_cmd_force_en;
    unsigned long bus_nfit_cmd_force_en;
+    unsigned int platform_cap;
    int (*blk_do_io)(struct nd_blk_region *ndbr, resource_size_t dpa,
        void *iobuf, u64 len, int rw);
};
--- linux-4.15.0.orig/drivers/acpi/numa.c
+++ linux-4.15.0/drivers/acpi/numa.c
@@ -46,7 +46,7 @@
int pxm_to_node(int pxm)
{
-if (pxm < 0)
+if (pxm < 0 || pxm >= MAX_PXM_DOMAINS || numa_off)
return NUMA_NO_NODE;
return pxm_to_node_map[pxm];
}
@@ -103,25 +103,27 @@
*/
int acpi_map_pxm_to_online_node(int pxm)
{
-int node, n, dist, min_dist;
+int node, min_node;
node = acpi_map_pxm_to_node(pxm);
if (node == NUMA_NO_NODE)
node = 0;
+min_node = node;
if (!node_online(node)) {
-min_dist = INT_MAX;
+int min_dist = INT_MAX, dist, n;
+
for_each_online_node(n) {
dist = node_distance(node, n);
if (dist < min_dist) {
min_dist = dist;
-node = n;
+min_node = n;
}
}
}
-return node;
+return min_node;
}
EXPORT_SYMBOL(acpi_map_pxm_to_online_node);
@@ -145,9 +147,9 @@
{
struct acpi_srat_mem_affinity *p =
(struct acpi_srat_mem_affinity *)header;
-pr_debug("SRAT Memory (0x%lx length 0x%lx) in proximity domain %d %s%s%s\n",
- (unsigned long)p->base_address,

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- (unsigned long)p->length,
+ pr_debug("SRAT Memory (0x%lx length 0x%lx) in proximity domain %d %s%s%s\n",
+ (unsigned long long)p->base_address,
+ (unsigned long long)p->length,
  p->proximity_domain,
  (p->flags & ACPI_SRAT_MEM_ENABLED) ?
    "enabled" : "disabled",
--- linux-4.15.0.orig/drivers/acpi/osi.c
+++ linux-4.15.0/drivers/acpi/osi.c
@@ -57,6 +57,30 @@
  "Processor Device", true],
  {"3.0 _SCP Extensions", true},
  {"Processor Aggregator Device", true},
+/*
+ * Linux-Dell-Video is used by BIOS to disable RTD3 for NVidia graphics
+ * cards as RTD3 is not supported by drivers now. Systems with NVidia
+ * cards will hang without RTD3 disabled.
+ *
+ * Once NVidia drivers officially support RTD3, this _OSI strings can
+ * be removed if both new and old graphics cards are supported.
+ */
+{"Linux-Dell-Video", true},
+/*
+ * Linux-Lenovo-NV-HDMI-Audio is used by BIOS to power on NVidia's HDMI
+ * audio device which is turned off for power-saving in Windows OS.
+ * This power management feature observed on some Lenovo Thinkpad
+ * systems which will not be able to output audio via HDMI without
+ * a BIOS workaround.
+ */
+{"Linux-Lenovo-NV-HDMI-Audio", true},
+/*
+ * Linux-HPI-Hybrid-Graphics is used by BIOS to enable dGPU to
+ * output video directly to external monitors on HP Inc. mobile
+ * workstations as Nvidia and AMD VGA drivers provide limited
+ * hybrid graphics supports.
+ */
+{"Linux-HPI-Hybrid-Graphics", true},
};

static u32 acpi_osi_handler(acpi_string interface, u32 supported)
@@ -456,6 +480,77 @@
});
+/*
+ * The following Lenovo models have a broken workaround in the
+ * acpi_video backlight implementation to meet the Windows 8
+ * requirement of 101 backlight levels. Reverting to pre-Win8
+ * behavior fixes the problem.
+ */
+
+.callback = dmi_disable_osi_win8,
+.ident = "Lenovo ThinkPad L430",
+.matches = {
  +  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  +  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad L430"),
  +},
+},
+
+.callback = dmi_disable_osi_win8,
+.ident = "Lenovo ThinkPad T430",
+.matches = {
  +  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  +  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad T430"),
  +},
+},
+
+.callback = dmi_disable_osi_win8,
+.ident = "Lenovo ThinkPad T430s",
+.matches = {
  +  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  +  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad T430s"),
  +},
+},
+
+.callback = dmi_disable_osi_win8,
+.ident = "Lenovo ThinkPad T530",
+.matches = {
  +  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  +  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad T530"),
  +},
+},
+
+.callback = dmi_disable_osi_win8,
+.ident = "Lenovo ThinkPad W530",
+.matches = {
  +  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  +  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad W530"),
  +},
+},
+
+.callback = dmi_disable_osi_win8,
+.ident = "Lenovo ThinkPad X1 Carbon",
+.matches = {
  +  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  +  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad X1 Carbon"),
  +},
+},
+
+.callback = dmi_disable_osi_win8,
+}.  
+}.  
+{  
+.callback = dmi_disable_osi_win8,  
+.ident = "Lenovo ThinkPad X230",  
+.matches = {  
+  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),  
+  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad X230"),  
+},  
+},  
+{  
+.callback = dmi_disable_osi_win8,  
+.ident = "Lenovo ThinkPad Edge E330",  
+.matches = {  
+  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),  
+  DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad Edge E330"),  
+},  
+},  
+  
/ *
  * BIOS invocation of _OSI(Linux) is almost always a BIOS bug.
  * Linux ignores it, except for the machines enumerated below.
--- linux-4.15.0.orig/drivers/acpi/osl.c  
+++ linux-4.15.0/drivers/acpi/osl.c  
@@ -45,6 +45,8 @@  
#include <linux/uaccess.h>  
#include <linux/io-64-nonatomic-lo-hi.h>  
+    acpica/accommon.h"  
+    acpica/acnamesp.h"  
+    "internal.h"  
#define _COMPONENT ACPI_OS_SERVICES  
@@ -192,7 +194,7 @@  
        acpi_physical_address pa = 0;  
#ifdef CONFIG_KEXEC  
    -if (acpi_rsdp)  
+    if (acpi_rsdp && !kernel_is_locked_down("ACPI RSDP specification"))  
        return acpi_rsdp;  
    #endif  
    
@@ -369,19 +371,21 @@  
}  
EXPORT_SYMBOL_GPL(acpi_os_map_memory);  
    -static void acpi_os_drop_map_ref(struct acpi_ioremap *map)  
+/* Must be called with mutex_lock(&acpi_ioremap_lock) */
+static unsigned long acpi_os_drop_map_ref(struct acpi_ioremap *map)
+ {
+ if (!--map->refcount)
+unsigned long refcount = --map->refcount;
+ +if (!refcount)
+list_del_rcu(&map->list);
+return refcount;
+}

static void acpi_os_map_cleanup(struct acpi_ioremap *map)
+ {
+ if (!map->refcount) {
+ synchronize_rcu_expedited();
+ acpi_unmap(map->phys, map->virt);
+ kfree(map);
+ }
+ synchronize_rcu_expedited();
+ acpi_unmap(map->phys, map->virt);
+ kfree(map);
+ }

/**
@@ -401,6 +405,7 @@
void __ref acpi_os_unmap_iomem(void __iomem *virt, acpi_size size)
{
 struct acpi_ioremap *map;
+unsigned long refcount;

if (!acpi_permanent_mmap) {
 __acpi_unmap_table(virt, size);
@@ -414,10 +419,11 @@
WARN(true, PREFIX ""%s: bad address %p\n", __func__, virt);
return;
}
-acpi_os_drop_map_ref(map);
+refcount = acpi_os_drop_map_ref(map);
mutex_unlock(&acpi_ioremap_lock);
-acpi_os_map_cleanup(map);
+if (!refcount)
+acpi_os_map_cleanup(map);
}
EXPORT_SYMBOL_GPL(acpi_os_unmap_iomem);

@@ -452,6 +458,7 @@
{
u64 addr;
struct acpi_ioremap *map;
+unsigned long refcount;

if (gas->space_id != ACPI_ADR_SPACE_SYSTEM_MEMORY)
return;
@@ -467,10 +474,11 @@
mutex_unlock(&acpi_ioremap_lock);
return;
}
-acpi_os_drop_map_ref(map);
+refcount = acpi_os_drop_map_ref(map);
mutex_unlock(&acpi_ioremap_lock);

-acpi_os_map_cleanup(map);
+if (!refcount)
+acpi_os_map_cleanup(map);
}
EXPORT_SYMBOL(acpi_os_unmap_generic_address);
@@ -612,15 +620,18 @@
}
/*
- * Support ACPI 3.0 AML Timer operand
- * Returns 64-bit free-running, monotonically increasing timer
- * with 100ns granularity
+ * Support ACPI 3.0 AML Timer operand. Returns a 64-bit free-running,
+ * monotonically increasing timer with 100ns granularity. Do not use
+ * ktime_get() to implement this function because this function may get
+ * called after timekeeping has been suspended. Note: calling this function
+ * after timekeeping has been suspended may lead to unexpected results
+ * because when timekeeping is suspended the jiffies counter is not
+ * incremented. See also timekeeping_suspend().
+ */
uint64 acpi_os_get_timer(void)
{
- uint64 time_ns = ktime_to_ns(ktime_get());
- do_div(time_ns, 100);
- return time_ns;
+ return (get_jiffies_64() - INITIAL_JIFFIES) *
+ (ACPI_100NSEC_PER_SEC / HZ);
}
acpi_status acpi_os_read_port(acpi_io_address port, u32 * value, u32 width)
@@ -1124,6 +1135,7 @@
flush_workqueue(kacpid_wq);
flush_workqueue(kacpi_notify_wq);

+EXPORT_SYMBOL(acpi_os_wait_events_complete);

struct acpi_hp_work {
    struct work_struct work;
    @@ -1487,6 +1499,76 @@
}
EXPORT_SYMBOL(acpi_check_region);

+static acpi_status acpi_deactivate_mem_region(acpi_handle handle, u32 level,
+    void *res, void **return_value)
+{
+    struct acpi_mem_space_context **mem_ctx;
+    union acpi_operand_object *handler_obj;
+    union acpi_operand_object *region_obj2;
+    union acpi_operand_object *region_obj;
+    struct resource *res = _res;
+    acpi_status status;
+    +region_obj = acpi_ns_get_attached_object(handle);
+    +if (!region_obj)
+        +return AE_OK;
+    +handler_obj = region_obj->region.handler;
+    +if (!handler_obj)
+        +return AE_OK;
+    +if (region_obj->region.space_id != ACPI_ADR_SPACE_SYSTEM_MEMORY)
+        +return AE_OK;
+    +if (!(region_obj->region.flags & AOPOBJ_SETUP_COMPLETE))
+        +return AE_OK;
+    +region_obj2 = acpi_ns_get_secondary_object(region_obj);
+    +if (!region_obj2)
+        +return AE_OK;
+    +mem_ctx = (void *)&region_obj2->extra.region_context;
+    +if (!mem_ctx[0]->address >= res->start &&
+        +mem_ctx[0]->address < res->end))
+        +return AE_OK;
+    +status = handler_obj->address_space.setup(region_obj,
+        ACPI_REGION_DEACTIVATE,
+        NULL, (void **)mem_ctx);
+    +if (ACPI_SUCCESS(status))
+        +region_obj->region.flags &= ~(AOPOBJ_SETUP_COMPLETE);
return status;
+
+
+/*
+ * acpi_release_memory - Release any mappings done to a memory region
+ * @handle: Handle to namespace node
+ * @res: Memory resource
+ * @level: A level that terminates the search
+ *
+ * Walks through @handle and unmaps all SystemMemory Operation Regions that
+ * overlap with @res and that have already been activated (mapped).
+ *
+ * This is a helper that allows drivers to place special requirements on memory
+ * region that may overlap with operation regions, primarily allowing them to
+ * safely map the region as non-cached memory.
+ *
+ * The unmapped Operation Regions will be automatically remapped next time they
+ * are called, so the drivers do not need to do anything else.
+ */
+acpi_status acpi_release_memory(acpi_handle handle, struct resource *res,
+u32 level)
+{
+if (!(res->flags & IORESOURCE_MEM))
+return AE_TYPE;
+
+return acpi_walk_namespace(ACPI_TYPE_REGION, handle, level,
+acpi_deactivate_mem_region, NULL, res, NULL);
+
+EXPORT_SYMBOL_GPL(acpi_release_memory);
+
+/*
* Let drivers know whether the resource checks are effective
*/
--- linux-4.15.0.orig/drivers/acpi/pci_irq.c
+++ linux-4.15.0/drivers/acpi/pci_irq.c
@@ -462,8 +462,10 @
* No IRQ known to the ACPI subsystem - maybe the BIOS /
* driver reported one, then use it. Exit in any case.
*/
-if (!acpi_pci_irq_valid(dev, pin))
+if (!acpi_pci_irq_valid(dev, pin)) {
+kfree(entry);
+return 0;
+
+if (acpi_isa_register_gsi(dev))
+dev_warn(&dev->dev, "PCI INT %c: no GSI\n",
--- linux-4.15.0.orig/drivers/acpi/pci_link.c
ACPI_DEBUG_PRINT((ACPI_DB_INFO,
--- linux-4.15.0.orig/drivers/acpi/pci_root.c
+++ linux-4.15.0/drivers/acpi/pci_root.c
@@ -454,8 +454,9 @@
 decode_osc_support(root, "OS supports", support);
 status = acpi_pci_osc_support(root, support);
 if (ACPI_FAILURE(status)) { 
-dev_info(&device->dev, "OSC failed (%s); disabling ASPM\n",
- acpi_format_exception(status));
+dev_info(&device->dev, "OSC failed (%s)%s\n",
+ acpi_format_exception(status),
+ pcie_aspm_support_enabled() ? " ; disabling ASPM" : "");
 *no_aspm = 1;
 return;
 }
@@ -472,9 +473,11 @@
}

control = OSC_PCI_EXPRESS_CAPABILITY_CONTROL
 - OSC_PCI_EXPRESS_NATIVE_HP_CONTROL
 + OSC_PCI_EXPRESS_PME_CONTROL;

+if (IS_ENABLED(CONFIG_HOTPLUG_PCI_PCIE))
+control |= OSC_PCI_EXPRESS_NATIVE_HP_CONTROL;
+
 if (pci_aer_available()) {
 if (aer_acpi_firmware_first())
 dev_info(&device->dev,
 @@ -729,7 +732,8 @@
} 

static void acpi_pci_root_remap_iospace(struct resource_entry *entry)
+static void acpi_pci_root_remap_iospace(struct fwnode_handle *fwnode,
+struct resource_entry *entry)
{
#endif PCI_IOBASE
struct resource *res = entry->res;
@@ -738,7 +742,7 @@
resource_size_t length = resource_size(res);
unsigned long port;

@if (pci_register_io_range(cpu_addr, length))
+if (pci_register_io_range(fwnode, cpu_addr, length))
goto err;

port = pci_address_to_pio(cpu_addr);
@@ -780,7 +784,8 @@
else {
resource_list_for_each_entry_safe(entry, tmp, list) {
if (entry->res->flags & IORESOURCE_IO)
-aci_pci_root_remap_iospace(entry);
+aci_pci_root_remap_iospace(&device->fwnode,
+entry);

if (entry->res->flags & IORESOURCE_DISABLED)
resource_list_destroy_entry(entry);
--- linux-4.15.0.orig/drivers/acpi/pmic/intel_pmic_xpower.c
+++ linux-4.15.0/drivers/acpi/pmic/intel_pmic_xpower.c
@@ -27,8 +27,11 @@
#define GPI1_LDO_ON		(3 << 0)
#define GPI1_LDO_OFF		(4 << 0)
-#define AXP288_ADC_TS_PIN_GPADC	0xf2
-#define AXP288_ADC_TS_PIN_ON	0xf3
+#define AXP288_ADC_TS_CURRENT_ON_OFF_MASK		GENMASK(1, 0)
+#define AXP288_ADC_TS_CURRENT_OFF			(0 << 0)
+#define AXP288_ADC_TS_CURRENT_ON_WHEN_CHARGING		(1 << 0)
+#define AXP288_ADC_TS_CURRENT_ON_ONDEMAND		(2 << 0)
+#define AXP288_ADC_TS_CURRENT_ON			(3 << 0)

static struct pmic_table power_table[] = {
|
@@ -211,22 +214,44 @@
*/
static int intel_xpower_pmic_get_raw_temp(struct regmap *regmap, int reg) {
+int ret, adc_ts_pin_ctrl;
+u8 buf[2];
-int ret;

-ret = regmap_write(regmap, AXP288_ADC_TS_PIN_CTRL,
-AXP288_ADC_TS_PIN_GPADC);
+/*
+ * The current-source used for the battery temp-sensor (TS) is shared
+ * with the GPADC. For proper fuel-gauge and charger operation the TS
+ * current-source needs to be permanently on. But to read the GPADC we
+ * need to temporary switch the TS current-source to ondemand, so that
+ * the GPADC can use it, otherwise we will always read an all 0 value.
+ *
+ * Note that the switching from on to on-ondemand is not necessary
+ * when the TS current-source is off (this happens on devices which
+ * do not use the TS-pin).
+ */
+ret = regmap_read(regmap, AXP288_ADC_TS_PIN_CTRL, &adc_ts_pin_ctrl);
if (ret)
return ret;

-/* After switching to the GPADC pin give things some time to settle */
-usleep_range(6000, 10000);
+if (adc_ts_pin_ctrl & AXP288_ADC_TS_CURRENT_ON_OFF_MASK) {
+ret = regmap_update_bits(regmap, AXP288_ADC_TS_PIN_CTRL,
+AXP288_ADC_TS_CURRENT_ON_OFF_MASK,
+AXP288_ADC_TS_CURRENT_ON_ONDEMAND);
+if (ret)
+return ret;
+
+/* Wait a bit after switching the current-source */
+usleep_range(6000, 10000);
+}

ret = regmap_bulk_read(regmap, AXP288_GP_ADC_H, buf, 2);
if (ret == 0)
ret = (buf[0] << 4) + ((buf[1] >> 4) & 0x0f);

-regmap_write(regmap, AXP288_ADC_TS_PIN_CTRL, AXP288_ADC_TS_PIN_ON);
+if (adc_ts_pin_ctrl & AXP288_ADC_TS_CURRENT_ON_OFF_MASK) {
+regmap_update_bits(regmap, AXP288_ADC_TS_PIN_CTRL,
+AXP288_ADC_TS_CURRENT_ON_OFF_MASK,
+AXP288_ADC_TS_CURRENT_ON_ONDEMAND);
+}

return ret;
}
--- linux-4.15.0.orig/drivers/acpi/power.c
+++ linux-4.15.0/drivers/acpi/power.c
@@ -131,6 +131,23 @@
+
+static bool acpi_power_resource_is_dup(union acpi_object *package,
+    unsigned int start, unsigned int i)
+{
unsigned int j;

/* The caller is expected to check the package element types */
+ /* ACPI tables contain duplicate power resource references */
+ if (acpi_power_resource_is_dup(package, start, i))
+ continue;
+
+ err = acpi_add_power_resource(rhandle);
+ if (err)
+ break;
++ linux-4.15.0/drivers/acpi/pptt.c
@@ -0,0 +1,654 @@
+/* This file implements parsing of the Processor Properties Topology Table (PPTT)*/
+/* Copyright (C) 2018, ARM */
+/* The PPTT structure is an inverted tree, with each node potentially
+ * holding one or two inverted tree data structures describing
+ * the caches available at that level. Each cache structure optionally
+ * contains properties describing the cache at a given level which can be
+ * used to override hardware probed values.
```c
/*
 * define pr_fmt(fmt) "ACPI PPTT: " fmt
 +
 * include <linux/acpi.h>
 * include <linux/cacheinfo.h>
 * include <acpi/processor.h>
 +
 static struct acpi_subtable_header *fetch_pptt_subtable(struct acpi_table_header *table_hdr,
 +u32 pptt_ref)
 +{
 +struct acpi_subtable_header *entry;
 +
 +" there isn't a subtable at reference 0 */
 +if (pptt_ref < sizeof(struct acpi_subtable_header))
 +return NULL;
 +
 +if (pptt_ref + sizeof(struct acpi_subtable_header) > table_hdr->length)
 +return NULL;
 +
 +entry = ACPI_ADD_PTR(struct acpi_subtable_header, table_hdr, pptt_ref);
 +
 +if (entry->length == 0)
 +return NULL;
 +
 +if (pptt_ref + entry->length > table_hdr->length)
 +return NULL;
 +
 +return entry;
 +}
 +
 +static struct acpi_pptt_processor *fetch_pptt_node(struct acpi_table_header *table_hdr,
 + u32 pptt_ref)
 +{
 +return (struct acpi_pptt_processor *)fetch_pptt_subtable(table_hdr, pptt_ref);
 +}
 +
 +static struct acpi_pptt_cache *fetch_pptt_cache(struct acpi_table_header *table_hdr,
 +u32 pptt_ref)
 +{
 +return (struct acpi_pptt_cache *)fetch_pptt_subtable(table_hdr, pptt_ref);
 +}
 +
 +static struct acpi_subtable_header *acpi_get_pptt_resource(struct acpi_table_header *table_hdr,
 + struct acpi_pptt_processor *node,
 + int resource)
 +{
 +u32 *ref;
 +
```

if (resource >= node->number_of_priv_resources)
+ return NULL;
+
+ ref = ACPI_ADD_PTR(u32, node, sizeof(struct acpi_pptt_processor));
+ ref += resource;
+ return fetch_pptt_subtable(table_hdr, *ref);
+
+ static inline bool acpi_pptt_match_type(int table_type, int type)
+ {
+ return ((table_type & ACPI_PPTT_MASK_CACHE_TYPE) == type ||
+ table_type & ACPI_PPTT_CACHE_TYPE_UNIFIED & type);
+ }
+
/**
+ * acpi_pptt_walk_cache() - Attempt to find the requested acpi_pptt_cache
+ * @table_hdr: Pointer to the head of the PPTT table
+ * @local_level: passed res reflects this cache level
+ * @res: cache resource in the PPTT we want to walk
+ * @found: returns a pointer to the requested level if found
+ * @level: the requested cache level
+ * @type: the requested cache type
+ *
+ * Attempt to find a given cache level, while counting the max number
+ * of cache levels for the cache node.
+ *
+ * Given a pptt resource, verify that it is a cache node, then walk
+ * down each level of caches, counting how many levels are found
+ * as well as checking the cache type (icache, dcache, unified). If a
+ * level & type match, then we set found, and continue the search.
+ * Once the entire cache branch has been walked return its max
+ * depth.
+ *
+ * Return: The cache structure and the level we terminated with.
+ */
+static int acpi_pptt_walk_cache(struct acpi_table_header *table_hdr,
+int local_level,
+struct acpi_subtable_header *res,
+struct acpi_pptt_cache **found,
+int level, int type)
+{
+ struct acpi_pptt_cache *cache;
+
+ if (res->type != ACPI_PPTT_TYPE_CACHE)
+ return 0;
+
+ cache = (struct acpi_pptt_cache *) res;
+while (cache) {
+local_level++;
+
+if (local_level == level &&
+ cache->flags & ACPI_PPTT_CACHE_TYPE_VALID &&
+ acpi_pptt_match_type(cache->attributes, type)) {
+if (*found != NULL && cache != *found)
+pr_warn("Found duplicate cache level/type unable to determine uniqueness\n");
+
+pr_debug("Found cache @ level %d\n", level);
+*found = cache;
+/*
+ * continue looking at this node's resource list
+ * to verify that we don't find a duplicate
+ * cache node.
+ */
+}
+cache = fetch_pptt_cache(table_hdr, cache->next_level_of_cache);
+}
+return local_level;
+
+static struct acpi_pptt_cache *acpi_find_cache_level(struct acpi_table_header *table_hdr,
+ struct acpi_pptt_processor *cpu_node,
+ int *starting_level, int level,
+ int type)
+{
+struct acpi_subtable_header *res;
+int number_of_levels = *starting_level;
+int resource = 0;
+struct acpi_pptt_cache *ret = NULL;
+int local_level;
+
+/* walk down from processor node */
+while ((res = acpi_get_pptt_resource(table_hdr, cpu_node, resource))) {
+resource++;
+
+local_level = acpi_pptt_walk_cache(table_hdr, *starting_level,
+ res, &ret, level, type);
+/*
+ * we are looking for the max depth. Since its potentially
+ * possible for a given node to have resources with differing
+ * depths verify that the depth we have found is the largest.
+ */
+if (number_of_levels < local_level)
+number_of_levels = local_level;
+}
+if (number_of_levels > *starting_level)
*starting_level = number_of_levels;
+
+return ret;
+}
+
+/**
+ * acpi_count_levels() - Given a PPTT table, and a cpu node, count the caches
+ * @table_hdr: Pointer to the head of the PPTT table
+ * @cpu_node: processor node we wish to count caches for
+ *
+ * Given a processor node containing a processing unit, walk into it and count
+ * how many levels exist solely for it, and then walk up each level until we hit
+ * the root node (ignore the package level because it may be possible to have
+ * caches that exist across packages). Count the number of cache levels that
+ * exist at each level on the way up.
+ *
+ * Return: Total number of levels found.
+ */
+static int acpi_count_levels(struct acpi_table_header *table_hdr,
+ struct acpi_pptt_processor *cpu_node)
+{
+int total_levels = 0;
+
+do {
+acpi_find_cache_level(table_hdr, cpu_node, &total_levels, 0, 0);
+cpu_node = fetch_pptt_node(table_hdr, cpu_node->parent);
+} while (cpu_node);
+
+return total_levels;
+}
+
+/**
+ * acpi_pptt_leaf_node() - Given a processor node, determine if its a leaf
+ * @table_hdr: Pointer to the head of the PPTT table
+ * @node: passed node is checked to see if its a leaf
+ *
+ * Determine if the *node parameter is a leaf node by iterating the
+ * PPTT table, looking for nodes which reference it.
+ *
+ * Return: 0 if we find a node referencing the passed node (or table error),
+ * or 1 if we don't.
+ */
+static int acpi_pptt_leaf_node(struct acpi_table_header *table_hdr,
+ struct acpi_pptt_processor *node)
+{
+struct acpi_subtable_header *entry;
+unsigned long table_end;
+u32 node_entry;
+struct acpi_pptt_processor *cpu_node;
+u32 proc_sz;
+
+table_end = (unsigned long)table_hdr + table_hdr->length;
+node_entry = ACPI_PTR_DIFF(node, table_hdr);
+entry = ACPI_ADD_PTR(struct acpi_subtable_header, table_hdr,
+    sizeof(struct acpi_table_pptt));
+proc_sz = sizeof(struct acpi_pptt_processor *);
+
+while ((unsigned long)entry + proc_sz < table_end) {
+    cpu_node = (struct acpi_pptt_processor *)entry;
+    if (entry->type == ACPI_PPTT_TYPE_PROCESSOR &&
+        cpu_node->parent == node_entry)
+        return 0;
+    if (entry->length == 0)
+        return 0;
+    entry = ACPI_ADD_PTR(struct acpi_subtable_header, entry,
+        entry->length);
+
+} /* acpi_find_processor_node() - Given a PPTT table find the requested processor
+ * @table_hdr: Pointer to the head of the PPTT table
+ * @acpi_cpu_id: cpu we are searching for
+ *
+ * Find the subtable entry describing the provided processor.
+ * This is done by iterating the PPTT table looking for processor nodes
+ * which have an acpi_processor_id that matches the acpi_cpu_id parameter
+ * passed into the function. If we find a node that matches this criteria
+ * we verify that it's a leaf node in the topology rather than depending
+ * on the valid flag, which doesn't need to be set for leaf nodes.
+ *
+ * Return: NULL, or the processors acpi_pptt_processor*
+ */
+
+static struct acpi_pptt_processor *acpi_find_processor_node(struct acpi_table_header *table_hdr,
+    u32 acpi_cpu_id)
+{
+   struct acpi_subtable_header *entry;
+   unsigned long table_end;
+   struct acpi_pptt_processor *cpu_node;
+   u32 proc_sz;
+
+   table_end = (unsigned long)table_hdr + table_hdr->length;
+   entry = ACPI_ADD_PTR(struct acpi_subtable_header, table_hdr,
+       sizeof(struct acpi_table_pptt));
+proc_sz = sizeof(struct acpi_pptt_processor *);
+
+"/ find the processor structure associated with this cpuid */
+while ((unsigned long)entry + proc_sz < table_end) {
+cpu_node = (struct acpi_pptt_processor *)entry;
+
+if (entry->length == 0) {
+pr_warn("Invalid zero length subtable\n");
+break;
+}
+if (entry->type == ACPI_PPTT_TYPE_PROCESSOR &&
+ acpi_cpu_id == cpu_node->acpi_processor_id &&
+ acpi_pptt_leaf_node(table_hdr, cpu_node)) {
+return (struct acpi_pptt_processor *)entry;
+}
+
+entry = ACPI_ADD_PTR(struct acpi_subtable_header, entry,
+ entry->length);
+}
+
+return NULL;
+
+}
+
+static int acpi_find_cache_levels(struct acpi_table_header *table_hdr,
+ u32 acpi_cpu_id)
+{
+int number_of_levels = 0;
+struct acpi_pptt_processor *cpu;
+
+cpu = acpi_find_processor_node(table_hdr, acpi_cpu_id);
+if (cpu)
+number_of_levels = acpi_count_levels(table_hdr, cpu);
+
+return number_of_levels;
+}
+
+static u8 acpi_cache_type(enum cache_type type)
+{
+switch (type) {
+case CACHE_TYPE_DATA:
+pr_debug("Looking for data cache\n");
+return ACPI_PPTT_CACHE_TYPE_DATA;
+case CACHE_TYPE_INST:
+pr_debug("Looking for instruction cache\n");
+return ACPI_PPTT_CACHE_TYPE_INSTR;
+default:
+case CACHE_TYPE_UNIFIED:
+pr_debug("Looking for unified cache\n");
+return
+/*
+ * It is important that ACPI_PPTT_CACHE_TYPE_UNIFIED
+ * contains the bit pattern that will match both
+ * ACPI unified bit patterns because we use it later
+ * to match both cases.
+ */
+return ACPI_PPTT_CACHE_TYPE_UNIFIED;
+
+static struct acpi_pptt_cache *acpi_find_cache_node(struct acpi_table_header *table_hdr,
+ u32 acpi_cpu_id,
+ enum cache_type type,
+ unsigned int level,
+ struct acpi_pptt_processor **node)
+{ 
+int total_levels = 0;
+struct acpi_pptt_cache *found = NULL;
+struct acpi_pptt_processor *cpu_node;
+u8 acpi_type = acpi_cache_type(type);
+
+pr_debug("Looking for CPU %d’s level %d cache type %d\n",
+ acpi_cpu_id, level, acpi_type);
+
+cpu_node = acpi_find_processor_node(table_hdr, acpi_cpu_id);
+
+while (cpu_node && !found) {
+found = acpi_find_cache_level(table_hdr, cpu_node,
+   &total_levels, level, acpi_type);
+*node = cpu_node;
+cpu_node = fetch_pptt_node(table_hdr, cpu_node->parent);
+}
+
+return found;
+
+/**
+ * update_cache_properties() - Update cacheinfo for the given processor
+ * @this_leaf: Kernel cache info structure being updated
+ * @found_cache: The PPTT node describing this cache instance
+ * @cpu_node: A unique reference to describe this cache instance
+ * 
+ * The ACPI spec implies that the fields in the cache structures are used to
+ * extend and correct the information probed from the hardware. Lets only
+ * set fields that we determine are VALID.
+ * 
+ * Return: nothing. Side effect of updating the global cacheinfo
+ */
+static void update_cache_properties(struct cacheinfo *this_leaf,
+    struct acpi_pptt_cache *found_cache,
+    struct acpi_pptt_processor *cpu_node)
+{
+    this_leaf->fw_token = cpu_node;
+    if (found_cache->flags & ACPI_PPTT_SIZE_PROPERTY_VALID)
+        this_leaf->size = found_cache->size;
+    if (found_cache->flags & ACPI_PPTT_LINE_SIZE_VALID)
+        this_leaf->coherency_line_size = found_cache->line_size;
+    if (found_cache->flags & ACPI_PPTT_NUMBER_OF SETS_VALID)
+        this_leaf->number_of_sets = found_cache->number_of_sets;
+    if (found_cache->flags & ACPI_PPTT_ASSOCIATIVITY_VALID)
+        this_leaf->ways_of_associativity = found_cache->associativity;
+    if (found_cache->flags & ACPI_PPTT_WRITE_POLICY_VALID) {
+        switch (found_cache->attributes & ACPI_PPTT_MASK_WRITE_POLICY) {
+            case ACPI_PPTT_CACHE_POLICY_WT:
+                this_leaf->attributes = CACHE_WRITE_THROUGH;
+                break;
+            case ACPI_PPTT_CACHE_POLICY_WB:
+                this_leaf->attributes = CACHE_WRITE_BACK;
+                break;
+            case ACPI_PPTT_CACHE_RW_ALLOCATE:
+                this_leaf->attributes |= CACHE_READ_ALLOCATE;
+                break;
+            case ACPI_PPTT_CACHE_RW_ALLOCATE_ALT:
+                this_leaf->attributes |= CACHE_READ_ALLOCATE | CACHE_WRITE_ALLOCATE;
+                break;
+        }
+    } else {
+        switch (found_cache->attributes & ACPI_PPTT_MASK_ALLOCATION_TYPE) {
+            case ACPI_PPTT_CACHE_READ_ALLOCATE:
+                this_leaf->attributes |= CACHE_READ_ALLOCATE;
+                break;
+            case ACPI_PPTT_CACHE_WRITE_ALLOCATE:
+                this_leaf->attributes |= CACHE_WRITE_ALLOCATE;
+                break;
+            case ACPI_PPTT_CACHE_RW_ALLOCATE:
+            case ACPI_PPTT_CACHE_RW_ALLOCATE_ALT:
+                this_leaf->attributes |= CACHE_READ_ALLOCATE | CACHE_WRITE_ALLOCATE;
+                break;
+        }
+    }
+
+    /*
+     * If cache type is NOCACHE, then the cache hasn't been specified
+     * via other mechanisms. Update the type if a cache type has been
+     * provided.
+     *
+     * Note, we assume such caches are unified based on conventional system
+     * design and known examples. Significant work is required elsewhere to
+     * fully support data/instruction only type caches which are only
+     * specified in PPTT.
+     */
+
+if (this_leaf->type == CACHE_TYPE_NOCACHE &&
    found_cache->flags & ACPI_PPTT_CACHE_TYPE_VALID)
+this_leaf->type = CACHE_TYPE_UNIFIED;
+
+static void cache_setup_acpi_cpu(struct acpi_table_header *table,
+ unsigned int cpu)
+{
+    struct acpi_pptt_cache *found_cache;
+    struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
+    u32 acpi_cpu_id = get_acpi_id_for_cpu(cpu);
+    struct cacheinfo *this_leaf;
+    unsigned int index = 0;
+    struct acpi_pptt_processor *cpu_node = NULL;
+    while (index < get_cpu_cacheinfo(cpu)->num_leaves) {
+        this_leaf = this_cpu_ci->info_list + index;
+        found_cache = acpi_find_cache_node(table, acpi_cpu_id,
+            this_leaf->type,
+            this_leaf->level,
+            &cpu_node);
+        pr_debug("found = %p %p\n", found_cache, cpu_node);
+        if (found_cache)
+            update_cache_properties(this_leaf,
+                found_cache,
+                cpu_node);
+        index++;
+    }
+
+    /* Passing level values greater than this will result in search termination */
+    #define PPTT_ABORT_PACKAGE 0xFF
+
+    static struct acpi_pptt_processor *acpi_find_processor_package_id(struct acpi_table_header *table_hdr,
+        struct acpi_pptt_processor *cpu,
+        int level, int flag)
+    {
+        struct acpi_pptt_processor *prev_node;
+        while (cpu && level) {
+            if (cpu->flags & flag)
+                break;
+            pr_debug("level %d\n", level);
+            prev_node = fetch_pptt_node(table_hdr, cpu->parent);
+            if (prev_node == NULL)
+                break;
+            cpu = prev_node;
+level--;  
+}  
+return cpu;  
+}  
+  
+/**  
+ * topology_get_acpi_cpu_tag() - Find a unique topology value for a feature  
+ * @table: Pointer to the head of the PPTT table  
+ * @cpu: Kernel logical cpu number  
+ * @level: A level that terminates the search  
+ * @flag: A flag which terminates the search  
+ *  
+ * Get a unique value given a cpu, and a topology level, that can be  
+ * matched to determine which cpus share common topological features  
+ * at that level.  
+ *  
+ * Return: Unique value, or -ENOENT if unable to locate cpu  
+ */  
+static int topology_get_acpi_cpu_tag(struct acpi_table_header *table,  
+    unsigned int cpu, int level, int flag)  
+{  
+    struct acpi_pptt_processor *cpu_node;  
+    u32 acpi_cpu_id = get_acpi_id_for_cpu(cpu);  
+    
+    cpu_node = acpi_find_processor_node(table, acpi_cpu_id);  
+    if (cpu_node) {  
+      cpu_node = acpi_find_processor_package_id(table, cpu_node,  
+        level, flag);  
+    }  
+    
+    if (level == 0 ||  
+        cpu_node->flags & ACPI_PPTT_ACPI_PROCESSOR_ID_VALID)  
+      return cpu_node->acpi_processor_id;  
+    return ACPI_PTR_DIFF(cpu_node, table);  
+}  
+pr_warn_once("PPTT table found, but unable to locate core %d (%d)/n",  
+    cpu, acpi_cpu_id);  
+return -ENOENT;  
+}  
+  
+static int find_acpi_cpu_topology_tag(unsigned int cpu, int level, int flag)  
+{  
+    struct acpi_table_header *table;  
+    acpi_status status;
+int retval;
+
+status = acpi_get_table(ACPI_SIG_PPTT, 0, &table);
+if (ACPI_FAILURE(status)) {
+pr_warn_once("No PPTT table found, cpu topology may be inaccurate\n");
+return -ENOENT;
+}
+retval = topology_get_acpi_cpu_tag(table, cpu, level, flag);
+pr_debug("Topology Setup ACPI cpu %d, level %d ret = %d\n",
+cpu, level, retval);
+acpi_put_table(table);
+
+return retval;
+}

+/**
+ * acpi_find_last_cache_level() - Determines the number of cache levels for a PE
+ * @cpu: Kernel logical cpu number
+ *
+ * Given a logical cpu number, returns the number of levels of cache represented
+ * in the PPTT. Errors caused by lack of a PPTT table, or otherwise, return 0
+ * indicating we didn't find any cache levels.
+ *
+ * Return: Cache levels visible to this core.
+ */
+
+int acpi_find_last_cache_level(unsigned int cpu)
+
+{u32 acpi_cpu_id;
+struct acpi_table_header *table;
+int number_of_levels = 0;
+acpi_status status;
+
+pr_debug("Cache Setup find last level cpu=%d\n", cpu);
+
+acpi_cpu_id = get_acpi_id_for_cpu(cpu);
+status = acpi_get_table(ACPI_SIG_PPTT, 0, &table);
+if (ACPI_FAILURE(status)) {
+pr_warn_once("No PPTT table found, cache topology may be inaccurate\n");
+} else {
+number_of_levels = acpi_find_cache_levels(table, acpi_cpu_id);
+acpi_put_table(table);
+}
+
+pr_debug("Cache Setup find last level level=%d\n", number_of_levels);
+
+return number_of_levels;
+}

+/*
+ * cache_setup_acpi() - Override CPU cache topology with data from the PPTT
+ * @cpu: Kernel logical cpu number
+ *
+ * Updates the global cache info provided by cpu_get_cacheinfo()
+ * when there are valid properties in the acpi_pptt_cache nodes. A
+ * successful parse may not result in any updates if none of the
+ * cache levels have any valid flags set. Further, a unique value is
+ * associated with each known CPU cache entry. This unique value
+ * can be used to determine whether caches are shared between cpus.
+ *
+ * Return: -ENOENT on failure to find table, or 0 on success
+ */
+int cache_setup_acpi(unsigned int cpu)
+{
+struct acpi_table_header *table;
+acpi_status status;
+
+pr_debug("Cache Setup ACPI cpu %d\n", cpu);
+
+status = acpi_get_table(ACPI_SIG_PPTT, 0, &table);
+if (ACPI_FAILURE(status)) {
+pr_warn_once("No PPTT table found, cache topology may be inaccurate\n");
+return -ENOENT;
+}
+
+cache_setup_acpi_cpu(table, cpu);
+acpi_put_table(table);
+
+return status;
+}
+
+/**
+ * find_acpi_cpu_topology() - Determine a unique topology value for a given cpu
+ * @cpu: Kernel logical cpu number
+ * @level: The topological level for which we would like a unique ID
+ * Determine a topology unique ID for each thread/core/cluster/mc_grouping
+ * /socket/etc. This ID can then be used to group peers, which will have
+ * matching ids.
+ * The search terminates when either the requested level is found or
+ * we reach a root node. Levels beyond the termination point will return the
+ * same unique ID. The unique id for level 0 is the acpi processor id. All
+ * other levels beyond this use a generated value to uniquely identify
+ * a topological feature.
+ *
+ * Return: -ENOENT if the PPTT doesn't exist, or the cpu cannot be found.
+ * Otherwise returns a value which represents a unique topological feature.
int find_acpi_cpu_topology(unsigned int cpu, int level)
{
    return find_acpi_cpu_topology_tag(cpu, level, 0);
}

int find_acpi_cpu_cache_topology(unsigned int cpu, int level)
{
    struct acpi_table_header *table;
    struct acpi_pptt_cache *found_cache;
    acpi_status status;
    u32 acpi_cpu_id = get_acpi_id_for_cpu(cpu);
    struct acpi_pptt_processor *cpu_node = NULL;
    int ret = -1;

    status = acpi_get_table(ACPI_SIG_PPTT, 0, &table);
    if (ACPI_FAILURE(status)) {
        pr_warn_once("No PPTT table found, topology may be inaccurate\n");
        return -ENOENT;
    }

    found_cache = acpi_find_cache_node(table, acpi_cpu_id,
                                      CACHE_TYPE_UNIFIED,
                                      level,
                                      &cpu_node);
    if (found_cache)
        ret = ACPI_PTR_DIFF(cpu_node, table);

    acpi_put_table(table);
    return ret;
}

int find_acpi_cpu_topology_package(unsigned int cpu, int level)
{
    struct acpi_table_header *table;
    struct acpi_pptt_cache *found_cache;
    acpi_status status;
    u32 acpi_cpu_id = get_acpi_id_for_cpu(cpu);
    struct acpi_pptt_processor *cpu_node = NULL;
    int ret = -1;

    status = acpi_get_table(ACPI_SIG_PPTT, 0, &table);
    if (ACPI_FAILURE(status)) {
        pr_warn_once("No PPTT table found, topology may be inaccurate\n");
        return -ENOENT;
    }

    found_cache = acpi_find_cache_node(table, acpi_cpu_id,
                                       CACHE_TYPE_UNIFIED,
                                       level,
                                       &cpu_node);
    if (found_cache)
        ret = ACPI_PTR_DIFF(cpu_node, table);

    acpi_put_table(table);
    return ret;
}
+ * Determine a topology unique package ID for the given cpu.
+ * This ID can then be used to group peers, which will have matching ids.
+ *
+ * The search terminates when either a level is found with the PHYSICAL_PACKAGE
+ * flag set or we reach a root node.
+ *
+ * Return: -ENOENT if the PPTT doesn't exist, or the cpu cannot be found.
+ * Otherwise returns a value which represents the package for this cpu.
+ */
+int find_acpi_cpu_topology_package(unsigned int cpu)
+{
+    return find_acpi_cpu_topology_tag(cpu, PPTT_ABORT_PACKAGE,
+        ACPI_PPTT_PHYSICAL_PACKAGE);
+}

--- linux-4.15.0.orig/drivers/acpi/processor_idle.c
+++ linux-4.15.0/drivers/acpi/processor_idle.c
@@ -29,6 +29,7 @@
#include <linux/acpi.h>
#include <linux/dmi.h>
#include <linux/sched.h>       /* need_resched() */
+#include <linux/sort.h>
#include <linux/tick.h>
#include <linux/cpuidle.h>
#include <linux/cpu.h>
@@ -540,10 +541,37 @@
return;
}

+static int acpi_cst_latency_cmp(const void *a, const void *b)
+{
+    const struct acpi_processor_cx *x = a, *y = b;
+    +if (!((x->valid && y->valid))
+        +return 0;
+    +if (x->latency > y->latency)
+        +return 1;
+    +if (x->latency < y->latency)
+        +return -1;
+    +return 0;
+}
+static void acpi_cst_latency_swap(void *a, void *b, int n)
+{
+    struct acpi_processor_cx *x = a, *y = b;
+    u32 tmp;
+    +if (!((x->valid && y->valid))
+        +return;
+    tmp = x->latency;
static int acpi_processor_power_verify(struct acpi_processor *pr)
{
    unsigned int i;
    unsigned int working = 0;
    unsigned int last_latency = 0;
    unsigned int last_type = 0;
    bool buggy_latency = false;

    pr->power.timer_broadcast_on_state = INT_MAX;

    if (!cx->valid)
        continue;
    if (cx->type >= last_type && cx->latency < last_latency)
        buggy_latency = true;
    last_latency = cx->latency;
    last_type = cx->type;

    lapic_timer_check_state(i, pr, cx);
    tsc_check_state(cx->type);
    working++;
}

    if (buggy_latency) {
        pr_notice("FW issue: working around C-state latencies out of order\n");
        sort(&pr->power.states[1], max_cstate,
             sizeof(struct acpi_processor_cx),
             acpi_cst_latency_cmp,
             acpi_cst_latency_swap);
    }
    lapic_timer_propagate_broadcast(pr);

    return (working);

* Only when it is notification event, the _OST object
* will be evaluated. Otherwise it is skipped.
--- linux-4.15.0.orig/drivers/acpi/processor_throttling.c
+++ linux-4.15.0/drivers/acpi/processor_throttling.c
@@ -909,13 +909,6 @@
 return pr->throttling.acpi_processor_get_throttling(pr);
 }

- static int call_on_cpu(int cpu, long (*fn)(void *), void *arg, bool direct)
- {
- if (direct || (is_percpu_thread() && cpu == smp_processor_id()))
- return fn(arg);
- return work_on_cpu(cpu, fn, arg);
- }
-
 static int acpi_processor_get_throttling(struct acpi_processor *pr)
 {
 if (!pr)
--- linux-4.15.0.orig/drivers/acpi/property.c
+++ linux-4.15.0/drivers/acpi/property.c
@@ -24,11 +24,23 @@
 ACPI _DSD device properties GUID: daffd814-6eba-4d8c-8a91-bc9bbf4aa301 */
 static const guid_t prp_guid =
 +/-
 + * The GUIDs here are made equivalent to each other in order to avoid extra
 + * complexity in the properties handling code, with the caveat that the
 + * kernel will accept certain combinations of GUID and properties that are
 + * not defined without a warning. For instance if any of the properties
 + * from different GUID appear in a property list of another, it will be
 + * accepted by the kernel. Firmware validation tools should catch these.
 + */
 + static const guid_t prp_guids[] = {
 + /* ACPI _DSD device properties GUID: daffd814-6eba-4d8c-8a91-bc9bbf4aa301 */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01);
 +/-
 ACPI _DSD data subnodes GUID: ddb8e3e6-5886-4ba6-8795-1319f52a966b */
 + 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 + ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
 - 0x8a, 0x91, 0x8c, 0x9b, 0xbf, 0x4a, 0xa3, 0x01),
 ACPI _DSD data subnodes GUID: e7bd8e3e6-5886-4ba6-8795-1319f52a966b */
 + GUID_INIT(0xdafffd814, 0x6eba, 0x4d8c,
dn->name = link->package.elements[0].string.pointer;

dn->fwnode.ops = &acpi_data_fwnode_ops;

dn->parent = parent;

INIT_LIST_HEAD(&dn->data.properties);
INIT_LIST_HEAD(&dn->data.subnodes);

result = acpi_extract_properties(desc, &dn->data);

adev->flags.of_compatible_ok = 1;

+static bool acpi_is_property_guid(const guid_t *guid)
+{
+int i;
+
+for (i = 0; i < ARRAY_SIZE(prp_guids); i++) {
+if (guid_equal(guid, &prp_guids[i]))
+return true;
+}
+
+return false;
+}
+
+struct acpi_device_properties *
+acpi_data_add_props(struct acpi_device_data *data, const guid_t *guid,
+ const union acpi_object *properties)
+{
+struct acpi_device_properties *props;
+
+props = kzalloc(sizeof(*props), GFP_KERNEL);
+if (props) {
+INIT_LIST_HEAD(&props->list);
+props->guid = guid;
+props->properties = properties;
+list_add_tail(&props->list, &data->properties);
+}
+
+return props;
+}
+
static bool acpi_extract_properties(const union acpi_object *desc,
    struct acpi_device_data *data)
{
    properties->type != ACPI_TYPE_PACKAGE)
    break;
if (!guid_equal((guid_t *)guid->buffer.pointer, &prp_guid))
continue;

/*@ -320,13 +362,13 @*/
* package immediately following it. */
if (!acpi_is_property_guid((guid_t *)guid->buffer.pointer))
-break;
+continue;
-data->properties = properties;
-return true;
+acpi_data_add_props(data, (const guid_t *)guid->buffer.pointer,
 + properties);
}
-return false;
+return !list_empty(&data->properties);
}

void acpi_init_properties(struct acpi_device *adev)
/*@ -336,6 +378,7 @*/
acpi_status status;
bool acpi_of = false;

+INIT_LIST_HEAD(&adev->data.properties);
INIT_LIST_HEAD(&adev->data.subnodes);

if (!adev->handle)
/*@ -398,11 +441,16 @*/

void acpi_free_properties(struct acpi_device *adev)
{
+struct acpi_device_properties *props, *tmp;
+acpi_destroy_nondev_subnodes(&adev->data.subnodes);
ACPI_FREE((void *)adev->data.pointer);
adev->data.of_compatible = NULL;
adev->data.pointer = NULL;
-adev->data.properties = NULL;
+list_for_each_entry_safe(props, tmp, &adev->data.properties, list) {
+list_del(&props->list);
+kfree(props);
+}
}
@@ -427,32 +475,37 @@
const char *name, acpi_object_type type,
const union acpi_object **obj)
{
-const union acpi_object *properties;
-int i;
+const struct acpi_device_properties *props;

    if (!data || !name)
        return -EINVAL;

    -if (!data->pointer || !data->properties)
+    if (!data->pointer || list_empty(&data->properties))
        return -EINVAL;

    properties = data->properties;
    -for (i = 0; i < properties->package.count; i++) {
    -    const union acpi_object *propname, *propvalue;
    -    const union acpi_object *property;
    -
    -    property = &properties->package.elements[i];
    -
    -    propname = &property->package.elements[0];
    -    propvalue = &property->package.elements[1];
+    list_for_each_entry(props, &data->properties, list) {
+        const union acpi_object *properties;
+        unsigned int i;
+        +
+        +properties = props->properties;
+        +for (i = 0; i < properties->package.count; i++) {
+        +    const union acpi_object *propname, *propvalue;
+        +    const union acpi_object *property;
+        +
+        +    property = &properties->package.elements[i];
+        +
+        +    propname = &property->package.elements[0];
+        +    propvalue = &property->package.elements[1];
+        +
+    +if (!strcmp(name, propname->string.pointer)) {
+    +if (type != ACPI_TYPE_ANY &&
+        +    propvalue->type != type)
+        +return -EPROTO;
+        +if (obj)
+            *obj = propvalue;

    -if (!strcmp(name, propname->string.pointer)) {
    -if (type != ACPI_TYPE_ANY && propvalue->type != type)
- return -EPROTO;
- if (obj)
- *obj = propvalue;
- return 0;
+ return 0;
+ }
} }
return -EINVAL;
@@ -688,9 +741,6 @@
const union acpi_object *obj;
int ret;

- if (!val)
- return -EINVAL;
-
if (proptype >= DEV_PROP_U8 && proptype <= DEV_PROP_U64) {
 ret = acpi_data_get_property(data, propname, ACPI_TYPE_INTEGER, &obj);
 if (ret)
 @@ -700,28 +750,43 @@
case DEV_PROP_U8:
 if (obj->integer.value > U8_MAX)
 return -EOVERFLOW;
- *(u8 *)val = obj->integer.value;
+ *(u8 *)val = obj->integer.value;
+ if (val)
+ *(u8 *)val = obj->integer.value;
+ break;
case DEV_PROP_U16:
 if (obj->integer.value > U16_MAX)
 return -EOVERFLOW;
- *(u16 *)val = obj->integer.value;
+ *(u16 *)val = obj->integer.value;
+ if (val)
+ *(u16 *)val = obj->integer.value;
+ break;
case DEV_PROP_U32:
 if (obj->integer.value > U32_MAX)
 return -EOVERFLOW;
- *(u32 *)val = obj->integer.value;
+ *(u32 *)val = obj->integer.value;
+ if (val)
+ *(u32 *)val = obj->integer.value;
+ break;
default:
-*(u64 *)val = obj->integer.value;
+if (val)
+*(u64 *)val = obj->integer.value;
+
break;
}
+
+if (!val)
+return 1;
} else if (proptype == DEV_PROP_STRING) {
ret = acpi_data_get_property(data, propname, ACPI_TYPE_STRING, &obj);
if (ret)
return ret;

-*(char **)val = obj->string.pointer;
+if (val)
+*(char **)val = obj->string.pointer;

return 1;
} else {
@@ -735,7 +800,7 @@

int ret;

-if (!adev)
+if (!adev || !val)
return -EINVAL;

ret = acpi_data_prop_read_single(&adev->data, propname, proptype, val);
@@ -829,10 +894,20 @@
const union acpi_object *items;
int ret;

-if (val && nval == 1) {
+if (nval == 1 || !val) {
ret = acpi_data_prop_read_single(data, propname, proptype, val);
- if (ret >= 0)
+ /*
+ * The overflow error means that the property is there and it is
+ * single-value, but its type does not match, so return.
+ */
+if (ret >= 0 || ret == -EOVERFLOW)
return ret;
+
+ /*
+ * Reading this property as a single-value one failed, but its
+ * value may still be represented as one-element array, so
+ */

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ret = acpi_data_get_property_array(data, propname, ACPI_TYPE_ANY, &obj);
@@ -943,6 +1018,14 @@
const struct acpi_data_node *data = to_acpi_data_node(fwnode);
struct acpi_data_node *dn;

*/
+ * We can have a combination of device and data nodes, e.g. with
+ * hierarchical DSD properties. Make sure the adev pointer is
+ * restored before going through data nodes, otherwise we will
+ * be looking for data_nodes below the last device found instead
+ * of the common fwnode shared by device_nodes and data_nodes.
+ */
+adev = to_acpi_device_node(fwnode);
if (adev)
head = &adev->data.subnodes;
else if (data)
--- linux-4.15.0.orig/drivers/acpi/resource.c
+++ linux-4.15.0/drivers/acpi/resource.c
@@ -549,7 +549,7 @@
ret = c->preproc(ares, c->preproc_data);
if (ret < 0) {
  c->error = ret;
-  return AE_CTRL_TERMINATE;
+  return AE_ABORT_METHOD;
} else if (ret > 0) {
  return AE_OK;
}
--- linux-4.15.0.orig/drivers/acpi/sbs.c
+++ linux-4.15.0/drivers/acpi/sbs.c
@@ -441,9 +441,13 @@
/*
 * The spec requires that bit 4 always be 1. If it's not set, assume
- * that the implementation doesn't support an SBS charger
+ * that the implementation doesn't support an SBS charger.
+ *
+ * And on some MacBooks a status of 0xffff is always returned, no
+ * matter whether the charger is plugged in or not, which is also
+ * wrong, so ignore the SBS charger for those too.
 */
-if (!(status >> 4) & 0x1))
+if (!(status >> 4) & 0x1) || status == 0xffff)
return -ENODEV;
sbs->charger_present = (status >> 15) & 0x1;
--- linux-4.15.0.orig/drivers/acpi/sbshc.c
+++ linux-4.15.0/drivers/acpi/sbshc.c
@@ -196,6 +196,7 @@
hc->callback = NULL;
hc->context = NULL;
mutex_unlock(&hc->lock);
+acpi_os_wait_events_complete();
return 0;
}

@@ -275,8 +276,8 @@
device->driver_data = hc;
acpi_ec_add_query_handler(hc->ec, hc->query_bit, NULL, smbus_alarm, hc);
-dev_info(&device->dev, "SBS HC: offset = 0x%0x, query_bit = 0x%0x\n",
+dev_info(&device->dev, "SBS HC: offset = 0x%0x, query_bit = 0x%0x\n",
+hc->offset, hc->query_bit);
return 0;
}

hc = acpi_driver_data(device);
acpi_ec_remove_query_handler(hc->ec, hc->query_bit);
+acpi_os_wait_events_complete();
kfree(hc);
device->driver_data = NULL;
return 0;
--- linux-4.15.0.orig/drivers/acpi/scan.c
+++ linux-4.15.0/drivers/acpi/scan.c
@@ -481,10 +481,10 @@
list_for_each_entry(acpi_device_bus_id, &acpi_bus_id_list, node)
if (!strcmp(acpi_device_bus_id->bus_id,
-dev_info(&acpi_device_bus_id->instance_ida, device->pnp.instance_no);
+kfree_const(acpi_device_bus_id->bus_id);
list_del(&acpi_device_bus_id->node);
+kfree(acpi_device_bus_id);
break;
@@ -584,6 +584,8 @@
if (!device)
return -EINVAL;

+*device = NULL;
+
+status = acpi_get_data_full(handle, acpi_scan_drop_device,
+    (void **)device, callback);
if (ACPI_FAILURE(status) || !*device) {
    @@ -619,12 +621,38 @@
    put_device(&adev->dev);
}

+static struct acpi_device_bus_id *acpi_device_bus_id_match(const char *dev_id)
+{
+    struct acpi_device_bus_id *acpi_device_bus_id;
+
+/* Find suitable bus_id and instance number in acpi_bus_id_list. */
+list_for_each_entry(acpi_device_bus_id, &acpi_bus_id_list, node) {
+    if (!strcmp(acpi_device_bus_id->bus_id, dev_id))
+        return acpi_device_bus_id;
+}
    return NULL;
+}
+
+static int acpi_device_set_name(struct acpi_device *device,
+    struct acpi_device_bus_id *acpi_device_bus_id)
+{
+    struct ida *instance_ida = &acpi_device_bus_id->instance_ida;
    +int result;
    +
    +result = ida_simple_get(instance_ida, 0, ACPI_MAX_DEVICE_INSTANCES, GFP_KERNEL);
    +if (result < 0)
        return result;
    +
    +device->pnp.instance_no = result;
    +dev_set_name(&device->dev, "%s:%02x", acpi_device_bus_id->bus_id, result);
    +return 0;
+}
+
int acpi_device_add(struct acpi_device *device,
    void (*release)(struct device *))
{
    +struct acpi_device_bus_id *acpi_device_bus_id;
    int result;
    -struct acpi_device_bus_id *acpi_device_bus_id, *new_bus_id;
    -int found = 0;

    if (device->handle) {
        acpi_status status;
INIT_LIST_HEAD(&device->del_list);
mutex_init(&device->physical_node_lock);

-new_bus_id = kzalloc(sizeof(struct acpi_device_bus_id), GFP_KERNEL);
-if (!new_bus_id) {
-pr_err(PREFIX "Memory allocation error\n");
-result = -ENOMEM;
-goto err_detach;
-
-
mutex_lock(&acpi_device_lock);
/
- * Find suitable bus_id and instance number in acpi_bus_id_list
- * If failed, create one and link it into acpi_bus_id_list
- */
-list_for_each_entry(acpi_device_bus_id, &acpi_bus_id_list, node) {
-if (!strcmp(acpi_device_bus_id->bus_id,
- acpi_device_hid(device))) {
-acpi_device_bus_id->instance_no++;
-found = 1;
-kfree(new_bus_id);
-break;
+
+acpi_device_bus_id = acpi_device_bus_id_match(acpi_device_hid(device));
+if (acpi_device_bus_id) {
+result = acpi_device_set_name(device, acpi_device_bus_id);
+if (result)
+goto err_unlock;
+} else {
+acpi_device_bus_id = kzalloc(sizeof(*acpi_device_bus_id),
+ GFP_KERNEL);
+if (!acpi_device_bus_id) {
+result = -ENOMEM;
+goto err_unlock;
+}
+acpi_device_bus_id->bus_id =
+kstrdup_const(acpi_device_hid(device), GFP_KERNEL);
+if (!acpi_device_bus_id->bus_id) {
+kfree(acpi_device_bus_id);
+result = -ENOMEM;
+goto err_unlock;
+}
+ida_init(&acpi_device_bus_id->instance_ida);
+
+result = acpi_device_set_name(device, acpi_device_bus_id);
+if (result) {
+

+kfree_const(acpi_device_bus_id->bus_id);
+kfree(acpi_device_bus_id);
+goto err_unlock;
}
-
-if (!found) {
- ACPI_DEVICE_BUS_ID = new_bus_id;
- strcpy(acpi_device_bus_id->bus_id, acpi_device_hid(device));
- ACPI_DEVICE_BUS_ID->instance_no = 0;
+ list_add_tail(&acpi_device_bus_id->node, &acpi_bus_id_list);
}
-dev_set_name(&device->dev, "%s:%02x", ACPI_DEVICE_BUS_ID->bus_id, ACPI_DEVICE_BUS_ID->instance_no);

if (device->parent)
list_add_tail(&device->node, &device->parent->children);
@@ -708,9 +741,10 @@
if (device->parent)
list_del(&device->node);
list_del(&device->wakeup_list);
+
+ mutex_unlock(&acpi_device_lock);
-
- ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
- ACPI_DEVICE_BUS_ID->instance_no = 0;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
+ ACPI_DEVICE_BUS_ID = ACPI_HOST_BUS_ID;
+ ACPI_DEVICE_BUS_ID->instance_no = 0;
+
ACPI_FREE(buffer.pointer);
}
@@ -972,14 +1003,27 @@
acpi_bus_init_power_state(device, i);

INIT_LIST_HEAD(&device->power.states[ACPI_STATE_D3_COLD].resources);
-if (!list_empty(&device->power.states[ACPI_STATE_D3_HOT].resources))
-device->power.states[ACPI_STATE_D3_COLD].flags.valid = 1;

/* Set defaults for D0 and D3hot states (always valid) */
device->power.states[ACPI_STATE_D0].flags.valid = 1;
device->power.states[ACPI_STATE_D0].power = 100;
device->power.states[ACPI_STATE_D3_HOT].flags.valid = 1;

/* Use power resources only if the D0 list of them is populated, because
 some platforms may provide _PR3 only to indicate D3cold support and
 in those cases the power resources list returned by it may be bogus.
 */
+if (!list_empty(&device->power.states[ACPI_STATE_D0].resources)) {
+device->power.flags.power_resources = 1;
+
+ * D3cold is supported if the D3hot list of power resources is
+ * not empty.
+ */
+if (!list_empty(&device->power.states[ACPI_STATE_D3_HOT].resources))
+device->power.states[ACPI_STATE_D3_COLD].flags.valid = 1;
+
+ if (acpi_bus_init_power(device))
+device->flags.power_manageable = 0;
}

static bool acpi_is_serial_bus_slave(struct acpi_device *device)
+static bool acpi_is_indirect_io_slave(struct acpi_device *device)
+
+struct acpi_device *parent = device->parent;
+const struct acpi_device_id indirect_io_hosts[] = {
+{"HISI0191", 0},
+[]
+};
+
+return parent && !acpi_match_device_ids(parent, indirect_io_hosts);
+
+static bool acpi_device Enumeration by parent(struct acpi_device *device)
+
+struct list_head resource_list;
+bool is_serial_bus_slave = false;
if (acpi_is_indirect_io_slave(device))
return true;
+
/* Macs use device properties in lieu of _CRS resources */
if (x86_apple_machine &&
   (fwnode_property_present(&device->fwnode, "spiSclkPeriod")) ||
@@ -1560,11 +1618,14 @@
    acpi_bus_get_flags(device);
    device->flags.match_driver = false;
    device->flags.initialized = true;
-    device->flags.serial_bus_slave = acpi_is_serial_bus_slave(device);
-    device->flags.enumeration_by_parent =
+    device->flags.enumeration_by_parent =
+    acpi_device_enumeration_by_parent(device);
    acpi_device_clearEnumerated(device);
    device_initialize(&device->dev);
    dev_set_uevent_suppress(&device->dev, true);
    acpi_init_coherency(device);
+/* Assume there are unmet deps until acpi_device_dep_initialize() runs */
+device->dep_unmet = 1;
}

void acpi_device_add_finalize(struct acpi_device *device)
@@ -1588,6 +1649,15 @@
}

acpi_init_device_object(device, handle, type, sta);
+/
+/*
+ * For ACPI_BUS_TYPE_DEVICE getting the status is delayed till here so
+ * that we can call acpi_bus_get_status() and use its quirk handling.
+ * Note this must be done before the get power-/wakeup_dev-flags calls.
+ */
+if (type == ACPI_BUS_TYPE_DEVICE)
+if (acpi_bus_get_status(device) < 0)
+acpi_set_device_status(device, 0);
+acpi_bus_get_power_flags(device);
+acpi_bus_get_wakeup_device_flags(device);
@@ -1660,9 +1730,11 @@
return -ENODEV;

*type = ACPI_BUS_TYPE_DEVICE;
status = acpi_bus_get_status_handle(handle, sta);
-if (ACPI_FAILURE(status))
-*sta = 0;
+/*
+ * acpi_add_single_object updates this once we've an acpi_device
+ * so that acpi_bus_get_status' quirk handling can be used.

---
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+ */
+ *sta = ACPI_STA_DEFAULT;
break;

case ACPI_TYPE_PROCESSOR:
*type = ACPI_BUS_TYPE_PROCESSOR;
@@ -1760,6 +1832,8 @@
acpi_status status;
int i;

+adev->dep_unmet = 0;
+
+ if (!acpi_has_method(adev->handle, "_DEP"))
return;

@@ -1844,10 +1918,10 @@
static void acpi_default_enumeration(struct acpi_device *device)
{
/*
- * Do not enumerate SPI/I2C/UART slaves as they will be enumerated by
- * their respective parents.
+ * Do not enumerate devices with enumeration_by_parent flag set as
+ * they will be enumerated by their respective parents.
 */
-if (!device->flags.serial_bus_slave) {
+if (!device->flags.enumeration_by_parent) {
acpi_create_platform_device(device, NULL);
acpi_device_set_enumerated(device);
} else {
@@ -1944,7 +2018,7 @@
return;

device->flags.match_driver = true;
-if (ret > 0 && !device->flags.serial_bus_slave) {
+if (ret > 0 && !device->flags.enumeration_by_parent) {
acpi_device_set_enumerated(device);
goto ok;
}
@@ -1953,10 +2027,10 @@
if (ret < 0)
return;

-if (!device->pnp.type.platform_id && !device->flags.serial_bus_slave)
-acpi_device_set_enumerated(device);
-else
+if (device->pnp.type.platform_id || device->flags.enumeration_by_parent)
acpi_default_enumeration(device);
+else
+acpi_device_set_enumerated(device);
list_for_each_entry(child, &device->children, node)
 @@ -2136,10 +2210,10 @@
 acpi_cmos_rtc_init();
 acpi_container_init();
 acpi_memory_hotplug_init();
+acpi_watchdog_init();
 acpi_pnp_init();
 acpi_int340x_thermal_init();
 acpi_amba_init();
-acpi_watchdog_init();
 acpi_init_lpit();

acpi_scan_add_handler(&generic_device_handler);
--- linux-4.15.0.orig/drivers/acpi/sleep.c
+++ linux-4.15.0/drivers/acpi/sleep.c
@@ -338,6 +338,14 @@
 DMI_MATCH(DMI_PRODUCT_NAME, "K54HR"),
 },
 },
+{callback = init_nvs_save_s3,
+ident = "Asus 1025C",
+matches = { 
+DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
+DMI_MATCH(DMI_PRODUCT_NAME, "1025C"),
+},
+},
/*
 * https://bugzilla.kernel.org/show_bug.cgi?id=189431
 * Lenovo G50-45 is a platform later than 2012, but needs nvs memory
@@ -364,6 +372,19 @@
 DMI_MATCH(DMI_PRODUCT_NAME, "XPS 13 9360"),
 },
 },
+/*
+ * ThinkPad X1 Tablet(2016) cannot do suspend-to-idle using
+ * the Low Power S0 Idle firmware interface (see
+ */
+{callback = init_no_lps0,
+ident = "ThinkPad X1 Tablet(2016)",
+matches = { 
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_PRODUCT_NAME, "20GGA00L00"),
+}.}
acpi_handle_debug(adev->handle, "_DSM function mask: 0x%x
", bitmask);
+
+acpi_ec_mark_gpe_for_wake();
} else {
acpi_handle_debug(adev->handle,
    "_DSM function 0 evaluation failed\n");
@@ -941,18 +964,18 @@
if (lps0_device_handle) {
    acpi_sleep_run_lps0_dsm(ACPI_LPS0_SCREEN_OFF);
    acpi_sleep_run_lps0_dsm(ACPI_LPS0_ENTRY);
-} else {
-    /*
-     * The configuration of GPEs is changed here to avoid spurious
-     * wakeups, but that should not be necessary if this is a
-     * "low-power S0" platform and the low-power S0 _DSM is present.
-     */
-    acpi_enable_all_wakeup_gpes();
-    acpi_os_wait_events_complete();
+    acpi_ec_set_gpe_wake_mask(ACPI_GPE_ENABLE);
+} else {
+    /*
     * Change the configuration of GPEs to avoid spurious wakeup. */
+    acpi_enable_all_wakeup_gpes();
+    acpi_os_wait_events_complete();
    return 0;
}

static void acpi_s2idle_restore(void)
{
+acpi_enable_all_runtime_gpes();
+acpi_disable_wakeup_devices(ACPI_STATE_S0);
+
+/* Change the configuration of GPEs to avoid spurious wakeup. */
+acpi_enable_all_wakeup_gpes();
+acpi_os_wait_events_complete();
return 0;
}

@@ -989,14 +1012,18 @@


if (acpisci_irq_valid())
    disable_irq_wake(acpisci_irq);

if (lps0_device_handle) {
    ACPI_GPE_DISABLE
    ACPI_LPS0_EXIT
    ACPI_LPS0_SCREEN_ON
} else {
    ACPI_ENABLE_ALL_RUNTIME_GPES();
}

--- linux-4.15.0.orig/drivers/acpi/spcr.c
+++ linux-4.15.0/drivers/acpi/spcr.c
@@ -148,6 +148,13 @@
switch (table->baud_rate) {
+case 0:
+  /*
+   * SPCR 1.04 defines 0 as a preconfigured state of UART.
+   * Assume firmware or bootloader configures console correctly.
+   */
+  baud_rate = 0;
+  break;
+}
+break;
+case 3:
    baud_rate = 9600;
    break;
@@ -196,6 +203,10 @@
    /* UART so don't attempt to change to the baud rate state
    * in the table because driver cannot calculate the dividers
    */
+  baud_rate = 0;
+}
+}
+if (!baud_rate) {
    snprintf(opts, sizeof(opts), "%s,%s,0x%llx", uart, iotype,
        table->serial_port.address);
} else {
--- linux-4.15.0.orig/drivers/acpi/sysfs.c
+++ linux-4.15.0/drivers/acpi/sysfs.c
@@ -446,7 +446,7 @@
    memory_read_from_buffer(buf, count, &offset, base,
    memory_read_from_io_buffer(buf, count, &offset, base,
    memory_read_from_buffer(buf, count, &offset, base,
data_attr->attr.size);
acpi_os_unmap_memory(base, data_attr->attr.size);

@@ -945,13 +945,13 @@
}

static ssize_t
-acpi_show_profile(struct device *dev, struct device_attribute *attr,
+acpi_show_profile(struct kobject *kobj, struct kobj_attribute *attr,
    char *buf)
{
    return sprintf(buf, "%d\n", acpi_gbl_FADT.preferred_profile);
}

-static const struct device_attribute pm_profile_attr =
+static const struct kobj_attribute pm_profile_attr =
    __ATTR(pm_profile, S_IRUGO, acpi_show_profile, NULL);

static ssize_t hotplug_enabled_show(struct kobject *kobj,
@@ -1000,8 +1000,10 @@
    error = kobject_init_and_add(&hotplug->kobj,
        &acpi_hotplug_profile_ktype, hotplug_kobj, "%s", name);
    -if (error)
+    if (error) {
+        kobject_put(&hotplug->kobj);
        goto err_out;
    +}
    kobject_uevent(&hotplug->kobj, KOBJ_ADD);
    return;

--- linux-4.15.0.orig/drivers/acpi/tables.c
+++ linux-4.15.0/drivers/acpi/tables.c
@@ -456,7 +456,8 @@
 ACPI_SIG_SLIC, ACPI_SIG_SPCR, ACPI_SIG_SPMI, ACPI_SIG_TCPA,
 ACPI_SIG_UEFI, ACPI_SIG_WAET, ACPI_SIG_WDAT, ACPI_SIG_WDDT,
 ACPI_SIG_WDRT, ACPI_SIG_DSDT, ACPI_SIG_FADT, ACPI_SIG_PSDT,
- ACPI_SIG_RSDT, ACPI_SIG_XSDT, ACPI_SIG_SSDT, NULL };
+ ACPI_SIG_RSDT, ACPI_SIG_XSDT, ACPI_SIG_SSDT, ACPI_SIG_PPTT,
+ NULL };

#define ACPI_HEADER_SIZE sizeof(struct acpi_table_header)

@@ -526,6 +527,11 @@
    if (table_nr == 0)
        return;
+
+    if (kernel_is_locked_down("ACPI table override")) {

+pr_notice("kernel is locked down, ignoring table override\n");
+return;
+
+acpi_tables_addr =
memblock_find_in_range(0, ACPI_TABLE_UPGRADE_MAX_PHYS,
    all_tables_size, PAGE_SIZE);
    @ @ -726,7 +732,7  @@
    }

/*
 * acpi_table_init()
+ * acpi_locate_initial_tables()
 * 
 * find RSDP, find and checksum SDT/XSDT.
 * checksum all tables, print SDT/XSDT
@@ -734,7 +740,7 @@
 * result: sdt_entry[] is initialized
 */

-int __init acpi_table_init(void)
+int __init acpi_locate_initial_tables(void)
{
    acpi_status status;

    @ @ -749,9 +755,45 @@
    status = acpi_initialize_tables(initial_tables, ACPI_MAX_TABLES, 0);
    if (ACPI_FAILURE(status))
        return -EINVAL;
    -acpi_table_initrd_scan();
    +return 0;
+
+void __init acpi_reserve_initial_tables(void)
+{
    +int i;
    +
    +for (i = 0; i < ACPI_MAX_TABLES; i++) {
    +struct acpi_table_desc *table_desc = &initial_tables[i];
    +u64 start = table_desc->address;
    +u64 size = table_desc->length;
    +
    +if (!start || !size)
    +break;
    +
    +pr_info("Reserving %4s table memory at [mem 0x%llx-0x%llx]\n",
        table_desc->signature.ascii, start, start + size - 1);
+ memblock_reserve(start, size);
+
+void __init acpi_table_init_complete(void)
+{
+acpi_table_initrd_scan();
+check_multiple_madt();
+}
+
+int __init acpi_table_init(void)
+{
+int ret;
+
+ret = acpi_locate_initial_tables();
+if (ret)
+return ret;
+
+acpi_table_init_complete();
+
+return 0;
}

--- linux-4.15.0.orig/drivers/acpi/thermal.c
+++ linux-4.15.0/drivers/acpi/thermal.c
@@ -188,6 +188,8 @@
int tz_enabled;
int kelvin_offset;
struct work_struct thermal_check_work;
+struct mutex thermal_check_lock;
+refcount_t thermal_check_count;
};

/*
 * @ -513,17 +515,6 @@
 * return 0;
 */

-static void acpi_thermal_check(void *data)
-{
-struct acpi_thermal *tz = data;
-
-if (!tz->tz_enabled)
-return;
-
-thermal_zone_device_update(tz->thermal_zone,
- THERMAL_EVENT_UNSPECIFIED);
-}
/* sys I/F for generic thermal sysfs support */
static int thermal_get_temp(struct thermal_zone_device *thermal, int *temp)
@@ -557,6 +548,8 @@
return 0;
}
+static void acpi_thermal_check_fn(struct work_struct *work);
+
static int thermal_set_mode(struct thermal_zone_device *thermal,
enum thermal_device_mode mode)
{
@@ -582,7 +575,7 @@
ACPI_DEBUG_PRINT((ACPI_DB_INFO,
"%s kernel ACPI thermal control\n",
tz->tz_enabled ? "Enable" : "Disable"));
-acpi_thermal_check(tz);
+acpi_thermal_check_fn(&tz->thermal_check_work);
}
return 0;
}
@@ -951,6 +944,12 @@
Driver Interface
-------------------------------------------------------------------------- */
+static void acpi_queue_thermal_check(struct acpi_thermal *tz)
+{
+if (!work_pending(&tz->thermal_check_work))
+queue_work(acpi_thermal_pm_queue, &tz->thermal_check_work);
+}
+
static void acpi_thermal_notify(struct acpi_device *device, u32 event)
{
struct acpi_thermal *tz = acpi_driver_data(device);
@@ -961,17 +960,17 @@
switch (event) {
case ACPI_THERMAL_NOTIFY_TEMPERATURE:
-acpi_thermal_check(tz);
+acpi_queue_thermal_check(tz);
break;
case ACPI_THERMAL_NOTIFY_THRESHOLDS:
acpi_thermal_trips_update(tz, ACPI_TRIPS_REFRESH_THRESHOLDS);
-acpi_thermal_check(tz);
+acpi_queue_thermal_check(tz);
acpi_bus_generate_netlink_event(device->pnp.device_class,

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dev_name(&device->dev), event, 0);
break;
case ACPI_THERMAL_NOTIFY_DEVICES:
acpi_thermal_trips_update(tz, ACPI_TRIPS_REFRESH_DEVICES);
-acpi_thermal_check(tz);
+acpi_queue_thermal_check(tz);
acpi_bus_generate_netlink_event(device->pnp.device_class,
dev_name(&device->dev), event, 0);
break;
@@ -1071,7 +1070,27 @@
{
struct acpi_thermal *tz = container_of(work, struct acpi_thermal,
thermal_check_work);
-acpi_thermal_check(tz);
+
+if (!tz->tz_enabled)
+return;
+/*
+ * In general, it is not sufficient to check the pending bit, because
+ * subsequent instances of this function may be queued after one of them
+ * has started running (e.g. if _TMP sleeps). Avoid bailing out if just
+ * one of them is running, though, because it may have done the actual
+ * check some time ago, so allow at least one of them to block on the
+ * mutex while another one is running the update.
+ */
+if (!refcount_dec_not_one(&tz->thermal_check_count))
+return;
+
+mutex_lock(&tz->thermal_check_lock);
+
+thermal_zone_device_update(tz->thermal_zone, THERMAL_EVENT_UNSPECIFIED);
+
+refcount_inc(&tz->thermal_check_count);
+
+mutex_unlock(&tz->thermal_check_lock);
}
static int acpi_thermal_add(struct acpi_device *device)
@@ -1103,6 +1122,8 @@
if (result)
goto free_memory;
+refcount_set(&tz->thermal_check_count, 3);
+mutex_init(&tz->thermal_check_lock);
INIT_WORK(&tz->thermal_check_work, acpi_thermal_check_fn);
pr_info(PREFIX "%s [%s] (%ld C)\n", acpi_device_name(device),
@@ -1168,7 +1189,7 @@

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tz->state.active |= tz->trips.active[i].flags.enabled;

-queue_work(acpi_thermal_pm_queue, &tz->thermal_check_work);
+acpi_queue_thermal_check(tz);

return AE_OK;
}
--- linux-4.15.0.orig/drivers/acpi/utils.c
+++ linux-4.15.0/drivers/acpi/utils.c
@@ -799,6 +799,7 @@
    dev = bus_find_device(&acpi_bus_type, NULL, &match,
                        acpi_dev_present_cb);
+
+put_device(dev);
return !!dev;
}
EXPORT_SYMBOL(acpi_dev_present);
--- linux-4.15.0.orig/drivers/acpi/video_detect.c
+++ linux-4.15.0/drivers/acpi/video_detect.c
@@ -220,6 +220,15 @@
    },
    },
    { /* https://bugzilla.redhat.com/show_bug.cgi?id=1557060 */
+    .callback = video_detect_force_video,
+    .ident = "SAMSUNG 670Z5E",
+    .matches = {
+      DMI_MATCH(DMI_SYS_VENDOR, "SAMSUNG ELECTRONICS CO., LTD."),
+      DMI_MATCH(DMI_PRODUCT_NAME, "670Z5E"),
+    },
+    },
+    {
+      /* https://bugzilla.redhat.com/show_bug.cgi?id=1094948 */
+      .callback = video_detect_force_video,
+      .ident = "SAMSUNG 730U3E/740U3E",
+      .matches = {
+        DMI_MATCH(DMI_PRODUCT_NAME, "530U4E/540U4E"),
+      },
+      },
+      /* https://bugs.launchpad.net/bugs/1894667 */
+      { /* HP 635 Notebook */
+        .callback = video_detect_force_video,
+        .ident = "HP 635 Notebook",
+        .matches = {
+          DMI_MATCH(DMI_SYS_VENDOR, "Hewlett-Packard"),
+          DMI_MATCH(DMI_PRODUCT_NAME, "HP 635 Notebook PC"),
+        }
+      },
/* Non win8 machines which need native backlight nevertheless */
{
    .callback = video_detect_force_native,
    .ident = "Lenovo E41-25",
    .matches = {
        DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
        DMI_MATCH(DMI_PRODUCT_NAME, "81FS"),
    },
},
{
    .callback = video_detect_force_native,
    .ident = "Lenovo E41-45",
    .matches = {
        DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
        DMI_MATCH(DMI_PRODUCT_NAME, "82BK"),
    },
},
{
    .callback = video_detect_force_native,
    .ident = "Apple MacBook Pro 12,1",
},
{
    .callback = video_detect_force_native,
    .ident = "Acer Aspire 5738z",
    .matches = {
        DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
        DMI_MATCH(DMI_PRODUCT_NAME, "Aspire 5738"),
        DMI_MATCH(DMI_BOARD_NAME, "JV50"),
    },
},
{
    .callback = video_detect_force_native,
    .ident = "Acer TravelMate 5735Z",
    .matches = {
        DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
        DMI_MATCH(DMI_PRODUCT_NAME, "TravelMate 5735Z"),
        DMI_MATCH(DMI_BOARD_NAME, "BA51_MV"),
    },
}
+ * Desktops which falsely report a backlight and which our heuristics
+ * for this do not catch.
+ */
+
+ /**
+ .callback = video_detect_force_none,
+ .ident = "Dell OptiPlex 9020M",
+ .matches = {
+ @ @ -327.6 +385.14 @@
+ DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 9020M"),
+ },
+ },
+ +{
+ .callback = video_detect_force_none,
+ .ident = "MSI MS-7721",
+ .matches = {
+ +DMI_MATCH(DMI_SYS_VENDOR, "MSI"),
+ +DMI_MATCH(DMI_PRODUCT_NAME, "MS-7721"),
+ +},
+ +},
+ [ ]
+ ]:

--- linux-4.15.0.orig/drivers/acpi/x86/apple.c
+++ linux-4.15.0/drivers/acpi/x86/apple.c
@@ -132,8 +132,8 @@
 { }
 WARN_ON(free_space != (void *)newprops + newsize);

-adev->data.properties = newprops;
-adev->data.pointer = newprops;
+acpi_data_add_props(&adev->data, &apple_prp_guid, newprops);

out_free:
ACPI_FREE(props);
--- linux-4.15.0.orig/drivers/acpi/x86/utils.c
+++ linux-4.15.0/drivers/acpi/x86/utils.c
@@ -54,7 +54,7 @@
 * Bay / Cherry Trail PWM directly poked by GPU driver in win10,
 * but Linux uses a separate PWM driver, harmless if not used.
 */
-ENTRY("80860F09", "1", ICPU(INTEL_FAM6_ATOM_SILVERMONT1), {}),
+ENTRY("80860F09", "1", ICPU(INTEL_FAM6_ATOM_SILVERMONT), {}),
 ENTRY("80862288", "1", ICPU(INTEL_FAM6_ATOM_AIRMONT), {}),
 /*
 * The INT0002 device is necessary to clear wakeup interrupt sources
--- linux-4.15.0.orig/drivers/amba/bus.c
+++ linux-4.15.0/drivers/amba/bus.c
@@ -69,11 +69,12 @@
 struct device_attribute *attr, char *buf)
 {
 struct amba_device *dev = to_amba_device(_dev);
+ ssize_t len;

 -if (!dev->driver_override)
- return 0;
-
- return sprintf(buf, "%s\n", dev->driver_override);
+ device_lock(_dev);
+ len = sprintf(buf, "%s\n", dev->driver_override);
+ device_unlock(_dev);
+ return len;
 }

 static ssize_t driver_override_store(struct device *dev,
@@ -78,9 +79,10 @@
 const char *buf, size_t count)
 {
 struct amba_device *dev = to_amba_device(_dev);
- char *driver_override, *old = dev->driver_override, *cp;
+ char *driver_override, *
+old, *cp;

 -if (count > PATH_MAX)
+ /* We need to keep extra room for a newline */
 +if (count >= (PAGE_SIZE - 1))
 return -EINVAL;

driver_override = kstrndup(buf, count, GFP_KERNEL);
@@ -94,12 +96,15 @@
 if (cp)
 *cp = '\0';
+ device_lock(_dev);
+old = dev->driver_override;
 if (strlen(driver_override)) {
 dev->driver_override = driver_override;
 } else {
- kfree(driver_override);
- dev->driver_override = NULL;
 } 
+ device_unlock(_dev);

 kfree(old);
struct amba_device *pcdev = to_amba_device(dev);
struct amba_driver *drv = to_amba_driver(dev->driver);
-int ret;
+int ret = 0;

pm_runtime_get_sync(dev);
-ret = drv->remove(pcdev);
+if (drv->remove)
+ret = drv->remove(pcdev);
pm_runtime_put_noidle(dev);

/* Undo the runtime PM settings in amba_probe() */
static void amba_shutdown(struct device *dev)
{
 struct amba_driver *drv = to_amba_driver(dev->driver);
-drv->shutdown(to_amba_device(dev));
+
+if (drv->shutdown)
+drv->shutdown(to_amba_device(dev));
}

int amba_driver_register(struct amba_driver *drv)
{
-drv->drv.bus = &amba_bustype;
+if (!drv->probe)
+return -EINVAL;

#define SETFN(fn)if (drv->fn) drv->drv.fn = amba_##fn
-SETFN(probe);
-SETFN(remove);
-SETFN(shutdown);
+drv->drv.bus = &amba_bustype;
+drv->drv.probe = amba_probe;
+drv->drv.remove = amba_remove;
+drv->drv.shutdown = amba_shutdown;

return driver_register(&drv->drv);
}

--- linux-4.15.0.org/drivers/android/binder.c
+++ linux-4.15.0/drivers/android/binder.c
@@ -286,7 +286,7 @@
struct binder_work {
struct list_head entry;

-enum {
+enum binder_work_type {
BINDER_WORK_TRANSACTION = 1,
BINDER_WORK_TRANSACTION_COMPLETE,
BINDER_WORK_RETURN_ERROR,
@@ -850,27 +850,6 @@
return w;
}

/**
- * binder_dequeue_work_head() - Dequeues the item at head of list
- * @proc: binder_proc associated with list
- * @list: list to dequeue head
- *
- * Removes the head of the list if there are items on the list
- *
- * Return: pointer dequeued binder_work, NULL if list was empty
- */
-static struct binder_work *binder_dequeue_work_head(
-struct binder_proc *proc,
-struct list_head *list)
-{"-struct binder_work *w;
-
-   -binder_inner_proc_lock(proc);
-   -w = binder_dequeue_work_head_ilocked(list);
-   -binder_inner_proc_unlock(proc);
-   -return w;
-}
-
static void
binder_defer_work(struct binder_proc *proc, enum binder_deferred_state defer);
static void binder_free_thread(struct binder_thread *thread);
@@ -1903,8 +1882,18 @@
static void binder_free_transaction(struct binder_transaction *t)
{
   -if (t->buffer) 
   -t->buffer->transaction = NULL;
+struct binder_proc *target_proc = t->to_proc;
+ +if (target_proc) {
+   +binder_inner_proc_lock(target_proc);
+   +if (t->buffer)
+   +t->buffer->transaction = NULL;
+   +binder_inner_proc_unlock(target_proc);
}
/*
 * If the transaction has no target_proc, then
 * t->buffer->transaction has already been cleared.
 */

kfree(t);

binder_stats_deleted(BINDER_STAT_TRANSACTION);
}
@@ -1933,8 +1922,14 @@
 &target_thread->todo);
 wake_up_interruptible(&target_thread->wait);
 } else {
- 				WARN(1, " Unexpected reply error: %u
",
- 						 target_thread->reply_error.cmd);
+ 				/*
+ 				 * Cannot get here for normal operation, but
+ 				 * we can if multiple synchronous transactions
+ 				 * are sent without blocking for responses.
+ 				 * Just ignore the 2nd error in this case.
+ 				 */
+ 				pr_warn(" Unexpected reply error: %u
",
+ 					 target_thread->reply_error.cmd);
+ /*
+ 					 * Cannot get here for normal operation, but
+ 					 * we can if multiple synchronous transactions
+ 					 * are sent without blocking for responses.
+ 					 * Just ignore the 2nd error in this case.
+ 				 */
+ 				pr_warn(" Unexpected reply error: %u
",

binder_inner_proc_unlock(target_thread->proc);

binder_thread_dec_tmpref(target_thread);

int debug_id = buffer->debug_id;

binder_debug(BINDER_DEBUG_TRANSACTION,
- " %d buffer release %d, size %zd-%zd, failed at %p
",
+ " %d buffer release %d, size %zd-%zd, failed at %pK
",
   proc->pid, buffer->debug_id,
   buffer->data_size, buffer->offsets_size, failed_at);

@@ -2779,6 +2774,14 @@
 else
     return_error = BR_DEAD_REPLY;
 mutex_unlock(&context->context_mgr_node_lock);
+if (target_node && target_proc->pid == proc->pid) {
+    binder_user_error("%d:%d got transaction to context manager from process owning it\n",
+        proc->pid, thread->pid);
+    +return_error = BR_FAILED_REPLY;
+    +return_error_param = -EINVAL;
+    +return_error_line = __LINE__;
+    +goto err_invalid_target_handle;
+} } if (!target_node) {
/*
@@ -2789,6 +2792,12 @@
 goto err_dead_binder;
 }
 e->to_node = target_node->debug_id;
+if (WARN_ON(proc == target_proc)) {
+    return_error = BR_FAILED_REPLY;
+    return_error_param = -EINVAL;
+    return_error_line = __LINE__;
+    goto err_invalid_target_handle;
+}
 if (security_binder_transaction(proc->tsk,
    target_proc->tsk) < 0) {
    return_error = BR_FAILED_REPLY;
@@ -2904,7 +2913,6 @@
t->buffer = NULL;
 goto err_binder_alloc_buf_failed;
 }
-    t->buffer->allow_user_free = 0;
    t->buffer->debug_id = t->debug_id;
    t->buffer->transaction = t;
    t->buffer->target_node = target_node;
@@ -3265,10 +3273,17 @@
 struct binder_node *ctx_mgr_node;
 mutex_lock(&context->context_mgr_node_lock);
 ctx_mgr_node = context->binder_context_mgr_node;
+if (ctx_mgr_node) {
+    if (ctx_mgr_node->proc == proc) {
+        binder_user_error("%d:%d context manager tried to acquire desc 0\n",
+             proc->pid, thread->pid);
+        mutex_unlock(&context->context_mgr_node_lock);
+        return -EINVAL;
+    }
    ret = binder_inc_ref_for_node(
        proc, ctx_mgr_node,
        strong, NULL, &rdata);
    }
    mutex_unlock(&context->context_mgr_node_lock);
    }
    if (ret)
@@ -3393,14 +3408,18 @@
     buffer = binder_alloc_prepare_to_free(&proc->alloc,
         data_ptr);
-    if (buffer == NULL) {
-       binder_user_error("%d:%d BC_FREE_BUFFER u%016llx no match\n",
-             proc->pid, thread->pid, (u64)data_ptr);
buffer = binder_alloc_prepare_to_free(&proc->alloc,
    data_ptr);
-    if (buffer == NULL) {
-        binder_user_error("%d:%d BC_FREE_BUFFER u%016llx no match\n",
-            proc->pid, thread->pid, (u64)data_ptr);
-break;
-
#ifdef DEBUG
-else if (!buffer->allow_user_free) {
-binder_user_error("%d:%d BC_FREE_BUFFER u%016llx matched unreturned buffer\n", 
-proc->pid, thread->pid, (u64)data_ptr);
+if (IS_ERR_OR_NULL(buffer)) {
+    if (PTR_ERR(buffer) == -EPERM) {
+        binder_user_error(
+            "%d:%d BC_FREE_BUFFER u%016llx matched unreturned or currently freeing buffer\n", 
+            proc->pid, thread->pid,
+            (u64)data_ptr);
+    } else {
+        binder_user_error(
+            "%d:%d BC_FREE_BUFFER u%016llx no match\n", 
+            proc->pid, thread->pid,
+            (u64)data_ptr);
+    }
+}
+break;
}
#endif
binder_debug(BINDER_DEBUG_FREE_BUFFER,
@@ -3409,10 +3428,12 @@
        buffer->debug_id,
        buffer->transaction ? "active" : "finished");

+binder_inner_proc_lock(proc);
if (buffer->transaction) {
    buffer->transaction->buffer = NULL;
    buffer->transaction = NULL;
} 
+binder_inner_proc_unlock(proc);
if (buffer->async_transaction && buffer->target_node) {
struct binder_node *buf_node;
struct binder_work *w;
@@ -3647,7 +3668,7 @@}
}

binder_debug(BINDER_DEBUG_DEAD_BINDER,
- "%d:%d BC_DEAD_BINDER_DONE %016llx found %p\n",
+ "%d:%d BC_DEAD_BINDER_DONE %016llx found %pK\n",
    proc->pid, thread->pid, (u64)cookie,
    death);
if (death == NULL) {
@@ -3859,6 +3880,8 @@
case BINDER_WORK_TRANSACTION_COMPLETE: {
    binder_inner_proc_unlock(proc);
    cmd = BR_TRANSACTION_COMPLETE;
    kfree(w);
+binder_stats_deleted(BINDER_STAT_TRANSACTION_COMPLETE);
if (put_user(cmd, (uint32_t __user *)ptr))
    return -EFAULT;
ptr += sizeof(uint32_t);
@@ -3867,8 +3890,6 @@
    binder_debug(BINDER_DEBUG_TRANSACTION_COMPLETE,
        "%d:%d BR_TRANSACTION_COMPLETE\n",
        proc->pid, thread->pid);
    -kfree(w);
    -binder_stats_deleted(BINDER_STAT_TRANSACTION_COMPLETE);
    } break;
    case BINDER_WORK_NODE: {
        struct binder_node *node = container_of(w, struct binder_node, work);
        @@ -4120,13 +4141,17 @@
            struct list_head *list)
        {
            struct binder_work *w;
            +enum binder_work_type wtype;

            while (1) {
                -w = binder_dequeue_work_head(proc, list);
                +binder_inner_proc_lock(proc);
                +w = binder_dequeue_work_head_ilocked(list);
                +wtype = w ? w->type : 0;
                +binder_inner_proc_unlock(proc);
                if (!w)
                    return;

                -switch (w->type) {
                +switch (wtype) {
                    case BINDER_WORK_TRANSACTION: {
                        struct binder_transaction *t;

                        @@ -4160,9 +4185,11 @@
                            kfree(death);
                            binder_stats_deleted(BINDER_STAT_DEATH);
                            } break;
                    +case BINDER_WORK_NODE:
                    +break;
                        default:
                            pr_err("unexpected work type, %d, not freed\n",
                                -    w->type);
                            +    wtype);
                            break;
                        }
                    } @ @ -4302,8 +4329,29 @@
            if (!t)
                spin_lock(&t->lock);
+/*
+ * If this thread used poll, make sure we remove the waitqueue
+ * from any epoll data structures holding it with POLLFREE.
+ * waitqueue_active() is safe to use here because we're holding
+ * the inner lock.
+ */
+if ((thread->looper & BINDER_LOOPER_STATE_POLL) &&
    waitqueue_active(&thread->wait)) {
    wake_up_poll(&thread->wait, POLLHUP | POLLFREE);
}

binder_inner_proc_unlock(thread->proc);

+/*
+ * This is needed to avoid races between wake_up_poll() above and
+ * ep_remove_waitqueue() called for other reasons (eg the epoll file
+ * descriptor being closed); ep_remove_waitqueue() holds an RCU read
+ * lock, so we can be sure it's done after calling synchronize_rcu().
+ */
+if (thread->looper & BINDER_LOOPER_STATE_POLL)
+synchronize_rcu();
+
if (send_reply)
binder_send_failed_reply(send_reply, BR_DEAD_REPLY);
binder_release_work(proc, &thread->todo);

bool wait_for_proc_work;
thread = binder_get_thread(proc);
+if (!thread)
+return POLLERR;

binder_inner_proc_lock(thread->proc);
thread->looper |= BINDER_LOOPER_STATE_POLL;
spin_lock(&t->lock);
to_proc = t->to_proc;
seq_printf(m,
  "%s %d: %pK from %d:%d to %d:%d code %x flags %x pri %ld r%d",
  prefix, t->debug_id, t,
  t->from ? t->from->proc->pid : 0,
  t->from ? t->from->pid : 0,
  t->from ? t->from->proc : NULL,
  buffer->target_node)
seq_printf(m, " node %d", buffer->target_node->debug_id);
-seq_printf(m, " size %zd:%zd data %p\n", 
+seq_printf(m, " size %zd:%zd data %pK\n", 
   buffer->data_size, buffer->offsets_size, 
   buffer->data);
}
--- linux-4.15.0.orig/drivers/android/binder_alloc.c
+++ linux-4.15.0/drivers/android/binder_alloc.c
@@ -149,14 +149,12 @@
 else {
 /*
  * Guard against user threads attempting to 
- * free the buffer twice 
- * free the buffer when in use by kernel or 
+ * after it's already been freed. 
 */
-if (buffer->free_in_progress) {
-   pr_err("%d:%d FREE_BUFFER u%016llx user freed buffer twice\n", 
-         alloc->pid, current->pid, (u64)user_ptr);
-   return NULL;
-}
-buffer->free_in_progress = 1;
+if (!buffer->allow_user_free)
+    return ERR_PTR(-EPERM);
+buffer->allow_user_free = 0;
 return buffer;
 }
@@ -291,8 +289,7 @@
 free_range:
-    for (page_addr = end - PAGE_SIZE; page_addr >= start; 
-        page_addr -= PAGE_SIZE) {
+    for (page_addr = end - PAGE_SIZE; 1; page_addr -= PAGE_SIZE) {
      bool ret;
      size_t index;

@@ -305,6 +302,8 @@
    WARN_ON(!ret);

    trace_binder_free_lru_end(alloc, index);
+    if (page_addr == start)
+        break;
    continue;

    err_vm_insert_page_failed:
@@ -314,7 +313,8 @@
page->page_ptr = NULL;
err_alloc_page_failed:
err_page_ptr_cleared:
;
+if (page_addr == start)
+break;
}
err_no_vma:
if (mm) {
@@ -324,6 +324,34 @@
return vma ? -ENOMEM : -ESRCH;
}

+static inline void binder_alloc_set_vma(struct binder_alloc *alloc,
+struct vm_area_struct *vma)
+{
+ +if (vma)
+alloc->vma_vm_mm = vma->vm_mm;
+/*
+ * If we see alloc->vma is not NULL, buffer data structures set up
+ * completely. Look at smp_rmb side binder_alloc_get_vma.
+ * We also want to guarantee new alloc->vma_vm_mm is always visible
+ * if alloc->vma is set.
+ */
+smp_wmb();
+alloc->vma = vma;
+
+/*
+static inline struct vm_area_struct *binder_alloc_get_vma(
+struct binder_alloc *alloc)
+{
+struct vm_area_struct *vma = NULL;
+
+ +if (alloc->vma) {
+/* Look at description in binder_alloc_set_vma */
+smp_rmb();
+vma = alloc->vma;
+
+return vma;
+}
+
+struct binder_buffer *binder_alloc_new_buf_locked(struct binder_alloc *alloc,
+size_t data_size,
+size_t offsets_size,
@@ -339,7 +367,7 @@
+size_t size, data_offsets_size;
+int ret;


if (alloc->vma == NULL) {
  if (!binder_alloc_get_vma(alloc)) {
    pr_err("%d: binder_alloc_buf, no vma\n",
           alloc->pid);
    return ERR_PTR(-ESRCH);
  }
}
rb_erase(best_fit, &alloc->free_buffers);
buffer->free = 0;
buffer->free_in_progress = 0;
buffer->allow_user_free = 0;
binder_insert_allocated_buffer_locked(alloc, buffer);
binder_alloc_debug(BINDER_DEBUG_BUFFER_ALLOC,
       "%d: binder_alloc_buf size %zd got %pK\n",
               alloc->pid, buffer_size, buffer);

-area = get_vm_area(vma->vm_end - vma->vm_start, VM_IOREMAP);
+area = get_vm_area(vma->vm_end - vma->vm_start, VM_ALLOC);
if (area == NULL) {
  ret = -ENOMEM;
  failure_string = "get_vm_area";

        return 0;
@@ -739,10 +765,10 @@
int buffers, page_count;
struct binder_buffer *buffer;

-BUG_ON(alloc->vma);
-
buffers = 0;
mutex_lock(&alloc->mutex);
+BUG_ON(alloc->vma);
+
while ((n = rb_first(&alloc->allocated_buffers))) {
  buffer = rb_entry(n, struct binder_buffer, rb_node);

@@ -842,14 +868,20 @@
int free = 0;

mutex_lock(&alloc->mutex);
-for (i = 0; i < alloc->buffer_size / PAGE_SIZE; i++) {
- page = &alloc->pages[i];
- if (!page->page_ptr)
- free++;,
- else if (list_empty(&page->lru))
- active++;,
- else
- lru++;
+ /*
+ * Make sure the binder_alloc is fully initialized, otherwise we might
+ * read inconsistent state.
+ */
+ if (binder_alloc_get_vma(alloc) != NULL) {
+ for (i = 0; i < alloc->buffer_size / PAGE_SIZE; i++) {
+ page = &alloc->pages[i];
+ if (!page->page_ptr)
+ free++;
+ else if (list_empty(&page->lru))
+ active++;
+ else
+ lru++;
+ }
}
mutex_unlock(&alloc->mutex);
seq_printf(m, "  pages: %d:%d:%d
", active, lru, free);
@@ -884,7 +916,7 @@*/
void binder_alloc_vma_close(struct binder_alloc *alloc)
{
- WRITE_ONCE(alloc->vma, NULL);
+ binder_alloc_set_vma(alloc, NULL);
}

/*
 @ @ -919,14 +951,13 @@

index = page - alloc->pages;
page_addr = (uintptr_t)alloc->buffer + index * PAGE_SIZE;
-vma = alloc->vma;
-if (vma) {
- if (!mmget_not_zero(alloc->vma_vm_mm))
- goto err_mmget;
- mm = alloc->vma_vm_mm;
- if (!down_write_trylock(&mm->mmap_sem))
- goto err_down_write_mmap_sem_failed;

Open Source Used In 5GaaS Edge AC-4 19862
mm = alloc->vma_vm_mm;
if (!mmget_not_zero(mm))
goto err_mmget;
if (!down_read_trylock(&mm->mmap_sem))
goto err_down_read_mmap_sem_failed;
vma = binder_alloc_get_vma(alloc);

list_lru_isolate(lru, item);
spin_unlock(lock);

trace_binder_unmap_user_end(alloc, index);
-
-up_write(&mm->mmap_sem);
-mmput(mm);
-
+up_read(&mm->mmap_sem);
+mmput_async(mm);

trace_binder_unmap_kernel_start(alloc, index);

mutex_unlock(&alloc->mutex);
return LRU_REMOVED_RETRY;

-err_down_write_mmap_sem_failed:
+err_down_read_mmap_sem_failed:
 mmput_async(mm);
err_mmget:
err_page_already_freed:
--- linux-4.15.0.orig/drivers/android/binder_alloc.h
+++ linux-4.15.0/drivers/android/binder_alloc.h
@@ -50,8 +50,7 @@
 unsigned free:1;
 unsigned allow_user_free:1;
 unsigned async_transaction:1;
-unsigned free_in_progress:1;
-unsigned debug_id:28;
+unsigned debug_id:29;

 struct binder_transaction *transaction;

--- linux-4.15.0.orig/drivers/ata/Kconfig
+++ linux-4.15.0/drivers/ata/Kconfig
@@ -92,6 +92,25 @@
If unsure, say N.

+config SATA_MOBILE_LPM_POLICY
+int "Default SATA Link Power Management policy for mobile chipsets"
+range 0 4
+default 0
+depends on SATA_AHCI
+help
+ Select the Default SATA Link Power Management (LPM) policy to use
+ for mobile / laptop variants of chipsets / "South Bridges".
+ The value set has the following meanings:
+0 => Keep firmware settings
+1 => Maximum performance
+2 => Medium power
+3 => Medium power with Device Initiated PM enabled
+4 => Minimum power
+ Note "Minimum power" is known to cause issues, including disk
+ corruption, with some disks and should not be used.
+
config SATA_AHCI_PLATFORM
tristate "Platform AHCI SATA support"
help
@@ -102,7 +121,8 @@
config AHCI_BRCM
tristate "Broadcom AHCI SATA support"
-depends on ARCH_BRCMSTB || BMIPS_GENERIC || ARCH_BCM_NSP
+depends on ARCH_BRCMSTB || BMIPS_GENERIC || ARCH_BCM_NSP || 
+ ARCH_BCM_63XX
help
This option enables support for the AHCI SATA3 controller found on
Broadcom SoC's.
--- linux-4.15.0.orig/drivers/ata/acard-ahci.c
+++ linux-4.15.0/drivers/ata/acard-ahci.c
@@ -72,7 +72,7 @@
     __le32			size;	 /* bit 31 (EOT) max==0x10000 (64k) */
 };

-static void acard_ahci_qc_prep(struct ata_queued_cmd *qc);
+static enum ata_completion_errors acard_ahci_qc_prep(struct ata_queued_cmd *qc);
 static bool acard_ahci_qc_fill_rtf(struct ata_queued_cmd *qc);
 static int acard_ahci_port_start(struct ata_port *ap);
 static int acard_ahci_init_one(struct pci_dev *pdev, const struct pci_device_id *ent);
 @@ -257,7 +257,7 @@
 return si;
+static void acard_ahci_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors acard_ahci_qc_prep(struct ata_queued_cmd *qc)
{
    struct ata_port *ap = qc->ap;
    struct ahci_port_priv *pp = ap->private_data;
    oops |= AHCI_CMD_ATAPI | AHCI_CMD_PREFETCH;

    ahci_fill_cmd_slot(pp, qc->tag, opts);
    +return AC_ERR_OK;
}

static bool acard_ahci_qc_fill_rtf(struct ata_queued_cmd *qc)
--- linux-4.15.0.orig/drivers/ata/ahci.c
+++ linux-4.15.0/drivers/ata/ahci.c
@@ -65,6 +65,7 @@
    /* board IDs by feature in alphabetical order */
    board_ahci,
    board_ahci_IGN_iferr,
+    board_ahci_mobile,
    board_ahci_norsm,
    board_ahci_noncq,
    board_ahci_nosnif,
@@ -80,6 +81,12 @@
    board_ahci_SB700,/* for SB700 and SB800 */
    board_ahci_vt8251,

+/*
+ * board IDs for Intel chipsets that support more than 6 ports
+ * and end up needing the PCS quirk.
+ */
+board_ahci_pcs7,
+
+/* aliases */
    board_ahci_mcp_linux= board_ahci_mcp65,
    board_ahci_mcp67= board_ahci_mcp65,
@@ -89,6 +96,7 @@

    static int ahci_init_one(struct pci_dev *pdev, const struct pci_device_id *ent);
    static void ahci_remove_one(struct pci_dev *dev);
+static void ahci_shutdown_one(struct pci_dev *dev);
    static int ahci_vt8251_hardreset(struct ata_link *link, unsigned int *class,
        unsigned long deadline);
    static int ahci_avn_hardreset(struct ata_link *link, unsigned int *class,
@@ -140,6 +148,13 @@

udma_mask = ATA_UDMA6,
.port_ops = &ahci_ops,
},
*[board_ahci_mobile] = {
+AHCI_HFLAGS(AHCI_HFLAG_IS_MOBILE),
.flags = AHCI_FLAG_COMMON,
+pio_mask = ATA PIO4,
.udma_mask = ATA UDMA6,
+port_ops = &ahci_ops,
*
},
[board_ahci_nomsi] = {
AHCI_HFLAGS(AHCI_HFLAG_NO_MSI),
.flags = AHCI_FLAG_COMMON,
@@ -228,6 +243,12 @@
.udma_mask = ATA UDMA6,
.port_ops = &ahci_vt8251_ops,
},
+[board_ahci_pcs7] = {
+flags = AHCI_FLAG_COMMON,
+pio_mask = ATA PIO4,
.udma_mask = ATA UDMA6,
+port_ops = &ahci_ops,
+}
];

static const struct pci_device_id ahci_pci_tbl[] = {
@@ -252,13 +273,13 @@
} PCI_VDEVICE(INTEL, 0x2924), board_ahci ), /* ICH9 */
} PCI_VDEVICE(INTEL, 0x2925), board_ahci ), /* ICH9 */
} PCI_VDEVICE(INTEL, 0x2927), board_ahci ), /* ICH9 */
-} PCI_VDEVICE(INTEL, 0x2929), board_ahci ), /* ICH9M */
-} PCI_VDEVICE(INTEL, 0x292a), board_ahci ), /* ICH9M */
-} PCI_VDEVICE(INTEL, 0x292b), board_ahci ), /* ICH9M */
-} PCI_VDEVICE(INTEL, 0x292c), board_ahci ), /* ICH9M */
-} PCI_VDEVICE(INTEL, 0x292d), board_ahci ), /* ICH9M */
+} PCI_VDEVICE(INTEL, 0x2929), board_ahci_mobile ), /* ICH9M */
+} PCI_VDEVICE(INTEL, 0x292a), board_ahci_mobile ), /* ICH9M */
+} PCI_VDEVICE(INTEL, 0x292b), board_ahci_mobile ), /* ICH9M */
+} PCI_VDEVICE(INTEL, 0x292c), board_ahci_mobile ), /* ICH9M */
+} PCI_VDEVICE(INTEL, 0x292d), board_ahci ), /* ICH9 */
-} PCI_VDEVICE(INTEL, 0x294c), board_ahci ), /* ICH9 */
+} PCI_VDEVICE(INTEL, 0x294e), board_ahci ), /* ICH9 */
+} PCI_VDEVICE(INTEL, 0x294e), board_ahci_mobile ), /* ICH10 */
@@ -268,34 +289,34 @@
} PCI_VDEVICE(INTEL, 0x294e), board_ahci ), /* PCH AHCI */
{ PCI_VDEVICE(INTEL, 0x3b24), board_ahci }, /* PCH RAID */
{ PCI_VDEVICE(INTEL, 0x3b25), board_ahci }, /* PCH RAID */
-{ PCI_VDEVICE(INTEL, 0x3b29), board_ahci }, /* PCH AHCI */
+{ PCI_VDEVICE(INTEL, 0x3b29), board_ahci_mobile }, /* PCH M AHCI */
{ PCI_VDEVICE(INTEL, 0x3b2b), board_ahci }, /* PCH RAID */
-{ PCI_VDEVICE(INTEL, 0x3b2c), board_ahci }, /* PCH RAID */
+{ PCI_VDEVICE(INTEL, 0x3b2c), board_ahci_mobile }, /* PCH M RAID */
{ PCI_VDEVICE(INTEL, 0x3b2f), board_ahci }, /* PCH AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b0), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b1), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b2), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b3), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b4), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b5), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b6), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19b7), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19bE), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c0), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c1), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c2), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c3), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c4), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c5), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c6), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19c7), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19cE), board_ahci }, /* DNV AHCI */
-{ PCI_VDEVICE(INTEL, 0x19cF), board_ahci }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b0), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b1), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b2), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b3), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b4), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b5), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b6), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19b7), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19bE), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c0), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c1), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c2), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c3), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c4), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c5), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c6), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19c7), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19cE), board_ahci_pcs7 }, /* DNV AHCI */
+{ PCI_VDEVICE(INTEL, 0x19cF), board_ahci_pcs7 }, /* DNV AHCI */
{ PCI_VDEVICE(INTEL, 0x1c02), board_ahci }, /* CPT AHCI */
- { PCI_VDEVICE(INTEL, 0x1c03), board_ahci }, /* CPT AHCI */
+ { PCI_VDEVICE(INTEL, 0x1c03), board_ahci_mobile }, /* CPT M AHCI */
{ PCI_VDEVICE(INTEL, 0x1c04), board_ahci }, /* CPT RAID */
- { PCI_VDEVICE(INTEL, 0x1c05), board_ahci }, /* CPT RAID */
+ { PCI_VDEVICE(INTEL, 0x1c05), board_ahci_mobile }, /* CPT M RAID */
{ PCI_VDEVICE(INTEL, 0x1c06), board_ahci }, /* CPT RAID */
{ PCI_VDEVICE(INTEL, 0x1c07), board_ahci }, /* CPT RAID */
{ PCI_VDEVICE(INTEL, 0x1d02), board_ahci }, /* PBG AHCI */
@@ -304,28 +325,28 @@
{ PCI_VDEVICE(INTEL, 0x2826), board_ahci }, /* PBG RAID */
{ PCI_VDEVICE(INTEL, 0x2323), board_ahci }, /* DH89xxCC AHCI */
{ PCI_VDEVICE(INTEL, 0x1e02), board_ahci }, /* Panther Point AHCI */
- { PCI_VDEVICE(INTEL, 0x1e03), board_ahci }, /* Panther Point AHCI */
+ { PCI_VDEVICE(INTEL, 0x1e03), board_ahci_mobile }, /* Panther M AHCI */
{ PCI_VDEVICE(INTEL, 0x1e04), board_ahci }, /* Panther Point RAID */
{ PCI_VDEVICE(INTEL, 0x1e05), board_ahci }, /* Panther Point RAID */
{ PCI_VDEVICE(INTEL, 0x1e06), board_ahci }, /* Panther Point RAID */
- { PCI_VDEVICE(INTEL, 0x1e07), board_ahci }, /* Panther Point RAID */
+ { PCI_VDEVICE(INTEL, 0x1e07), board_ahci_mobile }, /* Panther M RAID */
{ PCI_VDEVICE(INTEL, 0x1e0e), board_ahci }, /* Panther Point RAID */
{ PCI_VDEVICE(INTEL, 0x8c02), board_ahci }, /* Lynx Point AHCI */
- { PCI_VDEVICE(INTEL, 0x8c03), board_ahci }, /* Lynx Point AHCI */
+ { PCI_VDEVICE(INTEL, 0x8c03), board_ahci_mobile }, /* Lynx M AHCI */
{ PCI_VDEVICE(INTEL, 0x8c04), board_ahci }, /* Lynx Point RAID */
- { PCI_VDEVICE(INTEL, 0x8c05), board_ahci }, /* Lynx Point RAID */
+ { PCI_VDEVICE(INTEL, 0x8c05), board_ahci_mobile }, /* Lynx M RAID */
{ PCI_VDEVICE(INTEL, 0x8c06), board_ahci }, /* Lynx Point RAID */
- { PCI_VDEVICE(INTEL, 0x8c07), board_ahci }, /* Lynx Point RAID */
+ { PCI_VDEVICE(INTEL, 0x8c07), board_ahci_mobile }, /* Lynx M RAID */
{ PCI_VDEVICE(INTEL, 0x8c0e), board_ahci }, /* Lynx Point RAID */
- { PCI_VDEVICE(INTEL, 0x8c0f), board_ahci }, /* Lynx Point RAID */
- { PCI_VDEVICE(INTEL, 0x9c02), board_ahci }, /* Lynx Point-LP AHCI */
- { PCI_VDEVICE(INTEL, 0x9c03), board_ahci }, /* Lynx Point-LP AHCI */
- { PCI_VDEVICE(INTEL, 0x9c04), board_ahci }, /* Lynx Point-LP RAID */
- { PCI_VDEVICE(INTEL, 0x9c05), board_ahci }, /* Lynx Point-LP RAID */
- { PCI_VDEVICE(INTEL, 0x9c06), board_ahci }, /* Lynx Point-LP RAID */
- { PCI_VDEVICE(INTEL, 0x9c07), board_ahci }, /* Lynx Point-LP RAID */
- { PCI_VDEVICE(INTEL, 0x9c0e), board_ahci }, /* Lynx Point-LP RAID */
- { PCI_VDEVICE(INTEL, 0x9c0f), board_ahci }, /* Lynx Point-LP RAID */
+ { PCI_VDEVICE(INTEL, 0x9c02), board_ahci_mobile }, /* Lynx M RAID */
+ { PCI_VDEVICE(INTEL, 0x9c03), board_ahci_mobile }, /* Lynx LP AHCI */
+ { PCI_VDEVICE(INTEL, 0x9c04), board_ahci_mobile }, /* Lynx LP AHCI */
+ { PCI_VDEVICE(INTEL, 0x9c05), board_ahci_mobile }, /* Lynx LP RAID */
+ { PCI_VDEVICE(INTEL, 0x9c06), board_ahci_mobile }, /* Lynx LP RAID */
+ { PCI_VDEVICE(INTEL, 0x9c07), board_ahci_mobile }, /* Lynx LP RAID */
+ { PCI_VDEVICE(INTEL, 0x9c0e), board_ahci_mobile }, /* Lynx LP RAID */
+ { PCI_VDEVICE(INTEL, 0x9c0f), board_ahci_mobile }, /* Lynx LP RAID */
++{ PCI_VDEVICE(INTEL, 0x9e0f), board_ahci_mobile }, /* Lynx LP RAID */
++{ PCI_VDEVICE(INTEL, 0x1f22), board_ahci }, /* Avoton AHCI */
++{ PCI_VDEVICE(INTEL, 0x1f23), board_ahci }, /* Avoton AHCI */
++{ PCI_VDEVICE(INTEL, 0x1f24), board_ahci }, /* Avoton RAID */
++
++{ PCI_VDEVICE(INTEL, 0x8d66), board_ahci }, /* Wellsburg RAID */
++{ PCI_VDEVICE(INTEL, 0x8d6e), board_ahci }, /* Wellsburg RAID */
++{ PCI_VDEVICE(INTEL, 0x23a3), board_ahci }, /* Coleto Creek AHCI */
-{- PCI_VDEVICE(INTEL, 0x9c83), board_ahci }, /* Wildcat Point-LP AHCI */
-{- PCI_VDEVICE(INTEL, 0x9c85), board_ahci }, /* Wildcat Point-LP RAID */
-{- PCI_VDEVICE(INTEL, 0x9c87), board_ahci }, /* Wildcat Point-LP RAID */
-{- PCI_VDEVICE(INTEL, 0x9c8f), board_ahci }, /* Wildcat Point-LP RAID */
++{ PCI_VDEVICE(INTEL, 0x9c83), board_ahci_mobile }, /* Wildcat LP AHCI */
++{ PCI_VDEVICE(INTEL, 0x9c85), board_ahci_mobile }, /* Wildcat LP RAID */
++{ PCI_VDEVICE(INTEL, 0x9c87), board_ahci_mobile }, /* Wildcat LP RAID */
++{ PCI_VDEVICE(INTEL, 0x9c8f), board_ahci_mobile }, /* Wildcat LP RAID */
++{ PCI_VDEVICE(INTEL, 0x8c82), board_ahci }, /* 9 Series AHCI */
-{- PCI_VDEVICE(INTEL, 0x8c83), board_ahci }, /* 9 Series AHCI */
++{ PCI_VDEVICE(INTEL, 0x8c83), board_ahci }, /* 9 Series M AHCI */
++{ PCI_VDEVICE(INTEL, 0x8c85), board_ahci }, /* 9 Series M RAID */
++{ PCI_VDEVICE(INTEL, 0x8c86), board_ahci }, /* 9 Series M RAID */
-{- PCI_VDEVICE(INTEL, 0x8c87), board_ahci }, /* 9 Series M RAID */
++{ PCI_VDEVICE(INTEL, 0x8c87), board_ahci }, /* 9 Series M RAID */
++{ PCI_VDEVICE(INTEL, 0x8c88), board_ahci }, /* 9 Series RAID */
++{ PCI_VDEVICE(INTEL, 0x8c89), board_ahci }, /* 9 Series RAID */
-{- PCI_VDEVICE(INTEL, 0x8c8a), board_ahci }, /* 9 Series RAID */
++{ PCI_VDEVICE(INTEL, 0x8c8b), board_ahci }, /* 9 Series RAID */
-{- PCI_VDEVICE(INTEL, 0x9d03), board_ahci }, /* Sunrise Point-LP AHCI */
-{- PCI_VDEVICE(INTEL, 0x9d05), board_ahci }, /* Sunrise Point-LP RAID */
-{- PCI_VDEVICE(INTEL, 0x9d07), board_ahci }, /* Sunrise Point-LP RAID */
++{ PCI_VDEVICE(INTEL, 0x9d0f), board_ahci_mobile }, /* 9 Series M RAID */
++{ PCI_VDEVICE(INTEL, 0x9d03), board_ahci_mobile }, /* Sunrise LP AHCI */
++{ PCI_VDEVICE(INTEL, 0x9d05), board_ahci_mobile }, /* Sunrise LP RAID */
++{ PCI_VDEVICE(INTEL, 0x9d07), board_ahci_mobile }, /* Sunrise LP RAID */
++{ PCI_VDEVICE(INTEL, 0xa102), board_ahci }, /* Sunrise Point-H AHCI */
-{- PCI_VDEVICE(INTEL, 0xa103), board_ahci }, /* Sunrise Point-H AHCI */
++{ PCI_VDEVICE(INTEL, 0xa103), board_ahci }, /* Sunrise Point-H RAID */
++{ PCI_VDEVICE(INTEL, 0xa105), board_ahci }, /* Sunrise Point-H RAID */
++{ PCI_VDEVICE(INTEL, 0xa106), board_ahci }, /* Sunrise Point-H RAID */
-{- PCI_VDEVICE(INTEL, 0xa107), board_ahci }, /* Sunrise Point-H RAID */
++{ PCI_VDEVICE(INTEL, 0xa107), board_ahci_mobile }, /* Sunrise M RAID */
++{ PCI_VDEVICE(INTEL, 0xa10f), board_ahci }, /* Sunrise Point-H RAID */
++{ PCI_VDEVICE(INTEL, 0x2822), board_ahci }, /* Lewisburg RAID */
++{ PCI_VDEVICE(INTEL, 0x2823), board_ahci }, /* Lewisburg AHCI */
++
++{ PCI_VDEVICE(INTEL, 0xa206), board_ahci }, /* Lewisburg RAID */
++{ PCI_VDEVICE(INTEL, 0xa252), board_ahci }, /* Lewisburg RAID */
++{ PCI_VDEVICE(INTEL, 0xa256), board_ahci }, /* Lewisburg RAID */
++
++
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+{ PCI_VDEVICE(INTEL, 0xa356), board_ahci }, /* Cannon Lake PCH-H RAID */
+{ PCI_VDEVICE(INTEL, 0x06d7), board_ahci }, /* Comet Lake-H RAID */
+{ PCI_VDEVICE(INTEL, 0x0f22), board_ahci_mobile }, /* Bay Trail AHCI */
+{ PCI_VDEVICE(INTEL, 0x0f23), board_ahci_mobile }, /* Bay Trail AHCI */
+{ PCI_VDEVICE(INTEL, 0x22a3), board_ahci_mobile }, /* Cherry Tr. AHCI */
+{ PCI_VDEVICE(INTEL, 0x5ae3), board_ahci_mobile }, /* ApolloLake AHCI */

/* JMicron 360/1/3/5/6, match class to avoid IDE function */
{ PCI_VENDOR_ID_JMICRON, PCI_ANY_ID, PCI_ANY_ID, PCI_ANY_ID,
  .driver_data = board_ahci_yes_fbs },
{ PCI_DEVICE(PCI_VENDOR_ID_MARVELL_EXT, 0x9230),
  .driver_data = board_ahci_yes_fbs },
-{ PCI_DEVICE(PCI_VENDOR_ID_TTI, 0x0642),
  .driver_data = board_ahci_yes_fbs },
+{ PCI_DEVICE(PCI_VENDOR_ID_TTI, 0x0642), /* highpoint rocketraid 642L */
  .driver_data = board_ahci_yes_fbs },
+{ PCI_DEVICE(PCI_VENDOR_ID_TTI, 0x0645), /* highpoint rocketraid 644L */
  .driver_data = board_ahci_yes_fbs },

/* Promise */
@@ -580,6 +609,7 @@
  .id_table = ahci_pci_tbl,
  .probe = ahci_init_one,
  .remove = ahci_remove_one,
+ .shutdown = ahci_shutdown_one,
  .driver = {
    .pm = &ahci_pci_pm_ops,
  },
@@ -593,6 +623,9 @@
 module_param(marvell_enable, int, 0644);
 MODULE_PARM_DESC(marvell_enable, "Marvell SATA via AHCI (1 = enabled)");

+static int mobile_lpm_policy = -1;
+module_param(mobile_lpm_policy, int, 0644);
+MODULE_PARM_DESC(mobile_lpm_policy, "Default LPM policy for mobile chipsets");

static void ahci_pci_save_initial_config(struct pci_dev *pdev,
  struct ahci_host_priv *hpriv)
@@ -619,30 +652,6 @@
 ahci_save_initial_config(&pdev->dev, hpriv);
 }

-static int ahci_pci_reset_controller(struct ata_host *host)
-{
-  struct pci_dev *pdev = to_pci_dev(host->dev);
-  int rc;
-  
-  -rc = ahci_reset_controller(host);
if (rc)
return rc;
-
if (pdev->vendor == PCI_VENDOR_ID_INTEL) {
struct ahci_host_priv *hpriv = host->private_data;
uint16 tmp16;
-
/* configure PCS */
-pci_read_config_word(pdev, 0x92, &tmp16);
-if ((tmp16 & hpriv->port_map) != hpriv->port_map) {
-tmp16 |= hpriv->port_map;
-pci_write_config_word(pdev, 0x92, tmp16);
-}
-}
-
return 0;
-
-
static void ahci_pci_init_controller(struct ata_host *host)
{
struct ahci_host_priv *hpriv = host->private_data;
@@ -680,7 +689,7 @@
DPRINTK("ENTER\n");

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);

rc = sata_link_hardreset(link, sata_ehc_deb_timing(&link->eh_context),
deadline, &online, NULL);
@@ -706,7 +715,7 @@
bool online;
int rc;

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);

/* clear D2H reception area to properly wait for D2H FIS */
ata_tf_init(link->device, &tf);
@@ -770,7 +779,7 @@
DPRINTK("ENTER\n");

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);

for (i = 0; i < 2; i++) {
    uint16 val;
@@ -845,7 +854,7 @@
    struct ata_host *host = pci_get_drvdata(pdev);
    int rc;

    -rc = ahci_pci_reset_controller(host);
    +rc = ahci_reset_controller(host);
    if (rc)
        return rc;
    ahci_pci_init_controller(host);
@@ -880,7 +889,7 @@
    ahci_mcp89_apple_enable(pdev);

    if (pdev->dev.power.power_state.event == PM_EVENT_SUSPEND) {
    -rc = ahci_pci_reset_controller(host);
    +rc = ahci_reset_controller(host);
    if (rc)
        return rc;
    @@ -1261,6 +1270,59 @@
    return strcmp(buf, dmi->driver_data) < 0;
    }

+static bool ahci_broken_lpm(struct pci_dev *pdev)
+{
+    static const struct dmi_system_id sysids[] = {
+        /* Various Lenovo 50 series have LPM issues with older BIOSen */
+        { +.matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+            DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad X250"),
+        },
+        .driver_data = "20180406", /* 1.31 */
+        },
+        { +.matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+            DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad L450"),
+        },
+        .driver_data = "20180420", /* 1.28 */
+        },
+        { +.matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+            DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad T450s"),
+        },
+        .driver_data = "20180315", /* 1.33 */
+        },
+        { +.matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+            DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad T450s"),
+        },
+        .driver_data = "20180315", /* 1.33 */
+        },
+        { +.matches = {
+            DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+            DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad T450s"),
+        },
+        .driver_data = "20180315", /* 1.33 */
+        },
+    },
matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad W541"),
+}
+/
+ * Note date based on release notes, 2.35 has been
+ * reported to be good, but I've been unable to get
+ * a hold of the reporter to get the DMI BIOS date.
+ * TODO: fix this.
+ */
+ .driver_data = "20180310", /* 2.35 */
+}
+/
+ /* terminate list */
+};
+const struct dmi_system_id *dmi = dmi_first_match(sysids);
+int year, month, date;
+char buf[9];
+
+if (!dmi)
+return false;
+
dmi_get_date(DMI_BIOS_DATE, &year, &month, &date);
+snprintf(buf, sizeof(buf), "%04d%02d%02d", year, month, date);
+
+return strcmp(buf, dmi->driver_data) < 0;
+}
+
+static bool ahci_broken_online(struct pci_dev *pdev)
+{
+    #define ENCODE_BUSDEVFN(bus, slot, func)
+    @@ -1531,6 +1593,67 @@
+            return pci_alloc_irq_vectors(pdev, 1, 1, PCI_IRQ_MSIX);
+        }
+
+    static void ahci_update_initial_lpm_policy(struct ata_port *ap,
+        struct ahci_host_priv *hpriv)
+    {
+        int policy = CONFIG_SATA_MOBILE_LPM_POLICY;
+        +
+        */ Ignore processing for non mobile platforms */
+        +if (!((hpriv->flags & AHCI_HFLAG_IS_MOBILE)))
+            return;
+        +/* user modified policy via module param */
+        +if (mobile_lpm_policy != -1) {
+            +policy = mobile_lpm_policy;
+            +goto update_policy;
#ifdef CONFIG_ACPI
+if (policy > ATA_LPM_MED_POWER &&
+    (acpi_gbl_FADT.flags & ACPI_FADT_LOW_POWER_S0)) {
+if (hpriv->cap & HOST_CAP_PART)
+    policy = ATA_LPM_MIN_POWER_WITH_PARTIAL;
+else if (hpriv->cap & HOST_CAP_SSC)
+    policy = ATA_LPM_MIN_POWER;
+}
+#endif

update_policy:
+if (policy >= ATA_LPM_UNKNOWN && policy <= ATA_LPM_MIN_POWER)
+    ap->target_lpm_policy = policy;
+
+static void ahci_intel_pcs_quirk(struct pci_dev *pdev, struct ahci_host_priv *hpriv)
+{
+const struct pci_device_id *id = pci_match_id(ahci_pci_tbl, pdev);
+u16 tmp16;
+
+    /* Only apply the 6-port PCS quirk for known legacy platforms. */
+    if (!id || id->vendor != PCI_VENDOR_ID_INTEL)
+        return;
+
+    /* Skip applying the quirk on Denverton and beyond */
+    if (((enum board_ids) id->driver_data) >= board_ahci_pcs7)
+        return;
+
+    /* port_map is determined from PORTS_IMPL PCI register which is */
+    /* implemented as write or write-once register. If the register */
+    /* isn’t programmed, ahci automatically generates it from number */
+    /* of ports, which is good enough for PCS programming. It is */
+    /* otherwise expected that platform firmware enables the ports */
+    /* before the OS boots. */
+    if (((tmp16 & hpriv->port_map) != hpriv->port_map) {
+        tmp16 |= hpriv->port_map;
+        pci_write_config_word(pdev, PCS_6, tmp16);
+    }
+
+static int ahci_init_one(struct pci_dev *pdev, const struct pci_device_id *ent)
unsigned int board_id = ent->driver_data;
/* save initial config */
ahci_pci_save_initial_config(pdev, hpriv);

+/*
 + * If platform firmware failed to enable ports, try to enable
 + * them here.
 + */
+ahci_intel_pcs_quirk(pdev, hpriv);
+
/* prepare host */
if (hpriv->cap & HOST_CAP_NCQ) {
    pi.flags |= ATA_FLAG_NCQ;
    /* quirky BIOS, skipping spindown on poweroff
    */
)

+if (ahci_broken_lpm(pdev)) {
    +pi.flags |= ATA_FLAG_NO_LPM;
    +dev_warn(&pdev->dev,
    +"BIOS update required for Link Power Management support\n");
    +}
+
    if (ahci_broken_suspend(pdev)) {
        hpriv->flags |= AHCI_HFLAG_NO_SUSPEND;
        dev_warn(&pdev->dev,
        @ @ -1728,6 +1863,7 @@
        if (ap->flags & ATA_FLAG_EM)
            ap->em_message_type = hpriv->em_msg_type;

        +ahci_update_initial_lpm_policy(ap, hpriv);

        /* disabled/not-implemented port */
        if (!((hpriv->port_map & (1 << i))))
            @ @ -1745,7 +1881,7 @@
        if (rc)
            return rc;

            -rc = ahci_pci_reset_controller(host);
            +rc = ahci_reset_controller(host);
            if (rc)
                return rc;

                @ @ -1762,6 +1898,11 @@
            return 0;
        }

}
static void ahci_shutdown_one(struct pci_dev *pdev) {
+ata_pci_shutdown_one(pdev);
}

static void ahci_remove_one(struct pci_dev *pdev) {
    pm_runtime_get_noresume(&pdev->dev);
--- linux-4.15.0.orig/drivers/ata/ahci.h
+++ linux-4.15.0/drivers/ata/ahci.h
@@ -251,6 +251,9 @@
    AHCI_HFLAG_YES_ALPM	= (1 << 23), /* force ALPM cap on */
    AHCI_HFLAG_NO_WRITE_TO_RO	= (1 << 24), /* don't write to read
+    AHCI_HFLAG_IS_MOBILE	= (1 << 25), /* mobile chipset, use
+    SATA_MOBILE_LPM_POLICY
+    as default lpm_policy */

    /* ap->flags bits */

    ATA_FLAG_ACPI_SATA | ATA_FLAG_AN,
ich_MAP	= 0x90, /* ICH MAP register */
+    PCS_6	= 0x92, /* 6 port PCS */
+    PCS_7	= 0x94, /* 7+ port PCS (Denverton) */

    /* em constants */
    EM_MAX_SLOTS	= 8,
    * be overridden anytime before the host is activated.
*/
void(*start_engine)(struct ata_port *ap);
/*
+ * Optional ahci_stop_engine override, if not set this gets set to the
+ * default ahci_stop_engine during ahci_save_initial_config, this can
+ * be overridden anytime before the host is activated.
+ */
+int(*stop_engine)(struct ata_port *ap);
+
    irqreturn_t (*irq_handler)(int irq, void *dev_instance);

    /* only required for per-port MSI(-X) support */
--- linux-4.15.0.orig/drivers/ata/ahci_brcm.c
+++ linux-4.15.0/drivers/ata/ahci_brcm.c
@@ -25,6 +25,7 @@
#include <linux/module.h>
#include <linux/of.h>
#include <linux/platform_device.h>
+>#include <linux/reset.h>
#include <linux/string.h>

#include "ahci.h"
//@ -87,6 +88,7 @@
u32 port_mask;
u32 quirks;
enum brcm_ahci_version version;
+struct reset_control *rcdev;
}

static const struct ata_port_info ahci_brcm_port_info = {
//@ -221,19 +223,12 @@
brcm_sata_phy_disable(priv, i);
}

-static u32 brcm_ahci_get_portmask(struct platform_device *pdev,
+static u32 brcm_ahci_get_portmask(struct ahci_host_priv *hpriv,
   struct brcm_ahci_priv *priv)
{
- void __iomem *ahci;
- struct resource *res;
 u32 impl;

- res = platform_get_resource_byname(pdev, IORESOURCE_MEM, "ahci");
- ahci = devm_ioremap_resource(&pdev->dev, res);
- if (IS_ERR(ahci))
- return 0;
-
- impl = readl(ahci + HOST_PORTS_IMPL);
+impl = readl(hpriv->mmio + HOST_PORTS_IMPL);

 if (fls(impl) > SATA_TOP_MAX_PHYS)
 dev_warn(priv->dev, "warning: more ports than PHYs (%#x)\n",
//@ -241,9 +236,6 @@
 else if (!impl)
 dev_info(priv->dev, "no ports found\n");

-devm_iounmap(&pdev->dev, ahci);
-devm_release_mem_region(&pdev->dev, res->start, resource_size(res));
-
 return impl;
}
//@ -270,11 +262,10 @@
struct ata_host *host = dev_get_drvdata(dev);
struct ahci_host_priv *hpriv = host->private_data;
struct brcm_ahci_priv *priv = hpriv->plat_data;
-int ret;

-ret = ahci_platform_suspend(dev);
brcm_sata_phys_disable(priv);
-return ret;
+
+return ahci_platform_suspend(dev);
}

static int brcm_ahci_resume(struct device *dev)
@@ -282,11 +273,50 @@
struct ata_host *host = dev_get_drvdata(dev);
struct ahci_host_priv *hpriv = host->private_data;
struct brcm_ahci_priv *priv = hpriv->plat_data;
+int ret;
+
+/* Make sure clocks are turned on before re-configuration */
+ret = ahci_platform_enable_clks(hpriv);
+if (ret)
+return ret;
+
+ret = ahci_platform_enable_regulators(hpriv);
+if (ret)
+goto out_disable_clks;

brcm_sata_init(priv);
brcm_sata_phys_enable(priv);
brcm_sata_alpm_init(hpriv);
-return ahci_platform_resume(dev);
+
+/* Since we had to enable clocks earlier on, we cannot use
+ * ahci_platform_resume() as-is since a second call to
+ * ahci_platform_enable_resources() would bump up the resources
+ * (regulators, clocks, PHYs) count artificially so we copy the part
+ * after ahci_platform_enable_resources().
+ */
+ret = ahci_platform_enable_phys(hpriv);
+if (ret)
+goto out_disable_phys;
+
+ret = ahci_platform_resume_host(dev);
+if (ret)
+goto out_disable_platform_phys;
+
+/* We resumed so update PM runtime state */
+pm_runtime_disable(dev);
pm_runtime_set_active(dev);
pm_runtime_enable(dev);
+
return 0;
+
+out_disable_platform_phys:
+ahci_platform_disable_phys(hpriv);
+out_disable_phys:
+rcm_sata_phys_disable(priv);
+ahci_platform_disable_regulators(hpriv);
+out_disable_clks:
+ahci_platform_disable_clks(hpriv);
+return ret;
}
#endif

ifdef

@@ -327,44 +357,80 @@
if (IS_ERR(priv->top_ctrl))
return PTR_ERR(priv->top_ctrl);

+/* Reset is optional depending on platform */
+priv->rcdev = devm_reset_control_get(&pdev->dev, "ahci");
+if (!IS_ERR_OR_NULL(priv->rcdev))
+reset_control_deassert(priv->rcdev);
+
+if ((priv->version == BRCM_SATA_BCM7425) ||
(priv->version == BRCM_SATA_NSP)) {
  priv->quirks |= BRCM_AHCI_QUIRK_NO_NCQ;
  priv->quirks |= BRCM_AHCI_QUIRK_SKIP_PHY_ENABLE;
}

+hpriv = ahci_platform_get_resources(pdev);
+if (IS_ERR(hpriv)) {
  ret = PTR_ERR(hpriv);
  goto out_reset;
+}
+
+ret = ahci_platform_enable_clks(hpriv);
+if (ret)
+goto out_reset;
+
+ret = ahci_platform_enable_regulators(hpriv);
+if (ret)
+goto out_disable_clks;
+
+/* Must be first so as to configure endianness including that
+ * of the standard AHCI register space.
+ */
brcm_sata_init(priv);

-priv->port_mask = brcm_ahci_get_portmask(pdev, priv);
-if (!priv->port_mask)
-return -ENODEV;
+/* Initializes priv->port_mask which is used below */
+priv->port_mask = brcm_ahci_get_portmask(hpriv, priv);
+if (!priv->port_mask) {
+ret = -ENODEV;
+goto out_disable_regulators;
+}

+/* Must be done before ahci_platform_enable_phys() */
brcm_sata_phys_enable(priv);

-hpriv = ahci_platform_get_resources(pdev);
-if (IS_ERR(hpriv))
-return PTR_ERR(hpriv);
-hpriv->plat_data = priv;
-hpriv->flags = AHCI_HFLAG_WAKE_BEFORE_STOP;

brcm_sata_alpm_init(hpriv);

-ret = ahci_platform_enable_resources(hpriv);
-if (ret)
-return ret;
-
-if (priv->quirks & BRCM_AHCI_QUIRK_NO_NCQ)
-hpriv->flags |= AHCI_HFLAG_NO_NCQ;
-hpriv->flags |= AHCI_HFLAG_NO_WRITE_TO_RO;

+ret = ahci_platform_enable_phys(hpriv);
+if (ret)
+goto out_disable_phys;
+
ret = ahci_platform_init_host(pdev, hpriv, &ahci_brcm_port_info, &ahci_platform_sht);
-if (ret)
-return ret;
+goto out_disable_platform_phys;

dev_info(dev, "Broadcom AHCI SATA3 registered\n");

return 0;
+
+out_disable_platform_phys:
+ahci_platform_disable_phys(hpriv);
+out_disable_phys:
static int brcm_ahci_remove(struct platform_device *pdev)
{
    struct brcm_ahci_priv *priv = hpriv->plat_data;
    int ret;

    +brcm_sata_phys_disable(priv);
    +
    ret = ata_platform_remove_one(pdev);
    if (ret)
        return ret;

    -brcm_sata_phys_disable(priv);
    -
    return 0;
}

--- linux-4.15.0.orig/drivers/ata/ahci_mvebu.c
+++ linux-4.15.0/drivers/ata/ahci_mvebu.c
@@ -28,6 +28,10 @@
#define AHCI_WINDOW_BASE(win) (0x64 + ((win) << 4))
#define AHCI_WINDOW_SIZE(win) (0x68 + ((win) << 4))

+struct ahci_mvebu_plat_data {
+    int (*plat_config)(struct ahci_host_priv *hpriv);
+};
+
+static void ahci_mvebu_mbus_config(struct ahci_host_priv *hpriv,
+    const struct mbus_dram_target_info *dram)
+{
+    writel(0x80, hpriv->mmio + AHCI_VENDOR_SPECIFIC_0_DATA);
+}
+
+static int ahci_mvebu_armada_380_config(struct ahci_host_priv *hpriv)
+{
+    const struct mbus_dram_target_info *dram;
+    int rc = 0;
dram = mv_mbus_dram_info();
if (dram)
    ahci_mvebu_mbus_config(hpriv, dram);
else
    rc = -ENODEV;

ahci_mvebu_regret_option(hpriv);
return rc;

/**
 * ahci_mvebu_stop_engine
 *
 * @ap:	Target ata port
 *
 * Errata Ref#226 - SATA Disk HOT swap issue when connected through
 * Port Multiplier in FIS-based Switching mode.
 *
 * To avoid the issue, according to design, the bits[11:8, 0] of
 * register PxFBS are cleared when Port Command and Status (0x18) bit[0]
 * changes its value from 1 to 0, i.e. falling edge of Port
 * Command and Status bit[0] sends PULSE that resets PxFBS
 * bits[11:8; 0].
 *
 * This function is used to override function of "ahci_stop_engine"
 * from libahci.c by adding the mvebu work around(WA) to save PxFBS
 * value before the PxCMD ST write of 0, then restore PxFBS value.
 *
 * Return: 0 on success; Error code otherwise.
 */
int ahci_mvebu_stop_engine(struct ata_port *ap)
{
    void __iomem *port_mmio = ahci_port_base(ap);

    u32 tmp, port_fbs;

    tmp = readl(port_mmio + PORT_CMD);
    /* check if the HBA is idle */
    if ((tmp & (PORT_CMD_START | PORT_CMD_LIST_ON)) == 0)
        return 0;

    port_fbs = readl(port_mmio + PORT_FBS);
    /* setting HBA to idle */
    tmp &= ~PORT_CMD_START;
    tmp = readl(port_mmio + PORT_CMD);
    /* save the port PxFBS register for later restore */
    port_fbs = readl(port_mmio + PORT_FBS);
    /* setting HBA to idle */
    tmp &= ~PORT_CMD_START;
+ writel(tmp, port_mmio + PORT_CMD);
+
+ /*
+ * bit #15 PxCMD signal doesn't clear PxFBS,
+ * restore the PxFBS register right after clearing the PxCMD ST,
+ * no need to wait for the PxCMD bit #15.
+ */
+ writel(port_fbs, port_mmio + PORT_FBS);
+
+ /*wait for engine to stop. This could be as long as 500 msec */
+ tmp = ata_wait_register(ap, port_mmio + PORT_CMD,
+ PORT_CMD_LIST_ON, PORT_CMD_LIST_ON, 1, 500);
+ if (tmp & PORT_CMD_LIST_ON)
+ return -EIO;
+
+ return 0;
+
+#ifdef CONFIG_PM_SLEEP
static int ahci_mvebu_suspend(struct platform_device *pdev, pm_message_t state)
{

@@ -72,13 +146,10 @@
{
 struct ata_host *host = platform_get_drvdata(pdev);
 struct ahci_host_priv *hpriv = host->private_data;
-const struct mbus_dram_target_info *dram;
-        
-        dram = mv_mbus_dram_info();
-        
-        if (dram)
-            ahci_mvebu_mbus_config(hpriv, dram);
+const struct ahci_mvebu_plat_data *pdata = hpriv->plat_data;
+        
+        if (pdata->plat_config)
+            pdata->plat_config(hpriv);
+        
+        return ahci_platform_resume_host(&pdev->dev);
+
}

@@ -100,26 +171,31 @@
static int ahci_mvebu_probe(struct platform_device *pdev)
{
+const struct ahci_mvebu_plat_data *pdata;
+struct ahci_host_priv *hpriv;
-const struct mbus_dram_target_info *dram;
+int rc;
+
+pdata = of_device_get_match_data(&pdev->dev);
+if (!pdata)
+return -EINVAL;
+
+hp = ahci_platform_get_resources(pdev);
if (IS_ERR(hp))
return PTR_ERR(hp);

+hp->plat_data = (void *)pdata;
+
+rc = ahci_platform_enable_resources(hp);
if (rc)
return rc;

-if (of_device_is_compatible(pdev->dev.of_node,
- "marvell,armada-380-ahci") )
-	dram = m_mbus_dram_info();
-if (!dram)
-return -ENODEV;
+hp->stop_engine = ahci_mvebu_stop_engine;

-ahci_mvebu_mbus_config(hp, dram);
-ahci_mvebu_regret_option(hp);
+p = hp->plat_data;
+if (hp->plat_config) {
+rc = hp->plat_config(hp);
+if (rc)
+goto disable_resources;
}

rc = ahci_platform_init_host(pdev, hp, &ahci_mvebu_port_info,
@@ -134,9 +210,23 @@
return rc;
}

+static const struct ahci_mvebu_plat_data ahci_mvebu_armada_380_plat_data = {
+ .plat_config = ahci_mvebu_armada_380_config,
+};
+
+static const struct ahci_mvebu_plat_data ahci_mvebu_armada_3700_plat_data = {
+ .plat_config = NULL,
+};
+
+static const struct of_device_id ahci_mvebu_of_match[] = {
- {.compatible = "marvell,armada-380-ahci", },
- {.compatible = "marvell,armada-3700-ahci", },
+{
+.compatible = "marvell,armada-380-ahci",
+.data = &ahci_mvebu_armada_380_plat_data,
+{
+.compatible = "marvell,armada-3700-ahci",
+.data = &ahci_mvebu_armada_3700_plat_data,
+};

MODULE_DEVICE_TABLE(of, ahci_mvebu_of_match);

--- linux-4.15.0.orig/drivers/ata/ahci_qoriq.c
+++ linux-4.15.0/drivers/ata/ahci_qoriq.c
@@ -96,7 +96,7 @@
DPRINTK("ENTER\n");

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);

/*
 * There is a errata on ls1021a Rev1.0 and Rev2.0 which is:
--- linux-4.15.0.orig/drivers/ata/ahci_sunxi.c
+++ linux-4.15.0/drivers/ata/ahci_sunxi.c
@@ -165,7 +165,7 @@
}

static const struct ata_port_info ahci_sunxi_port_info = {
-.flags		= AHCI_FLAG_COMMON | ATA_FLAG_NCQ,
+.flags		= AHCI_FLAG_COMMON | ATA_FLAG_NCQ | ATA_FLAG_NO_DIPM,
.nio_mask	= ATA_PIO4,
.udma_mask	= ATA_UDMA6,
.port_ops	= &ahci_platform_ops,
--- linux-4.15.0.orig/drivers/ata/ahci_xgene.c
+++ linux-4.15.0/drivers/ata/ahci_xgene.c
@@ -165,7 +165,7 @@
 PORT_CMD_ISSUE, 0x0, 1, 100))
 return -EBUSY;

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);

ahci_start_fis_rx(ap);

/*
 @@ -421,7 +421,7 @@
 portrxfis_saved = readl(port_mmio + PORT_FIS_ADDR);
 portrxfishi_saved = readl(port_mmio + PORT_FIS_ADDR_HI);

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);
rc = xgene_ahci_do_hardreset(link, deadline, &online);

--- linux-4.15.0.orig/drivers/ata/libahci.c
+++ linux-4.15.0/drivers/ata/libahci.c
@@ -35,6 +35,7 @@
 #include <linux/kernel.h>
 #include <linux/gfp.h>
 #include <linux/module.h>
+#include <linux/nospec.h>
 #include <linux/blkdev.h>
 #include <linux/delay.h>
 #include <linux/interrupt.h>
@@ -72,7 +73,7 @@
 static bool ahci_qc_fill_rtf(struct ata_queued_cmd *qc);
 static int ahci_port_start(struct ata_port *ap);
 static void ahci_port_stop(struct ata_port *ap);
- static void ahci_qc_prep(struct ata_queued_cmd *qc);
+ static enum ata_completion_errors ahci_qc_prep(struct ata_queued_cmd *qc);
 static int ahci_pmp_qc_defer(struct ata_queued_cmd *qc);
 static void ahci_freeze(struct ata_port *ap);
 static void ahci_thaw(struct ata_port *ap);
@@ -190,7 +191,6 @@
 EXPORT_SYMBOL_GPL(ahci_pmp_retry_srste_ops);

 static bool ahci_em_messages __read_mostly = true;
-EXPORT_SYMBOL_GPL(ahci_em_messages);
 module_param(ahci_em_messages, bool, 0444);
 /* add other LED protocol types when they become supported */
 MODULE_PARM_DESC(ahci_em_messages,
@@ -560,6 +560,9 @@
 if (!hpriv->start_engine)
 hpriv->start_engine = ahci_start_engine;

+if (!hpriv->stop_engine)
+ hpriv->stop_engine = ahci_stop_engine;
+ if (!hpriv->irq_handler)
 hpriv->irq_handler = ahci_single_level_irq_intr;
 } 
@@ -787,6 +790,8 @@
 cmd |= PORT_CMD_ALPE;
 if (policy == ATA_LPM_MIN_POWER)
 cmd |= PORT_CMD_ASP;
+ else if (policy == ATA_LPM_MIN_POWER_WITH_PARTIAL)
+ cmd &= ~PORT_CMD_ASP;

 /* write out new cmd value */
 writel(cmd, port_mmio + PORT_CMD);
if ((hpriv->cap2 & HOST_CAP2_SDS) &
    (hpriv->cap2 & HOST_CAP2_SADM) &
    (link->device->flags & ATA_DFLAG_DEVSLP)) {
    if (policy == ATA_LPM_MIN_POWER)
        ahci_set_aggressive_devslp(ap, true);
    else
        ahci_set_aggressive_devslp(ap, false);
}

static int ahci_deinit_port(struct ata_port *ap, const char **emsg)
{
    int rc;
    struct ahci_host_priv *hpriv = ap->host->private_data;

    /* disable DMA */
    -rc = ahci_stop_engine(ap);
    +rc = hpriv->stop_engine(ap);
    if (rc) {
        *emsg = "failed to stop engine";
        return rc;
    }

    /* get the slot number from the message */
    pmp = (state & EM_MSG_LED_PMP_SLOT) >> 8;
    -if (pmp < EM_MAX_SLOTS)
    +if (pmp < EM_MAX_SLOTS) {
        emp = &pp->em_priv[pmp];
    } else
    +} else {
        return -EINVAL;
    +}

    /* mask off the activity bits if we are in sw_activity
     * mode, user should turn off sw_activity before setting
    */
    int busy, rc;

    /* stop engine */
    -rc = ahci_stop_engine(ap);
    +rc = hpriv->stop_engine(ap);
    if (rc)
        goto out_restart;

    /* disable DMA */
DPRINTK("ENTER\n");

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);

/* clear D2H reception area to properly wait for D2H FIS */
ata_tf_init(link->device, &tf);
@@ -1621,7 +1630,7 @@
return sata_pmp_qc_defer_cmd_switch(qc);
}

-static void ahci_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors ahci_qc_prep(struct ata_queued_cmd *qc)
{
 struct ata_port *ap = qc->ap;
 struct ahci_port_priv *pp = ap->private_data;
@@ -1657,6 +1666,8 @@
opts |= AHCI_CMD_ATAPI | AHCI_CMD_PREFETCH;

 ahci_fill_cmd_slot(pp, qc->tag, opts);
+   +return AC_ERR_OK;
}

static void ahci_fbs_dec_intr(struct ata_port *ap)
@@ -2065,14 +2076,14 @@

 if (!(ap->pflags & ATA_PFLAG_FROZEN)) {
 /* restart engine */
-   -ahci_stop_engine(ap);
+   +hpriv->stop_engine(ap);
   hpriv->start_engine(ap);
 }

 sata_pmp_error_handler(ap);

 if (!ata_dev_enabled(ap->link.device))
-   -ahci_stop_engine(ap);
+   +hpriv->stop_engine(ap);
 }
 EXPORT_SYMBOL_GPL(ahci_error_handler);
@@ -2090,7 +2101,7 @@
 struct ahci_host_priv *hpriv = ap->host->private_data;
 void __iomem *port_mmio = ahci_port_base(ap);
 struct ata_device *dev = ap->link.device;
@@ -386,7 +397,7 @@
 if (devslp, dm, dito, mdat, deto);
+   +u32 devslp, dm, dito, mdat, deto, dito_conf;


int rc;
unsigned int err_mask;

@@ -2114,20 +2125,22 @@
 return;
 }

-/* device sleep was already enabled */
-if (devslp & PORT_DEVSLP_ADSE)
+/* device sleep was already enabled */
+dm = (devslp & PORT_DEVSLP_DM_MASK) >> PORT_DEVSLP_DM_OFFSET;
+dito = devslp_idle_timeout / (dm + 1);
+if (dito > 0x3ff)
+dito = 0x3ff;
 +
+dito_conf = (devslp >> PORT_DEVSLP_DITO_OFFSET) & 0x3FF;
 +
+/* device sleep was already enabled and same dito */
+if ((devslp & PORT_DEVSLP_ADSE) && (dito_conf == dito))
 return;

/* set DITO, MDAT, DETO and enable DevSlp, need to stop engine first */
-rc = ahci_stop_engine(ap);
+rc = hpriv->stop_engine(ap);
 if (rc)
 return;

-/* Use the nominal value 10 ms if the read MDAT is zero, 
- * the nominal value of DETO is 20 ms.
- */
-@@ -2145,6 +2158,8 @@
 deto = 20;
 }

+/* Make dito, mdat, deto bits to 0s */
+devslp &= ~GENMASK_ULL(24, 2);
 devslp |= ((dito << PORT_DEVSLP_DITO_OFFSET) |
 (mdat << PORT_DEVSLP_MDAT_OFFSET) |
 (deto << PORT_DEVSLP_DETO_OFFSET) |
@@ -2179,7 +2194,7 @@
 return;
 }

-rc = ahci_stop_engine(ap);
+rc = hpriv->stop_engine(ap);
if (rc)
return;

@@ -2212,7 +2227,7 @@
return;
}

-rc = ahci_stop_engine(ap);
+rc = hpriv->stop_engine(ap);
if (rc)
return;

--- linux-4.15.0.orig/drivers/ata/libahci_platform.c
+++ linux-4.15.0/drivers/ata/libahci_platform.c
@@ -46,7 +46,7 @@
 * RETURNS:
 * 0 on success otherwise a negative error code
 */
-static int ahci_platform_enable_phys(struct ahci_host_priv *hpriv)
+int ahci_platform_enable_phys(struct ahci_host_priv *hpriv)
{
    int rc, i;

@@ -71,6 +71,7 @@
phy_exit(hpriv->phys[i]);
    }
return rc;
}
+EXPORT_SYMBOL_GPL(ahci_platform_enable_phys);

/**
 * ahci_platform_disable_phys - Disable PHYs
@@ -78,7 +79,7 @@
 * This function disables all PHYs found in hpriv->phys.
 */
-void ahci_platform_disable_phys(struct ahci_host_priv *hpriv)
+void ahci_platform_disable_phys(struct ahci_host_priv *hpriv)
{
    int i;

@@ -87,6 +88,7 @@
phy_exit(hpriv->phys[i]);
    }
}
+EXPORT_SYMBOL_GPL(ahci_platform_disable_phys);

/**
* ahci_platform_enable_clks - Enable platform clocks
@@ -301,6 +303,9 @@
    hpriv->phys[port] = NULL;
    rc = 0;
    break;
+case -EPROBE_DEFER:
+/* Do not complain yet */
+break;

default:
    dev_err(dev,
@@ -514,11 +519,13 @@
    irq = platform_get_irq(pdev, 0);
    -if (irq <= 0) {
    +if (irq < 0) {
        if (irq != -EPROBE_DEFER)
            dev_err(dev, "no irq\n");
            return irq;
    +if (!irq)
    +return -EINVAL;

    hpriv->irq = irq;

--- linux-4.15.0.orig/drivers/ata/libata-core.c
+++ linux-4.15.0/drivers/ata/libata-core.c
@@ -57,7 +57,6 @@
 #include <linux/workqueue.h>
 #include <linux/scatterlist.h>
 #include <linux/io.h>
-#include <linux/async.h>
 #include <linux/log2.h>
 #include <linux/slab.h>
 #include <linux/glob.h>
@@ -2278,6 +2277,25 @@
 }

+static bool ata_dev_check_adapter(struct ata_device *dev,
+    unsigned short vendor_id)
+{
+    struct pci_dev *pcidev = NULL;
+    struct device *parent_dev = NULL;
+    for (parent_dev = dev->tdev.parent; parent_dev != NULL; 
+        parent_dev = parent_dev->parent) {
+if (dev_is_pci(parent_dev)) {
+pcidev = to_pci_dev(parent_dev);
+if (pcidev->vendor == vendor_id)
+return true;
+break;
+}
+
+if (pcidev)
+break;
+
+return false;
+
static int ata_dev_config_ncq(struct ata_device *dev,
   char *desc, size_t desc_sz)
{
@@ -2294,6 +2312,13 @@
        snprintf(desc, desc_sz, "NCQ (not used)");
        return 0;
    }
+    
+if (dev->horkage & ATA_HORKAGE_NO_NCQ_ON_ATI &&
+    ata_dev_check_adapter(dev, PCI_VENDOR_ID_ATI)) {
+    snprintf(desc, desc_sz, "NCQ (not used)");
+    return 0;
+}
+    
+if (ap->flags & ATA_FLAG_NCQ) {
  hdepth = min(ap->scsi_host->can_queue, ATA_MAX_QUEUE - 1);
  dev->flags |= ATA_DFLAG_NCQ;
@@ -2502,6 +2527,9 @@
        (id[ATA_ID_SATA_CAPABILITY] & 0xe) == 0x2)
        dev->horkage |= ATA_HORKAGE_NOLPM;
+    
+if (ap->flags & ATA_FLAG_NO_LPM)
+    dev->horkage |= ATA_HORKAGE_NOLPM;
+    
+    if (dev->horkage & ATA_HORKAGE_NOLPM) {
+        ata_dev_warn(dev, "LPM support broken, forcing max_power\n");
+        dev->link->ap->target_lpm_policy = ATA_LPM_MAX_POWER;
@@ -3974,6 +4002,7 @@
        scontrol |= (0x6 << 8);
        break;
        case ATA_LPM_MED_POWER_WITH_DIPM:
+        case ATA_LPM_MIN_POWER_WITH_PARTIAL:
+            case ATA_LPM_MIN_POWER:
                if (ata_link_nr_enabled(link) > 0)
                    /* no restrictions on LPM transitions */
@@ -4479,9 +4508,12 @@
            { "ST3320[68][13AS","SD1[5-9]",ATA_HORKAGE_NONCQ |
ATA_HORKAGE_FIRMWARE_WARN },

/* drives which fail FPDMA_AA activation (some may freeze afterwards) */
-{ "ST1000LM024 HN-M101MBB", "2AR10001", ATA_HORKAGE_BROKEN_FPDMA_AA },
-{ "ST1000LM024 HN-M101MBB", "2BA30001", ATA_HORKAGE_BROKEN_FPDMA_AA },
+/* drives which fail FPDMA_AA activation (some may freeze afterwards)
+ the ST disks also have LPM issues */
+{ "ST1000LM024 HN-M101MBB", "2AR10001", ATA_HORKAGE_BROKEN_FPDMA_AA |
+ ATA_HORKAGE_NOLPM, },
+{ "ST1000LM024 HN-M101MBB", "2BA30001", ATA_HORKAGE_BROKEN_FPDMA_AA |
+ ATA_HORKAGE_NOLPM, },
{ "VB0250EAVER", "HPG7", ATA_HORKAGE_BROKEN_FPDMA_AA },

/* Blacklist entries taken from Silicon Image 3124/3132
@@ -4493,6 +4525,9 @@*/
{ "C300-CTFDDAC128MAG", "0001", ATA_HORKAGE_NONCQ, },
+/* Sandisk SD7/8/9s lock up hard on large trims */
+{ "SanDisk SD[789]*", NULL, ATA_HORKAGE_MAX_TRIM_128M, },
+
/* devices which puke on READ_NATIVE_MAX */
{ "HDS724040KLSA80", "KFAOA20N", ATA_HORKAGE_BROKEN_HPA, },
{ "WDW3200ID-00KLB0", "WD-WCAMR1130137", ATA_HORKAGE_BROKEN_HPA },
@@ -4530,7 +4565,30 @@
{ "PIONEER DVD-RW DVR-212D", NULL, ATA_HORKAGE_NOSETXFER, },
{ "PIONEER DVD-RW DVR-216D", NULL, ATA_HORKAGE_NOSETXFER, },
+/* Crucial BX100 SSD 500GB has broken LPM support */
+{ "CT500BX100SSDI", NULL, ATA_HORKAGE_NOLPM, },
+
+/* 512GB MX100 with MU01 firmware has both queued TRIM and LPM issues */
+{ "Crucial_CT512MX100**", "MU01", ATA_HORKAGE_NO_NCQ_TRIM |
+ ATA_HORKAGE ZERO_AFTER_TRIM |
+ ATA_HORKAGE_NOLPM, },
+/* 512GB MX100 with newer firmware has only LPM issues */
+{ "Crucial_CT512MX100**", NULL, ATA_HORKAGE_ZERO_AFTER_TRIM |
+ ATA_HORKAGE_NOLPM, },
+
+/* 480GB+ M500 SSDs have both queued TRIM and LPM issues */
+{ "Crucial_CT480M500**", NULL, ATA_HORKAGE_NO_NCQ_TRIM |
+ ATA_HORKAGE_ZERO_AFTER_TRIM |
+ ATA_HORKAGE_NOLPM, },
+{ "Crucial_CT960M500**", NULL, ATA_HORKAGE_NO_NCQ_TRIM |
+ ATA_HORKAGE ZERO_AFTER_TRIM |
+ ATA_HORKAGE_NOLPM, },
+{ "SAMSUNG MZ7TD256HAHV-000L9", NULL, ATA_HORKAGE_NOLPM, },
+{ "SAMSUNG MZ7TE512HMHP-000L1", "EXT06L0Q", ATA_HORKAGE_NOLPM, },
/* devices that don't properly handle queued TRIM commands */
+
{ "Micron_M500IT_","MU01",ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Micron_M500_","NULL",ATA_HORKAGE_NO_NCQ_TRIM |
 ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Crucial_CT*M500","NULL",ATA_HORKAGE_NO_NCQ_TRIM |
 ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Crucial_CT*MX100","MU01",ATA_HORKAGE_NO_NCQ_TRIM |
 ATA_HORKAGE_ZERO_AFTER_TRIM, },
-{ "Samsung SSD 8*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Samsung SSD 840*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Samsung SSD 850*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Samsung SSD 860*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_NO_NCQ_ON_ATI, },
{ "Samsung SSD 870*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_NO_NCQ_ON_ATI, },
{ "FCCT*M500","NULL",ATA_HORKAGE_NO_NCQ_TRIM |
 ATA_HORKAGE_ZERO_AFTER_TRIM, },

@@ -4541,8 +4599,16 @@
 ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Samsung SSD 840*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "Samsung SSD 850*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_ZERO_AFTER_TRIM | 
 +ATA_HORKAGE_NO_NCQ_ON_ATI, },
{ "Samsung SSD 860*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_NO_NCQ_ON_ATI, },
{ "Samsung SSD 870*",NULL,ATA_HORKAGE_NO_NCQ_TRIM |
 +ATA_HORKAGE_NO_NCQ_ON_ATI, },
{ "FCCT*M500","NULL",ATA_HORKAGE_NO_NCQ_TRIM |
 ATA_HORKAGE_ZERO_AFTER_TRIM, },

@@ -4573,6 +4639,7 @@
 ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "SSD*INTEL","NULL",ATA_HORKAGE_ZERO_AFTER_TRIM, },
{ "SAMSUNG*SSD","NULL",ATA_HORKAGE_ZERO_AFTER_TRIM, },
+{ "SAMSUNG*MZ7KM","NULL",ATA_HORKAGE_ZERO_AFTER_TRIM, },
+{ "ST[1248][0248][FH]","NULL",ATA_HORKAGE_ZERO_AFTER_TRIM, },

/*
@@ -4964,7 +5031,10 @@
 return ATA_DEFER_LINK;
 }

-void ata_noop_qc_prep(struct ata_queued_cmd *qc) { }
+enum ata_completion_errors ata_noop_qc_prep(struct ata_queued_cmd *qc)
+{ 
+return AC_ERR_OK;
+}

/**
 * ata_sg_init - Associate command with scatter-gather table.
 @@ -5331,10 +5401,20 @@
 */

int ata_qc_complete_multiple(struct ata_port *ap, u32 qc_active)

{u64 done_mask, ap_qc_active = ap->qc_active;
int nr_done = 0;
-u32 done_mask;

-done_mask = ap->qc_active ^ qc_active;
+/* 
+ * If the internal tag is set on ap->qc_active, then we care about 
+ * bit0 on the passed in qc_active mask. Move that bit up to match 
+ * the internal tag.
+ */
+if (ap_qc_active & (1ULL << ATA_TAG_INTERNAL)) {
+qc_active |= (qc_active & 0x01) << ATA_TAG_INTERNAL;
+qc_active ^= qc_active & 0x01;
+}
+
+done_mask = ap_qc_active ^ qc_active;

if (unlikely(done_mask & qc_active)) {
ata_port_err(ap, "illegal qc_active transition (%08x->%08x)\n",
@@ -5401,8 +5481,7 @@
* We guarantee to LLDs that they will have at least one 
* non-zero sg if the command is a data command.
*/
-}if (WARN_ON_ONCE(ata_is_data(prot) && 
- (!qc->sg || !qc->n_elem || !qc->nbytes)))
+if (ata_is_data(prot) && (!qc->sg || !qc->n_elem || !qc->nbytes))
goto sys_err;

if (ata_is_dma(prot) || (ata_is_pio(prot) && 
@@ -5418,7 +5497,9 @@
return;
} 
-ap->ops->qc_prep(qc);
+qc->err_mask |= ap->ops->qc_prep(qc);
+if (unlikely(qc->err_mask))
+goto err;
trace_ata_qc_issue(qc);
qc->err_mask |= ap->ops->qc_issue(qc);
if (unlikely(qc->err_mask))
@@ -6312,7 +6393,7 @@
have_stop = 1;
} 

-if (host->ops->host_stop)
+if (host->ops && host->ops->host_stop)
have_stop = 1;
if (have_stop) {
        @@ -6512,7 +6593,7 @@
    /* perform each probe asynchronously */
    for (i = 0; i < host->n_ports; i++) {
        struct ata_port *ap = host->ports[i];
        async_schedule(async_port_probe, ap);
        +ap->cookie = async_schedule(async_port_probe, ap);
    }

    return 0;
    @@ -6652,8 +6733,11 @@
    }
    int i;

    -for (i = 0; i < host->n_ports; i++)
    +for (i = 0; i < host->n_ports; i++) {
        +/* Ensure ata_port probe has completed */
        +async_synchronize_cookie(host->ports[i]->cookie + 1);
        ata_port_detach(host->ports[i]);
        +}

    /* the host is dead now, dissociate ACPI */
    ata_acpi_dissociate(host);
    @@ -6679,6 +6763,26 @@
    ata_host_detach(host);
    }

    +void ata_pci_shutdown_one(struct pci_dev *pdev)
    +{
    +struct ata_host *host = pci_get_drvdata(pdev);
    +int i;
    +
    +for (i = 0; i < host->n_ports; i++) {
    +struct ata_port *ap = host->ports[i];
    +
    +ap->pflags |= ATA_PFLAG_FROZEN;
    +
    +/* Disable port interrupts */
    +if (ap->ops->freeze)
    +ap->ops->freeze(ap);
    +
    +/* Stop the port DMA engines */
    +if (ap->ops->port_stop)
    +ap->ops->port_stop(ap);
    +
    +
    +


int pci_test_config_bits(struct pci_dev *pdev, const struct pci_bits *bits)
{
    if (bits->reg > 6806)
        return -ENOSYS;
    bits->reg -= 6806;

    switch (bits->reg) {
    case "ncq":
        if ((bits->reg & 1) == 0)
            pdev->reg |= ATA_HORKAGE_NONCQ;
        break;
    case "noncqtrim":
        if ((bits->reg & 1) == 0)
            pdev->reg |= ATA_HORKAGE_NO_NCQ_TRIM;
        break;
    case "ncqtrim":
        if ((bits->reg & 1) == 0)
            pdev->reg |= ATA_HORKAGE_NO_NCQ_TRIM;
        break;
    case "noncqati":
        if ((bits->reg & 1) == 0)
            pdev->reg |= ATA_HORKAGE_NO_NCQ_ON_ATI;
        break;
    case "ncqati":
        if ((bits->reg & 1) == 0)
            pdev->reg |= ATA_HORKAGE_NO_NCQ_ON_ATI;
        break;
    case "dump_id":
        if ((bits->reg & 1) == 0)
            pdev->reg |= ATA_HORKAGE_DUMP_ID;
        break;
    case "pio0":
        if ((bits->reg & 1) == 0)
            pdev->reg |= (ATA_HORKAGE_PIO0 | ATA_HORKAGE_PIO1);
        break;
    case "pio1":
        if ((bits->reg & 1) == 0)
            pdev->reg |= (ATA_HORKAGE_PIO0 | ATA_HORKAGE_PIO1);
        break;
    default:
        break;
    }
}

if (ap->pflags & ATA_PFLAG_LOADING)
    ap->pflags &= ~ATA_PFLAG_LOADING;
else if (ap->pflags & ATA_PFLAG_SCSI_HOTPLUG)
    ap->pflags &= ~ATA_PFLAG_SCSI_HOTPLUG;
        if (ata_id_has_ncq_autosense(dev->id))
            if (ata_id_has_ncq_autosense(dev->id))
                schedule_delayed_work(&ap->hotplug_task, 0);

if (ap->pflags & ATA_PFLAG_RECOVERED)
    schedule_delayed_work(&ap->hotplug_task, 0);


return 0;
@@ -1784,7 +1785,8 @@
memcpy(&qc->result_tf, &tf, sizeof(tf));
qc->result_tf.flags = ATA_TFLAG_ISADDR | ATA_TFLAG_LBA | ATA_TFLAG_LBA48;
qc->err_mask |= AC_ERR_DEV | AC_ERR_NCQ;
-if ((qc->result_tf.command & ATA_SENSE) || qc->result_tf.auxiliary) {
+if (dev->class == ATA_DEV_ZAC &&
+    ((qc->result_tf.command & ATA_SENSE) || qc->result_tf.auxiliary)) {
char sense_key, asc, ascq;

sense_key = (qc->result_tf.auxiliary >> 16) & 0xff;
@@ -1838,10 +1840,11 @@
} switch (qc->dev->class) {
-case ATA_DEV_ATA:
+case ATA_DEV_ZAC:
if (stat & ATA_SENSE)
ata_eh_request_sense(qc, qc->scsicmd);
+/* fall through */
+case ATA_DEV_ATA:
if (err & ATA_ICRC)
qc->err_mask |= AC_ERR_ATA_BUS;
if (err & (ATA_UNC | ATA_AMNF))
@@ -2217,12 +2220,16 @@
qc->err_mask &= ~AC_ERR_OTHER;
-/* SENSE_VALID trumps dev/unknown error and revalidation */
+/*
+ * SENSE_VALID trumps dev/unknown error and revalidation. Upper
+ * layers will determine whether the command is worth retrying
+ * based on the sense data and device class/type. Otherwise,
+ * determine directly if the command is worth retrying using its
+ * error mask and flags.
+ */
if (qc->flags & ATA_QCFLAG_SENSE_VALID)
qc->err_mask &= ~(AC_ERR_DEV | AC_ERR_OTHER);
-/* determine whether the command is worth retrying */
-if (ata_eh_worth_retry(qc))
+else if (ata_eh_worth_retry(qc))
qc->flags |= ATA_QCFLAG_RETRY;

/* accumulate error info */
```c
if (dev->flags & ATA_DFLAG_DETACH) {
    detach = 1;
    rc = -ENODEV;
    goto fail;
}

[ATA_LPM_MAX_POWER]= "max_performance",
[ATA_LPM_MED_POWER]= "medium_power",
[ATA_LPM_MED_POWER_WITH_DIPM]= "med_power_with_dipm",
+[ATA_LPM_MIN_POWER_WITH_PARTIAL] = "min_power_with_partial",
[ATA_LPM_MIN_POWER]= "min_power",
};

return 1;
}

static bool ata_check_nblocks(struct scsi_cmnd *scmd, u32 n_blocks)
+
+static bool ata_check_nblocks(struct scsi_cmnd *scmd, u32 n_blocks)
+{
+    struct request *rq = scmd->request;
+    u32 req_blocks;
+    +if (!blk_rq_is_passthrough(rq))
+        +return true;
+    +req_blocks = blk_rq_bytes(rq) / scmd->device->sector_size;
+    +if (n_blocks > req_blocks)
+        +return false;
+    +return true;
+}**

/*ata_scsi_rw_xlat - Translate SCSI r/w command into an ATA one
 *@qc: Storage for translated ATA taskfile
 *@@ -1849,6 +1865,8 @@
 scsi_10_lba_len(cdb, &block, &n_block);
 if (cdb[1] & (1 << 3))
     tf_flags |= ATA_TFLAG_FUA;
+if (!ata_check_nblocks(scmd, n_block))
+    goto invalid_fld;
```
break;
case READ_6:
case WRITE_6:
  
  /*
  if (!n_block)
  n_block = 256;
  +if (!ata_check_nblocks(scmd, n_block))
  +goto invalid_fld;
  break;
case READ_16:
case WRITE_16:
  
  scsi_16_lba_len(cdb, &block, &n_block);
  if (cdb[1] & (1 << 3))
    tf_flags |= ATA_TFLAG_FUA;
  +if (!ata_check_nblocks(scmd, n_block))
  +goto invalid_fld;
  break;
default:
    DPRINTK("no-byte command\n");
  */
  @ -1863,8 +1881,8 @@
  if (!ata_check_nblocks(scmd, n_block))
    goto invalid_fld;
break;
case READ_16:
case WRITE_16:
  
  scsi_16_lba_len(cdb, &block, &n_block);
  if (cdb[1] & (1 << 3))
    tf_flags |= ATA_TFLAG_FUA;
  +if (!ata_check_nblocks(scmd, n_block))
  +goto invalid_fld;
  break;
default:
    DPRINTK("no-byte command\n");
  @ -2372,6 +2394,7 @@

static unsigned int ata_scsiop_inq_b0(struct ata_scsi_args *args, u8 *rbuf)
{
  +struct ata_device *dev = args->dev;
  u16 min_io_sectors;

  rbuf[1] = 0xb0;
  @ -2397,7 +2420,12 @@
  * with the unmap bit set.
  */
  @ -3316,6 +3344,12 @@
  if (ata_id_has_trim(args->id)) {
    -put_unaligned_be64(65535 * ATA_MAX_TRIM_RNUM, &rbuf[36]);
    +u64 max_blocks = 65535 * ATA_MAX_TRIM_RNUM;
    +
    +if (dev->horkage & ATA_HORKAGE_MAX_TRIM_128M)
      +max_blocks = 128 << (20 - SECTOR_SHIFT);
    +
    +put_unaligned_be64(max_blocks, &rbuf[36]);
    put_unaligned_be32(1, &rbuf[28]);
  }
  @ -3316,6 +3344,12 @@
  goto invalid_fld;
  }
  +/* We may not issue NCQ commands to devices not supporting NCQ */
+if (ata_is_ncq(tf->protocol) && !ata_ncq_enabled(dev)) {
  fp = 1;
  goto invalid_fld;
+}
+
/* sanity check for pio multi commands */
if ((cdb[1] & 0xe0) && !is_multi_taskfile(tf)) {
  fp = 1;
  @@ -3796,10 +3830,20 @@
  goto invalid_param_len;
}
-if (block > dev->n_sectors)
  goto out_of_range;

all = cdb[14] & 0x1;
+if (all) {
+  /* Ignore the block address (zone ID) as defined by ZBC. */
+  /* */
+  +block = 0;
+  } else if (block >= dev->n_sectors) {
+    /* Block must be a valid zone ID (a zone start LBA). */
+    +fp = 2;
+    +goto invalid_fld;
+}

if (ata_ncq_enabled(qc->dev) &&
    ata_fpdma_zac_mgmt_out_supported(qc->dev)) {
  @@ -3828,10 +3872,6 @@
  invalid_fld:
  ata_scsi_set_invalid_field(qc->dev, scmd, fp, 0xff);
  return 1;
  - out_of_range:
  -/* "Logical Block Address out of range" */
  -ata_scsi_set_sense(qc->dev, scmd, ILLEGAL_REQUEST, 0x21, 0x00);
  -return 1;
  invalid_param_len:
  /* "Parameter list length error" */
  ata_scsi_set_sense(qc->dev, scmd, ILLEGAL_REQUEST, 0x1a, 0x0);
  @@ -3964,12 +4004,13 @@
  }
  struct scsi_cmnd *scmd = qc->scsicmd;
  const u8 *cdb = scmd->cmnd;
  -const u8 *p;
  u8 pg, spg;
unsigned six_byte, pg_len, hdr_len, bd_len;
int len;
u16 fp = (u16)-1;
u8 bp = 0xff;
+u8 buffer[64];
+const u8 *p = buffer;

VPRINTK("ENTER\n");

@@ -4003,12 +4044,14 @@
if (!scsi_sg_count(scmd) || scsi_sglist(scmd)->length < len)
goto invalid_param_len;

-p = page_address(sg_page(scsi_sglist(scmd)));
-
/* Move past header and block descriptors. */
if (len < hdr_len)
goto invalid_param_len;

+if (!sg_copy_to_buffer(scsi_sglist(scmd), scsi_sg_count(scmd),
+       buffer, sizeof(buffer)))
+goto invalid_param_len;
+
if (six_byte)
  bd_len = p[3];
else
@@ -4282,7 +4325,7 @@
#endif ATA_DEBUG
struct scsi_device *scsidev = cmd->device;

-DPRINTK("CDB (%u:%d,%d,%d) %9ph\n",
+DPRINTK("CDB (%u:%d,%d,%lld) %9ph\n",
ap->print_id,
  scsidev->channel, scsidev->id, scsidev->lun,
  cmd->cmnd);
@@ -4309,7 +4352,9 @@
if (likely((scsi_op != ATA_16) || !atapi_passthru16)) {
  /* relay SCSI command to ATAPI device */
  int len = COMMAND_SIZE(scsi_op);
@@ -4537,22 +4582,19 @@
  xlat_func = atapi_xlat;
@@ -4537,22 +4582,19 @@
*/
shost->max_host_blocked = 1;

-rc = scsi_add_host_with_dma(ap->scsi_host,  
-&ap->tdev, ap->host->dev);
+rc = scsi_add_host_with_dma(shost, &ap->tdev, ap->host->dev);
if (rc)
-goto err_add;
+goto err_alloc;
}

return 0;

- err_add:
-scsi_host_put(host->ports[i]->scsi_host);  
-err_alloc:
while (--i >= 0) {
struct Scsi_Host *shost = host->ports[i]->scsi_host;

+/* scsi_host_put() is in ata_devres_release() */
scsi_remove_host(shost);
-scsi_host_put(shost);
}
return rc;
}

--- linux-4.15.0.orig/drivers/ata/libata-sff.c
+++ linux-4.15.0/drivers/ata/libata-sff.c
@@ -657,6 +657,20 @@
}

EXPORT_SYMBOL_GPL(ata_sff_data_xfer32);

+static void ata_pio_xfer(struct ata_queued_cmd *qc, struct page *page,
+unsigned int offset, size_t xfer_size)
+{
+bool do_write = (qc->tf.flags & ATA_TFLAG_WRITE);
+unsigned char *buf;
+  
+buf = kmap_atomic(page);
+qc->ap->ops->sff_data_xfer(qc, buf + offset, xfer_size, do_write);
+kunmap_atomic(buf);
+  
+if (!do_write && !PageSlab(page))
+flush_dcache_page(page);
+
+/**
+ata_sff_data_xfer_noirq - Transfer data by PIO
+ @qc: queued command
+ @page -698.12 +712.14 @@
static void ata_pio_sector(struct queued_cmd *qc) {
    int do_write = (qc->tf.flags & ATA_TFLAG_WRITE);
    struct port *ap = qc->ap;
    struct page *page;
    unsigned int offset;
    unsigned char *buf;

    if (!qc->cursg) {
        qc->curbytes = qc->nbytes;
        return;
    }

    if (qc->curbytes == qc->nbytes - qc->sect_size)
        ap->hsm_task_state = HSM_ST_LAST;

    /* do the actual data transfer */
    buf = kmap_atomic(page);
    ap->ops->sff_data_xfer(qc, buf + offset, qc->sect_size, do_write);
    kunmap_atomic(buf);

    if (!do_write && !PageSlab(page))
        flush_dcache_page(page);

    DPRINTF("data %s\n", qc->tf.flags & ATA_TFLAG_WRITE ? "write" : "read");

    /* do the actual data transfer */
    buf = kmap_atomic(page);
    ap->ops->sff_data_xfer(qc, buf + offset, qc->sect_size, do_write);
    kunmap_atomic(buf);

    if (!do_write && !PageSlab(page))
        flush_dcache_page(page);

    WARN_ON_ONCE(offset % 4);

    if (offset + qc->sect_size > PAGE_SIZE) {
        unsigned int split_len = PAGE_SIZE - offset;
        ata_pio_xfer(qc, page, offset, split_len);
        ata_pio_xfer(qc, nth_page(page, 1), 0,
                     qc->sect_size - split_len);
    } else {
        ata_pio_xfer(qc, page, offset, qc->sect_size);
    }

    qc->curbytes += qc->sect_size;
    qc->cursg_ofs += qc->sect_size;

    if (qc->cursg_ofs == qc->cursg->length) {
        qc->cursg = sg_next(qc->cursg);
        if (!qc->cursg)
ap->hsm_task_state = HSM_ST_LAST;
qc->cursg_ofs = 0;
}
}
@@ -2719,12 +2744,14 @@
*LOCKING:
*spin_lock_irqsave(host lock)
*/
-void ata_bmdma_qc_prep(struct ata_queued_cmd *qc)
+enum ata_completion_errors ata_bmdma_qc_prep(struct ata_queued_cmd *qc)
{
if (!(qc->flags & ATA_QCFLAG_DMAMAP))
-    return;
+    return AC_ERR_OK;
    ata_bmdma_fill_sg(qc);
    +
    +return AC_ERR_OK;
}
EXPORT_SYMBOL_GPL(ata_bmdma_qc_prep);
@@ -2737,12 +2764,14 @@
*LOCKING:
*spin_lock_irqsave(host lock)
*/
-void ata_bmdma_dumb_qc_prep(struct ata_queued_cmd *qc)
+enum ata_completion_errors ata_bmdma_dumb_qc_prep(struct ata_queued_cmd *qc)
{
if (!(qc->flags & ATA_QCFLAG_DMAMAP))
-    return;
+    return AC_ERR_OK;
    ata_bmdma_fill_sg_dumb(qc);
    +
    +return AC_ERR_OK;
}
EXPORT_SYMBOL_GPL(ata_bmdma_dumb_qc_prep);
--- linux-4.15.0.orig/drivers/ata/libata-zpodd.c
+++ linux-4.15.0/drivers/ata/libata-zpodd.c
@@ -35,7 +35,7 @@ static int eject_tray(struct ata_device *dev)
{
struct ata_taskfile tf;
-static const char cdb[] = {  GPCMD_START_STOP_UNIT,
+static const char cdb[ATAPI_CDB_LEN] = {  GPCMD_START_STOP_UNIT,
    0, 0, 0,
    0x02,     /* LoEj */
static enum odd_mech_type zpodd_get_mech_type(struct ata_device *dev)
{
    int ret;
    struct rm_feature_desc *desc = (void *)(buf + 8);
    struct ata_taskfile tf;

    buf = kzalloc(16, GFP_KERNEL);
    if (!buf)
        return ODD_MECH_TYPE_UNSUPPORTED;
    desc = (void *)(buf + 8);
    ata_tf_init(dev, &tf);
    tf.flags = ATA_TFLAG_ISADDR | ATA_TFLAG_DEVICE;
    tf.command = ATA_CMD_PACKET;
    tf.protocol = ATAPI_PROT_PIO;
    tf.lbam = sizeof(buf);
    ret = ata_exec_internal(dev, &tf, &cdb[0], DMA_FROM_DEVICE,
                            &buf, sizeof(buf), 0);
    if (ret)
        kfree(buf);
    return ODD_MECH_TYPE_UNSUPPORTED;

    if (desc->feature_code != 3)
        kfree(buf);
    return ODD_MECH_TYPE_UNSUPPORTED;

    -if (be16_to_cpu(desc->feature_code) != 3)
        return ODD_MECH_TYPE_UNSUPPORTED;
    +return ODD_MECH_TYPE_UNSUPPORTED;

    -if (be16_to_cpu(desc->feature_code) != 3) { 
        +kfree(buf);
        return ODD_MECH_TYPE_UNSUPPORTED;
    +}
-if (desc->mech_type == 0 && desc->load == 0 && desc->eject == 1)
+if (desc->mech_type == 0 && desc->load == 0 && desc->eject == 1) {
+kfree(buf);
    return ODD_MECH_TYPE_SLOT;
-else if (desc->mech_type == 1 && desc->load == 0 && desc->eject == 1)
+} else if (desc->mech_type == 1 && desc->load == 0 &&
+    desc->eject == 1) {
+kfree(buf);
    return ODD_MECH_TYPE_DRAWER;
-else
+} else {
+kfree(buf);
return ODD_MECH_TYPE_UNSUPPORTED;
+
}

/* Test if ODD is zero power ready by sense code */
--- linux-4.15.0.orig/drivers/ata/pata_arasan_cf.c
+++ linux-4.15.0/drivers/ata/pata_arasan_cf.c
@@ -819,12 +819,19 @@
else
quirk = CF_BROKEN_UDMA; /* as it is on spear1340 */

-/* if irq is 0, support only PIO */
-acdev->irq = platform_get_irq(pdev, 0);
-if (acdev->irq)
+/*
+ * If there's an error getting IRQ (or we do get IRQ0),
+ * support only PIO
+ */
+ret = platform_get_irq(pdev, 0);
+if (ret > 0) {
+acdev->irq = ret;
+irq_handler = arasan_cf_interrupt;
-else
+} elseif (ret == -EPROBE_DEFER) {
+return ret;
+} else{
quirk |= CF_BROKEN_MWDMA | CF_BROKEN_UDMA;
+
}acdev->pbase = res->start;
acdev->vbase = devm_ioremap_nocache(&pdev->dev, res->start,
--- linux-4.15.0.orig/drivers/ata/pata_ep93xx.c
+++ linux-4.15.0/drivers/ata/pata_ep93xx.c
@@ -659,7 +659,7 @@
* start of new transfer.
*/
drv_data->dma_rx_data.port = EP93XX_DMA_IDE;
-driv_data->dma_rx_data.direction = DMA_FROM_DEVICE;
+drv_data->dma_rx_data.direction = DMA_DEV_TO_MEM;
drv_data->dma_rx_data.name = "ep93xx-pata-rx";
drv_data->dma_rx_channel = dma_request_channel(mask,
   ep93xx_pata_dma_filter, &drv_data->dma_rx_data);
@@ -667,7 +667,7 @@
   return;

drv_data->dma_tx_data.port = EP93XX_DMA_IDE;
-driv_data->dma_tx_data.direction = DMA_TO_DEVICE;
+drv_data->dma_tx_data.direction = DMA_MEM_TO_DEV;
drv_data->dma_tx_data.name = "ep93xx-pata-tx";
drv_data->dma_tx_channel = dma_request_channel(mask,
   ep93xx_pata_dma_filter, &drv_data->dma_tx_data);
@@ -678,7 +678,7 @@

/* Configure receive channel direction and source address */
memset(&conf, 0, sizeof(conf));
-conf.direction = DMA_FROM_DEVICE;
+conf.direction = DMA_DEV_TO_MEM;
   conf.src_addr = drv_data->udma_in_phys;
   conf.src_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
   if (dmaengine_slave_config(drv_data->dma_rx_channel, &conf)) {
      @@ -689,7 +689,7 @@
           }

/* Configure transmit channel direction and destination address */
memset(&conf, 0, sizeof(conf));
-conf.direction = DMA_TODEVICE;
+conf.direction = DMA_MEM_TO_DEV;
   conf.dst_addr = drv_data->udma_out_phys;
   conf.dst_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
   if (dmaengine_slave_config(drv_data->dma_tx_channel, &conf)) {
      @@ -927,7 +927,7 @@
           }

/* INT[3] (IRQ_EP93XX_EXT3) line connected as pull down */
   irq = platform_get_irq(pdev, 0);
   if (irq < 0) {
      -err = -ENXIO;
      +err = irq;
      goto err_rel_gpio;
   }

--- linux-4.15.0.orig/drivers/ata/pata_ftide010.c
+++ linux-4.15.0/drivers/ata/pata_ftide010.c
@@ -256,14 +256,12 @@
    .qc_issue	= ftide010_qc_issue,
    
};
-static struct ata_port_info ftide010_port_info[] = {
-{
- .flags= ATA_FLAG_SLAVE_POSS,
- .mwdma_mask= ATA_MWDMA2,
- .udma_mask= ATA_UDMA6,
- .pio_mask= ATAPIO4,
- .port_ops= &pata_ftide010_port_ops,
- },
+static struct ata_port_info ftide010_port_info = {
+ .flags= ATA_FLAG_SLAVE_POSS,
+ .mwdma_mask= ATA_MWDMA2,
+ .udma_mask= ATA_UDMA6,
+ .pio_mask= ATAPIO4,
+ .port_ops= &pata_ftide010_port_ops,
+ };

#if IS_ENABLED(CONFIG_SATA_GEMINI)
@@ -349,6 +347,7 @@}
static int pata_ftide010_gemini_init(struct ftide010 *ftide,
+ struct ata_port_info *pi,
+ bool is_ata1)
{
    struct device *dev = ftide->dev;
@@ -373,7 +372,13 @@
/* Flag port as SATA-capable */
    if (gemini_sata_bridge_enabled(sg, is_ata1))
- ftide010_port_info[0].flags |= ATA_FLAG_SATA;
+ pi->flags |= ATA_FLAG_SATA;
+    /* This device has broken DMA, only PIO works */
+    if (of_machine_is_compatible("itian,sq201")) {
+        pi->mwdma_mask = 0;
+        pi->udma_mask = 0;
+    }
+
/*
 * We assume that a simple 40-wire cable is used in the PATA mode.
@@ -435,6 +440,7 @@
 }
#else
 static int pata_ftide010_gemini_init(struct ftide010 *ftide,
+ struct ata_port_info *pi,
+ bool is_ata1)
{
    return -ENOTSUPP;
struct device *dev = &pdev->dev;
struct device_node *np = dev->of_node;
const struct ata_port_info pi = ftide010_port_info[0];
struct ata_port_info pi = ftide010_port_info;
const struct ata_port_info *ppi[] = { &pi, NULL };
struct ftide010 *ftide;
struct resource *res;

* are ATA0. This will also set up the cable types.
*/
ret = pata_ftide010_gemini_init(ftide,
				&pi,
(res->start == 0x63400000));
if (ret)
goto err_dis_clk;
--- linux-4.15.0.orig/drivers/ata/pata_ixp4xx_cf.c
+++ linux-4.15.0/drivers/ata/pata_ixp4xx_cf.c
@@ -169,8 +169,12 @@
return -ENOMEM;
irq = platform_get_irq(pdev, 0);
-if (irq)
+if (irq > 0)
irq_set_irq_type(irq, IRQ_TYPE_EDGE_RISING);
+else if (irq < 0)
+return irq;
+else
+return -EINVAL;
/* Setup expansion bus chip selects */
*data->cs0_cfg = data->cs0_bits;
--- linux-4.15.0.orig/drivers/ata/pata_legacy.c
+++ linux-4.15.0/drivers/ata/pata_legacy.c
@@ -329,7 +329,8 @@
iowrite32_rep(ap->ioaddr.data_addr, buf, buflen >> 2);

if (unlikely(slop)) {
-__le32 pad;
+__le32 pad = 0;
+if (rw == READ) {
+pad = cpu_to_le32(ioread32(ap->ioaddr.data_addr));
+memcpy(buf + buflen - slop, &pad, slop);
@@ -719,7 +720,8 @@
ioread32_rep(ap->ioaddr.data_addr, buf, buflen >> 2);
if (unlikely(slop)) {
    __le32 pad;
    __le32 pad = 0;
    
    if (rw == WRITE) {
        memcpy(&pad, buf + buflen - slop, slop);
        iowrite32(le32_to_cpu(pad), ap->ioaddr.data_addr);
    }
}

-static void pata_macio_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors pata_macio_qc_prep(struct ata_queued_cmd *qc)
{
    unsigned int write = (qc->tf.flags & ATA_TFLAG_WRITE);
    struct ata_port *ap = qc->ap;
    @@ -520,7 +520,7 @@

    if (!(qc->flags & ATA_QCFLAG_DMAMAP))
        return;
    return AC_ERR_OK;
+
    table = (struct dbdma_cmd *) priv->dma_table_cpu;

    @@ -565,6 +565,8 @@

    dev_dbgdma(priv->dev, "%s: %d DMA list entries\n", __func__, pi);
    + return AC_ERR_OK;
}

--- linux-4.15.0.orig/drivers/ata/pata_octeon_cf.c
+++ linux-4.15.0/drivers/ata/pata_octeon_cf.c
@@ -898,10 +898,11 @@

    -irq_handler = octeon_cf_interrupt;
    i = platform_get_irq(dma_dev, 0);
    -if (i > 0)
+    if (i > 0) {
        irq = i;
        +irq_handler = octeon_cf_interrupt;
static void pxa_qc_prep(struct ata_queued_cmd *qc)
{
    struct pata_pxa_data *pd = qc->ap->private_data;
    struct dma_async_tx_descriptor *tx;
    enum dma_transfer_direction dir;
    if (!(qc->flags & ATA_QCFLAG_DMAMAP))
        return;
    dir = (qc->dma_dir == DMA_TO_DEVICE ? DMA_MEM_TO_DEV : DMA_DEV_TO_MEM);
    tx = dmaengine_prep_slave_sg(pd->dma_chan, qc->sg, qc->n_elem, dir,
        DMA_PREP_INTERRUPT);
    if (!tx) {
        ata_dev_err(qc->dev, "prep_slave_sg() failed\n");
        return;
    }
    tx->callback = pxa_ata_dma_irq;
    tx->callback_param = pd;
    pd->dma_cookie = dmaengine_submit(tx);
    return AC_ERR_OK;
}

static enum ata_completion_errors pxa_qc_prep(struct ata_queued_cmd *qc)
{
    struct pata_pxa_data *pd = qc->ap->private_data;
    struct dma_async_tx_descriptor *tx;
    enum dma_transfer_direction dir;
    if (!((qc->flags & ATA_QCFLAG_DMAMAP))
        return;
    return AC_ERR_OK;
}

irq = platform_get_irq(pdev, 0);
-if (irq <= 0) {
    +if (irq < 0) {
        dev_err(&pdev->dev, "no IRQ resource found\n");
        return -ENOENT;
    } return irq;
}
if (!irq)  
  return -EINVAL;

pdata = dev_get_platdata(&pdev->dev);
if (!pdata) {
  --- linux-4.15.0.orig/drivers/ata/pdc_adma.c
  +++ linux-4.15.0/drivers/ata/pdc_adma.c
  @@ -132,7 +132,7 @@
  const struct pci_device_id *ent);
  static int adma_port_start(struct ata_port *ap);
  static void adma_port_stop(struct ata_port *ap);
-  static void adma_qc_prep(struct ata_queued_cmd *qc);
+  static enum ata_completion_errors adma_qc_prep(struct ata_queued_cmd *qc);
  static unsigned int adma_qc_issue(struct ata_queued_cmd *qc);
  static int adma_check_atapi_dma(struct ata_queued_cmd *qc);
  static void adma_freeze(struct ata_port *ap);
  @@ -311,7 +311,7 @@
  return i;
}

-  static void adma_qc_prep(struct ata_queued_cmd *qc)
+  static enum ata_completion_errors adma_qc_prep(struct ata_queued_cmd *qc)
  {
    struct adma_port_priv *pp = qc->ap->private_data;
    u8 *buf = pp->pkt;
    @@ -322,7 +322,7 @@
    adma_enter_reg_mode(qc->ap);
    if (qc->tf.protocol != ATA_PROT_DMA)
      return;
+    return AC_ERR_OK;
  }

  static inline void adma_packet_start(struct ata_queued_cmd *qc)
  --- linux-4.15.0.orig/drivers/ata/sata_dwc_460ex.c
  +++ linux-4.15.0/drivers/ata/sata_dwc_460ex.c
  @@ -1254,24 +1254,20 @@
    irq = irq_of_parse_and_map(np, 0);
    if (irq == NO_IRQ) {
      buf[i++] = 0; /* Response flags */
      buf[i++] = 0; /* reserved */
      @@ -387,6 +387,7 @@
      printk("%s\n", obuf);
    }
    #endif
+  return AC_ERR_OK;
  }

  static inline void adma_packet_start(struct ata_queued_cmd *qc)

dev_err(&ofdev->dev, "no SATA DMA irq\n");
-err = -ENODEV;
-goto error_out;
+return -ENODEV;
}

#ifdef CONFIG_SATA_DWC_OLD_DMA
if (!of_find_property(np, "dmas", NULL)) {
  err = sata_dwc_dma_init_old(ofdev, hsdev);
  if (err)
    -goto error_out;
    +return err;
}
#endif

hsdev->phy = devm_phy_optional_get(hsdev->dev, "sata-phy");
-if (IS_ERR(hsdev->phy)) {
  -err = PTR_ERR(hsdev->phy);
  -hsdev->phy = NULL;
  -goto error_out;
  -}
  +if (IS_ERR(hsdev->phy))
     +return PTR_ERR(hsdev->phy);

err = phy_init(hsdev->phy);
  if (err)
    --- linux-4.15.0.orig/drivers/ata/sata_fsl.c
    +++ linux-4.15.0/drivers/ata/sata_fsl.c
    @@ -513,7 +513,7 @@
    return num_prde;
  }

-static void sata_fsl_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors sata_fsl_qc_prep(struct ata_queued_cmd *qc)
{
  struct ata_port *ap = qc->ap;
  struct sata_fsl_port_priv *pp = ap->private_data;
  @@ -559,6 +559,8 @@

  VPRINTK("SATA FSL : xx_qc_prep, di = 0x%x, ttl = %d, num_prde = %d\n",
  desc_info, ttl_dwords, num_prde);
  +
     +return AC_ERR_OK;
  }

static unsigned int sata_fsl_qc_issue(struct ata_queued_cmd *qc)
--- linux-4.15.0.orig/drivers/ata/sata_highbank.c
+++ linux-4.15.0/drivers/ata/sata_highbank.c
int rc;
int retry = 100;

-ahci_stop_engine(ap);
+hpriv->stop_engine(ap);

/* clear D2H reception area to properly wait for D2H FIS */
ata_tf_init(link->device, &tf);

irq = platform_get_irq(pdev, 0);
-if (irq <= 0) {
+if (irq < 0) {
   dev_err(dev, "no irq\n");
   -return -EINVAL;
   +return irq;
}
+if (!irq)
+return -EINVAL;

hpriv = devm_kzalloc(dev, sizeof(*hpriv), GFP_KERNEL);
if (!hpriv) {
    --- linux-4.15.0.orig/drivers/ata/sata_inic162x.c
+++ linux-4.15.0/drivers/ata/sata_inic162x.c
@@ -472,7 +472,7 @@
    prd[-1].flags |= PRD_END;
}

-static void inic_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors inic_qc_prep(struct ata_queued_cmd *qc)
{ 
    struct inic_port_priv *pp = qc->ap->private_data;
    struct inic_pkt *pkt = pp->pkt;
@@ -532,6 +532,8 @@
    inic_fill_sg(prd, qc);

    pp->cpb_tbl[0] = pp->pkt_dma;
    +
    +return AC_ERR_OK;
}

-static unsigned int inic_qc_issue(struct ata_queued_cmd *qc)
--- linux-4.15.0.orig/drivers/ata/sata_mv.c
+++ linux-4.15.0/drivers/ata/sata_mv.c
@@ -605,8 +605,8 @@
    static int mv_port_start(struct ata_port *ap):
static void mv_port_stop(struct ata_port *ap);
static int mv_qc_defer(struct ata_queued_cmd *qc);
- static void mv_qc_prep(struct ata_queued_cmd *qc);
- static void mv_qc_prep_iie(struct ata_queued_cmd *qc);
+ static enum ata_completion_errors mv_qc_prep(struct ata_queued_cmd *qc);
+ static enum ata_completion_errors mv_qc_prep_iie(struct ata_queued_cmd *qc);
static unsigned int mv_qc_issue(struct ata_queued_cmd *qc);
static int mv_hardreset(struct ata_link *link, unsigned int *class,
unsigned long deadline);
@@ -2044,7 +2044,7 @@
 * LOCKING:
 * Inherited from caller.
 */
- static void mv_qc_prep(struct ata_queued_cmd *qc)
+ static enum ata_completion_errors mv_qc_prep(struct ata_queued_cmd *qc)
{
    struct ata_port *ap = qc->ap;
    struct mv_port_priv *pp = ap->private_data;
@@ -2056,15 +2056,15 @@
 switch (tf->protocol) {
 case ATA_PROT_DMA:
    if (tf->command == ATA_CMD_DSM)
-        return;
+        return AC_ERR_OK;
 /* fall-thru */
    case ATA_PROT_NCQ:
        break; /* continue below */
 case ATA_PROT_PIO:
-    return;
+    mv_rw_multi_errata_sata24(qc);
    return;
    + return AC_ERR_OK;
    default:
    - return;
    + return AC_ERR_OK;
 }

 /* Fill in command request block */
@@ -2111,12 +2111,10 @@
 * non-NCQ mode are: [RW] STREAM DMA and W DMA FUA EXT, none
 * of which are defined/used by Linux. If we get here, this
 * driver needs work.
- *
- * FIXME: modify libata to give qc_prep a return value and
- * return error here.
- */
- BUG_ON(tf->command);
- break;
+ ataport_err(ap, "\%s unsupported command: %.2x\n", __func__);
+tf->command);
+return AC_ERR_INVALID;
}
mv_crqb_pack_cmd(cw++, tf->nsect, ATA_REG_NSECT, 0);
mv_crqb_pack_cmd(cw++, tf->hob_lbal, ATA_REG_LBAL, 0);
@@ -2129,8 +2127,10 @@
mv_crqb_pack_cmd(cw++, tf->command, ATA_REG_CMD, 1); /* last */

if (!(qc->flags & ATA_QCFLAG_DMAMAP))
-    return;
+    return AC_ERR_OK;
    mv_fill_sg(qc);
+    return AC_ERR_OK;
}

/**
@@ -2145,7 +2145,7 @@
* LOCKING:
* Inherited from caller.
*/
-static void mv_qc_prep_iie(struct ata_queued_cmd *qc)
+static enum ata_completion_errors mv_qc_prep_iie(struct ata_queued_cmd *qc)
{
    struct ata_port *ap = qc->ap;
    struct mv_port_priv *pp = ap->private_data;
@@ -2156,9 +2156,9 @@
    if ((tf->protocol != ATA_PROT_DMA) &&
        (tf->protocol != ATA_PROT_NCQ))
-        return;
+        return AC_ERR_OK;
    if (tf->command == ATA_CMD_DSM)
-        return; /* use bmdma for this */
+        return AC_ERR_OK; /* use bmdma for this */

    /* Fill in Gen IIE command request block */
    if (!((tf->flags & ATA_TFLAG_WRITE))
@@ -2199,8 +2199,10 @@
    );

    if (!(qc->flags & ATA_QCFLAG_DMAMAP))
-        return;
+        return AC_ERR_OK;
    mv_fill_sg(qc);
+        return AC_ERR_OK;
    }
```c
/**
 * @ -4108,6 +4110,10 @@
 * n_ports = nv_platform_data->n_ports;
 * irq = platform_get_irq(pdev, 0);
 *
 * +if (irq < 0)
 * +return irq;
 * +if (!irq)
 * +return -EINVAL;
 *
 * host = ata_host_alloc_pinfo(&pdev->dev, ppi, n_ports);
 * hpriv = devm_kzalloc(&pdev->dev, sizeof(*hpriv), GFP_KERNEL);
 * --- linux-4.15.0.orig/drivers/ata/sata_nv.c
 * +++ linux-4.15.0/drivers/ata/sata_nv.c
 * @@ -313,7 +313,7 @@
 * static void nv_ck804_thaw(struct ata_port *ap);
 * static int nv_adma_slave_config(struct scsi_device *sdev);
 * static int nv_adma_check_atapi_dma(struct ata_queued_cmd *qc);
 * -static void nv_adma_qc_prep(struct ata_queued_cmd *qc);
 * +static enum ata_completion_errors nv_adma_qc_prep(struct ata_queued_cmd *qc);
 * static unsigned int nv_adma_qc_issue(struct ata_queued_cmd *qc);
 * static irqreturn_t nv_adma_irq_handler(int irq, void *dev_instance);
 * static void nv_adma_irq_clear(struct ata_port *ap);
 * @@ -335,7 +335,7 @@
 * static void nv_swncq_error_handler(struct ata_port *ap);
 * static int nv_swncq_slave_config(struct scsi_device *sdev);
 * static int nv_swncq_port_start(struct ata_port *ap);
 * -static void nv_swncq_qc_prep(struct ata_queued_cmd *qc);
 * +static enum ata_completion_errors nv_swncq_qc_prep(struct ata_queued_cmd *qc);
 * static void nv_swncq_fill_sg(struct ata_queued_cmd *qc);
 * static unsigned int nv_swncq_qc_issue(struct ata_queued_cmd *qc);
 * static void nv_swncq_irq_clear(struct ata_port *ap, u16 fis);
 * @@ -1382,7 +1382,7 @@
 * return 1;
 * }
 *
 * -static void nv_adma_qc_prep(struct ata_queued_cmd *qc)
 * +static enum ata_completion_errors nv_adma_qc_prep(struct ata_queued_cmd *qc)
 * }
 * struct nv_adma_port_priv *pp = qc->ap->private_data;
 * struct nv_adma_cpb *cpb = &pp->cpb[qc->tag];
 * @@ -1394,7 +1394,7 @@
 * (qc->flags & ATA_QCFLAG_DMAMAP));
 * nv_adma_register_mode(qc->ap);
 * ata_bmdma_qc_prep(qc);
 * -return;
 * +return AC_ERR_OK;
 */
```
cpb->resp_flags = NV_CPB_RESP_DONE;
@@ -1426,6 +1426,8 @@
cpb->ctl_flags = ctl_flags;
    wmb();
    cpb->resp_flags = 0;
+    +return AC_ERR_OK;
}

static unsigned int nv_adma_qc_issue(struct ataqueued_cmd *qc)
@@ -1989,17 +1991,19 @@
return 0;
}

- static void nv_swncq_qc_prep(struct ataqueued_cmd *qc)
+ static enum ata_completion_errors nv_swncq_qc_prep(struct ataqueued_cmd *qc)
{
    if (qc->tf.protocol != ATA_PROT_NCQ) {
        ata_bmdma_qc_prep(qc);
-            return;
+            return AC_ERR_OK;
    }

    if (!(qc->flags & ATA_QCFLAG_DMAMAP))
-        return;
+        return AC_ERR_OK;

    nv_swncq_fill_sg(qc);
+        +return AC_ERR_OK;
}

static void nv_swncq_fill_sg(struct ataqueued_cmd *qc)
--- linux-4.15.0.orig/drivers/ata/sata_promise.c
+++ linux-4.15.0/drivers/ata/sata_promise.c
@@ -155,7 +155,7 @@
static int pdc_ata_init_one(struct pci_dev *pdev, const struct pci_device_id *ent);
static int pdc_common_port_start(struct ata_port *ap);
static int pdc_sata_port_start(struct ata_port *ap);
- static void pdc_qc_prep(struct ataqueued_cmd *qc);
+ static enum ata_completion_errors pdc_qc_prep(struct ataqueued_cmd *qc);
 static enum ata_completion_errors pdc_tf_load_mmio(struct ata_port *ap, const struct ata_taskfile *tf);
 static void pdc_exec_command_mmio(struct ata_port *ap, const struct ata_taskfile *tf);
 static int pdc_check_atapi_dma(struct ataqueued_cmd *qc);
@@ -649,7 +649,7 @@
 prd[idx - 1].flags_len |= cpu_to_le32(ATA_PRD_EOT);
static void pdc_qc_prep(struct ata_queued_cmd *qc)
{
    struct pdc_port_priv *pp = qc->ap->private_data;
    unsigned int i;
    default:
        break;
    }
    return AC_ERR_OK;
}

static int pdc_is_sataii_tx4(unsigned long flags)
--- linux-4.15.0.orig/drivers/ata/sata_qstor.c
+++ linux-4.15.0/drivers/ata/sata_qstor.c
@@ -116,7 +116,7 @@
static int qs_ata_init_one(struct pci_dev *pdev, const struct pci_device_id *ent);
static int qs_port_start(struct ata_port *ap);
static void qs_host_stop(struct ata_host *host);
-static void qs_qc_prep(struct ata_queued_cmd *qc);
+static enum ata_completion_errors qs_qc_prep(struct ata_queued_cmd *qc);
static unsigned int qs_qc_issue(struct ata_queued_cmd *qc);
static int qs_check_atapi_dma(struct ata_queued_cmd *qc);
static void qs_freeze(struct ata_port *ap);
@@ -276,7 +276,7 @@
    return si;
}

-static void qs_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors qs_qc_prep(struct ata_queued_cmd *qc)
{
    struct qs_port_priv *pp = qc->ap->private_data;
    u8 dflags = QS_DF_PORD, *buf = pp->pkt;
    qs_enter_reg_mode(qc->ap);
    if (qc->tf.protocol != ATA_PROT_DMA)
        return;
    +return AC_ERR_OK;
    nelem = qs_fill_sg(qc);
    return si;
} /* frame information structure (FIS) */
ata_tf_to_fis(&qc->tf, 0, 1, &buf[32]);
+
+return AC_ERR_OK;
+
static inline void qs_packet_start(struct ata_queued_cmd *qc)
--- linux-4.15.0.orig/drivers/ata/sata_rcar.c
+++ linux-4.15.0/drivers/ata/sata_rcar.c
@@ -122,7 +122,7 @@
/* Descriptor table word 0 bit (when DTA32M = 1) */
#define SATA_RCAR_DTEND			BIT(0)

#define SATA_RCAR_DMA_BOUNDARY		0x1FFFFFFEUL
+#define SATA_RCAR_DMA_BOUNDARY		0x1FFFFFFFUL

/* Gen2 Physical Layer Control Registers */
#define RCAR_GEN2_PHY_CTL1_REG		0x1704
@@ -551,12 +551,14 @@
   prd[si - 1].addr |= cpu_to_le32(SATA_RCAR_DTEND);

-static void sata_rcar_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors sata_rcar_qc_prep(struct ata_queued_cmd *qc)
{
   if (!(qc->flags & ATA_QCFLAG_DMAMAP))
-      return;
+      return AC_ERR_OK;
+
   sata_rcar_bmdma_fill_sg(qc);
+
+return AC_ERR_OK;
+
static void sata_rcar_bmdma_setup(struct ata_queued_cmd *qc)
@@ -879,7 +881,9 @@
   int ret = 0;

   irq = platform_get_irq(pdev, 0);
-   if (irq <= 0)
+   if (irq < 0)
+      return irq;
+      if (!irq)
        return -EINVAL;

   priv = devm_kzalloc(&pdev->dev, sizeof(struct sata_rcar_priv),
--- linux-4.15.0.orig/drivers/ata/sata_sil.c
+++ linux-4.15.0/drivers/ata/sata_sil.c
@@ -119,7 +119,7 @@
static int sil_scr_read(struct ata_link *link, unsigned int sc_reg, u32 *val);
static int sil_scr_write(struct ata_link *link, unsigned int sc_reg, u32 val);
static int sil_set_mode(struct ata_link *link, struct ata_device **r_failed);

@static void sil_qc_prep(struct ata_queued_cmd *qc);
+static enum ata_completion_errors sil_qc_prep(struct ata_queued_cmd *qc);
static void sil_bmdma_setup(struct ata_queued_cmd *qc);
static void sil_bmdma_start(struct ata_queued_cmd *qc);
static void sil_bmdma_stop(struct ata_queued_cmd *qc);

last_prd->flags_len |= cpu_to_le32(ATA_PRD_EOT);
{

@-static void sil_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors sil_qc_prep(struct ata_queued_cmd *qc)
{
if (!(qc->flags & ATA_QCFLAG_DMAMAP))
return;

return AC_ERR_OK;

sil_fill_sg(qc);
+
return AC_ERR_OK;

} static unsigned char sil_get_device_cache_line(struct pci_dev *pdev)
--- linux-4.15.0.orig/drivers/ata/sata_sil24.c
+++ linux-4.15.0/drivers/ata/sata_sil24.c
@@ -336,7 +336,7 @@
static int sil24_scr_read(struct ata_link *link, unsigned sc_reg, u32 *val);
static int sil24_scr_write(struct ata_link *link, unsigned sc_reg, u32 val);
static int sil24_qc_defer(struct ata_queued_cmd *qc);
-@-static void sil24_qc_prep(struct ata_queued_cmd *qc);
+static enum ata_completion_errors sil24_qc_prep(struct ata_queued_cmd *qc);
static unsigned int sil24_qc_issue(struct ata_queued_cmd *qc);
static bool sil24_qc_fill_rtf(struct ata_queued_cmd *qc);
static void sil24_pmp_attach(struct ata_port *ap);
@@ @ -840,7 +840,7 @@
return ata_std_qc_defer(qc);
{

-@-static void sil24_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors sil24_qc_prep(struct ata_queued_cmd *qc)
{
struct ata_port *ap = qc->ap;
struct sil24_port_priv *pp = ap->private_data;
@@ @ -884,6 +884,8 @@

if (qc->flags & ATA_QCFLAG_DMAMAP)
sil24_fill_sg(qc, sge);
+
+return AC_ERR_OK;
}

static unsigned int sil24_qc_issue(struct ata_queued_cmd *qc)
--- linux-4.15.0.orig/drivers/ata/sata_sx4.c
+++ linux-4.15.0/drivers/ata/sata_sx4.c
@@ -218,7 +218,7 @@
static void pdc_freeze(struct ata_port *ap);
static void pdc_thaw(struct ata_port *ap);
static int pdc_port_start(struct ata_port *ap);
-static void pdc20621_qc_prep(struct ata_queued_cmd *qc);
+static enum ata_completion_errors pdc20621_qc_prep(struct ata_queued_cmd *qc);
static void pdc_tf_load_mmio(struct ata_port *ap, const struct ata_taskfile *tf);
static void pdc_exec_command_mmio(struct ata_port *ap, const struct ata_taskfile *tf);
static unsigned int pdc20621_dimm_init(struct ata_host *host);
@@ -546,7 +546,7 @@
VPRINTK("ata pkt buf ofs %u, mmio copied\n", i);
}

-static void pdc20621_qc_prep(struct ata_queued_cmd *qc)
+static enum ata_completion_errors pdc20621_qc_prep(struct ata_queued_cmd *qc)
{
switch (qc->tf.protocol) {
case ATA_PROT_DMA:
@@ -558,6 +558,8 @@
default:
break;
}
+
+return AC_ERR_OK;
}

static void __pdc20621_push_hdma(struct ata_queued_cmd *qc,
--- linux-4.15.0.orig/drivers/atm/Kconfig
+++ linux-4.15.0/drivers/atm/Kconfig
@@ -200,7 -200,7 @@
make the card work).
config ATM_NICSTAR_USE_IDT77105
-bool "Use IDT77015 PHY driver (25Mbps)"
+bool "Use IDT77105 PHY driver (25Mbps)"
depends on ATM_NICSTAR
help
 Support for the PHYsical layer chip in ForeRunner LE25 cards. In
return -EMEDIUMTYPE;
}
dev_data = PRIV(dev);
- if (!dev_data->persist) return 0;
+ if (!dev_data->persist) {
+ atm_dev_put(dev);
+ return 0;
+ }
dev_data->persist = 0;
- if (PRIV(dev)->vcc) return 0;
+ if (PRIV(dev)->vcc) {
+ atm_dev_put(dev);
+ return 0;
+ }
kfree(dev_data);
atm_dev_put(dev);
atm_dev_deregister(dev);
--- linux-4.15.0.orig/drivers/atm/eni.c
+++ linux-4.15.0/drivers/atm/eni.c
@@ -372,7 +372,7 @@
here = (eni_vcc->descr+skip) & (eni_vcc->words-1);
dma[j++] = (here << MID_DMA_COUNT_SHIFT) | (vcc->vci
<< MID_DMA_VCI_SHIFT) | MID_DT_JK;
-j++;
+dma[j++] = 0;
} here = (eni_vcc->descr+size+skip) & (eni_vcc->words-1);
if (!eff) size += skip;
@@ -445,7 +445,7 @@
if (size != eff) {
    dma[j++] = (here << MID_DMA_COUNT_SHIFT) |
    (vcc->vci << MID_DMA_VCI_SHIFT) | MID_DT_JK;
-j++;
+dma[j++] = 0;
} if (!j || j > 2*RX_DMA_BUF) {
  printk(KERN_CRIT DEV_LABEL "\j or j too big!!!\n");
@@ -2243,7 +2243,7 @@
rc = dma_set_mask_and_coherent(&pci_dev->dev, DMA_BIT_MASK(32));
if (rc < 0)
  -goto out;
+goto err_disable;
rc = -ENOMEM;
eni_dev = kmalloc(sizeof(struct eni_dev), GFP_KERNEL);
@@ -2279,7 +2279,8 @@
return rc;

err_eni_release:
-eni_do_release(dev);
+dev->phy = NULL;
+iounmap(ENI_DEV(dev)->ioaddr);
err_unregister:
atm_dev_deregister(dev);
err_free_consistent:
--- linux-4.15.0.orig/drivers/atm/firestream.c
+++ linux-4.15.0/drivers/atm/firestream.c
@@ -927,6 +927,7 @@
}
if (!to) {
    printk ("No more free channels for FS50..\n");
+    kfree(vcc);
    return -EBUSY;
}
}
}

vcc->channo = dev->channo;
@@ -937,6 +938,7 @@
if (((DO_DIRECTION(rxtp) && dev->atm_vccs[vcc->channo]) ||
     ( DO_DIRECTION(txtp) && test_bit (vcc->channo, dev->tx_inuse))) {\n    printk ("Channel is in use for FS155.\n");
+    kfree(vcc);
    return -EBUSY;
 }
 }

@@ -950,6 +952,7 @@
if (!tc) {
    fs_dprintk (FS_DEBUG_OPEN, "fs: can’t alloc transmit_config \n");
+    kfree(vcc);
    return -ENOMEM;
}
}

error = make_rate (pcr, r, &tmc0, NULL);
if (error) {
    kfree(tc);
+    kfree(vcc);
    return error;
}
}

--- linux-4.15.0.orig/drivers/atm/fore200e.c
+++ linux-4.15.0/drivers/atm/fore200e.c
@@ -1504,12 +1504,14 @@
static void
fore200e_close(struct atm_vcc* vcc)
+    struct fore200e*        fore200e;
+    struct fore200e_vcc*    fore200e_vcc;
+    struct fore200e_vc_map* vc_map;
+    unsigned long           flags;

    ASSERT(vcc);
+    fore200e = FORE200E_DEV(vcc->dev);
+    fore200e_vcc = FORE200E_VCC(vcc);
+    vc_map = FORE200E_VC_MAP(vcc);
+    flags = vcc->flags;

    ASSERT((vcc->vpi >= 0) && (vcc->vpi < 1<<FORE200E_VPI_BITS));
    ASSERT((vcc->vci >= 0) && (vcc->vci < 1<<FORE200E_VCI_BITS));

    static int
fore200e_send(struct atm_vcc *vcc, struct sk_buff *skb)
{    struct fore200e*        fore200e;
    struct fore200e_vcc*    fore200e_vcc;
    struct fore200e_vc_map* vc_map;
    struct host_txq*        txq;
    struct host_txq_entry*  entry;
    struct tpd*             tpd;
    struct tpd_haddr        tpd_haddr;
    unsigned char*          data;
    unsigned long           flags;

    ASSERT(vcc);
    ASSERT(fore200e);
    ASSERT(fore200e_vcc);
    ASSERT(test_bit(ATM_VF_READY, &vcc->flags));
DPRINTK(1, "VC %d.%d.%d not ready for tx\n", vcc->itf, vcc->vpi, vcc->vpi);
--- linux-4.15.0.orig/drivers/atm/he.c
+++ linux-4.15.0/drivers/atm/he.c
@@ -717,7 +717,7 @@
   instead of '/ 512', use '>> 9' to prevent a call
to divu3 on x86 platforms
/*
-rate_cps = (unsigned long long) (1 << exp) * (man + 512) >> 9;
+rate_cps = (unsigned long long) (1UL << exp) * (man + 512) >> 9;

if (rate_cps < 10)
rate_cps = 10;/* 2.2.1 minimum payload rate is 10 cps */
--- linux-4.15.0.orig/drivers/atm/idt77105.c
+++ linux-4.15.0/drivers/atm/idt77105.c
@@ -261,7 +261,7 @@
{
   unsigned long flags;
-if (!(dev->dev_data = kmalloc(sizeof(struct idt77105_priv),GFP_KERNEL)))
+if (!(dev->phy_data = kmalloc(sizeof(struct idt77105_priv),GFP_KERNEL)))
   return -ENOMEM;
   PRIV(dev)->dev = dev;
   spin_lock_irqsave(&idt77105_priv_lock, flags);
@@ -336,7 +336,7 @@
else
   idt77105_all = walk->next;
   dev->phy = NULL;
-   dev->dev_data = NULL;
+   dev->phy_data = NULL;
   kfree(walk);
   break;
 }
--- linux-4.15.0.orig/drivers/atm/idt77252.c
+++ linux-4.15.0/drivers/atm/idt77252.c
@@ -3611,7 +3611,7 @@
if ((err = dma_set_mask_and_coherent(&pcidev->dev, DMA_BIT_MASK(32)))) {
   printk("idt77252: can't enable DMA for PCI device at %s\n", pci_name(pcidev));
   return err;
+goto err_out_disable_pdev;
 err_out_disable_pdev:
 card = kzalloc(sizeof(struct idt77252_dev), GFP_KERNEL);
--- linux-4.15.0.orig/drivers/atm/iphase.c
+++ linux-4.15.0/drivers/atm/iphase.c
@@ -63,6 +63,7 @@
#include <asm/byteorder.h>
#include <linux/vmalloc.h>

if ((err = dma_set_mask_and_coherent(&pcidev->dev, DMA_BIT_MASK(32)))) {
   printk("idt77252: can't enable DMA for PCI device at %s\n", pci_name(pcidev));
   return err;
   +goto err_out_disable_pdev;
 }

#include <asm/byteorder.h>
#include <linux/vmalloc.h>

```c
#include <linux/jiffies.h>
+#include <linux/nospec.h>
#include "iphase.h"
#include "suni.h"
#define swap_byte_order(x) (((x & 0xff) << 8) | ((x & 0xff00) >> 8))
@@ -2760,8 +2761,11 @@
    }
    if (copy_from_user(&ia_cmds, arg, sizeof ia_cmds)) return -EFAULT;
    board = ia_cmds.status;
-   if ((board < 0) || (board > iadev_count))
-       board = 0;
+   if ((board < 0) || (board > iadev_count))
+       board = 0;
+   board = array_index_nospec(board, iadev_count + 1);
+   iadev = ia_dev[board];
    switch (ia_cmds.cmd) {
    case MEMDUMP:
@@ -3297,7 +3301,7 @@
    pci_unregister_driver(&ia_driver);
    -       del_timer(&ia_timer);
    +       del_timer_sync(&ia_timer);
    }
module_init(ia_module_init);
--- linux-4.15.0.orig/drivers/atm/lanai.c
+++ linux-4.15.0/drivers/atm/lanai.c
@@ -2238,6 +2238,7 @@
    conf1_write(lanai);
    #endif
    iounmap(lanai->base);
+lanai->base = NULL;
    error_pci:
    pci_disable_device(lanai->pci);
    error:
@@ -2250,6 +2251,8 @@
    static void lanai_dev_close(struct atm_dev *atmdev)
    {
    struct lanai_dev *lanai = (struct lanai_dev *) atmdev->dev_data;
+   if (lanai->base==NULL)
+       return;
    printk(KERN_INFO DEV_LABEL "(itf %d): shutting down interface\n",
        lanai->number);
    lanai_timed_poll_stop(lanai);
@@ -2559,7 +2562,7 @@
```
struct atm_dev *atmdev;
int result;

-lanai = kmalloc(sizeof(*lanai), GFP_KERNEL);
+lanai = kzalloc(sizeof(*lanai), GFP_KERNEL);
if (lanai == NULL) {
printk(KERN_ERR DEV_LABEL 
    " : couldn't allocate dev_data structure!\n");
--- linux-4.15.0.orig/drivers/atm/nicstar.c
+++ linux-4.15.0/drivers/atm/nicstar.c
@@ -296,7 +296,7 @@
{
XPRINTK("nicstar: nicstar_cleanup() called.\n");

-del_timer(&ns_timer);
+del_timer_sync(&ns_timer);

pci_unregister_driver(&nicstar_driver);

 @@ -524,6 +524,15 @@
 /* Set the VPI/VCI MSb mask to zero so we can receive OAM cells */
writel(0x00000000, card->membase + VPM);

+card->intcnt = 0;
+if (request_irq
+    (pcidev->irq, &ns_irq_handler, IRQF_SHARED, "nicstar", card) != 0) {
+    pr_err("nicstar%d: can't allocate IRQ %d.\n", i, pcidev->irq);
+    error = 9;
+    ns_init_card_error(card, error);
+    return error;
+}
+/* Initialize TSQ */
+card->tsq.org = dma_alloc_coherent(&card->pcidev->dev,
+    NS_TSQSIZE + NS_TSQ_ALIGNMENT,
@@ -750,15 +759,6 @@
card->efbie = 1;

-card->intcnt = 0;
-if (request_irq
-    (pcidev->irq, &ns_irq_handler, IRQF_SHARED, "nicstar", card) != 0) {
-    printk("nicstar%d: can't allocate IRQ %d.\n", i, pcidev->irq);
-    error = 9;
-    ns_init_card_error(card, error);
-    return error;
-}
/* Register device */
card->atmdev = atm_dev_register("nicstar", &card->pcidev->dev, &atm_ops,
-1, NULL);
@@ -836,10 +836,12 @@
dev_kfree_skb_any(hb);
}
if (error >= 12) {
-kfree(card->rsq.org);
+dma_free_coherent(&card->pcidev->dev, NS_RSQSIZE + NS_RSQ_ALIGNMENT,
+card->rsq.org, card->rsq.dma);
}
if (error >= 11) {
-kfree(card->tsq.org);
+dma_free_coherent(&card->pcidev->dev, NS_TSQSIZE + NS_TSQ_ALIGNMENT,
+card->tsq.org, card->tsq.dma);
}
if (error >= 10) {
-free_irq(card->pcidev->irq, card);
@@ -1705,6 +1707,8 @@
if (push_scqe(card, vc, &scqe, skb) != 0) {
atomic_inc(&vcc->stats->tx_err);
+dma_unmap_single(&card->pcidev->dev, NS_PRV_DMA(skb), skb->len,
+DMA_TO_DEVICE);
dev_kfree_skb_any(skb);
return -EIO;
}
--- linux-4.15.0.orig/drivers/atm/uPD98402.c
+++ linux-4.15.0/drivers/atm/uPD98402.c
@@ -210,7 +210,7 @@
static int uPD98402_start(struct atm_dev *dev)
{
DPRINTK("phy_start\n");
-if (!(dev->dev_data = kmalloc(sizeof(struct uPD98402_priv),GFP_KERNEL)))
+if (!(dev->phy_data = kmalloc(sizeof(struct uPD98402_priv),GFP_KERNEL)))
return -ENOMEM;
spin_lock_init(&PRIV(dev)->lock);
memset(&PRIV(dev)->sonet_stats,0,sizeof(struct k_sonet_stats));
--- linux-4.15.0.orig/drivers/atm/zatm.c
+++ linux-4.15.0/drivers/atm/zatm.c
@@ -28,6 +28,7 @@
#include <asm/io.h>
#include <linux/atomic.h>
#include <linux/uaccess.h>
+#include <linux/nospec.h>

#include "uPD98401.h"
#include "uPD98402.h"
```c
#define zin_n(r) inl(zatm_dev->base+r*4)
#define zin(r) inl(zatm_dev->base+uPD98401_##r*4)
#define zout(v,r) outl(v,zatm_dev->base+uPD98401_##r*4)
#define zwait while (zin(CMR) & uPD98401_BUSY)
#define zwait() do {} while (zin(CMR) & uPD98401_BUSY)

/* RX0, RX1, TX0, TX1 */
static const int mbx_entries[NR_MBX] = { 1024,1024,1024,1024 };

static void zpokel(struct zatm_dev *zatm_dev,u32 value,u32 addr)
{
    -zwait;
    +zwait();
    zout(value,CER);
    zout(uPD98401_IND_ACC | uPD98401_IA_BALL |
         (uPD98401_IA_TGT_CM << uPD98401_IA_TGT_SHIFT) | addr,CMR);
}

static u32 zpeekl(struct zatm_dev *zatm_dev,u32 addr)
{
    -zwait;
    +zwait();
    zout(uPD98401_IND_ACC | uPD98401_IA_BALL | uPD98401_IA_RW |
         (uPD98401_IA_TGT_CM << uPD98401_IA_TGT_SHIFT) | addr,CMR);
    -zwait;
    +zwait();
    return zin(CER);
}
```

@ @ -125,7 +126,7 @@
#define zin_n(r) inl(zatm_dev->base+r*4)
#define zin(r) inl(zatm_dev->base+uPD98401_##r*4)
#define zout(v,r) outl(v,zatm_dev->base+uPD98401_##r*4)
-#define zwait while (zin(CMR) & uPD98401_BUSY)
+#define zwait() do {} while (zin(CMR) & uPD98401_BUSY)

/* RX0, RX1, TX0, TX1 */
static const int mbx_entries[NR_MBX] = { 1024,1024,1024,1024 };

@ @ -139,7 +140,7 @@
static void zpokel(struct zatm_dev *zatm_dev,u32 value,u32 addr)
{
    -zwait;
    +zwait();
    zout(value,CER);
    zout(uPD98401_IND_ACC | uPD98401_IA_BALL |
         (uPD98401_IA_TGT_CM << uPD98401_IA_TGT_SHIFT) | addr,CMR);
}

static u32 zpeekl(struct zatm_dev *zatm_dev,u32 addr)
{
    -zwait;
    +zwait();
    zout(uPD98401_IND_ACC | uPD98401_IA_BALL | uPD98401_IA_RW |
         (uPD98401_IA_TGT_CM << uPD98401_IA_TGT_SHIFT) | addr,CMR);
    -zwait;
    +zwait();
    return zin(CER);
}
```

@ @ -148,10 +149,10 @@

@ @ -240,7 +241,7 @@
}
if (first) {
    spin_lock_irqsave(&zatm_dev->lock, flags);
    -zwait;
    +zwait();
    zout(virt_to_bus(first),CER);
    zout(uPD98401_ADD_BAT | (pool << uPD98401_POOL_SHIFT) | count,
         CMR);
    @ @ -507,9 +508,9 @@
}
if (zatm_vcc->pool < 0) return -EMSGSIZE;
spin_lock_irqsave(&zatm_dev->lock, flags);
    -zwait;
    +zwait();
    zout(uPD98401_OPEN_CHAN,CMR);
    -zwait;
```
+zwait();
DPRINTK("0x%x 0x%x
",zin(CMR),zin(CER));
chan = (zin(CMR) & uPD98401_CHAN_ADDR) >> uPD98401_CHAN_ADDR_SHIFT;
spin_unlock_irqrestore(&zatm_dev->lock, flags);
@@ -570,21 +571,21 @@
pos = vcc->vci >> 1;
shift = (1-(vcc->vci & 1)) << 4;
zpokel(zatm_dev,zpeekl(zatm_dev,pos) & ~(0xffff << shift),pos);
-zwait;
+zwait();
zout(uPD98401_NOP,CMR);
-zwait;
+zwait();
zout(uPD98401_NOP,CMR);
spin_unlock_irqrestore(&zatm_dev->lock, flags);
}
spin_lock_irqsave(&zatm_dev->lock, flags);
-zwait;
+zwait();
zout(uPD98401_DEACT_CHAN | uPD98401_CHAN_RT | (zatm_vcc->rx_chan << 
uPD98401_CHAN_ADDR_SHIFT),CMR);
-zwait;
+zwait();
udelay(10); /* why oh why ... ? */
zout(uPD98401_CLOSE_CHAN | uPD98401_CHAN_RT | (zatm_vcc->rx_chan << 
uPD98401_CHAN_ADDR_SHIFT),CMR);
-zwait;
+zwait();
if (!zin(CMR) & uPD98401_CHAN_ADDR)
printk(KERN_CRIT DEV_LABEL "(itf %d): can't close RX channel 
" "%d\n",vcc->dev->number,zatm_vcc->rx_chan);
@@ -698,7 +699,7 @@
skb_queue_tail(&zatm_vcc->tx_queue,skb);
DPRINTK("QRP=0x%010lx",zpeekl(zatm_dev,zatm_vcc->tx_chan*VC_SIZE/4+ 
uPD98401_TXVC_QRP));
-zwait;
+zwait();
zout(uPD98401_TX_READY | (zatm_vcc->tx_chan << 
 uPD98401_CHAN_ADDR_SHIFT),CMR);
spin_unlock_irqrestore(&zatm_dev->lock, flags);
@@ -890,12 +891,12 @@
}
spin_lock_irqsave(&zatm_dev->lock, flags);
#if 0
-zwait;
+zwait();
zout(uPD98401_DEACT_CHAN | (chan << uPD98401_CHAN_ADDR_SHIFT),CMR);
#endif
-zwait;
zout(uPD98401_CLOSE_CHAN | (chan << uPD98401_CHAN_ADDR_SHIFT),CMR);
-zwait;
+zwait();

if (!(zin(CMR) & uPD98401_CHAN_ADDR))
printk(KERN_CRIT DEV_LABEL "(itf %d): can't close TX channel ",
    "%d\n",vcc->dev->number,chan);
@@ -925,9 +926,9 @@
zatm_vcc->tx_chan = 0;
if (vcc->qos.txtp.traffic_class == ATM_NONE) return 0;
spin_lock_irqsave(&zatm_dev->lock, flags);
-zwait;
+zwait();
zout(uPD98401_OPEN_CHAN,CMR);
-zwait;
+zwait();
DPRINTK("0x%x 0x%x\n",zin(CMR),zin(CER));
chan = (zin(CMR) & uPD98401_CHAN_ADDR) >> uPD98401_CHAN_ADDR_SHIFT;
spin_unlock_irqrestore(&zatm_dev->lock, flags);
@@ -1150,8 +1151,8 @@
}
sizeof(info))) return -EFAULT;
@media -1554,7 +1559,7 @@
struct zatm_dev *zatm_dev;

zatm_dev = ZATM_DEV(dev);
-zwait;
+zwait();
zout(value,CER);
zout(uPD98401_IND_ACC | uPD98401_IA_B0 |
        (uPD98401_IA_TGT_PHY << uPD98401_IA_TGT_SHIFT) | addr,CMR);
@media -1566,10 +1571,10 @@
struct zatm_dev *zatm_dev;

zatm_dev = ZATM_DEV(dev);
-zwait;
+zwait();
zout(uPD98401_IND_ACC | uPD98401_IA_B0 | uPD98401_IA_RW |
        (uPD98401_IA_TGT_PHY << uPD98401_IA_TGT_SHIFT) | addr,CMR);
-zwait;
+zwait();
return zin(CER) & 0xff;
}

--- linux-4.15.0.orig/drivers/auxdisplay/Kconfig
+++ linux-4.15.0/drivers/auxdisplay/Kconfig
@media -14,9 +14,6 @@

If you say N, all options in this submenu will be skipped and disabled.

-config CHARLCD
-tristate "Character LCD core support" if COMPILE_TEST
-
if AUXDISPLAY

config HD44780
@media -157,8 +154,6 @@
Say yes here to add support for Holtek HT16K33, RAM mapping 16*8
LED controller driver with keyscan.

-endif # AUXDISPLAY
-
config ARM_CHARLCD
bool "ARM Ltd. Character LCD Driver"
depends on PLAT_VERSATILE
@media -169,6 +164,8 @@
line and the Linux version on the second line, but that's
still useful.
+endif # AUXDISPLAY
+
+config PANEL
+tristate "Parallel port LCD/Keypad Panel support"
depends on PARPORT
@@ -448,3 +445,6 @@
   printf()-formatted message is valid with newline and escape codes.

endif # PANEL
+
+config CHARLCD
+tristate "Character LCD core support" if COMPILE_TEST
--- linux-4.15.0.orig/drivers/auxdisplay/hd44780.c
+++ linux-4.15.0/drivers/auxdisplay/hd44780.c
@@ -302,6 +302,8 @@
   struct charlcd *lcd = platform_get_drvdata(pdev);

charlcd_unregister(lcd);
+
+kfree(lcd);
return 0;
}

--- linux-4.15.0.orig/drivers/auxdisplay/ht16k33.c
+++ linux-4.15.0/drivers/auxdisplay/ht16k33.c
@@ -125,8 +125,7 @@
{
   struct ht16k33_fbdev *fbdev = &priv->fbdev;

-schedule_delayed_work(&fbdev->work,
- msecs_to_jiffies(HZ / fbdev->refresh_rate));
+schedule_delayed_work(&fbdev->work, HZ / fbdev->refresh_rate);
}

/*
 @@ -517,7 +516,7 @@
 struct ht16k33_priv *priv = i2c_get_clientdata(client);
 struct ht16k33_fbdev *fbdev = &priv->fbdev;

-cancel_delayed_work(&fbdev->work);
+cancel_delayed_work_sync(&fbdev->work);
 unregister_framebuffer(fbdev->info);
 framebuffer_release(fbdev->info);
 free_page((unsigned long) fbdev->buffer);
--- linux-4.15.0.orig/drivers/auxdisplay/img-ascii-lcd.c
+++ linux-4.15.0/drivers/auxdisplay/img-ascii-lcd.c
@@ -441,3 +441,7 @@
.remove= img_ascii_lcd_remove,
module_platform_driver(img_ascii_lcd_driver);
+
+MODULE_DESCRIPTION("Imagination Technologies ASCII LCD Display");
+MODULE_AUTHOR("Paul Burton <paul.burton@mips.com>");
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/auxdisplay/panel.c
+++ linux-4.15.0/drivers/auxdisplay/panel.c
@@ -1622,6 +1622,8 @@
 return;

 err_lcd_unreg:
+if (scan_timer.function)
+del_timer_sync(&scan_timer);
if (lcd.enabled)
charlcd_unregister(lcd.charlcd);
err_unreg_device:
--- linux-4.15.0.orig/drivers/base/Kconfig
+++ linux-4.15.0/drivers/base/Kconfig
@@ -249,6 +249,7 @@
 select ANON_INODES
+select IRQ_WORK
 help
   This option enables the framework for buffer-sharing between
   multiple drivers. A buffer is associated with a file using driver
--- linux-4.15.0.orig/drivers/base/arch_topology.c
+++ linux-4.15.0/drivers/base/arch_topology.c
@@ -175,11 +175,11 @@
} #ifdef CONFIG_CPU_FREQ
-static cpumask_var_t cpus_to_visit __initdata;
-static void __init parsing_done_workfn(struct work_struct *work);
-static __initdata DECLARE_WORK(parsing_done_work, parsing_done_workfn);
+static cpumask_var_t cpus_to_visit;
+static void parsing_done_workfn(struct work_struct *work);
+static DECLARE_WORK(parsing_done_work, parsing_done_workfn);

-static int __init
+static int
init_cpu_capacity_callback(struct notifier_block *nb,
   unsigned long val,
   void *data)
@@ -215,7 +215,7 @@
 return 0;
}
static struct notifier_block init_cpu_capacity_notifier __initdata = {
    .notifier_call = init_cpu_capacity_callback,
};

core_initcall(register_cpufreq_notifier);

static void __init parsing_done_workfn(struct work_struct *work)
{
    cpufreq_unregister_notifier(&init_cpu_capacity_notifier,
        CPUFREQ_POLICY_NOTIFIER);
}

struct klist_node knode_bus;
struct list_head deferred_probe;
struct device *device;

#define to_device_private_parent(obj)	        container_of(obj, struct device_private, knode_parent)
#define DRIVER_ATTR_IGNORE_LOCKDEP(_name, _mode, _show, _store) \
                    struct driver_attribute driver_attr_##_name =
                        __ATTR_IGNORE_LOCKDEP(_name, _mode, _show, _store)

static int __must_check bus_rescan_devices_helper(struct device *dev,
    void *data);

#define to_drv_attr(_attr) container_of(_attr, struct driver_attribute, attr)

#define DRIVER_ATTR_IGNORE_LOCKDEP(_name, _mode, _show, _store) \
                struct driver_attribute driver_attr_##_name =
                    __ATTR_IGNORE_LOCKDEP(_name, _mode, _show, _store)
bus_put(bus);
return err;
}

/*
 * Manually attach a device to a driver.
 */
bus_put(bus);
return err;
}

static DRIVER_ATTR_WO(bind);
+static DRIVER_ATTR_IGNORE_LOCKDEP(bind, S_IWUSR, NULL, bind_store);

static ssize_t show_drivers_autoprobe(struct bus_type *bus, char *buf)
{
    int rc;
    +
rc = kobject_synth_uevent(&bus->p->subsys.kobj, buf, count);
+return rc ? rc : count;
}
static DRIVER_ATTR_WO(uevent);

static ssize_t bus_uevent_store(struct bus_type *bus,
const char *buf, size_t count)
{
    int rc;
    +rc = kobject_synth_uevent(&bus->p->subsys.kobj, buf, count);
+return rc ? rc : count;
}
static BUS_ATTR(uevent, S_IWUSR, NULL, bus_uevent_store);

--- linux-4.15.0.orig/drivers/base/cacheinfo.c
+++ linux-4.15.0/drivers/base/cacheinfo.c
@@ -43,50 +43,10 @@
}

--- linux-4.15.0/drivers/base/cacheinfo.c
+++ linux-4.15.0/drivers/base/cacheinfo.c
@@ -830,8 +835,10 @@
}

#ifdef CONFIG_OF
-static int cache_setup_of_node(unsigned int cpu)
-
-struct device_node *np;
-struct cacheinfo *this_leaf;
-struct device *cpu_dev = get_cpu_device(cpu);
-struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
-unsigned int index = 0;
-
-/* skip if of_node is already populated */
-if (this_cpu_ci->info_list->of_node)
- return 0;
-
- if (!cpu_dev) {
- pr_err("No cpu device for CPU %d\n", cpu);
- return -ENODEV;
- }
- np = cpu_dev->of_node;
- if (!np) {
- pr_err("Failed to find cpu%d device node\n", cpu);
- return -ENOENT;
- }
-
- while (index < cache_leaves(cpu)) {
- this_leaf = this_cpu_ci->info_list + index;
- if (this_leaf->level != 1)
- np = of_find_next_cache_node(np);
- else
- np = of_node_get(np); /* cpu node itself */
- if (!np)
- break;
- this_leaf->of_node = np;
- index++;
- }
-
- if (index != cache_leaves(cpu)) /* not all OF nodes populated */
- return -ENOENT;
-
- return 0;
- }
-
- static inline bool cache_leaves_are_shared(struct cacheinfo *this_leaf,
- struct cacheinfo *sib_leaf)
{
- return sib_leaf->of_node == this_leaf->of_node;
+ return sib_leaf->fw_token == this_leaf->fw_token;
}

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/* OF properties to query for a given cache type */
@@ -122,7 +82,7 @@
    return type;
 }

-static void cache_size(struct cacheinfo *this_leaf)
+static void cache_size(struct cacheinfo *this_leaf, struct device_node *np)
{
    const char *proppname;
    const __be32 *cache_size;
@@ -131,13 +91,14 @@
            ct_idx = get_cacheinfo_idx(this_leaf->type);
            propname = cache_type_info[ct_idx].size_prop;

            -cache_size = of_get_property(this_leaf->of_node, propname, NULL);
+            cache_size = of_get_property(np, propname, NULL);
            if (cache_size)
                this_leaf->size = of_read_number(cache_size, 1);
    }

    /* not cache_line_size() because that's a macro in include/linux/cache.h */
-static void cache_get_line_size(struct cacheinfo *this_leaf)
+static void cache_get_line_size(struct cacheinfo *this_leaf,
+        struct device_node *np)
{
    const __be32 *line_size;
    int i, lim, ct_idx;
@@ -149,7 +110,7 @@
            propname = cache_type_info[ct_idx].line_size_props[i];
            -line_size = of_get_property(this_leaf->of_node, propname, NULL);
+            line_size = of_get_property(np, propname, NULL);
            if (line_size)
                break;
    }
@@ -158,7 +119,7 @@
            this_leaf->coherency_line_size = of_read_number(line_size, 1);
    }

-static void cache_nr_sets(struct cacheinfo *this_leaf)
+static void cache_nr_sets(struct cacheinfo *this_leaf, struct device_node *np)
{
    const char *proppname;
    const __be32 *nr_sets;
@@ -167,7 +128,7 @@
            ct_idx = get_cacheinfo_idx(this_leaf->type);
            propname = cache_type_info[ct_idx].nr_sets_prop;
nr_sets = of_get_property(this_leaf->of_node, propname, NULL);
if (nr_sets)
this_leaf->number_of_sets = of_read_number(nr_sets, 1);
}

this_leaf->ways_of_associativity = (size / nr_sets) / line_size;

static bool cache_node_is_unified(struct cacheinfo *this_leaf,
struct device_node *np)
{
return of_property_read_bool(np, "cache-unified");
}

static void cache_of_set_props(struct cacheinfo *this_leaf,
struct device_node *np)
{
/* init_cache_level must setup the cache level correctly
* overriding the architecturally specified levels, so
* if type is NONE at this stage, it should be unified
*/
if (this_leaf->type == CACHE_TYPE_NOCACHE &&
    cache_node_is_unified(this_leaf, np))
    this_leaf->type = CACHE_TYPE_UNIFIED;
    cache_size(this_leaf, np);
    cache_get_line_size(this_leaf, np);
    cache_nr_sets(this_leaf, np);
    cache_associativity(this_leaf);
}

static int cache_setup_of_node(unsigned int cpu)
{
struct device_node *np;
struct cacheinfo *this_leaf;
struct device *cpu_dev = get_cpu_device(cpu);
struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
unsigned int index = 0;

for (index = 0; index < cache_leaves(cpu); index++) {
/* skip if fw_token is already populated */
if (this_cpu_ci->info_list->fw_token) {
    /*...*/
}
+return 0;
+
+if (!cpu_dev) {
+  pr_err("No cpu device for CPU %d\n", cpu);
+  return -ENODEV;
+}
+np = cpu_dev->of_node;
+if (!np) {
+  pr_err("Failed to find cpu%d device node\n", cpu);
+  return -ENOENT;
+}

+while (index < cache_leaves(cpu)) {
    this_leaf = this_cpu_ci->info_list + index;
    /*
    * init_cache_level must setup the cache level correctly
    * overriding the architecturally specified levels, so
    * if type is NONE at this stage, it should be unified
    */
    -if (this_leaf->type == CACHE_TYPE_NOCACHE &&
        cache_node_is_unified(this_leaf))
        -this_leaf->type = CACHE_TYPE_UNIFIED;
        -cache_size(this_leaf);
        -cache_get_line_size(this_leaf);
        -cache_nr_sets(this_leaf);
        -cache_associativity(this_leaf);
        +if (this_leaf->level != 1)
            +np = of_find_next_cache_node(np);
        +else
            +np = of_node_get(np);/* cpu node itself */
            +if (!np)
                +break;
            +cache_of_set_props(this_leaf, np);
            +this_leaf->fw_token = np;
            +index++;
    }
    +
    +if (index != cache_leaves(cpu)) /* not all OF nodes populated */
        +return -ENOENT;
    +
    +return 0;
}
#else
-static void cache_of_override_properties(unsigned int cpu) { }
static inline int cache_setup_of_node(unsigned int cpu) { return 0; }
static inline bool cache_leaves_are_shared(struct cacheinfo *this_leaf,
    struct cacheinfo *sib_leaf)
/*
 * For non-DT systems, assume unique level 1 cache, system-wide
 * For non-DT/ACPI systems, assume unique level 1 caches, system-wide
 * shared caches for all other levels. This will be used only if
 * arch specific code has not populated shared_cpu_map
 */
@@ -228,6 +225,11 @@
}
#endif

+int __weak cache_setup_acpi(unsigned int cpu)
+{
+    return -ENOTSUPP;
+}
+
static int cache_shared_cpu_map_setup(unsigned int cpu)
{
    struct cpu_cacheinfo *this_cpu_ci = get_cpu_cacheinfo(cpu);
@@ -241,8 +243,8 @@
    if (of_have_populated_dt())
        ret = cache_setup_of_node(cpu);
    else if (!acpi_disabled)
-        /* No cache property/hierarchy support yet in ACPI */
-        ret = -ENOTSUPP;
+        ret = cache_setup_acpi(cpu);
        if (ret)
            return ret;
    cpumask_clear_cpu(cpu, &sib_leaf->shared_cpu_map);
    cpumask_clear_cpu(sibling, &this_leaf->shared_cpu_map);
@@ -293,16 +295,11 @@
    //of_node_put(this_leaf->of_node);
    +if (of_have_populated_dt())
    +of_node_put(this_leaf->fw_token);
    }
    -static void cache_override_properties(unsigned int cpu)
    -{
    -if (of_have_populated_dt())
    -return cache_of_override_properties(cpu);
    -}
    -static void free_cache_attributes(unsigned int cpu)
    {
if (!per_cpu_cacheinfo(cpu))
	@return -ENOMEM;
/*
 * populate_cache_leaves() may completely setup the cache leaves and
 * shared_cpu_map or it may leave it partially setup.
 */
ret = populate_cache_leaves(cpu);
if (ret)
goto free_ci;
/*
 - * For systems using DT for cache hierarchy, of_node and shared_cpu_map
 - * will be set up here only if they are not populated already
 + * For systems using DT for cache hierarchy, fw_token
 + * and shared_cpu_map will be set up here only if they are
 + * not populated already
 */
ret = cache_shared_cpu_map_setup(cpu);
if (ret) {
	goto free_ci;
}
free_ci:
	@return 0;
static int __init cacheinfo_sysfs_init(void)
{
	return cpuhp_setup_state(CPUHP_AP_BASE_CACHEINFO_ONLINE,
			"base/cacheinfo:online",
			cacheinfo_cpu_online, cacheinfo_cpu_pre_down);
}
return ret;
}

@@ -431,8 +432,9 @@
devres_release_group(component->dev, NULL);
devres_release_group(master->dev, NULL);

-dev_err(master->dev, "failed to bind \%s (ops \%ps): \%d\n",
-dev_name(component->dev), component->ops, ret);
+if (ret != -EPROBE_DEFER)
+dev_err(master->dev, "failed to bind \%s (ops \%ps): \%d\n",
+dev_name(component->dev), component->ops, ret);
}

return ret;
@@ -461,9 +463,9 @@
}

if (ret != 0) {
 -for (; i--; )
 -if (!master->match->compare[i].duplicate) {
 -c = master->match->compare[i].component;
 +for (; i > 0; i--)
 +if (!master->match->compare[i - 1].duplicate) {
 +c = master->match->compare[i - 1].component;
 component_unbind(c, master, data);
 }
}
--- linux-4.15.0.orig/drivers/base/core.c
+++ linux-4.15.0/drivers/base/core.c
@@ -95,6 +96,16 @@
#endif /* !CONFIG_SRCU */

+static bool device_is_ancestor(struct device *dev, struct device *target)
+{
+while (target->parent) {
+target = target->parent;
+if (dev == target)
+return true;
+
+
+//#include <linux/cpufreq.h>
#include <linux/device.h>
#include <linux/err.h>
#include <linux/fwnode.h>
@@ -95.6 +96.16 @@
}
#endif /* !CONFIG_SRCU */

+static bool device_is_ancestor(struct device *dev, struct device *target)
+{
+while (target->parent) {
+target = target->parent;
+if (dev == target)
+return true;


/**
 * device_is_dependent - Check if one device depends on another one
 * @dev: Device to check dependencies for.
 * @@ -108,7 +119,12 @@
 * struct device_link *link;
 * int ret;
 *
 * -if (WARN_ON(dev == target))
 *+/*
 * + * The "ancestors" check is needed to catch the case when the target
 * + * device has not been completely initialized yet and it is still
 * + * missing from the list of children of its parent device.
 * + */
 * +if (dev == target || device_is_ancestor(dev, target))
 * return 1;
 *
 * ret = device_for_each_child(dev, target, device_is_dependent);
 * @@ -179,11 +195,20 @@
 * struct device *supplier, u32 flags)
 * {
 * struct device_link *link;
 * +bool rpm_put_supplier = false;
 *
 * if (!consumer || !supplier ||
 * ((flags & DL_FLAG_STATELESS) && (flags & DL_FLAG_AUTOREMOVE)))
 * return NULL;
 *
 * +if (flags & DL_FLAG_PM_RUNTIME && &flags & DL_FLAG_RPM_ACTIVE) {
 * +if (pm_runtime_get_sync(supplier) < 0) {
 * +pm_runtime_put_noidle(supplier);
 * +return NULL;
 * +}
 * +rpm_put_supplier = true;
 * +}
 * +
 * device_links_write_lock();
 * device_pm_lock();
 *
 * @@ -208,15 +233,17 @@
 *
 * if (flags & DL_FLAG_PM_RUNTIME) {
 * if (flags & DL_FLAG_RPM_ACTIVE) {
 * -if (pm_runtime_get_sync(supplier) < 0) {
 * -pm_runtime_put_noidle(supplier);
 * +else {
 * +pm_runtime_put_noidle(supplier);
 * +return NULL;
 * +}
 * +rpm_put_supplier = true;
 * +}
 * +
 * device_links_write_lock();
 * device_pm_lock();
 * +}
 */
- kfree(link);
- link = NULL;
- goto out;
-
link->rpm_active = true;
+ rpm_put_supplier = false;
}
pm_runtime_new_link(consumer);
+/
+ * If the link is being added by the consumer driver at probe
+ * time, balance the decrementation of the supplier's runtime PM
+ * usage counter after consumer probe in driver_probe_device().
+ */
+if (consumer->links.status == DL_DEV_PROBING)
+ pm_runtime_get_noresume(supplier);
}
get_device(supplier);
link->supplier = supplier;
@@ -231,17 +258,26 @@
link->status = DL_STATE_NONE;
} else {
switch (supplier->links.status) {
- case DL_DEV_DRIVER_BOUND:
+ case DL_DEV_PROBING:
+ case DL_DEV_PROBING:
switch (consumer->links.status) {
 case DL_DEV_DRIVER_BOUND:
/*
 - * Balance the decrementation of the supplier's
 - * runtime PM usage counter after consumer probe
 - * in driver_probe_device().
 + * A consumer driver can create a link to a
 + * supplier that has not completed its probing
 + * yet as long as it knows that the supplier is
 + * already functional (for example, it has just
 + * acquired some resources from the supplier).
 */
 -if (flags & DL_FLAG_PM_RUNTIME)
- pm_runtime_get_sync(supplier);
-
+link->status = DL_STATE_CONSUMER_PROBE;
+break;
+default:
+link->status = DL_STATE_DORMANT;
+break;
+}
+break;
+case DL_DEV_DRIVER_BOUND:
+switch (consumer->links.status) {

+case DL_DEV_PROBING:
link->status = DL_STATE_CONSUMER_PROBE;
break;

case DL_DEV_DRIVER_BOUND:
@@ -262,6 +298,14 @@
} 

/*
+ * Some callers expect the link creation during consumer driver probe to
+ * resume the supplier even without DL_FLAG_RPM_ACTIVE.
+ */
+if (link->status == DL_STATE_CONSUMER_PROBE &&
+ flags & DL_FLAG_PM_RUNTIME)
+pm_runtime_resume(supplier);
+
+/*
 * Move the consumer and all of the devices depending on it to the end
 * of dpm_list and the devices_kset list.
 * 
@@ -278,6 +322,10 @@
 out:
 device_pm_unlock();
 device_links_write_unlock();
+
+if (rpm_put_supplier)
+pm_runtime_put(supplier);
+
return link;
}
 EXPORT_SYMBOL_GPL(device_link_add);
@@ -313,6 +361,9 @@
dev_info(link->consumer, "Dropping the link to %s\n",
 dev_name(link->supplier));

+if (link->flags & DL_FLAG_PM_RUNTIME)
+pm_runtime_drop_link(link->consumer);
+
list_del(&link->s_node);
list_del(&link->c_node);
device_link_free(link);
@@ -406,6 +457,16 @@
if (link->flags & DL_FLAG_STATELESS)
 continue;
+
+ /* Links created during consumer probe may be in the "consumer
+ * probe" state to start with if the supplier is still probing
+ * when they are created and they may become "active" if the
+ * consumer probe returns first. Skip them here.
+ */
+if (link->status == DL_STATE_CONSUMER_PROBE ||
  link->status == DL_STATE_ACTIVE)
+continue;
+
+WARN_ON(link->status != DL_STATE_DORMANT);
+WRITE_ONCE(link->status, DL_STATE_AVAILABLE);
}
@@ -445,17 +506,48 @@
if (link->flags & DL_FLAG_AUTOREMOVE)
  __device_link_del(link);
-else if (link->status != DL_STATE_SUPPLIER_UNBIND)
+else if (link->status == DL_STATE_CONSUMER_PROBE ||
  link->status == DL_STATE_ACTIVE)
+WRITE_ONCE(link->status, DL_STATE_AVAILABLE);
}

dev->links.status = DL_DEV_NO_DRIVER;
}

+/**
+ * device_links_no_driver - Update links after failing driver probe.
+ * @dev: Device whose driver has just failed to probe.
+ *
+ * Clean up leftover links to consumers for @dev and invoke
+ * __device_links_no_driver() to update links to suppliers for it as
+ * appropriate.
+ *
+ * Links with the DL_FLAG_STATELESS flag set are ignored.
+ */
void device_links_no_driver(struct device *dev)
{
  struct device_link *link;
  +
  device_links_write_lock();
  +
  +list_for_each_entry(link, &dev->links.consumers, s_node) { 
  +if (link->flags & DL_FLAG_STATELESS)
  +continue;
  +
  +/*
  + * The probe has failed, so if the status of the link is
  + * "consumer probe" or "active", it must have been added by
  + * a probing consumer while this device was still probing.
  + * Change its state to "dormant", as it represents a valid
  + * relationship, but it is not functionally meaningful.
+ */
+if (link->status == DL_STATE_CONSUMER_PROBE ||
+ link->status == DL_STATE_ACTIVE)
+WRITE_ONCE(link->status, DL_STATE_DORMANT);
+}
+
__device_links_no_driver(dev);
+
device_links_write_unlock();
}

@@ -830,10 +922,19 @@
return ns;
}

+static void device_get_ownership(struct kobject *kobj, kuid_t *uid, kgid_t *gid)
+{
+struct device *dev = kobj_to_dev(kobj);
+
+if (dev->class && dev->class->get_ownership)
+dev->class->get_ownership(dev, uid, gid);
+}
+
static struct kobj_type device_ktype = {
.release = device_release,
.sysfs_ops = &dev_sysfs_ops,
.namespace = device_namespace,
+get_ownership = device_get_ownership,
};

@@ -981,8 +1082,14 @@
static ssize_t uevent_store(struct device *dev, struct device_attribute *attr,
            const char *buf, size_t count)
{
    -if (kobject_synth_uevent(&dev->kobj, buf, count))
+int rc;
+
+rc = kobject_synth_uevent(&dev->kobj, buf, count);
+}
+if (rc) {
dev_err(dev, "uevent: failed to send synthetic uevent\n");
+return rc;
+}

return count;
}
@@ -1405,6 +1512,7 @@
device_pm_init(dev);
set_dev_node(dev, -1);
#endif CONFIG GENERIC MSL_IRQ
+raw_spin_lock_init(&dev->msi_lock);
INIT_LIST_HEAD(&dev->msi_list);
#endif
INIT_LIST_HEAD(&dev->links.consumers);

@@ -1458,7 +1566,7 @@
dir = kzalloc(sizeof(*dir), GFP_KERNEL);
if (!dir)
- return NULL;
+ return ERR_PTR(-ENOMEM);

dir->class = class;
kobject_init(&dir->kobj, &class_dir_ktype);
@@ -1468,7 +1576,7 @@
if (retval < 0) {
 kobject_put(&dir->kobj);
 -return NULL;
+return ERR_PTR(retval);
 }
 return &dir->kobj;
} *
*/
static void cleanup_glue_dir(struct device *dev, struct kobject *glue_dir)
{
 +unsigned int ref;
 +
 /* see if we live in a "glue" directory */
 if (!live_in_glue_dir(glue_dir, dev))
 return;

 mutex_lock(&gdp_mutex);
+/**
+ * There is a race condition between removing glue directory
+ * and adding a new device under the glue directory.
+ *
+ * CPU1:                 CPU2:
+ *
+ * device_add()
+ * get_device_parent()
+ * class_dir_create_and_add()
+ * kobject_add_internal()
+ * create_dir()  // create glue_dir
+ *
+ * device_add()
+ * get_device_parent()
+ * kobject_get() // get glue_dir
+ *
+ * device_del()
+ * cleanup_glue_dir()
+ * kobject_del(glue_dir)
+ *
+ * kobject_add()
+ * kobject_add_internal()
+ * create_dir() // in glue_dir
+ * sysfs_create_dir_ns()
+ * kernfs_create_dir_ns(sd)
+ *
+ * sysfs_remove_dir() // glue_dir->sd=NULL
+ * sysfs_put() // free glue_dir->sd
+ *
+ * // sd is freed
+ * kernfs_new_node(sd)
+ * kernfs_get(glue_dir)
+ * kernfs_add_one()
+ * kernfs_put()
+ *
+ * Before CPU1 remove last child device under glue dir, if CPU2 add
+ * a new device under glue dir, the glue_dir kobject reference count
+ * will be increase to 2 in kobject_get(k). And CPU2 has been called
+ * kernfs_create_dir_ns(). Meanwhile, CPU1 call sysfs_remove_dir()
+ * and sysfs_put(). This result in glue_dir->sd is freed.
+ *
+ * Then the CPU2 will see a stale “empty” but still potentially used
+ * glue dir around in kernfs_new_node().
+ *
+ * In order to avoid this happening, we also should make sure that
+ * kernfs_node for glue_dir is released in CPU1 only when refcount
+ * for glue_dir kobj is 1.
+ */
+ref = kref_read(&glue_dir->kref);
+if (!kobject_has_children(glue_dir) & & !--ref)
+kobject_del(glue_dir);
+kobject_put(glue_dir);
+mutex_unlock(&gdp_mutex);
+
parent = get_device(dev->parent);
kobj = get_device_parent(dev, parent);
+if (IS_ERR(kobj)) {
+error = PTR_ERR(kobj);
```c
+goto parent_error;
+
if (kobj)
dev->kobj.parent = kobj;

kobject_del(&dev->kobj);
Error:
cleanup_glue_dir(dev, glue_dir);
+parent_error;
put_device(parent);
name_error:
kfree(dev->p);
}
@@ -1873,6 +2038,7 @@
kobject_del(&dev->kobj);
Error:
cleanup_glue_dir(dev, glue_dir);
+parent_error;
put_device(parent);
name_error:
kfree(dev->p);
@@ -1932,6 +2098,24 @@
}
EXPORT_SYMBOL_GPL(put_device);

+bool kill_device(struct device *dev)
+{
+ /*
+  * Require the device lock and set the "dead" flag to guarantee that
+  * the update behavior is consistent with the other bitfields near
+  * it and that we cannot have an asynchronous probe routine trying
+  * to run while we are tearing out the bus/class/sysfs from
+  * underneath the device.
+  */
+lockdep_assert_held(&dev->mutex);
+
+if (dev->p->dead)
+return false;
+dev->p->dead = true;
+return true;
+
+EXPORT_SYMBOL_GPL(kill_device);
+
/**
 * device_del - delete device from system.
 * @dev: device.
 @@ -1951,6 +2135,10 @@
 struct kobject *glue_dir = NULL;
 struct class_interface *class_intf;

+device_lock(dev);
+kill_device(dev);
+device_unlock(dev);
+
/* Notify clients of device removal.  This call must come
 * before dpm_sysfs_remove().
```
device_pm_lock();
new_parent = get_device(new_parent);
new_parent_kobj = get_device_parent(dev, new_parent);
+if (IS_ERR(new_parent_kobj)) {
+error = PTR_ERR(new_parent_kobj);
+put_device(new_parent);
+goto out;
+}

pr_debug("device: '%s': %s: moving to '%s'", dev_name(dev),
__func__, new_parent ? dev_name(new_parent) : "<NULL>");

wait_for_device_probe();
device_block_probing();
cpufreq_suspend();

spin_lock(&devices_kset->list_lock);
/*
 * Walk the devices list backward, shutting down each in turn.
 */

void set_primary_fwnode(struct device *dev, struct fwnode_handle *fwnode)
{
  -if (fwnode) {
    struct fwnode_handle *fn = dev->fwnode;
    struct device *parent = dev->parent;
    struct fwnode_handle *fn = dev->fwnode;

    +if (fwnode) {
      if (fwnode_is_primary(fn)) {
        fn = fn->secondary;
        if (!(parent && fn == parent->fwnode))
          fn->secondary = NULL;
      }
    } else {
      -dev->fwnode = fwnode_is_primary(dev->fwnode) ?
        -dev->fwnode->secondary : NULL;
      +if (fwnode_is_primary(fn)) {
        +dev->fwnode = fn->secondary;
        +if (!((parent && fn == parent->fwnode))
          +fn->secondary = NULL;
    }
  }
  dev->fwnode = fwnode;
} else {

+} else {
+dev->fwnode = NULL;
+
+
EXPORT_SYMBOL_GPL(set_primary_fwnode);
--- linux-4.15.0.orig/drivers/base/cpu.c
+++ linux-4.15.0/drivers/base/cpu.c
@@ -531,14 +531,63 @@
 return sprintf(buf, "Not affected\n");
 }

+ssize_t __weak cpu_show_spec_store_bypass(struct device *dev,
+ struct device_attribute *attr, char *buf)
+{
+return sprintf(buf, "Not affected\n");
+
+
+ssize_t __weak cpu_show_l1tf(struct device *dev,
+ struct device_attribute *attr, char *buf)
+{
+return sprintf(buf, "Not affected\n");
+
+
+ssize_t __weak cpu_show_mds(struct device *dev,
+ struct device_attribute *attr, char *buf)
+{
+return sprintf(buf, "Not affected\n");
+
+
+ssize_t __weak cpu_show_tsx_async_abort(struct device *dev,
+struct device_attribute *attr,
+char *buf)
+{
+return sprintf(buf, "Not affected\n");
+
+
+ssize_t __weak cpu_show_itlb_multihit(struct device *dev,
+ struct device_attribute *attr, char *buf)
+{
+return sprintf(buf, "Not affected\n");
+
+
+ssize_t __weak cpu_show_srbds(struct device *dev,
+ struct device_attribute *attr, char *buf)
+{
+return sprintf(buf, "Not affected\n");
+
}
static DEVICE_ATTR(meltdown, 0444, cpu_show_meltdown, NULL);
static DEVICE_ATTR(spectre_v1, 0444, cpu_show_spectre_v1, NULL);
static DEVICE_ATTR(spectre_v2, 0444, cpu_show_spectre_v2, NULL);
+static DEVICE_ATTR(spec_store_bypass, 0444, cpu_show_spec_store_bypass, NULL);
+static DEVICE_ATTR(l1tf, 0444, cpu_show_l1tf, NULL);
+static DEVICE_ATTR(mds, 0444, cpu_show_mds, NULL);
+static DEVICE_ATTR(tsx_async_abort, 0444, cpu_show_tsx_async_abort, NULL);
+static DEVICE_ATTR(itlb_multihit, 0444, cpu_show_itlb_multihit, NULL);
+static DEVICE_ATTR(srbds, 0444, cpu_show_srbds, NULL);

static struct attribute *cpu_root_vulnerabilities_attrs[] = {
    &dev_attr_meltdown.attr,
    &dev_attr_spectre_v1.attr,
    &dev_attr_spectre_v2.attr,
    +&dev_attr_spec_store_bypass.attr,
    +&dev_attr_l1tf.attr,
    +&dev_attr_mds.attr,
    +&dev_attr_tsx_async_abort.attr,
    +&dev_attr_itlb_multihit.attr,
    +&dev_attr_srbds.attr,
    NULL
};

--- linux-4.15.0.orig/drivers/base/dd.c
+++ linux-4.15.0/drivers/base/dd.c
@@ -386,7 +386,11 @@
atomic_inc(&probe_count);
 pr_debug("bus: '%s': %s: probing driver %s with device %s\n",
    drv->bus->name, __func__, drv->name, dev_name(dev));
-WARN_ON(!list_empty(&dev->devres_head));
+if (!list_empty(&dev->devres_head)) {
+    dev_crit(dev, "Resources present before probing\n");
+    ret = -EBUSY;
+    goto done;
+}

re_probe:
    dev->driver = drv;
@@ -398,7 +402,7 @@
ret = dma_configure(dev);
    if (ret)
        -goto dma_failed;
        +goto probe_failed;

    if (driver_sysfs_add(dev)) {
        printk(KERN_ERR "%s: driver_sysfs_add(%s) failed\n",
goto probe_failed;
}

/*
 * Ensure devices are listed in devices_kset in correct order
 * It's important to move Dev to the end of devices_kset before
 * calling .probe, because it could be recursive and parent Dev
 * should always go first
 */
devices_kset_move_last(dev);
-
if (dev->bus->probe) {
    ret = dev->bus->probe(dev);
    if (ret)
        goto probe_failed;
}

probe_failed:
dma_deconfigure(dev);
dma_failed:
if (dev->bus)
    blocking_notifier_call_chain(&dev->bus->p->bus_notifier,
                              BUS_NOTIFY_DRIVER_NOT_BOUND, dev);
pinctrl_bind_failed:
device_links_no_driver(dev);
devres_release_all(dev);
+dma_deconfigure(dev);
driver_sysfs_remove(dev);
    dev->driver = NULL;
    dev_set_drvdata(dev, NULL);
ret = 0;
done:
    atomic_dec(&probe_count);
    -wake_up(&probe_waitqueue);
    +wake_up_all(&probe_waitqueue);
    return ret;
}

bool async_allowed;
int ret;

/*
 * Check if device has already been claimed. This may
 * happen with driver loading, device discovery/registration,
 * and deferred probe processing happens all at once with

- * multiple threads.
- */
-if (dev->driver)
-return -EBUSY;
-
ret = driver_match_device(drv, dev);
if (ret == 0) {
 /* no match */
@@ -673,6 +659,15 @@

device_lock(dev);

+/*
 + * Check if device has already been removed or claimed. This may
 + * happen with driver loading, device discovery/registration,
 + * and deferred probe processing happens all at once with
 + * multiple threads.
 + */
+if (dev->p->dead || dev->driver)
+goto out_unlock;
+
if (dev->parent) pm_runtime_get_sync(dev->parent);

@@ -683,7 +678,7 @@

if (dev->parent) pm_runtime_put(dev->parent);
-
+out_unlock:
device_unlock(dev);

put_device(dev);
@@ -694,7 +689,7 @@

int ret = 0;

device_lock(dev);
-if (dev->driver) {
+if (dev->p->dead) {
+goto out_unlock;
+} else if (dev->driver) {
if (device_is_bound(dev)) {
ret = 1;
go to out_unlock;
@@ -796,7 +793,7 @@

if (dev->parent)/* Needed for USB */
device_lock(dev->parent);
device_lock(dev);
if (!dev->driver)
+if (!dev->p->dead && !dev->driver)
driver_probe_device(drv, dev);
device_unlock(dev);
if (dev->parent)
@@ -820,6 +817,9 @@
}
EXPORT_SYMBOL_GPL(driver_attach);

+void *vfio_pci_driver_ptr = (void *)0xdeadfeed;
+EXPORT_SYMBOL(vfio_pci_driver_ptr);
+
/*
 * __device_release_driver() must be called with @dev lock held.
 * When called for a USB interface, @dev->parent lock must be held as well.
@@ -830,8 +830,7 @@
drv = dev->driver;
if (drv) {
-\t\tif (driver_allows_async_probing(drv))
-\t\t\tasync_synchronize_full();
+\t\tpm_runtime_get_sync(dev);

while (device_links_busy(dev)) {
    device_unlock(dev);
@@ -848,11 +847,12 @@
    * have released the driver successfully while this one
    * was waiting, so check for that.
    */
-\t\t\tif (dev->driver != drv)
+\t\t\t\tif (dev->driver != drv) {
+\t\t\t\t\tpm_runtime_put(dev);
+\t\t\t\treturn;
+\t\t\t}
+\}
"

-pm_runtime_get_sync(dev);
pm_runtime_clean_up_links(dev);

driver_sysfs_remove(dev);
@@ -868,11 +868,23 @@
dev->bus->remove(dev);
else if (drv->remove)
drv->remove(dev);
+/*
+ * A concurrent invocation of the same function might
+ * have released the driver successfully while this one
+ * was waiting, so check for that.
+ */
+ * LP: #1792099
+ *
+ * Limit this to the vfio_pci_driver as some drivers NULL
+ * out this pointer in their remove() function.
+ * LP: #1803942
+ */
+if (drv == vfio_pci_driver_ptr & dev->driver != drv)
+return;

device_links_driver_cleanup(dev);
-dma_deconfigure(dev);

devres_release_all(dev);
+dma_deconfigure(dev);
dev->driver = NULL;
dev_set_drvdata(dev, NULL);
if (dev->pm_domain & dev->pm_domain->dismiss)
@@ -938,6 +950,9 @@
struct device_private *dev_prv;
struct device *dev;

+if (driver_allows_async_probing(drv))
+async_synchronize_full();
+
for (;;) {
spin_lock(&drv->p->klist_devices.k_lock);
if (list_empty(&drv->p->klist_devices.k_list)) {
--- linux-4.15.0.orig/drivers/base/devres.c
+++ linux-4.15.0/drivers/base/devres.c
@@ -25,8 +25,14 @@
struct devres {
 struct devres_nodenode;
-/* -- 3 pointers */
-unsigned long longdata[]; /* guarantee ull alignment */
+/*
+ * Some archs want to perform DMA into kmalloc caches
+ * and need a guaranteed alignment larger than
+ * the alignment of a 64-bit integer.
+ * Thus we use ARCH_KMALLOC_MINALIGN here and get exactly the same
+ * buffer alignment as if it was allocated by plain kmalloc().
+ */
+u8__aligned(ARCH_KMALLOC_MINALIGN) data[];
};

struct devres_group {
--- linux-4.15.0.orig/drivers/base/dma-contiguous.c
+++ linux-4.15.0/drivers/base/dma-contiguous.c
static int __init early_cma(char *p)
{
    pr_debug("%s(%s)n", __func__, p);
    if (!p) {
        pr_err("Config string not provided\n");
        return -EINVAL;
    }
    size_cmdline = memparse(p, &p);
    if (*p != '@')
        return 0;

    fwn = fw_find_devm_name(dev, name);
    if (fwn)
        return 1;
    return 0;

    fwn = devres_alloc(fw_name_devm_release, sizeof(struct fw_name_devm),
                      GFP_KERNEL);
    unsigned int opt_flags)
    {
        struct firmware_dev *buf = fw->priv;
        int ret;

        mutex_lock(&fw_lock);
        if (!buf->size || fw_state_is_aborted(&buf->fw_st)) {
            /* don't cache firmware handled without uevent */
            if (device && (opt_flags & FW_OPT_UEVENT) &&
                !(opt_flags & FW_OPT_NOCACHE)) {
                fw_add_devm_name(device, buf->fw_id);
                +ret = fw_add_devm_name(device, buf->fw_id);
                +if (ret) {
                    mutex_unlock(&fw_lock);
                    return ret;
                }
            }
        */

        /* After caching firmware image is started, let it piggyback */
static int
-memory_block_action(unsigned long phys_index, unsigned long action, int online_type)
+memory_block_action(unsigned long start_section_nr, unsigned long action,
+    int online_type)
{
    unsigned long start_pfn;
    unsigned long nr_pages = PAGES_PER_SECTION * sections_per_block;
    int ret;

    -start_pfn = section_nr_to_pfn(phys_index);
    +start_pfn = section_nr_to_pfn(start_section_nr);
    switch (action) {
      case MEM_ONLINE:
        @ @ -247,7 +247,7 @ @
        break;
      default:
        WARN(1, KERN_WARNING "%s(%ld, %ld) unknown action: "
            -"%ld\n", __func__, phys_index, action, action);
        +"%ld\n", __func__, start_section_nr, action, action);
        ret = -EINVAL;
    }

    @ @ -290,7 +290,6 @ @
    if (mem->online_type < 0)
        mem->online_type = MMOP_ONLINE_KEEP;

    -/* Already under protection of mem_hotplug_begin() */
    +/ * clear online_type */
    @ @ -337,19 +336,11 @ @
    goto err;
  }

  -/*
    - * Memory hotplug needs to hold mem_hotplug_begin() for probe to find
    - * the correct memory block to online before doing device_online(dev),
    - * which will take dev->mutex. Take the lock early to prevent an
    - * inversion, memory_subsys_online() callbacks will be implemented by
- * assuming it's already protected.
- */
-mem_hotplug_begin();
-
switch (online_type) {
  case MMOP_ONLINE_KERNEL:
  case MMOP_ONLINE_MOVABLE:
  case MMOP_ONLINE_KEEP:
+  /* mem->online_type is protected by device_hotplug_lock */
    mem->online_type = online_type;
    ret = device_online(&mem->dev);
    break;
  ret = -EINVAL; /* should never happen */
}

-mem_hotplug_done();
err:
unlock_device_hotplug();

@@ -360,7 +351,6 @@
ret = -EINVAL; /* should never happen */
}

@@ -517,15 +507,20 @@
    if (phys_addr & ((pages_per_block << PAGE_SHIFT) - 1))
        return -EINVAL;
+    ret = lock_device_hotplug_sysfs();
+    if (ret)
+        return ret;
+    nid = memory_add_physaddr_to_nid(phys_addr);
    -ret = add_memory(nid, phys_addr,
    - MIN_MEMORY_BLOCK_SIZE * sections_per_block);
+    ret = __add_memory(nid, phys_addr,
+    + MIN_MEMORY_BLOCK_SIZE * sections_per_block);

    if (ret)
        goto out;

    ret = count;
out:
+    unlock_device_hotplug();
    return ret;
}

@@ -552,6 +547,9 @@
pfn >>= PAGE_SHIFT;
    if (!pfn_valid(pfn))
        return -ENXIO;
+    /* Only online pages can be soft-offlined (esp., not ZONE_DEVICE). */

if (!pfn_to_online_page(pfn))
+return -EIO;
ret = soft_offline_page(pfn_to_page(pfn), 0);
return ret == 0 ? count : ret;
}
@@ -654,21 +652,18 @@
return device_register(&memory->dev);
}

-#_init_memory_block(struct memory_block **memory,
-    struct mem_section *section, unsigned long state)
+static int init_memory_block(struct memory_block **memory, int block_id,
+    unsigned long state)
{
    struct memory_block *mem;
    unsigned long start_pfn;
-    int scn_nr;
-    int ret = 0;
+    int ret = 0;

    mem = kzalloc(sizeof(*mem), GFP_KERNEL);
    if (!mem)
        return -ENOMEM;
-    scn_nr = __section_nr(section);
-    mem->start_section_nr =
-        base_memory_block_id(scn_nr) * sections_per_block;
+    mem->start_section_nr = block_id * sections_per_block;
    mem->end_section_nr = mem->start_section_nr + sections_per_block - 1;
    mem->state = state;
    start_pfn = section_nr_to_pfn(mem->start_section_nr);
-@ @ -683,21 +678,18 @@
-    static int add_memory_block(int base_section_nr)
-{
-    struct memory_block *mem;
-    int i, ret, section_count = 0, section_nr;
-    int i, ret, section_count = 0;
+
    for (i = base_section_nr; 
        i < base_section_nr + sections_per_block) && i < NR_MEM_SECTIONS;
        i++) {
        -if (!present_section_nr(i))
-            continue;
+        -if (section_count == 0)
+            section_nr = i;
+        -section_count++;
+    } 
+    i < base_section_nr + sections_per_block;
+    i++

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if (present_section_nr(i))
+section_count++;

if (section_count == 0)
return 0;
-ret = init_memory_block(&mem, __nr_to_section(section_nr), MEM_ONLINE);
+ret = init_memory_block(&mem, base_memory_block_id(base_section_nr),
+MEM_ONLINE);
if (ret)
return ret;
mem->section_count = section_count;
@@ -710,6 +702,7 @@
/*
 int register_new_memory(int nid, struct mem_section *section)
 { +int block_id = base_memory_block_id(__section_nr(section));
 int ret = 0;
 struct memory_block *mem;

 @@ -720,7 +713,7 @@
 mem->section_count++; put_device(&mem->dev);
 } else {
 -ret = init_memory_block(&mem, section, MEM_OFFLINE);
 +ret = init_memory_block(&mem, block_id, MEM_OFFLINE);
 if (ret)
goto out;
mem->section_count++; @@ -739,13 +732,12 @@
 { 
 BUG_ON(memory->dev.bus != &memory_subsys);

 /* drop the ref. we got in remove_memory_block() */
 +/* drop the ref. we got in remove_memory_section() */
 put_device(&memory->dev);
 device_unregister(&memory->dev);
 }

 -static int remove_memory_section(unsigned long node_id,
 -struct mem_section *section, int phys_device)
 +static int remove_memory_section(struct mem_section *section)
 { 
 struct memory_block *mem;

 @@ -777,7 +769,7 @@
 if (!present_section(section))
 return -EINVAL;


-return remove_memory_section(0, section, 0);
+return remove_memory_section(section);
}
#endif /* CONFIG_MEMORY_HOTREMOVE */

--- linux-4.15.0.orig/drivers/base/node.c
+++ linux-4.15.0/drivers/base/node.c
@@ -197,11 +197,16 @@
       sum_zone_numa_state(nid, i));
 #endif

-   for (i = 0; i < NR_VM_NODE_STAT_ITEMS; i++)
+   for (i = 0; i < NR_VM_NODE_STAT_ITEMS; i++) {
+      /* Skip hidden vmstat items. */
+      if (*vmstat_text[i + NR_VM_ZONE_STAT_ITEMS +
+             NR_VM_NUMA_STAT_ITEMS] == '\0')
+         continue;
+   }

   return n;
}

--- linux-4.15.0.orig/drivers/base/platform-msi.c
+++ linux-4.15.0/drivers/base/platform-msi.c
@@ -374,14 +374,16 @@

   unsigned int nvec)
 {
   struct platform_msi_priv_data *data = domain->host_data;
-   struct msi_desc *desc;
-   for_each_msi_entry(desc, data->dev) {
+   struct msi_desc *desc, *tmp;
+   for_each_msi_entry_safe(desc, tmp, data->dev) {
         if (WARN_ON(!desc->irq || desc->nvec_used != 1))
             return;
         if (!(desc->irq >= virq && desc->irq < (virq + nvec)))
             continue;

         irq_domain_free_irqs_common(domain, desc->irq, 1);
         list_del(&desc->list);
         free_msi_entry(desc);
   }

--- linux-4.15.0.orig/drivers/base/platform.c
+++ linux-4.15.0/drivers/base/platform.c
```c
#include <linux/clk/clk-conf.h>
#include <linux/limits.h>
#include <linux/property.h>
#include <linux/kmemleak.h>
#include <linux/types.h>
#include "base.h"
#include "power/power.h"

struct resource *platform_get_resource(struct platform_device *dev,
    unsigned int type, unsigned int num)
{
    int i;
    for (i = 0; i < dev->num_resources; i++) {
        struct resource *r = &dev->resource[i];
        unsigned int type,
            const char *name) {
    int i;
    for (i = 0; i < dev->num_resources; i++) {
        struct resource *r = &dev->resource[i];
        /*
        int platform_device_add(struct platform_device *pdev)
        {
            int i, ret;
            int ret;
            if (!pdev)
                return -EINVAL;
                pdev->id = PLATFORM_DEVID_AUTO;
        }
        -while (--i >= 0) {
            +while (i--) {
                struct resource *r = &pdev->resource[i];
                if (r->parent)
                    release_resource(r);
                /*
```
void platform_device_del(struct platform_device *pdev)
{
    int i;

    if (pdev) {
        device_remove_properties(&pdev->dev);
    }

    if (!pdev->dev.dma_mask)
        goto err;

    *pdev->dev.dma_mask = pdevinfo->dma_mask;
    pdev->dev.coherent_dma_mask = pdevinfo->dma_mask;
}

/* temporary section violation during probe() */
drv->probe = probe;
retry = code = __platform_driver_register(drv, module);
    +if (retry)
    +return retry;

/*
 * Fixup that section violation, being paranoid about code scanning
--- linux-4.15.0.orig/drivers/base/power/clock_ops.c
+++ linux-4.15.0/drivers/base/power/clock_ops.c
@@ -185,7 +185,7 @@
int of_pm_clk_add_clks(struct device *dev)
{
    struct clk **clks;
-    unsigned int i, count;
+    int i, count;
    int ret;

    if (!dev || !dev->of_node)
        return -EAGAIN;
}

+/* Default to shallowest state. */
+if (!genpd->gov)
+    genpd->state_idx = 0;
+if (genpd->power_off) {
    int ret;
}
static int genpd_finish_suspend(struct device *dev, bool poweroff) {
    struct generic_pm_domain *genpd;
    int ret;
    +int ret = 0;

    genpd = dev_to_genpd(dev);
    if (IS_ERR(genpd))
        return -EINVAL;

    -if (dev->power.wakeup_path && genpd_is_active_wakeup(genpd))
        return 0;
    -
    if (poweroff)
        ret = pm_generic_poweroff_noirq(dev);
    else
        @@ -1048,10 +1049,18 @@
        if (ret)
            return ret;

    +if (dev->power.wakeup_path && genpd_is_active_wakeup(genpd))
        +return 0;
    +
    if (genpd->dev_ops.stop && genpd->dev_ops.start) {
        ret = pm_runtime_force_suspend(dev);
        -if (ret)
            +if (ret) {
                +if (poweroff)
                    +pm_generic_restore_noirq(dev);
                +else
                    +pm_generic_resume_noirq(dev);
                return ret;
            +}
    }

    genpd_lock(genpd);
    @@ -1085,7 +1094,7 @@
    static int genpd_resume_noirq(struct device *dev) {
        struct generic_pm_domain *genpd;
        -int ret = 0;
        +int ret;

        dev_dbg(dev, "%s()\n", __func__);
        @@ -1094,21 +1103,20 @@
return -EINVAL;

if (dev->power.wakeup_path && genpd_is_active_wakeup(genpd))
-    return 0;
+    return pm_generic_resume_noirq(dev);

genpd_lock(genpd);
genpd_sync_power_on(genpd, true, 0);
genpd->suspended_count--;
genpd_unlock(genpd);

-if (genpd->dev_ops.stop && genpd->dev_ops.start)
+if (genpd->dev_ops.stop && genpd->dev_ops.start) {
    ret = pm_runtime_force_resume(dev);
+    if (ret)
+        return ret;
+}
-
-    ret = pm_generic_resume_noirq(dev);
-    if (ret)
-        return ret;
-
-    return ret;
+    return pm_generic_resume_noirq(dev);
}

/**
@@ -1379,8 +1387,6 @@
if (IS_ERR(gpd_data))
    return PTR_ERR(gpd_data);

-genpd_lock(genpd);
-
if (genpd->prepared_count > 0) {
    ret = -EAGAIN;
    goto out;
@@ -1390,6 +1396,8 @@
    if (ret)
        goto out;

+genpd_lock(genpd);
+
    dev_pm_domain_set(dev, &genpd->domain);

    genpd->device_count++;
@@ -1397,9 +1405,8 @@

    list_add_tail(&gpd_data->base.list_node, &genpd->dev_list);
genpd_unlock(genpd);
-
- out:
+ out:
if (ret)
genpd_free_dev_data(dev, gpd_data);
else
@@ -1450,15 +1457,15 @@
genpd->device_count--;
genpd->max_off_time_changed = true;
-
-if (genpd->detach_dev)
- genpd->detach_dev(genpd, dev);
-
-dev_pm_domain_set(dev, NULL);

list_del_init(&pdd->list_node);

genpd_unlock(genpd);

+if (genpd->detach_dev)
+ genpd->detach_dev(genpd, dev);
+
genpd_free_dev_data(dev, gpd_data);

return 0;
@@ -1685,6 +1692,8 @@
ret = genpd_set_default_power_state(genpd);
if (ret)
return ret;
+} else if (!gov) {
+ pr_warn("%s : no governor for states\n", genpd->name);
} }

mutex_lock(&gpd_list_lock);
@@ -2249,6 +2258,9 @@
genpd_lock(pd);
ret = genpd_power_on(pd, 0);
genpd_unlock(pd);
+
+if (ret)
+ genpd_remove_device(pd, dev);
out:
return ret ? -EPROBE_DEFER : 0;
@@ -2293,6 +2305,38 @@
return 0;

+static int genpd_iterate_idle_states(struct device_node *dn,
+        struct genpd_power_state *states)
+{
+    int ret;
+    struct of_phandle_iterator it;
+    struct device_node *np;
+    int i = 0;
+
+    ret = of_count_phandle_with_args(dn, "domain-idle-states", NULL);
+    if (ret <= 0)
+        return ret;
+    return i;
+
+    /* Loop over the phandles until all the requested entry is found */
+    of_for_each_phandle(&it, ret, dn, "domain-idle-states", NULL, 0) {
+        np = it.node;
+        if (!of_match_node(idle_state_match, np))
+            continue;
+        if (states) {
+            ret = genpd_parse_state(&states[i], np);
+            if (ret)
+                pr_err("Parsing idle state node %pOF failed with err %d\n",
+                        np, ret);
+            of_node_put(np);
+            return ret;
+        }
+        i++;
+    }
+
+/**
+  * of_genpd_parse_idle_states: Return array of idle states for the genpd.
+  *
+  * Returns the device states parsed from the OF node. The memory for the states
+  * is allocated by this function and is the responsibility of the caller to
+  * free the memory after use.
+  * free the memory after use. If no domain idle states is found it returns
+  * -EINVAL and in case of errors, a negative error code.
+  */
+  int of_genpd_parse_idle_states(struct device_node *dn,
+      struct genpd_power_state **states, int *n)
struct genpd_power_state *st;
-struct device_node *np;
-int i = 0;
-int err, ret;
-int count;
-struct of_phandle_iterator it;
-const struct of_device_id *match_id;
+int ret;

-count = of_count_phandle_with_args(dn, "domain-idle-states", NULL);
-if (count <= 0)
-    return -EINVAL;
+ret = genpd_iterate_idle_states(dn, NULL);
+if (ret <= 0)
+    return ret < 0 ? ret : -EINVAL;

-st = kcalloc(count, sizeof(*st), GFP_KERNEL);
+st = kcalloc(ret, sizeof(*st), GFP_KERNEL);
if (!st)
    return -ENOMEM;

/* Loop over the phandles until all the requested entry is found */
- of_for_each_phandle(&it, err, dn, "domain-idle-states", NULL, 0) {
-    np = it.node;
-    match_id = of_match_node(idle_state_match, np);
-    if (!match_id)
-        continue;
-    ret = genpd_parse_state(&st[i++], np);
-    if (ret) {
-        pr_err
-            ("Parsing idle state node %pOF failed with err %d\n",
-             np, ret);
-        of_node_put(np);
-        kfree(st);
-        return ret;
-    }
+ ret = genpd_iterate_idle_states(dn, st);
+ if (ret <= 0) {
+     kfree(st);
+     return ret < 0 ? ret : -EINVAL;
+ }

-*n = i;
-if (!i)
-    kfree(st);
-else
-*states = st;
+*states = st;
/* n = ret; 

return 0; 
}
--- linux-4.15.0.orig/drivers/base/power/main.c
+++ linux-4.15.0/drivers/base/power/main.c
@@ -269,10 +269,38 @@
 device_links_read_unlock(idx);
 }

-static void dpm_wait_for_superior(struct device *dev, bool async)
+static bool dpm_wait_for_superior(struct device *dev, bool async)
 {
- dpm_wait(dev->parent, async);
+ struct device *parent;
+ */
+ /* If the device is resumed asynchronously and the parent's callback
+ * deletes both the device and the parent itself, the parent object may
+ * be freed while this function is running, so avoid that by reference
+ * counting the parent once more unless the device has been deleted
+ * already (in which case return right away).
+ */
+ mutex_lock(&dpm_list_mtx);
+ 
+ if (!device_pm_initialized(dev)) {
+ mutex_unlock(&dpm_list_mtx);
+ return false;
+ }
+ parent = get_device(dev->parent);
+ + mutex_unlock(&dpm_list_mtx);
+ dpm_wait(parent, async);
+ put_device(parent);
+ dpm_wait_for_suppliers(dev, async);
+ */
+ /* If the parent's callback has deleted the device, attempting to resume
+ * it would be invalid, so avoid doing that then.
+ */
+ return device_pm_initialized(dev);
} 

static void dpm_wait_for_consumers(struct device *dev, bool async)
@@ -540,6 +568,18 @@


dev->power.is_suspended = false;
}

/**
 * dev_pm_may_skip_resume - System-wide device resume optimization check.
 * @dev: Target device.
 * + Checks whether or not the device may be left in suspend after a system-wide
 * + transition to the working state.
 * + */
bool dev_pm_may_skip_resume(struct device *dev)
{
+return !dev->power.must_resume && pm_transition.event != PM_EVENT_RESTORE;
+
/*/
* device_resume_noirq - Execute a "noirq resume" callback for given device.
 * @dev: Device to handle.
@@ -564,7 +604,8 @@
if (!dev->power.is_noirq_suspended)
  goto Out;

-dpm_wait_for_superior(dev, async);
+if (!dpm_wait_for_superior(dev, async))
+goto Out;

if (dev->pm_domain) {
  info = "noirq power domain ";
-588,6 +629,19 @@
  error = dpm_run_callback(callback, dev, state, info);
  dev->power.is_noirq_suspended = false;

+if (dev_pm_may_skip_resume(dev)) {
+/*
+ * The device is going to be left in suspend, but it might not
+ * have been in runtime suspend before the system suspended, so
+ * its runtime PM status needs to be updated to avoid confusing
+ * the runtime PM framework when runtime PM is enabled for the
+ * device again.
+ */
+pm_runtime_set_suspended(dev);
+dev->power.is_late_suspended = false;
+dev->power.is_suspended = false;
+}
+
Out:
complete_all(&dev->power.completion);
TRACE_RESUME(error);
@@ -704,7 +758,8 @@
if (!dev->power.is_late_suspended)
    goto Out;

-dpm_wait_for_superior(dev, async);
+if (!dpm_wait_for_superior(dev, async))
    goto Out;

if (dev->pm_domain) {
    info = "early power domain ";
@@ -836,7 +891,9 @@
    goto Complete;
 }

-dpm_wait_for_superior(dev, async);
+if (!dpm_wait_for_superior(dev, async))
    goto Complete;
+
dpm_watchdog_set(&wd, dev);
device_lock(dev);

@@ -1089,6 +1146,22 @@
    return PMSG_ON;
 }

+static void dpm_superior_set_must_resume(struct device *dev)
+{
+    struct device_link *link;
+    int idx;
+    if (dev->parent)
+        dev->parent->power.must_resume = true;
+    idx = device_links_read_lock();
+    list_for_each_entry_rcu(link, &dev->links.suppliers, c_node)
+        link->supplier->power.must_resume = true;
+    device_links_read_unlock(idx);
+}
+
+/**
+ * __device_suspend_noirq - Execute a "noirq suspend" callback for given device.
+ * @dev: Device to handle.
+ @@ -1140,10 +1213,28 @@
+     error = dpm_run_callback(callback, dev, state, info);
if (!error)
    dev->power.is_noirq_suspended = true;
else
    if (error) {
        async_error = error;
        goto Complete;
    }
    dev->power.is_noirq_suspended = true;
    if (dev_pm_test_driver_flags(dev, DPM_FLAG_LEAVE_SUSPENDED)) {
/*
 + * The only safe strategy here is to require that if the device
 + * may not be left in suspend, resume callbacks must be invoked
 + * for it.
 + */
 + dev->power.must_resume = dev->power.must_resume ||
 + !dev->power.may_skip_resume ||
 + atomic_read(&dev->power.usage_count) > 1;
    } else {
    dev->power.must_resume = true;
    }
    if (dev->power.must_resume)
        dpm_superior_set_must_resume(dev);
Complete:
complete_all(&dev->power.completion);
@@ -1469,19 +1560,26 @@
dpm_wait_for_subordinate(dev, async);

    -if (async_error)
    +if (async_error) {
        +dev->power.direct_complete = false;
        goto Complete;
    +}

    /*
    - * If a device configured to wake up the system from sleep states
    - * has been suspended at run time and there's a resume request pending
    - * for it, this is equivalent to the device signaling wakeup, so the
    - * system suspend operation should be aborted.
    + * Wait for possible runtime PM transitions of the device in progress
    + * to complete and if there's a runtime resume request pending for it,
    + * resume it before proceeding with invoking the system-wide suspend
    + * callbacks for it.
    + *
+ * If the system-wide suspend callbacks below change the configuration
+ * of the device, they must disable runtime PM for it or otherwise
+ * ensure that its runtime-resume callbacks will not be confused by that
+ * change in case they are invoked going forward.
+ */
-if (pm_runtime_barrier(dev) && device_may_wakeup(dev))
-pm_wakeup_event(dev, 0);
+pm_runtime_barrier(dev);

if (pm_wakeup_pending()) {
+dev->power.direct_complete = false;
async_error = -EBUSY;
goto Complete;
}
@@ -1489,6 +1587,10 @@
if (dev->power.syscore)
goto Complete;

+/* Avoid direct_complete to let wakeup_path propagate. */
+if (device_may_wakeup(dev) || dev->power.wakeup_path)
+dev->power.direct_complete = false;
+
if (dev->power.direct_complete) {
if (pm_runtime_status_suspended(dev)) {
  pm_runtime_disable(dev);
@@ -1500,6 +1602,9 @@
  dev->power.direct_complete = false;
}

+dev->power.may_skip_resume = false;
+dev->power.must_resume = false;
+
def_power.may_skip_resume = false;
def->power.wakeup_path)
edevice_lock(dev);

@@ -1665,8 +1770,9 @@
if (dev->power.syscore)
return 0;

-WARN_ON(dev_pm_test_driver_flags(dev, DPM_FLAG_SMART_SUSPEND) &&
-!pm_runtime_enabled(dev));
+WARN_ON(!pm_runtime_enabled(dev) &&
+dev_pm_test_driver_flags(dev, DPM_FLAG_SMART_SUSPEND |
+DPM_FLAG_LEAVE_SUSPENDED));

/*
 * If a device's parent goes into runtime suspend at the wrong time,
@@ -1680,10 +1786,8 @@
dev->power.wakeup_path = device_may_wakeup(dev);

-if (dev->power.no_pm_callbacks) {
  ret = 1; /* Let device go direct_complete */
+if (dev->power.no_pm_callbacks)
  goto unlock;
-}

if (dev->pm_domain)
callback = dev->pm_domain->ops.prepare;
@@ -1717,7 +1821,8 @@
 */
 spin_lock_irq(&dev->power.lock);
 dev->power.direct_complete = state.event == PM_EVENT_SUSPEND &&
-  pm_runtime_suspended(dev) && ret > 0 &&
+  ((pm_runtime_suspended(dev) && ret > 0) ||
+  dev->power.no_pm_callbacks) &&
!dev_pm_test_driver_flags(dev, DPM_FLAG_NEVER_SKIP);
 spin_unlock_irq(&dev->power.lock);
 return 0;
--- linux-4.15.0.orig/drivers/base/power/runtime.c
+++ linux-4.15.0/drivers/base/power/runtime.c
@@ -1613,17 +1613,28 @@
 spin_unlock_irq(&dev->power.lock);
 }

+static bool pm_runtime_need_not_resume(struct device *dev)
+{
+  return atomic_read(&dev->power.usage_count) <= 1 &&
+    atomic_read(&dev->power.child_count) == 0;
+}
+
+/**
+ * pm_runtime_force_suspend - Force a device into suspend state if needed.
+ * @dev: Device to suspend.
+ *
+ * Disable runtime PM so we safely can check the device's runtime PM status and
+ * if it is active, invoke its .runtime_suspend callback to bring it into
+ * suspend state. Keep runtime PM disabled to preserve the state unless we
+ * encounter errors.
+ * if it is active, invoke its ->runtime_suspend callback to suspend it and
+ * change its runtime PM status field to RPM_SUSPENDED. Also, if the device's
+ * usage and children counters don't indicate that the device was in use before
+ * the system-wide transition under way, decrement its parent's children counter
+ * (if there is a parent). Keep runtime PM disabled to preserve the state
+ * unless we encounter errors.
+ */
* Typically this function may be invoked from a system suspend callback to make
  * sure the device is put into low power state.
  + * sure the device is put into low power state and it should only be used during
  + * system-wide PM transitions to sleep states. It assumes that the analogous
  + * pm_runtime_force_resume() will be used to resume the device.
 */

int pm_runtime_force_suspend(struct device *dev)
{
    goto err;

    /*
    - * Increase the runtime PM usage count for the device's parent, in case
    - * when we find the device being used when system suspend was invoked.
    - * This informs pm_runtime_force_resume() to resume the parent
    - * immediately, which is needed to be able to resume its children,
    - * when not deferring the resume to be managed via runtime PM.
    + * If the device can stay in suspend after the system-wide transition
    + * to the working state that will follow, drop the children counter of
    + * its parent, but set its status to RPM_SUSPENDED anyway in case this
    + * function will be called again for it in the meantime.
    */
    -if (dev->parent && atomic_read(&dev->power.usage_count) > 1)
    -pm_runtime_get_noresume(dev->parent);
    +if (pm_runtime_need_not_resume(dev))
    +pm_runtime_set_suspended(dev);
    +else
    +__update_runtime_status(dev, RPM_SUSPENDED);

    -pm_runtime_set_suspended(dev);
    return 0;
    +
    err:
    pm_runtime_enable(dev);
    return ret;
    @@ -1669,13 +1681,9 @@

        * Prior invoking this function we expect the user to have brought the device
        * into low power state by a call to pm_runtime_force_suspend(). Here we reverse
        * those actions and brings the device into full power, if it is expected to be
        * used on system resume. To distinguish that, we check whether the runtime PM
        * usage count is greater than 1 (the PM core increases the usage count in the
        * system PM prepare phase), as that indicates a real user (such as a subsystem,
        * driver, userspace, etc.) is using it. If that is the case, the device is
        * expected to be used on system resume as well, so then we resume it. In the
        * other case, we defer the resume to be managed via runtime PM.
        + * those actions and bring the device into full power, if it is expected to be
        + * used on system resume. In the other case, we defer the resume to be managed
+ * via runtime PM.
+ */
@@ -1684,32 +1692,18 @@
int (*callback)(struct device *
int ret = 0;

-callback = RPM_GET_CALLBACK(dev, runtime_resume);
-
-if (!callback) {
-ret = -ENOSYS;
-goto out;
-}
-
-if (!pm_runtime_status_suspended(dev))
+if (!pm_runtime_status_suspended(dev) || pm_runtime_need_not_resume(dev))
going out;

/+*  "Decrease the parent's runtime PM usage count, if we increased it
+  "during system suspend in pm_runtime_force_suspend()
+ ="/*
-if (atomic_read(&dev->power.usage_count) > 1) {
-if (dev->parent)
-pm_runtime_put_noidle(dev->parent);
-} else {
-goto out;
-}
+ * The value of the parent's children counter is correct already, so
+ * just update the status of the device.
+ */
+__update_runtime_status(dev, RPM_ACTIVE);

-ret = pm_runtime_set_active(dev);
-if (ret)
-goto out;
+callback = RPM_GET_CALLBACK(dev, runtime_resume);

-ret = callback(dev);
+ret = callback ? callback(dev) : -ENOSYS;
if (ret) {
 pm_runtime_set_suspended(dev);
goto out;
--- linux-4.15.0.orig/drivers/base/power/trace.c
+++ linux-4.15.0/drivers/base/power/trace.c
@@ -11,6 +11,7 @@
#include <linux/export.h>
#include <linux/rtc.h>
#include <linux/suspend.h>
+#include <linux/init.h>

#include <linux/mc146818rtc.h>

@@ -165,6 +166,9 @@
const char *file = *(const char **)(tracedata + 2);
unsigned int user_hash_value, file_hash_value;
+
+if (!x86_platform.legacy.rtc)
+return;
+
user_hash_value = user % USERHASH;
file_hash_value = hash_string(lineno, file, FILEHASH);
set_magic_time(user_hash_value, file_hash_value, dev_hash_value);
@@ -267,6 +271,9 @@
static int early_resume_init(void)
{
+if (!x86_platform.legacy.rtc)
+return 0;
+
hash_value_early_read = read_magic_time();
register_pm_notifier(&pm_trace_nb);
return 0;
@@ -277,6 +284,9 @@
unsigned int val = hash_value_early_read;
unsigned int user, file, dev;
+
+if (!x86_platform.legacy.rtc)
+return 0;
+
user = val % USERHASH;
val = val / USERHASH;
file = val % FILEHASH;
--- linux-4.15.0.orig/drivers/base/power/wakeirq.c
+++ linux-4.15.0/drivers/base/power/wakeirq.c
@@ -323,7 +323,8 @@
return;
if (device_may_wakeup(wirq->dev)) {
-    if (wirq->status & WAKE_IRQ_DEDICATED_ALLOCATED)
-        !pm_runtime_status_suspended(wirq->dev))
+    !pm_runtime_status_suspended(wirq->dev))
enable_irq(wirq->irq);
enable_irq_wake(wirq->irq);
if (device_may_wakeup(wirq->dev)) {
    disable_irq_wake(wirq->irq);

    if (irq->status & WAKE_IRQ_DEDICATED_ALLOCATED)
        disable_irq_nosync(wirq->irq);
}

--- linux-4.15.0.orig/drivers/base/power/wakeup.c
+++ linux-4.15.0/drivers/base/power/wakeup.c
@@ -345,7 +346,8 @@
        if (wirq->status & WAKE_IRQ_DEDICATED_ALLOCATED &&
            !pm_runtime_status_suspended(wirq->dev))
        disable_irq_nosync(wirq->irq);
    }
}

--- linux-4.15.0.orig/drivers/base/power/wakeup.c
+++ linux-4.15.0/drivers/base/power/wakeup.c
@@ -113,7 +113,6 @@

- del_timer_sync(&ws->timer);
  __pm_relax(ws);
}

EXPORT_SYMBOL_GPL(wakeup_source_drop);

--- linux-4.15.0.orig/drivers/base/regmap/regmap-debugfs.c
+++ linux-4.15.0/drivers/base/regmap/regmap-debugfs.c
@@ -204,6 +204,9 @@
 if (*ppos < 0 || !count)
     return -EINVAL;

 void pm_system_cancel_wakeup(void)
 {
     -atomic_dec(&pm_abort_suspend);
     +atomic_dec_if_positive(&pm_abort_suspend);
 }

 void pm_wakeup_clear(bool reset)
 --- linux-4.15.0.orig/drivers/base/regmap/regmap-debugfs.c
+++ linux-4.15.0/drivers/base/regmap/regmap-debugfs.c
@@ -870,7 +876,7 @@
 void pm_system_cancel_wakeup(void)
 {
     -atomic_dec(&pm_abort_suspend);
     +atomic_dec_if_positive(&pm_abort_suspend);
 }

 void pm_wakeup_clear(bool reset)
```c
    +if (count > (PAGE_SIZE << (MAX_ORDER - 1)))
    +count = PAGE_SIZE << (MAX_ORDER - 1);
    +
    +buf = kmalloc(count, GFP_KERNEL);
    if (!buf)
        return -ENOMEM;
    @@ -352,6 +355,9 @@
        if (*ppos < 0 || !count)
            return -EINVAL;
        +if (count > (PAGE_SIZE << (MAX_ORDER - 1)))
        +count = PAGE_SIZE << (MAX_ORDER - 1);
        +
        buf = kmalloc(count, GFP_KERNEL);
        if (!buf)
            return -ENOMEM;
@@ -448,29 +454,31 @@
    {
        struct regmap *map = container_of(file->private_data,
            struct regmap, cache_only);
        -ssize_t result;
        -bool was_enabled, require_sync = false;
        +bool new_val, require_sync = false;
        int err;

        -map->lock(map->lock_arg);
        -
        -was_enabled = map->cache_only;
        +err = kstrtobool_from_user(user_buf, count, &new_val);
        +/* Ignore malformed data like debugfs_write_file_bool() */
        +if (err)
            +return count;
        +
        +err = debugfs_file_get(file->f_path.dentry);
        +if (err)
            +return err;
        +
        -map->unlock(map->lock_arg);
        -if (map->cache_only && !was_enabled) {
            +if (new_val && !map->cache_only) {
                dev_warn(map->dev, "debugfs cache_only=Y forced\n");
        ```
add_taint(TAINT_USER, LOCKDEP_STILL_OK);

}  else if (!map->cache_only && was_enabled) {
+}  else if (!new_val && map->cache_only) {
  dev_warn(map->dev, "debugfs cache_only=N forced: syncing cache\n");
  require_sync = true;
}  +map->cache_only = new_val;

map->unlock(map->lock_arg);
+debugfs_file_put(file->f_path.dentry);

if (require_sync) {
  err = regcache_sync(map);
  @@@ -478,7 +486,7 @@
  dev_err(map->dev, "Failed to sync cache %d\n", err);
 }  
  -return result;
+return count;

static const struct file_operations regmap_cache_only_fops = {
@@ -493,28 +501,32 @@
  struct regmap *map = container_of(file->private_data,
  struct regmap, cache_bypass);
  -ssize_t result;
  -bool was_enabled;
  -
  -map->lock(map->lock_arg);
  +bool new_val;
  +int err;

  -was_enabled = map->cache_bypass;
  +err = kstrtobool_from_user(user_buf, count, &new_val);
  +/* Ignore malformed data like debugfs_write_file_bool() */
  +if (err)
  +return count;
  +
  +err = debugfs_file_get(file->f_path.dentry);
  +if (err)
  +return err;

  -result = debugfs_write_file_bool(file, user_buf, count, ppos);
  -if (result < 0)
  -goto out;
  +map->lock(map->lock_arg);
- if (map->cache_bypass && !was_enabled) {
  + if (new_val && !map->cache_bypass) {
    dev_warn(map->dev, "debugfs cache_bypass=Y forced\n");
    add_taint(TAINT_USER, LOCKDEP_STILL_OK);
  } else if (!new_val && map->cache_bypass) {
    dev_warn(map->dev, "debugfs cache_bypass=N forced\n");
  } else if (new_val && map->cache_bypass) {
    + map->cache_bypass = new_val;
    
  out:
  map->unlock(map->lock_arg);
  + debugfs_file_put(file->f_path.dentry);
  
  - return result;
  + return count;
}

static const struct file_operations regmap_cache_bypass_fops = {
  @ @ -618,6 +630,7 @@
  regmap_debugfs_free_dump_cache(map);
  mutex_unlock(&map->cache_lock);
  kfree(map->debugfs_name);
  + map->debugfs_name = NULL;
} else {
  struct regmap_debugfs_node *node, *tmp;

--- linux-4.15.0.orig/drivers/base/regmap/regmap-irq.c
+++ linux-4.15.0/drivers/base/regmap/regmap-irq.c
@@ -91,6 +91,9 @@
 /* suppress pointless writes.
 */
 for (i = 0; i < d->chip->num_regs; i++) {
  +if (!d->chip->mask_base)
  +continue;
  +
  reg = d->chip->mask_base +
  (i * map->reg_stride * d->irq_reg_stride);
  if (d->chip->mask_invert) {
  @ @ -526,6 +529,9 @@
   /* Mask all the interrupts by default */
   for (i = 0; i < chip->num_regs; i++) {
    d->mask_buf[i] = d->mask_buf_def[i];
    +if (!chip->mask_base)
    +continue;
    +
    reg = chip->mask_base +
    (i * map->reg_stride * d->irq_reg_stride);
if (chip->mask_invert)
#include <linux/delay.h>
#include <linux/log2.h>
#include <linux/hwspinlock.h>
+include <asm/unaligned.h>

#define CREATE_TRACE_POINTS
#include "trace.h"

int ret;
unsigned int val;

-if (map->cache == REGCACHE_NONE)
+if (map->cache_type == REGCACHE_NONE)
return false;

if (!map->cache_ops)

static void regmap_format_16_be(void *buf, unsigned int val, unsigned int shift)
{
  __be16 *b = buf;
  -b[0] = cpu_to_be16(val << shift);
  +put_unaligned_be16(val << shift, buf);
}

static void regmap_format_16_le(void *buf, unsigned int val, unsigned int shift)
{
  __le16 *b = buf;
  -b[0] = cpu_to_le16(val << shift);
  +put_unaligned_le16(val << shift, buf);
}

static void regmap_format_16_native(void *buf, unsigned int val,
  unsigned int shift)
{
  *(u16 *)buf = val << shift;
  +u16 v = val << shift;
  +memcpy(buf, &v, sizeof(v));
}

static void regmap_format_24(void *buf, unsigned int val, unsigned int shift)
static void regmap_format_32_be(void *buf, unsigned int val, unsigned int shift)
{
    __be32 *b = buf;
    
    -b[0] = cpu_to_be32(val << shift);
    +put_unaligned_be32(val << shift, buf);
}

static void regmap_format_32_le(void *buf, unsigned int val, unsigned int shift)
{
    __le32 *b = buf;
    
    -b[0] = cpu_to_le32(val << shift);
    +put_unaligned_le32(val << shift, buf);
}

static void regmap_format_32_native(void *buf, unsigned int val, unsigned int shift)
{
    *(u32 *)buf = val << shift;
}

#ifdef CONFIG_64BIT
static void regmap_format_64_be(void *buf, unsigned int val, unsigned int shift)
{
    __be64 *b = buf;
    
    -b[0] = cpu_to_be64((u64)val << shift);
    +put_unaligned_be64((u64) val << shift, buf);
}

static void regmap_format_64_le(void *buf, unsigned int val, unsigned int shift)
{
    __le64 *b = buf;
    
    -b[0] = cpu_to_le64((u64)val << shift);
    +put_unaligned_le64((u64) val << shift, buf);
}

static void regmap_format_64_native(void *buf, unsigned int val, unsigned int shift)
{
    *(u64 *)buf = (u64)val << shift;
}
static unsigned int regmap_parse_16_be(const void *buf)
{
    const __be16 *b = buf;
    return be16_to_cpu(b[0]);
}

static unsigned int regmap_parse_16_le(const void *buf)
{
    const __le16 *b = buf;
    return le16_to_cpu(b[0]);
}

static void regmap_parse_16_be_inplace(void *buf)
{
    __be16 *b = buf;
    u16 v = get_unaligned_be16(buf);
    b[0] = be16_to_cpu(b[0]);
    memcpy(buf, &v, sizeof(v));
}

static void regmap_parse_16_le_inplace(void *buf)
{
    __le16 *b = buf;
    u16 v = get_unaligned_le16(buf);
    b[0] = le16_to_cpu(b[0]);
    memcpy(buf, &v, sizeof(v));
}

static unsigned int regmap_parse_16_native(const void *buf)
{
    return *(u16 *)buf;
}
static unsigned int regmap_parse_24(const void *buf)
{ 
	return v;
}

static unsigned int regmap_parse_32_be(const void *buf)
{ 
	const __be32 *b = buf;
-
	return be32_to_cpu(b[0]);
+return get_unaligned_be32(buf);
}

static unsigned int regmap_parse_32_le(const void *buf)
{ 
	const __le32 *b = buf;
-
	return le32_to_cpu(b[0]);
+return get_unaligned_le32(buf);
}

static void regmap_parse_32_be_inplace(void *buf)
{ 
	__be32 *b = buf;
+u32 v = get_unaligned_be32(buf);

-b[0] = be32_to_cpu(b[0]);
+memcpy(buf, &v, sizeof(v));
}

static void regmap_parse_32_le_inplace(void *buf)
{ 
	__le32 *b = buf;
+u32 v = get_unaligned_le32(buf);

-b[0] = le32_to_cpu(b[0]);
+memcpy(buf, &v, sizeof(v));
}

static unsigned int regmap_parse_32_native(const void *buf)
{ 
	return *(u32 *)buf;
+u32 v;
+
+memcpy(&v, buf, sizeof(v));
+return v;
}
#ifdef CONFIG_64BIT

static unsigned int regmap_parse_64_be(const void *buf)
{
    - const __be64 *b = buf;

    - return be64_to_cpu(b[0]);
+ return get_unaligned_be64(buf);
}

static unsigned int regmap_parse_64_le(const void *buf)
{
    - const __le64 *b = buf;

    - return le64_to_cpu(b[0]);
+ return get_unaligned_le64(buf);
}

static void regmap_parse_64_be_inplace(void *buf)
{
    __be64 *b = buf;

    u64 v = get_unaligned_be64(buf);

    -b[0] = be64_to_cpu(b[0]);
+ memcpy(buf, &v, sizeof(v));
}

static void regmap_parse_64_le_inplace(void *buf)
{
    __le64 *b = buf;

    u64 v = get_unaligned_le64(buf);

    -b[0] = le64_to_cpu(b[0]);
+ memcpy(buf, &v, sizeof(v));
}

static unsigned int regmap_parse_64_native(const void *buf)
{
    - return *(u64 *)buf;
+ u64 v;

    + memcpy(&v, buf, sizeof(v));
+ return v;
}
#endif

@@ -1307,6 +1299,7 @@
}

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if (IS_ENABLED(REGMAP_HWSPINLOCK) && map->hwlock)
    hwspin_lock_free(map->hwlock);
+kfree(map->patch);
kfree(map);
}
EXPORT_SYMBOL_GPL(regmap_exit);
@@ -1321,7 +1314,7 @@
    /* If the user didn't specify a name match any */
    if (data)
        -return (*r)->name == data;
+        return !strcmp((*r)->name, data);
    else
        return 1;
    }
@@ -1457,7 +1450,7 @@
    if (ret) {
        dev_err(map->dev,
                "Error in caching of register: %x ret: %d\n",
-        -reg + i, ret);
+        +reg + regmap_get_offset(map, i), ret);
        return ret;
    }
}
@@ -1588,6 +1581,8 @@
    if (ret == -ENOTSUPP) {
        map->format.reg_bytes +
        map->format.pad_bytes,
        val, val_len);
+    } else
+    ret = -ENOTSUPP;

    /* If that didn't work fall back on linearising by hand. */
    if (ret == -ENOTSUPP) {
        @ @ -1818,7 +1813,7 @@
        return -EINVAL;
        if (val_len % map->format.val_bytes)
            return -EINVAL;
-        if (map->max_raw_write && map->max_raw_write > val_len)
+        +if (map->max_raw_write && map->max_raw_write < val_len)
            return -E2BIG;

        map->lock(map->lock_arg);
--- linux-4.15.0.orig/drivers/base/soc.c
+++ linux-4.15.0/drivers/base/soc.c
@@ -155,6 +155,7 @@
 out1:
 return ERR_PTR(ret);
 }

+EXPORT_SYMBOL_GPL(soc_device_register);

/* Ensure soc_dev->attr is freed prior to calling soc_device_unregister. */
void soc_device_unregister(struct soc_device *soc_dev)
@@ -164,6 +165,7 @@
device_unregister(&soc_dev->dev);
early_soc_dev_attr = NULL;
}
+EXPORT_SYMBOL_GPL(soc_device_unregister);

static int __init soc_bus_register(void)
{
--- linux-4.15.0.orig/drivers/bcma/driver_mips.c
+++ linux-4.15.0/drivers/bcma/driver_mips.c
@@ -184,7 +184,7 @@
{
    int i;
    static const char *irq_name[] = {"2(S)", "3", "4", "5", "6", "D", "I"};
-    char interrupts[20];
+    char interrupts[25];
    char *ints = interrupts;
    for (i = 0; i < ARRAY_SIZE(irq_name); i++)
    --- linux-4.15.0.orig/drivers/bcma/driver_pci.c
+++ linux-4.15.0/drivers/bcma/driver_pci.c
@@ -78,7 +78,7 @@
                 v |= (address << BCMA_CORE_PCI_MDIODATA_REGADDR_SHF_OLD));
    }

    -v = BCMA_CORE_PCI_MDIODATA_START;
    +v |= BCMA_CORE_PCI_MDIODATA_START;
    v |= BCMA_CORE_PCI_MDIODATA_READ;
    v |= BCMA_CORE_PCI_MDIODATA_TA;
    @@ -121,7 +121,7 @@
    v |= (address << BCMA_CORE_PCI_MDIODATA_REGADDR_SHF_OLD));
    }

    -v = BCMA_CORE_PCI_MDIODATA_START;
    +v |= BCMA_CORE_PCI_MDIODATA_START;
    v |= BCMA_CORE_PCI_MDIODATA_WRITE;
    v |= BCMA_CORE_PCI_MDIODATA_TA;
    v |= data;
    --- linux-4.15.0.orig/drivers/bcma/main.c
+++ linux-4.15.0/drivers/bcma/main.c
@@ -236,6 +236,7 @@
     void bcma_prepare_core(struct bcma_bus *bus, struct bcma_device *core)
{  
device_initialize(&core->dev);  
core->dev.release = bcma_release_core_dev;  
core->dev.bus = &bcma_bus_type;  
dev_set_name(&core->dev, "bcma%d:%d", bus->num, core->core_index);  
@@ -299,11 +300,10 @@  
int err;  

-err = device_register(&core->dev);  
+err = device_add(&core->dev);  
if (err) {  
bcma_err(bus, "Could not register dev for core 0x%03X\n",  
core->id.id);  
-put_device(&core->dev);  
return;  
}  
core->dev_registered = true;  
@@ -394,7 +394,7 @@  /* Now noone uses internally-handled cores, we can free them */  
list_for_each_entry_safe(core, tmp, &bus->cores, list) {  
list_del(&core->list);  
-kfree(core);  
+put_device(&core->dev);  
}  
}

--- linux-4.15.0.orig/drivers/block/DAC960.c  
+++ linux-4.15.0/drivers/block/DAC960.c  
@@ -21,6 +21,7 @@  
#define DAC960_DriverDate		"21 Aug 2007"  

+#include <linux/compiler.h>  
#include <linux/module.h>  
#include <linux/types.h>  
#include <linux/miscdevice.h>  
@@ -6433,7 +6434,7 @@  
return true;  
}

-static int dac960_proc_show(struct seq_file *m, void *v)  
+static int __maybe_unused dac960_proc_show(struct seq_file *m, void *v)  
{  
unsigned char *StatusMessage = "OK\n";  
int ControllerNumber;  
@@ -6466,7 +6467,8 @@  
.release= single_release,
static int dac960_initial_status_proc_show(struct seq_file *m, void *v)
+static int __maybe_unused dac960_initial_status_proc_show(struct seq_file *m,
          void *v)
{
    DAC960_Controller_T *Controller = (DAC960_Controller_T *)m->private;
    seq_printf(m, "%.s", Controller->InitialStatusLength, Controller->CombinedStatusBuffer);
    .release= single_release,
};

static int dac960_current_status_proc_show(struct seq_file *m, void *v)
+static int __maybe_unused dac960_current_status_proc_show(struct seq_file *m,
          void *v)
{
    DAC960_Controller_T *Controller = (DAC960_Controller_T *) m->private;
    unsigned char *StatusMessage =

--- linux-4.15.0.orig/drivers/block/Kconfig
+++ linux-4.15.0/drivers/block/Kconfig
@@ -238,7 +238,7 @@
    WARNING: This device is not safe for journaled file systems like
    ext3 or Reiserfs. Please use the Device Mapper crypto module
    instead, which can be configured to be on-disk compatible with the
-    cryptoloop device.
+    cryptoloop device. cryptoloop support will be removed in Linux 5.16.

source "drivers/block/drbd/Kconfig"

@@ -470,6 +470,7 @@

config BLK_DEV_CRYPTOOLOOP
-tristate "Cryptoloop Support"
+tristate "Cryptoloop Support (DEPRECATED)"
select CRYPTO
select CRYPTO_CBC
depends on BLK_DEV_LOOP
@@ -250,7 +250,7 @@

config BLK_DEV_RSXX
tristate "IBM Flash Adapter 900GB Full Height PCIe Device Driver"
depends on PCI
+select CRC32
help
    Device driver for IBM's high speed PCIe SSD
    storage device: Flash Adapter 900GB Full Height.
--- linux-4.15.0.orig/drivers/block/amiflop.c
+++ linux-4.15.0/drivers/block/amiflop.c
+static struct gendisk *fd_alloc_disk(int drive)
+{
+static struct gendisk *disk;
+
+disk = alloc_disk(1);
+if (!disk)
+goto out;
+
+disk->queue = blk_init_queue(do_fd_request, &amiflop_lock);
+if (IS_ERR(disk->queue)) {
+disk->queue = NULL;
+goto out_put_disk;
+}
+
+unit[drive].trackbuf = kmalloc(FLOPPY_MAX_SECTORS * 512, GFP_KERNEL);
+if (!unit[drive].trackbuf)
+goto out_cleanup_queue;
+
+return disk;
+
+out_cleanup_queue:
+blk_cleanup_queue(disk->queue);
+disk->queue = NULL;
+out_put_disk:
+put_disk(disk);
+out:
+unit[drive].type->code = FD_NODRIVE;
+return NULL;
+
+}
+
static int __init fd_probe_drives(void)
{
int drive,drives,nomem;

-printk(KERN_INFO "FD: probing units\nfound ");
+pr_info("FD: probing units\nfound ");
drives=0;
nomem=0;
for(drive=0;drive<FD_MAX_UNITS;drive++) {
@@ -1713,27 +1743,17 @@
f_probe(drive);
if (unit[drive].type->code == FD_NODRIVE)
continue;
-disk = alloc_disk(1);
+disk = fd_alloc_disk(drive);
if (!disk) {
-      unit[drive].type->code = FD_NODRIVE;
+      pr_cont(" no mem for fd%d", drive);
+      nomem = 1;
    continue;
}
unit[drive].gendisk = disk;
-
-disk->queue = blk_init_queue(do_fd_request, &amiflop_lock);
-if (!disk->queue) {
-      unit[drive].type->code = FD_NODRIVE;
-      continue;
-    }
-
-drives++;
-if ((unit[drive].trackbuf = kmalloc(FLOPPY_MAX_SECTORS * 512, GFP_KERNEL)) == NULL) {
-      printk("no mem for ");
-      unit[drive].type = &drive_types[num_dr_types - 1]; /* FD_NODRIVE */
-      drives--;
-      nomem = 1;
-    }
-    printk("fd%d ",drive);
+
+    pr_cont(" fd%d",drive);
    disk->major = FLOPPY_MAJOR;
    disk->first_minor = drive;
    disk->fops = &floppy_fops;
    @@ -1744,11 +1764,11 @@
} 
if ((drives > 0) || (nomem == 0)) {
if (drives == 0)
-      printk("no drives");
-      printk("\n");
+      pr_cont(" no drives");
+      pr_cont("\n");
    return drives;
  }
-    printk("\n");
+    pr_cont("\n");
  return -ENOMEM;
}
@@ -1831,30 +1851,6 @@
return ret;
}
#if 0 /* not safe to unload */
static int __exit amiga_floppy_remove(struct platform_device *pdev)
{ 
  int i; 
  
  for( i = 0; i < FD_MAX_UNITS; i++) {
    if (unit[i].type->code != FD_NODRIVE) {
      struct request_queue *q = unit[i].gendisk->queue;
      del_gendisk(unit[i].gendisk);
      put_disk(unit[i].gendisk);
      kfree(unit[i].trackbuf);
      if (q)
        blk_cleanup_queue(q);
    }
  }
  blk_unregister_region(MKDEV(FLOPPY_MAJOR, 0), 256);
  free_irq(IRQ_AMIGA_CIAA_TB, NULL);
  free_irq(IRQ_AMIGA_DSKBLK, NULL);
  custom.dmacon = DMAF_DISK; /* disable DMA */
  amiga_chip_free(raw_buf);
  unregister_blkdev(FLOPPY_MAJOR, "fd");
}
#endif

static struct platform_driver amiga_floppy_driver = {
  .driver = {
    .name = "amiga-floppy",
    --- linux-4.15.0.orig/drivers/block/ataflop.c
    +++ linux-4.15.0/drivers/block/ataflop.c
    @@ -1935,6 +1935,11 @@
    unit[i].disk = alloc_disk(1);
    if (!unit[i].disk)
      goto Enomem;
+    unit[i].disk->queue = blk_init_queue(do_fd_request,
+                                        &ataflop_lock);
+    if (!unit[i].disk->queue)
+      goto Enomem;
  }

  if (UseTrackbuffer < 0)
    @ @ -1966,10 +1971,6 @@
    sprintf(unit[i].disk->disk_name, "fd%d", i);
    unit[i].disk->fops = &floppy_fops;
    unit[i].disk->private_data = &unit[i];
    -unit[i].disk->queue = blk_init_queue(do_fd_request,
    -*&ataflop_lock);
    -if (!unit[i].disk->queue)
goto Enomem;
set_capacity(unit[i].disk, MAX_DISK_SIZE * 2);
add_disk(unit[i].disk);
}
@@ -1984,13 +1985,17 @@
return 0;
Enomem:
-while (i--) {
-struct request_queue *q = unit[i].disk->queue;
+do {
+struct gendisk *disk = unit[i].disk;

-put_disk(unit[i].disk);
-if (q)
-blk_cleanup_queue(q);
-}
+if (disk) {
+if (disk->queue) {
+blk_cleanup_queue(disk->queue);
+disk->queue = NULL;
+}
+put_disk(unit[i].disk);
+}
+} while (i--);

unregister_blkdev(FLOPPY_MAJOR, "fd");
return -ENOMEM;
--- linux-4.15.0.orig/drivers/block/brd.c
+++ linux-4.15.0/drivers/block/brd.c
@@ -24,7 +24,6 @@
#include <linux/uaccess.h>

-#define SECTOR_SHIFT	9
+#define PAGE_SECTORS_SHIFT(PAGE_SHIFT - SECTOR_SHIFT)
+#define PAGE_SECTORS(1 << PAGE_SECTORS_SHIFT)

@@ -97,13 +96,8 @@
/*
 * Must use NOIO because we don't want to recurse back into the
 * block or filesystem layers from page reclaim.
- *
- * Cannot support DAX and highmem, because our ->direct_access
- * routine for DAX must return memory that is always addressable.
- * If DAX was reworked to use pfns and kmap throughout, this
- * restriction might be able to be lifted.
 */
gfp_flags = GFP_NOIO | __GFP_ZERO;
+gfp_flags = GFP_NOIO | __GFP_ZERO | __GFP_HIGHTMEM;
page = alloc_page(gfp_flags);
if (!page)
return NULL;
@@ -465,6 +459,25 @@
return kobj;
}

+static inline void brd_check_and_reset_par(void)
+{
+if (unlikely(!max_part))
+max_part = 1;
+
+/*
+ * make sure 'max_part' can be divided exactly by (1U << MINORBITS),
+ * otherwise, it is possible to get same dev_t when adding partitions.
+ */
+if ((1U << MINORBITS) % max_part != 0)
+max_part = 1UL << fls(max_part);
+
+if (max_part > DISK_MAX_PARTS) {
+pr_info("brd: max_part can't be larger than %d, reset max_part = %d:n",
+DISK_MAX_PARTS, DISK_MAX_PARTS);
+max_part = DISK_MAX_PARTS;
+}
+
+static int __init brd_init(void)
+
{ struct brd_device *brd, *next;
@@ -488,8 +501,7 @@
if (register_blkdev(RAMDISK_MAJOR, "ramdisk"))
return -EIO;

-if (unlikely(!max_part))
- max_part = 1;
- brd_check_and_reset_par();

for (i = 0; i < rd_nr; i++) {
brd = brd_alloc(i);
--- linux-4.15.0.orig/drivers/block/cryptoloop.c
+++ linux-4.15.0/drivers/block/cryptoloop.c
@@ -201,6 +201,8 @@
if (rc)
printk(KERN_ERR "cryptoloop: loop_register_transfer failed\n");
+else

+pr_warn("the cryptoloop driver has been deprecated and will be removed in in Linux 5.16\n");
return rc;
}

--- linux-4.15.0.orig/drivers/block/drbd/drbd_main.c
+++ linux-4.15.0/drivers/block/drbd/drbd_main.c
@@ -334,6 +334,8 @@
 thi->name[0],
 resource->name);

+allow_kernel_signal(DRBD_SIGKILL);
+allow_kernel_signal(SIGXCPU);
restart:
retval = thi->function(thi);

@@ -795,7 +797,6 @@
 if (nc->tentative && connection->agreed_pro_version < 92) {
 rcu_read_unlock();
 mutex_unlock(&sock->mutex);
-drbd_err(connection, "--dry-run is not supported by peer");
 return -EOPNOTSUPP;
 }
--- linux-4.15.0.orig/drivers/block/drbd/drbd_nl.c
+++ linux-4.15.0/drivers/block/drbd/drbd_nl.c
@@ -668,14 +668,15 @@
 if (rv == SS_TWO_PRIMARIES) {
 /* Maybe the peer is detected as dead very soon...
  * retry at most once more in this case. */
-int timeo;
-rcu_read_lock();
-nc = rcu_dereference(connection->net_conf);
-timeo = nc ? (nc->ping_timeo + 1) * HZ / 10 : 1;
-rcu_read_unlock();
-schedule_timeout_interruptible(timeo);
-if (try < max_tries)
+if (try < max_tries) {
+int timeo;
+try = max_tries - 1;
+rcu_read_lock();
+nc = rcu_dereference(connection->net_conf);
+timeo = nc ? (nc->ping_timeo + 1) * HZ / 10 : 1;
+rcu_read_unlock();
+schedule_timeout_interruptible(timeo);
+}
 continue;
 }
if (rv < SS_SUCCESS) {
static int disk_opts_check_al_size(struct drbd_device *device, struct disk_conf *dc)
{
    int err = -EBUSY;
    if (device->act_log &&
        device->act_log->nr_elements == dc->al_extents)
        return 0;
    drbd_suspend_io(device);
    /* If IO completion is currently blocked, we would likely wait
     * "forever" for the activity log to become unused. So we don't. */
    if (atomic_read(&device->ap_bio_cnt))
        goto out;
    wait_event(device->al_wait, lc_try_lock(device->act_log));
    drbd_al_shrink(device);
    err = drbd_check_al_size(device, dc);
    lc_unlock(device->act_log);
    wake_up(&device->al_wait);
    out:
    drbd_resume_io(device);
    return err;
}
try again without changing current al-extents setting
}
rcode = ERR_NOMEM;
goto fail_unlock;
}
@@ -1934,9 +1956,9 @@
}
}
}  

- if (device->state.conn < C_CONNECTED &&
-     device->state.role == R_PRIMARY && device->ed_uuid &&
-     (device->ed_uuid & ~((u64)1)) != (nbc->md.uuid[UI_CURRENT] & ~((u64)1))) {  
+ if (device->state.pdsk != D_UP_TO_DATE && device->ed_uuid &&
+     (device->state.role == R_PRIMARY || device->state.peer == R_PRIMARY) &&
+     (device->ed_uuid & ~((u64)1)) != (nbc->md.uuid[UI_CURRENT] & ~((u64)1))) {  
    drbd_err(device, "Can only attach to data with current UUID=%016llxXn",
    unsigned long long)device->ed_uuid);
    rcode = ERR_DATA_NOT_CURRENT;
--- linux-4.15.0.orig/drivers/block/drbd/drbd_receiver.c
+++ linux-4.15.0/drivers/block/drbd/drbd_receiver.c
@@ -3361,7 +3361,7 @@
     enum drbd_conns rv = C_MASK;
     enum drbd_disk_state mydisk;
     struct net_conf *nc;
-    int hg, rule_nr, rr_conflict, tentative;
+    int hg, rule_nr, rr_conflict, tentative, always_asbp;

     mydisk = device->state.disk;
     if (mydisk == D_NEGOTIATING)
@@ -3412,8 +3412,12 @@
     rcu_read_lock();
     nc = rcu_dereference(peer_device->connection->net_conf);
     +always_asbp = nc->always_asbp;
     +rr_conflict = nc->rr_conflict;
     +tentative = nc->tentative;
     +rcu_read_unlock();
     -if (hg == 100 || (hg == -100 && nc->always_asbp)) {
     +if (hg == 100 || (hg == -100 && always_asbp)) {
        int pcount = (device->state.role == R_PRIMARY)
        + (peer_role == R_PRIMARY);
        int forced = (hg == -100);
@@ -3452,9 +3456,6 @@

     "Sync from %s node\n",
     (hg < 0) ? "peer" : "this");
    }
    -rr_conflict = nc->rr_conflict;
    -tentative = nc->tentative;

---

Open Source Used in 5GaaS Edge AC-4  20003
if (hg == -100) {
    /* FIXME this log message is not correct if we end up here */
    @ @ -3976.6 +3977.7 @@

    struct o qlim *o = (connection->agreed_features & DRBD_FF_WSAME) ? p->qlim : NULL;
    enum determine_dev_size dd = DS_UNCHANGED;
    sector_t p_size, p_usize, p_csize, my_usize;
    +sector_t new_size, cur_size;
    int ldsc = 0; /* local disk size changed */
    enum dds_flags ddsf;

    @ @ -3983.6 +3985.7 @@
    if (!peer_device)
        return config_unknown_volume(connection, pi);
    device = peer_device->device;
    +cur_size = drbd_get_capacity(device->this_bdev);

    p_size = be64_to_cpu(p->d_size);
    p_usize = be64_to_cpu(p->u_size);
    @ @ -3993.7 +3996.6 @@
    device->p_size = p_size;

    if (get_ldev(device)) {
        -sector_t new_size, cur_size;
        rcu_read_lock();
        my_usize = rcu_dereference(device->ldev->disk_conf)->disk_size;
        rcu_read_unlock();
        @ @ -4011.7 +4013.6 @@
        /* Never shrink a device with usable data during connect. */
        But allow online shrinking if we are connected. */
        new_size = drbd_new_dev_size(device, device->ldev, p_usize, 0);
        -cur_size = drbd_get_capacity(device->this_bdev);
        if (new_size < cur_size &&
            device->state.disk >= D_OUTDATED &&
            device->state.conn < C_CONNECTED) {
            @ @ -4076.9 +4077.36 @@
            *
            * However, if he sends a zero current size,
            * take his (user-capped or) backing disk size anyways.
            + *
            + * Unless of course he does not have a disk himself.
            + * In which case we ignore this completely.
            */
            +sector_t new_size = p_csize ?: p_usize ?: p_size;
            drbd_reconsider_queue_parameters(device, NULL, o);
            +drbd_set_my_capacity(device, p_csize ?: p_usize ?: p_size);
            +if (new_size == 0) {

        -rcu_read_unlock();
    }
+/* Ignore, peer does not know nothing. */
+} else if (new_size == cur_size) {
+/* nothing to do */
+} else if (cur_size != 0 && p_size == 0) {
+drbd_warn(device, "Ignored diskless peer device size (peer:%llu != me:%llu sectors)!\n",
+(unsigned long long)new_size, (unsigned long long)cur_size);
+} else if (new_size < cur_size && device->state.role == R_PRIMARY) {
+drbd_err(device, "The peer's device size is too small! (%llu < %llu sectors); demote me first!\n",
+(unsigned long long)new_size, (unsigned long long)cur_size);
+conn_request_state(peer_device->connection, NS(conn, C_DISCONNECTING), CS_HARD);
+return -EIO;
+} else {
+/* I believe the peer, if
+ * - I don't have a current size myself
+ * - we agree on the size anyways
+ * - I do have a current size, am Secondary,
+ *   and he has the only disk
+ * - I do have a current size, am Primary,
+ *   and he has the only disk,
+ * - which is larger than my current size
+ */
+drbd_set_my_capacity(device, new_size);
+}
+
+if (get_ldev(device)) {
+@
+@
+kfree(device->p_uuid);
+device->p_uuid = p_uuid;
+
+if (device->state.conn < C_CONNECTED &&
+if (((device->state.conn < C_CONNECTED || device->state.pdsk == D_DISKLESS) &&
+   device->state.disk < D_INCONSISTENT &&
+   device->state.role == R_PRIMARY &&
+     (device->ed_uuid & ~((u64)1)) != (p_uuid[UI_CURRENT] & ~((u64)1))}) {
+@
+@
+if (peer_state.conn == C_AHEAD)
+ns.conn = C_BEHIND;
+}
+
+/* TODO:
+ * if (primary and diskless and peer uuid != effective uuid)
+ * abort attach on peer;
+ *
+ * If this node does not have good data, was already connected, but
+ * the peer did a late attach only now, trying to "negotiate" with me,
+ * AND I am currently Primary, possibly frozen, with some specific
+ * "effective" uuid, this should never be reached, really, because
+ * we first send the uuids, then the current state.
In this scenario, we already dropped the connection hard when we received the unsuitable uuids (receive_uuids()). Should we want to change this, that is: not drop the connection in receive_uuids() already, then we would need to add a branch here that aborts the attach of "unsuitable uuids" on the peer in case this node is currently Diskless Primary.

```
if (device->p_uuid && peer_state.disk >= D_NEGOTIATING && 
    get_ldev_if_state(device, D_NEGOTIATING)) {
    int cr; /* consider resync */
    @@ -5236,7 +5283,7 @@
    unsigned int key_len;
    char secret[SHARED_SECRET_MAX]; /* 64 byte */
    unsigned int resp_size;
    -SHASH_DESC_ON_STACK(desc, connection->cram_hmac_tfm);
    +struct shash_desc *desc;
    struct packet_info pi;
    struct net_conf *nc;
    int err, rv;
    @@ -5249,6 +5296,13 @@
    memcpy(secret, nc->shared_secret, key_len);
    rcu_read_unlock();

    +desc = kmalloc(sizeof(struct shash_desc) +
    + crypto_shash_descsize(connection->cram_hmac_tfm),
    + GFP_KERNEL);
    +if (!desc) {
    +rv = -1;
    +goto fail;
    +}
    desc->tfm = connection->cram_hmac_tfm;
    desc->flags = 0;

    @@ -5391,7 +5445,10 @@
    kfree(peers_ch);
    kfree(response);
    kfree(right_response);
    -shash_desc_zero(desc);
    +if (desc) {
    +shash_desc_zero(desc);
    +kfree(desc);
    +}

    return rv;
}
Open Source Used In 5GaaS Edge AC-4 20007

--- linux-4.15.0.orig/drivers/block/drbd/drbd_req.c
+++ linux-4.15.0/drivers/block/drbd/drbd_req.c
@@ -1244,8 +1244,8 @@
   _drbd_start_io_acct(device, req);

   /* process discards always from our submitter thread */
   -if ((bio_op(bio) & REQ_OP_WRITE_ZEROES) ||
   -   (bio_op(bio) & REQ_OP_DISCARD))
   +if (bio_op(bio) == REQ_OP_WRITE_ZEROES ||
   +   bio_op(bio) == REQ_OP_DISCARD)
   goto queue_for_submitter_thread;

   if (rw == WRITE && req->private_bio && req->i.size
--- linux-4.15.0.orig/drivers/block/drbd/drbd_state.c
+++ linux-4.15.0/drivers/block/drbd/drbd_state.c
@@ -688,11 +688,9 @@
   CS_VERBOSE | CS_ORDERED | CS_INHIBIT_MD_IO);
 }

-enum drbd_state_rv
-drbd_request_detach_interruptible(struct drbd_device *device)
+int drbd_request_detach_interruptible(struct drbd_device *device)
{
 -enum drbd_state_rv rv;
 -int ret;
 +int ret, rv;

drbd_suspend_io(device); /* so no-one is stuck in drbd_al_begin_io */
wait_event_interruptible(device->state_wait,
--- linux-4.15.0.orig/drivers/block/drbd/drbd_state.h
+++ linux-4.15.0/drivers/block/drbd/drbd_state.h
@@ -131,7 +131,7 @@
 enum chg_state_flags,
     struct completion *done);
 extern void print_st_err(struct drbd_device *, union drbd_state,
-enum drbd_state_rv
+enum drbd_state_rv
    union drbd_state, int);
+union drbd_state, enum drbd_state_rv);

 enum drbd_state_rv
 _conn_request_state(struct drbd_connection *connection, union drbd_state mask, union drbd_state val,
@@ -162,8 +162,7 @@}

 /* for use in adm_detach() (drbd_adm_detach(), drbd_adm_down()) */
-num drbd_state_rv
-drbd_request_detach_interruptible(struct drbd_device *device);
+int drbd_request_detach_interruptible(struct drbd_device *device);
enum drbd_role conn_highest_role(struct drbd_connection *connection);
enum drbd_role conn_highest_peer(struct drbd_connection *connection);
--- linux-4.15.0.orig/drivers/block/drbd/drbd_worker.c
+++ linux-4.15.0/drivers/block/drbd/drbd_worker.c
@@ -282,8 +282,8 @@
 what = COMPLETED_OK;
 }
-bio_put(req->private_bio);
 req->private_bio = ERR_PTR(blk_status_to_errno(bio->bi_status));
+bio_put(bio);

 /* not req_mod(), we need irqs save here! */
 spin_lock_irqsave(&device->resource->req_lock, flags);
--- linux-4.15.0.orig/drivers/block/floppy.c
+++ linux-4.15.0/drivers/block/floppy.c
@@ -852,14 +852,17 @@
 /* selects the fdc and drive, and enables the fdc's input/dma. */
 static void set_fdc(int drive)
 {
 +unsigned int new_fdc = fdc;
 +
 if (drive >= 0 && drive < N_DRIVE) {
 -fdc = FDC(drive);
 +new_fdc = FDC(drive);
 current_drive = drive;
 }
 -if (fdc != 1 && fdc != 0) {
 +if (new_fdc >= N_FDC) {
 pr_info("bad fdc value\n");
 return;
 }
 +fdc = new_fdc;
 set_dor(fdc, ~0, 8);
 #if N_FDC > 1
 set_dor(1 - fdc, ~8, 0);
@@ -2122,6 +2125,9 @@
 raw_cmd->kernel_data = floppy_track_buffer;
 raw_cmd->length = 4 * F_SECT_PER_TRACK;

 +if (!F_SECT_PER_TRACK)
 +return;
 +
 /* allow for about 30ms for data transport per track */
 head_shift = (F_SECT_PER_TRACK + 5) / 6;
@@ -3244,8 +3250,12 @@
 int cnt;
/* sanity checking for parameters. */
-if (g->sect <= 0 ||
-  g->head <= 0 ||
+if ((int)g->sect <= 0 ||
+  (int)g->head <= 0 ||
+  /* check for overflow in max_sector */
+  (int)(g->sect * g->head) <= 0 ||
+  /* check for zero in F_SECT_PER_TRACK */
+  (unsigned char)((g->sect << 2) >> FD_SIZECODE(g)) == 0 ||
  g->track <= 0 || g->track > UDP->tracks >> STRETCH(g) ||
 /* check if reserved bits are set */
  (g->stretch & ~(FD_STRETCH | FD_SWAPSIDES | FD_SECTBASEMASK)) != 0)
@@ -3389,6 +3399,24 @@
return 0;
}

+static bool valid_floppy_drive_params(const short autodetect[8],
+int native_format)
+{
+size_t floppy_type_size = ARRAY_SIZE(floppy_type);
+size_t i = 0;
+for (i = 0; i < 8; ++i) {
+  if (autodetect[i] < 0 ||
+      autodetect[i] >= floppy_type_size)
+    return false;
+}
+if (native_format < 0 || native_format >= floppy_type_size)
+  return false;
+return true;
+
static int fd_locked_ioctl(struct block_device *bdev, fmode_t mode, unsigned int cmd,
unsigned long param)
{
@@ -3470,6 +3498,8 @@
  if (ret)
    return ret;
+    memcpy(&inparam.g, outparam, offsetof(struct floppy_struct, name));
+outparam = &inparam.g;
break;
  case FDMSGON:
    UDP->flags |= FTD_MSG;
@@ -3512,6 +3542,9 @@

SUPBOUND(size, strlen((const char *)outparam) + 1);
break;
case FDSETDRVPRM:
+if (!valid_floppy_drive_params(inparam.dp.autodetect,
+inparam.dp.native_format))
+return -EINVAL;
*UDP = inparam.dp;
break;
case FDGETDRVPRM:
@@ -3709,6 +3742,8 @@
return -EPERM;
if (copy_from_user(&v, arg, sizeof(struct compat_floppy_drive_params)))
return -EFAULT;
+if (!valid_floppy_drive_params(v.autodetect, v.native_format))
+return -EINVAL;
mutex_lock(&floppy_mutex);
UDP->cmos = v.cmos;
UDP->max_dtr = v.max_dtr;
@@ -3761,7 +3796,7 @@
v.native_format = UDP->native_format;
mutex_unlock(&floppy_mutex);

-if (copy_from_user(arg, &v, sizeof(struct compat_floppy_drive_params)))
+if (copy_to_user(arg, &v, sizeof(struct compat_floppy_drive_params)))
return -EFAULT;
return 0;
}
@@ -3797,7 +3832,7 @@
v.bufblocks = UDRS->bufblocks;
mutex_unlock(&floppy_mutex);

-if (copy_from_user(arg, &v, sizeof(struct compat_floppy_drive_struct)))
+if (copy_to_user(arg, &v, sizeof(struct compat_floppy_drive_struct)))
return -EFAULT;
return 0;
Eintr:
@@ -4084,7 +4119,7 @@
if (time_after(jiffies, UDRS->last_checked + UDP->checkfreq)) {
if (lock_fdc(drive))
-return -EINVAL;
+return 0;
poll_drive(false, 0);
process_fd_request();
}
+init_completion(&cbdata.complete);
+
+submit_bio(&bio);
+process_fd_request();

-init_completion(&cbdata.complete);
wait_for_completion(&cbdata.complete);

__free_page(page);
--- linux-4.15.0.orig/drivers/block/loop.c
+++ linux-4.15.0/drivers/block/loop.c
@@ -266,7 +266,7 @@
 struct iov_iter i;
 ssize_t bw;

-iov_iter_bvec(&i, ITER_BVEC, bvec, 1, bvec->bv_len);
+iov_iter_bvec(&i, ITER_BVEC | WRITE, bvec, 1, bvec->bv_len);

file_start_write(file);
bw = vfs_iter_write(file, &i, ppos, 0);
@@ -414,19 +414,22 @@
 return ret;
 }

-static int lo_discard(struct loop_device *lo, struct request *rq, loff_t pos)
+static int lo_fallocate(struct loop_device *lo, struct request *rq, loff_t pos,
+\t\t\t\tint mode)
+\{
+\/*
+\*/
+\t/* We use punch hole to reclaim the free space used by the
+\t/* image a.k.a. discard. However we do not support discard if
+\t/* encryption is enabled, because it may give an attacker
+\t/* useful information.
+\t/* We use fallocate to manipulate the space mappings used by the image
+\t/* a.k.a. discard/zerrange. However we do not support this if
+\t/* encryption is enabled, because it may give an attacker useful
+\t/* information.
+\*/
+\struct file *file = lo->lo_backing_file;
+\-int mode = FALLOC_FL_PUNCH_HOLE | FALLOC_FL_KEEP_SIZE;
+\+struct request_queue *q = lo->lo_queue;
+\int ret;
+
+\-if (!(file->f_op->fallocate) || lo->lo_encrypt_key_size) {
+\+mode |= FALLOC_FL_KEEP_SIZE;
+\+
+\+if (!blk_queue_discard(q)) {
+\+\}
+\+};
+\}
switch (req_op(rq)) {
    case REQ_OP_FLUSH:
        return lo_req_flush(lo, rq);
    case REQ_OP_DISCARD:
        return lo_discard(lo, rq, pos);
    case REQ_OP_WRITE_ZEROES:
        /*
         * If the caller doesn't want deallocation, call zeroout to
         * write zeroes the range. Otherwise, punch them out.
         */
        return lo_fallocate(lo, rq, pos, (rq->cmd_flags & REQ_NOUNMAP) ?
            FALLOC_FL_ZERO_RANGE : FALLOC_FL_PUNCH_HOLE);
    case REQ_OP_DISCARD:
        return lo_fallocate(lo, rq, pos, FALLOC_FL_PUNCH_HOLE);
}

static void loop_reread_partitions(struct loop_device *lo, struct block_device *bdev)
{
    __func__, lo->lo_number, lo->lo_file_name, rc);
}

static inline int is_loop_device(struct file *file)
{
    struct inode *i = file->f_mapping->host;

    if (file->f_path.dentry->d_sb->s_op->real_loop)
        return 1;
    return 0;

    static struct file *loop_real_file(struct file *file)
    {
        struct file *f = NULL;

        if (file->f_path.dentry->d_sb->s_op->real_loop)
            f = file->f_path.dentry->d_sb->s_op->real_loop(file);
        return f;
    }

    static struct file *loop_real_file(struct file *file)
    {
        struct file *f = NULL;

        if (file->f_path.dentry->d_sb->s_op->real_loop)
            f = file->f_path.dentry->d_sb->s_op->real_loop(file);
        return f;
    }

    static void loop_reread_partitions(struct loop_device *lo, struct block_device *bdev)
    {
        __func__, lo->lo_number, lo->lo_file_name, rc);
    }

    static inline int is_loop_device(struct file *file)
    {
        struct inode *i = file->f_mapping->host;

        if (file->f_path.dentry->d_sb->s_op->real_loop)
            return 1;
        return 0;
    }

    return (i && S_ISBLK(i->i_mode) && MAJOR(i->i_rdev) == LOOP_MAJOR);
static int loop_validate_file(struct file *file, struct block_device *bdev) {
    struct inode *inode = file->f_mapping->host;
    struct file *f = file;

    /* Avoid recursion */
    while (is_loop_device(f)) {
        struct loop_device *l;

        if (f->f_mapping->host->i_bdev == bdev)
            return -EBADF;
        l = f->f_mapping->host->i_bdev->bd_disk->private_data;
        if (l->lo_state != Lo_bound) {
            return -EINVAL;
        }
        f = l->lo_backing_file;
    }

    if (!S_ISREG(inode->i_mode) && !S_ISBLK(inode->i_mode))
        return -EINVAL;
    return 0;
}

loop_change_fd switched the backing store of a loopback device to a new file. This is useful for operating system installers to free up unsigned int arg)
{
    struct file *file, *old_file;
    struct file *f, *virt_file = NULL, *old_virt_file;
    struct inode *inode;
    int error;

    file = fget(arg);
    if (!file)
        goto out;
    f = loop_real_file(file);
    if (f) {
        virt_file = file;
        file = f;
        get_file(file);
        +
    }

    if (!S_ISREG(inode->i_mode) && !S_ISBLK(inode->i_mode))
        return -EINVAL;
    return 0;
    +
    +error = loop_validate_file(file, bdev);
+if (error)
+goto out_putf;

inode = file->f_mapping->host;
old_file = lo->lo_backing_file;
+old_virt_file = lo->lo_backing_virt_file;

error = -EINVAL;

-if (!S_ISREG(inode->i_mode) && !S_ISBLK(inode->i_mode))
-goto out_putf;
-
/* size of the new backing store needs to be the same */
if (get_loop_size(lo, file) != get_loop_size(lo, old_file))
goto out_putf;
@@ -667,6 +726,7 @@
blk_mq_freeze_queue(lo->lo_queue);
mapping_set_gfp_mask(old_file->f_mapping, lo->old_gfp_mask);
lo->lo_backing_file = file;
+lo->lo_backing_virt_file = virt_file;
lo->old_gfp_mask = mapping_gfp_mask(file->f_mapping);
mapping_set_gfp_mask(file->f_mapping,
    lo->old_gfp_mask & ~(__GFP_IO|__GFP_FS));
@@ -674,22 +734,37 @@
blk_mq_unfreeze_queue(lo->lo_queue);

fput(old_file);
+if (old_virt_file)
+fput(old_virt_file);
if (lo->lo_flags & LO_FLAGS_PARTSCAN)
    loop_reread_partitions(lo, bdev);
return 0;

out_putf:
fput(file);
+if (virt_file)
+fput(virt_file);
out:
return error;
}

-static inline int is_loop_device(struct file *file)
+/*
+ * for AUFS
+ * no get/put for file.
+ */
+struct file *loop_backing_file(struct super_block *sb)
{
struct inode *i = file->f_mapping->host;
+struct file *ret;
+struct loop_device *l;

return i && S_ISBLK(i->i_mode) && MAJOR(i->i_rdev) == LOOP_MAJOR;
+ret = NULL;
+if (MAJOR(sb->s_dev) == LOOP_MAJOR) {
+  l = sb->s_bdev->bd_disk->private_data;
+  ret = l->lo_backing_file;
+}
+return ret;
}
+EXPORT_SYMBOL_GPL(loop_backing_file);

/* loop sysfs attributes */

static int loop_sysfs_init(struct loop_device *lo)
+static void loop_sysfs_init(struct loop_device *lo)
{
-  return sysfs_create_group(&disk_to_dev(lo->lo_disk)->kobj,
-    &loop_attribute_group);
+  lo->sysfs_inited = !sysfs_create_group(&disk_to_dev(lo->lo_disk)->kobj,
+    &loop_attribute_group);
}

static void loop_sysfs_exit(struct loop_device *lo)
{
-  sysfs_remove_group(&disk_to_dev(lo->lo_disk)->kobj,
-    &loop_attribute_group);
+  if (lo->sysfs_inited)
+    sysfs_remove_group(&disk_to_dev(lo->lo_disk)->kobj,
+      &loop_attribute_group);
}

static void loop_config_discard(struct loop_device *lo)
@@ -804,6 +880,23 @@
  struct file *file = lo->lo_backing_file;
  struct inode *inode = file->f_mapping->host;
  struct request_queue *q = lo->lo_queue;
+  u32 granularity, max_discard_sectors;
+}
+/*
+ * If the backing device is a block device, mirror its zeroing
+ * capability. Set the discard sectors to the block device's zeroing
+ * capabilities because loop discards result in blkdev_issue_zeroout(),
+ * not blkdev_issue_discard(). This maintains consistent behavior with
+ * file-backed loop devices: discarded regions read back as zero.
+ */
+if (S_ISBLK(inode->i_mode) && !lo->lo_encrypt_key_size) {
+struct request_queue *backingq;
+
+backingq = bdev_get_queue(inode->i_bdev);
+
+max_discard_sectors = backingq->limits.max_write_zeroes_sectors;
+granularity = backingq->limits.discard_granularity ?:
+queue_physical_block_size(backingq);

/*
 * We use punch hole to reclaim the free space used by the
 * encryption is enabled, because it may give an attacker
 * useful information.
 */
-if ((!file->f_op->fallocate) ||
-    lo->lo_encrypt_key_size) {
+} else if (!file->f_op->fallocate || lo->lo_encrypt_key_size) {
+max_discard_sectors = 0;
+granularity = 0;
+
+} else {
+max_discard_sectors = UINT_MAX >> 9;
+granularity = inode->i_sb->s_blocksize;
+)
+
+if (max_discard_sectors) {
+q->limits.discard_granularity = granularity;
+blk_queue_max_discard_sectors(q, max_discard_sectors);
+blk_queue_max_write_zeroes_sectors(q, max_discard_sectors);
+queue_flag_set_unlocked(Queue_FLAG_DISCARD, q);
+
+} else {
+q->limits.discard_granularity = 0;
-q->limits.discard_alignment = 0;
blk_queue_max_discard_sectors(q, 0);
blk_queue_max_write_zeroes_sectors(q, 0);
queue_flag_clear_unlocked(Queue_FLAG_DISCARD, q);
-package;
} } 

-q->limits.discard_granularity = inode->i_sb->s_blocksize;
-q->limits.discard_alignment = 0;

-blk_queue_max_discard_sectors(q, UINT_MAX >> 9);
-blk_queue_max_write_zeros_sectors(q, UINT_MAX >> 9);
-queue_flag_set_unlocked(QUEUE_FLAG_DISCARD, q);
}

static void loop_unprepare_queue(struct loop_device *lo)
@@ -837,7 +935,7 @@

static int loop_kthread_worker_fn(void *worker_ptr)
{
 -current->flags |= PF_LESS_THROTTLE;
+current->flags |= PF_LESS_THROTTLE | PF_MEMALLOC_NOIO;
 return kthread_worker_fn(worker_ptr);
}

@@ -855,7 +953,7 @@
 static int loop_set_fd(struct loop_device *lo, fmode_t mode,
 struct block_device *bdev, unsigned int arg)
 {
-struct file *file, *f;
+struct file *file, *f, *virt_file = NULL;
 struct inode *inode;
 struct address_space *mapping;
 intlo_flags = 0;
@@ -869,34 +967,24 @@
 file = fget(arg);
 if (!file)
 goto out;
+if (f) {
+virt_file = file;
+file = f;
+get_file(file);
+}

 error = -EBUSY;
 if (lo->lo_state != Lo_unbound)
 goto out_putf;

 /* Avoid recursion */
 -f = file;
-while (is_loop_device(f)) {
-struct loop_device *l;
-
- if (f->f_mapping->host->i_bdev == bdev)
- goto out_putf;
-
-l = f->f_mapping->host->i_bdev->bd_disk->private_data;
- if (l->lo_state == Lo_unbound) {

error = -EINVAL;
-goto out_putf;
-
-f = l->lo_backing_file;
-
+error = loop_validate_file(file, bdev);
+if (error)
+    goto out_putf;

mapping = file->f_mapping;
inode = mapping->host;

-error = -EINVAL;
-if (!S_ISREG(inode->i_mode) && !S_ISBLK(inode->i_mode))
    -goto out_putf;
-
    if (!!(file->f_mode & FMODE_WRITE) || !!(mode & FMODE_WRITE) ||
        !file->f_op->write_iter)
lo_flags |= LO_FLAGS_READ_ONLY;
@@ -917,6 +1005,7 @@
lo->lo_device = bdev;
lo->lo_flags = lo_flags;
lo->lo_backing_file = file;
+lo->lo_backing_virt_file = virt_file;
lo->transfer = NULL;
lo->ioctl = NULL;
lo->lo_sizelimit = 0;
@@ -950,6 +1039,8 @@
@@ -996,6 +1087,7 @@
static int loop_clr_fd(struct loop_device *lo)
{
    struct file *filp = lo->lo_backing_file;
+    struct file *virt_filp = lo->lo_backing_virt_file;
    gfp_t gfp = lo->old_gfp_mask;
    struct block_device *bdev = lo->lo_device;

    @@ -1027,6 +1119,7 @@
    spin_lock_irq(&lo->lo_lock);
    lo->lo_state = Lo_rundown;
    lo->lo_backing_file = NULL;

    out_putf:
    fput(file);
+    if (virt_file)
+        fput(virt_file);
    out:
/* This is safe: open() is still holding a reference. */
    module_put(THIS_MODULE);
@@ -996,6 +1087,7 @@

+lo->lo_backing_virt_file = NULL;
spin_unlock_irq(&lo->lo_lock);

loop_release_xfer(lo);
@@ -1074,6 +1167,8 @@
  * bd_mutex which is usually taken before lo_ctl_mutex.
  */
  fput(filp);
+  if (virt_filp)
+    fput(virt_filp);
return 0;
}

@@ -1093,6 +1188,12 @@
  if ((unsigned int) info->lo_encrypt_key_size > LO_KEY_SIZE)
  return -EINVAL;

  +if (lo->lo_offset != info->lo_offset ||
  +  lo->lo_sizelimit != info->lo_sizelimit) {
  +  sync_blockdev(lo->lo_device);
  +  invalidate_bdev(lo->lo_device);
  +}
  +
  /* I/O need to be drained during transfer transition */
  blk_mq_freeze_queue(lo->lo_queue);

  @@ -1103,11 +1204,15 @@
  if (info->lo_encrypt_type) {
    unsigned int type = info->lo_encrypt_type;

    -if (type >= MAX_LO_CRYPT)
    -return -EINVAL;
    +if (type >= MAX_LO_CRYPT) {
    +  err = -EINVAL;
    +  goto exit;
    +}
    xfer = xfer_funcs[type];
    -if (xfer == NULL)
    -return -EINVAL;
    +if (xfer == NULL) {
    +  err = -EINVAL;
    +  goto exit;
    +}
  } else
    xfer = NULL;

  @@ -1117,6 +1222,14 @@
if (lo->lo_offset != info->lo_offset ||
    lo->lo_sizelimit != info->lo_sizelimit) {
    /* kill_bdev should have truncated all the pages */
    if (lo->lo_device->bd_inode->i_mapping->nrpages) {
        /* kill_bdev should have truncated all the pages */
        if (lo->lo_device->bd_inode->i_mapping->nrpages) {
            err = -EAGAIN;
            pr_warn("%s: loop%d (%s) has still dirty pages (nrpages=%lu)\n",
                __func__, lo->lo_number, lo->lo_file_name,
                lo->lo_device->bd_inode->i_mapping->nrpages);
            goto exit;
        }
    } else if (figure_loop_size(lo, info->lo_offset, info->lo_sizelimit)) {
        err = -EFBIG;
        goto exit;
    }
}
static int
loop_get_status(struct loop_device *lo, struct loop_info64 *info)
{
    struct file *file = lo->lo_backing_file;
    struct path path;
    struct kstat stat;
    int error;
    int ret;

    -if (lo->lo_state != Lo_bound)
        return -ENXIO;
    error = vfs_getattr(&file->f_path, &stat,
        STATX_INO, AT_STATX_SYNC_AS_STAT);
    -if (error)
        return error;
    int ret;

    -if (lo->lo_state != Lo_bound)
        return -ENXIO;
    mutex_unlock(&lo->lo_ctl_mutex);
    return -ENXIO;
    -error = vfs_getattr(&file->f_path, &stat,
        -STATX_INO, AT_STATX_SYNC_AS_STAT);
    -if (error)
        return error;
    -return error;
    +}
    +
    memset(info, 0, sizeof(*info));
    info->lo_number = lo->lo_number;
    info->lo_device = huge_encode_dev(stat.dev);
    info->lo_inode = stat.ino;
    info->lo_rdevice = huge_encode_dev(lo->lo_device ? stat.rdev : stat.dev);
    info->lo_offset = lo->lo_offset;
    info->lo_sizelimit = lo->lo_sizelimit;
    info->lo_offset = lo->lo_offset;
    info->lo_sizelimit = lo->lo_sizelimit;
    info->lo_rdevice = huge_encode_dev(lo->lo_device ? stat.rdev : stat.dev);
    info->lo_offset = lo->lo_offset;
    info->lo_sizelimit = lo->lo_sizelimit;
    info->lo_flags = lo->lo_flags;
    +memcpy(info->lo_encrypt_key, lo->lo_encrypt_key,
            +lo->lo_encrypt_key_size);
    }
    return 0;
    +
    +/* Drop lo_ctl_mutex while we call into the filesystem. */
+path = lo->lo_backing_file->f_path;
+path_get(&path);
+mutex_unlock(&lo->lo_ctl_mutex);
+ret = vfs_getattr(&path, &stat, STATX_INO, AT_STATX_SYNC_AS_STAT);
+if (!ret) {
+info->lo_device = huge_encode_dev(stat.dev);
+info->lo_inode = stat.ino;
+info->lo_rdevice = huge_encode_dev(stat.rdev);
+}
+path_put(&path);
+return ret;
}

static void
@@ -1275,12 +1396,13 @@
loop_get_status_old(struct loop_device *lo, struct loop_info __user *arg) {
 struct loop_info info;
 struct loop_info64 info64;
- int err = 0;
- if (!arg)
- err = -EINVAL;
- if (!err)
- err = loop_get_status(lo, &info64);
+ int err;
+ if (!arg) {
+ mutex_unlock(&lo->lo_ctl_mutex);
+ return -EINVAL;
+ }
+ err = loop_get_status(lo, &info64);
 if (!err)
 err = loop_info64_to_old(&info64, &info);
 if (!err && copy_to_user(arg, &info, sizeof(info)))
@@ -1292,12 +1414,13 @@
 static int
 loop_get_status64(struct loop_device *lo, struct loop_info64 __user *arg) {
 struct loop_info64 info64;
- int err = 0;
- if (!arg)
- err = -EINVAL;
- if (!err)
- err = loop_get_status(lo, &info64);
+ int err;
+ if (!arg) {
+ mutex_unlock(&lo->lo_ctl_mutex);
+ return -EINVAL;
+ }

static int loop_set_block_size(struct loop_device *lo, unsigned long arg)
{
    int err = 0;

    if (lo->lo_state != Lo_bound)
        return -ENXIO;

    if (arg < 512 || arg > PAGE_SIZE || !is_power_of_2(arg))
        return -EINVAL;

    if (lo->lo_queue->limits.logical_block_size != arg) {
        sync_blockdev(lo->lo_device);
        invalidate_bdev(lo->lo_device);
    }
    blk_mq_freeze_queue(lo->lo_queue);

    if (lo->lo_queue->limits.logical_block_size != arg &&
        lo->lo_device->bd_inode->i_mapping->nrpages) {
        err = -EAGAIN;
        pr_warn("%s: loop%d (%s) has still dirty pages (nrpages=%lu)\n",
            __func__, lo->lo_number, lo->lo_file_name,
            lo->lo_device->bd_inode->i_mapping->nrpages);
        goto out_unfreeze;
    }
    blk_queue_logical_block_size(lo->lo_queue, arg);
    blk_queue_physical_block_size(lo->lo_queue, arg);
    blk_queue_io_min(lo->lo_queue, arg);
    loop_update_dio(lo);

out_unfreeze:
    blk_mq_unfreeze_queue(lo->lo_queue);
    return 0;
}

static int lo_ioctl(struct block_device *bdev, fmode_t mode,
@@ -1374,7 +1514,8 @@
break;

static int loop_get_status(lo, &info64);  
if (!err && copy_to_user(arg, &info64, sizeof(info64)))
err = -EFAULT;

@@ -1328,22 +1451,39 @@

case LOOP_GET_STATUS:
err = loop_get_status_old(lo, (struct loop_info __user *) arg);
break;
/* loop_get_status() unlocks lo_ctl_mutex */
goto out_unlocked;

err = -EPERM;
if (((mode & FMODE_WRITE) || capable(CAP_SYS_ADMIN))
@@ -1383,7 +1524,8 @@
break;
 case LOOP_GET_STATUS64:
err = loop_get_status64(lo, (struct loop_info64 __user *) arg);
/* loop_get_status() unlocks lo_ctl_mutex */
goto out_unlocked;

err = -EPERM;
if (((mode & FMODE_WRITE) || capable(CAP_SYS_ADMIN))
@@ -1516,12 +1658,13 @@
 {
 struct loop_info64 info64;
 -int err = 0;
 +int err;

 -if (!arg)
 -err = -EINVAL;
 -if (!err)
 -err = loop_get_status(lo, &info64);
 +if (!arg) {
 +mutex_unlock(&lo->lo_ctl_mutex);
 +return -EINVAL;
 +}
 +err = loop_get_status(lo, &info64);
 if (!err)
 err = loop_info64_to_compat(&info64, arg);
 return err;
@@ -1544,7 +1687,7 @@
    mutex_lock(&lo->lo_ctl_mutex);
    err = loop_get_status_compat(lo, (struct compat_loop_info __user *) arg);
 -mutex_unlock(&lo->lo_ctl_mutex);
 +/* loop_get_status() unlocks lo_ctl_mutex */
    goto out_unlocked;
    break;
 case LOOP_SET_CAPACITY:
 case LOOP_CLR_FD:
@@ -1553,6 +1696,8 @@
    arg = (unsigned long) compat_ptr(arg);
}
case LOOP_SET_FD:
case LOOP_CHANGE_FD:
+case LOOP_SET_BLOCK_SIZE:
+case LOOP_SET_DIRECT_IO:
err = lo_ioctl(bdev, mode, cmd, arg);
break;
default:

--- linux-4.15.0.orig/drivers/block/loop.h
+++ linux-4.15.0/drivers/block/loop.h
@@ -46,7 +46,7 @@
int (*ioctl)(struct loop_device *, int cmd,
unsigned long arg);

-struct file *lo_backing_file;
+struct file *lo_backing_file, *lo_backing_virt_file;
struct block_device *lo_device;
void*key_data;

@@ -58,6 +58,7 @@
struct kthread_workerworker;
struct task_struct*worker_task;
booluse_dio;
+boolsysfs_inited;

struct request_queue*lo_queue;
struct blk_mq_tag_settag_set;
--- linux-4.15.0.orig/drivers/block/nbd.c
+++ linux-4.15.0/drivers/block/nbd.c
@@ -76,6 +76,7 @@
#define NBD_HAS_CONFIG_REF4
#define NBD_BOUND5
#define NBD_DESTROY_ON_DISCONNECT6
+##define NBD_DISCONNECT_ON_CLOSE7

struct nbd_config {
 u32 flags;
@@ -105,18 +106,23 @@
struct nbd_config *config;
struct mutex config_lock;
struct gendisk *disk;
+struct workqueue_struct *recv_workq;

struct list_head list;
struct task_struct *task_recv;
struct task_struct *task_setup;
}

+##define NBD_CMD_REQUEUED1
struct nbd_cmd {
    struct nbd_device *nbd;
    struct mutex lock;
    int index;
    int cookie;
    struct completion send_complete;
    blk_status_t status;
    unsigned long flags;
    u32 cmd_cookie;
};

#define NBD_MAGIC 0x68797548

#define NBD_DEF_BLKSIZE 1024

static unsigned int nbds_max = 16;
static int max_part = 16;
static struct workqueue_struct *recv_workqueue;
static int part_shift;
static struct nbd_device *nbd_dev_dbg_init(struct nbd_device *nbd);
static void nbd_connect_reply(struct genl_info *info, int index);
static int nbd_genl_status(struct sk_buff *skb, struct genl_info *info);
static void nbd_dead_link_work(struct work_struct *work);
static void nbd_disconnect_and_put(struct nbd_device *nbd);
static inline struct device *nbd_to_dev(struct nbd_device *nbd)
{
    return disk_to_dev(nbd->disk);
}

#define NBD_COOKIE_BITS 32

static u64 nbd_cmd_handle(struct nbd_cmd *cmd)
{
struct request *req = blk_mq_rq_from_pdu(cmd);
+u32 tag = blk_mq_unique_tag(req);
+u64 cookie = cmd->cmd_cookie;
+
+return (cookie << NBD_COOKIE_BITS) | tag;
+
+static u32 nbd_handle_to_tag(u64 handle)
+{
+   return (u32)handle;
+}
+
+static u32 nbd_handle_to_cookie(u64 handle)
+{
+   return (u32)(handle >> NBDCOOKIE_BITS);
+}
+
static const char *nbdcmd_to_ascii(int cmd)
{
   switch (cmd) {
   @@ -173,9 +210,12 @@
   }

   static void nbd_dev_remove(struct nbd_device *nbd)
   {
      struct gendisk *disk = nbd->disk;
      +struct request_queue *q;
      +
      if (disk) {
         +q = disk->queue;
         del_gendisk(disk);
         -blk_cleanup_queue(disk->queue);
         +blk_cleanup_queue(q);
         blk_mq_free_tag_set(&nbd->tag_set);
         disk->private_data = NULL;
         put_disk(disk);
      @@ -188,8 +228,8 @@
      }
      if (refcount_dec_and_mutex_lock(&nbd->refs,
         &nbd_index_mutex)) {
      idr_remove(&nbd_index_idr, nbd->index);
      -mutex_unlock(&nbd_index_mutex);
      nbd_dev_remove(nbd);
      +mutex_unlock(&nbd_index_mutex);
      }
   }

   @@ -228,12 +268,23 @@
   }
}
static void nbd_size_update(struct nbd_device *nbd)
{  
    struct nbd_config *config = nbd->config;
    struct block_device *bdev = bdget_disk(nbd->disk, 0);
    blk_queue_logical_block_size(nbd->disk->queue, config->blksize);
    blk_queue_physical_block_size(nbd->disk->queue, config->blksize);
    set_capacity(nbd->disk, config->bytesize >> 9);
    if (bdev) {
        if (bdev->bd_disk) {
            bd_set_size(bdev, config->bytesize);
            if (start)
                set_blocksize(bdev, config->blksize);
        } else
            bdev->bd_invalidated = 1;
        bdput(bdev);
    }
    kobject_uevent(&nbd_to_dev(nbd)->kobj, KOBJ_CHANGE);
}

static void nbd_complete_rq(struct request *req)
{  
    struct nbd_config *config = nbd->config;
    config->blksize = blocksize;
    config->bytesize = blocksize * nr_blocks;
    if (nbd->task_recv != NULL)
        nbd_size_update(nbd, false);
}

static void nbd_size_update(struct nbd_device *nbd, bool start)
{  
    struct nbd_config *config = nbd->config;
    +struct block_device *bdev = bdget_disk(nbd->disk, 0);
    blk_queue_logical_block_size(nbd->disk->queue, config->blksize);
    blk_queue_physical_block_size(nbd->disk->queue, config->blksize);
    set_capacity(nbd->disk, config->bytesize >> 9);
    +if (bdev) {
    +if (bdev->bd_disk) {
        +bd_set_size(bdev, config->bytesize);
        +if (start)
            +set_blocksize(bdev, config->blksize);
    +} else
        +bdev->bd_invalidated = 1;
    +bdput(bdev);
    +}
    kobject_uevent(&nbd_to_dev(nbd)->kobj, KOBJ_CHANGE);
}

@@ -243,6 +294,8 @@
 struct nbd_config *config = nbd->config;
 config->blksize = blocksize;
 config->bytesize = blocksize * nr_blocks;
+if (nbd->task_recv != NULL)
+    nbd_size_update(nbd, false);
}

static void nbd_complete_rq(struct request *req)
@@ -290,6 +343,11 @@
 config = nbd->config;

+if (!mutex_trylock(&cmd->lock)) {
+    nbd_config_put(nbd);
+    +return BLK_EH_RESET_TIMER;
+}
+if (config->num_connections > 1) {
    dev_err_ratelimited(nbd_to_dev(nbd),
        "Connection timed out, retrying\n"
    );
@@ -312,7 +370,8 @@
    blk_mq_requeue_request(req, true);
    +mutex_unlock(&cmd->lock);
}
nbd_requeue_cmd(cmd);
    nbd_config_put(nbd);
    return BLK_EH_NOT_HANDLED;
}
@@ -322,6 +381,7 @@
    set_bit(NBD_TIMEDOUT, &config->runtime_flags);
    cmd->status = BLK_STS_IOERR;
    mutex_unlock(&cmd->lock);
    sock_shutdown(nbd);
    nbd_config_put(nbd);

    struct iov_iter from;
    unsigned long size = blk_rq_bytes(req);
    struct bio *bio;
+    u64 handle;
    u32 type;
    u32 nbd_cmd_flags = 0;
    -u32 tag = blk_mq_unique_tag(req);
    int sent = nsock->sent, skip = 0;
    iov_iter_kvec(&from, WRITE | ITER_KVEC, &iov, 1, sizeof(request));
    goto send_pages;
    }
    iov_iter_advance(&from, sent);
+} else {
+    cmd->cmd_cookie++;
    }
    cmd->index = index;
    cmd->cookie = nsock->cookie;
    @ @ -450,7 +512,8 @ @
    request.from = cpu_to_be64((u64)blk_rq_pos(req) << 9);
    request.len = htonl(size);
    }
    -memcpy(request.handle, &tag, sizeof(tag));
+    handle = nbd_cmd_handle(cmd);
+    memcpy(request.handle, &handle, sizeof(handle));

    dev_dbg(nbd_to_dev(nbd), "request %p: sending control (%s@%llu,%uB)n",
    cmd, nbdcmd_to_ascii(type),
    @ @ -468,6 +531,7 @ @
    nsock->pending = req;
    nsock->sent = sent;
    }
+    set_bit(NBD_CMD_REQUEUED, &cmd->flags);
    return BLK_STSRESOURCE;
dev_err_ratelimited(disk_to_dev(nbd->disk),
@@ -509,6 +573,7 @@
					set_bit(NBD_CMD_REQUEUED, &cmd->flags);
return BLK_STS_RESOURCE;
}
dev_err(disk_to_dev(nbd->disk),
@@ -541,10 +606,12 @@
struct nbd_reply reply;
struct nbd_cmd *cmd;
struct request *req = NULL;
+u64 handle;
 u16 hwq;
 u32 tag;
struct kvec iov = {.iov_base = &reply, .iov_len = sizeof(reply)};
struct iov_iter to;
+int ret = 0;

reply.magic = 0;
 iov_iter_kvec(&to, READ | ITER_KVEC, &iov, 1, sizeof(reply));
@@ -562,8 +629,8 @@
return ERR_PTR(-EPROTO);
}

-memcpy(&tag, reply.handle, sizeof(u32));
-
+memcpy(&handle, reply.handle, sizeof(handle));
+tag = nbd_handle_to_tag(handle);
 hwq = blk_mq_unique_tag_to_hwq(tag);
 if (hwq < nbd->tag_set.nr_hw_queues)
 req = blk_mq_tag_to_rq(nbd->tag_set.tags[hwq],
@@ -574,11 +641,31 @@
return ERR_PTR(-ENOENT);
}

 cmd = blk_mq_rq_to_pdu(req);
 +
+mutex_lock(&cmd->lock);
+if (cmd->cmd_cookie != nbd_handle_to_cookie(handle)) {
+dev_err(disk_to_dev(nbd->disk), "Double reply on req %p, cmd_cookie %u, handle cookie %u\n",
+req, cmd->cmd_cookie, nbd_handle_to_cookie(handle));
+ret = -ENOENT;
+goto out;
+}
+if (cmd->status != BLK_STS_OK) {
+dev_err(disk_to_dev(nbd->disk), "Command already handled %p\n",
+"Open Source Used In 5GasS Edge AC-4  20029"
+ret = -ENOENT;
+goto out;
+
+}  
+if (test_bit(NBD_CMD_REQUEUED, &cmd->flags)) {
+dev_err(disk_to_dev(nbd->disk), "Raced with timeout on req %p\n",
+req);
+ret = -ENOENT;
+goto out;
+
+
+}  
+if (ntohl(reply.error)) {
+dev_err(disk_to_dev(nbd->disk), "Other side returned error (%d)\n",
+ntohl(reply.error));
+cmd->status = BLK_STS_IOERR;
-return cmd;
+goto out;
+}
+dev_dbg(nbd_to_dev(nbd), "request %p: got reply\n", cmd);
+@ @ -603,18 +690,18 @@
+if (nbd_disconnected(config) ||
+config->num_connections <= 1) {
+cmd->status = BLK_STS_IOERR;
-return cmd;
+goto out;
+)
+-return ERR_PTR(-EIO);
+ret = -EIO;
+goto out;
+
+}  
+dev_dbg(nbd_to_dev(nbd), "request %p: got %d bytes data\n",
+cmd, bvec.bv_len);
+
+}  
+} else {
-/* See the comment in nbd_queue_rq. */
-\-wait_for_completion(&cmd->send_complete);
+\-return cmd;
+out:
+mutex_unlock(&cmd->lock);
+return ret ? ERR_PTR(ret) : cmd;
+}

static void recv_work(struct work_struct *work)
+@ @ -639,9 +726,9 @@

blk_mq_complete_request(blk_mq_rq_from_pdu(cmd));
}
+nbd_config_put(nbd);
atomic_dec(&config->recv_threads);
wake_up(&config->recv_wq);
-nbd_config_put(nbd);
kfree(args);
}

@@ -777,7 +864,7 @@
 */
 blk_mq_start_request(req);
if (unlikely(nsock->pending && nsock->pending != req)) {
-blk_mq_requeue_request(req, true);
+nbd_requeue_cmd(cmd);
ret = 0;
goto out;
}
@@ -790,7 +877,7 @@
dev_err_ratelimited(disk_to_dev(nbd->disk),
   "Request send failed, requeueing\n");
nbd_mark_nsock_dead(nbd, nsock, 1);
-blk_mq_requeue_request(req, true);
+nbd_requeue_cmd(cmd);
ret = 0;
}
out:
@@ -814,7 +901,8 @@
 * that the server is misbehaving (or there was an error) before we're
 * done sending everything over the wire.
 */
-init_completion(&cmd->send_complete);
+mutex_lock(&cmd->lock);
+clear_bit(NBD_CMD_REQUEUED, &cmd->flags);

/* We can be called directly from the user space process, which means we
 * could possibly have signals pending so our sendmsg will fail. In
@@ -826,11 +914,31 @@
 ret = BLK_STS_IOERR;
 else if (!ret)
 ret = BLK_STS_OK;
-complete(&cmd->send_complete);
+mutex_unlock(&cmd->lock);

 return ret;
}

+static struct socket *nbd_get_socket(struct nbd_device *nbd, unsigned long fd,
struct socket *sock;
+
+err = 0;
+sock = sockfd_lookup(fd, err);
+if (!sock)
+return NULL;
+
+if (sock->ops->shutdown == sock_no_shutdown) {
+dev_err(disk_to_dev(nbd->disk), "Unsupported socket: shutdown callout must be supported.
");
+err = -EINVAL;
+sockfd_put(sock);
+return NULL;
+}
+
+return sock;
+
static int nbd_add_socket(struct nbd_device *nbd, unsigned long arg,
    bool netlink)
{
    sock = sockfd_lookup(arg, &err);
    sock = nbd_get_socket(nbd, arg, &err);
    if (!sock)
        return err;
    /*
    * We need to make sure we don't get any errant requests while we're
    * reallocating the ->socks array.
    * /
    +blk_mq_freeze_queue(nbd->disk->queue);
    +
    if (!netlink && !nbd->task_setup &&
        !test_bit(NBD_BOUND, &config->runtime_flags)) {
        dev_err(disk_to_dev(nbd->disk),
            "Device being setup by another task");
        sockfd_put(sock);
        -return -EBUSY;
        +err = -EBUSY;
        +goto put_socket;
        +}
    +

Open Source Used In 5GaaS Edge AC-4  20032
sock = sockfd_lookup(arg, &err);
if (!sock)
    return err;

socks[config->num_connections++] = sock;
atomic_inc(&config->live_connections);

return 0;
+put_socket:
+blk_mq_unfreeze_queue(nbd->disk->queue);
+sockfd_put(sock);
+return err;
}

static int nbd_reconnect_socket(struct nbd_device *nbd, unsigned long arg)
int i;
int err;

-sock = sockfd_lookup(arg, &err);
+sock = nbd_get_socket(nbd, arg, &err);
if (!sock)
    return err;

/* We take the tx_mutex in an error path in the recv_work, so we
* need to queue_work outside of the tx_mutex.
*
-queue_work(recv_workqueue, &args->work);
+queue_work(nbd->recv_workq, &args->work);

atomic_inc(&config->live_connections);
wake_up(&config->conn_wait);
@@ -950,10 +1072,6 @@
if (bdev->bd_openers > 1)
return;
bd_set_size(bdev, 0);
-if (max_part > 0) {
-blkdev_reread_part(bdev);
-bdev->bd_invalidated = 1;
-}
}
static void nbd_parse_flags(struct nbd_device *nbd)
@@ -1039,6 +1157,10 @@
kfree(nbd->config);
nbd->config = NULL;

+if (nbd->recv_workq)
+destroy_workqueue(nbd->recv_workq);
+nbd->recv_workq = NULL;
+
nbdf->tag_set.timeout = 0;
queue_flag_clear_unlocked(QUEUE_FLAG_DISCARD, nbd->disk->queue);
@@ -1064,6 +1213,14 @@
return -EINVAL;
}

+nbd->recv_workq = alloc_workqueue("knbd%d-recv",
+WQ_MEM_RECLAIM | WQ_HIGHPRI |
+WQ_UNBOUND, 0, nbd->index);
+if (!nbd->recv_workq) {
+dev_err(disk_to_dev(nbd->disk), "Could not allocate knbd recv work queue.\n");
+return -ENOMEM;
+
blk_mq_update_nr_hw_queues(&nbd->tag_set, config->num_connections);

nbd->task_recv = current;
@@ -1083,6 +1213,16 @@
args = kzalloc(sizeof(*args), GFP_KERNEL);
if (!args) {
sock_shutdown(nbd);
/*
 * If num_connections is m (2 < m),
 * and NO.1 ~ NO.n (1 < n < m) kzallocs are successful.
 * But NO.(n + 1) failed. We still have n recv threads.
 * So, add flush_workqueue here to prevent recv threads
 * dropping the last config_refs and trying to destroy
 * the workqueue from inside the workqueue.
 */

if (i)
  flush_workqueue(nbd->recv_workq);
return -ENOMEM;
}
sk_set_memalloc(config->socks[i]->sock->sk);
@@ -1094,9 +1234,9 @@
 INIT_WORK(&args->work, recv_work);
 args->nbd = nbd;
 args->index = i;
-queue_work(recv_workqueue, &args->work);
+queue_work(nbd->recv_workq, &args->work);
}
-nbd_size_update(nbd);
+nbd_size_update(nbd, true);
return error;
}
@@ -1109,7 +1249,6 @@
 if (ret)
 return ret;

-bd_set_size(bdev, config->bytesize);
 if (max_part)
 bdev->bdinvalidated = 1;
 mutex_unlock(&nbd->config_lock);
-@ @ -1117.6 +1256.8 @@
 atomic_read(&config->recv_threads) == 0);
 if (ret)
 sock_shutdown(nbd);
+flush_workqueue(nbd->recv_workq);
+
 mutex_lock(&nbd->config_lock);
 bd_set_size(bdev, 0);
 /* user requested, ignore socket errors */
-@ @ -1131.13 +1272.21 @@
 struct block_device *bdev)
 {
 sock_shutdown(nbd);
-kill_bdev(bdev);
+__invalidate_device(bdev, true);
nbd_bdev_reset(bdev);
if (test_and_clear_bit(NBD_HAS_CONFIG_REF,
    &nbd->config->runtime_flags))
nbd_config_put(nbd);
}

+static bool nbd_is_valid_blksize(unsigned long blksize)
+{
+    if (!blksize || !is_power_of_2(blksize) || blksize < 512 ||
+        blksize > PAGE_SIZE)
+        return false;
+    return true;
+}
+
+/* Must be called with config_lock held */
stati@c nbd_ioctl(struct block_device *bdev, struct nbd_device *nbd,
    unsigned int cmd, unsigned long arg)
@@ -1153,6 +1302,10 @@
case NBD_SET_SOCK:
    return nbd_add_socket(nbd, arg, false);
case NBD_SET_BLKSIZE:
+    if (!arg)
+        arg = NBD_DEF_BLKSIZE;
+    if (!nbd_is_valid_blksize(arg))
+        return -EINVAL;
nbd_size_set(nbd, arg,
    div_s64(config->bytesize, arg));
    return 0;
@@ -1231,7 +1424,7 @@
    atomic_set(&config->recv_threads, 0);
    init_waitqueue_head(&config->recv_wq);
    init_waitqueue_head(&config->conn_wait);
-    config->blksize = 1024;
+    config->blksize = NBD_DEF_BLKSIZE;
    atomic_set(&config->live_connections, 0);
    try_module_get(THIS_MODULE);
    return config;
@@ -1269,6 +1462,9 @@
    refcount_set(&nbd->config_refs, 1);
    refcount_inc(&nbd->refs);
    mutex_unlock(&nbd->config_lock);
+    bdev->bd_invalidated = 1;
+} else if (nbd_disconnected(nbd->config)) {
+    bdev->bd_invalidated = 1;
+}
    out:
    mutex_unlock(&nbd_index_mutex);
@@ -1278,6 +1434,13 @@

static void nbd_release(struct gendisk *disk, fmode_t mode)
{
    struct nbd_device *nbd = disk->private_data;
    struct block_device *bdev = bdget_disk(disk, 0);
    if (test_bit(NBD_DISCONNECT_ON_CLOSE, &nbd->config->runtime_flags) &&
        bdev->bd_openers == 0)
        nbd_disconnect_and_put(nbd);
    bdput(bdev);
    nbd_config_put(nbd);
    nbd_put(nbd);
}

@@ -1425,6 +1588,8 @@
{
    struct nbd_cmd *cmd = blk_mq_rq_to_pdu(rq);
    cmd->nbd = set->driver_data;
+    cmd->flags = 0;
+    mutex_init(&cmd->lock);
    return 0;
}

@@ -1591,7 +1756,7 @@
if (new_index < 0) {
    mutex_unlock(&nbd_index_mutex);
    printk(KERN_ERR "nbd: failed to add new device\n");
    -return ret;
+    return new_index;
}
    nbd = idr_find(&nbd_index_idr, new_index);
}
@@ -1655,6 +1820,12 @@
if (info->attrs[NBD_ATTR_BLOCK_SIZE_BYTES]) {
    u64 bsize =
    nla_get_u64(info->attrs[NBD_ATTR_BLOCK_SIZE_BYTES]);
+    if (!bsize)
+        bsize = NBD_DEF_BLKSIZE;
+    if (!nbd_is_valid_blksize(bsize)) {
+        ret = -EINVAL;
+        goto out;
+    }
    nbd_size_set(nbd, bsize, div64_u64(config->bytesize, bsize));
}
+if (flags & NBD_CFLAG_DISCONNECT_ON_CLOSE) {
+    set_bit(NBD_DISCONNECT_ON_CLOSE, 
+            &config->runtime_flags);
+}
+
}

if (info->attrs[NBD_ATTR_SOCKETS]) {
@@ -1721,6 +1896,22 @@
    return ret;
 }

+static void nbd_disconnect_and_put(struct nbd_device *nbd)
+{
+    mutex_lock(&nbd->config_lock);
+    nbd_disconnect(nbd);
+    mutex_unlock(&nbd->config_lock);
+    /*
+     * Make sure recv thread has finished, so it does not drop the last
+     * config ref and try to destroy the workqueue from inside the work
+     * queue.
+     * /
+     */
+    flush_workqueue(nbd->recv_workq);
+    if (test_and_clear_bit(NBD_HAS_CONFIG_REF, 
+                           &nbd->config->runtime_flags))
+        nbd_config_put(nbd);
+}
+
+static int nbd_genl_disconnect(struct sk_buff *skb, struct genl_info *info)
+{
+    struct nbd_device *nbd;
+    @ @ -1753,12 +1944,7 @ @
+    nbd_put(nbd);
+    return 0;
+}

-    mutex_lock(&nbd->config_lock);
-    nbd_disconnect(nbd);
-    mutex_unlock(&nbd->config_lock);
-    if (test_and_clear_bit(NBD_HAS_CONFIG_REF, 
-                           &nbd->config->runtime_flags))
-        nbd_config_put(nbd);
-    nbd_disconnect_and_put(nbd);
-    nbd_config_put(nbd);
-    nbd_put(nbd);
-    return 0;
-@@ -1769,7 +1955,7 @@
-    struct nbd_device *nbd = NULL;
-    struct nbd_config *config;
-    int index;
-int ret = -EINVAL;
+int ret = 0;
bool put_dev = false;

if (!netlink_capable(skb, CAP_SYS_ADMIN))
@@ -1809,6 +1995,7 @@
    !nbd->task_recv) {
    dev_err(nbd_to_dev(nbd),
    "not configured, cannot reconfigure\n");
+ret = -EINVAL;
goto out;
}

@@ -1833,6 +2020,14 @@
    &config->runtime_flags))
    refcount_inc(&nbd->refs);
    }
+    if (flags & NBD_CFLAG_DISCONNECT_ON_CLOSE) {
+        set_bit(NBD_DISCONNECT_ON_CLOSE,
+                &config->runtime_flags);
+    } else {
+        clear_bit(NBD_DISCONNECT_ON_CLOSE,
+                &config->runtime_flags);
+    }
    }

if (info->attrs[NBD_ATTR_SOCKETS]) {
@@ -1979,6 +2174,12 @@
    }

    dev_list = nla_nest_start(reply, NBD_ATTR_DEVICE_LIST);
+if (!dev_list) {
+        nlmsg_free(reply);
+        ret = -EMSGSIZE;
+        goto out;
+    }
+    if (index == -1) {
+        ret = idr_for_each(&nbd_index_idr, &status_cb, reply);
+        if (ret) {
+            ret = -EINVAL;
+        }
+    else if (flags & NBD_CFLAG_DISCONNECT_ON_CLOSE) {
+        set_bit(NBD_DISCONNECT_ON_CLOSE,
+                &config->runtime_flags);
+    } else {
+        clear_bit(NBD_DISCONNECT_ON_CLOSE,
+                &config->runtime_flags);
+    }

    if (nbds_max > 1UL << (MINORBITS - part_shift))
return -EINVAL;
-receive_workqueue = alloc_workqueue("knbd-recv",
- WQ_MEM_RECLAIM | WQ_HIGHPRI, 0);
-if (recv_workqueue)
return -ENOMEM;

if (register_blkdev(NBD_MAJOR, "nbd")) {
    destroy_workqueue(recv_workqueue);
+    if (register_blkdev(NBD_MAJOR, "nbd"))
        return -EIO;
    }

if (genl_register_family(&nbd_genl_family)) {
    unregister_blkdev(NBD_MAJOR, "nbd");
    destroy_workqueue(recv_workqueue);
    return -EINVAL;
}

nbd_dbg_init();
@@ -2146,7 +2340,6 @@
    idr_destroy(&nbd_index_idr);
    genl_unregister_family(&nbd_genl_family);
    destroy_workqueue(recv_workqueue);
-   unregister_blkdev(NBD_MAJOR, "nbd");
    }

--- linux-4.15.0.orig/drivers/block/null_blk.c
+++ linux-4.15.0/drivers/block/null_blk.c
@@ -16,10 +16,8 @@
 #include <linux/configfs.h>
 #include <linux/badblocks.h>

+#define SECTOR_SHIFT9
#define PAGE_SECTORS_SHIFT((PAGE_SHIFT - SECTOR_SHIFT)
    #define PAGE_SECTORS(1 << PAGE_SECTORS_SHIFT)
-#define SECTOR_SIZE(1 << SECTOR_SHIFT)
    #define SECTOR_MASK((PAGE_SECTORS - 1))

    #define FREE_BATCH16
    @ @ -68,6 +66,7 @@
    NULLB_DEV_FL_CACHE= 3,
    ];

+    #define MAP_SZ((PAGE_SIZE >> SECTOR_SHIFT) + 2)

/*
 * nullb_page is a page in memory for nullb devices.
 * @@ -82,10 +81,10 @@
 */
    struct nullb_page {
        struct page *page;
        unsigned long bitmap;
struct nullb_device {
    struct nullb *nullb;
    if (tag != -1U) {
        cmd = &nq->cmds[tag];
        cmd->tag = tag;
        cmd->error = BLK_STS_OK;
        cmd->nq = nq;
        if (nq->dev->irqmode == NULL_IRQ_TIMER) {
            hrtimer_init(&cmd->timer, CLOCK_MONOTONIC,
                          &cmd->timer, CLOCK_MONOTONIC,
                          if (!t_page->page)
                goto out_freepage;
                memset(t_page->bitmap, 0, sizeof(t_page->bitmap));
                return t_page;
                out_freepage:
                kfree(t_page);
        }
        static void null_free_page(struct nullb_page *t_page) {
            __set_bit(NULLB_PAGE_FREE, &t_page->bitmap);
            if (test_bit(NULLB_PAGE_LOCK, &t_page->bitmap))
                __set_bit(NULLB_PAGE_FREE, t_page->bitmap);
            if (test_bit(NULLB_PAGE_LOCK, t_page->bitmap))
                return;
            __free_page(t_page->page);
            return;
        }
        return;
    }
    __free_page(t_page->page);
    kfree(t_page);
}

+static bool null_page_empty(struct nullb_page *page) {
    +int size = MAP_SZ - 2;
    +return find_first_bit(page->bitmap, size) == size;
    +}
    +
    static void null_free_sector(struct nullb *nullb, sector_t sector, bool is_cache)


t_page = radix_tree_lookup(root, idx);
if (t_page) {
	__clear_bit(sector_bit, &t_page->bitmap);

	__clear_bit(sector_bit, t_page->bitmap);
}

- if (!t_page->bitmap) {
+ if (null_page_empty(t_page)) {
    ret = radix_tree_delete_item(root, idx, t_page);
    WARN_ON(ret != t_page);
    null_free_page(ret);
    t_page = radix_tree_lookup(root, idx);
    WARN_ON(t_page && t_page->page->index != idx);
}

  - if (t_page && (for_write || test_bit(sector_bit, &t_page->bitmap)))
+ if (t_page && (for_write || test_bit(sector_bit, t_page->bitmap)))
    return t_page;
return NULL;

  t_page = null_insert_page(nullb, idx << PAGE_SECTORS_SHIFT, true);

  - __clear_bit(NULLB_PAGE_LOCK, &c_page->bitmap);
  - if (test_bit(NULLB_PAGE_FREE, &c_page->bitmap)) {
+ __clear_bit(NULLB_PAGE_LOCK, c_page->bitmap);
+ if (test_bit(NULLB_PAGE_FREE, c_page->bitmap)) {
    null_free_page(c_page);
- if (t_page && t_page->bitmap == 0) {
- if (null_page_empty(t_page)) {
    ret = radix_tree_delete_item(&nullb->dev->data,
    idx, t_page);
    null_free_page(t_page);
    t_page = radix_tree_lookup(root, idx);
    WARN_ON(t_page && t_page->page->index != idx);
}

  for (i = 0; i < PAGE_SECTORS; i += (nullb->dev->blocksize >> SECTOR_SHIFT)) {
    if (test_bit(i, &c_page->bitmap)) {
+ if (test_bit(i, c_page->bitmap)) {
      offset = (i << SECTOR_SHIFT);
      memcpy(dst + offset, src + offset,
        nullb->dev->blocksize);
- _set_bit(i, &t_page->bitmap);
+ _set_bit(i, t_page->bitmap);
}
* We found the page which is being flushed to disk by other threads */

if (test_bit(NULLB_PAGE_LOCK, &c_pages[i]->bitmap))
c_pages[i] = NULL;
else
	__set_bit(NULLB_PAGE_LOCK, &c_pages[i]->bitmap);
}

one_round = 0;

kunmap_atomic(dst);
kunmap_atomic(src);

__set_bit(sector & SECTOR_MASK, &t_page->bitmap);
+__set_bit(sector & SECTOR_MASK, t_page->bitmap);

if (is_fua)
null_free_sector(nullb, sector, true);

len = bvec.bv_len;
err = null_transfer(nullb, bvec.bv_page, len, bvec.bv_offset,
				req_op(rq)), sector,
			req_op(rq) & REQ_FUA);
+rq->cmd_flags & REQ_FUA);
if (err) {
spin_unlock_irq(&nullb->lock);
return err;
}@ -1231,7 +1238,7 @@
return BLK_STS_OK;
} else
/* requeue request */
-return BLK_STS_RESOURCE;
+return BLK_STS_DEV_RESOURCE;
}
}

cmd->timer.function = null_cmd_timer_expired;
}
cmd->rq = bd->rq;
+cmd->error = BLK_STS_OK;
cmd->nq = nq;
blk_mq_start_request(bd->rq);  
@@ -1589,7 +1597,12 @@
static void null_del_dev(struct nullb *nullb)  
{  
-struct nullb_device *dev = nullb->dev;  
+struct nullb_device *dev;  
+  
+if (!nullb)  
+return;  
+  
+dev = nullb->dev;  

ida_simple_remove(&nullb_indexes, nullb->index);  
@@ -1917,6 +1930,7 @@
cleanup_queues(nullb);  
out_free_nullb:  
 kfree(nullb);  
+dev->nullb = NULL;  
out:  
return rv;  
}  
@@ -1928,10 +1942,6 @@
struct nullb *nullb;  
struct nullb_device *dev;  

-/* check for nullb_page.bitmap */  
-if (sizeof(unsigned long) * 8 - 2 < (PAGE_SIZE >> SECTOR_SHIFT))  
-return -EINVAL;  
-  
if (g_bs > PAGE_SIZE) {  
 pr_warn("null_blk: invalid block size\n");  
 pr_warn("null_blk: defaults block size to %lu\n", PAGE_SIZE);  
--- linux-4.15.0.orig/drivers/block/paride/pcd.c  
+++ linux-4.15.0/drivers/block/paride/pcd.c  
@@ -230,6 +230,8 @@
 struct pcd_unit *cd = bdev->bd_disk->private_data;  
 int ret;  
+  
+check_disk_change(bdev);  
+  
 mutex_lock(&pcd_mutex);  
 ret = cdrom_open(&cd->info, bdev, mode);  
 mutex_unlock(&pcd_mutex);  
--- linux-4.15.0.orig/drivers/block/pktcdvd.c  
+++ linux-4.15.0/drivers/block/pktcdvd.c
#include <scsi/scsi.h>
#include <linux/debugfs.h>
#include <linux/device.h>
-
+#include <linux/nospec.h>
#include <linux/uaccess.h>

#define DRIVER_NAME "pktcdvd"

if (dev_minor >= MAX_WRITERS)
return NULL;
+
+dev_minor = array_index_nospec(dev_minor, MAX_WRITERS);
return pkt_devs[dev_minor];
}

bdev = bdget(dev);
if (!bdev)
return -ENOMEM;
-if (!blk_queue_scsi_passthrough(bdev_get_queue(bdev))) {
-WARN_ONCE(true, "Attempt to register a non-SCSI queue\n");
-bdput(bdev);
-return -EINVAL;
-
ret = blkdev_get(bdev, FMODE_READ | FMODE_NDELAY, NULL);
if (ret)
return ret;
+if (!blk_queue_scsi_passthrough(bdev_get_queue(bdev))) {
+blkdev_put(bdev, FMODE_READ | FMODE_NDELAY);
+return -EINVAL;
+
/* This is safe, since we have a reference from open(). */
_skbdev_get(this_module);
@@ -2745,7 +2746,7 @@
pd->pkt_dev = MKDEV(pktdev_major, idx);
ret = pkt_new_dev(pd, dev);
if (ret)
-goto out_new_dev;
+goto out_mem2;

/* inherit events of the host device */
disk->events = pd->bd->bd_disk->events;
@@ -2763,8 +2764,6 @@
mutex_unlock(&ctl_mutex);
return 0;

-out_new_dev:
blk_cleanup_queue(disk->queue);
out_mem2:
put_disk(disk);
out_mem:
--- linux-4.15.0.orig/drivers/block/ps3disk.c
+++ linux-4.15.0/drivers/block/ps3disk.c
@@ -468,7 +468,6 @@
blk_queue_bounce_limit(queue, BLK_BOUNCE_HIGH);

blk_queue_max_hw_sectors(queue, dev->bounce_size >> 9);
-blk_queue_segment_boundary(queue, -1UL);
blk_queue_dma_alignment(queue, dev->blk_size-1);
blk_queue_logical_block_size(queue, dev->blk_size);

--- linux-4.15.0.orig/drivers/block/rbd.c
+++ linux-4.15.0/drivers/block/rbd.c
@@ -51,15 +51,6 @@
#define RBD_DEBUG/* Activate rbd_assert() calls */

/*
- * The basic unit of block I/O is a sector. It is interpreted in a
- * number of contexts in Linux (blk, bio, genhd), but the default is
- * universally 512 bytes. These symbols are just slightly more
- * meaningful than the bare numbers they represent.
- */
-#defineSECTOR_SHIFT9
-#defineSECTOR_SIZE(1ULL << SECTOR_SHIFT)
-
-/*
 * Increment the given counter and return its updated value.
 * If the counter is already 0 it will not be incremented.
 * If the counter is already at its maximum value returns
@@ -124,11 +115,13 @@
#define RBD_FEATURE_STRIPINGV2(1ULL<<1)
#define RBD_FEATURE_EXCLUSIVE_LOCK(1ULL<<2)
#define RBD_FEATURE_DATA_POOL(1ULL<<7)
+#define RBD_FEATURE_OPERATIONS(1ULL<<8)

#define RBD_FEATURES_ALL(RBD_FEATURE_LAYERING |
 RBD_FEATURE_STRIPINGV2 |
 RBD_FEATURE_EXCLUSIVE_LOCK |
- RBD_FEATURE_DATA_POOL)
+ RBD_FEATURE_DATA_POOL |
+ RBD_FEATURE_OPERATIONS)
/* Features supported by this (client software) implementation. */

@@ -3812,13 +3805,16 @@
{
    dout("%s rbd_dev %p\n", __func__, rbd_dev);

    -cancel_delayed_work_sync(&rbd_dev->watch_dwork);
    cancel_work_sync(&rbd_dev->acquired_lock_work);
    cancel_work_sync(&rbd_dev->released_lock_work);
    cancel_delayed_work_sync(&rbd_dev->lock_dwork);
    cancel_work_sync(&rbd_dev->unlock_work);
}

+/*
+ * header_rwsem must not be held to avoid a deadlock with
+ * rbd_dev_refresh() when flushing notifies.
+ */

static void rbd_unregister_watch(struct rbd_device *rbd_dev)
{
    WARN_ON(waitqueue_active(&rbd_dev->lock_waitq));
    @@ -3830,6 +3826,7 @@
    rbd_dev->watch_state = RBD_WATCH_STATE_UNREGISTERED;
    mutex_unlock(&rbd_dev->watch_mutex);

    +cancel_delayed_work_sync(&rbd_dev->watch_dwork);
    ceph_osdc_flush_notifies(&rbd_dev->rbd_client->client->osdc);
}

@@ -4502,6 +4499,9 @@
{
    struct rbd_device *rbd_dev = dev_to_rbd_dev(dev);

    +if (!capable(CAP_SYS_ADMIN))
    +return -EPERM;
    +
    return sprintf(buf, "%s\n", rbd_dev->config_info);
}

@@ -4603,6 +4603,9 @@
{
    struct rbd_device *rbd_dev = dev_to_rbd_dev(dev);

    +if (!capable(CAP_SYS_ADMIN))
    +return -EPERM;
    +
    return rbd_dev_refresh(rbd_dev);
    if (ret)
    return ret;
static void rbd_dev_image_release(struct rbd_device *rbd_dev)
{
    rbd_dev_unprobe(rbd_dev);
    if (rbd_dev->opts)
        rbd_unregister_watch(rbd_dev);
    rbd_dev->image_format = 0;
    kfree(rbd_dev->spec->image_id);
    rbd_dev->spec->image_id = NULL;
}

static int rbd_dev_image_probe(struct rbd_device *rbd_dev, int depth)
{
    if (!depth)
        down_write(&rbd_dev->header_rwsem);
    ret = rbd_dev_header_info(rbd_dev);
    if (ret)
        goto err_out_watch;
    goto err_out_probe;

    /*
     * If this image is the one being mapped, we have pool name and
     * device. If this image is the one being mapped (i.e., not a
     * parent), initiate a watch on its header object before using that
     * object to get detailed information about the rbd image.
     */
    if (!depth)
        rbd_dev_unprobe(rbd_dev);
}

err_out_probe:
    rbd_dev_unprobe(rbd_dev);
    -err_out_watch:
        if (!depth)
            up_write(&rbd_dev->header_rwsem);
        rbd_unregister_watch(rbd_dev);
        rbd_dev_unprobe(rbd_dev);
    err_out_format:
rbd_dev->image_format = 0;
kfree(rbd_dev->spec->image_id);
@@ -6118,6 +6129,9 @@
struct rbd_client *rbdc;
int rc;
+if (!capable(CAP_SYS_ADMIN))
+return -EPERM;
+
if (!try_module_get(THIS_MODULE))
return -ENODEV;
@@ -6156,12 +6170,9 @@
goto err_out_rbd_dev;
}
-down_write(&rbd_dev->header_rwsem);
rc = rbd_dev_image_probe(rbd_dev, 0);
-if (rc < 0) {
-up_write(&rbd_dev->header_rwsem);
+if (rc < 0)
goto err_out_rbd_dev;
-}
/* If we are mapping a snapshot it must be marked read-only */
if (rbd_dev->spec->snap_id != CEPH_NOSNAP)
@@ -6267,10 +6278,12 @@
struct list_head *tmp;
int dev_id;
char opt_buf[6];
-bool already = false;
bool force = false;
int ret;
+if (!capable(CAP_SYS_ADMIN))
+return -EPERM;
+
dev_id = -1;
opt_buf[0] = '\0';
sscanf(buf, "%d %5s", &dev_id, opt_buf);
@@ -6300,13 +6313,13 @@
spin_lock_irq(&rbd_dev->lock);
if (rbd_dev->open_count && !force)
ret = -EBUSY;
-else
-already = test_and_set_bit(RBD_DEV_FLAG_REMOVING,
-&rbd_dev->flags);
+else if (test_and_set_bit(RBD_DEV_FLAG_REMOVING,

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+ &rbd_dev->flags))
+ret = -EINPROGRESS;
spin_unlock_irq(&rbd_dev->lock);  
}
spin_unlock(&rbd_dev_list_lock);
-if (ret < 0 || already)
+if (ret)
return ret;

if (force) {
--- linux-4.15.0.orig/drivers/block/rsxx/core.c
+++ linux-4.15.0/drivers/block/rsxx/core.c
@@ -180,15 +180,17 @@
{
 struct rsxx_cardinfo *card = file_inode(fp)->i_private;
 char *buf;
-ssize_t st;
+	int st;
+int st;

 buf = kzalloc(cnt, GFP_KERNEL);
 if (!buf)
return -ENOMEM;
st = rsxx_creg_read(card, CREG_ADD_CRAM + (u32)*ppos, cnt, buf, 1);
-if (!st)
- st = copy_to_user(ubuf, buf, cnt);
+if (!st) {
+if (copy_to_user(ubuf, buf, cnt))
+ st = -EFAULT;
+} 
kfree(buf);
if (st)
return st;
@@ -890,6 +892,7 @@
card->event_wq = create_singlethread_workqueue(DRIVER_NAME"_event");
 if (!card->event_wq) {
 dev_err(CARD_TO_DEV(card), "Failed card event setup.\n");
 +st = -ENOMEM;
 goto failed_event_handler;
 }
@@ -1025,8 +1028,10 @@
cancel_work_sync(&card->event_work);
+destroy_workqueue(card->event_wq);
rsxx_destroy_dev(card);
rssx_dma_destroy(card);
destroy_workqueue(card->creg_ctrl.creg_wq);

spin_lock_irqsave(&card->irq_lock, flags);
rsxx_disable_ier_and_isr(card, CR_INTR_ALL);
--- linux-4.15.0.orig/drivers/block/skd.main.c
+++ linux-4.15.0/drivers/block/skd.main.c
@@ -1417,7 +1417,7 @@
case SKD_CHECK_STATUS_BUSY_IMMINENT:
skd_log_skreq(skdev, skreq, "retry(busy)");
-blk_requeue_request(skdev->queue, req);
+blk_mq_requeue_request(req, true);
dev_info(&skdev->pdev->dev, "drive BUSY imminent
skdev->state = SKD_DRV_STATE_BUSY_IMMINENT;
skdev->timer_countdown = SKD_TIMER_MINUTES(20);
@@ -1427,7 +1427,7 @@
case SKD_CHECK_STATUS_REQUEUE_REQUEST:
if ((unsigned long) ++req->special < SKD_MAX_RETRIES) {
skd_log_skreq(skdev, skreq, "retry");
-blk_requeue_request(skdev->queue, req);
+blk_mq_requeue_request(req, true);
break;
} /* fall through */
--- linux-4.15.0.orig/drivers/block/sunvdc.c
+++ linux-4.15.0/drivers/block/sunvdc.c
@@ -41,6 +41,8 @@
#define WAITING_FOR_GEN_CMD 0x04
#define WAITING_FOR_ANY -1

static struct workqueue_struct *sunvdc_wq;
--- linux-4.15.0.orig/drivers/block/sunvdc.c
+++ linux-4.15.0/drivers/block/sunvdc.c
@@ -41,6 +41,8 @@
static struct vdc_req_entry {
@@ -427,6 +429,7 @@
 .end_idx = dr->prod,
};
int err, delay;
+int retries = 0;

hdr.seq = dr->snd_nxt;
delay = 1;
@@ -439,6 +442,8 @@
udelay(delay);
if ((delay <= 1) > 128)
delay = 128;
+if (retries++ > VDC_MAX_RETRIES)
+break;
} while (err == -EAGAIN);

if (err == -ENOTCONN)
--- linux-4.15.0.orig/drivers/block/swim.c
+++ linux-4.15.0/drivers/block/swim.c
@@ -110,7 +110,7 @@
/* Select values for swim_select and swim_readbit */

#define READ_DATA_0x074
#define TWOMEG_DRIVE_0x075
+#define ONEMEG_DRIVE_0x075
#define SINGLE_SIDED_0x076
#define DRIVE_PRESENT_0x077
#define DISK_IN_0x170
@@ -118,9 +118,9 @@
#define TRACK_ZERO_0x172
#define TACHO_0x173
#define READ_DATA_1_0x174
#define MFM_MODE_0x175
+#define GCR_MODE_0x175
#define SEEK_COMPLETE_0x176
-#define ONEMEG_MEDIA_0x177
+#define TWOMEG_MEDIA_0x177

/* Bits in handshake register */

@@ -612,7 +612,6 @@
struct floppy_struct *g;
fs->disk_in = 1;
fs->write_protected = swim_readbit(base, WRITE_PROT);
-ft->type = swim_readbit(base, ONEMEG_MEDIA);

if (swim_track00(base))
-print(KERN_ERR
@@ -620,6 +619,9 @@
swim_track00(base);

+fs->type = swim_readbit(base, TWOMEG_MEDIA) ?
+HD_MEDIA : DD_MEDIA;
+fs->head_number = swim_readbit(base, SINGLE_SIDED) ? 1 : 2;
get_floppy_geometry(fs, 0, &g);
fs->total_secs = g->size;
fs->secpercyl = g->head * g->sect;
@@ -646,7 +648,7 @@
swim_write(base, setup, S_IBM_DRIVE | S_FCLK_DIV2);
udelay(10);
-swmDrive(base, INTERNAL_DRIVE);
+swim_drive(base, fs->location);
swim_motor(base, ON);
swim_action(base, SETMFM);
if (fs->ejected)
@@ -656,6 +658,8 @@
goto out;
{

+set_capacity(fs->disk, fs->total_secs);
+
if (mode & FMODE_NDELAY)
return 0;

@@ -727,14 +731,9 @@
if (copy_to_user((void __user *) param, (void *) &floppy_type,
sizeof(struct floppy_struct)))
return -EFAULT;
-break;
-
-default:
-printk(KERN_DEBUG "SWIM floppy_ioctl: unknown cmd %d\n",
-cmd);
-return -ENOSYS;
+return 0;
}
-return 0;
+return -ENOTTY;
}

static int floppy_getgeo(struct block_device *bdev, struct hd_geometry *geo)
@@ -795,7 +794,7 @@
struct swim_priv *swd = data;
int drive = (*part & 3);

-if (drive > swd->floppy_count)
+if (drive >= swd->floppy_count)
return NULL;

*part = 0;
@@ -813,10 +812,9 @@
swim_motor(base, OFF);

-if (swim_readbit(base, SINGLE_SIDED))
-fs->head_number = 1;
-else
fs->head_number = 2;
+fs->type = HD_MEDIA;
+fs->head_number = 2;
+
fs->ref_count = 0;
fs->ejected = 1;

@@ -834,10 +832,12 @@
 /* scan floppy drives */

 swim_drive(base, INTERNAL_DRIVE);
- if (swim_readbit(base, DRIVE_PRESENT))
+ if (swim_readbit(base, DRIVE_PRESENT) &&
+  !swim_readbit(base, ONEMEG_DRIVE))
 swim_add_floppy(swd, INTERNAL_DRIVE);
 swim_drive(base, EXTERNAL_DRIVE);
- if (swim_readbit(base, DRIVE_PRESENT))
+ if (swim_readbit(base, DRIVE_PRESENT) &&
+  !swim_readbit(base, ONEMEG_DRIVE))
 swim_add_floppy(swd, EXTERNAL_DRIVE);

 /* register floppy drives */
@@ -861,7 +861,6 @@
 &swd->lock);
 if (!swd->unit[drive].disk->queue) {
 err = -ENOMEM;
-put_disk(swd->unit[drive].disk);
 goto exit_put_disks;
 }
 blk_queue_bounce_limit(swd->unit[drive].disk->queue,
@@ -888,8 +887,17 @@
exit_put_disks:
 unregister_blkdev(FLOPPY_MAJOR, "fd");
-while (drive--)
-put_disk(swd->unit[drive].disk);
+do {
+ struct gendisk *disk = swd->unit[drive].disk;
+ }
+ if (disk) {
+ if (disk->queue) {
+ blk_cleanup_queue(disk->queue);
+ disk->queue = NULL;
+ }
+ put_disk(disk);
+ }
+ while (drive--);
 return err;
swim_base = ioremap(res->start, resource_size(res));
+swim_base = (struct swim __iomem *)res->start;
if (!swim_base) {
    ret = -ENOMEM;
goto out_release_io;
@@ -923,7 +931,7 @@
    if (!get_swim_mode(swim_base)) {
        printk(KERN_INFO "SWIM device not found !\n");
        ret = -ENODEV;
    -goto out_iounmap;
    +goto out_release_io;
    }
/* set platform driver data */
@@ -931,7 +939,7 @@
    swd = kzalloc(sizeof(struct swim_priv), GFP_KERNEL);
    if (!swd) {
        ret = -ENOMEM;
    -goto out_iounmap;
    +goto out_release_io;
    }
    platform_set_drvdata(dev, swd);
@@ -945,8 +953,6 @@
    out_kfree:
    kfree(swd);
    -out_iounmap:
    -iounmap(swim_base);
    out_release_io:
    release_mem_region(res->start, resource_size(res));
    out:
    @@ -974,8 +980,6 @@
    for (drive = 0; drive < swd->floppy_count; drive++)
    floppy_eject(&swd->unit[drive]);
    -iounmap(swd->base);
    -
    res = platform_get_resource(dev, IORESOURCE_MEM, 0);
    if (res)
    release_mem_region(res->start, resource_size(res));
--- linux-4.15.0.orig/drivers/block/swim3.c
+++ linux-4.15.0/drivers/block/swim3.c
@@ -148,7 +148,7 @@
#define MOTOR_ON	2
#define RELAX		3 /* also eject in progress */
#define READ_DATA_0	4
-#define TWOMEG_DRIVE	5
+#define ONEMEG_DRIVE	5
#define SINGLE_SIDED6/* drive or diskette is 4MB type? */
#define DRIVE_PRESENT7
#define DISK_IN	8
#define TRACK_ZERO	10
#define TACHO11
#define READ_DATA_112
-#define MFM_MODE	13
+#define GCR_MODE	13
#define SEEK_COMPLETE14
-#define ONEMEG_MEDIA15
+#define TWOMEG_MEDIA15

/* Definitions of values used in writing and formatting */
#define DATA_ESCAPE	0x99
@@ -1026,7 +1026,11 @@
struct swim3 __iomem *sw = fs->swim3;

mutex_lock(&swim3_mutex);
-if (fs->ref_count > 0 && --fs->ref_count == 0) {
 +if (fs->ref_count > 0)
 +-fs->ref_count;
 +else if (fs->ref_count == -1)
 +fs->ref_count = 0;
 +if (fs->ref_count == 0) {
 swim3_action(fs, MOTOR_OFF);
 out_8(&sw->control_bic, 0xff);
 swim3_select(fs, RELAX);
--- linux-4.15.0.orig/drivers/block/virtio_blk.c
+++ linux-4.15.0/drivers/block/virtio_blk.c
@@ -31,6 +31,15 @@
 } ____cacheline_aligned_in_smp;

struct virtio_blk {
+/*
+ * This mutex must be held by anything that may run after
+ * virtblk_remove() sets vblk->vdev to NULL.
+ *
+ * blk-mq, virtqueue processing, and sysfs attribute code paths are
+ * shut down before vblk->vdev is set to NULL and therefore do not need
+ * to hold this mutex.
 */
+/*
+ struct mutex vdev_mutex;
struct virtio_device *vdev;

/* The disk structure for the kernel. */
@@ -42,6 +51,13 @@
/* Process context for config space updates */
struct work_struct config_work;

+/*
+ * Tracks references from block_device_operations open/release and
+ * virtio_driver probe/remove so this object can be freed once no
+ * longer in use.
+ */
+refcount_t refs;
+
/* What host tells us, plus 2 for header & tailer. */
unsigned int sg eius;

@@ -271,13 +287,20 @@
err = virtblk_add req(vblk->vqs[qid].vq, vbr, vbr->sg, num);
if (err) {
    virtqueue_kick(vblk->vqs[qid].vq);
    -blk_mq_stop_hw_queue(hctx);
    +/* Don't stop the queue if -ENOMEM: we may have failed to
    + * bounce the buffer due to global resource outage.
    + */
    +if (err == -ENOSPC)
       +blk_mq_stop_hw_queue(hctx);
    spin unlock irqrestore(&vblk->vqs[qid].lock, flags);
    -/* Out of mem doesn't actually happen, since we fall back
    - * to direct descriptors */
    -if (err == -ENOMEM || err == -ENOSPC)
       +switch (err) {
       +case -ENOSPC:
       +return BLK_STS_DEVStringUtil;
       +case -ENOMEM:
return BLK_STSStringUtil;
       +default:
       +return BLK_STSStringUtil;
       +}
}

if (bd->last && virtqueue_kick_prepare(vblk->vqs[qid].vq))
@@ -313,10 +336,55 @@
return err;
static void virtblk_get(struct virtio_blk *vblk)
{
    refcount_inc(&vblk->refs);
}

static void virtblk_put(struct virtio_blk *vblk)
{
    if (refcount_dec_and_test(&vblk->refs)) {
        ida_simple_remove(&vd_index_ida, vblk->index);
mutex_destroy(&vblk->vdev_mutex);
        kfree(vblk);
    }
}

static int virtblk_open(struct block_device *bd, fmode_t mode)
{
    struct virtio_blk *vblk = bd->bd_disk->private_data;
    int ret = 0;

    mutex_lock(&vblk->vdev_mutex);

    if (!vblk->vdev)
        virtblk_get(vblk);
    else
        ret = -ENXIO;

    mutex_unlock(&vblk->vdev_mutex);
    return ret;
}

static void virtblk_release(struct gendisk *disk, fmode_t mode)
{
    struct virtio_blk *vblk = disk->private_data;

    virtblk_put(vblk);
}

/* We provide getgeo only to please some old bootloader/partitioning tools */
static int virtblk_getgeo(struct block_device *bd, struct hd_geometry *geo)
{
    struct virtio_blk *vblk = bd->bd_disk->private_data;
    int ret = 0;

    mutex_lock(&vblk->vdev_mutex);

    if (!vblk->vdev) {
        ret = -ENXIO;
    }
    return ret;
/* see if the host passed in geometry config */
if (virtio_has_feature(vblk->vdev, VIRTIO_BLK_F_GEOMETRY)) {
    geo->sectors = 1 << 5;
    geo->cylinders = get_capacity(bd->bd_disk) >> 11;
}
    return 0;
    out:
    mutex_unlock(&vblk->vdev_mutex);
    return ret;
}

static const struct block_device_operations virtblk_fops = {
    .ioctl  = virtblk_ioctl,
    .owner  = THIS_MODULE,
    .open   = virtblk_open,
    .release = virtblk_release,
    .getgeo = virtblk_getgeo,
};

if (err)
    num_vqs = 1;

    num_vqs = min_t(unsigned int, nr_cpu_ids, num_vqs);
    vblk->vqs = kmalloc_array(num_vqs, sizeof(*vblk->vqs), GFP_KERNEL);
    if (!vblk->vqs)
        return -ENOMEM;

/v* This reference is dropped in virtblk_remove(). */
    refcount_set(&vblk->refs, 1);
    mutex_init(&vblk->vdev_mutex);
    vblk->vdev = vdev;
    vblk->sg elems = sg elems;

    put_disk(vblk->disk);
    out_free_vq:
    vdev->config->del_vqs(vdev);
    kfree(vblk->vqs);

static void virtblk_remove(struct virtio_device *vdev)
{
    struct virtio_blk *vblk = vdev->priv;
    int index = vblk->index;
    int refc;

    /* Make sure no work handler is accessing the device. */
    flush_work(&vblk->config_work);

    /* Stop all the virtqueues. */
    blk_mq_free_tag_set(&vblk->tag_set);

    mutex_lock(&vblk->vdev_mutex);
    /* Stop all the virtqueues. */
    vdev->config->reset(vdev);

    refc = kref_read(&disk_to_dev(vblk->disk)->kobj.kref);
    /* Virtqueues are stopped, nothing can use vblk->vdev anymore. */
    vblk->vdev = NULL;
    put_disk(vblk->disk);
    vdev->config->del_vqs(vdev);
    kfree(vblk->vqs);
    kfree(vblk);

    /* Only free device id if we don't have any users */
    if (refc == 1)
        ida_simple_remove(&vd_index_ida, index);

    mutex_unlock(&vblk->vdev_mutex);
    virtblk_put(vblk);
}

#ifdef CONFIG_PM_SLEEP
    blk_mq_quiesce_queue(vblk->disk->queue);
    vdev->config->del_vqs(vdev);
    kfree(vblk->vqs);
    +
    return 0;

```
--- linux-4.15.0.orig/drivers/block/xen-blkback/blkback.c
+++ linux-4.15.0/drivers/block/xen-blkback/blkback.c
@@ -183,7 +183,7 @@
#define vaddr(page) ((unsigned long)pfn_to_kaddr(page_to_pfn(page)))

-static int do_block_io_op(struct xen_blkif_ring *ring);
+static int do_block_io_op(struct xen_blkif_ring *ring, unsigned int *eoi_flags);
static int dispatch_rw_block_io(struct xen_blkif_ring *ring,
struct blkif_request *req,
struct pending_req *pending_req);
@@ -608,6 +608,8 @@
 struct xen_vbd *vbd = &blkif->vbd;
 unsigned long timeout;
 int ret;
+bool do_eoi;
+unsigned int eoi_flags = XEN_EOI_FLAG_SPURIOUS;

 set_freezable();
 while (!kthread_should_stop()) {
@@ -632,16 +634,23 @@
 if (timeout == 0)
 goto purge_gnt_list;
+do_eoi = ring->waiting_reqs;
 +
 ring->waiting_reqs = 0;
 smp_mb(); /* clear flag *before* checking for work */

 -ret = do_block_io_op(ring);
+ret = do_block_io_op(ring, &eoi_flags);
 if (ret > 0)
 ring->waiting_reqs = 1;
 if (ret == -EACCES)
 wait_event_interruptible(ring->shutdown_wq,
 kthread_should_stop());

+if (do_eoi && !ring->waiting_reqs) {
+xen_irq_lateo铱ring->irq, eoi_flags);
+eoi_flags |= XEN_EOI_FLAG_SPURIOUS;
+}
+
 purge_gnt_list:
 if (blkif->vbd.feature_gnt_persistent &&
 time_after(jiffies, ring->next_lru)) {
@@ -834,8 +843,11 @@
 pages[i]->page = persistent_gnt->page;
 pages[i]->persistent_gnt = persistent_gnt;

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} else {
- if (get_free_page(ring, &pages[i]->page))
- goto out_of_memory;
+ if (get_free_page(ring, &pages[i]->page)) {
+ put_free_pages(ring, pages_to_gnt, segs_to_map);
+ ret = -ENOMEM;
+ goto out;
+ }

 addr = vaddr(pages[i]->page);
 pages_to_gnt[segs_to_map] = pages[i]->page;
 pages[i]->persistent_gnt = NULL;
@@ -851,10 +863,8 @@
 break;
 }

- if (segs_to_map) {
+ if (segs_to_map)
 ret = gnttab_map_refs(map, NULL, pages_to_gnt, segs_to_map);
 - BUG_ON(ret);
 - }

 /*
 * Now swizzle the MFN in our domain with the MFN from the other domain
 @ @ -869.7 +879.7 @@
 pr_debug("invalid buffer -- could not remap it\n");
 put_free_pages(ring, &pages[seg_idx]->page, 1);
 pages[seg_idx]->handle = BLKBACK_INVALID_HANDLE;
 @ @ -921.15 +931.18 @@
 }

 segs_to_map = 0;
 last_map = map_until;
- if (map_until != num)
+ if (!ret && map_until != num)
 goto again;

- return ret;
+ out:
+ for (i = last_map; i < num; i++) {
+ /* Don't zap current batch's valid persistent grants. */
+ if(i >= map_until)
+ pages[i]->persistent_gnt = NULL;
+ pages[i]->handle = BLKBACK_INVALID_HANDLE;
+ }
static int xen_blkblk_map_seg(struct pending_req *pending_req)
{ }

static int __do_block_io_op(struct xen_blkif_ring *ring)
{ }

static int do_block_io_op(struct xen_blkif_ring *ring)
{ }

--- linux-4.15.0.orig/drivers/block/xen-blkback/xenbus.c
+++ linux-4.15.0/drivers/block/xen-blkback/xenbus.c
@@ -178,6 +178,15 @@
 blkif->domid = domid;

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atomic_set(&blkif->refcnt, 1);
init_completion(&blkif->drain_complete);
+
+/*
+ * Because freeing back to the cache may be deferred, it is not
+ * safe to unload the module (and hence destroy the cache) until
+ * this has completed. To prevent premature unloading, take an
+ * extra module reference here and release only when the object
+ * has been freed back to the cache.
+ */
+__module_get(THIS_MODULE);
INIT_WORK(&blkif->free_work, xen_blkif_deferred_free);
return blkif;
@@ -227,9 +236,8 @@
BUG();
}
-err = bind_interdomain_evtchn_to_irqhandler(blkif->domid, evtchn,
- xen_blkif_be_int, 0,
- "blkif-backend", ring);
+err = bind_interdomain_evtchn_to_irqhandler_lateeoi(blkif->domid,
+evtchn, xen_blkif_be_int, 0, "blkif-backend", ring);
if (err < 0) {
xenbus_unmap_ring_vfree(blkif->be->dev, ring->blk_ring);
ring->blk_rings.common.sring = NULL;
@@ -255,6 +263,7 @@
if (ring->xenblkd) {
kthread_stop(ring->xenblkd);
+ring->xenblkd = NULL;
wake_up(&ring->shutdown_wq);
}
@@ -327,6 +336,7 @@
/* Make sure everything is drained before shutting down */
kmem_cache_free(xen_blkif_cachep, blkif);
+module_put(THIS_MODULE);
}
int __init xen_blkif_interface_init(void)
@@ -641,7 +651,8 @@
/* setup back pointer */
be->blkif->be = be;
-err = xenbus_watch_pathfmt(dev, &be->backend_watch, backend_changed,
+err = xenbus_watch_pathfmt(dev, &be->backend_watch, NULL,

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+ backend_changed,
"%s/%s", dev->nodename, "physical-device");
if (err)
goto fail;
@@ -973,6 +984,7 @@
}
blkif->nr_ring_pages = nr_grefs;

+err = -ENOMEM;
for (i = 0; i < nr_grefs * XEN_BLKIF_REQS_PER_PAGE; i++) {
req = kzalloc(sizeof(*req), GFP_KERNEL);
if (!req)
@@ -995,7 +1007,7 @@
err = xen_blkif_map(ring, ring_ref, nr_grefs, evtchn);
if (err) {
xenbus_dev_fatal(dev, err, "mapping ring-ref port %u", evtchn);
-return err;
+goto fail;
}
return 0;
@@ -1015,8 +1027,7 @@
}
kfree(req);
}
-return -ENOMEM;
+
static int connect_ring(struct backend_info *be)
--- linux-4.15.0.orig/drivers/block/xen-blkfront.c
+++ linux-4.15.0/drivers/block/xen-blkfront.c
@@ -262,6 +262,7 @@
static int blkfront_setup_indirect(struct blkfront_ring_info *rinfo);
static void blkfront_gather_backend_features(struct blkfront_info *info);
+static int negotiate_mq(struct blkfront_info *info);

static int get_id_from_freelist(struct blkfront_ring_info *rinfo)
{
@@ -911,7 +912,7 @@
out_busy:
blk_mq_stop_hw_queue(hctx);
spin_unlock_irqrestore(&rinfo->ring_lock, flags);
-return BLK_STS_RESOURCE;
+return BLK_STS_DEV_RESOURCE;
}
static void blkif_complete_rq(struct request *rq)
@@ -936,7 +937,8 @@
 if (info->feature_discard) {
     queue_flag_set_unlocked(QUEUE_FLAG_DISCARD, rq);
     blk_queue_max_discard_sectors(rq, get_capacity(gd));
-    rq->limits.discard_granularity = info->discard_granularity;
+    rq->limits.discard_granularity = info->discard_granularity ?
+            info->physical_sector_size;
     rq->limits.discard_alignment = info->discard_alignment;
     if (info->feature_secdiscard)
         queue_flag_set_unlocked(QUEUE_FLAG_SECERASE, rq);
@@ -1114,8 +1116,8 @@
 if (!VDEV_IS_EXTENDED(info->vdevice)) {
     err = xen_translate_vdev(info->vdevice, &minor, &offset);
     if (err)
-        return err;
-    nr_parts = PARTS_PER_DISK;
+        return err;
+    nr_parts = PARTS_PER_DISK;
 } else {
     minor = BLKIF_MINOR_EXT(info->vdevice);
     nr_parts = PARTS_PER_EXT_DISK;
@@ -1774,11 +1776,18 @@
     unsigned int i, max_page_order;
     unsigned int ring_page_order;

+    if (!info)
+        return -ENODEV;
+    max_page_order = xenbus_read_unsigned(info->xbdev->otherend,
+            "max-ring-page-order", 0);
     ring_page_order = min(xen_blkif_max_ring_order, max_page_order);
     info->nr_ring_pages = 1 << ring_page_order;

+    err = negotiate_mq(info);
+    if (err)
+        goto destroy_blkring;
+    for (i = 0; i < info->nr_rings; i++) {
 struct blkfront_ring_info *rinfo = &info->rinfo[i];
@@ -1902,6 +1911,7 @@
     info->rinfo = kzalloc(sizeof(struct blkfront_ring_info) * info->nr_rings, GFP_KERNEL);
     if (!info->rinfo) {
         xenbus_dev_fatal(info->xbdev, -ENOMEM, "allocating ring_info structure");
+        info->nr_rings = 0;
         return -ENOMEM;
info->xbdev = dev;
-err = negotiate_mq(info);
-if (err) {
-kfree(info);
-return err;
-}

mutex_init(&info->mutex);
info->vdevice = vdevice;
@@ -1978,11 +1988,6 @@

blkif_free(info, info->connected == BLKIF_STATE_CONNECTED);

-err = negotiate_mq(info);
-if (err)
-return err;
-
err = talk_to_blkback(dev, info);
if (!err)
blk_mq_update_nr_hw_queues(&info->tag_set, info->nr_rings);
@@ -2099,10 +2104,6 @@

static void blkfront_setup_discard(struct blkfront_info *info)
{
-int err;
-unsigned int discard_granularity;
-unsigned int discard_alignment;
-
info->feature_discard = 1;
-err = xenbus_gather(XBT_NIL, info->xbdev->otherend,
-"discard-granularity", "%u", &discard_granularity,
-"discalign", "%u", &discard_alignment,
-NULL);
-if (!err) {
-info->discard_granularity = discard_granularity;
-info->discard_alignment = discard_alignment;
-}
+info->discard_granularity = xenbus_read_unsigned(info->xbdev->otherend,
+"discard-granularity",
+0);
+info->discard_alignment = xenbus_read_unsigned(info->xbdev->otherend,
+"discalign", 0);
-info->feature_secdiscard =


xenbus_read_unsigned(info->xbdev->otherend, "discard-secure", 0);
@@ -2472,6 +2466,9 @@
    dev_dbg(&xbdev->dev, "%s removed", xbdev->nodename);
    
    if (!info)
+    return 0;
+    
    blkif_free(info, 0);

    mutex_lock(&info->mutex);
--- linux-4.15.0.orig/drivers/block/xsysace.c
+++ linux-4.15.0/drivers/block/xsysace.c
@@ -1063,6 +1063,8 @@

err_read:
+ /* prevent double queue cleanup */
+ ace->gd->queue = NULL;
    put_disk(ace->gd);
    err_alloc_disk:
    blk_cleanup_queue(ace->queue);
--- linux-4.15.0.orig/drivers/block/zram/zram_drv.c
+++ linux-4.15.0/drivers/block/zram/zram_drv.c
@@ -47,6 +47,21 @@

static void zram_free_page(struct zram *zram, size_t index);
+static int zram_slot_trylock(struct zram *zram, u32 index)
+{
+    return bit_spin_trylock(ZRAM_LOCK, &zram->table[index].value);
+}
+    
+static void zram_slot_lock(struct zram *zram, u32 index)
+{
+    bit_spin_lock(ZRAM_LOCK, &zram->table[index].value);
+}
+    
+static void zram_slot_unlock(struct zram *zram, u32 index)
+{
+    bit_spin_unlock(ZRAM_LOCK, &zram->table[index].value);
+}
+    
static inline bool init_done(struct zram *zram)
{
    return zram->disksize;
@@ -275,7 +290,8 @@
zram->backing_dev = NULL;
zram->old_block_size = 0;
zram->bdev = NULL;
-
+zram->disk->queue->backing_dev_info->capabilities |=
+BDI_CAP_SYNCHRONOUS_IO;
kvfree(zram->bitmap);
zram->bitmap = NULL;
}
@@ -283,13 +299,14 @@
static ssize_t backing_dev_show(struct device *dev,
struct device_attribute *attr, char *buf)
{
+struct file *file;
struct zram *zram = dev_to_zram(dev);
-struct file *file = zram->backing_dev;
char *p;
ssize_t ret;
down_read(&zram->init_lock);
-if (!zram_wb_enabled(zram)) {
+file = zram->backing_dev;
+if (!file) {
memcpyp(buf, "none\n", 5);
up_read(&zram->init_lock);
return 5;
@@ -313,6 +330,7 @@
 struct device_attribute *attr, const char *buf, size_t len)
{
 char *file_name;
+size_t sz;
 struct file *backing_dev = NULL;
 struct inode *inode;
 struct address_space *mapping;
@@ -333,7 +351,11 @@
goto out;
 }

-strlcpy(file_name, buf, len);
+strlcpy(file_name, buf, PATH_MAX);
+/* ignore trailing newline */
+sz = strlen(file_name);
+if (sz > 0 && file_name[sz - 1] == '\n')
+file_name[sz - 1] = 0x00;

 backing_dev = filp_open(file_name, O_RDWR|O_LARGEFILE, 0);
if (IS_ERR(backing_dev)) {
@@ -353,8 +375,10 @@

bdev = bdgrab(I_BDEV(inode));
err = blkdev_get(bdev, FMODE_READ | FMODE_WRITE | FMODE_EXCL, zram);
-if (err < 0)
+if (err < 0) {
+bdev = NULL;
goto out;
+}

nr_pages = i_size_read(inode) >> PAGE_SHIFT;
bitmap_sz = BITS_TO_LONGS(nr_pages) * sizeof(long);
@@ -370,13 +394,24 @@
goto out;
reset_bdev(zram);
-spin_lock_init(&zram->bitmap_lock);

zram->old_block_size = old_block_size;
zram->bdev = bdev;
zram->backing_dev = backing_dev;
zram->bitmap = bitmap;
zram->nr_pages = nr_pages;
+/*
+ * With writeback feature, zram does asynchronous IO so it's no longer
+ * synchronous device so let's remove synchronous io flag. Otherwise,
+ * upper layer(e.g., swap) could wait IO completion rather than
+ * (submit and return), which will cause system sluggish.
+ * Furthermore, when the IO function returns(e.g., swap_readpage),
+ * upper layer expects IO was done so it could deallocate the page
+ * freely but in fact, IO is going on so finally could cause
+ * use-after-free when the IO is really done.
+ */
+zram->disk->queue->backing_dev_info->capabilities &=
+~BDI_CAP_SYNCHRONOUS_IO;
up_write(&zram->init_lock);

pr_info("setup backing device %s\n", file_name);
@@ -402,29 +437,24 @@
static unsigned long get_entry_bdev(struct zram *zram)
{
-unsigned long entry;
-
-spin_lock(&zram->bitmap_lock);
+unsigned long blk_idx = 1;
+retry:
/* skip 0 bit to confuse zram.handle = 0 */
-entry = find_next_zero_bit(zram->bitmap, zram->nr_pages, 1);
-if (entry == zram->nr_pages) {
-    spin_unlock(&zram->bitmap_lock);
+    blk_idx = find_next_zero_bit(zram->bitmap, zram->nr_pages, blk_idx);
+    if (blk_idx == zram->nr_pages)
        return 0;
-}

-set_bit(entry, zram->bitmap);
-    spin_unlock(&zram->bitmap_lock);
+    if (test_and_set_bit(blk_idx, zram->bitmap))
+       goto retry;

-    return entry;
+    return blk_idx;
}

static void put_entry_bdev(struct zram *zram, unsigned long entry)
{
    int was_set;

-    spin_lock(&zram->bitmap_lock);
-    was_set = test_and_clear_bit(entry, zram->bitmap);
-    spin_unlock(&zram->bitmap_lock);
    WARN_ON_ONCE(!was_set);
}

@@ -473,18 +503,18 @@
struct zram *zram;
unsigned long entry;
struct bio *bio;
+struct bio_vec bvec;
};

#if PAGE_SIZE != 4096
static void zram_sync_read(struct work_struct *work)
{
    struct bio_vec bvec;
    struct zram_work *zw = container_of(work, struct zram_work, work);
    struct zram *zram = zw->zram;
    unsigned long entry = zw->entry;
    struct bio *bio = zw->bio;
    +struct bio_vec bvec;
}

@@ -497,6 +527,7 @@
static void zram_sync_read(struct work_struct *work)
{
    -struct bio_vec bvec;
    struct zram_work *zw = container_of(work, struct zram_work, work);
    struct zram *zram = zw->zram;
    unsigned long entry = zw->entry;
    struct bio *bio = zw->bio;

    -read_from_bdev_async(zram, &bvec, entry, bio);
    +read_from_bdev_async(zram, &bvec, entry, bio);
    +read_from_bdev_async(zram, &zw->bvec, entry, bio);
}

/*
@@ -497,6 +527,7 @@

struct zram_work work;

+work.bvec = *bvec;
work.zram = zram;
work.entry = entry;
work.bio = bio;
@@ -721,7 +752,7 @@
zram->limit_pages << PAGE_SHIFT,
max_used << PAGE_SHIFT,
(u64)atomic64_read(&zram->stats.same_pages),
-pool_stats.pages_compacted);
+atomic_long_read(&pool_stats.pages_compacted);
up_read(&zram->init_lock);

return ret;
@@ -736,9 +767,10 @@
down_read(&zram->init_lock);
ret = scnprintf(buf, PAGE_SIZE,
-"version: %d\n%llu\n",
+"version: %d\n%8llu %8llu\n",
version,
-(u64)atomic64_read(&zram->stats.writestall));
+(u64)atomic64_read(&zram->stats.writestall),
+(u64)atomic64_read(&zram->stats.miss_free));
up_read(&zram->init_lock);

return ret;
@@ -748,16 +780,6 @@
static DEVICE_ATTR_RO(mm_stat);
static DEVICE_ATTR_RO(debug_stat);

-static void zram_slot_lock(struct zram *zram, u32 index)
-{
-+bit_spin_lock(ZRAM_ACCESS, &zram->table[index].value);
-}
-
-static void zram_slot_unlock(struct zram *zram, u32 index)
-{
-+bit_spin_unlock(ZRAM_ACCESS, &zram->table[index].value);
-}
-
static void zram_meta_free(struct zram *zram, u64 disksize)
{
size_t num_pages = disksize >> PAGE_SHIFT;
@@ -1243,10 +1265,14 @@


zram = bdev->bd_disk->private_data;

-zram_slot_lock(zram, index);
+atomic64_inc(&zram->stats.notify_free);
+if (!zram_slot_trylock(zram, index)) {
+atomic64_inc(&zram->stats.miss_free);
+return;
+
+zram_free_page(zram, index);
+zram_slot_unlock(zram, index);
-atomic64_inc(&zram->stats.notify_free);
}

static int zram_rw_page(struct block_device *bdev, sector_t sector,
@@ -1649,7 +1675,8 @@
return ret;
return scnprintf(buf, PAGE_SIZE, "%d\n", ret);
}
-static CLASS_ATTR_RO(hot_add);
+static struct class_attribute class_attr_hot_add =
+__ATTR(hot_add, 0400, hot_add_show, NULL);

static ssize_t hot_remove_store(struct class *class,
struct class_attribute *attr,
--- linux-4.15.0.orig/drivers/block/zram/zram_drv.h
+++ linux-4.15.0/drivers/block/zram/zram_drv.h
@@ -37,7 +37,6 @@
/*-- End of configurable params */

-#define SECTOR_SHIFT		9
#define SECTORS_PER_PAGE_SHIFT	(PAGE_SHIFT - SECTOR_SHIFT)
#define SECTORS_PER_PAGE	(1 << SECTORS_PER_PAGE_SHIFT)
#define ZRAM_LOGICAL_BLOCK_SHIFT 12
@@ -60,9 +59,9 @@
/* Flags for zram pages (table[page_no].value) */
enum zram_pageflags {
-/* Page consists the same element */
- ZRAM SAME = ZRAM_FLAG_SHIFT,
- ZRAM_ACCESS, /* page is now accessed */
+/* zram slot is locked */
+ ZRAM LOCK = ZRAM_FLAG_SHIFT,
+ ZRAM SAME, /* Page consists the same element */
 ZRAM WB, /* page is stored on backing_device */

 __NR_ZRAM_PAGEFLAGS,
atomic64_t pages_stored; /* no. of pages currently stored */
atomic_long_t max_used_pages; /* no. of maximum pages stored */
atomic64_t writestall; /* no. of write slow paths */
atomic64_t miss_free; /* no. of missed free */

struct zram {
    unsigned int old_block_size;
    unsigned long *bitmap;
    unsigned long nr_pages;
    spinlock_t bitmap_lock;
}:
@endif
@endif
--- linux-4.15.0.orig/drivers/bluetooth/Kconfig
+++ linux-4.15.0/drivers/bluetooth/Kconfig
@@ -122,7 +122,6 @@
     old_block_size;
     bitmap;
     nr_pages;
-    bitmap_lock;
@endif
@endif
--- linux-4.15.0.orig/drivers/bluetooth/btbcm.c
+++ linux-4.15.0/drivers/bluetooth/btbcm.c
@@ -322,6 +322,8 @@
                         { 0x4103, "BCM4330B1" }, /* 002.001.003 */
                         { 0x410e, "BCM43341B0" }, /* 002.001.014 */
                         { 0x4406, "BCM4324B3" }, /* 002.004.006 */
+                        { 0x4606, "BCM4324B5" }, /* 002.006.006 */
+                        { 0x6109, "BCM4335C0" }, /* 003.001.009 */
                         { 0x610c, "BCM4354" }, /* 003.001.012 */
                         { 0x2209, "BCM43430A1" }, /* 001.002.009 */

{ 0x6119, "BCM4345C0" } /* 003.001.025 */
@@ -421,6 +423,7 @@
 u16 subver;
 const char *name;
 } bcm_usb_subver_table[] = {
+{ 0x2105, "BCM20703A1" } /* 001.001.005 */
 { 0x210b, "BCM43142A0" } /* 001.001.011 */
 { 0x2112, "BCM4314A0" } /* 001.001.018 */
 { 0x2118, "BCM20702A0" } /* 001.001.024 */
--- linux-4.15.0.orig/drivers/bluetooth/btqca.c
+++ linux-4.15.0/drivers/bluetooth/btqca.c
@@ -363,6 +363,9 @@
 return err;
 }

 /* Give the controller some time to get ready to receive the NVM */
+msleep(10);
+
 /* Download NVM configuration */
 config.type = TLV_TYPE_NVM;
 snprintf(config.fwname, sizeof(config.fwname), "qca/nvm_%08x.bin",
--- linux-4.15.0.orig/drivers/bluetooth/btqcomsmd.c
+++ linux-4.15.0/drivers/bluetooth/btqcomsmd.c
@@ -88,7 +88,8 @@
 break;
 }

 -kfree_skb(skb);
+if (!ret)
+kfree_skb(skb);

 return ret;
 }
@@ -155,8 +156,10 @@
 btq->cmd_channel = qcom_wcnss_open_channel(wcnss, "APPS_RIVA_BT_CMD",
 btqcomsmd_cmd_callback, btq);
-if (IS_ERR(btq->cmd_channel))
-return PTR_ERR(btq->cmd_channel);
+if (IS_ERR(btq->cmd_channel)) {
+ret = PTR_ERR(btq->cmd_channel);
+goto destroy_acl_channel;
+}

 /* The local-bd-address property is usually injected by the
 * bootloader which has access to the allocated BD address.
@@ -168,8 +171,10 @@
hdev = hci_alloc_dev();
-if (!hdev)
-return -ENOMEM;
+if (!hdev) {
+ret = -ENOMEM;
+goto destroy_cmd_channel;
+
}

hci_set_drvdata(hdev, btq);
b tq->hdev = hdev;
@ @ -179,18 +184,30 @@
hdev->open = btqcomsmd_open;
hdev->close = btqcomsmd_close;
hdev->send = btqcomsmd_send;
+#ifdef CONFIG_BT_QCOMSMD_HACK
+if (bacmp(&btq->bdaddr, BDADDR_ANY))
+hdev->setup = btqcomsmd_setup;
+#else
hdev->setup = btqcomsmd_setup;
+#endif
hdev->set_bdaddr = qca_set_bdaddr_rome;

ret = hci_register_dev(hdev);
-if (ret < 0) {
- hci_free_dev(hdev);
- return ret;
-
+if (ret < 0)
+goto hci_free_dev;

platform_set_drvdata(pdev, btq);

return 0;
+
+hci_free_dev:
+hci_free_dev(hdev);
+destroy_cmd_channel:
+rpmsg_destroy_ept(btq->cmd_channel);
+destroy_acl_channel:
+rpmsg_destroy_ept(btq->acl_channel);
+
+return ret;
+
static int btqcomsmd_remove(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/bluetooth/btrtl.c
+++ linux-4.15.0/drivers/bluetooth/btrtl.c
@@ -35,6 +35,60 @@
#define RTL_ROM_LMP_8761A	0x8761
#define RTL_ROM_LMP_8822B0x8822

+//define IC_MATCH_FL_LMPSUBV(1 << 0)
+//define IC_MATCH_FL_HCIREV(1 << 1)
+//define IC_INFO(lmps, hcir)\
+//.match_flags = IC_MATCH_FL_LMPSUBV | IC_MATCH_FL_HCIREV,\
+//.lmp_subver = (lmps),\
+//.hci_rev = (hcir)
+
+struct id_table {
+_u16 match_flags;
+_u16 lmp_subver;
+_u16 hci_rev;
+bool config_needed;
+char *fw_name;
+char *cfg_name;
+};
+
+static const struct id_table ic_id_table[] = {
+/* 8723B */
+{ IC_INFO(RTL_ROM_LMP_8723B, 0xb),
+ .config_needed = false,
+ .fw_name = "rtl_bt/rtl8723b_fw.bin",
+ .cfg_name = "rtl_bt/rtl8723b_config.bin" },
+/* 8723D */
+{ IC_INFO(RTL_ROM_LMP_8723D, 0xd),
+ .config_needed = true,
+ .fw_name = "rtl_bt/rtl8723d_fw.bin",
+ .cfg_name = "rtl_bt/rtl8723d_config.bin" },
+/* 8821A */
+{ IC_INFO(RTL_ROM_LMP_8821A, 0xa),
+ .config_needed = false,
+ .fw_name = "rtl_bt/rtl8821a_fw.bin",
+ .cfg_name = "rtl_bt/rtl8821a_config.bin" },
+/* 8821C */
+{ IC_INFO(RTL_ROM_LMP_8821C, 0xc),
+ .config_needed = false,
+ .fw_name = "rtl_bt/rtl8821c_fw.bin",
+ .cfg_name = "rtl_bt/rtl8821c_config.bin" },
+/* 8761A */
+{ IC_MATCH_FL_LMPSUBV, RTL_ROM_LMP_8761A, 0x0,
+ .config_needed = false,
+ .fw_name = "rtl_bt/rtl8761a_fw.bin",
+ .cfg_name = "rtl_bt/rtl8761a_config.bin" },
+
+ /* 8822B */
+ { IC_INFO(RTL_ROM_LMP_8822B, 0xb),
+ .config_needed = true,
+ .fw_name = "rtl_bt/rtl8822b_fw.bin",
+ .cfg_name = "rtl_bt/rtl8822b_config.bin" },
+
+
static int rtl_read_rom_version(struct hci_dev *hdev, u8 *version)
{
    struct rtl_rom_version_evt *rom_version;
    @@ -64,9 +118,9 @@
    return 0;
}

-static int rtl8723b_parse_firmware(struct hci_dev *hdev, u16 lmp_subver,
-        const struct firmware *fw,
-        unsigned char **_buf)
+static int rtlbt_parse_firmware(struct hci_dev *hdev, u16 lmp_subver,
+        const struct firmware *fw,
+        unsigned char **_buf)
{
    const u8 extension_sig[] = { 0x51, 0x04, 0xfd, 0x77 };
    struct rtl_epatch_header *epatch_info;
    @@ -88,6 +142,8 @@
    { RTL_ROM_LMP_8821A, 2 },
    { RTL_ROM_LMP_8761A, 3 },
    { RTL_ROM_LMP_8822B, 8 },
+    { RTL_ROM_LMP_8723B, 9 },/* 8723D */
+    { RTL_ROM_LMP_8821A, 10 },/* 8821C */
    };

    ret = rtl_read_rom_version(hdev, &rom_version);
    @@ -320,8 +376,8 @@
    return ret;
}

-static int btrtl_setup_rtl8723b(struct hci_dev *hdev, u16 lmp_subver,
-        const char *fw_name)
+static int btrtl_setup_rtl8723b(struct hci_dev *hdev, u16 hci_rev,
+        u16 lmp_subver)
{
    unsigned char *fw_data = NULL;
    const struct firmware *fw;
    @@ -330,39 +386,40 @@
    u8 *cfg_buff = NULL;

u8 *tbuff;
char *cfg_name = NULL;
bool config_needed = false;
char *fw_name = NULL;
int i;

for (i = 0; i < ARRAY_SIZE(ic_id_table); i++) {
  if ((ic_id_table[i].match_flags & IC_MATCH_FL_LMPSUBV) &&
      (ic_id_table[i].lmp_subver != lmp_subver))
    continue;
  if ((ic_id_table[i].match_flags & IC_MATCH_FL_HCIREV) &&
      (ic_id_table[i].hci_rev != hci_rev))
    continue;
}

switch (lmp_subver) {
  case RTL_ROM_LMP_8723B:
    cfg_name = "rtl_bt/rtl8723b_config.bin";
    break;
  case RTL_ROM_LMP_8821A:
    cfg_name = "rtl_bt/rtl8821a_config.bin";
    break;
  case RTL_ROM_LMP_8761A:
    cfg_name = "rtl_bt/rtl8761a_config.bin";
    break;
  case RTL_ROM_LMP_8822B:
    cfg_name = "rtl_bt/rtl8822b_config.bin";
    config_needed = true;
    break;
  default:
    BT_ERR("%s: rtl: no config according to lmp_subver %04x",
        hdev->name, lmp_subver);
    break;
  }

if (i >= ARRAY_SIZE(ic_id_table)) {
  BT_ERR("%s: unknown IC info, lmp subver %04x, hci rev %04x",
      hdev->name, lmp_subver, hci_rev);
  return -EINVAL;
}

if (cfg_name) {
  cfg_sz = rtl_load_config(hdev, cfg_name, &cfg_buff);
  if (cfg_sz < 0) {
    cfg_sz = 0;
  }
}

if (config_needed)
  + (ic_id_table[i].config_needed)
BT_ERR("Necessary config file %s not found\n", 
cfg_name);
}
} else
cfg_sz = 0;
+f_w_name = ic_id_table[i].fw_name;
b_err(hdev, "rtl: loading %s", fw_name);
ret = request_firmware(&fw, fw_name, &hdev->dev);
if (ret < 0) {
@@ -370,7 +427,7 @@
goto err_req_fw;
}
@@ -429,7 +486,7 @@
  }
 struct sk_buff *skb;
 struct hci_rp_read_local_version *resp;
-u16 lmp_subver;
+u16 hci_rev, lmp_subver;

 skb = btrtl_read_local_version(hdev);
 if (IS_ERR(skb))
@@ -441,6 +498,7 @@
   resp->hci_ver, resp->hci_rev,
   resp->lmp_ver, resp->lmp_subver);
+HCI_REV = le16_to_cpu(resp->hci_rev);
 lmp_subver = le16_to_cpu(resp->lmp_subver);
 kfree_skb(skb);
@@ -455,17 +513,10 @@
case RTL_ROM_LMP_3499:
  return btrtl_setup_rtl8723a(hdev);
 case RTL_ROM_LMP_8723B:
-  return btrtl_setup_rtl8723b(hdev, lmp_subver,
-    "rtl bt/rtl8723b_fw.bin");
 case RTL_ROM_LMP_8821A:
-  return btrtl_setup_rtl8723b(hdev, lmp_subver,
-    "rtl bt/rtl8821a_fw.bin");
 case RTL_ROM_LMP_8761A:
-  return btrtl_setup_rtl8723b(hdev, lmp_subver,
-    "rtl bt/rtl8761a_fw.bin");

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case RTL_ROM_LMP_8822B:
- return btrtl_setup_rtl8723b(hdev, lmp_subver,
- "rtl_bt/rtl8822b_fw.bin");
+ return btrtl_setup_rtl8723b(hdev, hci_rev, lmp_subver);
default:
bt_dev_info(hdev, "rtl: assuming no firmware upload needed");
return 0;
--- linux-4.15.0.orig/drivers/bluetooth/btsdio.c
+++ linux-4.15.0/drivers/bluetooth/btsdio.c
@@ -31,6 +31,7 @@
#include <linux/errno.h>
#include <linux/skbuff.h>
+ #include <linux/mmc/host.h>
#include <linux/mmc/sdio_ids.h>
#include <linux/mmc/sdio_func.h>

+ /* BCM43341 devices soldered onto the PCB (non-removable) use an
+   uart connection for bluetooth, ignore the BT SDIO interface.
+ */
+ if (func->vendor == SDIO_VENDOR_ID_BROADCOM &&
+     func->device == SDIO_DEVICE_ID_BROADCOM_43341 &&
+     !mmc_card_is_removable(func->card->host))
+ return -ENODEV;
+ data = devm_kzalloc(&func->dev, sizeof(*data), GFP_KERNEL);
if (!data)
return -ENOMEM;
--- linux-4.15.0.orig/drivers/bluetooth/btusb.c
+++ linux-4.15.0/drivers/bluetooth/btusb.c
@@ -21,11 +21,14 @@
*
+ #include <linux/dmi.h>
+ #include <linux/module.h>
+ #include <linux/usb.h>
+ #include <linux/usb/quirks.h>
+ #include <linux/firmware.h>
+ #include <linux/of_device.h>
+ #include <linux/of_irq.h>
+ #include <linux/pci.h>
+ #include <linux/suspend.h>
+ #include <asm/unaligned.h>
{ USB_DEVICE(0x0489, 0xe09f), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x0489, 0xe0a2), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x04ca, 0x3011), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x04ca, 0x3015), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x04ca, 0x3016), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x04ca, 0x301a), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3459), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3494), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3414), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3401), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3491), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3496), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x0a5c, 0x2009), .driver_info = BTUSB_BCM92035 },
{ USB_DEVICE(0x8087, 0x0026), .driver_info = BTUSB_INTEL_NEW },
{ USB_DEVICE(0x8087, 0x0029), .driver_info = BTUSB_INTEL_NEW },
{ USB_DEVICE(0x8087, 0x002a), .driver_info = BTUSB_INTEL_NEW },
{ USB_DEVICE(0x8087, 0x07da), .driver_info = BTUSB_CSR },
{ USB_DEVICE(0x8087, 0x07dc), .driver_info = BTUSB_INTEL },
{ USB_DEVICE(0x0bda, 0xb009), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x2ff8, 0xb011), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x0b05, 0x17dc), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3414), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3401), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3491), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3496), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3491), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3496), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3491), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3496), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_QCA_ROME },

/* Broadcom BCM2035 */
{ USB_DEVICE(0x0a5c, 0x2009), .driver_info = BTUSB_BCM92035 },
{ USB_DEVICE(0x04ca, 0x3011), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x04ca, 0x3015), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x04ca, 0x3016), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x04ca, 0x301a), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3491), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3496), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_QCA_ROME },

/* Intel Bluetooth devices */
{ USB_DEVICE(0x8087, 0x0005), .driver_info = BTUSB_INTEL_NEW },
{ USB_DEVICE(0x8087, 0x0019), .driver_info = BTUSB_INTEL_NEW },
{ USB_DEVICE(0x8087, 0x0020), .driver_info = BTUSB_INTEL_NEW },
{ USB_DEVICE(0x8087, 0x002a), .driver_info = BTUSB_INTEL_NEW },
{ USB_DEVICE(0x8087, 0x07da), .driver_info = BTUSB_CSR },
{ USB_DEVICE(0x8087, 0x07dc), .driver_info = BTUSB_INTEL },
{ USB_DEVICE(0x0bda, 0xb009), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x2ff8, 0xb011), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3459), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3494), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3414), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_REALTEK },

+/* Additional Realtek 8723BU Bluetooth devices */
+{ USB_DEVICE(0x7392, 0x8a11), .driver_info = BTUSB_REALTEK },
+
+/* Additional Realtek 8723DE Bluetooth devices */
+{ USB_DEVICE(0x0b0a, 0xb009), .driver_info = BTUSB_REALTEK },
+{ USB_DEVICE(0x2ff8, 0xb011), .driver_info = BTUSB_REALTEK },
+
+/* Additional Realtek 8821AE Bluetooth devices */
{ USB_DEVICE(0x0b05, 0x17dc), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3414), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_REALTEK },
{ USB_DEVICE(0x13d3, 0x3491), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3496), .driver_info = BTUSB_QCA_ROME },
{ USB_DEVICE(0x13d3, 0x3501), .driver_info = BTUSB_QCA_ROME },

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/* Additional Realtek 8822BE Bluetooth devices */
+{ USB_DEVICE(0x0b05, 0x185c), .driver_info = BTUSB_REALTEK },
+
/* Additional Realtek 8822CE Bluetooth devices */
+{ USB_DEVICE(0x04ca, 0x4005), .driver_info = BTUSB_REALTEK },
+
/* Silicon Wave based devices */
{ USB_DEVICE(0x0c10, 0x0000), .driver_info = BTUSB_SWAVE },

{ }/* Terminating entry */

+/* The Bluetooth USB module build into some devices needs to be reset on resume, 
+ * this is a problem with the platform (likely shutting off all power) not with 
+ * the module itself. So we use a DMI list to match known broken platforms. 
+ */
+static const struct dmi_system_id btusb_needs_reset_resume_table[] = {
+{,
+/* Dell OptiPlex 3060 (QCA ROME device 0cf3:e007) */
+  .matches = {
+    DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+    DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 3060"),
+  },
+},
+{,
+/* Dell XPS 9360 (QCA ROME device 0cf3:e300) */
+  .matches = {
+    DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+    DMI_MATCH(DMI_PRODUCT_NAME, "XPS 13 9360"),
+  },
+},
+
+#define BTUSB_MAX_ISOC_FRAMES10
+
+#define BTUSB_INTR_RUNNING0
+@ @ -387.9 +434.8 @ @
+#define BTUSB_FIRMWARE_LOADED7
+#define BTUSB_FIRMWARE_FAILED8
+#define BTUSB_BOOTING9
-#define BTUSB_RESET_RESUME10
-#define BTUSB_DIAG_RUNNING11
-#define BTUSB_OOB_WAKE_ENABLED12
+#define BTUSB_DIAG_RUNNING
+#define BTUSB_OOB_WAKE_ENABLED

struct btusb_data {
    struct hci_dev *hdev;
    if (data->setup_on_usb) {
        err = data->setup_on_usb(hdev);
        if (err < 0)
            return err;
    }
    data->intf->needs_remote_wakeup = 1;
    /* device specific wakeup source enabled and required for USB
     * remote wakeup while host is suspended
     */
    -device_wakeup_enable(&data->udev->dev);
    if (test_and_set_bit(BTUSB_INTR_RUNNING, &data->flags))
        goto done;
    clear_bit(BTUSB_INTR_RUNNING, &data->flags);
    +setup_fail:
        usb_autopm_put_interface(data->intf);
        return err;
}  

failed:
    data->intf->needs_remote_wakeup = 0;
    -device_wakeup_disable(&data->udev->dev);
    +usb_autopm_put_interface(data->intf);
    failed:
    @ -2004,6 +2046,35 @@
        return -EILSEQ;
    }

+static bool btusb_setup_intel_new_get_fw_name(struct intel_version *ver,
    struct intel_boot_params *params,
    char *fw_name, size_t len,
    const char *suffix)
{+
+    switch (ver->hw_variant) {
        case 0x0b:/ SfP */

case 0x0c: /* WsP */
snprintf(fw_name, len, "intel/ibt-%u-%u.%s",
    le16_to_cpu(ver->hw_variant),
    le16_to_cpu(params->dev_revid),
    suffix);
    break;
+case 0x11: /* JfP */
+case 0x12: /* ThP */
+case 0x13: /* HrP */
+case 0x14: /* CcP */
    snprintf(fw_name, len, "intel/ibt-%u-%u-%u.%s",
        le16_to_cpu(ver->hw_variant),
        le16_to_cpu(ver->hw_revision),
        le16_to_cpu(ver->fw_revision),
        suffix);
    break;
+default:
+return false;
+}
+return true;
+
static int btusb_setup_intel_new(struct hci_dev *hdev)
{
static const u8 reset_param[] = { 0x00, 0x01, 0x00, 0x01,
    @ @ -2052.6 +2123.8 @ @
case 0x0c: /* WsP */
    case 0x11: /* JfP */
    case 0x12: /* ThP */
    case 0x13: /* HrP */
    case 0x14: /* CcP */
    break;
    default:
    BT_ERR("%s: Unsupported Intel hardware variant (%u)",
        @ @ -2166.21 +2239.9 @ @
    * ibt-<hw_variant>-<hw_revision>-<fw_revision>.sfi.
    * /
    -switch (ver.hw_variant) {
    -case 0x0b: /* SfP */
    -case 0x0c: /* WsP */
    -snprintf(fwname, sizeof(fwname), "intel/ibt-%u-%u.sfi",
                le16_to_cpu(ibt-<var>),
                le16_to_cpu(params->dev_revid));
    -break;
    -case 0x11: /* JfP */
    -case 0x12: /* ThP */
    -snprintf(fwname, sizeof(fwname), "intel/ibt-%u-%u-%u.sfi",
                le16_to_cpu(ibt-<var>),
                le16_to_cpu(params->dev_revid));
- le16_to_cpu(ver.hw_variant),
- le16_to_cpu(ver.hw_revision),
- le16_to_cpu(ver.fw_revision));
-break;
-default:
+err = btusb_setup_intel_new_get_fw_name(&ver, params, fwname,
+sizeof(fwname), "sfi");
+if (!err) {
 BT_ERR("%s: Unsupported Intel firmware naming", hdev->name);
 return -EINVAL;
 }
@@ -2198,21 +2259,9 @@
 /* Save the DDC file name for later use to apply once the firmware
 * downloading is done.
 */
- switch (ver.hw_variant) {
- case 0x0b:/* SfP */
- case 0x0c:/* WsP */
- snprintf(fwname, sizeof(fwname), "intel/ibt-%u-%u.ddc",
- le16_to_cpu(ver.hw_variant),
- le16_to_cpu(params->dev_revid));
- break;
- case 0x11:/* JfP */
- case 0x12:/* ThP */
- snprintf(fwname, sizeof(fwname), "intel/ibt-%u-%u-%u.ddc",
- le16_to_cpu(ver.hw_variant),
- le16_to_cpu(ver.hw_revision),
- le16_to_cpu(ver.fw_revision));
- break;
- default:
+err = btusb_setup_intel_new_get_fw_name(&ver, params, fwname,
+sizeof(fwname), "ddc");
+if (!err) {
 BT_ERR("%s: Unsupported Intel firmware naming", hdev->name);
 return -EINVAL;
 }
@@ -2484,6 +2533,35 @@
 return 0;
 }

+#define BTUSB_EDGE_LED_COMMAND	0xfc77
 +
+static void btusb_edge_set_led(struct hci_dev *hdev, bool state)
+{
+struct sk_buff *skb;
+u8 config_led[] = { 0x09, 0x00, 0x01, 0x01 };
+ +
+if (state)
+config_led[1] = 0x01;
+
+skb = __hci_cmd_sync(hdev, BTUSB_EDGE_LED_COMMAND, sizeof(config_led), config_led, 
+HCI_INIT_TIMEOUT);
+if (IS_ERR(skb))
+BT_ERR("%s fail to set LED (%ld)", hdev->name, PTR_ERR(skb));
+else
+kfree_skb(skb);
+
+}
+
+static int btusb_edge_post_init(struct hci_dev *hdev)
+{
+btusb_edge_set_led(hdev, true);
+return 0;
+}
+
+static int btusb_edge_shutdown(struct hci_dev *hdev)
+{
+btusb_edge_set_led(hdev, false);
+return 0;
+}
+
+static int btusb_set_bdaddr_ath3012(struct hci_dev *hdev, 
+const bdaddr_t *bdaddr)
+
{
  0x00000302, 28, 4, 18 }, /* Rome 3.2 */
};

-#static int btusb_qca_send_vendor_req(struct hci_dev *hdev, u8 request,
+static int btusb_qca_send_vendor_req(struct usb_device *udev, u8 request,
  void *data, u16 size)
{
-struct btusb_data *btdata = hci_get_drvdata(hdev);
-struct usb_device *udev = btdata->udev;
+int pipe, err;
+u8 *buf;
+
+@ @ -2547,11 +2625,9 @ @
+{ 0x00000302, 28, 4, 18 }, /* Rome 3.2 */
+};

-#static int btusb_qca_send_vendor_req(struct hci_dev *hdev, u8 request,
+static int btusb_qca_send_vendor_req(struct usb_device *udev, u8 request,
  void *data, u16 size)
{
-struct btusb_data *btdata = hci_get_drvdata(hdev);
-struct usb_device *udev = btdata->udev;
+int pipe, err;
+u8 *buf;
+
+@ @ -2566,7 +2642,7 @ @
+err = usb_control_msg(udev, pipe, request, USB_TYPE_VENDOR | USB_DIR_IN,  
+ 0, 0, buf, size, USB_CTRL_SET_TIMEOUT);
+if (err < 0) {
+bt_dev_err(hdev, "Failed to access otp area (%d)"), err);
+dev_err(&udev->dev, "Failed to access otp area (%d)"), err);
goto done;
+
+@ @ -2613,6 +2689,11 @ @
sent += size;
count -= size;

/* ep2 need time to switch from function acl to function dfu,
 * so we add 20ms delay here.
 */
msleep(20);

while (count) {
    size = min_t(size_t, count, QCA_DFU_PACKET_LEN);

    return err;
}

/* identify the ROM version and check whether patches are needed */
static bool btusb_qca_need_patch(struct usb_device *udev)
{
    struct qca_version ver;

    if (btusb_qca_send_vendor_req(udev, QCA_GET_TARGET_VERSION, &ver,
        sizeof(ver)) < 0)
        return false;

    /* only low ROM versions need patches */
    return !(le32_to_cpu(ver.rom_version) & ~0xffffU);
}

static int btusb_setup_qca(struct hci_dev *hdev)
{
    struct btusb_data *btdata = hci_get_drvdata(hdev);
    struct usb_device *udev = btdata->udev;
    const struct qca_device_info *info = NULL;
    struct qca_version ver;
    u32 ver_rom;
    u8 status;
    int i, err;

    err = btusb_qca_send_vendor_req(hdev, QCA_GET_TARGET_VERSION, &ver,
        sizeof(ver));
    if (err < 0)
        return err;

    ver_rom = le32_to_cpu(ver.rom_version);
    /* Don’t care about high ROM versions */
    if (ver_rom & ~0xffffU)
        return 0;

    const struct qca_device_info *info = NULL;
    struct qca_version ver;
    u32 ver_rom;
    u8 status;
    int i, err;

    err = btusb_qca_send_vendor_req(hdev, QCA_GET_TARGET_VERSION, &ver,
        sizeof(ver));
    if (err < 0)
        return err;

    ver_rom = le32_to_cpu(ver.rom_version);
    /* Don’t care about high ROM versions */
    if (ver_rom & ~0xffffU)
        return 0;
for (i = 0; i < ARRAY_SIZE(qca_devices_table); i++) {
    if (ver_rom == qca_devices_table[i].rom_version)
        info = &qca_devices_table[i];
@@ -2739,7 +2838,7 @@
    return -ENODEV;
}

@@ -2789,7 +2888,7 @@
    return -ENODEV;
}

@@ -2889,6 +2988,7 @@
    return sizeof(status));
    if (err < 0)
        return err;
@@ -2903,12 +3003,17 @@
    data->oob_wake_irq = irq;
-    disable_irq(irq);
    bt_dev_info(hdev, "OOB Wake-on-BT configured at IRQ %u", irq);
    return 0;
} #endif

+static void btusb_check_needs_reset_resume(struct usb_interface *intf)
+{
+    if (dmi_check_system(btusb_needs_reset_resume_table))
+        interface_to_usbdev(intf)->quirks |= USB_QUIRK_RESET_RESUME;
+}
+
static int btusb_probe(struct usb_interface *intf,
    const struct device_id *id)
{
    @ @ -2947,7 +3052,8 @@
    /* Old firmware would otherwise let ath3k driver load
     * patch and sysconfig files
     */
    -if (le16_to_cpu(udev->descriptor.bcdDevice) <= 0x0001)
      +if (le16_to_cpu(udev->descriptor.bcdDevice) <= 0x0001 &&
      +    !btusb_qca_need_patch(udev))
        return -ENODEV;
    }
@@ -3095,8 +3201,18 @@
    set_bit(HCI_QUIRK_NON_PERSISTENT_DIAG, &hdev->quirks);
 }

-if (id->driver_info & BTUSB_MARVELL)
+if (id->driver_info & BTUSB_MARVELL) {
+  struct pci_dev *pdev;
+  hdev->set_bdaddr = btusb_set_bdaddr_marvell;
+  pdev = pci_get_subsys(PCI_ANY_ID, PCI_ANY_ID, 0x1028, 0x0720, NULL);
+  if (!pdev)
+    pdev = pci_get_subsys(PCI_ANY_ID, PCI_ANY_ID, 0x1028, 0x0733, NULL);
+  if (pdev) {
+    pci_dev_put(pdev);
+    hdev->post_init = btusb_edge_post_init;
+    hdev->shutdown = btusb_edge_shutdown;
+  }
+}
+
+if (id->driver_info & BTUSB_SWAVE) {
  set_bit(HCI_QUIRK_FIXUP_INQUIRY_MODE, &hdev->quirks);
@@ -3109,6 +3225,7 @@
 }

if (id->driver_info & BTUSB_ATH3012) {
+  data->setup_on_usb = btusb_setup_qca;
  hdev->set_bdaddr = btusb_set_bdaddr_ath3012;
  set_bit(HCI_QUIRK_SIMULTANEOUS_DISCOVERY, &hdev->quirks);
  set_bit(HCI_QUIRK_STRICT_DUPLICATE_FILTER, &hdev->quirks);
@@ -3117,12 +3234,7 @@
 }

#ifdef CONFIG_BT_HCIBTUSB_RTL
@@ -3133,7 +3245,7 @@
  /* QCA Rome devices lose their updated firmware over suspend,
   - * but the USB hub doesn't notice any status change.
   - * Explicitly request a device reset on resume.
   - */
  -set_bit(BTUSB_RESET_RESUME, &data->flags);
  +btusb_check_needs_reset_resume(intf);
 }

#endif CONFIG_BT_HCIBTUSB_RTL
@@ -3133,7 +3245,7 @@
+  * but the USB hub doesn't notice any status change.
+  * Explicitly request a device reset on resume.
+  */
  -set_bit(BTUSB_RESET_RESUME, &data->flags);
+interface_to_usbdev(intf)->quirks |= USB_QUIRK_RESET_RESUME;
}
#endif

@@ -3299,14 +3411,6 @@
    enable_irq(data->oob_wake_irq);
 }

-/* Optionally request a device reset on resume, but only when
- * wakeups are disabled. If wakeups are enabled we assume the
- * device will stay powered up throughout suspend.
- */
-if (test_bit(BTUSB_RESET_RESUME, &data->flags) &&
-    !device_may_wakeup(&data->udev->dev))
-data->udev->reset_resume = 1;
-
-return 0;
}

--- linux-4.15.0.orig/drivers/bluetooth/hci_ath.c
+++ linux-4.15.0/drivers/bluetooth/hci_ath.c
@@ -112,6 +112,9 @@
     BT_DBG("hu %p", hu);

    +if (!hci_uart_has_flow_control(hu))
+    +return -EOPNOTSUPP;
+    +  ath = kzalloc(sizeof(*ath), GFP_KERNEL);
    if (!ath)
    +    return -ENOMEM;
-
--- linux-4.15.0.orig/drivers/bluetooth/hci_bcm.c
+++ linux-4.15.0/drivers/bluetooth/hci_bcm.c
@@ -50,6 +50,12 @@
 #define BCM_TYPE49_PKT 0x31
 #define BCM_TYPE49_SIZE 0

+#define BCM_TYPE52_PKT 0x34
+#define BCM_TYPE52_SIZE 0

 #define BCM_AUTOSUSPEND_DELAY 5000 /* default autosleep delay */

 /* device driver resources */
--- linux-4.15.0.orig/drivers/bluetooth/hci_bcm.c
+++ linux-4.15.0/drivers/bluetooth/hci_bcm.c
@@ -90,6 +96,10 @@
 static DEFINE_MUTEX(bcm_device_lock);
static LIST_HEAD(bcm_device_list);

+static int irq_polarity = -1;
+module_param(irq_polarity, int, 0444);
+MODULE_PARM_DESC(irq_polarity, "IRQ polarity 0: active-high 1: active-low");
+
static inline void host_set_baudrate(struct hci_uart *hu, unsigned int speed)
{
    if (hu->serdev)
@@ -307,6 +317,9 @@
        bcm = kzalloc(sizeof(*bcm), GFP_KERNEL);
    if (!bcm)
        return -ENOMEM;
+        if (!hci_uart_has_flow_control(hu))
+        return -EOPNOTSUPP;
+
    pm_runtime_disable(bdev->dev);
    pm_runtime_set_suspended(bdev->dev);
-    if (device_can_wakeup(bdev->dev)) {
+    if (bdev->irq > 0) {
        devm_free_irq(bdev->dev, bdev->irq, bdev);
        device_init_wakeup(bdev->dev, false);
    }
@@ -487,12 +500,28 @@
        .lsize = 0, \n        .maxlen = BCM_NULL_SIZE
+
#define BCM_RECV_TYPE49
+    .type = BCM_TYPE49_PKT, \n+    .hlen = BCM_TYPE49_SIZE, \n+    .loff = 0, \n+    .lsize = 0, \n+    .maxlen = BCM_TYPE49_SIZE
+
#define BCM_RECV_TYPE52
+    .type = BCM_TYPE52_PKT, \n+    .hlen = BCM_TYPE52_SIZE, \n+    .loff = 0, \n+    .lsize = 0, \n+    .maxlen = BCM_TYPE52_SIZE
+
static const struct h4_recv_pkt bcm_recv_pkts[] = {
    { H4_RECV_ACL, .recv = hci_recv_frame },

static int bcm_recv(struct hci_uart *hu, const void *data, int count)
{
    { H4_RECV_SCO, .recv = hci_recv_frame },
    { H4_RECV_EVENT, .recv = hci_recv_frame },
    { BCM_RECV_LM_DIAG, .recv = hci_recv_diag },
    { BCM_RECV_NULL, .recv = hci_recv_diag },
    +{ BCM_RECV_TYPE49, .recv = hci_recv_diag },
    +{ BCM_RECV_TYPE52, .recv = hci_recv_diag },
}

bt_dev_dbg(bdev, "");

    -if (bdev->device_wakeup) {
        -gpiod_set_value(bdev->device_wakeup, false);
        -bt_dev_dbg(bdev, "suspend, delaying 15 ms");
        -mdelay(15);
    }
    +gpiod_set_value(bdev->device_wakeup, false);
    +bt_dev_dbg(bdev, "suspend, delaying 15 ms");
    +mdelay(15);

    return 0;
}

bt_dev_dbg(bdev, "");

    -if (bdev->device_wakeup) {
        -gpiod_set_value(bdev->device_wakeup, true);
        -bt_dev_dbg(bdev, "resume, delaying 15 ms");
        -mdelay(15);
    }
    +gpiod_set_value(bdev->device_wakeup, true);
    +bt_dev_dbg(bdev, "resume, delaying 15 ms");
    +mdelay(15);

/* When this executes, the device has woken up already */
if (bdev->is_suspended && bdev->hu) {
    @ @ -632.7 +657.7 @@
    if (pm_runtime_active(dev))
        bcm_suspend_device(dev);

    -if (device_may_wakeup(dev)) {
        +if (device_may_wakeup(dev) && bdev->irq > 0) {
            error = enable_irq_wake(bdev->irq);
            if (!error)
                bt_dev_dbg(bdev, "BCM irq: enabled");
        } else
            bt_dev_dbg(bdev, "BCM irq: disabled");
    } 
}
if (!bdev->hu)
goto unlock;

-if (device_may_wakeup(dev)) {
+if (device_may_wakeup(dev) && bdev->irq > 0) {
    disable_irq_wake(bdev->irq);
    bt_dev_dbg(bdev, "BCM irq: disabled");
}

#ifdef CONFIG_ACPI
/* IRQ polarity of some chipsets are not defined correctly in ACPI table. */
static const struct dmi_system_id bcm_active_low_irq_dmi_table[] = {
    -.ident = "Asus T100TA",
    -.matches = {
        -DMI_EXACT_MATCH(DMI_SYS_VENDOR,
                         "ASUSTeK COMPUTER INC."),
        -DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "T100TA"),
    },
    .
    .
    {.ident = "Asus T100CHI",
    .matches = {
        -DMI_EXACT_MATCH(DMI_SYS_VENDOR,
                         "ASUSTeK COMPUTER INC."),
        -DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "T100CHI"),
    },
    .
    .
/*. Handle ThinkPad 8 tablets with BCM2E55 chipset ACPI ID */
    .ident = "Lenovo ThinkPad 8",
    .matches = {
        @ @ -748,7 +757,9 @@
    switch (ares->type) {
    case ACPI_RESOURCE_TYPE_EXTENDED_IRQ:
        irq = &ares->data.extended_irq;
        -dev->irq_active_low = irq->polarity == ACPI_ACTIVE_LOW;
+if (irq->polarity != ACPI_ACTIVE_LOW)
+dev_info(dev->dev, "ACPI Interrupt resource is active-high, this is usually wrong, treating the IRQ as active-low");
+dev->irq_active_low = true;
        break;

    case ACPI_RESOURCE_TYPE_GPIO:
        @ @ -779,8 +790,11 @@
        dev->clk = devm_clk_get(dev->dev, NULL);
dev->device_wakeup = devm_gpiod_get_optional(dev->dev, "device-wakeup",
    "device-wakeup",
+/* Handle deferred probing */
+if (dev->clk == ERR_PTR(-EPROBE_DEFER))
+return PTR_ERR(dev->clk);

+dev->device_wakeup = devm_gpiod_get_optional(dev->dev, "device-wakeup",
    GPIOD_OUT_LOW);
if (IS_ERR(dev->device_wakeup))
    return PTR_ERR(dev->device_wakeup);
@@ -839,11 +853,17 @@
}
acpi_dev_free_resource_list(&resources);

-dmi_id = dmi_first_match(bcm_active_low_irq_dmi_table);
-if (dmi_id) {
-    dev_warn(dev->dev, "%s: Overwriting IRQ polarity to active low",
        - dmi_id->ident);
-    dev->irq_active_low = true;
+if (irq_polarity != -1) {
+    dev->irq_active_low = irq_polarity;
+    dev_warn(dev->dev, "Overwriting IRQ polarity to active %s by module-param
+        dev->irq_active_low ? "low" : "high");
+} else {
+    dmi_id = dmi_first_match(bcm_active_low_irq_dmi_table);
+    if (dmi_id) {
+        dev_warn(dev->dev, "%s: Overwriting IRQ polarity to active low",
+            + dmi_id->ident);
+        dev->irq_active_low = true;
+    }
}

return 0;
--- linux-4.15.0.orig/drivers/bluetooth/hci_bcsp.c
+++ linux-4.15.0/drivers/bluetooth/hci_bcsp.c
@@ -606,6 +606,7 @@
    if (*ptr == 0xc0) {
        BT_ERR("Short BCSP packet");
        kfree_skb(bcsp->rx_skb);
+        bcsp->rx_skb = NULL;
        bcsp->rx_state = BCSP_W4_PKT_START;
        bcsp->rx_count = 0;
    } else
@@ -621,6 +622,7 @@
        bcsp->rx_skb->data[2]) != bcsp->rx_skb->data[3]) {
            BT_ERR("Error in BCSP hdr checksum");
            kfree_skb(bcsp->rx_skb);
+        bcsp->rx_skb = NULL;
        }
bcsp->rx_state = BCSP_W4_PKT_DELIMITER;
bcsp->rx_count = 0;
continue;
@@ -645,6 +647,7 @@
     bscp_get_crc(bcsp));

kfree_skb(bcsp->rx_skb);
+bcsp->rx_skb = NULL;
bcsp->rx_state = BCSP_W4_PKT_DELIMITER;
bcsp->rx_count = 0;
continue;
@@ -759,6 +762,11 @@
skb_queue_purge(&bcsp->rel);
skb_queue_purge(&bcsp->unrel);

+if (bcsp->rx_skb) {
  +kfree_skb(bcsp->rx_skb);
  +bcsp->rx_skb = NULL;
  +}
  +
  kfree(bcsp);
return 0;
}
--- linux-4.15.0.orig/drivers/bluetooth/hci_h4.c
+++ linux-4.15.0/drivers/bluetooth/hci_h4.c
@@ -174,6 +174,10 @@
struct hci_uart *hu = hci_get_drvdata(hdev);
  
  /* Check for error from previous call */
  if (IS_ERR(skb))
  skb = NULL;
+  while (count) {
  int i, len;

--- linux-4.15.0.orig/drivers/bluetooth/hci_intel.c
+++ linux-4.15.0/drivers/bluetooth/hci_intel.c
@@ -406,6 +406,9 @@
  BT_DBG("hu %p", hu);

  +if (!hci_uart_has_flow_control(hu))
  +return -EOPNOTSUPP;
  +
  intel = kzalloc(sizeof(*intel), GFP_KERNEL);
  if (!intel)
  return -ENOMEM;

  /* Check for error from previous call */
  if (IS_ERR(skb))
  skb = NULL;
  +
  while (count) {
  int i, len;

  BT_DBG("hu %p", hu);

  +if (!hci_uart_has_flow_control(hu))
  +return -EOPNOTSUPP;
  +
  intel = kzalloc(sizeof(*intel), GFP_KERNEL);
  if (!intel)
  return -ENOMEM;
err = hci_register_dev(hu->hdev);
if (err < 0) {
    BT_ERR("Can't register HCI device");
    clear_bit(HCI_UART_PROTO_READY, &hu->flags);
    hu->proto->close(hu);
    hdev = hu->hdev;
    hu->hdev = NULL;
    hci_free_dev(hdev);
    clear_bit(HCI_UART_PROTO_READY, &hu->flags);
    hu->proto->close(hu);
    return;
}

/* Check the underlying device or tty has flow control support */
bool hci_uart_has_flow_control(struct hci_uart *hu)
{
    /* serdev nodes check if the needed operations are present */
    if (hu->serdev)
        return true;
    if (hu->tty->driver->ops->tiocmget && hu->tty->driver->ops->tiocmset)
        return true;
    return false;
}

/* Flow control or un-flow control the device */
void hci_uart_set_flow_control(struct hci_uart *hu, bool enable)
{
    BT_DBG("tty %p", tty);
    if (!capable(CAP_NET_ADMIN))
        return -EPERM;
    /* Error if the tty has no write op instead of leaving an exploitable */
    /* hole */
    clear_bit(HCI_UART_PROTO_READY, &hu->flags);
percpu_up_write(&hu->proto_lock);

+cancel_work_sync(&hu->init_ready);
cancel_work_sync(&hu->write_work);

if (hdev) {
@@ -539,6 +556,8 @@
}
clear_bit(HCI_UART_PROTO_SET, &hu->flags);

+percpu_free_rwsem(&hu->proto_lock);
+kfree(hu);
}

@@ -610,6 +629,7 @@
static int hci_uart_register_dev(struct hci_uart *hu)
{
struct hci_dev *hdev;
+int err;

BT_DBG("");

@@ -653,11 +673,22 @@
else
hdev->dev_type = HCI_PRIMARY;

+/* Only call open() for the protocol after hdev is fully initialized as
+ * open() (or a timer/workqueue it starts) may attempt to reference it.
+ */
+err = hu->proto->open(hu);
+if (err) {
+hu->hdev = NULL;
+hci_free_dev(hdev);
+return err;
+}
+
#if (test_bit(HCI_UART_INIT_PENDING, &hu->hdev_flags))
return 0;

if (hci_register_dev(hdev) < 0) {
BT_ERR("Can't register HCI device");
+hu->proto->close(hu);
hu->hdev = NULL;
hci_free_dev(hdev);
return -ENOODEV;
@@ -677,20 +708,14 @@
if (!p)
return -EPROTONOSUPPORT;

-err = p->open(hu);
-if (err)
- return err;
-
hu->proto = p;
-set_bit(HCI_UART_PROTO_READY, &hu->flags);

err = hci_uart_register_dev(hu);
if (err) {
-clear_bit(HCI_UART_PROTO_READY, &hu->flags);
-p->close(hu);
return err;
}

+set_bit(HCI_UART_PROTO_READY, &hu->flags);
return 0;
}

--- linux-4.15.0.orig/drivers/bluetooth/hci_mrvl.c
+++ linux-4.15.0/drivers/bluetooth/hci_mrvl.c
@@ -66,6 +66,9 @@
 BT_DBG("hu %p", hu);

+if (!hci_uart_has_flow_control(hu))
+return -EOPNOTSUPP;
+ mrvl = kzalloc(sizeof(*mrvl), GFP_KERNEL);
if (!mrvl)
return -ENOMEM;

--- linux-4.15.0.orig/drivers/bluetooth/hci_qca.c
+++ linux-4.15.0/drivers/bluetooth/hci_qca.c
@@ -880,7 +880,7 @@
 */
 set_current_state(TASK_UNINTERRUPTIBLE);
schedule_timeout(msecs_to_jiffies(BAUDRATE_SETTLE_TIMEOUT_MS));
-set_current_state(TASK_INTERRUPTIBLE);
+set_current_state(TASK_RUNNING);

return 0;
}
@@ -932,6 +932,15 @@
 if (!ret) {
 set_bit(STATE_IN_BAND_SLEEP_ENABLED, &qca->flags);
 qca_debugfs_init(hdev);
+} else if (ret == -ENOENT) {

/* No patch/nvm-config found, run with original fw/config */
ret = 0;
} else if (ret == -EAGAIN) {
/**/
* Userspace firmware loader will return -EAGAIN in case no
* patch/nvm-config is found, so run with original fw/config.
*/**/
+ ret = 0;
}

/* Setup bdaddr */
--- linux-4.15.0.orig/drivers/bluetooth/hci_serdev.c
+++ linux-4.15.0/drivers/bluetooth/hci_serdev.c
@@ -303,6 +303,7 @@
hci_set_drvdata(hdev, hu);
INIT_WORK(&hu->write_work, hci_uart_write_work);
+percpu_init_rwlock(&hu->proto_lock);

/* Only when vendor specific setup callback is provided, consider
 * the manufacturer information valid. This avoids filling in the
@@ -358,7 +359,11 @@
{
 struct hci_dev *hdev = hu->hdev;

-hci_unregister_dev(hdev);
+clear_bit(HCI_UART_PROTO_READY, &hu->flags);
+
cancel_work_sync(&hu->init_ready);
+if (test_bit(HCI_UART_REGISTERED, &hu->flags))
+hci_unregister_dev(hdev);
hci_free_dev(hdev);
cancel_work_sync(&hu->write_work);
--- linux-4.15.0.orig/drivers/bluetooth/hci_uart.h
+++ linux-4.15.0/drivers/bluetooth/hci_uart.h
@@ -117,6 +117,7 @@
int hci_uart_tx_wakeup(struct hci_uart *hu);
int hci_uart_init_ready(struct hci_uart *hu);
void hci_uart_set_baudrate(struct hci_uart *hu, unsigned int speed);
+bool hci_uart_has_flow_control(struct hci_uart *hu);
void hci_uart_set_flow_control(struct hci_uart *hu, bool enable);
void hci_uart_set_speeds(struct hci_uart *hu, unsigned int init_speed,
unsigned int oper_speed);
--- linux-4.15.0.orig/drivers/bus/Kconfig
+++ linux-4.15.0/drivers/bus/Kconfig
@@ -65,6 +65,14 @@
arbiter. This driver provides timeout and target abort error handling

and internal bus master decoding.

+config HISILICON_LPC
+bool "Support for ISA I/O space on HiSilicon Hip06/7"
+depends on ARM64 && (ARCH_HISI || COMPILE_TEST)
+select INDIRECT_PIO
+help
+ Driver to enable I/O access to devices attached to the Low Pin
+ Count bus on the HiSilicon Hip06/7 SoC.
+
config IMX_WEIM
bool "Freescale EIM DRIVER"
depends on ARCH_MXC
--- linux-4.15.0.orig/drivers/bus/Makefile
+++ linux-4.15.0/drivers/bus/Makefile
@@ -7,6 +7,7 @@
obj-$(CONFIG_ARM_CCI)+= arm-cci.o
obj-$(CONFIG_ARM_CCN)+= arm-ccn.o

+obj-$(CONFIG_HISILICON_LPC)+= hisi_lpc.o
obj-$(CONFIG_BRCMSTB_GISB_ARB)+= brcmstb_gisb.o
obj-$(CONFIG_IMX_WEIM)+= imx-weim.o
obj-$(CONFIG_MIPS_CDMM)+= mips_cdmm.o
--- linux-4.15.0.orig/drivers/bus/arm-cci.c
+++ linux-4.15.0/drivers/bus/arm-cci.c
@@ -2103,8 +2103,6 @@
 [sizeof_struct_cpu_port] "i" (sizeof(struct cpu_port)),
 [sizeof_struct_ace_port] "i" (sizeof(struct cci_ace_port)),
 [offsetof_port_phys] "i" (offsetof(struct cci_ace_port, phys)) );
-
-unreachable();
}

/**
--- linux-4.15.0.orig/drivers/bus/arm-ccn.c
+++ linux-4.15.0/drivers/bus/arm-ccn.c
@@ -736,7 +736,7 @@
 ccn = pmu_to_arm_ccn(event->pmu);

 if (hw->sample_period) {
-dev_warn(ccn->dev, "Sampling not supported!\n");
+dev_dbg(ccn->dev, "Sampling not supported!\n");
 return -EOPNOTSUPP;
 }

@@ -744,12 +744,12 @@
 event->attr.exclude_kernel || event->attr.exclude_hv ||
 event->attr.exclude_idle || event->attr.exclude_host ||
event->attr.exclude_guest) {
-dev_warn(ccn->dev, "Can't exclude execution levels!n");
+dev_dbg(ccn->dev, "Can't exclude execution levels!n");
    return -EINVAL;
}

if (event->cpu < 0) {
-dev_warn(ccn->dev, "Can't provide per-task data!n");
+dev_dbg(ccn->dev, "Can't provide per-task data!n");
    return -EOPNOTSUPP;
}
/*
@@ -771,13 +771,13 @@
switch (type) {
    case CCN_TYPE_MN:
        if (node_xp != ccn->mn_id) {
-dev_warn(ccn->dev, "Invalid MN ID %d!
", node_xp);
+dev_dbg(ccn->dev, "Invalid MN ID %d!
", node_xp);
            return -EINVAL;
        }
        break;
    case CCN_TYPE_XP:
        if (node_xp >= ccn->num_xps) {
-dev_warn(ccn->dev, "Invalid XP ID %d!
", node_xp);
+dev_dbg(ccn->dev, "Invalid XP ID %d!
", node_xp);
            return -EINVAL;
        }
        break;
    @@ -785,11 +785,11 @@
        break;
    default:
        if (node_xp >= ccn->num_nodes) {
-dev_warn(ccn->dev, "Invalid node ID %d!
", node_xp);
+dev_dbg(ccn->dev, "Invalid node ID %d!
", node_xp);
            return -EINVAL;
        }
        if (!arm_ccn_pmu_type_eq(type, ccn->node[node_xp].type)) {
-dev_warn(ccn->dev, "Invalid type 0x%x for node %d!
", type, node_xp);
+dev_dbg(ccn->dev, "Invalid type 0x%x for node %d!
", type, node_xp);
            return -EINVAL;
        }
        @ @ -808,19 +808,19 @@
        if (event_id != e->event)
            continue;
        if (e->num_ports && port >= e->num_ports) {
-dev_warn(ccn->dev, "Invalid port %d for node/XP %d!
", node_xp, node_xp);
+dev dbg(ccn->dev, "Invalid port %d for node/XP %d!
", node_xp, node_xp);
port, node_xp);
return -EINVAL;
}

if (e->num_vcs && vc >= e->num_vcs) {
-dev_warn(ccn->dev, "Invalid vc %d for node/XP %d\n",
+dev_dbg(ccn->dev, "Invalid vc %d for node/XP %d\n",
vc, node_xp);
return -EINVAL;
}
valid = 1;
}
if (!valid) {
-dev_warn(ccn->dev, "Invalid event 0x%x for node/XP %d\n",
+dev_dbg(ccn->dev, "Invalid event 0x%x for node/XP %d\n",
event_id, node_xp);
return -EINVAL;
}
--- linux-4.15.0.orig/drivers/bus/hisi_lpc.c
+++ linux-4.15.0/drivers/bus/hisi_lpc.c
@@ -0,0 +1,639 @@
+# SPDX-License-Identifier: GPL-2.0+
+/*
+ * Copyright (C) 2017 Hisilicon Limited, All Rights Reserved.
+ * Author: Zhichang Yuan <yuanzhichang@hisilicon.com>
+ * Author: Zou Rongrong <zourongrong@huawei.com>
+ * Author: John Garry <john.garry@huawei.com>
+ */
+
+#include <linux/acpi.h>
+#include <linux/console.h>
+#include <linux/delay.h>
+#include <linux/io.h>
+#include <linux/logic_pio.h>
+#include <linux/mfd/core.h>
+#include <linux/module.h>
+#include <linux/of.h>
+#include <linux/of_address.h>
+#include <linux/of_platform.h>
+#include <linux/pci.h>
+#include <linux/slab.h>
+
+#define DRV_NAME "hisi-lpc"
+
+/*
+ * Setting this bit means each IO operation will target a different port
+ * address; 0 means repeated IO operations will use the same port,
+ * such as BT.
+ */

Open Source Used In 5GaaS Edge AC-4 20103
+\#define FG_INCRADDR_LPC0x02
+
+struct lpc_cycle_para {
+unsigned int opflags;
+unsigned int csize; /* data length of each operation */
+};
+
+struct hisi_lpc_dev {
+spinlock_t cycle_lock;
+void __iomem *membase;
+struct logic_pio_hwaddr *io_host;
+};
+
+/* The max IO cycle counts supported is four per operation at maximum */
+\#define LPC_MAX_DWIDTH4
+
+\#define LPC_REG_STARTUP_SIGNAL0x00
+\#define LPC_REG_STARTUP_SIGNAL_STARTBIT(0)
+\#define LPC_REG_OP_STATUS0x04
+\#define LPC_REG_OP_STATUS_IDLEBIT(0)
+\#define LPC_REG_OP_STATUS_FINISHEDBIT(1)
+\#define LPC_REG_OP_LEN0x10 /* LPC cycles count per start */
+\#define LPC_REG_CMD0x14
+\#define LPC_REG_CMD_OPBIT(0) /* 0: read, 1: write */
+\#define LPC_REG_CMDSAMEADDRBIT(3)
+\#define LPC_REG_ADDR0x20 /* target address */
+\#define LPC_REG_WDATA0x24 /* write FIFO */
+\#define LPC_REG_RDATA0x28 /* read FIFO */
+
+/* The minimal nanosecond interval for each query on LPC cycle status */
+\#define LPC_NSEC_PERWAIT100
+
+/* The maximum waiting time is about 128us. It is specific for stream I/O,
+ * such as ins.
+ */
+/* The fastest IO cycle time is about 390ns, but the worst case will wait
+ * for extra 256 lpc clocks, so (256 + 13) * 30ns = 8 us. The maximum burst
+ * cycles is 16. So, the maximum waiting time is about 128us under worst
+ * case.
+ */
+/* Choose 1300 as the maximum.
+ */
+\#define LPC_MAX_WAITCNT1300
+
+/* About 10us. This is specific for single IO operations, such as inb */
+\#define LPC_PEROP_WAITCNT100
+
+static int wait_lpc_idle(unsigned char *mbase, unsigned int waitcnt)
+{
+u32 status;
+
+do {
+status = readl(mbase + LPC_REG_OP_STATUS);
+if (status & LPC_REG_OP_STATUS_IDLE)
+return (status & LPC_REG_OP_STATUS_FINISHED) ? 0 : -EIO;
+ndelay(LPC_NSEC_PERWAIT);
+} while (--waitcnt);
+
+return -ETIME;
+}
+
+/*
+ * hisi_lpc_target_in - trigger a series of LPC cycles for read operation
+ * @lpcdev: pointer to hisi lpc device
+ * @para: some parameters used to control the lpc I/O operations
+ * @addr: the lpc I/O target port address
+ * @buf: where the read back data is stored
+ * @opcnt: how many I/O operations required, i.e. data width
+ *
+ * Returns 0 on success, non-zero on fail.
+ */
+static int hisi_lpc_target_in(struct hisi_lpc_dev *lpcdev,
+      struct lpc_cycle_para *para, unsigned long addr,
+      unsigned char *buf, unsigned long opcnt)
+{
+unsigned int cmd_word;
+unsigned int waitcnt;
+unsigned long flags;
+int ret;
+
+if (!buf || !opcnt || !para || !para->csize || !lpcdev)
+return -EINVAL;
+
+cmd_word = 0; /* IO mode, Read */
+waitcnt = LPC_PEROP_WAITCNT;
+if (!(para->opflags & FG_INCRADDR_LPC)) {
+cmd_word |= LPC_REG_CMD_SAMEADDR;
+waitcnt = LPC_MAX_WAITCNT;
+}
+
+ /* whole operation must be atomic */
+spin_lock_irqsave(&lpcdev->cycle_lock, flags);
+
+writel_relaxed(opcnt, lpcdev->membase + LPC_REG_OP_LEN);
+writel_relaxed(cmd_word, lpcdev->membase + LPC_REG_CMD);
+writel_relaxed(addr, lpcdev->membase + LPC_REG_ADDR);
+
+writel(LPC_REG_STARTUP_SIGNAL_START,
+      lpcdev->membase + LPC_REG_STARTUP_SIGNAL);
+
+ /* whether the operation is finished */
+ret = wait_lpc_idle(lpcdev->membase, waitcnt);
+if (ret) {
+spin_unlock_irqrestore(&lpcdev->cycle_lock, flags);
+return ret;
+} 
+
+readsb(lpcdev->membase + LPC_REG_RDATA, buf, opcnt);
+
+spin_unlock_irqrestore(&lpcdev->cycle_lock, flags);
+
+return 0;
+
+
+/*
+ * hisi_lpc_target_out - trigger a series of LPC cycles for write operation
+ * @lpcdev: pointer to hisi lpc device
+ * @para: some parameters used to control the lpc I/O operations
+ * @addr: the lpc I/O target port address
+ * @buf: where the data to be written is stored
+ * @opcnt: how many I/O operations required, i.e. data width
+ *
+ * Returns 0 on success, non-zero on fail.
+ */
+static int hisi_lpc_target_out(struct hisi_lpc_dev *lpcdev,
+    struct lpc_cycle_para *para, unsigned long addr,
+    const unsigned char *buf, unsigned long opcnt)
+{
+    unsigned int waitcnt;
+    unsigned long flags;
+    u32 cmd_word;
+    int ret;
+
+    if (!buf || !opcnt || !para || !lpcdev)
+    return -EINVAL;
+
+    /* default is increasing address */
+    cmd_word = LPC_REG_CMD_OP; /* IO mode, write */
+    waitcnt = LPC_PEROP_WAITCNT;
+    if (!(para->opflags & FG_INCRADDR_LPC)) {
+        cmd_word |= LPC_REG_CMD_SAMEADDR;
+        waitcnt = LPC_MAX_WAITCNT;
+    }
+    }

Open Source Used In 5GaaS Edge AC-4 20106
+spin_lock_irqsave(&lpcdev->cycle_lock, flags);
+
+writel_relaxed(opcnt, lpcdev->membase + LPC_REG_OP_LEN);
+writel_relaxed(cmd_word, lpcdev->membase + LPC_REG_CMD);
+writel_relaxed(addr, lpcdev->membase + LPC_REG_ADDR);
+
+writesb(lpcdev->membase + LPC_REG_WDATA, buf, opcnt);
+
+writel(LPC_REG_STARTUP_SIGNAL_START, lpcdev->membase + LPC_REG_STARTUP_SIGNAL);
+
+"/* whether the operation is finished */
+ret = wait_lpc_idle(lpcdev->membase, waitcnt);
+
+spin_unlock_irqrestore(&lpcdev->cycle_lock, flags);
+
+return ret;
+
+
+/*
 * hisi_lpc_pio_to_addr(struct hisi_lpc_dev *lpcdev,
 * unsigned long pio)
 */
+
+static unsigned long hisi_lpc_pio_to_addr(struct hisi_lpc_dev *lpcdev,
+unsigned long pio)
+{
+return pio - lpcdev->io_host->io_start + lpcdev->io_host->hw_start;
+}
+
+/*
 * hisi_lpc_comm_in - input the data in a single operation
 * @hostdata: pointer to the device information relevant to LPC controller
 * @pio: the target I/O port address
 * @dwidth: the data length required to read from the target I/O port
 * @
 * @ When success, data is returned. Otherwise, ~0 is returned.
 * @*/
+static u32 hisi_lpc_comm_in(void *hostdata, unsigned long pio, size_t dwidth)
+{
+struct hisi_lpc_dev *lpcdev = hostdata;
+struct lpc_cycle_para iopara;
+unsigned long addr;
+u32 rd_data = 0;
+int ret;
+
+if (!lpcdev || !dwidth || dwidth > LPC_MAX_DWIDTH)
+return ~0;
+
+addr = hisi_lpc_pio_to_addr(lpcdev, pio);
+
iopara.opflags = FG_INCRADDR_LPC;
+iopara.csize = dwidth;
+
+ret = hisi_lpc_target_in(lpcdev, &iopara, addr,
+ (unsigned char *)&rd_data, dwidth);
+if (ret)
+return ~0;
+
+return le32_to_cpu(rd_data);
+
+/
+ * hisi_lpc_comm_out - output the data in a single operation
+ * @hostdata: pointer to the device information relevant to LPC controller
+ * @pio: the target I/O port address
+ * @val: a value to be output from caller, maximum is four bytes
+ * @dwidth: the data width required writing to the target I/O port
+ *
+ * This function corresponds to out(b,w,l) only.
+ */
+static void hisi_lpc_comm_out(void *hostdata, unsigned long pio,
+ u32 val, size_t dwidth)
+{
+struct hisi_lpc_dev *lpcdev = hostdata;
+struct lpc_cycle_para iopara;
+const unsigned char *buf;
+unsigned long addr;
+
+if (!lpcdev || !dwidth || dwidth > LPC_MAX_DWIDTH)
+return;
+
+val = cpu_to_le32(val);
+
+buf = (const unsigned char *)&val;
+addr = hisi_lpc_pio_to_addr(lpcdev, pio);
+
iopara.opflags = FG_INCRADDR_LPC;
+iopara.csize = dwidth;
+
+hisi_lpc_target_out(lpcdev, &iopara, addr, buf, dwidth);
+}
+
+/
+ * hisi_lpc_comm_ins - input the data in the buffer in multiple operations
+ * @hostdata: pointer to the device information relevant to LPC controller
+ * @pio: the target I/O port address
+ * @buffer: a buffer where read/input data bytes are stored
+ * @dwidth: the data width required writing to the target I/O port
+ * @count: how many data units whose length is dwidth will be read
When success, the data read back is stored in buffer pointed by buffer. Returns 0 on success, -errno otherwise.

```c
static u32 hisi_lpc_comm_ins(void *hostdata, unsigned long pio, void *buffer,
    size_t dwidth, unsigned int count)
{
    struct hisi_lpc_dev *lpcdev = hostdata;
    unsigned char *buf = buffer;
    struct lpc_cycle_para iopara;
    unsigned long addr;

    if (!lpcdev || !buf || !count || !dwidth || dwidth > LPC_MAX_DWIDTH)
        return -EINVAL;

    iopara.opflags = 0;
    if (dwidth > 1)
        iopara.opflags |= FG_INCRADDR_LPC;
    iopara.csize = dwidth;
    addr = hisi_lpc_pio_to_addr(lpcdev, pio);

    do {
        int ret;
        ret = hisi_lpc_target_in(lpcdev, &iopara, addr, buf, dwidth);
        if (ret)
            return ret;
        buf += dwidth;
    } while (--count);

    return 0;
}

/*
 * hisi_lpc_comm_outs - output the data in the buffer in multiple operations
 * @hostdata: pointer to the device information relevant to LPC controller
 * @pio: the target I/O port address
 * @buffer: a buffer where write/output data bytes are stored
 * @dwidth: the data width required writing to the target I/O port
 * @count: how many data units whose length is dwidth will be written
 * /
 *static void hisi_lpc_comm_outs(void *hostdata, unsigned long pio,
 *    const void *buffer, size_t dwidth,
 *    unsigned int count)
 {
    struct hisi_lpc_dev *lpcdev = hostdata;
    struct lpc_cycle_para iopara;
```
const unsigned char *buf = buffer;
unsigned long addr;

if (!lpcdev || !buf || !count || !dwidth || dwidth > LPC_MAX_DWIDTH)
	return;

iopara.opflags = 0;
if (dwidth > 1)
	iopara.opflags |= FG_INCRADDR_LPC;
iopara.csize = dwidth;

addr = hisi_lpc_pio_to_addr(lpcdev, pio);
do {
	if (hisi_lpc_target_out(lpcdev, &iopara, addr, buf, dwidth))
		break;
	buf += dwidth;
	} while (--count);

static const struct logic_pio_host_ops hisi_lpc_ops = {
	.in = hisi_lpc_comm_in,
	.out = hisi_lpc_comm_out,
	.ins = hisi_lpc_comm_ins,
	.outs = hisi_lpc_comm_outs,
};

#ifdef CONFIG_ACPI
#define MFD_CHILD_NAME_PREFIX DRV_NAME"-
#define MFD_CHILD_NAME_LEN (ACPI_ID_LEN + sizeof(MFD_CHILD_NAME_PREFIX) - 1)

struct hisi_lpc_mfd_cell {
	struct mfd_cell_acpi_match acpi_match;
	nchar name[MFD_CHILD_NAME_LEN];
	nchar pnpid[ACPI_ID_LEN];
};

static int hisi_lpc_acpi_xlat_io_res(struct acpi_device *adev,
				struct acpi_device *host,
				struct resource *res)
{
	unsigned long sys_port;
	resource_size_t len = resource_size(res);

	sys_port = logic_pio_trans_hwaddr(&host->fwnode, res->start, len);
	if (sys_port == ~0UL)
		return -EFAULT;
	res->start = sys_port;
res->end = sys_port + len;
+
+return 0;
+
+/
+ * Released firmware describes the IO port max address as 0x3fff, which is
+ * the max host bus address. Fixup to a proper range. This will probably
+ * never be fixed in firmware.
+ */
+static void hisi_lpc_acpi_fixup_child_resource(struct device *hostdev,
+    struct resource *r)
+{
+    if (r->end != 0x3fff)
+        return;
+    if (r->start == 0xe4)
+        r->end = 0xe4 + 0x04 - 1;
+    else if (r->start == 0x2f8)
+        r->end = 0x2f8 + 0x08 - 1;
+    else
+        dev_warn(hostdev, "unrecognised resource %pR to fixup, ignoring\n",
+            r);
+}
+
+/*
+ * hisi_lpc_acpi_set_io_res - set the resources for a child's MFD
+ * @child: the device node to be updated the I/O resource
+ * @hostdev: the device node associated with host controller
+ * @res: double pointer to be set to the address of translated resources
+ * @num_res: pointer to variable to hold the number of translated resources
+ *
+ * Returns 0 when successful, and a negative value for failure.
+ *
+ * For a given host controller, each child device will have an associated
+ * host-relative address resource. This function will return the translated
+ * logical PIO addresses for each child devices resources.
+ */
+static int hisi_lpc_acpi_set_io_res(struct device *child,
+    struct device *hostdev,
+    const struct resource **res, int *num_res)
+{
+    struct acpi_device *adev;
+    struct acpi_device *host;
+    struct resource_entry *entry;
+    LIST_HEAD(resource_list);
+    struct resource *resources;
+    int count;
+int i;
+
+if (!child || !hostdev)
+return -EINVAL;
+
+host = to_acpi_device(hostdev);
+adev = to_acpi_device(child);
+
+if (!adev->status.present) {
+dev_dbg(child, "device is not present\n");
+return -EIO;
+}
+
+if (acpi_device Enumerated(adev)) {
+dev_dbg(child, "has been enumerated\n");
+return -EIO;
+}
+
/*
 + * The following code segment to retrieve the resources is common to
 + * acpi_create_platform_device(), so consider a common helper function
 + * in future.
 + */
+count = acpi_dev_get_resources(adev, &resource_list, NULL, NULL);
+if (count <= 0) {
+dev_dbg(child, "failed to get resources\n");
+return count ? count : -EIO;
+}
+
+resources = devm_kcalloc(hostdev, count, sizeof(*resources),
+ GFP_KERNEL);
+if (!resources) {
+dev_warn(hostdev, "could not allocate memory for %d resources\n",
+ count);
+acpi_dev_free_resource_list(&resource_list);
+return -ENOMEM;
+}
+
+count = 0;
+list_for_each_entry(rentry, &resource_list, node) {
+resources[count] = *rentry->res;
+hisi_lpc_acpi_fixup_child_resource(hostdev, &resources[count]);
+count++;
+}
+
+acpi_dev_free_resource_list(&resource_list);
+
+/* translate the I/O resources */
+for (i = 0; i < count; i++) {

int ret;
+
if (!(resources[i].flags & IORESOURCE_IO))
+continue;
+ret = hisi_lpc_acpi_xlat_io_res(adev, host, &resources[i]);
+if (ret) {
+dev_err(child, "translate IO range %pR failed (%d)\n",
+&resources[i], ret);
+return ret;
+}
+}
+}
+*res = resources;
+*num_res = count;
+
+return 0;
+
+
+/*
+ * hisi_lpc_acpi_probe - probe children for ACPI FW
+ * @hostdev: LPC host device pointer
+ *
+ * Returns 0 when successful, and a negative value for failure.
+ *
+ * Scan all child devices and create a per-device MFD with
+ * logical PIO translated IO resources.
+ */
+static int hisi_lpc_acpi_probe(struct device *hostdev)
+{
+struct acpi_device *adev = ACPI_COMPANION(hostdev);
+struct hisi_lpc_mfd_cell *hisi_lpc_mfd_cells;
+struct mfd_cell *mfd_cells;
+struct acpi_device *child;
+int size, ret, count = 0, cell_num = 0;
+
+list_for_each_entry(child, &adev->children, node)
+cell_num++;
+
+/* allocate the mfd cell and companion ACPI info, one per child */
+size = sizeof(*mfd_cells) + sizeof(*hisi_lpc_mfd_cells);
+mfd_cells = devm_kcalloc(hostdev, cell_num, size, GFP_KERNEL);
+if (!mfd_cells)
+return -ENOMEM;
+
+this_lpc_mfd_cells = (struct hisi_lpc_mfd_cell *)&mfd_cells[cell_num];
+/* Only consider the children of the host */
+list_for_each_entry(child, &adev->children, node) {
+struct mfd_cell *mfd_cell = &mfd_cells[count];
+struct hisi_lpc_mfd_cell *hisi_lpc_mfd_cell =

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/* For any instances of this host controller (Hip06 and Hip07
 * are the only chipsets), we would not have multiple slaves
 * with the same HID. And in any system we would have just one
 * controller active. So don't worry about MFD name clashes.
 */

snprintf(name, MFD_CHILD_NAME_LEN, MFD_CHILD_NAME_PREFIX%s,
        acpi_device_hid(child));

snprintf(pnpid, ACPI_ID_LEN, "%s", acpi_device_hid(child));

memcpy(acpi_match, &match, sizeof(*acpi_match));

mfd_cell->name = name;

mfd_cell->acpi_match = acpi_match;

ret = hisi_lpc_acpi_set_io_res(&child->dev, &adev->dev,
        &mfd_cell->resources,
        &mfd_cell->num_resources);

if (ret) {
    dev_warn(&child->dev, "set resource fail (%d)\n", ret);
    return ret;
}

count++;

ret = mfd_add_devices(hostdev, PLATFORM_DEVID_NONE,
        mfd_cells, cell_num, NULL, 0, NULL);

if (ret) {
    dev_err(hostdev, "failed to add mfd cells (%d)\n", ret);
    return ret;
}

return 0;


static const struct acpi_device_id hisi_lpc_acpi_match[] = {
    "HISI0191",
    {}
};
+static int hisi_lpc_acpi_probe(struct device *dev)
+{
+return -ENODEV;
+}
+#endif // CONFIG_ACPI
+
+/*
+ * hisi_lpc_probe - the probe callback function for hisi lpc host,
+ * will finish all the initialization.
+ * @pdev: the platform device corresponding to hisi lpc host
+ *
+ * Returns 0 on success, non-zero on fail.
+ */
+static int hisi_lpc_probe(struct platform_device *pdev)
+{
+struct device *dev = &pdev->dev;
+struct acpi_device *acpi_device = ACPI_COMPANION(dev);
+struct logic_pio_hwaddr *range;
+struct hisi_lpc_dev *lpcdev;
+resource_size_t io_end;
+struct resource *res;
+int ret;
+
lpcdev = devm_kzalloc(dev, sizeof(*lpcdev), GFP_KERNEL);
+if (!lpcdev)
	return -ENOMEM;
+
+spin_lock_init(&lpcdev->cycle_lock);
+
+res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+lpcdev->membase = devm_ioremap_resource(dev, res);
+if (IS_ERR(lpcdev->membase))
	return PTR_ERR(lpcdev->membase);
+
+range = devm_kzalloc(dev, sizeof(*range), GFP_KERNEL);
+if (!range)
	return -ENOMEM;
+
+range->fwnode = dev->fwnode;
+range->flags = LOGIC_PIO_INDIRECT;
+range->size = PIO_INDIRECT_SIZE;
+range->hostdata = lpcdev;
+range->ops = &hisi_lpc_ops;
+lpcdev->io_host = range;
+
+ret = logic_pio_register_range(range);
+if (ret) {
+dev_err(dev, "register IO range failed (%d)!n", ret);
+/* register the LPC host PIO resources */
+if (acpi_device)
+ret = hisi_lpc_acpi_probe(dev);
+else
+ret = of_platform_populate(dev->of_node, NULL, NULL, dev);
+if (ret) {
+logic_pio_unregister_range(range);
+return ret;
+}
+
+io_end = lpcdev->io_host->io_start + lpcdev->io_host->size;
+dev_info(dev, "registered range [%pa - %pa]\n",
+ &lpcdev->io_host->io_start, &io_end);
+
+return ret;
+}
+
+static const struct of_device_id hisi_lpc_of_match[] = {
+{ .compatible = "hisilicon,hip06-lpc", },
+{ .compatible = "hisilicon,hip07-lpc", },
+{ }
+};
+
+static struct platform_driver hisi_lpc_driver = {
+.driver = {
+.name           = DRV_NAME,
+.of_match_table = hisi_lpc_of_match,
+.acpi_match_table = ACPI_PTR(hisi_lpc_acpi_match),
+},
+.probe = hisi_lpc_probe,
+};
+builtin_platform_driver(hisi_lpc_driver);

--- linux-4.15.0.orig/drivers/bus/mips_cdmm.c
+++ linux-4.15.0/drivers/bus/mips_cdmm.c
@@ -544,10 +544,8 @@
dev_set_name(&dev->dev, "cdmm%u-%u", cpu, id);
 ++id;
 ret = device_register(&dev->dev);
 -if (ret) {
-+if (ret)
-put_device(&dev->dev);
-kfree(dev);
-}
-
-}
l3->debug_irq = platform_get_irq(pdev, 0);
ret = devm_request_irq(l3->dev, l3->debug_irq, l3_interrupt_handler,
-       0x0, "l3-dbg-irq", l3);
+       IRQF_NO_THREAD, "l3-dbg-irq", l3);
if (ret)
  dev_err(l3->dev, "request_irq failed for %d\n",
   l3->debug_irq);
  @ @ -294.7 +294.7 @ @

l3->app_irq = platform_get_irq(pdev, 1);
ret = devm_request_irq(l3->dev, l3->app_irq, l3_interrupt_handler,
-       0x0, "l3-app-irq", l3);
+       IRQF_NO_THREAD, "l3-app-irq", l3);
if (ret)
  dev_err(l3->dev, "request_irq failed for %d\n", l3->app_irq);
  @ @ -294.7 +294.7 @ @

/* Figure out the chipselect */
ret = of_property_read_u32(child, "reg", &csindex);
- if (ret)
+ if (ret) {
+   of_node_put(child);
 return ret;
+ }

if (csindex > 5) {
  dev_err(dev,
-          "reg", &csindex);
+          "reg", &csindex);
  goto unlock;

*buf = readl(rsb->regs + RSB_DATA);
*buf = readl(rsb->regs + RSB_DATA) & GENMASK(len * 8 - 1, 0);
unlock:
mutex_unlock(&rsb->lock);
/*
 * syc_ioremap - ioremap register space for the interconnect target module
 * @ddata: device driver data
 *
 * Note that the interconnect target module registers can be anywhere
 * within the first child device address space. For example, SGX has
 * them at offset 0x1fc00 in the 32MB module address space. We just
 * what we need around the interconnect target module registers.
 * within the interconnect target module range. For example, SGX has
 * them at offset 0x1fc00 in the 32MB module address space. And cpsw
 * has them at offset 0x1200 in the CPSW_WR child. Usually the
 * the interconnect target module registers are at the beginning of
 * the module range though.
 */

static int sysc_ioremap(struct sysc *ddata)
{
    u32 size = 0;

    if (ddata->offsets[SYSC_SYSSTATUS] >= 0)
        size = ddata->offsets[SYSC_SYSSTATUS];
    else if (ddata->offsets[SYSC_SYSCONFIG] >= 0)
        size = ddata->offsets[SYSC_SYSCONFIG];
    else if (ddata->offsets[SYSC_REVISION] >= 0)
        size = ddata->offsets[SYSC_REVISION];
    else
        return -EINVAL;

    size &= 0xfff00;
    size += SZ_256;
    if (size < 0 || (size + sizeof(u32)) > ddata->module_size)
        return -EINVAL;

    ddata->module_va = devm_ioremap(ddata->dev,
        ddata->module_pa,
        size);
    if (!size + sizeof(u32))
        return -EINVAL;

    return 0;
}
int i;

+if (!ddata->clocks)
+return;
+
+for (i = 0; i < SYSC_MAX_CLOCKS; i++) {
+ if (!IS_ERR_OR_NULL(ddata->clocks[i]))
+ clk_unprepare(ddata->clocks[i]);
+++ linux-4.15.0.orig/drivers/cdrom/cdrom.c
@@ -265,6 +265,7 @@
/* #define ERRLOGMASK (CD_WARNING|CD_OPEN|CD_COUNT_TRACKS|CD_CLOSE) */
/* #define ERRLOGMASK (CD_WARNING|CD_REG_UNREG|CD_DO_IOCTL|CD_OPEN|CD_CLOSE|CD_COUNT_TRACKS) */

+#include <linux/atomic.h>
#include <linux/module.h>
#include <linux/fs.h>
#include <linux/major.h>
@@ -289,7 +290,7 @@
/* default compatibility mode */
static bool autoclose=1;
static bool autoeject;
- static bool lockdoor = 1;
+ static bool lockdoor = 0;
/* will we ever get to use this... sigh. */
static bool check_media_type;
/* automatically restart mrw format */
@ @ -409,10 +410,10 @@
* hack to have the capability flags defined const, while we can still
* change it here without gcc complaining at every line.
*/
- #define ENSURE(call, bits)\ 
- do {\ 
- if (cdo->call == NULL)\ 
- *change_capability &= ~(bits);\ 
+ #define ENSURE(cdo, call, bits)\ 
+ do {\ 
+ if (cdo->call == NULL)\ 
+ WARN_ON_ONCE((cdo)->capability & (bits));\ 
} while (0)
/*
@@ -588,7 +589,6 @@
{
 static char banner_printed;
 const struct cdrom_device_ops *cdo = cdi->ops;
- int *change_capability = (int *)&cdo->capability; /* hack */
cd_dbg(CD_OPEN, "entering register_cdrom
");

@@ -600,16 +600,16 @@
cdrom_sysctl_register();
}

-ENSURE(drive_status, CDC_DRIVE_STATUS);
+ENSURE(cdo, drive_status, CDC_DRIVE_STATUS);
if (cdo->check_events == NULL && cdo->media_changed == NULL)
-*change_capability = ~(CDC_MEDIA_CHANGED | CDC_SELECT_DISC);
-ENSURE(tray_move, CDC_CLOSE_TRAY | CDC_OPEN_TRAY);
-ENSURE(lock_door, CDC_LOCK);
-ENSURE(select_speed, CDC_SELECT_SPEED);
-ENSURE(get_last_session, CDC_MULTI_SESSION);
-ENSURE(get_mcn, CDC_MCN);
-ENSURE(reset, CDC_RESET);
-ENSURE(generic_packet, CDC_GENERIC_PACKET);
+WARN_ON_ONCE(cdo->capability & (CDC_MEDIA_CHANGED | CDC_SELECT_DISC));
+ENSURE(cdo, tray_move, CDC_CLOSE_TRAY | CDC_OPEN_TRAY);
+ENSURE(cdo, lock_door, CDC_LOCK);
+ENSURE(cdo, select_speed, CDC_SELECT_SPEED);
+ENSURE(cdo, get_last_session, CDC_MULTI_SESSION);
+ENSURE(cdo, get_mcn, CDC_MCN);
+ENSURE(cdo, reset, CDC_RESET);
+ENSURE(cdo, generic_packet, CDC_GENERIC_PACKET);
cdi->mc_flags = 0;
cdi->options = CDO_USE_FFLAGS;

@@ -995,6 +995,12 @@
tracks->xa = 0;
tracks->error = 0;
cd_dbg(CD_COUNT_TRACKS, "entering cdrom_count_tracks\n");
+
+if (!CDROM_CAN(CDC_PLAY_AUDIO)) {
+tracks->error = CDS_NO_INFO;
+return;
+}
+
+ /* Grab the TOC header so we can see how many tracks there are */
ret = cdi->ops->audio_ioctl(cdi, CDROMREADTOCHDR, &header);
if (ret) {
@@ -1152,9 +1158,6 @@
cd_dbg(CD_OPEN, "entering cdrom_open\n");

-/* open is event synchronization point, check events first */
-check_disk_change(bdev);
/* if this was a O_NONBLOCK open and we should honor the flags, *
 * do a quick open without drive/disc integrity checks. */

cdi->use_count++;

ret = open_for_data(cdi);
if (ret)
goto err;

- cdrom_mmc3_profile(cdi);
+ if (CDROM_CAN(CDC_GENERIC_PACKET))
+ cdrom_mmc3_profile(cdi);
if (mode & FMODE_WRITE) {
  ret = -EROFS;
  if (cdrom_open_write(cdi))
    goto err;

- if ((unsigned int)arg >= cdi->capacity)
+ if (arg >= cdi->capacity)
  return -EINVAL;
}

info = kmalloc(sizeof(*info), GFP_KERNEL);

- if (((int)arg >= cdi->capacity))
+ if (arg >= cdi->capacity)
  return -EINVAL;
}

if (arg != CDSL_CURRENT && arg != CDSL_NONE) {
  - if (((int)arg >= cdi->capacity))
  + if (arg >= cdi->capacity)
  return -EINVAL;
}

if (!CDROM_CAN(CDC_SELECT_DISC) || arg == CDSL_CURRENT)
  return media_changed(cdi, 1);

- if (!CDROM_CAN(CDC_SELECT_DISC) || !CDROM_CAN(CDC_SELECT_DISC) ||
  (arg == CDSL_CURRENT || arg == CDSL_NONE))
  return cdi->ops->drive_status(cdi, CDSL_CURRENT);
- if (((int)arg >= cdi->capacity))
+ if (arg >= cdi->capacity)
  return -EINVAL;
}

return cdrom_slot_status(cdi, arg);

- use_toc:
+ if (!CDROM_CAN(CDC_PLAY_AUDIO))
  + return -ENOSYS;
+
static void cdrom_sysctl_register(void)
{
-static int initialized;
+static atomic_t initialized = ATOMIC_INIT(0);

-if (initialized == 1)
+if (!atomic_add_unless(&initialized, 1, 1))
return;

cdrom_sysctl_header = register_sysctl_table(cdrom_root_table);
-3705,8 +3712,6 @ @
cdrom_sysctl_settings.debug = debug;
cdrom_sysctl_settings.lock = lockdoor;
cdrom_sysctl_settings.check = check_media_type;
-
-initialized = 1;
}

static void cdrom_sysctl_unregister(void)
--- linux-4.15.0.orig/drivers/cdrom/gdrom.c
+++ linux-4.15.0/drivers/cdrom/gdrom.c
@@ -497,6 +497,9 @@
static int gdrom_bdops_open(struct block_device *bdev, fmode_t mode)
{
    int ret;
+
    +check_disk_change(bdev);
+
    +mutex_lock(&gdrom_mutex);
    ret = cdrom_open(gd.cd_info, bdev, mode);
    mutex_unlock(&gdrom_mutex);
    @ @ -772,6 +775,13 @@
static int probe_gdrom(struct platform_device *devptr)
{
    int err;
+
    /*!]
+ * Ensure our "one" device is initialized properly in case of previous
+ * usages of it
+ */
+memset(&gd, 0, sizeof(gd));
+
    /* Start the device */


if (gdrom_execute_diagnostic() != 1) {
    pr_warning("ATA Probe for GDROM failed\n");
    pr_warning("ATA Probe for GDROM failed\n");
    if (gdrom_major)
        unregister_blkdev(gdrom_major, GDROM_DEV_NAME);
    unregister_cdrom(gd.cd_info);
    kfree(gd.cd_info);
    kfree(gd.toc);

    return 0;
}
@@ -854,6 +864,8 @@
    if (gdrom_major)
        unregister_blkdev(gdrom_major, GDROM_DEV_NAME);
    unregister_cdrom(gd.cd_info);
+kfree(gd.cd_info);
+kfree(gd.toc);

    return 0;
}
@@ -869,7 +881,7 @@
static int __init init_gdrom(void)
{
    int rc;
    -gd.toc = NULL;
    +rc = platform_driver_register(&gdrom_driver);
    if (rc)
        return rc;
    @@ -885,7 +897,6 @@
    {
        platform_device_unregister(pd);
        platform_driver_unregister(&gdrom_driver);
+kfree(gd.toc);
    }

    module_init(init_gdrom);
    --- linux-4.15.0.orig/drivers/char/Kconfig
    +++ linux-4.15.0/drivers/char/Kconfig
    @ @ -380,7 +380,7 @@

    config R3964
    tristate "Siemens R3964 line discipline"
    -depends on TTY
    +depends on TTY && BROKEN
    ---help---
      This driver allows synchronous communication with devices using the
      Siemens R3964 packet protocol. Unless you are dealing with special
    --- linux-4.15.0.orig/drivers/char/agp/Kconfig
    +++ linux-4.15.0/drivers/char/agp/Kconfig
    @ @ -125,7 +125,7 @@

    config AGP_PARISC
    tristate "HP Quicksilver AGP support"
    -depends on AGP && PARISC && 64BIT
    +depends on AGP && PARISC && 64BIT && IOMMU_SBA
    help
This option gives you AGP GART support for the HP Quicksilver AGP bus adapter on HP PA-RISC machines (Ok, just on the C8000
--- linux-4.15.0.orig/drivers/char/agp/intel-gtt.c
+++ linux-4.15.0/drivers/char/agp/intel-gtt.c
@@ -304,8 +304,10 @@
 if (intel_private.needs_dmar) {
     dma_addr = pci_map_page(intel_private.pcidev, page, 0,
      PAGE_SIZE, PCI_DMA_BIDIRECTIONAL);
-   if (pci_dma_mapping_error(intel_private.pcidev, dma_addr))
+   if (pci_dma_mapping_error(intel_private.pcidev, dma_addr)) {
+     __free_page(page);
     return -EINVAL;
   }

   intel_private.scratch_page_dma = dma_addr;
 } else
@@ -846,6 +848,7 @@
 unsigned int flags)
 {
   intel_private.driver->write_entry(addr, pg, flags);
+   readl(intel_private.gtt + pg);
   if (intel_private.driver->chipset_flush)
     intel_private.driver->chipset_flush();
 }
@@ -871,7 +874,9 @@
       j++;
   }
 }
-   wmb();
+   readl(intel_private.gtt + j - 1);
+   if (intel_private.driver->chipset_flush)
+   intel_private.driver->chipset_flush();
 }
 EXPORT_SYMBOL(intel_gtt_insert_sg_entries);

@@ -1103,6 +1108,7 @@
 static void i9xx_chipset_flush(void)
 {
   +wmb();
 if (intel_private.i9xx_flush_page)
     writel(1, intel_private.i9xx_flush_page);
 }
--- linux-4.15.0.orig/drivers/char/agp/uninorth-agp.c
+++ linux-4.15.0/drivers/char/agp/uninorth-agp.c
@@ -195,7 +195,7 @@
 return 0;
 }

-int uninorth_remove_memory(struct agp_memory *mem, off_t pg_start, int type)
+static int uninorth_remove_memory(struct agp_memory *mem, off_t pg_start, int type)
{
    size_t i;
    u32 *gp;
    @@ -470,7 +470,7 @@
    return 0;
}

-void null_cache_flush(void)
+static void null_cache_flush(void)
{
    mb();
}
--- linux-4.15.0.orig/drivers/char/applicom.c
+++ linux-4.15.0/drivers/char/applicom.c
@@ -32,6 +32,7 @@
#include <linux/wait.h>
#include <linux/init.h>
#include <linux/fs.h>
+  #include <linux/nospec.h>
#include <asm/io.h>
#include <linux/uaccess.h>
@@ -386,7 +387,11 @@
    TicCard = st_loc.tic_des_from_pc; /* tic number to send */
    IndexCard = NumCard - 1;

-if((NumCard < 1) || (NumCard > MAX_BOARD) || !apbs[IndexCard].RamIO)
+if (IndexCard >= MAX_BOARD)
    +IndexCard = array_index_nospec(IndexCard, MAX_BOARD);
    +
    +if (!apbs[IndexCard].RamIO)
        return -EINVAL;

#ifdef DEBUG
@@ -697,6 +702,7 @@
    unsigned char IndexCard;
    void __iomem *pmem;
    int ret = 0;
+static int warncount = 10;
    volatile unsigned char byte_reset_it;
    struct st_ram_io *adgl;
    void __user *argp = (void __user *)arg;
@@ -711,16 +717,12 @@
    mutex_lock(&ac_mutex);
IndexCard = adgl->num_card-1;

- if(cmd != 6 && ((IndexCard >= MAX_BOARD) || !apbs[IndexCard].RamIO))
- static int warncount = 10;
- if (warncount) {
- printk(KERN_WARNING "APPLICOM driver IOCTL, bad board number %d\n",(int)IndexCard+1);
- warncount--;
- } 
- kfree(adgl);
- mutex_unlock(&ac_mutex);
- return -EINVAL;
- }
+ if (cmd != 6 && IndexCard >= MAX_BOARD)
+ goto err;
+ IndexCard = array_index_nospec(IndexCard, MAX_BOARD);
+ 
+ if (cmd != 6 && !apbs[IndexCard].RamIO)
+ goto err;
+ 
+ switch (cmd) {
@ @ -838,5 +840,16 @@
kfree(adgl);
mutex_unlock(&ac_mutex);
return 0;
+
+err:
+ if (warncount) {
+pr_warn("APPLICOM driver IOCTL, bad board number %d\n",(int)IndexCard+1);
+warncount--;
+ } 
+ kfree(adgl);
+ mutex_unlock(&ac_mutex);
+ return -EINVAL;
+ }
+
--- linux-4.15.0.orig/drivers/char/hpet.c
+++ linux-4.15.0/drivers/char/hpet.c
@@ -377,7 +377,7 @@
pr_info("HPET mmap %s\n", hpet_mmap_enabled ? "enabled" : "disabled");
 return 1;
 }
-__setup("hpet_mmap", hpet_mmap_enable);
+__setup("hpet_mmap=", hpet_mmap_enable);

 static int hpet_mmap(struct file *file, struct vm_area_struct *vma)
unsigned long long m;

m = hpets->hp_tick_freq + (dis >> 1);
-do_div(m, dis);
-return (unsigned long)m;
+return div64_ul(m, dis);
}

static int
@@ -978,6 +977,8 @@
if (ACPI_SUCCESS(status)) {
    hdp->hd_phys_address = addr.address.minimum;
    hdp->hd_address = ioremap(addr.address.minimum, addr.address.address_length);
+    if (!hdp->hd_address)
+        return AE_ERROR;
    if (hpet_is_known(hdp)) {
        iounmap(hdp->hd_address);
        --- linux-4.15.0.orig/drivers/char/hw_random/core.c
        +++ linux-4.15.0/drivers/char/hw_random/core.c
        @@ -67,7 +67,7 @@
        size_t size = min_t(size_t, 16, rng_buffer_size());

        mutex_lock(&reading_mutex);
-        bytes_read = rng_get_data(rng, rng_buffer, size, 1);
+        bytes_read = rng_get_data(rng, rng_buffer, size, 0);
        mutex_unlock(&reading_mutex);
        if (bytes_read > 0)
            add_device_randomness(rng_buffer, bytes_read);
@@ -306,6 +306,10 @@
        ret = ((new_rng == current_rng) ? 0 : set_current_rng(new_rng));
        if (!ret)
            cur_rng_set_by_user = 0;
+} else {
+    drop_current_rng();
+    cur_rng_set_by_user = 0;
+    ret = 0;
return ret;
@@  -512,11 +516,18 @@

void hwrng_unregister(struct hwrng *rng)
{
+int err;
+
+mutex_lock(&rng_mutex);

list_del(&rng->list);
-if (current_rng == rng)
-enable_best_rng();
+if (current_rng == rng) {
+err = enable_best_rng();
+if (err) {
+drop_current_rng();
+cur_rng_set_by_user = 0;
+}
++}

if (list_empty(&rng_list)) {
mutex_unlock(&rng_mutex);
--- linux-4.15.0.orig/drivers/char/hw_random/imx-rngc.c
+++ linux-4.15.0/drivers/char/hw_random/imx-rngc.c
@@ -110,8 +110,10 @@
return -ETIMEDOUT;
}

-if (rngc->err_reg != 0)
+if (rngc->err_reg != 0) {
+imx_rngc_irq_mask_clear(rngc);
return -EIO;
+
return 0;
}
--- linux-4.15.0.orig/drivers/char/hw_random/omap-rng.c
+++ linux-4.15.0/drivers/char/hw_random/omap-rng.c
@@ @ -66,6 +66,13 @@
#define OMAP4_RNG_OUTPUT_SIZE		0x8
#define EIP76_RNG_OUTPUT_SIZE		0x10

+/*
+ * EIP76 RNG takes approx. 700us to produce 16 bytes of output data
+ * as per testing results. And to account for the lack of udelay()'s
+ * reliability, we keep the timeout as 1000us.
+ */
+*/
+
+ #define RNG_DATA_FILL_TIMEOUT 100
+
+ enum {
+ RNG_OUTPUT_0_REG = 0,
+ RNG_OUTPUT_1_REG,
+ 175,7 +182,7 @ @
+ if (max < priv->pdata->data_size)
+ return 0;
+
+ for (i = 0; i < RNG_DATA_FILL_TIMEOUT; i++) {
+ present = priv->pdata->data_present(priv);
+ if (present || !wait)
+ break;
+ 442,6 +449,7 @ @
+ priv->rng.read = omap_rng_do_read;
+ priv->rng.init = omap_rng_init;
+ priv->rng.cleanup = omap_rng_cleanup;
+ priv->rng.quality = 900;
+
+ priv->rng.priv = (unsigned long)priv;
+ platform_set_drvdata(pdev, priv);
+ --- linux-4.15.0.orig/drivers/char/hw_random/omap3-rom-rng.c
+ +++ linux-4.15.0/drivers/char/hw_random/omap3-rom-rng.c
+ @@ -20,6 +20,8 @@
+ #include <linux/workqueue.h>
+ #include <linux/clk.h>
+ #include <linux/err.h>
+ +#include <linux/of.h>
+ +#include <linux/of_device.h>
+ #include <linux/platform_device.h>
+
+ #define RNG_RESET 0x01
+ @@ -86,14 +88,18 @@
+ static struct hwrng omap3_rom_rng_ops = {
+ .name = "omap3-rom",
+ .read = omap3_rom_rng_read,
+ }
+
+ static int omap3_rom_rng_probe(struct platform_device *pdev)
+ {
+ int ret = 0;
+ -pr_info("initializing\n");
+ +omap3_rom_rng_ops.read = of_device_get_match_data(&pdev->dev);
+ +if (!omap3_rom_rng_ops.read) {
+ 86,14 +88,18 @@
+ static struct hwrng omap3_rom_rng_ops = {
+ .name = "omap3-rom",
+ .read = omap3_rom_rng_read,
+ }
+
+ static int omap3_rom_rng_probe(struct platform_device *pdev)
+ {
+ int ret = 0;
+ -pr_info("initializing\n");
+ +omap3_rom_rng_ops.read = of_device_get_match_data(&pdev->dev);
+ +if (!omap3_rom_rng_ops.read) {
+dev_err(&pdev->dev, "missing rom code handler\n");
+
+return -ENODEV;
+

omap3_rom_rng_call = pdev->dev.platform_data;
if (!omap3_rom_rng_call) {
    cancel_delayed_work_sync(&idle_work);
    hwrng_unregister(&omap3_rom_rng_ops);
-    clk_disable_unprepare(rng_clk);
+    if (!rng_idle)
+        clk_disable_unprepare(rng_clk);
    return 0;
}

+static const struct of_device_id omap_rom_rng_match[] = {
+    {.compatible = "nokia,n900-rom-rng", .data = omap3_rom_rng_read, },
+    { /* sentinel */ },
+};
+MODULE_DEVICE_TABLE(of, omap_rom_rng_match);
+
static struct platform_driver omap3_rom_rng_driver = {
    .driver = {
        .name = "omap3-rom-rng",
        .of_match_table = omap_rom_rng_match,
    },
    .probe = omap3_rom_rng_probe,
    .remove = omap3_rom_rng_remove,
    ...
};
if (IS_ERR(priv->clk))
    return PTR_ERR(priv->clk);

+priv->rst = devm_reset_control_get(&ofdev->dev, NULL);
+if (!IS_ERR(priv->rst)) {
+    reset_control_assert(priv->rst);
+    udelay(2);
+    reset_control_deassert(priv->rst);
+}
+
+dev_set_drvdata(dev, priv);

priv->rng.name = dev_driver_string(dev),
@@ -157,6 +166,13 @@
return devm_hwrng_register(dev, &priv->rng);
}

+static int stm32_rng_remove(struct platform_device *ofdev)
+{
+    pm_runtime_disable(&ofdev->dev);
+    return 0;
+}
+
+#ifdef CONFIG_PM
static int stm32_rng_runtime_suspend(struct device *dev)
{
@@ -193,6 +209,7 @@
    .of_match_table = stm32_rng_match,
    ,
    .probe = stm32_rng_probe,
+    .remove = stm32_rng_remove,
    ,

module_platform_driver(stm32_rng_driver);
--- linux-4.15.0.orig/drivers/char/hw_random/timeriromem-rng.c
+++ linux-4.15.0/drivers/char/hw_random/timeriromem-rng.c
@@ -72,7 +72,7 @@
*/
    if (retval > 0)
        usleep_range(period_us,
        -period_us + min(1, period_us / 100));
+period_us + max(1, period_us / 100));

*(u32 *)data = readl(priv->io_base);
retval += sizeof(u32);
--- linux-4.15.0.orig/drivers/char/hw_random/via-rng.c
/* Enable secondary noise source on CPUs where it is present. */
/* Nehemiah stepping 8 and higher */
-if ((c->x86_model == 9) && (c->x86_mask > 7))
+if ((c->x86_model == 9) && (c->x86_stepping > 7))
lo |= VIA_NOISESRC2;
/* Esther */
--- linux-4.15.0.orig/drivers/char/hw_random/virtio-rng.c
+++ linux-4.15.0/drivers/char/hw_random/virtio-rng.c
@@ -73,7 +73,7 @@

if (!vi->busy) {
    vi->busy = true;
    -init_completion(&vi->have_data);
    +reinit_completion(&vi->have_data);
    register_buffer(vi, buf, size);
}
--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_bt_sm.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_bt_sm.c
@@ -77,8 +77,6 @@

BT_STATE_RESET3,
BT_STATE_RESTART,
BT_STATE_PRINTME,
-BT_STATE_CAPABILITIES_BEGIN,
-BT_STATE_CAPABILITIES_END,
BT_STATE_LONG_BUSY/* BT doesn't get hosed :-) */
};
@@ -104,7 +102,6 @@

int error_retries;/* end of "common" fields */
int nonzero_status;/* hung BMCs stay all 0 */
enum bt_statescomplete;/* to divert the state machine */
-intBT_CAP_outreqs;
longBT_CAP_req2rsp;
intBT_CAP_retries;/* Recommended retries */
};
@@ -155,8 +152,6 @@
case BT_STATE_RESET3:return("RESET3");
case BT_STATE_RESTART:return("RESTART");
case BT_STATE_LONG_BUSY:return("LONG_BUSY");
-case BT_STATE_CAPABILITIES_BEGIN:return("CAP_BEGIN");
-case BT_STATE_CAPABILITIES_END:return("CAP_END");
}
return("BAD STATE");
bt->complete = BT_STATE_IDLE; /* end here */
bt->BT_CAP_req2rsp = BT_NORMAL_TIMEOUT * USEC_PER_SEC;
bt->BT_CAP_retries = BT_NORMAL_RETRY_LIMIT;
-/* BT_CAP_outreqs == zero is a flag to read BT Capabilities */
return 3; /* We claim 3 bytes of space; ought to check SPMI table */
}

static enum si_sm_result bt_event(struct si_sm_data *bt, long time)
{
    unsigned char status, BT_CAP[8];
    static enum bt_states last_printed = BT_STATE_PRINTME;
    int i;

    if (status & BT_H_BUSY) /* clear a leftover H_BUSY */
        BT_CONTROL(BT_H_BUSY);

-/* Read BT capabilities if it hasn't been done yet */
    if (!bt->BT_CAP_outreqs)
        case BT_STATE_CAPABILITIES_BEGIN:
            bt->BT_CAP_outreqs = 1;
            
            unsigned char GetBT_CAP[2] = { 0x18, 0x36 };
            bt->state = BT_STATE_IDLE;
            bt_start_transaction(bt, GetBT_CAP, sizeof(GetBT_CAP));
            
            bt->complete = BT_STATE_CAPABILITIES_END;
            break;

    case BT_STATE_XACTION_START:
        BT_STATE_CHANGE(BT_STATE_XACTION_START,
                    SI_SM_CALL_WITH_DELAY);

        /* Get BT Capabilities, using timing of upper level state machine. */
        /* Set outreqs to prevent infinite loop on timeout. */
        
        -case BT_STATE_CAPABILITIES_BEGIN:
            bt->BT_CAP_outreqs = 1;
            
            unsigned char GetBT_CAP[] = { 0x18, 0x36 };
            bt->state = BT_STATE_IDLE;
            bt_start_transaction(bt, GetBT_CAP, sizeof(GetBT_CAP));
        
            bt->complete = BT_STATE_CAPABILITIES_END;
            break;

        case BT_STATE_XACTION_START:
            SI_SM_CALL_WITH_DELAY;
static int bt_detect(struct si_sm_data *bt)
{
    unsigned char GetBT_CAP[] = { 0x18, 0x36 };
    unsigned char BT_CAP[8];
    enum si_sm_result smi_result;
    int rv;
    
    /*
    * It's impossible for the BT status and interrupt registers to be
    * all 1's, (assuming a properly functioning, self-initialized BMC)
    */

    if ((BT_STATUS == 0xFF) && (BT_INTMASK_R == 0xFF))
        return 1;
    reset_flags(bt);
    
    /* Try getting the BT capabilities here. */
    
    rv = bt_start_transaction(bt, GetBT_CAP, sizeof(GetBT_CAP));
    if (rv) {
        dev_warn(bt->io->dev, 
            "Can't start capabilities transaction: %d\n", rv);
        goto out_no_bt_cap;
    }
    
    smi_result = SI_SM_CALL_WITHOUT_DELAY;
}

default:/* should never occur */
return error_recovery(bt,
    status,
    ...

- case BT_STATE_CAPABILITIES_END:
- i = bt_get_result(bt, BT_CAP, sizeof(BT_CAP));
- bt_init_data(bt, bt->io);
- if (i == 8) && !BT_CAP[2]) {
-     bt->BT_CAP_outreqs = BT_CAP[3];
-     bt->BT_CAP_retries = BT_CAP[7];
- } else
-     printk(KERN_WARNING "IPMI BT: using default values\n");
- if (!bt->BT_CAP_outreqs)
-     bt->BT_CAP_outreqs = 1;
-     printk(KERN_WARNING "IPMI BT: req2rsp=%ld secs retries=%d\n", 
-     bt->BT_CAP_req2rsp / USEC_PER_SEC, bt->BT_CAP_retries);
-     if (!bt->timeout)
-         bt->timeout = bt->BT_CAP_req2rsp;
-     return SI_SM_CALL_WITHOUT_DELAY;
- }

static int bt_detect(struct si_sm_data *bt)
{
+for (;;) {
+  if (smi_result == SI_SM_CALL_WITH_DELAY ||
+      smi_result == SI_SM_CALL_WITH_TICK_DELAY) {
+    schedule_timeout_uninterruptible(1);
+    smi_result = bt_event(bt, jiffies_to_usecs(1));
+  } else if (smi_result == SI_SM_CALLWITHOUT_DELAY) {
+    smi_result = bt_event(bt, 0);
+  } else
+  break;
+
+  rv = bt_get_result(bt, BT_CAP, sizeof(BT_CAP));
+  bt_init_data(bt, bt->io);
+  if (rv < 8) {
+    dev_warn(bt->io->dev, "bt cap response too short: %d\n", rv);
+    goto out_no_bt_cap;
+  }
+  if (BT_CAP[2]) {
+    dev_warn(bt->io->dev, "Error fetching bt cap: %x\n", BT_CAP[2]);
+    out_no_bt_cap:
+    dev_warn(bt->io->dev, "using default values\n");
+  } else {
+    bt->BT_CAP_retries = BT_CAP[7];
+  }
+  dev_info(bt->io->dev, "req2rsp=%ld secs retries=%d\n",
+            bt->BT_CAP_req2rsp / USEC_PER_SEC, bt->BT_CAP_retries);
+  return 0;
+}

--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_dmi.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_dmi.c
@@ -106,7 +106,10 @@
 pr_err("ipmi:dmi: Error allocation IPMI platform device\n");
 return;
 }
-pdev->driver_override = override;
+pdev->driver_override = kasprintf(GFP_KERNEL, "%s",
+                                        override);
+if (!pdev->driver_override)
+  goto err;

if (type == IPMI_DMI_TYPE_SSIF) {
  set_prop_entry(p[pidx++], "i2c-addr", u16, base_addr);
@@ -222,6 +225,10 @@
slave_addr = data[DMI_IPMI_SLAVEADDR];

memcpy(&base_addr, data + DMI_IPMI_ADDR, sizeof(unsigned long));
+if (!base_addr) {
+    pr_err("Base address is zero, assuming no IPMI interface\n");
+    return;
+
if (len >= DMI_IPMI_VER2_LENGTH) {
    if (type == IPMI_DMI_TYPE_SSIF) {
    offset = 0;
    --- linux-4.15.0.orig/drivers/char/ipmi/ipmi_msghandler.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_msghandler.c
@@ -49,6 +49,7 @@
#include <linux/moduleparam.h>
#include <linux/workqueue.h>
#include <linux/uuid.h>
+#include <linux/nospec.h>
#define PFX "IPMI message handler: "

@@ -1262,6 +1263,7 @@
    }
    if (channel >= IPMI_MAX_CHANNELS)
        return -EINVAL;
+    channel = array_index_nospec(channel, IPMI_MAX_CHANNELS);
    user->intf->addrinfo[channel].address = address;
    return 0;
}
@@ -1273,6 +1275,7 @@
    }
    if (channel >= IPMI_MAX_CHANNELS)
        return -EINVAL;
+    channel = array_index_nospec(channel, IPMI_MAX_CHANNELS);
    *address = user->intf->addrinfo[channel].address;
return 0;
}
@@ -1284,6 +1287,7 @@
    }
    if (channel >= IPMI_MAX_CHANNELS)
        return -EINVAL;
+    channel = array_index_nospec(channel, IPMI_MAX_CHANNELS);
    user->intf->addrinfo[channel].lun = LUN & 0x3;
    return 0;
}
@@ -1295,6 +1299,7 @@
    }
    if (channel >= IPMI_MAX_CHANNELS)
        return -EINVAL;

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+channel = array_index_nospec(channel, IPMI_MAX_CHANNELS);
*address = user->intf->addrinfo[channel].lun;
return 0;
}
@@ -2061,6 +2066,7 @@
{
    if (addr->channel >= IPMI_MAX_CHANNELS)
        return -EINVAL;
    addr->channel = array_index_nospec(addr->channel, IPMI_MAX_CHANNELS);
    lun = intf->addrinfo[addr->channel].lun;
    *saddr = intf->addrinfo[addr->channel].address;
return 0;
@@ -2588,7 +2594,7 @@
return snprintf(buf, 10, "%u\n", id.device_id);
}
-static DEVICE_ATTR(device_id, S_IRUGO, device_id_show, NULL);
+static DEVICE_ATTR_RO(device_id);
static ssize_t provides_device_sdrs_show(struct device *dev,
    struct device_attribute *attr,
    @@ -2604,8 +2610,7 @@
return snprintf(buf, 10, "%u\n", (id.device_revision & 0x80) >> 7);
}
-static DEVICE_ATTR(provides_device_sdrs, S_IRUGO, provides_device_sdrs_show,
-                      NULL);
+static DEVICE_ATTR_RO(provides_device_sdrs);
static ssize_t revision_show(struct device *dev, struct device_attribute *attr,
    char *buf)
@@ -2620,7 +2625,7 @@
return snprintf(buf, 20, "%u.%x\n", id.firmware_revision_1,
    id.firmware_revision_2);
}
-static DEVICE_ATTR(revision, S_IRUGO, revision_show, NULL);
+static DEVICE_ATTR_RO(revision);
static ssize_t firmware_revision_show(struct device *dev,
    struct device_attribute *attr,
    @@ -2637,7 +2642,7 @@
return snprintf(buf, 20, "%u.%x\n", id.firmware_revision_1,
    id.firmware_revision_2);
}
-static DEVICE_ATTR(firmware_revision, S_IRUGO, firmware_revision_show, NULL);
+static DEVICE_ATTR_RO(firmware_revision);
static ssize_t ipmi_version_show(struct device *dev,
struct device_attribute *attr,
@@ -2655,7 +2660,7 @@
ipmi_version_major(&id),
ipmi_version_minor(&id));
}
-static DEVICE_ATTR(ipmi_version, S_IRUGO, ipmi_version_show, NULL);
+static DEVICE_ATTR_RO(ipmi_version);

static ssize_t add_dev_support_show(struct device *dev,
    struct device_attribute *attr,
@@ -2688,7 +2693,7 @@
return snprintf(buf, 20, "0x%6.6x\n", id.manufacturer_id);
}
-static DEVICE_ATTR(manufacturer_id, S_IRUGO, manufacturer_id_show, NULL);
+static DEVICE_ATTR_RO(manufacturer_id);

static ssize_t product_id_show(struct device *dev,
    struct device_attribute *attr,
@@ -2704,7 +2709,7 @@
return snprintf(buf, 10, "0x%4.4x\n", id.product_id);
}
-static DEVICE_ATTR(product_id, S_IRUGO, product_id_show, NULL);
+static DEVICE_ATTR_RO(product_id);

static ssize_t aux_firmware_rev_show(struct device *dev,
    struct device_attribute *attr,
@@ -2742,7 +2747,7 @@
return snprintf(buf, 38, "%pUL\n", guid.b);
}
-static DEVICE_ATTR(guid, S_IRUGO, guid_show, NULL);
+static DEVICE_ATTR_RO(guid);

static struct attribute *bmc_dev_attrs[] = {
    &dev_attr_device_id.attr,
@@ -3005,8 +3010,11 @@
bmc->pdev.name = "ipmi_bmc";
rv = ida_simple_get(&ipmi_bmc_ida, 0, 0, GFP_KERNEL);
-    if (rv < 0)
+    if (rv < 0) {
+        kfree(bmc);
goto out;
+    }
+
bmc->pdev.dev.driver = &ipmidriver.driver;
bmc->pdev.id = rv;
bmc->pdev.dev.release = release_bmc_device;
@@ -3171,8 +3179,8 @@
    if (rv)
    /* Send failed, no GUID available. */
    bmc->dyn_guid_set = 0;
-
-wait_event(intf->waitq, bmc->dyn_guid_set != 2);
+    else
+    wait_event(intf->waitq, bmc->dyn_guid_set != 2);

    /* dyn_guid_set makes the guid data available. */
smp_rmb();
--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_powernv.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_powernv.c
@@ -250,8 +250,9 @@
    ipmi->irq = opal_event_request(prop);
 }

-if (request_irq(ipmi->irq, ipmi_opal_event, IRQ_TYPE_LEVEL_HIGH,
-"opal-ipmi", ipmi)) {
+rc = request_irq(ipmi->irq, ipmi_opal_event, IRQ_TYPE_LEVEL_HIGH,
+"opal-ipmi", ipmi);
+    if (rc) {
        dev_warn(dev, "Unable to request irq\n");
        goto err_dispose;
    }
--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_si.h
+++ linux-4.15.0/drivers/char/ipmi/ipmi_si.h
@@ -24,7 +24,9 @@
    int ipmi_si_remove_by_dev(struct device *dev);
    void ipmi_si_remove_by_data(int addr_space, enum si_type si_type,
                                               unsigned long addr);
-int ipmi_si_hardcode_find_bmc(void);
+void ipmi_si_hardcode_init(void);
+void ipmi_si_hardcode_exit(void);
+int ipmi_si_hardcode_match(int addr_type, unsigned long addr);
    void ipmi_si_platform_init(void);
    void ipmi_si_platform_shutdown(void);

--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_si_hardcode.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_si_hardcode.c
@@ -1,5 +1,6 @@
#include <linux/moduleparam.h>
+    #include <linux/platform_device.h>
#include "ipmi_si.h"
#define PFX "ipmi_hardcode: "
@@ -10,23 +11,22 @@
#define SI_MAX_PARMS 4

-static char          *si_type[SI_MAX_PARMS];
#define MAX_SI_TYPE_STR 30
-static char          si_type_str[MAX_SI_TYPE_STR];
+static char          si_type_str[MAX_SI_TYPE_STR] __initdata;
static unsigned long addr[SI_MAX_PARMS];
static unsigned int num_addr;
static unsigned int  ports[SI_MAX_PARMS];
static unsigned int num_ports;
-static int           irqs[SI_MAX_PARMS];
-static unsigned int num_irqs;
-static int           regspacings[SI_MAX_PARMS];
-static unsigned int num_regspacings;
-static int           regsizes[SI_MAX_PARMS];
-static unsigned int num_regsizes;
-static int           regshifts[SI_MAX_PARMS];
-static unsigned int num_regshifts;
-static int slave_addr[SI_MAX_PARMS]; /* Leaving 0 chooses the default value */
-static unsigned int num_slave_addr;
+static int           irqs[SI_MAX_PARMS] __initdata;
+static unsigned int num_irqs __initdata;
+static int           regspacings[SI_MAX_PARMS] __initdata;
+static unsigned int num_regspacings __initdata;
+static int           regsizes[SI_MAX_PARMS] __initdata;
+static unsigned int num_regsizes __initdata;
+static int           regshifts[SI_MAX_PARMS] __initdata;
+static unsigned int num_regshifts __initdata;
+static int slave_addr[SI_MAX_PARMS] __initdata;
+static unsigned int num_slave_addr __initdata;

module_param_string(type, si_type_str, MAX_SI_TYPE_STR, 0);
MODULE_PARM_DESC(type, "Defines the type of each interface, each"
@@ -71,12 +71,135 @@
" overridden by this parm. This is an array indexed"
" by interface number.");

-int ipmi_si_hardcode_find_bmc(void)
+static struct platform_device *ipmi_hc_pdevs[SI_MAX_PARMS];
 +
+static void __init ipmi_hardcode_init_one(const char *si_type_str,
 + unsigned int i,
 + unsigned long addr,
 + unsigned int flags)
int ret = -ENODEV;

int i;

struct si_sm_io io;
+struct platform_device *pdev;
+unsigned int num_r = 1, size;
+struct resource r[4];
+struct property_entry p[6];
+enum si_type si_type;
+unsigned int regspacing, regsize;
+int rv;
+
+memset(p, 0, sizeof(p));
+memset(r, 0, sizeof(r));
+
+if (!si_type_str || !*si_type_str || strcmp(si_type_str, "kcs") == 0) {
  +size = 2;
  +si_type = SI_KCS;
+} else if (strcmp(si_type_str, "smic") == 0) {
  +size = 2;
  +si_type = SI_SMIC;
+} else if (strcmp(si_type_str, "bt") == 0) {
  +size = 3;
  +si_type = SI_BT;
+} else if (strcmp(si_type_str, "invalid") == 0) {
  */
  + * Allow a firmware-specified interface to be
  + * disabled.
  + */
  +size = 1;
  +si_type = SI_TYPE_INVALID;
+} else {
  +pr_warn("Interface type specified for interface %d, was invalid: %s\n",
  +i, si_type_str);
  +return;
  +
  +regsize = regsizes[i];
  +if (regsize == 0)
  +regsize = DEFAULT_REGSIZExE;
  +
  +p[0] = PROPERTY_ENTRY_U8("ipmi-type", si_type);
  +p[1] = PROPERTY_ENTRY_U8("slave-addr", slave_addrs[i]);
  +p[2] = PROPERTY_ENTRY_U8("addr-source", SI_HARDCODED);
  +p[4] = PROPERTY_ENTRY_U8("reg-size", regsize);
  +/* Last entry must be left NULL to terminate it. */
  +
  +/*
+ * Register spacing is derived from the resources in
+ * the IPMI platform code.
+ */
+regspacing = regspacings[i];
+if (regspacing == 0)
+regspacing = regsize;
+
+r[0].start = addr;
+r[0].end = r[0].start + regsize - 1;
+r[0].name = "IPMI Address 1";
+r[0].flags = flags;
+
+if (size > 1) {
+r[1].start = r[0].start + regspacing;
+r[1].end = r[1].start + regsize - 1;
+r[1].name = "IPMI Address 2";
+r[1].flags = flags;
+num_r++;
+}
+
+if (size > 2) {
+r[2].start = r[1].start + regspacing;
+r[2].end = r[2].start + regsize - 1;
+r[2].name = "IPMI Address 3";
+r[2].flags = flags;
+num_r++;
+}
+
+if (irqs[i]) {
+r[num_r].start = irqs[i];
+r[num_r].end = irqs[i];
+r[num_r].name = "IPMI IRQ";
+r[num_r].flags = IORESOURCE_IRQ;
+num_r++;
+}
+
pdev = platform_device_alloc("hardcode-ipmi-si", i);
+if (!pdev) {
+pr_err("Error allocating IPMI platform device %d\n", i);
+return;
+}
+
+rv = platform_device_add_resources(pdev, r, num_r);
+if (rv) {
+dev_err(&pdev-&gt;dev,
+"Unable to add hard-code resources: %d\n", rv);
+goto err;
+}
rv = platform_device_add_properties(pdev, p);
if (rv) {
    dev_err(&pdev->dev, "%Unable to add hard-code properties: %d\n", rv);
    goto err;
}

rv = platform_device_add(pdev);
if (rv) {
    dev_err(&pdev->dev, "%Unable to add hard-code device: %d\n", rv);
    goto err;
}

tipmi_hc_pdevs[i] = pdev;
return;

err:
platform_device_put(pdev);
}

void __init ipmi_hardcode_init(void)
{
    unsigned int i;
    char *str;
    char *si_type[SI_MAX_PARMS];
    
    memset(si_type, 0, sizeof(si_type));
    /* Parse out the si_type string into its components. */
    str = si_type_str;
    for (i = 0; i < SI_MAX_PARMS; i++) {
        if (!ports[i] && !addrs[i])
            continue;
        io.addr_source = SI_HARDCODED;
        pr_info(PFX "probing via hardcoded address\n");
        if (i < num_ports && !ports[i])
            ipmi_hardcode_init_one(si_type[i], i, ports[i],
            IORESOURCE_IO);
        if (i < num_addrs && !addrs[i])
            ipmi_hardcode_init_one(si_type[i], i, addrs[i],
            IORESOURCE_IO);
    }
    /* Parse out the si_type string into its components. */
    str = si_type_str;
    for (i = 0; i < SI_MAX_PARMS; i++) {
        if (!ports[i] && !addrs[i])
            continue;
        if (i < num_ports && !ports[i])
            ipmi_hardcode_init_one(si_type[i], i, ports[i],
            IORESOURCE_IO);
        if (i < num_addrs && !addrs[i])
            ipmi_hardcode_init_one(si_type[i], i, addrs[i],
            IORESOURCE_IO);
    }
    /* Parse out the si_type string into its components. */
    str = si_type_str;
    for (i = 0; i < SI_MAX_PARMS; i++) {
        if (!ports[i] && !addrs[i])
            continue;
        if (i < num_ports && !ports[i])
            ipmi_hardcode_init_one(si_type[i], i, ports[i],
            IORESOURCE_IO);
        if (i < num_addrs && !addrs[i])
            ipmi_hardcode_init_one(si_type[i], i, addrs[i],
            IORESOURCE_IO);
    }
}
+ IORESOURCE_MEM);
+
+
-if (!si_type[i] || strcmp(si_type[i], "kcs") == 0) {
  -io.si_type = SI_KCS;
-} else if (strcmp(si_type[i], "smic") == 0) {
  -io.si_type = SI_SMIC;
-} else if (strcmp(si_type[i], "bt") == 0) {
  -io.si_type = SI_BT;
-} else {
  -pr_warn(PFX "Interface type specified for interface %d, was invalid: %s\n", 
    -i, si_type[i]);
  -continue;
  -}
+void ipmi_si_hardcode_exit(void)
+{
+    
+    unsigned int i;

  -if (ports[i]) {
   -/* An I/O port */
    -io.addr_data = ports[i];
    -io.addr_type = IPMI_IO_ADDR_SPACE;
  -} else if (addrs[i]) {
   -/* A memory port */
    -io.addr_data = addrs[i];
    -io.addr_type = IPMI_MEM_ADDR_SPACE;
  -} else {
    -pr_warn(PFX "Interface type specified for interface %d, but port and address were not set or set to zero.\n", 
      -i);
    -continue;
    -}
+for (i = 0; i < SI_MAX_PARMS; i++) {
  +if (ipmi_hc_pdevs[i])
  +platform_device_unregister(ipmi_hc_pdevs[i]);
  +}
+
  -io.addr = NULL;
  -io.regspacing = reg spacings[i];
  -if (!io.reg spacing)
    -io.reg spacing = DEFAULT_REGSPACING;
  -io.reg size = reg sizes[i];
  -if (!io.reg size)
    -io.reg size = DEFAULT_REGSIZ E;
  -io.reg shift = reg shifts[i];
  -io.irq = irqs[i];
  -if (io.irq)
-io.irq_setup = ipmi_std_irq_setup;
-io.slave_addr = slave_addrs[i];

+/*
 + * Returns true of the given address exists as a hardcoded address,
 + * false if not.
 + */
+int ipmi_si_hardcode_match(int addr_type, unsigned long addr)
+
+{unsigned int i;

-ret = ipmi_si_add_smi(&io);
+if (addr_type == IPMI_IO_ADDR_SPACE) {
+    for (i = 0; i < num_ports; i++) {
+        if (ports[i] == addr)
+            return 1;
+    }
+} else {
+    for (i = 0; i < num_addrs; i++) {
+        if (addrs[i] == addr)
+            return 1;
+    }
}

-return ret;
+
+return 0;
}

--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_si_intf.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_si_intf.c
@@ -241,6 +241,9 @@
*/
bool irq_enable_broken;

+/* Is the driver in maintenance mode? */
+bool in_maintenance_mode;
+
+/*
 + * Did we get an attention that we did not handle?
 + */
@@ -252,6 +255,9 @@
/* Default driver model device. */
struct platform_device *pdev;

+/* Have we added the device group to the device? */
+bool dev_group_added;
+
+/* Counters and things for the proc filesystem. */
atomic_t stats[SI_NUM_STATS];
spin_unlock_irqrestore(&(smi_info->si_lock), flags);

if (smi_result == SI_SM_CALL_WITHOUT_DELAY) {
    /* do nothing */
}
else if (smi_result == SI_SM_CALL_WITH_DELAY && busy_wait) {
    schedule();
}
else if (smi_result == SI_SM_IDLE) {
    return 0;
}

              } else if (atomic_read(&smi_info->need_watch)) {
        schedule_timeout_interruptible(100);
    } else {
        @[1044,8] +1059.9 @@
        __set_current_state(TASK_INTERRUPTIBLE);
        schedule();
    }
}

if (!enable)
    atomic_set(&smi_info->req_events, 0);
+smi_info->in_maintenance_mode = enable;

static const struct ipmi_smi_handlers handlers = {
    @[1973,6] +1990.18 @@
    int rv = 0;
    struct smi_info *new_smi, *dup;
+/*
+ * If the user gave us a hard-coded device at the same
+ * address, they presumably want us to use it and not what is
+ * in the firmware.
+ */
+if (io->addr_source != SI_HARDCODED &&
+    ipmi_si_hardcode_match(io->addr_type, io->addr_data)) {
+    dev_info(io->dev,
+             "Hard-coded device at this address already exists");
+    return -ENODEV;
+}
+
+if (!io->io_setup) {
+    if (io->addr_type == IPMI_IO_ADDR_SPACE) {
+        io->io_setup = ipmi_si_port_setup;
+    }
+}
+@@ -2025,8 +2054,8 @@
+    if (initialized) {
+        rv = try_smi_init(new_smi);
+    }
+    if (rv) {
+        -mutex_unlock(&smi_infos_lock);
+        cleanup_one_si(new_smi);
+        +mutex_unlock(&smi_infos_lock);
+        return rv;
+    }
+    int i;
+    char *init_name = NULL;
+    bool platform_device_registered = false;
+
+    pr_info(PFX "Trying %s-specified %s state machine at %s address 0x%lx, slave address 0x%x, irq %d
",
+             ipmi_addr_src_to_str(new_smi->io.addr_source),
+             @@ -2045,6 +2074,7 @@
+             int rv = 0;
+             int i;
+            char *init_name = NULL;
+            bool platform_device_registered = false;
+
+            pr_info(PFX "Trying %s-specified %s state machine at %s address 0x%lx, slave address 0x%x, irq %d
",
+                ipmi_addr_src_to_str(new_smi->io.addr_source),
+                @@ -2173,6 +2203,7 @@
+                rv);
+            goto out_err;
+        }
+        +platform_device_registered = true;
+    }
+
+    dev_set_drvdata(new_smi->io.dev, new_smi);
+    @@ -2183,6 +2214,7 @@
+    rv);
+    goto out_err_stop_timer;
+}
+    +new_smi->dev_group_added = true;
+
+    rv = ipmi_register_smi(&handlers,
+    "Register SMI"
new_smi,
@@ -2236,7 +2268,10 @@
 return 0;

 out_err_remove_attrs:
 -device_remove_group(new_smi->io.dev, &ipmi_si_dev_attr_group);
 +if (new_smi->dev_group_added) {
 +device_remove_group(new_smi->io.dev, &ipmi_si_dev_attr_group);
 +new_smi->dev_group_added = false;
 +}
 dev_set_drvdata(new_smi->io.dev, NULL);

 out_err_stop_timer:
 @@ -2279,10 +2314,12 @@
 }

 if (new_smi->pdev) {
 -platform_device_unregister(new_smi->pdev);
 +if (platform_device_registered)
 +platform_device_unregister(new_smi->pdev);
 +else
 +platform_device_put(new_smi->pdev);
 new_smi->pdev = NULL;
 -} else if (new_smi->pdev) {
 -platform_device_put(new_smi->pdev);
 +new_smi->io.dev = NULL;
 }

 kfree(init_name);
 @@ -2290,7 +2327,7 @@
 return rv;
 }

 -static int init_ipmi_si(void)
 +static int __init init_ipmi_si(void)
 {  
 struct smi_info *e;
 enum ipmi_addr_src type = SI_INVALID;
 @@ -2298,12 +2335,9 @@
 if (initialized)
 return 0;

 +ipmi_hardcode_init();
 pr_info("IPMI System Interface driver.
");

 /* If the user gave us a device, they presumably want us to use it */
 -if (!ipmi_si_hardcode_find_bmc())
 +goto do_scan;
ipmi_si_platform_init();

ipmi_si_pci_init();
@@ -2314,7 +2348,6 @@
 with multiple BMCs we assume that there will be several instances of a given type so if we succeed in registering a type then also try to register everything else of the same type */
do_scan:
mutex_lock(&smi_infos_lock);
list_for_each_entry(e, &smi_infos, link) {
/* Try to register a device if it has an IRQ and we either
@@ -2379,8 +2412,10 @@
	device_remove_group(to_clean->io.dev, &ipmi_si_dev_attr_group);
-dev_set_drvdata(to_clean->io.dev, NULL);
+if (to_clean->dev_group_added)
+device_remove_group(to_clean->io.dev, &ipmi_si_dev_attr_group);
+if (to_clean->io.dev)
+dev_set_drvdata(to_clean->io.dev, NULL);

list_del(&to_clean->link);

@@ -2477,6 +2512,8 @@
list_for_each_entry_safe(e, tmp_e, &smi_infos, link)
cleanup_one_si(e);
mutex_unlock(&smi_infos_lock);
+
ipmi_si_hardcode_exit();
} module_exit(cleanup_ipmi_si);

--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_si_mem_io.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_si_mem_io.c
@@ -50,7 +50,7 @@
 static void mem_outq(const struct si_sm_io *io, unsigned int offset,
 unsigned char b)
 {
- writeq(b << io->regshift, (io->addr)+(offset * io->regspacing));
+ writeq((u64)b << io->regshift, (io->addr)+(offset * io->regspacing));
 } #endif

--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_si_pci.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_si_pci.c
@@ -65,6 +65,15 @@
return DEFAULT_REGSPACING;
}

+static struct pci_device_id ipmi_pci_blacklist[] = {
+/*
+ * This is a "Virtual IPMI device", whatever that is.  It appears
+ * as a KCS device by the class, but it is not one.
+ */
+{ PCI_VDEVICE(REALTEK, 0x816c) },
+{ 0, }
+};
+
+static int ipmi_pci_probe(struct pci_dev *pdev,
+const struct pci_device_id *ent)
+{  
+    int class_type = pdev->class & PCI_ERMC_CLASSCODE_TYPE_MASK;
+    struct si_sm_io io;
+    if (pci_match_id(ipmi_pci_blacklist, pdev))
+        return -ENODEV;
+    memset(&io, 0, sizeof(io));
+    io.addr_source = SI_PCI;
+    dev_info(&pdev->dev, "probing via PCI");
+    if (io.irq)
+        io.irq_setup = ipmi_std_irq_setup;
+    io.addr_data = pci_resource_start(pdev, 0);
+    +io.dev = &pdev->dev;
+    io.regspacing = ipmi_pci_probe_regspacing(&io);
+    io.regsize = DEFAULT_REGSIZE;
+    io.regshift = 0;
+    if (io.irq)
+        io.irq_setup = ipmi_std_irq_setup;
+    io.dev = &pdev->dev;
+    -dev_info(&pdev->dev, "%pR regsize %d spacing %d irq %d\n",
+ &pdev->resource[0], io.regsize, io.regspacing, io.irq);
+    --- linux-4.15.0.orig/drivers/char/ipmi/ipmi_si_platform.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_si_platform.c
@@ -273,8 +273,6 @@
if (res_second->start > io->addr_data)
    io->regspacing = res_second->start - io->addr_data;
-io->regsize = DEFAULT_REGSIZE;
-io->regshift = 0;

return res;
}

static int platform_ipmi_probe(struct platform_device *pdev)
{
    struct si_sm_io io;
    u8 type, slave_addr, addr_source;
    +u8 type, slave_addr, addr_source, regsize, regshift;
    int rv;

    rv = device_property_read_u8(&pdev->dev, "addr-source", &addr_source);
    @@ -294,7 +292,7 @@
    if (addr_source == SI_SMBIOS) {
        if (!si_trydmi)
            return -ENODEV;
@@ -314,11 +312,23 @@
    case SI_BT:
        io.si_type = type;
        break;
        +case SI_TYPE_INVALID: /* User disabled this in hardcode. */
        +return -ENODEV;
        default:
            dev_err(&pdev->dev, "ipmi-type property is invalid\n");
            return -EINVAL;
    }

    +io.regsize = DEFAULT_REGSIZE;
    +rv = device_property_read_u8(&pdev->dev, "reg-size", &regsize);
    +if (!rv)
        +io.regsize = regsize;
        +
    +io.regshift = 0;
    +rv = device_property_read_u8(&pdev->dev, "reg-shift", &regshift);
    +if (!rv)
        +io.regshift = regshift;
        +
    if (!ipmi_get_info_from_resources(pdev, &io))
        return -EINVAL;


io.dev = &pdev->dev;

-pr_info("ipmi_si: SMBIOS: %s %ld regsize %d spacing %d irq %d\n", 
+pr_info("ipmi_si: %s: %s %ld regsize %d spacing %d irq %d\n", 
+ipmi_addr_src_to_str(addr_source), (io.addr_type == IPMI_IO_ADDR_SPACE) ? "io" : "mem", 
io.addr_data, io.regsize, io.regspacing, io.irq);

@@ -503,6 +514,9 @@
goto err_free;
}

+io.regsize = DEFAULT_REGSIZE;
+io.regshift = 0;
+
res = ipmi_get_info_from_resources(pdev, &io);
if (!res) {
    rv = -EINVAL;
@@ -564,6 +578,11 @@
    return ipmi_si_remove_by_dev(&pdev->dev);
}

+static const struct platform_device_id si_plat_ids[] = {
+    { "hardcode-ipmi-si", 0 },
+    { }
+};
+
struct platform_driver ipmi_platform_driver = {
    .driver = {
        .name = DEVICE_NAME,
@@ -572,6 +591,7 @@
        .probe = ipmi_probe,
        .remove = ipmi_remove,
        +.id_table = si_plat_ids
    },
    void ipmi_si_platform_init(void)
--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_ssif.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_ssif.c
@@ -64,6 +64,7 @@
    #define SSIF_IPMI_REQUEST 2
    #define SSIF_IPMI_MULTI_PART_REQUEST_START 6
    #define SSIF_IPMI_MULTI_PART_REQUEST_MIDDLE 7
+    #define SSIF_IPMI_MULTI_PART_REQUEST_END 8
    #define SSIF_IPMI_RESPONSE 3

Open Source Used In 5GaaS Edge AC-4 20152
#define SSIF_IPMI_MULTI_PART_RESPONSE_MIDDLE

@@ -185,6 +186,8 @@
 struct device *dev;
 struct i2c_client *client;

+struct i2c_client *added_client;
 +
 struct mutex clients_mutex;
 struct list_head clients;

@@ -274,6 +277,7 @@
/* Info from SSIF cmd */
 unsigned char max_xmit_msg_size;
 unsigned char max_recv_msg_size;
+bool cmd8_works; /* See test_multipart_messages() for details. */
 unsigned int multi_support;
 int supports_pec;

@@ -617,8 +621,9 @@
 flags = ipmi_ssif_lock_cond(ssif_info, &oflags);
 ssif_info->waiting_alert = true;
 ssif_info->rtc_us_timer = SSIF_MSG_USEC;
- mod_timer(&ssif_info->retry_timer,
- jiffies + SSIF_MSG_JIFFIES);
+ if (!ssif_info->stopping)
+ mod_timer(&ssif_info->retry_timer,
+ jiffies + SSIF_MSG_JIFFIES);
 ipmi_ssif_unlock_cond(ssif_info, flags);
 return;
 }
@@ -640,8 +645,9 @@
/* Remove the multi-part read marker. */
 len -= 2;
 +data += 2;
 for (i = 0; i < len; i++)
- ssif_info->data[i] = data[i+2];
+ ssif_info->data[i] = data[i];
 ssif_info->multi_len = len;
 ssif_info->multi_pos = 1;

@@ -669,8 +675,19 @@
}

/* Remove the multi-part read marker. */
 len -= 2;
 +data += 2;
 for (i = 0; i < len; i++)
- ssif_info->data[i] = data[i+2];
+ ssif_info->data[i] = data[i];
 ssif_info->multi_len = len;
 ssif_info->multi_pos = 1;

@@ -699,8 +715,19 @@
}

blocknum = data[0];
 +len--;
 +data++;
if (blocknum != 0xff && len != 31) {
    /* All blocks but the last must have 31 data bytes. */
    result = -EIO;
    if (ssif_info->ssif_debug & SSIF_DEBUG_MSG)
        pr_info("Received middle message <31\n");

    -if (ssif_info->multi_len + len - 1 > IPMI_MAX_MSG_LENGTH) {
        goto continue_op;
    +}

    +if (ssif_info->multi_len + len > IPMI_MAX_MSG_LENGTH) {
        /* Received message too big, abort the operation. */
        result = -E2BIG;
    if (ssif_info->ssif_debug & SSIF_DEBUG_MSG)
        @@ -679,10 +696,8 @@
goto continue_op;
    }

    /* Remove the blocknum from the data. */
    -len--;
    for (i = 0; i < len; i++)
        -ssif_info->data[i + ssif_info->multi_len] = data[i + 1];
        +ssif_info->data[i + ssif_info->multi_len] = data[i];
    ssif_info->multi_len += len;
    if (blocknum == 0xff) {
        /* End of read */
        @@ -694,6 +709,10 @@
        * numbers start at zero for the second block,
        * but multi_pos starts at one, so the +1.
        */
        +if (ssif_info->ssif_debug & SSIF_DEBUG_MSG)
            +dev_dbg(&ssif_info->client->dev,
                +"Received message out of sequence, expected %u, got %u\n",
                +ssif_info->multi_pos - 1, blocknum);
            result = -EIO;
        } else {
            ssif_inc_stat(ssif_info, received_message_parts);
        //@ -716,6 +735,7 @@
        }

    + continue_op:
    if (result < 0) {
        ssif_inc_stat(ssif_info, receive_errors);
    } else {
        @@ -723,8 +743,6 @@
            ssif_inc_stat(ssif_info, received_message_parts);
        }
if (ssif_info->ssif_debug & SSIF_DEBUG_STATE)
pr_info(PFX "DONE 1: state = %d, result=%d\n", ssif_info->ssif_state, result);
@@ -732,10 +750,14 @@
flags = ipmi_ssif_lock_cond(ssif_info, &oflags);
msg = ssif_info->curr_msg;
if (msg) {
+if (data) {
+len = IPMI_MAX_MSG_LENGTH;
+memcpy(msg->rsp, data, len);
+} else {
+len = 0;
+
} msg->rsp_size = len;
-if (msg->rsp_size > IPMI_MAX_MSG_LENGTH)
-msg->rsp_size = IPMI_MAX_MSG_LENGTH;
-memcpy(msg->rsp, data, msg->rsp_size);
ssif_info->curr_msg = NULL;
}
@@ -761,7 +783,7 @@
ssif_info->ssif_state = SSIF_NORMAL;
ipmi_ssif_unlock_cond(ssif_info, flags);
pr_warn(PFX "Error getting flags: %d %d, %x\n", -result, len, data[2]);
+result, len, (len >= 3) ? data[2] : 0);
} else if (data[0] != (IPMI_NETFN_APP_REQUEST | 1) << 2
  && data[1] != IPMI_GET_MSG_FLAGS_CMD) {
/*
 @@ -783,7 +805,7 @@
if ((result < 0) || (len < 3) || (data[2] != 0)) {
/* Error clearing flags */
pr_warn(PFX "Error clearing flags: %d %d, %x\n", -result, len, data[2]);
+result, len, (len >= 3) ? data[2] : 0);
} else if (data[0] != (IPMI_NETFN_APP_REQUEST | 1) << 2
  && data[1] != IPMI_CLEAR_MSG_FLAGS_CMD) {
pr_warn(PFX "Invalid response clearing flags: %x %x\n", @@ -898,32 +920,33 @@
* in the SSIF_MULTI_n_PART case in the probe function
* for details on the intricacies of this.
*/
-int left:
+int left, to_write;
unsigned char *data_to_send;
+unsigned char cmd;

ssif_inc_stat(ssif_info, sent_messages_parts);

left = ssif_info->multi_len - ssif_info->multi_pos;
-if (left > 32)
- left = 32;
+to_write = left;
+if (to_write > 32)
+to_write = 32;
/* Length byte. */
-ssif_info->multi_data[ssif_info->multi_pos] = left;
+ssif_info->multi_data[ssif_info->multi_pos] = to_write;
data_to_send = ssif_info->multi_data + ssif_info->multi_pos;
-ssif_info->multi_pos += left;
-if (left < 32)
 */
- * Write is finished.  Note that we must end
- * with a write of less than 32 bytes to
- * complete the transaction, even if it is
- * zero bytes.
- */
+ssif_info->multi_pos += to_write;
+cmd = SSIF_IPMI_MULTI_PART_REQUEST_MIDDLE;
+if (ssif_info->cmd8_works) {
+if (left == to_write) {
+ cmd = SSIF_IPMI_MULTI_PART_REQUEST_END;
+ ssif_info->multi_data = NULL;
+ }
+} else if (to_write < 32) {
+ ssif_info->multi_data = NULL;
+ }

rv = ssif_i2c_send(ssif_info, msg_written_handler,
- I2C_SMBUS_WRITE,
- SSIF_IPMI_MULTI_PART_REQUEST_MIDDLE,
- data_to_send,
- I2C_SMBUS_BLOCK_DATA);
+ I2C_SMBUS_WRITE, cmd,
+ data_to_send, I2C_SMBUS_BLOCK_DATA);
if (rv < 0) {
/* request failed, just return the error. */
 ssif_inc_stat(ssif_info, send_errors);
@@ -.950,8 +973,9 @@
 ssif_info->waiting_alert = true;
 ssif_info->retries_left = SSIF_RECV_RETRIES;
ssif_info->rtc_us_timer = SSIF_MSG_PART_USEC;
-mod_timer(&ssif_info->retry_timer,
- jiffies + SSIF_MSG_PART_JIFFIES);
+if (!ssif_info->stopping)
+mod_timer(&ssif_info->retry_timer,
+ jiffies + SSIF_MSG_PART_JIFFIES);
ipmi_ssif_unlock_cond(ssif_info, flags);
}
}
@@ -1278,6 +1302,24 @@
return 0;
}

+static int read_response(struct i2c_client *client, unsigned char *resp)
+{
+int ret = -ENODEV, retry_cnt = SSIF_RECV_RETRIES;
+
+while (retry_cnt > 0) {
+ret = i2c_smbus_read_block_data(client, SSIF_IPMI_RESPONSE,
+resp);
+if (ret > 0)
+break;
+msleep(SSIF_MSG_MSEC);
+retry_cnt--;
+if (retry_cnt <= 0)
+break;
+}
+
+return ret;
+}
+
static int do_cmd(struct i2c_client *client, int len, unsigned char *msg,
int *resp_len, unsigned char *resp)
{
@@ -1294,26 +1336,16 @@
return -ENODEV;
}

-ret = -ENODEV;
-retry_cnt = SSIF_RECV_RETRIES;
-while (retry_cnt > 0) {
-ret = i2c_smbus_read_block_data(client, SSIF_IPMI_RESPONSE,
-resp);
-if (ret > 0)
-break;
-msleep(SSIF_MSG_MSEC);
-retry_cnt--;
-if (retry_cnt <= 0)
-break;
-
+ret = read_response(client, resp);
if (ret > 0) {
    /* Validate that the response is correct. */
    if (ret < 3 ||
        (resp[0] != (msg[0] | (1 << 2))) ||
        (resp[1] != msg[1]))
        ret = -EINVAL;
    else {
        else if (ret > IPMI_MAX_MSG_LENGTH) {
            ret = -E2BIG;
        } else {
            *resp_len = ret;
            ret = 0;
        }
    }
    return slave_addr;
}

+static int start_multipart_test(struct i2c_client *client,
    unsigned char *msg, bool do_middle)
+
+int retry_cnt = SSIF_SEND_RETRIES, ret;
+
+retry_write:
+ret = i2c_smbus_write_block_data(client,
    + SSIF_IPMI_MULTI_PART_REQUEST_START,
    + 32, msg);
+if (ret) {
    +retry_cnt--;
    +if (retry_cnt > 0)
        goto retry_write;
+dev_err(&client->dev, "Could not write multi-part start, though the BMC said it could handle it. Just limit sends to one part.
    +return ret;
    +
    +if (!do_middle)
        +return 0;
+
+ret = i2c_smbus_write_block_data(client,
    + SSIF_IPMI_MULTI_PART_REQUEST_MIDDLE,
    + 32, msg + 32);
+if (ret) {
    +dev_err(&client->dev, "Could not write multi-part middle, though the BMC said it could handle it. Just limit sends to one part.

+return ret;
+
+return 0;
+
+static void test_multipart_messages(struct i2c_client *client,
+  struct ssif_info *ssif_info,
+  unsigned char *resp)
+{
+unsigned char msg[65];
+int ret;
+bool do_middle;
+
+if (ssif_info->max_xmit_msg_size <= 32)
+-return;
+
+do_middle = ssif_info->max_xmit_msg_size > 63;
+
+memset(msg, 0, sizeof(msg));
+msg[0] = IPMI_NETFN_APP_REQUEST << 2;
+msg[1] = IPMI_GET_DEVICE_ID_CMD;
+
+% The specification is all messed up dealing with sending
+% multi-part messages. Per what the specification says, it
+% is impossible to send a message that is a multiple of 32
+% bytes, except for 32 itself. It talks about a "start"
+% transaction (cmd=6) that must be 32 bytes, "middle"
+% transaction (cmd=7) that must be 32 bytes, and an "end"
+% transaction. The "end" transaction is shown as cmd=7 in
+% the text, but if that's the case there is no way to
+% differentiate between a middle and end part except the
+% length being less than 32. But there is a table at the far
+% end of the section (that I had never noticed until someone
+% pointed it out to me) that mentions it as cmd=8.
+
+% After some thought, I think the example is wrong and the
+% end transaction should be cmd=8. But some systems don't
+% implement cmd=8, they use a zero-length end transaction,
+% even though that violates the SMBus specification.
+
+% So, to work around this, this code tests if cmd=8 works.
+% If it does, then we use that. If not, it tests zero-
+% byte end transactions. If that works, good. If not,
+% we only allow 63-byte transactions max.
+*/
+
+ret = start_multipart_test(client, msg, do_middle);
+if (ret)
+goto out_no_multi_part;
+
+ret = i2c_smbus_write_block_data(client,
+ SSIF_IPMI_MULTI_PART_REQUEST_END,
+ 1, msg + 64);
+
+if (!ret)
+ret = read_response(client, resp);
+
+if (ret > 0) {
+/* End transactions work, we are good. */
+ssif_info->cmd8_works = true;
+return;
+}
+
+ret = start_multipart_test(client, msg, do_middle);
+if (ret) {
+dev_err(&client->dev, "Second multipart test failed.
");
+goto out_no_multi_part;
+}
+
+ret = i2c_smbus_write_block_data(client,
+ SSIF_IPMI_MULTI_PART_REQUEST_MIDDLE,
+ 0, msg + 64);
+if (!ret)
+ret = read_response(client, resp);
+
+if (ret > 0)
+/* Zero-size end parts work, use those. */
+return;
+
+/* Limit to 63 bytes and use a short middle command to mark the end. */
+if (ssif_info->max_xmit_msg_size > 63)
+ssif_info->max_xmit_msg_size = 63;
+return;
+
+out_no_multi_part:
+ssif_info->max_xmit_msg_size = 32;
+return;
+
+/*
* Global enables we care about.
*/
@@ -1577,26 +1724,7 @@ break;

case SSIF_MULTI_n_PART:
	/*
	 * The specification is rather confusing at
	 * this point, but I think I understand what
	 * is meant. At least I have a workable
	 * solution. With multi-part messages, you
	 * cannot send a message that is a multiple of
	 * 32-bytes in length, because the start and
	 * middle messages are 32-bytes and the end
	 * message must be at least one byte. You
	 * can't fudge on an extra byte, that would
	 * screw up things like fru data writes. So
	 * we limit the length to 63 bytes. That way
	 * a 32-byte message gets sent as a single
	 * part. A larger message will be a 32-byte
	 * start and the next message is always going
	 * to be 1-31 bytes in length. Not ideal, but
	 * it should work.
	 */
	@if (ssif_info->max_xmit_msg_size > 63)
	-ssif_info->max_xmit_msg_size = 63;
+/* We take whatever size given, but do some testing. */
	break;

default:
@@ -1615,6 +1743,8 @@
	ssif_info->supports_pec = 0;
}

+test_multipart_messages(client, ssif_info, resp);
+
+/* Make sure the NMI timeout is cleared. */
+msg[0] = IPMI_NETFN_APP_REQUEST << 2;
+msg[1] = IPMI_CLEAR_MSG_FLAGS_CMD;
@@ -1764,15 +1894,9 @@
+out:
+if (rv) {
+  /*
+   * Note that if addr_info->client is assigned, we
+   * leave it. The i2c client hangs around even if we
+   * return a failure here, and the failure here is not
+   * propagated back to the i2c code. This seems to be
+   * design intent, strange as it may be. But if we
+   * don't leave it, ssif_platform_remove will not remove
+   * the client like it should.
+   */
+   if (addr_info)
+addr_info->client = NULL;
+
+dev_err(&client->dev, "Unable to start IPMI SSIF: %d\n", rv);
+kfree(ssif_info);
+
}@@ -1797,7 +1921,8 @@
if (adev->type != &i2c_adapter_type)
    return 0;

-i2c_new_device(to_i2c_adapter(adev), &addr_info->binfo);
+addr_info->added_client = i2c_new_device(to_i2c_adapter(adev),
 + &addr_info->binfo);
+}
+
+if (!addr_info->adapter_name)
+    return 1; /* Only try the first I2C adapter by default. */
++@ -1906,108 +2031,6 @@
+ { },
+ };
+MODULEDEVICE_TABLE(acpi, ssif_acpi_match);
-
-/*
-* Once we get an ACPI failure, we don't try any more, because we go
-* through the tables sequentially. Once we don't find a table, there
-* are no more.
- */
-
-static int acpi_failure;
-
-/*
-* * Defined in the IPMI 2.0 spec.
-* */
-
-struct SPMITable {
-  s8 Signature[4];
-  u32 Length;
-  u8 Revision;
-  u8 Checksum;
-  s8 OEMID[6];
-  s8 OEMTableID[8];
-  s8 OEMRevision[4];
-  s8 CreatorID[4];
-  s8 CreatorRevision[4];
-  u8 InterfaceType;
-  u8 IPMILegacy;
-  s16 SpecificationRevision;
-
-/*
- * Bit 0 - SCI interrupt supported
- * Bit 1 - I/O APIC/SAPIC
- */
- u8 InterruptType;
-
-/*
- * If bit 0 of InterruptType is set, then this is the SCI
- * interrupt in the GPEx_STS register.
- */
-u8 GPE;
-
-s16 Reserved;
-
-/*
- * If bit 1 of InterruptType is set, then this is the I/O
- * APIC/SAPIC interrupt.
- */
-u32 GlobalSystemInterrupt;
-
-/* The actual register address. */
-struct acpi_generic_address addr;
-
-u8 UID[4];
-
-s8 spmi_id[1]; /* A '0' terminated array starts here. */
-
-static int try_init_spmi(struct SPMITable *spmi)
-
{
-unsigned short myaddr;
-
-if (num_addrs >= MAX_SSIF_BMCS)
-return -1;
-
-if (spmi->IPMIlegacy != 1) {
-pr_warn("IPMI: Bad SPMI legacy: %d\n", spmi->IPMIlegacy);
-return -ENODEV;
-}
-
-if (spmi->InterfaceType != 4)
-return -ENODEV;
-
-if (spmi->addr.space_id != ACPI_ADR_SPACE_SMBUS) {
-pr_warn(PFX "Invalid ACPI SSIF I/O Address type: %d\n",
-spmi->addr.space_id);
-return -EIO;
-}
-
-myaddr = spmi->addr.address & 0x7f;
-
-return new_ssif_client(myaddr, NULL, 0, 0, SI_SPMI, NULL);
static void spmi_find_bmc(void) {
    acpi_status status;
    struct SPMITable *spmi;
    int i;

    if (acpi_disabled)
        return;

    if (acpi_failure)
        return;

    for (i = 0; ; i++) {
        status = acpi_get_table(ACPI_SIG_SPMI, i+1,
                            (struct acpi_table_header **)&spmi);
        if (status != AE_OK)
            return;

        try_init_spmi(spmi);
    }

#else
    static void spmi_find_bmc(void) {}
#endif

#ifdef CONFIG_DMI
@@ -2071,8 +2094,8 @@
    return 0;
    mutex_lock(&ssif_infos_mutex);
    if (addr_info->client)
        i2c_unregister_device(addr_info->client);
+    if (addr_info->added_client)
+        i2c_unregister_device(addr_info->added_client);

    list_del(&addr_info->link);
    kfree(addr_info);
@@ -2113,9 +2136,6 @@
    ssif_i2c_driver.driver.acpi_match_table =
            ACPI_PTR(ssif_acpi_match);

-    if (ssif_tryacpi)
-        spmi_find_bmc();
-    if (ssif_trydmi) {
    rv = platform_driver_register(&ipmi_driver);
if (rv)
--- linux-4.15.0.orig/drivers/char/ipmi/ipmi_watchdog.c
+++ linux-4.15.0/drivers/char/ipmi/ipmi_watchdog.c
@@ -394,16 +394,18 @@
data[0] = 0;
WDOG_SET_TIMER_USE(data[0], WDOG_TIMER_USE_SMS_OS);

-if ((ipmi_version_major > 1)
-    || ((ipmi_version_major == 1) && (ipmi_version_minor >= 5))) {
-    /* This is an IPMI 1.5-only feature. */
-data[0] |= WDOG_DONT_STOP_ON_SET;
-} else if (ipmi_watchdog_state != WDOG_TIMEOUT_NONE) {
-    /*
-     * In ipmi 1.0, setting the timer stops the watchdog, we
-     * need to start it back up again.
-     */
-    hbnow = 1;
+if (ipmi_watchdog_state != WDOG_TIMEOUT_NONE) {
+    if ((ipmi_version_major > 1) ||
+        ((ipmi_version_major == 1) && (ipmi_version_minor >= 5))) {
+        /* This is an IPMI 1.5-only feature. */
+        data[0] |= WDOG_DONT_STOP_ON_SET;
+    } else {
+        /*
+         * In ipmi 1.0, setting the timer stops the watchdog, we
+         * need to start it back up again.
+         */
+        hbnow = 1;
+    }
+
    data[1] = 0;
--- linux-4.15.0.orig/drivers/char/mem.c
+++ linux-4.15.0/drivers/char/mem.c
@@ -97,6 +97,13 @@
}
#endif

static inline bool should_stop_iteration(void)
+{
+    if (need_resched())
+        cond_resched();
+    return fatal_signal_pending(current);
+}
+
/*
 * This function reads the *physical* memory. The f_pos points directly to the
 * memory location.
phys_addr_t p = *ppos;
ssize_t read, sz;
void *ptr;
char *bounce;
int err;

if (p != *ppos)
return 0;

bounce = kmalloc(PAGE_SIZE, GFP_KERNEL);
if (!bounce)
	return -ENOMEM;

while (count > 0) {
unsigned long remaining;
allowed = page_is_allowed(p >> PAGE_SHIFT);
if (!allowed)
	error = -EPERM;
if (allowed == 2) {
/* Show zeros for restricted memory. */
remaining = clear_user(buf, sz);
ptr = xlate_dev_mem_ptr(p);
if (!ptr)
	return -EFAULT;

remaining = copy_to_user(buf, ptr, sz);
if (probe)
goto failed;

probe = probe_kernel_read(bounce, ptr, sz);
xlate_dev_mem_ptr(p, ptr);
if (probe)
goto failed;


+remaining = copy_to_user(buf, bounce, sz);
}

if (remaining)
+return -EFAULT;
+goto failed;

buf += sz;
p += sz;
count -= sz;
read += sz;
+if (should_stop_iteration())
+break;
}
+kfree(bounce);

*ppos += read;
return read;
+
+failed:
+kfree(bounce);
+return err;
}

static ssize_t write_mem(struct file *file, const char __user *buf,
@@ -234,6 +260,8 @@
p += sz;
count -= sz;
written += sz;
+if (should_stop_iteration())
+break;
}
*ppos += written;
@@ -451,6 +479,10 @@
read += sz;
low_count -= sz;
count -= sz;
+if (should_stop_iteration()) {
+count = 0;
+break;
+}
}

@@ -475,6 +507,8 @@
buf += sz;
read += sz;
p += sz;
+if (should_stop_iteration())
+break;
}
free_page((unsigned long)kbuf);
}
@@ -527,6 +561,8 @@
p += sz;
count -= sz;
written += sz;
+if (should_stop_iteration())
+break;
}
*ppos += written;
@@ -578,6 +614,8 @@
buf += sz;
virtr += sz;
p += sz;
+if (should_stop_iteration())
+break;
}
free_page((unsigned long)kbuf);
}
@@ -767,6 +805,8 @@

static int open_port(struct inode *inode, struct file *filp)
{
+if (kernel_is_locked_down("/dev/mem,kmem,port"))
+return -EPERM;
return capable(CAP_SYS_RAWIO) ? 0 : -EPERM;
}

--- linux-4.15.0.orig/drivers/char/mwave/mwavedd.c
+++ linux-4.15.0/drivers/char/mwave/mwavedd.c
@@ -59,6 +59,7 @@
#include <linux/mutex.h>
#include <linux/delay.h>
#include <linux/serial_8250.h>
+##include <linux/nospec.h>
#include "smapi.h"
#include "mwavedd.h"
#include "3780i.h"
@@ -289,6 +290,8 @@
 ipcnum);
return -EINVAL;
}
+ipcnum = array_index_nospec(ipcnum,
ARRAY_SIZE(pDrvData->IPCs));
PRINTK_3(TRACE_MWAVE,
"mwavedd::mwave_ioctl IOCTL_MW_REGISTER_IPC"
" ipcnum %x entry usIntCount %x\n",
@@ -317,6 +320,8 @@
" Invalid ipcnum %x\n", ipcnum);
return -EINVAL;
}
+ipcnum = array_index_nospec(ipcnum,
+ ARRAY_SIZE(pDrvData->IPCs));
PRINTK_3(TRACE_MWAVE,
"mwavedd::mwave_ioctl IOCTL_MW_GET_IPC"
" ipcnum %x, usIntCount %x\n",
@@ -383,6 +388,8 @@
ipcnum);
return -EINVAL;
}
+ipcnum = array_index_nospec(ipcnum,
+ ARRAY_SIZE(pDrvData->IPCs));
mutex_lock(&mwave_mutex);
if (pDrvData->IPCs[ipcnum].bIsEnabled == true) {
  pDrvData->IPCs[ipcnum].bIsEnabled = false;
--- linux-4.15.0.orig/drivers/char/pcmcia/cm4000_cs.c
+++ linux-4.15.0/drivers/char/pcmcia/cm4000_cs.c
@@ -544,6 +544,10 @@
io_read_num_rec_bytes(iobase, &num_bytes_read);
if (num_bytes_read >= 4) {
  DEBUGP(2, dev, "NumRecBytes = %i\n", num_bytes_read);
+if (num_bytes_read > 4) {
+  rc = -EIO;
+  goto exit_setprotocol;
+}
break;
}
mdelay(10);
--- linux-4.15.0.orig/drivers/char/ppdev.c
+++ linux-4.15.0/drivers/char/ppdev.c
@@ -623,20 +623,27 @@
if (copy_from_user(time32, argp, sizeof(time32)))
  return -EFAULT;
+if ((time32[0] < 0) || (time32[1] < 0))
+  return -EINVAL;
+return pp_set_timeout(pp->pdev, time32[0], time32[1]);
  
  case PPSETTIME64:
    if (copy_from_user(time64, argp, sizeof(time64)))
  

return -EFAULT;

+if ((time64[0] < 0) || (time64[1] < 0))
+return -EINVAL;
+
+if (IS_ENABLED(CONFIG_SPARC64) && !in_compat_syscall())
+time64[1] >>= 32;
+
return pp_set_timeout(pp->pdev, time64[0], time64[1]);

case PPGETTIME32:
  jiffies_to_timespec64(pp->pdev->timeout, &ts);
  time32[0] = ts.tv_sec;
  time32[1] = ts.tv_nsec / NSEC_PER_USEC;
  -if ((time32[0] < 0) || (time32[1] < 0))
  -return -EINVAL;

if (copy_to_user(argp, time32, sizeof(time32)))
return -EFAULT;
@@ -647,8 +654,9 @@
jiffies_to_timespec64(pp->pdev->timeout, &ts);
  time64[0] = ts.tv_sec;
  time64[1] = ts.tv_nsec / NSEC_PER_USEC;
  -if ((time64[0] < 0) || (time64[1] < 0))
  -return -EINVAL;
  
+if (IS_ENABLED(CONFIG_SPARC64) && !in_compat_syscall())
+time64[1] <<= 32;

if (copy_to_user(argp, time64, sizeof(time64)))
return -EFAULT;
--- linux-4.15.0.orig/drivers/char/random.c
+++ linux-4.15.0/drivers/char/random.c
@@ -261,6 +261,7 @@
#include <linux/ptrace.h>
#include <linux/workqueue.h>
#include <linux/irq.h>
+include <linux/ratelimit.h>
#include <linux/syscalls.h>
#include <linux/completion.h>
#include <linux/uuid.h>
@@ -427,8 +428,9 @@
* its value (from 0->1->2).
*/

static int crng_init = 0;
-#define crng_ready() (likely(crng_init > 0))
+#define crng_ready() (likely(crng_init > 1))
static int crng_init_cnt = 0;
static unsigned long crng_global_init_time = 0;
#define CRNG_INIT_CNT_THRESH (2*CHACHA20_KEY_SIZE)
static void _extract_crng(struct crng_state *crng,
    __u8 out[CHACHA20_BLOCK_SIZE]);
static void process_random_ready_list(void);
static void _get_random_bytes(void *buf, int nbytes);

static struct ratelimit_state unseeded_warning =
    RATELIMIT_STATE_INIT("warn_unseeded_randomness", HZ, 3);
static struct ratelimit_state urandom_warning =
    RATELIMIT_STATE_INIT("warn_urandom_randomness", HZ, 3);

static int ratelimit_disable __read_mostly;

module_param_named(ratelimit_disable, ratelimit_disable, int, 0644);
MODULE_PARM_DESC(ratelimit_disable, "Disable random ratelimit suppression");

/* OS independent entropy store. Here are the functions which handle
***/

static int credit_entropy_bits_safe(struct entropy_store *r, int nbits)
{
    const int nbits_max = (int)(~0U >> (ENTROPY_SHIFT + 1));
    const int nbits_max = r->poolinfo->poolwords * 32;

    if (nbands < 0)
        return -EINVAL;
    crng->init_time = jiffies - CRNG_RESEED_INTERVAL - 1;
}

#define CONFIG_NUMA
static void do numa_crng_init(struct work_struct *work)
{
    int i;
    struct crng_state *crng;
    struct crng_state **pool;
    
    pool = kcalloc(nr_node_ids, sizeof(*pool), GFP_KERNEL|__GFP_NOFAIL);
    for_each_online_node(i) {
        crng = kmalloc_node(sizeof(struct crng_state),
                           GFP_KERNEL | __GFP_NOFAIL, i);
        spin_lock_init(&crng->lock);
        crng_initialize(crng);
        pool[i] = crng;
static DECLARE_WORK(numa_crng_init_work, do_numa_crng_init);

static void numa_crng_init(void)
{
    schedule_work(&numa_crng_init_work);
}

#else
static void numa_crng_init(void) {}#endif

/*
 * crng_fast_load() can be called by code in the interrupt service
 * path. So we can't afford to dilly-dally.
 */
static int crng_fast_load(const char *cp, size_t len)
{
    unsigned long flags;

    if (!spin_trylock_irqsave(&primary_crng.lock, flags))
        return 0;

    if (crng_ready()) {
        if (crng_init != 0) {
            spin_unlock_irqrestore(&primary_crng.lock, flags);
            return 0;
        }
    }

    return 1;
}

/*
 * crng_slow_load() is called by add_device_randomness, which has two
 * attributes. (1) We can't trust the buffer passed to it is
 * guaranteed to be unpredictable (so it might not have any entropy at
 * all), and (2) it doesn't have the performance constraints of
 * crng_fast_load().
 * 
 * So we do something more comprehensive which is guaranteed to touch
 * all of the primary_crng's state, and which uses a LFSR with a
period of 255 as part of the mixing algorithm. Finally, we do
*not* advance crng_init_cnt since buffer we may get may be something
like a fixed DMI table (for example), which might very well be
unique to the machine, but is otherwise unvarying.

```
static int crng_slow_load(const char *cp, size_t len)
{
    unsigned long flags;
    static unsigned char lfsr = 1;
    unsigned char tmp;
    unsigned i, max = CHACHA20_KEY_SIZE;
    const char *src_buf = cp;
    char *dest_buf = (char *) primary_crng.state[4];
    if (!spin_trylock_irqsave(&primary_crng.lock, flags))
        return 0;
    if (crng_init != 0) {
        spin_unlock_irqrestore(&primary_crng.lock, flags);
        return 0;
    }
    if (len > max)
        max = len;
    for (i = 0; i < max ; i++) {
        tmp = lfsr;
        lfsr >>= 1;
        if (tmp & 1)
            lfsr ^= 0xE1;
        tmp = dest_buf[i % CHACHA20_KEY_SIZE];
        dest_buf[i % CHACHA20_KEY_SIZE] ^= src_buf[i % len] ^ lfsr;
        lfsr += (tmp << 3) | (tmp >> 5);
    }
    spin_unlock_irqrestore(&primary_crng.lock, flags);
    return 1;
}
```

```
static void crng_reseed(struct crng_state *crng, struct entropy_store *r)
{
    unsigned longflags;
    if (!arch_get_random_seed_long(&rv) &&
        _crng_backtrack_protect(&primary_crng, buf.block,
        CHACHA20_KEY_SIZE);
    -spin_lock_irqsave(&primary_crng.lock, flags);
    +spin_lock_irqsave(&crng->lock, flags);
    for (i = 0; i < 8; i++) {
        unsigned longrv;
        if (!arch_get_random_seed_long(&rv) &&
            _crng_backtrack_protect(&primary_crng, buf.block,
            CHACHA20_KEY_SIZE);
        -spin_lock_irqsave(&primary_crng.lock, flags);
        +spin_lock_irqsave(&crng->lock, flags);
        for (i = 0; i < 8; i++) {
            unsigned longrv;
            if (!arch_get_random_seed_long(&rv) &&
```
memzero_explicit(&buf, sizeof(buf));
crng->init_time = jiffies;
-spin_unlock_irqrestore(&primary_crng.lock, flags);
+spin_unlock_irqrestore(&crng->lock, flags);
if (crng == &primary_crng && crng_init < 2) {
  invalidate_batched_entropy();
+numa_crng_init();
crng_init = 2;
process_random_ready_list();
wake_up_interruptible(&crng_init_wait);
pr_notice("random: crng init done\n");
+if (unseeded_warning.missed) {
  +pr_notice("random: %d get_random_xx warning(s) missed 
  + "due to ratelimiting\n",
  + unseeded_warning.missed);
  +unseeded_warning.missed = 0;
  +}
+if (urandom_warning.missed) {
  +pr_notice("random: %d urandom warning(s) missed 
  + "due to ratelimiting\n",
  + urandom_warning.missed);
  +urandom_warning.missed = 0;
  +}
}
}

{ unsigned long v, flags;
  -if (crng_init > 1 &&
    - time_after(jiffies, crng->init_time + CRNG_RESEED_INTERVAL))
  +if (crng_ready()) &&
  +  (time_after(crng->init_time, crng->init_time) ||
  +  time_after(jiffies, crng->init_time + CRNG_RESEED_INTERVAL)))
  crng_reseed(crng, crng == &primary_crng ? &input_pool : NULL);
  spin_lock_irqsave(&crng->lock, flags);
  if (arch_get_random_long(&v))
@@ -981.10 +1089.8 @@
    unsigned long time = random_get_entropy() ^ jiffies;
    unsigned long flags;

    -if (!crng_ready()) {
      -crng_fast_load(buf, size);
      -return;
      -}


+if (!crng_ready() && size)
+crng_slow_load(buf, size);

trace_add_device_randomness(size, _RET_IP_);
spin_lock_irqsave(&input_pool.lock, flags);
@@ -1031,14 +1137,13 @@
 */

if (!state->dont_count_entropy) {
  -delta = sample.jiffies - state->last_time;
  -state->last_time = sample.jiffies;
  +delta = sample.jiffies - READ_ONCE(state->last_time);

  -delta2 = delta - state->last_delta;
  -state->last_delta = delta;
  +delta2 = delta - READ_ONCE(state->last_delta);
  +WRITE_ONCE(state->last_delta, delta);

  -delta3 = delta2 - state->last_delta2;
  -state->last_delta2 = delta2;
  +delta3 = delta2 - READ_ONCE(state->last_delta2);
  +WRITE_ONCE(state->last_delta2, delta2);

if (delta < 0)
  delta = -delta;
@@ -1141,7 +1246,7 @@
 fast_mix(fast_pool);
 add_interrupt_bench(cycles);

 -if (!crng_ready()) {
  +if (unlikely(crng_init == 0)) {
  if ((fast_pool->count >= 64) &&
      crng_fast_load((char *) fast_pool->pool,
        sizeof(fast_pool->pool))) {
    @@ -1491,8 +1596,9 @@
 #ifndef CONFIG_WARN_ALL_UNSEEDERED_RANDOM
 print_once = true;
 #endif
 -pr_notice("random: %s called from %pS with crng_init=%d\n",
    - func_name, caller, crng_init);
 +pr_notice("random: %s called from %pS with crng_init=%d\n",
 +      func_name, caller, crng_init);
 }

 /*
 @@ -1535,6 +1641,56 @@
}
EXPORT_SYMBOL(get_random_bytes);

+ /*
+ * Each time the timer fires, we expect that we got an unpredictable
+ * jump in the cycle counter. Even if the timer is running on another
+ * CPU, the timer activity will be touching the stack of the CPU that is
+ * generating entropy..
+ *
+ * Note that we don't re-arm the timer in the timer itself - we are
+ * happy to be scheduled away, since that just makes the load more
+ * complex, but we do not want the timer to keep ticking unless the
+ * entropy loop is running.
+ *
+ * So the re-arming always happens in the entropy loop itself.
+ */
+static void entropy_timer(struct timer_list *t)
+{
+ credit_entropy_bits(&input_pool, 1);
+
+/*
+ * If we have an actual cycle counter, see if we can
+ * generate enough entropy with timing noise
+ */
+static void try_to_generate_entropy(void)
+{
+ struct {
+ unsigned long now;
+ struct timer_list timer;
+ } stack;
+
+ stack.now = random_get_entropy();
+
+ /* Slow counter - or none. Don't even bother */
+if (stack.now == random_get_entropy())
+return;
+
+timer_setup_on_stack(&stack.timer, entropy_timer, 0);
+while (!crng_ready()) {
+if (!timer_pending(&stack.timer))
+ mod_timer(&stack.timer, jiffies+1);
+ mix_pool_bytes(&input_pool, &stack.now, sizeof(stack.now));
+ schedule();
+ stack.now = random_get_entropy();
+}
+
+del_timer_sync(&stack.timer);
+destroy_timer_on_stack(&stack.timer);
+mix_pool_bytes(&input_pool, &stack.now, sizeof(stack.now));
+
/*
 * Wait for the urandom pool to be seeded and thus guaranteed to supply
 * cryptographically secure random numbers. This applies to: the /dev/urandom
 @@ -1549,7 +1705,17 @@
 {         
     if (likely(crng_ready()))
         return 0;
-return wait_event_interruptible(crng_init_wait, crng_ready());
 +
 +do {
 +int ret;
 +ret = wait_event_interruptible_timeout(crng_init_wait, crng_ready(), HZ);
 +if (ret)
 +return ret > 0 ? 0 : ret;
 +
 +try_to_generate_entropy();
 +} while (!crng_ready());
 +
 +return 0;
 }
 EXPORT_SYMBOL(wait_for_random_bytes);

@@ -1682,28 +1848,14 @@
 */
 static int rand_initialize(void)
 {
-#ifdef CONFIG_NUMA
 -int i;
 -struct crng_state *crng;
 -struct crng_state **pool;
-#endif
-
 init_std_data(&input_pool);
 init_std_data(&blocking_pool);
 crng_initialize(&primary_crng);
-
-#ifdef CONFIG_NUMA
 -pool = kcalloc(nr_node_ids, sizeof(*pool), GFP_KERNEL|__GFP_NOFAIL);
 -for_each_online_node(i) {
 - crng = kmalloc_node(sizeof(struct crng_state),
 - GFP_KERNEL | __GFP_NOFAIL, i);
 - spin_lock_init(&crng->lock);
 - crng_initialize(crng);
 - pool[i] = crng;
+crng_global_init_time = jiffies;
+if (ratelimit_disable) {
+    urandom_warning.interval = 0;
+    unseeded_warning.interval = 0;
+}
-mb();
-crng_node_pool = pool;
-#endif
return 0;
}
early_initcall(rand_initialize);
@@ -1771,9 +1923,10 @@
if (!crng_ready() && maxwarn > 0) {
    maxwarn--;
-    printk(KERN_NOTICE "random: %s: uninitialized urandom read 
-            "("%zd bytes read)\n",
-            current->comm, nbytes);
+    if (__ratelimit(&urandom_warning))
+        printk(KERN_NOTICE "random: %s: uninitialized 
+            ""urandom read (%zd bytes read)\n",
+            current->comm, nbytes);
spin_lock_irqsave(&primary_crng.lock, flags);
crng_init_cnt = 0;
spin_unlock_irqrestore(&primary_crng.lock, flags);
@@ -1803,14 +1956,22 @@
write_pool(struct entropy_store *r, const char __user *buffer, size_t count)
{
    size_t bytes;
-    __u32 buf[16];
+    __u32 t, buf[16];
    const char __user *p = buffer;

    while (count > 0) {
        int b, i = 0;
        +bytes = min(count, sizeof(buf));
        if (copy_from_user(&buf, p, bytes))
            return -EFAULT;

        +for (b = bytes ; b > 0 ; b -= sizeof(__u32), i++) {
+            if (!arch_get_random_int(&t))
+                break;
+            buf[i] ^= t;
+        }
        +
        count -= bytes;
        p += bytes;


input_pool.entropy_count = 0;
blocking_pool.entropy_count = 0;
return 0;
+case RNDRESEEDCRNG:
+if (!capable(CAP_SYS_ADMIN))
+return -EPERM;
+if (crng_init < 2)
+return -ENODATA;
+crng_reseed(&primary_crng, &input_pool);
+crng_global_init_time = jiffies - 1;
+return 0;
default:
return -EINVAL;
}
if (flags & GRND_RANDOM)
return _random_read(flags & GRND_NONBLOCK, buf, count);
-
- if (!crng_ready()) {
-+ if (crng_init == 0) {
if (flags & GRND_NONBLOCK)
return -EAGAIN;
-+ ret = wait_for_random_bytes();
+ret = wait_event_interruptible(crng_init_wait, crng_init > 0);
if (unlikely(ret))
return ret;
}
 u32 entropy_u32[CHACHA20_BLOCK_SIZE / sizeof(u32)];
};
unsigned int position;
+spinlock_t batch_lock;
};
-static rwlock_t batched_entropy_reset_lock = __RW_LOCK_UNLOCKED(batched_entropy_reset_lock);
/
* Get a random word for internal kernel use only. The quality of the random
- number is either as good as RDRAND or as good as /dev/urandom, with the
- goal of being quite fast and not depleting entropy. In order to ensure
+ number is good as /dev/urandom, but there is no backtrack protection, with
+ the goal of being quite fast and not depleting entropy. In order to ensure
* that the randomness provided by this function is okay, the function
- wait_for_random_bytes() should be called and return 0 at least once
- at any point prior.
+ wait_for_random_bytes() should be called and return 0 at least once at any
+ point prior.
static DEFINE_PER_CPU(struct batched_entropy, batched_entropy_u64);
+static DEFINE_PER_CPU(struct batched_entropy, batched_entropy_u64) = {
    +.batch_lock = __SPIN_LOCK_UNLOCKED(batched_entropy_u64.lock),
    +};
+
int u64 get_random_u64(void)
{
    u64 ret;
    bool use_lock;
    unsigned long flags = 0;
+unsigned long flags;
    struct batched_entropy *batch;
    static void *previous;

-#if BITS_PER_LONG == 64
    -if (arch_get_random_long((unsigned long *)&ret))
        -return ret;
    -#else
    -if (arch_get_random_long((unsigned long *)&ret) &&
        -    arch_get_random_long((unsigned long *)&ret + 1))
        -return ret;
    -#endif
    -warn_unseeded_randomness(&previous);

    -use_lock = READ_ONCE(crng_init) < 2;
    -batch = &get_cpu_var(batched_entropy_u64);
    -if (use_lock)
        -read_lock_irqsave(&batched_entropy_reset_lock, flags);
    +batch = raw_cpu_ptr(&batched_entropy_u64);
    +spin_lock_irqsave(&batch->batch_lock, flags);
    if (batch->position % ARRAY_SIZE(batch->entropy_u64) == 0) {
        extract_crng((u8 *)batch->entropy_u64);
        batch->position = 0;
    }
    ret = batch->entropy_u64[batch->position++];
    -if (use_lock)
        -read_unlock_irqrestore(&batched_entropy_reset_lock, flags);
    +spin_unlock_irqrestore(&batch->batch_lock, flags);
    return ret;
}
EXPORT_SYMBOL(get_random_u64);

-#if BITS_PER_LONG == 64
    -static DEFINE_PER_CPU(struct batched_entropy, batched_entropy_u32);
    +#static DEFINE_PER_CPU(struct batched_entropy, batched_entropy_u32) = {
    +.batch_lock = __SPIN_LOCK_UNLOCKED(batched_entropy_u32.lock),
    +};
    +#endif

Open Source Used In 5GaaS Edge AC-4 20180
u32 get_random_u32(void)
{
    u32 ret;
    -bool use_lock;
    -unsigned long flags = 0;
    +unsigned long flags;
    struct batched_entropy *batch;
    static void *previous;

    -if (arch_get_random_int(&ret))
        -return ret;
    -
        warn_unseeded_randomness(&previous);

    -use_lock = READ_ONCE(crng_init) < 2;
    -batch = &get_cpu_var(batched_entropy_u32);
    -if (use_lock)
        -read_lock_irqsave(&batched_entropy_reset_lock, flags);
    +batch = raw_cpu_ptr(&batched_entropy_u32);
    +spin_lock_irqsave(&batch->batch_lock, flags);
    if (batch->position % ARRAY_SIZE(batch->entropy_u32) == 0) {
        extract_crng((u8 *)batch->entropy_u32);
        batch->position = 0;
    }
    ret = batch->entropy_u32[batch->position++];
    -if (use_lock)
        -read_unlock_irqrestore(&batched_entropy_reset_lock, flags);
    -put_cpu_var(batched_entropy_u32);
    +spin_unlock_irqrestore(&batch->batch_lock, flags);
    return ret;
}
EXPORT_SYMBOL(get_random_u32);
@@ -2164,12 +2316,19 @@
    int cpu;
    unsigned long flags;

    -write_lock_irqsave(&batched_entropy_reset_lock, flags);
    for_each_possible_cpu (cpu) {
        -per_cpu_ptr(&batched_entropy_u32, cpu)->position = 0;
        -per_cpu_ptr(&batched_entropy_u64, cpu)->position = 0;
        +struct batched_entropy *batched_entropy;
        +
        +batched_entropy = per_cpu_ptr(&batched_entropy_u32, cpu);
        +spin_lock_irqsave(&batched_entropy->batch_lock, flags);
        +batched_entropy->position = 0;
        +spin_unlock(&batched_entropy->batch_lock);
        +
```c
batched_entropy = per_cpu_ptr(&batched_entropy_u64, cpu);
spin_lock(&batched_entropy->batch_lock);
batched_entropy->position = 0;
spin_unlock_irqrestore(&batched_entropy->batch_lock, flags);
}
write_unlock_irqrestore(&batched_entropy_reset_lock, flags);

/**
@@ -2214,7 +2373,7 @@
{
struct entropy_store *poolp = &input_pool;

-if (!crng_ready()) {
+if (unlikely(crng_init == 0)) {
    crng_fast_load(buffer, count);
    return;
}
--- linux-4.15.0.orig/drivers/char/tlclk.c
+++ linux-4.15.0/drivers/char/tlclk.c
@@ -776,17 +776,21 @@
{
    int ret;
+telclk_interrupt = (inb(TLCLK_REG7) & 0x0f);
    +alarm_events = kzalloc( sizeof(struct tlclk_alarms), GFP_KERNEL);
+if (!(alarm_events)) {
+    +ret = -ENOMEM;
+    +goto out1;
+}
+    +ret = register_chrdev(tlclk_major, "telco_clock", &tlclk_fops);
    if (ret < 0) {
        printk(KERN_ERR "tlclk: can't get major %d\n", tlclk_major);
        +kfree(alarm_events);
        return ret;
    }
    tlclk_major = ret;
-    alarm_events = kzalloc( sizeof(struct tlclk_alarms), GFP_KERNEL);
-    if (!(alarm_events)) {
-        -ret = -ENOMEM;
-        -goto out1;
-    }

    /* Read telecom clock IRQ number (Set by BIOS) */
    if (request_region(TLCLK_BASE, 8, "telco_clock")) {
        @@ -795,7 +799,6 @@
```
ret = -EBUSY;
goto out2;
}
telclk_interrupt = (inb(TLCLK_REG7) & 0x0f);

if (0x0F == telclk_interrupt) { /* not MCPBL0010 ? */
    printk(KERN_ERR "telclk_interrupt = 0x%x non-mcpbl0010 hw.\n",
        @ @ -836.8 +839.8 @ @
        release_region(TLCLK_BASE, 8);
    out2:
    kfree(alarm_events);
    -out1:
    unregister_chrdev(tlclk_major, "telco_clock");
    +out1:
    return ret;
}

--- linux-4.15.0.orig/drivers/char/tpm/st33zp24/i2c.c
+++ linux-4.15.0/drivers/char/tpm/st33zp24/i2c.c
@@ -33,7 +33,7 @@
    struct st33zp24_i2c_phy {
        struct i2c_client *client;
        -u8 buf[TPM_BUFSIZE + 1];
        +u8 buf[ST33ZP24_BUFSIZE + 1];
        int io_lpcpd;
    };

--- linux-4.15.0.orig/drivers/char/tpm/st33zp24/spi.c
+++ linux-4.15.0/drivers/char/tpm/st33zp24/spi.c
@@ -63,7 +63,7 @@
 * some latency byte before the answer is available (max 15).
 * We have 2048 + 1024 + 15.
 */
-#define ST33ZP24_SPI_BUFFER_SIZE (TPM_BUFSIZE + (TPM_BUFSIZE / 2) +
+#define ST33ZP24_SPI_BUFFER_SIZE (ST33ZP24_BUFSIZE + (ST33ZP24_BUFSIZE / 2) +
    MAX_SPI_LATENCY)

--- linux-4.15.0.orig/drivers/char/tpm/st33zp24/st33zp24.c
+++ linux-4.15.0/drivers/char/tpm/st33zp24/st33zp24.c
@@ -438,7 +438,7 @@
 goto out_err;
 }

-return len;
+return 0;
out_err:
st33zp24_cancel(chip);
release_locality(chip);
@@ -457,7 +457,7 @@
size_t count)
{
    int size = 0;
    -int expected;
    +u32 expected;

    if (!chip)
        return -EBUSY;
@@ -474,7 +474,7 @@
    expected = be32_to_cpu(*(__be32 *)(buf + 2));
    -if (expected > count) {
    +if (expected > count || expected < TPM_HEADER_SIZE) {
        size = -EIO;
        goto out;
    }
--- linux-4.15.0.orig/drivers/char/tpm/st33zp24/st33zp24.h
+++ linux-4.15.0/drivers/char/tpm/st33zp24/st33zp24.h
@@ -18,8 +18,8 @@
#define __LOCAL_ST33ZP24_H__
#define __LOCAL_ST33ZP24_H__
-#define TPM_WRITE_DIRECTION 0x80
+#define TPM_WRITE_DIRECTION 0x80
+#define TPM_BUFSIZE 2048
+#define TPM_WRITE_DIRECTION0x80
+#define ST33ZP24_BUFSIZE2048

struct st33zp24_dev {
struct tpm_chip *chip;
--- linux-4.15.0.orig/drivers/char/tpm/tpm-chip.c
+++ linux-4.15.0/drivers/char/tpm/tpm-chip.c
@@ -158,12 +158,13 @@
{
    struct tpm_chip *chip = container_of(dev, struct tpm_chip, dev);
    -down_write(&chip->ops_sem);
    +down_write(&chip->ops_sem);
    if (chip->flags & TPM_CHIP_FLAG_TPM2) {
        -down_write(&chip->ops_sem);
        tpm2_shutdown(chip, TPM2_SU_CLEAR);
        chip->ops = NULL;
        -up_write(&chip->ops_sem);
        +chip->ops = NULL;
        +up_write(&chip->ops_sem);
    }
return 0;
}
@@ -246,13 +247,8 @@
chip->cdev.owner = THIS_MODULE;
chip->cdevs.owner = THIS_MODULE;

-chip->work_space.context_buf = kzalloc(PAGE_SIZE, GFP_KERNEL);
-if (!chip->work_space.context_buf) {
-rc = -ENOMEM;
-goto out;
-
-chip->work_space.session_buf = kzalloc(PAGE_SIZE, GFP_KERNEL);
-if (!chip->work_space.session_buf) {
+rc = tpm2_init_space(&chip->work_space, TPM2_SPACE_BUFFER_SIZE);
+if (rc) {
+rc = -ENOMEM;
+goto out;
+}

--- linux-4.15.0.orig/drivers/char/tpm/tpm-dev-common.c
+++ linux-4.15.0/drivers/char/tpm/tpm-dev-common.c
@@ -37,7 +37,7 @@
struct file_priv *priv = container_of(work, struct file_priv, work);

mutex_lock(&priv->buffer_mutex);
-atomic_set(&priv->data_pending, 0);
+priv->data_pending = 0;
memset(priv->data_buffer, 0, sizeof(priv->data_buffer));
mutex_unlock(&priv->buffer_mutex);
}
@@ -46,7 +46,6 @@
struct file_priv *priv)
{
    struct file_priv *priv = file->private_data;

@@ -58,29 +57,24 @@
sizet size, loff_t *off)
{
    struct file_priv *priv = file->private_data;
    ssize_t ret_size;
    ssize_t orig_ret_size;
    int rc;

del_singleshot_timer_sync(&priv->user_read_timer);
flush_work(&priv->work);
- ret_size = atomic_read(&priv->data_pending);
- if (ret_size > 0) /* relay data */
- orig_ret_size = ret_size;
- if (size < ret_size)
- ret_size = size;
+ mutex_lock(&priv->buffer_mutex);

- mutex_lock(&priv->buffer_mutex);
+ if (priv->data_pending) {
+ ret_size = min_t(ssize_t, size, priv->data_pending);
+ rc = copy_to_user(buf, priv->data_buffer, ret_size);
- memset(priv->data_buffer, 0, orig_ret_size);
+ memset(priv->data_buffer, 0, priv->data_pending);
+ if (rc)
+ ret_size = -EFAULT;

- mutex_unlock(&priv->buffer_mutex);
+ priv->data_pending = 0;
} }
atomic_set(&priv->data_pending, 0);
-
+ mutex_unlock(&priv->buffer_mutex);
return ret_size;

@@ -91,17 +85,19 @@
size_t in_size = size;
ssize_t out_size;

+ if (in_size > TPM_BUFSIZE)
+ return -E2BIG;
+
+ mutex_lock(&priv->buffer_mutex);
+ /* Cannot perform a write until the read has cleared either via
+ * tpm_read or a user_read_timer timeout. This also prevents split
+ * buffered writes from blocking here.
+ */
- if (atomic_read(&priv->data_pending) != 0)
- if (priv->data_pending != 0) {
- mutex_unlock(&priv->buffer_mutex);
- return -EBUSY;
-}
- if (in_size > TPM_BUFSIZE)
- return -E2BIG;
-
mutex_lock(&priv->buffer_mutex);
+
if (copy_from_user
    (priv->data_buffer, (void __user *) buf, in_size)) {
@@ -132,7 +128,7 @@
    return out_size;
 }

-atomic_set(&priv->data_pending, out_size);
+priv->data_pending = out_size;
mutex_unlock(&priv->buffer_mutex);

/* Set a timeout by which the reader must come claim the result */
@@ -149,5 +145,5 @@
del_singleshot_timer_sync(&priv->user_read_timer);
flush_work(&priv->work);
file->private_data = NULL;
-atomic_set(&priv->data_pending, 0);
+priv->data_pending = 0;
}
--- linux-4.15.0.orig/drivers/char/tpm/tpm-dev.h
+++ linux-4.15.0/drivers/char/tpm/tpm-dev.h
@@ -8,7 +8,7 @@
    struct tpm_chip *chip;

/* Data passed to and from the tpm via the read/write calls */
-atomic_t data_pending;
+size_t data_pending;
struct mutex buffer_mutex;

    struct timer_list user_read_timer; /* user needs to claim result */
--- linux-4.15.0.orig/drivers/char/tpm-interface.c
+++ linux-4.15.0/drivers/char/tpm-interface.c
@@ -328,7 +328,7 @@
              if (len < TPM_HEADER_SIZE)
@@ -340,10 +340,10 @@

EXPORT_SYMBOL_GPL(tpm_calc_ordinal_duration);

-static bool tpm_validate_command(struct tpm_chip *chip,
+static int tpm_validate_command(struct tpm_chip *chip,
    struct tpm_space *space,
    const u8 *cmd,
    size_t len)
@@ -340,10 +340,10 @@

unsigned int nr_handles;

if (len < TPM_HEADER_SIZE)
    return false;
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return -EINVAL;

if (!space)
+return true;
+return 0;

if (chip->flags & TPM_CHIP_FLAG_TPM2 && chip->nr_commands) {
    cc = be32_to_cpu(header->ordinal);
    /* .352,7 +352,7 @ @
    if (i < 0) {
        dev_dbg(&chip->dev, "0x%04X is an invalid command\n", cc);
        -return false;
        +return -EOPNOTSUPP;
    }
    attrs = chip->ccattrs_tbl[i];
    /* .362,7 +362,7 @ @
    goto err_len;
    }
    -return true;
    +return 0;
    err_len:
    dev_dbg(&chip->dev,
            "%s: insufficient command length %zu", __func__, len);
            -return false;
            +return -EINVAL;
    }

/**
 * tpm_transmit - Internal kernel interface to transmit TPM commands.
 * @chip: TPM chip to use
 * @buf: TPM command buffer
 * @bufsiz: length of the TPM command buffer
 * @flags: tpm transmit flags - bitmap
 * @
 * Return:
 * 0 when the operation is successful.
 * A negative number for system errors (errno).
 */
ssize_t tpm_transmit(struct tpm_chip *chip, struct tpm_space *space,
                      u8 *buf, size_t bufsiz, unsigned int flags)
static int tpm_request_locality(struct tpm_chip *chip, unsigned int flags)
{
    int rc;

}
if (flags & TPM_TRANSMIT_RAW)
return 0;
+
if (!chip->ops->request_locality)
return 0;
+
rc = chip->ops->request_locality(chip, 0);
if (rc < 0)
return rc;
+
chip->locality = rc;
+
return 0;
+
static void tpm_relinquish_locality(struct tpm_chip *chip, unsigned int flags)
{
int rc;
+
if (flags & TPM_TRANSMIT_RAW)
return;
+
if (!chip->ops->relinquish_locality)
return;
+
rc = chip->ops->relinquish_locality(chip, chip->locality);
if (rc)
dev_err(&chip->dev, "%s: error %d\n", __func__, rc);
+
chip->locality = -1;
+
static int tpm_cmd_ready(struct tpm_chip *chip, unsigned int flags)
{
if (flags & TPM_TRANSMIT_RAW)
return 0;
+
if (!chip->ops->cmd_ready)
return 0;
+
return chip->ops->cmd_ready(chip);
+
static int tpm_go_idle(struct tpm_chip *chip, unsigned int flags)
{
if (flags & TPM_TRANSMIT_RAW)
return 0;
+if (!chip->ops->go_idle)
+return 0;
+
+return chip->ops->go_idle(chip);
+
+static ssize_t tpm_try_transmit(struct tpm_chip *chip,
+struct tpm_space *space,
+u8 *buf, size_t bufsiz,
+unsigned int flags)
+
+struct tpm_output_header *header = (void *)buf;
+int rc;
+
+if (!tpm_validate_command(chip, space, buf, bufsiz))
+  return -EINVAL;
+
+rc = tpm_validate_command(chip, space, buf, bufsiz);
+if (rc == -EINVAL)
+  return rc;
+
+/*
+ * If the command is not implemented by the TPM, synthesize a
+ * response with a TPM2_RC_COMMAND_CODE return for user-space.
+ */
+if (rc == -EOPNOTSUPP) {
+  header->length = cpu_to_be32(sizeof(*header));
+  header->tag = cpu_to_be16(TPM2_ST_NO_SESSIONS);
+  header->return_code = cpu_to_be32(TPM2_RC_COMMAND_CODE |
+    TSS2_RESMGR_TPM_RC_LAYER);
+  return sizeof(*header);
+}
+
+if (bufsiz > TPM_BUFSIZE)
+  bufsiz = TPM_BUFSIZE;
+
+if (!(flags & TPM_TRANSMIT_UNLOCKED))
+  mutex_lock(&chip->tpm_mutex);
+
+if (chip->dev.parent)
+  pm_runtime_get_sync(chip->dev.parent);
+
+if (chip->ops->clk_enable != NULL)
+  chip->ops->clk_enable(chip, true);
+
+/* Store the decision as chip->locality will be changed. */
+need_locality = chip->locality == -1;
-if (!(flags & TPM_TRANSMIT_RAW) &&
 - need_locality && chip->ops->request_locality) {
-rc = chip->ops->request_locality(chip, 0);
-if (rc < 0)
-goto out_no_locality;
-chip->locality = rc;
+if (need_locality) {
+rc = tpm_request_locality(chip, flags);
+if (rc < 0) {
+need_locality = false;
+goto out_locality;
+}
}

+rc = tpm_cmd_ready(chip, flags);
+if (rc)
+goto out_locality;
+
rc = tpm2_prepare_space(chip, space, ordinal, buf);
if (rc)
goto out;
@@ -432,10 +497,19 @@
if (rc < 0) {
if (rc != -EPIPE)
-dev_err(&chip->dev,
-"%s: tpm_send: error %d\n", __func__, rc);
+"%s: send(): error %d\n", __func__, rc);
-goto out;
}

+/* A sanity check. send() should just return zero on success e.g.
+ * not the command length.
+ */
+if (rc > 0) {
+dev_warn(&chip->dev,
+"%s: send(): invalid value %d\n", __func__, rc);
+rc = 0;
+}
+
if (chip->flags & TPM_CHIP_FLAG_IRQ)
goto out_recv;

@@ -482,15 +556,19 @@
}

rc = tpm2_commit_space(chip, space, ordinal, buf, &len);
+if (rc)
out:
- if (need_locality && chip->ops->relinquish_locality) {
- chip->ops->relinquish_locality(chip, chip->locality);
- chip->locality = -1;
- }
- out_no_locality:
- if (chip->dev.parent)
- pm_runtime_put_sync(chip->dev.parent);
+/* may fail but do not override previous error value in rc */
+tpm_go_idle(chip, flags);
+
+out_locality:
+ if (need_locality)
+ tpm_relinquish_locality(chip, flags);
+
+ if (chip->ops->clk_enable != NULL)
+ chip->ops->clk_enable(chip, false);

if (!flags & TPM_TRANSMIT_UNLOCKED))
mutex_unlock(&chip->tpm_mutex);
@@ -498,10 +576,80 @@
}

/**
- * tmp_transmit_cmd - send a tpm command to the device
+ * tpm_transmit - Internal kernel interface to transmit TPM commands.
+ *
+ * @chip: TPM chip to use
+ * @space: tpm space
+ * @buf: TPM command buffer
+ * @bufsz: length of the TPM command buffer
+ * @flags: tpm transmit flags - bitmap
+ *
+ * A wrapper around tpm_try_transmit that handles TPM2_RC_RETRY
+ * returns from the TPM and retransmits the command after a delay up
+ * to a maximum wait of TPM2_DURATION_LONG.
+ *
+ * Note: TPM1 never returns TPM2_RC_RETRY so the retry logic is TPM2
+ * only
+ *
+ * Return:
+ * the length of the return when the operation is successful.
+ * A negative number for system errors (errno).
+ */
+ssize_t tpm_transmit(struct tpm_chip *chip, struct tpm_space *space,
+ u8 *buf, size_t bufsz, unsigned int flags)
+struct tpm_output_header *header = (struct tpm_output_header *)buf;
+/* space for header and handles */
+u8 save[TPM_HEADER_SIZE + 3*sizeof(u32)];
+unsigned int delay_msec = TPM2_DURATION_SHORT;
+u32 rc = 0;
+ssize_t ret;
+const size_t save_size = min(space ? sizeof(save) : TPM_HEADER_SIZE, 
+ bufsiz);
+/* the command code is where the return code will be */
+u32 cc = be32_to_cpu(header->return_code);
+
+/*
+ * Subtlety here: if we have a space, the handles will be
+ * transformed, so when we restore the header we also have to
+ * restore the handles.
+ */
+memcpy(save, buf, save_size);
+
+for (;;) {
	ret = tpm_try_transmit(chip, space, buf, bufsiz, flags);
+if (ret < 0)
	break;
+rc = be32_to_cpu(header->return_code);
+if (rc != TPM2_RC_RETRY && rc != TPM2_RC_TESTING)
	break;
+/*
+ * return immediately if self test returns test
+ * still running to shorten boot time.
+ */
+if (rc == TPM2_RC_TESTING && cc == TPM2_CC_SELF_TEST)
	break;
+/*
+ * If delay time > TPM2_DURATION_LONG, we are in a retry loop
+ */
+if (delay_msec > TPM2_DURATION_LONG) {
+if (rc == TPM2_RC_RETRY)
+dev_err(&chip->dev, "in retry loop\n");
+else
+dev_err(&chip->dev, "self test is still running\n");
+break;
+}
+tpm_msleep(delay_msec);
+delay_msec *= 2;
+memcpy(buf, save, save_size);
+}
+return ret;
+}
+/**

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+ * tpm_transmit_cmd - send a tpm command to the device
+ * The function extracts tpm out header return code
+ *
+ * @chip: TPM chip to use
+ * @space: tpm space
+ * @buf: TPM command buffer
+ * @bufsiz: length of the buffer
+ * @min_rsp_body_length: minimum expected length of response body

return len;

err = be32_to_cpu(header->return_code);
-if (err != 0 && desc)
+if (err != 0 && err != TPM_ERR_DISABLED && err != TPM_ERR_DEACTIVATED
+    && desc)
dev_err(&chip->dev, "A TPM error (%d) occurred %s\n", err,
desc);
-if (err)
@@ -953,6 +1102,10 @@

rc = tpm_continue_selftest(chip);
+if (rc == TPM_ERR_INVALID_POSTINIT) {
+chip->flags |= TPM_CHIP_FLAG_ALWAYS_POWERED;
+dev_info(&chip->dev, "TPM not ready (%d)\n", rc);
+}
/* This may fail if there was no TPM driver during a suspend/resume
 * cycle; some may return 10 (BAD_ORDINAL), others 28 (FAILEDSELFTEST)
 */
@@ -1228,6 +1381,10 @@

recd = be32_to_cpu(tpm_cmd.params.getrandom_out.rng_data_len);
+if (recd > num_bytes) {
+total = -EFAULT;
+break;
+}

rlength = be32_to_cpu(tpm_cmd.header.out.length);
if (rlength < offsetof(struct tpm_getrandom_out, rng_data) +
--- linux-4.15.0.orig/drivers/char/tpm/tpm-sysfs.c
+++ linux-4.15.0/drivers/char/tpm/tpm-sysfs.c
@@ -39,7 +39,6 @@


char *str = buf;
struct tpm_chip *chip = to_tpm_chip(dev);
@@ -47,19 +46,18 @@
memset(&anti_replay, 0, sizeof(anti_replay));

-rc = tpm_buf_init(&tpm_buf, TPM_TAG_RQU_COMMAND, TPM_ORD_READPUBEK);
-if (rc)
-return rc;
+if (tpm_try_get_ops(chip))
+return 0;
+
+if (tpm_buf_init(&tpm_buf, TPM_TAG_RQU_COMMAND, TPM_ORD_READPUBEK))
+goto out_ops;

tpm_buf_append(&tpm_buf, anti_replay, sizeof(anti_replay));

-rc = tpm_transmit_cmd(chip, NULL, tpm_buf.data, PAGE_SIZE,
+if (tpm_transmit_cmd(chip, NULL, tpm_buf.data, PAGE_SIZE,
       READ_PUBEK_RESULT_MIN_BODY_SIZE, 0,
       "attempting to read the PUBEK"));
-if (rc) {
-tpm_buf_destroy(&tpm_buf);
-return 0;
-}
+
+"attempting to read the PUBEK")
+goto out_buf;

out = (struct tpm_readpubek_out *)&tpm_buf.data[10];
str +=
@@ -90,9 +88,11 @@
str += sprintf(str, "%n");
} 

-rc = str - buf;
+out_buf:
tpm_buf_destroy(&tpm_buf);
-return rc;
+out_ops:
+tpm_put_ops(chip);
+return str - buf;
}
static DEVICE_ATTR_RO(pubek);

@@ -106,12 +106,16 @@
char *str = buf;
struct tpm_chip *chip = to_tpm_chip(dev);
-rc = tpm_getcap(chip, TPM_CAP_PROP_PCR, &cap,
-"attempting to determine the number of PCRS",
-sizeof(cap.num_pcrs));
-if (rc)
+if (tpm_try_get_ops(chip))
    return 0;

+if (tpm_getcap(chip, TPM_CAP_PROP_PCR, &cap,
+    "attempting to determine the number of PCRS",
+    sizeof(cap.num_pcrs))) {
+    tpm_put_ops(chip);
+    return 0;
+
    num_pcrs = be32_to_cpu(cap.num_pcrs);
    for (i = 0; i < num_pcrs; i++) {
        rc = tpm_pcr_read_dev(chip, i, digest);
@ @ -122,6 +126,7 @ @
        str += sprintf(str, "%02X ", digest[j]);
        str += sprintf(str, "n");
    }
+    tpm_put_ops(chip);
    return str - buf;
    }

static DEVICE_ATTR_RO(pcrs);
@ @ -129,16 +134,21 @ @
static ssize_t enabled_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
+    struct tpm_chip *chip = to_tpm_chip(dev);
+    ssize_t rc = 0;
+    cap_t cap;
+    ssize_t rc;

-rc = tpm_getcap(to_tpm_chip(dev), TPM_CAP_FLAG_PERM, &cap,
-"attempting to determine the permanent enabled state",
-sizeof(cap.perm_flags));
-if (rc)
+if (tpm_try_get_ops(chip))
    return 0;

+if (tpm_getcap(chip, TPM_CAP_FLAG_PERM, &cap,
+    "attempting to determine the permanent enabled state",
+    sizeof(cap.perm_flags)))
+    goto out_ops;
+    rc = sprintf(buf, "%d\n", !cap.perm_flags.disable);
+    out_ops:
+tpm_put_ops(chip);
return rc;
}
static DEVICE_ATTR_RO(enabled);
@@ -146,16 +156,21 @@
static ssize_t active_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
+struct tpm_chip *chip = to_tpm_chip(dev);
+ssize_t rc = 0;
cap_t cap;
-ssize_t rc;
-cap_perm Flags, &cap,
-"attempting to determine the permanent active state",
-sizeof(cap.perm_flags));
-if (rc)
+if (tpm_try_get_ops(chip))
    return 0;

+if (tpm_getcap(chip, TPM_CAP_FLAG_PERM, &cap,
+    "attempting to determine the permanent active state",
+    sizeof(cap.perm_flags)))
+    goto out_ops;
+
    rc = sprintf(buf, "%d\n", !cap.perm_flags.deactivated);
+out_ops:
+tpm_put_ops(chip);
return rc;
}
static DEVICE_ATTR_RO(active);
@@ -163,16 +178,21 @@
static ssize_t owned_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
+struct tpm_chip *chip = to_tpm_chip(dev);
+ssize_t rc = 0;
cap_t cap;
-ssize_t rc;
-cap_perm Flags, &cap,
-"attempting to determine the owner state",
-sizeof(cap.owned));
-if (rc)
+if (tpm_try_get_ops(chip))
    return 0;

+if (tpm_getcap(to_tpm_chip(dev), TPM_CAP_PROP_OWNER, &cap,
+    "attempting to determine the owner state",
+    sizeof(cap.owned)))
+    goto out_ops;
+
    rc = sprintf(buf, "%d\n", !cap.owned.deactivated);
+out_ops:
+tpm_put_ops(chip);
return rc;
}
"attempting to determine the owner state",
sizeof(cap.owned))
+goto out_ops;
+
rc = sprintf(buf, "%d\n", cap.owned);
+out_ops:
+tpm_put_ops(chip);
return rc;
}
static DEVICE_ATTR_RO(owned);
@@ -180,16 +200,21 @@
static ssize_t temp_deactivated_show(struct device *dev, 
 struct device_attribute *attr, char *buf)
{
+struct tpm_chip *chip = to_tpm_chip(dev);
+ssize_t rc = 0;
cap_t cap;
-ssize_t rc;

-rc = tpm_getcap(to_tpm_chip(dev), TPM_CAP_FLAG_VOL, &cap, 
-"attempting to determine the temporary state", 
-sizeof(cap.stclear_flags));
-if (rc)
+if (tpm_try_get_ops(chip))
return 0;

+if (tpm_getcap(to_tpm_chip(dev), TPM_CAP_FLAG_VOL, &cap, 
+ "attempting to determine the temporary state", 
+ sizeof(cap.stclear_flags)))
+goto out_ops;
+
rc = sprintf(buf, "%d\n", cap.stclear_flags.deactivated);
+out_ops:
+tpm_put_ops(chip);
return rc;
}
static DEVICE_ATTR_RO(temp_deactivated);
@@ -198,15 +223,18 @@
char *buf)
{
struct tpm_chip *chip = to_tpm_chip(dev);
-cap_t cap;
-ssize_t rc;
+ssize_t rc = 0;
char *str = buf;
+cap_t cap;

-rc = tpm_getcap(chip, TPM_CAP_PROP_MANUFACTURER, &cap,
- "attempting to determine the manufacturer",
- sizeof(cap.manufacturer_id));
- if (rc)
+ if (tpm_try_get_ops(chip))
  return 0;
  +
+ if (tpm_getcap(chip, TPM_CAP_PROP_MANUFACTURER, &cap,
  +  "attempting to determine the manufacturer",
  +  sizeof(cap.manufacturer_id)))
+ goto out_ops;
  +
  str += sprintf(str, "Manufacturer: 0x%x
",
     be32_to_cpu(cap.manufacturer_id));
@@ -223,20 +251,22 @@
     cap.tpm_version_1_2.revMinor);
 } else {
 /* Otherwise just use TPM_STRUCT_VER */
-rc = tpm_getcap(chip, TPM_CAP_VERSION_1_1, &cap,
-"attempting to determine the 1.1 version",
-sizeof(cap.tpm_version));
-if (rc)
-  return 0;
+ if (tpm_getcap(chip, TPM_CAP_VERSION_1_1, &cap,
+  "attempting to determine the 1.1 version",
+  sizeof(cap.tpm_version)))
+ goto out_ops;
+ str += sprintf(str,
+   "TCG version: %d.%d
Firmware version: %d.%d
",
+     cap.tpm_version.Major,
+     cap.tpm_version.Minor,
+     cap.tpm_version.revMajor,
+     cap.tpm_version.revMinor);
-}
-
- return str - buf;
+
+rc = str - buf;
+out_ops:
+tpm_put_ops(chip);
+return rc;
}
static DEVICE_ATTR_RO(caps);
@@ -244,10 +274,12 @@
 const char *buf, size_t count)
 {
struct tpm_chip *chip = to_tpm_chip(dev);
-if (chip == NULL)
 +
 +if (tpm_try_get_ops(chip))
 return 0;

 chip->ops->cancel(chip);
 +tpm_put_ops(chip);
 return count;
}

static DEVICE_ATTR_WO(cancel);
--- linux-4.15.0.orig/drivers/char/tpm/tpm.h
+++ linux-4.15.0/drivers/char/tpm/tpm.h
@@ -93,14 +93,21 @@
 TPM2_ST_SESSIONS	= 0x8002,
 ++/* Indicates from what layer of the software stack the error comes from */
 ++#define TSS2_RC_LAYER_SHIFT 16
 ++#define TSS2_RESMGR_TPM_RC_LAYER (11 << TSS2_RC_LAYER_SHIFT)
 +
 enum tpm2_return_codes {
 TPM2_RC_SUCCESS = 0x0000,
 TPM2_RC_HASH = 0x0083, /* RC_FMT1 */
 TPM2_RC_HANDLE = 0x008B,
 TPM2_RC_INITIALIZE = 0x0100, /* RC_VER1 */
 +TPM2_RC_FAILURE = 0x0101,
 TPM2_RC_DISABLED = 0x0120,
 +TPM2_RC_COMMAND_CODE = 0x0143,
 TPM2_RC_TESTING = 0x090A, /* RC_WARN */
 TPM2_RC_REFERENCE_H0 = 0x0910,
 +TPM2_RC_RETRY = 0x0922,
 };}

 enum tpm2_algorithms {
 @@ -168,6 +175,7 @@
 u8 *context_buf;
 u32 session_tbl[3];
 u8 *session_buf;
 +u32 buf_size;
 };}

 enum tpm_chip_flags {
 @@ -255,6 +263,9 @@
 #define TPM_TAG_RQU_COMMAND 193
 +/* TPM2 specific constants. */


#define TPM2_SPACE_BUFFER_SIZE 16384 /* 16 kB */

struct stclear_flags_t {
    __be16 tag;
    u8 deactivated;
    @@ -492,9 +503,17 @@
 extern const struct file_operations tpmrm_fops;
 extern struct idr dev_nums_idr;

+/**
+ * enum tpm_transmit_flags
+ *
+ * @TPM_TRANSMIT_UNLOCKED: used to lock sequence of tpm_transmit calls.
+ * @TPM_TRANSMIT_RAW: prevent recursive calls into setup steps
+ * (go idle, locality...). Always use with UNLOCKED
+ * as it will fail on double locking.
+ */
+
enum tpm_transmit_flags {
    TPM_TRANSMIT_UNLOCKED = BIT(0),
    TPM_TRANSMIT_RAW = BIT(1),
    +TPM_TRANSMIT_RAW = BIT(1),
    
ssize_t tpm_transmit(struct tpm_chip *chip, struct tpm_space *space,
    @@ -569,7 +588,7 @@
 unsigned long tpm2_calc_ordinal_duration(struct tpm_chip *chip, u32 ordinal);
 int tpm2_probe(struct tpm_chip *chip);
 int tpm2_find_cc(struct tpm_chip *chip, u32 cc);
-    -int tpm2_init_space(struct tpm_space *space);
+    +int tpm2_init_space(struct tpm_space *space, unsigned int buf_size);
    void tpm2_del_space(struct tpm_chip *chip, struct tpm_space *space);
    int tpm2_prepare_space(struct tpm_chip *chip, struct tpm_space *space, u32 cc,
                            u8 *cmd);
--- linux-4.15.0.orig/drivers/char/tpm/tpm1_eventlog.c
+++ linux-4.15.0/drivers/char/tpm/tpm1_eventlog.c
@@ -390,6 +390,9 @@
 unsigned int cnt;
 int rc = 0;

+if (chip->flags & TPM_CHIP_FLAG_VIRTUAL)
+return -ENODEV;
+
rc = tpm_read_log(chip);
if (rc)
    return rc;
--- linux-4.15.0.orig/drivers/char/tpm2-cmd.c
+++ linux-4.15.0/drivers/char/tpm2-cmd.c
@@ -390,6 +390,9 @@
 unsigned int cnt;
 int rc = 0;

+if (chip->flags & TPM_CHIP_FLAG_VIRTUAL)
+return -ENODEV;
+
rc = tpm_read_log(chip);
if (rc)
union tpm2_cmd_params {
    struct tpm2_startup_in startup_in;
    struct tpm2_self_test_in selftest_in;
    struct tpm2_get_tpm_pt_in get_tpm_pt_in;
    struct tpm2_get_tpm_pt_out get_tpm_pt_out;
    struct tpm2_get_random_in getrandom_in;
}

if (!rc) {
    data_len = be16_to_cpup((__be16 *) &buf.data[TPM_HEADER_SIZE + 4]);
    if (data_len < MIN_KEY_SIZE || data_len > MAX_KEY_SIZE + 1) { 
        rc = -EFAULT;
        goto out;
    }
    rlength = be32_to_cpu(((struct tpm2_cmd *)&buf)->header.out.length);
} EXPORT_SYMBOL_GPL(tpm2_calc_ordinal_duration);

#define TPM2_SELF_TEST_IN_SIZE (sizeof(struct tpm_input_header) + sizeof(struct tpm2_self_test_in))

static const struct tpm_input_header tpm2_selftest_header = {
    .tag = cpu_to_be16(TPM2_ST_NO_SESSIONS),
    .length = cpu_to_be32(TPM2_SELF_TEST_IN_SIZE),
    .ordinal = cpu_to_be32(TPM2_CC_SELF_TEST)
};

/**
 * tpm2_do_selftest() - ensure that all self tests have passed
 */

@@ -848,29 +837,24 @@
static int tpm2_do_selftest(struct tpm_chip *chip)
{
    struct tpm_buf buf;
    int full;
    int rc;
    unsigned int delay_msec = 20;
    long duration;
    struct tpm2_cmd cmd;

    duration = jiffies_to_msecs(tpm2_calc_ordinal_duration(chip, TPM2_CC_SELF_TEST));
    -
    -while (duration > 0) {
        cmd.header.in = tpm2_selftest_header;
        cmd.params.selftest_in.full_test = 0;
        -
        -rc = tpm_transmit_cmd(chip, NULL, &cmd, TPM2_SELF_TEST_IN_SIZE,
        -    0, 0, "continue selftest");
        -
        -if (rc ! = TPM2_RC_TESTING)
        -break;
        +for (full = 0; full < 2; full++) {
            +rc = tpm_buf_init(&buf, TPM2_ST_NO_SESSIONS, TPM2_CC_SELF_TEST);
            +if (rc)
            +return rc;
            +
            +tpm_msleep(delay_msec);
            +duration -= delay_msec;
            +rc = tpm_buf_append_u8(&buf, full);
            +rc = tpm_transmit_cmd(chip, NULL, buf.data, PAGE_SIZE, 0, 0,
            +    "attempting the self test");
            +tpm_buf_destroy(&buf);
            
            -* wait longer the next round */
            -delay_msec *= 2;
            +if (rc == TPM2_RC_TESTING)
            +rc = TPM2_RC_SUCCESS;
            +if (rc == TPM2_RC_INITIALIZE || rc == TPM2_RC_SUCCESS)
            +return rc;
    }

    return rc;
    @@ -996,6 +980,10 @@

    chip->cc_attrs_tbl = devm_kzalloc(&chip->dev, 4 * nr_commands,
        GFP_KERNEL);
    +if (!chip->cc_attrs_tbl) {


rc = tpm_buf_init(&buf, TPM2_ST_NO_SESSIONS, TPM2_CC_GET_CAPABILITY);
if (rc)
@@ -1014,6 +1002,7 @@
    goto out;
rc = tpm2_do_selftest(chip);
- if (rc != 0 && rc != TPM2_RC_INITIALIZE) {
-     dev_err(&chip->dev, "TPM self test failed\n");
+ if (rc && rc != TPM2_RC_INITIALIZE)
    goto out;
- }
+rc = -EFAULT;
tpm_buf_destroy(&buf);
goto out;
@@ -1056,10 +1045,8 @@
goto out;
rc = tpm2_get_pcr_allocation(chip);
--- linux-4.15.0.orig/drivers/char/tpm/tpm2-space.c
+++ linux-4.15.0/drivers/char/tpm/tpm2-space.c
@@ -39,22 +39,26 @@
for (i = 0; i < ARRAY_SIZE(space->session_tbl); i++) {
    if (space->session_tbl[i])
tpm2_flush_context_cmd(chip, space->session_tbl[i],
-       TPM_TRANSMIT_UNLOCKED);
+       TPM_TRANSMIT_UNLOCKED |
+       TPM_TRANSMIT_RAW);
```c
int tpm2_init_space(void *space, unsigned int buf_size)
{
    space->context_buf = kzalloc(buf_size, GFP_KERNEL);
    if (!space->context_buf)
        return -ENOMEM;
    space->session_buf = kzalloc(buf_size, GFP_KERNEL);
    if (space->session_buf == NULL) {
        kfree(space->context_buf);
        /* Prevent caller getting a dangling pointer. */
        space->context_buf = NULL;
        return -ENOMEM;
    }
    space->buf_size = buf_size;
    return 0;
}

rc = tpm_transmit_cmd(chip, NULL, tbuf.data, PAGE_SIZE, 4,
                      TPM_TRANSMIT_UNLOCKED | TPM_TRANSMIT_RAW, NULL);
if (rc < 0) {
    dev_warn(&chip->dev, "%s: failed with a TPM error 0x%04X

* TPM_RC_REFERENCE_H0 means the session has been
* flushed outside the space
*/
-rc = -ENOENT;
+*handle = 0;
    tpm_buf_destroy(&tbuf);
    +return -ENOENT;
} else if (rc > 0) {
    dev_warn(&chip->dev, "%s: failed with a system error %d\n",
             __func__, rc);
    @@ -129,7 +134,7 @@
        tpm_buf_append_u32(&tbuf, handle);
    rc = tpm_transmit_cmd(chip, NULL, tbuf.data, PAGE_SIZE, 0,
                          TPM_TRANSMIT_UNLOCKED, NULL);
```
if (rc < 0) {
    dev_warn(&chip->dev, "%s: failed with a system error %d\n",
            __func__, rc);
}

for (i = 0; i < ARRAY_SIZE(space->context_tbl); i++)
    if (space->context_tbl[i] && ~space->context_tbl[i])
        tpm2_flush_context_cmd(chip, space->context_tbl[i],
                          TPM_TRANSMIT_UNLOCKED | TPM_TRANSMIT_RAW);

tpm2_flush_sessions(chip, space);

rc = tpm2_load_space(chip);
if (rc) {
    return 0;
}

out_no_slots:
    tpm2_flush_context_cmd(chip, phandle, TPM_TRANSMIT_UNLOCKED);
    tpm2_flush_context_cmd(chip, phandle,
                          TPM_TRANSMIT_UNLOCKED | TPM_TRANSMIT_RAW);
    dev_warn(&chip->dev, "%s: out of slots for 0x%08X\n", __func__,
             phandle);
    return -ENOMEM;

continue;

rc = tpm2_save_context(chip, space->context_tbl[i],
                          space->context_buf, PAGE_SIZE,
                          space->context_buf, space->buf_size,
                          &offset);
if (rc == -ENOENT) {
    space->context_tbl[i] = 0;
}

return rc;
tpm2_flush_context_cmd(chip, space->context_tbl[i],
   -   TPM_TRANSMIT_UNLOCKED);
+   TPM_TRANSMIT_UNLOCKED |
+   TPM_TRANSMIT_RAW);
space->context_tbl[i] = ~0;
}

@@ -473,9 +483,8 @@
continue;

rc = tpm2_save_context(chip, space->session_tbl[i],
   -   space->session_buf, PAGE_SIZE,
+   space->session_buf, space->buf_size,
         &offset);
-
if (rc == -ENOENT) {
    /* handle error saving session, just forget it */
space->session_tbl[i] = 0;
@@ -521,8 +530,10 @@
    sizeof(space->context_tbl));
  memcpy(&space->session_tbl, &chip->work_space.session_tbl,
                sizeof(space->session_tbl));
-  memcpy(space->context_buf, chip->work_space.context_buf, PAGE_SIZE);
-  memcpy(space->session_buf, chip->work_space.session_buf, PAGE_SIZE);
+  memcpy(space->context_buf, chip->work_space.context_buf,
+         space->buf_size);
+  memcpy(space->session_buf, chip->work_space.session_buf,
+         space->buf_size);

return 0;
}
--- linux-4.15.0.orig/drivers/char/tpm/tpm2_eventlog.c
+++ linux-4.15.0/drivers/char/tpm/tpm2_eventlog.c
@@ -36,8 +36,8 @@
*
   *
   * Returns size of the event. If it is an invalid event, returns 0.
   */
- static int calc_tpm2_event_size(struct tcg_pcr_event2 *event,
- struct tcg_pcr_event *event_header)
+ static size_t calc_tpm2_event_size(struct tcg_pcr_event2 *event,
+         struct tcg_pcr_event *event_header)
{
  struct tcg_efi_specid_event *efispecid;
  struct tcg_event_field *event_field;
--- linux-4.15.0.orig/drivers/char/tpm/tpm_atmel.c
+++ linux-4.15.0/drivers/char/tpm/tpm_atmel.c
@@ -105,7 +105,7 @@
iowrite8(buf[i], priv->iobase);
}

-return count;
+return 0;
}

static void tpm_atml_cancel(struct tpm_chip *chip)
--- linux-4.15.0.orig/drivers/char/tpm/tpm_crb.c
+++ linux-4.15.0/drivers/char/tpm/tpm_crb.c
@@ -26,6 +26,7 @@
#include "tpm.h"
#define ACPI_SIG_TPM2 "TPM2"
+#define TPM_CRB_MAX_RESOURCES 3

static const guid_t crb_acpi_start_guid =
GUID_INIT(0x6BBF6CAB, 0x5463, 0x4714,
@@ -95,7 +96,6 @@
struct crb_priv {
    u32 sm;
    const char *hid;
-    void __iomem *iobase;
    struct crb_regs_head __iomem *regs_h;
    struct crb_regs_tail __iomem *regs_t;
    u8 __iomem *cmd;
@@ -112,8 +112,27 @@
    u32 smc_func_id;
};

+static bool crb_wait_for_reg_32(u32 __iomem *reg, u32 mask, u32 value,
+unsigned long timeout)
+{
+    ktime_t start;
+    ktime_t stop;
+    +start = ktime_get();
+    +stop = ktime_add(start, ms_to_ktime(timeout));
+    +do {
+        +if ((ioread32(reg) & mask) == value)
+            +return true;
+        +usleep_range(50, 100);
+    +} while (ktime_before(ktime_get(), stop));
+    +return ((ioread32(reg) & mask) == value);
+}
**crb_go_idle** - request tpm crb device to go the idle state

**(crb_go_idle)** - request tpm crb device to go the idle state

* @dev: crb device
* @priv: crb private data

```
static int __crb_go_idle(struct device *dev, struct crb_priv *priv)
{
    if ((priv->sm == ACPI_TPM2_START_METHOD) ||
        (priv->sm == ACPI_TPM2_COMMAND_BUFFER_WITH_START_METHOD))
    {
        iowrite32(CRB_CTRL_REQ_GO_IDLE, &priv->regs_t->ctrl_req);
        /* we don't really care when this settles */
        +if (!crb_wait_for_reg_32(&priv->regs_t->ctrl_req,
            CRB_CTRL_REQ_GO_IDLE/* mask */,
            0, /* value */
            TPM2_TIMEOUT_C)) {
            dev_warn(dev, "goIdle timed out
        +return -ETIME;
    }
    return 0;
}
```

- static bool crb_wait_for_reg_32(u32 __iomem *reg, u32 mask, u32 value,
  unsigned long timeout)
+ static int crb_go_idle(struct tpm_chip *chip)

```
usleep_range(50, 100);
} while (ktime_before(ktime_get(), stop));

return false;
+return __crb_go_idle(dev, priv);
}

/**
 * crb_cmd_ready - request tpm crb device to enter ready state
 * __crb_cmd_ready - request tpm crb device to enter ready state
 *
 * @dev: crb device
 * @priv: crb private data
 *
 * @dev: crb device
 * @priv: crb private data
 *
 * Return: 0 on success -ETIME on timeout;
 */
-static int __maybe_unused crb_cmd_ready(struct device *dev,
-    struct crb_priv *priv)
+static int __crb_cmd_ready(struct device *dev, struct crb_priv *priv)
{
    if ((priv->sm == ACPI_TPM2_START_METHOD) ||
        (priv->sm == ACPI_TPM2_COMMAND_BUFFER_WITH_START_METHOD) ||
@@ -195,11 +209,19 @@
    return 0;
}

-static int crb_request_locality(struct tpm_chip *chip, int loc)
+static int crb_cmd_ready(struct tpm_chip *chip)
+{
+    struct device *dev = &chip->dev;
+    struct crb_priv *priv = dev_get_drvdata(dev);
+    return __crb_cmd_ready(dev, priv);
+}
+
+static int __crb_request_locality(struct device *dev,
+    struct crb_priv *priv, int loc)
+
+struct crb_priv *priv = dev_get_drvdata(&chip->dev);
+u32 value = CRB_LOC_STATE_LOC_ASSIGNED |
+    CRB_LOC_STATE_TPM_REG_VALID_STS;
+    CRB_LOC_STATE_TPM_REG_VALID_STS;
+    CRB_LOC_STATE_TPM_REG_VALID_STS;
+
+    if (!priv->regs_h)
+    return 0;
+    @@ -207,21 +229,45 @@
iowrite32(CRB_LOC_CTRL_REQUEST_ACCESS, &priv->regs_h->loc_ctrl);
if (!crb_wait_for_reg_32(&priv->regs_h->loc_state, value, value,
   TPM2_TIMEOUT_C)) {
-dev_warn(&chip->dev, "TPM_LOC_STATE_x.requestAccess timed out\n");
+dev_warn(dev, "TPM_LOC_STATE_x.requestAccess timed out\n");
return -ETIME;
}
return 0;
}

-static void crb_relinquish_locality(struct tpm_chip *chip, int loc)
+static int crb_request_locality(struct tpm_chip *chip, int loc)
{
struct crb_priv *priv = dev_get_drvdata(&chip->dev);

+return __crb_request_locality(&chip->dev, priv, loc);
+
+static int __crb_relinquish_locality(struct device *dev,
    struct crb_priv *priv, int loc)
+
+{u32 mask = CRB_LOC_STATE_LOC_ASSIGNED |
+  CRB_LOC_STATE_TPM_REG_VALID_STS;
+u32 value = CRB_LOC_STATE_TPM_REG_VALID_STS;
+
if (!priv->regs_h)
-    return;
+    return 0;

iowrite32(CRB_LOC_CTRL_RELINQUISH, &priv->regs_h->loc_ctrl);
+if (!crb_wait_for_reg_32(&priv->regs_h->loc_state, mask, value,
+   TPM2_TIMEOUT_C)) {
+dev_warn(dev, "TPM_LOC_STATE_x.requestAccess timed out\n");
+return -ETIME;
+}
+
+return 0;
+
+static int crb_relinquish_locality(struct tpm_chip *chip, int loc)
+{
+struct crb_priv *priv = dev_get_drvdata(&chip->dev);
+
+return __crb_relinquish_locality(&chip->dev, priv, loc);
}

static u8 crb_status(struct tpm_chip *chip)
struct crb_priv *priv = dev_get_drvdata(&chip->dev);
unsigned int expected;

/* sanity check */
-if (count < 6)
+ /* A sanity check that the upper layer wants to get at least the header
+    as that is the minimum size for any TPM response.
+ */
+if (count < TPM_HEADER_SIZE)
    return -EIO;

/* If this bit is set, according to the spec, the TPM is in
 * unrecoverable condition.
+ */
if (ioread32(&priv->regs_t->ctrl_sts) & CRB_CTRL_STS_ERROR)
    return -EIO;

-memcpy_fromio(buf, priv->rsp, 6);
-expected = be32_to_cpup((__be32 *) &buf[2]);
-if (expected > count || expected < 6)
+/* Read the first 8 bytes in order to get the length of the response.
+ We read exactly a quad word in order to make sure that the remaining
+ reads will be aligned.
+ */
+memcpy_fromio(buf, priv->rsp, 8);
+
+expected = be32_to_cpup((__be32 *)&buf[2]);
+if (expected > count || expected < TPM_HEADER_SIZE)
    return -EIO;

-memcpy_fromio(&buf[6], &priv->rsp[6], expected - 6);
+memcpy_fromio(&buf[8], &priv->rsp[8], expected - 8);

return expected;
}

static int crb_check_resource(struct acpi_resource *ares, void *data)
struct resource *io_res = data;
+struct resource *iores_array = data;
struct resource_win win;
struct resource *res = &(win.res);
+int i;

if (acpi_dev_resource_memory(ares, res) ||
   acpi_dev_resource_address_space(ares, &win)) {
   -*io_res = *res;
   -io_res->name = NULL;
 +for (i = 0; i < TPM_CRB_MAX_RESOURCES + 1; ++i) {
 +if (resource_type(iores_array + i) != IORESOURCE_MEM) {
 +iores_array[i] = *res;
 +iores_array[i].name = NULL;
 +break;
 +}
 +}
}

return 1;
}

static void __iomem *crb_map_res(struct device *dev, struct crb_priv *priv,
 - struct resource *io_res, u64 start, u32 size)
+static void __iomem *crb_map_res(struct device *dev, struct resource *iores,
 + void __iomem **iobase_ptr, u64 start, u32 size)
{
 struct resource new_res = {
 .start = start,
 @@ -406,10 +470,16 @@
 if (start != new_res.start)
 return (void __iomem *) ERR_PTR(-EINVAL);

 -if (!resource_contains(io_res, &new_res))
 +if (!iores)
 return devm_ioremap_resource(dev, &new_res);

 -return priv->iobase + (new_res.start - io_res->start);
 +if (!*iobase_ptr) {
 +*iobase_ptr = devm_ioremap_resource(dev, iores);
 +if (IS_ERR(*iobase_ptr))
 +return *iobase_ptr;
 +}
 +return *iobase_ptr + (new_res.start - iores->start);
 }
static int crb_map_io(struct acpi_device *device, struct crb_priv *priv,
    struct acpi_table_tpm2 *buf)
{
    struct list_head resources;
    struct resource io_res;
    struct list_head acpi_resource_list;
    struct resource iores_array[TPM_CRB_MAX_RESOURCES + 1] = { {0} };
    void __iomem *iobase_array[TPM_CRB_MAX_RESOURCES] = {NULL};
    struct device *dev = &device->dev;
    struct resource *iores;
    void __iomem **iobase_ptr;
    int i;
    u32 pa_high, pa_low;
    u64 cmd_pa;
    u32 cmd_size;
    u32 rsp_size;
    int ret;

    INIT_LIST_HEAD(&resources);
    ret = acpi_dev_get_resources(device, &resources, crb_check_resource,
        &io_res);
    INIT_LIST_HEAD(&acpi_resource_list);
    ret = acpi_dev_get_resources(device, &acpi_resource_list,
        crb_check_resource, iores_array);
    if (ret < 0)
        return ret;
    acpi_dev_free_resource_list(&resources);
    acpi_dev_free_resource_list(&acpi_resource_list);

    if (resource_type(&io_res) != IORESOURCE_MEM) {
        dev_err(dev, FW_BUG "TPM2 ACPI table does not define a memory resource\n");
        return -EINVAL;
    } else if (resource_type(iores_array + TPM_CRB_MAX_RESOURCES) ==
        IORESOURCE_MEM) {
        dev_warn(dev, "TPM2 ACPI table defines too many memory resources\n");
        memset(iores_array + TPM_CRB_MAX_RESOURCES,
            0, sizeof(*iores_array));
        iores_array[TPM_CRB_MAX.Resources].flags = 0;
    }
    iores = NULL;
    iobase_ptr = NULL;
    for (i = 0; resource_type(iores_array + i) == IORESOURCE_MEM; ++i) {
        if (buf->control_address >= iores_array[i].start &&
            iores_array[i].end &&
            !ioremap_nofill(iores_array[i].start, iores_array[i].end)
            && !ioremap_nofill(iores_array[i].start, iores_array[i].end))
            continue;
        ioremap_nofill(iores_array[i].start, iores_array[i].end);
        ret = acpi_ioremap_iomem(device, &ioremap_array[i],
            (void __iomem *)((unsigned long)ioremap_array[i].start +
            pa_low + pa_high), 0);
+ buf->control_address + sizeof(struct crb_regs_tail) - 1 <=
+ iores_array[i].end) {
  +iores = iores_array + i;
  +iobase_ptr = iobase_array + i;
  +break;
  +}
  }
  
  priv->iobase = devm_ioremap_resource(dev, &io_res);
  -if (IS_ERR(priv->iobase))
  -return PTR_ERR(priv->iobase);
  +priv->regs_t = crb_map_res(dev, iores, iobase_ptr, buf->control_address,
  + sizeof(struct crb_regs_tail));
  +
  +if (IS_ERR(priv->regs_t))
  +return PTR_ERR(priv->regs_t);
  
  /* The ACPI IO region starts at the head area and continues to include 
   * the control area, as one nice sane region except for some older 
   * @ @ 468,36 +562,49 @ @ 
   */
  if ((priv->sm == ACPI_TPM2_COMMAND_BUFFER) ||
      (priv->sm == ACPI_TPM2_MEMORY_MAPPED)) {
      -if (buf->control_address == io_res.start +
      +if (iores &&
      + bufscontrol_address == iores->start +
      + sizeof(*priv->regs_h))
      -priv->regs_h = priv->iobase;
      +priv->regs_h = *iobase_ptr;
      else 
      dev_warn(dev, FW_BUG "Bad ACPI memory layout");
    }

    -priv->regs_t = crb_map_res(dev, priv, &io_res, buf->control_address,
      - sizeof(struct crb_regs_tail));
    -if (IS_ERR(priv->regs_t))
    -return PTR_ERR(priv->regs_t);
    +ret = __crb_request_locality(dev, priv, 0);
    +if (ret)
    +return ret;
    
    /*
    * PTT HW bug w/a: wake up the device to access
    * possibly not retained registers.
    */
    -ret = crb_cmd_ready(dev, priv);
    +ret = __crb_cmd_ready(dev, priv);
    if (ret)
return ret;
+goto out_relinquish_locality;

pa_high = ioread32(&priv->regs_t->ctrl_cmd_pa_high);
pa_low = ioread32(&priv->regs_t->ctrl_cmd_pa_low);
cmd_pa = ((u64)pa_high << 32) | pa_low;
-cmd_size = crb_fixup_cmd_size(dev, &io_res, cmd_pa,
-    ioread32(&priv->regs_t->ctrl_cmd_size));
+cmd_size = ioread32(&priv->regs_t->ctrl_cmd_size);
+
+iores = NULL;
+iobase_ptr = NULL;
+for (i = 0; iores_array[i].end; ++i) {
+if (cmd_pa >= iores_array[i].start &&
+    cmd_pa <= iores_array[i].end) {
+iores = iores_array + i;
+iobase_ptr = iobase_array + i;
+break;
+}
+}
+
+iors = NULL;
+iobase_ptr = NULL;
+for (i = 0; resource_type(iores_array + i) == IORESOURCE_MEM; ++i) {
+if (rsp_pa >= iores_array[i].start &&
+    rsp_pa <= iores_array[i].end) {
+iors = iores_array + i;
+iobase_ptr = iobase_array + i;
+break;
+}
+}
+
+if (iores)
+cmd_size = crb_fixup_cmd_size(dev, iores, cmd_pa, cmd_size);

dev_dbg(dev, "cmd_hi = %X cmd_low = %X cmd_size %Xn",
    pa_high, pa_low, cmd_size);

-priv->cmd = crb_map_res(dev, priv, &io_res, cmd_pa, cmd_size);
+priv->cmd = crb_map_res(dev, iores, iobase_ptr, cmd_pa, cmd_size);
if (IS_ERR(priv->cmd)) {
ret = PTR_ERR(priv->cmd);
goto out;
@@ -505,11 +612,25 @@
memcpy_fromio(&rsp_pa, &priv->regs_t->ctrl_rsp_pa, 8);
rsp_pa = le64_to_cpu(rsp_pa);
-rsp_size = crb_fixup_cmd_size(dev, &io_res, rsp_pa,
-    ioread32(&priv->regs_t->ctrl_rsp_size));
+rsp_size = ioread32(&priv->regs_t->ctrl_rsp_size);
+}
+iors = NULL;
+iobase_ptr = NULL;
+for (i = 0; resource_type(iores_array + i) == IORESOURCE_MEM; ++i) {
+if (rsp_pa >= iores_array[i].start &&
+    rsp_pa <= iores_array[i].end) {
+iors = iores_array + i;
+iobase_ptr = iobase_array + i;
+break;
+}
if (iores) {
    rsp_size = crb_fixup_cmd_size(dev, iores, rsp_pa, rsp_size);
}
if (cmd_pa != rsp_pa) {
    priv->rsp = crb_map_res(dev, priv, &io_res, rsp_pa, rsp_size);
    ret = PTR_ERR_OR_ZERO(priv->rsp);
    goto out;
}
if (!ret)
    priv->cmd_size = cmd_size;

-crtiler-529,7 +650,11 @@
-priv->rsp = crb_map_res(dev, priv, &io_res, rsp_pa, rsp_size);
+priv->rsp = crb_map_res(dev, iores, iobase_ptr,
+    +rsp_pa, rsp_size);
ret = PTR_ERR_OR_ZERO(priv->rsp);
 goto out;
}
@@ -588,25 +713,7 @@
chip->acpi_dev_handle = device->handle;
chip->flags = TPM_CHIP_FLAG_TPM2;

-rc = crb_cmd_ready(dev, priv);
-if (rc)
-    return rc;
-
.pm_runtime_get_noresume(dev);
.pm_runtime_set_active(dev);
.pm_runtime_enable(dev);
-
-rc = tpm_chip_register(chip);
-if (rc) {
-crb_go_idle(dev, priv);
.pm_runtime_put_noidle(dev);
.pm_runtime_disable(dev);
-return rc;
-}
-
.pm_runtime_put(dev);
-
-return 0;
+return tpm_chip_register(chip);

static int crb_acpi_remove(struct acpi_device *device)
@@ -616,52 +723,11 @@
tpm_chip_unregister(chip);

-pm_runtime_disable(dev);
-
return 0;
}

-static int __maybe_unused crb_pm_runtime_suspend(struct device *dev)
-{
-struct tpm_chip *chip = dev_get_drvdata(dev);
-struct crb_priv *priv = dev_get_drvdata(&chip->dev);
-
-return crb_go_idle(dev, priv);
-}
-
-static int __maybe_unused crb_pm_runtime_resume(struct device *dev)
-{
-struct tpm_chip *chip = dev_get_drvdata(dev);
-struct crb_priv *priv = dev_get_drvdata(&chip->dev);
-
-return crb_cmd_ready(dev, priv);
-}
-
-static int __maybe_unused crb_pm_suspend(struct device *dev)
-{
-int ret;
-
-ret = tpm_pm_suspend(dev);
-if (ret)
-return ret;
-
-return crb_pm_runtime_suspend(dev);
-}
-
-static int __maybe_unused crb_pm_resume(struct device *dev)
-{
-int ret;
-
-ret = crb_pm_runtime_resume(dev);
-if (ret)
-return ret;
return tpm_pm_resume(dev);
}

static const struct dev_pm_ops crb_pm = {
-SET_SYSTEM_SLEEP_PM_OPS(crb_pm_suspend, crb_pm_resume)
-SET_RUNTIME_PM_OPS(crb_pm_runtime_suspend, crb_pm_runtime_resume, NULL)
+SET_SYSTEM_SLEEP_PM_OPS(tpm_pm_suspend, tpm_pm_resume)
};

static const struct acpi_device_id crb_device_ids[] = {
--- linux-4.15.0.orig/drivers/char/tpm/tpm_i2c_atmel.c
+++ linux-4.15.0/drivers/char/tpm/tpm_i2c_atmel.c
@@ -65,7 +65,15 @@
dev_dbg(&chip->dev,
"%s(buf=%*ph len=%0zx) -> sts=%d\n", __func__,
(int)min_t(size_t, 64, len), buf, len, status);
return status;
+
+if (status < 0)
+return status;
+
+/* The upper layer does not support incomplete sends. */
+if (status != len)
+return -E2BIG;
+
+return 0;
}

static int i2c_atmel_recv(struct tpm_chip *chip, u8 *buf, size_t count)
--- linux-4.15.0.orig/drivers/char/tpm/tpm_i2c_infineon.c
+++ linux-4.15.0/drivers/char/tpm/tpm_i2c_infineon.c
@@ -26,8 +26,7 @@
#include <linux/wait.h>
#include "tpm.h"

-/* max. buffer size supported by our TPM */
-#define TPM_BUFSIZE 1260
+#define TPM_I2C_INFINEON_BUFSIZE 1260

/* max. number of iterations after I2C NAK */
#define MAX_COUNT 3
@@ -63,11 +62,13 @@
UNKNOWN,
};

-/* Structure to store I2C TPM specific stuff */
struct tpm_inf_dev {
struct i2c_client *client;
int locality;
-u8 buf[TPM_BUFSIZE + sizeof(u8)]; /* max. buffer size + addr */
+/* In addition to the data itself, the buffer must fit the 7-bit I2C
+ * address and the direction bit.
+ */
+u8 buf[TPM_I2C_INFINEON_BUFSIZE + 1];
struct tpm_chip *chip;
enum i2c_chip_type chip_type;
unsigned int adapterlimit;
@@ -117,7 +118,7 @@ /* Lock the adapter for the duration of the whole sequence. */
if (!tpm_dev.client->adapter->algo->master_xfer)
return -EOPNOTSUPP;
-i2c_lock_adapter(tpm_dev.client->adapter);
+i2c_lock_bus(tpm_dev.client->adapter, I2C_LOCK_SEGMENT);

if (tpm_dev.chip_type == SLB9645) {
/* use a combined read for newer chips
@@ -192,7 +193,7 @@
out:
-i2c_unlock_adapter(tpm_dev.client->adapter);
+i2c_unlock_bus(tpm_dev.client->adapter, I2C_LOCK_SEGMENT);
/* take care of 'guard time' */
usleep_range(SLEEP_DURATION_LOW, SLEEP_DURATION_HI);
@@ -219,12 +220,12 @@
.buf = tpm_dev.buf
};
-if (len > TPM_BUFSIZE)
+if (len > TPM_I2C_INFINEON_BUFSIZE)
return -EINVAL;
if (!tpm_dev.client->adapter->algo->master_xfer)
return -EOPNOTSUPP;
i2c_lock_adapter(tpm_dev.client->adapter);
+i2c_lock_bus(tpm_dev.client->adapter, I2C_LOCK_SEGMENT);
/* prepend the 'register address' to the buffer */
tpm_dev.buf[0] = addr;
@@ -243,7 +244,7 @@
usleep_range(sleep_low, sleep_hi);
}
-i2c_unlock_adapter(tpm_dev.client->adapter);
i2c_unlock_bus(tpm_dev.client->adapter, I2C_LOCK_SEGMENT);
/* take care of 'guard time' */
usleep_range(SLEEP_DURATI0N_LOW, SLEEP_DURATI0N_HI);

@@ -473,7 +474,8 @@
static int tpm_tis_i2c_recv(struct tpm_chip *chip, u8 *buf, size_t count)
{
    int size = 0;
    int expected, status;
+    int status;
+    u32 expected;

    if (count < TPM_HEADER_SIZE) {
        size = -EIO;
@@ -488,7 +490,7 @@
        expected = be32_to_cpu(*(__be32 *)(buf + 2));
        if (((size_t) expected > count) || (expected < TPM_HEADER_SIZE)) {
            size = -EIO;
            goto out;
        }
@@ -526,8 +528,8 @@
        u8 retries = 0;
        u8 sts = TPM_STS_GO;

-    if (len > TPM_BUFSIZE)
-        return -E2BIG;/* command is too long for our tpm, sorry */
+    if (len > TPM_I2C_INFINEON_BUFSIZE)
+        return -E2BIG;

        if (request_locality(chip, 0) < 0)
            return -EBUSY;
@@ -586,7 +588,7 @@
/* go and do it */
iic_tpm_write(TPM_STS(tpm_dev.locality), &sts, 1);

-    return len;
+    return 0;
out_err:
    tpm_tis_i2c_ready(chip);
/* The TPM needs some time to clean up here,
--- linux-4.15.0.orig/drivers/char/tpm/tpm_i2c_nuvoton.c
+++ linux-4.15.0/drivers/char/tpm/tpm_i2c_nuvoton.c
@@ @ -35.14 +35.12 @@
#include "tpm.h"
/* I2C interface offsets */
#define TPM_STS 0x00
#define TPM_BURST_COUNT 0x01
#define TPM_DATA_FIFO_W 0x20
#define TPM_DATA_FIFO_R 0x40
#define TPM_VID_DID_RID 0x60

/* TPM command header size */
#define TPM_HEADER_SIZE 10
#define TPM_RETRY 5
+
#define TPM_STS 0x00
#define TPM_BURST_COUNT 0x01
#define TPM_DATA_FIFO_W 0x20
#define TPM_DATA_FIFO_R 0x40
+
#define TPM_VID_DID_RID 0x60
+
#define TPM_I2C_RETRIES 5

/*
I2C bus device maximum buffer size w/o counting I2C address or command
* i.e. max size required for I2C write is 34 = addr, command, 32 bytes data
@@ -281,14 +279,18 @@
struct device *dev = chip->dev.parent;
struct i2c_client *client = to_i2c_client(dev);
s32 rc;
-int expected, status, burst_count, retries, size = 0;
-int status;
-int burst_count;
-int retries;
-int size = 0;
+
+u32 expected;

if (count < TPM_HEADER_SIZE) {
    i2c_nuvoton_ready(chip); /* return to idle */
    dev_err(dev, "%s() count < header size\n", __func__);
    return -EIO;
}
-
-for (retries = 0; retries < TPM_RETRY; retries++) {
+for (retries = 0; retries < TPM_I2C_RETRIES; retries++) {
    if (retries > 0) {
        /* if this is not the first trial, set responseRetry */
        i2c_nuvoton_write_status(client,
@@ -323,7 +325,7 @@
            * to machine native

        expected = be32_to_cpu(*(__be32 *) (buf + 2));
+        if (expected > count) {
    dev_err(dev, "%s() expected > count\n", __func__);
    size = -EIO;
    continue;
struct device *dev = chip->dev.parent;
struct i2c_client *client = to_i2c_client(dev);
unsigned long duration;
size_t count = 0;
int burst_count, bytes2write, retries, rc = -EIO;

ordinal = be32_to_cpu(*((__be32 *) (buf + 6)));
- rc = i2c_nuvoton_wait_for_data_avail(chip,
  tpm_calc_ordinal_duration(chip,
  ordinal),
- &priv->read_queue);
+ if (chip->flags & TPM_CHIP_FLAG_TPM2)
+   duration = tpm2_calc_ordinal_duration(chip, ordinal);
+ else
+   duration = tpm_calc_ordinal_duration(chip, ordinal);
+
+ rc = i2c_nuvoton_wait_for_data_avail(chip, duration, &priv->read_queue);
if (rc) {
  dev_err(dev, "%s() timeout command duration\n", __func__);
  i2c_nuvoton_ready(chip);
}

dev_dbg(dev, "%s() -> %zd\n", __func__, len);
- return len;
+ return 0;
}

static bool i2c_nuvoton_req_canceled(struct tpm_chip *chip, u8 status)
--- linux-4.15.0.orig/drivers/char/tpm/tpm_ibmvtpm.c
+++ linux-4.15.0/drivers/char/tpm/tpm_ibmvtpm.c
@@ -1,5 +1,5 @@
/*
- * Copyright (C) 2012 IBM Corporation
+ * Copyright (C) 2012-2020 IBM Corporation
 * 
 * Author: Ashley Lai <ashleyd.lbl@gmail.com>
 * 
 @ @ -141,18 +141,77 @@
 */

/ **
- * tpm_ibmvtpm_send - Send tpm request
+ * ibmvtpm_crq_send_init - Send a CRQ initialize message
+ * @ibmvtpm: vtpm device struct
+ *
+ * Return:
+ * 0 on success.
+ * Non-zero on failure.
+ */
+static int ibmvtpm_crq_send_init(struct ibmvtpm_dev *ibmvtpm)
+{
+int rc;
+
+rc = ibmvtpm_send_crq_word(ibmvtpm->vdev, INIT_CRQ_CMD);
+if (rc != H_SUCCESS)
+dev_err(ibmvtpm->dev,
+"%s failed rc=%d\n", __func__, rc);
+
+return rc;
+}
+
+/**
+ * tpm_ibmvtpm_resume - Resume from suspend
+ *
+ * @dev: device struct
+ *
+ * Return: Always 0.
+ */
+static int tpm_ibmvtpm_resume(struct device *dev)
+{
+struct tpm_chip *chip = dev_get_drvdata(dev);
+struct ibmvtpm_dev *ibmvtpm = dev_get_drvdata(&chip->dev);
+int rc = 0;
+
+do {
+if (rc)
+msleep(100);
+rc = plpar_hcall_norets(H_ENABLE_CRQ,
+ibmvtpm->vdev->unit_address);
+} while (rc == H_IN_PROGRESS || rc == H_BUSY || H_IS_LONG_BUSY(rc));
+
+if (rc) {
+dev_err(dev, "Error enabling ibmvtpm rc=%d\n", rc);
+return rc;
+}
+
+rc = vio_enable_interrupts(ibmvtpm->vdev);
+if (rc) {
+dev_err(dev, "Error vio_enable_interrupts rc=%d\n", rc);
+return rc;
+rc = ibmvtpm_crq_send_init(ibmvtpm);
+if (rc)
+dev_err(dev, "Error send_init rc=%d\n", rc);
+
+return rc;
+
+/**
+ * tpm_ibmvtpm_send() - Send a TPM command
+ * @chip:tpm chip struct
+ * @buf:buffer contains data to send
+ * @count:size of buffer
+ *
+ * Return:
+ *   - Number of bytes sent or < 0 on error.
+ *   0 on success,
+ *   -errno on error
+ */
static int tpm_ibmvtpm_send(struct tpm *chip, u8 *buf, size_t count)
{
struct ibmvtpm_dev *ibmvtpm = dev_get_drvdata(&chip->dev);
+retry = true;

int rc, sig;

if (!ibmvtpm->rtce_buf) {
++ -186,18 +245,27 @@
@ @
ibmvtpm->tpm_processing_cmd = true;

again:
rc = ibmvtpm_send_crq(ibmvtpm->vdev,
IBMVTMPM_VALID_CMD, VTPM_TPM_COMMAND,
count, ibmvtpm->rtce_dma_handle);
if (rc != H_SUCCESS) {
++ -186,18 +245,27 @@
*]
    dev_err(ibmvtpm->dev, "tpm_ibmvtpm_send failed rc=%d\n", rc);
    rc = 0;
}
ibmvtpm->tpm_processing_cmd = false;
-} else
-rc = count;
+
}

spin_unlock(&ibmvtpm->rtce_lock);
-return rc;
+return 0;
}

static void tpm_ibmvtpm_cancel(struct tpm_chip *chip)
@@ -276,26 +344,6 @@
}

/**
 * ibmvtpm_crq_send_init - Send a CRQ initialize message
 * @ibmvtpm:	vtpm device struct
 *
 * Return:
 * 0 on success.
 * Non-zero on failure.
 * /
-static int ibmvtpm_crq_send_init(struct ibmvtpm_dev *ibmvtpm)
-{
-int rc;
-
-rc = ibmvtpm_send_crq_word(ibmvtpm->vdev, INIT_CRQ_CMD);
-if (rc != H_SUCCESS)
-dev_err(ibmvtpm->dev,
-"ibmvtpm_crq_send_init failed rc=%d\n", rc);
-
-return rc;
-}
-
-/**
 * tpm_ibmvtpm_remove - ibm vtpm remove entry point
 * @vdev:	vio device struct
 *
 @@ -407,44 +455,6 @@
 ibmvtpm->crq_dma_handle, CRQ_RES_BUF_SIZE);
 }

-/**
 * tpm_ibmvtpm_resume - Resume from suspend
 * @dev:device struct
 *
 * Return: Always 0.
- 
static int tpm_ibmvtpm_resume(struct device *dev)
{
    struct tpm_chip *chip = dev_get_drvdata(dev);
    struct ibmvtpm_dev *ibmvtpm = dev_get_drvdata(&chip->dev);
    int rc = 0;

    do {
        if (rc)
            msleep(100);
        rc = plpar_hcall_norets(H_ENABLE_CRQ,
                                ibmvtpm->vdev->unit_address);
    } while (rc == H_IN_PROGRESS || rc == H_BUSY || H_IS_LONG_BUSY(rc));

    if (rc) {
        dev_err(dev, "Error enabling ibmvtpm rc=%d\n", rc);
        return rc;
    }

    rc = vio_enable_interrupts(ibmvtpm->vdev);
    if (rc) {
        dev_err(dev, "Error vio_enable_interrupts rc=%d\n", rc);
        return rc;
    }

    rc = ibmvtpm_crq_send_init(ibmvtpm);
    if (rc)
        dev_err(dev, "Error send_init rc=%d\n", rc);

    return rc;
}

static bool tpm_ibmvtpm_req_canceled(struct tpm_chip *chip, u8 status)
{
    return (status == 0);
}

while ((crq = ibmvtpm_crq_get_next(ibmvtpm)) != NULL) {
    ibmvtpm_crq_process(crq, ibmvtpm);
    wake_up_interruptible(&ibmvtpm->crq_queue.wq);
    crq->valid = 0;
    smp_wmb();
}

crq_q->num_entry = CRQ_RES_BUF_SIZE / sizeof(*crq_q->crq_addr);
init_waitqueue_head(&crq_q->wq);
ibmvtpm->crq_dma_handle = dma_map_single(dev, crq_q->crq_addr,
CRQ_RES_BUF_SIZE,
DMA_BIDIRECTIONAL);
@@ -677,6 +689,13 @@ if (rc)
goto init_irq_cleanup;

+if (!wait_event_timeout(ibmvtpm->crq_queue.wq,
+ibmvtpm->rtce_buf != NULL,
+HZ)) {
+dev_err(dev, "CRQ response timed out\n");
+goto init_irq_cleanup;
+}
+
return tpm_chip_register(chip);
init_irq_cleanup:
do {
--- linux-4.15.0.orig/drivers/char/tpm/tpm_ibmvtpm.h
+++ linux-4.15.0/drivers/char/tpm/tpm_ibmvtpm.h
@@ -31,6 +31,7 @@
struct ibmvtpm_crq *crq_addr;
 u32 index;
 u32 num_entry;
+wait_queue_head_t wq;
};

struct ibmvtpm_dev {
--- linux-4.15.0.orig/drivers/char/tpm/tpm_infineon.c
+++ linux-4.15.0/drivers/char/tpm/tpm_infineon.c
@@ -354,7 +354,7 @@
 for (i = 0; i < count; i++) {
 wait_and_send(chip, buf[i]);
 }
-return count;
+return 0;
}

static void tpm_inf_cancel(struct tpm_chip *chip)
--- linux-4.15.0.orig/drivers/char/tpm/tpm_nsc.c
+++ linux-4.15.0/drivers/char/tpm/tpm_nsc.c
@@ -226,7 +226,7 @@
 }  
 outb(NSC_COMMAND_EOC, priv->base + NSC_COMMAND);

 -return count;
+return 0;
}
static void tpm_nsc_cancel(struct tpm_chip *chip)
--- linux-4.15.0.orig/drivers/char/tpm/tpm_tis.c
+++ linux-4.15.0/drivers/char/tpm/tpm_tis.c
@@ -31,6 +31,7 @@
  
#include <linux/of.h>
#include <linux/of_device.h>
#include <linux/kernel.h>
+#include <linux/dmi.h>
#include "tpm.h"
#include "tpm_tis_core.h"

@@ -53,8 +54,8 @@
  return container_of(data, struct tpm_tis_tcg_phy, priv);
 }

-static bool interrupts = true;
-module_param(interrupts, bool, 0444);
+static int interrupts = -1;
+module_param(interrupts, int, 0444);
MODULER_PARM_DESC(interrupts, "Enable interrupts");

static bool itpm;
@@ -67,6 +68,28 @@
MODULE_PARM_DESC(force, "Force device probe rather than using ACPI entry");
#endif

+static int tpm_tis_disable_irq(const struct dmi_system_id *d)
++{
++++if (interrupts == -1) {
++++pr_notice("tpm_tis: %s detected: disabling interrupts.\n", d->ident);
++++interrupts = 0;
++++}
+++}
++
++
++return 0;
++
++
++static const struct dmi_system_id tpm_tis_dmi_table[] = {
++{+
++++.callback = tpm_tis_disable_irq,
++++.ident = "ThinkPad T490s",
++++.matches = {
+++++DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+++++DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad T490s"),
+++++
+++++}
+++++
++++++}
++++++
++++++
++++++
++;
++
++
++
#if defined(CONFIG_PNP) && defined(CONFIG_ACPI)
static int has_hid(struct acpi_device *dev, const char *hid)
{
  @ @ -133.93 +156.14 @ @
}
#endif

#ifndef CONFIG_X86
#define INTEL_LEGACY_BLK_BASE_ADDR 0xFED08000
#define ILB_REMAP_SIZE0x100
#define LPC_CNTRL_REG_OFFSET 0x84
#define LPC_CLKRUN_EN (1 << 2)
-
-static void __iomem *ilb_base_addr;
-
-static inline bool is_bsw(void)
-{
-return ((boot_cpu_data.x86_model == INTEL_FAM6_ATOM_AIRMONT) ? 1 : 0);
-}
-
-/**
- * tpm_platform_begin_xfer() - clear LPC CLKRUN_EN i.e. clocks will be running
- */
-static void tpm_platform_begin_xfer(void)
-{
-u32 clkrun_val;
-
-if (!is_bsw())
-return;
-
-clkrun_val = ioread32(ilb_base_addr + LPC_CNTRL_REG_OFFSET);
-
-/* Disable LPC CLKRUN# */
-clkrun_val &= ~LPC_CLKRUN_EN;
-iowrite32(clkrun_val, ilb_base_addr + LPC_CNTRL_REG_OFFSET);
-
-/*
- * Write any random value on port 0x80 which is on LPC, to make
- * sure LPC clock is running before sending any TPM command.
- */
-outb(0xCC, 0x80);
-
-}
-
-/**
- * tpm_platform_end_xfer() - set LPC CLKRUN_EN i.e. clocks can be turned off
- */
-static void tpm_platform_end_xfer(void)
- { 
- u32 clkrun_val; 
- 
- if (!is_bsw()) 
- return; 
- 
- clkrun_val = ioread32(ilb_base_addr + LPC_CNTRL_REG_OFFSET); 
- 
- /* Enable LPC CLKRUN# */ 
- clkrun_val |= LPC_CLKRUN_EN; 
- iowrite32(clkrun_val, ilb_base_addr + LPC_CNTRL_REG_OFFSET); 
- 
- /* Write any random value on port 0x80 which is on LPC, to make 
- sure LPC clock is running before sending any TPM command. */ 
- outb(0xCC, 0x80); 
- 
- } 
- #else 
- static inline bool is_bsw(void) 
- { 
- return false; 
- } 
- 
- 
- static void tpm_platform_begin_xfer(void) 
- { 
- } 
- 
- static void tpm_platform_end_xfer(void) 
- { 
- } 
- #endif 
- 
- static int tpm_tcg_read_bytes(struct tpm_tis_data *data, u32 addr, u16 len, 
- u8 *result) 
- { 
- struct tpm_tis_tcg_phy *phy = to_tpm_tis_tcg_phy(data); 
- 
- tpm_platform_begin_xfer(); 
- 
- while (len--) 
- *result++ = ioread8(phy->iobase + addr); 
- 
- tpm_platform_end_xfer(); 
- 
- return 0; 
- }
struct tpm_tis_tcg_phy *phy = to_tpm_tis_tcg_phy(data);

-tpm_platform_begin_xfer();
-
while (len--)
  iowrite8(*value++, phy->iobase + addr);

-tpm_platform_end_xfer();
-
return 0;
}

struct tpm_tis_tcg_phy *phy = to_tpm_tis_tcg_phy(data);

-tpm_platform_begin_xfer();
-
*result = ioread16(phy->iobase + addr);

-tpm_platform_end_xfer();
-
return 0;
}

struct tpm_tis_tcg_phy *phy = to_tpm_tis_tcg_phy(data);

-tpm_platform_begin_xfer();
-
*result = ioread32(phy->iobase + addr);

-tpm_platform_end_xfer();
-
return 0;
}

struct tpm_tis_tcg_phy *phy = to_tpm_tis_tcg_phy(data);

-tpm_platform_begin_xfer();
-
iowrite32(value, phy->iobase + addr);
-tpm_platform_end_xfer();
-
return 0;
}

@@ -291,6 +219,8 @@
int irq = -1;
int rc;

+tpm_platform_end_xfer();
+
rc = check_acpi_tpm2(dev);
if (rc)
return rc;
@@ -461,11 +391,6 @@
if (rc)
goto err_force;

#ifndef CONFIG_X86
-if (is_bsw())
-ilb_base_addr = ioremap(INTEL_LEGACY_BLK_BASE_ADDR,
-ILB_REMAP_SIZE);
-endif
rc = platform_driver_register(&tis_drv);
if (rc)
goto err_platform;
@@ -484,10 +409,6 @@
err_platform:
if (force_pdev)
platform_device_unregister(force_pdev);
#ifndef CONFIG_X86
-if (is_bsw())
iounmap(ilb_base_addr);
-endif
err_force:
return rc;
}
@@ -497,10 +418,6 @@
pnp_unregister_driver(&tis_pnp_driver);
platform_driver_unregister(&tis_drv);

#ifndef CONFIG_X86
-if (is_bsw())
iounmap(ilb_base_addr);
-endif
if (force_pdev)
platform_device_unregister(force_pdev);
+static void tpm_tis_clkrun_enable(struct tpm_chip *chip, bool value);
+
/* Before we attempt to access the TPM we must see that the valid bit is set. */
/* The specification says that this bit is 0 at reset and remains 0 until the */
/* TPM has gone through its self test and initialization and has established */
@@ -66,7 +68,8 @@
if (rc < 0)
    return false;

static int release_locality(struct tpm_chip *chip, int l)
{
    struct tpm_tis_data *priv = dev_get_drvdata(&chip->dev);
    tpm_tis_write8(priv, TPM_ACCESS(l), TPM_ACCESS_ACTIVE_LOCALITY);
    return 0;
}

static int request_locality(struct tpm_chip *chip, int l)
{
    int expected, status;
    if (count < TPM_HEADER_SIZE) {
        size = -EIO;
        return false;
    }

    expected = priv->locality;
    priv->locality = l;
    return true;
}

static void release_locality(struct tpm_chip *chip, int l)
+
static int release_locality(struct tpm_chip *chip, int l)
{
    struct tpm_tis_data *priv = dev_get_drvdata(&chip->dev);

    tpm_tis_write8(priv, TPM_ACCESS(l), TPM_ACCESS_ACTIVE_LOCALITY);
    return 0;
}
expected = be32_to_cpu((__be32 *)(buf + 2));
-if (expected > count) {
+if (expected > count || expected < TPM_HEADER_SIZE) {
    size = -EINVAL;
goto out;
}
@@ -326,6 +332,9 @@
    int rc;

    +if (priv->irq == 0)
+    return;
+    rc = tpm_tis_read32(priv, TPM_INT_ENABLE(priv->locality), &intmask);
    if (rc < 0)
        intmask = 0;
@@ -374,7 +383,7 @@
goto out_err;
    }
    -return len;
+return 0;
out_err:
    tpm_tis_ready(chip);
    rc = tpm_tis_read32(priv, TPM_DID_VID(0), &did_vid);
@@ -421,19 +430,28 @@
    if (vendor_timeout_overrides[i].did_vid != did_vid)
        continue;
    memcpy(timeout_cap, vendor_timeout_overrides[i].timeout_us,
           sizeof(vendor_timeout_overrides[i].timeout_us));
    -return true;
+rc = true;
    }
return false;
+rc = false;
+
+out:
+if (chip->ops->clk_enable != NULL)
+chip->ops->clk_enable(chip, false);
+
+return rc;
}

/*@ -653,14 +671,73 @@*/
u32 interrupt;
int rc;

+tpm_tis_clkrun_enable(chip, true);
+
rc = tpm_tis_read32(priv, reg, &interrupt);
if (rc < 0)
interrupt = 0;

tpm_tis_write32(priv, reg, ~TPM_GLOBAL_INT_ENABLE & interrupt);
+
+tpm_tis_clkrun_enable(chip, false);
+
+if (priv->ilb_base_addr)
+iounmap(priv->ilb_base_addr);
}
EXPORT_SYMBOL_GPL(tpm_tis_remove);

+/**
+ * tpm_tis_clkrun_enable() - Keep clkrun protocol disabled for entire duration
+ *                           of a single TPM command
+ * @chip:	TPM chip to use
+ * @value:	1 - Disable CLKRUN protocol, so that clocks are free running
+ *          0 - Enable CLKRUN protocol
+ * Call this function directly in tpm_tis_remove() in error or driver removal
+ * path, since the chip->ops is set to NULL in tpm_chip_unregister().
+ */
+static void tpm_tis_clkrun_enable(struct tpm_chip *chip, bool value)
+{
+struct tpm_tis_data *data = dev_get_drvdata(&chip->dev);
+u32 clkrun_val;
+
+if (!IS_ENABLED(CONFIG_X86) || !is_bsw() ||
+ !data->ilb_base_addr)
+return;
+
+if (value) {
+data->clkrun_enabled++;  
+if (data->clkrun_enabled > 1)
+return;
+clkrun_val = ioread32(data->ilb_base_addr + LPC_CNTRL_OFFSET);  
+/* Disable LPC CLKRUN# */
+clkrun_val &= ~LPC_CLKRUN_EN;  
+iowrite32(clkrun_val, data->ilb_base_addr + LPC_CNTRL_OFFSET);  
+/* Disable LPC CLKRUN# */
+/* Write any random value on port 0x80 which is on LPC, to make
+ sure LPC clock is running before sending any TPM command.
+ */
+outb(0xCC, 0x80);
+} else {
+data->clkrun_enabled--;  
+if (data->clkrun_enabled)
+return;
+clkrun_val = ioread32(data->ilb_base_addr + LPC_CNTRL_OFFSET);  
+/* Enable LPC CLKRUN# */
+clkrun_val |= LPC_CLKRUN_EN;  
+iowrite32(clkrun_val, data->ilb_base_addr + LPC_CNTRL_OFFSET);  
+/* Write any random value on port 0x80 which is on LPC, to make
+ sure LPC clock is running before sending any TPM command.
+ */
+outb(0xCC, 0x80);
+
+static const struct tpm_class_ops tpm_tis = {
.flags = TPM_OPS_AUTO_STARTUP,  
.status = tpm_tis_status,  
=req canceled = tpm_tis_req_canceled,  
.request locality = request locality,  
.relinquish locality = release locality,  
.clk enable = tpm_tis_clkrun_enable,  
};

int tpm_tis_core_init(struct device *dev, struct tpm_tis_data *priv, int irq,  
=acpi_handle ACPI_dev_handle)
{
u32 vendor, intfcaps, intmask;
+u32 clkrun_val;
u8 rid;
int rc, probe;
struct tpm_chip *chip;
@@ -700,6 +779,23 @@
priv->phy_ops = phy_ops;
dev_set_drvdata(&chip->dev, priv);

+if (is_bsw()) {
+priv->ilb_base_addr = ioremap(INTEL_LEGACY_BLK_BASE_ADDR,
+ILB_REMAP_SIZE);
+if (!priv->ilb_base_addr)
+return -ENOMEM;
+
+clkrun_val = ioread32(priv->ilb_base_addr + LPC_CNTRL_OFFSET);
+/* Check if CLKRUN# is already not enabled in the LPC bus */
+if (!(clkrun_val & LPC_CLKRUN_EN)) {
+iounmap(priv->ilb_base_addr);
+priv->ilb_base_addr = NULL;
+}
+
+if (chip->ops->clk_enable != NULL)
+chip->ops->clk_enable(chip, true);
+
+if (wait_startup(chip, 0) != 0) {
+rc = -ENODEV;
+goto out_err;
@@ -782,17 +878,31 @@
-tpm_tis_probe_irq_single(chip, intmask,IRQF_SHARED,
-irq);
-if (!(chip->flags & TPM_CHIP_FLAG_IRQ))
+tpm_tis_probe_irq(chip, intmask);
} else {
+disable_interrupts(chip);
+}
}
-
-tpm_tis_probe_irq_single(chip, intmask);
-
-
-return tpm_chip_register(chip);
+rc = tpm_chip_register(chip);
+if (rc)
goto out_err;
+
+if (chip->ops->clk_enable != NULL)
+chip->ops->clk_enable(chip, false);
+
+return 0;
out_err:
+if (chip->ops->clk_enable != NULL)
+chip->ops->clk_enable(chip, false);
+
tpm_tis_remove(chip);
+
return rc;
}

EXPORT_SYMBOL_GPL(tpm_tis_core_init);

int rc;

+if (chip->ops->clk_enable != NULL)
+chip->ops->clk_enable(chip, true);
+
/*@ reenable interrupts that device may have lost or */
* BIOS/firmware may have disabled */
rc = tpm_tis_write8(priv, TPM_INT_VECTOR(priv->locality), priv->irq);
if (rc < 0)
+return;
+goto out;
rc = tpm_tis_read32(priv, TPM_INT_ENABLE(priv->locality), &intmask);
if (rc < 0)
+return;
+goto out;

intmask |= TPM_INTF_CMD_READY_INT
| TPM_INTF_LOCALITY_CHANGE_INT | TPM_INTF_DATA_AVAIL_INT
| TPM_INTF_STS_VALID_INT | TPM_GLOBAL_INT_ENABLE;

tpm_tis_write32(priv, TPM_INT_ENABLE(priv->locality), intmask);
+
+out:
+if (chip->ops->clk_enable != NULL)
+chip->ops->clk_enable(chip, false);
+
+return;
}
int tpm_tis_resume(struct device *dev)
--- linux-4.15.0.orig/drivers/char/tpm/tpm_tis_core.h
+++ linux-4.15.0/drivers/char/tpm/tpm_tis_core.h
@@ -79,6 +79,11 @@
#define TPM_DID_VID(l) (0x0F00 | ((l) << 12))
#define TPM_RID(l) (0x0F04 | ((l) << 12))

+#define LPC_CNTRL_OFFSET 0x84
+#define LPC_CLKRUN_EN (1 << 2)
+#define INTEL_LEGACY_BLK_BASE_ADDR 0xFED08000
+#define ILB_REMAP_SIZE 0x100
+
enum tpm_tis_flags {
    TPM_TIS_ITPM_WORKAROUND = BIT(0),
};
@@ -89,6 +94,8 @@
int irq;
bool irq_tested;
unsigned int flags;
+void __iomem *ilb_base_addr;
+u16 clkrun_enabled;
wait_queue_head_t int_queue;
wait_queue_head_t read_queue;
const struct tpm_tis_phy_ops *phy_ops;
@@ -144,6 +151,15 @@
return data->phy_ops->write32(data, addr, value);
}

+static inline bool is_bsw(void)
+{
+    ifdef CONFIG_X86
+    return ((boot_cpu_data.x86_model == INTEL_FAM6_ATOM_AIRMONT) ? 1 : 0);
+    #else
+    return false;
+    #endif
+    +}
void tpm_tis_remove(struct tpm_chip *chip);
int tpm_tis_core_init(struct device *dev, struct tpm_tis_data *priv, int irq,
    const struct tpm_tis_phy_ops *phy_ops,
--- linux-4.15.0.orig/drivers/char/tpm/tpm_tis_spi.c
+++ linux-4.15.0/drivers/char/tpm/tpm_tis_spi.c
@@ -199,6 +199,7 @@
static int tpm_tis_spi_probe(struct spi_device *dev)
{
    #ifdef CONFIG_X86
    return ((boot_cpu_data.x86_model == INTEL_FAM6_ATOM_AIRMONT) ? 1 : 0);
    #else
    return false;
    #endif
    +}


phy = devm_kzalloc(&dev->dev, sizeof(struct tpm_tis_spi_phy),
    GFP_KERNEL);
@@ -211,7 +212,13 @@
    if (!phy->iobuf)
    return -ENOMEM;
-    return tpm_tis_core_init(&dev->dev, &phy->priv, -1, &tpm_spi_phy_ops,
+    /* If the SPI device has an IRQ then use that */
+    if (dev->irq > 0)
+        irq = dev->irq;
+    else
+        irq = -1;
+    return tpm_tis_core_init(&dev->dev, &phy->priv, irq, &tpm_spi_phy_ops,
     NULL);
 }
--- linux-4.15.0.orig/drivers/char/tpm/tpm_vtpm_proxy.c
+++ linux-4.15.0/drivers/char/tpm/tpm_vtpm_proxy.c
@@ -335,7 +335,6 @@
     }
     if (count > sizeof(proxy_dev->buffer)) {
         dev_err(&chip->dev,
             @ @ -366,7 +365,7 @ @
     wake_up_interruptible(&proxy_dev->wq);

-    return rc;
+    return 0;
     }

 static void vtpm_proxy_tpm_op_cancel(struct tpm_chip *chip)
     --- linux-4.15.0.orig/drivers/char/tpm/tprm-dev.c
+++ linux-4.15.0/drivers/char/tpm/tprm-dev.c
@@ -22,7 +22,7 @@
     }
     if (priv == NULL)
     return -ENOMEM;
 return -ENOMEM;
-rc = tpm2_init_space(&priv->space);
+rc = tpm2_init_space(&priv->space, TPM2_SPACE_BUFFER_SIZE);
     if (rc) {
         kfree(priv);
         return -ENOMEM;
     --- linux-4.15.0.orig/drivers/char/tpm/xen-tpmfront.c
--- linux-4.15.0.orig/drivers/char/ttyprintk.c
+++ linux-4.15.0/drivers/char/ttyprintk.c
@@ -18,10 +18,11 @@
 #include <linux/serial.h>
 #include <linux/tty.h>
 #include <linux/module.h>
+#include <linux/spinlock.h>

 struct ttyprintk_port {
 struct tty_port port;
-struct mutex port_write_mutex;
+spinlock_t spinlock;
 }; 

 static struct ttyprintk_port tpk_port;
@@ -100,11 +101,12 @@
 static void tpk_close(struct tty_struct *tty, struct file *filp) {
 struct ttyprintk_port *tpkp = tty->driver_data;
,unsigned long flags;
-mutex_lock(&tpkp->port_write_mutex);
+spin_lock_irqsave(&tpkp->spinlock, flags);
 /* flush tpk_printk buffer */
 tpk_printk(NULL, 0);
-mutex_unlock(&tpkp->port_write_mutex);
+spin_unlock_irqrestore(&tpkp->spinlock, flags);

tty_port_close(&tpkp->port, tty, filp);
const unsigned char *buf, int count)
{
    struct ttyprintk_port *tpkp = tty->driver_data;
    unsigned long flags;
    int ret;

    /* exclusive use of tpk_printk within this tty */
    -mutex_lock(&tpkp->port_write_mutex);
    +spin_lock_irqsave(&tpkp->spinlock, flags);
    ret = tpk_printk(buf, count);
    -mutex_unlock(&tpkp->port_write_mutex);
    +spin_unlock_irqrestore(&tpkp->spinlock, flags);

    return ret;
}

static void tpk_hangup(struct tty_struct *tty)
{
    struct ttyprintk_port *tpkp = tty->driver_data;

    tty_port_hangup(&tpkp->port);
}

static const struct tty_operations ttyprintk_ops = {
    .open = tpk_open,
    .close = tpk_close,
    .write = tpk_write,
    .write_room = tpk_write_room,
    .ioctl = tpk_ioctl,
    .hangup = tpk_hangup,
};

static const struct tty_port_operations null_ops = { };
ttyprintfk_driver = tty_alloc_driver(1,
TTY_DRIVER_RESET_TERMIOS |
--- linux-4.15.0.org/drivers/char/virtio_console.c
+++ linux-4.15.0/drivers/char/virtio_console.c
@@ -75,7 +75,7 @@
/* All the console devices handled by this driver */
struct list_head consoles;
};
-static struct ports_driver_data pdrvdata;
+static struct ports_driver_data pdrvdata = { .next_vtermno = 1};

static DEFINE_SPINLOCK(pdrvdata_lock);
static DECLARE_COMPLETION(early_console_added);
@@ -422,7 +422,7 @@
}
}

-static struct port_buffer *alloc_buf(struct virtqueue *vq, size_t buf_size,
+static struct port_buffer *alloc_buf(struct virtio_device *vdev, size_t buf_size,
    int pages)
{
    struct port_buffer *buf;
@@ -445,16 +445,16 @@
        return buf;
    }

-If(is_rproc_serial(vq->vdev)) {}
+If(is_rproc_serial(vdev)) {
/*
 * Allocate DMA memory from ancestor. When a virtio
 * device is created by remoteproc, the DMA memory is
 * associated with the grandparent device:
 * vdev => rproc => platform-dev.
 */
    if (!vq->vdev->dev.parent || !vq->vdev->dev.parent->parent)
        goto free_buf;
    buf->dev = vq->vdev->dev.parent->parent;
    +buf->dev = vdev->dev.parent->parent;

    /* Increase device refcnt to avoid freeing it */
    get_device(buf->dev);
@@ -489,7 +489,7 @@
        buf = virtqueue_get_buf(port->in_vq, &len);
        if (buf) {
+buf->len = min_t(size_t, len, buf->size);
buf->offset = 0;
port->stats.bytes_received += len;
}
@@ -838,7 +838,7 @@
count = min((size_t)(32 * 1024), count);

.buf = alloc_buf(port->out_vq, count, 0);
+buf = alloc_buf(port->portdev->vdev, count, 0);
if (!buf)
return -ENOMEM;
@@ -957,7 +957,7 @@
if (ret < 0)
goto error_out;

.buf = alloc_buf(port->out_vq, 0, pipe->nrbufs);
+buf = alloc_buf(port->portdev->vdev, 0, pipe->nrbufs);
if (!buf) {
ret = -ENOMEM;
goto error_out;
@@ -1366,24 +1366,24 @@
port->cons.ws.ws_col = cols;
}

-static unsigned int fill_queue(struct virtqueue *vq, spinlock_t *lock)
+static int fill_queue(struct virtqueue *vq, spinlock_t *lock)
{
struct port_buffer *buf;
-unsigned int nr_added_bufs;
+int nr_added_bufs;
int ret;

nr_added_bufs = 0;
do {
+buf = alloc_buf(vq, PAGE_SIZE, 0);
+buf = alloc_buf(vq->vdev, PAGE_SIZE, 0);
if (!buf)
-break;
+return -ENOMEM;

spin_lock_irq(lock);
ret = add_inbuf(vq, buf);
if (ret < 0) {
spin_unlock_irq(lock);
free_buf(buf, true);
-break;
+return ret;
}

nr_added_bufs++;
spin_unlock_irq(lock);
@@ -1402,9 +1402,7 @@
{
char debugfs_name[16];
struct port *port;
-struct port_buffer *buf;
dev_t devt;
-unsigned int nr_added_bufs;
int err;

port = kmalloc(sizeof(*port), GFP_KERNEL);
@@ -1423,6 +1421,7 @@
port->async_queue = NULL;

port->cons.ws.ws_row = port->cons.ws.ws_col = 0;
+port->cons.vtermno = 0;

port->host_connected = port->guest_connected = false;
port->stats = (struct port_stats) { 0 };
@@ -1462,11 +1461,13 @@
spin_lock_init(&port->outvq_lock);
init_waitqueue_head(&port->waitqueue);

/* Fill the in_vq with buffers so the host can send us data. */
-nr_added_bufs = fill_queue(port->in_vq, &port->inbuf_lock);
-if (!nr_added_bufs) {
+/* We can safely ignore ENOSPC because it means
+ * the queue already has buffers. Buffers are removed
+ * only by virtcons_remove(), not by unplug_port()
+ */
+err = fill_queue(port->in_vq, &port->inbuf_lock);
+if (err < 0 && err != -ENOMEM) {
+dev_err(port->dev, "Error allocating inbufs\n");
-err = -ENOMEM;
-goto free_device;
+
}
@@ -1513,8 +1514,6 @@
return 0;

free_inbufs:
-while ((buf = virtqueue_detach_unused_buf(port->in_vq)))
- free_buf(buf, true);
free_device:
device_destroy(pdrvdata.class, port->dev->devt);
static void remove_port_data(struct port *port) {
    struct port_buffer *buf;
    
    spin_lock_irq(&port->inbuf_lock);
    /* Remove unused data this port might have received. */
    discard_port_data(port);
    spin_unlock_irq(&port->inbuf_lock);
    
    /* Remove buffers we queued up for the Host to send us data in. */
    do {
        spin_lock_irq(&port->inbuf_lock);
        buf = virtqueue_detach_unused_buf(port->in_vq);
        spin_unlock_irq(&port->inbuf_lock);
        if (buf)
            free_buf(buf, true);
    } while (buf);
    
    spin_lock_irq(&port->outvq_lock);
    reclaim_consumed_buffers(port);
    spin_unlock_irq(&port->outvq_lock);
    
    /* Free pending buffers from the out-queue. */
    do {
        spin_lock_irq(&port->outvq_lock);
        buf = virtqueue_detach_unused_buf(port->out_vq);
        spin_unlock_irq(&port->outvq_lock);
        if (buf)
            free_buf(buf, true);
    } while (buf);
}

/*
 * -1776.7 +1755.7 @@
while ((buf = virtqueue_get_buf(vq, &len))) {
spin_unlock(&portdev->c_ivq_lock);

    -buf->len = len;
    +buf->len = min_t(size_t, len, buf->size);
    buf->offset = 0;

    handle_control_message(vq->vdev, portdev, buf);
@ @ -1791,13 +1770,24 @@
spin_unlock(&portdev->c_ivq_lock);
}
static void flush_bufs(struct virtqueue *vq, bool can_sleep)
{
    struct port_buffer *buf;
    unsigned int len;
    while ((buf = virtqueue_get_buf(vq, &len)))
        free_buf(buf, can_sleep);
}

static void out_intr(struct virtqueue *vq)
{
    struct port *port;
    port = find_port_by_vq(vq->vdev->priv, vq);
    if (!port)
        flush_bufs(vq, false);
    return;
}

unsigned long flags;
port = find_port_by_vq(vq->vdev->priv, vq);
if (!port)
    flush_bufs(vq, false);
return;

spin_lock_irqsave(&port->inbuf_lock, flags);
port->inbuf = get_inbuf(port);

static void remove_vqs(struct ports_device *portdev)
{
    struct virtqueue *vq;
    virtio_device_for_each_vq(portdev->vdev, vq) {
        struct port_buffer *buf;
        while ((buf = virtqueueDetachUnusedBuf(vq)))
            free_buf(buf, true);
    }
portdev->vdev->config->del_vqs(portdev->vdev);
kfree(portdev->in_vqs);
kfree(portdev->out_vqs);
}

-static void remove_controlq_data(struct ports_device *portdev)
+static void virtcons_remove(struct virtio_device *vdev)
{
  -struct port_buffer *buf;
  -unsigned int len;
  +struct ports_device *portdev;
  +struct port *port, *port2;

  -if (!use_multiport(portdev))
  -return;
  +portdev = vdev->priv;

  -while ((buf = virtqueue_get_buf(portdev->c_ivq, &len)))
  -free_buf(buf, true);
  +spin_lock_irq(&pdrvdata_lock);
  +list_del(&portdev->list);
  +spin_unlock_irq(&pdrvdata_lock);

  -while ((buf = virtqueue_detach_unused_buf(portdev->c_ivq)))
  -free_buf(buf, true);
  +/* Disable interrupts for vqs */
  +vdev->config->reset(vdev);
  +/* Finish up work that's lined up */
  +if (use_multiport(portdev))
  +cancel_work_sync(&portdev->control_work);
  +else
  +cancel_work_sync(&portdev->config_work);
  +
  +list_for_each_entry_safe(port, port2, &portdev->ports, list)
  +unplug_port(port);
  +
  +unregister_chrdev(portdev->chr_major, "virtio-portsdev");
  +
  +/*
  + * When yanking out a device, we immediately lose the
  + * (device-side) queues. So there's no point in keeping the
  + * guest side around till we drop our final reference. This
  + * also means that any ports which are in an open state will
  + * have to just stop using the port, as the vqs are going
  + * away.
  + */
  +remove_vqs(portdev);
  +kfree(portdev);
spin_lock_init(&portdev->ports_lock);
INIT_LIST_HEAD(&portdev->ports);
+INIT_LIST_HEAD(&portdev->list);

virtio_device_ready(portdev->vdev);

INIT_WORK(&portdev->control_work, &control_work_handler);

if (multiport) {
-unsigned int nr_added_bufs;
-
spin_lock_init(&portdev->c_ivq_lock);
spin_lock_init(&portdev->c_ovq_lock);

-nr_added_bufs = fill_queue(portdev->c_ivq, &portdev->c_ivq_lock);
-if (!nr_added_bufs) {
+err = fill_queue(portdev->c_ivq, &portdev->c_ivq_lock);
+if (err < 0) {
    dev_err(&vdev->dev, "Error allocating buffers for control queue\n");
    -err = -ENOMEM;
    -goto free_vqs;
+/*
+ * The host might want to notify mgmt sw about device
+ * add failure.
+ */
+__send_control_msg(portdev, VIRTIO_CONSOLE_BAD_ID, VIRTIO_CONSOLE_DEVICE_READY, 0);
+/* Device was functional: we need full cleanup. */
+virtcons_remove(vdev);
+return err;
} }
} else {
/*
@@ -2119,11 +2146,6 @@
return 0;

-free_vqs:
-/* The host might want to notify mgmt sw about device add failure */
-__send_control_msg(portdev, VIRTIO_CONSOLE_BAD_ID,
- VIRTIO_CONSOLE_DEVICE_READY, 0);
-remove_vqs(portdev);
free_chrdev:
unregister_chrdev(portdev->chr_major, "virtio-portsdev");
free:
@@ -2132,47 +2154,11 @@
    return err;
 }

- static void virtcons_remove(struct virtio_device *vdev)
- {
- struct ports_device *portdev;
- struct port *port, *port2;
- 
- portdev = vdev->priv;
- 
- spin_lock_irq(&pdrvdata_lock);
- list_del(&portdev->list);
- spin_unlock_irq(&pdrvdata_lock);
- 
- /* Disable interrupts for vqs */
- vdev->config->reset(vdev);
- /* Finish up work that's lined up */
- if (use_multiport(portdev))
- cancel_work_sync(&portdev->control_work);
- else
- cancel_work_sync(&portdev->config_work);
- 
- list_for_each_entry_safe(port, port2, &portdev->ports, list)
- unplug_port(port);
- 
- unregister_chrdev(portdev->chr_major, "virtio-portsdev");
- 
- /* When yanking out a device, we immediately lose the
- * (device-side) queues. So there's no point in keeping the
- * guest side around till we drop our final reference. This
- * also means that any ports which are in an open state will
- * have to just stop using the port, as the vqs are going
- * away.
- */
- remove_controlq_data(portdev);
- remove_vqs(portdev);
- kfree(portdev);
- }

 static struct virtio_device_id id_table[] = {
 { VIRTIO_ID_CONSOLE, VIRTIO_DEV_ANY_ID },

static unsigned int features[] = {
    VIRTIO_CONSOLE_F_SIZE,
    @ @ -2185,6 +2171,7 @@
    #endif
    [ 0 ],
};
+MODULE_DEVICE_TABLE(virtio, id_table);

static unsigned int rproc_serial_features[] = {
};
@@ -2209,7 +2196,6 @@
    */
    if (use_multiport(portdev))
        virtqueue_disable_cb(portdev->c_ivq);
@@ -2338,6 +2324,5 @@
    module_init(init);
    module_exit(fini);
    -MODULE_DEVICE_TABLE(virtio, id_table);
    -MODULE_DESCRIPTION("Virtio console driver");
    MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/clk/Makefile
+++ linux-4.15.0/drivers/clk/Makefile
@@ -65,6 +65,7 @@
    obj-y			+= imgtec/
    obj-$(CONFIG_ARCH_MXC)++= imx/
    obj-$(CONFIG_MACH_INGENIC)++= ingenic/
+obj-$(CONFIG_ARCH_K3)++= keystone/
    obj-$(CONFIG_ARCH_KEYSTONE)++= keystone/
    obj-$(CONFIG_MACH_LOONGSON32)++= loongson1/
    obj-$(CONFIG_ARCH_MEDIATEK)++= mediatek/
@@ -87,7 +88,7 @@
    obj-$(CONFIG_CLK_UNIPHIER)++= uniphier/
    obj-$(CONFIG_ARCH_MEDIATEK)++= mediatek/
    @ @ -87,7 +88,7 @@
    obj-$(CONFIG.PLAT_SPEAR)++= spear/
    obj-$(CONFIG_ARCH_STI)++= st/
    obj-$(CONFIG_ARCH_SUNXI)++= sunxi/
+obj-$(CONFIG.SUNXI.CCU)++= sunxi-ng/
    obj-$(CONFIG_ARCH_TEGRA)++= tegra/
    obj+y++= ti/
    obj-$(CONFIG_CLK_UNIPHIER)++= uniphier/

---
static void __init of_sama5d2_clk_audio_pll_pmc_setup(struct device_node *np)
{
-struct clk_audio_pad *apmc_ck;
+struct clk_audio_pmc *apmc_ck;
    struct clk_init_data init = {1};

    apmc_ck = kzalloc(sizeof(*apmc_ck), GFP_KERNEL);

    div = DIV_ROUND_CLOSEST(parent_rate, req->rate);
+if (div > GENERATED_MAX_DIV + 1)
+div = GENERATED_MAX_DIV + 1;

    clk_generated_best_diff(req, parent, parent_rate, div,
        &best_diff, &best_rate);
    @ @ -282,7 +284,7 @ @
    static struct clk_hw *__init
        at91_clk_register_generated(struct regmap *regmap, spinlock_t *lock,
           const char *name, const char **parent_names,
           u8 num_parents, u8 id,
+        u8 num_parents, u8 id, bool pll_audio,
            const struct clk_range *range)
    {
        struct clk_generated *gck;
        @ @ -306,6 +308,7 @ @
        gck->regmap = regmap;
        gck->lock = lock;
        gck->range = *range;
+        gck->audio_pll_allowed = pll_audio;

        clk_generated_startup(gck);
        hw = &gck->hw;
        @ @ -331,7 +334,6 @ @
        struct device_node *gcknp;
        struct clk_range range = CLK_RANGE(0, 0);
        struct regmap *regmap;
        -struct clk_generated *gck;

        num_parents = of_clk_get_parent_count(np);
        if (num_parents == 0 || num_parents > GENERATED_SOURCE_MAX)
            @ @ -348,6 +350,8 @ @
for_each_child_of_node(np, gcknp) {
  bool pll_audio = false;
  
  if (of_property_read_u32(gcknp, "reg", &id))
    continue;

  of_at91_get_clk_range(gcknp, "atmel,clk-output-range",
                        &range);

  if (of_device_is_compatible(np, "atmel,sama5d2-clk-generated") &&
      (id == GCK_ID_I2S0 || id == GCK_ID_I2S1 ||
       id == GCK_ID_CLASSD))
    pll_audio = true;

  hw = at91_clk_register_generated(regmap, &pmc_pcr_lock, name,
                                   parent_names, num_parents,
                                   id, &range);

  gck = to_clk_generated(hw);

  if (of_device_is_compatible(np, "atmel,sama5d2-clk-generated") ||
      (gck->id == GCK_ID_I2S0 || gck->id == GCK_ID_I2S1 ||
       gck->id == GCK_ID_CLASSD))
    gck->audio_pll_allowed = true;
    else
    gck->audio_pll_allowed = false;
  }

  if (IS_ERR(hw))
    continue;

define MOR_KEY_MASK(0xff << 16)

#define clk_main_parent_select(s) (((s) &
    (AT91_PMC_MOSCEN | AT91_PMC_OSCBYPASS)) ? 1 : 0)
+ struct clk_main_osc {
  struct clk_hw hw;
  struct regmap *regmap;
@@ -119,7 +123,7 @@
  regmap_read(regmap, AT91_PMC_SR, &status);

  return (status & AT91_PMC_MOSCS) && (tmp & AT91_PMC_MOSCEN);
  +return (status & AT91_PMC_MOSCS) && clk_main_parent_select(tmp);
  }

static const struct clk_ops main_osc_ops = {
@@ -158,7 +162,7 @@
  if (bypass)
    regmap_update_bits(regmap,
      - AT91_CKGR_MOR, MOR_KEY_MASK |
- AT91_PMC_MOSCEN,
+ AT91_PMC_OSCBYPASS,
      AT91_PMC_OSCBYPASS | AT91_PMC_KEY);

  hw = &osc->hw;
@@ -350,7 +354,10 @@
  regmap_read(regmap, AT91_CKGR_MCFR, &mcfr);
  if (mcfr & AT91_PMC_MAINRDY)
    return 0;
-  usleep_range(MAINF_LOOP_MIN_WAIT, MAINF_LOOP_MAX_WAIT);
+  if (system_state < SYSTEM_RUNNING)
+    udelay(MAINF_LOOP_MIN_WAIT);
+  else
+    usleep_range(MAINF_LOOP_MIN_WAIT, MAINF_LOOP_MAX_WAIT);
  } while (time_before(prep_time, timeout));

  return -ETIMEDOUT;
@@ -510,12 +517,17 @@
  regmap_read(regmap, AT91_CKGR_MOR, &tmp);
  -tmp &= ~MOR_KEY_MASK;
  if (index && !(tmp & AT91_PMC_MOSCSEL))
    -regmap_write(regmap, AT91_CKGR_MOR, tmp | AT91_PMC_MOSCSEL);
-  +tmp = AT91_PMC_MOSCSEL;
 else if (!index && (tmp & AT91_PMC_MOSCSEL))
    -regmap_write(regmap, AT91_CKGR_MOR, tmp & ~AT91_PMC_MOSCSEL);
-  +tmp = 0;
+else
+  +return 0;


+regmap_update_bits(regmap, AT91_CKGR_MOR, AT91_PMC_MOSCSEL | MOR_KEY_MASK, tmp | AT91_PMC_KEY);

while (!clk_sam9x5_main_ready(regmap))
cpu_relax();
@@ -530,7 +542,7 @@
regmap_read(clkmain->regmap, AT91_CKGR_MOR, &status);

-return status & AT91_PMC_MOSCEN ? 1 : 0;
+return clk_main_parent_select(status);
 }

static const struct clk_ops sam9x5_main_ops = {
@@ -572,7 +584,7 @@
clkmain->hw.init = &init;
clkmain->regmap = regmap;
regmap_read(clkmain->regmap, AT91_CKGR_MOR, &status);
-clkmain->parent = status & AT91_PMC_MOSCEN ? 1 : 0;
+clkmain->parent = clk_main_parent_select(status);

hw = &clkmain->hw;
ret = clk_hw_register(NULL, &clkmain->hw);
--- linux-4.15.0.orig/drivers/clk/at91/clk-pll.c
+++ linux-4.15.0/drivers/clk/at91/clk-pll.c
@@ -132,19 +132,11 @@
unsigned long parent_rate)
{
 struct clk_pll *pll = to_clk_pll(hw);
-unsigned int pllr;
-u16 mul;
-u8 div;

-regmap_read(pll->regmap, PLL_REG(pll->id), &pllr);
- div = PLL_DIV(pllr);
-mul = PLL_MUL(pllr, pll->layout);
- if (!div || !mul)
- return 0;
+if (!pll->div || !pll->mul)
 return 0;

-return (parent_rate / div) * (mul + 1);
+return (parent_rate / pll->div) * (pll->mul + 1);
}

static long clk_pll_get_best_div_mul(struct clk_pll *pll, unsigned long rate,
--- linux-4.15.0.orig/drivers/clk/at91/clk-usb.c
+++ linux-4.15.0/drivers/clk/at91/clk-usb.c
@@ -78,6 +78,9 @@
tmp_parent_rate = req->rate * div;
tmp_parent_rate = clk_hw_round_rate(parent,
     tmp_parent_rate);
+        if (!tmp_parent_rate)
+            continue;
+        
tmp_rate = DIV_ROUND_CLOSEST(tmp_parent_rate, div);
if (tmp_rate < req->rate)
tmp_diff = req->rate - tmp_rate;
--- linux-4.15.0.orig/drivers/clk/at91/pmc.c
+++ linux-4.15.0/drivers/clk/at91/pmc.c
@@ -107,10 +107,20 @@
return 0;
}
+static bool pmc_ready(unsigned int mask)
+{
+    unsigned int status;
+    
+    regmap_read(pmcreg, AT91_PMC_SR, &status);
+    
+    return ((status & mask) == mask) ? 1 : 0;
+}
+
+static void pmc_resume(void)
{
    int i, ret = 0;
    int i;
    u32 tmp;
    u32 mask = AT91_PMC_MCKRDY | AT91_PMC_LOCKA;

    regmap_read(pmcreg, AT91_PMC_MCKR, &tmp);
    if (pmc_cache.mckr != tmp)
@@ -134,13 +144,11 @@
        AT91_PMC_PCR_CMD);
    }

    -if (pmc_cache.uckr & AT91_PMC_UPLLEN) {
        ret = regmap_read_poll_timeout(pmcreg, AT91_PMC_SR, tmp,
-            !(tmp & AT91_PMC_LOCKU),
-            10, 5000);
-        if (ret)
-            pr_crit("USB PLL didn't lock when resuming\n");
-    }
if (pmc_cache.uckr & AT91_PMC_UPLLEN)
    mask |= AT91_PMC_LOCKU;
+
    while (!pmc_ready(mask))
    cpu_relax();
}

static struct syscore_ops pmc_syscore_ops = {
    --- linux-4.15.0.orig/drivers/clk/at91/sckc.c
    +++ linux-4.15.0/drivers/clk/at91/sckc.c
    @ @ -74,7 +74,10 @@

    writel(tmp | AT91_SCKC_OSC32EN, sckr);

    -usleep_range(osc->startup_usec, osc->startup_usec + 1);
    +if (system_state < SYSTEM_RUNNING)
        udelay(osc->startup_usec);
    +else
        usleep_range(osc->startup_usec, osc->startup_usec + 1);

    return 0;
}  
@@ -197,7 +200,10 @@

    writel(readl(sckr) | AT91_SCKC_RCEN, sckr);

    -usleep_range(osc->startup_usec, osc->startup_usec + 1);
    +if (system_state < SYSTEM_RUNNING)
        udelay(osc->startup_usec);
    +else
        usleep_range(osc->startup_usec, osc->startup_usec + 1);

    return 0;
}  
@@ -310,7 +316,10 @@

    writel(tmp, sckr);

    -usleep_range(SLOWCK_SW_TIME_USEC, SLOWCK_SW_TIME_USEC + 1);
    +if (system_state < SYSTEM_RUNNING)
        udelay(SLOWCK_SW_TIME_USEC);
    +else
        usleep_range(SLOWCK_SW_TIME_USEC, SLOWCK_SW_TIME_USEC + 1);

    return 0;
}  
@@ -443,7 +452,10 @@

    return 0;
}
-usleep_range(osc->startup_usec, osc->startup_usec + 1);
+if (system_state < SYSTEM_RUNNING)
+udelay(osc->startup_usec);
+else
+usleep_range(osc->startup_usec, osc->startup_usec + 1);
osc->prepared = true;

return 0;
--- linux-4.15.0.orig/drivers/clk/bcm/clk-bcm2835.c
+++ linux-4.15.0/drivers/clk/bcm/clk-bcm2835.c
@@ -449,17 +449,17 @@
static const struct bcm2835_pll_ana_bits bcm2835_ana_default = {
 .mask0 = 0,
 .set0 = 0,
 .mask1 = (u32)~(A2W_PLL_KI_MASK | A2W_PLL_KP_MASK),
+.mask1 = A2W_PLL_KI_MASK | A2W_PLL_KP_MASK,
 .set1 = (2 << A2W_PLL_KI_SHIFT) | (8 << A2W_PLL_KP_SHIFT),
-.mask3 = (u32)~A2W_PLL_KA_MASK,
+.mask3 = A2W_PLL_KA_MASK,
 .set3 = (2 << A2W_PLL_KA_SHIFT),
 .fb_prediiv_mask = BIT(14),
};

static const struct bcm2835_pll_ana_bits bcm2835_ana_pllh = {
 .mask0 = (u32)~(A2W_PLLH_KA_MASK | A2W_PLLH_KI_LOW_MASK),
+.mask0 = A2W_PLLH_KA_MASK | A2W_PLLH_KI_LOW_MASK,
 .set0 = (2 << A2W_PLLH_KA_SHIFT) | (2 << A2W_PLLH_KI_LOW_SHIFT),
-.mask1 = (u32)~(A2W_PLLH_KI_HIGH_MASK | A2W_PLLH_KP_MASK),
+.mask1 = A2W_PLLH_KI_HIGH_MASK | A2W_PLLH_KP_MASK,
 .set1 = (6 << A2W_PLLH_KP_SHIFT),
 .mask3 = 0,
 .set3 = 0,
@@ -602,9 +602,7 @@
 const struct bcm2835_pll_data *data = pll->data;

 spin_lock(&cprman->regs_lock);
-spinman_write(cprman, data->cm_ctrl_reg, 
 -cprman_read(cprman, data->cm_ctrl_reg) | 
 - CM_PLL_ANARST); 
+ spinnerman_write(cprman, data->cm_ctrl_reg, CM_PLL_ANARST);
+ cprman_write(cprman, data->a2w_ctrl_reg,
 cprman_read(cprman, data->a2w_ctrl_reg) | 
 A2W_PLL_CTRL_PWRDN); 
@@ -623,8 +623,10 @@
 ~A2W_PLL_CTRL_PWRDN); 

/* Take the PLL out of reset. */
+spin_lock(&cprman->regs_lock);
cprman_write(cprman, data->cm_ctrl_reg,
       cprman_read(cprman, data->cm_ctrl_reg) & ~CM_PLL_ANARST);
+spin_unlock(&cprman->regs_lock);

/* Wait for the PLL to lock. */
timeout = ktime_add_ns(ktime_get(), LOCK_TIMEOUT_NS);
@@ -638,6 +638,10 @@
cpu_relax();
}

+   cprman_write(cprman, data->a2w_ctrl_reg,
+       cprman_read(cprman, data->a2w_ctrl_reg) |
+       A2W_PLL_CTRL_PRST_DISABLE);
+
return 0;
}

@@ -701,9 +705,11 @@
/* Unmask the reference clock from the oscillator. */
+spin_lock(&cprman->regs_lock);
cprman_write(cprman, A2W_XOSC_CTRL,
       cprman_read(cprman, A2W_XOSC_CTRL) |
       data->reference_enable_mask);
+spin_unlock(&cprman->regs_lock);

if (do_ana_setup_first)
bcm2835_pll_write_ana(cprman, data->ana_reg_base, ana);
@@ -1318,8 +1324,10 @@
   pll->hw.init = &init;

   ret = devm_clk_hw_register(cprman->dev, &pll->hw);
   -if (ret)
   +if (ret) {
       +kfree(pll);
       return NULL;
   +}
   return &pll->hw;
}

@@ -1447,13 +1455,13 @@
   return &clock->hw;
 }

-static struct clk *bcm2835_register_gate(struct bcm2835_cprman *cprman,
+static struct clk_hw *bcm2835_register_gate(struct bcm2835_cprman *cprman,
    const struct bcm2835_gate_data *data)
{
    return clk_register_gate(cprman->dev, data->name, data->parent,
        CLK_IGNORE_UNUSED | CLK_SET_RATE_GATE,
        cprman->regs + data->ctl_reg,
        CM_GATE_BIT, 0, &cprman->regs_lock);
}

typedef struct clk_hw *(*bcm2835_clk_register)(struct bcm2835_cprman *cprman,
--- linux-4.15.0.orig/drivers/clk/clk-axi-clkgen.c
+++ linux-4.15.0/drivers/clk/clk-axi-clkgen.c
@@ -40,6 +40,10 @@
#define MMCM_REG_FILTER10x4e
#define MMCM_REG_FILTER20x4f

+#define MMCM_CLKOUT_NOCOUNTBIT(6)
+
+#define MMCM_CLK_DIV_NOCOUNTBIT(12)
+
+struct axi_clkgen {
+    void __iomem *base;
+    struct clk_hw clk_hw;
+    unsigned int reg;
+    unsigned long long tmp;
+
-axi_clkgen_mmcm_read(axi_clkgen, MMCM_REG_CLKOUT0_1, &reg);
-dout = (reg & 0x3f) + ((reg >> 6) & 0x3f);
+axi_clkgen_mmcm_read(axi_clkgen, MMCM_REG_CLKOUT0_2, &reg);
+if (reg & MMCM_CLKOUT_NOCOUNT) {
+    dout = 1;
+} else {
+axi_clkgen_mmcm_read(axi_clkgen, MMCM_REG_CLKOUT0_1, &reg);
+dout = (reg & 0x3f) + ((reg >> 6) & 0x3f);
+}
+
+axi_clkgen_mmcm_read(axi_clkgen, MMCM_REG_CLK_DIV, &reg);
-d = (reg & 0x3f) + ((reg >> 6) & 0x3f);
-axi_clkgen_mmcm_read(axi_clkgen, MMCM_REG_CLK_FB1, &reg);
-m = (reg & 0x3f) + ((reg >> 6) & 0x3f);
+if (reg & MMCM_CLK_DIV_NOCOUNT)
+d = 1;
+else
+d = (reg & 0x3f) + ((reg >> 6) & 0x3f);
+
+axi_clkgen_mmcm_read(axi_clkgen, MMCM_REG_CLK_FB2, &reg);
+if (reg & MMCM_CLKOUT_NOCOUNT) {
+m = 1;
+} else {
+axi_clkgen_mmcm_read(axi_clkgen, MMCM_REG_CLK_FB1, &reg);
+m = (reg & 0x3f) + ((reg >> 6) & 0x3f);
+
if (d == 0 || dout == 0)
return 0;
--- linux-4.15.0.orig/drivers/clk/clk-divider.c
+++ linux-4.15.0/drivers/clk/clk-divider.c
@@ -118,12 +118,11 @@
unsigned long divider_recalc_rate(struct clk_hw *hw, unsigned long parent_rate,
  unsigned int val,
  const struct clk_div_table *table,
-  unsigned long flags)
+  unsigned long flags, unsigned long width)
{intér
  div = _get_div(table, val, flags, divider->width);
if (!div) {
  WARN(!(flags & CLK_DIVIDER_ALLOW_ZERO),
"%s: Zero divisor and CLK_DIVIDER_ALLOW_ZERO not setn",
@@ -145,7 +144,7 @@
val & div_mask(divider->width);

return divider_recalc_rate(hw, parent_rate, val, divider->table,
  - divider->flags);
+ divider->flags, divider->width);
  }
}

static bool _is_valid_table_div(const struct clk_div_table *table,
--- linux-4.15.0.orig/drivers/clk/clk-fixed-factor.c
+++ linux-4.15.0/drivers/clk/clk-fixed-factor.c
@@ -177,8 +177,15 @@
clk = clk_register_fixed_factor(NULL, clk_name, parent_name, flags,
mult, div);
-if (IS_ERR(clk))
+if (IS_ERR(clk)) {
+/*
+ * If parent clock is not registered, registration would fail.
* Clear OF_POPULATED flag so that clock registration can be
* attempted again from probe function.
+ */
+of_node_clear_flag(node, OF_POPULATED);
return clk;
+
ret = of_clk_add_provider(node, of_clk_src_simple_get, clk);
if (ret) {
@@ -203,6 +210,7 @@
    
    struct clk *clk = platform_get_drvdata(pdev);
+
+of_clk_del_provider(pdev->dev.of_node);
clk_unregister_fixed_factor(clk);

return 0;
--- linux-4.15.0.orig/drivers/clk/clk-fixed-rate.c
+++ linux-4.15.0/drivers/clk/clk-fixed-rate.c
@@ -200,6 +200,7 @@
    
    struct clk *clk = platform_get_drvdata(pdev);
+
+of_clk_del_provider(pdev->dev.of_node);
clk_unregister_fixed_rate(clk);

return 0;
--- linux-4.15.0.orig/drivers/clk/clk-fractional-divider.c
+++ linux-4.15.0/drivers/clk/clk-fractional-divider.c
@@ -77,7 +77,7 @@
    unsigned long m, n;
    u64 ret;
    
-    if (!rate || rate >= *parent_rate)
+    if (!rate || (!clk_hw_can_set_rate_parent(hw) && rate >= *parent_rate))
        return *parent_rate;

    if (fd->approximation)
--- linux-4.15.0.orig/drivers/clk/clk-gpio.c
+++ linux-4.15.0/drivers/clk/clk-gpio.c
@@ -248,7 +248,7 @@
    else
        clk = clk_register_gpio_gate(&pdev->dev, node->name,
            parent_names ? parent_names[0] : NULL, gpiod,
-        0);
+        CLK_SET_RATE_PARENT);
    if (IS_ERR(clk))
        return PTR_ERR(clk);
/* Map system registers */
srnp = of_find_compatible_node(NULL, NULL, "calxeda,hb-sregs");
hb_clk->reg = of_iomap(srnp, 0);
+of_node_put(srnp);
BUG_ON(!hb_clk->reg);
hb_clk->reg += reg;

+static int clk_mux_determine_rate(struct clk_hw *hw,
+  struct clk_rate_request *req)
+
+{  
+  struct clk_mux *mux = to_clk_mux(hw);
+  +
+  return clk_mux_determine_rate_flags(hw, req, mux->flags);
+  +}
+
+const struct clk_ops clk_mux_ops = {
+  .get_parent = clk_mux_get_parent,
+  .set_parent = clk_mux_set_parent,
+  -.determine_rate = __clk_mux_determine_rate,
+  +.determine_rate = clk_mux_determine_rate,
+};
EXPORT_SYMBOL_GPL(clk_mux_ops);

--- linux-4.15.0.orig/drivers/clk/clk-qoriq.c
+++ linux-4.15.0/drivers/clk/clk-qoriq.c
@@ -610,7 +610,7 @@
   .guts_compat = "fsl,qoriq-device-config-1.0",
   .init_periph = p5020_init_periph,
   .cmux_groups = {
-    &p2041_cmux_grp1, &p2041_cmux_grp2
+    &p2041_cmux_grp1, &p2041_cmux_grp2
   },
   .cmux_to_group = {
     0, 1, -1
@@ -1382,6 +1382,7 @@
   pr_err("%s: Couldn't map %pOF regs\n", __func__,
     guts);
   }

+of_node_put(guts);
}

--- linux-4.15.0.orig/drivers/clk/clk-s2mps11.c
+++ linux-4.15.0/drivers/clk/clk-s2mps11.c
@@ -211,6 +211,7 @@
 return ret;

 err_reg:
+of_node_put(s2mps11_clks[0].clk_np);
 while (--i >= 0)
 clkdev_drop(s2mps11_clks[i].lookup);

 @@ -245,6 +246,36 @@
 }; 
 MODULE_DEVICE_TABLE(platform, s2mps11_clk_id);

 +#ifdef CONFIG_OF
 +/*
 + * Device is instantiated through parent MFD device and device matching is done
 + * through platform_device_id.
 + *
 + * However if device's DT node contains proper clock compatible and driver is
 + * built as a module, then the *module* matching will be done through DT aliases.
 + * This requires of_device_id table. In the same time this will not change the
 + * actual *device* matching so do not add .of_match_table.
 + */
 +#endif
 +static const struct of_device_id s2mps11_dt_match[] __used = {
+{
+.compatible = "samsung,s2mps11-clk",
+.data = (void *)S2MPS11X,
+},
+.compatible = "samsung,s2mps13-clk",
+.data = (void *)S2MPS13X,
+},
+.compatible = "samsung,s2mps14-clk",
+.data = (void *)S2MPS14X,
+},
+.compatible = "samsung,s5m8767-clk",
+.data = (void *)S5M8767X,
+}, 
+/* Sentinel */
+},
+};
+MODULE_DEVICE_TABLE(of, s2mps11_dt_match);
+#endif
static struct platform_driver s2mps11_clk_driver = {
    .driver = {
        .name = "s2mps11-clk",
        --- linux-4.15.0.orig/drivers/clk/clk-si5351.c
        +++ linux-4.15.0/drivers/clk/clk-si5351.c
        @ @ .72,7 +72,7 @@
        "xtal", "clkin"
    },
    static const char * const si5351_pll_names[] = {
        "plla", "pllb", "vxco"
    };
    static const char * const si5351_msynth_names[] = {
        "ms0", "ms1", "ms2", "ms3", "ms4", "ms5", "ms6", "ms7"
    };
    --- linux-4.15.0.orig/drivers/clk/clk-stm32f4.c
    +++ linux-4.15.0/drivers/clk/clk-stm32f4.c
    @ @ .453,7 +453,7 @@
}

struct stm32f4_pll_post_div_data {
    int idx;
    -u8 pll_num;
    +int pll_idx;
    const char *name;
    const char *parent;
    u8 flag;
    @ @ -484,13 +484,13 @@

#define MAX_POST_DIV 3
static const struct stm32f4_pll_post_div_data post_div_data[MAX_POST_DIV] = {
    -{ CLK_I2SQ_PDIV, PLL_I2S, "plli2s-q-div", "plli2s-q",
    +{ CLK_I2SQ_PDIV, PLL_VCO_I2S, "plli2s-q-div", "plli2s-q",
        CLK_SET_RATE_PARENT, STM32F4_RCC_DCKCFGR, 0, 5, 0, NULL },

    -{ CLK_SAIQ_PDIV, PLL_SAI, "pllsai-q-div", "pllsai-q",
    +{ CLK_SAIQ_PDIV, PLL_VCO_SAI, "pllsai-q-div", "pllsai-q",
        CLK_SET_RATE_PARENT, STM32F4_RCC_DCKCFGR, 8, 5, 0, NULL },

    -{ NO_IDX, PLL_SAI, "pllsai-r-div", "pllsai-r",
    +{ NO_IDX, PLL_VCO_SAI, "pllsai-r-div", "pllsai-r",
        CLK_SET_RATE_PARENT, STM32F4_RCC_DCKCFGR, 16, 2, 0, post_divr_table },
    };
    @ @ -1489,7 +1489,7 @@
    post_div->width,
    post_div->flag_div,
    post_div->div_table,
    -clks[post_div->pll_num],
    +clks[post_div->pll_idx],
&stm32f4_clk_lock);

if (post_div->idx != NO_IDX)
--- linux-4.15.0.orig/drivers/clk/clk-twl6040.c
+++ linux-4.15.0/drivers/clk/clk-twl6040.c
@@ -41,6 +41,43 @@
return pdmclk->enabled;
 }

+static int twl6040_pdmclk_reset_one_clock(struct twl6040_pdmclk *pdmclk,
+    unsigned int reg)
+{
+  const u8 reset_mask = TWL6040_HPLLRST; /* Same for HPPLL and LPPLL */
+  int ret;
+  
+  ret = twl6040_set_bits(pdmclk->twl6040, reg, reset_mask);
+  if (ret < 0)
+    return ret;
+  
+  ret = twl6040_clear_bits(pdmclk->twl6040, reg, reset_mask);
+  if (ret < 0)
+    return ret;
+  
+  return 0;
+}
+
+/*
+ * TWL6040A2 Phoenix Audio IC erratum #6: "PDM Clock Generation Issue At
+ * Cold Temperature". This affects cold boot and deeper idle states it
+ * seems. The workaround consists of resetting HPPLL and LPPLL.
+ */
+static int twl6040_pdmclk_quirk_reset_clocks(struct twl6040_pdmclk *pdmclk)
+{
+  int ret;
+  
+  ret = twl6040_pdmclk_reset_one_clock(pdmclk, TWL6040_REG_HPPLLCTL);
+  if (ret)
+    return ret;
+  
+  ret = twl6040_pdmclk_reset_one_clock(pdmclk, TWL6040_REG_LPPLLCTL);
+  if (ret)
+    return ret;
+  
+  return 0;
+}
+
+static int twl6040_pdmclk_prepare(struct clk_hw *hw)
{
struct twl6040_pdmclk *pdmclk = container_of(hw, struct twl6040_pdmclk, ...
int ret;

ret = twl6040_power(pdmclk->twl6040, 1);
- if (!ret)
  - pdmclk->enabled = 1;
  + if (ret)
  + return ret;
+ ret = twl6040_pdmclk_quirk_reset_clocks(pdmclk);
+ if (ret)
+ goto out_err;
+ pdmclk->enabled = 1;
+ return 0;
+ out_err:
+ dev_err(pdmclk->dev, "%s: error %i
", __func__, ret);
+ twl6040_power(pdmclk->twl6040, 0);

return ret;
}
--- linux-4.15.0.orig/drivers/clk/clk-versaclock5.c
+++ linux-4.15.0/drivers/clk/clk-versaclock5.c
@@ -262,8 +262,10 @@
if (vc5->clk_mux_ins == VC5_MUX_IN_XIN)
  src = VC5_PRIM_SRC_SHDN_EN_XTAL;
- else if (vc5->clk_mux_ins == VC5_MUX_IN_CLKIN)
-   src = VC5_PRIM_SRC_SHDN_EN_CLKIN;
+ else /* Invalid; should have been caught by vc5_probe() */
+ return -EINVAL;
}

return regmap_update_bits(vc5->regmap, VC5_PRIM_SRC_SHDN, mask, src);
--- linux-4.15.0.orig/drivers/clk/clk.c
+++ linux-4.15.0/drivers/clk/clk.c
@@ -40,6 +40,12 @@
static HLIST_HEAD(clk_orphan_list);
static LIST_HEAD(clk_notifier_list);

+static struct hlist_head *all_lists[] = {
+   &clk_root_list,
+   &clk_orphan_list,
+   NULL,
/*
   **private data structures  ***/

struct clk_core {
    @-98.7 +104.11 @
    return 0;

    ret = pm_runtime_get_sync(core->dev);
    return ret < 0 ? ret : 0;
    +if (ret < 0) {
        pm_runtime_put_noidle(core->dev);
        return ret;
    +}
    +return 0;
}

static void clk_pm_runtime_put(struct clk_core *core)
    @@ -405.9 +415.9 @@
    return now <= rate && now > best;
}

- static int
- clk_mux_determine_rate_flags(struct clk_hw *hw, struct clk_rate_request *req,
-    unsigned long flags)
+ int clk_mux_determine_rate_flags(struct clk_hw *hw,
+    struct clk_rate_request *req,
+    unsigned long flags)
{
    struct clk_core *core = hw->core, *parent, *best_parent = NULL;
    int i, num_parents, ret;
    @@ -467.6 +477.7 @@
    return 0;
}
+ EXPORT_SYMBOL_GPL(clk_mux_determine_rate_flags);

struct clk *__clk_lookup(const char *name)
    @@ -1642.16 +1653.37 @@
    clk_pm_runtime_put(core);
}

+static unsigned long clk_core_req_round_rate_nolock(struct clk_core *core,
+    unsigned long req_rate)
+{
+    +int ret;
+    +struct clk_rate_request req;

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lockdep_assert_held(&prepare_lock);

if (!core)
    return 0;

clk_core_get_boundaries(core, &req.min_rate, &req.max_rate);
req.rate = req_rate;
ret = clk_core_round_rate_nolock(core, &req);
return ret ? 0 : req.rate;

static int clk_core_set_rate_nolock(struct clk_core *core, unsigned long req_rate)
{
    struct clk_core *top, *fail_clk;
    unsigned long rate = clk_core_req_round_rate_nolock(core, req_rate);
    /* bail early if nothing to do */
    if (rate == clk_core_get_rate_nolock(core))
        return 0;
    @ @ -1660.7 +1692.7 @ @
    return -EBUSY;

    /* calculate new rates and get the topmost changed clock */
    -top = clk_calc_new_rates(core, rate);
    +top = clk_calc_new_rates(core, req_rate);
    if (!top)
        return -EINVAL;
    @ @ -2027.6 +2059.9 @ @
    int ret;

    clk_prepare_lock();
    /* Always try to update cached phase if possible */
    +if (core->ops->get_phase)
        +core->phase = core->ops->get_phase(core->hw);
    ret = core->phase;
    clk_prepare_unlock();
@@ -2085,12 +2120,6 @@
static DEFINE_MUTEX(clk_debug_lock);
static HLIST_HEAD(clk_debug_list);

-static struct hlist_head *all_lists[] = {
    &clk_root_list,
    &clk_orphan_list,
    NULL,
    -};
-static struct hlist_head *orphan_list[] = {
    &clk_orphan_list,
    NULL,

core->dentry = d;

-d = debugfs_create_u32("clk_rate", S_IRUGO, core->dentry,
-(u32 *)&core->rate);
+d = debugfs_create_ulong("clk_rate", 0444, core->dentry, &core->rate);
if (!d)
goto err_out;

-d = debugfs_create_u32("clk_accuracy", S_IRUGO, core->dentry,
-(u32 *)&core->accuracy);
+d = debugfs_create_ulong("clk_accuracy", 0444, core->dentry,
+ &core->accuracy);
if (!d)
goto err_out;

d = debugfs_create_u32("clk_phase", S_IRUGO, core->dentry,
-(u32 *)&core->phase);
+d = debugfs_create_u32("clk_phase", 0444, core->dentry, &core->phase);
if (!d)
goto err_out;

@@ -2264,18 +2293,16 @@
if (!d)
goto err_out;

-d = debugfs_create_u32("clk_prepare_count", S_IRUGO, core->dentry,
-(u32 *)&core->prepare_count);
+d = debugfs_create_u32("clk_prepare_count", 0444, core->dentry,
+ &core->prepare_count);
if (!d)
goto err_out;

@@ -2284,23 +2311,23 @@
if (!d)
goto err_out;

-d = debugfs_create_u32("clk_prepare_count", S_IRUGO, core->dentry,
-(u32 *)&core->prepare_count);
+d = debugfs_create_u32("clk_prepare_count", 0444, core->dentry,
+ &core->prepare_count);
if (!d)
goto err_out;
-d = debugfs_create_u32("clk_enable_count", S_IRUGO, core->dentry, -
(u32 *)&core->enable_count);
+d = debugfs_create_u32("clk_enable_count", 0444, core->dentry, +
    &core->enable_count);
if (!d)
goto err_out;

-d = debugfs_create_u32("clk_notifier_count", S_IRUGO, core->dentry, -
(u32 *)&core->notifier_count);
+d = debugfs_create_u32("clk_notifier_count", 0444, core->dentry, +
    &core->notifier_count);
if (!d)
goto err_out;

if (core->num_parents > 1) {
-    d = debugfs_create_file("clk_possible_parents", S_IRUGO, -
    core->dentry, core, &possible_parents_fops);
+d = debugfs_create_file("clk_possible_parents", 0444, core->dentry, +
    core, &possible_parents_fops);
if (!d)
goto err_out;
@@ -2396,22 +2423,22 @@
if (!rootdir)
return -ENOMEM;
-    d = debugfs_create_file("clk_summary", S_IRUGO, rootdir, &all_lists, -
+d = debugfs_create_file("clk_summary", 0444, rootdir, &all_lists, +
    &clk_summary_fops);
if (!d)
return -ENOMEM;
-    d = debugfs_create_file("clk_orphan_summary", S_IRUGO, rootdir, -
+d = debugfs_create_file("clk_orphan_summary", 0444, rootdir, +
    &orphan_list, &clk_summary_fops);
if (!d)
return -ENOMEM;
-    d = debugfs_create_file("clk_orphan_dump", S_IRUGO, rootdir, -
+d = debugfs_create_file("clk_orphan_dump", 0444, rootdir, +
    &orphan_list, &clk_dump_fops);
if (!d)
return -ENOMEM;
@@ -2571,6 +2598,27 @@

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core->rate = core->req_rate = rate;

/*
 * Enable CLK_IS_CRITICAL clocks so newly added critical clocks
 * don't get accidentally disabled when walking the orphan tree and
 * re-parenting clocks
 */
+if (core->flags & CLK_IS_CRITICAL) {
+unsigned long flags;
+
+ret = clk_core_prepare(core);
+if (ret)
+goto out;
+
+flags = clk_enable_lock();
+ret = clk_core_enable(core);
+clk_enable_unlock(flags);
+if (ret) {
+clk_core_unprepare(core);
+goto out;
+
+}
+
+/*
 * walk the list of orphan clocks and re-parent any that newly finds a
 * parent.
 */
@@ -2578,10 +2626,13 @@
 struct clk_core *parent = __clk_init_parent(orphan);

 /*
 - * we could call __clk_set_parent, but that would result in a
 - * redundant call to the .set_rate op, if it exists
 + * We need to use __clk_set_parent_before() and _after() to
 + * to properly migrate any prepare/enable count of the orphan
 + * clock. This is important for CLK_IS_CRITICAL clocks, which
 + * are enabled during init but might not have a parent yet.
 */
 if (parent) {
+/* update the clk tree topology */
+__clk_set_parent_before(orphan, parent);
+__clk_set_parent_after(orphan, parent, NULL);
+__clk_recalc_accuracies(orphan);
@@ -2600,20 +2651,13 @@
 if (core->ops->init)
 core->ops->init(core->hw);

 -if (core->flags & CLK_IS_CRITICAL) {

Open Source Used In 5GaaS Edge AC-4 20273
unsigned long flags;
- clk_core_prepare(core);
- flags = clk_enable_lock();
- clk_core_enable(core);
- clk_enable_unlock(flags);
-
- kref_init(&core->ref);

out:
clk_pm_runtime_put(core);
unlock:
+if (ret)
+hlist_del_init(&core->child_node);
+
clk_prepare_unlock();

if (!ret)
@@ -2647,6 +2691,7 @@
return clk;
}

+/* keep in sync with __clk_put */
+void __clk_free_clk(struct clk *clk)
+{
+clk_prepare_lock();
+ @@ -2684,7 +2729,13 @@
+ret = -ENOMEM;
+goto fail_name;
+}
+
+if (WARN_ON(!hw->init->ops)) {
+ret = -EINVAL;
+goto fail_ops;
+}
+core->ops = hw->init->ops;
+
+if (dev && pm_runtime_enabled(dev))
+core->dev = dev;
+if (dev && dev->driver)
+@@ -2746,6 +2797,7 @@
kfree_const(core->parent_names[i]);
kfree(core->parent_names);
fail_parent_names:
+fail_ops:
kfree_const(core->name);
fail_name:
kfree(core);
@@ -2822,6 +2874,34 @@
  .set_parent= clk_nodrv_set_parent,
};

+static void clk_core_evict_parent_cache_subtree(struct clk_core *root,
+struct clk_core *target)
+{
+  int i;
+  struct clk_core *child;
+  
+  for (i = 0; i < root->num_parents; i++)
+    if (root->parents[i] == target)
+      root->parents[i] = NULL;
+  
+  hlist_for_each_entry(child, &root->children, child_node)
+    clk_core_evict_parent_cache_subtree(child, target);
+}
+
+/* Remove this clk from all parent caches */
+static void clk_core_evict_parent_cache(struct clk_core *core)
+{
+  struct hlist_head **lists;
+  struct clk_core *root;
+  
+  lockdep_assert_held(&prepare_lock);
+  
+  for (lists = all_lists; *lists; lists++)
+    hlist_for_each_entry(root, *lists, child_node)
+      clk_core_evict_parent_cache_subtree(root, core);
+}
+
+/**
+ * clk_unregister - unregister a currently registered clock
+ * @clk: clock to unregister
+ @@ -2860,6 +2940,8 @@
+ clk_core_set_parent(child, NULL);
+
+   clk_core_evict_parent_cache(clk->core);
+
+ hlist_del_init(&clk->core->child_node);
+
+ if (clk->core->prepare_count)
+   @ @ -3014,6 +3096,7 @@
+ return 1;
+}
/* keep in sync with __clk_free_clk */
void __clk_put(struct clk *clk)
{
    struct module *owner;
    @ @ -3035,6 +3118,7 @@

    module_put(owner);

    +kfree_const(clk->con_id);
kfree(clk);
}

@@ -3073,20 +3157,19 @@
    /* search the list of notifiers for this clk */
    list_for_each_entry(cn, &clk_notifier_list, node)
    if (cn->clk == clk)
        -break;
        +goto found;

    /* if clk wasn't in the notifier list, allocate new clk_notifier */
    -if (cn->clk != clk) {
        -cn = kzalloc(sizeof(*cn), GFP_KERNEL);
        -if (!cn)
            -goto out;
        +cn = kzalloc(sizeof(*cn), GFP_KERNEL);
        +if (!cn)
            +goto out;

        -cn->clk = clk;
        -srcu_init_notifier_head(&cn->notifier_head);
        +cn->clk = clk;
        +srcu_init_notifier_head(&cn->notifier_head);

        -list_add(&cn->node, &clk_notifier_list);
        -}
        +list_add(&cn->node, &clk_notifier_list);

    +found:
    ret = srcu_notifier_chain_register(&cn->notifier_head, nb);

    clk->core->notifier_count++;
    @ @ -3111,32 +3194,28 @@
    */
int clk_notifier_unregister(struct clk *clk, struct notifier_block *nb)
{
    -struct clk_notifier *cn = NULL;
    -int ret = -EINVAL;
    +struct clk_notifier *cn = NULL;
    +int ret = -EINVAL;

    ...
+struct clk_notifier *cn;
+int ret = -ENOENT;

if (!clk || !nb)
  return -EINVAL;

clk_prepare_lock();

[list_for_each_entry(cn, &clk_notifier_list, node)
  -if (cn->clk == clk)
    break;
  -
  -if (cn->clk == clk) {
    ret = srcu_notifier_chain_unregister(&cn->notifier_head, nb);
    list_for_each_entry(cn, &clk_notifier_list, node) {
      if (cn->clk == clk) {
        ret = srcu_notifier_chain_unregister(&cn->notifier_head, nb);
        clk->core->notifier_count--;
        clk->core->notifier_count--;

    /* XXX the notifier code should handle this better */
    -if (!cn->notifier_head.head) {
      -srcu_cleanup_notifier_head(&cn->notifier_head);
      -list_del(&cn->node);
      -kfree(cn);
      +/* XXX the notifier code should handle this better */
      +if (!cn->notifier_head.head) {
        +srcu_cleanup_notifier_head(&cn->notifier_head);
        +list_del(&cn->node);
        +kfree(cn);
        +}
      +break;
    }
  } else {
    -ret = -ENOENT;
  }

clk_prepare_unlock();
--- linux-4.15.0.orig/drivers/clk/hisilicon/clk-hi3660.c
+++ linux-4.15.0/drivers/clk/hisilicon/clk-hi3660.c
@@ -163,8 +163,12 @@
   
   { HI3660_CLK_GATE_ISP_SNCLK2, "clk_gate_isp_snclk2",
   "clk_isp_snclk_mux", CLK_SET_RATE_PARENT, 0x50, 18, 0, },
+ /* clk_gate_ufs_subsys is a system bus clock, mark it as critical
+ */
+ * clock and keep it on for system suspend and resume.
+ */
+ { HI3660_CLK_GATE_UFS_SUBSYS, "clk_gate_ufs_subsys", "clk_div_sysbus",
  - CLK_SET_RATE_PARENT, 0x50, 21, 0, },
+ CLK_SET_RATE_PARENT | CLK_IS_CRITICAL, 0x50, 21, 0, },
{ HI3660_PCLK_GATE_DSI0, "pclk_gate_dsi0", "clk_div_cfgbus",
  CLK_SET_RATE_PARENT, 0x50, 28, 0, },
{ HI3660_PCLK_GATE_DSI1, "pclk_gate_dsi1", "clk_div_cfgbus",
--- linux-4.15.0.orig/drivers/clk/hisilicon/clkdivider-hi6220.c
+++ linux-4.15.0/drivers/clk/hisilicon/clkdivider-hi6220.c
@@ -56,7 +56,7 @@
val &= div_mask(dclk->width);
return divider_recalc_rate(hw, parent_rate, val, dclk->table,
- CLK_DIVIDER_ROUND_CLOSEST);
+ CLK_DIVIDER_ROUND_CLOSEST, dclk->width);
}

static long hi6220_clkdiv_round_rate(struct clk_hw *hw, unsigned long rate,
--- linux-4.15.0.orig/drivers/clk/hisilicon/crg-hi3516cv300.c
+++ linux-4.15.0/drivers/clk/hisilicon/crg-hi3516cv300.c
@@ -204,7 +204,7 @@
/* hi3516CV300 sysctrl CRG */
#define HI3516CV300_SYSCTRL_NR_CLKS 16

-static const char *wdt_mux_p[]= __initconst = { "3m", "apb" };
+static const char *const wdt_mux_p[]= __initconst = { "3m", "apb" };
static u32 wdt_mux_table[] = {0, 1};

static const struct hisi_mux_clock hi3516cv300_sysctrl_mux_clks[] = {
--- linux-4.15.0.orig/drivers/clk/hisilicon/reset.c
+++ linux-4.15.0/drivers/clk/hisilicon/reset.c
@@ -109,9 +109,8 @@
return NULL;

res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
-rstc->membase = devm_ioremap(&pdev->dev,
- res->start, resource_size(res));
- if (!rstc->membase)
+rstc->membase = devm_ioremap_resource(&pdev->dev, res);
+ if (IS_ERR(rstc->membase))
return NULL;

spin_lock_init(&rstc->lock);
--- linux-4.15.0.orig/drivers/clk/imgtec/clk-boston.c
+++ linux-4.15.0/drivers/clk/imgtec/clk-boston.c
@@ -73,27 +73,40 @@
hw = clk_hw_register_fixed_rate(NULL, "input", NULL, 0, in_freq);
if (IS_ERR(hw)) {
    pr_err("failed to register input clock: %ld\n", PTR_ERR(hw));
    return;
}
onecell->hws[BOSTON_CLK_INPUT] = hw;

hw = clk_hw_register_fixed_rate(NULL, "sys", "input", 0, sys_freq);
if (IS_ERR(hw)) {
    pr_err("failed to register sys clock: %ld\n", PTR_ERR(hw));
    return;
}
    onecell->hws[BOSTON_CLK_SYS] = hw;

hw = clk_hw_register_fixed_rate(NULL, "cpu", "input", 0, cpu_freq);
if (IS_ERR(hw)) {
    pr_err("failed to register cpu clock: %ld\n", PTR_ERR(hw));
    return;
}
    onecell->hws[BOSTON_CLK_CPU] = hw;

err = of_clk_add_hw_provider(np, of_clk_hw_onecell_get, onecell);
    if (err) {
        pr_err("failed to add DT provider: %d\n", err);
        goto fail_clk_add;
    }
    return;
+fail_clk_add:
    clk_hw_unregister_fixed_rate(onecell->hws[BOSTON_CLK_CPU]);
    +fail_cpu:
    clk_hw_unregister_fixed_rate(onecell->hws[BOSTON_CLK_SYS]);
    +fail_sys:
    clk_hw_unregister_fixed_rate(onecell->hws[BOSTON_CLK_INPUT]);
    +fail_input:
    kfree(onecell);
}
/*
--- linux-4.15.0.orig/drivers/clk/imx/clk-busy.c
+++ linux-4.15.0/drivers/clk/imx/clk-busy.c
@@ -154,7 +154,7 @@
 struct clk *imx_clk_busy_mux(const char *name, void __iomem *reg, u8 shift,
struct clk_busy_mux *busy;
struct clk *clk;

struct clk *imx_clk_fixup_mux(const char *name, void __iomem *reg,
  u8 shift, u8 width, const char **parents,
  int num_parents, void (*fixup)(u32 *val))
{
  struct clk_fixup_mux *fixup_mux;

  /* Audio/video PLL post dividers do not work on i.MX6q revision 1.0 */
  if (clk_on_imx6q() && imx_get_soc_revision() == IMX_CHIP_REVISION_1_0) {
    * lvds1_gate and lvds2_gate are pseudo-gates. Both can be
    * independently configured as clock inputs or outputs. We treat
    * the "output_enable" bit as a gate, even though it's really just
    * enabling clock output.
    * enabling clock output. Initially the gate bits are cleared, as
    * otherwise the exclusive configuration gets locked in the setup done
    * by software running before the clock driver, with no way to change
    * it.
    * /
    +writel(readl(base + 0x160) & ~0x3c00, base + 0x160);
    clk[IMX6QDL_CLK_LVDS1_GATE] = imx_clk_gate_exclusive("lvds1_gate", "lvds1_sel", base + 0x160, 10,
      BIT(12));
    clk[IMX6QDL_CLK_LVDS2_GATE] = imx_clk_gate_exclusive("lvds2_gate", "lvds2_sel", base + 0x160, 11,
      BIT(13));
  }

  /* Linux 4.15.0 drivers/clk/imx/imx-imx6q.c */
  np = of_find_compatible_node(NULL, NULL, "fsl,imx6q-anatop");
  anatop_base = base = of_iomap(np, 0);
  WARN_ON(!base);  
  +of_node_put(np);
  
  /* Audio/video PLL post dividers do not work on i.MX6q revision 1.0 */
  if (clk_on_imx6q() && imx_get_soc_revision() == IMX_CHIP_REVISION_1_0) {
    * lvds1_gate and lvds2_gate are pseudo-gates. Both can be
    * independently configured as clock inputs or outputs. We treat
    * the "output_enable" bit as a gate, even though it's really just
    * enabling clock output.
    * enabling clock output. Initially the gate bits are cleared, as
    * otherwise the exclusive configuration gets locked in the setup done
    * by software running before the clock driver, with no way to change
    * it.
    * /
    +writel(readl(base + 0x160) & ~0x3c00, base + 0x160);
    clk[IMX6QDL_CLK_LVDS1_GATE] = imx_clk_gate_exclusive("lvds1_gate", "lvds1_sel", base + 0x160, 10,
      BIT(12));
    clk[IMX6QDL_CLK_LVDS2_GATE] = imx_clk_gate_exclusive("lvds2_gate", "lvds2_sel", base + 0x160, 11,
      BIT(13));
  }

  /* Audio/video PLL post dividers do not work on i.MX6q revision 1.0 */
+`#define CCDR				0x4`
+`#define BM_CCM_CCDR_MMDC_CH0_MASK	(1 << 17)`
+`#define CCSR				0xc`
+`#define BM_CCSR_PLL1_SW_CLK_SEL	(1 << 2)`
+`#define CACRR			0x10`
++`clks[IMX6SL_CLK_USDH3]       = imx_clk_gate2("usdhc3", "usdhc3_podf", base + 0x80, 6);`
++`clks[IMX6SL_CLK_USDH4]       = imx_clk_gate2("usdhc4", "usdhc4_podf", base + 0x80, 8);`

+/* Ensure the MMDC CH0 handshake is bypassed */
+`writel_relaxed(readl_relaxed(base + CCDR) |`
+`+BM_CCM_CCDR_MMDC_CH0_MASK, base + CCDR);`
+
+`imx_check_clocks(clks, ARRAY_SIZE(clks));`

++`clk_data.clks = clks;`
++`--- linux-4.15.0.orig/drivers/clk/imx/clk-imx6sx.c`
+++ `linux-4.15.0/drivers/clk/imx/clk-imx6sx.c`
@@ -164,6 +164,7 @@
``
++ `clk_set_rate(clks[IMX6UL_CLK_AHB], 99000000);`
-`+ clk_set_parent(clks[IMX6UL_CLK_PERIPH_CLK2_SEL], clks[IMX6UL_CLK_PLL3_USB_OTG]);`
++ `clk_set_parent(clks[IMX6UL_CLK_PERIPH_PRE], clks[IMX6UL_CLK_PLL2_BUS]);`
clk_set_parent(clks[IMX6UL_CLK_PERIPH], clks[IMX6UL_CLK_PERIPH_PRE]);
--- linux-4.15.0.orig/drivers/clk/imx/clk-imx7d.c
+++ linux-4.15.0/drivers/clk/imx/clk-imx7d.c
@@ -411,6 +411,7 @@
np = of_find_compatible_node(NULL, NULL, "fsl,imx7d-anatop");
 base = of_iomap(np, 0);
 WARN_ON(!base);
+of_node_put(np);

clk[IMX7D_PLL_ARM_MAIN_SRC] = imx_clk_mux("pll_arm_main_src", base + 0x60, 14, 2,
  pll_bypass_src_sel, ARRAY_SIZE(pll_bypass_src_sel));

clk[IMX7D_PLL_DRAM_MAIN_SRC] = imx_clk_mux("pll_dram_main_src", base + 0x70, 14, 2,
  pll_bypass_src_sel, ARRAY_SIZE(pll_bypass_src_sel));
--- linux-4.15.0.orig/drivers/clk/imx/clk-vf610.c
+++ linux-4.15.0/drivers/clk/imx/clk-vf610.c
@@ -203,6 +203,7 @@
np = of_find_compatible_node(NULL, NULL, "fsl,vf610-anatop");
 anatop_base = of_iomap(np, 0);
 BUG_ON(!anatop_base);
+of_node_put(np);

np = ccm_node;
ccm_base = of_iomap(np, 0);
--- linux-4.15.0.orig/drivers/clk/imx/clk.h
+++ linux-4.15.0/drivers/clk/imx/clk.h
@@ -63,14 +63,14 @@
 struct clk *imx_clk_busy_mux(const char *name, void __iomem *reg, u8 shift,
   u8 width, void __iomem *busy_reg, u8 busy_shift,
   - const char **parent_names, int num_parents);
+ const char * const *parent_names, int num_parents);

 struct clk *imx_clk_fixup_divider(const char *name, const char *parent,
   void __iomem *reg, u8 shift, u8 width,
   void (*fixup)(u32 *val));

 struct clk *imx_clk_fixup_mux(const char *name, void __iomem *reg,
   - u8 shift, u8 width, const char **parents,
+ u8 shift, u8 width, const char * const *parents,
     int num_parents, void (*fixup)(u32 *val));

 static inline struct clk *imx_clk_fixed(const char *name, int rate)
@@ -79,7 +79,8 @@
 }

 static inline struct clk *imx_clk_mux_ldb(const char *name, void __iomem *reg,
   -u8 shift, u8 width, const char **parents, int num_parents)
+u8 shift, u8 width, const char * const *parents,
int num_parents)
{
  return clk_register_mux(NULL, name, parents, num_parents,
  CLK_SET_RATE_NO_REPARENT | CLK_SET_RATE_PARENT, reg,
  @ -178,7 +179,8 @
}

static inline struct clk *imx_clk_mux(const char *name, void __iomem *reg,
  u8 shift, u8 width, const char **parents, int num_parents)
static inline struct clk *imx_clk_mux2(const char *name, void __iomem *reg,
  u8 shift, u8 width, const char **parents, int num_parents)
static inline struct clk *imx_clk_mux_flags(const char *name,
  void __iomem *reg, u8 shift, u8 width, const char **parents,
  int num_parents, unsigned long flags)
{
  return clk_register_mux(NULL, name, parents, num_parents,
  flags | CLK_SET_RATE_NO_REPARENT, reg, shift, width, 0,
  --- linux-4.15.0.orig/drivers/clk/ingenic/cgu.c
  +++ linux-4.15.0/drivers/clk/ingenic/cgu.c
  @ -364,16 +364,16 @
  struct ingenic_clk *ingenic_clk = to_ingenic_clk(hw);
  struct ingenic_cgu *cgu = ingenic_clk->cgu;
  const struct ingenic_cgu_clk_info *clk_info;
  -long rate = *parent_rate;
  +unsigned int div = 1;

  clk_info = &cgu->clock_info[ingenic_clk->idx];

  if (clk_info->type & CGU_CLK_DIV)
- rate /= ingenic_clk_calc_div(clk_info, *parent_rate, req_rate);
+ div = ingenic_clk_calc_div(clk_info, *parent_rate, req_rate);
else if (clk_info->type & CGU_CLK_FIXDIV)
- rate /= clk_info->fixdiv.div;
+ div = clk_info->fixdiv.div;
- return rate;
+ return DIV_ROUND_UP(*parent_rate, div);
}

static int
@@ -393,7 +393,7 @@
if (clk_info->type & CGU_CLK_DIV) {
    div = ingenic_clk_calc_div(clk_info, parent_rate, req_rate);
- rate = parent_rate / div;
+ rate = DIV_ROUND_UP(parent_rate, div);
    if (rate != req_rate)
        return -EINVAL;
--- linux-4.15.0.orig/drivers/clk/ingenic/cgu.h
+++ linux-4.15.0/drivers/clk/ingenic/cgu.h
@@ -78,7 +78,7 @@
    * @reg: offset of the divider control register within the CGU
    * @shift: number of bits to left shift the divide value by (ie. the index of
    *         the lowest bit of the divide value within its control register)
- * @div: number of bits to divide the divider value by (i.e. if the
+ * @div: number to divide the divider value by (i.e. if the
    * effective divider value is the value written to the register
    * multiplied by some constant)
    * @bits: the size of the divide value in bits
--- linux-4.15.0.orig/drivers/clk/ingenic/jz4740-cgu.c
+++ linux-4.15.0/drivers/clk/ingenic/jz4740-cgu.c
@@ -165,7 +165,7 @@
    -.parents = { JZ4740_CLK_EXT, JZ4740_CLK_PLL_HALF, -1, -1 },
    -.mux = { CGU_REG_CPCCR, 29, 1 },
    -.div = { CGU_REG_CPCCR, 23, 1, 6, -1, -1 },
- .gate = { CGU_REG_SCR, 6 },
+ .gate = { CGU_REG_SCR, 6, true },
    },

/* Gate-only clocks */
--- linux-4.15.0.orig/drivers/clk/keystone/Kconfig
+++ linux-4.15.0/drivers/clk/keystone/Kconfig
@@ -7,7 +7,7 @@
    config TI_SCI_CLK
    tristate "TI System Control Interface clock drivers"
-depends on (ARCH_KEYSTONE || COMPILER_TEST) && OF
+depends on (ARCH_KEYSTONE || ARCH_K3 || COMPILER_TEST) && OF
depends on TI_SCI_PROTOCOL
default ARCH_KEYSTONE
---help---
--- linux-4.15.0.orig/drivers/clk/mediatek/clk-cpumux.c
+++ linux-4.15.0/drivers/clk/mediatek/clk-cpumux.c
@@ -53,7 +53,7 @@
   .set_parent = clk_cpumux_set_parent,
 };

-static struct clk __init *
+static struct clk *
 mtk_clk_register_cpumux(const struct mtk_composite *mux,
 struct regmap *regmap)
 {
 @@ -84,9 +84,9 @@
 return clk;
 }

-int __init mtk_clk_register_cpumuxes(struct device_node *node,
-    const struct mtk_composite *clks, int num,
-    struct clk_onecell_data *clk_data)
+int mtk_clk_register_cpumuxes(struct device_node *node,
+    const struct mtk_composite *clks, int num,
+    struct clk_onecell_data *clk_data)
 { int i;
   struct clk *clk;
   --- linux-4.15.0.orig/drivers/clk/mediatek/clk-mt2701.c
--- linux-4.15.0/drivers/clk/mediatek/clk-mt2701.c
+++ linux-4.15.0/drivers/clk/mediatek/clk-mt2701.c
@@ -148,6 +148,7 @@
 FACTOR(CLK_TOP_CLK26M_D8, "clk26m_d8", "clk26m", 1, 8),
 FACTOR(CLK_TOP_32K_INTERNAL, "32k_internal", "clk26m", 1, 793),
 FACTOR(CLK_TOP_32K_EXTERNAL, "32k_external", "rtc32k", 1, 1),
+FACTOR(CLK_TOP_AXISEL_D4, "axisel_d4", "axi_sel", 1, 4),
 };

 static const char * const axi_parents[] = {
 @@ -857,13 +858,13 @@
 GATE_PERI0(CLK_PERI_USB1, "usb1_ck", "usb20_sel", 11),
 GATE_PERI0(CLK_PERI_USB0, "usb0_ck", "usb20_sel", 10),
 GATE_PERI0(CLK_PERI_PWM, "pwm_ck", "axi_sel", 9),
-  GATE_PERI0(CLK_PERI_PWM7, "pwm7_ck", "axi_sel", 8),
-  GATE_PERI0(CLK_PERI_PWM6, "pwm6_ck", "axi_sel", 7),
-  GATE_PERI0(CLK_PERI_PWM5, "pwm5_ck", "axi_sel", 6),
-  GATE_PERI0(CLK_PERI_PWM4, "pwm4_ck", "axi_sel", 5),
-  GATE_PERI0(CLK_PERI_PWM3, "pwm3_ck", "axi_sel", 4),
+  GATE_PERI0(CLK_PERI_PWM7, "pwm7_ck", "axi_sel", 8),
+  GATE_PERI0(CLK_PERI_PWM6, "pwm6_ck", "axi_sel", 7),
+  GATE_PERI0(CLK_PERI_PWM5, "pwm5_ck", "axi_sel", 6),
+  GATE_PERI0(CLK_PERI_PWM4, "pwm4_ck", "axi_sel", 5),
+  GATE_PERI0(CLK_PERI_PWM3, "pwm3_ck", "axi_sel", 4),

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-GATE_PERI0(CLK_PERI_PWM2, "pwm2_ck", "axi_sel", 3),
-GATE_PERI0(CLK_PERI_PWM1, "pwm1_ck", "axi_sel", 2),
+GATE_PERI0(CLK_PERI_PWM7, "pwm7_ck", "axisel_d4", 8),
+GATE_PERI0(CLK_PERI_PWM6, "pwm6_ck", "axisel_d4", 7),
+GATE_PERI0(CLK_PERI_PWM5, "pwm5_ck", "axisel_d4", 6),
+GATE_PERI0(CLK_PERI_PWM4, "pwm4_ck", "axisel_d4", 5),
+GATE_PERI0(CLK_PERI_PWM3, "pwm3_ck", "axisel_d4", 4),
+GATE_PERI0(CLK_PERI_PWM2, "pwm2_ck", "axisel_d4", 3),
+GATE_PERI0(CLK_PERI_PWM1, "pwm1_ck", "axisel_d4", 2),
GATE_PERI0(CLK_PERI_THERM, "therm_ck", "axi_sel", 1),
GATE_PERI0(CLK_PERI_NFI, "nfi_ck", "nfi2x_sel", 0),

--- linux-4.15.0.orig/drivers/clk/mediatek/clk-mt7622.c
+++ linux-4.15.0/drivers/clk/mediatek/clk-mt7622.c
@@ -513,7 +513,7 @@
GATE_PERI1(CLK_PERI_IRTX_PD, "peri_irtx_pd", "irtx_sel", 2);
}

-static struct mtk_composite infra_muxes[] __initdata = {
+static struct mtk_composite infra_muxes[] = {
 MUX(CLK_INFRA_MUX1_SEL, "infra_mux1_sel", infra_mux1_parents,
    0x000, 2, 2),
};
@@ -652,7 +652,7 @@
}

-return of_clk_add_provider(node, of_clk_src_onecell_get, clk_data);
}

-static int __init mtk_infrasys_init(struct platform_device *pdev)
+static int mtk_infrasys_init(struct platform_device *pdev)
{
        struct device_node *node = pdev->dev.of_node;
        struct clk_onecell_data *clk_data;
--- linux-4.15.0.orig/drivers/clk/mediatek/clk-pll.c
+++ linux-4.15.0/drivers/clk/mediatek/clk-pll.c
@@ -88,6 +88,32 @@

        return ((unsigned long)vco + postdiv - 1) / postdiv;
    }

+static void __mtk_pll_tuner_enable(struct mtk_clk_pll *pll)
+{
+    u32 r;
+    +if (pll->tuner_en_addr) {
+        r = readl(pll->tuner_en_addr) | BIT(pll->data->tuner_en_bit);
+        write(r, pll->tuner_en_addr);
+    } else if (pll->tuner_addr) {
+        r = readl(pll->tuner_addr) | AUDPLL_TUNER_EN;
+        write(r, pll->tuner_addr);
    }
static void __mtk_pll_tuner_disable(struct mtk_clk_pll *pll)
{
  u32 r;
  
  if (pll->tuner_en_addr) {
    r = readl(pll->tuner_en_addr) & ~BIT(pll->data->tuner_en_bit);
    writel(r, pll->tuner_en_addr);
  } else if (pll->tuner_addr) {
    r = readl(pll->tuner_addr) & ~AUDPLL_TUNER_EN;
    writel(r, pll->tuner_addr);
  }
}

static void mtk_pll_set_rate_regs(struct mtk_clk_pll *pll, u32 pcw, int postdiv)
{
  PLL_EN = readl(pll->base_addr + REG_CON0) & CON0_BASE_EN;

  /* disable tuner */
  __mtk_pll_tuner_disable(pll);

  /* set postdiv */
  val = readl(pll->pd_addr);
  val &= ~(POSTDIV_MASK << pll->data->pd_shift);
  @ @ -122.6 +151.9 @ @
  if (pll->tuner_addr)
    writel(con1 + 1, pll->tuner_addr);

  /* restore tuner_en */
  __mtk_pll_tuner_enable(pll);

  if (PLL_EN)
    udelay(20);
}

r |= pll->data->en_mask;
writel(r, pll->base_addr + REG_CON0);

@if (pll->tuner_en_addr) {
  r = readl(pll->tuner_en_addr) | BIT(pll->data->tuner_en_bit);
  writel(r, pll->tuner_en_addr);
}@ else if (pll->tuner_addr) {
  r = readl(pll->tuner_addr) | AUDPLL_TUNER_EN;
  writel(r, pll->tuner_addr);
}
writel(r, pll->tuner_addr);
-
+__mtk_pll_tuner_enable(pll);

udelay(20);

@@ -258,13 +284,7 @@
        r = readl(pll->tuner_addr) & ~ADCPLL_TUNER_EN;
    -writel(r, pll->tuner_addr);
    -}
    +__mtk_pll_tuner_disable(pll);
    
    r = readl(pll->base_addr + REG_CON0);
    r &= ~CON0_BASE_EN;
--- linux-4.15.0.orig/drivers/clk/meson/clk-pll.c
+++ linux-4.15.0/drivers/clk/meson/clk-pll.c
@@ -98,7 +98,7 @@
        *sdm = DIV_ROUND_UP(rem * SDM_DEN, requested_rate);
    } else {
        *n2 = div;
-    *sdm = DIV_ROUND_UP(rem * SDM_DEN, requested_rate);
+    *sdm = DIV_ROUND_UP_ULL((u64)rem * SDM_DEN, requested_rate);
    }
}

--- linux-4.15.0.orig/drivers/clk/meson/gxbb.c
+++ linux-4.15.0/drivers/clk/meson/gxbb.c
@@ -528,11 +528,6 @@
        .shift   = 14,
        .width    = 1,

-old_rate = rate;
+old_rate = clk_hw_get_rate(hw);

    rate_set = meson_clk_get_pll_settings(pll, rate);
    if (!rate_set)
        --- linux-4.15.0.orig/drivers/clk/meson/gxbb.c
+++ linux-4.15.0/drivers/clk/meson/gxbb.c
@@ -528,11 +528,6 @@
        .shift   = 14,
        .width    = 1,
@ @ -687,6 +682,7 @ @
    .ops = &clk_divider_ops,
    .parent_names = (const char *[[]){ "sar_adc_clk_sel" },
    .num_parents = 1,
    +.flags = CLK_SET_RATE_PARENT,
};

@@ -1386,7 +1382,7 @@
 static MESON_GATE(gxbb_periphs, HHI_GCLK_MPEG0, 7);
 static MESON_GATE(gxbb_spicc, HHI_GCLK_MPEG0, 8);
 static MESON_GATE(gxbb_i2c, HHI_GCLK_MPEG0, 9);
-static MESON_GATE(gxbb_sar_adc, HHI_GCLK_MPEG0, 10);
+static MESON_GATE(gxbb_sana, HHI_GCLK_MPEG0, 10);
 static MESON_GATE(gxbb_sana, HHI_GCLK_MPEG0, 10);
 static MESON_GATE(gxbb_smart_card, HHI_GCLK_MPEG0, 11);
 static MESON_GATE(gxbb_rng0, HHI_GCLK_MPEG0, 12);
 static MESON_GATE(gxbb_uart0, HHI_GCLK_MPEG0, 13);
-@ @ -1387,7 +1433,7 @@
 static MESON_GATE(gxbb_mmc_pclk, HHI_GCLK_MPEG2, 11);
 static MESON_GATE(gxbb_dvin, HHI_GCLK_MPEG2, 12);
 static MESON_GATE(gxbb_uart2, HHI_GCLK_MPEG2, 15);
-static MESON_GATE(gxbb_sana, HHI_GCLK_MPEG2, 22);
+static MESON_GATE(gxbb_sar_adc, HHI_GCLK_MPEG2, 22);
 static MESON_GATE(gxbb_vpu_intr, HHI_GCLK_MPEG2, 25);
 static MESON_GATE(gxbb_sec_abh_abh3_bridge, HHI_GCLK_MPEG2, 26);
 static MESON_GATE(gxbb_clk81_a53, HHI_GCLK_MPEG2, 29);
 --- linux-4.15.0.orig/drivers/clk/meson/meson8b.c
 +++ linux-4.15.0/drivers/clk/meson/meson8b.c
@@ -154,7 +154,7 @@
 },
 .n = {
   .reg_off = HHI_VID_PLL_CNTL,
-   .shift = 9,
+   .shift = 10,
   .width = 5,
 },
 .od = {
 --- linux-4.15.0.orig/drivers/clk/mmp/clk-of-mmp2.c
 +++ linux-4.15.0/drivers/clk/mmp/clk-of-mmp2.c
static const char *ssp_parent_names[] = {"vctxo_4", "vctxo_2", "vctxo", "pll1_16"};

static DEFINE_SPINLOCK(timer_lock);
-static const char *timer_parent_names[] = {"clk32", "vctxo_2", "vctxo_4", "vctxo"};
+static const char *timer_parent_names[] = {"clk32", "vctxo_4", "vctxo_2", "vctxo"};

static DEFINE_SPINLOCK(reset_lock);

/* The gate clocks has mux parent. */
{MMP2_CLK_SDH0, "sdh0_clk", "sdh_mix_clk", CLK_SET_RATE_PARENT, APMU_SDH0, 0x1b, 0x1b, 0x0, 0, &sdh_lock},
{MMP2_CLK_SDH1, "sdh1_clk", "sdh_mix_clk", CLK_SET_RATE_PARENT, APMU_SDH1, 0x1b, 0x1b, 0x0, 0, &sdh_lock},
-{MMP2_CLK_SDH1, "sdh2_clk", "sdh_mix_clk", CLK_SET_RATE_PARENT, APMU_SDH2, 0x1b, 0x1b, 0x0, 0, &sdh_lock},
-{MMP2_CLK_SDH1, "sdh3_clk", "sdh_mix_clk", CLK_SET_RATE_PARENT, APMU_SDH3, 0x1b, 0x1b, 0x0, 0, &sdh_lock},
+{MMP2_CLK_SDH2, "sdh2_clk", "sdh_mix_clk", CLK_SET_RATE_PARENT, APMU_SDH2, 0x1b, 0x1b, 0x0, 0, &sdh_lock},
+{MMP2_CLK_SDH3, "sdh3_clk", "sdh_mix_clk", CLK_SET_RATE_PARENT, APMU_SDH3, 0x1b, 0x1b, 0x0, 0, &sdh_lock},
{MMP2_CLK_DISP0, "disp0_clk", "disp0_div", CLK_SET_RATE_PARENT, APMU_DISP0, 0x1b, 0x1b, 0x0, 0, &disp0_lock},
{MMP2_CLK_DISP0_SPHY, "disp0_sphy_clk", "disp0_sphy_div", CLK_SET_RATE_PARENT, APMU_DISP0, 0x1024, 0x1024, 0x0, 0, &disp0_lock},
{MMP2_CLK_DISP1, "disp1_clk", "disp1_div", CLK_SET_RATE_PARENT, APMU_DISP1, 0x1b, 0x1b, 0x0, 0, &disp1_lock},
--- linux-4.15.0.orig/drivers/clk/mmp/clk.c
+++ linux-4.15.0/drivers/clk/mmp/clk.c
@@ -183,7 +183,7 @@
     pr_err("CLK %d has invalid pointer %p\n", id, clk);
     return;
   }
-  if (id > unit->nr_clks) {
+  if (id >= unit->nr_clks) {
     pr_err("CLK %d is invalid\n", id);
     return;
   }
--- linux-4.15.0.orig/drivers/clk/mvebu/armada-370.c
+++ linux-4.15.0/drivers/clk/mvebu/armada-370.c
@@ -177,8 +177,10 @@
 mvebu_coreclk_setup(np, &a370_coreclks);

-if (cgnp)
+if (cgnp) {

mvebu_clk_gating_setup(cgnp, a370_gating_desc);
+of_node_put(cgnp);
+
} }

CLK_OF_DECLARE(a370_clk, "marvell.armada-370-core-clock", a370_clk_init);

--- linux-4.15.0.orig/drivers/clk/mvebu/armada-37xx-xtal.c
+++ linux-4.15.0/drivers/clk/mvebu/armada-37xx-xtal.c
@@ -15,8 +15,8 @@
 #include <linux/platform_device.h>
 #include <linux/regmap.h>

-#define NB_GPIO1_LATCH	0xC
-#define XTAL_MODE	    BIT(31)
+#define NB_GPIO1_LATCH	0x8
+#define XTAL_MODE	    BIT(9)

static int armada_3700_xtal_clock_probe(struct platform_device *pdev)
{
--- linux-4.15.0.orig/drivers/clk/mvebu/armada-38x.c
+++ linux-4.15.0/drivers/clk/mvebu/armada-38x.c
@@ -46,11 +46,11 @@
}

static const u32 armada_38x_cpu_frequencies[] __initconst = {
-0, 0, 0, 0,
-1066 * 1000 * 1000, 0, 0, 0,
+666 * 1000 * 1000, 0, 800 * 1000 * 1000, 0,
+1066 * 1000 * 1000, 0, 1200 * 1000 * 1000, 0,
+1332 * 1000 * 1000, 0, 0, 0,
+1600 * 1000 * 1000, 0, 0, 0,
-1866 * 1000 * 1000,
+1866 * 1000 * 1000, 0, 0, 2000 * 1000 * 1000,
};

static u32 __init armada_38x_get_cpu_freq(void __iomem *sar)
@@ -76,11 +76,11 @@
};

static const int armada_38x_cpu_l2_ratios[32][2] __initconst = {
-0, 1, 0, 1, 0, 1,
-1, 2, 0, 1, 0, 1,
-1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
+1, 2, 0, 1, 0, 1,
mvebu_coreclk_setup(np, &axp_coreclks);

@if (cgnp)
  mvebu_clk_gating_setup(cgnp, axp_gating_desc);
  of_node_put(cgnp);
@end

CLK_OF_DECLARE(axp_clk, "marvell,armada-xp-core-clock", axp_clk_init);

static const struct clk_corediv_desc mv98dx3236_corediv_desc[] = {
  { .mask = 0x0f, .offset = 6, .fieldbit = 26 }, /* NAND clock */
  { .mask = 0x0f, .offset = 6, .fieldbit = 27 }, /* NAND clock */
};

#define to_corediv_clk(p) container_of(p, struct clk_corediv, hw)

if (type == CP110_CLK_TYPE_CORE) {
  if (idx > CP110_MAX_CORE_CLOCKS)
    return ERR_PTR(-EINVAL);
  return clk_data->hws[idx];
} else if (type == CP110_CLK_TYPE_GATABLE) {
  if (idx > CP110_MAX_GATABLE_CLOCKS)
    return ERR_PTR(-EINVAL);
  return ERR_PTR(-EINVAL);
}
+if (idx >= CP110_MAX_GATABLE_CLOCKS)
return ERR_PTR(-EINVAL);
return clk_data->hws[CP110_MAX_CORE_CLOCKS + idx];
}
--- linux-4.15.0.orig/drivers/clk/mvebu/dove.c
+++ linux-4.15.0/drivers/clk/mvebu/dove.c
@@ -190,10 +190,14 @@
mvebu_coreclk_setup(np, &dove_coreclks);

-if (ddnp)
+if (ddnp) {
    dove_divider_clk_init(ddnp);
+    of_node_put(ddnp);
+}

-if (cgnp)
+if (cgnp) {
    mvebu_clk_gating_setup(cgnp, dove_gating_desc);
+    of_node_put(cgnp);
+}
}

CLK_OF_DECLARE(dove_clk, "marvell,dove-core-clock", dove_clk_init);
--- linux-4.15.0.orig/drivers/clk/mvebu/kirkwood.c
+++ linux-4.15.0/drivers/clk/mvebu/kirkwood.c
@@ -254,6 +254,7 @@
static const struct clk_muxing_soc_desc kirkwood_mux_desc[] __initconst = {
 { "powersave", powersave_parents, ARRAY_SIZE(powersave_parents),
11, 1, 0 },
+{ }
};

static struct clk *clk_muxing_get_src(
@@ -333,6 +334,8 @@
if (cgnp) {
    mvebu_clk_gating_setup(cgnp, kirkwood_gating_desc);
    kirkwood_clk_muxing_setup(cgnp, kirkwood_mux_desc);
+    of_node_put(cgnp);
+}
}

CLK_OF_DECLARE(kirkwood_clk, "marvell,kirkwood-core-clock",
--- linux-4.15.0.orig/drivers/clk/mvebu/mv98dx3236.c
+++ linux-4.15.0/drivers/clk/mvebu/mv98dx3236.c
@@ -174,7 +174,9 @@
mvebu_coreclk_setup(np, &mv98dx3236_core_clocks);
-if (cgnp)
+if (cgnp) {
 mvebu_clk_gating_setup(cgnp, mv98dx3236_gating_desc);
+of_node_put(cgnp);
+}
}
CLK_OF_DECLARE(mv98dx3236_clk, "marvell,mv98dx3236-core-clock", mv98dx3236_clk_init);
--- linux-4.15.0.orig/drivers/clk/nxp/clk-lpc32xx.c
+++ linux-4.15.0/drivers/clk/nxp/clk-lpc32xx.c
@@ -956,7 +956,7 @@
 val &= div_mask(divider->width);
 return divider_recalc_rate(hw, parent_rate, val, divider->table,
- divider->flags);
+ divider->flags, divider->width);
}
static long clk_divider_round_rate(struct clk_hw *hw, unsigned long rate,
--- linux-4.15.0.orig/drivers/clk/pxa/clk-pxa27x.c
+++ linux-4.15.0/drivers/clk/pxa/clk-pxa27x.c
@@ -462,6 +462,7 @@
                                           
 DUMMY_CLK(NULL, "pxa27x-gpio", "osc_32_768khz"),
 +DUMMY_CLK(NULL, "pxa-rtc", "osc_32_768khz"),
 DUMMY_CLK(NULL, "sa1100-rtc", "osc_32_768khz"),
 DUMMY_CLK("UARTCLK", "pxa2xx-ir", "STUART"),
};
--- linux-4.15.0.orig/drivers/clk/qcom/Kconfig
+++ linux-4.15.0/drivers/clk/qcom/Kconfig
@@ -12,6 +12,27 @@
 select REGMAP_MMIO
 select RESET_CONTROLLER

+config QCOM_A53PLL
+tristate "MSM8916 A53 PLL"
+depends on COMMON_CLK_QCOM
+default ARCH_QCOM
+help
+ Support for the A53 PLL on MSM8916 devices. It provides
+ the CPU with frequencies above 1GHz.
+ Say Y if you want to support higher CPU frequencies on MSM8916
+ devices.
+
+config QCOM_CLK_APCS_MSM8916
+tristate "MSM8916 APCS Clock Controller"
+depends on COMMON_CLK_QCOM
+depends on QCOM_APCS_IPC || COMPILE_TEST
+default ARCH_QCOM
+help
+ Support for the APCS Clock Controller on msm8916 devices. The
+ APCS is managing the mux and divider which feeds the CPUs.
+ Say Y if you want to support CPU frequency scaling on devices
+ such as msm8916.
+
+ config QCOM_CLK_RPM
+ tristate "RPM based Clock Controller"
+ depends on COMMON_CLK_QCOM & MFD_QCOM_RPM

--- linux-4.15.0.orig/drivers/clk/qcom/Makefile
+++ linux-4.15.0/drivers/clk/qcom/Makefile
@@ -10,6 +10,7 @@
clk-qcom-y += clk-branch.o
clk-qcom-y += clk-regmap-divider.o
clk-qcom-y += clk-regmap-mux.o
+clk-qcom-y += clk-regmap-mux-div.o
clk-qcom-y += reset.o
clk-qcom-$(CONFIG_QCOM_GDSC) += gdsc.o
@@ -32,5 +33,7 @@
obj-$(CONFIG_MSM_MMCC_8960) += mmcc-msm8960.o
obj-$(CONFIG_MSM_MMCC_8974) += mmcc-msm8974.o
obj-$(CONFIG_MSM_MMCC_8996) += mmcc-msm8996.o
+obj-$(CONFIG_QCOM_A53PLL) += a53-pll.o
+obj-$(CONFIG_QCOM_CLK_APCS_MSM8916) += apcs-msm8916.o
obj-$(CONFIG_QCOM_CLK_RPM) += clk-rpm.o
obj-$(CONFIG_QCOM_CLK_SMD_RPM) += clk-smd-rpm.o
--- linux-4.15.0.orig/drivers/clk/qcom/a53-pll.c
+++ linux-4.15.0/drivers/clk/qcom/a53-pll.c
@@ -0,0 +1,108 @@
+// SPDX-License-Identifier: GPL-2.0
+/
+ * Qualcomm A53 PLL driver
+ *
+ * Copyright (c) 2017, Linaro Limited
+ * Author: Georgi Djakov <georgi.djakov@linaro.org>
+ */
+
+##include <linux/clk-provider.h>
+##include <linux/kernel.h>
+##include <linux/platform_device.h>
+##include <linux/regmap.h>
+##include <linux/module.h>
+
+##include "clk-pll.h"
+##include "clk-regmap.h"
static const struct pll_freq_tbl a53pll_freq[] = {
    { 998400000, 52, 0x0, 0x1, 0 },
    { 1094400000, 57, 0x0, 0x1, 0 },
    { 1152000000, 62, 0x0, 0x1, 0 },
    { 1209600000, 63, 0x0, 0x1, 0 },
    { 1248000000, 65, 0x0, 0x1, 0 },
    { 1363200000, 71, 0x0, 0x1, 0 },
    { 1401600000, 73, 0x0, 0x1, 0 },
};

static const struct regmap_config a53pll_regmap_config = {
    .reg_bits= 32,
    .reg_stride= 4,
    .val_bits= 32,
    .max_register= 0x40,
    .fast_io= true,
};

static int qcom_a53pll_probe(struct platform_device *pdev)
{
    struct device *dev = &pdev->dev;
    struct regmap *regmap;
    struct resource *res;
    struct clk_pll *pll;
    void __iomem *base;
    struct clk_init_data init = { };
    int ret;
    
    pll = devm_kzalloc(dev, sizeof(*pll), GFP_KERNEL);
    if (!pll)
        return -ENOMEM;
    
    res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    base = devm_ioremap_resource(dev, res);
    if (IS_ERR(base))
        return PTR_ERR(base);
    
    regmap = devm_regmap_init_mmio(dev, base, &a53pll_regmap_config);
    if (IS_ERR(regmap))
        return PTR_ERR(regmap);
    
    pll->l_reg = 0x04;
    pll->m_reg = 0x08;
    pll->n_reg = 0x0c;
    pll->config_reg = 0x14;
    pll->mode_reg = 0x00;
    pll->status_reg = 0x1c;
+pl->status_bit = 16;
+pl->freq_tbl = a53pll_freq;
+
+init.name = "a53pll";
+init.parent_names = (const char *[]){ "xo" };
+init.num_parents = 1;
+init.ops = &clk_pll_sr2_ops;
+init.flags = CLK_IS_CRITICAL;
+pl->clkr.hw.init = &init;
+
+ret = devm_clk_register_regmap(dev, &pl->clkr);
+if (ret) {
+dev_err(dev, "failed to register regmap clock: %d\n", ret);
+return ret;
+}
+
+ret = devm_of_clk_add_hw_provider(dev, of_clk_hw_simple_get,
+ &pl->clkr.hw);
+if (ret) {
+dev_err(dev, "failed to add clock provider: %d\n", ret);
+return ret;
+}
+
+return 0;
+
+static const struct of_device_id qcom_a53pll_match_table[] = {
+{ .compatible = "qcom,msm8916-a53pll" },
+{};
+};
+MODULE_DEVICE_TABLE(of, qcom_a53pll_match_table);
+
+static struct platform_driver qcom_a53pll_driver = {
+ .probe = qcom_a53pll_probe,
+ .driver = {
+ .name = "qcom-a53pll",
+ .of_match_table = qcom_a53pll_match_table,
+ },
+};
+module_platform_driver(qcom_a53pll_driver);
+
+MODULE_DESCRIPTION("Qualcomm A53 PLL Driver");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/clk/qcom/apcs-msm8916.c
+++ linux-4.15.0/drivers/clk/qcom/apcs-msm8916.c
@@ -0,0 +1,137 @@
+// SPDX-License-Identifier: GPL-2.0
+/

Open Source Used In 5GaaS Edge AC-4 20297
+ * Qualcomm APCS clock controller driver
+ *
+ * Copyright (c) 2017, Linaro Limited
+ * Author: Georgi Djakov <georgi.djakov@linaro.org>
+ */
+
+#include <linux/clk.h>
+#include <linux/clk-provider.h>
+#include <linux/kernel.h>
+#include <linux/module.h>
+#include <linux/slab.h>
+#include <linux/platform_device.h>
+#include <linux/regmap.h>
+
+#include "clk-regmap.h"
+#include "clk-regmap-mux-div.h"
+
+static const u32 gpll0_a53cc_map[] = { 4, 5 };
+
+static const char * const gpll0_a53cc[] = {
+  "gpll0_vote",
+  "a53pll",
+};
+
+/*
+ * We use the notifier function for switching to a temporary safe configuration
+ * (mux and divider), while the A53 PLL is reconfigured.
+ */
+
+static int a53cc_notifier_cb(struct notifier_block *nb, unsigned long event,
+                               void *data)
+{
+  int ret = 0;
+  struct clk_regmap_mux_div *md = container_of(nb,
+                                               struct clk_regmap_mux_div,
+                                               clk_nb);
+  if (event == PRE_RATE_CHANGE)
+    /* set the mux and divider to safe frequency (400mhz) */
+    ret = mux_div_set_src_div(md, 4, 3);
+  return notifier_from_errno(ret);
+}
+
+static int qcom_apcs_msm8916_clk_probe(struct platform_device *pdev)
+{
+  struct device *dev = &pdev->dev;
+  struct device *parent = dev->parent;
+  struct clk_regmap_mux_div *a53cc;
+  struct regmap *regmap;
struct clk_init_data init = { },
ret = -ENODEV;
+regmap = dev_get_regmap(parent, NULL);
+if (!regmap) {
+dev_err(dev, "failed to get regmap: %d\n", ret);
+return ret;
+}
+a53cc = devm_kzalloc(dev, sizeof(*a53cc), GFP_KERNEL);
+if (!a53cc)
+return -ENOMEM;
+init.name = "a53mux";
+init.parent_names = gpll0_a53cc;
+init.num_parents = ARRAY_SIZE(gpll0_a53cc);
+init.ops = &clk_regmap_mux_div_ops;
+init.flags = CLK_SET_RATE_PARENT;
+a53cc->clkr.hw.init = &init;
+a53cc->clkr.regmap = regmap;
+a53cc->reg_offset = 0x50;
+a53cc->hid_width = 5;
+a53cc->hid_shift = 0;
+a53cc->src_width = 3;
+a53cc->src_shift = 8;
+a53cc->parent_map = gpll0_a53cc_map;
+a53cc->pclk = devm_clk_get(parent, NULL);
+if (IS_ERR(a53cc->pclk)) {
+ret = PTR_ERR(a53cc->pclk);
+dev_err(dev, "failed to get clk: %d\n", ret);
+return ret;
+}
+a53cc->clk_nb.notifier_call = a53cc_notifier_cb;
+ret = clk_notifier_register(a53cc->pclk, &a53cc->clk_nb);
+if (ret) {
+dev_err(dev, "failed to register clock notifier: %d\n", ret);
+return ret;
+}
+a53cc->clk_nb.notifier_call = a53cc_notifier_cb;
+ret = clk_notifier_register(a53cc->pclk, &a53cc->clk_nb);
+if (ret) {
+dev_err(dev, "failed to register clock notifier: %d\n", ret);
+return ret;
+}
+
ret = devm_clk_register_regmap(dev, &a53cc->clkr);
+if (ret) {
+dev_err(dev, "failed to register regmap clock: %d\n", ret);
+goto err;
+}
+}
+ret = of_clk_add_hw_provider(parent->of_node, of_clk_hw_simple_get,
+    &a53cc->clkr.hw);
+if (ret) {
+    dev_err(dev, "failed to add clock provider: %d\n", ret);
+    goto err;
+}
+platform_set_drvdata(pdev, a53cc);
+
+return 0;
+
+err:
+clk_notifier_unregister(a53cc->pclk, &a53cc->clk_nb);
+return ret;
+}
+
+static int qcom_apcs_msm8916_clk_remove(struct platform_device *pdev)
+{
+    struct clk_regmap_mux_div *a53cc = platform_get_drvdata(pdev);
+    struct device *parent = pdev->dev.parent;
+
+    clk_notifier_unregister(a53cc->pclk, &a53cc->clk_nb);
+    of_clk_del_provider(parent->of_node);
+
+    return 0;
+}
+
+static struct platform_driver qcom_apcs_msm8916_clk_driver = {
+    .probe = qcom_apcs_msm8916_clk_probe,
+    .remove = qcom_apcs_msm8916_clk_remove,
+    .driver = {
+        .name = "qcom-apcs-msm8916-clk",
+    },
+};
+
+module_platform_driver(qcom_apcs_msm8916_clk_driver);
+
+MODULE_AUTHOR("Georgi Djakov <georgi.djakov@linaro.org>");
+MODULE_LICENSE("GPL v2");
+MODULE_DESCRIPTION("Qualcomm MSM8916 APCS clock driver");
--- linux-4.15.0.orig/drivers/clk/qcom/clk-rcg2.c
+++ linux-4.15.0/drivers/clk/qcom/clk-rcg2.c
@@ -112,7 +112,7 @@
}
WARN(1, "%s: rcg didn't update its configuration.", name);
-    return 0;
+    return -EBUSY;
};
static int clk_rcg2_set_parent(struct clk_hw *hw, u8 index)
@@ -210,8 +210,13 @@
    clk_flags = clk_hw_get_flags(hw);
    p = clk_hw_get_parent_by_index(hw, index);
    +if (!p)
    +return -EINVAL;
    +
    if (clk_flags & CLK_SET_RATE_PARENT) {
        if (f->pre_div) {
            +rate = req->rate;
            rate /= 2;
            rate *= f->pre_div + 1;
        }
    }
--- linux-4.15.0.orig/drivers/clk/qcom/clk-regmap-divider.c
+++ linux-4.15.0/drivers/clk/qcom/clk-regmap-divider.c
@@ -59,7 +59,7 @@
        return divider_recalc_rate(hw, parent_rate, div, NULL,
            - CLK_DIVIDER_ROUND_CLOSEST);
            + CLK_DIVIDER_ROUND_CLOSEST, divider->width);
    }

    const struct clk_ops clk_regmap_div_ops = {
--- linux-4.15.0.orig/drivers/clk/qcom/clk-regmap-mux-div.c
+++ linux-4.15.0/drivers/clk/qcom/clk-regmap-mux-div.c
@@ @ -0,0 +1,231 @
+// SPDX-License-Identifier: GPL-2.0
+/*
+ * Copyright (c) 2017, Linaro Limited
+ * Author: Georgi Djakov <georgi.djakov@linaro.org>
+/ *
++#include <linux/bitops.h>
+#include <linux/delay.h>
+#include <linux/kernel.h>
+#include <linux/regmap.h>
+
++#include "clk-regmap-mux-div.h"
+
+ +#define CMD_RCGR0x0
+ +#define CMD_RCGR_UPDATEBIT(0)
+ +#define CMD_RCGR_DIRTY_CFGBIT(4)
+ +#define CMD_RCGR_ROOT_OFFBIT(31)
+ +#define CFG_RCGR0x4
```c
#define to_clk_regmap_mux_div(_hw) 
	container_of(to_clk_regmap(_hw), struct clk_regmap_mux_div, clkr) 
+

int mux_div_set_src_div(struct clk_regmap_mux_div *md, u32 src, u32 div) 
+
{
	int ret, count;
	u32 val, mask;
	const char *name = clk_hw_get_name(&md->clkr.hw);
+
	val = (div << md->hid_shift) | (src << md->src_shift);
	mask = ((BIT(md->hid_width) - 1) << md->hid_shift) |
	       ((BIT(md->src_width) - 1) << md->src_shift);
+
	ret = regmap_update_bits(md->clkr.regmap, CFG_RCGR + md->reg_offset, 
				mask, val);
	if (ret)
		return ret;
+
	ret = regmap_update_bits(md->clkr.regmap, CMD_RCGR + md->reg_offset, 
				CMD_RCGR_UPDATE, CMD_RCGR_UPDATE);
	if (ret)
		return ret;
+
	/* Wait for update to take effect */
	for (count = 500; count > 0; count--) 
	{
		ret = regmap_read(md->clkr.regmap, CMD_RCGR + md->reg_offset, 
				 &val);
		if (ret)
			return ret;
		if (!(val & CMD_RCGR_UPDATE))
			return 0;
		udelay(1);
		}
+
	pr_err("%s: RCG did not update its configuration", name);
	return -EBUSY;
+
+EXPORT_SYMBOL_GPL(mux_div_set_src_div);
+
+static void mux_div_get_src_div(struct clk_regmap_mux_div *md, u32 *src, 
+u32 *div)
+
{
	u32 val, d, s;
	const char *name = clk_hw_get_name(&md->clkr.hw);
+
	regmap_read(md->clkr.regmap, CMD_RCGR + md->reg_offset, &val);
+
```

This code defines a function `mux_div_set_src_div` to set the source divider configuration for a multiplexer in a device, using the `regmap` interface for accessing and updating the configuration registers. It also includes a version `mux_div_get_src_div` for reading the configuration. The code is part of a larger system, possibly related to 5G network infrastructure, as suggested by the context.

The code snippet is part of a larger context, possibly related to the 5G Network Infrastructure, as indicated by the surrounding text and function names.
+if (val & CMD_RCGR_DIRTY_CFG) {
+pr_err("%s: RCG configuration is pending\n", name);
+return;
+}
+
+regmap_read(md->clkr.regmap, CFG_RCGR + md->reg_offset, &val);
+s = (val >> md->src_shift);
+s &= BIT(md->src_width) - 1;
+*src = s;
+
+d = (val >> md->hid_shift);
+d &= BIT(md->hid_width) - 1;
+*div = d;
+
+static inline bool is_better_rate(unsigned long req, unsigned long best,
+ unsigned long new)
+{
+return (req <= new && new < best) || (best < req && best < new);
+}
+
+static int mux_div_determine_rate(struct clk_hw *hw,
+ struct clk_rate_request *req)
+{
+struct clk_regmap_mux_div *md = to_clk_regmap_mux_div(hw);
+unsigned int i, div, max_div;
+unsigned long actual_rate, best_rate = 0;
+unsigned long req_rate = req->rate;
+
+for (i = 0; i < clk_hw_get_num_parents(hw); i++) {
+struct clk_hw *parent = clk_hw_get_parent_by_index(hw, i);
+unsigned long parent_rate = clk_hw_get_rate(parent);
+
+max_div = BIT(md->hid_width) - 1;
+for (div = 1; div < max_div; div++) {
+parent_rate = mult_frac(req_rate, div, 2);
+parent_rate = clk_hw_round_rate(parent, parent_rate);
+actual_rate = mult_frac(parent_rate, 2, div);
+
+if (is_better_rate(req_rate, best_rate, actual_rate)) {
+best_rate = actual_rate;
+req->rate = best_rate;
+req->best_parent_rate = parent_rate;
+req->best_parent_hw = parent;
+}
+}
+
+break;
if (!best_rate)
    return -EINVAL;

return 0;
}

static int __mux_div_set_rate_and_parent(struct clk_hw *hw, unsigned long rate,
        unsigned long prate, u32 src)
{
    struct clk_regmap_mux_div *md = to_clk_regmap_mux_div(hw);
    int ret;
    u32 div, max_div, best_src = 0, best_div = 0;
    unsigned int i;
    unsigned long actual_rate, best_rate = 0;

    for (i = 0; i < clk_hw_get_num_parents(hw); i++) {
        struct clk_hw *parent = clk_hw_get_parent_by_index(hw, i);
        unsigned long parent_rate = clk_hw_get_rate(parent);

        max_div = BIT(md->hid_width) - 1;
        for (div = 1; div < max_div; div++) {
            parent_rate = mult_frac(rate, div, 2);
            parent_rate = clk_hw_round_rate(parent, parent_rate);
            actual_rate = mult_frac(parent_rate, 2, div);

            if (is_better_rate(rate, best_rate, actual_rate)) {
                best_rate = actual_rate;
                best_src = md->parent_map[i];
                best_div = div - 1;
            }

            if (actual_rate < rate || best_rate <= rate)
                break;
        }
    }

    ret = mux_div_set_src_div(md, best_src, best_div);
    if (!ret) {
        md->div = best_div;
        md->src = best_src;
    }

    return ret;
}
+static u8 mux_div_get_parent(struct clk_hw *hw) +{
    +struct clk_regmap_mux_div *md = to_clk_regmap_mux_div(hw);
    +const char *name = clk_hw_get_name(hw);
    +u32 i, div, src = 0;
    +
    +mux_div_get_src_div(md, &src, &div);
    +
    +for (i = 0; i < clk_hw_get_num_parents(hw); i++)
    +if (src == md->parent_map[i])
    +return i;
    +
    +pr_err("%s: Can't find parent with src %d\n", name, src);
    +return 0;
+
+static int mux_div_set_parent(struct clk_hw *hw, u8 index) +{
    +struct clk_regmap_mux_div *md = to_clk_regmap_mux_div(hw);
    +
    +return mux_div_set_src_div(md, md->parent_map[index], md->div);
+
+static int mux_div_set_rate(struct clk_hw *hw, unsigned long rate, unsigned long prate) +{
    +struct clk_regmap_mux_div *md = to_clk_regmap_mux_div(hw);
    +
    +return __mux_div_set_rate_and_parent(hw, rate, prate, md->src);
+
+static int mux_div_set_rate_and_parent(struct clk_hw *hw, unsigned long rate, unsigned long prate, u8 index) +{
    +struct clk_regmap_mux_div *md = to_clk_regmap_mux_div(hw);
    +
    +return __mux_div_set_rate_and_parent(hw, rate, prate, md->parent_map[index]);
+
+static unsigned long mux_div_recalc_rate(struct clk_hw *hw, unsigned long prate) +{
    +struct clk_regmap_mux_div *md = to_clk_regmap_mux_div(hw);
    +u32 div, src;
    +int i, num_parents = clk_hw_get_num_parents(hw);
    +const char *name = clk_hw_get_name(hw);
    +
    +mux_div_get_src_div(md, &src, &div);
for (i = 0; i < num_parents; i++)
+ if (src == md->parent_map[i]) {
+ struct clk_hw *p = clk_hw_get_parent_by_index(hw, i);
+ unsigned long parent_rate = clk_hw_get_rate(p);
+ return mult_frac(parent_rate, 2, div + 1);
+ }
+ pr_err("%s: Can't find parent %d\n", name, src);
+ return 0;
+ }
+
+const struct clk_ops clk_regmap_mux_div_ops = {
+ .get_parent = mux_div_get_parent,
+ .set_parent = mux_div_set_parent,
+ .set_rate = mux_div_set_rate,
+ .set_rate_and_parent = mux_div_set_rate_and_parent,
+ .determine_rate = mux_div_determine_rate,
+ .recalc_rate = mux_div_recalc_rate,
+ };
+ * @clk_nb: clock notifier for rate changes of the input PLL
+ */
+struct clk_regmap_mux_div {
+u32 reg_offset;
+u32 hid_width;
+u32 hid_shift;
+u32 src_width;
+u32 src_shift;
+u32 div;
+u32 src;
+const u32 *parent_map;
+struct clk_regmapclkr;
+struct clk*pclk;
+struct notifier_blockclk_nb;
+};
+
+extern const struct clk_ops clk_regmap_mux_div_ops;
+extern int mux_div_set_src_div(struct clk_regmap_mux_div *md, u32 src, u32 div);
+
+#endif
--- linux-4.15.0.orig/drivers/clk/qcom/common.c
+++ linux-4.15.0/drivers/clk/qcom/common.c
@@ -37,6 +37,9 @@
if (!f)
return NULL;
+
if (!f->freq)
return f;
+
for (; f->freq; f++)
if (rate <= f->freq)
return f;
--- linux-4.15.0.orig/drivers/clk/gcc-msm8916.c
+++ linux-4.15.0/drivers/clk/gcc-msm8916.c
@@ -270,7 +270,7 @@
    .l_reg = 0x21004,
    .m_reg = 0x21008,
    .n_reg = 0x2100c,
-    .config_reg = 0x21014,
+    .config_reg = 0x21010,
    .mode_reg = 0x21000,
    .status_reg = 0x2101c,
    .status_bit = 17,
@@ -297,7 +297,7 @@
    .l_reg = 0x20004,
    .m_reg = 0x20008,
    .n_reg = 0x2000c,
-    .config_reg = 0x20014,
static struct clk_rcg2 codec_digcodec_clk_src = {
    .cmd_rcr = 0x1c09c,
    .cmd_rcgr = 0x1c09c,
    .mnd_width = 8,
    .hid_width = 5,
    .parent_map = gcc_xo_gpll1_emclk_sleep_map,
    .freq_tbl = ftbl_codec_clk,
    --- linux-4.15.0.orig/drivers/clk/qcom/gcc-msm8996.c
    +++ linux-4.15.0/drivers/clk/qcom/gcc-msm8996.c
    @ @ -140,22 +140,6 @@
    "gpll0_early_div"
};

-static const struct parent_map gcc_xo_gpll0_gpll2_gpll3_gpll0_early_div_map[] = {
    -{ P_XO, 0 },
    -{ P_GPLL0, 1 },
    -{ P_GPLL2, 2 },
    -{ P_GPLL3, 3 },
    -{ P_GPLL0_EARLY_DIV, 6 }
};
-
-static const char * const gcc_xo_gpll0_gpll2_gpll3_gpll0_early_div[] = {
    "xo",
    "gpll0",
    "gpll2",
    "gpll3",
    "gpll0_early_div"
};
"gpll3",
"gpll0_early_div"
-};

static const struct parent_map gcc_xo_gpll0_gpll1_gpll4_gpll0_early_div_map[] = {
    { P_XO, 0 },
    { P_GPLL0, 1 },
    @ @ -194.26 +178.6 @@
    "gpll0_early_div"
};

static const struct parent_map gcc_xo_gpll0_gpll2_gpll3_gpll1_gpll4_gpll0_early_div_map[] = {
    { P_XO, 0 },
    { P_GPLL0, 1 },
    { P_GPLL2, 2 },
    { P_GPLL3, 3 },
    { P_GPLL1, 4 },
    { P_GPLL4, 5 },
    { P_GPLL0_EARLY_DIV, 6 }
};

static const char * const gcc_xo_gpll0_gpll2_gpll3_g pll1_gpll4_gpll0_early_div[] = {
    "xo",
    "gpll0",
    "g pll2",
    "g pll3",
    "g pll1",
    "g pll4",
    "g pll0_early_div"
    -};

static struct clk_fixed_factor xo = {
    .mult = 1,
    .div = 1,
};

--- linux-4.15.0.orig/drivers/clk/renesas/clk-sh73a0.c
+++ linux-4.15.0/drivers/clk/renesas/clk-sh73a0.c
@@ -46,7 +46,7 @@
    unsigned int shift;
    -static struct div4_clk div4_clks[] = {
        { "zg", "pll0", CPG_FRQCRA, 16 },
    -static struct div4_clk div4_clks[] = {
        { "m3", "pll1", CPG_FRQCRA, 12 },
        { "b", "pll1", CPG_FRQCRA, 8 },
    @ @ -79.7 +79.7 @@
    const struct clk_div_table *table = NULL;

    -static struct div4_clk div4_clks[] = {
        { "zg", "pll0", CPG_FRQCRA, 16 },
        { "m3", "pll1", CPG_FRQCRA, 12 },
        { "b", "pll1", CPG_FRQCRA, 8 },
    @ @ -79.7 +79.7 @@
    const struct clk_div_table *table = NULL;
unsigned int shift, reg, width;
-const char *parent_name;
+const char *parent_name = NULL;
unsigned int mult = 1;
unsigned int div = 1;

@@ -135,7 +135,7 @@
shift = 24;
width = 5;
} else {
-struct div4_clk *c;
+const struct div4_clk *c;
+const struct div4_clk *c;

for (c = div4_clks; c->name; c++) {
if (!strcmp(name, c->name)) {
--- linux-4.15.0.orig/drivers/clk/renesas/r8a77970-cpg-mssr.c
+++ linux-4.15.0/drivers/clk/renesas/r8a77970-cpg-mssr.c
@@ -105,6 +105,7 @@
DEF_MOD("vspd0",	 623,R8A77970_CLK_S2D1),
DEF_MOD("csi40",	 716,R8A77970_CLK_CS10),
DEF_MOD("du0",	 724,R8A77970_CLK_S2D1),
+DEF_MOD("lvds",	 727,R8A77970_CLK_S2D1),
DEF_MOD("vin3",	 808,R8A77970_CLK_S2D1),
DEF_MOD("vin2",	 809,R8A77970_CLK_S2D1),
DEF_MOD("vin1",	 810,R8A77970_CLK_S2D1),
--- linux-4.15.0.orig/drivers/clk/renesas/r8a77995-cpg-mssr.c
+++ linux-4.15.0/drivers/clk/renesas/r8a77995-cpg-mssr.c
@@ -73,6 +73,7 @@
DEF_FIXED(".sdsrc",    CLK_SDSRC,          CLK_PLL1,       2, 1),
/* Core Clock Outputs */
+DEF_FIXED("za2",       R8A77995_CLK_ZA2,   CLK_PLL0D3,     2, 1),
DEF_FIXED("z2",        R8A77995_CLK_Z2,    CLK_PLL0D3,     1, 1),
DEF_FIXED("ztr",       R8A77995_CLK_ZTR,   CLK_PLL1,       6, 1),
DEF_FIXED("zt",        R8A77995_CLK_ZT,    CLK_PLL1,       4, 1),
@@ -141,8 +142,8 @@
DEF_MOD("vspbs",	 627,R8A77995_CLK_S0D1),
DEF_MOD("ehci0",	 703,R8A77995_CLK_S3D2),
DEF_MOD("hsusb",	 704,R8A77995_CLK_S3D2),
-DEF_MOD("du1",	 723,R8A77995_CLK_S2D1),
-DEF_MOD("du0",	 724,R8A77995_CLK_S2D1),
+DEF_MOD("du1",	 723,R8A77995_CLK_S1D1),
+DEF_MOD("du0",	 724,R8A77995_CLK_S1D1),
DEF_MOD("lvds",	 727,R8A77995_CLK_S2D1),
DEF_MOD("vin7",	 804,R8A77995_CLK_S1D2),
DEF_MOD("vin6",	 805,R8A77995_CLK_S1D2),
--- linux-4.15.0.orig/drivers/clk/renesas/rcar-gen3-cpg.c
+++ linux-4.15.0/drivers/clk/renesas/rcar-gen3-cpg.c
@@ -226,7 +226,7 @@
struct sd_clock *clock;
struct clk *clk;
unsigned int i;
-u32 sd_fc;
+u32 val;

clock = kzalloc(sizeof(*clock), GFP_KERNEL);
if (!clock)
@@ -243,17 +243,9 @@
clock->div_table = cpg_sd_div_table;
clock->div_num = ARRAY_SIZE(cpg_sd_div_table);

-sd_fc = readl(clock->csn.reg) & CPG_SD_FC_MASK;
-for (i = 0; i < clock->div_num; i++)
-if (sd_fc == (clock->div_table[i].val & CPG_SD_FC_MASK))
-break;
-
-if (WARN_ON(i >= clock->div_num)) {
-kfree(clock);
-return ERR_PTR(-EINVAL);
-}
-
-clock->cur_div_idx = i;
+val = readl(clock->csn.reg) & ~CPG_SD_FC_MASK;
+val |= CPG_SD_STP_MASK | (clock->div_table[0].val & CPG_SD_FC_MASK);
+writel(val, clock->csn.reg);

clock->div_max = clock->div_table[0].div;
clock->div_min = clock->div_max;
--- linux-4.15.0.orig/drivers/clk/renesas/renesas-cpg-mssr.c
+++ linux-4.15.0/drivers/clk/renesas/renesas-cpg-mssr.c
@@ -258,8 +258,9 @@
dev_err(dev, "Cannot get %s clock %u: %ld", type, clkspec->args[0], clkspec->args[1], clk, clk);
 else
-dev_dbg(dev, "clock (%u, %u) is %pC at %pCr Hz\n",
-clkspec->args[0], clkspec->args[1], clk, clk);
+dev_dbg(dev, "clock (%u, %u) is %pC at %lu Hz\n",
++clkspec->args[0], clkspec->args[1], clk, 
++clk_get_rate(clk));
 return clk;
 }

@@ -326,7 +327,7 @@
if (IS_ERR_OR_NULL(clk))
goto fail;
-dev_dbg(dev, "Core clock %pC at %pCr Hz\n", clk, clk);
+dev_dbg(dev, "Core clock %pC at %lu Hz\n", clk, clk_get_rate(clk));
priv->clks[id] = clk;
return;

@@ -392,7 +393,7 @@
if (IS_ERR(clk))
goto fail;

-dev_dbg(dev, "Module clock %pC at %pCr Hz\n", clk, clk);
+dev_dbg(dev, "Module clock %pC at %lu Hz\n", clk, clk_get_rate(clk));
priv->clks[id] = clk;
priv->smstpcr_saved[clock->index / 32].mask |= BIT(clock->index % 32);
return;
@@ -534,17 +535,11 @@
unsigned int reg = id / 32;
unsigned int bit = id % 32;
u32 bitmask = BIT(bit);
-unsigned long flags;
-unsigned long flags;
unsigned long flags;
-dev_dbg(priv->dev, "reset %u%02u\n", reg, bit);

/* Reset module */
-spin_lock_irqsave(&priv->rmw_lock, flags);
-unsigned long flags;
-value = readl(priv->base + SRCR(reg));
-unsigned long flags;
-value |= bitmask;
-unsigned long flags;
-writel(value, priv->base + SRCR(reg));
-unsigned long flags;
-writel(bitmask, priv->base + SRCR(reg));
+spin_unlock_irqrestore(&priv->rmw_lock, flags);
+spin_unlock_irqrestore(&priv->rmw_lock, flags);
+unsigned long flags;
+unsigned long flags;
+writel(bitmask, priv->base + SRCR(reg));

/* Wait for at least one cycle of the RCLK clock (@ ca. 32 kHz) */
udelay(35);
@@ -561,16 +556,10 @@
unsigned int reg = id / 32;
unsigned int bit = id % 32;
u32 bitmask = BIT(bit);
-unsigned long flags;
-unsigned long flags;
-dev_dbg(priv->dev, "assert %u%02u\n", reg, bit);

-spin_lock_irqsave(&priv->rmw_lock, flags);
-unsigned long flags;
-value = readl(priv->base + SRCR(reg));
-unsigned long flags;
-value |= bitmask;
-unsigned long flags;
-writel(value, priv->base + SRCR(reg));
-unsigned long flags;
-writel(bitmask, priv->base + SRCR(reg));
+spin_unlock_irqrestore(&priv->rmw_lock, flags);
+spin_unlock_irqrestore(&priv->rmw_lock, flags);
+unsigned long flags;
+unsigned long flags;
+writel(bitmask, priv->base + SRCR(reg));
return 0;
}

--- linux-4.15.0.orig/drivers/clk/rockchip/clk-ddr.c
+++ linux-4.15.0/drivers/clk/rockchip/clk-ddr.c
@@ -80,16 +80,12 @@
static u8 rockchip_ddrclk_get_parent(struct clk_hw *hw)
{
    struct rockchip_ddrclk *ddrclk = to_rockchip_ddrclk_hw(hw);
-int num_parents = clk_hw_get_num_parents(hw);
    u32 val;

    val = clk_readl(ddrclk->reg_base +
    ddrclk->mux_offset) >> ddrclk->mux_shift;
    val &= GENMASK(ddrclk->mux_width - 1, 0);

    -if (val >= num_parents)
    -return -EINVAL;
    -
    return val;
}

--- linux-4.15.0.orig/drivers/clk/rockchip/clk-mmc-phase.c
+++ linux-4.15.0/drivers/clk/rockchip/clk-mmc-phase.c
@@ -58,6 +58,10 @@
    u16 degrees;
    u32 delay_num = 0;
    /* See the comment for rockchip_mmc_set_phase below */
+    if (!rate)
++    return -EINVAL;
+    raw_value = readl(mmc_clock->reg) >> (mmc_clock->shift);

    degrees = (raw_value & ROCKCHIP_MMC_DEGREE_MASK) * 90;
    @ @ -84,6 +88,23 @@
    u32 raw_value;
    u32 delay;

+/*
+ * The below calculation is based on the output clock from
+ * MMC host to the card, which expects the phase clock inherits
+ * the clock rate from its parent, namely the output clock
+ * provider of MMC host. However, things may go wrong if
+ * (1) It is orphan.
+ * (2) It is assigned to the wrong parent.
+ */
+ This check help debug the case (1), which seems to be the
+ * most likely problem we often face and which makes it difficult
+ * for people to debug unstable mmc tuning results.
+ */
+if (!rate) {
  pr_err("%s: invalid clk rate\n", __func__);
  return -EINVAL;
} +
+
inenties = degrees / 90;
remainder = (degrees % 90);
--- linux-4.15.0.orig/drivers/clk/rockchip/clk-rk3188.c
+++ linux-4.15.0/drivers/clk/rockchip/clk-rk3188.c
@@ -362,8 +362,8 @@
 RK2928_CLKGATE_CON(2), 5, GFLAGS),
 MUX(SCLK_MAC, "sclk_macref", mux_sclk_macref_p, CLK_SET_RATE_PARENT,
 RK2928_CLKSEL_CON(21), 4, 1, MFLAGS),
-GATE(0, "sclk_mac_lbtest", "sclk_macref",
-RK2928_CLKGATE_CON(2), 12, 0, GFLAGS),
+GATE(0, "sclk_mac_lbtest", "sclk_macref", 0,
+RK2928_CLKGATE_CON(2), 12, GFLAGS),

 COMPOSITE(0, "hsadc_src", mux_pll_src_gpll_cpll_p, 0,
 RK2928_CLKSEL_CON(22), 0, 1, MFLAGS, 8, 8, DFLAGS,
 @@ -382,7 +382,7 @@
 COMPOSITE_NOMUX(0, "spdif_pre", "i2s_src", 0,
 RK2928_CLKSEL_CON(5), 0, 7, DFLAGS,
 RK2928_CLKGATE_CON(0), 13, GFLAGS),
-COMPOSITE_FRACMUX(0, "spdif_frac", "spdif_pll", CLK_SET_RATE_PARENT,
+COMPOSITE_FRACMUX(0, "spdif_frac", "spdif_pre", CLK_SET_RATE_PARENT,
 RK2928_CLKSEL_CON(9), 0,
 RK2928_CLKGATE_CON(0), 14, GFLAGS,
 &common_spdif_fracmux),
 @@ -391,8 +391,8 @@
 * Clock-Architecture Diagram 4
 */
-GATE(SCLK_SMC, "sclk_smc", "hclk_peri",
-RK2928_CLKGATE_CON(2), 4, 0, GFLAGS),
+GATE(SCLK_SMC, "sclk_smc", "hclk_peri", 0,
+RK2928_CLKGATE_CON(2), 4, GFLAGS),

 COMPOSITE_NOMUX(SCLK_SPI0, "sclk_spi0", "pclk_peri", 0,
 RK2928_CLKSEL_CON(25), 0, 7, DFLAGS,
--- linux-4.15.0.orig/drivers/clk/rockchip/clk-rk3228.c
+++ linux-4.15.0/drivers/clk/rockchip/clk-rk3228.c
@@ -144,7 +144,7 @@
 PNAME(mux_hdmiphy_p)= { "hdmiphy_phy", "xin24m" };
PNAME(mux_aclk_cpu_src_p) = { "cpll_aclk_cpu", "gpll_aclk_cpu", "hdmiphy_aclk_cpu" };

-PNAME(mux_pll_src_4plls_p) = { "cpll", "gpll", "hdmiphy", "usb480m" };
+PNAME(mux_pll_src_4plls_p) = { "cpll", "gpll", "hdmiphy", "usb480m" };
PNAME(mux_pll_src_3plls_p) = { "cpll", "gpll", "hdmiphy" };
PNAME(mux_pll_src_2plls_p) = { "cpll", "gpll" };
PNAME(mux_sclk_hdmi_cec_p) = { "cpll", "gpll", "xin24m" };
@@ -163,8 +163,6 @@
PNAME(mux_pll_src_3plls_p) = { "cpll", "gpll", "hdmiphy" };
PNAME(mux_pll_src_2plls_p) = { "cpll", "gpll" };
PNAME(mux_pll_src_1plls_p) = { "cpll", "gpll" };
PNAME(mux_pll_src_0plls_p) = { "cpll", "gpll" };
-@@ -163,8 +163,6 @@
PNAME(mux_i2s2_p) = { "i2s2_src", "i2s2_frac", "xin12m" };
PNAME(mux_sclk_spdif_p) = { "sclk_spdif_src", "spdif_frac", "xin12m" };

-PNAME(mux_aclk_gpu_pre_p) = { "cpll_gpu", "gpll_gpu", "hdmiphy_gpu", "usb480m_gpu" };
-PNAME(mux_uart0_p) = { "uart0_src", "uart0_frac", "xin24m" };
PNAME(mux_uart1_p) = { "uart1_src", "uart1_frac", "xin24m" };
PNAME(mux_uart2_p) = { "uart2_src", "uart2_frac", "xin24m" };
@@ -387,7 +385,7 @@
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,
RK2928_CLKSEL_CON(23), 5, 2, MFLAGS, 0, 6, DFLAGS,

-COMPOSITE(SCLK_SDMMC, "sclk_sdmmc", mux_pll_src_4plls_p, 0,
+COMPOSITE(SCLK_SDMMC, "sclk_sdmmc", mux_pll_src_4plls_p, 0,
RK2928_CLKSEL_CON(11), 8, 2, MFLAGS, 0, 8, DFLAGS,
RK2928_CLKSEL_CON(11), 8, 2, MFLAGS, 0, 8, DFLAGS,
RK2928_CLKSEL_CON(11), 8, 2, MFLAGS, 0, 8, DFLAGS,
RK2928_CLKSEL_CON(11), 8, 2, MFLAGS, 0, 8, DFLAGS,
RK2928_CLKSEL_CON(11), 8, 2, MFLAGS, 0, 8, DFLAGS,

@@ -475,16 +473,9 @@
RK2928_CLKSEL_CON(24), 6, 10, DFLAGS,
RK2928_CLKSEL_CON(24), 6, 10, DFLAGS,
RK2928_CLKSEL_CON(24), 6, 10, DFLAGS,

-GATE(0, "cpll_gpu", "gpll", 0,
-RK2928_CLKSEL_CON(3), 13, DFLAGS),
-GATE(0, "gpll_gpu", "g pll", 0,
-RK2928_CLKSEL_CON(3), 13, DFLAGS),
-GATE(0, "hdmiphy_gpu", "hdmiphy", 0,
-RK2928_CLKSEL_CON(3), 13, DFLAGS),
-GATE(0, "usb480m_gpu", "usb480m", 0,
+COMPOSITE(0, "aclk_gpu_pre", mux_pll_src_4plls_p, 0,
+RK2928_CLKSEL_CON(34), 5, 2, MFLAGS, 0, 5, DFLAGS,
RK2928_CLKSEL_CON(3), 13, DFLAGS),
-COMPOSITE_NOGATE(0, "aclk_gpu_pre", mux_pll_src_4plls_p, 0,
-RK2928_CLKSEL_CON(34), 5, 2, MFLAGS, 0, 5, DFLAGS,

COMPOSITE(SCLK_SPI0, "sclk_spi0", mux_pll_src_2plls_p, 0,
RK2928_CLKSEL_CON(25), 8, 1, MFLAGS, 0, 7, DFLAGS,
@@ -589,8 +580,8 @@
GATE(0, "pclk_peri_noc", "pclk_peri", CLK_IGNORE_UNUSED, RK2928_CLKGATE_CON(12), 2, DFLAGS),

/* PD_GPU */
GATE(ACLK_GPU, "aclk_gpu", "aclk_gpu_pre", 0, RK2928_CLKGATE_CON(13), 14, GFLAGS),
GATE(0, "aclk_gpu_noc", "aclk_gpu_pre", 0, RK2928_CLKGATE_CON(13), 15, GFLAGS),
+GATE(ACLK_GPU, "aclk_gpu", "aclk_gpu_pre", 0, RK2928_CLKGATE_CON(7), 14, GFLAGS),
+GATE(0, "aclk_gpu_noc", "aclk_gpu_pre", 0, RK2928_CLKGATE_CON(7), 15, GFLAGS),

/* PD_BUS */
GATE(0, "sclk_initmem_mbist", "aclk_cpu", 0, RK2928_CLKGATE_CON(8), 1, GFLAGS),
--- linux-4.15.0.orig/drivers/clk/rockchip/clk-rk3288.c
+++ linux-4.15.0/drivers/clk/rockchip/clk-rk3288.c
@@ -198,7 +198,7 @@
PNAME(mux_edp_24m_p)= { "ext_edp_24m", "xin24m" };
PNAME(mux_tspout_p)= { "cpll", "gpll", "npll", "xin27m" };

-PNAME(mux_aclk_vcodec_pre_p)= { "aclk_vepu", "aclk_vdpu" };
+PNAME(mux_aclk_vcodec_pre_p)= { "aclk_vdpu", "aclk_vepu" };
PNAME(mux_usbphy480m_p)= { "sclk_otgphy1_480m", "sclk_otgphy2_480m", "sclk_otgphy0_480m" };
PNAME(mux_hsicphy480m_p)= { "cpll", "gpll", "usbphy480m_src" };
@@ -292,13 +292,13 @@
COMPOSITE_NOMUX(0, "aclk_core_mp", "armclk", CLK_IGNORE_UNUSED,
 RK3288_CLKSEL_CON(0), 4, 4, DFLAGS | CLK_DIVIDER_READ_ONLY,
 RK3288_CLKGATE_CON(12), 6, GFLAGS),
-COMPOSITE_NOMUX(0, "atclk", "armclk", CLK_IGNORE_UNUSED,
+COMPOSITE_NOMUX(0, "atclk", "armclk", 0,
 RK3288_CLKSEL_CON(37), 4, 5, DFLAGS | CLK_DIVIDER_READ_ONLY,
 RK3288_CLKGATE_CON(12), 7, GFLAGS),
COMPOSITE_NOMUX(0, "pclk_dbg_pre", "armclk", CLK_IGNORE_UNUSED,
 RK3288_CLKSEL_CON(37), 9, 5, DFLAGS | CLK_DIVIDER_READ_ONLY,
 RK3288_CLKGATE_CON(12), 8, GFLAGS),
-GATE(0, "pclk_dbg", "pclk_dbg_pre", CLK_IGNORE_UNUSED,
+GATE(0, "pclk_dbg", "pclk_dbg_pre", 0,
 RK3288_CLKGATE_CON(12), 9, GFLAGS),
GATE(0, "cs_dbg", "pclk_dbg_pre", CLK_IGNORE_UNUSED,
 RK3288_CLKGATE_CON(12), 10, GFLAGS),
@@ -399,7 +399,7 @@
COMPOSITE(0, "aclk_vdpu", mux_pll_src_cpll_gpll_usb480m_p, 0,
 RK3288_CLKSEL_CON(32), 14, 2, MFLAGS, 8, 5, DFLAGS,
 RK3288_CLKGATE_CON(3), 11, GFLAGS),
-MUXGRF(0, "aclk_vcodec_pre", mux_aclk_vcodec_pre_p, 0,
+MUXGRF(0, "aclk_vcodec_pre", mux_aclk_vcodec_pre_p, CLK_SET_RATE_PARENT,
 RK3288_GRF_SOC_CON(0), 7, 1, MFLAGS),
GATE(ACLK_VCODEC, "aclk_vcodec", "aclk_vcodec_pre", 0,
 RK3288_CLKGATE_CON(9), 0, GFLAGS),
@@ -626,7 +626,7 @@
INVERTER(SCLK_HSADC, "sclk_hsadc", "sclk_hsadc_out",
 RK3288_CLKSEL_CON(22), 7, IFLAGS),
-GATE(0, "jtag", "ext_jtag", CLK_IGNORE_UNUSED,
+GATE(0, "jtag", "ext_jtag", 0,
RK3288_CLKGATE_CON(4), 14, GFLAGS),

COMPOSITE_NODIV(SCLK_USBPHY480M_SRC, "usbphy480m_src", mux_usbphy480m_p, 0,
@@ -635,7 +635,7 @@
COMPOSITE_NODIV(SCLK_HSICPHY480M, "sclk_hsicphy480m", mux_hsicphy480m_p, 0,
RK3288_CLKSEL_CON(29), 0, 2, MFLAGS,
RK3288_CLKGATE_CON(3), 6, GFLAGS),
-GATE(0, "hsicphy12m_xin12m", "xin12m", CLK_IGNORE_UNUSED,
+GATE(0, "hsicphy12m_xin12m", "xin12m", 0,
RK3288_CLKGATE_CON(13), 9, GFLAGS),
DIV(0, "hsicphy12m_usbphy", "sclk_hsicphy480m", 0,
RK3288_CLKSEL_CON(11), 8, 6, DFLAGS),
@@ -676,7 +676,7 @@
GATE(PCLK_TZPC, "pclk_tzpc", "pclk_cpu", 0, RK3288_CLKGATE_CON(11), 3, GFLAGS),
GATE(PCLK_UART2, "pclk_uart2", "pclk_cpu", 0, RK3288_CLKGATE_CON(11), 9, GFLAGS),
GATE(PCLK_EFUSE256, "pclk_efuse256", "pclk_cpu", 0, RK3288_CLKGATE_CON(11), 10, GFLAGS),
-GATE(PCLK_RKPWM, "pclk_rkpwm", "pclk_cpu", CLK_IGNORE_UNUSED, RK3288_CLKGATE_CON(11), 11, GFLAGS),
+GATE(PCLK_RKPWM, "pclk_rkpwm", "pclk_cpu", 0, RK3288_CLKGATE_CON(11), 11, GFLAGS),

/* ddrctrl [DDR Controller PHY clock] gates */
GATE(0, "nclk_ddrupctl0", "ddrphy", CLK_IGNORE_UNUSED, RK3288_CLKGATE_CON(11), 4, GFLAGS),
@@ -816,12 +816,9 @@
"pclk_alive_niu",
"pclk_ddrupctl0",
"pclk_publ0",
-"pclk_ddrupctl1",
-"pclk_publ1",
"pmu_hclk_otg0",
+/* pwm-regulators on some boards, so handoff-critical later */
+"pclk_rkpwm",
};

static void __iomem *rk3288_cru_base;
@@ -838,6 +835,9 @@
RK3288_CLKSEL_CON(10),
RK3288_CLKSEL_CON(33),
RK3288_CLKSEL_CON(37),
+/* We turn aclk_dmacl on for suspend; this will restore it */
+RK3288_CLKGATE_CON(10),
];

static u32 rk3288_saved_cru_regs[ARRAY_SIZE(rk3288_saved_cru_reg_ids)];
/*
 * Going into deep sleep (specifically setting PMU_CLR_DMA in
 * RK3288_PMU_PWRMODE_CON1) appears to fail unless
 * "aclk_dma1" is on.
 * */
+writel_relaxed(1 << (12 + 16),
  +  rk3288_cru_base + RK3288_CLKGATE_CON(10));
+
+/*
* Switch PLLs other than DPLL (for SDRAM) to slow mode to
* avoid crashes on resume. The Mask ROM on the system will
* put APLL, CPLL, and GPLL into slow mode at resume time
--- linux-4.15.0.orig/drivers/clk/rockchip/clk-rk3328.c
+++ linux-4.15.0/drivers/clk/rockchip/clk-rk3328.c
@@ -78,17 +78,17 @@
static struct rockchip_pll_rate_table rk3328_pll_frac_rates[] = {
/* _mhz, _refdiv, _fbdiv, _postdiv1, _postdiv2, _dsmpd, _frac */
- RK3036_PLL_RATE(1016064000, 3, 127, 1, 1, 0, 134217),
+ RK3036_PLL_RATE(1016064000, 3, 127, 1, 1, 0, 134218),
 /* vco = 1016064000 */
- RK3036_PLL_RATE(983040000, 24, 983, 1, 1, 0, 671088),
+ RK3036_PLL_RATE(983040000, 24, 983, 1, 1, 0, 671089),
 /* vco = 983040000 */
- RK3036_PLL_RATE(491520000, 24, 983, 2, 1, 0, 671088),
+ RK3036_PLL_RATE(491520000, 24, 983, 2, 1, 0, 671089),
 /* vco = 983040000 */
- RK3036_PLL_RATE(61440000, 6, 215, 7, 2, 0, 671088),
+ RK3036_PLL_RATE(61440000, 6, 215, 7, 2, 0, 671089),
 /* vco = 860156000 */
- RK3036_PLL_RATE(56448000, 12, 451, 4, 4, 0, 9797894),
+ RK3036_PLL_RATE(56448000, 12, 451, 4, 4, 0, 9797895),
 /* vco = 903168000 */
- RK3036_PLL_RATE(40960000, 12, 409, 4, 5, 0, 10066329),
+ RK3036_PLL_RATE(40960000, 12, 409, 4, 5, 0, 10066330),
 /* vco = 819200000 */
[ /* sentinel */ ],
};

static struct rockchip_pll_rate_table rk3328_pll_frac_rates[] = {
/* _mhz, _refdiv, _fbdiv, _postdiv1, _postdiv2, _dsmpd, _frac */
- RK3036_PLL_RATE(1016064000, 3, 127, 1, 1, 0, 134217),
+ RK3036_PLL_RATE(1016064000, 3, 127, 1, 1, 0, 134218),
 /* vco = 1016064000 */
- RK3036_PLL_RATE(983040000, 24, 983, 1, 1, 0, 671088),
+ RK3036_PLL_RATE(983040000, 24, 983, 1, 1, 0, 671089),
 /* vco = 983040000 */
- RK3036_PLL_RATE(491520000, 24, 983, 2, 1, 0, 671088),
+ RK3036_PLL_RATE(491520000, 24, 983, 2, 1, 0, 671089),
 /* vco = 983040000 */
- RK3036_PLL_RATE(61440000, 6, 215, 7, 2, 0, 671088),
+ RK3036_PLL_RATE(61440000, 6, 215, 7, 2, 0, 671089),
 /* vco = 860156000 */
- RK3036_PLL_RATE(56448000, 12, 451, 4, 4, 0, 9797894),
+ RK3036_PLL_RATE(56448000, 12, 451, 4, 4, 0, 9797895),
 /* vco = 903168000 */
- RK3036_PLL_RATE(40960000, 12, 409, 4, 5, 0, 10066329),
+ RK3036_PLL_RATE(40960000, 12, 409, 4, 5, 0, 10066330),
 /* vco = 819200000 */
[ /* sentinel */ ],
};
RK3328_CLKSEL_CON(8), 12, 1, MFLAGS,
RK3328_CLKGATE_CON(1), 7, GFLAGS),
@ @ -458,7 +458,7 @@
RK3328_CLKSEL_CON(35), 15, 1, MFLAGS, 8, 7, DFLAGS,
RK3328_CLKGATE_CON(2), 12, GFLAGS),
COMPOSITE(SCLK_CRYPTO, "clk_crypto", mux_2plls_p, 0,
-RK3328_CLKSEL_CON(20), 7, 1, MFLAGS, 0, 7, DFLAGS,
+RK3328_CLKSEL_CON(20), 7, 1, MFLAGS, 0, 5, DFLAGS,
RK3328_CLKGATE_CON(2), 4, GFLAGS),
COMPOSITE_NOMUX(SCLK_TSADC, "clk_tsadc", "clk_24m", 0,
RK3328_CLKSEL_CON(22), 0, 10, DFLAGS,
@ @ -550,15 +550,15 @@
GATE(0, "hclk_rkvenc_niu", "hclk_rkvenc", CLK_IGNORE_UNUSED,
RK3328_CLKGATE_CON(25), 1, GFLAGS),
GATE(ACLK_H265, "aclk_h265", "aclk_rkvenc", 0,
-RK3328_CLKGATE_CON(25), 0, GFLAGS),
+RK3328_CLKGATE_CON(25), 2, GFLAGS),
GATE(PCLK_H265, "pclk_h265", "hclk_rkvenc", 0,
-RK3328_CLKGATE_CON(25), 1, GFLAGS),
+RK3328_CLKGATE_CON(25), 3, GFLAGS),
GATE(ACLK_H264, "aclk_h264", "aclk_rkvenc", 0,
-RK3328_CLKGATE_CON(25), 0, GFLAGS),
+RK3328_CLKGATE_CON(25), 4, GFLAGS),
GATE(HCLK_H264, "hclk_h264", "hclk_rkvenc", 0,
-RK3328_CLKGATE_CON(25), 1, GFLAGS),
+RK3328_CLKGATE_CON(25), 5, GFLAGS),
GATE(ACLK_AXISRAM, "aclk_axisram", "aclk_rkvenc", CLK_IGNORE_UNUSED,
-RK3328_CLKGATE_CON(25), 0, GFLAGS),
+RK3328_CLKGATE_CON(25), 6, GFLAGS),
COMPOSITE(SCLK_VENC_CORE, "sclk_venc_core", mux_4plls_p, 0,
RK3328_CLKSEL_CON(51), 14, 2, MFLAGS, 8, 5, DFLAGS,
@ @ -663,7 +663,7 @@

/* PD_GMAC */
COMPOSITE(ACLK_GMAC, "aclk_gmac", mux_2plls_hdmiphy_p, 0,
-RK3328_CLKSEL_CON(35), 6, 2, MFLAGS, 0, 5, DFLAGS,
+RK3328_CLKSEL_CON(25), 6, 2, MFLAGS, 0, 5, DFLAGS,
RK3328_CLKGATE_CON(3), 2, GFLAGS),
COMPOSITE_NOMUX(PCLK_GMAC, "pclk_gmac", "aclk_gmac", 0,
RK3328_CLKSEL_CON(25), 8, 3, DFLAGS,
@ @ -733,7 +733,7 @@

/* PD_PERI */
GATE(0, "aclk_peri_noe", "aclk_peri", CLK_IGNORE_UNUSED, RK3328_CLKGATE_CON(19), 11, GFLAGS),
-GATE(ACLK_USB3OTG, "aclk_usb3otg", "aclk_peri", 0, RK3328_CLKGATE_CON(19), 4, GFLAGS),
+GATE(ACLK_USB3OTG, "aclk_usb3otg", "aclk_peri", 0, RK3328_CLKGATE_CON(19), 14, GFLAGS),
GATE(HCLK_SDMMC, "hclk_sdmmc", "hclk_peri", 0, RK3328_CLKGATE_CON(19), 0, GFLAGS),
GATE(HCLK_SDIO, "hclk_sdio", "hclk_peri", 0, RK3328_CLKGATE_CON(19), 1, GFLAGS),
@@ -813,22 +813,22 @@
MMC(SCLK_SDMMC_DRV, "sdmmc_drv", "sclk_sdmmc",
    RK3328_SDMMC_CON0, 1),
MMC(SCLK_SDMMC_SAMPLE, "sdmmc_sample", "sclk_sdmmc",
    RK3328_SDMMC_CON0, 1),
+    RK3328_SDMMC_CON1, 0),

MMC(SCLK_SDIO_DRV, "sdio_drv", "sclk_sdio",
    RK3328_SDIO_CON0, 1),
MMC(SCLK_SDIO_SAMPLE, "sdio_sample", "sclk_sdio",
    RK3328_SDIO_CON0, 1),
+    RK3328_SDIO_CON1, 0),

MMC(SCLK_EMMC_DRV, "emmc_drv", "sclk_emmc",
    RK3328_EMMC_CON0, 1),
MMC(SCLK_EMMC_SAMPLE, "emmc_sample", "sclk_emmc",
    RK3328_EMMC_CON0, 1),
+    RK3328_EMMC_CON1, 0),

MMC(SCLK_SDMMC_EXT_DRV, "sdmmc_ext_drv", "sclk_sdmmc_ext",
    RK3328_SDMMC_EXT_CON0, 1),
MMC(SCLK_SDMMC_EXT_SAMPLE, "sdmmc_ext_sample", "sclk_sdmmc_ext",
    RK3328_SDMMC_EXT_CON0, 1),
+    RK3328_SDMMC_EXT_CON1, 0),
	};

static const char *const rk3328_critical_clocks[] __initconst = {
    RK3328_CPUCLK_CON(0) +894,7 @ @
    &rk3328_cpuclk_data, rk3328_cpuclk_rates,
    ARRAY_SIZE(rk3328_cpuclk_rates));

-rockchip_register_softrst(np, 11, reg_base + RK3328_SOFRST_CON(0),
+rockchip_register_softrst(np, 12, reg_base + RK3328_SOFRST_CON(0),
    ROCKCHIP_SOFRST_HIWORD_MASK);

rockchip_register_restart_notifier(ctx, RK3328_GLB_SRST_FST, NULL);
--- linux-4.15.0.orig/drivers/clk/rockchip/clk-rk3399.c
+++ linux-4.15.0/drivers/clk/rockchip/clk-rk3399.c
@@ -630,7 +630,7 @@
    RK3399_CLKSEL_CON(31), 0, 2, MFLAGS),
    COMPOSITE_NODIV(SCLK_I2S_8CH_OUT, "clk_i2sout", mux_i2sout_p, CLK_SET_RATE_PARENT,
    RK3399_CLKKSEL_CON(31), 0, 2, MFLAGS),
    RK3399_CLKGATE_CON(8), 12, GFLAGS),
/* uart */
@@ -1522,6 +1522,7 @@
     "pclk_pmu_src",
     "fclk_cm0s_src_pmu",
     "clk_timer_src_pmu",
+    "pclk_rkpwm_pmu",
     
};

class u_init rk3399_clk_init(struct device_node *np)
--- linux-4.15.0.orig/drivers/clk/samsung/clk-cpu.c
+++ linux-4.15.0/drivers/clk/samsung/clk-cpu.c
@@ -152,7 +152,7 @@
 struct exynos_cpuclk *cpuclk, void __iomem *base)
 {
  const struct exynos_cpuclk_cfg_data *cfg_data = cpuclk->cfg;
-unsigned long alt_prate = clk_get_rate(cpuclk->alt_parent);
+unsigned long alt_prate = clk_hw_get_rate(cpuclk->alt_parent);
  unsigned long alt_div = 0, alt_div_mask = DIV_MASK;
  unsigned long div0, div1 = 0, mux_reg;
  unsigned long flags;
@@ -280,7 +280,7 @@
 struct exynos_cpuclk *cpuclk, void __iomem *base)
 {
  const struct exynos_cpuclk_cfg_data *cfg_data = cpuclk->cfg;
-unsigned long alt_prate = clk_get_rate(cpuclk->alt_parent);
+unsigned long alt_prate = clk_hw_get_rate(cpuclk->alt_parent);
  unsigned long alt_div = 0, alt_div_mask = DIV_MASK;
  unsigned long div0, div1 = 0, mux_reg;
  unsigned long flags;
@@ -432,7 +432,7 @@
 else
  cpuclk->clk_nb.notifier_call = exynos_cpuclk_notifier_cb;
-  cpuclk->alt_parent = __clk_lookup(alt_parent);
+  cpuclk->alt_parent = __clk_get_hw(__clk_lookup(alt_parent));
  if (!cpuclk->alt_parent) {
    pr_err("%s: could not lookup alternate parent %s\n",
    __func__, alt_parent);
--- linux-4.15.0.orig/drivers/clk/samsung/clk-cpu.h
+++ linux-4.15.0/drivers/clk/samsung/clk-cpu.h
@@ -49,7 +49,7 @@
 */
 struct exynos_cpuclk {
  struct clk_hw hw;
-  struct clk*alt_parent;
+  struct clk_hw*alt_parent;
  void __iomem*ctrl_base;
  spinlock_t*lock;

const struct exynos_cpuclk_cfg_data*cfg;
--- linux-4.15.0.orig/drivers/clk/samsung/clk-exynos3250.c
+++ linux-4.15.0/drivers/clk/samsung/clk-exynos3250.c
@@ -698,7 +698,7 @@
PLL_36XX_RATE(144000000, 96, 2, 3, 0),
PLL_36XX_RATE(96000000, 128, 2, 4, 0),
PLL_36XX_RATE(84000000, 112, 2, 4, 0),
-PLL_36XX_RATE(80000004, 106, 2, 4, 43691),
+PLL_36XX_RATE(80000003, 106, 2, 4, 43691),
PLL_36XX_RATE(73728000, 98, 2, 4, 19923),
PLL_36XX_RATE(67737598, 270, 3, 5, 62285),
PLL_36XX_RATE(65535999, 174, 2, 5, 49982),
@@ -734,7 +734,7 @@
PLL_36XX_RATE(148352005, 98, 2, 3, 59070),
PLL_36XX_RATE(108000000, 144, 2, 4, 0),
PLL_36XX_RATE(74500000, 99, 2, 4, 0),
-PLL_36XX_RATE(74176002, 98, 3, 4, 59070),
+PLL_36XX_RATE(74176002, 98, 2, 4, 59070),
PLL_36XX_RATE(54054000, 216, 3, 5, 14156),
PLL_36XX_RATE(54000000, 144, 2, 5, 0),
{ /* sentinel */ }
--- linux-4.15.0.orig/drivers/clk/samsung/clk-exynos4.c
+++ linux-4.15.0/drivers/clk/samsung/clk-exynos4.c
@@ -1072,7 +1072,7 @@
GATE(CLK_PCIE, "pcie", "aclk133", GATE_IP_FSYS, 14, 0, 0),
GATE(CLK_SMMU_PCIE, "smmu_pcie", "aclk133", GATE_IP_FSYS, 18, 0, 0),
GATE(CLK_MODEMIF, "modemif", "aclk100", GATE_IP_PERIL, 28, 0, 0),
- GATE(CLK_CHIPID, "chipid", "aclk100", E4210_GATE_IP_PERIR, 0, 0, 0),
+ GATE(CLK_CHIPID, "chipid", "aclk100", E4210_GATE_IP_PERIR, 0, CLK_IGNORE_UNUSED, 0),
GATE(CLK_SYSREG, "sysreg", "aclk100", E4210_GATE_IP_PERIR, 0,
CLK_IGNORE_UNUSED, 0),
GATE(CLK_HDMI_CEC, "hdmi_cec", "aclk100", E4210_GATE_IP_PERIR, 11, 0,
@@ -1113,7 +1113,7 @@
0),
GATE(CLK_TSADC, "tsadc", "aclk133", E4X12_GATE_BUS_FSYS1, 16, 0, 0),
GATE(CLK_MIPI_HSI, "mipl_hsi", "aclk133", GATE_IP_FSYS, 10, 0, 0),
- GATE(CLK_CHIPID, "chipid", "aclk100", E4X12_GATE_IP_PERIR, 0, 0, 0),
+ GATE(CLK_CHIPID, "chipid", "aclk100", E4X12_GATE_IP_PERIR, 0, CLK_IGNORE_UNUSED, 0),
GATE(CLK_SYSREG, "sysreg", "aclk100", E4X12_GATE_IP_PERIR, 1,
CLK_IGNORE_UNUSED, 0),
GATE(CLK_HDMI_CEC, "hdmi_cec", "aclk100", E4X12_GATE_IP_PERIR, 11, 0,
@@ -1226,6 +1226,7 @@
xom = readl(chipid_base + 8);

iounmap(chipid_base);
+of_node_put(np);
}
return xom;
--- linux-4.15.0.orig/drivers/clk/samsung/clk-exynos5250.c
+++ linux-4.15.0/drivers/clk/samsung/clk-exynos5250.c
@@ -560,6 +560,8 @@
            GATE(CLK_GSCL3, "gscl3", "mout_aclk266_gscl_sub", GATE_IP_GSCL, 3, 0, 0),
            +GATE(CLK_CAMIF_TOP, "camif_top", "mout_aclk266_gscl_sub",
            +GATE_IP_GSCL, 4, 0, 0),
            GATE(CLK_GSCL_WA, "gscl_wa", "div_gscl_wa", GATE_IP_GSCL, 5, 0, 0),
            GATE(CLK_GSCL_WB, "gscl_wb", "div_gscl_wb", GATE_IP_GSCL, 6, 0, 0),
            GATE(CLK_SMMU_GSCL0, "smmu_gscl0", "mout_aclk266_gscl_sub",
@@ -570,6 +572,10 @@
            GATE_IP_GSCL, 9, 0, 0),
            GATE(CLK_SMMU_GSCL3, "smmu_gscl3", "mout_aclk266_gscl_sub",
            GATE_IP_GSCL, 10, 0, 0),
            +GATE(CLK_SMMU_FIMC_LITE0, "smmu_fimc_lite0", "mout_aclk266_gscl_sub",
            +GATE_IP_GSCL, 11, 0, 0),
            +GATE(CLK_SMMU_FIMC_LITE1, "smmu_fimc_lite1", "mout_aclk266_gscl_sub",
            +GATE_IP_GSCL, 12, 0, 0),
            GATE(CLK_FIMD1, "fimd1", "mout_aclk200_disp1_sub", GATE_IP_DISP1, 0, 0, 0),
            @@ -711,13 +717,13 @@
            /* PLL_36XX_RATE(rate, m, p, s, k) */
            PLL_36XX_RATE(480000000, 160, 2, 2, 0),
            -PLL_36XX_RATE(432000000, 144, 2, 2, 0),
            PLL_36XX_RATE(400000000, 200, 3, 2, 0),
            -PLL_36XX_RATE(394073130, 459, 7, 2, 49282),
+PLL_36XX_RATE(394073128, 459, 7, 2, 49282),
PLL_36XX_RATE(333000000, 111, 2, 2, 0),
PLL_36XX_RATE(300000000, 100, 2, 2, 0),
PLL_36XX_RATE(266000000, 266, 3, 3, 0),
--- linux-4.15.0.orig/drivers/clk/samsung/clk-exynos5420.c
+++ linux-4.15.0/drivers/clk/samsung/clk-exynos5420.c
@@ -170,12 +170,20 @@
GATE_SCLK_CPU,
CLKOUT_CMU_CPU,
+APLL_CON0,
+KPLL_CON0,
+CPPLL_CON0,
+DPPLL_CON0,
EPLL_CON0,
EPLL_CON1,
EPLL_CON2,
RPLL_CON0,
RPLL_CON1,
RPLL_CON2,
+IPLL_CON0,
+SPLL_CON0,
+VPPLL_CON0,
+MPLL_CON0,
SRC_TOP0,
SRC_TOP1,
SRC_TOP2,
@@ -280,6 +288,7 @@
}{ .offset = GATE_BUS_DISP1, .value = 0xffffffff, },
{ .offset = GATE_IP_PERIC, .value = 0xffffffff, },
+{ .offset = GATE_IP_PERIS, .value = 0xffffffff, },
};

static int exynos5420_clk_suspend(void)
@@ -587,7 +596,7 @@
{ .offset = GATE_BUS_TOP, .value = 0xffffffff, },
{ .offset = GATE_BUS_DISP1, .value = 0xffffffff, },
{ .offset = GATE_IP_PERIC, .value = 0xffffffff, },
+{ .offset = GATE_IP_PERIS, .value = 0xffffffff, },
};

static const struct samsung_gate_clock exynos5800_gate_clks[] __initconst = {
GATE(CLK_ACLK550_CAM, "aclk550_cam", "mout_user_aclk550_cam",
- GATE_BUS_TOP, 24, 0, 0),
+GATE_BUS_TOP, 24, CLK_IS_CRITICAL, 0),
GATE(CLK_ACLK432_SCALER, "aclk432_scaler", "mout_user_aclk432_scaler",
GATE_BUS_TOP, 27, CLK_IS_CRITICAL, 0),
GATE(CLK_MAU_EPLL, "mau_epll", "mout_user_mau_epll",
@@ -631,6 +640,7 @@
};

static const struct samsung_gate_clock exynos5420_gate_clks[] __initconst = {

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+GATE(CLK_SECKEY, "seckey", "aclk66_psgen", GATE_BUS_PERIS1, 1, 0, 0),
GATE(CLK_MAU_EPLL, "mau_epll", "mout_mau_epll_clk",
SRC_MASK_TOP7, 20, CLK_SET_RATE_PARENT, 0),
)

@@ -977,25 +987,25 @@
GATE(0, "aclk300_jpeg", "mout_user_aclk300_jpeg",
GATE_BUS_TOP, 4, CLK_IGNORE_UNUSED, 0),
GATE(0, "aclk333_432_isp0", "mout_user_aclk333_432_isp0",
-GATE_BUS_TOP, 5, 0, 0),
+GATE_BUS_TOP, 5, CLK_IS_CRITICAL, 0),
GATE(0, "aclk300_gscl", "mout_user_aclk300_gscl",
GATE_BUS_TOP, 6, CLK_IS_CRITICAL, 0),
GATE(0, "aclk333_432_gscl", "mout_user_aclk333_432_gscl",
GATE_BUS_TOP, 7, CLK_IGNORE_UNUSED, 0),
GATE(0, "aclk333_432_isp", "mout_user_aclk333_432_isp",
-GATE_BUS_TOP, 8, 0, 0),
+GATE_BUS_TOP, 8, CLK_IS_CRITICAL, 0),
GATE(CLK_PCLK66_GPIO, "pclk66_gpio", "mout_user_pclk66_gpio",
GATE_BUS_TOP, 9, CLK_IGNORE_UNUSED, 0),
GATE(0, "aclk66_psgen", "mout_user_aclk66_psgen",
GATE_BUS_TOP, 10, CLK_IGNORE_UNUSED, 0),
GATE(0, "aclk266_isp", "mout_user_aclk266_isp",
-GATE_BUS_TOP, 13, 0, 0),
+GATE_BUS_TOP, 13, CLK_IS_CRITICAL, 0),
GATE(0, "aclk166", "mout_user_aclk166",
GATE_BUS_TOP, 14, CLK_IGNORE_UNUSED, 0),
GATE(CLK_ACLK333, "aclk333", "mout_user_aclk333",
GATE_BUS_TOP, 15, CLK_IS_CRITICAL, 0),
GATE(0, "aclk400_isp", "mout_user_aclk400_isp",
-GATE_BUS_TOP, 16, 0, 0),
+GATE_BUS_TOP, 16, CLK_IS_CRITICAL, 0),
GATE(0, "aclk400_mscl", "mout_user_aclk400_mscl",
GATE_BUS_TOP, 17, CLK_IS_CRITICAL, 0),
GATE(0, "aclk200_disp1", "mout_user_aclk200_disp1",
@@ -1165,8 +1175,10 @@
GATE(CLK_TMU, "tmu", "aclk66_psgen", GATE_IP_PERIS, 21, 0, 0),
GATE(CLK_TMU_GPU, "tmu_gpu", "aclk66_psgen", GATE_IP_PERIS, 22, 0, 0),

-GATE(CLK_SECKEY, "seckey", "aclk66_psgen", GATE_BUS_PERIS1, 1, 0, 0),
-
/* GEN Block */
GATE(CLK_ROTATOR, "rotator", "mout_user_aclk266", GATE_IP_GEN, 1, 0, 0),
GATE(CLK_JPEG, "jpeg", "aclk300_jpeg", GATE_IP_GEN, 2, 0, 0),
@@ -1209,8 +1217,10 @@
GATE_IP_GSCL1, 6, 0, 0),
GATE(CLK_SMMU_GSCL1, "smmu_gscl1", "dout_gscl_blk_300",
GATE_IP_GSCL1, 7, 0, 0),
-GATE(CLK_GSCL_WA, "gscl_wa", "sclk_gscl_wa", GATE_IP_GSCL1, 12, 0, 0),
-GATE(CLK_GSCL_WB, "gscl_wb", "sclk_g scl_wb", GATE_IP_GSCL1, 13, 0, 0),
+GATE(CLK_GSCL_WA, "gscl_wa", "sclk_g scl_wa", GATE_IP_GSCL1, 12,
+CLK_IS_CRITICAL, 0),
+GATE(CLK_GSCL_WB, "gscl_wb", "sclk_g scl_wb", GATE_IP_GSCL1, 13,
+CLK_IS_CRITICAL, 0),
GATE(CLK_SMMU_FIMCL3, "smmu_fimcl3," "dout_g scl_blk_333",
GATE_IP_GSCL1, 16, 0, 0),
GATE(CLK_FIMC_LITE3, "fimc_lite3", "aclk333_432_g scl",
--- linux-4.15.0.orig/drivers/clk/samsung/clk-exynos5433.c
+++ linux-4.15.0/drivers/clk/samsung/clk-exynos5433.c
@@ -16,6 +16,7 @@
#include <linux/of_device.h>
#include <linux/platform_device.h>
#include <linux/pm_runtime.h>
+#include <linux/slab.h>

#include <dt-bindings/clock/exynos5433.h>

@@ -729,7 +730,7 @@
 PLL_35XX_RATE(800000000U, 400, 6, 1),
P LL_35XX_RATE(733000000U, 733, 12, 1),
P LL_35XX_RATE(700000000U, 175, 3, 1),
-PLL_35XX_RATE(667000000U, 222, 4, 1),
+PLL_35XX_RATE(666000000U, 222, 4, 1),
P LL_35XX_RATE(633000000U, 211, 4, 1),
P LL_35XX_RATE(600000000U, 500, 5, 2),
P LL_35XX_RATE(552000000U, 460, 5, 2),
@@ -757,12 +758,12 @@
 /* AUD_PLL */
 static const struct samsung_pll_rate_table exynos5433_aud_pll_rates[] __initconst = {
P LL_36XX_RATE(400000000U, 200, 3, 2, 0),
-PLL_36XX_RATE(393216000U, 197, 3, 2, -25690),
+PLL_36XX_RATE(393216003U, 197, 3, 2, -25690),
P LL_36XX_RATE(384000000U, 128, 2, 2, 0),
-PLL_36XX_RATE(368640000U, 246, 4, 2, -15729),
-PLL_36XX_RATE(361507200U, 181, 3, 2, -16148),
-PLL_36XX_RATE(338688000U, 113, 2, 2, -6816),
-PLL_36XX_RATE(294912000U, 98, 1, 3, 19923),
+PLL_36XX_RATE(368639991U, 246, 4, 2, -15729),
+PLL_36XX_RATE(361507202U, 181, 3, 2, -16148),
+PLL_36XX_RATE(338687988U, 113, 2, 2, -6816),
+PLL_36XX_RATE(294912002U, 98, 1, 3, 19923),
P LL_36XX_RATE(288000000U, 96, 1, 3, 0),
P LL_36XX_RATE(252000000U, 84, 1, 3, 0),
{ /* sentinel */ }
@@ -1678,7 +1679,8 @@
 GATE(CLK_SCLK_PCM1, "sclk_pcm1", "sclk_pcm1_peric",
 ENABLE_SCLK_PERIC, 7, CLK_SET_RATE_PARENT, 0),

---
GATE(CLK_SCLK_I2S1, "sclk_i2s1", "sclk_i2s1_peric",
-ENABLE_SCLK_PERIC, 6, CLK_SET_RATE_PARENT, 0),
+ENABLE_SCLK_PERIC, 6,
+CLK_SET_RATE_PARENT | CLK_IGNORE_UNUSED, 0),
GATE(CLK_SCLK_SPI2, "sclk_spi2", "sclk_spi2_peric", ENABLE_SCLK_PERIC,
5, CLK_SET_RATE_PARENT, 0),
GATE(CLK_SCLK_SPI1, "sclk_spi1", "sclk_spi1_peric", ENABLE_SCLK_PERIC,
@@ -5528,6 +5530,8 @@
data->clk_save = samsung_clk_alloc_reg_dump(info->clk_regs,
    info->nr_clk_regs);
+if (!data->clk_save)
+return -ENOMEM;
    data->nr_clk_save = info->nr_clk_regs;
    data->clk_suspend = info->suspend_regs;
    data->nr_clk_suspend = info->nr_suspend_regs;
@@ -5536,12 +5540,19 @@
    if (data->nr_pclks > 0) {
        data->pclks = devm_kcalloc(dev, sizeof(struct clk *),
            data->nr_pclks, GFP_KERNEL);
-    +if (!data->pclks) {
+        kfree(data->clk_save);
+        return -ENOMEM;
+    }
        for (i = 0; i < data->nr_pclks; i++) {
            struct clk *clk = of_clk_get(dev->of_node, i);

            -if (IS_ERR(clk))
            +if (IS_ERR(clk)) {
                kfree(data->clk_save);
                +while (--i >= 0)
                +clk_put(data->pclks[i]);
                return PTR_ERR(clk);
            }
            data->pclks[i] = clk;
        }
    }
@@ -5631,7 +5642,7 @@
static const struct dev_pm_ops exynos5433_cmu_pm_ops = {
    SET_RUNTIME_PM_OPS(exynos5433_cmu_suspend, exynos5433_cmu_resume,
        NULL)
    -SET_LATE_SYSTEM_SLEEP_PM_OPS(pm_runtime_force_suspend,
    +SET_NOIRQ_SYSTEM_SLEEP_PM_OPS(pm_runtime_force_suspend,
        pm_runtime_force_resume)
};

--- linux-4.15.0.orig/drivers/clk/samsung/clk-exynos7.c
static const struct samsung_pll_rate_table pll1460x_24mhz_tbl[] __initconst = {
    PLL_36XX_RATE(491520000, 20, 1, 0, 31457),
    PLL_36XX_RATE(491519897, 20, 1, 0, 31457),
};

GATE(CLK_ACLK_FSYS0_200, "aclk_fsys0_200", "dout_aclk_fsys0_200",
    ENABLE_ACLK_TOP13, 28, CLK_SET_RATE_PARENT |
    CLK_IS_CRITICAL, 0),
    /*
    * This clock is required for the CMU_FSYS1 registers access, keep it
    * enabled permanently until proper runtime PM support is added.
    */
    GATE(CLK_ACLK_FSYS1_200, "aclk_fsys1_200", "dout_aclk_fsys1_200",
    -ENABLE_ACLK_TOP13, 24, CLK_SET_RATE_PARENT, 0),
    +ENABLE_ACLK_TOP13, 24, CLK_SET_RATE_PARENT |
    +CLK_IS_CRITICAL, 0),

GATE(CLK_SCLK_PHY_FSYS1_26M, "sclk_phy_fsys1_26m",
    "dout_sclk_phy_fsys1_26m", ENABLE_SCLK_TOP1_FSYS11, 
    --- linux-4.15.0.orig/drivers/clk/samsung/clk-s3c2410.c
    +++ linux-4.15.0/drivers/clk/samsung/clk-s3c2410.c
    @ @ -168.7 +168.7 @@
    PLL_35XX_RATE(226000000, 105, 1, 1),
    PLL_35XX_RATE(210000000, 132, 2, 1),
    /* 2410 common */
    -PLL_35XX_RATE(203000000, 161, 3, 1),
    +PLL_35XX_RATE(202800000, 161, 3, 1),
    PLL_35XX_RATE(192000000, 88, 1, 1),
    PLL_35XX_RATE(186000000, 85, 1, 1),
    PLL_35XX_RATE(180000000, 82, 1, 1),
    @ @ -178.18 +178.18 @@
    PLL_35XX_RATE(147000000, 90, 2, 1),
    PLL_35XX_RATE(135000000, 82, 2, 1),
    PLL_35XX_RATE(124000000, 116, 1, 2),
    -PLL_35XX_RATE(118000000, 150, 2, 2),
    +PLL_35XX_RATE(118500000, 150, 2, 2),
    PLL_35XX_RATE(113000000, 105, 1, 2),
    -PLL_35XX_RATE(101000000, 127, 2, 2),
    +PLL_35XX_RATE(101250000, 127, 2, 2),
    PLL_35XX_RATE(90000000, 112, 2, 2),
    -PLL_35XX_RATE(85000000, 105, 2, 2),
    +PLL_35XX_RATE(84750000, 105, 2, 2),
PLL_35XX_RATE(79000000, 71, 1, 2),
-PLL_35XX_RATE(68000000, 82, 2, 2),
-PLL_35XX_RATE(56000000, 142, 2, 3),
+PLL_35XX_RATE(67500000, 82, 2, 2),
+PLL_35XX_RATE(56250000, 142, 2, 3),
PLL_35XX_RATE(48000000, 120, 2, 3),
-PLL_35XX_RATE(51000000, 161, 3, 3),
+PLL_35XX_RATE(50700000, 161, 3, 3),
PLL_35XX_RATE(45000000, 82, 1, 3),
-PLL_35XX_RATE(34000000, 82, 2, 3),
+PLL_35XX_RATE(33750000, 82, 2, 3),

{ /* sentinel */ },
};

--- linux-4.15.0.orig/drivers/clk/sirf/clk-atlas6.c
+++ linux-4.15.0/drivers/clk/sirf/clk-atlas6.c
@@ -136,7 +136,7 @@
for (i = pll1; i < maxclk; i++) {
    atlas6_clks[i] = clk_register(NULL, atlas6_clk_hw_array[i]);
-    BUG_ON(!atlas6_clks[i]);
+    BUG_ON(IS_ERR(atlas6_clks[i]));
    +BUG_ON(IS_ERR(atlas6_clks[i]));
}  
    
clk_register_clkdev(atlas6_clks[cpu], NULL, "cpu");
clk_register_clkdev(atlas6_clks[io], NULL, "io");
--- linux-4.15.0.orig/drivers/clk/sirf/clk-common.c
+++ linux-4.15.0/drivers/clk/sirf/clk-common.c
@@ -298,9 +298,10 @@
    
struct clk_dmn *clk = to_dmnclk(hw);
    u32 cfg = clkc_readl(clk->regofs);
+    const char *name = clk_hw_get_name(hw);
    
    /* parent of io domain can only be pll3 */
    -if (strcmp(hw->init->name, "io") == 0)
+    if (strcmp(name, "io") == 0)
        return 4;

    WARN_ON((cfg & (BIT(3) - 1)) > 4);
@@ -312,9 +313,10 @@
    
struct clk_dmn *clk = to_dmnclk(hw);
    u32 cfg = clkc_readl(clk->regofs);
+    const char *name = clk_hw_get_name(hw);
    
    /* parent of io domain can only be pll3 */
    -if (strcmp(hw->init->name, "io") == 0)
+    if (strcmp(name, "io") == 0)
return -EINVAL;

cfg &= ~(BIT(3) - 1);
@@ -354,7 +356,8 @@
{
  unsigned long fin;
  unsigned ratio, wait, hold;
-  unsigned bits = (strcmp(hw->init->name, "mem") == 0) ? 3 : 4;
  +const char *name = clk_hw_get_name(hw);
  +unsigned bits = (strcmp(name, "mem") == 0) ? 3 : 4;

  fin = *parent_rate;
  ratio = fin / rate;
  @@ -376,7 +379,8 @@
  struct clk_dmn *clk = to_dmnclk(hw);
  unsigned long fin;
  unsigned ratio, wait, hold, reg;
-  unsigned bits = (strcmp(hw->init->name, "mem") == 0) ? 3 : 4;
  +const char *name = clk_hw_get_name(hw);
  +unsigned bits = (strcmp(name, "mem") == 0) ? 3 : 4;

  fin = parent_rate;
  ratio = fin / rate;
  --- linux-4.15.0.orig/drivers/clk/socfpga/clk-gate-a10.c
  +++ linux-4.15.0/drivers/clk/socfpga/clk-gate-a10.c
  @@ -157,6 +157,7 @@
  if (IS_ERR(socfpga_clk->sys_mgr_base_addr)) {
      pr_err("%s: failed to find altr,sys-mgr regmap!
          __func__);
      +kfree(socfpga_clk);
      return;
  }

  --- linux-4.15.0.orig/drivers/clk/socfpga/clk-gate.c
  +++ linux-4.15.0/drivers/clk/socfpga/clk-gate.c
  @@ -107,7 +107,7 @@
      val = readl(socfpgaclk->div_reg) >> socfpgaclk->shift;
      val &= GENMASK(socfpgaclk->width - 1, 0);
      /* Check for GPIO_DB_CLK by its offset */
-      if ((int) socfpgaclk->div_reg & SOCFPGA_GPIO_DB_CLK_OFFSET)
-          div = val + 1;
+      if ((uintptr_t) socfpgaclk->div_reg & SOCFPGA_GPIO_DB_CLK_OFFSET)
+          div = val + 1;
      else
          div = (1 << val);
  --- linux-4.15.0.orig/drivers/clk/socfpga/clk-pll-a10.c
  +++ linux-4.15.0/drivers/clk/socfpga/clk-pll-a10.c
  @@ -95,6 +95,7 @@
clkmgr_np = of_find_compatible_node(NULL, NULL, "altr,clk-mgr");
clk_mgr_a10_base_addr = of_iomap(clkmgr_np, 0);
+of_node_put(clkmgr_np);
BUG_ON(!clk_mgr_a10_base_addr);
pll_clk->hw.reg = clk_mgr_a10_base_addr + reg;

--- linux-4.15.0.orig/drivers/clk/socfpga/clk-pll.c
+++ linux-4.15.0/drivers/clk/socfpga/clk-pll.c
@@ -100,6 +100,7 @@
clkmgr_np = of_find_compatible_node(NULL, NULL, "altr,clk-mgr");
clk_mgr_base_addr = of_iomap(clkmgr_np, 0);
+of_node_put(clkmgr_np);
BUG_ON(!clk_mgr_base_addr);
pll_clk->hw.reg = clk_mgr_base_addr + reg;

--- linux-4.15.0.orig/drivers/clk/st/clk-flexgen.c
+++ linux-4.15.0/drivers/clk/st/clk-flexgen.c
@@ -373,6 +373,7 @@
break;
}

+flex_flags &= ~CLK_IS_CRITICAL;
of_clk_detect_critical(np, i, &flex_flags);
/*
--- linux-4.15.0.orig/drivers/clk/sunxi-ng/Makefile
+++ linux-4.15.0/drivers/clk/sunxi-ng/Makefile
@@ -1,24 +1,24 @@
# SPDX-License-Identifier: GPL-2.0
# Common objects
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_common.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_mmc_timing.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_reset.o
+obj-y+= ccu_common.o
+obj-y+= ccu_mmc_timing.o
+obj-y+= ccu_reset.o

# Base clock types
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_div.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_frac.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_gate.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_mux.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_mult.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_phase.o
-lib-$(CONFIG_SUNXI_CCU)	+= ccu_sdm.o
+obj-y+= ccu_div.o
+obj-y+= ccu_frac.o
+obj-y+= ccu_gate.o
+obj-y+= ccu_mux.o
+obj-y+= ccu_mult.o
+obj-y+= ccu_phase.o
+obj-y+= ccu_sdm.o

# Multi-factor clocks
-lib-$(CONFIG_SUNXI_CCU)+= ccu_nk.o
-lib-$(CONFIG_SUNXI_CCU)+= ccu_nkm.o
-lib-$(CONFIG_SUNXI_CCU)+= ccu_nkmp.o
-lib-$(CONFIG_SUNXI_CCU)+= ccu_nm.o
-lib-$(CONFIG_SUNXI_CCU)+= ccu_mp.o
+obj-y+= ccu_nk.o
+obj-y+= ccu_nkm.o
+obj-y+= ccu_nkmp.o
+obj-y+= ccu_nm.o
+obj-y+= ccu_mp.o

# SoC support
obj-$(CONFIG_SUN50I_A64_CCU)+= ccu-sun50i-a64.o
@@ -36,12 +36,3 @@
obj-$(CONFIG_SUN9I_A80_CCU)+= ccu-sun9i-a80.o
obj-$(CONFIG_SUN9I_A80_CCU)+= ccu-sun9i-a80-de.o
obj-$(CONFIG_SUN9I_A80_CCU)+= ccu-sun9i-a80-usb.o
-# The lib-y file goals is supposed to work only in arch/*/lib or lib/.
-# In our case, we want to use that goal, but even though lib.a will be properly
-# generated, it will not be linked in, eventually resulting in a linker error
-# for missing symbols.
-# We can work around that by explicitly adding lib.a to the obj-y goal. This is
-# an undocumented behaviour, but works well for now.
-obj-$(CONFIG_SUNXI_CCU)+= lib.a
--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun4i-a10.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun4i-a10.c
@@ -1434,8 +1434,16 @@
} return;
)

-/* Force the PLL-Audio-1x divider to 1 */
val = readl(reg + SUN4I_PLL_AUDIO_REG);
+
+/*
+ * Force VCO and PLL bias current to lowest setting. Higher
+ * settings interfere with sigma-delta modulation and result
+ * in audible noise and distortions when using SPDIF or I2S.
+ */
+val &= ~GENMASK(25, 16);
+ /* Force the PLL-Audio-1x divider to 1 */
val &= ~(GENMASK(29, 26);
write(val | (1 << 26), reg + SUN4I_PLL_AUDIO_REG);

--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun50i-a64.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun50i-a64.c
@@ -158,7 +158,12 @@
#define SUN50I_A64_PLL_MIPI_REG		0x040
static struct ccu_nkm pll_mipi_clk = {
- .enable		= BIT(31),
+ /*
+ * The bit 23 and 22 are called "LDO{1,2}_EN" on the SoC's
+ * user manual, and by experiments the PLL doesn't work without
+ * these bits toggled.
+ */
+ .enable		= BIT(31) | BIT(23) | BIT(22),
 .lock		= BIT(28),
 .n		= _SUNXI_CCU_MULT(8, 4),
 .k		= _SUNXI_CCU_MULT_MIN(4, 2, 2),
@@ -376,6 +381,7 @@
 { .val = 1, .div = 2 },
 { .val = 2, .div = 4 },
+{ /* Sentinel */ },
};
static const char * const ths_parents[] = { "osc24M" };
static struct ccu_div ths_clk = {
@@ -560,7 +566,7 @@
 static const u8 dsi_dphy_table[] = { 0, 2, };
 static SUNXI_CCU_M_WITH_MUX_TABLE_GATE(dsi_dphy_clk, "dsi-dphy", dsi_dphy_parents, dsi_dphy_table,
- 0x168, 0, 4, 8, 2, BIT(31), CLK_SET_RATE_PARENT);
+ 0x168, 0, 4, 8, 2, BIT(15), CLK_SET_RATE_PARENT);
static SUNXI_CCU_M_WITH_GATE(gpu_clk, "gpu", "pll-gpu",
 0x1a0, 0, 3, BIT(31), CLK_SET_RATE_PARENT);
@@ -879,11 +885,26 @@
 .num_resets= ARRAY_SIZE(sun50i_a64_ccu_resets),
};
+static struct ccu_pll_nb sun50i_a64_pll_cpu_nb = {
+ .common= &pll_cpu_clk.common,
+ /* copy from pll_cpu_clk */
+ .enable= BIT(31),
+ .lock= BIT(28),
+};
+
+static struct ccu_mux_nb sun50i_a64_cpu_nb = {
+  .common = &cpux_clk.common,
+  .cm = &cpux_clk.mux,
+  .delay_us = 1, /* > 8 clock cycles at 24 MHz */
+  .bypass_index = 1, /* index of 24 MHz oscillator */
+};
+
+static int sun50i_a64_ccu_probe(struct platform_device *pdev)
+{
+  struct resource *res;
+  void __iomem *reg;
+  u32 val;
+  int ret;
+
+  res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+  reg = devm_ioremap_resource(&pdev->dev, res);
+  /* Gate then ungate PLL CPU after any rate changes */
+  ccu_pll_notifier_register(&sun50i_a64_pll_cpu_nb);
+  /* Reparent CPU during PLL CPU rate changes */
+  ccu_mux_notifier_register(pll_cpux_clk.common.hw.clk,
+    &sun50i_a64_cpu_nb);
+  return 0;
+
+  return sunxi_ccu_probe(pdev->dev.of_node, reg, &sun50i_a64_ccu_desc);
+
+}
+
+static const struct of_device_id sun50i_a64_ccu_ids[] = {
+  --- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun6i-a31.c
+  +++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun6i-a31.c
+  @ @ -264,9 +264,9 @@
+  static SUNXI_CCU_GATE(ahb1_mmc2_clk, "ahb1-mmc2", "ahb1",
+    0x060, BIT(10), 0);
+  static SUNXI_CCU_GATE(ahb1_mmc3_clk, "ahb1-mmc3", "ahb1",
+    0x060, BIT(12), 0);
+  static SUNXI_CCU_GATE(ahb1_nand1_clk, "ahb1-nand1", "ahb1",
+    0x060, BIT(13), 0);
+};
static SUNXI_CCU_GATE(ahb1_nand0_clk,"ahb1-nand0","ahb1", 0x060, BIT(13), 0);
static SUNXI_CCU_GATE(ahb1_s dram_clk,"ahb1-sdram","ahb1", @ @ -762,7 +762,7 @ @ .features= CCU_FEATURE_FIXED_PREDIV,.hw.init= CLK_HW_INIT_PARENTS("out-a",   clk_out_parents, -   &ccu_div_ops, +   &ccu_mp_ops, 0),}, @ @ -783,7 +783,7 @ @ .features= CCU_FEATURE_FIXED_PREDIV,.hw.init= CLK_HW_INIT_PARENTS("out-b",  clk_out_parents, -   &ccu_div_ops, +   &ccu_mp_ops, 0),}, @ @ -804,7 +804,7 @ @ .features= CCU_FEATURE_FIXED_PREDIV,.hw.init= CLK_HW_INIT_PARENTS("out-c",   clk_out_parents, -   &ccu_div_ops, +   &ccu_mp_ops, 0),}, --- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun8i-a23.c +++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun8i-a23.c @@ -144,7 +144,7 @@ 8, 4,/* N */ 4, 2,/* K */ 0, 4,/* M */ - BIT(31),/* gate */ + BIT(31) | BIT(23) | BIT(22), /* gate */ BIT(28),/* lock */ CLK_SET_RATE_UNGATE);

--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun8i-a33.c +++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun8i-a33.c @@ -366,10 +366,10 @@
static const char * const i2s_parents[] = { "pll-audio-8x", "pll-audio-4x", "pll-audio-2x", "pll-audio" };
static SUNXI_CCU_MUX_WITH_GATE(i2s0_clk, "i2s0", i2s_parents, -0x0b0, 16, 2, BIT(31), 0);
static SUNXI_CCU_MUX_WITH_GATE(i2s1_clk, "i2s1", i2s_parents,
-    0xb4, 16, 2, BIT(31), CLK_SET_RATE_PARENT);
+
static SUNXI_CCU_MUX_WITH_GATE(i2s1_clk, "i2s1", i2s_parents,
-    0xb4, 16, 2, BIT(31), CLK_SET_RATE_PARENT);
+
static SUNXI_CCU_GATE(usb_phy0_clk, "usb-phy0", "osc24M",
    @ @ -446.7 +446.7 @@
static SUNXI_CCU_GATE(acDig_clk, "ac-dig", "pll-audio",
    0x140, BIT(31), CLK_SET_RATE_PARENT);
static SUNXI_CCU_GATE(acDig_4x_clk, "ac-dig-4x", "pll-audio-4x",
-    0x140, BIT(30), 0);
+
static SUNXI_CCU_GATE(acDig_4x_clk, "ac-dig-4x", "pll-audio-4x",
-    0x140, BIT(30), 0);
+
static SUNXI_CCU_GATE(avs_clk, "avs", "osc24M",
    0x144, BIT(31), 0);

--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun8i-a83t.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun8i-a83t.c
@@ -493,8 +493,8 @@
    static const char * const tcon1_parents[ ] = { "pll-video1" };
-static SUNXI_CCU_MUX_WITH_GATE(tcon1_clk, "tcon1", tcon1_parents,
-    0x11c, 24, 3, BIT(31), CLK_SET_RATE_PARENT);
+static SUNXI_CCU_MUX_WITH_GATE(tcon1_clk, "tcon1", tcon1_parents,
+    0x11c, 0, 4, 24, 2, BIT(31), CLK_SET_RATE_PARENT);

static SUNXI_CCU_GATE(csi_mclk_clk, "csi-mclk", "osc24M", 0x130, BIT(16), 0);

--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun8i-h3.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun8i-h3.c
@@ -327,6 +327,7 @@
    
-    }
-    ];
+    ];
    }
    ];
    [+ /* Sentinel */ ,
    ];

static SUNXI_CCU_DIV_TABLE_WITH_GATE(ths_clk, "ths", "osc24M",
    0x074, 0, 2, ths_div_table, BIT(31), 0);
@@ -472,7 +473,7 @@
static SUNXI_CCU_M_WITH_MUX_GATE(csi_sclk_clk, "csi-sclk", csi_sclk_parents,
-    0x134, 16, 3, BIT(31), 0);
+    0x134, 16, 4, 24, 3, BIT(31), 0);

-    static const char * const csi_mclk_parents[ ] = { "osc24M", "pll-video", "pll-periph0" };
+    static const char * const csi_mclk_parents[ ] = { "osc24M", "pll-video", "pll-periph1" };

---
--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun8i-v3s.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun8i-v3s.c
@@ -84,7 +84,7 @
  BIT(28),/* lock */
  0);

-static SUNXI_CCU_NKM_WITH_GATE_LOCK(pll_ddr_clk, "pll-ddr",
+static SUNXI_CCU_NKM_WITH_GATE_LOCK(pll_ddr0_clk, "pll-ddr0",
   "osc24M", 0x020,
   8, /* N */
   4, 2,/* K */
@@ -123,6 +123,14 @
   2,/* post-div */
   0);

+static SUNXI_CCU_NM_WITH_GATE_LOCK(pll_ddr1_clk, "pll-ddr1",
+   "osc24M", 0x04c,
+   8, 7,/* N */
+   0, 2,/* M */
+   BIT(31),/* gate */
+   BIT(28),/* lock */
+   0);
+   
+   static const char * const cpu_parents[] = { "osc32k", "osc24M",
+      "pll-cpu", "pll-cpu" };
 static SUNXI_CCU_MUX(cpu_clk, "cpu", cpu_parents,
@@ -310,7 +318,8 @
 static SUNXI_CCU_GATE(usb_ohci0_clk,"usb-ohci0","osc24M",
   0x0cc, BIT(16), 0);

-static const char * const dram_parents[] = { "pll-ddr", "pll-periph0-2x" };
+static const char * const dram_parents[] = { "pll-ddr0", "pll-ddr1",
+      "pll-periph0-2x" };
 static SUNXI_CCU_M_WITH_MUX(dram_clk, "dram", dram_parents,
   0x0f4, 0, 4, 20, 2, CLK_IS_CRITICAL);

@@ -369,10 +378,11 @@
 &pll_audio_base_clk.common,
 &pll_video_clk.common,
 &pll_ve_clk.common,
@@ -310,7 +318,8 @
 static SUNXI_CCU_GATE(usb_ohci0_clk,"usb-ohci0","osc24M",
   0x0cc, BIT(16), 0);

-static const char * const dram_parents[] = { "pll-ddr", "pll-periph0-2x" };
+static const char * const dram_parents[] = { "pll-ddr0", "pll-ddr1",
+      "pll-periph0-2x" };
 static SUNXI_CCU_M_WITH_MUX(dram_clk, "dram", dram_parents,
   0x0f4, 0, 4, 20, 2, CLK_IS_CRITICAL);
&axi_clk.common,
&ahb1_clk.common,
@@ -457,11 +467,12 @@
[CLK_PLL_AUDIO_8X]= &pll_audio_8x_clk.hw,
[CLK_PLL_VIDEO]= &pll_video_clk.common.hw,
[CLK_PLL_VE]= &pll_ve_clk.common.hw,
-[CLK_PLL_DDR]= &pll_ddr_clk.common.hw,
+[CLK_PLL_DDR]= &pll_ddr0_clk.common.hw,
[CLK_PLL_PERIPH0]= &pll_periph0_clk.common.hw,
[CLK_PLL_PERIPH0_2X]= &pll_periph0_2x_clk.hw,
[CLK_PLL_ISP]= &pll_isp_clk.common.hw,
[CLK_PLL_PERIPH1]= &pll_periph1_clk.common.hw,
+[CLK_PLL_DDR1]= &pll_ddr1_clk.common.hw,
[CLK_CPU]= &cpu_clk.common.hw,
[CLK_AXI]= &axi_clk.common.hw,
[CLK_AHB1]= &ahb1_clk.common.hw,
@@ -499,6 +510,9 @@
[CLK_MMC1]= &mmc1_clk.common.hw,
[CLK_MMC1_SAMPLE]= &mmc1_sample_clk.common.hw,
[CLK_MMC1_OUTPUT]= &mmc1_output_clk.common.hw,
+[CLK_MMC2]= &mmc2_clk.common.hw,
+[CLK_MMC2_SAMPLE]= &mmc2_sample_clk.common.hw,
+[CLK_MMC2_OUTPUT]= &mmc2_output_clk.common.hw,
[CLK_CE]= &ce_clk.common.hw,
[CLK_SPI0]= &spi0_clk.common.hw,
[CLK_USB_PHY0]= &usb_phy0_clk.common.hw,
@@ -542,7 +556,7 @@
[RST_BUS_OHCI0]= { 0x2c0, BIT(29) },

[RST_BUS_VE]= { 0x2c4, BIT(0) },
-[RST_BUS_TCON0]= { 0x2c4, BIT(3) },
+[RST_BUS_TCON0]= { 0x2c4, BIT(4) },
[RST_BUS_CSI]= { 0x2c4, BIT(8) },
[RST_BUS_DE]= { 0x2c4, BIT(12) },
[RST_BUS_DBG]= { 0x2c4, BIT(31) },
--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun8i-v3s.h
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun8i-v3s.h
@@ -29,7 +29,7 @@
#define CLK_PLL_AUDIO_8X5
#define CLK_PLL_VIDEO6
#define CLK_PLL_VE7
-#define CLK_PLL_DDR8
+#define CLK_PLL_DDR8
+#define CLK_PLL_PERIPH09
#define CLK_PLL_PERIPH0_2X10
#define CLK_PLL_ISP11
@@ -58,6 +58,8 @@
/* And the GPU module clock is exported */

-#define CLK_NUMBER(CLK_MII_P + 1)
+ #=>define CLK_PLL_DDR1 74
+
+ #=>define CLK_NUMBER(CLK_PLL_DDR1 + 1)

#endif /* _CCU_SUN8I_H3_H */
--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu-sun9i-a80.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu-sun9i-a80.c
@@ -1231,7 +1231,7 @@
 /* Enforce d1 = 0, d2 = 0 for Audio PLL */
 val = readl(reg + SUN9I_A80_PLL_AUDIO_REG);
- val &= (BIT(16) & BIT(18));
+ val &= ~(BIT(16) | BIT(18));
 writel(val, reg + SUN9I_A80_PLL_AUDIO_REG);

 /* Enforce P = 1 for both CPU cluster PLLs */
--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu_div.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu_div.c
@@ -71,7 +71,7 @@
 parent_rate);

 val = divider_recalc_rate(hw, parent_rate, val, cd->div.table,
- cd->div.flags);
+ cd->div.flags, cd->div.width);

 if (cd->common.features & CCU_FEATURE_FIXED_POSTDIV)
 val /= cd->fixed_post_div;
--- linux-4.15.0.orig/drivers/clk/sunxi-ng/ccu_nm.c
+++ linux-4.15.0/drivers/clk/sunxi-ng/ccu_nm.c
@@ -19,6 +19,17 @@
 unsigned long	m, min_m, max_m;
};

+static unsigned long ccu_nm_calc_rate(unsigned long parent,
+ unsigned long n, unsigned long m)
+{
+ u64 rate = parent;
+ rate *= n;
+ do_div(rate, m);
+ return rate;
+}
+static void ccu_nm_find_best(unsigned long parent,
struct _ccu_nm *nm)
{
			unsigned long tmp_rate = parent * _n / _m;
+unsigned long tmp_rate = ccu_nm_calc_rate(parent, + _n, _m);

if (tmp_rate > rate)
continue;
@@ -98,7 +110,7 @@
return rate;
}

-return parent_rate * n / m;
+return ccu_nm_calc_rate(parent_rate, n, m);
}

static long ccu_nm_round_rate(struct clk_hw *hw, unsigned long rate,
@@ -120,7 +132,7 @@
cuu_nm_find_best(*parent_rate, rate, &_nm);

-return *parent_rate * _nm.n / _nm.m;
+return ccu_nm_calc_rate(*parent_rate, _nm.n, _nm.m);
}

static int ccu_nm_set_rate(struct clk_hw *hw, unsigned long rate,
--- linux-4.15.0.orig/drivers/clk/sunxi/clk-sunxi.c
+++ linux-4.15.0/drivers/clk/sunxi/clk-sunxi.c
@@ -98,7 +98,7 @@
/* Round down the frequency to the closest multiple of either
  * 6 or 16
 */
-u32 round_freq_6 = round_down(freq_mhz, 6);
+u32 round_freq_6 = rounddown(freq_mhz, 6);
u32 round_freq_16 = round_down(freq_mhz, 16);

if (round_freq_6 > round_freq_16)
--- linux-4.15.0.orig/drivers/clk/tegra/clk-bpmp.c
+++ linux-4.15.0/drivers/clk/tegra/clk-bpmp.c
@@ -586,9 +586,15 @@
unsigned int id = clkspec->args[0], i;
struct tegra_bpmp *bpmp = data;

-for (i = 0; i < bpmp->num_clocks; i++)
if (bpmp->clocks[i]->id == id)
return &bpmp->clocks[i]->hw;

for (i = 0; i < bpmp->num_clocks; i++) {
  struct tegra_bpmp_clk *clk = bpmp->clocks[i];
  
  if (!clk)
    continue;
  
  if (clk->id == id)
    return &clk->hw;
}

return NULL;

--- linux-4.15.0.orig/drivers/clk/tegra/clk-emc.c
+++ linux-4.15.0/drivers/clk/tegra/clk-emc.c
@@ -515,7 +515,7 @@
        init.flags = 0;
        init.flags = CLK_IS_CRITICAL;
      init.parent_names = emc_parent_clk_names;
--inum_parents = ARRAY_SIZE(emc_parent_clk_names);

--- linux-4.15.0.orig/drivers/clk/tegra/clk-id.h
+++ linux-4.15.0/drivers/clk/tegra/clk-id.h
@@ -235,6 +235,7 @@
    tegra_clk_sdmmc4_8,
    tegra_clk_sdmmc4_9,
    tegra_clk_se,
+    tegra_clk_se_10,
    tegra_clk_soc_therm,
    tegra_clk_soc_therm_8,
    tegra_clk_sor0,
--- linux-4.15.0.orig/drivers/clk/tegra/clk-pll.c
+++ linux-4.15.0/drivers/clk/tegra/clk-pll.c
@@ -662,8 +662,8 @@
          val &= ~((divm_mask(pll) << div_nmp->override_divm_shift) |
                    (divn_mask(pll) << div_nmp->override_divn_shift));
          val |= (cfg->m << div_nmp->override_divm_shift) |
               (cfg->n << div_nmp->override_divn_shift);
          pll_override_writel(val, params->pme_divp_reg, pll);

          val = pll_override_readl(params->pme_divnm_reg, pll);
          -val &= ~(divm_mask(pll) << div_nmp->override_divm_shift) |
          ~(~(divm_mask(pll) << div_nmp->override_divm_shift));
          +val &= ~(divm_mask(pll) << div_nmp->override_divm_shift) |
          +(divm_mask(pll) << div_nmp->override_divm_shift));
          val |= (cfg->m << div_nmp->override_divm_shift) |
               (cfg->n << div_nmp->override_divn_shift);
          pll_override_writel(val, params->pme_divnm_reg, pll);
if (pll->lock)
spin_lock_irqsave(pll->lock, flags);

_clk_pll_enable(hw);
if (!clk_pll_is_enabled(hw))
	_clk_pll_enable(hw);
ret = clk_pll_wait_for_lock(pll);
if (ret < 0)
	@ @ -1151,6 +1152,8 @@
.enable = clk_pllu_enable,
.disable = clk_pll_disable,
.recalc_rate = clk_pll_recalc_rate,
+round_rate = clk_pll_round_rate,
+set_rate = clk_pll_set_rate,
};

static int _pll_fixed_mdiv(struct tegra_clk_pll_params *pll_params,
@@ -1706,7 +1709,8 @@
if (pll->lock)
spin_lock_irqsave(pll->lock, flags);

_clk_pll_enable(hw);
+if (!clk_pll_is_enabled(hw))
+clk_pll_enable(hw);
ret = clk_pll_wait_for_lock(pll);
if (ret < 0)
--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra-periph.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra-periph.c
@@ -659,7 +659,7 @@
INT8("host1x", mux_pll_perclk2_c_c3_pll_perclk_sc_perclk, CLK_SOURCE_HOST1X, 28, 0, tegra_clk_host1x_8),
INT8("host1x", mux_pll_perclk4_out1_pll_perclk4_out2_pll_perclk_perclk4_out0, CLK_SOURCE_HOST1X, 28, 0,
tegra_clk_host1x_9),
INT8("se", mux_pll_perclk2_c_c3_pll_perclk_perclk, CLK_SOURCE_SE, 127, TEGRA_PERIPH_ON_APB,
tegra_clk_se),
-INT8("se", mux_pll_perclk2_c_c3_pll_perclk_perclk, CLK_SOURCE_SE, 127, TEGRA_PERIPH_ON_APB, tegra_clk_se),
+INT8("se", mux_pll_perclk2_c_c3_pll_perclk_perclk, CLK_SOURCE_SE, 127, TEGRA_PERIPH_ON_APB,
tegra_clk_se_10),
INT8("2d", mux_pll_perclk2_c_c3_pll_perclk_sc_perclk, CLK_SOURCE_2D, 21, 0, tegra_clk_gr2d_8),
INT8("3d", mux_pll_perclk2_c_c3_pll_perclk_sc_perclk, CLK_SOURCE_3D, 24, 0, tegra_clk_gr3d_8),
INT8("vic03", mux_pll_perclk2_c_c3_pll_perclk_perclk, CLK_SOURCE_VIC03, 178, 0, tegra_clk_vic03),
@@ -810,7 +810,11 @@
GATE("ahbdma", "hclk", 33, 0, tegra_clk_ahbdma, 0),
GATE("apbdma", "pclk", 34, 0, tegra_clk_apbdma, 0),
GATE("kbc", "clk_32k", 36, TEGRA_PERIPH_ON_APB | TEGRA_PERIPH_NO_RESET, tegra_clk_kbc, 0),
-GATE("fuse", "clk_m", 39, TEGRA_PERIPH_ON_APB, tegra_clkFuse, 0),
+/*
+ * Critical for RAM re-repair operation, which must occur on resume
+ * from LP1 system suspend and as part of CCPLEX cluster switching.
+ */
+GATE("fuse", "clk_m", 39, TEGRA_PERIPH_ON_APB, tegra_clkFuse, CLK_IS_CRITICAL),
GATE("fuse_burn", "clk_m", 39, TEGRA_PERIPH_ON_APB, tegra_clkFuse_burn, 0),
GATE("kfuse", "clk_m", 40, TEGRA_PERIPH_ON_APB, tegra_clkKfuse, 0),
GATE("apbif", "clk_m", 107, TEGRA_PERIPH_ON_APB, tegra_clkApbif, 0),
    @ @ -830.7 +834.7 @ @
GATE("xusb_host", "xusb_host_src", 89, 0, tegra_clkXusb_host, 0),
GATE("xusb_ss", "xusb_ss_src", 156, 0, tegra_clkXusb_ss, 0),
GATE("xusb_dev", "xusb_dev_src", 95, 0, tegra_clkXusb_dev, 0),
-GATE("emc", "emc_mux", 57, 0, tegra_clkEmc, CLK_IGNORE_UNUSED),
+GATE("emc", "emc_mux", 57, 0, tegra_clkEmc, CLK_IS_CRITICAL),
GATE("sata_cold", "clk_m", 129, TEGRA_PERIPH_ON_APB, tegra_clkSata_cold, 0),
GATE("ispa", "isp", 23, 0, tegra_clksIspa, 0),
GATE("ispb", "isp", 3, 0, tegra_clksIspb, 0),
--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra-pmc.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra-pmc.c
@@ -60,16 +60,16 @@
static DEFINE_SPINLOCK(clk_out_lock);

-static const char *clk_out1_parents[] = { "clk_m", "clk_m_div2",
-"clk_m_div4", "extern1",
+static const char *clk_out1_parents[] = { "osc", "osc_div2",
+"osc_div4", "extern1",
 };

-static const char *clk_out2_parents[] = { "clk_m", "clk_m_div2",
-"clk_m_div4", "extern2",
+static const char *clk_out2_parents[] = { "osc", "osc_div2",
+"osc_div4", "extern2",
 };

-static const char *clk_out3_parents[] = { "clk_m", "clk_m_div2",
-"clk_m_div4", "extern3",
+static const char *clk_out3_parents[] = { "osc", "osc_div2",
+"osc_div4", "extern3",
 };

static struct pmc_clk_init_data pmc_clks[] = {
--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra-super-gen4.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra-super-gen4.c
@@ -125,7 +125,8 @@
/* SCLK */
dt_clk = tegra_lookup_dt_id(tegra_clkSclk, tegra_clks);
if (dt_clk) {
/* SCLK */

-clk = clk_register_divider(NULL, "sclk", "sclk_mux", 0,
+clk = clk_register_divider(NULL, "sclk", "sclk_mux",
+CLK_IS_CRITICAL,
clk_base + SCLK_DIVIDER, 0, 8,
0, &sysrate_lock);
*dt_clk = clk;
@@ -137,7 +138,8 @@
clk = tegra_clk_register_super_mux("sclk",
gen_info->sclk_parents,
gen_info->num_sclk_parents,
-CLK_SET_RATE_PARENT,
+CLK_SET_RATE_PARENT | CLK_IS_CRITICAL,
clk_base + SCLK_BURST_POLICY,
0, 4, 0, 0, NULL);
*dt_clk = clk;
@@ -151,7 +153,7 @@
clk_base + SYSTEM_CLK_RATE, 4, 2, 0,
&sysrate_lock);
clk = clk_register_gate(NULL, "hclk", "hclk_div",
-CLK_SET_RATE_PARENT | CLK_IGNORE_UNUSED,
+CLK_SET_RATE_PARENT | CLK_IS_CRITICAL,
clk_base + SYSTEM_CLK_RATE,
7, CLK_GATE_SET_TO_DISABLE, &sysrate_lock);
*dt_clk = clk;
--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra114.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra114.c
@@ -955,8 +955,7 @@
/* PLLM */
clk = tegra_clk_register_pllml("pll_m", "pll_ref", clk_base, pmc,
-CLK_IGNORE_UNUSED | CLK_SET_RATE_GATE,
-\&pll_m_params, NULL);
+CLK_SET_RATE_GATE, \&pll_m_params, NULL);
clks[TEGRA114_CLK_PLL_M] = clk;

/* PLLM_OUT1 */
--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra124-dfll-fcpu.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra124-dfll-fcpu.c
@@ -133,9 +133,11 @@
struct tegra_dfll_soc_data *soc;

soc = tegra_dfll_unregister(pdev);
-if (IS_ERR(soc))
+if (IS_ERR(soc)) {
    dev_err(&pdev->dev, "failed to unregister DFLL: %ld\n",
    PTR_ERR(soc));
+return PTR_ERR(soc);
tegra_cvb_remove_opp_table(soc->dev, soc->cvb, soc->max_freq);

--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra124.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra124.c
@@ -1089,8 +1089,7 @@
/* PLLM */
 clk = tegra_clk_register_pll("pll_m", "pll_ref", clk_base, pmc,
   - CLK_IGNORE_UNUSED | CLK_SET_RATE_GATE,
   - &pll_m_params, NULL);
+   CLK_SET_RATE_GATE, &pll_m_params, NULL);
 clk_register_clkdev(clk, "pll_m", NULL);
 clks[TEGRA124_CLK_PLL_M] = clk;

@@ -1099,7 +1098,7 @@
 clk_base + PLLM_OUT, 0, TEGRA_DIVIDER_ROUND_UP,
 8, 8, 1, NULL);
 clk = tegra_clk_register_pll_out("pll_m_out1", "pll_m_out1_div",
- clk_base + PLLM_OUT, 1, 0, CLK_IGNORE_UNUSED |
+ clk_base + PLLM_OUT, 1, 0,
   CLK_SET_RATE_PARENT, 0, NULL);
 clk_register_clkdev(clk, "pll_m_out1", NULL);
 clks[TEGRA124_CLK_PLL_M_OUT1] = clk;
@@ -1272,7 +1271,7 @@
 { TEGRA124_CLK_HOST1X, TEGRA124_CLK_PLL_P, 136000000, 1 },
 { TEGRA124_CLK_DSIALP, TEGRA124_CLK_PLL_P, 68000000, 0 },
 { TEGRA124_CLK_DSIIBLP, TEGRA124_CLK_PLL_P, 68000000, 0 },
-{ TEGRA124_CLK_SCLK, TEGRA124_CLK_PLL_P_OUT2, 102000000, 1 },
+{ TEGRA124_CLK_SCLK, TEGRA124_CLK_PLL_P_OUT2, 102000000, 0 },
 { TEGRA124_CLK_DFLL_SOC, TEGRA124_CLK_PLL_P, 51000000, 1 },
 { TEGRA124_CLK_DFLL_REF, TEGRA124_CLK_PLL_P, 51000000, 1 },
 { TEGRA124_CLK_PLL_C, TEGRA124_CLK_CLK_MAX, 768000000, 0 },
--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra20.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra20.c
@@ -651,8 +651,7 @@
 { TEGRA20_CLK_SCLK, TEGRA20_CLK_PLL_P, 136000000, 1 },
 { TEGRA20_CLK_DSIALP, TEGRA20_CLK_PLL_P, 68000000, 0 },
 { TEGRA20_CLK_DSIIBLP, TEGRA20_CLK_PLL_P, 68000000, 0 },
-{ TEGRA20_CLK_SCLK, TEGRA20_CLK_PLL_P_OUT2, 102000000, 1 },
+{ TEGRA20_CLK_SCLK, TEGRA20_CLK_PLL_P_OUT2, 102000000, 0 },
 { TEGRA20_CLK_DFLL_SOC, TEGRA20_CLK_PLL_P, 51000000, 1 },
 { TEGRA20_CLK_DFLL_REF, TEGRA20_CLK_PLL_P, 51000000, 1 },
 { TEGRA20_CLK_PLL_C, TEGRA20_CLK_CLK_MAX, 768000000, 0 },

/* PLLM */
 clk = tegra_clk_register_pll("pll_m", "pll_ref", clk_base, NULL,
 - CLK_IGNORE_UNUSED | CLK_SET_RATE_GATE,
 - &pll_m_params, NULL);
+ CLK_SET_RATE_GATE, &pll_m_params, NULL);
 clks[TEGRA20_CLK_PLL_M] = clk;

/* PLLM_OUT1 */
@@ -660,7 +659,7 @@
 clk_base + PLLM_OUT, 0, TEGRA_DIVIDER_ROUND_UP,
8, 8, 1, NULL); 
clk = tegra_clk_register_pll_out("pll_m_out1", "pll_m_out1_div", 
-clk_base + PLLM_OUT, 1, 0, CLK_IGNORE_UNUSED | 
+clk_base + PLLM_OUT, 1, 0, 
CLK_SET_RATE_PARENT, 0, NULL);
clks[TEGRA20_CLK_PLL_M_OUT1] = clk;

@@ -723,7 +722,8 @@
/* SCLK */
clk = tegra_clk_register_super_mux("sclk", sclk_parents, 
- ARRAY_SIZE(sclk_parents), CLK_SET_RATE_PARENT, 
+ ARRAY_SIZE(sclk_parents), 
+ CLK_SET_RATE_PARENT | CLK_IS_CRITICAL, 
    clk_base + SCLK_BURST_POLICY, 0, 4, 0, 0, NULL);
clks[TEGRA20_CLK_SCLK] = clk;

@@ -796,6 +796,31 @@
TEGRA_INIT_DATA_NODIV("disp2",mux_pllpmc_clkm,CLK_SOURCE_DISP2, 30, 2, 26, 0, 
TEGRA20_CLK_DISP2),
};

+static void __init tegra20_emc_clk_init(void)
+{
+struct clk *clk;
+
+clk = clk_register_mux(NULL, "emc_mux", mux_pllpmc_clkm, 
+ ARRAY_SIZE(mux_pllpmc_clkm), 
+ CLK_SET_RATE_NO_REPARENT, 
+ clk_base + CLK_SOURCE_EMC, 
+ 30, 2, 0, &emc_lock);
+
+clk = tegra_clk_register_mc("mc", "emc_mux", clk_base + CLK_SOURCE_EMC, 
+ &emc_lock);
+clks[TEGRA20_CLK_MC] = clk;
+
+/*
+ * Note that 'emc_mux' source and 'emc' rate shouldn't be changed at 
+ * the same time due to a HW bug, this won't happen because we're 
+ * defining 'emc_mux' and 'emc' as distinct clocks.
+ */
+clk = tegra_clk_register_divider("emc", "emc_mux", 
+clk_base + CLK_SOURCE_EMC, CLK_IS_CRITICAL, 
+TEGRA_DIVIDER_INT, 0, 8, 1, &emc_lock);
+clks[TEGRA20_CLK_EMC] = clk;
+
+static void __init tegra20_periph_clk_init(void)
struct tegra_periph_init_data *data;
clks[TEGRA20_CLK_AC97] = clk;

/* emc */
-clk = clk_register_mux(NULL, "emc_mux", mux_pllmc_clkm,
 - ARRAY_SIZE(mux_pllmc_clkm),
 - clk_base + CLK_SOURCE_EM,
 - 30, 2, 0, &emc_lock);
-clk = tegra_clk_register_periph_gate("emc", "emc_mux", 0, clk_base, 0,
 - 57, periph_clk_enb_refcnt);
-clks[TEGRA20_CLK_EM] = clk;
-
-clk = tegra_clk_register_mc("mc", "emc_mux", clk_base + CLK_SOURCE_EM,
 - &emc_lock);
-clks[TEGRA20_CLK_MC] = clk;
+tegra20_emc_clk_init();

/* dsi */
clk = tegra_clk_register_periph_gate("dsi", "pll_d", 0, clk_base, 0,
@@ -1019,13 +1033,12 @@
{ TEGRA20_CLK_PLL_P_OUT2, TEGRA20_CLK_CLK_MAX, 48000000, 1 },
{ TEGRA20_CLK_PLL_P_OUT3, TEGRA20_CLK_CLK_MAX, 72000000, 1 },
{ TEGRA20_CLK_PLL_P_OUT4, TEGRA20_CLK_CLK_MAX, 24000000, 1 },
-{ TEGRA20_CLK_PLL_C, TEGRA20_CLK_CLK_MAX, 60000000, 1 },
-{ TEGRA20_CLK_PLL_C_OUT1, TEGRA20_CLK_CLK_MAX, 21600000, 1 },
-{ TEGRA20_CLK_SCLK, TEGRA20_CLK_PLL_C_OUT1, 0, 1 },
-{ TEGRA20_CLK_HCLK, TEGRA20_CLK_CLK_MAX, 0, 1 },
-{ TEGRA20_CLK_PCLK, TEGRA20_CLK_CLK_MAX, 60000000, 1 },
+{ TEGRA20_CLK_PLL_C, TEGRA20_CLK_CLK_MAX, 60000000, 0 },
+{ TEGRA20_CLK_PLL_C_OUT1, TEGRA20_CLK_CLK_MAX, 21600000, 0 },
+{ TEGRA20_CLK_SCLK, TEGRA20_CLK_PLL_C_OUT1, 0, 0 },
+{ TEGRA20_CLK_HCLK, TEGRA20_CLK_CLK_MAX, 0, 0 },
+{ TEGRA20_CLK_PCLK, TEGRA20_CLK_CLK_MAX, 60000000, 0 },
{ TEGRA20_CLK_CSITE, TEGRA20_CLK_CLK_MAX, 0, 1 },
-{ TEGRA20_CLK_EM, TEGRA20_CLK_CLK_MAX, 0, 1 },
{ TEGRA20_CLK_CCLK, TEGRA20_CLK_CLK_MAX, 0, 1 },
{ TEGRA20_CLK_UARTA, TEGRA20_CLK_PLL_P, 0, 0 },
{ TEGRA20_CLK_UARTB, TEGRA20_CLK_PLL_P, 0, 0 },
--- linux-4.15.0.orig/drivers/clk/tegra/clk-tegra210.c
+++ linux-4.15.0/drivers/clk/tegra/clk-tegra210.c
@@ -2059,9 +2059,9 @@
};

static struct tegra_clk_pll_freq_table pll_u_freq_table[] = {
-12000000, 480000000, 40, 1, 0, 0 },
- { 13000000, 480000000, 36, 1, 0, 0 }, /* actual: 468.0 MHz */
- { 38400000, 480000000, 25, 2, 0, 0 },
+ { 12000000, 480000000, 40, 1, 1, 0 },
+ { 13000000, 480000000, 36, 1, 1, 0 }, /* actual: 468.0 MHz */
+ { 38400000, 480000000, 25, 2, 1, 0 },
  
static const char *pll_e_parents[] = { "pll_ref", "pll_p" };
/* PLLM */
clk = tegra_clk_register_pll("pll_m", "pll_ref", clk_base, pmc_base,
    - CLK_IGNORE_UNUSED | CLK_SET_RATE_GATE,
    - &pll_m_params, NULL);
+ CLK_SET_RATE_GATE, &pll_m_params, NULL);
clks[Tegra30_CLK_PLL_M] = clk;

/* PLLM_OUT1 */
clk_base + PLLM_OUT, 0, Tegra30_DIVIDER_ROUND_UP,
8, 8, 1, NULL);
clk = tegra_clk_register_pll_out("pll_m_out1", "pll_m_out1_div",
    -clk_base + PLLM_OUT, 1, 0,CLK_IGNORE_UNUSED |
    + clk_base + PLLM_OUT, 1, 0,
    CLOCK_SET_RATE_PARENT, 0, NULL);
clks[Tegra30_CLK_PLL_M_OUT1] = clk;

/* SCLK */
clk = tegra_clk_register_super_mux("sclk", sclk_parents,
    ARRAY_SIZE(sclk_parents),
    -CLK_SET_RATE_PARENT,
    +CLK_SET_RATE_PARENT | CLK_IS_CRITICAL,
    clk_base + SCLK_BURST_POLICY,
0, 4, 0, 0, NULL);
clks[Tegra30_CLK_SCLK] = clk;

/* MC */
clk = tegra_clk_register_mc("mc", "emc_mux", clk_base + CLK_SOURCE_EMC,
    &emc_lock);

clk = tegra_clk_register_periph_gate("emc", "emc_mux", 0, clk_base, 0,
    -57, periph_clk_enb_refcnt);
clks[Tegra30_CLK_EMC] = clk;

clks[Tegra30_CLK_MSELECT, Tegra30_CLK_CLK_MAX, 0, 1],
{ Tegra30_CLK_SBC2, Tegra30_CLK_PLL_P, 100000000, 0 },
@@ -1272,6 +1266,8 @@
{ Tegra30_CLK_GR3D, Tegra30_CLK_PLL_C, 300000000, 0 },
{ Tegra30_CLK_GR3D2, Tegra30_CLK_PLL_C, 300000000, 0 },
{ Tegra30_CLK_PLL_U, Tegra30_CLK_CLK_MAX, 480000000, 0 },
+{ Tegra30_CLK_HDA, Tegra30_CLK_PLL_P, 102000000, 0 },
+{ Tegra30_CLK_HDA2CODEC_2X, Tegra30_CLK_PLL_P, 48000000, 0 },
/* must be the last entry */
{ Tegra30_CLK_CLK_MAX, Tegra30_CLK_CLK_MAX, 0, 0 },
};
--- linux-4.15.0.orig/drivers/clk/ti/adpll.c
+++ linux-4.15.0/drivers/clk/ti/adpll.c
@@ -193,15 +193,8 @@
if (err)
    return NULL;
}{
-const char *base_name = "adpll";
-char *buf;
-
-buf = devm_kzalloc(d->dev, 8 + 1 + strlen(base_name) + 1 +
-    strlen(postfix), GFP_KERNEL);
-if (!buf)
-    return NULL;
-sprintf(buf, "%08lx.%s.%s", d->pa, base_name, postfix);
-name = buf;
+name = devm_kasprintf(d->dev, GFP_KERNEL, "%08lx.adpll.%s",
+    d->pa, postfix);
}
return name;
--- linux-4.15.0.orig/drivers/clk/ti/clk-dra7-atl.c
+++ linux-4.15.0/drivers/clk/ti/clk-dra7-atl.c
@@ -174,7 +174,6 @@
struct clk_init_data init = { NULL };
const char **parent_names = NULL;
struct clk *clk;
-int ret;

CLK_hw = kzalloc(sizeof(*CLK_hw), GFP_KERNEL);
if (!CLK_hw) {
    @ @ -207,11 +206,6 @ @
    CLK = ti_clk_register(NULL, &CLK_hw->hw, node->name);
}

if (!IS_ERR(CLK)) {
    -ret = ti_clk_add_alias(NULL, CLK, node->name);
    -if (ret) {
        -CLK_unregister(CLK);
        -goto cleanup;
    }
}

return NULL;
of_clk_add_provider(node, of_clk_src_simple_get, clk);
kfree(parent_names);
return;
--- linux-4.15.0.orig/drivers/clk/ti/clkctrl.c
+++ linux-4.15.0/drivers/clk/ti/clkctrl.c
@@ -124,9 +124,6 @@
 int ret;
 union omap4_timeout timeout = { 0 };

-if (!clk->enable_bit)
-  return 0;
-
-if (clk->clkdm) {
  ret = ti_clk_ll_ops->clkdm_clk_enable(clk->clkdm, hw->clk);
  if (ret) {
    @@ -138,6 +135,9 @@
  }
  }

+if (!clk->enable_bit)
+  return 0;
+
+val = ti_clk_ll_ops->clk_readl(&clk->enable_reg);

 val &= ~OMAP4_MODULEMODE_MASK;
 @@ -166,7 +166,7 @@
 union omap4_timeout timeout = { 0 };

 if (!clk->enable_bit)
-  return;
+  goto exit;

 val = ti_clk_ll_ops->clk_readl(&clk->enable_reg);

 @@ -215,6 +215,7 @@
 {
 struct omap_clkctrl_provider *provider = data;
 struct omap_clkctrl_clk *entry;
+bool found = false;

 if (clkspec->args_count != 2)
 return ERR_PTR(-EINVAL);
 @@ -224,11 +225,13 @@

 list_for_each_entry(entry, &provider->clocks, node) {
 if (entry->reg_offset == clkspec->args[0] &&
-  entry->bit_offset == clkspec->args[1])
+  entry->bit_offset == clkspec->args[1])


entry->bit_offset == clkspec->args[1]) {
+found = true;
break;
+
}

-if (!entry)
+if (!found)
return ERR_PTR(-EINVAL);

return entry->clk;
--- linux-4.15.0.orig/drivers/clk/ti/clockdomain.c
+++ linux-4.15.0/drivers/clk/ti/clockdomain.c
@@ -146,10 +146,12 @@
if (clk_hw_get_flags(clk_hw) & CLK_IS_BASIC) {
    pr_warn("can't setup clkdm for basic clk %s\n", __clk_get_name(clk));
+clk_put(clk);
    continue;
}

+clk_put(clk);
}

to_clk_hw_omap(clk_hw)->clkdm_name = clkdm_name;
omap2_init_clk_clkdm(clk_hw);

--- linux-4.15.0.orig/drivers/clk/ti/composite.c
+++ linux-4.15.0/drivers/clk/ti/composite.c
@@ -240,6 +240,7 @@
if (!cclk->comp_clks[i])
    continue;
list_del(&cclk->comp_clks[i]->link);
+kfree(cclk->comp_clks[i]->parent_names);
    kfree(cclk->comp_clks[i]);
}

--- linux-4.15.0.orig/drivers/clk/ti/divider.c
+++ linux-4.15.0/drivers/clk/ti/divider.c
@@ -363,8 +363,10 @@
num_dividers = i;

tmp = kzalloc(sizeof(*tmp) * (valid_div + 1), GFP_KERNEL);
-if (!tmp)
+if (!tmp) {
+*table = ERR_PTR(-ENOMEM);
    return -ENOMEM;
+}
valid_div = 0;
*width = 0;
@@ -399,6 +401,7 @@
{
    struct clk_omap_divider *div;
    struct clk_omap_reg *reg;
    +int ret;

    if (!setup)
        return NULL;
@@ -418,6 +421,12 @@
        div->flags |= CLK_DIVIDER_POWER_OF_TWO;

    div->table = _get_div_table_from_setup(setup, &div->width);
    +if (IS_ERR(div->table)) {
        +ret = PTR_ERR(div->table);
        +kfree(div);
        +return ERR_PTR(ret);
        +}

    div->shift = setup->bit_shift;

    --- linux-4.15.0.orig/drivers/clk/ti/fapll.c
+++ linux-4.15.0/drivers/clk/ti/fapll.c
@@ -497,6 +497,7 @@
{
    struct clk_init_data *init;
    struct fapll_synth *synth;
    +struct clk *clk = ERR_PTR(-ENOMEM);
    init = kzalloc(sizeof(*init), GFP_KERNEL);
    if (!init)
@@ -519,13 +520,19 @@
        synth->hw.init = init;
        synth->clk_pll = pll_clk;
        -return clk_register(NULL, &synth->hw);
        +clk = clk_register(NULL, &synth->hw);
        +if (IS_ERR(clk)) {
        +pr_err("failed to register clock\n");
        +goto free;
        +}
        +return clk;
    free:
    kfree(synth);
kfree(init);

-return ERR_PTR(-ENOMEM);
+return clk;
}

static void __init ti_fapll_setup(struct device_node *node)
--- linux-4.15.0.orig/drivers/clk/uniphier/clk-uniphier-cpugear.c
+++ linux-4.15.0/drivers/clk/uniphier/clk-uniphier-cpugear.c
@@ -47,7 +47,7 @@
    return ret;
 ret = regmap_write_bits(gear->regmap,
 -    gear->regbase + UNIPHIER_CLK_CPUGEAR_SET,
 +    gear->regbase + UNIPHIER_CLK_CPUGEAR_UPD,
    UNIPHIER_CLK_CPUGEAR_UPD_BIT,
    UNIPHIER_CLK_CPUGEAR_UPD_BIT);
    if (ret)
--- linux-4.15.0.orig/drivers/clk/uniphier/clk-uniphier-mux.c
+++ linux-4.15.0/drivers/clk/uniphier/clk-uniphier-mux.c
@@ -40,10 +40,10 @@
 static u8 uniphier_clk_mux_get_parent(struct clk_hw *hw)
 {
    struct uniphier_clk_mux *mux = to_uniphier_clk_mux(hw);
-   int num_parents = clk_hw_get_num_parents(hw);
+   unsigned int num_parents = clk_hw_get_num_parents(hw);
    int ret;
    unsigned int val;
-   u8 i;
+   unsigned int i;

    ret = regmap_read(mux->regmap, mux->reg, &val);
    if (ret)
--- linux-4.15.0.orig/drivers/clk/x86/clk-pmc-atom.c
+++ linux-4.15.0/drivers/clk/x86/clk-pmc-atom.c
@@ -55,6 +55,7 @@
 u8 nparents;
 struct clk_plt *clks[PMC_CLK_NUM];
 struct clk_lookup *mclk_lookup;
+struct clk_lookup *ether_clk_lookup;
    }

 /* Return an index in parent table */
 @@ -164,7 +165,7 @@
 }

 static struct clk_plt *plt_clk_register(struct platform_device *pdev, int id,
 -void __iomem *base,
const struct pmc_clk_data *pmc_data,
const char **parent_names,
int num_parents)
{
@@ -183,14 +184,15 @@
init.num_parents = num_parents;

pclk->hw.init = &init;
-pclk->reg = base + PMC_CLK_CTL_OFFSET + id * PMC_CLK_CTL_SIZE;
+pclk->reg = pmc_data->base + PMC_CLK_CTL_OFFSET + id * PMC_CLK_CTL_SIZE;
spin_lock_init(&pclk->lock);

/*
 - * If the clock was already enabled by the firmware mark it as critical
 - * to avoid it being gated by the clock framework if no driver owns it.
 + * On some systems, the pmc_plt_clocks already enabled by the
 + * firmware are being marked as critical to avoid them being
 + * gated by the clock framework.
 */
-if (plt_clk_is_enabled(&pclk->hw))
+if (pmc_data->critical && plt_clk_is_enabled(&pclk->hw))
init.flags |= CLK_IS_CRITICAL;

ret = devm_clk_hw_register(&pdev->dev, &pclk->hw);
@@ -338,7 +340,7 @@
return PTR_ERR(parent_names);

for (i = 0; i < PMC_CLK_NUM; i++) {
-data->clks[i] = plt_clk_register(pdev, i, pmc_data->base,
+data->clks[i] = plt_clk_register(pdev, i, pmc_data,
    parent_names, data->nparents);
if (IS_ERR(data->clks[i])) {
    err = PTR_ERR(data->clks[i]);
@@ -351,11 +353,20 @@
    goto err_unreg_clk_plt;
 }

+data->ether_clk_lookup = clkdev_hw_create(&data->clks[4]->hw,
 + "ether_clk", NULL);
+if (!data->ether_clk_lookup) {
+    err = -ENOMEM;
+    goto err_drop_mclk;
+}
+plt_clk_free_parent_names_loop(parent_names, data->nparents);

platform_set_drvdata(pdev, data);
return 0;
+err_drop_mclk:
+clkdev_drop(data->mclk_lookup);
err_unreg_clk_plt:
plt_clk_unregister_loop(data, i);
plt_clk_unregister_parents(data);
@@ -369,6 +380,7 @@
data = platform_get_drvdata(pdev);

+clkdev_drop(data->ether_clk_lookup);
clkdev_drop(data->mclk_lookup);
plt_clk_unregister_loop(data, PMC_CLK_NUM);
plt_clk_unregister_parents(data);
--- linux-4.15.0.orig/drivers/clk/zte/clk-zx296718.c
+++ linux-4.15.0/drivers/clk/zte/clk-zx296718.c
@@ -567,6 +567,7 @@
{
void __iomem *reg_base;
int i, ret;
+const char *name;

reg_base = of_iomap(np, 0);
if (!reg_base) {
@@ -576,11 +577,10 @@
for (i = 0; i < ARRAY_SIZE(zx296718_pll_clk); i++) {
zx296718_pll_clk[i].reg_base += (uintptr_t)reg_base;
+name = zx296718_pll_clk[i].hw.init->name;
ret = clk_hw_register(NULL, &zx296718_pll_clk[i].hw);
-if (ret) {
-pr_warn("top clk %s init error!\n",
-zx296718_pll_clk[i].hw.init->name);
-}
+if (ret)
+pr_warn("top clk %s init error!\n", name);
}
for (i = 0; i < ARRAY_SIZE(top_ffactor_clk); i++) {
@@ -588,11 +588,10 @@
top_hw_onecell_data.hws[top_ffactor_clk[i].id] =
 &top_ffactor_clk[i].factor.hw;
+name = top_ffactor_clk[i].factor.hw.init->name;
ret = clk_hw_register(NULL, &top_ffactor_clk[i].factor.hw);
-if (ret) {
-pr_warn("top clk %s init error!\n",
-top_ffactor_clk[i].factor.hw.init->name);
if (ret)
    pr_warn("top clk %s init error!\n", name);
}

for (i = 0; i < ARRAY_SIZE(top_mux_clk); i++) {
    &top_mux_clk[i].mux.hw;

    top_mux_clk[i].mux.reg += (uintptr_t)reg_base;
    +name = top_mux_clk[i].mux.hw.init->name;
    ret = clk_hw_register(NULL, &top_mux_clk[i].mux.hw);
    -if (ret) {
        -pr_warn("top clk %s init error!\n", 
                  -top_mux_clk[i].mux.hw.init->name);
        -}
    +if (ret)
        +pr_warn("top clk %s init error!\n", name);
    }

for (i = 0; i < ARRAY_SIZE(top_gate_clk); i++) {
    &top_gate_clk[i].gate.hw;

    top_gate_clk[i].gate.reg += (uintptr_t)reg_base;
    +name = top_gate_clk[i].gate.hw.init->name;
    ret = clk_hw_register(NULL, &top_gate_clk[i].gate.hw);
    -if (ret) {
        -pr_warn("top clk %s init error!\n", 
                  -top_gate_clk[i].gate.hw.init->name);
        -}
    +if (ret)
        +pr_warn("top clk %s init error!\n", name);
    }

for (i = 0; i < ARRAY_SIZE(top_div_clk); i++) {
    &top_div_clk[i].div.hw;

    top_div_clk[i].div.reg += (uintptr_t)reg_base;
    +name = top_div_clk[i].div.hw.init->name;
    ret = clk_hw_register(NULL, &top_div_clk[i].div.hw);
    -if (ret) {
        -pr_warn("top clk %s init error!\n", 
                  -top_div_clk[i].div.hw.init->name);
        -}
    +if (ret)
        +pr_warn("top clk %s init error!\n", name);
ret = of_clk_add_hw_provider(np, of_clk_hw_onecell_get,
@@ -757,6 +753,7 @@
{
    void __iomem *reg_base;
    int i, ret;
    +const char *name;

    reg_base = of_iomap(np, 0);
    if (!reg_base) {
        @ @ -770,11 +767,10 @@
        &lsp0_mux_clk[i].mux.hw;

        lsp0_mux_clk[i].mux.reg += (uintptr_t)reg_base;
        +name = lsp0_mux_clk[i].mux.hw.init->name;
        ret = clk_hw_register(NULL, &lsp0_mux_clk[i].mux.hw);
    -if (ret) {
        -pr_warn("lsp0 clk %s init error!\n",
         -lsp0_mux_clk[i].mux.hw.init->name);
         -}
        +if (ret)
        +pr_warn("lsp0 clk %s init error!\n", name);
    }
    for (i = 0; i < ARRAY_SIZE(lsp0_gate_clk); i++) {
        @ @ -783,11 +779,10 @@
        &lsp0_gate_clk[i].gate.hw;

        lsp0_gate_clk[i].gate.reg += (uintptr_t)reg_base;
        +name = lsp0_gate_clk[i].gate.hw.init->name;
        ret = clk_hw_register(NULL, &lsp0_gate_clk[i].gate.hw);
    -if (ret) {
        -pr_warn("lsp0 clk %s init error!\n",
         -lsp0_gate_clk[i].gate.hw.init->name);
         -}
        +if (ret)
        +pr_warn("lsp0 clk %s init error!\n", name);
    }
    for (i = 0; i < ARRAY_SIZE(lsp0_div_clk); i++) {
        @ @ -796,11 +791,10 @@
        &lsp0_div_clk[i].div.hw;

        lsp0_div_clk[i].div.reg += (uintptr_t)reg_base;
        +name = lsp0_div_clk[i].div.hw.init->name;
        ret = clk_hw_register(NULL, &lsp0_div_clk[i].div.hw);
    -if (ret) {
        -pr_warn("lsp0 clk %s init error!\n",
         -lsp0_div_clk[i].div.hw.init->name);
        -}
        +if (ret)
        +pr_warn("lsp0 clk %s init error!\n", name);
    }
-pr_warn("lsp0 clk %s init error!\n",
-lsp0_div_clk[i].div.hw.init->name);
-}
+if (ret)
+pr_warn("lsp0 clk %s init error!\n", name);
}

ret = of_clk_add_hw_provider(np, of_clk_hw_onecell_get,
@@ -865,6 +859,7 @@
{
  void __iomem *reg_base;
  int i, ret;
+const char *name;

  reg_base = of_iomap(np, 0);
  if (!reg_base) {
@@ -878,11 +873,10 @@
    &lsp0_mux_clk[i].mux.hw;

    lsp1_mux_clk[i].mux.reg += (uintptr_t)reg_base;
+  name = lsp1_mux_clk[i].mux.hw.init->name;
    ret = clk_hw_register(NULL, &lsp1_mux_clk[i].mux.hw);
    -if (ret) {
      -pr_warn("lsp1 clk %s init error!\n",
-    -lsp1_mux_clk[i].mux.hw.init->name);
    -}
+if (ret)
+  pr_warn("lsp1 clk %s init error!\n", name);
  }
}

for (i = 0; i < ARRAY_SIZE(lsp1_gate_clk); i++) {
@@ -891,11 +885,10 @@
 &lsp1_gate_clk[i].gate.hw;

    lsp1_gate_clk[i].gate.reg += (uintptr_t)reg_base;
+  name = lsp1_gate_clk[i].gate.hw.init->name;
    ret = clk_hw_register(NULL, &lsp1_gate_clk[i].gate.hw);
    -if (ret) {
      -pr_warn("lsp1 clk %s init error!\n",
-    -lsp1_gate_clk[i].gate.hw.init->name);
    -}
+if (ret)
+  pr_warn("lsp1 clk %s init error!\n", name);
  }
}

for (i = 0; i < ARRAY_SIZE(lsp1_div_clk); i++) {
@@ -904,11 +897,10 @@
 &lsp1_div_clk[i].div.hw;

    lsp1_div_clk[i].div.reg += (uintptr_t)reg_base;
+  name = lsp1_div_clk[i].div.hw.init->name;
    ret = clk_hw_register(NULL, &lsp1_div_clk[i].div.hw);
    -if (ret) {
      -pr_warn("lsp1 clk %s init error!\n",
-    -lsp1_div_clk[i].div.hw.init->name);
    -}
+if (ret)
+  pr_warn("lsp1 clk %s init error!\n", name);
  }
}
lsp1_div_clk[i].div.reg += (uintptr_t)reg_base;
+name = lsp1_div_clk[i].div.hw.init->name;
ret = clk_hw_register(NULL, &lsp1_div_clk[i].div.hw);
-if (ret) {
-pr_warn("lsp1 clk %s init error!
",
-lsp1_div_clk[i].div.hw.init->name);
-}
+if (ret)
+pr_warn("lsp1 clk %s init error!
", name);
}

ret = of_clk_add_hw_provider(np, of_clk_hw_onecell_get,
@@ -982,6 +974,7 @@
{
void __iomem *reg_base;
int i, ret;
+const char *name;

reg_base = of_iomap(np, 0);
if (!$reg_base) {
@@ -995,11 +988,10 @@
&audio_mux_clk[i].mux.hw;

audio_mux_clk[i].mux.reg += (uintptr_t)reg_base;
+name = audio_mux_clk[i].mux.hw.init->name;
ret = clk_hw_register(NULL, &audio_mux_clk[i].mux.hw);
-if (ret) {
-pr_warn("audio clk %s init error!
",
-audio_mux_clk[i].mux.hw.init->name);
-}
+if (ret)
+pr_warn("audio clk %s init error!
", name);
}

for (i = 0; i < ARRAY_SIZE(audio_adiv_clk); i++) {
@@ -1008,11 +1000,10 @@
&audio_adiv_clk[i].hw;

audio_adiv_clk[i].reg_base += (uintptr_t)reg_base;
+name = audio_adiv_clk[i].hw.init->name;
ret = clk_hw_register(NULL, &audio_adiv_clk[i].hw);
-if (ret) {
-pr_warn("audio clk %s init error!
",
-audio_adiv_clk[i].hw.init->name);
-}
+if (ret)
+pr_warn("audio clk %s init error!
", name);
for (i = 0; i < ARRAY_SIZE(audio_div_clk); i++) {
    &audio_div_clk[i].div.hw;
    audio_div_clk[i].div.reg += (uintptr_t)reg_base;
    +name = audio_div_clk[i].div.hw.init->name;
    ret = clk_hw_register(NULL, &audio_div_clk[i].div.hw);
    -if (ret) {
        -pr_warn("audio clk %s init error!\n", audio_div_clk[i].div.hw.init->name);
        -}
    +if (ret)
        +pr_warn("audio clk %s init error!\n", name);
}
for (i = 0; i < ARRAY_SIZE(audio_gate_clk); i++) {
    &audio_gate_clk[i].gate.hw;
    audio_gate_clk[i].gate.reg += (uintptr_t)reg_base;
    +name = audio_gate_clk[i].gate.hw.init->name;
    ret = clk_hw_register(NULL, &audio_gate_clk[i].gate.hw);
    -if (ret) {
        -pr_warn("audio clk %s init error!\n", audio_gate_clk[i].gate.hw.init->name);
        -}
    +if (ret)
        +pr_warn("audio clk %s init error!\n", name);
}
ret = of_clk_add_hw_provider(np, of_clk_hw_onecell_get,
--- linux-4.15.0.orig/drivers/clocksource/Kconfig
+++ linux-4.15.0/drivers/clocksource/Kconfig
@@ -278,6 +278,7 @@
    config ARC_TIMERS
    bool "Support for 32-bit TIMERn counters in ARC Cores" if COMPILE_TEST
    +depends on GENERIC_SCHED_CLOCK
    select TIMER_OF
    help
    These are legacy 32-bit TIMER0 and TIMER1 counters found on all ARC cores
    @@ -352,6 +353,16 @@
            The workaround will be dynamically enabled when an affected
            core is detected.
            
+config SUN50I_ERRATUM_UNKNOWN1
+bool "Workaround for Allwinner A64 erratum UNKNOWN1"
+default y
+depends on ARM_ARCH_TIMER && ARM64 && ARCH_SUNXI
+select ARM_ARCH_TIMER_OOL_WORKAROUND
+help
+ This option enables a workaround for instability in the timer on
+ the Allwinner A64 SoC. The workaround will only be active if the
+ allwinner,erratum-unknown1 property is found in the timer node.
+
+ config ARM_GLOBAL_TIMER
bool "Support for the ARM global timer" if COMPILE_TEST
select TIMER_OF if OF
--- linux-4.15.0.orig/drivers/clocksource/arc_timer.c
+++ linux-4.15.0/drivers/clocksource/arc_timer.c
@@ -23,6 +23,7 @@
#include <linux/cpu.h>
#include <linux/of.h>
#include <linux/of_irq.h>
+#include <linux/sched_clock.h>
#include <soc/arc/timers.h>
#include <soc/arc/mcip.h>
@@ -74,6 +75,11 @@
return (((u64)h) << 32) | l;
}

+static notrace u64 arc_gfrc_clock_read(void)
+{
+return arc_read_gfrc(NULL);
+}
+
+ static struct clocksource arc_counter_gfrc = {
+ .name   = "ARConnect GFRC",
+ .rating = 400,
+ @ @ -97,6 +103,8 @@
+ if (ret)
+ return ret;
+
+sched_clock_register(arc_gfrc_clock_read, 64, arc_timer_freq);
+
+ return clocksouce_register_hz(&arc_counter_gfrc, arc_timer_freq);
} 
TIMER_OF_DECLARE(arc_gfrc, "snps.archs-timer-gfrc", arc_cs_setup_gfrc);
@@ -125,6 +133,11 @@
return (((u64)h) << 32) | l;
}

+static notrace u64 arc_rtc_clock_read(void)
+{  
+return arc_read_rtc(NULL);  
+}
+
static struct clocksource arc_counter_rtc = {
    .name   = "ARCv2 RTC",
    .rating = 350,
    @@ -156,6 +169,8 @@
    write_aux_reg(AUX_RTC_CTRL, 1);

    +sched_clock_register(arc_rtc_clock_read, 64, arc_timer_freq);
    +
    return clocksource_register_hz(&arc_counter_rtc, arc_timer_freq);
    }
TEMPER_OF_DECLARE(arc_rtc, "snps,archs-timer-rtc", arc_cs_setup_rtc);
@@ -171,6 +186,11 @@
    return (u64) read_aux_reg(ARC_REG_TIMER1_CNT);
    }

    +static notrace u64 arc_timer1_clock_read(void)
    +{
    +return arc_read_timer1(NULL);
    +}
    +
    static struct clocksource arc_counter_timer1 = {
        .name   = "ARC Timer1",
        .rating = 300,
        @@ -195,6 +215,8 @@
        write_aux_reg(ARC_REG_TIMER1_CNT, 0);
        write_aux_reg(ARC_REG_TIMER1_CTRL, TIMER_CTRL_NH);

        +sched_clock_register(arc_timer1_clock_read, 32, arc_timer_freq);
        +
        return clocksource_register_hz(&arc_counter_timer1, arc_timer_freq);
    }

    --- linux-4.15.0.orig/drivers/clocksource/arm_arch_timer.c
    +++ linux-4.15.0/drivers/clocksource/arm_arch_timer.c
    @@ -319,6 +319,48 @@
    }
    #endif

    +#ifdef CONFIG_SUN50I_ERRATUM_UNKNOWN1
    +/*
    + * The low bits of the counter registers are indeterminate while bit 10 or
    + * greater is rolling over. Since the counter value can jump both backward
    + * (7ff -> 000 -> 800) and forward (7ff -> fff -> 800), ignore register values
    */
    +#endif

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with all ones or all zeros in the low bits. Bound the loop by the maximum
number of CPU cycles in 3 consecutive 24 MHz counter periods.

```
#define __sun50i_a64_read_reg(reg) ({
    u64 _val;
    int _retries = 150;
    do {
        _val = read_sysreg(reg);
        _retries--;
    } while (((_val + 1) & GENMASK(8, 0)) <= 1 && _retries);
    WARN_ON_ONCE(!_retries);
    _val;
})
```

```
static u64 notrace sun50i_a64_read_cntpct_el0(void)
{
    return __sun50i_a64_read_reg(cntpct_el0);
}
```

```
static u64 notrace sun50i_a64_read_cntvct_el0(void)
{
    return __sun50i_a64_read_reg(cntvct_el0);
}
```

```
static u32 notrace sun50i_a64_read_cntp_tval_el0(void)
{
    return read_sysreg(cntp_cval_el0) - sun50i_a64_read_cntpct_el0();
}
```

```
static u32 notrace sun50i_a64_read_cntv_tval_el0(void)
{
    return read_sysreg(cntv_cval_el0) - sun50i_a64_read_cntvct_el0();
}
```

```
```
typedef bool (*ate_match_fn_t)(const struct arch_timer_erratum_workaround *,
@@ -772,15 +827,24 @@
static void arch_timer_configure_evtstream(void)
{
  int evt_stream_div, pos;
  int evt_stream_div, lsb;
  +
  +/*
  +  * As the event stream can at most be generated at half the frequency
  +  * of the counter, use half the frequency when computing the divider.
  +  */
  +evt_stream_div = arch_timer_rate / ARCH_TIMER_EVT_STREAM_FREQ / 2;
  +
  +/*
  +  * Find the closest power of two to the divisor. If the adjacent bit
  +  * of lsb (last set bit, starts from 0) is set, then we use (lsb + 1).
  +  */
  +lsb = fls(evt_stream_div) - 1;
  +if (lsb > 0 && (evt_stream_div & (1 << (lsb - 1))))
  +lsb++;

  /* Find the closest power of two to the divisor */
  -evt_stream_div = arch_timer_rate / ARCH_TIMER_EVT_STREAM_FREQ;
  -pos = fls(evt_stream_div);
  -if (pos > 1 && !(evt_stream_div & (1 << (pos - 2))))
  -pos--;
  /* enable event stream */
  -arch_timer_evtstrm_enable(min(pos, 15));
  +arch_timer_evtstrm_enable(max(0, min(lsb, 15)));
}

static void arch_counter_set_user_access(void)
--- linux-4.15.0.orig/drivers/clocksource/asm9260_timer.c
+++ linux-4.15.0/drivers/clocksource/asm9260_timer.c
@@ -198,6 +198,10 @@

clk = of_clk_get(np, 0);
+if (IS_ERR(clk)) {
+    pr_err("Failed to get clk!
");
+    return PTR_ERR(clk);
+}

ret = clk_prepare_enable(clk);
if (ret) {
    --- linux-4.15.0.orig/drivers/clocksource/bcm2835_timer.c
    +++ linux-4.15.0/drivers/clocksource/bcm2835_timer.c
    @@ -134,7 +134,7 @@
    ret = setup_irq(irq, &timer->act);
    if (ret) {
        pr_err("Can't set up timer IRQ\n");
-            goto err_iounmap;
+            goto err_timer_free;
    }

    clockevents_config_and_register(&timer->evt, freq, 0xf, 0xffffffff);
    @@ -143,6 +143,9 @@
    return 0;

+    err_timer_free:
+    kfree(timer);
+    err_iounmap:
    iounmap(base);
    return ret;
    --- linux-4.15.0.orig/drivers/clocksource/cadence_ttc_timer.c
    +++ linux-4.15.0/drivers/clocksource/cadence_ttc_timer.c
    @@ -419,10 +419,8 @@
    ttcce->ttc.clk = clk;

    err = clk_prepare_enable(ttcce->ttc.clk);
    -if (err) {
-        -kfree(ttcce);
-        -return err;
-    }
+    if (err)
+        goto out_kfree;

    ttcce->ttc.clk_rate_change_nb.notifier_call =
    ttc_rate_change_clockevent_cb;
    @@ -432,7 +430,7 @@
        &ttcce->ttc.clk_rate_change_nb);
    if (err) {
pr_warn("Unable to register clock notifier.\n");
-return err;
+goto out_kfree;
}

ttcce->ttc.freq = clk_get_rate(ttcce->ttc.clk);
@@ -461,15 +459,17 @@
err = request_irq(irq, ttc_clock_event_interrupt,
    IRQF_TIMER, ttcce->ce.name, ttcce);
-if (err) {
-    kfree(ttcce);
-    -return err;
-}
+if (err)
+    goto out_kfree;

clockevents_config_and_register(&ttcce->ce,
    ttcce->ttc.freq / PRESCALE, 1, 0xffff);

return 0;
+
+out_kfree:
+kfree(ttcce);
+return err;
}

/**
--- linux-4.15.0.orig/drivers/clocksource/dw_apb_timer.c
+++ linux-4.15.0/drivers/clocksource/dw_apb_timer.c
@@ -225,7 +225,8 @@
 dw_ced->ced.max_delta_ticks = 0x7fffffff;
 dw_ced->ced.min_delta_ns = clockevent_delta2ns(5000, &dw_ced->ced);
 dw_ced->ced.min_delta_ticks = 5000;
-dw_ced->ced.cpus = cpumask_of(cpu);
+dw_ced->ced.cpus = cpu < 0 ? cpu_possible_mask : cpumask_of(cpu);
 dw_ced->ced.features = CLOCK_EVT_FEAT_PERIODIC |
 CLOCK_EVT_FEAT_ONESHOT | CLOCK_EVT_FEAT_DYNIRQ;
dw_ced->ced.set_state_shutdown = apbt_shutdown;
--- linux-4.15.0.orig/drivers/clocksource/dw_apb_timer_of.c
+++ linux-4.15.0/drivers/clocksource/dw_apb_timer_of.c
@@ -146,10 +146,6 @@
 static int __init dw_apb_timer_init(struct device_node *timer)
 {
    switch (num_called) {
-   case 0:
-      pr_debug("%s: found clockevent timer\n", __func__);
-      add_clockevent(timer);
-      break;
+   case 1:
+      pr_debug("%s: found clocksource timer\n", __func__);
+      add_clocksource(timer);
   case 1:
    pr_debug("%s: found clocksource timer\n", __func__);
    add_clocksource(timer);
@@ -160,6 +156,8 @@
    #endif
    break;
   default:
+   pr_debug("%s: found clockevent timer\n", __func__);
+   add_clockevent(timer);
    break;
   }

--- linux-4.15.0.orig/drivers/clocksource/exynos_mct.c
+++ linux-4.15.0/drivers/clocksource/exynos_mct.c
@@ -211,7 +211,7 @@
 static struct clocksource mct_frc = {
    .name= "mct-frc",
    .rating= 400,
-   .rating= 450,/* use value higher than ARM arch timer */
+   .rating= 450,/* use value higher than ARM arch timer */
    .read= exynos4_frc_read,
    .mask= CLOCKSOURCE_MASK(32),
    .flags= CLOCK_SOURCE_IS_CONTINUOUS,
@@ -388,6 +388,13 @@
     exynos4_mct_write(tmp, mevt->base + MCT_L_TCON_OFFSET);
 }

+static void exynos4_mct_tick_clear(struct mct_clock_event_device *mevt)
+{
+ /* Clear the MCT tick interrupt */
+ if (readl_relaxed(reg_base + mevt->base + MCT_L_INT_CSTAT_OFFSET) & 1)
+ exynos4_mct_write(0x1, mevt->base + MCT_L_INT_CSTAT_OFFSET);
+}
+static int exynos4_tick_set_next_event(unsigned long cycles,
+ struct clock_event_device *evt)
+{
mevt = container_of(evt, struct mct_clock_event_device, evt);
exynos4_mct_tick_stop(mevt);
+exynos4_mct_tick_clear(mevt);
return 0;
}

@@ -420,8 +428,11 @@
return 0;
}

-static void exynos4_mct_tick_clear(struct mct_clock_event_device *mevt)
+static irqreturn_t exynos4_mct_tick_isr(int irq, void *dev_id)
{
+struct mct_clock_event_device *mevt = dev_id;
+struct clock_event_device *evt = &mevt->evt;
+
/*
 * This is for supporting oneshot mode.
 * Mct would generate interrupt periodically
@@ -430,16 +441,6 @@
if (!clockevent_state_periodic(&mevt->evt))
exynos4_mct_tick_stop(mevt);

-/* Clear the MCT tick interrupt */
-if (readl_relaxed(reg_base + mevt->base + MCT_L_INT_CSTAT_OFFSET) & 1)
-exynos4_mct_write(0x1, mevt->base + MCT_L_INT_CSTAT_OFFSET);
-
-/*
- static irqreturn_t exynos4_mct_tick_isr(int irq, void *dev_id)
-{
- struct mct_clock_event_device *mevt = dev_id;
- struct clock_event_device *evt = &mevt->evt;
- 
- exynos4_mct_tick_clear(mevt);
- 
- evt->event_handler(evt);
- @@ -465,7 +466,7 @@
evt->set_state_oneshot_stopped = set_state_shutdown;
evt->tick_resume = set_state_shutdown;
evt->features = CLOCK_EVT_FEAT_PERIODIC | CLOCK_EVT_FEAT_ONESHOT;
-evt->rating = 450;
+evt->rating = 500; /* use value higher than ARM arch timer */

exynos4_mct_write(TICK_BASE_CNT, mevt->base + MCT_L_TCNTB_OFFSET);

@@ -562,7 +563,19 @@
return 0;

out_irq:
-free_percpu_irq(mct_irqs[MCT_L0_IRQ], &percpu_mct_tick);
+if (mct_int_type == MCT_INT_PPI) {
+free_percpu_irq(mct_irqs[MCT_L0_IRQ], &percpu_mct_tick);
+} else {
+for_each_possible_cpu(cpu) {
+struct mct_clock_event_device *pcpu_mevt =
+per_cpu_ptr(&percpu_mct_tick, cpu);
+
+if (pcpu_mevt->evt.irq != -1) {
+free_irq(pcpu_mevt->evt.irq, pcpu_mevt);
+pcpu_mevt->evt.irq = -1;
+}
+}
+}
return err;
}

--- linux-4.15.0.orig/drivers/clocksource/fsl_ftm_timer.c
+++ linux-4.15.0/drivers/clocksource/fsl_ftm_timer.c
@@ -281,7 +281,7 @@
 static unsigned long __init ftm_clk_init(struct device_node *np)
 {
-unsigned long freq;
+long freq;

 freq = __ftm_clk_init(np, "ftm-evt-counter-en", "ftm-evt");
 if (freq <= 0)
--- linux-4.15.0.orig/drivers/clocksource/h8300_timer8.c
+++ linux-4.15.0/drivers/clocksource/h8300_timer8.c
 @@ -169,7 +169,7 @@
 return PTR_ERR(clk);
 }

-ret = ENXIO;
+ret = -ENXIO;
 base = of_iomap(node, 0);
 if (!base) {
 pr_err("failed to map registers for clockevent
")
--- linux-4.15.0.orig/drivers/clocksource/i8253.c
+++ linux-4.15.0/drivers/clocksource/i8253.c
 @@ -20,6 +20,13 @@
 return PTR_ERR(clk);
 }

 DEFINE_RAW_SPINLOCK(i8253_lock);
 EXPORT_SYMBOL(i8253_lock);
/* Handle PIT quirk in pit_shutdown() where zeroing the counter register
 * restarts the PIT, negating the shutdown. On platforms with the quirk,
 * platform specific code can set this to false.
 */

bool i8253_clear_counter_on_shutdown __ro_after_init = true;

#ifdef CONFIG_CLKSRC_I8253

/*
 * Since the PIT overflows every tick, its not very useful
@@ -109,8 +116,11 @@
}
#endif /* DEBUG */

raw_spin_lock(&i8253_lock);

outb_p(0x30, PIT_MODE);
-outb_p(0, PIT_CH0);
-outb_p(0, PIT_CH0);
+if (i8253_clear_counter_on_shutdown) {
+outb_p(0, PIT_CH0);
+outb_p(0, PIT_CH0);
+
}

raw_spin_unlock(&i8253_lock);
return 0;
--- linux-4.15.0.orig/drivers/clocksource/mips-gic-timer.c
+++ linux-4.15.0/drivers/clocksource/mips-gic-timer.c
@@ -166,7 +166,7 @@
/* Set clocksource mask. */
count_width = read_gic_config() & GIC_CONFIG_COUNTBITS;
-count_width >>= __fls(GIC_CONFIG_COUNTBITS);
+count_width >>= __ffs(GIC_CONFIG_COUNTBITS);
count_width *= 4;
count_width += 32;
gic_clocksource.mask = CLOCKSOURCE_MASK(count_width);
--- linux-4.15.0.orig/drivers/clocksource/mxs_timer.c
+++ linux-4.15.0/drivers/clocksource/mxs_timer.c
@@ -152,10 +152,7 @@
/* Clear pending interrupt */
timrot_irq_acknowledge();
-
#ifndef DEBUG
-pr_info("%s: changing mode to %s\n", __func__, state)
-#else DEBUG */
+pr_debug("%s: changing mode to %s\n", __func__, state);
}
static int mxs_shutdown(struct clock_event_device *evt)
--- linux-4.15.0.orig/drivers/clocksource/sh_cmt.c
+++ linux-4.15.0/drivers/clocksource/sh_cmt.c
@@ -78,18 +78,17 @@
 unsigned int channels_mask;

 unsigned long width; /* 16 or 32 bit version of hardware block */
-unsigned long overflow_bit;
-unsigned long clear_bits;
+u32 overflow_bit;
+u32 clear_bits;

 /* callbacks for CMSTR and CMCSR access */
-unsigned long (*read_control)(void __iomem *base, unsigned long offs);
+u32 (*read_control)(void __iomem *base, unsigned long offs);
 void (*write_control)(void __iomem *base, unsigned long offs,
-    unsigned long value);
+    u32 value);

 /* callbacks for CMCNT and CMCOR access */
-unsigned long (*read_count)(void __iomem *base, unsigned long offs);
-void (*write_count)(void __iomem *base, unsigned long offs,
-    unsigned long value);
+u32 (*read_count)(void __iomem *base, unsigned long offs);
+void (*write_count)(void __iomem *base, unsigned long offs, u32 value);
};

struct sh_cmt_channel {
@@ -103,13 +102,13 @@
 unsigned int timer_bit;
 unsigned long flags;
-unsigned long match_value;
-unsigned long next_match_value;
-unsigned long max_match_value;
+u32 match_value;
+u32 next_match_value;
+u32 max_match_value;
 raw_spinlock_t lock;
 struct clock_event_device ced;
 struct clocksource cs;
-unsigned long total_cycles;
+u64 total_cycles;
 bool cs_enabled;
 }

@@ -160,24 +159,22 @@
 #define SH_CMT32_CMCSR_CKS_RCLK1(7 << 0)
#define SH_CMT32_CMCSR_CKS_MASK (7 << 0)

- static unsigned long sh_cmt_read16(void __iomem *base, unsigned long offs)
+ static u32 sh_cmt_read16(void __iomem *base, unsigned long offs)
  {
    return ioread16(base + (offs << 1));
  }

- static unsigned long sh_cmt_read32(void __iomem *base, unsigned long offs)
+ static u32 sh_cmt_read32(void __iomem *base, unsigned long offs)
  {
    return ioread32(base + (offs << 2));
  }

- static void sh_cmt_write16(void __iomem *base, unsigned long offs,
  -      unsigned long value)
+ static void sh_cmt_write16(void __iomem *base, unsigned long offs, u32 value)
  {
    iowrite16(value, base + (offs << 1));
  }

- static void sh_cmt_write32(void __iomem *base, unsigned long offs,
  -      unsigned long value)
+ static void sh_cmt_write32(void __iomem *base, unsigned long offs, u32 value)
  {
    iowrite32(value, base + (offs << 2));
  }

#define CMCNT 1 /* channel register */
#define CMCOR 2 /* channel register */

- static inline unsigned long sh_cmt_read_cmstr(struct sh_cmt_channel *ch)
+ static inline u32 sh_cmt_read_cmstr(struct sh_cmt_channel *ch)
  {
    if (ch->iostart)
      return ch->cmt->info->read_control(ch->iostart, 0);
    @ @ -250,8 +247,7 @ @
    return ch->cmt->info->read_control(ch->cmt->mapbase, 0);
  }

- static inline void sh_cmt_write_cmstr(struct sh_cmt_channel *ch,
  -      unsigned long value)
+ static inline void sh_cmt_write_cmstr(struct sh_cmt_channel *ch, u32 value)
  {
    if (ch->iostart)
      ch->cmt->info->write_control(ch->iostart, 0, value);
    @ @ -259,39 +255,35 @ @
    ch->cmt->info->write_control(ch->cmt->mapbase, 0, value);
static inline unsigned long sh_cmt_read_cmcsr(struct sh_cmt_channel *ch) {
    return ch->cmt->info->read_control(ch->ioctrl, CMCSR);
}

static inline void sh_cmt_write_cmcsr(struct sh_cmt_channel *ch, unsigned long value) {
    ch->cmt->info->write_control(ch->ioctrl, CMCSR, value);
}

static inline unsigned long sh_cmt_read_cmcnt(struct sh_cmt_channel *ch) {
    return ch->cmt->info->read_count(ch->ioctrl, CMCNT);
}

static inline void sh_cmt_write_cmcnt(struct sh_cmt_channel *ch, unsigned long value) {
    ch->cmt->info->write_count(ch->ioctrl, CMCNT, value);
}

static inline void sh_cmt_write_cmcor(struct sh_cmt_channel *ch, unsigned long value) {
    ch->cmt->info->write_count(ch->ioctrl, CMCOR, value);
}

static unsigned long sh_cmt_get_counter(struct sh_cmt_channel *ch, int *has_wrapped) {
    unsigned long v1, v2, v3;
    int o1, o2;
    u32 v1, v2, v3;
    u32 o1, o2;

    o1 = sh_cmt_read_cmcsr(ch) & ch->cmt->info->overflow_bit;

    return v1;
}

@@ -311,7 +303,8 @@
static void sh_cmt_start_stop_ch(struct sh_cmt_channel *ch, int start)
{
    unsigned long flags, value;
    unsigned long flags;
    u32 value;

    /* start stop register shared by multiple timer channels */
    raw_spin_lock_irqsave(&ch->cmt->lock, flags);
    static void sh_cmt_clock_event_program_verify(struct sh_cmt_channel *ch,
        int absolute)
    {
        unsigned long new_match;
        unsigned long value = ch->next_match_value;
        unsigned long delay = 0;
        unsigned long now = 0;
        int has_wrapped;
        u32 value = ch->next_match_value;
        u32 new_match;
        u32 delay = 0;
        u32 now = 0;
        u32 has_wrapped;

        now = sh_cmt_get_counter(ch, &has_wrapped);
        ch->flags |= FLAG_REPROGRAM; /* force reprogram */
        ch->flags |= flag;

        /* setup timeout if no clockevent */
        -if ((flag == FLAG_CLOCKSOURCE) && (!(ch->flags & FLAG_CLOCKEVENT)))
        +if (ch->cmt->num_channels == 1 &&
            flag == FLAG_CLOCKSOURCE && (!(ch->flags & FLAG_CLOCKEVENT)))
            __sh_cmt_set_next(ch, ch->max_match_value);
        out:
    }
}

static u64 sh_cmt_clocksource_read(struct clocksource *cs)
{
    struct sh_cmt_channel *ch = cs_to_sh_cmt(cs);
    -unsigned long flags, raw;
    -unsigned long value;
    -int has_wrapped;
    +u32 has_wrapped;

    -raw_spin_lock_irqsave(&ch->lock, flags);
    -value = ch->total_cycles;
    -raw = sh_cmt_get_counter(ch, &has_wrapped);
    +if (ch->cmt->num_channels == 1) {
unsigned long flags;
+u64 value;
+u32 raw;
+raw_spin_lock_irqsave(&ch->lock, flags);
+value = ch->total_cycles;
+raw = sh_cmt_get_counter(ch, &has_wrapped);
+
+if (unlikely(has_wrapped))
+raw += ch->match_value + 1;
+raw_spin_unlock_irqrestore(&ch->lock, flags);

-if (unlikely(has_wrapped))
-raw += ch->match_value + 1;
-raw_spin_unlock_irqrestore(&ch->lock, flags);
+return value + raw;
+
return value + raw;
+return sh_cmt_get_counter(ch, &has_wrapped);
}

static int sh_cmt_clocksource_enable(struct clocksource *cs)
@@ -694,7 +694,7 @@
 cs->disable = sh_cmt_clocksource_disable;
 cs->suspend = sh_cmt_clocksource_suspend;
 cs->resume = sh_cmt_clocksource_resume;
-cs->mask = CLOCKSOURCE_MASK(sizeof(unsigned long) * 8);
+cs->mask = CLOCKSOURCE_MASK(ch->cmt->info->width);
 cs->flags = CLOCK_SOURCE_IS_CONTINUOUS;

  dev_info(&ch->cmt->pdev->dev, "ch%u: used as clock source
", dev->base = of_iomap(node, 0);
 if (!data->base) {
 pr_err("Could not map PIT address\n");
-return -ENXIO;
+ret = -ENXIO;
+goto exit;
 }

data->mck = of_clk_get(node, 0);
 if (IS_ERR(data->mck)) {
 pr_err("Unable to get mck clk\n");
-return PTR_ERR(data->mck);
+ret = PTR_ERR(data->mck);
goto exit;
}

ret = clk_prepare_enable(data->mck);
if (ret) {
    pr_err("Unable to enable mck\n");
    return ret;
    goto exit;
}

/* Get the interrupts property */
data->irq = irq_of_parse_and_map(node, 0);
if (!data->irq) {
    pr_err("Unable to get IRQ from DT\n");
    return -EINVAL;
    ret = -EINVAL;
    goto exit;
}

/* Set up irq handler */
"at91_tick", data);
if (ret) {
    pr_err("Unable to setup IRQ\n");
    return ret;
    clocksource_unregister(&data->clksrc);
    goto exit;
}

/* Set up and register clockevents */
clockevents_register_device(&data->clkevt);
return 0;
+
+exit:
+kfree(data);
+return ret;
}
/*
 * Register definitions for the timers
 * +* Register definitions common for all the timer variants.
 */
#define TIMER1_COUNT	(0x00)
#define TIMER1_LOAD	(0x04)
#define TIMER3_MATCH1	(0x28)
#define TIMER3_MATCH2	(0x2c)
#define TIMER_CR	(0x30)
#define TIMER_INTR_STATE	(0x34)
#define TIMER_INTR_MASK	(0x38)

+/*
 +* Control register (TMC30) bit fields for fttmr010/gemini/moxart timers.
 +*/
#define TIMER_1_CR_ENABLE	BIT(0)
#define TIMER_1_CR_CLOCK	BIT(1)
#define TIMER_1_CR_INT	BIT(2)
#define TIMER_3_CR_UPDOWN	BIT(11)

+/*
 +* The Aspeed AST2400 moves bits around in the control register
 +* and lacks bits for setting the timer to count upwards.
 +* Control register (TMC30) bit fields for aspeed ast2400/ast2500 timers.
 +* The aspeed timers move bits around in the control register and lacks
 +* bits for setting the timer to count upwards.
 +*/
#define TIMER_1_CR_ASPEED_ENABLEBIT(0)
#define TIMER_1_CR_ASPEED_CLOCKBIT(1)
#define TIMER_1_CR_INTBIT(2)
#define TIMER_3_CR_ASPEED_CLOCKBIT(9)
#define TIMER_3_CR_ASPEED_INTBIT(10)

+/*
 +* Interrupt status/mask register definitions for fttmr010/gemini/moxart
 +* timers.
 +* The registers don’t exist and they are not needed on aspeed timers
 +* because:
 +* - aspeed timer overflow interrupt is controlled by bits in Control
    + * Register (TMC30).
    + * - aspeed timers always generate interrupt when either one of the
    + * Match registers equals to Status register.
    + */
    +
    +#define TIMER_INTR_STATE	(0x34)
    +#define TIMER_INTR_MASK	(0x38)
    +define TIMER_1_INT_MATCH1BIT(0)
    +define TIMER_1_INT_MATCH2BIT(1)
    +define TIMER_1_INT_OVERFLOWBIT(2)
    @@ -80,7 +94,7 @@
    struct fttmr010 {
    void __iomem *base;
    unsigned int tick_rate;
    -bool count_down;
    +bool is_aspeed;
    u32 t1_enable_val;
    struct clock_event_device clkevt;
    #ifdef CONFIG_ARM
    @@ -130,13 +144,17 @@
    cr &= ~fttmr010->t1_enable_val;
    writel(cr, fttmr010->base + TIMER_CR);
    -*/ Setup the match register forward/backward in time */
    -cr = readl(fttmr010->base + TIMER1_COUNT);
    -if (fttmr010->count_down)
    -cr -= cycles;
    -else
    -cr += cycles;
    -writel(cr, fttmr010->base + TIMER1_MATCH1);
    +if (fttmr010->is_aspeed) {
    +*/
    + * ASPEED Timer Controller will load TIMER1_LOAD register
    + * into TIMER1_COUNT register when the timer is re-enabled.
    + */
    +writel(cycles, fttmr010->base + TIMER1_LOAD);
    +} else {
    +*/ Setup the match register forward in time */
    +cr = readl(fttmr010->base + TIMER1_COUNT);
    +writel(cr + cycles, fttmr010->base + TIMER1_MATCH1);
    +}
    /* Start */
    cr = readl(fttmr010->base + TIMER_CR);
    @@ -171,16 +189,17 @@
    /* Setup counter start from 0 or ~0 */
    writel(0, fttmr010->base + TIMER1_COUNT);
    -if (fttmr010->count_down)
+if (fttmr010->is_aspeed) {
    writel(~0, fttmr010->base + TIMER1_LOAD);
} else {
    writel(0, fttmr010->base + TIMER1_LOAD);
}

-/* Enable interrupt */
-cr = readl(fttmr010->base + TIMER_INTR_MASK);
-cr &= ~(TIMER_1_INT_OVERFLOW | TIMER_1_INT_MATCH2);
-cr |= TIMER_1_INT_MATCH1;
-writel(cr, fttmr010->base + TIMER_INTR_MASK);
+/* Enable interrupt */
+cr = readl(fttmr010->base + TIMER_INTR_MASK);
+cr &= ~(TIMER_1_INT_OVERFLOW | TIMER_1_INT_MATCH2);
+cr |= TIMER_1_INT_MATCH1;
+writel(cr, fttmr010->base + TIMER_INTR_MASK);
+

return 0;
}

writel(cr, fttmr010->base + TIMER_CR);
/* Setup timer to fire at 1/HZ intervals. */
-if (fttmr010->count_down) {
  +if (fttmr010->is_aspeed) {
    writel(period, fttmr010->base + TIMER1_LOAD);
    -writel(0, fttmr010->base + TIMER1_MATCH1);
  } else {
    cr = 0xffffffff - (period - 1);
    writel(cr, fttmr010->base + TIMER1_COUNT);
  }
} else {
  cr = 0xffffffff - (period - 1);
  writel(cr, fttmr010->base + TIMER1_COUNT);
  @@ -277,23 +295,21 @@
  }

/**
 - * The Aspeed AST2400 moves bits around in the control register,
 - * otherwise it works the same.
 + * The Aspeed timers move bits around in the control register.
 */
if (is_aspeed) {
  fttmr010->t1_enable_val = TIMER_1_CR_ASPEED_ENABLE |
  TIMER_1_CR_ASPEED_INT;
-/* Downward not available */
-fftmr010->count_down = true;
+fftmr010->is_aspeed = true;
} else {
  fttmr010->t1_enable_val = TIMER_1_CR_ENABLE | TIMER_1_CR_INT;
-}
```c
/*
 * Reset the interrupt mask and status
 */
writel(TIMER_INT_ALL_MASK, fttmr010->base + TIMER_INTR_MASK);
writel(0, fttmr010->base + TIMER_INTR_STATE);
+
/*
 * Reset the interrupt mask and status
 */
+writel(TIMER_INT_ALL_MASK, fttmr010->base + TIMER_INTR_MASK);
+writel(0, fttmr010->base + TIMER_INTR_STATE);
+
} /* Enable timer 1 count up, timer 2 count up, except on Aspeed, */
@@ -302,9 +318,8 @@
if (is_aspeed)
    val = TIMER_2_CR_ASPEED_ENABLE;
else {
    -val = TIMER_2_CR_ENABLE;
    -if (!fttmr010->count_down)
    -val |= TIMER_1_CR_UPDOWN | TIMER_2_CR_UPDOWN;
    +val = TIMER_2_CR_ENABLE | TIMER_1_CR_UPDOWN |
    +TIMER_2_CR_UPDOWN;
}
writel(val, fttmr010->base + TIMER_CR);

@@ -317,7 +332,7 @@
writel(0, fttmr010->base + TIMER2_MATCH1);
writel(0, fttmr010->base + TIMER2_MATCH2);

-    if (fttmr010->count_down) {
-        if (fttmr010->is_aspeed) {
-            writel(~0, fttmr010->base + TIMER2_LOAD);
-        }
+    if (fttmr010->is_aspeed) {
+        clocksource_mmio_init(fttmr010->base + TIMER2_COUNT,
+                            "FTTMR010-TIMER2",
+                            @ @ -367,7 +382,7 @@

#ifdef CONFIG_ARM
/* Also use this timer for delays */
-    if (fttmr010->count_down)
+    if (fttmr010->is_aspeed)
        fttmr010->delay_timer.read_current_timer =
        fttmr010_read_current_timer_down;
    else
    --- linux-4.15.0.orig/drivers/clocksource/timer-imx-tpm.c
    +++ linux-4.15.0/drivers/clocksource/timer-imx-tpm.c
    @ @ -20,6 +20,7 @@
```
```c
#define TPM_SC 0x10
#define TPM_SC_CMOD_INC_PER_CNT (0x1 << 3)
#define TPM_SC_CMOD_DIV_DEFAULT 0x3
#define TPM_SC_TOF_MASK (0x1 << 7)
#define TPM_CNT 0x14
#define TPM_MOD 0x18
#define TPM_STATUS 0x1c
#define TPM_C0SC_MODE_SHIFT 2
#define TPM_C0SC_MODE_MASK 0x3c
#define TPM_C0SC_MODE_SW_COMPARE 0x4
#define TPM_C0SC_CHF_MASK (0x1 << 7)
#define TPM_C0V 0x24

static void __iomem *timer_base;

static int tpm_set_state_oneshot(struct clock_event_device *evt)
{
    /* increase per cnt, div 8 by default */
    writel(TPM_SC_CMOD_INC_PER_CNT | TPM_SC_CMOD_DIV_DEFAULT, timer_base + TPM_SC);
    /* TOF is W1C */
    writel(TPM_SC_TOF_MASK, timer_base + TPM_SC);
    writel(0, timer_base + TPM_CNT);
    /* CHF is W1C */
    writel(TPM_C0SC_CHF_MASK, timer_base + TPM_C0SC);
    /* make sure counter is disabled */
    writel(0, timer_base + TPM_SC);
    /* TOF is W1C */
    writel(TPM_SC_TOF_MASK, timer_base + TPM_SC);
    writel(0, timer_base + TPM_CNT);
    writel(0, timer_base + TPM_C0SC);
    /* 4) Channel0 disabled */
    /* 5) DMA transfers disabled */
    /* of writing CNT registers which may cause the min_delta event got missed, so we need add a ETIME check here in case it happened. */
    -return (int)((next - now) <= 0) ? -ETIME : 0;
    +return (int)(next - now) <= 0 ? -ETIME : 0;
}
```

---

```c
int irq;
struct clk *clk;
unsigned long rate;
-struct device_node *pri_node;
-struct device_node *sec_node;
+struct device_node *alias_node;
```
base = of_io_request_and_map(node, 0, "integrator-timer");
if (IS_ERR(base))
@@ -204,7 +203,18 @@
    return err;
}

-pri_node = of_find_node_by_path(path);
+alias_node = of_find_node_by_path(path);
+
+/*
+ * The pointer is used as an identifier not as a pointer, we
+ * can drop the refcount on the of__node immediately after
+ * getting it.
+ */
+of_node_put(alias_node);
+
+if (node == alias_node)
+    /* The primary timer lacks IRQ, use as clocksource */
+    return integrator_clocksource_init(rate, base);

err = of_property_read_string(ofAliases,
    "arm,timer-secondary", &path);
@@ -213,14 +223,11 @@
    return err;
}

+alias_node = of_find_node_by_path(path);

-sec_node = of_find_node_by_path(path);
-
-if (node == pri_node)
-    /* The primary timer lacks IRQ, use as clocksource */
-    return integrator_clocksource_init(rate, base);
-    of_node_put(alias_node);

-if (node == sec_node) {
+if (node == alias_node) {
    /* The secondary timer will drive the clock event */
    irq = irq_of_parse_and_map(node, 0);
    return integrator_clockevent_init(rate, base, irq);
--- linux-4.15.0.orig/drivers/clocksource/timer-of.c
+++ linux-4.15.0/drivers/clocksource/timer-of.c
@@ -162,7 +162,7 @@
}
if (!to->clkevt.name)
    to->clkevt.name = np->name;
to->clkdev.name = np->full_name;
return ret;

out_fail:
--- linux-4.15.0.orig/drivers/clocksource/timer-oxnas-rps.c
+++ linux-4.15.0/drivers/clocksource/timer-oxnas-rps.c
@@ -296,4 +296,4 @@
    TIMER_OF_DECLARE(ox810se_rps,
        "oxsemi,ox810se-rps-timer", oxnas_rps_timer_init);
    TIMER_OF_DECLARE(ox820_rps,
-       "oxsemi,ox820se-rps-timer", oxnas_rps_timer_init);
+       "oxsemi,ox820-rps-timer", oxnas_rps_timer_init);
--- linux-4.15.0.orig/drivers/clocksource/timer-stm32.c
+++ linux-4.15.0/drivers/clocksource/timer-stm32.c
@@ -106,6 +106,10 @@
    unsigned long rate, max_delta;
    int irq, ret, bits, prescaler = 1;

    +data = kmemdup(&clock_event_ddata, sizeof(*data), GFP_KERNEL);
    +if (!data)
    +return -ENOMEM;
    
    clk = of_clk_get(np, 0);
    if (IS_ERR(clk)) {
        ret = PTR_ERR(clk);
    } else {
        writel_relaxed(prescaler - 1, data->base + TIM_PSC);
        writel_relaxed(TIM_EGR_U, data->base + TIM_EGR);
-        writel_relaxed(TIM_DIER_UIE, data->base + TIM_DIER);
        writel_relaxed(0, data->base + TIM_SR);
        +writel_relaxed(TIM_DIER_UIE, data->base + TIM_DIER);
        data->periodic_top = DIV_ROUND_CLOSEST(rate, prescaler * HZ);
    }

    @@ -156,8 +160,8 @@
    @ @ -156,8 +160,8 @ @
    err_clk_disable:
    clk_put(clk);
    err_clk_get:
    +kfree(data);
    return ret;
    }

--- linux-4.15.0.orig/drivers/clocksource/timer-sun5i.c
+++ linux-4.15.0/drivers/clocksource/timer-sun5i.c
@@ -202,6 +202,11 @@
    }

    @ @ -184,6 +188,7 @ @
    err_clk_enable:
    clk_put(clk);
    err_clk_get:
    +kfree(data);
    return ret;
    }

--- linux-4.15.0.orig/drivers/clocksource/timer-sun5i.c
+++ linux-4.15.0/drivers/clocksource/timer-sun5i.c
@@ -202,6 +202,11 @@
    }

rate = clk_get_rate(clk);
+if (!rate) {
+pr_err("Couldn't get parent clock rate\n");
+ret = -EINVAL;
+goto err_disable_clk;
+
}

cs->timer.base = base;
cs->timer.clk = clk;
@@ -275,6 +280,11 @@
}

rate = clk_get_rate(clk);
+if (!rate) {
+pr_err("Couldn't get parent clock rate\n");
+ret = -EINVAL;
+goto err_disable_clk;
+
}

ce->timer.base = base;
ce->timer.ticks_per_jiffy = DIV_ROUND_UP(rate, HZ);
--- linux-4.15.0.orig/drivers/clocksource/timer-ti-32k.c
+++ linux-4.15.0/drivers/clocksource/timer-ti-32k.c
@@ -98,6 +98,9 @@
return -ENXIO;
}

+if (!of_machine_is_compatible("ti,am43"))
+	i32k_timer.cs.flags |= CLOCK_SOURCE_SUSPEND_NONSTOP;
+
+ti_32k_timer.counter = ti_32k_timer.base;

/*
--- linux-4.15.0.orig/drivers/cpufreq/acpi-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/acpi-cpufreq.c
@@ -629,7 +629,7 @@
if (c->x86_vendor == X86_VENDOR_INTEL) {
if ((c->x86 == 15) &&
    (c->x86_model == 6) &&
-    (c->x86_mask == 8)) {
+    (c->x86_stepping == 8)) {
    pr_info("Intel(R) Xeon(R) 7100 Errata AL30, processors may lock up on frequency changes: disabling acpi-cpufreq\n");
return -ENODEV;
    }
@@ -701,7 +701,8 @@
cpumask_copy(policy->cpus, topology_core_cpumask(cpus));
}
if (check_amd_hwpstate_cpu(cpu) && !acpi_pstate_strict) {
    if (check_amd_hwpstate_cpu(cpu) && boot_cpu_data.x86 < 0x19 && !acpi_pstate_strict) {
        cpumask_clear(policy->cpus);
        cpumask_set_cpu(cpu, policy->cpus);
        cpumask_copy(data->freqdomain_cpus, @ @ -909,8 +910,10 @ @
        }
        int ret;

    -if (!(boot_cpu_has(X86_FEATURE_CPB) || boot_cpu_has(X86_FEATURE_IDA)))
    +if (!(boot_cpu_has(X86_FEATURE_CPB) || boot_cpu_has(X86_FEATURE_IDA))) {
        +pr_debug("Boost capabilities not present in the processor\n");
        return;
    +}

    acpi_cpufreq_driver.set_boost = set_boost;
    acpi_cpufreq_driver.boost_enabled = boost_state(0);
    --- linux-4.15.0.orig/drivers/cpufreq/brcmstb-avs-cpufreq.c
    +++ linux-4.15.0/drivers/cpufreq/brcmstb-avs-cpufreq.c
    @@ -468,12 +468,12 @@
    return __issue_avs_command(priv, AVS_CMD_SET_PSTATE, true, args);
    }

    -static unsigned long brcm_avs_get_voltage(void __iomem *base)
    +static u32 brcm_avs_get_voltage(void __iomem *base)
    {
        return readl(base + AVS_MBOX_VOLTAGE1);
    }

    -static unsigned long brcm_avs_get_frequency(void __iomem *base)
    +static u32 brcm_avs_get_frequency(void __iomem *base)
    {
        return readl(base + AVS_MBOX_FREQUENCY) * 1000; /* in kHz */
    }
    @ @ -762.8 +762.8 @@
    rc = brcm_avs_get_pmap(priv, NULL);
    magic = readl(priv->base + AVS_MBOX_MAGIC);

    -return (magic == AVS_FIRMWARE_MAGIC) && (rc != -ENOTSUPP) &&
    -(rc != -EINVAL);
    +return (magic == AVS_FIRMWARE_MAGIC) && ((rc != -ENOTSUPP) ||
    +(rc != -EINVAL));
    }

    static unsigned int brcm_avs_cpufreq_get(unsigned int cpu)
    @ @ -973,14 +973,14 @@
struct private_data *priv = policy->driver_data;

return sprintf(buf, "0x%08lx", brcm_avs_get_voltage(priv->base));

int ret;
ret = cpufreq_unregister_driver(&brcm_avs_driver);
-if (ret)
return ret;
+WARN_ON(ret);

brcm_avs_cpufreq_debug_exit(pdev);

#include <linux/cpu.h>
#include <linux/cpufreq.h>
#include <linux/dmi.h>
#include <asm/unaligned.h>

#include <asm/cputype.h>

/*
 * The PCC subspace describes the rate at which platform can accept commands
 * on the shared PCC channel (including READs which do not count towards freq
 * transition requests), so ideally we need to use the PCC values as a fallback
 * if we don't have a platform specific transition_delay_us
 */
#ifndef CONFIG_ARM64
+include <asm/cputype.h>
#include <asm/unaligned.h>

cpu->perf_caps.lowest_perf, cpu_num, ret);

+*/
+static unsigned int cppc_cpufreq_get_transition_delay_us(int cpu)
{  
+unsigned long implementor = read_cpuid_implementor();  
+unsigned long part_num = read_cpuid_part_number();  
+unsigned int delay_us = 0;  
+%switch (implementor) {
+case ARM_CPU_IMP_QCOM:  
+switch (part_num) {  
+case QCOM_CPU_PART_FALKOR_V1:  
+case QCOM_CPU_PART_FALKOR:  
+delay_us = 10000;  
+break;  
+default:  
+delay_us = cppc_get_transition_latency(cpu) / NSEC_PER_USEC;  
+break;  
+}  
+break;  
+default:  
+delay_us = cppc_get_transition_latency(cpu) / NSEC_PER_USEC;  
+break;  
+}  
+break;  
+return delay_us;  
+}
+
+static int cppc_cpufreq_cpu_init(struct cpufreq_policy *policy)
{
 struct cppc_cpudata *cpu;
@@ -161,12 +205,22 @@
 cpu->perf_caps.highest_perf;
 policy->cpuinfo.max_freq = cppc_dmi_max_khz;

 -policy->cpuinfo.transition_latency = cppc_get_transition_latency(cpus);  
 +policy->transition_delay_us = cppc_cpufreq_get_transition_delay_us(cpu);  
 policy->shared_type = cpu->shared_type;  

 -if (policy->shared_type == CPUFREQ_SHARED_TYPE_ANY)  
 +if (policy->shared_type == CPUFREQ_SHARED_TYPE_ANY) {

+int i;
+
cpumask_copy(policy->cpus, cpu->shared_cpu_map);
-else if (policy->shared_type == CPUFREQ_SHARED_TYPE_ALL) {
+  
++for_each_cpu(i, policy->cpus) {
+    if (unlikely(i == policy->cpu))
+      continue;
+    
++memcpy(&all_cpu_data[i]->perf_caps, &cpu->perf_caps,
+    
++sizeof(cpu->perf_caps));
+      } else if (policy->shared_type == CPUFREQ_SHARED_TYPE_ALL) {
+      /* Support only SW_ANY for now. */
+    pr_debug("Unsupported CPU co-ord type\n");
+    return -EFAULT;
+    } else if (policy->shared_type == CPUFREQ_SHARED_TYPE_ALL) { /* Support only SW_ANY for now. */
+      pr_debug("Unsupported CPU co-ord type\n");
+      return -EFAULT;
+    } else if (policy->shared_type == CPUFREQ_SHARED_TYPE_ALL) {
+      /* Support only SW_ANY for now. */
+    pr_debug("Unsupported CPU co-ord type\n");
+    return -EFAULT;
+    }

out:
  -for_each_possible_cpu(i)
  -kfree(all_cpu_data[i]);
++for_each_possible_cpu(i) {
  +cpu = all_cpu_data[i];
  +if (!cpu)
  +break;
  +free_cpumask_var(cpu->shared_cpu_map);
  +kfree(cpu);
  +}

kfree(all_cpu_data);
return -ENODEV;
--- linux-4.15.0.orig/drivers/cpufreq/cpufreq-dt-platdev.c
+++ linux-4.15.0/drivers/cpufreq/cpufreq-dt-platdev.c
@@ -108,8 +108,18 @@
  { .compatible = "marvell,armadaxp", },
+
++{ .compatible = "mediatek,mt2701", },
++{ .compatible = "mediatek,mt2712", },
++{ .compatible = "mediatek,mt7622", },
++{ .compatible = "mediatek,mt7623", },
++{ .compatible = "mediatek,mt817x", },
++{ .compatible = "mediatek,mt8173", },
++{ .compatible = "mediatek,mt8176", },
++
++{ .compatible = "nvidia,tegra124", },
```c
static struct freq_attr *cpufreq_dt_attr[] = {
    
    struct device *cpu_dev;
    struct thermal_cooling_device *cdev;
    const char *reg_name;
    
    bool have_static_opps;
};

static int cpufreq_get_dynfreq_attr(const char *name, const char *policy, uint32_t cpus)
{
    int ret = -EINVAL;

    struct-device *cpu_dev;
    struct-thermal_cooling_device *cdev;
    const-char *reg_name;
    bool have_static_opps;

    priv = kzalloc(sizeof(*priv), GFP_KERNEL);
    if (!priv) {
        ret = -ENOMEM;
        goto out_put_regulator;
    }

    priv->reg_name = name;
    priv->opp_table = opp_table;

    /* Initialize OPP tables for all policy->cpus. They will be shared by
     * all CPUs which have marked their CPUs shared with OPP bindings.
     * OPPs might be populated at runtime, don't check for error here
     */
    -dev_pm_opp_of_cpumask_add_table(policy->cpus);
    if (!dev_pm_opp_of_cpumask_add_table(policy->cpus))
        priv->have_static_opps = true;

    /* But we need OPP table to function so if it is not there let's
     */
    -priv = kzalloc(sizeof(*priv), GFP_KERNEL);
    if (!priv) {
        ret = -ENOMEM;
    }
```

---

```c
+++
struct-device *cpu_dev;
struct-thermal_cooling_device *cdev;
const-char *reg_name;
bool have_static_opps;
};

static struct freq_attr *cpufreq_dt_attr[] = {
    
    struct device *cpu_dev;
    struct thermal_cooling_device *cdev;
    const char *reg_name;
    
    struct freq_attr *have_static_opps;
};

static int cpufreq_get_dynfreq_attr(const char *name, const char *policy, uint32_t cpus)
{
    int ret = -EINVAL;

    struct-device *cpu_dev;
    struct-thermal_cooling_device *cdev;
    const-char *reg_name;
    bool have_static_opps;

    priv = kzalloc(sizeof(*priv), GFP_KERNEL);
    if (!priv) {
        ret = -ENOMEM;
        goto out_put_regulator;
    }

    priv->reg_name = name;
    priv->opp_table = opp_table;

    /* Initialize OPP tables for all policy->cpus. They will be shared by
     * all CPUs which have marked their CPUs shared with OPP bindings.
     * OPPs might be populated at runtime, don't check for error here
     */
    -dev_pm_opp_of_cpumask_add_table(policy->cpus);
    if (!dev_pm_opp_of_cpumask_add_table(policy->cpus))
        priv->have_static_opps = true;

    /* But we need OPP table to function so if it is not there let's
     */
    -priv = kzalloc(sizeof(*priv), GFP_KERNEL);
    if (!priv) {
        ret = -ENOMEM;
    }
```
priv->cpu_dev = cpu_dev;
@@ -288,10 +290,11 @@

out_free_cpufreq_table:
dev_pm_opp_free_cpufreq_table(cpu_dev, &freq_table);
-out_free_priv:
-kfree(priv);
out_free_opp:
-dev_pm_opp_of_cpumask_remove_table(policy->cpus);
+if (priv->have_static_opps)
+dev_pm_opp_of_cpumask_remove_table(policy->cpus);
+kfree(priv);
+out_put_regulator:
if (name)
dev_pm_opp_put_regulators(opp_table);
out_put_clk:
@@ -306,7 +309,8 @@
cpufreq_cooling_unregister(priv->cdev);
dev_pm_opp_free_cpufreq_table(priv->cpu_dev, &policy->freq_table);
-dev_pm_opp_of_cpumask_remove_table(policy->related_cpus);
+if (priv->have_static_opps)
+dev_pm_opp_of_cpumask_remove_table(policy->related_cpus);
if (priv->reg_name)
dev_pm_opp_put_regulators(priv->opp_table);

--- linux-4.15.0.orig/drivers/cpufreq/cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/cpufreq.c
@@ -560,13 +560,13 @@
*/
*********************************************************************/
static ssize_t show_boost(struct kobject *kobj,
- struct attribute *attr, char *buf)
+ struct kobj_attribute *attr, char *buf)
{
return sprintf(buf, "%d\n", cpufreq_driver->boost_enabled);
}

-static ssize_t store_boost(struct kobject *kobj, struct attribute *attr,
-  const char *buf, size_t count)
+static ssize_t store_boost(struct kobject *kobj, struct kobj_attribute *attr,
+  const char *buf, size_t count)
{
  int ret, enable;

@@ -699,6 +699,8 @@
  struct cpufreq_policy new_policy;
  
  memcpy(&new_policy, policy, sizeof(*policy));
+  new_policy.min = policy->user_policy.min;
+  new_policy.max = policy->user_policy.max;
  
  ret = sscanf(buf, "%u", &new_policy.object);
  if (ret != 1) \n@@ -915,6 +917,9 @@
  struct freq_attr *fattr = to_attr(attr);
  ssize_t ret;

+if (!fattr->show)
+return -EIO;
+  down_read(&policy->rwsem);
+  ret = fattr->show(policy, buf);
+  up_read(&policy->rwsem);
@@ -929,6 +934,9 @@
  struct freq_attr *fattr = to_attr(attr);
  ssize_t ret = -EINVAL;

+if (!fattr->store)
+return -EIO;
+  cpus_read_lock();

if (cpu_online(policy->cpu)) {
  @@ -1105,6 +1113,7 @@
    cpufreq_global_kobject, "policy%u", cpu);
  if (ret) {
    pr_err("%s: failed to init policy->kobj: %d\n", __func__, ret);
+    kobject_put(&policy->kobj);
    goto err_free_real_cpus;
  }

@@ -1321,14 +1330,14 @@
return 0;

out_exit_policy:
+for_each_cpu(j, policy->real_cpus)
+remove_cpu_dev_symlink(policy, get_cpu_device(j));
+
up_write(&policy->rwsem);

if (cpufreq_driver->exit)
cpufreq_driver->exit(policy);
-
-for_each_cpu(j, policy->real_cpus)
-remove_cpu_dev_symlink(policy, get_cpu_device(j));
-
out_free_policy:
cpufreq_policy_free(policy);
return ret;
@ @ -1527,17 +1536,16 @@
{
unsigned int ret_freq = 0;

-if (!cpufreq_driver->get)
+if (unlikely(policy_is_inactive(policy)) || !cpufreq_driver->get)
return ret_freq;

ret_freq = cpufreq_driver->get(policy->cpu);

/*
 - * Updating inactive policies is invalid, so avoid doing that. Also
 - * if fast frequency switching is used with the given policy, the check
 + * If fast frequency switching is used with the given policy, the check
 * against policy->cur is pointless, so skip it in that case too.
 */
-if (unlikely(policy_is_inactive(policy))) || policy->fast_switch_enabled)
+if (policy->fast_switch_enabled)
return ret_freq;

if (ret_freq && policy->cur &&
@@ -1566,10 +1574,7 @@

if (policy) {
down_read(&policy->rwsem);
-
-if (!policy_is_inactive(policy))
-ret_freq = __cpufreq_get(policy);
-
+ret_freq = __cpufreq_get(policy);
up_read(&policy->rwsem);
cpufreq_cpu_put(policy);
@@ -1680,6 +1685,9 @@
    if (!cpufreq_driver)
        return;

    +if (unlikely(!cpufreq_suspended))
    +return;
    +
    cpufreq_suspended = false;

if (!has_target() && !cpufreq_driver->resume)
@@ -2455,6 +2463,20 @@
    return 0;
 }

+static char cpufreq_driver_name[CPUFREQ_NAME_LEN];
+
+static int __init cpufreq_driver_setup(char *str)
+{
+    strlcpy(cpufreq_driver_name, str, CPUFREQ_NAME_LEN);
+    return 1;
+}
+
+/
+ * Set this name to only allow one specific cpu freq driver, e.g.,
+ * cpufreq_driver=powernow-k8
+ */
+__setup("cpufreq_driver=", cpufreq_driver_setup);
+
+/**
+ * cpufreq_register_driver - register a CPU Frequency driver
+ * @driver_data: A struct cpufreq_driver containing the values#
+ @@ -2473,6 +2495,13 @@
+ if (cpufreq_disabled())
+    return -ENODEV;
+
+ /* The cpufreq core depends heavily on the availability of device
+ * structure, make sure they are available before proceeding further.
+ */
+if (!get_cpu_device(0))
+    return -EPROBE_DEFER;
+
    if (!driver_data || !driver_data->verify || !driver_data->init ||
        !driver_data->setpolicy || driver_data->target_index ||
        driver_data->target)
@@ -2481,7 +2510,13 @@
(!driver_data->get_intermediate != driver_data->target_intermediate)) return -EINVAL;

-pr_debug("trying to register driver %s\n", driver_data->name);
+pr_debug("trying to register driver %s, cpufreq_driver=%s\n",
+driver_data->name, cpufreq_driver_name);
+
+if (cpufreq_driver_name[0])
+if (!(driver_data->name ||
+strcmp(cpufreq_driver_name, driver_data->name))
+return -EINVAL;

/* Protect against concurrent CPU online/offline. */
cpus_read_lock();

EXPORT_SYMBOL_GPL(cpufreq_unregister_driver);

-/*
 * Stop cpufreq at shutdown to make sure it isn't holding any locks
 * or mutexes when secondary CPUs are halted.
 * */
+-static struct syscore_ops cpufreq_syscore_ops = {
- .shutdown = cpufreq_suspend,
-};
-
-struct kobject *cpufreq_global_kobject;
EXPORT_SYMBOL(cpufreq_global_kobject);

@@ -2596,8 +2623,6 @@
 cpufreq_global_kobject = kobject_create_and_add("cpufreq", &cpu_subsys.dev_root->kobj);
 BUG_ON(!cpufreq_global_kobject);

-registr_syscore_ops(&cpufreq_syscore_ops);
-
-return 0;
}
module_param(off, int, 0444);
--- linux-4.15.0.orig/drivers/cpufreq/cpufreq_conservative.c
+++ linux-4.15.0/drivers/cpufreq/cpufreq_conservative.c
@@ -80,8 +80,10 @@
 */
- if (requested_freq > policy->max || requested_freq < policy->min)
+ if (requested_freq > policy->max || requested_freq < policy->min) {
 requested_freq = policy->cur;
+ dbs_info->requested_freq = requested_freq;

freq_step = get_freq_step(cs_tuners, policy);

@@ -92,7 +94,7 @@
if (policy_dbs->idle_periods < UINT_MAX) {
    unsigned int freq_steps = policy_dbs->idle_periods * freq_step;

    if (requested_freq > freq_steps)
        requested_freq -= freq_steps;
    else
        requested_freq = policy->min;

--- linux-4.15.0.orig/drivers/cpufreq/cpufreq_governor.c
+++ linux-4.15.0/drivers/cpufreq/cpufreq_governor.c
@@ -165,7 +165,7 @@
    * calls, so the previous load value can be used then.
    */
    load = j_cdbs->prev_load;
-} else if (unlikely(time_elapsed > 2 * sampling_rate &&
+} else if (unlikely((int)idle_time > 2 * sampling_rate &&
                j_cdbs->prev_load)) {
    /*
     * If the CPU had gone completely idle and a task has
@@ -185,10 +185,8 @@
     * clear prev_load to guarantee that the load will be
     * computed again next time.
     *
-    * Detecting this situation is easy: the governor's
-    * utilization update handler would not have run during
-    * CPU-idle periods.  Hence, an unusually large
-    * 'time_elapsed' (as compared to the sampling rate)
+    * Detecting this situation is easy: an unusually large
+    * 'idle_time' (as compared to the sampling rate)
     * indicates this scenario.
     */
    load = j_cdbs->prev_load;
@@ -217,8 +215,8 @@
    j_cdbs->prev_load = load;
 }

-} else if (time_elapsed > 2 * sampling_rate) {
-    unsigned int periods = time_elapsed / sampling_rate;
+} else if (unlikely((int)idle_time > 2 * sampling_rate)) {
+    unsigned int periods = idle_time / sampling_rate;

    if (periods < idle_periods)
        idle_periods = periods;
```c
struct policy_dbs_info *policy_dbs = cdbs->policy_dbs;
    u64 delta_ns, lst;
    
    -if (!cpufreq_can_do_remote_dvfs(policy_dbs->policy))
    +if (!cpufreq_this_cpu_can_update(policy_dbs->policy))
    return;
    
    /*
    @@ -461,6 +459,8 @@
    */
    pr_err("initialization failed (dbs_data kobject init error %d)\n", ret);
    
    +kobject_put(&dbs_data->attr_set.kobj);
    +policy->governor_data = NULL;
    
    if (!have_governor_per_policy())
    @@ -557,12 +557,20 @@

    void cpufreq_dbs_governor_limits(struct cpufreq_policy *policy)
    {  
    -struct policy_dbs_info *policy_dbs = policy->governor_data;
    +struct policy_dbs_info *policy_dbs;
    +
    +/* Protect gov->gdbs_data against cpufreq_dbs_governor_exit() */
    +mutex_lock(&gov_dbs_data_mutex);
    +policy_dbs = policy->governor_data;
    +if (!policy_dbs)
    +goto out;
    
    mutex_lock(&policy_dbs->update_mutex);
    cpufreq_policy_apply_limits(policy);
    gov_update_sample_delay(policy_dbs, 0);
    - mutex_unlock(&policy_dbs->update_mutex);
    +
    +out:
    +mutex_unlock(&gov_dbs_data_mutex);
    }
    EXPORT_SYMBOL_GPL(cpufreq_dbs_governor_limits);
```

mutex_destroy(&attr_set->update_lock);
+kobject_put(&attr_set->kobj);
return 0;
}
EXPORT_SYMBOL_GPL(gov_attr_set_put);
--- linux-4.15.0.orig/drivers/cpufreq/highbank-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/highbank-cpufreq.c
@@ -104,6 +104,13 @@
}
module_init(hb_cpufreq_driver_init);
+static const struct of_device_id __maybe_unused hb_cpufreq_of_match[] = {
+{ .compatible = "calxeda,highbank" },
+{ .compatible = "calxeda,ecx-2000" },
+{ },
+};
+MODULE_DEVICE_TABLE(of, hb_cpufreq_of_match);
+
MODULE_AUTHOR("Mark Langsdorf <mark.langsdorf@calxeda.com>");
MODULE_DESCRIPTION("Calxeda Highbank cpufreq driver");
MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/cpufreq/imx6q-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/imx6q-cpufreq.c
@@ -136,8 +136,13 @@
/* Ensure the arm clock divider is what we expect */
ret = clk_set_rate(arm_clk, new_freq * 1000);
if (ret) {
+int ret1;
+
+dev_err(cpu_dev, "failed to set clock rate: %d\n", ret);
-regulator_set_voltage_tol(arm_reg, volt_old, 0);
+ret1 = regulator_set_voltage_tol(arm_reg, volt_old, 0);
+if (ret1)
+dev_warn(cpu_dev,
+ "failed to restore vddarm voltage: %d\n", ret1);
return ret;
}
@@ -473,6 +478,7 @@
};
module_platform_driver(imx6q_cpufreq_platdrv);
+MODULE_ALIAS("platform:imx6q-cpufreq");
MODULE_AUTHOR("Shawn Guo <shawn.guo@linaro.org>");
MODULE_DESCRIPTION("Freescale i.MX6Q cpufreq driver");
MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/cpufreq/intel_pstate.c
static struct pstate_funcs pstate_funcs __read_mostly;

static int hwp_active __read_mostly;
+static int hwp_mode_bdw __read_mostly;
static bool per_cpu_limits __read_mostly;

static struct cpufreq_driver *intel_pstate_driver __read_mostly;

rdmsrl_on_cpu(cpu, MSR_HWP_CAPABILITIES, &cap);
-if (global.no_turbo)
+if (global.no_turbo || global.turbo_disabled)
  *current_max = HWP_GUARANTEED_PERF(cap);
else
  *current_max = HWP_HIGHEST_PERF(cap);
@@ -805,7 +811,7 @@
mutex_lock(&intel_pstate_limits_lock);

+static void intel_pstate_hwp_enable(struct cpudata *cpudata);
+
static int intel_pstate_resume(struct cpufreq_policy *policy)
{
  if (!hwp_active)
@@ -814,7 +820,7 @@
  static int intel_pstate_update_status(const char *buf, size_t size);
static ssize_t show_status(struct kobject *kobj,
    struct attribute *attr, char *buf)
{
    ssize_t ret;

    return ret;
}

-static ssize_t store_status(struct kobject *a, struct attribute *b,
+static ssize_t store_status(struct kobject *a, struct kobj_attribute *b,
    const char *buf, size_t count)
    {
        char *p = memchr(buf, '\n', count);
        return ret;
    }

static ssize_t show_turbo_pct(struct kobject *kobj,
    struct attribute *attr, char *buf)
{
    struct cpudata *cpu;
    int total, no_turbo, turbo_pct;

    char *p = memchr(buf, '\n', count);
    return ret;
}

static ssize_t show_num_pstates(struct kobject *kobj,
    struct attribute *attr, char *buf)
{
    struct cpudata *cpu;
    int total;

    char *p = memchr(buf, '\n', count);
    return ret;
}

static ssize_t show_no_turbo(struct kobject *kobj,
    struct attribute *attr, char *buf)
{
    ssize_t ret;

    char *p = memchr(buf, '\n', count);
    return ret;
}

-static ssize_t store_no_turbo(struct kobject *a, struct attribute *b,
+static ssize_t store_no_turbo(struct kobject *a, struct kobj_attribute *b,
const char *buf, size_t count)
{
unsigned int input;
@@ -929,7 +935,7 @@
update_turbo_state();
if (global.turbo_disabled) {
-printf("Turbo disabled by BIOS or unavailable on processor\n");
+printf("Turbo disabled by BIOS or unavailable on processor\n");
mutex_unlock(&intel_pstate_limits_lock);
mutex_unlock(&intel_pstate_driver_lock);
return -EPERM;
@@ -955,7 +961,7 @@
return count;
}

static ssize_t store_max_perf_pct(struct kobject *a, struct attribute *b,
const char *buf, size_t count)
{
unsigned int input;
@@ -985,7 +991,7 @@
return count;
}

-static ssize_t store_min_perf_pct(struct kobject *a, struct attribute *b,
+static ssize_t store_min_perf_pct(struct kobject *a, struct kobj_attribute *b,
const char *buf, size_t count)
{
unsigned int input;
@@ -1366,7 +1372,16 @@
cpu->pstate.turbo_pstate = pstate_funcs.get_turbo();
cpu->pstate.scaling = pstate_funcs.get_scaling();
cpu->pstate.max_freq = cpu->pstate.max_pstate * cpu->pstate.scaling;
-cpu->pstate.turbo_freq = cpu->pstate.turbo_pstate * cpu->pstate.scaling;
+if (hwp_active && !hwp_mode_bdw) {
+unsigned int phy_max, current_max;
++intel_pstate_get_hwp_max(cpu, &phy_max, &current_max);
+cpu->pstate.turbo_freq = phy_max * cpu->pstate.scaling;
+cpu->pstate.turbo_pstate = phy_max;
+} else {
+cpu->pstate.turbo_freq = cpu->pstate.turbo_pstate * cpu->pstate.scaling;
+}

if (pstate_funcs.get_aperf_mperf_shift)
cpu->aperf_mperf_shift = pstate_funcs.get_aperf_mperf_shift();
static const struct x86_cpu_id intel_pstate_cpu_ids[] = {
ICPU(INTEL_FAM6_SANDYBRIDGE, core_funcs),
ICPU(INTEL_FAM6_SANDYBRIDGE_X, core_funcs),
-ICPU(INTEL_FAM6_ATOM_SILVERMONT1, silvermont_funcs),
+ICPU(INTEL_FAM6_ATOM_SILVERMONT, silvermont_funcs),
ICPU(INTEL_FAM6_IVYBRIDGE, core_funcs),
ICPU(INTEL_FAM6_HASWELL_CORE, core_funcs),
ICPU(INTEL_FAM6_BROADWELL_CORE, core_funcs),
@@ -1628,7 +1643,7 @@
ICPU(INTEL_FAM6_XEON_PHI_KNL, knl_funcs),
ICPU(INTEL_FAM6_XEON_PHI_KNM, knl_funcs),
ICPU(INTEL_FAM6_ATOM_GOLDMONT, bxt_funcs),
-ICPU(INTEL_FAM6_ATOM_GEMINI_LAKE, bxt_funcs),
+ICPU(INTEL_FAM6_ATOM_GOLDMONT_PLUS, bxt_funcs),
};
MODULE_DEVICE_TABLE(x86cpu, intel_pstate_cpu_ids);

int ret;

@if (size == 3 && !strncmp(buf, "off", size))
-    return intel_pstate_driver ?
-        intel_pstate_unregister_driver() : -EINVAL;
+    if (!intel_pstate_driver)
+        return -EINVAL;
+    if (hwp_active)
+        return -EBUSY;
+    return intel_pstate_unregister_driver();
+
    if (size == 6 && !strncmp(buf, "active", size)) {
        if (intel_pstate_driver) {
            @@ -2174,6 +2195,18 @@
                return true;
            }

    +static bool __init intel_pstate_no_acpi_pcch(void)
    +{
        acpi_status status;
        acpi_handle handle;
        +
        status = acpi_get_handle(NULL, "\_SB", &handle);
        +if (ACPI_FAILURE(status))
return true;
+
+return !acpi_has_method(handle, "PCCH");
+
}
+
static bool __init intel_pstate_has_acpi_ppc(void)
{
    int i;
    @ -2233,7 +2266,10 @@

    switch (plat_info[idx].data) {
    case PSS:
        -return intel_pstate_no_acpi_pss();
        +if (!intel_pstate_no_acpi_pss())
            +return false;
        +
        +return intel_pstate_no_acpi_pcch();
    case PPC:
        return intel_pstate_has_acpi_ppc() && !force_load;
    }
    @ -2256,28 +2292,36 @@
    static inline void intel_pstate_request_control_from_smm(void) {}
#endif /* CONFIG_ACPI */

+#define INTEL_PSTATE_HWP_BROADWELL 0x01
+
+#define ICPU_HWP(model, hwp_mode) \
+	{ X86_VENDOR_INTEL, 6, model, X86_FEATURE_HWP, hwp_mode }
+
static const struct x86_cpu_id hwp_support_ids[] __initconst = {
    -{ X86_VENDOR_INTEL, 6, X86_MODEL_ANY, X86_FEATURE_HWP },
    +ICPU_HWP(INTEL_FAM6_BROADWELL_X, INTEL_PSTATE_HWP_BROADWELL),
    +ICPU_HWP(INTEL_FAM6_BROADWELL_XEON_D, INTEL_PSTATE_HWP_BROADWELL),
    +ICPU_HWP(X86_MODEL_ANY, 0),
    []
};

static int __init intel_pstate_init(void)
{
    +const struct x86_cpu_id *id;
    int rc;

    if (no_load)
        return -ENODEV;

    -if (x86_match_cpu(hwp_support_ids)) {
        +id = x86_match_cpu(hwp_support_ids);
        +if (id) {


copy_cpu_funcs(&core_funcs);
if (!no_hwp) {
    hwp_active++;
    +hwp_mode_bdw = id->driver_data;
    intel_pstate.attr = hwp_cpufreq_attrs;
    goto hwp_cpu_matched;
} else {
    -const struct x86_cpu_id *id;
    id = x86_match_cpu(intel_pstate_cpu_ids);
    if (id)
        return -ENODEV;
    --- linux-4.15.0.orig/drivers/cpufreq/kirkwood-cpufreq.c
    +++ linux-4.15.0/drivers/cpufreq/kirkwood-cpufreq.c
    @@ -124,13 +124,14 @@
        priv.cpu_clk = of_clk_get_by_name(np, "cpu_clk");
        if (IS_ERR(priv.cpu_clk)) {
            dev_err(priv.dev, "Unable to get cpuclk\n");
            -return PTR_ERR(priv.cpu_clk);
            +err = PTR_ERR(priv.cpu_clk);
            +goto out_node;
        }
        err = clk_prepare_enable(priv.cpu_clk);
        if (err) {
            dev_err(priv.dev, "Unable to prepare cpuclk\n");
            -return err;
            +goto out_node;
        }
        kirkwood_freq_table[0].frequency = clk_get_rate(priv.cpu_clk) / 1000;
        @@ -161,20 +162,22 @@
        goto out_ddr;
    }
    -of_node_put(np);
    -np = NULL;
    -err = cpufreq_register_driver(&kirkwood_cpufreq_driver);
    -if (!err)
    -    return 0;
    +if (err) {
    +    dev_err(priv.dev, "Failed to register cpufreq driver\n");
    +    goto out_powersave;
    +}
    -dev_err(priv.dev, "Failed to register cpufreq driver\n");
of_node_put(np);
return 0;

out_powersave:
clk_disable_unprepare(priv.powersave_clk);
out_ddr:
clk_disable_unprepare(priv.ddr_clk);
out_cpu:
clk_disable_unprepare(priv.cpu_clk);
out_node:
of_node_put(np);

return err;
--- linux-4.15.0.orig/drivers/cpufreq/longhaul.c
+++ linux-4.15.0/drivers/cpufreq/longhaul.c
@@ -775,7 +775,7 @@
    break;
case 7:
-   switch (c->x86_mask) {
+   switch (c->x86_stepping) {
    case 0:
        longhaul_version = TYPE_LONGHAUL_V1;
        cpu_model = CPU_SAMUEL2;
@@ -787,7 +787,7 @@
    break;
case 1 ... 15:
    longhaul_version = TYPE_LONGHAUL_V2;
-   if (c->x86_mask < 8) {
+   if (c->x86_stepping < 8) {
        cpu_model = CPU_SAMUEL2;
        cpuname = "C3 'Samuel 2' [C5B]";
    } else {
@@ -814,7 +814,7 @@
        numscales = 32;
        memcpy(mults, nehemiah_mults, sizeof(nehemiah_mults));
        memcpy(eblcr, nehemiah_eblcr, sizeof(nehemiah_eblcr));
-   switch (c->x86_mask) {
+   switch (c->x86_stepping) {
    case 0 ... 1:
        cpu_model = CPU_NEHEMIAH;
        cpuname = "C3 'Nehemiah A' [C5XLOE]";
@@ -894,7 +894,7 @@
        if ((longhaul_version != TYPE_LONGHAUL_V1) && (scale_voltage != 0))
            longhaul_setup_voltagescaling();
        -policy->cpuinfo.transition_latency = 200000; /* nsec */
+policy->transition_delay_us = 200000; /* usec */
return cpufreq_table_validate_and_show(policy, longhaul_table);
}
--- linux-4.15.0.orig/drivers/cpufreq/loongson1-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/loongson1-cpufreq.c
@@ -217,6 +217,7 @@
module_platform_driver(ls1x_cpufreq_platdrv);

+MODULE_ALIAS("platform:ls1x-cpufreq");
MODULE_AUTHOR("Kelvin Cheung <keguang.zhang@gmail.com>");
MODULE_DESCRIPTION("Loongson1 CPUFreq driver");
MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/cpufreq/mediatek-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/mediatek-cpufreq.c
@@ -582,6 +582,7 @@
};
+MODULE_DEVICE_TABLE(of, mtk_cpufreq_machines);

static int __init mtk_cpufreq_driver_init(void)
{
--- linux-4.15.0.orig/drivers/cpufreq/p4-clockmod.c
+++ linux-4.15.0/drivers/cpufreq/p4-clockmod.c
@@ -168,7 +168,7 @@
#endif
/* Errata workaround */
-\tcpuid = (c->x86 << 8) | (c->x86_model << 4) | c->x86_mask;
+\tcpuid = (c->x86 << 8) | (c->x86_model << 4) | c->x86_stepping;
switch (cpuid) {
case 0x0f07:
case 0x0f0a:
--- linux-4.15.0.orig/drivers/cpufreq/pasemi-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/pasemi-cpufreq.c
@@ -145,10 +145,19 @@
int err = -ENODEV;

cpu = of_get_cpu_node(policy->cpu, NULL);
-
+max_freqp = of_get_property(cpu, "clock-frequency", NULL);
+of_node_put(cpu);
+if (!max_freqp) {
+err = -EINVAL;
}
+goto out;
+
+/* we need the freq in kHz */
+max_freq = *max_freqp / 1000;
+
+dn = of_find_compatible_node(NULL, NULL, "1682m-sdc");
+if (!dn)
+    dn = of_find_compatible_node(NULL, NULL,
@@ -184,16 +193,6 @@
    pr_debug("init cpufreq on CPU %d\n", policy->cpu);
-
-max_freqp = of_get_property(cpu, "clock-frequency", NULL);
-if (!max_freqp) {
-    err = -EINVAL;
-    goto out_unmap_sdcpwr;
-}
-
-/* we need the freq in kHz */
-max_freq = *max_freqp / 1000;
-
-pr_debug("max clock-frequency is at %u kHz\n", max_freq);
-pr_debug("initializing frequency table\n");
@@ -211,9 +210,6 @@
    return cpufreq_generic_init(policy, pas_freqs, get_gizmo_latency());
-
-out_unmap_sdcpwr:
-out_unmap_sdcasr:
-iounmap(sdcpwr_mapbase);
-
-out_unmap_sdcasr:
-iounmap(sdcasr_mapbase);
-out:
--- linux-4.15.0.orig/drivers/cpufreq/pcc-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/pcc-cpufreq.c
@@ -580,6 +580,10 @@
    int ret;

+/* Skip initialization if another cpufreq driver is there. */
+if (cpufreq_get_current_driver())
+    return 0;
+
+if (acpi_disabled)
    return 0;
volt_gpio_np = of_find_node_by_name(NULL, "cpu-vcore-select");
if (volt_gpio_np)
    voltage_gpio = read_gpio(volt_gpio_np);
+of_node_put(volt_gpio_np);
if (!voltage_gpio){
    pr_err("missing cpu-vcore-select gpio\n");
    return 1;
}@
-volt_gpio_np
voltage_gpio = read_gpio(volt_gpio_np);
+of_node_put(volt_gpio_np);
pvr = mfspr(SPRN_PVR);
has_cpu_l2lve = !((pvr & 0xf00) == 0x100);

	if ((c->x86_model == 6) && (c->x86_mask == 0)) {
+if ((c->x86_model == 6) && (c->x86_stepping == 0)) {
    pr_info("K7 660[A0] core detected, enabling errata workarounds\n");
    have_a0 = 1;
}@
--- linux-4.15.0.orig/drivers/cpufreq/powernow-k8.c
+++ linux-4.15.0/drivers/cpufreq/powernow-k8.c
@@ -921,9 +921,6 @@
freqs.old = find_khz_freq_from_fid(data->currfid);
freqs.new = find_khz_freq_from_fid(fid);

/* Take a frequency, and issue the fid/vid transition command */
static int transition_frequency_fidvid(struct powernow_k8_data *data,
-unsigned int index)
+unsigned int index,
+struct cpufreq_policy *policy)
{
-struct cpufreq_policy *policy;
+struct cpufreq_policy *policy;
    u32 fid = 0;
    u32 vid = 0;
    int res;
@@ -921,6 +921,9 @@
freqs.old = find_khz_freq_from_fid(data->currfid);
freqs.new = find_khz_freq_from_fid(fid);
policy = cpufreq_cpu_get(smp_processor_id());
cpufreq_cpu_put(policy);
-
cpufreq_freq_transition_begin(policy, &freqs);
res = transition_fid_vid(data, fid, vid);
cpufreq_freq_transition_end(policy, &freqs, res);
@@ -978,7 +975,7 @@
powernow_k8_acpi_pst_values(data, newstate);
-ret = transition_frequency_fidvid(data, newstate);
+ret = transition_frequency_fidvid(data, newstate, pol);

if (ret) {
    pr_err("transition frequency failed\n");
--- linux-4.15.0.orig/drivers/cpufreq/powernv-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/powernv-cpufreq.c
@@ -41,11 +41,10 @@
#define POWERNV_MAX_PSTATES	256
#define PMSR_PSAFE_ENABLE	(1UL << 30)
#define PMSR_SPR_EM_DISABLE	(1UL << 31)
-#define PMSR_MAX(x)		((x >> 32) & 0xFF)
+#define MAX_PSTATE_SHIFT	32
#define LPSTATE_SHIFT		48
#define GPSTATE_SHIFT		56
-#define GET_LPSTATE(x)		(((x) >> LPSTATE_SHIFT) & 0xFF)
-#define GET_GPSTATE(x)		(((x) >> GPSTATE_SHIFT) & 0xFF)
+#define MAX_NR_CHIPS		32
#define MAX_RAMP_DOWN_TIME				5120
/*
@@ -94,6 +93,7 @@
    
static struct cpufreq_frequency_table powernv_freqs[POWERNV_MAX_PSTATES+1];
+u32 pstate_sign_prefix;
static bool rebooting, throttled, occ_reset;

static const char * const throttle_reason[] = {
    
    bool wof_enabled;
    } powernv_pstate_info;

+static inline int extract_pstate(u64 pmsr_val, unsigned int shift)
+{
+    int ret = ((pmsr_val >> shift) & 0xFF);
+    +if (!ret)
+return ret;
+
+return (pstate_sign_prefix | ret);
+
+#define extract_local_pstate(x) extract_pstate(x, LPSTATE_SHIFT)
+#define extract_global_pstate(x) extract_pstate(x, GPSTATE_SHIFT)
+#define extract_max_pstate(x) extract_pstate(x, MAX_PSTATE_SHIFT)
+
/* Use following macros for conversions between pstate_id and index */
static inline int idx_to_pstate(unsigned int i)
{
@@ -278,6 +292,9 @@
    powernv_pstate_info.nr_pstates = nr_pstates;
    pr_debug("NR PStates %d\n", nr_pstates);
    +
    +pstate_sign_prefix = pstate_min & ~0xFF;
    +
    for (i = 0; i < nr_pstates; i++) {
        u32 id = be32_to_cpu(pstate_ids[i]);
        u32 freq = be32_to_cpu(pstate_freqs[i]);
        @@ -288,9 +305,9 @@
            if (id == pstate_max)
                powernv_pstate_info.max = i;
            -else if (id == pstate_nominal)
                +if (id == pstate_nominal)
                    powernv_pstate_info.nominal = i;
            -else if (id == pstate_min)
                +if (id == pstate_min)
                    powernv_pstate_info.min = i;
                if (powernv_pstate_info.wof_enabled && id == pstate_turbo) {
                    @@ -438,17 +455,10 @@
            static void powernv_read_cpu_freq(void *arg)
            {
                unsigned long pmspr_val;
                -s8 local_pstate_id;
                struct powernv_smp_call_data *freq_data = arg;

                pmspr_val = get_pmspr(SPRN_PMSR);
                -
                /*
                - * The local pstate id corresponds bits 48..55 in the PMSR.
                - * Note: Watch out for the sign!
                - */
                -local_pstate_id = (pmspr_val >> 48) & 0xFF;


freq_data->pstate_id = local_pstate_id;
+freq_data->pstate_id = extract_local_pstate(pmspr_val);
freq_data->freq = pstate_id_to_freq(freq_data->pstate_id);

pr_debug("cpu %d pmsr %016lX pstate_id %d frequency %d kHz\n",
@@ -522,7 +532,7 @@
chip = this_cpu_read(chip_info);

/* Check for Pmax Capping */
-pmsr_pmax = (s8)PMSR_MAX(pmsr);
+pmsr_pmax = extract_max_pstate(pmsr);
pmsr_pmax_idx = pstate_to_idx(pmsr_pmax);
if (pmsr_pmax_idx != powernv_pstate_info.max) {
  if (chip->throttled)
@@ -638,6 +648,16 @@
            if (!cpumask_test_cpu(raw_smp_processor_id(), policy->cpus)) {
                gpstates->timer.expires = jiffies + msecs_to_jiffies(1);
                add_timer_on(&gpstates->timer, cpumask_first(policy->cpus));
+              spin_unlock(&gpstates->gpstate_lock);
+              return;
+            }
+        }

/*
 * If PMCR was last updated was using fast_swtich then
@@ -645,8 +665,8 @@
 * value. Hence, read from PMCR to get correct data.
 */
val = get_pmspr(SPRN_PMCR);
-freq_data.gpstate_id = (s8)GET_GPSTATE(val);
-freq_data.pstate_id = (s8)GET_LPSTATE(val);
+freq_data.gpstate_id = extract_global_pstate(val);
+freq_data.pstate_id = extract_local_pstate(val);
if (freq_data.gpstate_id  == freq_data.pstate_id) {
  reset_gpstates(policy);
  spin_unlock(&gpstates->gpstate_lock);
@@ -677,10 +697,8 @@
  queue_gpstate_timer(gpstates);
+  set_pstate(&freq_data);
  spin_unlock(&freq_data);

-/* Timer may get migrated to a different cpu on cpu hot unplug */
smp_call_function_any(policy->cpus, set_pstate, &freq_data, 1);
}
/
@@ -830,12 +848,15 @@
unsigned long action, void *unused)
{
    int cpu;
-struct cpufreq_policy cpu_policy;
+struct cpufreq_policy *cpu_policy;

    rebooting = true;
    for_each_online_cpu(cpu) {
-        cpufreq_get_policy(&cpu_policy, cpu);
-        powernv_cpufreq_target_index(&cpu_policy, get_nominal_index());
+        cpu_policy = cpufreq_cpu_get(cpu);
+        if (!cpu_policy)
+            continue;
+        powernv_cpufreq_target_index(cpu_policy, get_nominal_index());
+        cpufreq_cpu_put(cpu_policy);
    }

    return NOTIFY_DONE;
@@ -848,6 +869,7 @@
void powernv_cpufreq_work_fn(struct work_struct *work)
{
    struct chip *chip = container_of(work, struct chip, throttle);
+    struct cpufreq_policy *policy;
    unsigned int cpu;
    cpumask_t mask;

@@ -862,12 +884,14 @@
chip->restore = false;
    for_each_cpu(cpu, &mask) {
        int index;
-            struct cpufreq_policy policy;
-            cpufreq_get_policy(&policy, cpu);
-            index = cpufreq_table_find_index_c(&policy, policy->cur);
-            powernv_cpufreq_target_index(&policy, index);
-            cpumask_andnot(&mask, &mask, policy->cpus);
+            policy = cpufreq_cpu_get(cpu);
+            if (!policy)
+                continue;
+            index = cpufreq_table_find_index_c(policy, policy->cur);
+            powernv_cpufreq_target_index(policy, index);
static int init_chip_info(void)
{
    unsigned int chip[256];
    unsigned int *chip;
    unsigned int cpu, i;
    unsigned int prev_chip_id = UINT_MAX;
    cpumask_t *chip_cpu_mask;
    int ret = 0;
    
    chip = kcalloc(num_possible_cpus(), sizeof(*chip), GFP_KERNEL);
    if (!chip)
        return -ENOMEM;
    
    /* Allocate a chip cpu mask large enough to fit mask for all chips */
    chip_cpu_mask = kcalloc(MAX_NR_CHIPS, sizeof(cpumask_t), GFP_KERNEL);
    if (!chip_cpu_mask) {
        ret = -ENOMEM;
        goto free_and_return;
    }
    
    for_each_possible_cpu(cpu) {
        unsigned int id = cpu_to_chip_id(cpu);
        prev_chip_id = id;
        chip[nr_chips++] = id;
        
        cpumask_set_cpu(cpu, &chip_cpu_mask[nr_chips-1]);
    }
    
    chips = kcalloc(nr_chips, sizeof(struct chip), GFP_KERNEL);
    if (!chips)
        return -ENOMEM;
    
    for (i = 0; i < nr_chips; i++) {
        chips[i].id = chip[i];
        cpumask_copy(&chips[i].mask, cpumask_of_node(chip[i]));
        cpumask_copy(&chips[i].mask, &chip_cpu_mask[i]);
INIT_WORK(&chips[i].throttle, powernv_cpufreq_work_fn);
for_each_cpu(cpu, &chips[i].mask)
per_cpu(chip_info, cpu) = &chips[i];
}

-return 0;
+out_free_chip_cpu_mask:
+kfree(chip_cpu_mask);
+free_and_return:
+kfree(chip);
+return ret;
}

static inline void clean_chip_info(void)
{
+int i;
+
+/* flush any pending work items */
+if (chips)
+for (i = 0; i < nr_chips; i++)
+kfree(chips[i].throttle);
kfree(chips);
}

--- linux-4.15.0.orig/drivers/cpufreq/ppc_cbe_cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/ppc_cbe_cpufreq.c
@@ -86,6 +86,7 @@
if (!cbe_get_cpu_pmd_regs(policy->cpu) ||
    !cbe_get_cpu_mic_tm_regs(policy->cpu)) {
    pr_info("invalid CBE regs pointers for cpufreq\n");
    of_node_put(cpu);
    return -EINVAL;
}

--- linux-4.15.0.orig/drivers/cpufreq/pxa2xx-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/pxa2xx-cpufreq.c
@@ -143,7 +143,7 @@
return ret;
}

-static void __init pxa_cpufreq_init_voltages(void)
+static void pxa_cpufreq_init_voltages(void)
{
    vcc_core = regulator_get(NULL, "vcc_core");
    if (IS_ERR(vcc_core)) {
        return 0;
    }

-
static void __init pxa_cpufreq_init_voltages(void) { }
+static void pxa_cpufreq_init_voltages(void) { }
#endif

static void find_freq_tables(struct cpufreq_frequency_table *freq_table,
--- linux-4.15.0.orig/drivers/cpufreq/s3c24xx-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/s3c24xx-cpufreq.c
@@ -351,7 +351,13 @@
static int s3c_cpufreq_init(struct cpufreq_policy *policy)
{ }
    policy->clk = clk_arm;
    -return cpufreq_generic_init(policy, ftab, cpu_cur.info->latency);
+    +policy->cpufreq_transition_latency = cpu_cur.info->latency;
+    +if (ftab)
+    +return cpufreq_table_validate_and_show(policy, ftab);
+    +return 0;
}

static int __init s3c_cpufreq_initclks(void)
--- linux-4.15.0.orig/drivers/cpufreq/scpi-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/scpi-cpufreq.c
@@ -85,6 +85,7 @@
};
module_platform_driver(scpi_cpufreq_platdrv);

+MODULE_ALIAS("platform:scpi-cpufreq");
MODULE_AUTHOR("Sudeep Holla <sudeep.holla@arm.com>");
MODULE_DESCRIPTION("ARM SCPI CPUFreq interface driver");
MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/cpufreq/speedstep-centrino.c
+++ linux-4.15.0/drivers/cpufreq/speedstep-centrino.c
@@ -37,7 +37,7 @@
{ __u8(x86; /* CPU family */
    __u8(x86_model; /* model */
    -__u8(x86_mask; /* stepping */
+__u8(x86_stepping; /* stepping */
    );

enum { }
    @ @ -277,7 +277,7 @ @
    { if ((c->x86 == x->x86) &&
        (c->x86_model == x->x86_model) &&
        (c->x86_stepping == x->x86_stepping) &&

- (c->x86_mask == x->x86_mask))
+ (c->x86_stepping == x->x86_stepping))
    return 1;
    return 0;
}
--- linux-4.15.0.orig/drivers/cpufreq/speedstep-lib.c
+++ linux-4.15.0/drivers/cpufreq/speedstep-lib.c
@@ -272,9 +272,9 @@
    ebx = cpuid_ebx(0x00000001);
    ebx &= 0x000000FF;
    -pr_debug("ebx value is %x, x86_mask is %x\n", ebx, c->x86_mask);
    +pr_debug("ebx value is %x, x86_stepping is %x\n", ebx, c->x86_stepping);
    switch (c->x86_mask) {
    +switch (c->x86_stepping) {
        case 4:
        /*
         * B-stepping [M-P4-M]
         */
@@ -361,7 +361,7 @@
            if (c->x86_mask == 0x01) {
                pr_debug("early PIII version\n");
                return SPEEDSTEP_CPU_PIII_C_EARLY;
            } else
            -- linux-4.15.0.orig/drivers/cpufreq/sti-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/sti-cpufreq.c
@@ -144,7 +144,8 @@
 static const struct reg_field *sti_cpufreq_match(void) {
             if (of_machine_is_compatible("st,stih407") ||
             -of_machine_is_compatible("st,stih410") ||
             +of_machine_is_compatible("st,stih410") ||
             +of_machine_is_compatible("st,stih418") ||
             return sti_stih407_dvfs_regfields;
@@ -261,7 +262,8 @@
 int ret;
    if (!of_machine_is_compatible("st,stih407") &&
    !of_machine_is_compatible("st,stih410") &&
-!of_machine_is_compatible("st,stih418"))
+!of_machine_is_compatible("st,stih418")
    return -ENODEV;

ddata.cpu = get_cpu_device(0);
@@ -293,6 +295,13 @@
 }
 module_init(sti_cpufreq_init);

+static const struct of_device_id __maybe_unused sti_cpufreq_of_match[] = {
+    { .compatible = "st,stih407" },
+    { .compatible = "st,stih410" },
+    { },
+};
+MODULE_DEVICE_TABLE(of, sti_cpufreq_of_match);
+
MODULE_DESCRIPTION("STMicroelectronics CPUFreq/OPP driver");
MODULE_AUTHOR("Ajitpal Singh <ajitpal.singh@st.com>");
MODULE_AUTHOR("Lee Jones <lee.jones@linaro.org>");
--- linux-4.15.0.orig/drivers/cpufreq/tegra124-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/tegra124-cpufreq.c
@@ -134,6 +134,8 @@
 platform_set_drvdata(pdev, priv);

+of_node_put(np);
+
return 0;

out_switch_to_pll:
--- linux-4.15.0.orig/drivers/cpufreq/ti-cpufreq.c
+++ linux-4.15.0/drivers/cpufreq/ti-cpufreq.c
@@ -218,7 +218,7 @@
 opp_data->cpu_dev = get_cpu_device(0);
 if (!opp_data->cpu_dev) {
     pr_err("%s: Failed to get device for CPU0\n", __func__); 
-    ret = ENODEV;
+    ret = -ENODEV;
    goto free_opp_data;
 }

--- linux-4.15.0.orig/drivers/cpuidle/cpuidle-big_little.c
+++ linux-4.15.0/drivers/cpuidle/cpuidle-big_little.c
@@ -167,6 +167,7 @@
 {
     int ret;
     struct device_node *root = of_find_node_by_path("/");
+    const struct_device_id *match_id;
 }

    if (!root)
        return -ENODEV;
/*
* Initialize the driver just for a compliant set of machines
*
- if (!of_match_node(compatible_machine_match, root))
+ of_node_put(root);
+ if (!match_id)
   return -ENODEV;

if (!mcpm_is_available())
--- linux-4.15.0.orig/drivers/cpuidle/cpuidle-powernv.c
+++ linux-4.15.0/drivers/cpuidle/cpuidle-powernv.c
@@ -43,9 +43,31 @@
 static struct stop_psscr_table stop_psscr_table[CPUIDLE_STATE_MAX] __read_mostly;

 static u64 snooze_timeout __read_mostly;
+static u64 default_snooze_timeout __read_mostly;
 static bool snooze_timeout_en __read_mostly;

+static u64 get_snooze_timeout(struct cpuidle_device *dev,
+      struct cpuidle_driver *drv,
+      int index)
+{
+    int i;
+    +if (unlikely(!snooze_timeout_en))
+      return default_snooze_timeout;
+    +for (i = index + 1; i < drv->state_count; i++) {
+      struct cpuidle_state *s = &drv->states[i];
+      struct cpuidle_state_usage *su = &dev->states_usage[i];
+      +if (s->disabled || su->disable)
+        continue;
+      +return s->target_residency * tb_ticks_per_usec;
+    +}
+    +return default_snooze_timeout;
+  }
+  +return snooze_loop(struct cpuidle_device *dev,
+struct cpuidle_driver *drv,
+  int index)
local_irq_enable();

-snooze_exit_time = get_tb() + snooze_timeout;
+snooze_exit_time = get_tb() + get_snooze_timeout(dev, drv, index);
ppc64_runlatch_off();
HMT_very_low();
while (!need_resched()) {
@@ -463,11 +485,9 @@
cpuidle_state_table = powernv_states;
/* Device tree can indicate more idle states */
max_idle_state = powernv_add_idle_states();
-if (max_idle_state > 1) {
+default_snooze_timeout = TICK_USEC * tb_ticks_per_usec;
+if (max_idle_state > 1)
  snooze_timeout_en = true;
-snooze_timeout = powernv_states[1].target_residency *
- tb_ticks_per_usec;
-}
} else
  return -ENODEV;

--- linux-4.15.0.orig/drivers/cpuidle/cpuidle-pseries.c
+++ linux-4.15.0/drivers/cpuidle/cpuidle-pseries.c
@@ -239,7 +239,13 @@
if (firmware_has_feature(FW_FEATURE_SPLPAR)) {
-if (lppaca_shared_proc(get_lppaca())) {
+/*
+ * Use local_paca instead of get_lppaca() since
+ * preemption is not disabled, and it is not required in
+ * fact, since lppaca_ptr does not need to be the value
+ * associated to the current CPU, it can be from any CPU.
+ */
+if (lppaca_shared_proc(local_paca->lppaca_ptr)) {
  cpuidle_state_table = shared_states;
  max_idle_state = ARRAY_SIZE(shared_states);
} else {
--- linux-4.15.0.orig/drivers/cpuidle/cpuidle.c
+++ linux-4.15.0/drivers/cpuidle/cpuidle.c
@@ -144,7 +144,8 @@
* stop_critical_timings();
drv->states[index].enter_s2idle(dev, drv, index);
-WARN_ON(!irqs_disabled());
+if (WARN_ON_ONCE(!irqs_disabled()))

+local_irq_disable();
/*
 * timekeeping_resume() that will be called by tick_unfreeze() for the
 * first CPU executing it calls functions containing RCU read-side
--- linux-4.15.0.orig/drivers/cpuidle/driver.c
+++ linux-4.15.0/drivers/cpuidle/driver.c
@@ -62,24 +62,23 @@
 */
static inline int __cpuidle_set_driver(struct cpuidle_driver *drv)
{
  int cpu;
  for_each_cpu(cpu, drv->cpumask) {
+    struct cpuidle_driver *old_drv;
    if (__cpuidle_get_cpu_driver(cpu)) {
-      __cpuidle_unset_driver(drv);
+      old_drv = __cpuidle_get_cpu_driver(cpu);
+      if (old_drv && old_drv != drv)
          return -EBUSY;
-    }
    for_each_cpu(cpu, drv->cpumask)
      per_cpu(cpuidle_drivers, cpu) = drv;
  } return 0;
}
--- linux-4.15.0.orig/drivers/cpuidle/sysfs.c
+++ linux-4.15.0/drivers/cpuidle/sysfs.c
@@ -414,7 +414,7 @@
 ret = kobject_init_and_add(&kobj->kobj, &ktype_state_cpuidle,
                           &kdev->kobj, "state%d", i);
 if (ret) {
-    kfree(kobj);
+    kobject_put(&kobj->kobj);
   goto error_state;
 }
kobject_uevent(&kobj->kobj, KOBJ_ADD);
@@ -544,7 +544,7 @@
    ret = kobject_init_and_add(&kdrv->kobj, &ktype_driver_cpuidle,
        &kdev->kobj, "driver");
    if (ret) {
        -kfree(kdrv);
+        kobject_put(&kdrv->kobj);
        return ret;
    }

@@ -638,7 +638,7 @@
    error = kobject_init_and_add(&kdev->kobj, &ktype_cpuidle, &cpu_dev->kobj,
        "cpuidle");
    if (error) {
        -kfree(kdev);
+        kobject_put(&kdev->kobj);
        return error;
    }

--- linux-4.15.0.orig/drivers/crypto/Kconfig
+++ linux-4.15.0/drivers/crypto/Kconfig
@@ -681,6 +681,7 @@
 depends on ARCH_BCM_IPROC
 depends on MAILBOX
 default m
+select CRYPTO_AUTHENC
 select CRYPTO_DES
 select CRYPTO_MD5
 select CRYPTO_SHA1
@@ -723,7 +724,6 @@
 select CRYPTO_SHA256
 -select CRYPTO_SHA384
 select CRYPTO_SHA512
 help
    Enables the driver for the on-chip crypto accelerator
--- linux-4.15.0.orig/drivers/crypto/amcc/crypto4xx_alg.c
+++ linux-4.15.0/drivers/crypto/amcc/crypto4xx_alg.c
@@ -134,8 +134,10 @@
      -SA_LOAD_HASH_FROM_SA, SA_LOAD_IV_FROM_STATE,
      +set_dynamic_sa_command_0(sa, SA_NOT_SAVE_HASH, (cm == CRYPTO_MODE_ECB ?
      +SA_NOT_SAVE_IV : SA_SAVE_IV),
      +SA_NOT_LOAD_HASH, (cm == CRYPTO_MODE_ECB ?


memcpy(ctx->sa_out, ctx->sa_in, ctx->sa_len * 4);
sa = ctx->sa_out;

/*
 * SA_OPCODE_ENCRYPT is the same value as SA_OPCODE_DECRYPT.
 * it's the DIR_(IN|OUT)BOUND that matters
 */
+ * SA_OPCODE_ENCRYPT is the same value as SA_OPCODE_DECRYPT.
+ * it's the DIR_(IN|OUT)BOUND that matters
+ */
+sa->sa_command_0.bf.opcode = SA_OPCODE_ENCRYPT;

return 0;
}
@@ -256,10 +263,6 @@
 if (is_ccm && !(req->iv[0] == 1 || req->iv[0] == 3))
 return true;

-/* CCM - fix CBC MAC mismatch in special case */
- if (is_ccm && decrypt && !req->assoclen)
- return true;
-
 return false;
}
@@ -330,7 +333,7 @@
 sa = (struct dynamic_sa_ctl *) ctx->sa_in;
sa->sa_contents.w = SA_AES_CCM_CONTENTS | (keylen << 2);

-set_dynamic_sa_command_0(sa, SA_NOT_SAVE_HASH, SA_NOT_SAVE_IV,
 +set_dynamic_sa_command_0(sa, SA_SAVE_HASH, SA_NOT_SAVE_IV,
 SA_LOAD_HASH_FROM_SA, SA_LOAD_IV_FROM_STATE,
 SA_NO_HEADER_PROC, SA_HASH_ALG_CBC_MAC,
 SA_CIPHER_ALG_AES,
--- linux-4.15.0.orig/drivers/crypto/amcc/crypto4xx_core.c
+++ linux-4.15.0/drivers/crypto/amcc/crypto4xx_core.c
 @@ -367,12 +367,8 @@
 dma_alloc_coherent(dev->core_dev->device,
 PPC4XX_SD_BUFFER_SIZE * PPC4XX_NUM_SD,
 &dev->scatter_buffer_pa, GFP_ATOMIC);
- if (!dev->scatter_buffer_va) {
- dma_free_coherent(dev->core_dev->device,
- sizeof(struct ce_sd) * PPC4XX_NUM_SD,
- dev->sdr, dev->sdr_pa);
+ if (!dev->scatter_buffer_va)
 return -ENOMEM;
for (i = 0; i < PPC4XX_NUM_SD; i++) {
    dev->sdr[i].ptr = dev->scatter_buffer_pa +
    @ @ -541,6 +537,15 @@
    addr = dma_map_page(dev->core_dev->device, sg_page(dst),
        dst->offset, dst->length, DMA_FROM_DEVICE);
}
+
+if (pd_uinfo->sa_va->sa_command_0.bf.save_iv == SA_SAVE_IV) {
  +struct crypto_skcipher *skcipher = crypto_skcipher_reqtfm(req);
  +crypto4xx_memcpy_from_le32((u32 *)req->iv,
        pd_uinfo->sr_va->save_iv,
        crypto_skcipher_ivsize(skcipher));
  +}
+
crypto4xx_ret_sg_desc(dev, pd_uinfo);

if (pd_uinfo->state & PD_ENTRY_BUSY)
    @ @ -570,15 +575,14 @@
    struct pd_uinfo *pd_uinfo,
    struct ce_pd *pd)
{
-struct aead_request *aead_req;
-struct crypto4xx_ctx *ctx;
+struct aead_request *aead_req = container_of(pd_uinfo->async_req,
    +struct aead_request, base);
    struct scatterlist *dst = pd_uinfo->dest_va;
    +size_t cp_len = crypto_aead_authsize(
    +crypto_aead_reqtfm(aead_req));
    +u32 icv[cp_len];
int err = 0;

-aead_req = container_of(pd_uinfo->async_req, struct aead_request, 
    -base);
-ctx = crypto_tfm_ctx(aead_req->base.tfm);
-
    if (pd_uinfo->using_sd) {
        crypto4xx_copy_pkt_to_dst(dev, pd, pd_uinfo,
            pd->pd_ctl_len.bf.pkt_len,
            @ @ -590,38 +594,39 @@
        if (pd_uinfo->sa_va->sa_command_0.bf.dir == DIR_OUTBOUND) {
            /* append icv at the end */
            -size_t cp_len = crypto_aead_authsize(
                -crypto_aead_reqtfm(aead_req));
            -u32 icv[cp_len];

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crypto4xx_memcpy_from_le32(icv, pd_uinfo->sr_va->save_digest, cp_len);

scatterwalk_map_and_copy(icv, dst, aead_req->cryptlen, cp_len, 1);
} else {

/* check icv at the end */
scatterwalk_map_and_copy(icv, aead_req->src, aead_req->assoclen + aead_req->cryptlen - cp_len, cp_len, 0);
+
crypto4xx_memcpy_from_le32(icv, icv, cp_len);
+
if (crypto_memneq(icv, pd_uinfo->sr_va->save_digest, cp_len))
+err = -EBADMSG;
}
crypto4xx_ret_sg_desc(dev, pd_uinfo);

if (pd->pd_ctl.bf.status & 0xff) {
-if (pd->pd_ctl.bf.status & 0x1) {
-/* authentication error */
-err = -EBADMSG;
-} else {
-if (!__ratelimit(&dev->aead_ratelimit)) {
-if (pd->pd_ctl.bf.status & 2)
-pr_err("pad fail error\n");
-if (pd->pd_ctl.bf.status & 4)
-pr_err("seqnum fail\n");
-if (pd->pd_ctl.bf.status & 8)
-pr_err("error _notify\n");
-pr_err("aead return err status = 0x%02x\n", pd->pd_ctl.bf.status & 0xff);
-pr_err("pd pad_ctl = 0x%08x\n", pd->pd_ctl.bf.pd_pad_ctl);
-}
-err = -EINVAL;
+if (!__ratelimit(&dev->aead_ratelimit)) {
+if (pd->pd_ctl.bf.status & 2)
+pr_err("pad fail error\n");
+if (pd->pd_ctl.bf.status & 4)
+pr_err("seqnum fail\n");
+if (pd->pd_ctl.bf.status & 8)
+pr_err("error _notify\n");
+pr_err("aead return err status = 0x%02x\n", pd->pd_ctl.bf.status & 0xff);
+pr_err("pd pad_ctl = 0x%08x\n", pd->pd_ctl.bf.pd_pad_ctl);
if (pd_uinfo->state & PD_ENTRY_BUSY)
@@ -699,7 +704,23 @@
size_t offset_to_sr_ptr;
 u32 gd_idx = 0;
 int tmp;
 -bool is_busy;
 +bool is_busy, force_sd;
 +
 +/**
 + * There's a very subtle/disguised "bug" in the hardware that
 + * gets indirectly mentioned in 18.1.3.5 Encryption/Decryption
 + * of the hardware spec:
 + * *drum roll* the AES/(T)DES OFB and CFB modes are listed as
 + * operation modes for >>> "Block ciphers" <<<.
 + *
 + * To workaround this issue and stop the hardware from causing
 + * "overran dst buffer" on crypttexts that are not a multiple
 + * of 16 (AES_BLOCK_SIZE), we force the driver to use the
 + * scatter buffers.
 + */
 +force_sd = (req_sa->sa_command_1.bf.crypto_mode9_8 == CRYPTO_MODE_CFB
 +|| req_sa->sa_command_1.bf.crypto_mode9_8 == CRYPTO_MODE_OFB)
 +&& (datalen % AES_BLOCK_SIZE);
 +
 /* figure how many gd are needed */
tmp = sg_nents_for_len(src, assoclen + datalen);
@@ -717,7 +738,7 @@
} /* figure how many sd are needed */
- if (sg_is_last(dst)) {
+ if (sg_is_last(dst) && force_sd == false) {
    num_sd = 0;
 } else {
    if (datalen > PPC4XX_SD_BUFFER_SIZE) {
@@ -792,9 +813,10 @@
pd->sa_len = sa_len;
 pd_uinfo = &dev->pdr_uinfo[pd_entry];
 -pd_uinfo->async_req = req;
 pd_uinfo->num_gd = num_gd;
 pd_uinfo->num_sd = num_sd;
 +pd_uinfo->dest_va = dst;
+pd_uinfo->async_req = req;

if (iv_len)
    memcpy(pd_uinfo->sr_va->save_iv, iv, iv_len);
@@ -813,7 +835,6 @@
    /* get first gd we are going to use */
    gd_idx = fst_gd;
    pd_uinfo->first_gd = fst_gd;
-   pd_uinfo->num_gd = num_gd;
    gd = crypto4xx_get_gdp(dev, &gd_dma, gd_idx);
    pd->src = gd_dma;
    /* enable gather */
@@ -850,17 +871,14 @@
    * Indicate gather array is not used
    */
    pd_uinfo->first_gd = 0xffffffff;
-   pd_uinfo->num_gd = 0;
}
-if (sg_is_last(dst)) {
+if (!num_sd) {
/*
    * we know application give us dst a whole piece of memory
    * no need to use scatter ring.
    */
    pd_uinfo->using_sd = 0;
    pd_uinfo->first_sd = 0xffffffff;
-   pd_uinfo->num_sd = 0;
    sa->sa_command_0.bf.scatter = 0;
    pd->dest = (u32)dma_map_page(dev->core_dev->device, sg_page(dst), dst->offset,
@@ -874,9 +892,7 @@
    nbytes = datalen;
    sa->sa_command_0.bf.scatter = 1;
    pd_uinfo->using_sd = 1;
-   pd_uinfo->dest_va = dst;
    pd_uinfo->first_sd = fst_sd;
-   pd_uinfo->num_sd = num_sd;
    sd = crypto4xx_get_sdp(dev, &sd_dma, sd_idx);
    pd->dest = sd_dma;
    /* setup scatter descriptor */
@@ -906,7 +922,7 @@
    pd->pd_ctl.w = PD_CTL_HOST_READY |
-((crypto_tfm_alg_type(req->tfm) == CRYPTO_ALG_TYPE_AHASH) |
+((crypto_tfm_alg_type(req->tfm) == CRYPTO_ALG_TYPE_AHASH) ||
 (crypto_tfm_alg_type(req->tfm) == CRYPTO_ALG_TYPE_AEAD) ?

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/* Find the TRNG device node and map it */
trng = of_find_matching_node(NULL, ppc4xx_trng_match);
- if (!trng || !of_device_is_available(trng))
+ if (!trng || !of_device_is_available(trng)) {
+ of_node_put(trng);
+ return;
+ }

dev->trng_base = of_iomap(trng, 0);
of_node_put(trng);
@@ -109,7 +111,6 @@
return;

err_out:
- of_node_put(trng);
iounmap(dev->trng_base);
kfree(rng);
dev->trng_base = NULL;
--- linux-4.15.0.orig/drivers/crypto/amcc/crypto4xx_trng.h
+++ linux-4.15.0/drivers/crypto/amcc/crypto4xx_trng.h
@@ -26,9 +26,9 @@
void ppc4xx_trng_remove(struct crypto4xx_core_device *core_dev);
#else
static inline void ppc4xx_trng_probe(
- struct crypto4xx_device *dev __maybe_unused) { }
+ struct crypto4xx_device *dev __maybe_unused) { }
static inline void ppc4xx_trng_remove(
- struct crypto4xx_device *dev __maybe_unused) { }
+ struct crypto4xx_device *dev __maybe_unused) { }
#endif

#endif
--- linux-4.15.0.orig/drivers/crypto/atmel-aes.c
+++ linux-4.15.0/drivers/crypto/atmel-aes.c
@@ -91,7 +91,6 @@
struct atmel_aes_caps {
 bool has_dubuff;
 bool cf64;
- bool has_ctr32;
 bool gc;
 bool xts;
 bool authenc;

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u32 key2[AES_KEYSIZE_256 / sizeof(u32)];
;
-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+## IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
struct atmel_aes_authenc_ctx {
struct atmel_aes_base_ctx base;
struct atmel_sha_authenc_ctx*auth;
-@ -160,7 +159,7 @@
u32 lastc[AES_BLOCK_SIZE / sizeof(u32)];
};

-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+## IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
struct atmel_aes_authenc_reqctx {
struct atmel_aes_reqctx base;

@@ -489,13 +488,36 @@
return (dd->flags & AES_FLAGS_ENCRYPT);
}

-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+## IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
static void atmel_aes_authenc_complete(struct atmel_aes_dev *dd, int err);
@end
+static void atmel_aes_set_iv_as_last_ciphertext_block(struct atmel_aes_dev *dd) 
+{ 
+struct ablkcipher_request *req = ablkcipher_request_cast(dd->areq);
+struct atmel_aes_reqctx *rctx = ablkcipher_request_ctx(req);
+struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
+unsigned int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
+  
+  +if (req->nbytes < ivsize)
+    return;
+    
+  +if (rctx->mode & AES_FLAGS_ENCRYPT) {
+scatterwalk_map_and_copy(req->info, req->dst, 
+  req->nbytes - ivsize, ivsize, 0);
+  } else {
+if (req->src == req->dst)
+memcpy(req->info, rctx->lastc, ivsize);
+else
+scatterwalk_map_and_copy(req->info, req->src, 
+  req->nbytes - ivsize, ivsize, 0);
+}
static inline int atmel_aes_complete(struct atmel_aes_dev *dd, int err) {
#if defined CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
#elif IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
    if (dd->ctx->is_aead) atmel_aes_authenc_complete(dd, err);
#endif
    clk_disable(dd->iclk);
    dd->flags &= ~AES_FLAGS_BUSY;

    if (!dd->ctx->is_aead) {
        struct ablkcipher_request *req = ablkcipher_request_cast(dd->areq);  
        struct atmel_aes_reqctx *rctx = ablkcipher_request_ctx(req);  
        struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);  
        int ivsize = crypto_ablkcipher_ivsize(ablkcipher);  
        
        if (rctx->mode & AES_FLAGS_ENCRYPT) {  
            scatterwalk_map_and_copy(req->info, req->dst, req->nbytes - ivsize, ivsize, 0);  
        } else {  
            if (req->src == req->dst) {  
                memcpy(req->info, rctx->lastc, ivsize);  
            } else {  
                scatterwalk_map_and_copy(req->info, req->src, req->nbytes - ivsize, ivsize, 0);  
            }  
        }  
    } else {  
        if (!dd->ctx->is_aead)  
            atmel_aes_set_iv_as_last_ciphertext_block(dd);  
        +atmel_aes_set_iv_as_last_ciphertext_block(dd);  
    }

    if (dd->is_async) dd->areq->complete(dd->areq, err);
    @ @ -1011.8 +1015.9 @@
    struct atmel_aes_ctr_ctx *ctx = atmel_aes_ctr_ctx_cast(dd->ctx);  
    struct ablkcipher_request *req = ablkcipher_request_cast(dd->areq);  
    struct scatterlist *src, *dst;  
    -u32 ctr, blocks;  
    size_t datalen;  
    +u32 ctr;  
    +u16 blocks, start, end;  
    bool use_dma, fragmented = false;
/* Check for transfer completion. */
@@ -1024,27 +1029,17 @@
datalen = req->nbytes - ctx->offset;
blocks = DIV_ROUND_UP(datalen, AES_BLOCK_SIZE);
ctr = be32_to_cpu(ctx->iv[3]);
-if (dd->caps.has_ctr32) {
  /* Check 32bit counter overflow. */
  -u32 start = ctr;
  -u32 end = start + blocks - 1;
  -
  -if (end < start) {
    -ctr |= 0xffffffff;
    -datalen = AES_BLOCK_SIZE * -start;
    -fragmented = true;
    -}
  -} else {
  /* Check 16bit counter overflow. */
  -u16 start = ctr & 0xffff;
  -u16 end = start + (u16)blocks - 1;
  -
  -if (blocks >> 16 || end < start) {
    -ctr |= 0xffff;
    -datalen = AES_BLOCK_SIZE * (0x10000-start);
    -fragmented = true;
    -}
  + /* Check 16bit counter overflow. */
  +start = ctr & 0xffff;
  +end = start + blocks - 1;
  +
  +if (blocks >> 16 || end < start) {
    +ctr |= 0xffff;
    +datalen = AES_BLOCK_SIZE * (0x10000 - start);
    +fragmented = true;
    +}
  +
  use_dma = (datalen >= ATMEL_AES_DMA_THRESHOLD);
/* Jump to offset. */
@@ -1128,10 +1123,12 @@
rctx->mode = mode;

if (!(mode & AES_FLAGS_ENCRYPT) && (req->src == req->dst)) {
  int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
  unsigned int ivsize = crypto_ablkcipher_ivsize(ablkcipher);

  scatterwalk_map_and_copy(rctx->lastc, req->src,
  -(req->nbytes - ivsize), ivsize, 0);
if (req->nbytes >= ivsize)
scatterwalk_map_and_copy(rctx->lastc, req->src,
+ req->nbytes - ivsize,
+ ivsize, 0);
}

return atmel_aes_handle_queue(dd, &req->base);
@@ -1976,7 +1973,7 @@
}
};

-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+#if IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
/* authenc aead functions */

static int atmel_aes_authenc_start(struct atmel_aes_dev *dd);
@@ -2155,7 +2152,7 @@

badkey:
crypto_aead_set_flags(tfm, CRYPTO_TFM_RES_BAD_KEY_LEN);
-memzero_explicit(&key, sizeof(keys));
+memzero_explicit(&keys, sizeof(keys));
return -EINVAL;
}
@@ -2463,7 +2460,7 @@
{
int i;

-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+#if IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
if (dd->caps.has_authenc)
for (i = 0; i < ARRAY_SIZE(aes_authenc_algs); i++)
crypto_unregister_aead(&aes_authenc_algs[i]);
@@ -2510,7 +2507,7 @@
goto err_aes_xts_alg;
}

-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+#if IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
if (dd->caps.has_authenc) {
for (i = 0; i < ARRAY_SIZE(aes_authenc_algs); i++) {
err = crypto_register_aead(&aes_authenc_algs[i]);
@@ -2522,7 +2519,7 @@
return 0;

-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC

+#if IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
/* i = ARRAY_SIZE(aes_authenc_algs); */
err_aes_authenc_alg:
for (j = 0; j < i; j++)
@@ -2546,7 +2543,6 @@
{
    dd->caps.has_dualbuff = 0;
    dd->caps.has_cfb64 = 0;
    -dd->caps.has_ctr32 = 0;
    dd->caps.has_gcm = 0;
    dd->caps.has_xts = 0;
    dd->caps.has_authenc = 0;
@@ -2557,7 +2553,6 @@
case 0x500:
    dd->caps.has_dualbuff = 1;
    dd->caps.has_cfb64 = 1;
    -dd->caps.has_ctr32 = 1;
    dd->caps.has_gcm = 1;
    dd->caps.has_xts = 1;
    dd->caps.has_authenc = 1;
@@ -2566,7 +2561,6 @@
case 0x200:
    dd->caps.has_dualbuff = 1;
    dd->caps.has_cfb64 = 1;
    -dd->caps.has_ctr32 = 1;
    dd->caps.has_gcm = 1;
    dd->caps.max_burst_size = 4;
    break;
@@ -2717,7 +2711,7 @@
atmel_aes_get_cap(aes_dd);

+#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+#if IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
if (aes_dd->caps.has_authenc && !atmel_sha_authenc_is_ready()) {
    err = -EPROBE_DEFER;
    goto iclk_unprepare;
--- linux-4.15.0.orig/drivers/crypto/atmel-authenc.h
+++ linux-4.15.0/drivers/crypto/atmel-authenc.h
@@ -23,7 +23,7 @@
 #ifndef __ATMEL_AUTHENC_H__
 #define __ATMEL_AUTHENC_H__
+#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+#ifndef __ATMEL_AUTHENC_H__
+#define __ATMEL_AUTHENC_H__

+if IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)

#include <crypto/authenc.h>
#include <crypto/hash.h>
--- linux-4.15.0.orig/drivers/crypto/atmel-sha.c
+++ linux-4.15.0/drivers/crypto/atmel-sha.c
@@ -1921,12 +1921,7 @@
{
 struct atmel_sha_hmac_ctx *hmac = crypto_ahash_ctx(tfm);

- if (atmel_sha_hmac_key_set(&hmac->hkey, key, keylen)) {
- crypto_ahash_set_flags(tfm, CRYPTO_TFM_RES_BAD_KEY_LEN);
- return -EINVAL;
- }
- 
- return 0;
+ return atmel_sha_hmac_key_set(&hmac->hkey, key, keylen);
}

static int atmel_sha_hmac_init(struct ahash_request *req)
@@ -2215,7 +2210,7 @@
},
];

-#ifdef CONFIG_CRYPTO_DEV_ATMEL_AUTHENC
+#if IS_ENABLED(CONFIG_CRYPTO_DEV_ATMEL_AUTHENC)
 /* authenc functions */

 static int atmel_sha_authenc_init2(struct atmel_sha_dev *dd);
--- linux-4.15.0.orig/drivers/crypto/axis/artpec6_crypto.c
+++ linux-4.15.0/drivers/crypto/axis/artpec6_crypto.c
@@ -22,6 +22,7 @@
 #include <linux/slab.h>
 #include <crypto/aes.h>
+#include <crypto/gcm.h>
 #include <crypto/internal/aead.h>
 #include <crypto/internal/hash.h>
 #include <crypto/internal/skcipher.h>
@@ -283,6 +284,7 @@
 struct artpec6_crypto_req_common {
 struct list_head list;
+struct list_head complete_in_progress;
 struct artpec6_crypto_dma_descriptors *dma;
 struct crypto_async_request *req;
 void (*complete)(struct crypto_async_request *req);
@@ -1254,7 +1256,7 @@
 if (len != 16 && len != 24 && len != 32) {
 crypto_aead_set_flags(tfm, CRYPTO_TFM_RES_BAD_KEY_LEN);
- return -1;
+ return 0;

return -EINVAL;
}

text->key_length = len;
@@ -1934,7 +1936,7 @@
memcpy(req_ctx->hw_ctx.J0, areq->iv, crypto_aead_ivsize(cipher));
// The HW omits the initial increment of the counter field.
-crypto_inc(req_ctx->hw_ctx.J0+12, 4);
+memcpy(req_ctx->hw_ctx.J0 + GCM_AES_IV_SIZE, "\x00\x00\x00\x01", 4);
ret = artpec6_crypto_setup_out_descr(common, &req_ctx->hw_ctx,
sizeof(struct artpec6_crypto_aead_hw_ctx), false, false);
@@ -2045,7 +2047,8 @@
return artpec6_crypto_dma_map_descs(common);
}

-static void artpec6_crypto_process_queue(struct artpec6_crypto *ac)
+static void artpec6_crypto_process_queue(struct artpec6_crypto *ac,
+    struct list_head *completions)
{
    struct artpec6_crypto_req_common *req;
@@ -2056,7 +2059,7 @@
    list_move_tail(&req->list, &ac->pending);
    artpec6_crypto_start_dma(req);

    -req->req->complete(req->req, -EINPROGRESS);
+list_add_tail(&req->complete_in_progress, completions);
}
/*
 @@ -2086,6 +2089,11 @@
 struct artpec6_crypto *ac = (struct artpec6_crypto *)data;
 struct artpec6_crypto_req_common *req;
 struct artpec6_crypto_req_common *n;
+struct list_head complete_done;
+struct list_head complete_in_progress;
+INIT_LIST_HEAD(&complete_done);
+INIT_LIST_HEAD(&complete_in_progress);

 if (list_empty(&ac->pending)) {
    pr_debug("Spurious IRQ\n");
@@ -2119,19 +2127,30 @@
    pr_debug("Completing request %p\n", req);
-list_del(&req->list);
+list_move_tail(&req->list, &complete_done);

artpec6_crypto_dma_unmap_all(req);
artpec6_crypto_copy_bounce_buffers(req);

ac->pending_count--;
artpec6_crypto_common_destroy(req);
-req->complete(req->req);
}
-artpec6_crypto_process_queue(ac);
+artpec6_crypto_process_queue(ac, &complete_in_progress);

spin_unlock_bh(&ac->queue_lock);
+
+/* Perform the completion callbacks without holding the queue lock
+ * to allow new request submissions from the callbacks.
+ */
+list_for_each_entry_safe(req, n, &complete_done, list) {
+req->complete(req->req);
+}
+
+list_for_each_entry_safe(req, n, &complete_in_progress,
+ complete_in_progress) {
+req->req->complete(req->req, -EINPROGRESS);
+}
}

static void artpec6_crypto_complete_crypto(struct crypto_async_request *req)
@@ -2956,7 +2975,7 @@
 .setkey = artpec6_crypto_aead_set_key,
 .encrypt = artpec6_crypto_aead_encrypt,
 .decrypt = artpec6_crypto_aead_decrypt,
-.ivsize = AES_BLOCK_SIZE,
+.ivsize = GCM_AES_IV_SIZE,
 .maxauthsize = AES_BLOCK_SIZE,

 .base = {
 --- linux-4.15.0.orig/drivers/crypto/bcm/cipher.c
+++ linux-4.15.0/drivers/crypto/bcm/cipher.c
@@ -53,7 +53,7 @@

 /* =============== Device Structure =============== */

-struct device_private iproc_priv;
+struct bcm_device_private iproc_priv;

unsigned int new_data_len;

-unsigned int chunk_start = 0;
+unsigned int __maybe_unused chunk_start = 0;

unsigned int __maybe_unused chunk_start = 0;

u32 db_size; /* Length of data field, incl gcm and hash padding */

int pad_len = 0; /* total pad len, including gcm, hash, stat padding */

u32 data_pad_len = 0; /* length of GCM/CCM padding */

struct spu_hw *spu = &iproc_priv.spu;
struct bcm_message *msg = mssg;
struct iproc_reqctx_s *rctx;
-struct iproc_ctx_s *ctx;
-struct crypto_async_request *areq;

err = 0;

rctx = msg->ctx;
@@ -1676,8 +1676,6 @@
err = -EFAULT;
goto cb_finish;
} 
-areq = rctx->parent;
-ctx = rctx->ctx;
/* process the SPU status */
err = spu->spu_status_process(rctx->msg_buf.rx_stat);
@@ -2846,44 +2842,28 @@
struct spu_hw *spu = &iproc_priv.spu;
struct iproc_ctx_s *ctx = crypto_aead_ctx(cipher);
struct crypto_tfm *tfm = crypto_aead_tfm(cipher);
-struct rtattr *rta = (void *)key;
-struct crypto_authenc_key_param *param;
-const u8 *origkey = key;
-const unsigned int origkeylen = keylen;
-
-int ret = 0;
+struct crypto_authenc_keys keys;
+int ret;

flow_log("%s() aead:%p key:%p keylen:%u\n", __func__, cipher, key, keylen);
flow_dump(" key: ", key, keylen);

-if (!RTA_OK(rta, keylen))
+ret = crypto_authenc_extractkeys(&keys, key, keylen);
if (ret)
goto badkey;
if (rta->rta_type != CRYPTO_AUTHENC_KEYA_PARAM)
goto badkey;
if (RTA_PAYLOAD(rta) < sizeof(*param))
goto badkey;
param = RTA_DATA(rta);
ctx->enckeylen = be32_to_cpu(param->enckeylen);

-key += RTA_ALIGN(rta->rta_len);
-keylen -= RTA_ALIGN(rta->rta_len);

-if (keylen < ctx->enckeylen)
goto badkey;
-if (ctx->enckeylen > MAX_KEY_SIZE)
+if (keys.enckeylen > MAX_KEY_SIZE)
  + keys.authkeylen > MAX_KEY_SIZE)
goto badkey;

-ctx->authkeylen = keylen - ctx->enckeylen;
-ctx->enckeylen = keys.enckeylen;
+ctx->authkeylen = keys.authkeylen;

-memcpy(ctx->enckey, key + ctx->authkeylen, ctx->enckeylen);
+memcpy(ctx->enckey, keys.enckey, keys.enckeylen);
/* May end up padding auth key. So make sure it's zeroed. */
memset(ctx->authkey, 0, sizeof(ctx->authkey));
-memcpy(ctx->authkey, key, ctx->authkeylen);
+memcpy(ctx->authkey, keys.authkey, keys.authkeylen);

switch (ctx->alg->cipher_info.alg) {
case CIPHER_ALG_DES:
  @@ -2891,7 +2871,7 @@
    u32 tmp[DES_EXPKEY_WORDS];
  u32 flags = CRYPTO_TFM_RES_WEAK_KEY;

    -if (des_ekey(tmp, key) == 0) {
    +if (des_ekey(tmp, keys.enckey) == 0) {
      if (crypto_aead_get_flags(cipher) &
        CRYPTO_TFM_REQ_WEAK_KEY) {
        crypto_aead_set_flags(cipher, flags);
        @@ -2906,7 +2886,7 @@
        break;
    case CIPHER_ALG_3DES:
if (ctx->enckeylen == (DES_KEY_SIZE * 3)) {
-const u32 *K = (const u32 *)key;
+const u32 *K = (const u32 *)keys.enckey;
u32 flags = CRYPTO_TFM_RES_BAD_KEY_SCHED;

if (!(K[0] ^ K[2]) | (K[1] ^ K[3]))
@@ -2957,9 +2937,7 @@
    ret = crypto_aead_setkey(ctx->fallback_cipher, origkey,
-            origkeylen);
+            key, keylen);
    if (ret) {
        flow_log(" fallback setkey() returned:%d\n", ret);
        tfm->crt_flags &= ~CRYPTO_TFM_REQ_MASK;
@@ -3003,7 +2981,6 @@
    ctx->enckeylen = keylen;
    ctx->authkeylen = 0;
    -memcpy(ctx->enckey, key, ctx->enckeylen);
        switch (ctx->enckeylen) {
            case AES_KEYSIZE_128:
    goto badkey;
@@ -3019,6 +2996,8 @@
        }
+memcpy(ctx->enckey, key, ctx->enckeylen);
+ flow_log(" enckeylen:%u authkeylen:%u\n", ctx->enckeylen,
+     ctx->authkeylen);
        flow_dump(" enc: ", ctx->enckey, ctx->enckeylen);
@@ -3079,6 +3058,10 @@
 struct iproc_ctx_s *ctx = crypto_aead_ctx(cipher);

        flow_log("%s\n", __func__);
+        if (keylen < GCM_ESP_SALT_SIZE)
+        return -EINVAL;
+        ctx->salt_len = GCM_ESP_SALT_SIZE;
        ctx->salt_offset = GCM_ESP_SALT_OFFSET;
        memcpy(ctx->salt, key + keylen - GCM_ESP_SALT_SIZE, GCM_ESP_SALT_SIZE);
@@ -3107,6 +3090,10 @@
 struct iproc_ctx_s *ctx = crypto_aead_ctx(cipher);

        flow_log("%s\n", __func__);
+        if (keylen < GCM_ESP_SALT_SIZE)
+        return -EINVAL;
+        ctx->salt_len = GCM_ESP_SALT_SIZE;
        ctx->salt_offset = GCM_ESP_SALT_OFFSET;
        memcpy(ctx->salt, key + keylen - GCM_ESP_SALT_SIZE, GCM_ESP_SALT_SIZE);
@@ -3107,6 +3090,10 @@
 struct iproc_ctx_s *ctx = crypto_aead_ctx(cipher);

flow_log("%s\n", __func__);
+
+if (keylen < GCM_ESP_SALT_SIZE)
+return -EINVAL;
+
+ctx->salt_len = GCM_ESP_SALT_SIZE;
+ctx->salt_offset = GCM_ESP_SALT_OFFSET;
+memcpy(ctx->salt, key + keylen - GCM_ESP_SALT_SIZE, GCM_ESP_SALT_SIZE);
@@ -3136,6 +3123,10 @@
+struct iproc_ctx_s *ctx = crypto_aead_ctx(cipher);
+
+if (keylen < CCM_ESP_SALT_SIZE)
+return -EINVAL;
+
+ctx->salt_len = CCM_ESP_SALT_SIZE;
+ctx->salt_offset = CCM_ESP_SALT_OFFSET;
+memcpy(ctx->salt, key + keylen - CCM_ESP_SALT_SIZE, CCM_ESP_SALT_SIZE);
@@ -4655,12 +4646,16 @@
+if ((driver_alg->auth_info.alg == HASH_ALG_AES) &&
+ (driver_alg->auth_info.mode == HASH_MODE_XCBC) ||
+ (driver_alg->auth_info.mode == HASH_MODE_CMAC)) {
+hash->setkey = ahash_setkey;
+
} else {
+hash->setkey = ahash_hmac_setkey;
+hash->init = ahash_hmac_init;
--- linux-4.15.0.orig/drivers/crypto/bcm/cipher.h
+++ linux-4.15.0/drivers/crypto/bcm/cipher.h
@@ -431,7 +431,7 @@
u32 num_chan;
};

-struct device_private {
+struct bcm_device_private {
+ struct platform_device *pdev;
+
+ struct spu_hw spu;
@@ -478,6 +478,6 @@
struct mbox_chan **mbox;
};

-extern struct device_private iproc_priv;
+extern struct bcm_device_private iprocPriv;

#endif
--- linux-4.15.0.orig/drivers/crypto/bcm/util.c
+++ linux-4.15.0/drivers/crypto/bcm/util.c
@@ -401,7 +401,7 @@
static ssize_t spu_debugfs_read(struct file *filp, char __user *ubuf,
size_t count, loff_t *offp)
{
-struct device_private *ipriv;
+struct bcm_device_private *ipriv;
char *buf;
ssize_t ret, out_offset, out_count;
int i;
--- linux-4.15.0.orig/drivers/crypto/bfin_crc.c
+++ linux-4.15.0/drivers/crypto/bfin_crc.c
@@ -494,7 +494,8 @@
.cra_driver_name= DRIVER_NAME,
.cra_priority= 100,
.cra_flags= CRYPTO_ALG_TYPE_AHASH |
- CRYPTO_ALG_ASYNC,
+ CRYPTO_ALG_ASYNC |
+ CRYPTO_ALG_OPTIONAL_KEY,
.cra_blocksize= CHKSUM_BLOCK_SIZE,
.cra_ctxsize= sizeof(struct bfin_crypto_crc_ctx),
.cra_alignmask= 3,
--- linux-4.15.0.orig/drivers/crypto/caam/caamalg.c
+++ linux-4.15.0/drivers/crypto/caam/caamalg.c
@@ -735,15 +735,18 @@
* @src_nents: number of segments in input s/w scatterlist
* @dst_nents: number of segments in output s/w scatterlist
* @iv_dma: dma address of iv for checking continuity and link table
+* @iv_dir: DMA mapping direction for IV
+* @sec4_sg_bytes: length of dma mapped sec4_sg space
+* @sec4_sg_dma: bus physical mapped address of h/w link table
+* @sec4_sg: pointer to h/w link table
+* @hw_desc: the h/w job descriptor followed by any referenced link tables
+* and IV
*/

struct ablkcipher_edesc {
  int src_nents;
  int dst_nents;
  dma_addr_t iv_dma;
enum dma_data_direction iv_dir;
int sec4_sg_bytes;
dma_addr_t sec4_sg_dma;
struct sec4_sg_entry *sec4_sg;

static void caam_unmap(struct device *dev, struct scatterlist *src,
    struct scatterlist *dst, int src_nents,
    int dst_nents,
- dma_addr_t iv_dma, int ivsize, dma_addr_t sec4_sg_dma,
+ dma_addr_t iv_dma, int ivsize,
+ enum dma_data_direction iv_dir, dma_addr_t sec4_sg_dma,
    int sec4_sg_bytes)
{
    if (dst != src) {
        dma_unmap_single(dev, iv_dma, ivsize, DMA_TO_DEVICE);
    }
    if (iv_dma)
- dma_unmap_single(dev, iv_dma, ivsize, DMA_TO_DEVICE);
+ dma_unmap_single(dev, iv_dma, ivsize, iv_dir);
    if (sec4_sg_bytes)
        dma_unmap_single(dev, sec4_sg_dma, sec4_sg_bytes,
            DMA_TO_DEVICE);
    struct aead_request *req)
{
    caam_unmap(dev, req->src, req->dst,
- edesc->src_nents, edesc->dst_nents, 0, 0,
+ edesc->src_nents, edesc->dst_nents, 0, 0, DMA_NONE,
    edesc->sec4_sg_dma, edesc->sec4_sg_bytes);
}

caam_unmap(dev, req->src, req->dst,
    edesc->src_nents, edesc->dst_nents,
- edesc->iv_dma, ivsize,
+ edesc->iv_dma, ivsize, edesc->iv_dir,
    edesc->sec4_sg_dma, edesc->sec4_sg_bytes);
}

struct ablkcipher_request *req = context;
struct ablkcipher_edesc *edesc;
struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
+struct caam_ctx *ctx = crypto_ablkcipher_ctx(ablkcipher);
int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
ifdef DEBUG
@@ -873,10 +878,23 @@*/

/*
 * The crypto API expects us to set the IV (req->info) to the last
 * ciphertext block. This is used e.g. by the CTS mode.
 * ciphertext block when running in CBC mode.
 */
-scatterwalk_map_and_copy(req->info, req->dst, req->nbytes - ivsize,
-  ivsize, 0);
+if ((ctx->cdata.algtype & OP_ALG_AAI_MASK) == OP_ALG_AAI_CBC)
+scatterwalk_map_and_copy(req->info, req->dst, req->nbytes -
+  ivsize, ivsize, 0);
+
+/* In case initial IV was generated, copy it in GIVCIPHER request */
+if (edesc->iv_dir == DMA_FROM_DEVICE) {
+  u8 *iv;
+  struct skcipher_givcrypt_request *greq;
+  +greq = container_of(req, struct skcipher_givcrypt_request,
+    creq);
+  +iv = (u8 *)edesc->hw_desc + desc_bytes(edesc->hw_desc) +
+    edesc->sec4_sg_bytes;
+  memcpy(greq->giv, iv, ivsize);
+  +}

/*
 * The crypto API expects us to set the IV (req->info) to the last
 * ciphertext block.
 */
-kfree(edesc);
@@ -888,10 +906,10 @@
{
    struct ablkcipher_request *req = context;
    struct ablkcipher_edesc *edesc;
+ifdef DEBUG
    struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
    int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
    
    #ifdef DEBUG
    dev_err(jrdev, "%s %d: err 0x%x\n", __func__, __LINE__, err);
    
    @@ -909,14 +927,6 @@
        edesc->dst_nents > 1 ? 100 : req->nbytes, 1);
    
        ablkcipher_unmap(jrdev, edesc, req);
-
-/* The crypto API expects us to set the IV (req->info) to the last
- ciphertext block.
scatterwalk_map_and_copy(req->info, req->src, req->nbytes - ivsize, ivsize, 0);

kfree(edesc);

ablkcipher_request_complete(req, err);
@@ -1057,15 +1067,14 @@
 */
 static void init_ablkcipher_job(u32 *sh_desc, dma_addr_t ptr, struct ablkcipher_edesc *edesc, struct ablkcipher_request *req, bool iv_contig)
 +struct ablkcipher_request *req)
 {
 struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
 int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
 u32 *desc = edesc->hw_desc;
 -u32 out_options = 0, in_options;
 -dma_addr_t dst_dma, src_dma;
 -int len, sec4_sg_index = 0;
 +u32 out_options = 0;
 +dma_addr_t dst_dma;
 +int len;
 
 #ifdef DEBUG
 print_hex_dump(KERN_ERR, "presciv"__stringify(__LINE__)": ",
 @@ -1081,30 +1090,19 @@
 len = desc_len(sh_desc);
 init_job_desc_shared(desc, ptr, len, HDR_SHARE_DEFER | HDR_REVERSE);
 
 -if (iv_contig) {
 -src_dma = edesc->iv_dma;
 -in_options = 0;
 -} else {
 -src_dma = edesc->sec4_sg_dma;
 -sec4_sg_index += edesc->src_nents + 1;
 -in_options = LDST_SGF;
 -}
 -append_seq_in_ptr(desc, src_dma, req->nbytes + ivsize, in_options);
 +append_seq_in_ptr(desc, edesc->sec4_sg_dma, req->nbytes + ivsize, + LDST_SGF);
 
 if (likely(req->src == req->dst)) {
 -if (edesc->src_nents == 1 && iv_contig) {
 -dst_dma = sg_dma_address(req->src);
 -} else {
 -dst_dma = edesc->sec4_sg_dma +
 

-sizeof(struct sec4_sg_entry);
-out_options = LDST_SGF;
-
+dst_dma = edesc->sec4_sg_dma + sizeof(struct sec4_sg_entry);
+out_options = LDST_SGF;
} else {
    if (edesc->dst_nents == 1) {
        dst_dma = sg_dma_address(req->dst);
        +out_options = 0;
    } else {
        -dst_dma = edesc->sec4_sg_dma +
        -sec4_sg_index * sizeof(struct sec4_sg_entry);
        +dst_dma = edesc->sec4_sg_dma + (edesc->src_nents + 1) *
        +sizeof(struct sec4_sg_entry);
        out_options = LDST_SGF;
    }
}
@@ -1116,13 +1114,12 @@
*/
static void init_ablkcipher_giv_job(u32 *sh_desc, dma_addr_t ptr,
    struct ablkcipher_edesc *edesc,
    -struct ablkcipher_request *req,
    -bool iv_contig)
    +struct ablkcipher_request *req)
{
    struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
    int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
    u32 *desc = edesc->hw_desc;
    -u32 out_options, in_options;
    +u32 in_options;
    dma_addr_t dst_dma, src_dma;
    int len, sec4_sg_index = 0;

    @@ -1148,15 +1145,9 @@
    }
    append_seq_in_ptr(desc, src_dma, req->nbytes, in_options);

    -if (iv_contig) {
        -dst_dma = edesc->iv_dma;
        -out_options = 0;
        -}
    } else {
        -dst_dma = edesc->sec4_sg_dma +
        -sec4_sg_index * sizeof(struct sec4_sg_entry);
        -out_options = LDST_SGF;
    -}
    -append_seq_out_ptr(desc, dst_dma, req->nbytes + ivsize, out_options);
    +dst_dma = edesc->sec4_sg_dma + sec4_sg_index *
    +sizeof(struct sec4_sg_entry);
append_seq_out_ptr(desc, dst_dma, req->nbytes + ivsize, LDST_SGF);
"

/*
@@ -1245,7 +1236,7 @@
GFP_DMA | flags);
 if (!edesc) {
 caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents, 0,
 - 0, 0, 0);
+ 0, DMA_NONE, 0, 0);
 return ERR_PTR(-ENOMEM);
 }

@@ -1449,8 +1440,7 @@
 * allocate and map the ablkcipher extended descriptor for ablkcipher
 */
 static struct ablkcipher_edesc *ablkcipher_edesc_alloc(struct ablkcipher_request
 -						       *req, int desc_bytes,
-bool *iv_contig_out)
+						       *req, int desc_bytes)
 {
 struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
 struct caam_ctx *ctx = crypto_ablkcipher_ctx(ablkcipher);
@@ -1459,8 +1449,8 @@
 GFP_KERNEL : GFP_ATOMIC;
 int src_nents, mapped_src_nents, dst_nents = 0, mapped_dst_nents = 0;
 struct ablkcipher_edesc *edesc;
-dma_addr_t iv_dma = 0;
-bool in_contig;
+dma_addr_t iv_dma;
+u8 *iv;
 int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
 int dst_sg_idx, sec4_sg_ents, sec4_sg_bytes;
@@ -1504,48 +1494,46 @@
 }
 }

-dma_addr_t iv_dma = dma_map_single(jrdev, req->info, ivsize, DMA_TO_DEVICE);
-if (dma_mapping_error(jrdev, iv_dma)) {
-dev_err(jrdev, "unable to map IV\n");
-caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents, 0,
 - 0, 0, 0);
-return ERR_PTR(-ENOMEM);
-}
-
-if (mapped_src_nents == 1 &&
 - iv_dma + ivsize == sg_dma_address(req->src)) {

in_contig = true;
-sec4_sg_ents = 0;
}
-else {
-in_contig = false;
-sec4_sg_ents = 1 + mapped_src_nents;
-
+sec4_sg_ents = 1 + mapped_src_nents;

dst_sg_idx = sec4_sg_ents;
sec4_sg_ents += mapped_dst_nents > 1 ? mapped_dst_nents : 0;
sec4_sg_bytes = sec4_sg_ents * sizeof(struct sec4_sg_entry);

/* allocate space for base edesc and hw desc commands, link tables */
edesc = kzalloc(sizeof(*edesc) + desc_bytes + sec4_sg_bytes,
+/*
+ * allocate space for base edesc and hw desc commands, link tables, IV
+ */
+edesc = kzalloc(sizeof(*edesc) + desc_bytes + sec4_sg_bytes + ivsize,
+ GFP_DMA | flags);
if (!edesc) {
dev_err(jrdev, "could not allocate extended descriptor\n");
-caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents,
- iv_dma, ivsize, 0, 0);
+caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents, 0,
+ 0, DMA_NONE, 0, 0);
return ERR_PTR(-ENOMEM);
}
edesc->src_nents = src_nents;
edesc->dst_nents = dst_nents;
edesc->sec4_sg_bytes = sec4_sg_bytes;
edesc->sec4_sg = (void *)edesc + sizeof(struct ablkcipher_edesc) +
- desc_bytes;
edesc->sec4_sg = (struct sec4_sg_entry *)((u8 *)edesc->hw_desc +
 + desc_bytes);
edesc->iv_dir = DMA_TO_DEVICE;
+
+/* Make sure IV is located in a DMAable area */
+iv = (u8 *)edesc->hw_desc + desc_bytes + sec4_sg_bytes;
+memcpy(iv, req->info, ivsize);

-if (!in_contig) {
-dma_to_sec4_sg_one(edesc->sec4_sg, iv_dma, ivsize, 0);
-sg_to_sec4_sg_last(req->src, mapped_src_nents,
- edesc->sec4_sg + 1, 0);
+iv_dma = dma_map_single(jrdev, iv, ivsize, DMA_TO_DEVICE);
+if (dma_mapping_error(jrdev, iv_dma)) {
+dev_err(jrdev, "unable to map IV\n");
+caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents, 0,
+ 0, DMA_NONE, 0, 0);
+kfree(edesc);
+return ERR_PTR(-ENOMEM);
}

+dma_to_sec4_sg_one(edesc->sec4_sg, iv_dma, ivsize, 0);
+sg_to_sec4_sg_last(req->src, mapped_src_nents, edesc->sec4_sg + edesc->sec4_sg + 1, 0);
+
+if (mapped_dst_nents > 1) {
+sg_to_sec4_sg_last(req->dst, mapped_dst_nents,
+ edesc->sec4_sg + dst_sg_idx, 0);
+}
@if (dma_mapping_error(jrdev, edesc->sec4_sg_dma)) {
 dev_err(jrdev, "unable to map S/G table\n");
 caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents,
- iv_dma, ivsize, 0, 0);
+ iv_dma, ivsize, DMA_TO_DEVICE, 0, 0);
 kfree(edesc);
 return ERR_PTR(-ENOMEM);
} 
@if (-1569,7 +1557,6 @@
 sec4_sg_bytes, 1);
#endif
-*iv_contig_out = in_contig;
 return edesc;
}

@@ -1579,19 +1566,16 @@
 struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
 struct caam_ctx *ctx = crypto_ablkcipher_ctx(ablkcipher);
 struct device *jrdev = ctx->jrdev;
-bool iv_contig;
+u32 *desc;
 int ret = 0;

 /* allocate extended descriptor */
-edesc = ablkcipher_edesc_alloc(req, DESC_JOB_IO_LEN *
 - CAAM_CMD_SZ, &iv_contig);
+edesc = ablkcipher_edesc_alloc(req, DESC_JOB_IO_LEN * CAAM_CMD_SZ);
 if (IS_ERR(edesc))
 return PTR_ERR(edesc);

 /* Create and submit job descriptor*/
-init_ablkcipher_job(ctx->sh_desc_enc,
-ctx->sh_desc_enc_dma, edesc, req, iv_contig);
+init_ablkcipher_job(ctx->sh_desc_enc, ctx->sh_desc_enc_dma, edesc, req);
 ifdef DEBUG
print_hex_dump(KERN_ERR, "ablkcipher jobdesc@" stringify(__LINE__)"); 
DUMP_PREFIX_ADDRESS, 16, 4, edesc->hw_desc,
@@ -1615,20 +1599,26 @@
struct ablkcipher_edesc *edesc;
struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
struct caam_ctx *ctx = crypto_ablkcipher_ctx(ablkcipher);
+int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
struct device *jrdev = ctx->jrdev;
-bool iv_contig;
u32 *desc;
ret = 0;
/* allocate extended descriptor */
edesc = ablkcipher_edesc_alloc(req, DESC_JOB_IO_LEN *
- CAAM_CMD_SZ, &iv_contig);
+edesc = ablkcipher_edesc_alloc(req, DESC_JOB_IO_LEN * CAAM_CMD_SZ);
if (IS_ERR(edesc))
return PTR_ERR(edesc);
+/*
 + The crypto API expects us to set the IV (req->info) to the last
 + ciphertext block when running in CBC mode.
 + */
+if ((ctx->cdata.algtype & OP_ALG_AAI_MASK) == OP_ALG_AAI_CBC)
+scatterwalk_map_and_copy(req->info, req->src, req->nbytes -
+ivsize, ivsize, 0);
+
+/* Create and submit job descriptor*/
-init_ablkcipher_job(ctx->sh_desc_dec,
-ctx->sh_desc_dec_dma, edesc, req, iv_contig);
+init_ablkcipher_job(ctx->sh_desc_dec, ctx->sh_desc_dec_dma, edesc, req);
desc = edesc->hw_desc;
#endif DEBUG
print_hex_dump(KERN_ERR, "ablkcipher jobdesc@" stringify(__LINE__)"); 
@@ -1653,8 +1643,7 @@
*/
static struct ablkcipher_edesc *ablkcipher_giv_edesc_alloc(
 struct sckipher_givcrypt_request *greq,
 -int desc_bytes,
 -bool *iv_contig_out)
+int desc_bytes)
 {
 struct ablkcipher_request *req = &greq->creq;
 struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
@@ -1664,8 +1653,8 @@
 GFP_KERNEL : GFP_ATOMIC;
 int src_nents, mapped_src_nents, dst_nents, mapped_dst_nents;
 struct ablkcipher_edesc *edesc;
- dma_addr_t iv_dma = 0;
- bool out_contig;
+ dma_addr_t iv_dma;
+ u8 *iv;

int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
int dst_sg_idx, sec4_sg_ents, sec4_sg_bytes;

@ @ -1710,62 +1699,55 @@
}
}
}

- */
- * Check if iv can be contiguous with source and destination.
- * If so, include it. If not, create scatterlist.
- */
- iv_dma = dma_map_single(jrdev, greq->giv, ivsize, DMA_TO_DEVICE);
- if (dma_mapping_error(jrdev, iv_dma)) {
- dev_err(jrdev, "unable to map IV\n");
- caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents, 0,
- 0, 0, 0);
- return ERR_PTR(-ENOMEM);
- }
-
sec4_sg_ents = mapped_src_nents > 1 ? mapped_src_nents : 0;
dst_sg_idx = sec4_sg_ents;
- if (mapped_dst_nents == 1 &&
- iv_dma + ivsize == sg_dma_address(req->dst)) {
- out_contig = true;
- } else {
- out_contig = false;
- sec4_sg_ents += 1 + mapped_dst_nents;
- }
+sec4_sg_ents += 1 + mapped_dst_nents;

- */ allocate space for base edesc and hw desc commands, link tables */
+ */
+ * allocate space for base edesc and hw desc commands, link tables, IV
+ */
sec4_sg_bytes = sec4_sg_ents * sizeof(struct sec4_sg_entry);
edesc = kzalloc(sizeof(*edesc) + desc_bytes + sec4_sg_bytes,
+edesc = kzalloc(sizeof(*edesc) + desc_bytes + sec4_sg_bytes + ivsize,
GFP_DMA | flags);
if (!edesc) {
 dev_err(jrdev, "could not allocate extended descriptor\n");
- caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents,
-  iv_dma, ivsize, 0, 0);
+ caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents, 0,
+ 0, DMA_NONE, 0, 0);
return ERR_PTR(-ENOMEM);
}

edesc->src_nents = src_nents;
edesc->dst_nents = dst_nents;
edesc->sec4_sg_bytes = sec4_sg_bytes;
edesc->sec4_sg = (void *)edesc + sizeof(struct ablkcipher_edesc) +
                desc_bytes;
edesc->iv_dir = DMA_FROM_DEVICE;
+
edesc->sec4_sg = (struct sec4_sg_entry *)((u8 *)edesc->hw_desc +
                desc_bytes);
+
/* Make sure IV is located in a DMAable area */
+iv = (u8 *)edesc->hw_desc + desc_bytes + sec4_sg_bytes;
+iv_dma = dma_map_single(jrdev, iv, ivsize, DMA_FROM_DEVICE);
+if (dma_mapping_error(jrdev, iv_dma)) {
+    dev_err(jrdev, "unable to map IV\n");
+    caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents, 0,
+           0, DMA_NONE, 0, 0);
+    kfree(edesc);
+    return ERR_PTR(-ENOMEM);
+
if (mapped_src_nents > 1)
    sg_to_sec4_sg_last(req->src, mapped_src_nents, edesc->sec4_sg,
                        0);

-        sg_to_sec4_sg_last(req->dst, mapped_dst_nents, edesc->sec4_sg +
-                dst_sg_idx + 1, 0);
-
+        dma_to_sec4_sg_one(edesc->sec4_sg + dst_sg_idx,
+                iv_dma, ivsize, 0);
+        sg_to_sec4_sg_last(req->dst, mapped_dst_nents, edesc->sec4_sg +
+                dst_sg_idx + 1, 0);
+
edesc->sec4_sg_dma = dma_map_single(jrdev, edesc->sec4_sg,
        sec4_sg_bytes, DMA_TO_DEVICE);
if (dma_mapping_error(jrdev, edesc->sec4_sg_dma)) {
    dev_err(jrdev, "unable to map S/G table\n");
    caam_unmap(jrdev, req->src, req->dst, src_nents, dst_nents,
       -        iv_dma, ivsize, 0, 0);
+        iv_dma, ivsize, DMA_FROM_DEVICE, 0, 0);
    kfree(edesc);
    return ERR_PTR(-ENOMEM);
}
sec4_sg_bytes, 1);
#endif

iv_contig_out = out_contig;
return edesc;
}

@@ -1789,19 +1770,17 @@
struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
struct caam_ctx *ctx = crypto_ablkcipher_ctx(ablkcipher);
struct device *jrdev = ctx->jrdev;
-bool iv_contig = false;
u32 *desc;
int ret = 0;
/* allocate extended descriptor */
edesc = ablkcipher_giv_edesc_alloc(creq, DESC_JOB_IO_LEN * CAAM_CMD_SZ);
if (IS_ERR(edesc))
return PTR_ERR(edesc);
/* Create and submit job descriptor*/
init_ablkcipher_giv_job(ctx->sh_desc_givenc, ctx->sh_desc_givenc_dma,
edesc, req, iv_contig);
#ifdef DEBUG
print_hex_dump(KERN_ERR,
         "ablkcipher jobdesc@" __stringify(__LINE__) ": ",
--- linux-4.15.0.orig/drivers/crypto/caam/caamalg_desc.c
+++ linux-4.15.0/drivers/crypto/caam/caamalg_desc.c
@@ -476,6 +476,7 @@
     is_qi)
 { u32 geniv, moveiv;
   u32 *wait_cmd;
/* Note: Context registers are saved. */
init_sh_desc_key_aead(desc, cdata, adata, is_rfc3686, nonce);
@@ -566,6 +567,14 @@
/* Will read cryptlen */
append_math_add(desc, VARSEQINLEN, SEQINLEN, REG0, CAAM_CMD_SZ);
+
*/
+ * Wait for IV transfer (ofifo -> class2) to finish before starting
+ * ciphertext transfer (ofifo -> external memory).
+ */
+wait_cmd = append_jump(desc, JUMP_JSL | JUMP_TEST_ALL | JUMP_COND_NIFP);
+set_jump_tgt_here(desc, wait_cmd);
+
append_seq_fifo_load(desc, 0, FIFOLD_CLASS_BOTH | KEY_VLF |
    FIFOLD_TYPE_MSG1OUT2 | FIFOLD_TYPE_LASTBOTH);
append_seq_fifo_store(desc, 0, FIFOST_TYPE_MESSAGE_DATA | KEY_VLF);
@@ -1271,7 +1280,13 @@
 */
void cnstr_shdsc_xts_ablcipher_encap(u32 * const desc, struct alginfo *cdata)
{
   ,__be64 sector_size = cpu_to_be64(512);
+/*
+ * Set sector size to a big value, practically disabling
+ * sector size segmentation in xts implementation. We cannot
+ * take full advantage of this HW feature with existing
+ * crypto API / dm-crypt SW architecture.
+ */
+__be64 sector_size = cpu_to_be64(BIT(15));
    u32 *key_jump_cmd;

init_sh_desc(desc, HDR_SHARE_SERIAL | HDR_SAVCTX);
@@ -1323,7 +1338,13 @@
 */
void cnstr_shdsc_xts_ablcipher_decap(u32 * const desc, struct alginfo *cdata)
{
    __be64 sector_size = cpu_to_be64(512);
+/*
+ * Set sector size to a big value, practically disabling
+ * sector size segmentation in xts implementation. We cannot
+ * take full advantage of this HW feature with existing
+ * crypto API / dm-crypt SW architecture.
+ */
+__be64 sector_size = cpu_to_be64(BIT(15));
    u32 *key_jump_cmd;

init_sh_desc(desc, HDR_SHARE_SERIAL | HDR_SAVCTX);
--- linux-4.15.0.orig/drivers/crypto/caam/caamalg_desc.h
+++ linux-4.15.0/drivers/crypto/caam/caamalg_desc.h
@@ -12,7 +12,7 @@
#define DESC_AEAD_BASE	(4 * CAAM_CMD_SZ)
#define DESC_AEAD_ENC_LEN	(DESC_AEAD_BASE + 11 * CAAM_CMD_SZ)
#define DESC_AEAD_DEC_LEN	(DESC_AEAD_BASE + 15 * CAAM_CMD_SZ)
-#define DESC_AEAD_GIVENC_LEN	(DESC_AEAD_ENC_LEN + 7 * CAAM_CMD_SZ)
+#define DESC_AEAD_GIVENC_LEN	(DESC_AEAD_ENC_LEN + 8 * CAAM_CMD_SZ)
#define DESC_QI_AEAD_ENC_LEN	(DESC_AEAD_ENC_LEN + 3 * CAAM_CMD_SZ)
#define DESC_QI_AEAD_DEC_LEN	(DESC_AEAD_DEC_LEN + 3 * CAAM_CMD_SZ)
#define DESC_QI_AEAD_GIVENC_LEN	(DESC_AEAD_GIVENC_LEN + 3 * CAAM_CMD_SZ)
--- linux-4.15.0.orig/drivers/crypto/caam/caamalg_qi.c
int ret = 0;

if (keylen != 2 * AES_MIN_KEY_SIZE && keylen != 2 * AES_MAX_KEY_SIZE) {
    crypto_ablkcipher_set_flags(ablkcipher,
    - CRYPTO_TFM_RES_BAD_KEY_LEN);
    dev_err(jrdev, "key size mismatch\n");
    -return -EINVAL;
    +goto badkey;
}

memcpy(ctx->key, key, keylen);

return ret;
badkey:
    crypto_ablkcipher_set_flags(ablkcipher, CRYPTO_TFM_RES_BAD_KEY_LEN);
    -return 0;
    +return -EINVAL;
}

/*
	@@ -401,7 +399,7 @@
	 * @assoclen: associated data length, in CAAM endianness
	 * @assoclen_dma: bus physical mapped address of req->assoclen
	 * @drv_req: driver-specific request structure
	 - * @sgt: the h/w link table
	 + * @sgt: the h/w link table, followed by IV
	 */
struct aead_edesc {
    int src_nents;
    @@ -412,9 +410,6 @@
    unsigned int assoclen;
    dma_addr_t assoclen_dma;
    struct caam_drv_req drv_req;
    -#define CAAM_QI_MAX_AEAD_SG					
    -((CAAM_QI_MEMCACHE_SIZE - offsetof(struct aead_edesc, sgt)) /
    - sizeof(struct qm_sg_entry))
    struct qm_sg_entry sgt[0];
};

@@ -426,7 +421,7 @@
    * @qm_sg_bytes: length of dma mapped h/w link table
    * @qm_sg_dma: bus physical mapped address of h/w link table
    * @drv_req: driver-specific request structure
    - * @sgt: the h/w link table
    + * @sgt: the h/w link table, followed by IV
    */
struct ablkcipher_edesc {
        int src_nents;
        int qm_sg_bytes;
        dma_addr_t qm_sg_dma;
        struct caam_drv_req drv_req;

        #define CAAM_QI_MAX_ABLKCIPHER_SG
            ((CAAM_QI_MEMCACHE_SIZE - offsetof(struct ablkcipher_edesc, sgt)) /
             sizeof(struct qm_sg_entry))
        struct qm_sg_entry sgt[0];
    };

    /* Create S/G table: req->assoclen, [IV,] req->src [], req->dst.
     */
    qm_sg_ents = 1 + !!ivsize + mapped_src_nents +
        (mapped_dst_nents > 1 ? mapped_dst_nents : 0);
    if (unlikely(qm_sg_ents > CAAM_QI_MAX_AEAD_SG)) {
        dev_err(qidev, "Insufficient S/G entries: \%d > \%lu\n",
                qm_sg_ents, CAAM_QI_MAX_AEAD_SG);
        caam_unmap(qidev, req->src, req->dst, src_nents,
                   dst_nents, 0, 0, op_type, 0, 0);
        qi_cache_free(edesc);
        return ERR_PTR(-ENOMEM);
    }

    if ((alg->caam.rfc3686 && encrypt) || !alg->caam.geniv) {
        if ((alg->caam.rfc3686 && encrypt) || !alg->caam.geniv)
            ivsize = crypto_aead_ivsize(aead);
        -iv_dma = dma_map_single(qidev, req->iv, ivsize, DMA_TO_DEVICE);
        -if (dma_mapping_error(qidev, iv_dma)) {
            dev_err(qidev, "unable to map IV\n");
            caam_unmap(qidev, req->src, req->dst, src_nents,
                       dst_nents, 0, 0, op_type, 0, 0);
            qi_cache_free(edesc);
            return ERR_PTR(-ENOMEM);
        }
    }

    sg_table = &edesc->sgt[0];
    qm_sg_bytes = qm_sg_ents * sizeof(*sg_table);
    if (unlikely(offsetof(struct aead_edesc, sgt) + qm_sg_bytes + ivsize >
                 CAAM_QI_MEMCACHE_SIZE)) {
        dev_err(qidev, "No space for \%d S/G entries and/or \%dB IV\n",
                qm_sg_ents, ivsize);
        caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
                   0, 0, 0, 0);
qi_cache_free(edesc);
return ERR_PTR(-ENOMEM);
}
-sg_table = &edesc->sgt[0];
-qm_sg_bytes = qm_sg_ents * sizeof(*sg_table);
+if (ivsize) {
  +u8 *iv = (u8 *)(sg_table + qm_sg_ents);
  +/* Make sure IV is located in a DMAable area */
  +memcpy(iv, req->iv, ivsize);
  +
  +iv_dma = dma_map_single(qidev, iv, ivsize, DMA_TO_DEVICE);
  +if (dma_mapping_error(qidev, iv_dma)) {
    +dev_err(qidev, "unable to map IV\n");
    +caam_unmap(qidev, req->src, req->dst, src_nents,
      + dst_nents, 0, 0, 0, 0, 0);
    +qi_cache_free(edesc);
    +return ERR_PTR(-ENOMEM);
  +}
  +}
edesc->src_nents = src_nents;
edesc->dst_nents = dst_nents;
@@ -813,15 +813,27 @@
#endif
ablkcipher_unmap(qidev, edesc, req);
  -qi_cache_free(edesc);
  +/* In case initial IV was generated, copy it in GIVCIPHER request */
  +if (edesc->drv_req.drv_ctx->op_type == GIVENCRYPT) {
    +u8 *iv;
    +struct skcipher_givcrypt_request *greq;
    +
    +greq = container_of(req, struct skcipher_givcrypt_request,
      + creq);
    +iv = (u8 *)edesc->sgt + edesc->qm_sg_bytes;
    +memcpy(greq->giv, iv, ivsize);
    +}

/*
 * The crypto API expects us to set the IV (req->info) to the last
 * ciphertext block. This is used e.g. by the CTS mode.
 */
-scatterwalk_map_and_copy(req->info, req->dst, req->nbytes - ivsize,
    - ivsize, 0);
+if (edesc->drv_req.drv_ctx->op_type != DECRYPT)
+scatterwalk_map_and_copy(req->info, req->dst, req->nbytes - ivsize, ivsize, 0);

+qi_cache_free(edesc);
ablkcipher_request_complete(req, status);

@@ -836,9 +848,9 @@
int src_nents, mapped_src_nents, dst_nents = 0, mapped_dst_nents = 0;
struct ablkcipher_edesc *edesc;
dma_addr_t iv_dma;
-bool in_contig;
+u8 *iv;
int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
-int dst_sg_idx, qm_sg_ents;
+int dst_sg_idx, qm_sg_ents, qm_sg_bytes;
struct qm_sg_entry *sg_table, *fd_sgt;
struct caam_drv_ctx *drv_ctx;
enum optype op_type = encrypt ? ENCRYPT : DECRYPT;
@@ -885,55 +897,53 @@
}
}

-iv_dma = dma_map_single(qidev, req->info, ivsize, DMA_TO_DEVICE);
-if (dma_mapping_error(qidev, iv_dma)) {
-dev_err(qidev, "unable to map IV\n");
-caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
-0, 0, 0, 0);
-return ERR_PTR(-ENOMEM);
-
-if (mapped_src_nents == 1 &&
-iv_dma + ivsize == sg_dma_address(req->src)) {
-in_contig = true;
-qm_sg_ents = 0;
-} else {
-in_contig = false;
-qm_sg_ents = 1 + mapped_src_nents;
-}
+qm_sg_ents = 1 + mapped_src_nents;

dst_sg_idx = qm_sg_ents;

qm_sg_ents += mapped_dst_nents > 1 ? mapped_dst_nents : 0;
-if (unlikely(qm_sg_ents > CAAM_QI_MAX_ABLKCIPHER_SG)) {
-dev_err(qidev, "Insufficient S/G entries: %d > %lu\n",
-qm_sg_ents, CAAM_QI_MAX_ABLKCIPHER_SG);
-caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents,
-iv_dma, ivsize, op_type, 0, 0);
+qm_sg_bytes = qm_sg_ents * sizeof(struct qm_sg_entry);
+if (unlikely((offsetof(struct ablkcipher_edesc, sgt) + qm_sg_bytes +
  ivsize > CAAM_QI_MEMCACHE_SIZE)) {
+dev_err(qidev, "No space for %d S/G entries and/or %dB IV\n",
+qm_sg_ents, ivsize);
+caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
  0, 0, 0, 0);
{return ERR_PTR(-ENOMEM);
}

-/* allocate space for base edesc and link tables */
+/* allocate space for base edesc, link tables and IV */
edesc = qi_cache_alloc(GFP_DMA | flags);
if (unlikely(!edesc)) {
  dev_err(qidev, "could not allocate extended descriptor\n");
-caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents,
  - iv_dma, ivsize, op_type, 0, 0);
+caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
    + 0, 0, 0, 0);
+return ERR_PTR(-ENOMEM);
}

-/* Make sure IV is located in a DMAable area */
+sg_table = &edesc->sgt[0];
+iv = (u8 *)(sg_table + qm_sg_ents);
+memcpy(iv, req->info, ivsize);
+iv_dma = dma_map_single(qidev, iv, ivsize, DMA_TO_DEVICE);
+if (dma_mapping_error(qidev, iv_dma)) {
  dev_err(qidev, "unable to map IV\n");
+caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
      + 0, 0, 0, 0);
+qi_cache_free(edesc);
return ERR_PTR(-ENOMEM);
}

edesc->src_nents = src_nents;
edesc->dst_nents = dst_nents;
edesc->iv_dma = iv_dma;
-sg_table = &edesc->sgt[0];
-edesc->qm_sg_bytes = qm_sg_ents * sizeof(*sg_table);
+edesc->qm_sg_bytes = qm_sg_bytes;
edesc->drv_req.app_ctx = req;
edesc->drv_req.cbk = ablkcipher_done;
edesc->drv_req.drv_ctx = drv_ctx;

-if (!in_contig) {
-dma_to_qm_sg_one(sg_table, iv_dma, ivsize, 0);
if (mapped_dst_nents > 1)
    sg_to_qm_sg_last(req->dst, mapped_dst_nents, sg_table +
@ @ -951,20 +961,12 @@

    fd_sgt = &edesc->drv_req.fd_sgt[0];

    if (!in_contig)
        dma_to_qm_sg_one_last_ext(&fd_sgt[1], edesc->qm_sg_dma,
            ivsize + req->nbytes, 0);
    else
        dma_to_qm_sg_one_last(&fd_sgt[1], iv_dma, ivsize + req->nbytes,
            0);
    dma_to_qm_sg_one_last_ext(&fd_sgt[1], edesc->qm_sg_dma,
        ivsize + req->nbytes, 0);

if (req->src == req->dst) {
    if (!in_contig)
        dma_to_qm_sg_one_ext(&fd_sgt[0], edesc->qm_sg_dma +
            sizeof(*sg_table), req->nbytes, 0);
    else
        dma_to_qm_sg_one(&fd_sgt[0], sg_dma_address(req->src),
            req->nbytes, 0);
    dma_to_qm_sg_one_ext(&fd_sgt[0], edesc->qm_sg_dma + dst_sg_idx *
        sizeof(*sg_table), req->nbytes, 0);
@ @ -988,10 +990,10 @@

int src_nents, mapped_src_nents, dst_nents, mapped_dst_nents;
struct ablkcipher_edesc *edesc;
dma_addr_t iv_dma;
-bool out_contig;
+u8 *iv;
int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
struct qm_sg_entry *sg_table, *fd_sgt;
-int dst_sg_idx, qm_sg_ents;
+int dst_sg_idx, qm_sg_ents, qm_sg_bytes;
struct caam_drv_ctx *drv_ctx;

drv_ctx = get_drv_ctx(ctx, GIVENCRYPT);
@ @ -1039,46 +1041,45 @@
mapped_dst_nents = src_nents;
}

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iv_dma = dma_map_single(qidev, creq->giv, ivsize, DMA_FROM_DEVICE);
-if (dma_mapping_error(qidev, iv_dma)) {
  -dev_err(qidev, "unable to map IV\n");
  -caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
    - 0, 0, 0, 0);
  -return ERR_PTR(-ENOMEM);
-
  qm_sg_ents = mapped_src_nents > 1 ? mapped_src_nents : 0;
  dst_sg_idx = qm_sg_ents;
  -if (mapped_dst_nents == 1 & &
    - iv_dma + ivsize == sg_dma_address(req->dst)) {
    -out_contig = true;
    } else {
    -out_contig = false;
    -qm_sg_ents += 1 + mapped_dst_nents;
    -}
-
  -if (unlikely(qm_sg_ents > CAAM_QI_MAX_ABLKCIPHER_SG)) {
    -dev_err(qidev, "Insufficient S/G entries: %d > %lu\n",
      -qm_sg_ents, CAAM_QI_MAX_ABLKCIPHER_SG);
    -caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents,
      -    - iv_dma, ivsize, GIVENCRYPT, 0, 0);
    +qm_sg_ents += 1 + mapped_dst_nents;
    +qm_sg_bytes = qm_sg_ents * sizeof(struct qm_sg_entry);
    +if (unlikely(offsetof(struct ablkcipher_edesc, sgt) + qm_sg_bytes +
      + ivsize > CAAM_QI_MEMCACHE_SIZE)) {
    +dev_err(qidev, "No space for %d S/G entries and/or %dB IV\n",
      +qm_sg_ents, ivsize);
    +caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
      + 0, 0, 0, 0);
    +return ERR_PTR(-ENOMEM);
    }

  /* allocate space for base edesc and link tables */
  /* allocate space for base edesc, link tables and IV */
edesc = qi_cache_alloc(GFP_DMA | flags);
if (!edesc) {
  dev_err(qidev, "could not allocate extended descriptor\n");
  -caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents,
    -    - iv_dma, ivsize, GIVENCRYPT, 0, 0);
  +caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
    + 0, 0, 0, 0);
  +return ERR_PTR(-ENOMEM);
  +}
  +
  +/* Make sure IV is located in a DMAable area */
+sg_table = &edesc->sgt[0];
+iv = (u8 *)(sg_table + qm_sg_ents);
+iv_dma = dma_map_single(qidev, iv, ivsize, DMA_FROM_DEVICE);
+if (dma_mapping_error(qidev, iv_dma)) {
+dev_err(qidev, "unable to map IV\n");
+caam_unmap(qidev, req->src, req->dst, src_nents, dst_nents, 0,
+ 0, 0, 0, 0);
+qi_cache_free(edesc);
return ERR_PTR(-ENOMEM);
}
edesc->src_nents = src_nents;
edesc->dst_nents = dst_nents;
edesc->iv_dma = iv_dma;
-sg_table = &edesc->sgt[0];
-edesc->qm_sg_bytes = qm_sg_ents * sizeof(*sg_table);
+edesc->qm_sg_bytes = qm_sg_bytes;
edesc->drv_req.app_ctx = req;
edesc->drv_req.cbk = ablkcipher_done;
edesc->drv_req.drv_ctx = drv_ctx;
@@ -1086,11 +1087,9 @@
if (mapped_src_nents > 1)
 sg_to_qm_sg_last(req->src, mapped_src_nents, sg_table, 0);

@if (!out_contig) {
-dma_to_qm_sg_one(sg_table + dst_sg_idx, iv_dma, ivsize, 0);
-sg_to_qm_sg_last(req->dst, mapped_dst_nents, sg_table +
- dst_sg_idx + 1, 0);
-}
+dma_to_qm_sg_one(sg_table + dst_sg_idx, iv_dma, ivsize, 0);
+sg_to_qm_sg_last(req->dst, mapped_dst_nents, sg_table + dst_sg_idx + 1,
+ 0);

edesc->qm_sg_dma = dma_map_single(qidev, sg_table, edesc->qm_sg_bytes,
DMA_TO_DEVICE);
@@ -1111,13 +1110,8 @@
dma_to_qm_sg_one(&fd_sgt[1], sg_dma_address(req->src),
 req->nbytes, 0);

-if (!out_contig)
-dma_to_qm_sg_one_ext(&fd_sgt[0], edesc->qm_sg_dma + dst_sg_idx *
- sizeof(*sg_table), ivsize + req->nbytes,
- 0);
-else
-dma_to_qm_sg_one(&fd_sgt[0], sg_dma_address(req->dst),
- ivsize + req->nbytes, 0);
+dma_to_qm_sg_one_ext(&fd_sgt[0], edesc->qm_sg_dma + dst_sg_idx *
+ sizeof(*sg_table), ivsize + req->nbytes, 0);
return edesc;
}
@@ -1127,6 +1121,7 @@
struct ablkcipher_edesc *edesc;
 struct crypto_ablkcipher *ablkcipher = crypto_ablkcipher_reqtfm(req);
 struct caam_ctx *ctx = crypto_ablkcipher_ctx(ablkcipher);
+int ivsize = crypto_ablkcipher_ivsize(ablkcipher);
 int ret;

if (unlikely(caam_congested))
@@ -1137,6 +1132,14 @@
 if (IS_ERR(edesc))
 return PTR_ERR(edesc);

+/*
+ * The crypto API expects us to set the IV (req->info) to the last
+ * ciphertext block.
+ */
+if (!encrypt)
+scatterwalk_map_and_copy(req->info, req->src, req->nbytes -
+ ivsize, ivsize, 0);
+ ret = caam_qi_enqueue(ctx->qidev, &edesc->drv_req);
 if (!ret) {
 ret = -EINPROGRESS;
 --- linux-4.15.0.orig/drivers/crypto/caam/caamhash.c
+++ linux-4.15.0/drivers/crypto/caam/caamhash.c
@@ -117,6 +117,7 @@
 struct caam_hash_state {
 dma_addr_t buf_dma;
 dma_addr_t ctx_dma;
+int ctx_dma_len;
 u8 buf_0[CAAM_MAX_HASH_BLOCK_SIZE] ____cacheline_aligned;
 int buflen_0;
 u8 buf_1[CAAM_MAX_HASH_BLOCK_SIZE] ____cacheline_aligned;
@@ -182,18 +184,6 @@
 return 0;
}
/* Map req->result, and append seq_out_ptr command that points to it */
static inline dma_addr_t map_seq_out_ptr_result(u32 *desc, struct device *jrdev,
						u8 *result, int digestsize)
{
	dma_addr_t dst_dma;

	dst_dma = dma_map_single(jrdev, result, digestsize, DMA_FROM_DEVICE);
append_seq_out_ptr(desc, dst_dma, digestsize, 0);

return dst_dma;
}

/* Map current buffer in state (if length > 0) and put it in link table */
static inline int buf_map_to_sec4_sg(struct device *jrdev,
struct sec4_sg_entry *sec4_sg,
@@ -222,6 +212,7 @@
struct caam_hash_state *state, int ctx_len,
struct sec4_sg_entry *sec4_sg, u32 flag)
{
+state->ctx_dma_len = ctx_len;
state->ctx_dma = dma_map_single(jrdev, state->caam_ctx, ctx_len, flag);
dma_mapping_error(jrdev, state->ctx_dma))
}
@@ -462,7 +453,6 @@
/* ahash_edesc - s/w-extended ahash descriptor
- @dst_dma: physical mapped address of req->result
- @sec4_sg_dma: physical mapped address of h/w link table
- @src_nents: number of segments in input scatterlist
- @sec4_sg_bytes: length of dma mapped sec4_sg space
@ @ -470,7 +460,6 @@ @
 * @sec4_sg: h/w link table
 */
struct ahash_edesc {
-dma_addr_t dst_dma;

dma_addr_t sec4_sg_dma;
int src_nents;
int sec4_sg_bytes;
@ @ -486,8 +475,6 @@

if (edesc->src_nents)
dma_unmap_sg(dev, req->src, edesc->src_nents, DMA_TO_DEVICE);
-if (edesc->dst_dma)
-dma_unmap_single(dev, edesc->dst_dma, dst_len, DMA_FROM_DEVICE);

if (edesc->sec4_sg_bytes)
dma_unmap_single(dev, edesc->sec4_sg_dma,
struct ahash_edesc *edesc, 
struct ahash_request *req, int dst_len, u32 flag)
{
-struct crypto_ahash *ahash = crypto_ahash_reqtfm(req);
-struct caam_hash_ctx *ctx = crypto_ahash_ctx(ahash);
struct caam_hash_state *state = ahash_request_ctx(req);

if (state->ctx_dma) {
-dma_unmap_single(dev, state->ctx_dma, ctx->ctx_len, flag);
+dma_unmap_single(dev, state->ctx_dma, state->ctx_dma_len, flag);
state->ctx_dma = 0;
}
ahash_unmap(dev, edesc, req, dst_len);
}

struct crypto_ahash *ahash = crypto_ahash_reqtfm(req);
int digestsize = crypto_ahash_digestsize(ahash);
+struct caam_hash_state *state = ahash_request_ctx(req);
#ifdef DEBUG
struct caam_hash_ctx *ctx = crypto_ahash_ctx(ahash);
-struct caam_hash_state *state = ahash_request_ctx(req);
dev_err(jrdev, "%s %d: err 0x%x\n", __func__, __LINE__, err);
#endif
if (err)
caam_jr_strstatus(jrdev, err);

-ahash_unmap(jrdev, edesc, req, digestsize);
+ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_FROM_DEVICE);
+memcpy(req->result, state->caam_ctx, digestsize);
kfree(edesc);

#ifdef DEBUG
print_hex_dump(KERN_ERR, "ctx"__stringify(__LINE__)": ",
- DUMP_PREFIX_ADDRESS, 16, 4, state->caam_ctx,
- ctx->ctx_len, 1);
-if (req->result)
-print_hex_dump(KERN_ERR, "result"__stringify(__LINE__)": ",
- DUMP_PREFIX_ADDRESS, 16, 4, req->result,
- digestsize, 1);
#endif

req->base.complete(&req->base, err);
}

struct crypto_ahash *ahash = crypto_ahash_reqtfm(req);
int digestsize = crypto_ahash_digestsize(ahash);
+struct caam_hash_state *state = ahash_request_ctx(req);
#ifdef DEBUG
struct caam_hash_ctx *ctx = crypto_ahash_ctx(ahash);
-struct caam_hash_state *state = ahash_request_ctx(req);

dev_err(jrdev, "%s %d: err 0x%x\n", __func__, __LINE__, err);
#endif
@@ -602,17 +584,14 @@
if (err)
    caam_jr_strstatus(jrdev, err);

-ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_TO_DEVICE);
+ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_BIDIRECTIONAL);
+memcpy(req->result, state->caam_ctx, digestsize);
    kfree(edesc);

#ifdef DEBUG
    print_hex_dump(KERN_ERR, "ctx@"__stringify(__LINE__)": ",
        DUMP_PREFIX_ADDRESS, 16, 4, state->caam_ctx,
        ctx->ctx_len, 1);
-    if (req->result)
-        print_hex_dump(KERN_ERR, "result@"__stringify(__LINE__)": ",
-            DUMP_PREFIX_ADDRESS, 16, 4, req->result,
-            digestsize, 1);
#endif
@endif
req->base.complete(&req->base, err);
@@ -873,7 +852,7 @@
edesc->sec4_sg_bytes = sec4_sg_bytes;
    ret = ctx_map_to_sec4_sg(jrdev, state, ctx->ctx_len,
        edesc->sec4_sg, DMA_TO_DEVICE);
    ret = ctx_map_to_sec4_sg(jrdev, state, ctx->ctx_len,
-        edesc->sec4_sg, DMA_TO_DEVICE);
+        edesc->sec4_sg, DMA_BIDIRECTIONAL);
    if (ret)
        goto unmap_ctx;

    @@ -893,14 +872,7 @@
    append_seq_in_ptr(desc, edesc->sec4_sg_dma, ctx->ctx_len + buflen, 
    LDST_SGF);
-    edesc->dst_dma = map_seq_out_ptr_result(desc, jrdev, req->result,
-        digestsize);
-    if (dma_mapping_error(jrdev, edesc->dst_dma)) {
-        dev_err(jrdev, "unable to map dst\n");
-        ret = -ENOMEM;
-        goto unmap_ctx;

append_seq_out_ptr(desc, state->ctx_dma, digestsize, 0);

#ifdef DEBUG
print_hex_dump(KERN_ERR, "jobdesc" __stringify(__LINE__)": ",
@@ -913,7 +885,7 @@
return -EINPROGRESS;
 unmap_ctx:
 -ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_FROM_DEVICE);
 +ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_BIDIRECTIONAL);
 kfree(edesc);
 return ret;
 }
@@ -967,7 +939,7 @@
edesc->src_nents = src_nents;

 ret = ctx_map_to_sec4_sg(jrdev, state, ctx->ctx_len,
 - edesc->sec4_sg, DMA_TO_DEVICE);
 + edesc->sec4_sg, DMA_BIDIRECTIONAL);
 if (ret)
 goto unmap_ctx;
@@ -981,13 +953,7 @@
 if (ret)
 goto unmap_ctx;
 -edesc->dst_dma = map_seq_out_ptr_result(desc, jrdev, req->result,
 -digestsize);
 -if (dma_mapping_error(jrdev, edesc->dst_dma)) {
 -dev_err(jrdev, "unable to map dst\n");
 -ret = -ENOMEM;
 -goto unmap_ctx;
 -}
 +append_seq_out_ptr(desc, state->ctx_dma, digestsize, 0);
 #ifdef DEBUG
print_hex_dump(KERN_ERR, "jobdesc" __stringify(__LINE__)": ",
@@ -1000,7 +966,7 @@
return -EINPROGRESS;
 unmap_ctx:
 -ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_FROM_DEVICE);
 +ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_BIDIRECTIONAL);
 kfree(edesc);
 return ret;
 }
@@ -1059,10 +1025,8 @@
desc = edesc->hw_desc;

-edesc->dst_dma = map_seq_out_ptr_result(desc, jrdev, req->result,
-digestsize);
-if (dma_mapping_error(jrdev, edesc->dst_dma)) {
-dev_err(jrdev, "unable to map dst\n");
+ret = map_seq_out_ptr_ctx(desc, jrdev, state, digestsize);
+if (ret) {
  ahash_unmap(jrdev, edesc, req, digestsize);
  kfree(edesc);
  return -ENOMEM;
@@ -1077,7 +1041,7 @@
  if (!ret) {
    ret = -EINPROGRESS;
  } else {
    -ahash_unmap(jrdev, edesc, req, digestsize);
    +ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_FROM_DEVICE);
    kfree(edesc);
  }
@@ -1108,20 +1072,20 @@
  desc = edesc->hw_desc;

  -state->buf_dma = dma_map_single(jrdev, buf, buflen, DMA_TO_DEVICE);
  -if (dma_mapping_error(jrdev, state->buf_dma)) {
    -dev_err(jrdev, "unable to map src\n");
    -goto unmap;
  }
  +if (buflen) {
    +state->buf_dma = dma_map_single(jrdev, buf, buflen,
    +DMA_TO_DEVICE);
    +if (dma_mapping_error(jrdev, state->buf_dma)) {
    +dev_err(jrdev, "unable to map src\n");
    +goto unmap;
    +}
  }

  -append_seq_in_ptr(desc, state->buf_dma, buflen, 0);
  +append_seq_in_ptr(desc, state->buf_dma, buflen, 0);
  +}

  -edesc->dst_dma = map_seq_out_ptr_result(desc, jrdev, req->result,
    digestsize);
  -if (dma_mapping_error(jrdev, edesc->dst_dma)) {
    -dev_err(jrdev, "unable to map dst\n");
    +ret = map_seq_out_ptr_ctx(desc, jrdev, state, digestsize);
    +if (ret)
goto unmap;
-
#endif DEBUG
print_hex_dump(KERN_ERR, "jobdesc"__stringify(__LINE__)": ",
@@ -1132,7 +1096,7 @@
if (!ret) {
    ret = -EINPROGRESS;
} else {
-    ahash_unmap(jrdev, edesc, req, digestsize);
+    ahash_unmap_ctx(jrdev, edesc, req, digestsize, DMA_FROM_DEVICE);
    kfree(edesc);
}
@@ -1331,12 +1295,9 @@
goto unmap;
}

-edesc->dst_dma = map_seq_out_ptr_result(desc, jrdev, req->result,
-edesc);  
-if (dma_mapping_error(jrdev, edesc->dst_dma)) {
-    dev_err(jrdev, "unable to map dst\n");
+    ret = map_seq_out_ptr_ctx(desc, jrdev, state, digestsize);
+    if (ret)
        goto unmap;
-}
@@ -1479,6 +1440,7 @@
    state->current_buf = 0;
    state->buf_dma = 0;
    state->buflen_0 = 0;
- --- linux-4.15.0.orig/drivers/crypto/caam/caampkc.c
+++ linux-4.15.0/drivers/crypto/caam/caampkc.c

@@ -66,13 +66,13 @@
        struct caam_rsa_key *key = &ctx->key;
        struct rsa_priv_f2_pdb *pdb = &edesc->pdb.priv_f2;
        size_t p_sz = key->p_sz;
-       size_t q_sz = key->p_sz;
+       size_t q_sz = key->q_sz;
        dma_unmap_single(dev, pdb->d_dma, key->d_sz, DMA_TO_DEVICE);
        dma_unmap_single(dev, pdb->p_dma, p_sz, DMA_TO_DEVICE);
        dma_unmap_single(dev, pdb->q_dma, q_sz, DMA_TO DEVICE);
-       dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_TO_DEVICE);
-       dma_unmap_single(dev, pdb->tmp2_dma, q_sz, DMA_TO_DEVICE);
+       dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_BIDIRECTIONAL);
+       dma_unmap_single(dev, pdb->tmp2_dma, q_sz, DMA_BIDIRECTIONAL);
    }

static void rsa_priv_f3_unmap(struct device *dev, struct rsa_edesc *edesc,
@ @ -83,15 +83,15 @@
    struct caam_rsa_key *key = &ctx->key;
    struct rsa_priv_f3_pdb *pdb = &edesc->pdb.priv_f3;
    size_t p_sz = key->p_sz;
-   size_t q_sz = key->p_sz;
+   size_t q_sz = key->q_sz;
    dma_unmap_single(dev, pdb->p_dma, p_sz, DMA_TO_DEVICE);
    dma_unmap_single(dev, pdb->q_dma, q_sz, DMA_TO_DEVICE);
    dma_unmap_single(dev, pdb->dp_dma, p_sz, DMA_TO_DEVICE);
    dma_unmap_single(dev, pdb->dq_dma, q_sz, DMA_TO_DEVICE);
    dma_unmap_single(dev, pdb->c_dma, p_sz, DMA_TO DEVICE);
-   dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_TO_DEVICE);
-   dma_unmap_single(dev, pdb->tmp2_dma, q_sz, DMA_TO_DEVICE);
+   dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_BIDIRECTIONAL);
+   dma_unmap_single(dev, pdb->tmp2_dma, q_sz, DMA_BIDIRECTIONAL);
    }

/* RSA Job Completion handler */
@@ -166,18 +166,71 @@
        akcipher_request_complete(req, err);
    }

+static int caam_rsa_count_leading_zeros(struct scatterlist *sgl,
+     unsigned int nbytes,
+     unsigned int flags)
+{
+    struct sg_mapping_iter miter;
+    int lzeros, ents;
+    unsigned int len;
+    unsigned int tbytes = nbytes;

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const u8 *buff;
+
ents = sg_nents_for_len(sgl, nbytes);
+if (ents < 0)
+return ents;
+
sg_miter_start(&miter, sgl, ents, SG_MITER_FROM_SG | flags);
+
lzeros = 0;
+len = 0;
while (nbytes > 0) {
+len = miter.length;
+}

static struct rsa_edesc *rsa_edesc_alloc(struct akcipher_request *req,
size_t desclen)
{
struct crypto_akcipher *tfm = crypto_akcipher_reqtfm(req);
struct caam_rsa_ctx *ctx = akcipher_tfm_ctx(tfm);
struct device *dev = ctx->dev;
+struct caam_rsa_req_ctx *req_ctx = akcipher_request_ctx(req);
gfp_t flags = (req->base.flags & CRYPTO_TFM_REQ_MAY_SLEEP) ?
GFP_KERNEL : GFP_ATOMIC;
+int sg_flags = (flags == GFP_ATOMIC) ? SG_MITER_ATOMIC : 0;
int sgc;
int sec4_sg_index, sec4_sg_len = 0, sec4_sg_bytes;
int src_nents, dst_nents;
+int lzeros;
+
+lzeros = caam_rsa_count_leading_zeros(req->src, req->src_len, sg_flags);
+if (lzeros < 0)
+    return ERR_PTR(lzeros);
+
+req->src_len -= lzeros;
+req->src = scatterwalk_ffwd(req_ctx->src, req->src, lzeros);

src_nents = sg_nents_for_len(req->src, req->src_len);
dst_nents = sg_nents_for_len(req->dst, req->dst_len);
@@ -344,7 +397,7 @@
struct rsa_priv_f2_pdb *pdb = &edesc->pdb.priv_f2;
int sec4_sg_index = 0;
size_t p_sz = key->p_sz;
-size_t q_sz = key->q_sz;
+size_t q_sz = key->q_sz;

pdb->d_dma = dma_map_single(dev, key->d, key->d_sz, DMA_TO_DEVICE);
if (dma_mapping_error(dev, pdb->d_dma)) {
    @@ -364,13 +417,13 @@
goto unmap_p;
}

-pdb->tmp1_dma = dma_map_single(dev, key->tmp1, p_sz, DMA_TO_DEVICE);
+pdb->tmp1_dma = dma_map_single(dev, key->tmp1, p_sz, DMA_BIDIRECTIONAL);
if (dma_mapping_error(dev, pdb->tmp1_dma)) {
    dev_err(dev, "Unable to map RSA tmp1 memory\n");
goto unmap_q;
}

-pdb->tmp2_dma = dma_map_single(dev, key->tmp2, q_sz, DMA_TO_DEVICE);
+pdb->tmp2_dma = dma_map_single(dev, key->tmp2, q_sz, DMA_BIDIRECTIONAL);
if (dma_mapping_error(dev, pdb->tmp2_dma)) {
    dev_err(dev, "Unable to map RSA tmp2 memory\n");
goto unmap_tmp1;
    @@ -398,7 +451,7 @@
return 0;

unmap_tmp1:
-dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_TO_DEVICE);
+dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_BIDIRECTIONAL);
unmap_q:
    dma_unmap_single(dev, pdb->q_dma, q_sz, DMA_TO_DEVICE);
unmap_p:
    @@ -419,7 +472,7 @@
struct rsa_priv_f3_pdb *pdb = &edesc->pdb.priv_f3;
int sec4_sg_index = 0;
size_t p_sz = key->p_sz;
size_t q_sz = key->p_sz;
size_t q_sz = key->q_sz;
pdb->p_dma = dma_map_single(dev, key->p, p_sz, DMA_TO_DEVICE);
if (dma_mapping_error(dev, pdb->p_dma)) {
    goto unmap_dq;
}

-pdb->tmp1_dma = dma_map_single(dev, key->tmp1, p_sz, DMA_TO_DEVICE);
+pdb->tmp1_dma = dma_map_single(dev, key->tmp1, p_sz, DMA_BIDIRECTIONAL);
if (dma_mapping_error(dev, pdb->tmp1_dma)) {
    dev_err(dev, "Unable to map RSA tmp1 memory\n");
    goto unmap_qinv;
}

-pdb->tmp2_dma = dma_map_single(dev, key->tmp2, q_sz, DMA_TO_DEVICE);
+pdb->tmp2_dma = dma_map_single(dev, key->tmp2, q_sz, DMA_BIDIRECTIONAL);
if (dma_mapping_error(dev, pdb->tmp2_dma)) {
    dev_err(dev, "Unable to map RSA tmp2 memory\n");
    goto unmap_tmp1;
}
return 0;

unmap_tmp1:
-dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_TO_DEVICE);
+dma_unmap_single(dev, pdb->tmp1_dma, p_sz, DMA_BIDIRECTIONAL);
unmap_qinv:
dma_unmap_single(dev, pdb->c_dma, p_sz, DMA_TO_DEVICE);
unmap_dq:
 @@ -953,6 +1006,14 @@
 .max_size = caam_rsa_max_size,
 .init = caam_rsa_init_tfm,
 .exit = caam_rsa_exit_tfm,
+ .reqsize = sizeof(struct caam_rsa_req_ctx),
 .base = {
   .cra_name = "rsa",
   .cra_driver_name = "rsa-caam",
--- linux-4.15.0.orig/drivers/crypto/caam/caampkc.h
+++ linux-4.15.0/drivers/crypto/caam/caampkc.h
@@ -96,6 +101,14 @@
};

/**
+ * caam_rsa_req_ctx - per request context.
+ * @src: input scatterlist (stripped of leading zeros)
+ * /
+ * struct caam_rsa_req_ctx {
+ * struct scatterlist src[2];
+ *};
+ *
+ */
+
* rsa_edesc - s/w-extended rsa descriptor
* @src_nents     : number of segments in input scatterlist
* @dst_nents     : number of segments in output scatterlist
--- linux-4.15.0.orig/drivers/crypto/caam/caamrng.c
+++ linux-4.15.0/drivers/crypto/caam/caamrng.c
@@ -353,7 +353,10 @@
goto free_rng_ctx;

dev_info(dev, "registering rng-caam\n");
-return hwrng_register(&caam_rng);
+
+err = hwrng_register(&caam_rng);
+if (!err)
+   return err;

free_rng_ctx:
kfree(rng_ctx);
--- linux-4.15.0.orig/drivers/crypto/caam/ctrl.c
+++ linux-4.15.0/drivers/crypto/caam/ctrl.c
@@ -228,12 +228,16 @@
* without any error (HW optimizations for later
* CAAM eras), then try again.
*/
+if (ret)
+break;
+
rdsta_val = rd_reg32(&ctrl->r4tst[0].rdsta) & RDSTA_IFMASK;
if (status && status != JRSTA_SSRC_JUMP_HALT_CC) ||
   !(rdsta_val & (1 << sh_idx))
+   !(rdsta_val & (1 << sh_idx))) {
   ret = -EAGAIN;
+break;
+}

dev_info(ctrldev, "Instantiated RNG4 SH%d\n", sh_idx);
/* Clear the contents before recreating the descriptor */
memset(desc, 0x00, CAAM_CMD_SZ * 7);
@@ -809,9 +813,6 @@
return 0;

caam_remove:
ifdef CONFIG_DEBUG_FS
#ifdef CONFIG_DEBUG_FS
	debugfs_remove_recursive(ctrlpriv->dfs_root);
#endif
caam_remove(pdev);
return ret;

--- linux-4.15.0.orig/drivers/crypto/caam/error.c
+++ linux-4.15.0/drivers/crypto/caam/error.c
@@ -22,7 +22,7 @@
    size_t len;
    void *buf;

   for (it = sg; it && tlen > 0 ; it = sg_next(sg)) {
+   for (it = sg; it && tlen > 0 ; it = sg_next(it)) {
/*
   * make sure the scatterlist's page
   * has a valid virtual memory mapping
--- linux-4.15.0.orig/drivers/crypto/caam/jr.c
+++ linux-4.15.0/drivers/crypto/caam/jr.c
@@ -190,7 +190,8 @@
BUG_ON(CIRC_CNT(head, tail + i, JOBR_DEPTH) <= 0):

   /* Unmap just-run descriptor so we can post-process */
-dma_unmap_single(dev, jrp->outring[hw_idx].desc,
+dma_unmap_single(dev, caam_dma_to_cpu(jrp->outring[hw_idx].desc),
       jrp->entinfo[sw_idx].desc_size,
       DMA_TO_DEVICE);

--- linux-4.15.0.orig/drivers/crypto/caam/regs.h
+++ linux-4.15.0/drivers/crypto/caam/regs.h
@@ -70,22 +70,22 @@
 extern bool caam_little_end;
 extern bool caam_imx;

-#define caam_to_cpu(len)
-    static inline u##len caam##len##_to_cpu(u##len val)
-    
-    if (caam_little_end)
-    
-    return le##len##_to_cpu(val);
-    
-else
-    
-    return be##len##_to_cpu(val);
+
+#define caam_to_cpu(len)
+    static inline u##len caam##len##_to_cpu(u##len val)
+    
+    if (caam_little_end)
+    
+    return le##len##_to_cpu((__force __le##len)val);
+    
+else
+    
+    return be##len##_to_cpu(val);

+return be##len ## _to_cpu((__force __be##len)val);
}

#define cpu_to_caam(len)
-static inline u##len cpu_to_caam##len(u##len val)
-{
-\tif (caam_little_end)
-\t\treturn cpu_to_le##len(val);
-\telse
-\t\treturn cpu_to_be##len(val);
+#define cpu_to_caam(len)
+static inline u##len cpu_to_caam##len(u##len val)
+{
+\tif (caam_little_end)
+\t\treturn (__force u##len)cpu_to_le##len(val);
+\telse
+\t\treturn (__force u##len)cpu_to_be##len(val);
}

cam_to_cpu(16)
--- linux-4.15.0.orig/drivers/crypto/cavium/cpt/cptvf_algs.c
+++ linux-4.15.0/drivers/crypto/cavium/cpt/cptvf_algs.c
@@ -205,6 +205,7 @@

int status;

memset(req_info, 0, sizeof(struct cpt_request_info));
+req_info->may_sleep = (req->base.flags & CRYPTO_TFM_REQ_MAY_SLEEP) != 0;
memset(fctx, 0, sizeof(struct fc_context));
create_input_list(req, enc, enc_iv_len);
create_output_list(req, enc_iv_len);
--- linux-4.15.0.orig/drivers/crypto/cavium/cpt/cptvf_reqmanager.c
+++ linux-4.15.0/drivers/crypto/cavium/cpt/cptvf_reqmanager.c
@@ -136,7 +136,7 @@

/* Setup gather (input) components */
g_sz_bytes = ((req->incnt + 3) / 4) * sizeof(struct sglist_component);
-info->gather_components = kzalloc(g_sz_bytes, GFP_KERNEL);
+info->gather_components = kzalloc(g_sz_bytes, req->may_sleep ? GFP_KERNEL : GFP_ATOMIC);
if (!info->gather_components) {
  ret = -ENOMEM;
  goto scatter_gather_clean;
@@ -153,7 +153,7 @@

/* Setup scatter (output) components */
s_sz_bytes = ((req->outcnt + 3) / 4) * sizeof(struct sglist_component);
-info->scatter_components = kzalloc(s_sz_bytes, GFP_KERNEL);
+info->scatter_components = kzalloc(s_sz_bytes, req->may_sleep ? GFP_KERNEL : GFP_ATOMIC);
if (!info->scatter_components) {
ret = -ENOMEM;
goto scatter_gather_clean;
@@ -170,7 +170,7 @@
    /* Create and initialize DPTR */
    info->dlen = g_sz_bytes + s_sz_bytes + SG_LIST_HDR_SIZE;
    -info->in_buffer = kzalloc(info->dlen, GFP_KERNEL);
    +info->in_buffer = kzalloc(info->dlen, req->may_sleep ? GFP_KERNEL : GFP_ATOMIC);
    if (!info->in_buffer) {
        ret = -ENOMEM;
        goto scatter_gather_clean;
    }

    /* Create and initialize RPTR */
    -info->out_buffer = kzalloc(COMPLETION_CODE_SIZE, GFP_KERNEL);
    +info->out_buffer = kzalloc(COMPLETION_CODE_SIZE, req->may_sleep ? GFP_KERNEL : GFP_ATOMIC);
    if (!info->out_buffer) {
        ret = -ENOMEM;
        goto scatter_gather_clean;
    }

    struct cpt_vq_command vq_cmd;
    union cpt_inst_s cptinst;

    -info = kzalloc(sizeof(*info), GFP_KERNEL);
    +info = kzalloc(sizeof(*info), req->may_sleep ? GFP_KERNEL : GFP_ATOMIC);
    if (unlikely(!info)) {
        dev_err(&pdev->dev, "Unable to allocate memory for info_buffer\n");
        return -ENOMEM;
    }

    /* Get buffer for union cpt_res_s response
     * structure and its physical address
     */
    -info->completion_addr = kzalloc(sizeof(union cpt_res_s), GFP_KERNEL);
    +info->completion_addr = kzalloc(sizeof(union cpt_res_s), req->may_sleep ? GFP_KERNEL : GFP_ATOMIC);
    if (unlikely(!info->completion_addr)) {
        dev_err(&pdev->dev, "Unable to allocate memory for completion_addr\n");
        -return -ENOMEM;
        +ret = -ENOMEM;
        +goto request_cleanup;
    }

    result = (union cpt_res_s *)info->completion_addr;
    --- linux-4.15.0.orig/drivers/crypto/cavium/cpt/request_manager.h
    +++ linux-4.15.0/drivers/crypto/cavium/cpt/request_manager.h
    @@ -65,6 +65,8 @@
    union ctrl_info ctrl; /* User control information */
    struct cptvf_request req; /* Request Information (Core specific) */
bool may_sleep;
+  
struct buf_ptr in[MAX_BUF_CNT];
struct buf_ptr out[MAX_BUF_CNT];

--- linux-4.15.0.orig/drivers/crypto/cavium/nitrox/nitrox_algs.c
+++ linux-4.15.0/drivers/crypto/cavium/nitrox/nitrox_algs.c
@@ -73,7 +73,7 @@
 static int nitrox_skcipher_init(struct crypto_skcipher *tfm)
 {
     struct nitrox_crypto_ctx *nctx = crypto_skcipher_ctx(tfm);
-    void *fctx;
+    struct crypto_ctx_hdr *chdr;
     /* get the first device */
     nctx->ndev = nitrox_get_first_device();
     @ @ -81,12 +81,14 @ @
     return -ENODEV;

     /* allocate nitrox crypto context */
-    fctx = crypto_alloc_context(nctx->ndev);
-    if (!fctx) {
+    chdr = crypto_alloc_context(nctx->ndev);
+    if (!chdr) {
         nitrox_put_device(nctx->ndev);
         return -ENOMEM;
     }
     nctx->u.ctx_handle = (uintptr_t)fctx;
     +nctx->chdr = chdr;
     +nctx->u.ctx_handle = (uintptr_t)((u8 *)chdr->vaddr +
+     sizeof(struct crypto_ctx_hdr));
     crypto_skcipher_set_reqsize(tfm, crypto_skcipher_reqsize(tfm) +
     sizeof(struct nitrox_kcrypt_request));
     return 0;
     @ @ -102,7 +104,7 @ @

     memset(&fctx->crypto, 0, sizeof(struct crypto_keys));
     memset(&fctx->auth, 0, sizeof(struct auth_keys));
-    crypto_free_context((void *)fctx);
+    crypto_free_context((void *)nctx->chdr);
     } }
     nitrox_put_device(nctx->ndev);

--- linux-4.15.0.orig/drivers/crypto/cavium/nitrox/nitrox_dev.h
+++ linux-4.15.0/drivers/crypto/cavium/nitrox/nitrox_dev.h
@@ -35,6 +35,7 @@
 /* requests in backlog queues */

atomic_t backlog_count;

+int write_idx;
/* command size 32B/64B */
u8 instr_size;
u8 qno;
@@ -87,7 +88,7 @@
struct bh_data *slc;
};

/*! NITROX-5 driver state */
+/*! NITROX-V driver state */
#define NITROX_UCODE_LOADED 0
#define NITROX_READY 1

--- linux-4.15.0.orig/drivers/crypto/cavium/nitrox/nitrox_lib.c
+++ linux-4.15.0/drivers/crypto/cavium/nitrox/nitrox_lib.c
@@ -36,6 +36,7 @@
cmdq->head = PTR_ALIGN(cmdq->head_unaligned, PKT_IN_ALIGN);
cmdq->dma = PTR_ALIGN(cmdq->dma_unaligned, PKT_IN_ALIGN);
cmdq->qsize = (qsize + PKT_IN_ALIGN);
+cmdq->write_idx = 0;
spin_lock_init(&cmdq->response_lock);
spin_lock_init(&cmdq->cmdq_lock);
@@ -145,12 +146,19 @@
void *crypto_alloc_context(struct nitrox_device *ndev)
{
    struct ctx_hdr *ctx;
    +struct crypto_ctx_hdr *chdr;
    void *vaddr;
    dma_addr_t dma;

    +chdr = kmalloc(sizeof(*chdr), GFP_KERNEL);
    +if (!chdr)
    +return NULL;
    +
    vaddr = dma_pool_alloc(ndev->ctx_pool, (GFP_ATOMIC | __GFP_ZERO), &dma);
    -if (!vaddr)
    +if (!vaddr) {
    +kfree(chdr);
    return NULL;
    +}

    /* fill meta data */
    ctx = vaddr;
    @@ -158,7 +166,11 @@
    ctx->dma = dma;

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ctx->ctx_dma = dma + sizeof(struct ctx_hdr);

-return ((u8 *)vaddr + sizeof(struct ctx_hdr));
+chdr->pool = ndev->ctx_pool;
+chdr->dma = dma;
+chdr->vaddr = vaddr;
+
+return chdr;
}

/**
 @@ -167,13 +179,14 @@
 */
void crypto_free_context(void *ctx)
{
-struct ctx_hdr *ctxp;
+struct crypto_ctx_hdr *ctxp;

if (!ctx)
    return;

-ctxp = (struct ctx_hdr *)((u8 *)ctx - sizeof(struct ctx_hdr));
-dma_pool_free(ctxp->pool, ctxp, ctxp->dma);
+ctxp = ctx;
+kfree(ctxp);
}

/**
 --- linux-4.15.0.orig/drivers/crypto/cavium/nitrox/nitrox_main.c
 +++ linux-4.15.0/drivers/crypto/cavium/nitrox/nitrox_main.c
 @@ -183,7 +183,7 @@
 struct nitrox_device *nitrox_get_first_device(void)
 {
-struct nitrox_device *ndev = NULL;
+struct nitrox_device *ndev;

    mutex_lock(&devlist_lock);
    list_for_each_entry(ndev, &devlist, list) {
@@ -191,7 +191,7 @@
        break;
    }
    mutex_unlock(&devlist_lock);
    -if (!ndev)
    +if (&ndev->list == &devlist)
        return NULL;
refcount_inc(&ndev->refcnt);
--- linux-4.15.0.orig/drivers/crypto/cavium/nitrox/nitrox_req.h
+++ linux-4.15.0/drivers/crypto/cavium/nitrox/nitrox_req.h
@@ -181,12 +181,19 @@
struct auth_keys auth;
};

+struct crypto_ctx_hdr {
+struct dma_pool *pool;
+dma_addr_t dma;
+void *vaddr;
+};
+
+struct nitrox_crypto_ctx {
+struct nitrox_device *ndev;
+union {
+u64 ctx_handle;
+struct flexi_crypto_context *fctx;
} u;
+struct crypto_ctx_hdr *chdr;
};

++ struct nitrox_kcrypt_request {
++ struct nitrox_device *ndev;
@@ -427,30 +437,29 @@
struct nitrox_cmdq *cmdq)
{
    struct nitrox_device *ndev = sr->ndev;
-union nps_pkt_in_instr_baoff_dbell pkt_in_baoff_dbell;
        struct nitrox_cmdq *cmdq)
    {
        struct nitrox_device *ndev = sr->ndev;
        -union nps_pkt_in_instr_baoff_dbell pkt_in_baoff_dbell;
        -u64 offset;

    static inline int incr_index(int index, int count, int max)
    +{
    +if ((index + count) >= max)
    +index = index + count - max;
    +else
    +index += count;
    +
    +return index;
    +}

    /*
     * dma_free_sglist - unmap and free the sg lists.
     * @ndev: N5 device
     * @ @ -427,30 +437,29 @@
     * struct nitrox_cmdq *cmdq)
     * struct nitrox_device *ndev = sr->ndev;
     *-union nps_pkt_in_instr_baoff_dbell pkt_in_baoff_dbell;
     *-u64 offset;

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+int idx;
+u8 *ent;

spin_lock_bh(&cmdq->cmdq_lock);

/* get the next write offset */
-offset = NPS_PKT_IN_INSTR_BAOFF_DBELLX(cmdq->qno);
-pkt_in_baoff_dbell.value = nitrox_read_csr(ndev, offset);
+idx = cmdq->write_idx;

/* copy the instruction */
-ent = cmdq->head + pkt_in_baoff_dbell.s.aoff;
+ent = cmdq->head + (idx * cmdq->instr_size);
memcpy(ent, &sr->instr, cmdq->instr_size);

/* flush the command queue updates */
-dma_wmb();

-sr->tstamp = jiffies;
atomic_set(&sr->status, REQ_POSTED);
response_list_add(sr, cmdq);
+sr->tstamp = jiffies;

/* flush the command queue updates */
+dma_wmb();

/* Ring doorbell with count 1 */
writeq(1, cmdq->dbell_csr_addr);
/* orders the doorbell rings */
mmiowb();

+cmdq->write_idx = incr_index(idx, 1, ndev->qlen);
+
spin_unlock_bh(&cmdq->cmdq_lock);
}

if (!atomic_read(&cmdq->backlog_count))
+return 0;
+
spin_lock_bh(&cmdq->backlog_lock);

list_for_each_entry_safe(sr, tmp, &cmdq->backlog_head, backlog) {

/* submit until space available */
if (unlikely(cmdq_full(cmdq, ndev->qlen))) {
-ret = -EBUSY;

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+ret = -ENOSPC;
break;
}
/* delete from backlog list */
@@ -492,23 +504,20 @@
{
    struct nitrox_cmdq *cmdq = sr->cmdq;
    struct nitrox_device *ndev = sr->ndev;
-int ret = -EBUSY;
+    /* try to post backlog requests */
+    post_backlog_cmds(cmdq);

    if (unlikely(cmdq_full(cmdq, ndev->qlen))) {
        if (!(sr->flags & CRYPTO_TFM_REQ_MAY_BACKLOG))
            return -EAGAIN;
-        return -ENOSPC;
+        return -EBUSY;
    } else {
        ret = post_backlog_cmds(cmdq);
        if (ret) {
            backlog_list_add(sr, cmdq);
            return ret;
        }
        post_seinstr(sr, cmdq);
        ret = -EINPROGRESS;
+        return -EBUSY;
    }
    return ret;
+    post_seinstr(sr, cmdq);
+    return -EINPROGRESS;
}
/*
@@ -625,11 +634,9 @@
*/
sr->instr.fdata[0] = *((u64 *)&req->gph);
sr->instr.fdata[1] = 0;
-/* flush the soft_req changes before posting the cmd */
-wmb();

ret = nitrox_enqueue_request(sr);
-if (ret == -EAGAIN)
+if (ret == -ENOSPC)
goto send_fail;

return ret;
--- linux-4.15.0.orig/drivers/crypto/cavium/zip/common.h
+++ linux-4.15.0/drivers/crypto/cavium/zip/common.h
@@ -46,8 +46,10 @@
 #ifndef __COMMON_H__
 #define __COMMON_H__
 
+#include <linux/delay.h>
#include <linux/init.h>
#include <linux/interrupt.h>
+#include <linux/io.h>
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/pci.h>
@@ -149,6 +151,25 @@
 u32   sizeofzops;
 }

+#include <linux/delay.h>
#include <linux/init.h>
#include <linux/interrupt.h>
+#include <linux/io.h>
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/pci.h>
@@ -149,6 +151,25 @@
 u32   sizeofzops;
 }

+static inline int zip_poll_result(union zip_zres_s *result)
+{
+  +int retries = 1000;
+  +
+  +while (!result->s.compcode) {
+    +if (!--retries)
+      +pr_err("ZIP ERR: request timed out");
+    +return -ETIMEDOUT;
+  +}
+  +udelay(10);
+  +/
+  + /* Force re-reading of compcode which is updated
+  + by the ZIP coprocessor.
+  + */
+  +rmb();
+  +}
+  +return 0;
+  +}
+  +
+  /* error messages */
+#define zip_err(fmt, args...) pr_err("ZIP ERR:%s():%d: " 
    fmt "\n", __func__, __LINE__, ## args)
--- linux-4.15.0.orig/drivers/crypto/cavium/zip/zip_crypto.c
+++ linux-4.15.0/drivers/crypto/cavium/zip/zip_crypto.c
@@ -124,7 +124,7 @@
 struct zip_kernel_ctx *zip_ctx)
 {
   struct zip_operation  *zip_ops   = NULL;
-struct zip_state      zip_state;
+struct zip_kernel_ctx *zip_ctx)
```c
+struct zip_state  *zip_state;
struct zip_device  *zip = NULL;
int ret;

@@ -135,20 +135,23 @@
if (!zip)
return -ENODEV;

-memset(&zip_state, 0, sizeof(struct zip_state));
+zip_state = kzalloc(sizeof(*zip_state), GFP_ATOMIC);
+if (!zip_state)
+    return -ENOMEM;
+
zip_ops = &zip_ctx->zip_comp;

zip_ops->input_len  = slen;
zip_ops->output_len = *dlen;
memcpy(zip_ops->input, src, slen);

-ret = zip_deflate(zip_ops, &zip_state, zip);
+ret = zip_deflate(zip_ops, zip_state, zip);

if (!ret) {
    *dlen = zip_ops->output_len;
    memcpy(dst, zip_ops->output, *dlen);
}
-
+kfree(zip_state);
return ret;
}

@@ -157,7 +160,7 @@
    struct zip_kernel_ctx *zip_ctx)
{
    struct zip_operation  *zip_ops   = NULL;
-    struct zip_state      zip_state;
+    struct zip_state      *zip_state;
    struct zip_device     *zip = NULL;
    int ret;

@@ -168,7 +171,10 @@
    if (!zip)
    return -ENODEV;

-memset(&zip_state, 0, sizeof(struct zip_state));
+zip_state = kzalloc(sizeof(*zip_state), GFP_ATOMIC);
+if (!zip_state)
+    return -ENOMEM;
```
zip_ops = &zip_ctx->zip_decomp;
memcpy(zip_ops->input, src, slen);

ret = zip_inflate(zip_ops, &zip_state, zip);
if (!ret) {
    *dlen = zip_ops->output_len;
    memcpy(dst, zip_ops->output, *dlen);
}
+kfree(zip_state);
return ret;

/* Wait for completion or error */
+zip_poll_result(result_ptr);

/* Stats update for compression requests completed */
atomic64_inc(&zip_dev->stats.comp_req_complete);

*/

zip_dbg("CPU Core: %d Queue number:%d", smp_processor_id(), queue);
+zip_dbg("CPU Core: %d Queue number:%d", raw_smp_processor_id(), queue);
/* Take cmd buffer lock */
spin_lock(&zip_dev->iq[queue].lock);
--- linux-4.15.0.orig/drivers/crypto/cavium/zip_inflate.c
+++ linux-4.15.0/drivers/crypto/cavium/zip_inflate.c
@@ -143,8 +143,8 @@
     /* Decompression requests submitted stats update */
     atomic64_inc(&zip_dev->stats.decomp_req_submit);
     
-    while (!result_ptr->s.compcode)
-      continue;
+    /* Wait for completion or error */
+    zip_poll_result(result_ptr);

    /* Decompression requests completed stats update */
    atomic64_inc(&zip_dev->stats.decomp_req_complete);
--- linux-4.15.0.orig/drivers/crypto/cavium/zip_main.c
+++ linux-4.15.0/drivers/crypto/cavium/zip_main.c
@@ -113,7 +113,7 @@
 */
int zip_get_node_id(void)
{
    -return cpu_to_node(smp_processor_id());
    +return cpu_to_node(raw_smp_processor_id());
    }

/* Initializes the ZIP h/w sub-system */
@@ -351,6 +351,7 @@
     static struct crypto_alg zip_comp_deflate = {
       .cra_name= "deflate",
       +.cra_driver_name= "deflate-cavium",
     .cra_flags= CRYPTO_ALG_TYPE_COMPRESS,
     .cra_ctxsize= sizeof(struct zip_kernel_ctx),
     .cra_priority = 300,
@@ -365,6 +366,7 @@
     static struct crypto_alg zip_comp_lzs = {
       .cra_name= "lzs",
       +.cra_driver_name= "lzs-cavium",
     .cra_flags= CRYPTO_ALG_TYPE_COMPRESS,
     .cra_ctxsize= sizeof(struct zip_kernel_ctx),
     .cra_priority = 300,
@@ -384,7 +386,7 @@
             .decompress= zip_scomp_decompress,
             .base= {
               .cra_name= "deflate",
                 -.cra_driver_name= "deflate-scomp",
                 +.cra_driver_name= "deflate-scomp-cavium",

.cra_module= THIS_MODULE,
.cra_priority = 300,
}
@@ -397,7 +399,7 @@
.decompress= zip_scomp_decompress,
.base= {
.cra_name= "lzs",
-cra_driver_name= "lzs-scomp",
+cra_driver_name= "lzs-scomp-cavium",
.cra_module= THIS_MODULE,
.cra_priority = 300,
}
@@ -469,6 +471,8 @@
struct zip_stats  *st;

for (index = 0; index < MAX_ZIP_DEVICES; index++) {
+u64 pending = 0;
+
if (zip_dev[index]) {
    zip = zip_dev[index];
st  = &zip->stats;
@@ -476,16 +480,15 @@
/* Get all the pending requests */
for (q = 0; q < ZIP_NUM_QUEUES; q++) {
    val = zip_reg_read((zip->reg_base +
    ZIP_DBG_COREX_STA(q)));
    -val = (val >> 32);
    -val = val & 0xffffff;
    +val = atomic64_read(&st->pending_req);
    +pending += val >> 32 & 0xffffffff;
}

-avg_chunk = (atomic64_read(&st->comp_in_bytes) /
- atomic64_read(&st->comp_req_complete));
-avg_cr = (atomic64_read(&st->comp_in_bytes) /
- atomic64_read(&st->comp_out_bytes));
+val = atomic64_read(&st->comp_req_complete);
+avg_chunk = (val) ? atomic64_read(&st->comp_in_bytes) / val : 0;
+
+val = atomic64_read(&st->comp_out_bytes);
+avg_cr = (val) ? atomic64_read(&st->comp_in_bytes) / val : 0;

seq_printf(s, "        ZIP Device %d Stats
" "Comp Req Submitted : \%ld\n" "\n",
@@ -513,10 +516,7 @@
        (u64)atomic64_read(&st->decomp_in_bytes),
        (u64)atomic64_read(&st->decomp_out_bytes),
(u64)atomic64_read(&st->decomp_bad_reqs),
- (u64)atomic64_read(&st->pending_req);
-
-/* Reset pending requests count */
-atomic64_set(&st->pending_req, 0);
+ pending);
}
}
return 0;
@@ -593,6 +593,7 @@
 .owner = THIS_MODULE,
 .open  = zip_stats_open,
 .read  = seq_read,
+ .release = single_release,
 }
);

static int zip_clear_open(struct inode *inode, struct file *file)
@@ -604,6 +605,7 @@
 .owner = THIS_MODULE,
 .open  = zip_clear_open,
 .read  = seq_read,
+ .release = single_release,
 }
);

static int zip_regs_open(struct inode *inode, struct file *file)
@@ -615,6 +617,7 @@
 .owner = THIS_MODULE,
 .open  = zip_regs_open,
 .read  = seq_read,
+ .release = single_release,
 }
);

 /* Root directory for thunderx_zip debugfs entry */
--- linux-4.15.0.orig/drivers/crypto/cavium/zip/zip_main.h
+++ linux-4.15.0/drivers/crypto/cavium/zip/zip_main.h
@@ -74,7 +74,6 @@
 atomic64_t    comp_req_complete;
 atomic64_t    comp_req_submit;
 atomic64_t    comp_req_complete;
-atomic64_t    pending_req;
 atomic64_t    comp_in_bytes;
 atomic64_t    comp_out_bytes;
 atomic64_t    decomp_in_bytes;
--- linux-4.15.0.orig/drivers/crypto/ccp/Kconfig
+++ linux-4.15.0/drivers/crypto/ccp/Kconfig
@@ -8,10 +8,9 @@
 config CRYPTO_DEV_SP_CCP
 bool "Cryptographic Coprocessor device"
default y
- depends on CRYPTO_DEV_CCP_DD
+ depends on CRYPTO_DEV_CCP_DD && DMADEVICES
select HW_RANDOM
select DMA_ENGINE
- select DMADEVICES
select CRYPTO_SHA1
select CRYPTO_SHA256
help
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-crypto-aes-galois.c
+++ linux-4.15.0/drivers/crypto/ccp/ccp-crypto-aes-galois.c
@@ -62,6 +62,19 @@
 static int ccp_aes_gcm_setauthsize(struct crypto_aead *tmf,
 ,unsigned int authsize)
 {
+ switch (authsize) {
+ case 16:
+ case 15:
+ case 14:
+ case 13:
+ case 12:
+ case 8:
+ case 4:
+ break;
+ default:
+ return -EINVAL;
+ }
+ return 0;
 }

@@ -108,6 +121,7 @@
 memset(&rctx->cmd, 0, sizeof(rctx->cmd));
 INIT_LIST_HEAD(&rctx->cmd.entry);
 rctx->cmd.engine = CCP_ENGINE_AES;
+ rctx->cmd.u.aes.authsize = crypto_aead_authsize(tmf);
 rctx->cmd.u.aes.type = ctx->u.aes.type;
 rctx->cmd.u.aes.mode = ctx->u.aes.mode;
 rctx->cmd.u.aes.action = encrypt;
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-crypto-aes.c
+++ linux-4.15.0/drivers/crypto/ccp/ccp-crypto-aes.c
@@ -1,7 +1,8 @@
+/*
+ // SPDX-License-Identifier: GPL-2.0
+*/
+ * AMD Cryptographic Coprocessor (CCP) AES crypto API support
+ *
+ - * Copyright (C) 2013,2016 Advanced Micro Devices, Inc.
+ * Copyright (C) 2013-2019 Advanced Micro Devices, Inc.
* Author: Tom Lendacky <thomas.lendacky@amd.com>
*
@@ -79,8 +80,7 @@
  return -EINVAL;

if (((ctx->u.aes.mode == CCP_AES_MODE_ECB) ||
    (ctx->u.aes.mode == CCP_AES_MODE_CBC) ||
    (ctx->u.aes.mode == CCP_AES_MODE_CFB)) &&
    (req->nbytes & (AES_BLOCK_SIZE - 1)))
  return -EINVAL;

@@ -291,7 +291,7 @@
   .version = CCP_VERSION(3, 0),
   .name = "cfb(aes)",
   .driver_name = "cfb-aes-ccp",
  -.blocksize = AES_BLOCK_SIZE,
  +.blocksize = 1,
   .ivsize = AES_BLOCK_SIZE,
   .alg_defaults = &ccp_aes_defaults,
  },
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-crypto-rsa.c
+++ linux-4.15.0/drivers/crypto/ccp/ccp-crypto-rsa.c
@@ -60,10 +60,9 @@
static unsigned int ccp_rsa_maxsize(struct crypto_akcipher *tfm)
{
- if (ccp_version() > CCP_VERSION(3, 0))
- return CCP5_RSA_MAXMOD;
- else
- return CCP_RSA_MAXMOD;
+ struct ccp_ctx *ctx = akcipher_tfm_ctx(tfm);
+ return ctx->u.rsa.n_len;
}

static int ccp_rsa_crypt(struct akcipher_request *req, bool encrypt)
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-debugfs.c
+++ linux-4.15.0/drivers/crypto/ccp/ccp-debugfs.c
@@ -278,7 +278,7 @@
};

static struct dentry *ccp_debugfs_dir;
- static DEFINE_RWLOCK(ccp_debugfs_lock);
+ static DEFINE_MUTEX(ccp_debugfs_lock);

#define MAX_NAME_LEN 20
@@ -290,16 +290,15 @@
    struct dentry *debugfs_stats;
    struct dentry *debugfs_q_instance;
    struct dentry *debugfs_q_stats;
    -unsigned long flags;
    int i;

    if (!debugfs_initialized())
        return;

    -write_lock_irqsave(&ccp_debugfs_lock, flags);
    +mutex_lock(&ccp_debugfs_lock);
    if (!ccp_debugfs_dir)
        ccp_debugfs_dir = debugfs_create_dir(KBUILD_MODNAME, NULL);
    -write_unlock_irqrestore(&ccp_debugfs_lock, flags);
    +mutex_unlock(&ccp_debugfs_lock);
    if (!ccp_debugfs_dir)
        return;

--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-dev-v3.c
+++ linux-4.15.0/drivers/crypto/ccp/ccp-dev-v3.c
@@ -590,6 +590,7 @@
    .setup = NULL,
    .perform = &ccp3_actions,
    .offset = 0,
    +.rsamax = CCP_RSA_MAX_WIDTH,
    
};

const struct ccp_vdata ccpv3 = {
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-dev.c
+++ linux-4.15.0/drivers/crypto/ccp/ccp-dev.c
@@ -35,56 +35,62 @@
    
};

/* Human-readable error strings */
+#define CCP_MAX_ERROR_CODE64
static char *ccp_error_codes[] = {
    
    "ERR 01: ILLEGALENGINE",
    "ERR 02: ILLEGALKEY_ID",
    "ERR 03: ILLEGALFUNCTION_TYPE",
    "ERR 04: ILLEGALFUNCTION_MODE",
    "ERR 05: ILLEGALFUNCTION_ENCRYPT",
    "ERR 06: ILLEGALFUNCTION_SIZE",
    "ERR 07: Zlib_MISSING_INIT_EOM",
    "ERR 08: ILLEGALFUNCTION_RSVD",
    "ERR 09: ILLEGALBUFFER_LENGTH",
    

- ERR 10: VLSB_FAULT,
- ERR 11: ILLEGAL_MEM_ADDR,
- ERR 12: ILLEGAL_MEM_SEL,
- ERR 13: ILLEGAL_CONTEXT_ID,
- ERR 14: ILLEGAL_KEY_ADDR,
- ERR 15: 0xF Reserved",
- ERR 16: Zlib_ILLEGAL_MULTI_QUEUE",
- ERR 17: Zlib_ILLEGAL_JOBID_CHANGE",
- ERR 18: CMD_TIMEOUT",
- ERR 19: IDMA0_AXI_SLVERR",
- ERR 20: IDMA0_AXI_DECERR",
- ERR 21: 0x15 Reserved",
- ERR 22: IDMA1_AXI_SLAVE_FAULT",
- ERR 23: IDMA1_AXI_DECERR",
- ERR 24: 0x18 Reserved",
- ERR 25: ZLIBVHB_AXI_SLVERR",
- ERR 26: ZLIBVHB_AXI_DECERR",
- ERR 27: 0x1B Reserved",
- ERR 27: ZLIB_UNEXPECTED_EOM",
- ERR 27: ZLIB_EXTRA_DATA",
- ERR 30: ZLIB_BTYPE",
- ERR 31: ZLIB_UNDEFINED_SYMBOL",
- ERR 32: ZLIB_UNDEFINED_DISTANCE_S",
- ERR 33: ZLIB_CODE_LENGTH_SYMBOL",
- ERR 34: ZLIB_VHB_ILLEGAL_FETCH",
- ERR 35: ZLIB_UNCOMPRESSED_LEN",
- ERR 36: ZLIB_LIMIT_REACHED",
- ERR 37: ZLIB_CHECKSUM_MISMATCH0",
- ERR 38: ODMA0_AXI_SLVERR",
- ERR 39: ODMA0_AXI_DECERR",
- ERR 40: 0x28 Reserved",
- ERR 41: ODMA1_AXI_SLVERR",
- ERR 42: ODMA1_AXI_DECERR",
- ERR 43: LSB_PARITY_ERR",
+ "ILLEGAL_ENGINE",
+ "ILLEGAL_KEY_ID",
+ "ILLEGAL_FUNCTION_TYPE",
+ "ILLEGAL_FUNCTION_MODE",
+ "ILLEGAL_FUNCTION_ENCRYPT",
+ "ILLEGAL_FUNCTION_SIZE",
+ Zlib_MISSING_INIT_EOM",
+ "ILLEGAL_FUNCTION_RSVD",
+ "ILLEGAL_BUFFER_LENGTH",
+ "VLSB_FAULT",
+ "ILLEGAL_MEM_ADDR",
+ "ILLEGAL_MEM_SEL",
+ "ILLEGAL_CONTEXT_ID",
+ "ILLEGAL_KEY_ADDR"
/* 0xF Reserved, */
/* Zlib_ILLEGAL_MULTI_QUEUE, */
/* Zlib_ILLEGAL_JOBID_CHANGE, */
/* CMD_TIMEOUT, */
/* IDMA0_AXI_SLVERR, */
/* IDMA0_AXI_DECERR, */
/* 0x15 Reserved, */
/* IDMA1_AXI_SLAVE_FAULT, */
/* IDMA1_AXI_DECERR, */
/* 0x18 Reserved, */
/* ZLIBVHB_AXI_SLVERR, */
/* ZLIBVHB_AXI_DECERR, */
/* 0x1B Reserved, */
/* ZLIB_UNEXPECTED_EOM, */
/* ZLIB_EXTRA_DATA, */
/* ZLIB_BTYPES, */
/* ZLIB_UNDEFINED_SYMBOL, */
/* ZLIB_UNDEFINED_DISTANCE_S, */
/* ZLIB_CODE_LENGTH_SYMBOL, */
/* ZLIB_VHB_ILLEGAL_FETCH, */
/* ZLIB_UNCOMPRESSED_LEN, */
/* ZLIB_LIMIT_REACHED, */
/* ZLIB_CHECKSUM_MISMATCH0, */
/* ODMA0_AXI_SLVERR, */
/* ODMA0_AXI_DECERR, */
/* 0x28 Reserved, */
/* ODMA1_AXI_SLVERR, */
/* ODMA1_AXI_DECERR, */
};

void ccp_log_error(struct ccp_device *d, int e)
+ void ccp_log_error(struct ccp_device *d, unsigned int e)
{
-dev_err(d->dev, "CCP error: %s (0x%x)\n", ccp_error_codes[e], e);
+ if (WARN_ON(e >= CCP_MAX_ERROR_CODE))
+ return;
+ if (e < ARRAY_SIZE(ccp_error_codes))
  -dev_err(d->dev, "CCP error %d: %s\n", e, ccp_error_codes[e]);
+ else
+ dev_err(d->dev, "CCP error %d: Unknown Error\n", e);
}

/* List of CCPs, CCP count, read-write access lock, and access functions */
unsigned long flags;
unsigned int i;
/* If there's no device there's nothing to do */
+if (!ccp)
+return 0;
+
spin_lock_irqsave(&ccp->cmd_lock, flags);

ccp->suspending = 1;
@@ -561,6 +571,10 @@
unsigned long flags;
unsigned int i;

/* If there's no device there's nothing to do */
+if (!ccp)
+return 0;
+
spin_lock_irqsave(&ccp->cmd_lock, flags);

ccp->suspending = 0;
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-dev.h
+++ linux-4.15.0/drivers/crypto/ccp/ccp-dev.h
@@ -471,6 +471,7 @@
struct scatterlist *dma_sg;
+struct scatterlist *dma_sg_head;
struct device *dma_dev;
unsigned int dma_count;
enum dma_data_direction dma_dir;
@@ -632,7 +633,7 @@
void ccp_add_device(struct ccp_device *ccp);
void ccp_del_device(struct ccp_device *ccp);

-extern void ccp_log_error(struct ccp_device *, int);
+extern void ccp_log_error(struct ccp_device *, unsigned int);
+extern void ccp_log_error(struct ccp_device *, unsigned int);

struct ccp_device *ccp_alloc_struct(struct sp_device *sp);
bool ccp_queues_suspended(struct ccp_device *ccp);
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-dmaengine.c
+++ linux-4.15.0/drivers/crypto/ccp/ccp-dmaengine.c
@@ -340,6 +340,7 @@
desc->tx_desc.flags = flags;
desc->tx_desc.tx_submit = ccp_tx_submit;
desc->ccp = chan->ccp;
+INIT_LIST_HEAD(&desc->entry);
INIT_LIST_HEAD(&desc->pending);
INIT_LIST_HEAD(&desc->active);
desc->status = DMA_IN_PROGRESS;
--- linux-4.15.0.orig/drivers/crypto/ccp/ccp-ops.c
static void ccp_sg_free(struct ccp_sg_workarea *wa)
{
    if (wa->dma_count)
        dma_unmap_sg(wa->dma_dev, wa->dma_sg, wa->nents, wa->dma_dir);
    dma_unmap_sg(wa->dma_dev, wa->dma_sg_head, wa->nents, wa->dma_dir);

    wa->dma_count = 0;
}

wa->dma_sg = sg;
+wa->dma_sg_head = sg;
wa->dma_dev = dev;
wa->dma_dir = dma_dir;
wa->dma_count = dma_map_sg(dev, sg, wa->nents, dma_dir);

static void ccp_update_sg_workarea(struct ccp_sg_workarea *wa, unsigned int len)
{
    unsigned int nbytes = min_t(u64, len, wa->bytes_left);
    +unsigned int sg_combined_len = 0;

    if (!wa->sg)
        return;

    wa->sg_used += nbytes;
    wa->bytes_left -= nbytes;
    -if (wa->sg_used == wa->sg->length) {
        -wa->sg = sg_next(wa->sg);
    }
    +if (wa->sg_used == sg_dma_len(wa->dma_sg)) {
        /* Advance to the next DMA scatterlist entry */
        +wa->dma_sg = sg_next(wa->dma_sg);
        +*/
        +/* In the case that the DMA mapped scatterlist has entries
        + that have been merged, the non-DMA mapped scatterlist
        + must be advanced multiple times for each merged entry.
        + This ensures that the current non-DMA mapped entry
        + corresponds to the current DMA mapped entry.
        + */
        +do {
            +sg_combined_len += wa->sg->length;
            +wa->sg = sg_next(wa->sg);
        } while (wa->sg_used > sg_combined_len);
        + wa->sg_used = 0;
    }
static void ccp_set_dm_area(struct ccp_dm_workarea *wa, unsigned int wa_offset,
  struct scatterlist *sg, unsigned int sg_offset,
  unsigned int len)
{
  WARN_ON(!wa->address);

  if (len > (wa->length - wa_offset))
    return -EINVAL;

  scatterwalk_map_and_copy(wa->address + wa_offset, sg, sg_offset, len, 0);
  return 0;
}

static void ccp_get_dm_area(struct ccp_dm_workarea *wa, unsigned int wa_offset,
  unsigned int len)
{
  u8 *p, *q;
  int rc;

  ccp_set_dm_area(wa, wa_offset, sg, sg_offset, len);
  rc = ccp_set_dm_area(wa, wa_offset, sg, sg_offset, len);
  if (rc)
    return rc;

  p = wa->address + wa_offset;
  q = p + len - 1;

  while (sg->bytes_left && (buf_count < dm->length)) {
    nbytes = min(sg->length - sg->used, dm->length - buf_count);
    nbytes = min_t(u64, SG_DMA_LEN(sg->dma_sg) - sg->used,
      dm->length - buf_count);
    nbytes = min_t(u64, sg->bytes_left, nbytes);

    /* Update the structures and generate the count */
    buf_count = 0;
    while (sg->bytes_left && (buf_count < dm->length)) {
      nbytes = min(sg->length - sg->used, dm->length - buf_count);
      nbytes = min_t(u64, sg->bytes_left, nbytes);

      /* and destination. The resulting len values will always be <= UINT_MAX
       * because the dma length is an unsigned int.
/*
sg_src_len = sg_dma_len(src->sg_wa.sg) - src->sg_wa.sg_used;
sg_src_len = sg_dma_len(src->sg_wa.dma_sg) - src->sg_wa.sg_used;
sg_src_len = min_t(u64, src->sg_wa.bytes_left, sg_src_len);

if (dst) {
    sg_dst_len = sg_dma_len(dst->sg_wa.sg) - dst->sg_wa.sg_used;
    sg_dst_len = sg_dma_len(dst->sg_wa.dma_sg) - dst->sg_wa.sg_used;
    sg_dst_len = min_t(u64, src->sg_wa.bytes_left, sg_dst_len);
} else {
    @@ -363,7 +385,7 @@
    /* Enough data in the sg element, but we need to
    * adjust for any previously copied data
    */
    -op->src.u.dma.address = sg_dma_address(src->sg_wa.sg);
    +op->src.u.dma.address = sg_dma_address(src->sg_wa.dma_sg);
    op->src.u.dma.offset = src->sg_wa.sg_used;
    op->src.u.dma.length = op_len & ~(block_size - 1);

    @@ -384,7 +406,7 @@
    /* Enough room in the sg element, but we need to
    * adjust for any previously used area
    */
    -op->dst.u.dma.address = sg_dma_address(dst->sg_wa.sg);
    +op->dst.u.dma.address = sg_dma_address(dst->sg_wa.dma_sg);
    op->dst.u.dma.offset = dst->sg_wa.sg_used;
    op->dst.u.dma.length = op->src.u.dma.length;
} 
@@ -451,8 +473,8 @@
    return ccp_copy_to_from_sb(cmd_q, wa, jobid, sb, byte_swap, true);
}

-static int ccp_run_aes_cmac_cmd(struct ccp_cmd_queue *cmd_q, 
-struct ccp_cmd *cmd)
+static noinline_for_stack int 
+ccp_run_aes_cmac_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{
    struct ccp_aes_engine *aes = &cmd->u.aes;
    struct ccp_dm_workarea key, ctx;
    @@ -509,7 +531,9 @@
    return ret;

dm_offset = CCP_SB_BYTES - aes->key_len;
-ccp_set_dm_area(&key, dm_offset, aes->key, 0, aes->key_len);
+ret = ccp_set_dm_area(&key, dm_offset, aes->key, 0, aes->key_len);
+if (ret)
+  goto e_key;

ret = ccp_copy_to_sb(cmd_q, &key, op.jobid, op.sb_key, CCP_PASSTHRU_BYTESWAP_256BIT);
if (ret) {
    @{ -528,7 +552,9 @}
goto e_key;
}

dm_offset = CCP_SB_BYTES - AES_BLOCK_SIZE;
-ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
+ret = ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
+if (ret)
+goto e_ctx;
ret = ccp_copy_to_sb(cmd_q, &ctx, op.jobid, op.sb_ctx, CCP_PASSTHRU_BYTESWAP_256BIT);
if (ret) {
    @{ -556,8 +582,10 @}
goto e_src;
}

-ccp_set_dm_area(&ctx, 0, aes->cmac_key, 0,
-aes->cmac_key_len);
+ret = ccp_set_dm_area(&ctx, 0, aes->cmac_key, 0,
+    aes->cmac_key_len);
+if (ret)
+goto e_src;
ret = ccp_copy_to_sb(cmd_q, &ctx, op.jobid, op.sb_ctx, CCP_PASSTHRU_BYTESWAP_256BIT);
if (ret) {
    @{ -601,8 +629,8 @}
return ret;
}

-static int ccp_run_aes_gcm_cmd(struct ccp_cmd_queue *cmd_q,
-    struct ccp_cmd *cmd)
+static noinline_for_stack int
+ccp_run_aes_gcm_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{
    struct ccp_aes_engine *aes = &cmd->u.aes;
    struct ccp_dm_workarea key, ctx, final_wa, tag;
    @{ -612,6 +640,8 @}

unsigned long long *final;
unsigned int dm_offset;
+unsigned int authsize;
+unsigned int jobid;
unsigned int ilen;
bool in_place = true; /* Default value */
int ret;
    @{ -632,6 +662,21 @}
if (!aes->key) /* Gotta have a key SGL */
return -EINVAL;

/* Zero defaults to 16 bytes, the maximum size */
 authsize = aes->authsize ? aes->authsize : AES_BLOCK_SIZE;
 switch (authsize) {
 case 16:
 case 15:
 case 14:
 case 13:
 case 12:
 case 8:
 case 4:
 break;
 default:
 return -EINVAL;
 }

 /* First, decompose the source buffer into AAD & PT,
  * and the destination buffer into AAD, CT & tag, or
  * the input into CT & tag.
@@ -646,13 +691,15 @@
p_tag = scatterwalk_ffwd(sg_tag, p_outp, ilen);
 } else {
/* Input length for decryption includes tag */
-ilen = aes->src_len - AES_BLOCK_SIZE;
+ilen = aes->src_len - authsize;
p_tag = scatterwalk_ffwd(sg_tag, p_inp, ilen);
 }

+jobid = CCP_NEW_JOBID(cmd_q->ccp);
+memset(&op, 0, sizeof(op));
op.cmd_q = cmd_q;
-op.jobid = CCP_NEW_JOBID(cmd_q->ccp);
+op.jobid = jobid;
op.sb_key = cmd_q->sb_key; /* Pre-allocated */
op.sb_ctx = cmd_q->sb_ctx; /* Pre-allocated */
op.init = 1;
@@ -666,7 +713,9 @@
 return ret;

dm_offset = CCP_SB_BYTES - aes->key_len;
-ccp_set_dm_area(&key, dm_offset, aes->key, 0, aes->key_len);
+ret = ccp_set_dm_area(&key, dm_offset, aes->key, 0, aes->key_len);
+if (ret)
+goto e_key;
ret = ccp_copy_to_sb(cmd_q, &key, op.jobid, op.sb_key,
CCP_PASSTHRU_BYTESWAP_256BIT);
if (ret) {
@@ -685,7 +734,9 @@
goto e_key;

dm_offset = CCP_AES_CTX_SB_COUNT * CCP_SB_BYTES - aes->iv_len;
-ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
+ret = ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
+if (ret)
+goto e_ctx;

ret = ccp_copy_to_sb(cmd_q, &ctx, op.jobid, op.sb_ctx,
             CCP_PASSTHRU_BYTESWAP_256BIT);
@@ -732,7 +783,7 @@
in_place ? DMA_BIDIRECTIONAL
         : DMA_TO_DEVICE);
if (ret)
-goto e_ctx;
+goto e_aad;

if (in_place) {
    dst = src;
@@ -749,8 +800,7 @@
          src.sg_wa.bytes_left) {
      ccp_prepare_data(&src, &dst, &op, AES_BLOCK_SIZE, true);
      if (!src.sg_wa.bytes_left) {
        unsigned int nbytes = aes->src_len
    - % AES_BLOCK_SIZE;
+unsigned int nbytes = ilen % AES_BLOCK_SIZE;

      if (nbytes) {
        op.eom = 1;
@@ -777,7 +827,9 @@
goto e_dst;
      }

     -ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
    +ret = ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
    +if (ret)
    +goto e_dst;

    ret = ccp_copy_to_sb(cmd_q, &ctx, op.jobid, op.sb_ctx,
             CCP_PASSTHRU_BYTESWAP_256BIT);
@@ -797,6 +849,13 @@
            final[0] = cpu_to_be64(aes->aad_len * 8);
            final[1] = cpu_to_be64(ilen * 8);

        +memset(&op, 0, sizeof(op));


+op.cmd_q = cmd_q;
+op.jobid = jobid;
+op.sb_key = cmd_q->sb_key; /* Pre-allocated */
+op.sb_ctx = cmd_q->sb_ctx; /* Pre-allocated */
+op.init = 1;
+op.u.aes.type = aes->type;
op.u.aes.mode = CCP_AES_MODE_GHASH;
op.u.aes.action = CCP_AES_GHASHFINAL;
op.src.type = CCP_MEMTYPE_SYSTEM;
@@ -809,32 +868,37 @@
op.u.aes.size = 0;
ret = cmd_q->ccp->vdata->perform->aes(&op);
if (ret)
-goto e_dst;
+goto e_final_wa;

if (aes->action == CCP_AES_ACTION_ENCRYPT) {
/* Put the ciphered tag after the ciphertext. */
-ccp_get_dm_area(&final_wa, 0, p_tag, 0, AES_BLOCK_SIZE);
+ccp_get_dm_area(&final_wa, 0, p_tag, 0, authsize);
} else {
/* Does this ciphered tag match the input? */
-ret = ccp_init_dm_workarea(&tag, cmd_q, AES_BLOCK_SIZE,
+ret = ccp_init_dm_workarea(&tag, cmd_q, authsize,
     DMA_BIDIRECTIONAL);
if (ret)
-goto e_tag;
+goto e_final_wa;
-ccp_set_dm_area(&tag, 0, p_tag, 0, AES_BLOCK_SIZE);
+goto e_final_wa;
+ret = ccp_set_dm_area(&tag, 0, p_tag, 0, authsize);
+if (ret) {
+ccp_dm_free(&tag);
+goto e_final_wa;
+
-ret = memcmp(tag.address, final_wa.address, AES_BLOCK_SIZE);
+ret = crypto_memneq(tag.address, final_wa.address,
+ authsize) ? -EBADMSG : 0;
ccp_dm_free(&tag);
}

-e_tag:
+e_final_wa:
ccp_dm_free(&final_wa);

-e_dst:
-if (aes->src_len && !in_place)
+if (ilen > 0 && !in_place)
ccp_free_data(&dst, cmd_q);

e_src:
- if (aes->src_len)
+ if (ilen > 0)
    ccp_free_data(&src, cmd_q);

e_aad:
@@ -850,7 +914,8 @@
    return ret;
}

- static int ccp_run_aes_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd) 
+ static noinline_for_stack int
+ ccp_run_aes_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{ 
    struct ccp_aes_engine *aes = &cmd->u.aes;
    struct ccp_dm_workarea key, ctx;
@@ -860,12 +925,6 @@
    bool in_place = false;
    int ret;

    - if (aes->mode == CCP_AES_MODE_CMAC) 
      - return ccp_run_aes_cmac_cmd(cmd_q, cmd);
      -
      - if (aes->mode == CCP_AES_MODE_GCM) 
      - return ccp_run_aes_gcm_cmd(cmd_q, cmd);
-    -
if (!((aes->key_len == AES_KEYSIZE_128) ||
      (aes->key_len == AES_KEYSIZE_192) ||
      (aes->key_len == AES_KEYSIZE_256)))
@@ -914,7 +973,9 @@
    return ret;

dm_offset = CCP_SB_BYTES - aes->key_len;
    - ccp_set_dm_area(&key, dm_offset, aes->key, 0, aes->key_len);
-    + ret = ccp_set_dm_area(&key, dm_offset, aes->key, 0, aes->key_len);
+    + if (ret)
+      + goto e_key;
    ret = ccp_copy_to_sb(cmd_q, &key, op.jobid, op.sb_key, 
                  CCP_PASSTHRU_BYTESWAP_256BIT);
    if (ret) { 
      @@ -935,7 +996,9 @@
      if (aes->mode != CCP_AES_MODE_ECB) {
        /* Load the AES context - convert to LE */
        dm_offset = CCP_SB_BYTES - AES_BLOCK_SIZE;
        - ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
        + ret = ccp_set_dm_area(&ctx, dm_offset, aes->iv, 0, aes->iv_len);
+if (ret)
+goto e_ctx;
ret = ccp_copy_to_sb(cmd_q, &ctx, op.jobid, op.sb_ctx,
    CCP_PASSTHRU_BYTESWAP_256BIT);
if (ret) {
    return ret;
}

static int ccp_run_xts_aes_cmd(struct ccp_cmd_queue *cmd_q,
    struct ccp_cmd *cmd)
{+static noinline_for_stack int
+ccp_run_xts_aes_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
}{
    struct ccp_xts_aes_engine *xts = &cmd->u.xts;
    struct ccp_dm_workarea key, ctx;
    @ @ -1113,8 +1176,12 @@
* big endian to little endian. */
    dm_offset = CCP_SB_BYTES - AES_KEYSIZE_128;
-ccp_set_dm_area(&key, dm_offset, xts->key, 0, xts->key_len);
-ccp_set_dm_area(&key, 0, xts->key, xts->key_len, xts->key_len);
+ret = ccp_set_dm_area(&key, dm_offset, xts->key, 0, xts->key_len);
+if (ret)
+goto e_key;
+ret = ccp_set_dm_area(&key, 0, xts->key, xts->key_len, xts->key_len);
+if (ret)
+goto e_key;
} else {
/* Version 5 CCPs use a 512-bit space for the key: each portion
* occupies 256 bits, or one entire slot, and is zero-padded.
@ @ -1123,9 +1190,13 @@
    dm_offset = CCP_SB_BYTES;
    pad = dm_offset - xts->key_len;
-ccp_set_dm_area(&key, pad, xts->key, 0, xts->key_len);
-ccp_set_dm_area(&key, dm_offset + pad, xts->key, xts->key_len,
    -xts->key_len);
+ret = ccp_set_dm_area(&key, pad, xts->key, 0, xts->key_len);
+if (ret)
+goto e_key;
+ret = ccp_set_dm_area(&key, dm_offset + pad, xts->key,
+    + xts->key_len, xts->key_len);
+if (ret)
+goto e_key;
} 
ret = ccp_copy_to_sb(cmd_q, &key, op.jobid, op.sb_key,
    CCP_PASSTHRU_BYTESWAP_256BIT);
@@ -1144,7 +1215,9 @@
        if (ret)
            goto e_key;

-ccp_set_dm_area(&ctx, 0, xts->iv, 0, xts->iv_len);
+ret = ccp_set_dm_area(&ctx, 0, xts->iv, 0, xts->iv_len);
+if (ret)
+    goto e_ctx;
ret = ccp_copy_to_sb(cmd_q, &ctx, op.jobid, op.sb_ctx,
        CCP_PASSTHRU_BYTESWAP_NOOP);
if (ret) {
@@ -1219,7 +1292,8 @@
    return ret;
}

-static int ccp_run_des3_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
+static noinline_for_stack int
+ccp_run_des3_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{
    struct ccp_des3_engine *des3 = &cmd->u.des3;

@@ -1232,6 +1306,9 @@
    int ret;
    /* Error checks */
    +if (cmd_q->ccp->vdata->version < CCP_VERSION(5, 0))
    +return -EINVAL;
    +
    if (!cmd_q->ccp->vdata->perform->des3)
        return -EINVAL;

@@ -1287,12 +1364,18 @@
    dm_offset = CCP_SB_BYTES - des3->key_len; /* Basic offset */

    len_singlekey = des3->key_len / 3;
-ccp_set_dm_area(&key, dm_offset + 2 * len_singlekey,
-            des3->key, 0, len_singlekey);
-ccp_set_dm_area(&key, dm_offset + len_singlekey,
-            des3->key, len_singlekey, len_singlekey);
-ccp_set_dm_area(&key, dm_offset,
-            des3->key, 2 * len_singlekey, len_singlekey);
+ret = ccp_set_dm_area(&key, dm_offset + 2 * len_singlekey,
+            des3->key, 0, len_singlekey);
+if (ret)
+    goto e_key;
+ret = ccp_set_dm_area(&key, dm_offset + len_singlekey,
+            des3->key, len_singlekey, len_singlekey);
+if (ret)
goto e_key;
ret = ccp_set_dm_area(&key, dm_offset,
    des3->key, 2 * len_singlekey, len_singlekey);
if (ret)
    goto e_key;

/* Copy the key to the SB */
ret = ccp_copy_to_sb(cmd_q, &key, op.jobid, op.sb_key,
    CCP_PASSTHRU_BYTESWAP_NOOP);
if (ret) {
    cmd->engine_error = cmd_q->cmd_error;
    goto e_ctx;
}

/* Load the context into the LSB */
if (des3->mode != CCP_DES3_MODE_ECB) {
    u32 load_mode;
    op.sb_ctx = cmd_q->sb_ctx;
    ret = ccp_init_dm_workarea(&ctx, cmd_q,
        CCP_PASSTHRU_BYTESWAP_256BIT);
    if (ret) {
        goto e_ctx;
    }
-
    if (cmd_q->ccp->vdata->version == CCP_VERSION(3, 0))
        dm_offset = CCP_SB_BYTES - des3->iv_len;
    else
        dm_offset = 0;
    ccp_get_dm_area(&ctx, dm_offset, des3->iv, 0,
        DES3_EDE_BLOCK_SIZE);
}
/* ...but we only need the last DES3_EDE_BLOCK_SIZE bytes */

/* Open Source Used In 5GaaS Edge AC-4  20504 */
return ret;
}

static int ccp_run_rsa_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{
    struct ccp_rsa_engine *rsa = &cmd->u.rsa;
    struct ccp_dm_workarea ctx;
    return ret;
}

/* Restore the context */
-ccp_set_dm_area(&ctx, 0, sha->ctx, 0,
-sb_count * CCP_SB_BYTES);
+ret = ccp_set_dm_area(&ctx, 0, sha->ctx, 0,
+    sb_count * CCP_SB_BYTES);
+if (ret)
+    goto e_ctx;
+goto e_data;
}

if (op.data_size > sb_count)
    break;

default:
    ret = -EINVAL;
    goto e_data;
}

/* Stash the context */
-ccp_set_dm_area(&ctx, 0, sha->ctx, 0,
-sb_count * CCP_SB_BYTES);
+ret = ccp_set_dm_area(&ctx, 0, sha->ctx, 0,
+    sb_count * CCP_SB_BYTES);
+if (ret)
+    goto e_ctx;
+goto e_data;
}
}else {
    /* Stash the context */
-ccp_set_dm_area(&ctx, 0, sha->ctx, 0,
-sb_count * CCP_SB_BYTES);
+ret = ccp_set_dm_area(&ctx, 0, sha->ctx, 0,
+    sb_count * CCP_SB_BYTES);
+if (ret)
+    goto e_ctx;
+goto e_data;
}
}

memset(&hmac_cmd, 0, sizeof(hmac_cmd));

-ccp_run_rsa_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
+static noinline_for_stack int
+ccp_run_rsa_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{
  struct ccp_rsa_engine *rsa = &cmd->u.rsa;
  struct ccp_dm_workarea exp, src, dst;
  return ret;
}

-static int ccp_run_passthru_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
+static noinline_for_stack int
+ccp_run_passthru_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{
  struct ccp_passthru_engine *pt = &cmd->u.passthru;
  struct ccp_dm_workarea mask;
  if (ret) return ret;

  -ccp_set_dm_area(&mask, 0, pt->mask, 0, pt->mask_len);
  +ret = ccp_set_dm_area(&mask, 0, pt->mask, 0, pt->mask_len);
  +if (ret)
  +goto e_mask;
  ret = ccp_copy_to_sb(cmd_q, &mask, op.jobid, op.sb_key,
                      CCP_PASSTHRU_BYTESWAP_NOOP);
  if (ret) {
    dst.sg_wa.sg_used = 0;
    for (i = 1; i <= src.sg_wa.dma_count; i++) {
      if (!dst.sg_wa.sg ||
         (sg_dma_len(dst.sg_wa.sg) < sg_dma_len(src.sg_wa.sg))) {
        ret = -EINVAL;
        goto e_dst;
      }
      dst.sg_wa.sg_used += src.sg_wa.sg->length;
      if (dst.sg_wa.sg_used == dst.sg_wa.sg->length) {
        dst.sg_wa.sg = sg_next(dst.sg_wa.sg);
        dst.sg_wa.sg_used = 0;
      }
    }
  }
  @ @ -1968,7 +2051,7 @@
  dst.sg_wa.sg_used += src.sg_wa.sg->length;
  -if (dst.sg_wa.sg_used == dst.sg_wa.sg->length) {
  +dst.sg_wa.sg_used += sg_dma_len(src.sg_wa.sg);
  +if (dst.sg_wa.sg_used == sg_dma_len(dst.sg_wa.sg)) {
    dst.sg_wa.sg = sg_next(dst.sg_wa.sg);
    dst.sg_wa.sg_used = 0;
  }
  @ @ -2016,7 +2099,8 @@
return ret;
}

static int ccp_run_passthru_nomap_cmd(struct ccp_cmd_queue *cmd_q,
    struct ccp_cmd *cmd)
{
    struct ccp_passthru_nomap_engine *pt = &cmd->u.passthru_nomap;
    return ret;
}

static int ccp_run_ecc_cmd(struct ccp_cmd_queue *cmd_q, struct ccp_cmd *cmd)
{
    struct ccp_ecc_engine *ecc = &cmd->u.ecc;
    return ret;
}

switch (cmd->engine) {
    case CCP_ENGINE_AES:
        ret = ccp_run_aes_cmd(cmd_q, cmd);
        switch (cmd->u.aes.mode) {
            case CCP_AES_MODE_CMAC:
                ret = ccp_run_aes_cmac_cmd(cmd_q, cmd);
                break;
            case CCP_AES_MODE_GCM:
                ret = ccp_run_aes_gcm_cmd(cmd_q, cmd);
                break;
            default:
                ret = ccp_run_aes_cmd(cmd_q, cmd);
                break;
        }
        break;
    case CCP_ENGINE_XTS_AES_128:
        ret = ccp_run_xts_aes_cmd(cmd_q, cmd);
        if (ret) {
            dev_err(dev, "dma_set_mask_and_coherent failed (%d)\n", ret);
            goto e_err;
        }
        break;
    default:
        break;
}

ret = sp_init(sp);
if (ret)
    goto e_err;
+free_irqs;

dev_notice(dev, "enabled\n");

return 0;

+free_irqs:
+sp_free_irqs(sp);

ret = sp_init(sp);
if (ret)
    goto e_err;

dev_notice(dev, "initialization failed\n");
return ret;

--- linux-4.15.0.orig/drivers/crypto/chelsio/chcr_algo.c
+++ linux-4.15.0/drivers/crypto/chelsio/chcr_algo.c
@@ -414,7 +414,8 @@
walk->to = (struct phys_sge_pairs *)(dsgl + 1);
}

-void dsgl_walk_end(struct dsgl_walk *walk, unsigned short qid)
+void dsgl_walk_end(struct dsgl_walk *walk, unsigned short qid,
				int pci_chan_id)
{
    struct cpl_rx_phys_dsgl *phys_cpl;
    @ @ -432,6 +433,7 @@
    phys_cpl->rss_hdr_int.opcode = CPL_RX_PHYS_ADDR;
    phys_cpl->rss_hdr_int.qid = htons(qid);
    phys_cpl->rss_hdr_int.hash_val = 0;
    +phys_cpl->rss_hdr_int.channel = pci_chan_id;
}

static inline void dsgl_walk_add_page(struct dsgl_walk *walk,
    @ @ -737,7 +739,7 @@
    FILL_WR_RX_Q_ID(ctx->dev->rx_channel_id, qid,
        !lcb, ctx->tx_qidx);

-  -chcr_req->ulptx.cmd_dest = FILL_ULPTX_CMD_DEST(ctx->dev->tx_channel_id,
+  -chcr_req->ulptx.cmd_dest = FILL_ULPTX_CMD_DEST(ctx->tx_chan_id,
      qid);
  chcr_req->ulptx.len = htonl((DIV_ROUND_UP_UP(len16, 16) -
    ((sizeof(chcr_req->wreq)) >> 4)));
@@ -1366,16 +1368,23 @@
adap->vres.ncrypto_fc);
rxq_perchan = u_ctx->lldi.nrxq / u_ctx->lldi.nchan;
txq_perchan = ntxq / u_ctx->lldi.nchan;
-rxq_idx = ctx->dev->tx_channel_id * rxq_perchan;
-txq_idx = ctx->dev->tx_channel_id * txq_perchan;

spin_lock(&ctx->dev->lock_chcr_dev);
-ctx->rx_qidx = rxq_idx;
-ctx->tx_qidx = txq_idx;
+ctx->tx_chan_id = ctx->dev->tx_channel_id;
ctx->dev->tx_channel_id = !ctx->dev->tx_channel_id;
spin_unlock(&ctx->dev->lock_chcr_dev);
+ctx->rx_qidx = ctx->tx_chan_id * rxq_perchan;
+ctx->tx_qidx = ctx->tx_chan_id * txq_perchan;
+ctx->pci_chan_id = txq_idx / txq_perchan;

/* Channel Id used by SGE to forward packet to Host.
 + Same value should be used in cpl-fw6_pld RSS_CH field
 + by FW. Driver programs PCI channel ID to be used in fw
 + at the time of queue allocation with value "pi->tx_chan"
 + */
+ctx->pci_chan_id = txq_idx / txq_perchan;
}
out:
return err;
@@ -2318,6 +2327,7 @@
struct crypto_aead *tfm = crypto_aead_reqtfm(req);
struct dsgl_walk dsgl_walk;
unsigned int authsize = crypto_aead_authsize(tfm);
+struct chcr_context *ctx = a_ctx(tfm);
u32 temp;

dsgl_walk_init(&dsgl_walk, phys_cpl);
@@ -2327,7 +2337,7 @@
dsgl_walk_add_page(&dsgl_walk, IV, &reqctx->iv_dma);
temp = req->cryptlen + (op_type ? -authsize : authsize);
dsgl_walk_add_sg(&dsgl_walk, req->dst, temp, req->assoclen);
-dsgl_walk_end(&dsgl_walk, qid);
+dsgl_walk_end(&dsgl_walk, qid, ctx->pci_chan_id);
}

static inline void chcr_add_cipher_src_ent(struct ablkcipher_request *req,
@@ -2361,6 +2371,8 @@
    unsigned short qid)
{
    }
struct chcr_blkcipher_req_ctx *reqctx = ablkcipher_request_ctx(req);
+struct crypto_ablkcipher *tfm = crypto_ablkcipher_reqtfm(wrparam->req);
+struct chcr_context *ctx = c_ctx(tfm);
struct dsgl_walk dsgl_walk;

dsgl_walk_init(&dsgl_walk, phys_cpl);
@@ -2370,7 +2382,7 @@
 reqctx->dstsg = dsgl_walk.last_sg;
 reqctx->dst_ofst = dsgl_walk.last_sg_len;
-dsgl_walk_end(&dsgl_walk, qid);
+dsgl_walk_end(&dsgl_walk, qid, ctx->pci_chan_id);
}

static inline void chcr_add_hash_src_ent(struct ahash_request *req,
@@ -2414,7 +2426,7 @@
 if (!error)
 -return error;
 +return -ENOMEM;
 req_ctx->is_sg_map = 1;
 return 0;
 }
@@ -2579,7 +2591,7 @@
 unsigned int mac_mode = CHCR_SCMD_AUTH_MODE_CBCMAC;
 unsigned int c_id = a_ctx(tfm)->dev->rx_channel_id;
 unsigned int ccm_xtra;
-unsigned char tag_offset = 0, auth_offset = 0;
+unsigned int tag_offset = 0, auth_offset = 0;
 unsigned int assoclen;

 if (get_aead_subtype(tfm) == CRYPTO_ALG_SUB_TYPE_AEAD_RFC4309)
@@ -2979,9 +2991,6 @@
aeadctx->mayverify = VERIFY_SW;
 break;
 default:
-
- crypto_tfm_set_flags((struct crypto_tfm *) tfm,
- CRYPTO_TFM_RES_BAD_KEY_LEN);
 return -EINVAL;
 }
 return crypto_aead_setauthsize(aeadctx->sw_cipher, authsize);
@@ -3006,8 +3015,6 @@
aeadctx->mayverify = VERIFY_HW;
 break;
 default:
 -crypto_tfm_set_flags((struct crypto_tfm *)tfm,


CRYPTO_TFM_RES_BAD_KEY_LEN);
return -EINVAL;
}
return crypto_aead_setauthsize(aeadctx->sw_cipher, authsize);
@@ -3048,8 +3055,6 @@
aeadctx->mayverify = VERIFY_HW;
break;
default:
-crypto_tfm_set_flags((struct crypto_tfm *)tfm,
- CRYPTO_TFM_RES_BAD_KEY_LEN);
+crypto_aead_set_flags(aead, CRYPTO_TFM_RES_BAD_KEY_LEN);
return -EINVAL;
}
return crypto_aead_setauthsize(aeadctx->sw_cipher, authsize);
@@ -3075,8 +3080,7 @@
ck_size = CHCR_KEYCTX_CIPHER_KEY_SIZE_256;
mk_size = CHCR_KEYCTX_MAC_KEY_SIZE_256;
} else {
-crypto_tfm_set_flags((struct crypto_tfm *)aead,
- CRYPTO_TFM_RES_BAD_KEY_LEN);
+crypto_aead_set_flags(aead, CRYPTO_TFM_RES_BAD_KEY_LEN);
aeadctx->enckey_len = 0;
return -EINVAL;
}
@@ -3114,8 +3118,7 @@
int error;
if (keylen < 3) {
-crypto_tfm_set_flags((struct crypto_tfm *)aead,
- CRYPTO_TFM_RES_BAD_KEY_LEN);
+crypto_aead_set_flags(aead, CRYPTO_TFM_RES_BAD_KEY_LEN);
aeadctx->enckey_len = 0;
return -EINVAL;
}
@@ -3165,8 +3168,7 @@
} else if (keylen == AES_KEYSIZE_256) {
ck_size = CHCR_KEYCTX_CIPHER_KEY_SIZE_256;
} else {
-crypto_tfm_set_flags((struct crypto_tfm *)aead,
- CRYPTO_TFM_RES_BAD_KEY_LEN);
+crypto_aead_set_flags(aead, CRYPTO_TFM_RES_BAD_KEY_LEN);
pr_err("GCM: Invalid key length %d\n", keylen);
ret = -EINVAL;
goto out;
--- linux-4.15.0.orig/drivers/crypto/chelsio/chcr_crypto.h
+++ linux-4.15.0/drivers/crypto/chelsio/chcr_crypto.h
@@ -258,6 +258,8 @@
struct chcr_dev *dev;
unsigned char tx_qidx;

if (keylen < 3) {
-crypto_tfm_set_flags((struct crypto_tfm *)aead,
- CRYPTO_TFM_RES_BAD_KEY_LEN);
+crypto_aead_set_flags(aead, CRYPTO_TFM_RES_BAD_KEY_LEN);
aeadctx->enckey_len = 0;
return -EINVAL;
}
@@ -3165,8 +3168,7 @@
} else if (keylen == AES_KEYSIZE_256) {
ck_size = CHCR_KEYCTX_CIPHER_KEY_SIZE_256;
} else {
-crypto_tfm_set_flags((struct crypto_tfm *)aead,
- CRYPTO_TFM_RES_BAD_KEY_LEN);
+crypto_aead_set_flags(aead, CRYPTO_TFM_RES_BAD_KEY_LEN);
pr_err("GCM: Invalid key length %d\n", keylen);
ret = -EINVAL;
goto out;
--- linux-4.15.0.orig/drivers/crypto/chelsio/chcr_crypto.h
+++ linux-4.15.0/drivers/crypto/chelsio/chcr_crypto.h
@@ -258,6 +258,8 @@
struct chcr_dev *dev;
unsigned char tx_qidx;
unsigned char rx_qidx;
+unsigned char tx_chan_id;
+unsigned char pci_chan_id;
struct __crypto_ctx crypto_ctx[0];
};

--- linux-4.15.0.orig/drivers/crypto/geode-aes.c
+++ linux-4.15.0/drivers/crypto/geode-aes.c
@@ -14,6 +14,7 @@
#include <linux/spinlock.h>
#include <crypto/algapi.h>
#include <crypto/aes.h>
+#include <crypto/internal/skcipher.h>
#include <linux/io.h>
#include <linux/delay.h>
@@ -27,12 +28,12 @@
/* Write a 128 bit field (either a writable key or IV) */
static inline void
-  _writefield(u32 offset, void *value)
+  _writefield(u32 offset, const void *value)
{  
  int i;

  for (i = 0; i < 4; i++)
-    iowrite32(((u32 *) value)[i], _iobase + offset + (i * 4));
+    iowrite32(((const u32 *) value)[i], _iobase + offset + (i * 4));
}

/* Read a 128 bit field (either a writable key or IV) */
@@ -46,12 +47,12 @@
}

static int
-  do_crypt(void *src, void *dst, int len, u32 flags)
+  do_crypt(const void *src, void *dst, u32 len, u32 flags)
{  
  u32 status;
  u32 counter = AES_OP_TIMEOUT;

  -iowrite32(virt_to_phys(src), _iobase + AES_SOURCEA_REG);
+  iowrite32(virt_to_phys(src), _iobase + AES_SOURCEA_REG);
  iowrite32(virt_to_phys(dst), _iobase + AES_DSTA_REG);
  iowrite32(len, _iobase + AES_LENA_REG);

  @@ -68,16 +69,14 @@
  return counter ? 0 : 1;
static unsigned int
geode_aes_crypt(struct geode_aes_op *op)
+static void
g+eode_aes_crypt(const struct geode_aes_tfm_ctx *tctx, const void *src,
+void *dst, u32 len, u8 *iv, int mode, int dir)
{
    u32 flags = 0;
    unsigned long iflags;
    int ret;

    if (op->len == 0)
        return 0;

    /* If the source and destination is the same, then
     * we need to turn on the coherent flags, otherwise
     * we don't need to worry
    */
    flags |= (AES_CTRL_DCA | AES_CTRL_SCA);

    if (op->dir == AES_DIR_ENCRYPT)
        flags |= AES_CTRL_ENCRYPT;
*/
/* Start the critical section */

spin_lock_irqsave(&lock, iflags);

    if (op->mode == AES_MODE_CBC) {
        flags |= AES_CTRL_CBC;
        _writefield(AES_WRITEIV0_REG, op->iv);
        _writefield(AES_WRITEIV0_REG, iv);
    }

    if (!(op->flags & AES_FLAGS_HIDDENKEY)) {
        flags |= AES_CTRL_WRKEY;
        _writefield(AES_WRITEKEY0_REG, op->key);
    }

    if (!(op->flags & AES_FLAGS_HIDDENKEY)) {
        flags |= AES_CTRL_WRKEY;
        _writefield(AES_WRITEKEY0_REG, tctx->key);
    }

    ret = do_crypt(op->src, op->dst, op->len, flags);
    ret = do_crypt(src, dst, len, flags);
    BUG_ON(ret);
-if (op->mode == AES_MODE_CBC)
+if (mode == AES_MODE_CBC)
+_readfield(AES_WRITEIV0_REG, iv);

spin_unlock_irqrestore(&lock, iflags);
-
-return op->len;
}

/* CRYPTO-API Functions */
@@ -118,13 +113,13 @@
static int geode_setkey_cip(struct crypto_tfm *tfm, const u8 *key,
unsigned int len)
{
-struct geode_aes_op *op = crypto_tfm_ctx(tfm);
+struct geode_aes_tfm_ctx *tctx = crypto_tfm_ctx(tfm);
unsigned int ret;

-op->keylen = len;
+ttctx->keylen = len;

if (len == AES_KEYSIZE_128) {
-memcpy(op->key, key, len);
+memcpy(tctx->key, key, len);
return 0;
}

@@ -137,135 +132,93 @@
/*
 * The requested key size is not supported by HW, do a fallback
 */
-op->fallback.cip->base.crt_flags &= ~CRYPTO_TFM_REQ_MASK;
-op->fallback.cip->base.crt_flags |= (tfm->crt_flags & CRYPTO_TFM_REQ_MASK);
+tctx->fallback.cip->base.crt_flags &= ~CRYPTO_TFM_REQ_MASK;
+tctx->fallback.cip->base.crt_flags |=
+ (tfm->crt_flags & CRYPTO_TFM_REQ_MASK);

-ret = crypto_cipher_setkey(op->fallback.cip, key, len);
+ret = crypto_cipher_setkey(tctx->fallback.cip, key, len);
if (ret) {
 tfm->crt_flags &= ~CRYPTO_TFM_RES_MASK;
 -tfm->crt_flags |= (op->fallback.cip->base.crt_flags & CRYPTO_TFM_RES_MASK);
 +tfm->crt_flags |= (tctx->fallback.cip->base.crt_flags &
+ CRYPTO_TFM_RES_MASK);
}
return ret;
}
static int geode_setkey_blk(struct crypto_tfm *tfm, const u8 *key, unsigned int len)
+static int geode_setkey_skcipher(struct crypto_skcipher *tfm, const u8 *key, unsigned int len)
{
  struct geode_aes_op *op = crypto_tfm_ctx(tfm);
+struct geode_aes_tfm_ctx *tctx = crypto_skcipher_ctx(tfm);
  unsigned int ret;

  -op->keylen = len;
  +tctx->keylen = len;

  if (len == AES_KEYSIZE_128) {
   -memcpy(op->key, key, len);
   +memcpy(tctx->key, key, len);
   return 0;
  }

  if (len != AES_KEYSIZE_192 && len != AES_KEYSIZE_256) {
   /* not supported at all */
   -tfm->crt_flags |= CRYPTO_TFM_RES_BAD_KEY_LEN;
   +crypto_skcipher_set_flags(tfm, CRYPTO_TFM_RES_BAD_KEY_LEN);
   return -EINVAL;
  }

  /* The requested key size is not supported by HW, do a fallback */
  -op->fallback.blk->base.crt_flags &= ~CRYPTO_TFM_REQ_MASK;
  -op->fallback.blk->base.crt_flags |= (tfm->crt_flags & CRYPTO_TFM_REQ_MASK);
  -ret = crypto_blkcipher_setkey(op->fallback.blk, key, len);
  -if (ret) {
    -tfm->crt_flags &= ~CRYPTO_TFM_RES_MASK;
    -tfm->crt_flags |= (op->fallback.blk->base.crt_flags & CRYPTO_TFM_RES_MASK);
  -}
  -return ret;
-}

+static int fallback_blk_dec(struct blkcipher_desc *desc, struct scatterlist *dst, struct scatterlist *src, unsigned int nbytes)
{ 
    struct geode_aes_op *op = crypto_blkcipher_ctx(desc->tfm);
    unsigned int ret;
    
    -static int fallback_blk_dec(struct blkcipher_desc *desc, struct scatterlist *dst, struct scatterlist *src, unsigned int nbytes)
    -
-tfm = desc->tfm;
-desc->tfm = op->fallback.blk;
-
-ret = crypto_blkcipher_decrypt_iv(desc, dst, src, nbytes);
-
-desc->tfm = tfm;
-return ret;
-
}\n-static int fallback_blk_enc(struct blkcipher_desc *desc,
-struct scatterlist *dst, struct scatterlist *src,
-unsigned int nbytes)
-{\n-unsigned int ret;
-struct crypto_blkcipher *tfm;
-struct geode_aes_op *op = crypto_blkcipher_ctx(desc->tfm);
-
-tfm = desc->tfm;
-desc->tfm = op->fallback.blk;
-
-ret = crypto_blkcipher_encrypt_iv(desc, dst, src, nbytes);
-
-desc->tfm = tfm;
+crypto_skcipher_clear_flags(tctx->fallback.skcipher,
+ CRYPTO_TFM_REQ_MASK);
+crypto_skcipher_set_flags(tctx->fallback.skcipher,
+ crypto_skcipher_get_flags(tfm) &
+ CRYPTO_TFM_REQ_MASK);
+ret = crypto_skcipher_setkey(tctx->fallback.skcipher, key, len);
+crypto_skcipher_set_flags(tfm,
+ crypto_skcipher_get_flags(tctx->fallback.skcipher) &
+ CRYPTO_TFM_RES_MASK);
-return ret;
}

static void
geode_encrypt(struct crypto_tfm *tfm, u8 *out, const u8 *in)
{
-struct geode_aes_op *op = crypto_tfm_ctx(tfm);
+const struct geode_aes_tfm_ctx *tctx = crypto_tfm_ctx(tfm);

-if (unlikely(op->keylen != AES_KEYSIZE_128))
{-crypto_cipher_encrypt_one(op->fallback.cip, out, in);
+if (unlikely(tctx->keylen != AES_KEYSIZE_128))
{+crypto_cipher_encrypt_one(tctx->fallback.cip, out, in);
-return;
}

-op->src = (void *) in;


-op->dst = (void *) out;
-op->mode = AES_MODE_ECB;
-op->flags = 0;
-op->len = AES_BLOCK_SIZE;
-op->dir = AES_DIR_ENCRYPT;
-
-geode_aes_crypt(op);
+geode_aes_crypt(tctx, in, out, AES_BLOCK_SIZE, NULL,
+AES_MODE_ECB, AES_DIR_ENCRYPT);
}

static void
geode_decrypt(struct crypto_tfm *tfm, u8 *out, const u8 *in)
{
-struct geode_aes_op *op = crypto_tfm_ctx(tfm);
+const struct geode_aes_tfm_ctx *tctx = crypto_tfm_ctx(tfm);

-if (unlikely(op->keylen != AES_KEYSIZE_128)) {
-crypto_cipher_decrypt_one(op->fallback.cip, out, in);
+if (unlikely(tctx->keylen != AES_KEYSIZE_128)) {
+crypto_cipher_decrypt_one(tctx->fallback.cip, out, in);
return;
}

-op->src = (void *) in;
-op->dst = (void *) out;
-op->mode = AES_MODE_ECB;
-op->flags = 0;
-op->len = AES_BLOCK_SIZE;
-op->dir = AES_DIR_DECRYPT;
-
-geode_aes_crypt(op);
+geode_aes_crypt(tctx, in, out, AES_BLOCK_SIZE, NULL,
+AES_MODE_ECB, AES_DIR_DECRYPT);
}

static int fallback_init_cip(struct crypto_tfm *tfm)
{
-struct geode_aes_op *op = crypto_tfm_ctx(tfm);
+struct geode_aes_tfm_ctx *tctx = crypto_tfm_ctx(tfm);

-op->fallback.cip = crypto_alloc_cipher(name, 0,
+CRYPTO_ALG_ASYNC | CRYPTO_ALG_NEED_FALLBACK);
+tctx->fallback.cip = crypto_alloc_cipher(name, 0,
+CRYPTO_ALG_NEED_FALLBACK);
-if (IS_ERR(op->fallback.cip)) {
+if (IS_ERR(tctx->fallback.cip)) {
    printk(KERN_ERR "Error allocating fallback algo %s\n", name);
-    return PTR_ERR(op->fallback.cip);
+    return PTR_ERR(tctx->fallback.cip);
}

return 0;
@@ -273,10 +226,9 @@

static void fallback_exit_cip(struct crypto_tfm *tfm)
{
-    struct geode_aes_op *op = crypto_tfm_ctx(tfm);
+    struct geode_aes_tfm_ctx *tctx = crypto_tfm_ctx(tfm);

-    crypto_free_cipher(op->fallback.cip);
-    op->fallback.cip = NULL;
+    crypto_free_cipher(tctx->fallback.cip);
    +crypto_free_cipher(tctx->fallback.cip);
}

static struct crypto_alg geode_alg = {
@@ -289,7 +241,7 @@
.cra_init=fallback_init_cip,
.cra_exit=fallback_exit_cip,
.cra_blocksize=AES_BLOCK_SIZE,
- .cra_ctxsize=sizeof(struct geode_aes_op),
+ .cra_ctxsize=sizeof(struct geode_aes_tfm_ctx),
.cra_module=THIS_MODULE,
.cra_u= {
    .cipher= {
@@ -302,209 +254,126 @@
        }
    }
};

-    -static int
-    -geode_cbc_decrypt(struct blkcipher_desc *desc,
-        - struct scatterlist *dst, struct scatterlist *src,
-        - unsigned int nbytes)
-    -{
-        -struct geode_aes_op *op = crypto_blkcipher_ctx(desc->tfm);
-        -struct blkcipher_walk walk;
-        -int err, ret;
-        -
-        -if (unlikely(op->keylen != AES_KEYSIZE_128))
-            -return fallback_blk_dec(desc, dst, src, nbytes);
-        -
-        -blkcipher_walk_init(&walk, dst, src, nbytes);
-        -err = blkcipher_walk_virt(desc, &walk);
-op->iv = walk.iv;
-
-while ((nbytes = walk.nbytes)) {
  -op->src = walk.src.virt.addr,
  -op->dst = walk.dst.virt.addr;
  -op->mode = AES_MODE_CBC;
  -op->len = nbytes - (nbytes % AES_BLOCK_SIZE);
  -op->dir = AES_DIR_DECRYPT;
  -
  -ret = geode_aes_crypt(op);
  -
  -nbytes -= ret;
  -err = blkcipher_walk_done(desc, &walk, nbytes);
  -}
-
-return err;
-
-
-static int
-geode_cbc_encrypt(struct blkcipher_desc *desc,
  struct scatterlist *dst, struct scatterlist *src,
  unsigned int nbytes)
-
|int err, ret;
-
-if (unlikely(op->keylen != AES_KEYSIZE_128))
-return fallback_blk_enc(desc, dst, src, nbytes);
-
-blkcipher_walk_init(&walk, dst, src, nbytes);
-err = blkcipher_walk_virt(desc, &walk);
-   -op->iv = walk.iv;
-
-while ((nbytes = walk.nbytes)) {
  -op->src = walk.src.virt.addr,
  -op->dst = walk.dst.virt.addr;
  -op->mode = AES_MODE_CBC;
  -op->len = nbytes - (nbytes % AES_BLOCK_SIZE);
  -op->dir = AES_DIR_ENCRYPT;
  -
  -ret = geode_aes_crypt(op);
  -nbytes -= ret;
  -err = blkcipher_walk_done(desc, &walk, nbytes);
  -}
-
-return err;
-}
static int fallback_init_blk(struct crypto_tfm *tfm)
+static int geode_init_skcipher(struct crypto_skcipher *tfm)
{
-const char *name = crypto_tfm_alg_name(tfm);
-struct geode_aes_op *op = crypto_tfm_ctx(tfm);
-
-op->fallback.blk = crypto_alloc_blkcipher(name, 0,
-CRYPTO_ALG_ASYNC | CRYPTO_ALG_NEED_FALLBACK);
+const char *name = crypto_tfm_alg_name(&tfm->base);
+struct geode_aes_tfm_ctx *tctx = crypto_skcipher_ctx(tfm);
+
-if (IS_ERR(op->fallback.blk)) {
+\t\t\ttctx->fallback.skcipher =
+\t\t\tcrypto_alloc_skcipher(name, 0, CRYPTO_ALG_NEED_FALLBACK |
+\t\t\t\tCRYPTO_ALG_ASYNC);
+\tif(IS_ERR(tctx->fallback.skcipher)) {
+\t\t\tprintk(KERN_ERR "Error allocating fallback algo \%s\n\", name);
+\t\t\treturn PTR_ERR(op->fallback.blk);
+\t\t\treturn PTR_ERR(tctx->fallback.skcipher);
+\t}
+
+crypto_skcipher_set_reqsize(tfm, sizeof(struct skcipher_request) +
+ \tcrypto_skcipher_reqsize(tctx->fallback.skcipher));
\treturn 0;
}

-static void fallback_exit_blk(struct crypto_tfm *tfm)
+static void geode_exit_skcipher(struct crypto_skcipher *tfm)
{
-\tstruct geode_aes_op *op = crypto_tfm_ctx(tfm);
-\tcrypto_free_blkcipher(op->fallback.blk);
-\t\top->fallback.blk = NULL;
-\tcrypto_free_skcipher(tctx->fallback.skcipher);
-
}

-static struct crypto_alg geode_cbc_alg = {
- \t.cra_name="cbc(aes)",
- \t.cra_driver_name="cbc-aes-geode",
- \t.cra_priority=400,
- \t.cra_flags=CRYPTO_ALG_TYPE_BLKCIIPHER |
- \tCRYPTO_ALG_KERN_DRIVER_ONLY |
- \tCRYPTO_ALG_NEED_FALLBACK,
- \t.cra_init=fallback_init_blk,
- \t.cra_exit=fallback_exit_blk,
- \t.cra_blocksize=AES_BLOCK_SIZE,
.cra_ctxsize=sizeof(struct geode_aes_op),
.cra_alignmask=15,
.cra_type=&crypto_blkcipher_type,
.cra_module=THIS_MODULE,
.cra_u={
    .blkcipher={
        .min_keysize=AES_MIN_KEY_SIZE,
        .max_keysize=AES_MAX_KEY_SIZE,
        .setkey=geode_setkey_blk,
        .encrypt=geode_cbc_encrypt,
        .decrypt=geode_cbc_decrypt,
        .ivsize=AES_BLOCK_SIZE,
    }
}+static int geode_skcipher_crypt(struct skcipher_request *req, int mode, int dir)
+
+struct crypto_sk_cipher *tfm = crypto_skcipher_reqtfm(req);
+const struct geode_aes_tfm_ctx *tctx = crypto_skcipher_ctx(tfm);
+struct skcipher_walk walk;
+unsigned int nbytes;
+int err;
+
+if (unlikely(tctx->keylen != AES_KEYSIZE_128)) {
+    struct skcipher_request *subreq = skcipher_request_ctx(req);
+    *subreq = *req;
+    skcipher_request_set_tfm(subreq, tctx->fallback.skcipher);
+    if (dir == AES_DIR_DECRYPT)
+        return crypto_skcipher_decrypt(subreq);
+    else
+        return crypto_skcipher_encrypt(subreq);
+}
+
-statc int
-statc geode_ebc_decrypt(struct blk_cipher_desc *desc,
-statc     struct scatterlist *dst, struct scatterlist *src,
-statc     unsigned int nbytes)
-
-statc     struct geode_aes_op *op = crypto_blk_cipher_ctx(desc->tfm);
-statc     struct blk_cipher_walk walk;
-statc     int err, ret;
-
-statc     if (unlikely(op->keylen != AES_KEYSIZE_128))
-statc         return fallback_blk_dec(desc, dst, src, nbytes);
-
-statc         blk_cipher_walk_init(&walk, dst, src, nbytes);
-statc         err = blk_cipher_walk_virt(desc, &walk);
-
while ((nbytes = walk.nbytes)) {
    op->src = walk.src.virt.addr,
    op->dst = walk.dst.virt.addr;
    op->mode = AES_MODE_ECB;
    op->len = nbytes - (nbytes % AES_BLOCK_SIZE);
    op->dir = AES_DIR_DECRYPT;
    ret = geode_aes_crypt(op);
    nbytes -= ret;
    err = blk_cipher_walk_done(desc, &walk, nbytes);
}

err = skcipher_walk_virt(&walk, req, false);
+
+while ((nbytes = walk.nbytes) != 0) {
+    geode_aes_crypt(tctx, walk.src.virt.addr, walk.dst.virt.addr,
+    round_down(nbytes, AES_BLOCK_SIZE),
+    walk.iv, mode, dir);
+    err = skcipher_walk_done(&walk, nbytes % AES_BLOCK_SIZE);
+}

return err;
}

-static int
-geode_ecb_encrypt(struct blk_cipher_desc *desc,
-    struct scatterlist *dst, struct scatterlist *src,
-    unsigned int nbytes)
-{
    struct geode_aes_op *op = crypto_blk_cipher_ctx(desc->tfm);
    struct blk_cipher_walk walk;
    int err, ret;
-
-if (unlikely(op->keylen != AES_KEYSIZE_128))
-return fallback_blk_enc(desc, dst, src, nbytes);
-
    blk_cipher_walk_init(&walk, dst, src, nbytes);
    err = blk_cipher_walk_virt(desc, &walk);
-
    while ((nbytes = walk.nbytes)) {
        op->src = walk.src.virt.addr,
        op->dst = walk.dst.virt.addr;
        op->mode = AES_MODE_ECB;
        op->len = nbytes - (nbytes % AES_BLOCK_SIZE);
        op->dir = AES_DIR_ENCRYPT;
-
        ret = geode_aes_crypt(op);
        nbytes -= ret;
        err = blk_cipher_walk_done(desc, &walk, nbytes);
    -}
+static int geode_cbc_encrypt(struct skcipher_request *req)
+{
+    return geode_skcipher_crypt(req, AES_MODE_CBC, AES_DIR_ENCRYPT);
+}

-return err;
+static int geode_cbc_decrypt(struct skcipher_request *req)
+{
+    return geode_skcipher_crypt(req, AES_MODE_CBC, AES_DIR_DECRYPT);
+}

-static struct crypto_alg geode_ecb_alg = {
-    .cra_name="ecb(aes)",
-    .cra_driver_name="ecb-aes-geode",
-    .cra_priority=400,
-    .cra_flags=CRYPTO_ALG_TYPE_BLK_CIPHER | 
-        CRYPTO_ALG_KERN_DRIVER_ONLY | 
-        CRYPTO_ALG_NEED_FALLBACK,
-    .cra_init=fallback_init_blk,
-    .cra_exit=fallback_exit_blk,
-    .cra_blocksize=AES_BLOCK_SIZE,
-    .cra_ctxsize=sizeof(struct geode_aes_op),
-    .cra_alignmask=15,
-    .cra_type=&crypto_blk_cipher_type,
-    .cra_module=THIS_MODULE,
-    .cra_u=
-    {
-        .blkcipher=
-        {
-            .min_keysize=AES_MIN_KEY_SIZE,
-            .max_keysize=AES_MAX_KEY_SIZE,
-            .setkey=geode_setkey_blk,
-            .encrypt=geode_ecb_encrypt,
-            .decrypt=geode_ecb_decrypt,
-        }
-    }
-}
+
+static int geode_ecb_encrypt(struct skcipher_request *req)
+{
+    return geode_skcipher_crypt(req, AES_MODE_ECB, AES_DIR_ENCRYPT);
+}
+
+static int geode_ecb_decrypt(struct skcipher_request *req)
+{
+    return geode_skcipher_crypt(req, AES_MODE_ECB, AES_DIR_DECRYPT);
+}
+
+static struct skcipher_alg geode_skcipher_algs[] = {
+    {
+        .base.cra_name = "cbc(aes)",
+        .base.cra_driver_name = "cbc-aes-geode",
+    }
+}
static void geode_aes_remove(struct pci_dev *dev)
{
    crypto_unregister_alg(&geode_alg);
    crypto_unregister_alg(&geode_ecb_alg);
    crypto_unregister_alg(&geode_cbc_alg);
    crypto_unregister_skciphers(geode_skcipher_algs,
        ARRAY_SIZE(geode_skcipher_algs));
    pci_iounmap(dev, _iobase);
    _iobase = NULL;
    if (ret)
        goto eiomap;
-ret = crypto_register_alg(&geode_ecb_alg);
+ret = crypto_register_skciphers(geode_skcipher_algs,
+ARRAY_SIZE(geode_skcipher_algs));
if (ret)
go to ealg;

-ret = crypto_register_alg(&geode_cbc_alg);
-if (ret)
-goto eecb;
-
-dev_notice(&dev->dev, "GEODE AES engine enabled\n");
return 0;

- eecb:
-crypto_unregister_alg(&geode_ecb_alg);
-
ealg:
crypto_unregister_alg(&geode_alg);

--- linux-4.15.0.orig/drivers/crypto/geode-aes.h
+++ linux-4.15.0/drivers/crypto/geode-aes.h
@@ -50,21 +50,10 @@

#define AES_OP_TIMEOUT 0x50000

-struct geode_aes_op {
-   void *src;
-   void *dst;
-   u32 mode;
-   u32 dir;
-   u32 flags;
-   int len;
-+struct geode_aes_tfm_ctx {
-      u8 key[AES_KEYSIZE_128];
-      u8 *iv;
-      union {
-         struct crypto_blkcipher *blk;
-+         struct crypto_skcipher *skcipher;
-         struct crypto_cipher *cip;
-      } fallback;
-      u32 keylen;
-      --- linux-4.15.0.orig/drivers/crypto/inside-secure/safexcel.c
+++ linux-4.15.0/drivers/crypto/inside-secure/safexcel.c
if (backlog)
backlog->complete(backlog, -EINPROGRESS);

/* In case the send() helper did not issue any command to push
 * to the engine because the input data was cached, continue to
 * dequeue other requests as this is valid and not an error.
 * */
if (!commands && !results)
{kfree(request);
continue;
}
+
spin_lock_bh(&priv->ring[ring].egress_lock);
list_add_tail(&request->list, &priv->ring[ring].list);
spin_unlock_bh(&priv->ring[ring].egress_lock);

-priv->clk = of_clk_get(dev->of_node, 0);
+priv->clk = devm_clk_get(&pdev->dev, NULL);
if (!IS_ERR(priv->clk)) {
ret = clk_prepare_enable(priv->clk);
if (ret) {
--- linux-4.15.0.orig/drivers/crypto/inside-secure/safexcel_cipher.c
+++ linux-4.15.0/drivers/crypto/inside-secure/safexcel_cipher.c
@@ -446,7 +446,7 @@
if (!priv->ring[ring].need_dequeue)
safexcel_dequeue(priv, ring);

-wait_for_completion_interruptible(&result.completion);
+wait_for_completion(&result.completion);

if (result.error) {
    dev_warn(priv->dev,
--- linux-4.15.0.orig/drivers/crypto/inside-secure/safexcel_hash.c
+++ linux-4.15.0/drivers/crypto/inside-secure/safexcel_hash.c
@@ -22,7 +22,6 @@
struct safexcel_crypto_priv *priv;

u32 alg;
-u32 digest;

u32 ipad[SHA1_DIGEST_SIZE / sizeof(u32)];
u32 opad[SHA1_DIGEST_SIZE / sizeof(u32)];
@@ -34,6 +33,10 @@
bool hmac;


bool needs_inv;

+int nents;
+u32 digest;
+u8 state_sz;  /* expected state size, only set once */
u32 state[SHA256_DIGEST_SIZE / sizeof(u32)]; __aligned(sizeof(u32));

@@ -48,6 +51,8 @@
    len;
    processed;
+
+u32 digest;
+u32 state[SHA256_DIGEST_SIZE / sizeof(u32)];
    cache[SHA256_BLOCK_SIZE];
    ;
@@ -81,9 +86,9 @@
    cdesc->control_data.control0 |= CONTEXT_CONTROL_TYPE_HASH_OUT;
    cdesc->control_data.control0 |= ctx->alg;
    -cdesc->control_data.control0 |= ctx->digest;
    +cdesc->control_data.control0 |= req->digest;
    -if (ctx->digest == CONTEXT_CONTROL_DIGEST_PRECOMPUTED) {
    +if (req->digest == CONTEXT_CONTROL_DIGEST_PRECOMPUTED) {
        if (req->processed) {
            if (ctx->alg == CONTEXT_CONTROL_CRYPTO_ALG_SHA1)
                cdesc->control_data.control0 |= CONTEXT_CONTROL_SIZE(6);
    @ @ -111,7+116,7 @@
            if (req->finish)
                ctx->base.ctxr->data[i] = cpu_to_le32(req->processed / blocksize);
        }
    } else if (ctx->digest == CONTEXT_CONTROL_DIGEST_HMAC) {
    +} else if (req->digest == CONTEXT_CONTROL_DIGEST_HMAC) {
        cdesc->control_data.control0 |= CONTEXT_CONTROL_SIZE(10);
        memcpy(ctx->base.ctxr->data, ctx->ipad, digestsize);
    @ @ -152,8+157,10 @@
        memcpy(areq->result, sreq->state,
            crypto_ahash_digestsize(ahash));
        -dma_unmap_sg(priv->dev, areq->src,
            - sg_nents_for_len(areq->src, areq->nbytes), DMA_TO_DEVICE);
    +if (sreq->nents) {
        +dma_unmap_sg(priv->dev, areq->src, sreq->nents, DMA_TO_DEVICE);
        +sreq->nents = 0;
    }
safexcel_free_context(priv, async, sreq->state_sz);

@@ -178,25 +185,39 @@
struct safexcel_command_desc *cdesc, *first_cdesc = NULL;
struct safexcel_result_desc *rdesc;
struct scatterlist *sg;
-int i, nents, queued, len, cache_len, extra, n_cdesc = 0, ret = 0;
+int i, queued, len, cache_len, extra, n_cdesc = 0, ret = 0;

queued = len = req->len - req->processed;
-if (queued < crypto_ahash_blocksize(ahash))
+if (queued <= crypto_ahash_blocksize(ahash))
  cache_len = queued;
else
  cache_len = queued - areq->nbytes;

-/*
-* If this is not the last request and the queued data does not fit
-* into full blocks, cache it for the next send() call.
-*/
-extra = queued & (crypto_ahash_blocksize(ahash) - 1);
-if (!req->last_req && extra) {
-  sg_pcopy_to_buffer(areq->src, sg_nents(areq->src),
-    req->cache_next, extra, areq->nbytes - extra);
-  queued -= extra;
-  len -= extra;
+if (!req->last_req) {
+  /* If this is not the last request and the queued data does not
+   * fit into full blocks, cache it for the next send() call.
+   */
+  extra = queued & (crypto_ahash_blocksize(ahash) - 1);
+  if (!extra) {
+    /* If this is not the last request and the queued data
+     * is a multiple of a block, cache the last one for now.
+     */
+    extra = crypto_ahash_blocksize(ahash);
+  }
+  if (extra) {
+    sg_pcopy_to_buffer(areq->src, sg_nents(areq->src),
+      req->cache_next, extra, areq->nbytes - extra);
+    queued -= extra;
+    len -= extra;
+    
if (!queued) {
  *commands = 0;
  *results = 0;
  return 0;
}
}
}
spin_lock_bh(&priv->ring[ring].egress_lock);

/* Now handle the current ahash request buffer(s) */
-nents = dma_map_sg(priv->dev, areq->src,
-   sg_nents_for_len(areq->src, areq->nbytes),
-   DMA_TO_DEVICE);
-if (!nents) {
+req->nents = dma_map_sg(priv->dev, areq->src,
+   sg_nents_for_len(areq->src, areq->nbytes),
+   DMA_TO_DEVICE);
+if (!req->nents) {
    ret = -ENOMEM;
    goto cdesc_rollback;
  }

-for_each_sg(areq->src, sg, nents, i) {
+for_each_sg(areq->src, sg, req->nents, i) {
    int sglen = sg_dma_len(sg);

    /* Do not overflow the request */
    memset(req, 0, sizeof(struct ahash_request));
+memset(req, 0, EIP197_AHASH_REQ_SIZE);

    /* create invalidation request */
    init_completion(&result.completion);
    int ring = ctx->base.ring;

    -memset(req, 0, sizeof(struct safexcel_inv_result));
+memset(req, 0, EIP197_AHASH_REQ_SIZE);

    /* create invalidation request */
    init_completion(&result.completion);
    if (!priv->ring[ring].need_dequeue)
        safexcel_dequeue(priv, ring);

    -wait_for_completion_interruptible(&result.completion);
+wait_for_completion(&result.completion);

    if (result.error) {
      dev_warn(priv->dev, "hash: completion error (%d)\n","}
req->needs_inv = false;

- if (req->processed && ctx->digest == CONTEXT_CONTROL_DIGEST_PRECOMPUTED)
  + if (req->processed && req->digest == CONTEXT_CONTROL_DIGEST_PRECOMPUTED)
  ctx->base.needs_inv = safexcel_ahash_needs_inv_get(areq);

  if (ctx->base.ctxr) {
    static int safexcel_ahash_update(struct ahash_request *areq)
      {
        struct safexcel_ahash_ctx *ctx = crypto_ahash_ctx(crypto_ahash_reqtfm(areq));
        struct safexcel_ahash_req *req = ahash_request_ctx(areq);
        struct crypto_ahash *ahash = crypto_ahash_reqtfm(areq);

        * We're not doing partial updates when performing an hmac request.
        * Everything will be handled by the final() call.
        */
        - if (ctx->digest == CONTEXT_CONTROL_DIGEST_HMAC)
          + if (req->digest == CONTEXT_CONTROL_DIGEST_HMAC)
          return 0;

          if (req->hmac)
            export->len = req->len;
            export->processed = req->processed;

          + export->digest = req->digest;
            + memcpy(export->state, req->state, req->state_sz);
            memset(export->cache, 0, crypto_ahash_blocksize(ahash));
            memcpy(export->cache, req->cache, crypto_ahash_blocksize(ahash));
            @ @ -645,6 +667,8 @@
            req->len = export->len;
            req->processed = export->processed;

          + req->digest = export->digest;
            + memcpy(req->cache, export->cache, crypto_ahash_blocksize(ahash));
            memcpy(req->state, export->state, req->state_sz);

            @ @ -681,7 +705,7 @@
            req->state[4] = SHA1_H4;

          ctx->alg = CONTEXT_CONTROL_CRYPTO_ALG_SHA1;

          if (ctx->base.ctxr) {
- ctx->digest = CONTEXT_CONTROL_DIGEST_PRECOMPUTED;
+ req->digest = CONTEXT_CONTROL_DIGEST_PRECOMPUTED;
req->state_sz = SHA1_DIGEST_SIZE;

return 0;
@@ -743,10 +767,10 @@
static int safexcel_hmac_sha1_init(struct ahash_request *areq)
{
    struct safexcel_ahash_ctx *ctx = crypto_ahash_ctx(crypto_ahash_reqtfm(areq));
+    struct safexcel_ahash_req *req = ahash_request_ctx(areq);

    safexcel_sha1_init(areq);
    - ctx->digest = CONTEXT_CONTROL_DIGEST_HMAC;
+    req->digest = CONTEXT_CONTROL_DIGEST_HMAC;
    return 0;
}

@@ -799,7 +823,7 @@
init_completion(&result.completion);

ret = crypto_ahash_digest(areq);
- if (ret == -EINPROGRESS) {
+ if (ret == -EINPROGRESS || ret == -EBUSY) {
    wait_for_completion_interruptible(&result.completion);
    ret = result.error;
}
@@ -981,7 +1005,7 @@
    ctx->alg = CONTEXT_CONTROL_CRYPTO_ALG_SHA256;
    - ctx->digest = CONTEXT_CONTROL_DIGEST_PRECOMPUTED;
+    req->digest = CONTEXT_CONTROL_DIGEST_PRECOMPUTED;
    req->state_sz = SHA256_DIGEST_SIZE;
    return 0;
@@ -1043,7 +1067,7 @@
    ctx->alg = CONTEXT_CONTROL_CRYPTO_ALG_SHA224;
    - ctx->digest = CONTEXT_CONTROL_DIGEST_PRECOMPUTED;
+    req->digest = CONTEXT_CONTROL_DIGEST_PRECOMPUTED;
    req->state_sz = SHA256_DIGEST_SIZE;
    return 0;
--- linux-4.15.0.orig/drivers/crypto/ixp4xx_crypto.c
+++ linux-4.15.0/drivers/crypto/ixp4xx_crypto.c
@@ -333,7 +333,7 @@
buf1 = buf->next;
phys1 = buf->phys_next;
dma_unmap_single(dev, buf->phys_next, buf->buf_len, buf->dir);
dma_pool_free(buffer_pool, buf, phys);
buf = buf1;
phys = phys1;
@@ -531,7 +531,7 @@

if (crypt_virt) {
  dma_free_coherent(dev,
-NPE_QLEN_TOTAL * sizeof(struct crypt_ctl),
+NPE_QLEN * sizeof(struct crypt_ctl),
crypt_virt, crypt_phys);
}
}
--- linux-4.15.0.orig/drivers/crypto/mediatek/mtk-platform.c
+++ linux-4.15.0/drivers/crypto/mediatek/mtk-platform.c
@@ -445,7 +445,7 @@
static int mtk_desc_ring_alloc(struct mtk_cryp *cryp)
{
  struct mtk_ring **ring = cryp->ring;
-int i, err = ENOMEM;
+int i;

  for (i = 0; i < MTK_RING_MAX; i++) {
    ring[i] = kzalloc(sizeof(**ring), GFP_KERNEL);
    @ @ -472,14 +472,14 @@
    return 0;

    err_cleanup:
-  for (; i--; ) {
+  do {
    dma_free_coherent(cryp->dev, MTK_DESC_RING_SZ,
      ring[i]->res_base, ring[i]->res_dma);
    dma_free_coherent(cryp->dev, MTK_DESC_RING_SZ,
      ring[i]->cmd_base, ring[i]->cmd_dma);
    kfree(ring[i]);
  -}
  -return err;
  +} while (i--);
  +return -ENOMEM;
  }

  static int mtk_crypto_probe(struct platform_device *pdev)
  --- linux-4.15.0.orig/drivers/crypto/mxc-scc.c
  +++ linux-4.15.0/drivers/crypto/mxc-scc.c
else
from = scc->black_memory;

-dev_dbg(scc->dev, "pcopy: from 0x%p %d bytes\n", from,
+dev_dbg(scc->dev, "pcopy: from 0x%p %zu bytes\n", from,
ctx->dst_nents * 8);
len = sg_pcopy_from_buffer(ablkreq->dst, ctx->dst_nents,
    from, ctx->size, ctx->offset);
if (!len) {
-dev_err(scc->dev, "pcopy err from 0x%p (len=%d)\n", from, len);
+dev_err(scc->dev, "pcopy err from 0x%p (len=%zu)\n", from, len);
    return -EINVAL;
}
#define DCP_ALIGNMENT 64

+/*
 + * Null hashes to align with hw behavior on imx6sl and ull
 + * these are flipped for consistency with hw output
 + */
+static const uint8_t sha1_null_hash[] =
+  "\x09\x07\xda\xaf\x90\x18\x60\x95\xef\xbf"
+  "\x55\x32\x0d\x4b\x6b\x5e\xe3\xa3\x39\xda";
+ static const uint8_t sha256_null_hash[] =
+  "\x55\xb8\x52\x78\x1b\x99\xa4"
+  "\x4c\x93\xb6\xe4\x41\xae\x27"
+  "\x24\xb9\x8f\x9c\x8f\x4f\xb0\x9a"
+  "\x14\x1c\xe9\x98\x42\xc4\xb0\xe3";
+ /* DCP DMA descriptor. */
 struct dcp_dma_desc {
  uint32_t next_cmd_addr;
+  uint8_t sha_out_buf[DCP_SHA_PAY_SZ];
  uint8_t aes_in_buf[DCP_BUF_SZ];
  uint8_t aes_out_buf[DCP_BUF_SZ];
  uint8_t sha_in_buf[DCP_BUF_SZ];
  uint8_t aes_key[2 * AES_KEYSIZE_128];
  struct completion completion[DCP_MAX_CHANS];
  struct mutex mutex[DCP_MAX_CHANS];
  spinlock_t lock[DCP_MAX_CHANS];
  struct task_struct thread[DCP_MAX_CHANS];
  struct crypto_queue queue[DCP_MAX_CHANS];
};

static int mxs_dcp_start_dma(struct dcp_async_ctx *actx) {
  int dma_err;
  struct dcp *sdcp = global_sdcp;
  const int chan = actx->chan;
  uint32_t stat;
  unsigned long ret;
  struct dcp_dma_desc *desc = &sdcp->coh->desc[actx->chan];
  -
dma_addr_t desc_phys = dma_map_single(sdcp->dev, desc, sizeof(*desc), DMA_TO_DEVICE);

+dma_err = dma_mapping_error(sdcp->dev, desc_phys);
+if (dma_err)
+return dma_err;
+
reinit_completion(&sdcp->completion[chan]);

/* Clear status register. */
@@ -196,18 +217,35 @@
static int mxs_dcp_run_aes(struct dcp_async_ctx *actx,
      struct ablkcipher_request *req, int init)
{
  +dma_addr_t key_phys, src_phys, dst_phys;
  struct dcp *sdcp = global_sdcp;
  struct dcp_dma_desc *desc = &sdcp->coh->desc[actx->chan];
  struct dcp_aes_req_ctx *rctx = ablkcipher_request_ctx(req);
  int ret;

  -dma_addr_t key_phys = dma_map_single(sdcp->dev, sdcp->coh->aes_key,
    - 2 * AES_KEYSIZE_128,
    - DMA_TO_DEVICE);
  -dma_addr_t src_phys = dma_map_single(sdcp->dev, sdcp->coh->aes_in_buf,
    - DCP_BUF_SZ, DMA_TO_DEVICE);
  -dma_addr_t dst_phys = dma_map_single(sdcp->dev, sdcp->coh->aes_out_buf,
    - DCP_BUF_SZ, DMA_FROM_DEVICE);
  +key_phys = dma_map_single(sdcp->dev, sdcp->coh->aes_key,
    + 2 * AES_KEYSIZE_128, DMA_TO_DEVICE);
  +ret = dma_mapping_error(sdcp->dev, key_phys);
  +if (ret)
  +return ret;
  +
  +src_phys = dma_map_single(sdcp->dev, sdcp->coh->aes_in_buf,
    + DCP_BUF_SZ, DMA_TO_DEVICE);
  +ret = dma_mapping_error(sdcp->dev, src_phys);
  +if (ret)
  +goto err_src;
  +
  +dst_phys = dma_map_single(sdcp->dev, sdcp->coh->aes_out_buf,
    + DCP_BUF_SZ, DMA_FROM_DEVICE);
  +ret = dma_mapping_error(sdcp->dev, dst_phys);
  +if (ret)
  +goto err_dst;
  +
  +if (actx->fill % AES_BLOCK_SIZE) {
    +dev_err(sdcp->dev, "Invalid block size!
"
    +ret = -EINVAL;
  

    goto aes_done_run;
+
/* Fill in the DMA descriptor. */
desc->control0 = MXS_DCP_CONTROL0_DECR_SEMAPHORE |
@@ -238,10 +276,13 @@
ret = mxs_dcp_start_dma(actx);

+aes_done_run:
+dma_unmap_single(sdc->dev, dst_phys, DCP_BUF_SZ, DMA_FROM_DEVICE);
+err_dst:
+dma_unmap_single(sdc->dev, src_phys, DCP_BUF_SZ, DMA_TO_DEVICE);
+err_src:
    dma_unmap_single(sdc->dev, key_phys, 2 * AES_KEYSIZE_128,
    DMA_TO_DEVICE);
-dma_unmap_single(sdc->dev, src_phys, DCP_BUF_SZ, DMA_TO_DEVICE);
-dma_unmap_single(sdc->dev, dst_phys, DCP_BUF_SZ, DMA_FROM_DEVICE);

    return ret;

             }  
@@ -256,21 +297,22 @@
struct scatterlist *dst = req->dst;
struct scatterlist *src = req->src;
-const int nents = sg_nents(req->src);
+int dst_nents = sg_nents(dst);
    const int out_off = DCP_BUF_SZ;
    uint8_t *in_buf = sdc->coh->aes_in_buf;
    uint8_t *out_buf = sdc->coh->aes_out_buf;

-uint8_t *out_tmp, *src_buf, *dst_buf = NULL;
+uint8_t *src_buf = NULL;
+uint32_t last_out_len = 0;
    uint8_t *key = sdc->coh->aes_key;

    int ret = 0;
    -int split = 0;
-    unsigned int i, len, clen, rem = 0;
+    unsigned int i, len, clen, tlen = 0;
    int init = 0;
+    bool limit_hit = false;

    actx->fill = 0;
memset(key + AES_KEYSIZE_128, 0, AES_KEYSIZE_128);

- for_each_sg(req->src, src, nents, i) {
  src_buf = sg_virt(src);
  len = sg_dma_len(src);
  +tlen += len;
  +limit_hit = tlen > req->nbytes;
  +
  +if (limit_hit)
  +len = req->nbytes - (tlen - len);
  do {
    if (actx->fill + len > out_off)
      +if (actx->fill == out_off || sg_is_last(src) || limit_hit) {
        ret = mxs_dcp_run_aes(actx, req, init);
        if (ret)
          return ret;
        init = 0;

        -out_tmp = out_buf;
        -while (dst && actx->fill) {
          -if (!split) {
            -dst_buf = sg_virt(dst);
            -dst_off = 0;
            -}
            -rem = min(sg_dma_len(dst) - dst_off,
              - actx->fill);
            -
            -memcpy(dst_buf + dst_off, out_tmp, rem);
            -out_tmp += rem;
            -dst_off += rem;
            -actx->fill -= rem;
            -
            -if (dst_off == sg_dma_len(dst)) {
              -dst = sg_next(dst);
              -split = 0;
              -} else {
                -split = 1;
                -}
sg_pcopy_from_buffer(dst, dst_nents, out_buf,
    actx->fill, dst_off);
    dst_off += actx->fill;
    last_out_len = actx->fill;
    actx->fill = 0;
}
} while (len);
+
    if (limit_hit)
    +break;
    +}
    +
    /* Copy the IV for CBC for chaining */
+    if (!rctx->ecb) {
+        if (!rctx->enc)
+            memcpy(req->info, out_buf+(last_out_len-AES_BLOCK_SIZE),
+                AES_BLOCK_SIZE);
+        else
+            memcpy(req->info, in_buf+(last_out_len-AES_BLOCK_SIZE),
+                AES_BLOCK_SIZE);
    }

return ret;
@@ -349,13 +394,20 @@
 int ret;
-
 -do {
-    __set_current_state(TASK_INTERRUPTIBLE);
+    while (!kthread_should_stop()) {
+        set_current_state(TASK_INTERRUPTIBLE);

    -mutex_lock(&sdcp->mutex[chan]);
+    spin_lock(&sdcp->lock[chan]);
    backlog = crypto_get_backlog(&sdcp->queue[chan]);
    arq = crypto_dequeue_request(&sdcp->queue[chan]);
    -mutex_unlock(&sdcp->mutex[chan]);
+    spin_unlock(&sdcp->lock[chan]);
    +
    +if (!backlog && !arq) {
    +schedule();
    +continue;
    +}
    +
    +set_current_state(TASK_RUNNING);

if (backlog)
backlog->complete(backlog, -EINPROGRESS);
@@ -363,11 +415,8 @@
if (arq) {
 ret = mxs_dcp_aes_block_crypt(arq);
 arq->complete(arq, ret);
- continue;
-}
-}
-}
+while (!kthread_should_stop());
+
  return 0;
 }
@@ -409,9 +458,9 @@
rctx->ecb = ecb;
 actx->chan = DCP_CHAN_CRYPTO:

- mutex_lock(&sdcp->mutex[actx->chan]);
+ spin_lock(&sdcp->lock[actx->chan]);
 ret = crypto_enqueue_request(&sdcp->queue[actx->chan], &req->base);
- mutex_unlock(&sdcp->mutex[actx->chan]);
+ spin_unlock(&sdcp->lock[actx->chan]);

 wake_up_process(sdcp->thread[actx->chan]);

@@ -509,14 +558,16 @@
 struct crypto_ahash *tfm = crypto_ahash_reqtfm(req);
 struct dcp_async_ctx *actx = crypto_ahash_ctx(tfm);
 struct dcp_sha_req_ctx *rctx = ahash_request_ctx(req);
- struct hash_alg_common *halg = crypto_hash_alg_common(tfm);
- 
- struct dcp_dma_desc *desc = &sdcp->coh->desc[actx->chan];

 dma_addr_t digest_phys = 0;
 dma_addr_t buf_phys = dma_map_single(sdcp->dev, sdcp->coh->sha_in_buf,
     DCP_BUF_SZ, DMA_TO_DEVICE);

+ ret = dma_mapping_error(sdcp->dev, buf_phys);
+ if (ret)
+ return ret;
+
/* Fill in the DMA descriptor. */
desc->control0 = MXS_DCP_CONTROL0_DECR_SEMAPHORE |
    MXS_DCP_CONTROL0_INTERRUPT |
@@ -532,10 +583,27 @@
desc->payload = 0;
desc->status = 0;

/*
 * Align driver with hw behavior when generating null hashes
 */

if (rctx->init && rctx->fini && desc->size == 0) {
    struct hash_alg_common *halg = crypto_hash_alg_common(tfm);
    const uint8_t *sha_buf =
        (actx->alg == MXS_DCP_CONTROL1_HASH_SELECT_SHA1) ?
        sha1_null_hash : sha256_null_hash;
    memcpy(sdcp->coh->sha_out_buf, sha_buf, halg->digestsize);
    ret = 0;
    goto done_run;
}

/* Set HASH_TERM bit for last transfer block. */
if (rctx->fini) {
    digest_phys = dma_map_single(sdcp->dev, req->result,
        halg->digestsize, DMA_FROM_DEVICE);
    +digest_phys = dma_map_single(sdcp->dev, sdcp->coh->sha_out_buf,
        DCP_SHA_PAY_SZ, DMA_FROM_DEVICE);
    +ret = dma_mapping_error(sdcp->dev, digest_phys);
    +if (ret)
        +goto done_run;
    +
    desc->control0 |= MXS_DCP_CONTROL0_HASH_TERM;
    desc->payload = digest_phys;
}

ret = mxs_dcp_start_dma(actx);

if (rctx->fini)
    -dma_unmap_single(sdcp->dev, digest_phys, halg->digestsize,
        DCP_SHA_PAY_SZ, DMA_FROM_DEVICE);
+dma_unmap_single(sdcp->dev, digest_phys, DCP_SHA_PAY_SZ,
    DMA_FROM_DEVICE);
+done_run:
dma_unmap_single(sdcp->dev, buf_phys, DCP_BUF_SZ, DMA_TO_DEVICE);

return ret;

uint8_t *in_buf = sdcp->coh->sha_in_buf;
-
-uint8_t *src_buf;
uint8_t *out_buf = sdcp->coh->sha_out_buf;

struct scatterlist *src;

unsigned int i, len, clen;

int fin = rctx->fini;
if (fin)
    rctx->fini = 0;

for_each_sg(req->src, src, nents, i) {
    src_buf = sg_virt(src);
    len = sg_dma_len(src);
    
    do {
        if (actx->fill + len > DCP_BUF_SZ)
            clen = DCP_BUF_SZ - actx->fill;
        else
            clen = len;

        memcpy(in_buf + actx->fill, src_buf, clen);
        len -= clen;
        src_buf += clen;
        actx->fill += clen;
    } while (len);
}

/*
  * If we filled the buffer and still have some
  * more data, submit the buffer.
  */

if (len && actx->fill == DCP_BUF_SZ) {
    ret = mxs_dcp_run_sha(req);
    if (ret)
        return ret;
    actx->fill = 0;
    rctx->init = 0;
}

while (len) {
    if (actx->fill + len > DCP_BUF_SZ)
        clen = DCP_BUF_SZ - actx->fill;
    else
        clen = len;

    src = req->src;
    len = req->nbytes;

    scatterwalk_map_and_copy(in_buf + actx->fill, src, oft, clen,
len -= clen;
actx->fill += clen;
+
+/*
+ * If we filled the buffer and still have some
+ * more data, submit the buffer.
+ */
+if (len && actx->fill == DCP_BUF_SZ) {
+ret = mxs_dcp_run_sha(req);
+if (ret)
+return ret;
+actx->fill = 0;
+rctx->init = 0;
+}
}

if (fin) {
@@ -617,11 +684,9 @@
actx->fill = 0;

-/* For some reason, the result is flipped. */
-for (i = 0; i < halg->digestsize / 2; i++) {
-    swap(req->result[i],
-         req->result[halg->digestsize - i - 1]);
-}
+/* For some reason the result is flipped */
+for (i = 0; i < halg->digestsize; i++)
+req->result[i] = out_buf[halg->digestsize - i - 1];
}

return 0;
@@ -640,13 +705,20 @@
struct ahash_request *req;
int ret, fini;

-do {
-__set_current_state(TASK_INTERRUPTIBLE);
+while (!kthread_should_stop()) {
+set_current_state(TASK_INTERRUPTIBLE);

-mutex_lock(&sdcp->mutex[chan]);
+spin_lock(&sdcp->lock[chan]);
-backlog = crypto_get_backlog(&sdcp->queue[chan]);
-arq = crypto_dequeue_request(&sdcp->queue[chan]);
mutex_unlock(&sdcp->mutex[chan]);
+
spin_unlock(&sdcp->lock[chan]);
+
if (!backlog && !arq) {
    schedule();
    continue;
    +}
+
set_current_state(TASK_RUNNING);

if (backlog)
    backlog->complete(backlog, -EINPROGRESS);
@@ -658,12 +730,8 @@
ret = dcp_sha_req_to_buf(arq);
fini = rctx->fini;
arq->complete(arq, ret);
    -if (!fini)
    -continue;
    }
-
-schedule();
-} while (!kthread_should_stop());
+
return 0;
}
@@ -721,9 +789,9 @@
rctx->init = 1;
}

mutex_lock(&sdcp->mutex[actx->chan]);
+spin_lock(&sdcp->lock[actx->chan]);
ret = crypto_enqueue_request(&sdcp->queue[actx->chan], &req->base);
-mutex_unlock(&sdcp->mutex[actx->chan]);
+spin_unlock(&sdcp->lock[actx->chan]);

wake_up_process(sdp->thread[actx->chan]);
mutex_unlock(&actx->mutex);
@@ -983,7 +1051,7 @@
platform_set_drvdata(pdev, sdcp);

for (i = 0; i < DCP_MAX_CHANS; i++) {
    mutex_init(&sdcp->mutex[i]);
    +spin_lock_init(&sdcp->lock[i]);
    init_completion(&sdcp->completion[i]);
crypto_init_queue(&sdcp->queue[i], 50);
}

--- linux-4.15.0.orig/drivers/crypto/nx/nx-842-powernv.c
+++ linux-4.15.0/drivers/crypto/nx/nx-842-powernv.c
@@ -24,6 +24,8 @@
#include <asm/icswx.h>
#include <asm/vas.h>
#include <asm/reg.h>
+include <asm/opal-api.h>
+include <asm/opal.h>

MODULE_LICENSE("GPL");
MODULE_AUTHOR("Dan Streetman <ddstreet@ieee.org>");
@@ -34,8 +36,6 @@
#define WORKMEM_ALIGN(CRB_ALIGN)
#define CSB_WAIT_MAX(5000) /* ms */
#define VAS_RETRIES(10)
-/* # of requests allowed per RxFIFO at a time. 0 for unlimited */
-#define MAX_CREDITS_PER_RXFIFO(1024)

struct nx842_workmem {
/* Below fields must be properly aligned */
@@ -753,7 +753,7 @@
}

static int __init vas_cfg_coproc_info(struct device_node *dn, int chip_id,
-int vasid)
+int vasid, int *ct)
{
 struct vas_window *rxwin = NULL;
 struct vas_rx_win_attr rxattr;
@@ -819,7 +819,11 @@
 rxattr.lnotify_lpid = lpid;
 rxattr.lnotify_pid = pid;
 rxattr.lnotify_tid = tid;
-rxattr.wcreds_max = MAX_CREDITS_PER_RXFIFO;
+/*
+ * Maximum RX window credits can not be more than #CRBs in
+ * RxFIFO. Otherwise, can get checkstop if RxFIFO overruns.
+ */
+rxattr.wcreds_max = fifo_size / CRB_SIZE;

/*
 * Open a VAS receive window which is used to configure RxFIFO
@@ -837,6 +841,15 @@
coproc->vas.id = vasid;
nx842_add_coprocs_list(coproc, chip_id);
+/*
+ * (lpid, pid, tid) combination has to be unique for each
+ * coprocessor instance in the system. So to make it

unique, skiboot uses coprocessor type such as 842 or
GZIP for pid and provides this value to kernel in pid
device-tree property.
*/
*ct = pid;
+
return 0;

err_out:
@@ -850,6 +863,7 @@
struct device_node *dn;
int chip_id, vasid, ret = 0;
int nx_fifo_found = 0;
+int uninitialized_var(ct);

chip_id = of_get_ibm_chip_id(pn);
if (chip_id < 0) {
@@ -865,7 +879,7 @@
for_each_child_of_node(pn, dn) {
  if (of_device_is_compatible(dn, "ibm,p9-nx-842")) {
    -ret = vas_cfg_coproc_info(dn, chip_id, vasid);
    +ret = vas_cfg_coproc_info(dn, chip_id, vasid, &ct);
    if (ret) {
      of_node_put(dn);
      return ret;
@@ -876,9 +890,22 @@
        if (!nx_fifo_found) {
          pr_err("NX842 FIFO nodes are missing\n");
          -ret = -EINVAL;
          +return -EINVAL;
        }
        +/*
        + * Initialize NX instance for both high and normal priority FIFOs.
        + */
        +if (opal_check_token(OPAL_NX_COPROC_INIT)) {
          +ret = opal_nx_coproc_init(chip_id, ct);
          +if (ret) {
            +pr_err("Failed to initialize NX for chip(%d): %d\n", chip_id, ret);
            +ret = opal_error_code(ret);
            +} else
            +pr_warn("Firmware doesn't support NX initialization\n");
        + return ret;
--- linux-4.15.0.orig/drivers/crypto/nx/nx-842-pseries.c
+++ linux-4.15.0/drivers/crypto/nx/nx-842-pseries.c
@@ -553,13 +553,15 @@
 * The status field indicates if the device is enabled when the status
 * is 'okay'. Otherwise the device driver will be disabled.
 *
- * @prop - struct property point containing the maxsyncop for the update
+ * @devdata: struct nx842_devdata to use for dev_info
+ * @prop: struct property point containing the maxsyncop for the update
 *
 * Returns:
 *  0 - Device is available
 *  -ENODEV - Device is not available
 */
-static int nx842_OF_upd_status(struct property *prop)
+static int nx842_OF_upd_status(struct nx842_devdata *devdata,
+                                struct property *prop)
{
    const char *status = (const char *)prop->value;

    @@ -773,7 +775,7 @@
    goto out;

    /* Perform property updates */
-    ret = nx842_OF_upd_status(status);
+    ret = nx842_OF_upd_status(new_devdata, status);
    if (ret)
        goto error_out;

    @@ -1086,6 +1088,7 @@
    
    +MODULE_DEVICE_TABLE(vio, nx842_vio_driver_ids);

    static struct vio_driver nx842_vio_driver = {
        .name = KBUILD_MODNAME,
--- linux-4.15.0.orig/drivers/crypto/omap-aes.c
+++ linux-4.15.0/drivers/crypto/omap-aes.c
@@ -1069,7 +1069,7 @@
    if (err < 0) {
        dev_err(dev, "%s: failed to get_sync(%d)\n", __func__, err);
        __func__, err);
-        goto err_res;
+        goto err_pm_disable;

}
omap_aes_dma_stop(dd);
@@ -1178,6 +1178,7 @@
omap_aes_dma_cleanup(dd);
err_irq:
tasklet_kill(&dd->done_task);
+err_pm_disable:
pm_runtime_disable(dev);
err_res:
  dd = NULL;
--- linux-4.15.0.orig/drivers/crypto/omap-sham.c
+++ linux-4.15.0/drivers/crypto/omap-sham.c
@@ -168,8 +168,6 @@
};

struct omap_sham_ctx {  
-struct omap_sham_dev*dd;
-
unsigned long flags;

/* fallback stuff */
@@ -457,6 +455,9 @@
struct omap_sham_reqctx *ctx = ahash_request_ctx(dd->req);
u32 val, mask;

+if (likely(ctx->digcnt))
+omap_sham_writer(dd, SHA_REG_DIGEST_CTX(dd), ctx->digcnt);
+
/*
 * Setting ALGO_CONST only for the first iteration and
 * CLOSE_HASH only for the last one. Note that flags mode bits
@@ -916,27 +917,35 @@
return 0;
}

+struct omap_sham_dev *omap_sham_find_dev(struct omap_sham_reqctx *ctx)
+{
+struct omap_sham_dev *dd;
+
+if (ctx->dd)
+return ctx->dd;
+
+spin_lock_bh(&sham.lock);
+dd = list_first_entry(&sham.dev_list, struct omap_sham_dev, list);
+list_move_tail(&dd->list, &sham.dev_list);
+ctx->dd = dd;
+spin_unlock_bh(&sham.lock);
+
static int omap_sham_init(struct ahash_request *req)
{
    struct crypto_ahash *tfm = crypto_ahash_reqtfm(req);
    struct omap_sham_ctx *tctx = crypto_ahash_ctx(tfm);
    struct omap_sham_reqctx *ctx = ahash_request_ctx(req);
    struct omap_sham_dev *dd = NULL, *tmp;
    int bs = 0;

    spin_lock_bh(&sham.lock);
    if (!tctx->dd) {
        list_for_each_entry(tmp, &sham.dev_list, list) {
            dd = tmp;
            break;
        }
        tctx->dd = dd;
    } else {
        dd = tctx->dd;
    }
    spin_unlock_bh(&sham.lock);

    ctx->dd = NULL;
    ctx->dd = dd;
    ctx->flags = 0;

    if (test_bit(FLAGS_SGS_COPIED, &dd->flags))
        free_pages((unsigned long)sg_virt(ctx->sg),
                    -get_order(ctx->sg->length));
    if (test_bit(FLAGS_SGS_ALLOCED, &dd->flags))
        kfree(ctx->sg);

    if (test_bit(FLAGS_SGS_COPIED, &dd->flags))
        free_pages((unsigned long)ctx->bufcnt);
    if (test_bit(FLAGS_SGS_ALLOCED, &dd->flags))
        kfree(ctx->sg);
    static int omap_sham_enqueue(struct ahash_request *req, unsigned int op)
    {
        struct omap_sham_reqctx *ctx = ahash_request_ctx(req);
        struct omap_sham_ctx *tctx = crypto_tfm_ctx(req->base.tfm);
        struct omap_sham_dev *dd = tctx->dd;
        struct omap_sham_dev *tmp = NULL;
        struct omap_sham_dev *dd = ctx->dd;
        struct omap_sham_dev *dd = omap_sham_find_dev(ctx);
        if (!dd)
            return -ENODEV;
    return -ENOMEM;

ctx->op = op;

@@ -1197,7 +1205,7 @@
static int omap_sham_update(struct ahash_request *req)
 {
 struct omap_sham_reqctx *ctx = ahash_request_ctx(req);
-struct omap_sham_dev *dd = ctx->dd;
+struct omap_sham_dev *dd = omap_sham_find_dev(ctx);

 if (!req->nbytes)
     return 0;
@@ -1302,21 +1310,8 @@
 struct omap_sham_hmac_ctx *bctx = tctx->base;
 int bs = crypto_shash_blocksize(bctx->shash);
 int ds = crypto_shash_digestsize(bctx->shash);
-struct omap_sham_dev *dd = NULL, *tmp;
 int err, i;

-spin_lock_bh(&sham.lock);
-if (!tctx->dd) {
-list_for_each_entry(tmp, &sham.dev_list, list) {
-    dd = tmp;
-    break;
-} 
-tctx->dd = dd;
-} else {
-    dd = tctx->dd;
-}
-spin_unlock_bh(&sham.lock);
-
 err = crypto_shash_setkey(tctx->fallback, key, keylen);
 if (err)
     return err;
@@ -1334,7 +1329,7 @@
 memset(bctx->ipad + keylen, 0, bs - keylen);

-if (!test_bit(FLAGS_AUTO_XOR, &dd->flags)) {
+if (!test_bit(FLAGS_AUTO_XOR, &sham.flags)) {
    memcpy(bctx->opad, bctx->ipad, bs);
    for (i = 0; i < bs; i++) {
@@ -1751,7 +1746,7 @@
 if (test_and_clear_bit(FLAGS_OUTPUT_READY, &dd->flags))
     goto finish;
 } else if (test_bit(FLAGS_DMA_READY, &dd->flags)) [
-if (test_and_clear_bit(FLAGS_DMA_ACTIVE, &dd->flags)) {

if (test_bit(FLAGS_DMA_ACTIVE, &dd->flags)) {
    omap_sham_update_dma_stop(dd);
    if (dd->err) {
        err = dd->err;
    }
}

dd->flags |= dd->pdata->flags;
+sham.flags |= dd->pdata->flags;

pm_runtime_use_autosuspend(dev);
pm_runtime_set_autosuspend_delay(dev, DEFAULT_AUTOSUSPEND_DELAY);

for (i = 0; i < dd->pdata->algs_info_size; i++) {
    +if (dd->pdata->algs_info[i].registered)
    +break;
+
for (j = 0; j < dd->pdata->algs_info[i].size; j++) {
    struct ahash_alg *alg;

    list_del(&dd->list);
    spin_unlock(&sham.lock);
    for (i = dd->pdata->algs_info_size - 1; i >= 0; i--)
        for (j = dd->pdata->algs_info[i].registered - 1; j >= 0; j--)
            +crypto_unregister_ahash(&dd->pdata->algs_info[i].algs_list[j]);
    dd->pdata->algs_info[i].registered--;
    tasklet_kill(&dd->done_task);
    pm_runtime_disable(&pdev->dev);
}

+count -= initial;
+
if (initial)
    asm volatile (".byte 0xf3,0x0f,0xa7,0xc8" /* rep xcryptecb */
        : "+S"(input), "+D"(output)
        @ @ -273,7 +275,7 @ @
asm volatile (".byte 0xf3,0x0f,0xa7,0xc8" /* rep xcryptecb */
      : "+S"(input), "+D"(output)
   - : "d"(control_word), "b"(key), "c"(count - initial));
+    : "d"(control_word), "b"(key), "c"(count));
}

static inline u8 *padlock_xcrypt_cbc(const u8 *input, u8 *output, void *key,
@@ -284,6 +286,8 @@
     if (count < cbc_fetch_blocks)
      return cbc_crypt(input, output, key, iv, control_word, count);

+count -= initial;
+
if (initial)
asm volatile (".byte 0xf3,0x0f,0xa7,0xd0" /* rep xcryptcbc */
      : "+S" (input), "+D" (output), "+a" (iv)
@@ -291,7 +295,7 @@
    asm volatile (".byte 0xf3,0x0f,0xa7,0xd0" /* rep xcryptcbc */
      : "d" (control_word), "b" (key), "c" (count-initial));
+    : "d" (control_word), "b" (key), "c" (count));
return iv;
}
@@ -512,7 +516,7 @@
printk(KERN_NOTICE PFX "Using VIA PadLock ACE for AES algorithm.\n");

-if (c->x86 == 6 && c->x86_model == 15 && c->x86_mask == 2) {
+if (c->x86 == 6 && c->x86_model == 15 && c->x86_stepping == 2) {
  ecb_fetch_blocks = MAX_ECB_FETCH_BLOCKS;
  cbc_fetch_blocks = MAX_CBC_FETCH_BLOCKS;
printk(KERN_NOTICE PFX "VIA Nano stepping 2 detected: enabling workaround.\n");
--- linux-4.15.0.orig/drivers/crypto/picoxcell_crypto.c
+++ linux-4.15.0/drivers/crypto/picoxcell_crypto.c
@@ -1616,6 +1616,11 @@
MODULE_DEVICE_TABLE(of, spacc_of_id_table);
#endif /* CONFIG_OF */

+static void spacc_tasklet_kill(void *data)
+{+}
+tasklet_kill(data);
+
+static int spacc_probe(struct platform_device *pdev)
+{int i, err, ret = -EINVAL;
return -ENXIO;
}

+tasklet_init(&engine->complete, spacc_spacc_complete,
+            (unsigned long)engine);
+
+ret = devm_add_action(&pdev->dev, space_tasklet_kill,
+                     &engine->complete);
+if (ret)
+return ret;
+
if (devm_request_irq(&pdev->dev, irq->start, spacc_spacc_irq, 0,
                 engine->name, engine)) {
    dev_err(engine->dev, "failed to request IRQ\n");
}

INIT_LIST_HEAD(&engine->completed);
INIT_LIST_HEAD(&engine->in_progress);
engine->in_flight = 0;
-tasklet_init(&engine->complete, spacc_spacc_complete,
-            (unsigned long)engine);
+
platform_set_drvdata(pdev, engine);

--- linux-4.15.0.orig/drivers/crypto/qat/qat_c3xxx/adf_drv.c
+++ linux-4.15.0/drivers/crypto/qat/qat_c3xxx/adf_drv.c
@@ -123,7 +123,8 @@
 struct adf_hw_device_data *hw_data;
 char name[ADF_DEVICE_NAME_LENGTH];
 unsigned int i, bar_nr;
-int ret, bar_mask;
+unsigned long bar_mask;
+int ret;

 switch (ent->device) {
 case ADF_C3XXX_PCI_DEVICE_ID:
@@ -235,8 +236,7 @@
 /* Find and map all the device's BARS */
 i = 0;
 bar_mask = pci_select_bars(pdev, IORESOURCE_MEM);
-        for_each_set_bit(bar_nr, (const unsigned long *)&bar_mask,
-                ADF_PCI_MAX_BARS * 2) {
+        for_each_set_bit(bar_nr, &bar_mask, ADF_PCI_MAX_BARS * 2) {
 struct adf_bar *bar = &accel_pci_dev->pci_bars[i++];

         bar->base_addr = pci_resource_start(pdev, bar_nr);
--- linux-4.15.0.orig/drivers/crypto/qat/qat_c3xxxvf/adf_c3xxxvf_hw_data.c
+++ linux-4.15.0/drivers/crypto/qat/qat_c3xxxvf/adf_c3xxxvf_hw_data.c
hw_data->enable_error_correction = adf_vf_void_noop;
hw_data->init_admin_comms = adf_vf_int_noop;
hw_data->exit_admin_comms = adf_vf_void_noop;
hw_data->send_admin_init = adf_vf2pf_init;
+hw_data->send_admin_init = adf_vf2pf_notify_init;
hw_data->init_arb = adf_vf_int_noop;
hw_data->exit_arb = adf_vf_void_noop;
-hw_data->disable_iov = adf_vf2pf_shutdown;
+hw_data->disable_iov = adf_vf2pf_notify_shutdown;
hw_data->get_accel_mask = get_accel_mask;
hw_data->get_ae_mask = get_ae_mask;
hw_data->get_num_accels = get_num_accels;
--- linux-4.15.0.orig/drivers/crypto/qat/qat_c3xxxvf/adf_drv.c
+++ linux-4.15.0/drivers/crypto/qat/qat_c3xxxvf/adf_drv.c
@@ -123,10 +123,10 @@
 hw_data->init_arb = adf_vf_int_noop;
 hw_data->exit_arb = adf_vf_void_noop;
 -hw_data->disable_iov = adf_vf2pf_shutdown;
+hw_data->disable_iov = adf_vf2pf_notify_shutdown;
 hw_data->get_accel_mask = get_accel_mask;
 hw_data->get_ae_mask = get_ae_mask;
 hw_data->get_num_accels = get_num_accels;
--- linux-4.15.0.orig/drivers/crypto/qat/qat_c3xxxvf/adf_drv.c
+++ linux-4.15.0/drivers/crypto/qat/qat_c3xxxvf/adf_drv.c
@@ -123,10 +123,10 @@
 struct adf_hw_device_data *hw_data;
 char name[ADF_DEVICE_NAME_LENGTH];
 unsigned int i, bar_nr;
-int ret, bar_mask;
+unsigned long bar_mask;
+int ret;

 switch (ent->device) {
 case ADF_C3XXXIOV_PCI_DEVICE_ID:
 @@ -215,8 +216,7 @@
 /* Find and map all the device's BARS */
 i = 0;
 bar_mask = pci_select_bars(pdev, IORESOURCE_MEM);
-bar_mask = pci_select_bars(pdev, IORESOURCE_MEM);
-#for_each_set_bit(bar_nr, (const unsigned long *)&bar_mask,
-# for_each_set_bit(bar_nr, (const unsigned long *)&bar_mask,
-# ADF_PCI_MAX_BARS * 2) {
+for_each_set_bit(bar_nr, &bar_mask, ADF_PCI_MAX_BARS * 2) {
 struct adf_bar *bar = &accel_pci_dev->pci_bars[i++];

 bar->base_addr = pci_resource_start(pdev, bar_nr);
 @@ -238,12 +238,12 @@
 if (ret)
 goto out_err_free_reg;

-#set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
-#set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
 ret = adf_dev_init(accel_dev);
 if (ret)
 goto out_err_dev_shutdown;

+set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
 +set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
 ret = adf_dev_start(accel_dev);

if (ret)
goto out_err_dev_stop;
--- linux-4.15.0.orig/drivers/crypto/qat/qat_c62x/adf_drv.c
+++ linux-4.15.0/drivers/crypto/qat/qat_c62x/adf_drv.c
@@ -123,7 +123,8 @@
 struct adf_hw_device_data *hw_data;
 char name[ADF_DEVICE_NAME_LENGTH];
 unsigned int i, bar_nr;
-int ret, bar_mask;
+unsigned long bar_mask;
+int ret;

 switch (ent->device) {
 case ADF_C62X_PCI_DEVICE_ID:
@@ -235,8 +236,7 @@
 /* Find and map all the device's BARS */
 i = (hw_data->fuses & ADF_DEVICE_FUSECTL_MASK) ? 1 : 0;
 bar_mask = pci_select_bars(pdev, IORESOURCE_MEM);
-for_each_set_bit(bar_nr, (const unsigned long *)&bar_mask,
- ADF_PCI_MAX_BARS * 2) {
+for_each_set_bit(bar_nr, &bar_mask, ADF_PCI_MAX_BARS * 2) {
 struct adf_bar *bar = &accel_pci_dev->pci_bars[i++];

 hw_data->enable_error_correction = adf_vf_void_noop;
 hw_data->init_admin_comms = adf_vf_int_noop;
 hw_data->exit_admin_comms = adf_vf_void_noop;
 hw_data->send_admin_init = adf_vf2pf_notify_init;
 hw_data->send_admin_init = adf_vf2pf_notify_init;
 hw_data->init_arb = adf_vf_int_noop;
 hw_data->exit_arb = adf_vf_void_noop;
 hw_data->disable_iov = adf_vf2pf_notify_shutdown;
 hw_data->disable_iov = adf_vf2pf_notify_shutdown;
 hw_data->get_accel_mask = get_accel_mask;
 hw_data->get_ae_mask = get_ae_mask;
 hw_data->get_num_accels = get_num_accels;
@@ -125,7 +125,8 @@
 struct adf_hw_device_data *hw_data;
 char name[ADF_DEVICE_NAME_LENGTH];
 unsigned int i, bar_nr;
-int ret, bar_mask;
+unsigned long bar_mask;
+int ret;
switch (ent->device) {
    case ADF_C62XIOV_PCI_DEVICE_ID:
        /* Find and map all the device's BARS */
        i = 0;
        bar_mask = pci_select_bars(pdev, IORESOURCE_MEM);
        for_each_set_bit(bar_nr, &bar_mask, ADF_PCI_MAX_BARS * 2) {
            struct adf_bar *bar = &accel_pci_dev->pci_bars[i++];
            bar->base_addr = pci_resource_start(pdev, bar_nr);
        }
        if (ret)
            goto out_err_free_reg;

        set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
        ret = adf_dev_init(accel_dev);
        if (ret)
            goto out_err_dev_shutdown;

        ret = adf_dev_start(accel_dev);
        if (ret)
            goto out_err_dev_stop;

    static inline int get_current_node(void)
    {
        return topology_physical_package_id(smp_processor_id());
    }

    int adf_service_register(struct service_hndl *service);
    void adf_enable_pf2vf_interrupts(struct adf_accel_dev *accel_dev);
    void adf_disable_pf2vf_interrupts(struct adf_accel_dev *accel_dev);
    int adf_vf2pf_notify_init(struct adf_accel_dev *accel_dev);
    void adf_vf2pf_notify_shutdown(struct adf_accel_dev *accel_dev);
    int adf_init_pf_wq(void);
void adf_exit_pf_wq(void);
int adf_init_vf_wq(void);
@@ -263,12 +263,12 @@
{
}

-static inline int adf_vf2pf_init(struct adf_accel_dev *accel_dev)
+static inline int adf_vf2pf_notify_init(struct adf_accel_dev *accel_dev)
{
    return 0;
}

-static inline void adf_vf2pf_shutdown(struct adf_accel_dev *accel_dev)
+static inline void adf_vf2pf_notify_shutdown(struct adf_accel_dev *accel_dev)
{
}

--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/adf_init.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/adf_init.c
@@ -105,6 +105,7 @@
 struct service_hndl *service;
 struct list_head *list_itr;
 struct adf_hw_device_data *hw_data = accel_dev->hw_device;
+int ret;

 if (!hw_data) {
    dev_err(&GET_DEV(accel_dev),
@@ -171,9 +172,9 @@
 hw_data->enable_vf2pf_comms(accel_dev);
 -return 0;
+return ret;
}

EXPORT_SYMBOL_GPL(adf_dev_init);

--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/adf_isr.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/adf_isr.c
@@ -59,6 +59,8 @@
 #include "adf_transport_access_macros.h"
 #include "adf_transport_internal.h"

+#define ADF_MAX_NUM_VFS32
+
 static int adf_enable_msix(struct adf_accel_dev *accel_dev)
struct adf_accel_pci *pci_dev_info = &accel_dev->accel_pci_dev;
@@ -111,7 +113,7 @@
 struct adf_bar *pmisc =
 &GET_BARS(accel_dev)[hw_data->get_misc_bar_id(hw_data)];
 void __iomem *pmisc_bar_addr = pmisc->virt_addr;
-		u32 vf_mask;
+		unsigned long vf_mask;

 /* Get the interrupt sources triggered by VFs */
 vf_mask = ((ADF_CSR_RD(pmisc_bar_addr, ADF_ERRSOU5) &
@@ -132,8 +134,7 @@
 * unless the VF is malicious and is attempting to
 * flood the host OS with VF2PF interrupts.
 */
-			for_each_set_bit(i, (const unsigned long *)&vf_mask,
-					 (sizeof(vf_mask) * BITS_PER_BYTE)) {
+			for_each_set_bit(i, &vf_mask, ADF_MAX_NUM_VFS) {
 vf_info = accel_dev->pf.vf_info + i;

 if (!__ratelimit(&vf_info->vf2pf_ratelimit)) {
@@ -330,19 +331,32 @@
 ret = adf_isr_alloc_msix_entry_table(accel_dev);
 if (ret)
 -return ret;
-	-if (adf_enable_msix(accel_dev))
 goto err_out;

 -if (adf_setup_bh(accel_dev))
 -goto err_out;
 +ret = adf_enable_msix(accel_dev);
 +if (ret)
 +goto err_free_msix_table;

 -if (adf_request_irqs(accel_dev))
 -goto err_out;
 +ret = adf_setup_bh(accel_dev);
 +if (ret)
 +goto err_disable_msix;
 +
 +ret = adf_request_irqs(accel_dev);
 +if (ret)
 +goto err_cleanup_bh;

 return 0;
+
+err_cleanup_bh:
+adf_cleanup_bh(accel_dev);
+
+err_disable_msix:
+adf_disable_msix(&accel_dev->accel_pci_dev);
+
+err_free_msix_table:
+adf_isr_free_msix_entry_table(accel_dev);
+
err_out:
-adf_isr_resource_free(accel_dev);
-return -EFAULT;
+return ret;
}

EXPORT_SYMBOL_GPL(adf_isr_resource_alloc);
--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/adf_pf2vf_msg.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/adf_pf2vf_msg.c
@@ -231,7 +231,6 @@
return ret;
}

-EXPORT_SYMBOL_GPL(adf_iov_putmsg);

void adf_vf2pf_req_hndl(struct adf_accel_vf_info *vf_info)
{
@@ -361,6 +360,8 @@
 msg |= ADF_PFVF_COMPATIBILITY_VERSION << ADF_VF2PF_COMPAT_VER_REQ_SHIFT;
 BUILD_BUG_ON(ADF_PFVF_COMPATIBILITY_VERSION > 255);

+reinit_completion(&accel_dev->vf.iov_msg_completion);
+
/* Send request from VF to PF */
ret = adf_iov_putmsg(accel_dev, msg, 0);
if (ret) {
--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/adf_transport.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/adf_transport.c
@@ -197,6 +197,7 @@
dev_err(&GET_DEV(accel_dev), "Ring address not aligned\n");
dma_free_coherent(&GET_DEV(accel_dev), ring_size_bytes,
    ring->base_addr, ring->dma_addr);
+ring->base_addr = NULL;
return -EFAULT;
}

--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/adf_pf2vf_msg.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/adf_pf2vf_msg.c
@@ -49,14 +49,14 @@
#include "adf_pf2vf_msg.h"
/ **
- * adf_vf2pf_init() - send init msg to PF
+ * adf_vf2pf_notify_init() - send init msg to PF
* @accel_dev: Pointer to acceleration VF device.
*
* Function sends an init message from the VF to a PF
*
* Return: 0 on success, error code otherwise.
*/
-int adf_vf2pf_init(struct adf_accel_dev *accel_dev)
+int adf_vf2pf_notify_init(struct adf_accel_dev *accel_dev)
 {
 u32 msg = (ADF_VF2PF_MSGORIGIN_SYSTEM |
 (ADF_VF2PF_MSGTYPE_INIT << ADF_VF2PF_MSGTYPE_SHIFT));
@@ -69,17 +69,17 @@
 set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
 return 0;
 }
-EXPORT_SYMBOL_GPL(adf_vf2pf_init);
+EXPORT_SYMBOL_GPL(adf_vf2pf_notify_init);

/ **
- * adf_vf2pf_shutdown() - send shutdown msg to PF
+ * adf_vf2pf_notify_shutdown() - send shutdown msg to PF
* @accel_dev: Pointer to acceleration VF device.
*
* Function sends a shutdown message from the VF to a PF
*
* Return: void
*/
-void adf_vf2pf_shutdown(struct adf_accel_dev *accel_dev)
+void adf_vf2pf_notify_shutdown(struct adf_accel_dev *accel_dev)
 {
 u32 msg = (ADF_VF2PF_MSGORIGIN_SYSTEM |
 (ADF_VF2PF_MSGTYPE_SHUTDOWN << ADF_VF2PF_MSGTYPE_SHIFT));
@@ -89,4 +89,4 @@
 dev_err(&GET_DEV(accel_dev),
 "Failed to send Shutdown event to PF\n");
 }
-EXPORT_SYMBOL_GPL(adf_vf2pf_shutdown);
+EXPORT_SYMBOL_GPL(adf_vf2pf_notify_shutdown);
--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/adf_vf_isr.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/adf_vf_isr.c
 @@ -203,6 +203,7 @@
 struct adf_bar *pmisc =
 &GET_BARS(accel_dev)[hw_data->get_misc_bar_id(hw_data)];
 void __iomem *pmisc_bar_addr = misc->virt_addr;
+bool handled = false;
u32 v_int;

/* Read VF INT source CSR to determine the source of VF interrupt */
@@ -215,7 +216,7 @@
 /* Schedule tasklet to handle interrupt BH */
tasklet_hi_schedule(&accel_dev->vf.pf2vf_bh_tasklet);
>Returns IRQ.Handled;
+handled = true;
 }

/* Check bundle interrupt */
@@ -227,10 +228,10 @@
 WRITE_CSR_INT_FLAG_AND_COL(bank->csr_addr, bank->bank_number, 0);
tasklet_hi_schedule(&bank->resp_handler);
-Returns IRQ.Handled;
+handled = true;
 }

-Returns IRQ.NONE;
+return handled ? IRQ.Handled : IRQ_NONE;
 }

static int adf_request_msi_irq(struct adf_accel_dev *accel_dev)
@@ -304,17 +305,26 @@
goto err_out;

if (adf_setup_pf2vf_bh(accel_dev))
-goto err_out;
+goto err_disable_msi;

if (adf_setup_bh(accel_dev))
-goto err_out;
+goto err_cleanup_pf2vf_bh;

if (adf_request_msi_irq(accel_dev))
-goto err_out;
+goto err_cleanup_bh;

return 0;
+
+err_cleanup_bh;
+adf_cleanup_bh(accel_dev);
+
+err_cleanup_pf2vf_bh;
+adf_cleanup_pf2vf_bh(accel_dev);
+err_disable_msi:
+adf_disable_msi(accel_dev);
+
err_out:
-adf_vf_isr_resource_free(accel_dev);
return -EFAULT;
}

EXPORT_SYMBOL_GPL(adf_vf_isr_resource_alloc);
--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/qat_algs.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/qat_algs.c
@@ -825,6 +825,11 @@
 struct icp_qat_fw_la_bulk_req *msg;
 int digst_size = crypto_aead_authsize(aead_tfm);
 int ret, ctr = 0;
+u32 cipher_len;
+
+cipher_len = areq->cryptlen - digst_size;
+if (cipher_len % AES_BLOCK_SIZE != 0)
+return -EINVAL;
+ret = qat_alg_sgl_to_bufl(ctx->inst, areq->src, areq->dst, qat_req);
if (unlikely(ret))
@@ -839,7 +844,7 @@
 qat_req->req.comn_mid.src_data_addr = qat_req->buf.blp;
 qat_req->req.comn_mid.dest_data_addr = qat_req->buf.bloutp;
 cipher_param = (void *)&qat_req->req.serv_specif_rqpars;
-cipher_param->cipher_length = areq->cryptlen - digst_size;
+cipher_param->cipher_length = cipher_len;
 cipher_param->cipher_offset = areq->assoclen;
 memcpy(cipher_param->u.cipher_IV_array, areq->iv, AES_BLOCK_SIZE);
 auth_param = (void *)((uint8_t *)cipher_param + sizeof(*cipher_param));
@@ -868,6 +873,9 @@
 uint8_t *iv = areq->iv;
 ret = qat_alg_sgl_to_bufl(ctx->inst, areq->src, areq->dst, qat_req);
if (unlikely(ret))
+return -EINVAL;
+if (areq->cryptlen % AES_BLOCK_SIZE != 0)
+return -EINVAL;
+ret = qat_alg_sgl_to_bufl(ctx->inst, areq->src, areq->dst, qat_req);
if (unlikely(ret))
return ret;
--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/qat_hal.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/qat_hal.c
@@ -1255,7 +1255,11 @@
 pr_err("QAT: bad xfrAddr=0x%x\n", xfr_addr);
 return -EINVAL;
 }
-qat_hal_rd_rel_reg(handle, ae, ICP_GPB_REL, gprnum, &gprval);
+status = qat_hal_rd_rel_reg(handle, ae, ICP_GPB_REL, gprnum, &gprval);
+if (status) {
+pr_err("QAT: failed to read register");
+return status;
+}
+}
gpr_addr = qat_hal_get_reg_addr(ICP_GPB_REL, gprnum);
data16low = 0xffff & data;
data16hi = 0xffff & (data >> 0x10);
--- linux-4.15.0.orig/drivers/crypto/qat/qat_common/qat_uclo.c
+++ linux-4.15.0/drivers/crypto/qat/qat_common/qat_uclo.c
@@ -332,13 +332,18 @@
} return 0;
out_err:
+/* Do not free the list head unless we allocated it. */
+tail_old = tail_old->next;
+if (flag) {
+kfree(*init_tab_base);
+*init_tab_base = NULL;
+}
+ while (tail_old) {
+mem_init = tail_old->next;
+kfree(tail_old);
+tail_old = mem_init;
+}
-if (flag)
-kfree(*init_tab_base);
return -ENOMEM;
}
@@ -380,7 +385,6 @@
return 0;
}

#define ICP_DH895XCC_PESRAM_BAR_SIZE 0x80000
static int qat_uclo_init_ae_memory(struct icp_qat_fw_loader_handle *handle,
    struct icp_qat_uof_initmem *init_mem)
{
    --- linux-4.15.0.orig/drivers/crypto/qat/qat_dh895xcc/ADF_drv.c
+++ linux-4.15.0/drivers/crypto/qat/qat_dh895xcc/ADF_drv.c
@@ -123,7 +123,8 @@
    struct adf_hw_device_data *hw_data;
    char name[ADF_DEVICE_NAME_LENGTH];
    unsigned int i, bar_nr;
-int ret, bar_mask;
+unsigned long bar_mask;
+int ret;

switch (ent->device) {
  case ADF_DH895XCC_PCI_DEVICE_ID:
    /* Find and map all the device's BARS */
    i = 0;
    bar_mask = pci_select_bars(pdev, IORESOURCE_MEM);
    for_each_set_bit(bar_nr, (const unsigned long *)&bar_mask,
        -ADF_PCI_MAX_BARS * 2) {
        +for_each_set_bit(bar_nr, &bar_mask, ADF_PCI_MAX_BARS * 2) {
            struct adf_bar *bar = &accel_pci_dev->pci_bars[i++];

            bar->base_addr = pci_resource_start(pdev, bar_nr);

            hw_data->enable_error_correction = adf_vf_void_noop;
            hw_data->init_admin_comms = adf_vf_int_noop;
            hw_data->exit_admin_comms = adf_vf_void_noop;
            hw_data->send_admin_init = adf_vf2pf_notify_init;
            hw_data->init_arb = adf_vf_int_noop;
            hw_data->exit_arb = adf_vf_void_noop;
            hw_data->disable_iov = adf_vf2pf_notify_shutdown;
            hw_data->get_accel_mask = get_accel_mask;
            hw_data->get_ae_mask = get_ae_mask;
            hw_data->get_num_accels = get_num_accels;

          -- linux-4.15.0.orig/drivers/crypto/qat/qat_dh895xccvf/adf_dh895xccvf_hw_data.c
          +++ linux-4.15.0/drivers/crypto/qat/qat_dh895xccvf/adf_dh895xccvf_hw_data.c
            @@ -123,10 +123,10 @@
            hw_data->enable_error_correction = adf_vf_void_noop;
            hw_data->init_admin_comms = adf_vf_int_noop;
            hw_data->exit_admin_comms = adf_vf_void_noop;
            hw_data->send_admin_init = adf_vf2pf_init;
            hw_data->init_arb = adf_vf_int_noop;
            hw_data->exit_arb = adf_vf_void_noop;
            hw_data->disable_iov = adf_vf2pf_shutdown;
            hw_data->get_accel_mask = get_accel_mask;
            hw_data->get_ae_mask = get_ae_mask;
            hw_data->get_num_accels = get_num_accels;

          -- linux-4.15.0.orig/drivers/crypto/qat/qat_dh895xccvf/adf_drv.c
          +++ linux-4.15.0/drivers/crypto/qat/qat_dh895xccvf/adf_drv.c
            @@ -125,7 +125,8 @@
            struct adf_hw_device_data *hw_data;
            char name[ADF_DEVICE_NAME_LENGTH];
            unsigned int i, bar_nr;
            -int ret, bar_mask;
            +unsigned long bar_mask;
            +int ret;

            switch (ent->device) {
              case ADF_DH895XCCIOV_PCI_DEVICE_ID:
                /* Find and map all the device's BARS */
                i = 0;
                bar_mask = pci_select_bars(pdev, IORESOURCE_MEM);
                for_each_set_bit(bar_nr, (const unsigned long *)&bar_mask,
                    -ADF_PCI_MAX_BARS * 2) {
                    +for_each_set_bit(bar_nr, &bar_mask, ADF_PCI_MAX_BARS * 2) {
                        struct adf_bar *bar = &accel_pci_dev->pci_bars[i++];

                        bar->base_addr = pci_resource_start(pdev, bar_nr);

                        hw_data->enable_error_correction = adf_vf_void_noop;
                        hw_data->init_admin_comms = adf_vf_int_noop;
                        hw_data->exit_admin_comms = adf_vf_void_noop;
                        hw_data->send_admin_init = adf_vf2pf_notify_init;
                        hw_data->init_arb = adf_vf_int_noop;
                        hw_data->exit_arb = adf_vf_void_noop;
                        hw_data->disable_iov = adf_vf2pf_notify_shutdown;
                        hw_data->get_accel_mask = get_accel_mask;
                        hw_data->get_ae_mask = get_ae_mask;
                        hw_data->get_num_accels = get_num_accels;

bar->base_addr = pci_resource_start(pdev, bar_nr);
@@ -238,12 +238,12 @@
    if (ret)
        goto out_err_free_reg;

-    set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
-    ret = adf_dev_init(accel_dev);
    if (ret)
        goto out_err_dev_shutdown;

+    set_bit(ADF_STATUS_PF_RUNNING, &accel_dev->status);
+    ret = adf_dev_init(accel_dev);
    if (ret)
        goto out_err_dev_stop;

    --- linux-4.15.0.orig/drivers/crypto/rockchip/rk3288_crypto.c
    +++ linux-4.15.0/drivers/crypto/rockchip/rk3288_crypto.c
    @@ -119,7 +119,7 @@
    count = (dev->left_bytes > PAGE_SIZE) ? PAGE_SIZE : dev->left_bytes;

    --- linux-4.15.0.orig/drivers/crypto/rockchip/rk3288_crypto.h
    +++ linux-4.15.0/drivers/crypto/rockchip/rk3288_crypto.h
    @@ -244,6 +245,7 @@
    void*addr_vir;
    intaligned;
    intalign_size;
    int size_tnents;
    +size_tsrc_nents;
    +size_tdst_nents;
    unsigned inttotal;
    unsigned intcount;
    dma_addr_taddr_in;
    @@ -244,6 +245,7 @@
    struct rk_crypto_info*dev;
    unsigned intkeylen;
    u8iv[AES_BLOCK_SIZE];

    enum alg_type {
static int rk_set_data_start(struct rk_crypto_info *dev)
{
    int err;
    +struct ablkcipher_request *req =
        ablkcipher_request_cast(dev->async_req);
    +struct crypto_ablkcipher *tfm = crypto_ablkcipher_reqtfm(req);
    +struct rk_cipher_ctx *ctx = crypto_ablkcipher_ctx(tfm);
    +u32 ivsize = crypto_ablkcipher_ivsize(tfm);
    +u8 *src_last_blk = page_address(sg_page(dev->sg_src)) +
        dev->sg_src->offset + dev->sg_src->length - ivsize;
    +
    /* Store the iv that need to be updated in chain mode.
     * And update the IV buffer to contain the next IV for decryption mode.
     */
    +*/
    +if (ctx->mode & RK_CRYPTO_DEC) {
        +memcpy(ctx->iv, src_last_blk, ivsize);
        +sg_pcopy_to_buffer(dev->first, dev->src_nents, req->info,
            +ivsize, dev->total - ivsize);
        +}

    err = dev->load_data(dev, dev->sg_src, dev->sg_dst);
    if (!err)
        @ @ -260,8 +276,9 @@
        dev->total = req->nbytes;
        dev->sg_src = req->src;
        dev->first = req->src;
        -dev->nents = sg_nents(req->src);
        +dev->src_nents = sg_nents(req->src);
        dev->sg_dst = req->dst;
        +dev->dst_nents = sg_nents(req->dst);
        dev->aligned = 1;

        spin_lock_irqsave(&dev->lock, flags);
        @ @ -276,13 +293,41 @@
        struct ablkcipher_request *req =
            ablkcipher_request_cast(dev->async_req);
        struct crypto_ablkcipher *tfm = crypto_ablkcipher_reqtfm(req);
        +struct rk_cipher_ctx *ctx = crypto_ablkcipher_ctx(tfm);
        u32 ivsize = crypto_ablkcipher_ivsize(tfm);

        /* Update the IV buffer to contain the next IV for encryption mode. */
        +if (!ctx->mode & RK_CRYPTO_DEC) {
            +if (dev->aligned) {
                +memcpy(req->info, sg_virt(dev->sg_dst) +
                    dev->sg_dst->length - ivsize, ivsize);
            +}

            +*/
        +if (!ctx->mode & RK_CRYPTO_DEC) {
            +if (dev->aligned) {
                +memcpy(req->info, sg_virt(dev->sg_dst) +
                    dev->sg_dst->length - ivsize, ivsize);
            +}
+} else {
+memcpy(req->info, dev->addr_vir +
+dev->count - ivsize, ivsize);
+
+}
+
+static void rk_update_iv(struct rk_crypto_info *dev)
+
+{
+struct ablkcipher_request *req =
+ablkcipher_request_cast(dev->async_req);
+struct crypto_ablkcipher *tfm = crypto_ablkcipher_reqtfm(req);
+struct rk_cipher_ctx *ctx = crypto_ablkcipher_ctx(tfm);
+u32 ivsize = crypto_ablkcipher_ivsize(tfm);
+u8 *new_iv = NULL;
+
+if (ctx->mode & RK_CRYPTO_DEC) {
+new_iv = ctx->iv;
+} else {
+new_iv = page_address(sg_page(dev->sg_dst)) +
+dev->sg_dst->offset + dev->sg_dst->length - ivsize;
+}
+
+if (ivsize == DES_BLOCK_SIZE)
+memcpy_fromio(req->info, dev->reg + RK_CRYPTO_TDES_IV_0,
+ivsize);
+memcpy_toio(dev->reg + RK_CRYPTO_TDES_IV_0, new_iv, ivsize);
+else if (ivsize == AES_BLOCK_SIZE)
+memcpy_fromio(req->info, dev->reg + RK_CRYPTO_AES_IV_0, ivsize);
+memcpy_toio(dev->reg + RK_CRYPTO_AES_IV_0, new_iv, ivsize);
+}

/* return:
@@ -297,7 +342,7 @@
+dev->unload_data(dev);
+if (!dev->aligned) {
+if (!sg_pcopy_from_buffer(req->dst, dev->nents,
+dev->addr_vir, dev->count,
+dev->total - dev->left_bytes -
+dev->count)) {
+@@ -306,6 +351,7 @@
+
+if (dev->aligned) {
+rk_update_iv(dev);
+if (dev->aligned) {

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if (sg_is_last(dev->sg_src)) {
    dev_err(dev->dev, "[%s:%d] Lack of data\n",
--- linux-4.15.0.orig/drivers/crypto/rockchip/rk3288_crypto_ahash.c
+++ linux-4.15.0/drivers/crypto/rockchip/rk3288_crypto_ahash.c
@@ -206,7 +206,7 @@
    dev->sg_dst = NULL;
    dev->sg_src = req->src;
    dev->first = req->src;
-dev->nents = sg_nents(req->src);
+dev->src_nents = sg_nents(req->src);
    rctx = ahash_request_ctx(req);
    rctx->mode = 0;

--- linux-4.15.0.orig/drivers/crypto/s5p-sss.c
+++ linux-4.15.0/drivers/crypto/s5p-sss.c
@@ -477,9 +477,9 @@
 } /* Calls the completion. Cannot be called with dev->lock hold. */
 static void s5p_aes_complete(struct s5p_aes_dev *dev, int err)
 static void s5p_aes_complete(struct ablkcipher_request *req, int err)
{ -dev->req->base.complete(&dev->req->base, err);
+req->base.complete(&req->base, err);
 } static void s5p_unset_outdata(struct s5p_aes_dev *dev)
@@ -493,7 +493,7 @@
 static int s5p_make_sg_cpy(struct s5p_aes_dev *dev, struct scatterlist *src,
-dev->t	struct scatterlist **dst)
+struct scatterlist **dst)
{ void *pages;
    int len;
-@ @ -657,6 +657,7 @@
+struct platform_device *pdev = dev_id;
    struct s5p_aes_dev *dev = platform_get_drvdata(pdev);
+struct ablkcipher_request *req;
    int err_dma_tx = 0;
    int err_dma_rx = 0;
    int err_dma_hx = 0;
@@ -729,7 +730,7 @@
     spin_unlock_irqrestore(&dev->lock, flags);
- s5p_aes_complete(dev, 0);
+ s5p_aes_complete(dev->req, 0);
/* Device is still busy */
tasklet_schedule(&dev->tasklet);
} else {
@@ -754,11 +755,12 @@
error:
s5p_sg_done(dev);
dev->busy = false;
+req = dev->req;
if (err_dma_hx == 1)
s5p_set_dma_hashdata(dev, dev->hash_sg_iter);
spin_unlock_irqrestore(&dev->lock, flags);
- s5p_aes_complete(dev, err);
+ s5p_aes_complete(req, err);

hash_irq_end:
/*
@@ -1894,7 +1896,7 @@
}

static int s5p_set_outdata_start(struct s5p_aes_dev *dev,
- struct ablkcipher_request *req)
+ struct ablkcipher_request *req)
{
 struct scatterlist *sg;
 int err;
@@ -1926,15 +1928,21 @@
 uint32_t aes_control;
 unsigned long flags;
 int err;
+ u8 *iv;

 aes_control = SSS_AES_KEY_CHANGE_MODE;
if (mode & FLAGS_AES_DECRYPT)
aes_control |= SSS_AES_MODE_DECRYPT;

-if ((mode & FLAGS_AES.MODE_MASK) == FLAGS_AES_CBC)
+if ((mode & FLAGS_AES_MODE_MASK) == FLAGS_AES_CBC) {
 aes_control |= SSS_AES_MODE_CBC;
-else if ((mode & FLAGS_AES.MODE_MASK) == FLAGS_AES_CTR)
+iv = req->info;
+} else if ((mode & FLAGS_AES_MODE_MASK) == FLAGS_AES_CTR) {
 aes_control |= SSS_AES_CHAIN_MODE_CTR;
+iv = req->info;
+} else {
+iv = NULL; /* AES_ECB */
if (dev->ctx->keylen == AES_KEYSIZE_192)
aes_control |= SSS_AES_KEY_SIZE_192;
@@ -1965,7 +1973,7 @@
goto outdata_error;

SSS_AES_WRITE(dev, AES_CONTROL, aes_control);
-5p_set_aes(dev, dev->ctx->aes_key, req->info, dev->ctx->keylen);
+s5p_set_aes(dev, dev->ctx->aes_key, iv, dev->ctx->keylen);

s5p_set_dma_indata(dev, dev->sg_src);
s5p_set_dma_outdata(dev, dev->sg_dst);
@@ -1984,7 +1992,7 @@
s5p_sg_done(dev);
dev->busy = false;
spin_unlock_irqrestore(&dev->lock, flags);
-5p_aes_complete(dev, err);
+s5p_aes_complete(req, err);
}

static void s5p_tasklet_cb(unsigned long data)
--- linux-4.15.0.orig/drivers/crypto/sahara.c
+++ linux-4.15.0/drivers/crypto/sahara.c
@@ -1351,7 +1351,7 @@
for (j = 0; j < k; j++)
-5crypto_unregister_ahash(&sha_v4_algs[j]);
+s5crypto_unregister_ahash(&sha_v3_algs[j]);

err_sha_v3_algs:
for (j = 0; j < k; j++)
crypto_unregister_ahash(&sha_v4_algs[j]);
+crypto_unregister_ahash(&sha_v3_algs[j]);

err_aes_algs:
for (j = 0; j < i; j++)
@@ -1367,7 +1367,7 @@
for (i = 0; i < ARRAY_SIZE(aes_algs); i++)
crypto_unregister_alg(&aes_algs[i]);

-5for (i = 0; i < ARRAY_SIZE(sha_v4_algs); i++)
+s5for (i = 0; i < ARRAY_SIZE(sha_v3_algs); i++)
crypto_unregister_ahash(&sha_v3_algs[i]);

if (dev->version > SAHARA_VERSION_3)
--- linux-4.15.0.orig/drivers/crypto/stm32/stm32-hash.c
+++ linux-4.15.0/drivers/crypto/stm32/stm32-hash.c
@@ -361,7 +361,7 @@
return -ETIMEDOUT;

if ((hdev->flags & HASH_FLAGS_HMAC) &&
- (hdev->flags & ~HASH_FLAGS_HMAC_KEY)) {
+ (!(hdev->flags & HASH_FLAGS_HMAC_KEY))) {
    hdev->flags |= HASH_FLAGS_HMAC_KEY;
    stm32_hash_write_key(hdev);
    if (stm32_hash_wait_busy(hdev))
--- linux-4.15.0.orig/drivers/crypto/stm32/stm32_crc32.c
+++ linux-4.15.0/drivers/crypto/stm32/stm32_crc32.c
@@ -25,8 +25,10 @@
    /* Registers values */
#define CRC_CR_RESET            BIT(0)
-#define CRC_CR_REVERSE          (BIT(7) | BIT(6) | BIT(5))
-#define CRC_INIT_DEFAULT        0xFFFFFFFF
+#define CRC_CR_REV_IN_WORD      (BIT(6) | BIT(5))
+#define CRC_CR_REV_IN_BYTE      BIT(5)
+#define CRC_CR_REV_OUT          BIT(7)
+#define CRC32C_INIT_DEFAULT     0xFFFFFFFF

/* Polynomial reversed */
#define POLY_CRC32              0xEDB88320
@@ -37,8 +39,6 @@
struct device    *dev;
void __iomem     *regs;
struct clk       *clk;
-u8               pending_data[sizeof(u32)];
-size_t           nb_pending_bytes;
};

struct stm32_crc_list {
@@ -58,14 +58,13 @@
    /* crc32c: partial in first 4 bytes of that struct */
    struct stm32_crc *crc;
};

static int stm32_crc32_cra_init(struct crypto_tfm *tfm)
{ 
    struct stm32_crc_ctx *mctx = crypto_tfm_ctx(tfm);
    -mctx->key = CRC_INIT_DEFAULT;
    +mctx->key = 0;
    mctx->poly = POLY_CRC32;
    return 0;
    }
@@ -74,7 +73,7 @@
    }
    struct stm32_crc_ctx *mctx = crypto_tfm_ctx(tfm);
- mctx->key = CRC_INIT_DEFAULT;
+ mctx->key = CRC32C_INIT_DEFAULT;
 mctx->poly = POLY_CRC32C;
 return 0;
 }
 @ @ -93,27 +92,37 @@
 return 0;
 }

+ static struct stm32_crc *stm32_crc_get_next_crc(void)
+ {
+ struct stm32_crc *crc;
+ +spin_lock_bh(&crc_list.lock);
+ crc = list_first_entry(&crc_list.dev_list, struct stm32_crc, list);
+ if (crc)
+ list_move_tail(&crc->list, &crc_list.dev_list);
+ spin_unlock_bh(&crc_list.lock);
 +
+ return crc;
+ }
+
 static int stm32_crc_init(struct shash_desc *desc)
 { 
 struct stm32_crc_desc_ctx *ctx = shash_desc_ctx(desc);
 struct stm32_crc_ctx *mctx = crypto_shash_ctx(desc->tfm);
 struct stm32_crc *crc;

 -spin_lock_bh(&crc_list.lock);
 -list_for_each_entry(crc, &crc_list.dev_list, list) {
-ctx->crc = crc;
- break;
- }
- spin_unlock_bh(&crc_list.lock);
+ crc = stm32_crc_get_next_crc();
+ if (!crc)
+ return -ENODEV;

 /* Reset, set key, poly and configure in bit reverse mode */
 -writel_relaxed(bitrev32(mctx->key), ctx->crc->regs + CRC_INIT);
 -writel_relaxed(bitrev32(mctx->poly), ctx->crc->regs + CRC_POL);
 -writel_relaxed(CRC_CR_RESET | CRC_CR_REVERSE, ctx->crc->regs + CRC_CR);
+ writel_relaxed(bitrev32(mctx->key), crc->regs + CRC_INIT);
+ writel_relaxed(bitrev32(mctx->poly), crc->regs + CRC_POL);
+ writel_relaxed(CRC_CR_RESET | CRC_CR_REV_IN_WORD | CRC_CR_REV_OUT,
+     crc->regs + CRC_CR);
/* Store partial result */
-ctx->partial = readl_relaxed(ctx->crc->regs + CRC_DR);
-ctx->crc->nb_pending_bytes = 0;
+ctx->partial = readl_relaxed(crc->regs + CRC_DR);

return 0;
}

unsigned int length)
    unsigned int i;

    -if (unlikely(crc->nb_pending_bytes)) {
        -while (crc->nb_pending_bytes != sizeof(u32) && length) {
            /* Fill in pending data */
            -crc->pending_data[crc->nb_pending_bytes++] = *(d8++);
            -length--;
            -}
    }

    +struct stm32_crc_ctx *mctx = crypto_shash_ctx(desc->tfm);
    +struct stm32_crc *crc;
    +
    +crc = stm32_crc_get_next_crc();
    +
    +#if (!crc)
    +return -ENODEV;
    +
    -if (crc->nb_pending_bytes == sizeof(u32)) {
        /* Process completed pending data */
        -writel_relaxed(*(u32 *)crc->pending_data,
            -crc->regs + CRC_DR);
        -crc->nb_pending_bytes = 0;
        +#/*
        + * Restore previously calculated CRC for this context as init value
        + * Restore polynomial configuration
        + * Configure in register for word input data,
        + * Configure out register in reversed bit mode data.
        + */
        +writel_relaxed(bitrev32(ctx->partial), crc->regs + CRC_INIT);
        +writel_relaxed(bitrev32(mctx->poly), crc->regs + CRC_POL);
        +writel_relaxed(CRC_CR_RESET | CRC_CR_REV_IN_WORD | CRC_CR_REV_OUT,
            +crc->regs + CRC_CR);
        +
        +if (d8 != PTR_ALIGN(d8, sizeof(u32))) {
            +#/* Configure for byte data */
            +writel_relaxed(CRC_CR_REV_IN_BYTE | CRC_CR_REV_OUT,
                +crc->regs + CRC_CR);
while (d8 != PTR_ALIGN(d8, sizeof(u32)) && length) {
    writeb_relaxed(*d8++, crc->regs + CRC_DR);
    length--;
}

// Configure for word data */
writel_relaxed(CRC_CR_REV_IN_WORD | CRC_CR_REV_OUT, crc->regs + CRC_CR);

-d32 = (u32 *)d8;
for (i = 0; i < length >> 2; i++)
    /* Process 32 bits data */
    -writel_relaxed(*(d32++), crc->regs + CRC_DR);
+for (; length >= sizeof(u32); d8 += sizeof(u32), length -= sizeof(u32))
+writel_relaxed(*((u32 *)d8), crc->regs + CRC_DR);

/* Store partial result */
-ctx->partial = readl_relaxed(crc->regs + CRC_DR);
-
/* Check for pending data (non 32 bits) */
-length &⇐ 3;
-if (likely(!length))
    return 0;
-
-if (((crc->nb_pending_bytes + length) >= sizeof(u32)) {
    /* Shall not happen */
    -dev_err(crc->dev, "Pending data overflow\n");
    -return -EINVAL;
+if (length) {
    /* Configure for byte data */
    +writel_relaxed(CRC_CR_REV_IN_BYTE | CRC_CR_REV_OUT, crc->regs + CRC_CR);
    +while (length--)
        +writeb_relaxed(*d8++, crc->regs + CRC_DR);
}

-d8 = (const u8 *)d32;
-for (i = 0; i < length; i++)
    /* Store pending data */
    -crc->pending_data[crc->nb_pending_bytes++] = *(d8++);
+/* Store partial result */
+ctx->partial = readl_relaxed(crc->regs + CRC_DR);

return 0;
}
@@ -193,6 +204,8 @@
return stm32_crc_init(desc) ?: stm32_crc_finup(desc, data, length, out);
+static unsigned int refcnt;
+static DEFINE_MUTEX(refcnt_lock);
static struct shash_alg algs[] = {
    /* CRC-32 */
    {
        .cra_name = "crc32",
        .cra_driver_name = DRIVER_NAME,
        .cra_priority = 200,
        .cra_flags = CRYPTO_ALG_OPTIONAL_KEY,
        .cra_blocksize = CHKSUM_BLOCK_SIZE,
        .cra_alignmask = 3,
        .cra_ctxsize = sizeof(struct stm32_crc_ctx),
        .cra_name = "crc32c",
        .cra_driver_name = DRIVER_NAME,
        .cra_priority = 200,
        .cra_flags = CRYPTO_ALG_OPTIONAL_KEY,
        .cra_blocksize = CHKSUM_BLOCK_SIZE,
        .cra_alignmask = 3,
        .cra_ctxsize = sizeof(struct stm32_crc_ctx),
    }
};

list_add(&crc->list, &crc_list.dev_list);
spin_unlock(&crc_list.lock);

-ret = crypto_register_shashes(algs, ARRAY_SIZE(algs));
-if (ret) {
-dev_err(dev, "Failed to register\n");
-clk_disable_unprepare(crc->clk);
-return ret;
+mutex_lock(&refcnt_lock);
+if (!refcnt) {
+ret = crypto_register_shashes(algs, ARRAY_SIZE(algs));
+if (ret) {
+mutex_unlock(&refcnt_lock);
+dev_err(dev, "Failed to register\n");
+clk_disable_unprepare(crc->clk);
+return ret;
+}

-dev_info(dev, "Initialized\n");

-list_del(&crc->list);
spin_unlock(&crc_list.lock);

-crypto_unregister_hashes(algs, ARRAY_SIZE(algs));
+mutex_lock(&refcnt_lock);  
+if (!--refcnt)  
+crypto_unregister_hashes(algs, ARRAY_SIZE(algs));
+mutex_unlock(&refcnt_lock);

clk_disable_unprepare(crc->clk);

--- linux-4.15.0.orig/drivers/crypto/sunxi-ss/sun4i-ss-cipher.c
+++ linux-4.15.0/drivers/crypto/sunxi-ss/sun4i-ss-cipher.c
@@ -34,6 +34,8 @@
unsigned int ileft = areq->cryptlen;
unsigned int oleft = areq->cryptlen;
unsigned int todo;
+unsigned long pi = 0, po = 0; /* progress for in and out */
+bool miter_err;
struct sg_mapping_iter mi, mo;
unsigned int oi, oo; /* offset for in and out */
unsigned long flags;
@@ -53,59 +55,74 @@
spin_lock_irqsave(&ss->slock, flags);

- for (i = 0; i < op->keylen; i += 4)
- writel(*(op->key + i / 4), ss->base + SS_KEY0 + i);
+ for (i = 0; i < op->keylen / 4; i++)
+ writesl(ss->base + SS_KEY0 + i * 4, &op->key[i], 1);

if (areq->iv) {
 for (i = 0; i < 4 && i < ivsize / 4; i++) {
 v = *(u32 *)(areq->iv + i * 4);
- writel(v, ss->base + SS_IV0 + i * 4);
+ writels(ss->base + SS_IV0 + i * 4, &v, 1);
 }
 }

writel(mode, ss->base + SS_CTL);

-sg_miter_start(&mi, areq->src, sg_nents(areq->src),
- SG_MITER_FROM_SG | SG_MITER_ATOMIC);
-sg_miter_start(&mo, areq->dst, sg_nents(areq->dst),
- SG_MITER_TO_SG | SG_MITER_ATOMIC);
-sg_miter_next(&mi);
-sg_miter_next(&mo);
-if (!mi.addr || !mo.addr) {
- dev_err_ratelimited(ss->dev, "ERROR: sg_miter return null");
- err = -EINVAL;

-goto release_ss;
-
ileft = areq->cryptlen / 4;
oleft = areq->cryptlen / 4;
oi = 0;
oo = 0;
do {
  todo = min3(rx_cnt, ileft, (mi.length - oi) / 4);
  if (todo) {
    ileft -= todo;
    writesl(ss->base + SS_RXFIFO, mi.addr + oi, todo);
    oi += todo * 4;
  }
  if (oi == mi.length) {
    sg_miter_next(&mi);
    oi = 0;
    if (ileft) {
      sg_miter_start(&mi, areq->src, sg_nents(areq->src),
      SG_MITER_FROM_SG | SG_MITER_ATOMIC);
      if (pi)
        sg_miter_skip(&mi, pi);
      miter_err = sg_miter_next(&mi);
      if (!miter_err || !mi.addr) {
        dev_err_rate_limited(ss->dev, "ERROR: sg_miter return null\n");
        err = -EINVAL;
        goto release_ss;
      }
      todo = min(rx_cnt, ileft);
      todo = min_t(size_t, todo, (mi.length - oi) / 4);
      if (todo) {
        ileft -= todo;
        writesl(ss->base + SS_RXFIFO, mi.addr + oi, todo);
        oi += todo * 4;
      }
      if (oi == mi.length) {
        pi += mi.length;
        oi = 0;
        if (ileft) {
          sg_miter_stop(&mi);
        }
      }
    }
  }
}
spaces = readl(ss->base + SS_FCSR);
rx_cnt = SS_RXFIFO_SPACES(spaces);
rx_cnt = SS_TXFIFO_SPACES(spaces);
-todo = min3(tx_cnt, oleft, (mo.length - oo) / 4);
+sg_miter_start(&mo, areq->dst, sg_nents(areq->dst),
+ SG_MITER_TO_SG | SG_MITER_ATOMIC);
+if (po)
+sg_miter_skip(&mo, po);
+miter_err = sg_miter_next(&mo);
+if (!miter_err || !mo.addr) {
+dev_err_rate_limited(ss->dev, "ERROR: sg_miter return null\n\n");
+err = -EINVAL;
+goto release_ss;
+}
+todo = min(tx_cnt, oleft);
+todo = min_t(size_t, todo, (mo.length - oo) / 4);
+if (todo) {
+oleft -= todo;
+readsl(ss->base + SS_TXFIFO, mo.addr + oo, todo);
+oo += todo * 4;
+
+}
+if (oo == mo.length) {
+sg_miter_next(&mo);
+oo = 0;
+po += mo.length;
+}
+sg_miter_stop(&mo);
} while (oleft);

if (areq->iv) {
@@ -116,8 +133,6 @@
}

release_ss:
-sg_miter_stop(&mi);
-sg_miter_stop(&mo);
+writel(0, ss->base + SS_CTL);
+spin_unlock_irqstore(&ss->slock, flags);
+return err;
@@ -146,6 +161,8 @@
unsigned int oleft = areq->cryptlen;
unsigned int todo;
struct sg_mapping_iter mi, mo;
+unsigned long pi = 0, po = 0; /* progress for in and out */
+bool miter_err;

unsigned int oi, oo;/* offset for in and out */
char buf[4 * SS_RX_MAX]; /* buffer for linearize SG src */
char bufo[4 * SS_TX_MAX]; /* buffer for linearize SG dst */
@@ -172,12 +189,12 @@
/* we can use the SS optimized function */
while (in_sg && no_chunk == 1) {
-if (in_sg->length % 4)
+if ((in_sg->length | in_sg->offset) & 3u)
    no_chunk = 0;
in_sg = sg_next(in_sg);
}
while (out_sg &amp;&amp; no_chunk == 1) {
    -if (out_sg-&gt;length % 4)
    +if ((out_sg-&gt;length | out_sg-&gt;offset) & 3u)
        no_chunk = 0;
out_sg = sg_next(out_sg);
}
@@ -187,28 +204,17 @@
spin_lock_irqsave(&amp;ss-&gt;slock, flags);
      -for (i = 0; i &lt; op-&gt;keylen; i += 4)
      +for (i = 0; i &lt; op-&gt;keylen / 4; i++)
    +writels(ss-&gt;base + SS_KEY0 + i * 4, &amp;op-&gt;key[i], 1);

    if (areq-&gt;iv) {
        +writesl(ss-&gt;base + SS_IV0 + i * 4, &amp;v, 1);
    }
    writel(mode, ss-&gt;base + SS_CTL);
    -sg_miter_start(&amp;mi, areq-&gt;src, sg_nents(areq-&gt;src),
    -   SG_MITER_FROM_SG | SG_MITER_ATOMIC);
    -sg_miter_start(&amp;mo, areq-&gt;dst, sg_nents(areq-&gt;dst),
    -   SG_MITER_TO_SG | SG_MITER_ATOMIC);
    -sg_miter_next(&amp;mi);
    -sg_miter_next(&amp;mo);
    -if (!mi.addr || !mo.addr) {
        -dev_err_ratelimited(ss-&gt;dev, "ERROR: sg_miter return null\n");
        -err = -EINVAL;
        -goto release_ss;
    } else {
        ileft = areq-&gt;cryptlen;
        oleft = areq-&gt;cryptlen;
        oi = 0;
    }
    @@ -216,11 +222,22 @@

    while (oleft) {
        +writesl(ss-&gt;base + SS_IV0 + i * 4, &amp;v, 1);
        +sg_miter_start(&amp;mi, areq-&gt;src, sg_nents(areq-&gt;src),
        +   SG_MITER_FROM_SG | SG_MITER_ATOMIC);
if (pi)
+sg_miter_skip(&mi, pi);
+miter_err = sg_miter_next(&mi);
+if (!miter_err || !mi.addr) {
+dev_err_ratelimited(ss->dev, "ERROR: sg_miter return null\n");
+err = -EINVAL;
+goto release_ss;
+}
/*
 * todo is the number of consecutive 4byte word that we
 * can read from current SG
 */
-todo = min3(rx_cnt, ileft / 4, (mi.length - oi) / 4);
+todo = min(rx_cnt, ileft / 4);
+todo = min_t(size_t, todo, (mi.length - oi) / 4);
if (todo && !ob) {
writesl(ss->base + SS_RXFIFO, mi.addr + oi,
todo);
@@ -234,8 +251,8 @@
 * we need to be able to write all buf in one
 * pass, so it is why we min() with rx_cnt
 */
-todo = min3(rx_cnt * 4 - ob, ileft,
 - mi.length - oi);
+todo = min(rx_cnt * 4 - ob, ileft);
+todo = min_t(size_t, todo, mi.length - oi);
memcpy(buf + ob, mi.addr + oi, todo);
ileft -= todo;
oi += todo;
@@ -247,29 +264,38 @@
}
}
if (oi == mi.length) {
-sg_miter_next(&mi);
+pi += mi.length;
oi = 0;
}
+sg_miter_stop(&mi);
}

spaces = readl(ss->base + SS_FCSR);
rx_cnt = SS_RXFIFO_SPACES(spaces);
tx_cnt = SS_TXFIFO_SPACES(spaces);
-dev_dbg(ss->dev, "%u %u/%u %u/%u cnt=%u %u/%u %u/%u cnt=%u %u/%u\n",
-mode,
-o, mi.length, ileft, areq->cryptlen, rx_cnt,
-oo, mo.length, oleft, areq->cryptlen, tx_cnt, ob);
if (!tx_cnt)
continue;
+sg_miter_start(&mo, areq->dst, sg_nents(areq->dst),
+      SG_MITER_TO_SG | SG_MITER_ATOMIC);
+if (po)
+sg_miter_skip(&mo, po);
+miter_err = sg_miter_next(&mo);
+if (!miter_err || !mo.addr) {
+dev_err_ratelimited(ss->dev, "ERROR: sg_miter return null\n");
+err = -EINVAL;
+goto release_ss;
+
/* todo in 4bytes word */
-todo = min3(tx_cnt, oleft / 4, (mo.length - oo) / 4);
+todo = min(tx_cnt, oleft / 4);
+todo = min_t(size_t, todo, (mo.length - oo) / 4);
+
if (todo) {
readsl(ss->base + SS_TXFIFO, mo.addr + oo, todo);
oleft -= todo * 4;
oo += todo * 4;
if (oo == mo.length) {
     sg_miter_next(&mo);
     po += mo.length;
     oo = 0;
}
} else {
@@ -287,18 +313,21 @@
 * no more than remaining buffer
 * no need to test against oleft
 */
-todo = min(mo.length - oo, obl - obo);
+todo = min_t(size_t,
+     mo.length - oo, obl - obo);
memcpy(mo.addr + oo, bufo + obo, todo);
oleft -= todo;
obo += todo;
oo += todo;
if (oo == mo.length) {
     po += mo.length;
     sg_miter_next(&mo);
     oo = 0;
}
} while (obo < obl);
/* bufo must be fully used here */
+
+sg_miter_stop(&mo);
}
if (areq->iv) {
    for (i = 0; i < 4 && i < ivsize / 4; i++) {
        @@ -308,8 +337,6 @@
    }
}

release_ss:
-    sg_miter_stop(&mi);
-    sg_miter_stop(&mo);
    writel(0, ss->base + SS_CTL);
    spin_unlock_irqrestore(&ss->slock, flags);

--- linux-4.15.0.orig/drivers/crypto/sunxi-ss/sun4i-ss-core.c
+++ linux-4.15.0/drivers/crypto/sunxi-ss/sun4i-ss-core.c
@@ -451,6 +451,7 @@
module_platform_driver(sun4i_ss_driver);

+MODULE_ALIAS("platform:sun4i-ss");
MODULE_DESCRIPTION("Allwinner Security System cryptographic accelerator");
MODULE_LICENSE("GPL");
MODULE_AUTHOR("Corentin LABBE <clabbe.montjoie@gmail.com>");
--- linux-4.15.0.orig/drivers/crypto/sunxi-ss/sun4i-ss-hash.c
+++ linux-4.15.0/drivers/crypto/sunxi-ss/sun4i-ss-hash.c
@@ -179,7 +179,7 @@
*/
unsigned int i = 0, end, fill, min_fill, nwait, nbw = 0, j = 0, todo;
unsigned int in_i = 0;
-u32 spaces, rx_cnt = SS_RX_DEFAULT, bf[32] = {0}, wb = 0, v, ivmode = 0;
+u32 spaces, rx_cnt = SS_RX_DEFAULT, bf[32] = {0}, v, ivmode = 0;
    struct sun4i_req_ctx *op = ahash_request_ctx(areq);
    struct crypto_ahash *tfm = crypto_ahash_reqtfm(areq);
    struct sun4i_tfm_ctx *tfmctx = crypto_ahash_ctx(tfm);
    int in_r, err = 0;
    size_t copied = 0;
    +__le32 wb = 0;
    dev_dbg(ss->dev, "%s %s bc=%llu len=%u mode=%x wl=%u h0=%0x", 
        __func__, crypto_tfm_alg_name(areq->base.tfm),
        @@ -240,7 +241,10 @@
} else {
    /* Since we have the flag final, we can go up to modulo 4 */
    -end = ((areq->nbytes + op->len) / 4) * 4 - op->len;
    +if (areq->nbytes < 4)
    +end = 0;
    +else
+end = ((areq->nbytes + op->len) / 4) * 4 - op->len;
}

/* TODO if SGlen % 4 and !op->len then DMA */
@@ -273,8 +277,8 @@
 */
 while (op->len < 64 && i < end) {
 /* how many bytes we can read from current SG */
-  in_r = min3(mi.length - in_i, end - i, 
-       64 - op->len);
+  in_r = min(end - i, 64 - op->len);
+  in_r = min_t(size_t, mi.length - in_i, in_r);
 memcpy(op->buf + op->len, mi.addr + in_i, in_r);
 op->len += in_r;
  i += in_r;
@@ -294,8 +298,8 @@
 }
 if (mi.length - in_i > 3 && i < end) {
 /* how many bytes we can read from current SG */
-  in_r = min3(mi.length - in_i, areq->nbytes - i, 
-       ((mi.length - in_i) / 4) * 4);
+  in_r = min(areq->nbytes - i, 64 - op->len);
+  in_r = min_t(size_t, mi.length - in_i, in_r);
 /* how many bytes we can write in the device*/
todo = min3((u32)(end - i) / 4, rx_cnt, (u32)in_r / 4);
 writesl(ss->base + SS_RXFIFO, mi.addr + in_i, todo);
@@ -321,8 +325,8 @@
 if ((areq->nbytes - i) < 64) {
 while (i < areq->nbytes && in_i < mi.length && op->len < 64) {
 /* how many bytes we can read from current SG */
-  in_r = min3(mi.length - in_i, areq->nbytes - i, 
-       64 - op->len);
+  in_r = min(areq->nbytes - i, 64 - op->len);
+  in_r = min_t(size_t, mi.length - in_i, in_r);
 memcpy(op->buf + op->len, mi.addr + in_i, in_r);
  op->len += in_r;
   i += in_r;
@@ -396,7 +400,7 @@
 nbw = op->len - 4 * nwait;
 if (nbw) {
   -wb = *(u32 *)(op->buf + nwait * 4);
+wb = cpu_to_le32(*(u32 *)(op->buf + nwait * 4));
   wb &= GENMASK((nbw * 8) - 1, 0);
   op->byte_count += nbw;
@@ -405,7 +409,7 @@
/* write the remaining bytes of the nbw buffer */
wb |= ((1 << 7) << (nbw * 8));
-bf[j++] = wb;
+bf[j++] = le32_to_cpu(wb);

/*
 * number of space to pad to obtain 64o minus 8(size) minus 4 (final 1)
@@ -424,13 +428,13 @@ */
if (op->mode == SS_OP_SHA1) {
-    __be64 bits = cpu_to_be64(op->byte_count << 3);
-    bf[j++] = lower_32_bits(bits);
-    bf[j++] = upper_32_bits(bits);
+    __be64 *bits = (__be64 *)&bf[j];
+    *bits = cpu_to_be64(op->byte_count << 3);
+    j += 2;
} else {
-    __le64 bits = op->byte_count << 3;
-    bf[j++] = lower_32_bits(bits);
-    bf[j++] = upper_32_bits(bits);
+    __le64 *bits = (__le64 *)&bf[j];
+    *bits = cpu_to_le64(op->byte_count << 3);
+    j += 2;
}
writesl(ss->base + SS_RXFIFO, bf, j);

@@ -472,7 +476,7 @@
} else {
    for (i = 0; i < 4; i++) {
-        v = readl(ss->base + SS_MD0 + i * 4);
+        v = cpu_to_le32(readl(ss->base + SS_MD0 + i * 4));
        memcpy(areq->result + i * 4, &v, 4);
    }
}
--- linux-4.15.0.orig/drivers/crypto/sunxi-ss/sun4i-ss-prng.c
+++ linux-4.15.0/drivers/crypto/sunxi-ss/sun4i-ss-prng.c
@@ -28,7 +28,7 @@
    spin_lock_bh(&ss->slock);
writel(mode, ss->base + SS_CTL);

@@ -51,6 +51,6 @@
writel(0, ss->base + SS_CTL);
-spin_unlock(&ss->slock);
-return dlen;
+spin_unlock_bh(&ss->slock);
+return 0;
}
--- linux-4.15.0.orig/drivers/crypto/talitos.c
+++ linux-4.15.0/drivers/crypto/talitos.c
@@ -316,6 +316,21 @@
}

EXPORT_SYMBOL(talitos_submit);

+static __be32 get_request_hdr(struct talitos_request *request, bool is_sec1)
+{
+struct talitos_edesc *edesc;
+
+if (!is_sec1)
+    return request->desc->hdr;
+
+if (!request->desc->next_desc)
+    return request->desc->hdr1;
+
edesc = container_of(request->desc, struct talitos_edesc, desc);
+
+edesc = container_of(request->desc, struct talitos_edesc, desc);
+
+return ((struct talitos_desc *)(edesc->buf + edesc->dma_len))->hdr1;
+
+}
+
/*
 * process what was done, notify callback of error if not
 */
@@ -337,12 +352,7 @@
 /* descriptors with their done bits set don't get the error */
rmb();
-    if (!is_sec1)
-        hdr = request->desc->hdr;
-    else if (request->desc->next_desc)
-        hdr = (request->desc + 1)->hdr1;
-    else
-        hdr = request->desc->hdr1;
+hdr = get_request_hdr(request, is_sec1);

    if ((hdr & DESC_HDR_DONE) == DESC_HDR_DONE)
        status = 0;
@@ -446,7 +456,7 @@
 /*
locate current (offending) descriptor
*/
static u32 current_desc_hdr(struct device *dev, int ch)
static __be32 current_desc_hdr(struct device *dev, int ch)
{
    struct talitos_private *priv = dev_get_drvdata(dev);
    int tail, iter;
    @@ -464,7 +474,7 @@
    iter = tail;
    while (priv->chan[ch].fifo[iter].dma_desc != cur_desc &&
        priv->chan[ch].fifo[iter].desc->next_desc != cur_desc) {
        iter = (iter + 1) & (priv->fifo_len - 1);
    if (iter == tail) {
        dev_err(dev, "couldn't locate current descriptor\n");
    }
}

    -if (priv->chan[ch].fifo[iter].desc->next_desc == cur_desc)
    -return (priv->chan[ch].fifo[iter].desc + 1)->hdr;
    +if (priv->chan[ch].fifo[iter].desc->next_desc == cpu_to_be32(cur_desc)) {
        edesc = container_of(priv->chan[ch].fifo[iter].desc,
            struct talitos_edesc, desc);
        +return ((struct talitos_desc *)
            (edesc->buf + edesc->dma_len))->hdr;
    +}

    return priv->chan[ch].fifo[iter].desc->hdr;
}@@ -481,13 +497,13 @@
/*
 * user diagnostics; report root cause of error based on execution unit status
 */
static void report_eu_error(struct device *dev, int ch, u32 desc_hdr)
static void report_eu_error(struct device *dev, int ch, __be32 desc_hdr)
{
    struct talitos_private *priv = dev_get_drvdata(dev);
    int i;

    if (!desc_hdr)
        desc_hdr = in_be32(priv->chan[ch].reg + TALITOS_DESCBUF);
    +desc_hdr = cpu_to_be32(in_be32(priv->chan[ch].reg + TALITOS_DESCBUF));

    switch (desc_hdr & DESC_HDR_SEL0_MASK) {
case DESC_HDR_SEL0_AFEU:
@@ -819,7 +835,11 @@
 * HMAC_SNOOP_NO_AFEA (HSNA) instead of type IPSEC_ESP
 */
#define TALITOS_CRA_PRIORITY_AEAD_HSNA(TALITOS_CRA_PRIORITY - 1)
+ifdef CONFIG_CRYPTO_DEV_TALITOS2
#define TALITOS_MAX_KEY_SIZE(AES_MAX_KEY_SIZE + SHA512_BLOCK_SIZE)
+else
+#define TALITOS_MAX_KEY_SIZE(AES_MAX_KEY_SIZE + SHA256_BLOCK_SIZE)
+endif
#define TALITOS_MAX_IV_LENGTH16 /* max of AES_BLOCK_SIZE, DES3_EDE_BLOCK_SIZE */

struct talitos_ctx {
@@ -832,8 +852,6 @@
 unsigned int keylen;
 unsigned int enckeylen;
 unsigned int authkeylen;
-dma_addr_t dma_buf;
-dma_addr_t dma_hw_context;
};

#define HASH_MAX_BLOCK_SIZE SHA512_BLOCK_SIZE
@@ -895,36 +913,6 @@
 return -EINVAL;
 }
-/*
 - * talitos_edesc - s/w-extended descriptor
 - * @src_nents: number of segments in input scatterlist
 - * @dst_nents: number of segments in output scatterlist
 - * @icv_ool: whether ICV is out-of-line
 - * @iv_dma: dma address of iv for checking continuity and link table
 - * @dma_len: length of dma mapped link_tbl space
 - * @dma_link_tbl: bus physical address of link_tbl/buf
 - * @desc: h/w descriptor
 - * @link_tbl: input and output h/w link tables (if {src,dst}_nents > 1) (SEC2)
 - * @buf: input and output buffeur (if {src,dst}_nents > 1) (SEC1)
 - *
 - * if decrypting (with authcheck), or either one of src_nents or dst_nents
 - * is greater than 1, an integrity check value is concatenated to the end
 - * of link_tbl data
 - */
-struct talitos_edesc {
-int src_nents;
-int dst_nents;
-bool icv_ool;
-dma_addr_t iv_dma;
-int dma_len;
static void talitos_sg_unmap(struct device *dev,  
    struct talitos_edesc *edesc,  
    struct scatterlist *src,  
    struct talitos_desc *desc, void *context,
    dma_addr_t dma_link_tbl;

-union {
  -struct talitos_desc desc;
-  -union {
-    -struct talitos_ptr link_tbl[0];
-    -u8 buf[0];
-  -};
-}
-
- static void talitos_sg_unmap(struct device *dev,  
  struct talitos_edesc *edesc,  
  struct scatterlist *src,  
  struct talitos_desc *desc,  
  dma_addr_t dma_link_tbl;

static void ipsec_esp_unmap(struct device *dev,  
    struct talitos_edesc *edesc,  
    struct aead_request *areq, bool encrypt)
{
  struct crypto_aead *aead = crypto_aead_reqtfm(areq);
  struct talitos_ctx *ctx = crypto_aead_ctx(aead);
  unsigned int ivsize = crypto_aead_ivsize(aead);
+
  unsigned int authsize = crypto_aead_authsize(aead);
  unsigned int cryptlen = areq->cryptlen - (encrypt ? 0 : authsize);
  bool is_ipsec_esp = edesc->desc.hdr & DESC_HDR_TYPE_IPSEC_ESP;
  struct talitos_ptr *civ_ptr = &edesc->desc.ptr[is_ipsec_esp ? 2 : 3];
+
  @ @ -958,8 +958,8 @@
  DMA_FROM_DEVICE);
+
  unmmap_single_talitos_ptr(dev, civ_ptr, DMA_TO_DEVICE);
+
  @ @ -980,14 +980,14 @@
  struct talitos_desc *desc, void *context,
int err)
{
-struct talitos_private *priv = dev_get_drvdata(dev);
-bool is_sec1 = has_ftr_sec1(priv);
struct aead_request *areq = context;
struct crypto_aead *authenc = crypto_aead_reqtfm(areq);
unsigned int authsize = crypto_aead_authsize(authenc);
unsigned int ivsize = crypto_aead_ivsize(authenc);
struct talitos_edesc *edesc;
-struct scatterlist *sg;
-void *icvdata;

edesc = container_of(desc, struct talitos_edesc, desc);

-ipsec_esp_unmap(dev, edesc, areq);
-
/+/* copy the generated ICV to dst */
-if (edesc->icv_ool) {
-if (is_sec1)
-icvdata = edesc->buf + areq->assoclen + areq->cryptlen;
-else
-icvdata = &edesc->link_tbl[edesc->src_nents +
  - edesc->dst_nents + 2];
-sg = sg_last(areq->dst, edesc->dst_nents);
-memcpy((char *)sg_virt(sg) + sg->length - authsize,
  - icvdata, authsize);
-}
+ipsec_esp_unmap(dev, edesc, areq, true);

dma_unmap_single(dev, edesc->iv_dma, ivsize, DMA_TO_DEVICE);

@@ -1031,32 +1004,16 @@
struct crypto_aead *authenc = crypto_aead_reqtfm(req);
unsigned int authsize = crypto_aead_authsize(authenc);
struct talitos_edesc *edesc;
-struct scatterlist *sg;
-char *oicv, *icv;
-struct talitos_private *priv = dev_get_drvdata(dev);
-bool is_sec1 = has_ftr_sec1(priv);

edesc = container_of(desc, struct talitos_edesc, desc);

-ipsec_esp_unmap(dev, edesc, req);
+ipsec_esp_unmap(dev, edesc, req, false);

if (!err) {
 /* auth check */
 -sg = sg_last(req->dst, edesc->dst_nents ? : 1);
icv = (char *)sg_virt(sg) + sg->length - authsize;
-
-if (edesc->dma_len) {
  -if (is_sec1)
    -oicv = (char *)&edesc->dma_link_tbl +
      - req->assoclen + req->cryptlen;
  -else
    -oicv = (char *)
      - &edesc->link_tbl[edesc->src_nents +
        -edesc->dst_nents + 2];
    -if (edesc->icv_ool)
      -icv = oicv + authsize;
    -} else
    -oicv = (char *)&edesc->link_tbl[0];
  +oicv = edesc->buf + edesc->dma_len;
  +icv = oicv - authsize;
}

err = crypto_memneq(oicv, icv, authsize) ? -EBADMSG : 0;
}
@@ -1075,7 +1032,7 @@
edesc = container_of(desc, struct talitos_edesc, desc);

-ipsec_esp_unmap(dev, edesc, req);
+ipsec_esp_unmap(dev, edesc, req, false);

/* check ICV auth status */
if (!err && ((desc->hdr_lo & DESC_HDR_LO_ICCR1_MASK) !=
  @@ -1092,11 +1049,13 @@
  * stop at cryptlen bytes
 */
static int sg_to_link_tbl_offset(struct scatterlist *sg, int sg_count,
  @@ -1111,11 +1070,20 @@
  unsigned int offset, int cryptlen,
  - struct talitos_ptr *link_tbl_ptr)
  + unsigned int offset, int datalen, int elen,
  + struct talitos_ptr *link_tbl_ptr, int align)
 {       
    -int n_sg = sg_count;
  +int n_sg = elen ? sg_count + 1 : sg_count;
  int count = 0;
  +int cryptlen = datalen + elen;
  +int padding = ALIGN(cryptlen, align) - cryptlen;

  while (cryptlen && sg && n_sg--) {
    unsigned int len = sg_dma_len(sg);
    @@ -1111,11 +1070,20 @@
    if (len > cryptlen)
      len = cryptlen;
if (datalen > 0 && len > datalen) {
    to_talitos_ptr(link_tbl_ptr + count,
    + sg_dma_address(sg) + offset, datalen, 0);
    to_talitos_ptr_ext_set(link_tbl_ptr + count, 0, 0);
    count++;
    len -= datalen;
    offset += datalen;
}

next:
    to_talitos_ptr(link_tbl_ptr + count,
    - sg_dma_address(sg) + offset, len, 0);
    to_talitos_ptr_ext_set(link_tbl_ptr + count, 0, 0);
    count++;
    cryptlen -= len;
    +datalen -= len;
    offset = 0;

    return count;
}

-static int talitos_sg_map(struct device *dev, struct scatterlist *src,
    unsigned int len, struct talitos_edesc *edesc,
    struct talitos_ptr *ptr,
    int sg_count, unsigned int offset, int tbl_off)
+static int talitos_sg_map_ext(struct device *dev, struct scatterlist *src,
    unsigned int len, struct talitos_edesc *edesc,
    struct talitos_ptr *ptr, int sg_count,
    unsigned int offset, int tbl_off, int elen,
    bool force, int align)
{
    struct talitos_private *priv = dev_get_drvdata(dev);
    bool is_sec1 = has_ftr_sec1(priv);
    +int aligned_len = ALIGN(len, align);

    -if (sg_count == 1) {
        to_talitos_ptr(ptr, sg_dma_address(src) + offset, len, is_sec1);
    } else {
        to_talitos_ptr(ptr, 0, 0, is_sec1);
        return 1;
static int talitos_sg_map(struct device *dev, struct scatterlist *src,  
  unsigned int len, struct talitos_edesc *edesc, struct talitos_ptr *ptr,  
  int sg_count, unsigned int offset, int tbl_off)  
{
  return talitos_sg_map_ext(dev, src, len, edesc, ptr, sg_count, offset,  
    tbl_off, 0, false, 1);
}

/* fill in and submit ipsec_esp descriptor */
static int ipsec_esp(struct talitos_edesc *edesc, struct aead_request *areq,  
  bool encrypt,  
  void (*callback)(struct device *dev, struct talitos_desc *desc,
      void *context, int error))  
{
  struct talitos_ctx *ctx = crypto_aead_ctx(aead);
struct device *dev = ctx->dev;
struct talitos_desc *desc = &edesc->desc;
unsigned int cryptlen = areq->cryptlen;
unsigned int cryptlen = areq->cryptlen - (encrypt ? 0 : authsize);
unsigned int ivsize = crypto_aead_ivsize(aead);
int tbl_off = 0;
int sg_count, ret;
-int sg_link_tbl_len;
+int elen = 0;
bool sync_needed = false;
struct talitos_private *priv = dev_get_drvdata(dev);
bool is_sec1 = has_ftr_sec1(priv);
bool is_ipsec_esp = desc->hdr & DESC_HDR_TYPE_IPSEC_ESP;
struct talitos_ptr *civ_ptr = &desc->ptr[is_ipsec_esp ? 2 : 3];
struct talitos_ptr *ckey_ptr = &desc->ptr[is_ipsec_esp ? 3 : 2];
+dma_addr_t dma_icv = edesc->dma_link_tbl + edesc->dma_len - authsize;

/* hmac key */
to_talitos_ptr(&desc->ptr[0], ctx->dma_key, ctx->authkeylen, is_sec1);
@@@@ -1219,17 +1205,12 @@
* extent is bytes of HMAC postpended to ciphertext,
* typically 12 for ipsec
*/
-sg_link_tbl_len = cryptlen;
+if (is_ipsec_esp && (desc->hdr & DESC_HDR_MODE1_MDEU_CICV))
+elen = authsize;

-if (is_ipsec_esp) {
-to_talitos_ptr_ext_set(&desc->ptr[4], authsize, is_sec1);
-
-if (desc->hdr & DESC_HDR_MODE1_MDEU_CICV)
-sg_link_tbl_len += authsize;
-}
-
-ret = talitos_sg_map(dev, areq->src, sg_link_tbl_len, edesc,
- &desc->ptr[4], sg_count, areq->assoclen, tbl_off);
+ret = talitos_sg_map_ext(dev, areq->src, cryptlen, edesc, &desc->ptr[4],
+ sg_count, areq->assoclen, tbl_off, elen,
+ false, 1);

if (ret > 1) {
 tbl_off += ret;
@@ -1243,55 +1224,35 @@
dma_map_sg(dev, areq->dst, sg_count, DMA_FROM_DEVICE);
}

-ret = talitos_sg_map(dev, areq->dst, cryptlen, edesc, &desc->ptr[5],
- sg_count, areq->assoclen, tbl_off);
- if (is_ipsec_esp)
  - to_talitos_ptr_ext_or(&desc->ptr[5], authsize, is_sec1);
+ if (is_ipsec_esp && encrypt)
  + len = authsize;
+ else
  + len = 0;
+ ret = talitos_sg_map_ext(dev, areq->dst, cryptlen, edesc, &desc->ptr[5],
+ sg_count, areq->assoclen, tbl_off, len,
+ is_ipsec_esp && !encrypt, 1);
+ tbl_off += ret;

/* ICV data */
- if (ret > 1) {
-     tbl_off += ret;
-     edesc->icv_ool = true;
-     sync_needed = true;
+     edesc->icv_ool = !encrypt;

-     if (is_ipsec_esp) {
-         struct talitos_ptr *tbl_ptr = &edesc->link_tbl[tbl_off];
-         int offset = (edesc->src_nents + edesc->dst_nents + 2) *
-             sizeof(struct talitos_ptr) + authsize;
-         /* Add an entry to the link table for ICV data */
-         - to_talitos_ptr_ext_set(tbl_ptr - 1, 0, is_sec1);
-         - to_talitos_ptr_ext_set(tbl_ptr, DESC_PTR_LNKTBL_RETURN,
-             - is_sec1);
-         }
-     else {
-         dma_addr_t addr = edesc->dma_link_tbl;
-         if (!encrypt && is_ipsec_esp) {
-             struct talitos_ptr *tbl_ptr = &edesc->link_tbl[tbl_off];
-             - if (is_sec1)
-                 - addr += areq->assoclen + cryptlen;
-             - else
-                 - addr += sizeof(struct talitos_ptr) * tbl_off;
-             /* Add an entry to the link table for ICV data */
-             + to_talitos_ptr_ext_set(tbl_ptr - 1, 0, is_sec1);
-             + to_talitos_ptr_ext_set(tbl_ptr, DESC_PTR_LNKTBL_RET, is_sec1);
-             - to_talitos_ptr(&desc->ptr[6], addr, authsize, is_sec1);
-         } 
+ /* icv data follows link tables */
}
+to_talitos_ptr(tbl_ptr, dma_icv, authsize, is_sec1);
+to_talitos_ptr_ext_or(&desc->ptr[5], authsize, is_sec1);
+sync_needed = true;
+} else if (!encrypt) {
+to_talitos_ptr(&desc->ptr[6], dma_icv, authsize, is_sec1);
+sync_needed = true;
} else if (!is_ipsec.esp) {
-ret = talitos_sg_map(dev, areq->dst, authsize, edesc,
- &desc->ptr[6], sg_count, areq->assoclen +
- cryptlen,
- tbl_off);
-if (ret > 1) {
-tbl_off += ret;
-edesc->icv_ool = true;
-sync_needed = true;
-} else {
-edesc->icv_ool = false;
-}
-} else {
-edesc->icv_ool = false;
+talitos_sg_map(dev, areq->dst, authsize, edesc, &desc->ptr[6],
+ sg_count, areq->assoclen + cryptlen, tbl_off);
}

/* iv out */
@@ -1306,7 +1267,7 @@
ret = talitos_submit(dev, ctx->ch, desc, callback, areq);
if (ret != -EINPROGRESS) {
- ipsec_esp_unmap(dev, edesc, areq);
+ ipsec_esp_unmap(dev, edesc, areq, encrypt);
kfree(edesc);
}
return ret;
@@ -1335,23 +1296,18 @@
struct talitos_private *priv = dev_get_drvdata(dev);
bool is_sec1 = has_ftr_sec1(priv);
int max_len = is_sec1 ? TALITOS1_MAX_DATA_LEN : TALITOS2_MAX_DATA_LEN;
-void *err;

if (cryptlen + authsize > max_len) {
 dev_err(dev, "length exceeds h/w max limit\n");
 return ERR_PTR(-EINVAL);
}

-if (ivsize)
-iv_dma = dma_map_single(dev, iv, ivsize, DMA_TO_DEVICE);
-
if (!dst || dst == src) {
  src_len = assoclen + cryptlen + authsize;
  src_nents = sg_nents_for_len(src, src_len);
  if (src_nents < 0) {
    dev_err(dev, "Invalid number of src SG\n");
    -err = ERR_PTR(-EINVAL);
    -goto error_sg;
    +return ERR_PTR(-EINVAL);
  }
  src_nents = (src_nents == 1) ? 0 : src_nents;
  dst_nents = dst ? src_nents : 0;
  @ @ -1361,16 +1317,14 @@
  src_nents = sg_nents_for_len(src, src_len);
  if (src_nents < 0) {
    dev_err(dev, "Invalid number of src SG\n");
    -err = ERR_PTR(-EINVAL);
    -goto error_sg;
    +return ERR_PTR(-EINVAL);
  }
  src_nents = (src_nents == 1) ? 0 : src_nents;
  dst_nents = sg_nents_for_len(dst, dst_len);
  if (dst_nents < 0) {
    dev_err(dev, "Invalid number of dst SG\n");
    -err = ERR_PTR(-EINVAL);
    -goto error_sg;
    +return ERR_PTR(-EINVAL);
  }
  dst_nents = (dst_nents == 1) ? 0 : dst_nents;
  @ @ -1381,28 +1335,30 @@
  * and space for two sets of ICVs (stashed and generated)
  */
  alloc_len = sizeof(struct talitos_edesc);
  -if (src_nents || dst_nents) {
  +if (src_nents || dst_nents || !encrypt) {
    if (is_sec1)
      dma_len = (src_nents ? src_len : 0) +
      - (dst_nents ? dst_len : 0);
      + (dst_nents ? dst_len : 0) + authsize;
    else
      dma_len = (src_nents + dst_nents + 2) *
      - sizeof(struct talitos_ptr) + authsize * 2;
      + sizeof(struct talitos_ptr) + authsize;
      alloc_len += dma_len;
    } else {
      dma_len = 0;
      -alloc_len += icv_stashing ? authsize : 0;
/* if its a ahash, add space for a second desc next to the first one */
if (is_sec1 && !dst)
alloc_len += sizeof(struct talitos_desc);
+alloc_len += ivsize;

edesc = kmalloc(alloc_len, GFP_DMA | flags);
- if (!edesc) {
- dev_err(dev, "could not allocate edescriptor\n");
- err = ERR_PTR(-ENOMEM);
- goto error_sg;
+ if (!edesc)
+ return ERR_PTR(-ENOMEM);
+ if (ivsize) {
+ iv = memcpy(((u8 *)edesc) + alloc_len - ivsize, iv, ivsize);
+ iv_dma = dma_map_single(dev, iv, ivsize, DMA_TO_DEVICE);
} 
memset(&edesc->desc, 0, sizeof(edesc->desc));

edesc->dst_nents = dst_nents;
edesc->iv_dma = iv_dma;
edesc->dma_len = dma_len;
- if (dma_len) {
- void *addr = &edesc->link_tbl[0];
-}
- if (is_sec1 && !dst)
- addr += sizeof(struct talitos_desc);
- edesc->dma_link_tbl = dma_map_single(dev, addr,
+ if (dma_len)
+ edesc->dma_link_tbl = dma_map_single(dev, &edesc->link_tbl[0],
edesc->dma_len, 
 DMA_BIDIRECTIONAL);
- }
+
return edesc;
-error_sg:
- if (iv_dma)
- dma_unmap_single(dev, iv_dma, ivsize, DMA_TO_DEVICE);
- return err;
}

static struct talitos_edesc *aead_edesc_alloc(struct aead_request *areq, u8 *iv,
@@ -1433,9 +1381,10 @@
unsigned int authsize = crypto_aead_authsize(authenc);
struct talitos_ctx *ctx = crypto_aead_ctx(authenc);
unsigned int ivsize = crypto_aead_ivsize(authenc);
unsigned int cryptlen = areq->cryptlen - (encrypt ? 0 : authsize);

return talitos_edesc_alloc(ctx->dev, areq->src, areq->dst,
-   iv, areq->assoclen, areq->cryptlen,
+   iv, areq->assoclen, cryptlen,
   authsize, ivsize, icv_stashing,
   areq->base.flags, encrypt);
}

@@ -1454,7 +1403,7 @@
/* set encrypt */
edesc->desc.hdr = ctx->desc_hdr_template | DESC_HDR_MODE0_ENCRYPT;

-return ipsec_esp(edesc, req, ipsec_esp_encrypt_done);
+return ipsec_esp(edesc, req, true, ipsec_esp_encrypt_done);
}

static int aead_decrypt(struct aead_request *req)
@@ -1464,17 +1413,15 @@
    struct talitos_ctx *ctx = crypto_aead_ctx(authenc);
    struct talitos_private *priv = dev_get_drvdata(ctx->dev);
    struct talitos_edesc *edesc;
-    struct scatterlist *sg;
    void *icvdata;

    -req->cryptlen -= authsize;
    -
    /* allocate extended descriptor */
edesc = aead_edesc_alloc(req, req->iv, 1, false);
    if (IS_ERR(edesc))
        return PTR_ERR(edesc);

    -if (((priv->features & TALITOS_FTR_HW_AUTH_CHECK) &&
+if (((edesc->desc.hdr & DESC_HDR_TYPE_IPSEC_ESP) &&
       (priv->features & TALITOS_FTR_HW_AUTH_CHECK) &&
       ((!edesc->src_nents && !edesc->dst_nents) ||
           priv->features & TALITOS_FTR_SRC_LINK_TBL_LEN_INCLUDES_EXTENT)) { 

    @@ -1485,24 +1432,20 @@
        /* reset integrity check result bits */

        -return ipsec_esp(edesc, req, ipsec_esp_decrypt_hwauth_done);
+return ipsec_esp(edesc, req, false,
+    + ipsec_esp_decrypt_hwauth_done);
     }

    /* Have to check the ICV with software */

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edesc->desc.hdr = ctx->desc_hdr_template | DESC_HDR_DIR_INBOUND;

/* stash incoming ICV for later cmp with ICV generated by the h/w */
-if (edesc->dma_len)
-icvdata = (char *)&edesc->link_tbl[edesc->src_nents +
   edesc->dst_nents + 2];
-else
-icvdata = &edesc->link_tbl[0];
-
-sg = sg_last(req->src, edesc->src_nents ? : 1);
+icvdata = edesc->buf + edesc->dma_len;

-memcpy(icvdata, (char *)sg_virt(sg) + sg->length - authsize, authsize);
+sg_pcopy_to_buffer(req->src, edesc->src_nents ? : 1, icvdata, authsize,
   +req->assoclen + req->cryptlen - authsize);

-return ipsec_esp(edesc, req, ipsec_esp_decrypt_swauth_done);
+return ipsec_esp(edesc, req, false, ipsec_esp_decrypt_swauth_done);
}

static int ablkcipher_setkey(struct crypto_ablkcipher *cipher,
@@ -1535,6 +1478,18 @@
return 0;
}

+static int ablkcipher_aes_setkey(struct crypto_ablkcipher *cipher,
+    const u8 *key, unsigned int keylen)
+{
+    if (keylen == AES_KEYSIZE_128 || keylen == AES_KEYSIZE_192 ||
+        keylen == AES_KEYSIZE_256)
+        return ablkcipher_setkey(cipher, key, keylen);
+    crypto_ablkcipher_set_flags(cipher, CRYPTO_TFM_RES_BAD_KEY_LEN);
+    return -EINVAL;
+
+static void common_nonsnoop_unmap(struct device *dev,
+    struct talitos_edesc *edesc,
+    struct ablkcipher_request *areq)
@@ -1554,11 +1509,15 @@
    int err)
{
    struct ablkcipher_request *areq = context;
+    struct crypto_ablkcipher *cipher = crypto_ablkcipher_reqtfm(areq);
+    struct talitos_ctx *ctx = crypto_ablkcipher_ctx(cipher);
+    unsigned int ivsize = crypto_ablkcipher_ivsize(cipher);
    struct talitos_edesc *edesc;
edesc = container_of(desc, struct talitos_edesc, desc);

common_nonsnoop_unmap(dev, edesc, areq);
+memcpy(areq->info, ctx->iv, ivsize);

kfree(edesc);

@@ -1581,6 +1540,8 @@
bool sync_needed = false;
struct talitos_private *priv = dev_get_drvdata(dev);
bool is_sec1 = has_ftr_sec1(priv);
+bool is_ctr = (desc->hdr & DESC_HDR_SEL0_MASK) == DESC_HDR_SEL0_AESU &&
+      (desc->hdr & DESC_HDR_MODE0_AESU_MASK) == DESC_HDR_MODE0_AESU_CTR;

/* first DWORD empty */
@@ -1601,8 +1562,8 @@
/*
 * cipher in
 */
-    sg_count = talitos_sg_map(dev, areq->src, cryptlen, edesc,
-        &desc->ptr[3], sg_count, 0, 0);
+    sg_count = talitos_sg_map_ext(dev, areq->src, cryptlen, edesc, &desc->ptr[3],
+        sg_count, 0, 0, false, is_ctr ? 16 : 1);
    if (sg_count > 1)
        sync_needed = true;

@@ -1653,6 +1614,14 @@
struct crypto_ablkcipher *cipher = crypto_ablkcipher_reqtfm(areq);
struct talitos_ctx *ctx = crypto_ablkcipher_ctx(cipher);
struct talitos_edesc *edesc;
+    unsigned int blocksize =
+        crypto_tfm_alg_blocksize(crypto_ablkcipher_tfm(cipher));
+    if (!areq->nbytes)
+        return 0;
+    if (areq->nbytes % blocksize)
+        return -EINVAL;
+    edesc = ablkcipher_edesc_alloc(areq, true);
@@ -1670,6 +1639,14 @@
struct crypto_ablkcipher *cipher = crypto_ablkcipher_reqtfm(areq);
struct talitos_ctx *ctx = crypto_ablkcipher_ctx(cipher);
struct talitos_edesc *edesc;
+    unsigned int blocksize =

crypto_tfm_alg_blocksize(crypto_ablkcipher_tfm(cipher));
+
+if (!areq->nbytes)
+return 0;
+
+if (areq->nbytes % blocksize)
+return -EINVAL;
+
/* allocate extended descriptor */
edesc = ablkcipher_edesc_alloc(areq, false);
@@ -1686,8 +1663,31 @@
          struct ahash_request *areq)
 {
    struct talitos_ahash_req_ctx *req_ctx = ahash_request_ctx(areq);
+    struct talitos_private *priv = dev_get_drvdata(dev);
+    bool is_sec1 = has_ftr_sec1(priv);
+    struct talitos_desc *desc = &edesc->desc;
+    struct talitos_desc *desc2 = (struct talitos_desc *)
+                    (edesc->buf + edesc->dma_len);
-
talitos_sg_unmap(dev, edesc, req_ctx->psrc, NULL, 0, 0);
+unmap_single_talitos_ptr(dev, &edesc->desc[ptr[5]], DMA_FROM_DEVICE);
+if (desc->next_desc &&
+    desc->ptr[5].ptr != desc2->ptr[5].ptr)
+unmap_single_talitos_ptr(dev, &desc2->ptr[5], DMA_FROM_DEVICE);
+
+if (req_ctx->psrc)
+talitos_sg_unmap(dev, edesc, req_ctx->psrc, NULL, 0, 0);
+
+/* When using hashctx-in, must unmap it. */
+if (from_talitos_ptr_len(&edesc->desc[ptr[1]], is_sec1))
+unmap_single_talitos_ptr(dev, &edesc->desc[ptr[1]],
+    DMA_TO_DEVICE);
+else if (desc->next_desc)
+unmap_single_talitos_ptr(dev, &desc2->ptr[1],
+    DMA_TO_DEVICE);
+
+if (is_sec1 && req_ctx->dbuf)
+unmap_single_talitos_ptr(dev, &desc->ptr[3],
+    DMA_TO_DEVICE);
+
    if (edesc->dma_len)
    dma_unmap_single(dev, edesc->dma_link_tbl, edesc->dma_len,
@@ -1742,7 +1742,6 @@
static int common_nonsnoop_hash(struct talitos_edesc *edesc,
struct ahash_request *areq, unsigned int length,
    unsigned int offset,
void (*callback) (struct device *dev,
    struct talitos_desc *desc,
    void *context, int error)
@@ -1762,8 +1761,10 @@
    /* hash context in */
    if (!req_ctx->first || req_ctx->swinit) {
        to_talitos_ptr(&desc->ptr[1], ctx->dma_hw_context,
            req_ctx->hw_context_size, is_sec1);
        map_single_talitos_ptr(dev, &desc->ptr[1],
            req_ctx->hw_context_size, (char *)req_ctx->hw_context,
            DMA_TO_DEVICE);
        req_ctx->swinit = 0;
    }
/* Indicate next op is not the first. */
@@ -1779,9 +1780,7 @@
    if (!req_ctx->first) {
        sg_count = edesc->src_nents ?: 1;
        if (is_sec1 && sg_count > 1)
            sg_pcopy_to_buffer(req_ctx->psrc, sg_count,
                edesc->buf + sizeof(struct talitos_desc),
                length, req_ctx->nbuf);
        else if (length)
            sg_count = dma_map_sg(dev, req_ctx->psrc, sg_count,
                DMA_TO_DEVICE);
@@ -1808,8 +1806,9 @@
    crypto_ahash_digestsize(tfm),
    areq->result, DMA_FROM_DEVICE);
else
  - to_talitos_ptr(&desc->ptr[5], ctx->dma_hw_context,
    - req_ctx->hw_context_size, is_sec1);
+ map_single_talitos_ptr(dev, &desc->ptr[5],
  + req_ctx->hw_context_size,
  + req_ctx->hw_context, DMA_FROM_DEVICE);

/* last DWORD empty */

@@ -1817,7 +1816,8 @@
talitos_handle_buggy_hash(ctx, edesc, &desc->ptr[3]);

if (is_sec1 && req_ctx->nbuf && length) {
  - struct talitos_desc *desc2 = desc + 1;
+ struct talitos_desc *desc2 = (struct talitos_desc *)
    + (edesc->buf + edesc->hw_context);
  dma_addr_t next_desc;
  memset(desc2, 0, sizeof(*desc2));
@ @ -1828,18 +1828,25 @@
desc->hdr |= DESC_HDR_MODE0_MDEU_CONT;
desc->hdr &= ~DESC_HDR_DONE_NOTIFY;

  - to_talitos_ptr(&desc2->ptr[1], ctx->dma_hw_context,
+ map_single_talitos_ptr(dev, &desc2->ptr[1],
  + req_ctx->hw_context_size, is_sec1);

+ if (desc->ptr[1].ptr)
+   copy_talitos_ptr(&desc->ptr[1], &desc2->ptr[1],
+                     is_sec1);
+ else
+   map_single_talitos_ptr(dev, &desc2->ptr[1],
+                          req_ctx->hw_context_size,
+                          req_ctx->hw_context,
+                          DMA_TO_DEVICE);

  copy_talitos_ptr(&desc2->ptr[2], &desc->ptr[2], is_sec1);
  sg_count = talitos_sg_map(dev, req_ctx->psrc, length, edesc,
                           &desc2->ptr[3], sg_count, offset, 0);
  + &desc2->ptr[3], sg_count, 0, 0);
  if (sg_count > 1)
    sync_needed = true;
  copy_talitos_ptr(&desc2->ptr[5], &desc->ptr[5], is_sec1);
  if (req_ctx->last)
    - to_talitos_ptr(&desc->ptr[5], ctx->dma_hw_context,
+ map_single_talitos_ptr(dev, &desc->ptr[5],
  + req_ctx->hw_context_size, is_sec1);
  + map_single_talitos_ptr(dev, &desc->ptr[5],
    req_ctx->hw_context_size,
    DMA_FROM_DEVICE);
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```c
next_desc = dma_map_single(dev, &desc2->hdr1, TALITOS_DESC_SIZE,
   DMA_BIDIRECTIONAL);
@@ -1877,12 +1884,8 @@
static int ahash_init(struct ahash_request *areq)
 {
 struct crypto_ahash *tfm = crypto_ahash_reqtfm(areq);
-struct talitos_ctx *ctx = crypto_ahash_ctx(tfm);
-struct device *dev = ctx->dev;
 struct talitos_ahash_req_ctx *req_ctx = ahash_request_ctx(areq);
 unsigned int size;
-struct talitos_private *priv = dev_get_drvdata(dev);
-bool is_sec1 = has_ftr_sec1(priv);

 /* Initialize the context */
 req_ctx->buf_idx = 0;
@@ -1894,18 +1897,6 @@
 : TALITOS_MDEU_CONTEXT_SIZE_SHA384_SHA512;
 req_ctx->hw_context_size = size;

 -if (ctx->dma_hw_context)
- dma_unmap_single(dev, ctx->dma_hw_context, size,
- DMA_BIDIRECTIONAL);
-ctx->dma_hw_context = dma_map_single(dev, req_ctx->hw_context, size,
- DMA_BIDIRECTIONAL);
-if (ctx->dma_buf)
- dma_unmap_single(dev, ctx->dma_buf, sizeof(req_ctx->buf),
- DMA_TO_DEVICE);
-if (is_sec1)
-ctx->dma_buf = dma_map_single(dev, req_ctx->buf,
- sizeof(req_ctx->buf),
- DMA_TO_DEVICE);
 return 0;
 }

@@ -1916,9 +1907,6 @@
 static int ahash_init_sha224_swinit(struct ahash_request *areq)
 {
 struct talitos_ahash_req_ctx *req_ctx = ahash_request_ctx(areq);
-struct crypto_ahash *tfm = crypto_ahash_reqtfm(areq);
-struct talitos_ctx *ctx = crypto_ahash_ctx(tfm);
-struct device *dev = ctx->dev;

 ahash_init(areq);
 req_ctx->swinit = 1;/* prevent h/w initting context with sha256 values*/
@@ -1936,9 +1924,6 @@
 req_ctx->hw_context[8] = 0;
 req_ctx->hw_context[9] = 0;
```

- dma_sync_single_for_device(dev, ctx->dma_hw_context,
-   req_ctx->hw_context_size, DMA_TO_DEVICE);
-
- return 0;
}

@@ -1957,7 +1942,6 @@
 struct device *dev = ctx->dev;
 struct talitos_private *priv = dev_get_drvdata(dev);
 bool is_sec1 = has_ftr_sec1(priv);
-int offset = 0;
 u8 *ctx_buf = req_ctx->buf[req_ctx->buf_idx];

 if (!req_ctx->last && (nbytes + req_ctx->nbuf <= blocksize)) {
-@@ -1997,6 +1981,8 @@
     sg_chain(req_ctx->bufsl, 2, areq->src);
     req_ctx->psrc = req_ctx->bufsl;
 } else if (is_sec1 && req_ctx->nbuf && req_ctx->nbuf < blocksize) {
@@ -1997,7 +1981,8 @@
     offset = blocksize - req_ctx->nbuf;
     else
@@ -2009,7 +1995,8 @@
     sg_copy_to_buffer(areq->src, nents,
         ctx_buf + req_ctx->nbuf, offset);
     req_ctx->nbuf += offset;
@@ -2019,7 +2005,8 @@
     req_ctx->psrc = scatterwalk_ffwd(req_ctx->bufsl, areq->src,
         + offset);
 } else
@@ -2042,13 +2029,6 @@
 /* request SEC to INIT hash. */
 if (req_ctx->first && !req_ctx->swinit)
     edesc->desc.hdr |= DESC_HDR_MODE0_MDEU_INIT;
@@ -2060,7 +2047,6 @@
     dma_addr_t dma_buf = ctx->dma_buf + req_ctx->buf_idx *
         HASH_MAX_BLOCK_SIZE;
@@ -2066,7 +2053,6 @@
     dma_sync_single_for_device(dev, dma_buf,
         req_ctx->nbuf, DMA_TO_DEVICE);
@@ -2070,7 +2057,6 @@
 /* When the tfm context has a keylen, it's an HMAC.
 * A first or last (ie. not middle) descriptor must request HMAC.
if (ctx->keylen && (req_ctx->first || req_ctx->last))
edesc->desc.hdr |= DESC_HDR_MODE0_MDEU_HMAC;

-return common_nonsnoop_hash(edesc, areq, nbytes_to_hash, offset,
-    ahash_done);
+return common_nonsnoop_hash(edesc, areq, nbytes_to_hash, ahash_done);
}

static int ahash_update(struct ahash_request *areq)
@@ -2102,12 +2081,7 @@
{
    struct talitos_ahash_req_ctx *req_ctx = ahash_request_ctx(areq);
    struct talitos_export_state *export = out;
-    struct crypto_ahash *ahash = crypto_ahash_reqtfm(areq);
-    struct talitos_ctx *ctx = crypto_ahash_ctx(ahash);
-    struct device *dev = ctx->dev;
-    dma_sync_single_for_cpu(dev, ctx->dma_hw_context,
-        req_ctx->hw_context_size, DMA_FROM_DEVICE);
    memcpy(export->hw_context, req_ctx->hw_context,
        req_ctx->hw_context_size);memcpy(export->buf, req_ctx->buf[req_ctx->buf_idx], req_ctx->nbuf);
    struct crypto_ahash *tfm = crypto_ahash_reqtfm(areq);
    const struct talitos_export_state *export = in;
    unsigned int size;
-    struct talitos_ctx *ctx = crypto_ahash_ctx(tfm);
-    struct device *dev = ctx->dev;
-    struct talitos_private *priv = dev_get_drvdata(dev);
-    bool is_sec1 = has_ftr_sec1(priv);
    memset(req_ctx, 0, sizeof(*req_ctx));

    size = (crypto_ahash_digestsize(tfm) <= SHA256_DIGEST_SIZE)
        ? TALITOS_MDEU_CONTEXT_SIZE_MD5_SHA1_SHA256
        : TALITOS_MDEU_CONTEXT_SIZE_SHA384_SHA512;
    req_ctx->hw_context_size = size;
-    if (ctx->dma_hw_context)
-        dma_unmap_single(dev, ctx->dma_hw_context, size,
-            DMA_BIDIRECTIONAL);
-    memcpy(req_ctx->hw_context, export->hw_context, size);
-    ctx->dma_hw_context = dma_map_single(dev, req_ctx->hw_context, size,
-        DMA_BIDIRECTIONAL);
-    if (ctx->dma_buf)
-        dma_unmap_single(dev, ctx->dma_buf, sizeof(req_ctx->buf),
-            DMA_TO_DEVICE);
    memcpy(req_ctx->buf[0], export->buf, export->nbuf);
if (is_sec1)
   ctx->dma_buf = dma_map_single(dev, req_ctx->buf,
      sizeof(req_ctx->buf),
      DMA_TO_DEVICE);
req_ctx->swinit = export->swinit;
req_ctx->first = export->first;
req_ctx->last = export->last;
@@ -2246,7 +2203,7 @@
    .base = {
      .cra_name = "authenc(hmac(sha1),cbc(aes))",
      .cra_driver_name = "authenc-hmac-sha1-"
-    "cbc-aes-talitos",
+    "cbc-aes-talitos-hsna",
      .cra_blocksize = AES_BLOCK_SIZE,
      .cra_flags = CRYPTO_ALG_ASYNC,
    },
    @@ -2288,7 +2245,7 @@
      .cra_name = "authenc(hmac(sha1),"
        "cbc(des3_e(de))",
      .cra_driver_name = "authenc-hmac-sha1-"
-    "cbc-3des-talitos",
+    "cbc-3des-talitos-hsna",
      .cra_blocksize = DES3_EDE_BLOCK_SIZE,
      .cra_flags = CRYPTO_ALG_ASYNC,
    },
    @@ -2332,7 +2289,7 @@
    .base = {
      .cra_name = "authenc(hmac(sha224),cbc(aes))",
      .cra_driver_name = "authenc-hmac-sha224-"
-    "cbc-aes-talitos",
+    "cbc-aes-talitos-hsna",
      .cra_blocksize = AES_BLOCK_SIZE,
      .cra_flags = CRYPTO_ALG_ASYNC,
    },
    @@ -2374,7 +2331,7 @@
    .base = {
      .cra_name = "authenc(hmac(sha224),cbc(aes))",
      .cra_driver_name = "authenc-hmac-sha224-"
-    "cbc-3des-talitos",
+    "cbc-3des-talitos-hsna",
      .cra_blocksize = DES3_EDE_BLOCK_SIZE,
      .cra_flags = CRYPTO_ALG_ASYNC,
    },
    @@ -2418,7 +2375,7 @@
    .base = {
      .cra_name = "authenc(hmac(sha256),cbc(aes))",
      .cra_driver_name = "authenc-hmac-sha256-"
-    "cbc-aes-talitos",
+    "cbc-aes-talitos-hsna",
      .cra_blocksize = AES_BLOCK_SIZE,
      .cra_flags = CRYPTO_ALG_ASYNC,
+  "cbc-aes-talitos-hsna",
+  .cra_blocksize = AES_BLOCK_SIZE,
+  .cra_flags = CRYPTO_ALG_ASYNC,
+  }
@@ -2460,7 +2417,7 @@
+  .cra_name = "authenc(hmac(sha256),
+                  "cbc(des3_ede))",
+  .cra_driver_name = "authenc-hmac-sha256-"
+    "cbc-3des-talitos-hsna",
+  .cra_blocksize = DES3_EDE_BLOCK_SIZE,
+  .cra_flags = CRYPTO_ALG_ASYNC,
+  }
@@ -2588,7 +2545,7 @@
+  .base = {
+    .cra_name = "authenc(hmac(md5),cbc(aes))",
+    .cra_driver_name = "authenc-hmac-md5-"
+      "cbc-aes-talitos-hsna",
+  .cra_blocksize = AES_BLOCK_SIZE,
+  .cra_flags = CRYPTO_ALG_ASYNC,
+  }
@@ -2629,7 +2586,7 @@
+  .base = {
+    .cra_name = "authenc(hmac(md5),cbc(des3_ede))",
+    .cra_driver_name = "authenc-hmac-md5-"
+      "cbc-3des-talitos-hsna",
+  .cra_blocksize = DES3_EDE_BLOCK_SIZE,
+  .cra_flags = CRYPTO_ALG_ASYNC,
+  }
@@ -2679,6 +2636,7 @@
+    .min_keysize = AES_MIN_KEY_SIZE,
+    .max_keysize = AES_MAX_KEY_SIZE,
+    .ivsize = AES_BLOCK_SIZE,
+    .setkey = ablkcipher_aes_setkey,
+  }
+}
+.
desc_hdr_template = DESC_HDR_TYPE_COMMON_NONSNOOP_NO_AFEU | 
@@ -2694,7 +2652,6 @@
+  .cra_ablkcipher = {
+    .min_keysize = AES_MIN_KEY_SIZE,
+    .max_keysize = AES_MAX_KEY_SIZE,
+    .ivsize = AES_BLOCK_SIZE,
+  }
+}
+.
desc_hdr_template = DESC_HDR_TYPE_COMMON_NONSNOOP_NO_AFEU |
\alg\crypto = {
  .cra_name = "ctr(aes)",
  .cra_driver_name = "ctr-aes-talitos",
  .cra_blocksize = AES\_BLOCK\_SIZE,
  +.cra_blocksize = 1,
  .cra_flags = CRYPTO\_ALG\_TYPE\_ABLCIPHER |
      CRYPTO\_ALG\_ASYNC,
  .cra_ablcipher = {
    .min_keysize = AES\_MIN\_KEY\_SIZE,
    .max_keysize = AES\_MAX\_KEY\_SIZE,
    .ivsize = AES\_BLOCK\_SIZE,
    +.setkey = ablcipher\_aes\_setkey,
  },
},
\desc\_hdr\_template = DESC\_HDR\_TYPE\_AESU\_CTR\_NONSNOOP |
@@ -3060,27 +3018,6 @@
  dma_unmap\_single(dev, ctx->dma\_key, ctx->keylen, DMA\_TO\_DEVICE);
 \}
-
-static void talitos\_cra\_exit\_ahash(struct crypto\_tfm *tfm)
-{
-\struct talitos\_ctx *ctx = crypto\_tfm\_ctx(tfm);
-\struct device *dev = ctx->dev;
-\unsigned int size;
--
-  talitos\_cra\_exit(tfm);
-  size = (crypto\_ahash\_digestsize(__crypto\_ahash\_cast(tfm)) <=
-           SHA256\_DIGEST\_SIZE)
-    ? TALITOS\_MDEU\_CONTEXT\_SIZE\_MD5\_SHA1\_SHA256
-    : TALITOS\_MDEU\_CONTEXT\_SIZE\_SHA384\_SHA512;
-    
-  if (ctx->dma\_hw\_context)
-    dma\_unmap\_single(dev, ctx->dma\_hw\_context, size,
-            DMA\_BIDIRECTIONAL);
-  if (ctx->dma\_buf)
-    dma\_unmap\_single(dev, ctx->dma\_buf, HASH\_MAX\_BLOCK\_SIZE * 2,
-            DMA\_TO\_DEVICE);
-}
-
-/*
- * given the alg's descriptor header template, determine whether descriptor
- * type and primary/secondary execution units required match the hw
-@@ -3114,6 +3051,7 @@
- break;
- case CRYPTO\_ALG\_TYPE\_AEAD:
- crypto\_unregister\_aead(&t\_alg->alg\_aead);
- +break;
case CRYPTO_ALG_TYPE_AHASH:
crypto_unregister_ahash(&t_alg->algt.alg.hash);
break;
@@ -3179,7 +3117,7 @@
case CRYPTO_ALG_TYPE_AHASH:
    alg = &t_alg->algt.alg.hash.halg.base;
    alg->cra_init = talitos_cra_init_ahash;
    alg->cra_exit = talitos_cra_exit_ahash;
+alg->cra_exit = talitos_cra_exit;
    alg->cra_type = crypto_ahash_type;
    t_alg->algt.alg.hash.init = ahash_init;
    t_alg->algt.alg.hash.update = ahash_update;
@@ -3217,7 +3155,10 @@
    alg->cra_priority = t_alg->algt.priority;
    else
    alg->cra_priority = TALITOS_CRA_PRIORITY;
-    alg->cra_alignmask = 0;
+    if (has_ftr_sec1(priv))
+        alg->cra_alignmask = 3;
+    else
+        alg->cra_alignmask = 0;
    alg->cra_ctxsize = sizeof(struct talitos_ctx);
    alg->cra_flags |= CRYPTO_ALG_KERN_DRIVER_ONLY;

--- linux-4.15.0.orig/drivers/crypto/talitos.h
+++ linux-4.15.0/drivers/crypto/talitos.h
@@ -65,6 +65,36 @@
#define TALITOS_DESC_SIZE (sizeof(struct talitos_desc) - sizeof(__be32))

+/*
+ * talitos_edesc - s/w-extended descriptor
+ * @src_nents: number of segments in input scatterlist
+ * @dst_nents: number of segments in output scatterlist
+ * @icv_ool: whether ICV is out-of-line
+ * @iv_dma: dma address of iv for checking continuity and link table
+ * @dma_len: length of dma mapped link_tbl space
+ * @dma_link_tbl: bus physical address of link_tbl/buf
+ * @desc: h/w descriptor
+ * @link_tbl: input and output h/w link tables (if [src,dst].nents > 1) (SEC2)
+ * @buf: input and output buffeur (if [src,dst].nents > 1) (SEC1)
+ *
+ * if decrypting (with authcheck), or either one of src_nents or dst_nents
+ * is greater than 1, an integrity check value is concatenated to the end
+ * of link_tbl data
+ */
+struct talitos_edesc {
+int src_nents;
+int dst_nents;
+bool icv_ool;
+dma_addr_t iv_dma;
+int dma_len;
+dma_addr_t dma_link_tbl;
+struct talitos_desc desc;
+union {
  +struct talitos_ptr link_tbl[0];
  +u8 buf[0];
}:
+);
+
/\* talitos_request - descriptor submission request
* @desc: descriptor pointer (kernel virtual)
@@ -347,6 +377,7 @@
/* primary execution unit mode (MODE0) and derivatives */
#define DESC_HDR_MODE0_ENCRYPT cpu_to_be32(0x00100000)
#define DESC_HDR_MODE0_AESU_MASK cpu_to_be32(0x00600000)
#define DESC_HDR_MODE0_AESU_CBC cpu_to_be32(0x00200000)
#define DESC_HDR_MODE0_AESU_CTR cpu_to_be32(0x00600000)
#define DESC_HDR_MODE0_DEU_CBC cpu_to_be32(0x00400000)
@@ -412,5 +443,5 @@
/* link table extent field bits */
#define DESC_PTR_LNKTBL_JUMP 0x80
+-define DESC_PTR_LNKTBL_RETURN 0x02
#define DESC_PTR_LNKTBL_RET 0x02
#define DESC_PTR_LNKTBL_NEXT 0x01
--- linux-4.15.0.orig/drivers/crypto/ux500/cryp/cryp_core.c
+++ linux-4.15.0/drivers/crypto/ux500/cryp/cryp_core.c
@@ -555,7 +555,7 @@
desc = dmaengine_prep_slave_sg(channel,
ctx->device->dma.sg_src,
ctx->device->dma.sg_src_len,
-direction, DMA_CTRL_ACK);
+DMA_MEM_TO_DEV, DMA_CTRL_ACK);
break;

case DMA_FROM_DEVICE:
@@ -579,7 +579,7 @@
desc = dmaengine_prep_slave_sg(channel,
ctx->device->dma.sg_src,
ctx->device->dma.sg_src_len,
-direction,
+DMA_MEM_TO_DEV, DMA_CTRL_ACK);
break;

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DMA_PREP_INTERRUPT);

--- linux-4.15.0.orig/drivers/crypto/ux500/hash/hash_core.c
+++ linux-4.15.0/drivers/crypto/ux500/hash/hash_core.c
@@ -165,7 +165,7 @@ __func__);
desc = dmaengine_prep_slave_sg(channel,
ctx->device->dma.sg, ctx->device->dma.sg_len,
-direction, DMA_CTRL_ACK | DMA_PREP_INTERRUPT);
+DMA_MEM_TO_DEV, DMA_CTRL_ACK | DMA_PREP_INTERRUPT);
if (!desc) {
 dev_err(ctx->device->dev,
"%s: dmaengine_prep_slave_sg() failed!
", __func__);
@@ -1006,6 +1006,7 @@
goto out;
} else if (req->nbytes == 0 && ctx->keylen > 0) {
+ret = -EPERM;
dev_err(device_data->dev, "%s: Empty message with keylength > 0, NOT supported\n", __func__);
goto out;
--- linux-4.15.0.orig/drivers/crypto/virtio/virtio_crypto_algs.c
+++ linux-4.15.0/drivers/crypto/virtio/virtio_crypto_algs.c
@@ -110,8 +110,6 @@
*alg = VIRTIO_CRYPTO_CIPHER_AES_CBC;
break;
default:
-pr_err("virtio_crypto: Unsupported key length: %d\n", key_len);
-key_len);
return -EINVAL;
} return 0;
@@ -356,13 +354,18 @@
unsigned long flags;
struct scatterlist outhdr, iv_sg, status_sg, **sgs;
-int i;
u64 dst_len;
unsigned int num_out = 0, num_in = 0;
int sg_total;
uint8_t *iv;
+struct scatterlist *sg;

src_nents = sg_nents_for_len(req->src, req->nbytes);
+if (src_nents < 0) {
+pr_err("Invalid number of src SG.\n");
+return src_nents;
+}
+ dst_nents = sg_nents(req->dst);

pr_debug("virtio_crypto: Number of sgs (src_nents: %d, dst_nents: %d)n", 
@@ -408,6 +411,7 @@
goto free;
}
+dst_len = min_t(unsigned int, req->nbytes, dst_len);
pr_debug("virtio_crypto: src_len: %u, dst_len: %llu\n", 
req->nbytes, dst_len);

@@ -438,17 +442,22 @@
goto free;
} 
memcpy(iv, req->info, ivsize);
+if (!vc_sym_req->encrypt)
+scatterwalk_map_and_copy(req->info, req->src,
+req->nbytes - AES_BLOCK_SIZE,
+AES_BLOCK_SIZE, 0);
+
sg_init_one(&iv_sg, iv, ivsize);
sgs[num_out++] = &iv_sg;
vc_sym_req->iv = iv;

/* Source data */
-for (i = 0; i < src_nents; i++)
-sgs[num_out++] = &req->src[i];
+for (sg = req->src; src_nents; sg = sg_next(sg), src_nents--)
+sgs[num_out++] = sg;

/* Destination data */
-for (i = 0; i < dst_nents; i++)
-sgs[num_out + num_in++] = &req->dst[i];
+for (sg = req->dst; sg; sg = sg_next(sg))
+sgs[num_out + num_in++] = sg;

/* Status */
sg_init_one(&status_sg, &vc_req->status, sizeof(vc_req->status));
@@ -485,6 +494,11 @@
/* Use the first data virtqueue as default */
struct data_queue *data_vq = &vcrypto->data_vq[0];

+if (!req->nbytes)
+return 0;
+if (req->nbytes % AES_BLOCK_SIZE)
+return -EINVAL;
+
vc_req->dataq = data_vq;
vc_req->alg_cb = virtio_crypto_dataq_sym_callback;
vc_sym_req->ablkcipher_ctx = ctx;
/*@ -505,6 +519,11 @@*/
/* Use the first data virtqueue as default */
struct data_queue *data_vq = &vcrypto->data_vq[0];

+if (!req->nbytes)
+return 0;
+if (req->nbytes % AES_BLOCK_SIZE)
+return -EINVAL;
+vc_req->dataq = data_vq;
vc_req->alg_cb = virtio_crypto_dataq_sym_callback;
vc_sym_req->ablkcipher_ctx = ctx;
/*@ -561,10 +580,15 @@*/
struct ablkcipher_request *req,
int err)
{
    -crypto_finalize_cipher_request(vc_sym_req->base.dataq->engine,
    -req, err);
+if (vc_sym_req->encrypt)
+scatterwalk_map_and_copy(req->info, req->dst,
+req->nbytes - AES_BLOCK_SIZE,
+AES_BLOCK_SIZE, 0);
kzfree(vc_sym_req->iv);
virtcrypto_clear_request(&vc_sym_req->base);
+
+crypto_finalize_cipher_request(vc_sym_req->base.dataq->engine,
+req, err);
}
static struct crypto_alg virtio_crypto_algs[] = {
    ...
--- linux-4.15.0.orig/drivers/crypto/vmx/Makefile
+++ linux-4.15.0/drivers/crypto/vmx/Makefile
@@ -3,13 +3,13 @@
vmx-crypto-objs := vmx.o aesp8-ppc.o ghashp8-ppc.o aes.o aes_cbc.o aes_ctr.o aes_xts.o ghash.o

ifeq ($(CONFIG_CPU_LITTLE_ENDIAN),y)
-TARGET := linux-ppc64le
+override flavour := linux-ppc64le
else
-TARGET := linux-ppc64
+override flavour := linux-ppc64
endif

quiet_cmd_perl = PERL $@
    cmd_perl = $(PERL) $(<) $(TARGET) > $(@)
targets += aesp8-ppc.S ghashp8-ppc.S

--- linux-4.15.0.orig/drivers/crypto/vmx/aes.c
+++ linux-4.15.0/drivers/crypto/vmx/aes.c
@@ -48,8 +48,6 @@
      alg, PTR_ERR(fallback));
 return PTR_ERR(fallback);
 }
-printf(KERN_INFO "Using '%s' as fallback implementation.\n",
-       crypto_tfm_alg_driver_name((struct crypto_tfm *) fallback));

crypto_cipher_set_flags(fallback,
crypto_cipher_get_flags((struct
--- linux-4.15.0.orig/drivers/crypto/vmx/aes_cbc.c
+++ linux-4.15.0/drivers/crypto/vmx/aes_cbc.c
@@ -52,9 +52,6 @@
      alg, PTR_ERR(fallback));
 return PTR_ERR(fallback);
 }
-printf(KERN_INFO "Using '%s' as fallback implementation.\n",
-       crypto_skcipher_driver_name(fallback));
-
crypto_skcipher_set_flags(fallback,
   ...
ret = crypto_skcipher_encrypt(req);
skcipher_request_zero(req);
} else {
    -preempt_disable();
    -pagefault_disable();
    -enable_kernel_vsx();
    -}
    blkcipher_walk_init(&walk, dst, src, nbytes);
ret = blkcipher_walk_virt(desc, &walk);
while (((nbytes = walk.nbytes)) { 
+preempt_disable();
+pagefault_disable();
+enable_kernel_vsx();
+blkcipher_walk_init(&walk, dst, src, nbytes);
ret = blkcipher_walk_virt(desc, &walk);
while (((nbytes = walk.nbytes)) { 
+aes_p8_cbc_encrypt(walk.src.virt.addr, 
    walk.dst.virt.addr, 
    nbytes & AES_BLOCK_MASK, 
    &ctx->enc_key, walk.iv, 1); 
+disable_kernel_vsx();
+pagefault_enable();
+preempt_enable();
+} 
+} 

+ nbytes &= AES_BLOCK_SIZE - 1;
ret = blkcipher_walk_done(desc, &walk, nbytes);
}
-
  -disable_kernel_vsx();
  -pagefault_enable();
  -preempt_enable();
}

return ret;
@@ -150,24 +146,23 @@
ret = crypto_skcipher_decrypt(req);
skcipher_request_zero(req);
} else {
  -preempt_disable();
  -pagefault_disable();
  -enable_kernel_vsx();
  -
  blkcipher_walk_init(&walk, dst, src, nbytes);
ret = blkcipher_walk_virt(desc, &walk);
while ((nbytes = walk.nbytes)) {
  +preempt_disable();
  +pagefault_disable();
  +enable_kernel_vsx();
  aes_p8_cbc_encrypt(walk.src.virt.addr,
    walk.dst.virt.addr,
    nbytes & AES_BLOCK_MASK,
    &ctx->dec_key, walk.iv, 0);
  +disable_kernel_vsx();
  +pagefault_enable();
  +preempt_enable();
  +
  nbytes &= AES_BLOCK_SIZE - 1;
ret = blkcipher_walk_done(desc, &walk, nbytes);
}
-
  -disable_kernel_vsx();
  -pagefault_enable();
  -preempt_enable();
}

return ret;
--- linux-4.15.0.orig/drivers/crypto/vmx/aes_ctr.c
+++ linux-4.15.0/drivers/crypto/vmx/aes_ctr.c
@@ -50,8 +50,6 @@
alg, PTR_ERR(fallback));
return PTR_ERR(fallback);
crypto_skcipher_set_flags(
    fallback,
    --- linux-4.15.0.orig/drivers/crypto/vmx/aes_xts.c
    +++ linux-4.15.0/drivers/crypto/vmx/aes_xts.c
    @@ -53,8 +53,6 @@
        alg, PTR_ERR(fallback));
    return PTR_ERR(fallback);
}
-printk(KERN_INFO "Using '%s' as fallback implementation.\n",
-crypto_skcipher_driver_name(fallback));

crypto_skcipher_set_flags(
    fallback,
    @ @ -118,32 +116,39 @@
    ret = enc? crypto_skcipher_encrypt(req) : crypto_skcipher_decrypt(req);
    skcipher_request_zero(req);
} else {
    +blkcipher_walk_init(&walk, dst, src, nbytes);
    +
    +ret = blkcipher_walk_virt(desc, &walk);
    +
    preempt_disable();
    pagefault_disable();
    enable_kernel_vsx();

    -blkcipher_walk_init(&walk, dst, src, nbytes);
    -
    -ret = blkcipher_walk_virt(desc, &walk);
    iv = walk.iv;
    memset(tweak, 0, AES_BLOCK_SIZE);
    aes_p8_encrypt(iv, tweak, &ctx->tweak_key);

    +disable_kernel_vsx();
    +pagefault_enable();
    +preempt_enable();
    +
    while ((nbytes = walk.nbytes)) {
        +preempt_disable();
        +pagefault_disable();
        +enable_kernel_vsx();
        if (enc)
            aes_p8_xts_encrypt(walk.src.virt.addr, walk.dst.virt.addr,
                nbytes & AES_BLOCK_MASK, &ctx->enc_key, NULL, tweak);
        else
aes_p8_xts_decrypt(walk.src.virt.addr, walk.dst.virt.addr,
  nbytes & AES_BLOCK_MASK, &ctx->dec_key, NULL, tweak);
  
+disable_kernel_vsx();
+pagefault_enable();
+preempt_enable();

  nbytes &= AES_BLOCK_SIZE - 1;
  ret = blkcipher_walk_done(desc, &walk, nbytes);
  }
-  
 disable_kernel_vsx();
 pagefault_enable();
 preempt_enable();
  }
 return ret;
 }

--- linux-4.15.0.orig/drivers/crypto/vmx/aesp8-ppc.pl
+++ linux-4.15.0/drivers/crypto/vmx/aesp8-ppc.pl
@@ -1318,7 +1318,7 @@
addi		$idx,$idx,16
bdnz		Loop_ctr32_enc
-vadduwm		$ivec,$ivec,$one
+vadduqm		$ivec,$ivec,$one
vmr		$dat,$inptail
lvx$inptail,0,$inp
addi$inp,$inp,16
@@ -1815,7 +1815,7 @@
  
-stvx_u$out1,$x10,$out
-stvx_u$out2,$x20,$out
addi$out,$out,0x30
-bLcbc_dec8x_done
+blctr32_enc8x_done

.align5
Lctr32_enc8x_two:
@@ -1827,7 +1827,7 @@
  
-stvx_u$out0,$x10,$out
-stvx_u$out1,$x10,$out
addi$out,$out,0x20
-bLcbc_dec8x_done
+blctr32_enc8x_done

.align5
Lctr32_enc8x_one:
--- linux-4.15.0.orig/drivers/crypto/vmx/ghash.c
+++ linux-4.15.0/drivers/crypto/vmx/ghash.c
@@ -1,22 +1,14 @@

   @ @ -1,22 +1,14 @@
#!/ SPDX-License-Identifier: GPL-2.0
/**
 * GHASH routines supporting VMX instructions on the Power 8
 *
 * Copyright (C) 2015 International Business Machines Inc.
 *
 * This program is free software; you can redistribute it and/or modify
 * it under the terms of the GNU General Public License as published by
 * the Free Software Foundation; version 2 only.
 *
 * This program is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
 * GNU General Public License for more details.
 *
 * Author: Marcelo Henrique Cerri <mhcerri@br.ibm.com>
 *
 * Extended by Daniel Axtens <dja@axtens.net> to replace the fallback
 * mechanism. The new approach is based on arm64 code, which is:
 * Copyright (C) 2014 - 2018 Linaro Ltd. <ard.biesheuvel@linaro.org>
 */

#include <linux/types.h>

const u8 *in, size_t len);

struct p8_ghash_ctx {
    /* key used by vector asm */
    u128 htable[16];
    struct crypto_shash *fallback;
    /* key used by software fallback */
    be128 key;
};

struct p8_ghash_desc_ctx {
    u64 shash[2];
    u8 buffer[GHASH_DIGEST_SIZE];
    int bytes;
    struct shash_desc fallback_desc;
};

-static int p8_ghash_init_tfm(struct crypto_tfm *tfm)
const char *alg = "ghash-generic";
struct crypto_shash *fallback;
struct crypto_hash *shash_tfm = __crypto_shash_cast(tfm);
struct p8_ghash_ctx *ctx = crypto_tfm_ctx(tfm);

fallback = crypto_alloc_shash(alg, 0, CRYPTO_ALG_NEED_FALLBACK);
if (IS_ERR(fallback)) {
    printk(KERN_ERR "Failed to allocate transformation for '%s': %ld\n",
    alg, PTR_ERR(fallback));
    return PTR_ERR(fallback);
}
printk(KERN_INFO "Using '%s' as fallback implementation.\n",
    crypto_tfm_alg_driver_name(crypto_shash_tfm(fallback)));

crypto_shash_set_flags(fallback,
    crypto_shash_get_flags((struct crypto_shash *tfm)));

/* Check if the descsize defined in the algorithm is still enough. */
if (shash_tfm->descsize < sizeof(struct p8_ghash_desc_ctx)
    + crypto_shash_descsize(fallback)) {
    printk(KERN_ERR "Desc size of the fallback implementation (%s) does not match the expected value: %lu vs %u\n",
        alg,
        shash_tfm->descsize - sizeof(struct p8_ghash_desc_ctx),
        crypto_shash_descsize(fallback));
    return -EINVAL;
}
ctx->fallback = fallback;
return 0;
}

static void p8_ghash_exit_tfm(struct crypto_tfm *tfm)
{
    struct p8_ghash_ctx *ctx = crypto_tfm_ctx(tfm);

    if (ctx->fallback) {
        crypto_free_shash(ctx->fallback);
        ctx->fallback = NULL;
    }

static int p8_ghash_init(struct shash_desc *desc)
{
    struct p8_ghash_ctx *ctx = crypto_tfm_ctx(crypto_shash_tfm(desc->tfm));
    struct p8_ghash_desc_ctx *dctx = shash_desc_ctx(desc);

dctx->bytes = 0;
memset(dctx->shash, 0, GHASH_DIGEST_SIZE);
-dctx->fallback_desc.tfm = ctx->fallback;
-dctx->fallback_desc.flags = desc->flags;
+return crypto_shash_init(&dctx->fallback_desc);
+return 0;
}

static int p8_ghash_setkey(struct crypto_shash *tfm, const u8 *key,
@@ -123,7 +67,51 @@
disable_kernel_vsx();
pagefault_enable();
preempt_enable();
-return crypto_shash_setkey(ctx->fallback, key, keylen);
+
+memcpy(&ctx->key, key, GHASH BLOCK_SIZE);
+
+return 0;
+}
+
+static inline void __ghash_block(struct p8_ghash_ctx *ctx,
+ struct p8_ghash_desc_ctx *dctx)
+{
+if (!IN_INTERRUPT) {
+preempt_disable();
+pagefault_disable();
+enable_kernel_vsx();
+gcm_ghash_p8(dctx->shash, ctx->htable,
+dctx->buffer, GHASH_DIGEST_SIZE);
+disable_kernel_vsx();
+pagefault_enable();
+preempt_enable();
+} else {
+crypto_xor((u8 *)dctx->shash, dctx->buffer, GHASH BLOCK_SIZE);
+gf128mul_lle((be128 *)&dctx->shash, &ctx->key);
+}
+}
+
+static inline void __ghash_blocks(struct p8_ghash_ctx *ctx,
+ struct p8_ghash_desc_ctx *dctx,
+ const u8 *src, unsigned int srclen)
+{
+if (!IN_INTERRUPT) {
+preempt_disable();
+pagefault_disable();
+enable_kernel_vsx();
+gcm_ghash_p8(dctx->shash, ctx->htable,
+src, srclen);
+disable_kernel_vsx();
+pagefault_enable();
+preempt_enable();
+} else {
+while (srclen >= GHASH_BLOCK_SIZE) {
+crypto_xor((u8 *)dctx->shash, src, GHASH_BLOCK_SIZE);
+gf128mul_lle((be128 *)dctx->shash, &ctx->key);
+srclen -= GHASH_BLOCK_SIZE;
+src += GHASH_BLOCK_SIZE;
+}
+
+
}

static int p8_ghash_update(struct shash_desc *desc,
@@ -133,49 +121,33 @@
struct p8_ghash_ctx *ctx = crypto_tfm_ctx(crypto_shash_tfm(desc->tfm));
struct p8_ghash_desc_ctx *dctx = shash_desc_ctx(desc);

-if (IN_INTERRUPT) {
-return crypto_shash_update(&dctx->fallback_desc, src,
- srclen);
-} else {
- if (dctx->bytes) {
- if (dctx->bytes + srclen < GHASH_DIGEST_SIZE) {
-memcpy(dctx->buffer + dctx->bytes, src,
- srclen);
-dctx->bytes += srclen;
-return 0;
-}
+if (dctx->bytes) {
+if (dctx->bytes + srclen < GHASH_DIGEST_SIZE) {
+memcpy(dctx->buffer + dctx->bytes, src,
+ srclen);
-dctx->bytes += srclen;
+return 0;
-}
+if (dctx->bytes) {
+if (dctx->bytes + srclen < GHASH_DIGEST_SIZE) {
+memcpy(dctx->buffer + dctx->bytes, src,
- GHASH_DIGEST_SIZE - dctx->bytes);
-preempt_disable();
-pagefault_disable();
-enable_kernel_vsx();
-gcm_ghash_p8(dctx->shash, ctx->htable,
- dctx->buffer, GHASH_DIGEST_SIZE);
-disable_kernel_vsx();
-pagefault_enable();
-preempt_enable();
-src += GHASH_DIGEST_SIZE - dctx->bytes;
-srclen -= GHASH_DIGEST_SIZE - dctx->bytes;
-dctx->bytes = 0;
+srclen);
+dctx->bytes += srclen;
+return 0;
-} else {
- return crypto_shash_update(&dctx->fallback_desc, src,
- srclen);
-}
-} else {
- if (dctx->bytes) {
- if (dctx->bytes + srclen < GHASH_DIGEST_SIZE) {
-memcpy(dctx->buffer + dctx->bytes, src,
- srclen);
-dctx->bytes += srclen;
-return 0;
-}
+if (dctx->bytes) {
+if (dctx->bytes + srclen < GHASH_DIGEST_SIZE) {
+memcpy(dctx->buffer + dctx->bytes, src,
+ srclen);
-dctx->bytes += srclen;
+return 0;
len = srclen & ~(GHASH_DIGEST_SIZE - 1);
if (len) {
    preempt_disable();
    pagefault_disable();
    enable_kernel_vsx();
    gcm_ghash_p8(dctx->shash, ctx->htable, src, len);
    disable_kernel_vsx();
    pagefault_enable();
    preempt_enable();
    src += len;
    srclen -= len;
}
if (srclen) {
    memcpy(dctx->buffer, src, srclen);
    dctx->bytes = srclen;
}
return 0;

memcpy(dctx->buffer + dctx->bytes, src, GHASH_DIGEST_SIZE - dctx->bytes);
__ghash_block(ctx, dctx);
src += GHASH_DIGEST_SIZE - dctx->bytes;
srclen -= GHASH_DIGEST_SIZE - dctx->bytes;
}
len = srclen & ~(GHASH_DIGEST_SIZE - 1);
if (len) {
    __ghash_blocks(ctx, dctx, src, len);
    src += len;
    srclen -= len;
}
if (srclen) {
    memcpy(dctx->buffer, src, srclen);
    dctx->bytes = srclen;
}
return 0;

static int p8_ghash_final(struct shash_desc *desc, u8 *out)
@@ -184,25 +156,14 @@
    struct p8_ghash_ctx *ctx = crypto_tfm_ctx(crypto_shash_tfm(desc->tfm));
    struct p8_ghash_desc_ctx *dctx = shash_desc_ctx(desc);

    -if (IN_INTERRUPT) {
        -return crypto_shash_final(&dctx->fallback_desc, out);
    -} else {


if (dctx->bytes) {
  for (i = dctx->bytes; i < GHASH_DIGEST_SIZE; i++)
    dctx->buffer[i] = 0;
  preempt_disable();
  pagefault_disable();
  enable_kernel_vsx();
  gcm_ghash_p8(dctx->shash, ctx->htable,
                dctx->buffer, GHASH_DIGEST_SIZE);
  disable_kernel_vsx();
  pagefault_enable();
  preempt_enable();
  dctx->bytes = 0;
}
memcpy(out, dctx->shash, GHASH_DIGEST_SIZE);
return 0;

if (dctx->bytes) {
  for (i = dctx->bytes; i < GHASH_DIGEST_SIZE; i++)
    dctx->buffer[i] = 0;
  __ghash_block(ctx, dctx);
  dctx->bytes = 0;
}
memcpy(out, dctx->shash, GHASH_DIGEST_SIZE);
return 0;

struct shash_alg p8_ghash_alg = {
  .cra_name = "ghash",
  .cra_driver_name = "p8_ghash",
  .cra_priority = 1000,
  .cra_flags = CRYPTO_ALG_TYPE_SHASH | CRYPTO_ALG_NEED_FALLBACK,
  .cra_flags = CRYPTO_ALG_TYPE_SHASH,
  .cra_blocksize = GHASH_BLOCK_SIZE,
  .cra_ctxsize = sizeof(struct p8_ghash_ctx),
  .cra_module = THIS_MODULE,
  .cra_init = p8_ghash_init_tfm,
  .cra_exit = p8_ghash_exit_tfm,
};

--- linux-4.15.0.orig/drivers/dax/device.c
+++ linux-4.15.0/drivers/dax/device.c
@@ -19,6 +19,7 @@
#include <linux/dax.h>
#include <linux/fs.h>
#include <linux/mm.h>
+#include <linux/mman.h>
#include "dax-private.h"
#include "dax.h"
/* prevent private mappings from being established */
if ((vma->vm_flags & VM_MAYSHARE) != VM_MAYSHARE) {
-dev_info(dev, "%s: %s: fail, attempted private mapping\n",
+dev_info_ratelimited(dev,
+"%s: %s: fail, attempted private mapping\n",
current->comm, func);
return -EINVAL;
}

mask = dax_region->align - 1;
if (vma->vm_start & mask || vma->vm_end & mask) {
-dev_info(dev, "%s: %s: fail, unaligned vma (%#lx - %#lx, %#lx)\n",
+dev_info_ratelimited(dev,
+"%s: %s: fail, unaligned vma (%#lx - %#lx, %#lx)\n",
current->comm, func, vma->vm_start, vma->vm_end,
mask);
return -EINVAL;
}

if ((dax_region->pfn_flags & (PFN_DEV|PFN_MAP)) == PFN_DEV
&& (vma->vm_flags & VM_DONTCOPY) == 0) {
-dev_info(dev, "%s: %s: fail, dax range requires MADV_DONTFORK\n",
+dev_info_ratelimited(dev,
+"%s: %s: fail, dax range requires MADV_DONTFORK\n",
current->comm, func);
return -EINVAL;
}

if (!vma_is_dax(vma)) {
-dev_info(dev, "%s: %s: fail, vma is not DAX capable\n",
+dev_info_ratelimited(dev,
+"%s: %s: fail, vma is not DAX capable\n",
current->comm, func);
return -EINVAL;
}

@@ -330,8 +335,7 @@
pfn = phys_to_pfn_t(phys, dax_region->pfn_flags);

-return vmf_insert_pfn_pmd(vmf->vma, vmf->address, vmf->pmd, pfn,
-vmf->flags & FAULT_FLAG_WRITE);
+return vmf_insert_pfn_pmd(vmf, pfn, vmf->flags & FAULT_FLAG_WRITE);
}

#ifdef CONFIG_HAVE_ARCH_TRANSPARENT_HUGEPAGE_PUD
pfm = phys_to_pfn_t(phys, dax_region->pfm_flags);

-vmf_insert_pfn_pdu(vmf->vma, vmf->address, vmf->pud, pfn,
-vmf->flags & FAULT_FLAG_WRITE);
+return vmf_insert_pfn_pdu(vmf, pfn, vmf->flags & FAULT_FLAG_WRITE);
}
#else
static int __dev_dax_pud_fault(struct dev_dax *dev_dax, struct vm_fault *vmf)
@@ -534,6 +537,7 @@
.release = dax_release,
.get_unmapped_area = dax_get_unmapped_area,
.mmap = dax_mmap,
+.mmap_supported_flags = MAP_SYNC,
};

static void dev_dax_release(struct device *dev)
--- linux-4.15.0.orig/drivers/dax/pmem.c
+++ linux-4.15.0/drivers/dax/pmem.c
@@ -105,14 +105,18 @@
if (rc)
return rc;
-rc = devm_add_action_or_reset(dev, dax_pmem_percpu_exit,
-&dax_pmem->ref);
-if (rc)
+rc = devm_add_action(dev, dax_pmem_percpu_exit, &dax_pmem->ref);
+if (rc) {
+percpu_ref_exit(&dax_pmem->ref);
+return rc;
+}

addr = devm_memremap_pages(dev, &res, &dax_pmem->ref, altmap);
-if (IS_ERR(addr))
+if (IS_ERR(addr)) {
+devm_remove_action(dev, dax_pmem_percpu_exit, &dax_pmem->ref);
+percpu_ref_exit(&dax_pmem->ref);
+return PTR_ERR(addr);
+}

rc = devm_add_action_or_reset(dev, dax_pmem_percpu_kill,
&dax_pmem->ref);
--- linux-4.15.0.orig/drivers/dax/super.c
+++ linux-4.15.0/drivers/dax/super.c
@@ -15,6 +15,7 @@
#include <linux/mount.h>
#include <linux/magic.h>

#include <linux/genhd.h>
+#include <linux/pfn_t.h>
#include <linux/cdev.h>
#include <linux/hash.h>
#include <linux/slab.h>
@@ -73,42 +74,50 @@

/**
 * __bdev_dax_supported() - Check if the device supports dax for filesystem
 - * @sb: The superblock of the device
 + * @bdev: block device to check
 * @blocksize: The block size of the device
 *
 * This is a library function for filesystems to check if the block device
 * can be mounted with dax option.
 *
 - * Return: negative errno if unsupported, 0 if supported.
 + * Return: true if supported, false if unsupported
 */
-int __bdev_dax_supported(struct super_block *sb, int blocksize)
+bool __bdev_dax_supported(struct block_device *bdev, int blocksize)
{
-struct block_device *bdev = sb->s_bdev;
 struct dax_device *dax_dev;
+struct request_queue *q;
 pgoff_t pgoff;
 void *kaddr;
 pfnt_t pfnt;
 long len;
+char buf[ BDEVNAME_SIZE ];

 if (blocksize != PAGE_SIZE) {
-printf("VFS (%s): error: unsupported blocksize for dax\n", 
-sb->s_id);
-return -EINVAL;
 +pr_debug("%s: error: unsupported blocksize for dax\n", 
+bdevname(bdev, buf));
 +return false;
 +}
+
 +q = bdev_get_queue(bdev);
 +if (!q || !blk_queue_dax(q)) {
 +pr_debug("%s: error: request queue doesn't support dax\n", 
+bdevname(bdev, buf));
 +return false;
 }
err = bdev_dax_pgoff(bdev, 0, PAGE_SIZE, &pgoff);
if (err) {
    -pr_debug("VFS (%s): error: unaligned partition for dax\n", 
              -sb->s_id);
    -return err;
    +pr_debug("%s: error: unaligned partition for dax\n", 
              +bdevname(bdev, buf));
    +return false;
}

dax_dev = dax_get_by_host(bdev->bd_disk->disk_name);
if (!dax_dev) {
    -pr_debug("VFS (%s): error: device does not support dax\n", 
              -sb->s_id);
    -return -EOPNOTSUPP;
    +pr_debug("%s: error: device does not support dax\n", 
              +bdevname(bdev, buf));
    +return false;
}
id = dax_read_lock();
@@ -118,12 +127,21 @@
    put_dax(dax_dev);
}

if (len < 1) {
    -pr_debug("VFS (%s): error: dax access failed (%ld)\n", 
              -sb->s_id, len);
    -return len < 0 ? len : -EIO;
    +pr_debug("%s: error: dax access failed (%ld)\n", 
              +bdevname(bdev, buf), len);
    +return false;
}

-    -return 0;
-+    if ((IS_ENABLED(CONFIG_FS_DAX_LIMITED) && pfn_t_special(pfn)) 
+    /* pass */;
+    } else {
+        +pr_debug("%s: error: dax support not enabled\n", 
                      +bdevname(bdev, buf));
+        +return false;
+    }
+    +return true;
+
EXPORT_SYMBOL_GPL(__bdev_dax_supported);
#ifdef
--- linux-4.15.0.orig/drivers/devfreq/Kconfig
+++ linux-4.15.0/drivers/devfreq/Kconfig
@@ -103,7 +103,8 @@
     depends on ARCH_ROCKCHIP
+depends on (ARCH_ROCKCHIP && HAVE_ARM_SMCCC) || 
+(COMPILER_TEST && HAVE_ARM_SMCCC)
select DEVFREQ_EVENT_ROCKCHIP_DFI
select DEVFREQ_GOV_SIMPLE_ONDEMAND
select PM_DEVFREQ_EVENT
--- linux-4.15.0.orig/drivers/devfreq/devfreq.c
+++ linux-4.15.0/drivers/devfreq/devfreq.c
@@ -11,6 +11,7 @@
 */
 #include <linux/kernel.h>
 +#include <linux/kmod.h>
 #include <linux/sched.h>
 #include <linux/errno.h>
 #include <linux/err.h>
 @@ -162,6 +163,7 @@
 int lev, prev_lev, ret = 0;
 unsigned long cur_time;

+lockdep_assert_held(&devfreq->lock);
 cur_time = jiffies;

 /* Immediately exit if previous_freq is not initialized yet. */
 @@ -221,6 +223,49 @@
 return ERR_PTR(-ENODEV);
 }

+/**
+ * try_then_request_governor() - Try to find the governor and request the
+ * module if is not found.
+ * @name:	name of the governor
+ *
+ * Search the list of devfreq governors and request the module and try again
+ * if is not found. This can happen when both drivers (the governor driver
+ * and the driver that call devfreq_add_device) are built as modules.
+ * devfreq_list_lock should be held by the caller. Returns the matched
+ * governor's pointer or an error pointer.
+ */
+static struct devfreq_governor *try_then_request_governor(const char *name)
+{
+    struct devfreq_governor *governor;
+    int err = 0;


+if (IS_ERR_OR_NULL(name)) {
+    pr_err("DEVFREQ: %s: Invalid parameters\n", __func__);
+    return ERR_PTR(-EINVAL);
+}
+WARN(!mutex_is_locked(&devfreq_list_lock),
+     "devfreq_list_lock must be locked.");
+
governor = find_devfreq_governor(name);
+if (IS_ERR(governor)) {
+    mutex_unlock(&devfreq_list_lock);
+
+    if (!strncmp(name, DEVFREQ_GOV_SIMPLE_ONDEMAND,
+                 DEVFREQ_NAME_LEN))
+        err = request_module("governor_%s", "simpleondemand");
+    else
+        err = request_module("governor_%s", name);
+    /* Restore previous state before return */
+    mutex_lock(&devfreq_list_lock);
+    if (err)
+        return (err < 0) ? ERR_PTR(err) : ERR_PTR(-EINVAL);
+
+    governor = find_devfreq_governor(name);
+}+
+
+return governor;
}

static int devfreq_notify_transition(struct devfreq *devfreq,
   struct devfreq_freqs *freqs, unsigned int state)
{

max_freq = MIN(devfreq->scaling_max_freq, devfreq->max_freq);
min_freq = MAX(devfreq->scaling_min_freq, devfreq->min_freq);

- if (min_freq && freq < min_freq) {
+ if (freq < min_freq) {
  freq = min_freq;
  flags &= ~DEVFREQ_FLAG_LEAST_UPPER_BOUND; /* Use GLB */
 }- if (max_freq && freq > max_freq) {
+ if (freq > max_freq) {
  freq = max_freq;
  flags |= DEVFREQ_FLAG_LEAST_UPPER_BOUND; /* Use LUB */
 }
struct devfreq *devfreq = container_of(nb, struct devfreq, nb);

- int ret;
+ int err = -EINVAL;

mutex_lock(&devfreq->lock);

devfreq->scaling_min_freq = find_available_min_freq(devfreq);
- if (!devfreq->scaling_min_freq) {
- mutex_unlock(&devfreq->lock);
- return -EINVAL;
- }
+ if (!devfreq->scaling_min_freq)
+ goto out;

devfreq->scaling_max_freq = find_available_max_freq(devfreq);
if (!devfreq->scaling_max_freq) {
- mutex_unlock(&devfreq->lock);
- return -EINVAL;
+ devfreq->scaling_max_freq = ULONG_MAX;
+ goto out;
}

- ret = update_devfreq(devfreq);
+ err = update_devfreq(devfreq);
+
+ out:
mutex_unlock(&devfreq->lock);
+ if (err)
+ dev_err(devfreq->dev.parent,
+ "failed to update frequency from OPP notifier (%d)\n",
+ err);

- return ret;
+ return NOTIFY_OK;

/**
@@ -526,18 +575,9 @@
struct devfreq *devfreq = to_devfreq(dev);

mutex_lock(&devfreq_list_lock);
- if (IS_ERR(find_device_devfreq(devfreq->dev.parent))) {
- mutex_unlock(&devfreq_list_lock);
- dev_warn(&devfreq->dev, "releasing devfreq which doesn't exist\n");
- return;
- }
list_del(&devfreq->node);
mutex_unlock(&devfreq_list_lock);
if (devfreq->governor)
-devfreq->governor->event_handler(devfreq,
- DEVFREQ_GOV_STOP, NULL);
-
if (devfreq->profile->exit)
devfreq->profile->exit(devfreq->dev.parent);

@@ -560,7 +600,6 @@
{
  struct devfreq *devfreq;
  struct devfreq_governor *governor;
- static atomic_t devfreq_no = ATOMIC_INIT(-1);
  int err = 0;

  if (!dev || !profile || !governor_name) {
    @ @ -589,6 +628,7 @@
    devfreq->dev.parent = dev;
    devfreq->dev.class = devfreq_class;
    devfreq->dev.release = devfreq_dev_release;
    +INIT_LIST_HEAD(&devfreq->node);
    devfreq->profile = profile;
    strncpy(devfreq->governor_name, governor_name, DEVFREQ_NAME_LEN);
    devfreq->previous_freq = profile->initial_freq;
    @ @ -620,12 +660,12 @@
  }
  devfreq->scaling_max_freq = devfreq->max_freq;

  -dev_set_name(&devfreq->dev, "devfreq%d",
- atomic_inc_return(&devfreq_no));
  +dev_set_name(&devfreq->dev, "%s", dev_name(dev));
  err = device_register(&devfreq->dev);
  if (err) {
    mutex_unlock(&devfreq->lock);
    -goto err_dev;
    +put_device(&devfreq->dev);
    +goto err_out;
  }

  devfreq->trans_table = devm_kzalloc(&devfreq->dev,
    @ @ -644,9 +684,8 @@
    mutex_unlock(&devfreq->lock);

    mutex_lock(&devfreq_list_lock);
    -list_add(&devfreq->node, &devfreq_list);

    -governor = find_devfreq_governor(devfreq->governor_name);
    +governor = try_then_request_governor(devfreq->governor_name);
if (IS_ERR(governor)) {
    dev_err(dev, "%s: Unable to find governor for the device\n", __func__);  
    goto err_init;  
}
+
t_list_add(&devfreq->node, &devfreq_list);
+
mutex_unlock(&devfreq_list_lock);

return devfreq;

er_init:
-      list_del(&devfreq->node);
-      mutex_unlock(&devfreq_list_lock);
-
-device_unregister(&devfreq->dev);
+devfreq_remove_device(devfreq);
+devfreq = NULL;

er_dev:
   if (devfreq)
      kfree(devfreq);
   @ @ -690,6 +732,9 @ @
   if (!devfreq)
      return -EINVAL;
+
   if (devfreq->governor)
      devfreq->governor->event_handler(devfreq,
      DEVFREQ_GOV_STOP, NULL);
   device_unregister(&devfreq->dev);

return 0;
   @ @ -737,7 +782,7 @ @
devfreq = devfreq_add_device(dev, profile, governor_name, data);
if (IS_ERR(devfreq)) {
    devres_free(ptr);
    -return ERR_PTR(-ENOMEM);
+return devfreq;
}

*ptr = devfreq;
   @ @ -966,6 +1011,14 @ @
}
EXPORT_SYMBOL(devfreq_remove_governor);
+
static ssize_t name_show(struct device *dev,
+struct device_attribute *attr, char *buf)  
+{  
+struct devfreq *devfreq = to_devfreq(dev);  
+return sprintf(buf, "%s
", dev_name(devfreq->dev.parent));  
+}  
+static DEVICE_ATTR_RO(name);  
+  
+static ssize_t governor_show(struct device *dev,  
+    struct device_attribute *attr, char *buf)  
+  {  
+    goto -988,7 +1041,7 @@  
+    return -EINVAL;  
+  }  

mutex_lock(&devfreq_list_lock);  
-governor = find_devfreq_governor(str_governor);  
+governor = try_then_request_governor(str_governor);  
if (IS_ERR(governor)) {  
  ret = PTR_ERR(governor);  
goto out;  
@@ -996,7 +1049,8 @@  
if (df->governor == governor) {  
  ret = 0;  
goto out;  
-} else if (df->governor->immutable || governor->immutable) {  
+} else if ((df->governor && df->governor->immutable)  
+      || governor->immutable) {  
  ret = -EINVAL;  
goto out;  
}  
@@ -1037,7 +1091,7 @@  
/* The devfreq with immutable governor (e.g., passive) shows  
* only own governor.  
*/  
-endif (df->governor->immutable) {  
+if (df->governor && df->governor->immutable) {  
  count = scnprintf(&buf[count], DEVFREQ_NAME_LEN,  
    "%s ", df->governor_name);  
/*  
@@ -1122,17 +1176,26 @@  
struct devfreq *df = to_devfreq(dev);  
unsigned long value;  
int ret;  
 unsigned long max;  
  
ret = sscanf(buf, "%lu", &value);  
if (ret != 1)  
return -EINVAL;  

mutex_lock(&df->lock);
-max = df->max_freq;
-if (value && max && value > max) {
-ret = -EINVAL;
-goto unlock;
+
+if (value) {
+if (value > df->max_freq) {
+ret = -EINVAL;
+goto unlock;
+} 
+} else {
+unsigned long *freq_table = df->profile->freq_table;
+
+/* Get maximum frequency according to sorting order */
+if (freq_table[0] < freq_table[df->profile->max_state - 1])
+value = freq_table[0];
+else
+value = freq_table[df->profile->max_state - 1];
}

df->min_freq = value;
@@ -1157,17 +1220,26 @@
struct devfreq *df = to_devfreq(dev);
unsigned long value;
int ret;
-unsigned long min;

ret = sscanf(buf, "%lu", &value);
if (ret != 1)
return -EINVAL;

mutex_lock(&df->lock);
-min = df->min_freq;
-if (value && min && value < min) {
-ret = -EINVAL;
-goto unlock;
+
+if (value) {
+if (value < df->min_freq) {
+ret = -EINVAL;
+goto unlock;
+} 
+} else {
+unsigned long *freq_table = df->profile->freq_table;
+
+/* Get maximum frequency according to sorting order */
+if (freq_table[0] < freq_table[df->profile->max_state - 1])

+value = freq_table[devfreq->profile->max_state - 1];
+else
+value = freq_table[0];
}

devfreq->max_freq = value;
@@ -1221,12 +1293,17 @@
int i, j;
unsigned int max_state = devfreq->profile->max_state;

-if (!devfreq->stop_polling &&
-devfreq_update_status(devfreq, devfreq->previous_freq))
-return 0;
if (max_state == 0)
return sprintf(buf, "Not Supported\n");

+mutex_lock(&devfreq->lock);
+if (!devfreq->stop_polling &&
+devfreq_update_status(devfreq, devfreq->previous_freq)) {
+mutex_unlock(&devfreq->lock);
+return 0;
+
+mutex_unlock(&devfreq->lock);
+
+len = sprintf(buf, "     From  :   To
" + sprintf(buf + len, "           :");
for (i = 0; i < max_state; i++)
@@ -1258,6 +1335,7 @@
static DEVICE_ATTR_RO(trans_stat);

static struct attribute *devfreq_attrs[] = {
 +&dev_attr_name.attr,
 &dev_attr_governor.attr,
 &dev_attr_available_governors.attr,
 &dev_attr_cur_freq.attr,
--- linux-4.15.0.orig/drivers/devfreq/event/Kconfig
+++ linux-4.15.0/drivers/devfreq/event/Kconfig
@@ -33,7 +33,7 @@
 config DEVFREQ_EVENT_ROCKCHIP_DFI
 tristate "ROCKCHIP DFI DEVFREQ event Driver"
 -depends on ARCH_ROCKCHIP
+depends on ARCH_ROCKCHIP || COMPILE_TEST
 help
  This add the devfreq-event driver for Rockchip SoC. It provides DFI
 (DDR Monitor Module) driver to count ddr load.
--- linux-4.15.0.orig/drivers/devfreq/exynos-bus.c
+++ linux-4.15.0/drivers/devfreq/exynos-bus.c
if (ret < 0)
    dev_warn(dev, "failed to disable the devfreq-event devices\n");

-if (bus->regulator)
-regulator_disable(bus->regulator);
-
    dev_pm_opp_of_remove_table(dev);
    clk_disable_unprepare(bus->clk);
+if (bus->regulator)
+regulator_disable(bus->regulator);
}

/*
  @ @ -386,6 +385,7 @ @
struct exynos_bus *bus;
int ret, max_state;
unsigned long min_freq, max_freq;
+bool passive = false;

    if (!np) {
        dev_err(dev, "failed to find devicetree node\n");
      @ @ -399,27 +399,27 @ @
        bus->dev = &pdev->dev;
        platform_set_drvdata(pdev, bus);

        /* Parse the device-tree to get the resource information */
        -ret = exynos_bus_parse_of(np, bus);
        -if (ret < 0)
        -return ret;
        -
        profile = devm_kzalloc(dev, sizeof(*profile), GFP_KERNEL);
        -if (!profile) {
        -ret = -ENOMEM;
        -goto err;
        -}
        +if (!profile)
        +return -ENOMEM;

        node = of_parse_phandle(dev->of_node, "devfreq", 0);
        if (node) {
            of_node_put(node);
            -passive = true;
            } else {
                ret = exynos_bus_parent_parse_of(np, bus);
                +if (ret < 0)
                +return ret;
+/* Parse the device-tree to get the resource information */
+ret = exynos_bus_parse_of(np, bus);
+if (ret < 0)
+    goto err;
+
+if (passive)
+    goto passive;
+
+/* Initialize the struct profile and governor data for parent device */
+profile->polling_ms = 50;
+
+err:
+dev_pm_opp_of_remove_table(dev);
+clk_disable_unprepare(bus->clk);
+
+if (!passive)
+    regulator_disable(bus->regulator);
+
+return ret;
+
+--- linux-4.15.0.orig/drivers/devfreq/governor_passive.c
+++ linux-4.15.0/drivers/devfreq/governor_passive.c
@@ -152,7 +152,6 @@
 static int devfreq_passive_event_handler(struct devfreq *devfreq,
     unsigned int event, void *data)
 {
-    struct device *dev = devfreq->dev.parent;
     struct devfreq_passive_data *p_data = (struct devfreq_passive_data *)devfreq->data;
     struct devfreq *parent = (struct devfreq *)p_data->parent;
@@ -168,12 +167,12 @@
     p_data->this = devfreq;
     nb->notifier_call = devfreq_passive_notifier_call;
     -ret = devm_devfreq_register_notifier(dev, parent, nb,
     +ret = devfreq_register_notifier(parent, nb,
        DEVFREQ_TRANSITION_NOTIFIER);
     break;
     case DEVFREQ_GOV_STOP:
     -devm_devfreq_unregister_notifier(dev, parent, nb,
     +WARN_ON(devfreq_unregister_notifier(parent, nb,
        DEVFREQ_TRANSITION_NOTIFIER));
     break;
     default:
break;
--- linux-4.15.0.orig/drivers/devfreq/tegra-devfreq.c
+++ linux-4.15.0/drivers/devfreq/tegra-devfreq.c
@@ -79,6 +79,8 @@

#define KHZ							1000

+#define KHZ_MAX						(ULONG_MAX / KHZ)
+
/* Assume that the bus is saturated if the utilization is 25% */
#define BUS_SATURATION_RATIO					25

@@ -179,7 +181,7 @@
}

static struct tegra_actmon_emc_ratio actmon_emc_ratios[] = {
-    { 1400000, ULONG_MAX },
+    { 1400000,    KHZ_MAX },
    { 1200000,    750000 },
    { 1100000,    600000 },
    { 1000000,    500000 },
@@ -485,11 +487,11 @@
{
    unsigned long rate = *freq * KHZ;
    unsigned long rate;

-    opp = devfreq_recommended_opp(dev, &rate, flags);
+    opp = devfreq_recommended_opp(dev, freq, flags);
    if (IS_ERR(opp)) {
-        dev_err(dev, "Failed to find opp for %lu KHz\n", *freq);
+        dev_err(dev, "Failed to find opp for %lu Hz\n", *freq);
        return PTR_ERR(opp);
    }
    rate = dev_pm_opp_get_freq(opp);
@@ -498,8 +500,6 @@
        clk_set_min_rate(tegra->emc_clock, rate);
        clk_set_rate(tegra->emc_clock, 0);

-    *freq = rate;
-    return 0;
}

@@ -509,7 +509,7 @@
    struct tegra_devfreq *tegra = dev_get_drvdata(dev);
    struct tegra_devfreq_device *actmon_dev;

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-stat->current_frequency = tegra->cur_freq;
+stat->current_frequency = tegra->cur_freq * KHZ;

/* To be used by the tegra governor */
stat->private_data = tegra;
@@ -564,7 +564,7 @@
target_freq = max(target_freq, dev->target_freq);
}

-*freq = target_freq;
+*freq = target_freq * KHZ;

return 0;
}
--- linux-4.15.0.orig/drivers/dma-buf/dma-buf.c
+++ linux-4.15.0/drivers/dma-buf/dma-buf.c
@@ -1115,6 +1115,7 @@
fence->ops->get_driver_name(fence),
fence->ops->get_timeline_name(fence),
dma_fence_is_signaled(fence) ? "" : "un");
+dma_fence_put(fence);
}
rcu_read_unlock();

--- linux-4.15.0.orig/drivers/dma-buf/dma-fence-array.c
+++ linux-4.15.0/drivers/dma-buf/dma-fence-array.c
@@ -31,6 +31,14 @@
return "unbound";
}

+static void irq_dma_fence_array_work(struct irq_work *wrk)
+{
+struct dma_fence_array *array = container_of(wrk, typeof(*array), work);
+    dma_fence_signal(&array->base);
+    dma_fence_put(&array->base);
+
+static void dma_fence_array_cb_func(struct dma_fence *f,
+    struct dma_fence_cb *cb)
+
    struct dma_fence cb *cb)
    {
    @ @ -39,8 +47,9 @@
    struct dma_fence_array *array = array_cb->array;

    if (atomic_dec_and_test(&array->num_pending))
        -dma_fence_signal(&array->base);
        -dma_fence_put(&array->base);
irq_work_queue(&array->work);
else
+dma_fence_put(&array->base);
}

static bool dma_fence_array_enable_signaling(struct dma_fence *fence)
{
  spin_lock_init(&array->lock);
  dma_fence_init(&array->base, &dma_fence_array_ops, &array->lock,
                 context, seqno);
  +init_irq_work(&array->work, irq_dma_fence_array_work);

  array->num_fences = num_fences;
  atomic_set(&array->num_pending, signal_on_any ? 1 : num_fences);
...

if(!nshared) {
  rcu_read_unlock();
+
+dma_fence_put(fence_excl);
+fence_excl = NULL;
+
  nshared = krealloc(shared, sz, GFP_KERNEL);
  if(nshared) {
    shared = nshared;
    unsigned long timeout)
    }
    struct dma_fence *fence;
    -unsigned seq, shared_count, i = 0;
+unsigned seq, shared_count;
    long ret = timeout ? timeout : 1;
+int i;

    retry:
    shared_count = 0;
    seq = read_seqcount_begin(&obj->seq);
    rcu_read_lock();
    +i = -1;

    fence = rcu_dereference(obj->fence_excl);
    if (fence && !test_bit(DMA_FENCE_FLAG_SIGNALED_BIT, &fence->flags)) {
      fence = NULL;
    }
-if (!fence && wait_all) {
+if (wait_all) {
    struct reservation_object_list *fobj =
    rcu_dereference(obj->fence);

    if (fobj)
        shared_count = fobj->shared_count;

    -for (i = 0; i < shared_count; ++i) {
+for (i = 0; !fence && i < shared_count; ++i) {
        struct dma_fence *lfence = rcu_dereference(fobj->shared[i]);

        if (test_bit(DMA_FENCE_FLAG_SIGNALED_BIT,
+          linux-4.15.0.orig/drivers/dma-buf/sw_sync.c
+++ linux-4.15.0/drivers/dma-buf/sw_sync.c
@@ -141,17 +141,14 @@
{
    struct sync_pt *pt = dma_fence_to_sync_pt(fence);
    struct sync_timeline *parent = dma_fence_parent(fence);
    unsigned long flags;

+    spin_lock_irqsave(fence->lock, flags);
    if (!list_empty(&pt->link)) {
        unsigned long flags;
-    
-    spin_lock_irqsave(fence->lock, flags);
-    if (!list_empty(&pt->link)) {
-        list_del(&pt->link);
-        rb_erase(&pt->node, &parent->pt_tree);
-    }
-    spin_unlock_irqrestore(fence->lock, flags);
+    spin_unlock_irqrestore(fence->lock, flags);
    sync_timeline_put(parent);
    dma_fence_free(fence);
@@ -275,7 +272,8 @@
p = &parent->rb_left;
} else {
    if (dma_fence_get_rcu(&other->base)) {
-        dma_fence_put(&pt->base);
+        sync_timeline_put(obj);
+        kfree(pt);
        pt = other;
        goto unlock;
    }
}

    sync_timeline_put(parent);
    dma_fence_free(fence);
@@ -275,7 +272,8 @@
p = &parent->rb_left;
} else {
    if (dma_fence_get_rcu(&other->base)) {
-        dma_fence_put(&pt->base);
+        sync_timeline_put(obj);
+        kfree(pt);
        pt = other;
        goto unlock;
    }
}
struct sync_file *b) {
    struct sync_file *sync_file;
    struct dma_fence **fences, **nfences, **a_fences, **b_fences;
    int i, i_a, i_b, num_fences, a_num_fences, b_num_fences;
    struct dma_fence **fences = NULL, **nfences, **a_fences, **b_fences;
    int i = 0, i_a, i_b, num_fences, a_num_fences, b_num_fences;
    sync_file = sync_file_alloc();
    if (!sync_file)
        goto err;

    a_fences = get_fences(a, &a_num_fences);
    b_fences = get_fences(b, &b_num_fences);
    if (a_num_fences > INT_MAX - b_num_fences)
        return NULL;
    goto err;

    num_fences = a_num_fences + b_num_fences;

    * If a sync_file can only be created with sync_file_merge
    * and sync_file_create, this is a reasonable assumption.
    */
    for (i = i_a = i_b = 0; i_a < a_num_fences && i_b < b_num_fences; ) {
        struct dma_fence *pt_a = a_fences[i_a];
        struct dma_fence *pt_b = b_fences[i_b];

        if (sync_file_set_fence(sync_file, fences, i) < 0) {
            kfree(fences);
            goto err;
        }

        strlcpy(sync_file->user_name, name, sizeof(sync_file->user_name));
        return sync_file;
    }
    -if (sync_file_set_fence(sync_file, fences, i) < 0) {
        -kfree(fences);
        -if (sync_file_set_fence(sync_file, fences, i) < 0)
            goto err;
    -}

    strlcpy(sync_file->user_name, name, sizeof(sync_file->user_name));
    return sync_file;

    err:
        +while (i)
        +dma_fence_put(fences[--i]);
        +kfree(fences);
fput(sync_file->file);
return NULL;

--- linux-4.15.0.orig/drivers/dma/Kconfig
+++ linux-4.15.0/drivers/dma/Kconfig
@@ -58,6 +58,7 @@
#devices
config ALTERA_MSGDMA
tristate "Altera / Intel mSGDMA Engine"
+depends on HAS_IOMEM
select DMA_ENGINE
help
   Enable support for Altera / Intel mSGDMA controller.
@@ -143,7 +144,7 @@
config DMA_JZ4780
tristate "JZ4780 DMA support"
-depends on MACH_JZ4780 || COMPILE_TEST
+depends on MIPS || COMPILE_TEST
select DMA_ENGINE
select DMA_VIRTUAL_CHANNELS
help
@@ -261,7 +262,7 @@
config INTEL_IOATDMA
tristate "Intel I/OAT DMA support"
-depends on PCI && X86_64
+depends on PCI && X86_64 && !UML
select DMA_ENGINE
select DMA_ENGINE_RAID
select DCA
--- linux-4.15.0.orig/drivers/dma/acpi-dma.c
+++ linux-4.15.0/drivers/dma/acpi-dma.c
@@ -72,10 +72,14 @@
    si = (const struct acpi_csrt_shared_info *)&grp[1];

-/* Match device by MMIO and IRQ */
+/* Match device by MMIO */
    if (si->mmio_base_low != lower_32_bits(mem) ||
        si->mmio_base_high != upper_32_bits(mem) ||
        si->gsi_interrupt != irq)
+    si->mmio_base_high != upper_32_bits(mem))
+    return 0;
+    /* Match device by Linux vIRQ */
+    ret = acpi_register_gsi(NULL, si->gsi_interrupt, si->interrupt_mode, si->interrupt_polarity);
+    if (ret != irq)
return 0;

dev_dbg(&adev->dev, "matches with %.4s%04X (rev %u)\n",
@@ -131,11 +135,13 @@
if (ret < 0) {
    dev_warn(&adev->dev,
        "error in parsing resource group\n");
    -return;
    +break;
}

grp = (struct acpi_csrt_group *)((void *)grp + grp->length);
}
+
+acpi_put_table((struct acpi_table_header *)csrt);
}

/**
 --- linux-4.15.0.orig/drivers/dma/at_hmac.c
+++ linux-4.15.0/drivers/dma/at_hmac.c
@@ -1641,6 +1641,12 @@
    atchan->descs_allocated = 0;
    atchan->status = 0;

+/*
+ * Free atslave allocated in at_dma_xlate()
+ */
+kfree(chan->private);
+chan->private = NULL;
+
+dev_vdbg(chan2dev(chan), "free_chan_resources: done\n");
}
@@ -1671,13 +1677,17 @@
return NULL;

dmac_pdev = of_find_device_by_node(dma_spec->np);
+if (!dmac_pdev)
+return NULL;

 dma_cap_zero(mask);
 dma_cap_set(DMA_SLAVE, mask);

-atslave = devm_kzalloc(&dmac_pdev->dev, sizeof(*atslave), GFP_KERNEL);
-if (!atslave)
+atslave = kmalloc(sizeof(*atslave), GFP_KERNEL);
+if (!atslave) {
+put_device(&dmac_pdev->dev);
return NULL;
+

tslave->cfg = ATC_DST_H2SEL_HW | ATC_SRC_H2SEL_HW;
/*
@@ -1706,8 +1716,11 @@
atslave->dma_dev = &dmac_pdev->dev;

chan = dma_request_channel(mask, at_dma_filter, atslave);
-if (!chan)
+if (!chan) {
+put_device(&dmac_pdev->dev);
+kfree(atslave);
return NULL;
+}

atchan = to_at_dma_chan(chan);
atchan->per_if = dma_spec->args[0] & 0xff;
@@ -2000,6 +2013,8 @@
struct resource*io;

at_dma_off(atdma);
+if (pdev->dev.of_node)
+of_dma_controller_free(pdev->dev.of_node);
dma_async_device_unregister(&atdma->dma_common);

dma_pool_destroy(atdma->memset_pool);
--- linux-4.15.0.orig/drivers/dma/at_xdmac.c
+++ linux-4.15.0/drivers/dma/at_xdmac.c
@@ -203,6 +203,7 @@
u32				save_cim;
u32				save_cnda;
u32				save_cndc;
+u32				irq_status;
unsigned long			status;
struct tasklet_struct		tasklet;
struct dma_slave_config		sconfig;
@@ -1471,10 +1472,10 @@
for (retry = 0; retry < AT_XDMAC_RESIDUE_MAX_RETRIES; retry++) {
check_nda = at_xdmac_chan_read(atchan, AT_XDMAC_CNDA) & 0xffffffff;
rmb();
-initid = !!(at_xdmac_chan_read(atchan, AT_XDMAC_CC) & AT_XDMAC_CC_INITD);
-rmb();
cur_ubb = at_xdmac_chan_read(atchan, AT_XDMAC_CUBC);
rmb();
+initid = !!(at_xdmac_chan_read(atchan, AT_XDMAC_CC) & AT_XDMAC_CC_INITD);
+rmb();
cur_nba = at_xdmac_chan_read(atchan, AT_XDMAC_CNDA) & 0xffffffff;
rmb();

@@ -1580,8 +1581,8 @@
struct at_xdma_desc *desc;
u32 error_mask;

-dev_dbg(chan2dev(&atchan->chan), "%s: status=0x%08lx\n", 
- __func__, atchan->status);
+dev_dbg(chan2dev(&atchan->chan), "%s: status=0x%08x\n", 
+ __func__, atchan->irq_status);

event_mask = AT_XDMAC_CIS_RBEIS
    | AT_XDMAC_CIS_WBEIS
@@ -1589,15 +1590,15 @@
if (at_xdma_chan_is_cyclic(atchan)) {
    at_xdma_handle_cyclic(atchan);
} else if ((atchan->status & AT_XDMAC_CIS_LIS)
    | (atchan->status & error_mask)) {
+    } else if ((atchan->irq_status & AT_XDMAC_CIS_LIS)
+        | (atchan->irq_status & error_mask)) {
struct dma_async_tx_descriptor *txd;

-if (atchan->status & AT_XDMAC_CIS_RBEIS)
+if (atchan->irq_status & AT_XDMAC_CIS_RBEIS)
    dev_err(chan2dev(&atchan->chan), "read bus error!!!");
-if (atchan->status & AT_XDMAC_CIS_WBEIS)
+if (atchan->irq_status & AT_XDMAC_CIS_WBEIS)
    dev_err(chan2dev(&atchan->chan), "write bus error!!!");
-if (atchan->status & AT_XDMAC_CIS_ROIS)
+if (atchan->irq_status & AT_XDMAC_CIS_ROIS)
    dev_err(chan2dev(&atchan->chan), "request overflow error!!!");

spin_lock_bh(&atchan->lock);
@@ -1605,7 +1606,11 @@
struct at_xdma_desc,
    xfer_node);
-dev_vdbg(chan2dev(&atchan->chan), "%s: desc 0x%p\n", __func__, desc);
-BUG_ON(!(desc->active_xfer);
+if (!desc->active_xfer) {
+    dev_err(chan2dev(&atchan->chan), "Xfer not active: exiting");
+spin_unlock(&atchan->lock);
+return;
+}

    txd = &desc->tx_dma_desc;

@@ -1652,7 +1657,7 @@
atchan = &atxdmac->chan[i];
chan_imr = at_xdmac_chan_read(atchan, AT_XDMAC_CIM);
chan_status = at_xdmac_chan_read(atchan, AT_XDMAC_CIS);
-atchan->status = chan_status & chan_imr;
+atchan->irq_status = chan_status & chan_imr;
devel_vdbg(atxdmac->dma.dev,
"%s: chan%d: imr=0x%x, status=0x%x\n",
__func__, i, chan_imr, chan_status);
@@ -1666,7 +1671,7 @@
at_xdmac_chan_read(atchan, AT_XDMAC_CDA),
at_xdmac_chan_read(atchan, AT_XDMAC_CUBC));

-if (atchan->status & (AT_XDMAC_CIS_RBEIS | AT_XDMAC_CIS_WBEIS))
+if (atchan->irq_status & (AT_XDMAC_CIS_RBEIS | AT_XDMAC_CIS_WBEIS))
at_xdmac_write(atxdmac, AT_XDMAC_GD, atchan->mask);

tasklet_schedule(&atchan->tasklet);
--- linux-4.15.0.orig/drivers/dma/bcm2835-dma.c
+++ linux-4.15.0/drivers/dma/bcm2835-dma.c
@@ -415,38 +415,32 @@
}

-static int bcm2835_dma_abort(void __iomem *chan_base)
+static int bcm2835_dma_abort(struct bcm2835_chan *c)
{
-unsigned long cs;
+void __iomem *chan_base = c->chan_base;
long int timeout = 10000;

- cs = readl(chan_base + BCM2835_DMA_CS);
- if (!((cs & BCM2835_DMA_ACTIVE))
+ /*
+ * A zero control block address means the channel is idle.
+ * (The ACTIVE flag in the CS register is not a reliable indicator.)
+ */
+ if (!readl(chan_base + BCM2835_DMA_ADDR))
return 0;

/* Write 0 to the active bit - Pause the DMA */
writel(0, chan_base + BCM2835_DMA_CS);

/* Wait for any current AXI transfer to complete */
-while ((cs & BCM2835_DMA_ISPAUSED) && --timeout) {
+while ((readl(chan_base + BCM2835_DMA_CS) &
+BCM2835_DMA_WAITING_FOR_WRITES) && --timeout)
cpu_relax();
- cs = readl(chan_base + BCM2835_DMA_CS);
-}
-/* We'll un-pause when we set of our next DMA */
+/* Peripheral might be stuck and fail to signal AXI write responses */
if (!timeout)
-return -ETIMEDOUT;
-if (!(cs & BCM2835_DMA_ACTIVE))
-return 0;
-/* Terminate the control block chain */
-writel(0, chan_base + BCM2835_DMA_NEXTCB);
-/* Abort the whole DMA */
-writel(BCM2835_DMA_ABORT | BCM2835_DMA_ACTIVE,
chan_base + BCM2835_DMA_CS);
+dev_err(c->vc.chan.device->dev,
+"failed to complete outstanding writes\n");
+writel(BCM2835_DMA_RESET, chan_base + BCM2835_DMA_CS);
return 0;
}
@@ -485,8 +479,15 @@
spin_lock_irqsave(&c->vc.lock, flags);
-/* Acknowledge interrupt */
-writel(BCM2835_DMA_INT, c->chan_base + BCM2835_DMA_CS);
+/*
+ * Clear the INT flag to receive further interrupts. Keep the channel
+ * active in case the descriptor is cyclic or in case the client has
+ * already terminated the descriptor and issued a new one. (May happen
+ * if this IRQ handler is threaded.) If the channel is finished, it
+ * will remain idle despite the ACTIVE flag being set.
+ */
+writel(BCM2835_DMA_INT | BCM2835_DMA_ACTIVE,
+
c->chan_base + BCM2835_DMA_CS);
d = c->desc;
@@ -494,11 +495,7 @@
if (d->cyclic) {
/* call the cyclic callback */
vchan_cyclic_callback(&d->vd);
-/* Keep the DMA engine running */
-writel(BCM2835_DMA_ACTIVE,

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- c->chan_base + BCM2835_DMA_CS);
-} else {
+} else if (!readl(c->chan_base + BCM2835_DMA_ADDR)) {
    vchan_cookie_complete(&c->desc->vd);
    bcm2835_dma_start_desc(c);
} @ @ -796,7 +793,6 @@
struct bcm2835_chan *c = to_bcm2835_dma_chan(chan);
struct bcm2835_dmadev *d = to_bcm2835_dma_dev(c->vc.chan.device);
unsigned long flags;
-int timeout = 10000;
LIST_HEAD(head);

spin_lock_irqsave(&c->vc.lock, flags);
@@ -806,27 +802,11 @@
list_del_init(&c->node);
spin_unlock(&d->lock);

-/*
- * Stop DMA activity: we assume the callback will not be called
- * after bcm_dma_abort() returns (even if it does, it will see
- * c->desc is NULL and exit.)
- */
+/* stop DMA activity */
if (c->desc) {
    bcm2835_dma_desc_free(&c->desc->vd);
    c->desc = NULL;
-bcm2835_dma_abort(c->chan_base);
-
-/* Wait for stopping */
-while (--timeout) {
-    if (!(readl(c->chan_base + BCM2835_DMA_CS) &
-    -BCM2835_DMA_ACTIVE))
-        break;
-    -cpu_relax();
-    -}
-    -
-    -if (!timeout)
-        dev_err(d->ddev.dev, "DMA transfer could not be terminated\n");
+    bcm2835_dma_abort(c);
} 

vchan_get_all_descriptors(&c->vc, &head);
@@ -911,8 +891,10 @@
pdev->dev.dma_mask = &pdev->dev.coherent_dma_mask;

rc = dma_set_mask_and_coherent(pdev->dev, DMA_BIT_MASK(32));
if (rc) {
+dev_err(&pdev->dev, "Unable to set DMA mask\n");
return rc;
+

od = devm_kzalloc(&pdev->dev, sizeof(*od), GFP_KERNEL);
if (!od)
--- linux-4.15.0.orig/drivers/dma/coh901318.c
+++ linux-4.15.0/drivers/dma/coh901318.c
@@ -1797,13 +1797,10 @@
     static int coh901318_config(struct coh901318_chan *cohc,
     struct coh901318_params *param)
{
-unsigned long flags;
     const struct coh901318_params *p;
     int channel = cohc->id;
     void __iomem *virtbase = cohc->base->virtbase;

-  spin_lock_irqsave(&cohc->lock, flags);
-  if (param)
-    p = param;
-  else
-    coh901318_set_conf(cohc, p->config);
     coh901318_set_ctrl(cohc, p->ctrl_lli_last);

-  spin_unlock_irqrestore(&cohc->lock, flags);
-  return 0;
 }

@@ -1949,8 +1944,6 @@
 return;
 }

-  spin_lock(&cohc->lock);
-  /*
* When we reach this point, at least one queue item
* should have been moved over from cohc->queue to
-  coh901318_queue_start(cohc) == NULL)
     cohc->busy = 0;

-  spin_unlock(&cohc->lock);
-  }
/*
 * This tasklet will remove items from cohc->active
 * and thus terminates them.
--- linux-4.15.0.orig/drivers/dma/cppi41.c
+++ linux-4.15.0/drivers/dma/cppi41.c
@@ -585,9 +585,22 @@
 enum dma_transfer_direction dir, unsigned long tx_flags, void *context)
 {
 struct cppi41_channel *c = to_cpp41_chan(chan);
+struct dma_async_tx_descriptor *txd = NULL;
+struct cppi41_dd *cdd = c->cdd;
 struct cppi41_desc *d;
 struct scatterlist *sg;
 unsigned int i;
+int error;
+
+error = pm_runtime_get(cdd->ddev.dev);
+if (error < 0) {
+pm_runtime_put_noidle(cdd->ddev.dev);
+
+return NULL;
+}
+
+if (cdd->is_suspended)
+goto err_out_not_ready;
 d = c->desc;
 for_each_sg(sgl, sg, sg_len, i) {
 @@ -610,7 +623,13 @@
 d++;
 }

-return &c->txd;
+txd = &c->txd;
+
+err_out_not_ready:
+pm_runtime_mark_last_busy(cdd->ddev.dev);
+pm_runtime_put_autosuspend(cdd->ddev.dev);
+
+return txd;
}

static void cppi41_compute_td_desc(struct cppi41_desc *d)
@@ @ -723,8 +742,22 @@

desc_phys = lower_32_bits(c->desc_phys);
desc_num = (desc_phys - cdd->descs_phys) / sizeof(struct cppi41_desc);
-if (!cdd->chan_busy[desc_num])
+if (!cdd->chan_busy[desc_num]) {
+struct cppi41_channel *cc, *_ct;
+
+/*
+ * channels might still be in the pending list if
+ * cppi41_dma_issue_pending() is called after
+ * cppi41_runtime_suspend() is called
+ */
+list_for_each_entry_safe(cc, _ct, &cdd->pending, node) {
+if (cc != c)
+continue;
+list_del(&cc->node);
+break;
+}
+return 0;
+}

ret = cppi41_tear_down_chan(c);
if (ret)
--- linux-4.15.0.orig/drivers/dma/dma-axi-dmac.c
+++ linux-4.15.0/drivers/dma/dma-axi-dmac.c
@@ -486,7 +486,7 @@
if (chan->hw_2d) {
if (!axi_dmac_check_len(chan, xt->sgl[0].size) ||
- !axi_dmac_check_len(chan, xt->numf))
+ xt->numf == 0)
return NULL;
if (xt->sgl[0].size + dst_icg > chan->max_length ||
  xt->sgl[0].size + src_icg > chan->max_length)
--- linux-4.15.0.orig/drivers/dma/dma-jz4780.c
+++ linux-4.15.0/drivers/dma/dma-jz4780.c
@@ -567,11 +567,11 @@
enum dma_status status;
unsigned long flags;
+spin_lock_irqsave(&jzchan->vchan.lock, flags);
+status = dma_cookie_status(chan, cookie, txstate);
if ((status == DMA_COMPLETE) || (txstate == NULL))
-return status;
-
-spin_lock_irqsave(&jzchan->vchan.lock, flags);
goto out_unlock_irqrestore;

vdesc = vchan_find_desc(&jzchan->vchan, cookie);
if (vdesc) {
@@ -580,7 +580,7 @@
to_jz4780_dma_desc(vdesc), 0);  
} else if (cookie == jzchan->desc->tx.cookie) {  
    txstate->residue = jz4780_dma_desc_residue(jzchan, jzchan->desc,  
        - (jzchan->curr_hwdesc + 1) % jzchan->desc->count);  
    +jzchan->curr_hwdesc + 1);  
} else  
    txstate->residue = 0;  
@@ -588,6 +588,7 @@  
&& jzchan->desc->status & (JZ_DMA_DCS_AR | JZ_DMA_DCS_HLT))  
status = DMA_ERROR;  
+out_unlock_irqrestore:  
spin_unlock_irqrestore(&jzchan->vchan.lock, flags);  
return status;  
}  
@@ -754,6 +755,11 @@  
struct resource *res;  
int i, ret;  
+if (!dev->of_node) {  
+    dev_err(dev, "This driver must be probed from devicetree\n");  
+    return -EINVAL;  
+}  
+  
+  jzdma = devm_kzalloc(dev, sizeof(*jzdma), GFP_KERNEL);  
if (!jzdma)  
      return -ENOMEM;  
--- linux-4.15.0.orig/drivers/dma/dmaengine.c  
+++ linux-4.15.0/drivers/dma/dmaengine.c  
@@ -192,7 +192,7 @@  
static struct module *dma_chan_to_owner(struct dma_chan *chan)  
{  
    -return chan->device->dev->driver->owner;  
+return chan->device->owner;  
}  
/**  
@@ -928,6 +928,8 @@  
return -EIO;  
}  
+device->owner = device->dev->driver->owner;  
+  
if (dma_has_cap(DMA_MEMCPY, device->cap_mask) && !device->device_prep_dma_memcpy) {  
    dev_err(device->dev,  
"Device claims capability %s, but op is not defined\n",  
Open Source Used In 5GaaS Edge AC-4  20653
--- linux-4.15.0.orig/drivers/dma/dmatest.c
+++ linux-4.15.0/drivers/dma/dmatest.c
@@ -355,7 +355,7 @@
{
    struct dmatest_done *done = arg;
    struct dmatest_thread *thread =
    -container_of(arg, struct dmatest_thread, done_wait);
    +container_of(done, struct dmatest_thread, test_done);
    if (!thread->done) {
        done->done = true;
        wake_up_all(done->wait);
    } @ @ -552.8 +552.8 @@
    flags = DMA_CTRL_ACK | DMA_PREP_INTERRUPT;

    ktime = ktime_get();
    -while (!kthread_should_stop())
    -    && (!(params->iterations && total_tests >= params->iterations)) {
    +while (!(kthread_should_stop() ||
    +        (params->iterations && total_tests >= params->iterations))) {
    struct dma_async_tx_descriptor *tx = NULL;
    struct dmaengine_unmap_data *um;
    dma_addr_t srcs[src_cnt];
    @@ -626,11 +626,9 @@
     srcs[i] = um->addr[i] + src_off;
     ret = dma_mapping_error(dev->dev, um->addr[i]);
     if (ret) {
    -        dmaengine_unmap_put(um);
    -        result("src mapping error", total_tests,
    -            src_off, dst_off, len, ret);
    -        failed_tests++;
    -        continue;
    +        goto error_unmap_continue;
    } um->to_cnt++;
    }
    @@ -645,11 +643,9 @@
        DMA_BIDIRECTIONAL);
    ret = dma_mapping_error(dev->dev, dsts[i]);
    if (ret) {
    -        dmaengine_unmap_put(um);
    -        result("dst mapping error", total_tests,
    -            src_off, dst_off, len, ret);
    -        failed_tests++;
    -        continue;
    +        goto error_unmap_continue;
    } um->bidi_cnt++;
    }

if (!tx) {
    dmaengine_unmap_put(um);
    result("prep error", total_tests, src_off,
            dst_off, len, ret);
    msleep(100);
    failed_tests++;
    continue;
    +goto error_unmap_continue;
}

done->done = false;
if (dma_submit_error(cookie)) {
    dmaengine_unmap_put(um);
    result("submit error", total_tests, src_off,
            dst_off, len, ret);
    msleep(100);
    failed_tests++;
    continue;
    +goto error_unmap_continue;
}
dma_async_issue_pending(chan);

@media .-711.16 +703.14 @@
dmaengine_unmap_put(um);
result("test timed out", total_tests, src_off, dst_off,
       len, 0);
    failed_tests++;
    continue;
+goto error_unmap_continue;
} else if (status != DMA_COMPLETE) {
    dmaengine_unmap_put(um);
    result(status == DMA_ERROR ?
        "completion error status" :
        "completion busy status", total_tests, src_off,
       dst_off, len, ret);
    failed_tests++;
    continue;
+goto error_unmap_continue;
}
verbose_result("test passed", total_tests, src_off,
    dst_off, len, 0);
}
+continue;
+
+error_unmap_continue:
+dmaengine_unmap_put(um);
+failed_tests++;
}
ktime = ktime_sub(ktime_get(), ktime);
ktime = ktime_sub(ktime, comparetime);
--- linux-4.15.0.orig/drivers/dma/dw/Kconfig
+++ linux-4.15.0/drivers/dma/dw/Kconfig
@@ -8,6 +8,7 @@
config DW_DMAC
tristate "Synopsys DesignWare AHB DMA platform driver"
+depends on HAS_IOMEM
select DW_DMAC_CORE
help
    Support the Synopsys DesignWare AHB DMA controller. This
@@ -16,6 +17,7 @@
config DW_DMAC_PCI
tristate "Synopsys DesignWare AHB DMA PCI driver"
depends on PCI
+depends on HAS_IOMEM
select DW_DMAC_CORE
help
    Support the Synopsys DesignWare AHB DMA controller on the
--- linux-4.15.0.orig/drivers/dma/dw/core.c
+++ linux-4.15.0/drivers/dma/dw/core.c
@@ -1064,12 +1066,12 @@@

static void dwc_initialize_chan_dw(struct dw_dma_chan *dwc)
{
    +struct dw_dma *dw = to_dw_dma(dwc->chan.device);
    u32 cfghi = DWC_CFGH_FIFO_MODE;
    u32 cfglo = DWC_CFGL_CH_PRIOR(dwc->priority);
    bool hs_polarity = dw->dws.hs_polarity;
    cfghi |= DWC_CFGH_DST_PER(dwc->dws.dst_id);
    cfghi |= DWC_CFGH_SRC_PER(dwc->dws.src_id);
    +cfghi |= DWC_CFGH_PROTCTL(dw->pdata->protctl);

    /* Set polarity of handshake interface */
    cfglo |= hs_polarity ? DWC_CFGL_HS_DST_POL | DWC_CFGL_HS_SRC_POL : 0;
@@ -1064,12 +1066,12 @@

static void idma32_fifo_partition(struct dw_dma *dw)
{
    u64 value = IDMA32C_FP_PSIZE_CH0(64) | IDMA32C_FP_PSIZE_CH1(64) |
        IDMA32C_FP_UPDATE;
    u64 fifo_partition = 0;
    fifo_partition |= value << 32;
    idma32_writeq(dw, FIFO_PARTITION1, fifo_partition);
    idma32_writeq(dw, FIFO_PARTITION0, fifo_partition);
}

/* Program FIFO size of channels. */
/* By default full FIFO (512 bytes) is assigned to channel 0. Here we */
/* slice FIFO on equal parts between channels. */

static void dw_dma_acpi_controller_register(struct dw_dma *dw)
{
    struct device *dev = dw->dma.dev;
    acpi_dma_controller_register(dev, acpi_dma_simple_xlate, info);
    if (ret)
        dev_err(dev, "could not register acpi_dma_controller\n");
    +static void dw_dma_acpi_controller_free(struct dw_dma *dw)
    +{
        struct device *dev = dw->dma.dev;
        +acpi_dma_controller_free(dev);
    +}
    #else /* !CONFIG_ACPI */
    static inline void dw_dma_acpi_controller_register(struct dw_dma *dw) {}
    +static inline void dw_dma_acpi_controller_free(struct dw_dma *dw) {}
    #endif /* !CONFIG_ACPI */

#endif /* CONFIG_OF */
pdata->multi_block[ tmp ] = 1;
}

t = if ( of_property_read_u32(np, "snps,dma-protection-control", &tmp)) {
  if ( tmp > CHAN_PROTCTL_MASK)
    return NULL;
  pdata->protctl = tmp;
}
+ return pdata;
}
#else
@@ -243,6 +256,9 @@
{
    struct dw_dma_chip *chip = platform_get_drvdata(pdev);

    if (ACPI_HANDLE(&pdev->dev))
+    dw_dma_acpi_controller_free(chip->dw);
    +
    if (pdev->dev.of_node)
      of_dma_controller_free(pdev->dev.of_node);
—— linux-4.15.0.orig/drivers/dma/dw/regs.h
+++ linux-4.15.0/drivers/dma/dw/regs.h
@@ -200,6 +200,10 @@
#define DWC_CFGH_PROTCTL(x) ((x) << 2)
    +#define DWC_CFGH_PROTCTL_DATA (0 << 2) /* data access - always set */
    +#define DWC_CFGH_PROTCTL_PRIV(1 << 2)/* privileged -> AHB HPROT[1] */
    +#define DWC_CFGH_PROTCTL_BUFFER(2 << 2)/* bufferable -> AHB HPROT[2] */
    +#define DWC_CFGH_PROTCTL_CACHE(4 << 2)/* cacheable -> AHB HPROT[3] */
    +#define DWC_CFGH_DS_UPD_EN (1 << 5)
    +#define DWC_CFGH_SS_UPD_EN (1 << 6)
    +#define DWC_CFGH_SRC_PER(x) ((x) << 7)
—— linux-4.15.0.orig/drivers/dma/edma.c
+++ linux-4.15.0/drivers/dma/edma.c
@@ -2273,9 +2273,6 @@
    ecc->default_queue = info->default_queue;

    for (i = 0; i < ecc->num_slots; i++)
-    edma_write_slot(ecc, i, &dummy_paramset);
    -
    if (info->rsv) {
      /* Set the reserved slots in inuse list */
      rsv_slots = info->rsv->rsv_slots;
for (i = 0; i < ecc->num_slots; i++) {
    /* Reset only unused - not reserved - padRAM slots */
    if (!test_bit(i, ecc->slot_inuse))
        edma_write_slot(ecc, i, &dummy_paramset);
}
/* Clear the xbar mapped channels in unused list */
if (xbar_chans) {
    for (i = 0;; i++) {
        ret = of_parse_phandle_with_fixed_args(node, "ti,tptcs",
            sizeof(*ecc->tc_list), GFP_KERNEL);
        if (!ecc->tc_list)
            ret = -ENOMEM;
        goto err_reg1;
    }
    for (i = 0; i < ecc->num_tc;
        sizeof(*ecc->tc_list), GFP_KERNEL);
    if (!ecc->tc_list)
        return -ENOMEM;
    if (!ecc->tc_list) {
        ret = -ENOMEM;
        goto err_reg1;
    }
    for (i = 0;; i++) {  
        ret = of_parse_phandle_with_fixed_args(node, "ti,tptcs",
            --- linux-4.15.0.orig/drivers/dma/fsl-edma.c
+++ linux-4.15.0/drivers/dma/fsl-edma.c
@@ -682,6 +682,13 @@
            fsl_chan = &fsl_edma->chans[ch];

            spin_lock(&fsl_chan->vchan.lock);
+            if (!fsl_chan->edesc) {
+                /* terminate_all called before */
+                spin_unlock(&fsl_chan->vchan.lock);
+                continue;
+            }
+            if (!fsl_chan->edesc->iscyclic) {
                list_del(&fsl_chan->edesc->vdesc.node);
                vchan_cookie_complete(&fsl_chan->edesc->vdesc);
                --- linux-4.15.0.orig/drivers/dma/fsldma.c
+++ linux-4.15.0/drivers/dma/fsldma.c
@@ -1218,6 +1218,7 @@
                }
                struct fsldma_device *fdev;
                struct device_node *child;


+unsigned int i;
int err;

fdev = kzalloc(sizeof(*fdev), GFP_KERNEL);
@@ -1296,6 +1297,10 @@
return 0;

out_free_fdev:
+for (i = 0; i < FSL_DMA_MAX_CHANS_PER_DEVICE; i++) {
+if (fdev->chan[i])
+  fsl_dma_chan_remove(fdev->chan[i]);
+
  irq_dispose_mapping(fdev->irq);
  iounmap(fdev->regs);
out_free:
@@ -1318,6 +1323,7 @@
if (fdev->chan[i])
  fsl_dma_chan_remove(fdev->chan[i]);
  irq_dispose_mapping(fdev->irq);

iounmap(fdev->regs);
kfree(fdev);
--- linux-4.15.0.orig/drivers/dma/hsu/hsu.c
+++ linux-4.15.0/drivers/dma/hsu/hsu.c
@@ -64,10 +64,10 @@
if (hsuc->direction == DMA_MEM_TO_DEV) {
  bsr = config->dst_maxburst;
  -mtsr = config->src_addr_width;
  +mtsr = config->dst_addr_width;
} else if (hsuc->direction == DMA_DEV_TO_MEM) {
  bsr = config->src_maxburst;
  -mtsr = config->dst_addr_width;
  +mtsr = config->src_addr_width;
}

hsu_chan_disable(hsuc);
--- linux-4.15.0.orig/drivers/dma/hsu/pci.c
+++ linux-4.15.0/drivers/dma/hsu/pci.c
@@ -29,22 +29,12 @@
static irqreturn_t hsu_pci_irq(int irq, void *dev)
{
  struct hsu_dma_chip *chip = dev;
  -struct pci_dev *pdev = to_pci_dev(chip->dev);
  u32 dmaisr;
  u32 status;
  unsigned short i;

  --- linux-4.15.0.orig/drivers/dma/hsu/hsu.c
  +++ linux-4.15.0/drivers/dma/hsu/hsu.c
  @@ -64,10 +64,10 @@
  if (hsuc->direction == DMA_MEM_TO_DEV) {
  bsr = config->dst_maxburst;
  -mtsr = config->src_addr_width;
  +mtsr = config->dst_addr_width;
  } else if (hsuc->direction == DMA_DEV_TO_MEM) {
  bsr = config->src_maxburst;
  -mtsr = config->dst_addr_width;
  +mtsr = config->src_addr_width;
  }

  hsu_chan_disable(hsuc);

  --- linux-4.15.0.orig/drivers/dma/hsu/pci.c
  +++ linux-4.15.0/drivers/dma/hsu/pci.c
  @@ -29,22 +29,12 @@
  static irqreturn_t hsu_pci_irq(int irq, void *dev)
  {
  struct hsu_dma_chip *chip = dev;
  -struct pci_dev *pdev = to_pci_dev(chip->dev);
  u32 dmaisr;
  u32 status;
  unsigned short i:
int ret = 0;
int err;

/*
 * On Intel Tangier B0 and Anniedale the interrupt line, disregarding
 * to have different numbers, is shared between HSU DMA and UART IPs.
 * Thus on such SoCs we are expecting that IRQ handler is called in
 * UART driver only.
 */
-if (pdev->device == PCI_DEVICE_ID_INTEL_MRFLD_HSU_DMA)
  return IRQ_HANDLED;
-
  dmaisr = readl(chip->regs + HSU_PCI_DMAISR);
  for (i = 0; i < chip->hsu->nr_channels; i++) {
    if (dmaisr & 0x1) {
      @ -108,6 +98,17 @@
      if (ret)
        goto err_register_irq;
              +
      /* On Intel Tangier B0 and Anniedale the interrupt line, disregarding
         to have different numbers, is shared between HSU DMA and UART IPs.
         Thus on such SoCs we are expecting that IRQ handler is called in
         UART driver only. Instead of handling the spurious interrupt
         from HSU DMA here and waste CPU time and delay HSU UART interrupt
         handling, disable the interrupt entirely.
      */
      +
      if (pdev->device == PCI DEVICE ID INTEL MRFLD_HSU_DMA)
        disable_irq_nosync(chip->irq);
        +
        pci_set_drvdata(pdev, chip);

  return 0;
--- linux-4.15.0.orig/drivers/dma/idma64.c
+++ linux-4.15.0/drivers/dma/idma64.c
@@ -589,7 +589,7 @@
    idma64->dma.directions = BIT(DMA_DEV_TO_MEM) | BIT(DMA_MEM_TO_DEV);
    idma64->dma.residue_granularity = DMA_RESIDUE_GRANULARITY_BURST;

  idma64->dma.dev = chip->dev;
+idma64->dma.dev = chip->sysdev;

dma_set_max_seg_size(idma64->dma.dev, IDMA64C_CTLH_BLOCK_TS_MASK);
@@ -629,6 +629,7 @@
         {
         struct idma64_chip *chip;
         struct device *dev = &pdev->dev;

struct device *sysdev = dev->parent;
struct resource *mem;
int ret;

if (IS_ERR(chip->regs))
    return PTR_ERR(chip->regs);

struct resource *mem;
int ret;
@@ -645,11 +646,12 @@
    if (IS_ERR(chip->regs))
        return PTR_ERR(chip->regs);
-
    ret = dma_coerce_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(64));
+    ret = dma_coerce_mask_and_coherent(sysdev, DMA_BIT_MASK(64));
    if (ret)
        return ret;

chip->dev = dev;
+chip->sysdev = sysdev;

ret = idma64_probe(chip);
if (ret)
    --- linux-4.15.0.orig/drivers/dma/idma64.h
+++ linux-4.15.0/drivers/dma/idma64.h
@@ -216,12 +216,14 @@
    struct idma64_chip - representation of iDMA 64-bit controller hardware
    * @dev: struct device of the DMA controller
    + * @sysdev: struct device of the physical device that does DMA
    * @irq: irq line
    * @regs: memory mapped I/O space
    * @idma64: struct idma64 that is filed by idma64_probe()

/**
 * struct idma64_chip - representation of iDMA 64-bit controller hardware
 * @dev: struct device of the DMA controller
 * @sysdev: struct device of the physical device that does DMA
 * @irq: irq line
 * @regs: memory mapped I/O space
 * @idma64: struct idma64 that is filed by idma64_probe()
 */
struct idma64_chip {
struct device *dev;
+struct device *sysdev;
    int irq;
    void __iomem *regs;
struct idma64 *idma64;
    --- linux-4.15.0.orig/drivers/dma/imx-dma.c
+++ linux-4.15.0/drivers/dma/imx-dma.c
@@ -290,7 +290,7 @@
    unsigned long now;

    -now = min(d->len, sg_dma_len(sg));
    +now = min_t(size_t, d->len, sg_dma_len(sg));
    if (d->len != IMX_DMA_LENGTH_LOOP)
        d->len = now;

@@ -623,7 +623,7 @@

struct imxdma_channel *imxdma = (void *)data;
struct imxdma_engine *imdma = imxdma->imxdma;
-struct imxdma_desc *desc;
+struct imxdma_desc *desc, *next_desc;
unsigned long flags;

spin_lock_irqsave(&imxdma->lock, flags);
@@ -653,10 +653,10 @@
list_move_tail(imxdmac->ld_active.next, &imxdmac->ld_free);

if (!list_empty(&imxdmac->ld_queue)) {
+next_desc = list_first_entry(&imxdmac->ld_queue, struct imxdma_desc, node);
    if (imxdma_xfer_desc(desc) < 0)
        dev_warn(imxdma->dev, "%s: channel: %d couldn't xfer desc\n", __func__, imxdma->channel);
}
"SDMA script number %d not match with firmware.\n",
+sdma->script_number);
+return;
+
for (i = 0; i < sdma->script_number; i++)
if (addr_arr[i] > 0)
    saddr_arr[i] = addr_arr[i];
@@ -1829,27 +1837,6 @@
    if (pdata) {
        ret = sdma_get_firmware(sdma, pdata->fw_name);
        -dev_warn(&pdev->dev, "failed to get firmware from platform data\n");
    } else {
        /*
        - * Because that device tree does not encode ROM script address,
        - * the RAM script in firmware is mandatory for device tree
        - * probe, otherwise it fails.
        - */
        -ret = of_property_read_string(np, "fsl,sdma-ram-script-name",
        -   &fw_name);
        -if (ret)
        -dev_warn(&pdev->dev, "failed to get firmware name\n");
    -} else {
        -ret = sdma_get_firmware(sdma, fw_name);
        -if (ret)
        -dev_warn(&pdev->dev, "failed to get firmware from device tree\n");
    -} -
    sdma->dma_device.dev = &pdev->dev;

sdma->dma_device.device_alloc_chan_resources = sdma_alloc_chan_resources;
@@ -1891,6 +1878,33 @@
of_node_put(spba_bus);
}

+/
+ * Kick off firmware loading as the very last step:
+ * attempt to load firmware only if we're not on the error path, because
+ * the firmware callback requires a fully functional and allocated sdma
+ * instance.
+ */
+if (pdata) {
+    ret = sdma_get_firmware(sdma, pdata->fw_name);
if (ret) {
    dev_warn(&pdev->dev, "failed to get firmware from platform data\n");
} else {
    /* Because that device tree does not encode ROM script address,
    + the RAM script in firmware is mandatory for device tree
    + probe, otherwise it fails.
    */
    ret = of_property_read_string(np, "fsl,sdma-ram-script-name",
        &fw_name);
    if (ret) {
        dev_warn(&pdev->dev, "failed to get firmware name\n");
    } else {
        ret = sdma_get_firmware(sdma, fw_name);
        if (ret)
            dev_warn(&pdev->dev, "failed to get firmware from device tree\n");
    }
}

return 0;

err_register:
--- linux-4.15.0.orig/drivers/dma/ioat/dma.c
+++ linux-4.15.0/drivers/dma/ioat/dma.c
@@ -38,6 +38,18 @@
#include "../dmaengine.h"

+int completion_timeout = 200;
+module_param(completion_timeout, int, 0644);
+MODULE_PARM_DESC(completion_timeout,
+    "set ioat completion timeout [msec] (default 200 [msec])";
+int idle_timeout = 2000;
+module_param(idle_timeout, int, 0644);
+MODULE_PARM_DESC(idle_timeout,
+    "set ioat idle timeout [msec] (default 2000 [msec])";
+
+#define IDLE_TIMEOUT msecs_to_jiffies(idle_timeout)
+#define COMPLETION_TIMEOUT msecs_to_jiffies(completion_timeout)
+
static char *chanerr_str[] = {
    "DMA Transfer Source Address Error",
    "DMA Transfer Destination Address Error",
    "DMA Transfer Source Address Error",
    "DMA Transfer Destination Address Error",
    @ @ -388,10 +400,11 @@

descs->virt = dma_alloc_coherent(to_dev(ioat_chan),
    SZ_2M, &descs->hw, flags);
-if (!descs->virt & (i > 0)) {
+if (!descs->virt) {
    int idx;

    for (idx = 0; idx < i; idx++) {
+        desc = &ioat_chan->descs[idx];
        dma_free_coherent(to_dev(ioat_chan), SZ_2M,
            descs->virt, descs->hw);
        desc->virt = NULL;
        --- linux-4.15.0.orig/drivers/dma/ioat/dma.h
        +++ linux-4.15.0/drivers/dma/ioat/dma.h
        @@ -111,8 +111,6 @@
        #define IOAT_RUN 5
        #define IOAT_CHAN_ACTIVE 6
        struct timer_list timer;
-        #define COMPLETION_TIMEOUT msecs_to_jiffies(100)
-        #define IDLE_TIMEOUT msecs_to_jiffies(2000)
        #define RESET_DELAY msecs_to_jiffies(100)
        struct ioatdma_device *ioat_dma;
        dma_addr_t completion_dma;
        --- linux-4.15.0.orig/drivers/dma/ioat/init.c
        +++ linux-4.15.0/drivers/dma/ioat/init.c
        @@ -129,7 +129,7 @@
            ioat_init_channel(struct ioatdma_device *ioat_dma,
                struct ioatdma_chan *ioat_chan, int idx);
        static void ioat_intr_quirk(struct ioatdma_device *ioat_dma);
        static void ioat_enumerate_channels(struct ioatdma_device *ioat_dma);
        static int ioat3_dma_self_test(struct ioatdma_device *ioat_dma);
        static int ioat_dma_enabled = 1;
        @@ -575,7 +575,7 @@
            xfercap_log = readb(ioat_dma->reg_base + IOAT_XFERCAP_OFFSET);
            xfercap_log &= 0x1f; /* bits [4:0] valid */
            if (xfercap_log == 0)
+                return;
                dev_dbg(dev, "%s: xfercap = %d\n", __func__, 1 << xfercap_log);

                for (i = 0; i < dma->chancnt; i++) {
@@ -611,7 +611,6 @@

 dma->chancnt = i;
 -return i;
 }

 /**
 @@ -1205,8 +1204,15 @@
 spin_lock_bh(&ioat_chan->prep_lock);
 set_bit(IOAT_CHAN_DOWN, &ioat_chan->state);
 -del_timer_sync(&ioat_chan->timer);
 spin_unlock_bh(&ioat_chan->prep_lock);
 +/**
 + * Synchronization rule for del_timer_sync():
 + * - The caller must not hold locks which would prevent
 + *   completion of the timer's handler.
 + * So prep_lock cannot be held before calling it.
 + */
 +del_timer_sync(&ioat_chan->timer);
 +
 /* this should quiesce then reset */
 ioat_reset_hw(ioat_chan);
 }

 --- linux-4.15.0.orig/drivers/dma/iop-adma.c
 +++ linux-4.15.0/drivers/dma/iop-adma.c
 @@ -125,9 +125,9 @@
 list_for_each_entry_safe(iter, _iter, &iop_chan->chain, chain_node) {
     pr_debug("tcookie: %d slot: %d busy: %d "
 -"this_desc: %x next_desc: %x ack: %d\n",
 +"this_desc: %llx next_desc: %llx ack: %d\n",
 iter->async_tx.cookie, iter->idx, busy,
 -iter->async_tx.phys, iop_desc_get_next_desc(iter),
 +iter->async_tx.phys, (u64)iop_desc_get_next_desc(iter),
 async_tx_test_ack(&iter->async_tx);
 prefetch(_iter);
 prefetch(&_iter->async_tx);
 @@ -315,9 +315,9 @@
 int i;
 dev_dbg(iop_chan->device->common.dev,
 "allocated slot: %d "
 -"(desc %p phys: %#x) slots_per_op %d\n",
 +"(desc %llx phys: %#llx) slots_per_op %d\n",
 iter->idx, iter->hw_desc,
 -iter->async_tx.phys, slots_per_op);
 +(u64)iter->async_tx.phys, slots_per_op);
/* pre-ack all but the last descriptor */
if (num_slots != slots_per_op)
@@ -525,7 +525,7 @@
    return NULL;
    BUG_ON(len > IOP_ADMA_MAX_BYTE_COUNT);

    -dev_dbg(iop_chan->device->common.dev, "%s len: %u\n", 
    +dev_dbg(iop_chan->device->common.dev, "%s len: %zu\n", 
    __func__, len);

    spin_lock_bh(&iop_chan->lock);
@@ -558,7 +558,7 @@
    BUG_ON(len > IOP_ADMA_XOR_MAX_BYTE_COUNT);

    dev_dbg(iop_chan->device->common.dev, 
    -"%s src_cnt: %d len: %u flags: %lx\n", 
    +"%s src_cnt: %d len: %zu flags: %lx\n", 
    __func__, src_cnt, len, flags);

    spin_lock_bh(&iop_chan->lock);
@@ -591,7 +591,7 @@
    if (unlikely(!len))
        return NULL;

    -dev_dbg(iop_chan->device->common.dev, "%s src_cnt: %d len: %u\n", 
    +dev_dbg(iop_chan->device->common.dev, "%s src_cnt: %d len: %zu\n", 
    __func__, src_cnt, len);

    spin_lock_bh(&iop_chan->lock);
@@ -629,7 +629,7 @@
    BUG_ON(len > IOP_ADMA_XOR_MAX_BYTE_COUNT);

    dev_dbg(iop_chan->device->common.dev, 
    -"%s src_cnt: %d len: %u flags: %lx\n", 
    +"%s src_cnt: %d len: %zu flags: %lx\n", 
    __func__, src_cnt, len, flags);

    if (dmaf_p_disabled_continue(flags))
    @@ -692,7 +692,7 @@
        return NULL;
        BUG_ON(len > IOP_ADMA_XOR_MAX_BYTE_COUNT);

        -dev_dbg(iop_chan->device->common.dev, "%s src_cnt: %d len: %u\n", 
        +dev_dbg(iop_chan->device->common.dev, "%s src_cnt: %d len: %zu\n", 
        __func__, src_cnt, len);

        spin_lock_bh(&iop_chan->lock);
c = p->vchan;
if (c && (tc1 & BIT(i))) {
    spin_lock_irqsave(&c->vc.lock, flags);
    vchan_cookie_complete(&p->ds_run->vd);
    p->ds_done = p->ds_run;
    p->ds_run = NULL;
    if (p->ds_run != NULL) {
        vchan_cookie_complete(&p->ds_run->vd);
        p->ds_done = p->ds_run;
        p->ds_run = NULL;
    }
    spin_unlock_irqrestore(&c->vc.lock, flags);
}
if (c && (tc2 & BIT(i))) {
    if (c->phy->idx & k3_dma_get_chan_stat(d))
        return -EAGAIN;

    /* Avoid losing track of ds_run if a transaction is in flight */
    +if (c->phy->ds_run)
        +return -EAGAIN;
+
    if (vd) {
        struct k3_dma_desc_sw *ds =
            container_of(vd, struct k3_dma_desc_sw, vd);
        struct k3_dma_dev *d = ofdma->of_dma_data;
        unsigned int request = dma_spec->args[0];

        -if (request > d->dma_requests)
            +if (request >= d->dma_requests)
        return NULL;

        return dma_get_slave_channel(&(d->chans[request].vc.chan));
    }
}

return dma_get_slave_channel(&d->chans[request].vc.chan);
mv_chan->op_in_desc = XOR_MODE_IN_DESC;

dma_dev = &mv_chan->dmadev;
+dma_dev->dev = &pdev->dev;
mv_chan->xordev = xordev;

/*
@@ -1091,7 +1092,6 @@
dma_dev->device_free_chan_resources = mv_xor_free_chan_resources;
dma_dev->device_tx_status = mv_xor_status;
dma_dev->device_issue_pending = mv_xor_issue_pending;
-dma_dev->dev = &pdev->dev;
/* set prep routines based on capability */
if (dma_has_cap(DMA_INTERRUPT, dma_dev->cap_mask))
--- linux-4.15.0.orig/drivers/dma/mv_xor_v2.c
+++ linux-4.15.0/drivers/dma/mv_xor_v2.c
@@ -163,6 +163,7 @@

void __iomem *dma_base;
void __iomem *glob_base;
struct clk *clk;
+struct clk *reg_clk;
struct tasklet_struct irq_tasklet;
struct list_head free_sw_desc;
struct dma_device dmadev;
@@ -749,13 +750,26 @@
if (ret)
    return ret;
+xor_dev->reg_clk = devm_clk_get(&pdev->dev, "reg");
+if (PTR_ERR(xor_dev->reg_clk) != -ENOENT) {
+    if (!IS_ERR(xor_dev->reg_clk)) {
+        ret = clk_prepare_enable(xor_dev->reg_clk);
+        if (ret)
+            return ret;
+    } else {
+        +return PTR_ERR(xor_dev->reg_clk);
+    }
+}
+xor_dev->clk = devm_clk_get(&pdev->dev, NULL);
-    if (IS_ERR(xor_dev->clk) && PTR_ERR(xor_dev->clk) == -EPROBE_DEFER)
-        return -EPROBE_DEFER;
+    if (IS_ERR(xor_dev->clk) && PTR_ERR(xor_dev->clk) == -EPROBE_DEFER) {
+        ret = EPROBE_DEFER;
+    }
+    xor_dev->reg_clk = devm_clk_get(&pdev->dev, "reg");
+    if (PTR_ERR(xor_dev->reg_clk) != -ENOENT) {
+        if (!IS_ERR(xor_dev->reg_clk)) {
+            ret = clk_prepare_enable(xor_dev->reg_clk);
+            if (ret)
+                return ret;
+        } else {
+            return PTR_ERR(xor_dev->reg_clk);
+        }
+    } else {
+        +return PTR_ERR(xor_dev->reg_clk);
+    }
+}

if (!IS_ERR(xor_dev->clk)) {
    if (ret)
        goto disable_reg_clk;
    goto disable_clk;
}
ret = platform_msi_domain_alloc_irqs(&pdev->dev, 1,
@@ -764,8 +778,10 @@
    goto disable_clk;
    msi_desc = first_msi_entry(&pdev->dev);
    -if (!msi_desc)
+    if (!msi_desc) {
        +ret = -ENODEV;
        goto free_msi_irqs;
        +}
    ret = devm_request_irq(&pdev->dev, msi_desc->irq,
        mv_xor_v2_interrupt_handler, 0,
@@ -866,8 +882,9 @@
    free_msi_irqs:
    platform_msi_domain_free_irqs(&pdev->dev);
    disable_clk:
    -if (!IS_ERR(xor_dev->clk))
+    -clk_disable_unprepare(xor_dev->clk);
+    +clk_disable_unprepare(xor_dev->clk);
+    +disable_reg_clk:
+    +clk_disable_unprepare(xor_dev->reg_clk);
    return ret;
}
@@ -883,6 +900,8 @@
    platform_msi_domain_free_irqs(&pdev->dev);

    +tasklet_kill(&xor_dev->irq_tasklet);
    +
    clk_disable_unprepare(xor_dev->clk);

    return 0;
--- linux-4.15.0.orig/drivers/dma/of-dma.c
+++ linux-4.15.0/drivers/dma/of-dma.c
@@ -68,18 +68,23 @@
    return NULL;

    +goto disable_reg_clk;
    +}
    if (!IS_ERR(xor_dev->clk)) {
        ret = clk_prepare_enable(xor_dev->clk);
        if (ret)
            -return ret;
        +goto disable_reg_clk;
    }

    ret = platform_msi_domain_alloc_irqs(&pdev->dev, 1,
@@ -764,8 +778,10 @@
        goto disable_clk;
    msi_desc = first_msi_entry(&pdev->dev);
    -if (!msi_desc)
+    if (!msi_desc) {
        +ret = -ENODEV;
        goto free_msi_irqs;
        +}
    ret = devm_request_irq(&pdev->dev, msi_desc->irq,
        mv_xor_v2_interrupt_handler, 0,
@@ -866,8 +882,9 @@
        free_msi_irqs:
        platform_msi_domain_free_irqs(&pdev->dev);
        disable_clk:
        -if (!IS_ERR(xor_dev->clk))
+        -clk_disable_unprepare(xor_dev->clk);
+        +clk_disable_unprepare(xor_dev->clk);
+        +disable_reg_clk:
+        +clk_disable_unprepare(xor_dev->reg_clk);
        return ret;
    }

    @} -883,6 +900,8 @}
ofdma_target = of_dma_find_controller(&dma_spec_target);
-if (!ofdma_target)
-  return NULL;
+if (!ofdma_target) {
+  ofdma->dma_router->route_free(ofdma->dma_router->dev,
+      route_data);
+  chan = ERR_PTR(-EPROBE_DEFER);
+  goto err;
+
} chan = ofdma_target->of_dma_xlate(&dma_spec_target, ofdma_target);
-if (chan) {
-  chan->router = ofdma->dma_router;
-  chan->route_data = route_data;
-} else {
+  if (IS_ERR_OR_NULL(chan)) {
+    ofdma->dma_router->route_free(ofdma->dma_router->dev,
+        route_data);
+  } else {
+    chan->router = ofdma->dma_router;
+    chan->route_data = route_data;
+  }
+
} err:

/*
 * Need to put the node back since the ofdma->of_dma_route_allocate
 * has taken it for generating the new, translated dma_spec
--- linux-4.15.0.orig/drivers/dma/omap-dma.c
+++ linux-4.15.0/drivers/dma/omap-dma.c
@@ -1237,7 +1237,7 @@
if (src_icg) {
  d->ccr |= CCR_SRC_AMODE_DBLIDX;
  d->ei = 1;
-  d->fi = src_icg;
+  d->fi = src_icg + 1;
 } else if (xt->src_inc) {
  d->ccr |= CCR_SRC_AMODE_POSTINC;
  d->fi = 0;
@@ -1252,7 +1252,7 @@
if (dst_icg) {
  d->ccr |= CCR_DST_AMODE_DBLIDX;
  sg->ei = 1;
-  sg->fi = dst_icg;
+  sg->fi = dst_icg + 1;
 } else if (xt->dst_inc) {
  d->ccr |= CCR_DST_AMODE_POSTINC;
  sg->fi = 0;
@@ -1485,11 +1485,11 @@
od->ddev.src_addr_widths = OMAP_DMA_BUSWIDTHS;
od->ddev.dst_addr_widths = OMAP_DMA_BUSWIDTHS;
od->ddev.directions = BIT(DMA_DEV_TO_MEM) | BIT(DMA_MEM_TO_DEV);
-od->ddev.residue_granularity = DMA_RESIDUE_GRANULARITY_BURST;
+if (__dma_omap15xx(od->plat->dma_attr))
+od->ddev.residue_granularity =
+DMA_RESIDUE_GRANULARITY_DESCRIPTOR;
+else
+od->ddev.residue_granularity = DMA_RESIDUE_GRANULARITY_BURST;
od->ddev.max_burst = SZ_16M - 1; /* CCEN: 24bit unsigned */
od->ddev.dev = &pdev->dev;
INIT_LIST_HEAD(&od->ddev.channels);
@@ -1539,8 +1543,10 @@
rc = devm_request_irq(&pdev->dev, irq, omap_dma_irq,
                    IRQF_SHARED, "omap-dma-engine", od);
-if (rc)
+if (rc) {
+omap_dma_free(od);
  return rc;
+}
}

if (omap_dma_glbl_read(od, CAPS_0) & CAPS_0_SUPPORT_LL123)
--- linux-4.15.0.orig/drivers/dma/pch_dma.c
+++ linux-4.15.0/drivers/dma/pch_dma.c
@@ -873,6 +873,7 @@
}
pci_set_master(pdev);
+pd->dma.dev = &pdev->dev;

err = request_irq(pdev->irq, pd_irq, IRQF_SHARED, DRV_NAME, pd);
if (err) {
@@ -888,7 +889,6 @@
goto err_free_irq;
}

-pd->dma.dev = &pdev->dev;
INIT_LIST_HEAD(&pd->dma.channels);
@@ -972,7 +972,6 @@

/* PCI Device ID of DMA device */
#define PCI_VENDOR_ID_ROHM             0x10DB
#define PCI_DEVICE_ID_EG20T_PCH_DMA_8CH 0x8810

#define PCI_DEVICE_ID_EG20T_PCH_DMA_4CH 0x8815
#define PCI_DEVICE_ID_ML7213_DMA1_8CH0x8026
--- linux-4.15.0.orig/drivers/dma/pl330.c
+++ linux-4.15.0/drivers/dma/pl330.c
@@ -960,6 +960,7 @@
{
    void __iomem *regs = thrd->dmac->base;
    u8 insn[6] = {0, 0, 0, 0, 0, 0};
    +u32 inten = readl(regs + INTEN);

    if (_state(thrd) == PL330_STATE_FAULT_COMPLETING)
        UNTIL(thrd, PL330_STATE_FAULTING | PL330_STATE_KILLING);
    @@ -972,10 +973,13 @@
        _emit_KILL(0, insn);

        /* Stop generating interrupts for SEV */
        -writel(readl(regs + INTEN) & ~(1 << thrd->ev), regs + INTEN);
        -
        _execute_DBGINSN(thrd, insn, is_manager(thrd));
        +
        +/* clear the event */
        +if (inten & (1 << thrd->ev))
        +writel(1 << thrd->ev, regs + INTCLR);
        +/* Stop generating interrupts for SEV */
        +writel(inten & ~(1 << thrd->ev), regs + INTEN);
    }

    /* Start doing req 'idx' of thread 'thrd' */
    @@ -1510,7 +1514,7 @@
    /* Returns 1 if state was updated, 0 otherwise */
    static int pl330_update(struct pl330_dmac *pl330)
    {
        struct dma_pl330_desc *descdone, *tmp;
        unsigned long flags;
        void __iomem *regs;
        u32 val;
        @@ -1588,7 +1592,9 @@
            }

            /* Now that we are in no hurry, do the callbacks */
            -list_for_each_entry_safe(descdone, tmp, &pl330->req_done, rqd) {
            +while (!list_empty(&pl330->req_done)) {
            +descdone = list_first_entry(&pl330->req_done, struct dma_pl330_desc, rqd);
            +    struct dma_pl330_desc *descdone;
            +    unsigned long flags;
            +    void __iomem *regs;
            +    u32 val;
            +    @@ -1588,7 +1592,9 @@
                }

                /* Now that we are in no hurry, do the callbacks */
                -list_for_each_entry_safe(descdone, tmp, &pl330->req_done, rqd) {
                +while (!list_empty(&pl330->req_done)) {
                +descdone = list_first_entry(&pl330->req_done, struct dma_pl330_desc, rqd);
                +    struct dma_pl330_desc, rqd);
                +    list_del(&descdone->rqd);
                +    spin_unlock_irqrestore(&pl330->lock, flags);
dma_pl330_rqcb(descdone, PL330_ERR_NONE);
@@ -2140,13 +2146,14 @@

pm_runtime_get_sync(pl330->ddma.dev);
spin_lock_irqsave(&pch->lock, flags);
+
spin_lock(&pl330->lock);
_stop(pch->thread);
-spin_unlock(&pl330->lock);
-
pch->thread->req[0].desc = NULL;
pch->thread->req[1].desc = NULL;
pch->thread->req_running = -1;
+spin_unlock(&pl330->lock);
+
power_down = pch->active;
pch->active = false;

@@ -2556,13 +2563,15 @@
for (i = 0; i < len / period_len; i++) {
    desc = pl330_get_desc(pch);
    if (!desc) {
+    unsigned long iflags;
+    dev_err(pch->dmac->ddma.dev, "%s:%d Unable to fetch desc\n", __func__, __LINE__);

    if (!first)
        return NULL;

    spin_lock_irqsave(&pl330->pool_lock, iflags);
+spin_lock_irqsave(&pl330->pool_lock, flags);

    while (!list_empty(&first->node)) {
        desc = list_entry(first->node.next,
@@ -2572,7 +2581,7 @@
        list_move_tail(&first->node, &pl330->desc_pool);
-
        spin_unlock_irqrestore(&pl330->pool_lock, flags);
+spin_unlock_irqrestore(&pl330->pool_lock, iflags);

        return NULL;
    }
@@ -2654,14 +2663,14 @@
while (burst != (1 << desc->rqcfg.brst_size))
    desc->rqcfg.brst_size++;
+desc->rqcfg.brst_len = get_burst_len(desc, len);
/*
 * If burst size is smaller than bus width then make sure we only
 * transfer one at a time to avoid a burst straddling an MFIFO entry.
 */
- if (desc->rqcfg.brst_size * 8 < pl330->pcfg.data_bus_width)
+ if (burst * 8 < pl330->pcfg.data_bus_width)
 desc->rqcfg.brst_len = 1;

-desc->rqcfg.brst_len = get_burst_len(desc, len);
desc->bytes_requested = len;

desc->txd.flags = flags;
@@ -2922,7 +2931,7 @@
pd->src_addr_widths = PL330_DMA_BUSWIDTHS;
pd->dst_addr_widths = PL330_DMA_BUSWIDTHS;
pd->directions = BIT(DMA_DEV_TO_MEM) | BIT(DMA_MEM_TO_DEV);
- pd->residue_granularity = DMA_RESIDUE_GRANULARITY_SEGMENT;
+ pd->residue_granularity = DMA_RESIDUE_GRANULARITY_BURST;
pd->max_burst = (pl330->quirks & PL330_QUIRK_BROKEN_NO_FLUSH) ?
 1 : PL330_MAX_BURST);

--- linux-4.15.0.orig/drivers/dma/ppc4xx/adma.c
+++ linux-4.15.0/drivers/dma/ppc4xx/adma.c
@@ -4360,7 +4360,7 @@
 }
 static DRIVER_ATTR_RW(enable);

-config QCOM_HIDMA_MGMT
 tristate "Qualcomm Technologies HIDMA Management support"
+depends on HAS_IOMEM
 select DMA_ENGINE
 help
     Enable support for the Qualcomm Technologies HIDMA Management.
--- linux-4.15.0.orig/drivers/dma/qcom/bam_dma.c
+++ linux-4.15.0/drivers/dma/qcom/bam_dma.c
@@ -393,6 +393,7 @@
 struct device_dma_parameters dma_parms;
 struct bam_chan *
}{
 ssize_t size = 0;
 u32 reg;
--- linux-4.15.0.orig/drivers/dma/qcom/Kconfig
+++ linux-4.15.0/drivers/dma/qcom/Kconfig
@@ -9,6 +9,7 @@
 config QCOM_HIDMA_MGMT
 tristate "Qualcomm Technologies HIDMA Management support"
+depends on HAS_IOMEM
 select DMA_ENGINE
 help
     Enable support for the Qualcomm Technologies HIDMA Management.
--- linux-4.15.0.orig/drivers/dma/qcom/bam_dma.c
+++ linux-4.15.0/drivers/dma/qcom/bam_dma.c
@@ -393,6 +393,7 @@
 struct device_dma_parameters dma_parms;
 struct bam_chan *channels;
u32 num_channels;
+u32 num_ees;

/* execution environment ID, from DT */
u32 ee;
@@ -693,6 +694,25 @@
/* remove all transactions, including active transaction */
spin_lock_irqsave(&bchan->vc.lock, flag);
+/*
+ * If we have transactions queued, then some might be committed to the
+ * hardware in the desc fifo. The only way to reset the desc fifo is
+ * to do a hardware reset (either by pipe or the entire block).
+ * bam_chan_init_hw() will trigger a pipe reset, and also reinit the
+ * pipe. If the pipe is left disabled (default state after pipe reset)
+ * and is accessed by a connected hardware engine, a fatal error in
+ * the BAM will occur. There is a small window where this could happen
+ * with bam_chan_init_hw(), but it is assumed that the caller has
+ * stopped activity on any attached hardware engine. Make sure to do
+ * this first so that the BAM hardware doesn't cause memory corruption
+ * by accessing freed resources.
+ */
+if (!list_empty(&bchan->desc_list)) {
+async_desc = list_first_entry(&bchan->desc_list,
+struct bam_async_desc, desc_node);
+bam_chan_init_hw(bchan, async_desc->dir);
+}
+
+list_for_each_entry_safe(async_desc, tmp,
&bchan->desc_list, desc_node) {
list_add(&async_desc->vd.node, &bchan->vc.desc_issued);
@@ -798,6 +818,9 @@
/* Number of bytes available to read */
avail = CIRC_CNT(offset, bchan->head, MAX_DESCRIPTORS + 1);

+if (offset < bchan->head)
+avail--;
+
+list_for_each_entry_safe(async_desc, tmp,
&bchan->desc_list, desc_node) {
/* Not enough data to read */
@@ -1128,15 +1151,19 @@
 u32 val;

/* read revision and configuration information */
-val = readl_relaxed(bam_addr(bdev, 0, BAM_REVISION)) >> NUM_EES_SHIFT;
-val &= NUM_EES_MASK;
+if (!bdev->num_ees) {

val = readl_relaxed(bam_addr(bdev, 0, BAM_REVISION));
+bdev->num_ees = (val >> NUM_EES_SHIFT) & NUM_EES_MASK;
+
/* check that configured EE is within range */
-if (bdev->ee >= val)
+if (bdev->ee >= bdev->num_ees)
 return -EINVAL;
-val = readl_relaxed(bam_addr(bdev, 0, BAM_NUM_PIPES));
-bdev->num_channels = val & BAM_NUM_PIPES_MASK;
+if (!bdev->num_channels) {
 +val = readl_relaxed(bam_addr(bdev, 0, BAM_NUM_PIPES));
 +bdev->num_channels = val & BAM_NUM_PIPES_MASK;
 +}

if (bdev->controlled_remotely)
 return 0;
@@ -1232,6 +1259,18 @@
bdev->controlled_remotely = of_property_read_bool(pdev->dev.of_node,
 "qcom.controlled-remotely");
+if (bdev->controlled_remotely) {
 +ret = of_property_read_u32(pdev->dev.of_node, "num-channels",
 + &bdev->num_channels);
 +if (ret)
 +dev_err(bdev->dev, "num-channels unspecified in dt
");
 +
 +ret = of_property_read_u32(pdev->dev.of_node, "qcom.num-ees",
 + &bdev->num_ees);
 +if (ret)
 +dev_err(bdev->dev, "num-ees unspecified in dt
");
 +}
 +bdev->bamclk = devm_clk_get(bdev->dev, "bam_clk");
 if (IS_ERR(bdev->bamclk))
 return PTR_ERR(bdev->bamclk);
--- linux-4.15.0.orig/drivers/dma/qcom/hidma.c
+++ linux-4.15.0/drivers/dma/qcom/hidma.c
@@ -133,24 +133,25 @@
desc = &mdesc->desc;
 last_cookie = desc->cookie;

+llstat = hidma_ll_status(mdma->lldev, mdesc->tre_ch);
 +
 spin_lock_irqsave(&mchan->lock, irqflags);
 +if (llstat == DMA_COMPLETE) {
 +mchan->last_success = last_cookie;

```c
result.result = DMA_TRANS_NOERROR;
} else {
    result.result = DMA_TRANS_ABORTED;
}

dma_cookie_complete(desc);
spin_unlock_irqrestore(&mchan->lock, irqflags);

llstat = hidma_ll_status(mdma->lldev, mdesc->tre_ch);
dmaengine_desc_get_callback(desc, &cb);

dma_run_dependencies(desc);

spin_lock_irqsave(&mchan->lock, irqflags);
list_move(&mdesc->node, &mchan->free);
-
-    if (llstat == DMA_COMPLETE) {
-        mchan->last_success = last_cookie;
-        result.result = DMA_TRANS_NOERROR;
-    } else
-        result.result = DMA_TRANS_ABORTED;
-
-    spin_unlock_irqrestore(&mchan->lock, irqflags);
-
    dmaengine_desc_callback_invoke(&cb, &result);
@@ -410,6 +411,7 @@
    if (!mdesc)
        return NULL;
+    mdesc->desc.flags = flags;
    hidma_ll_set_transfer_params(mdma->lldev, mdesc->tre_ch,
        src, dest, len, flags,
        HIDMA_TRE_MEMCPY);
@@ -442,6 +444,7 @@
    if (!mdesc)
        return NULL;
+    mdesc->desc.flags = flags;
    hidma_ll_set_transfer_params(mdma->lldev, mdesc->tre_ch,
        value, dest, len, flags,
        HIDMA_TRE_MEMSET);
--- linux-4.15.0.orig/drivers/dma/qcom/hidma_ll.c
+++ linux-4.15.0/drivers/dma/qcom/hidma_ll.c
@@ -393,6 +393,8 @@
 static void hidma_ll_int_handler_internal(struct hidma_lldev *lldev, int cause)
 {
     unsigned long irqflags;
```
if (cause & HIDMA_ERR_INT_MASK) {
    dev_err(lldev->dev, "error 0x%x, disabling...
", cause);
    return;
}

spin_lock_irqsave(&lldev->lock, irqflags);
writel_relaxed(cause, lldev->evca + HIDMA_EVCA_IRQ_CLR_REG);
spin_unlock_irqrestore(&lldev->lock, irqflags);

/*
 * Fine tuned for this HW...
 */
hidma_handle_tre_completion(lldev);

/* We consumed TREs or there are pending TREs or EVREs. */
-writel_relaxed(cause, lldev->evca + HIDMA_EVCA_IRQ_CLR_REG);
}

irqreturn_t hidma_ll_inthandler(int chirq, void *arg)

hidma_mgmt_of_populate_channels(child);
}
#endif

/* We do not check for return value here, as it is assumed that
 * platform_driver_register must not fail. The reason for this is that
 * the (potential) hidma_mgmt_of_populate_channels calls above are not
 * cleaned up if it does fail, and to do this work is quite
 * complicated. In particular, various calls of of_address_to_resource,
 * of_irq_to_resource, platform_device_register_full, of_dma_configure,
 * and of_msi_configure which then call other functions and so on, must
 * be cleaned up - this is not a trivial exercise.
 */
platform_driver_register(&hidma_mgmt_driver);

return 0;
--- linux-4.15.0.orig/drivers/dma/sh/rcar-dmac.c
+++ linux-4.15.0/drivers/dma/sh/rcar-dmac.c
@@ -200,6 +200,7 @@
 struct dma_device engine;
 struct device *dev;
 void __iomem *iomem;
+struct device_dma_parameters parms;

 unsigned int n_channels;
 struct rcar_dmac_chan *channels;
@@ -880,7 +881,7 @@
 rcar_dmac_chan_configure_desc(chan, desc);

-max_chunk_size = (RCAR_DMATCR_MASK + 1) << desc->xfer_shift;
+max_chunk_size = RCAR_DMATCR_MASK << desc->xfer_shift;

/*
 * Allocate and fill the transfer chunk descriptors. We own the only
@@ -1129,7 +1130,7 @@
 struct rcar_dmac_chan *rchan = to_rcar_dmac_chan(chan);

 /* Someone calling slave DMA on a generic channel? */
-if (rchan->mid_rid < 0 || !sg_len) {
+if (rchan->mid_rid < 0 || !sg_len || !sg_dma_len(sgl)) {
    dev_warn(chan->device->dev,
            "%s: bad parameter: len=%d, id=%d\n",
            __func__, sg_len, rchan->mid_rid);
@@ -1264,8 +1265,17 @@
* If the cookie doesn't correspond to the currently running transfer
* then the descriptor hasn't been processed yet, and the residue is
* equal to the full descriptor size.
+ * Also, a client driver is possible to call this function before
+ * rcar_dmac_isr_channel_thread() runs. In this case, the "desc.running"
+ * will be the next descriptor, and the done list will appear. So, if
+ * the argument cookie matches the done list's cookie, we can assume
+ * the residue is zero.
+ */
if (cookie != desc->async_tx.cookie) {
    list_for_each_entry(desc, &chan->desc.done, node) {
        if (cookie == desc->async_tx.cookie)
            return 0;
    }
    list_for_each_entry(desc, &chan->desc.pending, node) {
        if (cookie == desc->async_tx.cookie)
            return desc->size;
@@ -1323,6 +1333,7 @@
 enum dma_status status;


unsigned long flags;
unsigned int residue;
+bool cyclic;

status = dma_cookie_status(chan, cookie, txstate);
if (status == DMA_COMPLETE || !txstate)
@@ -1330,10 +1341,11 @@
    spin_lock_irqsave(&rchan->lock, flags);
    residue = rcar_dmac_chan_get_residue(rchan, cookie);
+    cyclic = rchan->desc.running ? rchan->desc.running->cyclic : false;
    spin_unlock_irqrestore(&rchan->lock, flags);

    /* if there's no residue, the cookie is complete */
    -if (!residue)
    +if (!residue && !cyclic)
      return DMA_COMPLETE;

    dma_set_residue(txstate, residue);
    @@ -1753,6 +1765,8 @@

dmac->dev = &pdev->dev;
    platform_set_drvdata(pdev, dmac);
+    dmac->dev->dma_parms = &dmac->parms;
+    dma_set_max_seg_size(dmac->dev, RCAR_DMATCR_MASK);
    dma_set_mask_and_coherent(dmac->dev, DMA_BIT_MASK(40));

    ret = rcar_dmac_parse_of(&pdev->dev, dmac);
--- linux-4.15.0.orig/drivers/dma/sh/usb-dmac.c
+++ linux-4.15.0/drivers/dma/sh/usb-dmac.c
@@ -697,6 +697,8 @@
#endif /* CONFIG_PM */

static const struct dev_pm_ops usb_dmac_pm = {
+    SET_NOIRQ_SYSTEM_SLEEP_PM_OPS(pm_runtime_force_suspend,
+        pm_runtime_force_resume)
    SET_RUNTIME_PM_OPS(usb_dmac_runtime_suspend, usb_dmac_runtime_resume,
        NULL)
};
@@ -858,8 +860,8 @@

error:
    of_dma_controller_free(pdev->dev.of_node);
-    pm_runtime_put(&pdev->dev);
+    pm_runtime_put(&pdev->dev);
    error_pm:
    pm_runtime_disable(&pdev->dev);
    return ret;
static void sprd_dma_stop(struct sprd_dma_chn *schan)
{
    struct virt_dma_desc *vd;
    unsigned long flags;
    spin_lock_irqsave(&schan->vc.lock, flags);
    if (schan->cur_desc)
        vd = &schan->cur_desc->vd;
    sprd_dma_free_desc(vd);
    spin_unlock_irqrestore(&schan->vc.lock, flags);
}

static void sprd_dma_free_desc(struct virt_dma_desc *vd);

static int sprd_dma_terminate_all(struct dma_chan *chan)
{
    struct sprd_dma_chn *schan = to_sprd_dma_chan(chan);
    struct virt_dma_desc *cur_vd = NULL;
    unsigned long flags;
    spin_lock_irqsave(&schan->vc.lock, flags);
    if (schan->cur_desc)
        cur_vd = &schan->cur_desc->vd;
    sprd_dma_stop(schan);
    spin_unlock_irqrestore(&schan->vc.lock, flags);
    vchan_free_allDescriptors(&schan->vc, &head);
    pm_runtime_put(chan->device->dev);
    return 0;
}

static int sprd_dma_free_chan_resources(struct dma_chan *chan)
{
    struct virt_dma_desc *cur_vd = NULL;
    unsigned long flags;
    spin_lock_irqsave(&schan->vc.lock, flags);
    if (schan->cur_desc)
        cur_vd = &schan->cur_desc->vd;
    sprd_dma_stop(schan);
    spin_unlock_irqrestore(&schan->vc.lock, flags);
    vchan_free_allDescriptors(&schan->vc, &head);
    pm_runtime_put(chan->device->dev);
    return 0;
}
+if (cur_vd)
+sprd_dma_free_desc(cur_vd);
+
vchan_dma_desc_free_list(&schan->vc, &head);
return 0;
}
--- linux-4.15.0.orig/drivers/dma/ste_dma40.c
+++ linux-4.15.0/drivers/dma/ste_dma40.c
@@ -142,7 +142,7 @@
 * when the DMA hw is powered off.
 * TODO: Add save/restore of D40_DREG_GCC on dma40 v3 or later, if that works.
 */
-static u32 d40_backup_regs[] = {
+static __maybe_unused u32 d40_backup_regs[] = {
D40_DREG_LCPA,
D40_DREG_LCLA,
D40_DREG_PRMSE,
@@ -211,7 +211,7 @@
#define BACKUP_REGS_SZ_V4B ARRAY_SIZE(d40_backup_regs_v4b)

-static u32 d40_backup_regs_chan[] = {
+static __maybe_unused u32 d40_backup_regs_chan[] = {
D40_CHAN_REG_SSCFG,
D40_CHAN_REG_SSELT,
D40_CHAN_REG_SSPTR,
@@ -3656,6 +3656,9 @@
 kfree(base->lcla_pool.base_unaligned);

 +if (base->lcpa_base)
+ iounmap(base->lcpa_base);
+ if (base->phy_lcpa)
+ release_mem_region(base->phy_lcpa,
+ base->lcpa_size);
- --- linux-4.15.0.orig/drivers/dma/stm32-dma.c
+++ linux-4.15.0/drivers/dma/stm32-dma.c
@@ -392,8 +392,10 @@
 spin_lock_irqsave(&chan->vchan.lock, flags);

 -if (chan->busy) {
- stm32_dma_stop(chan);
+if (chan->desc) {
+ vchan_terminate_vdesc(&chan->desc->vdesc);
+ if (chan->busy)
+ stm32_dma_stop(chan);
chan->desc = NULL;
}

@@ -429,6 +431,8 @@
dev_dbg(chan2dev(chan), "SFCR: 0x%08x\n", sfcr);
}

+static void stm32_dma_configure_next_sg(struct stm32_dma_chan *chan);
+static void stm32_dma_start_transfer(struct stm32_dma_chan *chan)
{
 struct stm32_dma_device *dmadev = stm32_dma_get_dev(chan);
@@ -447,6 +451,8 @@
     if (!vdesc)
         return;

+list_del(&vdesc->node);
+chan->desc = to_stm32_dma_desc(vdesc);
chan->next_sg = 0;
}
@@ -471,6 +477,9 @@
     if (status)
         stm32_dma_irq_clear(chan, status);

+if (chan->desc->cyclic)
+stm32_dma_configure_next_sg(chan);
+stm32_dma_dump_reg(chan);

/* Start DMA */
@@ -521,7 +530,6 @@
 } else {
     chan->busy = false;
     if (chan->next_sg == chan->desc->num_sgs) {
@@ -564,8 +572,7 @@
         vchan_cookie_complete(&chan->desc->vdesc);
         chan->desc = NULL;
 } else {

spin_unlock_irqrestore(&chan->vchan.lock, flags);
```c
+list_del(&vdesc->node);
  chan->desc = to_stm32_mdma_desc(vdesc);
  hwdesc = chan->desc->hwdesc;
  chan->curr_hwdesc = 0;
  LIST_HEAD(head);
  spin_lock_irqsave(&chan->vchan.lock, flags);
  if (chan->busy) {
    -stm32_mdma_stop(chan);
  +vchan_terminate_vdesc(&chan->desc->vdesc);
  +stm32_mdma_stop(chan);
  chan->desc = NULL;
  } else {
    vchan_get_all_descriptors(&chan->vchan, &head);
```
if (async_tx_test_ack(&dma_desc->txd)) {
  if (async_tx_test_ack(&dma_desc->txd) && !dma_desc->cb_count) {
    list_del(&dma_desc->node);
    spin_unlock_irqrestore(&tdc->lock, flags);
    dma_desc->txd.flags = 0;
  }
}

sgreq = list_first_entry(&tdc->pending_sg_req, typeof(*sgreq), node);
dma_desc = sgreq->dma_desc;
dma_desc->bytes_transferred += sgreq->req_len;
/* if we dma for long enough the transfer count will wrap */
+dma_desc->bytes_transferred =
+(dma_desc->bytes_transferred + sgreq->req_len) %
+dma_desc->bytesRequested;

/* Callback need to be call */
if (!dma_desc->cb_count)
  @ @ -752,10 +755,6 @@
bool was_busy;

spin_lock_irqsave(&tdc->lock, flags);
-if (list_empty(&tdc->pending_sg_req)) {
  -spin_unlock_irqrestore(&tdc->lock, flags);
  -return 0;
-}

if (!tdc->busy)
goto skip_dma_stop;
@@ -1209,8 +1208,7 @@
dev_dbg(tdc2dev(tdc), "Freeing channel %dn", tdc->id);

-if (tdc->busy)
  -tegra_dma_terminate_all(dc);
  +tegra_dma_terminate_all(dc);

spin_lock_irqsave(&tdc->lock, flags);
list_splice_init(&tdc->pending_sg_req, &sg_req_list);
--- linux-4.15.0.orig/drivers/dma/tegra210-adma.c
+++ linux-4.15.0/drivers/dma/tegra210-adma.c
@@ -22,7 +22,6 @@
#include <linux/of_device.h>
#include <linux/of_dma.h>
#include <linux/of_irq.h>
-#include <linux/pm_clock.h>
#include <linux/pm_runtime.h>
#include <linux/slab.h>
unsigned int src_addr;
unsigned int trg_addr;
unsigned int fifo_ctrl;
+unsigned int cmd;
unsigned int tc;
);

enum dma_transfer_direction
sreq_dir;
unsigned int sreq_index;
bool sreq_reserved;
+struct tegra_adma_chan_regs ch_regs;

/* Transfer count and position info */
unsigned int tx_buf_count;
@ @ -141.6 +142.7 @ @
struct dma_device dma_dev;
struct device *dev;
void __iomem *base_addr;
+struct clk *ahubclk;
unsigned int nr_channels;
unsigned long rx_requests_reserved;
unsigned long tx_requests_reserved;
@@ -581.6 +583.7 @@

ret = pm_runtime_get_sync(tdc2dev(tdc));
if (ret < 0) {
+pm_runtime_put_noidle(tdc2dev(tdc));
free_irq(tdc->irq, tdc);
return ret;
}
@@ -635.23 +638.67 @@
static int tegra_adma_runtime_suspend(struct device *dev)
{
struct tegra_adma *tdma = dev_get_drvdata(dev);
+struct tegra_adma_chan_regs *ch_reg;
+struct tegra_adma_chan *tdc;
+int i;

tdma->global_cmd = tdma_read(tdma, ADMA_GLOBAL_CMD);
+if (!tdma->global_cmd)
+goto clk_disable;
+
+for (i = 0; i < tdma->nr_channels; i++) {
+tdc = &tdma->channels[i];
+ch_reg = &tdc->regs;
+ch_reg->cmd = tdma_ch_read(tdc, ADMA_CH_CMD);
/* skip if channel is not active */
+if (!ch_reg->cmd)
+continue;
+ch_reg->tc = tdma_ch_read(tdc, ADMA_CH_TC);
+ch_reg->src_addr = tdma_ch_read(tdc, ADMA_CH_LOWER_SRC_ADDR);
+ch_reg->trg_addr = tdma_ch_read(tdc, ADMA_CH_LOWER_TRG_ADDR);
+ch_reg->ctrl = tdma_ch_read(tdc, ADMA_CH_CTRL);
+ch_reg->fifo_ctrl = tdma_ch_read(tdc, ADMA_CH_FIFO_CTRL);
+ch_reg->config = tdma_ch_read(tdc, ADMA_CH_CONFIG);
+
+clk_disable:
+clk_disable_unprepare(tdma->ahub_clk);
-
-return pm_clk_suspend(dev);
+return 0;
+
static int tegra_adma_runtime_resume(struct device *dev)
{
struct tegra_adma *tdma = dev_get_drvdata(dev);
-int ret;
+struct tegra_adma_chan_regs *ch_reg;
+struct tegra_adma_chan *tdc;
+int ret, i;
-
-ret = pm_clk_resume(dev);
-if (ret)
+-ret = clk_prepare_enable(tdma->ahub_clk);
+-if (ret) {
++dev_err(dev, "ahub clk_enable failed: %d\n", ret);
+-return ret;
+-}
+}
-tdma_write(tdma, ADMA_GLOBAL_CMD, tdma->global_cmd);
+
+-if (!tdma->global_cmd)
++return 0;
++
++for (i = 0; i < tdma->nr_channels; i++) {
++tdc = &tdma->channels[i];
++ch_reg = &tdc->ch_regs;
++/* skip if channel was not active earlier */
++if (!ch_reg->cmd)
+++continue;
++tdma_ch_write(tdc, ADMA_CH_TC, ch_reg->tc);
++tdma_ch_write(tdc, ADMA_CH_LOWER_SRC_ADDR, ch_reg->src_addr);
++tdma_ch_write(tdc, ADMA_CH_LOWER_TRG_ADDR, ch_reg->trg_addr);
+tdma_ch_write(tdc, ADMA_CH_CTRL, ch_reg->ctrl);
+tdma_ch_write(tdc, ADMA_CH_FIFO_CTRL, ch_reg->fifo_ctrl);
+tdma_ch_write(tdc, ADMA_CH_CONFIG, ch_reg->config);
+tdma_ch_write(tdc, ADMA_CH_CMD, ch_reg->cmd);
+
{return 0;
}

@@ -692,23 +739,11 @@
if (IS_ERR(tdma->base_addr))
return PTR_ERR(tdma->base_addr);

-ret = pm_clk_create(&pdev->dev);
-if (ret)
-return ret;
-
-ret = of_pm_clk_add_clk(&pdev->dev, "d_audio");
-if (ret)
-goto clk_destroy;
-
-pm_runtime_enable(&pdev->dev);
-
-ret = pm_runtime_get_sync(&pdev->dev);
-if (ret < 0)
-goto rpm_disable;
-
-ret = tegra_adma_init(tdma);
-if (ret)
-goto rpm_put;
+tdma->ahub_clk = devm_clk_get(&pdev->dev, "d_audio");
+if (IS_ERR(tdma->ahub_clk)) {
+dev_err(&pdev->dev, "Error: Missing ahub controller clock\n");
+return PTR_ERR(tdma->ahub_clk);
+
INIT_LIST_HEAD(&tdma->dma_dev.channels);
for (i = 0; i < tdma->nr_channels; i++) {
@@ -727,6 +762,18 @@
tdc->tdma = tdma;
}

+pm_runtime_enable(&pdev->dev);
+
+ret = pm_runtime_get_sync(&pdev->dev);
+if (ret < 0) {
+pm_runtime_put_noidle(&pdev->dev);
+goto rpm_disable;

+} 
+ +ret = tegra_adma_init(tdma);  
+if (ret)
+goto rpm_put; 
+ 
dma_cap_set(DMA_SLAVE, tdma->dma_dev.cap_mask); 
dma_cap_set(DMA_PRIVATE, tdma->dma_dev.cap_mask); 
dma_cap_set(DMA_CYCLIC, tdma->dma_dev.cap_mask); 
@@ -749,7 +796,7 @@
ret = dma_async_device_register(&tdma->dma_dev);
if (ret < 0) {
  dev_err(&pdev->dev, "ADMA registration failed: %d\n", ret);
  -goto irq_dispose;
  +goto rpm_put;
}

ret = of_dma_controller_register(pdev->dev.of_node,
@@ -768,15 +815,13 @@
dma_remove:
 dma_async_device_unregister(&tdma->dma_dev);
 -irq_dispose:
 -while (--i >= 0)
 -irq_dispose_mapping(tdma->channels[i].irq);
 rpm_put:
 rpm_runtime_put_sync(&pdev->dev);
 rpm_disable:
 -clk_destroy:
 -pm_clk_destroy(&pdev->dev);
 +irq_dispose:
 +while (--i >= 0)
 +irq_dispose_mapping(tdma->channels[i].irq);

return ret;
}
@@ -786,6 +831,7 @@
struct tegra_adma *tdma = platform_get_drvdata(pdev);
int i;

+of_dma_controller_free(pdev->dev.of_node);
 dma_async_device_unregister(&tdma->dma_dev);

for (i = 0; i < tdma->nr_channels; ++i)
@@ -793,7 +839,6 @@
 rpm_runtime_put_sync(&pdev->dev);
pm_runtime_disable(&pdev->dev);
-dirclk_disable(&pdev->dev);

return 0;
}
--- linux-4.15.0.orig/drivers/dma/ti-dma-crossbar.c
+++ linux-4.15.0/drivers/dma/ti-dma-crossbar.c
@@ -54,7 +54,15 @@
 static inline void ti_am335x_xbar_write(void __iomem *iomem, int event, u8 val)
 { 
- writeb_relaxed(val, iomem + event);
+/*
+ * TPCC_EVT_MUX_60_63 register layout is different than the
+ * rest, in the sense, that event 63 is mapped to lowest byte
+ * and event 60 is mapped to highest, handle it separately.
+ */
+if (event >= 60 && event <= 63)
+writeb_relaxed(val, iomem + (63 - event % 4));
+else
+writeb_relaxed(val, iomem + event);
}

static void ti_am335x_xbar_free(struct device *dev, void *route_data)
@@ -387,8 +395,10 @@
 ret = of_property_read_u32_array(node, pname, (u32 *)rsv_events,
     nelm * 2);
 -if (ret)
+-if (ret) { 
+    kfree(rsv_events);
     return ret;
+} 

 for (i = 0; i < nelm; i++) {
 ti_dra7_xbar_reserve(rsv_events[i][0], rsv_events[i][1],
 --- linux-4.15.0.orig/drivers/dma/timb_dma.c
+++ linux-4.15.0/drivers/dma/timb_dma.c
@@ -545,7 +545,7 @@
 }

dma_sync_single_for_device(chan2dmadev(chan), td_desc->txd.phys,
 -td_desc->desc_list_len, DMA_MEM_TO_DEV);
+td_desc->desc_list_len, DMA_TO_DEVICE);

 return &td_desc->txd;
--- linux-4.15.0.orig/drivers/dma/xilinx/xilinx_dma.c
#define XILINX_DMA_DMACR_CIRC_EN BIT(1)
#define XILINX_DMA_DMACR_RUNSTOPBIT(0)
#define XILINX_DMA_DMACR_FSYNCSRC_MASK GENMASK(6, 5)
#define XILINX_DMA_DMACR_DELAY_MASK GENMASK(31, 24)
#define XILINX_DMA_DMACR_FRAME_COUNT_MASK GENMASK(23, 16)
#define XILINX_DMA_DMACR_MASTER_MASK GENMASK(11, 8)
#define XILINX_DMA_REG_DMASR 0x0004
#define XILINX_DMA_DMASR_EOL_LATE_ERR BIT(15)

/* IO accessors */
static inline u32 dma_read(struct xilinx_dma_chan *chan, u32 reg)
{"@ -2071,8 +2074,10 @@
chan->config.gen_lock = cfg->gen_lock;
chan->config.master = cfg->master;

+dmacr &= ~XILINX_DMA_DMACR_GENLOCK_EN;
if (cfg->gen_lock && chan->genlock) {
dmacr |= XILINX_DMA_DMACR_GENLOCK_EN;
+dmacr &= ~XILINX_DMA_DMACR_MASTER_MASK;
dmacr |= cfg->master << XILINX_DMA_DMACR_MASTER_SHIFT;
}
"@ -2086,11 +2091,13 @@
chan->config.delay = cfg->delay;

if (cfg->coalesc <= XILINX_DMA_DMACR_FRAME_COUNT_MAX) {
+dmacr &= ~XILINX_DMA_DMACR_FRAME_COUNT_MASK;
dmacr |= cfg->coalesc << XILINX_DMA_DMACR_FRAME_COUNT_SHIFT;
chan->config.coalesc = cfg->coalesc;
}

if (cfg->delay <= XILINX_DMA_DMACR_DELAY_MAX) {
+dmacr &= ~XILINX_DMA_DMACR_DELAY_MASK;
dmacr |= cfg->delay << XILINX_DMA_DMACR_DELAY_SHIFT;
chan->config.delay = cfg->delay;
}
"@ -2367,7 +2374,7 @@
has_dre = false;

if (!has_dre)
    -xdev->common.copy_align = fls(width - 1);
+    xdev->common.copy_align = (enum dmaengine_alignment)fls(width - 1);

if (of_device_is_compatible(node, "xlnx,axi-vdma-mm2s-channel") ||
     of_device_is_compatible(node, "xlnx,axi-dma-mm2s-channel") ||
@@ -2460,7 +2467,8 @@
/*
 static int xilinx_dma_child_probe(struct xilinx_dma_device *xdev,
     struct device_node *node) {
-int ret, i, nr_channels = 1;
+int ret, i;
+u32 nr_channels = 1;

    ret = of_property_read_u32(node, "dma-channels", &nr_channels);
    if ((ret < 0) && xdev->mcdma)
@@ -2592,7 +2600,7 @@
    xdev->ext_addr = false;

 /* Set the dma mask bits */
-    dma_set_mask(xdev->dev, DMA_BIT_MASK(addr_width));
+    dma_set_mask_and_coherent(xdev->dev, DMA_BIT_MASK(addr_width));

 /* Initialize the DMA engine */
    xdev->common.dev = &pdev->dev;
@@ -2644,7 +2652,11 @@
}

/* Register the DMA engine with the core */
-    dma_async_device_register(&xdev->common);
+    err = dma_async_device_register(&xdev->common);
+    if (err) {
+        dev_err(xdev->dev, "failed to register the dma device\n");
+        goto error;
+    }

    err = of_dma_controller_register(node, of_dma_xilinx_xlate,
    xdev);
--- linux-4.15.0.orig/drivers/dma/xilinx/zynqmp_dma.c
+++ linux-4.15.0/drivers/dma/xilinx/zynqmp_dma.c
@@ -125,10 +125,12 @@
    /* Max transfer size per descriptor */
    #define ZYNQMP_DMA_MAX_TRANS_LEN 0x40000000
    /* Max burst lengths */
+    #define ZYNQMP_DMA_MAX_DST_BURST_LEN 32768U
```c
#define ZYNQMP_DMA_MAX_SRC_BURST_LEN 32768U
+

/* Reset values for data attributes */
#define ZYNQMP_DMA_AXCACHE_VAL 0xF
-#define ZYNQMP_DMA_ARLEN_RST_VAL 0xF
-#define ZYNQMP_DMA_AWLEN_RST_VAL 0xF

#define ZYNQMP_DMA_SRC_ISSUE_RST_VAL 0x1F

@ -159,7 +161,7 @@
u32 ctrl;
u64 nxtdscraddr;
u64 rsvd;
-}; __aligned(64)
+};

/**
 * struct zynqmp_dma_desc_sw - Per Transaction structure
 @ -527,17 +529,19 @@

 static void zynqmp_dma_config(struct zynqmp_dma_chan *chan)
 {
- u32 val;
+ u32 val, burst_val;

  val = readl(chan->regs + ZYNQMP_DMA_CTRL0);
  val |= ZYNQMP_DMA_POINT_TYPE_SG;
  writel(val, chan->regs + ZYNQMP_DMA_CTRL0);

  val = readl(chan->regs + ZYNQMP_DMA_DATA_ATTR);
  +burst_val = __ilog2_u32(chan->src_burst_len);
  val = (val & ~ZYNQMP_DMA_ARLEN) |
  -(chan->src_burst_len << ZYNQMP_DMA_ARLEN_OFST);
  +(burst_val << ZYNQMP_DMA_ARLEN_OFST) & ZYNQMP_DMA_ARLEN);
  +burst_val = __ilog2_u32(chan->dst_burst_len);
  val = (val & ~ZYNQMP_DMA_AWLEN) |
  -(chan->dst_burst_len << ZYNQMP_DMA_AWLEN_OFST);
  +((burst_val << ZYNQMP_DMA_AWLEN_OFST) & ZYNQMP_DMA_AWLEN);
  writel(val, chan->regs + ZYNQMP_DMA_DATA_ATTR);
 }

@@ -551,8 +555,10 @@
 {
 struct zynqmp_dma_chan *chan = to_chan(dchan);

- chan->src_burst_len = config->src_maxburst;
- chan->dst_burst_len = config->dst_maxburst;
+ chan->src_burst_len = clamp(config->src_maxburst, 1U,
```

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+ZYNQMP_DMA_MAX_SRC_BURST_LEN);
+chan->dst_burst_len = clamp(config->dst_maxburst, 1U,
+ZYNQMP_DMA_MAX_DST_BURST_LEN);

return 0;
}
@@ -838,7 +844,8 @@
if (!chan)
    return;

-devm_free_irq(chan->zdev->dev, chan->irq, chan);
+if (chan->irq)
    devm_free_irq(chan->zdev->dev, chan->irq, chan);
    tasklet_kill(&chan->tasklet);
    list_del(&chan->common.device_node);
    clk_disable_unprepare(chan->clk_apb);
@@ -872,8 +879,8 @@
    return PTR_ERR(chan->regs);

chan->bus_width = ZYNQMP_DMA_BUS_WIDTH_64;
-chan->dst_burst_len = ZYNQMP_DMA_AWLEN_RST_VAL;
-chan->src_burst_len = ZYNQMP_DMA_ARLEN_RST_VAL;
+chan->dst_burst_len = ZYNQMP_DMA_MAX_DST_BURST_LEN;
+chan->src_burst_len = ZYNQMP_DMA_MAX_SRC_BURST_LEN;
    err = of_property_read_u32(node, "xlnx,bus-width", &chan->bus_width);
    if (err < 0) {
        dev_err(&pdev->dev, "missing xlnx,bus-width property\n");
--- linux-4.15.0.orig/drivers/edac/Kconfig
+++ linux-4.15.0/drivers/edac/Kconfig
@@ -246,8 +246,8 @@
 micro-server but may appear on others in the future.

config EDAC_MPC85XX
-tristate "Freescale MPC83xx / MPC85xx"
+bool "Freescale MPC83xx / MPC85xx"
    depends on FSL_SOC
    depends on FSL_SOC && EDAC=y
    help
        Support for error detection and correction on the Freescale
        MPC8349, MPC8560, MPC8540, MPC8548, T4240
--- linux-4.15.0.orig/drivers/edac/altera_edac.c
+++ linux-4.15.0/drivers/edac/altera_edac.c
@@ -1106,7 +1106,7 @@
        static void ocram_free_mem(void *p, size_t size, void *other) {
            -gen_pool_free((struct gen_pool *)other, (u32)p, size);
            +gen_pool_free((struct gen_pool *)other, (unsigned long)p, size);
static const struct edac_device_prv_data ocramecc_data = {
    .dbam_to_cs = f17_base_addr_to_cs_size,
};

struct altr_arria10_edac *edac = irq_desc_get_handler_data(desc);
struct irq_chip *chip = irq_desc_get_chip(desc);
int irq = irq_desc_get_irq(desc);
unsigned long bits;

dberr = (irq == edac->db_irq) ? 1 : 0;
sm_offset = dberr ? A10_SYSMGR_ECC_INTSTAT_DERR_OFST :
    @ @ -1655,7 +1656,8 @@

regmap_read(edac->ecc_mgr_map, sm_offset, &irq_status);
-@ @ -1646,6 +1646,7 @ @

	for_each_set_bit(bit, (unsigned long *)&irq_status, 32) {
    +bits = irq_status;
    +for_each_set_bit(bit, &bits, 32) {
         irq = irq_linear_revmap(edac->domain, dberr * 32 + bit);
    
    if (irq)
        generic_handle_irq(irq);
--- linux-4.15.0.orig/drivers/edac/amd64_edac.c
+++ linux-4.15.0/drivers/edac/amd64_edac.c
@@ @ -18,6 +18,9 @@
 /* Per-node stuff */
 static struct ecc_settings **ecc_stngs;

+/* Device for the PCI component */
+static struct device *pci_ctl_dev;
+
+/*
+ * Valid scrub rates for the K8 hardware memory scrubber. We map the scrubbing
+ * bandwidth to a valid bit pattern. The 'set' operation finds the 'matching-
@@ @ -261,6 +264,8 @@
if (pvt->model == 0x60)
    amd64_read_pci_cfg(pvt->F2, F15H_M60H_SCRCTRL, &scrubval);
+else
+    amd64_read_pci_cfg(pvt->F3, SCRCTRL, &scrubval);
break;

    case 0x17:
    @@ @ -2200,6 +2205,24 @@
    .dbam_to_cs = f17_base_addr_to_cs_size,
    }
    
    +[F17_M10H_CPUS] = {
        .ctl_name = "F17h_M10h",
+.f0_id = PCI_DEVICE_ID_AMD_17H_M10H_DF_F0,
+.f6_id = PCI_DEVICE_ID_AMD_17H_M10H_DF_F6,
+.ops = {
+.early_channel_count= f17_early_channel_count,
+.dbam_to_cs= f17_base_addr_to_cs_size,
+
+
+
+
+[F17_M30H_CPUS] = {
+.ctl_name = "F17h_M30h",
+.f0_id = PCI_DEVICE_ID_AMD_17H_M30H_DF_F0,
+.f6_id = PCI_DEVICE_ID_AMD_17H_M30H_DF_F6,
+.ops = {
+.early_channel_count= f17_early_channel_count,
+.dbam_to_cs= f17_base_addr_to_cs_size,
+
+
+
/*
@@ -2492,13 +2515,6 @@
goto log_error;
}

-if (umc_normaddr_to_sysaddr(m->addr, pvt->mc_node_id, err.channel, &sys_addr)) {
-err.err_code = ERR_NORM_ADDR;
-goto log_error;
-}
-
-error_address_to_page_and_offset(sys_addr, &err);
-
-if (!(m->status & MCI_STATUS_SYNDV)) {
err.err_code = ERR_SYND;
goto log_error;
@@ -2515,6 +2531,13 @@
err.csrow = m->synd & 0x7;

+if (umc_normaddr_to_sysaddr(m->addr, pvt->mc_node_id, err.channel, &sys_addr)) {
+err.err_code = ERR_NORM_ADDR;
+goto log_error;
+
+error_address_to_page_and_offset(sys_addr, &err);
+
log_error:
  _log_ecc_error(mci, &err, ecc_type);
}
@@ -2543,6 +2566,9 @@
return -ENODEV;
}

if (!pci_ctl_dev)
+pci_ctl_dev = &pvt->F0->dev;
+edac_dbg(1, "F0: %s\n", pci_name(pvt->F0));
edac_dbg(1, "F3: %s\n", pci_name(pvt->F3));
edac_dbg(1, "F6: %s\n", pci_name(pvt->F6));
@@ -2567,6 +2593,9 @@
return -ENODEV;
}

if (!pci_ctl_dev)
+pci_ctl_dev = &pvt->F2->dev;
+edac_dbg(1, "F1: %s\n", pci_name(pvt->F1));
edac_dbg(1, "F2: %s\n", pci_name(pvt->F2));
edac_dbg(1, "F3: %s\n", pci_name(pvt->F3));
@@ -2854,6 +2883,7 @@
dimm = csrow->channels[j]->dimm;
dimm->mtype = pvt->dram_type;
dimm->edac_mode = edac_mode;
+dimm->grain = 64;
}

static inline void
f17h_determine_edac_ctl_cap(struct mem_ctl_info *mci, struct amd64_pvt *pvt)
{
-u8 i, ecc_en = 1, cpk_en = 1;
+u8 i, ecc_en = 1, cpk_en = 1, dev_x4 = 1, dev_x16 = 1;

for (i = 0; i < NUM_UMCS; i++) {
if (pvt->umc[i].sdp_ctrl & UMC_SDPI_INIT) {
  ecc_en &= !(pvt->umc[i].umc_cap_hi & UMC_ECC_ENABLED);
cpk_en &= !(pvt->umc[i].umc_cap_hi & UMC_ECC_CHIPKILL_CAP);
  +dev_x4 &= !(pvt->umc[i].dimm_cfg & BIT(6));
  +dev_x16 &= !(pvt->umc[i].dimm_cfg & BIT(7));
}
}

@@ -3092,12 +3122,15 @@
if (ecc_en) {
  mci->edac_ctl_cap |= EDAC_FLAG_SECDED;
  
@@ -3105,8 +3138,15 @@
if (ecc_en) {
  mci->edac_ctl_cap |= EDAC_FLAG_SECDED;
if (cpk_en)
+if (!cpk_en)
+return;
+
+if (dev_x4)
mci->edac_ctl_cap |= EDAC_FLAG_S4ECD4ED;
+else if (dev_x16)
mci->edac_ctl_cap |= EDAC_FLAG_S16ECD16ED;
+else
mci->edac_ctl_cap |= EDAC_FLAG_S8ECD8ED;
}
}

@@ -3147,7 +3187,7 @@
struct amd64_family_type *fam_type = NULL;

pvt->ext_model = boot_cpu_data.x86_model >> 4;
-pvt->stepping= boot_cpu_data.x86_mask;
+pvt->stepping= boot_cpu_data.x86_stepping;
+pvt->model= boot_cpu_data.x86_model;
+pvt->fam= boot_cpu_data.x86;

@@ -3188,6 +3228,15 @@
break;

case 0x17:
+if (pvt->model >= 0x10 && pvt->model <= 0x2f) {
+  fam_type = &family_types[F17_M10H_CPUS];
+  pvt->ops = &family_types[F17_M10H_CPUS].ops;
+  break;
+} else if (pvt->model >= 0x30 && pvt->model <= 0x3f) {
+  fam_type = &family_types[F17_M30H_CPUS];
+  pvt->ops = &family_types[F17_M30H_CPUS].ops;
+  break;
  }
  fam_type= &family_types[F17_CPUS];
  pvt->ops= &family_types[F17_CPUS].ops;
break;
@@ -3401,21 +3450,10 @@

static void setup_pci_device(void)
{
-struct mem_ctl_info *mci;
-struct amd64_pvt *pvt;
-
  if (pci_ctl)
  return;
- mci = edac_mc_find(0);
- if (!mci)
- return;
-
- pvt = mci->pvt_info;
- if (pvt->umc)
- pci_ctl = edac_pci_create_generic_ctl(&pvt->F0->dev, EDAC_MOD_STR);
- else
-pci_ctl = edac_pci_create_generic_ctl(&pvt->F2->dev, EDAC_MOD_STR);
+pci_ctl = edac_pci_create_generic_ctl(pci_ctl_dev, EDAC_MOD_STR);
if (!pci_ctl) {
pr_warn("%s(): Unable to create PCI control", __func__);
pr_warn("%s(): PCI error report via EDAC not set", __func__);
@@ -3495,6 +3533,8 @@
return 0;

err_pci:
+pci_ctl_dev = NULL;
+
msrs_free(msrs);
msrs = NULL;

@@ -3526,6 +3566,8 @@
kfree(ecc_stngs);
ecc_stngs = NULL;

+pci_ctl_dev = NULL;
+msrs_free(msrs);
msrs = NULL;
}
--- linux-4.15.0.orig/drivers/edac/amd64_edac.h
+++ linux-4.15.0/drivers/edac/amd64_edac.h
@@ -115,6 +115,10 @@
#define PCI_DEVICE_ID_AMD_16H_M30H_NB_F2 0x1582
#define PCI_DEVICE_ID_AMD_17H_DF_F00x1460
#define PCI_DEVICE_ID_AMD_17H_DF_F60x1466
+##define PCI_DEVICE_ID_AMD_17H_M10H_DF_F0 0x15e8
+##define PCI_DEVICE_ID_AMD_17H_M10H_DF_F6 0x15ee
+##define PCI_DEVICE_ID_AMD_17H_M30H_DF_F0 0x1490
+##define PCI_DEVICE_ID_AMD_17H_M30H_DF_F6 0x1496

/*
 * Function 1 - Address Map
@@ -281,6 +285,8 @@
F16_CPU,
F16_M30H_CPU,
F17_CPU,
+F17_M10H_CPUS,
+F17_M30H_CPUS,
NUM_FAMILIES,
};

--- linux-4.15.0.orig/drivers/edac/edac_device_sysfs.c
+++ linux-4.15.0/drivers/edac/edac_device_sysfs.c
@@ -275,6 +275,7 @@
 /* Error exit stack */
 err_kobj_reg:
 +kobject_put(&edac_dev->kobj);
 module_put(edac_dev->owner);

 err_out:
--- linux-4.15.0.orig/drivers/edac/edac_mc.c
+++ linux-4.15.0/drivers/edac/edac_mc.c
@@ -215,6 +215,7 @@
 [MEM_LRDDR4]= "Load-Reduced-DDR4-RAM",
];
 EXPORT_SYMBOL_GPL(edac_mem_types);

@@ -679,22 +680,18 @@

 struct mem_ctl_info *edac_mc_find(int idx)
 { 
-struct mem_ctl_info *mci = NULL;
 +struct mem_ctl_info *mci;
 struct list_head *item;
 mutex_lock(&mem_ctls_mutex);

 list_for_each(item, &mc_devices) { 
  mci = list_entry(item, struct mem_ctl_info, link);
-   -if (mci->mc_idx >= idx) {
-     -if (mci->mc_idx == idx) {
-       goto unlock;
-     }
-     break;
-   }
+  +if (mci->mc_idx == idx)
+     goto unlock;
 }
+mci = NULL;
unlock:
mutex_unlock(&mem_ctls_mutex);
return mci;
@@ -1244,9 +1241,13 @@
if (p > e->location)
 *(p - 1) = '0';
*/

-/* Report the error via the trace interface */
-grain_bits = fls_long(e->grain) + 1;
+/* Sanity-check driver-supplied grain value. */
+if (WARN_ON_ONCE(!e->grain))
+e->grain = 1;
+
+/* Report the error via the trace interface */
if (IS_ENABLED(CONFIG_RAS))
trace_mc_event(type, e->msg, e->label, e->error_count,
    mci->mc_idx, e->top_layer, e->mid_layer,
--- linux-4.15.0.orig/drivers/edac/edac_mc_sysfs.c
+++ linux-4.15.0/drivers/edac/edac_mc_sysfs.c
@@ -26,7 +26,7 @@
static int edac_mc_log_ue = 1;
static int edac_mc_log_ce = 1;
static int edac_mc_panic_on_ue;
-static int edac_mc_poll_msec = 1000;
+static unsigned int edac_mc_poll_msec = 1000;

 /* Getter functions for above */
int edac_mc_get_log_ue(void)
@@ -45,30 +45,30 @@
}

 /* this is temporary */
-int edac_mc_get_poll_msec(void)
+unsigned int edac_mc_get_poll_msec(void)
{
    return edac_mc_poll_msec;
}

static int edac_set_poll_msec(const char *val, const struct kernel_param *kp)
{
    unsigned long i;
    unsigned int i;
    int ret;
    if (!val)
return -EINVAL;

-retr = kstrtol(val, 0, &l);
+ret = kstrtouint(val, 0, &i);
if (ret)
return ret;

-if (l < 1000)
+if (i < 1000)
return -EINVAL;

-*(unsigned long *)kp->arg) = l;
+*(unsigned int *)kp->arg) = i;

/* notify edac_me engine to reset the poll period */
-edac_me_reset_delay_period(l);
+edac_me_reset_delay_period(i);

return 0;
}
@@ -82,7 +82,7 @@
module_param(edac_me_log_ce, int, 0644);
MODULE_PARM_DESC(edac_me_log_ce,
  "Log correctable error to console: 0=off 1=on");
-module_param_call(edac_me_poll_msec, edac_set_poll_msec, param_get_int,
+module_param_call(edac_me_poll_msec, edac_set_poll_msec, param_get_uint,
  &edac_me_poll_msec, 0644);
MODULE_PARM_DESC(edac_me_poll_msec, "Polling period in milliseconds");

@@ -426,6 +426,8 @@
static int edac_create_csrow_object(struct mem_ctl_info *mci,
    struct csrow_info *csrow, int index)
{
+int err;
+csrow->dev.type = &csrow_attr_type;
    csrow->dev.bus = mci->bus;
    csrow->dev.groups = csrow_dev_groups;
@@ -438,7 +440,11 @@
edac_dbg(0, "creating (virtual) csrow node %s\n",
    dev_name(&csrow->dev));

-return device_add(&csrow->dev);
+err = device_add(&csrow->dev);
+if (err)
+    put_device(&csrow->dev);
+return err;
/ Create a CSROW object under specified edac_mc_device */

err = device_add(mci_pdev);
if (err < 0)
  goto out_dev_free;
+goto out_put_device;

edac_dbg(0, "device %s created\n", dev_name(mci_pdev));

return 0;

- out_dev_free:
- kfree(mci_pdev);
+ out_put_device:
+ put_device(mci_pdev);
out:
return err;

--- linux-4.15.0.orig/drivers/edac/edac_module.h
+++ linux-4.15.0/drivers/edac/edac_module.h
@@ -36,7 +36,7 @@
extern int edac_mc_get_log_ce(void);
extern int edac_mc_get_panic_on_ue(void);
extern int edac_get_poll_msec(void);
-extern int edac_mc_get_poll_msec(void);
+extern unsigned int edac_mc_get_poll_msec(void);

unsigned edac_dimm_info_location(struct dimm_info *dimm, char *buf,
unsigned len);
--- linux-4.15.0.orig/drivers/edac/edac_pci_sysfs.c
+++ linux-4.15.0/drivers/edac/edac_pci_sysfs.c
@@ -386,7 +386,7 @@
/* Error unwind stack */
kobject_init_and_add_fail:
- kfree(edac_pci_top_main_kobj);
+ kobject_put(edac_pci_top_main_kobj);

kzalloc_fail:
module_put(THIS_MODULE);
--- linux-4.15.0.orig/drivers/edac/ghes_edac.c
+++ linux-4.15.0/drivers/edac/ghes_edac.c
@@ -204,6 +204,7 @@
/* Cleans the error report buffer */
memset(e, 0, sizeof (*e));
e->error_count = 1;
e->grain = 1;
strcpy(e->label, "unknown label");
e->msg = pvt->msg;
e->other_detail = pvt->other_detail;
@@ -299,7 +300,7 @@
/* Error grain */
if (mem_err->validation_bits & CPER_MEM_VALID_PA_MASK)
-e->grain = ~(mem_err->physical_addr_mask & ~PAGE_MASK);
+e->grain = ~mem_err->physical_addr_mask + 1;

/* Memory error location, mapped on e->location */
p = e->location;
@@ -406,8 +407,13 @@
if (p > pvt->other_detail)
(*(p - 1) = '\0';

/* Sanity-check driver-supplied grain value. */
+if (WARN_ON_ONCE(!e->grain))
+e->grain = 1;
+
+/* Generate the trace event */
-grain_bits = fls_long(e->grain);
+grain_bits = fls_long(e->grain - 1);
+
#include "trace.h"
include "trace_event.h"


--- linux-4.15.0.orig/drivers/edac/i3200_edac.c
+++ linux-4.15.0/drivers/edac/i3200_edac.c
@@ -399,7 +399,7 @@
if (nr_pages == 0)
    continue;
    edac_dbg(0, "csrow %d, channel %d%s, size = %ld Mb\n", i, j,
+edac_dbg(0, "csrow %d, channel %d%s, size = %ld MiB", i, j, stacked ? " (stacked)" : ", PAGES_TO_MiB(nr_pages));

dimm->nr_pages = nr_pages;
--- linux-4.15.0.orig/drivers/edac/i5100_edac.c
+++ linux-4.15.0/drivers/edac/i5100_edac.c
@@ -1072,16 +1072,15 @@
PCIDEVICE_ID_INTEL_5100_19, 0);
if (!einj) {
ret = -ENODEV;
-goto bail_einj;
+goto bail_mc_free;
}

rc = pci_enable_device(einj);
if (rc < 0) {
ret = rc;
-goto bail_disable_einj;
+goto bail_einj;
}

- mci->pdev = &pdev->dev;

priv = mci->pvt_info;
@@ -1147,14 +1146,14 @@
bail_scrub:
priv->scrub_enable = 0;
cancel_delayed_work_sync(&priv->i5100_scrubbing);
-edac_mc_free(mci);
-
-bail_disable_einj:
pici_disable_device(einj));

bail_einj:
pici_dev_put(einj);

+bail_mc_free:
+edac_mc_free(mci);
+
bail_disable_ch1:
pici_disable_device(ch1mm);

--- linux-4.15.0.orig/drivers/edac/i7core_edac.c
+++ linux-4.15.0/drivers/edac/i7core_edac.c
@@ -597,7 +597,7 @@
/* DDR3 has 8 I/O banks */
size = (rows * cols * banks * ranks) >> (20 - 3);
-edac_dbg(0, "dimm %d %d Mb offset: %x, bank: %d, rank: %d, row: %#x, col: %#x\n",
+edac_dbg(0, "dimm %d %d MiB offset: %x, bank: %d, rank: %d, row: %#x, col: %#x\n",
 j, size,
RANKOFFSET(dimm_dod[j]),
banks, ranks, rows, cols);
@@ -1177,15 +1177,14 @@
rc = device_add(pvt->addrmatch_dev);
if (rc < 0)
-        return rc;
+        goto err_put_addrmatch;

if (!pvt->is_registered) {
pvt->chancounts_dev = kzalloc(sizeof(*pvt->chancounts_dev),
    GFP_KERNEL);
if (!pvt->chancounts_dev) {
-            put_device(pvt->addrmatch_dev);
-            device_del(pvt->addrmatch_dev);
-            return -ENOMEM;
+            rc = -ENOMEM;
+            goto err_del_addrmatch;
}  
pvt->chancounts_dev->type = &all_channel_counts_type;
@@ -1199,9 +1198,18 @@
rc = device_add(pvt->chancounts_dev);
if (rc < 0)
-        return rc;
+        goto err_put_chancounts;
}
return 0;
+
+err_put_chancounts:
+put_device(pvt->chancounts_dev);
+err_del_addrmatch:
+device_del(pvt->addrmatch_dev);
+err_put_addrmatch:
+put_device(pvt->addrmatch_dev);
+
+return rc;
}

static void i7core_delete_sysfs_devices(struct mem_ctl_info *mci)
@@ -1211,11 +1219,11 @@
edac_dbg(1, "\n");
if (!pvt->is_registered) {
    -put_device(pvt->chancounts_dev);
device_del(pvt->chancounts_dev);
    +put_device(pvt->chancounts_dev);
}

-put_device(pvt->addrmatch_dev);
device_del(pvt->addrmatch_dev);
+put_device(pvt->addrmatch_dev);
}

/****************************************************************************
@@ -1703,6 +1711,7 @@
     u32 errnum = find_first_bit(&error, 32);

    if (uncorrected_error) {
+    core_err_cnt = 1;
    if (ripv)
        tp_event = HW_EVENT_ERR_FATAL;
    else
--- linux-4.15.0.orig/drivers/edac/ie31200_edac.c
+++ linux-4.15.0/drivers/edac/ie31200_edac.c
@@ -147,6 +147,8 @@
     (n << (28 + (2 * skl) - PAGE_SHIFT))

     static int nr_channels;
+    static struct pci_dev *mci_pdev;
+    static int ie31200_registered = 1;

     struct ie31200_priv {
         void __iomem *window;
@@ -518,12 +520,16 @@
     static int ie31200_init_one(struct pci_dev *pdev, const struct pci_device_id *ent)
     {
         -edac_dbg(0, "MC:\n");
+        int rc;

         +edac_dbg(0, "MC:\n");
         if (pci_enable_device(pdev) < 0)
             return -EIO;
+        rc = ie31200_probe1(pdev, ent->driver_data);
+        if (rc == 0 && !mci_pdev)
+            mci_pdev = pci_dev_get(pdev);

         -return ie31200_probe1(pdev, ent->driver_data);
+        return rc;
     }

}
static void ie31200_remove_one(struct pci_dev *pdev)
@@ -532,6 +538,8 @@
        struct ie31200_priv *priv;

        edac_dbg(0, "\n");
+        pci_dev_put(mci_pdev);
+        mci_pdev = NULL;
        mci = edac_mc_del_mc(&pdev->dev);
        if (!mci)
            return;
@@ -583,17 +591,53 @@
+
static int __init ie31200_init(void)
{ 
+    int pci_rc, i;
+    
        edac_dbg(3, "MC:\n");
/* Ensure that the OPSTATE is set correctly for POLL or NMI */
opstate_init();

    return pci_register_driver(&ie31200_driver);
+    pci_rc = pci_register_driver(&ie31200_driver);
+    if (pci_rc < 0)
+        goto fail0;
+    
+    if (!mci_pdev) {
+        ie31200_registered = 0;
+        for (i = 0; ie31200_pci_tbl[i].vendor != 0; i++) {
+            mci_pdev = pci_get_device(ie31200_pci_tbl[i].vendor,
+                ie31200_pci_tbl[i].device,
+                NULL);
+            if (mci_pdev)
+                break;
+        }
+        if (!mci_pdev)
+            edac_dbg(0, "ie31200 pci_get_device fail\n");
+        pci_rc = -ENODEV;
+        goto fail1;
+    }
+    
+    if (!mci_pdev) {
+        edac_dbg(0, "ie31200 pci_get_device fail\n");
+        pci_rc = -ENODEV;
+        goto fail1;
+    }
    
    pci_rc = ie31200_init_one(mci_pdev, &ie31200_pci_tbl[i]);
+    if (pci_rc < 0) {
+        edac_dbg(0, "ie31200 init fail\n");
+        pci_rc = -ENODEV;
+        goto fail1;
+    }
+    
+    return 0;
+    

static void __exit ie31200_exit(void)
{
edac_dbg(3, "MC:\n");
pci_unregister_driver(&ie31200_driver);
+if (!ie31200_registered)
+ie31200_remove_one(mci_pdev);
}

module_init(ie31200_init);
--- linux-4.15.0.orig/drivers/edac/mce_amd.c
+++ linux-4.15.0/drivers/edac/mce_amd.c
@@ -854,21 +854,24 @@
static void decode_smca_error(struct mce *m)
{
    struct smca_hwid *hwid;
-    unsigned int bank_type;
+    enum smca_bank_types bank_type;
    const char *ip_name;
    u8 xec = XEC(m->status, xec_mask);

    if (m->bank >= ARRAY_SIZE(smca_banks))
        return;

    -if (x86_family(m->cpuid) >= 0x17 && m->bank == 4)
    +pr_emerg(HW_ERR "Bank 4 is reserved on Fam17h.\n");
    -
    +hwid = smca_banks[m->bank].hwid;
    if (!hwid)
        return;

    bank_type = hwid->bank_type;
    +
    +if (bank_type == SMCA_RESERVED) {
    +pr_emerg(HW_ERR "Bank %d is reserved.\n", m->bank);
    +return;
    +}
    +
    ip_name = smca_get_long_name(bank_type);

    pr_emerg(HW_ERR "%s Extended Error Code: %d\n", ip_name, xec);
static bool ignore_mce(struct mce *m) {

/* NB GART TLB error reporting is disabled by default. */

if (ignore_mce(m))
    return NOTIFY_STOP;

pr_emerg(HW_ERR "%s
", decode_error_status(m));

edac_dbg(3, "init mci
");

#define DNV_MCHBAR_SIZE  0x8000
#define DNV_SB_PORT_SIZE 0x10000
static int dnv_rd_reg(int port, int off, int op, void *data, size_t sz, char *name)

+##define DNV_MCHBAR_SIZE 0x8000
+##define DNV_SB_PORT_SIZE 0x10000

struct pci_dev *pdev;
char *base;
unsigned long size;

if (op == 4) {
pdev = pci_get_device(PCI_VENDOR_ID_INTEL, 0x1980, NULL);
addr = get_mem_ctrl_hub_base_addr();
if (!addr)
return -ENODEV;
+size = DNV_MCHBAR_SIZE;
} else {
/* MMIO via sideband register base address */
addr = get_sideband_reg_base_addr();
if (!addr)
return -ENODEV;
addr += (port << 16);
+size = DNV_SB_PORT_SIZE;
}
-base = ioremap((resource_size_t)addr, 0x10000);
+base = ioremap((resource_size_t)addr, size);
if (!base)
return -ENODEV;

static const struct x86_cpu_id pnd2_cpuids[] = {
{ X86_VENDOR_INTEL, 6, INTEL_FAM6_ATOM_GOLDMONT, 0, (kernel_ulong_t)&apl_ops },
+{ X86_VENDOR_INTEL, 6, INTEL_FAM6_ATOM_GOLDMONT_X, 0, (kernel_ulong_t)&dnv_ops },
};
MODULE_DEVICE_TABLE(x86cpu, pnd2_cpuids);
--- linux-4.15.0.orig/drivers/edac/sb_edac.c
+++ linux-4.15.0/drivers/edac/sb_edac.c
@@ -279,7 +279,7 @@
	* sbridge structs
*/
-#define NUM_CHANNELS		4	/* Max channels per MC */
+#define NUM_CHANNELS	6	/* Max channels per MC */
#define MAX_DIMMS3	/* Max DIMMS per channel */
#define KNL_MAX_CHAS38	/* KNL max num. of Cache Home Agents */
#define KNL_MAX_CHANNELS6	/* KNL max num. of PCI channels */
@@ -1615,7 +1615,7 @@
size = ((u64)rows * cols * banks * ranks) >> (20 - 3);
npages = MiB_TO_PAGES(size);

-edac_dbg(0, "mc#%d: ha %d channel %d, dimm %d, %lld Mb (%d pages) bank: %d, rank: %d, row: %#x, col: %#x\n",
+edac_dbg(0, "mc#%d: ha %d channel %d, dimm %d, %lld MiB (%d pages) bank: %d, rank: %d, row: %#x, col: %#x\n",
  pvt->sbridge_dev->mc, pvt->sbridge_dev->dom, i, j,
  size, npages,
  banks, ranks, rows, cols);
@ @ -2878,6 +2878,7 @@
recoverable = GET_BITFIELD(m->status, 56, 56);

if (uncorrected_error) {
  +core_err_cnt = 1;
if (ripv) {
  type = "FATAL";
  tp_event = HW_EVENT_ERR_FATAL;
  @ @ -2901,35 +2902,27 @@
  *cccc = channel
  * If the mask doesn't match, report an error to the parsing logic
  */
  -if (! ((errcode & 0xef80) == 0x80)) {
  -*optype = "Can't parse: it is not a mem";
  -} else {
  -*switch (optypenum) {
  -case 0:
  -*optype = "generic undef request error";
  -break;
  -case 1:
  -*optype = "memory read error";
  -break;
  -case 2:
  -*optype = "memory write error";
  -break;
  -case 3:
  -*optype = "addr/cmd error";
  -break;
  -case 4:
  -*optype = "memory scrubbing error";
  -break;
  -default:
  -*optype = "reserved";
  -break;
  -}
  +switch (optypenum) {
  +case 0:
  +optype = "generic undef request error";
+break;
+case 1:
+  otype = "memory read error";
+break;
+case 2:
+  otype = "memory write error";
+break;
+case 3:
+  otype = "addr/cmd error";
+break;
+case 4:
+  otype = "memory scrubbing error";
+break;
+default:
+  otype = "reserved";
+break;
}

-/* Only decode errors with a valid address (ADDRV) */
-if (!GET_BITFIELD(m->status, 58, 58))
  -return;
-
-  if (pvt->info.type == KNIGHTS_LANDING) {
-    if (channel == 14) {
-      edac_dbg(0, "%s%s err_code:%04x:%04x EDRAM bank %d
",
-            @ @ -3035,17 +3028,11 @ @
-      }
-      struct mce *mce = (struct mce *)data;
-      struct mem_ctl_info *mci;
-      -struct sbridge_pvt *pvt;
-      char *type;
-      
-      if (edac_get_report_status() == EDAC_REPORTING_DISABLED)
-        return NOTIFY_DONE;
-      
-      -mci = get_mci_for_node_id(mce->socketid, IMC0);
-      -if (!mci)
-        -return NOTIFY_DONE;
-      -pvt = mci->pvt_info;
-      -
-      /*
-       * Just let mcelog handle it if the error is
-       * outside the memory controller. A memory error
-            @ @ -3055,6 +3042,22 @ @
-       if ((mce->status & 0xefff) >> 7 != 1)
-         return NOTIFY_DONE;
-       */
-       
-       /* Check ADDRV bit in STATUS */
+if (!GET_BITFIELD(mce->status, 58, 58))
+return NOTIFY_DONE;
+
+/* Check MISCV bit in STATUS */
+if (!GET_BITFIELD(mce->status, 59, 59))
+return NOTIFY_DONE;
+
+/* Check address type in MISC (physical address only) */
+if (GET_BITFIELD(mce->misc, 6, 8) != 2)
+return NOTIFY_DONE;
+
+if (!mci)
+return NOTIFY_DONE;
+
+if (mce->mcgstatus & MCG_STATUS_MCIP)
+type = "Exception";
+else
+
+size = ((1ull << (rows + cols + ranks)) * banks) >> (20 - 3);
+npages = MiB_TO_PAGES(size);
+
+edac_dbg(0, "mc#%d: channel %d, dimm %d, %lld Mb (%d pages) bank: %d, rank: %d, row: %#x, col: %#x\n",
+imc->mc, chan, dimmno, size, npages,
banks, 1 << ranks, rows, cols);
+
+break;
+case 2:
lchan = (addr >> shift) % 2;
- lchan = (lchan << 1) | ~lchan;
+ lchan = (lchan << 1) | !lchan;
+break;
+case 3:
lchan = ((addr >> shift) % 2) << 1;
+ @ @ -904,6 +904,7 @ @
+recoverable = GET_BITFIELD(m->status, 56, 56);
+
+if (uncorrected_error) {
+core_err_cnt = 1;
+if (ripv) {
+type = "FATAL";
+tp_event = HW_EVENT_ERR_FATAL;
+--- linux-4.15.0.orig/drivers/edac/synopsys_edac.c
+++ linux-4.15.0/drivers/edac/synopsys_edac.c
@@ -904,6 +904,7 @@
recovery = GET_BITFIELD(m->status, 56, 56);

for (j = 0; j < csi->nr_channels; j++) {
    dimm = csi->channels[j]->dimm;
    --dimm->edac_mode = EDAC_FLAG_SECDED;
    +dimm->edac_mode = EDAC_SECDED;
    dimm->mtype = synps_edac_get_mtype(priv->baseaddr);
    dimm->nr_pages = (size >> PAGE_SHIFT) / csi->nr_channels;
    dimm->grain = SYNPS_EDAC_ERR_GRAIN;
}
default:
    dev_err(&l2c->pdev->dev, "Unsupported device: \%04x\n",
            l2c->pdev->device);
    -return IRQ_NONE;
    +goto err_free;
}

while (CIRC_CNT(l2c->ring_head, l2c->ring_tail,
        -- @ @ -1902.7 +1902.7 @@
    l2c->ring_tail++;
    }

    -return IRQ_HANDLED;
    +ret = IRQ_HANDLED;
}

err_free:
    kfree(other);
}

for (i = 0; data->adc_conditions[i].id != EXTCON_NONE; i++); 
data->num_conditions = i;

-data->chan = iio_channel_get(&pdev->dev, pdata->consumer_channel);
+data->chan = devm_iio_channel_get(&pdev->dev, pdata->consumer_channel);
if (IS_ERR(data->chan))
    return PTR_ERR(data->chan);

    @ @ -170.7 +170.6 @@

    free_irq(data->irq, data);
    cancel_work_sync(&data->handler.work);
    -iio_channel_release(data->chan);

    return 0;
}
struct arizona *arizona = info->arizona;
int id_gpio = arizona->pdata.hpdet_id_gpio;
unsigned int report = EXTCON_JACK_HEADPHONE;
int ret, reading;
bool mic = false;

mutex_lock(&info->lock);

/* If the cable was removed while measuring ignore the result */
-ret = extcon_get_state(info->edev, EXTCON_MECHANICAL);
-if (ret < 0) {
-dev_err(arizona->dev, "Failed to check cable state: %d\n", ret);
+state = extcon_get_state(info->edev, EXTCON_MECHANICAL);
+if (state < 0) {
+dev_err(arizona->dev, "Failed to check cable state: %d\n", state);
goto out;
-} else if (!ret) {
+} else if (!state) {
+dev_dbg(arizona->dev, "Ignoring HPDET for removed cable\n");
goto done;
}
@@ -673,7 +672,7 @@
ARIZONA_ACCDET_MODE_MASK, ARIZONA_ACCDET_MODE_MIC);

/* If we have a mic then reenable MICDET */
-if (mic || info->mic)
+if (state && (mic || info->mic))
arizona_start_mic(info);

if (info->hpdet_active) {
@@ -681,7 +680,9 @@
-info->hpdet_active = false;
 }

-INFO->hpdet_done = true;
+/* Do not set hp_det done when the cable has been unplugged */
+if (state)
+INFO->hpdet_done = true;

out:
mutex_unlock(&info->lock);
struct arizona_extcon_info *info = platform_get_drvdata(pdev);
struct arizona *arizona = info->arizona;
int jack_irq_rise, jack_irq_fall;

bool change;

regmap_update_bits_check(arizona->regmap, ARIZONA_MIC_DETECT_1,
    ARIZONA_MICD_ENA, 0,
    &change);

if (change) {
    regulator_disable(info->micvdd);
    pm_runtime_put(info->dev);
}

gpiod_put(info->micd_pol_gpio);

#define CHT_WC_VBUS_GPIO_CTLO_GPIO_CTLO0x6e2d
#define CHT_WC_VBUS_GPIO_CTLO_OUTPUTBIT(0)
+#define CHT_WC_VBUS_GPIO_CTLO_DRV_ODBIT(4)
+#define CHT_WC_VBUS_GPIO_CTLO_DIR_OUTBIT(5)

enum cht_wc_usb_id {
    USB_ID_OTG,
    ret, val;

    case CHT_WC_USBSRC_TYPE_SDP:
    case CHT_WC_USBSRC_TYPE_FLOAT_DP_DN:
    case CHT_WC_USBSRC_TYPE_OTHER:
    @ @ -183,14 +185,15 @ @
    }

-int ret, val;

-val = enable ? CHT_WC_VBUS_GPIO_CTLO_OUTPUT : 0;

-/*
 * The 5V boost converter is enabled through a gpio on the PMIC, since
 * there currently is no gpio driver we access the gpio reg directly.
 */
-ret = regmap_update_bits(ext->regmap, CHT_WC_VBUS_GPIO_CTLO,

- CHT_WC_VBUS_GPIO_CTLO_OUTPUT, val);
+val = CHT_WC_VBUS_GPIO_CTLO_DRV_OD | CHT_WC_VBUS_GPIO_CTLO_DIR_OUT;
+if (enable)
+val |= CHT_WC_VBUS_GPIO_CTLO_OUTPUT;
+
+ret = regmap_write(ext->regmap, CHT_WC_VBUS_GPIO_CTLO, val);
if (ret)
dev_err(ext->dev, "Error writing Vbus GPIO CTLO: %d\n", ret);
}
--- linux-4.15.0.orig/drivers/extcon/extcon-intel-int3496.c
+++ linux-4.15.0/drivers/extcon/extcon-intel-int3496.c
@@ -153,8 +153,9 @@
return ret;
}
-/* queue initial processing of id-pin */
+/* process id-pin so that we start with the right status */
queue_delayed_work(system_wq, &data->work, 0);
+flush_delayed_work(&data->work);

platform_set_drvdata(pdev, data);

--- linux-4.15.0.orig/drivers/extcon/extcon-max77693.c
+++ linux-4.15.0/drivers/extcon/extcon-max77693.c
@@ -1275,4 +1275,4 @@
MODULE_DESCRIPTION("Maxim MAX77693 Extcon driver");
MODULE_AUTHOR("Chanwoo Choi <cw00.choi@samsung.com>");
MODULE_LICENSE("GPL");
-MODULE_ALIAS("platform:extcon-max77693");
+MODULE_ALIAS("platform:max77693-muic");
--- linux-4.15.0.orig/drivers/extcon/extcon-max8997.c
+++ linux-4.15.0/drivers/extcon/extcon-max8997.c
@@ -321,12 +321,10 @@
{
int ret = 0;

-if (usb_type == MAX8997_USB_HOST) {
- ret = max8997_muic_set_path(info, info->path_usb, attached);
- if (ret < 0) {
- dev_err(info->dev, "failed to update muic register\n");
- return ret;
- }
+ret = max8997_muic_set_path(info, info->path_usb, attached);
+if (ret < 0) {
+ dev_err(info->dev, "failed to update muic register\n");
+ return ret;
+}
switch (usb_type) {
    @ @ .785,3 +783,4 @ @
    MODULE_DESCRIPTION("Maxim MAX8997 Extcon driver");
    MODULE_AUTHOR("Donggeun Kim <dg77.kim@samsung.com>");
    MODULE_LICENSE("GPL");
    +MODULE_ALIAS("platform:max8997-muic");
    --- linux-4.15.0.orig/drivers/extcon/extcon-sm5502.c
    +++ linux-4.15.0/drivers/extcon/extcon-sm5502.c
    @ @ -69,6 +69,10 @@
    /* Default value of SM5502 register to bring up MUIC device. */
    static struct reg_data sm5502_reg_data[] = {
        {
            .reg = SM5502_REG_RESET,
            .val = SM5502_REG_RESET_MASK,
            .invert = true,
        },
        {
            .reg = SM5502_REG_CONTROL,
            .val = SM5502_REG_CONTROL_MASK_INT_MASK,
            .invert = false,
            @ @ -88,7 +92,6 @@
            | SM5502_REG_INTM2_MHL_MASK,
            .invert = true,
        },
    -{ }
    };

    /* List of detectable cables */
    --- linux-4.15.0.orig/drivers/extcon/extcon-sm5502.h
    +++ linux-4.15.0/drivers/extcon/extcon-sm5502.h
    @ @ -241,6 +241,8 @@
    #define DM_DP_SWITCH_UART				((DM_DP_CON_SWITCH_UART
    | (DM_DP_CON_SWITCH_UART <<SM5502_REG_MANUAL_SW1_DP_SHIFT))
    +
    // SM5502 Interrupts */
    enum sm5502_irq {
        /* INT1 */
        --- linux-4.15.0.orig/drivers/extcon/extcon.c
        +++ linux-4.15.0/drivers/extcon/extcon.c
        @ @ -433,8 +433,8 @@
        return index;

        spin_lock_irqsave(&edev->lock, flags);
        -
        state = !!(edev->state & BIT(index));
        +spin_unlock_irqrestore(&edev->lock, flags);
/*
 * Call functions in a raw notifier chain for the specific one
@@ -448,6 +448,7 @@*/
raw_notifier_call_chain(&edev->nh_all, state, edev);

+spin_lock_irqsave(&edev->lock, flags);
/* This could be in interrupt handler */
prop_buf = (char *)get_zeroed_page(GFP_ATOMIC);
if (!prop_buf) {
@@ -1251,6 +1252,7 @@
sizeof(*edev->nh), GFP_KERNEL);
if (!edev->nh) {
ret = -ENOMEM;
+device_unregister(&edev->dev);
goto err_dev;
}

--- linux-4.15.0.orig/drivers/firewire/net.c
+++ linux-4.15.0/drivers/firewire/net.c
@@ -249,7 +249,11 @@
h = (struct fwnet_header *)((u8 *)hh->hh_data + HH_DATA_OFF(sizeof(*h)));
h->h_proto = type;
memcpy(h->h_dest, neigh->ha, net->addr_len);
-hh->hh_len = FWNET_HLEN;
+/* Pairs with the READ_ONCE() in neigh_resolve_output(),
+ * neigh_hh_output() and neigh_update_hhs().
+ */
+smp_store_release(&hh->hh_len, FWNET_HLEN);
return 0;
}

--- linux-4.15.0.orig/drivers/firewire/nosy.c
+++ linux-4.15.0/drivers/firewire/nosy.c
@@ -359,6 +359,7 @@
struct client *client = file->private_data;
spinlock_t *client_list_lock = &client->lynx->client_list_lock;
struct nosy_stats stats;
+int ret;

switch (cmd) {
case NOSY_IOC_GET_STATS:
@@ -373,11 +374,15 @@
return 0;

case NOSY_IOC_START:
+ret = -EBUSY;
spin_lock_irq(client_list_lock);
-list_add_tail(&client->link, &client->lynx->client_list);
+if (list_empty(&client->link)) {
+list_add_tail(&client->link, &client->lynx->client_list);
+ret = 0;
+}
spin_unlock_irq(client_list_lock);

-return 0;
+return ret;

case NOSY_IOC_STOP:
spin_lock_irq(client_list_lock);
--- linux-4.15.0.orig/drivers/firewire/ohci.c
+++ linux-4.15.0/drivers/firewire/ohci.c
@@ -1128,7 +1128,13 @@
return -ENOMEM;
offset = (void *)&desc->buffer - (void *)desc;
-desc->buffer_size = PAGE_SIZE - offset;
+/*
+ * Some controllers, like JMicron ones, always issue 0x20-byte DMA reads
+ * for descriptors, even 0x10-byte ones. This can cause page faults when
+ * an IOMMU is in use and the oversized read crosses a page boundary.
+ * Work around this by always leaving at least 0x10 bytes of padding.
+ */
+desc->buffer_size = PAGE_SIZE - offset - 0x10;
desc->buffer_bus = bus_addr + offset;
desc->used = 0;

--- linux-4.15.0.orig/drivers/firmware/Kconfig
+++ linux-4.15.0/drivers/firmware/Kconfig
@@ -48,6 +48,14 @@
This enables support for the SCPI power domains which can be
enabled or disabled via the SCP firmware

+config ARM_SDE_INTERFACE
+bool "ARM Software Delegated Exception Interface (SDEI)"
+depends on ARM64
+help
+ The Software Delegated Exception Interface (SDEI) is an ARM
+ standard for registering callbacks from the platform firmware
+ into the OS. This is typically used to implement RAS notifications.
+
config EDD
tristate "BIOS Enhanced Disk Drive calls determine boot disk"
depends on X86
config ISCSI_IBFT_FIND
bool "iSCSI Boot Firmware Table Attributes"
- depends on X86 && ACPI
+ depends on X86 && ISCSI_IBFT
default n
help
This option enables the kernel to find the region of memory

config ISCSI_IBFT
tristate "iSCSI Boot Firmware Table Attributes module"
select ISCSI_BOOT_SYSFS
- depends on ISCSI_IBFT_FIND && SCSI && SCSI_LOWLEVEL
+ select ISCSI_IBFT_FIND if X86
+ depends on ACPI && SCSI && SCSI_LOWLEVEL
default n
help
This option enables support for detection and exposing of iSCSI

config QCOM_SCM
bool
depends on ARM || ARM64
+ depends on HAVE_ARM_SMCCC
select RESET_CONTROLLER

config QCOM_SCM_32
--- linux-4.15.0.orig/drivers/firmware/Makefile
+++ linux-4.15.0/drivers/firmware/Makefile
@@ -6,6 +6,7 @@
obj-$(CONFIG_ARM_PSCI_CHECKER) += psci_checker.o
obj-$(CONFIG_ARM_SCPI_PROTOCOL) += arm_scpi.o
obj-$(CONFIG_ARM_SCPI_POWER_DOMAIN) += scpi_pm_domain.o
+obj-$(CONFIG_ARM_SDE_INTERFACE) += arm_sdei.o
obj-$(CONFIG_DMI) += dmi_scan.o
obj-$(CONFIG_DMI_SYSFS) += dmi-sysfs.o
obj-$(CONFIG_EDD) +=edd.o
--- linux-4.15.0.orig/drivers/firmware/arm_scpi.c
+++ linux-4.15.0/drivers/firmware/arm_scpi.c
@@ -588,8 +588,10 @@
 ret = scpi_send_message(CMD_GET_CLOCK_VALUE, &le_clk_id,
 sizeof(le_clk_id), &clk, sizeof(clk));
+if (ret)
+ return 0;

 -return ret ? ret : le32_to_cpu(clk.rate);
+return le32_to_cpu(clk.rate);
static int scpi_clk_set_val(u16 clk_id, unsigned long rate)

--- linux-4.15.0.orig/drivers/firmware/arm_sdei.c
+++ linux-4.15.0/drivers/firmware/arm_sdei.c
@@ -0,0 +1,1086 @@
+// SPDX-License-Identifier: GPL-2.0
+// Copyright (C) 2017 Arm Ltd.
+#define pr_fmt(fmt) "sdei: " fmt
+
+﻿#include "linux/acpi.h"
+﻿#include "linux/arm_sdei.h"
+﻿#include "linux/arm-smccc.h"
+﻿#include "linux/atomic.h"
+ +#include "linux/bitops.h"
+ +#include "linux/compiler.h"
+ +#include "linux/cpuhotplug.h"
+ +#include "linux/cpu.h"
+ +#include "linux/cpu_pm.h"
+ +#include "linux/errno.h"
+ +#include "linux/hardirq.h"
+ +#include "linux/kernel.h"
+ +#include "linux/kprobes.h"
+ +#include "linux/kvm_host.h"
+ +#include "linux/list.h"
+ +#include "linux/lockdev.h"
+ +#include "linux/notifier.h"
+ +#include "linux/of.h"
+ +#include "linux/of_platform.h"
+ +#include "linux/percpu.h"
+ +#include "linux/platform_device.h"
+ +#include "linux/pm.h"
+ +#include "linux/ptrace.h"
+ +#include "linux/preempt.h"
+ +#include "linux/reboot.h"
+ +#include "linux/slab.h"
+ +#include "linux/smp.h"
+ +#include "linux/spinlock.h"
+ +#include "linux/uaccess.h"
+
+/**
+ * The call to use to reach the firmware.
+ */
+static asmlinkage void (*sdei_firmware_call)(unsigned long function_id,
+                                          unsigned long arg0, unsigned long arg1,
+                                          unsigned long arg2, unsigned long arg3,
+                                          unsigned long arg4, struct arm_smccc_res *res);
+/* entry point from firmware to arch asm code */
+static unsigned long sdei_entry_point;
+
+struct sdei_event {
+/* These three are protected by the sdei_list_lock */
+struct list_head list;
+bool reregister;
+bool reenable;
+
+u32 event_num;
+u8 type;
+u8 priority;
+
+/* This pointer is handed to firmware as the event argument. */
+union {
+/* Shared events */
+struct sdei_registered_event *registered;
+
+/* CPU private events */
+struct sdei_registered_event __percpu *private_registered;
+};
+};
+
+/* Take the mutex for any API call or modification. Take the mutex first. */
+static DEFINE_MUTEX(sdei_events_lock);
+
+/* and then hold this when modifying the list */
+static DEFINE_SPINLOCK(sdei_list_lock);
+static LIST_HEAD(sdei_list);
+
+/* Private events are registered/enabled via IPI passing one of these */
+struct sdei_crosscall_args {
+struct sdei_event *event;
+atomic_t errors;
+int first_error;
+};
+
+#define CROSSCALL_INIT(arg, event) \( \text{arg.event = event, } \text{arg.first_error = 0, } \text{atomic_set(&arg.errors, 0))} \)
+
+static inline int sdei_do_cross_call(void *fn, struct sdei_event * event)
+{\}
+struct sdei_crosscall_args arg;
+
+CROSSCALL_INIT(arg, event);
+on_each_cpu(fn, &arg, true);
+return arg.first_error;
+
+static inline void
+sdei_cross_call_return(struct sdei_crosscall_args *arg, int err)
+{
+if (err && (atomic_inc_return(&arg->errors) == 1))
+arg->first_error = err;
+
+static int sdei_to_linux_errno(unsigned long sdei_err)
+{
+switch (sdei_err) {
+case SDEI_NOT_SUPPORTED:
+return -EOPNOTSUPP;
+case SDEI_INVALID_PARAMETERS:
+return -EINVAL;
+case SDEI_DENIED:
+return -EPERM;
+case SDEI_PENDING:
+return -EINPROGRESS;
+case SDEI_OUT_OF_RESOURCE:
+return -ENOMEM;
+}
+/* Not an error value ... */
+return sdei_err;
+
+/* If x0 is any of these values, then the call failed, use sdei_to_linux_errno()
+ * to translate.
+ */
+static int sdei_is_err(struct arm_smccc_res *res)
+{
+switch (res->a0) {
+case SDEI_NOT_SUPPORTED:
+case SDEI_INVALID_PARAMETERS:
+case SDEI_DENIED:
+case SDEI_PENDING:
+case SDEI_OUT_OF_RESOURCE:
+return true;
+}
+
+return false;
+
+static int invoke_sdei_fn(unsigned long function_id, unsigned long arg0,
int sdei_api_event_context(u32 query, u64 *result) {
    int err = 0;
    struct arm_smccc_res res;
    
    if (sdei_firmware_call) {
        sdei_firmware_call(function_id, arg0, arg1, arg2, arg3, arg4,
                             &res);
        if (sdei_is_err(&res))
            err = sdei_to_linux_errno(res.a0);
    } else {
        /*
         * !sdei_firmware_call means we failed to probe or called
         * sdei_mark_interface_broken(). -EIO is not an error returned
         * by sdei_to_linux_errno() and is used to suppress messages
         * from this driver.
         */
        err = -EIO;
        res.a0 = SDEI_NOT_SUPPORTED;
    }
    
    if (result)
        *result = res.a0;
    
    return err;
}

static struct sdei_event *sdei_event_find(u32 event_num) {
    struct sdei_event *e, *found = NULL;
    
    lockdep_assert_held(&sdei_events_lock);
    spin_lock(&sdei_list_lock);
    list_for_each_entry(e, &sdei_list, list) {
        if (e->event_num == event_num) {
            found = e;
            break;
        }
    }
    spin_unlock(&sdei_list_lock);
    
    return found;
}

int sdei_api_event_context(u32 query, u64 *result)
+{
+  return invoke_sdei_fn(SDEI_1_0_FN_SDEI_EVENT_CONTEXT, query, 0, 0, 0,
+    result);
+}
+NOKPROBE_SYMBOL(sdei_api_event_context);
+
+static int sdei_api_event_get_info(u32 event, u32 info, u64 *result)
+{
+  return invoke_sdei_fn(SDEI_1_0_FN_SDEI_EVENT_GET_INFO, event, info, 0,
+    0, 0, result);
+}
+
+static struct sdei_event *sdei_event_create(u32 event_num,
+    sdei_event_callback *cb,
+    void *cb_arg)
+{
+  int err;
+  u64 result;
+  struct sdei_event *event;
+  struct sdei_registered_event *reg;
+
+  lockdep_assert_held(&sdei_events_lock);
+
+  event = kzalloc(sizeof(*event), GFP_KERNEL);
+  if (!event)
+    return ERR_PTR(-ENOMEM);
+  INIT_LIST_HEAD(&event->list);
+  event->event_num = event_num;
+
+  err = sdei_api_event_get_info(event_num, SDEI_EVENT_INFO_EV_PRIORITY,
+    &result);
+  if (err)
+    kfree(event);
+  return ERR_PTR(err);
+
+  event->priority = result;
+
+  err = sdei_api_event_get_info(event_num, SDEI_EVENT_INFO_EV_TYPE,
+    &result);
+  if (err)
+    kfree(event);
+  return ERR_PTR(err);
+
+  event->priority = result;
+
+  if (event->type == SDEI_EVENT_TYPE_SHARED) {
+    reg = kzalloc(sizeof(*reg), GFP_KERNEL);
if (!reg) {
    kfree(event);
    return ERR_PTR(-ENOMEM);
} else {
    reg->event_num = event_num;
    reg->priority = event->priority;
    reg->callback = cb;
    reg->callback_arg = cb_arg;
    event->registered = reg;
    int cpu;
    struct sdei_registered_event __percpu *regs;
    regs = alloc_percpu(struct sdei_registered_event);
    if (!regs) {
        kfree(event);
        return ERR_PTR(-ENOMEM);
    }
    for_each_possible_cpu(cpu) {
        reg = per_cpu_ptr(regs, cpu);
        reg->event_num = event->event_num;
        reg->priority = event->priority;
        reg->callback = cb;
        reg->callback_arg = cb_arg;
    }
    event->private_registered = regs;
}
if (sdei_event_find(event_num)) {
    kfree(event->registered);
    kfree(event);
    event = ERR_PTR(-EBUSY);
} else {
    spin_lock(&sdei_list_lock);
    list_add(&event->list, &sdei_list);
    spin_unlock(&sdei_list_lock);
    return event;
}
}

static void sdei_event_destroy(struct sdei_event *event) {

}
lockdep_assert_held(&sdei_events_lock);
+
spin_lock(&sdei_list_lock);
+list_del(&event->list);
+spin_unlock(&sdei_list_lock);
+
if (event->type == SDEI_EVENT_TYPE_SHARED)
+kfree(event->registered);
+else
+free_percpu(event->private_registered);
+
+kfree(event);
+
static int sdei_api_get_version(u64 *version)
+
{return invoke_sdei_fn(SDEI_1_0_FN_SDEI_VERSION, 0, 0, 0, 0, 0, version);
+
+int sdei_mask_local_cpu(void)
+
{int err;
+
+WARN_ON_ONCE(preemptible());
+
+err = invoke_sdei_fn(SDEI_1_0_FN_SDEI_PE_MASK, 0, 0, 0, 0, NULL);
+if (err && err != -EIO) {
+pr_warn_once("failed to mask CPU[%u]: %d\n",
+    smp_processor_id(), err);
+return err;
+
+return 0;
+
+static void _ipi_mask_cpu(void *ignored)
+
{sdei_mask_local_cpu();
+
+int sdei_unmask_local_cpu(void)
+
{int err;
+
+WARN_ON_ONCE(preemptible());
+
+err = invoke_sdei_fn(SDEI_1_0_FN_SDEI_PE_UNMASK, 0, 0, 0, 0, NULL);
+if (err && err != -EIO) {
+pr_warn_once("failed to unmask CPU[%u]: %d\n", 
    smp_processor_id(), err);
+return err;
+
+return 0;
+
+static void _ipi_unmask_cpu(void *ignored)
+
+sdei_unmask_local_cpu();
+}
+
+static void _ipi_private_reset(void *ignored)
+
+int err;
+
+err = invoke_sdei_fn(SDEI_1_0_FN_SDEI_PRIVATE_RESET, 0, 0, 0, 0, 0, 
             NULL);
+if (err && err != -EIO)
    +pr_warn_once("failed to reset CPU[%u]: %d\n", 
        smp_processor_id(), err);
+}
+
+static int sdei_api_shared_reset(void)
+
+return invoke_sdei_fn(SDEI_1_0_FN_SDEI_SHARED_RESET, 0, 0, 0, 0, 
             NULL);
+
+static void sdei_mark_interface_broken(void)
+
+pr_err("disabling SDEI firmware interface\n");
+on_each_cpu(&_ipi_mask_cpu, NULL, true);
+sdei_firmware_call = NULL;
+}
+
+static int sdei_platform_reset(void)
+
+int err;
+
+on_each_cpu(&_ipi_private_reset, NULL, true);
+err = sdei_api_shared_reset();
+if (err) 
    +pr_err("Failed to reset platform: %d\n", err);
+sdei_mark_interface_broken();
+}
+
static int sdei_api_event_enable(u32 event_num) {
    return invoke_sdei_fn(SDEI_1_0_FN_SDEI_EVENT_ENABLE, event_num, 0, 0, 0, 0, NULL);
}

static void _local_event_enable(void *data) {
    int err = 0;
    struct sdei_crosscall_args *arg = data;

    WARN_ON_ONCE(preemptible());

    err = sdei_api_event_enable(arg->event->event_num);
    sdei_cross_call_return(arg, err);
}

int sdei_event_enable(u32 event_num) {
    int err = -EINVAL;
    struct sdei_event *event;

    mutex_lock(&sdei_events_lock);
    event = sdei_event_find(event_num);
    if (!event) {
        mutex_unlock(&sdei_events_lock);
        return -ENOENT;
    }

cpus_read_lock();
    if (event->type == SDEI_EVENT_TYPE_SHARED)
        err = sdei_api_event_enable(event->event_num);
    else
        err = sdei_do_cross_call(_local_event_enable, event);

cpus_read_unlock();
    mutex_unlock(&sdei_events_lock);

    spin_lock(&sdei_list_lock);
    event->reenable = true;
    spin_unlock(&sdei_list_lock);

    return err;
}
+return err;
+
EXPORT_SYMBOL(sdei_event_enable);
+
+static int sdei_api_event_disable(u32 event_num)
+{
+return invoke_sdei_fn(SDEI_1_0_FN_SDEI_EVENT_DISABLE, event_num, 0, 0,
+0, 0, NULL);
+
+
+static void _ipi_event_disable(void *data)
+{
+int err;
+struct sdei_crosscall_args *arg = data;
+
+err = sdei_api_event_disable(arg->event->event_num);
+
sdei_cross_call_return(arg, err);
+
+int sdei_event_disable(u32 event_num)
+{
+int err = -EINVAL;
+struct sdei_event *event;
+
+mutex_lock(&sdei_events_lock);
+event = sdei_event_find(event_num);
+if (!event) {
+mutex_unlock(&sdei_events_lock);
+return -ENOENT;
+
+spin_lock(&sdei_list_lock);
+event->reenable = false;
+spin_unlock(&sdei_list_lock);
+
+if (event->type == SDEI_EVENT_TYPE_SHARED)
+err = sdei_api_event_disable(event->event_num);
+else
+err = sdei_do_cross_call(_ipi_event_disable, event);
+mutex_unlock(&sdei_events_lock);
+
+return err;
+
+EXPORT_SYMBOL(sdei_event_disable);
+
+static int sdei_api_event_unregister(u32 event_num)
/* Called directly by the hotplug callbacks */
+static void _local_event_unregister(void *data)
+
+int err;
+struct sdei_crosscall_args *arg = data;
+
+WARN_ON_ONCE(preemptible());
+
+err = sdei_api_event_unregister(arg->event->event_num);
+
+sdei_cross_call_return(arg, err);
+
+static int _sdei_event_unregister(struct sdei_event *event)
+
+lockdep_assert_held(&sdei_events_lock);
+
+if (event->type == SDEI_EVENT_TYPE_SHARED)
+return sdei_api_event_unregister(event->event_num);
+
+return sdei_do_cross_call(_local_event_unregister, event);
+
+int sdei_event_unregister(u32 event_num)
+
+int err;
+struct sdei_event *event;
+
+WARN_ON(in_nmi());
+
+mutex_lock(&sdei_events_lock);
+event = sdei_event_find(event_num);
+do {
+if (!event) {
+pr_warn("Event %u not registered\n", event_num);
+err = -ENOENT;
+break;
+}
+
+spin_lock(&sdei_list_lock);
+event->reregister = false;
+event->reenable = false;
+spin_unlock(&sdei_list_lock);
err = sdei_event_unregister(event);
if (err)
    break;
+
sdei_event_destroy(event);
} while (0);
mutex_unlock(&sdei_events_lock);
+
return err;
+
EXPORT_SYMBOL(sdei_event_unregister);
+
/*
 * unregister events, but don't destroy them as they are re-registered by
 * sdei_reregister_shared().
 */
+
static int sdei_unregister_shared(void)
+
{ int err = 0;
  struct sdei_event *event;
  +mutex_lock(&sdei_events_lock);
  +spin_lock(&sdei_list_lock);
  +list_for_each_entry(event, &sdei_list, list) {
      +if (event->type != SDEI_EVENT_TYPE_SHARED)
          +continue;
      +err = sdei_event_unregister(event);
      +if (err)
          +break;
      +} 
  +spin_unlock(&sdei_list_lock);
  +mutex_unlock(&sdei_events_lock);
  +
  +return err;
  +}
+
static int sdei_api_event_register(u32 event_num, unsigned long entry_point,
    +void *arg, u64 flags, u64 affinity)
+
{ +return invoke_sdei_fn(SDEI_1_0_FN_SDEI_EVENT_REGISTER, event_num,
    +(unsigned long)entry_point, (unsigned long)arg,
    +flags, affinity, NULL);
  +}
+
/+ Called directly by the hotplug callbacks */
+static void _local_event_register(void *data)
+{ 
+int err;
+struct sdei_registered_event *reg;
+struct sdei_crosscall_args *arg = data;
+
+WARN_ON(preemptible());
+
+reg = per_cpu_ptr(arg->event->private_registered, smp_processor_id());
+err = sdei_api_event_register(arg->event->event_num, sdei_entry_point,
+    reg, 0, 0);
+
sdei_cross_call_return(arg, err);
+}
+
+static int _sdei_event_register(struct sdei_event *event)
+{
+int err;
+
+lockdep_assert_held(&sdei_events_lock);
+
+if (event->type == SDEI_EVENT_TYPE_SHARED)
+return sdei_api_event_register(event->event_num,
+    sdei_entry_point,
+    event->registered,
+    SDEI_EVENT_REGISTER_RM_ANY, 0);
+
+err = sdei_do_cross_call(_local_event_register, event);
+if (err)
+sdei_do_cross_call(_local_event_unregister, event);
+
+return err;
+}
+
+int sdei_event_register(u32 event_num, sdei_event_callback *cb, void *arg)
+{
+int err;
+struct sdei_event *event;
+
+WARN_ON(in_nmi());
+
+mutex_lock(&sdei_events_lock);
+do {
+if (sdei_event_find(event_num)) {
+pr_warn("Event %u already registered\n", event_num);
+err = -EBUSY;
+break;
+}
+}
event = sdei_event_create(event_num, cb, arg);
if (IS_ERR(event)) {
    err = PTR_ERR(event);
    pr_warn("Failed to create event %u: %d\n", event_num, err);
    break;
}

cpus_read_lock();
err = _sdei_event_register(event);
if (err) {
    sdei_event_destroy(event);
    pr_warn("Failed to register event %u: %d\n", event_num, err);
} else {
    spin_lock(&sdei_list_lock);
    event->reregister = true;
    spin_unlock(&sdei_list_lock);
}

return err;

EXPORT_SYMBOL(sdei_event_register);

static int sdei_reregister_event(struct sdei_event *event)
{
    int err;

    lockdep_assert_held(&sdei_events_lock);
    err = _sdei_event_register(event);
    if (err) {
        pr_err("Failed to re-register event %u\n", event->event_num);
        sdei_event_destroy(event);
        return err;
    }

    if (event->reenable) {
        if (event->type == SDEI_EVENT_TYPE_SHARED)
            err = sdei_api_event_enable(event->event_num);
        else
            err = sdei_do_cross_call(_local_event_enable, event);
    }

    return err;
}

if (err)
pr_err("Failed to re-enable event %u\n", event->event_num);
+
+return err;
+
+}
+
+static int sdei_reregister_shared(void)
+{
+int err = 0;
+struct sdei_event *event;
+
+mutex_lock(&sdei_events_lock);
+spin_lock(&sdei_list_lock);
+list_for_each_entry(event, &sdei_list, list) {
+if (event->type != SDEI_EVENT_TYPE_SHARED)
+continue;
+
+if (event->reregister) {
+err = sdei_reregister_event(event);
+if (err)
+break;
+}
+
+spin_unlock(&sdei_list_lock);
+mutex_unlock(&sdei_events_lock);
+
+return err;
+
+
+}
+
+static int sdei_cpuhp_down(unsigned int cpu)
+{
+struct sdei_event *event;
+struct sdei_crosscall_args arg;
+
+/* un-register private events */
+spin_lock(&sdei_list_lock);
+list_for_each_entry(event, &sdei_list, list) {
+if (event->type == SDEI_EVENT_TYPE_SHARED)
+continue;
+
+CROSSCALL_INIT(arg, event);
+/* call the cross-call function locally... */
+_local_event_unregister(&arg);
+if (arg.first_error)
+pr_err("Failed to unregister event %u: %d\n", event->event_num, arg.first_error);
+
+spin_unlock(&sdei_list_lock);
return sdei_mask_local_cpu();
+
+static int sdei_cpuhp_up(unsigned int cpu)
+
+struct sdei_event *event;
+struct sdei_crosscall_args arg;
+
+/* re-register/enable private events */
+spin_lock(&sdei_list_lock);
+list_for_each_entry(event, &sdei_list, list) {
+if (event->type == SDEI_EVENT_TYPE_SHARED)
+continue;
+
+if (event->reregister) {
+CROSSCALL_INIT(arg, event);
+/* call the cross-call function locally... */
+_local_event_register(&arg);
+if (arg.first_error)
+pr_err("Failed to re-register event %u: %d\n",
+event->event_num, arg.first_error);
+}
+
+if (event->reenable) {
+CROSSCALL_INIT(arg, event);
+_local_event_enable(&arg);
+if (arg.first_error)
+pr_err("Failed to re-enable event %u: %d\n",
+event->event_num, arg.first_error);
+}
+
+spin_unlock(&sdei_list_lock);
+
+return sdei_unmask_local_cpu();
+
+/* When entering idle, mask/unmask events for this cpu */
+static int sdei_pm_notifier(struct notifier_block *nb, unsigned long action,
+void *data)
+
+int rv;
+
+switch (action) {
+case CPU_PM_ENTER:
+rv = sdei_mask_local_cpu();
+break;
+case CPU_PM_EXIT:
+case CPU_PM_ENTERFAILED:
rv = sdei_unmask_local_cpu();
break;
default:
+return NOTIFY_DONE;
+
+if (rv)
+return notifier_from_errno(rv);
+
+return NOTIFY_OK;
+
+static struct notifier_block sdei_pm_nb = {
+.notifier_call = sdei_pm_notifier,
+};
+
+static int sdei_device_suspend(struct device *dev)
+{
+on_each_cpu(_ipi_mask_cpu, NULL, true);
+
+return 0;
+
+}
+
+static int sdei_device_resume(struct device *dev)
+{
+on_each_cpu(_ipi_unmask_cpu, NULL, true);
+
+return 0;
+
+/*
+ * We need all events to be reregistered when we resume from hibernate.
+ * The sequence is freeze->thaw. Reboot. freeze->restore. We unregister
+ * events during freeze, then re-register and re-enable them during thaw
+ * and restore.
+ */
+static int sdei_device_freeze(struct device *dev)
+{
+int err;
+
+/* unregister private events */
+cpuhp_remove_state(CPUHP_AP_ARM_SDEI_STARTING);
+
+err = sdei_unregister_shared();
+if (err)
+return err;
+
+/*
return 0;
+
static int sdei_device_thaw(struct device *dev)
+
+static int sdei_device_restore(struct device *dev)
+
+static const struct dev_pm_ops sdei_pm_ops = {
  +.suspend = sdei_device_suspend,
  +.resume = sdei_device_resume,
  +.freeze = sdei_device_freeze,
  +.thaw = sdei_device_thaw,
  +.restore = sdei_device_restore,
  +};
+
+  *
+  * Mask all CPUs and unregister all events on panic, reboot or kexec.
+  */
+static int sdei_reboot_notifier(struct notifier_block *nb, unsigned long action,
+void *data)
/*
 * We are going to reset the interface, after this there is no point
 * doing work when we take CPUs offline.
 */
cpuhp_remove_state(CPUHP_AP_ARM_SDEI_STARTING);
+sdei_platform_reset();
+return NOTIFY_OK;
}
+
+static struct notifier_block sdei_reboot_nb = {
+ .notifier_call = sdei_reboot_notifier,
+};
+
+static void sdei_smccc_smc(unsigned long function_id,
+ unsigned long arg0, unsigned long arg1,
+ unsigned long arg2, unsigned long arg3,
+ unsigned long arg4, struct arm_smccc_res *res)
+{
+ arm_smccc_smc(function_id, arg0, arg1, arg2, arg3, arg4, 0, 0, res);
+}
+
+static void sdei_smccc_hvc(unsigned long function_id,
+ unsigned long arg0, unsigned long arg1,
+ unsigned long arg2, unsigned long arg3,
+ unsigned long arg4, struct arm_smccc_res *res)
+{
+ arm_smccc_hvc(function_id, arg0, arg1, arg2, arg3, arg4, 0, 0, res);
+}
+
+static int sdei_get_conduit(struct platform_device *pdev)
+{
+const char *method;
+struct device_node *np = pdev->dev.of_node;
+
+sdei_firmware_call = NULL;
+if (np) {
+if (of_property_read_string(np, "method", &method)) {
+pr_warn("missing \"method\" property\n");
+return CONDUIT_INVALID;
+}
+
+if (!strcmp("hvc", method)) {
+sdei_firmware_call = &sdei_smccc_hvc;
+return CONDUIT_HVC;
+}
+else if (!strcmp("smc", method)) {
+sdei_firmware_call = &sdei_smccc_smc;
+return CONDUIT_SMC;
+}
+else {
+pr_info("Unknown method \"%s\"
", method);
return CONDUIT_SMC;
+
+pr_warn("invalid \"method\" property: %s\n", method);
+} else if (IS_ENABLED(CONFIG_ACPI) && !acpi_disabled) {
+if (acpi_psci_use_hvc()) {
+sdei_firmware_call = &sdei_smccc_hvc;
+return CONDUIT_HVC;
+} else {
+sdei_firmware_call = &sdei_smccc_smc;
+return CONDUIT_SMC;
+}
+
+return CONDUIT_INVALID;
+
+static int sdei_probe(struct platform_device *pdev)
+{
+int err;
+u64 ver = 0;
+int conduit;
+
+conduit = sdei_get_conduit(pdev);
+if (!sdei_firmware_call)
+return 0;
+
+err = sdei_api_get_version(&ver);
+if (err == -EOPNOTSUPP)
+pr_err("advertised but not implemented in platform firmware\n");
+if (err) {
+pr_err("Failed to get SDEI version: %d\n", err);
+sdei_mark_interface_broken();
+return err;
+}
+
+pr_info("SDEIv%d.%d (0x%x) detected in firmware.\n",
+(int)SDEI_VERSION_MAJOR(ver), (int)SDEI_VERSION_MINOR(ver),
+(int)SDEI_VERSION_VENDOR(ver));
+
+if (SDEI_VERSION_MAJOR(ver) != 1) {
+pr_warn("Conflicting SDEI version detected.\n");
+sdei_mark_interface_broken();
+return -EINVAL;
+}
+
+err = sdei_platform_reset();
+if (err)
return err;
+
sdei_entry_point = sdei_arch_get_entry_point(conduit);
+/* Not supported due to hardware or boot configuration */
+sdei_mark_interface_broken();
+return 0;
+
+err = cpu_pm_register_notifier(&sdei_pm_nb);
+if (err) {
+pr_warn("Failed to register CPU PM notifier...
");
+goto error;
+}
+
+err = register_reboot_notifier(&sdei_reboot_nb);
+if (err) {
+pr_warn("Failed to register reboot notifier...\n");
+goto remove_cupm;
+}
+
+err = cpuhp_setup_state(CPUHP_AP_ARM_SDEI_STARTING, "SDEI",
+&sdei_cpuhp_up, &sdei_cpuhp_down);
+if (err) {
+pr_warn("Failed to register CPU hotplug notifier...\n");
+goto remove_reboot;
+}
+
+return 0;
+
+remove_reboot:
+
+unregister_reboot_notifier(&sdei_reboot_nb);
+
+remove_cupm:
+
+cpu_pm_unregister_notifier(&sdei_pm_nb);
+
+error:
+sdei_mark_interface_broken();
+return err;
+
+static const struct of_device_id sdei_of_match[] = {
+
+static struct platform_driver sdei_driver = {

`.name= "sdei",
.pm= &sdei_pm_ops,
.of_match_table= sdei_of_match,
+{,
.probe= sdei_probe,
+};
+
+static bool __init sdei_present_dt(void)
+{
+struct device_node *np, *fw_np;
+
+fw_np = of_find_node_by_name(NULL, "firmware");
+if (!fw_np)
+return false;
+
+np = of_find_matching_node(fw_np, sdei_of_match);
+if (!np)
+return false;
+of_node_put(np);
+
+return true;
+}
+
+static bool __init sdei_present_acpi(void)
+{
+acpi_status status;
+struct platform_device *pdev;
+struct acpi_table_header *sdei_table_header;
+
+if (acpi_disabled)
+return false;
+
+status = acpi_get_table(ACPI_SIG_SDEI, 0, &sdei_table_header);
+if (ACPI_FAILURE(status) && status != AE_NOT_FOUND) {
+const char *msg = acpi_format_exception(status);
+
+pr_info("Failed to get ACPI:SDEI table, %s\n", msg);
+}
+if (ACPI_FAILURE(status))
+return false;
+
+pdev = platform_device_register_simple(sdei_driver.driver.name, 0, NULL,
+ 0);
+if (IS_ERR(pdev))
+return false;
+
+return true;
+}
static int __init sdei_init(void) {
    if (sdei_present_dt() || sdei_present_acpi())
        platform_driver_register(&sdei_driver);
    return 0;
}

/*
 * On an ACPI system SDEI needs to be ready before HEST:GHES tries to register
 * its events. ACPI is initialised from a subsys_initcall(), GHES is initialised
 * by device_initcall(). We want to be called in the middle.
 * */
subsys_initcall_sync(sdei_init);

int sdei_event_handler(struct pt_regs *regs,
                    struct sdei_registered_event *arg) {
    int err;
    mm_segment_t orig_addr_limit;
    u32 event_num = arg->event_num;
    orig_addr_limit = get_fs();
    set_fs(USER_DS);

    err = arg->callback(event_num, regs, arg->callback_arg);
    if (err)
        pr_err_ratelimited("event %u on CPU %u failed with error: %d\n",
                        event_num, smp_processor_id(), err);
    set_fs(orig_addr_limit);
    return err;
}

+NOKPROBE_SYMBOL(sdei_event_handler);
--- linux-4.15.0.orig/drivers/firmware/dell_rbu.c
+++ linux-4.15.0/drivers/firmware/dell_rbu.c
@@ -45,6 +45,7 @@
#include <linux/moduleparam.h>
#include <linux/firmware.h>
#include <linux/dma-mapping.h>
#include <asm/set_memory.h>

MODULE_AUTHOR("Abhay Salunke <abhay_salunke@dell.com>");
MODULE_DESCRIPTION("Driver for updating BIOS image on DELL systems");
packet_data_temp_buf = NULL;
*/
* set to uncacheable or it may never get written back before reboot
*/

set_memory_uc((unsigned long)packet_data_temp_buf, 1 << ordernum);
+
spin_lock(&rbu_data.lock);

newpacket->data = packet_data_temp_buf;

/* to make sure there are no stale RBU packets left in memory */

memset(newpacket->data, 0, rbu_data.packetsize);
+set_memory_wb((unsigned long)newpacket->data,
+1 << newpacket->ordernum);
free_pages((unsigned long)newpacket->data,
newpacket->ordernum);
kfree(newpacket);

static const char dmi_empty_string[] = "        ";
+static const char dmi_empty_string[] = "";

static u32 dmi_ver __initdata;
static u32 dmi_len;

static const char * __init dmi_string_nosave(const struct dmi_header *dm, u8 s)
{
    const u8 *bp = ((u8 *) dm) + dm->length;
+const u8 *nsp;

    if (s) {
        -s--;
        -while (s > 0 && *bp) {
+while (--s > 0 && *bp)
            bp += strlen(bp) + 1;
        -s--;
    }

    -if (*bp != 0) {
+size_t len = strlen(bp) + 1;
        -size_t cmp_len = len > 8 ? 8 : len;
        -}
if (!memcmp(bp, dmi_empty_string, cmp_len))
    return dmi_empty_string;

/* Strings containing only spaces are considered empty */
    nsp = bp;
    while (*nsp == ' ')
        nsp++;
    if (*nsp != '\0')
        return bp;

    return "";

return dmi_empty_string;
}

static const char *__init dmi_string(const struct dmi_header *dm, u8 s)
{
    char *s;
    int is_ff = 1, is_00 = 1, i;

    if (dmi_ident[slot] || dm->length <= index + 16)
        return;
    d = (u8 *) dm + index;

    if (dmi_ident[slot] || dm->length < index + 16)
        return;

    d = (u8 *) dm + index;

    using the TCG Platform Reset Attack Mitigation specification. This
    protects against an attacker forcibly rebooting the system while it
    still contains secrets in RAM, booting another OS and extracting the
    secrets. This should only be enabled when userland is configured to
    clear the MemoryOverwriteRequest flag on clean shutdown after secrets
    have been evicted, since otherwise it will trigger even on clean
    reboots.

    +config EFI_CUSTOM_SSDT_OVERLAYS
    +bool "Load custom ACPI SSDT overlay from an EFI variable"
    +depends on EFI_VARS && ACPI
    +default ACPI_TABLE_UPGRADE
    +help
    + Allow loading of an ACPI SSDT overlay from an EFI variable specified
    + by a kernel command line option.
    + See Documentation/admin-guide/acpi/ssdt-overlays.rst for more
    + information.endmenu
config UEFI_CPER
bool

+config UEFI_CPER_ARM
+bool
+depends on UEFI_CPER && ( ARM || ARM64 )
+default y
+
config EFI_DEV_PATH_PARSER
bool
depends on ACPI
--- linux-4.15.0.orig/drivers/firmware/efi/Makefile
+++ linux-4.15.0/drivers/firmware/efi/Makefile
@@ -24,9 +24,12 @@
 obj-$(CONFIG_EFI_BOOTLOADER_CONTROL)+= efibc.o
 obj-$(CONFIG_EFI_TEST)+= test/
 obj-$(CONFIG_EFI_DEV_PATH_PARSER)+= dev-path-parser.o
+obj-$(CONFIG_EFI)+= secureboot.o
 obj-$(CONFIG_APPLE_PROPERTIES)+= apple-properties.o
+obj-$(CONFIG_LOAD_UEFI_KEYS)+= mokvar-table.o

arm-obj-$(CONFIG_EFI):= arm-init.o arm-runtime.o
obj-$(CONFIG_EFI)+= $(arm-obj-y)
obj-$(CONFIG_ARM64)+= $(arm-obj-y)
obj-$(CONFIG_EFI_CAPSULE_LOADER)+= capsule-loader.o
+obj-$(CONFIG_UEFI_CPER_ARM)+= cper-arm.o
--- linux-4.15.0.orig/drivers/firmware/efi/arm-init.c
+++ linux-4.15.0/drivers/firmware/efi/arm-init.c
@@ -259,13 +259,17 @@
 reserve_regions();
efi_esrt_init();
-efi_memmap_unmap();
+efi_mokvar_table_init();

memblock_reserve(params.mmap & PAGE_MASK,
 PAGE_ALIGN(params.mmap_size +
   (params.mmap & ~PAGE_MASK)));

init_screen_info();
+
+/* ARM does not permit early mappings to persist across paging_init() */
+if (IS_ENABLED(CONFIG_ARM))
+  efi_memmap_unmap();
}
static int __init register_gop_device(void)
--- linux-4.15.0.orig/drivers/firmware/efi/arm-runtime.c
+++ linux-4.15.0/drivers/firmware/efi/arm-runtime.c
@@ -54,6 +54,9 @@
     if (!efi_enabled(EFI_RUNTIME_SERVICES))
         return 0;
     return ptdump_debugfs_register(&efi_ptdump_info, "efi_page_tables");
 }
device_initcall(ptdump_init);
@@ -124,6 +127,15 @@
     efi_memmap_unmap();
     +
     mapsiz = efi_memmap.desc_size * efi_memmap.nr_map;
     +
     if (efi_memmap_init_late(efi_memmap.phys_map, mapsiz)) {
         +pr_err("Failed to remap EFI memory map\n");
         +return 0;
         +}
     +
     if (efi_runtime_disabled()) {
         pr_info("EFI runtime services will be disabled.\n");
         return 0;
@@ -136,13 +148,6 @@
         pr_info("Remapping and enabling EFI services.\n");
         -mapsiz = efi_memmap.desc_size * efi_memmap.nr_map;
         -
         -if (efi_memmap_init_late(efi_memmap.phys_map, mapsiz)) {
             -pr_err("Failed to remap EFI memory map\n");
             -return -ENOMEM;
             -}
         -
         -if (!efi_virtmap_init()) {
             pr_err("UEFI virtual mapping missing or invalid -- runtime services will not be available\n");
             return -ENOMEM;
         }"
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along with this program; if not, write to the Free Software
Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
/

#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/time.h>
#include <linux/cper.h>
#include <linux/dmi.h>
#include <linux/acpi.h>
#include <linux/pci.h>
#include <linux/aer.h>
#include <linux/printk.h>
#include <linux/bcd.h>
#include <acpi/ghes.h>
#include <ras/ras_event.h>
+
#define INDENT_SP	" 
+
+static const char * const arm_reg_ctx_strs[] = {
+"AArch32 general purpose registers",
+"AArch32 EL1 context registers",
+"AArch32 EL2 context registers",
+"AArch32 secure context registers",
+"AArch64 general purpose registers",
+"AArch64 EL1 context registers",
+"AArch64 EL2 context registers",
+"AArch64 EL3 context registers",
+"Misc. system register structure",
+};
+
+static const char * const arm_err_trans_type_strs[] = {
+"Instruction",
+"Data Access",
+"Generic",
+ static const char * const arm_bus_err_op_strs[] = {
+ "Generic error (type cannot be determined)",
+ "Generic read (type of instruction or data request cannot be determined)",
+ "Generic write (type of instruction of data request cannot be determined)",
+ "Data read",
+ "Data write",
+ "Instruction fetch",
+ "Prefetch",
+ };
+
+ static const char * const arm_cache_err_op_strs[] = {
+ "Generic error (type cannot be determined)",
+ "Generic read (type of instruction or data request cannot be determined)",
+ "Generic write (type of instruction of data request cannot be determined)",
+ "Data read",
+ "Data write",
+ "Instruction fetch",
+ "Prefetch",
+ "Eviction",
+ "Snooping (processor initiated a cache snoop that resulted in an error)",
+ "Snooped (processor raised a cache error caused by another processor or device snooping its cache)",
+ "Management",
+ };
+
+ static const char * const arm_tlb_err_op_strs[] = {
+ "Generic error (type cannot be determined)",
+ "Generic read (type of instruction or data request cannot be determined)",
+ "Generic write (type of instruction of data request cannot be determined)",
+ "Data read",
+ "Data write",
+ "Instruction fetch",
+ "Prefetch",
+ "Local management operation (processor initiated a TLB management operation that resulted in an error)",
+ "External management operation (processor raised a TLB error caused by another processor or device broadcasting TLB operations)",
+ };
+
+ static const char * const arm_bus_err_part_type_strs[] = {
+ "Local processor originated request",
+ "Local processor responded to request",
+ "Local processor observed",
+ "Generic",
+ };
+
+ static const char * const arm_bus_err_addr_space_strs[] = {
+ "External Memory Access",
+ };

Internal Memory Access,
"Unknown",
Device Memory Access",

static void cper_print_arm_err_info(const char *pfx, u32 type,
    u64 error_info) {
    u8 trans_type, op_type, level, participation_type, address_space;
    u16 mem_attributes;
    bool proc_context_corrupt, corrected, precise_pc, restartable_pc;
    bool time_out, access_mode;
    /* If the type is unknown, bail. */
    if (type > CPER_ARM_MAX_TYPE)
        return;
    /*
     * Vendor type errors have error information values that are vendor
     * specific.
     */
    if (type == CPER_ARM_VENDOR_ERROR)
        return;
    if (error_info & CPER_ARM_ERR_VALID_TRANSACTION_TYPE) {
        trans_type = ((error_info >> CPER_ARM_ERR_TRANSACTION_SHIFT)
            & CPER_ARM_ERR_TRANSACTION_MASK);
        if (trans_type < ARRAY_SIZE(arm_err_trans_type_strs)) {
            printk("%stransaction type: %s
", pfx,
               arm_err_trans_type_strs[trans_type]);
        }
    }
    if (error_info & CPER_ARM_ERR_VALID_OPERATION_TYPE) {
        op_type = ((error_info >> CPER_ARM_ERR_OPERATION_SHIFT)
            & CPER_ARM_ERR_OPERATION_MASK);
        switch (type) {
            case CPER_ARM_CACHE_ERROR:
                if (op_type < ARRAY_SIZE(arm_cache_err_op_strs)) {
                    printk("%soperation type: %s
", pfx,
                       arm_cache_err_op_strs[op_type]);
                }
                break;
            case CPER_ARM_TLB_ERROR:
                if (op_type < ARRAY_SIZE(arm_tlb_err_op_strs)) {
                    printk("%soperation type: %s
", pfx,
                       arm_tlb_err_op_strs[op_type]);
                }
                break;
        }
    }
+break;
+case CPER_ARM_BUS_ERROR:
+  if (op_type < ARRAY_SIZE(arm_bus_err_op_strs)) {
+    printk("%soperation type: %s\n", pfx,
+        arm_bus_err_op_strs[op_type]);
+  }
+  break;
+}
+
+  if (error_info & CPER_ARM_ERR_VALID_LEVEL) {
+    level = ((error_info >> CPER_ARM_ERR_LEVEL_SHIFT)
+        & CPER_ARM_ERR_LEVEL_MASK);
+  switch (type) {
+    case CPER_ARM_CACHE_ERROR:
+      printk("%scache level: %d\n", pfx, level);
+      break;
+    case CPER_ARM_TLB_ERROR:
+      printk("%sTLB level: %d\n", pfx, level);
+      break;
+    case CPER_ARM_BUS_ERROR:
+      printk("%saﬃnity level at which the bus error occurred: %d\n",
+        pfx, level);
+      break;
+  }
+  }
+
+  if (error_info & CPER_ARM_ERR_VALID_PROC_CONTEXT_CORRUPT) {
+    proc_context_corrupt = ((error_info >> CPER_ARM_ERR_PC_CORRUPT_SHIFT)
+        & CPER_ARM_ERR_PC_CORRUPT_MASK);
+    if (proc_context_corrupt)
+      printk("%sprocessor context corrupted\n", pfx);
+    else
+      printk("%sprocessor context not corrupted\n", pfx);
+  }
+
+  if (error_info & CPER_ARM_ERR_VALID_CORRECTED) {
+    corrected = ((error_info >> CPER_ARM_ERR_CORRECTED_SHIFT)
+        & CPER_ARM_ERR_CORRECTED_MASK);
+    if (corrected)
+      printk("%sthe error has been corrected\n", pfx);
+    else
+      printk("%sthe error has not been corrected\n", pfx);
+  }
+
+  if (error_info & CPER_ARM_ERR_VALID_PRECISE_PC) {
+    precise_pc = ((error_info >> CPER_ARM_ERR_PRECISE_PC_SHIFT)
+        & CPER_ARM_ERR_PRECISE_PC_MASK);
+if (precise_pc)
+printk("%sPC is precise\n", pfx);
+else
+printk("%sPC is imprecise\n", pfx);
+
+if (error_info & CPER_ARM_ERR_VALID_RESTARTABLE_PC) {
+restartable_pc = ((error_info >> CPER_ARM_ERR_RESTARTABLE_PC_SHIFT)
+ & CPER_ARM_ERR_RESTARTABLE_PC_MASK);
+if (restartable_pc)
+printk("%sProgram execution can be restarted reliably at the PC associated with the error.\n", pfx);
+}
+
+ /* The rest of the fields are specific to bus errors */
+if (type != CPER_ARM_BUS_ERROR)
+return;
+
+if (error_info & CPER_ARM_ERR_VALID_PARTICIPATION_TYPE) {
+participation_type = ((error_info >> CPER_ARM_ERR_PARTICIPATION_TYPE_SHIFT)
+ & CPER_ARM_ERR_PARTICIPATION_TYPE_MASK);
+if (participation_type < ARRAY_SIZE(arm_bus_err_part_type_strs)) {
+printk("%s participation type: %s\n", pfx,
+ arm_bus_err_part_type_strs[participation_type]);
+}
+
+if (error_info & CPER_ARM_ERR_VALID_TIME_OUT) {
+time_out = ((error_info >> CPER_ARM_ERR_TIME_OUT_SHIFT)
+ & CPER_ARM_ERR_TIME_OUT_MASK);
+if (time_out)
+printk("%s request timed out\n", pfx);
+}
+
+if (error_info & CPER_ARM_ERR_VALID_ADDRESS_SPACE) {
+address_space = ((error_info >> CPER_ARM_ERR_ADDRESS_SPACE_SHIFT)
+ & CPER_ARM_ERR_ADDRESS_SPACE_MASK);
+if (address_space < ARRAY_SIZE(arm_bus_err_addr_space_strs)) {
+printk("%s address space: %s\n", pfx,
+ arm_bus_err_addr_space_strs[address_space]);
+}
+
+if (error_info & CPER_ARM_ERR_VALID_MEM_ATTRIBUTES) {
+mem_attributes = ((error_info >> CPER_ARM_ERR_MEM_ATTRIBUTES_SHIFT)
+ & CPER_ARM_ERR_MEM_ATTRIBUTES_MASK);
+printk("%s memory access attributes: 0x%\n", pfx, mem_attributes);
+}
+}
+if (error_info & CPER_ARM_ERR_VALID_ACCESS_MODE) {
+access_mode = ((error_info >> CPER_ARM_ERR_ACCESS_MODE_SHIFT)
+ & CPER_ARM_ERR_ACCESS_MODE_MASK);
+if (access_mode)
+printk("%saccess mode: normal\n", pfx);
+else
+printk("%saccess mode: secure\n", pfx);
+}
+
+void cper_print_proc_arm(const char *pfx,
+ const struct cper_sec_proc_arm *proc)
+{
+int i, len, max_ctx_type;
+struct cper_arm_err_info *err_info;
+struct cper_arm_ctx_info *ctx_info;
+char newpfx[64], infopfx[64];
+
+printk("%sMIDR: 0x%016llx\n", pfx, proc->midr);
+
+len = proc->section_length - (sizeof(*proc) +
+proc->err_info_num * (sizeof(*err_info)));
+if (len < 0) {
+printk("%ssection length: %d\n", pfx, proc->section_length);
+printk("%ssection length is too small\n", pfx);
+printk("%sfirmware-generated error record is incorrect\n", pfx);
+printk("%sERR_INFO_NUM is %d\n", pfx, proc->err_info_num);
+return;
+}
+
+if (proc->validation_bits & CPER_ARM_VALID_MPIDR)
+printk("%sMultiprocessor Affinity Register (MPIDR): 0x%016llx\n",
+pfx, proc->mpidr);
+
+if (proc->validation_bits & CPER_ARM_VALID_AFFINITY_LEVEL)
+printk("%serror affinity level: %d\n", pfx,
+proc->affinity_level);
+
+if (proc->validation_bits & CPER_ARM_VALID_RUNNING_STATE) {
+printk("%srunning state: 0x%x\n", pfx, proc->running_state);
+printk("%sPower State Coordination Interface state: %d\n",
+pfx, proc->psci_state);
+}
+
+snprintf(newpfx, sizeof(newpfx), "%s%s", pfx, INDENT_SP);
+
+err_info = (struct cper_arm_err_info *)(proc + 1);
+for (i = 0; i < proc->err_info_num; i++) {
printk("%sError info structure %d:
", pfx, i);
+
+printk("%snum errors: %d
", pfx, err_info->multiple_error + 1);
+
+if (err_info->validation_bits & CPER_ARM_INFO_VALID_FLAGS) {
+    if (err_info->flags & CPER_ARM_INFO_FLAGS_FIRST)
+        printk("%sfirst error captured
", newpfx);
+    if (err_info->flags & CPER_ARM_INFO_FLAGS_LAST)
+        printk("%slast error captured
", newpfx);
+    if (err_info->flags & CPER_ARM_INFO_FLAGS_PROPAGATED)
+        printk("%spropagated error captured
",
+               newpfx);
+    if (err_info->flags & CPER_ARM_INFO_FLAGS_OVERFLOW)
+        printk("%soverflow occurred, error info is incomplete
",
+               newpfx);
+}
+
+printk("%serror_type: %d, %s
", newpfx, err_info->type,
+        err_info->type < ARRAY_SIZE(cper_proc_error_type_strs) ?
+        cper_proc_error_type_strs[err_info->type] : "unknown";
+if (err_info->validation_bits & CPER_ARM_INFO_VALID_ERR_INFO) {
+    printk("%serror_info: 0x%016llx
", newpfx,
+           err_info->error_info);
+    snprintf(infopfx, sizeof(infopfx), "%s%s", newpfx, INDENT_SP);
+    cper_print_arm_err_info(infopfx, err_info->type,
+                            err_info->error_info);
+}
+if (err_info->validation_bits & CPER_ARM_INFO_VALID_VIRT_ADDR)
+    printk("%svirtual fault address: 0x%016llx
",
+            newpfx, err_info->virt_fault_addr);
+if (err_info->validation_bits & CPER_ARM_INFO_VALID_PHYSICAL_ADDR)
+    printk("%sphysical fault address: 0x%016llx
",
+            newpfx, err_info->physical_fault_addr);
+err_info += 1;
+
+ctx_info = (struct cper_arm_ctx_info *)err_info;
+max_ctx_type = ARRAY_SIZE(arm_reg_ctx_strs) - 1;
+for (i = 0; i < proc->context_info_num; i++) {
+    int size = sizeof(*ctx_info) + ctx_info->size;
+    printk("%sContext info structure %d:
", pfx, i);
+    if (len < size) {
+        printk("%ssection length is too small
", newpfx);
+        printk("%sfirmware-generated error record is incorrect
", pfx);
+        return;
+    }
+    if (ctx_info->type > max_ctx_type) {
++printk("%sInvalid context type: %d (max: %d)
",
++newpfx, ctx_info->type, max_ctx_type);
++return;
+
++printk("%sregister context type: %s
", newpfx,
++arm_reg_ctx_strs[ctx_info->type]);
++print_hex_dump(newpfx, ",", DUMP_PREFIX_OFFSET, 16, 4,
++(ctx_info + 1), ctx_info->size, 0);
++len -= size;
++ctx_info = (struct cper_arm_ctx_info *)((long)ctx_info + size);
+
++if (len > 0) {
++printk("%sVendor specific error info has %u bytes:
", pfx,
++ + len);
++print_hex_dump(newpfx, ",", DUMP_PREFIX_OFFSET, 16, 4, ctx_info,
++ +len, true);
++}
++
--- linux-4.15.0.orig/drivers/firmware/efi/cper.c
+++ linux-4.15.0/drivers/firmware/efi/cper.c
@@ -39,8 +39,6 @@
#define INDENT_SP	" 

-static char rcd_decode_str[CPER_REC_LEN];
-
 /*
 * CPER record ID need to be unique even after reboot, because record
 * ID is used as index for ERST storage, while CPER records from
 @ @ -39.8 +39.6 @@
 "ARM A64",
 ];
-
-static const char * const proc_error_type_strs[] = {
+const char * const cper_proc_error_type_strs[] = {
 "cache error",
 "TLB error",
 "bus error",
 @ @ -157.8 +155.8 @@
 if (proc->validation_bits & CPER_PROC_VALID_ERROR_TYPE) {
 printk("%s""error_type: 0x%02x\n", pfx, proc->proc_error_type);
 cper_print_bits(pfx, proc->proc_error_type,
 -proc_error_type_strs,
 -ARRAY_SIZE(proc_error_type_strs));
 +cper_proc_error_type_strs,
 +ARRAY_SIZE(cper_proc_error_type_strs));
 }
if (proc->validation_bits & CPER_PROC_VALID_OPERATION)
printk("%s"operation: %d, %s\n", pfx, proc->operation,
@@ -188,122 +186,6 @@
printk("%s"IP: 0x%016llx\n", pfx, proc->ip);
}

-#if defined(CONFIG_ARM64) || defined(CONFIG_ARM)
-static const char * const arm_reg_ctx_strs[] = {
-"AArch32 general purpose registers",
-"AArch32 EL1 context registers",
-"AArch32 EL2 context registers",
-"AArch32 secure context registers",
-"AArch64 general purpose registers",
-"AArch64 EL1 context registers",
-"AArch64 EL2 context registers",
-"AArch64 EL3 context registers",
-"Misc. system register structure",
-};
-
-static void cper_print_proc_arm(const char *pfx,
-const struct cper_sec_proc_arm *proc)
-{n
-int i, len, max_ctx_type;
-struct cper_arm_err_info *err_info;
-struct cper_arm_ctx_info *ctx_info;
-char newpfx[64];
-
-printk("%sMIDR: 0x%016llx\n", pfx, proc->midr);
-
-len = proc->section_length - (sizeof(*proc) +
-proc->err_info_num * (sizeof(*err_info)));
-if (len < 0) {
-printk("%ssection length: %d\n", pfx, proc->section_length);
-printk("%ssection length is too small\n", pfx);
-printk("%sfirmware-generated error record is incorrect\n", pfx);
-printk("%sERR_INFO_NUM is %d\n", pfx, proc->err_info_num);
-return;
-}
-
-if (proc->validation_bits & CPER_ARM_VALID_MPIDR)
-printk("%sMultiprocessor Affinity Register (MPIDR): 0x%016llx\n",
-pfx, proc->mpidr);
-
-if (proc->validation_bits & CPER_ARM_VALID_AFFINITY_LEVEL)
-printk("%serror affinity level: %d\n", pfx,
-proc->affinity_level);
-
-if (proc->validation_bits & CPER_ARM_VALID_RUNNING_STATE) {

-printk("%srunning state: 0x%lx\n", pfx, proc->running_state);
-printk("%sPower State Coordination Interface state: %d\n", pfx, proc->psci_state);
-
-snprintf(newpfx, sizeof(newpfx), "%s%s", pfx, INDENT_SP);
-
-err_info = (struct cper_arm_err_info *)(proc + 1);
-for (i = 0; i < proc->err_info_num; i++) {
  -printk("%sError info structure %d: \n", pfx, i);
  -
  -printk("%snum errors: %d\n", pfx, err_info->multiple_error + 1);
  -
  -if (err_info->validation_bits & CPER_ARM_INFO_VALID_FLAGS) {
    -if (err_info->flags & CPER_ARM_INFO_FLAGS_FIRST) {
      -printk("%sfirst error captured\n", newpfx);
    -if (err_info->flags & CPER_ARM_INFO_FLAGS_LAST) {
      -printk("%slast error captured\n", newpfx);
    -if (err_info->flags & CPER_ARM_INFO_FLAGS_PROPAGATED) {
      -printk("%spropagated error captured\n", newpfx);
      -
      -if (err_info->flags & CPER_ARM_INFO_FLAGS_OVERFLOW) {
        -printk("%soverflow occurred, error info is incomplete\n", newpfx);
      -
      -err_info += 1;
    -}
    -
    -printk("%serror type: %d, %s\n", newpfx, err_info->type,
    -err_info->type < ARRAY_SIZE(proc_error_type_strs) ?
    -proc_error_type_strs[err_info->type] : "unknown";
    -if (err_info->validation_bits & CPER_ARM_INFO_VALID_ERR_INFO) {
      -printk("%serror info: 0x%llx\n", newpfx,
    -err_info->error_info);
    -if (err_info->validation_bits & CPER_ARM_INFO_VALID_VIRT_ADDR) {
      -printk("%svirtual fault address: 0x%llx\n", newpfx,
    -err_info->virt_fault_addr);
    -if (err_info->validation_bits & CPER_ARM_INFO_VALID_PHYSICAL_ADDR) {
      -printk("%sphysical fault address: 0x%llx\n", newpfx,
    -err_info->physical_fault_addr);
      -err_info += 1;
    -}
    -
    -ctx_info = (struct cper_arm_ctx_info *)err_info;
    -max_ctx_type = ARRAY_SIZE(arm_reg_ctx_strs) - 1;
    -for (i = 0; i < proc->context_info_num; i++) {
      -int size = sizeof(*ctx_info) + ctx_info->size;
      -
      -printk("%sContext info structure %d: \n", pfx, i);
      -if (len < size) {
        -printk("%s\n", pfx, ctx_info);
      -
      -ctx_info = (struct cper_arm_ctx_info *)err_info;
      -max_ctx_type = ARRAY_SIZE(arm_reg_ctx_strs) - 1;
      -for (i = 0; i < proc->context_info_num; i++) {
        -int size = sizeof(*ctx_info) + ctx_info->size;
        -
        -printk("%sContext info structure %d: \n", pfx, i);
        -if (len < size) {
          -printk("%s\n", pfx, ctx_info);
        -}
-printk("%ssection length is too small\n", newpfx);
-printk("%sfirmware-generated error record is incorrect\n", pfx);
-return;
-
-if (ctx_info->type > max_ctx_type) {
-printk("%sInvalid context type: %d (max: %d)\n", newpfx, ctx_info->type, max_ctx_type);
-return;
-
-printk("%sregister context type: %s\n", newpfx, arm_reg_ctx_strs[ctx_info->type]);
-print_hex_dump(newpfx, "", DUMP_PREFIX_OFFSET, 16, 4,
-(ctx_info + 1), ctx_info->size, 0);
-len -= size;
-ctx_info = (struct cper_arm_ctx_info *)((long)ctx_info + size);
-
-
-if (len > 0) {
-printk("%sVendor specific error info has %u bytes:\n", pfx, len);
-print_hex_dump(newpfx, "", DUMP_PREFIX_OFFSET, 16, 4, ctx_info,
-len, true);
-
-
-#endif
-
-static const char * const mem_err_type_strs[] = {
"unknown",
"no error",
@@ -380,8 +262,7 @@
if (!msg || !(mem->validation_bits & CPER_MEM_VALID_MODULE_HANDLE))
return 0;

-n = 0;
-len = CPER_REC_LEN - 1;
+len = CPER_REC_LEN;
-dmi_memdev_name(mem->mem_dev_handle, &bank, &device);
if (bank && device)
n = snprintf(msg, len, "DIMM location: %s %s ", bank, device);
@@ -390,7 +271,6 @@
 "DIMM location: not present. DMI handle: 0x%.4x ",
 mem->mem_dev_handle);

-msg[n] = '\0';
return n;
}
struct cper_mem_err_compact *cmem) {
define char *ret = trace_seq_buffer_ptr(p);
define char rcd_decode_str[CPER_REC_LEN];

if (cper_mem_err_location(cmem, rcd_decode_str))
trace_seq_printf(p, "%s", rcd_decode_str);
@@ -432,6 +313,7 @@
int len)
{
struct cper_mem_err_compact cmem;
define char rcd_decode_str[CPER_REC_LEN];

/* Don't trust UEFI 2.1/2.2 structure with bad validation bits */
if (len == sizeof(struct cper_sec_mem_err_old) &&
@@ -498,7 +380,7 @@
printk("%s""vendor_id: 0x%04x, device_id: 0x%04x\n", pfx,
    pcie->device_id.vendor_id, pcie->device_id.device_id);
p = pcie->device_id.class_code;
-printk("%s""class_code: %02x%02x%02x\n", pfx, p[0], p[1], p[2]);
+printk("%s""class_code: %02x%02x%02x\n", pfx, p[2], p[1], p[0]);
} 
if (pcie->validation_bits & CPER_PCIE_VALID_SERIAL_NUMBER)
printk("%s""serial number: 0x%04x, 0x%04x\n", pfx,
@@ -507,6 +389,21 @@
printk(
    "%s""bridge: secondary_status: 0x%04x, control: 0x%04x\n",
pfx, pcie->bridge.secondary_status, pcie->bridge.control);
+ /* Fatal errors call __ghes_panic() before AER handler prints this */
+if ((pcie->validation_bits & CPER_PCIE_VALID_AER_INFO) &
+    (gdata->error_severity & CPER_SEV_FATAL)) {
+struct aer_capability_regs *aer;
+ +aer = (struct aer_capability_regs *)pcie->aer_info;
+printk("%saer_uncor_status: 0x%08x, aer_uncor_mask: 0x%08x\n",
+    px, aer->uncor_status, aer->uncor_mask);
+printk("%saer_uncor_severity: 0x%08x\n",
+    px, aer->uncor_severity);
+printk("%stLP Header: %08x %08x %08x %08x\n", px,
+    aer->header_log.dw0, aer->header_log.dw1,
+    aer->header_log.dw2, aer->header_log.dw3);
+}
}

static void cper_print_tstamp(const char *pfx,
@@ -641,19 +538,24 @@
int cper_estatus_check(const struct acpi_hest_generic_status *estatus)
struct ACPI_HEST_GENERIC_DATA *gdata;

rc = cper_estatus_check_header(estatus);
if (rc)
    return rc;
+    data_len = estatus->data_length;

apei_estatus_for_each_section(estatus, gdata) { 
    -    gedata_len = ACPI_HEST_GET_ERROR_LENGTH(gdata);
    -if (gedata_len > data_len - ACPI_HEST_GET_SIZE(gdata))
    +if (sizeof(struct ACPI_HEST_GENERIC_DATA) > data_len)
    +    return -EINVAL;
    +
    +    record_size = ACPI_HEST_GET_RECORD_SIZE(gdata);
    +if (record_size > data_len)
    return -EINVAL;
    -data_len -= ACPI_HEST_GET_RECORD_SIZE(gdata);
    +
    +data_len -= record_size;
}
if (data_len)
return -EINVAL;

--- linux-4.15.0.orig/drivers/firmware/efi/efi-bgrt.c
+++ linux-4.15.0/drivers/firmware/efi/efi-bgrt.c
@@ -50,11 +50,6 @@
      bgrt->version);
goto out;
-	if (bgrt->status & 0xfe) {
       pr_notice("Ignoring BGRT: reserved status bits are non-zero %u\n",
              bgrt->status);
       goto out;
-
}     
if (bgrt->image_type != 0) {
    pr_notice("Ignoring BGRT: invalid image type %u (expected 0)\n",
              bgrt->image_type);
--- linux-4.15.0.orig/drivers/firmware/efi/efi-pstore.c
+++ linux-4.15.0/drivers/firmware/efi/efi-pstore.c
@@ -258,8 +258,7 @@
       efi_name[i] = name[i];

   ret = efivar_entry_set_safe(efi_name, vendor, PSTORE_EFI_ATTRIBUTES,
      -   !pstore_cannot_block_path(record->reason),
- record->size, record->psi->buf);
+ preemptible(), record->size, record->psi->buf);

if (record->reason == KMSG_DUMP_OOPS)
  efivar_run_worker();
@@ -368,7 +367,6 @@
return -ENOMEM;

efi_pstore_info.bufsize = 1024;
-spin_lock_init(&efi_pstore_info.buf_lock);
if (pstore_register(&efi_pstore_info)) {
  kfree(efi_pstore_info.buf);
--- linux-4.15.0.orig/drivers/firmware/efi/efi.c
+++ linux-4.15.0/drivers/firmware/efi/efi.c
@@ -52,6 +52,9 @@
    .properties_table = EFI_INVALID_TABLE_ADDR,
    .mem_attr_table = EFI_INVALID_TABLE_ADDR,
    .rng_seed = EFI_INVALID_TABLE_ADDR,
+#ifdef CONFIG_LOAD_UEFI_KEYS
    .mokvar_table = EFI_INVALID_TABLE_ADDR,
+#endif
  }
 EXPORT_SYMBOL(efi);

@@ -72,6 +75,9 @@
    &efi.esrt,
    &efi.properties_table,
    &efi.mem_attr_table,
+#ifdef CONFIG_LOAD_UEFI_KEYS
    &efi.mokvar_table,
+#endif
    }

static bool disable_runtime;
@@ -223,11 +229,16 @@
efivars_unregister(&generic_efivars);
}

-#ifdef CONFIG_ACPI
+#ifdef CONFIG_EFI_CUSTOM_SSDT_OVERLAYS
    #define EFIVAR_SSDT_NAME_MAX 16
    static char efivar_ssdt[EFIVAR_SSDT_NAME_MAX] __initdata;
    static int __init efivar_ssdtd_setup(char *str)
    {
      bool locked_down = kernel_is_locked_down("modifying ACPI tables");
      +
      +if (locked_down)
+return -EPERM;
+
+if (strlen(str) < sizeof(efivar_ssdt))
+memcpy(efivar_ssdt, str, strlen(str));
+else
+@@ -268,6 +279,9 @@
+void *data;
+int ret;
+
+if (!efivar_ssdt[0])
+return 0;
+
+ret = efivar_init(efivar_ssdt_iter, &entries, true, &entries);
+
list_for_each_entry_safe(entry, aux, &entries, list) {
@@ -464,6 +478,9 @@
{EFI_PROPERTIES_TABLE_GUID, "PROP", &efi.properties_table },
{EFI_MEMORY_ATTRIBUTES_TABLE_GUID, "MEMATTR", &efi.mem_attr_table },
{LINUX_EFI_RANDOM_SEED_TABLE_GUID, "RNG", &efi.rng_seed },
+#ifdef CONFIG_LOAD_UEFI_KEYS
+{LINUX_EFI_MOK_VARIABLE_TABLE_GUID, "MOKvar", &efi.mokvar_table },
+#endif
{NULL_GUID, NULL, NULL},
};

@@ -549,7 +566,7 @@
}

-if (efi_enabled(EFI_MEMMAP))
+if (!IS_ENABLED(CONFIG_X86_32) && efi_enabled(EFI_MEMMAP))
efi_memattr_init();

/* Parse the EFI Properties table if it exists */
--- linux-4.15.0.orig/drivers/firmware/efi/efivars.c
+++ linux-4.15.0/drivers/firmware/efi/efivars.c
@@ -139,13 +139,16 @@
efivar_attr_read(struct efivar_entry *entry, char *buf)
{
    struct efi_variable *var = &entry->var;
+    unsigned long long size = sizeof(var->Data);
    char *str = buf;
+    int ret;

    if (!entry || !buf)
        return -EINVAL;
-var->DataSize = 1024;
+var->DataSize = 1024;
if (efivar_entry_get(entry, &var->Attributes, &size, var->Data))
    ret = efivar_entry_get(entry, &var->Attributes, &size, var->Data);
    var->DataSize = size;
    if (ret)
        return -EIO;

    var->Attributes & EFI_VARIABLE_NON_VOLATILE

efivar_size_read(struct efivar_entry *entry, char *buf)
{
    struct efi_variable *var = &entry->var;
    unsigned long size = sizeof(var->Data);
    char *str = buf;
    int ret;

    if (!entry || !buf)
        return -EINVAL;

    var->DataSize = 1024;
    if (efivar_entry_get(entry, &var->Attributes, &var->DataSize, var->Data))
        ret = efivar_entry_get(entry, &var->Attributes, &size, var->Data);
    var->DataSize = size;
    if (ret)
        return -EIO;

    str += sprintf(str, "0x%lx\n", var->DataSize);

efivar_data_read(struct efivar_entry *entry, char *buf)
{
    struct efi_variable *var = &entry->var;
    unsigned long size = sizeof(var->Data);
    int ret;

    if (!entry || !buf)
        return -EINVAL;

    var->DataSize = 1024;
    if (efivar_entry_get(entry, &var->Attributes, &var->DataSize, var->Data))
        ret = efivar_entry_get(entry, &var->Attributes, &size, var->Data);
    var->DataSize = size;
    if (ret)
        return -EIO;

    memcpy(buf, var->Data, var->DataSize);
}

u8 *data;
int err;
+if (!entry || !buf)
+return -EINVAL;
+
+if (is_compat()) {
    struct compat_efi_variable *compat;

@@ -314,14 +326,16 @@
    {
        struct efi_variable *var = &entry->var;
        struct compat_efi_variable *compat;
+        unsigned long datasize = sizeof(var->Data);
        size_t size;
+        int ret;

        if (!entry || !buf)
            return 0;

-        var->DataSize = 1024;
-        if (efivar_entry_get(entry, &entry->var.Attributes,
-            &entry->var.DataSize, entry->var.Data))
+        ret = efivar_entry_get(entry, &var->Attributes, &datasize, var->Data);
+        var->DataSize = datasize;
+        if (ret)
            return -EIO;

        if (is_compat()) {
@@ -572,8 +586,10 @@
            ret = kobject_init_and_add(&new_var->kobj, &efivar_ktype,
                NULL, "%s", short_name);
            kfree(short_name);
+            if (ret) { 
+                kobject_put(&new_var->kobj);
                return ret;
+            }

            kobject_uevent(&new_var->kobj, KOBJ_ADD);
        if (efivar_entry_add(new_var, &efivar_sysfs_list)) {
            --- linux-4.15.0.orig/drivers/firmware/efi/esrt.c
            +++ linux-4.15.0/drivers/firmware/efi/esrt.c
            @@ -180,7 +180,7 @@
                rc = kobject_init_and_add(&entry->kobj, &esre1_ktype, NULL,
                    "entry%d", entry_num);
                if (rc) {
                    -kfree(entry);
                    +kobject_put(&entry->kobj);
                    return rc;
                }
end = esrt_data + size;
pr_info("Reserving ESRT space from %pa to %pa\n", &esrt_data, &end);
-efi_mem_reserve(esrt_data, esrt_data_size);
+if (md.type == EFI_BOOT_SERVICES_DATA)
+efi_mem_reserve(esrt_data, esrt_data_size);

pr_debug("esrt-init: loaded.\n");
err_memunmap:
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/Makefile
+++ linux-4.15.0/drivers/firmware/efi/libstub/Makefile
@@ -9,18 +9,23 @@
cflags-$(CONFIG_X86_64):= -mmodel=small
cflags-$(CONFIG_X86)+= -m$(BITS) -D__KERNEL__ -O2 
 -fPIC -fno-strict-aliasing -mno-red-zone 
 -mno-mmxi -mno-sse 
 + -mno-mmxi -mno-sse 
 + -Wno-pointer-sign 
 + $(call cc-disable-warning, address-of-packed-member) 
 + $(call cc-disable-warning, gnu)

cflags-$(CONFIG_ARM64):= $(subst -pg,,$(KBUILD_CFLAGS)) -fpie 
cflags-$(CONFIG_ARM):= $(subst -pg,,$(KBUILD_CFLAGS)) 
 -fno-builtint -fpic -mno-single-pic-base 
 + -fno-builtin -fpic 
 + $(call cc-option,-mno-single-pic-base)

cflags-$(CONFIG_EFI_ARMSTUB)+= -I$(srctree)/scripts/dtc/libfdt

KBUILD_CFLAGS:=$(cflags-y) -DDISABLE_BRANCH_PROFILING 
 -D__NO_FORTIFY 
 $(call cc-option,-ffreestanding) 
 - $(call cc-option,-fno-stack-protector) 
 + $(call cc-option,-fno-stack-protector) 
 + $(call cc-option,-fno-addrsig)

GCOV_PROFILE:= n
KASAN_SANITIZE:= n
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/arm-stub.c
+++ linux-4.15.0/drivers/firmware/efi/libstub/arm-stub.c
@@ -364,6 +364,11 @@
paddr = in->phys_addr;
size = in->num_pages * EFI_PAGE_SIZE;

+if (novamap()) {
+in->virt_addr = in->phys_addr;
}
continue;
+
+/*
* Make the mapping compatible with 64k pages: this allows
* a 4k page size kernel to kexec a 64k page size kernel and
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/arm64-stub.c
+++ linux-4.15.0/drivers/firmware/efi/libstub/arm64-stub.c
@@ -98,6 +98,16 @@
(phys_seed >> 32) & mask : TEXT_OFFSET;
*/
+ /* With CONFIG_RANDOMIZE_TEXT_OFFSET=y, TEXT_OFFSET may not
+  be a multiple of EFI_KIMG_ALIGN, and we must ensure that
+  we preserve the misalignment of 'offset' relative to
+  EFI_KIMG_ALIGN so that statically allocated objects whose
+  alignment exceeds PAGE_SIZE appear correctly aligned in
+  memory.
+ */
+ offset |= TEXT_OFFSET % EFI_KIMG_ALIGN;
+
+ /*
* If KASLR is enabled, and we have some randomness available,
* locate the kernel at a randomized offset in physical memory.
*/
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/efi-stub-helper.c
+++ linux-4.15.0/drivers/firmware/efi/libstub/efi-stub-helper.c
@@ -34,6 +34,7 @@
static int __section(.data) __nokaslr;
static int __section(.data) __quiet;
+static int __section(.data) __novamap;

int __pure nokaslr(void)
{
@@ -43,8 +44,12 @@
{
 return __quiet;
 }
+int __pure novamap(void)
+{
+ return __novamap;
+}

#define EFI_MMAP_NR_SLACK_SLOTS8
+#define EFI_MMAP_NR_SLACK_SLOTS16

struct file_info {
efi_file_handle_t *handle;
@@ -454,6 +459,11 @@
 __chunk_size = -1UL;
 }

+if (!strncmp(str, "novamap", 7)) {
 +str += strlen("novamap");
 +__novamap = 1;
 +}
+
 /* Group words together, delimited by "," */
 while (*str && *str != ' ' && *str != ',')
   str++;
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/efistub.h
+++ linux-4.15.0/drivers/firmware/efi/libstub/efistub.h
@@ -27,6 +27,7 @@
 extern int __pure nokaslr(void);
 extern int __pure is_quiet(void);
+extern int __pure novamap(void);

#define pr_efi(sys_table, msg) \
 if (!is_quiet()) efi_printk(sys_table, "EFI stub: ": msg);\
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/fdt.c
+++ linux-4.15.0/drivers/firmware/efi/libstub/fdt.c
@@ -158,6 +158,10 @@
 return efi_status;
 }
 }
+
 /* shrink the FDT back to its minimum size */
 +fdt_pack(fdt);
 +
 return EFI_SUCCESS;

fdt_set_fail:
@@ -323,6 +327,9 @@
 if (status == EFI_SUCCESS) {
 efi_set_virtual_address_map_t *svam;

+if (novamap())
+return EFI_SUCCESS;
+
 /* Install the new virtual address map */
 svam = sys_table->runtime->set_virtual_address_map;
 status = svam(runtime_entry_count * desc_size, desc_size,
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/gop.c
+++ linux-4.15.0/drivers/firmware/efi/libstub/gop.c
static efi_status_t
__gop_query32(efi_system_table_t *sys_table_arg,
struct efi_graphics_output_protocol_32 *gop32,
struct efi_graphics_output_mode_info **info,
unsigned long *size, u64 *fb_base)
{
-struct efi_graphics_output_protocol_mode_32 *mode;
-efi_graphics_output_protocol_query_mode query_mode;
-efi_status_t status;
-unsigned long m;
-
-m = gop32->mode;
-mode = (struct efi_graphics_output_protocol_mode_32 *)m;
-query_mode = (void *)(unsigned long)gop32->query_mode;
-
-status = __efi_call_early(query_mode, (void *)gop32, mode->mode, size,
- info);
-if (status != EFI_SUCCESS)
-return status;
-
-*fb_base = mode->frame_buffer_base;
-return status;
-}
-
-static efi_status_t
setup_gop32(efi_system_table_t *sys_table_arg, struct screen_info *si,
efi_guid_t *proto, unsigned long size, void **gop_handle)
{
@@ -121,7 +97,7 @@
u64 fb_base;
 struct efi_pixel_bitmask pixel_info;
 int pixel_format;
 -efi_status_t status = EFI_NOT_FOUND;
+efi_status_t status;
 u32 *handles = (u32 *)(unsigned long)gop_handle;
 int i;

@@ -130,6 +106,7 @@
 nr_gops = size / sizeof(u32);
 for (i = 0; i < nr_gops; i++) {
 +struct efi_graphics_output_protocol_mode_32 *mode;
 struct efi_graphics_output_mode_info *info = NULL;
 efi_guid_t conout_proto = EFI_CONSOLE_OUT_DEVICE_GUID;
 bool conout_found = false;
if (status == EFI_SUCCESS)
conout_found = true;

-status = __gop_query32(sys_table_arg, gop32, &info, &size,
-  &current_fb_base);
-if (status == EFI_SUCCESS & & (!first_gop || conout_found) & &
+mode = (void *) (unsigned long) gop32->mode;
+info = (void *) (unsigned long) mode->info;
+current_fb_base = mode->frame_buffer_base;
+
+if ((!first_gop || conout_found) & &
    info->pixel_format != PIXEL_BLT_ONLY) {
/*
 * Systems that use the UEFI Console Splitter may
*/
/* Did we find any GOPs? */
if (!first_gop)
  goto out;
+return EFI_NOT_FOUND;

/* EFI framebuffer */
si->orig_video_isVGA = VIDEO_TYPE_EFI;
out:
-return status;
-}
-
static efi_status_t
__gop_query64(efi_system_table_t *sys_table_arg,
  struct efi_graphics_output_protocol_64 *gop64,
  struct efi_graphics_output_mode_info **info,
  unsigned long *size, u64 *fb_base)
{
  struct efi_graphics_output_protocol_mode_64 *mode;
  efi_graphics_output_protocol_query_mode query_mode;
  efi_status_t status;
  unsigned long m;

  -m = gop64->mode;
  -mode = (struct efi_graphics_output_protocol_mode_64 *) m;
  -query_mode = (void *) (unsigned long) gop64->query_mode;
  -
  -status = __efi_call_early(query_mode, (void *) gop64, mode->mode, size,

- info);  
-if (status != EFI_SUCCESS)  
-return status;  
-*fb_base = mode->frame_buffer_base;  
-return status;  
+return EFI_SUCCESS;  
}

static efi_status_t
@@ -239,7 +194,7 @@  
  u64 fb_base;  
  struct efi_pixel_bitmask pixel_info;  
  int pixel_format;  
-efi_status_t status = EFI_NOT_FOUND;  
+efi_status_t status;  
  u64 *handles = (u64 *)(unsigned long)gop_handle;  
  int i;

@@ -248,6 +203,7 @@
  nr_gops = size / sizeof(u64);  
  for (i = 0; i < nr_gops; i++) {
  +struct efi_graphics_output_protocol_mode_64 *mode;  
  struct efi_graphics_output_mode_info *info = NULL;  
  efi_guid_t conout_proto = EFI_CONSOLE_OUT_DEVICE_GUID;  
  bool conout_found = false;  
@@ -265,9 +221,11 @@
  if (status == EFI_SUCCESS)  
  conout_found = true;

  -status = __gop_query64(sys_table_arg, gop64, &info, &size,  
  -&current_fb_base);  
  -if (status == EFI_SUCCESS && !first_gop || conout_found) &&  
  +mode = (void *)(unsigned long)gop64->mode;  
  +info = (void *)(unsigned long)mode->info;  
  +current_fb_base = mode->frame_buffer_base;  
  +  
  +if (!first_gop || conout_found) &&  
  info->pixel_format != PIXEL_BLT_ONLY) {
  /*
  * Systems that use the UEFI Console Splitter may
  @ @ -295.7 +253.7 @ @

  /* Did we find any GOPs? */
  if (!first_gop)  
  -goto out;
  +return EFI_NOT_FOUND;
/ * EFI framebuffer */
si->orig_video_isVGA = VIDEO_TYPE_EFI;
@@ -317,8 +275,8 @@
si->lfb_size = si->lfb_linelength * si->lfb_height;

si->capabilities |= VIDEO_CAPABILITY_SKIP_QUIRKS;
-out:
+*return EFI_SUCCESS;
+
+return status;
}

/*
--- linux-4.15.0.orig/drivers/firmware/efi/libstub/secureboot.c
+++ linux-4.15.0/drivers/firmware/efi/libstub/secureboot.c
@@ -77,10 +77,8 @@
return efi_secureboot_mode_disabled;
secure_boot_enabled:
-pr_efi(sys_table_arg, "UEFI Secure Boot is enabled.\n");
return efi_secureboot_mode_enabled;

out_efi_err:
-pr_efi_err(sys_table_arg, "Could not determine UEFI Secure Boot status.\n");
return efi_secureboot_mode_unknown;
}

--- linux-4.15.0.orig/drivers/firmware/efi/memattr.c
+++ linux-4.15.0/drivers/firmware/efi/memattr.c
@@ -69,11 +69,6 @@
return false;
-
if (!(in->attribute & (EFI_MEMORY_RO | EFI_MEMORY_XP))) {
-pr_warn("Entry attributes invalid: RO and XP bits both cleared\n");
-return false;
-
if (PAGE_SIZE > EFI_PAGE_SIZE &&
  (!PAGE_ALIGNED(in->phys_addr) ||
   !PAGE_ALIGNED(in->num_pages << EFI_PAGE_SHIFT))) {
@@ -94,7 +89,7 @@
if (!(md->attribute & EFI_MEMORY_RUNTIME))
 continue;
-if (md->virt_addr == 0) {
+if (md->virt_addr == 0 &&& md->phys_addr != 0) {
    /* no virtual mapping has been installed by the stub */
break;
}
--- linux-4.15.0.orig/drivers/firmware/efi/memmap.c
+++ linux-4.15.0/drivers/firmware/efi/memmap.c
@@ -118,6 +118,9 @@
void __init efi_memmap_unmap(void)
{
+if (!efi_enabled(EFI_MEMMAP))
+return;
+
if (!efi.memmap.late) {
unsigned long size;
--- linux-4.15.0.orig/drivers/firmware/efi/mokvar-table.c
+++ linux-4.15.0/drivers/firmware/efi/mokvar-table.c
@@ -0,0 +1,362 @@
+// SPDX-License-Identifier: GPL-2.0
+/*
+ * mokvar-table.c
+ *
+ * Copyright (c) 2020 Red Hat
+ * Author: Lenny Szubowicz <lszubowi@redhat.com>
+ *
+ * This module contains the kernel support for the Linux EFI Machine
+ * Owner Key (MOK) variable configuration table, which is identified by
+ * the LINUX_EFI_MOK_VARIABLE_TABLE_GUID.
+ *
+ * This EFI configuration table provides a more robust alternative to
+ * EFI volatile variables by which an EFI boot loader can pass the
+ * contents of the Machine Owner Key (MOK) certificate stores to the
+ * kernel during boot. If both the EFI MOK config table and corresponding
+ * EFI MOK variables are present, the table should be considered as
+ * more authoritative.
+ *
+ * This module includes code that validates and maps the EFI MOK table,
+ * if it's presence was detected very early in boot.
+ *
+ * Kernel interface routines are provided to walk through all the
+ * entries in the MOK config table or to search for a specific named
+ * entry.
+ *
+ * The contents of the individual named MOK config table entries are
+ * made available to user space via read-only sysfs binary files under:
+ *
+ */


#define pr_fmt(fmt) "mokvar: " fmt
+
+﻿#define pr_fmt(fmt) "mokvar: " fmt
+  +
+  +#include <linux/capability.h>
+  +#include <linux/efi.h>
+  +#include <linux/init.h>
+  +#include <linux/io.h>
+  +#include <linux/kernel.h>
+  +#include <linux/kobject.h>
+  +#include <linux/list.h>
+  +#include <linux/slab.h>
+  +
+  +#include <asm/early_ioremap.h>
+  +
+  +/*
+  + * The LINUX_EFI_MOK_VARIABLE_TABLE_GUID config table is a packed
+  + * sequence of struct efi_mokvar_table_entry, one for each named
+  + * MOK variable. The sequence is terminated by an entry with a
+  + * completely NULL name and 0 data size.
+  + */
+static size_t efi_mokvar_table_size;
+
+/*
+ * efi_mokvar_table_va is the kernel virtual address at which the
+ * EFI MOK config table has been mapped by efi_mokvar_table_init(). This will be
+ * non-zero if and only if the table if present and has been
+ * validated by efi_mokvar_table_init().
+ */
+static struct efi_mokvar_table_entry *efi_mokvar_table_va;
+/
+/*
+ * Each /sys/firmware/efi/mok-variables/ sysfs file is represented by
+ * an instance of struct efi_mokvar_sysfs_attr on efi_mokvar_sysfs_list.
+ * bin_attr.private points to the associated EFI MOK config table entry.
+ *
+ * This list is created during boot and then remains unchanged.
+ * So no synchronization is currently required to walk the list.
+ */
+struct efi_mokvar_sysfs_attr {
+struct bin_attribute bin_attr;
+struct list_head node;
+};
+
+static LIST_HEAD(efi_mokvar_sysfs_list);
+static struct kobject *mokvar_kobj;
+

---

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+/*
+ * efi_mokvar_table_init() - Early boot validation of EFI MOK config table
+ *
+ * If present, validate and compute the size of the EFI MOK variable
+ * configuration table. This table may be provided by an EFI boot loader
+ * as an alternative to ordinary EFI variables, due to platform-dependent
+ * limitations. The memory occupied by this table is marked as reserved.
+ *
+ * This routine must be called before efi_free_boot_services() in order
+ * to guarantee that it can mark the table as reserved.
+ *
+ * Implicit inputs:
+ *
+ * efi.mokvar_table: Physical address of EFI MOK variable config table
+ * or special value that indicates no such table.
+ *
+ * Implicit outputs:
+ *
+ * efi_mokvar_table_size: Computed size of EFI MOK variable config table.
+ * The table is considered present and valid if this
+ * is non-zero.
+ */
+
+void __init efi_mokvar_table_init(void)
+{
+  efi_memory_desc_t md;
+  void *va = NULL;
+  unsigned long cur_offset = 0;
+  unsigned long offset_limit;
+  unsigned long map_size = 0;
+  unsigned long map_size_needed = 0;
+  unsigned long size;
+  struct efi_mokvar_table_entry *mokvar_entry;
+  int err;
+
+  if (!efi_enabled(EFI_MEMMAP))
+    return;
+
+  if (efi.mokvar_table == EFI_INVALID_TABLE_ADDR)
+    return;
+  
+  err = efi_mem_desc_lookup(efi.mokvar_table, &md);
+  if (err) {
+    pr_warn("EFI MOKvar config table is not within the EFI memory map\n");
+    return;
+  }
+
+  offset_limit = efi_mem_desc_end(&md) - efi.mokvar_table;
+ /*
+ * Validate the MOK config table. Since there is no table header
+ * from which we could get the total size of the MOK config table,
+ * we compute the total size as we validate each variably sized
+ * entry, remapping as necessary.
+ */
+ err = -EINVAL;
+ while (cur_offset + sizeof(*mokvar_entry) <= offset_limit) {
+  mokvar_entry = va + cur_offset;
+  map_size_needed = cur_offset + sizeof(*mokvar_entry);
+  if (map_size_needed > map_size) {
+    if (va)
+      early_memunmap(va, map_size);
+    /*
+     * Map a little more than the fixed size entry
+     * header, anticipating some data. It's safe to
+     * do so as long as we stay within current memory
+     * descriptor.
+     */
+    map_size = min(map_size_needed + 2*EFI_PAGE_SIZE,
+                   offset_limit);
+    va = early_memremap(efi.mokvar_table, map_size);
+    if (!va)
+      pr_err("Failed to map EFI MOKvar config table pa=0x%lx, size=%lu\n",
+             efi.mokvar_table, map_size);
+    return;
+  }
+  mokvar_entry = va + cur_offset;
+  }
+  /* Check for last sentinel entry */
+  if (mokvar_entry->name[0] == '\0') {
+    if (mokvar_entry->data_size != 0)
+      break;
+    err = 0;
+    break;
+  }
+  /* Sanity check that the name is null terminated */
+  size = strnlen(mokvar_entry->name,
+                 sizeof(mokvar_entry->name));
+  if (size >= sizeof(mokvar_entry->name))
+    break;
+  /* Advance to the next entry */
+  cur_offset = map_size_needed + mokvar_entry->data_size;
+}
+if (va)
+early_memunmap(va, map_size);
+if (err) {
+pr_err("EFI MOKvar config table is not valid\n");
+return;
+}
+
+if (md.type == EFI_BOOT_SERVICES_DATA)
+efi_mem_reserve(efi.mokvar_table, map_size_needed);
+
+efi_mokvar_table_size = map_size_needed;
+}
+
+/
+ * efi_mokvar_entry_next() - Get next entry in the EFI MOK config table
+ *
+ * mokvar_entry: Pointer to current EFI MOK config table entry
+ * or null. Null indicates get first entry.
+ * Passed by reference. This is updated to the
+ * same value as the return value.
+ *
+ * Returns: Pointer to next EFI MOK config table entry
+ * or null, if there are no more entries.
+ * Same value is returned in the mokvar_entry
+ * parameter.
+ *
+ * This routine depends on the EFI MOK config table being entirely
+ * mapped with it's starting virtual address in efi_mokvar_table_va.
+ */
+struct efi_mokvar_table_entry *efi_mokvar_entry_next(
+struct efi_mokvar_table_entry **mokvar_entry)
+{
+struct efi_mokvar_table_entry *mokvar_cur;
+struct efi_mokvar_table_entry *mokvar_next;
+size_t size_cur;
+
+mokvar_cur = *mokvar_entry;
+*mokvar_entry = NULL;
+
+if (efi_mokvar_table_va == NULL)
+return NULL;
+
+if (mokvar_cur == NULL) {
+mokvar_next = efi_mokvar_table_va;
+} else {
+if (mokvar_cur->name[0] == '0')
+return NULL;
+size_cur = sizeof(*mokvar_cur) + mokvar_cur->data_size;
+mokvar_next = (void *)mokvar_cur + size_cur;
+
+if (mokvar_next->name[0] == \'0\')
+return NULL;
+
+*mokvar_entry = mokvar_next;
+return mokvar_next;
+
+/*
+ * efi_mokvar_entry_find() - Find EFI MOK config entry by name
+ *
+ * name: Name of the entry to look for.
+ *
+ * Returns: Pointer to EFI MOK config table entry if found;
+ * null otherwise.
+ *
+ * This routine depends on the EFI MOK config table being entirely
+ * mapped with its starting virtual address in efi_mokvar_table_va.
+ */
+struct efi_mokvar_table_entry *efi_mokvar_entry_find(const char *name) {
+struct efi_mokvar_table_entry *mokvar_entry = NULL;
+
+while (efi_mokvar_entry_next(&mokvar_entry)) {
+if (!strncmp(name, mokvar_entry->name,
+    sizeof(mokvar_entry->name)))
+    return mokvar_entry;
+}
+return NULL;
+
+/*
+ * efi_mokvar_sysfs_read() - sysfs binary file read routine
+ *
+ * Returns: Count of bytes read.
+ *
+ * Copy EFI MOK config table entry data for this mokvar sysfs binary file
+ * to the supplied buffer, starting at the specified offset into mokvar table
+ * entry data, for the specified count bytes. The copy is limited by the
+ * amount of data in this mokvar config table entry.
+ */
+static ssize_t efi_mokvar_sysfs_read(struct file *file, struct kobject *kobj,
+    struct bin_attribute *bin_attr, char *buf,
+    loff_t off, size_t count) {
+    

+struct efi_mokvar_table_entry *mokvar_entry = bin_attr->private;
+
+if (!capable(CAP_SYS_ADMIN))
+return 0;
+
+if (off >= mokvar_entry->data_size)
+return 0;
+if (count > mokvar_entry->data_size - off)
+count = mokvar_entry->data_size - off;
+
+memcpy(buf, mokvar_entry->data + off, count);
+return count;
+
+/*
+ * efi_mokvar_sysfs_init() - Map EFI MOK config table and create sysfs
+ *
+ * Map the EFI MOK variable config table for run-time use by the kernel
+ * and create the sysfs entries in /sys/firmware/efi/mok-variables/
+ *
+ * This routine just returns if a valid EFI MOK variable config table
+ * was not found earlier during boot.
+ *
+ * This routine must be called during a "middle" initcall phase, i.e.
+ * after efi_mokvar_table_init() but before UEFI certs are loaded
+ * during late init.
+ *
+ * Implicit inputs:
+ * efi.mokvar_table: Physical address of EFI MOK variable config table
+ * or special value that indicates no such table.
+ *
+ * efi_mokvar_table_size: Computed size of EFI MOK variable config table.
+ * The table is considered present and valid if this
+ * is non-zero.
+ *
+ * Implicit outputs:
+ * efi_mokvar_table_va: Start virtual address of the EFI MOK config table.
+ */
+static int __init efi_mokvar_sysfs_init(void)
+{
+void *config_va;
+struct efi_mokvar_table_entry *mokvar_entry = NULL;
+struct efi_mokvar_sysfs_attr *mokvar_sysfs = NULL;
+int err = 0;
+
+if (efi_mokvar_table_size == 0)
+return -ENOENT;
+}
+config_va = memremap(efi.mokvar_table, efi_mokvar_table_size,
  + MEMREMAP_WB);
+if (!config_va) {
  +pr_err("Failed to map EFI MOKvar config table\n");
  +return -ENOMEM;
  +}
+efi_mokvar_table_va = config_va;
+
+mokvar_kobj = kobject_create_and_add("mok-variables", efi_kobj);
+if (!mokvar_kobj) {
  +pr_err("Failed to create EFI mok-variables sysfs entry\n");
  +return -ENOMEM;
  +}
+
+while (efi_mokvar_entry_next(&mokvar_entry)) {
  +mokvar_sysfs = kzalloc(sizeof(*mokvar_sysfs), GFP_KERNEL);
  +if (!mokvar_sysfs) {
    +err = -ENOMEM;
    +break;
    +}
    +
    +sysfs_bin_attr_init(&mokvar_sysfs->bin_attr);
    +mokvar_sysfs->bin_attr.private = mokvar_entry;
    +mokvar_sysfs->bin_attr.attr.name = mokvar_entry->name;
    +mokvar_sysfs->bin_attr.attr.mode = 0400;
    +mokvar_sysfs->bin_attr.size = mokvar_entry->data_size;
    +mokvar_sysfs->bin_attr.read = efi_mokvar_sysfs_read;
    +
    +err = sysfs_create_bin_file(mokvar_kobj,
      + &mokvar_sysfs->bin_attr);
    + &mokvar_sysfs->bin_attr);
    +if (err)
      +break;
      +
      +list_add_tail(&mokvar_sysfs->node, &efi_mokvar_sysfs_list);
      +}
      +
      +if (err) {
        +pr_err("Failed to create some EFI mok-variables sysfs entries\n");
        +kfree(mokvar_sysfs);
        +}  
        +return err;
        +}
        +device_initcall(efi_mokvar_sysfs_init);
        --- linux-4.15.0.orig/drivers/firmware/efi/runtime-wrappers.c
        +++ linux-4.15.0/drivers/firmware/efi/runtime-wrappers.c
        @@ -50,6 +50,13 @@
        }
        
        Open Source Used In 5GaaS Edge AC-4  20783
/*
 * Expose the EFI runtime lock to the UV platform
 */
#ifdef CONFIG_X86_UV
extern struct semaphore __efi_uv_runtime_lock __alias(efi_runtime_lock);
#endif

/* According to section 7.1 of the UEFI spec, Runtime Services are not fully
 * reentrant, and there are particular combinations of calls that need to be
 * serialized. (source: UEFI Specification v2.4A)

 unsigned long data_size,
 efi_char16_t *data)
 {
 -if (down_interruptible(&efi_runtime_lock)) {
 +if (down_trylock(&efi_runtime_lock)) {
 pr_warn("failed to invoke the reset_system() runtime service\n"
 "could not get exclusive access to the firmware\n");
 return;
 --- linux-4.15.0.orig/drivers/firmware/efi/secureboot.c
 +++ linux-4.15.0/drivers/firmware/efi/secureboot.c
 @@ -0,0 +1,38 @@
 +/* Core kernel secure boot support.
 + *
 + * Copyright (C) 2017 Red Hat, Inc. All Rights Reserved.
 + * Written by David Howells (dhowells@redhat.com)
 + *
 + * This program is free software; you can redistribute it and/or
 + * modify it under the terms of the GNU General Public Licence
 + * as published by the Free Software Foundation; either version
 + * 2 of the Licence, or (at your option) any later version.
 + */
 + *
 +#define pr_fmt(fmt) KBUILD_MODNAME ": " fmt
 + +#include <linux/efi.h>
 + +#include <linux/kernel.h>
 + +#include <linux/printk.h>
 + *
 +/*
 * Decide what to do when UEFI secure boot mode is enabled.
 + */
 +void __init efi_set_secure_boot(enum efi_secureboot_mode mode)
 +{
 +if (efi_enabled(EFI_BOOT)) {
 +switch (mode) {
 +case efi_secureboot_mode_disabled:
static int efi_test_open(struct inode *inode, struct file *file) {
    bool locked_down = kernel_is_locked_down("/dev/efi_test access");
    +
     
    +return -EPERM;
    +
    +if (!capable(CAP_SYS_ADMIN))
    +return -EACCES;
    /*
     * nothing special to do here
     */
    
    static efi_status_t check_var_size(u32 attributes, unsigned long size) {
        -const struct efivar_operations *fops = __efivars->ops;
        +const struct efivar_operations *fops;
        +
        +if (!_efivars)
        +return EFI_UNSUPPORTED;
        +
        +fops = _efivars->ops;
        
        if (!fops->query_variable_store)
            return EFI_UNSUPPORTED;
        @@ -329,7 +334,12 @@
        static efi_status_t check_var_size_nonblocking(u32 attributes, unsigned long size)
            {
                -const struct efivar_operations *fops = __efivars->ops;
                +const struct efivar_operations *fops;
                +
                +if (!_efivars)
                +return EFI_UNSUPPORTED;
                +
                +fops = _efivars->ops;
                
                if (!fops->query_variable_store)
                    return EFI_UNSUPPORTED;
        @@ -329,7 +334,12 @@
        static efi_status_t check_var_size_nonblocking(u32 attributes, unsigned long size)
const struct efivar_operations *fops = __efivars->ops;
+const struct efivar_operations *fops;
+
+if (!__efivars)
+return EFI_UNSUPPORTED;
+
+fops = __efivars->ops;

if (!fops->query_variable_store)
return EFI_UNSUPPORTED;
@@ -429,13 +439,18 @@
int efivar_init(int (*func)(efi_char16_t *, efi_guid_t, unsigned long, void *),
void *data, bool duplicates, struct list_head *head)
{
-const struct efivar_operations *ops = __efivars->ops;
+const struct efivar_operations *ops;
unsigned long variable_name_size = 1024;
efi_char16_t *variable_name;
efi_status_t status;
efi_guid_t vendor_guid;
int err = 0;
+
+if (!__efivars)
+return -EFAULT;
+
+ops = __efivars->ops;
+
variable_name = kzalloc(variable_name_size, GFP_KERNEL);
if (!variable_name) {
printk(KERN_ERR "efivars: Memory allocation failed\n");
@@ -583,12 +598,14 @@*/
int __efivar_entry_delete(struct efivar_entry *entry)
{
-const struct efivar_operations *ops = __efivars->ops;
+const struct efivar_operations *ops;
efi_status_t status;

-status = ops->set_variable(entry->var.VariableName,
- &entry->var.VendorGuid,
- 0, 0, NULL);
+if (!__efivars)
+return -EINVAL;
+
+status = __efivars->ops->set_variable(entry->var.VariableName,
+ &entry->var.VendorGuid,
+ 0, 0, NULL);
int efivar_entry_delete(struct efivar_entry *entry)
{
    const struct efivar_operations *ops = __efivars->ops;
    efi_status_t status;
    if (down_interruptible(&efivars_lock))
        return -EINTR;

    if (!__efivars) {
        up(&efivars_lock);
        return -EINVAL;
    }
    ops = __efivars->ops;
    status = ops->set_variable(entry->var.VariableName,
                                &entry->var.VendorGuid,
                                0, 0, NULL);
    if (head && efivar_entry_find(name, vendor, head, false)) {
        up(&efivars_lock);
        return -EEXIST;
    }
    efivar_entry_set_nonblocking(efi_char16_t *name, efi_guid_t vendor,
                                 u32 attributes, unsigned long size, void *data);
    if (down_interruptible(&efivars_lock))
        return -EINTR;
    if (!__efivars) {
        up(&efivars_lock);
        return -EINVAL;
    }
    ops = __efivars->ops;
    if (head &

efi_status_t status;

if (down_trylock(&efivars_lock))
    return -EBUSY;

@if (!__efivars) {
+up(&efivars_lock);
+return -EINVAL;
+}
+
status = check_var_size_nonblocking(attributes,
    size + ucs2_strsize(name, 1024));
if (status != EFI_SUCCESS) {
    return -ENOSPC;
}

+ops = __efivars->ops;
status = ops->set_variable_nonblocking(name, &vendor, attributes,
    size, data);

@@ -727,9 +761,13 @@
int efivar_entry_set_safe(efi_char16_t *name, efi_guid_t vendor, u32 attributes,
    bool block, unsigned long size, void *data)
{
    const struct efivar_operations *ops = __efivars->ops;
+const struct efivar_operations *ops;
efi_status_t status;

+if (!__efivars)
+return -EINVAL;
+
+ops = __efivars->ops;
if (!ops->query_variable_store)
    return -ENOSYS;

@@ -829,13 +867,18 @@
/*
int efivar_entry_size(struct efivar_entry *entry, unsigned long *size)
{
    const struct efivar_operations *ops = __efivars->ops;
+const struct efivar_operations *ops;
    efi_status_t status;

    *size = 0;

    if (down_interruptible(&efivars_lock))
        return -EINTR;
+if (!__efivars) {
+up(&efivars_lock);
+return -EINVAL;
+
+}
+ops = __efivars->ops;
status = ops->get_variable(entry->var.VariableName,
    &entry->var.VendorGuid, NULL, NULL);
up(&efivars_lock);
@@ -861,12 +904,14 @@
int __efivar_entry_get(struct efivar_entry *entry, u32 *attributes,
    unsigned long *size, void *data)
{
-const struct efivar_operations *ops = __efivars->ops;
    efi_status_t status;

- status = ops->get_variable(entry->var.VariableName,
-    &entry->var.VendorGuid,
-    attributes, size, data);
+if (!__efivars) {
+    up(&efivars_lock);
+    return -EINVAL;
+
+ status = __efivars->ops->get_variable(entry->var.VariableName,
+    &entry->var.VendorGuid,
+    attributes, size, data);

        return efi_status_to_err(status);
    }
@@ -882,14 +927,19 @@
int efivar_entry_get(struct efivar_entry *entry, u32 *attributes,
    unsigned long *size, void *data)
{
-const struct efivar_operations *ops = __efivars->ops;
    efi_status_t status;

    if (down_interruptible(&efivars_lock))
        return -EINTR;
    status = ops->get_variable(entry->var.VariableName,
        &entry->var.VendorGuid,
        attributes, size, data);
+if (!__efivars) {
+    up(&efivars_lock);
+    return -EINVAL;
+
+ status = __efivars->ops->get_variable(entry->var.VariableName,
+    &entry->var.VendorGuid,
+    attributes, size, data);
up(&efivars_lock);

return efi_status_to_err(status);
@@ -921,7 +971,7 @@
int efivar_entry_set_get_size(struct efivar_entry *entry, u32 attributes,
    unsigned long *size, void *data, bool *set)
{
-    const struct efivar_operations *ops = __efivars->ops;
+    const struct efivar_operations *ops;
    efi_char16_t *name = entry->var.VariableName;
    efi_guid_t *vendor = &entry->var.VendorGuid;
    efi_status_t status;
@@ -940,6 +990,11 @@
    if (down_interruptible(&efivars_lock))
        return -EINTR;

    +if (!__efivars) {
        +err = -EINVAL;
        +goto out;
        +}
    +
    /*
    * Ensure that the available space hasn't shrunk below the safe level
    */
@@ -956,6 +1011,8 @@
    }

    +ops = __efivars->ops;
    +
    status = ops->set_variable(name, vendor, attributes, *size, data);
    if (status != EFI_SUCCESS) {
        err = efi_status_to_err(status);
--- linux-4.15.0.orig/drivers/firmware/google/coreboot_table-of.c
+++ linux-4.15.0/drivers/firmware/google/coreboot_table-of.c
@@ -19,7 +19,6 @@
#include <linux/io.h>
#include <linux/module.h>
#include <linux/of_address.h>
-#include <linux/of_platform.h>
#include "coreboot_table.h"
@@ -30,7 +29,6 @@
    #include <linux/io.h>
    #include <linux/module.h>
    #include <linux/of_address.h>
-    #include <linux/of_platform.h>
    #include <linux/platform_device.h>

    #include "coreboot_table.h"
@@ -30,7 +29,6 @@
    void __iomem *ptr;

    ptr = of_iomap(fw_dn, 0);
    -of_node_put(fw_dn);
if (!ptr)
return -ENOMEM;

@@ -44,8 +42,9 @@
static const struct of_device_id coreboot_of_match[] = {
    { .compatible = "coreboot" },
    {-},
    +{} };
+MODULE_DEVICE_TABLE(of, coreboot_of_match);

static struct platform_driver coreboot_table_of_driver = {
    .probe = coreboot_table_of_probe,
@@ -55,28 +54,7 @@
    .of_match_table = coreboot_of_match,
    },
    };
-
-static int __init platform_coreboot_table_of_init(void)
-{  
-struct platform_device *pdev;
-struct device_node *of_node;
-
-/* Limit device creation to the presence of /firmware/coreboot node */
-of_node = of_find_node_by_path("/firmware/coreboot");
-if (!of_node)
-return -ENODEV;
-
-if (!of_match_node(coreboot_of_match, of_node))
-return -ENODEV;
-
-pdev = of_platform_device_create(of_node, "coreboot_table_of", NULL);
-if (!pdev)
-return -ENODEV;
-
-return platform_driver_register(&coreboot_table_of_driver);
-
-module_init(platform_coreboot_table_of_init);
+module_platform_driver(coreboot_table_of_driver);

MODULE_AUTHOR("Google, Inc.");
MODULE_LICENSE("GPL");
--- linux-4.15.0.org/drivers/firmware/google/gsmi.c
+++ linux-4.15.0/drivers/firmware/google/gsmi.c
@@ -480,11 +480,10 @@
if (count < sizeof(u32))
return -EINVAL;
param.type = *(u32 *)buf;
-count -= sizeof(u32);
buf += sizeof(u32);

/* The remaining buffer is the data payload */
-if (count > gsmi_dev.data_buf->length)
+if (((count - sizeof(u32)) > gsmi_dev.data_buf->length)
    return -EINVAL;
param.data_len = count - sizeof(u32);

@@ -504,7 +503,7 @@
    return rc;
+return (rc == 0) ? count : rc;
}

--- linux-4.15.0.orig/drivers/firmware/google/vpd.c
+++ linux-4.15.0/drivers/firmware/google/vpd.c
@@ -100,8 +100,8 @@
    return VPD_OK;
 }

-static int vpd_section_attrib_add(const u8 *key, s32 key_len,
-    const u8 *value, s32 value_len,
+static int vpd_section_attrib_add(const u8 *key, u32 key_len,
+    const u8 *value, u32 value_len,
    void *arg)
{
    int ret;
    @ @ -246,6 +246,7 @@
    sysfs_remove_bin_file(vpd_kobj, &sec->bin_attr);
    kfree(sec->raw_name);
    munmap(sec->baseaddr);
+    sec->enabled = false;
    }

return 0;
@@ -279,8 +280,10 @@
    ret = vpd_section_init("rw", &rw_vpd,
        physaddr + sizeof(struct vpd_cbmem) +
        header.ro_size, header.rw_size);
-    if (ret)
+    if (ret) {
+      vpd_section_destroy(&ro_vpd);
return ret;
+
+
return 0;

--- linux-4.15.0.orig/drivers/firmware/google/vpd_decode.c
+++ linux-4.15.0/drivers/firmware/google/vpd_decode.c
@@ -19,8 +19,8 @@
 #include "vpd_decode.h"

-static int vpd_decode_len(const s32 max_len, const u8 *in,
- s32 *length, s32 *decoded_len)
+static int vpd_decode_len(const u32 max_len, const u8 *in,
+ u32 *length, u32 *decoded_len)
{
 u8 more;
 int i = 0;
 @@ -40,18 +40,39 @@
 } while (more);

 *decoded_len = i;
+return VPD_OK;
+
+{  
+static int vpd_decode_entry(const u32 max_len, const u8 *input_buf,
+ u32 *_consumed, const u8 **entry, u32 *entry_len)
+{  
+u32 decoded_len;
+u32 consumed = *_consumed;

+if (vpd_decode_len(max_len - consumed, &input_buf[consumed],
+ entry_len, &decoded_len) != VPD_OK)
+return VPD_FAIL;
+if (max_len - consumed < decoded_len)
+return VPD_FAIL;
+
+consumed += decoded_len;
+*entry = input_buf + consumed;
+
+/* entry_len is untrusted data and must be checked again. */
+if (max_len - consumed < *entry_len)
+return VPD_FAIL;
+
+consumed += *entry_len;
+*_consumed = consumed;
return VPD_OK;
}
int vpd_decode_string(const s32 max_len, const u8 *input_buf, s32 *consumed,
vpd_decode_callback callback, void *callback_arg)
{
int type;
int res;
-s32 key_len;
-s32 value_len;
-s32 decoded_len;
+u32 key_len;
+u32 value_len;
const u8 *key;
const u8 *value;

@@ -66,26 +87,14 @@
case VPD_TYPE_STRING:
(*consumed)++;

-/* key */
-res = vpd_decode_len(max_len - *consumed, &input_buf[*consumed],
-&key_len, &decoded_len);
-if (res != VPD_OK || *consumed + decoded_len >= max_len)
+if (vpd_decode_entry(max_len, input_buf, consumed, &key,
+&key_len) != VPD_OK)
return VPD_FAIL;
-(*consumed) += decoded_len;
-key = &input_buf[*consumed];
-(*consumed) += key_len;
-
-/* value */
-res = vpd_decode_len(max_len - *consumed, &input_buf[*consumed],
-&value_len, &decoded_len);
-if (res != VPD_OK || *consumed + decoded_len > max_len)
+if (vpd_decode_entry(max_len, input_buf, consumed, &value,
+&value_len) != VPD_OK)
return VPD_FAIL;
-(*consumed) += decoded_len;
-value = &input_buf[*consumed];
-(*consumed) += value_len;
-
if (type == VPD_TYPE_STRING)
return callback(key, key_len, value, value_len,
callback_arg);
--- linux-4.15.0.orig/drivers/firmware/google/vpd_decode.h
+++ linux-4.15.0/drivers/firmware/google/vpd_decode.h
typedef int vpd_decode_callback(const u8 *key, u32 key_len,
   const u8 *value, u32 value_len,
   void *arg);

int vpd_decode_string(const u32 max_len, const u8 *input_buf,
   u32 *consumed, vpd_decode_callback callback, void *callback_arg);

#ifndef CONFIG_ISCSI_IBFT_FIND
struct acpi_table_ibft *ibft_addr;
#endif

struct ibft_hdr {
    u8 id;
    u8 version;
    ...
+struct psci_operations psci_ops = {
+  .conduit = PSCI_CONDUIT_NONE,
+  .smc_version = SMCCC_VERSION_1_0,
+};

typedef unsigned long (psci_fn)(unsigned long, unsigned long,
unsigned long, unsigned long);
@@ -210,6 +213,22 @@
0, 0, 0);
}
+
+static void set_conduit(enum psci_conduit conduit)
+{
+  switch (conduit) {
+    case PSCI_CONDUIT_HVC:
+      invoke_psci_fn = __invoke_psci_fn_hvc;
+      break;
+    case PSCI_CONDUIT_SMC:
+      invoke_psci_fn = __invoke_psci_fn_smc;
+      break;
+    default:
+      WARN(1, "Unexpected PSCI conduit %d", conduit);
+      break;
+  }
+
+  psci_ops.conduit = conduit;
+}
+
+static int get_set_conduit_method(struct device_node *np)
+{
+  const char *method;
@@ -222,9 +241,9 @@
} if (!strcmp("hvc", method)) {
-    invoke_psci_fn = __invoke_psci_fn_hvc;
+    set_conduit(PSCI_CONDUIT_HVC);
} else if (!strcmp("smc", method)) {
-    invoke_psci_fn = __invoke_psci_fn_smc;
+    set_conduit(PSCI_CONDUIT_SMC);
} else {
pr_warn("invalid \"method\" property: \%s\n", method);
    return -EINVAL;
@@ -493,9 +512,36 @@
pr_info("Trusted OS resident on physical CPU 0x%lx\n", cpuid);
}
+
+static void __init psci_init_smccc(void)
+{
+u32 ver = ARM_SMCCC_VERSION_1_0;
+int feature;
+
+feature = psci_features(ARM_SMCCC_VERSION_FUNC_ID);
+
+if (feature != PSCI_RET_NOT_SUPPORTED) {
+  +u32 ret;
+  +ret = invoke_psci_fn(ARM_SMCCC_VERSION_FUNC_ID, 0, 0, 0);
+  +if (ret == ARM_SMCCC_VERSION_1_1) {
+    +psci_ops.smccc_version = SMCCC_VERSION_1_1;
+    +ver = ret;
+  +}
+  +}
+
+ /* Conveniently, the SMCCC and PSCI versions are encoded the
+  * same way. No, this isn't accidental.
+  */
+  +pr_info("SMC Calling Convention v%d.%d\n",
+    +PSCI_VERSION_MAJOR(ver), PSCI_VERSION_MINOR(ver));
+
+}
+
+static void __init psci_0_2_set_functions(void) {
+  +pr_info("Using standard PSCI v0.2 function IDs\n");
+  +psci_ops.get_version = psci_get_version;
+  +
+  +psci_function_id[PSCI_FN_CPU_SUSPEND] =
+    +PSCI_FN_NATIVE(0_2, CPU_SUSPEND);
+  +psci_ops.cpu_suspend = psci_cpu_suspend;
+@@ -539,6 +585,7 @@
+    +psci_init_migrate();
+  } 
+  +
+  if (PSCI_VERSION_MAJOR(ver) >= 1) {
+    +psci_init_smccc();
+    +psci_init_cpu_suspend();
+    +psci_init_system_suspend();
+@@ -652,9 +699,9 @@
+    +pr_info("probing for conduit method from ACPI\n");
+  }
+
+  if (acpi_psci_use_hvc())
+    +invoke_psci_fn = __invoke_psci_fn_hvc;
+  +set_conduit(PSCI_CONDUIT_HVC);
+  } else
+    +invoke_psci_fn = __invoke_psci_fn_smc;
+  +set_conduit(PSCI_CONDUIT_SMC);
return psci_probe();
}
--- linux-4.15.0.orig/drivers/firmware/psci_checker.c
+++ linux-4.15.0/drivers/firmware/psci_checker.c
@@ -353,16 +353,16 @@
for (;;) {
 /* Needs to be set first to avoid missing a wakeup. */
 set_current_state(TASK_INTERRUPTIBLE);
- if (kthread_should_stop()) {
- __set_current_state(TASK_RUNNING);
+ if (kthread_should_park())
 break;
-}
 schedule();
 }

pr_info("CPU %d suspend test results: success %d, shallow states %d, errors %d\n", cpu, nb_suspend, nb_shallow_sleep, nb_err);

+kthread_parkme();
+
 return nb_err;
}
@@ -427,8 +427,10 @@
/* Stop and destroy all threads, get return status. */
- for (i = 0; i < nb_threads; ++i)
+ for (i = 0; i < nb_threads; ++i) {
+ err += kthread_park(threads[i]);
 err += kthread_stop(threads[i]);
+ }
 out:
cpuidle_resume_and_unlock();
kfree(threads);
--- linux-4.15.0.orig/drivers/firmware/qcom_scm-64.c
+++ linux-4.15.0/drivers/firmware/qcom_scm-64.c
@@ -158,7 +158,7 @@
-kfree(args_virt);
-if (res->a0 < 0)
+if ((long)res->a0 < 0)
 return qcom_scm_remap_error(res->a0);

 return 0;
static const struct {
    struct attribute attr;
    ssize_t (*show)(struct kobject *k, struct attribute *a, char *buf);
} fw_cfg_rev_attr = {
    .attr = { .name = "rev", .mode = S_IRUSR },
    .show = fw_cfg_showrev,
};

/* add raw binary content access */
err = sysfs_create_bin_file(&entry->kobj, &fw_cfg_sysfs_attr_raw);

err_add_raw:
kobject_del(&entry->kobj);
-err_register:
    kfree(entry);
    return err;
}
/* No need to setup flags since it is expected to respond */
xfer = ti_sci_get_one_xfer(info, TI_SCI_MSG_VERSION,
    0x0, sizeof(struct ti_sci_msg_hdr),
    TI_SCI_FLAG_REQ_ACK_ON_PROCESSED,
    sizeof(struct ti_sci_msg_hdr),
    sizeof(*rev_info));
if (IS_ERR(xfer)) {
    ret = PTR_ERR(xfer);
    dev_err(dev, handle_to_ti_sci_info(handle);
    dev = info->dev;
}

/* Response is expected, so need of any flags */
xfer = ti_sci_get_one_xfer(info, TI_SCI_MSG_GET_DEVICE_STATE,
    0, sizeof(*req), sizeof(*resp));
if (IS_ERR(xfer)) {
    ret = PTR_ERR(xfer);
    dev_err(dev, "Message alloc failed(%d)\n", ret);
    config FPGA_MGR_ALTERA_PS_SPI
    tristate "Altera FPGA Passive Serial over SPI"
    depends on SPI
    +select BITREVERSE
    help
    FPGA manager driver support for Altera Arria/Cyclone/Stratix
    using the passive serial interface over SPI.
    config FPGA_MGR_ALTERA_PS_SPI
    tristate "Altera FPGA Passive Serial over SPI"
    depends on SPI
    +select BITREVERSE
    help
    FPGA manager driver support for Altera Arria/Cyclone/Stratix
    using the passive serial interface over SPI.
    config FPGA_MGR_ALTERA_PS_SPI
    tristate "Altera FPGA Passive Serial over SPI"
    depends on SPI
    +select BITREVERSE
    help
    FPGA manager driver support for Altera Arria/Cyclone/Stratix
    using the passive serial interface over SPI.
+regval);
+return -ENODEV;
+
+conf = devm_kzalloc(&pdev->dev, sizeof(*conf), GFP_KERNEL);
if (!conf)
    return -ENOMEM;
return 0;

err_unmap:
-pci_iounmap(pdev, conf->map);
+if (conf->map)
  +pci_iounmap(pdev, conf->map);
pci_release_region(pdev, CVP_BAR);
err_disable:
    cmd &= ~PCI_COMMAND_MEMORY;
@@ -470,7 +479,8 @@
return 0;
err_unmap:
-pci_iounmap(pdev, conf->map);
+if (conf->map)
  +pci_iounmap(pdev, conf->map);
pci_release_region(pdev, CVP_BAR);
++ pc
--- linux-4.15.0.orig/drivers/fpga/altera-ps-spi.c
+++ linux-4.15.0/drivers/fpga/altera-ps-spi.c
@@ -207,7 -207,7 @@
return -EIO;

conf->data = of_id->data;
conf->spi = spi;
-conf->config = devm_gpiod_get(&spi->dev, "nconfig", GPIOD_OUT_HIGH);
+conf->config = devm_gpiod_get(&spi->dev, "nconfig", GPIOD_OUT_LOW);
if (IS_ERR(conf->config)) {
    dev_err(&mgr->dev, "CONF_DONE is inactive!\n");
    return -EIO;
    @ @ -249,7 +249,7 @@
conf->data = of_id->data;
conf->spi = spi;
-conf->config = devm_gpiod_get(&spi->dev, "nconfig", GPIOD_OUT_HIGH);
+conf->config = devm_gpiod_get(&spi->dev, "nconfig", GPIOD_OUT_LOW);
if (IS_ERR(conf->config)) {
    dev_err(&spi->dev, "Failed to get config gpio: %ld\n",
    PTR_ERR(conf->config));
    @ @ -263,10 +263,13 @@
return PTR_ERR(conf->status);
}

-conf->confd = devm_gpiod_get(&spi->dev, "confd", GPIOD_IN);
+conf->confd = devm_gpiod_get_optional(&spi->dev, "confd", GPIOD_IN);
if (IS_ERR(conf->confd)) {
-dev_warn(&spi->dev, "Not using confd gpio: %ld\n",
-dev_err(&spi->dev, "Failed to get confd gpio: %ld\n",
+PTR_ERR(conf->confd));
+return PTR_ERR(conf->confd);
+} else if (!conf->confd) {
+dev_warn(&spi->dev, "Not using confd gpio");
}

/* Register manager with unique name */
--- linux-4.15.0.orig/drivers/fpga/fpga-region.c
+++ linux-4.15.0/drivers/fpga/fpga-region.c
@@ -147,6 +147,7 @@
mgr_node = of_parse_phandle(np, "fpga-mgr", 0);
if (mgr_node) {
  mgr = of_fpga_mgr_get(mgr_node);
  of_node_put(mgr_node);
@@ -192,10 +193,13 @@
parent_br = region_np->parent;
/* If overlay has a list of bridges, use it. */
-if (of_parse_phandle(overlay, "fpga-bridges", 0))
+br = of_parse_phandle(overlay, "fpga-bridges", 0);
+if (br) {
+  of_node_put(br);
+  np = overlay;
+  else
+  np = region_np;
+}

for (i = 0; ; i++) {
  br = of_parse_phandle(np, "fpga-bridges", i);
@@ -203,12 +207,15 @@
break;
/* If parent bridge is in list, skip it. */
-if (br == parent_br)
+if (br == parent_br) {

of_node_put(br);
continue;
+

/* If node is a bridge, get it and add to list */
ret = fpga_bridge_get_to_list(br, region->info,
    &region->bridge_list);
+of_node_put(br);

/* If any of the bridges are in use, give up */
if (ret == -EBUSY) {
    --- linux-4.15.0.orig/drivers/fsi/fsi-core.c
    +++ linux-4.15.0/drivers/fsi/fsi-core.c
    @@ -419,6 +419,31 @@
    return 0;
}

+static unsigned long aligned_access_size(size_t offset, size_t count)
+{
+    unsigned long offset_unit, count_unit;
+
+    /* Find 1 by the bottom bit of offset (with a 4 byte access cap) */
+    offset_unit = BIT(__builtin_ctzl(offset | 4));
+
+    /* Find 2 by the top bit of count */
+    count_unit = BIT(8 * sizeof(unsigned long) - 1 - __builtin_clzl(count));
+
+    /* Constrain the maximum access width to the minimum of both criteria */
+    return BIT(__builtin_ctzl(offset_unit | count_unit));
+
    static ssize_t fsi_slave_sysfs_raw_read(struct file *file,
        struct kobject *kobj, struct bin_attribute *attr, char *buf,
        loff_t off, size_t count)
    @@ -434,8 +459,7 @@
    return -EINVAL;

for (total_len = 0; total_len < count; total_len += read_len) {
    read_len = min_t(size_t, count, 4);
    read_len -= off & 0x3;
    read_len = aligned_access_size(off, count - total_len);

    rc = fsi_slave_read(slave, off, buf + total_len, read_len);
    if (rc)
        return -EINVAL;
}

for (total_len = 0; total_len < count; total_len += write_len) {
    write_len = min_t(size_t, count, 4);
    write_len -= off & 0x3;
    write_len = aligned_access_size(off, count - total_len);

    rc = fsi_slave_write(slave, off, buf + total_len, write_len);
    if (rc)
        return -EINVAL;
}

--- linux-4.15.0.orig/drivers/gpio/gpio-adnp.c
+++ linux-4.15.0/drivers/gpio/gpio-adnp.c
@@ -132,8 +132,10 @@
    if (err < 0)
        goto out;

-if (err & BIT(pos))
-    err = -EACCES;
+    if (value & BIT(pos)) {
+        err = -EPERM;
+        goto out;
+    }
err = 0;

--- linux-4.15.0.orig/drivers/gpio/gpio-adp5588.c
+++ linux-4.15.0/drivers/gpio/gpio-adp5588.c
@@ -41,6 +41,8 @@
    uint8_t int_en[3];
    uint8_t irq_mask[3];
    uint8_t irq_stat[3];
+#define int_input_en[3];
    uint8_t int_lvl_cached[3];
};

static int adp5588_gpio_read(struct i2c_client *client, u8 reg)
@@ -173,12 +175,28 @@
    struct adp5588_gpio *dev = irq_data_get_irq_chip_data(d);
    int i;

    -for (i = 0; i <= ADP5588_BANK(ADP5588_MAXGPIO); i++)
    +for (i = 0; i <= ADP5588_BANK(ADP5588_MAXGPIO); i++) {
        +if (dev->int_input_en[i]) {
            +mutex_lock(&dev->lock);
            +dev->dir[i] &= ~dev->int_input_en[i];
            +dev->int_input_en[i] = 0;
            +adp5588_gpio_write(dev->client, GPIO_DIR1 + i,
                 +   dev->dir[i]);
            +mutex_unlock(&dev->lock);
            +}
        +
        +if (dev->int_lvl_cached[i] != dev->int_lvl[i]) {
            +dev->int_lvl_cached[i] = dev->int_lvl[i];
            +adp5588_gpio_write(dev->client, GPIO_INT_LVL1 + i,
                 +   dev->int_lvl[i]);
            +}
        +
        if (dev->int_en[i] ^ dev->irq_mask[i]) {
            dev->int_en[i] = dev->irq_mask[i];
            adp5588_gpio_write(dev->client, GPIO_INT_EN1 + i,
                 +   dev->int_en[i]);
        }
    }

    mutex_unlock(&dev->irq_lock);
}
@@ -221,9 +239,7 @@
    else
    return -EINVAL;

-#define adp5588_gpio_direction_input(&dev->gpio_chip, gpio);
adp5588_gpio_write(dev->client, GPIO_INT_LVL1 + bank);
    dev->int_lvl[bank] = bit;

return 0;
}

--- linux-4.15.0.orig/drivers/gpio/gpio-altera-a10sr.c
+++ linux-4.15.0/drivers/gpio/gpio-altera-a10sr.c
@@ -66,8 +66,10 @@
static int altr_a10sr_gpio_direction_output(struct gpio_chip *gc,
    unsigned int nr, int value)
{
    if (nr <= (ALTR_A10SR_OUT_VALID_RANGE_HI - ALTR_A10SR_LED_VALID_SHIFT)) {
+        altr_a10sr_gpio_set(gc, nr, value);
    return 0;
+} 
    return -EINVAL;
}

--- linux-4.15.0.orig/drivers/gpio/gpio-arizona.c
+++ linux-4.15.0/drivers/gpio/gpio-arizona.c
@@ -69,6 +69,7 @@
    ret = pm_runtime_get_sync(chip->parent);
    if (ret < 0) {
        dev_err(chip->parent, "Failed to resume: %d\n", ret);
+        pm_runtime_put_autosuspend(chip->parent);
        return ret;
    }

    if (ret < 0) {
        dev_err(chip->parent, "Failed to drop cache: %d\n", ret);
+        pm_runtime_put_autosuspend(chip->parent);
        return ret;
    }

    ret = regmap_read(arizona->regmap, reg, &val);
    if (ret < 0)
+        pm_runtime_put_autosuspend(chip->parent);
        return ret;
    }

    pm_runtime_mark_last_busy(chip->parent);
    pm_runtime_put_autosuspend(chip->parent);
@@ -111,6 +115,7 @@
ret = pm_runtime_get_sync(chip->parent);
if (ret < 0) {
    dev_err(chip->parent, "Failed to resume: %d\n", ret);
    pm_runtime_put(chip->parent);
    return ret;
}

--- linux-4.15.0.orig/drivers/gpio/gpio-aspeed.c
+++ linux-4.15.0/drivers/gpio/gpio-aspeed.c
@@ -375,7 +375,7 @@
    if (set)
        reg |= bit;
    else
-       reg &= bit;
+       reg &= ~bit;
iowrite32(reg, addr);

spin_unlock_irqrestore(&gpio->lock, flags);
@@ -864,6 +864,8 @@

gpio->offset_timer =
    devm_kzalloc(&pdev->dev, gpio->chip.ngpio, GFP_KERNEL);
+    if (!gpio->offset_timer)
+        return -ENOMEM;
return aspeed_gpio_setup_irqs(gpio, pdev);
} 
--- linux-4.15.0.orig/drivers/gpio/gpio-ath79.c
+++ linux-4.15.0/drivers/gpio/gpio-ath79.c
@@ -324,3 +324,6 @@
    
module_platform_driver(ath79_gpio_driver);
+    "Atheros AR71XX/AR724X/AR913X GPIO API support"
+    "GPL v2")
+    --- linux-4.15.0.orig/drivers/gpio/gpio-brcmstb.c
+++ linux-4.15.0/drivers/gpio/gpio-brcmstb.c
@@ -665,6 +665,18 @@
    struct brcmstb_gpio_bank *bank;
    struct gpio_chip *gc;

+/*
+ * If bank_width is 0, then there is an empty bank in the
+ * register block. Special handling for this case.
+ */
+if (bank_width == 0) {
+    dev_dbg(dev, "Width 0 found: Empty bank @ %d\n", dev->parent, "Failed to resume: %d\n", ret),
+    pm_runtime_put(chip->parent);
return ret;
num_banks);
+num_banks++;
+gpio_base += MAX_GPIO_PER_BANK;
+continue;
+
+bank = devm_kzalloc(dev, sizeof(*bank), GFP_KERNEL);
if (!bank) {
  err = -ENOMEM;
@@ -741,9 +753,6 @@
goto fail;
}

-dev_info(dev, "Registered %d banks (GPIO(s): %d-%d)\n",
-num_banks, priv->gpio_base, gpio_base - 1);
-
if (priv->parent_wake_irq && need_wakeup_event)
  pm_wakeup_event(dev, 0);

--- linux-4.15.0.orig/drivers/gpio/gpio-dwapb.c
+++ linux-4.15.0/drivers/gpio/gpio-dwapb.c
@@ -52,7 +52,9 @@
#define GPIO_EXT_PORTC		0x58
#define GPIO_EXT_PORTD		0x5c
+#define DWAPB_DRIVER_NAME	"gpio-dwapb"
#define DWAPB_MAX_PORTS		4
+
#define GPIO_EXT_PORT_SIZE(GPIO_EXT_PORTB - GPIO_EXT_PORTA)
#define GPIO_SWPORT_DR_SIZE(GPIO_SWPORTB_DR - GPIO_SWPORTA_DR)
#define GPIO_SWPORT_DDR_SIZE(GPIO_SWPORTB_DDR - GPIO_SWPORTA_DDR)
@@ -374,7 +376,7 @@
return;

err = irq_alloc_domain_generic_chips(gpio->domain, ngpio, 2,
- "gpio-dwapb", handle_level_irq,
+ DWAPB_DRIVER_NAME, handle_level_irq,
  IRQ_NOREQUEST, 0,
  IRQ_GC_INIT_NESTED_LOCK);
if (err) {
@@ -426,7 +428,7 @@ */
err = devm_request_irq(gpio->dev, pp->irq,
  dwapb_irq_handler_mfd,
- IRQF_SHARED, "gpio-dwapb-mfd", gpio);
+ IRQF_SHARED, DWAPB_DRIVER_NAME, gpio);
if (err) {
  dev_err(gpio->dev, "error requesting IRQ\n");

---
irq_domain_remove(gpio->domain);
@@ -503,26 +505,33 @@
dwapb_configure_irqs(gpio, port, pp);

err = gpiochip_add_data(&port->gc, port);
-if (err)
+if (err) {
  dev_err(gpio->dev, "failed to register gpiochip for port%d
, port->idx);
-else
-  port->is_registered = true;
+  return err;
+}
+
/* Add GPIO-signaled ACPI event support */
-if (pp->irq)
-acpi_gpiochip_request_interrupts(&port->gc);
+acpi_gpiochip_request_interrupts(&port->gc);

-return err;
+port->is_registered = true;
+
+return 0;
}

static void dwapb_gpio_unregister(struct dwapb_gpio *gpio)
{
  unsigned int m;

-  for (m = 0; m < gpio->nr_ports; ++m)
-    if (gpio->ports[m].is_registered)
-      gpiochip_remove(&gpio->ports[m].gc);
+  for (m = 0; m < gpio->nr_ports; ++m) {
+    struct dwapb_gpio_port *port = &gpio->ports[m];
+    +acpi_gpiochip_free_interrupts(&port->gc);
+    +gpiochip_remove(&port->gc);
+  }

 static struct dwapb_platform_data *
-@@ -785,7 +794,7 @@
 static struct platform_driver dwapb_gpio_driver = {
 .driver= {

- .name = "gpio-dwapb",
+ .name = DWAPB_DRIVER_NAME,
   .pm = &dwapb_gpio_pm_ops,
   .of_match_table = of_match_ptr(dwapb_of_match),
   .acpi_match_table = ACPI_PTR(dwapb_acpi_match),
@@ -799,3 +808,4 @@
  MODULE_LICENSE("GPL");
  MODULE_AUTHOR("Jamie Iles");
  MODULE_DESCRIPTION("Synopsys DesignWare APB GPIO driver");
+MODULE_ALIAS("platform:" DWAPB_DRIVER_NAME);
--- linux-4.15.0.orig/drivers/gpio/gpio-exar.c
+++ linux-4.15.0/drivers/gpio/gpio-exar.c
@@ -148,6 +148,10 @@
    mutex_init(&exar_gpio->lock);

    index = ida_simple_get(&ida_index, 0, 0, GFP_KERNEL);
+    if (index < 0) {
+        ret = index;
+        goto err_mutex_destroy;
+    }

    sprintf(exar_gpio->name, "exar_gpio%d", index);
    exar_gpio->gpio_chip.label = exar_gpio->name;
@@ -174,6 +178,7 @@
err_destroy:
    ida_simple_remove(&ida_index, index);
+    err_mutex_destroy:
    mutex_destroy(&exar_gpio->lock);
    return ret;
}
--- linux-4.15.0.orig/drivers/gpio/gpio-grgpio.c
+++ linux-4.15.0/drivers/gpio/gpio-grgpio.c
@@ -259,17 +259,16 @@
        lirq->irq = irq;
        uirq = &priv->uirqs[lirq->index];
        if (uirq->refcnt == 0) {
+            spin_unlock_irqrestore(&priv->gc.bgpio_lock, flags);
    ret = request_irq(uirq->uirq, grgpio_irq_handler, 0,
                        dev_name(priv->dev), priv);
    if (ret) {
        dev_err(priv->dev,
                "Could not request underlying irq %d\n",
                        uirq->uirq);
-            spin_unlock_irqrestore(&priv->gc.bgpio_lock, flags);
-            return ret;
spin_lock_irqsave(&priv->gc.bgpio_lock, flags);
}
uiirq->refcnt++;

@@ -315,8 +314,11 @@
if (index >= 0) {
  uiirq = &priv->uiqrs[lirq->index];
  uiirq->refcnt--;
-  if (uiirq->refcnt == 0)
+  if (uiirq->refcnt == 0) {
+    spin_unlock_irqrestore(&priv->gc.bgpio_lock, flags);
  free_irq(uiirq->uirq, priv);
  +return;
+  }
}
}

spin_unlock_irqrestore(&priv->gc.bgpio_lock, flags);
--- linux-4.15.0.orig/drivers/gpio/gpio-iop.c
+++ linux-4.15.0/drivers/gpio/gpio-iop.c
@@ -58,3 +58,7 @@
return platform_driver_register(&iop3xx_gpio_driver);
}
arch_initcall(iop3xx_gpio_init);
+
+MODULE_DESCRIPTION("GPIO handling for Intel IOP3xx processors");
+MODULE_AUTHOR("Lennert Buytenhek <buytenh@wantstofly.org>");
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/gpio/gpio-max7301.c
+++ linux-4.15.0/drivers/gpio/gpio-max7301.c
@@ -25,7 +25,7 @@
struct spi_device *spi = to_spi_device(dev);
 u16 word = ((reg & 0x7F) << 8) | (val & 0xFF);
-
+return spi_write(spi, (const u8 *)&word, sizeof(word));
 if (ret)
-
+return spi_write_then_read(spi, &word, sizeof(word), NULL, 0);
 }
/* A read from the MAX7301 means two transfers; here, one message each */
@@ -37,14 +37,8 @@
struct spi_device *spi = to_spi_device(dev);
 u16 word = ((reg & 0x7F) << 8) | (val & 0xFF);
-
+return spi_write(spi, (const u8 *)&word, sizeof(word));
+return spi_write_then_read(spi, &word, sizeof(word), NULL, 0);
 }

/* This relies on the fact, that a transfer with NULL tx_buf shifts out
- * zero bytes (=NOOP for MAX7301)
  - */
- ret = spi_read(spi, (u8 *)&word, sizeof(word));
+ ret = spi_write_then_read(spi, &word, sizeof(word), &word,
  + sizeof(word));
if (ret)
  return ret;
return word & 0xff;
--- linux-4.15.0.orig/drivers/gpio/gpio-max77620.c
+++ linux-4.15.0/drivers/gpio/gpio-max77620.c
@@ -163,13 +163,13 @@
    case 0:
    val = MAX77620_CNFG_GPIO_DBNC_None;
    break;
-    case 1 ... 8:
+    case 1 ... 8000:
    val = MAX77620_CNFG_GPIO_DBNC_8ms;
    break;
-    case 9 ... 16:
+    case 8001 ... 16000:
    val = MAX77620_CNFG_GPIO_DBNC_16ms;
    break;
-    case 17 ... 32:
+    case 16001 ... 32000:
    val = MAX77620_CNFG_GPIO_DBNC_32ms;
    break;
    default:
    --- linux-4.15.0.orig/drivers/gpio/gpio-menz127.c
+++ linux-4.15.0/drivers/gpio/gpio-menz127.c
@@ -56,9 +56,9 @@
    rnd = fls(debounce) - 1;
    if (rnd && (debounce & BIT(rnd - 1)))
-       debounce = round_up(debounce, MEN_Z127_DB_MIN_US);
+       debounce = roundup(debounce, MEN_Z127_DB_MIN_US);
    else
-       debounce = round_down(debounce, MEN_Z127_DB_MIN_US);
+       debounce = rounddown(debounce, MEN_Z127_DB_MIN_US);
    if (debounce > MEN_Z127_DB_MAX_US)
      debounce = MEN_Z127_DB_MAX_US;
--- linux-4.15.0.orig/drivers/gpio/gpio-ml-ioh.c
+++ linux-4.15.0/drivers/gpio/gpio-ml-ioh.c
@@ -31,8 +31,6 @@
    #define IOH_IRQ_BASE0

    -#define PCI_VENDOR_ID_ROHM 0x10DB
struct ioh_reg_comm {
  u32 ien;
  u32 istatus;
  @ @ -497,9 +495,10 @@
  return 0;

  err_gpiochip_add:
  +chip = chip_save;
  while (--i >= 0) {
    -chip--;
  gpiochip_remove(&chip->gpio);
  +chip++;
  }
  kfree(chip_save);

  --- linux-4.15.0.orig/drivers/gpio/gpio-mockup.c
  +++ linux-4.15.0/drivers/gpio/gpio-mockup.c
  @@ -35,8 +35,8 @@
  #define GPIO_MOCKUP_MAX_RANGES(GPIO_MOCKUP_MAX_GC * 2)

  enum {
    -GPIO_MOCKUP_DIR_OUT = 0,
    -GPIO_MOCKUP_DIR_IN = 1,
    +GPIO_MOCKUP_DIR_IN = 0,
    +GPIO_MOCKUP_DIR_OUT = 1,
  };

  /*
   @ @ -112,7 +112,7 @@
   { struct gpio_mockup_chip *chip = gpiochip_get_data(gc);

    -return chip->lines[offset].dir;
    +return !chip->lines[offset].dir;
   }

   static int gpio_mockup_name_lines(struct device *dev,
   @ @ -350,6 +350,7 @@
   err = platform_driver_register(&gpio_mockup_driver);
   if (err) {
     platform_device_unregister(pdev);
     +debugfs_remove_recursive(gpio_mockup_dbg_dir);
     return err;
   }

   --- linux-4.15.0.orig/drivers/gpio/gpio-mpc8xxx.c
   +++ linux-4.15.0/drivers/gpio/gpio-mpc8xxx.c
@@ -317,6 +317,7 @@
return -ENOMEM;

gc = &mpc8xxx_gc->gc;
+gc->parent = &pdev->dev;

if (of_property_read_bool(np, "little-endian")) {
    ret = bgpio_init(gc, &pdev->dev, 4,
    @ @ -348,7 +349,8 @@
        * It's assumed that only a single type of gpio controller is available
        * on the current machine, so overwriting global data is fine.
        */
        -mpc8xxx_irq_chip.irq_set_type = devtype->irq_set_type;
        +if (devtype->irq_set_type)
        +mpc8xxx_irq_chip.irq_set_type = devtype->irq_set_type;

        if (devtype->gpio_dir_out)
            gc->direction_output = devtype->gpio_dir_out;
--- linux-4.15.0.orig/drivers/gpio/gpio-mvebu.c
+++ linux-4.15.0/drivers/gpio/gpio-mvebu.c
@@ -654,9 +654,8 @@
        do_div(val, mvpwm->clk_rate);
        if (val > UINT_MAX)
            state->duty_cycle = UINT_MAX;
@@ -665,21 +664,17 @@
        else
            state->duty_cycle = 1;

        -val = (unsigned long long)
        -readl_relaxed(mvebu_pwmreg_blink_on_duration(mvpwm));
        -val *= NSEC_PER_SEC;
        +u = readl_relaxed(mvebu_pwmreg_blink_on_duration(mvpwm));
        +val = (unsigned long long) u * NSEC_PER_SEC;
        do_div(val, mvpwm->clk_rate);
        if (val > UINT_MAX)
            state->duty_cycle = UINT_MAX;
@@ -665,21 +664,17 @@
        else
            state->duty_cycle = 1;

        -val = (unsigned long long)
        -readl_relaxed(mvebu_pwmreg_blink_off_duration(mvpwm));
        +val = (unsigned long long) u; /* on duration */
        +/* period = on + off duration */
        +val += readl_relaxed(mvebu_pwmreg_blink_off_duration(mvpwm));
        val *= NSEC_PER_SEC;
        do_div(val, mvpwm->clk_rate);
        -if (val < state->duty_cycle) {
        +if (val > UINT_MAX)
            +state->period = UINT_MAX;
        +else if (val)
            +state->period = val;

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else
state->period = 1;
} else {
val -= state->duty_cycle;
if (val > UINT_MAX)
state->period = UINT_MAX;
else if (val)
state->period = val;
else
state->period = 1;
}

regmap_read(mvchip->regs, GPIO_BLINK_EN_OFF + mvchip->offset, &u);
if (u)
return 0;

if (IS_ERR(mvchip->clk))
return PTR_ERR(mvchip->clk);

if (!res)
return 0;

if (IS_ERR(mvchip->clk))
return PTR_ERR(mvchip->clk);

/*
 * There are only two sets of PWM configuration registers for
 * all the GPIO lines on those SoCs which this driver reserves
 * @ @ -790,6 +782,9 @ @
if (!res)
return 0;

+if (IS_ERR(mvchip->clk))
+return PTR_ERR(mvchip->clk);
+
/*
 * Use set A for lines of GPIO chip with id 0, B for GPIO chip
 * with id 1. Don't allow further GPIO chips to be used for PWM.
 * @ @ -1195,6 +1190,13 @ @

devm_gpiochip_add_data(&pdev->dev, &mvchip->chip, mvchip);

+/* Some MVEBU SoCs have simple PWM support for GPIO lines */
+if (IS_ENABLED(CONFIG_PWM)) {
+err = mvebu_pwm_probe(pdev, mvchip, id);
+if (err)
+return err;
+}
+
/* Some gpio controllers do not provide irq support */
if (!have_irqs)
return 0;
if (!mvchip->domain) {
    dev_err(&pdev->dev, "couldn't allocate irq domain %s (DT)\n",
            mvchip->chip.label);
    return -ENODEV;
}
err = irq_alloc_domain_generic_chips(
        mvchip);

/* Some MVEBU SoCs have simple PWM support for GPIO lines */
if (IS_ENABLED(CONFIG_PWM))
    return mvebu_pwm_probe(pdev, mvchip, id);
return 0;

err_domain:
    irq_domain_remove(mvchip->domain);
    err_pwm:
        pwmchip_remove(&mvchip->mvpwm->chip);
    return err;

--- linux-4.15.0.orig/drivers/gpio/gpio-mxs.c
+++ linux-4.15.0/drivers/gpio/gpio-mxs.c
@@ -32,8 +32,6 @@
 #include <linux/platform_device.h>
 #include <linux/slab.h>
 #include <linux/gpio/driver.h>
-/* FIXME: for gpio_get_value(), replace this by direct register read */
-#include <linux/gpio.h>
 #include <linux/module.h>
 #define MXS_SET	0x4
@@ -100,7 +98,7 @@
 port->both_edges &= ~pin_mask;
 switch (type) {
     case IRQ_TYPE_EDGE_BOTH:
-        val = gpio_get_value(port->gc.base + d->hwirq);
+        val = port->gc.get(&port->gc, d->hwirq);
         if (val)
             edge = GPIO_INT_FALL_EDGE;
         else
--- linux-4.15.0.orig/drivers/gpio/gpio-omap.c
/*
 * Off mode wake-up capable GPIOs in bank(s) that are in the wakeup domain.
 * See TRM section for GPIO for "Wake-Up Generation" for the list of GPIOs
 * in wakeup domain. If bank->non_wakeup_gpios is not configured, assume none
 * are capable waking up the system from off mode.
 */
static bool omap_gpio_is_off_wakeup_capable(struct gpio_bank *bank, u32 gpio_mask)
{
    u32 no_wake = bank->non_wakeup_gpios;
    if (no_wake)
        return !!(~no_wake & gpio_mask);
    return false;
}

static inline void omap_set_gpio_trigger(struct gpio_bank *bank, int gpio,
unsigned trigger)
{
    /* This part needs to be executed always for OMAP{34xx, 44xx} */
    /* On omap24xx proceed only when valid GPIO bit is set */
    if (!bank->regs->irqctrl) {
        /* Log the edge gpio and manually trigger the IRQ
         * after resume if the input level changes */
        bank->enabled_non_wakeup_gpios &= ~gpio_bit;
    }
    exit:
    bank->level_mask =
    readl_relaxed(bank->base + bank->regs->leveldetect0) |
    readl_relaxed(bank->base + bank->regs->leveldetect1);
}
raw_spin_lock_irqsave(&bank->lock, flags);
bank->irq_usage &= ~(BIT(offset));
-omap_set_gpio_irqenable(bank, offset, 0);
-omap_clear_gpio_irqstatus(bank, offset);
omap_set_gpio_triggering(bank, offset, IRQ_TYPE_NONE);
+omap_clear_gpio_irqstatus(bank, offset);
+omap_set_gpio_irqenable(bank, offset, 0);
if (!LINE_USED(bank->mod_usage, offset))
omap_clear_gpio_debounce(bank, offset);
omap_disable_gpio_module(bank, offset);
}@ @ -825,8 +834,8 @@
unsigned long flags;

raw_spin_lock_irqsave(&bank->lock, flags);
-omap_set_gpio_irqenable(bank, offset, 0);
omap_set_gpio_triggering(bank, offset, IRQ_TYPE_NONE);
+omap_set_gpio_irqenable(bank, offset, 0);
raw_spin_unlock_irqrestore(&bank->lock, flags);
}

}@ @ -838,17 +847,20 @@
unsigned long flags;

raw_spin_lock_irqsave(&bank->lock, flags);
-if (trigger)
-omap_set_gpio_triggering(bank, offset, trigger);
+omap_set_gpio_irqenable(bank, offset, 1);

-/* For level-triggered GPIOs, the clearing must be done after
- * the HW source is cleared, thus after the handler has run */
-if (bank->level_mask & BIT(offset)) {
-omap_set_gpio_irqenable(bank, offset, 0);
+/*
+ * For level-triggered GPIOs, clearing must be done after the source
+ * is cleared, thus after the handler has run. OMAP4 needs this done
+ * after enabling the interrupt to clear the wakeup status.
+ */
+if (bank->regs->leveldetect0 && bank->regs->wkup_en &&
+ trigger & (IRQ_TYPE_LEVEL_HIGH | IRQ_TYPE_LEVEL_LOW))
onmap_clear_gpio_irqstatus(bank, offset);
-}

-omap_set_gpio_irqenable(bank, offset, 1);
+if (trigger)
+omap_set_gpio_triggering(bank, offset, trigger);
+
raw_spin_unlock_irqrestore(&bank->lock, flags);
.clr_dataout = OMAP4_GPIO_CLEARDATAOUT,
.irqstatus = OMAP4_GPIO_IRQSTATUS0,
.irqstatus2 = OMAP4_GPIO_IRQSTATUS1,
+ .irqstatus_raw0 = OMAP4_GPIO_IRQSTATUSRAW0,
+ .irqstatus_raw1 = OMAP4_GPIO_IRQSTATUSRAW1,
 .irqenable = OMAP4_GPIO_IRQSTATUSSET0,
 .irqenable2 = OMAP4_GPIO_IRQSTATUSSET1,
 .set_irqenable = OMAP4_GPIO_IRQSTATUSSET0,
--- linux-4.15.0.orig/drivers/gpio/gpio-pcf857x.c
+++ linux-4.15.0/drivers/gpio/gpio-pcf857x.c
@@ -1593,6 +1605,8 @@
 .irqstatus_raw0 = OMAP4_GPIO_IRQSTATUSRAW0,
 .irqstatus = OMAP4_GPIO_IRQSTATUS0,
 .irqstatus2 = OMAP4_GPIO_IRQSTATUS1,
+ .irqstatus_raw0 = OMAP4_GPIO_IRQSTATUSRAW0,
+ .irqstatus_raw1 = OMAP4_GPIO_IRQSTATUSRAW1,
 .irqenable = OMAP4_GPIO_IRQSTATUSSET0,
 .irqenable2 = OMAP4_GPIO_IRQSTATUSSET1,
 .set_irqenable = OMAP4_GPIO_IRQSTATUSSET0,
--- linux-4.15.0.orig/drivers/gpio/gpio-pcf857x.c
+++ linux-4.15.0/drivers/gpio/gpio-pcf857x.c
@@ -84,6 +84,7 @@
+ .irqstatus2 = OMAP4_GPIO_IRQSTATUS1,
 struct i2c_client *client;
 struct mutex lock; /* protect 'out' */
 unsigned out; /* software latch */
@@ -252,18 +253,6 @@
 mutex_unlock(&gpio->lock);
 }
if (status < 0)
@@ -376,8 +365,17 @@
/* Enable irqchip if we have an interrupt */
if (client->irq) {
    +gpio->irqchip.name = "pcf857x",
    +gpio->irqchip.irq_enable = pcf857x_irq_enable,
    +gpio->irqchip.irq_disable = pcf857x_irq_disable,
    +gpio->irqchip.irq_ack = noop,
    +gpio->irqchip.irq_mask = noop,
    +gpio->irqchip.irq_unmask = noop,
    +gpio->irqchip.irq_set_wake = pcf857x_irq_set_wake,
    +gpio->irqchip.irq_bus_lock = pcf857x_irq_bus_lock,
    +gpio->irqchip.irq_bus_sync_unlock = pcf857x_irq_bus_sync_unlock,
    status = gpiochip_irqchip_add_nested(&gpio->chip,
    - &pcf857x_irq_chip,
    + &gpio->irqchip,
        0, handle_level_irq,
       IRQ_TYPE_NONE);
    if (status) {
@@ -392,7 +390,7 @@
    if (status)
        goto fail;
    -gpiochip_set_nested_irqchip(&gpio->chip, &pcf857x_irq_chip,
    +gpiochip_set_nested_irqchip(&gpio->chip, &gpio->irqchip,
        client->irq);
    gpio->irq_parent = client->irq;
}
#ifdef CONFIG_PM
@@ -281,15 +282,6 @@
return irq_set_irq_wake(pl061->parent_irq, state);
}

-static struct irq_chip pl061_irqchip = {
-    .name = "pl061",
-    .irq_ack = pl061_irq_ack,
-    .irq_mask = pl061_irq_mask,
-    .irq_unmask = pl061_irq_unmask,
-    .irq_set_type = pl061_irq_type,
-    .irq_set_wake = pl061_irq_set_wake,
-};
-
static int pl061_probe(struct amba_device *adev, const struct amba_id *id)
{struct device *dev = &adev->dev;
@@ -328,6 +320,13 @@
    IRQ_TYPE_NONE);
    if (ret) {
        dev_info(&adev->dev, "could not add irqchip\n");
        return ret;
    }
    -gpiochip_set_chained_irqchip(&pl061->gc, &pl061_irqchip,
    irq, pl061_irq_handler);

amba_set_drvdata(adev, pl061);

    irq = adev->irq[0];
    if (irq < 0) {
        @@ -336,14 +335,14 @@
pl061->parent_irq = irq;

    -gpiochip_irqchip_add(&pl061->gc, &pl061_irqchip,
    +ret = gpiochip_irqchip_add(&pl061->gc, &pl061->irq_chip,
        0, handle_bad_irq,
        IRQ_TYPE_NONE);
    if (ret) {
        dev_info(&adev->dev, "could not add irqchip\n");
        return ret;
    }
    -gpiochip_set_chained_irqchip(&pl061->gc, &pl061_irqchip,
    +gpiochip_set_chained_irqchip(&pl061->gc, &pl061->irq_chip,
        irq, pl061_irq_handler);

amba_set_drvdata(adev, pl061);
--- linux-4.15.0.orig/drivers/gpio/gpio-pxa.c
+++ linux-4.15.0/drivers/gpio/gpio-pxa.c
@@ -241,6 +241,18 @@
     return irq_gpio0;
 }

+static bool pxa_gpio_has_pinctrl(void)
+{
+  switch (gpio_type) {
+  case PXA3XX_GPIO:
+  case MMP2_GPIO:
+    return false;
+    
+  default:
+    return true;
+  }
+}
+
+static int pxa_gpio_to_irq(struct gpio_chip *chip, unsigned offset)
+{
+  struct pxa_gpio_chip *pchip = chip_to_pxachip(chip);
+  @ @ -255.9 +267.11 @@
+  unsigned long flags;
+  int ret;
+
+  if (pxa_gpio_has_pinctrl()) {
+    ret = pinctrl_gpio_direction_input(chip->base + offset);
+    if (!ret)
+      return 0;
+    ret = pinctrl_gpio_direction_output(chip->base + offset);
+    if (ret)
+      return ret;
+  } else {
+    writel_relaxed(mask, base + (value ? GPSR_OFFSET : GPCR_OFFSET));
+    @ @ -282.9 +296.11 @@
+    ret = pinctrl_gpio_direction_input(chip->base + offset);
+    if (ret)
+      return ret;
+  }
+
+  spin_lock_irqsave(&gpio_lock, flags);
+
+  @ @ -282.9 +296.11 @@
+  writel_relaxed(mask, base + (value ? GPSR_OFFSET : GPCR_OFFSET));
+  
+  ret = pinctrl_gpio_direction_output(chip->base + offset);
+  if (ret)
+    return ret;
+  ret = pinctrl_gpio_direction_input(chip->base + offset);
+  if (ret)
+    return ret;
+  }
spin_lock_irqsave(&gpio_lock, flags);

@@ -348,8 +364,12 @@
pchip->chip.set = pxa_gpio_set;
pchip->chip.to_irq = pxa_gpio_to_irq;
pchip->chip.ngpio = ngpio;
-pchip->chip.request = gpiochip_generic_request;
-pchip->chip.free = gpiochip_generic_free;
+    +if (pxa_gpio_has_pinctrl()) {
+        pchip->chip.request = gpiochip_generic_request;
+        pchip->chip.free = gpiochip_generic_free;
+    }
+
+#ifdef CONFIG_OF_GPIO
pchip->chip.of_node = np;
pchip->chip.of_xlate = pxa_gpio_of_xlate;
@@ -652,6 +672,8 @@
pchip->irq0 = irq0;
pchip->irq1 = irq1;
res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+    +if (!res)
+        return -EINVAL;
+    gpio_reg_base = devm_ioremap(&pdev->dev, res->start,
             resource_size(res));
if (!gpio_reg_base)
@@ -764,6 +807,9 @@
        struct pxa_gpio_bank *c;
        int gpio;

        +if (!pchip)
        +return 0;
        +
        for_each_gpio_bank(gpio, c, pchip) {
            c->saved_gplr = readl_relaxed(c->regbase + GPLR_OFFSET);
            c->saved_gpdr = readl_relaxed(c->regbase + GPDR_OFFSET);
@@ -782,6 +827,9 @@
             struct pxa_gpio_bank *c;
             int gpio;

            +if (!pchip)
            +return;
            +
            for_each_gpio_bank(gpio, c, pchip) {
                /* restore level with set/clear */
                writel_relaxed(c->saved_gplr, c->regbase + GPSR_OFFSET);
                --- linux-4.15.0.orig/drivers/gpio/gpio-stmpe.c
+++ linux-4.15.0/drivers/gpio/gpio-stmpe.c
@@ -190,6 +190,16 @@
    	/*
    * STMPE1600: to be able to get IRQ from pins,
    * a read must be done on GPMR register, or a write in
    * GPSR or GPCR registers
    */
+if (stmpe->partnum == STMPE1600) {
+    stmpe_reg_read(stmpe, stmpe->regs[STMPE_IDX_GPMR_LSB]);
+    stmpe_reg_read(stmpe, stmpe->regs[STMPE_IDX_GPMR_CSB]);
+}
+
+for (i = 0; i < CACHE_NR_REGS; i++) {
/* STMPE801 and STMPE1600 don't have RE and FE registers */
    if ((stmpe->partnum == STMPE801 ||
@@ -227,21 +237,11 @@
    int offset = d->hwirq;
    int regoffset = offset / 8;
    int mask = BIT(offset % 8);

    stmpe_gpio->regs[REG_IE][regoffset] |= mask;
-
-/*
- * STMPE1600 workaround: to be able to get IRQ from pins,
- * a read must be done on GPMR register, or a write in
- * GPSR or GPCR registers
- */
-    if (stmpe->partnum == STMPE1600)
-        stmpe_reg_read(stmpe,
-
static void stmpe_dbg_show_one(struct seq_file *s,
--- linux-4.15.0.orig/drivers/gpio/gpio-syscon.c
+++ linux-4.15.0/drivers/gpio/gpio-syscon.c
@@ -122,7 +122,7 @@
    priv->data->set(chip, offset, val);
-    chip->set(chip, offset, val);
return 0;
}

--- linux-4.15.0.orig/drivers/gpio/gpio-tc3589x.c
+++ linux-4.15.0/drivers/gpio/gpio-tc3589x.c
@@ -209,7 +209,7 @@
 continue;

tc3589x_gpio->oldregs[i][j] = new;
-tc3589x_reg_write(tc3589x, regmap[i] + j * 8, new);
+tc3589x_reg_write(tc3589x, regmap[i] + j, new);
}
}

--- linux-4.15.0.orig/drivers/gpio/gpio-tegra.c
+++ linux-4.15.0/drivers/gpio/gpio-tegra.c
@@ -323,13 +323,6 @@
 return -EINVAL;
 }
-
-ret = gpiochip_lock_as_irq(&tgi->gc, gpio);
-if (ret) {
-dev_err(tgi->dev,
-"unable to lock Tegra GPIO %u as IRQ\n", gpio);
-return ret;
-}
-
-spin_lock_irqsave(&bank->lvl_lock[port], flags);

val = tegra_gpio_readl(tgi, GPIO_INT_LVL(tgi, gpio));
@@ -342,6 +335,14 @@
tegra_gpio_mask_write(tgi, GPIO_MSK_OE(tgi, gpio), gpio, 0);
tegra_gpio_enable(tgi, gpio);
+
-ret = gpiochip_lock_as_irq(&tgi->gc, gpio);
+if (ret) {
+dev_err(tgi->dev,
+"unable to lock Tegra GPIO %u as IRQ\n", gpio);
+tegra_gpio_disable(tgi, gpio);
+return ret;
+}
+
+if (type & (IRQ_TYPE_LEVEL_LOW | IRQ_TYPE_LEVEL_HIGH))
+irq_set_handler_locked(d, handle_level_irq);
+else if (type & (IRQ_TYPE_EDGE_FALLING | IRQ_TYPE_EDGE_RISING))
-@
+struct tegra_gpio_info *tgi = bank->tgi;
+unsigned int gpio = d->hwiirq;
+tegra_gpio_irq_mask(d);
gpiochip_unlock_as_irq(&tgi->gc, gpio);
}

@@ -730,4 +732,4 @@
{
    return platform_driver_register(&tegra_gpio_driver);
}
-postcore_initcall(tegra_gpio_init);
+subsys_initcall(tegra_gpio_init);
--- linux-4.15.0.orig/drivers/gpio/gpio-thunderx.c
+++ linux-4.15.0/drivers/gpio/gpio-thunderx.c
@@ -553,8 +553,10 @@
    txgpio->irqd = irq_domain_create_hierarchy(irq_get_irq_data(txgpio->msix_entries[0].vector)->domain,
        0, 0, of_node_to_fwnode(dev->of_node),
        &thunderx_gpio_irqd_ops, txgpio);
-if (!txgpio->irqd)
+if (!txgpio->irqd) {
+    err = -ENOMEM;
    goto out;
+
    /* Push on irq_data and the domain for each line. */
    for (i = 0; i < ngpio; i++) {
        --- linux-4.15.0.orig/drivers/gpio/gpio-uniphier.c
+++ linux-4.15.0/drivers/gpio/gpio-uniphier.c
@@ -181,7 +181,11 @@
        fwspec.param_count = 2;
        fwspec.param[0] = offset - UNIPHIER_GPIO_IRQ_OFFSET;
        -fwspec.param[1] = IRQ_TYPE_NONE;
+        /* IRQ_TYPE_NONE is rejected by the parent irq domain. Set LEVEL_HIGH
+         * temporarily. Anyway, ->irq_set_type() will override it later.
+         */
+        +fwspec.param[1] = IRQ_TYPE_LEVEL_HIGH;
        return irq_create_fwspec_mapping(&fwspec);
    }
@@ -193,7 +197,7 @@
    uniphier_gpio_reg_update(priv, UNIPHIER_GPIO_IRQ_EN, mask, 0);
-
    -return irq_chip_mask_parent(data);
+    +irq_chip_mask_parent(data);
    }


static void uniphier_gpio_irq_unmask(struct irq_data *data)
@@ -203,7 +207,7 @@
    return irq_chip_unmask_parent(data);
+    irq_chip_unmask_parent(data);
}@}

static int uniphier_gpio_irq_set_type(struct irq_data *data, unsigned int type)
@@ -505,4 +509,4 @@

MODULE_AUTHOR("Masahiro Yamada <yamada.masahiro@socionext.com>");
MODULE_DESCRIPTION("UniPhier GPIO driver");
-MODULE_LICENSE("GPL");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/gpio/gpio-vf610.c
+++ linux-4.15.0/drivers/gpio/gpio-vf610.c
@@ -37,6 +37,7 @@
 struct vf610_gpio_port {
 struct gpio_chip gc;
+    struct irq_chip ic;
 void __iomem *base;
 void __iomem *gpio_base;
 const struct fsl_gpio_soc_data *sdata;
@@ -66,8 +67,6 @@
 #define PORT_INT_EITHER_EDGE 0xb
 #define PORT_INT_LOGIC_ONE 0xc

-struct irq_chip vf610_gpio_irq_chip = {
-    .name = "gpio-vf610",
-    .irq_ack = vf610_gpio_irq_ack,
-    .irq_mask = vf610_gpio_irq_mask,
-    .irq_unmask = vf610_gpio_irq_unmask,
-    .irq_set_type = vf610_gpio_irq_set_type,
-    .irq_set_wake = vf610_gpio_irq_set_wake,
-};
-
static int vf610_gpio_probe(struct platform_device *pdev)
{
    const struct of_device_id *of_id = of_match_device(vf610_gpio_dt_ids,
    struct vf610_gpio_port *port;
    struct resource *iores;
    struct gpio_chip *gc;
    +struct irq_chip *ic;
    +int i;
    int ret;

    port = devm_kzalloc(&pdev->dev, sizeof(*port), GFP_KERNEL);
    gc->direction_output = vf610_gpio_direction_output;
    gc->set = vf610_gpio_set;
    gc->name = "gpio-vf610";
    gc->irq_ack = vf610_gpio_irq_ack;
    gc->irq_mask = vf610_gpio_irq_mask;
    gc->irq_unmask = vf610_gpio_irq_unmask;
    gc->irq_set_type = vf610_gpio_irq_set_type;
    gc->irq_set_wake = vf610_gpio_irq_set_wake;
    +
    ret = gpiochip_add_data(gc, port);
    if (ret < 0)
        return ret;
    /* Mask all GPIO interrupts */
    +for (i = 0; i < gc->ngpio; i++)
        vf610_gpio_writel(0, port->base + PORT_PCR(i));
    +
    /* Clear the interrupt status register for all GPIO's */
    vf610_gpio_writel(~0, port->base + PORT_ISFR);
    -ret = gpiochip_irqchip_add(gc, &vf610_gpio_irq_chip, 0,
        handle_edge_irq, IRQ_TYPE_NONE);
    +ret = gpiochip_irqchip_add(gc, &vf610_gpio_irq_chip, 0,
        handle_edge_irq, IRQ_TYPE_NONE);
    if (ret) {
        dev_err(dev, "failed to add irqchip\n");
        gpiochip_remove(gc);
        return ret;
    }
    -gpiochip_set_chained_irqchip(gc, &vf610_gpio_irq_chip, port->irq,
        vf610_gpio_irq_handler);
    +gpiochip_set_chained_irqchip(gc, &vf610_gpio_irq_chip, port->irq,
        vf610_gpio_irq_handler);

    return 0;
```c
/*
  * zynq_gpio_get_direction - Read the direction of the specified GPIO pin
  * @chip:	gpio_chip instance to be worked on
  * @pin:	gpio pin number within the device
  *
  * This function returns the direction of the specified GPIO.
  * +
  * @ Return: 0 for output, 1 for input
  * +*/
+
+static int zynq_gpio_get_direction(struct gpio_chip *chip, unsigned int pin)
+
+
+u32 reg;
+unsigned int bank_num, bank_pin_num;
+struct zynq_gpio *gpio = gpiochip_get_data(chip);
+
+zynq_gpio_get_bank_pin(pin, &bank_num, &bank_pin_num, gpio);
+
+reg = readl_relaxed(gpio->base_addr + ZYNQ_GPIO_DIRM_OFFSET(bank_num));
+
+return !(reg & BIT(bank_pin_num));
+}
+
+/**
  * zynq_gpio_irq_mask - Disable the interrupts for a gpio pin
  * @irq_data:	per irq and chip data passed down to chip functions
  *+
  *@@ -639,6 +661,8 @@
  * unsigned int bank_num;

  for (bank_num = 0; bank_num < gpio->p_data->max_bank; bank_num++) {
  +writel_relaxed(ZYNQ_GPIO_IXR_DISABLE_ALL, gpio->base_addr +
  +ZYNQ_GPIO_INTDIS_OFFSET(bank_num));
  +writel_relaxed(gpio->context.datalsw[bank_num],
  +gpio->base_addr +
  +ZYNQ_GPIO_DATA_LSW_OFFSET(bank_num));
  @@ -648,9 +672,6 @@
  +writel_relaxed(gpio->context.dirm[bank_num],
  +gpio->base_addr +
  +ZYNQ_GPIO_DIRM_OFFSET(bank_num));
  -writel_relaxed(gpio->context.int_en[bank_num],
  -gpio->base_addr +
  -ZYNQ_GPIO_INTEN_OFFSET(bank_num));
  +writel_relaxed(gpio->context.int_type[bank_num],
```
gpio->base_addr +
        ZYNQ_GPIO_INTTYPE_OFFSET(bank_num));
@@ -660,6 +681,9 @@
    writable_relaxed(gpio->context.int_any[bank_num],
        gpio->base_addr +
        ZYNQ_GPIO_INTANY_OFFSET(bank_num));
+    writable_relaxed(~(gpio->context.int_en[bank_num]),
+        gpio->base_addr +
+        ZYNQ_GPIO_INTEN_OFFSET(bank_num));
    }
    }

@@ -831,6 +855,7 @@
    chip->free = zynq_gpio_free;
    chip->direction_input = zynq_gpio_dir_in;
    chip->direction_output = zynq_gpio_dir_out;
+    chip->get_direction = zynq_gpio_get_direction;
    chip->base = -1;
    chip->ngpio = gpio->p_data->ngpio;

@@ -898,8 +923,11 @@
    static int zynq_gpio_remove(struct platform_device *pdev)
    {
        struct zynq_gpio *gpio = platform_get_drvdata(pdev);
+        int ret;

            pm_runtime_get_sync(&pdev->dev);
+        ret = pm_runtime_get_sync(&pdev->dev);
+        if (ret < 0)
            dev_warn(&pdev->dev, "pm_runtime_get_sync() Failed\n");
        gpiochip_remove(&gpio->chip);
        clk_disable_unprepare(gpio->clk);
        device_set_wakeup_capable(&pdev->dev, 0);
--- linux-4.15.0.orig/drivers/gpio/gpiolib-acpi.c
+++ linux-4.15.0/drivers/gpio/gpiolib-acpi.c
@@ -10,6 +10,7 @@
 * published by the Free Software Foundation.
 */

+﻿#include <linux/dmi.h>
+#include <linux/errno.h>
+#include <linux/gpio.h>
+#include <linux/gpio/consumer.h>
@@ -23,11 +24,44 @@

+        include "gpiolib.h"

+        static int run_edge_events_on_boot = -1;

+module_param(run_edge_events_on_boot, int, 0444);
+MODULE_PARM_DESC(run_edge_events_on_boot,
+ "Run edge _AEI event-handlers at boot: 0=no, 1=yes, -1=auto");
+
+static char *ignore_wake;
+module_param(ignore_wake, charp, 0444);
+MODULE_PARM_DESC(ignore_wake,
+ "controller@pin combos on which to ignore the ACPI wake flag 
+ "ignore_wake=controller@pin[,controller@pin[...]]");
+
+struct acpi_gpiolib_dmi_quirk {
+bool no_edge_events_on_boot;
+char *ignore_wake;
+};
+
+/**
+ * struct acpi_gpio_event - ACPI GPIO event handler data
+ *
+ * @node: list-entry of the events list of the struct acpi_gpio_chip
+ * @handle: handle of ACPI method to execute when the IRQ triggers
+ * @handler: irq_handler to pass to request_irq when requesting the IRQ
+ * @pin: ACPI pin number on the gpio_chip
+ * @irq: Linux IRQ number for the event, for request_ / free_irq
+ * @irqflags: flags to pass to request_irq when requesting the IRQ
+ * @irq_is_wake: If the ACPI flags indicate the IRQ is a wakeup source
+ * @is_requested: True if request_irq has been done
+ * @desc: gpio_desc for the GPIO pin for this event
+ */
struct acpi_gpio_event {
    struct list_head node;
    acpi_handle handle;
    +irq_handler_t handler;
    unsigned int pin;
    unsigned int irq;
    unsigned long irqflags;
    +bool irq_is_wake;
    +bool irq_requested;
    struct gpio_desc *desc;
};

@@ -48,8 +82,20 @@
struct mutex conn_lock;
struct gpio_chip *chip;
struct list_head events;
+struct list_head deferred_req_irqs_list_entry;
};
+
+/*
For gpiochips which call acpi_gpiochip_request_interrupts() before late_init
(sobuiltin drivers) we register the ACPI GpioInt IRQ handlers from a
late_initcall_sync handler, so that other builtin drivers can register their
OpRegions before the event handlers can run. This list contains gpiochips
for which the acpi_gpiochip_request_irqs() call has been deferred.

static DEFINE_MUTEX(acpi_gpio_deferred_req_irqs_lock);
static LIST_HEAD(acpi_gpio_deferred_req_irqs_list);
static bool acpi_gpio_deferred_req_irqs_done;

static int acpi_gpiochip_find(struct gpio_chip *gc, void *data)
{
if (!gc->parent)
return ACPI_HANDLE(gc->parent) == data;
}

-#ifdef CONFIG_PINCTRL
-/**
- * acpi_gpiochip_pin_to_gpio_offset() - translates ACPI GPIO to Linux GPIO
- * @gdev: GPIO device
- * @pin: ACPI GPIO pin number from GpioIo/GpioInt resource
- *
- * Function takes ACPI GpioIo/GpioInt pin number as a parameter and
- * translates it to a corresponding offset suitable to be passed to a
- * GPIO controller driver.
- *
- * Typically the returned offset is same as @pin, but if the GPIO
- * controller uses pin controller and the mapping is not contiguous the
- * offset might be different.
- */
-static int acpi_gpiochip_pin_to_gpio_offset(struct gpio_device *gdev, int pin)
{-
-struct gpio_pin_range *pin_range;
-
-/* If there are no ranges in this chip, use 1:1 mapping */
-if (list_empty(&gdev->pin_ranges))
-return pin;
-
-list_for_each_entry(pin_range, &gdev->pin_ranges, node) {
-const struct pinctrl_gpio_range *range = &pin_range->range;
-int i;
-
-if (range->pins) {
-for (i = 0; i < range->npins; i++) {
-if (range->pins[i] == pin)
-return range->base + i - gdev->base;
-}
-} else {
- if (pin >= range->pin_base &&
-     pin < range->pin_base + range->npins) {
-     unsigned gpio_base;
-
-     gpio_base = range->base - gdev->base;
-     return gpio_base + pin - range->pin_base;
- }
- }
- }
- 
- return -EINVAL;
- }
#else
static inline int acpi_gpiochip_pin_to_gpio_offset(struct gpio_device *gdev,
- int pin)
{
- return pin;
- }
#endif

/**
 * acpi_get_gpiod() - Translate ACPI GPIO pin to GPIO descriptor usable with GPIO API
 * @path:	ACPI GPIO controller full path name, (e.g. "\_SB.GPO1")
 * @chip:	ACPI GPIO controller
 @ @ -125.7 +119.6 @@
 * @offset:	ACPI GPIO pin to GPIO offset
 struct gpio_chip *chip;
 acpi_handle handle;
 acpi_status status;
 -int offset;
 
 status = acpi_get_handle(NULL, path, &handle);
 if (ACPI_FAILURE(status))
 @ @ -135,11 +128,7 @@
 if (!chip)
 return ERR_PTR(-EPROBE_DEFER);

 -offset = acpi_gpiochip_pin_to_gpio_offset(chip->gpiodev, pin);
 -if (offset < 0)
 -return ERR_PTR(offset);
 
 -return gpiochip_get_desc(chip, offset);
 +return gpiochip_get_desc(chip, pin);
 }
static acpi_status acpi_gpiochip_request_interrupt(struct acpi_resource *ares, void *context)
static void acpi_gpiochip_request_irq(struct acpi_gpio_chip *acpi_gpio, struct acpi_gpio_event *event)
{
    int ret, value;

    ret = request_threaded_irq(event->irq, NULL, event->handler, event->irqflags | IRQF_ONESHOT, "ACPI:Event", event);
    if (ret) {
        dev_err(acpi_gpio->chip->parent, "Failed to setup interrupt handler for %d\n", event->irq);
        return;
    }

    if (event->irq_is_wake)
        enable_irq_wake(event->irq);
    event->irq_requested = true;

    /* Make sure we trigger the initial state of edge-triggered IRQs */
    if (run_edge_events_on_boot &&
        (event->irqflags & (IRQF_TRIGGER_RISING | IRQF_TRIGGER_FALLING))) {
        value = gpiod_get_raw_value_cansleep(event->desc);
        if (((event->irqflags & IRQF_TRIGGER_RISING) && value == 1) ||
            ((event->irqflags & IRQF_TRIGGER_FALLING) && value == 0))
            event->handler(event->irq, event);
    }

    static void acpi_gpiochip_request_irqs(struct acpi_gpio_chip *acpi_gpio)
    {
        struct acpi_gpio_event *event;

        list_for_each_entry(event, &acpi_gpio->events, node)
            acpi_gpiochip_request_irq(acpi_gpio, event);
    }

    static bool acpi_gpio_in_ignore_list(const char *controller_in, int pin_in)
    {
        const char *controller, *pin_str;
        int len, pin;
        char *endp;

        controller = ignore_wake;
        while (controller) {

            /* Rest of the code... */
        }
pin_str = strchr(controller, '@');
if (!pin_str)
    goto err;

len = pin_str - controller;
if (len == strlen(controller_in) &&
    strncmp(controller, controller_in, len) == 0) {
    pin = simple_strtoul(pin_str + 1, &endp, 10);
    if (*endp != 0 && *endp != ',')
        goto err;

    if (pin == pin_in)
        return true;
}

controller = strchr(controller, ',');
if (controller)
    controller++;

return false;

err:
    pr_err_once("Error invalid value for gpiolib_acpi.ignore_wake: %s\n",
        ignore_wake);
    return false;
}

static bool acpi_gpio_irq_is_wake(struct device *parent,
    struct acpi_resource_gpio *agpio)
{
    int pin = agpio->pin_table[0];

    if (agpio->wake_capable != ACPI_WAKE_CAPABLE)
        return false;

    if (acpi_gpio_in_ignore_list(dev_name(parent), pin)) {
        dev_info(parent, "Ignoring wakeup on pin %d\n", pin);
        return false;
    }

    return true;
}

static acpi_status acpi_gpiochip_alloc_event(struct acpi_resource *ares,
    void *context)
{ struct acpi_gpio_chip *acpi_gpio = context;
    struct gpio_chip *chip = acpi_gpio->chip;
@@ -192,7 +269,6 @@
    struct acpi_gpio_event *event;
    irq_handler_t handler = NULL;
    struct gpio_desc *desc;
-    unsigned long irqflags;
    int ret, pin, irq;

    if (!acpi_gpio_get_irq_resource(ares, &agpio))
+      return AE_OK;
        @ @ -192,7 +269,6 @@
    if (!handler)
        @ @ -216,10 +292,6 @@
        return AE_OK;

        -pin = acpi_gpiochip_pin_to_gpio_offset(chip->gpio, pin);
        -if (pin < 0)
        -return AE_BAD_PARAMETER;
        -
        desc = gpiochip_request_own_desc(chip, pin, "ACPI:Event");
        if (IS_ERR(desc)) {
+          dev_err(chip->parent, "Failed to request GPIO
+  @ @ -240,53 +312,42 @@
            goto fail_unlock_irq;
        }

+        -irqflags = IRQF_ONESHOT;
+        +event = kzalloc(sizeof(*event), GFP_KERNEL);
+        -if (!event)
+            goto fail_unlock_irq;
+        +
+        event->irqflags = IRQF_ONESHOT;
+        +event->irqflags = IRQF_ONESHOT;
+        if (agpio->triggering == ACPI_LEVEL_SENSITIVE) {
+            if (agpio->polarity == ACPI_ACTIVE_HIGH)
+                -irqflags |= IRQF_TRIGGER_HIGH;
+                +event->irqflags |= IRQF_TRIGGER_HIGH;
+            else
+                -irqflags |= IRQF_TRIGGER_LOW;
+                +event->irqflags |= IRQF_TRIGGER_LOW;
+            } else {
+                switch (agpio->polarity) {
+                    case ACPI_ACTIVE_HIGH:
+                        -irqflags |= IRQF_TRIGGER_RISING;
+                        +event->irqflags |= IRQF_TRIGGER_RISING;
+                        break;
+                    case ACPI_ACTIVE_LOW:
+                        -irqflags |= IRQF_TRIGGER_FALLING;
+                        +event->irqflags |= IRQF_TRIGGER_FALLING;
+                        break;
+                    default:
+                        -irqflags |= IRQF_TRIGGER_RISING |
+                        +event->irqflags |= IRQF_TRIGGER_RISING;
- IRQF_TRIGGER_FALLING;
+ event->irqflags |= IRQF_TRIGGER_RISING |
+ IRQF_TRIGGER_FALLING;
break;
}
}

-event = kzalloc(sizeof(*event), GFP_KERNEL);
-if (!event)
-goto fail_unlock_irq;
-
-event->handle = evt_handle;
+event->handler = handler;
-event->irq = irq;
+event->irq_is_wake = acpi_gpio_irq_is_wake(chip->parent, agpio);
-event->pin = pin;
-event->desc = desc;

-ret = request_threaded_irq(event->irq, NULL, handler, irqflags,
- "ACPI:Event", event);
-if (ret) {
-dev_err(chip->parent,
-"Failed to setup interrupt handler for %d\n",
-event->irq);
-goto fail_free_event;
-}
-
-
-if (agpio->wake_capable == ACPI_WAKE_CAPABLE)
-enable_irq_wake(irq);
-
-list_add_tail(&event->node, &acpi_gpio->events);
+ return AE_OK;

-fail_free_event:
-kfree(event);
fail_unlock_irq:
gpiochip_unlock_as_irq(chip, pin);
fail_free_desc:
@@ -310,6 +371,7 @@
struct acpi_gpio_chip *acpi_gpio;
    acpi_handle handle;
    acpi_status status;
+bool defer;

    if (!chip->parent || !chip->to_irq)
        return;
@@ -323,7 +385,19 @@


return;

acpi_walk_resources(handle, "_AEI",
    acpi_gpiochip_request_interrupt, acpi_gpio);
+ acpi_gpiochip_alloc_event, acpi_gpio);
+
+mutex_lock(&acpi_gpio_deferred_req_irqs_lock);
+defer = !acpi_gpio_deferred_req_irqs_done;
+if (defer)
+list_add(&acpi_gpio->deferred_req_irqs_list_entry,
+    &acpi_gpio_deferred_req_irqs_list);
+mutex_unlock(&acpi_gpio_deferred_req_irqs_lock);
+
@if (defer)
    return;
+
+acpi_gpiochip_request_irqs(acpi_gpio);
}
EXPORT_SYMBOL_GPL(acpi_gpiochip_request_interrupts);

@@ -352,13 +426,21 @@
    if (ACPI_FAILURE(status))
    return;
+
+mutex_lock(&acpi_gpio_deferred_req_irqs_lock);
+if (!list_empty(&acpi_gpio->deferred_req_irqs_list_entry))
+list_del_init(&acpi_gpio->deferred_req_irqs_list_entry);
+mutex_unlock(&acpi_gpio_deferred_req_irqs_lock);
+
list_for_each_entry_safe_reverse(event, ep, &acpi_gpio->events, node) {
    struct gpio_desc *desc;

    -if (irqd_is_wakeup_set(irq_get_irq_data(event->irq)))
    -disable_irq_wake(event->irq);
    +if (event->irq_requested) {
    +if (event->irq_is_wake)
    +disable_irq_wake(event->irq);
    +
    +free_irq(event->irq, event);
    +}

    -free_irq(event->irq, event);
    desc = event->desc;
    if (WARN_ON(IS_ERR(desc)))
    continue;
@@ -852,12 +934,6 @@
    struct gpio_desc *desc;
    bool found;

pin = acpi_gpiochip_pin_to_gpio_offset(chip->gpiodev, pin);
if (pin < 0) {
    status = AE_BAD_PARAMETER;
    goto out;
}
mutex_lock(&achip->conn_lock);

found = false;
@@ -990,11 +1066,7 @@ if (ret < 0)
    return ERR_PTR(ret);

-ret = acpi_gpiochip_pin_to_gpio_offset(chip->gpiodev, gpios[0]);
-if (ret < 0)
-    return ERR_PTR(ret);
-
-desc = gpiochip_get_desc(chip, ret);
+desc = gpiochip_get_desc(chip, gpios[0]);
    if (IS_ERR(desc))
        return desc;
@@ -1065,6 +1137,7 @@
acpi_gpio->chip = chip;
INIT_LIST_HEAD(&acpi_gpio->events);
+INIT_LIST_HEAD(&acpi_gpio->deferred_req irqs_list_entry);

status = acpi_attach_data(handle, acpi_gpio_chip_dh, acpi_gpio);
if (ACPI_FAILURE(status)) {
    @@ -1205,8 +1278,150 @@
    bool acpi_can_fallback_to_crs(struct acpi_device *adev, const char *con_id)
    {
        /* Never allow fallback if the device has properties */
        -if (adev->data.properties || adev->driver_gpios)
        +if (acpi_dev_has_props(adev) || adev->driver_gpios)
            return false;
    return con_id == NULL;
    }
    /* Run deferred acpi_gpiochip_request_irqs() */
+static int acpi_gpio_handle_deferred_request_irqs(void)
+{
+    +struct acpi_gpio_chip *acpi_gpio, *tmp;
+    +mutex_lock(&acpi_gpio_deferred_req irqs_lock);
list_for_each_entry_safe(acpi_gpio, tmp,
+ &acpi_gpio_deferred_req_irqs_list,
+ deferred_req_irqs_list_entry)
+acpi_gpiochip_request_irqs(acpi_gpio);
+
+acpi_gpio_deferred_req_irqs_done = true;
+mutex_unlock(&acpi_gpio_deferred_req_irqs_lock);
+
+return 0;
+
+/* We must use _sync so that this runs after the first deferred_proberun */
+late_initcall_sync(acpi_gpio_handle_deferred_request_irqs);
+
+static const struct dmi_system_id gpiolib_acpi_quirks[] = {
+
+/* The Minix Neo Z83-4 has a micro-USB-B id-pin handler for
+ * a non existing micro-USB-B connector which puts the HDMI
+ * DDC pins in GPIO mode, breaking HDMI support.
+ */
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "MINIX"),
+ DMI_MATCH(DMI_PRODUCT_NAME, "Z83-4"),
+ },
+ .driver_data = &(struct acpi_gpiolib_dmi_quirk) {
+ .no_edge_events_on_boot = true,
+ },
+ },
+{
+ /* The Terra Pad 1061 has a micro-USB-B id-pin handler, which
+ * instead of controlling the actual micro-USB-B turns the 5V
+ * boost for its USB-A connector off. The actual micro-USB-B
+ * connector is wired for charging only.
+ */
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Wortmann_AG"),
+ DMI_MATCH(DMI_PRODUCT_NAME, "TERRA_PAD_1061"),
+ },
+ .driver_data = &(struct acpi_gpiolib_dmi_quirk) {
+ .no_edge_events_on_boot = true,
+ },
+ },
+{
+ /* The Dell Venue 10 Pro 5055, with Bay Trail SoC + TI PMIC uses an
+ * external embedded-controller connected via I2C + an ACPI GPIO
+ * event handler on INT33FFC:02 pin 12, causing spurious wakeups.
+ */
+ * 
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Venue 10 Pro 5055"),
+},
+.driver_data = &(struct acpi_gpiolib_dmi_quirk) {
+.ignore_wake = "INT33FC:02@12",
+},
+},
+}
+/
+ * HP X2 10 models with Cherry Trail SoC + TI PMIC use an
+ * external embedded-controller connected via I2C + an ACPI GPIO
+ * event handler on INT33FF:01 pin 0, causing spurious wakeups.
+ * When suspending by closing the LID, the power to the USB
+ * keyboard is turned off, causing INT0002 ACPI events to
+ * trigger once the XHCI controller notices the keyboard is
+ * gone. So INT0002 events cause spurious wakeups too. Ignoring
+ * EC wakes breaks wakeup when opening the lid, the user needs
+ * to press the power-button to wakeup the system. The
+ * alternative is suspend simply not working, which is worse.
+ */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "HP"),
+DMI_MATCH(DMI_PRODUCT_NAME, "HP x2 Detachable 10-p0XX"),
+},
+.driver_data = &(struct acpi_gpiolib_dmi_quirk) {
+.ignore_wake = "INT33FF:01@0,INT0002:00@2",
+},
+},
+}
+/
+ * HP X2 10 models with Bay Trail SoC + AXP288 PMIC use an
+ * external embedded-controller connected via I2C + an ACPI GPIO
+ * event handler on INT33FC:02 pin 28, causing spurious wakeups.
+ */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Hewlett-Packard"),
+DMI_MATCH(DMI_PRODUCT_NAME, "HP Pavilion x2 Detachable"),
+DMI_MATCH(DMI_BOARD_NAME, "815D"),
+},
+.driver_data = &(struct acpi_gpiolib_dmi_quirk) {
+.ignore_wake = "INT33FC:02@28",
+},
+},
+}
+/
+ * HP X2 10 models with Cherry Trail SoC + AXP288 PMIC use an
+ * external embedded-controller connected via I2C + an ACPI GPIO
+ * event handler on INT33FF:01 pin 0, causing spurious wakeups.
+ */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "HP"),
+DMI_MATCH(DMI_PRODUCT_NAME, "HP Pavilion x2 Detachable"),
+DMI_MATCH(DMI_BOARD_NAME, "813E"),
+}
+.driver_data = &struct acpi_gpiolib_dmi_quirk {
+.ignore_wake = "INT33FF:01@0",
+}
+];
+} /* Terminating entry */
+};
+
+static int acpi_gpio_setup_params(void)
+{
+const struct acpi_gpiolib_dmi_quirk *quirk = NULL;
+const struct dmi_system_id *id;
+
+id = dmi_first_match(gpiolib_acpi_quirks);
+if (id)
+quirk = id->driver_data;
+
+if (run_edge_events_on_boot < 0) {
+if (quirk && quirk->no_edge_events_on_boot)
+run_edge_events_on_boot = 0;
+} else
+run_edge_events_on_boot = 1;
+
+if (ignore_wake == NULL && quirk && quirk->ignore_wake)
+ignore_wake = quirk->ignore_wake;
+
+return 0;
+}
+
+/* Directly after dmi_setup() which runs as core_initcall() */
+postcore_initcall(acpi_gpio_setup_params);

--- linux-4.15.0.orig/drivers/gpio/gpiolib-of.c
+++ linux-4.15.0/drivers/gpio/gpiolib-of.c
@@ -31,6 +31,7 @@
 struct of_phandle_args *gpiospec = data;

 return chip->gpiodev->dev.of_node == gpiospec->np &&
+chip->of_xlate &&
 chip->of_xlate(chip, gpiospec, NULL) >= 0;
}
of_node_get(chip->of_node);

return of_gpiochip_scan_gpios(chip);
+status = of_gpiochip_scan_gpios(chip);
+if (status) {
+of_node_put(chip->of_node);
+gpiochip_remove_pin_ranges(chip);
+
+
+return status;
}

void of_gpiochip_remove(struct gpio_chip *chip)
--- linux-4.15.0.orig/drivers/gpio/gpiolib.c
+++ linux-4.15.0/drivers/gpio/gpiolib.c
@@ -209,6 +209,14 @@
chip = gpiod_to_chip(desc);
offset = gpio_chip_hwgpio(desc);

+/*
+ * Open drain emulation using input mode may incorrectly report
+ * input here, fix that up.
+ */
+if (test_bit(FLAG_OPEN_DRAIN, &desc->flags) &&
+    test_bit(FLAG_IS_OUT, &desc->flags))
+return 0;
+
if (!chip->get_direction)
return status;

@@ -446,7 +454,7 @@
struct gpiohandle_request handlereq;
struct linehandle_state *lh;
struct file *file;
-int fd, i, ret;
+int fd, i, count = 0, ret;
u32 lflags;

if (copy_from_user(&handlereq, ip, sizeof(handlereq)))
@@ -460,6 +468,23 @@
if (lflags & ~GPIOHANDLE_REQUEST_VALID_FLAGS)
    return -EINVAL;
+*/
+ * Do not allow both INPUT & OUTPUT flags to be set as they are

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+ * contradictory.
+ */
+if ((lflags & GPIOHANDLE_REQUEST_INPUT) &&
+ (lflags & GPIOHANDLE_REQUEST_OUTPUT))
+return -EINVAL;
+
+ /*
+ * Do not allow OPEN_SOURCE & OPEN_DRAIN flags in a single request. If
+ * the hardware actually supports enabling both at the same time the
+ * electrical result would be disastrous.
+ */
+if ((lflags & GPIOHANDLE_REQUEST_OPEN_DRAIN) &&
+ (lflags & GPIOHANDLE_REQUEST_OPEN_SOURCE))
+return -EINVAL;
+
+ /* OPEN_DRAIN and OPEN_SOURCE flags only make sense for output mode. */
if (!(lflags & GPIOHANDLE_REQUEST_OUTPUT) &&
    ((lflags & GPIOHANDLE_REQUEST_OPEN_DRAIN) ||
    (lflags & GPIOHANDLE_REQUEST_OPEN_SOURCE))
@@ -498,6 +523,7 @@
if (ret)
goto out_free_descs;
lh->descs[i] = desc;
+count = i + 1;

if (lflags & GPIOHANDLE_REQUEST_ACTIVE_LOW)
set_bit(FLAG_ACTIVE_LOW, &desc->flags);
@@ -564,7 +590,7 @@
out_put_unused_fd:
put_unused_fd(fd);
out_free_descs:
-for (; i >= 0; i--)
+for (i = 0; i < count; i++)
gpiod_free(lh->descs[i]);
kfree(lh->label);
out_free_lh:
@@ -732,6 +758,9 @@
struct gpioevent_data ge;
int ret, level;

+ /* Do not leak kernel stack to userspace */
+memset(&ge, 0, sizeof(ge));
+
ge.timestamp = ktime_get_real_ns();
level = gpiod_get_value_cansleep(le->desc);
@@ -810,7 +839,9 @@
}
/* This is just wrong: we don't look for events on output lines */
-if (lflags & GPIOHANDLE_REQUEST_OUTPUT) {
+if ((lflags & GPIOHANDLE_REQUEST_OUTPUT) ||
    (lflags & GPIOHANDLE_REQUEST_OPEN_DRAIN) ||
    (lflags & GPIOHANDLE_REQUEST_OPEN_SOURCE)) {
    ret = -EINVAL;
    goto out_free_label;
}
@@ -818,16 +849,12 @@
desc = &gdev->descs[offset];
ret = gpiod_request(desc, le->label);
if (ret)
@@ -840,9 +867,11 @@
    if (eflags & GPIOEVENT_REQUEST_RISING_EDGE)
@@ -974,9 +1003,11 @@
    if (test_bit(FLAG_ACTIVE_LOW, &desc->flags))
        lineinfo.flags |= GPIOLINE_FLAG_ACTIVE_LOW;
    if (test_bit(FLAG_OPEN_DRAIN, &desc->flags))
        -lineinfo.flags |= GPIOLINE_FLAG_OPEN_DRAIN;
+lineinfo.flags |= (GPIOLINE_FLAG_OPEN_DRAIN |
      GPIOLINE_FLAG_IS_OUT);
    if (test_bit(FLAG_OPEN_SOURCE, &desc->flags))
- lineinfo.flags |= GPIOLINE_FLAG_OPEN_SOURCE;
+ lineinfo.flags |= (GPIOLINE_FLAG_OPEN_SOURCE |
+   GPIOLINE_FLAG_IS_OUT);

if (copy_to_user(ip, &lineinfo, sizeof(lineinfo)))
    return -EFAULT;
@@ -1150,7 +1181,7 @@
gdev->descs = kmalloc(chip->ngpio, sizeof(gdev->descs[0]), GFP_KERNEL);
if (!gdev->descs) {
    status = -ENOMEM;
    goto err_free_gdev;
+    goto err_free_ida;
}

if (chip->ngpio == 0) {
    @@ -1209,31 +1240,14 @@
    struct gpio_desc *desc = &gdev->descs[i];

    desc->gdev = gdev;
    /*
     - * REVISIT: most hardware initializes GPIOs as inputs
     - * (often with pullups enabled) so power usage is
     - * minimized. Linux code should set the gpio direction
     - * first thing; but until it does, and in case
     - * chip->get_direction is not set, we may expose the
     - * wrong direction in sysfs.
     - */
    -
    -if (chip->get_direction) {
    -/*
     - * If we have .get_direction, set up the initial
     - * direction flag from the hardware.
     - */
    -int dir = chip->get_direction(chip, i);
    -
    -if (!dir)
    -set_bit(FLAG_IS_OUT, &desc->flags);
    -} else if (!chip->direction_input) {
    -/*
     - * If the chip lacks the .direction_input callback
     - * we logically assume all lines are outputs.
     - */
    -set_bit(FLAG_IS_OUT, &desc->flags);
    -}  
    */
    */ REVISIT: most hardware initializes GPIOs as inputs (often
    + * code should set the gpio direction first thing; but until
    + * it does, and in case chip->get_direction is not set, we may
* expose the wrong direction in sysfs.
+ */
+desc->flags = !chip->direction_input ? (1 << FLAG_IS_OUT) : 0;
}

#ifdef CONFIG_PINCTRL
@@ -1286,8 +1300,9 @@
kfree(gdev->label);
err_free_descs:
kfree(gdev->descs);
-err_free_gdev:
+err_free_gdev:
ida_simple_remove(&gpio_ida, gdev->id);
+err_free_gdev:
/* failures here can mean systems won't boot... */
pr_err("%s: GPIOs %d..%d (%s) failed to register\n", __func__,
gdev->base, gdev->base + gdev->ngpio - 1,
@@ -1556,7 +1571,8 @@
irq_set_chained_handler_and_data(parent_irq, parent_handler,
gpiochip);

-gpiochip->irq.parents = &parent_irq;
+gpiochip->irq.parent_irq = parent_irq;
+gpiochip->irq.parents = &gpiochip->irq.parent_irq;
gpiochip->irq.num_parents = 1;
}
@@ -2373,19 +2389,27 @@
int gpiod_direction_input(struct gpio_desc *desc)
{
    struct gpio_chip*chip;
-    intstatus = -EINVAL;
+    intstatus = 0;

    VALIDATE_DESC(desc);
    chip = desc->gdev->chip;

-    -if (!chip->get || !chip->direction_input) {
+    -if (!chip->get && chip->direction_input) {
        gpiod_warn(desc,
-        "%s: missing get() or direction_input() operations\n", __func__);
+        "%s: missing get() and direction_input() operations\n", __func__);
        return -EIO;
    }

-    status = chip->direction_input(chip, gpio_chip_hwgpio(desc));
+    if (chip->direction_input) {


status = chip->direction_input(chip, gpio_chip_hwgpio(desc));
} else if (chip->get_direction &&
  (chip->get_direction(chip, gpio_chip_hwgpio(desc)) != 1)) {
  gpio_warn(desc,
    "%s: missing direction_input() operation\n",
    __func__);  
return -EIO; 
}
if (status == 0)
clear_bit(FLAG_IS_OUT, &desc->flags);

/**
 * gpiod_direction_output - set direction output
 *
 * @desc: gpio_desc
 * @value: direction output value
 *
 * Returns 0 on success, -EIO on error.
 */
int gpiod_direction_output(struct gpio_desc *desc, int value)
{
    int gc = desc->gdev->chip;
    int val = !!value;
    int ret = 0;

    if (!gc->set || !gc->direction_output) {
        if (!gc->set && !gc->direction_output) 
            gpio_warn(desc,
                "%s: missing set() or direction_output() operations\n",
                "%s: missing set() and direction_output() operations\n",
                __func__);  
        return -EIO;  
    } else {
        ret = gc->direction_output(gc, gpio_chip_hwgpio(desc), val);
        if (gc->direction_output) {
            ret = gc->direction_output(gc, gpio_chip_hwgpio(desc), val);
        } else {
            if (gc->get_direction &&
                gc->get_direction(gc, gpio_chip_hwgpio(desc))) {
                gpio_warn(desc,
                    "%s: missing direction_output() operation\n",
                    __func__); 
                return -EIO;  
            } 
            gc->set(gc, gpio_chip_hwgpio(desc), val);
        }  
        if (!ret)
            set_bit(FLAG_IS_OUT, &desc->flags);
        trace_gpio_value(desc_to_gpio(desc), 0, val);
    }  
    /*
     * int gpiod_direction_output(struct gpio_desc *desc, int value)
     */
}
-struct gpio_chip *gc = desc->gdev->chip;
+struct gpio_chip *gc;
int ret;

VALIDATE_DESC(desc);
@@ -2473,6 +2509,7 @@
return -EIO;
}

+gc = desc->gdev->chip;
if (test_bit(FLAG_OPEN_DRAIN, &desc->flags)) {
    /* First see if we can enable open drain in hardware */
    ret = gpio_set_drive_single_ended(gc, gpio_chip_hwgpio(desc),
@@ -2480,8 +2517,10 @@
        goto set_output_value;
    /* Emulate open drain by not actively driving the line high */
    -if (value)
    -		return gpiod_direction_input(desc);
    +if (value) {
    +		ret = gpiod_direction_input(desc);
    +goto set_output_flag;
    +}
} else if (test_bit(FLAG_OPEN_SOURCE, &desc->flags)) {
    ret = gpio_set_drive_single_ended(gc, gpio_chip_hwgpio(desc),
@@ -2489,8 +2528,10 @@
        goto set_output_value;
    /* Emulate open source by not actively driving the line low */
    -if (!value)
    -		return gpiod_direction_input(desc);
    +if (!value) {
    +		ret = gpiod_direction_input(desc);
    +goto set_output_flag;
    +}
} else {
    gpio_set_drive_single_ended(gc, gpio_chip_hwgpio(desc),
        PIN_CONFIG_DRIVE_PUSH_PULL);
@@ -2498,6 +2539,17 @@
    set_output_value:
    return gpiod_direction_output_raw_commit(desc, value);
+/
+set_output_flag:
+/*
+ * When emulating open-source or open-drain functionalities by not
+ * actively driving the line (setting mode to input) we still need to
+ * set the IS_OUT flag or otherwise we won't be able to set the line
+ * value anymore.
+ */
+if (ret == 0)
+set_bit(FLAG_IS_OUT, &desc->flags);
+return ret;
}
EXPORT_SYMBOL_GPL(gpiod_direction_output);

@@ -2656,7 +2708,7 @@
int gpiod_get_raw_value(const struct gpio_desc *desc)
{
VALIDATE_DESC(desc);
-/* Should be using gpio_get_value_cansleep() */
+/* Should be using gpiod_get_raw_value_cansleep() */
WARN_ON(desc->gdev->chip->can_sleep);
return gpiod_get_raw_value_commit(desc);
}
@@ -2677,7 +2729,7 @@
int value;
VALIDATE_DESC(desc);
-/* Should be using gpio_get_value_cansleep() */
+/* Should be using gpiod_get_value_cansleep() */
WARN_ON(desc->gdev->chip->can_sleep);
value = gpiod_get_raw_value_commit(desc);
@@ -2749,8 +2801,6 @@
if (value) {
err = chip->direction_input(chip, offset);
-if (!err)
-clear_bit(FLAG_IS_OUT, &desc->flags);
} else {
err = chip->direction_output(chip, offset, 0);
if (!err)
@@ -2780,8 +2830,6 @@
set_bit(FLAG_IS_OUT, &desc->flags);
] else {
err = chip->direction_input(chip, offset);
-if (!err)
-clear_bit(FLAG_IS_OUT, &desc->flags);
} else {
trace_gpio_direction(desc_to_gpio(desc), !value, err);
if (err < 0)
@@ -2886,7 +2934,7 @@
void gpiod_set_raw_value(struct gpio_desc *desc, int value)
VALIDATE_DESC_VOID(desc);
 /* Should be using gpiod_set_value_cansleep() */
 +/* Should be using gpiod_set_raw_value_cansleep() */
 WARN_ON(desc->gdev->chip->can_sleep);
 gpiod_set_raw_value_commit(desc, value);
 }
@@ -2927,6 +2975,7 @@
 void gpiod_set_value(struct gpio_desc *desc, int value)
 {
  VALIDATE_DESC_VOID(desc);
 +/* Should be using gpiod_set_value_cansleep() */
 WARN_ON(desc->gdev->chip->can_sleep);
 gpiod_set_value_nocheck(desc, value);
 }
@@ -3415,8 +3464,9 @@
 if (chip->ngpio <= p->chip_hwnum) {
  dev_err(dev,
  "requested GPIO %d is out of range [0..%d] for chip %s\n",
 -idx, chip->ngpio, chip->label);
 +"requested GPIO %u (%u) is out of range [0..%u] for chip %s\n",
 +idx, p->chip_hwnum, chip->ngpio - 1,
 +chip->label);
  return ERR_PTR(-EINVAL);
 }
@@ -3606,6 +3656,8 @@
 struct gpio_desc *desc = NULL;
 int status;
 enum gpio_lookup_flags lookupflags = 0;
 +/* Maybe we have a device name, maybe not */
 +const char *devname = dev ? dev_name(dev) : "?";

 dev_dbg(dev, "GPIO lookup for consumer %s\n", con_id);
@@ -3634,7 +3686,11 @@
 return desc;
 }

 -status = gpiod_request(desc, con_id);
 +/*
 + * If a connection label was passed use that, else attempt to use
 + * the device name as label
 + */
 +status = gpiod_request(desc, con_id ? con_id : devname);
 if (status < 0)
  return ERR_PTR(status);
static const char * const gpio_suffixes[] = { "gpios", "gpio" };  
+static __maybe_unused const char * const gpio_suffixes[] = { "gpios", "gpio" };  

#ifdef CONFIG_OF_GPIO  
struct gpio_desc *of_find_gpio(struct device *dev,  
--- linux-4.15.0.orig/drivers/gpu/drm/Kconfig  
+++ linux-4.15.0/drivers/gpu/drm/Kconfig  
@@ -156,6 +156,7 @@  
config DRM_RADEON  
tristate "ATI Radeon"  
depends on DRM & PCI & MMU  
+depends on AGP || !AGP  
select FW_LOADER  
    select DRM_KMS_HELPER  
    select DRM_TTM  
--- linux-4.15.0.orig/drivers/gpio/gpiolib.h  
+++ linux-4.15.0/drivers/gpio/gpiolib.h  
@@ -88,7 +88,7 @@  
};  
/* gpio suffixes used for ACPI and device tree lookup */  
-static const char * constgpio_suffixes[] = { "gpios", "gpio" };  
+static __maybe_unused const char * const gpio_suffixes[] = { "gpios", "gpio" };  

#define AMDGPU_MAX_WB 512  
+#define AMDGPU_MAX_WB 128  
 struct amdgpu_wb {  
 struct amdgpu_bo*wb_obj;  
@@ -1346,43 +1347,6 @@  
/*  
 * ACPI  
 */  
-struct amdgpu_atif_notification_cfg {  
-bool enabled;  
-int command_code;  
-};
-struct amdgpu_atif_notifications {
- bool display_switch;
- bool expansion_mode_change;
- bool thermal_state;
- bool forced_power_state;
- bool system_power_state;
- bool display_conf_change;
- bool px_gfx_switch;
- bool brightness_change;
- bool dgpu_display_event;
-};
-
-struct amdgpu_atif_functions {
- bool system_params;
- bool sbios_requests;
- bool select_active_disp;
- bool lid_state;
- bool get_tv_standard;
- bool set_tv_standard;
- bool get_panel_expansion_mode;
- bool set_panel_expansion_mode;
- bool temperature_change;
- bool graphics_device_types;
-};
-
-struct amdgpu_atif {
- struct amdgpu_atif_notifications notifications;
- struct amdgpu_atif_functions functions;
- struct amdgpu_atif_notification_cfg notification_cfg;
- struct amdgpu_encoder *encoder_for_bl;
-};
-
-struct amdgpu_atcs_functions {
- bool get_ext_state;
- bool pcie_perf_req;
 @ @ -1450.7 +1414.7 @@
#if defined(CONFIG_DEBUG_FS)
 struct dentry *debugfs_regs[AMDGPU_DEBUGFS_MAX_COMPONENTS];
 #endif
 -struct amdgpu_atifatif;
 +struct amdgpu_atif*atif;
 struct amdgpu_atcsatcs;
 struct mutex srbm_mutex;
 /* GRBM index mutex. Protects concurrent access to GRBM index */
 @ @ -1860.6 +1824.12 @@
 static inline bool amdgpu_has_atpx(void) { return false; }
 #endif

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void *amdgpu_atpx_get_dhandle(void);

static inline void *amdgpu_atpx_get_dhandle(void) { return NULL; }

/*
 * KMS
 */
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_acp.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_acp.c
@@ -272,7 +272,7 @@
    u32 val = 0;
    u32 count = 0;
    struct device *dev;
-   struct i2s_platform_data *i2s_pdata;
+   struct i2s_platform_data *i2s_pdata = NULL;
    struct amdgpu_device *adev = (struct amdgpu_device *)handle;

@@ -314,21 +314,22 @@
    adev->acp.acp_cell = kzalloc(sizeof(struct mfd_cell) * ACP_DEVS,
                                 GFP_KERNEL);
-   if (adev->acp.acp_cell == NULL)
-      return -ENOMEM;
+   if (adev->acp.acp_cell == NULL) {
+      r = -ENOMEM;
+      goto failure;
+   }
    adev->acp.acp_res = kzalloc(sizeof(struct resource) * 4, GFP_KERNEL);

    if (adev->acp.acp_res == NULL) {
        -kfree(adev->acp.acp_cell);
-       return -ENOMEM;
+       r = -ENOMEM;
+      goto failure;
    }

    i2s_pdata = kzalloc(sizeof(struct i2s_platform_data) * 2, GFP_KERNEL);

    if (i2s_pdata == NULL) {
        -kfree(adev->acp.acp_res);
-       kfree(adev->acp.acp_cell);
-       return -ENOMEM;
+       r = -ENOMEM;
+      goto failure;
    }


switch (adev->asic_type) {
  @ -400,7 +401,7 @@
  r = mfd_add_hotplug_devices(adev->acp.parent, adev->acp.acl, ACP_DEVS);
  if (r)
    -return r;
    +goto failure;

  if (adev->asic_type != CHIP_STONEY) {
    for (i = 0; i < ACP_DEVS ; i++) {
      @ -408,7 +409,7 @@
      r = pm_genpd_add_device(&adev->acp_genpd->gpd, dev);
      if (r) {
        dev_err(dev, "Failed to add dev to genpd\n");
        -return r;
        +goto failure;
      }
    }

  @ -427,7 +428,8 @@
  break;
  if (--count == 0) {
    dev_err(&adev->pdev->dev, "Failed to reset ACP\n");
    -return -ETIMEDOUT;
    +r = -ETIMEDOUT;
    +goto failure;
  }
  udelay(100);
}
@ -444,7 +446,8 @@
break;
if (--count == 0) {
  dev_err(&adev->pdev->dev, "Failed to reset ACP\n");
  -return -ETIMEDOUT;
  +r = -ETIMEDOUT;
  +goto failure;
}
udelay(100);
}
@ -454,6 +457,13 @@
cgs_write_register(adev->acp.cgs_device, mmACP_SOFT_RESET, val);

  return 0;
+
  +failure:
  +kfree(i2s_pdata);
}
struct amdgpu_atif_notification_cfg {
    bool enabled;
    int command_code;
};

struct amdgpu_atif_notifications {
    bool display_switch;
    bool expansion_mode_change;
    bool thermal_state;
    bool forced_power_state;
    bool system_power_state;
    bool display_conf_change;
    bool px_gfx_switch;
    bool brightness_change;
    bool dgpu_display_event;
};

struct amdgpu_atif_functions {
    bool system_params;
    bool sbios_requests;
    bool select_active_disp;
    bool lid_state;
    bool get_tv_standard;
    bool set_tv_standard;
    bool get_panel_expansion_mode;
    bool set_panel_expansion_mode;
    bool temperature_change;
    bool graphics_device_types;
};

struct amdgpu_atif {
    acpi_handle handle;
    struct amdgpu_atif_notifications notifications;
    struct amdgpu_atif_functions functions;
+struct amdgpu_atif_notification_cfg notification_cfg;
+struct amdgpu_encoder *encoder_for_bl;
+};
+
/* Call the ATIF method */
*/
/** *
@@ -46,8 +85,9 @@
 * Executes the requested ATIF function (all asics).
 * Returns a pointer to the acpi output buffer.
 */
-static union acpi_object *amdgpu_atif_call(acpi_handle handle, int function,
-    struct acpi_buffer *params)
+static union acpi_object *amdgpu_atif_call(struct amdgpu_atif *atif,
    int function,
    struct acpi_buffer *params)
{
    acpi_status status;
    union acpi_object atif_arg_elements[2];
    @@ -70,7 +110,8 @@
             atif_arg_elements[1].integer.value = 0;
    }

-    status = acpi_evaluate_object(handle, "ATIF", &atif_arg, &buffer);
+    status = acpi_evaluate_object(atif->handle, NULL, &atif_arg, 
        &buffer);

    /* Fail only if calling the method fails and ATIF is supported */
    if (ACPI_FAILURE(status) && status != AE_NOT_FOUND) {
@@ -141,15 +182,14 @@
             * returns 0 on success, error on failure.
 */
-    static int amdgpu_atif_verify_interface(acpi_handle handle,
-        struct amdgpu_atif *atif)
+    static int amdgpu_atif_verify_interface(struct amdgpu_atif *atif)
{
    union acpi_object *info;
    struct atif_verify_interface output;
    size_t size;
    int err = 0;

    -info = amdgpu_atif_call(handle, ATIF_FUNCTION_VERIFY_INTERFACE, NULL);
+info = amdgpu_atif_call(atif, ATIF_FUNCTION_VERIFY_INTERFACE, NULL);
    if (!info)
        return -EIO;
@@ -176,6 +216,35 @@
return err;
}

+static acpi_handle amdgpu_atif_probe_handle(acpi_handle dhandle)
+{
+acpi_handle handle = NULL;
+char acpi_method_name[255] = { 0 };
+struct acpi_buffer buffer = { sizeof(acpi_method_name), acpi_method_name };
+acpi_status status = ACPI_SUCCESS;
+
+/* For PX/HG systems, ATIF and ATPX are in the iGPU’s namespace, on dGPU only
+ * systems, ATIF is in the dGPU’s namespace.
+ */
+status = acpi_get_handle(dhandle, "ATIF", &handle);
+if (ACPI_SUCCESS(status))
+goto out;
+
+if (amdgpu_has_atpx()) {
+status = acpi_get_handle(amdgpu_atpx_get_dhandle(), "ATIF", &handle);
+if (ACPI_SUCCESS(status))
+goto out;
+}
+DMP_DEBUG_DRIVER("No ATIF handle found\n");
+return NULL;
+out:
+acpi_get_name(handle, ACPI_FULL_PATHNAME, &buffer);
+DMP_DEBUG_DRIVER("Found ATIF handle %s\n", acpi_method_name);
+return handle;
+}

/**
 * amdgpu_atif_get_notification_params - determine notify configuration
 * where n is specified in the result if a notifier is used.
 * Returns 0 on success, error on failure.
 */
-static int amdgpu_atif_get_notification_params(acpi_handle handle, 
-struct amdgpu_atif_notification_cfg *n)
+static int amdgpu_atif_get_notification_params(struct amdgpu_atif *atif)
{
union acpi_object *info;
+struct amdgpu_atif_notification_cfg *n = &atif->notification_cfg;
struct atif_system_params params;
size_t size;
int err = 0;
info = amdgpu_atif_call(handle, ATIF_FUNCTION_GET_SYSTEM_PARAMETERS, NULL);
+info = amdgpu_atif_call(atif, ATIF_FUNCTION_GET_SYSTEM_PARAMETERS,
+NULL);
if (!info) {
  err = -EIO;
goto out;
@@ -250,14 +320,15 @@
  * (all asics).
  * Returns 0 on success, error on failure.
  */
+static int amdgpu_atif_get_sbios_requests(struct amdgpu_atif *atif,
+struct atif_sbios_requests *req)
+  {
union acpi_object *info;
  size_t size;
  int count = 0;
- info = amdgpu_atif_call(handle, ATIF_FUNCTION_GET_SYSTEM_BIOS_REQUESTS, NULL);
+ info = amdgpu_atif_call(atif, ATIF_FUNCTION_GET_SYSTEM_BIOS_REQUESTS,
+ NULL);
if (!info)
  return -EIO;
@@ -290,11 +361,10 @@
  * Returns NOTIFY code
  */
static int amdgpu_atif_handler(struct amdgpu_device *adev,
-struct acpi_bus_event *event)
+struct acpi_bus_event *event)
{
-struct amdgpu_atif *atif = &adev->atif;
+struct amdgpu_atif *atif = adev->atif;
struct atif_sbios_requests req;
-acpi_handle handle;
  int count;

DRM_DEBUG_DRIVER("event, device_class = %s, type = %#x\n",
@@ -303,14 +373,14 @@
  if (strcmp(event->device_class, ACPI_VIDEO_CLASS) != 0)
    return NOTIFY_DONE;
+if (!atif->notification_cfg.enabled)
+  if (!atif)
+    !atif->notification_cfg.enabled
+      event->type != atif->notification_cfg.command_code)
/* Not our event */
return NOTIFY_DONE;

/* Check pending SBIOS requests */
-handle = ACPI_HANDLE(&adev->pdev->dev);
-count = amdgpu_atif_get_sbios_requests(handle, &req);
+count = amdgpu_atif_get_sbios_requests(atif, &req);

if (count <= 0)
return NOTIFY_DONE;
@@ -335,8 +405,7 @@}
}
}
if (req.pending & ATIF_DGPU_DISPLAY_EVENT) {
-    if ((adev->flags & AMD_IS_PX) &&
-        amdgpu_atpx_dgpu_req_power_for_displays()) {
+    if (adev->flags & AMD_IS_PX) {
        pm_runtime_get_sync(adev->ddev->dev);
/* Just fire off a uevent and let userspace tell us what to do */
drm_helper_hpd_irq_event(adev->ddev);
@@ -540,6 +609,9 @@
size_t size;
u32 retry = 3;

+if (amdgpu_acpi_pcie_notify_device_ready(adev))
+return -EINVAL;
+
/* Get the device handle */
handle = ACPI_HANDLE(&adev->pdev->dev);
if (!handle)
@@ -638,8 +710,8 @@
*/
int amdgpu_acpi_init(struct amdgpu_device *adev)
{
    -acpi_handle handle;
-struct amdgpu_atif *atif = &adev->atif;
+acpi_handle handle, atif_handle;
+struct amdgpu_atif *atif;
struct amdgpu_atcs *atcs = &adev->atcs;
int ret;

    @@ -655,12 +727,26 @@
DRM_DEBUG_DRIVER("Call to ATCS verify_interface failed: %dn", ret);
}

+/* Probe for ATIF, and initialize it if found */
+atif_handle = amdgpu_atif_probe_handle(handle);
+if (!atif_handle)
goto out;
+
+atif = kzalloc(sizeof(*atif), GFP_KERNEL);
+if (!atif) {
+DRM_WARN("Not enough memory to initialize ATIF\n");
+goto out;
+
+atif->handle = atif_handle;
+
/* Call the ATIF method */
-ret = amdgpu_atif_verify_interface(handle, atif);
+ret = amdgpu_atif_verify_interface(atif);
if (ret) {
DRM_DEBUG_DRIVER("Call to ATIF verify_interface failed: %d\n", ret);
+kfree(atif);
 goto out;
}
+adev->atif = atif;

if (atif->notifications.brightness_change) {
 struct drm_encoder *tmp;
@@ -690,8 +776,7 @@
}

if (atif->functions.system_params) {
-ret = amdgpu_atif_get_notification_params(handle,
-&atif->notification_cfg);
+ret = amdgpu_atif_get_notification_params(atif);
if (ret) {
DRM_DEBUG_DRIVER("Call to GET_SYSTEM_PARAMS failed: %d\n", ret);
@@ -717,4 +802,6 @@
 void amdgpu_acpi_fini(struct amdgpu_device *adev)
 {
 unregister_acpi_notifier(&adev->acpi_nb);
+if (adev->atif)
+kfree(adev->atif);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_amdkfd.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_amdkfd.c
@@ -265,6 +265,9 @@
{
 struct amdgpu_device *adev = (struct amdgpu_device *)kgd;

-/* The sclk is in quantas of 10kHz */
-return adev->pm.dpm.dyn_state.max_clock_voltage_on_ac.sclk / 100;
+/* the sclk is in quantas of 10kHz */
+if (amdgpu_sriov_vf(adev))
+return adev->clock.default_sclk / 100;
+
+return amdgpu_dpm_get_sclk(adev, false) / 100;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_amdkfd.h
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_amdkfd.h
@@ -26,6 +26,7 @@
#define AMDGPU_AMDKFD_H_INCLUDED
#include <linux/types.h>
+include <linux/mm.h>
#include <linux/mmu_context.h>
#include <kgd_kfd_interface.h>
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_amdkfd_gfx_v7.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_amdkfd_gfx_v7.c
@@ -586,7 +586,7 @@
while (true) {
    temp = RREG32(sdma_base_addr + mmSDMA0_RLC0_CONTEXT_STATUS);
-    if (temp & SDMA0_STATUS__REG_RB_CMD_IDLE__SHIFT)
+    if (temp & SDMA0_RLC0_CONTEXT_STATUS__IDLE_MASK)
        break;
    if (timeout <= 0)
        return -ETIME;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_atombios.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_atombios.c
@@ -336,17 +336,9 @@
 path_size += le16_to_cpu(path->usSize);

 if (device_support & le16_to_cpu(path->usDeviceTag)) {
-    uint8_t con_obj_id, con_obj_num, con_obj_type;
-    
-    con_obj_id =
-    uint8_t con_obj_id =
-        (le16_to_cpu(path->usConnObjectId) & OBJECT_ID_MASK)
-         >> OBJECT_ID_SHIFT;
-    con_obj_num =
-        (le16_to_cpu(path->usConnObjectId) & ENUM_ID_MASK)
-         >> ENUM_ID_SHIFT;
-    con_obj_type =
-        (le16_to_cpu(path->usConnObjectId) &
-         OBJECT_TYPE_MASK) >> OBJECT_TYPE_SHIFT;

 /* Skip TV/CV support */
 if ((le16_to_cpu(path->usDeviceTag) ==
    @@ -371,15 +363,7 @@
 router.ddc_valid = false;
router.cd_valid = false;
for (j = 0; j < ((le16_to_cpu(path->usSize) - 8) / 2); j++) {
    uint8_t grph_obj_id, grph_obj_num, grph_obj_type;
    grph_obj_id = (le16_to_cpu(path->usGraphicObjIds[j]) & OBJECT_ID_MASK) >> OBJECT_ID_SHIFT;
    grph_obj_num = (le16_to_cpu(path->usGraphicObjIds[j]) & ENUM_ID_MASK) >> ENUM_ID_SHIFT;
    grph_obj_type = (le16_to_cpu(path->usGraphicObjIds[j]) & OBJECT_TYPE_MASK) >> OBJECT_TYPE_SHIFT;
}

#include "amd_acpi.h"

#define AMDGPU_PXQUIRK_FORCE_ATPX (1 << 0)

+struct amdgpu_px_quirk {
+ u32 chip_vendor;
+ u32 chip_device;
+ u32 subsys_vendor;
+ u32 subsys_device;
+ u32 px_quirk_flags;
+};
+
+ struct amdgpu_atpx_functions {
+ bool px_params;
+ bool power_cntl;
+ static struct amdgpu_atpx_priv {
+ bool atpx_detected;
+ bool bridge_pm_usable;
+ unsigned int quirks;
+ /* handle for device - and atpx */
+ acpi_handle dhandle;
+ acpi_handle other_handle;
+ return amdgpu_atpx_priv.atpx.dgpu_req_power_for_displays;
+}
+
+if defined(CONFIG ACPI) +void *amdgpu_atpx_get_dhandle(void) {

+return amdgpu_atpx_priv.dhandle;
+
+/*
+ * amdgpu_atpx_call - call an ATPX method
+ *
+ @ @ -205,13 +222,19 @@
+
+atpx->is_hybrid = false;
+if (valid_bits & ATPX_MS_HYBRID_GFX_SUPPORTED) {
+-printk("ATPX Hybrid Graphics\n");
+/*
+ * Disable legacy PM methods only when pcie port PM is usable,
+ * otherwise the device might fail to power off or power on.
+ * 
+atpx->functions.power_cntl = !amdgpu_atpx_priv.bridge_pm_usable;
+atpx->is_hybrid = true;
+if (amdgpu_atpx_priv.quirks & AMDGPU_PX_QUIRK_FORCE_ATPX) {
++printk("ATPX Hybrid Graphics, forcing to ATPX\n");
+atpx->functions.power_cntl = true;
+atpx->is_hybrid = false;
+} else {
++printk("ATPX Hybrid Graphics\n");
++/*
+ * Disable legacy PM methods only when pcie port PM is usable,
+ * otherwise the device might fail to power off or power on.
+ */
+atpx->functions.power_cntl = !amdgpu_atpx_priv.bridge_pm_usable;
+atpx->is_hybrid = true;
+}
+}
+
+atpx->dgpu_req_power_for_displays = false;
@@ -533,7 +570,7 @@
+ * look up whether we are the integrated or discrete GPU (all asics).
+ * Returns the client id.
+ */
-static int amdgpu_atpx_get_client_id(struct pci_dev *pdev)
+static int amdgpu_atpx_get_client_id(struct pci_dev *pdev)
+{
+ if (amdgpu_atpx_priv.dhandle == ACPI_HANDLE(&pdev->dev))
+ return VGA_SWITCHEROO_IGD;
+ @@ -547,6 +570,35 @@
+.get_client_id = amdgpu_atpx_get_client_id,
+};
+
++static const struct amdgpu_px_quirk amdgpu.px_quirk_list[] = {

/* HG_PR3 doesn't seem to work on this A+A weston board */

static const struct amdgpu_px_quirk
+
{ 0x1002, 0x6900, 0x1002, 0x0124, AMDGPU_PX_QUIRK_FORCE_ATPX },
+
{ 0x1002, 0x6900, 0x1028, 0x0813, AMDGPU_PX_QUIRK_FORCE_ATPX },
+
{ 0x1002, 0x6900, 0x1025, 0x125A, AMDGPU_PX_QUIRK_FORCE_ATPX },
+
{ 0x1002, 0x67DF, 0x1028, 0x0774, AMDGPU_PX_QUIRK_FORCE_ATPX },
+
{ 0x1002, 0x6900, 0x17AA, 0x3806, AMDGPU_PX_QUIRK_FORCE_ATPX },
+
{ 0, 0, 0, 0 },
+
};
+
+
static void amdgpu_atpx_get_quirks(struct pci_dev *pdev)
+
{ }
+
/* Apply PX quirks */
+
while (p & p->chip_device != 0) {
    if (pdev->vendor == p->chip_vendor &
        pdev->device == p->chip_device &
        pdev->subsystem_vendor == p->subsys_vendor &
        pdev->subsystem_device == p->subsys_device) {
        amdgpu_atpx_priv quirks |= p->px_quirk_flags;
        break;
    }
    ++p;
    +}
+
++p;
+
+
+/*
 * amdgpu_atpx_detect - detect whether we have PX
 *

parent_pdev = pci_upstream_bridge(pdev);
d3_supported |= parent_pdev && parent_pdev->bridge_d3;
+amdgpu_atpx_get_quirks(pdev);
}

while ((pdev = pci_get_class(PCI_CLASS_DISPLAY_OTHER << 8, pdev)) != NULL) {
    parent_pdev = pci_upstream_bridge(pdev);
d3_supported |= parent_pdev && parent_pdev->bridge_d3;
+amdgpu_atpx_get_quirks(pdev);
}

if (has_atpx && vga_count == 2) {
--- linux-4.15.0.orig/drivers/gpu/drm/amdgpu/amdgpu_bios.c
static bool amdgpu_read_platform_bios(struct amdgpu_device *adev)
{
    uint8_t __iomem *bios;
    size_t size;
    phys_addr_t rom = adev->pdev->rom;
    size_t romlen = adev->pdev->romlen;
    void __iomem *bios;

    adev->bios = NULL;

    bios = pci_platform_rom(adev->pdev, &size);
    if (!bios) {
        if (!rom || romlen == 0)
            return false;
    }

    adev->bios = kzalloc(size, GFP_KERNEL);
    if (adev->bios == NULL)
        return false;

    memcpy_fromio(adev->bios, bios, size);
    bios = ioremap(rom, romlen);
    if (!bios)
        goto free_bios;

    if (!check_atom_bios(adev->bios, size)) {
        kfree(adev->bios);
        return false;
    }

    memcpy_fromio(adev->bios, bios, romlen);
    iounmap(bios);
    +
    if (!check_atom_bios(adev->bios, romlen))
        goto free_bios;

    adev->bios_size = size;
    adev->bios_size = romlen;

    return true;
    +free_bios;
    +kfree(adev->bios);
    +return false;
}
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#ifdef CONFIG_ACPI
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_bo_list.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_bo_list.c
@@ -233,8 +233,10 @@
     unsigned priority = list->array[i].priority;

     list_add_tail(&list->array[i].tv.head,
-       &bucket[priority]);
+       if (!list->array[i].robj->parent)
+     list_add_tail(&list->array[i].tv.head,
         &bucket[priority]);
         list->array[i].user_pages = NULL;
     }

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_cgs.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_cgs.c
@@ -774,13 +774,16 @@
         break;
     case CHIP_POLARIS10:
         if (type == CGS_UCODE_ID_SMU) {
-           if (((adev->pdev->device == 0x67df) &&
-             ((adev->pdev->revision == 0xe0) ||
-             (adev->pdev->revision == 0xe3) ||
-             (adev->pdev->revision == 0xe4) ||
-             (adev->pdev->revision == 0xe5) ||
-             (adev->pdev->revision == 0xe7) ||
-             (adev->pdev->revision == 0xef))) ||
+           if (((adev->pdev->device == 0x67df) &&
+             ((adev->pdev->revision == 0xe0) ||
+             (adev->pdev->revision == 0xe3) ||
+             (adev->pdev->revision == 0xe4) ||
+             (adev->pdev->revision == 0xe5) ||
+             (adev->pdev->revision == 0xe7) ||
+             (adev->pdev->revision == 0xef)))
               info->is_kicker = true;
               strcpy(fw_name, "amdgpu/polaris10_k_smc.bin");
         } else
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_connectors.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_connectors.c
@@ -69,25 +69,18 @@
/* don't do anything if sink is not display port, i.e.,
   * passive dp->(dvi|hdmi) adaptor
/*
- if (dig_connector->dp_sink_type == CONNECTOR_OBJECT_ID_DISPLAYPORT) {
- int saved_dpms = connector->dpms;
- */
- */ Only turn off the display if it's physically disconnected */
- if (!amdgpu_display_hpd_sense(adev, amdgpu_connector->hpd.hpd)) {
- drm_helper_connector_dpms(connector, DRM_MODE_DPMS_OFF);
- } else if (amdgpu_atombios_dp_needs_link_train(amdgpu_connector)) {
- */ Don't try to start link training before we
- * have the dpdc */
- if (amdgpu_atombios_dp_get_dpcd(amdgpu_connector))
- return;
- }
- } else if (amdgpu_atombios_dp_needs_link_train(amdgpu_connector)) {
- */ Don't try to start link training before we
- * have the dpdc */
- if (amdgpu_atombios_dp_get_dpcd(amdgpu_connector))
- return;
- }
- */ set it to OFF so that drm_helper_connector_dpms()
- * won't return immediately since the current state
- * is ON at this point.
- */
- connector->dpms = DRM_MODE_DPMS_OFF;
- drm_helper_connector_dpms(connector, DRM_MODE_DPMS_ON);
- }
- connector->dpms = saved_dpms;
+ if (dig_connector->dp_sink_type == CONNECTOR_OBJECT_ID_DISPLAYPORT &&
+ amdgpu_display_hpd_sense(adev, amdgpu_connector->hpd.hpd) &&
+ amdgpu_atombios_dp_needs_link_train(amdgpu_connector)) {
+ */ Don't start link training before we have the DPCD */
+ if (amdgpu_atombios_dp_get_dpcd(amdgpu_connector))
+ return;
+ }
+ */ Turn the connector off and back on immediately, which
+ * will trigger link training
+ */
+ drm_helper_connector_dpms(connector, DRM_MODE_DPMS_OFF);
+ drm_helper_connector_dpms(connector, DRM_MODE_DPMS_ON);
}
}

@@ -737,9 +730,13 @@
enum drm_connector_status ret = connector_status_disconnected;
int r;

-r = pm_runtime_get_sync(connector->dev->dev);
- if (r < 0)
- return connector_status_disconnected;
+ if (!drm_kms_helper_is_poll_worker()) {
+ r = pm_runtime_get_sync(connector->dev->dev);
+ if (r < 0) {
+ pm_runtime_put_autosuspend(connector->dev->dev);
+ return connector_status_disconnected;
+ }
if (encoder) {
    struct amdgpu_encoder *amdgpu_encoder = to_amdgpu_encoder(encoder);
    if (encoder) {
        struct amdgpu_encoder *amdgpu_encoder = to_amdgpu_encoder(encoder);
        amdgpu_connector_update_scratch_regs(connector, ret);
        pm_runtime_mark_last_busy(connector->dev->dev);
        pm_runtime_put_autosuspend(connector->dev->dev);
        if (!drm_kms_helper_is_poll_worker()) {
            pm_runtime_mark_last_busy(connector->dev->dev);
            pm_runtime_put_autosuspend(connector->dev->dev);
        }
        return ret;
    }
}

enum drm_connector_status ret = connector_status_disconnected;
int r;

r = pm_runtime_get_sync(connector->dev->dev);
if (r < 0)
    return connector_status_disconnected;
if (!drm_kms_helper_is_poll_worker()) {
    r = pm_runtime_get_sync(connector->dev->dev);
    if (r < 0) {
        pm_runtime_put_autosuspend(connector->dev->dev);
        return connector_status_disconnected;
    }
}
encoder = amdgpu_connector_best_single_encoder(connector);
if (!encoder)
    amdgpu_connector_update_scratch_regs(connector, ret);

out:
    pm_runtime_mark_last_busy(connector->dev->dev);
    pm_runtime_put_autosuspend(connector->dev->dev);
    if (!drm_kms_helper_is_poll_worker()) {
        pm_runtime_mark_last_busy(connector->dev->dev);
        pm_runtime_put_autosuspend(connector->dev->dev);
    }
    return ret;
enum drm_connector_status ret = connector_status_disconnected;
bool dret = false, broken_edid = false;

-r = pm_runtime_get_sync(connector->dev->dev);
-if (r < 0)
-return connector_status_disconnected;
+if (!drm_kms_helper_is_poll_worker()) {
+r = pm_runtime_get_sync(connector->dev->dev);
+if (r < 0) {
+pm_runtime_put_autosuspend(connector->dev->dev);
+return connector_status_disconnected;
+}
+
}

if (!force && amdgpui::connector_check_hpd_status_unchanged(connector)) {
ret = connector->status;
@@ -1116,8 +1127,10 @@
amdgpui::connector_update_scratch_regs(connector, ret);

exit:
-pm_runtime_mark_last_busy(connector->dev->dev);
-pm_runtime_put_autosuspend(connector->dev->dev);
+if (!drm_kms_helper_is_poll_worker()) {
+pm_runtime_mark_last_busy(connector->dev->dev);
+pm_runtime_put_autosuspend(connector->dev->dev);
+
}

return ret;
}
@@ -1360,9 +1373,13 @@
struct drm_encoder *encoder = amdgpui::connector_best_single_encoder(connector);
int r;

-r = pm_runtime_get_sync(connector->dev->dev);
-if (r < 0)
-return connector_status_disconnected;
+if (!drm_kms_helper_is_poll_worker()) {
+r = pm_runtime_get_sync(connector->dev->dev);
+if (r < 0) {
+pm_runtime_put_autosuspend(connector->dev->dev);
+return connector_status_disconnected;
+}
+
}

if (!force && amdgpui::connector_check_hpd_status_unchanged(connector)) {
ret = connector->status;

@@ -1430,8 +1447,10 @@
    pm_runtime_mark_last_busy(connector->dev->dev);
    pm_runtime_put_autosuspend(connector->dev->dev);
    +if (!drm_kms_helper_is_poll_worker()) {
    +    pm_runtime_mark_last_busy(connector->dev->dev);
    +    pm_runtime_put_autosuspend(connector->dev->dev);
    +}

    return ret;
 }
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_cs.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_cs.c
@@ -38,6 +38,7 @@
 {
     struct drm_gem_object *gobj;
     unsigned long size;
+    int r;

     gobj = drm_gem_object_lookup(p->filp, data->handle);
     if (gobj == NULL)
@@ -49,20 +50,26 @@
         p->uf_entry.tv.shared = true;
         p->uf_entry.user_pages = NULL;

-        size = amdgpu_bo_size(p->uf_entry.robj);
-        if (size != PAGE_SIZE || (data->offset + 8) > size)
-            -EINVAL;
-        -*offset = data->offset;
-        drm_gem_object_put_unlocked(gobj);
+        size = amdgpu_bo_size(p->uf_entry.robj);
+        if (size != PAGE_SIZE || (data->offset + 8) > size) {
+            r = -EINVAL;
+            goto error_unref;
+        }
+        if (amdgpu_ttm_tt_get_usermm(p->uf_entry.robj->tbo.ttm)) {
+            amdgpu_bo_unref(&p->uf_entry.robj);
+            return -EINVAL;
+        }
+        return -EINVAL;
+        goto error_unref;
 }
static int amdgpu_cs_parser_init(struct amdgpu_cs_parser *p, void *data)
{
    INIT_LIST_HEAD(&duplicates);
    amdgpu_vm_get_pd_bo(&fpriv->vm, &p->validated, &p->vm_pd);

    if (p->uf_entry.robj)
        return 0;
    return r;
}

static int amdgpu_cs_find_mapping(struct amdgpu_cs_chunk *chunk, struct amdgpu_bo_va_mapping *m)
{
    uint64_t offset, va_start;
    uint8_t *kptr;

    if (chunk->chunk_id != AMDGPU_CHUNK_ID_IB)
        continue;

    if ((chunk->va_start + chunk->ib_bytes) > (m->last + 1) * AMDGPU_GPU_PAGE_SIZE) {
        DRM_ERROR("IB va_start+ib_bytes is invalid\n");
        return -EINVAL;
    }

    return 0;
}

int amdgpu_cs_load_mapping(struct amdgpu_cs_chunk *chunk)
{
    struct amdgpu_bo_va_mapping *m;
    struct amdgpu_bo *aobj = NULL;

    if (chunk->chunk_id != AMDGPU_CHUNK_ID_IB)
        continue;

    if ((chunk->va_start + chunk->ib_bytes) > (m->last + 1) * AMDGPU_GPU_PAGE_SIZE) {
        DRM_ERROR("IB va_start+ib_bytes is invalid\n");
        return -EINVAL;
    }

    return 0;
}
offset = m->start * AMDGPU_GPU_PAGE_SIZE;  
-kptr += chunk_ib->va_start - offset;  
+kptr += va_start - offset;  

memcpy(ib->ptr, kptr, chunk_ib->ib_bytes);  
amdgpu_bo_kunmap(aobj));  
@@ -915,6 +922,10 @@  
r = amdgpu_bo_vm_update_pte(p);  
if (r)  
return r;  
+  
+r = reservation_object_reserve_shared(vm->root.base.bo->tbo.resv);  
+if (r)  
+return r;  
}  

return amdgpu_cs_sync_rings(p);  
@@ -959,13 +970,9 @@  
if (r)  
return r;  

-if (chunk_ib->flags & AMDGPU_IB_FLAG_PREAMBLE) {  
-parser->job->preamble_status |= AMDGPU_PREAMBLE_IB_PRESENT;  
-if (!parser->ctx->preamble_presented) {  
-parser->job->preamble_status |= AMDGPU_PREAMBLE_IB_PRESENT_FIRST;  
-parser->ctx->preamble_presented = true;  
-}  
-}  
+if (chunk_ib->flags & AMDGPU_IB_FLAG_PREAMBLE)  
+parser->job->preamble_status |=  
+AMDGPU_PREAMBLE_IB_PRESENT;  

if (parser->job->ring && parser->job->ring != ring)  
return -EINVAL;  
@@ -1190,6 +1197,12 @@  
+if ((job->preamble_status & AMDGPU_PREAMBLE_IB_PRESENT) &&  
+ !p->ctx->preamble_presented) {  
+job->preamble_status |= AMDGPU_PREAMBLE_IB_PRESENT_FIRST;  
+p->ctx->preamble_presented = true;  
+}  
+  
+cs->out.handle = seq;  
+job->uf_sequence = seq;
if (other) {
signed long r;
-r = dma_fence_wait_timeout(other, false, MAX_SCHEDULE_TIMEOUT);
+r = dma_fence_wait(other, true);
if (r < 0) {
-DRM_ERROR("Error (%ld) waiting for fence!\n", r);
+if (r != -ERESTARTSYS)
+DRM_ERROR("Error (%ld) waiting for fence!\n", r);
+
return r;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_device.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_device.c
@@ -526,7 +526,7 @@
 memset(&adev->wb.used, 0, sizeof(adev->wb.used));

 /* clear wb memory */
-memset((char *)adev->wb.wb, 0, AMDGPU_MAX_WB * sizeof(uint32_t));
+memset((char *)adev->wb.wb, 0, AMDGPU_MAX_WB * sizeof(uint32_t) * 8);
 }

 return 0;
@@ -564,8 +564,9 @@
*/
void amdgpu_wb_free(struct amdgpu_device *adev, u32 wb)
{
   wb >>= 3;
 if (wb < adev->wb.num_wb)
-__clear_bit(wb >> 3, adev->wb.used);
+__clear_bit(wb, adev->wb.used);
 }

/**
 @@ -1922,7 +1923,7 @@
 AMD_IP_BLOCK_TYPE_IH,
 });

-for (i = 0; i < ARRAY_SIZE(ip_order); i++) {
+for (i = 0; i < adev->num_ip_blocks; i++) {
   int j;
   struct amdgpu_ip_block *block;

switch (asic_type) {
#if defined(CONFIG_DRM_AMD_DC)
    case CHIP_BONAIRE:
    case CHIP_HAWAII:
    case CHIP_KAVERI:
+    case CHIP_KABINI:
+    case CHIP_MULLINS:
+    */
+    /* We have systems in the wild with these ASICs that require
+       * LVDS and VGA support which is not supported with DC.
+       * Fallback to the non-DC driver here by default so as not to
+       * cause regressions.
+       */
+    return amdgpu_dc > 0;
    case CHIP_HAWAII:
    case CHIP_CARRIZO:
    case CHIP_STONEY:
    case CHIP_POLARIS11:
    #if defined(CONFIG_DRM_AMD_DC_PRE_VEGA)
        return amdgpu_dc != 0;
    #endif
    -case CHIP_KABINI:
    -case CHIP_MULLINS:
    -return amdgpu_dc > 0;
    case CHIP_VEGA10:
    #if defined(CONFIG_DRM_AMD_DC_DCN1_0)
        case CHIP_RAVEN:
        @ @ -2228,8 +2236,6 @ @
        * ignore it */
vga_client_register(adev->pdev, adev, NULL, amdgpu_vga_set_decode);
-    -if (amdgpu_runtime_pm == 1)
-        runtime = true;
-    if (amdgpu_device_is_px(ddev))
        runtime = true;
-    if (!pci_is_thunderbolt_attached(adev->pdev))
-        ret = pm_runtime_get_sync(dev->dev);
    if (ret < 0)
        -return ret;
        +goto out;
ret = drm_crtc_helper_set_config(set, ctx);

adev->have_disp_power_ref = false;
}

+out:
/* drop the power reference we got coming in here */
pm_runtime_put_autosuspend(dev->dev);
return ret;

@if (amdgpu_device_has_dc_support(adev)) {
+adev->mode_info.max_bpc_property =
+drm_property_create_range(adev->ddev, 0, "max bpc", 8, 16);
+if (!adev->mode_info.max_bpc_property)
+return -ENOMEM;
+
+return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_drv.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_drv.c
@@ -516,6 +516,7 @@
{0x1002, 0x67CA, PCI_ANY_ID, PCI_ANY_ID, 0, 0, CHIP_POLARIS10},
{0x1002, 0x67CC, PCI_ANY_ID, PCI_ANY_ID, 0, 0, CHIP_POLARIS10},
{0x1002, 0x67CF, PCI_ANY_ID, PCI_ANY_ID, 0, 0, CHIP_POLARIS10},
+{0x1002, 0x6FDF, PCI_ANY_ID, PCI_ANY_ID, 0, 0, CHIP_POLARIS10},
/* Polaris12 */
{0x1002, 0x6980, PCI_ANY_ID, PCI_ANY_ID, 0, 0, CHIP_POLARIS12},
{0x1002, 0x6981, PCI_ANY_ID, PCI_ANY_ID, 0, 0, CHIP_POLARIS12},
@@ -587,6 +588,41 @@
if (ret == -EPROBE_DEFER)
return ret;

+#ifdef CONFIG_DRM_AMDGPU_SI
+if (!amdgpu_si_support) {
+switch (flags & AMD_ASIC_MASK) {
+case CHIP_TAHITI:
+case CHIP_PITCAIRN:
+case CHIP_VERDE:
+case CHIP_OLAND:
+case CHIP_HAINAN:
+dev_info(&pdev->dev,
+ "SI support provided by radeon.
");

---
+dev_info(&pdev->dev,
+ "Use radeon.si_support=0 amdgpu.si_support=1 to override."
+);
+return -ENODEV;
+
+#endif
+#ifdef CONFIG_DRM_AMDGPU_CIK
+if (!amdgpu_cik_support) {
+switch (flags & AMD_ASIC_MASK) {
+case CHIP_KAVERI:
+case CHIP_BONAIRE:
+case CHIP_HAWAII:
+case CHIP_KABINI:
+case CHIP_MULLINS:
+dev_info(&pdev->dev,
+ "CIK support provided by radeon."
+);
+dev_info(&pdev->dev,
+ "Use radeon.cik_support=0 amdgpu.cik_support=1 to override."
+);
+return -ENODEV;
+}
+
+/* Get rid of things like offb */
ret = amdgpu_kick_out_firmware_fb(pdev);
if (ret)
@@ -710,7 +746,6 @@
         drm_dev->switch_power_state = DRM_SWITCH_POWER_CHANGING;
         drm_kms_helper_poll_disable(drm_dev);
         -vga_switcheroo_set_dynamic_switch(pdev, VGA_SWITCHEROO_OFF);

         ret = amdgpu_device_suspend(drm_dev, false, false);
         pci_save_state(pdev);
@@ -747,7 +782,6 @@
         drm_dev->switch_power_state = DRM_SWITCH_POWER_ON;
         return 0;
}
@@ -785,11 +819,12 @@
         dev = file_priv->minor->dev;
         ret = pm_runtime_get_sync(dev->dev);
         if (ret < 0)


-return ret;
+goto out;

ret = drm_ioctl(filp, cmd, arg);

pm_runtime_mark_last_busy(dev->dev);
+out:
pm_runtime_put_autosuspend(dev->dev);
return ret;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_fence.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_fence.c
@@ -135,8 +135,9 @@
{
struct amdgpu_device *adev = ring->adev;
struct amdgpu_fence *fence;
-struct dma_fence *old, **ptr;
+struct dma_fence __rcu **ptr;
uint32_t seq;
+int r;

fence = kmem_cache_alloc(amdgpu_fence_slab, GFP_KERNEL);
if (fence == NULL)
@@ -152,15 +153,24 @@
seq, AMDGPU_FENCE_FLAG_INT);

ptr = &ring->fence_drv.fences[seq & ring->fence_drv.num_fences_mask];
+if (unlikely(rcu_dereference_protected(*ptr, 1))) {
+struct dma_fence *old;
+    +rcu_read_lock();
+    +old = dma_fence_get_rcu_safe(ptr);
+    +rcu_read_unlock();
+    +if (old) {
+        +r = dma_fence_wait(old, false);
+        +dma_fence_put(old);
+        +if (r)
+        +return r;
+    }
+}
+ /* This function can't be called concurrently anyway, otherwise
+ * emitting the fence would mess up the hardware ring buffer.
+ */
-old = rcu_dereference_protected(*ptr, 1);
-if (old && !dma_fence_is_signaled(old)) {
-DRM_INFO("rcu slot is busy\n");
- dma_fence_wait(old, false);
- }
-
rcu_assign_pointer(*ptr, dma_fence_get(&fence->base));

*f = &fence->base;
@@ -385,7 +395,9 @@
ring->fence_drv.gpu_addr = adev->uvd.gpu_addr + index;
)
amdgpu_fence_write(ring, atomic_read(&ring->fence_drv.last_seq));
-amdgpu_irq_get(adev, irq_src, irq_type);
+ if (irq_src)
+ amdgpu_irq_get(adev, irq_src, irq_type);

ring->fence_drv.irq_src = irq_src;
ring->fence_drv.irq_type = irq_type;
@@ -501,8 +513,9 @@ /* no need to trigger GPU reset as we are unloading */
amdgpu_fence_driver_force_completion(adev);
} 
-amdgpu_irq_put(adev, ring->fence_drv.irq_src,
- ring->fence_drv.irq_type);
+ if (ring->fence_drv.irq_src)
+ amdgpu_irq_put(adev, ring->fence_drv.irq_src,
+ ring->fence_drv.irq_type);
amd_sched_fini(&ring->sched);
del_timer_sync(&ring->fence_drv.fallback_timer);
for (j = 0; j <= ring->fence_drv.num_fences_mask; ++j)
@@ -538,8 +551,9 @@
} }

/* disable the interrupt */
-amdgpu_irq_put(adev, ring->fence_drv.irq_src,
- ring->fence_drv.irq_type);
+ if (ring->fence_drv.irq_src)
+ amdgpu_irq_put(adev, ring->fence_drv.irq_src,
+ ring->fence_drv.irq_type);
}

@@ -565,8 +579,9 @@
continue;

/* enable the interrupt */
-amdgpu_irq_get(adev, ring->fence_drv.irq_src,
- ring->fence_drv.irq_type);
+ if (ring->fence_drv.irq_src)
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_gem.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_gem.c
@@ -36,8 +36,6 @@
 struct amdgpu_bo *robj = gem_to_amdgpu_bo(gobj);

 if (robj) {
- if (robj->gem_base.import_attach)
- drm_prime_gem_destroy(&robj->gem_base, robj->tbo.sg);
+ amdgpu_mn_unregister(robj);
+ amdgpu_bo_unref(&robj);
 }

@@ -554,6 +552,18 @@

 uint64_t va_flags;
 int r = 0;

 if (args->va_address < AMDGPU_VA_RESERVED_SIZE) {
- return -EINVAL;
 }
+ if (args->va_address >= AMDGPU_VA_HOLE_START \
+ && args->va_address < AMDGPU_VA_HOLE_END) { 
+ dev_dbg(&dev->pdev->dev, 
+ "va_address 0x%lx is in VA hole 0x%lx-0x%lx\n",
+ args->va_address, AMDGPU_VA_HOLE_START, 
+ AMDGPU_VA_HOLE_END);
+ return -EINVAL;
+ }
+ +args->va_address &= AMDGPU_VA_HOLE_MASK;
+ +vm_size = adev->vm_manager.max_pfn * AMDGPU_GPU_PAGE_SIZE;
+vm_size -= AMDGPU_VA_RESERVED_SIZE;
+if (args->va_address + args->map_size > vm_size) {
+ dev_dbg(&dev->pdev->dev, 
+ "va_address 0x%llx is in top reserved area 0x%llx\n",
+ args->va_address + args->map_size, vm_size);
+ return -EINVAL;
+ }
+ +
if ((args->flags & ~valid_flags) && (args->flags & ~prt_flags)) {
    dev_err(&dev->pdev->dev, "invalid flags combination 0x%08X\n",
            args->flags);
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_i2c.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_i2c.c
@@ -338,7 +338,7 @@
 void
 amdgpu_i2c_router_select_ddc_port(const struct amdgpu_connector *amdgpu_connector)
 {
-    u8 val;
+    u8 val = 0;
    if (!amdgpu_connector->router.ddc_valid)
        return;

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_ib.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_ib.c
@@ -163,8 +163,10 @@
} return r;
+	need_ctx_switch = ring->current_ctx != fence_ctx;
if (ring->funcs->emit_pipeline_sync && job &&
    ((tmp = amdgpu_sync_get_fence(&job->sched_sync)) ||
     (amdgpu_sriov_vf(adev) && need_ctx_switch) ||
     amdgpu_vm_need_pipeline_sync(ring, job))) {
    need_pipe_sync = true;
    dma_fence_put(tmp);
    ++ @ -192,7 +194,6 @@
    amdgpu_ring_emit_hdp_flush(ring);
}

skip_preamble = ring->current_ctx == fence_ctx;
-need_ctx_switch = ring->current_ctx != fence_ctx;
if (job && ring->funcs->emit_cntxcmd) {
    if (need_ctx_switch)
        status |= AMDGPU_HAVE_CTX_SWITCH;
++ @ -322,14 +323,45 @@
} unsigned i;
    int r, ret = 0;
+long tmo_gfx, tmo_mm;
+    +tmo_mm = tmo_gfx = AMDGPU_IB_TEST_TIMEOUT;
    +if (amdgpu_sriov_vf(adev)) {
        +/* for MM engines in hypervisor side they are not scheduled together
        + with CP and SDMA engines, so even in exclusive mode MM engine could
        + still running on other VF thus the IB TEST TIMEOUT for MM engines
        + under SR-IOV should be set to a long time. 8 sec should be enough
        + for the MM comes back to this VF.
tmo_mm = 8 * AMDGPU_IB_TEST_TIMEOUT;
}

if (amdgpu_sriov_runtime(adev)) {
	/* for CP & SDMA engines since they are scheduled together so
   * need to make the timeout width enough to cover the time
   * cost waiting for it coming back under RUNTIME only
   */

tmo_gfx = 8 * AMDGPU_IB_TEST_TIMEOUT;
}

for (i = 0; i < AMDGPU_MAX_RINGS; ++i)
struct amdgpu_ring *ring = adev->rings[i];
long tmo;

if (!ring || !ring->ready)
continue;

r = amdgpu_ring_test_ib(ring, AMDGPU_IB_TEST_TIMEOUT);
// MM engine need more time */

if (ring->funcs->type == AMDGPU_RING_TYPE_UVD ||
    ring->funcs->type == AMDGPU_RING_TYPE_VCE ||
    ring->funcs->type == AMDGPU_RING_TYPE_UVD_ENC ||
    ring->funcs->type == AMDGPU_RING_TYPE_VCN_DEC ||
    ring->funcs->type == AMDGPU_RING_TYPE_VCN_ENC)
    tmo = tmo_mm;
else
    tmo = tmo_gfx;
+
    r = amdgpu_ring_test_ib(ring, tmo);
    if (r)
        ring->ready = false;

for (j = 0; j < AMDGPU_MAX_IRQ_SRC_ID; ++j)
    struct amdgpu_irq_src *src = adev->irq.client[i].sources[j];

if (!src || !src->funcs || !src->funcs->set)
continue;
for (k = 0; k < src->num_types; k++)
amdgpu_irq_update(adev, src, k);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_job.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_job.c
@@ -183,7 +183,7 @@
for (j = 0; j < AMDGPU_MAX_IRQ_SRC_ID; ++j) {
    struct amdgpu_irq_src *src = adev->irq.client[i].sources[j];

-if (!src)
+if (!src || !src->funcs || !src->funcs->set)
    continue;
for (k = 0; k < src->num_types; k++)
amdgpu_irq_update(adev, src, k);
struct dma_fence *fence = NULL;
struct amdgpudevice *adev;
struct amdgpu_job *job;

int r;
int r = 0;

if (!sched_job) {
    DRM_ERROR("job is null\n");
    @ @ -210,6 +210,8 @ @
    job->fence = dma_fence_get(fence);
}

amdgpu_job_free_resources(job);
+
+fence = r ? ERR_PTR(r) : fence;
return fence;
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_kms.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_kms.c
@@ -88,41 +88,6 @@

struct amdgpu_device *adev;
int r, acpi_status;

-#ifdef CONFIG_DRM_AMDGPU_SI
-if (!amdgpusi_support) {
-    switch (flags & AMD_ASIC_MASK) {
-    case CHIP_TAHITI:
-    case CHIP_PITCAIRN:
-    case CHIP_VERDE:
-    case CHIP_OLAND:
-    case CHIP_HAINAN:
-        dev_info(dev->dev,
-        - "SI support provided by radeon.\n");
-        dev_info(dev->dev,
-        - "Use radeon.si_support=0 amdgpu.si_support=1 to override.\n" 
-        -t);
-        return -ENODEV;
-    }
-}
-#endif
-
-#ifdef CONFIG_DRM_AMDGPU_CIK
-if (!amdgpucik_support) {
-    switch (flags & AMD_ASIC_MASK) {
-    case CHIP_KAVERI:
-    case CHIP_BONAIRE:
-    case CHIP_HAWAII:
-    case CHIP_KABINI:
-    case CHIP_MULLINS:
-dev_info(dev->dev,
- "CIK support provided by radeon.nn"};
-dev_info(dev->dev,
- "Use radeon.cik_support=0 amdgpu.cik_support=1 to override.nn"
-);
-return -ENODEV;
-
-
-adev = kzalloc(sizeof(struct amdgpu_device), GFP_KERNEL);
-if (adev == NULL) {
-return -ENOMEM;
@@ -163,6 +128,7 @@
amdgpu_amdkfd_device_init(adev);
+amdgpu_device_is_px(dev)) {
+dev_pm_set_driver_flags(dev->dev, DPM_FLAG_NEVER_SKIP);
+pm_runtime_use_autosuspend(dev->dev);
+pm_runtime_set_autosuspend_delay(dev->dev, 5000);
+pm_runtime_set_active(dev->dev);
@@ -535,8 +501,15 @@
+ * in the bitfields */
+if (se_num == AMDGPU_INFO_MMR_SE_INDEX_MASK)
+se_num = 0xffffffff;
+else if (se_num >= AMDGPU_GFX_MAX_SE)
+return -EINVAL;
+if (sh_num == AMDGPU_INFO_MMR_SH_INDEX_MASK)
+sh_num = 0xffffffff;
+else if (sh_num >= AMDGPU_GFX_MAX_SH_PER_SE)
+return -EINVAL;
+
+if (info->read_mmr_reg.count > 128)
+return -EINVAL;
+
+regs = kmalloc_array(info->read_mmr_reg.count, sizeof(*regs), GFP_KERNEL);
+if (!regs)
@@ -557,8 +530,9 @@
+return n ? -EFAULT : 0;
+}
+case AMDGPU_INFO_DEV_INFO: {
+struct drm_amdgpu_info_device dev_info = {};
+struct drm_amdgpu_info_device dev_info;
+
+memset(&dev_info, 0, sizeof(dev_info));
+dev_info.device_id = dev->pdev->device;
+dev_info.chip_rev = adev->rev_id;
+dev_info.external_rev = adev->external_rev_id;
+dev_info.
@@ -586,7 +560,9 @@
 if (amdgpu_sriov_vf(adev))
     dev_info.ids_flags |= AMDGPU_IDS_FLAGS_PREEMPTION;
     dev_info.virtual_address_offset = AMDGPU VA_RESERVED_SIZE;
-    dev_info.virtual_address_max = (uint64_t) adev->vm_manager.max_pfn * AMDGPU_GPU_PAGE_SIZE;
+    dev_info.virtual_address_max =
+    min(adev->vm_manager.max_pfn * AMDGPU_GPU_PAGE_SIZE,
+        AMDGPU VA_HOLE_START);
     dev_info.virtual_address_alignment = max((int) PAGE_SIZE, AMDGPU_GPU_PAGE_SIZE);
     dev_info.pte_fragment_size = (1 << adev->vm_manager.fragment_size) * AMDGPU_GPU_PAGE_SIZE;
     dev_info.gart_page_size = AMDGPU_GPU_PAGE_SIZE;
@@ -811,7 +787,7 @@
 r = pm_runtime_get_sync(dev->dev);
 if (r < 0)
     -return r;
+    goto pm_put;

 fpriv = kzalloc(sizeof(*fpriv), GFP_KERNEL);
 if (unlikely(!fpriv)) {
@@ -852,6 +828,7 @@
 out_suspend:
     pm_runtime_mark_last_busy(dev->dev);
+    pm_put:
     pm_runtime_put_autosuspend(dev->dev);

 return r;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_mn.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_mn.c
@@ -316,7 +316,7 @@
     unsigned long end = addr + amdgpu_bo_size(bo) - 1;
     struct amdgpu_device *adev = amdgpu_ttm_adev(bo->tbo.bdev);
     struct amdgpu_mn *rmn;
-    struct amdgpu_mn_node *node = NULL;
+    struct amdgpu_mn_node *node = NULL, *new_node;
     struct list_head bos;
     struct interval_tree_node *it;
@@ -324,6 +324,10 @@
     return PTR_ERR(rmn);
     new_node = kmalloc(sizeof(*new_node), GFP_KERNEL);
+    new_node = kmalloc(sizeof(*new_node), GFP_KERNEL);
+    if (!new_node)
+        return -ENOMEM;
+    INIT_LIST_HEAD(&bos);

     @ @ -324,6 +324,10 @@
     if (IS_ERR(rmn))
         return PTR_ERR(rmn);
+    new_node = kmalloc(sizeof(*new_node), GFP_KERNEL);
+    if (!new_node)
+        return -ENOMEM;
+    INIT_LIST_HEAD(&bos);
down_write(&rmn->lock);
@@ -337,13 +341,10 @@
 list_splice(&node->bos, &bos);
 }

-if (!node) {
-node = kmalloc(sizeof(struct amdgpu_mn_node), GFP_KERNEL);
-if (!node) {
-up_write(&rmn->lock);
-return -ENOMEM;
-}
-}
+if (!node)
+node = new_node;
+else
+kfree(new_node);

bo->mn = rmn;

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_mode.h
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_mode.h
@@ -345,6 +345,8 @@
 struct drm_property *audio_property;
 /* FMT dithering */
 struct drm_property *dither_property;
+/* maximum number of bits per channel for monitor color */
+struct drm_property *max_bpc_property;
 /* hardcoded DFP edid from BIOS */
 struct edid *bios_hardcoded_edid;
 int bios_hardcoded_edid_size;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_object.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_object.c
@@ -44,6 +44,8 @@
 amdgpu_bo_kunmap(bo);

+if (bo->gem_base.import_attach)
+drm_prime_gem_destroy(&bo->gem_base, bo->tbo.sg);
 drm_gem_object_release(&bo->gem_base);
 amdgpu_bo_unref(&bo->parent);
 if (!list_empty(&bo->shadow_list)) {
@@ -641,8 +643,12 @@
 return -EINVAL;
 /* A shared bo cannot be migrated to VRAM */
-if (bo->prime_shared_count && (domain == AMDGPU_GEM_DOMAIN_VRAM))
-return -EINVAL;

/*
if (bo->prime_shared_count) {
    if (domain & AMDGPU_GEM_DOMAIN_GTT)
        domain = AMDGPU_GEM_DOMAIN_GTT;
    else
        return -EINVAL;
}

if (bo->pin_count) {
    uint32_t mem_type = bo->tbo.mem.mem_type;
    if (domain == AMDGPU_GEM_DOMAIN_VRAM) {
        adev->vram_pin_size += amdgpu_bo_size(bo);
    -if (bo->flags & AMDGPU_GEM_CREATE_NO_CPU_ACCESS)
    -adev->invisible_pin_size += amdgpu_bo_size(bo);
    +adev->invisible_pin_size += amdgpu_vram_mgr_bo_invisible_size(bo);
    } else if (domain == AMDGPU_GEM_DOMAIN_GTT) {
        adev->gart_pin_size += amdgpu_bo_size(bo);
    }
    @ @ -738,8 +743,7 @@

    if (bo->tbo.mem.mem_type == TTM_PL_VRAM) {
    -adev->vram_pin_size += amdgpu_bo_size(bo);
    -if (bo->flags & AMDGPU_GEM_CREATE_NO_CPU_ACCESS)
    -adev->invisible_pin_size += amdgpu_bo_size(bo);
    +adev->invisible_pin_size -= amdgpu_vram_mgr_bo_invisible_size(bo);
    } else if (bo->tbo.mem.mem_type == TTM_PL_TT) {
        adev->gart_pin_size -= amdgpu_bo_size(bo);
    }
    @ @ +790,13 @@
    return amdgpu_ttm_init(adev);
}

+int amdgpu_bo_late_init(struct amdgpu_device *adev)
+{
    +amdgpu_ttm_late_init(adev);
    +
    +return 0;
    +}
+
void amdgpu_bo_fini(struct amdgpu_device *adev)
{
    amdgpu_ttm_fini(adev);
    --- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_object.h
    +++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_object.h
    @ @ -230,6 +230,7 @@
    int amdgpu_bo_unpin(struct amdgpu_bo *bo);
    int amdgpu_bo_evict_vram(struct amdgpu_device *adev);
int amdgpu_bo_init(struct amdgpu_device *adev);
+int amdgpu_bo_late_init(struct amdgpu_device *adev);
void amdgpu_bo_fini(struct amdgpu_device *adev);
int amdgpu_bo_fbdev_mmap(struct amdgpu_bo *bo,
 struct vm_area_struct *vma);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_pm.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_pm.c
@@ -31,6 +31,7 @@
 #include <linux/power_supply.h>
 #include <linux/hwmon.h>
 #include <linux/hwmon-sysfs.h>
+#include <linux/nospec.h>
 #include "amd_powerplay.h"

 @@ -72,7 +73,8 @@
 adev->pm.dpm.ac_power = true;
 else
 adev->pm.dpm.ac_power = false;
-+if (adev->powerplay.pp_funcs->enable_bapm)
+if (adev->powerplay.pp_funcs &&
 + adev->powerplay.pp_funcs->enable_bapm)
 amdgpu_dpm_enable_bapm(adev, adev->pm.dpm.ac_power);
 mutex_unlock(&adev->pm.mutex);
 }
@@ -310,6 +312,7 @@
 count = -EINVAL;
 goto fail;
 }
+idx = array_index_nospec(idx, ARRAY_SIZE(data.states));

 amdgpu_dpm_get_pp_num_states(adev, &data);
 state = data.states[idx];
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_psp.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_psp.c
 @@ -37,18 +37,10 @@
 static int psp_early_init(void *handle)
 {
 struct amdgpu_device *adev = (struct amdgpu_device *)handle;
+struct psp_context *psp = &adev->psp;

 psp_set_funcs(adev);

 -return 0;
 -}
-struct amdgpu_device *adev = (struct amdgpu_device *)handle;
-struct psp_context *psp = &adev->psp;
-int ret;
-
-switch (adev->asic_type) {
  case CHIP_VEGA10:
    psp->init_microcode = psp_v3_1_init_microcode;
    @$ -81.6 +73.15 @$
    psp->adev = adev;
    +return 0;
    +}
    +static int psp_sw_init(void *handle)
    +{
    +struct amdgpu_device *adev = (struct amdgpu_device *)handle;
    +struct psp_context *psp = &adev->psp;
    +int ret;
    +
    ret = psp_init_microcode(psp);
    if (ret) {
      DRM_ERROR("Failed to load psp firmware!\n");
      @$ -142.6 +143.11 @$
      msleep(1);
    }
    +
    +if (ucode) {
    +ucode->tmr_mc_addr_lo = psp->cmd_buf_mem->resp.fw_addr_lo;
    +ucode->tmr_mc_addr_hi = psp->cmd_buf_mem->resp.fw_addr_hi;
    +}
    +
    return ret;
    +

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_ring.h
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_ring.h
@@ -187,6 +187,7 @@
    uint64_t                eop_gpu_addr;
    u32			doorbell_index;
    booluse_doorbell;
+booluse_pollmem;
    unsigned wptr_offs;
    unsigned fence_offs;
    uint64_t_tcurrent_ctx;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_sched.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_sched.c
@@ -53,9 +53,8 @@
int fd,
    enum amd_sched_priority priority
{
    struct file *filp = fcheck(fd);
+struct file *filp = fget(fd);
struct drm_file *file;
-struct pid *pid;
struct amdgpu_fpriv *fpriv;
struct amdgpu_ctx *ctx;
uint32_t id;
@@ -63,20 +62,12 @@
    if (!filp)
        return -EINVAL;

-    pid = get_pid(((struct drm_file *)filp->private_data)->pid);
+    file = filp->private_data;
+    fpriv = file->driver_priv;
+    idr_for_each_entry(&fpriv->ctx_mgr.ctx_handles, ctx, id)
+        amdgpu_ctx_priority_override(ctx, priority);

-    mutex_lock(&adev->ddev->filelist_mutex);
-    list_for_each_entry(file, &adev->ddev->filelist, lhead) {
-        if (file->pid != pid)
-            continue;
-    
-    fpriv = file->driver_priv;
-    idr_for_each_entry(&fpriv->ctx_mgr.ctx_handles, ctx, id)
-    amdgpu_ctx_priority_override(ctx, priority);
-}
-    mutex_unlock(&adev->ddev->filelist_mutex);
-
-    put_pid(pid);
+    fput(filp);

    return 0;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpum/amdgpum_sync.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpum/amdgpum_sync.c
@@ -191,9 +191,6 @@
f = reservation_object_get_excl(resv);
r = amdgpu_sync_fence(adev, sync, f);

-    if (explicit_sync)
-        return r;
-
    flist = reservation_object_get_list(resv);
    if (!flist || r)
        return r;
/* Ignore fence from the same owner as
 */
if (owner != AMDGPU_FENCE_OWNER_UNDEFINED &&
-    fence_owner == owner)
+    (fence_owner == owner || explicit_sync))
continue;
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_test.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_test.c
@@ -125,6 +125,7 @@
}

dma_fence_put(fence);
+fence = NULL;

r = amdgpu_bo_kmap(vram_obj, &vram_map);
if (r) {
@@ -170,6 +171,7 @@
}

dma_fence_put(fence);
+fence = NULL;

r = amdgpu_bo_kmap(gtt_obj[i], &gtt_map);
if (r) {
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_trace.h
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_trace.h
@@ -21,-7 +21,7 @@
 /*
 */
-#if !defined(_AMDGPU_TRACE_H) || defined(TRACE_HEADER_MULTI_READ)
+#if !defined(_AMDGPU_TRACE_H_) || defined(TRACE_HEADER_MULTI_READ)
#define _AMDGPU_TRACE_H_

#include <linux/stringify.h>
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_ttm.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_ttm.c
@@ -813,6 +813,7 @@
release_sg:
kfree(ttm->sg);
+ttm->sg = NULL;
return r;
}

DMA_BIDIRECTIONAL : DMA_TO_DEVICE;

/* double check that we don't free the table twice */
-if (!ttm->sg->sgl)
+if (!ttm->sg || !ttm->sg->sgl)
return;

/* free the sg table and pages again */
@@ -1057,6 +1058,7 @@
if (gtt && gtt->userptr) {
    amdgpu_ttm_tt_set_user_pages(ttm, NULL);
    kfree(ttm->sg);
+    ttm->sg = NULL;
    ttm->page_flags &= ~TTM_PAGE_FLAG_SG;
    return;
}
@@ -1339,12 +1341,14 @@
return r;
}

- r = amdgpu_bo_create_kernel(adev, adev->mc.stolen_size, PAGE_SIZE,
- AMDGPU_GEM_DOMAIN_VRAM,
- &adev->stolen_vga_memory,
- NULL, NULL);
-if (r)
-return r;
+if (adev->mc.stolen_size) {
+r = amdgpu_bo_create_kernel(adev, adev->mc.stolen_size, PAGE_SIZE,
+ AMDGPU_GEM_DOMAIN_VRAM,
+ &adev->stolen_vga_memory,
+ NULL, NULL);
+if (r)
+return r;
+}
DRM_INFO(“amdgpu: %uM of VRAM memory ready\n”,
(unsigned) (adev->mc.real_vram_size / (1024 * 1024)));

@@ -1408,6 +1412,11 @@
return 0;
}

+void amdgpu_ttm_late_init(struct amdgpu_device *adev)
void amdgpu_ttm_fini(struct amdgpu_device *adev) {
  int r;
  if (!adev->mman.initialized) return;
  amdgpu_ttm_debugfs_fini(adev);
  if (adev->stolen_vga_memory) {
    r = amdgpu_bo_reserve(adev->stolen_vga_memory, true);
    if (r == 0) {
      amdgpu_bo_unpin(adev->stolen_vga_memory);
      amdgpu_bo_unreserve(adev->stolen_vga_memory);
    }
    amdgpu_bo_unref(&adev->stolen_vga_memory);
  }
  ttm_bo_clean_mm(&adev->mman.bdev, TTM_PL_VRAM);
  ttm_bo_clean_mm(&adev->mman.bdev, TTM_PL_TT);
}

bool amdgpu_gtt_mgr_is_allocated(struct ttm_mem_reg *mem);
uint64_t amdgpu_gtt_mgr_usage(struct ttm_mem_type_manager *man);
uint64_t amdgpu_vram_mgr_vis_usage(struct ttm_mem_type_manager *man);
void amdgpu_ttm_late_init(struct amdgpu_device *adev);
int amdgpu_copy_buffer(struct amdgpu_ring *ring, uint64_t src_offset,
                       uint64_t dst_offset, uint32_t byte_count,
                       struct reservation_object *resv,
AMDGPU_UCODE_ID_SMC,
AMDGPU_UCODE_ID_UVD,
AMDGPU_UCODE_ID_VCE,
+AMDGPU_UCODE_ID_VCN,
AMDGPU_UCODE_ID_MAXIMUM,
};

void *kaddr;
/* ucode_size_bytes */
uint32_t ucode_size;
+/* starting tmr mc address */
+uint32_t tmr_mc_addr_lo;
+uint32_t tmr_mc_addr_hi;
};

void amdgpu_ucode_print_mc_hdr(const struct common_firmware_header *hdr);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_uvd.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_uvd.c
@@ -213,7 +213,7 @@
if ((adev->asic_type == CHIP_POLARIS10 ||
    adev->asic_type == CHIP_POLARIS11) &&
(adev->uvd.fw_version < FW_1_66_16))
-DRM_ERROR("POLARIS10/11 UVD firmware version %hu.%hu is too old\n",
+DRM_ERROR("POLARIS10/11 UVD firmware version %u.%u is too old\n",
    version_major, version_minor);

bo_size = AMDGPU_UVD_STACK_SIZE + AMDGPU_UVD_HEAP_SIZE
@@ -297,12 +297,15 @@
if (adev->uvd.vcpu_bo == NULL)
return 0;

-// only valid for physical mode */
-if (atomic_read(&adev->uvd.handles[i]))
-break;
+
-if (i == AMDGPU_MAX_UVD_HANDLES)
+break;

-}
cancel_delayed_work_sync(&adev->uvd.idle_work);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_vce.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_vce.c
@@ -231,6 +231,8 @@
{
    int i;

    +cancel_delayed_work_sync(&adev->vce.idle_work);
+    if (adev->vce.vcpu_bo == NULL)
        return 0;

    @@ -241,7 +243,6 @@
    if (i == AMDGPU_MAX_VCE_HANDLES)
        return 0;

-    cancel_delayed_work_sync(&adev->vce.idle_work);
+    /* TODO: suspending running encoding sessions isn't supported */
+    return -EINVAL;
    }
@@ -930,7 +931,7 @@
    int amdgpu_vce_ring_test_ring(struct amdgpu_ring *ring)
    {
        struct amdgpu_device *adev = ring->adev;
-        uint32_t rptr = amdgpu_ring_get_rptr(ring);
+        unsigned i;
        unsigned i;
        int r, timeout = adev->usec_timeout;

    @@ -944,6 +945,9 @@
        ring->idx, r);
        return r;
    }
+    +rptr = amdgpu_ring_get_rptr(ring);
+        amdgpu_ring_write(ring, VCE_CMD_END);
+        amdgpu_ring_commit(ring);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_vcn.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/amdgpu_vcn.c
@@ -85,6 +85,7 @@
}
    hdr = (const struct common_firmware_header *)adev->vcn.fw->data;
    +adev->vcn.fw_version = le32_to_cpu(hdr->ucode_version);
    family_id = le32_to_cpu(hdr->ucode_version) & 0xff;
version_major = (le32_to_cpu(hdr->ucode_version) >> 24) & 0xff;
version_minor = (le32_to_cpu(hdr->ucode_version) >> 8) & 0xff;
@@ -92,9 +93,10 @@
    version_major, version_minor, family_id);

-bo_size = AMDGPU_GPU_PAGE_ALIGN(le32_to_cpu(hdr->ucode_size_bytes) + 8)
-  + AMDGPU_VCN_STACK_SIZE + AMDGPU_VCN_HEAP_SIZE
+bo_size = AMDGPU_VCN_STACK_SIZE + AMDGPU_VCN_HEAP_SIZE
  + AMDGPU_VCN_SESSION_SIZE * 40;
+if (adev->firmware.load_type != AMDGPU_FW_LOAD_PSP)
+  bo_size += AMDGPU_GPU_PAGE_ALIGN(le32_to_cpu(hdr->ucode_size_bytes) + 8);
-r = amdgpu_bo_create_kernel(adev, bo_size, PAGE_SIZE,
  AMDGPU_GEM_DOMAIN_VRAM, &adev->vcn.vcpu_bo,
  &adev->vcn.gpu_addr, &adev->vcn.cpu_addr);
@@ -153,11 +155,11 @@
unsigned size;
void *ptr;

+cancel_delayed_work_sync(&adev->vcn.idle_work);
+
if (adev->vcn.vcpu_bo == NULL)
    return 0;

-cancel_delayed_work_sync(&adev->vcn.idle_work);
-
  size = amdgpu_bo_size(adev->vcn.vcpu_bo);
  ptr = adev->vcn.cpu_addr;
@@ -190,11 +192,13 @@
unsigned offset;

  hdr = (const struct common_firmware_header *)adev->vcn.fw->data;
-  offset = le32_to_cpu(hdr->ucode_array_offset_bytes);
-  memcpy_toio(adev->vcn.cpu_addr, adev->vcn.fw->data + offset,
-             le32_to_cpu(hdr->ucode_size_bytes));
-  size -= le32_to_cpu(hdr->ucode_size_bytes);
-  ptr += le32_to_cpu(hdr->ucode_size_bytes);
+  if (adev->firmware.load_type != AMDGPU_FW_LOAD_PSP) {
+    offset = le32_to_cpu(hdr->ucode_array_offset_bytes);
+    memcpy_toio(adev->vcn.cpu_addr, adev->vcn.fw->data + offset,
+                 le32_to_cpu(hdr->ucode_size_bytes));
+    size -= le32_to_cpu(hdr->ucode_size_bytes);
+    ptr += le32_to_cpu(hdr->ucode_size_bytes);
+  }
  memset_io(ptr, 0, size);
}
int amdgpu_vcn_enc_ring_test_ring(struct amdgpu_ring *ring)
{
    struct amdgpu_device *adev = ring->adev;
    -uint32_t rptr = amdgpu_ring_get_rptr(ring);
    +uint32_t rptr;
    unsigned i;
    int r;

    ring->idx, r);
    return r;
}
+
+rptr = amdgpu_ring_get_rptr(ring);
+
amdgpu_ring_write(ring, VCN_ENC_CMD_END);
amdgpu_ring_commit(ring);

max_entries = min(max_entries, 16ull * 1024ull);
-for (count = 1; count < max_entries; ++count) {
+for (count = 1;
    + count < max_entries / (PAGE_SIZE / AMDGPU_GPU_PAGE_SIZE);
    + ++count) {
    uint64_t idx = pfn + count;

    if (pages_addr[idx] !=
@@ -1764,7 +1766,7 @@
dma_addr = pages_addr;
    } else {
        addr = pages_addr[pfn];
        -max_entries = count;
        +max_entries = count * (PAGE_SIZE / AMDGPU_GPU_PAGE_SIZE);
    }
}
}
} else if (flags & AMDGPU_PTE_VALID) {
@@ -1779,7 +1781,7 @@
if (r)
    return r;

-pfn += last - start + 1;
+pfm += (last - start + 1) / (PAGE_SIZE / AMDGPU_GPU_PAGE_SIZE);
if (nodes && nodes->size == pfn) {

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pfm = 0;
++nodes;
@@ -2196,8 +2198,8 @@
uint64_t eaddr;

/* validate the parameters */
- if (saddr & AMDGPU_GPU_PAGE_MASK || offset & AMDGPU_GPU_PAGE_MASK ||
- size == 0 || size & AMDGPU_GPU_PAGE_MASK)
+ if (saddr & ~PAGE_MASK || offset & ~PAGE_MASK ||
+ size == 0 || size & ~PAGE_MASK)
 return -EINVAL;

/* make sure object fit at this offset */
@@ -2258,8 +2260,8 @@
 int r;

/* validate the parameters */
- if (saddr & AMDGPU_GPU_PAGE_MASK || offset & AMDGPU_GPU_PAGE_MASK ||
- size == 0 || size & AMDGPU_GPU_PAGE_MASK)
+ if (saddr & ~PAGE_MASK || offset & ~PAGE_MASK ||
+ size == 0 || size & ~PAGE_MASK)
 return -EINVAL;

/* make sure object fit at this offset */
@@ -2390,7 +2392,8 @@
 after->offset = tmp->offset;
 before->flags = tmp->flags;
- list_add(&before->list, &tmp->list);
+ before->bo_va = tmp->bo_va;
+ list_add(&before->list, &tmp->bo_va->invalids);
}

/* Remember mapping split at the end */
@@ -2398,9 +2401,10 @@
 after->last = saddr - 1;
 before->offset = tmp->offset;
 after->flags = tmp->flags;
- list_add(&after->list, &tmp->list);
+ before->bo_va = tmp->bo_va;
+ list_add(&after->list, &tmp->bo_va->invalids);
}

list_del(&tmp->list);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/amdgpu_vm.h
/* hardcode that limit for now */
#define AMDGPU_VA_RESERVED_SIZE (8ULL << 20)

/* VA hole for 48bit addresses on Vega10 */
#define AMDGPU_VA_HOLE_START 0x0000800000000000ULL
#define AMDGPU_VA_HOLE_END 0xffff800000000000ULL

/* Hardware is programmed as if the hole doesn't exists with start and end 
 * address values.
 */
#define AMDGPU_VA_HOLE_MASK 0x0000ffffffffffffULL

/* max vmids dedicated for process */
#define AMDGPU_VM_MAX_RESERVED_VMID 1

---

@@ -135,7 +151,8 @@
 num_nodes = DIV_ROUND_UP(mem->num_pages, pages_per_node);

*/

/**
 * amdGPU_vram_mgr_bo_invisible_size - CPU invisible BO size
 * @bo: &amdGPU_bo buffer object (must be in VRAM)
 * @returns:
 * How much of the given &amdGPU_bo buffer object lies in CPU invisible VRAM.
 */
+u64 amdGPU_vram_mgr_bo_invisible_size(struct amdGPU_bo *bo)
+{
+if (bo->flags & AMDGPU_GEM_CREATE_NO_CPU_ACCESS)
+return amdgpu_bo_size(bo);
+
+return 0;
+
}++
Open Source Used In 5GaaS Edge AC-4  20900

- nodes = kcalloc(num_nodes, sizeof(*nodes), GFP_KERNEL);
+ nodes = kvmalloc_array(num_nodes, sizeof(*nodes),
+ GFP_KERNEL | __GFP_ZERO);
if (!nodes)
    return -ENOMEM;
@@ -190,7 +207,7 @@
drm_mm_remove_node(&nodes[i]);
    spin_unlock(&mgr->lock);
-
+    kfree(nodes);
+    kvfree(nodes);
    return r == -ENOSPC ? 0 : r;
}  
@@ -229,7 +246,7 @@
    atomic64_sub(vis_usage, &mgr->vis_usage);
    atomic64_sub(mem->mm_node = NULL;
    }
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/atom.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/atom.c
@@ -742,8 +742,8 @@
cjiffies -= ctx->last_jump_jiffies;
    if (time_after(cjiffies, ctx->last_jump_jiffies)) {
        cjiffies = cjiffies;
        if (jiffies_to_msecs(cjiffies) > 5000) {
-
+            DRM_ERROR("atombios stuck in loop for more than 5secs aborting\n");
            ctx->abort = true;
        } else {  
            ...
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/cik_sdma.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/cik_sdma.c
@@ -866,7 +866,7 @@
amdgpu_ring_write(ring, addr & 0xffffffff);
amdgpu_ring_write(ring, upper_32_bits(addr) & 0xffffffff);
amdgpu_ring_write(ring, seq); /* reference */
    -amdgpu_ring_write(ring, 0xffffffff); /* mask */
+amdgpu_ring_write(ring, 0xffffffff); /* mask */
amdgpu_ring_write(ring, (0xfff << 16) | 4); /* retry count, poll interval */
u32 srbm_soft_reset = 0;
struct amdgpu_device *a dev = (struct amdgpu_device *)handle;

if (tmp & SRBM_STATUS2__SDMA_BUSY_MASK) {
  /* sdma0 */
  tmp = RREG32(mmSDMA0_F32_CNTL + SDMA0_REGISTER_OFFSET);
  tmp |= SDMA0_F32_CNTL__HALT_MASK;
  WREG32(mmSDMA0_F32_CNTL + SDMA0_REGISTER_OFFSET, tmp);
  srbm_soft_reset |= SRBM_SOFT_RESET__SOFT_RESET_SDMA_MASK;
}

if (tmp & SRBM_STATUS2__SDMA1_BUSY_MASK) {
  /* sdma1 */
  tmp = RREG32(mmSDMA0_F32_CNTL + SDMA1_REGISTER_OFFSET);
  tmp |= SDMA0_F32_CNTL__HALT_MASK;
  WREG32(mmSDMA0_F32_CNTL + SDMA1_REGISTER_OFFSET, tmp);
  srbm_soft_reset |= SRBM_SOFT_RESET__SOFT_RESET_SDMA1_MASK;
}

if (srbm_soft_reset) {
  tmp = RREG32(mmSRBM_SOFT_RESET);
  drm_kms_helper_poll_fini(a dev->ddev);
  drm_mode_config_cleanup(a dev->ddev);
  memset(a dev->mode_info.crtcs, 0, sizeof(a dev->mode_info.crtcs[0]) * AMDGPU_MAX_CRTCS);
  a dev->mode_info.mode_config_initialized = false;
  return 0;
}
int crtc,
enum amdgpu_interrupt_state state)
{
  if (crtc >= adev->mode_info.num_crtc)
    return;
  DRM_DEBUG("invalid crtc %d", crtc);
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/gfx_v7_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/gfx_v7_0.c
@@ -4403,34 +4403,8 @@
case CHIP_KAVERI:
  adev->gfx.config.max_shader_engines = 1;
  adev->gfx.config.max_tile_pipes = 4;
  if ((adev->pdev->device == 0x1304) ||
+     (adev->pdev->device == 0x1309) ||
      (adev->pdev->device == 0x130A) ||
      (adev->pdev->device == 0x130D) ||
      (adev->pdev->device == 0x130E) ||
      (adev->pdev->device == 0x131B)) {
    adev->gfx.config.max_cu_per_sh = 6;
    adev->gfx.config.max_backends_per_se = 1;
  } else if ((adev->pdev->device == 0x1307) ||
-     (adev->pdev->device == 0x1306) ||
      (adev->pdev->device == 0x130B) ||
      (adev->pdev->device == 0x130E) ||
      (adev->pdev->device == 0x1315) ||
      (adev->pdev->device == 0x131B)) {
    adev->gfx.config.max_cu_per_sh = 4;
    adev->gfx.config.max_backends_per_se = 1;
  } else {
    adev->gfx.config.max_cu_per_sh = 3;
    adev->gfx.config.max_backends_per_se = 1;
}
+adev->gfx.config.max_cu_per_sh = 8;
+adev->gfx.config.max_backends_per_se = 2;
  adev->gfx.config.max_gprs = 256;
  adev->gfx.config.max_texture_channel_caches = 4;

Open Source Used In 5GaaS Edge AC-4 20902
static const u32 vgpr_init_regs[] =
{
mMCompute_Static_Thread_Mgmt_SE0, 0xffffffff,
  -mMCompute_Resource_Limits, 0,
  +mMCompute_Resource_Limits, 0x1000000, /* CU_Group_Count=1 */
  mMCompute_Num_Thread_X, 256*4,
  mMCompute_Num_Thread_Y, 1,
  mMCompute_Num_Thread_Z, 1,
  +mMCompute_Pgm_Rsrc1, 0x100004f, /* VGPRS=15 (64 logical VGPRs), SGPRS=1 (16 SGPRs),
  BULKY=1 */
  mMCompute_Pgm_Rsrc2, 20,
  mMCompute_User_Data_0, 0xedcedc00,
  @ @ -1459,10 +1459,11 @ @
}
static const u32 sgpr1_init_regs[] =
{
mMCompute_Static_Thread_Mgmt_SE0, 0x0f,
  -mMCompute_Resource_Limits, 0x1000000,
  +mMCompute_Resource_Limits, 0x1000000, /* CU_Group_Count=1 */
  mMCompute_Num_Thread_X, 256*5,
  mMCompute_Num_Thread_Y, 1,
  mMCompute_Num_Thread_Z, 1,
  +mMCompute_Pgm_Rsrc1, 0x240, /* SGPRS=9 (80 GPRS) */
  mMCompute_Pgm_Rsrc2, 20,
  mMCompute_User_Data_0, 0xedcedc00,
  mMCompute_User_Data_1, 0xedcedc01,
  @ @ -1479,10 +1480,11 @ @
}

if (amdgpu_sriov_vf(adev))
  return 0;
  +if (adev->pg_flags & (AMD_PG_SUPPORT_GFX_SMG |
    +AMD_PG_SUPPORT_RLC_SMU_HS |
    +AMD_PG_SUPPORT_CP |
    +AMD_PG_SUPPORT_GFX_DMG))
  +adev->gfx.rlc.funcs->enter_safe_mode(adev);
  switch (adev->asic_type) {
  case CHIP_CARRIZO:
case CHIP_STONEY:
  @ @ -5616.7 +5624.11 @ @
default:
break;
}
-
+if (adev->pg_flags & (AMD_PG_SUPPORT_GFX_SMG |
+AMD_PG_SUPPORT_RLC_SMU_HS |
+AMD_PG_SUPPORT_CP |
+AMD_PG_SUPPORT_GFX_DMG))
+adev->gfx.rlc.funcs->exit_safe_mode(adev);
return 0;
}

bool write64bit = flags & AMDGPU_FENCE_FLAG_64BIT;
bool int_sel = flags & AMDGPU_FENCE_FLAG_INT;

/* EVENT_WRITE_EOP - flush caches, send int */
+/* Workaround for cache flush problems. First send a dummy EOP
+ event down the pipe with seq one below.
+ */
+amdgpu_ring_write(ring, PACKET3(PACKET3_EVENT_WRITE_EOP, 4));
+amdgpu_ring_write(ring, (EOP_TCL1_ACTION_EN |
+EOP_TC_ACTION_EN |
+EOP_TC_WB_ACTION_EN |
+EVENT_TYPE(CACHE_FLUSH_AND_INV_TS_EVENT) |
+EVENT_INDEX(5)));
+amdgpu_ring_write(ring, addr & 0xfffffffc);
+amdgpu_ring_write(ring, (upper_32_bits(addr) & 0xffff) |
+DATA_SEL(1) | INT_SEL(0));
+amdgpu_ring_write(ring, lower_32_bits(seq - 1));
+amdgpu_ring_write(ring, upper_32_bits(seq - 1));
+
+/* Then send the real EOP event down the pipe:
+ * EVENT_WRITE_EOP - flush caches, send int */
amdgpu_ring_write(ring, PACKET3(PACKET3_EVENT_WRITE_EOP, 4));
amdgpu_ring_write(ring, (EOP_TCL1_ACTION_EN |
EOP_TC_ACTION_EN |
@ @ -6888.7 +6916.7 @ @
5 + /* COND_EXEC */
7 + /* PIPELINE_SYNC */
19 + /* VM_FLUSH */
-8 + /* FENCE for VM_FLUSH */
+12 + /* FENCE for VM_FLUSH */
20 + /* GDS switch */
4 + /* double SWITCH_BUFFER,
the first COND_EXEC jump to the place just
gfx_v9_0_init_compute_vmid(adev);
-
-mutex_lock(&adev->grbm_idx_mutex);
-/*
- * making sure that the following register writes will be broadcasted
- * to all the shaders
- */
-gfx_v9_0_select_se_sh(adev, 0xffffffff, 0xffffffff, 0xffffffff);
-
-WREG32_SOC15(GC, 0, mmPA_SC_FIFO_SIZE,
- (adev->gfx.config.sc_prim_fifo_size_frontend <<
- PA_SC_FIFO_SIZE__SC_FRONTEND_PRIM_FIFO_SIZE__SHIFT) |
- (adev->gfx.config.sc_prim_fifo_size_backend <<
- PA_SC_FIFO_SIZE__SC_BACKEND_PRIM_FIFO_SIZE__SHIFT)) |
-WREG32_FIELD15(GC, 0, RLC_CNTL, RLC_ENABLE_F32, 1);
+udelay(50);
/* carrizo do enable cp interrupt after cp inited */
-if (!(adev->flags & AMD_IS_APU))
+if (!(adev->flags & AMD_IS_APU)) {
gfx_v9_0_enable_gui_idle_interrupt(adev, true);
-}
-udelay(50);
+udelay(50);
+
#endif

/* RLC_GPM_GENERAL_6 : RLC Ucode version */
@@ -3008,7 +2990,13 @@
gfx_v9_0_kcq_disable(&adev->gfx.kiq.ring, &adev->gfx.compute_ring[i]);

if (amdgpu_sriov_vf(adev)) {
- pr_debug("For SRIOV client, shouldn't do anything.\n");
+ gfx_v9_0_cp_gfx_enable(adev, false);
+ /* must disable polling for SRIOV when hw finished, otherwise
+ * CPC engine may still keep fetching WB address which is already
+ * invalid after sw finished and trigger DMAR reading error in
+ * hypervisor side.
+ */
+WREG32_FIELD15(GC, 0, CP_PQ_WPTR_POLL_CNTL, EN, 0);
return 0;
} 
gfx_v9_0_cp_enable(adev, false);
@@ -3221,7 +3209,7 @@
/* wait for RLC_SAFE_MODE */
for (i = 0; i < adev->usec_timeout; i++) {
- if (!REG_GET_FIELD(SOC15_REG_OFFSET(GC, 0, mmRLC_SAFE_MODE), RLC_SAFE_MODE, CMD))
+ if (!REG_GET_FIELD(RREG32_SOC15(GC, 0, mmRLC_SAFE_MODE), RLC_SAFE_MODE, CMD))
    break;
    udelay(1);
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/gmc_v6_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/gmc_v6_0.c
@@ -803,12 +803,33 @@
{
 struct amdgpu_device *adev = (struct amdgpu_device *)handle;

+amdgpu_bo_late_init(adev);
+
+if (amdgpu_vm_fault_stop != AMDGPU_VM_FAULT_STOP_ALWAYS)
+    return amdgpu_irq_get(adev, &adev->mc.vm_fault, 0);
+else
+    return 0;
+
+static unsigned gmc_v6_0_get_vbios_fb_size(struct amdgpu_device *adev)
+{
+    u32 d1vga_control = RREG32(mmD1VGA_CONTROL);
+    unsigned size;

Open Source Used In 5GaaS Edge AC-4 20906
if (REG_GET_FIELD(d1vga_control, D1VGA_CONTROL, D1VGA_MODE_ENABLE)) {
    size = 9 * 1024 * 1024; /* reserve 8MB for vga emulator and 1 MB for FB */
} else {
    u32 viewport = RREG32(mmVIEWPORT_SIZE);
    size = (REG_GET_FIELD(viewport, VIEWPORT_SIZE, VIEWPORT_HEIGHT) *
    REG_GET_FIELD(viewport, VIEWPORT_SIZE, VIEWPORT_WIDTH) *
    4);
}
/* return 0 if the pre-OS buffer uses up most of vram */
if ((adev->mc.real_vram_size - size) < (8 * 1024 * 1024))
    return 0;
return size;
}

static int gmc_v6_0_sw_init(void *handle)
{
    int r;
    adev->mc.mc_mask = 0xffffffffULL;
    adev->mc.stolen_size = 256 * 1024;
    adev->need_dma32 = false;
    dma_bits = adev->need_dma32 ? 32 : 40;
    r = pci_set_dma_mask(adev->pdev, DMA_BIT_MASK(dma_bits));
    if (r)
        return r;
    adev->mc.stolen_size = gmc_v6_0_get_vbios_fb_size(adev);
    r = amdgpu_bo_init(adev);
    if (r)
        return r;
    {
        struct amdgpu_device *adev = (struct amdgpu_device *)handle;
    }
    if (amdgpu_bo_late_init(adev);
    return r;

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/gmc_v7_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/gmc_v7_0.c
@@ -938,12 +938,33 @@
{
    struct amdgpu_device *adev = (struct amdgpu_device *)handle;

    amdgpu_bo_late_init(adev);
    if (amdgpu_vm_fault_stop != AMDGPU_VM_FAULT_STOP_ALWAYS)
        return amdgpu_irq_get(adev, &adev->mc.vm_fault, 0);
    else
        return 0;

Open Source Used In 5GaaS Edge AC-4 20907
static unsigned gmc_v7_0_get_vbios_fb_size(struct amdgpu_device *adev)
{
    u32 d1vga_control = RREG32(mmD1VGA_CONTROL);
    unsigned size;
    
    if (REG_GET_FIELD(d1vga_control, D1VGA_CONTROL, D1VGA_MODE_ENABLE)) {
        size = 9 * 1024 * 1024; /* reserve 8MB for vga emulator and 1 MB for FB */
    } else {
        u32 viewport = RREG32(mmVIEWPORT_SIZE);
        size = (REG_GET_FIELD(viewport, VIEWPORT_SIZE, VIEWPORT_HEIGHT) * 
               REG_GET_FIELD(viewport, VIEWPORT_SIZE, VIEWPORT_WIDTH) * 
               4);
    }
    /* return 0 if the pre-OS buffer uses up most of vram */
    if ((adev->mc.real_vram_size - size) < (8 * 1024 * 1024))
        return 0;
    return size;
}

static int gmc_v7_0_sw_init(void *handle)
{
    int r;
    adev->mc.mc_mask = 0xffffffffULL; /* 40 bit MC */
    adev->mc.stolen_size = 256 * 1024;
    // set DMA mask + need_dma32 flags.
    // PCIE - can handle 40-bits.
    // IGP - can handle 40-bits
    if (r)
        return r;
    adev->mc.stolen_size = gmc_v7_0_get_vbios_fb_size(adev);
    // Memory manager
    r = amdgpu_bo_init(adev);
    if (r)
        ...
static const u32 golden_settings_tonga_a11[] =
{
    chip_name = "tonga";
    break;
    case CHIP_POLARIS11:
        -chip_name = "polaris11";
        +if (((adev->pdev->device == 0x67ef) &&
              (adev->pdev->revision == 0xe0)) ||
            (adev->pdev->revision == 0xe5)) ||
              (adev->pdev->device == 0x67ff) &&
            (adev->pdev->revision == 0xcf) ||
            (adev->pdev->revision == 0xef) ||
            (adev->pdev->revision == 0xff))
            +chip_name = "polaris11_k";
            +else if (((adev->pdev->device == 0x67df) &&
                        (adev->pdev->revision == 0xe1) ||
                        (adev->pdev->revision == 0xf7))
                        +chip_name = "polaris10_k";
                        +else
                        +chip_name = "polaris10";
                        break;
    case CHIP_POLARIS12:
        -chip_name = "polaris12";
        +if (((adev->pdev->device == 0x6987) &&
              (adev->pdev->revision == 0xc0) ||
              (adev->pdev->revision == 0xc3)) ||
            (adev->pdev->device == 0x6981) &&
            (adev->pdev->revision == 0x00) ||
            (adev->pdev->revision == 0x01) ||
            (adev->pdev->revision == 0x10))
            +chip_name = "polaris12_k";
            +else
            +chip_name = "polaris12";
            break;
    case CHIP_FIJI:
case CHIP_CARRIZO:
@@ -331,7 +360,7 @@
const struct mc_firmware_header_v1_0 *hdr;
const __le32 *fw_data = NULL;
const __le32 *io_mc_regs = NULL;
-tu32 data, vbios_version;
+	u32 data;
int i, ucode_size, regs_size;

/* Skip MC ucode loading on SR-IOV capable boards. 
@@ -342,13 +371,6 @@
if (amdgpu_sriov_bios(adev))
return 0;

-WREG32(mmMC_SEQ_IO_DEBUG_INDEX, 0x9F);
-data = RREG32(mmMC_SEQ_IO_DEBUG_DATA);
-vbios_version = data & 0xf;
-
-if (vbios_version == 0)
-return 0;
-
if (!adev->mc.fw)
return -EINVAL;

@@ -1028,12 +1050,33 @@
{ 
struct amdgpu_device *adev = (struct amdgpu_device *)handle;

+amdgpu_bo_late_init(adev);
+
+if (amdgpu_vm_fault_stop != AMDGPU_VM_FAULT_STOP_ALWAYS)
return amdgpu_irq_get(adev, &adev->mc.vm_fault, 0);
else
return 0;
}

+static unsigned gmc_v8_0_get_vbios_fb_size(struct amdgpu_device *adev)
+{
+u32 d1vga_control = RREG32(mmD1VGA_CONTROL);
+unsigned size;
+
+if (REG_GET_FIELD(d1vga_control, D1VGA_CONTROL, D1VGA_MODE_ENABLE)) {
+size = 9 * 1024 * 1024; /* reserve 8MB for vga emulator and 1 MB for FB */
+} else {
+u32 viewport = RREG32(mmVIEWPORT_SIZE);
+size = (REG_GET_FIELD(viewport, VIEWPORT_SIZE, VIEWPORT_HEIGHT) *
+REG_GET_FIELD(viewport, VIEWPORT_SIZE, VIEWPORT_WIDTH) *
+4);
/* return 0 if the pre-OS buffer uses up most of vram */
+if (((adev->mc.real_vram_size - size) < (8 * 1024 * 1024))
+return 0;
+return size;
+

#define mmMC_SEQ_MISC0_FIJI 0xA71

static int gmc_v8_0_sw_init(void *handle)
@@ -1076,8 +1119,6 @@
*/
adev->mc.mc_mask = 0xffffffffULL; /* 40 bit MC */

-adev->mc.stolen_size = 256 * 1024;
-
/* set DMA mask + need_dma32 flags.
 * PCIE - can handle 40-bits.
 * IGP - can handle 40-bits
@@ -1107,6 +1148,8 @@
if (r)
  return r;

+adev->mc.stolen_size = gmc_v8_0_get_vbios_fb_size(adev);
+
/* Memory manager */
r = amdgpu_bo_init(adev);
if (r)
  --- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/gmc_v9_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/gmc_v9_0.c
@@ -56,6 +56,14 @@
#define DF_CS_AON0_DramBaseAddress0__IntLvAddrSel_MASK 0x00000700L
#define DF_CS_AON0_DramBaseAddress0__DramBaseAddr_MASK 0xFFFFF000L
+/* add these here since we already include dce12 headers and these are for DCN */
+#define mmHUBP0_DCSURF_PRI_VIEWPORT_DIMENSION 0x055d
+#define mmHUBP0_DCSURF_PRI_VIEWPORT_DIMENSION_BASE_IDX 2
+#define HUBP0_DCSURF_PRI_VIEWPORT_DIMENSION__PRI_VIEWPORT_WIDTH__SHIFT 0x0
+#define HUBP0_DCSURF_PRI_VIEWPORT_DIMENSION__PRI_VIEWPORT_HEIGHT__SHIFT 0x10
+#define HUBP0_DCSURF_PRI_VIEWPORT_DIMENSION__PRI_VIEWPORT_WIDTH__MASK 0x00003FFFL
+#define HUBP0_DCSURF_PRI_VIEWPORT_DIMENSION__PRI_VIEWPORT_HEIGHT__MASK 0x3FFF0000L
+

/* XXX Move this macro to VEGA10 header file, which is like vid.h for VI. */
#define AMDGPU_NUM_OF_VMIDS8

@@ -404,6 +412,11 @@
unsigned vm_inv_eng[AMDGPU_MAX_VMHUBS] = { 4, 4 };
unsigned i;

+/*
+ * TODO - Uncomment once GART corruption issue is fixed.
+ */
+/* amdgp3u_bo_late_init(adev); */
+
for(i = 0; i < adev->num_rings; ++i) {
    struct amdgpu_ring *ring = adev->rings[i];
    unsigned vmhub = ring->funcs->vmhub;
@@ -453,7 +466,10 @@
    adev->mc.vram_width = amdgpu_atomfirmware_get_vram_width(adev);
    if (!adev->mc.vram_width) {
        /* hbm memory channel size */
-        chansize = 128;
+        if (adev->flags & AMD_IS_APU)
+            chansize = 64;
+        else
+            chansize = 128;

        tmp = RREG32_SOC15(DF, 0, mmDF_CS_AON0_DramBaseAddress0);
        tmp &= DF_CS_AON0_DramBaseAddress0__IntLvNumChan_MASK;
@@ -543,6 +559,52 @@
return amdgpu_gart_table_vram_alloc(adev);
}

+static unsigned gmc_v9_0_get_vbios_fb_size(struct amdgpu_device *adev)
+{
+    +#if 0
+    u32 d1vga_control = RREG32_SOC15(DCE, 0, mmD1VGA_CONTROL);
+    +#endif
+    +unsigned size;
+    +
+    +/*
+    + * TODO Remove once GART corruption is resolved
+    + * Check related code in gmc_v9_0_sw_fini
+    + */
+    +size = 9 * 1024 * 1024;
+    +
+    +#if 0
+    +if (REG_GET_FIELD(d1vga_control, D1VGA_CONTROL, D1VGA_MODE_ENABLE)) {
+    +size = 9 * 1024 * 1024; /* reserve 8MB for vga emulator and 1 MB for FB */
+    +} else {
+u32 viewport;
+
+switch (adev->asic_type) {
+case CHIP_RAVEN:
+    viewport = RREG32_SOC15(DCE, 0, mmHUBP0_DCSURF_PRI_VIEWPORT_DIMENSION);
+    size = (REG_GET_FIELD(viewport,
+        HUBP0_DCSURF_PRI_VIEWPORT_DIMENSION, PRI_VIEWPORT_HEIGHT) *
+        REG_GET_FIELD(viewport,
+        HUBP0_DCSURF_PRI_VIEWPORT_DIMENSION, PRI_VIEWPORT_WIDTH) *
+        4);
+    break;
+case CHIP_VEGA10:
+case CHIP_VEGA12:
+default:
+    viewport = RREG32_SOC15(DCE, 0, mmSCL0_VIEWPORT_SIZE);
+    size = (REG_GET_FIELD(viewport, SCL0_VIEWPORT_SIZE, VIEWPORT_HEIGHT) *
+        REG_GET_FIELD(viewport, SCL0_VIEWPORT_SIZE, VIEWPORT_WIDTH) *
+        4);
+    break;
+}
+
+/* return 0 if the pre-OS buffer uses up most of vram */
+if ((adev->mc.real_vram_size - size) < (8 * 1024 * 1024))
+    return 0;
+
+static int gmc_v9_0_sw_init(void *handle)
+{
+    int r;
+    @ @ -607,12 +669,6 @ @
+    /*
+    adev->mc.mc_mask = 0xffffffffffffULL; /* 48 bit MC */
+    */
+    /* It needs to reserve 8M stolen memory for vega10
+    * TODO: Figure out how to avoid that...
+    */
+    adev->mc.stolen_size = 8 * 1024 * 1024;
+
+    /* set DMA mask + need_dma32 flags.
+     * PCIE - can handle 44-bits.
+     * IGP - can handle 44-bits
+     * @ @ -636,6 +692,8 @ @
+     */
+    if (r)
+        return r;
+}
adev->mc.stolen_size = gmc_v9_0_get_vbios_fb_size(adev);
+
/* Memory manager */

ret = amdgpu_bo_init(adev);
if (ret)
    amdgpu_vm_manager_fini(adev);
gmc_v9_0_gart_fini(adev);
amdgpu_gem_force_release(adev);
+
+/*
+ * TODO:
+ * Currently there is a bug where some memory client outside
+ * of the driver writes to first 8M of VRAM on S3 resume,
+ * this overrides GART which by default gets placed in first 8M and
+ * causes VM_FAULTS once GTT is accessed.
+ * Keep the stolen memory reservation until the while this is not solved.
+ */
+amdgpu_bo_free_kernel(&adev->stolen_vga_memory, NULL, NULL);
+
amdgpu_bo_fini(adev);
return 0;

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/kv_dpm.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/kv_dpm.c
@@ -1352,8 +1352,6 @@
return ret;
}

-kv_update_current_ps(adev, adev->pm.dpm.boot_ps);
-
if (adev->irq.installed &&
    amdgpu_is_internal_thermal_sensor(adev->pm.int_thermal_type)) {
    ret = kv_set_thermal_temperature_range(adev, KV_TEMP_RANGE_MIN, KV_TEMP_RANGE_MAX);
@@ -3056,7 +3054,7 @@
else
    adev->pm.dpm_enabled = true;
mutex_unlock(&adev->pm.mutex);
-
+amdgpu_pm_compute_clocks(adev);
return ret;
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/mxgpu_ai.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/mxgpu_ai.c
@@ -282,9 +282,17 @@


/* see what event we get */
r = xgpu_ai_mailbox_rcv_msg(adev, IDH_FLR_NOTIFICATION);

-/* only handle FLR_NOTIFY now */
-if (!r)
  -schedule_work(&adev->virt.flr_work);
+/* sometimes the interrupt is delayed to inject to VM, so under such case
+ * the IDH_FLR_NOTIFICATION is overwritten by VF FLR from GIM side, thus
+ * above receieve message could be failed, we should schedule the flr_work
+ * anyway
+ */
+if (r) {
  +DRM_ERROR("FLR_NOTIFICATION is missed\n");
  +xgpu_ai_mailbox_send_ack(adev);
  +}
  +
  +schedule_work(&adev->virt.flr_work);
}

return 0;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/psp_v10_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/psp_v10_0.c
@@ -80,6 +80,9 @@
case AMDGPU_UCODE_ID_VCE:
  +type = GFX_FW_TYPE_VCE;
  +break;
+case AMDGPU_UCODE_ID_VCN:
  +*type = GFX_FW_TYPE_VCN;
  +break;
+case AMDGPU_UCODE_ID_MAXIMUM:
  +default:
  +return -EINVAL;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/sdma_v2_4.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/sdma_v2_4.c
@@ -846,7 +846,7 @@
amdgpu_ring_write(ring, addr & 0xfffffffc);
amdgpu_ring_write(ring, upper_32_bits(addr) & 0xffffffff);
amdgpu_ring_write(ring, seq); /* reference */
-amdgpu_ring_write(ring, 0xfffffff); /* mask */
+amdgpu_ring_write(ring, SDMA_PKT_POLL_REGMEM_DW5_RETRY_COUNT(0xfff) |
  SDMA_PKT_POLL_REGMEM_DW5_INTERVAL(4)); /* retry count, poll interval */
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/sdma_v3_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/sdma_v3_0.c
@@ -355,7 +355,7 @@
struct amdgpu_device *adev = ring->adev;
 u32 wptr;

-if (ring->use_doorbell) {
+if (ring->use_pollmem) {
/* XXX check if swapping is necessary on BE */
wptr = ring->adev->wb.wb[ring->wptr_offs] >> 2;
} else {
@@ -380,10 +380,13 @@
if (ring->use_doorbell) {
  u32 *wb = (u32 *)&adev->wb.wb[ring->wptr_offs];
-
/* XXX check if swapping is necessary on BE */
WRITE_ONCE(*wb, (lower_32_bits(ring->wptr) << 2));
WDOORBELL32(ring->doorbell_index, lower_32_bits(ring->wptr) << 2);
+} else if (ring->use_pollmem) {
+  u32 *wb = (u32 *)&adev->wb.wb[ring->wptr_offs];
+  
+  WRITE_ONCE(*wb, (lower_32_bits(ring->wptr) << 2));
} else {
  int me = (ring == &ring->adev->sdma.instance[0].ring) ? 0 : 1;

@@ -718,10 +721,17 @@
WREG32(mmSDMA0_GFX_RB_WPTR_POLL_ADDR_HI + sdmaOffsets[i],
    upper_32_bits(wptr_gpu_addr));
wptr_poll_cntl = RREG32(mmSDMA0_GFX_RB_WPTR_POLL_CNTL + sdmaOffsets[i]);
-if (amdgpu_sriov_vf(adev))
-wptr_poll_cntl = REG_SET_FIELD(wptr_poll_cntl, SDMA0_GFX_RB_WPTR_POLL_CNTL, F32_POLL_ENABLE, 1);
-else
-wptr_poll_cntl = REG_SET_FIELD(wptr_poll_cntl, SDMA0_GFX_RB_WPTR_POLL_CNTL, F32_POLL_ENABLE, 0);
+if (ring->use_pollmem) {
+  /*wptr polling is not enough fast, directly clean the wptr register */
+  WREG32(mmSDMA0_GFX_RB_WPTR + sdmaOffsets[i], 0);
+  wptr_poll_cntl = REG_SET_FIELD(wptr_poll_cntl, SDMA0_GFX_RB_WPTR_POLL_CNTL, ENABLE, 1);
+} else {
+  wptr_poll_cntl = REG_SET_FIELD(wptr_poll_cntl, SDMA0_GFX_RB_WPTR_POLL_CNTL, ENABLE, 0);
+} 
WREG32(mmSDMA0_GFX_RB_WPTR_POLL_CNTL + sdmaOffsets[i], wptr_poll_cntl);

/* enable DMA RB */
@@ -1105,7 +1115,7 @@
amdgpu_ring_write(ring, addr & 0xffffffff);
amdgpu_ring_write(ring, upper_32_bits(addr) & 0xffffffff);
amdgpu_ring_write(ring, seq); /* reference */
-amdgpu_ring_write(ring, 0xffffffff); /* mask */
+amdgpu_ring_write(ring, 0xffffffff); /* mask */
amdgpu_ring_write(ring, SDMA_PKT_POLL_REGMEM_DW5_RETRY_COUNT(0xffff) | 
SDMA_PKT_POLL_REGMEM_DW5_INTERVAL(4)); /* retry count, poll interval */
}
@@ -1203,9 +1213,13 @@
for (i = 0; i < adev->sdma.num_instances; i++) {
    ring = &adev->sdma.instance[i].ring;
    ring->ring_obj = NULL;
-ring->use_doorbell = true;
+if (!amdgpu_sriov_vf(adev)) {
+    ring->use_doorbell = true;
+    ring->doorbell_index = (i == 0) ? 
+        AMDGPU_DOORBELL_sDMA_ENGINE0 : AMDGPU_DOORBELL_sDMA_ENGINE1;
+} else {
+    ring->use_pollmem = true;
+}
}

sprintf(ring->name, "sdma%d", i);
r = amdgpu_ring_init(adev, ring, 1024, 
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/sdma_v4_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/sdma_v4_0.c
@@ -66,6 +66,7 @@
SOC15_REG_OFFSET(SDMA0, 0, mmSDMA0_UTCL1_PAGE), 0x000003ff, 0x000003c0,
+SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_UTCL1_WATERMK), 0xfc000000, 0x00000000,
SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_CLK_CTRL), 0xffffffff, 0x02831f07, 
SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_GFX_IB_CNTL), 0x800f0100, 0x00000100,
@@ -77,7 +78,8 @@
SOC15_REG_OFFSET(SDMA0, 0, mmSDMA0_UTCL1_PAGE), 0x000003ff, 0x000003c0
SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_UTCL1_PAGE), 0x000003ff, 0x000003c0,
+SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_UTCL1_WATERMK), 0xfc000000, 0x00000000,
SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_GFX_IB_CNTL), 0x800f0100, 0x00000100, 
@ @ -77,7 +78,8 @@
SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_RLC0_RB_WPTR_POLL_CNTL), 0x00000ff0, 0x00403000,
SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_RLC1_RB_WPTR_POLL_CNTL), 0x00000ff0, 0x00403000,
-SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_UTCL1_PAGE), 0x000003ff, 0x000003c0
+SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_UTCL1_PAGE), 0x000003ff, 0x000003c0,
+SOC15_REG_OFFSET(SDMA1, 0, mmSDMA1_UTCL1_WATERMK), 0xfc000000, 0x00000000
};

static const u32 golden_settings_sdma_vg10[] = {
@@ -98,7 +100,8 @@
SOC15_REG_OFFSET(SDMA0, 0, mmSDMA0_RLC0_RB_WPTR_POLL_CNTL), 0xffffffff7, 0x00403000,
SOC15_REG_OFFSET(SDMA0, 0, mmSDMA0_RLC1_RB_WPTR_POLL_CNTL), 0x800f0111, 0x00000100,
SOC15_REG_OFFSET(SDMA0, 0, mmSDMA0_RLC1_RB_WPTR_POLL_CNTL), 0xffffffff7, 0x00403000,
-SOC15_REG_OFFSET(SDMA0, 0, mmSDMA0_UTCL1_PAGE), 0x000003ff, 0x000003c0
+SOC15_REG_OFFSET(SDMA0, 0, mmSDMA0_UTCL1_PAGE), 0x000003ff, 0x000003c0
};
static const u32 golden_settings_sdma_rv1[] =
@@ -1136,7 +1139,7 @@
amdgpu_ring_write(ring, addr & 0xfffffffc);
amdgpu_ring_write(ring, upper_32_bits(addr) & 0xffffffff);
amdgpu_ring_write(ring, seq); /* reference */
-amdgpu_ring_write(ring, 0xffffff); /* mask */
+amdgpu_ring_write(ring, 0xffffffff); /* mask */
amdgpu_ring_write(ring, SDMA_PKT_POLL_REGMEM_DW5_RETRY_COUNT(0xfff) | SDMA_PKT_POLL_REGMEM_DW5_INTERVAL(4)); /* retry count, poll interval */
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/si.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/si.c
@@ -31,6 +31,7 @@
#include "amdgpu_uvd.h"
#include "amdgpu_vce.h"
#include "atom.h"
+#include "amd_pcie.h"
#include "amdgpu_powerplay.h"
#include "sid.h"
#include "si_ih.h"
@@ -1230,6 +1231,71 @@
+static int si_get_pcie_lanes(struct amdgpu_device *adev)
+{
+u32 link_width_cntl;
+ +if (adev->flags & AMD_IS_APU)
+ return 0;
+ +
+link_width_cntl = RREG32_PCIE_PORT(PCIE_LC_LINK_WIDTH_CNTL);
+ +switch ((link_width_cntl & LC_LINK_WIDTH_RD_MASK) >> LC_LINK_WIDTH_RD_SHIFT) {
+case LC_LINK_WIDTH_X1:
+return 1;
+case LC_LINK_WIDTH_X2:
+return 2;
+case LC_LINK_WIDTH_X4:
+return 4;
+case LC_LINK_WIDTH_X8:
+return 8;
+case LC_LINK_WIDTH_X0:
+case LC_LINK_WIDTH_X16:
+default:
+  return 16;
+
+static void si_set_pcie_lanes(struct amdgpu_device *adev, int lanes)
+{
+  u32 link_width_cntl, mask;
+
+  if (adev->flags & AMD_IS_APU)
+    return;
+
+  switch (lanes) {
+    case 0:
+      mask = LC_LINK_WIDTH_X0;
+      break;
+    case 1:
+      mask = LC_LINK_WIDTH_X1;
+      break;
+    case 2:
+      mask = LC_LINK_WIDTH_X2;
+      break;
+    case 4:
+      mask = LC_LINK_WIDTH_X4;
+      break;
+    case 8:
+      mask = LC_LINK_WIDTH_X8;
+      break;
+    case 16:
+      mask = LC_LINK_WIDTH_X16;
+      break;
+    default:
+      DRM_ERROR("invalid pcie lane request: %d\n", lanes);
+      return;
+  }
+
+  link_width_cntl = RREG32_PCIE_PORT(PCIE_LC_LINK_WIDTH_CNTL);
+  link_width_cntl &= ~LC_LINK_WIDTH_MASK;
+  link_width_cntl |= mask << LC_LINK_WIDTH_SHIFT;
+  link_width_cntl |= (LC_RECONFIG_NOW |
+    LC_RECONFIG_ARC_MISSING_ESCAPE);
+  WREG32_PCIE_PORT(PCIE_LC_LINK_WIDTH_CNTL, link_width_cntl);
+
+static const struct amdgpu_asic_funcs si_asic_funcs =
{
  .read_disabled_bios = &si_read_disabled_bios,
@@ -1240,6 +1306,8 @@
   .get_xclk = &si_get_xclk,
   .set_uvd_clocks = &si_set_uvd_clocks,
   .set_vce_clocks = NULL,
+  .get_pcie_lanes = &si_get_pcie_lanes,
+  .set_pcie_lanes = &si_set_pcie_lanes,
   .get_config_memsize = &si_get_config_memsize,
};

@@ -1461,8 +1529,8 @@
 {
 struct pci_dev *root = adev->pdev->bus->self;
 int bridge_pos, gpu_pos;
-u32 speed_cntl, mask, current_data_rate;
-int ret, i;
+  u32 speed_cntl, current_data_rate;
+int i;
 u16 tmp16;

 if (pci_is_root_bus(adev->pdev->bus))
@@ -1474,23 +1542,20 @@
 if (adev->flags & AMD_IS_APU)
 return;

-ret = drm_pcie_get_speed_cap_mask(adev->ddev, &mask);
-if (ret != 0)
-return;
-
-if (!(mask & (DRM_PCIE_SPEED_50 | DRM_PCIE_SPEED_80)))
+if (!(adev->pm.pcie_gen_mask & (CAIL_PCIE_LINK_SPEED_SUPPORT_GEN2 |
+  CAIL_PCIE_LINK_SPEED_SUPPORT_GEN3)))
 return;

 speed_cntl = RREG32_PCIE_PORT(PCIE_LC_SPEED_CNTL);
 current_data_rate = (speed_cntl & LC_CURRENT_DATA_RATE_MASK) >>
 LC_CURRENT_DATA_RATE_SHIFT;
-if (mask & DRM_PCIE_SPEED_80) {
+if (adev->pm.pcie_gen_mask & CAIL_PCIE_LINK_SPEED_SUPPORT_GEN3) {
   if (current_data_rate == 2) {
     DRM_INFO("PCIE gen 3 link speeds already enabled\n");
     return;
   }
   \"enabling PCIE gen 3 link speeds, disable with amdgpu.pcie_gen2=0\n\";
 } else if (mask & DRM_PCIE_SPEED_50) {
+   else if (adev->pm.pcie_gen_mask & CAIL_PCIE_LINK_SPEED_SUPPORT_GEN2) {
     if (current_data_rate == 1) {
       DRM_INFO("PCIE gen 2 link speeds already enabled\n");
     return;
   }
if (!gpu_pos)
return;

-if (mask & DRM_PCIE_SPEED_80) {
+if (adev->pm.pcie_gen_mask & CAIL_PCIE_LINK_SPEED_SUPPORT_GEN3) {
if (current_data_rate != 2) {
    u16 bridge_cfg, gpu_cfg;
    u16 bridge_cfg2, gpu_cfg2;
    tmp16 &= ~0xf;
    -if (mask & DRM_PCIE_SPEED_80)
    +if (adev->pm.pcie_gen_mask & CAIL_PCIE_LINK_SPEED_SUPPORT_GEN3)
        tmp16 |= 3;
    -else if (mask & DRM_PCIE_SPEED_50)
    +else if (adev->pm.pcie_gen_mask & CAIL_PCIE_LINK_SPEED_SUPPORT_GEN2)
        tmp16 |= 2;
    else
        -if (orig != data)
            si_pif_phy1_wreg(adev,PB1_PIF_PWRDOWN_1, data);
    orig = data = si_pif_phy0_rreg(adev,PB0_PIF_PWRDOWN_0);
    data &= ~PLL_RAMP_UP_TIME_0_MASK;
    if (orig != data)
        @ @ -1767,14 +1832,14 @@
orig = data = si_pif_phy0_rreg(adev,PB0_PIF_CNTL);
    data &= ~LS2_EXIT_TIME_MASK;
    -if ((adev->family != CHIP_OLAND) || (adev->family == CHIP_HAINAN))
        data |= LS2_EXIT_TIME(5);
    if (orig != data)
        si_pif_phy0_wreg(adev,PB0_PIF_CNTL, data);
orig = data = si_pif_phy1_rreg(adev,PB1_PIF_CNTL);
    data &= ~LS2_EXIT_TIME_MASK;
    -if ((adev->family == CHIP_OLAND) || (adev->family == CHIP_HAINAN))
        data |= LS2_EXIT_TIME(5);
    if (orig != data)
        si_pif_phy1_wreg(adev,PB1_PIF_CNTL, data);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/si_dpm.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/si_dpm.c
@@ -26,6 +26,7 @@
 #include "amdgpu_pm.h"
 #include "amdgpu_dpm.h"
 #include "amdgpu_atombios.h"
+#include "amd_pcie.h"
 #include "sid.h"
 #include "r600_dpm.h"
 #include "si_dpm.h"
@@ -3331,29 +3332,6 @@
 }
 }

-static enum amdgpu_pcie_gen r600_get_pcie_gen_support(struct amdgpu_device *adev,
 -	 u32 sys_mask,
 -	 enum amdgpu_pcie_gen asic_gen,
 -	 enum amdgpu_pcie_gen default_gen)
 -{
 -	 switch (asic_gen) {
 -	 case AMDGPU_PCIE_GEN1:
 -		 return AMDGPU_PCIE_GEN1;
 -	 case AMDGPU_PCIE_GEN2:
 -		 return AMDGPU_PCIE_GEN2;
 -	 case AMDGPU_PCIE_GEN3:
 -		 return AMDGPU_PCIE_GEN3;
 -	 default:
 -	 if ((sys_mask & DRM_PCIE_SPEED_80) && (default_gen == AMDGPU_PCIE_GEN3))
 -	 return AMDGPU_PCIE_GEN3;
 -	 else if ((sys_mask & DRM_PCIE_SPEED_50) && (default_gen == AMDGPU_PCIE_GEN2))
 -	 return AMDGPU_PCIE_GEN2;
 -	 else
 -	 return AMDGPU_PCIE_GEN1;
 -	}
 -	 return AMDGPU_PCIE_GEN1;
-

 static void r600_calculate_u_and_p(u32 i, u32 r_c, u32 p_b,
     u32 *p, u32 *u)
 {
     (@ @ -3464,6 +3442,11 @@
         (adev->pdev->device == 0x6667)) {
             max_sclk = 75000;
         }
 +if ((adev->pdev->revision == 0xC3) ||
 +    (adev->pdev->device == 0x6665)) {
 +    max_sclk = 60000;
 +    max_mclk = 80000;
 +}
} else if (adev->asic_type == CHIP_OLAND) {
    if ((adev->pdev->revision == 0xC7) ||
        (adev->pdev->revision == 0x80))
    {
        table->ACPIState.levels[0].vddc.index,
        &table->ACPIState.levels[0].std_vddc);
    }
}

if (si_pi->vddc_phase_shed_control) {
    si_populate_phase_shedding_value(adev,
    @ @ -6390,9 +6374,9 @@
    {
        u32 lane_width;
        u32 new_lane_width =
        -(amdgpu_new_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
        ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT;
        +(amdgpu_new_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
        ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT) + 1;
        u32 current_lane_width =
        -(amdgpu_current_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
        ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT;
        +(amdgpu_current_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
        ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT) + 1;

        if (new_lane_width != current_lane_width) {
            amdgpu_set_pcie_lanes(adev, new_lane_width);
            @ @ -6905,7 +6889,6 @@
            si_enable_auto_throttle_source(adev, AMDGPU_DPM_AUTO_THROTTLE_SRC_THERMAL, true);
            si_thermal_start_thermal_controller(adev);
            -ni_update_current_ps(adev, boot_ps);

            return 0;
        }
    }
    @ @ -7167,10 +7150,10 @@
    pl->vddc = le16_to_cpu(clock_info->si.usVDDC);  
    pl->vddci = le16_to_cpu(clock_info->si.usVDDCI);
    pl->flags = le32_to_cpu(clock_info->si.ulFlags);
   -pl->pcie_gen = r600_get_pcie_gen_support(adev,
si_pi->sys_pcie_mask,
si_pi->boot_pcie_gen,
clock_info->si.ucPCIEGen);
+ pl->pcie_gen = amdgpu_get_pcie_gen_support(adev,
+ si_pi->sys_pcie_mask,
+ si_pi->boot_pcie_gen,
+ clock_info->si.ucPCIEGen);

/* patch up vddc if necessary */
ret = si_get_leakage_voltage_from_leakage_index(adev, pl->vddc,
@@ -7325,7 +7308,6 @@
struct si_power_info *si_pi;
struct atom_clock_dividers dividers;
int ret;
-u32 mask;

si_pi = kzalloc(sizeof(struct si_power_info), GFP_KERNEL);
if (si_pi == NULL)
@@ -7335,11 +7317,9 @@
eg_pi = &ni_pi->eg;
pi = &eg_pi->rv7xx;

-ret = drm_pcie_get_speed_cap_mask(adev->ddev, &mask);
-if (ret)
-si_pi->sys_pcie_mask = 0;
-else
-si_pi->sys_pcie_mask = mask;
+si_pi->sys_pcie_mask =
+(adev->pm.pcie_gen_mask & CAIL_PCIE_LINK_SPEED_SUPPORT_MASK) >>
+CAIL_PCIE_LINK_SPEED_SUPPORT_SHIFT;
si_pi->force_pcie_gen = AMDGPU_PCIE_GEN_INVALID;
si_pi->boot_pcie_gen = si_get_current_pcie_speed(adev);

@@ -7782,7 +7762,7 @@
else
adev->pm.dpm_enabled = true;
mutex_unlock(&adev->pm.mutex);
-
+amdgpu_pm_compute_clocks(adev);
return ret;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/soc15.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/soc15.c
@@ -279,7 +279,12 @@
}
static u32 soc15_get_xclk(struct amdgpu_device *adev)
{
int uvd_v6_0_enc_ring_test_ring(struct amdgpu_ring *ring)
{
    struct amdgpu_device *adev = ring->adev;
    uint32_t rptr = amdgpu_ring_get_rptr(ring);
    unsigned i;
    int r;

    @@ -174,6 +174,9 @@
    ring->idx, r);
    return r;
}
+
+rptr = amdgpu_ring_get_rptr(ring);
+
    amdgpu_ring_write(ring, HEVC_ENC_CMD_END);
    amdgpu_ring_commit(ring);

    --- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpudrv/uvd_v7_0.c
    +++ linux-4.15.0/drivers/gpu/drm/amd/amdgpudrv/uvd_v7_0.c
    @@ -161,7 +161,7 @@
    static int uvd_v7_0_enc_ring_test_ring(struct amdgpu_ring *ring)
    {
        struct amdgpu_device *adev = ring->adev;
        uint32_t rptr = amdgpu_ring_get_rptr(ring);
        unsigned i;
        int r;

        @@ -161,7 +161,7 @@
        amdgpu_ring_write(ring, HEVC_ENC_CMD_END);
        amdgpu_ring_commit(ring);

        --- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpudrv/uvd_v7_0.c
        +++ linux-4.15.0/drivers/gpu/drm/amd/amdgpudrv/uvd_v7_0.c
        @@ -161,7 +161,7 @@
        static int uvd_v7_0_enc_ring_test_ring(struct amdgpu_ring *ring)
        {
            struct amdgpu_device *adev = ring->adev;
uint32_t rptr = amdgpu_ring_get_rptr(ring);
unsigned i;
int r;

@@ -174,6 +174,9 @@
        ring->idx, r);
    return r;
 }
+    rptr = amdgpu_ring_get_rptr(ring);
+    amdgpu_ring_write(ring, HEVC_ENC_CMD_END);
    amdgpu_ring_commit(ring);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/vce_v3_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/vce_v3_0.c
@@ -467,8 +467,8 @@
     struct amdgpu_device *adev = (struct amdgpu_device *)handle;
     vce_v3_0_override_vce_clock_gating(adev, true);
-    if (!(adev->flags & AMD_IS_APU))
-        amdgpu_asic_set_vce_clocks(adev, 10000, 10000);
+    amdgpu_asic_set_vce_clocks(adev, 10000, 10000);
     for (i = 0; i < adev->vce.num_rings; i++)
         adev->vce.ring[i].ready = false;
@@ -899,7 +899,7 @@
         .emit_frame_size =
             4 + /* vce_v3_0_emit_pipeline_sync */
             6, /* amdgpu_vce_ring_emit_fence x1 no user fence */
-            .emit_ib_size = 5, /* vce_v3_0_ring_emit_ib */
+            .emit_ib_size = 4, /* amdgpu_vce_ring_emit_ib */
            .emit_ib = amdgpu_vce_ring_emit_ib,
            .emit_fence = amdgpu_vce_ring_emit_fence,
            .test_ring = amdgpu_vce_ring_test_ring,
@@ -923,7 +923,7 @@
             6 + /* vce_v3_0_emit_vm_flush */
             4 + /* vce_v3_0_emit_pipeline_sync */
             6 + 6, /* amdgpu_vce_ring_emit_fence x2 vm fence */
-            .emit_ib_size = 4, /* amdgpu_vce_ring_emit_ib */
+            .emit_ib_size = 5, /* vce_v3_0_ring_emit_ib */
            .emit_ib = vce_v3_0_ring_emit_ib,
            .emit_vm_flush = vce_v3_0_emit_vm_flush,
            .emit_pipeline_sync = vce_v3_0_emit_pipeline_sync,
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/vcn_v1_0.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/vcn_v1_0.c

if (r)
return r;

@if (adev->firmware.load_type == AMDGPU_FW_LOAD_PSP) {
+const struct common_firmware_header *hdr;
+hdr = (const struct common_firmware_header *)adev->vcn.fw->data;
+adev->firmware.ucode[AMDGPU_UCODE_ID_VCN].ucode_id = AMDGPU_UCODE_ID_VCN;
+adev->firmware.ucode[AMDGPU_UCODE_ID_VCN].fw = adev->vcn.fw;
+adev->firmware.fw_size +=
+ALIGN(le32_to_cpu(hdr->ucode_size_bytes), PAGE_SIZE);
+-DRM_INFO("PSP loading VCN firmware\n");
+
+
} elseif (r)
return r;
@@ -248,26 +258,38 @@
static void vcn_v1_0_mc_resume(struct amdgpu_device *adev)
{
    uint32_t size = AMDGPU_GPU_PAGE_ALIGN(adev->vcn.fw->size + 4);
    uint32_t offset;

    if (adev->firmware.load_type == AMDGPU_FW_LOAD_PSP) {
-        WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE_64BIT_BAR_LOW,
+        (adev->firmware.ucode[AMDGPU_UCODE_ID_VCN].tmr_mc_addr_lo));
-        WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE_64BIT_BAR_HIGH,
+        (adev->firmware.ucode[AMDGPU_UCODE_ID_VCN].tmr_mc_addr_hhi));
+        WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_OFFSET0, 0);
+        offset = 0;
+    } else {
+        WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE_64BIT_BAR_LOW,
+            lower_32_bits(adev->vcn.gpu_addr));
-        WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE_64BIT_BAR_HIGH,
+            upper_32_bits(adev->vcn.gpu_addr));
-        WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_OFFSET0,
-            AMDGPU_UVD_FIRMWARE_OFFSET >> 3);
+        offset = size;
+        WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_OFFSET0,
+            AMDGPU_UVD_FIRMWARE_OFFSET >> 3);
+    }
+
+    WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_SIZE0, size);
+
    WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE1_64BIT_BAR_LOW,
        lower_32_bits(adev->vcn.gpu_addr + size));
+ lower_32_bits(adev->vcn.gpuaaddr + offset));
WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE1_64BIT_BAR_HIGH,
- upper_32_bits(adev->vcn.gpuaaddr + size));
+ upper_32_bits(adev->vcn.gpuaaddr + offset));
WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_OFFSET1, 0);
WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_SIZE1, AMDGPU_VCN_HEAP_SIZE);

WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE2_64BIT_BAR_LOW,
- lower_32_bits(adev->vcn.gpuaaddr + size + AMDGPU_VCN_HEAP_SIZE));
+ lower_32_bits(adev->vcn.gpuaaddr + offset + AMDGPU_VCN_HEAP_SIZE));
WREG32_SOC15(UVD, 0, mmUVD_LMI_VCPU_CACHE2_64BIT_BAR_HIGH,
- upper_32_bits(adev->vcn.gpuaaddr + size + AMDGPU_VCN_HEAP_SIZE));
+ upper_32_bits(adev->vcn.gpuaaddr + offset + AMDGPU_VCN_HEAP_SIZE));
WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_OFFSET2, 0);
WREG32_SOC15(UVD, 0, mmUVD_VCPU_CACHE_SIZE2, AMDGPU_VCN_STACK_SIZE + (AMDGPU_VCN_SESSION_SIZE * 40));
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdgpu/vi.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdgpu/vi.c
@@ -449,14 +449,19 @@
static void vi_detect_hw_virtualization(struct amdgpu_device *adev)
{
    -uint32_t reg = RREG32(mmBIF_IOV_FUNC_IDENTIFIER);
    -/* bit0: 0 means pf and 1 means vf */
    -/* bit31: 0 means disable IOV and 1 means enable */
    -if (reg & 1)
    -adev->virt.caps |= AMDGPU_SRIOV_CAPS_IS_VF;
    +uint32_t reg = 0;

    -if (reg & 0x80000000)
    -adev->virt.caps |= AMDGPU_SRIOV_CAPS_ENABLE_IOV;
    +if (adev->asic_type == CHIP_TONGA ||
        +adev->asic_type == CHIP_FIJI) {
        +reg = RREG32(mmBIF_IOV_FUNC_IDENTIFIER);
        +/* bit0: 0 means pf and 1 means vf */
        +/* bit31: 0 means disable IOV and 1 means enable */
        +if (reg & 1)
        +adev->virt.caps |= AMDGPU_SRIOV_CAPS_IS_VF;
        +
        +if (reg & 0x80000000)
        +adev->virt.caps |= AMDGPU_SRIOV_CAPS_ENABLE_IOV;
    +}

    if (reg == 0) {
        if (is_virtual_machine()) /* passthrough mode exclus sr-iov mode */
            @ @ -725,33 +730,59 @ @
    return r;
tmp = RREG32_SMC(cntl_reg);
-tmp &= ~(CG_DCLK_CNTL__DCLK_DIR_CNTL_EN_MASK |
-CG_DCLK_CNTL__DCLK_DIVIDER_MASK);
+
+if (adev->flags & AMD_IS_APU)
+tmp &= ~CG_DCLK_CNTL__DCLK_DIVIDER_MASK;
+else
+tmp &= ~(CG_DCLK_CNTL__DCLK_DIR_CNTL_EN_MASK |
+CG_DCLK_CNTL__DCLK_DIVIDER_MASK);

for (i = 0; i < 100; i++) {
-if (RREG32_SMC(status_reg) & CG_DCLK_STATUS__DCLK_STATUS_MASK)
-break;
+tmp = RREG32_SMC(status_reg);
+if (adev->flags & AMD_IS_APU) {
+if (tmp & 0x10000)
+break;
+} else {
+if (tmp & CG_DCLK_STATUS__DCLK_STATUS_MASK)
+break;
+}
+}
+mdelay(10);
}

return 0;

#define ixGNB_CLK1_DFS_CNTL 0xD82200F0
#define ixGNB_CLK1_STATUS   0xD822010C
#define ixGNB_CLK2_DFS_CNTL 0xD8220110
#define ixGNB_CLK2_STATUS   0xD822012C
#define ixGNB_CLK3_DFS_CNTL 0xD8220130
#define ixGNB_CLK3_STATUS   0xD822014C
+
static int vi_set_uvd_clocks(struct amdgpu_device *adev, u32 vclk, u32 dclk)
{
int r;

-r = vi_set_uvd_clock(adev, vclk, ixCG_VCLK_CNTL, ixCG_VCLK_STATUS);
-if (r)
-return r;
-
-r = vi_set_uvd_clock(adev, dclk, ixCG_DCLK_CNTL, ixCG_DCLK_STATUS);
-if (r)
-return r;
+if (adev->flags & AMD_IS_APU) {
+    r = vi_set_uvd_clock(adev, vclk, ixGNB_CLK2_DFS_CNTL, ixGNB_CLK2_STATUS);
+    if (r)
+        return r;
+    r = vi_set_uvd_clock(adev, dclk, ixGNB_CLK2_DFS_CNTL, ixGNB_CLK2_STATUS);
+    if (r)
+        return r;
+} else {
+    r = vi_set_uvd_clock(adev, vclk, ixCG_VCLK_CNTL, ixCG_VCLK_STATUS);
+    if (r)
+        return r;
+    r = vi_set_uvd_clock(adev, dclk, ixCG_DCLK_CNTL, ixCG_DCLK_STATUS);
+    if (r)
+        return r;
+}
+
return 0;
}
@@ -761,6 +792,22 @@
int r, i;
struct atom_clock_dividers dividers;
u32 tmp;
+    u32 reg_ctrl;
+    u32 reg_status;
+    u32 status_mask;
+    u32 reg_mask;
+
+    if (adev->flags & AMD_IS_APU) {
+        reg_ctrl = ixGNB_CLK3_DFS_CNTL;
+        reg_status = ixGNB_CLK3_STATUS;
+        status_mask = 0x00010000;
+        reg_mask = CG_ECLK_CNTL__ECLK_DIVIDER_MASK;
+    } else {
+        reg_ctrl = ixCG_ECLK_CNTL;
+        reg_status = ixCG_ECLK_STATUS;
+        status_mask = CG_ECLK_STATUS__ECLK_STATUS_MASK;
+        reg_mask = CG_ECLK_CNTL__ECLK_DIR_CNTL_EN_MASK |
+                          CG_ECLK_CNTL__ECLK_DIVIDER_MASK;
+    }

r = amdgpu_atombios_get_clock_dividers(adev,
             COMPUTE_GPUCLK_INPUT_FLAG_DEFAULT_GPUCLK,
@@ -769,24 +816,25 @@
return r;
for (i = 0; i < 100; i++) {
    if (RREG32_SMC(ixC_GCLK_STATUS) & CG_ECLK_STATUS__ECLK_STATUS_MASK)
        break;
    mdelay(10);
} +
if (i == 100)
    return -ETIMEDOUT;

    tmp = RREG32_SMC(ixCG_ECLK_CNTL);
    tmp &= ~(CG_ECLK_CNTL__ECLK_DIR_CNTL_EN_MASK |
        CG_ECLK_CNTL__ECLK_DIVIDER_MASK);
    tmp = RREG32_SMC(reg_ctrl);
    tmp &= ~reg_mask;
    tmp |= dividers.post_divider;
    WREG32_SMC(ixCG_ECLK_CNTL, tmp);
    WREG32_SMC(reg_ctrl, tmp);
for (i = 0; i < 100; i++) {
    if (RREG32_SMC(ixC_GCLK_STATUS) & CG_ECLK_STATUS__ECLK_STATUS_MASK)
        break;
    mdelay(10);
} +
if (i == 100)
    return -ETIMEDOUT;

@@ -1045,7 +1093,6 @@
    AMD_CG_SUPPORT_GFX_CP_LS |
    AMD_CG_SUPPORT_GFX_CGTS |
    AMD_CG_SUPPORT_GFX_CGTS_LS |
-    AMD_CG_SUPPORT_GFX_CGCG |
    AMD_CG_SUPPORT_BIF_LS |
    AMD_CG_SUPPORT_HDP_MGCC |
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_chardev.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdkfd/kfd_chardev.c
@@ -715,12 +715,13 @@
    struct timespec64 time;
    dev = kfd_device_by_id(args->gpu_id);
    if (dev == NULL)
-        return -EINVAL;
-
-    /* Reading GPU clock counter from KGD */
-    args->gpu_clock_counter =
if (dev)
    /* Reading GPU clock counter from KGD */
    args->gpu_clock_counter =
    +dev->kfd2kgd->get_gpu_clock_counter(dev->kgd);
else
    /* Node without GPU resource */
    args->gpu_clock_counter = 0;

/* No access to rdtsc. Using raw monotonic time */
getrawmonotonic64(&time);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_device.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdkfd/kfd_device.c
@@ -395,17 +395,19 @@
    /* This is called directly from KGD at ISR. */
    void kgd2kfd_interrupt(struct kfd_dev *kfd, const void *ih_ring_entry)
    {
        +unsigned long flags;
        +
        if (!kfd->init_complete)
            return;

        -spin_lock(&kfd->interrupt_lock);
        +spin_lock_irqsave(&kfd->interrupt_lock, flags);

        if (kfd->interrupts_active
            && interrupt_is_wanted(kfd, ih_ring_entry)
            && enqueue_ih_ring_entry(kfd, ih_ring_entry))
            queue_work(kfd->ih_wq, &kfd->interrupt_work);

        -spin_unlock(&kfd->interrupt_lock);
        +spin_unlock_irqrestore(&kfd->interrupt_lock, flags);
    }

static int kfd_gtt_sa_init(struct kfd_dev *kfd, unsigned int buf_size,
@@ @ -559,9 +561,9 @@
    return 0;

    kfd_gtt_no_free_chunk:
    -pr_debug("Allocation failed with mem_obj = \%p\n", mem_obj);
    +pr_debug("Allocation failed with mem_obj = \%p\n", *mem_obj);
    mutex_unlock(&kfd->gtt_sa_lock);
    -kfree(mem_obj);
    +kfree(*mem_obj);
    return -ENOMEM;

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_device_queue_manager.c
unmap_queues_cpsch(dqm, KFD_UNMAP_QUEUES_FILTER_ALL_QUEUES, 0);
mutex_unlock(&dqm->lock);

+pm_release_ib(&dqm->packets);
+
kfd_gtt_sa_free(dqm->dev, dqm->fence_mem);
pm_uninit(&dqm->packets);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_interrupt.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdkfd/kfd_interrupt.c
@@ -62,6 +62,11 @@
{
    kfd->ih_wq = alloc_workqueue("KFD IH", WQ_HIGHPRI, 1);
    +if (unlikely(!kfd->ih_wq)) {
        +kfifo_free(&kfd->ih_fifo);
        +dev_err(kfd_chardev(), "Failed to allocate KFD IH workqueue\n");
        +return -ENOMEM;
        +}
    spin_lock_init(&kfd->interrupt_lock);

    INIT_WORK(&kfd->interrupt_work, interrupt_wq);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_mqd_manager_cik.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdkfd/kfd_mqd_manager_cik.c
@@ -275,57 +275,7 @@
    struct kfd_mem_obj **mqd_mem_obj, uint64_t *gart_addr,
    struct queue_properties *q)
{
-    uint64_t addr;
-    struct cik_mqd *m;
-    int retval;
-    
-    retval = kfd_gtt_sa_allocate(mm->dev, sizeof(struct cik_mqd),
-        mqd_mem_obj);
-    
-    -if (retval != 0)
-        return -ENOMEM;
-    
-    m = (struct cik_mqd *) (*mqd_mem_obj)->cpu_ptr;
-    -addr = (*mqd_mem_obj)->gpu_addr;
-    
-    memset(m, 0, ALIGN(sizeof(struct cik_mqd), 256));
-    
-    -m->header = 0xC0310800;
-    -m->compute_pipelinestat_enable = 1;
-    -m->compute_static_thread_mgmt_se0 = 0xFFFFFFFF;

---
-m->compute_static_thread_mgmt_se1 = 0xFFFFFFFF;
-m->compute_static_thread_mgmt_se2 = 0xFFFFFFFF;
-m->compute_static_thread_mgmt_se3 = 0xFFFFFFFF;

-m->cp_hqd_persistent_state = DEFAULT_CP_HQD_PERSISTENT_STATE | PRELOAD_REQ;
-m->cp_hqd_quantum = QUANTUM_EN | QUANTUM_SCALE_1MS | QUANTUM_DURATION(10);

-m->cp_mqd_control = MQD_CONTROL_PRIV_STATE_EN;
-m->cp_mqd_base_addr_lo = lower_32_bits(addr);
-m->cp_mqd_base_addr_hi = upper_32_bits(addr);

-m->cp_hqd_ib_control = DEFAULT_MIN_IB_AVAIL_SIZE;

/*
 * Pipe Priority
 * Identifies the pipe relative priority when this queue is connected
 * to the pipeline. The pipe priority is against the GFX pipe and HP3D.
 * In KFD we are using a fixed pipe priority set to CS_MEDIUM.
 * 0 = CS_LOW (typically below GFX)
 * 1 = CS_MEDIUM (typically between HP3D and GFX
 * 2 = CS_HIGH (typically above HP3D)
 */
-m->cp_hqd_pipe_priority = 1;
-m->cp_hqd_queue_priority = 15;

/*mqd = m;
-if (gart_addr)
 *gart_addr = addr;
-return mm->update_mqd(mm, m, q);
 */

return init_mqd(mm, mqd, mqd_mem_obj, gart_addr, q);
}

static int update_mqd_hiq struct mqd_manager *mm, void *mqd,
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_packet_manager.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdkfd/kfd_packet_manager.c
@@ -161,8 +161,7 @@
 packet->sh_mem_ape1_base = qpd->sh_mem_ape1_base;
 packet->sh_mem_ape1_limit = qpd->sh_mem_ape1_limit;

-/* TODO: scratch support */
-packe-1024
+packet->sh_hidden_private_base_vmid = qpd->sh_hidden_private_base;

-packet->gds_addr_lo = lower_32_bits(qpd->gds_context_area);
packet->gds_addr_hi = upper_32_bits(qpd->gds_context_area);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_process.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdkfd/kfd_process.c
@@ -116,6 +116,8 @@
 return ERR_PTR(-EINVAL);

 process = find_process(thread);
+if (!process)
+ return ERR_PTR(-EINVAL);

 return process;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/amdkfd/kfd_topology.c
+++ linux-4.15.0/drivers/gpu/drm/amd/amdkfd/kfd_topology.c
@@ -501,11 +501,17 @@
 return ret;
 }
+static void kfd_topology_kobj_release(struct kobject *kobj)
+{
+ kfree(kobj);
+ }
+
 static const struct sysfs_ops sysprops_ops = {
 .show = sysprops_show,
 };

 static struct kobj_type sysprops_type = {
+.release = kfd_topology_kobj_release,
 .sysfs_ops = &sysprops_ops,
};
@@ -541,6 +547,7 @@
};

 static struct kobj_type iolink_type = {
+.release = kfd_topology_kobj_release,
 .sysfs_ops = &iolink_ops,
};
@@ -568,6 +575,7 @@
};

 static struct kobj_type mem_type = {
+.release = kfd_topology_kobj_release,
 .sysfs_ops = &mem_ops,
};


static struct kobj_type cache_type = {
  .release = kfd_topology_kobj_release,
  .sysfs_ops = &cache_ops,
};

static struct kobj_type node_type = {
  .release = kfd_topology_kobj_release,
  .sysfs_ops = &node_ops,
};

ret = kobject_init_and_add(dev->kobj_node, &node_type,
  sys_props.kobj_nodes, "%d", id);
  -if (ret < 0)
  +if (ret < 0) {
  +kobject_put(dev->kobj_node);
  return ret;
  +}

  dev->kobj_mem = kobject_create_and_add("mem_banks", dev->kobj_node);
  if (!dev->kobj_mem)
    return -ENOMEM;

  mem->attr.name = "properties";
  mem->attr.mode = KFD_SYSFS_FILE_MODE;
    -if (ret < 0)
    +if (ret < 0) {
    +kobject_put(mem->kobj);
    return ret;
    +}

    mem->attr.name = "properties";
    mem->attr.mode = KFD_SYSFS_FILE_MODE;
      return -ENOMEM;
      ret = kobject_init_and_add(cache->kobj, &cache_type,
        dev->kobj_cache, "%d", i);
          -if (ret < 0)
          +if (ret < 0) {
          +kobject_put(cache->kobj);
          return ret;
          +}
cache->attr.name = "properties";
cache->attr.mode = KFD_SYSFS_FILE_MODE;
return -ENOMEM;
ret = kobject_init_and_add(iolink->kobj, &iolink_type,
dev->kobj_iolink, "%d", i);
-if (ret < 0)
+if (ret < 0) {
+kobject_put(iolink->kobj);
return ret;
+
}
iolink->attr.name = "properties";
iolink->attr.mode = KFD_SYSFS_FILE_MODE;
ret = kobject_init_and_add(sys_props.kobj_topology,
&sysprops_type, &kfd_device->kobj,
"topology");
-if (ret < 0)
+if (ret < 0) {
+kobject_put(sys_props.kobj_topology);
return ret;
+
}
sys_props.kobj_nodes = kobject_create_and_add("nodes",
sys_props.kobj_topology);
init_data.asic_id.pci_revision_id = adev->rev_id;
init_data.asic_id.hw_internal_rev = adev->external_rev_id;
+init_data.asic_id.chip_id = adev->pdev->device;
in/* TODO: initialize init_data.asic_id.vram_type here!!!! */
{  
struct amdgpu_dm_connector *aconnector;
struct drm_connector *connector;
+struct drm_dp_mst_topology_mgr *mgr;
+int ret;
+bool need_hotplug = false;

drm_modeset_lock(&dev->mode_config.connection_mutex, NULL);
list_for_each_entry(connector, &dev->mode_config.connector_list, head) {
    aconnector = to_amdgpu_dm_connector(connector);
    if (aconnector->dc_link->type == dc_connection_mst_branch &&
        !aconnector->mst_port) {
        if (suspend)
            drm_dp_mst_topology_mgr_suspend(&aconnector->mst_mgr);
        else
            drm_dp_mst_topology_mgr_resume(&aconnector->mst_mgr);
    }
    list_for_each_entry(connector, &dev->mode_config.connector_list,
        head) {
        aconnector = to_amdgpu_dm_connector(connector);
        if (aconnector->dc_link->type != dc_connection_mst_branch ||
            aconnector->mst_port)
            continue;
        else
            mgr = &aconnector->mst_mgr;
            if (suspend) {
                drm_dp_mst_topology_mgr_suspend(mgr);
            } else {
                ret = drm_dp_mst_topology_mgr_resume(mgr);
                if (ret < 0) {
                    drm_dp_mst_topology_mgr_set_mst(mgr, false);
                    need_hotplug = true;
                }
            }
    }
    drm_modeset_unlock(&dev->mode_config.connection_mutex);
    if (need_hotplug)
        drm_kms_helper_hotplug_event(dev);
}

static int dm_hw_init(void *handle)
@@ -594,12 +609,13 @@
    struct amdgpu_display_manager *dm = &adev->dm;
    int ret = 0;
    WARN_ON(adev->dm.cached_state);
+    adev->dm.cached_state = drm_atomic_helper_suspend(adev->ddev);
    +    s3_handle_mst(adev->ddev, true);

    amdgpu_dm_irq_suspend(adev);
-WARN_ON(adev->dm.cached_state);
-adev->dm.cached_state = drm_atomic_helper_suspend(adev->ddev);

dc_set_power_state(dm->dc, DC_ACPI_CM_POWER_STATE_D3);

@@ -904,6 +920,7 @@
drm_mode_connector_update_edid_property(connector, NULL);
aconnector->num_modes = 0;
aconnector->dc_sink = NULL;
+aconnector->edid = NULL;
}
mutex_unlock(&dev->mode_config.mutex);
@@ -1308,6 +1325,7 @@
    .options = BL_CORE_SUSPENDRESUME,
    .get_brightness = amdgpu_dm_backlight_get_brightness,
    .update_status= amdgpu_dm_backlight_update_status,
    
@@ -1319,6 +1337,7 @@
struct backlight_properties props = { 0 };
props.max_brightness = AMDGPU_MAX_BL_LEVEL;
+props.brightness = AMDGPU_MAX_BL_LEVEL;
props.type = BACKLIGHT_RAW;

snprintf(bl_name, sizeof(bl_name), "amdgpu_bl%d",
@@ -2114,13 +2133,8 @@
         { 0);

static enum dc_aspect_ratio
get_aspect_ratio(const struct drm_display_mode *mode_in)
{
  -int32_t width = mode_in->crtc_hdisplay * 9;
  -int32_t height = mode_in->crtc_vdisplay * 16;
  -
  -if ((width - height) < 10 && (width - height) > -10)
  -return ASPECT_RATIO_16_9;
  -else
  -return ASPECT_RATIO_4_3;
  +/* 1-1 mapping, since both enums follow the HDMI spec. */
  +return (enum dc_aspect_ratio) mode_in->picture_aspect_ratio;
}

static enum dc_color_space
@@ -2929,7 +2943,7 @@
 .update_plane= drm_atomic_helper_update_plane,

static const struct backlight_ops amdgpu_dm_backlight_ops = {
    .options = BL_CORE_SUSPENDRESUME,
    .get_brightness = amdgpu_dm_backlight_get_brightness,
    .update_status= amdgpu_dm_backlight_update_status,

static const struct drm_plane_funcs dm_plane_funcs = {
    .update_plane= drm_atomic_helper_update_plane,

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switch (aplane->base.type) {
    case DRM_PLANE_TYPE_PRIMARY:
        aplane->base.format_default = true;
        res = drm_universal_plane_init(
            dm->adev->ddev,
            &aplane->base,
            @ @ -3368,6 +3380,13 @@
        )
        struct amdgpu_device *adev = dm->ddev->dev_private;

        /*
         * Some of the properties below require access to state, like bpc.
         * Allocate some default initial connector state with our reset helper.
         * *
         */
        if (aconnector->basefuncs->reset)
            aconnector->basefuncs->reset(&aconnector->base);
        +
        aconnector->connector_id = link_index;
        aconnector->dc_link = link;
        aconnector->base.interface_allowed = false;
        @ @ -3528,9 +3547,6 @@
        &aconnector->base,
        &amdgpu_dm_connector_helper_funcs);

        -if (aconnector->basefuncs->reset)
            aconnector->basefuncs->reset(&aconnector->base);
        -
        amdGPU_dm_connector_init_helper(
            dm,
            aconnector,
            @ @ -3760,6 +3776,7 @@
            amdGPU_crtc->cursor_width = plane->state->crtc_w;
            amdGPU_crtc->cursor_height = plane->state->crtc_h;

            +memset(&attributes, 0, sizeof(attributes));
            attributes.address.high_part = upper_32_bits(address);
            attributes.address.low_part = lower_32_bits(address);
            attributes.width = plane->state->crtc_w;
            @ @ -3874,10 +3891,11 @@
if (acrtc->base.state->event)
prepare_flip_isr(acrtc);

+spin_unlock_irqrestore(&crtc->dev->event_lock, flags);
+
surface_updates->surface = dc_stream_get_status(acrtc_state->stream)->plane_states[0];
surface_updates->flip_addr = &addr;
-
dc_commit_updates_for_stream(adev->dm.dc,
    surface_updates,
    1,
    __func__,
    addr.address.grph.addr.high_part,
    addr.address.grph.addr.low_part);
-
-
-spin_unlock_irqrestore(&crtc->dev->event_lock, flags);
}

static void amdgpu_dm_commit_planes(struct drm_atomic_state *state,
@@ -4258,12 +4273,18 @@
}
spin_unlock_irqrestore(&adev->ddev->event_lock, flags);

-/* Signal HW programming completion */
-drm_atomic_helper_commit_hw_done(state);

if (wait_for_vblank)
drm_atomic_helper_wait_for_flip_done(dev, state);

+/*
 + * FIXME:
 + * Delay hw_done() until flip_done() is signaled. This is to block
 + * another commit from freeing the CRTC state while we're still
 + * waiting on flip_done.
 + */
+drm_atomic_helper_commit_hw_done(state);
+
drm_atomic_helper_cleanup_planes(dev, state);
} 

@@ -4293,14 +4314,14 @@
ret = PTR_ERR_OR_ZERO(conn_state);
if (ret)
    goto err;
goto out;

/* Attach crtc to drm_atomic_state*/
crtc_state = drm_atomic_get_crtc_state(state, &disconnected_acrtc->base);

ret = PTR_ERR_OR_ZERO(crtc_state);
if (ret)
    -goto err;
+goto out;

/* force a restore */
crtc_state->mode_changed = true;
@@ -4310,17 +4331,15 @@

ret = PTR_ERR_OR_ZERO(plane_state);
if (ret)
    -goto err;
- 
+goto out;

/* Call commit internally with the state we just constructed */
ret = drm_atomic_commit(state);
-if (!ret)
-    return 0;

-err:
-DRM_ERROR("Restoring old state failed with %i\n", ret);
+out:
    drm_atomic_state_put(state);
+if (ret)
+    DRM_ERROR("Restoring old state failed with %i\n", ret);

return ret;
}
@@ -4426,6 +4445,7 @@
struct amdgpu_dm_connector *aconnector = NULL;
struct drm_connector_state *new_con_state = NULL;
struct dm_connector_state *dm_conn_state = NULL;
+struct drm_plane_state *new_plane_state = NULL;
new_stream = NULL;

@@ -4433,6 +4453,13 @@
dm_new_crtc_state = to_dm_crtc_state(new_crtc_state);
acrtc = to_amdgpu_crtc(crtc);

+new_plane_state = drm_atomic_get_new_plane_state(state, new_crtc_state->crtc->primary);
+
+if (new_crtc_state->enable && new_plane_state && !new_plane_state->fb) {
+    ret = -EINVAL;
+    goto fail;
+}
+aconnector = amdgpu_dm_find_first_crtc_matching_connector(state, crtc);

/* TODO This hack should go away */
@@ -4607,7 +4634,7 @@
     DRM_DEBUG_ATOMIC("Disabling DRM plane: %d on DRM crtc %d\n",
       plane->base.id, old_plane_crtc->base.id);

     if (!dc_remove_plane_from_context(
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/amdgpu_dm/amdgpu_dm_helpers.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/amdgpu_dm/amdgpu_dm_helpers.c
@@ -109,7 +109,7 @@
       edid_caps->audio_modes[i].format_code = sad->format;
 -edid_caps->audio_modes[i].channel_count = sad->channels;
 +edid_caps->audio_modes[i].channel_count = sad->channels + 1;
       edid_caps->audio_modes[i].sample_rate = sad->freq;
       edid_caps->audio_modes[i].sample_size = sad->byte2;
   }
@@ -243,7 +243,8 @@
         drm_dp_mst_reset_vcpi_slots(mst_mgr, mst_port);
     }

 -ret = drm_dp_update_payload_part1(mst_mgr);
+/* It's OK for this to fail */
+        drm_dp_update_payload_part1(mst_mgr);

 /* mst_mgr->->payloads are VC payload notify MST branch using DPCD or
 * AUX message. The sequence is slot 1-63 allocated sequence for each
@@ -252,9 +253,6 @@
     get_payload_table(aconnector, proposed_table);

 -if (ret)
-      return false;
-     return true;
}
@@ -296,7 +294,6 @@
 struct amdgpu_dm_connector *aconnector;
 struct drm_dp_mst_topology_mgr *mst_mgr;
 struct drm_dp_mst_port *mst_port;
-int ret;

 aconnector = stream->sink->priv;

@@ -310,10 +307,8 @@
 if (!mst_mgr->mst_state)
 return false;

-ret = drm_dp_update_payload_part2(mst_mgr);
-
-if (ret)
-return false;
+/* It's OK for this to fail */
+drm_dp_update_payload_part2(mst_mgr);

if (!enable)
 drm_dp_mst_deallocate_vcpi(mst_mgr, mst_port);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/amdgpu_dm/amdgpu_dm_irq.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/amdgpu_dm/amdgpu_dm_irq.c
@@ -400,14 +400,15 @@
{
 int src;
 struct irq_list_head *lh;
+unsigned long irq_table_flags;
 DRM_DEBUG_KMS("DM_IRQ: releasing resources.
); 
-
 for (src = 0; src < DAL_IRQ_SOURCES_NUMBER; src++) {
-
+DM_IRQ_TABLE_LOCK(adev, irq_table_flags);
 /* The handler was removed from the table,
 * it means it is safe to flush all the 'work'
 * (because no code can schedule a new one). */
 lh = &adev->dm.irq_handler_list_low_tab[src];
+DM_IRQ_TABLE_UNLOCK(adev, irq_table_flags);
 flush_work(&lh->work);
 }

@@ -630,6 +631,9 @@
 return 0;
 }

+if (acrtc->otg_inst == -1)
+return 0;
+}
irq_source = dal_irq_type + acrtc->otg_inst;

st = (state == AMDGPU_IRQ_STATE_ENABLE);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/amdgpu_dm/amdgpu_dm_mst_types.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/amdgpu_dm/amdgpu_dm_mst_types.c
@@ -298,12 +298,7 @@
  
 struct amdgpu_device *adev = dev->dev_private;
 struct amdgpu_encoder *amdgpu_encoder;
 struct drm_encoder *encoder;
-const struct drm_connector_helper_funcs *connector_funcs =
-connector->base.helper_private;
-struct drm_encoder *enc_master =
-connector->base.helper_private;
-struct drm_encoder *enc_master =
-connector_funcs->best_encoder(&connector->base);

-DRM_DEBUG_KMS("enc master is %p\n", enc_master);

amdgpu_encoder = kzalloc(sizeof(*amdgpu_encoder), GFP_KERNEL);
if (!amdgpu_encoder)
  return NULL;

*aconnector->mst_encoder = dm_dp_create_fake_mst_encoder(master);

-/*
 -* TODO: understand why this one is needed
 -*/

drm_object_attach_property(
  &connector->base,
  dev->mode_config.path_property,
  @ @ -424,6 +416,7 @ @
  dc_link_remove_remote_sink(aconnector->dc_link, aconnector->dc_sink);
  dc_sink_release(aconnector->dc_sink);
  aconnector->dc_sink = NULL;
  +aconnector->dc_link->cur_link_settings.lane_count = 0;
  }
if (aconnector->edid) {
  kfree(aconnector->edid);
  --- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/bios/command_table.c
+++
  linux-4.15.0/drivers/gpu/drm/amd/display/dc/bios/command_table.c
  @ @ -805,6 +805,24 @ @
  * (=1: 8bpp, =1.25: 10bpp, =1.5:12bpp, =2: 16bpp)
  * LVDS mode: usPixelClock = pixel clock
  */
+if (cntl->signal == SIGNAL_TYPE_HDMI_TYPE_A) {
  +switch (cntl->color_depth) {
  +case COLOR_DEPTH_101010:
  +params.usSymClock =
  +cpu_to_le16((le16_to_cpu(params.usSymClock) * 30) / 24);
  +break;
case COLOR_DEPTH_121212:
params.usSymClock =
cpu_to_le16(le16_to_cpu(params.usSymClock) * 36) / 24);
break;
}

case COLOR_DEPTH_161616:
params.usSymClock =
cpu_to_le16(le16_to_cpu(params.usSymClock) * 48) / 24);
break;
default:
break;
+
+
+
if (EXEC_BIOS_CMD_TABLE(UNIPHYTransmitterControl, params))
result = BP_RESULT_OK;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/core/dc.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/core/dc.c
@@ -443,8 +443,10 @@
static void destruct(struct dc *dc)
{
  -dc_release_state(dc->current_state);
  -dc->current_state = NULL;
+  if (dc->current_state) {
+    dc_release_state(dc->current_state);
+    dc->current_state = NULL;
+  }

  destroy_links(dc);

@@ -937,6 +939,26 @@

+static bool is_flip_pending_in_pipes(struct dc *dc, struct dc_state *context)
+{
+int i;
+struct pipe_ctx *pipe;
+
+for (i = 0; i < MAX_PIPES; i++) {
+  pipe = &context->res_ctx.pipe_ctx[i];
+
+  if (!pipe->plane_state)
+    continue;
+
+  /* Must set to false to start with, due to OR in update function */
+  pipe->plane_state->status.is_flip_pending = false;
+  dc->hwss.update_pending_status(pipe);
if (pipe->plane_state->status.is_flip_pending)
+ return true;
+
+ return false;
+
bool dc_post_update_surfaces_to_stream(struct dc *dc)
{
    int i;
    @ @ -944,6 +966,9 @ @

    post_surface_trace(dc);

    +if (is_flip_pending_in_pipes(dc, context))
    + return true;
    +
    for (i = 0; i < dc->res_pool->pipe_count; i++)
        if (context->res_ctx.pipe_ctx[i].stream == NULL
            || context->res_ctx.pipe_ctx[i].plane_state == NULL)
            @ @ -1542,6 +1567,14 @ @
        dc_resource_state_construct(dc, dc->current_state);

    dc->hwss.init_hw(dc);

    +#ifdef CONFIG_DRM_AMD_DC_DCN2_0
    +if (dc->hwss.init_sys_ctx != NULL
        && dc->vm_pa_config.valid) {
        +dc->hwss.init_sys_ctx(dc->hwseq, dc, &dc->vm_pa_config);
        +}
    +#endif

    break;
    default:

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/core/dc_link.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/core/dc_link.c
@@ -311,7 +311,7 @@
{
    enum gpio_result gpio_result;
    uint32_t clock_pin = 0;
    @ @ -311,7 +311,7 @ @

    enum connector_id connector_id =
    @ @ -335,16 +335,27 @ @

    if (GPIO_RESULT_OK != dal_ddc_open(
ddc, GPIO_MODE_INPUT, GPIO_DDC_CONFIG_TYPE_MODE_I2C)) {
  -dal_gpio_destroy_ddc(&ddc);
  +dal_ddc_close(ddc);

  return present;
}

/\* Read GPIO: DP sink is present if both clock and data pins are zero */
/\* [anaumov] in DAL2, there was no check for GPIO failure */
-
-gpio_result = dal_gpio_get_value(ddc->pin_clock, &clock_pin);
-ASSERT(gpio_result == GPIO_RESULT_OK);
+
+/* Read GPIO: DP sink is present if both clock and data pins are zero */
+/*
+ * [W/A] plug-unplug DP cable, sometimes customer board has
+ * one short pulse on clk_pin(1V, < 1ms). DP will be config to HDMI/DVI
+ * then monitor can't br light up. Add retry 3 times
+ * But in real passive dongle, it need additional 3ms to detect
+ */
+do {
+  gpio_result = dal_gpio_get_value(ddc->pin_clock, &clock_pin);
+  ASSERT(gpio_result == GPIO_RESULT_OK);
+  if (clock_pin)
+    udelay(1000);
+  else
+    break;
+} while (retry++ < 3);

  present = (gpio_result == GPIO_RESULT_OK) && !clock_pin;

@@ -484,6 +495,10 @@
sink_caps->signal = SIGNAL_TYPE_DISPLAY_PORT_MST;
link->type = dc_connection_mst_branch;

+dal_ddc_service_set_transaction_type(
+link->ddc,
+sink_caps->transaction_type);
+
/*
 * This call will initiate MST topology discovery. Which
 * will detect MST ports and add new DRM connector DRM
@@ -1005,6 +1020,11 @@
goto ddc_create_fail;
}

+if (!link->ddc->ddc_pin) {
  +DC_ERROR("Failed to get I2C info for connector!\n");
+static enum dc_status enable_link_edp(
  struct dc_state *state,
  struct pipe_ctx *pipe_ctx)
{
  enum dc_status status;
  struct dc_stream_state *stream = pipe_ctx->stream;
  struct dc_link *link = stream->sink->link;

  /* in case it is not on */
  link->dc->hwss.edp_power_control(link, true);
  link->dc->hwss.edp_wait_for_hpd_ready(link, true);

  status = enable_link_dp(state, pipe_ctx);
  return status;
}

+static enum dc_status enable_link_dp_mst(
  struct dc_state *state,
  struct pipe_ctx *pipe_ctx)
{
  enum dc_status status = DC_ERROR_UNEXPECTED;
  switch (pipe_ctx->stream->signal) {
  case SIGNAL_TYPE_DISPLAY_PORT:
    break;
  case SIGNAL_TYPE_EDP:
    status = enable_link_dp(state, pipe_ctx);
    break;
  case SIGNAL_TYPE_DISPLAY_PORT_MST:
    status = enable_link_dp_mst(state, pipe_ctx);
    msleep(200);
    break;
  case SIGNAL_TYPE_EDP:
    status = enable_link_dp_mst(state, pipe_ctx);
    break;
  case SIGNAL_TYPE_DISPLAY_PORT_MST:
    status = enable_link_dp_mst(state, pipe_ctx);
    msleep(200);
    break;
  default:
    dp_disable_link_phy_mst(link, signal);
  }
  else
    -link->link_enc->funcs->disable_output(link->link_enc, signal, link);
static bool dp_active_dongle_validate_timing(
    @ @ -1876.7 +1915.7 @@
/* A hack to avoid failing any modes for EDID override feature on
 * topology change such as lower quality cable for DP or different dongle
 */
-if (link->remote_sinks[0])
+if (link->remote_sinks[0] && link->remote_sinks[0]->sink_signal == SIGNAL_TYPE_VIRTUAL)
    return DC_OK;

/* Passive Dongle */
@@ -2408,15 +2447,16 @@
    if (pipe_ctx->stream->signal == SIGNAL_TYPE_DISPLAY_PORT_MST)
        allocate_mst_payload(pipe_ctx);

    -if (dc_is_dp_signal(pipe_ctx->stream->signal))
    -core_dc->hwss.unblank_stream(pipe_ctx,
    -&pipe_ctx->stream->sink->link->cur_link_settings);
    +core_dc->hwss.unblank_stream(pipe_ctx,
    +&pipe_ctx->stream->sink->link->cur_link_settings);
}

void core_link_disable_stream(struct pipe_ctx *pipe_ctx, int option)
{
    struct dc  *core_dc = pipe_ctx->stream->ctx->dc;

    +core_dc->hwss.blank_stream(pipe_ctx);
    +
    if (pipe_ctx->stream->signal == SIGNAL_TYPE_DISPLAY_PORT_MST)
        deallocate_mst_payload(pipe_ctx);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/core/dc_link_ddc.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/core/dc_link_ddc.c
@@ -126,22 +126,16 @@
    struct vector payloads;
};

static struct i2c_payloads *dal_ddc_i2c_payloads_create(struct dc_context *ctx, uint32_t count)
+static bool dal_ddc_i2c_payloads_create(
+    struct dc_context *ctx,
+    struct i2c_payloads *payloads,
+    uint32_t count)
+{   
-    struct i2c_payloads *payloads = kzalloc(sizeof(struct i2c_payloads), GFP_KERNEL);

if (!payloads)
	return NULL;
if (dal_vector_construct(&payloads->payloads, ctx, count, sizeof(struct i2c_payload)))
	return payloads;
-kfree(payloads);
-return NULL;
+return true;
+return false;
}

static struct i2c_payload *dal_ddc_i2c_payloads_get(struct i2c_payloads *p)
@@ -154,14 +148,12 @@
return p->payloads.count;
}

static void dal_ddc_i2c_payloads_destroy(struct i2c_payloads **p)
+static void dal_ddc_i2c_payloads_destroy(struct i2c_payloads *p)
{
-if (!p || !*p)
+if (!p)
return;
-dal_vector_destruct(&(*p)->payloads);
-kfree(*p);
-*p = NULL;

+dal_vector_destruct(&p->payloads);
}

static struct aux_payloads *dal_ddc_aux_payloads_create(struct dc_context *ctx, uint32_t count)
@@ -432,6 +424,7 @@
enum display_dongle_type *dongle = &sink_cap->dongle_type;
uint8_t type2_dongle_buf[DP_ADAPTOR_TYPE2_SIZE];
bool is_type2_dongle = false;
+int retry_count = 2;
struct dp_hdmi_dongle_signature_data *dongle_signature;
/* Assume we have no valid DP passive dongle connected */
@@ -444,13 +437,24 @@
DP_HDMI_DONGLE_ADDRESS,
type2_dongle_buf,
sizeof(type2_dongle_buf))) {
-*dongle = DISPLAY_DONGLE_DP_DVI_DONGLE;
-sink_cap->max_hdmi_pixel_clock = DP_ADAPTOR_DVI_MAX_TMDS_CLK;
/* Passive HDMI dongles can sometimes fail here without retrying*/
while (retry_count > 0) {
	if (i2c_read(ddc, 
+DP_HDMI_DONGLE_ADDRESS, 
+type2_dongle_buf, 
+sizeof(type2_dongle_buf)))
		break;
+retry_count--;
+
+if (retry_count == 0) {
+*dongle = DISPLAY_DONGLE_DP_DVI_DONGLE;
+sink_cap->max_hdmi_pixel_clock = DP_ADAPTOR_DVI_MAX_TMDS_CLK;

-CONN_DATA_DETECT(ddc->link, type2_dongle_buf, sizeof(type2_dongle_buf), 
-"DP-DVI passive dongle %dMhz: ", 
-DP_ADAPTOR_DVI_MAX_TMDS_CLK / 1000);
-return;
+CONN_DATA_DETECT(ddc->link, type2_dongle_buf, sizeof(type2_dongle_buf), 
+"DP-DVI passive dongle %dMhz: ", 
+DP_ADAPTOR_DVI_MAX_TMDS_CLK / 1000);
+return;
+
}@}

/* Check if Type 2 dongle.*/
@@ -567,9 +571,13 @@
+uint32_t payloads_num = write_payloads + read_payloads;
+
+if (write_size > EDID_SEGMENT_SIZE || read_size > EDID_SEGMENT_SIZE)
+return false;
+
+if (!payloads_num)
+return false;
++
+/*TODO: len of payload data for i2c and aux is uint8!!!!,
+ but we want to read 256 over i2c!!!!*/
+if (dal_ddc_service_is_in_aux_transaction_mode(ddc)) {
@@ -600,23 +608,25 @@
dal_ddc_aux_payloads_destroy(&payloads);
} else {
-struct i2c_payloads *payloads = 
-dal_ddc_i2c_payloads_create(ddc->ctx, payloads_num);
+struct i2c_command command = {0};
+struct i2c_payloads payloads =

struct i2c_command command = {
    .payloads = dal_ddc_i2c_payloads_get(payloads),
    .number_of_payloads = 0,
    .engine = DDC_I2C_COMMANDENGINE,
    .speed = ddc->ctx->dc->caps.i2c_speed_in_khz};

if (!dal_ddc_i2c_payloads_create(ddc->ctx, &payloads, payloads_num))
    return false;

command.payloads = dal_ddc_i2c_payloads_get(&payloads);
command.number_of_payloads = 0;
command.engine = DDC_I2C_COMMANDENGINE;
command.speed = ddc->ctx->dc->caps.i2c_speed_in_khz;

dal_ddc_i2c_payloads_add(
    -payloads, address, write_size, write_buf, true);
+&payloads, address, write_size, write_buf, true);

dal_ddc_i2c_payloads_add(
    -payloads, address, read_size, read_buf, false);
+&payloads, address, read_size, read_buf, false);

custom_number_of_payloads =
    -dal_ddc_i2c_payloads_get_count(payloads);
+dal_ddc_i2c_payloads_get_count(&payloads);

ret = dm_helpers_submit_i2c(
    ddc->ctx,
    --- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/core/dc_link_dp.c
    +++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/core/dc_link_dp.c
    @ @ -21477 +21478 @@
    translate_dpcc_max_bpc(
      hdmi_color_caps.bits.MAX_BITS_PER_COLOR_COMPONENT);

  -link->dpcc_caps.dongle_caps.extendedCapValid = true;
  +if (link->dpcc_caps.dongle_caps.dp_hhmi_max_pixel_clk != 0)
  +link->dpcc_caps.dongle_caps.extendedCapValid = true;
}
-link_enc,
-link_settings,
-clock_source);
+link->dc->hwss.edp_backlight_control(link, true);
} else
-link_enc->func->enable_dp_output(
   +link_enc->func->enable_dp_output(
      link_enc,
      link_settings,
      clock_source);
   @@ -138,12 +130,11 @@
   dp_receiver_power_ctrl(link, false);
   if (signal == SIGNAL_TYPE_EDP) {
      -link->dc->hwss.edp_backlight_control(link, false);
      edp_receiver_ready_T9(link);
      -link->link_enc->func->disable_output(link->link_enc, signal, link);
      -link->dc->hwss.edp_power_control(link->link_enc, false);
      +link->link_enc->func->disable_output(link->link_enc, signal);
      +link->dc->hwss.edp_power_control(link, false);
   } else
      -link->link_enc->func->disable_output(link->link_enc, signal, link);
      +link->link_enc->func->disable_output(link->link_enc, signal);

   /* Clear current link setting. */
   memset(&link->cur_link_settings, 0,
   @@ -286,8 +277,7 @@
      /* Clear current link setting. */
      memset(&link->cur_link_settings, 0,
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/core/dc_resource.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/core/dc_resource.c
@@ -35,6 +35,7 @@
 #include "core_types.h"
 #include "set_mode_types.h"
 #include "virtual/virtual_stream_encoder.h"
+#include "dpcd_defs.h"

 #include "dce80/dce80_resource.h"
 #include "dce100/dce100_resource.h"
 @@ -216,7 +217,7 @@
 * PORT_CONNECTIVITY == 1 (as instructed by HW team).
update_num_audio(&straps, &num_audio, &pool->audio_support);
- for (i = 0; i < pool->pipe_count && i < num_audio; i++) {
+ for (i = 0; i < caps->num_audio; i++) {
  struct audio *aud = create_funcs->create_audio(ctx, i);
  if (aud == NULL) {
@@ -262,24 +263,30 @@
    return true;
  }
+ static int find_matching_clock_source(
+   const struct resource_pool *pool,
+   struct clock_source *clock_source)
+ {
+   int i;
+   
+   for (i = 0; i < pool->clk_src_count; i++) {
+     if (pool->clock_sources[i] == clock_source)
+       return i;
+   }
+   return -1;
+ }
+ void resource_unrefreference_clock_source(
+   struct resource_context *res_ctx,
+   const struct resource_pool *pool,
+   struct clock_source *clock_source)
+ {
+   int i;
+   
+   for (i = 0; i < pool->clk_src_count; i++) {
+     if (pool->clock_sources[i] != clock_source)
+       continue;
+   }
+   if (pool->dp_clock_source == clock_source)
+     res_ctx->dp_clock_source_ref_count--;
+   if (i > -1)
+     res_ctx->clock_source_ref_count[i]--;
+   -break;
+   -}
+   -
+ if (pool->dp_clock_source == clock_source)
+   res_ctx->dp_clock_source_ref_count--;
+ }
@@ -289,19 +296,31 @@
 const struct resource_pool *pool,
struct clock_source *clock_source)
{
    int i;
    for (i = 0; i < pool->clk_src_count; i++) {
        if (pool->clock_sources[i] != clock_source)
            continue;
        int i = find_matching_clock_source(pool, clock_source);
        if (i > -1)
            res_ctx->clock_source_ref_count[i]++;
    }

    if (pool->dp_clock_source == clock_source)
        res_ctx->dp_clock_source_ref_count++;
}

int resource_get_clock_source_reference(
    struct resource_context *res_ctx,
    const struct resource_pool *pool,
    struct clock_source *clock_source)
{
    int i = find_matching_clock_source(pool, clock_source);
    if (i > -1)
        return res_ctx->clock_source_ref_count[i];
    if (pool->dp_clock_source == clock_source)
        return res_ctx->dp_clock_source_ref_count;
    return -1;
}

bool resource_are_streams_timing_synchronizable(
    struct dc_stream_state *stream1,
    struct dc_stream_state *stream2)
{
    if (stream1->clamping.c_depth != stream2->clamping.c_depth)
        return false;
    if (stream1->phy_pix_clk != stream2->phy_pix_clk
        && (!dc_is_dp_signal(stream1->signal)
            || !dc_is_dp_signal(stream2->signal)))
        return false;
    if (stream1->phy_pix_clk != stream2->phy_pix_clk
        && (!dc_is_dp_signal(stream1->signal)
            || !dc_is_dp_signal(stream2->signal)))
        return false;
    return true;
}
static bool is_dp_and_hdmi_sharable(
    struct dc_stream_state *stream1,
    struct dc_stream_state *stream2)
{
    if (stream1->ctx->dc->caps.disable_dp_clk_share)
        return false;
    if (stream1->clamping.c_depth != COLOR_DEPTH_888 ||
        stream2->clamping.c_depth != COLORDEPTH_888)
        return false;
    return true;
}

static bool is_sharable_clk_src(
    const struct pipe_ctx *pipe_with_clk_src,
    const struct pipe_ctx *pipe)
{
    if (pipe_with_clk_src->stream->signal == SIGNAL_TYPE_VIRTUAL)
        return false;
    if (dc_is_dp_signal(pipe_with_clk_src->stream->signal) ||
        (dc_is_dp_signal(pipe->stream->signal) &&
        !is_dp_and_hdmi_sharable(pipe_with_clk_src->stream,
            pipe->stream)))
        return false;

    if (dc_is_hdmi_signal(pipe_with_clk_src->stream->signal))
        return false;

    if (!pipe_ctx->top_pipe)
        if (!pipe_ctx->top_pipe || (!pipe_ctx->top_pipe->top_pipe &&
            pipe_ctx->top_pipe->stream_res.opp != pipe_ctx->stream_res.opp))
            pipe_ctx->top_pipe = NULL;
        pipe_ctx->plane_state = NULL;
        pipe_ctx->bottom_pipe = NULL;
    else
        memset(pipe_ctx, 0, sizeof(*pipe_ctx));
}

return pool->audios[i];
+ /* use engine id to find free audio */
+ if ((id < pool->audio_count) && (res_ctx->is_audio_acquired[id] == false)) {
+ return pool->audios[id];
+ }
+ /* not found the matching one, first come first serve*/
+ for (i = 0; i < pool->audio_count; i++) {
+ if (res_ctx->is_audio_acquired[i] == false) {
+ @ @ -1546.8 +1593.6 @@
+ del_pipe->clock_source);
+ }
+ }
+ memset(del_pipe, 0, sizeof(*del_pipe));
+ -break;
+ }
+ }
+ @ @ -1626.6 +1671.7 @@
+ pix_clk /= 2;
+ if (timing->pixel_encoding != PIXEL_ENCODING_YCBCR422) {
+ switch (timing->display_color_depth) {
+ case COLOR_DEPTH_666:
+ case COLOR_DEPTH_888:
+ normalized_pix_clk = pix_clk;
+ break;
+ @ @ -1679.6 +1725.8 @@
+ }
+ */
+ /* acquire new resources */
+ pipe_idx = acquire_first_free_pipe(&context->res_ctx, pool, stream);
+ @ @ -1707.7 +1755.7 @@
+ /* TODO: Add check if ASIC support and EDID audio */
+ if (!stream->sink->converter_disable_audio &&
+ dc_is_audio_capable_signal(pipe_ctx->stream->signal) &&
+ - stream->audio_info.mode_count) {
+ + stream->audio_info.mode_count && stream->audio_info.flags.all) {
+ pipe_ctx->stream_res.audio = find_first_free_audio(
+ &context->res_ctx, pool, pipe_ctx->stream_res.stream_enc->id);
+ @ @ -2428.7 +2476.8 @@
+ unsigned int vscPacketRevision = 0;
unsigned int i;

- if (stream->sink->link->psr_enabled) {
+ /*VSC packet set to 2 when DP revision >= 1.2*/
+ if (stream->sink->link->dpcd_caps.dpcd_rev.raw >= DPCD_REV_12) {
    vscPacketRevision = 2;
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/core/dc_stream.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/core/dc_stream.c
@@ -200,7 +200,8 @@
    for (i = 0; i < MAX_PIPES; i++) {
        struct pipe_ctx *pipe_ctx = &res_ctx->pipe_ctx[i];

-       if (pipe_ctx->stream != stream || (!pipe_ctx->plane_res.xfm && !pipe_ctx->plane_res.dpp))
+       if (pipe_ctx->stream != stream || (!pipe_ctx->plane_res.xfm && !pipe_ctx->plane_res.dpp) || !pipe_ctx->plane_res.ipp)
          continue;

if (pipe_ctx->top_pipe && pipe_ctx->plane_state != pipe_ctx->top_pipe->plane_state) continue;
@@ -276,7 +277,8 @@
 continue;
@@ -276,7 +277,8 @@
+          (!pipe_ctx->plane_res.xfm && !pipe_ctx->plane_res.dpp) || !pipe_ctx->plane_res.ipp)
          continue;

if (pipe_ctx->plane_state->address.type
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dc.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dc.h
@@ -60,6 +60,7 @@
     unsigned int max_video_width;
     bool dcc_const_color;
     bool dynamic_audio;
+    bool disable_dp_clk_share;
   }

struct dc_dcc_surface_param {
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dce/dce_abm.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dce/dce_abm.c
@@ -250,6 +250,10 @@
     s2 |= (level << ATOM_S2_CURRENT_BL_LEVEL_SHIFT);
     REG_WRITE(BIOS_SCRATCH_2, s2);
+    */ waitDMCUReadyForCmd */
static void dce_abm_init(struct abm *abm) {
    struct dce_abm *abm_dce = TO_DCE_ABM(*abm);

    abm_dce->base.funcs->set_abmImmediateDisable(*abm);
    kfree(abm_dce);
    *abm = NULL;
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce/dce_clock_source.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce/dce_clock_source.c
@@ -131,7 +131,7 @@
     feedback_divider =
     -(uint64_t)(target_pix_clk_khz * ref_divider * post_divider);
     +(uint64_t)target_pix_clk_khz * ref_divider * post_divider;
    feedback_divider *= 10;
    /* additional factor, since we divide by 10 afterwards */
    feedback_divider *= (uint64_t)(calc_pll_cs->fract_fb_divider_factor);
    @ @ -143.8 +143.8 @ @
    * of fractional feedback decimal point and the fractional FB Divider precision
    * is 2 then the equation becomes (ullfeedbackDivider + 5*100) / (10*100))*/

    -feedback_divider += (uint64_t)5 * calc_pll_cs->fract_fb_divider_precision_factor);
    +feedback_divider += 5ULL *
    + calc_pll_cs->fract_fb_divider_precision_factor;
    feedback_divider =
    div_u64(feedback_divider,
    calc_pll_cs->fract_fb_divider_precision_factor * 10);
    @ @ -201.8 +201.8 @ @
    &fract_feedback_divider);

    /*Actual calculated value*/
    -actual_calc_clk_khz = (uint64_t)(feedback_divider *
    -calc_pll_cs->fract_fb_divider_factor) +
    +actual_calc_clk_khz = (uint64_t)feedback_divider *
    +calc_pll_cs->fract_fb_divider_factor +
    fract_feedback_divider;
    actual_calc_clk_khz *= calc_pll_cs->ref_freq_khz;
    actual_calc_clk_khz =
    --- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce/dce_hwseq.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce/dce_hwseq.h
@@ -240,6 +240,7 @@
    SR(D2VGA_CONTROL),
    SR(D3VGA_CONTROL),
    SR(D4VGA_CONTROL),
+   SR(VGA_TEST_CONTROL),
    SR(DC_IP_REQUEST_CNTL),
    BL_REG_LIST()
@@ -342,6 +343,7 @@
    uint32_t D2VGA_CONTROL;
    uint32_t D3VGA_CONTROL;
    uint32_t D4VGA_CONTROL;
+   uint32_t VGA_TEST_CONTROL;
/* MMHUB registers. read only. temporary hack */
    uint32_t VM_CONTEXT0_PAGE_TABLE_BASE_ADDR_HI32;
    uint32_t VM_CONTEXT0_PAGE_TABLE_BASE_ADDR_LO32;
@@ -500,6 +502,12 @@
    HWS_SF(, DOMAIN6_PG_STATUS, DOMAIN6_PGFSM_PWR_STATUS, mask_sh),
    HWS_SF(, DOMAIN7_PG_STATUS, DOMAIN7_PGFSM_PWR_STATUS, mask_sh),
    HWS_SF(, DC_IP_REQUEST_CNTL, IP_REQUEST_EN, mask_sh),
+   HWS_SF(, D1VGA_CONTROL, D1VGA_MODE_ENABLE, mask_sh),
+   HWS_SF(, D2VGA_CONTROL, D2VGA_MODE_ENABLE, mask_sh),
+   HWS_SF(, D3VGA_CONTROL, D3VGA_MODE_ENABLE, mask_sh),
+   HWS_SF(, D4VGA_CONTROL, D4VGA_MODE_ENABLE, mask_sh),
+   HWS_SF(, VGA_TEST_CONTROL, VGA_TEST_ENABLE, mask_sh),
+   HWS_SF(, VGA_TEST_CONTROL, VGA_TEST_RENDER_START, mask_sh),
    HWS_SF(, LVTMA_PWRSEQ_CNTL, LVTMA_BLON, mask_sh),
    HWS_SF(, LVTMA_PWRSEQ_STATE, LVTMA_PWRSEQ_TARGET_STATE_R, mask_sh)
@@ -591,7 +599,14 @@
    type DOMAIN7_PGFSM_PWR_STATUS;
    type DCFCLK_GATE_DIS;
    type DCHUBBUB_GLOBAL_TIMER_REFDIV;
-   type DENTIST_DPPCLK_WDIVIDER;
+   type DENTIST_DPPCLK_WDIVIDER;
+   type DENTIST_DISPCLK_WDIVIDER;
+   type VGA_TEST_ENABLE;
+   type VGA_TEST_RENDER_START;
+   type D1VGA_MODE_ENABLE;
+   type D2VGA_MODE_ENABLE;
+   type D3VGA_MODE_ENABLE;
+   type D4VGA_MODE_ENABLE;

    struct dce_hwseq_shift {
        HWSEQ_REG_FIELD_LIST(uint8_t)
    }
struct bp_encoder_cap_info bp_cap_info = {0};
const struct dc_vbios_funcs *bp_funcs = init_data->ctx->dc_bios->funcs;
+enum bp_result result = BP_RESULT_OK;
enc110->base.funcs = &dce110_link_enc_funcs;
renc110->base.ctx = init_data->ctx;

/* default to one to mirror Windows behavior */
+enc110->base.features.flags.bits.HDMI_6GB_EN = 1;
+
+result = bp_funcs->get_encoder_cap_info(enc110->base.ctx->dc_bios,
+enc110->base.id, &bp_cap_info);
+
+/* Override features with DCE-specific values */
-if (BP_RESULT_OK == bp_funcs->get_encoder_cap_info(
-enc110->base.ctx->dc_bios, enc110->base.id,
-&bp_cap_info)) {
+if (BP_RESULT_OK == result) {
enc110->base.features.flags.bits.IS_HBR2_CAPABLE =
bp_cap_info.DP_HBR2_EN;
enc110->base.features.flags.bits.IS_HBR3_CAPABLE =
bp_cap_info.DP_HBR3_EN;
enc110->base.features.flags.bits.HDMI_6GB_EN = bp_cap_info.HDMI_6GB_EN;
+} else {
+dm_logger_write(enc110->base.ctx->logger, LOG_WARNING,
+"%s: Failed to get encoder_cap_info from VBIOS with error code %d!\n",
+__func__,
+result);
} }

cntl.coherent = false;
cntl.hpd_sel = enc110->base.hpd_source;

+if (enc110->base.connector.id == CONNECTOR_ID_EDP)
+cntl.signal = SIGNAL_TYPE_EDP;
+
result = link_transmitter_control(enc110, &cntl);

if (result != BP_RESULT_OK) {

ASSERT(result == BP_RESULT_OK);

-} else if (enc110->base.connector.id == CONNECTOR_ID_EDP) {
  -ctx->dc->hwss.edp_power_control(enc, true);
}
aux_initialize(enc110);

@@ -916,7 +927,7 @@
enum bp_result result;

  /* Enable the PHY */
  -
  cntl.connector_obj_id = enc110->base.connector;
  cntl.action = TRANSMITTER_CONTROL_ENABLE;
  cntl.engine_id = enc->preferred_engine;
  cntl.transmitter = enc110->base.transmitter;
@@ -964,7 +975,7 @@
    * We need to set number of lanes manually.
    */
  configure_encoder(enc110, link_settings);
-  
  cntl.connector_obj_id = enc110->base.connector;
  cntl.action = TRANSMITTER_CONTROL_ENABLE;
  cntl.engine_id = enc->preferred_engine;
  cntl.transmitter = enc110->base.transmitter;
@@ -1033,8 +1044,7 @@
  /* We need to set number of lanes manually.
  */
  void dce110_link_encoder_disable_output(
    struct link_encoder *enc,
    -enum signal_type signal,
-    struct dc_link *link)
+enum signal_type signal)
  {
    struct dce110_link_encoder *enc110 = TO_DCE110_LINK_ENC(enc);
    struct dc_context *ctx = enc110->base.ctx;
@@ -1045,8 +1055,6 @@
    /* OF_SKIP_POWER_DOWN_INACTIVE_ENCODER */
    return;
  }
-} if (enc110->base.connector.id == CONNECTOR_ID_EDP)
-ctx->dc->hwss.edp_backlight_control(link, false);

  /* Power-down RX and disable GPU PHY should be paired.
   * Disabling PHY without powering down RX may cause
   * symbol lock loss, on which we will get DP Sink interrupt. */
@@ -1077,20 +1085,6 @@
  /* disable encoder */
  if (dc_is_dp_signal(signal))
    link_encoder_disable(enc110);
if (enc110->base.connector.id == CONNECTOR_ID_EDP) {
    /* power down eDP panel */
    /* TODO: Power control cause regression, we should implement
     * it properly, for now just comment it.
     */
    /*
    * link_encoder_edp_wait_for_hpd_ready(
    * -link_enc,
    * -link_enc->connector,
    * -false);
    *
    * link_encoder_edp_power_control(
    * -link_enc, false); */
}

void dce110_link_encoder_dp_set_lane_settings(
    struct link_encoder *enc,
    enum signal_type signal);
/* disable PHY output */
void dce110_link_encoder_disable_output(
    struct link_encoder *link_enc,
    enum signal_type signal,
    struct dc_link *link);
/* set DP lane settings */
void dce110_link_encoder_dp_set_lane_settings(
    struct link_encoder *link_enc,
    enum signal_type signal,
    struct dc_link *link);

if (info_frame->avi.valid) {
    const uint32_t *content =
        (const uint32_t *)&info_frame->avi.sb[0];
    /*we need turn on clock before programming AFMT block*/
    /*+REG_UPDATE(AFMT_CNTL, AFMT_AUDIO_CLOCK_EN, 1);
     *REG_WRITE(AFMT_AVI_INFO0, content[0]);
    */
    if (info_frame->avi.valid) {
        const uint32_t *content =
            (const uint32_t *)&info_frame->avi.sb[0];
        if (info_frame->avi.valid) {
            const uint32_t *content =
                (const uint32_t *)&info_frame->avi.sb[0];
            /*+REG_UPDATE(AFMT_CNTL, AFMT_AUDIO_CLOCK_EN, 1);
             *REG_WRITE(AFMT_AVI_INFO0, content[0]);
            */
        }
    }
    /*set DP lane settings*/
    clamp_max = 0x3FC0;
    break;
    case COLOR_DEPTH_101010:
-/* 10bit MSB aligned on 14 bit bus '11 1111 1111 1100' */
-clamp_max = 0x3FFC;
+/* 10bit MSB aligned on 14 bit bus '11 1111 1111 1100' */
+clamp_max = 0x3FF0;
break;

case COLOR_DEPTH_121212:
-/* 12bit MSB aligned on 14 bit bus '11 1111 1111 1111' */
-clamp_max = 0x3FFF;
+/* 12bit MSB aligned on 14 bit bus '11 1111 1111 1100' */
+clamp_max = 0x3FFC;
break;

default:
clamp_max = 0x3FC0;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce100/dce100_resource.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce100/dce100_resource.c
@@ -566,6 +566,7 @@
   return &clk_src->base;
 }

+kfree(clk_src);
BREAK_TO_DEBUGGER();
return NULL;
}
@@ -647,9 +648,22 @@
 struct dc  *dc,
 struct dc_state *context)
 {
-/* TODO implement when needed but for now hardcode max value*/
-context->bw.dce.dispcclk_khz = 681000;
-context->bw.dce.yclk_khz = 250000 * MEMORY_TYPE_MULTIPLIER;
+int i;
+bool at_least_one_pipe = false;
+
+for (i = 0; i < dc->res_pool->pipe_count; i++) {
+    if (context->res_ctx.pipe_ctx[i].stream)
+        at_least_one_pipe = true;
+}
+
+if (at_least_one_pipe) {
+/* TODO implement when needed but for now hardcode max value*/
+context->bw.dce.dispcclk_khz = 681000;
+context->bw.dce.yclk_khz = 250000 * MEMORY_TYPE_MULTIPLIER;
+} else {
+context->bw.dce.dispcclk_khz = 0;
+context->bw.dce.yclk_khz = 0;
+
return true;
dc->caps.max_downscale_ratio = 200;
dc->caps.i2c_speed_in_khz = 40;
dc->caps.max_cursor_size = 128;
-
+dc->caps.disable_dp_clk_share = true;
for (i = 0; i < pool->base.pipe_count; i++) {
    pool->base.timing_generators[i] =
dce100_timing_generator_create(
        @ @ -927,6 +941,7 @@
    if (construct(num_virtual_links, dc, pool))
return &pool->base;
}
+kfree(pool);
BREAK_TO_DEBUGGER();
return NULL;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce110/dce110_compressor.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce110/dce110_compressor.c
@@ -104,7 +104,7 @@
uint8_t counter = 0;
+uint16_t counter = 0;
uint32_t addr = mmFBC_STATUS;
uint32_t value;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce110/dce110_hw_sequencer.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce110/dce110_hw_sequencer.c
@@ -239,6 +239,9 @@
prescale_params->mode = IPP_PRESCALE_MODE_FIXED_UNSIGNED;
switch (plane_state->format) {
+case SURFACE_PIXEL_FORMAT_GRPH_RGB565:
    +prescale_params->scale = 0x2082;
+break;
    case SURFACE_PIXEL_FORMAT_GRPH_ARGB8888:
    case SURFACE_PIXEL_FORMAT_GRPH_ABGR8888:
    prescale_params->scale = 0x2020;
@@ -814,11 +817,11 @@
* eDP only.
 */
void hwss_edp_wait_for_hpd_ready(
    -struct link_encoder *enc,
    -bool power_up)
+struct dc_link *link,
+bool power_up)
{
-struct dc_context *ctx = enc->ctx;
-struct graphics_object_id connector = enc->connector;
+struct dc_context *ctx = link->ctx;
+struct graphics_object_id connector = link->link_enc->connector;
struct gpio *hpd;
bool edp_hpd_high = false;
uint32_t time_elapsed = 0;
@@ -882,16 +885,16 @@
}

void hwss_edp_power_control(
-struct link_encoder *enc,
-bool power_up)
+struct dc_link *link,
+bool power_up)
{
-struct dc_context *ctx = enc->ctx;
+struct dc_context *ctx = link->ctx;
struct dce_hwseq *hwseq = ctx->dc->hwseq;
struct bp_transmitter_control cntl = { 0 };
enum bp_result bp_result bp_result;

-if (dal_graphics_object_id_get_connector_id(enc->connector)
+if (dal_graphics_object_id_get_connector_id(link->link_enc->connector)
!= CONNECTOR_ID_EDP) {
    BREAK_TO_DEBUGGER();
    return;
    @@ -907,11 +910,11 @@
    cntl.action = power_up ?
    TRANSMITTER_CONTROL_POWER_ON :
    TRANSMITTER_CONTROL_POWER_OFF;
    -cntl.transmitter = enc->transmitter;
    -cntl.connector_obj_id = enc->connector;
    +cntl.transmitter = link->link_enc->transmitter;
    +cntl.connector_obj_id = link->link_enc->connector;
    cntl.coherent = false;
    cntl.lanes_number = LANE_COUNT_FOUR;
    -cntl.hpd_sel = enc->hpd_source;
    +cntl.hpd_sel = link->link_enc->hpd_source;
    bp_result = link_transmitter_control(ctx->dc_bios, &cntl);

    @@ -924,8 +927,6 @@
    "%s: Skipping Panel Power action: %s"
    __func__, (power_up ? "On":"Off"));
hwss_edp_wait_for_hpd_ready(enc, true);
}

/*todo: cloned in stream enc, fix*/
@@ -934,14 +935,14 @@
  *
  * eDP only. Control the backlight of the eDP panel
  */
void hwss_edp_backlight_control(
  -struct dc_link *link,
  -bool enable)
+struct dc_link *link,
+bool enable)
{
  -struct dce_hwseq *hws = link->dc->hwseq;
  -struct dc_context *ctx = link->dc->ctx;
  +struct dc_context *ctx = link->ctx;
  +struct dce_hwseq *hws = ctx->dc->hwseq;
  struct bp_transmitter_control cntl = { 0 };

  -if (dal_graphics_object_id_get_connector_id(link->link_id)
    != CONNECTOR_ID_EDP) {
    BREAK_TO_DEBUGGER();
    return;
  }
  /* Enable it in the future if necessary. */
  /* dc_service_sleep_in_milliseconds(50); */
  -link_transmitter_control(link->dc->ctx->dc_bios, &cntl);
  +link_transmitter_control(ctx->dc_bios, &cntl);
}

void dce110_disable_stream(struct pipe_ctx *pipe_ctx, int option)
@@ -1026,11 +1027,9 @@
  }
/* blank at encoder level */
-if (dc_is_dp_signal(pipe_ctx->stream->signal)) {
  -if (pipe_ctx->stream->sink->link->connector_signal == SIGNAL_TYPE_EDP)
    -hwss_edp_backlight_control(link, false);
  +if (dc_is_dp_signal(pipe_ctx->stream->signal))
    pipe_ctx->stream_res.stream_enc->funcs->dp_blank(pipe_ctx->stream_res.stream_enc);
  -}
  +
  link->link_enc->funcs->connect_dig_be_to_fe(
    link->link_enc,
pipe_ctx->stream_res.stream_enc->id,  
@@ -1042,15 +1041,30 @@
    struct encoder_unblank_param params = { { 0 } };  
    struct dc_link *link = pipe_ctx->stream->sink->link;  
+    struct dc_stream_state *stream = pipe_ctx->stream;  
+    struct dc_link *link = stream->sink->link;  

    /* only 3 items below are used by unblank */  
    params.pixel_clk_khz =  
        pipe_ctx->stream->timing.pix_clk_khz;  
    params.link_settings.link_rate = link_settings->link_rate;  
    -pipe_ctx->stream_res.stream_enc->funcs->dp_unblank(pipe_ctx->stream_res.stream_enc, &params);  
    -if (link->connector_signal == SIGNAL_TYPE_EDP)  
        hwss_edp_backlight_control(link, true);  
+    +if (dc_is_dp_signal(pipe_ctx->stream->signal))  
+        pipe_ctx->stream_res.stream_enc->funcs->dp_unblank(pipe_ctx->stream_res.stream_enc, &params);  
+    +if (link->local_sink && link->local_sink->sink_signal == SIGNAL_TYPE_EDP)  
+        link->dc->hwss.edp_backlight_control(link, true);  
+    +}  
+}  
+void dce110_blank_stream(struct pipe_ctx *pipe_ctx)  
+{  
+    struct dc_stream_state *stream = pipe_ctx->stream;  
+    struct dc_link *link = stream->sink->link;  
+    +if (link->local_sink && link->local_sink->sink_signal == SIGNAL_TYPE_EDP)  
+        link->dc->hwss.edp_backlight_control(link, false);  
+    +if (dc_is_dp_signal(pipe_ctx->stream->signal))  
+        pipe_ctx->stream_res.stream_enc->funcs->dp_blank(pipe_ctx->stream_res.stream_enc);  
+}  

@@ -1401,7 +1415,7 @@
    }  
    }  

    dc->links[i]->link_enc->funcs->disable_output(  
        -dc->links[i]->link_enc, signal, dc->links[i]);  
+    +dc->links[i]->link_enc, signal);  
    }  
    }  

@@ -1885,7 +1899,9 @@
    pipe_ctx_old->plane_res.mi->funcs->free_mem_input(  
        pipe_ctx_old->plane_res.mi, dc->current_state->stream_count);  

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-if (old_clk)
+if (old_clk && 0 == resource_get_clock_source_reference(&context->res_ctx,
+    +dc->res_pool,
+    +old_clk))
old_clk->funcs->cs_power_down(old_clk);

dc->hwss.power_down_front_end(dc, pipe_ctx_old->pipe_idx);
@@ -2513,6 +2529,10 @@
 * required signal (which may be different from the
 * default signal on connector). */
 struct dc_link *link = dc->links[i];
+if (link->link_enc->connector.id == CONNECTOR_ID_EDP)
+    +dc->hwss.edp_power_control(link, true);
+link->link_enc->funcs->hw_init(link->link_enc);
}
@@ -2667,6 +2687,8 @@
+pp_display_cfg->min_dcfclock_khz = pp_display_cfg->min_engine_clock_khz;
+pp_display_cfg->min_engine_clock_deep_sleep_khz = context->bw.dce.sclk_deep_sleep_khz;
@@ -2981,6 +3003,7 @@
 .disable_stream = dce110_disable_stream,
 .unblank_stream = dce110_unblank_stream,
 .blank_stream = dce110_blank_stream,
+ .enable_display_pipe_clock_gating = enable_display_pipe_clock_gating,
+ .enable_display_power_gating = dce110_enable_display_power_gating,
 .power_down_front_end = dce110_power_down_fe,
@@ -2998,6 +3021,7 @@
 .optimize_shared_resources = optimize_shared_resources,
 .edp_backlight_control = hwss_edp_backlight_control,
 .edp_power_control = hwss_edp_power_control,
+ .edp_wait_for_hpd_ready = hwss_edp_wait_for_hpd_ready,
};

void dce110_hw_sequencer_construct(struct dc *dc)
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce110/dce110_hw_sequencer.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce110/dce110_hw_sequencer.h
@@ -52,6 +52,7 @@
 .optimized = 0,
 .optimize_shared_resources = optimize_shared_resources,
 .edp_wait_for_hpd_ready = hwss_edp_wait_for_hpd_ready,
+ .edp_wait_for_hpd_ready = hwss_edp_wait_for_hpd_ready,
};

void dce110_unblank_stream(struct pipe_ctx *pipe_ctx,
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce110/dce110_hw_sequencer.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce110/dce110_hw_sequencer.h
@@ -52,6 +52,7 @@
struct dc_link_settings *link_settings);

+void dce110_blank_stream(struct pipe_ctx *pipe_ctx);
void dce110_update_info_frame(struct pipe_ctx *pipe_ctx);

void dce110_set_avmute(struct pipe_ctx *pipe_ctx, bool enable);
@@ -70,12 +71,16 @@
void dp_receiver_power_ctrl(struct dc_link *link, bool on);

void hwss_edp_power_control(
 -struct link_encoder *enc,
 -bool power_up);
+struct dc_link *link,
+bool power_up);

void hwss_edp_backlight_control(
 struct dc_link *link,
 bool enable);

+void hwss_edp_wait_for_hpd_ready(
 +struct dc_link *link,
 +bool power_up);
 +
 #endif /* __DC_HWSS_DCE110_H__ */

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce110/dce110_resource.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce110/dce110_resource.c
@@ -606,6 +606,7 @@
return &clk_src->base;
 }

+kfree(clk_src);
BREAK_TO_DEBUGGER();
return NULL;
}
@@ -1324,6 +1325,7 @@
if (construct(num_virtual_links, dc, pool, asic_id))
return &pool->base;

+kfree(pool);
BREAK_TO_DEBUGGER();
return NULL;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce112/dce112_resource.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce112/dce112_resource.c
@@ -606,6 +606,7 @@
return &clk_src->base;
 }

+kfree(clk_src);
BREAK_TO_DEBUGGER();
return NULL;
}
@@ -1278,6 +1279,7 @@
if (construct(num_virtual_links, dc, pool))
return &pool->base;

+kfree(pool);
BREAK_TO_DEBUGGER();
return NULL;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce120/dce120_resource.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce120/dce120_resource.c
@@ -395,6 +395,7 @@
return &clk_src->base;
}

+kfree(clk_src);
BREAK_TO_DEBUGGER();
return NULL;
}
@@ -999,6 +1000,7 @@
if (construct(num_virtual_links, dc, pool))
return &pool->base;

+kfree(pool);
BREAK_TO_DEBUGGER();
return NULL;
}
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dce80/dce80_resource.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dce80/dce80_resource.c
@@ -582,6 +582,7 @@
return &clk_src->base;
}

+kfree(clk_src);
BREAK_TO_DEBUGGER();
return NULL;
}
@@ -900,6 +901,7 @@

dc->caps.max_planes = pool->base.pipe_count;
+dc->caps.disable_dp_clk_share = true;

if (!resource_construct(num_virtual_links, dc, &pool->base,
+dc->caps.disable_dp_clk_share = true;

if (!resource_construct(num_virtual_links, dc, &pool->base, &res_create_funcs))
@@ -1064,6 +1066,7 @@
}{
dc->caps.max_planes = pool->base.pipe_count;
+dc->caps.disable_dp_clk_share = true;

if (!resource_construct(num_virtual_links, dc, &pool->base, &res_create_funcs))
@@ -1224,6 +1227,7 @@
}{
dc->caps.max_planes = pool->base.pipe_count;
+dc->caps.disable_dp_clk_share = true;

if (!resource_construct(num_virtual_links, dc, &pool->base, &res_create_funcs))
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dcn10/dcn10_dpp_dscl.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dcn10/dcn10_dpp_dscl.c
@@ -406,15 +406,25 @@
 {
 +int lb_memory_size, lb_memory_size_c, lb_memory_size_a, num_partitions_a,
 +lb_bpc, memory_line_size_y, memory_line_size_c, memory_line_size_a;
 +int line_size = scl_data->viewport.width < scl_data->recout.width ?
 +scl_data->viewport.width : scl_data->recout.width;
 +int line_size_c = scl_data->viewport_c.width < scl_data->recout.width ?
 +scl_data->viewport_c.width : scl_data->recout.width;
 -int lb_bpc = dpp1_dscl_get_lb_depth_bpc(scl_data->lb_params.depth);
 -int memory_line_size_y = (line_size * lb_bpc + 71) / 72; /* +71 to ceil */
 -int memory_line_size_c = (line_size_c * lb_bpc + 71) / 72; /* +71 to ceil */
 -int memory_line_size_a = (line_size + 5) / 6; /* +5 to ceil */
 -int lb_memory_size, lb_memory_size_c, lb_memory_size_a, num_partitions_a;
 +
 +if (line_size == 0)
 +line_size = 1;
 +
 +if (line_size_c == 0)
 +line_size_c = 1;
 +
 +lb_bpc = dpp1_dscl_get_lb_depth_bpc(scl_data->lb_params.depth);
 +memory_line_size_y = (line_size * lb_bpc + 71) / 72; /* +71 to ceil */
 +memory_line_size_c = (line_size_c * lb_bpc + 71) / 72; /* +71 to ceil */
 +memory_line_size_a = (line_size + 5) / 6; /* +5 to ceil */
if (lb_config == LB_MEMORY_CONFIG_1) {
    lb_memory_size = 816;
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dcn10/dcn10_hw_sequencer.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dcn10/dcn10_hw_sequencer.c
@@ -23,6 +23,7 @@
*/
*/
+#include <linux/delay.h>
#include "dm_services.h"
#include "core_types.h"
#include "resource.h"
@@ -376,10 +377,34 @@
static void disable_vga(
    struct dce_hwseq *hws)
{
    unsigned int in_vga1_mode = 0;
    unsigned int in_vga2_mode = 0;
    unsigned int in_vga3_mode = 0;
    unsigned int in_vga4_mode = 0;
    
    REG_GET(D1VGA_CONTROL, D1VGA_MODE_ENABLE, &in_vga1_mode);
    REG_GET(D2VGA_CONTROL, D2VGA_MODE_ENABLE, &in_vga2_mode);
    REG_GET(D3VGA_CONTROL, D3VGA_MODE_ENABLE, &in_vga3_mode);
    REG_GET(D4VGA_CONTROL, D4VGA_MODE_ENABLE, &in_vga4_mode);
    
    if (in_vga1_mode == 0 && in_vga2_mode == 0 &&
        in_vga3_mode == 0 && in_vga4_mode == 0)
        return;
    
    REG_WRITE(D1VGA_CONTROL, 0);
    REG_WRITE(D2VGA_CONTROL, 0);
    REG_WRITE(D3VGA_CONTROL, 0);
    REG_WRITE(D4VGA_CONTROL, 0);
    
    /* HW Engineer's Notes:
    * During switch from vga->extended, if we set the VGA_TEST_ENABLE and
    * then hit the VGA_TEST_RENDER_START, then the DCHUBP timing gets updated correctly.
    * Then vBIOS will have it poll for the VGA_TEST_RENDER_DONE and unset
    * VGA_TEST_ENABLE, to leave it in the same state as before.
    */
    +REG_UPDATE(VGA_TEST_CONTROL, VGA_TEST_ENABLE, 1);
    +REG_UPDATE(VGA_TEST_CONTROL, VGA_TEST_RENDER_START, 1);
}
struct dc_link *link = dc->links[i];

+if (link->link_enc->connector.id == CONNECTOR_ID_EPD)
+dc->hwss.edp_power_control(link, true);
+
+link->link_enc->funcs->hw_init(link->link_enc);
}

@@ -2932,6 +2960,7 @@
 .enable_stream = dce110_enable_stream,
 .disable_stream = dce110_disable_stream,
 .unblank_stream = dce110_unblank_stream,
+ .blank_stream = dce110_blank_stream,
 .enable_display_power_gating = dcn10_dummy_display_power_gating,
 .power_down_front_end = dcn10_power_down_fe,
 .power_on_front_end = dcn10_power_on_fe,
@@ -2949,7 +2978,8 @@
 .ready_shared_resources = ready_shared_resources,
 .optimize_shared_resources = optimize_shared_resources,
 .edp_backlight_control = hwss_edp_backlight_control,
+ .edp_power_control = hwss_edp_power_control,
+ .edp_wait_for_hpd_ready = hwss_edp_wait_for_hpd_ready;
};

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/dcn10/dcn10_resource.c
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/dcn10/dcn10_resource.c
@@ -590,6 +590,7 @@
 return &clk_src->base;
}
+kfree(clk_src);
BREAK_TO_DEBUGGER();
return NULL;
}
@@ -1463,6 +1464,7 @@
 if (construct(num_virtual_links, dc, pool))
 return &pool->base;

+kfree(pool);
BREAK_TO_DEBUGGER();
return NULL;
}
extract_rq_sizing_regs(mode_lib, &(rq_regs->rq_regs_l), rq_param.sizing.rq_l);
if (rq_param.yuv420)
extract_rq_sizing_regs(mode_lib, &(rq_regs->rq_regs_c), rq_param.sizing.rq_c);
else
    memset(&(rq_regs->rq_regs_c), 0, sizeof(rq_regs->rq_regs_c));

rq_regs->rq_regs_l.swath_height = dml_log2(rq_param.dlg.rq_l.swath_height);
rq_regs->rq_regs_c.swath_height = dml_log2(rq_param.dlg.rq_c.swath_height);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/inc/core_types.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/inc/core_types.h
@@ -156,7 +156,7 @@
struct clock_source *clock_sources[MAX_CLOCK_SOURCES];
unsigned int clk_src_count;
-struct audio *audios[MAX_PIPES];
+struct audio *audios[MAX_AUDIOS];
unsigned int audio_count;
struct audio_support audio_support;

--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/inc/hw/hw_shared.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/inc/hw/hw_shared.h
@@ -34,6 +34,7 @@
>Data types shared between different Virtual HW blocks
******************************************************************************/
#define MAX_AUDIOS 7
#define MAX_PIPES 6

struct gamma_curve {
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/inc/hw/link_encoder.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/inc/hw/link_encoder.h
@@ -133,7 +133,7 @@
const struct dc_link_settings *link_settings,
enum clock_source_id clock_source);
void (*disable_output)(struct link_encoder *link_enc,
-enum signal_type signal, struct dc_link *link);
+enum signal_type signal);
void (*dp_set_lane_settings)(struct link_encoder *enc,
const struct link_training_settings *link_settings);
void (*dp_set_phy_pattern)(struct link_encoder *enc,
--- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/inc/hw/sequencer.h
+++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/inc/hw/sequencer.h
@@ -140,6 +140,7 @@
void (*unblank_stream)(struct pipe_ctx *pipe_ctx,
-enum signal_type signal, struct dc_link *link);
+enum signal_type signal);
void (*unblank_stream)(struct pipe_CTX *pipe_CTX,
struct dc_link_settings *link_settings);
    }
    }
    }
    void (*unblank_stream)(struct pipe_CTX *pipe_CTX,
    void (*unblank_stream)(struct pipe_CTX *pipe_CTX,
    void (*unblank_stream)(struct pipe_CTX *pipe_CTX, (}
struct dc *dc,
struct pipe_ctx *pipe,
@@ -179,11 +180,13 @@
  void (*edp_power_control)(
    -struct link_encoder *enc,
    +struct dc_link *link,
    bool enable);
  void (*edp_backlight_control)(
    struct dc_link *link,
    bool enable);
  +void (*edp_wait_for_hpd_ready)(struct dc_link *link, bool power_up);
  +
  };

void color_space_to_black_color(
  --- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/inc/resource.h
  +++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/inc/resource.h
  @@ -102,6 +102,11 @@
    const struct resource_pool *pool,
    struct clock_source *clock_source);

  +int resource_get_clock_source_reference(
  +struct resource_context *res_ctx,
  +const struct resource_pool *pool,
  +struct clock_source *clock_source);
  +
  bool resource_are_streams_timing_synchronizable(
    struct dc_stream_state *stream1,
    struct dc_stream_state *stream2);
  --- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/os_types.h
  +++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/os_types.h
  @@ -61,7 +61,7 @@
    * general debug capabilities
    *
  */
#define ASSERT_CRITICAL(expr) do {
  if (WARN_ON(!(expr))) {
    kgdb_breakpoint();
      --- linux-4.15.0.orig/drivers/gpu/drm/amd/display/dc/virtual/virtual_link_encoder.c
      +++ linux-4.15.0/drivers/gpu/drm/amd/display/dc/virtual/virtual_link_encoder.c
      @@ -58,8 +58,7 @@
      static void virtual_link_encoder_disable_output(
struct link_encoder *link_enc,
-enum signal_type signal,
-struct dc_link *link) {}
+enum signal_type signal) {}

static void virtual_link_encoder_dp_set_lane_settings(
    struct link_encoder *link_enc,
    --- linux-4.15.0.orig/drivers/gpu/drm/amd/include/atomfirmware.h
+++ linux-4.15.0/drivers/gpu/drm/amd/include/atomfirmware.h
@@ -1048,7 +1048,7 @@
    uint8_t   memorytype;                       // enum of atom_sys_mem_type
+    uint8_t   memorytype;                       // enum of atom_dmi_t17_mem_type_def, APU memory type indication.
    uint8_t   umachannelnumber;                 // number of memory channels
    int8_t    pwr_on_digon_to_de;               /* all pwr sequence numbers below are in uint of 4ms */
    int8_t    pwr_on_de_to_vary_bl;
@@ -1058,18 +1058,25 @@
    int8_t    pwr_on_vary_bl_to_blon;
    int8_t    pwr_down_bloff_to_vary_bloff;
    int8_t    min_allowed_bl_level;
+    int8_t    htc_hyst_limit;
+    int8_t    htc_tmp_limit;
+    int8_t    reserved1;
+    int8_t    reserved2;

    struct atom_external_display_connection_info extdispconninfo;
    struct atom_14nm_dpphy_dvihdmi_tuningset dvi_tuningset;
    struct atom_14nm_dpphy_dvihdmi_tuningset hdmi_tuningset;
    struct atom_14nm_dpphy_dvihdmi_tuningset hdmi6g_tuningset;
-    struct atom_14nm_dpphy_dp_tuningset dp_tuningset;
-    struct atom_14nm_dpphy_dp_tuningset dp_hbr3_tuningset;
+    struct atom_14nm_dpphy_dp_tuningset dp_tuningset;        // rbr 1.62G dp tuning set
+    struct atom_14nm_dpphy_dp_tuningset dp_hbr3_tuningset;   // HBR3 dp tuning set
struct atom_14nm_dpphy_dp_tuningset dp_hbr_tuningset;    //hbr 2.7G dp tuning set
struct atom_14nm_dpphy_dp_tuningset dp_hbr2_tuningset;   //hbr2 5.4G dp tuning set
struct atom_14nm_dpphy_dp_tuningset edp_tuningset;       //edp tuning set
+    int32_t    reserved[66];
};

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/cz_clockpowergating.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/cz_clockpowergating.c
@@ -166,10 +166,10 @@
cz_dpm_powerup_uvd(hwmgr);
cgs_set_clockgating_state(hwmgr->device,
  AMD_IP_BLOCK_TYPE_UVD,
-  AMD_PG_STATE_UNGATE);
+  AMD_CG_STATE_UNGATE);
cgs_set_powergating_state(hwmgr->device,
  AMD_IP_BLOCK_TYPE_UVD,
-  AMD_CG_STATE_UNGATE);
+  AMD_PG_STATE_UNGATE);
cz_dpm_update_uvd_dpm(hwmgr, false);
}

@@ -197,11 +197,11 @@
cgs_set_clockgating_state(
  hwmgr->device,
  AMD_IP_BLOCK_TYPE_VCE,
-  AMD_PG_STATE_UNGATE);
+  AMD_CG_STATE_UNGATE);
cgs_set_powergating_state(
  hwmgr->device,
  AMD_IP_BLOCK_TYPE_VCE,
-  AMD_CG_STATE_UNGATE);
+  AMD_PG_STATE_UNGATE);
cz_dpm_update_vce_dpm(hwmgr);
cz_enable_disable_vce_dpm(hwmgr, true);
}

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/processpptables.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/processpptables.c
@@ -983,6 +983,32 @@
 struct pp_hwmgr *hwmgr,
 const ATOM_PPLIB_POWERPLAYTABLE *powerplay_table)
 {
-  if (0 == powerplay_table->usFanTableOffset)
+  if (0 == powerplay_table->usFanTableOffset) {
+    hwmgr->thermal_controller.use_hw_fan_control = 1;
+    return 0;
+  }

  fan_table = (const PPTable_Generic_SubTable_Header *)
    (((unsigned long)powerplay_table) +
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/processpptables.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/processpptables.c
@@ -983,6 +983,32 @@
 struct pp_hwmgr *hwmgr,
 const ATOM_PPLIB_POWERPLAYTABLE *powerplay_table)
 {
-  if (0 == powerplay_table->usFanTableOffset)
+  if (0 == powerplay_table->usFanTableOffset) {
+    hwmgr->thermal_controller.use_hw_fan_control = 1;
+    return 0;
+  }

  fan_table = (const PPTable_Generic_SubTable_Header *)
    (((unsigned long)powerplay_table) +

```c
+hwmgr->thermal_controller.ucType =
+powerplay_table->sThermalController.ucType;
+hwmgr->thermal_controller.ucI2cLine =
+powerplay_table->sThermalController.ucI2cLine;
+hwmgr->thermal_controller.ucI2cAddress =
+powerplay_table->sThermalController.ucI2cAddress;
+
+hwmgr->thermal_controller.fanInfo.bNoFan =
+(0 != (powerplay_table->sThermalController.ucFanParameters &
+ATOM_PP_FANPARAMETERS_NOFAN));
+
+hwmgr->thermal_controller.fanInfo.ucTachometerPulsesPerRevolution =
+powerplay_table->sThermalController.ucFanParameters &
+ATOM_PP_FANPARAMETERS_TACHOMETER_PULSES_PER_REVISION_MASK;
+
+hwmgr->thermal_controller.fanInfo.ulMinRPM
+= powerplay_table->sThermalController.ucFanMinRPM * 100UL;
+hwmgr->thermal_controller.fanInfo.ulMaxRPM
+= powerplay_table->sThermalController.ucFanMaxRPM * 100UL;
+
+set_hw_cap(hwmgr,
+ATOM_PP_THERMALCONTROLLER_NONE != hwmgr->thermal_controller.ucType,
+PHM_PlatformCaps_TermalController);
+
+hwmgr->thermal_controller.use_hw_fan_control = 1;
+
return 0;
}
```

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/smu7_clockpowergating.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/smu7_clockpowergating.c
@@ -162,7 +162,7 @@
AMD_CG_STATE_UNGATE);
 cgs_set_powergating_state(hwmgr->device,
 AMD_IP_BLOCK_TYPE_UVD,
-AMD_CG_STATE_UNGATE);
+AMD_PG_STATE_UNGATE);
 smu7_update_uvd_dpm(hwmgr, false);
 }

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/smu7_hwmgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/smu7_hwmgr.c
@@ -1334,6 +1334,10 @@
 "Failed to reset to default!", result = tmp_result);
 +tmp_result = smum_stop_smc(hwmgr);
 +PP_ASSERT_WITH_CODE((tmp_result == 0),
```
"Failed to stop smc!", result = tmp_result);
+
  tmp_result = smu7_force_switch_to_arbf0(hwmgr);
PP_ASSERT_WITH_CODE((tmp_result == 0),
"Failed to force to switch arbf0!", result = tmp_result);
@@ -2791,10 +2795,13 @@
  PHM_PlatformCaps_DisableMclkSwitchingForFrameLock);

  @disable_mclk_switching = ((1 < info.display_count) ||
  - disable_mclk_switching_for_frame_lock ||
  - smu7_vblank_too_short(hwmgr, mode_info.vblank_time_us) ||
  - (mode_info.refresh_rate > 120));
+if (info.display_count == 0)
+  disable_mclk_switching = false;
+else
+  @disable_mclk_switching = ((1 < info.display_count) ||
+    disable_mclk_switching_for_frame_lock ||
+    smu7_vblank_too_short(hwmgr, mode_info.vblank_time_us) ||
+    (mode_info.refresh_rate > 120));

sclk = smu7_ps->performance_levels[0].engine_clock;
mclk = smu7_ps->performance_levels[0].memory_clock;
@@ -3969,6 +3976,11 @@
  data->frame_time_x2 = frame_time_in_us * 2 / 100;

+if (data->frame_time_x2 < 280) {
+  pr_debug("%s: enforce minimal VBITimeout: %d -> 280\n", __func__, data->frame_time_x2);
+  data->frame_time_x2 = 280;
+}
+display_gap2 = pre_vbi_time_in_us * (ref_clock / 100);

cgs_write_ind_register(hwmgr->device, CGS_IND_REG__SMC, ixCG_DISPLAY_GAP_CNTL2, display_gap2);
@@ -4569,13 +4581,6 @@
 int tmp_result, result = 0;
 uint32_t sclk_mask = 0, mclk_mask = 0;

-\tif (hwmgr->chip_id == CHIP_FIJI) {
-\t-if (request->type == AMD_PP_GFX_PROFILE)
-\t  -smu7_enable_power_containment(hwmgr);
-\t-else if (request->type == AMD_PP_COMPUTE_PROFILE)
-\t  -smu7_disable_power_containment(hwmgr);
-\t-
-\t\t\tif (hwmgr->dpm_level != AMD_DPM_FORCED_LEVEL_AUTO)
\t\t\treturn -EINVAL;

"Open Source Used In 5GaaS Edge AC-4 20981"
<table>
<thead>
<tr>
<th>Configuration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIDT_SQ_TUNING_CTRL</td>
<td>DIDT_SQ_TUNING_CTRL__MAX_POWER_DELTA_LO_MASK, 0x3153, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_TUNING_CTRL</td>
<td>DIDT_SQ_TUNING_CTRL__UNUSED_0_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_CTRL0</td>
<td>DIDT_SQ_CTRL0__DIDT_CTRL_EN_MASK, 0x0001, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_CTRL0</td>
<td>DIDT_SQ_CTRL0__USE_REF_CLOCK_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_CTRL0</td>
<td>DIDT_SQ_CTRL0__PHASE_OFFSET_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_CTRL0</td>
<td>DIDT_SQ_CTRL0__DIDT_CLK_EN_OVERRIDE_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_CTRL0</td>
<td>DIDT_SQ_CTRL0__DIDT_MAX_STALLS_ALLOWED_HI_MASK, 0x0010, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_CTRL0</td>
<td>DIDT_SQ_CTRL0__DIDT_MAX_STALLS_ALLOWED_LO_MASK, 0x0010, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_SQ_CTRL0</td>
<td>DIDT_SQ_CTRL0__UNUSED_0_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT0_3</td>
<td>DIDT_TD_WEIGHT0_3__WEIGHT0_MASK, 0x000a, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT0_3</td>
<td>DIDT_TD_WEIGHT0_3__WEIGHT1_MASK, 0x0010, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT0_3</td>
<td>DIDT_TD_WEIGHT0_3__WEIGHT2_MASK, 0x0017, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT0_3</td>
<td>DIDT_TD_WEIGHT0_3__WEIGHT3_MASK, 0x002f, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT4_7</td>
<td>DIDT_TD_WEIGHT4_7__WEIGHT4_MASK, 0x0046, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT4_7</td>
<td>DIDT_TD_WEIGHT4_7__WEIGHT5_MASK, 0x005d, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT4_7</td>
<td>DIDT_TD_WEIGHT4_7__WEIGHT6_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_WEIGHT4_7</td>
<td>DIDT_TD_WEIGHT4_7__WEIGHT7_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_CTRL1</td>
<td>DIDT_TD_CTRL1__MIN_POWER_MASK, 0x0000, GPU_CONFIGREG_DIDT_IND</td>
</tr>
<tr>
<td>DIDT_TD_CTRL1</td>
<td>DIDT_TD_CTRL1__MAX_POWER_MASK, 0xffff, GPU_CONFIGREG_DIDT_IND</td>
</tr>
</tbody>
</table>
+ { ixDIDT_TD_CTRL_OCP, DIDT_TD_CTRL_OCPUNUSED_0_MASK, } 
+ { ixDIDT_TD_CTRL_OCPUNUSED_0_SHIFT, 0x0000, GPU_CONFIGREG_DIDT_IND }, 
+ { ixDIDT_TD_CTRL_OCP, DIDT_TD_CTRL_OCPUNUSED_MAX_POWER_MASK, } 
+ { ixDIDT_TD_CTRL_OCPUNUSED_MAX_POWER_SHIFT, 0x00ff, GPU_CONFIGREG_DIDT_IND }, 
+ { ixDIDT_TD_CTRL2, DIDT_TD_CTRL2_MAX_POWER_DELTA_MASK, } 
+ { ixDIDT_TD_CTRL2_MAX_POWER_DELTA_SHIFT, 0x3fff, GPU_CONFIGREG_DIDT_IND },

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_hwmgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_hwmgr.c
@@ -3208,10 +3208,13 @@
# disable_mclk_switching_for_frame_lock ||
+if (info.display_count == 0)
+disable_mclk_switching = false;
+else
+disable_mclk_switching = (info.display_count > 1) ||
++ disable_mclk_switching_for_frame_lock ||
++ disable_mclk_switching_for_vr ||
++ force_mclk_high;

sclk = vega10_ps->performance_levels[0].gfx_clock;
mclk = vega10_ps->performance_levels[0].mem_clock;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_powertune.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_powertune.c
@@ -1122,7 +1122,7 @@
 for (count = 0; count < num_se; count++) {
   data = GRBM_GFX_INDEX__INSTANCE_BROADCAST_WRITES_MASK |
   GRBM_GFX_INDEX__SH_BROADCAST_WRITES_MASK | (count <<
   GRBM_GFX_INDEX__SE_INDEX__SHIFT);
   cgs_write_register(hwmgr->device, reg, data);
-result |= vega10_program_didt_config_registers(hwmgr, PSMSEEDCStallPatternConfig_Vega10,
-VEGA10_CONFIGREG_DIDT);
+result = vega10_program_didt_config_registers(hwmgr, PSMSEEDCStallPatternConfig_Vega10,
+VEGA10_CONFIGREG_DIDT);
result |= vega10_program_didt_config_registers(hwmgr, PSMSEEDCStallDelayConfig_Vega10,
+VEGA10_CONFIGREG_DIDT);
result |= vega10_program_didt_config_registers(hwmgr, PSMSEEDCStallDelayConfig_Vega10,
+VEGA10_CONFIGREG_DIDT);
result |= vega10_program_didt_config_registers(hwmgr, PSMSEEDCStallDelayConfig_Vega10,
+VEGA10_CONFIGREG_DIDT);
++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_processpptables.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_processpptables.c

---
static void set_hw_cap(struct pp_hwmgr *hwmgr, bool enable,
enum phm_platform_caps cap)
{
- hwmgr->platform_descriptor.overdriveLimit.engineClock =
+ const ATOM_Vega10_GFXCLK_Dependency_Record_V2 *patom_record_v2 =
+ (const ATOM_Vega10_GFXCLK_Dependency_Record_V2 *)
+ (const ATOM_Vega10_GFXCLK_Dependency_Table *)
+ (((unsigned long) powerplay_table) +
+ le16_to_cpu(powerplay_table->usGfxclkDependencyTableOffset));
+ bool is_acg_enabled = false;
+ ATOM_Vega10_GFXCLK_Dependency_Record_V2 *patom_record_v2;
+ if (gfxclk_dep_table->ucRevId == 1) {
+ patom_record_v2 =
+ (ATOM_Vega10_GFXCLK_Dependency_Record_V2 *)gfxclk_dep_table->entries;
+ is_acg_enabled =
+ (bool)patom_record_v2[gfxclk_dep_table->ucNumEntries-1].ucACGEnable;
+ } +
+ if (powerplay_table->ulMaxODEngineClock > VEGA10_ENGINECLOCK_HARDMAX &&
+ !is_acg_enabled)
+ hwmgr->platform_descriptor.overdriveLimit.engineClock =
+ VEGA10 ENGINECLOCK_HARDMAX;
+ else
+ hwmgr->platform_descriptor.overdriveLimit.engineClock =
+ le32_to_cpu(powerplay_table->ulMaxODEngineClock);
+ hwmgr->platform_descriptor.overdriveLimit.memoryClock =
+ le32_to_cpu(powerplay_table->ulMaxODMemoryClock);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_thermal.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/hwmgr/vega10_thermal.c
@@ -386,6 +386,9 @@
static int vega10_thermal_set_temperature_range(struct pp_hwmgr *hwmgr,
 struct PP_TemperatureRange *range)
{
+ struct phm_ppt_v2_information *pp_table_info =
+ (struct phm_ppt_v2_information *)(hwmgr->pptable);
+ struct phm_tdp_table *tpd_table = pp_table_info->tpd_table;
uint32_t low = VEGA10 THERMAL_MINIMUM_ALERT_TEMP *
PP_TEMPERATURE_UNITS_PER_CENTIGRADES;
uint32_t high = VEGA10 THERMAL_MAXIMUM_ALERT_TEMP *
if (low < range->min)
  low = range->min;
- if (high > range->max)
-   high = range->max;
+ if (high > tdp_table->usSoftwareShutdownTemp)
+   high = tdp_table->usSoftwareShutdownTemp;

if (low > high)
  return -EINVAL;

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/inc/hwmgr.h
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/inc/hwmgr.h
@@ -266,6 +266,7 @@
int (*populate_requested_graphic_levels)(struct pp_hwmgr *hwmgr,
  struct amd_pp_profile *request);
bool (*is_hw_avfs_present)(struct pp_hwmgr *hwmgr);
+int (*stop_smc)(struct pp_hwmgr *hwmgr);
};

struct pp_hwmgr_func {
  @@ -698,6 +699,7 @@
    uint8_t ucType;
    uint8_t ucI2cLine;
    uint8_t ucI2cAddress;
+    uint8_t use_hw_fan_control;
    struct pp_fan_info fanInfo;
    struct pp_advance_fan_control_parameters advanceFanControlParameters;
};

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/inc/smumgr.h
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/inc/smumgr.h
@@ -135,4 +135,6 @@
 extern bool smum_is_hw_avfs_present(struct pp_hwmgr *hwmgr);
+extern int smum_stop_smc(struct pp_hwmgr *hwmgr);
};

+extern int smum_stop_smc(struct pp_hwmgr *hwmgr);
+
#endif

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/smumgr/ci_smumgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/smumgr/ci_smumgr.c
@@ -246,7 +246,7 @@
 switch (dev_id) {
 case 0x67BA:
   -case 0x66B1:
+   case 0x67B1:
   smu_data->power_tune_defaults = &defaults_hawaii_pro;
   break;


case 0x67B8:
@@ -2277,11 +2277,13 @@
case DRAM_LOG_BUFF_SIZE:
    return offsetof(SMU7_SoftRegisters, DRAM_LOG_BUFF_SIZE);
 }
+break;
case SMU_Discrete_DpmTable:
    switch (member) {
    case LowSclkInterruptThreshold:
        return offsetof(SMU7_Discrete_DpmTable, LowSclkInterruptT);
    } 
+break;
}
pr_debug("can't get the offset of type %x member %x\n", type, member);
return 0;
@@ -2793,6 +2795,29 @@
return 0;
}

+static void ci_reset_smc(struct pp_hwmgr *hwmgr)
+{
+    PHM_WRITE_INDIRECT_FIELD(hwmgr->device, CGS_IND_REG__SMC,
+        SMC_SYSCON_RESET_CNTL,
+        rst_reg, 1);
+}
+
+static void ci_stop_smc_clock(struct pp_hwmgr *hwmgr)
+{
+    PHM_WRITE_INDIRECT_FIELD(hwmgr->device, CGS_IND_REG__SMC,
+        SMC_SYSCON_CLOCK_CNTL_0,
+        ck_disable, 1);
+}
+
+static int ci_stop_smc(struct pp_hwmgr *hwmgr)
+{
+    ci_reset_smc(hwmgr);
+    ci_stop_smc_clock(hwmgr);
+    return 0;
+}
+
const struct pp_smumgr_func ci_smu_funcs = {
    .smu_init = ci_smu_init,
    .smu_fini = ci_smu_fini,
    @@ -2815,4 +2840,5 @@
    .initialize_mc_reg_table = ci_initialize_mc_reg_table,
    .is_dpm_running = ci_is_dpm_running,
.populate_requested_graphic_levels = ci_populate_requested_graphic_levels,
+stop_smc = ci_stop_smc,
};
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/smumgr/fiji_smumgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/smumgr/fiji_smumgr.c
@@ -2438,6 +2438,7 @@
case DRAM_LOG_BUFF_SIZE:
    return offsetof(SMU73_SoftRegisters, DRAM_LOG_BUFF_SIZE);
 }
+break;
 case SMU_Discrete_DpmTable:
switch (member) {
case UvdBootLevel:
@@ -2449,6 +2450,7 @@
case LowSclkInterruptThreshold:
    return offsetof(SMU73_Discrete_DpmTable, LowSclkInterruptThreshold);
 }
+break;
}
pr_warn("can't get the offset of type %x member %x\n", type, member);
return 0;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/smumgr/iceland_smumgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/smumgr/iceland_smumgr.c
@@ -2264,11 +2264,13 @@
case DRAM_LOG_BUFF_SIZE:
    return offsetof(SMU71_SoftRegisters, DRAM_LOG_BUFF_SIZE);
 }
+break;
 case SMU_Discrete_DpmTable:
switch (member) {
case LowSclkInterruptThreshold:
return offsetof(SMU71_Discrete_DpmTable, LowSclkInterruptThreshold);
 }
+break;
}
pr_warn("can't get the offset of type %x member %x\n", type, member);
return 0;
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/smumgr/polaris10_smumgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/smumgr/polaris10_smumgr.c
@@ -1610,8 +1610,21 @@
efuse = efuse >> 24;

if (hwmgr->chip_id == CHIP_POLARIS10) {
-    min = 1000;
-    max = 2300;
+    if (hwmgr->is_kicker) {
+        min = 1200;
+        max = 2500;
} else {
+min = 1000;
+max = 2300;
+
} else if (hwmgr->chip_id == CHIP_POLARIS11) {
+if (hwmgr->is_kicker) {
+min = 900;
+max = 2100;
+} else {
+min = 1100;
+max = 2100;
+}
} else {
min = 1100;
max = 2100;
}
}

/* use hardware fan control */
+if (hwmgr->thermal_controller.use_hw_fan_control)
+return 0;
+
tmp64 = hwmgr->thermal_controller.advanceFanControlParameters.
usPWMMin * duty100;
do_div(tmp64, 10000);
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/smumgr/rv_smumgr.h
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/smumgr/rv_smumgr.h
@@ -40,7 +40,7 @@
uint32_t table_addr_high;
uint32_t table_addr_low;
uint8_t *table;
-uint32_t handle;
+-unsigned long handle;
);

struct smu_table_array {
--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/smumgr/smu7_smumgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/smumgr/smu7_smumgr.c
@@ -648,6 +648,12 @@
int smu7_smu_fini(struct pp_hwmgr *hwmgr)
{
+struct smu7_smumgr *smu_data = (struct smu7_smumgr *)(hwmgr->smu_backend);
+smu_free_memory(hwmgr->device, (void *) smu_data->header_buffer.handle);
+if (!cgs_is_virtualization_enabled(hwmgr->device))
+smu_free_memory(hwmgr->device, (void *) smu_data->smu_buffer.handle);
kfree(hwmgr->smu_backend);

hwmgr->smu_backend = NULL;
cgs_rel_firmware(hwmgr->device, CGS_UCODE_ID_SMU);

--- linux-4.15.0.orig/drivers/gpu/drm/amd/powerplay/smumgr/smumgr.c
+++ linux-4.15.0/drivers/gpu/drm/amd/powerplay/smumgr/smumgr.c
@@ -253,3 +253,11 @@
return false;
}
+
+int smum_stop_smc(struct pp_hwmgr *hwmgr)
+{
+if (hwmgr->smumgr_funcs->stop_smc)
+return hwmgr->smumgr_funcs->stop_smc(hwmgr);
+
+return 0;
+
--- linux-4.15.0.orig/drivers/gpu/drm/arm/hdlcd_crtc.c
+++ linux-4.15.0/drivers/gpu/drm/arm/hdlcd_crtc.c
@@ -186,20 +186,20 @@
clk_disable_unprepare(hdlcd->clk);
}
-
-static int hdlcd_crtc_atomic_check(struct drm_crtc *crtc, struct drm_crtc_state
+static enum drm_mode_status hdlcd_crtc_mode_valid(struct drm_crtc *crtc, const struct drm_display_mode *mode)
{
    struct hdlcd_drm_private *hdlcd = crtc_to_hdlcd_priv(crtc);

    -static int hdlcd_crtc_atomic_check(struct drm_crtc *crtc,
-    struct drm_crtc_state *state)
+static enum drm_mode_status hdlcd_crtc_mode_valid(struct drm_crtc *crtc,
+    const struct drm_display_mode *mode)
{
    struct hdlcd_drm_private *hdlcd = crtc_to_hdlcd_priv(crtc);
struct drm_display_mode *mode = &state->adjusted_mode;
long rate, clk_rate = mode->clock * 1000;

rate = clk_round_rate(hdlcd->clk, clk_rate);
-if (rate != clk_rate) {
+ /* 0.1% seems a close enough tolerance for the TDA19988 on Juno */
+ if (abs(rate - clk_rate) * 1000 > clk_rate) {
+ /* clock required by mode not supported by hardware */
+ return -EINVAL;
+ return MODE_NOCLOCK;
+}
+return 0;
+return MODE_OK;
}

static void hdlcd_crtc_atomic_begin(struct drm_crtc *crtc,
+@ @ -220,7 +220,7 @@
})

static const struct drm_crtc_helper_funcs hdlcd_crtc_helper_funcs = {
+ .atomic_check = hdlcd_crtc_atomic_check,
+ .mode_valid = hdlcd_crtc_mode_valid,
+ .atomic_begin = hdlcd_crtc_atomic_begin,
+ .atomic_enable = hdlcd_crtc_atomic_enable,
+ .atomic_disable = hdlcd_crtc_atomic_disable,
+ drm->irq_enabled = true;

ret = drm_vblank_init(drm, drm->mode_config.num_crtc);
+ drm_crtc_vblank_reset(&malidp->crtc);
if (ret < 0) {
DRM_ERROR("failed to initialise vblank\n");
goto vblank_fail;
+ @ @ -652,6 +653,7 @@
malidp_de_irq_fini(drm);
drm->irq_enabled = false;
irq_init_fail:
+ drm_atomic_helper_shutdown(drm);
component_unbind_all(dev, drm);
bind_fail:
of_node_put(malidp->crtc.port);
+ @ @ -688,6 +690,7 @@
pm_runtime_get_sync(dev);
malidp_se_irq_fini(drm);
malidp_de_irq_fini(drm);
+drm_atomic_helper_shutdown(drm);
component_unbind_all(dev, drm);
of_node_put(malidp->crtc.port);
malidp->crtc.port = NULL;
--- linux-4.15.0.orig/drivers/gpu/drm/arm/malidp_hw.c
+++ linux-4.15.0/drivers/gpu/drm/arm/malidp_hw.c
@@ -634,7 +634,8 @@
    .vsync_irq = MALIDP500_DE_IRQ_VSYNC,
 },
    .se_irq_map = {
-    .irq_mask = MALIDP500_SE_IRQ_CONF_MODE,
-    .irq_mask = MALIDP500_SE_IRQ_CONF_MODE |
+    .irq_mask = MALIDP500_SE_IRQ_CONF_MODE |
         MALIDP500_SE_IRQ_GLOBAL,
    .vsync_irq = 0,
 },
    .dc_irq_map = {
--- linux-4.15.0.orig/drivers/gpu/drm/arm/malidp_planes.c
+++ linux-4.15.0/drivers/gpu/drm/arm/malidp_planes.c
@@ -23,6 +23,7 @@
 /* Layer specific register offsets */
 #define MALIDP_LAYER_FORMAT0x000
 #define LAYER_FORMAT_MASK0x3f
 #define MALIDP_LAYER_CONTROL0x004
 #define LAYER_ENABLE(1 << 0)
 #define LAYER_FLOWCFG_MASK7
 @@ -230,8 +231,8 @@
 if (state->rotation & MALIDP_ROTATED_MASK) {
     int val;

-    val = mp->hwdev->hw->rotmem_required(mp->hwdev, state->crtc_h,
-    state->crtc_w,
+    val = mp->hwdev->hw->rotmem_required(mp->hwdev, state->crtc_w,
+    state->crtc_h,
         fb->format->format);
     if (val < 0)
        return val;
@@ -277,7 +278,9 @@
     dest_w = plane->state->crtc_w;
     dest_h = plane->state->crtc_h;

-    malidp_hw_write(mp->hwdev, ms->format, mp->layer->base);
+    val = malidp_hw_read(mp->hwdev, mp->layer->base);
+    val = (val & ~LAYER_FORMAT_MASK) | ms->format;
+    malidp_hw_write(mp->hwdev, val, mp->layer->base);

     for (i = 0; i < ms->n_planes; i++) {
        /* calculate the offset for the layer's plane registers */
const struct malidp_hw_regmap *map = &malidp->dev->hw->map;
struct malidp_plane *plane = NULL;
enum drm_plane_type plane_type;
unsigned long crtcs = 1 << drm->mode_config.num_crtc;
unsigned long flags = DRM_MODE_ROTATE_0 | DRM_MODE_ROTATE_90 | DRM_MODE_ROTATE_180 |
DRM_MODE_ROTATE_270 | DRM_MODE_REFLECT_X | DRM_MODE_REFLECT_Y;

u32 * formats;

--- linux-4.15.0.orig/drivers/gpu/drm/armada/armada_crtc.c
+++ linux-4.15.0/drivers/gpu/drm/armada/armada_crtc.c
@@ -490,8 +490,9 @@
 u32 v, stat = readl_relaxed(dcrtc->base + LCD_SPU_IRQ_ISR);
 *
- * This is rediculous - rather than writing bits to clear, we
- * have to set the actual status register value. This is racy.
+ * Reading the ISR appears to clear bits provided CLEAN_SPU_IRQ_ISR
+ * is set. Writing has some other effect to acknowledge the IRQ -
+ * without this, we only get a single IRQ.
 */
 writel_relaxed(0, dcrtc->base + LCD_SPU_IRQ_ISR);

@@ -1110,16 +1111,22 @@
 static int armada_drm_crtc_enable_vblank(struct drm_crtc *crtc)
 {
 struct armada_crtc *dcrtc = drm_to_armada_crtc(crtc);
+unsigned long flags;

+spin_lock_irqsave(&dcrtc->irq_lock, flags);
armada_drm_crtc_enable_irq(dcrtc, VSYNC_IRQ_ENA);
+spin_unlock_irqrestore(&dcrtc->irq_lock, flags);
  return 0;
 }

static void armada_drm_crtc_disable_vblank(struct drm_crtc *crtc)
 {
 struct armada_crtc *dcrtc = drm_to_armada_crtc(crtc);
+unsigned long flags;

+spin_lock_irqsave(&dcrtc->irq_lock, flags);
armada_drm_crtc_disable_irq(dcrtc, VSYNC_IRQ_ENA);
+spin_unlock_irqrestore(&dcrtc->irq_lock, flags);
 }

static const struct drm_crtc_funcs armada_crtc_funcs = {
@@ -1227,6 +1234,7 @@
 CFG_PDWN64x66, dcrtc->base + LCD_SPU_SRAM_PARA1);
writel_relaxed(0x2032ff81, dcrtc->base + LCD_SPU_DMA_CTRL1);
writel_relaxed(dcrtc->irq_ena, dcrtc->base + LCD_SPU_IRQ_ENA);
+readl_relaxed(dcrtc->base + LCD_SPU_IRQ_ISR);
writel_relaxed(0, dcrtc->base + LCD_SPU_IRQ_ISR);

ret = devm_request_irq(dev, irq, armada_drm_irq, 0, "armada_drm_crtc",
--- linux-4.15.0.orig/drivers/gpu/drm/armada/armada_hw.h
+++ linux-4.15.0/drivers/gpu/drm/armada/armada_hw.h
@@ -160,6 +160,7 @@
CFG_ALPHAM_GRA		= 0x1 << 16,
CFG_ALPHAM_CFG		= 0x2 << 16,
CFG_ALPHA_MASK		= 0xff << 8,
+#define CFG_ALPHA(x)((x) << 8)
CFG_PIXCMD_MASK		= 0xff,
};

--- linux-4.15.0.orig/drivers/gpu/drm/armada/armada_overlay.c
+++ linux-4.15.0/drivers/gpu/drm/armada/armada_overlay.c
@@ -28,6 +28,7 @@
    uint32_t colorkey_mode;
    uint32_t colorkey_enable;
};

struct armada_ovl_plane {
    @ @ -.99,11 +60.13 @ @
writel_relaxed(0x00002000, dcrtc->base + LCD_SPU_CBSH_HUE);

    spin_lock_irq(&dcrtc->irq_lock);
-armada_update(prop->colorkey_mode | CFG_ALPHAM GRA,
-    CFG_CKMODE_MASK | CFG_ALPHAM MASK | CFG_ALPHA_MASK,
-    dcrtc->base + LCD_SPU_DMA_CTRL1);
-
-armada_update(ADV_GRACOLORKEY, 0, dcrtc->base + LCD_SPU_ADV_REG);
+armada_update(prop->colorkey_mode,
+    CFG_CKMODE_MASK | CFG_ALPHAM MASK | CFG_ALPHA_MASK,
+    dcrtc->base + LCD_SPU_DMA_CTRL1);
+if (dcrtc->variant->has_spu_adv_reg)
+    armada_update(prop->colorkey_enable,
+    ADV_GRACOLORKEY | ADV_VIDCOLORKEY,
+    dcrtc->base + LCD_SPU_ADV_REG);
spin_unlock_irq(&dcrtc->irq_lock);
}

@ @ -339.8 +342.17 @ @
dplane->prop.colorkey_vb |= K2B(val);
update_attr = true;
} else if (property == priv->colorkey_mode_prop) {
    -dplane->prop.colorkey_mode &= ~CFG_CKMODE_MASK;
    -dplane->prop.colorkey_mode |= CFG_CKMODE(val);
    +if (val == CKMODE_DISABLE) {
        +dplane->prop.colorkey_mode =
        +CFG_CKMODE(CKMODE_DISABLE) |
        +CFG_ALPHAM_CFG | CFG_ALPHA(255);
        +dplane->prop.colorkey_enable = 0;
        +} else {
        +dplane->prop.colorkey_mode =
        +CFG_CKMODE(val) |
        +CFG_ALPHAM_GRA | CFG_ALPHA(0);
        +dplane->prop.colorkey_enable = ADV_GRACOLORKEY;
        +} update_attr = true;
    } else if (property == priv->brightness_prop) {
        dplane->prop.brightness = val - 256;
        @ @ -470.7 +482.9 @ @
        dplane->prop.colorkey_yr = 0xefefe00;
        dplane->prop.colorkey Ug = 0x01010100;
        dplane->prop.colorkey vb = 0x01010100;
        -dplane->prop.colorkey_mode = CFG_CKMODE(CKMODE_RGB);
        +dplane->prop.colorkey_mode = CFG_CKMODE(CKMODE_RGB) |
            + CFG_ALPHAM_GRA | CFG_ALPHA(0);
        +dplane->prop.colorkey_enable = ADV_GRACOLORKEY;
        dplane->prop.brightness = 0;
        dplane->prop.contrast = 0x4000;
        dplane->prop.saturation = 0x4000;
        --- linux-4.15.0.orig/drivers/gpu/drm/ast/ast_drv.c
        +++ linux-4.15.0/drivers/gpu/drm/ast/ast_drv.c
        @ @ -60.8 +60.29 @ @

        MODULE_DEVICE_TABLE(pci, pciidlist);

        +static void ast_kick_out_firmware_fb(struct pci_dev *pdev)
        +{
            +struct apertures_struct *ap;
            +bool primary = false;
            +ap = alloc_apertures(1);
            +if (!ap)
                +return;
            +ap->ranges[0].base = pci_resource_start(pdev, 0);
            +ap->ranges[0].size = pci_resource_len(pdev, 0);
            +#ifdef CONFIG_X86
            +primary = pdev->resource[PCI_ROM_RESOURCE].flags & IORESOURCE_ROM_SHADOW;
            +}
static int ast_pci_probe(struct pci_dev *pdev, const struct pci_device_id *ent) {
+ast_kick_out_firmware_fb(pdev);
+return drm_get_pci_dev(pdev, ent, &driver);
}

--- linux-4.15.0.orig/drivers/gpu/drm/ast/ast_fb.c
+++ linux-4.15.0/drivers/gpu/drm/ast/ast_fb.c
@@ -263,6 +263,7 @@
    {
        struct ast_framebuffer *afb = &afbdev->afb;
        +drm_crtc_force_disable_all(dev);
+        drm_fb_helper_unregister_fbi(&afbdev->helper);

        if (afb->obj) {
            --- linux-4.15.0.orig/drivers/gpu/drm/ast/ast_main.c
+++ linux-4.15.0/drivers/gpu/drm/ast/ast_main.c
@@ -131,8 +131,8 @@
            /* Enable extended register access */
-            ast_enable_mmio(dev);
+            ast_enable_mmio(dev);
            ast_open_key(ast);
+            ast_enable_mmio(dev);

            /* Find out whether P2A works or whether to use device-tree */
            ast_detect_config_mode(dev, &scu_rev);
@@ -576,6 +576,9 @@
            {
                struct ast_private *ast = dev->dev_private;
                +/* enable standard VGA decode */
+                ast_set_index_reg(ast, AST_IO_CRTC_PORT, 0xa1, 0x04);
+                ast_release_firmware(dev);
+                kfree(ast->dp501_fw_addr);
                ast_mode_fini(dev);
@@ -583,7 +586,8 @@
                drm_mode_config_cleanup(dev);
                ast_mm_fini(ast);
-pci_iounmap(dev->pdev, ast->ioregs);
+if (ast->ioregs != ast->regs + AST_IO_MM_OFFSET)
+pci_iounmap(dev->pdev, ast->ioregs);
pci_iounmap(dev->pdev, ast->regs);
kfree(ast);
}

--- linux-4.15.0.orig/drivers/gpu/drm/ast/ast_mode.c
+++ linux-4.15.0/drivers/gpu/drm/ast/ast_mode.c
@@ -568,6 +568,7 @@
 ast_bo_unreserve bo);

+ast_set_offset_reg (crtc);
 ast_set_start_address_crt1 (crtc, (u32) gpu_addr);

 return 0;
@@ -599,7 +600,7 @@
 return -EINVAL;
 ast_open_key (ast);

-ast_set_index_reg_mask (ast, AST_IO_CRTC_PORT, 0xa1, 0xff, 0x04);
+ast_set_index_reg (ast, AST_IO_CRTC_PORT, 0xa1, 0x06);

 ast_set_std_reg (crtc, adjusted_mode, &vbios_mode);
 ast_set_crtc_reg (crtc, adjusted_mode, &vbios_mode);
@@ -644,6 +645,7 @@
 {
 struct ast_private *ast = crtc->dev->dev_private;
 ast_set_index_reg_mask (ast, AST_IO_SEQ_PORT, 0x1, 0xdf, 0);
+ast_crtc_load_lut (crtc);
 }

@@ -971,9 +973,21 @@
 {
 struct ast_i2c_chan *i2c = i2c_priv;
 struct ast_private *ast = i2c->dev->dev_private;
-uint32_t val;
+uint32_t val, val2, count, pass;
+
+count = 0;
+pass = 0;
+val = (ast_get_index_reg_mask (ast, AST_IO_CRTC_PORT, 0xb7, 0x10) >> 4) & 0x01;
+do {
+val2 = (ast_get_index_reg_mask (ast, AST_IO_CRTC_PORT, 0xb7, 0x10) >> 4) & 0x01;
+if (val == val2) {
+pass++;
+} else {
```c
+pass = 0;
+val = (ast_get_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0x10) >> 4) & 0x01;
+
+} while ((pass < 5) && (count++ < 0x10000));

-val = ast_get_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0x10) >> 4;
return val & 1 ? 1 : 0;
}

@@ -981,9 +995,21 @@
{
  struct ast_i2c_chan *i2c = i2c_priv;
  struct ast_private *ast = i2c->dev->dev_private;
-uint32_t val;
+uint32_t val, val2, count, pass;
+
+count = 0;
+pass = 0;
+val = (ast_get_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0x20) >> 5) & 0x01;
+do {
+  val2 = (ast_get_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0x20) >> 5) & 0x01;
+  if (val == val2) {
+    pass++;
+  } else {
+    pass = 0;
+  } while ((pass < 5) && (count++ < 0x10000));

-val = ast_get_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0x20) >> 5;
return val & 1 ? 1 : 0;
}

@@ -996,7 +1022,7 @@
for (i = 0; i < 0x10000; i++) {
  ujcrb7 = ((clock & 0x01) ? 0 : 1);
-ast_set_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0xfe, ujcrb7);
+ast_set_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0xf4, ujcrb7);
  jtemp = ast_get_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0x01);
  if (ujcrb7 == jtemp)
    break;
@@ -1012,7 +1038,7 @@
for (i = 0; i < 0x10000; i++) {
  ujcrb7 = ((data & 0x01) ? 0 : 1) << 2;
-ast_set_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0xfb, ujcrb7);
+ast_set_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0xf1, ujcrb7);
```
jtemp = ast_get_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xb7, 0x04);
if (ujcrb7 == jtemp)
break;
@@ -1253,7 +1279,7 @@
ast_set_index_reg(ast, AST_IO_CRTC_PORT, 0xc7, ((y >> 8) & 0x07));
/* dummy write to fire HWC */
-ast_set_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xCB, 0xFF, 0x00);
+ast_show_cursor(crtc);
return 0;
}
--- linux-4.15.0.orig/drivers/gpu/drm/ast/ast_post.c
+++ linux-4.15.0/drivers/gpu/drm/ast/ast_post.c
@@ -46,7 +46,7 @@
{
struct ast_private *ast = dev->dev_private;
-ast_set_index_reg_mask(ast, AST_IO_CRTC_PORT, 0xa1, 0xff, 0x04);
+ast_set_index_reg(ast, AST_IO_CRTC_PORT, 0xa1, 0x06);
}
--- linux-4.15.0.orig/drivers/gpu/drm/ast/ast_tables.h
+++ linux-4.15.0/drivers/gpu/drm/ast/ast_tables.h
@@ -97,7 +97,7 @@
{0x6a, 0x22, 0x00}, /* 0F: VCLK162 */
{0x4d, 0x4c, 0x80}, /* 10: VCLK154 */
-0xa7, 0x78, 0x80}, /* 11: VCLK83.5 */
+0x68, 0x6f, 0x80}, /* 11: VCLK83.5 */
{0x28, 0x49, 0x80}, /* 12: VCLK106.5 */
{0x37, 0x49, 0x80}, /* 13: VCLK146.25 */
{0x1f, 0x45, 0x80}, /* 14: VCLK148.5 */
@@ -127,7 +127,7 @@
{0x67, 0x22, 0x00}, /* 0E: VCLK157.5 */
{0x6a, 0x22, 0x00}, /* 0F: VCLK162 */
{0x4d, 0x4c, 0x80}, /* 10: VCLK154 */
-0xa7, 0x78, 0x80}, /* 11: VCLK83.5 */
+0x68, 0x6f, 0x80}, /* 11: VCLK83.5 */
{0x28, 0x49, 0x80}, /* 12: VCLK106.5 */
{0x37, 0x49, 0x80}, /* 13: VCLK146.25 */
{0x1f, 0x45, 0x80}, /* 14: VCLK148.5 */
--- linux-4.15.0.orig/drivers/gpu/drm/atmel-hlcdc/atmel_hlcdc_crtc.c
+++ linux-4.15.0/drivers/gpu/drm/atmel-hlcdc/atmel_hlcdc_crtc.c
@@ -79,7 +79,11 @@
struct videomode vm;
unsigned long prate;
---
unsigned int cfg;
-int div;
+int div, ret;
+ret = clk_prepare_enable(crtc->dc->hlcdc->sys_clk);
+if (ret)
+return;

vm.vfront_porch = adj->crtc_vsync_start - adj->crtc_vdisplay;
vm.vback_porch = adj->crtc_vtotal - adj->crtc_vsync_end;
@@ -138,6 +142,8 @@
 ATMEL_HLCDC_VSPSU | ATMEL_HLCDC_VSPHO |
 ATMEL_HLCDC_GUARDTIME_MASK | ATMEL_HLCDC_MODE_MASK, 
 cfg);
+
+clk_disable_unprepare(crtc->dc->hlcdc->sys_clk);
}

static enum drm_mode_status
--- linux-4.15.0.orig/drivers/gpu/drm/atmel-hlcdc/atmel_hlcdc_plane.c
+++ linux-4.15.0/drivers/gpu/drm/atmel-hlcdc/atmel_hlcdc_plane.c
@@ -889,7 +889,7 @@
 drm_object_attach_property(&plane->base.base,
 --- linux-4.15.0.orig/drivers/gpu/drm/bochs/bochs_hw.c
+++ linux-4.15.0/drivers/gpu/drm/bochs/bochs_hw.c
@@ -97,10 +97,8 @@
 size = min(size, mem);
 }

-bochs->fb_map = ioremap(addr, size);
-if (bochs->fb_map == NULL) {
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/Kconfig
+++ linux-4.15.0/drivers/gpu/drm/bridge/Kconfig
@@ -35,6 +35,7 @@

config DRM_LVDS_ENCODER
tristate "Transparent parallel to LVDS encoder support"
depends on OF
+select DRM_KMS_HELPER
select DRM_PANEL_BRIDGE
help
  Support for transparent parallel to LVDS encoders that don’t require
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/adv7511/Kconfig
+++ linux-4.15.0/drivers/gpu/drm/bridge/adv7511/Kconfig
@@ -29,3 +29,7 @@
default y
help
When selected the HDMI transmitter will support the CEC feature.
+
+config ADV7511_SNAPDRAGON_HACKS
+bool "Dragonboard 410c ADV7511 hacks"
+default n
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/adv7511/Makefile
+++ linux-4.15.0/drivers/gpu/drm/bridge/adv7511/Makefile
@@ -1,5 +1,5 @@
-adv7511-y := adv7511_drv.o
-adv7511-y := adv7511_drv.o
-adv7511-y := adv7511_audio.o
-adv7511-y := adv7511_cce.o
-adv7511-y := adv7533.o
-obj-$(CONFIG_DRM_I2C_ADV7511) += adv7511.o
+adv7511-drm-y := adv7511_drv.o
+adv7511-drm-y := adv7511_drv.o
+adv7511-drm-y := adv7511_audio.o
+adv7511-drm-y := adv7511_cce.o
+adv7511-drm-y := adv7533.o
+obj-$(CONFIG_DRM_I2C_ADV7511) += adv7511_drm.o
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/adv7511/adv7511_audio.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/adv7511/adv7511_audio.c
@@ -20,13 +20,15 @@
{
    switch (fs) {
    case 32000:
-*n = 4096;
+case 44100:
+case 48000:
+case 96000:
+case 192000:
+*n = fs * 128 / 1000;
break;
    case 444100:
-*n = 6272;
-break;
-*n = 6144;
+case 88200:
}
+case 176400:
+*n = fs * 128 / 900;
+break;
+
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/adv7511/adv7511_drv.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/adv7511/adv7511_drv.c
@@ -429,6 +429,18 @@
else
  status = connector_status_disconnected;

+/*
+ * The bridge resets its registers on unplug. So when we get a plug
+ * event and we're already supposed to be powered, cycle the bridge to
+ * restore its state.
+ */
+if (status == connector_status_connected &&
+ adv7511->connector.status == connector_status_disconnected &&
+ adv7511->powered) {
+  regcache_mark_dirty(adv7511->regmap);
+  adv7511_power_on(adv7511);
+}
+
+if (adv7511->connector.status != status) {
+  adv7511->connector.status = status;
+  if (status == connector_status_disconnected)
+    @@ -450,7 +462,20 @@
+    if (ret < 0)
+      return ret;
+
+  #ifdef CONFIG_ADV7511_SNAPDRAGON_HACKS
+  */
+  * Don't clear HPD flag right now, let it be cleared later in
+  * adv7511_detect(). If we don't do this, adv7511_detect
+  * (i.e. the connector's detect op) doesn't realize that we need to
+  * re-enable the display.
+  */
+  if (process_hpd && irq0 & ADV7511_INT0_HPD)
+    #else
+    regmap_write(adv7511->regmap, ADV7511_REG_INT(0), irq0);
+    #endif
    regmap_write(adv7511->regmap, ADV7511_REG_INT(1), irq1);
    if (process_hpd &&& irq0 & ADV7511_INT0_HPD &&& adv7511->bridge.encoder)
    @@ -487,7 +512,17 @@
int ret;

#if CONFIG_ADV7511_SNAPDRAGON_HACKS
+ /*
+ * HACK: EDID-Ready interrupt doesn't seem to happen if we try to do
+ * "power-on - read EDID - power-off" consecutively really fast.
+ * Inserting a delay after powering on ADV7511 improves things a
+ * bit but doesn't solve it entirely.
+ */
+ if (0 /*adv7511->i2c_main->irq*/) {
+#else
+ if (adv7511->i2c_main->irq) {
+#endif
ret = wait_event_interruptible_timeout(adv7511->wq,
adv7511->edid_read, msecs_to_jiffies(timeout));
} else {
@@ -735,11 +770,11 @@
vsync_polarity = 1;
}

#if (mode->vrefresh <= 24000)
+if (drm_mode_vrefresh(mode) <= 24)
low_refresh_rate = ADV7511_LOW_REFRESH_RATE_24HZ;
#else if (mode->vrefresh <= 25000)
+else if (drm_mode_vrefresh(mode) <= 25)
low_refresh_rate = ADV7511_LOW_REFRESH_RATE_25HZ;
#else if (mode->vrefresh <= 30000)
+else if (drm_mode_vrefresh(mode) <= 30)
low_refresh_rate = ADV7511_LOW_REFRESH_RATE_30HZ;
else
low_refresh_rate = ADV7511_LOW_REFRESH_RATE_NONE;
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/analogix-anx78xx.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/analogix-anx78xx.c
@@ -725,7 +725,9 @@
/* 1.0V digital core power regulator */
pdata->dvdd10 = devm_regulator_get(dev, "dvdd10");
if (IS_ERR(pdata->dvdd10)) {
-DRM_ERROR("DVDD10 regulator not found\n");
+if (PTR_ERR(pdata->dvdd10) != -EPROBE_DEFER)
+DRM_ERROR("DVDD10 regulator not found\n");
+return PTR_ERR(pdata->dvdd10);
}
@@ -1344,7 +1346,9 @@
err = anx78xx_init_pdata(anx78xx);
if (err) {
    -DRM_ERROR("Failed to initialize pdata: %d\n", err);
    +if (err != -EPROBE_DEFER)
        +DRM_ERROR("Failed to initialize pdata: %d\n", err);
    +
    return err;
}

--- linux-4.15.0.orig/drivers/gpu/drm/bridge/dumb-vga-dac.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/dumb-vga-dac.c
@@ -55,7 +55,9 @@
}
    drm_mode_connector_update_edid_property(connector, edid);
    -return drm_add_edid_modes(connector, edid);
    +ret = drm_add_edid_modes(connector, edid);
    +kfree(edid);
    +return ret;

fallback:
/*
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/megachips-stdpxxxx-ge-b850v3-fw.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/megachips-stdpxxxx-ge-b850v3-fw.c
@@ -306,8 +306,12 @@
        const struct i2c_device_id *id)
{
    struct device *dev = &stdp4028_i2c->dev;
    +int ret;

    -ge_b850v3_lvds_init(dev);
    +ret = ge_b850v3_lvds_init(dev);
    +if (ret)
        +return ret;

    ge_b850v3_lvds_ptr->stdp4028_i2c = stdp4028_i2c;
    i2c_set_clientdata(stdp4028_i2c, ge_b850v3_lvds_ptr);
    @@ -365,8 +369,12 @@
        const struct i2c_device_id *id)
{
    struct device *dev = &stdp2690_i2c->dev;
    +int ret;

    +ret = ge_b850v3_lvds_init(dev);
    +if (ret)
ge_b850v3_lvds_ptr->stdp2690_i2c = stdp2690_i2c;
i2c_set_clientdata(stdp2690_i2c, ge_b850v3_lvds_ptr);

--- linux-4.15.0.orig/drivers/gpu/drm/bridge/sii902x.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/sii902x.c
@@ -137,7 +137,9 @@
    struct sii902x *sii902x = connector_to_sii902x(connector);
    struct regmap *regmap = sii902x->regmap;
    u32 bus_format = MEDIA_BUS_FMT_RGB888_1X24;
+    struct device *dev = &sii902x->i2c->dev;
    unsigned long timeout;
+    unsigned int retries;
    unsigned int status;
    struct edid *edid;
    int num = 0;
@@ -159,7 +161,7 @@
    time_before(jiffies, timeout));

if (!(status & SII902X_SYS_CTRL_DDC_BUS_GRTD)) {  
    -dev_err(&sii902x->i2c->dev, "failed to acquire the i2c bus\n");
    +dev_err(dev, "failed to acquire the i2c bus\n");
    return -ETIMEDOUT;
    }

@@ -179,9 +181,19 @@
    if (ret)
    return ret;

    -ret = regmap_read(regmap, SII902X_SYS_CTRL_DATA, &status);
    +/*
    + * Sometimes the I2C bus can stall after failure to use the
    + * EDID channel. Retry a few times to see if things clear
    + * up, else continue anyway.
    + */
    +retries = 5;
    +do {
    +ret = regmap_read(regmap, SII902X_SYS_CTRL_DATA,
    + &status);
    +retries--;
    +} while (ret & &retries);
    if (ret)
    -return ret;
    +dev_err(dev, "failed to read status (%d)\n", ret);

    ret = regmap_update_bits(regmap, SII902X_SYS_CTRL_DATA,
    SII902X_SYS_CTRL_DDC_BUS_REQ |
@@ -201,7 +213,7 @@
if (status & (SII902X_SYS_CTRL_DDC_BUS_REQ | SII902X_SYS_CTRL_DDC_BUS_GRTD)) {
    -dev_err(&sii902x->i2c->dev, "failed to release the i2c bus\n");
    +dev_err(dev, "failed to release the i2c bus\n");
    return -ETIMEDOUT;
}

@@ -249,10 +261,11 @@
    struct regmap *regmap = sii902x->regmap;
    u8 buf[HDMI_INFOFRAME_SIZE(AVI)];
    struct hdmi_avi_infoframe frame;
    +u16 pixel_clock_10kHz = adj->clock / 10;
    int ret;

    -buf[0] = adj->clock;
    -buf[1] = adj->clock >> 8;
    +buf[0] = pixel_clock_10kHz & 0xff;
    +buf[1] = pixel_clock_10kHz >> 8;
    buf[2] = adj->vrefresh;
    buf[3] = 0x00;
    buf[4] = adj->hdisplay;

static u8 sii8620_readb(struct sii8620 *ctx, u16 addr)
{
    -u8 ret;
    +u8 ret = 0;

    sii8620_read_buf(ctx, addr, &ret, 1);
    return ret;
}

static void sii8620_fetch_edid(struct sii8620 *ctx)
{
    u8 lm_ddc, ddc_cmd, int3, cbus;
    +unsigned long timeout;
    int fetched, i;
    int edid_len = EDID_LENGTH;
    u8 *edid;

    REG_DDC_CMD, ddc_cmd | VAL_DDC_CMD_ENH_DDC_READ_NO_ACK );

    -do {
        -int3 = sii8620_readb(ctx, REG_INTR3);
        +int3 = 0;

timeout = jiffies + msecs_to_jiffies(200);
+for (;;) {
    cbus = sii8620_readb(ctx, REG_CBUS_STATUS);
-    if (int3 & BIT_DDC_CMD_DONE)
-        break;
-    if (! (cbus & BIT_CBUS_STATUS_CBUS_CONNECTED)) {
+        if (~cbus & BIT_CBUS_STATUS_CBUS_CONNECTED) {
+            kfree(edid);
+            edid = NULL;
+            goto end;
+        } else {
+            int3 = sii8620_readb(ctx, REG_INTR3);
+        }
+    if (time_is_before_jiffies(timeout)) {
+        ctx->error = -ETIMEDOUT;
+        dev_err(ctx->dev, "timeout during EDID read\n");
+        kfree(edid);
+        edid = NULL;
+        goto end;
    } else if (sii8620_readb(ctx, REG_DDC_DOUT_CNT) >= FETCH_SIZE) {
+        break;
+    } else {
+        int3 = sii8620_readb(ctx, REG_INTR3);
+    }
+    if (time_is_before_jiffies(timeout)) {
+        ctx->error = -ETIMEDOUT;
+        dev_err(ctx->dev, "timeout during EDID read\n");
+        kfree(edid);
+        edid = NULL;
+        goto end;
    } while (1);
-    sii8620_readb(ctx, REG_DDC_STATUS);
-    while (sii8620_readb(ctx, REG_DDC_DOUT_CNT) < FETCH_SIZE)
usleep_range(10, 20);
+}

sii8620_read_buf(ctx, REG_DDC_DATA, edid + fetched, FETCH_SIZE);
if (fetched + FETCH_SIZE == EDID_LENGTH) {
    @ @ -1049,23 +1058,23 @@
    BIT_M3_PCTRL_MHL3_P0_PIXEL_MODE_PACKED,
    ctx->use_packed_pixel ? -0 : 0);
} else {
    -if (ctx->use_packed_pixel)
    +if (ctx->use_packed_pixel) {
        sii8620_write_seq_static(ctx,
        REG_VID_MODE, BIT_VID_MODE_M1080P,
        REG_MHL_TOP_CTL, BIT_MHL_TOP_CTL_MHL_PP_SEL | 1,
        REG_MHLTX_CTL6, 0x60
    );
    -else
} else {
    sii8620_write_seq_static(ctx,
        REG_VID_MODE, 0,
        REG_MHL_TOP_CTL, 1,
        REG_MHLTX_CTL6, 0xa0
    );
} }

if (ctx->use_packed_pixel)
-    out_fmt = VAL_TPI_FORMAT(YCBCR422, FULL) |
-        BIT_TPI_OUTPUT_CSCMODE709;
+    out_fmt = VAL_TPI_FORMAT(YCBCR422, FULL);
else
    out_fmt = VAL_TPI_FORMAT(RGB, FULL);

@@ -1200,7 +1209,7 @@
    int clk = ctx->pixel_clock * (ctx->use_packed_pixel ? 2 : 3);
    int i;

-    for (i = 0; i < ARRAY_SIZE(clk_spec); ++i)
+    for (i = 0; i < ARRAY_SIZE(clk_spec) - 1; ++i)
        if (clk < clk_spec[i].max_clk)
            break;

--- linux-4.15.0.orig/drivers/gpu/drm/bridge/synopsys/dw-hdmi.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/synopsys/dw-hdmi.c
@@ -39,6 +39,7 @@
     #include <media/cec-notifier.h>

+#define DDC_CI_ADDR	0x37
+#define DDC_SEGMENT_ADDR	0x30
+#define HDMI_EDID_LEN	512
@@ -321,6 +322,15 @@
     u8 addr = msgs[0].addr;
     int i, ret = 0;

+    if (addr == DDC_CI_ADDR)
+    /*
+     * The internal I2C controller does not support the multi-byte
+     * read and write operations needed for DDC/CI.
+     * TOFIX: Blacklist the DDC/CI address until we filter out
+     * unsupported I2C operations.
+     */
+    +return -EOPNOTSUPP;
+    +
dev_dbg(hdmi->dev, "xfer: num: %d, addr: %#x\n", num, addr);

for (i = 0; i < num; i++) {
	switch (hdmi->hdmi_data.enc_out_encoding) {
	case V4L2_YCBCR_ENC_601:
		frame.colorspace = HDMI_COLORSPACE_RGB;
		/* Set up colorimetry */
		-switch (hdmi->hdmi_data.enc_out_encoding) {
		-case V4L2_YCBCR_ENC_601:
			if (hdmi->hdmi_data.enc_in_encoding == V4L2_YCBCR_ENC_XV601)
				frame.colorimetry = HDMI_COLORIMETRY_EXTENDED;
			-else
			+if (!hdmi_bus_fmt_is_rgb(hdmi->hdmi_data.enc_out_bus_format)) {
			+switch (hdmi->hdmi_data.enc_out_encoding) {
			+case V4L2_YCBCR_ENC_601:
			+if (hdmi->hdmi_data.enc_in_encoding == V4L2_YCBCR_ENC_XV601)
					frame.colorimetry = HDMI_COLORIMETRY_EXTENDED;
			+else
			+frame.colorimetry = HDMI_COLORIMETRY_ITU_601;
			+frame.extended_colorimetry =
			+HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
			+break;
		+case V4L2_YCBCR_ENC_709:
		+if (hdmi->hdmi_data.enc_in_encoding == V4L2_YCBCR_ENC_XV709)
			frame.colorimetry = HDMI_COLORIMETRY_EXTENDED;
		-else
		+frame.colorimetry = HDMI_COLORIMETRY_ITU_709;
		+frame.extended_colorimetry =
		+HDMI_EXTENDED_COLORIMETRY_XV_YCC_709;
		+break;
	+default: /* Carries no data */
	frame.colorimetry = HDMI_COLORIMETRY_ITU_601;
	+frame.extended_colorimetry =
	+HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
	+break;
	+}
	+} else {
	+frame.colorimetry = HDMI_COLORIMETRY_NONE;
	frame.extended_colorimetry =
	-HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
	-break;
	-case V4L2_YCBCR_ENC_709:
	-else
	-frame.colorimetry = HDMI_COLORIMETRY_ITU_709;
	-frame.extended_colorimetry =
	-HDMI_EXTENDED_COLORIMETRY_XV_YCC_709;
-break;
-default: /* Carries no data */
-frame.colorimetry = HDMI_COLORIMETRY_ITU_601;
-frame.extended_colorimetry =
-HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
-break;
+HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
}

frame.scan_mode = HDMI_SCAN_MODE_NONE;
@@ -1635,6 +1651,8 @@
* (and possibly on the platform). So far only i.MX6Q (v1.30a) and
* i.MX6DL (v1.31a) have been identified as needing the workaround, with
* 4 and 1 iterations respectively.
+ * The Amlogic Meson GX SoCs (v2.01a) have been identified as needing
+ * the workaround with a single iteration.
+ */

switch (hdmi->version) {
@@ -1642,6 +1660,7 @@
  count = 4;
  break;
  case 0x131a:
+  case 0x201a:
    count = 1;
  break;
  default:
@@ -1731,7 +1750,7 @@
  /* HDMI Initialization Step E - Configure audio */
  hdmi_clk_regenerator_update_pixel_clock(hdmi);
  -hdmi_enable_audio_clk(hdmi, true);
+  hdmi_enable_audio_clk(hdmi, hdmi->audio_enable);
  }

  /* not for DVI mode */
--- linux-4.15.0.orig/drivers/gpu/drm/bridge/synopsys/dw-mipi-dsi.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/synopsys/dw-mipi-dsi.c
@@ -328,7 +328,6 @@
    if (lpm)
      val |= CMD_MODE_ALL_LP;

    -dsi_write(dsi, DSI_LPCLK_CTRL, lpm ? 0 : PHY_TXREQUESTCLKHS);
    dsi_write(dsi, DSI_CMD_MODE_CFG, val);
  }

@@ -485,16 +484,22 @@
static void dw_mipi_dsi_set_mode(struct dw_mipi_dsi *dsi,
unsigned long mode_flags)
{
  u32 val;
  
  dsi_write(dsi, DSI_PWR_UP, RESET);

  if (mode_flags & MIPI_DSI_MODE_VIDEO) {
    dsi_write(dsi, DSI_MODE_CFG, ENABLE_VIDEO_MODE);
    dw_mipi_dsi_video_mode_config(dsi);
    dsi_write(dsi, DSI_LPCLK_CTRL, PHY_TXREQUESTCLKHS);
  } else {
    dsi_write(dsi, DSI_MODE_CFG, ENABLE_CMD_MODE);
  }

  val = PHY_TXREQUESTCLKHS;
  if (dsi->mode_flags & MIPI_DSI_CLOCK_NON_CONTINUOUS)
    val |= AUTO_CLKLANE_CTRL;
  dsi_write(dsi, DSI_LPCLK_CTRL, val);
  
  dsi_write(dsi, DSI_PWR_UP, POWERUP);
}

--- linux-4.15.0.orig/drivers/gpu/drm/bridge/tc358767.c
+++ linux-4.15.0/drivers/gpu/drm/bridge/tc358767.c
@@ -96,6 +96,8 @@
#define DP0_STARTVAL		0x064c
#define DP0_ACTIVEVAL		0x0650
#define DP0_SYNCVAL0x0654
+#define SYNCVAL_HS_POL_ACTIVE_LOW	(1 << 15)
+#define SYNCVAL_VS_POL_ACTIVE_LOW	(1 << 31)
#define DP0_MISC0x0658
#define TU_SIZE_RECOMMENDED(63) /* LSCLK cycles per TU */
#define BPC_6				(0 << 5)
@@ -140,6 +142,8 @@
#define DP0_LTLOOPCTRL		0x06d8
#define DP0_SNKLTCTRL		0x06e4
+#define DP1_SRCCTRL		0x07a0
+
/* PHY */
#define DP_PHY_CTRL		0x0800
#define DP_PHY_RSTBIT(28) /* DP PHY Global Soft Reset */
@@ -148,6 +152,7 @@
#define PHY_M1_RSTBIT(12) /* Reset PHY1 Main Channel */
#define PHY_RDYBIT(16) /* PHY Main Channels Ready */
#define PHY_M0_RSTBIT(8) /* Reset PHY0 Main Channel */
+#define PHY_2LANEBIT(2) /* PHY Enable 2 lanes */
#define PHY_A0_ENBIT(1) /* PHY Aux Channel0 Enable */
#define PHY_M0_ENBIT(0) /* PHY Main Channel0 Enable */

```
#define PHY_M0_EN BIT(0)   /* PHY Main Channel0 Enable */
@@ -295,7 +300,7 @@
 struct drm_dp_aux_msg *msg)
 {
 struct tc_data *tc = aux_to_tc(aux);
-size_t size = min_t(size_t, 8, msg->size);
+size_t size = min_t(size_t, DP_AUX_MAX_PAYLOAD_BYTES - 1, msg->size);
 u8 request = msg->request & ~DP_AUX_I2C_MOT;
 u8 *buf = msg->buffer;
 u32 tmp = 0;
@@ -538,6 +543,7 @@
 unsigned long rate;
 u32 value;
 int ret;
+u32 dp_phy_ctrl;

 rate = clk_get_rate(tc->refclk);
 switch (rate) {
@@ -562,7 +568,10 @@
 value |= SYSCLK_SEL_LSCLK | LSCLK_DIV_2;
 tc_write(SYS_PLLPARAM, value);
@@ -717,7 +726,9 @@
tc_write(DP0_ACTIVEVAL, (mode->vdisplay << 16) | (mode->hdisplay));
@@ -827,12 +838,11 @@
 if (!tc->mode)
 return -EINVAL;
 /* from excel file - DP0_SrcCtrl */
tc_write(DP0_SRCCTRL, DP0_SRCCTRL_SCRMBLDIS | DP0_SRCCTRL_EN810B |
```

```
- DP0_SRCCTRL_LANESKEW | DP0_SRCCTRL_LANES_2 |
- DP0_SRCCTRL_BW27 | DP0_SRCCTRL_AUTOCORRECT);
-/* from excel file - DP1_SrcCtrl */
-tc_write(0x07a0, 0x00003083);
+tc_write(DP0_SRCCTRL, tc_srcctrl(tc));
+/* SSCG and BW27 on DP1 must be set to the same as on DP0 */
+tc_write(DP1_SRCCTRL,
+ (tc->link.spread ? DP0_SRCCTRL_SSCG : 0) |
+ ((tc->link.base.rate != 162000) ? DP0_SRCCTRL_BW27 : 0));

rate = clk_get_rate(tc->refclk);
switch (rate) {
  @@ -853,8 +863,11 @@
    value |= SYSCLK_SEL_LSCLK | LSCLK_DIV_2;
    tc_write(SYS_PLLPARAM, value);
+    /* Setup Main Link */
+    -dp_phy_ctrl = BGREN | PWR_SW_EN | BIT(2) | PHY_A0_EN | PHY_M0_EN;
+    +dp_phy_ctrl = BGREN | PWR_SW_EN | PHY_A0_EN | PHY_M0_EN;
+    +if (tc->link.base.num_lanes == 2)
+    +dp_phy_ctrl |= PHY_2LANE;
    tc_write(DP_PHY_CTRL, dp_phy_ctrl);
    msleep(100);

  @@ -1103,10 +1116,20 @@
  static int tc_connector_mode_valid(struct drm_connector *connector,
    struct drm_display_mode *mode)
    { 
        struct tc_data *tc = connector_to_tc(connector);
        +struct tc_data *tc = connector_to_tc(connector);
        +u32 req, avail;
        +u32 bits_per_pixel = 24;
        +
        /* DPI interface clock limitation: upto 154 MHz */
        if (mode->clock > 154000)
            return MODE_CLOCK_HIGH;

        +req = mode->clock * bits_per_pixel / 8;
        +avail = tc->link.base.num_lanes * tc->link.base.rate;
        +
        +if (req > avail)
        +return MODE_BAD;
        +
        return MODE_OK;
    }

  @@ -1124,6 +1147,13 @@
  struct tc_data *tc = connector_to_tc(connector);
struct edid *edid;
unsigned int count;

int ret;

ret = tc_get_display_props(tc);
if (ret < 0) {
    dev_err(tc->dev, "failed to read display props: %d\n", ret);
    return 0;
}

if (tc->panel && tc->panel->funcs && tc->panel->funcs->get_modes) {
    count = tc->panel->funcs->get_modes(tc->panel);

    drm_mode_connector_update_edid_property(connector, edid);

    return drm_add_edid_modes(connector, edid);
}

tfree(edid);
return ret;

fallback:
    /* No EDID, fallback on the XGA standard modes */
    ret = drm_add_modes_noedid(connector, 1920, 1200);

    /* This is called after a mode is programmed. It should reverse anything done
    * by the prepare function
    */
    -static void cirrus_crtc_commit(struct drm_crtc *crtc)
    -{
    -}
    -
    -/*
    - * The core can pass us a set of gamma values to program. We actually only
    - * use this for 8-bit mode so can’t perform smooth fades on deeper modes,
    - * but it’s a requirement that we provide the function
    - */
    -static int cirrus_crtc_gamma_set(struct drm_crtc *crtc, u16 *red, u16 *green,
- u16 *blue, uint32_t size,
- struct drm_modeset_acquire_ctx *ctx)
+static void cirrus_crtc_load_lut(struct drm_crtc *crtc)
{
  struct drm_device *dev = crtc->dev;
  struct cirrus_device *cdev = dev->dev_private;
  @ @ -317,7 +302,7 @@
  int i;

  if (!crtc->enabled)
    return 0;
  +return;

  r = crtc->gamma_store;
  g = r + crtc->gamma_size;
  @@ -330,6 +315,27 @@
  WREG8(PALETTE_DATA, *g++ >> 8);
  WREG8(PALETTE_DATA, *b++ >> 8);
  }
  +}
  +
  +/*
  + * This is called after a mode is programmed. It should reverse anything done
  + * by the prepare function
  + */
  +static void cirrus_crtc_commit(struct drm_crtc *crtc)
  +{
    +cirrus_crtc_load_lut(crtc);
    +}
  +
  +/*
  + * The core can pass us a set of gamma values to program. We actually only
  + * use this for 8-bit mode so can't perform smooth fades on deeper modes,
  + * but it's a requirement that we provide the function
  + */
  +static int cirrus_crtc_gamma_set(struct drm_crtc *crtc, u16 *red, u16 *green,
  +u16 *blue, uint32_t size,
  + struct drm_modeset_acquire_ctx *ctx)
  +{
    +cirrus_crtc_load_lut(crtc);

    return 0;
  }

--- linux-4.15.0.orig/drivers/gpu/drm/drm_atomic.c
+++ linux-4.15.0/drivers/gpu/drm/drm_atomic.c
@@ -151,6 +151,8 @@
    state->connectors[i].ptr = NULL;


state->connectors[i].state = NULL;
+state->connectors[i].old_state = NULL;
+state->connectors[i].new_state = NULL;
drm_connector_put(connector);
}

@@ -165,6 +167,13 @@
state->crtcs[i].ptr = NULL;
state->crtcs[i].state = NULL;
+state->crtcs[i].old_state = NULL;
+state->crtcs[i].new_state = NULL;
+
+if (state->crtcs[i].commit) {
+drm_crtc_commit_put(state->crtcs[i].commit);
+state->crtcs[i].commit = NULL;
+
+		if (state->crtcs[i].commit) {
+drm_crtc_commit_put(state->crtcs[i].commit);
+state->crtcs[i].commit = NULL;
+
+
+}
}
}

for (i = 0; i < config->num_total_plane; i++) {
@@ -177,6 +186,8 @@
	state->planes[i].state);
state->planes[i].ptr = NULL;
state->planes[i].state = NULL;
+state->planes[i].old_state = NULL;
+state->planes[i].new_state = NULL;
}

for (i = 0; i < state->num_private_objs; i++) {
@@ -186,6 +197,8 @@
	state->private_objs[i].state);
state->private_objs[i].ptr = NULL;
state->private_objs[i].state = NULL;
+state->private_objs[i].old_state = NULL;
+state->private_objs[i].new_state = NULL;
}
state->num_private_objs = 0;

@@ -1341,7 +1354,9 @@
{
struct drm_plane *plane = plane_state->plane;
struct drm_crtc_state *crtc_state;
-*/
+/* Nothing to do for same crtc*/
+if (plane_state->crtc == crtc)
+return 0;
if (plane_state->crtc) {
crtc_state = drm_atomic_get_crtc_state(plane_state->state,
plane_state->crtc);
--- linux-4.15.0.orig/drivers/gpu/drm/drm_atomic_helper.c
+++ linux-4.15.0/drivers/gpu/drm/drm_atomic_helper.c
@@ -306,6 +306,26 @@
    return 0;
 }
+    
+    crtc_state = drm_atomic_get_new_crtc_state(state, 
+    new_connector_state->crtc);
+    /*
+     * For compatibility with legacy users, we want to make sure that
+     * we allow DPMS On->Off modesets on unregistered connectors. Modesets
+     * which would result in anything else must be considered invalid, to
+     * avoid turning on new displays on dead connectors.
+     *
+     * Since the connector can be unregistered at any point during an
+     * atomic check or commit, this is racy. But that's OK: all we care
+     * about is ensuring that userspace can't do anything but shut off the
+     * display on a connector that was destroyed after its been notified,
+     * not before.
+     */
+    if (!READ_ONCE(connector->registered) && crtc_state->active) {
+        DRM_DEBUG_ATOMIC("[CONNECTOR:%d:%s] is not registered
+        ",
+        connector->base.id, connector->name);
+        return -EINVAL;
+    }
+    
+    funcs = connector->helper_private;
+
+    if (funcs->atomic_best_encoder)
+    @ @ -350,7 +370,6 @ @
+
+    set_best_encoder(state, new_connector_state, new_encoder);
+
+    -crtc_state = drm_atomic_get_new_crtc_state(state, new_connector_state->crtc);
+    crtc_state->connectors_changed = true;
+
+    DRM_DEBUG_ATOMIC("[CONNECTOR:%d:%s] using [ENCODER:%d:%s] on [CRTC:%d:%s]n", 
+    @ @ -1271,15 +1290,16 @ @
+    void drm_atomic_helper_wait_for_flip_done(struct drm_device *dev,
+        struct drm_atomic_state *old_state)
+    {
+        struct drm_crtc_state *new_crtc_state;
+        struct drm_crtc *crtc;
+        int i;
+        
+        -for_each_new_crtc_in_state(old_state, crtc, new_crtc_state, i) {
+            struct drm_crtc_commit *commit = new_crtc_state->commit;
+            

+for (i = 0; i < dev->mode_config.num_crtc; i++) {
+struct drm_crtc_commit *commit = old_state->crtcs[i].commit;
+int ret;
+
+-if (!commit)
+crtc = old_state->crtcs[i].ptr;
+ +
+if (!crtc || !commit)
+continue;
+
+ret = wait_for_completion_timeout(&commit->flip_done, 10 * HZ);
+DRM_ERROR("[CRTC:%d:%s] flip_done timed out
+ crtc->base.id, crtc->name);
+
+if (old_state->fake_commit)
+complete_all(&old_state->fake_commit->flip_done);
+
+EXPORT_SYMBOL(drm_atomic_helper_wait_for_flip_done);
+
+
@@ -1287,6 +1307,9 @@
+if (old_state->fake_commit)
+complete_all(&old_state->fake_commit->flip_done);
+
+EXPORT_SYMBOL(drm_atomic_helper_wait_for_flip_done);
+
@@ -1397,8 +1420,9 @@
+struct drm_crtc *crtc;
+struct drm_crtc_state *crtc_state;
+-struct drm_plane *plane;
--+struct drm_plane_state *old_plane_state, *new_plane_state;
+struct drm_plane *plane = NULL;
+struct drm_plane_state *old_plane_state = NULL;
+struct drm_plane_state *new_plane_state = NULL;
+const struct drm_plane_helper_funcs *funcs;
+int i, n_planes = 0;
+
@@ -1414,7 +1438,17 @@
+if (n_planes != 1)
+return -EINVAL;
+
-if (!new_plane_state->crtc)
+if (!new_plane_state->crtc ||
+    old_plane_state->crtc != new_plane_state->crtc)
+return -EINVAL;
+
+/*
+ * FIXME: Since prepare_fb and cleanup_fb are always called on
+ * the new_plane_state for async updates we need to block framebuffer
+ * changes. This prevents use of a fb that's been cleaned up and
+ * double cleanups from occuring.
+ */
+if (old_plane_state->fb != new_plane_state->fb)
return -EINVAL;

funcs = plane->helper_private;
@@ -1447,6 +1481,8 @@
    * drm_atomic_async_check() succeeds. Async commits are not supposed to swap
    * the states like normal sync commits, but just do in-place changes on the
    * current state.
+ *
+ * TODO: Implement full swap instead of doing in-place changes.
*/
void drm_atomic_helper_async_commit(struct drm_device *dev,
    struct drm_atomic_state *state)
@@ -1457,8 +1493,16 @@
int i;

for_each_new_plane_in_state(state, plane, plane_state, i) {
+struct drm_framebuffer *old_fb = plane->state->fb;
+    funcs = plane->helper_private;
+    funcs->atomic_async_update(plane, plane_state);
+    /*
+     * Make sure the FBs have been swapped so that cleanups in the
+     * new_state performs a cleanup in the old FB.
+     */
+    WARN_ON_ONCE(plane_state->fb != old_fb);
}
EXPORT_SYMBOL(drm_atomic_helper_async_commit);
@@ -1778,6 +1822,11 @@
new_crtc_state->event->base.completion = &commit->flip_done;
new_crtc_state->event->base.completion_release = release_crtc_commit;
   drm_crtc_commit_get(commit);
+   commit->abort_completion = true;
+   state->crtcs[i].commit = commit;
+   drm_crtc_commit_get(commit);
} 
for_each_oldnew_connector_in_state(state, conn, old_conn_state, new_conn_state, i) {
@@ -2698,7 +2747,7 @@
    ret = handle_conflicting_encoders(state, true);
    if (ret)
        goto fail;
ret = drm_atomic_commit(state);

@@ -2783,31 +2832,9 @@
return 0;
}

-/**
- * drm_atomic_helper_disable_all - disable all currently active outputs
- * @dev: DRM device
- * @ctx: lock acquisition context
- *
- * Loops through all connectors, finding those that aren't turned off and then
- * turns them off by setting their DPMS mode to OFF and deactivating the CRTC
- * that they are connected to.
- *
- * This is used for example in suspend/resume to disable all currently active
- * functions when suspending. If you just want to shut down everything at e.g.
- * driver unload, look at drm_atomic_helper_shutdown().
- *
- * Note that if callers haven't already acquired all modeset locks this might
- * return -EDEADLK, which must be handled by calling drm_modeset_backoff().
- *
- * Returns:
- * 0 on success or a negative error code on failure.
- *
- * See also:
- * drm_atomic_helper_suspend(), drm_atomic_helper_resume() and
- * drm_atomic_helper_shutdown().
- */
- int drm_atomic_helper_disable_all(struct drm_device *dev,
-     struct drm_modeset_acquire_ctx *ctx)
+static int __drm_atomic_helper_disable_all(struct drm_device *dev,
+    struct drm_modeset_acquire_ctx *ctx,
+    bool clean_old_fbs)
{
    struct drm_atomic_state *state;
    struct drm_connector_state *conn_state;
    goto free;

drm_atomic_set_fb_for_plane(plane_state, NULL);
-    plane_mask |= BIT(drm_plane_index(plane));
-    plane->old_fb = plane->fb;
+    +if (clean_old_fbs) {
+        plane->old_fb = plane->fb;
+        plane_mask |= BIT(drm_plane_index(plane));
+    }

ret = drm_atomic_commit(state);
@@ -2871,6 +2901,34 @@
return ret;
}

+/**
+ * drm_atomic_helper_disable_all - disable all currently active outputs
+ * @dev: DRM device
+ * @ctx: lock acquisition context
+ *
+ * Loops through all connectors, finding those that aren't turned off and then
+ * turns them off by setting their DPMS mode to OFF and deactivating the CRTC
+ * that they are connected to.
+ *
+ * This is used for example in suspend/resume to disable all currently active
+ * functions when suspending. If you just want to shut down everything at e.g.
+ * driver unload, look at drm_atomic_helper_shutdown().
+ *
+ * Note that if callers haven't already acquired all modeset locks this might
+ * return -EDEADLK, which must be handled by calling drm_modeset_backoff().
+ *
+ * Returns:
+ * 0 on success or a negative error code on failure.
+ *
+ * See also:
+ * drm_atomic_helper_suspend(), drm_atomic_helper_resume() and
+ * drm_atomic_helper_shutdown().
+ */
+int drm_atomic_helper_disable_all(struct drm_device *dev,
+ struct drm_modeset_acquire_ctx *ctx)
+{
+return __drm_atomic_helper_disable_all(dev, ctx, false);
+
EXPORT_SYMBOL(drm_atomic_helper_disable_all);

@@ -2893,7 +2951,7 @@
while (1) {
  ret = drm_modeset_lock_all_ctx(dev, &ctx);
  if (!ret)
-  ret = drm_atomic_helper_disable_all(dev, &ctx);
+  ret = __drm_atomic_helper_disable_all(dev, &ctx, true);

  if (ret != -EDEADLK)
    break;

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int drm_atomic_helper_commit_duplicated_state(struct drm_atomic_state *state, struct drm_modeset_acquire_ctx *ctx)
{
    int i, ret;
    struct drm_plane *plane;
    struct drm_plane_state *new_plane_state;
    struct drm_connector *connector;
    struct drm_connector_state *new_conn_state;
    struct drm_crtc *crtc;
    struct drm_crtc_state *new_crtc_state;
    unsigned plane_mask = 0;
    struct drm_device *dev = state->dev;

    state->acquire_ctx = ctx;

    for_each_new_plane_in_state(state, plane, new_plane_state, i) {
        plane_mask |= BIT(drm_plane_index(plane));
    }

    for_each_new_crtc_in_state(state, crtc, new_crtc_state, i)
    state->crtcs[i].old_state = crtc->state;

    ret = drm_atomic_commit(state);
    if (plane_mask)
        drm_atomic_clean_old_fb(dev, plane_mask, ret);
    state->acquire_ctx = NULL;

    return ret;
}

void __drm_atomic_helper_crtc_destroy_state(struct drm_crtc_state *state)
{
    if (state->commit) {
        /*
         * In the event that a non-blocking commit returns
         * -ERESTARTSYS before the commit_tail work is queued, we will
         * have an extra reference to the commit object. Release it, if
         * the event has not been consumed by the worker.
         * state->event may be freed, so we can't directly look at
         */
        
        state->connectors[i].old_state = connector->state;
    }
}

void __drm_atomic_helper_crtc_destroy_state(struct drm_crtc_state *state)
+ * state->event->base.completion.
+ */
+ if (state->event && state->commit->abort_completion)
+ drm_crtc_commit_put(state->commit);
+ kfree(state->commit->event);
state->commit->event = NULL;
+ drm_crtc_commit_put(state->commit);
} --- linux-4.15.0.orig/drivers/gpu/drm/drm_auth.c
+++ linux-4.15.0/drivers/gpu/drm/drm_auth.c
@@ -142,6 +142,7 @@
lockdep_assert_held_once(&dev->master_mutex);
+WARN_ON(fpriv->is_master);
old_master = fpriv->master;
fpriv->master = drm_master_create(dev);
if (!fpriv->master) {
@@ -170,6 +171,7 @@
/* drop references and restore old master on failure */
drm_master_put(&fpriv->master);
fpriv->master = old_master;
+fpriv->is_master = 0;

return ret;
}
@@ -230,6 +232,12 @@
if (!dev->master)
goto out_unlock;
+if (file_priv->master->lessor != NULL) {
+DRM_DEBUGLEASE("Attempt to drop lessee %d as master\n", file_priv->master->lessee_id);
+ret = -EINVAL;
+goto out_unlock;
+}
+ret = 0;
drm_drop_master(dev, file_priv);
out_unlock:
@@ -257,9 +265,10 @@
void drm_master_release(struct drm *file_priv)
{
 struct drm_device *dev = file_priv->minor->dev;
-struct drm_master *master = file_priv->master;
+struct drm_master *master;
mutex_lock(&dev->master_mutex);
+master = file_priv->master;
if (file_priv->magic)
idr_remove(&file_priv->master->magic_map, file_priv->magic);

--- linux-4.15.0.orig/drivers/gpu/drm/drm_bufs.c
+++ linux-4.15.0/drivers/gpu/drm/drm_bufs.c
@@ -36,6 +36,8 @@
#include <drm/drmP.h>
#include "drm_legacy.h"

+include <linux/nospec.h>
+
static struct drm_map_list *drm_find_matching_map(struct drm_device *dev,
    struct drm_local_map *map)
{
@@ -1319,7 +1321,10 @@
    .size = from->buf_size,
    .low_mark = from->low_mark,
    .high_mark = from->high_mark;
-    return copy_to_user(to, &v, offsetof(struct drm_buf_desc, flags));
+
+if (copy_to_user(to, &v, offsetof(struct drm_buf_desc, flags)))
+    return -EFAULT;
+    return 0;
}

int drm_legacy_infobufs(struct drm_device *dev, void *data,
@@ -1417,6 +1422,7 @@
    if (buf->file_priv != file_priv) {
        DRM_ERROR("Process %d freeing buffer not owned\n",
            idx, dma->buf_count - 1);
    return -EINVAL;
    }
    idx = array_index_nospec(idx, dma->buf_count);
buf = dma->buflist[idx];
if (buf->file_priv != file_priv) {
    DRM_ERROR("Process %d freeing buffer not owned\n",
--- linux-4.15.0.orig/drivers/gpu/drm/drm_context.c
+++ linux-4.15.0/drivers/gpu/drm/drm_context.c
@@ -361,23 +361,26 @@
    if (!drm_core_check_feature(dev, DRIVER_KMS_LEGACY_CONTEXT) &&
        !drm_core_check_feature(dev, DRIVER_LEGACY))
    return -EINVAL;
ctx->handle = drm_legacy_ctxbitmap_next(dev);
- if (ctx->handle == DRM_KERNEL_CONTEXT) {
+ tmp_handle = drm_legacy_ctxbitmap_next(dev);
+ if (tmp_handle == DRM_KERNEL_CONTEXT) {
      /* Skip kernel's context and get a new one. */
- ctx->handle = drm_legacy_ctxbitmap_next(dev);
+ tmp_handle = drm_legacy_ctxbitmap_next(dev);
    }
    DRM_DEBUG("%d", ctx->handle);
    if (ctx->handle == -1) {
+ DRM_DEBUG("%d", tmp_handle);
+ if (tmp_handle < 0) {
        DRM_DEBUG("Not enough free contexts.
*/ Should this return -EBUSY instead? */
- return -ENOMEM;
+ return tmp_handle;
    }
    }

+ctx->handle = tmp_handle;
+
ctx_entry = kmalloc(sizeof(*ctx_entry), GFP_KERNEL);
if (!ctx_entry) {
    DRM_DEBUG("out of memory\n");
    --- linux-4.15.0.orig/drivers/gpu/drm/drm_crtc.c
+++ linux-4.15.0/drivers/gpu/drm/drm_crtc.c
@@ -550,9 +550,9 @@
        struct drm_mode_config *config = &dev->mode_config;
        struct drm_mode_crtc *crtc_req = data;
        struct drm_crtc *crtc;
-        struct drm_connector **connector_set = NULL, *connector;
-        struct drm_framebuffer *fb = NULL;
-        struct drm_display_mode *mode = NULL;
+        struct drm_connector **connector_set, *connector;
+        struct drm_framebuffer *fb;
+        struct drm_display_mode *mode;
        struct drm_mode_set_set;
        uint32_t __user *set_connectors_ptr;
        struct drm_modeset_acquire_ctx ctx;
@@ -579,6 +579,10 @@
            mutex_lock(&crtc->dev->mode_config.mutex);
            drm_modeset_acquire_init(&ctx, DRM_MODESET_ACQUIRE_INTERRUPTIBLE);
            retry:
+        connector_set = NULL;
+        fb = NULL;
+        mode = NULL;
+        ret = drm_modeset_lock_all_ctx(crtc->dev, &ctx);
if (ret)
goto out;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_debugfs.c
+++ linux-4.15.0/drivers/gpu/drm/drm_debugfs.c
@@ -250,13 +250,13 @@
    buf[len] = '\0';
    -if (!strcmp(buf, "on"))
    +if (sysfs_streq(buf, "on"))
        connector->force = DRM_FORCE_ON;
    -else if (!strcmp(buf, "digital"))
    +else if (sysfs_streq(buf, "digital"))
        connector->force = DRM_FORCE_ON_DIGITAL;
    -else if (!strcmp(buf, "off"))
    +else if (sysfs_streq(buf, "off"))
        connector->force = DRM_FORCE_OFF;
    -else if (!strcmp(buf, "unspecified"))
    +else if (sysfs_streq(buf, "unspecified"))
        connector->force = DRM_FORCE_UNSPECIFIED;
    else
        return -EINVAL;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_debugfs_crc.c
+++ linux-4.15.0/drivers/gpu/drm/drm_debugfs_crc.c
@@ -101,8 +101,8 @@
    if (IS_ERR(source))
        return PTR_ERR(source);
    -if (source[len] == '\n')
    +if (source[len - 1] == '\n')
        source[len - 1] = '\0';
    spin_lock_irq(&crc->lock);

@@ -139,6 +139,7 @@
 static void crtc_crc_cleanup(struct drm_crtc_crc *crc)
 {
    kfree(crc->entries);
    +crc->overflow = false;
    crc->entries = NULL;
    crc->head = 0;
    crc->tail = 0;
    @@ -359,12 +360,13 @@
    struct drm_crtc_crc *crc = &crtc->crc;
    struct drm_crtc_crc_entry *entry;
    int head, tail;
    +unsigned long flags;
-spin_lock(&crc->lock);
+spin_lock_irqsave(&crc->lock, flags);

/* Caller may not have noticed yet that userspace has stopped reading */
if (!crc->entries) {
-.spin_unlock(&crc->lock);
+spin_unlock_irqrestore(&crc->lock, flags);
    return -EINVAL;
}

@@ -372,8 +374,14 @@
tail = crc->tail;

if (CIRC_SPACE(head, tail, DRM_CRC_ENTRIES_NR) < 1) {
-    spin_unlock(&crc->lock);
-    DRM_ERROR("Overflow of CRC buffer, userspace reads too slow.\n");
+    bool was_overflow = crc->overflow;
+    crc->overflow = true;
+    spin_unlock_irqrestore(&crc->lock, flags);
+    if (!was_overflow)
+        DRM_ERROR("Overflow of CRC buffer, userspace reads too slow.\n");
    return -ENOBUFS;
}

@@ -385,7 +393,7 @@
    head = (head + 1) & (DRM_CRC_ENTRIES_NR - 1);
    crc->head = head;

-    spin_unlock(&crc->lock);
+spin_unlock_irqrestore(&crc->lock, flags);

    wake_up_interruptible(&crc->wq);

--- linux-4.15.0.orig/drivers/gpu/drm/drm_dp_aux_dev.c
+++ linux-4.15.0/drivers/gpu/drm/drm_dp_aux_dev.c
@@ -60,7 +60,7 @@
mutex_lock(&aux_idr_mutex);
    aux_dev = idr_find(&aux_idr, index);
-    if (!kref_get_unless_zero(&aux_dev->refcount))
+    if (aux_dev && !kref_get_unless_zero(&aux_dev->refcount))
        aux_dev = NULL;
    mutex_unlock(&aux_idr_mutex);
--- linux-4.15.0.orig/drivers/gpu/drm/drm_dp_dual_mode_helper.c
+++ linux-4.15.0/drivers/gpu/drm/drm_dp_dual_mode_helper.c
@@ -350,19 +350,44 @@
{
    uint8_t tmds_oen = enable ? 0 : DP_DUAL_MODE_TMDS_DISABLE;
    ssize_t ret;
    +int retry;

    if (type < DRM_DP_DUAL_MODE_TYPE2_DVI)
        return 0;

    -ret = drm_dp_dual_mode_write(adapter, DP_DUAL_MODE_TMDS_OEN,
       -&tmds_oen, sizeof(tmds_oen));
    -if (ret) {
        -DRM_DEBUG_KMS("Failed to %s TMDS output buffers\n",
        -enable ? "enable" : "disable");
        -return ret;
    +/*
        + * LSPCON adapters in low-power state may ignore the first write, so
        + * read back and verify the written value a few times.
        + */
        +for (retry = 0; retry < 3; retry++) {
            +uint8_t tmp;
            +
            +ret = drm_dp_dual_mode_write(adapter, DP_DUAL_MODE_TMDS_OEN,
            +&tmds_oen, sizeof(tmds_oen));
            +if (ret) {
                +DRM_DEBUG_KMS("Failed to %s TMDS output buffers (%d attempts)\n",
                +enable ? "enable" : "disable",
                +retry + 1);
                +return ret;
            +}
            +
            +ret = drm_dp_dual_mode_read(adapter, DP_DUAL_MODE_TMDS_OEN,
            +&tmp, sizeof(tmp));
            +if (ret) {
                +DRM_DEBUG_KMS("I2C read failed during TMDS output buffer %s (%d attempts)\n",
                +enable ? "enabling" : "disabling",
                +retry + 1);
                +return ret;
            +}
            +
            +if (tmp == tmds_oen)
                +return 0;
        }

    -return 0;
    +DRM_DEBUG_KMS("I2C write value mismatch during TMDS output buffer %s\n",

+    enable ? "enabling" : "disabling&quot;);
+
+return -EIO;
}

EXPORT_SYMBOL(drm_dp_dual_mode_set_tmds_output);

--- linux-4.15.0.orig/drivers/gpu/drm/drm_dp_helper.c
+++ linux-4.15.0/drivers/gpu/drm/drm_dp_helper.c
@@ -1142,6 +1142,7 @@
 static const u16 psr_setup_time_us[] = {
     PSR_SETUP_TIME(330),
     PSR_SETUP_TIME(275),
+-    PSR_SETUP_TIME(220),
     PSR_SETUP_TIME(165),
     PSR_SETUP_TIME(110),
     PSR_SETUP_TIME(55),
--- linux-4.15.0.orig/drivers/gpu/drm/drm_dp_mst_topology.c
+++ linux-4.15.0/drivers/gpu/drm/drm_dp_mst_topology.c
@@ -29,6 +29,7 @@

 #include &lt;drm/drm_fixed.h&gt;
 #include &lt;drm/drm_atomic.h&gt;
+#include &lt;linux/iopoll.h&gt;

 #include &lt;drm/drm_fixed.h&gt;
 #include &lt;drm/drm_atomic.h&gt;
@@ -274,7 +275,7 @@
    memcpy(&amp;buf[idx], req-&gt;u.i2c_read.transactions[i].bytes, req-&gt;u.i2c_read.transactions[i].num_bytes);
    idx += req-&gt;u.i2c_read.transactions[i].num_bytes;
-    buf[idx] = (req-&gt;u.i2c_read.transactions[i].no_stop_bit &amp; 0x1) &lt;&lt; 5;
+    buf[idx] = (req-&gt;u.i2c_read.transactions[i].no_stop_bit &amp; 0x1) &lt;&lt; 4;
    buf[idx] |= (req-&gt;u.i2c_read.transactions[i].i2c_transaction_delay &amp; 0xf);
    idx++;
 }
@@ -439,6 +440,7 @@
 if (idx &gt; raw-&gt;curlen)
     goto fail_len;
    repmsg-&gt;u.remote_dpdc_read_ack.num_bytes = raw-&gt;msg[idx];
+    idx++;
 if (idx &gt; raw-&gt;curlen)
     goto fail_len;

@@ -1082,10 +1084,12 @@
 lct = drm_dp_calculate_rad(port, rad);

 port-&gt;mstb = drm_dp_add_mst_branch_device(lct, rad);
-port-&gt;mstb-&gt;mgr = port-&gt;mgr;
+port-&gt;mstb-&gt;mgr = port-&gt;mgr;

- port->mstb->port_parent = port;
+ if (port->mstb) {
+ port->mstb->mgr = port->mgr;
+ port->mstb->port_parent = port;

-send_link = true;
+ send_link = true;
+
break;
}
return send_link;
@@ -1272,6 +1276,9 @@
mutex_lock(&mgr->lock);
mstb = mgr->mst_primary;

+ if (!mstb)
+ goto out;
+ for (i = 0; i < lct - 1; i++) {
  int shift = (i % 2) ? 0 : 4;
  int port_num = (rad[i / 2] >> shift) & 0xf;
  @ @ -1577,7 +1584,11 @@
  if (ret != 1)
    DRM_DEBUG_KMS("failed to send msg in q %d\n", ret);

-txmsg->dst->tx_slots[txmsg->seqno] = NULL;
+ if (txmsg->seqno != -1) {
+ WARN_ON((unsigned int)txmsg->seqno >
+ ARRAY_SIZE(txmsg->dst->tx_slots));
+ txmsg->dst->tx_slots[txmsg->seqno] = NULL;
+ }
}

static void drm_dp_queue_down_tx(struct drm_dp_mst_topology_mgr *mgr,
@@ -2104,6 +2115,7 @@
mutex_lock(&mgr->payload_lock);
mutex_lock(&mgr->lock);
if (mst_state == mgr->mst_state)
  goto out_unlock;
@@ -2162,7 +2174,10 @@
/* this can fail if the device is gone */
drm_dp_dpdc_write(mgr->aux, DP_MSTM_CTRL, 0);
ret = 0;
-memset(mgr->payloads, 0, mgr->max_payloads * sizeof(struct drm_dp_payload));
+memset(mgr->payloads, 0,
open source used in 5g as edge ac-4

+ mgr->max_payloads * sizeof(mgr->payloads[0]);
+ memset(mgr->proposed_vcpis, 0,
+    mgr->max_payloads * sizeof(mgr->proposed_vcpis[0]));
    mgr->payload_mask = 0;
    set_bit(0, &mgr->payload_mask);
    mgr->vcpi_mask = 0;
@@ -2170,6 +2185,7 @@
    out_unlock:
    mutex_unlock(&mgr->lock);
    +mutex_unlock(&mgr->payload_lock);
if (mstb)
    drm_dp_put_mst_branch_device(mstb);
    return ret;
    @@ -2687,11 +2703,11 @@
{ 
    int ret;
-
-port = drm_dp_get_validated_port_ref(mgr, port);
-if (!port)
+if (slots < 0)
    return false;
-
-if (slots < 0)
+port = drm_dp_get_validated_port_ref(mgr, port);
+if (!port)
    return false;

if (port->vcpi.vcpi > 0) {
@@ -2706,6 +2722,7 @@
    if (ret) {
        DRM_DEBUG_KMS("failed to init vcpi slots=%d max=63 ret=%d\n",
        DIV_ROUND_UP(pbn, mgr->pbn_div), ret);
+    drm_dp_put_port(port);
    goto out;
    } 
    DRM_DEBUG_KMS("initing vcpi for pbn=%d slots=%d\n",
    @@ -2810,6 +2827,17 @@
    return ret;
    } 

+static int do_get_act_status(struct drm_dp_aux *aux)
+{ 
+    int ret;
+    u8 status;
+    
+    ret = drm_dp_dpcd_readb(aux, DP_PAYLOAD_TABLE_UPDATE_STATUS, &status);
+    if (ret < 0)
int drm_dp_check_act_status(struct drm_dp_mst_topology_mgr *mgr)
{
    int ret, status;
    int count = 0;
    do {
        ret = drm_dp_dpcd_readb(mgr->aux, DP_PAYLOAD_TABLE_UPDATE_STATUS, &status);
        if (ret < 0) {
            DRM_DEBUG_KMS("failed to read payload table status %d
", ret);
            goto fail;
        }
        if (status & DP_PAYLOAD_ACT_HANDLED)
            break;
        count++;
        udelay(100);
    } while (count < 30);
    /*
     * There doesn't seem to be any recommended retry count or timeout in
     * the MST specification. Since some hubs have been observed to take
     * over 1 second to update their payload allocations under certain
     * conditions, we use a rather large timeout value.
     * */
    const int timeout_ms = 3000;
    ret = readx_poll_timeout(do_get_act_status, mgr->aux, status,
                              status & DP_PAYLOAD_ACT_HANDLED || status < 0,
                              200, timeout_ms * USEC_PER_MSEC);
    if (ret < 0 && status >= 0) {
        DRM_DEBUG_KMS("Failed to get ACT after %dms, last status: %02x
",
                       timeout_ms, status);
        goto fail;
    }
    ret = drm_dp_dpcd_readb(mgr->aux, DP_PAYLOAD_ACT_HANDLED, &status);
    if (ret < 0) {
        DRM_DEBUG_KMS("failed to read payload table status %d
", ret);
        goto fail;
    }
    if (status & DP_PAYLOAD_ACT_HANDLED)
        break;
    count++;
    udelay(100);
    /*
     * There doesn't seem to be any recommended retry count or timeout in
     * the MST specification. Since some hubs have been observed to take
     * over 1 second to update their payload allocations under certain
     * conditions, we use a rather large timeout value.
     * */
    const int timeout_ms = 3000;
    ret = readx_poll_timeout(do_get_act_status, mgr->aux, status,
                             status & DP_PAYLOAD_ACT_HANDLED || status < 0,
                             200, timeout_ms * USEC_PER_MSEC);
    if (ret < 0 && status >= 0) {
        DRM_DEBUG_KMS("Failed to get ACT after %dms, last status: %02x
",
                       timeout_ms, status);
        goto fail;
    }
    return ret;
+return status;
+}

/**
 * drm_dp_check_act_status() - Check ACT handled status.
@@ -2819,33 +2847,29 @@*/
int drm_dp_check_act_status(struct drm_dp_mst_topology_mgr *mgr)
{
    int ret, status;
    int count = 0;
    do {
        ret = drm_dp_dpcd_readb(mgr->aux, DP_PAYLOAD_TABLE_UPDATE_STATUS, &status);
        if (ret < 0) {
            DRM_DEBUG_KMS("failed to read payload table status %d
", ret);
            goto fail;
        }
        if (status & DP_PAYLOAD_ACT_HANDLED)
            break;
        count++;
        udelay(100);
    } while (count < 30);
    /*
     * There doesn't seem to be any recommended retry count or timeout in
     * the MST specification. Since some hubs have been observed to take
     * over 1 second to update their payload allocations under certain
     * conditions, we use a rather large timeout value.
     * */
    const int timeout_ms = 3000;
    ret = readx_poll_timeout(do_get_act_status, mgr->aux, status,
                             status & DP_PAYLOAD_ACT_HANDLED || status < 0,
                             200, timeout_ms * USEC_PER_MSEC);
    if (ret < 0 && status >= 0) {
        DRM_DEBUG_KMS("Failed to get ACT after %dms, last status: %02x
",
                       timeout_ms, status);
        goto fail;
    }
    return ret;
+return status;
+}
return -EINVAL;
+} else if (status < 0) {
+DRM_DEBUG_KMS("Failed to read payload table status: \%d\n",
+status);
+return status;
}
+
return 0;
-fail:
-return ret;
}
EXPORT_SYMBOL(drm_dp_check_act_status);

@@ -2936,12 +2960,14 @@
{}
{}

+#define DP_PAYLOAD_TABLE_SIZE	64
+
static bool dump_dp_payload_table(struct drm_dp_mst_topology_mgr *mgr,
        char *buf)
{
    int i;
    
-    for (i = 0; i < 64; i += 16) {
+    for (i = 0; i < DP_PAYLOAD_TABLE_SIZE; i += 16) {
        if (drm_dp_dpcd_read(mgr->aux,
               DP_PAYLOAD_TABLE_UPDATE_STATUS + i,
               &buf[i], 16) != 16)
@@ -3010,7 +3036,7 @@
               mutex_lock(&mgr->lock);
        if (mgr->mst_primary) {
            u8 buf[64];
        +u8 buf[DP_PAYLOAD_TABLE_SIZE];
            int ret;
            
            ret = drm_dp_dpdc_read(mgr->aux, DP_DPCD_REV, buf, DP_RECEIVER_CAP_SIZE);
@@ -3028,8 +3054,7 @@
               seq_printf(m, " revision: hw: \%x,\%x sw: \%x,\%x\n",
                 buf[0x9] >> 4, buf[0x9] & 0xf, buf[0xa], buf[0xb]);
        if (dump_dp_payload_table(mgr, buf))
-           seq_printf(m, "payload table: \%ph\n", 63, buf);
+           seq_printf(m, "payload table: \%ph\n", DP_PAYLOAD_TABLE_SIZE, buf);
        }
        mutex_unlock(&mgr->lock);
msg.u.i2c_read.transactions[i].i2c_dev_id = msgs[i].addr;
msg.u.i2c_read.transactions[i].num_bytes = msgs[i].len;
msg.u.i2c_read.transactions[i].bytes = msgs[i].buf;
+msg.u.i2c_read.transactions[i].no_stop_bit = !(msgs[i].flags & I2C_M_STOP);
}
msg.u.i2c_read.read_i2c_device_id = msgs[num - 1].addr;
msg.u.i2c_read.num_bytes_read = msgs[num - 1].len;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_drv.c
+++ linux-4.15.0/drivers/gpu/drm/drm_drv.c
@@ -506,7 +506,7 @@
}
drm_minor_free(dev, DRM_MINOR_RENDER);
drm_minor_free(dev, DRM_MINOR_CONTROL);
drm_fs_inode_free(dev->anon_inode);
err_free:
+put_device(dev->dev);
mutex_destroy(&dev->master_mutex);
mutex_destroy(&dev->ctxlist_mutex);
mutex_destroy(&dev->filelist_mutex);
@@ -608,6 +609,8 @@
}
drm_minor_free(dev, DRM_MINOR_RENDER);
drm_minor_free(dev, DRM_MINOR_CONTROL);
+put_device(dev->dev);
+
mutex_destroy(&dev->master_mutex);
mutex_destroy(&dev->ctxlist_mutex);
mutex_destroy(&dev->filelist_mutex);
@@ -763,7 +766,7 @@
if (!minor)
return;
-name = kasprintf(GFP_KERNEL, "controlD%d", minor->index);
+name = kasprintf(GFP_KERNEL, "controlD%d", minor->index + 64);
if (!name)
return;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_dumb_buffers.c
+++ linux-4.15.0/drivers/gpu/drm/drm_dumb_buffers.c
@@ -65,12 +65,13 @@
return -EINVAL;

/* overflow checks for 32bit size calculations */
-/* NOTE: DIV_ROUND_UP() can overflow */
+if (args->bpp > U32_MAX - 8)
+return -EINVAL;

cpp = DIV_ROUND_UP(args->bpp, 8);
-/* NOTE: DIV_ROUND_UP() can overflow */
+if (cpp > U32_MAX / args->width)
+return -EINVAL;

stride = cpp * args->width;
-/* NOTE: DIV_ROUND_UP() can overflow */
+if (args->height > U32_MAX / stride)
+return -EINVAL;

/* test for wrap-around */
--- linux-4.15.0.orig/drivers/gpu/drm/drm_edid.c
+++ linux-4.15.0/drivers/gpu/drm/drm_edid.c
@@ -113,6 +113,18 @@
 /* AEO model 0 reports 8 bpc, but is a 6 bpc panel */
 { "AEO", 0, EDID_QUIRK_FORCE_6BPC },
+
+/* BOE model on HP Pavilion 15-n233sl reports 8 bpc, but is a 6 bpc panel */
+{ "BOE", 0x78b, EDID_QUIRK_FORCE_6BPC },
+
+/* CPT panel of Asus UX303LA reports 8 bpc, but is a 6 bpc panel */
+{ "CPT", 0x17df, EDID_QUIRK_FORCE_6BPC },
+
+/* SDC panel of Lenovo B50-80 reports 8 bpc, but is a 6 bpc panel */
+{ "SDC", 0x3652, EDID_QUIRK_FORCE_6BPC },
+
+/* BOE model 0x0771 reports 8 bpc, but is a 6 bpc panel */
+{ "BOE", 0x0771, EDID_QUIRK_FORCE_6BPC },
+
+/* Belinea 10 15 55 */
+{ "MAX", 1516, EDID_QUIRK_PREFER_LARGE_60 },
+{ "MAX", 0x77e, EDID_QUIRK_PREFER_LARGE_60 },
@@ -154,14 +166,43 @@
 /* Medion MD 30217 PG */
 { "MED", 0x7b8, EDID_QUIRK_PREFER_LARGE_75 },
+
+/* Lenovo G50 */
+{ "SDC", 18514, EDID_QUIRK_FORCE_6BPC },
+
+/* Panel in Samsung NP700G7A-S01PL notebook reports 6bpc */
+{ "SEC", 0xd033, EDID_QUIRK_FORCE_8BPC },
+
+/* Rotel RSX-1058 forwards sink's EDID but only does HDMI 1.1*/
static void drm_get_displayid(struct drm_connector *connector,  
    struct edid *edid);  

+static int validate_displayid(u8 *displayid, int length, int idx);  

static int drm_edid_block_checksum(const u8 *raw_edid)  
{  
    return edid_ext;  
}  

static u8 *drm_find_cea_extension(const struct edid *edid)  
{-}
static u8 *drm_find_displayid_extension(const struct edid *edid) {
    return drm_find_edid_extension(edid, DISPLAYID_EXT);
}

+static u8 *drm_find_cea_extension(const struct edid *edid) {
    +int ret;
    +int idx = 1;
    +int length = EDID_LENGTH;
    +struct displayid_block *block;
    +u8 *cea;
    +u8 *displayid;
    +
    /* Look for a top level CEA extension block */
    +cea = drm_find_edid_extension(edid, CEA_EXT);
    +if (cea)
    +return cea;
    +
    /* CEA blocks can also be found embedded in a DisplayID block */
    +displayid = drm_find_displayid_extension(edid);
    +if (!displayid)
    +return NULL;
    +
    +ret = validate_displayid(displayid, length, idx);
    +if (ret)
    +return NULL;
    +
    +idx += sizeof(struct displayid_hdr);
    +for_each_displayid_db(displayid, block, idx, length) {
        +if (block->tag == DATA_BLOCK_CTA) {
            +break;
        +}
    +}
    +}
    +
    +return cea;
    +}
    +
    +static int
    +cea_db_offsets(const u8 *cea, int *start, int *end)
/* Data block offset in CEA extension block */
-*start = 4;
-*end = cea[2];
-if (*end == 0)
-*end = 127;
-if (*end < 4 || *end > 127)
-return -ERANGE;
+%/* DisplayID CTA extension blocks and top-level CEA EDID
+% * block header definitions differ in the following bytes:
+% * 1) Byte 2 of the header specifies length differently,
+% * 2) Byte 3 is only present in the CEA top level block.
+
+% * The different definitions for byte 2 follow.
+
+% * DisplayID CTA extension block defines byte 2 as:
+% * Number of payload bytes
+% *
+% * CEA EDID block defines byte 2 as:
+% * Byte number (decimal) within this block where the 18-byte
+% * DTDs begin. If no non-DTD data is present in this extension
+% * block, the value should be set to 04h (the byte after next).
+% * If set to 00h, there are no DTDs present in this block and
+% * no non-DTD data.
+% */
++if (cea[0] == DATA_BLOCK_CTA) {
++*start = 3;
++*end = *start + cea[2];
++} else if (cea[0] == CEA_EXT) {
++/* Data block offset in CEA extension block */
++*start = 4;
++*end = cea[2];
++if (*end == 0)
++*end = 127;
++if (*end < 4 || *end > 127)
++return -ERANGE;
++} else {
++return -ENOTSUPP;
++}
+
++return 0;
+
@@ -3840,8 +3937,7 @@
++* @edid: EDID to parse
++* 
++* Fill the ELD (EDID-Like Data) buffer for passing to the audio driver. The 
- * Conn_Type, HDCP and Port_ID ELD fields are left for the graphics driver to
* fill in.
+ * HDCP and Port_ID ELD fields are left for the graphics driver to fill in.
* /

```c
void drm_edid_to_eld(struct drm_connector *connector, struct edid *edid)
{
    /* -3922.6 +4018.12 @@
    */
    eld[5] |= total_sad_count << 4;

+    if (connector->connector_type == DRM_MODE_CONNECTOR_DisplayPort ||
+        connector->connector_type == DRM_MODE_CONNECTOR_eDP)
+        eld[DRM_ELD_SAD_COUNT_CONN_TYPE] |= DRM_ELD_CONN_TYPE_DP;
+    else
+        eld[DRM_ELD_SAD_COUNT_CONN_TYPE] |= DRM_ELD_CONN_TYPE_HDMI;
+    
    eld[DRM_ELD_BASELINE_ELD_LEN] =
        DIV_ROUND_UP(drm_eld_calc_baseline_block_size(eld), 4);

    /* @ @ -4229.7 +4331.7 @ @
    */
    struct drm_hdmi_info *hdmi = &connector->display_info.hdmi;

    dc_mask = db[7] & DRM_EDID_YCBCR420_DC_MASK;
-    hdmi->y420_dc_modes |= dc_mask;
+    hdmi->y420_dc_modes = dc_mask;
}
```

```c
static void drm_parse_hdmi_forum_vsdb(struct drm_connector *connector,
@@ -4413,6 +4515,7 @@
    info->max_tmds_clock = 0;
    info->dvi_dual = false;
+    memset(&info->hdmi, 0, sizeof(info->hdmi));
}
@@ -4424,16 +4527,11 @@
    u32 quirks = edid_get_quirks(edid);

    +drm_reset_display_info(connector);
+    
+    info->width_mm = edid->width_cm * 10;
+    info->height_mm = edid->height_cm * 10;

-/* driver figures it out in this case */
-    info->bpc = 0;
-    info->color_formats = 0;
-    info->cea_rev = 0;
```
info->max_tmds_clock = 0;
info->dvi_dual = false;

info->non_desktop = !!((quirks & EDID_QUIRK_NON_DESKTOP);

DRM_DEBUG_KMS("non_desktop set to %d\n", info->non_desktop);
@@ -4530,7 +4628,7 @@
struct drm_display_mode *mode;
unsigned pixel_clock = (timings->pixel_clock[0] |
(timings->pixel_clock[1] << 8) |
-(timings->pixel_clock[2] << 16));
+(timings->pixel_clock[2] << 16)) + 1;
unsigned hactive = (timings->hactive[0] | timings->hactive[1] << 8) + 1;
unsigned hblank = (timings->hblank[0] | timings->hblank[1] << 8) + 1;
unsigned hsync = (timings->hsync[0] | (timings->hsync[1] & 0x7f) << 8) + 1;
@@ -5057,6 +5155,9 @@
case DATA_BLOCK_TYPE_1_DETAILED_TIMING:
 /* handled in mode gathering code. */
 break;
+case DATA_BLOCK_CTA:
+/* handled in the cea parser code. */
+break;
default:
DRM_DEBUG_KMS("found DisplayID tag 0x%x, unhandled\n", block->tag);
break;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_edid_load.c
+++ linux-4.15.0/drivers/gpu/drm/drm_edid_load.c
@@ -290,6 +290,8 @@
* the last one found one as a fallback.
*/
fwstr = kstrdup(edid_firmware, GFP_KERNEL);
+if (!fwstr)
+return ERR_PTR(-ENOMEM);
edidstr = fwstr;
while ((edidname = strsep(&edidstr, ","))) {
--- linux-4.15.0.orig/drivers/gpu/drm/drm_encoder_slave.c
+++ linux-4.15.0/drivers/gpu/drm/drm_encoder_slave.c
@@ -84,7 +84,7 @@

err = encoder_drv->encoder_init(client, dev, encoder);
if (err)
-goto fail_unregister;
+goto fail_module_put;

if (info->platform_data)
encoder->slave_funcs->set_config(&encoder->base,
@@ -92,9 +92,10 @@
return 0;

+fail_module_put:
+module_put(module);
fail_unregister:
i2c_unregister_device(client);
-module_put(module);
fail:
return err;
}
--- linux-4.15.0.orig/drivers/gpu/drm/drm_fb_helper.c
+++ linux-4.15.0/drivers/gpu/drm/drm_fb_helper.c
@@ -1490,58 +1490,38 @@
}
EXPORT_SYMBOL(drm_fb_helper_ioctl);

-/**
- * drm_fb_helper_check_var - implementation for &fb_ops.fb_check_var
- * @var: screeninfo to check
- * @info: fbdev registered by the helper
- */
-int drm_fb_helper_check_var(struct fb_var_screeninfo *var,
-struct fb_info *info)
+
+static bool drm_fb_pixel_format_equal(const struct fb_var_screeninfo *var_1,
+const struct fb_var_screeninfo *var_2)
{
-struct drm_fb_helper *fb_helper = info->par;
-struct drm_framebuffer *fb = fb_helper->fb;
-int depth;
-
-if (var->pixclock != 0 || in_dbg_master())
-return -EINVAL;
-
-/*
- * Changes struct fb_var_screeninfo are currently not pushed back
- * to KMS, hence fail if different settings are requested.
- */
-if (var->bits_per_pixel != fb->format->cpp[0] * 8 ||
- var->xres > fb->width || var->yres > fb->height ||
- var->xres_virtual > fb->width || var->yres_virtual > fb->height) {
-DRM_DEBUG("fb requested width/height/bpp can't fit in current fb ",
- "request %dx%d-%d (virtual %dx%d) > %dx%d-%d"
- "",
- var->xres, var->yres, var->bits_per_pixel,
- var->xres_virtual, var->yres_virtual,
- fb->width, fb->height, fb->format->cpp[0] * 8);
-return -EINVAL;
-}
switch (var->bits_per_pixel) {
case 16:
    depth = (var->green.length == 6) ? 16 : 15;
    break;
case 32:
    depth = (var->transp.length > 0) ? 32 : 24;
    break;
default:
    depth = var->bits_per_pixel;
    break;
}
return var_1->bits_per_pixel == var_2->bits_per_pixel &&
       var_1->grayscale == var_2->grayscale &&
       var_1->red.offset == var_2->red.offset &&
       var_1->red.length == var_2->red.length &&
       var_1->red.msb_right == var_2->red.msb_right &&
       var_1->green.offset == var_2->green.offset &&
       var_1->green.length == var_2->green.length &&
       var_1->green.msb_right == var_2->green.msb_right &&
       var_1->blue.offset == var_2->blue.offset &&
       var_1->blue.length == var_2->blue.length &&
       var_1->blue.msb_right == var_2->blue.msb_right &&
       var_1->transp.offset == var_2->transp.offset &&
       var_1->transp.length == var_2->transp.length &&
       var_1->transp.msb_right == var_2->transp.msb_right;
}

static void drm_fb_helper_fill_pixel_fmt(struct fb_var_screeninfo *var,
    u8 depth)
{
    switch (depth) {
    case 8:
        var->red.offset = 0;
        var->green.offset = 0;
        var->blue.offset = 0;
        var->red.length = 8;
        var->green.length = 8; /* 8bit DAC */
        var->blue.length = 8;
        var->transp.length = 0;
        var->transp.offset = 0;
        break;
    case 15:
        var->red.offset = 10;
        var->red.length = 5:
        break;
    }
var->green.length = 5;
var->blue.length = 5;
-var->transp.length = 1;
var->transp.offset = 15;
+var->transp.length = 1;
break;
case 16:
var->red.offset = 11;
@@ -1560,7 +1540,6 @@
var->red.length = 5;
var->green.length = 6;
var->blue.length = 5;
-var->transp.length = 0;
var->transp.offset = 0;
break;
case 24:
@@ -1570,8 +1549,8 @@
var->red.length = 8;
var->green.length = 8;
var->blue.length = 8;
-var->transp.length = 0;
+var->transp.length = 0;
break;
case 32:
var->red.offset = 16;
@@ -1580,12 +1559,76 @@
var->red.length = 8;
var->green.length = 8;
var->blue.length = 8;
-var->transp.length = 8;
+var->transp.length = 8;
break;
default:
+break;
+}
+}
+/**
+ * drm_fb_helper_check_var - implementation for &fb_ops.fb_check_var
+ * @var: screeninfo to check
+ * @info: fbdev registered by the helper
+ */
+int drm_fb_helper_check_var(struct fb_var_screeninfo *var,
+ struct fb_info *info)
+{
+struct drm_fb_helper *fb_helper = info->par;
struct drm_framebuffer *fb = fb_helper->fb;
+
+if (in_dbg_master())
+return -EINVAL;
+
+if (var->pixclock != 0) {
+DRM_DEBUG("fbdev emulation doesn’t support changing the pixel clock, value of pixclock is ignored\n");
+var->pixclock = 0;
+}
+
+ /* Changes struct fb_var_screeninfo are currently not pushed back
+ * to KMS, hence fail if different settings are requested.
+ */
+if (var->bits_per_pixel > fb->format->cpp[0] * 8 ||
+ var->xres > fb->width || var->yres > fb->height ||
+ var->xres_virtual > fb->width || var->yres_virtual > fb->height) {
+DRM_DEBUG("fb requested width/height/bpp can’t fit in current fb
+ request %dx%d-%d (virtual %dx%d-%d) > %dx%d-%d\n",
+ var->xres, var->yres, var->bits_per_pixel,
+ var->xres_virtual, var->yres_virtual,
+ fb->width, fb->height, fb->format->cpp[0] * 8);
+return -EINVAL;
+}
+
+ /* Workaround for SDL 1.2, which is known to be setting all pixel format
+ * fields values to zero in some cases. We treat this situation as a
+ * kind of ”use some reasonable autodetected values”.
+ */
+if (!var->red.offset && !var->green.offset &&
+ !var->blue.offset && !var->transp.offset &&
+ !var->red.length && !var->green.length &&
+ !var->blue.length && !var->transp.length &&
+ !var->red.msb_right && !var->green.msb_right &&
+ !var->blue.msb_right && !var->transp.msb_right) {
+drm_fb_helper_fill_pixel_fmt(var, fb->format->depth);
+}
+
+ /* Likewise, bits_per_pixel should be rounded up to a supported value.
+ */
+var->bits_per_pixel = fb->format->cpp[0] * 8;
+
+ /* drm fbdev emulation doesn’t support changing the pixel format at all,
+ * so reject all pixel format changing requests.
+ */
if (!drm_fb_pixel_format_equal(var, &info->var)) {
    DRM_DEBUG("fbdev emulation doesn't support changing the pixel format\n");
    return -EINVAL;
}

return 0;
}

EXPORT_SYMBOL(drm_fb_helper_check_var);

info->var.yoffset = 0;
info->var.activate = FB_ACTIVATE_NOW;

switch (fb->format->depth) {
    case 8:
    info->var.red.offset = 0;
    info->var.green.offset = 0;
    info->var.blue.offset = 0;
    info->var.red.length = 8; /* 8bit DAC */
    info->var.green.length = 8;
    info->var.blue.length = 8;
    info->var.transp.offset = 0;
    info->var.transp.length = 0;
    break;
    case 15:
    info->var.red.offset = 10;
    info->var.green.offset = 5;
    info->var.blue.offset = 0;
    info->var.red.length = 5;
    info->var.green.length = 5;
    info->var.blue.length = 5;
    info->var.transp.offset = 15;
    info->var.transp.length = 1;
    break;
    case 16:
    info->var.red.offset = 11;
    info->var.green.offset = 5;
    info->var.blue.offset = 0;
    info->var.red.length = 5;
    info->var.green.length = 6;
    info->var.blue.length = 5;
    info->var.transp.offset = 0;
    break;
    case 24:
    info->var.red.offset = 16;
    info->var.green.offset = 8;
    info->var.blue.offset = 0;
    info->var.red.length = 8;
    info->var.green.length = 8;
    break;
    /* other cases */
}
- info->var.blue.length = 8;
- info->var.transp.offset = 0;
- info->var.transp.length = 0;
- break;
- case 32:
  - info->var.red.offset = 16;
  - info->var.green.offset = 8;
  - info->var.blue.offset = 0;
  - info->var.red.length = 8;
  - info->var.green.length = 8;
  - info->var.blue.length = 8;
  - info->var.transp.offset = 24;
- break;
- default:
- break;
-
+ drm_fb_helper_fill_pixel_fmt(&info->var, fb->format->depth);

  info->var.xres = fb_width;
  info->var.yres = fb_height;

--- linux-4.15.0.orig/drivers/gpu/drm/drm_file.c
+++ linux-4.15.0/drivers/gpu/drm/drm_file.c
@@ -212,6 +212,7 @@
 return -ENOMEM;
 filp->private_data = priv;
+filp->f_mode |= FMODE_UNSIGNED_OFFSET;
 priv->filp = filp;
 priv->pid = get_pid(task_pid(current));
 priv->minor = minor;
@@ -524,6 +525,7 @@
 file_priv->event_space -= length;
 list_add(&e->link, &file_priv->event_list);
 spin_unlock_irq(&dev->event_lock);
+  wake_up_interruptible(&file_priv->event_wait);
 break;
 }

--- linux-4.15.0.orig/drivers/gpu/drm/drm_framebuffer.c
+++ linux-4.15.0/drivers/gpu/drm/drm_framebuffer.c
@@ -118,6 +118,10 @@
 r.pixel_format = drm_mode_legacy_fb_format(or->bpp, or->depth);
 r.handles[0] = or->handle;

+if (r.pixel_format == DRM_FORMAT_XRGB2101010 &&
+  dev->driver->driver_features & DRIVER_PREFER_XBGR_30BPP)
+r.pixel_format = DRM_FORMAT_XBGR2101010;
return ret;
@@ -147,3 +147,2 @
        plane_mask;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_gem.c
+++ linux-4.15.0/drivers/gpu/drm/drm_gem.c
 @ @ -727,9 +727,6 @@
 * @file_priv: drm file-private structure
 *
 * Open an object using the global name, returning a handle and the size.
- *
- * This handle (of course) holds a reference to the object, so the object
- * will not go away until the handle is deleted.
+ */
 int drm_gem_open_ioctl(struct drm_device *dev, void *data,
 @@ -751,15 +751,15 @@
/* drm_gem_handle_create_tail unlocks dev->object_name_lock. */
ret = drm_gem_handle_create_tail(file_priv, obj, &handle);
drm_gem_object_put_unlocked(obj);
if (ret)
	return ret;
+goto err;

args->handle = handle;
args->size = obj->size;

-return 0;
+err:
+drm_gem_object_put_unlocked(obj);
+return ret;
}

/**
@@ -1032,6 +1030,15 @@
return -EACCES;
}

+if (node->readonly) {
+if (vma->vm_flags & VM_WRITE) {
+drm_gem_object_put_unlocked(obj);
+return -EINVAL;
+
+	vma->vm_flags &= ~VM_MAYWRITE;
+
+ret = drm_gem_mmap_obj(obj, drm_vma_node_size(node) << PAGE_SHIFT,
+                        vma);

--- linux-4.15.0.orig/drivers/gpu/drm/drm_internal.h
+++ linux-4.15.0/drivers/gpu/drm/drm_internal.h
@@ -97,6 +97,8 @@
int drm_sysfs_connector_add(struct drm_connector *connector);
void drm_sysfs_connector_remove(struct drm_connector *connector);

+void drm_sysfs_lease_event(struct drm_device *dev);
+
+/* drm_gem.c */
int drm_gem_init(struct drm_device *dev);
void drm_gem_destroy(struct drm_device *dev);
--- linux-4.15.0.orig/drivers/gpu/drm/drm_ioc32.c
+++ linux-4.15.0/drivers/gpu/drm/drm_ioc32.c
@@ -96,6 +96,8 @@
if (copy_from_user(&v32, (void __user *)arg, sizeof(v32)))
return -EFAULT;
+
+memset(&v, 0, sizeof(v));
+
+ v = (struct drm_version) {
+    .name_len = v32.name_len,
+    .name = compat_ptr(v32.name),
+    @ @ -134,6 +136,9 @ @
+
+ if (copy_from_user(&uq32, (void __user *)arg, sizeof(uq32)))
+ return -EFAULT;
+
+ memset(&uq, 0, sizeof(uq));
+
+ uq = (struct drm_unique){
+    .unique_len = uq32.unique_len,
+    .unique = compat_ptr(uq32.unique),
+    @ @ -185,7 +190,7 @ @
+ m32.size = map.size;
+ m32.type = map.type;
+ m32.flags = map.flags;
- m32.handle = ptr_to_compat(map.handle);
+ m32.handle = ptr_to_compat( void __user *)map.handle);
+ m32.mtrr = map.mtrr;
+ if (copy_to_user(argp, &m32, sizeof(m32)))
+ return -EFAULT;
+ @ @ -216,7 +221,7 @ @
+
+ m32.offset = map.offset;
+ m32.mtrr = map.mtrr;
- m32.handle = ptr_to_compat(map.handle);
+ m32.handle = ptr_to_compat( void __user *)map.handle);
+ if (map.handle != compat_ptr(m32.handle))
+ pr_err_ratelimited("compat_drm_addmap truncated handle %p for type %d offset %x\n",
+    map.handle, m32.type, m32.offset);
+ @ @ -260,6 +265,8 @ @
+ if (copy_from_user(&(c32, argp, sizeof(c32)))
+ return -EFAULT;
+
+ memset(&client, 0, sizeof(client));
+
+ client.idx = c32.idx;
+
+ err = drm_ioctl_kernel(file, drm_getclient, &client, DRM_UNLOCKED);
+ @ @ -372,7 +379,10 @ @
+ .size = from->buf_size,
+ .low_mark = from->low_mark,
+ .high_mark = from->high_mark};
-return copy_to_user(to + count, &v, offsetof(drm_buf_desc32_t, flags));
+
+if (copy_to_user(to + count, &v, offsetof(drm_buf_desc32_t, flags)))
+return -EFAULT;
+return 0;
}

static int drm_legacy_infobufs32(struct drm_device *dev, void *data, 
@@ -526,7 +536,7 @@
if (err)
    return err;

-req32.handle = ptr_to_compat(req.handle);
+req32.handle = ptr_to_compat((void __user *)req.handle);
if (copy_to_user(argp, &req32, sizeof(req32)))
    return -EFAULT;
@@ -839,12 +849,12 @@
if (copy_from_user(&req32, argp, sizeof(req32)))
    return -EFAULT;

+memset(&req, 0, sizeof(req));
+
  req.request.type = req32.request.type;
  req.request.sequence = req32.request.sequence;
  req.request.signal = req32.request.signal;
  err = drm_ioctl_kernel(file, drm_wait_vblank_ioctl, &req, DRM_UNLOCKED);
  -if (err)
  -return err;
  
  req32.reply.type = req.reply.type;
  req32.reply.sequence = req.reply.sequence;
@@ -853,7 +863,7 @@
if (copy_to_user(argp, &req32, sizeof(req32)))
    return -EFAULT;

  -return 0;
  +return err;
}

#if defined(CONFIG_X86)
@@ -876,6 +886,8 @@
struct drm_mode_fb_cmd2 req64;
int err;

+memset(&req64, 0, sizeof(req64));
+if (copy_from_user(&req64, argp,
offsetof(drm_mode_fb_cmd232_t, modifier))
return -EFAULT;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_ioctl.c
+++ linux-4.15.0/drivers/gpu/drm/drm_ioctl.c
@@ -37,6 +37,7 @@
 #include <linux/pci.h>
 #include <linux/export.h>
 +#include <linux/nospec.h>

 /**
  * DOC: getunique and setversion story
 @@ -111,17 +112,18 @@
 struct drm_file *file_priv)
 {
 struct drm_unique *u = data;
-struct drm_master *master = file_priv->master;
+struct drm_master *master;

-.mutex_lock(&master->dev->master_mutex);
+-mutex_lock(&dev->master_mutex);
 +master = file_priv->master;
 if (u->unique_len >= master->unique_len) {
 if (copy_to_user(u->unique, master->unique, master->unique_len)) {
-mutex_unlock(&master->dev->master_mutex);
+-mutex_unlock(&dev->master_mutex);
 return -EFAULT;
 }
 }
 u->unique_len = master->unique_len;
-mutex_unlock(&master->dev->master_mutex);
+-mutex_unlock(&dev->master_mutex);

 return 0;
 }
@@ -320,7 +322,12 @@
 case DRM_CLIENT_CAP_ATOMIC:
 if (!drm_core_check_feature(dev, DRIVER_ATOMIC))
 return -EINVAL;
-if (req->value > 1)
+/* The modesetting DDX has a totally broken idea of atomic. */
+if (current->comm[0] == 'X' && req->value == 1) {
+pr_info("broken atomic modeset userspace detected, disabling atomic
");
+return -EOPNOTSUPP;
+}
+if (req->value > 2)
 return -EINVAL;
 file_priv->atomic = req->value;
file_priv->universal_planes = req->value;
@@ -780,17 +787,24 @@
     if (drm_dev_is_unplugged(dev))
         return -ENODEV;
     
+     if (DRM_IOCTL_TYPE(cmd) != DRM_IOCTL_BASE)
+         return -ENOTTY;
+     
     is_driver_ioctl = nr >= DRM_COMMAND_BASE && nr < DRM_COMMAND_END;

     if (is_driver_ioctl) {
         /* driver ioctl */
-        if (nr - DRM_COMMAND_BASE >= dev->driver->num_ioctls)
+        unsigned int index = nr - DRM_COMMAND_BASE;
+        if (index >= dev->driver->num_ioctls)
            goto err_i1;
-        ioctl = &dev->driver->ioctls[nr - DRM_COMMAND_BASE];
+        index = array_index_nospec(index, dev->driver->num_ioctls);
+        ioctl = &dev->driver->ioctls[index];
 } else {
     /* core ioctl */
     if (nr >= DRM_CORE_IOCTL_COUNT)
         goto err_i1;
+        nr = array_index_nospec(nr, DRM_CORE_IOCTL_COUNT);
     ioctl = &drm_ioctls[nr];
 }

 @@ -872,6 +886,7 @@
     if (nr >= DRM_CORE_IOCTL_COUNT)
         return false;
     +nr = array_index_nospec(nr, DRM_CORE_IOCTL_COUNT);
     *flags = drm_ioctls[nr].flags;
     return true;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_lease.c
+++ linux-4.15.0/drivers/gpu/drm/drm_lease.c
 @@ -296,7 +296,7 @@
     if (master->lessor) {
         /* Tell the master to check the lessee list */
-        drm_sysfs_hotplug_event(dev);
+        drm_sysfs_lease_event(dev);
        drm_master_put(&master->lessor);
     }

 @@ -544,59 +544,46 @@
DRM_DEBUGLEASE("Creating lease\n"); /* lessee will take the ownership of leases */
lessee = drm_lease_create(lessor, &leases);

if (IS_ERR(lessee)) {
    ret = PTR_ERR(lessee);
    idr_destroy(&leases);
    goto out_leases;
}

/* Clone the lessor file to create a new file for us */
DRM_DEBUGLEASE("Allocating lease file\n");
-path_get(&lessor_file->f_path);
-lessee_file = alloc_file(&lessor_file->f_path,
    - lessor_file->f_mode,
    - fops_get(lessor_file->f_inode->i_fop));
-
+lessee_file = filp_clone_open(lessor_file);
if (IS_ERR(lessee_file)) {
    ret = PTR_ERR(lessee_file);
    goto out_lessee;
}

/* Initialize the new file for DRM */
-DRM_DEBUGLEASE("Initializing the file with %p\n", lessee_file->f_op->open);
-ret = lessee_file->f_op->open(lessee_file->f_inode, lessee_file);
-if (ret)
    goto out_lessee_file;
-
lessee_priv = lessee_file->private_data;
-
/* Change the file to a master one */
drm_master_put(&lessee_priv->master);
lessee_priv->master = lessee;
lessee_priv->is_master = 1;
lessee_priv->authenticated = 1;

-/* Hook up the fd */
-fd_install(fd, lessee_file);
-
-/* Pass fd back to userspace */
DRM_DEBUGLEASE("Returning fd %d id %d\n", fd, lessee->lessee_id);
cl->fd = fd;
cl->lessee_id = lessee->lessee_id;

+/* Hook up the fd */
+fd_install(fd, lessee_file);
+
DRM_DEBUG_LEASE("drm_mode_create_lease_ioctl succeeded\n");
return 0;

-out_lessee_file:
-put(lessee_file);
-
out_lessee:
 drm_master_put(&lessee);

out_leases:
 put_unused_fd(fd);
-idr_destroy(&leases);

DRM_DEBUG_LEASE("drm_mode_create_lease_ioctl failed: %d\n", ret);
return ret;
--- linux-4.15.0.orig/drivers/gpu/drm/drm_mipi_dsi.c
+++ linux-4.15.0/drivers/gpu/drm/drm_mipi_dsi.c
@@ -1029,11 +1029,11 @@

/*
 int mipi_dsi_dcs_set_tear_scanline(struct mipi_dsi_device *dsi, u16 scanline)
 {
-u8 payload[3] = { MIPI_DCS_SET_TEAR_SCANLINE, scanline >> 8,
- scanline & 0xff }
+
+u8 payload[2] = { scanline >> 8, scanline & 0xff }
; 
 ssize_t err;

-err = mipi_dsi_generic_write(dsi, payload, sizeof(payload));
+err = mipi_dsi_dcs_write(dsi, MIPI_DCS_SET_TEAR_SCANLINE, payload,
+ sizeof(payload));
 if (err < 0)
 return err;

--- linux-4.15.0.orig/drivers/gpu/drm/drm_mm.c
+++ linux-4.15.0/drivers/gpu/drm/drm_mm.c
@@ -836,9 +836,24 @@
 if (!mm->color_adjust)
 return NULL;

-hole = list_first_entry(&mm->hole_stack, typeof(*hole), hole_stack);
-hole_start = __drm_mm_hole_node_start(hole);
-hole_end = hole_start + hole->hole_size;
+/*
+ * The hole found during scanning should ideally be the first element
+ * in the hole_stack list, but due to side-effects in the driver it
+ * may not be.
+ */

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list_for_each_entry(hole, &mm->hole_stack, hole_stack) {
    hole_start = __drm_mm_hole_node_start(hole);
    hole_end = hole_start + hole->hole_size;
    if (hole_start <= scan->hit_start &&
        hole_end >= scan->hit_end)
        break;
}

/* We should only be called after we found the hole previously */
DRM_MM_BUG_ON(&hole->hole_stack == &mm->hole_stack);
if (unlikely(&hole->hole_stack == &mm->hole_stack))
    return NULL;

DRM_MM_BUG_ON(hole_start > scan->hit_start);
DRM_MM_BUG_ON(hole_end < scan->hit_end);

struct drm_modeset_acquire_ctx ctx;
int ret;
-drm_modeset_acquire_init(&ctx, 0);
-
state = drm_atomic_state_alloc(dev);
if (!state)
    return -ENOMEM;
+drm_modeset_acquire_init(&ctx, 0);
state->acquire_ctx = &ctx;
+
retry:
if (prop == state->dev->mode_config.dpms_property) {
    if (obj->type != DRM_MODE_OBJECT_CONNECTOR) {
        -- linux-4.15.0.orig/drivers/gpu/drm/drm_mode_object.c
+++ linux-4.15.0/drivers/gpu/drm/drm_mode_object.c
@@ -459,12 +459,13 @@
struct drm_modeset_acquire_ctx ctx;
    int ret;

    -drm_modeset_acquire_init(&ctx, 0);
    -
    state = drm_atomic_state_alloc(dev);
    if (!state)
        return -ENOMEM;
    +
    +drm_modeset_acquire_init(&ctx, 0);
    state->acquire_ctx = &ctx;
    +
    if (prop == state->dev->mode_config.dpms_property) {
        if (obj->type != DRM_MODE_OBJECT_CONNECTOR) {
-- linux-4.15.0.orig/drivers/gpu/drm/drm_modes.c
+++ linux-4.15.0/drivers/gpu/drm/drm_modes.c
@@ -751,7 +751,7 @@
        if (mode->hsync)
            return mode->hsync;
        -if (mode->htotal < 0)
        +if (mode->htotal <= 0)
            return 0;

calc_val = (mode->clock * 1000) / mode->htotal; /* hsync in Hz */
-- linux-4.15.0.orig/drivers/gpu/drm/drm_pci.c
+++ linux-4.15.0/drivers/gpu/drm/drm_pci.c
@@ -46,8 +46,6 @@
drm_dma_handle_t *drm_pci_alloc(struct drm_device * dev, size_t size, size_t align)
{
    drm_dma_handle_t *dmah;
    unsigned long addr;
    size_t sz;

    /* pci_alloc_consistent only guarantees alignment to the smallest
     * PAGE_SIZE order which is greater than or equal to the requested size.
     */
    return NULL;

dmah->size = size;
-dmah->vaddr = dma_alloc_coherent(&dev->pdev->dev, size, &dmah->busaddr, GFP_KERNEL | __GFP_COMP);
+dmah->vaddr = dma_alloc_coherent(&dev->pdev->dev, size, &dmah->busaddr, GFP_KERNEL);

    if (dmah->vaddr == NULL) {
        kfree(dmah);
        return NULL;
    }

    memset(dmah->vaddr, 0, size);
-
    /* XXX - Is virt_to_page() legal for consistent mem? */
    /* Reserve */
    -for (addr = (unsigned long)dmah->vaddr, sz = size;
    - sz > 0; addr += PAGE_SIZE, sz -= PAGE_SIZE) {
    -SetPageReserved(virt_to_page((void *)addr));
    -}
    -
    return dmah;
}

@@ -89,19 +78,9 @@
/*
void __drm_legacy_pci_free(struct drm_device * dev, drm_dma_handle_t * dmah)
{
    unsigned long addr;
    size_t sz;
    
    -if (dmah->vaddr) {
    -/* XXX - Is virt_to_page() legal for consistent mem? */
    -/* Unreserve */
    -for (addr = (unsigned long)dmah->vaddr, sz = dmah->size;
    - sz > 0; addr += PAGE_SIZE, sz -= PAGE_SIZE) {
    -ClearPageReserved(virt_to_page((void *)addr));
    -}
    +if (dmah->vaddr)
    dma_free_coherent(&dev->pdev->dev, dmah->size, dmah->vaddr,

dmah->busaddr);
-
}
}

/**
 * drm_kms_helper_is_poll_worker - is current task an output poll worker?
 */
* Determine if current task is an output poll worker. This can be used
* to select distinct code paths for output polling versus other contexts.
* One use case is to avoid a deadlock between the output poll worker and
* the autosuspend worker wherein the latter waits for polling to finish
* upon calling drm_kms_helper_poll_disable(), while the former waits for
* runtime suspend to finish upon calling pm_runtime_get_sync() in a
* connector->detect hook.
*/
bool drm_kms_helper_is_poll_worker(void)
{
    struct work_struct *work = current_work();
    if (!dev->mode_config.poll_enabled)
        return;
    /* Pick up any changes detected by the probe functions. */
    changed = dev->mode_config.delayed_event;
    dev->mode_config.delayed_event = false;
    if (format_modifier_count)
        config->allow_fb_modifiers = true;
    format_modifier_count++;
}

+if (fabric->mode_config.poll_enabled)
+return;
+
/* Determine if current task is an output poll worker. This can be used
* to select distinct code paths for output polling versus other contexts.
*/

+if (!dev->mode_config.poll_enabled)
+return;
+
/* Pick up any changes detected by the probe functions. */
changed = dev->mode_config.delayed_event;
dev->mode_config.delayed_event = false;

+if (format_modifier_count)
+config->allow_fb_modifiers = true;
+
plane->modifier_count = format_modifier_count;
plane->modifiers = kmalloc_array(format_modifier_count,
    sizeof(format_modifiers[0]),
--- linux-4.15.0.orig/drivers/gpu/drm/drm_probe_helper.c
+++ linux-4.15.0/drivers/gpu/drm/drm_probe_helper.c
@@ -576,6 +576,9 @@
enum drm_connector_status old_status;
bool repoll = false, changed;

+if (!dev->mode_config.poll_enabled)
+return;
+
/* Determine if current task is an output poll worker. This can be used
* to select distinct code paths for output polling versus other contexts.
*/

+if (!dev->mode_config.poll_enabled)
+return;
+
/* Pick up any changes detected by the probe functions. */
changed = dev->mode_config.delayed_event;
dev->mode_config.delayed_event = false;

+if (format_modifier_count)
+config->allow_fb_modifiers = true;
+
plane->modifier_count = format_modifier_count;
plane->modifiers = kmalloc_array(format_modifier_count,
    sizeof(format_modifiers[0]),
--- linux-4.15.0.orig/drivers/gpu/drm/drm_plane.c
+++ linux-4.15.0/drivers/gpu/drm/drm_plane.c
@@ -203,6 +203,9 @@
format_modifier_count++;
}
return work && work->func == output_poll_execute;
+
+EXPORT_SYMBOL(drm_kms_helper_is_poll_worker);
+
+/**
+ * drm_kms_helper_poll_disable - disable output polling
+ * @dev: drm_device
+ *
+ /* @ @ -710,7 +733,11 @@ */
+ */
void drm_kms_helper_poll_fini(struct drm_device *dev)
{
- drm_kms_helper_poll_disable(dev);
+ if (!dev->mode_config.poll_enabled)
+ return;
+ dev->mode_config.poll_enabled = false;
+ cancel_delayed_work_sync(&dev->mode_config.output_poll_work);
} EXPORT_SYMBOL(drm_kms_helper_poll_fini);

--- linux-4.15.0.orig/drivers/gpu/drm/drm_property.c
+++ linux-4.15.0/drivers/gpu/drm/drm_property.c
@@ -516,7 +516,7 @@
 drm_mode_object_unregister(blob->dev, &blob->base);

- kfree(blob);
+ kvfree(blob);
 }

 /**
 @@ -540,10 +540,10 @@
 struct drm_property_blob *blob;
 int ret;

- if (!length || length > ULONG_MAX - sizeof(struct drm_property_blob))
+ if (!length || length > INT_MAX - sizeof(struct drm_property_blob))
 return ERR_PTR(-EINVAL);

- blob = kzalloc(sizeof(struct drm_property_blob)+length, GFP_KERNEL);
+ blob = kvzalloc(sizeof(struct drm_property_blob)+length, GFP_KERNEL);
 if (!blob)
 return ERR_PTR(-ENOMEM);

@@ -559,7 +559,7 @@
 ret = drm_mode_object_add(dev, &blob->base, DRM_MODE_OBJECT_BLOB,
 true, drm_property_free_blob);
if (ret) {
    -kfree(blob);
    +kvfree(blob);
    return ERR_PTR(-EINVAL);
}

--- linux-4.15.0.orig/drivers/gpu/drm/drm_syncobj.c
+++ linux-4.15.0/drivers/gpu/drm/drm_syncobj.c
@@ -96,6 +96,8 @@
 {
     WARN_ON(*fence);
     +
     *fence = drm_syncobj_fence_get(syncobj);
     if (*fence)
         return 1;
 @ @ -386,7 +388,6 @@
     return PTR_ERR(file);
 }

-drm_syncobj_get(syncobj);
 fd_install(fd, file);
 *
+p_fd = fd;
 @ @ -704,6 +705,9 @@

 if (flags & DRM_SYNCOBJ_WAIT_FLAGS_WAIT_FOR_SUBMIT) {
     for (i = 0; i < count; ++i) {
         +if (entries[i].fence)
         +continue;
         +
         drm_syncobj_fence_get_or_add_callback(syncobjs[i],
             &entries[i].fence,
             &entries[i].syncobj_cb,
 --- linux-4.15.0.orig/drivers/gpu/drm/drm_sysfs.c
+++ linux-4.15.0/drivers/gpu/drm/drm_sysfs.c
@@ -301,6 +301,16 @@
     connector->kdev = NULL;
 }

+void drm_sysfs_lease_event(struct drm_device *dev)
 +{
+    +char *event_string = "LEASE=1";
+    +char *envp[] = { event_string, NULL };
+    +
+    +DRM_DEBUG("generating lease event\n");
+    +

+kobject_uevent_env(&dev->primary->kdev->kobj, KOBJ_CHANGE, envp);
+
/**
 * drm_sysfs_hotplug_event - generate a DRM uevent
 * @dev: DRM device
--- linux-4.15.0.orig/drivers/gpu/drm/drm_vblank.c
+++ linux-4.15.0/drivers/gpu/drm/drm_vblank.c
@@ -105,13 +105,20 @@
 write_sequnlock(&vblank->seqlock);
 }

+static u32 drm_max_vblank_count(struct drm_device *dev, unsigned int pipe)
+{
+ struct drm_vblank_crtc *vblank = &dev->vblank[pipe];
+ +return vblank->max_vblank_count ?: dev->max_vblank_count;
+ } 
+
/*
 * "No hw counter" fallback implementation of .get_vblank_counter() hook,
 * if there is no useable hardware frame counter available.
 */
static u32 drm_vblank_no_hw_counter(struct drm_device *dev, unsigned int pipe)
{
- WARN_ON_ONCE(dev->max_vblank_count != 0);
+ WARN_ON_ONCE(drm_max_vblank_count(dev, pipe) != 0);
 return 0;
 }

@ @ -195,6 +202,7 @@
 ktime_t t_vblank;
 int count = DRM_TIMESTAMP_MAXRETRIES;
 int framedur_ns = vblank->framedur_ns;
+u32 max_vblank_count = drm_max_vblank_count(dev, pipe);

 /*
 * Interrupts were disabled prior to this call, so deal with counter
@@ -213,9 +221,9 @@
 rc = drm_get_last_vbltimestamp(dev, pipe, &t_vblank, in_vblank_irq);
 } while (cur_vblank != __get_vblank_counter(dev, pipe) && --count > 0);

- if (dev->max_vblank_count != 0) {
- +if (max_vblank_count) {
- /* trust the hw counter when it's around */
- -diff = (cur_vblank - vblank->last) & dev->max_vblank_count;
- +diff = (cur_vblank - vblank->last) & max_vblank_count;
- } else if (rc && framedur_ns) {
-
u64 diff_ns = ktime_to_ns(ktime_sub(t_vblank, vblank->time));

@@ -271,7 +279,7 @@
 store_vblank(dev, pipe, diff, t_vblank, cur_vblank);
 }

-static u32 drm_vblank_count(struct drm_device *dev, unsigned int pipe)
+static u64 drm_vblank_count(struct drm_device *dev, unsigned int pipe)
 {
     struct drm_vblank_crtc *vblank = &dev->vblank[pipe];

@@ -292,11 +300,11 @@
 * This is mostly useful for hardware that can obtain the scanout position, but
 * doesn't have a hardware frame counter.
 */
-    u32 vblank;
+    u64 vblank;
 unsigned long flags;
 WARN_ONCE(drm_debug & DRM_UT_VBL && !dev->driver->get_vblank_timestamp,
     delta_ns = div_s64(1000000LL * (vpos * mode->crtc_htotal + hpos),
         mode->crtc_clock);
-/* save this only for debugging purposes */
-    ts_etimediff = ktime_to_timespec64(etime);
-    ts_vblank_time = ktime_to_timespec64(*vblank_time);
 /* Subtract time delta from raw timestamp to get final
 * vblank_time timestamp for end of vblank.
 */
-    etime = ktime_sub_ns(etime, delta_ns);
-    *vblank_time = etime;
+    *vblank_time = ktime_sub_ns(etime, delta_ns);
+    if ((drm_debug & DRM_UT_VBL) == 0)
+        return true;
+    ts_etimediff = ktime_to_timespec64(etime);
+    ts_vblank_time = ktime_to_timespec64(*vblank_time);

 DRM_DEBUG_VBL("crtc %u : v p(%d,%d)@ %lld.%06ld -> %lld.%06ld [e %d us, %d rep]n",
    pipe, hpos, vpos,
    @@ -1053,7 +1063,7 @@
struct drm_vblank_crtc *vblank = &dev->vblank[pipe];
int ret;
-u32 last;
+u64 last;

if (WARN_ON(pipe >= dev->num_crtcs))
return;
@@ -1192,6 +1202,37 @@
EXPORT_SYMBOL(drm_crtc_vblank_reset);

/**
+ * drm_crtc_set_max_vblank_count - configure the hw max vblank counter value
+ * @crtc: CRTC in question
+ * @max_vblank_count: max hardware vblank counter value
+ *
+ * Update the maximum hardware vblank counter value for @crtc
+ * at runtime. Useful for hardware where the operation of the
+ * hardware vblank counter depends on the currently active
+ * display configuration.
+ *
+ * For example, if the hardware vblank counter does not work
+ * when a specific connector is active the maximum can be set
+ * to zero. And when that specific connector isn't active the
+ * maximum can again be set to the appropriate non-zero value.
+ *
+ * If used, must be called before drm_vblank_on().
+ */
+void drm_crtc_set_max_vblank_count(struct drm_crtc *crtc,
+    u32 max_vblank_count)
+{
+    struct drm_device *dev = crtc->dev;
+    unsigned int pipe = drm_crtc_index(crtc);
+    struct drm_vblank_crtc *vblank = &dev->vblank[pipe];
+    WARN_ON(!READ_ONCE(vblank->inmodeset));
+    WARN_ON(dev->max_vblank_count);
+    WARN_ON(!READ_ONCE(vblank->inmodeset));
+    vblank->max_vblank_count = max_vblank_count;
+}
+EXPORT_SYMBOL(drm_crtc_set_max_vblank_count);
+
+/**
+ * drm_crtc_vblank_on - enable vblank events on a CRTC
+ * @crtc: CRTC in question
+ *
+ @@ -1455,7 +1496,7 @@
unsigned int flags, pipe, high_pipe;
if (!dev->irq_enabled)
-    return -EINVAL;
+    return -EOPNOTSUPP;

if (vblwait->request.type & _DRM_VBLANK_SIGNAL)
    return -EINVAL;
@@ -1696,7 +1737,7 @@
    return -EINVAL;

if (!dev->irq_enabled)
-    return -EINVAL;
+    return -EOPNOTSUPP;

crtc = drm_crtc_find(dev, file_priv, get_seq->crtc_id);
if (!crtc)
    return -EINVAL;
@@ -1754,7 +1795,7 @@
    return -EINVAL;

if (!dev->irq_enabled)
-    return -EINVAL;
+    return -EOPNOTSUPP;

crtc = drm_crtc_find(dev, file_priv, queue_seq->crtc_id);

--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/Kconfig
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/Kconfig
@@ -6,6 +6,7 @@
 helps on MMU
 select SHMEM
 select SYNC_FILE
+select THERMAL if DRM_ETNAVIV_THERMAL
 select TMPFS
 select WANT_DEV_COREDUMP
 select CMA if HAVE_DMA_CONTIGUOUS
@@ -13,6 +14,14 @@
 help
    DRM driver for Vivante GPUs.

+config DRM_ETNAVIV_THERMAL
+bool "enable ETNAVIV thermal throttling"
+depends on DRM_ETNAVIV
+default y
+help
+ Compile in support for thermal throttling.
+ Say Y unless you want to risk burning your SoC.
+ config DRM_ETNAVIV_REGISTER_LOGGING
bool "enable ETNAVIV register logging"
depends on DRM_ETNAVIV
--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_buffer.c
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_buffer.c
@@ -294,6 +294,8 @@
 unsigned int waitlink_offset = buffer->user_size - 16;
 u32 return_target, return_dwords;
 u32 link_target, link_dwords;
+unsigned int new_flush_seq = READ_ONCE(gpu->mmu->flush_seq);
+bool need_flush = gpu->flush_seq != new_flush_seq;

 if (drm_debug & DRM_UT_DRIVER)
etnaviv_buffer_dump(gpu, buffer, 0, 0x50);
 @@ -306,14 +308,14 @@
 /* need to append a mmu flush load state, followed by a new 
 * link to this buffer - a total of four additional words.
 * */
- if (gpu->mmu->need_flush || gpu->switch_context) {
+ if (need_flush || gpu->switch_context) {
 u32 target, extra_dwords;

 /* link command */
 extra_dwords = 1;

 /* flush command */
- if (gpu->mmu->need_flush) {
+ if (need_flush) {
 +if (gpu->mmu->version == ETNAVIV_IOMMU_V1)
 extra_dwords += 1;
 else
@@ -326,7 +328,7 @@
 target = etnaviv_buffer_reserve(gpu, buffer, extra_dwords);
- if (gpu->mmu->need_flush) {
+ if (need_flush) {
 /* Add the MMU flush */
 if (gpu->mmu->version == ETNAVIV_IOMMU_V1) {
 CMD_LOAD_STATE(buffer, VIVS_GL_FLUSH_MMU,
 @@ -346,7 +348,7 @@
 SYNC_RECIPIENT_PE);
 } }
--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_drv.c
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_drv.c
@@ -586,6 +586,9 @@
goto out_wq;
}
+dev->dma_parms = &priv->dma_parms;
+dma_set_max_seg_size(dev, SZ_2G);
+
mutex_init(&priv->gem_lock);
INIT_LIST_HEAD(&priv->gem_list);
priv->num_gpus = 0;
@@ -629,6 +632,8 @@
component_unbind_all(dev, drm);
+
dev->dma_parms = NULL;
+
drm->dev_private = NULL;
kfree(priv);

--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_drv.h
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_drv.h
@@ -51,6 +51,7 @@
struct etnaviv_drm_private {
    int num_gpus;
    +struct device_dma_parameters dma_parms;
    struct etnaviv_gpu *[ETNA_MAX_PIPES];

    /* list of GEM objects: */
--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_dump.c
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_dump.c
@@ -125,6 +125,8 @@
    __le64 *bomap, *bomap_start;
+
    mutex_lock(&gpu->mmu->lock);
+
    mmu_size = etnaviv_iommu_dump_size(gpu->mmu);
    /* We always dump registers, mmu, ring and end marker */
    @@ -164,6 +166,7 @@
    iter.start = __vmalloc(file_size, GFP_KERNEL | __GFP_NOWARN | __GFP_NORETRY,
                        PAGE_KERNEL);
    if (!iter.start) {
+        mutex_unlock(&gpu->mmu->lock);
        dev_warn(gpu->dev, "failed to allocate devcoredump file\n");
mutex_lock(&obj->lock);
pages = etnaviv_gem_get_pages(obj);
mutex_unlock(&obj->lock);

if (pages) {
    if (!IS_ERR(pages)) {
        int j;

        iter.hdr->data[0] = bomap - bomap_start;
        iter.hdr->data[1] = obj->base.size;
    }

    mutex_unlock(&gpu->mmu->lock);

    etnaviv_core_dump_header(&iter, ETDUMP_BUF_END, iter.data);
}

dev_coredump(gpu->dev, iter.start, iter.data - iter.start, GFP_KERNEL);

--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_gem_prime.c
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_gem_prime.c
@@ -26,7 +26,7 @@
    int npages = obj->size >> PAGE_SHIFT;

    if (WARN_ON(!etnaviv_obj->pages)) /* should have already pinned! */
    -return NULL;
    +return ERR_PTR(-EINVAL);

    return drm_prime_pages_to_sg(etnaviv_obj->pages, npages);
}

--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_gpu.c
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_gpu.c
@@ -713,7 +713,7 @@
    if (IS_ERR(gpu->cmdbuf_suballoc)) {
        dev_err(gpu->dev, "Failed to create cmdbuf suballocator\n");
        ret = PTR_ERR(gpu->cmdbuf_suballoc);
        -goto fail;
        +goto destroy_iommu;
    }

    /* Create buffer: */
    @@ -721,7 +721,7 @@
    if (!gpu->buffer) {
        ret = -ENOMEM;
        dev_err(gpu->dev, "could not create command buffer\n");
        -goto destroy_iommu;
        +goto destroy_suballoc;
    }

    /* Create buffer: */
    @@ -721,7 +721,7 @@
    if (!gpu->buffer) {
        ret = -ENOMEM;
        dev_err(gpu->dev, "could not create command buffer\n");
        -goto destroy_iommu;
        +goto destroy_suballoc;
if (gpu->mmu->version == ETNAVIV_IOMMU_V1 &&
     free_buffer:
    etnaviv_cmdbuf_free(gpu->buffer);
gpu->buffer = NULL;
+destroy_suballoc:
+etnaviv_cmdbuf_suballoc_destroy(gpu->cmdbuf_suballoc);
+gpu->cmdbuf_suballoc = NULL;
destroy_iommu:
    etnaviv_iommu_destroy(gpu->mmu);
gpu->mmu = NULL;
@@ -1431,7 +1434,7 @@
gpu->active_fence = submit->fence->seqno;
}

if (gpu->lastctx != cmdbuf->ctx) {
    -gpu->mmu->need_flush = true;
+gpu->mmu->flush_seq++;
    gpu->switch_context = true;
    gpu->lastctx = cmdbuf->ctx;
}
@@ -1738,7 +1741,7 @@
struct etnaviv_gpu *gpu = dev_get_drvdata(dev);
int ret;

-if (IS_ENABLED(CONFIG_THERMAL)) {
+if (IS_ENABLED(CONFIG_DRM_ETNAVIV_THERMAL)) {
    gpu->cooling = thermal_of_cooling_device_register(dev->of_node,
    (char *)dev_name(dev), gpu, &cooling_ops);
    if (IS_ERR(gpu->cooling))
        ret = etnaviv_gpu_clk_enable(gpu);
#endif
if (ret < 0) {
    -thermal_cooling_device_unregister(gpu->cooling);
+thermal_cooling_device_unregister(gpu->cooling);
    return ret;
}
@@ -1808,7 +1812,8 @@

gpu->drm = NULL;

-thermal_cooling_device_unregister(gpu->cooling);
+if (IS_ENABLED(CONFIG_DRM_ETNAVIV_THERMAL))
+thermal_cooling_device_unregister(gpu->cooling);
gpu->cooling = NULL;
}

--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_gpu.h
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_gpu.h
@@ -147,6 +147,7 @@
struct etnaviv_iommu *mmu;
 struct etnaviv_cmdbuf_suballoc *cmdbuf_suballoc;
+unsigned int flush_seq;

 /* Power Control: */
struct clk *clk_bus;
--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_mmu.c
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_mmu.c
@@ -174,7 +174,7 @@
*/
if (mmu->last_iova) {
  mmu->last_iova = 0;
-  mmu->need_flush = true;
+  mmu->flush_seq++;
  continue;
}

@@ -288,7 +288,7 @@
list_add_tail(&mapping->mmu_node, &mmu->mappings);
-  mmu->need_flush = true;
+  mmu->flush_seq++;
  mutex_unlock(&mmu->lock);

  return ret;
@@ -306,7 +306,7 @@
etnaviv_iommu_remove_mapping(mmu, mapping);
list_del(&mapping->mmu_node);
-  mmu->need_flush = true;
+  mmu->flush_seq++;
  mutex_unlock(&mmu->lock);
}

@@ -384,7 +384,7 @@
return ret;
}
mutex_unlock(&mmu->lock);

*iova = (u32)vram_node->start;
--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_mmu.h
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_mmu.h
@@ -60,7 +60,7 @@
 struct list_head mappings;
 struct drm_mm mm;
 u32 last_iova;
-bool need_flush;
+unsigned int flush_seq;
};

struct etnaviv_gem_object;
--- linux-4.15.0.orig/drivers/gpu/drm/etnaviv/etnaviv_perfmon.c
+++ linux-4.15.0/drivers/gpu/drm/etnaviv/etnaviv_perfmon.c
@@ -15,6 +15,7 @@
 * this program. If not, see <http://www.gnu.org/licenses/>.
 */

+#include "common.xml.h"
#include "etnaviv_gpu.h"
#include "etnaviv_perfmon.h"
#include "state_hi.xml.h"
@@ -42,17 +43,11 @@
};

struct etnaviv_pm_domain_meta {
+unsigned int feature;
 const struct etnaviv_pm_domain *domains;
 u32 nr_domains;
};

-static u32 simple_reg_read(struct etnaviv_gpu *gpu,
-const struct etnaviv_pm_domain *domain,
-const struct etnaviv_pm_signal *signal)
-{
-return gpu_read(gpu, signal->data);
-}

 static u32 perf_reg_read(struct etnaviv_gpu *gpu,
 const struct etnaviv_pm_domain *domain,
 const struct etnaviv_pm_signal *signal)
@@ -86,6 +81,34 @@
 return value;
 }

+static u32 hi_total_cycle_read(struct etnaviv_gpu *gpu,
const struct etnaviv_pm_domain *domain,
const struct etnaviv_pm_signal *signal)
+
+u32 reg = VIVS_HI_PROFILE_TOTAL_CYCLES;
+
+if (gpu->identity.model == chipModel_GC880 ||
+gpu->identity.model == chipModel_GC2000 ||
+gpu->identity.model == chipModel_GC2100)
+reg = VIVS_MC_PROFILE_CYCLE_COUNTER;
+
+return gpu_read(gpu, reg);
+
static u32 hi_total_cycle_read(struct etnaviv_gpu *gpu,
const struct etnaviv_pm_domain *domain,
const struct etnaviv_pm_signal *signal)
+
+u32 reg = VIVS_HI_PROFILE_IDLE_CYCLES;
+
+if (gpu->identity.model == chipModel_GC880 ||
+gpu->identity.model == chipModel_GC2000 ||
+gpu->identity.model == chipModel_GC2100)
+reg = VIVS_HI_PROFILE_TOTAL_CYCLES;
+
+return gpu_read(gpu, reg);
+
static const struct etnaviv_pm_domain doms_3d[] = {
{
.name = "HI",
.signal = (const struct etnaviv_pm_signal[]) {
{
"TOTAL_CYCLES",
-VIVS_HI_PROFILE_TOTAL_CYCLES,
-&simple_reg_read
+0,
+&hi_total_cycle_read
},
{
"IDLE_CYCLES",
-VIVS_HI_PROFILE_IDLE_CYCLES,
-&simple_reg_read
+0,
+&hi_total_idle_cycle_read
},
{
"AXI_CYCLES_READ_REQUEST_STALLED",

.name = "PE",
.profile_read = VIVS_MC_PROFILE_PE_READ,
.profile_config = VIVS_MC_PROFILE_CONFIG0,
.nr_signals = 5,
+nr_signals = 4,
.signal = (const struct etnaviv_pm_signal[]) {
  "PIXEL_COUNT_KILLED_BY_COLORPIPE",
}

static const struct etnaviv_pm_domain_meta doms_meta[] = {
  .feature = chipFeatures.PIPE_3D,
  .nr_domains = ARRAY_SIZE(doms_3d),
  .domains = &doms_3d[0]
},
{
  .feature = chipFeatures.PIPE_2D,
  .nr_domains = ARRAY_SIZE(doms_2d),
  .domains = &doms_2d[0]
},
{
  .feature = chipFeatures.PIPE_VG,
  .nr_domains = ARRAY_SIZE(doms_vg),
  .domains = &doms_vg[0]
};

+static unsigned int num_pm_domains(const struct etnaviv_gpu *gpu)
+{
  unsigned int num = 0, i;
  +for (i = 0; i < ARRAY_SIZE(doms_meta); i++) {
    +const struct etnaviv_pm_domain_meta *meta = &doms_meta[i];
    +if (gpu->identity.features & meta->feature) {
      +num += meta->nr_domains;
    +}
  +}
  +return num;
+}
+
+static const struct etnaviv_pm_domain *pm_domain(const struct etnaviv_gpu *gpu,
+unsigned int index)
+{
  +unsigned int offset = 0, i;

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for (i = 0; i < ARRAY_SIZE(doms_meta); i++) {
	const struct etnaviv_pm_domain_meta *meta = &doms_meta[i];
	if (!(gpu->identity.features & meta->feature))
		continue;
	if (index - offset >= meta->nr_domains) {
+offset += meta->nr_domains;
+continue;
+
+domain = meta->domains + (index - offset);
+
+return domain;
+
+int etnaviv_pm_query_domain(struct etnaviv_gpu *gpu, struct drm_etnaviv_pm_domain *domain) {
-const struct etnaviv_pm_domain_meta *meta = &doms_meta[domain->pipe];
+const unsigned int nr_domains = num_pm_domains(gpu);
+const struct etnaviv_pm_domain *dom;

-if (domain->iter >= meta->nr_domains)
+if (domain->iter >= nr_domains)
return -EINVAL;
-dom = meta->domains + domain->iter;
+dom = pm_domain(gpu, domain->iter);
+if (!dom)
+return -EINVAL;

domain->id = domain->iter;
domain->nr_signals = dom->nr_signals;
strncpy(domain->name, dom->name, sizeof(domain->name));

domain->iter++;
-if (domain->iter == meta->nr_domains)
+if (domain->iter == nr_domains)
domain->iter = 0xff;

return 0;
@@ -437,16 +502,18 @@
int etnaviv_pm_query_signal(struct etnaviv_gpu *gpu, struct drm_etnaviv_pm_signal *signal) {

const struct etnaviv_pm_domain_meta *meta = &doms_meta[signal->pipe];
const unsigned int nr_domains = num_pm_domains(gpu);
const struct etnaviv_pm_domain *dom;
const struct etnaviv_pm_signal *sig;

-if (signal->domain >= meta->nr_domains)
+if (signal->domain >= nr_domains)
    return -EINVAL;
-
dom = meta->domains + signal->domain;
+dom = pm_domain(gpu, signal->domain);
+if (!dom)
+    return -EINVAL;
-
-if (signal->iter > dom->nr_signals)
+if (signal->iter >= dom->nr_signals)
    return -EINVAL;
-
sig = &dom->signal[signal->iter];
@@ -472,7 +539,7 @@
-dom = meta->domains + r->domain;
-
-if (r->signal > dom->nr_signals)
+if (r->signal >= dom->nr_signals)
    return -EINVAL;
-
return 0;
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos5433_drm_decon.c
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos5433_drm_decon.c
@@ -160,13 +160,6 @@
   return frm;
 }

-static u32 decon_get_vblank_counter(struct exynos_drm_crtc *crtc)
-{
-    struct decon_context *ctx = crtc->ctx;
-    unsigned long val;
+
+static void decon_setup_trigger(struct decon_context *ctx)
+{
+    if (!ctx->crtc->i80_mode & !ctx->out_type & I80_HW_TRG))
+        unsigned long val;
+
            val = readl(ctx->addr + DECON_WINCONx(win));

-val &= ~WINCONx_BPPMODE_MASK;
+val &= WINCONx_ENWIN_F;

switch (fb->format->format) {
    case DRM_FORMAT_XRGB1555:
        @ @ -352,8 +345,8 @@
        writel(val, ctx->addr + DECON_VIDOSDxB(win));
}

-val = VIDOSD_Wx_ALPHA_R_F(0x0) | VIDOSD_Wx_ALPHA_G_F(0x0) |
-VIDOSD_Wx_ALPHA_B_F(0x0);
+val = VIDOSD_Wx_ALPHA_R_F(0xff) | VIDOSD_Wx_ALPHA_G_F(0xff) |
+VIDOSD_Wx_ALPHA_B_F(0xff);
            writel(val, ctx->addr + DECON_VIDOSDxC(win));

val = VIDOSD_Wx_ALPHA_R_F(0x0) | VIDOSD_Wx_ALPHA_G_F(0x0) |
@@ -532,7 +525,6 @@
    .disable = decon_disable,
    .enable_vblank = decon_enable_vblank,
    .disable_vblank = decon_disable_vblank,
    .get_vblank_counter = decon_get_vblank_counter,
    .atomic_begin = decon_atomic_begin,
    .update_plane = decon_update_plane,
    .disable_plane = decon_disable_plane,
    @ @ -550,7 +542,6 @@
int ret;

ctx->drm_dev = drm_dev;
-drm_dev->max_vblank_count = 0xffffffff;

for (win = ctx->first_win; win < WINDOWS_NR; win++) {
    int tmp = (win == ctx->first_win) ? 0 : win;
    --- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos_drm_crtc.c
    +++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_crtc.c
    @ @ -162,16 +162,6 @@
    exynos_crtc->ops->disable_vblank(exynos_crtc);
}

-static u32 exynos_drm_crtc_get_vblank_counter(struct drm *crtc)
-{
    struct exynos_drm_crtc *exynos_crtc = to_exynos_crtc(crtc);
    -if (exynos_crtc->ops->get_vblank_counter)
    -return exynos_crtc->ops->get_vblank_counter(exynos_crtc);
    -
    -return 0;
    -}
    -
static const struct drm_crtc_funcs exynos_crtc_funcs = {
    .set_config = drm_atomic_helper_set_config,
    .page_flip = drm_atomic_helper_page_flip,
    .atomic_destroy_state = drm_atomic_helper_crtc_destroy_state,
    .enable_vblank = exynos_drm_crtc_enable_vblank,
    .disable_vblank = exynos_drm_crtc_disable_vblank,
    .get_vblank_counter = exynos_drm_crtc_get_vblank_counter,
};

struct exynos_drm_crtc *exynos_drm_crtc_create(struct drm_device *drm_dev,
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos_drm_drv.h
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_drv.h
@@ -133,7 +133,6 @@
    void (*disable)(struct exynos_drm_crtc *crtc);
    int (*enable_vblank)(struct exynos_drm_crtc *crtc);
    void (*disable_vblank)(struct exynos_drm_crtc *crtc);
-    u32 (*get_vblank_counter)(struct exynos_drm_crtc *crtc);
    enum drm_mode_status (*mode_valid)(struct exynos_drm_crtc *crtc,
        const struct drm_display_mode *mode);
    bool (*mode_fixup)(struct exynos_drm_crtc *crtc,
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos_drm_dsi.c
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_dsi.c
@@ -1739,8 +1739,9 @@
    ret = devm_regulator_bulk_get(dev, ARRAY_SIZE(dsi->supplies),
        dsi->supplies);
    if (ret) {
        -dev_info(dev, "failed to get regulators: %d\n", ret);
        -return -EPROBE_DEFER;
        +if (ret != -EPROBE_DEFER)
        +dev_info(dev, "failed to get regulators: %d\n", ret);
        +return ret;
    }

dsi->clks = devm_kzalloc(dev,
--- linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_dsi.c
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_dsi.c
@@ -1753,9 +1754,10 @@
    if (IS_ERR(dsi->clks[i])) {
        -strcpy(clk_names[i], OLD_SCLK_MIPI_CLK_NAME);
        -i--;
        -continue;
        +dsi->clks[i] = devm_clk_get(dev,
        +OLD_SCLK_MIPI_CLK_NAME);
        +if (!IS_ERR(dsi->clks[i]))
        +continue;
    }
dev_info(dev, "failed to get the clock: %s\n",
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos_drm_g2d.c
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_g2d.c
@@ @-926,7 +926,7 @@
struct drm_device *drm_dev = g2d->subdrv.drm_dev;
struct g2d_runqueue_node *runqueue_node = g2d->runqueue_node;
struct drm_exynos_pending_g2d_event *e:
-struct timeval now;
+struct timespec64 now;

if (list_empty(&runqueue_node->event_list))
return;
@@ -934,9 +934,9 @@
e = list_first_entry(&runqueue_node->event_list,
struct drm_exynos_pending_g2d_event, base.link);

-do_gettimeofday(&now);
+kt ime_get_ts64(&now);
e->event.tv_sec = now.tv_sec;
-e->event.tv_usec = now.tv_usec;
+e->event.tv_usec = now.tv_nsec / NSEC_PER_USEC;
e->event.cmdlist_no = cmdlist_no;

drm_send_event(drm_dev, &e->base);
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos_drm_gsc.c
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_gsc.c
@@ -532,21 +532,25 @@
		break;
case DRM_FORMAT_NV21:
+cfg |= (GSC_IN_CHROMA_ORDER_CRCB | GSC_IN_YUV420_2P);
+break;
case DRM_FORMAT_NV61:
-cfg |= (GSC_IN_CHROMA_ORDER_CRCB |
-GSC_IN_YUV420_2P);
+cfg |= (GSC_IN_CHROMA_ORDER_CRCB | GSC_IN_YUV422_2P);
break;
case DRM_FORMAT_YUV422:
 cfg |= GSC_IN_YUV422_3P;
break;
case DRM_FORMAT_YUV420:
+cfg |= (GSC_IN_CHROMA_ORDER_CBCR | GSC_IN_YUV420_3P);
+break;
case DRM_FORMAT_YVU420:
-cfg |= GSC_IN_YUV420_3P;
+cfg |= (GSC_IN_CHROMA_ORDER_CRCB | GSC_IN_YUV420_3P);
break;
case DRM_FORMAT_NV12:

---
+cfg |= (GSC_IN_CHROMA_ORDER_CbCr | GSC_IN_YUV420_2P);
+break;
case DRM_FORMAT_NV16:
-cfg |= (GSC_IN_CHROMA_ORDER_CbCr |
-GSC_IN_YUV420_2P);
+cfg |= (GSC_IN_CHROMA_ORDER_CbCr | GSC_IN_YUV422_2P);
break;
default:
debug(ippdrv->dev, "invalid target yuv order 0x%x; \n", fmt);
@@ -806,18 +810,25 @@
GSC_OUT_CHROMA_ORDER_CbCr);
break;
case DRM_FORMAT_NV21:
-case DRM_FORMAT_NV61:
+cfg |= (GSC_OUT_CHROMA_ORDER_CbCr | GSC_OUT_YUV422_2P);
+break;
case DRM_FORMAT_NV61:
+cfg |= (GSC_OUT_CHROMA_ORDER_CbCr | GSC_OUT_YUV422_2P);
+break;
case DRM_FORMAT_YUV422:
+cfg |= GSC_OUT_YUV422_3P;
+break;
case DRM_FORMAT_YUV420:
+cfg |= (GSC_OUT_CHROMA_ORDER_CbCr | GSC_OUT_YUV420_3P);
+break;
case DRM_FORMAT_YVU420:
-cfg |= GSC_OUT_YUV420_3P;
+cfg |= (GSC_OUT_CHROMA_ORDER_CbCr | GSC_OUT_YUV420_3P);
break;
case DRM_FORMAT_NV12:
+cfg |= (GSC_OUT_CHROMA_ORDER_CbCr | GSC_OUT_YUV420_2P);
+break;
case DRM_FORMAT_NV16:
-cfg |= (GSC_OUT_CHROMA_ORDER_CbCr |
-GSC_OUT_YUV420_2P);
+cfg |= (GSC_OUT_CHROMA_ORDER_CbCr | GSC_OUT_YUV422_2P);
break;
default:
debug(ippdrv->dev, "invalid target yuv order 0x%x; \n", fmt);
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos_drm_mic.c
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_drm_mic.c
@@ -267,8 +267,10 @@
goto unlock;
ret = pm_runtime_get_sync(mic->dev);
@if (ret < 0)
+if (ret < 0) {
+pm_runtime_put_noidle(mic->dev);
goto unlock;
+

mic_set_path(mic, 1);

--- linux-4.15.0.orig/drivers/gpu/drm/exynos/exynos_mixer.c
+++ linux-4.15.0/drivers/gpu/drm/exynos/exynos_mixer.c
@@ -20,6 +20,7 @@
#include "regs-vp.h"

#include <linux/kernel.h>
+include <linux/ktime.h>
#include <linux/spinlock.h>
#include <linux/wait.h>
#include <linux/i2c.h>
@@ -349,15 +350,62 @@
mixer_reg_write(ctx, MXR_VIDEO_CFG, val);

-mixer_vsync_set_update(struct mixer_context *ctx, bool enable)
+mixer_is_synced(struct mixer_context *ctx)
{
  /* block update on vsync */
  mixer_reg_writemask(ctx, MXR_STATUS, enable ?
  -MXR_STATUS_SYNC_ENABLE : 0, MXR_STATUS_SYNC_ENABLE);
  +u32 base, shadow;

  if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
      ctx->mxr_ver == MXR_VER_128_0_0_184)
    return !(mixer_reg_read(ctx, MXR_CFG) &
      +MXR_CFG_LAYER_UPDATE_COUNT_MASK);
  +
  if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags) &&
      +vp_reg_read(ctx, VP_SHADOW_UPDATE))
    return false;
  +
  if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
      ctx->mxr_ver == MXR_VER_128_0_0_184)
    return !(mixer_reg_read(ctx, MXR_CFG) &
      +MXR_CFG_LAYER_UPDATE_COUNT_MASK);
  +
  if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags) &&
      +vp_reg_read(ctx, VP_SHADOW_UPDATE))
    return false;
  +
  base = mixer_reg_read(ctx, MXR_CFG);
  +shadow = mixer_reg_read(ctx, MXR_CFG_S);
  +if (base != shadow)
    return false;
  +
  base = mixer_reg_read(ctx, MXR_GRAPHIC_BASE(0));
  +shadow = mixer_reg_read(ctx, MXR_GRAPHIC_BASE_S(0));
  +if (base != shadow)
    return false;
  +
  base = mixer_reg_read(ctx, MXR_GRAPHIC_BASE(1));
  +shadow = mixer_reg_read(ctx, MXR_GRAPHIC_BASE_S(1));
+if (base != shadow)
+return false;
+
+return true;
+
+static int mixer_wait_for_sync(struct mixer_context *ctx)
+{
+    ktime_t timeout = ktime_add_us(ktime_get(), 100000);
+
+    while (!mixer_is_synced(ctx)) {
+        usleep_range(1000, 2000);
+        if (ktime_compare(ktime_get(), timeout) > 0)
+            return -ETIMEDOUT;
+    }
+    return 0;
+
+}
+
+static void mixer_disable_sync(struct mixer_context *ctx)
+{
+    mixer_reg_writemask(ctx, MXR_STATUS, 0, MXR_STATUS_SYNC_ENABLE);
+}
+
+static void mixer_enable_sync(struct mixer_context *ctx)
+{
+    if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+        ctx->mxr_ver == MXR_VER_128_0_0_184)
+        mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
+
+static void mixer_cfg_scan(struct mixer_context *ctx, int width, int height)
+
+static void mixer_config(struct mixer_context *ctx, int width, int height)
+
+if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+    ctx->mxr_ver == MXR_VER_128_0_0_184)
+    mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
+
+static void mixer_enable_sync(struct mixer_context *ctx)
+{
+    if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+        ctx->mxr_ver == MXR_VER_128_0_0_184)
+        mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
+
+static void mixer_cfg_scan(struct mixer_context *ctx, int width, int height)
+
+static void mixer_config(struct mixer_context *ctx, int width, int height)
+
+if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+    ctx->mxr_ver == MXR_VER_128_0_0_184)
+    mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
+
+static void mixer_cfg_scan(struct mixer_context *ctx, int width, int height)
+
+static void mixer_config(struct mixer_context *ctx, int width, int height)
+
+if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+    ctx->mxr_ver == MXR_VER_128_0_0_184)
+    mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
+
+static void mixer_cfg_scan(struct mixer_context *ctx, int width, int height)
+
+static void mixer_config(struct mixer_context *ctx, int width, int height)
+
+if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+    ctx->mxr_ver == MXR_VER_128_0_0_184)
+    mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
+
+static void mixer_cfg_scan(struct mixer_context *ctx, int width, int height)
+
+static void mixer_config(struct mixer_context *ctx, int width, int height)
+
+if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+    ctx->mxr_ver == MXR_VER_128_0_0_184)
+    mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
+
+static void mixer_cfg_scan(struct mixer_context *ctx, int width, int height)
+
+static void mixer_config(struct mixer_context *ctx, int width, int height)
+
+if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
+    ctx->mxr_ver == MXR_VER_128_0_0_184)
+    mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
+    mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SYNC_ENABLE);
+    if (test_bit(MXR_BIT_VP_ENABLED, &ctx->flags))
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, enable ?
+            VP_SHADOW_UPDATE_ENABLE : 0);
+    else
+        vp_reg_write(ctx, VP_SHADOW_UPDATE, VP_SHADOW_UPDATE_ENABLE);
+
+}
/* chroma plane for NV12/NV21 is half the height of the luma plane */
-vp_reg_write(ctx, VP_IMG_SIZE_C, VP_IMG_HSIZE(fb->pitches[0]) |
+v-p_reg_write(ctx, VP_IMG_SIZE_C, VP_IMG_HSIZE(fb->pitches[1]) |
VP_IMG_VSIZE(fb->height / 2));

vp_reg_write(ctx, VP_SRC_WIDTH, state->src.w);
-vp_reg_write(ctx, VP_SRC_HEIGHT, state->src.h);
vp_reg_write(ctx, VP_SRC_H_POSITION,
VP_SRC_H_POSITION_VAL(state->src.x));
-vp_reg_write(ctx, VP_SRC_V_POSITION, state->src.y);
-
vp_reg_write(ctx, VP_DST_WIDTH, state->crtc.w);
vp_reg_write(ctx, VP_DST_H_POSITION, state->crtc.x);
+
if (test_bit(MXR_BIT_INTERLACE, &ctx->flags)) {
+vp_reg_write(ctx, VP_SRC_HEIGHT, state->src.h / 2);
+vp_reg_write(ctx, VP_SRC_V_POSITION, state->src.y / 2);
+vp_reg_write(ctx, VP_DST_HEIGHT, state->crtc.h / 2);
vp_reg_write(ctx, VP_DST_V_POSITION, state->crtc.y / 2);
} else {
+vp_reg_write(ctx, VP_SRC_HEIGHT, state->src.h);
+vp_reg_write(ctx, VP_SRC_V_POSITION, state->src.y);
vp_reg_write(ctx, VP_DST_HEIGHT, state->crtc.h);
vp_reg_write(ctx, VP_DST_V_POSITION, state->crtc.y);
}
@@ -546,11 +596,6 @@
vp_regs_dump(ctx);
}

-static void mixer_layer_update(struct mixer_context *ctx)
-{
-    mixer_reg_writemask(ctx, MXR_CFG, ~0, MXR_CFG_LAYER_UPDATE);
-}
-
static void mixer_graph_buffer(struct mixer_context *ctx,
    struct exynos_drm_plane *plane)
{
@@ -627,11 +672,6 @@
mixer_cfg_layer(ctx, win, priority, true);
mixer_cfg_gfx_blend(ctx, win, is_alpha_format(fb->format->format));

-/* layer update mandatory for mixer 16.0.33.0 */
-if (ctx->mxr_ver == MXR_VER_16_0_33_0 ||
-ctx->mxr_ver == MXR_VER_128_0_0_184)
-mixer_layer_update(ctx);
-
spin_unlock_irqrestore(&ctx->reg_slock, flags);
mixer_regs_dump(ctx);
static irqreturn_t mixer_irq_handler(int irq, void *arg)
{
    struct mixer_context *ctx = arg;
-u32 val, base, shadow;
+u32 val;

    spin_lock(&ctx->reg_slock);

    val &= ~MXR_INT_STATUS_VSYNC;

    /* interlace scan need to check shadow register */
    -if (test_bit(MXR_BIT_INTERLACE, &ctx->flags)) { 
    -base = mixer_reg_read(ctx, MXR_GRAPHIC_BASE(0));
    -shadow = mixer_reg_read(ctx, MXR_GRAPHIC_BASE_S(0));
    -if (base != shadow) 
    -goto out;
    -
    -base = mixer_reg_read(ctx, MXR_GRAPHIC_BASE(1));
    -shadow = mixer_reg_read(ctx, MXR_GRAPHIC_BASE_S(1));
    -if (base != shadow) 
    -goto out;
    -}
+if (test_bit(MXR_BIT_INTERLACE, &ctx->flags)
    && !mixer_is_synced(ctx))
+    goto out;

    drm_crtc_handle_vblank(&ctx->crtc->base);
}

static void mixer_atomic_begin(struct exynos_drm_crtc *crtc)
{
    struct mixer_context *mixer_ctx = crtc->ctx;
+    struct mixer_context *ctx = crtc->ctx;

    -if (!test_bit(MXR_BIT_POWERED, &mixer_ctx->flags))
    +if (!test_bit(MXR_BIT_POWERED, &ctx->flags))
        return;

    -mixer_vsync_set_update(mixer_ctx, false);
    +if (mixer_wait_for_sync(ctx))
        dev_err(ctx->dev, "timeout waiting for VSYNC\n");
    +mixer_disable_sync(ctx);
}
static void mixer_update_plane(struct exynos_drm_crtc *crtc,
@@ -944,7 +978,7 @@
if (!test_bit(MXR_BIT_POWERED, &mixer_ctx->flags))
    return;

    -mixer_vsync_set_update(mixer_ctx, true);
+mixer_enable_sync(mixer_ctx);
    exynos_crtc_handle_event(crtc);
}

@@ -959,7 +993,7 @@
exynos_drm_pipe_clk_enable(crtc, true);

    -mixer_vsync_set_update(ctx, false);
+mixer_disable_sync(ctx);

mixer_reg_writemask(ctx, MXR_STATUS, ~0, MXR_STATUS_SOFT_RESET);

@@ -972,7 +1006,7 @@
mixer_commit(ctx);

    -mixer_vsync_set_update(ctx, true);
+mixer_enable_sync(ctx);

set_bit(MXR_BIT_POWERED, &ctx->flags);
}
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/regs-fimc.h
+++ linux-4.15.0/drivers/gpu/drm/exynos/regs-fimc.h
@@ -569,7 +569,7 @@
#define EXYNOS_CIIMGEFF_FIN_EMBOSSING	(4 << 26)
#define EXYNOS_CIIMGEFF_FIN_SILHOUETTE	(5 << 26)
#define EXYNOS_CIIMGEFF_FIN_MASK		(7 << 26)
-#define EXYNOS_CIIMGEFF_PAT_CBCR_MASK	((0xff < 13) | (0xff < 0))
+#define EXYNOS_CIIMGEFF_PAT_CBCR_MASK	((0xff << 13) | (0xff << 0))
/* Real input DMA size register */
#define EXYNOS_CIREAL_ISIZE_AUTOLOAD_ENABLE	(1 << 31)
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/regs-gsc.h
+++ linux-4.15.0/drivers/gpu/drm/exynos/regs-gsc.h
@@ -138,6 +138,7 @@
#define GSC_OUT_YUV422_1P	(4 << 4)
#define GSC_OUT_YUV422_2P	(5 << 4)
+#define GSC_OUT_YUV422_3P	(6 << 4)
#define GSC_OUT_YUV444	(7 << 4)
#define GSC_OUT_TILE_TYPE_MASK	(1 << 2)
#define GSC_OUT_TILE_C_16x8 (0 << 2)
--- linux-4.15.0.orig/drivers/gpu/drm/exynos/regs-mixer.h
+++ linux-4.15.0/drivers/gpu/drm/exynos/regs-mixer.h
@@ -47,6 +47,7 @@
 #define MXR_MO	 0x0304
 #define MXR_RESOLUTION 0x0310

+#define MXR_CFG_S0x2004
#define MXR_GRAPHIC0_BASE_S0x2024
#define MXR_GRAPHIC1_BASE_S0x2044

--- linux-4.15.0.orig/drivers/gpu/drm/gma500/cdv_intel_display.c
+++ linux-4.15.0/drivers/gpu/drm/gma500/cdv_intel_display.c
@@ -415,6 +415,8 @@
 struct gma_crtc *gma_crtc = to_gma_crtc(crtc);
 struct gma_clock_t clock;
+
 switch (refclk) {
 case 27000:
 if (target < 200000) {
--- linux-4.15.0.orig/drivers/gpu/drm/gma500/cdv_intel_dp.c
+++ linux-4.15.0/drivers/gpu/drm/gma500/cdv_intel_dp.c
@@ -2119,12 +2119,12 @@
 intel_dp->dpcd,
 sizeof(intel_dp->dpcd));
cdv_intel_edp_panel_vdd_off(gma_encoder);
-if (ret == 0) {
+if (ret <= 0) {
 /* if this fails, presume the device is a ghost */
 DRM_INFO("failed to retrieve link info, disabling eDP\n");
cdv_intel_dp_encoder_destroy(encoder);
cdv_intel_dp_destroy(connector);
-goto err_priv;
+goto err_connector;
} else {
 DRM_DEBUG_KMS("DPCD: Rev=%x LN_Rate=%x LN_CNT=%x LN_DOWNSP=%x\n",
 intel_dp->dpcd[0], intel_dp->dpcd[1],
--- linux-4.15.0.orig/drivers/gpu/drm/gma500/cdv_intel_lvds.c
+++ linux-4.15.0/drivers/gpu/drm/gma500/cdv_intel_lvds.c
@@ -594,6 +594,9 @@
 int pipe;
 u8 pin;
+
-if (!dev_priv->lvds_enabled_in_vbt)
+return;
+  

pin = GMBUS_PORT_PANEL;
if (!lvds_is_present_in_vbt(dev, &pin)) {
  DRM_DEBUG_KMS("LVDS is not present in VBT\n");
}

--- linux-4.15.0.orig/drivers/gpu/drm/gma500/framebuffer.c
+++ linux-4.15.0/drivers/gpu/drm/gma500/framebuffer.c
@@ -486,6 +486,7 @@
    container_of(helper, struct psb_fbdev, psb_fb_helper);
    struct drm_device *dev = psb_fbdev->psb_fb_helper.dev;
    struct drm_psb_private *dev_priv = dev->dev_private;
+    unsigned int fb_size;
    int bytespp;

    bytespp = sizes->surface_bpp / 8;
    @ @ -495,8 +496,11 @@
    /* If the mode will not fit in 32bit then switch to 16bit to get
     * a console on full resolution. The X mode setting server will
     * allocate its own 32bit GEM framebuffer */
    -if (ALIGN(sizes->fb_width * bytespp, 64) * sizes->fb_height >
        -dev_priv->vram_stolen_size) {
        +fb_size = ALIGN(sizes->surface_width * bytespp, 64) *
          + sizes->surface_height;
        +fb_size = ALIGN(fb_size, PAGE_SIZE);
    +    if (fb_size > dev_priv->vram_stolen_size) {
            sizes->surface_bpp = 16;
            sizes->surface_depth = 16;
    }

    --- linux-4.15.0.orig/drivers/gpu/drm/gma500/intel_bios.c
+++ linux-4.15.0/drivers/gpu/drm/gma500/intel_bios.c
@@ -436,6 +436,9 @@
    if (driver->lvds_config == BDB_DRIVER_FEATURE_EDP)
    dev_priv->edp.support = 1;
+    dev_priv->lvds_enabled_in_vbt = driver->lvds_config != 0;
+    DRM_DEBUG_KMS("LVDS VBT config bits: 0x%x\n", driver->lvds_config);
+    /* This bit means to use 96Mhz for DPLL_A or not */
    if (driver->primary_lfp_id)
    dev_priv->dplla_96mhz = true;
    --- linux-4.15.0.orig/drivers/gpu/drm/gma500/oaktrail_crtc.c
+++ linux-4.15.0/drivers/gpu/drm/gma500/oaktrail_crtc.c
@@ -139,6 +139,7 @@
    s32 freq_error, min_error = 100000;
    memset(best_clock, 0, sizeof(*best_clock));
    +memset(&clock, 0, sizeof(clock));
    for (clock.m = limit->m.min; clock.m <= limit->m.max; clock.m++) {

for (clock.n = limit->n.min; clock.n <= limit->n.max;
@ @ -195.6 +196.7 @@
int err = target;

memset(best_clock, 0, sizeof(*best_clock));
+memset(&clock, 0, sizeof(clock));

for (clock.m = limit->m.min; clock.m <= limit->m.max; clock.m++) {
for (clock.p1 = limit->p1.min; clock.p1 <= limit->p1.max;
--- linux-4.15.0.orig/drivers/gpu/drm/gma500/oaktrail_hDMI_i2c.c
+++ linux-4.15.0/drivers/gpu/drm/gma500/oaktrail_hDMI_i2c.c
@@ -279,11 +279,8 @@
hDMI_dev = pci_get_drvdata(dev);

i2c_dev = kzalloc(sizeof(struct hdmi_i2c_dev), GFP_KERNEL);
-if (i2c_dev == NULL) {
-DMERROR("Can't allocate interface\n");
-ret = -ENOMEM;
-goto exit;
-}
+if (!i2c_dev)
+return -ENOMEM;
i2c_dev->adap = &oaktrail_hDMI_i2c_adap;
i2c_dev->status = 12C_STAT_INIT;
@ @ -300,16 +297,23 @@
oaktrail_hDMI_i2c_adap.name, hdmi_dev);
if (ret) {
DMERROR("Failed to request IRQ for I2C controller\n");
-goto err;
+goto free_dev;
}

/* Adapter registration */
ret = i2c_add_numbered_adapter(&oaktrail_hDMI_i2c_adap);
-return ret;
+if (ret) {
+DMERROR("Failed to add I2C adapter\n");
+goto free_irq;
+
+return 0;

-err:
+free_irq;
+free_irq(dev->irq, hdmi_dev);
+free_dev:
kfree(i2c_dev);
if (ret)
goto out_err;

+ret = -ENOMEM;
+
dev_priv->mmu = psb_mmu_driver_init(dev, 1, 0, 0);
if (!dev_priv->mmu)
goto out_err;

int lvds_ssc_freq;
bool is_lvds_on;
bool is_mipi_on;
+bool lvds_enabled_in_vbt;
u32 mipi_ctrl_display;

unsigned int core_freq;

extern bool psb_intel_lvds_mode_fixup(struct drm_encoder *encoder,
 const struct drm_display_mode *mode,
 struct drm_display_mode *adjusted_mode);
-extern int psb_intel_lvds_mode_valid(struct drm_connector *connector,
 const struct drm_display_mode *mode);
+extern enum drm_mode_status psb_intel_lvds_mode_valid(struct drm_connector *connector,
 struct drm_display_mode *mode);

extern int psb_intel_lvds_set_property(struct drm_connector *connector,
 struct drm_property *property,

-int psb_intel_lvds_mode_valid(struct drm_connector *connector,
 +enum drm_mode_status psb_intel_lvds_mode_valid(struct drm_connector *connector,
 struct drm_display_mode *mode)
struct drm_psb_private *dev_priv = dev->dev_private;
unsigned long irqflags;
unsigned int i;

spin_lock_irqsave(&dev_priv->irqmask_lock, irqflags);

if (dev->vblank[0].enabled)
    psb_enable_pipestat(dev_priv, 0, PIPE_VBLANK_INTERRUPT_ENABLE);
else
    psb_disable_pipestat(dev_priv, 0, PIPE_VBLANK_INTERRUPT_ENABLE);

if (dev->vblank[1].enabled)
    psb_enable_pipestat(dev_priv, 1, PIPE_VBLANK_INTERRUPT_ENABLE);
else
    psb_disable_pipestat(dev_priv, 1, PIPE_VBLANK_INTERRUPT_ENABLE);

if (dev->vblank[2].enabled)
    psb_enable_pipestat(dev_priv, 2, PIPE_VBLANK_INTERRUPT_ENABLE);
else
    psb_disable_pipestat(dev_priv, 2, PIPE_VBLANK_INTERRUPT_ENABLE);

for (i = 0; i < dev->num_crtcs; ++i) {
    if (dev->vblank[i].enabled)
        psb_enable_pipestat(dev_priv, i, PIPE_VBLANK_INTERRUPT_ENABLE);
    else
        psb_disable_pipestat(dev_priv, i, PIPE_VBLANK_INTERRUPT_ENABLE);
}

if (dev_priv->ops->hotplug_enable)
    dev_priv->ops->hotplug_enable(dev, true);

if (dev_priv->ops->hotplug_enable)
    dev_priv->ops->hotplug_enable(dev, true);

PSB_WVDC32(0xFFFFFFFF, PSB_HWSTAM);
if (dev->vblank[0].enabled)
-psb_disable_pipestat(dev_priv, 0, PIPE_VBLANK_INTERRUPT_ENABLE);
-
if (dev->vblank[1].enabled)
-psb_disable_pipestat(dev_priv, 1, PIPE_VBLANK_INTERRUPT_ENABLE);
-
if (dev->vblank[2].enabled)
-psb_disable_pipestat(dev_priv, 2, PIPE_VBLANK_INTERRUPT_ENABLE);
+
for (i = 0; i < dev->num_crtcs; ++i) {
+if (dev->vblank[i].enabled)
+psb_disable_pipestat(dev_priv, i, PIPE_VBLANK_INTERRUPT_ENABLE);
+}

dev_priv->vdc_irq_mask &= _PSB_IRQ_SGX_FLAG |
                  _PSB_IRQ_MSVDX_FLAG |
--- linux-4.15.0.orig/drivers/gpu/drm/hisilicon/hibmc/Kconfig
+++ linux-4.15.0/drivers/gpu/drm/hisilicon/hibmc/Kconfig
@@ -1,6 +1,6 @@
config DRM_HISI_HIBMC
tristate "DRM Support for Hisilicon Hibmc"
-depends on DRM && PCI && MMU
+depends on DRM && PCI && MMU && ARM64
select DRM_KMS_HELPER
select DRM_TTM

--- linux-4.15.0.orig/drivers/gpu/drm/hisilicon/hibmc_drm_fbdev.c
+++ linux-4.15.0/drivers/gpu/drm/hisilicon/hibmc_drm_fbdev.c
@@ -71,7 +71,6 @@
DRM_DEBUG_DRIVER("surface width(%d), height(%d) and bpp(%d)\n",
sizes->surface_width, sizes->surface_height,
sizes->surface_bpp);
-size->surface_depth = 32;

bytes_per_pixel = DIV_ROUND_UP(sizes->surface_bpp, 8);

@@ -122,6 +121,7 @@
hi_fbdev->fb = hibmc_framebuffer_init(priv->dev, &mode_cmd, gobj);
if (IS_ERR(hi_fbdev->fb)) {
 ret = PTR_ERR(hi_fbdev->fb);
+hi_fbdev->fb = NULL;
 DRM_ERROR("failed to initialize framebuffer: %d\n", ret);
go to out_release_fbi;
}
--- linux-4.15.0.orig/drivers/gpu/drm/i810/i810_dma.c
+++ linux-4.15.0/drivers/gpu/drm/i810/i810_dma.c
@@ -721,7 +721,7 @@
if (nbox > I810_NR_SAREA_CLIPRECTS)
nbox = I810_NR_SAREA_CLIPRECTS;

-if (used > 4 * 1024)
+if (used < 0 || used > 4 * 1024)
  used = 0;

if (sarea_priv->dirty)
@@ -1041,7 +1041,7 @@
  if (u != I810_BUF_CLIENT)
    DRM_DEBUG("MC found buffer that isn't mine!\n");

- if (used > 4 * 1024)
+ if (used < 0 || used > 4 * 1024)
  used = 0;

sarea_priv->dirty = 0x7f;
--- linux-4.15.0.orig/drivers/gpu/drm/i915/gvt/cfg_space.c
+++ linux-4.15.0/drivers/gpu/drm/i915/gvt/cfg_space.c
@@ -119,16 +119,6 @@
 if (map == vgpu->cfg_space.bar[INTEL_GVT_PCI_BAR_APERTURE].tracked)
  return 0;

- if (map) {
-  vgpu->gm.aperture_va = memremap(aperture_pa, aperture_sz,
-    MEMREMAP_WC);
-  if (!vgpu->gm.aperture_va)
-    return -ENOMEM;
- } else {
-   memunmap(vgpu->gm.aperture_va);
-   vgpu->gm.aperture_va = NULL;
- }
-
- val = vgpu_cfg_space(vgpu)[PCI_BASE_ADDRESS_2];
- if (val & PCI_BASE_ADDRESS_MEM_TYPE_64)
-  val = *(u64 *)(vgpu_cfg_space(vgpu) + PCI_BASE_ADDRESS_2);
- @@ -141,11 +131,8 @@
-    aperture_pa >> PAGE_SHIFT,
-    aperture_sz >> PAGE_SHIFT,
-    map);
-  if (ret) {
-    memunmap(vgpu->gm.aperture_va);
-    vgpu->gm.aperture_va = NULL;
-  } return ret;
-
- vgpu->cfg_space.bar[INTEL_GVT_PCI_BAR_APERTURE].tracked = map;
- return 0;
if (index_mode) {
    if (guest_gma >= GTT_PAGE_SIZE / sizeof(u64)) {
        ret = -EINVAL;
        goto err;
    }
}
@@ -1545,10 +1545,10 @@
    return -EFAULT;
}
@@ -2516,7 +2516,7 @@
    int ret = 0;
    /* ring base is page aligned */
    -if (WARN_ON(!IS_ALIGNED(workload->rb_start, GTT_PAGE_SIZE)))
    +if (WARN_ON(!IS_ALIGNED(workload->rb_start, I915_GTT_PAGE_SIZE)))
        return -EINVAL;

    gma_head = workload->rb_start + workload->rb_head;
    @@ -2565,8 +2565,7 @@
    wa_ctx);

    /* ring base is page aligned */
    -if (WARN_ON(!IS_ALIGNED(wa_ctx->indirect_ctx.guest_gma, GTT_PAGE_SIZE)))
    +if (WARN_ON(!IS_ALIGNED(wa_ctx->indirect_ctx.guest_gma, I915_GTT_PAGE_SIZE)))
        return -EINVAL;

    ring_tail = wa_ctx->indirect_ctx.size + 3 * sizeof(uint32_t);
    @@ -2813,6 +2814,7 @@ if (info) {
        gvt_err("%s %s duplicated\n", e->info->name, info->name);
+kfree(e);
return -EEXIST;
}

--- linux-4.15.0.orig/drivers/gpu/drm/i915/gvt/execlist.c
+++ linux-4.15.0/drivers/gpu/drm/i915/gvt/execlist.c
@@ -667,7 +667,7 @@
    ring_context_gpa = intel_vgpu_gma_to_gpa(vgpu->gtt.ggtt_mm, 
    -(u32)((desc->lrca + 1) << GTT_PAGE_SHIFT));
    +(u32)((desc->lrca + 1) << I915_GTT_PAGE_SHIFT));
    if (ring_context_gpa == INTEL_GVT_INVALID_ADDR) {
        gvt_vgpu_err("invalid guest context LRCA: %x\n", desc->lrca);
        return -EINVAL;
    --- linux-4.15.0.orig/drivers/gpu/drm/i915/gtt.c
    +++ linux-4.15.0/drivers/gpu/drm/i915/gtt.c
    @@ -94,12 +94,12 @@
    u64 h_addr;
    int ret;

    -ret = intel_gvt_ggtt_gmadr_g2h(vgpu, g_index << GTT_PAGE_SHIFT, 
    +ret = intel_gvt_ggtt_gmadr_g2h(vgpu, g_index << I915_GTT_PAGE_SHIFT, 
        &h_addr);
    if (ret)
        return ret;

    -*h_index = h_addr >> GTT_PAGE_SHIFT;
    +*h_index = h_addr >> I915_GTT_PAGE_SHIFT;
    return 0;
}

@@ -109,12 +109,12 @@
    u64 g_addr;
    int ret;

    -ret = intel_gvt_ggtt_gmadr_h2g(vgpu, h_index << GTT_PAGE_SHIFT, 
    +ret = intel_gvt_ggtt_gmadr_h2g(vgpu, h_index << I915_GTT_PAGE_SHIFT, 
        &g_addr);
    if (ret)
        return ret;

    -*g_index = g_addr >> GTT_PAGE_SHIFT;
    +*g_index = g_addr >> I915_GTT_PAGE_SHIFT;
    return 0;
}

@@ -382,7 +382,7 @@
static unsigned long gma_to_ggtt_pte_index(unsigned long gma)
{
    unsigned long x = (gma >> I915_GTT_PAGE_SHIFT);
    trace_gma_index(__func__, gma, x);
    return x;
}

int split_gma(unsigned long gma, struct spt *spt)
{
    ret = ops->get_entry(page_table, e, index, guest,
        -spt->guest_page.gfn << GTT_PAGE_SHIFT,
        +spt->guest_page.gfn << I915_GTT_PAGE_SHIFT,
        spt->vgpu);
    if (ret)
        return ret;
    return ops->set_entry(page_table, e, index, guest,
        -spt->guest_page.gfn << GTT_PAGE_SHIFT,
        +spt->guest_page.gfn << I915_GTT_PAGE_SHIFT,
        spt->vgpu);
}

int gma_to_ggtt(unsigned long gma)
{
    INIT_HLIST_NODE(&p->node);

    -p->mfn = daddr >> GTT_PAGE_SHIFT;
    +p->mfn = daddr >> I915_GTT_PAGE_SHIFT;
    hash_add(vgpu->gtt.shadow_page_hash_table, &p->node, p->mfn);
    return 0;
}

#define pt_entries(spt) 

```c
-(GTT_PAGE_SIZE >> pt_entry_size_shift(spt))
+(I915_GTT_PAGE_SIZE >> pt_entry_size_shift(spt))

#define for_each_present_guest_entry(spt, e, i)
for (i = 0; i < pt_entries(spt); i++)
@@ -1078,8 +1078,8 @@
old.type = new.type = get_entry_type(spt->guest_page_type);
old.val64 = new.val64 = 0;

-for (index = 0; index < (GTT_PAGE_SIZE >> info->gtt_entry_size_shift);
-index++) {
+for (index = 0; index < (I915_GTT_PAGE_SIZE >>
+index++) { 
ops->get_entry(oos_page->mem, &old, index, false, 0, vgpu);
ops->get_entry(NULL, &new, index, true,
oos_page->guest_page->gfn << PAGE_SHIFT, vgpu);
@@ @ -1132,8 +1132,8 @@
struct intel_gvt *gvt = vgpu->gvt;
int ret;

-ret = intel_gvt_hypervisor_read_gpa(vgpu, gpt->gfn << GTT_PAGE_SHIFT,
-oos_page->mem, GTT_PAGE_SIZE);
+ret = intel_gvt_hypervisor_read_gpa(vgpu, gpt->gfn << I915_GTT_PAGE_SHIFT,
+oos_page->mem, I915_GTT_PAGE_SIZE);
if (ret)
return ret;
@@ @ -1418,7 +1418,7 @@
mm->shadow_page_table = mem + mm->page_table_entry_size;
} else if (mm->type == INTEL_GVT_MM_GGTT) {
mm->page_table_entry_cnt =
-(gvt_ggtt_gm_sz(gvt) >> GTT_PAGE_SHIFT);
+(gvt_ggtt_gm_sz(gvt) >> I915_GTT_PAGE_SHIFT);
mm->page_table_entry_size = mm->page_table_entry_cnt *
info->gtt_entry_size;
mem = vzalloc(mm->page_table_entry_size);
@@ @ -1629,7 +1629,7 @@
if (WARN_ON(mm->type != INTEL_GVT_MM_PPGTT))
return;

-atomic_dec(&mm->pincount);
+atomic_dec_if_positive(&mm->pincount);
}

/**
@@ @ -1740,8 +1740,8 @@
gma_ops->gma_to_ggtt_pte_index(gma);
if (ret)
```
goto err;
-gpa = (pte_ops->get_pfn(&e) << GTT_PAGE_SHIFT)
+ (gma & ~GTT_PAGE_MASK);
+gpa = (pte_ops->get_pfn(&e) << I915_GTT_PAGE_SHIFT)
++ (gma & ~I915_GTT_PAGE_MASK);

trace_gma_translate(vgpu->id, "ggtt", 0, 0, gma, gpa);
return gpa;
@@ -1793,8 +1793,8 @@
}
}
-gpa = (pte_ops->get_pfn(&e) << GTT_PAGE_SHIFT)
+ (gma & ~GTT_PAGE_MASK);
+gpa = (pte_ops->get_pfn(&e) << I915_GTT_PAGE_SHIFT)
++ (gma & ~I915_GTT_PAGE_MASK);

trace_gma_translate(vgpu->id, "ppgtt", 0,
mm->page_table_level, gma, gpa);
@@ -1862,7 +1862,7 @@
if (bytes != 4 && bytes != 8)
return -EINVAL;
-gma = g_gtt_index << GTT_PAGE_SHIFT;
+gma = g_gtt_index << I915_GTT_PAGE_SHIFT;

/* the VM may configure the whole GM space when ballooning is used */
if (!vgpu_gmadr_is_valid(vgpu, gma))
@@ -1925,7 +1925,7 @@
{
struct intel_vgpu_gtt *gtt = &vgpu->gtt;
struct intel_gvt_gtt_pte_ops *ops = vgpu->gvt->gtt.pte_ops;
-int page_entry_num = GTT_PAGE_SIZE >>
+int page_entry_num = I915_GTT_PAGE_SIZE >>
gpu-gvt->device_info.gtt_entry_size_shift;
void *scratch_pt;
int i;
@@ -1949,7 +1949,7 @@
return -ENOMEM;
}

vgpu->gtt[type].page_mfn =
-(unsigned long)(daddr >> GTT_PAGE_SHIFT);
+(unsigned long)(daddr >> I915_GTT_PAGE_SHIFT);
vgpu->gtt[type].page = virt_to_page(scratch_pt);
gvt_dbg_mm("vgpu%d create scratch_pt: type %d mfn=0x%lx
", vgpu->id, type, vgpu->gtt[type].page_mfn);
@@ -1992,7 +1992,7 @@
for (i = GTT_TYPE_PPGTT_PTE_PT; i < GTT_TYPE_MAX; i++) {
if (vgpu->gtt.scratch_pt[i].page != NULL) {
    daddr = (dma_addr_t)(vgpu->gtt.scratch_pt[i].page_mfn <<
            -GTT_PAGE_SHIFT);
    +I915_GTT_PAGE_SHIFT);
    dma_unmap_page(dev, daddr, 4096, PCI_DMA_BIDIRECTIONAL);
    __free_page(vgpu->gtt.scratch_pt[i].page);
    vgpu->gtt.scratch_pt[i].page = NULL;
    return -ENOMEM;
}

gvt->gtt.scratch_ggtt_page = virt_to_page(page);
-gvt->gtt.scratch_ggtt_mfn = (unsigned long)(daddr >> GTT_PAGE_SHIFT);
+gvt->gtt.scratch_ggtt_mfn = (unsigned long)(daddr >>
    +I915_GTT_PAGE_SHIFT);

if (enable_out_of_sync) {
    ret = setup_spt_oos(gvt);
    return -2316,7 +2317,7 @@
}

struct device *dev = &gvt->dev_priv->drm.pdev->dev;
-dma_addr_t daddr = (dma_addr_t)(gvt->gtt.scratch_ggtt_mfn <<
    -GTT_PAGE_SHIFT);
+dma_addr_t daddr = (dma_addr_t)(gvt->gtt.scratch_ggtt_mfn <<
    +I915_GTT_PAGE_SHIFT);

dma_unmap_page(dev, daddr, 4096, PCI_DMA_BIDIRECTIONAL);

--- linux-4.15.0.orig/drivers/gpu/drm/i915/gvt/gtt.h
+++ linux-4.15.0/drivers/gpu/drm/i915/gvt/gtt.h
@@ -34,9 +34,7 @@
#ifndef _GVT_GTT_H_
#define _GVT_GTT_H_

-#define GTT_PAGE_SHIFT		12
-#define GTT_PAGE_SIZE		(1UL << GTT_PAGE_SHIFT)
-#define GTT_PAGE_MASK		(~(GTT_PAGE_SIZE-1))
+#define I915_GTT_PAGE_SHIFT         12

struct intel_vgpu_mm;

@@ -243,7 +241,7 @@
 struct list_head list_head;
 struct list_head vm_list;
 int id;
-unsigned char mem[GTT_PAGE_SIZE];
+unsigned char mem[I915_GTT_PAGE_SIZE];
};

#define GTT_ENTRY_NUM_IN_ONE_PAGE 512
/* Aperture/GM space definitions for GVT device */
#define gvt_aperture_sz(gvt) (gvt->dev_priv->ggtt.mappable_end)  
#define gvt_aperture_pa_base(gvt) (gvt->dev_priv->ggtt.mappable_base)  
#define gvt_aperture_pa_base(gvt) (gvt->dev_priv->ggtt.gmadr.start)  
#define gvt_ggtt_gm_sz(gvt) (gvt->dev_priv->ggtt.base.total)  
#define gvt_ggtt_sz(gvt) (gvt->dev_priv->ggtt.base.total)  

#include <linux/vfio.h>
#include <linux/mdev.h>
#include <linux/nospec.h>
#include "i915_drv.h"
#include "gvt.h"

return ret;  
}  

+static inline bool intel_vgpu_in_aperture(struct intel_vgpu *vgpu, uint64_t off) 
+{  
+    off < vgpu_aperture_offset(vgpu) + vgpu_aperture_sz(vgpu);  
+}  
+  
+static int intel_vgpu_aperture_rw(struct intel_vgpu *vgpu, uint64_t off, 
+    void *buf, unsigned long count, bool is_write) 
+{  
+    /* TODO: Implement aperture read/write functionality */  
+}  
+  
+gvt_vgpu_err("Invalid aperture offset %llu\n", off);
return -EINVAL;
+
+aperture_va = io_mapping_map_wc(&vgpu->gvt->dev_priv->ggtt.iomap,
+ALIGN_DOWN(off, PAGE_SIZE),
+count + offset_in_page(off));
+if (!aperture_va)
+return -EINVAL;
+
+if (is_write)
+memcpy(aperture_va + offset_in_page(off), buf, count);
+else
+memcpy(buf, aperture_va + offset_in_page(off), count);
+
+io_mapping_unmap(aperture_va);
+
+return 0;
+
static ssize_t intel_vgpu_rw(struct mdev_device *mdev, char *buf,
size_t count, loff_t *ppos, bool is_write)
{
    @ -798,8 +714,7 @
buf, count, is_write);
break;

case VFIO_PCI_BAR2_REGION_INDEX:
    -ret = intel_vgpu_bar_rw(vgpu, PCI_BASE_ADDRESS_2, pos,
    -buf, count, is_write);
+ret = intel_vgpu_aperture_rw(vgpu, pos, buf, count, is_write);
break;

case VFIO_PCI_BAR1_REGION_INDEX:

caseVFIO_PCI_BAR3_REGION_INDEX:
    @ -817,7 +851,7 @
{
    unsigned int index;
    u64 virtaddr;
    -unsigned long req_size, pgoff = 0;
+unsigned long req_size, pgoff, req_start;
    pgprot_t pg_prot;
    struct intel_vgpu *vgpu = mdev->drvdata(mdev);

    @ -835,7 +869,17 @
    pg_prot = vma->vm_page_prot;
    virtaddr = vma->vm_start;
    req_size = vma->vm_end - vma->vm_start;
    -pgoff = vgpu_aperture_pa_base(vgpu) >> PAGE_SHIFT;
+pgoff = vma->vm_pgoff &
+((1U << (VFIO_PCI_OFFSET_SHIFT - PAGE_SHIFT)) - 1);
+req_start = pgoff << PAGE_SHIFT;
+
+if (!intel_vgpu_in_aperture(vgpu, req_start))
+return -EINVAL;
+if (req_start + req_size >
+ vgpu_aperture_offset(vgpu) + vgpu_aperture_sz(vgpu))
+return -EINVAL;
+
+pgoff = (gvt_aperture_pa_base(vgpu->gvt) >> PAGE_SHIFT) + pgoff;

return remap_pfn_range(vma, virtaddr, pgoff, req_size, pg_prot);
}
@@ -961,7 +1005,8 @@
} else if (cmd == VFIO_DEVICE_GET_REGION_INFO) {
    struct vfio_region_info info;
    struct vfio_info_cap caps = { .buf = NULL, .size = 0 };
-    int i, ret;
+    unsigned int i;
+    int ret;

    struct vfio_region_info_cap_sparse_mmap *sparse = NULL;
    size_t size_t size;
    int nr_areas = 1;
-    @ @ -1038,6 +1083,10 @@
    if (info.index >= VFIO_PCI_NUM_REGIONS +
        vgpu->vdev.num_regions)
    return -EINVAL;
+    info.index =
+    array_index_nospec(info.index,
+    VFIO_PCI_NUM_REGIONS +
+    vgpu->vdev.num_regions);

    i = info.index - VFIO_PCI_NUM_REGIONS;

    @ @ -1161,7 +1210,7 @@
    return 0;
}

-return 0;
+return -ENOTTY;

static ssize_t
--- linux-4.15.0.orig/drivers/gpu/drm/i915/gvt/mmio.c
+++ linux-4.15.0/drivers/gpu/drm/i915/gvt/mmio.c
@@ -56,38 +56,6 @@
    (reg >= gvt->device_info.gtt_start_offset \
     && reg < gvt->device_info.gtt_start_offset + gvt_ggtt_sz(gvt))
-static bool vgpu_gpa_is_aperture(struct intel_vgpu *vgpu, uint64_t gpa)
-{
-    u64 aperture_gpa = intel_vgpu_get_bar_gpa(vgpu, PCI_BASE_ADDRESS_2);
-    u64 aperture_sz = vgpu_aperture_sz(vgpu);
-    return gpa >= aperture_gpa && gpa < aperture_gpa + aperture_sz;
-}
-
-static int vgpu_aperture_rw(struct intel_vgpu *vgpu, uint64_t gpa,
-    void *pdata, unsigned int size, bool is_read)
-{
-    u64 aperture_gpa = intel_vgpu_get_bar_gpa(vgpu, PCI_BASE_ADDRESS_2);
-    u64 offset = gpa - aperture_gpa;
-    if (!vgpu_gpa_is_aperture(vgpu, gpa + size - 1)) {
-        gvt_vgpu_err("Aperture rw out of range, offset %llx, size %d\n",
-            offset, size);
-        return -EINVAL;
-    }
-    if (!vgpu->gm.aperture_va) {
-        gvt_vgpu_err("BAR is not enabled\n");
-        return -ENXIO;
-    }
-    if (is_read)
-        memcpy(pdata, vgpu->gm.aperture_va + offset, size);
-    else
-        memcpy(vgpu->gm.aperture_va + offset, pdata, size);
-    return 0;
-}
-
-static void failsafe_emulate_mmio_rw(struct intel_vgpu *vgpu, uint64_t pa,
void *p_data, unsigned int bytes, bool read)
{
    @@ -164,12 +132,6 @@
    mutex_lock(&gvt->lock);
    -if (vgpu_gpa_is_aperture(vgpu, pa)) {
    -ret = vgpu_aperture_rw(vgpu, pa, p_data, bytes, true);
    -mutex_unlock(&gvt->lock);
    -return ret;
    -}
    -
    if (atomic_read(&vgpu->gtt.n_write_protected_guest_page)) {
        struct intel_vgpu_guest_page *gp;
mutex_lock(&gvt->lock);

-if (vgpu_gpa_is_aperture(vgpu, pa)) {
- ret = vgpu_aperture_rw(vgpu, pa, p_data, bytes, false);
- mutex_unlock(&gvt->lock);
- return ret;
-}
-
if (atomic_read(&vgpu->gtt.n_write_protected_guest_page)) {
struct intel_vgpu_guest_page *gp;

--- linux-4.15.0.orig/drivers/gpu/drm/i915/gvt/reg.h
+++ linux-4.15.0/drivers/gpu/drm/i915/gvt/reg.h
@@ -71,6 +71,7 @@
#define RB_HEAD_OFF_MASK ((1U << 21) - (1U << 2))
#define RB_TAIL_OFF_MASK ((1U << 21) - (1U << 3))
#define RB_TAIL_SIZE_MASK ((1U << 21) - (1U << 12))
-#define _RING_CTL_BUF_SIZE(ctl) (((ctl) & RB_TAIL_SIZE_MASK) + GTT_PAGE_SIZE)
+#define _RING_CTL_BUF_SIZE(ctl) (((ctl) & RB_TAIL_SIZE_MASK) + I915_GTT_PAGE_SIZE)
+i915_GTT_PAGE_SIZE)

#endif
--- linux-4.15.0.orig/drivers/gpu/drm/i915/gvt/scheduler.c
+++ linux-4.15.0/drivers/gpu/drm/i915/gvt/scheduler.c
@@ -81,7 +81,7 @@
while (i < context_page_num) {
context_gpa = intel_vgpu_gma_to_gpa(vgpu->gtt.ggtt_mm,
(u32)((workload->ctx_desc.lrca + i) <<
- GTT_PAGE_SHIFT));
+I915_GTT_PAGE_SHIFT));
if (context_gpa == INTEL_GVT_INVALID_ADDR) {
gvt_vgpu_err("Invalid guest context descriptor\n");
return -EINVAL;
@@ -90,7 +90,7 @@
page = i915_gem_object_get_page(ctx_obj, LRC_HEADER_PAGES + i);
dst = kmap(page);
intel_gvt_hypervisor_read_gpa(vgpu, context_gpa, dst,
- GTT_PAGE_SIZE);
+i915_GTT_PAGE_SIZE);
kunmap(page);
i++;
}
@@ -120,7 +120,7 @@
sizeof(*shadow_ring_context),
( void *)shadow_ring_context +
 sizeof(*shadow_ring_context),
-GTT_PAGE_SIZE - sizeof(*shadow_ring_context));
+i915_GTT_PAGE_SIZE - sizeof(*shadow_ring_context));

kunmap(page);
return 0;
@@ -483,7 +483,7 @@
while (i < context_page_num) {
    context_gpa = intel_vgpu_gma_to_gpa(vgpu->gtt.ggtt_mm,
        (u32)((workload->ctx_desc.lrca + i) <<
-GTT_PAGE_SHIFT));
+i915_GTT_PAGE_SHIFT));
    if (context_gpa == INTEL_GVT_INVALID_ADDR) {
        gvt_vgpu_err("invalid guest context descriptor\n");
        return;
@@ -492,7 +492,7 @@
    page = i915_gem_object_get_page(ctx_obj, LRC_HEADER_PAGES + i);
    src = kmap(page);
    intel_gvt_hypervisor_write_gpa(vgpu, context_gpa, src,
-GTT_PAGE_SIZE);
+i915_GTT_PAGE_SIZE);
    kunmap(page);
    i++;
}@@ -517,7 +517,7 @@
 sizeof(*shadow_ring_context),
     (void *)shadow_ring_context +
     sizeof(*shadow_ring_context),
-GTT_PAGE_SIZE - sizeof(*shadow_ring_context));
+i915_GTT_PAGE_SIZE - sizeof(*shadow_ring_context));

kunmap(page);
}
@@ -760,8 +760,6 @@
if (INTEL_INFO(vgpu->gvt->dev_priv)->has_logical_ring_preemption)
    vgpu->shadow_ctx->priority = INT_MAX;
    -
    bitmap_zero(vgpu->shadow_ctx_desc_updated, I915_NUM_ENGINES);

return 0;
--- linux-4.15.0.orig/drivers/gpu/drm/i915/gvt/vgpu.c
+++ linux-4.15.0/drivers/gpu/drm/i915/gvt/vgpu.c
@@ -513,9 +513,9 @@
 intel_vgpu_reset_mmio(vgpu, dmlr);
 populate_pvinfo_page(vgpu);
-intel_vgpu_reset_display(vgpu);
if (dmlr) {
    intel_vgpu_reset_display(vgpu);
    intel_vgpu_reset_cfg_space(vgpu);
    /* only reset the failsafe mode when dmlr reset */
    vgpu->failsafe = false;
}

#include "i915_drv.h"
+#include "intel_ringbuffer.h"

/**
 * DOC: batch buffer command parser
@@ -101,8 +100,6 @@
    * CMD_DESC_REJECT: The command is never allowed
    * CMD_DESC_REGISTER: The command should be checked against the
register whitelist for the appropriate ring

* CMD_DESC_MASTER: The command is allowed if the submitting process
  * is the DRM master
  */

u32 flags;
#define CMD_DESC_FIXED (1<<0)
#define CMD_DESC_REJECT (1<<2)
#define CMD_DESC_REGISTER (1<<3)
#define CMD_DESC_BITMASK (1<<4)
#define CMD_DESC_MASTER (1<<5)

/* The command's unique identification bits and the bitmask to get them. */
#define CMD(op, opm, f, lm, fl, ...) {
  .flags = (fl) | ((f) ? CMD_DESC_FIXED : 0),
  .cmd = { (op), ~0u << (opm) },
  .length = { (lm) },
  __VA_ARGS__
}

#define R CMD_DESC_REJECT
#define W CMD_DESC_REGISTER
#define B CMD_DESC_BITMASK
#define M CMD_DESC_MASTER

/* Command                          Mask   Fixed Len   Action */
----------------------------------------------------------

static const struct drm_i915_cmd_descriptor common_cmds[] = {
  CMD( MI_NOOP,                          SMI,    F,  1,      S  ),
  CMD( MI_USER_INTERRUPT,                SMI,    F,  1,      R  ),
  CMD( MI_WAIT_FOR_EVENT,                SMI,    F,  1,      M  ),
  CMD( MI_ARB_CHECK,                     SMI,    F,  1,      S  ),
  CMD( MI_REPORT_HEAD,                   SMI,    F,  1,      S  ),
  CMD( MI_SUSPEND_FLUSH,                 SMI,    F,  1,      S  ),
  CMD( MI_BATCH_BUFFER_START,            SMI,    F,  1,      S  ),
}@ -243,7 +238,7 @@
};

static const struct drm_i915_cmd_descriptor render_cmds[] = {
  CMD( MI_FLUSH,                         SMI,    F,  1,      S  ),
  CMD( MI_ARB_ON_OFF,                    SMI,    F,  1,      R  ),
};
CMD(  MI_PREDICATE,  SMI,  F,  1,  S ),
@@ -310,7 +305,7 @@
  CMD(  MI_URB_ATOMIC_ALLOC,  SMI,  F,  1,  S ),
CMD(  MI_SET_APPID,  SMI,  F,  1,  S ),
CMD(  MI_RS_CONTEXT,  SMI,  F,  1,  S ),
-CMD(  MI_LOAD_SCAN_LINES_INCL,  SMI,  !F,  0x3F,  M ),
+CMD(  MI_LOAD_SCAN_LINES_INCL,  SMI,  !F,  0x3F,  R ),
    CMD(  MI_LOAD_SCAN_LINES_EXCL,  SMI,  !F,  0x3F,  R ),
    CMD(  MI_LOAD_REGISTER_REG,  SMI,  !F,  0xFF,  W,    
        .reg = { .offset = 1, .mask = 0x007FFFFC, .step = 1 }  ),
@@ -327,7 +322,7 @@
    CMD(  GFX_OP_3DSTATE_BINDING_TABLE_EDIT_PS,  S3D,  !F,  0x1FF,  S ),
};

-static const struct drm_i915_cmd_descriptor video_cmds[] = {
+static const struct drm_i915_cmd_descriptor gen7_video_cmds[] = {
    CMD(  MI_ARB_ON_OFF,  SMI,  F,  1,  R ),
    CMD(  MI_SET_APPID,  SMI,  F,  1,  S ),
    CMD(  MI_STORE_DWORD_IMM,  SMI,  !F,  0xFF,  B,    
        @@ -371,7 +366,7 @@
    CMD(  MFX_WAIT,  SMFX,  F,  1,  S ),
};

-static const struct drm_i915_cmd_descriptor vecs_cmds[] = {
+static const struct drm_i915_cmd_descriptor gen7_vecs_cmds[] = {
    CMD(  MI_ARB_ON_OFF,  SMI,  F,  1,  R ),
    CMD(  MI_SET_APPID,  SMI,  F,  1,  S ),
    CMD(  MI_STORE_DWORD_IMM,  SMI,  !F,  0xFF,  B,    
@@ -409,7 +404,7 @@
    }},  ),
};

-static const struct drm_i915_cmd_descriptor blt_cmds[] = {
+static const struct drm_i915_cmd_descriptor gen7_blt_cmds[] = {
    CMD(  MI_DISPLAY_FLIP,  SMI,  !F,  0xFF,  R ),
    CMD(  MI_STORE_DWORD_IMM,  SMI,  !F,  0x3FF,  B,    
        .bits = {{    
@@ -443,10 +438,64 @@
        }},  ),
    CMD(  MI_LOAD_SCAN_LINES_INCL,  SMI,  !F,  0x3F,  M ),
    CMD(  MI_LOAD_SCAN_LINES_INCL,  SMI,  !F,  0x3F,  R ),
    CMD(  MI_LOAD_SCAN_LINES_EXCL,  SMI,  !F,  0x3F,  R ),
};

 static const struct drm_i915_cmd_descriptor hsw_blt_cmds[] = {
-CMD(  MI_LOAD_SCAN_LINES_INCL,  SMI,  !F,  0x3F,  M ),
+CMD(  MI_LOAD_SCAN_LINES_INCL,  SMI,  !F,  0x3F,  R ),
    CMD(  MI_LOAD_SCAN_LINES_EXCL,  SMI,  !F,  0x3F,  R ),
};

+/*
  + * For Gen9 we can still rely on the h/w to enforce cmd security, and only

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need to re-enforce the register access checks. We therefore only need to
teach the cmdparser how to find the end of each command, and identify
register accesses. The table doesn't need to reject any commands, and so
the only commands listed here are:

1) Those that touch registers
2) Those that do not have the default 8-bit length

Note that the default MI length mask chosen for this table is 0xFF, not
the 0x3F used on older devices. This is because the vast majority of MI
cmds on Gen9 use a standard 8-bit Length field.
All the Gen9 blitter instructions are standard 0xFF length mask, and
none allow access to non-general registers, so in fact no BLT cmds are
included in the table at all.

static const struct drm_i915_cmd_descriptor gen9_blt_cmds[] = {
    CMD( MI_NOOP,                          SMI,    F,  1,      S  ),
    CMD( MI_USER_INTERRUPT,                SMI,    F,  1,      S  ),
    CMD( MI_WAIT_FOR_EVENT,                SMI,    F,  1,      S  ),
    CMD( MI_FLUSH,                         SMI,    F,  1,      S  ),
    CMD( MI_ARB_CHECK,                     SMI,    F,  1,      S  ),
    CMD( MI_REPORT_HEAD,                   SMI,    F,  1,      S  ),
    CMD( MI_ARB_ON_OFF,                    SMI,    F,  1,      S  ),
    CMD( MI_SUSPEND_FLUSH,                 SMI,    F,  1,      S  ),
    CMD( MI_LOAD_SCAN_LINES_INCL,          SMI,   !F,  0x3F,   S  ),
    CMD( MI_LOAD_SCAN_LINES_EXCL,          SMI,   !F,  0x3F,   S  ),
    CMD( MI_LOAD_REGISTER_IMM(1),          SMI,   !F,  0xFF,   W,
        .reg = { .offset = 1, .mask = 0x007FFFFC, .step = 2 }    ),
    CMD( MI_UPDATE_GTT,                    SMI,   !F,  0x3FF,  S  ),
    CMD( MI_STORE_REGISTER_MEM_GEN8,       SMI,    F,  4,      W,
        .reg = { .offset = 1, .mask = 0x007FFFFC }               ),
    CMD( MI_FLUSH_DW,                      SMI,   !F,  0x3F,   S  ),
    CMD( MI_LOAD_REGISTER_MEM_GEN8,        SMI,    F,  4,      W,
        .reg = { .offset = 1, .mask = 0x007FFFFC }               ),
    CMD( MI_LOAD_REGISTER_REG,             SMI,    !F,  0xFF,  W,
        .reg = { .offset = 1, .mask = 0x007FFFFC, .step = 1 }    ),
    /*
     * We allow BB_START but apply further checks. We just sanitize the
     * basic fields here.
     */
#define MI_BB_START_OPERAND_MASK   GENMASK(SMI-1, 0)
#define MI_BB_START_OPERAND_EXPECT (MI_BATCH_PPGTT_HSW | 1)
    CMD( MI_BATCH_BUFFER_START_GEN8,       SMI,    !F,  0xFF,  B,
        .bits = { { .offset = 0, .mask = MI_BB_START_OPERAND_MASK, }, } ),
};
static const struct drm_i915_cmd_table gen7_render_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { render_cmds, ARRAY_SIZE(render_cmds) },
+
    static const struct drm_i915_cmd_table gen7_render_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_render_cmds, ARRAY_SIZE(gen7_render_cmds) },
    };

static const struct drm_i915_cmd_table gen7_video_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { video_cmds, ARRAY_SIZE(video_cmds) },
+
    static const struct drm_i915_cmd_table gen7_video_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_video_cmds, ARRAY_SIZE(gen7_video_cmds) },
    };

static const struct drm_i915_cmd_table hsw_vebox_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { vecs_cmds, ARRAY_SIZE(vecs_cmds) },
+
    static const struct drm_i915_cmd_table hsw_vebox_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_vecs_cmds, ARRAY_SIZE(gen7_vecs_cmds) },
    };

static const struct drm_i915_cmd_table gen7_blt_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { expected = MI_BB_START_OPERAND_EXPECT, }},
+    
    static const struct drm_i915_cmd_descriptor noop_desc =
    CMD(MI_NOOP, SMI, F, 1, S);

static const struct drm_i915_cmd_table hsw_render_ring_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { render_cmds, ARRAY_SIZE(render_cmds) },
+
    static const struct drm_i915_cmd_table hsw_render_ring_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_render_cmds, ARRAY_SIZE(gen7_render_cmds) },
        { hsw_render_cmds, ARRAY_SIZE(hsw_render_cmds) },
    };

static const struct drm_i915_cmd_table gen7_video_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { video_cmds, ARRAY_SIZE(video_cmds) },
+
    static const struct drm_i915_cmd_table gen7_video_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_video_cmds, ARRAY_SIZE(gen7_video_cmds) },
    };

static const struct drm_i915_cmd_table hsw_vebox_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { vecs_cmds, ARRAY_SIZE(vecs_cmds) },
+
    static const struct drm_i915_cmd_table hsw_vebox_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_vecs_cmds, ARRAY_SIZE(gen7_vecs_cmds) },
    };

static const struct drm_i915_cmd_table gen7_blt_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { expected = MI_BB_START_OPERAND_EXPECT, }},
+    
    static const struct drm_i915_cmd_descriptor noop_desc =
    CMD(MI_NOOP, SMI, F, 1, S);

static const struct drm_i915_cmd_table gen7_video_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { video_cmds, ARRAY_SIZE(video_cmds) },
+
    static const struct drm_i915_cmd_table gen7_video_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_video_cmds, ARRAY_SIZE(gen7_video_cmds) },
    };

static const struct drm_i915_cmd_table hsw_vebox_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { vecs_cmds, ARRAY_SIZE(vecs_cmds) },
+
    static const struct drm_i915_cmd_table hsw_vebox_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_vecs_cmds, ARRAY_SIZE(gen7_vecs_cmds) },
    };

static const struct drm_i915_cmd_table gen7_blt_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { expected = MI_BB_START_OPERAND_EXPECT, }},
+    
    static const struct drm_i915_cmd_descriptor noop_desc =
    CMD(MI_NOOP, SMI, F, 1, S);
static const struct drm_i915_cmd_table gen7_blt_cmd_table[] = {
    { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
    { gen7_blt_cmds, ARRAY_SIZE(gen7_blt_cmds) },
};

static const struct drm_i915_cmd_table hsw_blt_ring_cmds[] = {
    { common_cmds, ARRAY_SIZE(common_cmds) },
    { blt_cmds, ARRAY_SIZE(blt_cmds) },
    static const struct drm_i915_cmd_table hsw_blt_ring_cmd_table[] = {
        { gen7_common_cmds, ARRAY_SIZE(gen7_common_cmds) },
        { gen7_blt_cmds, ARRAY_SIZE(gen7_blt_cmds) },
        { hsw_blt_cmds, ARRAY_SIZE(hsw_blt_cmds) },
    };

static const struct drm_i915_cmd_table gen9_blt_cmd_table[] = {
    { gen9_blt_cmds, ARRAY_SIZE(gen9_blt_cmds) },
};

/*
 * Register whitelists, sorted by increasing register offset.
 */
#define REG32(_reg, ...) \
    { .addr = (_reg), __VA_ARGS__ }

#define REG32_IDX(_reg, idx) \
    { .addr = _reg(idx) }

/*
 * Convenience macro for adding 64-bit registers.
 *
 * @ @ -517,6 +570,9 @ @
 #define REG32(_reg, ...) \
  { .addr = (_reg), __VA_ARGS__ } 

#define REG32_ID(_reg, idx) \
  { .addr = _reg(idx) } 

/*
 * Convenience macro for adding 64-bit registers.
 *
 * @ @ -609,17 +665,28 @ @
 REG64_ID(RING_TIMESTAMP, BLT_RING_BASE),
};

static const struct drm_i915_reg_descriptor ivb_master_regs[] = {
    REG32(FORCEWAKE_MT),
    REG32(DERRMR),
    REG32(GEN7PIPE_DE_LOAD_SL(PIPE_A)),
    REG32(GEN7PIPE_DE_LOAD_SL(PIPE_B)),
    REG32(GEN7PIPE_DE_LOAD_SL(PIPE_C)),
};

- static const struct drm_i915_reg_descriptor hsw_master_regs[] = {
    -REG32(FORCEWAKE_MT),
    -REG32(DERRMR),

static const struct drm_i915_reg_descriptor gen9_blt_regs[] = {
+REG64_IDX(RING_TIMESTAMP, RENDER_RING_BASE),
+REG64_IDX(RING_TIMESTAMP, BSD_RING_BASE),
+REG32(BCS_SWCTRL),
+REG64_IDX(RING_TIMESTAMP, BLT_RING_BASE),
+REG32_IDX(RING_CTX_TIMESTAMP, BLT_RING_BASE),
+REG64_IDX(BCS_GPR, 0),
+REG64_IDX(BCS_GPR, 1),
+REG64_IDX(BCS_GPR, 2),
+REG64_IDX(BCS_GPR, 3),
+REG64_IDX(BCS_GPR, 4),
+REG64_IDX(BCS_GPR, 5),
+REG64_IDX(BCS_GPR, 6),
+REG64_IDX(BCS_GPR, 7),
+REG64_IDX(BCS_GPR, 8),
+REG64_IDX(BCS_GPR, 9),
+REG64_IDX(BCS_GPR, 10),
+REG64_IDX(BCS_GPR, 11),
+REG64_IDX(BCS_GPR, 12),
+REG64_IDX(BCS_GPR, 13),
+REG64_IDX(BCS_GPR, 14),
+REG64_IDX(BCS_GPR, 15),
};

#undef REG64
@@ -628,28 +695,27 @@
struct drm_i915_reg_table {
  const struct drm_i915_reg_descriptor *regs;
  int num_regs;
  -bool master;
};

static const struct drm_i915_reg_table ivb_render_reg_tables[] = {
  -{ gen7_render_regs, ARRAY_SIZE(gen7_render_regs), false },
-  -{ ivb_master_regs, ARRAY_SIZE(ivb_master_regs), true },
+  +{ gen7_render_regs, ARRAY_SIZE(gen7_render_regs) },
};

static const struct drm_i915_reg_table ivb_blt_reg_tables[] = {
  -{ gen7_blt_regs, ARRAY_SIZE(gen7_blt_regs), false },
-  -{ ivb_master_regs, ARRAY_SIZE(ivb_master_regs), true },
+  +{ gen7_blt_regs, ARRAY_SIZE(gen7_blt_regs) },
};

static const struct drm_i915_reg_table hsw_render_reg_tables[] = {
  -{ gen7_render_regs, ARRAY_SIZE(gen7_render_regs), false },
-  -{ hsw_render_regs, ARRAY_SIZE(hsw_render_regs), false },
-  -{ hsw_master_regs, ARRAY_SIZE(hsw_master_regs), true },
};
static const struct drm_i915_reg_table hsw_blt_reg_tables[] = {
	{ gen7_blt_regs, ARRAY_SIZE(gen7_blt_regs), false },
	{ hsw_master_regs, ARRAY_SIZE(hsw_master_regs), true },
	{ gen7_blt_regs, ARRAY_SIZE(gen7_blt_regs) },
};

static const struct drm_i915_reg_table gen9_blt_reg_tables[] = {
	{ gen9_blt_regs, ARRAY_SIZE(gen9_blt_regs) },
};

static u32 gen7_render_get_cmd_length_mask(u32 cmd_header)
@@ -707,6 +773,17 @@
    return 0;
 }

+static u32 gen9_blt_get_cmd_length_mask(u32 cmd_header)
+{
+    u32 client = cmd_header >> INSTR_CLIENT_SHIFT;
+    +if (client == INSTR_MI_CLIENT || client == INSTR_BC_CLIENT)
+        return 0xFF;
+    +DRM_DEBUG_DRIVER("CMD: Abnormal blt cmd length! 0x%08X\n", cmd_header);
+        return 0;
+    +}
+    +static bool validate_cmds_sorted(const struct intel_engine_cs *engine,
+    const struct drm_i915_cmd_table *cmd_tables,
+    int cmd_table_count)
@@ -798,22 +875,15 @@
    */
 static inline u32 cmd_header_key(u32 x)
 {
-    u32 shift;
-    switch (x >> INSTR_CLIENT_SHIFT) {
        default:
            case INSTR_MI_CLIENT:
                -shift = STD_MI_OPCODE_SHIFT;
                -break;
                +return x >> STD_MI_OPCODE_SHIFT;
            case INSTR_RC_CLIENT:
                -shift = STD_3D_OPCODE_SHIFT;
                -break;
                +break;
+return x >> STD_3D_OPCODE_SHIFT;
case INSTR_BC_CLIENT:
-shift = STD_2D_OPCODE_SHIFT;
-break;
+return x >> STD_2D_OPCODE_SHIFT;
{
-
-return x >> shift;
}

static int init_hash_table(struct intel_engine_cs *engine,
@@ -871,18 +941,19 @@
int cmd_table_count;
int ret;

-if (!IS_GEN7(engine->i915))
+if (!IS_GEN7(engine->i915) && !(IS_GEN9(engine->i915) &&
+engine->id == BCS))
return;

switch (engine->id) {
case RCS:
if (IS_HASWELL(engine->i915)) {
-cmd_tables = hsw_render_ring_cmds;
+cmd_tables = hsw_render_ring_cmd_table;
-cmd_table_count =
+ARRAY_SIZE(hsw_render_ring_cmds);
+ARRAY_SIZE(hsw_render_ring_cmd_table);
} else {
-cmd_tables = gen7_render_cmds;
-cmd_table_count = ARRAY_SIZE(gen7_render_cmds);
+cmd_tables = gen7_render_cmd_table;
+cmd_table_count = ARRAY_SIZE(gen7_render_cmd_table);
}

if (IS_HASWELL(engine->i915)) {
@ @ -892,36 +963,46 @@
engine->reg_tables = ivb_render_reg_tables;
engine->reg_table_count = ARRAY_SIZE(ivb_render_reg_tables);
}
-
engine->get_cmd_length_mask = gen7_render_get_cmd_length_mask;
break;
case VCS:
-cmd_tables = gen7_video_cmds;
-cmd_table_count = ARRAY_SIZE(gen7_video_cmds);
+cmd_tables = gen7_video_cmd_table;
+cmd_table_count = ARRAY_SIZE(gen7_video_cmd_table);
engine->get_cmd_length_mask = gen7_bsd_get_cmd_length_mask;
break;
case BCS:
   -if (IS_HASWELL(engine->i915)) {
       -cmd_tables = hsw_blt_ring_cmds;
       -cmd_table_count = ARRAY_SIZE(hsw_blt_ring_cmds);
       +engine->get_cmd_length_mask = gen7_blt_get_cmd_length_mask;
       +if (IS_GEN9(engine->i915)) {
           +cmd_tables = gen9_blt_cmd_table;
           +cmd_table_count = ARRAY_SIZE(gen9_blt_cmd_table);
           +engine->get_cmd_length_mask =
           +gen9_blt_get_cmd_length_mask;
           +/* BCS Engine unsafe without parser */
           +engine->flags |= I915_ENGINE_REQUIRES_CMD_PARSER;
       +} else if (IS_HASWELL(engine->i915)) {
           +cmd_tables = hsw_blt_ring_cmd_table;
           +cmd_table_count = ARRAY_SIZE(hsw_blt_ring_cmd_table);
       }
   -
   -if (IS_HASWELL(engine->i915)) {
       -if (IS_GEN9(engine->i915)) {
           -engine->reg_tables = gen9_blt_reg_tables;
           -engine->reg_table_count =
           -ARRAY_SIZE(gen9_blt_reg_tables);
       -} else if (IS_HASWELL(engine->i915)) {
           -engine->reg_tables = hsw_blt_reg_tables;
           -engine->reg_table_count = ARRAY_SIZE(hsw_blt_reg_tables);
       -} else {
           -engine->reg_tables = ivb_blt_reg_tables;
           -engine->reg_table_count = ARRAY_SIZE(ivb_blt_reg_tables);
       -
       -engine->get_cmd_length_mask = gen7_blt_get_cmd_length_mask;
   }

   -if (IS_HASWELL(engine->i915)) {
       +if (IS_GEN9(engine->i915)) {
           +engine->reg_tables = gen9_blt_reg_tables;
           +engine->reg_table_count =
           +ARRAY_SIZE(gen9_blt_reg_tables);
       +} else if (IS_HASWELL(engine->i915)) {
           +engine->reg_tables = hsw_blt_reg_tables;
           +engine->reg_table_count = ARRAY_SIZE(hsw_blt_reg_tables);
       +} else {
           +engine->reg_tables = ivb_blt_reg_tables;
           +engine->reg_table_count = ARRAY_SIZE(ivb_blt_reg_tables);
       +
       -engine->get_cmd_length_mask = gen7_blt_get_cmd_length_mask;
   }
break;
case VECS:
   -cmd_tables = hsw_vebox_cmds;
   -cmd_table_count = ARRAY_SIZE(hsw_vebox_cmds);
   +cmd_tables = hsw_vebox_cmd_table;
   +cmd_table_count = ARRAY_SIZE(hsw_vebox_cmd_table);
   /* VECS can use the same length_mask function as VCS */
   engine->get_cmd_length_mask = gen7_bsd_get_cmd_length_mask;
   break;
engine->needs_cmd_parser = true;
+engine->flags |= I915_ENGINE_USING_CMD_PARSER;
}

/**
 * void intel_engine_cleanup_cmd_parser(struct intel_engine_cs *engine)
 * 
 * Returns a vmap'd pointer to dst_obj, which the caller must unmap */

static bool check_cmd(const struct intel_engine_cs *engine,
    const struct drm_i915_cmd_descriptor *desc,
    const u32 *cmd, u32 length,
    const bool is_master)
{
    if (desc->flags & CMD_DESC_SKIP)
        return true;
@@ -1144,12 +1218,6 @@
    return false;
}

-if ((desc->flags & CMD_DESC_MASTER) && !is_master) {
    DRM_DEBUG_DRIVER("CMD: Rejected master-only command: 0x%08X\n", *cmd);
    return false;
    -}
    -
    if (desc->flags & CMD_DESC_REGISTER) {
        /*
        * Get the distance between individual register offset
@@ -1163,7 +1231,7 @@
        offset += step) {
            const u32 reg_addr = cmd[offset] & desc->reg.mask;
            const struct drm_i915_reg_descriptor *reg =
                -find_reg(engine, is_master, reg_addr);
                +find_reg(engine, reg_addr);

            if (!reg) {
                DRM_DEBUG_DRIVER("CMD: Rejected register 0x%08X in command: 0x%08X (%s)\n", @ @ -1218,6 +1286,12 @@
                    continue;
                }
        */
+        if (desc->bits[i].offset >= length) {
+            DRM_DEBUG_DRIVER("CMD: Rejected command 0x%08X, too short to check bitmask (%s)\n", + *cmd, engine->name);
+            return false;
+        }
+        dword = cmd[desc->bits[i].offset] &
+            desc->bits[i].mask;

@@ -1235,16 +1309,112 @@
            return true;
        }
    }

+static int check_bbstart(const struct i915_gem_context *ctx,
+ u32 *cmd, u32 offset, u32 length,
+ u32 batch_len,
+ u64 batch_start,
+ u64 shadow_batch_start)
+
+u64 jump_offset, jump_target;
+u32 target_cmd_offset, target_cmd_index;
+
+/* For igt compatibility on older platforms */
+if (CMDPARSER_USES_GGTT(ctx->i915)) {
+DRM_DEBUG("CMD: Rejecting BB_START for ggtt based submission\n");
+return -EACCES;
+
+
+if (length != 3) {
+DRM_DEBUG("CMD: Recursive BB_START with bad length(%u)\n",
+  length);
+return -EINVAL;
+
+
+jump_target = *(u64*)(cmd+1);
+jump_offset = jump_target - batch_start;
+
+/*
+ * Any underflow of jump_target is guaranteed to be outside the range
+ * of a u32, so >= test catches both too large and too small
+ */
+if (jump_offset >= batch_len) {
+DRM_DEBUG("CMD: BB_START to 0x%llx jumps out of BB\n",
+  jump_target);
+return -EINVAL;
+
+
+/*
+ * This cannot overflow a u32 because we already checked jump_offset
+ * is within the BB, and the batch_len is a u32
+ */
+target_cmd_offset = lower_32_bits(jump_offset);
+target_cmd_index = target_cmd_offset / sizeof(u32);
+
+*(u64*)(cmd + 1) = shadow_batch_start + target_cmd_offset;
+
+if (target_cmd_index == offset)
+return 0;
+
+if (ctx->jump_whitelist_cmds <= target_cmd_index) {
+DRM_DEBUG("CMD: Rejecting BB_START - truncated whitelist array\n");
+return -EINVAL;
+} else if (!test_bit(target_cmd_index, ctx->jump_whitelist)) {
  +DRM_DEBUG("CMD: BB_START to 0x%llx not a previously executed cmd\n",
  + jump_target);
  +return -EINVAL;
  +}
  +
  +return 0;
  +}
  +
  +static void init_whitelist(struct i915_gem_context *ctx, u32 batch_len)
  +{
  +-+const u32 batch_cmds = DIV_ROUND_UP(batch_len, sizeof(u32));
  +-+const u32 exact_size = BITS_TO_LONGS(batch_cmds);
  ++u32 next_size = BITS_TO_LONGS(roundup_pow_of_two(batch_cmds));
  +-unsigned long *next_whitelist;
  +-+if (CMDPARSER_USES_GGTT(ctx->i915))
  +-+return;
  +-+if (batch_cmds <= ctx->jump_whitelist_cmds) {
  + +#+bitmap_zero(ctx->jump_whitelist, batch_cmds);
  ++return;
  ++}
  ++again:
  ++next_whitelist = kcalloc(next_size, sizeof(long), GFP_KERNEL);
  ++if (next_whitelist) {
  ++kfree(ctx->jump_whitelist);
  ++ctx->jump_whitelist = next_whitelist;
  ++ctx->jump_whitelist_cmds =
  ++next_size * BITS_PER_BYTE * sizeof(long);
  ++return;
  ++}
  ++if (next_size > exact_size) {
  ++next_size = exact_size;
  ++goto again;
  ++}
  +)
  +
  ++DRM_DEBUG("CMD: Failed to extend whitelist. BB_START may be disallowed\n");
  ++bitmap_zero(ctx->jump_whitelist, ctx->jump_whitelist_cmds);
  ++
  ++return;
  +}
  +
  +#define LENGTH_BIAS 2

/**
* i915_parse_cmds() - parse a submitted batch buffer for privilege violations
+ * @ctx: the context in which the batch is to execute
* @engine: the engine on which the batch is to execute
* @batch_obj: the batch buffer in question
- * @shadow_batch_obj: copy of the batch buffer in question
+ * @batch_start: Canonical base address of batch
* @batch_start_offset: byte offset in the batch at which execution starts
- * @is_master: length of the commands in batch_obj
+ * @shadow_batch_obj: copy of the batch buffer in question
+ * @shadow_batch_start: Canonical base address of shadow_batch_obj
+
* Parses the specified batch buffer looking for privilege violations as
* described in the overview.
@ @ -1252,14 +1422,17 @@
+ * Return: non-zero if the parser finds violations or otherwise fails; -EACCES
+ * if the batch appears legal but should use hardware parsing
+ */
-int intel_engine_cmd_parser(struct intel_engine_cs *engine,
+ int intel_engine_cmd_parser(struct i915_gem_context *ctx,
+ struct intel_engine_cs *engine,
+ struct drm_i915_gem_object *batch_obj,
- struct drm_i915_gem_object *shadow_batch_obj,
+ u64 batch_start,
+ u32 batch_start_offset,
+ u32 batch_len,
- bool is_master)
+ struct drm_i915_gem_object *shadow_batch_obj,
+ u64 shadow_batch_start)
{
- u32 *cmd, *batch_end;
+ u32 *cmd, *batch_end, offset = 0;
 struct drm_i915_cmd_descriptor default_desc = noop_desc;
 const struct drm_i915_cmd_descriptor *desc = &default_desc;
 bool needs_clflush_after = false;
 @ @ -1273,6 +1446,8 @@
 return PTR_ERR(cmd);
 }

+init_whitelist(ctx, batch_len);
+
/ *
* We use the batch length as size because the shadow object is as
* large or larger and copy_batch() will write MI_NOPs to the extra
@ @ -1282,31 +1457,15 @@
do {
 u32 length:
-if (*cmd == MI_BATCH_BUFFER_END) {
- \ if (needs_clflush_after) {
- \ void *ptr = page_mask_bits(shadow_batch_obj->mm.mapping);
- \ drm_clflush_virt_range(ptr,
- \ \ \ \ (void *)(cmd + 1) - ptr);
- \}
+if (*cmd == MI_BATCH_BUFFER_END)
\ break;
- \}

\ desc = find_cmd(engine, *cmd, desc, &default_desc);
\ if (!desc) {
\ \ DRM_DEBUG_DRIVER("CMD: Unrecognized command: 0x%08X\n",
\ \ \ \ *cmd);
\ \ ret = -EINVAL;
\ \ -break;
\ \ -
\ \ \ /*
\ \ \ \ - * If the batch buffer contains a chained batch, return an
\ \ \ \ - * error that tells the caller to abort and dispatch the
\ \ \ \ - * workload as a non-secure batch.
\ \ \ \ - */
\ \ -if (desc->cmd.value == MI_BATCH_BUFFER_START) {
\ \ \ ret = -EACCES;
\ \ \ -break;
\ \ \ +goto err;
\ \ }

\ if (desc->flags & CMD_DESC_FIXED)
\ \ @@ -1320,22 +1479,43 @@
\ \ length,
\ \ batch_end - cmd);
\ \ ret = -EINVAL;
\ \ -break;
\ \ +goto err;
\ }

\ -if (!check_cmd(engine, desc, cmd, length, is_master)) {
\ \ +if (!check_cmd(engine, desc, cmd, length)) {
\ \ \ ret = -EACCES;
\ \ \ +goto err;
\ \ +}
\ \ +if (desc->cmd.value == MI_BATCH_BUFFER_START) {
\ \ \ ret = check_bbstart(ctx, cmd, offset, length,
\ \ \ \ batch_len, batch_start,
+    shadow_batch_start);
+
+if (ret)
+    goto err;
break;
}

+if (ctx->jump_whitelist_cmds > offset)
+    set_bit(offset, ctx->jump_whitelist);
+
    cmd += length;
+    offset += length;
    if (cmd >= length) {
        DRM_DEBUG_DRIVER("CMD: Got to the end of the buffer w/o a BBE cmd!\n");
        ret = -EINVAL;
        -break;
        +goto err;
    } while (1);

+if (needs_clflush_after) {
+    void *ptr = page_mask_bits(shadow_batch_obj->mm.mapping);
+    +drm_clflush_virt_range(ptr, (void *)(cmd + 1) - ptr);
+}
+
+err:
    i915_gem_object_unpin_map(shadow_batch_obj);
return ret;

}  
@@ -1357,7 +1537,7 @@
/* If the command parser is not enabled, report 0 - unsupported */
for_each_engine(engine, dev_priv, id) {
    -if (engine->needs_cmd_parser) {
        +if (intel_engine_using_cmd_parser(engine)) {
            active = true;
break;
    }

    @@ -1382,6 +1562,7 @@
    * the parser enabled.
    * 9. Don't whitelist or handle oacontrol specially, as ownership
    * for oacontrol state is moving to i915-perf.
    + * 10. Support for Gen9 BCS Parsing
    */
    -return 9;
    +return 10;
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_debugfs.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_debugfs.c
@@ -1783,6 +1783,8 @@
     if (!IS_GEN5(dev_priv))
     return -ENODEV;
+	intel_runtime_pm_get(dev_priv);
+
     ret = mutex_lock_interruptible(&dev->struct_mutex);
     if (ret)
     return ret;
@@ -1797,6 +1799,8 @@
          seq_printf(m, "GFX power: %ld\n", gfx);
     seq_printf(m, "Total power: %ld\n", chipset + gfx);
+	intel_runtime_pm_put(dev_priv);
+
     return 0;
 }
@@ -1974,7 +1978,6 @@
          seq_printf(m, "%s: ", engine->name);
-			seq_putc(m, ce->initialised ? 'I' : 'i');
     if (ce->state)
         describe_obj(m, ce->state->obj);
     if (ce->ring)
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_drv.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_drv.c
@@ -324,7 +324,7 @@
             break;
     case I915_PARAM_HAS_SECURE_BATCHES:
             value = capable(CAP_SYS_ADMIN);
-			value = capable(CAP_SYS_ADMIN);
+			value = HAS_SECURE_BATCHES(dev_priv) && capable(CAP_SYS_ADMIN);
             break;
     case I915_PARAM_CMD_PARSER_VERSION:
             value = i915_cmd_parser_get_version(dev_priv);
@@ -407,6 +407,9 @@
*/
     value = 1;
     break;
+case I915_PARAM_HAS_CONTEXT_ISOLATION:
+    value = intel_engines_has_context_isolation(dev_priv);
+    break;
     case I915_PARAM_SLICE_MASK:
         value = INTEL_INFO(dev_priv)->sseu.slice_mask;
if (!value)
@@ -677,7 +680,7 @@
if (ret)
goto cleanup_uc;

-intel_modeset_gem_init(dev);
+intel_setup_overlay(dev_priv);

if (INTEL_INFO(dev_priv)->num_pipes == 0)
return 0;
@@ -724,7 +727,7 @@
if (!ap)
return -ENOMEM;

-ap->ranges[0].base = ggtt->mappable_base;
+ap->ranges[0].base = ggtt->gmadr.start;
ap->ranges[0].size = ggtt->mappable_end;

primary =
@@ -894,7 +897,6 @@
spin_lock_init(&dev_priv->mm.object_stat_lock);
mutex_init(&dev_priv->sb_lock);
-mutex_init(&dev_priv->modeset_restore_lock);
mutex_init(&dev_priv->av_mutex);
mutex_init(&dev_priv->wm.wm_mutex);
mutex_init(&dev_priv->pps_mutex);
@@ -1122,6 +1124,12 @@
pci_set_master(pdev);

+/*
+ * We don't have a max segment size, so set it to the max so sg's
+ * debugging layer doesn't complain
+ */
+dma_set_max_seg_size(&pdev->dev, UINT_MAX);
+
/* overlay on gen2 is broken and can't address above 1G */
if (IS_GEN2(dev_priv)) {
ret = dma_set_coherent_mask(&pdev->dev, DMA_BIT_MASK(30));
@@ -1526,11 +1534,6 @@
pci_power_t opregion_target_state;
int error;

-/* ignore lid events during suspend */
-mutex_lock(&dev_priv->modeset_restore_lock);
-dev_priv->modeset_restore = MODESET_SUSPENDED;
-mutex_unlock(&dev_priv->modeset_restore_lock);
disable_rpm_wakeref_asserts(dev_priv);

/* We do a lot of poking in a lot of registers, make sure they work */
@@ -1585,15 +1588,14 @@
{
    struct drm_i915_private *devPriv = to_i915(dev);
    struct pci_dev *pdev = devPriv->drm.pdev;
    int ret;
    disable_rpm_wakeref_asserts(dev_priv);

    intel_display_set_init_power(dev_priv, false);

    -fw_csr = !IS_GEN9_LP(dev_priv) && !hibernation &&
    -suspend_to_idle(dev_priv) && dev_priv->csr.dmc_payload;
    +i915_rc6_ctxt_wa_suspend(dev_priv);
    +
    /*
    * In case of firmware assisted context save/restore don't manually
    * deinit the power domains. This also means the CSR/DMC firmware will
    * also enable deeper system power states that would be blocked if the
    * firmware was inactive.
    */
    -if (!fw_csr)
    +if (IS_GEN9_LP(dev_priv) || hibernation || !suspend_to_idle(dev_priv) ||
    +    dev_priv->csr.dmc_payload == NULL) {
        intel_power_domains_suspend(dev_priv);
        +dev_priv->power_domains_suspended = true;
    +}

    ret = 0;
    if (IS_GEN9_LP(dev_priv))
    @@ -1614,8 +1619,10 @@

    if (ret) {
        DRM_ERROR("Suspend complete failed: \%d\n", ret);
        -if (!fw_csr)
        +if (dev_priv->power_domains_suspended) {
            intel_power_domains_init_hw(dev_priv, true);
            +dev_priv->power_domains_suspended = false;
        +}

        goto out;
    }
    @@ -1636,8 +1643,6 @@
if (!(hibernation && INTEL_GEN(dev_priv) < 6))
    pci_set_power_state(pdev, PCI_D3hot);

-dev_priv->suspended_to_idle = suspend_to_idle(dev_priv);
-
out:
enable_rpm_wakeref_asserts(dev_priv);

@@ -1739,10 +1744,6 @@
    intel_fbdev_set_suspend(dev, FBINFO_STATE_RUNNING, false);

    -mutex_lock(&dev_priv->modeset_restore_lock);
    -dev_priv->modeset_restore = MODESET_DONE;
    -mutex_unlock(&dev_priv->modeset_restore_lock);
    -
    intel_opregion_notify_adapter(dev_priv, PCI_D0);

    intel_autoenable_gt_powersave(dev_priv);
    @@ -1815,8 +1816,7 @@
    intel_uncore_resume_early(dev_priv);

    if (IS_GEN9_LP(dev_priv)) {
        -if (!dev_priv->suspended_to_idle)
            -gen9_sanitize_dc_state(dev_priv);
        +gen9_sanitize_dc_state(dev_priv);
        bxt_disable_dc9(dev_priv);
    } else if (IS_HASWELL(dev_priv) || IS_BROADWELL(dev_priv)) {
        hsw_disable_pc8(dev_priv);
        @@ -1824,16 +1824,19 @@
    intel_uncore_sanitize(dev_priv);

    -if (IS_GEN9_LP(dev_priv) ||
        -!(dev_priv->suspended_to_idle && dev_priv->csr.dmc_payload))
        +if (dev_priv->power_domains_suspended)
            intel_power_domains_init_hw(dev_priv, true);
        +else
            +intel_display_set_init_power(dev_priv, true);

    i915_gem_sanitize(dev_priv);

    +i915_rc6_ctx_wa_resume(dev_priv);
    +
    enable_rpm_wakeref_asserts(dev_priv);

    out:
    -dev_priv->suspended_to_idle = false;
+dev_priv->power_domains_suspended = false;

return ret;
}
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_drv.h
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_drv.h
@@ -33,6 +33,8 @@
  #include <uapi/drm/i915_drm.h>
  #include <uapi/drm/drm_fourcc.h>

+#include <asm/hypervisor.h>
+
  #include <linux/io-mapping.h>
  #include <linux/i2c.h>
  #include <linux/i2c-algo-bit.h>
@@ -698,7 +700,8 @@
  void (*get_cdclk)(struct drm_i915_private *dev_priv,
   struct intel_cdclk_state *cdclk_state);
  void (*set_cdclk)(struct drm_i915_private *dev_priv,
-const struct intel_cdclk_state *cdclk_state);
+const struct intel_cdclk_state *cdclk_state,
+enum pipe pipe);
  int (*get_fifo_size)(struct drm_i915_private *dev_priv, int plane);
  int (*compute_pipe_wm)(struct intel_crtc_state *cstate);
  int (*compute_intermediate_wm)(struct drm_device *dev,
@@ -1231,6 +1234,7 @@
#define QUIRK_BACKLIGHT_PRESENT (1<<3)
#define QUIRK_PIN_SWIZZLED_PAGES (1<<5)
#define QUIRK_INCREASE_T12_DELAY (1<<6)
+#define QUIRK_INCREASE_DDI_DISABLED_TIME (1<<7)

struct intel_fbdev;
struct intel_fbc_work;
@@ -1376,6 +1380,7 @@
struct intel_rc6 {
  bool enabled;
  +bool ctx_corrupted;
  
};

struct intel_llc_pstate {
  @@ -1682,12 +1687,6 @@
    unsigned long test_irq_rings;
  
};

-enum modeset_restore {
  -MODESET_ON_LID_OPEN,
  -MODESET_DONE,


-MODESET_SUSPENDED,
-}
-
#define DP_AUX_A 0x40
#define DP_AUX_B 0x10
#define DP_AUX_C 0x20
@@ -2357,6 +2356,8 @@
 struct intel_cdclk_state actual;
 /* The current hardware cdclk state */
 struct intel_cdclk_state hw;
 +
 +int force_min_cdclk;
 } cdclk;

/**
 @@ -2380,8 +2381,6 @@
 unsigned long quirks;

-enum modeset_restore modeset_restore;
-struct mutex modeset_restore_lock;
 struct drm_atomic_state *modeset_restore_state;
 struct drm_modeset_acquire_ctx reset_ctx;

 @@ -2477,6 +2476,7 @@
 */
 struct mutex av_mutex;
 +int audio_power_refcount;

 struct {
 struct list_head list;
 @@ -2504,7 +2504,7 @@
 u32 bxt_phy_grc;

 u32 suspend_count;
 -bool suspended_to_idle;
 +bool power_domains_suspended;
 struct i915_suspend_saved_registers regfile;
 struct vlv_s0ix_state vlv_s0ix_state;

 @@ -2745,6 +2745,9 @@
 bool ipc_enabled;

 +/* Hack to bypass TMDS_OE write on DP->HDMI dongle */
 +bool bypass_tmds_oe;
 +
/* Used to save the pipe-to-encoder mapping for audio */
struct intel_encoder *av_enc_map[I915_MAX_PIPES];

#define for_each_sgt_dma(__dmap, __iter, __sgt)
for ((__iter) = __sgt_iter((__sgt)->sgl, true);
    ((__dmap) = (__iter).dma + (__iter).curr);
    - (((__iter).curr += PAGE_SIZE) >= (__iter).max) ?
      ((__iter).curr += I915_GTT_PAGE_SIZE) >= (__iter).max) ?
      ((__iter) = __sgt_iter(__sg_next((__iter).sgp), true), 0 : 0)

/**
* The Gen7 cmdparser copies the scanned buffer to the ggtt for execution
* All later gens can run the final buffer from the ppgtt
* + */
+#define CMDPARSER_USES_GGTT(dev_priv) IS_GEN7(dev_priv)
+
#define ENGINE_MASK(id) BIT(id)
#define RENDER_RING ENGINE_MASK(RCS)
#define BSD_RING ENGINE_MASK(VCS)
#define HAS_BLT(dev_priv) HAS_ENGINE(dev_priv, BCS)
#define HAS_VEBOX(dev_priv) HAS_ENGINE(dev_priv, VECS)

+#define HAS_SECURE_BATCHES(dev_priv) (INTEL_GEN(dev_priv) < 6)
+
#define HAS_LLCC(dev_priv)((dev_priv)->info.has_llc)
#define HAS_SNOOP(dev_priv)((dev_priv)->info.has_snoop)
#define HAS_EDRAM(dev_priv) (!((dev_priv)->edram_cap & EDRAM_ENABLED))

/* Early gen2 have a totally busted CS tlb and require pinned batches. */
# define HAS_BROKEN_CS_TLB(dev_priv) (IS_I830(dev_priv) || IS_I845G(dev_priv))

+#define NEEDS_RC6_CTX_CORRUPTION_WA(dev_priv)
+(IS_BROADWELL(dev_priv) || INTEL_GEN(dev_priv) == 9)
+
/* WaRsDisableCoarsePowerGating:skl,bxt */
#define NEEDS_WaRsDisableCoarsePowerGating(dev_priv) 
!(IS_SKL_GT3(dev_priv) || IS_SKL_GT4(dev_priv))
+(INTEL_GEN(dev_priv) == 9)

/*
* dp aux and gmbus irq on gen4 seems to be able to generate legacy interrupts
*/
if (intel_iommu_gfx_mapped)
    return true;
#endif
-return false;
+
+/* Running as a guest, we assume the host is enforcing VT'd */
+return !hypervisor_is_type(X86_HYPER_NATIVE);
}

static inline bool intel_scanout_needs_vtd_wa(struct drm_i915_private *dev_priv)

+struct i915_vma *__must_check
+i915_gem_object_pin(struct drm_i915_gem_object *obj,
+    struct i915_address_space *vm,
+    const struct i915_ggtt_view *view,
+    u64 size,
+    u64 alignment,
+    u64 flags);
+
+i915_gem_object_unbind(struct drm_i915_gem_object *obj);
void i915_gem_release_mmap(struct drm_i915_gem_object *obj);

/* i915_perf.c */
extern void i915_perf_init(struct drm_i915_private *dev_priv);
@@ -4110,7 +4136,6 @@
/* modesetting */
extern void intel_modeset_init_hw(struct drm_device *dev);
extern int intel_modeset_init(struct drm_device *dev);
-extern void intel_modeset_gem_init(struct drm_device *dev);
extern void intel_modeset_cleanup(struct drm_device *dev);
extern int intel_connector_register(struct drm_connector *);
extern void intel_connector_unregister(struct drm_connector *);
@@ -4140,7 +4165,11 @@
     struct intel_display_error_state *error);

     int sandybridge_pcode_read(struct drm_i915_private *dev_priv, u32 mbox, u32 *val);
-int sandybridge_pcode_write(struct drm_i915_private *dev_priv, u32 mbox, u32 val);
+int sandybridge_pcode_write_timeout(struct drm_i915_private *dev_priv, u32 mbox,
+        u32 val, int timeout_us);
+#define sandybridge_pcode_write(dev_priv, mbox, val)  
+sandybridge_pcode_write_timeout(dev_priv, mbox, val, 500)
+
     int skl_pcode_request(struct drm_i915_private *dev_priv, u32 mbox, u32 request,
         u32 reply_mask, u32 reply, int timeout_base_ms);

     --- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem.c
     +++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem.c
     @@ -986,11 +986,7 @@
             offset = offset_in_page(args->offset);
             for (idx = args->offset >> PAGE_SHIFT; remain; idx++) {
                 struct page *page = i915_gem_object_get_page(obj, idx);
-int length = remain;
-            length = min_t(u64, remain, PAGE_SIZE - offset);
+            unsigned int length = min_t(u64, remain, PAGE_SIZE - offset);

             ret = shmem_pread(page, offset, length, user_data,
                                page_to_phys(page) & obj_do_bit17_swizzling,
@@ -1099,7 +1095,7 @@
                              page_base += offset & PAGE_MASK;
             }

             -if (gtt_user_read(&ggtt->mappable, page_base, page_offset,
             +if (gtt_user_read(&ggtt->iomap, page_base, page_offset,
                               user_data, page_length)) {  
                 ret = -EFAULT;
                 break;
@@ -1307,7 +1303,7 @@
                     * If the object is non-shmem backed, we retry again with the
                     * path that handles page fault.
                     */
-        -if (gtt_write(&ggtt->mappable, page_base, page_offset,
-                        user_data, page_length)) {
-            ret = EFAULT;
-            break;
+        +if (gtt_write(&ggtt->iomap, page_base, page_offset,
+                        user_data, page_length)) {
+            ret = EFAULT;
+            break;

ret = -EFAULT;
break;
@@ -1436,11 +1432,7 @@
    offset = offset_in_page(args->offset);
    for (idx = args->offset >> PAGE_SHIFT; remain; idx++) {
        struct page *page = i915_gem_object_get_page(obj, idx);
-        int length;
-        length = remain;
-        if (offset + length > PAGE_SIZE)
-            length = PAGE_SIZE - offset;
+        unsigned int length = min_t(u64, remain, PAGE_SIZE - offset);
        ret = shmem_pwrite(page, offset, length, user_data,
                          page_to_phys(page) & obj_do_bit17_swizzling,
                          @@ -1675,6 +1667,17 @@
                          return 0;
        }

        +static inline bool
        +__vma_matches(struct vm_area_struct *vma, struct file *filp,
        +    unsigned long addr, unsigned long size)
        +{
        +    if (vma->vm_file != filp)
        +        return false;
        +
        +    return vma->vm_start == addr &&
        +        (vma->vm_end - vma->vm_start) == PAGE_ALIGN(size);
        +}

        /**
        * i915_gem_mmap_ioctl - Maps the contents of an object, returning the address
        * it is mapped to.
        @@ -1717,39 +1720,50 @@
        * pages from.
        */
        if (!obj->base.filp) {
            -i915_gem_object_put(obj);
            -return -EINVAL;
            +addr = -ENXIO;
            +goto err;
            +}
            +
            +if (range_overflows(args->offset, args->size, (u64)obj->base.size)) {
            +addr = -EINVAL;
            +goto err;
            }
addr = vm_mmap(obj->base.filp, 0, args->size,
         PROT_READ | PROT_WRITE, MAP_SHARED,
         args->offset);
+if (IS_ERR_VALUE(addr))
+goto err;
+
if (args->flags & I915_MMAP_WC) {
struct mm_struct *mm = current->mm;
struct vm_area_struct *vma;

if (down_write_killable(&mm->mmap_sem)) {
-    i915_gem_object_put(obj);
-    return -EINTR;
+    addr = -EINTR;
+    goto err;
} 
    vma = find_vma(mm, addr);
-    if (vma)
+    if (vma && __vma_matches(vma, obj->base.filp, addr, args->size))
    vma->vm_page_prot =
    pgprot_writecombine(vm_get_page_prot(vma->vm_flags));
else
    addr = -ENOMEM;
    up_write(&mm->mmap_sem);
+    if (IS_ERR_VALUE(addr))
+    goto err;

/* This may race, but that's ok, it only gets set */
WRITE_ONCE(obj->frontbuffer_ggtt_origin, ORIGIN_CPU);
} 
i915_gem_object_put(obj);
-    if (IS_ERR((void *)addr))
-    return addr;
+
args->addr_ptr = (uint64_t) addr;
-
return 0;
+
+err:
+i915_gem_object_put(obj);
+return addr;
}

static unsigned int tile_row_pages(struct drm_i915_gem_object *obj)
@@ -1865,6 +1879,10 @@
    unsigned int flags;
    int ret;

    addr = vm_mmap(obj->base.filp, 0, args->size,
         PROT_READ | PROT_WRITE, MAP_SHARED,
         args->offset);
+    if (IS_ERR_VALUE(addr))
+    goto err;
+
if (args->flags & I915_MMAP_WC) {
struct mm_struct *mm = current->mm;
struct vm_area_struct *vma;

    vma = find_vma(mm, addr);
-    if (vma)
+    if (vma && __vma_matches(vma, obj->base.filp, addr, args->size))
        vma->vm_page_prot =
        pgprot_writecombine(vm_get_page_prot(vma->vm_flags));
    else
        addr = -ENOMEM;
        up_write(&mm->mmap_sem);
+    if (IS_ERR_VALUE(addr))
+    goto err;

    /* This may race, but that's ok, it only gets set */
    WRITE_ONCE(obj->frontbuffer_ggtt_origin, ORIGIN_CPU);
} 
i915_gem_object_put(obj);
-    if (IS_ERR((void *)addr))
-    return addr;
+
    args->addr_ptr = (uint64_t) addr;
    
    return 0;
+
+err:
+i915_gem_object_put(obj);
+return addr;
}


/* Sanity check that we allow writing into this object */
if (i915_gem_object_is_readonly(obj) & write)
    return VM_FAULT_SIGBUS;

/* We don't use vmf->pgoff since that has the fake offset */
page_offset = (vmf->address - area->vm_start) >> PAGE_SHIFT;

@@ -1936,9 +1954,9 @@
    /* Finally, remap it using the new GTT offset */
    ret = remap_io_mapping(area,
                           area->vm_start + (vma->ggtt_view.partial.offset << PAGE_SHIFT),
-                          (ggtt->mappable_base + vma->node.start) >> PAGE_SHIFT,
+                          (ggtt->gmadr.start + vma->node.start) >> PAGE_SHIFT,
                           min_t(u64, vma->size, area->vm_end - area->vm_start),
                           &ggtt->mappable);
    +&ggtt->iomap);
    if (ret)
      goto err_fence;
@@ -3695,7 +3713,8 @@
    ret = i915_vma_unbind(vma);
    @@ -4079,6 +4098,20 @@
    {
        struct drm_i915_private *dev_priv = to_i915(obj->base.dev);
        struct i915_address_space *vm = &dev_priv->ggtt.base;
+        return i915_gem_object_pin(obj, vm, view, size, alignment,
+                        flags | PIN_GLOBAL);
+    }
+    *
+struct i915_vma *
+i915_gem_object_pin(struct drm_i915_gem_object *obj,
    + struct i915_address_space *vm,
    + const struct i915_ggtt_view *view,
    + u64 size,
    + u64 alignment,
    + u64 flags)
    +{
        struct drm_i915_private *dev_priv = to_i915(obj->base.dev);
        struct i915_vma *vma;
int ret;

@@ -4141,7 +4174,7 @@
    return ERR_PTR(ret);
 }

-ret = i915_vma_pin(vma, size, alignment, flags | PIN_GLOBAL);
+ret = i915_vma_pin(vma, size, alignment, flags);
    if (ret)
        return ERR_PTR(ret);

@@ -4655,14 +4688,16 @@
    i915_gem_object_put(obj);
 }

-static void assert_kernel_context_is_current(struct drm_i915_private *dev_priv)
+static void assert_kernel_context_is_current(struct drm_i915_private *i915)
{
    struct i915_gem_context *kernel_context = i915->kernel_context;
    struct intel_engine_cs *engine;
    enum intel_engine_id id;

    -for_each_engine(engine, dev_priv, id)
    -GEM_BUG_ON(engine->last_retired_context &&
    -!i915_gem_context_is_kernel(engine->last_retired_context));
+for_each_engine(engine, i915, id) {
+  GEM_BUG_ON(__i915_gem_active_peek(&engine->timeline->last_request));
+  GEM_BUG_ON(engine->last_retired_context != kernel_context);
+}

void i915_gem_sanitize(struct drm_i915_private *i915)
@@ -4937,6 +4972,120 @@
    return true;
 }

+static int __intel_engines_record_defaults(struct drm_i915_private *i915)
+{
+    struct i915_gem_context *ctx;
+    struct intel_engine_cs *engine;
+    enum intel_engine_id id;
+    int err;
+    +/
+    + As we reset the gpu during very early sanitisation, the current
+    + register state on the GPU should reflect its defaults values.
+    + We load a context onto the hw (with restore-inhibit), then switch
+    + over to a second context to save that default register state. We

/* can then prime every new context with that state so they all start
 * from the same default HW values.
 */

+ctx = i915_gem_context_create_kernel(i915, 0);
+if (IS_ERR(ctx))
+return PTR_ERR(ctx);
+
+for_each_engine(engine, i915, id) {
+struct drm_i915_gem_request *rq;
+
+rq = i915_gem_request_alloc(engine, ctx);
+if (IS_ERR(rq)) {
+err = PTR_ERR(rq);
+goto out_ctx;
+
+err = i915_switch_context(rq);
+if (engine->init_context)
+err = engine->init_context(rq);
+
+__i915_add_request(rq, true);
+if (err)
+goto err_active;
+
+err = i915_gem_wait_for_idle(i915);  // I915_WAIT_LOCKED)
+if (err)
+goto err_active;
+
+assert_kernel_context_is_current(i915);
+
+for_each_engine(engine, i915, id) {
+struct i915_vma *state;
+
+state = ctx->engine[id].state;
+if (!state)
+continue;
+
+/*
 + * As we will hold a reference to the logical state, it will
 + * not be torn down with the context, and importantly the
 + * object will hold onto its vma (making it possible for a
 + * stray GTT write to corrupt our defaults). Unmap the vma

+ * from the GTT to prevent such accidents and reclaim the
+ * space.
+ */
+err = i915_vma_unbind(state);
+if (err)
+goto err_active;
+
+err = i915_gem_object_set_to_cpu_domain(state->obj, false);
+if (err)
+goto err_active;
+
+engine->default_state = i915_gem_object_get(state->obj);
+
+if (IS_ENABLED(CONFIG_DRM_I915_DEBUG_GEM)) {
+unsigned int found = intel_engines_has_context_isolation(i915);
+
+/*
+ * Make sure that classes with multiple engine instances all
+ * share the same basic configuration.
+ */
+for_each_engine(engine, i915, id) {
+unsigned int bit = BIT(engine->uabi_class);
+unsigned int expected = engine->default_state ? bit : 0;
+
+if ((found & bit) != expected) {
+DRM_ERROR("mismatching default context state for class \%d on engine \%s\n",
+ engine->uabi_class, engine->name);
+}
+}
+
+out_ctx:
+i915_gem_context_set_closed(ctx);
+i915_gem_context_put(ctx);
+return err;
+
+err_active:
+/*
+ * If we have to abandon now, we expect the engines to be idle
+ * and ready to be torn-down. First try to flush any remaining
+ * request, ensure we are pointing at the kernel context and
+ * then remove it.
+ */
+if (WARN_ON(i915_gem_switch_to_kernel_context(i915)))
+goto out_ctx;
+
+if (WARN_ON(i915_gem_wait_for_idle(i915, I915_WAIT_LOCKED)))
int i915_gem_init(struct drm_i915_private *dev_priv)
{
    int ret;
    if (ret)
        goto out_unlock;

    intel_init_gt_powersave(dev_priv);
    ret = i915_gem_init_hw(dev_priv);
    if (ret)
        goto out_unlock;

   intel_init_clock_gating(dev_priv);
    ret = __intel_engines_record_defaults(dev_priv);
out_unlock:
    if (ret == -EIO) {
        mutex_lock(&dev_priv->drm.struct_mutex);
        /* Allow engine initialisation to fail by marking the GPU as
         * wedged. But we only want to do this where the GPU is angry,
         * for all other failure, such as an allocation failure, bail.
        */
        DRM_ERROR("Failed to initialize GPU, declaring it wedged\n");
        i915_gem_set_wedged(dev_priv);
    } -ret = 0;
-
[out_unlock:
*/ Minimal basic recovery for KMS */
+ret = i915_ggtt_enable_hw(dev_priv);
+i915_gem_restore_gtt_mappings(dev_priv);
+i915_gem_restore_fences(dev_priv);
+intel_init_clock_gating(dev_priv);
+
+mutex_unlock(&dev_priv->drm.struct_mutex);
+
intel_uncore_forcetake_put(dev_priv, FORCEWAKE_ALL);
mutex_unlock(&dev_priv->drm.struct_mutex);

--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem_context.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem_context.c
@@ -136,6 +136,8 @@
  
 __i915_gem_object_release_unless_active(ce->state->obj);
 }
+  
+kfree(ctx->jump_whitelist);
+
  kfree(ctx->name);
  put_pid(ctx->pid);
  
@@ -321,6 +323,9 @@
  
  else
  ctx->ggtt_offset_bias = I915_GTT_PAGE_SIZE;
+
  ctx->jump_whitelist = NULL;
  ctx->jump_whitelist_cmds = 0;
  +
  return ctx;
  
err_pid:
@@ -418,8 +423,8 @@
  return ctx;
 }

-struct i915_gem_context *
-create_kernel_context(struct drm_i915_private *i915, int prio)
+struct i915_gem_context *
+i915_gem_context_create_kernel(struct drm_i915_private *i915, int prio)
{
 struct i915_gem_context *ctx;

@@ -473,7 +478,7 @@
  ida_init(&dev_priv->contexts.hw_ida);

 /* lowest priority; idle task */
-ctx = create_kernel_context(dev_priv, I915_PRIORITY_MIN);
+ctx = i915_gem_context_create_kernel(dev_priv, I915_PRIORITY_MIN);
  if (IS_ERR(ctx)) {
DRM_ERROR("Failed to create default global context\n");
err = PTR_ERR(ctx);
@@ -487,7 +492,7 @@
dev_priv->kernel_context = ctx;

/* highest priority; preempting task */
-ctx = create_kernel_context(dev_priv, INT_MAX);
+ctx = i915_gem_context_create_kernel(dev_priv, INT_MAX);
if (IS_ERR(ctx)) {
    DRM_ERROR("Failed to create default preempt context\n");
    err = PTR_ERR(ctx);
 @@ -522,28 +527,6 @@
    if (!i915_modparams.enable_execlists) {
        struct i915_gem_context *ctx;

        list_for_each_entry(ctx, &dev_priv->contexts.list, link) {
            if (!i915_gem_context_is_default(ctx))
                continue;

            for_each_engine(engine, dev_priv, id)
                ctx->engine[engine->id].initialised = false;

            ctx->remap_slice = ALL_L3_SLICES(dev_priv);
        }
    }

    for_each_engine(engine, dev_priv, id) {
        struct intel_context *kce =
            &dev_priv->kernel_context->engine[engine->id];

        kce->initialised = true;
    }
}

void i915_gem_contexts_fini(struct drm_i915_private *i915)
@@ -718,9 +701,6 @@
    if (to->remap_slice)
        return false;

    -if (!to->engine[RCS].initialised)
        return false;
    -if (ppgtt && (intel_engine_flag(engine) & ppgt->pd_dirty_rings))
return false;

@@ -795,11 +775,14 @@
    return ret;
 }

-if (!to->engine[RCS].initialised || i915_gem_context_is_default(to))
-/* NB: If we inhibit the restore, the context is not allowed to
- * die because future work may end up depending on valid address
- * space. This means we must enforce that a page table load
- * occur when this occurs. */
+if (i915_gem_context_is_kernel(to))
+/*
+ * The kernel context(s) is treated as pure scratch and is not
+ * expected to retain any state (as we sacrifice it during
+ * suspend and on resume it may be corrupted). This is ok,
+ * as nothing actually executes using the kernel context; it
+ * is purely used for flushing user contexts.
+ */
    hw_flags = MI_RESTORE_INHIBIT;
else if (ppgtt && intel_engine_flag(engine) & ppgtt->pd_dirty_rings)
    hw_flags = MI_FORCE_RESTORE;
@@ -843,15 +826,6 @@
    to->remap_slice &= ~(1<<i);
 }

-if (!to->engine[RCS].initialised) {
-    if (engine->init_context) {
-        ret = engine->init_context(req);
-        if (ret)
-            return ret;
-    }
-    to->engine[RCS].initialised = true;
-}
-
-return 0;
 }

@@ -899,7 +873,7 @@
    return do_rcs_switch(req);
 }

-static bool engine_has_kernel_context(struct intel_engine_cs *engine)
+static bool engine_has_idle_kernel_context(struct intel_engine_cs *engine)
 {
     struct i915_gem_timeline *timeline;

@@ -915,8 +889,7 @@
return false;
}

-int i915_gem_switch_to_kernel_context(struct drm_i915_private *dev_priv)
@@ -933,7 +906,7 @@
    struct drm_i915_gem_request *req;
    int ret;

    -if (engine_has_kernel_context(engine))
+if (engine_has_idle_kernel_context(engine))
    continue;

    req = i915_gem_request_alloc(engine, dev_priv->kernel_context);
@@ -1022,18 +995,19 @@
    if (args->ctx_id == DEFAULT_CONTEXT_HANDLE)
        return -ENOENT;

    +ret = i915_mutex_lock_interruptible(dev);
    +if (ret)
    +return ret;
    +
    ctx = i915_gem_context_lookup(file_priv, args->ctx_id);
    -if (!ctx) {
    +if (!ctx) {
        mutex_unlock(&dev->struct_mutex);
        return -ENOENT;
    -
    -ret = mutex_lock_interruptible(&dev->struct_mutex);
    -if (ret)
    -goto out;
    +}

    __destroy_hw_context(ctx, file_priv);
    mutex_unlock(&dev->struct_mutex);

    -out:
    i915_gem_context_put(ctx);
    return 0;
}
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem_context.h
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem_context.h
@@ -577,7 +550,7 @@
    _i915_gem_context_is_kernel(engine->last_retired_context);
    +return intel_engine_has_kernel_context(engine);
    }

int i915_gem_switch_to_kernel_context(struct drm_i915_private *dev_priv)
u64 lrc_desc;
int pin_count;
-bool initialised;
] engine[i915_NUM_ENGINES];

/** ring_size: size for allocating the per-engine ring buffer */
@@ -181,6 +180,12 @@
/** remap_slice: Bitmask of cache lines that need remapping */
u8 remap_slice;

+/** jump_whitelist: Bit array for tracking cmds during cmdparsing */
+unsigned long *jump_whitelist;
+
+/** jump_whitelist_cmds: No of cmd slots available */
+u32 jump_whitelist_cmds;
+
+/** handles_vma: rbtree to look up our context specific obj/vma for
* the user handle. (user handles are per fd, but the binding is
* per vm, which may be one per context or shared with the global GTT)
@@ -292,6 +297,9 @@
int i915_gem_context_reset_stats_ioctl(struct drm_device *dev, void *data,
     struct drm_file *file);

+struct i915_gem_context *
+i915_gem_context_create_kernel(struct drm_i915_private *i915, int prio);
+
+static inline struct i915_gem_context *
i915_gem_context_get(struct i915_gem_context *ctx)
{  
     --- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem_evict.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem_evict.c
@@ -46,7 +46,7 @@
       return false;
     
     for_each_engine(engine, i915, id) {
-       if (engine->last_retired_context != i915->kernel_context)
+       if (!intel_engine_has_kernel_context(engine))
           return false;
     }

@@ -73,6 +73,7 @@
if (err)
    return err;

+GEM_BUG_ON(!ggtt_is_idle(i915));
    return 0;
}
static inline bool eb_use_cmdparser(const struct i915_execbuffer *eb)
{
    return intel_engine_requires_cmd_parser(eb->engine) ||
    intel_engine_using_cmd_parser(eb->engine) &&
    eb->args->batch_len;
}

static int eb_create(struct i915_execbuffer *eb)
{
    if (!(flags & EXEC_OBJECT_SUPPORTS_48B_ADDRESS) &&
        (vma->node.start + vma->node.size - 1) >> 32)
    return true;
    if (flags & __EXEC_OBJECT_NEEDS_MAP &&
        (vma->node.start + vma->node.size + 4095) >> 32)
    return true;

    if (unlikely(entry->flags & EXEC_OBJECT_PINNED &&
        entry->offset != gen8_canonical_addr(entry->offset & I915_GTT_PAGE_MASK)))
    return -EINVAL;

    /* pad_to_size was once a reserved field, so sanitize it */
    list_add_tail(&vma->exec_link, &eb->unbound);
    if (drm_mm_node_allocated(&vma->node))
        err = i915_vma_unbind(vma);
    if (unlikely(err))
        vma->exec_flags = NULL;
    return err;
}

err = radix_tree_insert(handles_vma, handle, vma);
if (unlikely(err)) {
    kfree(lut);
    kmem_cache_free(eb->i915->luts, lut);
    goto err_obj;
}
offset += page << PAGE_SHIFT;
}

-vaddr = (void __force *)io_mapping_map_atomic_wc(&ggtt->mappable,
+ vaddr = (void __force *)io_mapping_map_atomic_wc(&ggtt->iomap,
    offset);
    cache->page = page;
cache->vaddr = (unsigned long)vaddr;
@@ -1563,7 +1567,9 @@
    * happened we would make the mistake of assuming that the
    * relocations were valid.
    */
- user_access_begin();
+ if (!user_access_begin(VERIFY_WRITE, urelocs, size))
+ goto end_user;
+
+ for (copied = 0; copied < nreloc; copied++)
    unsafe_put_user(-1,
&urelocs[copied].presumed_offset,
@@ -1910,10 +1916,38 @@
return 0;
}

-static struct i915_vma *eb_parse(struct i915_execbuffer *eb, bool is_master)
+static struct i915_vma *
+shadow_batch_pin(struct i915_execbuffer *eb, struct drm_i915_gem_object *obj)
+{
+    struct drm_i915_private *dev_priv = eb->i915;
+    struct i915_address_space *vm;
+    u64 flags;
+    
+    /*
+     * PPGTT backed shadow buffers must be mapped RO, to prevent
+     * post-scan tampering
+     */
+    if (CMDPARSER_USES_GGTT(dev_priv)) {
+        flags = PIN_GLOBAL;
+        vm = &dev_priv->ggtt.base;
+    } else if (eb->vm->has_read_only) {
+        flags = PIN_USER;
+        vm = eb->vm;
+    } else {
+        DRM_DEBUG("Cannot prevent post-scan tampering without RO capable vm\n");
+        return ERR_PTR(-EINVAL);
+    }
+ return i915_gem_object_pin(obj, vm, NULL, 0, 0, flags);
+
+
+static struct i915_vma *eb_parse(struct i915_execbuffer *eb)
+ {
+ struct drm_i915_gem_object *shadow_batch_obj;
+ struct i915_vma *vma;
+ u64 batch_start;
+ u64 shadow_batch_start;
+ int err;
+
+ shadow_batch_obj = i915_gem_batch_pool_get(&eb->engine->batch_pool,
+ @ @ -1921,29 +1955,53 @ @
+ if (IS_ERR(shadow_batch_obj))
+ return ERR_CAST(shadow_batch_obj);
+
+ err = intel_engine_cmd_parser(eb->engine,
+ vma = shadow_batch_pin(eb, shadow_batch_obj);
+ if (IS_ERR(vma))
+ goto out;
+
+ batch_start = gen8_canonical_addr(eb->batch->node.start) +
+ eb->batch_start_offset;
+
+ shadow_batch_start = gen8_canonical_addr(vma->node.start);
+
+ err = intel_engine_cmd_parser(eb->ctx,
+ eb->engine,
+ eb->batch->obj,
+ shadow_batch_obj,
+ batch_start,
+ eb->batch_start_offset,
+ eb->batch_len,
+ is_master);
+
+ err = intel_engine_cmd_parser(eb->ctx,
+ eb->engine,
+ eb->batch->obj,
+ shadow_batch_obj,
+ batch_start,
+ eb->batch_start_offset,
+ eb->batch_len,
+ is_master);
+
+ if (err) {
+ if (err == -EACCES) /* unhandled chained batch */
+ i915_vma_unpin(vma);
+ +/*
+ * Unsafe GGTT-backed buffers can still be submitted safely
+ * as non-secure.
+ * For PPGTT backing however, we have no choice but to forcibly
+ * reject unsafe buffers
+ */
+ +*/
+

if (CMDPARSER_USES_GGTT(eb->i915) && (err == -EACCES))
	/* Execute original buffer non-secure */
	vma = NULL;
else
	vma = ERR_PTR(err);
-goto out;
-
-vma = i915_gem_object_ggtt_pin(shadow_batch_obj, NULL, 0, 0, 0);
-if (IS_ERR(vma))

goto out;
+
}

eb->vma[eb->buffer_count] = i915_vma_get(vma);

eb->flags[eb->buffer_count] =
__EXEC_OBJECT_HAS_PIN | __EXEC_OBJECT_HAS_REF;

vma->exec_flags = &eb->flags[eb->buffer_count];

eb->buffer_count++;
+eb->batch_start_offset = 0;
+eb->batch = vma;
+/* eb->batch_len unchanged */
+
+if (CMDPARSER_USES_GGTT(eb->i915))
+eb->batch_flags |= I915_DISPATCH_SECURE;

out:
i915_gem_object_unpin_pages(shadow_batch_obj);
@@ -2194,6 +2252,7 @@
struct drm_i915_gem_exec_object2 *exec,
struct drm_syncobj **fences)
{
+struct drm_i915_private *dev_priv = to_i915(dev);
 struct i915_execbuffer eb;
 struct dma_fence *in_fence = NULL;
 struct sync_file *out_fence = NULL;
@@ -2204,7 +2263,7 @@
 BUILD_BUG_ON(__EXEC_OBJECT_INTERNAL_FLAGS &
 ~__EXEC_OBJECT_UNKNOWN_FLAGS);

-eb.i915 = to_i915(dev);
+eb.i915 = dev_priv;
 eb.file = file;
 eb.args = args;
 if (DBG_FORCE_RELOC || !(args->flags & I915_EXEC_NO_RELOC))
@@ -2226,8 +2285,15 @@

 eb.batch_flags = 0;
 if (args->flags & I915_EXEC_SECURE) {

+if (INTEL_GEN(dev_priv) >= 11)
+return -ENODEV;
+
+/* Return -EPERM to trigger fallback code on old binaries. */
+if (!HAS_SECURE_BATCHES(dev_priv))
+return -EPERM;
+
if (!drm_is_current_master(file) || !capable(CAP_SYS_ADMIN))
-    return -EPERM;
+return -EPERM;

if (!drm_is_current_master(file) || !capable(CAP_SYS_ADMIN))
-    return -EPERM;
+    return -EPERM;

eb.batch_flags |= I915_DISPATCH_SECURE;
}
@@ -2314,34 +2380,19 @@
goto err_vma;
}

+if (eb.batch_len == 0)
+eb.batch_len = eb.batch->size - eb.batch_start_offset;
+
if (eb_use_cmdparser(&eb)) {
    struct i915_vma *vma;

    -vma = eb_parse(&eb, drm_is_current_master(file));
    +vma = eb_parse(&eb);
    if (IS_ERR(vma)) {
        err = PTR_ERR(vma);
        goto err_vma;
    }
-
    -if (vma) {
        /*
        - * Batch parsed and accepted:
        - *
        - * Set the DISPATCH_SECURE bit to remove the NON_SECURE
        - * bit from MI_BATCH_BUFFER_START commands issued in
        - * the dispatch_execbuffer implementations. We
        - * specifically don't want that set on batches the
        - * command parser has accepted.
        - */
        -eb.batch_flags |= I915_DISPATCH_SECURE;
        -eb.batch_start_offset = 0;
        -eb.batch = vma;
        -}
    }

    -if (eb.batch_len == 0)
    -eb.batch_len = eb.batch->size - eb.batch_start_offset;
/* snb/ivb/vlv conflate the "batch in ppgtt" bit with the "non-secure batch" bit. Hence we need to pin secure batches into the global gtt. */
@ @ -2419,7 +2470,7 @@ if (out_fence) {
if (err == 0) {
    fd_install(out_fence_fd, out_fence->file);
-    args->rsvd2 &= GENMASK_ULL(0, 31); /* keep in-fence */
+    args->rsvd2 &= GENMASK_ULL(31, 0); /* keep in-fence */
    args->rsvd2 |= (u64)out_fence_fd << 32;
    out_fence_fd = -1;
} else {
    @ @ -2554,6 +2605,7 @@
        struct drm_i915_gem_execbuffer2 *args = data;
        struct drm_i915_gemexecobject2 *exec2_list;
        struct drm_syncobj **fences = NULL;
+        const size_t count = args->buffer_count;
        int err;

        if (args->buffer_count < 1 || args->buffer_count > SIZE_MAX / sz - 1) {
            @ @ -2602,7 +2654,17 @@
            unsigned int i;

            /* Copy the new buffer offsets back to the user's exec list. */
-            user_access_begin();
+            /*
+             * Note: count * sizeof(*user_exec_list) does not overflow,
+             * because we checked 'count' in check_buffer_count().
+             * And this range already got effectively checked earlier
+             * when we did the "copy_from_user()" above.
+             */
+            if (!user_access_begin(VERIFY_WRITE, user_exec_list,
+                count * sizeof(*user_exec_list)))
+                goto end_user;
+            for (i = 0; i < args->buffer_count; i++) {
+                if (!$exec2_list[i].offset & UPDATE))
                    continue;
-                --- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem_gtt.c
-                +++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem_gtt.c
-                @ @ -157.7 +157.8 @@
+                if (enable_ppgtt == 0 && INTEL_GEN(dev_priv) < 9)
                    return 0;

-                -if (enable_ppgtt == 1)
+                /* Full PPGTT is required by the Gen9 cmdparser */

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if (enable_ppgtt == 1 && INTEL_GEN(dev_priv) != 9)
    return 1;

if (enable_ppgtt == 2 && has_full_ppgtt)
    return ret;

/* Currently applicable only to VLV */
/* Applicable to VLV, and gen8+ */
pte_flags = 0;
- if (vma->obj->gt_ro)
  + if (i915_gem_object_is_readonly(vma->obj))
    pte_flags |= PTE_READ_ONLY;

vma->vm->insert_entries(vma->vm, vma, cache_level, pte_flags);

static gen8_pte_t gen8_pte_encode(dma_addr_t addr,
  enum i915_cache_level level)
{
  gen8_pte_t pte = _PAGE_PRESENT | _PAGE_RW;
  pte |= addr;
  switch (level) {
    case I915_CACHE_NONE:
    case I915_CACHE_L2:
    case I915_CACHE_L3:
    case I915_CACHE_L1:
      fill_px(vm, pt,
        gen8_pte_encode(vm->scratch_page.daddr, I915_CACHE_LLC));
      break;
  }
}

static void gen6_initialize_pt(struct i915_address_space *vm,
  unsigned int pte = gen8_pte_index(start);
  unsigned int pte_end = pte + num_entries;
  const gen8_pte_t scratch_pte =
    gen8_pte_encode(vm->scratch_page.daddr, I915_CACHE_LLC);
gen8_pte_t *vaddr;

GEM_BUG_ON(num_entries > pt->used_ptes);
@@ -989,10 +993,11 @@
       struct i915_page_directory_pointer *pdp,
       struct sgt_dma *iter,
       struct gen8_insert_pte *idx,
-  enum i915_cache_level cache_level)
+  enum i915_cache_level cache_level,
+  u32 flags)
{
  struct i915_page_directory *pd;
-  const gen8_pte_t pte_encode = gen8_pte_encode(0, cache_level);
+  const gen8_pte_t pte_encode = gen8_pte_encode(0, cache_level, flags);
  gen8_pte_t *vaddr;
  bool ret;
@@ -1002,7 +1007,7 @@
do {
  vaddr[idx->pte] = pte_encode | iter->dma;

-  iter->dma += PAGE_SIZE;
+  iter->dma += I915_GTT_PAGE_SIZE;
  if (iter->dma >= iter->max) {
    iter->sg = __sg_next(iter->sg);
    if (!iter->sg) {
@@ -1043,14 +1048,14 @@
static void gen8_ppgtt_insert_3lvl(struct i915_address_space *vm,
       struct i915_vma *vma,
       enum i915_cache_level cache_level,
-   u32 unused)
+   u32 flags)
{
  struct i915_hw_ppgtt *ppgtt = i915_vm_to_ppgtt(vm);
  struct sgt_dma iter = sgt_dma(vma);
  struct gen8_insert_pte idx = gen8_insert_pte(vma->node.start);
  gen8_ppgtt_insert_3lvl_entries(ppgtt, &ppgtt->pdp, &iter, &idx,
-    cache_level);
+    cache_level, flags);
  vma->page_sizes.gtt = I915_GTT_PAGE_SIZE;
}
@@ -1058,9 +1063,10 @@
static void gen8_ppgtt_insert_huge_entries(struct i915_vma *vma,
       struct i915_page_directory_pointer **pdp,
       struct sgt_dma *iter,
-   enum i915_cache_level cache_level)
+ enum i915_cache_level cache_level,
+ u32 flags)
{
    -const gen8_pte_t pte_encode = gen8_pte_encode(0, cache_level);
+const gen8_pte_t pte_encode = gen8_pte_encode(0, cache_level, flags);
    u64 start = vma->node.start;
    dma_addr_t rem = iter->sg->length;

    @ @ -1155,19 +1161,21 @@
    static void gen8_ppgtt_insert_4lvl(struct i915_address_space *vm,
        struct i915_vma *vma,
        enum i915_cache_level cache_level,
-    u32 unused)
+    u32 flags)
    {
        struct i915_hw_ppgtt *ppgtt = i915_vm_to_ppgtt(vm);
        struct sgt_dma iter = sgt_dma(vma);
        struct i915_page_directory_pointer **pdps = ppgtt->pml4.pdps;

        if (vma->page_sizes.sg > I915_GTT_PAGE_SIZE) {
-            gen8_ppgtt_insert_huge_entries(vma, pdps, &iter, cache_level);
+            gen8_ppgtt_insert_huge_entries(vma, pdps, &iter, cache_level,
+                                            flags);
        } else {
            struct gen8_insert_pte idx = gen8_insert_pte(vma->node.start);

            while (gen8_ppgtt_insert_pte_entries(ppgtt, pdps[idx.pml4e++],
                &iter, &idx, cache_level,
                flags))
                GEM_BUG_ON(idx.pml4e >= GEN8_PML4ES_PER_PML4);

        vma->page_sizes.gtt = I915_GTT_PAGE_SIZE;
    @ @ -1499,7 +1507,7 @@
    {
        struct i915_address_space *vm = &ppgtt->base;
        const gen8_pte_t scratch_ppte =
            -gen8_pte_encode(vm->scratch_page.daddr, I915_CACHE_LLC);
+            gen8_pte_encode(vm->scratch_page.daddr, I915_CACHE_LLC, 0);
        u64 start = 0, length = ppgtt->base.total;

        if (use_4lvl(vm)) {
            @ @ -1568,6 +1576,13 @@
            1ULL << 48 :
            1ULL << 32;

            /*
             * From bdw, there is support for read-only pages in the PPGTT.
+ *
+ * XXX GVT is not honouring the lack of RW in the PTE bits.
+ */
+ ppgtt->base.has_read_only = !intel_vgpu_active(dev_priv);
+
/* There are only few exceptions for gen >=6. chv and bxt.
 * And we are not sure about the latter so play safe for now.
 */
@@ -1656,8 +1671,8 @@
for (pte = 0; pte < GEN6_PTES; pte+=4) {
    unsigned long va =
        -(pde * PAGE_SIZE * GEN6_PTES) +
-        (pte * PAGE_SIZE);
+        (pde * I915_GTT_PAGE_SIZE * GEN6_PTES) +
+        (pte * I915_GTT_PAGE_SIZE);
    int i;
    bool found = false;
    for (i = 0; i < 4; i++)
@@ -1872,7 +1887,7 @@
do {
    vaddr[act_pte] = pte_encode | GEN6_PTE_ADDR_ENCODE(iter.dma);
-    iter.dma += PAGE_SIZE;
+    iter.dma += I915_GTT_PAGE_SIZE;
    if (iter.dma == iter.max)
@@ -1997,7 +2012,7 @@
        DRM_DEBUG("Forced to use aperture for PDEs\n");

        ppgtt->pd.base.ggtt_offset =
-        ppgtt->node.start / PAGE_SIZE * sizeof(gen6_pte_t);
+        ppgtt->node.start / I915_GTT_PAGE_SIZE * sizeof(gen6_pte_t);

        ppgtt->pd_addr = (gen6_pte_t __iomem *)&ggtt->gsm +
        ppgtt->pd_base.ggtt_offset / sizeof(gen6_pte_t);
@@ -2044,7 +2059,7 @@
    if (ret)
        return ret;

-        ppgtt->base.total = I915_PDES * GEN6_PTES * PAGE_SIZE;
+        ppgtt->base.total = I915_PDES * GEN6_PTES * I915_GTT_PAGE_SIZE;

        gen6_scratch_va_range(ppgtt, 0, ppgtt->base.total);
        gen6_write_page_range(ppgtt, 0, ppgtt->base.total);
@@ -2066,7 +2081,7 @@
DRM_DEBUG_DRIVER("Allocated pde space (%lldM) at GTT entry: %llx\n","pgett->node.size >> 20,
 - pgett->node.start / PAGE_SIZE);
 + pgett->node.start / I915_GTT_PAGE_SIZE);

DRM_DEBUG_DRIVER("Adding PPGTT at offset %x\n","pgett->pd.base.ggtt_offset << 10);
@@ -2336,7 +2351,7 @@
gen8_pte_t __iomem *pte =
(gen8_pte_t __iomem *)ggtt->gsm + (offset >> PAGE_SHIFT);

-genn8_set_pte(pte, gen8_pte_encode(addr, level));
+genn8_set_pte(pte, gen8_pte_encode(addr, level, 0));

pgett->invalidate(vm->i915);
}
@@ -2344,14 +2359,19 @@
static void genn8_ggtt_insert_entries(struct i915_address_space *vm,
 struct i915_vma *vma,
 enum i915_cache_level level,
 - u32 unused)
+ u32 flags)
{
 struct i915_ggtt *ggtt = i915_vm_to_ggtt(vm);
 struct sgt_iter sgt_iter;
 gen8_pte_t __iomem *gtt_entries;
-const gen8_pte_t pte_encode = gen8_pte_encode(0, level);
+const gen8_pte_t pte_encode = gen8_pte_encode(0, level, 0);
dma_addr_t addr;

+/*
 + * Note that we ignore PTE_READ_ONLY here. The caller must be careful
 + * not to allow the user to override access to a read only page.
 + */
 +
gtt_entries = (gen8_pte_t __iomem *)ggtt->gsm;
gtt_entries += vma->node.start >> PAGE_SHIFT;
for_each_sgt_dma(addr, sgt_iter, vma->pages)
@@ -2420,7 +2440,7 @@
unsigned first_entry = start >> PAGE_SHIFT;
unsigned num_entries = length >> PAGE_SHIFT;
const gen8_pte_t scratch_pte =
-gen8_pte_encode(vm->scratch_page.daddr, I915_CACHE_LLC);
+gen8_pte_encode(vm->scratch_page.daddr, I915_CACHE_LLC, 0);
gen8_pte_t __iomem *ggtt_base =
(gen8_pte_t __iomem *)ggtt->gsm + first_entry;
const int max_entries = ggtt_total_entries(ggtt) - first_entry;
@@ -2481,13 +2501,14 @@
struct i915_address_space *vm;
struct i915_vma *vma;
enum i915_cache_level level;
+u32 flags;
};

static int bxt_vtd_ggtt_insert_entries__cb(void *arg)
{
    struct insert_entries *arg = arg;

    -gen8_ggtt_insert_entries(arg->vm, arg->vma, arg->level, 0);
    +gen8_ggtt_insert_entries(arg->vm, arg->vma, arg->level, arg->flags);
    bxt_vtd_ggtt_wa(arg->vm);

    return 0;
}
@@ -2496,9 +2517,9 @@
static void bxt_vtd_ggtt_insert_entries__BKL(struct i915_address_space *vm,
                                          struct i915_vma *vma,
                                          enum i915_cache_level level,
-    u32 unused)
+    u32 flags)
{
    -struct insert_entries arg = { vm, vma, level }; 
    +struct insert_entries arg = { vm, vma, level, flags };

    stop_machine(bxt_vtd_ggtt_insert_entries__cb, &arg, NULL);
} 
@@ -2589,9 +2610,9 @@
struct drm_i915_gem_object *obj = vma->obj;
    u32 pte_flags;

    -/* Currently applicable only to VLV */
    +/* Applicable to VLV (gen8+ do not support RO in the GGTT) */
    pte_flags = 0;
    -if (obj->gt_ro)
    +if (i915_gem_object_is_readonly(obj))
    pte_flags |= PTE_READ_ONLY;

    intel_runtime_pm_get(i915);
    @@ -2629,7 +2650,7 @@

    /* Currently applicable only to VLV */
    pte_flags = 0;
    -if (vma->obj->gt_ro)
    +if (i915_gem_object_is_readonly(vma->obj))
    pte_flags |= PTE_READ_ONLY;

    if (flags & I915_VMA_LOCAL_BIND) { 


mutex_unlock(&dev_priv->drm.struct_mutex);

arch_phys_wc_del(ggtt->mtrr);
-io_mapping_fini(&ggtt->mappable);
+io_mapping_fini(&ggtt->iomap);
}

static unsigned int gen6_get_total_gtt_size(u16 snb_gmch_ctl)
@@ -2895,7 +2916,7 @@
    bdw_gmch_ctl = 1 << bdw_gmch_ctl;

    #ifdef CONFIG_X86_32
-    /* Limit 32b platforms to a 2GB GGTT: 4 << 20 / pte size * PAGE_SIZE */
+    /* Limit 32b platforms to a 2GB GGTT: 4 << 20 / pte size * I915_GTT_PAGE_SIZE */
if (bdw_gmch_ctl > 4)
    bdw_gmch_ctl = 4;
    #endif
@@ -3303,8 +3324,10 @@
    int err;

    /* TODO: We're not aware of mappable constraints on gen8 yet */
-    ggtt->mappable_base = pci_resource_start(pdev, 2);
-    ggtt->mappable_end = pci_resource_len(pdev, 2);
+    ggtt->gmadr =
+        (struct resource) DEFINE_RES_MEM(pci_resource_start(pdev, 2),
+                                          pci_resource_len(pdev, 2));
+    ggtt->mappable_end = resource_size(&ggtt->gmadr);

    err = pci_set_dma_mask(pdev, DMA_BIT_MASK(39));
    if (!err)
@@ -3361,8 +3384,10 @@
    u16 snb_gmch_ctl;
    int err;

-    ggtt->mappable_base = pci_resource_start(pdev, 2);
-    ggtt->mappable_end = pci_resource_len(pdev, 2);
+    ggtt->gmadr =
+        (struct resource) DEFINE_RES_MEM(pci_resource_start(pdev, 2),
+                                          pci_resource_len(pdev, 2));
+    ggtt->mappable_end = resource_size(&ggtt->gmadr);

    /* 64/512MB is the current min/max we actually know of, but this is just
    * a coarse sanity check.
@@ -3417,6 +3442,7 @@
    static int i915_gmch_probe(struct i915_ggtt *ggtt)
    {
        struct drm_i915_private *dev_priv = ggtt->base.i915;
phys_addr_t gmadr_base;
int ret;

ret = intel_gmch_probe(dev_priv->bridge_dev, dev_priv->drm.pdev, NULL);
@@@@ -3427,9 +3453,13 @@

intel_gtt_get(&ggtt->base.total,
    &ggtt->stolen_size,
-   &ggtt->mappable_base,
+   &gmadr_base,
    &ggtt->mappable_end);

+ggtt->gmadr =
+(*(struct resource) DEFINE_RES_MEM(gmadr_base,
+  ggtt->mappable_end));
+
+ ggtt->do_idle_maps = needs_idle_maps(dev_priv);
+ ggtt->base.insert_page = i915_ggtt_insert_page;
+ ggtt->base.insert_entries = i915_ggtt_insert_entries;

DRM_INFO("Memory usable by graphics device = %lluM",
    ggtt->base.total >> 20);
-DRM_DEBUG_DRIVER("GMADR size = %lldM
', ggtt->mappable_end >> 20);
+DRM_DEBUG_DRIVER("GMADR size = %lluM", (u64)ggtt->mappable_end >> 20);

DRM_DEBUG_DRIVER("GTT stolen size = %uM", ggtt->stolen_size >> 20);
if (intel_vtd_active())
    DRM_INFO("VT-d active for gfx access\n");
@@ -3523,18 +3553,22 @@
/* GMADR is the PCI mmio aperture into the global GTT. */

mutex_lock(&dev_priv->drm.struct_mutex);
i915_address_space_init(&ggtt->base, dev_priv, "[global]");
+
+/* Only VLV supports read-only GGTT mappings */
+ggtt->base.has_read_only = IS_VALLEYVIEW(dev_priv);
+
+ if (!HAS_LLC(dev_priv) && !USES_PPGTT(dev_priv))
+ ggtt->base.mm.color_adjust = i915_gtt_color_adjust;
+ mutex_unlock(&dev_priv->drm.struct_mutex);
+
-if (!io_mapping_init_wc(&dev_priv->ggtt.mappable,
-    dev_priv->ggtt.mappable_base,
+if (!io_mapping_init_wc(&dev_priv->ggtt.iomap,
+    dev_priv->ggtt.gmadr.start,
    dev_priv->ggtt.mappable_end)) {
    ret = -EIO;
    goto out_gtt_cleanup;
}
- ggtt->mtrr = arch_phys_wc_add(ggtt->mappable_base, ggtt->mappable_end);
+ ggtt->mtrr = arch_phys_wc_add(ggtt->gma.dr.start, ggtt->mappable_end);

/*
 * Initialise stolen early so that we may reserve preallocated
 * the entries so the sg list can be happily traversed.
 * The only thing we need are DMA addresses.
 */
-sg_set_page(sg, NULL, PAGE_SIZE, 0);
+sg_set_page(sg, NULL, I915_GTT_PAGE_SIZE, 0);
 sg_dma_address(sg) = in[offset + src_idx];
-sg_dma_len(sg) = PAGE_SIZE;
+sg_dma_len(sg) = I915_GTT_PAGE_SIZE;
 sg = sg_next(sg);
 src_idx -= stride;
}
@@ -3667,7 +3701,7 @@
 int intel_rotate_pages(struct intel_rotation_info *rot_info,
 struct drm_i915_gem_object *obj)
 {
-const unsigned long n_pages = obj->base.size / PAGE_SIZE;
+const unsigned long n_pages = obj->base.size / I915_GTT_PAGE_SIZE;
 unsigned int size = intel_rotation_info_size(rot_info);
 struct sgt_iter sgt_iter;
 dma_addr dma_addr;
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem_gtt.h
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem_gtt.h
@@ -42,13 +42,15 @@
 #include "i915_gem_request.h"
 #include "i915_selftest.h"

+#define I915_GTT_PAGE_SIZE_4K BIT_ULL(12)
+#define I915_GTT_PAGE_SIZE_64K BIT_ULL(16)
+#define I915_GTT_PAGE_SIZE_2M BIT_ULL(21)
+﻿#define I915_GTT_PAGE_SIZE_4KBIT_ULL(12)
+﻿#define I915_GTT_PAGE_SIZE_64KBIT_ULL(16)
+﻿#define I915_GTT_PAGE_SIZE_2MBIT_ULL(21)

 #define I915_GTT_PAGE_SIZE I915_GTT_PAGE_SIZE_4K
 #define I915_GTT_MAX_PAGE_SIZE I915_GTT_PAGE_SIZE_2M

+#define I915_GTT_PAGE_MASK -I915_GTT_PAGE_SIZE
+ #define I915_GTT_MIN_ALIGNMENT I915_GTT_PAGE_SIZE

 #define I915_FENCE_REG_NONE -1

---
struct list_head unbound_list;

struct pagevec free_pages;
-bool pt_kmap_wc;
+
+/* Some systems require uncached updates of the page directories */
+bool pt_kmap_wc:1;
+
+/* Some systems support read-only mappings for GGTT and/or PPGTT */
+bool has_read_only:1;

/* FIXME: Need a more generic return type */
gen6_pte_t (*pte_encode)(dma_addr_t addr,
@@ -368,9 +375,9 @@
/* Flags used by pin/bind&friends. */
-#define PIN_NONBLOCKBIT(0)
-#define PIN_MAPPABLEBIT(1)
-#define PIN_ZONE_4GBIT(2)
-#define PIN_NONFAULTBIT(3)
-#define PIN_NOEVICTBIT(4)
-
-#define PIN_MBZBIT(5) /* I915_VMA_PIN_OVERFLOW */
-#define PIN_GLOBALBIT(6) /* I915_VMA_GLOBAL_BIND */
-#define PIN_USERBIT(7) /* I915_VMA_LOCAL_BIND */
-#define PIN_UPDATEBIT(8)
-
-#define PIN_HIGHBIT(9)
-#define PIN_OFFSET_BIASBIT(10)
-#define PIN_OFFSET_FIXEDBIT(11)
+#define PIN_NONBLOCKULL(0)
+#define PIN_MAPPABLEULL(1)
+#define PIN_ZONE_4GBITULL(2)
+#define PIN_NONFAULTULL(3)
+#define PIN_NOEVICT_BIT_ULL(4)
+
+#define PIN_MBZBIT_ULL(5) /* I915_VMA_PIN_OVERFLOW */
+#define PIN_GLOBALBIT_ULL(6) /* I915_VMA_GLOBAL_BIND */
+#define PIN_USERBIT_ULL(7) /* I915_VMA_LOCAL_BIND */
+#define PIN_UPDATEBIT_ULL(8)
+
+#define PIN_HIGHBIT_ULL(9)
+#define PIN_OFFSET_BIASBIT_ULL(10)
+#define PIN_OFFSET_FIXEDBIT_ULL(11)
#define PIN_OFFSET_MASK(-I915_GTT_PAGE_SIZE)

#endif
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem_object.h
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem_object.h
@@ -140,7 +140,6 @@
 * Is the object to be mapped as read-only to the GPU
 * Only honoured if hardware has relevant pte bit
 */
-unsigned long gt_ro:1;
unsigned int cache_level:3;
unsigned int cache_coherent:2;
#define I915_BO_CACHE_COHERENT_FOR_READ BIT(0)
@@ -349,6 +348,18 @@
 reservation_object_unlock(obj->resv);
 }

+static inline void
+i915_gem_object_set_readonly(struct drm_i915_gem_object *obj)
+{
+    obj->base.vma_node.readonly = true;
+}
+
+static inline bool
+i915_gem_object_is_readonly(const struct drm_i915_gem_object *obj)
+{
+    return obj->base.vma_node.readonly;
+}
+
static inline bool
i915_gem_object_has_struct_page(const struct drm_i915_gem_object *obj)
{
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gem_userptr.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_gem_userptr.c
@@ -640,6 +640,14 @@
 GFP_KERNEL |
 __GFP_NORETRY |
 __GFP_NOWARN);
/*
 * Using __get_user_pages_fast() with a read-only
 * access is questionable. A read-only page may be
 * COW-broken, and then this might end up giving
 * the wrong side of the COW..
 *
 * We may or may not care.
 */
if (pvec) /* defer to worker if malloc fails */
pinned = __get_user_pages_fast(obj->userptr.ptr,
       num_pages,
@@ -684,8 +692,28 @@
i915_gem_gtt_finish_pages(obj, pages);

for_each_sgt_page(page, sgt_iter, pages) {
    -if (obj->mm.dirty)
    +if (obj->mm.dirty && trylock_page(page)) {
        /*
         * As this may not be anonymous memory (e.g. shmem)
         * but exist on a real mapping, we have to lock
         * the page in order to dirty it -- holding
         * the page reference is not sufficient to
         * prevent the inode from being truncated.
         * Play safe and take the lock.
         *
         * However...!
         *
         * The mmu-notifier can be invalidated for a
         * migrate_page, that is already holding the lock
         * on the page. Such a try_to_unmap() will result
         * in us calling put_pages() and so recursively try
         * to lock the page. We avoid that deadlock with
         * a trylock_page() and in exchange we risk missing
         * some pagedirtying.
         */
    + set_page_dirty(page);
    +unlock_page(page);
    +}

mark_page_accessed(page);
put_page(page);
@@ -776,6 +804,9 @@

    I915_USERPTR_UNSYNCHRONIZED))
return -EINVAL;

+if (!args->user_size)
+return -EINVAL;
+
if (offset_in_page(args->user_ptr | args->user_size))
return -EINVAL;

--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_gpu_error.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_gpu_error.c
@@ -231,6 +231,8 @@
if (zlib_deflate(zstream, Z_SYNC_FLUSH) != Z_OK)
return -EIO;
+
+cond_resched();
} while (zstream->avail_in);

/* Fallback to uncompressed if we increase size */
@@ -912,7 +915,7 @@
ggtt->base.insert_page(&ggtt->base, dma, slot,
   I915_CACHE_NONE, 0);

-s = io_mapping_map_atomic_wc(&ggtt->mappable, slot);
+s = io_mapping_map_atomic_wc(&ggtt->iomap, slot);
ret = compress_page(&compress, (void  __force *)s, dst);
+cond_resched();
return 0;
}
@@ -1851,9 +1851,17 @@
/*
 * Clear the PIPE*STAT regs before the IIR
 + *
+ * Toggle the enable bits to make sure we get an
+ * edge in the ISR pipe event bit if we don't clear
+ * all the enabled status bits. Otherwise the edge
+ * triggered IIR on i965/g4x wouldn't notice that
+ * an interrupt is still pending.
 */
-if (pipe_stats[pipe])
-   -I915_WRITE(reg, enable_mask | pipe_stats[pipe]);
+if (pipe_stats[pipe]) {
  +I915_WRITE(reg, pipe_stats[pipe]);
+*/
I915_WRITE(reg, enable_mask);
+
}
spin_unlock(&dev_priv->irq_lock);
}
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_pci.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_pci.c
@@ -74,19 +74,19 @@
    GEN_DEFAULT_PAGE_SIZES, \
    CURSOR_OFFSETS

- static const struct intel_device_info intel_i830_info __initconst = {
+ static const struct intel_device_info intel_i830_info = {
    GEN2_FEATURES,
    .platform = INTEL_I830,
    .is_mobile = 1, .cursor_needs_physical = 1,
    .num_pipes = 2, /* legal, last one wins */
    
};

- static const struct intel_device_info intel_i845g_info __initconst = {
+ static const struct intel_device_info intel_i845g_info = {
    GEN2_FEATURES,
    .platform = INTEL_I845G,
    
};

- static const struct intel_device_info intel_i85x_info __initconst = {
+ static const struct intel_device_info intel_i85x_info = {
    GEN2_FEATURES,
    .platform = INTEL_I85X, .is_mobile = 1,
    .num_pipes = 2, /* legal, last one wins */
@@ -94,7 +94,7 @@
    .has_fbc = 1,
    
};

- static const struct intel_device_info intel_i865g_info __initconst = {
+ static const struct intel_device_info intel_i865g_info = {
    GEN2_FEATURES,
    .platform = INTEL_I865G,
    
};
@@ -108,7 +108,7 @@
    GEN_DEFAULT_PAGE_SIZES, \
    CURSOR_OFFSETS

- static const struct intel_device_info intel_i915g_info __initconst = {
+ static const struct intel_device_info intel_i915g_info = {
    GEN3_FEATURES,
    .platform = INTEL_I915G, .cursor_needs_physical = 1,
    .has_overlay = 1, .overlay_needs_physical = 1,
@@ -116,7 +116,7 @@
.unfenced_needs_alignment = 1,
};

-static const struct intel_device_info intel_i915gm_info __initconst = {
+static const struct intel_device_info intel_i915gm_info = {
GEN3FEATURES,
.platform = INTEL_I915GM,
.is_mobile = 1,
@@ -128,7 +128,7 @@
.unfenced_needs_alignment = 1,
};

-static const struct intel_device_info intel_i945g_info __initconst = {
+static const struct intel_device_info intel_i945g_info = {
GEN3FEATURES,
.platform = INTEL_I945G,
.has_hotplug = 1, .cursor_needs_physical = 1,
@@ -137,7 +137,7 @@
.unfenced_needs_alignment = 1,
};

-static const struct intel_device_info intel_i945gm_info __initconst = {
+static const struct intel_device_info intel_i945gm_info = {
GEN3FEATURES,
.platform = INTEL_I945GM, .is_mobile = 1,
.has_hotplug = 1, .cursor_needs_physical = 1,
@@ -148,14 +148,14 @@
.unfenced_needs_alignment = 1,
};

-static const struct intel_device_info intel_g33_info __initconst = {
+static const struct intel_device_info intel_g33_info = {
GEN3FEATURES,
.platform = INTEL_G33,
.has_hotplug = 1,
.has_overlay = 1,
};

-static const struct intel_device_info intel_pineview_info __initconst = {
+static const struct intel_device_info intel_pineview_info = {
GEN3FEATURES,
.platform = INTEL_PINEVIEW, .is_mobile = 1,
.has_hotplug = 1,
@@ -172,7 +172,7 @@
GEN_DEFAULT_PAGE_SIZES, \nCURSOR_OFFSETS
-static const struct intel_device_info intel_i965g_info __initconst = {
  +static const struct intel_device_info intel_i965g_info = {
    GEN4_FEATURES,
    .platform = INTEL_I965G,
    .has_overlay = 1,
    @ @ -180,7 +180,7 @ @
    .has_snoop = false,
  };

-static const struct intel_device_info intel_i965gm_info __initconst = {
  +static const struct intel_device_info intel_i965gm_info = {
    GEN4_FEATURES,
    .platform = INTEL_I965GM,
    .is_mobile = 1, .has_fbc = 1,
    @ @ -190,13 +190,13 @ @
    .has_snoop = false,
  };

-static const struct intel_device_info intel_g45_info __initconst = {
  +static const struct intel_device_info intel_g45_info = {
    GEN4_FEATURES,
    .platform = INTEL_G45,
    .ring_mask = RENDER_RING | BSD_RING,
  };

-static const struct intel_device_info intel_gm45_info __initconst = {
  +static const struct intel_device_info intel_gm45_info = {
    GEN4_FEATURES,
    .platform = INTEL_GM45,
    .is_mobile = 1, .has_fbc = 1,
    @ @ -213,12 +213,12 @ @
    GEN_DEFAULT_PAGE_SIZES, \CURSOR_OFFSETS

-static const struct intel_device_info intel_ironlake_d_info __initconst = {
  +static const struct intel_device_info intel_ironlake_d_info = {
    GEN5_FEATURES,
    .platform = INTEL_IRONLAKE,
  };

-static const struct intel_device_info intel_ironlake_m_info __initconst = {
  +static const struct intel_device_info intel_ironlake_m_info = {
    GEN5_FEATURES,
    .platform = INTEL_IRONLAKE,
  };

-static const struct intel_device_info intel_sandybridge_info __initconst = {
  +static const struct intel_device_info intel_sandybridge_info = {
    GEN6_FEATURES, \}
    .platform = INTEL_SANDYBRIDGE

  };

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static const struct intel_device_info intel_sandybridge_d_gt1_info __initconst = {
   .gt = 1,
};

static const struct intel_device_info intel_sandybridge_d_gt2_info __initconst = {
   .gt = 2,
};

static const struct intel_device_info intel_sandybridge_m_gt1_info __initconst = {
   .gt = 1,
};

static const struct intel_device_info intel_sandybridge_m_gt2_info __initconst = {
   .gt = 2,
};

static const struct intel_device_info intel_ivybridge_d_gt1_info __initconst = {
   .gt = 1,
};

static const struct intel_device_info intel_ivybridge_d_gt2_info __initconst = {
   .gt = 2,
};

static const struct intel_device_info intel_ivybridge_m_gt1_info __initconst = {
   .gt = 1,
};

static const struct intel_device_info intel_ivybridge_m_gt2_info __initconst = {
   .gt = 2,
};

static const struct intel_device_info intel_ivybridge_d_gt1_info __initconst = {
   .gt = 1,
};

static const struct intel_device_info intel_ivybridge_d_gt2_info __initconst = {
   .gt = 2,
};

static const struct intel_device_info intel_ivybridge_m_gt1_info __initconst = {
   .gt = 1,
};

static const struct intel_device_info intel_ivybridge_m_gt2_info __initconst = {
IVB_M_PLATFORM,
.gt = 1,
};

- static const struct intel_device_info intel_ivybridge_m_gt2_info __initconst = {
+ static const struct intel_device_info intel_ivybridge_m_gt2_info = {
IVB_M_PLATFORM,
.gt = 2,
};

- static const struct intel_device_info intel_ivybridge_q_info __initconst = {
+ static const struct intel_device_info intel_ivybridge_q_info = {
GEN7_FEATURES,
.platform = INTEL_IVYBRIDGE,
.gt = 2,
@@ -.320,7 +320,7 @@
.has_l3_dpf = 1,
};

- static const struct intel_device_info intel_valleyview_info __initconst = {
+ static const struct intel_device_info intel_valleyview_info = {
.platform = INTEL_VALLEYVIEW,
.gen = 7,
.is_lp = 1,
@@ -.356,17 +356,17 @@
.platform = INTEL_HASWELL, \n.has_l3_dpf = 1

- static const struct intel_device_info intel_haswell_gt1_info __initconst = {
+ static const struct intel_device_info intel_haswell_gt1_info = {
HSW_PLATFORM,
.gt = 1,
};

- static const struct intel_device_info intel_haswell_gt2_info __initconst = {
+ static const struct intel_device_info intel_haswell_gt2_info = {
HSW_PLATFORM,
.gt = 2,
};

- static const struct intel_device_info intel_haswell_gt3_info __initconst = {
+ static const struct intel_device_info intel_haswell_gt3_info = {
HSW_PLATFORM,
.gt = 3,
}@ @ -.386,17 +386,17 @@
.gen = 8, \n.platform = INTEL_BROADWELL
static const struct intel_device_info intel_broadwell_gt1_info __initconst = {
  BDW_PLATFORM,
  .gt = 1,
};

static const struct intel_device_info intel_broadwell_gt2_info __initconst = {
  BDW_PLATFORM,
  .gt = 2,
};

static const struct intel_device_info intel_broadwell_rsvd_info __initconst = {
  BDW_PLATFORM,
  .gt = 3,
  /* According to the device ID those devices are GT3, they were
   * @ @ -404,13 +404,13 @ @
   */
};

static const struct intel_device_info intel_broadwell_gt3_info __initconst = {
  BDW_PLATFORM,
  .gt = 3,
  .ring_mask = RENDER_RING | BSD_RING | BLT_RING | VEBOX_RING | BSD2_RING,
};

static const struct intel_device_info intel_cherryview_info __initconst = {
  ..gen = 8, .num_pipes = 3,
  .has_hotplug = 1,
  .is_lp = 1,
  @@ -453,12 +453,12 @@
  .gen = 9,
  .platform = INTEL_SKYLAKE

static const struct intel_device_info intel_skylake_gt1_info __initconst = {
  SKL_PLATFORM,
  .gt = 1,
};

static const struct intel_device_info intel_skylake_gt2_info __initconst = {
  SKL_PLATFORM,
  .gt = 2,
.ring_mask = RENDER_RING | BSD_RING | BLT_RING | VEBOX_RING | BSD2_RING

static const struct intel_device_info intel_skylake_gt3_info __initconst = {
    SKL_GT3_PLUS_PLATFORM,
    .gt = 3,
};

static const struct intel_device_info intel_skylake_gt4_info __initconst = {
    SKL_GT3_PLUS_PLATFORM,
    .gt = 4,
};

static const struct intel_device_info intel_broxton_info __initconst = {
    GEN9_LP_FEATURES,
    .platform = INTEL_BROXTON,
    .ddb_size = 512,
};

static const struct intel_device_info intel_geminilake_info __initconst = {
    GEN9_LP_FEATURES,
    .platform = INTEL_GEMINILAKE,
    .ddb_size = 1024,
    .gen = 9,
    .platform = INTEL_KABYLAKE
};

static const struct intel_device_info intel_kabylake_gt1_info __initconst = {
    KBL_PLATFORM,
    .gt = 1,
};

static const struct intel_device_info intel_kabylake_gt2_info __initconst = {
    KBL_PLATFORM,
    .gt = 2,
};
static const struct intel_device_info intel_kabylake_gt3_info __initconst = {
KBL_PLATFORM,
.gt = 3,
.ring_mask = RENDER_RING | BSD_RING | BLT_RING | VEBOX_RING | BSD2_RING,
@@ -548,17 +548,17 @@
gen = 9,
.platform = INTEL_COFFEELAKE

static const struct intel_device_info intel_coffeelake_gt1_info __initconst = {
+static const struct intel_device_info intel_coffeelake_gt1_info = {
CFL_PLATFORM,
.gt = 1,
};

static const struct intel_device_info intel_coffeelake_gt2_info __initconst = {
+static const struct intel_device_info intel_coffeelake_gt2_info = {
CFL_PLATFORM,
.gt = 2,
};

static const struct intel_device_info intel_coffeelake_gt3_info __initconst = {
+static const struct intel_device_info intel_coffeelake_gt3_info = {
CFL_PLATFORM,
.gt = 3,
.ring_mask = RENDER_RING | BSD_RING | BLT_RING | VEBOX_RING | BSD2_RING,
@@ -569,7 +569,7 @@
ddb_size = 1024,
 GLK_COLORS

static const struct intel_device_info intel_cannonlake_gt2_info __initconst = {
+static const struct intel_device_info intel_cannonlake_gt2_info = {
GEN10_FEATURES,
.is_alpha_support = 1,
.platform = INTEL_CANNONLAKE,
@@ -628,10 +628,15 @@
 INTEL_KBL_GT2_IDS(&intel_kabylake_gt2_info),
 INTEL_KBL_GT3_IDS(&intel_kabylake_gt3_info),
 INTEL_KBL_GT4_IDS(&intel_kabylake_gt3_info),
+INTEL_AML_GT2_IDS(&intel_kabylake_gt2_info),
 INTEL_CFL_S_GT1_IDS(&intel_coffeelake_gt1_info),
 INTEL_CFL_S_GT2_IDS(&intel_coffeelake_gt2_info),
 INTEL_CFL_H_GT2_IDS(&intel_coffeelake_gt2_info),
+INTEL_CFL_U_GT2_IDS(&intel_coffeelake_gt2_info),
 INTEL_CFL_U_GT3_IDS(&intel_coffeelake_gt3_info),
+INTEL_WHL_U_GT1_IDS(&intel_coffeelake_gt1_info),
+INTEL_WHL_U_GT2_IDS(&intel_coffeelake_gt2_info),
+INTEL_WHL_U_GT3_IDS(&intel_coffeelake_gt3_info),
mutex_lock(&dev_priv->drm.struct_mutex);
dev_priv->perf.oa.exclusive_stream = NULL;
mutex_unlock(&dev_priv->drm.struct_mutex);
free_oa_buffer(dev_priv);

static int gen8_configure_all_contexts(struct drm_i915_private *dev_priv,
				const struct i915_oa_config *oa_config,
				bool interruptible)
{
    int ret;
    unsigned int wait_flags = I915_WAIT_LOCKED;
    struct i915_gem_context *ctx;

    if (interruptible) {
        ret = i915_mutex_lock_interruptible(&dev_priv->drm);
        if (ret)
            return ret;
    } else {
        mutex_lock(&dev_priv->drm.struct_mutex);
    }

    if (!(wait_flags & I915_WAIT_INTERRUPTIBLE))
        return ret;

    ctx = drm_i915_create_gem_context(dev_priv);
    if (!ctx)
        return -EAGAIN;

    if (interruptible)
        ret = i915_mutex_lock_interruptible(&dev_priv->drm);
    else
        mutex_lock(&dev_priv->drm.struct_mutex);

    ret = drmm_i915_gem_context_lock(ctx);
    if (ret)
        goto out;

    free_gem(context);
    return ret;
}

/* Switch away from any user context. */
ret = gen8_switch_to_updated_kernel_context(dev_priv, oa_config);
mutex_unlock(&dev_priv->drm.struct_mutex);
return ret;
@@ -1862,7 +1850,7 @@
to make sure all slices/subslices are ON before writing to NOA
* registers.*
 */
-ret = gen8_configure_all_contexts(dev_priv, oa_config, true);
+ret = gen8_configure_all_contexts(dev_priv, oa_config);
 if (ret)
 return ret;

static void gen8_disable_metric_set(struct drm_i915_private *dev_priv)
{
 /* Reset all contexts' slices/subslices configurations. */
-gen8_configure_all_contexts(dev_priv, NULL, false);
+gen8_configure_all_contexts(dev_priv, NULL);

I915_WRITE(GDT_CHICKEN_BITS, (I915_READ(GDT_CHICKEN_BITS) & ~GT_NOA_ENABLE));
@@ -2127,6 +2115,10 @@
if (ret)
goto err_oa_buf_alloc;

+ret = i915_mutex_lock_interruptible(&dev_priv->drm);
+if (ret)
+goto err_lock;
+
ret = dev_priv->perf.oa.ops.enable_metric_set(dev_priv, stream->oa_config);
if (ret)
@@ -2134,23 +2126,17 @@
stream->ops = &i915_oa_stream_ops;

-/* Lock device for exclusive_stream access late because
- * enable_metric_set() might lock as well on gen8+.
- */
-ret = i915_mutex_lock_interruptible(&dev_priv->drm);
-if (ret)
-goto err_lock;
-
dev_priv->perf.oa.exclusive_stream = stream;

mutex_unlock(&dev_priv->drm.struct_mutex);

return 0;
- err_lock:
+ err_enable:
dev_priv->perf.oa.ops.disable_metric_set(dev_priv);
+ mutex_unlock(&dev_priv->drm.struct_mutex);

- err_enable:
+ err_lock:
free_oa_buffer(dev_priv);

err_oa_buf_alloc:
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_reg.h
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_reg.h
@@ -358,6 +358,8 @@
#define GEN8_CONFIG0_MMIO(0xD00)
#define GEN9_DEFAULT_FIXES(1 << 3 | 1 << 2 | 1 << 1)

+#define GEN8_RC6_CTX_INFO_MMIO(0x8504)
+ #define GAC_ECO_BITS_MMIO(0x14090)
# define ECOBITS_SNB_BIT(1<<13)
# define ECOBITS_PPGTT_CACHE64B(3<<8)
@@ -703,6 +705,10 @@
 */
#define BCS_SWCTRL_MMIO(0x22200)

+/* There are 16 GPR registers */
+#define BCS_GPR(n)_MMIO(0x22600 + (n) * 8)
+#define BCS_GPR_UDW(n)_MMIO(0x22600 + (n) * 8 + 4)
+ #define GPGPU_THREADS_DISPATCHED_MMIO(0x2290)
# define GPGPU_THREADS_DISPATCHED_UDW_MMIO(0x2290 + 4)
#define HS_INVOCATION_COUNT_MMIO(0x2300)
@@ -2488,12 +2494,17 @@
#define _3D_CHICKEN_MMIO(0x2084)
#define _3D_CHICKEN_HIZ_PLANE_DISABLE_MSAA_4X_SNB(1 << 10)
#define _3D_CHICKEN2_MMIO(0x208c)
+ #define FF_SLICE_CHICKEN_MMIO(0x2088)
+ #define FF_SLICE_CHICKEN_CL_PROVOKING_VERTEX_FIX(1 << 1)
+ /* Disables pipelining of read flushes past the SF-WIZ interface.
 * Required on all Ironlake steppings according to the B-Spec, but the
 * particular danger of not doing so is not specified.
 */
#define _3D_CHICKEN2_WM_READ_PIPELINED(1 << 14)
#define _3D_CHICKEN3_MMIO(0x2090)
+#define _3D_CHICKEN_SF_PROVOKING_VERTEX_FIX(1 << 12)
#define _3D_CHICKEN_SF_DISABLE_OBJEND_CULL(1 << 10)
#define _3D_CHICKEN3_AA_LINE_QUALITY_FIX_ENABLE(1 << 5)
#define _3D_CHICKEN3_SF_DISABLE_FASTCLIP_CULL(1 << 5)
@@ -6187,6 +6198,12 @@
#define _SPATILEOFF (VLV_DISPLAY_BASE + 0x721a4)
#define _SPACONSTALPHA(VLV_DISPLAY_BASE + 0x721a8)
#define SP_CONST_ALPHA_ENABLE (1<<31)
+define _SPACLRC0 (VLV_DISPLAY_BASE + 0x721d0)
+define SP_CONTRAST(x)(x) << 18 /* u3.6 */
+define SP_BRIGHTNESS(x)(x) & 0xff /* s8 */
+define _SPACLRC1 (VLV_DISPLAY_BASE + 0x721d4)
+define SP_SH_SIN(x)(((x) & 0x7ff) << 16) /* s4.7 */
+define SP_SH_COS(x) /* u3.7 */
#define _SPAGAMC(VLV_DISPLAY_BASE + 0x721f4)

#define _SPBCNTR(VLV_DISPLAY_BASE + 0x72280)
@@ -6200,6 +6217,8 @@
#define _SPBKEYMAXVAL(VLV_DISPLAY_BASE + 0x722a0)
#define _SPBITLEOFF(VLV_DISPLAY_BASE + 0x722a4)
#define _SPBCONSTALPHA(VLV_DISPLAY_BASE + 0x722a8)
+#define _SPBCLRC0(VLV_DISPLAY_BASE + 0x722d0)
+#define _SPBCLRC1(VLV_DISPLAY_BASE + 0x722d4)
#define _SPBGAMC(VLV_DISPLAY_BASE + 0x722f4)

#define_MMIO_VLV_SPR(pipe, plane_id, reg_a, reg_b) \
@@ -6216,6 +6235,8 @@
#define SPKEYMAXVAL(pipe, plane_id) MMIO_VLV_SPR((pipe), (plane_id), _SPAKEYMAXVAL,
#define SPTILEOFF(pipe, plane_id) MMIO_VLV_SPR((pipe), (plane_id), _SPATILEOFF, _SPBTILEOFF)
#define SPCONSTALPHA(pipe, plane_id) MMIO_VLV_SPR((pipe), (plane_id), _SPACONSTALPHA,
#define SPCLRC0(pipe, plane_id) MMIO_VLV_SPR((pipe), (plane_id), _SPACLRC0, _SPBCLRC0)
#define SPCLRC1(pipe, plane_id) MMIO_VLV_SPR((pipe), (plane_id), _SPACLRC1, _SPBCLRC1)
#define SPGAMC(pipe, plane_id) MMIO_VLV_SPR((pipe), (plane_id), _SPAGAMC, _SPBGAMC)

/*
@@ -6281,7 +6302,7 @@
#define PLANE_CTL_YUV422_UYVY( 1 << 16)
#define PLANE_CTL_YUV422_YVYU( 2 << 16)
#define PLANE_CTL_YUV422_VYUY( 3 << 16)
-#define PLANE_CTL_DECOMPRESSION_ENABLE(1 << 15)
+#define PLANE_CTL_RENDER_DECOMPRESSION_ENABLE(1 << 15)
#define PLANE_CTL_TRICKLE_FEED_DISABLE(1 << 14)
#define PLANE_CTL_PLANEGAMMA_DISABLE(1 << 13)
#define PLANE_CTL_TILED_MASK(0x7 << 10)
@@ -6735,6 +6756,10 @@
#define SKL_CSR_DC5_DC6_COUNT_MMIO(0x8002C)
#define BXT_CSR_DC3_DC5_COUNT_MMIO(0x80038)

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/* Display Internal Timeout Register */
#define RM_TIMEOUT_MMIO(0x42060)
#define MMIO_TIMEOUT_US(us)((us) << 0)
+
/* interrupts */
#define DE_MASTER_IRQ_CONTROL (1 << 31)
#define DE_SPRITEB_FLIP_DONE (1 << 29)
@@ -7075,6 +7100,9 @@
#define SLICE_ECO_CHICKEN0_MMIO(0x7308)
#define PIXEL_MASK_CAMMING_DISABLE(1 << 14)
+
#define GEN9_WM_CHICKEN3_MMIO(0x5588)
#define GEN9_FACTOR_IN_CLR_VAL_HIZ(1 << 9)
+
/* WaCatErrorRejectionIssue */
#define GEN7_SQ_CHICKEN_MBCUNIT_CONFIG_MMIO(0x9030)
#define GEN7_SQ_CHICKEN_MBCUNIT_SQINTMOB(1<<11)
@@ -8491,6 +8519,7 @@
#define TRANS_MSA_10_BPC(2<<5)
#define TRANS_MSA_12_BPC(3<<5)
#define TRANS_MSA_16_BPC(4<<5)
+#define TRANS_MSA_CEA_RANGE(1<<3)

/* LCPLL Control */
#define LCPLL_CTL_MMIO(0x130040)
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_sysfs.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_sysfs.c
@@ -434,13 +434,13 @
   return ret ?: count;
}

-static DEVICE_ATTR(gt_act_freq_mhz, S_IRUGO, gt_act_freq_mhz_show, NULL);
-static DEVICE_ATTR(gt_cur_freq_mhz, S_IRUGO, gt_cur_freq_mhz_show, NULL);
-static DEVICE_ATTR(gt_boost_freq_mhz, S_IRUGO | S_IWUSR, gt_boost_freq_mhz_show,
   gt_boost_freq_mhz_store);
-static DEVICE_ATTR(gt_max_freq_mhz, S_IRUGO | S_IWUSR, gt_max_freq_mhz_show,
   gt_max_freq_mhz_store);
-static DEVICE_ATTR(gt_min_freq_mhz, S_IRUGO | S_IWUSR, gt_min_freq_mhz_show,
   gt_min_freq_mhz_store);
+static DEVICE_ATTR_RO(gt_act_freq_mhz);
+static DEVICE_ATTR_RO(gt_cur_freq_mhz);
+static DEVICE_ATTR_RW(gt_boost_freq_mhz);
+static DEVICE_ATTR_RW(gt_max_freq_mhz);
+static DEVICE_ATTR_RW(gt_min_freq_mhz);

-static DEVICE_ATTR(vlv_rpe_freq_mhz, S_IRUGO, vlv_rpe_freq_mhz_show, NULL);
+static DEVICE_ATTR_RO(vlv_rpe_freq_mhz);
static ssize_t gt_rp_mhz_show(struct device *kdev, struct device_attribute *attr, char *buf);
static DEVICE_ATTR(gt_RP0_freq_mhz, S_IRUGO, gt_rp_mhz_show, NULL);
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_vgpu.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_vgpu.c
@@ -100,6 +100,9 @@
 static void vgt_deballoon_space(struct i915_ggtt *ggtt,
 struct drm_mm_node *node)
 {
+  if (!drm_mm_node_allocated(node))
+    return;
+    DRM_DEBUG_DRIVER("deballoon space: range [0x%llx - 0x%llx] %llu KiB\n",
       node->start, node->start + node->size,
--- linux-4.15.0.orig/drivers/gpu/drm/i915/i915_vma.c
+++ linux-4.15.0/drivers/gpu/drm/i915/i915_vma.c
@@ -305,7 +305,7 @@
             ptr = io_mapping_map_wc(&i915_vm_to_ggtt(vma->vm)->iomap,
                vma->node.start, vma->node.size);
            if (ptr == NULL) {
@@ -466,6 +466,7 @@
               GEM_BUG_ON(!i915_vma_is_closed(vma));
               GEM_BUG_ON((vma->flags & (I915_VMA_GLOBAL_BIND | I915_VMA_LOCAL_BIND)));
               GEM_BUG_ON(drm_mm_node_allocated(&vma->node));
@@ -675,7 +676,9 @@
               list_del(&vma->obj_link);
               list_del(&vma->vm_link);
+              if (!i915_vma_is_ggtt(vma))
                   i915_ppgtt_put(i915_vm_to_ppgtt(vma->vm));
@@ -687,7 +690,6 @@
               GEM_BUG_ON(!i915_vma_is_closed(vma));
               vma->flags |= I915_VMA_CLOSED;
+              list_del(&vma->obj_link);
rb_erase(&vma->obj_node, &vma->obj->vma_tree);

if (!i915_vma_is_active(vma) && !i915_vma_is_pinned(vma))
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_audio.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_audio.c
@@ -134,6 +134,9 @@
    /* HDMI N/CTS table */
#define TMDS_297M 297000
#define TMDS_296M 296703
+#define TMDS_594M 594000
+#define TMDS_593M 593407
+
static const struct {
    int sample_rate;
    int clock;
@@ -154,6 +157,20 @@
    { 176400, TMDS_297M, 18816, 247500 },
    { 192000, TMDS_296M, 23296, 281250 },
    { 192000, TMDS_297M, 20480, 247500 },
+    { 44100, TMDS_593M, 8918, 937500 },
+    { 44100, TMDS_594M, 9408, 990000 },
+    { 48000, TMDS_593M, 5824, 562500 },
+    { 48000, TMDS_594M, 6144, 594000 },
+    { 32000, TMDS_593M, 5824, 843750 },
+    { 32000, TMDS_594M, 3072, 445500 },
+    { 88200, TMDS_593M, 17836, 937500 },
+    { 88200, TMDS_594M, 18816, 990000 },
+    { 96000, TMDS_593M, 11648, 562500 },
+    { 96000, TMDS_594M, 12288, 594000 },
+    { 176400, TMDS_593M, 35672, 937500 },
+    { 176400, TMDS_594M, 37632, 990000 },
+    { 192000, TMDS_593M, 23296, 562500 },
+    { 192000, TMDS_594M, 24576, 594000 },
    }
};

/* get AUD_CONFIG_PIXEL_CLOCK_HDMI_ value for mode */
@@ -688,13 +705,70 @@
}

+static void glk_force_audio_cdclk(struct drm_i915_private *dev_priv,
+    bool enable)
+{
+    struct drm_modeset_acquire_ctx ctx;
+    struct drm_atomic_state *state;
+    int ret;
+    
+    drm_modeset_acquire_init(&ctx, 0);
+state = drm_atomic_state_alloc(&dev_priv->drm);
+if (WARN_ON(!state))
+return;
+
+state->acquire_ctx = &ctx;
+
+ retry:
+to_intel_atomic_state(state)->cdclk.force_min_cdclk_changed = true;
+to_intel_atomic_state(state)->cdclk.force_min_cdclk =
+enable ? 2 * 96000 : 0;
+
+/*
+ * Protects dev_priv->cdclk.force_min_cdclk
+ * Need to lock this here in case we have no active pipes
+ * and thus wouldn't lock it during the commit otherwise.
+ */
+ret = drm_modeset_lock(&dev_priv->drm.mode_config.connection_mutex,
+&ctx);
+if (!ret)
+ret = drm_atomic_commit(state);
+
+if (ret == -EDEADLK) {
+drm_atomic_state_clear(state);
+drm_modeset_backoff(&ctx);
+goto retry;
+}
+
+WARN_ON(ret);
+
+drm_atomic_state_put(state);
+
+drm_modeset_drop_locks(&ctx);
+drm_modeset_acquire_fini(&ctx);
+
+static void i915_audio_component_get_power(struct device *kdev)
{
+struct drm_i915_private *dev_priv = kdev_to_i915(kdev);
+intel_display_power_get(kdev_to_i915(kdev), POWER_DOMAIN_AUDIO);
+
+/* Force CDCLK to 2*BCLK as long as we need audio to be powered. */
+if (dev_priv->audio_power_refcount++ == 0)
+if (IS_CANNONLAKE(dev_priv) || IS_GEMINILAKE(dev_priv))
+glk_force_audio_cdclk(dev_priv, true);
+
+}

static void i915_audio_component_put_power(struct device *kdev)
struct drm_i915_private *dev_priv = kdev_to_i915(kdev);

/* Stop forcing CDCLK to 2*BCLK if no need for audio to be powered. */
if (--dev_priv->audio_power_refcount == 0)
  if (IS_CANNONLAKE(dev_priv) || IS_GEMINILAKE(dev_priv))
    glk_force_audio_cdclk(dev_priv, false);

intel_display_power_put(kdev_to_i915(kdev), POWER_DOMAIN_AUDIO);
}  

struct drm_i915_private *dev_priv = kdev_to_i915(kdev);
int32_t tmp;

if (!IS_GEN9_BC(dev_priv))
  if (!IS_GEN9(dev_priv))
    return;

i915_audio_component_get_power(kdev);

{  
  struct intel_encoder *encoder;

  if (WARN_ON(pipe >= INTEL_INFO(dev_priv)->num_pipes))
    return NULL;

  /* MST */
  if (pipe >= 0) {
    if (WARN_ON(pipe >= ARRAY_SIZE(dev_priv->av_enc_map)))
      return NULL;
    
    encoder = dev_priv->av_enc_map[pipe];
  }

  /* when bootup, audio driver may not know it is
  --- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_bios.c
  +++ linux-4.15.0/drivers/gpu/drm/i915/intel_bios.c
  @@ -29,6 +29,7 @@
  #include <drm/drmP.h>
  #include <drm/i915 drm.h>
  #include "i915_drv.h"
  +#include <linux/dmi.h>

  #define _INTEL_BIOS_PRIVATE
  #include "intel_vbt_def.h"
  @@ -1107,6 +1108,7 @@
static const u8 cnp_ddc_pin_map[] = {
  [0] = 0, /* N/A */
  [DDC_BUS_DDI_B] = GMBUS_PIN_1_BXT,
  [DDC_BUS_DDI_C] = GMBUS_PIN_2_BXT,
  [DDC_BUS_DDI_D] = GMBUS_PIN_4_CNP, /* sic */
@@ -1115,9 +1117,14 @@
static u8 map_ddc_pin(struct drm_i915_private *dev_priv, u8 vbt_pin)
{
-  if (HAS_PCH_CNP(dev_priv) &&
-      vbt_pin > 0 && vbt_pin < ARRAY_SIZE(cnp_ddc_pin_map))
-    return cnp_ddc_pin_map[vbt_pin];
-  if (HAS_PCH_CNP(dev_priv)) {
-    if (vbt_pin < ARRAY_SIZE(cnp_ddc_pin_map)) {
-      return cnp_ddc_pin_map[vbt_pin];
-    } else {
+  if (HAS_PCH_CNP(dev_priv)) {
+    if (vbt_pin < ARRAY_SIZE(cnp_ddc_pin_map)) {
+      return cnp_ddc_pin_map[vbt_pin];
+    } else {
  +DRM_DEBUG_KMS("Ignoring alternate pin: VBT claims DDC pin %d, which is not valid for this platform\n", vbt_pin);
+    return 0;
+  }
+}
+
  return vbt_pin;
}
@@ -1167,7 +1174,6 @@
return;

aux_channel = child->aux_channel;
-ddc_pin = child->ddc_pin;

is_dvi = child->device_type & DEVICE_TYPE_TMDS_DVI_SIGNALING;
is_dp = child->device_type & DEVICE_TYPE_DISPLAYPORT_OUTPUT;
@@ -1214,9 +1220,15 @@
DRM_DEBUG_KMS("Port %c is internal DP\n", port_name(port));

if (is_dvi) {
  -info->alternate_ddc_pin = map_ddc_pin(dev_priv, ddc_pin);
  -
  -sanitize_ddc_pin(dev_priv, port);
  +ddc_pin = map_ddc_pin(dev_priv, child->ddc_pin);
  +if (intel_gmbus_is_valid_pin(dev_priv, ddc_pin)) {
  +  info->alternate_ddc_pin = ddc_pin;
  +  sanitize_ddc_pin(dev_priv, port);
  +} else {
  +DRM_DEBUG_KMS("Port %c has invalid DDC pin %d, ",
  +  "sticking to defaults\n", 
  +  port_name(port), ddc_pin);
  +}
if (is_dp) {
    return NULL;
}

#define DRM_DMI_PRODUCT_VERSION 0x6

static void parse_product_info(struct drm_i915_private *dev_priv)
{
    const char *product_ver = dmi_get_system_info(DRM_DMI_PRODUCT_VERSION);
    if (!product_ver)
        return;

    if (!strncmp(product_ver, "ThinkPad X1", 11)) {
        DRM_DEBUG_KMS("dmi: %s, Bypassing TMDS_OE write\n", product_ver);
        dev_priv->bypass_tmds_oe = true;
    }
    return;
}

/*
 * intel_bios_init - find VBT and initialize settings from the BIOS
 *
 * @dev_priv: i915 device instance
 */
parse_sdvo_device_mapping(dev_priv, bdb->version);
parse_ddi_ports(dev_priv, bdb->version);

out:
if (!vbt) {
    DRM_INFO("Failed to find VBIOS tables (VBT)\n");
    spin_unlock_irq(&b->rb_lock);
}

-static bool signal_valid(const struct drm_i915_gem_request *request)
-{
    return intel_wait_check_request(&request->signaling.wait, request);
-}
-
static bool signal_complete(const struct drm_i915_gem_request *request)
if (!request)
return false;

    /* If another process served as the bottom-half it may have already
     * signalled that this wait is already completed.
     */
    if (intel_wait_complete(&request->signaling.wait))
    signal_valid(request);

    /* Carefully check if the request is complete, giving time for the
     * seqno to be visible or if the GPU hung.
     */
    if (__i915_request_irq_complete(request))
    return true;
    return false;

static struct drm_i915_gem_request *to_signaler(struct rb_node *rb)
@@ -617,9 +604,13 @@
request = i915_gem_request_get_rcu(request);
rcu_read_unlock();
if (signal_complete(request)) {
    -local_bh_disable();
    -dma_fence_signal(&request->fence);
    -local_bh_enable(); /* kick start the tasklets */
+if (!test_bit(DMA_FENCE_FLAG_SIGNALED_BIT,
+    &request->fence.flags)) {
+    -local_bh_disable();
+    -dma_fence_signal(&request->fence);
+    -GEM_BUG_ON(!i915_gem_request_completed(request));
+    -local_bh_enable(); /* kick start the tasklets */
+}

    spin_lock_irq(&b->rb_lock);

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_cdclk.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_cdclk.c
@@ -483,7 +483,8 @@
}

static void vlv_set_cdclk(struct drm_i915_private *dev_priv,
    - const struct intel_cdclk_state *cdclk_state)
+  const struct intel_cdclk_state *cdclk_state,
+  enum pipe pipe)
int cdclk = cdclk_state->cdclk;
uint32_t val, data;
}

static void chv_set_cdclk(struct drm_i915_private *dev_priv,
- const struct intel_cdclk_state *cdclk_state)
+ const struct intel_cdclk_state *cdclk_state,
+ enum pipe pipe)
{
    int cdclk = cdclk_state->cdclk;
    u32 val, cmd;
}

static void bdw_set_cdclk(struct drm_i915_private *dev_priv,
- const struct intel_cdclk_state *cdclk_state)
+ const struct intel_cdclk_state *cdclk_state,
+ enum pipe pipe)
{
    int cdclk = cdclk_state->cdclk;
    uint32_t val, data;
}

static void skl_set_cdclk(struct drm_i915_private *dev_priv,
- const struct intel_cdclk_state *cdclk_state)
+ const struct intel_cdclk_state *cdclk_state,
+ enum pipe pipe)
{
    int cdclk = cdclk_state->cdclk;
    int vco = cdclk_state->vco;
    cdclk_state.vco = 8100000;
    cdclk_state.cdclk = skl_calc_cdclk(0, cdclk_state.vco);
    skl_set_cdclk(dev_priv, &cdclk_state);
    skl_set_cdclk(dev_priv, &cdclk_state, INVALID_PIPE);
}

/**
@@ -1090,7 +1094,7 @@
    cdclk_state.cdclk = cdclk_state.ref;
    cdclk_state.vco = 0;
    skl_set_cdclk(dev_priv, &cdclk_state);
    skl_set_cdclk(dev_priv, &cdclk_state, INVALID_PIPE);
static int bxt_calc_cdclk(int min_cdclk)
@@ -1254,7 +1258,8 @@
}
static void bxt_set_cdclk(struct drm_i915_private *dev_priv,
- const struct intel_cdclk_state *cdclk_state)
+ const struct intel_cdclk_state *cdclk_state,
+ enum pipe pipe)
{
  int cdclk = cdclk_state->cdclk;
  int vco = cdclk_state->vco;
 @@ -1284,10 +1289,15 @@
     break;
}

-/* Inform power controller of upcoming frequency change */
+     /* Inform power controller of upcoming frequency change. BSpec
     + requires us to wait up to 150usec, but that leads to timeouts;
     + the 2ms used here is based on experiment.
     */
+  ret = sandybridge_pcode_write_timeout(dev_priv,
+    HSW_PCODE_DE_WRITE_FREQ_REQ,
+    0x80000000, 2000);
     mutex_unlock(&dev_priv->pcu_lock);

     if (ret) {
@@ -1304,11 +1314,10 @@
bxt_de_pll_enable(dev_priv, vco);

     val = divider | skl_cdclk_decimal(cdclk);
-/*
     - * FIXME if only the cd2x divider needs changing, it could be done
     - * without shutting off the pipe (if only one pipe is active).
     */
-  -val |= BXT_CDCLK_CD2X_PIPELINE_NONE;
+  if (pipe == INVALID_PIPE)
+    -val |= BXT_CDCLK_CD2X_PIPELINE_NONE;
     else
+    else
      +val |= BXT_CDCLK_CD2X_PIPELINE(pipe);
  /*
     * Disable SSA Precharge when CD clock frequency < 500 MHz,
     * enable otherwise.
     */
@@ -1317,9 +1326,19 @@
 val |= BXT_CDCLK_SSA_PRECHARGE_ENABLE;
 i915_WRITE(CDCLK_CTL, val);

+if (pipe != INVALID_PIPE)
+intel_wait_for_vblank(dev_priv, pipe);
 +mutex_lock(&dev_priv->pcu_lock);
-ret = sandybridge_pcode_write(dev_priv, HSW_PCODE_DE_WRITE_FREQ_REQ,
 - DIV_ROUND_UP(cdclk, 25000));
+/*
 + * The timeout isn’t specified, the 2ms used here is based on
 + * experiment.
 + * FIXME: Waiting for the request completion could be delayed until
 + * the next PCODE request based on BSpec.
 + */
+ret = sandybridge_pcode_write_timeout(dev_priv,
 + HSW_PCODE_DE_WRITE_FREQ_REQ,
 + DIV_ROUND_UP(cdclk, 25000), 2000);
mutex_unlock(&dev_priv->pcu_lock);

if (ret) {
@@ -1412,7 +1431,7 @@
 cdclk_state.vco = bxt_de_pll_vco(dev_priv, cdclk_state.cdclk);
 }

-bxt_set_cdclk(dev_priv, &cdclk_state);
+bxt_set_cdclk(dev_priv, &cdclk_state, INVALID_PIPE);
}

/**
@@ -1429,7 +1448,7 @@
 cdclk_state.cdclk = cdclk_state.ref;
 cdclk_state.vco = 0;

-bxt_set_cdclk(dev_priv, &cdclk_state);
+bxt_set_cdclk(dev_priv, &cdclk_state, INVALID_PIPE);
}

static int cnl_calc_cdclk(int min_cdclk)
@@ -1528,7 +1547,8 @@
 }

static void cnl_set_cdclk(struct drm_i915_private *dev_priv,
- const struct intel_cdclk_state *cdclk_state)
+ const struct intel_cdclk_state *cdclk_state,
+ enum pipe pipe)
{  

int cdclk = cdclk_state->cdclk;
int vco = cdclk_state->vco;
@@ -1584,13 +1604,15 @@
cnl_cdclk_pll_enable(dev_priv, vco);

val = divider | skl_cdclk_decimal(cdclk);
-/*
- * FIXME if only the cd2x divider needs changing, it could be done
- * without shutting off the pipe (if only one pipe is active).
- */
-val |= BXT_CDCLK_CD2X_PIPE_NONE;
+if (pipe == INVALID_PIPE)
+val |= BXT_CDCLK_CD2X_PIPE_NONE;
+else
+val |= BXT_CDCLK_CD2X_PIPE(pipe);
I915_WRITE(CDCLK_CTL, val);

+if (pipe != INVALID_PIPE)
+intel_wait_for_vblank(dev_priv, pipe);
+
/* inform PCU of the change */
mutex_lock(&dev_priv->pcu_lock);
sandybridge_pcode_write(dev_priv, SKL_PCODE_CDCLK_CONTROL, pcu_ack);
@@ -1686,7 +1708,7 @@
cnl_set_cdclk(dev_priv, &cdclk_state);
+cnl_set_cdclk(dev_priv, &cdclk_state, INVALID_PIPE);
} 

/**
 @@ -1703,7 +1725,7 @@
cnl_set_cdclk(dev_priv, &cdclk_state);
+cnl_set_cdclk(dev_priv, &cdclk_state, INVALID_PIPE);
 }

/**
 @@ -1721,15 +1743,58 @@
cnl_set_cdclk(dev_priv, &cdclk_state);
+cnl_set_cdclk(dev_priv, &cdclk_state, INVALID_PIPE);
 }

/**
 + * intel_cdclk_needs_cd2x_update - Determine if two CDCLK states require a cd2x divider update
 + * @a: first CDCLK state
 + * @b: second CDCLK state
 */
bool intel_cdclk_needs_cd2x_update(struct drm_i915_private *dev_priv, const struct intel_cdclk_state *a, const struct intel_cdclk_state *b) {
    /* Older hw doesn't have the capability */
    if (INTEL_GEN(dev_priv) < 10 && !IS_GEN9_LP(dev_priv))
        return false;
    return a->cdclk != b->cdclk &&
           a->vco == b->vco &&
           a->ref == b->ref;
}

/**
 * intel_cdclk_swap_state - make atomic CDCLK configuration effective
 * @state: atomic state
 *
 * This is the CDCLK version of drm_atomic_helper_swap_state() since the
 * helper does not handle driver-specific global state.
 *
 * Similarly to the atomic helpers this function does a complete swap,
 * i.e. it also puts the old state into @state. This is used by the commit
 * code to determine how CDCLK has changed (for instance did it increase or
 * decrease).
 */
void intel_cdclk_swap_state(struct intel_atomic_state *state) {
    struct drm_i915_private *dev_priv = to_i915(state->base.dev);
    swap(state->cdclk.logical, dev_priv->cdclk.logical);
    swap(state->cdclk.actual, dev_priv->cdclk.actual);
}

/**
 * intel_set_cdclk - Push the CDCLK state to the hardware
 * @dev_priv: i915 device
 * @cdclk_state: new CDCLK state
 * @pipe: pipe with which to synchronize the update
 *
 * Program the hardware based on the passed in CDCLK state,
 * if necessary.
 */
void intel_set_cdclk(struct drm_i915_private *dev_priv, const struct intel_cdclk_state *cdclk_state)
+static void intel_set_cdclk(struct drm_i915_private *dev_priv,
+    const struct intel_cdclk_state *cdclk_state,
+    enum pipe pipe)
+
+    if (intel_cdclk_state_compare(&dev_priv->cdclk.hw, cdclk_state))
+        return;
+    cdclk_state->cdclk, cdclk_state->vco,
+    cdclk_state->ref);
+
-    dev_priv->display.set_cdclk(dev_priv, cdclk_state);
+    dev_priv->display.set_cdclk(dev_priv, cdclk_state, pipe);
+
+/**
+ * intel_set_cdclk_pre_plane_update - Push the CDCLK state to the hardware
+ * @dev_priv: i915 device
+ * @old_state: old CDCLK state
+ * @new_state: new CDCLK state
+ * @pipe: pipe with which to synchronize the update
+ *
+ * Program the hardware before updating the HW plane state based on the passed
+ * in CDCLK state, if necessary.
+ */
+void
+intel_set_cdclk_pre_plane_update(struct drm_i915_private *dev_priv,
+    const struct intel_cdclk_state *old_state,
+    const struct intel_cdclk_state *new_state,
+    enum pipe pipe)
+
+    if (pipe == INVALID_PIPE || old_state->cdclk <= new_state->cdclk)
+    intel_set_cdclk(dev_priv, new_state, pipe);
+
+/**
+ * intel_set_cdclk_post_plane_update - Push the CDCLK state to the hardware
+ * @dev_priv: i915 device
+ * @old_state: old CDCLK state
+ * @new_state: new CDCLK state
+ * @pipe: pipe with which to synchronize the update
+ *
+ * Program the hardware after updating the HW plane state based on the passed
+ * in CDCLK state, if necessary.
+ */
+void
+intel_set_cdclk_post_plane_update(struct drm_i915_private *dev_priv,
+    const struct intel_cdclk_state *old_state,
+    const struct intel_cdclk_state *new_state,
+ enum pipe pipe
+{
+if (pipe != INVALID_PIPE && old_state->cdclk > new_state->cdclk)
+intel_set_cdclk(dev_priv, new_state, pipe);
}

static int intel_pixel_rate_to_cdclk(struct drm_i915_private *dev_priv,
@@ -1804,7 +1909,8 @@

-/* According to BSpec, "The CD clock frequency must be at least twice
+/* According to BSpec, "The CD clock frequency must be at least twice
* the frequency of the Azalia BCLK." and BCLK is 96 MHz by default.
*/
if (crtc_state->has_audio && INTEL_GEN(dev_priv) >= 9)
@@ -1839,7 +1945,7 @@
intel_state->min_cdclk[i] = min_cdclk;
}

-min_cdclk = 0;
+min_cdclk = intel_state->cdclk.force_min_cdclk;
for_each_pipe(dev_priv, pipe)
min_cdclk = max(intel_state->min_cdclk[pipe], min_cdclk);

@@ -1861,7 +1967,8 @@
intel_state->cdclk.logical.cdclk = cdclk;

if (!intel_state->active_crtcs) {
-cdclk = vlv_calc_cdclk(dev_priv, 0);
+cdclk = vlv_calc_cdclk(dev_priv,
+    intel_state->cdclk.force_min_cdclk);

intel_state->cdclk.actual.cdclk = cdclk;
} else {
@@ -1890,7 +2008,44 @@
intel_state->cdclk.logical.cdclk = cdclk;

if (!intel_state->active_crtcs) {
-cdclk = bdw_calc_cdclk(0);
+cdclk = bdw_calc_cdclk(intel_state->cdclk.force_min_cdclk);

intel_state->cdclk.actual.cdclk = cdclk;
} else {
@@ -1901,9 +2025,9 @@
return 0;
}


+static int skl_dpll0_vco(struct intel_atomic_state *intel_state)
+
+{ 
+struct drm_i915_private *dev_priv = to_i915(intel_state->base.dev);
+struct intel_crtc *crtc;
+struct intel_crtc_state *crtc_state;
+int vco, i;
+
+vco = intel_state->cdclk.logical.vco;
+if (!vco)
+vco = dev_priv->skl_preferred_vco_freq;
+
+for_each_new_intel_crtc_in_state(intel_state, crtc, crtc_state, i) { 
+if (!crtc_state->base.enable)
+continue;
+
+if (!intel_crtc_has_type(crtc_state, INTEL_OUTPUT_EDP))
+continue;
+
+/*
+ * DPLL0 VCO may need to be adjusted to get the correct
+ * clock for eDP. This will affect cdclk as well.
+ */
+switch (crtc_state->port_clock / 2) { 
+case 108000:
+case 216000:
+vco = 8640000;
+break;
+default:
+vco = 8100000;
+break;
+}
+}
+
+return vco;
+}
+
static int skl_modeset_calc_cdclk(struct drm_atomic_state *state)
{
-struct drm_i915_private *dev_priv = to_i915(state->base.dev);
-struct intel_atomic_state *intel_state = to_intel_atomic_state(state);
-int min_cdclk, cdclk, vco;

@@ -1911,9 +2053,7 @@
if (min_cdclk < 0)
    return min_cdclk;

-vco = intel_state->cdclk.logical.vco;
-if (!vco)
-vco = dev_priv->skl_preferred_vco_freq;
+vco = skl_dpll0_vco(intel_state);

/*
 * FIXME should also account for plane ratio
@@ -1925,7 +2065,7 @@
 intel_state->cdclk.logical.cdclk = cdclk;

 if (!intel_state->active_crtcs) {
- cdclk = skl_calc_cdclk(0, vco);
+ cdclk = skl_calc_cdclk(intel_state->cdclk.force_min_cdclk, vco);

 intel_state->cdclk.actual.vco = vco;
 intel_state->cdclk.actual.cdclk = cdclk;
@@ -1960,10 +2100,10 @@
 if (!intel_state->active_crtcs) {
 if (IS_GEMINILAKE(dev_priv)) {
- cdclk = glk_calc_cdclk(0);
+ cdclk = glk_calc_cdclk(intel_state->cdclk.force_min_cdclk);
 vco = glk_de_pll_vco(dev_priv, cdclk);
 } else {
- cdclk = bxt_calc_cdclk(0);
+ cdclk = bxt_calc_cdclk(intel_state->cdclk.force_min_cdclk);
 vco = bxt_de_pll_vco(dev_priv, cdclk);
 }

@@ -1994,7 +2134,7 @@
 intel_state->cdclk.logical.cdclk = cdclk;

 if (!intel_state->active_crtcs) {
- cdclk = cnl_calc_cdclk(0);
+ cdclk = cnl_calc_cdclk(intel_state->cdclk.force_min_cdclk);
 vco = cnl_cdclk_pll_vco(dev_priv, cdclk);

 intel_state->cdclk.actual.vco = vco;
 --- linux-4.15.0.org/drivers/gpu/drm/i915/intel_csr.c
 +++ linux-4.15.0/drivers/gpu/drm/i915/intel_csr.c
 @ @ -35,6 +35,7 @@
 */

#define I915_CSR_GLK "i915/glk_dmc_ver1_04.bin"
+MODULE_FIRMWARE(I915_CSR_GLK);
#define GLK_CSR_VERSION_REQUIRED	CSR_VERSION(1, 4)

#define I915_CSR_CNL "i915/cnl_dmc_ver1_04.bin"
@@ -279,10 +280,17 @@
uint32_t i;
uint32_t *dmc_payload;
uint32_t required_version;
size_t fsize;

if (!fw)
    return NULL;

fsize = sizeof(struct intel_css_header) +
    sizeof(struct intel_package_header) +
    sizeof(struct intel_dmc_header);
if (fsize > fw->size)
    goto error_truncated;
 /* Extract CSS Header information*/
css_header = (struct intel_css_header *)fw->data;
if (sizeof(struct intel_css_header) !=
    @ @ -354,6 +362,9 @ @
    return NULL;
{ readcount += dmc_offset;
fsize += dmc_offset;
if (fsize > fw->size)
    goto error_truncated;

/* Extract dmc_header information. */
dmc_header = (struct intel_dmc_header *)&fw->data[readcount];
    @ @ -385,6 +396,10 @ @

/* fw_size is in dwords, so multiplied by 4 to convert into bytes. */
nbytes = dmc_header->fw_size * 4;
fsize += nbytes;
if (fsize > fw->size)
    goto error_truncated;
if (nbytes > CSR_MAX_FW_SIZE) {
    DRM_ERROR("DMC firmware too big (%u bytes)\n", nbytes);
    return NULL;
    @ @ -398,6 +413,10 @ @
}

return memcpy(dmc_payload, &fw->data[readcount], nbytes);
+
+error_truncated:
+DRM_ERROR("Truncated DMC firmware, rejecting.\n");
+return NULL;
}
static void csr_load_work_fn(struct work_struct *work)
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_ddi.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_ddi.c
@@ -1513,6 +1513,10 @@
     WARN_ON(transcoder_is_dsi(cpu_transcoder));

     temp = TRANS_MSA_SYNC_CLK;
+   +if (crtc_state->limited_color_range)
+     temp |= TRANS_MSA_CEA_RANGE;
+   switch (crtc_state->pipe_bpp) {
     case 18:
       temp |= TRANS_MSA_6_BPC;
@@ -1639,15 +1643,24 @@
     I915_WRITE(TRANS_DDI_FUNC_CTL(cpu_transcoder), temp);
 }

-void intel_ddi_disable_transcoder_func(struct drm_i915_private *dev_priv,
-                                        enum transcoder cpu_transcoder)
+void intel_ddi_disable_transcoder_func(const struct intel_crtc_state *crtc_state)
{
+  struct intel_crtc *crtc = to_intel_crtc(crtc_state->base.crtc);
+  struct drm_i915_private *dev_priv = to_i915(crtc->base.dev);
+  enum transcoder cpu_transcoder = crtc_state->cpu_transcoder;
+  i915_reg_t reg = TRANS_DDI_FUNC_CTL(cpu_transcoder);
+  uint32_t val = I915_READ(reg);

  val &= ~(TRANS_DDI_FUNC_ENABLE | TRANS_DDI_PORT_MASK |
            TRANS_DDI_DP_VC_PAYLOAD_ALLOC);
  val |= TRANS_DDI_PORT_NONE;
  I915_WRITE(reg, val);
+  if (dev_priv->quirks & QUIRK_INCREASE_DDI_DISABLED_TIME &&
+      intel_crtc_has_type(crtc_state, INTEL_OUTPUT_HDMI)) {
+    DRM_DEBUG_KMS("Quirk Increase DDI disabled time\n");
+    /* Quirk time at 100ms for reliable operation */
+    msleep(100);
+  }
}

bool intel_ddi_connector_get_hw_state(struct intel_connector *intel_connector)
@@ -2208,8 +2221,7 @@
    intel_prepare_dp_ddi_buffers(encoder);

    intel_ddi_init_dp_ddi_buffers(encoder);
-    if (!is_mst)
-       intel_dp_sink_dpms(intel_dp, DRM_MODE_DPMS_ON);
intel_dp_sink_dpms(intel_dp, DRM_MODE_DPMS_ON);
intel_dp_start_link_train(intel_dp);
if (port != PORT_A || INTEL_GEN(dev_priv) >= 9)
intel_dp_stop_link_train(intel_dp);
bool is_mst = !old_crtc_state;

/*
 * Power down sink before disabling the port, otherwise we end
 * up getting interrupts from the sink on detecting link loss.
 */
-if (!is_mst)
-intel_dp_sink_dpms(intel_dp, DRM_MODE_DPMS_OFF);
+intel_dp_sink_dpms(intel_dp, DRM_MODE_DPMS_OFF);

intel_disable_ddi_buf(encoder);

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_display.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_display.c
@@ -2691,6 +2691,17 @@
 if (size_aligned * 2 > ggtt->stolen_usable_size)
 return false;

+switch (fb->modifier) {
+case DRM_FORMAT_MOD_LINEAR:
+case I915_FORMAT_MOD_X_TILED:
+case I915_FORMAT_MOD_Y_TILED:
+break;
+default:
+DRM_DEBUG_DRIVER("Unsupported modifier for initial FB: 0x%llx
",
 + fb->modifier);
+return false;
+}
+mutex_lock(&dev->struct_mutex);
+obj = i915_gem_object_create_stolen_for_preallocated(dev_priv,
+ base_aligned,
@@ -2700,8 +2711,17 @@
 if (!obj)
 return false;
if (plane_config->tiling == I915_TILING_X)
*++obj->tiling_and_stride = fb->pitches[0] | I915_TILING_X;
+*switch (plane_config->tiling) {
+*case I915_TILING_NONE:
+*break;
+*case I915_TILING_X:
+*case I915_TILING_Y:
+*obj->tiling_and_stride = fb->pitches[0] | plane_config->tiling;
+*break;
+*default:
+*MISSING_CASE(plane_config->tiling);
+*return false;
+*
+
+mode_cmd.pixel_format = fb->format->format;
+mode_cmd.width = fb->width;
+case I915_FORMAT_MOD_Y_TILED:
+return PLANE_CTL_TILED_Y;
+case I915_FORMAT_MOD_Y_TILED_CCS:
+return PLANE_CTL_TILED_Y | PLANE_CTL_DECOMPRESSION_ENABLE;
+case I915_FORMAT_MOD_Yf_TILED:
+return PLANE_CTL_TILED_YF;
+case I915_FORMAT_MOD_Yf_TILED_CCS:
+return PLANE_CTL_TILED_YF | PLANE_CTL_DECOMPRESSION_ENABLE;
+case I915_FORMAT_MOD_Yf_TILED_CCS:
+return PLANE_CTL_TILED_YF | PLANE_CTL_RENDER_DECOMPRESSION_ENABLE;
+default:
+MISSING_CASE(fb_modifier);
+
+
+mutex_lock(&dev_priv->pcu_lock);
+WARN_ON(sandybridge_pcode_write(dev_priv, DISPLAY_IPS_CONTROL, 0));
+mutex_unlock(&dev_priv->pcu_lock);
+/* wait for pcde to finish disabling IPS, which may take up to 42ms */
+/*
+ + * Wait for PCODE to finish disabling IPS. The BSpec specified
+ + 42ms timeout value leads to occasional timeouts so use 100ms
+ + instead.
+ + */
+if (intel_wait_for_register(dev_priv,
+    IPS_CTL, IPS_ENABLE, 0,
+    - 42))
+    + 100))
+DRM_ERROR("Timed out waiting for IPS disable\n");
+else {
+    I915_WRITE(IPS_CTL, 0);
intel_ddi_set_vc_payload_alloc(intel_crtc->config, false);

if (!transcoder_is_dsi(cpu_transcoder))
    -intel_ddi_disable_transcoder_func(dev_priv, cpu_transcoder);
    +intel_ddi_disable_transcoder_func( old_crtc_state );

    if (INTEL_GEN(dev_priv) >= 9)
        skylake_scaler_disable(intel_crtc);
    @@ -8449,13 +8473,14 @@
    fb->modifier = I915_FORMAT_MOD_X_TILED;
    break;
    case PLANE_CTL_TILED_Y:
        -if (val & PLANE_CTL_DECOMPRESSION_ENABLE)
        +plane_config->tiling = I915_TILING_Y;
        +if (val & PLANE_CTL_RENDER_DECOMPRESSION_ENABLE)
    fb->modifier = I915_FORMAT_MOD_Y_TILED_CCS;
    else
    fb->modifier = I915_FORMAT_MOD_Y_TILED;
    break;
    case PLANE_CTL_TILED_YF:
        -if (val & PLANE_CTL_DECOMPRESSION_ENABLE)
        +if (val & PLANE_CTL_RENDER_DECOMPRESSION_ENABLE)
    fb->modifier = I915_FORMAT_MOD_Yf_TILED_CCS;
    else
    fb->modifier = I915_FORMAT_MOD_Yf_TILED;
    @@ -11924,10 +11949,17 @@
    return -EINVAL;
    }

    +/* keep the current setting */
    +if (!intel_state->cdclk.force_min_cdclk_changed)
    +intel_state->cdclk.force_min_cdclk =
    +dev_priv->cdclk.force_min_cdclk;
    +
    +intel_state->modeset = true;
    intel_state->active_crtcs = dev_priv->active_crtcs;
    intel_state->cdclk.logical = dev_priv->cdclk.logical;
    intel_state->cdclk.actual = dev_priv->cdclk.actual;
    +intel_state->cdclk.pipe = INVALID_PIPE;

    for_each_oldnew_crtc_in_state(state, crtc, old_crtc_state, new_crtc_state, i) {
        if (new_crtc_state->active)
            @@ -11947,6 +11979,8 @@
            * adjusted_mode bits in the crtc directly.
            */
        if (dev_priv->display.modeset_cale_cdclk) {
enum pipe pipe;
+
ret = dev_priv->display.modeset_calc_cdclk(state);
if (ret < 0)
return ret;
@@ -11963,19 +11997,41 @@
return ret;
}
+
@if (is_power_of_2(intel_state->active_crtcs)) {
+struct drm_crtc *crtc;
+struct drm_crtc_state *crtc_state;
+
+pipe = ilog2(intel_state->active_crtcs);
+crtc = &intel_get_crtc_for_pipe(dev_priv, pipe)->base;
+crtc_state = drm_atomic_get_new_crtc_state(state, crtc);
+if (crtc_state && needs_modeset(crtc_state))
+pipe = INVALID_PIPE;
+} else {
+pipe = INVALID_PIPE;
+
+
/* All pipes must be switched off while we change the cdclk. */
-if (!intel_cdclk_state_compare(&dev_priv->cdclk.actual,
+if (pipe != INVALID_PIPE &&
+ intel_cdclk_needs_cd2x_update(dev_priv,
+ &dev_priv->cdclk.actual,
+ &intel_state->cdclk.actual)) {
+ret = intel_lock_all_pipes(state);
+if (ret < 0)
+return ret;
+
++intel_state->cdclk.pipe = pipe;
+} else if (!intel_cdclk_state_compare(&dev_priv->cdclk.actual,
+ &intel_state->cdclk.actual)) {
ret = intel_modeset_all_pipes(state);
if (ret < 0)
return ret;
+
++intel_state->cdclk.pipe = INVALID_PIPE;
}

DRM_DEBUG_KMS("New cdclk calculated to be logical %u kHz, actual %u kHz\n",
 intel_state->cdclk.logical.cdclk,
 intel_state->cdclk.actual.cdclk);
-} else {
-+to_intel_atomic_state(state)->cdclk.logical = dev_priv->cdclk.logical;
}
intel_modeset_clear_pll(state);
@@ -12016,7 +12072,7 @@
 struct drm_crtc *crtc;
 struct drm_crtc_state *old_crtc_state, *crtc_state;
 int ret, i;
-bool any_ms = false;
+bool any_ms = intel_state->cdclk.force_min_cdclk_changed;

 ret = drm_atomic_helper_check_modeset(dev, state);
 if (ret)
@@ -12311,17 +12367,12 @@
 intel_check_cpu_fifo_underruns(dev_priv);
 intel_check_pch_fifo_underruns(dev_priv);

- if (!new_crtc_state->active) {
- /*
- * Make sure we don't call initial_watermarks
- * for ILK-style watermark updates.
- *
- * No clue what this is supposed to achieve.
- */
- if (INTEL_GEN(dev_priv) >= 9)
- dev_priv->display.initial_watermarks(intel_state,
- to_intel_crtc_state(new_crtc_state));
- }
+ /* FIXME unify this for all platforms */
+ if (!new_crtc_state->active &&
+ !HAS_GMCH_DISPLAY(dev_priv) &&
+ dev_priv->display.initial_watermarks)
+ dev_priv->display.initial_watermarks(intel_state,
+ to_intel_crtc_state(new_crtc_state));
 }
+
@@ -12332,7 +12383,10 @@
 if (intel_state->modeset) {
 drm_atomic_helper_update_legacy_modeset_state(state->dev, state);

-intel_set_cdclk(dev_priv, &dev_priv->cdclk.actual);
+intel_set_cdclk_pre_plane_update(dev_priv,
+ &intel_state->cdclk.actual,
+ &dev_priv->cdclk.actual,
+ intel_state->cdclk.pipe);

 /*
 * SKL workaround: bspec recommends we disable the SAGV when we
@@ -12361,6 +12415,12 @@
/* Now enable the clocks, plane, pipe, and connectors that we set up. */
dev_priv->display.update_crtcs(state);

+if (intel_state->modeset)
+intel_set_cdclk_post_plane_update(dev_priv,
+ &intel_state->cdclk.actual,
+ &dev_priv->cdclk.actual,
+ intel_state->cdclk.pipe);
+
+ /* FIXME: We should call drm_atomic_helper_commit_hw_done() here
+ * already, but still need the state for the delayed optimization. To
+ * fix this:
@@ -12543,8 +12603,10 @@
memcpy(dev_priv->min_cdclk, intel_state->min_cdclk,
   sizeof(intel_state->min_cdclk));
dev_priv->active_crtcs = intel_state->active_crtcs;
-dev_priv->cdclk.logical = intel_state->cdclk.logical;
-dev_priv->cdclk.actual = intel_state->cdclk.actual;
+dev_priv->cdclk.force_min_cdclk =
+intel_state->cdclk.force_min_cdclk;
+
+intel_cdclk_swap_state(intel_state);
}

drm_atomic_state_get(state);
@@ -14251,6 +14313,18 @@
DRM_INFO("Applying T12 delay quirk\n");
}

+/*
+ * GeminiLake NUC HDMI outputs require additional off time
+ * this allows the onboard retimer to correctly sync to signal
+ */
+static void quirk_increase_ddi_disabled_time(struct drm_device *dev)
+{
+struct drm_i915_private *dev_priv = to_i915(dev);
+
+dev_priv->quirks |= QUIRK_INCREASE_DDI_DISABLED_TIME;
+DRM_INFO("Applying Increase DDI Disabled quirk\n");
+
+struct intel_quirk {
+int device;
+int subsystem_vendor;
@@ -14337,6 +14411,13 @@
/* Toshiba Satellite P50-C-18C */
{ 0x191B, 0x1179, 0xF840, quirk_increase_t12_delay },

Open Source Used In 5GaaS Edge AC-4 21195
static void intel_init_quirks(struct drm_device *dev)
@@ -14463,6 +14544,8 @@
            cs->wm.need_postvbl_update = true;
        dev_priv->display.optimize_watermarks(intel_state, cs);
        +
        +to_intel_crtc_state(crtc->state)->wm = cs->wm;
    }

put_state:
@@ -14544,7 +14627,7 @@
        dev->mode_config.cursor_height = MAX_CURSOR_HEIGHT;
    }

-driv->mode_config.fb_base = ggtt->mappable_base;
+driv->mode_config.fb_base = ggtt->gmadr.start;

DRM_DEBUG_KMS("%d display pipe%s available.",
              INTEL_INFO(dev_priv)->num_pipes,
@@ -14775,13 +14858,9 @@
            I915_READ(reg) & ~PIPECONF_FRAME_START_DELAY_MASK);
        }

-/* restore vblank interrupts to correct state */
-driv->crtc_vblank_reset(&crtc->base);
+if (crtc->active) {
+    struct intel_plane *plane;
+
+    -drv->crtc_vblank_on(&crtc->base);
         -
         /* Disable everything but the primary plane */
    for_each_intel_plane_on_crtc(dev, crtc, plane) {
        const struct intel_plane_state *plane_state =
@@ -15090,7 +15169,6 @@
                struct drm_modeset_acquire_ctx *ctx)
    {
        struct drm_i915_private *dev_priv = to_i915(dev);
-
-enum pipe pipe;
+        struct intel_crtc *crtc;
struct intel_encoder *encoder;
int i;
/*@ -15109,15 +15187,23 @*/
/* HW state is read out, now we need to sanitize this mess. */
get_encoder_power_domains(dev_priv);

-intel_sanitize_plane_mapping(dev_priv);
+/*
+ * intel_sanitize_plane_mapping() may need to do vblank
+ * waits, so we need vblank interrupts restored beforehand.
+ */
+for_each_intel_crtc(&dev_priv->drm, crtc) {
+drm_crtc_vblank_reset(&crtc->base);
}

-for_each_intel_encoder(dev, encoder) {
-intel_sanitize_encoder(encoder);
+if (crtc->active)
+-drm_crtc_vblank_on(&crtc->base);
}

-for_each_pipe(dev_priv, pipe) {
-crtc = intel_get_crtc_for_pipe(dev_priv, pipe);
+intel_sanitize_plane_mapping(dev_priv);
+
+for_each_intel_encoder(dev, encoder)
+intel_sanitize_encoder(encoder);

+for_each_intel_crtc(&dev_priv->drm, crtc) {
intel_sanitize_crtc(crtc, ctx);
intel_dump_pipe_config(crtc, crtc->config,
        "[setup_hw_state]");
/*@ -15197,17 +15283,6 @*/
drm_atomic_state_put(state);
}

-void intel_modeset_gem_init(struct drm_device *dev)
-{
-struct drm_i915_private *dev_priv = to_i915(dev);
-
-intel_init_gt_powersave(dev_priv);
-
-intel_init_clock_gating(dev_priv);
-
-intel_setup_overlay(dev_priv);
-
-intel_connector_register(struct drm_connector *connector)
{
struct intel_connector *intel_connector = to_intel_connector(connector);
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_dp.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_dp.c
@@ -342,6 +342,22 @@
 return true;
 }

+static bool intel_dp_can_link_train_fallback_for_edp(struct intel_dp *intel_dp,
+    int link_rate,
+    uint8_t lane_count)
+{
+    const struct drm_display_mode *fixed_mode =
+        intel_dp->attached_connector->panel.fixed_mode;
+    int mode_rate, max_rate;
+    
+    mode_rate = intel_dp_link_required(fixed_mode->clock, 18);
+    max_rate = intel_dp_max_data_rate(link_rate, lane_count);
+    if (mode_rate > max_rate)
+        return false;

+    return true;
+}
+
int intel_dp_get_link_train_fallback_values(struct intel_dp *intel_dp,
    int link_rate, uint8_t lane_count)
{
    intel_dp->num_common_rates = intel_dp->common_rates;
    int intel_dp_link_train_fallback_for_edp(struct intel_dp *intel_dp,
        int link_rate, uint8_t lane_count)
    {
        if (index > 0) {
            +if (intel_dp_is_edp(intel_dp) &&
                +!intel_dp_can_link_train_fallback_for_edp(intel_dp,
                +    intel_dp->common_rates[index - 1],
                +    lane_count))
                +DRM_DEBUG_KMS("Retrying Link training for eDP with same parameters\n");
                +return 0;
            }
            intel_dp->max_link_rate = intel_dp->common_rates[index - 1];
            intel_dp->max_link_lane_count = lane_count;
    } else if (lane_count > 1) {
        +if (intel_dp_is_edp(intel_dp) &&
            +!intel_dp_can_link_train_fallback_for_edp(intel_dp,
            +    intel_dp_max_common_rate(intel_dp),
            +    lane_count >> 1))
                +DRM_DEBUG_KMS("Retrying Link training for eDP with same parameters\n");
                +return 0;
            }
            intel_dp->max_link_rate = intel_dp_max_common_rate(intel_dp);
intel_dp->max_link_lane_count = lane_count >> 1;
} else {
    return bpp;
}

-static bool intel_edp_compare_alt_mode(struct drm_display_mode *m1,
   struct drm_display_mode *m2)
{
    bool bres = false;
    
    if (m1 && m2)
        bres = (m1->hdisplay == m2->hdisplay &&
         m1->hsync_start == m2->hsync_start &&
         m1->hsync_end == m2->hsync_end &&
         m1->htotal == m2->htotal &&
         m1->vdisplay == m2->vdisplay &&
         m1->vsync_start == m2->vsync_start &&
         m1->vsync_end == m2->vsync_end &&
         m1->vtotal == m2->vtotal);
    return bres;
}

bool intel_dp_compute_config(struct intel_encoder *encoder,
   struct intel_crtc_state *pipe_config,
   struct drm_display_mode *panel_mode = intel_connector->panel.alt_fixed_mode;
   struct drm_display_mode *req_mode = &pipe_config->base.mode;
   
   if (!intel_edp_compare_alt_mode(req_mode, panel_mode))
    panel_mode = intel_connector->panel.alt_fixed_mode;
    
   drm_mode_debug_printmodeinfo(panel_mode);
   
   intel_fixed_panel_mode(panel_mode, adjusted_mode);
   +intel_fixed_panel_mode(intel_connector->panel.fixed_mode,
      +   adjusted_mode);

if (INTEL_GEN(dev_priv) >= 9) {
    int ret;
    return reduce_m_n);
}
/*
   * DPLL0 VCO may need to be adjusted to get the correct
   * clock for eDP. This will affect cdclk as well.
   * */

if (intel_dp_is_edp(intel_dp) && IS_GEN9_BC(dev_priv)) {
  int vco;

  switch (pipe_config->port_clock / 2) {
    case 108000:
    case 216000:
      vco = 8640000;
      break;
    default:
      vco = 8100000;
      break;
  }

  to_intel_atomic_state(pipe_config->base.state)->cdclk.logical.vco = vco;
}

if (!HAS_DDI(dev_priv))
  intel_dp_set_clock(encoder, pipe_config);

/*
 * HW has only a 100msec granularity for t11_t12 so round it up
 * accordingly.
 */
final->t11_t12 = roundup(final->t11_t12, 100 * 10);

static void
@@ -5336,6 +5321,12 @@
  final->t8 = 1;
  final->t9 = 1;
  +
  +/*
   + * HW has only a 100msec granularity for t11_t12 so round it up
   + * accordingly.
   + */
  +final->t11_t12 = roundup(final->t11_t12, 100 * 10);

struct drm_device *dev = intel_encoder->base.dev;
struct drm_i915_private *dev_priv = to_i915(dev);
struct drm_display_mode *fixed_mode = NULL;
-struct drm_display_mode *alt_fixed_mode = NULL;
struct drm_display_mode *downclock_mode = NULL;
bool has_dpcd;
struct drm_display_mode *scan;
@@ -5822,7 +5813,6 @@
/* prefer fixed mode from EDID if available, save an alt mode also */
+/* prefer fixed mode from EDID if available */
list_for_each_entry(scan, &connector->probed_modes, head) {
if ((scan->type & DRM_MODE_TYPE_PREFERRED)) {
    fixed_mode = drm_mode_duplicate(dev, scan);
downclock_mode = intel_dp_drrs_init(
    intel_connector, fixed_mode);
} else if (!alt_fixed_mode) {
    alt_fixed_mode = drm_mode_duplicate(dev, scan);
    break;
}
}

pipe_name(pipe));

-intel_panel_init(&intel_connector->panel, fixed_mode, alt_fixed_mode,
    downclock_mode);
+intel_panel_init(&intel_connector->panel, fixed_mode, downclock_mode);
intel_connector->panel.backlight.power = intel_edp_backlight_power;
in.tel_panel_setup_backlight(connector, pipe);

/* init MST on ports that can support it */
+if (HAS_DP_MST(dev_priv) && !intel_dp_is_edp(intel_dp) &&
    (port == PORT_B || port == PORT_C || port == PORT_D))
    -intel_dp_mst_encoder_init(intel_dig_port,
    intel_connector->base.base.id);
+intel_dp_mst_encoder_init(intel_dig_port,
    intel_connector->base.base.id);

if (!intel_edp_init_connector(intel_dp, intel_connector)) {
in.tel_dp_aux_fin(intel_dp);
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_dp_mst.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_dp_mst.c
@@ -37,11 +37,11 @@
    struct intel_dp_mst_encoder *intel_mst = enc_to_mst(&encoder->base);
    struct intel_digital_port *intel_dig_port = intel_mst->primary;
    struct intel_dp *intel_dp = &intel_dig_port->dp;
    -struct intel_connector *connector =
    +to_intel_connector(conn_state->connector);
    +struct drm_connector *connector = conn_state->connector;
    +void *port = to_intel_connector(connector)-&gt;port;
    struct drm_atomic_state *state = pipe_config-&gt;base.state;

int bpp;
-int lane_count, slots;
+int lane_count, slots = 0;
const struct drm_display_mode *adjusted_mode = &pipe_config->base.adjusted_mode;
int mst_pbn;
bool reduce_m_n = drm_dp_has_quirk(&intel_dp->desc,
@@ -66,17 +66,23 @@
pipe_config->port_clock = intel_dp_max_link_rate(intel_dp);

-if (drm_dp_mst_port_has_audio(&intel_dp->mst_mgr, connector->port))
+if (drm_dp_mst_port_has_audio(&intel_dp->mst_mgr, port))
pipe_config->has_audio = true;

mst_pbn = drm_dp_calc_pbn_mode(adjusted_mode->crtc_clock, bpp);
pipe_config->pbn = mst_pbn;

-slots = drm_dp_atomic_find_vcpi_slots(state, &intel_dp->mst_mgr,
- connector->port, mst_pbn);
-if (slots < 0) {
- DRM_DEBUG_KMS("failed finding vcpi slots:%d\n", slots);
- return false;
+/* Zombie connectors can't have VCPI slots */
+ if (READ_ONCE(connector->registered)) {
+ slots = drm_dp_atomic_find_vcpi_slots(state,
+ &intel_dp->mst_mgr,
+ port,
+ mst_pbn);
+ if (slots < 0) {
+ DRM_DEBUG_KMS("failed finding vcpi slots:%d\n",
+ slots);
+ return false;
+ }
+ }
}

intel_link_compute_m_n(bpp, lane_count,
@@ -316,9 +322,8 @@
struct edid *edid;
 int ret;

-if (!intel_dp) {
+if (!READ_ONCE(connector->registered))
 return intel_connector_update_modes(connector, NULL);
-}

edid = drm_dp_mst_get_edid(connector, &intel_dp->mst_mgr, intel_connector->port);
ret = intel_connector_update_modes(connector, edid);
@@ -333,9 +338,10 @@
struct intel_connector *intel_connector = to_intel_connector(connector);
struct intel_dp *intel_dp = intel_connector->mst_port;

-if (!intel_dp)
 +if (!READ_ONCE(connector->registered))
 return connector_status_disconnected;
-return drm_dp_mst_detect_port(connector, &intel_dp->mst_mgr, intel_connector->port);
 +return drm_dp_mst_detect_port(connector, &intel_dp->mst_mgr,
 + intel_connector->port);
}

static void
@@ -375,7 +381,7 @@
 int bpp = 24; /* MST uses fixed bpp */
 int max_rate, mode_rate, max_lanes, max_link_clock;

 -if (!intel_dp)
 +if (!READ_ONCE(connector->registered))
 return MODE_ERROR;

 max_link_clock = intel_dp_max_link_rate(intel_dp);
 @@ -404,8 +410,6 @@
 struct intel_dp *intel_dp = intel_connector->mst_port;
 struct intel_crtc *crtc = to_intel_crtc(state->crtc);

 -if (!intel_dp)
 -return NULL;
 return &intel_dp->mst_encoders[crtc->pipe]->base.base;
 }

 @@ -464,6 +468,10 @@
 if (!intel_connector)
 return NULL;

 +intel_connector->get_hw_state = intel_dp_mst_get_hw_state;
 +intel_connector->mst_port = intel_dp;
 +intel_connector->port = port;
 +
 connector = &intel_connector->base;
 ret = drm_connector_init(dev, connector, &intel_dp_mst_connector_funcs,
 DRM_MODE_CONNECTION_DisplayPort);
 @@ -474,10 +482,6 @@
 drm_connector_helper_add(connector, &intel_dp_mst_connector_helper_funcs);

 -intel_connector->get_hw_state = intel_dp_mst_get_hw_state;
 -intel_connector->mst_port = intel_dp;
 -intel_connector->port = port;
for_each_pipe(dev_priv, pipe) {
    struct drm_encoder *enc =
        &intel_dp->mst_encoders[pipe]->base.base;
    if (enc != NULL) {
        static void intel_dp_destroy_mst_connector(struct drm_dp_mst_topology_mgr *mgr,
            struct drm_connector *connector)
        {
            struct intel_connector *intel_connector = to_intel_connector(connector);
            struct drm_i915_private *dev_priv = to_i915(connector->dev);

            DRM_DEBUG_KMS("[CONNECTOR:%d:%s]", connector->base.id, connector->name);
            if (dev_priv->fbdev)
                drm_fb_helper_remove_one_connector(&dev_priv->fbdev->helper,
                    connector);
            /* prevent race with the check in ->detect */
            drm_modeset_lock(&connector->dev->mode_config.connection_mutex, NULL);
            intel_connector->mst_port = NULL;
            drm_modeset_unlock(&connector->dev->mode_config.connection_mutex);

            drm_connector_unreference(connector);
        }
    }
}

int intel_dp_mst_encoder_init(struct intel_digital_port *intel_dig_port, int conn_base_id)
{
    struct drm_i915_private *i915 = to_i915(intel_dig_port->base.base.dev);
    struct intel_dp *intel_dp = &intel_dig_port->dp;
    int ret = 0;

    /* can_mst = true; */
    if (!HAS_DP_MST(i915) || intel_dp_is_edp(intel_dp))
        return 0;
    if (INTEL_GEN(i915) < 12 && intel_dp->can_mst)
        return 0;
    if (INTEL_GEN(i915) < 11 && intel_dp->can_mst)
        return 0;
    intel_dp->mst_mgr.cbs = &mst_cbs;

    /* create encoders */
    intel_dp_create_fake_mst_encoders(intel_dig_port);

    return ret;
}
+ret = drm_dp_mst_topology_mgr_init(&intel_dp->mst_mgr, &i915->drm, &intel_dp->aux, 16, 3, conn_base_id);
-if (ret) {
-intel_dp->can_mst = false;
+if (ret)
return ret;
-}
+
+intel_dp->can_mst = true;
+
+return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_drv.h
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_drv.h
@@ -207,6 +207,16 @@
 struct i915_vma *vma;
 async_cookie_t cookie;
 int preferred_bpp;
+
 +/* Whether or not fbdev hp d processing is temporarily suspended */
 +bool hpd_suspended : 1;
 +/* Set when a hotplug was received while HPD processing was
 + * suspended
 + */
 +bool hpd_waiting : 1;
 +
 +/* Protects hpd_suspended */
 +struct mutex hpd_lock;
};

struct intel_encoder {
@@ -265,7 +275,6 @@
 struct intel_panel {
 struct drm_display_mode *fixed_mode;
-struct drm_display_mode *alt_fixed_mode;
 struct drm_display_mode *downclock_mode;

 /* backlight */
 @@ -369,6 +378,11 @@
 * state only when all crtc's are DPMS off.
 */
 struct intel_cdclk_state actual;
+
 +int force_min_cdclk;
 +bool force_min_cdclk_changed;
 +/* pipe to which cd2x update is synchronized */
enum pipe pipe;
} cdclk;

bool dpll_set, modeset;
@@ -1275,8 +1289,7 @@
enum port intel_ddi_get_encoder_port(struct intel_encoder *intel_encoder);
bool intel_ddi_get_hw_state(struct intel_encoder *encoder, enum pipe *pipe);
void intel_ddi_enable_transcoder_func(const struct intel_crtc_state *crtc_state);
-void intel_ddi_disable_transcoder_func(struct drm_i915_private *dev_priv,
-    enum transcoder cpu_transcoder);
+void intel_ddi_disable_transcoder_func(const struct intel_crtc_state *crtc_state);
void intel_ddi_enable_pipe_clock(const struct intel_crtc_state *crtc_state);
void intel_ddi_disable_pipe_clock(const struct intel_crtc_state *crtc_state);
struct intel_encoder *
@@ -1325,9 +1338,20 @@
void intel_update_rawclk(struct drm_i915_private *dev_priv);
bool intel_cdclk_state_compare(const struct intel_cdclk_state *a,
    const struct intel_cdclk_state *b);
-void intel_set_cdclk(struct drm_i915_private *dev_priv,
-    const struct intel_cdclk_state *cdclk_state);
-
+bool intel_cdclk_needs_cd2x_update(struct drm_i915_private *dev_priv,
+    const struct intel_cdclk_state *a,
+    const struct intel_cdclk_state *b);
+void intel_cdclk_swap_state(struct intel_atomic_state *state);
+void 
+intel_set_cdclk_pre_plane_update(struct drm_i915_private *dev_priv,
+    const struct intel_cdclk_state *old_state,
+    const struct intel_cdclk_state *new_state,
+    enum pipe pipe);
+void 
+intel_set_cdclk_post_plane_update(struct drm_i915_private *dev_priv,
+    const struct intel_cdclk_state *old_state,
+    const struct intel_cdclk_state *new_state,
+    enum pipe pipe);
/* intel_display.c */
void i830_enable_pipe(struct drm_i915_private *dev_priv, enum pipe pipe);
void i830_disable_pipe(struct drm_i915_private *dev_priv, enum pipe pipe);
@@ -1708,7 +1732,6 @@
/* intel_panel.c */
int intel_panel_init(struct intel_panel *panel,
    struct drm_display_mode *fixed_mode,
    struct drm_display_mode *alt_fixed_mode,
-    struct drm_display_mode *downclock_mode);
void intel_panel_fini(struct intel_panel *panel);
void intel_fixed_panel_mode(const struct drm_display_mode *fixed_mode,
@@ -1872,6 +1895,9 @@
void intel_autoenable_gt_powersave(struct drm_i915_private *dev_priv);
void intel_disable_gt_powersave(struct drm_i915_private *dev_priv);
void intel_suspend_gt_powersave(struct drm_i915_private *dev_priv);
+bool i915_rc6_ctx_wa_check(struct drm_i915_private *i915);
+void i915_rc6_ctx_wa_suspend(struct drm_i915_private *i915);
+void i915_rc6_ctx_wa_resume(struct drm_i915_private *i915);
void gen6_rps_busy(struct drm_i915_private *dev_priv);
void gen6_rps_reset_ei(struct drm_i915_private *dev_priv);
void gen6_rps_idle(struct drm_i915_private *dev_priv);
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_dsi.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_dsi.c
@@ -1822,7 +1822,7 @@
   connector->display_info.width_mm = fixed_mode->width_mm;
   connector->display_info.height_mm = fixed_mode->height_mm;

-intel_panel_init(&intel_connector->panel, fixed_mode, NULL, NULL);
+intel_panel_init(&intel_connector->panel, fixed_mode, NULL);
intel_panel_setup_backlight(connector, INVALID_PIPE);

intel_dsi_add_properties(intel_connector);
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_dsi_pll.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_dsi_pll.c
@@ -422,8 +422,8 @@
   else
   txesc2_div = 10;

-1915_WRITE(MIPIO_TXESC_CLK_DIV1, txesc1_div & GLK_TX_ESC_CLK_DIV1_MASK);
-1915_WRITE(MIPIO_TXESC_CLK_DIV2, txesc2_div & GLK_TX_ESC_CLK_DIV2_MASK);
+1915_WRITE(MIPIO_TXESC_CLK_DIV1, (1 << (txesc1_div - 1)) & GLK_TX_ESC_CLK_DIV1_MASK);
+1915_WRITE(MIPIO_TXESC_CLK_DIV2, (1 << (txesc2_div - 1)) & GLK_TX_ESC_CLK_DIV2_MASK);
}

/* Program BXT Mipi clocks and dividers */
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_dvo.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_dvo.c
@@ -535,7 +535,7 @@
 */
 intel_panel_init(&intel_connector->panel,
   int (*init_legacy)(struct intel_engine_cs *engine);
- NULL, NULL);
+ NULL);
   intel_dvo->panel_wants_dither = true;
 }

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_engine_cs.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_engine_cs.c
@@ -50,8 +50,8 @@
   const char *name;
   int (*init_legacy)(struct intel_engine_cs *engine);
int (*init_execlists)(struct intel_engine_cs *engine);
+
+u8 uabi_class;
};

static const struct engine_class_info intel_engine_classes[] = {
    [.name = "rcs",
    .init_execlists = logical_render_ring_init,
    .init_legacy = intel_init_render_ring_buffer,
    +.uabi_class = I915_ENGINE_CLASS_RENDER,
    ],
[COPY_ENGINE_CLASS] = {
    .name = "bcs",
    .init_execlists = logical_xcs_ring_init,
    .init_legacy = intel_init_blt_ring_buffer,
    +.uabi_class = I915_ENGINE_CLASS_COPY,
    },
[VIDEO_DECODE_CLASS] = {
    .name = "vcs",
    .init_execlists = logical_xcs_ring_init,
    .init_legacy = intel_init_bsd_ring_buffer,
    +.uabi_class = I915_ENGINE_CLASS_VIDEO,
    },
[VIDEO_ENHANCEMENT_CLASS] = {
    .name = "vecs",
    .init_execlists = logical_xcs_ring_init,
    .init_legacy = intel_init_vebox_ring_buffer,
    +.uabi_class = I915_ENGINE_CLASS_VIDEO_ENHANCE,
    ],
    
};

WARN_ON(snprintf(engine->name, sizeof(engine->name), "%s%u",
    class_info->name, info->instance) >=
    sizeof(engine->name));
-engine->uabi_id = info->uabi_id;
-engine->hw_id = engine->guc_id = info->hw_id;
-engine->mmio_base = info->mmio_base;
-engine->irq_shift = info->irq_shift;
-engine->class = info->class;
-engine->instance = info->instance;
+
+engine->uabi_id = info->uabi_id;
+engine->uabi_class = class_info->uabi_class;
+
+engine->context_size = __intel_engine_context_size(dev_priv,
    engine->class);
if (WARN_ON((engine->context_size > BIT(20))))
@@ -679,6 +687,9 @@
i915_gem_batch_pool_fini(&engine->batch_pool);
+	if (engine->default_state)
+i915_gem_object_put(engine->default_state);
+
if (INTEL_INFO((engine->i915)->has_logical_ring_preemption)
engine->context_unpin(engine, engine->i915->preempt_context);
engine->context_unpin(engine, engine->i915->kernel_context);
@@ -1109,6 +1120,10 @@
WA_SET_FIELD_MASKED(GEN8_CS_CHICKEN1, GEN9_PREEMPT_GPGPU_LEVEL_MASK,
GEN9_PREEMPT_GPGPU_COMMAND_LEVEL);

+/* WaClearHIZ_WM_CHICKEN3:bxt,glk */
+if (IS_GEN9_LP(dev_priv))
+WA_SET_BIT_MASKED(GEN9_WM_CHICKEN3, GEN9_FACTOR_IN_CLR_VAL_HIZ);
+
/+ WaVFEStateAfterPipeControlwithMediaStateClear:skl,bxt,glk,cfl */
ret = wa_ring_whitelist_reg(engine, GEN9_CTX_PREEMPT_REG);
if (ret)
@@ -1590,6 +1605,34 @@
return true;
}

+/**
+ * intel_engine_has_kernel_context:
+ * @engine: the engine
+ *
+ * Returns true if the last context to be executed on this engine, or has been
+ * executed if the engine is already idle, is the kernel context
+ * (#i915.kernel_context).
+ */
+bool intel_engine_has_kernel_context(const struct intel_engine_cs *engine)
+{
+const struct i915_gem_context * const kernel_context =
eengine->i915->kernel_context;
+struct drm_i915_gem_request *rq;
+
+lockdep_assert_held(&engine->i915->drm.struct_mutex);
+
+/*
+ * Check the last context seen by the engine. If active, it will be
+ * the last request that remains in the timeline. When idle, it is
+ * the last executed context as tracked by retirement.
+ */
+rq = __i915_gem_active_peek(&engine->timeline->last_request);
+if (rq)
+return rq->ctx == kernel_context;
+else
+return engine->last_retired_context == kernel_context;
+
void intel_engines_reset_default_submission(struct drm_i915_private *i915)
{
struct intel_engine_cs *engine;
//@ -1627,6 +1670,20 @-
}
}

+unsigned int intel_engines_has_context_isolation(struct drm_i915_private *i915)
+{
+struct intel_engine_cs *engine;
+enum intel_engine_id id;
+unsigned int which;
+
+which = 0;
+for_each_engine(engine, i915, id)
+if (engine->default_state)
+which |= BIT(engine->uabi_class);
+
+return which;
+
static void print_request(struct drm_printer *m,
    struct drm_i915_gem_request *rq,
    const char *prefix)
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_fbc.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_fbc.c
@@ -1319,6 +1319,10 @@
    if (!HAS_FBC(dev_priv))
    return 0;

    /* https://bugs.freedesktop.org/show_bug.cgi?id=108085 */
+if (IS_GEMINILAKE(dev_priv))
    +return 0;
+
    if (IS_BROADWELL(dev_priv) || INTEL_GEN(dev_priv) >= 9)
    return 1;

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_fbdev.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_fbdev.c
@@ -672,6 +672,7 @@
    if (ifbdev == NULL)
    return -ENOMEM;

    /* https://bugs.freedesktop.org/show_bug.cgi?id=108085 */
+if (IS_GEMINILAKE(dev_priv))
    +return 0;
+
    if (IS_BROADWELL(dev_priv) || INTEL_GEN(dev_priv) >= 9)
    return 1;
mutex_init(&ifbdev->hpd_lock);
drm_fb_helper_prepare(dev, &ifbdev->helper, &intel_fb_helper_funcs);

if (!intel_fbdev_init_bios(dev, ifbdev))
@@ -745,6 +746,26 @@
intel_fbdev_destroy(ifbdev);
}

+/* Suspends/resumes fbdev processing of incoming HPD events. When resuming HPD
+ * processing, fbdev will perform a full connector reprobe if a hotplug event
+ * was received while HPD was suspended.
+ */
+static void intel_fbdev_hpd_set_suspend(struct intel_fbdev *ifbdev, int state)
+{
+ GLenum send_hpd = false;
+ +
+ mutex_lock(&ifbdev->hpd_lock);
+ ifbdev->hpd_suspended = state == FBINFO_STATE_SUSPENDED;
+ send_hpd = !ifbdev->hpd_suspended && ifbdev->hpd_waiting;
+ ifbdev->hpd_waiting = false;
+ mutex_unlock(&ifbdev->hpd_lock);
+ +
+ if (send_hpd) {
+ DRM_DEBUG_KMS("Handling delayed fbcon HPD event\n");
+ drm_fb_helper_hotplug_event(&ifbdev->helper);
+ }
+ }
+
+ void intel_fbdev_set_suspend(struct drm_device *dev, int state, bool synchronous)
+ {
+ struct drm_i915_private *dev_priv = to_i915(dev);
+ @@ -766,6 +787,7 @@
+ /*
+ if (state != FBINFO_STATE_RUNNING)
+ flush_work(&dev_priv->fbdev_suspend_work);
+ +
+ console_lock();
+ } else {
+ /*
+ @@ -792,17 +814,26 @@
+
+ drm_fb_helper_set_suspend(&ifbdev->helper, state);
+ console_unlock();
+ +
+intel_fbdev_hpd_set_suspend(ifbdev, state);
+ }
void intel_fbdev_output_poll_changed(struct drm_device *dev) {
    struct intel_fbdev *ifbdev = to_i915(dev)->fbdev;
    bool send_hpd;

    if (!ifbdev)
        return;

    intel_fbdev_sync(ifbdev);
    -if (ifbdev->vma)
    +
        ++intel_fbdev_output_poll_changed(++intel_fbdev);  // Original code
    +mutex_lock(&ifbdev->hpd_lock);
    +send_hpd = !ifbdev->hpd_suspended;
    +ifbdev->hpd_waiting = true;
    +mutex_unlock(&ifbdev->hpd_lock);
    +
    +if (send_hpd && (ifbdev->vma || ifbdev->helper.deferred_setup))
        drm_fb_helper_hotplug_event(&ifbdev->helper);
}

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_guc_fw.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_guc_fw.c
@@ -39,9 +39,6 @@
#define KBL_FW_MAJOR 9
#define KBL_FW_MINOR 14
-
#define GLK_FW_MAJOR 10
#define GLK_FW_MINOR 56
-
#define GUC_FW_PATH(platform, major, minor) \
    "i915/" __stringify(platform) "_guc_ver" __stringify(major) "\"_" __stringify(minor) ".bin"
@@ -54,8 +51,6 @@
#define I915_KBL_GUC_UCODE GUC_FW_PATH(kbl, KBL_FW_MAJOR, KBL_FW_MINOR)
MODULE_FIRMWARE(I915_KBL_GUC_UCODE);

-#define I915_GLK_GUC_UCODE GUC_FW_PATH(glk, GLK_FW_MAJOR, GLK_FW_MINOR)
-
/**
 * intel_guc_fw_select() - selects GuC firmware for uploading
 *
@@ -85,10 +80,6 @@
         guc->fw.path = I915_KBL_GUC_UCODE;
         guc->fw.major_ver_wanted = KBL_FW_MAJOR;
         guc->fw.minor_ver_wanted = KBL_FW_MINOR;
-    } else if (IS_GEMINILAKE(dev_priv)) {
-        guc->fw.path = I915_GLK_GUC_UCODE;
-        guc->fw.major_ver_wanted = GLK_FW_MAJOR;

-guc->fw.minor_ver_wanted = GLK_FW_MINOR;
} else {
    DRM_ERROR("No GuC firmware known for platform with GuC\n");
    return -ENOENT;
}

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_hdmi.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_hdmi.c
@@ -867,6 +867,11 @@
    if (hdmi->dp_dual_mode.type < DRM_DP_DUAL_MODE_TYPE2_DVI)
        return;

+    if (dev_priv->bypass_tmds_oe) {
+        DRM_DEBUG_KMS("Bypassing TMDS_OE setting\n");
+        return;
+    }

    DRM_DEBUG_KMS("%s DP dual mode adaptor TMDS output\n", enable ? "Enabling" : "Disabling");

@@ -1573,12 +1578,20 @@
    struct intel_hdmi *intel_hdmi = intel_attached_hdmi(connector);
    struct edid *edid;
    bool connected = false;
+    struct i2c_adapter *i2c;

    intel_display_power_get(dev_priv, POWER_DOMAIN_GMBUS);

    -edid = drm_get_edid(connector,
    -    intel_gmbus_get_adapter(dev_priv,
    -        intel_hdmi->ddc_bus));
    +i2c = intel_gmbus_get_adapter(dev_priv, intel_hdmi->ddc_bus);
    +    edid = drm_get_edid(connector, i2c);
    +
    +if (!edid && !intel_gmbus_is_forced_bit(i2c)) {
    +    DRM_DEBUG_KMS("HDMI GMBUS EDID read failed, retry using GPIO bit-banging\n");
    +    intel_gmbus_force_bit(i2c, true);
    +    edid = drm_get_edid(connector, i2c);
    +    intel_gmbus_force_bit(i2c, false);
    +}

    intel_hdmi_dp_dual_mode_detect(connector, edid != NULL);

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_huc.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_huc.c
@@ -54,10 +54,6 @@
#define KBL_HUC_FW_MINOR 00
#define KBL_BLD_NUM 1810

```c
#define GLK_HUC_FW_MAJOR 02
#define GLK_HUC_FW_MINOR 00
#define GLK_BLD_NUM 1748

#define HUC_FW_PATH(platform, major, minor, bld_num) "i915/" _STRINGIFY(platform) "_huc_ver" _STRINGIFY(major) "_" _STRINGIFY(minor) "_" _STRINGIFY(bld_num) ".bin"

#define I915_GLK_HUC_UCODE HUC_FW_PATH(glk, GLK_HUC_FW_MAJOR, GLK_HUC_FW_MINOR, GLK_BLD_NUM)

/**
 * intel_huc_select_fw() - selects HuC firmware for loading
 * @huc: intel_huc struct
 */

huc->fw.path = I915_KBL_HUC_UCODE;

huc->fw.major_ver_wanted = KBL_HUC_FW_MAJOR;

huc->fw.minor_ver_wanted = KBL_HUC_FW_MINOR;

} else if (IS_GEMINILAKE(dev_priv)) {
    huc->fw.path = I915_GLK_HUC_UCODE;
    huc->fw.major_ver_wanted = GLK_HUC_FW_MAJOR;
    huc->fw.minor_ver_wanted = GLK_HUC_FW_MINOR;
}

else {
    DRM_ERROR("No HuC firmware known for platform with HuC!\n");
    return;
}
```
handle_simple_irq,
"hdmi_lpe_audio_irq_handler";

static const struct pci_device_id irq_quirk_ids[] = {
	/* Dell Wyse 3040 */
	{PCI_DEVICE_SUB(PCI_VENDOR_ID_INTEL, 0x22b0, 0x1028, 0x07c1)},
	{
		if (pci_dev_present(irq_quirk_ids))
	return 0;
return irq_set_chip_data(irq, dev_priv);
}

lpe_audio_platdev_destroy(dev_priv);

irq_free_desc(dev_priv->lpe_audio.irq);
-
+dev_priv->lpe_audio.irq = -1;
+dev_priv->lpe_audio.platdev = NULL;
+

/**
 * intel_lpe_audio_notify() - notify lpe audio event
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_lrc.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_lrc.c
@@ -418,7 +418,8 @@
reg_state[CTX_RING_TAIL+1] = intel_ring_set_tail(rq->ring, rq->tail);

-/* True 32b PPGTT with dynamic page allocation: update PDP
+/*
+ * True 32b PPGTT with dynamic page allocation: update PDP
+ * registers and point the unallocated PDPs to scratch page.
+ * PML4 is allocated during ppgtt init, so this is not needed
+ * in 48-bit mode.
++ linux-4.15.0/drivers/gpu/drm/i915/intel_lrc.c
@@ -426,6 +427,22 @@
if (ppgtt && !i915_vm_is_48bit(&ppgtt->base))
execlists_update_context_pdps(ppgtt, reg_state);

+/*
+ * Make sure the context image is complete before we submit it to HW.
+ *
+ * Ostensibly, writes (including the WCB) should be flushed prior to
an uncached write such as our mmio register access, the empirical evidence (esp. on Braswell) suggests that the WC write into memory may not be visible to the HW prior to the completion of the UC register write and that we may begin execution from the context before its image is complete leading to invalid PD chasing.

Furthermore, Braswell, at least, wants a full mb to be sure that the writes are coherent in memory (visible to the GPU) prior to execution, and not just visible to other CPUs (as is the result of wmb).

mb();
return ce->lrc_desc;
}

static int __context_pin(struct i915_gem_context *ctx, struct i915_vma *vma) {
unsigned int flags;
int err;
+
/*
 * Clear this page out of any CPU caches for coherent swap-in/out.
 * We only want to do this on the first bind so that we do not stall
 * on an active context (which by nature is already on the GPU).
 * */
+if (!(vma->flags & I915_VMA_GLOBAL_BIND)) {
+err = i915_gem_object_set_to_gtt_domain(vma->obj, true);
+if (err)
+return err;
+
+flags = PIN_GLOBAL | PIN_HIGH;
+if (ctx->ggtt_offset_bias)
+flags |= PIN_OFFSET_BIAS | ctx->ggtt_offset_bias;
+
+return i915_vma_pin(vma, 0, GEN8_LR_CONTEXT_ALIGN, flags);
+
static struct intel_ring *
execlists_context_pin(struct intel_engine_cs *engine,
        struct i915_gem_context *ctx) {
    struct intel_context *ce = &ctx->engine[engine->id];
    -unsigned int flags;
void *vaddr;
int ret;

@@ -1082,11 +1121,7 @@
}
GEM_BUG_ON(!ce->state);

-flags = PIN_GLOBAL | PIN_HIGH;
-if (ctx->ggtt_offset_bias)
-flags |= PIN_OFFSET_BIAS | ctx->ggtt_offset_bias;
-
-ret = i915_vma_pin(ce->state, 0, GEN8_LR_CONTEXT_ALIGN, flags);
+ret = __context_pin(ctx, ce->state);
if (ret)
goto err;

@@ -1106,9 +1141,7 @@
ce->lrc_reg_state[CTX_RING_BUFFER_START+1] =
i915_ggtt_offset(ce->ring->vma);
-ce->state->obj->mm.dirty = true;
ce->state->obj->pin_global++;
-
-i915_gem_context_get(ctx);
out:
return ce->ring;
@@ -1147,7 +1180,6 @@
struct intel_engine_cs *engine = request->engine;
struct intel_context *ce = &request->ctx->engine[engine->id];
u32 *cs;
-int ret;

GEM_BUG_ON(!ce->pin_count);

@@ -1161,14 +1193,6 @@
if (IS_ERR(cs))
return PTR_ERR(cs);

-if (!ce->initialised) {
-ret = engine->init_context(request);
-if (ret)
-return ret;
-
-ce->initialised = true;
-
-/* Note that after this point, we have committed to using
 * this request as it is being used to both track the
* state of engine initialisation and liveness of the
@@ -1277,24 +1301,31 @@
batch = gen8_emit_flush_coherentl3_wa(engine, batch);
+	/* WaDisableGatherAtSetShaderCommonSlice:skl,bxt,kbl,glk */
-\t*batch++ = MI_LOAD_REGISTER_IMM(1);
+\t*batch++ = i915_mmio_reg_offset(COMMON_SLICE_CHICKEN2);
+\t*batch++ = _MASKED_BIT_DISABLE(
+\tGEN9_DISABLE_GATHER_AT_SET_SHADER_COMMON_SLICE);
+\t	/* BSpec: 11391 */
+\t*batch++ = i915_mmio_reg_offset(FF_SLICE_CHICKEN);
+\t*batch++ = _MASKED_BIT_ENABLE(FF_SLICE_CHICKEN_CL_PROVOKING_VERTEX_FIX);
+\t	/* BSpec: 11299 */
+\t*batch++ = i915_mmio_reg_offset(_3D_CHICKEN3);
+\t*batch++ = _MASKED_BIT_ENABLE(_3D_CHICKEN_SF_PROVOKING_VERTEX_FIX);
+\t*batch++ = MI_NOOP;
-\t/* WaClearSlmSpaceAtContextSwitch:kbl */
-\t/* Actual scratch location is at 128 bytes offset */
-\tif (IS_KBL_REVID(engine->i915, 0, KBL_REVID_A0)) {
-\t-batch = gen8_emit_pipe_control(batch,
-\t-\t\t\- PIPE_CONTROL_FLUSH_L3 |
-\t-\t\- PIPE_CONTROL_GLOBAL_GTT_IVB |
-\t-\t\- PIPE_CONTROL_CS_STALL |
-\t-\t\- PIPE_CONTROL_QW_WRITE,
-\t-\t\- i915_ggtt_offset(engine->scratch)
-\t-\t\- + 2 * CACHELINE_BYTES);
-\t}\n+\t/* WaClearSlmSpaceAtContextSwitch:skl,bxt,kbl,glk,cfl */
+\t+batch = gen8_emit_pipe_control(batch,
+\t+\t\t\+ PIPE_CONTROL_FLUSH_L3 |
+\t+\t\+ PIPE_CONTROL_GLOBAL_GTT_IVB |
+\t+\t\+ PIPE_CONTROL_CS_STALL |
+\t+\t\+ PIPE_CONTROL_QW_WRITE,
+\t+\t\+ i915_ggtt_offset(engine->scratch) +
+\t+\t\+ 2 * CACHELINE_BYTES);
-\t/* WaMediaPoolStateCmdInWABB:bxt,glk */
-\tif (HAS_POOLED_EU(engine->i915)) {
-\t\t\- @ @ -2109,7 +2140,6 @@
```c
__MASKED_BIT_ENABLE(CTX_CTRL_INHIBIT_SYN_CTX_SWITCH |
  - CTX_CTRL_ENGINE_CTX_RESTORE_INHIBIT |
    (HAS_RESOURCE_STREAMER(dev_priv) ?
      CTX_CTRL_RS_CTX_ENABLE : 0));
CTX_REG(regs, CTX_RING_HEAD, RING_HEAD(base), 0);
@@ -2186,6 +2216,7 @@
      struct intel_ring *ring)
 {
   void *vaddr;
+  u32 *regs;
   int ret;

   ret = i915_gem_object_set_to_cpu_domain(ctx_obj, true);
@@ -2202,11 +2233,31 @@
 ctx_obj->mm.dirty = true;

 +if (engine->default_state) {
+/*
+ * We only want to copy over the template context state;
+ * skipping over the headers reserved for GuC communication,
+ * leaving those as zero.
+ */
+const unsigned long start = LRC_HEADER_PAGES * PAGE_SIZE;
+void *defaults;
+ +defaults = i915_gem_object_pin_map(engine->default_state,
+    I915_MAP_WB);
+if (IS_ERR(defaults))
+return PTR_ERR(defaults);
+ +memcpy(vaddr + start, defaults + start, engine->context_size);
+   i915_gem_object_unpin_map(engine->default_state);
+}
+/* The second page of the context object contains some fields which must
+ * be set up prior to the first execution. */
+execlists_init_reg_state(vaddr + LRC_STATE_PN * PAGE_SIZE,
+   ctx, engine, ring);
+regs = vaddr + LRC_STATE_PN * PAGE_SIZE;
+execlists_init_reg_state(regs, ctx, engine, ring);
+if (!engine->default_state)
+regs[CTX_CONTEXT_CONTROL + 1] |=
+  __MASKED_BIT_ENABLE(CTX_CTRL_ENGINE_CTX_RESTORE_INHIBIT);
+i915_gem_object_unpin_map(ctx_obj);
```
ce->ring = ring;
ce->state = vma;
-ce->initialised |= engine->init_context == NULL;

return 0;

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_lspcon.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_lspcon.c
@@ -74,7 +74,7 @@
 DRM_DEBUG_KMS("Waiting for LSPCON mode %s to settle\n",
     lspcon_mode_name(mode));

-wait_for((current_mode = lspcon_get_current_mode(lspcon)) == mode, 100);
+wait_for((current_mode = lspcon_get_current_mode(lspcon)) == mode, 400);
if (current_mode != mode)
    DRM_ERROR("LSPCON mode hasn’t settled\n");

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_lvds.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_lvds.c
@@ -44,8 +44,6 @@
 struct intel_lvds_connector {
     struct intel_connector base;
     -
-    struct notifier_block lid_notifier;
};

struct intel_lvds_pps {
    @@ -317,7 +315,8 @@
     POSTING_READ(lvds_encoder->reg);
     -if (intel_wait_for_register(dev_priv, PP_STATUS(0), PP_ON, PP_ON, 1000))
     +
     +if (intel_wait_for_register(dev_priv, PP_STATUS(0), PP_ON, PP_ON, 5000))
     DRM_ERROR("timed out waiting for panel to power on\n");

     intel_panel_enable_backlight(pipe_config, conn_state);
     @@ -439,27 +438,10 @@
     return true;
 }

-/**
- * Detect the LVDS connection.
- *
- * Since LVDS doesn't have hotplug, we use the lid as a proxy. Open means

* connected and closed means disconnected. We also send hotplug events as
* needed, using lid status notification from the input layer.
*
static enum drm_connector_status
intel_lvds_detect(struct drm_connector *connector, bool force)
{
    struct drm_i915_private *dev_priv = to_i915(connector->dev);
    enum drm_connector_status status;

    DRM_DEBUG_KMS("[CONNECTOR:%d:%s]\n",
        connector->base.id, connector->name);

    status = intel_panel_detect(dev_priv);
    if (status != connector_status_unknown)
        return status;

    return connector_status_connected;
}

/**
 @@ -483,87 +465,6 @@
return 1;
}

-static int intel_no_modeset_on_lid_dmi_callback(const struct dmi_system_id *id)
-{
-    DRM_INFO("Skipping forced modeset for %s\n", id->ident);
-    return 1;
-}
-
-/* The GPU hangs up on these systems if modeset is performed on LID open */
-static const struct dmi_system_id intel_no_modeset_on_lid[] = {
-    { /* callback = intel_no_modeset_on_lid_dmi_callback, */
-        .ident = "Toshiba Tecra A11",
-        .matches = {
-            DMI_MATCH(DMI_SYS_VENDOR, "TOSHIBA"),
-            DMI_MATCH(DMI_PRODUCT_NAME, "TECRA A11"),
-        },
-    },
-    { /* terminating entry */
-    },
-
-    /* Lid events. Note the use of 'modeset';
-    * - we set it to MODESET_ON_LID_OPEN on lid close,
and set it to MODESET_DONE on open
- * - we use it as a "only once" bit (ie we ignore
duplicate events where it was already properly set)
- * - the suspend/resume paths will set it to
- *  MODESET_SUSPENDED and ignore the lid open event,
because they restore the mode ("lid open").
- */
static int intel_lid_notify(struct notifier_block *nb, unsigned long val,
  void *unused)
{
  struct intel_lvds_connector *lvds_connector =
  container_of(nb, struct intel_lvds_connector, lid_notifier);
  struct drm_connector *connector = &lvds_connector->base.base;
  struct drm_device *dev = connector->dev;
  struct drm_i915_private *dev_priv = to_i915(dev);

  if (dev->switch_power_state != DRM_SWITCH_POWER_ON)
    return NOTIFY_OK;

  mutex_lock(&dev_priv->modeset_restore_lock);
  if (dev_priv->modeset_restore == MODESET_SUSPENDED)
    goto exit;
  
  connector->status = connector->funcs->detect(connector, false);

  /* Don't force modeset on machines where it causes a GPU lockup */
  if (dmi_check_system(intel_no_modeset_on_lid))
    goto exit;
  if (!acpi_lid_open()) {
    /* do modeset on next lid open event */
    dev_priv->modeset_restore = MODESET_ON_LID_OPEN;
    goto exit;
  }

  if (dev_priv->modeset_restore == MODESET_DONE)
    goto exit;

  /* Some old platform's BIOS love to wreak havoc while the lid is closed.
   * We try to detect this here and undo any damage. The split for PCH
   * platforms is rather conservative and a bit arbitrary expect that on
   * those platforms VGA disabling requires actual legacy VGA I/O access,
   * and as part of the cleanup in the hw state restore we also redisable
   * the vga plane.
   */
-if (!HAS_PCH_SPLIT(dev_priv))
-intel_display_resume(dev);
-
-dev_priv->modeset_restore = MODESET_DONE;
-
-exit:
-mutex_unlock(&dev_priv->modeset_restore_lock);
-return NOTIFY_OK;
-
/**
 * intel_lvds_destroy - unregister and free LVDS structures
 * @connector: connector to free
 @@ -576,9 +477,6 @@
 struct intel_lvds_connector *lvds_connector =
to_lvds_connector(connector);

-if (lvds_connector->lid_notifier.notifier_call)
-acpi_lid_notifier_unregister(&lvds_connector->lid_notifier);
-
if (!IS_ERR_OR_NULL(lvds_connector->base.edid))
kfree(lvds_connector->base.edid);

 @@ -817,6 +715,14 @@
 DMI_EXACT_MATCH(DMI_BOARD_NAME, "D525MW"),
 },
 },
+{ *
 +.callback = intel_no_lvds_dmi_callback,
 +.ident = "Radiant P845",
 +.matches = {
 +DMI_MATCH(DMI_SYS_VENDOR, "Radiant Systems Inc"),
 +DMI_MATCH(DMI_PRODUCT_NAME, "P845"),
 +},
 +},
+{ 

+}/* terminating entry */
+}
@@ -1053,8 +959,7 @@
 * 2) check for VBT data
 * 3) check to see if LVDS is already on
 * if none of the above, no panel
-* 4) make sure lid is open
-* if closed, act like it's not there for now
*/

/*
@@ -1125,8 +1029,7 @@
mutex_unlock(&dev->mode_config.mutex);

-intel_panel_init(&intel_connector->panel, fixed_mode, NULL,
- downclock_mode);
+intel_panel_init(&intel_connector->panel, fixed_mode, downclock_mode);
intel_panel_setup_backlight(connector, INVALIDPIPE);

lvds_encoder->is_dual_link = compute_is_dual_link_lvds(lvds_encoder);
@@ -1135,12 +1038,6 @@
 lvds_encoder->a3_power = lvds & LVDS_A3_POWER_MASK;

-lvds_connector->lid_notifier.notifier_call = intel_lid_notify;
-if (acpi_lid_notifier_register(&lvds_connector->lid_notifier)) {
-DRM_DEBUG_KMS("lid notifier registration failed\n");
-lvds_connector->lid_notifier.notifier_call = NULL;
-}
-

failed:
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_overlay.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_overlay.c
@@ -219,7 +219,7 @@
 if (OVERLAY_NEEDS_PHYSICAL(dev_priv))
     regs = (struct overlay_registers __iomem *)overlay->reg_bo->phys_handle->vaddr;
 else
-    regs = io_mapping_map_wc(&dev_priv->ggtt.mappable,
+    regs = io_mapping_map_wc(&dev_priv->ggtt.iomap,
        overlay->flip_addr,
        PAGE_SIZE);

@@ -1508,7 +1508,7 @@
     regs = (struct overlay_registers __iomem *)
     overlay->reg_bo->phys_handle->vaddr;
 else
-    regs = io_mapping_map_atomic_wc(&dev_priv->ggtt.mappable,
+    regs = io_mapping_map_atomic_wc(&dev_priv->ggtt.iomap,
        overlay->flip_addr);

return regs;
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_panel.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_panel.c
@@ -1924,13 +1924,11 @@
 int intel_panel_init(struct intel_panel *panel,
 struct drm_display_mode *fixed_mode,
struct drm_display_mode *alt_fixed_mode,
struct drm_display_mode *downclock_mode)
{
    intel_panel_init_backlight_funcs(panel);

    panel->fixed_mode = fixed_mode;
    panel->alt_fixed_mode = alt_fixed_mode;
    panel->downclock_mode = downclock_mode;

    return 0;
}

if (panel->fixed_mode)
drm_mode_destroy(intel_connector->base.dev, panel->fixed_mode);

- if (panel->alt_fixed_mode)
    drm_mode_destroy(intel_connector->base.dev,
        panel->alt_fixed_mode);
-
if (panel->downclock_mode)
drm_mode_destroy(intel_connector->base.dev,
    panel->downclock_mode);

/*
 * Lower the display internal timeout.
 * This is needed to avoid any hard hangs when DSI port PLL
 * is off and a MMIO access is attempted by any privilege
 * application, using batch buffers or any other means.
 */
I915_WRITE(GEN9_CLKGATE_DIS_0, I915_READ(GEN9_CLKGATE_DIS_0) | 
PWM1_GATING_DIS | PWM2_GATING_DIS);
+
+/*
+ * Lower the display internal timeout.
+ * This is needed to avoid any hard hangs when DSI port PLL
+ * is off and a MMIO access is attempted by any privilege
+ * application, using batch buffers or any other means.
+ */
+I915_WRITE(RM_TIMEOUT, MMIO_TIMEOUT_US(950));
}

static void glk_init_clock_gating(struct drm_i915_private *dev_priv)
@@ -2470,6 +2478,9 @@
uint32_t method1, method2;
    int cpp;

    +if (mem_value == 0)
        +return U32_MAX;
        +
    if (!intel_wm_plane_visible(cstate, pstate))
        return 0;
uint32_t method1, method2;
int cpp;

if (mem_value == 0)
    return U32_MAX;

if (!intel_wm_plane_visible(cstate, pstate))
    return 0;

static void intel_print_wm_latency(struct drm_i915_private *dev_priv,
    const char *name,
    const uint16_t wm[8])
{
int level, max_level = ilk_wm_max_level(dev_priv);

    unsigned int latency = wm[level];

    if (latency == 0) {
        DRM_ERROR("%s WM%d latency not provided\n",
            name, level);
        DRM_DEBUG_KMS("%s WM%d latency not provided\n",
            name, level);
        continue;
    }

    intel_print_wm_latency(dev_priv, "Cursor", dev_priv->wm.cur_latency);
}

static void snb_wm_lp3_irq_quirk(struct drm_i915_private *dev_priv)
{
    /*
    * On some SNB machines (Thinkpad X220 Tablet at least)
+ * LP3 usage can cause vblank interrupts to be lost.
+ * The DEIIR bit will go high but it looks like the CPU
+ * never gets interrupted.
+ *
+ * It’s not clear whether other interrupt source could
+ * be affected or if this is somehow limited to vblank
+ * interrupts only. To play it safe we disable LP3
+ * watermarks entirely.
+ */
+if (dev_priv->wm.pri_latency[3] == 0 &&
+    dev_priv->wm.spr_latency[3] == 0 &&
+    dev_priv->wm.cur_latency[3] == 0)
+    return;
+
+dev_priv->wm.pri_latency[3] = 0;
+dev_priv->wm.spr_latency[3] = 0;
+dev_priv->wm.cur_latency[3] = 0;
+
+DRM_DEBUG_KMS("LP3 watermarks disabled due to potential for lost interrupts\n");
+intel_print_wm_latency(dev_priv, "Primary", dev_priv->wm.pri_latency);
+intel_print_wm_latency(dev_priv, "Sprite", dev_priv->wm.spr_latency);
+intel_print_wm_latency(dev_priv, "Cursor", dev_priv->wm.cur_latency);
+}
+
static void ilk_setup_wm_latency(struct drm_i915_private *dev_priv)
{
  intel_read_wm_latency(dev_priv, dev_priv->wm.pri_latency);
  int __leaf i915_read_wm_latency(dev_priv, dev_priv->wm.pri_latency);
  @ @ -2996,8 +3041,10 @@
  intel_print_wm_latency(dev_priv, "Sprite", dev_priv->wm.spr_latency);
  intel_print_wm_latency(dev_priv, "Cursor", dev_priv->wm.cur_latency);
  
  -if (IS_GEN6(dev_priv))
  +if (IS_GEN6(dev_priv)) {
    snb_wm_latency_quirk(dev_priv);
    +snb_wm_lp3_irq_quirk(dev_priv);
    +}
  }

static void skl_setup_wm_latency(struct drm_i915_private *dev_priv)
{
  @ @ -7891,6 +7938,95 @@
  dev_priv->ips.corr = (lcfuse & LCFUSE_HIV_MASK);
  }

+static bool i915_rc6_ctx_corrupted(struct drm_i915_private *dev_priv)
+{ 
+    +return !I915_READ(GEN8_RC6_CTX_INFO);
+}
+static void i915_rc6_ctx_wa_init(struct drm_i915_private *i915)
+{
+  if (!NEEDS_RC6_CTX_CORRUPTION_WA(i915))
+    return;
+
+  if (i915_rc6_ctx_corrupted(i915)) {
+    DRM_INFO("RC6 context corrupted, disabling runtime power management\n");
+    i915->gt_pm.rc6.ctx_corrupted = true;
+    intel_runtime_pm_get(i915);
+  }
+}
+
+static void i915_rc6_ctx_wa_cleanup(struct drm_i915_private *i915)
+{
+  if (i915->gt_pm.rc6.ctx_corrupted) {
+    intel_runtime_pm_put(i915);
+    i915->gt_pm.rc6.ctx_corrupted = false;
+  }
+}
+
+/**
+ * i915_rc6_ctx_wa_suspend - system suspend sequence for the RC6 CTX WA
+ * @i915: i915 device
+ *
+ * Perform any steps needed to clean up the RC6 CTX WA before system suspend.
+ */
+void i915_rc6_ctx_wa_suspend(struct drm_i915_private *i915)
+{
+  if (i915->gt_pm.rc6.ctx_corrupted)
+    intel_runtime_pm_put(i915);
+}
+
+/**
+ * i915_rc6_ctx_wa_resume - system resume sequence for the RC6 CTX WA
+ * @i915: i915 device
+ *
+ * Perform any steps needed to re-init the RC6 CTX WA after system resume.
+ */
+void i915_rc6_ctx_wa_resume(struct drm_i915_private *i915)
+{
+  if (!i915->gt_pm.rc6.ctx_corrupted)
+    return;
+
+  if (i915_rc6_ctx_corrupted(i915)) {
+    intel_runtime_pm_get(i915);
+    return;
+  }
+}
+DRM_INFO("RC6 context restored, re-enabling runtime power management\n");
+i915->gt_pm.rc6.ctx_corrupted = false;
+
+static void intel_disable_rc6(struct drm_i915_private *dev_priv);
+
+/**
+ * i915_rc6_ctx_wa_check - check for a new RC6 CTX corruption
+ * @i915: i915 device
+ *
+ * Check if an RC6 CTX corruption has happened since the last check and if so
+ * disable RC6 and runtime power management.
+ *
+ * Return false if no context corruption has happened since the last call of
+ * this function, true otherwise.
+ */
+bool i915_rc6_ctx_wa_check(struct drm_i915_private *i915)
+{
+if (!NEEDS_RC6_CTX_CORRUPTION_WA(i915))
+return false;
+if (!i915->gt_pm.rc6.ctx_corrupted)
+return false;
+if (!i915_rc6_ctx_corrupted(i915))
+return false;
+
+DRM_NOTE("RC6 context corruption, disabling runtime power management\n");
+
+intel_disable_rc6(i915);
+i915->gt_pm.rc6.ctx_corrupted = true;
+intel_runtime_pm_get_noresume(i915);
+
+return true;
+}
+
+void intel_init_gt_powersave(struct drm_i915_private *dev_priv)
{ }

-mutex_lock(&dev_priv->drm.struct_mutex);
mutex_lock(&dev_priv->pcu_lock);
+
+i915_rc6_ctx_wa_init(dev_priv);
+
/* Initialize RPS limits (for userspace) */
if (IS_CHERRYVIEW(dev_priv))
    cherryview_init_gt_powersave(dev_priv);
@@ -7946,7 +8083,6 @@
rps->boost_freq = rps->max_freq;
mutex_unlock(&dev_priv->pcu_lock);
-mutex_unlock(&dev_priv->drm.struct_mutex);

intel_autoenable_gt_powersave(dev_priv);
}
@@ -7956,6 +8092,8 @@
if (IS_VALLEYVIEW(dev_priv))
    valleyview_cleanup_gt_powersave(dev_priv);

+i915_rc6_ctx_wa_cleanup(dev_priv);
+
if (!i915_modparams.enable_rc6)
    intel_runtime_pm_put(dev_priv);
}
@@ -8000,7 +8138,7 @@
i915->gt_pm.llc_pstate.enabled = false;
}

-static void intel_disable_rc6(struct drm_i915_private *dev_priv)
+static void __intel_disable_rc6(struct drm_i915_private *dev_priv)
{
    lockdep_assert_held(&dev_priv->pcu_lock);

    @@ -8019,6 +8157,13 @@
    dev_priv->gt_pm.rc6.enabled = false;
 }

+static void intel_disable_rc6(struct drm_i915_private *dev_priv)
+{
+    mutex_lock(&dev_priv->pcu_lock);
+    __intel_disable_rc6(dev_priv);
+    mutex_unlock(&dev_priv->pcu_lock);
+}
+
static void intel_disable_rps(struct drm_i915_private *dev_priv)
{
    lockdep_assert_held(&dev_priv->pcu_lock);
    @@ -8044,7 +8189,7 @@
    mutex_lock(&dev_priv->pcu_lock);

    -intel_disable_rc6(dev_priv);
__intel_disable_rc6(dev_priv);

intel_disable_rps(dev_priv);
if (HAS LLC(dev_priv))
    intel_disable_llc_pstate(dev_priv);
@@ -8071,6 +8216,9 @@
    if (dev_priv->gt_pm.rc6.enabled)
        return;
+
    +if (dev_priv->gt_pm.rc6.ctx_corrupted)
        return;
+
    +if (IS CHERRYVIEW(dev_priv))
        cherryview_enable_rc6(dev_priv);
    else if (IS VALLEYVIEW(dev_priv))
@@ -9227,8 +9375,8 @@
return 0;
}

-int sandybridge_pcode_write(struct drm_i915_private *dev_priv,
-u32 mbox, u32 val)
+int sandybridge_pcode_write_timeout(struct drm_i915_private *dev_priv,
+u32 mbox, u32 val, int timeout_us)
{
    int status;
@@ -9251,7 +9399,7 @@
    if (__intel_wait_for_register_fw(dev_priv,
        GEN6_PCODE_MAILBOX, GEN6_PCODE_READY, 0,
        -500, 0, NULL)) {
+		timeout_us, 0, NULL)) {
        DRM_ERROR("timeout waiting for pcode write of 0x%08x to mbox %x to finish for %ps\n",
            val, mbox, __builtin_return_address(0));
        return -ETIMEDOUT;
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_ringbuffer.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_ringbuffer.c
@@ -1284,6 +1284,7 @@
static struct i915_vma *
    intel_ring_create_vma(struct drm_i915_private *dev_priv, int size)
{
    +struct i915_address_space *vm = &dev_priv->ggtt.base;
    struct drm_i915_gem_object *obj;
    struct i915_vma *vma;
@@ -1293,10 +1294,14 @@
    if (IS_ERR(obj))
        return ERR_CAST(obj);

/* mark ring buffers as read-only from GPU side by default */
-obj->gt_ro = 1;
+
+ * Mark ring buffers as read-only from GPU side (so no stray overwrites)
+ * if supported by the platform's GGTT.
+ */
+if (vm->has_read_only)
+i915_gem_object_set_readonly(obj);

-vma = i915_vma_instance(obj, &dev_priv->ggtt.base, NULL);
+vma = i915_vma_instance(obj, vm, NULL);
if (IS_ERR(vma))
goto err;

/* Clear this page out of any CPU caches for coherent swap-in/out.
 */
+ /* Clear this page out of any CPU caches for coherent swap-in/out.
+ * We only want to do this on the first bind so that we do not stall
+ * on an active context (which by nature is already on the GPU).
+ */
if (!(vma->flags & I915_VMA_GLOBAL_BIND)) {
- ret = i915_gem_object_set_to_gtt_domain(vma->obj, false);
+ ret = i915_gem_object_set_to_gtt_domain(vma->obj, true);
if (ret)
return ret;
}

struct drm_i915_private *i915 = engine->i915;
struct i915_vma *vma = ctx->engine[RCS].state;
int ret;

obj = i915_gem_object_create(i915, engine->context_size);
if (IS_ERR(obj))
return ERR_CAST(obj);

+if (engine->default_state) {
+void *defaults, *vaddr;
+
+vaddr = i915_gem_object_pin_map(obj, I915_MAP_WB);
+if (IS_ERR(vaddr)) {
+err = PTR_ERR(vaddr);
+goto err_obj;
+}
+defaults = i915_gem_object_pin_map(engine->default_state, 
+  I915_MAP_WB);
+if (IS_ERR(defaults)) {
+  err = PTR_ERR(defaults);
+  goto err_map;
+
+  memcpy(vaddr, defaults, engine->context_size);
+
+i915_gem_object_unpin_map(engine->default_state);
+i915_gem_object_unpin_map(obj);
+}
+
/*
 */
/* Try to make the context utilize L3 as well as LLC.
 */
@@ -1405,10 +1434,18 @@
}
vma = i915_vma_instance(obj, &i915->ggtt.base, NULL);
-if (IS_ERR(vma))
-i915_gem_object_put(obj);
+if (IS_ERR(vma)) {
+  err = PTR_ERR(vma);
+  goto err_obj;
+
+  return vma;
+
+err_map:
+i915_gem_object_unpin_map(obj);
+err_obj:
+i915_gem_object_put(obj);
+return ERR_PTR(err);
} 

static struct intel_ring *
@@ -1441,20 +1478,9 @@
if (ret)
goto err;
-ce->state->obj->mm.dirty = true;
-ce->state->obj->pin_global++;
}

-/* The kernel context is only used as a placeholder for flushing the
- * active context. It is never used for submitting user rendering and
- * as such never requires the golden render context, and so we can skip
- * emitting it when we switch to the kernel context. This is required
- * as during eviction we cannot allocate and pin the renderstate in
- * order to initialise the context.
- */
-if (i915_gem_context_is_kernel(ctx))
-ce->initialised = true;
-
j915_gem_context_get(ctx);

out:
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_ringbuffer.h
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_ringbuffer.h
@@ -290,11 +290,14 @@
 struct intel_engine_cs {
 struct drm_i915_private *i915;
 char name[INTEL_ENGINE_CS_MAX_NAME];
+ enum intel_engine_id id;
- unsigned int uabi_id;
 unsigned int hw_id;
 unsigned int guc_id;

  +u8 uabi_id;
+ u8 uabi_class;
+ 
+ u8 class;
 u8 instance;
 u32 context_size;
@@ -304,6 +307,7 @@
 struct intel_ring *buffer;
 struct intel_timeline *timeline;

  +struct drm_i915_gem_object *default_state;
 struct intel_render_state *render_state;

atomic_t irq_count;
@@ -507,7 +511,9 @@
 struct intel_engine_hangcheck hangcheck;

  -bool needs_cmd_parser;
+ #define I915_ENGINE_USING_CMD_PARSER_BIT(0)
+ #define I915_ENGINE_REQUIRES_CMD_PARSER_BIT(3)
+ unsigned int flags;

/*
 * Table of commands the command parser needs to know about
u32 (*get_cmd_length_mask)(u32 cmd_header);

+static inline bool
+intel_engine_using_cmd_parser(const struct intel_engine_cs *engine)
+{
+return engine->flags & I915_ENGINE_USING_CMD_PARSER;
+}
+
+static inline bool
+intel_engine_requires_cmd_parser(const struct intel_engine_cs *engine)
+{
+return engine->flags & I915_ENGINE_REQUIRES_CMD_PARSER;
+}
+
static inline void
execlists_set_active(struct intel_engine_execlists *execlists,
unsigned int bit)

bool intel_engine_is_idle(struct intel_engine_cs *engine);
bool intel_engines_are_idle(struct drm_i915_private *dev_priv);

+bool intel_engine_has_kernel_context(const struct intel_engine_cs *engine);
+
void intel_engines_mark_idle(struct drm_i915_private *i915);
void intel_engines_reset_default_submission(struct drm_i915_private *i915);
+unsigned int intel_engines_has_context_isolation(struct drm_i915_private *i915);
+
bool intel_engine_can_store_dword(struct intel_engine_cs *engine);

--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_runtime_pm.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_runtime_pm.c
@@ -622,19 +622,18 @@
 DRM_DEBUG_KMS("Enabling DC6\n");

-gen9_set_dc_state(dev_priv, DC_STATE_EN_UPTO_DC6);
+/* Wa Display #1183: skl,kbl,cfl */
+if (IS_GEN9_BC(dev_priv))
+I915_WRITE(GEN8_CHICKEN_DCPR_1, I915_READ(GEN8_CHICKEN_DCPR_1) |
+SKL_SELECT_ALTERNATE_DC_EXIT);
+
-gen9_set_dc_state(dev_priv, DC_STATE_EN_UPTO_DC6);
+
void skl_disable_dc6(struct drm_i915_private *dev_priv)
{
}
DRM_DEBUG_KMS("Disabling DC6\n");

/* Wa Display #1183: skl,kbl,cfl */
-if (IS_GEN9_BC(dev_priv))
-GEN8_WRITE(GEN8_CHICKEN_DCPR_1, GEN8_READ(GEN8_CHICKEN_DCPR_1)
- SKL_SELECT_ALTERNATE_DC_EXIT);
-
g9_set_dc_state(dev_priv, DC_STATE_DISABLE);
}

@@ -1844,6 +1843,7 @@
CNLgetDisplay_powerwell_2_power_domains |
BIT_ULL(Power_domain_modeSet) |
BIT_ULL(Power_domain_aux_A) |
+BIT_ULL(Power_domain_Gmbus) |
BIT_ULL(Power_domain_Init))

static const struct i915_power_well_ops i9xx_always_on_power_well_ops = {
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_sdvo.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_sdvo.c
@@ -925,6 +925,13 @@
return intel_sdvo_set_value(intel_sdvo, SDVO_CMD_SET_COLORIMETRY, &mode, 1);
}

+static bool intel_sdvo_set_audio_state(struct intel_sdvo *intel_sdvo,
+       u8 audio_state)
+{
+return intel_sdvo_set_value(intel_sdvo, SDVO_CMD_SET_AUDIO_STAT,
+       &audio_state, 1);
+}
+
#if 0
static void intel_sdvo_dump_hdmibuf(struct intel_sdvo *intel_sdvo)
{
@@ -1357,11 +1364,6 @@
else
sdvox |= SDVO_PIPE_SEL(crtc->pipe);

-if (crtc_state->has_audio) {
-WARN_ON_ONCE(INTEL_GEN(dev_priv) < 4);
-sdvox |= SDVO_AUDIO_ENABLE;
-}
-
if (INTEL_GEN(dev_priv) >= 4) {
/* done in crtc_mode_set as the dpll_md reg must be written early */
} else if (IS_I945G(dev_priv) || IS_I945GM(dev_priv))
@@ -1490,8 +1492,13 @@
if (sdvox & HDMI_COLOR_RANGE_16_235)
pipe_config->limited_color_range = true;

-if (sdvox & SDVO_AUDIO_ENABLE)
- pipe_config->has_audio = true;
+if (intel_sdvo_get_value(intel_sdvo, SDVO_CMD_GET_AUDIO_STAT,
+ &val, 1)) {
+ u8 mask = SDVO_AUDIO_ELD_VALID | SDVO_AUDIO_PRESENCE_DETECT;
+ if ((val & mask) == mask)
+ pipe_config->has_audio = true;
+}

if (intel_sdvo_get_value(intel_sdvo, SDVO_CMD_GET_ENCODE,
 &val, 1)) {
@@ -1504,6 +1511,32 @@
 pipe_config->pixel_multiplier, encoder_pixel_multiplier);
}

+static void intel_sdvo_disable_audio(struct intel_sdvo *intel_sdvo)
+{
+ intel_sdvo_set_audio_state(intel_sdvo, 0);
+}
+
+static void intel_sdvo_enable_audio(struct intel_sdvo *intel_sdvo,
+ const struct intel_crtc_state *crtc_state,
+ const struct drm_connector_state *conn_state)
+{
+  const struct drm_display_mode *adjusted_mode =
+  &crtc_state->base.adjusted_mode;
+  struct drm_connector *connector = conn_state->connector;
+  u8 *eld = connector->eld;
+  eld[6] = drm_av_sync_delay(connector, adjusted_mode) / 2;
+  intel_sdvo_set_audio_state(intel_sdvo, 0);
+  intel_sdvo_write_infoframe(intel_sdvo, SDVO_HBUF_INDEX_ELD,
+    SDVO_HBUF_TX_DISABLED,
+    e, drm_eld_size(eld));
+  intel_sdvo_set_audio_state(intel_sdvo, SDVO_AUDIO_ELD_VALID |
+    SDVO_AUDIO_PRESENCE_DETECT);
+}
+
+static void intel_disable_sdvo(struct intel_encoder *encoder,
+ const struct intel_crtc_state *old_crtc_state,
+ const struct drm_connector_state *conn_state)
@@ -1513,6 +1546,9 @@
struct intel_crtc *crtc = to_intel_crtc(encoder->base.crtc);

u32 temp;

+if (old_crtc_state->has_audio)
+intel_sdvo_disable_audio(intel_sdvo);
+
+intel_sdvo_set_active_outputs(intel_sdvo, 0);
if (0)
intel_sdvo_set_encoder_power_state(intel_sdvo,
@@ -1596,6 +1632,9 @@
intel_sdvo_set_encoder_power_state(intel_sdvo,
    DRM_MODE_DPMS_ON);
intel_sdvo_set_active_outputs(intel_sdvo, intel_sdvo->attached_output);
+
+if (pipe_config->has_audio)
+intel_sdvo_enable_audio(intel_sdvo, pipe_config, conn_state);
}

static enum drm_mode_status
@@ -2466,7 +2505,6 @@
intel_sdvo_dvi_init(struct intel_sdvo *intel_sdvo, int device)
{
struct drm_encoder *encoder = &intel_sdvo->base.base;
-struct drm_i915_private *dev_priv = to_i915(encoder->dev);
struct drm_connector *connector;
struct intel_encoder *intel_encoder = to_intel_encoder(encoder);
struct intel_connector *intel_connector;
@@ -2502,9 +2540,7 @@
encoder->encoder_type = DRM_MODE_ENCODER_TMDS;
connector->connector_type = DRM_MODE_CONNECTOR_HDMIA;

-/* gen3 doesn't do the hdmi bits in the SDVO register */
-if (INTEL_GEN(dev_priv) >= 4 &&
- intel_sdvo_is_hdmi_connector(intel_sdvo, device)) {
+if (intel_sdvo_is_hdmi_connector(intel_sdvo, device)) {
    connector->connector_type = DRM_MODE_CONNECTOR_HDMIA;
    intel_sdvo->is_hdmi = true;
}
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_sdvo_regs.h
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_sdvo_regs.h
@@ -707,6 +707,9 @@
#define SDVO_CMD_GET_AUDIO_ENCRYPT_PREFER 0x90
#define SDVO_CMD_SET_AUDIO_STAT0x91
#define SDVO_CMD_GET_AUDIO_STAT0x92
+ #define SDVO_AUDIO_ELD_VALID(1 << 0)
+ #define SDVO_AUDIO_PRESENCE_DETECT(1 << 1)
+ #define SDVO_AUDIO_CP_READY(1 << 2)
#define SDVO_CMD_SET_HBUF_INDEX0x93
#define SDVO_HBUF_INDEX_ELD0
#define SDVO_HBUF_INDEX_AVI_IF1
--- linux-4.15.0.orig/drivers/gpu/drm/i915/intel_sprite.c
+++ linux-4.15.0/drivers/gpu/drm/i915/intel_sprite.c
@@ -350,44 +350,87 @@
}

static void
-chv_update_csc(struct intel_plane *plane, uint32_t format)
+chv_update_csc(const struct intel_plane_state *plane_state)
{
+struct intel_plane *plane = to_intel_plane(plane_state->base.plane);
struct drm_i915_private *dev_priv = to_i915(plane->base.dev);
+const struct drm_framebuffer *fb = plane_state->base.fb;
enum plane_id plane_id = plane->id;

/* Seems RGB data bypasses the CSC always */
-if (!format_is_yuv(format))
+if (!format_is_yuv(fb->format->format))
    return;

/*
- * BT.601 limited range YCbCr -> full range RGB
+ * BT.601 full range YCbCr -> full range RGB
- *
- * |r|   | 6537 4769  0| |cr |
- * |g| = |-3330 4769 -1605| x |y-64|
- * |b|   |    0 4769  8263| |cb |
- + * |r|   | 5743 4096  0| |cr|
- + * |g| = |-2925 4096 -1410| x |y |
- + * |b|   |    0 4096  7258| |cb|
*
- * Cb and Cr apparently come in as signed already, so no
- * need for any offset. For Y we need to remove the offset.
+ * Cb and Cr apparently come in as signed already,
+ * and we get full range data in on account of CLRC0/1
*/
-I915_WRITE_FW(SPCSCYGOFF(plane_id), SPCSC_OOFF(0) | SPCSC_IOFF(-64));
+I915_WRITE_FW(SPCSCYGOFF(plane_id), SPCSC_OOFF(0) | SPCSC_IOFF(0));
I915_WRITE_FW(SPCSCCBOFF(plane_id), SPCSC_OOFF(0) | SPCSC_IOFF(0));
I915_WRITE_FW(SPCSCCCROFF(plane_id), SPCSC_OOFF(0) | SPCSC_IOFF(0));
-I915_WRITE_FW(SPCSCCC01(plane_id), SPCSC_C1(4769) | SPCSC_C0(6537));
-I915_WRITE_FW(SPCSCCC23(plane_id), SPCSC_C1(-3330) | SPCSC_C0(0));
-I915_WRITE_FW(SPCSCC45(plane_id), SPCSC_C1(-1605) | SPCSC_C0(4769));
-I915_WRITE_FW(SPCSCC67(plane_id), SPCSC_C1(4769) | SPCSC_C0(0));
-I915_WRITE_FW(SPCSCC8(plane_id), SPCSC_C0(8263));
-
-I915_WRITE_FW(SPCSCYGICLAMP(plane_id), SPCSC_IMAX(940) | SPCSC_IMIN(64));
-I915_WRITE_FW(SPCSCCBICLAMP(plane_id), SPCSC_IMAX(448) | SPCSC_IMIN(-448));
-I915_WRITE_FW(SPCSCCRICLAMP(plane_id), SPCSC_IMAX(448) | SPCSC_IMIN(-448));
+I915_WRITE_FW(SPCSCC01(plane_id), SPCSC_C1(4096) | SPCSC_C0(5743));
+I915_WRITE_FW(SPCSCC23(plane_id), SPCSC_C1(-2925) | SPCSC_C0(0));
+I915_WRITE_FW(SPCSCC45(plane_id), SPCSC_C1(-1410) | SPCSC_C0(4096));
+I915_WRITE_FW(SPCSCC67(plane_id), SPCSC_C1(4096) | SPCSC_C0(0));
+I915_WRITE_FW(SPCSCC8(plane_id), SPCSC_C0(7258));
+
+I915_WRITE_FW(SPCSCYGICLAMP(plane_id), SPCSC_IMAX(1023) | SPCSC_IMIN(0));
+I915_WRITE_FW(SPCSCCBICLAMP(plane_id), SPCSC_IMAX(512) | SPCSC_IMIN(-512));
+I915_WRITE_FW(SPCSCCRICLAMP(plane_id), SPCSC_IMAX(512) | SPCSC_IMIN(-512));
+sh_sin = SIN_0 * sh_scale;
+sh_cos = COS_0 * sh_scale;
+
+/* FIXME these register are single buffered :( */
+i915_WRITE_FW(SPCLRC0(pipe, plane_id), SP_CONTRAST(contrast) | SP_BRIGHTNESS(brightness));
+i915_WRITE_FW(SPCLRC1(pipe, plane_id), SP_SH_SIN(sh_sin) | SP_SH_COS(sh_cos));
+
+static u32 vlv_sprite_ctl(const struct intel_crtc_state *crtc_state, const struct intel_plane_state *plane_state)
{ }

spin_lock_irqsave(&dev_priv->uncore.lock, irqflags);

+vlv_update_clrc(plane_state);
+
+if (IS_CHERRYVIEW(dev_priv) && pipe == PIPE_B)
- chv_update_csc(plane, fb->format->format);
+ chv_update_csc(plane_state);

if (key->flags) {
  I915_WRITE_FW(SPKEYMINVAL(pipe, plane_id), key->min_value);
--- linux-4.15.0.orig/drivers/gpu/drm/i915/selftests/huge_pages.c
+++ linux-4.15.0/drivers/gpu/drm/i915/selftests/huge_pages.c
@@ -548,7 +548,7 @@
 err = igt_check_page_sizes(vma);

 if (vma->page_sizes.gtt != I915_GTT_PAGE_SIZE_4K) {
- pr_err("page_sizes.gtt=%u, expected %lu\n",
+ pr_err("page_sizes.gtt=%u, expected %llu\n",
       vma->page_sizes.gtt, I915_GTT_PAGE_SIZE_4K);
 err = -EINVAL;
 }
i915_gem_object_get_dma_address(obj, 0),
offset, I915_CACHE_NONE, 0);

-vaddr = io_mapping_map_atomic_wc(&ggtt->mappable, offset);
+vaddr = io_mapping_map_atomic_wc(&ggtt->iomap, offset);
val = ioread32(vaddr + n);
io_mapping_unmap_atomic(vaddr);

GEM_BUG_ON(!drm_mm_node_allocated(&vma->node));
if (vma->node.start != total)
    vma->node.size != 2*I915_GTT_PAGE_SIZE) {
    -pr_err("i915_gem_gtt_reserve (pass 1) placement failed, found (%llx + %llx), expected (%llx + %lx)\n",
    +pr_err("i915_gem_gtt_reserve (pass 1) placement failed, found (%llx + %llx), expected (%llx + %llx)\n",
           vma->node.start, vma->node.size,
           total, 2*I915_GTT_PAGE_SIZE);
    err = -EINVAL;

GEM_BUG_ON(!drm_mm_node_allocated(&vma->node));
if (vma->node.start != total)
    vma->node.size != 2*I915_GTT_PAGE_SIZE) {
    -pr_err("i915_gem_gtt_reserve (pass 2) placement failed, found (%llx + %llx), expected (%llx + %lx)\n",
    +pr_err("i915_gem_gtt_reserve (pass 2) placement failed, found (%llx + %llx), expected (%llx + %llx)\n",
           vma->node.start, vma->node.size,
           total, 2*I915_GTT_PAGE_SIZE);
    err = -EINVAL;

GEM_BUG_ON(!drm_mm_node_allocated(&vma->node));
if (vma->node.start != offset)
    vma->node.size != 2*I915_GTT_PAGE_SIZE) {
    -pr_err("i915_gem_gtt_reserve (pass 3) placement failed, found (%llx + %llx), expected (%llx + %lx)\n",
    +pr_err("i915_gem_gtt_reserve (pass 3) placement failed, found (%llx + %llx), expected (%llx + %llx)\n",
           vma->node.start, vma->node.size,
           offset, 2*I915_GTT_PAGE_SIZE);
    err = -EINVAL;

--- linux-4.15.0.orig/drivers/gpu/drm/i915/selftests/i915_random.h
+++ linux-4.15.0/drivers/gpu/drm/i915/selftests/i915_random.h
@@ -59,6 +59,7 @@
    #ifndef __I915_SELFTESTS_RANDOM_H__
    #define __I915_SELFTESTS_RANDOM_H__
    
+include <linux/math64.h>
    #include <linux/random.h>
    
    #include "../i915_selftest.h"
--- linux-4.15.0.orig/drivers/gpu/drm/i915/selftests/mock_gtt.c
+++ linux-4.15.0/drivers/gpu/drm/i915/selftests/mock_gtt.c

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ggtt->base.i915 = i915;
-ggtt->mappable_base = 0;
-ggtt->mappable_end = 2048 * PAGE_SIZE;
+ggtt->gmadr = (struct resource) DEFINE_RES_MEM(0, 2048 * PAGE_SIZE);
+ggtt->mappable_end = resource_size(&ggtt->gmadr);

--- linux-4.15.0.orig/drivers/gpu/drm/imx/imx-ldb.c
+++ linux-4.15.0/drivers/gpu/drm/imx/imx-ldb.c
@@ -110,8 +110,8 @@
@@ -206,6 +206,11 @@
@@ -264,6 +269,11 @@
@@ -311,18 +321,19 @@

if (dual) {
@@ -264,6 +269,11 @@
}

if (mode->clock > 170000) {
    dev_warn ldb->dev, "%s: mode exceeds 170 MHz pixel clock\n", __func__);
@@ -311,18 +321,19 @@
struct imx_ldb_channel *imx_ldb_ch = enc_to_imx_ldb_ch(encoder);
struct imx_ldb *ldb = imx_ldb_ch->ldb;
+int dual = ldb->ldb_ctrl & LDB_SPLIT_MODE_EN;
int mux, ret;

drm_panel_disable(imx_ldb_ch->panel);

-endif (imx_ldb_ch == &ldb->channel[0])
+if (imx_ldb_ch == &ldb->channel[0] || dual)
ldb->ldb_ctrl &= ~LDB_CH0_MODE_EN_MASK;
-else if (imx_ldb_ch == &ldb->channel[1])
+if (imx_ldb_ch == &ldb->channel[1] || dual)
ldb->ldb_ctrl &= ~LDB_CH1_MODE_EN_MASK;

regmap_write(ldb->regmap, IOMUXC_GPR2, ldb->ldb_ctrl);

-if (ldb->ldb_ctrl & LDB_SPLIT_MODE_EN) {
+if (dual) {
clk_disable_unprepare(ldb->clk[0]);
clk_disable_unprepare(ldb->clk[1]);
}
@@ -612,6 +623,9 @@
return PTR_ERR(imx_ldb->regmap);
}

+/* disable LDB by resetting the control register to POR default */
+regmap_write(imx_ldb->regmap, IOMUXC_GPR2, 0);
+
imx_ldb->dev = dev;

if (of_id)
@@ -649,21 +663,22 @@
int bus_format;

ret = of_property_read_u32(child, "reg", &i);
-if (ret || i < 0 || i > 1)
-return -EINVAL;
+if (ret || i < 0 || i > 1) {
+ret = -EINVAL;
+goto free_child;
+}
+
+if (!of_device_is_available(child))
+continue;

if (dual && i > 0) {
dev_warn(dev, "dual-channel mode, ignoring second output\n");
continue;
}

-if (!of_device_is_available(child))
-continue;
-
channel = &imx_ldb->channel[i];
channel->ldb = imx_ldb;
channel->chno = i;
-channel->child = child;
/*
 * The output port is port@4 with an external 4-port mux or
 * @ @ -673,13 +688,13 @ @
 * imx_ldb->lvds_mux ? 4 : 2, 0,
 * &channel->panel, &channel->bridge);
 * if (ret & & ret != -ENODEV)
 * return ret;
 * +goto free_child;
 *
 * panel ddc only if there is no bridge */
 * if (!channel->bridge) {
 * ret = imx_ldb_panel_ddc(dev, channel, child);
 * if (ret)
 * -return ret;
 * +goto free_child;
 * }

 bus_format = of_get_bus_format(dev, child);
 @ @ -695,18 +710,26 @ @
 * if (bus_format < 0) {
 * dev_err(dev, "could not determine data mapping: \%d\n",
 * bus_format);
 * -return bus_format;
 * +ret = bus_format;
 * +goto free_child;
 * }
 * channel->bus_format = bus_format;
 * +channel->child = child;

 ret = imx_ldb_register(drm, channel);
 -if (ret)
 -return ret;
 +if (ret) {
 +channel->child = NULL;
 +goto free_child;
 +}
 }

 dev_set_drvdata(dev, imx_ldb);

 return 0;
 +
 +free_child:
 +of_node_put(child);
 +return ret;
 }
static void imx_ldb_unbind(struct device *dev, struct device *master,
--- linux-4.15.0.orig/drivers/gpu/drm/imx/imx-tve.c
+++ linux-4.15.0/drivers/gpu/drm/imx/imx-tve.c
@@ -498,6 +498,13 @@
     return 0;
 }

+static void imx_tve_disable_regulator(void *data)
+{
+    struct imx_tve *tve = data;
+    +regulator_disable(tve->dac_reg);
+}
+
+static bool imx_tve_readable_reg(struct device *dev, unsigned int reg)
+{
+    return (reg % 4 == 0) && (reg <= 0xdc);
+}
+
+static void imx_tve_unbind(struct device *dev, struct device *master,
-    void *data)
-{
-    struct imx_tve *tve = dev_get_drvdata(dev);
-    if (!IS_ERR(tve->dac_reg))
-        regulator_disable(tve->dac_reg);
-
}

#ifdef CONFIG_IMX_TVE

static const struct component_ops imx_tve_ops = {
    .bind = imx_tve_bind,
    .unbind = imx_tve_unbind,
};

static int imx_tve_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/gpu/drm/imx/ipuv3-crtc.c
+++ linux-4.15.0/drivers/gpu/drm/imx/ipuv3-crtc.c
@@ -668,18 +678,8 @@
     return 0;
 }

-#ifdef CONFIG_IMX_TVE

-tve->clk = devm_clk_get(dev, "tve");
-@@ -668,18 +678,8 @@
     return 0;
 }

-#endif

static void imx_tve_unbind(struct device *dev, struct device *master,
-    void *data)
-{
-    struct imx_tve *tve = dev_get_drvdata(dev);
-    -if (!IS_ERR(tve->dac_reg))
-        -regulator_disable(tve->dac_reg);
-    -}
-    -
-    static const struct component_ops imx_tve_ops = {
-        .bind = imx_tve_bind,
-        .unbind = imx_tve_unbind,
-    };

    static int imx_tve_probe(struct platform_device *pdev)
if (disable_partial)
    ipu_plane_disable(ipu_crtc->plane[1], true);
if (disable_full)
    -ipu_plane_disable(ipu_crtc->plane[0], false);
    +ipu_plane_disable(ipu_crtc->plane[0], true);
}

static void ipu_crtc_atomic_disable(struct drm_crtc *crtc,
    +drm_crtc_vblank_off(crtc);
    +
    spin_lock_irq(&crtc->dev->event_lock);
    -if (crtc->state->event) {
        +if (crtc->state->event && !crtc->state->active) {
            drm_crtc_send_vblank_event(crtc, crtc->state->event);
            crtc->state->event = NULL;
        }
    }
    spin_unlock_irq(&crtc->dev->event_lock);
    -
    -drm_crtc_vblank_off(crtc);
}

static void imx_drm_crtc_reset(struct drm_crtc *crtc)
    +static void ipu_crtc_atomic_flush(structdrm_crtc *crtc,
        +struct drm_crtc_state *old_crtc_state)
        +{
            spin_lock_irq(&crtc->dev->event_lock);
            if (crtc->state->event) {
                WARN_ON(drm_crtc_vblank_get(crtc));
            }
            .mode_set_nofb = ipu_crtc_mode_set_nofb,
            .atomic_check = ipu_crtc_atomic_check,
            .atomic_begin = ipu_crtc_atomic_begin,
            +.atomic_flush = ipu_crtc_atomic_flush,
            .atomic_disable = ipu_crtc_atomic_disable,
            .atomic_enable = ipu_crtc_atomic_enable,
        }
    ;
--- linux-4.15.0.orig/drivers/gpu/drm/imx/ipuv-plane.c
if (ret)
return ret;

/* CRTC should be enabled */
/+ nothing to check when disabling or disabled */
if (!crtc_state->enable)
- return -EINVAL;
+ return 0;
switch (plane->type) {
 case DRM_PLANE_TYPE_PRIMARY:
 static void mtk_crtc_ddp_hw_fini(struct mtk_drm_crtc *mtk_crtc)
 { 
 struct drm_device *drm = mtk_crtc->base.dev;
 + struct drm_crtc *crtc = &mtk_crtc->base;
 int i;

 DRM_DEBUG_DRIVER("%s\n", __func__);
 mtk_disp_mutex_unprepare(mtk_crtc->mutex);

 pm_runtime_put(drm->dev);
 +
 + if (crtc->state->event && !crtc->state->active) {
 + spin_lock_irq(&crtc->dev->event_lock);
 + drm_crtc_send_vblank_event(crtc, crtc->state->event);
 + crtc->state->event = NULL;
 + spin_unlock_irq(&crtc->dev->event_lock);
 + }
 }

 static void mtk_crtc_ddp_config(struct drm_crtc *crtc)
 struct mtk_drm_private *private = drm->dev_private;
 struct platform_device *pdev;
 struct device_node *np;
 + struct device *dma_dev;
 int ret;

 if (!iommu_present(&platform_bus_type))
goto err_component_unbind;
}

private->dma_dev = &pdev->dev;
+dma_dev = &pdev->dev;
+private->dma_dev = dma_dev;
+
+/*
+ * Configure the DMA segment size to make sure we get contiguous IOVA
+ * when importing PRIME buffers.
+ */
+if (!dma_dev->dma_parms) {
+private->dma_parms_allocated = true;
+dma_dev->dma_parms =
+devm_kzalloc(drm->dev, sizeof(*dma_dev->dma_parms),
+    GFP_KERNEL);
+} 
+if (!dma_dev->dma_parms) {
+ret = -ENOMEM;
+goto err_component_unbind;
+}
+
+ret = dma_set_max_seg_size(dma_dev, (unsigned int)DMA_BIT_MASK(32));
+if (ret) {
+dev_err(dma_dev, "Failed to set DMA segment size\n");
+goto err_unset_dmaParms;
+}
+
/*
* We don't use the drm_irq_install() helpers provided by the DRM
@@ -252,13 +275,16 @@
drm->irq_enabled = true;
ret = drm_vblank_init(drm, MAX_CRTC);
if (ret < 0)
-goto err_component_unbind;
-goto err_unset_dmaParms;

drm_kms_helper_poll_init(drm);
drm_mode_config_reset(drm);

return 0;
+
+err_unset_dmaParms:
+if (private->dma_parms_allocated)
+dma_dev->dma_parms = NULL;
+err_component_unbind:
+component_unbind_all(drm->dev, drm);
+err_config_cleanup:
static void mtk_drm_kms_deinit(struct drm_device *drm)
{
+struct mtk_drm_private *private = drm->dev_private;
+drm_kms_helper_poll_fini(drm);
+drm_atomic_helper_shutdown(drm);
+if (private->dma_parms_allocated)
+private->dma_dev->dma_parms = NULL;

component_unbind_all(drm->dev, drm);
drm_mode_config_cleanup(drm);
static void mtk_drm_kms_deinit(struct drm_device *drm) {
+struct mtk_drm_private *private = drm->dev_private;
+}

/*
 * We need to override this because the device used to import the memory is
 * not dev->dev, as drm_gem_prime_import() expects.
 */
+struct drm_gem_object *mtk_drm_gem_prime_import(struct drm_device *dev,
+struct dma_buf *dma_buf)
+{
+struct mtk_drm_private *private = dev->dev_private;
+
+return drm_gem_prime_import_dev(d've, dma_buf, private->dma_dev);
+}
+
static struct drm_driver mtk_drm_driver = {
+driver_features = DRIVER_MODESET | DRIVER_GEM | DRIVER_PRIME |
+DRIVER_ATOMIC,
+prime_handle_to_fd = drm_gem_prime_handle_to_fd,
+prime_fd_to_handle = drm_gem_prime_fd_to_handle,
+gem_prime_export = drm_gem_prime_export,
+gem_prime_import = drm_gem_prime_import,
+gem_prime_import = mtk_drm_gem_prime_import,
+gem_prime_get_sg_table = mtk_gem_prime_get_sg_table,
+gem_prime_import_sg_table = mtk_gem_prime_import_sg_table,
+gem_prime_mmap = mtk_drm_gem_mmap_buf,
+drm_dev_unregister(private->drm);
+mtk_drm_kms_deinit(private->drm);
+drm_dev_unref(private->drm);
private->num_pipes = 0;
private->drm = NULL;
}

comp = devm_kzalloc(dev, sizeof(*comp), GFP_KERNEL);
if (!comp) {
ret = -ENOMEM;
+of_node_put(node);
.goto err_node;
}

ret = mtk_ddp_comp_init(dev, node, comp, comp_id, NULL);
-if (ret)
+if (ret) {
+of_node_put(node);
+goto err_node;
+
}

private->ddp_comp[comp_id] = comp;
}

pm_runtime_disable(dev);
err_node:
of_node_put(private->mutex_node);
-if (i = 0; i < DDP_COMPONENT_ID_MAX; i++)
+for (i = 0; i < DDP_COMPONENT_ID_MAX; i++) {
of_node_put(private->comp_node[i]);
+if (private->ddp_comp[i]) {
+put_device(private->ddp_comp[i]->larb_dev);
+private->ddp_comp[i] = NULL;
+}
+
return ret;
}

static int mtk_drm_remove(struct platform_device *pdev)
{
struct mtk_drm_private *private = platform_get_drvdata(pdev);
-struct drm_device *drm = private->drm;
-int i;

-drm_dev_unregister(drm);
-mtk_drm_kms_deinit(drm);
-drm_dev_unref(drm);
-
component_master_del(&pdev->dev, &mtk_drm_ops);
-pm_runtime_disable(&pdev->dev);
of_node_put(private->mutex_node);
--- linux-4.15.0.orig/drivers/gpu/drm/mediatek/mtk_drm_drv.h
+++ linux-4.15.0/drivers/gpu/drm/mediatek/mtk_drm_drv.h
@@ -56,6 +56,8 @@
 }
 commit;

 struct drm_atomic_state *suspend_state;
+
 +bool dma_parms_allocated;
 );

 extern struct platform_driver mtk_ddp_driver;
--- linux-4.15.0.orig/drivers/gpu/drm/mediatek/mtk_drm_plane.c
+++ linux-4.15.0/drivers/gpu/drm/mediatek/mtk_drm_plane.c
@@ -117,6 +117,16 @@
 true, true);
 }

 static void mtk_plane_atomic_disable(struct drm_plane *plane,
+ struct drm_plane_state *old_state)
+{
+ struct mtk_plane_state *state = to_mtk_plane_state(plane->state);
+ 
+ state->pending.enable = false;
+ wmb(); /* Make sure the above parameter is set before update */
+ state->pending.dirty = true;
+ }
+ 
+ static void mtk_plane_atomic_update(struct drm_plane *plane,
 struct drm_plane_state *old_state)
 { 
@@ -131,6 +141,11 @@
 if (!crtc || WARN_ON(!fb))
 return;
+if (!plane->state->visible) {
+ mtk_plane_atomic_disable(plane, old_state);
+return;
+ }
+ 
+ gem = mtk_fb_get_gem_obj(fb);
 mtk_gem = to_mtk_gem_obj(gem);
 addr = mtk_gem->dma_addr;
@@ -152,16 +167,6 @@
 state->pending.dirty = true;
 }

 -static void mtk_plane_atomic_disable(struct drm_plane *plane,
struct drm_plane_state *old_state)
{
    struct mtk_plane_state *state = to_mtk_plane_state(plane->state);
    state->pending.enable = false;
    wmb(); /* Make sure the above parameter is set before update */
    state->pending.dirty = true;
}

static const struct drm_plane_helper_funcs mtk_plane_helper_funcs = {
    .atomic_check = mtk_plane_atomic_check,
    .atomic_update = mtk_plane_atomic_update,
    ...
    linux-4.15.0.orig/drivers/gpu/drm/mediatek/mtk_dsi.c
    +++ linux-4.15.0/drivers/gpu/drm/mediatek/mtk_dsi.c
    @@ -631,6 +631,15 @@
    if (--dsi->refcount != 0)
        return;

    /*
     * mtk_dsi_stop() and mtk_dsi_start() is asymmetric, since
     * mtk_dsi_stop() should be called after mtk_drm_crtc_atomic_disable(),
     * which needs irq for vblank, and mtk_dsi_stop() will disable irq.
     * mtk_dsi_start() needs to be called in mtk_output_dsi_enable(),
     * after dsi is fully set.
     * */
    +mtk_dsi_stop(dsi);

    if (!mtk_dsi_switch_to_cmd_mode(dsi, VM_DONE_INT_FLAG, 500)) {
        if (dsi->panel) {
            if (drm_panel_unprepare(dsi->panel)) {
                @@ -697,7 +706,6 @@
            }
        }
    }

    -mtk_dsi_stop(dsi);
    mtk_dsi_poweroff(dsi);

dsi->enabled = false;
@@ -851,6 +859,8 @@
    /* Skip connector cleanup if creation was delegated to the bridge */
    if (dsi->conn.dev)
        drm_connector_cleanup(&dsi->conn);
    +if (dsi->panel)
    +drm_panel_detach(dsi->panel);
    }

static void mtk_dsi_ddp_start(struct mtk_ddp_comp *comp)
    ...
    linux-4.15.0.orig/drivers/gpu/drm/mediatek/mtk_hDMI.c
/* The CEC module handles HDMI hotplug detection */
- cec_np = of_find_compatible_node(np->parent, NULL,
-   "mediatek,mt8173-cec");
+ cec_np = of_get_compatible_child(np->parent, "mediatek,mt8173-cec");
if (!cec_np) {
    dev_err(dev, "Failed to find CEC node\n");
    return -EINVAL;
} @ @ -1457.8 +1456.10 @@
if (!cec_pdev) {
    dev_err(hdmi->dev, "Waiting for CEC device %pOF\n", cec_np);
    +of_node_put(cec_np);
    return -EPROBE_DEFER;
}
+of_node_put(cec_np);
hdmi->cec_dev = &cec_pdev->dev;

/*
 * @ @ -1472.29 +1473.33 @@
if (IS_ERR(regmap))
    ret = PTR_ERR(regmap);
if (ret) {
    -ret = PTR_ERR(regmap);
    dev_err(dev, "Failed to get system configuration registers: %d\n", ret);
    -return ret;
    +goto put_device;
}
hdmi->sys_regmap = regmap;

mem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
hdmi->regs = devm_ioremap_resource(dev, mem);
-if (IS_ERR(hdmi->regs))
    -return PTR_ERR(hdmi->regs);
+if (IS_ERR(hdmi->regs)) {
    +ret = PTR_ERR(hdmi->regs);
    +goto put_device;
    +}

remote = of_graph_get_remote_node(np, 1, 0);
-if (!remote)
    -return -EINVAL;
+if (!remote) {

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+ret = -EINVAL;
+goto put_device;
+}

if (!of_device_is_compatible(remote, "hdmi-connector")) {
    hdmi->next_bridge = of_drm_find_bridge(remote);
    if (!hdmi->next_bridge) {
        dev_err(dev, "Waiting for external bridge\n");
        of_node_put(remote);
        -return -EPROBE_DEFER;
        +ret = -EPROBE_DEFER;
        +goto put_device;
    }
}

@@ -1503,17 +1508,23 @@
    dev_err(dev, "Failed to find ddc-i2c-bus node in %pOF\n",
               remote);
    of_node_put(remote);
-    return -EINVAL;
+    ret = -EINVAL;
+    goto put_device;
}
    of_node_put(remote);

    hdmi->ddc_adpt = of_find_i2c_adapter_by_node(i2c_np);
+    of_node_put(i2c_np);
    if (!hdmi->ddc_adpt) {
        dev_err(dev, "Failed to get ddc i2c adapter by node\n");
-        return -EINVAL;
+        ret = -EINVAL;
+        goto put_device;
    }

    return 0;
+    put_device:
+    put_device(hdmi->cec_dev);
+    return ret;
}

/ *
--- linux-4.15.0.orig/drivers/gpu/drm/meson/meson_crtc.c
+++ linux-4.15.0/drivers/gpu/drm/meson/meson_crtc.c
@@ -36,6 +36,7 @@
 #include "meson_venc.h"
 #include "meson_vpp.h"
 #include "meson_viu.h"
+#include "meson_canvas.h"
#include "meson_registers.h"

/* CRTC definition */
@@ -100,6 +101,8 @@
writel_bits_relaxed(VPP_POSTBLEND_ENABLE, VPP_POSTBLEND_ENABLE,
priv->io_base + _REG(VPP_MISC));

+drm_crtc_vblank_on(crtc);
+
+priv->viu.osd1_enabled = true;
}

@@ -109,6 +112,8 @@
struct meson_crtc *meson_crtc = to_meson_crtc(crtc);
struct meson_drm *priv = meson_crtc->priv;

+drm_crtc_vblank_off(crtc);
+
+priv->viu.osd1_enabled = false;
+priv->viu.osd1_commit = false;

@@ -192,6 +197,11 @@
} else
meson_vpp_disable_interlace_vscaler_osd1(priv);

+meson_canvas_setup(priv, MESON_CANVAS_ID_OSD1,
+ priv->viu.osd1_addr, priv->viu.osd1_stride,
+ priv->viu.osd1_height, MESON_CANVAS_WRAP_NONE,
+ MESON_CANVAS_BLKMODE_LINEAR);
+
+/* Enable OSD1 */
writel_bits_relaxed(VPP_OSD1_POSTBLEND, VPP_OSD1_POSTBLEND,
priv->io_base + _REG(VPP_MISC));
--- linux-4.15.0.orig/drivers/gpu/drm/meson/meson_drv.c
+++ linux-4.15.0/drivers/gpu/drm/meson/meson_drv.c
@@ -82,6 +82,10 @@
};

+static const struct drm_mode_config_helper_funcs meson_mode_config_helpers = {
+ .atomic_commit_tail = drm_atomic_helper_commit_tail_rpm,
+ *};
+
+static irqreturn_t meson_irq(int irq, void *arg)
+
+{  
+ struct drm_device *dev = arg;
+@@ -181,44 +185,56 @@
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res = platform_get_resource_byname(pdev, IORESOURCE_MEM, "vpu");
regs = devm_ioremap_resource(dev, res);
-if (IS_ERR(regs))
-return PTR_ERR(regs);
+if (IS_ERR(regs)) {
+	ret = PTR_ERR(regs);
+goto free_drm;
+
}
priv->io_base = regs;

res = platform_get_resource_byname(pdev, IORESOURCE_MEM, "hhi");
/* Simply ioremap since it may be a shared register zone */
regs = devm_ioremap(dev, res->start, resource_size(res));
-if (!regs)
-return -EADDRNOTAVAIL;
+if (!regs) {
+ret = -EADDRNOTAVAIL;
+goto free_drm;
+
}
priv->hhi = devm_regmap_init_mmio(dev, regs,
	&meson_regmap_config);
if (IS_ERR(priv->hhi)) {
	dev_err(&pdev->dev, "Couldn't create the HHI regmap\n");
-return PTR_ERR(priv->hhi);
+ret = PTR_ERR(priv->hhi);
+goto free_drm;
+
}
res = platform_get_resource_byname(pdev, IORESOURCE_MEM, "dmc");
/* Simply ioremap since it may be a shared register zone */
regs = devm_ioremap(dev, res->start, resource_size(res));
-if (!regs)
-return -EADDRNOTAVAIL;
+if (!regs) {
+ret = -EADDRNOTAVAIL;
+goto free_drm;
+
}
priv->dmc = devm_regmap_init_mmio(dev, regs,
	&meson_regmap_config);
if (IS_ERR(priv->dmc)) {
	dev_err(&pdev->dev, "Couldn't create the DMC regmap\n");
-return PTR_ERR(priv->dmc);
+ret = PTR_ERR(priv->dmc);
+goto free_drm;
+}
priv->vsync_irq = platform_get_irq(pdev, 0);

-drm_vblank_init(drm, 1);
+ret = drm_vblank_init(drm, 1);
+if (ret)
+goto free_drm;
+
+ drm_mode_config_init(drm);
+ drm->mode_config.max_width = 3840;
+ drm->mode_config.max_height = 2160;
+ drm->mode_config.funcs = &meson_mode_config_funcs;
+ drm->mode_config.helper_private = &meson_mode_config_helpers;

/* Hardware Initialization */

@@ -267,10 +283,12 @@
ret = drm_dev_register(drm, 0);
if (ret)
- goto free_drm;
+ goto uninstall_irq;

return 0;
+
+ uninstall_irq:
+ drm_irq_uninstall(drm);
+ free_drm:
+ drm_dev_unref(drm);

@@ -284,10 +302,11 @@

static void meson_drv_unbind(struct device *dev)
{
- struct drm_device *drm = dev_get_drvdata(dev);
- struct meson_drm *priv = drm->dev_private;
+ struct meson_drm *priv = dev_get_drvdata(dev);
+ struct drm_device *drm = priv->drm;
+ struct drm_device *drm = priv->drm;

- drm_dev_unregister(drm);
+ drm_irq_uninstall(drm);
+ drm_kms_helper_poll_fini(drm);
+ drm_fbdev_cma_fini(priv->fbdev);
+ drm_mode_config_cleanup(drm);
+remote_node = of_graph_get_remote_port_parent(ep);
if (!remote_node ||
    remote_node == parent || /* Ignore parent endpoint */

count += meson_probe_remote(pdev, match, remote, remote_node);

@@ -346,6 +367,17 @@
return count;
}

+static void meson_drv_shutdown(struct platform_device *pdev)
+{
+struct meson_drm *priv = dev_get_drvdata(pdev->dev);
++
+if (!priv)
+return;
+
+drm_kms_helper_poll_fini(priv->drm);
+drm_atomic_helper_shutdown(priv->drm);
+}
+
+static int meson_drv_probe(struct platform_device *pdev)
{    
for_each_endpoint_of_node(np, ep) {
    remote = of_graph_get_remote_port_parent(ep);
    -if (!remote || !of_device_is_available(remote))
    +if (!remote || !of_device_is_available(remote)) {
        of_node_put(remote);
        continue;
    }
    count += meson_probe_remote(pdev, &match, np, remote);
    +of_node_put(remote);
}

if (count && !match)
@@ -387,6 +422,7 @@
static struct platform_driver meson_drm_platform_driver = {
  .probe     = meson_drv_probe,
  +.shutdown  = meson_drv_shutdown,
  .driver     = {
  .name="meson-drm",
bool osd1_commit;
uint32_t osd1_ctrl_stat;
uint32_t osd1_blk0_cfg[5];
+uint32_t osd1_addr;
+uint32_t osd1_stride;
+uint32_t osd1_height;
} viu;

struct {

static bool meson_hdmi_connector_is_available(struct device *dev)
static bool meson_hdmi_connector_is_available(struct device *dev)
static bool meson_hdmi_connector_is_available(struct device *dev)
static bool meson_hdmi_connector_is_available(struct device *dev)
static bool meson_hdmi_connector_is_available(struct device *dev)
static bool meson_hdmi_connector_is_available(struct device *dev)
+    OSD_COLOR_MATRIX_32_ABGR;
+break;
+case DRM_FORMAT_RGB888:
+    priv->viu.osd1_blk0_cfg[0] |= OSD_BLK_MODE_24 |
+        OSD_COLOR_MATRIX_24_RGB;
@@ -164,10 +178,9 @@
+    priv->viu.osd1_addr = gem->paddr;
+    priv->viu.osd1_stride = fb->pitches[0];
+    priv->viu.osd1_height = fb->height;

spin_unlock_irqrestore(&priv->drm->event_lock, flags);
}
@@ -201,7 +214,9 @@
static const uint32_t supported_drm_formats[] = {
    DRM_FORMAT_ARGB8888,
    DRM_FORMAT_ABGR8888,
    DRM_FORMAT_XRGB8888,
    DRM_FORMAT_XBGR8888,
    DRM_FORMAT_RGB888,
    DRM_FORMAT_RGB565,
    
    --- linux-4.15.0.orig/drivers/gpu/drm/meson/meson_venc.c
    +++ linux-4.15.0/drivers/gpu/drm/meson/meson_venc.c
    @ @ -71,6 +71,7 @ @
*/

/* HHI Registers */
+#define HHI_GCLK_MPEG20x148 /* 0x52 offset in data sheet */
+#define HHI_VDAC_CNTL0x2F4 /* 0xbd offset in data sheet */
+#define HHI_VDAC_CNTL0x2F8 /* 0xbe offset in data sheet */
+#define HHI_HDMI_PHY_CNTL0x3a0 /* 0xe8 offset in data sheet */
    @ @ -714,6 +715,7 @ @
    { 5, &meson_hdmi_encp_mode_1080i60 },
    { 20, &meson_hdmi_encp_mode_1080i50 },
    { 32, &meson_hdmi_encp_mode_1080p24 },
    +{ 33, &meson_hdmi_encp_mode_1080p50 },
    { 34, &meson_hdmi_encp_mode_1080p30 },
    { 31, &meson_hdmi_encp_mode_1080p50 },
    { 16, &meson_hdmi_encp_mode_1080p60 },
    @ @ -1480,10 +1482,12 @ @
void meson_venc_enable_vsync(struct meson_drm *priv)
{
    writel_relaxed(2, priv->io_base + _REG(VENC_INTCTRL));
+regmap_update_bits(priv->hhi, HHI_GCLK_MPEG2, BIT(25), BIT(25));
}

void meson_venc_disable_vsync(struct meson_drm *priv)
{
+regmap_update_bits(priv->hhi, HHI_GCLK_MPEG2, BIT(25), 0);
    writel_relaxed(0, priv->io_base + _REG(VENC_INTCTRL));
}

--- linux-4.15.0.orig/drivers/gpu/drm/meson/meson_viu.c
+++ linux-4.15.0/drivers/gpu/drm/meson/meson_viu.c
@@ -184,18 +184,18 @@
    if (lut_sel == VIU_LUT_OSD_OETF) {
        writel(0, priv->io_base + _REG(addr_port));

        -for (i = 0; i < 20; i++)
        +for (i = 0; i < (OSD_OETF_LUT_SIZE / 2); i++)
            writel(r_map[i * 2] | (r_map[i * 2 + 1] << 16),
                    priv->io_base + _REG(data_port));

        writel(r_map[OSD_OETF_LUT_SIZE - 1] | (g_map[0] << 16),
                    priv->io_base + _REG(data_port));

        -for (i = 0; i < 20; i++)
        +for (i = 0; i < (OSD_OETF_LUT_SIZE / 2); i++)
            writel(g_map[i * 2 + 1] | (g_map[i * 2 + 2] << 16),
                    priv->io_base + _REG(data_port));

        -for (i = 0; i < 20; i++)
        +for (i = 0; i < (OSD_OETF_LUT_SIZE / 2); i++)
            writel(b_map[i * 2] | (b_map[i * 2 + 1] << 16),
                    priv->io_base + _REG(data_port));

@@ -211,18 +211,18 @@
    } else if (lut_sel == VIU_LUT_OSD_EOTF) {
        writel(0, priv->io_base + _REG(addr_port));

        -for (i = 0; i < 20; i++)
        +for (i = 0; i < (OSD_EOTF_LUT_SIZE / 2); i++)
            writel(r_map[i * 2] | (r_map[i * 2 + 1] << 16),
                    priv->io_base + _REG(data_port));

        writel(r_map[OSD_EOTF_LUT_SIZE - 1] | (g_map[0] << 16),
                    priv->io_base + _REG(data_port));
- for (i = 0; i < 20; i++)
+ for (i = 0; i < (OSD_EOTF_LUT_SIZE / 2); i++)
writel(g_map[i * 2 + 1] | (g_map[i * 2 + 2] << 16),
priv->io_base + _REG(data_port));

- for (i = 0; i < 20; i++)
+ for (i = 0; i < (OSD_EOTF_LUT_SIZE / 2); i++)
writel(b_map[i * 2] | (b_map[i * 2 + 1] << 16),
priv->io_base + _REG(data_port));
const struct firmware *fw;
-struct device_node *np;
+struct device_node *np, *mem_np;
struct resource r;
phys_addr_t mem_phys;
ssize_t mem_size;
@@ -44,11 +44,13 @@
if (!np)
    return -ENODEV;

-np = of_parse_phandle(np, "memory-region", 0);
-if (!np)
+mem_np = of_parse_phandle(np, "memory-region", 0);
+of_node_put(np);
+if (!mem_np)
    return -EINVAL;

-ret = of_address_to_resource(np, 0, &r);
+ret = of_address_to_resource(mem_np, 0, &r);
+of_node_put(mem_np);
if (ret)
    return ret;

@@ -621,8 +623,6 @@
if (adreno_gpu->info->quirks & ADRENO_QUIRK_TWO_PASS_USE_WFI)
    gpu_rmw(gpu, REG_A5XX_PC_DBG_ECO_CNTL, 0, (1 << 8));

-gpu_write(gpu, REG_A5XX_PC_DBG_ECO_CNTL, 0xc0200100);
-/* Enable USE_RETENTION_FLOPS */
-gpu_write(gpu, REG_A5XX_CP_CHICKEN_DBG, 0x02000000);

@@ -1135,8 +1135,8 @@
a5xx_get_timestamp(struct msm_gpu *gpu, uint64_t *value)
{
  -*value = gpu_read64(gpu, REG_A5XX_RBBM_PERFCTR_CP_0_LO,
    -REG_A5XX_RBBM_PERFCTR_CP_0_HI);
+*value = gpu_read64(gpu, REG_A5XX_RBBM_ALWAYSON_COUNTER_LO,
+    +REG_A5XX_RBBM_ALWAYSON_COUNTER_HI);

    return 0;
}
@@ -1210,7 +1210,8 @@
a5xx_gpu->lm_leakage = 0x4E001A;

-ret = adreno_gpu_init(dev, pdev, adreno_gpu, &funcs, 4);
/* Restricting nr_rings to 1 to temporarily disable preemption */
+ret = adreno_gpu_init(dev, pdev, adreno_gpu, &funcs, 1);
if (ret) {
    a5xx_destroy(&(a5xx_gpu->base.base));
return ERR_PTR(ret);
--- linux-4.15.0.orig/drivers/gpu/drm/msm/adreno/adreno_device.c
+++ linux-4.15.0/drivers/gpu/drm/msm/adreno/adreno_device.c
@@ -125,11 +125,14 @@
{
    struct msm_drm_private *priv = dev->dev_private;
    struct platform_device *pdev = priv->gpu_pdev;
-    struct msm_gpu *gpu = platform_get_drvdata(priv->gpu_pdev);
+    struct msm_gpu *gpu = NULL;
    int ret;

    +if (pdev)
    +gpu = platform_get_drvdata(pdev);
    +
    if (!gpu) {
-        dev_err(dev->dev, "no adreno device\n");
+        dev_err_once(dev->dev, "no GPU device was found\n");
        return NULL;
    }
@@ -196,8 +199,7 @@
struct device_node *child, *node;
int ret;

-    node = of_find_compatible_node(dev->of_node, NULL,
-        "qcom,gpu-pwrlevels");
+    node = of_get_compatible_child(dev->of_node, "qcom,gpu-pwrlevels");
    if (!node) {
        dev_err(dev, "Could not find the GPU powerlevels\n");
        return -ENXIO;
@@ -218,6 +220,8 @@
dev_pm_opp_add(dev, val, 0);
}

+of_node_put(node);
+
return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/msm/adreno/adreno_gpu.c
+++ linux-4.15.0/drivers/gpu/drm/msm/adreno/adreno_gpu.c
@@ -190,7 +190,7 @@
    ring->next = ring->start;
/* reset completed fence seqno: */
-ring->memptrs->fence = ring->seqno;
+ring->memptrs->fence = ring->fctx->completed_fence;
ring->memptrs->rptr = 0;
}

@@ -461,7 +461,7 @@
{
 if (spin_until(ring_freewords(ring) >= ndwords))
 DRM_DEV_ERROR(ring->gpu->dev->dev,
-"timeout waiting for space in ringbuffer %d\n",
+"timeout waiting for space in ringbuffer %d\n",
 ring->id);
}

--- linux-4.15.0.orig/drivers/gpu/drm/msm/dsi/dsi.c
+++ linux-4.15.0/drivers/gpu/drm/msm/dsi/dsi.c
@@ -34,8 +34,10 @@
}

phy_pdev = of_find_device_by_node(phy_node);
-if (phy_pdev)
+if (phy_pdev) {
   msm_dsi->phy = platform_get_drvdata(phy_pdev);
+msm_dsi->phy_dev = &phy_pdev->dev;
+}

of_node_put(phy_node);

@@ -44,8 +46,6 @@
return -EPROBE_DEFER;
}

-msm_dsi->phy_dev = get_device(&phy_pdev->dev);
-
return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/msm/dsi/dsi_host.c
+++ linux-4.15.0/drivers/gpu/drm/msm/dsi/dsi_host.c
@@ -34,6 +34,8 @@
#include "dsi_cfg.h"
#include "msm_kms.h"

+#define DSI_RESET_TOGGLE_DELAY_MS 20
+
static int dsi_get_version(const void __iomem *base, u32 *major, u32 *minor)
{
u32 ver;
@@ -380,15 +382,15 @@
 }

 msm_host->byte_clk_src = clk_get_parent(msm_host->byte_clk);
- if (!msm_host->byte_clk_src) {
- ret = -ENODEV;
+ if (IS_ERR(msm_host->byte_clk_src)) {
+ ret = PTR_ERR(msm_host->byte_clk_src);
 pr_err("%s: can't find byte_clk clock. ret=%d\n", __func__, ret);
goto exit;
 }

 msm_host->pixel_clk_src = clk_get_parent(msm_host->pixel_clk);
- if (!msm_host->pixel_clk_src) {
- ret = -ENODEV;
+ if (IS_ERR(msm_host->pixel_clk_src)) {
+ ret = PTR_ERR(msm_host->pixel_clk_src);
 pr_err("%s: can't find pixel_clk clock. ret=%d\n", __func__, ret);
goto exit;
 }

 return 0;

 err:
- for (; i > 0; i--)
+ while (--i >= 0)
  clk_disable_unprepare(msm_host->bus_clks[i]);

 return ret;
@@ -740,7 +742,7 @@
 switch (mipi_fmt) {
 case MIPI_DSI_FMT_RGB888: return CMD_DST_FORMAT_RGB888;
 case MIPI_DSI_FMT_RGB666_PACKED:
- case MIPI_DSI_FMT_RGB666: return VID_DST_FORMAT_RGB666;
+ case MIPI_DSI_FMT_RGB666: return CMD_DST_FORMAT_RGB666;
 case MIPI_DSI_FMT_RGB565: return CMD_DST_FORMAT_RGB565;
 default: return CMD_DST_FORMAT_RGB888;
 }
@@ -906,7 +908,7 @@
 wmb(); /* clocks need to be enabled before reset */

dsi_write(msm_host, REG_DSI_RESET, 1);
- wmb(); /* make sure reset happen */
+ msleep(DSI_RESET_TOGGLE_DELAY_MS); /* make sure reset happen */
dsi_write(msm_host, REG_DSI_RESET, 0);
dsi_write(msm_host, REG_DSI_RESET, 1);
-wmb(); /* make sure reset happen */
+msleep(DSI_RESET_TOGGLE_DELAY_MS); /* make sure reset happen */
ds_i_write(msm_host, REG_DSI_RESET, 0);
wmb(); /* controller out of reset */
ds_i_write(msm_host, REG_DSI_CTRL, data0);

--- linux-4.15.0.orig/drivers/gpu/drm/msm/dsi/dsi_manager.c
+++ linux-4.15.0/drivers/gpu/drm/msm/dsi/dsi_manager.c
@@ -400,7 +400,7 @@
static int dsi_mgr_connector_mode_valid(struct drm_connector *connector,
+enum drm_mode_status dsi_mgr_connector_mode_valid(struct drm_connector *connector,
struct drm_display_mode *mode)
{
int id = dsi_mgr_connector_get_id(connector);
@@ -543,6 +543,7 @@
struct msm_dsi *msm_dsi1 = dsi_mgr_get_dsi(DSI_1);
struct mipi_dsi_host *host = msm_dsi->host;
struct drm_panel *panel = msm_dsi->panel;
+struct msm_dsi_pll *src_pll;
bool is_dual_dsi = IS_DUAL_DSI();
int ret;

@@ -583,6 +584,10 @@
id, ret);
+	/* Save PLL status if it is a clock source */
+src_pll = msm_dsi_phy_get_pll(msm_dsi->phy);
+msm_dsi_pll_save_state(src_pll);
+
ret = msm_dsi_host_power_off(host);
if (ret)
pr_err("%s: host %d power off failed,%d\n", __func__, id, ret);
--- linux-4.15.0.orig/drivers/gpu/drm/msm/dsi/phy/dsi_phy.c
+++ linux-4.15.0/drivers/gpu/drm/msm/dsi/phy/dsi_phy.c
@@ -613,10 +613,6 @@
if (!phy || !phy->cfg->ops.disable)
return;
+/* Save PLL status if it is a clock source */
+src_pll = msm_dsi_phy_get_pll(phy);
+msm_dsi_pll_save_state(src_pll);
+
ret = msm_dsi_host_power_off(host);
if (ret)
pr_err("%s: host %d power off failed,%d\n", __func__, id, ret);
--- linux-4.15.0/drivers/gpu/drm/msm/dsi/phy/dsi_phy.c
+++ linux-4.15.0/drivers/gpu/drm/msm/dsi/phy/dsi_phy.c
@@ -613,10 +613,6 @@
if (!phy || !phy->cfg->ops.disable)
return;
-/* Save PLL status if it is a clock source */
-if (phy->usecase != MSM_DSI_PHY_SLAVE)
-msm_dsi_pll_save_state(phy->pll);
- phy->cfg->ops.disable(phy);

dsi_phy_regulator_disable(phy);
--- linux-4.15.0.orig/drivers/gpu/drm/msm/dsi/phy/dsi_phy_20nm.c
+++ linux-4.15.0/drivers/gpu/drm/msm/dsi/phy/dsi_phy_20nm.c
@@ -147,7 +147,7 @@
     .disable = dsi_20nm_phy_disable,
     .init = msm_dsi_phy_init_common,
 };
- .io_start = { 0xfd998300, 0xfd9a0300 }
+ .io_start = { 0xfd998500, 0xfd9a0500 }
 , .num_dsi_phy = 2;
}

--- linux-4.15.0.orig/drivers/gpu/drm/msm/dsi/pll/dsi_pll_14nm.c
+++ linux-4.15.0/drivers/gpu/drm/msm/dsi/pll/dsi_pll_14nm.c
@@ -698,7 +698,7 @@
     val &= div_mask(width);

     return divider_recalc_rate(hw, parent_rate, val, NULL,
-    *postdiv->flags);
+    *postdiv->flags, width);
}

static long dsi_pll_14nm_postdiv_round_rate(struct clk_hw *hw,
--- linux-4.15.0.orig/drivers/gpu/drm/msm/edp/edp_ctrl.c
+++ linux-4.15.0/drivers/gpu/drm/msm/edp/edp_ctrl.c
@@ -1090,7 +1090,7 @@
     int msm_edp_ctrl_init(struct msm_edp *edp)
     {
         struct edp_ctrl *ctrl = NULL;
-        struct device *dev = &edp->pdev->dev;
+        struct device *dev;
         int ret;

         if (!edp) {
             return -EINVAL;
         }
         dev = &edp->pdev->dev;
         ctrl = devm_kzalloc(dev, sizeof(*ctrl), GFP_KERNEL);
         if (!ctrl)
             return -ENOMEM;

         +dev = &edp->pdev->dev;
         ctrl = devm_kzalloc(dev, sizeof(*ctrl), GFP_KERNEL);
         if (!ctrl)
             return -ENOMEM;
--- linux-4.15.0.orig/drivers/gpu/drm/msm/hdmi/hdmi.c
+++ linux-4.15.0/drivers/gpu/drm/msm/hdmi/hdmi.c
@@ -324,6 +324,12 @@


goto fail;
}

+ret = msm_hdmi_hpd_enable(hdmi->connector);
+if (ret < 0) {
+DRM_DEV_ERROR(&hdmi->pdev->dev, "failed to enable HPD: %d\n", ret);
+goto fail;
+}
+
encoder->bridge = hdmi->bridge;

priv->bridges[priv->num_bridges++] = hdmi->bridge;
--- linux-4.15.0.orig/drivers/gpu/drm/msm/hdmi/hdmi.h
+++ linux-4.15.0/drivers/gpu/drm/msm/hdmi/hdmi.h
@@ -245,6 +245,7 @@
void msm_hdmi_connector_irq(struct drm_connector *connector);
struct drm_connector *msm_hdmi_connector_init(struct hdmi *hdmi);
+int msm_hdmi_hpd_enable(struct drm_connector *connector);

/*
 * i2c adapter for ddc:
--- linux-4.15.0.orig/drivers/gpu/drm/msm/hdmi/hdmi_connector.c
+++ linux-4.15.0/drivers/gpu/drm/msm/hdmi/hdmi_connector.c
@@ -167,8 +167,9 @@
}
}
}

-static int hpd_enable(struct hdmi_connector *hdmi_connector)
+int msm_hdmi_hpd_enable(struct drm_connector *connector)
{
+struct hdmi_connector *hdmi_connector = to_hdmi_connector(connector);
 struct hdmi *hdmi = hdmi_connector->hdmi;
 const struct hdmi_platform_config *config = hdmi->config;
 struct device *dev = &hdmi->pdev->dev;
 @@ -450,7 +451,6 @@
{
 struct drm_connector *connector = NULL;
 struct hdmi_connector *hdmi_connector;
-\int ret;

 hdmi_connector = kzalloc(sizeof(*hdmi_connector), GFP_KERNEL);
 if (!hdmi_connector)
 @@ -471,12 +471,6 @@
 connector->interlace_allowed = 0;
 connector->doublescan_allowed = 0;

 \-ret = hpd_enable(hdmi_connector);
if (ret) {
    dev_err(&hdmi->pdev->dev, "failed to enable HPD: %d\n", ret);
    return ERR_PTR(ret);
}

drm_mode_connector_attach_encoder(connector, hdmi->encoder);

return connector;

--- linux-4.15.0.orig/drivers/gpu/drm/msm/mdp/mdp4/mdp4_dsi_encoder.c
+++ linux-4.15.0/drivers/gpu/drm/msm/mdp/mdp4/mdp4_dsi_encoder.c
@@ -139,7 +139,7 @@
if (mdp4_dsi_encoder->enabled)
    return;

    mdp4_crtc_set_config(encoder->crtc,
+    mdp4_crtc_set_config(encoder->crtc,
    MDP4_DMA_CONFIG_PACK_ALIGN_MSB | MDP4_DMA_CONFIG_DEFLKR_EN | MDP4_DMA_CONFIG_DITHER_EN |
    --- linux-4.15.0.orig/drivers/gpu/drm/msm/mdp/mdp5/mdp5_cfg.c
+++ linux-4.15.0/drivers/gpu/drm/msm/mdp/mdp5/mdp5_cfg.c
@@ -635,7 +635,7 @@
if (cfg_handler)
    mdp5_cfg_destroy(cfg_handler);

    return NULL;
+    return ERR_PTR(ret);
}

static struct mdp5_cfg_platform *mdp5_get_config(struct platform_device *dev)
--- linux-4.15.0.orig/drivers/gpu/drm/mdp5/mdp5_cmd_encoder.c
+++ linux-4.15.0/drivers/gpu/drm/mdp5/mdp5_cmd_encoder.c
@@ -78,9 +78,17 @@
| MDP5_PP_SYNC_CONFIG_VSYNC_COUNT(vclks_line);

+/*
+ * Tearcheck emits a blanking signal every vclks_line * vtotal * 2 ticks on
+ * the vsync_clk equating to roughly half the desired panel refresh rate.
+ * This is only necessary as stability fallback if interrupts from the
+ * panel arrive too late or not at all, but is currently used by default
+ * because these panel interrupts are not wired up yet.
+ */
mdp5_write(mdp5_kms, REG_MDP5_PP_SYNC_CONFIG_VSYNC(pp_id), cfg);
mdp5_write(mdp5_kms,
    REG_MDP5_PP_SYNC_CONFIG_HEIGHT(pp_id), 0xfff0);
+    REG_MDP5_PP_SYNC_CONFIG_HEIGHT(pp_id), (2 * mode->vtotal));
+    REG_MDP5_PP_SYNC_CONFIG_HEIGHT(pp_id), (2 * mode->vtotal));
+    REG_MDP5_PP_SYNC_CONFIG_HEIGHT(pp_id), (2 * mode->vtotal));
+    REG_MDP5_PP_SYNC_CONFIG_HEIGHT(pp_id), (2 * mode->vtotal));
mdp5_write(mdp5_kms, REG_MDP5_PP_VSYNC_INIT_VAL(pp_id), mode->vdisplay);
mdp5_write(mdp5_kms, REG_MDP5_PP_RD_PTR_IRQ(pp_id), mode->vdisplay + 1);

--- linux-4.15.0.orig/drivers/gpu/drm/msm/mdp5/mdp5_crtc.c
+++ linux-4.15.0/drivers/gpu/drm/msm/mdp5/mdp5_crtc.c
@@ -1064,8 +1064,8 @@
 ret = wait_for_completion_timeout(&mdp5_crtc->pp_completion, msecs_to_jiffies(50));
 if (ret == 0)
  -dev_warn(dev->dev, "pp done time out, lm=%d\n",
-    -mdp5_cstate->pipeline.mixer->lm);
+  -dev_warn_ratelimited(dev->dev, "pp done time out, lm=%d\n",
+    +mdp5_cstate->pipeline.mixer->lm);
 }

static void mdp5_crtc_wait_for_flush_done(struct drm_crtc *crtc)
--- linux-4.15.0.orig/drivers/gpu/drm/msm/mdp5/mdp5_kms.c
+++ linux-4.15.0/drivers/gpu/drm/msm/mdp5/mdp5_kms.c
@@ -972,7 +972,8 @@

 return 0;
 fail:
  -mdp5_destroy(pdev);
-+if (mdp5_kms)
-+  mdp5_destroy(pdev);
 return ret;
 }

--- linux-4.15.0.orig/drivers/gpu/drm/msm/mdp5/mdp5_plane.c
+++ linux-4.15.0/drivers/gpu/drm/msm/mdp5/mdp5_plane.c
@@ -526,6 +526,8 @@
 static void mdp5_plane_atomic_async_update(struct drm_plane *plane,
                  struct drm_plane_state *new_state)
                     {
+structure drm_framebuffer *old_fb = plane->state->fb;
+  plane->state->src_x = new_state->src_x;
  plane->state->src_y = new_state->src_y;
  plane->state->crtc_x = new_state->crtc_x;
@@ -548,6 +550,8 @@

 *to_mdp5_plane_state(plane->state) =
 *to_mdp5_plane_state(new_state);
+   +new_state->fb = old_fb;
 }

 static const struct drm_plane_helper_funcs mdp5_plane_helper_funcs = {

if (!new_crtc_state->active)
    continue;

    if (drm_crtc_vblank_get(crtc))
        continue;
    +
    kms->funcs->wait_for_crtc_commit_done(kms, crtc);
    +
    +drm_crtc_vblank_put(crtc);
}

if (ret)
    goto fail;

    if (!dev->dma_parms) {
        dev->dma_parms = devm_kzalloc(dev, sizeof(*dev->dma_parms),
            GFP_KERNEL);
        if (!dev->dma_parms)
            return -ENOMEM;
    }
    dma_set_max_seg_size(dev, DMA_BIT_MASK(32));
    +
    msm_gem_shrinker_init(ddev);

switch (get_mdp_ver(pdev)) {
    @ @ -1101,7 +1109,8 @@
    if (!np)
        return 0;

-drm_of_component_match_add(dev, matchptr, compare_of, np);
+if (of_device_is_available(np))
    +drm_of_component_match_add(dev, matchptr, compare_of, np);

    of_node_put(np);
    @ @ -1138,16 +1147,24 @@

    ret = add_gpu_components(&pdev->dev, &match);
    if (ret)
        -return ret;
        +goto fail;
/* on all devices that I am aware of, iommu's which can map
 * any address the cpu can see are used:
 */
ret = dma_set_mask_and_coherent(&pdev->dev, ~0);
if (ret)
    -return ret;
+    goto fail;
+
+    ret = component_master_add_with_match(&pdev->dev, &msm_drm_ops, match);
+    if (ret)
+        goto fail;
+
+    return 0;

-return component_master_add_with_match(&pdev->dev, &msm_drm_ops, match);
+fail:
+    of_platform_depopulate(&pdev->dev);
+    return ret;
}

static int msm_pdev_remove(struct platform_device *pdev)
@@ -1158,6 +1175,17 @@
    return 0;
}

+static void msm_pdev_shutdown(struct platform_device *pdev)
+{
+    struct drm_device *drm = platform_get_drvdata(pdev);
+    struct msm_drm_private *priv = drm ? drm->dev_private : NULL;
+    +if (!priv || !priv->kms)
+        return;
+    +    drm_atomic_helper_shutdown(drm);
+    +}
+
+static const struct of_device_id dt_match[] = {
+    { .compatible = "qcom,mdp4", .data = (void *)4 },/* MDP4 */
+    { .compatible = "qcom,mdss", .data = (void *)5 },/* MDP5 MDSS */
@@ -1168,6 +1196,7 @@

static struct platform_driver msm_platform_driver = {
    .probe      = msm_pdev_probe,
    .remove     = msm_pdev_remove,
    +.shutdown   = msm_pdev_shutdown,
    .driver     = {
        .name   = "msm",
        .of_match_table = dt_match,
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_drv.h
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_drv.h
@@ -303,7 +303,8 @@
     void msm_perf_debugfs_cleanup(struct msm_drm_private *priv);
 #else
     static inline int msm_debugfs_late_init(struct drm_device *dev) { return 0; }
-    static inline void msm_rd_dump_submit(struct msm_gem_submit *submit) {}
+    static inline void msm_rd_dump_submit(struct msm_rd_state *rd, struct msm_gem_submit *submit,
+                                          const char *fmt, ...) {}
     static inline void msm_rd_debugfs_cleanup(struct msm_drm_private *priv) {}
     static inline void msm_perf_debugfs_cleanup(struct msm_drm_private *priv) {}
 #endif
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_fbdev.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_fbdev.c
@@ -92,8 +92,7 @@
     if (IS_ERR(fb)) {
         dev_err(dev->dev, "failed to allocate fb\n");
         -ret = PTR_ERR(fb);
-        goto fail;
+        return PTR_ERR(fb);
     }

     bo = msm_framebuffer_bo(fb, 0);
@@ -151,13 +150,7 @@
     fail_unlock:
     mutex_unlock(&dev->struct_mutex);
     -fail:
-        -
-        -if (ret) {
-            -if (fb)
-                -drm_framebuffer_remove(fb);
-        -}
-        
+        drm_framebuffer_remove(fb);
         return ret;
     }

--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_fence.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_fence.c
@@ -56,7 +56,7 @@
     int ret;
     if (fence > fctx->last_fence) {
         -DRM_ERROR("%s: waiting on invalid fence: %u (of %u)\n",
+        DRM_ERROR_RATELIMITED("%s: waiting on invalid fence: %u (of %u)\n",
             fctx->name, fence, fctx->last_fence);
return -EINVAL;
}
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_gem.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_gem.c
@@ -93,14 +93,17 @@
		msm_obj->pages = p;

+    msm_obj->sgt = drm_prime_pages_to_sg(p, npages);
    if (IS_ERR(msm_obj->sgt)) {
+        void *ptr = ERR_CAST(msm_obj->sgt);
+        dev_err(dev->dev, "failed to allocate sgt\n");
        -return ERR_CAST(msm_obj->sgt);
+        msm_obj->sgt = NULL;
+        return ptr;
    }

-    msm_obj->pages = p;
-
-    /* For non-cached buffers, ensure the new pages are clean
-       * because display controller, GPU, etc. are not coherent:
-       */
-    @ @ -129,14 +132,19 @@
-    struct msm_gem_object *msm_obj = to_msm_bo(obj);

    if (msm_obj->pages) {
        /* For non-cached buffers, ensure the new pages are clean
           * because display controller, GPU, etc. are not coherent:
           */
        -if (msm_obj->flags & (MSM_BO_WC|MSM_BO_UNCACHED))
-            -dma_unmap_sg(obj->dev->dev, msm_obj->sgt->sgl,
-                          -msm_obj->sgt->nents, DMA_BIDIRECTIONAL);
-            -sg_free_table(msm_obj->sgt);
-            -kfree(msm_obj->sgt);
-        +if (msm_obj->sgt) {
-            +    /* For non-cached buffers, ensure the new
-                * pages are clean because display controller,
-                * GPU, etc. are not coherent:
-                */
-            +    if (msm_obj->flags & (MSM_BO_WC|MSM_BO_UNCACHED))
-                +    dma_unmap_sg(obj->dev->dev, msm_obj->sgt->sgl,
-                               +    msm_obj->sgt->nents,
-                               +    DMA_BIDIRECTIONAL);
-                +    sg_free_table(msm_obj->sgt);
+kfree(msm_obj->sgt);
+
if (use_pages(obj))
drm_gem_put_pages(obj, msm_obj->pages, true, false);
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_gem_submit.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_gem_submit.c
@@ -410,7 +410,6 @@
 struct msm_file_private *ctx = file->driver_priv;
 struct msm_gem_submit *submit;
 struct msm_gpu *gpu = priv->gpu;
-struct dma_fence *in_fence = NULL;
 struct sync_file *sync_file = NULL;
 struct msm_gpu_submitqueue *queue;
 struct msm_ringbuffer *ring;
@@ -437,6 +436,8 @@
 ring = gpu->rb[queue->prio];

 if (args->flags & MSM_SUBMIT_FENCE_FD_IN) {
+struct dma_fence *in_fence;
 +
in_fence = sync_file_get_fence(args->fence_fd);

 if (!in_fence)
@@ -446,11 +447,13 @@
 * Wait if the fence is from a foreign context, or if the fence
 * array contains any fence from a foreign context.
 */
-if (!dma_fence_match_context(in_fence, ring->fctx->context)) {
+ret = 0;
+if (!dma_fence_match_context(in_fence, ring->fctx->context))
ret = dma_fence_wait(in_fence, true);
- if (ret)
- return ret;
- }
+ +dma_fence_put(in_fence);
+ if (ret)
+ return ret;
 }

 ret = mutex_lock_interruptible(&dev->struct_mutex);
@@ -573,8 +576,6 @@
 out:
- if (in_fence)
- dma_fence_put(in_fence);
submit_cleanup(submit);
if (ret)
    msm_gem_submit_free(submit);
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_gpu.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_gpu.c
@@ -270,8 +270,7 @@
    if (submit) {
        struct task_struct *task;

    -rcu_read_lock();
    -task = pid_task(submit->pid, PIDTYPE_PID);
    +task = get_pid_task(submit->pid, PIDTYPE_PID);
        if (task) {
            char *cmd;

            @@ -287,6 +286,7 @@
            */
            mutex_unlock(&dev->struct_mutex);
            cmd = kstrdup_quotable_cmdline(task, GFP_KERNEL);
            +put_task_struct(task);
            mutex_lock(&dev->struct_mutex);

            dev_err(dev->dev, "%s: offending task: %s (%s)n",
            @@ -297,7 +297,6 @@
            } else {
                msm_rd_dump_submit(priv->hangrd, submit, NULL);
            }
            -rcu_read_unlock();
            }

    @@ -306,7 +305,7 @@
            */
            -for (i = 0; i < ARRAY_SIZE(gpu->rb); i++) {
            +for (i = 0; i < gpu->nr_rings; i++) {
                struct msm_ringbuffer *ring = gpu->rb[i];

                uint32_t fence = ring->memptrs->fence;
    --- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_gpu.h
    +++ linux-4.15.0/drivers/gpu/drm/msm/msm_gpu.h
    @@ -62,7 +62,7 @@
        struct msm_ringbuffer *(*active_ring)(struct msm_gpu *gpu);
        void (*recover)(struct msm_gpu *gpu);
        void (*destroy)(struct msm_gpu *gpu);
        #ifdef CONFIG_DEBUG_FS
        +#if defined(CONFIG_DEBUG_FS) || defined(CONFIG_DEV_COREDUMP)
/* show GPU status in debugfs: */
void (*show)(struct msm_gpu *gpu, struct seq_file *m);
#endif
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_iommu.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_iommu.c
@@ -63,10 +63,10 @@
 struct msm_iommu *iommu = to_msm_iommu(mmu);
 size_t ret;

-//	pm_runtime_get_sync(mmu->dev);
+tpm_runtime_get_sync(mmu->dev);
 ret = iommu_map_sg(iommu->domain, iova, sgt->sgl, sgt->nents, prot);
 //pm_runtime_put_sync(mmu->dev);
-WARN_ON(ret < 0);
+WARN_ON(!ret);
 return (ret == len) ? 0 : -EINVAL;
 }
@@ -78,7 +78,7 @@
 pm_runtime_get_sync(mmu->dev);
 iommu_unmap(iommu->domain, iova, len);
-//pm_runtime_put_sync(mmu->dev);
+pm_runtime_put_sync(mmu->dev);
 return 0;
 }
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_rd.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_rd.c
@@ -115,7 +115,9 @@
 char *fptr = &fifo->buf[fifo->head];
 int n;

-wait_event(rd->fifo_event, circ_space(&rd->fifo) > 0);
+wait_event(rd->fifo_event, circ_space(&rd->fifo) > 0 || !rd->open);
+if (!rd->open)
+return;

 /* Note that smp_load_acquire() is not strictly required
 * as CIRC_SPACE_TO_END() does not access the tail more
@@ -213,7 +215,10 @@
 static int rd_release(struct inode *inode, struct file *file)
 {
 struct msm_rd_state *rd = inode->i_private;
+ rd->open = false;
+ wake_up_all(&rd->fifo_event);
+ return;
return 0;
}

@@ -316,10 +321,11 @@
uint64_t iova, uint32_t size)
{
    struct msm_gem_object *obj = submit->bos[idx].obj;
+    unsigned offset = 0;
    const char *buf;

    if (iova) {
-        buf += iova - submit->bos[idx].iova;
+        offset = iova - submit->bos[idx].iova;
    } else {
        iova = submit->bos[idx].iova;
        size = obj->base.size;
@@ -340,6 +346,8 @@
    if (IS_ERR(buf))
        return;

+    buf += offset;
+    rd_write_section(rd, RD_BUFFER_CONTENTS, buf, size);

    msm_gem_put_vaddr(&obj->base);
--- linux-4.15.0.orig/drivers/gpu/drm/msm/msm_submitqueue.c
+++ linux-4.15.0/drivers/gpu/drm/msm/msm_submitqueue.c
@@ -78,8 +78,10 @@
    queue->flags = flags;

    if (priv->gpu) {
-        if (prio >= priv->gpu->nr_rings)
+        if (prio >= priv->gpu->nr_rings) {
+            kfree(queue);
            return -EINVAL;
+        }

    queue->prio = prio;
}
--- linux-4.15.0.orig/drivers/gpu/mxsfb/Kconfig
+++ linux-4.15.0/drivers/gpu/mxsfb/Kconfig
@@ -9,7 +9,6 @@
    depends on COMMON_CLK
    select DRM_MXS
    select DRM_KMS_HELPER
@@ -9,7 +9,6 @@
    select DRM_KMS_FB_HELPER
    select DRM_KMS_CMA_HELPER
    select DRM_PANEL

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help
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/Kconfig
+++ linux-4.15.0/drivers/gpu/drm/nouveau/Kconfig
@@ -16,10 +16,21 @@
select INPUT if ACPI && X86
select THERMAL if ACPI && X86
select ACPI_VIDEO if ACPI && X86
-select DRM_VM
+config NOUVEAU_LEGACY_CTX_SUPPORT
+bool "Nouveau legacy context support"
+depends on DRM_NOUVEAU
+select DRM_VM
+default y
+help
+ There was a version of the nouveau DDX that relied on legacy
+ ctx ioctls not erroring out. But that was back in time a long
+ ways, so offer a way to disable it now. For uapi compat with
+ old nouveau ddx this should be on by default, but modern distros
+ should consider turning it off.
+ config NOUVEAU_PLATFORM_DRIVER
bool "Nouveau (NVIDIA) SoC GPUs"
depends on DRM_NOUVEAU && ARCH_TEGRA
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/dispnv04/disp.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/dispnv04/disp.c
@@ -55,6 +55,9 @@
nouveau_display(dev)->init = nv04_display_init;
nouveau_display(dev)->fini = nv04_display_fini;

+/* Pre-nv50 doesn't support atomic, so don't expose the ioctls */
+dev->driver->driver_features &= ~DRIVER_ATOMIC;
+
+ nouveau_hw_save_vga_fonts(dev, 1);

nv04_crtc_create(dev, 0);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/dispnv04/tvnv17.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/dispnv04/tvnv17.c
@@ -750,7 +750,9 @@
/* Disable the crtc to ensure a full modeset is
 * performed whenever it's turned on again. */
 if (crtc)
- drm_crtc_force_disable(crtc);
+ drm_crtc_helper_set_mode(crtc, &crtc->mode,
+ crtc->x, crtc->y,
+ crtc->primary->fb);
return 0;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/include/nvkm/subdev/i2c.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/include/nvkm/subdev/i2c.h
@@ -38,6 +38,7 @@
 struct mutex mutex;
 struct list_head head;
 struct i2c_adapter i2c;
+u8 enabled;
};

int nvkm_i2c_bus_acquire(struct nvkm_i2c_bus *);
@@ -57,6 +58,7 @@
 struct mutex mutex;
 struct list_head head;
 struct i2c_adapter i2c;
+u8 enabled;

 u32 intr;
};
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/include/nvkm/subdev/volt.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/include/nvkm/subdev/volt.h
@@ -38,6 +38,7 @@
 int nv40_volt_new(struct nvkm_device *, int, struct nvkm_volt **);
 int gf100_volt_new(struct nvkm_device *, int, struct nvkm_volt **);
+int gf117_volt_new(struct nvkm_device *, int, struct nvkm_volt **);
 int gk104_volt_new(struct nvkm_device *, int, struct nvkm_volt **);
 int gk20a_volt_new(struct nvkm_device *, int, struct nvkm_volt **);
 int gm20b_volt_new(struct nvkm_device *, int, struct nvkm_volt **);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_abi16.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_abi16.c
@@ -212,6 +212,7 @@
 WARN_ON(1);
 break;
 }+break;
 case NOUVEAU_GETPARAM_FB_SIZE:
 getparam->value = drm->gem.vram_available;
 break;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_acpi.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_acpi.c
@@ -193,7 +193,7 @@
 return nouveau_dsm_set_discrete_state(nouveau_dsm_priv.dhandle, state);
 }}

-static int nouveau_dsm_get_client_id(struct pci_dev *pdev)
static enum vga_switcheroo_client_id nouveau_dsm_get_client_id(struct pci_dev *pdev)
{
/* easy option one - intel vendor ID means Integrated */
if (pdev->vendor == PCI_VENDOR_ID_INTEL)
{
&nv40_bl_ops, &props);

struct nouveau_encoder *nv_encoder = bl_get_data(bd);
struct nouveau_drm *drm = nouveau_drm(nv_encoder->base.base.dev);
struct nvif_object *device = &drm->client.device.object;
-int or = nv_encoder->or;
+int or = ffs(nv_encoder->dcb->or) - 1;

u32 div = 1025;
u32 val;

div = nvif_rd32(device, NV50_PDISP_SOR_PWM_DIV(or));
}
u32 div, val;

div = nvif_rd32(device, NV50_PDISP_SOR_PWM_DIV(or));
@@ -228,7 +228,7 @@
    return -ENODEV;
 }

-    if (!nvif_rd32(device, NV50_PDISP_SOR_PWM_CTL(nv_encoder->or)))
+    if (!nvif_rd32(device, NV50_PDISP_SOR_PWM_CTL(ffs(nv_encoder->dcb->or) - 1)))
        return 0;

    if (drm->client.device.info.chipset <= 0xa0 ||
@@ -249,7 +249,7 @@
        nv_encoder, ops, &props);

    if (IS_ERR(bd)) {
-        if (bl_connector.id > 0)
+        if (bl_connector.id >= 0)
            ida_simple_remove(&bl_ida, bl_connector.id);
            return PTR_ERR(bd);
@@ -267,15 +267,17 @@
        struct nouveau_drm *drm = nouveau_drm(dev);
        struct nvif_device *device = &drm->client.device;
        struct drm_connector *connector;
+        struct drm_connector_list_iter conn_iter;
+        INIT_LIST_HEAD(&drm->bl_connectors);

        if (apple_gmux_present()) {
            NV_INFO(drm, "Apple GMUX detected: not registering Nouveau backlight interface\n");
            return 0;
        }

-        INIT_LIST_HEAD(&drm->bl_connectors);
-        list_for_each_entry(connector, &dev->mode_config.connector_list, head) {
-            drm_connector_list_iter_begin(dev, &conn_iter);
-            drm_for_each_connector_iter(connector, &conn_iter) {
-                if (connector->connector_type != DRM_MODE_CONNECTOR_LVDS &&
-                    connector->connector_type != DRM_MODE_CONNECTOR_eDP)
-                    continue;
-                break;
-            }
-        }
-        drm_connector_list_iter_end(&conn_iter);

        if (IS_ERR(bd)) {
            if (bl_connector.id > 0)
                ida_simple_remove(&bl_ida, bl_connector.id);
                return PTR_ERR(bd);
        }
return 0;
}
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_bios.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_bios.c
@@ -935,7 +935,7 @@
tmdstableptr = ROM16(bios->data[bitentry->offset]);
    if (!tmdstableptr) {
-      NV_ERROR(drm, "Pointer to TMDS table invalid\n");
+      NV_WARN(drm, "Pointer to TMDS table invalid\n");
        return -EINVAL;
    }

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_bo.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_bo.c
@@ -214,7 +214,6 @@
    INIT_LIST_HEAD(&nvbo->entry);
    INIT_LIST_HEAD(&nvbo->vma_list);
    nvbo->bo.bdev = &drm->ttm.bdev;
-    nvbo->cli = cli;
/* This is confusing, and doesn't actually mean we want an uncached
 * mapping, but is what NOUVEAU_GEM_DOMAIN_COHERENT gets translated
 @@ -513,7 +512,7 @@
     struct ttm_dma_tt *ttm_dma = (struct ttm_dma_tt *)nvbo->bo.ttm;
     int i;

-    if (!ttm_dma)
+    if (!ttm_dma || !ttm_dma->dma_address)
        return;
/* Don't waste time looping if the object is coherent */
 @@ -533,7 +532,7 @@
     struct ttm_dma_tt *ttm_dma = (struct ttm_dma_tt *)nvbo->bo.ttm;
     int i;

-    if (!ttm_dma)
+    if (!ttm_dma || !ttm_dma->dma_address)
        return;
/* Don't waste time looping if the object is coherent */
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_bo.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_bo.h
@@ -26,8 +26,6 @@
     struct list_head vma_list;

 struct list_head vma_list;
- struct nouveau_cli *cli;
-
unsigned contig:1;
unsigned page:5;
unsigned kind:8;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_connector.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_connector.c
@@ -251,7 +251,7 @@
return;
if (connector->state)
- __drm_atomic_helper_connector_destroy_state(connector->state);
+ nouveau_conn_atomic_destroy_state(connector, connector->state);
__drm_atomic_helper_connector_reset(connector, &async->state);
async->dither.mode = DITHERING_MODE_AUTO;
async->dither.depth = DITHERINGDEPTH_AUTO;
@@ -570,9 +570,21 @@
v_nv_connector->edid = NULL;
}

- ret = pm_runtime_get_sync(connector->dev->dev);
- if (ret < 0 && ret != -EACCES)
- return conn_status;
- return conn_status;
+ /* Outputs are only polled while runtime active, so resuming the
+  * device here is unnecessary (and would deadlock upon runtime suspend
+  * because it waits for polling to finish). We do however, want to
+  * prevent the autosuspend timer from elapsing during this operation
+  * if possible.
+  */
+ if (drm_kms_helper_is_poll_worker()) {
+ pm_runtime_get_noresume(dev->dev);
+ } else {
+ ret = pm_runtime_get_sync(dev->dev);
+ if (ret < 0 && ret != -EACCES) {
+ pm_runtime_put_autosuspend(dev->dev);
+ return conn_status;
+ }
+ }

nv_encoder = nouveau_connector_ddc_detect(connector);
if (nv_encoder && (i2c = nv_encoder->i2c) != NULL) {
@@ -647,8 +659,8 @@
 out:

- pm_runtime_mark_last_busy(connector->dev->dev);
- pm_runtime_put_autosuspend(connector->dev->dev);
+ pm_runtime_mark_last_busy(dev->dev);
return conn_status;
}
@@ -1112,6 +1124,26 @@
const struct nvif_notify_conn_rep_v0 *rep = notify->data;
const char *name = connector->name;
struct nouveau_encoder *nv_encoder;
+int ret;
+
+ret = pm_runtime_get(drm->dev->dev);
+if (ret == 0) {
+ /* We can't block here if there's a pending PM request
+ * running, as we'll deadlock nouveau_display_fini() when it
+ * calls nvif_put() on our nvif_notify struct. So, simply
+ * defer the hotplug event until the device finishes resuming
+ */
+NV_DEBUG(drm, "Deferring HPD on %s until runtime resume\n", name);
+schedule_work(&drm->hpd_work);
+
+ret = pm_runtime_put_noidle(drm->dev->dev);
+return NVIF_NOTIFY_KEEP;
+} else if (ret != 0) {
+ /* We can't block here if there's a pending PM request
+ * running, as we'll deadlock nouveau_display_fini() when it
+ * calls nvif_put() on our nvif_notify struct. So, simply
+ * defer the hotplug event until the device finishes resuming
+ */
+NV_WARN(drm, "HPD on %s dropped due to RPM failure: %d\n", name, ret);
+return NVIF_NOTIFY_DROP;
+
}
if (rep->mask & NVIF_NOTIFY_CONN_V0_IRQ) {
NV_DEBUG(drm, "service %s\n", name);
@@ -1129,6 +1161,8 @@
drm_helper_hpd_irq_event(connector->dev);
}

+pm_runtime_mark_last_busy(drm->dev->dev);
+pm_runtime_put_autosuspend(drm->dev->dev);
return NVIF_NOTIFY_KEEP;
}
@@ -1200,14 +1234,19 @@
struct nouveau_display *disp = nouveau_display(dev);
struct nouveau_connector *nv_connector = NULL;
struct drm_connector *connector;
+struct drm_connector_list_iter conn_iter;
int type, ret = 0;
bool dummy;
list_for_each_entry(connector, &dev->mode_config.connector_list, head) {
+drm_connector_list_iter_begin(dev, &conn_iter);
+nouveau_for_each_non_mst_connector_iter(connector, &conn_iter) {

nv_connector = nouveau_connector(connector);
-if (nv_connector->index == index)
+if (nv_connector->index == index) {

+drm_connector_list_iter_end(&conn_iter);

nv_connector = kzalloc(sizeof(*nv_connector), GFP_KERNEL);
if (!nv_connector)
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_connector.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_connector.h
@@ -29,61 +29,15 @@

#include <nvif/notify.h>

+#include <drm/drm_crtc.h>
#include <drm/drm_edid.h>
#include <drm/drm_encoder.h>
#include <drm/drm_dp_helper.h>
#include "nouveau_crtc.h"
+include "nouveau_encoder.h"

struct nvkm_i2c_port;

-struct nouveau_connector {
-struct drm_connector base;
-enum dcb_connector_type type;
-u8 index;
-u8 *dcb;
-
-struct nvif_notify hpd;
-
-struct drm_dp_aux aux;
-
-int dithering_mode;
-int scaling_mode;
-
-struct nouveau_encoder *detected_encoder;
-struct edid *edid;
-struct drm_display_mode *native_mode;
-};
-
-static inline struct nouveau_connector *nouveau_connector(
struct nouveau_connector {
  struct drm_connector base;
  enum dcb_connector_type type;
  u8 index;
  u8 *dcb;

  struct nvif_notify hpd;

  struct drm_dp_aux aux;

  int dithering_mode;
  int scaling_mode;
};

-struct drm_connector *con)
{-
  return container_of(con, struct nouveau_connector, base);
-}
-
static inline struct nouveau_connector *
nouveau_crtc_connector_get(struct nouveau_crtc *nv_crtc)
{-
  struct drm_device *dev = nv_crtc->base.dev;
  struct drm_connector *connector;
  struct drm_crtc *crtc = to_drm_crtc(nv_crtc);

  list_for_each_entry(connector, &dev->mode_config.connector_list, head) {
    if (connector->encoder && &connector->encoder->crtc == crtc)
      return nouveau_connector(connector);
  }

  return NULL;
-}
-

struct drm_connector *
nouveau_connector_create(struct drm_device *, int index);
-

extern int nouveau_tv_disable;
extern int nouveau_ignorelid;
extern int nouveau_duallink;
extern int nouveau_hdmimhz;
-
#include <drm/drm_crtc.h>
define nouveau_conn_atom(p) container_of((p), struct nouveau_conn_atom, state)

@@ -138,6 +92,80 @@
} set;
}
+
+struct nouveau_connector {
+  struct drm_connector base;
+  enum dcb_connector_type type;
+  u8 index;
+  u8 *dcb;
+
+  struct nvif_notify hpd;
+  
+  struct drm_dp_aux aux;
+}
+int dithering_mode;
+int scaling_mode;
struct nouveau_encoder *detected_encoder;
struct edid *edid;
struct drm_display_mode *native_mode;
};

static inline struct nouveau_encoder *nouveau_connector(
    struct drm_connector *con)
{
    return container_of(con, struct nouveau_connector, base);
}

static inline bool
nouveau_connector_is_mst(struct drm_connector *connector)
{
    const struct nouveau_encoder *nv_encoder;
    const struct drm_encoder *encoder;

    if (connector->connector_type != DRM_MODE_CONNECTOR_DisplayPort)
        return false;
    nv_encoder = find_encoder(connector, DCB_OUTPUT_ANY);
    if (!nv_encoder)
        return false;
    encoder = &nv_encoder->base.base;
    return encoder->encoder_type == DRM_MODE_ENCODER_DPMST;
}

#define nouveau_for_each_non_mst_connector_iter(connector, iter) 
    drm_for_each_connector_iter(connector, iter) 
    for_each_if(!nouveau_connector_is_mst(connector))

static inline struct nouveau_connector *
    nouveau_crtc_connector_get(struct nouveau_crtc *nv_crtc)
{
    struct drm_device *dev = nv_crtc->base.dev;
    struct drm_connector *connector;
    struct drm_connector_list_iter conn_iter;
    struct nouveau_connector *nv_connector = NULL;
    struct drm_crtc *crtc = to_drm_crtc(nv_crtc);

    drm_connector_list_iter_begin(dev, &conn_iter);
    nouveau_for_each_non_mst_connector_iter(connector, &conn_iter) {
        if (connector->encoder && connector->encoder->crtc == crtc) {
            nv_connector = nouveau_connector(connector);
            break;
        }
    }

    +#define nouveau_for_each_non_mst_connector_iter(connector, iter) \ 
    +drm_for_each_connector_iter(connector, iter) \ 
    +for_each_if(!nouveau_connector_is_mst(connector))
    +
    +static inline struct nouveau_connector *
    +nouveau_crtc_connector_get(struct nouveau_crtc *nv_crtc)
    +{
        struct drm_device *dev = nv_crtc->base.dev;
        struct drm_connector *connector;
        struct drm_connector_list_iter conn_iter;
        struct nouveau_connector *nv_connector = NULL;
        struct drm_crtc *crtc = to_drm_crtc(nv_crtc);

        +drm_connector_list_iter_begin(dev, &conn_iter);
        nouveau_for_each_non_mst_connector_iter(connector, &conn_iter) { 
            if (connector->encoder && connector->encoder->crtc == crtc) { 
                nv_connector = nouveau_connector(connector);
                break;
            } 
        }
    }

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struct drm_connector *nouveau_connector_create(struct drm_device *, int index);

extern int nouveau_tv_disable;
extern int nouveau_ignorelid;
extern int nouveau_duallink;
extern int nouveau_hdmimhz;

void nouveau_conn_attach_properties(struct drm_connector *);

void nouveau_conn_reset(struct drm_connector *);

struct drm_connector_state *
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_debugfs.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_debugfs.c
@@ -160,7 +160,14 @@
 args.ustate = value;
 }

+ret = pm_runtime_get_sync(drm->dev);
+if (ret < 0 && ret != -EACCES) {
+pm_runtime_put_autosuspend(drm->dev);
+return ret;
+}
+
+ret = nvif_mthd(ctrl, NVIF_CONTROL_PSTATE_USER, &args, sizeof(args));
+pm_runtime_put_autosuspend(drm->dev);
if (ret < 0)
    return ret;

@@ -178,6 +185,7 @@
 .open = nouveau_debugfs_pstate_open,
 .read = seq_read,
 .write = nouveau_debugfs_pstate_set,
+.release = single_release,
 };
/* enable polling for external displays */
drm_kms_helper_poll_enable(drm->dev);

pm_runtime_mark_last_busy(drm->dev->dev);
pm_runtime_put_sync(drm->dev->dev);
@@ -380,15 +378,29 @@
{
struct nouveau_drm *drm = container_of(nb, typeof(*drm), acpi_nb);
struct acpi_bus_event *info = data;
+int ret;

if (!strcmp(info->device_class, ACPI_VIDEO_CLASS)) {
if (info->type == ACPI_VIDEO_NOTIFY_PROBE) {
-/* This may be the only indication we receive of a
- * connector hotplug on a runtime suspended GPU,
- * schedule hpd_work to check.
- */
-schedule_work(&drm->hpd_work);
+ret = pm_runtime_get(drm->dev->dev);
+if (ret == 1 || ret == -EACCES) {
+/* If the GPU is already awake, or in a state
+ * where we can't wake it up, it can handle
+ * it's own hotplug events.
+ */
+pm_runtime_put_autosuspend(drm->dev->dev);
+} else if (ret == 0) {
+/* This may be the only indication we receive
+ * of a connector hotplug on a runtime
+ * suspended GPU, schedule hpd_work to check.
+ */
+NV_DEBUG(drm, "ACPI requested connector reprobe\n");
+schedule_work(&drm->hpd_work);
+pm_runtime_put_noidle(drm->dev->dev);
+} else {
+NV_WARN(drm, "Dropped ACPI reprobe event due to RPM error: %d\n",
+ret);
+}

/* acpi-video should not generate keypresses for this */
return NOTIFY_BAD;
@@ -405,17 +417,25 @@
struct nouveau_display *disp = nouveau_display(dev);
struct nouveau_drm *drm = nouveau_drm(dev);
struct drm_connector *connector;
+struct drm_connector_list_iter conn_iter;
int ret;
ret = disp->init(dev);
if (ret)
    return ret;

/* enable connector detection and polling for connectors without HPD support */
+ drm_kms_helper_poll_enable(dev);
+
/* enable hotplug interrupts */
-list_for_each_entry(connector, &dev->mode_config.connector_list, head) {
+ drm_connector_list_iter_begin(dev, &conn_iter);
+ nouveau_for_each_non_mst_connector_iter(connector, &conn_iter) {
    struct nouveau_connector *conn = nouveau_connector(connector);
    nvif_notify_get(&conn->hpd);
} 
+ drm_connector_list_iter_end(&conn_iter);

/* enable flip completion events */
nvif_notify_get(&drm->flip);

void
-nouveau_display_fini(struct drm_device *dev, bool suspend)
+nouveau_display_fini(struct drm_device *dev, bool suspend, bool runtime)
{
struct nouveau_display *disp = nouveau_display(dev);
struct nouveau_drm *drm = nouveau_drm(dev);
struct drm_connector *connector;
+struct drm_connector_list_iter conn_iter;

if (!suspend) {
    if (drm_drv_uses_atomic_modeset(dev))
@@ -423,11 +443,15 @@
        nvif_notify_put(&drm->flip);
+        disable_hotplug_interrupts();
    }

/* disable hotplug interrupts */
-list_for_each_entry(connector, &dev->mode_config.connector_list, head) {
+ drm_connector_list_iter_begin(dev, &conn_iter);
+ nouveau_for_each_non_mst_connector_iter(connector, &conn_iter) {
    struct nouveau_connector *conn = nouveau_connector(connector);
    nvif_notify_put(&conn->hpd);
} 
+ drm_connector_list_iter_end(&conn_iter);
+
+if (!runtime)
+    cancel_work_sync(&drm->hpd_work);
drm_kms_helper_poll_disable(dev);
disp->fini(dev);
@@ -634,11 +660,11 @@
 }
 }

-nouveau_display_fini(dev, true);
+nouveau_display_fini(dev, true, runtime);
return 0;
 }

-nouveau_display_fini(dev, true);
+nouveau_display_fini(dev, true, runtime);

list_for_each_entry(crtc, &dev->mode_config.crtc_list, head) {
 struct nouveau_framebuffer *nouveau_fb;
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_display.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_display.h
@@ -61,7 +61,7 @@
 int nouveau_display_create(struct drm_device *dev);
 void nouveau_display_destroy(struct drm_device *dev);
-void nouveau_display_init(struct drm_device *dev);
+-void nouveau_display_init(struct drm_device *dev, bool suspend);
+void nouveau_display_fini(struct drm_device *dev, bool suspend, bool runtime);
 int nouveau_display_suspend(struct drm_device *dev, bool runtime);
 void nouveau_display_resume(struct drm_device *dev, bool runtime);
 int nouveau_display_vblank_enable(struct drm_device *, unsigned int);
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_dma.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_dma.c
@@ -80,18 +80,10 @@
 }

void
-nv50_dma_push(struct nouveau_channel *chan, struct nouveau_bo *bo, int delta, int length)
+nv50_dma_push(struct nouveau_channel *chan, u64 offset, int length)
{
-struct nouveau_CLI *cli = (void *)chan->user.client;
 struct nouveau_bo *pb = chan->push.buffer;
-struct nouveau_vma *vma;
 int ip = (chan->dma.ib_put * 2) + chan->dma.ib_base;
- u64 offset;
 -
- vma = nouveau_vma_find(bo, &cli->vmm);
- BUG_ON(!vma);
- offset = vma->addr + delta;
BUG_ON(chan->dma.ib_free < 1);

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_dma.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_dma.h
@@ -31,8 +31,7 @@
 #include "nouveau_chan.h"

 int nouveau_dma_wait(struct nouveau_channel *, int slots, int size);
-void nv50_dma_push(struct nouveau_channel *, struct nouveau_bo *,
- int delta, int length);
+void nv50_dma_push(struct nouveau_channel *, u64 addr, int length);

 /*
 * There's a hw race condition where you can't jump to your PUT offset,
"@
 chan->accel_done = true;

 if (chan->dma.ib_max) {
- nv50_dma_push(chan, chan->push.buffer, chan->dma.put << 2,
+ nv50_dma_push(chan, chan->push.addr + (chan->dma.put << 2),
 (chan->dma.cur - chan->dma.put) << 2);
 } else {
 WRITE_PUT(chan->dma.cur);
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_drm.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_drm.c
@@ -79,6 +79,10 @@
 int nouveau_modeset = -1;
 module_param_named(moderset, nouveau_modeset, int, 0400);

+MODULE_PARM_DESC(atomic, "Expose atomic ioctl (default: disabled)");
+static int nouveau_atomic = 0;
+module_param_named(atomic, nouveau_atomic, int, 0400);
+ static inline bool
- nouveau_cli_work_ready(struct dma_fence *fence, bool wait)
+ nouveau_cli_work_ready(struct dma_fence *fence) 
 { 
- if (!dma_fence_is_signaled(fence)) {
- if (!wait)
- WARN_ON(dma_fence_wait_timeout(fence, false, 2 * HZ) <= 0);
- } 
 static inline bool
- nouveau_cli_work_ready(struct dma_fence *fence, bool wait)
+ nouveau_cli_work_ready(struct dma_fence *fence)
 { 
- if (!dma_fence_is_signaled(fence)) {
- if (!wait)
- return false;
- WARN_ON(dma_fence_wait_timeout(fence, false, 2 * HZ) <= 0);
- }
+if (!dma_fence_is_signaled(fence))
+return false;
+dma_fence_put(fence);
+return true;
+
+static void
+  nouveau_cli_work(struct work_struct *w)
{+
  struct nouveau_cli *cli = container_of(w, typeof(*cli), work);
  struct nouveau_cli_work *work, *wtmp;
  mutex_lock(&cli->lock);
  list_for_each_entry_safe(work, wtmp, &cli->worker, head) {
-    if (!work->fence || nouveau_cli_work_ready(work->fence, wait)) {
-      list_del(&work->head);
-      work->func(work);
    }
+    if (!work->fence || nouveau_cli_work_ready(work->fence)) {
+      list_del(&work->head);
+      work->func(work);
    }
}@@ -158,16 +160,16 @@
 static void
  nouveau_cli_work_flush(struct nouveau_cli *cli, bool wait)
{+
  nouveau_cli_work(struct work_struct *w)
{+
  struct nouveau_cli *cli = container_of(w, typeof(*cli), work);
  struct nouveau_cli_work *work, *wtmp;
  mutex_lock(&cli->lock);
  list_for_each_entry_safe(work, wtmp, &cli->worker, head) {
-    if (!work->fence || nouveau_cli_work_ready(work->fence, wait)) {
-      list_del(&work->head);
-      work->func(work);
    }
-}+
-  /* All our channels are dead now, which means all the fences they
-    * own are signalled, and all callback functions have been called.
-    * So, after flushing the workqueue, there should be nothing left.
-    */
+  +flush_work(&cli->work);
+  +WARN_ON(!list_empty(&cli->worker));
+  +usif_client_fini(cli);
+  nouveau_vmm_fini(&cli->vmm);
+  nvif_mmu_fini(&cli->mmu);
+}@@ -226,7 +228,7 @@
  mutex_unlock(&drm->master.lock);
}
NV_ERROR(drm, "Client allocation failed: %d\n", ret);
NV_PRINTK(err, cli, "Client allocation failed: %d\n", ret);
goto done;
}

NV_ERROR(drm, "Device allocation failed: %d\n", ret);
NV_PRINTK(err, cli, "Device allocation failed: %d\n", ret);
goto done;
}

ret = nvif_mclass(&cli->device.object, mmus);
if (ret < 0) {
    NV_ERROR(drm, "No supported MMU class\n");
    NV_PRINTK(err, cli, "No supported MMU class\n");
goto done;
}

ret = nouveau_vmm_init(cli, vmms[ret].oclass, &cli->vmm);
if (ret) {
    NV_ERROR(drm, "VMM allocation failed: %d\n", ret);
    NV_PRINTK(err, cli, "VMM allocation failed: %d\n", ret);
goto done;
}

ret = nvif_mclass(&cli->mmu.object, mems);
if (ret < 0) {
    NV_ERROR(drm, "No supported MEM class\n");
    NV_PRINTK(err, cli, "No supported MEM class\n");
goto done;
}
pci_set_master(pdev);

+if (nouveau_atomic)
+driver_pci.driver_features |= DRIVER_ATOMIC;
+ret = drm_get_pci_dev(pdev, pent, &driver_pci);
if (ret) {
    nvkm_device_del(&device);
    nouveau_debugfs_fini(drm);
}

if (dev->mode_config.num_crtc)
    nouveau_display_fini(dev, false);
+nouveau_display_fini(dev, false, false);
nouveau_display_destroy(dev);

nouveaubios_takedown(dev);
return -EBUSY;
}

-drm_kms_helper_poll_disable(drm_dev);
-vga_switcheroo_set_dynamic_switch(pdev, VGA_SWITCHEROO_OFF);
nouveau_switcheroo_optimus_dsm();
ret = nouveau_do_suspend(drm_dev, true);
pci_save_state(pdev);
/* do magic */
vif_mask(&device->object, 0x088488, (1 << 25), (1 << 25));
-vga_switcheroo_set_dynamic_switch(pdev, VGA_SWITCHEROO_ON);
drm_dev->switch_power_state = DRM_SWITCH_POWER_ON;

/* Monitors may have been connected / disconnected during suspend */
get_task_comm(tmpname, current);
snprintf(name, sizeof(name), "\%s[\%d]\"", tmpname, pid_nr(fpriv->pid));

-if (!cli = kzalloc(sizeof(*cli), GFP_KERNEL)))
-    return ret;
+    if (!(cli = kzalloc(sizeof(*cli), GFP_KERNEL))) {
+        ret = -ENOMEM;
+        goto done;
+    }

    ret = nouveau_cli_init(drm, name, cli);
    if (ret)
        @@ -1022,8 +1028,10 @@
        long ret;

        ret = pm_runtime_get_sync(drm->dev->dev);
-    if (ret < 0 && ret != -EACCES)
+    if (ret < 0 && ret != -EACCES) {
+        pm_runtime_put_autosuspend(drm->dev->dev);
        return ret;
+    }

    switch (_IOC_NR(cmd) - DRM_COMMAND_BASE) {
    case DRM_NOUVEAU_NVIF:
        @@ -1057,8 +1065,11 @@
        static struct drm_driver
        driver_stub = {
            .driver_features =
                DRIVER_GEM | DRIVER_MODESET | DRIVER_PRIME | DRIVER_RENDER |
                DRIVER_KMS_LEGACY_CONTEXT,
            +DRIVER_GEM | DRIVER_MODESET | DRIVER_PRIME | DRIVER_RENDER
            +#if defined(CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT)
            +| DRIVER_KMS_LEGACY_CONTEXT
            +#endif
            +,
            .load = nouveau_drm_load,
            .unload = nouveau_drm_unload,
            --- linux-4.15.0.org/drivers/gpu/drm/nouveau/nouveau_fbcon.c
            +++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_fbcon.c
            @@ -185,8 +185,10 @@
            struct nouveau_fbdev *fbcon = info->par;
            struct nouveau_drm *drm = nouveau_drm(fbcon->helper.dev);
            int ret = pm_runtime_get_sync(drm->dev->dev);
-        if (ret < 0 && ret != -EACCES)
+        if (ret < 0 && ret != -EACCES) {
+            pm_runtime_put(drm->dev->dev);
            return ret;
+        }
return 0;
}

@@ -311,7 +313,7 @@
    struct nouveau_framebuffer *fb;
    struct nouveau_channel *chan;
    struct nouveau_bo *nvbo;
-    struct drm_mode_fb_cmd2 mode_cmd;
+    struct drm_mode_fb_cmd2 mode_cmd = {};
    int ret;

    mode_cmd.width = sizes->surface_width;
@@ -544,6 +546,7 @@
    drm_fb_helper_fini(&fbcon->helper);
    free:
    kfree(fbcon);
+    drm->fbcon = NULL;
    return ret;
}

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_fence.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_fence.c
@@ -158,7 +158,7 @@
    fence = list_entry(fctx->pending.next, typeof(*fence), head);
    chan = rcu_dereference_protected(fence->channel, lockdep_is_held(&fctx->lock));
    -if (nouveau_fence_update(fence->channel, fctx))
+    if (nouveau_fence_update(chan, fctx))
        ret = NVIF_NOTIFY_DROP;
    spin_unlock_irqrestore(&fctx->lock, flags);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_gem.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_gem.c
@@ -46,8 +46,10 @@
    int ret;
    ret = pm_runtime_get_sync(dev);
    -if (WARN_ON(ret < 0 && ret != -EACCES))
+    if (WARN_ON(ret < 0 && ret != -EACCES)) {
+        pm_runtime_put_autosuspend(dev);
        return;
+    }

    if (gem->import_attach)
        drm_prime_gem_destroy(gem, nvbo->bo.sg);
@@ -80,8 +82,10 @@
    int ret;
    ret = pm_runtime_get_sync(dev);
    -if (WARN_ON(ret < 0 && ret != -EACCES))
+    if (WARN_ON(ret < 0 && ret != -EACCES)) {
+        pm_runtime_put_autosuspend(dev);
        return;
+    }

    if (gem->import_attach)
        drm_prime_gem_destroy(gem, nvbo->bo.sg);
ret = pm_runtime_get_sync(dev);
-if (ret < 0 & & ret != -EACCES)
+if (ret < 0 & & ret != -EACCES) {
+pm_runtime_put_autosuspend(dev);
goto out;
+
ret = nouveau_vma_new(nvbo, &cli->vmm, &vma);
pm_runtime_mark_last_busy(dev);
@@ -432,7 +436,20 @@
 }
 }

-b->user_priv = (uint64_t)(unsigned long)nvbo;
+if (cli->vmm.vmm.object.oclass >= NVIF_CLASS_VMM_NV50) {
+struct nouveau_vmm *vmm = &cli->vmm;
+struct nouveau_vma *vma = nouveau_vma_find(nvbo, vmm);
+if (!vma) {
+NV_PRINTK(err, cli, "vma not found!\n");
+ret = -EINVAL;
+break;
+}
+
+b->user_priv = (uint64_t)(unsigned long)vma;
+} else {
+b->user_priv = (uint64_t)(unsigned long)nvbo;
+}
+
+nvbo->reserved_by = file_priv;
nvbo->pbbo_index = i;
if ((b->valid_domains & NOUVEAU_GEM_DOMAIN_VRAM) & &
@@ -604,7 +621,7 @@
 struct nouveau_bo *nvbo;
 uint32_t data;

-if (unlikely(r->bo_index > req->nr_buffers)) {
+if (unlikely(r->bo_index >= req->nr_buffers)) {
 NV_PRINTK(err, cli, "reloc bo index invalid\n");
 ret = -EINVAL;
 break;
@@ -614,7 +631,7 @@
 if (b->presumed.valid)
 continue;

-if (unlikely(r->reloc_bo_index > req->nr_buffers)) {
+if (unlikely(r->reloc_bo_index >= req->nr_buffers)) {
 NV_PRINTK(err, cli, "reloc container bo index invalid\n");
 ret = -EINVAL;
for (i = 0; i < req->nr_push; i++) {
    struct nouveau_bo *nvbo = (void *)(unsigned long) bo[push[i].bo_index].user_priv;
    nv50_dma_push(chan, nvbo, push[i].offset, push[i].length);
}

nouveau_mem_del(struct ttm_mem_reg *reg)
{
    struct nouveau_mem *mem = nouveau_mem(reg);
    +if (!mem)
    +return;
    nouveau_mem_fini(mem);
    kfree(reg->mm_node);
    reg->mm_node = NULL;
}

if (ret)
    return -EINVAL;

+ret = ttm_bo_reserve(&nvbo->bo, false, false, NULL);
+if (ret)
    goto error;
+if (nvbo->bo.moving)
    ret = dma_fence_wait(nvbo->bo.moving, true);
+ret = ttm_bo_unreserve(&nvbo->bo);
+if (ret)
    goto error;
+error:
    nouveau_bo_unpin(nvbo);
    return ret;
void nouveau_gem_prime_unpin(struct drm_gem_object *obj)
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_sgdma.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_sgdma.c
@@ -98,12 +98,9 @@
   else
   nvbe->ttm.func = &nv50_sgdma_backend;

-  if (ttm_dma_tt_init(&nvbe->ttm, bdev, size, page_flags, dummy_read_page))
-      /*
-       * A failing ttm_dma_tt_init() will call ttm_tt_destroy()
-       * and thus our nouveau_sgdma_destroy() hook, so we don't need
-       * to free nvbe here.
-       */
-     +if (ttm_dma_tt_init(&nvbe->ttm, bdev, size, page_flags, dummy_read_page)) {
-         kfree(nvbe);
-         return NULL;
+    }
   return &nvbe->ttm.ttm;

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nouveau_ttm.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nouveau_ttm.c
@@ -63,15 +63,13 @@
   struct ttm_mem_reg *reg)
   {
   struct nouveau_bo *nvbo = nouveau_bo(bo);
-   struct nouveau_drm *drm = nvbo->cli->drm;
-   struct nouveau_mem *mem;
+   struct nouveau_drm *drm = nouveau_bdev(bo->bdev);
   int ret;
   
   if (drm->client.device.info.ram_size == 0)
   return -ENOMEM;
   ret = nouveau_mem_new(&drm->master, nvbo->kind, nvbo->comp, reg);
   -mem = nouveau_mem(reg);
   if (ret)
   return ret;

-@ @ -103,12 +101,10 @@
   struct ttm_mem_reg *reg)
   {
   struct nouveau_bo *nvbo = nouveau_bo(bo);
-   struct nouveau_drm *drm = nvbo->cli->drm;
-   struct nouveau_mem *mem;
+   struct nouveau_drm *drm = nouveau_bdev(bo->bdev);
   int ret;

ret = nouveau_mem_new(&drm->master, nvbo->kind, nvbo->comp, reg);
-mem = nouveau_mem(reg);
if (ret)
return ret;

@@ -131,7 +127,7 @@
     struct ttm_mem_reg *reg)
 {
 struct nouveau_bo *nvbo = nouveau_bo(bo);
-struct nouveau_drm *drm = nvbo->cli->drm;
+struct nouveau_drm *drm = nouveau_bdev(bo->bdev);
 struct nouveau_mem *mem;
 int ret;

@@ -170,7 +166,11 @@
 struct nouveau_drm *drm = nouveau_drm(file_priv->minor->dev);

 if (unlikely(vma->vm_pgoff < DRM_FILE_PAGE_OFFSET))
+if defined(CONFIG_NOUVEAU_LEGACY_CTX_SUPPORT)
 return drm_legacy_mmap(filp, vma);
+else
+return -EINVAL;
+endif

 return ttm_bo_mmap(filp, vma, &drm->ttm.bdev);
 }
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nv50_display.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nv50_display.c
@@ -2940,7 +2940,8 @@
 slots = drm_dp_find_vcpi_slots(&mstm->mgr, mstc->pbn);
 r = drm_dp_mst_allocate_vcpi(&mstm->mgr, mstc->port, mstc->pbn, slots);
-WARN_ON(!r);
+if (!r)
+DRM_DEBUG_KMS("Failed to allocate VCPI\n");

 if (!mstm->links++)
 nv50_outp_acquire(mstm->outp);
@@ -3216,10 +3217,11 @@
 drm_connector_unregister(&mstc->connector);

-drm_modeset_lock_all(drm->dev);
 drm_fb_helper_remove_one_connector(&drm->fbcon->helper, &mstc->connector);
+drm_modeset_lock(&drm->dev->mode_config.connection_mutex, NULL);
 mstc->port = NULL;

-drm_modeset_unlock_all(drm->dev);
+drm_modeset_unlock(&drm->dev->mode_config.connection_mutex);

drm_connector_unref(&mstc->connector);
"
@@ -3229,9 +3231,7 @@
{
    struct nouveau_drm *drm = nouveau_drm(connector->dev);

    drm_modeset_lock_all(drm->dev);
    drm_fb_helper_add_one_connector(&drm->fbcon->helper, connector);
    drm_modeset_unlock_all(drm->dev);

    drm_connector_register(connector);
"
@@ -3314,17 +3314,20 @@
    int ret;

    if (dpcd >= 0x12) {
-        ret = drm_dp_dpcd_readb(mstm->mgr.aux, DP_MSTM_CTRL, &dpcd);
-        if (ret < 0)
-            return ret;
-    }
-    dpcd &= ~DP_MST_EN;
-    if (state)
-        dpcd |= DP_MST_EN;
-    ret = drm_dp_dpcd_writeb(mstm->mgr.aux, DP_MSTM_CTRL, dpcd);
    /* Even if we're enabling MST, start with disabling the
       * branching unit to clear any sink-side MST topology state
       * that wasn't set by us
       */
+    ret = drm_dp_dpcd_writeb(mstm->mgr.aux, DP_MSTM_CTRL, 0);
    if (ret < 0)
        return ret;
    if (state) {
+        /* Now, start initializing */
        ret = drm_dp_dpcd_writeb(mstm->mgr.aux, DP_MSTM_CTRL,
            DP_MST_EN);
        if (ret < 0)
            return ret;
+    }
    }

    return nvif_mthd(disp, 0, &args, sizeof(args));
"
@@ -3333,31 +3336,58 @@
    int
    nv50_mstm_detect(struct nv50_mstm *mstm, u8 dpcd[8], int allow)
int ret, state = 0;
struct drm_dp_aux *aux;
int ret;
bool old_state, new_state;
u8 mstm_ctrl;

if (!mstm)
    return 0;

    if (dpcd[0] >= 0x12) {
        ret = drm_dp_dpcd_readb(mstm->mgr.aux, DP_MSTM_CAP, &dpcd[1]);
        mutex_lock(&mstm->mgr.lock);
        old_state = mstm->mgr.mst_state;
        new_state = old_state;
        aux = mstm->mgr.aux;
        if (old_state) {
            /* Just check that the MST hub is still as we expect it */
            ret = drm_dp_dpcd_readb(aux, DP_MSTM_CTRL, &mstm_ctrl);
            if (ret < 0 || !(mstm_ctrl & DP_MST_EN)) {
                DRM_DEBUG_KMS("Hub gone, disabling MST topology\n");
                new_state = false;
            } else if (dpcd[0] >= 0x12) {
                ret = drm_dp_dpcd_readb(aux, DP_MSTM_CAP, &dpcd[1]);
                if (ret < 0)
                    return ret;
                goto probe_error;
            }
        }
        if (new_state == old_state) {
            mutex_unlock(&mstm->mgr.lock);
            return new_state;
        }
    }
    if (!(dpcd[1] & DP_MST_CAP))
        dpcd[0] = 0x11;
    else
        -state = allow;
        +new_state = allow;
        +
    +if (new_state == old_state) {
        mutex_unlock(&mstm->mgr.lock);
        return new_state;
    }

    ret = nv50_mstm_enable(mstm, dpcd[0], state);
    ret = nv50_mstm_enable(mstm, dpcd[0], new_state);
    if (ret)
        -return ret;
        +goto probe_error;
mutex_unlock(&mstm->mgr.lock);

ret = drm_dp_mst_topology_mgr_set_mst(&mstm->mgr, state);
+ret = drm_dp_mst_topology_mgr_set_mst(&mstm->mgr, new_state);
if (ret)
return nv50_mstm_enable(mstm, dpcd[0], 0);

-return mstm->mgr.mst_state;
+return new_state;
+
+probe_error:
+mutex_unlock(&mstm->mgr.lock);
+return ret;
}

static void
@@ -3370,8 +3400,16 @@
static void
nv50_mstm_init(struct nv50_mstm *mstm)
{
-if (mstm && mstm->mgr.mst_state)
-drm_dp_mst_topology_mgr_resume(&mstm->mgr);
+int ret;
+
+if (!mstm || !mstm->mgr.mst_state)
+return;
+
+ret = drm_dp_mst_topology_mgr_resume(&mstm->mgr);
+if (ret == -1) {
+-drm_dp_mst_topology_mgr_set_mst(&mstm->mgr, false);
+-drm_kms_helper_hotplug_event(mstm->mgr.dev);
+}
}

static void
@@ -3379,6 +3417,7 @@
{
struct nv50_mstm *mstm = *pmstm;
if (mstm) {
+drm_dp_mst_topology_mgr_destroy(&mstm->mgr);
 kfree(*pmstm);
 *pmstm = NULL;
 }
@@ -4151,7 +4190,7 @@
nv50_disp_atomic_commit_tail(state);

drm_for_each_crtc(crtc, dev) {


if (crtc->state->enable) {
    if (crtc->state->active) {
        if (!drm->have_disp_power_ref) {
            drm->have_disp_power_ref = true;
            return 0;
        }
    }
}

MODULE_PARM_DESC(atomic, "Expose atomic ioctl (default: disabled)");
static int nouveau_atomic = 0;
module_param_named(atomic, nouveau_atomic, int, 0400);

int nv50_display_create(struct drm_device *dev)
{
    nouveau_display(dev)->fini = nv50_display_fini;
    disp->disp = &nouveau_display(dev)->disp;
    dev->mode_config.funcs = &nv50_disp_func;
    if (nouveau_atomic)
        dev->driver->driver_features |= DRIVER_ATOMIC;
    dev->driver->driver_features |= DRIVER_PREFER_XBGR_30BPP;

    /* small shared memory area we use for notifiers and semaphores */
    ret = nouveau_bo_new(&drm->client, 4096, 0x1000, TTM_PL_FLAG_VRAM,
        -- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/core/memory.c
        +++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/core/memory.c
        @@ -91,8 +91,8 @@
        }
        refcount_set(&tags->refcount, 1);
        *ptags = memory->tags = tags;
        mutex_unlock(&fb->subdev.mutex);
        *ptags = tags;
        return 0;
    }

    -- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/device/base.c
    +++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/device/base.c
    @@ -1612,7 +1612,7 @@
        .pci = gf106_pci_new,
        .therm = gf119_therm_new,
        .timer = nv41_timer_new,
        -.volt = gf100_volt_new,
        +.volt = gf117_volt_new,
        .ce[0] = gf100_ce_new,
        .disp = gf119_disp_new,
.dma = gf119_dma_new,
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/device/ctrl.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/device/ctrl.c
@@ -57,7 +57,7 @@
args->v0.count = 0;
args->v0.ustate_ac = NVIF_CONTROL_PSTATE_INFO_V0_USTATE_DISABLE;
args->v0.ustate_dc = NVIF_CONTROL_PSTATE_INFO_V0_USTATE_DISABLE;
-args->v0.pwrsrc = -ENOSYS;
+args->v0.pwrsrc = -ENODEV;
args->v0.pstate = NVIF_CONTROL_PSTATE_INFO_V0_PSTATE_UNKNOWN;
}

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/device/tegra.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/device/tegra.c
@@ -23,6 +23,10 @@
#ifdef CONFIG_NOUVEAU_PLATFORM_DRIVER
#include "priv.h"
+#if IS_ENABLED(CONFIG_ARM_DMA_USE_IOMMU)
+    include <asm/dma-iommu.h>
+#endif
+
static int
nvkm_device_tegra_power_up(struct nvkm_device_tegra *tdev)
{
    @@ -105,6 +109,15 @@
    unsigned long pgszize_bitmap;
    int ret;

    +if IS_ENABLED(CONFIG_ARM_DMA_USE_IOMMU)
    +if (dev->archdata.mapping) { 
    +struct dma_iommu_mapping *mapping = to_dma_iommu_mapping(dev);
    +
    +arm_iommu_detach_device(dev);
    +arm_iommu_release_mapping(mapping);
    +}
    +#endif
    +
    if (!tdev->func->iommu_bit)
    return;

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/base.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/base.c
@@ -258,6 +258,7 @@
    struct nvkm_outp *outp, *outt, *pair;
    struct nvkm_conn *conn;
    struct nvkm_head *head;
+    struct nvkm_iomu *ior;
struct nvbios_connE connE;
struct dcb_output dcbE;
u8 hpd = 0, ver, hdr;
@@ -376,6 +377,19 @@
if (ret)
    return ret;

+/* Enforce identity-mapped SOR assignment for panels, which have
+ * certain bits (ie. backlight controls) wired to a specific SOR.
+ */
+list_for_each_entry(outp, &disp->outp, head) {
+  if (outp->conn->info.type == DCB_CONNECTOR_LVDS ||
+      outp->conn->info.type == DCB_CONNECTOR_eDP) {
+    ior = nvkm_ior_find(disp, SOR, ffs(outp->info.or) - 1);
+    if (!WARN_ON(!ior))
+      ior->identity = true;
+    outp->identity = true;
+  }
+}
+i = 0;
list_for_each_entry(head, &disp->head, head)
  i = max(i, head->id + 1);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/channv50.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/channv50.c
@@ -73,6 +73,8 @@
    if (debug > subdev->debug)
        return;
    if (!mthd)
+      return;
+  }
    return;

  for (i = 0; (list = mthd->data[i].mthd) != NULL; i++) {
    u32 base = chan->head * mthd->addr;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/dp.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/dp.c
@@ -364,8 +364,15 @@
    * and it's better to have a failed modeset than that.
    */
  for (cfg = nvkm_dp_rates; cfg->rate; cfg++) {
-    -if (cfg->nr <= outp_nr && cfg->nr <= outp_bw)
-      failsafe = cfg;
-    +if (cfg->nr <= outp_nr && cfg->nr <= outp_bw) {
-      /* Try to respect sink limits too when selecting
-       * lowest link configuration.
-       */
-      +if (!failsafe ||
-         (cfg->nr <= sink_nr && cfg->bw <= sink_bw))
failsafe = cfg;
+
if (failsafe && cfg[1].rate < dataKBps)
break;
}
@@ -411,15 +418,11 @@
return ret;
}

-static void
-nvkm_dp_release(struct nvkm_outp *outp, struct nvkm_ior *ior)
+void
+nvkm_dp_disable(struct nvkm_outp *outp, struct nvkm_ior *ior)
{
struct nvkm_dp *dp = nvkm_dp(outp);

-/* Prevent link from being retrained if sink sends an IRQ. */
-atomic_set(&dp->lt.done, 0);
-ior->dp.nr = 0;
-
/* Execute DisableLT script from DP Info Table. */
nvbios_init(&(ior->disp->engine.subdev.dp->info.script[4],
init.outp = &dp->outp.info;
@@ -428,6 +431,16 @@
});

+static void
+nvkm_dp_release(struct nvkm_outp *outp)
+{
+struct nvkm_dp *dp = nvkm_dp(outp);
+
+/* Prevent link from being retrained if sink sends an IRQ. */
+atomic_set(&dp->lt.done, 0);
+dp->outp.ior->dp.nr = 0;
+
+static int
nvkm_dp_acquire(struct nvkm_outp *outp)
{
@@ -576,6 +589,7 @@
.fini = nvkm_dp_fini,
.acquire = nvkm_dp_acquire,
.release = nvkm_dp_release,
+.disable = nvkm_dp_disable,
};


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static int
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/dp.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/dp.h
@@ -32,6 +32,7 @@
    int nvkm_dp_new(struct nvkm_disp *, int index, struct dcb_output *,
    struct nvkm_outp **);
+void nvkm_dp_disable(struct nvkm_outp *, struct nvkm_ior *);

/* DPCD Receiver Capabilities */
#define DPCD_RC00_DPCD_REV 0x00000
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/ior.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/ior.h
@@ -16,6 +16,7 @@
    char name[8];

struct list_head head;
+bool identity;

struct nvkm_ior_state {
    struct nvkm_outp *outp;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/nv50.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/nv50.c
@@ -436,11 +436,11 @@
    nv50_disp_super_ied_off(head, ior, 2);

    /* If we're shutting down the OR's only active head, execute
    - * the output path's release function.
    + * the output path's disable function.
      */
    if (ior->arm.head == (1 << head->id)) {
        -if (((outp = ior->arm.outp) && outp->func->release)
            -outp->func->release(outp, ior);
        +if (((outp = ior->arm.outp) && outp->func->disable)
            +outp->func->disable(outp, ior);
        }
    }

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/outp.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/outp.c
@@ -22,6 +22,7 @@
 * Authors: Ben Skeggs
 */
 #include "outp.h"
+#{include "dp.h"
+#{include "ior.h"

#include <subdev/bios.h>
if (ior) {
    outp->acquired &= ~user;
    if (!outp->acquired) {
        if (outp->func->release && ior)
            outp->func->release(outp);
        outp->ior->asy.outp = NULL;
        outp->ior = NULL;
    }
}

/* Deal with panels requiring identity-mapped SOR assignment. */
if (outp->identity) {
    ior = nvkm_ior_find(outp->disp, SOR, ffs(outp->info.or) - 1);
    if (WARN_ON(!ior))
        return -ENOSPC;
    return nvkm_outp_acquire_ior(outp, user, ior);
}

/* First preference is to reuse the OR that is currently armed */
/* on HW, if any, in order to prevent unnecessary switching. */
list_for_each_entry(ior, &outp->disp->ior, head) {
    if (!ior->asy.outp && ior->arm.outp == outp)
        return nvkm_outp_acquire_ior(outp, user, ior);
}

/* Failing that, a completely unused OR is the next best thing. */
list_for_each_entry(ior, &outp->disp->ior, head) {
    if (!ior->identity && !ior->asy.outp && ior->type == type &&
        (ior->func->route.set || ior->id == __ffs(outp->info.or)))
        return nvkm_outp_acquire_ior(outp, user, ior);
}

/* but will be released during the next modeset. */
list_for_each_entry(ior, &outp->disp->ior, head) {
    if (!ior->identity && !ior->asy.outp && ior->type == type &&
        (ior->func->route.set || ior->id == __ffs(outp->info.or)))
        return nvkm_outp_acquire_ior(outp, user, ior);
}
if (!ior->arm.head || ior->arm.proto != proto) {
    OUTP_DBG(outp, "no heads (%x %d %d)", ior->arm.head, ior->arm.proto, proto);
    +/* The EFI GOP driver on Ampere can leave unused DP links routed,
    + * which we don't expect. The DisableLT IED script *should* get
    + * us back to where we need to be.
    + */
    +if (ior->func->route.get && !ior->arm.head && outp->info.type == DCB_OUTPUT_DP)
    +nvkm_dp_disable(outp, ior);
    +return;
}

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/disp/outp.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/disp/outp.h
@@ -17,6 +17,7 @@
    struct list_head head;
    struct nvkm_conn *conn;
    +bool identity;

    /* Assembly state. */
    #define NVKM_OUTP_PRIV 1
   @@ -41,7 +42,8 @@
    void (*init)(struct nvkm_outp *);
    void (*fini)(struct nvkm_outp *);
    int (*acquire)(struct nvkm_outp *);
    -void (*release)(struct nvkm_outp *, struct nvkm_ior *);
    +void (*release)(struct nvkm_outp *)
    +void (*disable)(struct nvkm_outp *, struct nvkm_ior *);
    };

    #define OUTP_MSG(o,l,f,a...) do {                                              
    --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/falcon.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/falcon.c
@@ -22,6 +22,7 @@
    #include <core/gpuobj.h>
    +#include <subdev/mc.h>
    #include <subdev/timer.h>
    #include <engine/fifo.h>

    #include <engine/falcon.h>
    @@ -107,8 +108,10 @@
    }
-nvkm_mask(device, base + 0x048, 0x00000003, 0x00000000);
-nvkm_wr32(device, base + 0x014, 0xffffffff);
+if (nvkm_mc_enabled(device, engine->subdev.index)) {
  +nvkm_mask(device, base + 0x048, 0x00000003, 0x00000000);
  +nvkm_wr32(device, base + 0x014, 0xffffffff);
  +}
return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/fifo/gk104.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/fifo/gk104.c
@@ -155,10 +155,10 @
         (target << 28));
     nvkm_wr32(device, 0x002274, (runl << 20) | nr);

  -if (wait_event_timeout(fifo->runlist[runl].wait,
-    - !(nvkm_rd32(device, 0x002284 + (runl * 0x08))
-      & 0x00100000),
-    - msecs_to_jiffies(2000)) == 0)
+  if (nvkm_msec(device, 2000,
+    + (!nvkm_rd32(device, 0x002284 + (runl * 0x08)) & 0x00100000))
+    +break;
+    +) < 0)
    nvkm_error(subdev, "runlist %d update timeout\n", runl);
unlock:
  mutex_unlock(&subdev->mutex);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgf100.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgf100.c
@@ -1200,6 +1200,7 @@
 gf100_grctx_generate_r406800(struct gf100_gr *gr)
 {
  struct nvkm_device *device = gr->base.engine.subdev.device;
+  const struct gf100_grctx_func *func = gr->func->grctx;
  u64 tpc_mask = 0, tpc_set = 0;
  u8  tpcnr[GPC_MAX];
  int gpc, tpc;
  @ @ -1228,6 +1229,11 @ @
  nvkm_wr32(device, 0x406c04 + (i * 0x20), upper_32_bits(tpc_set ^ tpc_mask));
  }
  }
+  if (func->tpc_mask)
+  func->tpc_mask(gr);
+  if (func->smid_config)
+  func->smid_config(gr);
  }

  void
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgf100.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgf100.h
@@ -48,6 +48,8 @@
    u32 attrib_nr;
    u32 alpha_nr_max;
    u32 alpha_nr;
+    void (*tpc_mask)(struct gf100_gr *);
+    void (*smid_config)(struct gf100_gr *);    
};

extern const struct gf100_grctx_func gf100_grctx;
@@ -83,10 +85,6 @@
    void gk104_grctx_generate_unkn(struct gf100_gr *);
    void gk104_grctx_generate_r418bb8(struct gf100_gr *);
    
-    void gm107_grctx_generate_bundle(struct gf100_grctx *);
-    void gm107_grctx_generate_pagepool(struct gf100_grctx *);
-    void gm107_grctx_generate_attrib(struct gf100_grctx *);
-    
    extern const struct gf100_grctx_func gk110_grctx;
    extern const struct gf100_grctx_func gk110b_grctx;
    extern const struct gf100_grctx_func gk208_grctx;
@@ -95,16 +93,20 @@
    void gm107_grctx_generate_bundle(struct gf100_grctx *);
    void gm107_grctx_generate_pagepool(struct gf100_grctx *);
    void gm107_grctx_generate_attrib(struct gf100_grctx *);
+    void gm107_grctx_generate_sm_id(struct gf100_gr *, int, int, int);
    extern const struct gf100_grctx_func gm200_grctx;
+    void gm200_grctx_generate_tpcid(struct gf100_gr *);
    -void gm200_grctx_generate_405b60(struct gf100_gr *);
+    void gm200_grctx_generate_tpc_mask(struct gf100_gr *);
+    void gm200_grctx_generate_smid_config(struct gf100_gr *);
    extern const struct gf100_grctx_func gm20b_grctx;

    extern const struct gf100_grctx_func gp100_grctx;
    void gp100_grctx_generate_main(struct gf100_gr *, struct gf100_grctx *);
    void gp100_grctx_generate_pagepool(struct gf100_grctx *);
+    void gp100_grctx_generate_smid_config(struct gf100_gr *);

    extern const struct gf100_grctx_func gp102_grctx;
    void gp102_grctx_generate_attrib(struct gf100_grctx *);

    extern const struct gf100_grctx_func gp102_grctx;
    void gp102_grctx_generate_attrib(struct gf100_grctx *);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgm200.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgm200.c
@@ -46,7 +46,7 @@
}}
void
-gm200_grctx_generate_405b60(struct gf100_gr *gr)
+gm200_grctx_generate_smid_config(struct gf100_gr *gr)
{
  struct nvkm_device *device = gr->base.engine.subdev.device;
  const u32 dist_nr = DIV_ROUND_UP(gr->tpc_total, 4);
  @ @ -77,6 +77,15 @@
  nvkm_wr32(device, 0x405ba0 + (i * 4), gpcs[i]);
}

+void
+gm200_grctx_generate_tpc_mask(struct gf100_gr *gr)
+
+{ 
+  u32 tmp, i;
+  +for (tmp = 0, i = 0; i < gr->gpc_nr; i++)
+    tmp |= ((1 << gr->tpc_nr[i]) - 1) << (i * 4);
+  nvkm_wr32(gr->base.engine.subdev.device, 0x4041c4, tmp);
+}
+
+static void
+gm200_grctx_generate_main(struct gf100_gr *gr, struct gf100_grctx *info)
+
+{ 
+  u32 tmp, i;
+  +for (tmp = 0, i = 0; i < gr->gpc_nr; i++)
+    tmp |= ((1 << gr->tpc_nr[i]) - 1) << (i * gr->func->tpc_nr);
+  nvkm_wr32(gr->base.engine.subdev.device, 0x4041c4, tmp);
+  
+  gm200_grctx_generate_405b60(gr);
+  +gm200_grctx_generate_smid_config(gr);
+
+  gf100_gr_icmd(gr, gr->fuc_bundle);
+  nvkm_wr32(device, 0x404154, idle_timeout);
+  @ @ -133,4 +142,6 @@
+  .attrib_nr = 0x400,
+  .alpha_nr_max = 0x1800,
+  .alpha_nr = 0x1000,
+  +.tpc_mask = gm200_grctx_generate_tpc_mask,
+  +.smid_config = gm200_grctx_generate_smid_config,
+};
- gm200_grctx_generate_405b60(gr);
+ gm200_grctx_generate_smid_config(gr);

gf100_gr_wait_idle(gr);

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgp100.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgp100.c
@@ -89,13 +89,12 @@
     mmio_wr32(info, 0x41befc, 0x00000000);
 }

- static void
- gp100_grctx_generate_405b60(struct gf100_gr *gr)
+ void
+ gp100_grctx_generate_smid_config(struct gf100_gr *gr)
{
    struct nvkm_device *device = gr->base.engine.subdev.device;
    const u32 dist_nr = DIV_ROUND_UP(gr->tpc_total, 4);
-    u32 dist[TPC_MAX / 4] = {};
-    u32 gpcs[GPC_MAX * 2] = {};
+    u32 dist[TPC_MAX / 4] = {}, gpcs[16] = {};
    u8  tpcnr[GPC_MAX];
    int tpc, gpc, i;

@@ -112,12 +111,12 @@
     dist[i / 4] |= ((gpc << 4) | tpc) << ((i % 4) * 8);
-     gpcs[gpc + (gr->gpc_nr * (tpc / 4))] |= i << (tpc * 8);
+     gpcs[gpc + (gr->func->gpc_nr * (tpc / 4))] |= i << (tpc * 8);
 }

    for (i = 0; i < dist_nr; i++)
-     nvkm_wr32(device, 0x405b60 + (i * 4), dist[i]);
-     for (i = 0; i < gr->gpc_nr * 2; i++)
+     for (i = 0; i < ARRAY_SIZE(gpcs); i++)
         nvkm_wr32(device, 0x405ba0 + (i * 4), gpcs[i]);
 }

@@ -149,10 +148,10 @@
     nvkm_wr32(device, 0x405b00, (gr->tpc_total << 8) | gr->gpc_nr);

    for (tmp = 0, i = 0; i < gr->gpc_nr; i++)
-     tmp |= ((1 << gr->tpc_nr[i]) - 1) << (i * 5);
+     tmp |= ((1 << gr->tpc_nr[i]) - 1) << (i * gr->func->tpc_nr);
    nvkm_wr32(device, 0x4041c4, tmp);
gp100_grctx_generate_405b60(gr);
+gp100_grctx_generate_smid_config(gr);

gf100_gr_icmd(gr, gr->fuc_bundle);
nvkm_wr32(device, 0x404154, idle_timeout);
@@ -174,4 +173,6 @@
    .attrib_nr = 0x440,
    .alpha_nr_max = 0xc00,
    .alpha_nr = 0x800,
+tpc_mask = gm200_grctx_generate_tpc_mask,
+smid_config = gp100_grctx_generate_smid_config,
};
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgp102.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgp102.c
@@ -94,4 +94,6 @@
    .attrib_nr = 0x320,
    .alpha_nr_max = 0xc00,
    .alpha_nr = 0x800,
+tpc_mask = gm200_grctx_generate_tpc_mask,
+smid_config = gp100_grctx_generate_smid_config,
};
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgp107.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/ctxgp107.c
@@ -44,4 +44,6 @@
    .attrib_nr = 0x540,
    .alpha_nr_max = 0xc00,
    .alpha_nr = 0x800,
+tpc_mask = gm200_grctx_generate_tpc_mask,
+smid_config = gp100_grctx_generate_smid_config,
};
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/gf100.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/gf100.h
@@ -135,6 +135,8 @@
 struct gf100_gr_ucode *ucode;
 } gpccs;
 int (*rops)(struct gf100_gr *);
+int gpc_nr;
+int tpc_nr;
 int ppc_nr;
 const struct gf100_grctx_func *grctx;
 struct nvkm_sclass sclass[];
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/gk20a.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/gk20a.c
@@ -143,23 +143,24 @@
nent = (fuc.size / sizeof(struct gk20a_fw_av));

-pack = vzalloc((sizeof(*pack) * max_classes) +

- (sizeof(*init) * (nent + 1)));  
+pack = vzalloc((sizeof(*pack) * (max_classes + 1)) +  
+ (sizeof(*init) * (nent + max_classes + 1)));  

if (!pack) {  
ret = -ENOMEM;  
goto end;  
}  

-init = (void *)(pack + max_classes);  
+init = (void *)(pack + max_classes + 1);  

-for (i = 0; i < nent; i++) {  
-struct gf100_gr_init *ent = &init[i];  
+for (i = 0; i < nent; i++, init++) {  
struct gk20a_fw_av *av = &((struct gk20a_fw_av *)fuc.data)[i];  
 u32 class = av->addr & 0xffff;  
 u32 addr = (av->addr & 0xffff0000) >> 14;  

if (prevclass != class) {  
-pack[classidx].init = ent;  
+if (prevclass) /* Add terminator to the method list. */  
+init++;  
+pack[classidx].init = init;  
-pack[classidx].type = class;  
-prevclass = class;  
if (++classidx >= max_classes) {  
@@ -169,10 +170,10 @@  
}  
}  

-ent->addr = addr;  
-ent->data = av->data;  
-ent->count = 1;  
-ent->pitch = 1;  
+init->addr = addr;  
+init->data = av->data;  
+init->count = 1;  
+init->pitch = 1;  
}  

*ppack = pack;  
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/gm200.c  
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/gm200.c  
@@ -213,6 +213,7 @@  
 .init_rop_active_fbps = gm200_gr_init_rop_active_fbps,  
 .init_ppc_exceptions = gk104_gr_init_ppc_exceptions,  
 .rops = gm200_gr_rops,  
+.tpc_nr = 4,
.ppc_nr = 2,
grctx = &gm200_grctx,
.sclass = {
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp100.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp100.c
@@ -164,6 +164,8 @@
 .init_ppc_exceptions = gk104_gr_init_ppc_exceptions,
 .init_num_active_ltc = gp100_gr_init_num_active_ltc,
 .rops = gm200_gr_rops,
+.gpc_nr = 6,
+.tpc_nr = 5,
 .ppc_nr = 2,
grctx = &gp100_grctx,
.sclass = {
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp102.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp102.c
@@ -49,6 +49,8 @@
 .init_swdx_pes_mask = gp102_gr_init_swdx_pes_mask,
 .init_num_active_ltc = gp100_gr_init_num_active_ltc,
 .rops = gm200_gr_rops,
+.gpc_nr = 6,
+.tpc_nr = 5,
 .ppc_nr = 3,
grctx = &gp102_grctx,
.sclass = {
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp107.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp107.c
@@ -35,6 +35,8 @@
 .init_swdx_pes_mask = gp102_gr_init_swdx_pes_mask,
 .init_num_active_ltc = gp100_gr_init_num_active_ltc,
 .rops = gm200_gr_rops,
+.gpc_nr = 2,
+.tpc_nr = 3,
 .ppc_nr = 1,
grctx = &gp107_grctx,
.sclass = {
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp10b.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/engine/gr/gp10b.c
@@ -41,6 +41,8 @@
 .init_ppc_exceptions = gk104_gr_init_ppc_exceptions,
 .init_num_active_ltc = gp10b_gr_init_num_active_ltc,
 .rops = gm200_gr_rops,
+.gpc_nr = 1,
+.tpc_nr = 2,
 .ppc_nr = 1,
grctx = &gp102_grctx,
.sclass = {
 --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/bar/gf100.c
bar_len = device->func->resource_size(device, bar_nr);
+if (!bar_len)
+return -ENOMEM;
if (bar_nr == 3 && !bar->bar2_halve)
bar_len >>= 1;

/* BAR2 */
start = 0x0100000000ULL;
-limit = start + device->func->resource_size(device, 3);
+size = device->func->resource_size(device, 3);
+if (!size)
+return -ENOMEM;
+limit = start + size;

ret = nvkm_vmm_new(device, start, limit - start, NULL, 0, &bar2_lock, "bar2", &bar->bar2_vmm);
@@ -164,10 +167,15 @@
/* BAR1 */
start = 0x0000000000ULL;
-limit = start + device->func->resource_size(device, 1);
+size = device->func->resource_size(device, 1);
+if (!size)
+return -ENOMEM;
+limit = start + size;

ret = nvkm_vmm_new(device, start, limit - start, NULL, 0, &bar1_lock, "bar1", &bar->bar1_vmm);
+if (ret)
+return ret;
atomic_inc(&bar->bar1_vmm->engref[NVKM_SUBDEV_BAR]);
bar->bar1_vmm->debug = bar->base.subdev.debug;

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/bios/shadow.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/bios/shadow.c
@@ -75,7 +75,7 @@
 nvkm_debug(subdev, "%08x: type %02x, %d bytes\n",
     image.base, image.type, image.size);

-    if (!shadow_fetch(bios, mthd, image.size)) {
-+    if (!shadow_fetch(bios, mthd, image.base + image.size)) {
 nvkm_debug(subdev, "%08x: fetch failed\n", image.base);
    return 0;
 }

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/bios/shadowpci.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/bios/shadowpci.c
@@ -101,9 +101,13 @@
   else
     return ERR_PTR(-ENODEV);
 else
     return ERR_PTR(ret);
 }

+static void
+platform_fini(void *data)
+{
+  struct priv *priv = data;
+  iounmap(priv->rom);
+  kfree(priv);
+}
+const struct nvbios_source
+nvbios_platform = {
  .name = "PLATFORM",
  .init = platform_init,
  .fini = (void(*)(void *))kfree,
.fini = platform_fini,
.read = pciram_read,
.rw = true,
}
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/bios/volt.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/bios/volt.c
@@ -96,6 +96,8 @@
 info->min     = min(info->base,
           info->base + info->step * info->vidmask);
 info->max     = nvbios_rd32(bios, volt + 0x0e);
+if (!info->max)
+  info->max = max(info->base, info->base + info->step * info->vidmask);
 break;
 case 0x50:
  info->min     = nvbios_rd32(bios, volt + 0x0a);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/devinit/gm200.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/devinit/gm200.c
@@ -158,7 +158,8 @@
 }
/* load and execute some other ucode image (bios therm?) */
-return pmu_load(init, 0x01, post, NULL, NULL);
+pmu_load(init, 0x01, post, NULL, NULL);
+return 0;
}
static const struct nvkm_devinit_func
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/fb/gddr3.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/fb/gddr3.c
@@ -87,7 +87,7 @@
 WR  = (ram->next->bios.timing[2] & 0x007f0000) >> 16;
 /* XXX: Get these values from the VBIOS instead */
 DLL = !(ram->mr[1] & 0x1);
-RON = !(ram->mr[1] & 0x300) >> 8;
+RON = !((ram->mr[1] & 0x300) >> 8);
 break;
 default:
 return -ENOSYS;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/aux.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/aux.c
@@ -40,8 +40,7 @@
 u8 *ptr = msg->buf;
 while (remaining) {
    u8 cnt = (remaining > 16) ? 16 : remaining;
-    u8 cmd;
+    u8 cnt, retries, cmd;

if (msg->flags & I2C_M_RD)
    cmd = 1;
@@ -51,10 +50,19 @@
if (mcnt || remaining > 16)
    cmd |= 4; /* MOT */

-ret = aux->func->xfer(aux, true, cmd, msg->addr, ptr, &cnt);
-if (ret < 0) {
    nvkm_i2c_aux_release(aux);
    return ret;
+for (retries = 0, cnt = 0;
+     retries < 32 && !cnt;
+     retries++) {
+    cnt = min_t(u8, remaining, 16);
+    ret = aux->func->xfer(aux, true, cmd,
+        msg->addr, ptr, &cnt);
+    if (ret < 0)
+        goto out;
+    }
+    if (!cnt) {
+        AUX_TRACE(aux, "no data after 32 retries");
+        ret = -EIO;
+        goto out;
    }
}

ptr += cnt;
@@ -64,8 +72,10 @@
msg++;
}

+ret = num;
+out:
+nvkm_i2c_aux_release(aux);
-return num;
+return ret;
}

static u32
@@ -105,9 +115,15 @@
{
    struct nvkm_i2c_pad *pad = aux->pad;
    int ret;
    +
    AUX_TRACE(aux, "acquire");
    mutex_lock(&aux->mutex);
    -ret = nvkm_i2c_pad_acquire(pad, NVKM_I2C_PAD_AUX);
    +
    +if (aux->enabled)
+ret = nvkm_i2c_pad_acquire(pad, NVKM_I2C_PAD_AUX);
+else
+ret = -EIO;
+
+if (ret)
+mutex_unlock(&aux->mutex);
+return ret;
+
+void
+nvkm_i2c_aux_init(struct nvkm_i2c_aux *aux)
+{
++AUX_TRACE(aux, "init");
+mutex_lock(&aux->mutex);
+aux->enabled = true;
+mutex_unlock(&aux->mutex);
+}
+
+void
+nvkm_i2c_aux_fini(struct nvkm_i2c_aux *aux)
+{
++AUX_TRACE(aux, "fini");
+mutex_lock(&aux->mutex);
+aux->enabled = false;
+mutex_unlock(&aux->mutex);
+}
+
+int
+nvkm_i2c_aux_ctor(const struct nvkm_i2c_aux_func *func,
+struct nvkm_i2c_pad *pad, int id,
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/aux.h
+int nvkm_i2c_aux_new_(const struct nvkm_i2c_aux_func *, struct nvkm_i2c_pad *,
++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/aux.h
int nvkm_i2c_aux_xfer(struct nvkm_i2c_aux *, bool retry, u8 type,
int id, struct nvkm_i2c_aux_func *, struct nvkm_i2c_pad *,
void nvkm_i2c_aux_del(struct nvkm_i2c_aux **);
+void nvkm_i2c_aux_init(struct nvkm_i2c_aux *);
+void nvkm_i2c_aux_fini(struct nvkm_i2c_aux *);
int nvkm_i2c_aux_xfer(struct nvkm_i2c_aux *, bool retry, u8 type,
  u32 addr, u8 *data, u8 *size);

+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/auxg94.c
if (retries)
  udelay(400);
-/* transaction request, wait up to 1ms for it to complete */
+/* transaction request, wait up to 2ms for it to complete */
nvkm_wr32(device, 0x00e4e4 + base, 0x00010000 | ctrl);

timeout = 1000;
+timeout = 2000;
do {
  ctrl = nvkm_rd32(device, 0x00e4e4 + base);
  udelay(1);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/auxgm200.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/auxgm200.c
@@ -33,7 +33,7 @@
 gm200_i2c_aux_fini(struct gm200_i2c_aux *aux)
 {
   struct nvkm_device *device = aux->base.pad->i2c->subdev.device;
-  nvkm_mask(device, 0x00d954 + (aux->ch * 0x50), 0x00310000, 0x00000000);
+  nvkm_mask(device, 0x00d954 + (aux->ch * 0x50), 0x00710000, 0x00000000);
 }

 static int
@@ -54,10 +54,10 @@
 AUX_ERR(&aux->base, "begin idle timeout %08x", ctrl);
 return -EBUSY;
 }
-} while (ctrl & 0x03010000);
+} while (ctrl & 0x07010000);

 /* set some magic, and wait up to 1ms for it to appear */
-  nvkm_mask(device, 0x00d954 + (aux->ch * 0x50), 0x00300000, ureq);
+  nvkm_mask(device, 0x00d954 + (aux->ch * 0x50), 0x00700000, ureq);
timeout = 1000;
do {
  ctrl = nvkm_rd32(device, 0x00d954 + (aux->ch * 0x50));
@@ -67,7 +67,7 @@
 gm200_i2c_aux_fini(aux);
 return -EBUSY;
 }
-} while ((ctrl & 0x03000000) != urep);
+} while ((ctrl & 0x07000000) != urep);

 return 0;
 }
@@ -118,10 +118,10 @@
 if (retries)
   udelay(400);

-/* transaction request, wait up to 1ms for it to complete */
+/* transaction request, wait up to 2ms for it to complete */
+nvkm_wr32(device, 0x00d954 + base, 0x00010000 | ctrl);
+
+timeout = 1000;
++timeout = 2000;
+do {
+ctrl = nvkm_rd32(device, 0x00d954 + base);
+udelay(1);
+--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/base.c
++++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/base.c
@@ -160,8 +160,18 @@
+struct nvkm_i2c_pad *pad;
+struct nvkm_i2c_bus *bus;
+struct nvkm_i2c_aux *aux;
+u32 mask;
+
+list_for_each_entry(aux, &i2c->aux, head) {
+nvkm_i2c_aux_fini(aux);
+}
+
+list_for_each_entry(bus, &i2c->bus, head) {
+nvkm_i2c_bus_fini(bus);
+}
+
+if ((mask = (1 << i2c->func->aux) - 1), i2c->func->aux_stat) {
+i2c->func->aux_mask(i2c, NVKM_I2C_ANY, mask, 0);
+i2c->func->aux_stat(i2c, &mask, &mask, &mask, &mask);
@@ -175,11 +185,31 @@
}

static int
+nvkm_i2c_preinit(struct nvkm_subdev *subdev)
+{
+struct nvkm_i2c *i2c = nvkm_i2c(subdev);
+struct nvkm_i2c_bus *bus;
+struct nvkm_i2c_pad *pad;
+
+/*
+ * We init our i2c busses as early as possible, since they may be
+ * needed by the vbios init scripts on some cards
+ */
+list_for_each_entry(pad, &i2c->pad, head)
+nvkm_i2c_pad_init(pad);
+list_for_each_entry(bus, &i2c->bus, head)
+nvkm_i2c_bus_init(bus);
+}
+static int
nvkm_i2c_init(struct nvkm_subdev *subdev)
{
    struct nvkm_i2c *i2c = nvkm_i2c(subdev);
    struct nvkm_i2c_bus *bus;
    struct nvkm_i2c_pad *pad;
    struct nvkm_i2c_aux *aux;

    list_for_each_entry(pad, &i2c->pad, head) {
        nvkm_i2c_pad_init(pad);
@ -189,6 +219,10 @@
        nvkm_i2c_bus_init(bus);
    }

+    list_for_each_entry(aux, &i2c->aux, head) {
+        nvkm_i2c_aux_init(aux);

+    return 0;
+}

@@ -223,6 +257,7 @@
    static const struct nvkm_subdev_func
    nvkm_i2c = {
        .dtor = nvkm_i2c_dtor,
@ -223,6 +257,7 @@
        .init = nvkm_i2c_init,
        .fini = nvkm_i2c_fini,
        .intr = nvkm_i2c_intr,
        --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/bus.c
        +++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/bus.c
        @ -110,6 +110,19 @@
        BUS_TRACE(bus, "init");
        if (bus->func->init)
            bus->func->init(bus);
            +mutex_lock(&bus->mutex);
            +bus->enabled = true;
            +mutex_unlock(&bus->mutex);
+    }
+}
+}
+void
+nvkm_i2c_bus_fini(struct nvkm_i2c_bus *bus)
+{
+    BUS_TRACE(bus, "fini");
mutex_lock(&bus->mutex);
+bus->enabled = false;
+mutex_unlock(&bus->mutex);
}

void
@@ -126,9 +139,15 @@
{
    struct nvkm_i2c_pad *pad = bus->pad;
    int ret;
    +
    BUS_TRACE(bus, "acquire");
    mutex_lock(&bus->mutex);
    -ret = nvkm_i2c_pad_acquire(pad, NVKM_I2C_PAD_I2C);
    +if (bus->enabled)
    +ret = nvkm_i2c_pad_acquire(pad, NVKM_I2C_PAD_I2C);
    +else
    +ret = -EIO;
    +
    if (ret)
        mutex_unlock(&bus->mutex);
    return ret;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/bus.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/i2c/bus.h
@@ -18,6 +18,7 @@
    int id, struct nvkm_i2c_bus **);
    void nvkm_i2c_bus_del(struct nvkm_i2c_bus **);
    void nvkm_i2c_bus_init(struct nvkm_i2c_bus *);
    +void nvkm_i2c_bus_fini(struct nvkm_i2c_bus *);

    int nvkm_i2c_bit_xfer(struct nvkm_i2c_bus *, struct i2c_msg *, int);

--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/ibus/gf100.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/ibus/gf100.c
@@ -22,6 +22,7 @@
       * Authors: Ben Skeggs
       */
#include "priv.h"
+#include <subdev/timer.h>

    static void
gf100_ibus_intr_hub(struct nvkm_subdev *ibus, int i)
@@ -31,7 +32,6 @@
       u32 data = nvkm_rd32(device, 0x122124 + (i * 0x0400));
       u32 stat = nvkm_rd32(device, 0x122128 + (i * 0x0400));
    nvkm_debug(ibus, "HUB%d: %06x %08x (%08x)n", i, addr, data, stat);
    -nvkm_mask(device, 0x122128 + (i * 0x0400), 0x00000200, 0x00000000);
static void
@@ -42,7 +42,6 @@
u32 data = nvkm_rd32(device, 0x124124 + (i * 0x0400));
u32 stat = nvkm_rd32(device, 0x124128 + (i * 0x0400));
nvkm_debug(ibus, "ROP%d: %06x %08x (%08x)n", i, addr, data, stat);
-nvkm_mask(device, 0x124128 + (i * 0x0400), 0x00000200, 0x00000000);
}

static void
@@ -53,7 +52,6 @@
u32 data = nvkm_rd32(device, 0x128124 + (i * 0x0400));
u32 stat = nvkm_rd32(device, 0x128128 + (i * 0x0400));
nvkm_debug(ibus, "GPC%d: %06x %08x (%08x)n", i, addr, data, stat);
-nvkm_mask(device, 0x128128 + (i * 0x0400), 0x00000200, 0x00000000);
}

void
@@ -90,6 +88,12 @@
intrl &= ~stat;
}
}
+
+nvkm_mask(device, 0x121c4c, 0x0000003f, 0x00000002);
+nvkm_msec(device, 2000,
+if (!(nvkm_rd32(device, 0x121c4c) & 0x0000003f))
+break;
+);
}

static int
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/ibus/gk104.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/ibus/gk104.c
@@ -22,6 +22,7 @@
* Authors: Ben Skeggs
*/
#include "priv.h"
+#include <subdev/timer.h>

static void
gk104_ibus_intr_hub(struct nvkm_subdev *ibus, int i)
@@ -31,7 +32,6 @@
u32 data = nvkm_rd32(device, 0x122124 + (i * 0x0800));
u32 stat = nvkm_rd32(device, 0x122128 + (i * 0x0800));
nvkm_debug(ibus, "HUB%d: %06x %08x (%08x)n", i, addr, data, stat);
-nvkm_mask(device, 0x122128 + (i * 0x0800), 0x00000200, 0x00000000);
static void
@@ -42,7 +42,6 @@
    u32 data = nvkm_rd32(device, 0x124124 + (i * 0x0800));
    u32 stat = nvkm_rd32(device, 0x124128 + (i * 0x0800));
    nvkm_debug(ibus, "ROP%d: %06x %08x (%08x)
", i, addr, data, stat);
-    nvkm_mask(device, 0x124128 + (i * 0x0800), 0x00000200, 0x00000000);
}

static void
@@ -53,7 +52,6 @@
    u32 data = nvkm_rd32(device, 0x128124 + (i * 0x0800));
    u32 stat = nvkm_rd32(device, 0x128128 + (i * 0x0800));
    nvkm_debug(ibus, "GPC%d: %06x %08x (%08x)
", i, addr, data, stat);
-    nvkm_mask(device, 0x128128 + (i * 0x0800), 0x00000200, 0x00000000);
}

void
@@ -90,6 +88,12 @@
   intr1 &= ~stat;
   }
   }
+    nvkm_mask(device, 0x12004c, 0x0000003f, 0x00000002);
+    nvkm_msec(device, 2000,
+        if (!(nvkm_rd32(device, 0x12004c) & 0x0000003f))
+            break;
+    )
;

static int
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/mmu/base.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/mmu/base.c
@@ -316,9 +316,9 @@
{
    struct nvkm_device *device = mmu->subdev.device;
    struct nvkm_mm *mm = &device->fb->ram->vram;
-    const u32 sizeN = nvkm_mm_heap_size(mm, NVKM_RAM_MM_NORMAL);
-    const u32 sizeU = nvkm_mm_heap_size(mm, NVKM_RAM_MM_NOMAP);
-    const u32 sizeM = nvkm_mm_heap_size(mm, NVKM_RAM_MM_MIXED);
+    const u64 sizeN = nvkm_mm_heap_size(mm, NVKM_RAM_MM_NORMAL);
+    const u64 sizeU = nvkm_mm_heap_size(mm, NVKM_RAM_MM_NOMAP);
+    const u64 sizeM = nvkm_mm_heap_size(mm, NVKM_RAM_MM_MIXED);
    u8 type = NVKM_MEM_KIND * !!mmu->func->kind;
    u8 heap = NVKM_MEM_VRAM;
    int heapM, heapN, heapU;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/mmu/vmm.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/mmu/vmm.c

tail = this->addr + this->size;
if (vmm->func->page_block && next && next->page != p)
-tail = ALIGN_DOWN(addr, vmm->func->page_block);
+tail = ALIGN_DOWN(tail, vmm->func->page_block);

if (addr <= tail && tail - addr >= size) {
rb_erase(&this->tree, &vmm->free);
}

void
nvkm_vmm_part(struct nvkm_vmm *vmm, struct nvkm_memory *inst)
{
- if (vmm->func->part && inst) {
+ if (inst && vmm && vmm->func->part) {
 mutex_lock(&vmm->mutex);
 vmm->func->part(vmm, inst);
 mutex_unlock(&vmm->mutex);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/fuc/gf100.fuc3.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/fuc/gf100.fuc3.h
@@ -47,8 +47,8 @@
 0x00000000,
 0x00000000,
 0x584d454d,
-0x00000756,
-0x00000748,
+0x00000754,
+0x00000746,
 0x00000000,
 0x00000000,
 0x00000000,
@@ -69,8 +69,8 @@
 0x00000000,
 0x00000000,
 0x46524550,
-0x0000075a,
+0x00000758,
 0x00000000,
 0x00000000,
 0x00000000,
@@ -91,8 +91,8 @@
 0x00000000,
 0x00000000,
 0x5433249,
-0x00000b8a,
-0x00000a2d,
+0x00000b88,
+0x00000a2b,  
0x00000000,  
0x00000000,  
0x00000000,  
@@ -113,8 +113,8 @@  
0x00000000,  
0x00000000,  
0x54534554,  
-0x00000bb3,  
-0x00000b8c,  
+0x00000bb1,  
+0x00000b8a,  
0x00000000,  
0x00000000,  
0x00000000,  
@@ -135,8 +135,8 @@  
0x00000000,  
0x00000000,  
0x454c4449,  
-0x00000bbf,  
0x00000bbd,  
+0x00000bbb,  
0x00000000,  
0x00000000,  
0x00000000,  
@@ -237,19 +237,19 @@  
0x0000005d3,  
0x00000003,  
0x00000002,  
-0x0000069d,  
+0x00000069b,  
0x00040004,  
0x00000000,  
-0x000006b9,  
+0x000006b7,  
0x00010005,  
0x00000000,  
-0x000006d6,  
+0x0000006d4,  
0x00010006,  
0x00000000,  
0x0000065b,  
0x00000007,  
0x00000000,  
-0x000006e1,  
+0x0000006df,  
/* 0x03c4: memx_func_tail */  
/* 0x03c4: memx_ts_start */
0x00000000,
@@ -1373,432 +1373,432 @@
/* 0x065b: memx_func_wait_vblank */
0x9800f440,
0x66b00016,
-0x130bf400,
+0x120bf400,
0xf40166b0,
0xe0f406b0,
/* 0x066d: memx_func_wait_vblank_head1 */
-0x2077f12e,
-0x070ef400,
-/* 0x0674: memx_func_wait_vblank_head0 */
-0x000877f1,
-/* 0x0678: memx_func_wait_vblank_0 */
-0x07c467f1,
-0xcf0664b6,
-0x67fd0066,
-0xf31bf404,
-/* 0x0688: memx_func_wait_vblank_1 */
-0x07c467f1,
-0xcf0664b6,
-0x67fd0066,
-0xf30bf404,
-/* 0x0698: memx_func_wait_vblank_fini */
-0xf80410b6,
-/* 0x069d: memx_func_wr32 */
-0x00169800,
-0x86011598,
-0x60f90810,
-0x0f0c5099,
-0x21f4e0fc,
-0x0242b640,
-0xf8e91bf4,
-/* 0x06b9: memx_func_wait */
-0x2c87f000,
-0xcf0684b6,
-0x1e980088,
-0x011d9800,
-0x98021b98,
-0xa321f410,
-/* 0x06d6: memx_func_delay */
-0x1e9800f8,
-0x0410b600,
-0x87e21f4,
-/* 0x06e1: memx_func_train */
-/* 0x06e3: memx_exec */
-0xf900f800,
-0xb9d0f9e0,
-0xb2b902c1,

/* 0x06ed: memx_exec_next */
-0x00139802,
-0xc70410b6,
-0xe701f034,
-0xeb601e033,
-0xe30f00132,
-0xe3de35980c,
-0xe312b855f9,
-0xe3e41ef406,
-0xe398f1b98,
-0xe3cbbbf20c,
-0xe3c4bb7f102,
-0xe306b4b607,
-0xe30fc0bbbf,
-0xe30f5ef0cd0,
-0xe3f8033621,

/* 0x0729: memx_info */
-0xe301c67000,

/* 0x072f: memx_info_data */
-0xe3f10e0bf4,
-0xe3f103ccc7,
-0xe3f40800b7,

/* 0x073a: memx_info_train */
-0xe3xc7f1b0e,
-0xe3xb7f1b0ec,

/* 0x0742: memx_info_send */
-0xe3x2f1f50100,
-0xe3x00f80336,

/* 0x0748: memx_recv */
-0xe3xf401d6b0,
-0xe3xd690980b,
-0xe3xd80bf400,

/* 0x0756: memx_init */
-0xe3x00f800f8,

/* 0x0758: perf_recv */
/* 0x075a: perf_init */
+0xe3x2077f02c,

/* 0x0673: memx_func_wait_vblank_head0 */
+0xe3x0f0060ef4,

/* 0x0676: memx_func_wait_vblank_0 */
+0xe3x67f108777,
+0xe3x64b607e4,
+0xe3x0066cf06,
+0xe3xf40467fd,

/* 0x0686: memx_func_wait_vblank_1 */

---

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+0x7000f803,
+0x0bf401c6,
+/* 0x072d: memx_info_data */
+0xccc7f10e,
+0x0b7f103,
+0x0b0ef408,
+/* 0x0738: memx_info_train */
+0x0bccc7f1,
+0x0100b7f1,
+/* 0x0740: memx_info_send */
+0x033621f5,
+/* 0x0746: memx_recv */
+0xd6b000f8,
+0x980bf401,
+0xf400d6b0,
+0x0f8d80b,
+/* 0x0754: memx_init */
+/* 0x0756: perf_recv */
0x00f800f8,
+/* 0x075c: i2c_drive_scl */
-0xf40036b0,
-0x07f1110b,
-0x04b607e0,
-0x0001d006,
-0x00f804bd,
+/* 0x0770: i2c_drive_scl_lo */
-0x07e407f1,
-0xd00604b6,
-0x04bd0001,
-/* 0x077e: i2c_drive_sda */
+/* 0x0758: perf_init */
+/* 0x075a: i2c_drive_scl */
0x36b000f8,
0x110bf400,
0x07e007f1,
0xd00604b6,
-0x04bd0002,
+/* 0x077c: i2c_drive_sda */
+0x04bd0001,
+/* 0x076e: i2c_drive_scl_lo */
0x07f100f8,
0x04b607e4,
+0x0001d006,
+0x00f804bd,
+/* 0x077c: i2c_drive_sda */
+0xf40036b0,
+0x07f1110b,
+0x04b607e0,
0x0002d006,
0x00f804bd,
/* 0x07a0: i2c_sense_scl */
-0xf10132f4,
-0xb607c437,
-0x33cf0634,
-0x0431fd00,
-0xf4060bf4,
/* 0x07b6: i2c_sense_scl_done */
-0x00f80131,
/* 0x07b8: i2c_sense_sda */
-0xf10132f4,
-0xb607c437,
-0x33cf0634,
-0x0432fd00,
-0xf4060bf4,
/* 0x07ce: i2c_sense_sda_done */
-0x00f80131,
/* 0x07d0: i2c_raise_scl */
-0x47f140f9,
-0x37f00898,
-0x5c21f501,
/* 0x07dd: i2c_raise_scl_wait */
-0xe8e7f107,
-0x7e21f403,
-0x07a021f5,
-0xb60901f4,
-0x1bf40142,
/* 0x07f1: i2c_raise_scl_done */
-0xf840fcef,
/* 0x07f5: i2c_start */
-0xa021f500,
-0x0d11f407,
-0x07b821f5,
-0xf40611f4,
/* 0x0806: i2c_start_rep */
-0x37f0300e,
-0x5c21f500,
-0x0137f007,
-0x077e21f5,
-0xb60076bb,
-0x50f90465,
-0xbb046594,
-0x50bd0256,
-0x5c0475fd,
-0xd021f550,
-0x464b607,
/* 0x0833: i2c_start_send */
-0xf01f11f4,
+/* 0x0790: i2c_drive_sda_lo */
+0x07e407f1,
+0xd00604b6,
+0x04bd0002,
+/* 0x079e: i2c_sense_scl */
+0x32f400f8,
+0xc437f101,
+0x0634b607,
+0xf0d0033cf,
+0x0bf40431,
+0x0131f406,
+/* 0x07b4: i2c_sense_scl_done */
+/* 0x07b6: i2c_sense_sda */
+0x32f400f8,
+0xc437f101,
+0x0634b607,
+0xf0d0033cf,
+0x0bf40432,
+0x0131f406,
+/* 0x07cc: i2c_sense_sda_done */
+/* 0x07ce: i2c_raise_scl */
+0x40f900f8,
+0x089847f1,
+0xf50137f0,
+/* 0x07db: i2c_raise_scl_wait */
+0xf1075a21,
+0x21f50d11,
+0x11f40774,
+0x0142b609,
+/* 0x07ef: i2c_raise_scl_done */
+0x40f900f8,
+/* 0x07f3: i2c_start */
+0xf500f840,
+0x40f9079e,21,
+0x21f50d11,
+0x11f407b6,
+0x300ef406,
+/* 0x0804: i2c_start_rep */
+0xf50037f0,
+0xf0075a21,
+0x21f50137,
+0x76bb077c,
+0x0465b600,
+0x659450f9,
+0x0256bb04,
+0x75fd50bd,
-0x00f80131,
-0x04659450,
-0x0475fd50,
-0x21f550fc,
-0x64b608c5,
+/* 0x0910: i2c_get_byte_next */
+0xbb0154b6,
+0x65b60076,
+0x9450f904,
+0x56bb0465,
+0xfd50bd02,
+0x50f90465,
+0x088421f5,
+0x08321f5,
+0xf40464b6,
+0x46b03411,
+0xd81bf400,
+0xb60076bb,
+0x50f90465,
+0xbb0154b6,
+0x65b60076,
+0x9450f904,
+0x56bb0465,
+0xfd50bd02,
+0x50f90465,
+0x088421f5,
+0x08321f5,
+0xf40464b6,
+0x46b03411,
+0xd81bf400,
+0xb60076bb,
+0x50f90465,
+0xbb0154b6,
-0x64b607f5,
-0x2911f404,
-0x012ec3e7,
-0xfd0134b6,
-0x76bb0553,
+0x64b60882,
+0x3411f404,
+0xf40046b0,
+0x76bbd81b,
0x0465b600,
0x659450f9,
0x0256bb04,
0x75fd50bd,
0xf550fc04,
-0xb6095e21,
-/* 0x09fe: i2c_addr_done */
-0x00180464,
-/* 0x0a00: i2c_acquire_addr */
-0xb6f8cec7,
-0xe0b702e4,
-0xee980d1c,
-/* 0x0a0f: i2c_acquire */
-0xf500f800,
-0xf40a0021,
-0xd9f00421,
-0x4021f403,
-/* 0x0a1e: i2c_release */
-0x21f500f8,
-0x21f40a00,
-0x03daa004,
-0xf84021f4,
-/* 0x0a2d: i2c_recv */
-0x0132f400,
-0xb6f8c1c7,
-0x16b00214,
-0x3a1f528,
-0xf413a001,
-0x0032980c,
-0x0cccc13a0,
-0xf403198,
-0xd0f90231,
-0xd0f9e0f9,
-0x000067f1,
-0x100063f1,
-0xbb016792,
+0xb608c321,
+0x11f40464,
+0x0076bb0f,
+0xf40136b0,
+0x32f4061b,
+/* 0x09b5: i2c_put_byte_done */
+/* 0x09b7: i2c_addr */
+0xbb00f801,
0x65b60076,
0x9450f904,
0x56bb0465,
0xfd50bd02,
0x50fc0475,
-0x0a0f21f5,
-0xfc0464b6,
-0x00d6b0d0,
-0x00b31bf5,
-0xbb0057f0,
-0x65b60076,
-0x9450f904,
-0x56bb0465,
-0xfd50bd02,
-0x50fc0475,
-0x09b921f5,
-0xf50464b6,
-0xc700d011,
-0x76bbe0c5,
-0x0465b600,
-0x659450f9,
-0x0256bb04,
-0x75fd50bd,
-0xf550fc04,
-0xb6095e21,
-0x11f50464,
-0x57f000ad,
+0x07f321f5,
+0xf40464b6,
+0xc3e72911,
+0x34b6012e,
+0x0553fd01,
+0xb60076bb,
+0x50f90465,
+0xbb046594,
+0x50bd0256,
+0xfc0475fd,
+0x5e21f550,
+0x0464b609,
+/* 0x09fc: i2c_addr_done */
+/* 0x09fe: i2c_acquire_addr */
+0xcec700f8,
+0x02e4b6f8,
+0xe0c5c700,
+0xb60076bb,
+0x50f90465,
+0xbb046594,
+0x50bd0256,
+0xfc0475fd,
+0x5c21f550,
+0x0464b609,
+0x00ad11f5,
+0xbb0157f0,
0x65b60076,
0x9450f904,
0x56bb0465,
0xfd50bd02,
0x50fc0475,
-0x085121f5,
-0xb90464b6,
-0x74bd025b,
/* 0x0b33: i2c_recv_not_rd08 */
-0xb0430ef4,
-0x1bf401d6,
-0x0057f03d,
-0x09b921f5,
-0xc73311f4,
-0x21f5e0c5,
-0x11f4095e,
-0x0057f029,
-0x09b921f5,
-0xc71f11f4,
-0x21f5e0b5,
-0x11f4095e,
-0x5121f515,
-0xc774bd08,
-0x1bf408c5,
-0x0232f409,
/* 0x0b73: i2c_recv_not_wr08 */
/* 0x0b73: i2c_recv_done */
-0xc7030ef4,
-0x21f5f8ce,
-0xe0fc0a1e,
-0x1bf4d0fc,
-0x027cb90a,
-0x033621f5,
/* 0x0b88: i2c_recv_exit */
/* 0x0b8a: i2c_init */
-0x00f800f8,
/* 0x0b8c: test_recv */
-0x05d817f1,
/* 0x0b31: i2c_recv_not_rd08 */
+0x01d6b043,
+0xf03d1bf4,
+0x21f50057,
+0x11f409b7,
+0xe0c5c733,
+0x095c21f5,
+0xf02911f4,
+0x21f50057,
+0x11f409b7,
+0xe0b5c71f,
+0x095c21f5,
+0xf51511f4,
+0xbd084f21,
+0x08c5c774,
+0xf4091bf4,
+0x0ef40232,

/* 0x0b71: i2c_recv_not_wr08 */
+0xf8cec703,
+0x0a1c21f5,
+0xd0fce0fc,
+0xb90a12f4,
+0x21f5027c,

/* 0x0b86: i2c_recv_exit */
+0x00f80336,

/* 0x0b88: i2c_init */
/* 0x0b8a: test_recv */
-0xf40911f4,
-0x0ef40231,
/* 0x0bf5: idle_proc_next */
-0x5810b6ef,
-0xf4061fb8,
-0x02f4e61b,
-0x0028f4dd,
-0x00bb0ef4,
/+/* 0x0bd9: idle_loop */
+0x5817f004,
/+/* 0x0bdf: idle_proc */
/+/* 0x0bdf: idle_proc_exec */
+0xf90232f4,
+0x021eb910,
+0x033f21f5,
+0x11f410fc,
+0x0231f409,
/+/* 0xbf3: idle_proc_next */
+0xb6ef0ef4,
+0x1fb85810,
+0xe61bf406,
+0xf4dd02f4,
+0x0ef40028,
+0x000000bb,
0x00000000,
0x00000000,
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/fuc/gk208.fuc5.h
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/fuc/gk208.fuc5.h
@@ -47,8 +47,8 @@
0x00000000,
0x00000000,
0x46524550,
-0x0000005f7,
-0x0000005f5,
+0x0000005f2,
+0x0000005f0,
0x00047e6e,
0xfd8b200,
0xf8000000,
0xf960f905,
0xcfd0f80,
0x002d7ee0,
0x0aa24700,
0x0476eb216,
0x02000004,
0x0587fdd8,
0x80f960f9,
0x0fd0fc80,
0x000047e,
0x87fdd8b2,
0x60f90587,
0xd0fc80f9,
0x2d7ee0fc,
0x67f10000,
0x6eb21620,
0x00000047e,
0x87fdd8b2,
0x0476eb216,
0xd88b20000,
0xf960f905,
0xc80f960,
0x7ee0fc80,
0xf8000002d,

/* 0x0541: memx_func_wait_vblank */
+0x20460000,
+0x7e6eb216,
+0x2000004,
+0x0587fdd8,
+0x80f960f9,
+0xe0fc80,
+0x002d7e,
+0x0aa24700,
+0xf800002d,
+0x0a24700,
+0xb2000004,
+0x0587fdd8,
+0x2d7ee0fc,
+0x000047e6e,
+0x87fdd8b2,
+0x60f90587,
+0xfd8b200,
+0x0476eb216,
+0x021c9801,
+0xb6001e98,
+0x587e0410,
+0x00f80000,
+/* 0x0578: memx_func_delay */
+0xb6001e98,
+0x587e0410,
+0x00f80000,
+/* 0x0584: memx_func_train */
+/* 0x0586: memx_exec */
+0xe0f900f8,
+0xc1b2d0f9,
+/* 0x058e: memx_exec_next */
+0x1398b2b2,
0x0410b600,
+/* 0x0546: memx_func_wr32 */
-0x169800f8,
-0x01159800,
-0xf90810b6,
-0xfc50f960,
-0x01f034e7,
+0x01e033e7,
+0xf00132b6,
+0x35980c30,
+0xa655f9de,
+0xe51ef412,
+0x98f10b98,
+0xcbbbf20c,
+0x07c44b02,
+0xfc00bbcf,
0x7ee0fcd0,
-0xb600002d,
-0x1bf40242,
+/* 0x0563: memx_func_wait */
-0x0800f8e8,
-0x0088cf2c,
-0x98001e98,
-0x1c98011d,
-0x031b9802,
-0x7e1010b6,
-0xf8000074,
+/* 0x057d: memx_func_delay */
-0x001e9800,
-0x7e0410b6,
-0xf8000058,
+/* 0x0589: memx_func_train */
+/* 0x058b: memx_exec */
-0x900f800,
-0xb2d0f9e0,
/* 0x0593: memx_exec_next */
-0x98b2b2c1,
-0x10b60013,
-0xf034e704,
-0x0e033e701,
-0x0132b601,
-0x980c30f0,
-0xf034e704,
-0xe033e701,
-0x0132b601,
-0x980c30f0,
-0x55f9de35,
-0x1ef412a6,
-0xf10b98e5,
-0xbbb20e98,
-0xc44b02cb,
-0x0bbbcf07,
-0xe0fcd0fc,
-0x00029f7e,
/* 0x05ca: memx_info */
-0xc67000f8,
-0x0c0bf401,
/* 0x05d0: memx_info_data */
-0x4b03cc4c,
-0x0ef40800,
/* 0x05d9: memx_info_train */
-0x0bbcc4c09,
/* 0x05df: memx_info_send */
-0x7e01004b,
0xf800029f,
/* 0x05e5: memx_recv */
-0x01d6b000,
-0x0a0a30bf4,
-0x00bf400d6,
/* 0x05f3: memx_init */
-0xf800f8dc,
/* 0x05f5: perf_recv */
/* 0x05f7: perf_init */
-0xf800f800,
/* 0x05f9: i2c_drive_scl */
-0x0036b000,
-0x400d0bf4,
-0x1ff607e0,
-0xf804bd00,
/* 0x0609: i2c_drive_scl_lo */
-0x07e44000,
-0xb0001f6,
/* 0x0613: i2c_drive_sda */
-0xb000f804,
-0x0bf40036,
-0x07e0400d,
+/* 0x05da: memx_info_send */
+0x9f7e0100,
+0x00f80002,
+/* 0x05e0: memx_recv */
+0xf401d6b0,
+0xd6b0a30b,
+0xdc0bf400,
+/* 0x05ee: memx_init */
+0x00f800f8,
+/* 0x05f0: perf_recv */
+/* 0x05f2: perf_init */
+0x00f800f8,
+/* 0x05f4: i2c_drive_scl */
+0xf40036b0,
+0xe0400d0b,
+0x0001f607,
+0x00f804bd,
+/* 0x0604: i2c_drive_scl_lo */
+0xf607e440,
+0x04bd0001,
+/* 0x060e: i2c_drive_sda */
+0x36b000f8,
+0x0d0bf400,
+0xf607e040,
+0x04bd0002,
+/* 0x061e: i2c_drive_sda_lo */
+0xe44000f8,
+0x0002f607,
+0x00f804bd,
+/* 0x0628: i2c_sense_scl */
+0x430132f4,
+0x33cf07c4,
+0x0431fd00,
+0xf4060bf4,
+/* 0x063a: i2c_sense_scl_done */
+0x00f80131,
+/* 0x063c: i2c_sense_sda */
+0x430132f4,
+0x33cf07c4,
+0x0432fd00,
+0xf4060bf4,
+/* 0x064e: i2c_sense_sda_done */
+0x00f80131,
+/* 0x0650: i2c_raise_scl */
+0x984440f9,
+0x7e010308,
+/* 0x065b: i2c_raise_scl_wait */
+0x4e0005f4,
+0x00587e03,
0x0076bb00,
0xf90465b6,
0x04659450,
0xbd0256bb,
0x0475fd50,
-0x557e50fc,
+0x507e50fc,
0x64b60006,
-0x1d11f404,
-/* 0x06b4: i2c_start_send */
-0x137e0003,
-0x884e0006,
-0x00587e13,
-0x7e000300,
-0x4e0005f9,
-0x587e1388,
-/* 0x06ce: i2c_start_out */
-0x00f80000,
-/* 0x06d0: i2c_stop */
-0xf97e0003,
-0x00030005,
-0x0006137e,
-0x7e03e84e,
+0x1711f404,
+0x7e13884e,
0x03000058,
-0x05f97e01,
+0x05f47e00,
0x13884e00,
0x0000587e,
-0x137e0103,
-0x884e0006,
-0x00587e13,
-/* 0x06ff: i2c_bitw */
-0x7e00f800,
-0x4e000613,
-0x587e03e8,
-0x76bb0000,
+/* 0x0738: i2c_bitw_out */
+/* 0x073a: i2c_bitr */
+0x010300f8,
+0x000060e7e,
+0x7e03e84e,
+0xbb000058,
+0x65b60076,
+0x9450f904,
+0x56bb0465,
+0xfd50bd02,
+0x50fc0475,
+0x0006507e,
+0xf40464b6,
+0x3c7e1a11,
+0x00030006,
+0x0005f47e,
+0x7e13884e,
+0xf0000058,
+0x31f4013c,
+/* 0x077d: i2c_bitr_done */
+/* 0x077f: i2c_get_byte */
+0x0500f801,
+/* 0x0783: i2c_get_byte_next */
+0xb6080400,
+0x76bb0154,
0x0465b600,
0x694509,
0x0256bb04,
0x75fd50bd,
0x7e50fc04,
-xb6000655,
+0xb600073a,
0x11f40464,
-x013884e17,
-x0000587e,
-x0f97e0003,
-x0884e0005,
-x000587e13,
-/* 0x073d: i2c_bitw_out */
-/* 0x073f: i2c_bitr */
-x0300f800,
-x06137e01,
-x03e84e00,
-x0000587e,
+0x0553fd2a,
+0xf40142b6,
+0x0103d81b,
0xb60076bb,
0x50f90465,
0xbb046594,
0x50bd0256,
0xfc0475fd,
-x06557e50,
+0x06fa7e50,
0x0464b600,
-x7e1a11f4,
-x03000641,
-0x05f97e00,
-0x13884e00,
-0x0000587e,
-0x4013e00,
/* 0x0782: i2c_bitr_done */
-0x00f80131,
/* 0x0784: i2c_get_byte */
-0x08040005,
/* 0x0788: i2c_get_byte_next */
-0xb80154b6,
-0x65b60076,
-0x9450904,
-0x56b0465,
-0xfd50bd02,
-0x50f0c0475,
-0x0073f7e,
-0xf40464b6,
-0x53fd2a11,
-0x0142b605,
-0x03d81bf4,
-0x0076b001,
-0xf90465b6,
-0x04659450,
-0xbd0256bb,
-0x475fd50,
-0xf75e50fc,
-0x64b60006,
/* 0x07d1: i2c_get_byte_done */
/* 0x07d3: i2c_put_byte */
-0x0400f804,
/* 0x07d5: i2c_put_byte_next */
-0x0142b608,
-0xbb3854ff,
/+* 0x07cc: i2c_get_byte_done */
/+* 0x07ce: i2c_get_byte */
+0x080400f8,
/+* 0x07d0: i2c_get_byte_next */
+0xff0142b6,
+0x76b3854,
+0x0465b600,
+0x659450f9,
+0x0256bb04,
+0x75fd50bd,
+0x5f0c0475,
+0xb60006fa,
+0x11f40464,
+0x0465034,
+0xbbd81bf4,
-0x00f80002,
-/* 0x09f8: i2c_init */
-/* 0x09fa: test_recv */
-0x584100f8,
-0x0011cf04,
-0x400110b6,
-0x01f60458,
-0xde04bd00,
-0x134fd900,
-0x0001de7e,
-/* 0x0a16: test_init */
-0x004e00f8,
-0x01de7e08,
-/* 0x0a1f: idle_recv */
+0x287e50fc,
+0x64b60008,
+0xcc11f504,
+0xe0c5c700,
+0xb60076bb,
+0x50f90465,
+0xbb046594,
+0x50bd0256,
+0xfc0475fd,
+0x07cc7e50,
+0x0464b600,
+0x00a911f5,
+0x76bb0105,
+0x0465b600,
+0x659450f9,
+0x0256bb04,
+0x75fd50bd,
+0x7e50fc04,
+0xb6000828,
+0x11f50464,
+0x76bb0087,
+0x0465b600,
+0x659450f9,
+0x0256bb04,
+0x75fd50bd,
+0x7e50fc04,
+0xb600077f,
+0x11f40464,
+0xe05bc67,
+0xb60076bb,
+0x50f90465,
+0xbb046594,
+0x50bd0256,
+0xfc0475fd,
+0x06cb7e50,  
+0x0464b600,  
+0x74bd5bb2,  
+/* 0x099f: i2c_recv_not_rd08 */  
+0xb0410ef4,  
+0x1bf401d6,  
+0x7e00053b,  
+0xf4000828,  
+0xc5c73211,  
+0x07ce7ee0,  
+0x2811f400,  
+0x287e0005,  
+0x11f40008,  
+0xe0b5c71f,  
+0x0007ce7e,  
+0x7e1511f4,  
+0xbd0006cb,  
+0x08c5c774,  
+0xf4091bf4,  
+0x0ef40232,  
+/* 0x09dd: i2c_recv_not_wr08 */  
+/* 0x09dd: i2c_recv_done */  
+0xf8cec703,  
+0x00088c7e,  
+0xd0f0c0fc,  
+0xb20912f4,  
+0x029f7e7c,  
+/* 0x09f1: i2c_recv_exit */  
+/* 0x09f3: i2c_init */  
0xf800f800,  
/* 0xa21: idle */  
-0x0031f400,  
-0xcf045441,  
-0x10b60011,  
-0x04544001,  
-0xbd0001f6,  
/* 0xa35: idle_loop */  
-0xf4580104,  
/* 0xa3a: idle_proc */  
/* 0xa3a: idle_proc_exec */  
-0x10f90232,  
-0xa87e1eb2,  
-0x10fc0002,  
-0xf40911f4,  
-0x0ef40231,  
/* 0xa4d: idle_proc_next */  
-0x5810b6f0,  
-0x1bf41fa6,
0x00000000,
0x00000000,
@@ -234,22 +234,22 @@
/* 0x037c: memx_func_next */
0x00000002,
0x00000000,
-0x000005a0,
+0x0000059f,
0x00000003,
0x00000002,
-0x00000632,
+0x0000062f,
0x00040004,
0x00000000,
-0x0000064e,
+0x0000064b,
0x00010005,
0x00000000,
-0x0000066b,
+0x00000668,
0x00010006,
0x00000000,
-0x000005f0,
+0x000005ef,
0x00010007,
0x00000000,
-0x00000676,
+0x00000673,
/* 0x03c4: memx_func_tail */
/* 0x03c4: memx_ts_start */
0x00000000,
@@ -1305,560 +1305,560 @@
0x67f102d7,
0x63f1fffc,
0x76fdffff,
-0x0267f104,
-0x0576fd00,
-0x70f980f9,
-0xe0fecd0fc,
-0xf04021f4,
+0x0267f004,
+0xf90576fd,
+0xfc70f980,
+0xf4e0fcd0,
+0x0e07f104,
+0x0604b607,
+0xbd0006d0,
-0x0067f150,
/* 0x06b5: memx_func_train_loop_inner */
-0x1187f100,
-0x9068ff11,
-0xfd109894,
-0x97f10589,
-0x93f00720,
-0xf990f910,
-0xfcd0fc80,
-0x4021f4e0,
-0x008097f1,
-0xb91093f0,
-0x21f4029e,
-0x02d8b904,
-0xf92088c5,
+0xb64021f4,
+0x1bf40242,
/* 0x064b: memx_func_wait */
+0xf000f8e9,
+0x84b62c87,
+0x0088cf06,
+0x98001e98,
+0xc98011d,
+0x031b9802,
+0xf41010b6,
+0x00f8a321,
/* 0x0668: memx_func_delay */
+0xb6001e98,
+0x21f40410,
/* 0x0673: memx_func_train */
+0xf000f87e,
+0x77f00357,
+0x0097f100,
+0x7093f000,
+0xf4029eb9,
+0xd8b90421,
+0x10e7f102,
+0x7e21f427,
/* 0x0690: memx_func_train_loop_outer */
+0x010158e0,
+0x020083f1,
+0x11e097f1,
+0xf91193f0,
+0xfc80f990,
+0xf4e0fcd0,
+0x50f94021,
/* 0x06af: memx_func_train_loop_inner */
+0xf10067f0,
+0xff111187,
+0x98949068,
+0x0589fd10,
+0x072097f1,
+0x91093f0,
0xfc80f990,
0xf4e0fc5d0,
0x97f14021,
-0x93f0053c,
-0x0287f110,
-0x0083f130,
-0xf990f980,
+0x93f00080,
+0x029eb910,
+0xb90421f4,
+0x88c502d8,
+0xf990f920,
0xfc00fc80,
0x4021f4e0,
-0x0560e7f1,
-0xf110e3f0,
-0xf10000d7,
-0x090800d3,
-0xb7f100dc,
-0xb3f08480,
-0xa321f41e,
-0x000057f1,
-0xff89f97f1,
-0x830093f1,
-/* 0x0734: memx_func_train_loop_4x */
-0x0080a7f1,
-0xb910a3f0,
-0x21f402ae,
-0x02d8b904,
-0xffd0b7f1,
-0xff89f3f1,
-0xf9048fbd,
-0xfc80f9a0,
+0x053c97f1,
+0xf11093f0,
+0xf1300287,
+0x9800083,
+0xfc80f990,
0xf4e0fc5d0,
-0xa7f14021,
-0xa3f0053c,
-0x0287f110,
-0x0083f130,
-0xf9a0f980,
-0xfcd0fc80,
-0x4021f4e0,
-0x0560e7f1,
-0xf110e3f0,
-0xf10000d7,
-0xb98000d3,
-0xb7f102dc,
-0xb3f02710,
-0xa321f400,
-0xf402eeb9,
-0xddb90421,
-0x949dff02,
+0xce7f14021,
+0xce3f00560,
+0x00d7f110,
+0x00d3f100,
+0x00dc9080,
+0x8480b7f1,
+0xf41eb3f0,
+0x57f0a321,
+0xff97f100,
+0x0093f1ff,
+/* 0x072d: memx_func_train_loop_4x */
+0x80a7f183,
+0x10a3f000,
+0xf402ae9,
+0xd8b90421,
+0xdfb7f102,
+0xffb3f1ff,
+0x048bfdff,
+0x80f9a0f9,
+0x0fc0f0fc,
+0xf14021f4,
+0xff0053ca7,
+0x87f110a3,
+0x83f13002,
+0xa0f98000,
+0xd0fc80f9,
+0x21f4e0fc,
+0x60e7f140,
+0x10e3f005,
+0x00000d7f1,
+0x8000d3f1,
+0xf102de9,
+0xf02710b7,
+0x21f400b3,
+0x02eeb9a3,
+0xb90421f4,
+0x9df02dd,
+0x0150b694,
+0xf4045670,
+0x7aa0921e,
+0xa9800bcc,
+0x0160b600,
+0x700470b6,
+0x1ef51066,
+0x50fcff01,
0x700150b6,
-0x1ef40456,
-0xc7aa092,
-0x00a9800b,
-0xb60160b6,
-0x66700470,
-0x001ef510,
-0xb650fcff,
-0x56700150,
-0xd41ef507,
/* 0x07c7: memx_exec */
-0xf900f8fe,
-0xb9d0f9e0,
-0xb2b902c1,
/* 0x07d1: memx_exec_next */
-0x00139802,
-0xce70410b6,
-0xce701f034,
-0xb601e033,
-0x30f00132,
-0xde35980c,
-0x12b855f9,
-0xe41ef406,
-0x98f10b98,
-0xcbbbf20c,
-0xce4b7f102,
-0x06b4b607,
-0xfc00bbcf,
-0xf5e0fcd0,
+0x1ef50756,
+0x00f8fed6,
/+* 0x07c0: memx_exec */
+0xd0f9e0f9,
+0xb902c1b9,
/+* 0x07ca: memx_exec_next */
+0x139802b2,
+0x0410b600,
+0x01f034e7,
-0x04b607e0,
-0x0001d006,
-0x00f804bd,
-0x0854: i2c_drive_scl_lo */
-0x07e407f1,
-0xd00604b6,
-0x04bd0001,
-0x0862: i2c_drive_sda */
-0x36b000f8,
-0x110bf400,
-0x07e007f1,
-0xd00604b6,
-0x04bd0002,
-0x0876: i2c_drive_sda_lo */
-0x07f100f8,
-0x4607e4,
-0x0002d006,
-0x00f804bd,
-0x0884: i2c_sense_scl */
-0xf10132f4,
-0xb607c437,
-0x33cf0634,
-0x0431fd00,
-0xf4060bf4,
-0x089a: i2c_sense_scl_done */
-0x00f80131,
-0x089c: i2c_sense_sda */
-0xf10132f4,
-0xb607c437,
-0x33cf0634,
-0x0432fd00,
-0xf4060bf4,
-0x08b2: i2c_sense_sda_done */
-0x00f80131,
-0x08b4: i2c_raise_scl */
-0x47f140f9,
-0x37f00898,
-0x4021f501,
-0x08c1: i2c_raise_scl_wait */
+/* 0x0825: memx_recv */
+0x01d6b000,
+0xb0980bf4,
+0x0bf400d6,
+/* 0x0833: memx_init */
+0xf800f8d8,
+/* 0x0835: perf_recv */
+/* 0x0837: perf_init */
+0xf800f800,
/* 0x0839: i2c_drive_scl */
+0x0036b000,
+0xf1110bf4,
+0xb607e007,
+0x01d00604,
+0xf804bd00,
/* 0x084d: i2c_drive_scl_lo */
+0xe407f100,
+0x0604b607,
+0xbd0001d0,
/* 0x085b: i2c_drive_sda */
+0xb000f804,
+0x0bf40036,
+0xe007f111,
+0x0604b607,
+0xbd0002d0,
/* 0x086f: i2c_drive_sda_lo */
+0xf100f804,
+0xb607e407,
+0x02d00604,
+0xf804bd00,
/* 0x087d: i2c_sense_scl */
+0x0132f400,
+0x07c437f1,
+0xcf0634b6,
+0x31fd0033,
+0x060bf404,
/* 0x0893: i2c_sense_scl_done */
+0xf80131f4,
/* 0x0895: i2c_sense_sda */
+0x0132f400,
+0x07c437f1,
+0xcf0634b6,
+0x32fd0033,
+0x060bf404,
/* 0x0893: i2c_sense_scl_done */
+0xf80131f4,
/* 0x0895: i2c_sense_sda */
+0x0132f400,
+0x07c437f1,
+0xcf0634b6,
+0x32fd0033,
+0x060bf404,
/* 0x08ab: i2c_sense_sda_done */
+0xf80131f4,
/* 0x08ad: i2c_raise_scl */
+0xf140f900,
+0xf0089847,
+0x21f50137,
/* 0x08ba: i2c_raise_scl_wait */
+0xe7f10839,
+0x21f403e8,
+0x7d21f57e,
+0x0901f408,
+0xf40142b6,
/* 0x08ce: i2c_raise_scl_done */
-0x1bf40142,
-/* 0x08d5: i2c_raise_scl_done */
-0xf840fcdf,
-/* 0x08d9: i2c_start */
-0x8421f500,
-0x0d11f408,
-0x089c21f5,
-0xf40611f4,
-/* 0x08ea: i2c_start_rep */
-0x37f0300e,
-0x4021f500,
-0x0137f008,
-0x086221f5,
0xb60076bb,
0x50f90465,
0xbb046594,
0x50bd0256,
0xfc0475fd,
-0xb421f550,
+0xad21f550,
0x0464b608,
-/* 0x0917: i2c_start_send */
-0xf01f11f4,
-0x21f50037,
-0xc7f10862,
-0x21f41388,
-0x0037f07e,
-0x084021f5,
-0x1388e7f1,
-/* 0x0933: i2c_start_out */
-0xf87e21f4,
-/* 0x0935: i2c_stop */
-0x0037f000,
-0x084021f5,
-0xf50037f0,
-0xf1086221,
-0xf403e8e7,
+0xf11811f4,
+0xf41388e7,
0x37f07e21,
-0x4021f501,
+0x3921f500,
0x88e7f108,
0x7e21f413,
-0xf50137f0,
-0xf1086221,
-0xf41388e7,
-0x00f87e21,
/* 0x0968: i2c_bitw */
-0x086221f5,
-0x03e8e7f1,
-0xbb7e21f4,
-0x65b60076,
-0x9450f904,
-0x56bb0465,
-0xfd50bd02,
-0x50fc0475,
-0x08b421f5,
-0xf40464b6,
-0xe7f11811,
+/* 0x09a0: i2c_bitw_out */
+/* 0x09a2: i2c_bitr */
+0x37f000f8,
+0x5b21f501,
+0xe8e7f108,
+0x7e21f403,
+0xb60076bb,
+0x50f90465,
+0xbb046594,
+0x50bd0256,
+0xc0475fd,
+0xad21f550,
+0x0464b608,
+0xf51b11f4,
+0x0089521,
+0x21f50037,
+0xe7f10839,
0x21f41388,
-0x0037f07e,
-0x084021f5,
-0x1388e7f1,
-/* 0x09a7: i2c_bitw_out */
-0xf87e21f4,
-/* 0x09a9: i2c_bitr */
-0x0137f000,
-0x086221f5,
-0x03e8e7f1,
-0xbb7e21f4,
-0x65b60076,
-0x9450f904,
-0x56bb0465,
-0xfd50bd02,
-0x50fc0475,
-0x08b421f5,
-0xf40464b6,
-0x21f51b11,
+0x0134b601,
+0xb0553fd,
0x65b60076,
0x9450f904,
0x56bb0465,
0xfd50bd02,
0x50fc0475,
-0xa0f321f5,
-0xfc0464b6,
-0x00d6b0d0,
-0x00b31bf5,
-0xbbb0057f0,
+0xa3b21f5,
+/* 0x0adb: i2c_addr_done */
+0xf80464b6,
+/* 0x0add: i2c_acquire_addr */
+0xf8cec700,
+0xb702e4b6,
+0x980d1ce0,
+0x00f800ee,
+/* 0x0aec: i2c_acquire */
+0x0add21f5,
+0xf00421f4,
+0x21f403d9,
+/* 0x0afb: i2c_release */
+0xf500f840,
+0xf40add21,
+0xda00421,
+0x4021f403,
+/* 0x0b0a: i2c_recv */
+0x32f400f8,
+0xf8c1c701,
+0xb00214b6,
+0x1f5f2816,
+0x13a0013a,
+0x32980cf4,
+0xcce13a00,
+0x0031980c,
+0xf90231f4,
+0x9e0f9d0,
+0x0067f1d0,
+0x0063f100,
+0x01679210,
+0xb60076bb,
+0x50f90465,
+0xbb046594,
+0x50bd026,
+0xfc0475fd,
+0xec21f550,
+0x0464b60a,
+0xd6b0d0fc,
+0xb31bf500,
+0x0057f000,
+0xb60076bb,
+0x50f90465,
+0xbb046594,
+0x50bd0256,
+0xfc0475fd,
+0xb60a9621,
+0x8a11f504,
+0x0076bb00,
+0xf90465b6,
-0x04659450,
+0xbd0256bb,
-0x0475fd50,
-0x21f550fc,
-0x64b609f0,
-0x6a11f404,
-0xbbe05bcb,
-0x65b60076,
-0x9450f904,
-0x56bb0465,
-0xfd50bd02,
-0x50fc0475,
-0x093521f5,
-0xb90464b6,
-0x74bd025b,
-*/ 0x0c17: i2c_recv_not_rd08 */
-0xb0430ef4,
-0x1bf401d6,
-0x0057f03d,
-0xa9d21f5,
-0xc73311f4,
-0x21f5e0c5,
-0x11f40a42,
-0x0057f029,
-0x0a9d21f5,
-0xc71f11f4,
-0x21f5e0b5,
-0x11f40a42,
-0x3521f515,
-0xc774bd09,
-0x1bf408c5,
-0x0232f409,
-*/ 0x0c57: i2c_recv_not_wr08 */
-*/ 0x0c57: i2c_recv_done */
-0xc7030ef4,
-0x21f5f8ce,
-0xe0fc0b02,
-0x12f4d0fc,
-0x027cb90a,
-0x033621f5,
-*/ 0x0c6c: i2c_recv_exit */
-*/ 0x0c6e: i2c_init */
+0x76bb008a,
+0x0465b600,
+0x659450f9,
+0x0256bb04,
+0x75fd50bd,
+0xf550fc04,
+0xb609e921,
+0x1f40464,
+0xe05bcb6a,
+0x0800e7f1,
+0x025621f5,
+/* 0x0c9a: idle_recv */
0x00f800f8,
-/* 0x0c70: test_recv */
-0x05d817f1,
-0xcf0614b6,
-0x10b60011,
-0xd807f101,
-0x0604b605,
-0xbd0001d0,
-0x00e7f104,
-0x4fe3f1d9,
-0x5621f513,
-/* 0x0c97: test_init */
-0xf100f802,
-0xf50800e7,
-0xf8025621,
-/* 0x0ca1: idle_recv */
-/* 0x0ca3: idle */
-0xf400f800,
-0x17f10031,
-0x14b605d4,
-0x0011cf06,
-0xf10110b6,
-0xb605d407,
-0x01d00604,
-/* 0xc9f: idle_loop */
-0xf004bd00,
-0x32f45817,
-/* 0xcc5: idle_proc */
-/* 0xcc5: idle_proc_exec */
-0xb910f902,
-0x21f5021e,
-0x10fc033f,
-0xf40911f4,
-0xe4f40231,
-/* 0xcd9: idle_proc_next */
-0x5810b6ef,
-0xf4061fb8,
-0x02f4e61b,
-0x0028f4dd,
-0x00bb0ef4,
+/* 0xc9: idle */
+0xf10031f4,
+0xb605d417,
+0x11cf0614,
+0x0110b600,
+0x05d407f1,
+0xd00604b6,
+0x04bd0001,
+/* 0xcb8: idle_loop */
+0xf45817f0,
+/* 0xcbe: idle_proc */
+/* 0xcbe: idle_proc_exec */
+0x10f90232,
+0xf5021eb9,
+0xfc033f21,
+0x0911f410,
+0xf40231f4,
+/* 0xcd2: idle_proc_next */
+0x10b6ef0e,
+0x061fb858,
+0xf4e61bf4,
+0x28f4dd02,
+0xbb0ef400,
+0x00000000,
+0x00000000,
+0x00000000,
+0x00000000,
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/fuc/memx.fuc
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/fuc/memx.fuc
@@ -82,15 +82,15 @@
// $r0  - zero
memx_func_enter:
#if NVKM_PPWR_CHIPSET == GT215
-    movw $r8 0x1610
+    mov $r8 0x1610
    nv_rd32($r7, $r8)
    imm32($r6, 0xfffffffc)
    and $r8 $r7
@@ -101,7 +101,7 @@
    and $r7 $r6
    nv_wr32($r6, $r8)
#else
-    movw $r6 0x001620
+    mov $r6 0x001620
    imm32($r7, ~0x00000aa2);
    nv_rd32($r8, $r6)
    and $r8 $r7
@@ -101,7 +101,7 @@
    and $r8 $r7
    nv_wr32($r6, $r8)
-movw $r6 0x0026f0
+mov $r6 0x0026f0

nv_rd32($r8, Sr6)
and $r8 $r7

nv_wr32($r6, $r8)
@@ -136,19 +136,19 @@
bra nz #memx_func_leave_wait

#if NVKM_PPWR_CHIPSET == GT215
-movw $r8 0x1610
+mov $r8 0x1610

nv_rd32($r7, $r8)
imm32($r6, 0xffffffffc)
and $r7 $r6

nv_wr32($r8, $r7)
#else
-movw $r6 0x0026f0
+mov $r6 0x0026f0

imm32($r7, 0x00000001)

nv_rd32($r8, $r6)
or $r8 $r7

nv_wr32($r6, $r8)
@@ -177,11 +177,11 @@
bra #memx_func_wait_vblank_fini

memx_func_wait_vblank_head1:
-movw $r7 0x20
+mov $r7 0x20

bra #memx_func_wait_vblank_0

memx_func_wait_vblank_head0:
-movw $r7 0x08
+mov $r7 0x08

memx_func_wait_vblank_0:

nv_iord($r6, NV_PPWR_INPUT)
@@ -273,13 +273,13 @@
// $r5 - outer loop counter
// $r6 - inner loop counter
// $r7 - entry counter (#memx_train_head + $r7)
-movw $r5 0x3
-movw $r7 0x0
mov $r5 0x3
mov $r7 0x0

// Read random memory to wake up... things
imm32($r9, 0x700000)
nv_rd32($r8, $r9)
-mov $r14 0x2710
+mov $r14 0x2710
call(nsec)

memx_func_train_loop_outer:
@@ -289,9 +289,9 @@
nv_wr32($r9, $r8)
push $r5

-movw $r6 0x0
+mov $r6 0x0
memx_func_train_loop_inner:
-movw $r8 0x1111
+mov $r8 0x1111
mulu $r9 $r6 $r8
shl b32 $r8 $r9 0x10
or $r8 $r9
@@ -315,7 +315,7 @@
// $r5 - inner inner loop counter
// $r9 - result
-movw $r5 0
+mov $r5 0
imm32($r9, 0x8300ffff)
memx_func_train_loop_4x:
imm32($r10, 0x100080)
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/memx.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/pmu/memx.c
@@ -88,10 +88,10 @@
if (exec) {
    nvkm_pmu_send(pmu, reply, PROC_MEMX, MEMX_MSG_EXEC,
                   memx->base, finish);
+nvkm_debug(subdev, "Exec took %uns, PMU_IN %08x\n",
            + reply[0], reply[1]);
} }

-nvkm_debug(subdev, "Exec took %uns, PMU_IN %08x\n",
-        reply[0], reply[1]);
kfree(memx);
return 0;
} --- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/secboot/gm20b.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/secboot/gm20b.c
@@ -108,6 +108,7 @@
struct gm200_secboot *gsb;
struct nvkm_acr *acr;

+*psb = NULL;
acr = acr_r352_new(BIT(NVKM_SECBOOT_FALCON_FECS) |
    BIT(NVKM_SECBOOT_FALCON_PMU));
if (IS_ERR(acr))
@@ -116,10 +117,8 @@
acr->optional_falcons = BIT(NVKM_SECBOOT_FALCON_PMU);
gsb = kzalloc(sizeof(*gsb), GFP_KERNEL);
-if (!gsb) {
-    *psb = NULL;
+if (!gsb)
    return -ENOMEM;
    }
*psb = &gsb->base;

ret = nvkm_secboot_ctor(&gm20b_secboot, acr, device, index, &gsb->base);
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/therm/base.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/therm/base.c
@@ -131,11 +131,12 @@
duty = nvkm_therm_update_linear_fallback(therm);
break;
case NVBIOS_THERM_FAN_OTHER:
-    if (therm->cstate)
-    duty = therm->cstate;
-else {
+    if (therm->cstate) {
+        poll = false;
+    } else {
    duty = nvkm_therm_update_linear_fallback(therm);
-    poll = false;
+    }
break;
}
immd = false;
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/volt/Kbuild
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/volt/Kbuild
@@ @ -2,6 +2,7 @@
 nvkm-y += nvkm/subdev/gpio.o
 nvkm-y += nvkm/subdev/volt/nv40.o
 nvkm-y += nvkm/subdev/volt/gf100.o
+nvkm-y += nvkm/subdev/volt/gf117.o
 nvkm-y += nvkm/subdev/volt/gk104.o
 nvkm-y += nvkm/subdev/volt/gk20a.o
Open Source Used In 5GasS Edge AC-4  21397
nvkm-y += nvkm/subdev/volt/gm20b.o
--- linux-4.15.0.orig/drivers/gpu/drm/nouveau/nvkm/subdev/volt/gf117.c
+++ linux-4.15.0/drivers/gpu/drm/nouveau/nvkm/subdev/volt/gf117.c
@@ -0,0 +1,60 @@
+/*
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+ *
+ * Authors: Ilia Mirkin
+ */
+#include "priv.h"
+
+#include <subdev/fuse.h>
+
+static int
+gf117_volt_speedo_read(struct nvkm_volt *volt)
+{
+struct nvkm_device *device = volt->subdev.device;
+struct nvkm_fuse *fuse = device->fuse;
+
+if (!fuse)
+    return -EINVAL;
+
+return nvkm_fuse_read(fuse, 0x3a8);
+}

+static const struct nvkm_volt_func
+gf117_volt = {
+  .oneinit = gf100_volt_oneinit,
+  .vid_get = nvkm_voltpgio_get,
+  .vid_set = nvkm_voltpgio_set,
+speedo_read = gf117_volt_speedo_read,
+}
+
+int
+gf117_volt_new(struct nvkm_device *device, int index, struct nvkm_volt **pvolt)
+{
+struct nvkm_volt *volt;
+int ret;
+
+ret = nvkm_volt_new_(&gf117_volt, device, index, &volt);
+*pvolt = volt;
+if (ret)
+return ret;
+
+return nvkm_voltgpio_init(volt);
+
--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/displays/panel-tpo-td028ttec1.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/displays/panel-tpo-td028ttec1.c
@@ -452,6 +452,8 @@
{}
static const struct of_device_id td028ttec1_of_match[] = {
+{ .compatible = "omapdss,tdo,td028ttec1" , },
+ /* keep to not break older DTB */
+{ .compatible = "omapdss,toppoly,td028ttec1", },
+{ },
+; @ @ -471,6 +473,7 @ @
}

module_spi_driver(td028ttec1_spi_driver);

+MODULE_ALIAS("spi:tdo,td028ttec1");
MODULE_ALIAS("spi:toppoly,td028ttec1");
MODULE_AUTHOR("H. Nikolaus Schaller <hns@goldelico.com>");
MODULE_DESCRIPTION("Toppoly TD028TTEC1 panel driver");
--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/dss/dss.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/dss/dss.c
@@ -1100,7 +1100,7 @@
static const struct dss_features omap3630_dss_feats = {
 .model=DSS_MODEL_OMAP3,
 -.fck_div_max=32,
+.fck_div_max=31,
 .fck_freq_max=173000000,
 .dss_fck_multiplier=1,
 .parent_clk_name="dpll4_ck",
 @@ -1299,88 +1299,18 @@
static int dss_bind(struct device *dev)
{
    struct platform_device *pdev = to_platform_device(dev);
    struct resource *dss_mem;
    u32 rev;
    int r;

    dss_mem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    dss.base = devm_ioremap_resource(&pdev->dev, dss_mem);
    if (IS_ERR(dss.base))
        return PTR_ERR(dss.base);

    r = dss_get_clocks();
    r = component_bind_all(dev, NULL);
    if (r)
        return r;

    r = dss_setup_default_clock();
    if (r)
        goto err_setup_clocks;

    r = dss_video_pll_probe(pdev);
    if (r)
        goto err_pll_init;

    r = dss_init_ports(pdev);
    if (r)
        goto err_init_ports;

    pm_runtime_enable(&pdev->dev);

    r = dss_runtime_get();
    if (r)
        goto err_runtime_get;

    dss.dss_clk_rate = clk_get_rate(dss.dss_clk);

    /* Select DPLL */
    REG_FLD_MOD(DSS_CONTROL, 0, 0, 0);
    dss_select_dispc_clk_source(DSS_CLK_SRC_FCK);

    #ifdef CONFIG_OMAP2_DSS_VENC
    REG_FLD_MOD(DSS_CONTROL, 1, 4, 4); /* venc dac demen */
    REG_FLD_MOD(DSS_CONTROL, 1, 3, 3); /* venc clock 4x enable */
    REG_FLD_MOD(DSS_CONTROL, 0, 2, 2); /* venc clock mode = normal */
    #endif
    dss.dsi_clk_source[0] = DSS_CLK_SRC_FCK;
-dss.dsi_clk_source[1] = DSS_CLK_SRC_FCK;
dss.dispc_clk_source = DSS_CLK_SRC_FCK;
dss.lcd_clk_source[0] = DSS_CLK_SRC_FCK;
dss.lcd_clk_source[1] = DSS_CLK_SRC_FCK;
-
-rev = dss_read_reg(DSS_REVISION);
-pr_info("OMAP DSS rev \%d.%d\%", FLD_GET(rev, 7, 4), FLD_GET(rev, 3, 0));
-
-dss_runtime_put();
-
-r = component_bind_all(&pdev->dev, NULL);
-if (r)
-goto err_component;
-
-dss_debugfs_create_file("dss", dss_dump_regs);
-
pm_set_vt_switch(0);

omapdss_gather_components(dev);
omapdss_set_is_initialized(true);

return 0;
-
-err_component:
-err_runtime_get:
-pm_runtime_disable(&pdev->dev);
-dss_uninit_ports(pdev);
-err_init_ports:
-if (dss.video1_pll)
-dss_video_pll_uninit(dss.video1_pll);
-
-if (dss.video2_pll)
-dss_video_pll_uninit(dss.video2_pll);
-err_pll_init:
-err_setup_clocks:
-dss_put_clocks();
-return r;
}

static void dss_unbind(struct device *dev)
@@ -1390,18 +1320,6 @@
omapdss_set_is_initialized(false);

component_unbind_all(&pdev->dev, NULL);
-
-if (dss.video1_pll)
-dss_video_pll_uninit(dss.video1_pll);
-
if (dss.video2_pll)
-
dss_video_pll_uninit(dss.video2_pll);
-
-dss_uninit_ports(pdev);
-
-pm_runtime_disable(&pdev->dev);
-
-dss_put_clocks();
}

static const struct component_master_ops dss_component_ops = {
    return 0;
    }

static int dss_probe_hardware(void)
{
    u32 rev;
    int r;
    +
    +r = dss_runtime_get();
    +if (r)
    +return r;
    +
    +dss.dss_clk_rate = clk_get_rate(dss.dss_clk);
    +
    +/\ Select DPLL */
    +REG_FLD_MOD(DSS_CONTROL, 0, 0, 0);
    +
    +dss.select_dispc_clk_source(DSS_CLK_SRC_FCK);
    +
    +#ifdef CONFIG_OMAP2_DSS_VENC
    +REG_FLD_MOD(DSS_CONTROL, 1, 4, 4); /* venc dac demen */
    +REG_FLD_MOD(DSS_CONTROL, 1, 3, 3); /* venc clock 4x enable */
    +REG_FLD_MOD(DSS_CONTROL, 0, 2, 2); /* venc clock mode = normal */
    +#endif
    +dss.dsi_clk_source[0] = DSS_CLK_SRC_FCK;
    +dss.dsi_clk_source[1] = DSS_CLK_SRC_FCK;
    +dss.dispc_clk_source = DSS_CLK_SRC_FCK;
    +dss.lcd_clk_source[0] = DSS_CLK_SRC_FCK;
    +dss.lcd_clk_source[1] = DSS_CLK_SRC_FCK;
    +
    +rev = dss_read_reg(DSS_REVISION);
    +pr_info("OMAP DSS rev %d.%d\n", FLD_GET(rev, 7, 4), FLD_GET(rev, 3, 0));
    +
    +dss_runtime_put();
    +
    +return 0;
static int dss_probe(struct platform_device *pdev)
{
    const struct soc_device_attribute *soc;
    struct component_match *match = NULL;
    struct resource *dss_mem;
    int r;

    dss.pdev = pdev;
    @ @ -1451.20 +1405.69 @ @
    else
dss.feat = of_match_device(dss_of_match, &pdev->dev)->data;

    /* Map I/O registers, get and setup clocks. */
    +dss_mem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    +dss.base = devm_ioremap_resource(&pdev->dev, dss_mem);
    +if (IS_ERR(dss.base))
    +return PTR_ERR(dss.base);

    /* Add all the child devices as components */
    +r = dss_setup_default_clock();
    +if (r)
    +goto err_put_clocks;

    /* Setup the video PLLs and the DPI and SDI ports. */
    +r = dss_video_pll_probe(pdev);
    +if (r)
    +goto err_put_clocks;

    /* Enable runtime PM and probe the hardware. */
    +pm_runtime_enable(&pdev->dev);
    +r = dss_probe_hardware();
    +if (r)
    +goto err_pm_runtime_disable;

    /* Initialize debugfs. */
    +r = dss_initialize_debugfs();

    /* Map I/O registers, get and setup clocks. */
    +dss_mem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    +dss.base = devm_ioremap_resource(&pdev->dev, dss_mem);
    +if (IS_ERR(dss.base))
    +return PTR_ERR(dss.base);

    /* Add all the child devices as components */
    +r = dss_setup_default_clock();
    +if (r)
    +goto err_put_clocks;

    /* Setup the video PLLs and the DPI and SDI ports. */
    +r = dss_video_pll_probe(pdev);
    +if (r)
    +goto err_put_clocks;

    /* Enable runtime PM and probe the hardware. */
    +pm_runtime_enable(&pdev->dev);
    +r = dss_probe_hardware();
    +if (r)
    +goto err_pm_runtime_disable;

    /* Initialize debugfs. */
    +r = dss_initialize_debugfs();
+if (r)
+goto err_pm_runtime_disable;
+
+dss_debugfs_create_file("dss", dss_dump_regs);
+
+/* Add all the child devices as components. */
device_for_each_child(&pdev->dev, &match, dss_add_child_component);

r = component_master_add_with_match(&pdev->dev, &dss_component_ops, match);
-if (r) {
-dss_uninitialize_debugfs();
-return r;
-}
+if (r)
+goto err_uninit_debugfs;

return 0;
+
+err_uninit_debugfs:
+dss_uninitialize_debugfs();
+
+err_pm_runtime_disable:
+pm_runtime_disable(&pdev->dev);
+dss_uninit_ports(pdev);
+
+err_uninit_pll:
+if (dss.video1_pll)
+dss_video_pll_uninit(dss.video1_pll);
+if (dss.video2_pll)
+dss_video_pll_uninit(dss.video2_pll);
+
+err_put_clocks:
+dss_put_clocks();
+
+return r;
}

static int dss_remove(struct platform_device *pdev)
@@ -1473,6 +1476,18 @@
dss_uninitialize_debugfs();
+
+pm_runtime_disable(&pdev->dev);
+
+dss_uninit_ports(pdev);
+
+if (dss.video1_pll)
+dss_video_pll_uninit(dss.video1_pll);
+ if (dss.video2_pll)
+ dss_video_pll_uninit(dss.video2_pll);
+ dss_put_clocks();
+ return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/dss/hdmi4.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/dss/hdmi4.c
@@ -664,7 +664,7 @@
 struct omap_dss_audio *dss_audio)
 {
 struct omap_hdmi *hd = dev_get_drvdata(dev);
-int ret;
+int ret = 0;

 mutex_lock(&hd->lock);

--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/dss/hdmi4_cec.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/dss/hdmi4_cec.c
@@ -175,6 +175,7 @@
 REG_FLD_MOD(core->base, HDMI_CORE_SYS_INTR_UNMASK4, 0, 3, 3);
 hdmi_wp_clear_irqenable(core->wp, HDMI_IRQ_CORE);
 hdmi_wp_set_irqstatus(core->wp, HDMI_IRQ_CORE);
+REG_FLD_MOD(core->wp->base, HDMI_WP_CLK, 0, 5, 0);
 hdmi4_core_disable(NULL);
 return 0;
 }
@@ -182,16 +183,24 @@
 if (err)
 return err;

+/*
+ * Initialize CEC clock divider: CEC needs 2MHz clock hence
+ * set the divider to 24 to get 48/24=2MHz clock
+ */
+REG_FLD_MOD(core->wp->base, HDMI_WP_CLK, 0x18, 5, 0);
+ /* Clear TX FIFO */
+ if (!hdmi_cec_clear_tx_fifo(adap)) {
+ pr_err("cecm-%s: could not clear TX FIFO\n", adap->name);
+ -return -EIO;
+ -err = -EIO;
+ goto err_disable_clk;
+ }
/* Clear RX FIFO */
if (!hdmi_cec_clear_rx_fifo(adap)) {
    pr_err("cec-%s: could not clear RX FIFO\n", adap->name);
    return -EIO;
    err = -EIO;
    goto err_disable_clk;
}

/* Clear CEC interrupts */
hdmi_write_reg(core->base, HDMI_CEC_INT_STATUS_1, temp);
}
return 0;
+
+err_disable_clk:
+REG_FLD_MOD(core->wp->base, HDMI_WP_CLK, 0, 5, 0);
+hdmi4_core_disable(core);
+
+return err;
}

static int hdmi_cec_adap_log_addr(struct cec_adapter *adap, u8 log_addr)
ret = cec_register_adapter(core->adap, &pdev->dev);
if (ret < 0) {
    --- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/dss/hdmi4_core.c
    +++ linux-4.15.0/drivers/gpu/drm/omapdrm/dss/hdmi4_core.c
    @@ -923,8 +923,13 @@
    {
    const struct hdmi4_features *features;
    struct resource *res;
    +const struct soc_device_attribute *soc;

    -features = soc_device_match(hdmi4_soc_devices)->data;
    +soc = soc_device_match(hdmi4_soc_devices);
    +if (!soc)
    +return -ENODEV;
+
+features = soc->data;
core->cts_swmode = features->cts_swmode;
core->audio_use_mclk = features->audio_use_mclk;
--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/dss/hdmi5.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/dss/hdmi5.c
@@ -660,7 +660,7 @@
struct omap_dss_audio *dss_audio)
{
struct omap_hdmi *hd = dev_get_drvdata(dev);
-int ret;
+int ret = 0;
mutex_lock(&hd->lock);
--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/dss/omapdss-boot-init.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/dss/omapdss-boot-init.c
@@ -193,7 +193,7 @@
dss = of_find_matching_node(NULL, omapdss_of_match);
if (dss == NULL || !of_device_is_available(dss))
-return 0;
+goto put_node;
omapdss_walk_device(dss, true);
@@ -218,6 +218,8 @@
kfree(n);
}
+put_node:
+of_node_put(dss);
return 0;
}
--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/omap_connector.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/omap_connector.c
@@ -123,6 +123,9 @@
if (dssdrv->read_edid) {
void *edid = kzalloc(MAX_EDID, GFP_KERNEL);
+if (!edid)
+return 0;
+
if ((dssdrv->read_edid(dssdev, edid, MAX_EDID) > 0) &&
drm_edid_is_valid(edid)) {
drm_mode_connector_update_edid_property(

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struct drm_display_mode *mode = drm_mode_create(dev);

struct videomode vm = {0};

if (!mode)
  return 0;
+
dssdrv->get_timings(dssdev, &vm);

drm_display_mode_from_videomode(&vm, mode);

/* check if vrefresh is still valid */
new_mode = drm_mode_duplicate(dev, mode);
+
+return MODE_BAD;
+
new_mode->clock = vm.pixelclock / 1000;
new_mode->vrefresh = 0;
if (mode->vrefresh == drm_mode_vrefresh(new_mode))

mutex_lock(&priv->list_lock);
omap_gem_describe_objects(&priv->obj_list, m);
+
mutex_unlock(&priv->list_lock);
mutex_unlock(&dev->struct_mutex);

mutex_unlock(&dev->struct_mutex);

/* ensure that the written descriptors are visible to DMM */
wmb();
+
+ NOTE: the wmb() above should be enough, but there seems to be a bug
+ in OMAP's memory barrier implementation, which in some rare cases may
+ cause the writes not to be observable after wmb().
+ */
+ 
/* read back to ensure the data is in RAM */
readl(&txn->last_pat->next_pa);

/* write to PAT_DESCR to clear out any pending transaction */
dmm_write(dmm, 0x0, reg[PAT_DESCR][engine->id]);
@@ -298,7 +309,12 @@
msecs_to_jiffies(100))) {
    dev_err(dmm->dev, "timed out waiting for done\n");
    ret = -ETIMEDOUT;
    goto cleanup;
}
+
+/* Check the engine status before continue */
+ret = wait_status(engine, DMM_PATSTATUS_READY |
+    DMM_PATSTATUS_VALID | DMM_PATSTATUS_DONE);
}

cleanup:
@@ -384,12 +400,16 @@
struct tiler_block *tiler_reserve_2d(enum tiler_fmt fmt, uint16_t w,
    uint16_t h, uint16_t align)
{
    struct tiler_block *block = kzalloc(sizeof(*block), GFP_KERNEL);
+    block = kzalloc(sizeof(*block), GFP_KERNEL);
    if (!block)
        return ERR_PTR(-ENOMEM);
    BUG_ON(!validfmt(fmt));
    /* convert width/height to slots */
    &omap_dmm->refill_pa, GFP_KERNEL);
    if (!omap_dmm->refill_va) {
        dev_err(&dev->dev, "could not allocate refill memory\n");
        +ret = -ENOMEM;
        goto fail;
    }

    --- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/omapDrv.c
    +++ linux-4.15.0/drivers/gpu/drm/omapdrm/omapDrv.c
    @@ -580,7 +580,7 @@
    priv->omaprev = soc ? (unsigned int)soc->data : 0;
priv->wq = alloc_ordered_workqueue("omapdrm", 0);

-spin_lock_init(&priv->list_lock);
+mutex_init(&priv->list_lock);
INIT_LIST_HEAD(&priv->obj_list);

/* Allocate and initialize the DRM device. */
--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/omap_drv.h
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/omap_drv.h
@@ -68,7 +68,7 @@
 struct workqueue_struct *wq;
 /* lock for obj_list below */
 -spinlock_t list_lock;
+struct mutex list_lock;

 /* list of GEM objects: */
--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/omap_gem.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/omap_gem.c
@@ -1003,6 +1003,7 @@
 struct omap_gem_object *omap_obj;
 int ret = 0;

 +mutex_lock(&priv->list_lock);
 list_for_each_entry(omap_obj, &priv->obj_list, mm_list) {
 if (omap_obj->block) {
 struct drm_gem_object *obj = &omap_obj->base;
 @@ -1013,12 +1014,14 @@
 omap_obj->roll, true);
 if (ret) {
 dev_err(dev, "could not repin: %dn", ret);
 -return ret;
+goto done;
 } 
 }
 }

-return 0;
+done:
+mutex_unlock(&priv->list_lock);
+return ret;
}
#endif

WARN_ON(!mutex_is_locked(&dev->struct_mutex));
-spin_lock(&priv->list_lock);
+mutex_lock(&priv->list_lock);
list_del(&omap_obj->mm_list);
-spin_unlock(&priv->list_lock);
+mutex_unlock(&priv->list_lock);

/* this means the object is still pinned.. which really should
 * not happen. I think..
@@ -1207,9 +1210,9 @@
    goto err_release;
 }

-spin_lock(&priv->list_lock);
+mutex_lock(&priv->list_lock);
list_add(&omap_obj->mm_list, &priv->obj_list);
-spin_unlock(&priv->list_lock);
+mutex_unlock(&priv->list_lock);

return obj;

--- linux-4.15.0.orig/drivers/gpu/drm/omapdrm/tcm-sita.c
+++ linux-4.15.0/drivers/gpu/drm/omapdrm/tcm-sita.c
@@ -92,7 +92,7 @@
{
    int i;
    unsigned long index;
-bool area_free;
+bool area_free = false;
    unsigned long slots_per_band = PAGE_SIZE / slot_bytes;
    unsigned long bit_offset = (offset > 0) ? offset / slot_bytes : 0;
    unsigned long curr_bit = bit_offset;
--- linux-4.15.0.orig/drivers/gpu/drm/panel/panel-innolux-p079zca.c
+++ linux-4.15.0/drivers/gpu/drm/panel/panel-innolux-p079zca.c
@@ -40,7 +40,6 @@
static int innolux_panel_disable(struct drm_panel *panel)
{
    struct innolux_panel *innolux = to_innolux_panel(panel);
-    int err;
if (!innolux->enabled)
    return 0;
@@ -48,11 +47,6 @@
        innolux->backlight->props.power = FB_BLANK_POWERDOWN;
        backlight_update_status(innolux->backlight);
        -err = mipi_dsi_dcs_set_display_off(innolux->link);
-    -if (err < 0)
-DRM_DEV_ERROR(panel->dev, "failed to set display off: \%d\n", err);

innolux->enabled = false;

return 0;
@@ -66,6 +60,11 @@
if (!innolux->prepared)
return 0;

+err = mipi_dsi_dcs_set_display_off(innolux->link);
+if (err < 0)
+DRM_DEV_ERROR(panel->dev, "failed to set display off: \%d\n", err);
+
er = mipi_dsi_dcs_enter_sleep_mode(innolux->link);
if (err < 0) {
  DRM_DEV_ERROR(panel->dev, "failed to enter sleep mode: \%d\n",
  --- linux-4.15.0.orig/drivers/gpu/drm/panel/orisetech-otm8009a.c
  +++ linux-4.15.0/drivers/gpu/drm/panel/orisetech-otm8009a.c
  @@ -234,6 +234,9 @@
/* Send Command GRAM memory write (no parameters) */
  dcs_write_seq(ctx, MIPI_DCS_WRITE_MEMORY_START);
  
  /* Wait a short while to let the panel be ready before the 1st frame */
+  mdelay(10);
  +
  return 0;
  }

  --- linux-4.15.0.orig/drivers/gpu/drm/panel/raspberrypi-touchscreen.c
  +++ linux-4.15.0/drivers/gpu/drm/panel/raspberrypi-touchscreen.c
  @@ -221,7 +221,7 @@
  return container_of(panel, struct rpi_touchscreen, base);
  }

  -static u8 rpi_touchscreen_i2c_read(struct rpi_touchscreen *ts, u8 reg)
  +static int rpi_touchscreen_i2c_read(struct rpi_touchscreen *ts, u8 reg)
  {
  return i2c_smbus_read_byte_data(ts->i2c, reg);
  }
  @@ -412,7 +412,13 @@
/* Look up the DSI host. It needs to probe before we do. */
  endpoint = of_graph_get_next_endpoint(dev->of_node, NULL);
  +if (!endpoint)
  +return -ENODEV;
  +
dsi_host_node = of_graph_get_remote_port_parent(endpoint);
+if (!dsi_host_node)
+goto error;
+
host = of_find_mipi_dsi_host_by_node(dsi_host_node);
of_node_put(dsi_host_node);
if (!host) {
@@ -421,6 +427,9 @@
}

info.node = of_graph_get_remote_port(endpoint);
+if (!info.node)
+goto error;
+
of_node_put(endpoint);

ts->dsi = mipi_dsi_device_register_full(host, &info);
@@ -430,6 +439,7 @@
return PTR_ERR(ts->dsi);
}

+drm_panel_init(&ts->base);
ts->base.dev = dev;
ts->base.funcs = &rpi_touchscreen_funcs;

@@ -441,6 +451,10 @@
return ret;

return 0;
+
+error:
+of_node_put(endpoint);
+return -ENODEV;
}

static int rpi_touchscreen_remove(struct i2c_client *i2c)
@@ -452,7 +466,6 @@
drm_panel_remove(&ts->base);

mipi_dsi_device_unregister(ts->dsi);
-kfree(ts->dsi);

return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/panel/panel-samsung-s6e8a0.c
+++ linux-4.15.0/drivers/gpu/drm/panel/panel-samsung-s6e8a0.c
@@ -823,7 +823,7 @@

int ret, i;
ret = s6e8aa0_dcs_read(ctx, 0xd1, id, ARRAY_SIZE(id));
- if (ret < ARRAY_SIZE(id) || id[0] == 0x00) {
+ if (ret < 0 || ret < ARRAY_SIZE(id) || id[0] == 0x00) {
    dev_err(ctx->dev, "read id failed\n");
    ctx->error = -EIO;
    return;
--- linux-4.15.0.orig/drivers/gpu/drm/panel/panel-simple.c
+++ linux-4.15.0/drivers/gpu/drm/panel/panel-simple.c
@@ -437,6 +437,32 @@
    .bus_format = MEDIA_BUS_FMT_RGB666_1X18,
    }

+static const struct display_timing santek_st0700i5y_rbslw_f_timing = {
+    .pixelclock = { 26400000, 33300000, 46800000 },
+    .hactive = { 800, 800, 800 },
+    .hfront_porch = { 16, 210, 354 },
+    .hback_porch = { 45, 36, 6 },
+    .hsync_len = { 1, 10, 40 },
+    .vactive = { 480, 480, 480 },
+    .vfront_porch = { 7, 22, 147 },
+    .vback_porch = { 22, 13, 3 },
+    .vsync_len = { 1, 10, 20 },
+    .flags = DISPLAY_FLAGS_HSYNC_LOW | DISPLAY_FLAGS_VSYNC_LOW |
+    DISPLAY_FLAGS_DE_HIGH | DISPLAY_FLAGS_PIXDATA_POSEDGE
+};
+
+static const struct panel_desc armadeus_st0700_adapt = {
+    .timings = &santek_st0700i5y_rbslw_f_timing,
+    .num_timings = 1,
+    .bpc = 6,
+    .size = {
+        .width = 154,
+        .height = 86,
+    },
+    .bus_format = MEDIA_BUS_FMT_RGB666_1X18,
+    .bus_flags = DRM_BUS_FLAG_DE_HIGH | DRM_BUS_FLAG_PIXDATA_POSEDGE,
+};
+
static const struct drm_display_mode auo_b101aw03_mode = {
    .clock = 51450,
    .hdisplay = 1024,
@@ -613,9 +639,9 @@
static const struct display_timing auo_g185han01_timings = {
    .pixelclock = { 120000000, 144000000, 175000000 },
    .hactive = { 1920, 1920, 1920 },
    .hfront_porch = { 18, 60, 74 },
-    .hback_porch = { 12, 44, 54 },
+    .hback_porch = { 12, 44, 54 },
static const struct panel_desc lg_lb070wv8 = {
    .modes = &lg_lb070wv8_mode,
    .num_modes = 1,
    .bpc = 16,
    .size = {
        .width = 151,
        .height = 91,
        @ @ -1565,7 +1591,7 @@
        .width = 154,
        .height = 83,
    },
    .bus_format = MEDIA_BUS_FMT_RGB888_1X24,
    .bus_format = MEDIA_BUS_FMT_RGB666_1X18,
};

static const struct drm_display_mode ortustech_com43h4m85ulc_mode = {
    @ @ -1975,6 +2001,9 @@
    .compatible = "ampe,am800480r3tmqwa1h",
    .data = &ampe_am800480r3tmqwa1h,
};
  }, {
    .compatible = "armadeus,st0700-adapt",
    .data = &armadeus_st0700_adapt,
  }, {
    .compatible = "auo,b101aw03",
    .data = &auo_b101aw03,
  }, {
    @ @ -2402,7 +2431,14 @@
    dsi->format = desc->format;
    dsi->lanes = desc->lanes;
    -return mipi_dsi_attach(dsi);
    +err = mipi_dsi_attach(dsi);
    +if (err) {
        +struct panel_simple *panel = dev_get_drvdata(&dsi->dev);
        +
        +drm_panel_remove(&panel->base);
        +}
    +
    +return err;
static int panel_simple_dsi_remove(struct mipi_dsi_device *dsi)
--- linux-4.15.0.orig/drivers/gpu/drm/panel/panel-sitronix-st7789v.c
+++ linux-4.15.0/drivers/gpu/drm/panel/panel-sitronix-st7789v.c
@@ -380,6 +380,7 @@
    spi_set_drvdata(spi, ctx);
    ctx->spi = spi;

+    drm_panel_init(&ctx->panel);
    ctx->panel.dev = &spi->dev;
    ctx->panel.funcs = &st7789v_drm_funcs;

--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_cmd.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_cmd.c
@@ -341,12 +341,9 @@
    thread_mutex_lock(thread_mutex);
    thread_mutex_unlock(thread_mutex);

    return -EINVAL;
-}
+
+mutex_lock(&qdev->update_area_mutex);
    qdev->ram_header->update_area = *area;
    qdev->ram_header->update_surface = surface_id;
@@ -374,6 +371,7 @@
void qxl_io_destroy_primary(struct qxl_device *qdev)
{
    wait_for_io_cmd(qdev, 0, QXL_IO_DESTROY_PRIMARY_ASYNC);
+    qdev->primary_created = false;
}

void qxl_io_create_primary(struct qxl_device *qdev,
@@ -407,20 +406,6 @@
    wait_for_io_cmd(qdev, id, QXL_IO_MEMSLOT_ADD_ASYNC);
}

void qxl_io_create_primary(struct qxl_device *qdev,
@@ -399,6 +397,7 @@
    create->type = QXL_SURF_TYPE_PRIMARY;

    wait_for_io_cmd(qdev, 0, QXL_IO_CREATE_PRIMARY_ASYNC);
+    qdev->primary_created = true;

void qxl_io_log(struct qxl_device *qdev, const char *fmt, ...)  
{
    va_list args;
    
    va_start(args, fmt);
    vsprintf(qdev->ram_header->log_buf, QXL_LOG_BUF_SIZE, fmt, args);
    va_end(args);
/*
 * DO not do a DRM output here - this will call printk, which will
 * call back into qxl for rendering (qxl_fb)
 */
    outb(0, qdev->io_base + QXL_IO_LOG);
}

void qxl_io_reset(struct qxl_device *qdev)  
{
    outb(0, qdev->io_base + QXL_IO_RESET);
    @ @ -428,19 +413,6 @ @
}

void qxl_io_monitors_config(struct qxl_device *qdev)  
{
    qxl_io_log(qdev, "%s: %d [%dx%d+%d+%d]\n", __func__,
        -qdev->monitors_config ?
        -qdev->monitors_config->count : -1,
        -qdev->monitors_config && qdev->monitors_config->count ?
        -qdev->monitors_config->heads[0].width : -1,
        -qdev->monitors_config && qdev->monitors_config->count ?
        -qdev->monitors_config->heads[0].height : -1,
        -qdev->monitors_config && qdev->monitors_config->count ?
        -qdev->monitors_config->heads[0].x : -1,
        -qdev->monitors_config && qdev->monitors_config->count ?
        -qdev->monitors_config->heads[0].y : -1
    );

    wait_for_io_cmd(qdev, 0, QXL_IO_MONITORS_CONFIG_ASYNC);
}

    @ @ -502,9 +474,10 @ @
return ret;

ret = qxl_release_reserve_list(release, true);
@if (ret)
+if (ret) {
+qxl_release_free(qdev, release);
return ret;
-
cmd = (struct qxl_surface_cmd *)qxl_release_map(qdev, release);
cmd->type = QXL_SURFACE_CMD_CREATE;
cmd->flags = QXL_SURF_FLAG_KEEP_DATA;
/* no need to add a release to the fence for this surface bo,
   since it is only released when we ask to destroy the surface
   and it would never signal otherwise */
-qxl_push_command_ring_release(qdev, release, QXL_CMD_SURFACE, false);
qxl_release_fence_buffer_objects(release);
+surf->hw_surf_alloc = true;
spin_lock(&qdev->surf_id_idr_lock);
-surf->surface_id = id;
qxl_release_unmap(qdev, release, &cmd->release_info);

- qxl_push_command_ring_release(qdev, release, QXL_CMD_SURFACE, false);
- qxl_release_fence_buffer_objects(release);
+ qxl_push_command_ring_release(qdev, release, QXL_CMD_SURFACE, false);

return 0;
}
if (crc != qdev->rom->client_monitors_config_crc)
return MONITORS_CONFIG_BAD_CRC;

if (!num_monitors) {
    DRM_DEBUG_KMS("no client monitors configured\n");
    return status;
}

if (status == MONITORS_CONFIG_BAD_CRC) {
    qxl_io_log(qdev, "config: bad crc\n");
    DRM_DEBUG_KMS("ignoring client monitors config: bad crc");
    return;
}

if (status == MONITORS_CONFIG_UNCHANGED) {
    qxl_io_log(qdev, "config: unchanged\n");
    DRM_DEBUG_KMS("ignoring client monitors config: unchanged");
    return;
}

for (i = 0 ; i < qdev->monitors_config->count ; ++i) {
    struct qxl_head *head = &qdev->monitors_config->heads[i];
    double x, y, width, height;
    x = head->x + qdev->monitors_config->x;
    y = head->y + qdev->monitors_config->y;
    width = head->width + qdev->monitors_config->width;
    height = head->height + qdev->monitors_config->height;
    if (width > 8192 || height > 8192) {
        DRM_ERROR("head %d wrong: dx%d+dx%d+dx%d\n",
                    i, head->width, head->height,
                    head->x, head->y);
        return;
    }
}

qxl_update_monitors_config(qdev);

+static void qxl_send_monitors_config(struct qxl_device *qdev)
+
+ {
+    int i;
+    +BUG_ON(!qdev->ram_header->monitors_config);
+    +if (qdev->monitors_config->count == 0)
+        return;
+    +for (i = 0 ; i < qdev->monitors_config->count ; ++i) {
+        struct qxl_head *head = &qdev->monitors_config->heads[i];
+        +if (head->y > 8192 || head->x > 8192 ||
+            head->width > 8192 || head->height > 8192) {
+            DRM_ERROR("head %d wrong: dx%d+dx%d+dx%d\n",
+                    i, head->width, head->height,
+                    head->x, head->y);
+            return;
+        }
+    }
+    +qxl_update_monitors_config(qdev);
+}
const char *reason)
{+
struct drm_device *dev = crtc->dev;
struct qxl_device *qdev = dev->dev_private;
struct qxl_crtc *qcrtc = to_qxl_crtc(crtc);
struct qxl_head head;
+int oldcount, i = qcrtc->index;
+
+if (!qdev->primary_created) {
+DRM_DEBUG_KMS("no primary surface, skip (%s)\n", reason);
+return;
+}
+
+if (!qdev->monitors_config ||
+ qdev->monitors_config->max_allowed <= i)
+return;
+
+head.id = i;
+head.flags = 0;
+oldcount = qdev->monitors_config->count;
+if (crtc->state->active) {
+struct drm_display_mode *mode = &crtc->mode;
+head.width = mode->hdisplay;
+head.height = mode->vdisplay;
+head.x = crtc->x;
+head.y = crtc->y;
+if (qdev->monitors_config->count < i + 1)
+qdev->monitors_config->count = i + 1;
+} else if (i > 0) {
+head.width = 0;
+head.height = 0;
+head.x = 0;
+head.y = 0;
+if (qdev->monitors_config->count == i + 1)
+qdev->monitors_config->count = i;
+} else {
+DRM_DEBUG_KMS("inactive head 0, skip (%s)\n", reason);
+return;
+}
+
+if (head.width == qdev->monitors_config->heads[i].width &&
+ head.height == qdev->monitors_config->heads[i].height &&
+ head.x == qdev->monitors_config->heads[i].x &&
+ head.y == qdev->monitors_config->heads[i].y &&
+ oldcount == qdev->monitors_config->count)
+return;
+
+DRM_DEBUG_KMS("head %d, %dx%d, at +%d+%d, %s (%s)\n",}
static void qxl_crtc_update_monitors_config(struct drm_crtc *crtc, const char *reason);
static void qxl_send_monitors_config(struct qxl_device *qdev);

static void qxl_crtc_destroy(struct drm_crtc *crtc);

static void qxl_send_monitors_config(struct qxl_device *qdev) {
    static void qxl_crtc_destroy(struct drm_crtc *crtc) {
        struct qxl_crtc *qxl_crtc = to_qxl_crtc(crtc);

        qxl_bo_unref(&qxl_crtc->cursor_bo);
        drm_crtc_cleanup(crtc);
        kfree(qxl_crtc);
    }
    @ @ -384,91 +460,23 @@
    const struct drm_display_mode *mode,
    struct drm_display_mode *adjusted_mode) {
    -struct drm_device *dev = crtc->dev;
    -struct qxl_device *qdev = dev->dev_private;
    -
    -qxl_io_log(qdev, "%s: (%d,%d) => (%d,%d)\n", __func__,
    -    mode->hdisplay, mode->vdisplay,
    -    adjusted_mode->hdisplay,
    -    adjusted_mode->vdisplay);
    return true;
    }

    -static void
    -qxl_send_monitors_config(struct qxl_device *qdev)
    -{

+    i, head.width, head.height, head.x, head.y,
+    crtc->state->active ? "on" : "off", reason);
+if (oldcount != qdev->monitors_config->count)
+DRM_DEBUG_KMS("active heads %d -> %d (%d total)\n",
    + oldcount, qdev->monitors_config->count,
    + qdev->monitors_config->max_allowed);
+
+qdev->monitors_config->heads[i] = head;
+qxl_send_monitors_config(qdev);
+
+static void qxl_crtc_atomic_flush(struct drm_crtc *crtc,
    struct drm_crtc_state *old_crtc_state) {
    drm_crtc_send_vblank_event(crtc, event);
    spin_unlock_irqrestore(&dev->event_lock, flags);
    } +

+qxl_crtc_update_monitors_config(crtc, "flush");
}
# Open Source Used In 5GaaS Edge

## AC-4 21422

```c
-int i;
-
-BUG_ON(!qdev->ram_header->monitors_config);
-
-if (qdev->monitors_config->count == 0) {
-qxl_io_log(qdev, "%s: 0 monitors??\n", __func__);  
-return;
-}
-
- struct qxl_head *head = &qdev->monitors_config->heads[i];
-
- if (head->y > 8192 || head->x > 8192) {
-    head->width > 8192 || head->height > 8192) {
-   DRM_ERROR("head %d wrong: %dx%d+%d+%d\n", 
-   i, head->width, head->height, 
-   head->x, head->y);
- return;
- }
-
-qxl_io_monitors_config(qdev);
-
-
-static void qxl_monitors_config_set(struct qxl_device *qdev,
  -    int index,
  -    unsigned x, unsigned y,
  -    unsigned width, unsigned height,
  -    unsigned surf_id)
  -{
    -DRM_DEBUG_KMS("%d:%dx%d+%d+%d\n", index, width, height, x, y);
-qdev->monitors_config->heads[index].x = x;
-qdev->monitors_config->heads[index].y = y;
-qdev->monitors_config->heads[index].width = width;
-qdev->monitors_config->heads[index].height = height;
-qdev->monitors_config->heads[index].surface_id = surf_id;
-
-
-
-static void qxl_mode_set_nofb(struct drm_crtc *crtc)
  -{
    -struct qxl_device *qdev = crtc->dev->dev_private;
    -struct qxl_crtc *qcrtc = to_qxl_crtc(crtc);
    -struct drm_display_mode *mode = &crtc->mode;
    -
    -DRM_DEBUG("Mode set (%d,%d)\n", 
    -  mode->hdisplay, mode->vdisplay);
    -
    -qxl_monitors_config_set(qdev, qcrtc->index, 0, 0,
    -  mode->hdisplay, mode->vdisplay, 0);
```
static void qxl_crtc_atomic_enable(struct drm_crtc *crtc, 
    struct drm_crtc_state *old_state) 
{
    DRM_DEBUG("\n");
    qxl_crtc_update_monitors_config(crtc, "enable");
}

static void qxl_crtc_atomic_disable(struct drm_crtc *crtc, 
    struct drm_crtc_state *old_state) 
{
    struct qxl_crtc *qcrtc = to_qxl_crtc(crtc);
    struct qxl_device *qdev = crtc->dev->dev_private;
    -
    qxl_monitors_config_set(qdev, qcrtc->index, 0, 0, 0, 0, 0);
    -
    qxl_send_monitors_config(qdev);
    +qxl_crtc_update_monitors_config(crtc, "disable");
}

static const struct drm_crtc_helper_funcs qxl_crtc_helper_funcs = {
    .mode_fixup = qxl_crtc_mode_fixup,
    -.mode_set_nofb = qxl_mode_set_nofb,
    .atomic_flush = qxl_crtc_atomic_flush,
    .atomic_enable = qxl_crtc_atomic_enable,
    .atomic_disable = qxl_crtc_atomic_disable,
    @@ -495,6 +503,53 @@
    return 0;
}

+static int qxl_primary_apply_cursor(struct drm_plane *plane)
+{
+    struct drm_device *dev = plane->dev;
+    struct qxl_device *qdev = dev->dev_private;
+    struct drm_framebuffer *fb = plane->state->fb;
+    struct qxl_crtc *qcrtc = to_qxl_crtc(plane->state->crtc);
+    struct qxl_cursor_cmd *cmd;
+    struct qxl_release *release;
+    int ret = 0;
+    +
+    +if (!qcrtc->cursor_bo)
+        return 0;
+        +
+        +ret = qxl_alloc_release_reserved(qdev, sizeof(*cmd),
+            QXL_RELEASE_CURSOR_CMD,
+            &release, NULL);
+if (ret)
+return ret;
+
+ret = qxl_release_list_add(release, qerc->cursor_bo);
+if (ret)
+goto out_free_release;
+
+ret = qxl_release_reserve_list(release, false);
+if (ret)
+goto out_free_release;
+
+cmd = (struct qxl_cursor_cmd *)qxl_release_map(qdev, release);
+cmd->type = QXL_CURSOR_SET;
+cmd->u.set.position.x = plane->state->crtc_x + fb->hot_x;
+cmd->u.set.position.y = plane->state->crtc_y + fb->hot_y;
+
+cmd->u.set.shape = qxl_bo_physical_address(qdev, qerc->cursor_bo, 0);
+
+cmd->u.set.visible = 1;
+qxl_release_unmap(qdev, release, &cmd->release_info);
+
+qxl_release_fence_buffer_objects(release);
+qxl_push_cursor_ring_release(qdev, release, QXL_CMD_CURSOR, false);
+
+return ret;
+
+out_free_release:
+qxl_release_free(qdev, release);
+return ret;
+
}
+
static void qxl_primary_atomic_update(struct drm_plane *plane,
    struct drm_plane_state *old_state)
{
    \@-510,6 +565,7 \@
    .x2 = qfb->base.width,
    .y2 = qfb->base.height
};
+int ret;
bool same_shadow = false;

if (old_state->fb) {
    \@-531,6 +587,11 \@
    if (!same_shadow)
        qxl_io_destroy_primary(qdev);
    bo_old->is_primary = false;
+
+ret = qxl_primary_apply_cursor(plane);
if (ret)
+DRM_ERROR(
+"could not set cursor after creating primary");
}

if (!bo->is_primary) {
    struct drm_device *dev = plane->dev;
    struct qxl_device *qdev = dev->dev_private;
    struct drm_framebuffer *fb = plane->state->fb;
    +struct qxl_crtc *qcrtc = to_qxl_crtc(plane->state->crtc);
    struct qxl_release *release;
    struct qxl_cursor_cmd *cmd;
    struct qxl_cursor *cursor;
    struct drm_gem_object *obj;
    -struct qxl_bo *cursor_bo, *user_bo = NULL;
    +struct qxl_bo *cursor_bo = NULL, *user_bo = NULL, *old_cursor_bo = NULL;
    int ret;
    void *user_ptr;
    int size = 64*64*4;
    cmd->u.set.shape = qxl_bo_physical_address(qdev,
        cursor_bo, 0);
    cmd->type = QXL_CURSOR_SET;
    +old_cursor_bo = qcrtc->cursor_bo;
    +qcrtc->cursor_bo = cursor_bo;
    +cursor_bo = NULL;
} else {
    ret = qxl_release_reserve_list(release, true);
    cmd->u.position.y = plane->state->crtc_y + fb->hot_y;
    qxl_release_unmap(qdev, release, &cmd->release_info);
    -qxl_push_cursor_ring_release(qdev, release, QXL_CMD_CURSOR, false);
    qxl_release_fence_buffer_objects(release);
    +qxl_push_cursor_ring_release(qdev, release, QXL_CMD_CURSOR, false);
    +if (old_cursor_bo)
    +qxl_bo_unref(&old_cursor_bo);
    +qxl_bo_unref(&cursor_bo);

    return;
}

cmd->type = QXL_CURSOR_HIDE;
qxl_release_unmap(qdev, release, &cmd->release_info);

-qxl_push_cursor_ring_release(qdev, release, QXL_CMD_CURSOR, false);
qxl_release_fence_buffer_objects(release);
+qxl_push_cursor_ring_release(qdev, release, QXL_CMD_CURSOR, false);
}

static int qxl_plane_prepare_fb(struct drm_plane *plane,
@@ -898,61 +969,8 @@
DRM_DEBUG("\\n");
}

-static void qxl_write_monitors_config_for_encoder(struct qxl_device *qdev,
-struct drm_encoder *encoder)
-{i
-int i;
-struct qxl_output *output = drm_encoder_to_qxl_output(encoder);
-struct qxl_head *head;
-struct drm_display_mode *mode;
-
-BUG_ON(!encoder);
-/* TODO: ugly, do better */
i = output->index;
-if (!qdev->monitors_config ||
- qdev->monitors_config->max_allowed <= i) {
-DRM_ERROR("head number too large or missing monitors config: %p, %d",
- qdev->monitors_config,
- qdev->monitors_config ?
- qdev->monitors_config->max_allowed : -1);
-return;
-}
-if (!encoder->crtc) {
-DRM_ERROR("missing crtc on encoder %p\n", encoder);
-return;
-}
-if (i != 0)
-DRM_DEBUG("missing for multiple monitors: no head holes\n");
-head = &qdev->monitors_config->heads[i];
-head->id = i;
-if (encoder->crtc->enabled) {
-mode = &encoder->crtc->mode;
-head->width = mode->hdisplay;
-head->height = mode->vdisplay;
-head->x = encoder->crtc->x;
-head->y = encoder->crtc->y;
-if (qdev->monitors_config->count < i + 1)
-qdev->monitors_config->count = i + 1;
DRM_DEBUG_KMS("setting head %d to +%d+%d %dx%d out of %d\n", i, head->x, head->y, head->width, head->height, qdev->monitors_config->count);
-head->flags = 0;
-/* TODO - somewhere else to call this for multiple monitors
- *(config_commit?) */
-qxl_send_monitors_config(qdev);
-
-
static void qxl_enc_commit(struct drm_encoder *encoder)
{
-struct qxl_device *qdev = encoder->dev->dev_private;
-
-qxl_write_monitors_config_for_encoder(qdev, encoder);
DRM_DEBUG("\n");
}

@@ -1039,8 +1057,6 @@
qxl_head_enabled(&qdev->client_monitors_config->heads[output->index]);

DRM_DEBUG("#%d connected: %d\n", output->index, connected);
-if (!connected)
-qxl_monitors_config_set(qdev, output->index, 0, 0, 0, 0);

return connected ? connector_status_connected :
  connector_status_disconnected;
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_draw.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_draw.c
@@ -241,8 +241,8 @@
qxl_bo_physical_address(qdev, dimage->bo, 0);
qxl_release_unmap(qdev, release, &drawable->release_info);
- qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);
qxl_release_fence_buffer_objects(release);
+ qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);

out_free_palette:
if (palette_bo)
@@ -348,9 +348,10 @@
goto out_release_backoff;

rects = drawable_set_clipping(qdev, num_clips, clips_bo);
-if (!rects)
+if (!rects) {
+ret = -EINVAL;
+goto out_release_backoff;
+
+}
+drawable = (struct qxl_drawable *)qxl_release_map(qdev, release);

drawable->clip.type = SPICE_CLIP_TYPE_RECTS;
@@ -381,8 +382,8 @@
 }
 qxl_bo_kunmap(clips_bo);

-qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);
qxl_release_fence_buffer_objects(release);
+qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);

out_release_backoff:
if (ret)
@@ -432,8 +433,8 @@
 drawable->u.copy_bits.src_pos.y = sy;
 qxl_release_unmap(qdev, release, &drawable->release_info);

-qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);
qxl_release_fence_buffer_objects(release);
+qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);

out_free_release:
if (ret)
@@ -476,8 +477,8 @@
 qxl_release_unmap(qdev, release, &drawable->release_info);

-qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);
qxl_release_fence_buffer_objects(release);
+qxl_push_command_ring_release(qdev, release, QXL_CMD_DRAW, false);

out_free_release:
if (ret)
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_drv.h
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_drv.h
@@ -111,6 +111,8 @@
 struct qxl_crtc {
     struct drm_crtc base;
     int index;
+    +struct qxl_bo *cursor_bo;
 };
struct qxl_output {
@@ -296,9 +298,6 @@
    int monitors_config_height;
};

-/* forward declaration for QXL_INFO_IO */
-__printf(2,3) void qxl_io_log(struct qxl_device *qdev, const char *fmt, ...);
-
extern const struct drm_ioctl_desc qxl_ioctls[];
extern int qxl_max_ioctl;

--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_dumb.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_dumb.c
@@ -57,6 +57,8 @@
surf.stride = pitch;
surf.format = format;
+surf.data = 0;
+
    r = qxl_gem_object_create_with_handle(qdev, file_priv,
        QXL_GEM_DOMAIN_VRAM,
        args->size, &surf, &qobj,
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_fb.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_fb.c
@@ -185,8 +185,6 @@
    /* we are using a shadow draw buffer, at qdev->surface0_shadow */

    -qxl_io_log(qdev, "dirty x[%d, %d], y[%d, %d]\n", clips->x1, clips->x2,
-    clips->y1, clips->y2);
    image->dx = clips->x1;
    image->dy = clips->y1;
    image->width = clips->x2 - clips->x1;
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_image.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_image.c
@@ -210,7 +210,8 @@
    break;
    default:
    DRM_ERROR("unsupported image bit depth\n");
-    return -EINVAL; /* TODO: cleanup */
+    qxl_bo_kunmap_atomic_page(qdev, image_bo, ptr);
+    return -EINVAL;
}

    image->u.bitmap.flags = QXL_BITMAP_TOP_DOWN;
    image->u.bitmap.x = width;
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_ioctl.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_ioctl.c
@@ -257,11 +257,8 @@

    -qxl_io_log(qdev, "dirty x[%d, %d], y[%d, %d]\n", clips->x1, clips->x2,
-    clips->y1, clips->y2);
    image->dx = clips->x1;
    image->dy = clips->y1;
    image->width = clips->x2 - clips->x1;
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_ioctl.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_ioctl.c
@@ -257,11 +257,8 @@

    -qxl_io_log(qdev, "dirty x[%d, %d], y[%d, %d]\n", clips->x1, clips->x2,
-    clips->y1, clips->y2);
    image->dx = clips->x1;
    image->dy = clips->y1;
    image->width = clips->x2 - clips->x1;
apply_surf_reloc(qdev, &reloc_info[i]);
}

+qxl_release_fence_buffer_objects(release);
ret = qxl_push_command_ring_release(qdev, release, cmd->type, true);
-if (ret)
-qxl_release_backoff_reserve_list(release);
-else
-qxl_release_fence_buffer_objects(release);

out_free_bos:
out_free_release:
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_irq.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_irq.c
@@ -57,10 +57,9 @@
*/
qdev->irq_received_error++;
-qxl_io_log(qdev, "%s: driver is in bug mode.\n", __func__);   
+DRM_WARN("driver is in bug mode\n");
}
if (pending & QXL_INTERRUPT_CLIENT_MONITORS_CONFIG) {
	-qxl_io_log(qdev, "QXL_INTERRUPT_CLIENT_MONITORS_CONFIG\n");
schedule_work(&qdev->client_monitors_config_work);
}
qdev->ram_header->int_mask = QXL_INTERRUPT_MASK;
--- linux-4.15.0.orig/drivers/gpu/drm/qxl/qxl_kms.c
+++ linux-4.15.0/drivers/gpu/drm/qxl/qxl_kms.c
@@ -181,7 +181,7 @@
&(qdev->ram_header->cursor_ring_hdr),
sizeof(struct qxl_command),
QXL_CURSOR_RING_SIZE,
-qdev->io_base + QXL_IO_NOTIFY_CMD,
+qdev->io_base + QXL_IO_NOTIFY_CURSOR,
false,
&qdev->cursor_event);

--- linux-4.15.0.orig/drivers/gpu/drm/radeon/ci_dpm.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/ci_dpm.c
@@ -4364,7 +4364,7 @@
table->mc_reg_table_entry[k].mc_data[j]] |= 0x100;
}
}++;
-if (j > SMU7_DISCRETE_MC_REGISTER_ARRAY_SIZE)
+if (j >= SMU7_DISCRETE_MC_REGISTER_ARRAY_SIZE)
return -EINVAL;

if (!pi->mem_gddr5) {


@@ -5573,6 +5573,7 @@
 if (!rdev->pm.dpm.ps)
 return -ENOMEM;
 power_state_offset = (u8 *)state_array->states;
+    rdev->pm.dpm.num_ps = 0;
 for (i = 0; i < state_array->ucNumEntries; i++) {
     u8 *idx;
     power_state = (union pplib_power_state *)power_state_offset;
@@ -5582,10 +5583,8 @@
 if (!rdev->pm.power_state[i].clock_info)
 return -EINVAL;
 ps = kzalloc(sizeof(struct ci_ps), GFP_KERNEL);
-if (ps == NULL) {
-    kfree(rdev->pm.dpm.ps);
+    if (ps == NULL)
-        return -ENOMEM;
-    }
 rdev->pm.dpm.ps[i].ps_priv = ps;
 ci_parse_pplib_non_clock_info(rdev, &rdev->pm.dpm.ps[i],
     non_clock_info,
@@ -5607,8 +5606,8 @@
 k++;}
 }
 power_state_offset += 2 + power_state->v2.ucNumDPMLevels;
+    rdev->pm.dpm.num_ps = i + 1;
 }
-rdev->pm.dpm.num_ps = state_array->ucNumEntries;
 /* fill in the vce power states */
 for (i = 0; i < RADEON_MAX_VCE_LEVELS; i++) {
     --- linux-4.15.0.orig/drivers/gpu/drm/radeon/cik.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/cik.c
@@ -3228,35 +3228,8 @@
     case CHIP_KAVERI:
         rdev->config.cik.max_shader_engines = 1;
         rdev->config.cik.max_tile_pipes = 4;
-        if (((rdev->pdev->device == 0x1304) ||
-            (rdev->pdev->device == 0x1305)) ||
-            (rdev->pdev->device == 0x130C)) {
-            rdev->config.cik.max_cu_per_sh = 8;
-            rdev->config.cik.max_backends_per_se = 2;
-        } else if (((rdev->pdev->device == 0x1309) ||
-            (rdev->pdev->device == 0x1310) ||
-            (rdev->pdev->device == 0x131C)) {
Open Source Used In 5GaaS Edge AC-4  21431
- (rdev->pdev->device == 0x1313) ||
- (rdev->pdev->device == 0x131D)) {
  rdev->config.cik.max_cu_per_sh = 6;
  rdev->config.cik.max_backends_per_se = 2;
} else if ((rdev->pdev->device == 0x1306) ||
- (rdev->pdev->device == 0x1307) ||
- (rdev->pdev->device == 0x130B) ||
- (rdev->pdev->device == 0x130E) ||
- (rdev->pdev->device == 0x1315) ||
- (rdev->pdev->device == 0x1318) ||
- (rdev->pdev->device == 0x131B)) {
  rdev->config.cik.max_cu_per_sh = 4;
  rdev->config.cik.max_backends_per_se = 1;
} else {
  rdev->config.cik.max_cu_per_sh = 3;
  rdev->config.cik.max_backends_per_se = 1;
}
+ rdev->config.cik.max_cu_per_sh = 8;
+ rdev->config.cik.max_backends_per_se = 2;
rdev->config.cik.max_sh_per_se = 1;
rdev->config.cik.max_texture_channel_caches = 4;
rdev->config.cik.max_gprs = 256;
@@ -7013,8 +6986,8 @@
} /* setup interrupt control */
/* XXX this should actually be a bus address, not an MC address. same on older asics */
-WREG32(INTERRUPT_CNTL2, rdev->ih.gpu_addr >> 8);
+/* set dummy read address to dummy page address */
+WREG32(INTERRUPT_CNTL2, rdev->dummy_page.addr >> 8);
interrupt_cntl = RREG32(INTERRUPT_CNTL);
/* IH_DUMMY_RD_OVERRIDE=0 - dummy read disabled with msi, enabled without msi */
* IH_DUMMY_RD_OVERRIDE=1 - dummy read controlled by IH_DUMMY_RD_EN
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/evergreen_cs.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/evergreen_cs.c
@@ -1299,6 +1299,7 @@
return -EINVAL;
}
ib[idx] += (u32)((reloc->gpu_offset >> 8) & 0xffffffff);
+break;
case CB_TARGET_MASK:
  track->cb_target_mask = radeon_get_ib_value(p, idx);
  track->cb_dirty = true;
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/ni_dpm.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/ni_dpm.c
@@ -2126,7 +2126,7 @@
if (clk_s & ~(SMC_NISLANDS_SPLL_DIV_TABLE_CLKS_MASK >>
           SMC_NISLANDS_SPLL_DIV_TABLE_CLKS_SHIFT))
           SMC_NISLANDS_SPLL_DIV_TABLE_CLKS_SHIFT))
ret = -EINVAL;

-if (clk_s & ~(SMC_NISLANDS_SPLL_DIV_TABLE_CLKS_MASK >>
     SMC_NISLANDS_SPLL_DIV_TABLE_CLKS_SHIFT))
+if (fb_div & ~(SMC_NISLANDS_SPLL_DIV_TABLE_FBDIV_MASK >>
     SMC_NISLANDS_SPLL_DIV_TABLE_FBDIV_SHIFT))
ret = -EINVAL;

if (clk_v & ~(SMC_NISLANDS_SPLL_DIV_TABLE_CLKV_MASK >>
    SMC_NISLANDS_SPLL_DIV_TABLE_CLKV_SHIFT))
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/r100.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/r100.c
@@ -1820,8 +1820,8 @@
    track->textures[i].use_pitch = 1;
 } else {
    track->textures[i].use_pitch = 0;
-    track->textures[i].width = 1 << ((idx_value >> RADEON_TXFORMAT_WIDTH_SHIFT) &
-    RADEON_TXFORMAT_WIDTH_MASK);
-    track->textures[i].height = 1 << ((idx_value >> RADEON_TXFORMAT_HEIGHT_SHIFT) &
-    RADEON_TXFORMAT_HEIGHT_MASK);
+    track->textures[i].width = 1 << ((idx_value & RADEON_TXFORMAT_WIDTH_MASK) >>
+    RADEON_TXFORMAT_WIDTH_SHIFT);
+    track->textures[i].height = 1 << ((idx_value & RADEON_TXFORMAT_HEIGHT_MASK) >>
    RADEON_TXFORMAT_HEIGHT_SHIFT);
 }

if (idx_value & RADEON_TXFORMAT_CUBIC_MAP_ENABLE)
    track->textures[i].tex_coord_type = 2;
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/r200.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/r200.c
@@ -476,8 +476,8 @@
    track->textures[i].use_pitch = 1;
 } else {
    track->textures[i].use_pitch = 0;
-    track->textures[i].width = 1 << ((idx_value >> RADEON_TXFORMAT_WIDTH_SHIFT) &
-    RADEON_TXFORMAT_WIDTH_MASK);
-    track->textures[i].height = 1 << ((idx_value >> RADEON_TXFORMAT_HEIGHT_SHIFT) &
-    RADEON_TXFORMAT_HEIGHT_MASK);
+    track->textures[i].width = 1 << ((idx_value & RADEON_TXFORMAT_WIDTH_MASK) >>
+    RADEON_TXFORMAT_WIDTH_SHIFT);
+    track->textures[i].height = 1 << ((idx_value & RADEON_TXFORMAT_HEIGHT_MASK) >>
    RADEON_TXFORMAT_HEIGHT_SHIFT);
 }

if (idx_value & R200_TXFORMAT_LOOKUP_DISABLE)
    track->textures[i].lookup_disable = true;
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/r600.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/r600.c
@@ -3690,8 +3690,8 @@
}
/* setup interrupt control */
-/* set dummy read address to ring address */
-WREG32(INTERRUPT_CNTL2, rdev->ih.gpu_addr >> 8);
+/* set dummy read address to dummy page address */
+WREG32(INTERRUPT_CNTL2, rdev->dummy_page.addr >> 8);
interrupt_cntl = RREG32(INTERRUPT_CNTL);
/* IH_DUMMY_RD_OVERRIDE=0 - dummy read disabled with msi, enabled without msi
 * IH_DUMMY_RD_OVERRIDE=1 - dummy read controlled by IH_DUMMY_RD_EN
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon.h
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon.h
@@ -1562,6 +1562,7 @@
 void                    *priv;
 u32			new_active_crtcs;
 intnew_active_crtc_count;
+int			high_pixelclock_count;
 u32			current_active_crtcs;
 intcurrent_active_crtc_count;
 bool single_display;
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_atombios.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_atombios.c
@@ -2131,10 +2131,14 @@
 return state_index;
 /* last mode is usually default, array is low to high */
 for (i = 0; i < num_modes; i++) {
- rdev->pm.power_state[state_index].clock_info =
- kzalloc(sizeof(struct radeon_pm_clock_info) * 1, GFP_KERNEL);
+/* avoid memory leaks from invalid modes or unknown frev. */
+if (!rdev->pm.power_state[state_index].clock_info) {
+ rdev->pm.power_state[state_index].clock_info =
+ kzalloc(sizeof(struct radeon_pm_clock_info),
+ GFP_KERNEL);
+}
 if (!rdev->pm.power_state[state_index].clock_info)
-return state_index;
+goto out;
 rdev->pm.power_state[state_index].num_clock_modes = 1;
rdev->pm.power_state[state_index].clock_info[0].voltage.type = VOLTAGE_NONE;
switch (frev) {
@@ -2253,17 +2257,24 @@
 break;
 }
}
+out:
+/* free any unused clock_info allocation. */
+if (state_index & state_index < num_modes) {
+kfree(rdev->pm.power_state[state_index].clock_info);
+rdev->pm.power_state[state_index].clock_info = NULL;
/* last mode is usually default */
- if (rdev->pm.default_power_state_index == -1) {  
+ if (state_index && rdev->pm.default_power_state_index == -1) {  
        rdev->pm.power_state[state_index - 1].type =  
            POWER_STATE_TYPE_DEFAULT;  
        rdev->pm.default_power_state_index = state_index - 1;  
        rdev->pm.power_state[state_index - 1].default_clock_mode =  
            &rdev->pm.power_state[state_index - 1].clock_info[0];  
        -rdev->pm.power_state[state_index].flags &=  
+ rdev->pm.power_state[state_index - 1].flags &=  
            ~RADEON_PM_STATE_SINGLE_DISPLAY_ONLY;  
        -rdev->pm.power_state[state_index].misc = 0;  
+ rdev->pm.power_state[state_index - 1].misc = 0;  
        -rdev->pm.power_state[state_index - 1].misc2 = 0;  
+ rdev->pm.power_state[state_index - 1].misc2 = 0;  
    }  
    return state_index;
}  
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_atpx_handler.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_atpx_handler.c
@@ -526,7 +526,7 @@
* look up whether we are the integrated or discrete GPU (all asics).
* Returns the client id.
*/
-static int radeon_atpx_get_client_id(struct pci_dev *pdev)
+static enum vga_switcheroo_client_id radeon_atpx_get_client_id(struct pci_dev *pdev)
{
    if (radeon_atpx_priv.dhandle == ACPI_HANDLE(&pdev->dev))
        return VGA_SWITCHEROO_IGD;
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_bios.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_bios.c
@@ -104,25 +104,33 @@
static bool radeon_read_platform_bios(struct radeon_device *rdev)
{
    uint8_t __iomem *bios;
    size_t size;
    phys_addr_t rom = rdev->pdev->rom;
    +size_t romlen = rdev->pdev->romlen;
    +void __iomem *bios;

    rdev->bios = NULL;

    -bios = pci_platform_rom(rdev->pdev, &size);
+if (!bios) {
+    +if (!rom || romlen == 0)
return false;
-
-if (size == 0 || bios[0] != 0x55 || bios[1] != 0xaa) {
+    rdev->bios = kzalloc(romlen, GFP_KERNEL);
+    if (!rdev->bios)
return false;
-
-rdev->bios = kmemdup(bios, size, GFP_KERNEL);
-if (rdev->bios == NULL) {
-return false;
-
+
+    bios = ioremap(rom, romlen);
+    if (!bios)
+        goto free_bios;
+    +
+    +    memcpy_fromio(rdev->bios, bios, romlen);
+    +    iounmap(bios);
+    +
+    +    if (rdev->bios[0] != 0x55 || rdev->bios[1] != 0xaa)
+        goto free_bios;
+
return true;
+free_bios:
+kfree(rdev->bios);
+return false;
}

#ifdef CONFIG_ACPI
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_connectors.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_connectors.c
@@ -90,25 +90,18 @@
/* don't do anything if sink is not display port, i.e.,
 * passive dp->(dvi|hdmi) adaptor
 */
-if (dig_connector->dp_sink_type == CONNECTOR_OBJECT_ID_DISPLAYPORT) {
-    int saved_dpms = connector->dpms;
-    /* Only turn off the display if it's physically disconnected */
-    if (!radeon_hpd_sense(rdev, radeon_connector->hpd.hpd)) {
-        drm_helper_connector_dpms(connector, DRM_MODE_DPMS_OFF);
-    } else if (radeon_dp_needs_link_train(radeon_connector)) {
-        /* Don't try to start link training before we
- * have the dpcd */
-        if (!radeon_dp_getdpcd(radeon_connector))
-            return;
-        
-        /* set it to OFF so that drm_helper_connector_dpms()
- * won't return immediately since the current state
- * is ON at this point.
- */
-connector->dpms = DRM_MODE_DPMS_OFF;
drm_helper_connector_dpms(connector, DRM_MODE_DPMS_ON);
-}
-connector->dpms = saved_dpms;
+if (dig_connector->dp_sink_type == CONNECTOR_OBJECT_ID_DISPLAYPORT &&
   + radeon_hpd_sense(rdev, radeon_connector->hpd.hpd) &&
   + radeon_dp_needs_link_train(radeon_connector)) {
+/* Don't start link training before we have the DPCD */
+if (!radeon_dp_getdpcd(radeon_connector))
+return;
+
+/* Turn the connector off and back on immediately, which
+ * will trigger link training
+ */
+drm_helper_connector_dpms(connector, DRM_MODE_DPMS_OFF);
drm_helper_connector_dpms(connector, DRM_MODE_DPMS_ON);
}
}
}@@ -771,7 +764,7 @@
radeon_encoder->output_csc = val;

-if (connector->encoder->crtc) {
+if (connector->encoder && connector->encoder->crtc) {
   struct drm_crtc *crtc = connector->encoder->crtc;
   struct radeon_crtc *radeon_crtc = to_radeon_crtc(crtc);

@@ -860,7 +853,7 @@
     return ret;
 }

-static int radeon_lvds_mode_valid(struct drm_connector *connector,
+static enum drm_mode_status radeon_lvds_mode_valid(struct drm_connector *connector,
   struct drm_display_mode *mode)
 {
 struct drm_encoder *encoder = radeon_best_single_encoder(connector);
@@ -900,9 +893,13 @@
     enum drm_connector_status ret = connector_status_disconnected;
     int r;

-r = pm_runtime_get_sync(connector->dev->dev);
-if (r < 0)
-  return connector_status_disconnected;
+if (!drm_kms_helper_is_poll_worker()) {

+r = pm_runtime_get_sync(connector->dev->dev);
+if (r < 0) {
+    pm_runtime_put_autosuspend(connector->dev->dev);
+    return connector_status_disconnected;
+} +
+
+if (encoder) {
    struct radeon_encoder *radeon_encoder = to_radeon_encoder(encoder);
@@ -925,8 +922,12 @@
/* check acpi lid status ??? */

    radeon_connector_update_scratch_regs(connector, ret);
-    pm_runtime_mark_last_busy(connector->dev->dev);
-    pm_runtime_put_autosuspend(connector->dev->dev);
+    +if (!drm_kms_helper_is_poll_worker()) {
+        pm_runtime_mark_last_busy(connector->dev->dev);
+        pm_runtime_put_autosuspend(connector->dev->dev);
+    } +
+
    return ret;
}

@@ -1014,7 +1015,7 @@
return ret;
}

-static int radeon_vga_mode_valid(struct drm_connector *connector, 
+static enum drm_mode_status radeon_vga_mode_valid(struct drm_connector *connector, 
    struct drm_display_mode *mode)
{
    struct drm_device *dev = connector->dev;
@@ -1040,9 +1041,13 @@
    enum drm_connector_status ret = connector_status_disconnected;
    int r;

    -r = pm_runtime_get_sync(connector->dev->dev);
    -if (r < 0)
    -    return connector_status_disconnected;
    +if (!drm_kms_helper_is_poll_worker()) {
    +    r = pm_runtime_get_sync(connector->dev->dev);
    +    if (r < 0) {
    +        pm_runtime_put_autosuspend(connector->dev->dev);
    +        return connector_status_disconnected;
    +    } +
encoder = radeon_best_single_encoder(connector);
if (!encoder)
@@ -1109,8 +1114,10 @@
 radeon_connector_update_scratch_regs(connector, ret);

 out:
- pm_runtime_mark_last_busy(connector->dev->dev);
- pm_runtime_put_autosuspend(connector->dev->dev);
+ if (!drm_kms_helper_is_poll_worker()) {
+ pm_runtime_mark_last_busy(connector->dev->dev);
+ pm_runtime_put_autosuspend(connector->dev->dev);
+ }

 return ret;
 }
@@ -1154,7 +1161,7 @@ return 1;
 }

-static int radeon_tv_mode_valid(struct drm_connector *connector,
+static enum drm_mode_status radeon_tv_mode_valid(struct drm_connector *connector,
    struct drm_display_mode *mode)
 {
     if ((mode->hdisplay > 1024) || (mode->vdisplay > 768))
@@ -1174,9 +1181,13 @@
     if (!radeon_connector->dac_load_detect)
     return ret;

-     r = pm_runtime_get_sync(connector->dev->dev);
-     if (r < 0)
-         return connector_status_disconnected;
+     if (!drm_kms_helper_is_poll_worker()) {
+         r = pm_runtime_get_sync(connector->dev->dev);
+         if (r < 0) {
+             pm_runtime_put_autosuspend(connector->dev->dev);
+             return connector_status_disconnected;
+         }
+     }

 encoder = radeon_best_single_encoder(connector);
 if (!encoder)
@@ -1188,8 +1199,12 @@
 if (ret == connector_status_connected)
     ret = radeon_connector_analog_encoder_conflict_solve(connector, encoder, ret, false);
     radeon_connector_update_scratch_regs(connector, ret);
@@ -1164,8 +1175,12 @@
if (!drm_kms_helper_is_poll_worker()) {
    pm_runtime_mark_last_busy(connector->dev->dev);
    pm_runtime_put_autosuspend(connector->dev->dev);
}

return ret;
}

@@ -1252,9 +1267,13 @@
enum drm_connector_status ret = connector_status_disconnected;
bool dret = false, broken_edid = false;

-r = pm_runtime_get_sync(connector->dev->dev);
-if (r < 0)
-paid disconnect
-if (!drm_kms_helper_is_poll_worker()) {
+r = pm_runtime_get_sync(connector->dev->dev);
+r = pm_runtime_get_sync(connector->dev->dev);
-if (r < 0) {
+    pm_runtime_put_autosuspend(connector->dev->dev);
+    return connector_status_disconnected;
+}
+}
+
if (radeon_connector->detected_hpd_without_ddc) {
    force = true;
@@ -1437,8 +1456,10 @@
}

exit:
-radeon_connector->use_digital = true;

@@ -1486,7 +1507,7 @@

return ret;
}

@@ -1486,7 +1507,7 @@
radeon_connector->use_digital = true;
}

-static int radeon_dvi_mode_valid(struct drm_connector *connector,
+static enum drm_mode_status radeon_dvi_mode_valid(struct drm_connector *connector,
   struct drm_display_mode *mode)
{
    struct drm_device *dev = connector->dev;
@@ -1689,9 +1710,13 @@

return ret;
}

@@ -1689,9 +1710,13 @@
radeon_connector->use_digital = true;
}

-static int radeon_dvi_mode_valid(struct drm_connector *connector,
+static enum drm_mode_status radeon_dvi_mode_valid(struct drm_connector *connector,
    struct drm_display_mode *mode)
{
    struct drm_device *dev = connector->dev;
@@ -1689,9 +1710,13 @@
if (radeon_dig_connector->is_mst) return connector_status_disconnected;

-r = pm_runtime_get_sync(connector->dev->dev);
-if (r < 0)
-return connector_status_disconnected;
+if (!drm_kms_helper_is_poll_worker()) {
+r = pm_runtime_get_sync(connector->dev->dev);
+if (r < 0) {
+pm_runtime_put_autosuspend(connector->dev->dev);
+return connector_status_disconnected;
+
+
+
+
+
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+
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+
+
+
+
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+
+
+
+
+
+
+
+
+
if (!force && radeon_check_hpd_status_unchanged(connector)) {
ret = connector->status;
@@ -1778,13 +1803,15 @@
}
out:
-pm_runtime_mark_last_busy(connector->dev->dev);
-pm_runtime_put_autosuspend(connector->dev->dev);
+if (!drm_kms_helper_is_poll_worker()) {
+pm_runtime_mark_last_busy(connector->dev->dev);
+pm_runtime_put_autosuspend(connector->dev->dev);
+
+}

return ret;
}

-static int radeon_dp_mode_valid(struct drm_connector *connector,
+static enum drm_mode_status radeon_dp_mode_valid(struct drm_connector *connector,
 struct drm_display_mode *mode)
 {
 struct drm_device *dev = connector->dev;
 --- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_device.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_device.c
@@ -139,6 +139,10 @@
 * https://bugs.freedesktop.org/show_bug.cgi?id=101491
 */
 { PCI_VENDOR_ID_ATI, 0x6741, 0x1043, 0x2122, RADEON_PX_QUIRK_DISABLE_PX },
+/* Asus K73TK laptop with AMD A6-3420M APU and Radeon 7670m GPU
+ * https://bugzilla.kernel.org/show_bug.cgi?id=51381#c52
+ */
+{ PCI_VENDOR_ID_ATI, 0x6840, 0x1043, 0x2123, RADEON_PX_QUIRK_DISABLE_PX },
+{ 0, 0, 0, 0, 0 },
+};
if ((rdev->flags & RADEON_IS_PCI) &&
    (rdev->family <= CHIP_RS740))
rdev->need_dma32 = true;
#ifdef CONFIG_PPC64
    if (rdev->family == CHIP_CEDAR)
        rdev->need_dma32 = true;
#endif
dma_bits = rdev->need_dma32 ? 32 : 40;
r = pci_set_dma_mask(rdev->pdev, DMA_BIT_MASK(dma_bits));
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_display.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_display.c
@@ -119,6 +119,8 @@

DRM_DEBUG_KMS("%d\n", radeon_crtc->crtc_id);

+msleep(10);
+WREG32(NI_INPUT_CSC_CONTROL + radeon_crtc->crtc_offset,
      (NI_INPUT_CSC_GRPH_MODE(NI_INPUT_CSC_BYPASS) |
       NI_INPUT_CSC_OVL_MODE(NI_INPUT_CSC_BYPASS)));
@@ -625,8 +627,10 @@

dev = set->crtc->dev;

ret = pm_runtime_get_sync(dev->dev);
-if (ret < 0)
+if (ret < 0) {
    pm_runtime_put_autosuspend(dev->dev);
    return ret;
+}

ret = drm_crtc_helper_set_config(set, ctx);

/* get matching reference and feedback divider */
-ref_div = min(max(DIV_ROUND_CLOSEST(den, post_div), 1u), ref_div_max);
+ref_div = min(max(den/post_div, 1u), ref_div_max);
*fb_div = DIV_ROUND_CLOSEST(nom * *ref_div * post_div, den);

/* limit fb divider to its maximum */
if (*fb_div > fb_div_max) {
    *ref_div = DIV_ROUND_CLOSEST(*ref_div * fb_div_max, *fb_div);
+ref_div = (*ref_div * fb_div_max)/(*fb_div);
*fb_div = fb_div_max;
}
Handle is imported dma-buf, so cannot be migrated to VRAM for scanout */
if (obj->import_attach) {
    DRM_DEBUG_KMS("Cannot create framebuffer from imported dma_buf\n");
    drm_gem_object_put(obj);
    return ERR_PTR(-EINVAL);
}

--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_drv.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_drv.c
@@ -168,7 +168,7 @@
    int radeon_modeset = -1;
    int radeon_dynclks = -1;
    int radeon_r4xx_atom = 0;
-int radeon_agpmode = 0;
+int radeon_agpmode = -1;
    int radeon_vram_limit = 0;
    int radeon_gart_size = -1; /* auto */
    int radeon_benchmarking = 0;
@@ -335,8 +335,39 @@
    static int radeon_pci_probe(struct pci_dev *pdev,
        const struct pci_device_id *ent)
    {
+    unsigned long flags = 0;
    int ret;

    +if (!ent)
    +return -ENODEV; /* Avoid NULL-ptr deref in drm_get_pci_dev */
+    +flags = ent->driver_data;
+    +if (!radeon_si_support) {
+        +switch (flags & RADEON_FAMILY_MASK) {
+            +case CHIP_TAHITI:
+            +case CHIP_PITCAIRN:
+            +case CHIP_VERDE:
+            +case CHIP_OLAND:
+            +case CHIP_HAINAN:
+                +dev_info(&pdev->dev, 
+                +"SI support disabled by module param\n");
+                +return -ENODEV;
+            +}
+        +}
+    +if (!radeon_cik_support) {
+        +switch (flags & RADEON_FAMILY_MASK) {
+            +case CHIP_KAVERI:
+            +case CHIP_BONAIRE:
case CHIP_HAWAII:
    case CHIP_KABINI:
    case CHIP_MULLINS:
    dev_info(&pdev->dev,
            "CIK support disabled by module param\n");
    return -ENODEV;
}
+
if (vga_switcheroo_client_probe_defer(pdev))
    return -EPROBE_DEFER;

@@ -415,7 +446,6 @@
    drm_dev->switch_power_state = DRM_SWITCH_POWER_CHANGING;
    drm_kms_helper_poll_disable(drm_dev);
    -vga_switcheroo_set_dynamic_switch(pdev, VGA_SWITCHEROO_OFF);
+
    ret = radeon_suspend_kms(drm_dev, false, false, false);
    pci_save_state(pdev);
    @@ -452,7 +482,6 @@
    ret = radeon_resume_kms(drm_dev, false, false);
    drm_kms_helper_poll_enable(drm_dev);
    -vga_switcheroo_set_dynamic_switch(pdev, VGA_SWITCHEROO_ON);
    drm_dev->switch_power_state = DRM_SWITCH_POWER_ON;
    return 0;
}
@@ -489,8 +518,10 @@
    struct radeon_bo *robj = gem_to_radeon_bo(gobj);

    if (robj) {
        if (robj->gem_base.import_attach)
            drm_prime_gem_destroy(&robj->gem_base, robj->tbo.sg);
radeon_mn_unregister(robj);
radeon_bo_unref(&robj);
}
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_kms.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_kms.c
@@ -94,31 +94,6 @@
 struct radeon_device *rdev;
 int r, acpi_status;

- if (!radeon_si_support) {
- switch (flags & RADEON_FAMILY_MASK) {
- case CHIP_TAHITI:
- case CHIP_PITCAIRN:
- case CHIP_VERDE:
- case CHIP_OLAND:
- case CHIP_HAINAN:
- dev_info(dev->dev, 
- "SI support disabled by module param\n");
- return -ENODEV;
- }
- }
-}
-
 rdev = kzalloc(sizeof(struct radeon_device), GFP_KERNEL);
if (rdev == NULL) {
return -ENOMEM;
@@ -171,6 +146,7 @@
}

if (radeon_is_px(dev)) {
	dev_pm_set_driver_flags(dev->dev, DPM_FLAG_NEVER_SKIP);

 pm_runtime_use_autosuspend(dev->dev);
 pm_runtime_set_autosuspend_delay(dev->dev, 5000);
 pm_runtime_set_active(dev->dev);
@@ -524,6 +500,7 @@
 *value = rdev->config.si.backend_enable_mask;
 } else {

DRM_DEBUG_KMS("BACKEND_ENABLED_MASK is si+ only!\n");
+return -EINVAL;
}
break;
case RADEON_INFO_MAX_SCLK:
@@ -652,8 +629,10 @@
file_priv->driver_priv = NULL;

r = pm_runtime_get_sync(dev->dev);
-if (r < 0)
+if (r < 0) {
+pm_runtime_put_autosuspend(dev->dev);
return r;
+
/* new gpu have virtual address space support */
if (rdev->family >= CHIP_CAYMAN) {
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_object.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_object.c
@@ -82,6 +82,8 @@
mutex_unlock(&bo->rdev->gem.mutex);
radeon_bo_clear_surface_reg(bo);
WARN_ON_ONCE(!list_empty(&bo->va));
+if (bo->gem_base.import_attach)
+drm_prime_gem_destroy(&bo->gem_base, bo->tbo.sg);
drm_gem_object_release(&bo->gem_base);
kfree(bo);
}
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_pm.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_pm.c
@@ -47,7 +47,6 @@
static bool radeon_pm_debug_check_in_vbl(struct radeon_device *rdev, bool finish);
static void radeon_pm_update_profile(struct radeon_device *rdev);
static void radeon_pm_set_clocks(struct radeon_device *rdev);
-static void radeon_pm_compute_clocks_dpm(struct radeon_device *rdev);
int radeon_pm_get_type_index(struct radeon_device *rdev,
    enum radeon_pm_state_type ps_type,
@@ -885,8 +882,7 @@
mutex_unlock(&rdev->pm.mutex);
#endif
else if (rdev->pm.pm_method == PM_METHOD_PROFILE) {
if (rdev->pm.profile == PM_PROFILE_AUTO) {
@@ -858,7 +855,6 @@
mutex_lock(&rdev->pm.mutex);
#endif
else if (rdev->pm.pm_method == PM_METHOD_PROFILE) {
if (rdev->pm.profile == PM_PROFILE_AUTO) {
mutex_lock(&rdev->pm.mutex);
@@ -885,8 +882,7 @@

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dpm_state = POWER_STATE_TYPE_INTERNAL_3DPERF;
/* balanced states don't exist at the moment */
if (dpm_state == POWER_STATE_TYPE_BALANCED)
    -dpm_state = rdev->pm.dpm.ac_power ?
        -POWER_STATE_TYPE_PERFORMANCE : POWER_STATE_TYPE_BATTERY;
    +dpm_state = POWER_STATE_TYPE_PERFORMANCE;

restart_search:
/* Pick the best power state based on current conditions */
@@ -1719,6 +1715,7 @@
@@ -1728,6 +1725,7 @@
@@ -1735,6 +1733,12 @@

if (unlikely(ret))
    goto error;

/* pin buffer into GTT */
ret = radeon_bo_pin(bo, RADEON_GEM_DOMAIN_GTT, NULL);
-if (likely(ret == 0))
-    bo->prime_shared_count++;
+if (unlikely(ret))
+    goto error;

--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_prime.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_prime.c
@@ -92,9 +92,19 @@
+if (bo->tbo.moving) {
  ret = dma_fence_wait(bo->tbo.moving, false);
  +if (unlikely(ret)) {
    +radeon_bo_unpin(bo);
    +goto error;
  +}
  +}
  +bo->prime_shared_count++;
+error:
  radeon_bo_unreserve(bo);
  return ret;
}
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/radeon_uvd.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/radeon_uvd.c
@@ -286,7 +286,7 @@
if (rdev->uvd.vcpu_bo == NULL)
  return -EINVAL;
-  memcpy(rdev->uvd.cpu_addr, rdev->uvd_fw->data, rdev->uvd_fw->size);
+  memcpy_toio((void __iomem *)rdev->uvd.cpu_addr, rdev->uvd_fw->data, rdev->uvd_fw->size);

  size = radeon_bo_size(rdev->uvd.vcpu_bo);
  size -= rdev->uvd_fw->size;
@@ -294,7 +294,7 @@
  ptr = rdev->uvd.cpu_addr;
  ptr += rdev->uvd_fw->size;
-  memset(ptr, 0, size);
+  memset_io((void __iomem *)ptr, 0, size);
  return 0;
}
@@ -995,7 +995,7 @@
/* calc dclk divider with current vco freq */
dclk_div = radeon_uvd_calc_upll_post_div(vco_freq, dclk,
  pd_min, pd_even);
-  if (vclk_div > pd_max)
-    if (dclk_div > pd_max)
+    break; /* vco is too big, it has to stop */

/* calc score with current vco freq */
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/si.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/si.c
@@ -5993,8 +5993,8 @@
}
/* setup interrupt control */
- /* set dummy read address to ring address */
- WREG32(INTR_CNTL2, rdev->ih.gpu_addr >> 8);
+ /* set dummy read address to dummy page address */
+ WREG32(INTR_CNTL2, rdev->dummy_page.addr >> 8);

interrupt_cntl = RREG32(INTR_CNTL);

/* IH_DUMMY_RD_OVERRIDE=0 - dummy read disabled with msi, enabled without msi */
* IH_DUMMY_RD_OVERRIDE=1 - dummy read controlled by IH_DUMMY_RD_EN
--- linux-4.15.0.orig/drivers/gpu/drm/radeon/si_dpm.c
+++ linux-4.15.0/drivers/gpu/drm/radeon/si_dpm.c
@@ -1956,6 +1956,7 @@
     case 0x682C:
     si_pi->cac_weights = cac_weights_cape_verde_pro;
     si_pi->dte_data = dte_data_sun_xt;
+     update_dte_from_pl2 = true;
     break;
     case 0x6825:
@@ -2984,6 +2985,11 @@
     (rdev->pdev->device == 0x6667)) {  
         max_sclk = 75000;
     }
+     if ((rdev->pdev->revision == 0xC3) ||
+         (rdev->pdev->device == 0x6665)) {
+         + max_sclk = 60000;
+         + max_mclk = 80000;
+     }
+ } else if (rdev->family == CHIP_OLAND) {
if ((rdev->pdev->revision == 0xC7) ||
    (rdev->pdev->device == 0x6650)) {
@@ -2994,6 +3000,9 @@
         max_sclk = 75000;
     }
+     +if (rdev->pm.dpm.high_pixelclock_count > 1)
+     +disable_sclk_switching = true;
+ }

if (rps->vce_active) {
@@ -5907,9 +5916,9 @@
{
    u32 lane_width;
    u32 new_lane_width =
-    (radeon_new_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
+    (radeon_new_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
        ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT;
+    (radeon_new_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
        ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT) + 1;
u32 current_lane_width =
-(radeon_current_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT;
+(radeon_current_state->caps & ATOM_PPLIB_PCIE_LINK_WIDTH_MASK) >>
ATOM_PPLIB_PCIE_LINK_WIDTH_SHIFT) + 1;

if (new_lane_width != current_lane_width) {
    radeon_set_pcie_lanes(rdev, new_lane_width);
    dev_dbg(rcdu->dev,
            "connected entity "%d is disabled, skipping
",
            entity);
    of_node_put(entity);
    return -ENODEV;
}

/* Initialize vertical blanking interrupts handling. Start with vblank
 * disabled for all CRTC's.
 */
ret = drm_vblank_init(dev, (1 << rcdu->info->num_crtcs) - 1);
if (ret < 0)
    return ret;

rcar_lvds_write(lvds, LVDPLLCR, pllcr);

/*
 * Select the input, hardcode mode 0, enable LVDS operation and turn
 * bias circuitry on.
 */
lvdc0 = (lvds->mode << LVDCR0_LVMD_SHIFT) | LVDCR0_BEN | LVDCR0_LVEN;
/* Select the input and set the LVDS mode. */
lvdc0 = lvds->mode << LVDCR0_LVMD_SHIFT;
if (rcrtc->index == 2)
lvdc0 |= LVDCR0_DUSEL;
rcar_lvds_write(lvds, LVDCR0, lvdc0);
/* Enable LVDS operation and turn bias circuitry on. */
+lvdc0 |= LVDCR0_BEN | LVDCR0_LVEN;
+rcar_lvds_write(lvds, LVDCR0, lvdc0);
+
/*
 * Turn the PLL on, wait for the startup delay, and turn the output
 * on.
@@ -95,7 +96,7 @@
 u32 lvdc0;
 u32 pllcr;

-/* PLL clock configuration */
+/* Set the PLL clock configuration and LVDS mode. */
if (freq < 42000)
    pllcr = LVDPLLCCR_PLLDIVCNT_42M;
else if (freq < 85000)
    @@ -107,6 +108,9 @@
    rcar_lvds_write(lvds, LVDPLLCCR, pllcr);
+
    lvdc0 = lvds->mode << LVDCR0_LVMD_SHIFT;
    rcar_lvds_write(lvds, LVDCR0, lvdc0);
+
    /* Turn all the channels on. */
    rcar_lvds_write(lvds, LVDCR1,
    LVDCR1_CHSTBY_GEN3(3) | LVDCR1_CHSTBY_GEN3(2) |
    @@ -117,7 +121,7 @@
 * Turn the PLL on, set it to LVDS normal mode, wait for the startup
 * delay and turn the output on.
 */
- lvdc0 = (lvds->mode << LVDCR0_LVMD_SHIFT) | LVDCR0_PLLON;
+ lvdc0 |= LVDCR0_PLLON;
    rcar_lvds_write(lvds, LVDCR0, lvdc0);

    lvdc0 |= LVDCR0_PWD;
--- linux-4.15.0.orig/drivers/gpu/drm/rockchip/cdn-dp-core.c
+++ linux-4.15.0/drivers/gpu/drm/rockchip/cdn-dp-core.c
@@ -83,6 +83,7 @@@
    ret = regmap_write(dp->grf, reg, val);
    if (ret) {
        DRM_DEV_ERROR(dp->dev, "Could not write to GRF: %d\n", ret);
+        clk_disable_unprepare(dp->grf_clk);
        return ret;
    }

--- linux-4.15.0.orig/drivers/gpu/drm/rockchip/cdn-dp-reg.c
+++ linux-4.15.0/drivers/gpu/drm/rockchip/cdn-dp-reg.c
@@ -113,7 +113,7 @@
static int cdn_dp_mailbox_validate_receive(struct cdn_dp_device *dp,
   u8 module_id, u8 opcode,
   - u8 req_size)
+ u16 req_size)
{
   u32 mbox_size, i;
   u8 header[4];
   @@ -147,7 +147,7 @@
}

static int cdn_dp_mailbox_read_receive(struct cdn_dp_device *dp,
   - u8 *buff, u8 buff_size)
+ u8 *buff, u16 buff_size)
{
   u32 i;
   int ret;
   --- linux-4.15.0.orig/drivers/gpu/drm/rockchip/rockchip_drm_drv.c
+++ linux-4.15.0/drivers/gpu/drm/rockchip/rockchip_drm_drv.c
@@ -427,6 +427,14 @@
    return 0;
    }

+static void rockchip_drm_platform_shutdown(struct platform_device *pdev)
+{
+   struct drm_device *drm = platform_get_drvdata(pdev);
+   +if (drm)
+      drm_atomic_helper_shutdown(drm);
+   +}
+
+static const struct device_id rockchip_drm_dt_ids[] = {
+    {.compatible = "rockchip,display-subsystem", },
+    /* sentinel */
+};
+@@ -436,6 +444,7 @@
+static struct platform_driver rockchip_drm_platform_driver = {
+    .probe = rockchip_drm_platform_probe,
+    .remove = rockchip_drm_platform_remove,
+    .shutdown = rockchip_drm_platform_shutdown,
+    .driver = {
+        .name = "rockchip-drm",
+        .of_match_table = rockchip_drm_dt_ids,
+    },
+};

--- linux-4.15.0.orig/drivers/gpu/drm/rockchip/rockchip_drm_gem.c
+++ linux-4.15.0/drivers/gpu/drm/rockchip/rockchip_drm_gem.c
@@ -262,7 +262,6 @@
    * VM_PFNMAP flag that was set by drm_gem_mmap_obj()/drm_gem_mmap().
    */
    vma->vm_flags &= ~VM_PFNMAP;
-vma->vm_pgoff = 0;
if (rk_obj->pages)
ret = rockchip_drm_gem_object_mmap_iommu(obj, vma);
@@ -297,6 +296,12 @@
if (ret)
return ret;

+/*
+ * Set vm_pgoff (used as a fake buffer offset by DRM) to 0 and map the
+ * whole buffer from the start.
+ */
+vma->vm_pgoff = 0;
+obj = vma->vm_private_data;

return rockchip_drm_gem_object_mmap(obj, vma);
--- linux-4.15.0.orig/drivers/gpu/drm/rockchip/rockchip_drm_psr.c
+++ linux-4.15.0/drivers/gpu/drm/rockchip/rockchip_drm_psr.c
@@ -221,13 +221,15 @@
int rockchip_drm_psr_register(struct drm_encoder *encoder,
void (*psr_set)(struct drm_encoder *, bool enable))
{
-struct rockchip_drm_private *drm_drv = encoder->dev->dev_private;
+struct rockchip_drm_private *drm_drv = encoder->dev->dev_private;
struct psr_drv *psr;
unsigned long flags;
if (!encoder || !psr_set)
return -EINVAL;
+drm_drv = encoder->dev->dev_private;
+
psr = kzalloc(sizeof(struct psr_drv), GFP_KERNEL);
if (!psr)
return -ENOMEM;
--- linux-4.15.0.orig/drivers/gpu/drm/rockchip/rockchip_drm_vop.c
+++ linux-4.15.0/drivers/gpu/drm/rockchip/rockchip_drm_vop.c
@@ -492,6 +492,18 @@
spin_unlock_irqrestore(&vop->irq_lock, flags);
}

+static void vop_win_disable(struct vop *vop, const struct vop_win_data *win)
+{  
+if (win->phy->scl && win->phy->scl->ext) {
+VOP_SCL_SET_EXT(vop, win, yrgb_hor_scl_mode, SCALE_NONE);
+VOP_SCL_SET_EXT(vop, win, yrgb_ver_scl_mode, SCALE_NONE);
+VOP_SCL_SET_EXT(vop, win, cbcr_hor_scl_mode, SCALE_NONE);
+VOP_SCL_SET_EXT(vop, win, cbcr_ver_scl_mode, SCALE_NONE);
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+VOP_WIN_SET(vop, win, enable, 0);

static int vop_enable(struct drm_crtc *crtc)
{
    struct vop *vop = to_vop(crtc);
    @ @ -528,7 +540,10 @@
    goto err_disable_aclk;
}

-memcpy(vop->regs, vop->regsbak, vop->len);
+spin_lock(&vop->reg_lock);
+for (i = 0; i < vop->len; i += 4)
+writel_relaxed(vop->regsbak[i / 4], vop->regs + i);
+
/*
 * We need to make sure that all windows are disabled before we
 * enable the crtc. Otherwise we might try to scan from a destroyed
 @@ -538,10 +553,9 @@
 struct vop_win *vop_win = &vop->win[i];
 const struct vop_win_data *win = vop_win->data;

-spin_lock(&vop->reg_lock);
-VOP_WIN_SET(vop, win, enable, 0);
-spin_unlock(&vop->reg_lock);
+vop_win_disable(vop, win);
}
+spin_unlock(&vop->reg_lock);

vop_cfg_done(vop);

@@ -696,7 +710,7 @@
-spin_lock(&vop->reg_lock);
-VOP_WIN_SET(vop, win, enable, 0);
-spin_unlock(&vop->reg_lock);
+vop_win_disable(vop, win);
}
+spin_unlock(&vop->reg_lock);

spin_lock(&vop->reg_lock);

-VOP_WIN_SET(vop, win, enable, 0);
+vop_win_disable(vop, win);

spin_unlock(&vop->reg_lock);
}@ @ -862,7 +876,8 @@
struct vop *vop = to_vop(crtc);

adjusted_mode->clock =
-clk_round_rate(vop->dclk, mode->clock * 1000) / 1000;
+DIV_ROUND_UP(clk_round_rate(vop->dclk, mode->clock * 1000),

return true;
}
@@ -1414,7 +1429,11 @@
usleep_range(10, 20);
reset_control_deassert(ahb_rst);

-memcpy(vop->regsbak, vop->regs, vop->len);
+VOP_INTR_SET_TYPE(vop, clear, INTR_MASK, 1);
+VOP_INTR_SET_TYPE(vop, enable, INTR_MASK, 0);
+for (i = 0; i < vop->len; i += sizeof(u32))
+vop->regsbak[i / 4] = readl_relaxed(vop->regs + i);
VOP_REG_SET(vop, misc, global_regdone_en, 1);
VOP_REG_SET(vop, common, dsp_blank, 0);
@@ -1424,7 +1443,7 @@
int channel = i * 2 + 1;
VOP_WIN_SET(vop, win, channel, (channel + 1) << 4 | channel);
-VOP_WIN_SET(vop, win, enable, 0);
+vop_win_disable(vop, win);
VOP_WIN_SET(vop, win, gate, 1);
}
@@ -1569,17 +1588,19 @@
mutex_init(&vop->vsync_mutex);

-ret = devm_request_irq(dev, vop->irq, vop_isr,
- IRQF_SHARED, dev_name(dev), vop);
-if (ret)
- return ret;
-/* IRQ is initially disabled; it gets enabled in power_on */
-disable_irq(vop->irq);
-
-ret = vop_create_crtc(vop);
-if (ret)
- goto err_enable_irq;
+return ret;
+pm_runtime_enable(&pdev->dev);

@@ -1590,13 +1601,19 @@
goto err_disable_pm_runtime;
}
ret = devm_request_irq(dev, vop->irq, vop_isr,
    IRQF_SHARED, dev_name(dev), vop);
if (ret)
    goto err_disable_pm_runtime;

/* IRQ is initially disabled; it gets enabled in power_on */
disable_irq(vop->irq);

return 0;

err_disable_pm_runtime:
    pm_runtime_disable(&pdev->dev);
vop_destroy_crtc(vop);
-err_enable_irq:
    enable_irq(vop->irq); /* To balance out the disable_irq above */
return ret;

--- linux-4.15.0.orig/drivers/gpu/drm/rockchip/rockchip_lvds.c
+++ linux-4.15.0/drivers/gpu/drm/rockchip/rockchip_lvds.c
@@ -362,8 +362,10 @@
of_property_read_u32(endpoint, "reg", &endpoint_id);
ret = drm_of_find_panel_or_bridge(dev->of_node, 1, endpoint_id,
    &lvds->panel, &lvds->bridge);
-if (!ret)
+if (!ret) {
    of_node_put(endpoint);
    break;
+}
}

if (!child_count) {
    DRM_DEV_ERROR(dev, "lvds port does not have any children\n");
--- linux-4.15.0.orig/drivers/gpu/drm/shmobile/shmob_drm_drv.c
+++ linux-4.15.0/drivers/gpu/drm/shmobile/shmob_drm_drv.c
@@ -233,8 -233,8 @@
res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
sdev->mmio = devm_ioremap_resource(&pdev->dev, res);
-if (sdev->mmio == NULL)
-    return -ENOMEM;
+if (IS_ERR(sdev->mmio))
+    return PTR_ERR(sdev->mmio);
ret = shmob_drm_setup_clocks(sdev, pdata->clk_source);
if (ret < 0)
--- linux-4.15.0.orig/drivers/gpu/drm/sti/sti_hda.c
+++ linux-4.15.0/drivers/gpu/drm/sti/sti_hda.c

@@ -721,7 +721,6 @@
    return 0;

err_sysfs:
-    drm_bridge_remove(bridge);
    return -EINVAL;
}

--- linux-4.15.0.orig/drivers/gpu/drm/sti/sti_hdmi.c
+++ linux-4.15.0/drivers/gpu/drm/sti/sti_hdmi.c
@@ -1314,7 +1314,6 @@
    return 0;

err_sysfs:
-    drm_bridge_remove(bridge);
    hdmi->drm_connector = NULL;
    return -EINVAL;
}

--- linux-4.15.0.orig/drivers/gpu/drm/stm/ltdc.c
+++ linux-4.15.0/drivers/gpu/drm/stm/ltdc.c
@@ -20,6 +20,7 @@
       include <drm/drm_crtc_helper.h>
       include <drm/drm_fb_cma_helper.h>
       include <drm/drm_gem_cma_helper.h>
+-include <drm/drm_gem_framebuffer_helper.h>
       include <drm/drm_of.h>
       include <drm/drm_bridge.h>
       include <drm/drm_plane_helper.h>
@@ -691,6 +692,7 @@
    
};

static const struct drm_plane_helper_funcs ltdc_plane_helper_funcs = {
    .prepare_fb = drm_gem_fb_prepare_fb,
    .atomic_check = ltdc_plane_atomic_check,
    .atomic_update = ltdc_plane_atomic_update,
--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun4i_dotclock.c
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun4i_dotclock.c
@@ -78,9 +78,19 @@
       for (i = 6; i <= 127; i++) {
-           unsigned long ideal = rate * i;
-       
+       u64 ideal = (u64)rate * i;

+    /*
+     * ideal has overflowed the max value that can be stored in an
         unsigned long rounded;
+    */

unsigned long, and every clk operation we might do on a truncated u64 value will give us incorrect results. Let's just stop there since bigger dividers will result in the same overflow issue.

if (ideal > ULONG_MAX) goto out;

rounded = clk_hw_round_rate(clk_hw_get_parent(hw), ideal);

static int sun4i_dclk_set_phase(struct clk_hw *hw, int degrees)
{
    struct sun4i_dclk *dclk = hw_to_dclk(hw);
    u32 val = degrees / 120;
    val <<= 28;
    regmap_update_bits(dclk->regmap, SUN4I_TCON0_IO_POL_REG,
                        GENMASK(29, 28),
                        degrees / 120);
    return 0;
}
remote = of_graph_get_remote_port_parent(ep);
if (!remote) {
  DRM_DEBUG_DRIVER("Error retrieving the output node\n");
  of_node_put(remote);
  continue;
}

if (of_graph_parse_endpoint(ep, &endpoint)) {
  DRM_DEBUG_DRIVER("Couldn't parse endpoint\n");
  of_node_put(remote);
  continue;
}

if (!endpoint.id) {
  DRM_DEBUG_DRIVER("Endpoint is our panel... skipping\n");
  of_node_put(remote);
  continue;
}

static int sun4i_drv_remove(struct platform_device *pdev) {
    component_master_del(&pdev->dev, &sun4i_drv_master_ops);
    return 0;
}

--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun4i_hdmi.h
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun4i_hdmi.h
@@ -152,7 +152,7 @@
 #define SUN4I_HDMI_DDC_CMD_IMPLICIT_WRITE 3
 #define SUN4I_HDMI_DDC_CLK_REG 0x528
 #define SUN4I_HDMI_DDC_CLK_M(m) (((m) & 0x7) << 3)
--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun4i_hdmi_ddc_clk.c
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun4i_hdmi_ddc_clk.c
@@ -37,7 +37,7 @@
     unsigned long best_rate = 0;
     u8 best_m = 0, best_n = 0, _m, _n;

-for (_m = 0; _m < 8; _m++) {
+for (_m = 0; _m < 16; _m++) {
for (_n = 0; _n < 8; _n++) {
unsigned long tmp_rate;

--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun4i_hdmi_enc.c
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun4i_hdmi_enc.c
@@ -92,6 +92,8 @@
val = readl(hdmi->base + SUN4I_HDMI_VID_CTRL_REG);
val &= ~SUN4I_HDMI_VID_CTRL_ENABLE;
writel(val, hdmi->base + SUN4I_HDMI_VID_CTRL_REG);
+
+clk_disable_unprepare(hdmi->tmds_clk);
}

static void sun4i_hdmi_enable(struct drm_encoder *encoder)
@@ -102,6 +104,8 @@
DRM_DEBUG_DRIVER("Enabling the HDMI Output\n");
+clk_prepare_enable(hdmi->tmds_clk);
+
sun4i_hdmi_setup_avi_infoframes(hdmi, mode);
val |= SUN4I_HDMI_PKT_CTRL_TYPE(0, SUN4I_HDMI_PKT_AVI);
val |= SUN4I_HDMI_PKT_CTRL_TYPE(1, SUN4I_HDMI_PKT_END);
@@ -238,9 +242,8 @@
struct sun4i_hdmi *hdmi = drm_connector_to_sun4i_hdmi(connector);
unsigned long reg;

-if (readl_poll_timeout(hdmi->base + SUN4I_HDMI_HPD_REG, reg,
-    0, 500000)) {
+reg = readl(hdmi->base + SUN4I_HDMI_HPD_REG);
  if (!(reg & SUN4I_HDMI_HPD_HIGH)) {
    cec_phys_addr_invalidate(hdmi->cec_adap);
    return connector_status_disconnected;
  }
@@ -645,8 +648,6 @@
struct sun4i_hdmi *hdmi = dev_get_drvdata(dev);

cec_unregister_adapter(hdmi->cec_adap);
-drm_connector_cleanup(&hdmi->connector);
-drm_encoder_cleanup(&hdmi->encoder);
i2c_del_adapter(hdmi->i2c);
clk_disable_unprepare(hdmi->mod_clk);
clk_disable_unprepare(hdmi->bus_clk);
--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun4i_hdmi_tmds_clk.c
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun4i_hdmi_tmds_clk.c
@@ -52,7 +52,7 @@
     (rate - tmp_rate) < (rate - best_rate)) {
 best_rate = tmp_rate;
 best_m = m;
-is_double = d;
+is_double = (d == 2) ? true : false;
 }
 }
 }

--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun4i_tcon.c
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun4i_tcon.c
@@ -403,6 +403,7 @@
     dev_err(dev, "Couldn't get the TCON channel 0 clock\n");
     return PTR_ERR(tcon->sclk0);
 }
+clk_prepare_enable(tcon->sclk0);

 if (tcon->quirks->has_channel_1) {
     tcon->sclk1 = devm_clk_get(dev, "tcon-ch1");
@@ -417,6 +418,7 @@
 static void sun4i_tcon_free_clocks(struct sun4i_tcon *tcon)
 {
+clk_disable_unprepare(tcon->sclk0);
     clk_disable_unprepare(tcon->clk);
 }

--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun8i_mixer.c
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun8i_mixer.c
@@ -235,7 +235,7 @@
 .reg_bits= 32,
 .val_bits= 32,
 .reg_stride= 4,
-.max_register= 0xbfffc, /* guessed */
+.max_register= 0xffffc, /* guessed */
};

static int sun8i_mixer_bind(struct device *dev, struct device *master,
--- linux-4.15.0.orig/drivers/gpu/drm/sun4i/sun8i_mixer.h
+++ linux-4.15.0/drivers/gpu/drm/sun4i/sun8i_mixer.h
@@ -80,7 +80,7 @@
 #define SUN8I_MIXER_CHAN_UI_LAYER_ATTR_ENBIT(0)
 #define SUN8I_MIXER_CHAN_UI_LAYER_ATTR_ALPHA_MODE_MASKGENMMAK(2, 1)
-#define SUN8I_MIXER_CHAN_UI_LAYER_ATTR_FBFMT_MASKGENMMAK(11, 8)
+#define SUN8I_MIXER_CHAN_UI_LAYER_ATTR_FBFMT_MASKGENMMAK(12, 8)
 #define SUN8I_MIXER_CHAN_UI_LAYER_ATTR_ALPHA_MASKGENMMAK(31, 24)
 #define SUN8I_MIXER_CHAN_UI_LAYER_ATTR_ALPHA_MODE_DEF(1 << 1)
#define SUN8I_MIXER_CHAN_UI_LAYER_ATTR_FBFMT_ARGB8888 (0 << 8)
--- linux-4.15.0.orig/drivers/gpu/drm/tegra/dc.c
+++ linux-4.15.0/drivers/gpu/drm/tegra/dc.c
@@ -1130,6 +1130,11 @@
dev_err(dc->dev,  
"failed to set clock rate to %lu Hz\n",  
state->pclk);
+
+err = clk_set_rate(dc->clk, state->pclk);
+if (err < 0)
+dev_err(dc->dev, "failed to set clock %pC to %lu Hz: %d\n",  
+dc->clk, state->pclk, err);
}

DRM_DEBUG_KMS("rate: %lu, div: %u\n", clk_get_rate(dc->clk),  
@@ -1138,11 +1143,6 @@
value = SHIFT_CLK_DIVIDER(state->div) | PIXEL_CLK_DIVIDER_PCD1;
tegra_dc_writel(dc, value, DC_DISP_DISP_CLOCK_CONTROL);
-
-err = clk_set_rate(dc->clk, state->pclk);
-if (err < 0)
-dev_err(dc->dev, "failed to set clock %pC to %lu Hz: %d\n",  
-dc->clk, state->pclk, err);
}

static void tegra_dc_stop(struct tegra_dc *dc)
--- linux-4.15.0.orig/drivers/gpu/drm/tegra/drm.c
+++ linux-4.15.0/drivers/gpu/drm/tegra/drm.c
@@ -249,6 +249,7 @@
drm_kms_helper_poll_fini(drm);
tegra_drm_fb_exit(drm);
drm_atomic_helper_shutdown(drm);
drm_mode_config_cleanup(drm);
err = host1x_device_exit(device);
@@ -471,7 +472,7 @@
* unaligned offset is malformed and cause commands stream  
* corruption on the buffer address relocation.  
*/
-if (offset & 3 || offset >= obj->gem.size) {
+if (offset & 3 || offset > obj->gem.size) {
    err = -EINVAL;
goto fail;
}
if (err < 0) {
    dev_err(sor->dev, "failed to deassert SOR reset: %d\n", err);
    clk_disable_unprepare(sor->clk);
    return err;
}

err = clk_prepare_enable(sor->clk_safe);
-if (err < 0)
+if (err < 0) {
    clk_disable_unprepare(sor->clk);
    return err;
+
}

err = clk_prepare_enable(sor->clk_dp);
-if (err < 0)
+if (err < 0) {
    clk_disable_unprepare(sor->clk_safe);
    clk_disable_unprepare(sor->clk);
    return err;
+
}

return 0;
}
- CPUFREQ_TRANSITION_NOTIFIER);
-#endif
-
if (priv->clk)
clk_put(priv->clk);

@@ -283,17 +283,6 @@
goto init_failed;
}

-#ifdef CONFIG_CPU_FREQ
-priv->freq_transition.notifier_call = cpufreq_transition;
-ret = cpufreq_register_notifier(&priv->freq_transition,
-CPUFREQ_TRANSITION_NOTIFIER);
-if (ret) {
-dev_err(dev, "failed to register cpufreq notifier\n");
-priv->freq_transition.notifier_call = NULL;
-goto init_failed;
-}
-#endif
-
if (of_property_read_u32(node, "max-bandwidth", &priv->max_bandwidth))
priv->max_bandwidth = TILCDC_DEFAULT_MAX_BANDWIDTH;

@@ -370,6 +359,17 @@
}
modeset_init(ddev);

+#ifdef CONFIG_CPU_FREQ
+priv->freq_transition.notifier_call = cpufreq_transition;
+ret = cpufreq_register_notifier(&priv->freq_transition,
+CPUFREQ_TRANSITION_NOTIFIER);
+if (ret) {
+dev_err(dev, "failed to register cpufreq notifier\n");
+priv->freq_transition.notifier_call = NULL;
+goto init_failed;
+}
+#endif
+
if (priv->is_componentized) {
ret = component_bind_all(dev, ddev);
if (ret < 0)
--- linux-4.15.0.orig/drivers/gpu/drm/tilcdc/tilcdc_panel.c
+++ linux-4.15.0/drivers/gpu/drm/tilcdc/tilcdc_panel.c
@@ -152,12 +152,16 @@
for (i = 0; i < timings->num_timings; i++) {

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struct drm_display_mode *mode = drm_mode_create(dev);
struct videomode vm;

if (videomode_from_timings(timings, &vm, i))
    break;

mode = drm_mode_create(dev);
if (!mode)
    break;
+ drm_display_mode_from_videomode(&vm, mode);

mode->type = DRM_MODE_TYPE_DRIVER;

--- linux-4.15.0.orig/drivers/gpu/drm/tilcdc/tilcdc_regs.h
+++ linux-4.15.0/drivers/gpu/drm/tilcdc/tilcdc_regs.h
@@ -133,7 +133,7 @@
    struct tilcdc_drm_private *priv = dev->dev_private;
    volatile void __iomem *addr = priv->mmio + reg;

-#ifdef iowrite64
+#if defined(iowrite64) && !defined(iowrite64_is_nonatomic)
    iowrite64(data, addr);
#else
    __iowmb();
--- linux-4.15.0.orig/drivers/gpu/drm/ttm/ttm_bo.c
+++ linux-4.15.0/drivers/gpu/drm/ttm/ttm_bo.c
@@ -175,7 +175,8 @@
    list_add_tail(&bo->lru, &man->lru[bo->priority]);
    kref_get(&bo->list_kref);

-if (bo->ttm && !(bo->ttm->page_flags & TTM_PAGE_FLAG_SG)) {
+if (bo->ttm && !(bo->ttm->page_flags &
			(TTM_PAGE_FLAG_SG | TTM_PAGE_FLAG_SWAPPED))) {
    list_add_tail(&bo->swap,
		&bo->glob->swap_lru[bo->priority]);
    kref_get(&bo->list_kref);
@@ -720,7 +721,7 @@
/* Don't evict this BO if it's outside of the
 * requested placement range
 */
-if (place->fpfn >= (bo->mem.start + bo->mem.size) ||
+if (place->fpfn >= (bo->mem.start + bo->mem.num_pages) ||
    (place->lpfn && place->lpfn <= bo->mem.start))
    return false;
@@ -1471,7 +1472,6 @@
ttm_mem_unregister_shrink(glob->mem_glob, &glob->shrink);  
__free_page(glob->dummy_read_page);  
-kfree(glob);  
}  

void ttm_bo_global_release(struct drm_global_reference *ref)  
--- linux-4.15.0.orig/drivers/gpu/drm/ttm/ttm_bo_vm.c  
+++ linux-4.15.0/drivers/gpu/drm/ttm/ttm_bo_vm.c  
@@ -92,6 +92,17 @@  
return ret;  
}  

+static unsigned long ttm_bo_io_mem_pfn(struct ttm_buffer_object *bo,  
+    unsigned long page_offset)  
+{  
+    struct ttm_bo_device *bdev = bo->bdev;  
+    +if (bdev->driver->io_mem_pfn)  
+        return bdev->driver->io_mem_pfn(bo, page_offset);  
+    +return ttm_bo_default_io_mem_pfn(bo, page_offset);  
+}  
+  
+static int ttm_bo_vm_fault(struct vm_fault *vmf)  
{  
    struct vm_area_struct *vma = vmf->vma;  
    @@ -234,7 +245,7 @@  
    if (bo->mem.bus.is_iomem) {  
        /* Iomem should not be marked encrypted */  
        cvma.vm_page_prot = pgprot_decrypted(cvma.vm_page_prot);  
-        pfn = bdev->driver->io_mem_pfn(bo, page_offset);  
+        pfn = ttm_bo_io_mem_pfn(bo, page_offset);  
    } else {  
        page = ttm->pages[page_offset];  
        if (unlikely(!page && i == 0)) {  
            @@ -299,7 +310,7 @@  
    static int ttm_bo_vm_access_kmap(struct ttm_buffer_object *bo,  
        unsigned long offset,  
-        void *buf, int len, int write)  
+        uint8_t *buf, int len, int write)  
    {  
        unsigned long page = offset >> PAGE_SHIFT;  
        unsigned long bytes_left = len;  
-        @@ -328,6 +339,7 @@  
        ttm_bo_kunmap(&map);  
        page++;  
        return ret;  
    
}
+buf += bytes;
bytes_left -= bytes;
offset = 0;
} while (bytes_left);
--- linux-4.15.0.orig/drivers/gpu/drm/ttm/ttm_memory.c
+++ linux-4.15.0/drivers/gpu/drm/ttm/ttm_memory.c
@@ -166,16 +166,7 @@
    .default_attrs = ttm_mem_zone_attrs,
    }

-static void ttm_mem_global_kobj_release(struct kobject *kobj)
-{  
-struct ttm_mem_global *glob =
-container_of(kobj, struct ttm_mem_global, kobj);
-
-kfree(glob);
-}
-
static struct kobj_type ttm_mem_glob_kobj_type = { }
-.
-release = &ttm_mem_global_kobj_release,
};

static bool ttm_zones_above_swap_target(struct ttm_mem_global *glob,
--- linux-4.15.0.orig/drivers/gpu/drm/ttm/ttm_page_alloc.c
+++ linux-4.15.0/drivers/gpu/drm/ttm/ttm_page_alloc.c
@@ -777,9 +777,10 @@
}

#ifdef CONFIG_TRANSPARENT_HUGEPAGE
-if (!(flags & TTM_PAGE_FLAG_DMA32)) { 
-    for (j = 0; j < HPAGE_PMD_NR; ++j)
-    if (p++ != pages[i + j]) 
+    if (!(flags & TTM_PAGE_FLAG_DMA32) &&
+        (npages - i) >= HPAGE_PMD_NR) { 
+        for (j = 1; j < HPAGE_PMD_NR; ++j)
+        if (++p != pages[i + j])
+            break;

if (j == HPAGE_PMD_NR)
@@ -806,15 +807,15 @@
unsigned max_size, n2free;

spin_lock_irqsave(&huge->lock, irq_flags);
-while (i < npages) {
+while ((npages - i) >= HPAGE_PMD_NR) {
    struct page *p = pages[i];
    unsigned j;
if (!p)
break;

- for (j = 0; j < HPAGE_PMD_NR; ++j)
  - if (p++ != pages[i + j])
+ for (j = 1; j < HPAGE_PMD_NR; ++j)
  + if (++p != pages[i + j])
    break;

if (j != HPAGE_PMD_NR)
@@ -904,7 +905,8 @@
    while (npages >= HPAGE_PMD_NR) {
        gfp_t huge_flags = gfp_flags;

- huge Flags |= GFP_TRANSHUGE;
+ huge Flags |= GFP_TRANSHUGE_LIGHT | __GFP_NORETRY |
    + __GFP_KSWAPD_RECLAIM;
    huge Flags &= ~__GFP_MOVABLE;
    huge Flags &= ~__GFP_COMP;
    p = alloc_pages(huge Flags, HPAGE_PMD_ORDER);
    @@ -1021,11 +1023,15 @@
        GFP_USER | GFP_DMA32, "uc dma", 0);

        ttm_page init_locked(& _manager->wc_pool huge.
        - GFP_TRANSHUGE & ~(__GFP_MOVABLE | __GFP_COMP),
        + (GFP_TRANSHUGE_LIGHT | __GFP_NORETRY |
        + __GFP_KSWAPD_RECLAIM) &
        + ~(__GFP_MOVABLE | __GFP_COMP),
        "wc huge", order);

        ttm_page init_locked(& _manager->uc_pool huge.
        - GFP_TRANSHUGE & ~(__GFP_MOVABLE | __GFP_COMP)
        + (GFP_TRANSHUGE_LIGHT | __GFP_NORETRY |
        + __GFP_KSWAPD_RECLAIM) &
        + ~(__GFP_MOVABLE | __GFP_COMP)
        , "uc huge", order);

    _manager->options.max size = max_pages;
--- linux-4.15.0.orig/drivers/gpu/drm/ttm/ttm_page_alloc_dma.c
+++ linux-4.15.0/drivers/gpu/drm/ttm/ttm_page_alloc_dma.c
@@ -333,14 +333,18 @@
static struct dma_page * __ttm_dma_alloc_page(struct dma_pool *pool)
{
    struct dma_page *d_page;
    unsigned long attrs = 0;
    void *vaddr;

d_page = kmalloc(sizeof(struct dma_page), GFP_KERNEL);
if (!d_page)
return NULL;

-vaddr = dma_alloc_coherent(pool->dev, pool->size, &d_page->dma,
- pool->gfp_flags);
+if (pool->type & IS_HUGE)
+attrs = DMA_ATTR_NO_WARN;
+
+vaddr = dma_alloc_attrs(pool->dev, pool->size, &d_page->dma,
+pool->gfp_flags, attrs);
if (vaddr) {
if (is_vmalloc_addr(vaddr))
d_page->p = vmalloc_to_page(vaddr);
@@ -911,7 +915,8 @@
gfp_flags |= __GFP_ZERO;

if (huge) {
- gfp_flags |= GFP_TRANSHUGE;
+ gfp_flags |= GFP_TRANSHUGE_LIGHT | __GFP_NORETRY |
+ __GFP_KSWAPD_RECLAIM;
 gfp_flags &= ~__GFP_MOVABLE;
 gfp_flags &= ~__GFP_COMP;
} }
--- linux-4.15.0.orig/drivers/gpu/drm/ttm/ttm_tt.c
+++ linux-4.15.0/drivers/gpu/drm/ttm/ttm_tt.c
@@ -199,7 +199,6 @@
ttm_tt_alloc_page_directory(ttm);
if (!ttm->pages) {
-ttm_tt_destroy(ttm);
pr_err("Failed allocating page table\n");
return -ENOMEM;
}
@@ -232,7 +231,6 @@
INIT_LIST_HEAD(&ttm_dma->pages_list);
ttm_dma_tt_alloc_page_directory(ttm_dma);
if (!ttm->pages) {
-ttm_tt_destroy(ttm);
pr_err("Failed allocating page table\n");
return -ENOMEM;
}
--- linux-4.15.0.orig/drivers/gpu/drm/tve200/tve200_display.c
+++ linux-4.15.0/drivers/gpu/drm/tve200/tve200_display.c
@@ -17,6 +17,7 @@
#include <linux/version.h>
#include <linux/dma-buf.h>
#include <linux/of_graph.h>
#include <linux/delay.h>
#include <drm/drmP.h>
#include <drm/drm_panel.h>
@@ -131,9 +132,25 @@
    struct drm_connector *connector = priv->connector;

    u32 format = fb->format->format;
@@ -230,8 +247,9 @@
    drm_crtc_vblank_off(crtc); 
    /* Disable and Power Down */
    /* Disable put into reset and Power Down */
    writel(0, priv->regs + TVE200_CTRL);
    +writel(TVE200_CTRL_4_RESET, priv->regs + TVE200_CTRL_4);
    clk_disable_unprepare(priv->clk);
    }
    @ @ -277,6 +295,8 @ @
    
    struct tve200_drm_dev_private *priv = drm->dev_private;
    
    +/* Clear any IRQs and enable */
    +writel(0xFF, priv->regs + TVE200_CTRL);
    writel(TVE200_INT_CLR, priv->regs + TVE200_INT_CLR);
    writel(TVE200_INT_Y_STATUS, priv->regs + TVE200_INT_EN);
    return 0;
irq = platform_get_irq(pdev, 0);
-if (!irq) {
-ret = -EINVAL;
+if (irq < 0) {
+ret = irq;
+goto clk_disable;
+}

--- linux-4.15.0.orig/drivers/gpu/drm/udl/udl drv.c
+++ linux-4.15.0/drivers/gpu/drm/udl/udl drv.c
@@ -47,10 +47,17 @@
 .llseek = noop_llseek,
 }

+static void udl_driver_release(struct drm_device *dev)
+{
+udl_fini(dev);
+udl_modeset_cleanup(dev);
+kfree(dev);
+}
+
static struct drm_driver driver = {
 .driver_features = DRIVER_MODESET | DRIVER_GEM | DRIVER_PRIME,
-.load = udl_driver_load,
-.unload = udl_driver_unload,
+.release = udl_driver_release,
/* gem hooks */
 .gem_free_object = udl_gem_free_object,
 @ @ -73,28 +80,56 @ @
 .patchlevel = DRIVER_PATCHLEVEL,
};

+static struct udl_device *udl_driver_create(struct usb_interface *interface)
+{
+struct usb_device *udev = interface_to_usbdev(interface);
+struct udl_device *udl;
+int r;
+uudl = kzalloc(sizeof(*udl), GFP_KERNEL);
+if (!udl)
+return ERR_PTR(-ENOMEM);
+
+r = drm_dev_init(&udl->drm, &driver, &interface->dev);
+if (r) {
+kfree(udl);
+return ERR_PTR(r);
+
+udl->udev = udev;
+udl->drm.dev_private = udl;
+
+r = udl_init(udl);
+if (r) {
+drm_dev_fini(&udl->drm);
+kfree(udl);
+return ERR_PTR(r);
+
+usb_set_intfdata(interface, udl);
+return udl;
+
+static int udl_usb_probe(struct usb_interface *interface,
 const struct usb_device_id *id)
{
-struct usb_device *udev = interface_to_usbdev(interface);
-struct drm_device *dev;
+struct udl_device *udl;

-dev = drm_dev_alloc(&driver, &interface->dev);
-if (IS_ERR(dev))
-return PTR_ERR(dev);
+udl = udl_driver_create(interface);
+if (IS_ERR(udl))
+return PTR_ERR(udl);

-r = drm_dev_register(dev, (unsigned long)udev);
+r = drm_dev_register(&udl->drm, 0);
if (r)
goto err_free;

-usb_set_intfdata(interface, dev);
-DRM_INFO("Initialized udl on minor %d\n", dev->primary->index);
+DRM_INFO("Initialized udl on minor %d\n", udl->drm.primary->index);

return 0;
err_free:
- drm_dev_unref(dev);
+ drm_dev_unref(&udl->drm);
return r;
}

--- linux-4.15.0.orig/drivers/gpu/drm/udl/udl_drv.h
+++ linux-4.15.0/drivers/gpu/drm/udl/udl_drv.h
@@ -49,8 +49,8 @@
struct udl_fbdev;

struct udl_device {
+ struct drm_device drm;
 struct device *dev;
- struct drm_device *ddev;
 struct usb_device *udev;
 struct drm_crtc *crtc;

@@ -68,6 +68,8 @@
 atomic_t cpu_kcycles_used; /* transpired during pixel processing */
};

+#define to_udl(x) container_of(x, struct udl_device, drm)
+
 struct udl_gem_object {
 struct drm_gem_object base;
 struct page **pages;
@@ -99,8 +101,8 @@
 int udl_submit_urb(struct drm_device *dev, struct urb *urb, size_t len);
 void udl_urb_completion(struct urb *urb);

-int udl_driver_load(struct drm_device *dev, unsigned long flags);
-void udl_driver_unload(struct drm_device *dev);
+int udl_init(struct udl_device *udl);
+void udl_fini(struct drm_device *dev);

 int udl_fbdev_init(struct drm_device *dev);
 void udl_fbdev_cleanup(struct drm_device *dev);
@@ -110,7 +112,7 @@
 struct drm_file *file,
 const struct drm_mode_fb_cmd2 *mode_cmd);

-int udl_render_hline(struct drm_device *dev, int bpp, struct urb **urb_ptr,
+int udl_render_hline(struct drm_device *dev, int log_bpp, struct urb **urb_ptr,
 const char *front, char **urb_buf_ptr,
 u32 byte_offset, u32 device_byte_offset, u32 byte_width,
 int *ident_ptr, int *sent_ptr);
--- linux-4.15.0.orig/drivers/gpu/drm/udl/udl_fb.c
int width, int height)
{
    struct drm_device *dev = fb->base.dev;
    -struct udl_device *udl = dev->dev_private;
    +struct udl_device *udl = to_udl(dev);
    int i, ret;
    char *cmd;

    cycles_t start_cycles, end_cycles;
    @ @ -90.7 +90.10 @ @
    int bytes_identical = 0;
    struct urb *urb;
    int aligned_x;
    -int bpp = fb->base.format->cpp[0];
    +int log_bpp;
    +
    +BUG_ON(!is_power_of_2(fb->base.format->cpp[0]));
    +log_bpp = __ffs(fb->base.format->cpp[0]);

    if (!fb->active_16)
        return 0;
    @ @ -125.19 +128.22 @ @

    for (i = y; i < y + height ; i++) {
        const int line_offset = fb->base.pitches[0] * i;
        -const int byte_offset = line_offset + (x * bpp);
        -const int dev_byte_offset = (fb->base.width * bpp * i) + (x * bpp);
        -if (udl_render_hline(dev, bpp, &urb,
                        +const int byte_offset = line_offset + (x << log_bpp);
                        +const int dev_byte_offset = (fb->base.width * i + x) << log_bpp;
                        +if (udl_render_hline(dev, log_bpp, &urb,
                                            (char *) fb->obj->vmapping,
                                            &cmd, byte_offset, dev_byte_offset,
                                            -    width * bpp,
                                            +   width << log_bpp,
                                            &bytes_identical, &bytes_sent))
                        goto error;
        }

        if (cmd > (char *) urb->transfer_buffer) {
            /* Send partial buffer remaining before exiting */
            -int len = cmd - (char *) urb->transfer_buffer;
            +int len;
            +if (cmd < (char *) urb->transfer_buffer + urb->transfer_buffer_length)
                +*cmd++ = 0xAF;
            +len = cmd - (char *) urb->transfer_buffer;
            ret = udl_submit_urb(dev, urb, len);
bytes_sent += len;
} else
@@ -146,7 +152,7 @@
error:
atomic_add(bytes_sent, &udl->bytes_sent);
atomic_add(bytes_identical, &udl->bytes_identical);
-atomic_add(width*height*bpp, &udl->bytes_rendered);
+atomic_add((width * height) << log_bpp, &udl->bytes_rendered);
end_cycles = get_cycles();
atomic_add(((unsigned int) ((end_cycles - start_cycles) >> 10)), /* Kcycles */
@@ -159,10 +165,15 @@
{
  unsigned long start = vma->vm_start;
  unsigned long size = vma->vm_end - vma->vm_start;
-  unsigned long offset = vma->vm_pgoff << PAGE_SHIFT;
+  unsigned long offset;
  unsigned long page, pos;

  -if (offset + size > info->fix.smem_len)
+if (vma->vm_pgoff > (~0UL >> PAGE_SHIFT))
  +return -EINVAL;
  +
  +offset = vma->vm_pgoff << PAGE_SHIFT;
  +
  +if (offset > info->fix.smem_len || size > info->fix.smem_len - offset)
  +return -EINVAL;

 pos = (unsigned long)info->fix.smem_start + offset;
@@ -199,10 +210,10 @@
{
  struct udl_fbdev *ufbdev = info->par;
  struct drm_device *dev = ufbdev->ufb.base.dev;
-  struct udl_device *udl = dev->dev_private;
+  struct udl_device *udl = to_udl(dev);
  /* If the USB device is gone, we don't accept new opens */
-  if (drm_dev_is_unplugged(udl->ddev))
+  if (drm_dev_is_unplugged(&udl->drm))
    return -ENODEV;

  ufbdev->fb_count++;
@@ -213,7 +224,7 @@

 struct fb_deferred_io *fbdefio;

-  fbdefio = kmalloc(sizeof(struct fb_deferred_io), GFP_KERNEL);
+  fbdefio = kzalloc(sizeof(struct fb_deferred_io), GFP_KERNEL);
if (fbdefio) {
    fbdefio->delay = DL_DEFIO_WRITE_DELAY;
    @@ -421,14 +432,16 @@
    }
    drm_fb_helper_unregister_fbi(&ufbdev->helper);
    drm_fb_helper_fini(&ufbdev->helper);
    -drm_framebuffer_unregister_private(&ufbdev->ufb.base);
    -drm_framebuffer_cleanup(&ufbdev->ufb.base);
    -drm_gem_object_put_unlocked(&ufbdev->ufb.obj->base);
    +if (ufbdev->ufb.obj) {
    +    drm_framebuffer_unregister_private(&ufbdev->ufb.base);
    +    drm_framebuffer_cleanup(&ufbdev->ufb.base);
    +    drm_gem_object_put_unlocked(&ufbdev->ufb.obj->base);
    +}
}

int udl_fbdev_init(struct drm_device *dev)
{
    -struct udl_device *udl = dev->dev_private;
    +struct udl_device *udl = to_udl(dev);
    int bpp_sel = fb_bpp;
    struct udl_fbdev *ufbdev;
    int ret;
    @@ -467,7 +480,7 @@

void udl_fbdev_cleanup(struct drm_device *dev)
{
    -struct udl_device *udl = dev->dev_private;
    +struct udl_device *udl = to_udl(dev);
    if (!udl->fbdev)
        return;
    @@ -478,7 +491,7 @@

void udl_fbdev_unplug(struct drm_device *dev)
{
    -struct udl_device *udl = dev->dev_private;
    +struct udl_device *udl = to_udl(dev);
    struct udl_fbdev *ufbdev;
    if (!udl->fbdev)
        return;
    --- linux-4.15.0.orig/drivers/gpu/drm/udl/udl_main.c
    +++ linux-4.15.0/drivers/gpu/drm/udl/udl_main.c
    @@ -29,7 +29,7 @@
    static int udl_parse_vendor_descriptor(struct drm_device *dev,
    -    struct usb_device *usbdev)
    +    struct usb_device *usbdev)
static void udl_free_urb_list(struct drm_device *dev)
{
    struct udl_device *udl = dev->dev_private;
    struct udl_device *udl = to_udl(dev);
    int count = udl->urbs.count;
    struct list_head *node;
    struct urb_node *unode;
    struct urb *urb;
    int ret;
    DRM_DEBUG("Waiting for completes and freeing all render urbs\n");

    /* keep waiting and freeing, until we've got 'em all */
    while (count--) {
        DRM_DEBUG("waiting\n");
        -
        /* Getting interrupted means a leak, but ok at shutdown*/
        -ret = down_interruptible(&udl->urbs.limit_sem);
        -if (ret)
        -break;
        +down(&udl->urbs.limit_sem);

        spin_lock_irqsave(&udl->urbs.lock, flags);

retry:
        udl->urbs.size = size;
        INIT_LIST_HEAD(&udl->urbs.list);

static int udl_alloc_urb_list(struct drm_device *dev, int count, size_t size)
{
    struct udl_device *udl = dev->dev_private;
    int i = 0;
    struct udl_device *udl = to_udl(dev);
    struct urb *urb;
    struct urb_node *unode;
    char *buf;
    +size_t wanted_size = count * size;

    spin_lock_init(&udl->urbs.lock);

retry:
        udl->urbs.size = size;
        INIT_LIST_HEAD(&udl->urbs.list);


while (i < count) {
  sema_init(&udl->urbs.limit_sem, 0);
  udl->urbs.count = 0;
  udl->urbs.available = 0;
  
  while (udl->urbs.count * size < wanted_size) {
    unode = kzalloc(sizeof(struct urb_node), GFP_KERNEL);
    if (!unode)
      break;
    unode->urb = urb;
    buf = usb_alloc_coherent(udl->udev, MAX_TRANSFER, GFP_KERNEL,
                            &urb->transfer_dma);
    if (!buf) {
      kfree(unode);
      usb_free_urb(urb);
      if (size > PAGE_SIZE) {
        size /= 2;
        udl_free_urb_list(dev);
        goto retry;
      }
      break;
    }
  }
  list_add_tail(&unode->entry, &udl->urbs.list);
  
  i++;
  up(&udl->urbs.limit_sem);
  udl->urbs.count++;
  udl->urbs.available++;
}

sema_init(&udl->urbs.limit_sem, i);
udl->urbs.count = i;
udl->urbs.available = i;
+DRM_DEBUG("allocated %d %d byte urb\n", udl->urbs.count, (int) size);

-DRM_DEBUG("allocated %d %d byte urb\n", i, (int) size);
-
  return i;
  return udl->urbs.count;
}
struct urb *udl_get_urb(struct drm_device *dev)
{
-struct udl_device *udl = dev->dev_private;
+struct udl_device *udl = to_udl(dev);
    int ret = 0;
    struct list_head *entry;
    struct urb_node *unode;

int udl_submit_urb(struct drm_device *dev, struct urb *urb, size_t len)
{
-struct udl_device *udl = dev->dev_private;
+struct udl_device *udl = to_udl(dev);
    int ret;

BUG_ON(len > udl->urbs.size);
    return ret;
}

-int udl_driver_load(struct drm_device *dev, unsigned long flags)
+int udl_init(struct udl_device *udl)
{
-    struct usb_device *udev = (void*)flags;
-    struct udl_device *udl;
+    struct drm_device *dev = &udl->drm;
    int ret = -ENOMEM;

DRM_DEBUG("\n");
    udl = kzalloc(sizeof(struct udl_device), GFP_KERNEL);
    if (!udl)
        return -ENOMEM;
-
    udl->udev = udev;
    udl->ddev = dev;
    dev->dev_private = udl;

    if (!udl_parse_vendor_descriptor(dev, udl->udev)) {
        ret = -ENODEV;
        @ @ -347,19 +342,13 @ @
        if (ret)
            goto err;

        ret = drm_vblank_init(dev, 1);
        if (ret)
            goto err_fb;
-

drm_kms_helper_poll_init(dev);

return 0;

-err_fb:
-udl_fbdev_cleanup(dev);
+
err:
if (udl->urbs.count)
udl_free_urb_list(dev);
-kfree(udl);
DRM_ERROR("%d\n", ret);
return ret;
}
@@ -370,9 +359,9 @@
return 0;
}

-void udl_driver_unload(struct drm_device *dev)
+void udl_fini(struct drm_device *dev)
{
-struct udl_device *udl = dev->dev_private;
+struct udl_device *udl = to_udl(dev);
drm_kms_helper_poll_fini(dev);

@@ -380,6 +369,4 @@
udl_free_urb_list(dev);

udl_fbdev_cleanup(dev);
-udl_modeset_cleanup(dev);
-kfree(udl);
}
--- linux-4.15.0.orig/drivers/gpu/drm/udl/udl_transfer.c
+++ linux-4.15.0/drivers/gpu/drm/udl/udl_transfer.c
@@ -83,12 +83,12 @@
((pixel >> 8) & 0xf800));
}

-static inline u16 get_pixel_val16(const uint8_t *pixel, int bpp)
+static inline u16 get_pixel_val16(const uint8_t *pixel, int log_bpp)
{
-u16 pixel_val16 = 0;
-if (bpp == 2)
+u16 pixel_val16;
+if (log_bpp == 1)
    pixel_val16 = *(const uint16_t *)pixel;
-else if (bpp == 4)
+else
pixel_val16 = pixel32_to_be16(*(const uint32_t *)pixel);
return pixel_val16;
}
@@ -125,8 +125,9 @@
const u8 *const pixel_end,
uint32_t *device_address_ptr,
uint8_t **command_buffer_ptr,
-const uint8_t *const cmd_buffer_end, int bpp)
+const uint8_t *const cmd_buffer_end, int log_bpp)
{
+const int bpp = 1 << log_bpp;
const u8 *pixel = *pixel_start_ptr;
uint32_t dev_addr  = *device_address_ptr;
uint8_t *cmd = *command_buffer_ptr;
@@ -153,12 +154,12 @@
raw_pixels_count_byte = cmd++; /* we'll know this later */
raw_pixel_start = pixel;

-cmd_pixel_end = pixel + (min(MAX_CMD_PIXELS + 1,
-min((int)(pixel_end - pixel) / bpp,
- (int)(cmd_buffer_end - cmd) / 2))) * bpp;
+cmd_pixel_end = pixel + (min3(MAX_CMD_PIXELS + 1UL,
+(unsigned long)(pixel_end - pixel) >> log_bpp,
+(unsigned long)(cmd_buffer_end - 1 - cmd) / 2) << log_bpp);

-prefetch_range((void *) pixel, (cmd_pixel_end - pixel) * bpp);
-pixel_val16 = get_pixel_val16(pixel, bpp);
+prefetch_range((void *) pixel, cmd_pixel_end - pixel);
+pixel_val16 = get_pixel_val16(pixel, log_bpp);

while (pixel < cmd_pixel_end) {
const u8 *const start = pixel;
@@ -170,7 +171,7 @@
pixel += bpp;
while (pixel < cmd_pixel_end) {
-pixel_val16 = get_pixel_val16(pixel, bpp);
+pixel_val16 = get_pixel_val16(pixel, log_bpp);
if (pixel_val16 != repeating_pixel_val16)
break;
pixel += bpp;
@@ -179,10 +180,10 @@
if (unlikely(pixel > start + bpp)) {
/* go back and fill in raw pixel count */
 *raw_pixels_count_byte = (((start -
 -raw_pixel_start) / bpp) + 1) & 0xFF;
 +raw_pixel_start) >> log_bpp) + 1) & 0xFF;
/* immediately after raw data is repeat byte */
-cmd++ = (((pixel - start) / bpp) - 1) & 0xFF;
+cmd++ = (((pixel - start) >> log_bpp) - 1) & 0xFF;

/* Then start another raw pixel span */
raw_pixel_start = pixel;
@@ -192,11 +193,14 @@

if (pixel > raw_pixel_start) {
  /* finalize last RAW span */
-cmd_pixels_count_byte = ((pixel - raw_pixel_start) / bpp) & 0xFF;
+cmd_pixels_count_byte = ((pixel - raw_pixel_start) >> log_bpp) & 0xFF;
+} else {
+  /* undo unused byte */
+cmd--;
}

-cmd_pixels_count_byte = ((pixel - cmd_pixel_start) / bpp) & 0xFF;
-dev_addr += ((pixel - cmd_pixel_start) / bpp) * 2;
+cmd_pixels_count_byte = ((pixel - cmd_pixel_start) >> log_bpp) & 0xFF;
+dev_addr += ((pixel - cmd_pixel_start) >> log_bpp) * 2;
}

if (cmd_buffer_end <= MIN_RLX_CMD_BYTES + cmd) {
@@ -219,19 +223,19 @@

  * (that we can only write to, slowly, and can never read), and (optionally)
  * our shadow copy that tracks what's been sent to that hardware buffer.
  */
-int udl_render_hline(struct drm_device *dev, int bpp, struct urb **urb_ptr,
+int udl_render_hline(struct drm_device *dev, int log_bpp, struct urb **urb_ptr,
    const char *front, char **urb_buf_ptr,
    u32 byte_offset, u32 device_byte_offset,
    u32 byte_width,
@@ -241,7 +245,7 @@
udl_compress_hline16(&next_pixel, 
    line_end, &base16, 
-    (u8 **) &cmd, (u8 *) cmd_end, bpp); 
+    (u8 **) &cmd, (u8 *) cmd_end, log_bpp);

if (cmd >= cmd_end) {
    int len = cmd - (u8 *) urb->transfer_buffer;
    --- linux-4.15.0.orig/drivers/gpu/drm/vc4/vc4_bo.c
    +++ linux-4.15.0/drivers/gpu/drm/vc4/vc4_bo.c 
    @@ -195,6 +195,7 @@ 
    vc4_bo_set_label(obj, -1);

    if (bo->validated_shader) {
+        kfree(bo->validated_shader->uniform_addr_offsets);
        kfree(bo->validated_shader->texture_samples);
        kfree(bo->validated_shader);
        bo->validated_shader = NULL;
        @@ -591,6 +592,7 @@
    }

    if (bo->validated_shader) {
+        kfree(bo->validated_shader->uniform_addr_offsets);
        kfree(bo->validated_shader->texture_samples);
        kfree(bo->validated_shader);
        bo->validated_shader = NULL;
        --- linux-4.15.0.orig/drivers/gpu/drm/vc4/vc4_crtc.c
        +++ linux-4.15.0/drivers/gpu/drm/vc4/vc4_crtc.c 
        @@ -735,6 +735,7 @@
    }

    struct vc4_async_flip_state {
    struct drm_crtc *crtc;
    struct drm_framebuffer *fb;
    +struct drm_framebuffer *old_fb;
    struct drm_pending_vblank_event *event;

    struct vc4_seqno_cb cb;
    @@ -764,6 +765,23 @@

    drm_crtc_vblank_put(crtc);
    drm_framebuffer_put(flip_state->fb);
+    +/* Decrement the BO usecnt in order to keep the inc/dec calls balanced
+    + when the planes are updated through the async update path.
+    + FIXME: we should move to generic async-page-flip when it's
+    + available, so that we can get rid of this hand-made cleanup_fb() 
+    + logic.
+    +*/
    +if (flip_state->old_fb) {

+struct drm_gem_cma_object *cma_bo;
+struct vc4_bo *bo;
+
+cma_bo = drm_fb_cma_get_gem_obj(flip_state->old_fb, 0);
+bo = to_vc4_bo(&cma_bo->base);
+vc4_bo_dec_usecnt(bo);
+drm_framebuffer_put(flip_state->old_fb);
+
+kfree(flip_state);
+
+up(&vc4->async_modeset);
@@ -788,9 +806,22 @@
    struct drm_gem_cma_object *cma_bo = drm_fb_cma_get_gem_obj(fb, 0);
    struct vc4_bo *bo = to_vc4_bo(&cma_bo->base);
+
+/* Increment the BO usecnt here, so that we never end up with an
+ * unbalanced number of vc4_bo_{dec,inc}_usecnt() calls when the
+ * plane is later updated through the non-async path.
+ * FIXME: we should move to generic async-page-flip when it's
+ * available, so that we can get rid of this hand-made prepare_fb()
+ * logic.
+ */
+ret = vc4_bo_inc_usecnt(bo);
+if (ret)
+  return ret;
+
+flip_state = kzalloc(sizeof(*flip_state), GFP_KERNEL);
-if (!flip_state)
+if (!flip_state) {
    +vc4_bo_dec_usecnt(bo);
    return -ENOMEM;
    +}
+
drm_framebuffer_get(fb);
flip_state->fb = fb;
@@ -801,10 +832,23 @@
    ret = down_interruptible(&vc4->async_modeset);
    if (ret) {
    drm_framebuffer_put(fb);
+    +vc4_bo_dec_usecnt(bo);
+    kfree(flip_state);
+    return ret;
+    }
+
+/* Save the current FB before it's replaced by the new one in
+ * drm_atomic_set_fb_for_plane(). We'll need the old FB in
+ * vc4_async_page_flip_complete() to decrement the BO usecnt and keep
+ * it consistent.
+ * FIXME: we should move to generic async-page-flip when it's
+ * available, so that we can get rid of this hand-made cleanup_fb()
+ * logic.
+ */
+flip_state->old_fb = plane->state->fb;
+if (flip_state->old_fb)
+drm_framebuffer_get(flip_state->old_fb);
+
+ WARN_ON(drm_crtc_vblank_get(crtc) != 0);

/* Immediately update the plane's legacy fb pointer, so that later
@@ -867,7 +911,7 @@
vc4_crtc_reset(struct drm_crtc *crtc)
{
  if (crtc->state)
-__drm_atomic_helper_crtc_destroy_state(crtc->state);
+vc4_crtc_destroy_state(crtc, crtc->state);

crtc->state = kzalloc(sizeof(struct vc4_crtc_state), GFP_KERNEL);
if (crtc->state)
--- linux-4.15.0.orig/drivers/gpu/drm/vc4/vc4_dpi.c
+++ linux-4.15.0/drivers/gpu/drm/vc4/vc4_dpi.c
@@ -96,7 +96,6 @@
struct platform_device *pdev;

struct drm_encoder *encoder;
-struct drm_connector *connector;

void __iomem *regs;

@@ -164,14 +163,31 @@

static void vc4_dpi_encoder_enable(struct drm_encoder *encoder)
{
  +struct drm_device *dev = encoder->dev;
  struct drm_display_mode *mode = &encoder->crtc->mode;
  struct vc4_dpi_encoder *vc4_encoder = to_vc4_dpi_encoder(encoder);
  struct vc4_dpi *dpi = vc4_encoder->dpi;
  +struct drm_connector_list_iter conn_iter;
  +struct drm_connector *connector = NULL, *connector_scan;
  u32 dpi_c = DPI_ENABLE | DPI_OUTPUT_ENABLE_MODE;
  int ret;

  -if (dpi->connector->display_info.num_bus_formats) {
  -u32 bus_format = dpi->connector->display_info.bus_formats[0];
  +/* Look up the connector attached to DPI so we can get the
  + * bus_format. Ideally the bridge would tell us the
bus_format we want, but it doesn't yet, so assume that it's
uniform throughout the bridge chain.
+ */
drm_connector_list_iter_begin(dev, &conn_iter);
drm_for_each_connector_iter(connector_scan, &conn_iter) {
+ if (connector_scan->encoder == encoder) {
+ connector = connector_scan;
+ break;
+ }
+ }
drm_connector_list_iter_end(&conn_iter);
+
+ if (connector && connector->display_info.num_bus_formats) {
+ u32 bus_format = connector->display_info.bus_formats[0];
switch (bus_format) {
case MEDIA_BUS_FMT_RGB888_1X24:
@@ -199,6 +215,9 @@
DRM_ERROR("Unknown media bus format %d\n", bus_format);
break;
+ } else {
+/* Default to 24bit if no connector found. */
+dpi_c |= VC4_SET_FIELD(DPI_FORMAT_24BIT_888_RGB, DPI_FORMAT);
} }

if (mode->flags & DRM_MODE_FLAG_NHSYNC)
--- linux-4.15.0.orig/drivers/gpu/drm/vc4/vc4_drv.c
+++ linux-4.15.0/drivers/gpu/drm/vc4/vc4_drv.c
@@ -291,6 +291,7 @@
component_unbind_all(dev, drm);
gem_destroy:
vc4_gem_destroy(drm);
+drm_mode_config_cleanup(drm);
vc4_bo_cache_destroy(drm);
dev_unref:
drm_dev_unref(drm);
--- linux-4.15.0.orig/drivers/gpu/drm/vc4/vc4_hdmi.c
+++ linux-4.15.0/drivers/gpu/drm/vc4/vc4_hdmi.c
@@ -1106,6 +1106,7 @@
card->num_links = 1;
card->name = "vc4-hdmi";
card->dev = dev;
+card->owner = THIS_MODULE;
/*
* Be careful, snd_soc_register_card() calls dev_set_drvdata() and
--- linux-4.15.0.orig/drivers/gpu/drm/vc4/vc4_plane.c
vc4_state->y_scaling[0] = vc4_get_scaling_mode(vc4_state->src_h[0],
    vc4_state->crtc_h);

+vc4_state->is Unity = (vc4_state->x_scaling[0] == VC4_SCALING_NONE &&
+    vc4_state->y_scaling[0] == VC4_SCALING_NONE);
+
+if (num_planes > 1) {
    vc4_state->is_yuv = true;
}

-vc4_state->is Unity = (vc4_state->x Scaling[0] == VC4_SCALING_NONE &&
-    vc4_state->y Scaling[0] == VC4_SCALING_NONE &&
-    vc4_state->x Scaling[1] == VC4_SCALING_NONE &&
-    vc4_state->y Scaling[1] == VC4_SCALING_NONE);
-
/* No configuring scaling on the cursor plane, since it gets
non-vblank-synced updates, and scaling requires requires
LBM changes which have to be vblank-synced.
*/
if (num_planes == 1) {

- scl0 = vc4_get_scl_field(state, 1);
+ scl0 = vc4_get_scl_field(state, 0);
   scl1 = scl0;
 } else {
   scl0 = vc4_get_scl_field(state, 1);
   // -647.7 649.10 @
   vc4_dlist_write(vc4_state, SCALER_CSC2_ITR_R_601_5);
 }

- if (!vc4_state->is_unity) {
+ if (vc4_state->x_scaling[0] != VC4_SCALING_NONE ||
   + vc4_state->x_scaling[1] != VC4_SCALING_NONE ||
   + vc4_state->y_scaling[0] != VC4_SCALING_NONE ||
   + vc4_state->y_scaling[1] != VC4_SCALING_NONE) {
   /* LBM Base Address. */
   if (vc4_state->y_scaling[0] != VC4_SCALING_NONE ||
       vc4_state->y_scaling[1] != VC4_SCALING_NONE) {
     // linux-4.15.0.orig/drivers/gpu/drm/vc4/vc4_validate_shaders.c
     +++ linux-4.15.0/drivers/gpu/drm/vc4/vc4_validate_shaders.c
     @ @ -942.6 +942.7 @
     fail:
     kfree(validation_state.branch_targets);
     if (validated_shader) {
       + kfree(validated_shader->uniform_addr_offsets);
       kfree(validated_shader->texture_samples);
       kfree(validated_shader);
     }
     // linux-4.15.0.orig/drivers/gpu/drm/vgem/vgem_drv.c
     +++ linux-4.15.0/drivers/gpu/drm/vgem/vgem_drv.c
     @ @ -192.13 +192.9 @
     ret = drm_gem_handle_create(file, &obj->base, handle);
     drm_gem_object_put_unlocked(&obj->base);
     if (ret)
       goto err;
     + return ERR_PTR(ret);
     return &obj->base;
   } else {  
     -__vgem_gem_destroy(obj);
     -return ERR_PTR(ret);
   }

   static int vgem_gem_dumb_create(struct drm_file *file, struct drm_device *dev,
     @ @ -224.32 +220.6 @
     return 0;
   }
static int vgem_gem_dumb_map(struct drm_file *file, struct drm_device *dev,
    uint32_t handle, uint64_t *offset)
{
    struct drm_gem_object *obj;
    int ret;

    obj = drm_gem_object_lookup(file, handle);
    if (!obj)
        return -ENOENT;

    if (!obj->filp) {
        ret = -EINVAL;
        goto unref;
    }

    ret = drm_gem_create_mmap_offset(obj);
    if (ret)
        goto unref;

    *offset = drm_vma_node_offset_addr(&obj->vma_node);
    unref:
    drm_gem_object_put_unlocked(obj);
    return ret;
}

static struct drm_ioctl_desc vgem_ioctls[] = {
    DRM_IOCTL_DEF_DRV(VGEM_FENCE_ATTACH, vgem_fence_attach_ioctl,
        DRM_AUTH|DRM_RENDER_ALLOW),
    DRM_IOCTL_DEF_DRV(VGEM_FENCE_SIGNAL, vgem_fence_signal_ioctl,
        DRM_AUTH|DRM_RENDER_ALLOW),

    .fops				= &vgem_driver_fops,
    .dumb_create			= vgem_gem_dumb_create,
    .dumb_map_offset		= vgem_gem_dumb_map,

    .prime_handle_to_fd = drm_gem_prime_handle_to_fd,
    .prime_fd_to_handle = drm_gem_prime_fd_to_handle,
    @@@ -443,7 +413,6 @@
    .fops= &vgem_driver_fops,

    .dumb_create= vgem_gem_dumb_create,
    .dumb_map_offset= vgem_gem_dumb_map,

    .prime_handle_to_fd = drm_gem_prime_handle_to_fd,
    .prime_fd_to_handle = drm_gem_prime_fd_to_handle,
    @@@ -472,31 +441,31 @@
    if (!vgem_device)
        return -ENOMEM;
    ret = drm_dev_init(&vgem_device->drm, &vgem_driver, NULL);
    if (ret)
        goto out_free;

    vgem_device->platform =
platform_device_register_simple("vgem", -1, NULL, 0);
if (IS_ERR(vgem_device->platform)) {
    ret = PTR_ERR(vgem_device->platform);
    -goto out_fini;
    +goto out_free;
}

dma_coerce_mask_and_coherent(&vgem_device->platform->dev,
    DMA_BIT_MASK(64));
+ret = drm_dev_init(&vgem_device->drm, &vgem_driver,
    +  &vgem_device->platform->dev);
+if (ret)
+    goto out_unregister;

/* Final step: expose the device/driver to userspace */
ret  = drm_dev_register(&vgem_device->drm, 0);
if (ret)
    -goto out_unregister;
    +goto out_fini;

return 0;

-out_unregister:
-platform_device_unregister(vgem_device->platform);
out_fini:
drm_dev_fini(&vgem_device->drm);
+out_unregister:
+platform_device_unregister(vgem_device->platform);
out_free:
kfree(vgem_device);
return ret;
--- linux-4.15.0.orig/drivers/gpu/drm/virtio/virtgpu_ioctl.c
+++ linux-4.15.0/drivers/gpu/drm/virtio/virtgpu_ioctl.c
@@ -196,6 +196,9 @@
case VIRTGPU_PARAM_3D_FEATURES:
    value = vgdev->has_virgl_3d == true ? 1 : 0;
    break;
+case VIRTGPU_PARAM_CAPSET_QUERY_FIX:
+    value = 1;
+    break;
default:
    return -EINVAL;
}
@@ -471,7 +474,7 @@
{
    struct virtio_gpu_device *vgdev = dev->dev_private;
    struct drm_virtgpu_get_caps *args = data;
-int size;

unsigned size, host_caps_size;
int i;
int found_valid = -1;
int ret;
if (vgdev->num_capsets == 0)
return -ENOSYS;
/* don't allow userspace to pass 0 */
if (args->size == 0)
+return -EINVAL;
+
spin_lock(&vgdev->display_info_lock);
for (i = 0; i < vgdev->num_capsets; i++) {
if (vgdev->capsets[i].id == args->cap_set_id) {
size = vgdev->capsets[found_valid].max_size;
if (args->size > size) {
spin_unlock(&vgdev->display_info_lock);
return -EINVAL;
}
host_caps_size = vgdev->capsets[found_valid].max_size;
++only copy to user the minimum of the host caps size or the guest caps size */
+size = min(args->size, host_caps_size);
list_for_each_entry(cache_ent, &vgdev->cap_cache, head) {
if (cache_ent->id == args->cap_set_id &&
ret = wait_event_timeout(vgdev->resp_wq,
atomic_read(&cache_ent->is_valid), 5 * HZ);
++is_valid check must proceed before copy of the cache entry. */
+smp_rmb();
+}
    |
ptr = cache_ent->caps_cache;

kfree(vgdev->capsets);
vgdev->capsets = NULL;
+spin_unlock(&vgdev->display_info_lock);
return;
}
DRM_INFO("cap set %d: id %d, max-version %d, max-size %d\n",
@@ -235,6 +237,7 @@
err_vbufs:
vgdev->vdev->config->del_vqs(vgdev->vdev);
err_vqs:
+dev->dev_private = NULL;
kfree(vgdev);
return ret;
}
--- linux-4.15.0.orig/drivers/gpu/drm/virtio/virtgpu_vq.c
+++ linux-4.15.0/drivers/gpu/drm/virtio/virtgpu_vq.c
@@ -291,7 +291,7 @@
ret = virtqueue_add_sgs(vq, sgs, outcnt, incnt, vbuf, GFP_ATOMIC);
if (ret == -ENOSPC) {
spin_unlock(&vgdev->ctrlq.qlock);
-wait_event(vgdev->ctrlq.ack_queue, vq->num_free);
+wait_event(vgdev->ctrlq.ack_queue, vq->num_free >= outcnt + incnt);
spin_lock(&vgdev->ctrlq.qlock);
goto retry;
} else {
@@ -366,7 +366,7 @@
ret = virtqueue_add_sgs(vq, sgs, outcnt, 0, vbuf, GFP_ATOMIC);
if (ret == -ENOSPC) {
spin_unlock(&vgdev->cursorq.qlock);
-wait_event(vgdev->cursorq.ack_queue, vq->num_free);
+wait_event(vgdev->cursorq.ack_queue, vq->num_free >= outcnt);
spin_lock(&vgdev->cursorq.qlock);
goto retry;
} else {
@@ -563,9 +563,13 @@
int i = le32_to_cpu(cmd->capset_index);

spin_lock(&vgdev->display_info_lock);
-vgdev->capsets[i].id = le32_to_cpu(resp->capset_id);
-vgdev->capsets[i].max_version = le32_to_cpu(resp->capset_max_version);
-vgdev->capsets[i].max_size = le32_to_cpu(resp->capset_max_size);
+if (vgdev->capsets) {
+v[vgdev->capsets[i].id = le32_to_cpu(resp->capset_id);
+v[vgdev->capsets[i].max_version = le32_to_cpu(resp->capset_max_version);
+v[vgdev->capsets[i].max_size = le32_to_cpu(resp->capset_max_size);
+} else {
+DRM_ERROR("invalid capset memory.");
+}
spin_unlock(&vgdev->display_info_lock);
wake_up(&vgdev->resp_wq);
}
@@ -585,6 +589,8 @@
    cache_ent->id == le32_to_cpu(cmd->capset_id)) {
        memcpy(cache_ent->caps_cache, resp->capset_data,
                cache_ent->size);
+/* Copy must occur before is_valid is signalled. */
+    smp_wmb();
    atomic_set(&cache_ent->is_valid, 1);
    break;
}
@@ -646,11 +652,11 @@}
{
    struct virtio_gpu_get_capset *cmd_p;
    struct virtio_gpu_vbuffer *vbuf;
    -int max_size = vgdev->capsets[idx].max_size;
    +int max_size;
    struct virtio_gpu_drv_cap_cache *cache_ent;
    void *resp_buf;

    -if (idx > vgdev->num_capsets)
    +if (idx >= vgdev->num_capsets)
        return -EINVAL;

    if (version > vgdev->capsets[idx].max_version)
    @@ -660,6 +666,7 @@
        if (!cache_ent)
            return -ENOMEM;

        +max_size = vgdev->capsets[idx].max_size;
        cache_ent->caps_cache = kmalloc(max_size, GFP_KERNEL);
        if (!cache_ent->caps_cache) {
            kfree(cache_ent);
            @@ -858,9 +865,9 @@
        }

        /* gets freed when the ring has consumed it */
        -ents = kmalloc_array(obj->pages->nents,
        -    sizeof(struct virtio_gpu_mem_entry),
        -    GFP_KERNEL);
        +ents = kvmalloc_array(obj->pages->nents,
        +    sizeof(struct virtio_gpu_mem_entry),
        +    GFP_KERNEL);
        if (!ents) {
            DRM_ERROR("failed to allocate ent list\n");
            return -ENOMEM;
        -- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_cmdbuf_res.c
        +++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_cmdbuf_res.c
cres->hash.key = user_key | (res_type << 24);
ret = drm_ht_insert_item(&man->resources, &cres->hash);
- if (unlikely(ret != 0))
+ if (unlikely(ret != 0)) {
  kfree(cres);
  goto out_invalid_key;
  +}

++  state = VMW_CMDBUF_RES_ADD;
++  res = vmw_resource_reference(res);
--- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_drv.c
+++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_drv.c
@@ -604,13 +604,16 @@
 static int vmw_dma_masks(struct vmw_private *dev_priv)
 {
   struct drm_device *dev = dev_priv->dev;
   +int ret = 0;
   
   -if (intel_iommu_enabled &&
     +ret = dma_set_mask_and_coherent(dev->dev, DMA_BIT_MASK(64));
     +if (dev_priv->map_mode != vmw_dma_phys &&
       (sizeof(unsigned long) == 4 || vmw_restrict_dma_mask)) {
       DRM_INFO("Restricting DMA addresses to 44 bits\n");
       +return dma_set_mask_and_coherent(dev->dev, DMA_BIT_MASK(44));
     }
   -return 0;
   +return ret;
   }
 
   #else
 static int vmw_dma_masks(struct vmw_private *dev_priv)
@@ -754,6 +757,9 @@
 if (unlikely(ret != 0))
   goto out_err0;
   
+   dma_set_max_seg_size(dev->dev, min_t(unsigned int, U32_MAX & PAGE_MASK,
+     SCATTERLIST_MAX_SEGMENT));
+   
+   if (dev_priv->capabilities & SVGA_CAP_GMR2) {
+     DRM_INFO("Max GMR ids is %u\n",
+       dev_priv->max_gmr_ids);
+   @ @ -1242,7 +1248,13 @@

   dev_priv->active_master = vmaster;
Inform a new master that the layout may have changed while it was gone.
+ if (!from_open)
+ drm_sysfs_hotplug_event(dev);

return 0;
}

void vmw_svga_disable(struct vmw_private *dev_priv)
{
+ /*
+ * Disabling SVGA will turn off device modesetting capabilities, so notify KMS about that so that it doesn't cache atomic state that isn't valid anymore, for example crotcs turned on.
+ * Strictly we'd want to do this under the SVGA lock (or an SVGA mutex), but vmw_kms_lost_device() takes the reservation sem and thus we'll end up with lock order reversal. Thus, a master may actually perform a new modeset just after we call vmw_kms_lost_device() and race with vmw_svga_disable(), but that should at worst cause atomic KMS state to be inconsistent with the device, causing modesetting problems.
+ *
+ */
+vmw_kms_lost_device(dev_priv->dev);

void vmw_kms_lost_device(struct drm_device *dev);

int vmw_kms_update_layout_ioctl(struct drm_device *dev, void *data,
                      struct drm_file *file_priv);

void vmw_kms_legacy_hotspot_clear(struct vmw_private *dev_priv);

int vmw_dumb_create(struct drm_file *file_priv,
                        struct drm_device *dev,

int vmw_dumb_create(struct drm_file *file_priv,
                        struct drm_device *dev,

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int vmw_dumb_create(struct drm_file *file_priv,
                        struct drm_device *dev,

int vmw_dumb_create(struct drm_file *file prive}
+if (cmd->body.type >= SVGA3D_SHADERTYPE_DX10_MAX ||
  cmd->body.type < SVGA3D_SHADERTYPE_MIN) {
    DRM_ERROR("Illegal shader type %u\n",
               (unsigned) cmd->body.type);
    return -EINVAL;
}
@@ -2734,6 +2735,10 @@
 if (view_type == vmw_view_max)
     return -EINVAL;
 cmd = container_of(header, typeof(*cmd), header);
+if (unlikely(cmd->sid == SVGA3D_INVALID_ID)) {
+    DRM_ERROR("Invalid surface id.\n");
+    return -EINVAL;
+}
 ret = vmw_cmd_res_check(dev_priv, sw_context, vmw_res_surface,
 user_surface_converter,
 &cmd->sid, &srf_node);
@@ -3818,7 +3823,7 @@
 *p_fence = NULL;
 }
 -return 0;
 +return ret;
 }
/**
 --- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_fb.c
 +++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_fb.c
 @@ -588,11 +588,9 @@
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    DRM_MODE_FLAG_NHSYNC | DRM_MODE_FLAG_PVSYNC)
 );
-struct drm_display_mode *old_mode;
 struct drm_display_mode *mode;
 int ret;

-old_mode = par->set_mode;
 mode = drm_mode_duplicate(vmw_priv->dev, &new_mode);
 if (!mode) {
   DRM_ERROR("Could not create new fb mode.\n");
   @ @ -603,11 +601,7 @@
     mode->vdisplay = var->yres;
     vmw_guess_mode_timing(mode);

   -if (old_mode && drm_mode_equal(old_mode, mode)) {
     drm_mode_destroy(vmw_priv->dev, mode);
     -mode = old_mode;
     -old_mode = NULL;
     -} else if (!vmw_kms_validate_mode_vram(vmw_priv,
+if (!vmw_kms_validate_mode_vram(vmw_priv, mode->hdisplay * 
  DIV_ROUND_UP(var->bits_per_pixel, 8), 
  mode->vdisplay)) { 
  @@ -677,8 +671,8 @@
  schedule_delayed_work(&par->local_work, 0);

  out_unlock:
  -if (old_mode)
  -drm_mode_destroy(vmw_priv->dev, old_mode);
  +if (par->set_mode)
  +drm_mode_destroy(vmw_priv->dev, par->set_mode);
  par->set_mode = mode;

  drm_modeset_unlock_all(vmw_priv->dev);

--- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_fence.c
+++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_fence.c
@@ -897,11 +897,12 @@
  spin_lock_irq(&dev->event_lock);

  if (likely(eaction->tv_sec != NULL)) {
    -struct timeval tv;
    +struct timespec64 ts;

    -do_gettimeofday(&tv);
    -*eaction->tv_sec = tv.tv_sec;
    -*eaction->tv_usec = tv.tv_usec;
    +ktime_get_ts64(&ts);
    +/* monotonic time, so no y2038 overflow */
    +*eaction->tv_sec = ts.tv_sec;
    +*eaction->tv_usec = ts.tv_nsec / NSEC_PER_USEC;
  }

  drm_send_event_locked(dev, eaction->event);

--- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_kms.c
+++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_kms.c
@@ @ -31,7 +31,6 @@
 #include <drm/drm_atomic_helper.h>
 #include <drm/drm_rect.h>

- /* Might need a hrtimer here? */
#define VMWGFX_PRESENT_RATE ((HZ / 60 > 0) ? HZ / 60 : 1)

 @@ -2531,9 +2530,12 @@
 * Helper to be used if an error forces the caller to undo the actions of
 * vmw_kms_helper_resource_prepare.
 */

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void vmw_kms_helper_resource_revert(struct vmw_resource *res)
+void vmw_kms_helper_resource_revert(struct vmw_validation_ctx *ctx)
{
-vmw_kms_helper_buffer_revert(res->backup);
+struct vmw_resource *res = ctx->res;
+vmw_kms_helper_buffer_revert(ctx->buf);
+vmw_dmabuf_unref(&ctx->buf);
vmw_resource_unreserve(res, false, NULL, 0);
mutex_unlock(&res->dev_priv->cmdbuf_mutex);
}
@@ -2550,10 +2552,14 @@
 * interrupted by a signal.
 */
int vmw_kms_helper_resource_prepare(struct vmw_resource *res,
- bool interruptible)
+ bool interruptible,
+ struct vmw_validation_ctx *ctx)
{
int ret = 0;

+ctx->buf = NULL;
+ctx->res = res;
+
if (interruptible)
ret = mutex_lock_interruptible(&res->dev_priv->cmdbuf_mutex);
else
@@ -2572,6 +2578,8 @@
     res->dev_priv->has Mob);
if (ret)
goto out_unreserve;
+
+ctx->buf = vmw_dmabuf_reference(res->backup);
} 
ret = vmw_resource_validate(res);
if (ret)
@@ -2579,7 +2587,7 @@
return 0;

out_revert:
-vmw_kms_helper_buffer_revert(res->backup);
+vmw_kms_helper_buffer_revert(ctx->buf);
out_unreserve:
vmw_resource_unreserve(res, false, NULL, 0);
out_unlock:
@@ -2595,13 +2603,16 @@
 * @out_fence: Optional pointer to a fence pointer. If non-NULL, a
 * ref-counted fence pointer is returned here.
void vmw_kms_helper_resource_finish(struct vmw_resource *res,
    struct vmw_fence_obj **out_fence)
+
void vmw_kms_helper_resource_finish(struct vmw_validation_ctx *ctx,
    struct vmw_fence_obj **out_fence)
{
    if (res->backup || out_fence)
        vmw_kms_helper_buffer_finish(res->dev_priv, NULL, res->backup,
            struct vmw_resource *res = ctx->res;
            +
        +if (ctx->buf || out_fence)
            +vmw_kms_helper_buffer_finish(res->dev_priv, NULL, ctx->buf,
                out_fence, NULL);

+vmw_dmabuf_unreference(&ctx->buf);
    vmw_resource_unreserve(res, false, NULL, 0);
    mutex_unlock(&res->dev_priv->cmdbuf_mutex);
}
@@ -2696,7 +2707,7 @@
    ++i;
}

-[][ -2696,7 +2707,7 @@
-if (i != unit) {
+if (&con->head == &dev_priv->dev->mode_config.connector_list) {
    DRM_ERROR("Could not find initial display unit.
"");
    return -EINVAL;
}
@@ -2718,13 +2729,13 @@
    break;
}

-[] -2718,13 +2729,13 @@
-if (mode->type & DRM_MODE_TYPE_PREFERRED)
    -*p_mode = mode;
-else {
+if (&mode->head == &con->modes) {
    WARN_ONCE(true, "Could not find initial preferred mode.
"");
    *p_mode = list_first_entry(&con->modes,
        struct drm_display_mode,
        head);
+} else {
+    -*p_mode = mode;
    }

return 0;
@@ -2865,3 +2876,14 @@

return drm_atomic_helper_set_config(set, ctx);
}
/**
 * vmw_kms_lost_device - Notify kms that modesetting capabilities will be lost
 *
 * @dev: Pointer to the drm device
 */
void vmw_kms_lost_device(struct drm_device *dev)
{
    drm_atomic_helper_shutdown(dev);
}

#define vmw_crtc_to_du(x)  
    container_of(x, struct vmw_display_unit, crtc)
#define vmw_connector_to_du(x)  
    container_of(x, struct vmw_display_unit, connector)

int vmw_kms_helper_resource_prepare(struct vmw_resource *res,  
    bool interruptible);  
void vmw_kms_helper_resource_revert(struct vmw_resource *res);  
void vmw_kms_helper_resource_finish(struct vmw_resource *res,  
    bool interruptible,  
    struct vmw_validation_ctx *ctx);  
void vmw_kms_helper_resource_revert(struct vmw_validation_ctx *ctx);  
void vmw_kms_helper_resource_finish(struct vmw_validation_ctx *ctx,  
    struct vmw_fence_obj **out_fence);

int vmw_kms_readback(struct vmw_private *dev_priv,  
    struct drm_file *file_priv,  
    struct drm_vmw_fence_rep __user *user_fence_rep);

int vmw_kms_set_config(struct drm_mode_set *set,  
    struct drm_modeset_acquire_ctx *ctx);  

@endif

--- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_kms.h
+++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_kms.h
@@ -240,6 +240,11 @@
    int set_gui_y;
    
    +struct vmw_validation_ctx {
        +struct vmw_resource *res;
        +struct vmw_dma_buffer *buf;
        +};
+
    #define vmw_crtc_to_du(x) \  
        container_of(x, struct vmw_display_unit, crtc)
    #define vmw_connector_to_du(x) \  
        container_of(x, struct vmw_display_unit, connector)
@@ -296,9 +301,10 @@
    struct drm_vmw_fence_rep __user *user_fence_rep):
    int vmw_kms_helper_resource_prepare(struct vmw_resource *res,  
        bool interruptible);
    -void vmw_kms_helper_resource_revert(struct vmw_resource *res);
    -void vmw_kms_helper_resource_finish(struct vmw_resource *res,  
        bool interruptible,  
        struct vmw_validation_ctx *ctx);
    +void vmw_kms_helper_resource_revert(struct vmw_validation_ctx *ctx);
    +void vmw_kms_helper_resource_finish(struct vmw_validation_ctx *ctx,  
        struct vmw_fence_obj **out_fence);
    int vmw_kms_readback(struct vmw_private *dev_priv,  
        struct drm_file *file_priv,  
        struct drm_vmw_fence_rep __user *user_fence_rep):
    @ @ -439,5 +445,4 @@
struct vmw_legacy_display_unit *entry;
struct drm_framebuffer *fb = NULL;
struct drm_crtc *crtc = NULL;

int i = 0;

/* If there is no display topology the host just assumes
 * that the guest will set the same layout as the host.
 * @crtc = &entry->base.crtc;
 * w = max(w, crtc->x + crtc->mode.hdisplay);
 * h = max(h, crtc->y + crtc->mode.vdisplay);
 * i++;
 */

if (crtc == NULL)
    return 0;

fb = crtc->primary->state->fb;

return vmw_kms_write_svga(dev_priv, w, h, fb->pitches[0],
    fb->format->cpp[0] * 8,
    --- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_msg.c
    +++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_msg.c
    @@ -135,6 +135,114 @@
    return 0;
 }

+/**
 + * vmw_port_hb_out - Send the message payload either through the
 + * high-bandwidth port if available, or through the backdoor otherwise.
 + * @channel: The rpc channel.
 + * @msg: NULL-terminated message.
 + * @hb: Whether the high-bandwidth port is available.
 + *
 + * Return: The port status.
 + */
 +
 +static unsigned long vmw_port_hb_out(struct rpc_channel *channel,
 +    const char *msg, bool hb)
 +{
 +    unsigned long si, di, eax, ebx, ecx, edx;
 +    unsigned long msg_len = strlen(msg);
 +    
 +    if (hb) {
 +        unsigned long bp = channel->cookie_high;
 +        
 +        si = (uintptr_t) msg;
 +        di = channel->cookie_low;
 +    }
 +    
 +    return 0;
VMW_PORT_HB_OUT(
+MESSAGE_STATUS_SUCCESS << 16) | VMW_PORT_CMD_HB_MSG,
+msg_len, si, di,
+VMW_HYPERVISOR_HB_PORT | (channel->channel_id << 16),
+VMW_HYPERVISOR_MAGIC, bp,
+eax, ebx, ecx, edx, si, di);
+
+return ebx;
+
+/**
+ /* HB port not available. Send the message 4 bytes at a time. */
+ecx = MESSAGE_STATUS_SUCCESS << 16;
+while (msg_len && (HIGH_WORD(ecx) & MESSAGE_STATUS_SUCCESS)) {
+unsigned int bytes = min_t(size_t, msg_len, 4);
+unsigned long word = 0;
+
+memcpy(&word, msg, bytes);
+msg_len -= bytes;
+msg += bytes;
+si = channel->cookie_high;
+di = channel->cookie_low;
+
+VMW_PORT(VMW_PORT_CMD_MSG | (MSG_TYPE_SENDPAYLOAD << 16),
+word, si, di,
+VMW_HYPERVISOR_PORT | (channel->channel_id << 16),
+VMW_HYPERVISOR_MAGIC,
+eax, ebx, ecx, edx, si, di);
+}
+
+return ecx;
+
+/**
+ * vmw_port_hb_in - Receive the message payload either through the
+ * high-bandwidth port if available, or through the backdoor otherwise.
+ * @channel: The rpc channel.
+ * @reply: Pointer to buffer holding reply.
+ * @reply_len: Length of the reply.
+ * @hb: Whether the high-bandwidth port is available.
+ *
+ * Return: The port status.
+ */
+static unsigned long vmw_port_hb_in(struct rpc_channel *channel, char *reply,
+unsigned long reply_len, bool hb)
+{[...]
+unsigned long si, di, eax, ebx, ecx, edx;
if (hb) {
unsigned long bp = channel->cookie_low;
+si = channel->cookie_high;
+di = (uintptr_t) reply;
+VMW_PORT_HB_IN(
+(MESSAGE_STATUS_SUCCESS << 16) | VMW_PORT_CMD_HB_MSG,
+reply_len, si, di,
+VMW_HYPERVISOR_HB_PORT | (channel->channel_id << 16),
+VMW_HYPERVISOR_MAGIC, bp,
+eax, ebx, ecx, edx, si, di);
+return ebx;
}
+
/* HB port not available. Retrieve the message 4 bytes at a time. */
+ecx = MESSAGE_STATUS_SUCCESS << 16;
+while (reply_len) {
+unsigned int bytes = min_t(unsigned long, reply_len, 4);
+si = channel->cookie_high;
+di = channel->cookie_low;
+VMW_PORT(VMW_PORT_CMD_MSG | (MSG_TYPE_RECVPAYLOAD << 16),
+MESSAGE_STATUS_SUCCESS, si, di,
+VMW_HYPERVISOR_PORT | (channel->channel_id << 16),
+VMW_HYPERVISOR_MAGIC,
+eax, ebx, ecx, edx, si, di);
+if ((HIGH_WORD(ecx) & MESSAGE_STATUS_SUCCESS) == 0)
+break;
+
+memcpy(reply, &ebx, bytes);
+reply_len -= bytes;
+reply += bytes;
+
+return ecx;
+
/**
@@ -147,11 +255,10 @@
*/
static int vmw_send_msg(struct rpc_channel *channel, const char *msg)
{
-unsigned long eax, ebx, ecx, edx, si, di, bp;
unsigned long eax, ebx, ecx, edx, si, di;
size_t msg_len = strlen(msg);
int retries = 0;

while (retries < RETRIES) {
    retries++;

    VMW_HYPERVISOR_MAGIC,
    eax, ebx, ecx, edx, si, di);

    if ((HIGH_WORD(ecx) & MESSAGE_STATUS_SUCCESS) == 0 ||
        (HIGH_WORD(ecx) & MESSAGE_STATUS_HB) == 0) {
        /* Expected success + high-bandwidth. Give up. */
    } else {
        /* Expected success. Give up. */
        return -EINVAL;
    }

    /* Send msg */
    si  = (uintptr_t) msg;
    di  = channel->cookie_low;
    bp  = channel->cookie_high;
    VMW_PORT_HB_OUT(
        MESSAGE_STATUS_SUCCESS << 16) | VMW_PORT_CMD_HB_MSG,
        msg_len, si, di,
        VMW_HYPERVISOR_HB_PORT | (channel->channel_id << 16),
        VMW_HYPERVISOR_MAGIC, bp,
        eax, ebx, ecx, edx, si, di);
    ebx = vmw_port_hb_out(channel, msg,
              !!(HIGH_WORD(ecx) & MESSAGE_STATUS_HB));

    if ((HIGH_WORD(ebx) & MESSAGE_STATUS_SUCCESS) != 0) {
        return 0;
    }

    static int vmw_recv_msg(struct rpc_channel *channel, void **msg,
            size_t *msg_len)
    {
        unsigned long eax, ebx, ecx, edx, si, di, bp;
        char *reply;
        size_t reply_len;
        int retries = 0;
        VMW_HYPERVISOR_MAGIC,
        eax, ebx, ecx, edx, si, di);
-if ((HIGH_WORD(ecx) & MESSAGE_STATUS_SUCCESS) == 0) {
  if ((HIGH_WORD(ecx) & MESSAGE_STATUS_HB) == 0) {
    DRM_ERROR("Failed to get reply size\n");
    return -EINVAL;
  }
}
@@ -251,20 +348,11 @@
/* Receive buffer */
-si  = channel->cookie_high;
-di  = (uintptr_t) reply;
-bp  = channel->cookie_low;
-
-VMW_PORT_HB_IN(
- (MESSAGE_STATUS_SUCCESS << 16) | VMW_PORT_CMD_HB_MSG,
-replay_len, si, di,
-VMW_HYPervisor_HB_PORT | (channel->channel_id << 16),
-VMW_HYPervisor_MAGIC, bp,
-eax, ebx, ecx, edx, si, di);
-
+ebx = vmw_port_hb_in(channel, reply, reply_len,
+   !!(HIGH_WORD(ecx) & MESSAGE_STATUS_HB));
if ((HIGH_WORD(ebx) & MESSAGE_STATUS_SUCCESS) == 0) {
  kfree(reply);
-}
+
+reply = NULL;
if ((HIGH_WORD(ebx) & MESSAGE_STATUS_CPT) != 0) {
  /* A checkpoint occurred. Retry. */
  continue;
@@ -288,7 +388,7 @@
if ((HIGH_WORD(ecx) & MESSAGE_STATUS_SUCCESS) == 0) {
  kfree(reply);
-}
+
+reply = NULL;
if ((HIGH_WORD(ecx) & MESSAGE_STATUS_CPT) != 0) {
  /* A checkpoint occurred. Retry. */
  continue;
@@ -300,7 +388,7 @@
break;
}

-if (retries == RETRIES)
+if (!reply)
  return -EINVAL;

*msg_len = reply_len;
@@ -328,9 +416,7 @@
{
    struct rpc_channel channel;
    char *msg, *reply = NULL;
    -size_t msg_len, reply_len = 0;
    -int ret = 0;
    -
    +size_t reply_len = 0;

    if (!vmv_msg_enabled)
        return -ENODEV;
@@ -338,24 +424,20 @@
    if (!guest_info_param || !length)
        return -EINVAL;
-    msg_len = strlen(guest_info_param) + strlen("info-get ") + 1;
-    msg = kzalloc(msg_len, GFP_KERNEL);
+    msg = kasprintf(GFP_KERNEL, "info-get %s", guest_info_param);
    if (!msg) {
        DRM_ERROR("Cannot allocate memory to get %s", guest_info_param);
        return -ENOMEM;
    }
-
-    sprintf(msg, "info-get %s", guest_info_param);
-    if (vmv_open_channel(&channel, RPCI_PROTOCOL_NUM) ||
-        vmv_send_msg(&channel, msg) ||
-        vmv_recv_msg(&channel, (void *) &reply, &reply_len) ||
-        vmv_close_channel(&channel)) {
-        DRM_ERROR("Failed to get %s", guest_info_param);
-        ret = -EINVAL;
-    }
+
+    if (vmv_open_channel(&channel, RPCI_PROTOCOL_NUM))
+        goto out_open;

    -ret = -EINVAL;
    -
+    if (vmv_send_msg(&channel, msg))
+        goto out_msg;
+    vmv_recv_msg(&channel, (void *) &reply, &reply_len)
+    goto out_msg;
+
+    vmv_close_channel(&channel);
    if (buffer && reply && reply_len > 0) {
        /* Remove reply code, which are the first 2 characters of
        * the reply
@@ -372,7 +454,17 @@
        kfree(reply);
        kfree(msg);
        kfree(msg);
return ret;
+return 0;
+
+out_msg:
+vmw_close_channel(&channel);
+kfree(reply);
+out_open:
+*length = 0;
+kfree(msg);
+DRM_ERROR("Failed to get %s", guest_info_param);
+
+return -EINVAL;
}

@@ -388,7 +480,6 @@
{
    struct rpc_channel channel;
    char *msg;
    -int msg_len;
    int ret = 0;
}

@@ -398,24 +489,28 @@
    if (!log)
        return ret;

-msg_len = strlen(log) + strlen("log ") + 1;
-msg = kzalloc(msg_len, GFP_KERNEL);
+msg = kasprintf(GFP_KERNEL, "log %s", log);
    if (!msg) {
        DRM_ERROR("Cannot allocate memory for log message\n");
        return -ENOMEM;
    }

    -sprintf(msg, "log %s", log);
    +if (vmw_open_channel(&channel, RPCI_PROTOCOL_NUM))
    +goto out_open;

    -if (vmw_open_channel(&channel, RPCI_PROTOCOL_NUM) ||
        vmw_send_msg(&channel, msg) ||
        vmw_close_channel(&channel)) {
        -DRM_ERROR("Failed to send log\n");
        +if (vmw_send_msg(&channel, msg))
        +goto out_msg;

        -ret = -EINVAL;
        -}
+vmw_close_channel(&channel);
+kfree(msg);
+
+return 0;
+
+out_msg:
+vmw_close_channel(&channel);
+out_open:
+kfree(msg);
+DRM_ERROR("Failed to send log\n");

-return ret;
+return -EINVAL;
}

--- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_msg.h
+++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_msg.h
@@ -135,17 +135,24 @@

#else

-/* In the 32-bit version of this macro, we use "m" because there is no
-* more register left for bp
+/*
+ * In the 32-bit version of this macro, we store bp in a memory location
+ * because we've ran out of registers.
+ * Now we can't reference that memory location while we've modified
+ * %esp or %ebp, so we first push it on the stack, just before we push
+ * %ebp, and then when we need it we read it from the stack where we
+ * just pushed it.
+ */
+
+#define VMW_PORT_HB_OUT(cmd, in_ecx, in_si, in_di,
port_num, magic, bp,
eax, ebx, ecx, edx, si, di)
({
	asm volatile ("push %%ebp;"
		"mov %12, %%ebp;"
	asm volatile ("push %12;
	 push %%ebp;"
	 "mov 0x04(%%esp), %%ebp;"
"rep outsb;"
	 "pop %%ebp;" :
	 "pop %%ebp;"
	 "mov 0x04(%%esp), %%ebp;"
"rep outsb;"
	 "add S0x04, %%esp;" :
"=a"(eax),
"=b"(ebx),
"=c"(ecx),
@@ -167,10 +174,12 @@
port_num, magic, bp,}
eax, ebx, ecx, edx, si, di)\n
\{\n
-asm volatile ("push %%ebp;"
-*mov %12, %%%ebp;"
+asm volatile ("push %12;"
-*"push %%%ebp;"
+*mov 0x04(%esp), %%%ebp;"
-*"rep insb;"
-*"pop %%%ebp" :
+*"pop %%%ebp;"
+*"add 0x04, %%%esp;" :
*"a"(eax),
*"b"(ebx),
*"c"(ecx),

--- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_scrn.c
+++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_scrn.c
@@ -453,7 +453,11 @@
 struct drm_plane_state *old_state)
 {
 struct vmw_plane_state *vps = vmw_plane_state_to_vps(old_state);
+struct drm_crtc *crtc = plane->state->crtc ?
+    plane->state->crtc : old_state->crtc;

+if (vps->dmabuf)
+vmw_dmabuf_unpin(vmw_priv(crtc->dev), vps->dmabuf, false);
+vmw_dmabuf_unreference(&vps->dmabuf);
+vps->dmabuf_size = 0;

@@ -491,10 +495,17 @@
 size = new_state->crtc_w * new_state->crtc_h * 4;
 +dev_priv = vmw_priv(crtc->dev);

 if (vps->dmabuf) {
    -if (vps->dmabuf_size == size)
    -return 0;
    +if (vps->dmabuf_size == size) {
        +/*
        + * Note that this might temporarily up the pin-count
        + * to 2, until cleanup_fb() is called.
        + */
        +return vmw_dmabuf_pin_in_vram(dev_priv, vps->dmabuf,
        +    true);
        +}

 vmw_dmabuf_unreference(&vps->dmabuf);
 vps->dmabuf_size = 0;

---
if (!vps->dmabuf)
    return -ENOMEM;

-dev_priv = vmw_priv(crtc->dev);
vmw_svga_enable(dev_priv);

/* After we have allocated the backing store might not be able to
   &vmw_vram_ne_placement,
   false, &vmw_dmabuf_bo_free);
vmw_overlay_resume_all(dev_priv);
-*/
-if (ret != 0)
+if (ret) {
    vps->dmabuf = NULL; /* vmw_dmabuf_init frees on error */
-else
-    vps->dmabuf_size = size;
+    return ret;
+}
-return ret;
+vps->dmabuf_size = size;
+
+/*
+ * TTM already thinks the buffer is pinned, but make sure the
+ * pin_count is upped.
+ */
+return vmw_dmabuf_pin_in_vram(dev_priv, vps->dmabuf, true);
}

struct vmw_framebuffer_surface *vfbs =
container_of(framebuffer, typeof(*vfbs), base);
struct vmw_kms_sou_surface_dirty sdirty;
+struct vmw_validation_ctx ctx;
int ret;

if (!srf)
    srf = &vfbs->surface->res;

-ret = vmw_kms_helper_resource_prepare(srf, true);
+ret = vmw_kms_helper_resource_prepare(srf, true, &ctx);
if (ret)
    return ret;

//@ -933,7 +949,7 @@
ret = vmw_kms_helper_dirty(dev_priv, framebuffer, clips, vclips,
        dest_x, dest_y, num_clips, inc,
        &sdirty.base);
-vmw_kms_helper_resource_finish(srf, out_fence);
+vmw_kms_helper_resource_finish(&ctx, out_fence);

return ret;
}
--- linux-4.15.0.orig/drivers/gpu/drm/vmwgfx/vmwgfx_stdu.c
+++ linux-4.15.0/drivers/gpu/drm/vmwgfx/vmwgfx_stdu.c
@@ -980,12 +980,13 @@
struct vmw_framebuffer_surface *vfbs =
    container_of(framebuffer, typeof(*vfbs), base);
struct vmw_stdu_dirty sdirty;
+struct vmw_validation_ctx ctx;
int ret;

if (!srf)
srf = &vfbs->surface->res;

- ret = vmw_kms_helper_resource_prepare(srf, true);
+ret = vmw_kms_helper_resource_prepare(srf, true, &ctx);
if (ret)
    return ret;

@@ -1008,7 +1009,7 @@
        dest_x, dest_y, num_clips, inc,
        &sdirty.base);
out_finish:
-vmw_kms_helper_resource_finish(srf, out_fence);
+vmw_kms_helper_resource_finish(&ctx, out_fence);

return ret;
}
--- linux-4.15.0.orig/drivers/gpu/drm/zte/Kconfig
+++ linux-4.15.0/drivers/gpu/drm/zte/Kconfig
@@ -2,7 -2,6 @@
tristate "DRM Support for ZTE SoCs"
depends on DRM & ARCH_ZX
select DRM_KMS_CMA_HELPER
-select DRM_KMS_FB_HELPER
select DRM_KMS_HELPER
select SND_SOC_HDMI_CODEC if SND_SOC
select VIDEOMODE_HELPERS
--- linux-4.15.0.orig/drivers/gpu/host1x/bus.c
+++ linux-4.15.0/drivers/gpu/host1x/bus.c
@@ -411,9 +411,9 @@
of_dma_configure(&device->dev, host1x->dev->of_node);

+device->dev.dma_parms = &device->dma_parms;
+dma_set_max_seg_size(&device->dev, SZ_4M);
+
err = host1x_device_parse_dt(device, driver);
if (err < 0) {
    kfree(device);
    @@ -617,8 +620,17 @@
    */
void host1x_driver_unregister(struct host1x *driver)
{
+struct host1x *host1x;
+
    driver_unregister(&driver->driver);

+mutex_lock(&devices_lock);
+
+list_for_each_entry(host1x, &devices, list)
+host1x_detach_driver(host1x, driver);
+
+mutex_unlock(&devices_lock);
+
mutex_lock(&drivers_lock);
list_del_init(&driver->list);
mutex_unlock(&drivers_lock);
--- linux-4.15.0.orig/drivers/gpu/host1x/debug.c
+++ linux-4.15.0/drivers/gpu/host1x/debug.c
@@ -25,6 +25,8 @@
#include "debug.h"
#include "channel.h"

+static DEFINE_MUTEX(debug_lock);
+
unsigned int host1x_debug_trace_cmdbuf;

static pid_t host1x_debug_force_timeout_pid;
@@ -61,12 +63,14 @@
struct output *o = data;

mutex_lock(&ch->cdma.lock);
+mutex_lock(&debug_lock);

if (show_fifo)
host1x_hw_show_channel_fifo(m, ch, o);

host1x_hw_show_channel_cdma(m, ch, o);
mutex_unlock(&debug_lock);
mutex_unlock(&ch->cdma.lock);

return 0;

--- linux-4.15.0.orig/drivers/gpu/host1x/dev.c
+++ linux-4.15.0/drivers/gpu/host1x/dev.c
@@ -218,6 +218,9 @@
     return err;
 }

+if (IS_ENABLED(CONFIG_TEGRA_HOST1X_FIREWALL))
+goto skip_iommu;
+
+if (iommu_present(&platform_bus_type)) {
     struct iommu_domain_geometry *geometry;
     unsigned long order;
--- linux-4.15.0.orig/drivers/gpu/host1x/hw/hw_host1x06_uclass.h
+++ linux-4.15.0/drivers/gpu/host1x/hw/hw_host1x06_uclass.h
@@ -59,7 +59,7 @@

# define HOST1X_UCLASS_INCR_SYNCPT_COND_F(v) \
host1x_uclass_incr_syncpt_r()
static inline u32 host1x_uclass_incr_syncpt_cond_f(u32 v)
{
    -return (v & 0xff) << 8;
    +return (v & 0xff) << 10;

    return err;
}

static inline int copy_gathers(struct host1x_job *job, struct device *dev)
+static inline int copy_gathers(struct device *host, struct host1x_job *job,
+struct device *dev)
{
    struct host1x_firewall fw;
    size_t size = 0;
    @ @ -570,12 +571,12 @@
    * Try a non-blocking allocation from a higher priority pools first,
    * as awaiting for the allocation here is a major performance hit.
    */
    -job->gather_copy_mapped = dma_alloc_wc(dev, size, &job->gather_copy,
    +job->gather_copy_mapped = dma_alloc_wc(host, size, &job->gather_copy,
            GFP_NOWAIT);

    /* the higher priority allocation failed, try the generic-blocking */
if (!job->gather_copy_mapped)
-job->gather_copy_mapped = dma_alloc_wc(dev, size,
+job->gather_copy_mapped = dma_alloc_wc(host, size,
      &job->gather_copy,
      GFP_KERNEL);
if (!job->gather_copy_mapped)
@@ -636,7 +637,7 @@
goto out;

if (IS_ENABLED(CONFIG_TEGRA_HOST1X_FIREWALL)) {
-err = copy_gathers(job, dev);
+err = copy_gathers(host->dev, job, dev);
if (err)
goto out;
}
@@ -686,7 +687,8 @@
for (i = 0; i < job->num_unpins; i++) {
    struct host1x_job_unpin_data *unpin = &job->unpins[i];
...
-if (!IS_ENABLED(CONFIG_TEGRA_HOST1X_FIREWALL) && host->domain) {
+if (!IS_ENABLED(CONFIG_TEGRA_HOST1X_FIREWALL) &&
    unpin->size && host->domain) {
    iommu_unmap(host->domain, job->addr_phys[i],
       unpin->size);
    free_iova(&host->iova,
@@ -700,7 +702,7 @@
    job->num_unpins = 0;

    if (job->gather_copy_size)
-dma_free_wc(job->channel->dev, job->gather_copy_size,
+dma_free_wc(host->dev, job->gather_copy_size,
       job->gather_copy_mapped, job->gather_copy);
}
EXPORT_SYMBOL(host1x_job_unpin);
.cpmem_ofs = 0x07000000,
.srm_ofs = 0x07040000,
.tpm_ofs = 0x07060000,
- .csi0_ofs = 0x07030000,
- .csi1_ofs = 0x07038000,
+ .csi0_ofs = 0x06030000,
+ .csi1_ofs = 0x06038000,
.ic_ofs = 0x06020000,
.sql0_ofs = 0x06040000,
.sql1_ofs = 0x06048000,
@@ -1401,6 +1401,8 @@
return -ENODEV;

ipu->id = of_alias_get_id(np, "ipu");
+if (ipu->id < 0)
+ipu->id = 0;

if (of_device_is_compatible(np, "fsl.imx6qp-ipu") &&
    IS_ENABLED(CONFIG_DRM)) {
    --- linux-4.15.0.orig/drivers/gpu/ipu-v3/ipu-csi.c
    +++ linux-4.15.0/drivers/gpu/ipu-v3/ipu-csi.c
    @@ -316,13 +316,17 @@
    /*
     * Fill a CSI bus config struct from mbus_config and mbus_framefmt.
     */
-    static void fill_csi_bus_cfg(struct ipu_csi_bus_config *csicfg,
+    static int fill_csi_bus_cfg(struct ipu_csi_bus_config *csicfg,
        struct v4l2_mbus_config *mbus_cfg,
        struct v4l2_mbus_framefmt *mbus_fmt)
    {
        int ret;
        + memset(csicfg, 0, sizeof(*csicfg));

        - mbus_code_to_bus_cfg(csicfg, mbus_fmt->code);
        + ret = mbus_code_to_bus_cfg(csicfg, mbus_fmt->code);
        + if (ret < 0)
        + return ret;

        switch (mbus_cfg->type) {
            case V4L2_MBUS_PARALLEL:
                @@ -353,6 +357,8 @@
                /* will never get here, keep compiler quiet */
                break;
            +
            + return 0;
        }
    }
int ipu_csi_init_interface(struct ipu_csi *csi,
@@ -362,8 +368,11 @@
                      struct ipu_csi_bus_config cfg;
                      unsigned long flags;
                      u32 width, height, data = 0;
                      +int ret;

                      -fill_csi_bus_cfg(&cfg, mbus_cfg, mbusFmt);
                      +ret = fill_csi_bus_cfg(&cfg, mbus_cfg, mbusFmt);
                      +if (ret < 0)
                      +return ret;

                      /* set default sensor frame width and height */
                      width = mbusFmt->width;
                      @@ -584,11 +593,14 @@
                      struct ipu_csi_bus_config cfg;
                      unsigned long flags;
                      +int ret;
                      if (vc > 3)
                      return -EINVAL;

                      -mbus_code_to_bus_cfg(&cfg, mbusFmt->code);
                      +ret = mbus_code_to_bus_cfg(&cfg, mbusFmt->code);
                      +if (ret < 0)
                      +return ret;

                      spin_lock_irqsave(&csi->lock, flags);

                      --- linux-4.15.0.orig/drivers/gpu/ipu-v3/ipu-dp.c
                      +++ linux-4.15.0/drivers/gpu/ipu-v3/ipu-dp.c
                      @@ -195,7 +195,8 @@
                      ipu_dp_csc_init(flow, flow->foreground.in_cs, flow->out_cs,
                      DP_COM_CONF_CSC_DEF_BOTH);
                      } else { 
                      -if (flow->foreground.in_cs == flow->out_cs)
                      +if (flow->foreground.in_cs == IPUV3_COLORSPACE_UNKNOWN ||
                      +    flow->foreground.in_cs == flow->out_cs)
                      /*
                      * foreground identical to output, apply color
                      * conversion on background
                      @@ -261,6 +262,8 @@
                      struct ipu_dp_priv *priv = flow->priv;
                      u32 reg, csc;

                      +dp->in_cs = IPUV3_COLORSPACE_UNKNOWN;
if (!dp->foreground)
return;

reg = readl(flow->base + DP_COM_CONF);
csc = reg & DP_COM_CONF_CSC_DEF_MASK;
-reg &=-DP_COM_CONF_CSC_DEF_MASK;
-reg &=-DP_COM_CONF_CSC_DEF_MASK;
+reg &=-DP_COM_CONF_CSC_DEF_MASK;
+if (csc == DP_COM_CONF_CSC_DEF_BOTH || csc == DP_COM_CONF_CSC_DEF_BG)
+reg |= DP_COM_CONF_CSC_DEF_BG;

reg &= ~DP_COM_CONF_FG_EN;
writel(reg, flow->base + DP_COM_CONF);
mutex_init(&priv->mutex);

for (i = 0; i < IPUV3_NUM_FLOWS; i++) {
  +priv->flow[i].background.in_cs = IPUV3_COLORSPACE_UNKNOWN;
  +priv->flow[i].foreground.in_cs = IPUV3_COLORSPACE_UNKNOWN;
  priv->flow[i].foreground.foreground = true;
  priv->flow[i].base = priv->base + ipu_dp_flow_base[i];
  priv->flow[i].priv = priv;
  --- linux-4.15.0.orig/drivers/gpu/ipu-v3/ipu-ic.c
  +++ linux-4.15.0/drivers/gpu/ipu-v3/ipu-ic.c
  @ @ -256,7 +256,7 @@
writel(param, base++);

  param = ((a[0] & 0x1fe0) >> 5) | (params->scale << 8) |
  -(params->sat << 9);  
  +(params->sat << 10);
writel(param, base++);

  param = ((a[1] & 0x1f) << 27) | ((c[0][1] & 0x1ff) << 18) |
  --- linux-4.15.0.orig/drivers/gpu/ipu-v3/ipu-image-convert.c
  +++ linux-4.15.0/drivers/gpu/ipu-v3/ipu-image-convert.c
  @ @ -992.9 +992.10 @@
return IRQ_WAKE_THREAD;
}

-static irqreturn_t norotate_irq(int irq, void *data)
+static irqreturn_t eof_irq(int irq, void *data)
{
  struct ipu_image_convert_chan *chan = data;
  +struct ipu_image_convert_priv *priv = chan->priv;
  struct ipu_image_convert_ctx *ctx;

--- linux-4.15.0.orig/drivers/gpu/ipu-v3/ipu-ic.c
+++ linux-4.15.0/drivers/gpu/ipu-v3/ipu-ic.c
@@ -256,7 +261,7 @@
writel(param, base++);
    --- linux-4.15.0.orig/drivers/gpu/ipu-v3/ipu-image-convert.c
    +++ linux-4.15.0/drivers/gpu/ipu-v3/ipu-image-convert.c
    @ @ -992.9 +992.10 @@
    return IRQ_WAKE_THREAD;
  }

-static irqreturn_t norotate_irq(int irq, void *data)
+static irqreturn_t eof_irq(int irq, void *data)
{
struct ipu_image_convert_run *run;
unsigned long flags;
@@ -1011,45 +1012,26 @@

cnt = run->ctx;

- if (ipu_rot_mode_is_irt(ctx->rot_mode)) {
- /* this is a rotation operation, just ignore */
- spin_unlock_irqrestore(&chan->irqlock, flags);
- return IRQ_HANDLED;
- }
- 
- ret = do_irq(run);
- out:
- spin_unlock_irqrestore(&chan->irqlock, flags);
- return ret;
- }
- 
- static irqreturn_t rotate_irq(int irq, void *data)
- {
- struct ipu_image_convert_chan *chan = data;
- struct ipu_image_convert_priv *priv = chan->priv;
- struct ipu_image_convert_ctx *ctx;
- struct ipu_image_convert_run *run;
- unsigned long flags;
- irqreturn_t ret;
- 
- spin_lock_irqsave(&chan->irqlock, flags);
- 
- /* get current run and its context */
- run = chan->current_run;
- if (!run) {
+ if (irq == chan->out_eof_irq) {
+ if (ipu_rot_mode_is_irt(ctx->rot_mode)) {
+ /* this is a rotation op, just ignore */
+ ret = IRQ_HANDLED;
+ goto out;
+ }
+ } else if (irq == chan->rot_out_eof_irq) {
+ if (!ipu_rot_mode_is_irt(ctx->rot_mode)) {
+ /* this was NOT a rotation op, shouldn't happen */
+ dev_err(priv->ipu->dev, "Unexpected rotation interrupt\n");
+ ret = IRQ_HANDLED;
+ goto out;
+ } else {
+ dev_err(priv->ipu->dev, "Received unknown irq %d\n", irq);
ret = IRQ_NONE;
goto out;
}

-ctx = run->ctx;
-
-if (!ipu_rot_mode_is_irt(ctx->rot_mode)) {
-/* this was NOT a rotation operation, shouldn't happen */
-dev_err(priv->ipu->dev, "Unexpected rotation interrupt\n");
-spin_unlock_irqrestore(&chan->irqlock, flags);
-return IRQ_HANDLED;
-}
-
ret = do_irq(run);
out:
spin_unlock_irqrestore(&chan->irqlock, flags);
@@ -1142,7 +1124,7 @@
 chan->out_chan,
 IPU_IRQ_EOF);
-ret = request_threaded_irq(chan->out_eof_irq, norotate_irq, do_bh,
+ret = request_threaded_irq(chan->out_eof_irq, eof_irq, do_bh,
 0, "ipu-ic", chan);
 if (ret < 0) {
 dev_err(priv->ipu->dev, "could not acquire irq %d\n",
 @@ -1155,7 +1137,7 @@
 chan->rotation_out_chan,
 IPU_IRQ_EOF);
-ret = request_threaded_irq(chan->rot_out_eof_irq, rotate_irq, do_bh,
+ret = request_threaded_irq(chan->rot_out_eof_irq, eof_irq, do_bh,
 0, "ipu-ic", chan);
 if (ret < 0) {
 dev_err(priv->ipu->dev, "could not acquire irq %d\n",
 @@ -1518,7 +1500,7 @@
EXPORT_SYMBOL_GPL(ipu_image_convert_queue);

 /* Abort any active or pending conversions for this context */
-void ipu_image_convert_abort(struct ipu_image_convert_ctx *ctx)
+static void __ipu_image_convert_abort(struct ipu_image_convert_ctx *ctx)
{
 struct ipu_image_convert_chan *chan = ctx->chan;
 struct ipu_image_convert_priv *priv = chan->priv;
 @@ -1545,7 +1527,7 @@
 need_abort = (run_count || active_run);

-ctx->aborting = need_abort;
ctx->aborting = true;

spin_unlock_irqrestore(chan->irqlock, flags);

dev_warn(priv->dev, "%s: timeout\n", __func__);
force_abort(ctx);
}
+

void ipu_image_convert_abort(struct ipu_image_convert_ctx *ctx)
+
__ipu_image_convert_abort(ctx);
ctx->aborting = false;
}

EXPORT_SYMBOL_GPL(ipu_image_convert_abort);

/* make sure no runs are hanging around */
-ipu_image_convert_abort(ctx);
+__ipu_image_convert_abort(ctx);

debug(priv->dev, "%s: task %u: removing ctx \n", __func__,
chan->ic_task, ctx);
--- linux-4.15.0.orig/drivers/gpu/ipu-v3/ipu-pre.c
+++ linux-4.15.0/drivers/gpu/ipu-v3/ipu-pre.c
@@ -102,6 +102,7 @@
    unsigned int		last_bufaddr;
};

static DEFINE_MUTEX(ipu_pre_list_mutex);
@@ -125,11 +126,14 @@
    if (pre_node == pre->dev->of_node) {
        unlock(&ipu_pre_list_mutex);
        device_link_add(dev, pre->dev, DL_FLAG_AUTOREMOVE);
+        of_node_put(pre_node);
        return pre;
    }
    }
mutex_unlock(&ipu_pre_list_mutex);

+of_node_put(pre_node);
+return NULL;
writel(bufaddr, pre->regs + IPU_PRE_CUR_BUF);
writel(bufaddr, pre->regs + IPU_PRE_NEXT_BUF);
    pre->last_bufaddr = bufaddr;

val = IPU_PRE_PREF_ENG_CTRL_INPUT_PIXEL_FORMAT(0) |
    IPU_PRE_PREF_ENG_CTRL_INPUT_ACTIVE_BPP(active_bpp) |
unsigned short current_yblock;
u32 val;

    if (bufaddr == pre->last_bufaddr)
    return;
    
    writel(bufaddr, pre->regs + IPU_PRE_NEXT_BUF);
    pre->last_bufaddr = bufaddr;

    do {
        if (time_after(jiffies, timeout)) {
            mutex_unlock(&ipu_prg_list_mutex);
            device_link_add(dev, prg->dev, DL_FLAG_AUTOREMOVE);
            prg->id = ipu_id;
            of_node_put(prg_node);
            return prg;
        }
    }

    mutex_unlock(&ipu_prg_list_mutex);

    +of_node_put(prg_node);
    return NULL;
}

int prg_chan = ipu_prg_ipu_to_prg_chan(ipu_chan->num);
struct ipu_prg *prg = ipu_chan->ipu->prg_priv;
-struct ipu_prg_channel *chan = &prg->chan[prg_chan];
+struct ipu_prg_channel *chan;
u32 val;

    -if (!chan->enabled || prg_chan < 0)
+if (prg_chan < 0)
+return;
+
+chan = &prg->chan[prg_chan];
+if (!chan->enabled)
return;

clk_prepare_enable(prg->clk_ipg);
@@ -279,13 +286,15 @@
{
int prg_chan = ipu_prg_ipu_to_prg_chan(ipu_chan->num);
struct ipu_prg *prg = ipu_chan->ipu->prg_priv;
-struct ipu_prg_channel *chan = &prg->chan[prg_chan];
+struct ipu_prg_channel *chan;
u32 val;
int ret;

if (prg_chan < 0)
return prg_chan;

+chan = &prg->chan[prg_chan];
+
if (chan->enabled) {
  ipu_pre_update(prg->pres[chan->used_pre], *eba);
  return 0;
--- linux-4.15.0.orig/drivers/gpu/vga/vga_switcheroo.c
+++ linux-4.15.0/drivers/gpu/vga/vga_switcheroo.c
@@ -92,7 +92,8 @@
 * @pwr_state: current power state if manual power control is used.
 + * @pwr_state: current power state if manual power control is used.
 + * For driver power control, call vga_switcheroo_pwr_state().
 * @ops: client callbacks
 * @id: client identifier. Determining the id requires the handler,
 * so gpus are initially assigned VGA_SWITCHEROO_UNKNOWN_ID
@@ -102,10 +103,11 @@
 * runtime pm. If true, writing ON and OFF to the vga_switcheroo debugfs
 * interface is a no-op so as not to interfere with runtime pm
 * @list: client list
+ * @vga_dev: pci device, indicate which GPU is bound to current audio client
  *
  * Registered client. A client can be either a GPU or an audio device on a GPU.
  - * For audio clients, the @fb_info, @active and @driver_power_control members
  - * are bogus.
+ * For audio clients, the @fb_info and @active members are bogus. For GPU
+ * clients, the @vga_dev is bogus.
struct vga_switcheroo_client {
  struct pci_dev *pdev;
  bool active;
  bool driver_power_control;
  struct list_head list;
  struct pci_dev *vga_dev;
};

#define ID_BIT_AUDIO 0x100
#define client_is_audio(c) ((c)->id & ID_BIT_AUDIO)
#define client_is_vga(c) ((c)->id == VGA_SWITCHEROO_UNKNOWN_ID || !client_is_audio(c))
#define client_id(c) ((c)->id & ~ID_BIT_AUDIO)

static int vga_switcheroo_debugfs_init(struct vgasr_priv *priv);

list_for_each_entry(client, &vgasr_priv.clients, list) {
  if (client->id != VGA_SWITCHEROO_UNKNOWN_ID)
    continue;
  ret = vgasr_priv.handler->get_client_id(client->pdev);
  if (ret < 0)
    return;
  client->id = ret;
}

list_for_each_entry(client, &vgasr_priv.clients, list) {
  if (!client_is_vga(client) ||
      client_id(client) != VGA_SWITCHEROO_UNKNOWN_ID)
    continue;
  ret = vgasr_priv.handler->get_client_id(client->vga_dev);
  if (ret < 0)
    return;
}

static int register_client(struct pci_dev *pdev,
   const struct vga_switcheroo_client_ops *ops,
   enum vga_switcheroo_client_id id, bool active,
   struct pci_dev *vga_dev, bool active,
   bool driver_power_control)
{
    struct vga_switcheroo_client *client;

    client->id = id;
    client->active = active;
    client->driver_power_control = driver_power_control;
    client->vga_dev = vga_dev;

    mutex_lock(&vgasr_mutex);
    list_add_tail(&client->list, &vgasr_priv.clients);
    mutex_unlock(&vgasr_mutex);

    return register_client(pdev, ops, VGA_SWITCHEROO_UNKNOWN_ID, NULL, pdev == vga_default_device(),
                           driver_power_control);
}

* vga_switcheroo_register_audio_client - register audio client
  * @pdev: client pci device
  * @ops: client callbacks
  * @id: client identifier
  * @vga_dev: pci device which is bound to current audio client

- * Register audio client (audio device on a GPU). The power state of the
  * client is assumed to be ON. Beforehand, vga_switcheroo_client_probe_defer()
  * to use runtime PM. Beforehand, vga_switcheroo_client_probe_defer()
  * shall be called to ensure that all prerequisites are met.
  *
- * Return: 0 on success, -ENOMEM on memory allocation error.
int vga_switcheroo_register_audio_client(struct pci_dev *pdev,
    const struct vga_switcheroo_client_ops *ops,
    enum vga_switcheroo_client_id id)
    +struct pci_dev *vga_dev)
{
    return register_client(pdev, ops, id | ID_BIT_AUDIO, false, false);
    +enum vga_switcheroo_client_id id = VGA_SWITCHEROO_UNKNOWN_ID;
    +
    +
    +*/
    + * if vga_switcheroo has enabled, that mean two GPU clients and also
    + * handler are registered. Get audio client id from bound GPU client
    + * id directly, otherwise, set it as VGA_SWITCHEROO_UNKNOWN_ID,
    + * it will set to correct id in later when vga_switcheroo_enable()
    + * is called.
    + */
    +mutex_lock(&vgasr_mutex);
    +if (vga_switcheroo_pwr_state(client))
    +{
    +    if (vga_switcheroo_client_probe_defer);
    +else
    +    return client->pwr_state;
vga_switcheroo_get_client_state() - obtain power state of a given client
@pdev: client pci device
@@ -425,7 +479,7 @@
if (!client)
    ret = VGA_SWITCHEROO_NOT_FOUND;
else
-    ret = client->pwr_state;
+    ret = vga_switcheroo_pwr_state(client);
mutex_unlock(&vgasr_mutex);
return ret;
}
@@ -598,7 +652,7 @@
client_is_vga(client) ? "" : ":Audio",
    client->active ? '+': ' ',
    client->driver_power_control ? "Dyn": "",
-    client->pwr_state ? "Pwr": "Off",
+    vga_switcheroo_pwr_state(client) ? "Pwr": "Off",
    pci_name(client->pdev));
i++;}
@@ -641,10 +695,8 @@
    struct vga_switcheroo_client *client;

    client = find_client_from_id(&vgasr_priv.clients, id | ID_BIT_AUDIO);
-    if (client && client->pwr_state != state) {
+    if (client)
        client->ops->set_gpu_state(client->pdev, state);
-    client->pwr_state = state;
-    }
-}

/* stage one happens before delay */
@@ -656,7 +708,7 @@
if (!active)
    return 0;
-    if (new_client->pwr_state == VGA_SWITCHEROO_OFF)
+    if (vga_switcheroo_pwr_state(new_client) == VGA_SWITCHEROO_OFF)
        vga_switchon(new_client);
    vga_set_default_device(new_client->pdev);
@@ -695,7 +747,7 @@
    if (new_client->ops->reprobe)
        new_client->ops->reprobe(new_client->pdev);
if (active->pwr_state == VGA_SWITCHEROO_ON)
+if (vga_switcheroo_pwr_state(active) == VGA_SWITCHEROO_ON)
vga_switchoff(active);

set_audio_state(new_client->id, VGA_SWITCHEROO_ON);

* Specifying nouveau.runpm=0, radeon.runpm=0 or amdgpu.runpm=0 on the kernel
* command line disables it.
* 
- * When the driver decides to power up or down, it notifies vga_switcheroo
- * thereof so that it can (a) power the audio device on the GPU up or down,
- * and (b) update its internal power state representation for the device.
- * This is achieved by vga_switcheroo_set_dynamic_switch().
- *
* After the GPU has been suspended, the handler needs to be called to cut
* power to the GPU. Likewise it needs to reinstate power before the GPU
* can resume. This is achieved by vga_switcheroo_init_domain_pm_ops(),
* @ @ -951,8 +998,9 @ @
* calls to the handler.
* 
* When the audio device resumes, the GPU needs to be woken. This is achieved
- * by vga_switcheroo_init_domain_pm_optimus_hdmi_audio(), which augments the
- * audio device's resume function.
+ * by a PCI quirk which calls device_link_add() to declare a dependency on the
+ * GPU. That way, the GPU is kept awake whenever and as long as the audio
+ * device is in use.
* 
* On muxed machines, if the mux is initially switched to the discrete GPU,
* the user ends up with a black screen when the GPU powers down after boot.
* @ @ -978,35 +1026,6 @@
 vgasyr_priv.handler->power_state(client->id, state);
}

/**
 * vga_switcheroo_set_dynamic_switch() - helper for driver power control
 * @pdev: client pci device
 * @dynamic: new power state
 * 
 * Helper for GPUs whose power state is controlled by the driver's runtime pm.
 * When the driver decides to power up or down, it notifies vga_switcheroo
 * thereof using this helper so that it can (a) power the audio device on
 * the GPU up or down, and (b) update its internal power state representation
 * for the device.
 */
-void vga_switcheroo_set_dynamic_switch(struct pci_dev *pdev,
   - enum vga_switcheroo_state dynamic)
{
-struct vga_switcheroo_client *client;
- mutex_lock(&vgasr_mutex);
- client = find_client_from_pci(&vgasr_priv.clients, pdev);
- if (!client || !client->driver_power_control) {
- mutex_unlock(&vgasr_mutex);
- return;
- }
-
- client->pwr_state = dynamic;
- set_audio_state(client->id, dynamic);
- mutex_unlock(&vgasr_mutex);
- }
- EXPORT_SYMBOL(vga_switcheroo_set_dynamic_switch);
-
/* switcheroo power domain */
static int vga_switcheroo_runtime_suspend(struct device *dev)
{
@@ -1076,69 +1095,3 @@
dev_pm_domain_set(dev, NULL);
}
EXPORT_SYMBOL(vga_switcheroo_fini_domain_pm_ops);
-
-static int vga_switcheroo_runtime_resume_hdmi_audio(struct device *dev)
-{  
- struct pci_dev *pdev = to_pci_dev(dev);
- struct vga_switcheroo_client *client;
- struct device *video_dev = NULL;
- int ret;
-
- /* we need to check if we have to switch back on the video
- * device so the audio device can come back
- */
- mutex_lock(&vgasr_mutex);
- list_for_each_entry(client, &vgasr_priv.clients, list) {
- if (PCI_SLOT(client->pdev->devfn) == PCI_SLOT(pdev->devfn) &&
- client_is_vga(client)) {
- video_dev = &client->pdev->dev;
- break;
- }
-
- mutex_unlock(&vgasr_mutex);
-
- if (video_dev) {
- ret = pm_runtime_get_sync(video_dev);
- if (ret && ret != 1)
- return ret;
- }
- ret = dev->bus->pm->runtime_resume(dev);
-/* put the reference for the gpu */
-if (video_dev) {
-  pm_runtime_mark_last_busy(video_dev);
-  pm_runtime_put_autosuspend(video_dev);
-
-  return ret;
-
-}

-/**
- * vga_switcheroo_init_domain_pm_optimus_hdmi_audio() - helper for driver
- * power control
- * @dev: audio client device
- * @domain: power domain
- *
- * Helper for GPUs whose power state is controlled by the driver's runtime pm.
- * When the audio device resumes, the GPU needs to be woken. This helper
- * augments the audio device's resume function to do that.
- *
- * Return: 0 on success. -EINVAL if no power management operations are
- * defined for this device.
- */
-int
-vga_switcheroo_init_domain_pm_optimus_hdmi_audio(struct device *dev,
-    struct dev_pm_domain *domain)
-{
-  /* copy over all the bus versions */
-  if (dev->bus && dev->bus->pm) {
-    domain->ops = *dev->bus->pm;
-    domain->ops.runtime_resume =
-        vga_switcheroo_runtime_resume_hdmi_audio;
-
-    dev_pm_domain_set(dev, domain);
-    return 0;
-  }
-  dev_pm_domain_set(dev, NULL);
-  return -EINVAL;
-}

-EXPORT_SYMBOL(vga_switcheroo_init_domain_pm_optimus_hdmi_audio):
--- linux-4.15.0.orig/drivers/gpu/vga/vgaarb.c
+++ linux-4.15.0/drivers/gpu/vga/vgaarb.c
@@ -676,7 +676,7 @@
vga_arbiter_check_bridge_sharing(vgadev);
/* Add to the list */
-list_add(&vgadev->list, &vga_list);
+list_add_tail(&vgadev->list, &vga_list);
 vga_count++;
vgaarb_info(&pdev->dev, "VGA device added: decodes=%s,owns=%s,locks=%s\n", 

vga_iostate_to_str(vgadev->decodes), 
@@ -1408,6 +1408,18 @@ 

struct vga_device *vgadev;

#if defined(CONFIG_X86) || defined(CONFIG_IA64) 
+u64 base = screen_info.lfb_base; 
+u64 size = screen_info.lfb_size; 
+u64 limit; 
+resource_size_t start, end; 
+unsigned long flags; 
+int i; 
+ 
+if (screen_info.capabilities & VIDEO_CAPABILITY_64BIT_BASE) 
+base |= (u64)screen_info.ext_lfb_base << 32; 
+ 
+limit = base + size; 
+ 
+list_for_each_entry(vgadev, &vga_list, list) { 
+struct device *dev = &vgadev->pdev->dev; 
+% 
@@ -1418,11 +1430,6 @@ 
* Select the device owning the boot framebuffer if there is 
* one. 
 */ 
-resource_size_t start, end, limit; 
-unsigned long flags; 
-int i; 
- 
-limit = screen_info.lfb_base + screen_info.lfb_size; 

/* Does firmware framebuffer belong to us? */ 
for (i = 0; i < DEVICE_COUNT_RESOURCE; i++) { 
@@ -1437,7 +1444,7 @@ 
if (!start || !end) 
continue; 

-if (screen_info.lfb_base < start || limit >= end) 
+if (base < start || limit >= end) 
continue; 

if (!vga_default_device()) 
--- linux-4.15.0.orig/drivers/hid/Kconfig
+++ linux-4.15.0/drivers/hid/Kconfig
@@ -436,10 +436,11 @@ 
select NEW_LEDS
select LEDS_CLASS
---help---
- Support for Lenovo devices that are not fully compliant with HID standard.
+ Support for IBM/Lenovo devices that are not fully compliant with HID standard.

- Say Y if you want support for the non-compliant features of the Lenovo
  Thinkpad standalone keyboards, e.g:
+ Say Y if you want support for horizontal scrolling of the IBM/Lenovo
  Scrollpoint mice or the non-compliant features of the Lenovo Thinkpad
+ standalone keyboards, e.g:
- ThinkPad USB Keyboard with TrackPoint (supports extra LEDs and trackpoint configuration)
- ThinkPad Compact Bluetooth Keyboard with TrackPoint (supports Fn keys)

--- linux-4.15.0.orig/drivers/hid/Makefile
+++ linux-4.15.0/drivers/hid/Makefile
@@ -2,7 +2,7 @@
# Makefile for the HID driver
#
- hid-y := hid-core.o hid-input.o
+ hid-y := hid-core.o hid-input.o hid-quirks.o
hid-$(CONFIG_DEBUG_FS) += hid-debug.o

obj-$(CONFIG_HID) += hid.o
--- linux-4.15.0.orig/drivers/hid/hid-a4tech.c
+++ linux-4.15.0/drivers/hid/hid-a4tech.c
@@ -26,12 +26,36 @@
#define A4_WHEEL_ORIENTATION (HID_UP_GENDESK | 0x000000b8)
+
+ struct a4tech_sc { 
+     unsigned long quirks;
+     unsigned int hw_wheel;
+     __s32 delayed_value;
+   };
+
+ static int a4_input_mapping(struct hid_device *hdev, struct hid_input *hi,
+     struct hid_field *field, struct hid_usage *usage,
+     unsigned long **bit, int *max)
+ { 
+     struct a4tech_sc *a4 = hid_get_drvdata(hdev);
+     
+     if (a4->quirks & A4_2WHEEL_MOUSE_HACK_B8 & &
+         usage->hid == A4_WHEEL_ORIENTATION) {
+         /*
+         * We do not want to have this usage mapped to anything as it's
+         * nonstandard and doesn't really behave like an HID report.
+         * It's only selecting the orientation (vertical/horizontal) of
* the previous mouse wheel report. The input_events will be
* generated once both reports are recorded in a4_event().

*/
+return -1;
+
+return 0;
+
 return 0;
+
+}
+
static int a4_input_mapped(struct hid_device *hdev, struct hid_input *hi,
 struct hid_field *field, struct hid_usage *usage,
 unsigned long **bit, int *max)
@@ -53,8 +77,7 @@
 struct a4tech_sc *a4 = hid_get_drvdata(hdev);
 struct input_dev *input;
@@ -65,7 +88,7 @@
 return 1;
 }

-if (!hdev->claimed & HID_CLAIMED_INPUT) || !field->hidinput ||
-!usage->type)
+if (!hdev->claimed & HID_CLAIMED_INPUT) || !field->hidinput)
 return 0;

 input = field->hidinput->input;
 @@ -65,7 +88,7 @@
 return 1;
 }

-if (usage->hid == 0x000100b8) {
 +if (usage->hid == A4_WHEEL_ORIENTATION) {
 input_event(input, EV_REL, value ? REL_HWHEEL :
 REL_WHEEL, a4->delayed_value);
 return 1;
 @@ -129,6 +152,7 @@
 static struct hid_driver a4_driver = {
 .name = "a4tech",
 .id_table = a4_devices,
+.input_mapping = a4_input_mapping,
+.input_mapped = a4_input_mapped,
 .event = a4_event,
 .probe = a4_probe,
 --- linux-4.15.0.orig/drivers/hid/hid-alps.c
 +++ linux-4.15.0/drivers/hid/hid-alps.c
 @@ -29,6 +29,7 @@
#define U1_MOUSE_REPORT_ID			0x01 /* Mouse data ReportID */
#define U1_ABSOLUTE_REPORT_ID0x03 /* Absolute data ReportID */
+#define U1_ABSOLUTE_REPORT_ID0x03 /* Absolute data ReportID */
#define U1_FEATURE_REPORT_ID0x05 /* Feature ReportID */
```c
#define U1_SP_ABSOLUTE_REPORT_ID 0x06 /* Feature ReportID */

@@ -370,6 +371,7 @@
case U1_FEATURE_REPORT_ID:
    break;
  case U1_ABSOLUTE_REPORT_ID:
+  case U1_ABSOLUTE_REPORT_ID_SECD:
    for (i = 0; i < hdata->max_fingers; i++) {
      u8 *contact = &data[i * 5];

  @@ -640,6 +642,20 @@
    return ret;
  }

+static int alps_sp_open(struct input_dev *dev)
+{
+    struct hid_device *hid = input_get_drvdata(dev);
+    return hid_hw_open(hid);
+}
+
+static void alps_sp_close(struct input_dev *dev)
+{
+    struct hid_device *hid = input_get_drvdata(dev);
+    hid_hw_close(hid);
+}
+
+static int alps_input_configured(struct hid_device *hdev, struct hid_input *hi)
+{
    struct alps_dev *data = hid_get_drvdata(hdev);
@@ -700,7 +716,7 @@
    if (data->has_sp) {
      input2 = input_allocate_device();
      if (!input2) {
        -input_free_device(input2);
+        ret = -ENOMEM;
        goto exit;
      }
@@ -713,6 +729,10 @@
      input2->id.version = input->id.version;
      input2->dev.parent = input->dev.parent;

      +input_set_drvdata(input2, hdev);
      +input2->open = alps_sp_open;
      +input2->close = alps_sp_close;
    }
```
- (fnmode == 1 && !asc->fn_on);
- else
- do_translate = asc->fn_on;
-
- if (do_translate) {
- if (value)
- set_bit(usage->code, asc->pressed_fn);
- else
- clear_bit(usage->code, asc->pressed_fn);
-
- input_event(input, usage->type, trans->to,
- value);
+
+ if (test_bit(trans->from, input->key))
+ code = trans->from;
+ else if (test_bit(trans->to, input->key))
+ code = trans->to;
+
+ if (!code) {
+ if (trans->flags & APPLE_FLAG_FKEY) {
+ switch (fnmode) {
+ case 1:
+ do_translate = !asc->fn_on;
+ break;
+ case 2:
+ do_translate = asc->fn_on;
+ break;
+ default:
+ /* should never happen */
+ do_translate = false;
+ }
+ } else {
+ do_translate = asc->fn_on;
+ }
+
+ return 1;
+ code = do_translate ? trans->to : trans->from;
} 
+
+ input_event(input, usage->type, code, value);
+ return 1;
}

if (asc->quirks & APPLE_NUMLOCK_EMULATION &&
 @@ -296,12 +304,19 @@ 

 /*
 * MacBook JIS keyboard has wrong logical maximum
 + * Magic Keyboard JIS has wrong logical maximum
static __u8 *apple_report_fixup(struct hid_device *hdev, __u8 *rdesc, unsigned int *rsize)
{
    struct apple_sc *asc = hid_get_drvdata(hdev);

    if (*rsize > 71 && rdesc[70] == 0x65 && rdesc[64] == 0x65) {
        hid_info(hdev,
            "fixing up Magic Keyboard JIS report descriptor\n");
        rdesc[64] = rdesc[70] = 0xe7;
    }
    if ((asc->quirks & APPLE_RDESC_JIS) && *rsize >= 60 &&
        rdesc[53] == 0x65 && rdesc[59] == 0x65) {
        hid_info(hdev, @ @ -335,10 +350,15 @ @
            struct hid_field *field, struct hid_usage *usage,
            unsigned long **bit, int *max)
            {
            -if (usage->hid == (HID_UP_CUSTOM | 0x0003)) {
                +struct apple_sc *asc = hid_get_drvdata(hdev);
                +
                +if (usage->hid == (HID_UP_CUSTOM | 0x0003) ||
                    usage->hid == (HID_UP_MSVENDOR | 0x0003) ||
                    usage->hid == (HID_UP_HPVENOR2 | 0x0003)) {
                        /* The fn key on Apple USB keyboards */
                        set_bit(EV_REP, hi->input->evbit);
                        hid_map_usage_clear(hi, usage, bit, max, EV_KEY, KEY_FN);
                        +asc->fn_found = true;
                        apple_setup_input(hi->input);
                        return 1;
                    }
            } else {
                return 0;
            }

            +static int apple_input_configured(struct hid_device *hdev,
            +struct hid_input *hidinput)
            +{
                +struct apple_sc *asc = hid_get_drvdata(hdev);
                +
                +if ((asc->quirks & APPLE_HAS_FN) && !asc->fn_found) {
                    +hid_info(hdev, "Fn key not found (Apple Wireless Keyboard clone?), disabling Fn key handling\n");
                    +asc->quirks = 0;
                } else {
                +return 0;
            }
static int apple_probe(struct hid_device *hdev, const struct hid_device_id *id)
{
    .driver_data = APPLE_NUMLOCK_EMULATION | APPLE_HAS_FN },
    { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_ANSI),
      .driver_data = APPLE_HAS_FN },
    +{ HID_BLUETOOTH_DEVICE(BT_VENDOR_ID_APPLE,
                          USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_ANSI),
      .driver_data = APPLE_HAS_FN },
    +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE,
                          USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_NUMPAD_ANSI),
      .driver_data = APPLE_HAS_FN },
    +{ HID_BLUETOOTH_DEVICE(BT_VENDOR_ID_APPLE,
                          USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_NUMPAD_ANSI),
      .driver_data = APPLE_HAS_FN },
    +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ANSI),
      .driver_data = APPLE_HAS_FN },
    +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ISO),
      .driver_data = APPLE_HAS_FN },
    @ @ -573.6 +612.7 @@
    .event = apple_event,
    .input_mapping = apple_input_mapping,
    .input_mapped = apple_input_mapped,
    .input_configured = apple_input_configured,
};
module_hid_driver(apple_driver);

--- linux-4.15.0.orig/drivers/hid/hid-axff.c
+++ linux-4.15.0/drivers/hid/hid-axff.c
@@ -75,13 +75,20 @@
 {
     struct axff_device *axff;
     struct hid_report *report;
-    struct hid_input *hidinput = list_first_entry(&hid->inputs, struct hid_input, list);
+    struct hid_input *hidinput;
     struct list_head *report_list = &hid->report_enum[HID_OUTPUT_REPORT].report_list;
-    struct input_dev *dev = hidinput->input;
+    struct input_dev *dev;
     int field_count = 0;
     int i, j;
     int error;

     +if (list_empty(&hid->inputs)) {
         +hid_err(hid, "no inputs found\n");
         +return -ENODEV;
         +}
     +hidinput = list_first_entry(&hid->inputs, struct hid_input, list);
dev = hidinput->input;
+
if (list_empty(report_list)) {
    hid_err(hid, "no output reports found\n");
    return -ENODEV;
--- linux-4.15.0.orig/drivers/hid/hid-betopff.c
+++ linux-4.15.0/drivers/hid/hid-betopff.c
@@ -59,15 +59,22 @@
{
    struct betopff_device *betopff;
    struct hid_report *report;
-    struct hid_input *hidinput =
-        list_first_entry(&hid->inputs, struct hid_input, list);
+    struct hid_input *hidinput;
    struct list_head *report_list =
        &hid->report_enum[HID_OUTPUT_REPORT].report_list;
    +struct input_dev *dev = hidinput->input;
    int field_count = 0;
    int error;
    int i, j;

    +if (list_empty(&hid->inputs)) {
    +    hid_err(hid, "no inputs found\n");
    +    return -ENODEV;
    +}
    +
    +hidinput = list_first_entry(&hid->inputs, struct hid_input, list);
    +dev = hidinput->input;
    +
    if (list_empty(report_list)) {
        hid_err(hid, "no output reports found\n");
        return -ENODEV;
--- linux-4.15.0.orig/drivers/hid/hid-core.c
+++ linux-4.15.0/drivers/hid/hid-core.c
@@ -90,7 +90,7 @@
    * Register a new field for this report.
    */

-static struct hid_field *hid_register_field(struct hid_report *report, unsigned usages, unsigned values)
+static struct hid_field *hid_register_field(struct hid_report *report, unsigned usages)
{
    struct hid_field *field;

    @ @ -101,7 +101,7 @ @

    field = kzalloc((sizeof(struct hid_field) +
        usages * sizeof(struct hid_usage) +

--- linux-4.15.0.orig/drivers/hid/hid-core.c
+++ linux-4.15.0/drivers/hid/hid-core.c
@@ -101,7 +101,7 @@
- values * sizeof(unsigned)), GFP_KERNEL);
+ usages * sizeof(unsigned)), GFP_KERNEL);
if (!field)
return NULL;

@@ -196,16 +196,37 @@}

/*
+ * Concatenate usage which defines 16 bits or less with the
+ * currently defined usage page to form a 32 bit usage
+ */
+ *
+static void complete_usage(struct hid_parser *parser, unsigned int index)
+{
+parser->local.usage[index] &= 0xFFFF;
+parser->local.usage[index] |=
+(parser->global.usage_page & 0xFFFF) << 16;
+
+/*
+ * Add a usage to the temporary parser table.
+ */
+
-statint hid_add_usage(struct hid_parser *parser, unsigned usage)
+static int hid_add_usage(struct hid_parser *parser, unsigned usage, u8 size)
{
if (parser->local.usage_index >= HID_MAX_USAGES) {
  hid_err(parser->device, "usage index exceeded\n");
  return -1;
}
parser->local.usage[parser->local.usage_index] = usage;
+
+/*
+ * If Usage item only includes usage id, concatenate it with
+ * currently defined usage page
+ */
+if (size <= 2)
+complete_usage(parser, parser->local.usage_index);
+
+parser->local.usage_size[parser->local.usage_index] = size;
+parser->local.collection_index[parser->local.usage_index] =
+parser->collection_stack_ptr ?
+parser->collection_stack[parser->collection_stack_ptr - 1] : 0;
+@ @ -247,13 +268,19 @@
+offset = report->size;
report->size += parser->global.report_size * parser->global.report_count;

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/* Total size check: Allow for possible report index byte */
if (report->size > (HID_MAX_BUFFER_SIZE - 1) << 3) {
    hid_err(parser->device, "report is too long\n");
    return -1;
}

if (!parser->local.usage_index) /* Ignore padding fields */
return 0;

usages = max_t(unsigned, parser->local.usage_index,
    parser->global.report_count);

field = hid_register_field(report, usages, parser->global.report_count);
if (!field)
    return 0;

@@ -462,10 +489,7 @@
return 0;
}

-if (item->size <= 2)
-data = (parser->global.usage_page << 16) + data;
-
-return hid_add_usage(parser, data);
+return hid_add_usage(parser, data, item->size);

case HID_LOCAL_ITEM_TAG_USAGE_MINIMUM:

@@ -474,9 +498,6 @@
return 0;
}

-if (item->size <= 2)
-data = (parser->global.usage_page << 16) + data;
-
    parser->local.usage_minimum = data;
    return 0;

@@ -487,9 +508,6 @@
return 0;
}

-if (item->size <= 2)
-data = (parser->global.usage_page << 16) + data;
-
    count = data - parser->local.usage_minimum;
    if (count + parser->local.usage_index >= HID_MAX_USAGES) {

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for (n = parser->local.usage_minimum; n <= data; n++)
    if (hid_add_usage(parser, n)) {
        dbg_hid("hid_add_usage failed\n");
        return -1;
    }

/*
 * Concatenate Usage Pages into Usages where relevant:
 * As per specification, 6.2.2.8: "When the parser encounters a main item it
 * concatenates the last declared Usage Page with a Usage to form a complete
 * Usage value."
 */

static void hid_concatenate_last_usage_page(struct hid_parser *parser) {
    int i;
    unsigned int usage_page;
    unsigned int current_page;

    if (!parser->local.usage_index)
        return;

    usage_page = parser->global.usage_page;
    
    /* Concatenate usage page again only if last declared Usage Page
     * has not been already used in previous usages concatenation
     */
    for (i = parser->local.usage_index - 1; i >= 0; i--) {
        if (parser->local.usage_size[i] > 2)
            /* Ignore extended usages */
            continue;

        current_page = parser->local.usage[i] >> 16;
        if (current_page == usage_page)
            break;

        complete_usage(parser, i);
    }
/*
 * Process a main item.
 */

@@ -532,6 +585,8 @@
    __u32 data;
    int ret;

+hid_concatenate_last_usage_page(parser);
+data = item_udata(item);

switch (item->tag) {
@@ -711,6 +766,10 @@
    if (usage == 0xff0000c5 && parser->global.report_count == 256 &&
        parser->global.report_size == 8)
        parser->scan_flags |= HID_SCAN_FLAG_MT_WIN_8;
+    if (usage == 0xff0000c6 && parser->global.report_count == 1 &&
+        parser->global.report_size == 8)
+        parser->scan_flags |= HID_SCAN_FLAG_MT_WIN_8;
    }

static void hid_scan_collection(struct hid_parser *parser, unsigned type)
@@ -741,6 +800,8 @@
    __u32 data;
    int i;

+hid_concatenate_last_usage_page(parser);
+data = item_udata(item);

switch (item->tag) {
@@ -830,31 +891,6 @@
        break;
    }

-/* fall back to generic driver in case specific driver doesn't exist */
-switch (hid->group) {
-    case HID_GROUP_MULTITOUCH_WIN_8:
-        break;
-    case HID_GROUP_MULTITOUCH:
-        if (!IS_ENABLED(CONFIG_HID_MULTITOUCH))
-            hid->group = HID_GROUP_GENERIC;
-        break;
-    case HID_GROUP_SENSOR_HUB:
-        if (!IS_ENABLED(CONFIG_HID_SENSOR_HUB))
-            hid->group = HID_GROUP_GENERIC;

-break;
- case HID_GROUP_RMI:
  -if (!IS_ENABLED(CONFIG_HID_RMI))
  -hid->group = HID_GROUP_GENERIC;
  -break;
- case HID_GROUP_WACOM:
  -if (!IS_ENABLED(CONFIG_HID_WACOM))
  -hid->group = HID_GROUP_GENERIC;
  -break;
- case HID_GROUP_LOGITECH_DJ_DEVICE:
  -if (!IS_ENABLED(CONFIG_HID_LOGITECH_DJ))
  -hid->group = HID_GROUP_GENERIC;
  -break;
  }
  vfree(parser);
  return 0;
}

@@ -967,6 +1003,7 @@
__u8 *start;
__u8 *buf;
__u8 *end;
+__u8 *next;
int ret;
static int (*dispatch_type[])(struct hid_parser *parser,  
  struct hid_item *item) = {
@@ -1020,7 +1057,8 @@
device->collection_size = HID_DEFAULT_NUM_COLLECTIONS;
    ret = -EINVAL;
    while ((start = fetch_item(start, end, &item)) != NULL) {
+while ((next = fetch_item(start, end, &item)) != NULL) {
+  start = next;
    if (item.format != HID_ITEM_FORMAT_SHORT) {
      hid_err(device, "unexpected long global item\n");  
@@ -1049,7 +1087,8 @@
    }
    }
    if (item.format != HID_ITEM_FORMAT_SHORT) {
      hid_err(device, "item fetching failed at offset %d\n", (int)(end - start));
+      hid_err(device, "item fetching failed at offset %u/%u\n",  
+        size - (unsigned int)(end - start), size);
    err:
    vfree(parser);
    hid_close_report(device);
@@ -1065,6 +1104,9 @@
    static s32 snpto32(__u32 value, unsigned n)
{  
  if (!value || !n)  
    return 0;  
  switch (n) {  
    case 8: return ((__s8)value);  
    case 16: return ((__s16)value);  
    @ @ -1128,8 +1170,8 @ @  
  unsigned offset, unsigned n)  
    {  
      if (n > 32) {  
        hid_warn_once(hid, "%s() called with n (%d) > 32! (%s)\n",  
                      __func__, n, current->comm);  
        hid_warn(hid, "hid_field_extract() called with n (%d) > 32! (%s)\n",  
                 n, current->comm);  
        n = 32;  
      }  
    }  
    @ @ -1363,6 +1405,17 @ @  
  }  
/*  
+ * Compute the size of a report.  
+ */  
+static size_t hid_compute_report_size(struct hid_report *report)  
+{  
+  if (report->size)  
+    return ((report->size - 1) >> 3) + 1;  
+  +return 0;  
+}  
+/*  
* Create a report. 'data' has to be allocated using  
* hid_alloc_report_buf() so that it has proper size.  
* */  
@@ -1374,7 +1427,7 @@  
if (report->id > 0)  
*data++ = report->id;  
-memset(data, 0, ((report->size - 1) >> 3) + 1);  
+memset(data, 0, hid_compute_report_size(report));  
for (n = 0; n < report->maxfield; n++)  
  hid_output_field(report->device, report->field[n], data);  
}  
@@ -1390,7 +1443,7 @@  
* of implement() working on 8 byte chunks  
*/
int len = hid_report_len(report) + 7;
+u32 len = hid_report_len(report) + 7;

return kmalloc(len, flags);
}
@@ -1455,7 +1508,7 @@
{ char *buf;
  int ret;
  -int len;
  +u32 len;

  buf = hid_alloc_report_buf(report, GFP_KERNEL);
  if (!buf)
+    
@@ -1481,14 +1534,14 @@
} EXPORT_SYMBOL_GPL(__hid_request);

-int hid_report_raw_event(struct hid_device *hid, int type, u8 *data, int size,
+int hid_report_raw_event(struct hid_device *hid, int type, u8 *data, u32 size,
  int interrupt)
+
  { struct hid_report_enum *report_enum = hid->report_enum + type;
    struct hid_report *report;
    struct hid_driver *hdrv;
    unsigned int a;
    -int rsize, csize = size;
    +u32 rsize, csize = size;
    u8 *cdata = data;
    int ret = 0;

@@ -1501,9 +1554,11 @@
      csize--;
  }
-rsize = ((report->size - 1) >> 3) + 1;
+rsz = hid_compute_report_size(report);

-if (rsz > HID_MAX_BUFFER_SIZE)
+if (report_enum->numbered && rsz >= HID_MAX_BUFFER_SIZE)
  +rsz = HID_MAX_BUFFER_SIZE - 1;
  +else if (rsz > HID_MAX_BUFFER_SIZE)
  rsz = HID_MAX_BUFFER_SIZE;

  if (csize < rsz) {
@@ -1546,7 +1601,7 @@
*
* This is data entry for lower layers.
* /
-int hid_input_report(struct hid_device *hid, int type, u8 *data, int size, int interrupt)
+int hid_input_report(struct hid_device *hid, int type, u8 *data, u32 size, int interrupt)
{
    struct hid_report_enum *report_enum;
    struct hid_driver *hdrv;
    @@ -1597,8 +1652,8 @@
}
EXPORT_SYMBOL_GPL(hid_input_report);

-static bool hid_match_one_id(struct hid_device *hdev,
-const struct hid_device_id *id)
+bool hid_match_one_id(const struct hid_device *hdev,
+const struct hid_device_id *id)
{
    return (id->bus == HID_BUS_ANY || id->bus == hdev->bus) &&
            (id->group == HID_GROUP_ANY || id->group == hdev->group) &&
    @@ -1606,7 +1661,7 @@
    (id->product == HID_ANY_ID || id->product == hdev->product);
}

-const struct hid_device_id *hid_match_id(struct hid_device *hdev,
-const struct hid_device_id *id)
+const struct hid_device_id *hid_match_id(const struct hid_device *hdev,
    const struct hid_device_id *id)
{
    for (; id->bus; id++)
    @@ -1744,6 +1799,9 @@
        case BUS_I2C:
            bus = "I2C";
            break;
+case BUS_VIRTUAL:
+    bus = "VIRTUAL";
+    break;
    default:
        bus = "<UNKNOWN>";
    }
    @@ -1862,541 +1920,6 @@
    }
EXPORT_SYMBOL_GPL(hid_hw_close);

-/*
-* A list of devices for which there is a specialized driver on HID bus.
-*
-* Please note that for multitouch devices (driven by hid-multitouch driver),
-* there is a proper autodetection and autoloading in place (based on presence
-* of HID_DG_CONTACTID), so those devices don't need to be added to this list,
-* as we are doing the right thing in hid_scan_usage().
-*
Autodetection for (USB) HID sensor hubs exists too. If a collection of type physical is found inside a usage page of type sensor, hid-sensor-hub will be used as a driver. See hid_scan_report().

- *

static const struct hid_device_id hid_have_special_driver[] = {
  #if IS_ENABLED(CONFIG_HID_A4TECH)
  { HID_USB_DEVICE(USB_VENDOR_ID_A4TECH, USB_DEVICE_ID_A4TECH_WCP32PU) },
  { HID_USB_DEVICE(USB_VENDOR_ID_A4TECH, USB_DEVICE_ID_A4TECH_X5_005D) },
  { HID_USB_DEVICE(USB_VENDOR_ID_A4TECH, USB_DEVICE_ID_A4TECH_RP_649) },
  #endif
  
  #if IS_ENABLED(CONFIG_HID_ACCUTOUCH)
  { HID_USB_DEVICE(USB_VENDOR_ID_ELO, USB_DEVICE_ID_ELO_ACCUTOUCH_2216) },
  #endif
  
  #if IS_ENABLED(CONFIG_HID_ACRUX)
  { HID_USB_DEVICE(USB_VENDOR_ID_ACRUX, 0x0802) },
  { HID_USB_DEVICE(USB_VENDOR_ID_ACRUX, 0xf705) },
  #endif
  
  #if IS_ENABLED(CONFIG_HID_ALPS)
  { HID_DEVICE(HID_BUS_ANY, HID_GROUP_ANY, USB_VENDOR_ID_ALPS_JP, HID_DEVICE_ID_ALPS_U1_DUAL) },
  { HID_I2C_DEVICE(USB_VENDOR_ID_ALPS_JP, HID_DEVICE_ID_ALPS_U1_DUAL) },
  { HID_I2C_DEVICE(USB_VENDOR_ID_ALPS_JP, HID_DEVICE_ID_ALPS_U1) },
  { HID_I2C_DEVICE(USB_VENDOR_ID_ALPS_JP, HID_DEVICE_ID_ALPS_T4_BTNLESS) },
  #endif
  
  #if IS_ENABLED(CONFIG_HID_APPLE)
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MIGHTYMOUSE) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ANSI) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER_ANSI) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER_JIS) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER3_ANSI) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER3_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER3_JIS) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USBDEVICE_ID_APPLE_GEGYSER4_ANSI) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_JIS) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_HF_ANSI) },
  { HID_USBDEVICE_ID_APPLE_GEGYSER4_HF_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_HF_JIS) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ANSI) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_JIS) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ANSI) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_JIS) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_HF_JIS) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_HF_ISO) },
  { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_HF_JIS) },
  { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEGYSER4_HF_JIS) },
  #endif

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USB_DEVICE_ID_APPLE_ALU_WIRELESS_ANSI)},
-\{ HID_BLEUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,
USB_DEVICE_ID_APPLE_ALU_WIRELESS_ISO) },
-\{ HID_BLEUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,
USB_DEVICE_ID_APPLE_ALU_WIRELESS_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING2_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING2_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING2_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING3_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING3_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING3_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING4_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING4_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING4_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING4A_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING4A_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING4A_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING5_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING5_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING5_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING5A_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING5A_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING5A_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING6_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING6_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING6_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING6A_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING6A_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING6A_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING7_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING7_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING7_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING7A_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING7A_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING7A_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING8_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING8_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING8_JIS) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING9_ANSI) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING9_ISO) },
-\{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELSPRING9_JIS) },
-\{ HID_BLEUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,


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USB_DEVICE_ID_APPLE_ALU_WIRELESS_2009_ANSI),
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,
  USB_DEVICE_ID_APPLE_ALU_WIRELESS_2009_ISO) },
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,
  USB_DEVICE_ID_APPLE_ALU_WIRELESS_2009_JIS) },
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,
  USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_ANSI) },
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,
  USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_ISO) },
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE,
  USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_JIS) },
- { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_ANSI) }
- { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_ISO) }
- { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_JIS) }
- { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_TP_ONLY) },
- { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER1_TP_ONLY) },
- #endif
- #if IS_ENABLED(CONFIG_HID_APPLEIR)
  - { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL2) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL3) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL4) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL5) },
  - #endif
- #if IS_ENABLED(CONFIG_HID_ASUS)
  - { HID_I2C_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_I2C_KEYBOARD) },
  - { HID_I2C_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_I2C_TOUCHPAD) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_ROG_KEYBOARD1) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USBDEVICE_ID_ASUSTEK_ROG_KEYBOARD2) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_ROG_KEYBOARD3) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_T100_KEYBOARD) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUS_MD_5112) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUS_MD_5110) },
  - { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_T100CHI_KEYBOARD) },
- #endif
- #if IS_ENABLED(CONFIG_HID_AUREAL)
  - { HID_USB_DEVICE(USB_VENDOR_ID_AUREAL, USB_DEVICE_ID_AUREAL_W01RN) },
- #endif
- #if IS_ENABLED(CONFIG_HID_BELKIN)
  - { HID_USB_DEVICE(USB_VENDOR_ID_BELKIN, USB_DEVICE_ID_BELKIN_WIRELESS_KEYBOARD) },
- #endif
- #if IS_ENABLED(CONFIG_HID_BETOP_FF)
  - { HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185BFM, 0x2208) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185PC, 0x5506) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185V2PC, 0x1850) },
  - { HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185V2BFM, 0x5500) },
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#endif
#if IS_ENABLED(CONFIG_HID_CHERRY)
	{ HID_USB_DEVICE(USB_VENDOR_ID_CHERRY, USB_DEVICE_ID_CHERRY_CYMOTION) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CHERRY, USB_DEVICE_ID_CHERRY_CYMOTION_SOLAR) },
#endif
#if IS_ENABLED(CONFIG_HID_CHICONY)
	{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_TACTICAL_PAD) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_WIRELESS2) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_ASUS_AK1D) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_ACER_SWITCH12) },
#endif
#if IS_ENABLED(CONFIG_HID_CMEDIA)
	{ HID_USB_DEVICE(USB_VENDOR_ID_CMEDIA, USB_DEVICE_ID_CM6533) },
#endif
#if IS_ENABLED(CONFIG_HID_CORSAIR)
	{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_K90) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_SCIMITAR_PRO_RGB) },
#endif
#if IS_ENABLED(CONFIG_HID_CP2112)
	{ HID_USB_DEVICE(USB_VENDOR_ID_CYGNAL, USB_DEVICE_ID_CYGNAL_CP2112) },
#endif
#if IS_ENABLED(CONFIG_HID_CYPRESS)
	{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_1) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_2) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_3) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_4) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_MOUSE) },
#endif
#if IS_ENABLED(CONFIG_HID_DRAGONRISE)
	{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, 0x0006) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, 0x0011) },
#endif
#if IS_ENABLED(CONFIG_HID_ELECOM)
	{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_BM084) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_DEFT WIRED) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM DEFT WIRELESS) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_HUGE WIRED) },
	{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_HUGE WIRELESS) },
#endif
#if IS_ENABLED(CONFIG_HID_EZKEY)
- { HID_USB_DEVICE(USB_VENDOR_ID_EZKEY, USB_DEVICE_ID_BTC_8193) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_GEMBIRD)
- { HID_USB_DEVICE(USB_VENDOR_ID_GEMBIRD, USB_DEVICE_ID_GEMBIRD_JPD_DUALFORCE2) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_GFRM)
- { HID_BLUETOOTH_DEVICE(0x58, 0x2000) },
- { HID_BLUETOOTH_DEVICE(0x471, 0x2210) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_GREENASIA)
- { HID_USB_DEVICE(USB_VENDOR_ID_GREENASIA, 0x0012) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_GT683R)
- { HID_USB_DEVICE(USB_VENDOR_ID_MSI, USB_DEVICE_ID_MSI_GT683R_LED_PANEL) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_GYRATION)
- { HID_USB_DEVICE(USB_VENDOR_ID_GYRATION, USB_DEVICE_ID_GYRATION_REMOTE) },
- { HID_USB_DEVICE(USB_VENDOR_ID_GYRATION, USB_DEVICE_ID_GYRATION_REMOTE_2) },
- { HID_USB_DEVICE(USB_VENDOR_ID_GYRATION, USB_DEVICE_ID_GYRATION_REMOTE_3) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_HOLTEK)
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK, USB_DEVICE_ID_HOLTEK_ON_LINE_GRIP) },
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_KEYBOARD) },
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A04A) },
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A067) },
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A070) },
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A072) },
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A081) },
- { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A0C2) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_ICADE)
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_ION, USB_DEVICE_ID_ICADE) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_ITE)
- { HID_USB_DEVICE(USB_VENDOR_ID_ITE, USB_DEVICE_ID_ITE8595) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_KENSINGTON)
- { HID_USB_DEVICE(USB_VENDOR_ID_KENSINGTON, USB_DEVICE_ID_KS_SLIMBLADE) },
-#{endif
-#{if IS_ENABLED(CONFIG_HID_KEYTOUCH)

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-{ HID_USB_DEVICE(USB_VENDOR_ID_KEYTOUCH, USB_DEVICE_ID_KEYTOUCH_IEC) },
-#endif
-#if IS_ENABLED(CONFIG_HID_KYE)
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_GENIUS_GILA_GAMING_MOUSE) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_GENIUS_MANTICORE) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_GENIUS_GX_IMPERATOR) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_ERGO_525V) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_EASYHPEN_1405X) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_MOUSEPEN_1608X) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_MOUSEPEN_1608X_V2) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_EASYHPEN_M610X) },
- { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_PENSKETCH_M912) },
-#endif
-#if IS_ENABLED(CONFIG_HID_LCPOWER)
- { HID_USB_DEVICE(USB_VENDOR_ID_LCPOWER, USB_DEVICE_ID_LCPOWER_LC1000) },
-#endif
-#if IS_ENABLED(CONFIG_HID_LED)
- { HID_USB_DEVICE(USB_VENDOR_ID_DELCOM, USB_DEVICE_ID_DELCOM_VISUAL_IND) },
- { HID_USB_DEVICE(USB_VENDOR_ID_DELCOM, USB_DEVICE_ID_DELCOM_VISUAL_CRT) },
- { HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_LUXAFOR) },
- { HID_USB_DEVICE(USB_VENDOR_ID_RISO_KAGAKU, USB_DEVICE_ID_RISO_KA_WEBMAIL) },
- { HID_USB_DEVICE(USB_VENDOR_ID_THINGM, USB_DEVICE_ID_BLINK1) },
-#endif
-#if IS_ENABLED(CONFIG_HID_LENOVO)
- { HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_TPKBD) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_CUSBKBD) },
- { HID_USBDEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_CUSBKBD) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_CTPRODOCK) },
-#endif
-#if IS_ENABLED(CONFIG_HID_LOGITECH)
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_MX3000_RECEIVER) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_S510_RECEIVER) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_S510_RECEIVER_2) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RECEIVER) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_DINOVO_DESKTOP) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_DINOVO_3D) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_DINOVO_ACTION) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_DINOVO_WHEEL) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_DINOVO_MINI) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_ELITE_KBD) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_CORDLESS_DESKTOP_LX500) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_EXTREME_3D) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RUMBLEPAD_CORD) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RUMBLEPAD) },
- { HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RUMBLEPAD) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RUMBLEPAD2_2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G29_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_WINGMAN_F3D) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_WINGMAN_FFG) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_FORCE3D_PRO) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_FLIGHT_SYSTEM_G940) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_MOMO_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_MOMO_WHEEL2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_VIBRATION_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_DFP_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_DFGT_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G25_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G27_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_WII_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RUMBLEPAD2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_DFP_WHEEL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_SPACETRAVELLER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_SPACENAVIGATOR) },
#endif
#if IS_ENABLED(CONFIG_HID_LOGITECH_HIDPP)
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_T651) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G920_WHEEL) },
#endif
#if IS_ENABLED(CONFIG_HID_LOGITECH_DJ)
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_UNIFYING_RECEIVER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_UNIFYING_RECEIVER_2) },
#endif
#if IS_ENABLED(CONFIG_HID_MAGICMOUSE)
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGICMOUSE) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGICTRACKPAD) },
#endif
#if IS_ENABLED(CONFIG_HID_MAYFLASH)
-{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USBDEVICE_ID_DRAGONRISE_PS3) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_DOLPHINBAR) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_GAMECUBE1) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_GAMECUBE2) },
#endif
#if IS_ENABLED(CONFIG_HID_MICROSOFT)
-{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_COMFORT MOUSE_4500) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_COMFORT_KEYBOARD) }
}
},
- { HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_OFFICE_KB) },
- { HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_DIGITAL_MEDIA_7K) },
- { HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_DIGITAL_MEDIA_600) },
- { HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_DIGITAL_MEDIA_3KV1) },
- { HID_USBDEVICE(USB_VENDOR_ID_EXPANDED, USB_DEVICE_ID_WIRELESS_OPTICAL_DESKTOP_3_0) },
- { HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_PRESENTER_8K_BT) },
- #endif
- #if IS_ENABLED(CONFIG_HID_MONTEREY)
- { HID_USB_DEVICE(USB_VENDOR_ID_MONTEREY, USB_DEVICE_ID_GENIUS_KB29E) },
- #endif
- #if IS_ENABLED(CONFIG_HID_MULTITOUCH)
- { HID_USB_DEVICE(USB_VENDOR_ID_LG, USB_DEVICE_ID_LG_MELFAS_MT) },
- #endif
- #if IS_ENABLED(CONFIG_HID_WIIMOTE)
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_NINTENDO, USB_DEVICE_ID_NINTENDO_WIIMOTE) },
- { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_NINTENDO, USB_DEVICE_ID_NINTENDO_WIIMOTE2) },
- #endif
- #if IS_ENABLED(CONFIG_HID_NTI)
- { HID_USB_DEVICE(USB_VENDOR_ID_NTI, USB_DEVICE_ID_USB_SUN) },
- #endif
- #if IS_ENABLED(CONFIG_HID_NTRIG)
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_1) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_2) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_3) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG TOUCH SCREEN_4) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_5) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_6) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG TOUCH SCREEN_7) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_8) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_9) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG TOUCH SCREEN_10) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH SCREEN_11) },
- { HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG TOUCH SCREEN_12) },
{- HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_13) },
{- HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_14) },
{- HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USBDEVICE_ID_NTRIG_TOUCH_SCREEN_15) },
{- HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_16) },
{- HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_17) },
{- HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USBDEVICE_ID_NTRIG_TOUCH_SCREEN_18) },
-#endif
-#if IS_ENABLED(CONFIG_HID_ORTEK)
{- HID_USB_DEVICE(USB_VENDOR_ID_ORTEK, USBDEVICE_ID_ORTEK_PKB1700) },
{- HID_USB_DEVICE(USB_VENDOR_ID_ORTEK, USB_DEVICE_ID_ORTEK_WKB2000) },
{- HID_USB_DEVICE(USB_VENDOR_ID_ORTEK, USB_DEVICE_ID_ORTEK_IHOME_IMAC_A210S) },
{- HID_USB_DEVICE(USB_VENDOR_ID_SKYCABLE, USB_DEVICE_ID_SKYCABLE_WIRELESS_PRESENTER) },
-#endif
-#if IS_ENABLED(CONFIG_HID_PANTHERLORD)
{- HID_USB_DEVICE(USB_VENDOR_ID_GAMERON, USB_DEVICE_ID_GAMERON_DUAL_PSX_ADAPTOR) },
{- HID_USB_DEVICE(USB_VENDOR_ID_GAMERON, USB_DEVICE_ID_GAMERON_DUAL_PCS_ADAPTOR) },
{- HID_USB_DEVICE(USB_VENDOR_ID_GREENASIA, 0x0003) },
{- HID_USB_DEVICE(USB_VENDOR_ID_JESS2, USB_DEVICE_ID_JESS2_COLOR_RUMBLE_PAD) },
-#endif
-#if IS_ENABLED(CONFIG_HID_PENMOUNT)
{- HID_USB_DEVICE(USB_VENDOR_ID_PENMOUNT, USB_DEVICE_ID_PENMOUNT_6000) },
-#endif
-#if IS_ENABLED(CONFIG_HID_PETALYNX)
{- HID_USB_DEVICE(USB_VENDOR_ID_PETALYNX, USB_DEVICE_ID_PETALYNX_MAXTER_REMOTE) },
-#endif
-#if IS_ENABLED(CONFIG_HID_PICOLCD)
{- HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICOLCD) },
{- HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICOLCD_BOOTLOADER) },
-#endif
-#if IS_ENABLED(CONFIG_HID_PLANTRONICS)
{- HID_USB_DEVICE(USB_VENDOR_ID_PLANTRONICS, HID_ANY_ID) },
-#endif
-#if IS_ENABLED(CONFIG_HID_PRIMAX)
{- HID_USB_DEVICE(USB_VENDOR_ID_PRIMAX, USB_DEVICE_ID_PRIMAX_KEYBOARD) },
-#endif
-#if IS_ENABLED(CONFIG_HID_PRODIKEYS)
{- HID_USB_DEVICE(USB_VENDOR_ID_CREATIVELABS, USB_DEVICE_ID_PRODIKEYS_PCMIDI) },
-#endif
-#if IS_ENABLED(CONFIG_HID_RETRODE)
{- HID_USB_DEVICE(USB_VENDOR_ID_FUTURE_TECHNOLOGY, USB_DEVICE_ID_RETRODE2) },
-#endif
-#if IS_ENABLED(CONFIG_HID_RMI)
{- HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_X1_COVER) },
{- HID_USB_DEVICE(USB_VENDOR_ID_RAZER, USB_DEVICE_ID_RAZER_BLADE_14) },

#endif

-#if IS_ENABLED(CONFIG_HID_ROCCAT)
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_ARVO) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_ISKU) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_ISKUFX) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONE) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEPLUS) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEPURE) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEPURE_OPTICAL) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEXTD) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KOVAPLUS) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_LUA) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_PYRA_WIRED) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_PYRA_WIRELESS) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_RYOS_MK) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_RYOS_MK_GLOW) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_RYOS_MK_PRO) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USBDEVICE_ID_ROCCAT_SAVU) },
-#endif

-#if IS_ENABLED(CONFIG_HID_SAITEK)
  -{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_PS1000) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_OLD) },
  -{ HID_USBDEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_MMO7) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_MADCATZ, USB_DEVICE_ID_MADCATZ_RAT5) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_MADCATZ, USB_DEVICE_ID_MADCATZ_RAT9) },
-#endif

-#if IS_ENABLED(CONFIG_HID_SAMSUNG)
  -{ HID_USB_DEVICE(USB_VENDOR_ID_SAMSUNG, USB_DEVICE_ID_SAMSUNG_IR_REMOTE) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_SAMSUNG, USB_DEVICE_ID_SAMSUNG_WIRELESS_KBD_MOUSE) },
-#endif

-#if IS_ENABLED(CONFIG_HID_SMARTJOYPLUS)
  -{ HID_USB_DEVICE(USB_VENDOR_ID_PLAYDOTCOM, USB_DEVICE_ID_PLAYDOTCOM_EMS_USBII) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP, USB_DEVICE_ID_WISEGROUP_SMARTJOYPLUS) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP, USB_DEVICE_ID_SUPER_JOY_BOX_3) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP, USB_DEVICE_ID_SAMOS_JOYPAD) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP_LTD, USB_DEVICE_ID_SUPER_JOY_BOX_3_PRO) },
  -{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP_LTD, USB_DEVICE_ID_SUPER_JOY_BOX_5_PRO) },
-#endif

-#if IS_ENABLED(CONFIG_HID_SONY)
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_HARMONY_PS3) },
-{ HID_BLUETOOTHDEVICE(USB_VENDOR_ID_SMK, USB_DEVICE_ID_SMK_PS3_BDREMOTE) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_BUZZ_CONTROLLER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_WIRELESS_BUZZ_CONTROLLER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_MOTION_CONTROLLER) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_MOTION_CONTROLLER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_NAVIGATION_CONTROLLER) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_NAVIGATION_CONTROLLER) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS3_BDREMOTE) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS3_CONTROLLER) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS3_CONTROLLER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER_2) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER_2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER_DONGLE) },
-{ HID_USBDEVICE(USB_VENDOR_ID_SINO_LITE, USB_DEVICE_ID_SINO_LITE_CONTROLLER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_X_TENSIONS, USB_DEVICE_ID_SPEEDLINK_VAD_CEZANNE) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_STEELSERIES, USB_DEVICE_ID_STEELSERIES_SRWS1) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_SUNPLUS, USB_DEVICE_ID_SUNPLUS_WDESKTOP) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb300) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb304) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb323) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb324) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb605) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb651) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb653) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb654) },
- { HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb65a) },
- #endif
- #if IS_ENABLED(CONFIG_HID_TIVO)
- { HID_USB_DEVICE(USB_VENDOR_ID_TIVO, USB_DEVICE_ID_TIVO_SLIDE_BT) },
- { HID_USB_DEVICE(USB_VENDOR_ID_TIVO, USB_DEVICE_ID_TIVO_SLIDE) },
- { HID_USB_DEVICE(USB_VENDOR_ID_TIVO, USB_DEVICE_ID_TIVO_SLIDE_PRO) },
- #endif
- #if IS_ENABLED(CONFIG_HID_TOPSEED)
- { HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE) },
- { HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE_2) },
- { HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_WIRELESS) },
- { HID_USB_DEVICE(USB_VENDOR_ID_TOPSEED, USB_DEVICE_ID_TOPSEED_CYBERLINK) },
- { HID_USB_DEVICE(USB_VENDOR_ID_TOPSEED2, USB_DEVICE_ID_TOPSEED2_RF_COMBO) },
- #endif
- #if IS_ENABLED(CONFIG_HID_TWINHAN)
- { HID_USB_DEVICE(USB_VENDOR_ID_TWINHAN, USB_DEVICE_ID_TWINHAN_IR_REMOTE) },
- #endif
- #if IS_ENABLED(CONFIG_HID_UCLOGIC)
- { HID_USB_DEVICE(USB_VENDOR_ID_HUION, USB_DEVICE_ID_HUION_TABLET) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_HUION_TABLET) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_HUION_TABLET_PF1209) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_WP4030U) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_WP5540U) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_WP8060U) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_WP1062) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_WIRELESS_TABLET_TWHL850) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_WIRELESS_TABLET_TWHA60) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_YIYNOVA_TABLET) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UGEE_TABLET_81) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UGEE_TABLET_45) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_DRAWIMAGE_G3) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_EX07S) },
- { HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_WIRELESS_TABLET_TWHL850) },
- #endif
- #if IS_ENABLED(CONFIG_HID_UDRAW_PS3)
- { HID_USB_DEVICE(USB_VENDOR_ID_THQ, USB_DEVICE_ID_THQ_PS3_UDRAW) },
- #endif
- #if IS_ENABLED(CONFIG_HID_WALTOP)
- { HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SLIM_TABLET_5_8_INCH) },
- { HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SLIM_TABLET_12_1_INCH) },
- { HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_Q_PAD) },
- { HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_PID_0038) },
- { HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH) },
- { HID_USB_DEVICE(USB_VENDOR_ID_WALTOP,
USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP,
USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET) },
-#endif
-#if IS_ENABLED(CONFIG_HID_XINMO)
-{ HID_USB_DEVICE(USB_VENDOR_ID_XIN_MO,
USB_DEVICE_ID_XIN_MO_DUAL_ARCADE) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_XIN_MO,
USB_DEVICE_ID_THT_2P_ARCADE) },
-#endif
-#if IS_ENABLED(CONFIG_HID_ZEROPLUS)
-{ HID_USB_DEVICE(USB_VENDOR_ID_ZEROPLUS,
0x0005) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_ZEROPLUS,
0x0030) },
-#endif
-#if IS_ENABLED(CONFIG_HID_ZYDACRON)
-{ HID_USB_DEVICE(USB_VENDOR_ID_ZYDACRON,
USB_DEVICE_ID_ZYDACRON_REMOTE_CONTROL) },
-#endif
-{ }
-}: 
-
struct hid_dynid { 
struct list_head list;
struct hid_device_id id;
@@ -2463,8 +1986,8 @@
spin_unlock(&hdrv->dyn_lock);
} 

-static const struct hid_device_id *hid_match_device(struct hid_device *hdev,
-struct hid_driver *hdrv)
+const struct hid_device_id *hid_match_device(struct hid_device *hdev,
+ struct hid_driver *hdrv)
{ 
struct hid_dynid *dynid;
@@ -2479,6 +2002,7 @@
return hid_match_id(hdev, hdrv->id_table);
} 
+EXPORT_SYMBOL_GPL(hid_match_device);

static int hid_bus_match(struct device *dev, struct device_driver *drv)
{ 
@@ -2508,6 +2032,23 @@
goto unlock;
} 
+if (hdrv->match) {
+if (!hdrv->match(hdev, hid_ignore_special_drivers)) {
+ret = -ENODEV;
+}
+goto unlock;
+
+} else {
+/*
+ * hid-generic implements .match(), so if
+ * hid_ignore_special_drivers is set, we can safely
+ * return.
+ */
+if (hid_ignore_special_drivers) {
+ret = -ENODEV;
+goto unlock;
+
+}
+
+hdev->driver = hdrv;

if (hdrv->probe) {
ret = hdrv->probe(hdev, id);
@@ -2532,12 +2073,8 @@
{
struct hid_device *hdev = to_hid_device(dev);
struct hid_driver *hdrv;
-int ret = 0;

-if (down_interruptible(&hdev->driver_input_lock)) {
- ret = -EINTR;
- goto end;
- }
-+down(&hdev->driver_input_lock);
-hdev->io_started = false;

hdrv = hdev->driver;
@@ -2552,8 +2089,8 @@

if (!hdev->io_started)
up(&hdev->driver_input_lock);
ende:
-return ret;
+
+return 0;
}

static ssize_t modalias_show(struct device *dev, struct device_attribute *a,
@@ -2604,7 +2141,7 @@
return 0;
}

- static struct bus_type hid_bus_type = {
+ struct bus_type hid_bus_type = {

- static struct bus_type hid_bus_type = {
+ struct bus_type hid_bus_type = {

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.name= "hid",
.dev_groups= hid_dev_groups,
.drv_groups= hid_drv_groups,
.remove= hid_device_remove,
.uevent= hid_uevent,
};
-/* a list of devices that shouldn't be handled by HID core at all */
-static const struct hid_device_id hid_ignore_list[] = {
    { HID_USB_DEVICE(USB_VENDOR_ID_ACECAD, USB_DEVICE_ID_ACECAD_FLAIR) },
    { HID_USB_DEVICE(USB_VENDOR_ID_ACECAD, USB_DEVICE_ID_ACECAD_302) },
    { HID_USB_DEVICE(USB_VENDOR_ID_ADS_TECH, USB_DEVICE_ID_ADS_TECH_RADIO_SI470X) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_01) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_10) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_20) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_21) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_22) },
    { HID_USB DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_23) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_24) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIRCABLE, USB_DEVICE_ID_AIRCABLE1) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIRCABLE, USB_DEVICE_ID_AIRCABLE2) },
    { HID_USB_DEVICE(USB_VENDOR_ID_ALCOR, USB_DEVICE_ID_ALCOR_USBRS232) },
    { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_LCM)},
    { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_LCM2)},
    { HID_USB_DEVICE(USB_VENDOR_ID_AVERMEDIA, USB_DEVICE_ID_AVER_FM_MR800) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AXENTIA, USB_DEVICE_ID_AXENTIA_FM_RADIO) },
    { HID_USB_DEVICE(USB_VENDOR_ID_BERKSHIRE, USB_DEVICE_ID_BERKSHIRE_PCWD) },
    { HID_USB_DEVICE(USB_VENDOR_ID_BERKSHIRE, USB_DEVICE_ID_BERKSHIRE_PCWD)},
    { HID_USB_DEVICE(USB_VENDOR_ID_CIDE, 0x0103) },
    { HID_USB_DEVICE(USB_VENDOR_ID_CYGNAL, USB_DEVICE_ID_CYGNAL_RADIO_SI470X) },
    { HID_USB_DEVICE(USB_VENDOR_ID_CYGNAL, USB_DEVICE_ID_CYGNAL_RADIO_SI4713) },
    { HID_USB_DEVICE(USB_VENDOR_ID_CYGNAL, USB_DEVICE_ID_CYGNAL_RADIO_SI4713) },
    { HID_USB_DEVICE(USB_VENDOR_ID_GENERAL_TOUCH, 0x0001) },
    { HID_USB_DEVICE(USB_VENDOR_ID_GENERAL_TOUCH, 0x0002) },
    { HID_USB_DEVICE(USB_VENDOR_ID_GENERAL_TOUCH, 0x0004) },
    { HID_USB_DEVICE(USB_VENDOR_ID_GOTOP, USB_DEVICE_ID_SUPER_Q2) },
    { HID_USB_DEVICE(USB_VENDOR_ID_GOTOP, USB_DEVICE_ID_GOGOPEN) },
}
-{ HID_USB_DEVICE(USB_VENDOR_ID_GOTOP, USB_DEVICE_ID_PENPOWER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GRETAGMACBETH, USB_DEVICE_ID_GRETAGMACBETH_HUEY) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GRIFFIN, USB_DEVICE_ID_POWERMATE) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GRIFFIN, USB_DEVICE_ID_SOUNDKNOB) },
-{ HID_USB DEVICE(USB_VENDOR_ID_GRIFFIN, USB_DEVICE_ID_RADIOSHARK) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_90) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_100) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_101) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_103) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_104) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_105) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_106) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_107) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_108) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_200) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_201) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_202) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_203) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_204) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_205) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_206) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_207) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_300) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_301) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_302) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_303) },
-{ HID_USB DEVICE(USB_VENDOR_ID_GTCO, USB DEVICE_ID_GTCO_304) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_305) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_306) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_307) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_308) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_309) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_400) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_401) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_402) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_403) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_404) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_405) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_500) },
-{ HID_USB DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_501) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_502) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_503) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_504) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1000) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1001) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1002) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1003) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1004) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1005) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1006) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1007) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_IMATION, USB_DEVICE_ID_DISC_STAKKA) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_JABRA, USB_DEVICE_ID_JABRA_SPEAK_410) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_JABRA, USB_DEVICE_ID_JABRA_SPEAK_510) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_JABRA, USB_DEVICE_ID_JABRA_GN9350E) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_KBGEAR, USB_DEVICE_ID_KBGEAR_JAMSTUDIO) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_KWORLD, USB_DEVICE_ID_KWORLD_RADIO_FM700) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_GPEN_560) },
-{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_KYE, 0x0058) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_CASSY) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_CASSY2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USBDEVICE_ID_LD_POCKETCASSY) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_POCKETCASSY2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOBILECASSY) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOBILECASSY2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYVOLTAGE) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYCURRENT) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYTIME) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYTEMPERATURE) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYPH) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_JWM) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_DMMP) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_UMIP) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_UMIC) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_UMIB) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_XRAY) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_XRAY2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_VIDEOCOM) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOTOR) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_COM3LAB) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_Teleport) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_NETWORKANALYSER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_POWERCONTROL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MACHINETEST) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOSTANALYSER) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOSTANALYSER2) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_ABSESP) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_AUTODATABUS) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MCT) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MCT) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_HYBRID) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_HEATCONTROL) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_MADCATZ, USB_DEVICE_ID_MADCATZ_BEATPAD) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_MCC, USB_DEVICE_ID_MCC_PMD1024LS) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_MCC, USB_DEVICE_ID_MCC_PMD1208LS) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICKIT1) },

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->{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICKIT2) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICK16F1454) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICK16F1454_V2) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_NATIONAL_SEMICONDUCTOR, USB_DEVICE_ID_N_S_HARMONY) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 20) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 30) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 100) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 108) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 118) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 200) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 300) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 400) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 500) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0001) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0002) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0003) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0004) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_PETZL, USB_DEVICE_ID_PETZL_HEADLAMP) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_PHILIPS, USB_DEVICE_ID_PHILIPS_IEEE802154_DONGLE) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_YEALINK, USB_DEVICE_ID_YEALINK_P1K_P4K_B2K) },
->{ };
}

/**
 * hid_mouse_ignore_list - mouse devices which should not be handled by the hid layer
 * *
 * There are composite devices for which we want to ignore only a certain
 * interface. This is a list of devices for which only the mouse interface will
 * be ignored. This allows a dedicated driver to take care of the interface.
 * */
static const struct hid_device_id hid_mouse_ignore_list[] = {
*/ appletouch driver */
->{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ANSI) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ISO) },
->{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER3_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER3_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER3_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_HF_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_HF_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_HF_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_JIS) },
{- HID_USBDEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING8_ANSI) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING8_ISO) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING8_JIS) },
{- HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING9_ANSI) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING9_ISO) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING9_JIS) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_TP_ONLY) },
-{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER1_TP_ONLY) },
-{ }
-};

bool hid_ignore(struct hid_device *hdev)
{-
-if (hdev->quirks & HID_QUIRK_NO_IGNORE)
	return false;
-if (hdev->quirks & HID_QUIRK_IGNORE)
	return true;
-
-switch (hdev->vendor) {
-case USB_VENDOR_ID_CODEMERCS:
	/* ignore all Code Mercenaries IOWarrior devices */
-if (hdev->product >= USB_DEVICE_ID_CODEMERCS_IOW_FIRST &&
＂hdev->product <= USB_DEVICE_ID_CODEMERCS_IOW_LAST)
	return true;
	break;
-case USB_VENDOR_ID_LOGITECH:
-if (hdev->product >= USB_DEVICE_ID_LOGITECH_HARMONY_FIRST &&
＂hdev->product <= USB_DEVICE_ID_LOGITECH_HARMONY_LAST)
	return true;
	break;
- /*
- * The Keene FM transmitter USB device has the same USB ID as
- * the Logitech AudioHub Speaker, but it should ignore the hid.
- * Check if the name is that of the Keene device.
- * For reference: the name of the AudioHub is
- * "HOLTEK AudioHub Speaker".
- */
-if (hdev->product == USB_DEVICE_ID_LOGITECH_AUDIOHUB &&
-if (hdev->product == USB_DEVICE_ID_LOGITECH_AUDIOHUB &&
!strcmp(hdev->name, "HOLTK B-LINK USB Audio "))
	return true;
	break;
-case USB_VENDOR_ID_SOUNDGRAPH:
-if (hdev->product >= USB_DEVICE_ID_SOUNDGRAPH_IMON_FIRST &&
-hdev->product <= USB_DEVICE_ID_SOUNDGRAPH_IMON_LAST)
	return true;
	break;
-case USB_VENDOR_ID_HANWANG:
-if (hdev->product >= USB_DEVICE_ID_HANWANG_TABLET_FIRST &&
-hdev->product <= USB_DEVICE_ID_HANWANG_TABLET_LAST)
	return true;
	break;
-case USB_VENDOR_ID_JESS:
-if (hdev->product == USB_DEVICE_ID_JESS_YUREX &&

if (hdev->type == HID_TYPE_USBNONE)
  return true;
break;
case USB_VENDOR_ID_VELLEMAN:
  /* These are not HID devices. They are handled by comedi. */
  -if ((hdev->product >= USB_DEVICE_ID_VELLEMAN_K8055_FIRST &&
      hdev->product <= USB_DEVICE_ID_VELLEMAN_K8055_LAST) ||
    (hdev->product >= USB DEVICE ID VELLEMAN K8061 FIRST &&
      hdev->product <= USB_DEVICE_ID_VELLEMAN_K8061_LAST))
    return true;
break;
case USB_VENDOR_ID_ATMEL_V_USB:
  /* Masterkit MA901 usb radio based on Atmel tiny85 chip and
  * it has the same USB ID as many Atmel V-USB devices. This
  * usb radio is handled by radio-ma901.c driver so we want
  * ignore the hid. Check the name, bus, product and ignore
  * if we have MA901 usb radio.
  * */
  -if (hdev->product == USB_DEVICE_ID_ATMEL_V_USB &&
      hdev->bus == BUS_USB &&
     strncmp(hdev->name, "www.masterkit.ru MA901", 22) == 0)
    return true;
break;
-
  -if (hdev->type == HID_TYPE_USBMOUSE &&
      hid_match_id(hdev, hid_mouse_ignore_list))
    return true;
-
  -return !!hid_match_id(hdev, hid_ignore_list);
-
EXPORT_SYMBOL_GPL(hid_ignore);
EXPORT_SYMBOL(hid_bus_type);

int hid_add_device(struct hid_device *hdev)
{
  @@ -2931,6 +2160,8 @@
if (WARN_ON(hdev->status & HID_STAT_ADDED))
    return -EBUSY;

+hdev->quirks = hid_lookup_quirk(hdev);
+
/* we need to kill them here, otherwise they will stay allocated to
 * wait for coming driver */
if (hid_ignore(hdev))
  @@ -2960,7 +2191,7 @@
if (hid_ignore_special_drivers) {
    hdev->group = HID_GROUP_GENERIC;

-
else if (!hdev->group &&
    !(hid_match_id(hdev, hid_have_special_driver)) ||
    !(hid_match_id(hdev, hid_have_special_driver))) {
    hid_warn(hdev, "bad device descriptor (%d)\n", ret);
    return ret;
}

EXPORT_SYMBOL_GPL(hid_destroy_device);

+static int __bus_add_driver(struct device_driver *drv, void *data)
+{
  struct hid_driver *added_hdrv = data;
  struct hid_driver *hdrv = to_hid_driver(drv);
  if (hdrv->bus_add_driver)
    hdrv->bus_add_driver(added_hdrv);
  +return 0;
+}
+
+static int __bus_removed_driver(struct device_driver *drv, void *data)
+{
  struct hid_driver *removed_hdrv = data;
  struct hid_driver *hdrv = to_hid_driver(drv);
  if (hdrv->bus_removed_driver)
    hdrv->bus_removed_driver(removed_hdrv);
  +return 0;
+}
+
int __hid_register_driver(struct hid_driver *hdrv, struct module *owner,
const char *mod_name)
{
  INIT_LIST_HEAD(&hdrv->dyn_list);
  spin_lock_init(&hdrv->dyn_lock);

  +bus_for_each_drv(&hid_bus_type, NULL, hdrv, __bus_add_driver);
  +return driver_register(&hdrv->driver);
}

EXPORT_SYMBOL_GPL(__hid_register_driver);

+driver_unregister(&hdrv->driver);

hid_free_dynids(hdrv);
+
+bus_for_each_drv(&hid_bus_type, NULL, hdrv, __bus_removed_driver);
}
EXPORT_SYMBOL_GPL(hid_unregister_driver);

@@ -3117,6 +2375,7 @@
 hid_debug_exit();
 hidraw_exit();
 bus_unregister(&hid_bus_type);
+hid_quirks_exit(HID_BUS_ANY);
}

module_init(hid_init);
--- linux-4.15.0.orig/drivers/hid/hid-cp2112.c
+++ linux-4.15.0/drivers/hid/hid-cp2112.c
@@ -1160,8 +1160,6 @@
 INIT_DELAYED_WORK(&dev->gpio_poll_worker, cp2112_gpio_poll_callback);
-	cp2112_gpio_direction_input(gc, d->hwirq);
-
 if (!dev->gpio_poll) {
 dev->gpio_poll = true;
 schedule_delayed_work(&dev->gpio_poll_worker, 0);
@@ -1209,6 +1207,12 @@
 return PTR_ERR(dev->desc[pin]);
 }

+ret = cp2112_gpio_direction_input(&dev->gc, pin);
+if (ret < 0) {
+dev_err(dev->gc.parent, "Failed to set GPIO to input dir\n");
+goto err_desc;
+}
+
+ret = gpiochip_lock_as_irq(&dev->gc, pin);
+if (ret) {
+dev_err(dev->gc.parent, "Failed to lock GPIO as interrupt\n");
--- linux-4.15.0.orig/drivers/hid/hid-cypress.c
+++ linux-4.15.0/drivers/hid/hid-cypress.c
@@ -26,19 +26,17 @@
 #define CP_2WHEEL_MOUSE_HACK		0x02
 #define CP_2WHEEL_MOUSE_HACK_ON		0x04
+#define VA_INVAL_LOGICAL_BOUNDARY	0x08
+
 */
* Some USB barcode readers from cypress have usage min and usage max in
/*
 * the wrong order
 */

- static __u8 *cp_report_fixup(struct hid_device *hdev, __u8 *rdesc,
+ static __u8 *cp_rdesc_fixup(struct hid_device *hdev, __u8 *rdesc,
 unsigned int *rsize)

 { unsigned long quirks = (unsigned long)hid_get_drvdata(hdev);
   unsigned int i;

   -if (!(quirks & CP_RDESC_SWAPPED_MIN_MAX))
   -return rdesc;

   if (*rsize < 4)
   return rdesc;

   @@ -51,6 +49,40 @@
   return rdesc;
   }

+ static __u8 *va_logical_boundary_fixup(struct hid_device *hdev, __u8 *rdesc,
+    unsigned int *rsize)
+ {
+   /*
+    * Varmilo VA104M (with VID Cypress and device ID 07B1) incorrectly
+    * reports Logical Minimum of its Consumer Control device as 572
+    * (0x02 0x3c). Fix this by setting its Logical Minimum to zero.
+    */
+   +if (*rsize == 25 &&
+       rdesc[0] == 0x05 && rdesc[1] == 0x0c &&
+       rdesc[2] == 0x09 && rdesc[3] == 0x01 &&
+       rdesc[6] == 0x19 && rdesc[7] == 0x00 &&
+       hid_info(hdev,
+         "fixing up varmilo VA104M consumer control report descriptor\n");
+       rdesc[12] = 0x00;
+       rdesc[13] = 0x00;
+   }
+   +return rdesc;
+   +}
+
+ static __u8 *cp_report_fixup(struct hid_device *hdev, __u8 *rdesc,
+    unsigned int *rsize)
+ {
+   unsigned long quirks = (unsigned long)hid_get_drvdata(hdev);
+   if (quirks & VA_INVAL_LOGICAL_BOUNDARY)
+   return rdesc;
+}

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rdesc = va_logical_boundary_fixup(hdev, rdesc, rsize);
+
+return rdesc;
+
static int cp_input_mapped(struct hid_device *hdev, struct hid_input *hi,
struct hid_field *field, struct hid_usage *usage,
unsigned long **bit, int *max)
@@ -131,6 +163,8 @@
.driver_data = CP_RDESC_SWAPPED_MIN_MAX },
{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_MOUSE),
.driver_data = CP_2WHEEL_MOUSE_HACK },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS,
USB_DEVICE_ID_CYPRESS_VARMILO_VA104M_07B1),
+driver_data = VA_INVAL_LOGICAL_BOUNDARY },
[ ]
);
MODULE_DEVICE_TABLE(hid, cp_devices);
--- linux-4.15.0.orig/drivers/hid/hid-debug.c
+++ linux-4.15.0/drivers/hid/hid-debug.c
@@ -30,6 +30,7 @@
#include <linux/debugfs.h>
#include <linux/seq_file.h>
+including <linux/kfifo.h>
#include <linux/sched/signal.h>
#include <linux/export.h>
#include <linux/slab.h>
@@ -457,7 +458,7 @@
char *buf = NULL;
if (!f) {
-buf = kzalloc(sizeof(char) * HID_DEBUG_BUFSIZE, GFP_ATOMIC);
+buf = kzalloc(HID_DEBUG_BUFSIZE, GFP_ATOMIC);
if (!buf)
return ERR_PTR(-ENOMEM);
@@ -661,17 +662,12 @@
/* enqueue string to 'events' ring buffer */
void hid_debug_event(struct hid_device *hdev, char *buf)
{
-unsigned i;
struct hid_debug_list *list;
unsigned long flags;

spin_lock_irqsave(&hdev->debug_list_lock, flags);
-list_for_each_entry(list, &hdev->debug_list, node) {
-   for (i = 0; buf[i]; i++)

list->hid_debug_buf[(list->tail + i) % HID_DEBUG_BUFSIZE] = buf[i];
list->tail = (list->tail + i) % HID_DEBUG_BUFSIZE;
}
list_for_each_entry(list, &hdev->debug_list, node)
kfifo_in(&list->hid_debug_fifo, buf, strlen(buf));
spin_unlock_irqrestore(&hdev->debug_list_lock, flags);
wake_up_interruptible(&hdev->debug_wait);

hid_debug_event(hdev, buf);

kfree(buf);
- wake_up_interruptible(&hdev->debug_wait);
-
+ wake_up_interruptible(&hdev->debug_wait);
}
EXPORT_SYMBOL_GPL(hid_dump_input);

/* dump parsed data and input mappings */
+ if (down_interruptible(&hdev->driver_input_lock))
+ return 0;
+
hid_dump_device(hdev, f);
seq_printf(f, "\n\n");
hid_dump_input_mapping(hdev, f);

+ up(&hdev->driver_input_lock);
+
return 0;
}

goto out;
}

- if (!list->hid_debug_buf = kzalloc(sizeof(char) * HID_DEBUG_BUFSIZE, GFP_KERNEL)) {
- err = -ENOMEM;
+ err = kfifo_alloc(&list->hid_debug_fifo, HID_DEBUG_FIFOSIZE, GFP_KERNEL);
+ if (err) {
 kfree(list);
 goto out;
 }

+ err = kfifo_alloc(&list->hid_debug_fifo, HID_DEBUG_FIFOSIZE, GFP_KERNEL);
+ if (err) {
 kfree(list);
 goto out;
 }

size_t count, loff_t *ppos)
struct hid_debug_list *list = file->private_data;
- int ret = 0, len;
+ int ret = 0, copied;
DECLARE_WAITQUEUE(wait, current);

mutex_lock(&list->read_mutex);
-while (ret == 0) {
- if (list->head == list->tail) {
- add_wait_queue(&list->hdev->debug_wait, &wait);
- set_current_state(TASK_INTERRUPTIBLE);
- }
- while (list->head == list->tail) {
- if (file->f_flags & O_NONBLOCK) {
- ret = -EAGAIN;
- break;
- }
- if (signal_pending(current)) {
- ret = -ERESTARTSYS;
- break;
- }
- }
- if (!(list->hdev || list->hdev->debug) {
- ret = -EIO;
- set_current_state(TASK_RUNNING);
- goto out;
- }
- /* allow O_NONBLOCK from other threads */
- mutex_unlock(&list->read_mutex);
- schedule();
- mutex_lock(&list->read_mutex);
- set_current_state(TASK_INTERRUPTIBLE);
- if (kfifo_is_empty(&list->hid_debug_fifo)) {
- add_wait_queue(&list->hdev->debug_wait, &wait);
- set_current_state(TASK_INTERRUPTIBLE);
- + while (kfifo_is_empty(&list->hid_debug_fifo)) {
- if (file->f_flags & O_NONBLOCK) {
- ret = -EAGAIN;
- break;
- }
- set_current_state(TASK_RUNNING);
- remove_wait_queue(&list->hdev->debug_wait, &wait);
- }
- }


-goto out;
-
-/* pass the ringbuffer contents to userspace */
-copy_rest:
-if (list->tail == list->head)
-goto out;
-if (list->tail > list->head) {
-len = list->tail - list->head;
-
-if (copy_to_user(buffer + ret, &list->hid_debug_buf[list->head], len)) {
-ret = -EFAULT;
-goto out;
+if (signal_pending(current)) {
+ret = -ERESTARTSYS;
+break;
}
-ret += len;
-list->head += len;
-} else {
-len = HID_DEBUG_BUFSIZE - list->head;
-
-if (copy_to_user(buffer, &list->hid_debug_buf[list->head], len)) {
-ret = -EFAULT;
+/* if list->hdev is NULL we cannot remove_wait_queue().
+ * if list->hdev->debug is 0 then hid_debug_unregister()
+ * was already called and list->hdev is being destroyed.
+ * if we add remove_wait_queue() here we can hit a race.
+ */
+if (!(list->hdev || !list->hdev->debug)) {
+ret = -EIO;
+set_current_state(TASK_RUNNING);
-goto out;
}
-list->head = 0;
-ret += len;
-goto copy_rest;
+
+/* allow O_NONBLOCK from other threads */
+mutex_unlock(&list->read_mutex);
+schedule();
+mutex_lock(&list->read_mutex);
+set_current_state(TASK_INTERRUPTIBLE);
}
+
+set_current_state(TASK_RUNNING);
+remove_wait_queue(&list->hdev->debug_wait, &wait);
+
+if (ret)
+goto out;
+*/
+/* pass the fifo content to userspace, locking is not needed with only
+ * one concurrent reader and one concurrent writer
+ */
+ret = kfifo_to_user(&list->hid_debug_fifo, buffer, count, &copied);
+if (ret)
+goto out;
+ret = copied;
out:
mutex_unlock(&list->read_mutex);
return ret;
@@ -1184,7 +1170,7 @@
struct hid_debug_list *list = file->private_data;
poll_wait(file, &list->hdev->debug_wait, wait);
-if (list->head != list->tail)
+if (!kfifo_is_empty(&list->hid_debug_fifo))
return POLLIN | POLLRDNORM;
if (!list->hdev->debug)
return POLLERR | POLLHUP;
@@ -1199,7 +1185,7 @@
spin_lock_irqsave(&list->hdev->debug_list_lock, flags);
list_del(&list->node);
spin_unlock_irqrestore(&list->hdev->debug_list_lock, flags);
-kfree(list->hid_debug_buf);
+kfifo_free(&list->hid_debug_fifo);
kfree(list);
return 0;
@@ -1250,4 +1236,3 @@
{
debugfs_remove_recursive(hid_debug_root);
}
---- linux-4.15.0.orig/drivers/hid/hid-dr.c
+++ linux-4.15.0/drivers/hid/hid-dr.c
@@ -87,13 +87,19 @@
{
struct drff_device *drff;
struct hid_report *report;
-struct hid_input *hidinput = list_first_entry(&hid->inputs,
-struct hid_input, list);
+struct hid_input *hidinput;
struct list_head *report_list =
&hid->report_enum[HID_OUTPUT_REPORT].report_list;
-struct input_dev *dev = hidinput->input;

+struct input_dev *dev;
int error;

+if (list_empty(&hid->inputs)) {
+hid_err(hid, "no inputs found\n");
+return -ENODEV;
+}
+hidinput = list_first_entry(&hid->inputs, struct hid_input, list);
+dev = hidinput->input;
+
+if (list_empty(report_list)) {
hid_err(hid, "no output reports found\n");
return -ENODEV;
--- linux-4.15.0.orig/drivers/hid/hid-elo.c
+++ linux-4.15.0/drivers/hid/hid-elo.c
@@ -42,6 +42,12 @@
{
struct input_dev *input = hidinput->input;
+/*
+ * ELO devices have one Button usage in GenDesk field, which makes
+ * hid-input map it to BTN_LEFT; that confuses userspace, which then
+ * considers the device to be a mouse/touchpad instead of touchscreen.
+ */
+clear_bit(BTN_LEFT, input->keybit);
set_bit(BTN_TOUCH, input->keybit);
set_bit(ABS_PRESSURE, input->absbit);
input_set_abs_params(input, ABS_PRESSURE, 0, 256, 0, 0);
--- linux-4.15.0.orig/drivers/hid/hid-emsff.c
+++ linux-4.15.0/drivers/hid/hid-emsff.c
@@ -59,13 +59,19 @@
{
struct emsff_device *emsff;
struct hid_report *report;
-struct hid_input *hidinput = list_first_entry(&hid->inputs,
-struct hid_input, list);
+struct hid_input *hidinput;
struct list_head *report_list =
&hid->report_enum[HID_OUTPUT_REPORT].report_list;
-struct input_dev *dev = hidinput->input;
+struct input_dev *dev;
int error;

+if (list_empty(&hid->inputs)) {
+hid_err(hid, "no inputs found\n");
+return -ENODEV;
+}
+hidinput = list_first_entry(&hid->inputs, struct hid_input, list);
dev = hidinput->input;
+
if (list_empty(report_list)) {
    hid_err(hid, "no output reports found\n");
    return -ENODEV;
}

/* linux-4.15.0.orig/drivers/hid/hid-gaff.c */
+++ linux-4.15.0/drivers/hid/hid-gaff.c
@@ -77,14 +77,20 @@
{  
    struct gaff_device *gaff;
    struct hid_report *report;
    -struct hid_input *hidinput = list_entry(hid->inputs.next,
    -struct hid_input, list);
    +struct hid_input *hidinput;
    struct list_head *report_list =
        &hid->report_enum[HID_OUTPUT_REPORT].report_list;
    struct list_head *report_ptr = report_list;
    -struct input_dev *dev = hidinput->input;
    +struct input_dev *dev;
    int error;

    +if (list_empty(&hid->inputs)) {
    +    hid_err(hid, "no inputs found\n");
    +    return -ENODEV;
    +}
    +hidinput = list_entry(hid->inputs.next, struct hid_input, list);
    +dev = hidinput->input;
    +
    if (list_empty(report_list)) {
        hid_err(hid, "no output reports found\n");
        return -ENODEV;
    }

#include <linux/hid.h>

+static struct hid_driver hid_generic;
+    +static int __unmap_hid_generic(struct device *dev, void *data)
+{
+    +struct hid_driver *hdrv = data;
+    +struct hid_device *hdev = to_hid_device(dev);
+    +
+    +/* only unbind matching devices already bound to hid-generic */
+    +if (hdev->driver != &hid_generic ||
+        hid_match_device(hdev, hdrv) == NULL)
+        return 0;
if (dev->parent) /* Needed for USB */
device_lock(dev->parent);
device_release_driver(dev);
if (dev->parent)
device_unlock(dev->parent);
}

static void hid_generic_add_driver(struct hid_driver *hdrv)
{
bus_for_each_dev(&hid_bus_type, NULL, hdrv, __unmap_hid_generic);
}

static void hid_generic_removed_driver(struct hid_driver *hdrv)
{
int ret;
ret = driver_attach(&hid_generic.driver);
}

static int __check_hid_generic(struct device_driver *drv, void *data)
{
struct hid_driver *hdrv = to_hid_driver(drv);
struct hid_device *hdev = data;
if (hdrv == &hid_generic)
return 0;

if (bus_for_each_drv(&hid_bus_type, NULL, hdev, __check_hid_generic))
return false;

static bool hid_generic_match(struct hid_device *hdev,
bool ignore_special_driver)
{
if (ignore_special_driver)
return true;

if (hdev->quirks & HID_QUIRK_HAVE_SPECIAL_DRIVER)
return false;

/* If any other driver wants the device, leave the device to this other
driver. */
if (bus_for_each_drv(&hid_bus_type, NULL, hdev, __check_hid_generic))
return false;
static const struct hid_device_id hid_table[] = {
    { HID_DEVICE(HID_BUS_ANY, HID_GROUP_GENERIC, HID_ANY_ID, HID_ANY_ID) },
    { HID_DEVICE(HID_BUS_ANY, HID_GROUP_ANY, HID_ANY_ID, HID_ANY_ID) },
    { }
};
MODULE_DEVICE_TABLE(hid, hid_table);

--- linux-4.15.0.orig/drivers/hid/hid-gt683r.c
+++ linux-4.15.0/drivers/hid/hid-gt683r.c
@@ -64,6 +64,7 @@
    { HID_USB_DEVICE(USB_VENDOR_ID_MSI, USB_DEVICE_ID_MSI_GT683R_LED_PANEL) },
    { }
};
+MODULE_DEVICE_TABLE(hid, gt683r_led_id);

static void gt683r_brightness_set(struct led_classdev *led_cdev,
enum led_brightness brightness)
--- linux-4.15.0.orig/drivers/hid/hid-holtek-kbd.c
+++ linux-4.15.0/drivers/hid/hid-holtek-kbd.c
@@ -126,9 +126,14 @@
/* Locate the boot interface, to receive the LED change events */
struct usb_interface *boot_interface = usb_ifnum_to_if(usb_dev, 0);
+struct hid_device *boot_hid;
+struct hid_input *boot_hid_input;

-struct hid_device *boot_hid = usb_get_intfdata(boot_interface);
-struct hid_input *boot_hid_input = list_first_entry(&boot_hid->inputs,
+if (unlikely(boot_interface == NULL))
+return -ENODEV;
+
+boot_hid = usb_get_intfdata(boot_interface);
+boot_hid_input = list_first_entry(&boot_hid->inputs,
struct hid_input, list);
return boot_hid_input->input->event(boot_hid_input->input, type, code,
--- linux-4.15.0.orig/drivers/hid/hid-holtekff.c
+++ linux-4.15.0/drivers/hid/hid-holtekff.c
@@ -136,13 +136,19 @@
{
    struct holtekff_device *holtekff;
    struct hid_report *report;
-   struct hid_input *hidinput = list_entry(hid->inputs.next,
-   struct hid_input, list);
+   struct hid_input *hidinput;
    struct list_head *report_list = 
    &hid->report_enum[HID_OUTPUT_REPORT].report_list;
-   struct input_dev *dev = hidinput->input;
+   struct input_dev *dev;
    int error;

    +if (list_empty(&hid->inputs)) {
+   hid_err(hid, "no inputs found\n");
+   return -ENODEV;
    +}
    hidinput = list_entry(hid->inputs.next, struct hid_input, list);
    +dev = hidinput->input;
    +
    if (list_empty(report_list)) {
        hid_err(hid, "no output report found\n");
        return -ENODEV;
--- linux-4.15.0.orig/drivers/hid/hid-hyperv.c
+++ linux-4.15.0/drivers/hid/hid-hyperv.c
@@ -309,7 +309,7 @@
    hid_input_report(input_dev->hid_device, HID_INPUT_REPORT,
    input_dev->input_buf, len, 1);

-   pm_wakeup_event(&input_dev->device->device, 0);
+   pm_wakeup_hard_event(&input_dev->device->device);

    break;
    default:
@@ -322,60 +322,24 @@

    static void mousevsc_on_channel_callback(void *context)
    {
        -const int packet_size = 0x100;
-    int ret;
        struct hv_device *device = context;
-   u32 bytes_recvd;
-   u64 req_id;
        struct vmpacket_descriptor *desc;
-    unsigned char*buffer;
int bufferlen = packet_size;
-
buffer = kmalloc(bufferlen, GFP_ATOMIC);
-if (!buffer)
-return;
-
do {
-ret = vmbus_recvpacket_raw(device->channel, buffer,
-bufferlen, &bytes_recvd, &req_id);
-
-switch (ret) {
-case 0:
-if (bytes_recvd <= 0) {
-kfree(buffer);
-return;
-}
-desc = (struct vmpacket_descriptor *)buffer;
-
-switch (desc->type) {
-case VM_PKT_COMP:
-break;
-
-case VM_PKT_DATA_INBAND:
-mousevsc_on_receive(device, desc);
-break;
-
-default:
-pr_err("unhandled packet type %d, tid %llx len %d\n",
-desc->type, req_id, bytes_recvd);
-break;
-
}

foreach_vmbus_pkt(desc, device->channel) {
+switch (desc->type) {
+case VM_PKT_COMP:
+break;
-
-case -ENOBUFS:
-kfree(buffer);
- /* Handle large packet */
-bufferlen = bytes_recvd;
-buffer = kmalloc(bytes_recvd, GFP_ATOMIC);
-
-if (!buffer)
-return;
+case VM_PKT_DATA_INBAND:
+mousevsc_on_receive(device, desc);
+break;
+default:
+\pr_err("Unhandled packet type %d, tid %llx len %d\n",
+ \desc->type, desc->trans_id, desc->len8 * 8);
break;
}
-\} while (1);
-
+\}
}

static int mousevsc_connect_to_vsp(struct hv_device *device)
--- linux-4.15.0.orig/drivers/hid/hid-ids.h
+++ linux-4.15.0/drivers/hid/hid-ids.h
@@ -17,6 +17,9 @@
#ifndef HID_IDS_H_FILE
#define HID_IDS_H_FILE
+
#define USB_VENDOR_ID_258A		0x258a
#define USB_DEVICE_ID_258A_6A880x6a88	
+
+\define USB_VENDOR_ID_3M0x0596
+\define USB_DEVICE_ID_3M19680x0500
+\define USB_DEVICE_ID_3M22560x0502
+\@ @ -.788 +.819 @@
+\define HID_DEVICE_ID_ALPS_U1_DUAL_PTP0x121F
+\define HID_DEVICE_ID_ALPS_U1_DUAL_3BTN_PTP0x1220
+\define HID_DEVICE_ID_ALPS_U10x1215
+\define HIDDEVICE_ID_ALPS_U1_UNICORN_LEGACY 0x121E
+\define HID_DEVICE_ID_ALPS_T4_BTNLESS0x120C
-
+-\define HID_DEVICE_ID_ALPS_12220x1222

-\define USB_VENDOR_ID_AMI0x046b
-\define USB_DEVICE_ID_AMI_VIRT_KEYBOARD_AND_MOUSE0xff10
-\@ @ -.886 +.927 @@
-\define USB_DEVICE_ID_ANTON_TOUCH_PAD0x3101

-\define USB_VENDOR_ID_APPLE0x05ac
-\define BT_VENDOR_ID_APPLE0x004c
-\define USB_DEVICE_ID_APPLE_MIGHTYMOMUSE0x0304
-\define USB_DEVICE_ID_APPLE_MAGICMOMUSE0x030d
-\define USB_DEVICE_ID_APPLE_MAGICTRACKPAD0x030e
-\@ @ -.157,6 +162,7 @@
-\define USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_ISO 0x0256
-\define USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_JIS 0x0257
-\define USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_ANSI 0x0267
+\define USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_NUMPAD_ANSI 0x026c
#define USB_DEVICE_ID_APPLE_WELLSPRING8_ANSI0x0290
#define USB_DEVICE_ID_APPLE_WELLSPRING8_ISO0x0291
#define USB_DEVICE_ID_APPLE_WELLSPRING8_JIS0x0292
@@ -173,6 +179,7 @@
#define USB_VENDOR_ID_ASUS0x0486
#define USB_DEVICE_ID_ASUS_T91MT0x0185
+#define USB_DEVICE_ID_ASUS_UX550_TOUCHSCREEN0x2706
#define USB_DEVICE_ID_ASUSTEK_MULTITOUCH_YFO0x0186

#define USB_VENDOR_ID_ASUS0x0b05
@@ -268,6 +275,9 @@
#define USB_VENDOR_ID_CIDC0x1677

+#define I2C_VENDOR_ID_CIRQUE0x0488
+#define I2C_PRODUCT_ID_CIRQUE_121F0x121F +
#define USB_VENDOR_ID_CJTOUCH0x24b8
#define USB_DEVICE_ID_CJTOUCH_MULTI_TOUCH_00200x0020
#define USB_DEVICE_ID_CJTOUCH_MULTI_TOUCH_00400x0040
@@ -318,6 +328,8 @@
#define USB_DEVICE_ID_CYPRESS_BARCODE_40xed81
#define USB_DEVICE_ID_CYPRESS_TRUETOUCH0xc001

+#define USB_DEVICE_ID_CYPRESS_VARMILO_VA104M_07B1 0x07b1 +
#define USB_VENDOR_ID_DATA_MODUL0x7374
#define USB_VENDOR_ID_DATA_MODUL_EASYMAXTOUCH0x1201
@@ -343,6 +355,7 @@
#define USB_DEVICE_ID_DWAV_EGALAX_MULTITOUCH_73490x7349
#define USB_DEVICE_ID_DWAV_EGALAX_MULTITOUCH_73F70x73f7
#define USB_DEVICE_ID_DWAV_EGALAX_MULTITOUCH_A0010xa001
+#define USB_DEVICE_ID_DWAV_EGALAX_MULTITOUCH_C0020xc002

#define USB_VENDOR_ID_DWAV0x0eef
#define USB_DEVICE_ID_DJERCER_TOUCHCONTROLLER0x0001
@@ -365,6 +378,7 @@
#define USB_DEVICE_ID_DRAGONRISE_DOLPHINBAR0x1803
#define USB_DEVICE_ID_DRAGONRISE_GAMECUBE10x1843
#define USB_DEVICE_ID_DRAGONRISE_GAMECUBE20x1844
+#define USB_DEVICE_ID_DRAGONRISE_GAMECUBE30x1846

#define USB_VENDOR_ID_DWAV0x0eef
#define USB_DEVICE_ID_DJERCER_TOUCHCONTROLLER0x0001
@@ -386,6 +399,7 @@
#define USB_DEVICE_ID_DJERCER_DOLPHINBAR0x1803
#define USB_DEVICE_ID_DJERCER_GAMECUBE10x1843
#define USB_DEVICE_ID_DJERCER_GAMECUBE20x1844
+#define USB_DEVICE_ID_DJERCER_GAMECUBE30x1846

#define USB_VENDOR_ID_ELAN0x04f3
#define USB_DEVICE_ID_DJERCER_GENERAL_TOUCH_WIN8_PIT_010A 0x010a
#define USB_DEVICE_ID_GENERAL_TOUCH_WIN8_PIT_E100 0xe100

+#define I2C_VENDOR_ID_GOODIX 0x27c6
+#define I2C_DEVICE_ID_GOODIX_01F00x01f0
+
#define USB_VENDOR_ID_GOODTOUCH 0x1aad
#define USB_DEVICE_ID_GOODTOUCH 000f0x000f

@@ -450,6 +467,7 @@
#define USB_VENDOR_ID_GreenAsia 0x0e8f
+
#define USB_DEVICE_ID_GreenAsia_Dual_Sat_Adaptor 0x3010
#define USB_DEVICE_ID_GreenAsia_Dual_USB_JoyPad 0x3013

#define USB_VENDOR_ID_Grettagmacbeth 0x0971
@@ -535,10 +553,21 @@
#define USB_PRODUCT_ID_HP_Logitech_OEM_USB_Optical_Mouse 0a4A0x0a4a
#define USB_PRODUCT_ID_HP_Logitech_OEM_USB_Optical_Mouse_0B4A0x0b4a
#define USB_PRODUCT_ID_HP_Pixart_OEM_USB_Optical_Mouse 0x134a
+UBLISH #define USB_PRODUCT_ID_HP_Pixart_OEM_USB_Optical_Mouse 094A0x094a
+UBLISH #define USB_PRODUCT_ID_HP_Pixart_OEM_USB_Optical_Mouse_0941 0x0941
+UBLISH #define USB_PRODUCT_ID_HP_Pixart_OEM_USB_Optical_Mouse_0641 0x0641
+UBLISH #define USB_PRODUCT_ID_HP_Pixart_OEM_USB_Optical_Mouse_1f4a 0x1f4a

#define USB_VENDOR_ID_Huion 0x256c
#define USB_DEVICE_ID_Huion_Tablet 0x006e

+#define USB_VENDOR_ID_IBM 0x04b3
+#define USB_DEVICE_ID_IBM_ScrollPoint_III 0x3100
+#define USB_DEVICE_ID_IBM_ScrollPoint_Pro 0x3103
+UBLISH #define USB_DEVICE_ID_IBM_ScrollPoint_Optical 0x3105
+UBLISH #define USB_DEVICE_ID_IBM_ScrollPoint_800DPI_Optical 0x3108
+UBLISH #define USB_DEVICE_ID_IBM_ScrollPoint_800DPI_Optical_Pro 0x3109
+
#define USB_VENDOR_ID_Ideacom 0x1cb6
#define USB_DEVICE_ID_Ideacom_IDC66500x6650
#define USB_DEVICE_ID_Ideacom_IDC66510x6651
@@ -571,6 +600,7 @@
#define USB_DEVICE_ID_Holtek_Alt_Mouse_A0810xa081
#define USB_DEVICE_ID_Holtek_Alt_Mouse_A0C20xa0c2
#define USB_DEVICE_ID_Holtek_Alt_Keyboard_A0960xa096
+UBLISH #define USB_DEVICE_ID_Holtek_Alt_Keyboard_A2930xa293

#define USB_VENDOR_ID_Imation 0x0718
#define USB_DEVICE_ID_Disc_Stakka 0xd000
@@ -584,6 +614,7 @@
#define USB_VENDOR_ID_Ite 0x048d
#define USB_DEVICE_ID_ITE_LENOVO_YOGA   0x8386
#define USB_DEVICE_ID_ITE_LENOVO_YOGA2  0x8350
+#define I2C_DEVICE_ID_ITE_LENOVO_LEGION_Y7200x837a
#define USB_DEVICE_ID_ITE_LENOVO_YOGA9000x8396
#define USB_DEVICE_ID_ITE85950x8595
@@ -641,6 +672,9 @@
#define USB_DEVICE_ID_LD_MICROCASSYTIME	0x1033
#define USB_DEVICE_ID_LD_MICROCASSYPERATURE0x1035
#define USB_DEVICE_ID_LD_MICROCASSYPH0x1038
+#define USB_DEVICE_ID_LD_POWERANALYSERCASSY0x1040
+#define USB_DEVICE_ID_LD_CONVERTERCONTROLLERCASSY0x1042
+#define USB_DEVICE_ID_LD_MACHINETESTCASSY0x1043
#define USB_DEVICE_ID_LD_JWM0x1080
#define USB_DEVICE_ID_LD_DMMP0x1081
#define USB_DEVICE_ID_LD_UMIP0x1090
@@ -668,6 +702,7 @@
#define USB_VENDOR_ID_LG		0x1fd2
#define USB_DEVICE_ID_LG_MULTITOUCH	0x0064
#define USB_DEVICE_ID_LG_MELFAS_MT	0x6007
 I2C_DEVICE_ID_LG_8001		0x8001
 I2C_DEVICE_ID_LG_7010		0x7010
#define USB_VENDOR_ID_LOGITECH		0x046d
#define USB_DEVICE_ID_LOGITECH_AUDIOHUB 0x0a0e
#define USB_DEVICE_ID_LOGITECH_T6510xb00c
+I2CDEVICE_ID_LOGITECH_DINOVO_EDGE_KBD0xb309
#define USB_DEVICE_ID_LOGITECH_C0070xc007
#define USB_DEVICE_ID_LOGITECH_C0770xc077
#define USB_DEVICE_ID_LOGITECH_RECEIVER0xc101
@@ -709,6 +747,7 @@
#define USB_DEVICE_ID_LOGITECH_G27_WHEEL0xc29b
#define USB_DEVICE_ID_LOGITECH_WII_WHEEL0xc29c
#define USB_DEVICE_ID_LOGITECH_ELITE_KBD0xc30a
+I2CDEVICE_ID_LOGITECH_GROUP_AUDIO0xc882
#define USB_DEVICE_ID_S510_RECEIVER0xc50c
#define USB_DEVICE_ID_S510_RECEIVER_20xc517
#define USBDEVICE_ID_LOGITECH_CORDLESS_DESKTOP_LX5000xc512
@@ -844,6 +883,7 @@
#define USB_DEVICE_ID_ORTEK_IHOME_IMAC_A210S0xc8003

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#define USB_VENDOR_ID_PLANTRONICS 0x047f
+#define USB_DEVICE_ID_PLANTRONICS_BLACKWIRE_3220_SERIES0xc056

#define USB_VENDOR_ID_PANASONIC 0x04da
#define USB_DEVICE_ID_PANABOARD_UBT7800x1044 @ @ -918,10 +958,13 @@
#define USB_DEVICE_ID_ROCCAT_RYOS_MK_PRO0x3232
#define USB_DEVICE_ID_ROCCAT_SAVU0x2d5a

+ #define USB_VENDOR_ID_SAI0x17dd +
#define USB_VENDOR_ID_SAITEK 0x06a3
#define USB_DEVICE_ID_SAITEK_RUMBLEPAD0xff17
#define USB_DEVICE_ID_SAITEK_PS10000x0621
#define USB_DEVICE_ID_SAITEK_RAT7_OLD0x0ccb
+ #define USB_DEVICE_ID_SAITEK_RAT7_CONTAGION 0x0cccd
#define USB_DEVICE_ID_SAITEK_RAT70x0cd7
#define USB_DEVICE_ID_SAITEK_RAT90x0cfa
#define USB_DEVICE_ID_SAITEK_MMO70x0cd0 @ @ -948,6 +991,7 @@
#define USB_DEVICE_ID_SIS817_TOUCH0x0817
#define USB_DEVICE_ID_SIS_T5000x1013
#define USB_DEVICE_ID_SIS1030_TOUCH0x1030
+ #define USB_DEVICE_ID_SIS10FB_TOUCH 0x10fb

#define USB_VENDOR_ID_SKYCABLE 0x1223
#define USB_DEVICE_ID_SKYCABLE_WIRELESS_PRESENTER 0x3F07 @ @ -996,6 +1040,10 @@
#define USB_VENDOR_ID_SYMBOL 0x05e0
#define USB_DEVICE_ID_SYMBOL.Scanner.10x0800
#define USB_DEVICE_ID_SYMBOL.Scanner.20x1300
+ #define USB_DEVICE_ID_SYMBOL.Scanner.30x1200
+
+ #define I2C_VENDOR_ID_SYNAPTICS 0x06cb
+ #define I2C_PRODUCT_ID_SYNAPTICS_SYNA2393 0x7a13

#define USB_VENDOR_ID_SYNAPTICS 0x06cb
#define USB_DEVICE_ID_SYNAPTICS_TP0x0001 @ @ -1011,6 +1059,8 @@
#define USB_DEVICE_ID_SYNAPTICS.LTS20x1d10
#define USB_DEVICE_ID_SYNAPTICS.HD0x0ac3
#define USB_DEVICE_ID_SYNAPTICS.QUAD_HD0x1ac3
+ #define USB_DEVICE_ID_SYNAPTICS.DELI_K12A0x2819
+ #define USB_DEVICE_ID_SYNAPTICS.ACER_SWITCH5_0120x2968
#define USB_DEVICE_ID_SYNAPTICS_TP.V1030x5710

#define USB_VENDOR_ID_TEXAS_INSTRUMENTS 0x2047
case POWER_SUPPLY_PROP_CAPACITY:
    if (dev->battery_report_type == HID_FEATURE_REPORT) {
        if (dev->battery_status != HID_BATTERY_REPORTED && !dev->battery_avoid_query) {
            value = hidinput_query_battery_capacity(dev);
            if (value < 0)
                return value;
        }
    } else {
        break;
    }

    if (!dev->battery_reported && dev->battery_report_type == HID_FEATURE_REPORT) {
        if (dev->battery_status != HID_BATTERY_REPORTED && !dev->battery_avoid_query) {
            value = hidinput_query_battery_capacity(dev);
            if (value < 0)
                return value;
        }
    }

    dev->battery_capacity = value;
    dev->battery_reported = true;
    dev->battery_status = HID_BATTERY_QUERIED;
}

    if (!dev->battery_reported)
    +if (dev->battery_status == HID_BATTERY_UNKNOWN)
        val->intval = POWER_SUPPLY_STATUS_UNKNOWN;
    -else if (dev->battery_capacity == 100)
        -val->intval = POWER_SUPPLY_STATUS_FULL;
    else
        val->intval = POWER_SUPPLY_STATUS_DISCHARGING;
    break;
    }

    dev->battery_report_type = report_type;
    dev->battery_report_id = field->report->id;
+
/*
   * Stylus is normally not connected to the device and thus we
   * can't query the device and get meaningful battery strength.
   * We have to wait for the device to report it on its own.
   */
+
    dev->battery_avoid_query = report_type == HID_INPUT_REPORT &&
    + field->physical == HID_DG_STYLUS;
    +
    dev->battery = power_supply_register(&dev->dev, psy_desc, &psy_cfg);
    if (IS_ERR(dev->battery)) {
error = PTR_ERR(dev->battery);
@@ -530,9 +548,10 @@
capacity = hidinput_scale_battery_capacity(dev, value);

-    if (!dev->battery_reported || capacity != dev->battery_capacity) {
+    if (dev->battery_status != HID_BATTERY_REPORTED ||
+        capacity != dev->battery_capacity) {
        dev->battery_capacity = capacity;
        -    dev->battery_reported = true;
+    dev->battery_status = HID_BATTERY_REPORTED;
        power_supply_changed(dev->battery);
    }
    @ @ -664,6 +683,14 @@
break;
}

+    if ((usage->hid & 0xf0) == 0xb0) { /* SC - Display */
+        switch (usage->hid & 0xf) {
+            case 0x05: map_key_clear(KEY_SWITCHVIDEOMODE); break;
+            +
+            }
+        +break;
+        +}
+        +}
+    +
+    /*
+     * Some lazy vendors declare 255 usages for System Control,
+     * leading to the creation of ABS_X|Y axis and too many others.
+     @ @ -772,7 +799,7 @@
    case 0x3b: /* Battery Strength */
    hidinput_setup_battery(device, HID_INPUT_REPORT, field);
    usage->type = EV_PWR;
    -goto ignore;
    +return;
    case 0x3c: /* Invert */
    map_key_clear(BTN_TOOL_RUBBER);
    @ @ -882,6 +909,10 @@
    case 0x074: map_key_clear(KEY_BRIGHTNESS_MAX);break;
    case 0x075: map_key_clear(KEY_BRIGHTNESS_AUTO);break;
    +case 0x079: map_key_clear(KEY_KBDILLUMUP);break;
    +case 0x07a: map_key_clear(KEY_KBDILLUMDOWN);break;
    +case 0x07c: map_key_clear(KEY_KBDILLUMTOGGLE);break;
    +
    case 0x082: map_key_clear(KEY_VIDEO_NEXT);break;
    case 0x083: map_key_clear(KEY_LAST);break;
case 0x084: map_key_clear(KEY_ENTER);break;
@@ -969,6 +1000,7 @@
case 0x1b8: map_key_clear(KEY_VIDEO);break;
case 0x1bc: map_key_clear(KEY_MESSENGER);break;
case 0x1bd: map_key_clear(KEY_INFO);break;
+case 0x1cb: map_key_clear(KEY_ASSISTANT);break;
case 0x201: map_key_clear(KEY_NEW);break;
case 0x202: map_key_clear(KEY_OPEN);break;
case 0x203: map_key_clear(KEY_CLOSE);break;
@@ -1012,6 +1044,8 @@
case 0x2cb: map_key_clear(KEY_KBDINPUTASSIST_ACCEPT);break;
case 0x2cc: map_key_clear(KEY_KBDINPUTASSIST_CANCEL);break;
+
+case 0x29f: map_key_clear(KEY_SCALE);break;
+
default: map_key_clear(KEY_UNKNOWN);
}
break;
@@ -1021,7 +1055,7 @@


case HID_DC_BATTERYSTRENGTH:
hidinput_setup_battery(device, HID_INPUT_REPORT, field);
usage->type = EV_PWR;
-goto ignore;
+return;
}
goto unknown;

@@ -1094,9 +1128,19 @@
}
mapped:
-if (device->driver->input_mapped && device->driver->input_mapped(device,
hidinput, field, usage, &bit, &max) < 0)
-goto ignore;
+/* Mapping failed, bail out */
+if (!bit)
+return;
+ /* Mapping failed, bail out */
+if (device->driver->input_mapped &&
+ device->driver->input_mapped(device, hidinput, field, usage,
+ &bit, &max) < 0) {
+ /*
+ * The driver indicated that no further generic handling
+ * of the usage is desired.
+ */
+return;
+}
set_bit(usage->type, input->evbit);

@@ -1154,9 +1198,11 @@
 set_bit(MSC_SCAN, input->mscbit);
 }

-ignore:
-return;

+ignore:
+usage->type = 0;
+usage->code = 0;
}

void hidinput_hid_event(struct hid_device *hid, struct hid_field *field, struct hid_usage *usage, __s32 value)
@@ -1368,7 +1414,8 @@
     led_work);
 struct hid_field *field;
 struct hid_report *report;
-int len, ret;
+int ret;
+u32 len;
     __u8 *buf;

     field = hidinput_get_led_field(hid);
--- linux-4.15.0.orig/drivers/hid/hid-ite.c
+++ linux-4.15.0/drivers/hid/hid-ite.c
@@ -42,6 +42,11 @@
 static const struct hid_device_id ite_devices[] = {
     { HID_USB_DEVICE(USB_VENDOR_ID_ITE, USB_DEVICE_ID_ITE8595) },
     { HID_USB_DEVICE(USB_VENDOR_ID_258A, USB_DEVICE_ID_258A_6A88) },
+    /* ITE8595 USB kbd ctrl, with Synaptics touchpad connected to it. */
+    { HID_DEVICE(BUS_USB, HID_GROUP_GENERIC,
+        USB_VENDOR_ID_SYNAPTICS,
+        USB_DEVICE_ID_SYNAPTICS_ACER_SWITCH5_012) },
  
  MODULE_DEVICE_TABLE(hid, ite_devices);
--- linux-4.15.0.orig/drivers/hid/hid-lenovo.c
+++ linux-4.15.0/drivers/hid/hid-lenovo.c
@@ -6,6 +6,17 @@

 * Copyright (c) 2012 Bernhard Seibold
 * Copyright (c) 2014 Jamie Lentin <jm@lentin.co.uk>
+ * Linux IBM/Lenovo Scrollpoint mouse driver:
+ * - IBM Scrollpoint III
static int lenovo_input_mapping_scrollpoint(struct hid_device *hdev,
    struct hid_input *hi, struct hid_field *field,
    struct hid_usage *usage, unsigned long **bit, int *max)
{
    if (usage->hid == HID_GD_Z) {
        hid_map_usage(hi, usage, bit, max, EV_REL, REL_HWHEEL);
        return 1;
    }
    return 0;
}

static int lenovo_input_mapping(struct hid_device *hdev, struct hid_input *hi, struct hid_field *field, struct hid_usage *usage, unsigned long **bit, int *max)
{
    case USB_DEVICE_ID_LENOVO_CBTKBD:
        return lenovo_input_mapping_cptkbd(hdev, hi, field, usage, bit, max);
    case USB_DEVICE_ID_IBM_SCROLLPOINT_III:
    case USB_DEVICE_ID_IBM_SCROLLPOINT_PRO:
    case USB_DEVICE_ID_IBM_SCROLLPOINT_OPTICAL:
    case USB_DEVICE_ID_IBM_SCROLLPOINT_800DPI_OPTICAL:
    case USB_DEVICE_ID_IBM_SCROLLPOINT_800DPI_OPTICAL_PRO:
    case USB_DEVICE_ID_LENOVO_SCROLLPOINT_OPTICAL:
        return lenovo_input_mapping_scrollpoint(hdev, hi, field, usage, bit, max);
    default:
        return 0;
}

data_pointer->led_mute.brightness_get = lenovo_led_brightness_get_tpkbd;
data_pointer->led_mute.brightness_set = lenovo_led_brightness_set_tpkbd;
data_pointer->led_mute.dev = dev;
- led_classdev_register(dev, &data_pointer->led_mute);
+ ret = led_classdev_register(dev, &data_pointer->led_mute);
+ if (ret < 0)
+ goto err;

data_pointer->led_micmute.name = name_micmute;
data_pointer->led_micmute.brightness_get =
@@ -721,7 +753,11 @@
data_pointer->led_micmute.brightness_set =
 lenovo_led_brightness_set_tpkbd;
data_pointer->led_micmute.dev = dev;
-led_classdev_register(dev, &data_pointer->led_micmute);
+ ret = led_classdev_register(dev, &data_pointer->led_micmute);
+ if (ret < 0) {
+ led_classdev_unregister(&data_pointer->led_mute);
+ goto err;
+ }

lenovo_features_set_tpkbd(hdev);

@@ -883,6 +919,12 @@
 { HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_CUSBKBD) },
 { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_CBTKBD) },
 { HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_TPPRODOCK) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_IBM, USB_DEVICE_ID_IBM_SCROLLPOINT_III) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_IBM, USB_DEVICE_ID_IBM_SCROLLPOINT_PRO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_IBM, USB_DEVICE_ID_IBM_SCROLLPOINT_OPTICAL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_IBM,
 USB_DEVICE_ID_IBM_SCROLLPOINT_800DPI_OPTICAL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_IBM,
 USB_DEVICE_ID_IBM_SCROLLPOINT_800DPI_OPTICAL_PRO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LENOVO,
 USB_DEVICE_ID_LENOVO_SCROLLPOINT_OPTICAL) },
 { };

--- linux-4.15.0.orig/drivers/hid/hid-lg.c
+++ linux-4.15.0/drivers/hid/hid-lg.c
@@ -763,7 +763,7 @@
if (!buf) {
 ret = -ENOMEM;
-goto err_free;
+goto err_stop;
} } 

ret = hid_hw_raw_request(hdev, buf[0], buf, sizeof(cbuf),
@@ -795,9 +795,12 @@
ret = lg4ff_init(hdev);

if (ret)
    -goto err_free;
+goto err_stop;

return 0;
+
+err_stop:
+hid_hw_stop(hdev);
err_free:
kfree(drv_data);
return ret;

struct lg_drv_data *drv_data = hid_get_drvdata(hdev);
if (drv_data->quirks & LG_FF4)
    lg4ff_deinit(hdev);
#else
    hid_hw_stop(hdev);
+kfree(drv_data);

--- linux-4.15.0.orig/drivers/hid/hid-lg2ff.c
+++ linux-4.15.0/drivers/hid/hid-lg2ff.c
@@ -62,11 +62,17 @@
{
    struct lg2ff_device *lg2ff;
    struct hid_report *report;
-    struct hid_input *hidinput = list_entry(hid->inputs.next,
-        struct hid_input, list);
-    struct input_dev *dev = hidinput->input;
+    struct hid_input *hidinput;
+    struct input_dev *dev;

    /* Check that the report looks ok */
    report = hid_validate_values(hid, HID_OUTPUT_REPORT, 0, 0, 7);
    if (!report)
        --- linux-4.15.0.orig/drivers/hid/hid-lg3ff.c
        +++ linux-4.15.0/drivers/hid/hid-lg3ff.c
    
    if (list_empty(&hid->inputs)) { 
        hid_err(hid, "no inputs found");
        return -ENODEV;


int lg3ff_init(struct hid_device *hid)
{
-struct hid_input *hidinput = list_entry(hid->inputs.next, struct hid_input, list);
-struct input_dev *dev = hidinput->input;
+struct hid_input *hidinput;
+struct input_dev *dev;
const signed short *ff_bits = ff3_joystick_ac;
int error;
int i;

+if (list_empty(&hid->inputs)) {
+hid_err(hid, "no inputs found\n");
+return -ENODEV;
+
+hidinput = list_entry(hid->inputs.next, struct hid_input, list);
+dev = hidinput->input;
+
/* Check that the report looks ok */
if (!hid_validate_values(hid, HID_OUTPUT_REPORT, 0, 0, 35))
return -ENODEV;
--- linux-4.15.0.orig/drivers/hid/hid-lg4ff.c
+++ linux-4.15.0/drivers/hid/hid-lg4ff.c
@@ -1259,8 +1259,8 @@
int lg4ff_init(struct hid_device *hid)
{
-struct hid_input *hidinput = list_entry(hid->inputs.next, struct hid_input, list);
-struct input_dev *dev = hidinput->input;
+struct hid_input *hidinput;
+struct input_dev *dev;
struct list_head *report_list = &hid->report_enum[HID_OUTPUT_REPORT].report_list;
struct hid_report *report = list_entry(report_list->next, struct hid_report, list);
const struct usb_device_descriptor *udesc = &(hid_to_usb_dev(hid)->descriptor);
@@ -1272,6 +1272,13 @@
int mmode_ret, mmode_idx = -1;
u16 real_product_id;

+if (list_empty(&hid->inputs)) {
+hid_err(hid, "no inputs found\n");
+return -ENODEV;
+
+hidinput = list_entry(hid->inputs.next, struct hid_input, list);
+dev = hidinput->input;
+
/* Check that the report looks ok */
if (!hid_validate_values(hid, HID_OUTPUT_REPORT, 0, 0, 7)
return -1;
@@ -1483,7 +1490,6 @@
{
    hid_hw_stop(hid);
    drv_data->device_props = NULL;
}

kfree(entry);
--- linux-4.15.0.orig/drivers/hid/hid-lgff.c
+++ linux-4.15.0/drivers/hid/hid-lgff.c
@@ -127,12 +127,19 @@
    hidinput = list_entry(hid->inputs.next, struct hid_input, list);
    dev = hidinput->input;
+    hidinput = list_entry(hid->inputs.next, struct hid_input, list);
+    dev = hidinput->input;
    +hidinput = list_entry(hid->inputs.next, struct hid_input, list);
    +dev = hidinput->input;
+    /* Check that the report looks ok */
    if (!hid_validate_values(hid, HID_OUTPUT_REPORT, 0, 0, 7))
        return -ENODEV;
    +}
+hidinput = list_entry(hid->inputs.next, struct hid_input, list);
+dev = hidinput->input;
+
static int lgff_init(struct hid_device* hid)
{
    struct hid_input *hidinput = list_entry(hid->inputs.next, struct hid_input, list);
    struct input_dev *dev = hidinput->input;
    struct hid_input *hidinput;
    struct input_dev *dev;
    const signed short *ff_bits = ff_joystick;
    int error;
    int i;

    if (list_empty(&hid->inputs)) {
        hid_err(hid, "no inputs found\n");
        return -ENODEV;
    }
    hidinput = list_entry(hid->inputs.next, struct hid_input, list);
    dev = hidinput->input;
    if (!hid_validate_values(hid, HID_OUTPUT_REPORT, 0, 0, 7))
        return -ENODEV;

static int hidpp_root_get_protocol_version(struct hidpp_device *hidpp)
{
    const u8 ping_byte = 0x5a;
    u8 ping_data[3] = { 0, 0, ping_byte };
    struct hidpp_report response;
    int ret;

    -ret = hidpp_send_fap_command_sync(hidpp,
            REPORT_ID_HIDPP_SHORT,
            HIDPP_PAGE_ROOT_IDX,
CMD_ROOT_GET_PROTOCOL_VERSION,
    -NULL, 0, &response);
+ping_data, sizeof(ping_data), &response);

if (ret == HIDPP_ERROR_INVALID_SUBID) {
    hidpp->protocol_major = 1;
    @ @ -751,8 +754,14 @@
    if (ret)
        return ret;

    hidpp->protocol_major = response.fap.params[0];
    hidpp->protocol_minor = response.fap.params[1];
+if (response.rap.params[2] != ping_byte) {
+    hid_err(hidpp->hid_dev, "%s: ping mismatch 0x%02x != 0x%02x\n",
+            __func__, response.rap.params[2], ping_byte);
+    return -EPROTO;
+}
+
    hidpp->protocol_major = response.rap.params[0];
    hidpp->protocol_minor = response.rap.params[1];

    return ret;
}
@@ -901,7 +910,11 @@
{
    if (capacity < 11)
        return POWER_SUPPLY_CAPACITY_LEVEL_CRITICAL;
-else if (capacity < 31)
+/*
+ * The spec says this should be < 31 but some devices report 30
+ * with brand new batteries and Windows reports 30 as "Good".
+ */
+else if (capacity < 30)
        return POWER_SUPPLY_CAPACITY_LEVEL_LOW;
    else if (capacity < 81)
        return POWER_SUPPLY_CAPACITY_LEVEL_NORMAL;
    @ @ -965,6 +978,9 @@
    ret = hidpp_send_fap_command_sync(hidpp, feature_index,
                                        CMD_BATTERY_LEVEL_STATUS_GET_BATTERY_LEVEL_STATUS,
                                        NULL, 0, &response);
+/* Ignore these intermittent errors */
+if (ret == HIDPP_ERROR_RESOURCE_ERROR)
    +return -EIO;
    if (ret > 0) {
        hid_err(hidpp->hid_dev, "%s: received protocol error 0x%02x\n",
                __func__, ret);
        @ @ -1854,8 +1870,8 @@
        static int hidpp_ff_init(struct hidpp_device *hidpp, u8 feature_index)
struct hid_device *hid = hidpp->hid_dev;

struct hid_input *hidinput = list_entry(hid->inputs.next, struct hid_input, list);
struct input_dev *dev = hidinput->input;

const struct usb_device_descriptor *udesc = &(hid_to_usb_dev(hid)->descriptor);
const u16 bcdDevice = le16_to_cpu(udesc->bcdDevice);

struct ff_device *ff;

if (list_empty(&hid->inputs)) {
    hid_err(hid, "no inputs found\n");
    return -ENODEV;
}

hidinput = list_entry(hid->inputs.next, struct hid_input, list);
dev = hidinput->input;

if (!dev) {
    hid_err(hid, "Struct input_dev not set!\n");
    return -EINVAL;
}

++data->wq = create_singlethread_workqueue("hidpp-ff-sendqueue");
if (!data->wq) {
    kfree(data->effect_ids);
    kfree(data);
    return -ENOMEM;
}

data->hidpp = hidpp;
data->feature_index = feature_index;
data->version = version;

/* ignore boost value at response.fap.params[2] */

/* init the hardware command queue */
-data->wq = create_singlethread_workqueue("hidpp-ff-sendqueue");
atomic_set(&data->workqueue_size, 0);

/* initialize with zero autocenter to get wheel in usable state */
--- linux-4.15.0.orig/drivers/hid/hid-magicmouse.c
+++ linux-4.15.0/drivers/hid/hid-magicmouse.c
@@ -452,6 +452,12 @@

/* ignore boost value at response.fap.params[2] */

/* init the hardware command queue */
-data->wq = create_singlethread_workqueue("hidpp-ff-sendqueue");
atomic_set(&data->workqueue_size, 0);

/* initialize with zero autocenter to get wheel in usable state */
--- linux-4.15.0.orig/drivers/hid/hid-magicmouse.c
+++ linux-4.15.0/drivers/hid/hid-magicmouse.c
@@ -452,6 +452,12 @@
__set_bit(MSC_RAW, input->mscbit);
}

+/*
 + * hid-input may mark device as using autorepeat, but neither
 + * the trackpad, nor the mouse actually want it.
 + */
+__clear_bit(EV_REP, input->evbit);
+
return 0;
}

--- linux-4.15.0.orig/drivers/hid/hid-mf.c
+++ linux-4.15.0/drivers/hid/hid-mf.c
@@ -161,6 +161,8 @@
    { HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE,
                  USB_DEVICE_ID_DRAGONRISE_GAMECUBE2),
        .driver_data = 0 }, /* No quirk required */
+    { HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE,
                 USB_DEVICE_ID_DRAGONRISE_GAMECUBE3),
+      .driver_data = HID_QUIRK_MULTI_INPUT },
    
};

MODULE_DEVICE_TABLE(hid, mf_devices);

--- linux-4.15.0.orig/drivers/hid/hid-multitouch.c
+++ linux-4.15.0/drivers/hid/hid-multitouch.c
@@ -365,7 +365,8 @@
 static void mt_get_feature(struct hid_device *hdev, struct hid_report *report)
 {
   struct mt_device *td = hid_get_drvdata(hdev);
-int ret, size = hid_report_len(report);
+int ret;
+u32 size = hid_report_len(report);
   u8 *buf;

   /*
@@ -632,6 +633,8 @@
 (usage->hid & HID_USAGE) > 1)
 code--; 
 hid_map_usage(hi, usage, bit, max, EV_KEY, code);
+if (!*bit)
+  return -1;
 input_set_capability(hi->input, EV_KEY, code);
 return 1;

@@ -778,9 +781,11 @@
}
static void mt_process_mt_event(struct hid_device *hid, struct hid_field *field,
struct hid_usage *usage, __s32 value,
+struct hid_usage *usage, __s32 value,
+bool first_packet)
{
    struct mt_device *td = hid_get_drvdata(hid);
    +__s32 cls = td->mtclass.name;
    __s32 quirks = td->mtclass.quirks;
    struct input_dev *input = field->hidinput->input;

    @ @ -.837,6 +842,15 @ @
    break;

default:
    +/
    + * For Win8 PTP touchpads we should only look at
    + * non finger/touch events in the first_packet of
    + * a (possible) multi-packet frame.
    + */
    +if ((cls == MT_CLS_WIN_8 || cls == MT_CLS_WIN_8_DUAL) &&
    +    !first_packet)
    +return;
    +
    if (usage->type)
        input_event(input, usage->type, usage->code, value);
    @ @ -.856,6 +870,7 @ @
    }
    struct mt_device *td = hid_get_drvdata(hid);
    struct hid_field *field;
    +bool first_packet;
    unsigned count;
    int r, n;

    @ @ -.874,6 +889,7 @ @
    td->num_expected = value;
}

+first_packet = td->num_received == 0;
for (r = 0; r < report->maxfield; r++) {
    field = report->field[r];
    count = field->report_count;
    @ @ -.883,7 +899,7 @ @

    for (n = 0; n < count; n++)
        mt_process_mt_event(hid, field, &field->usage[n],
            -field->value[n]);
+ field->value[n], first_packet);
}

if (td->num_received >= td->num_expected)
@@ -1079,7 +1095,7 @@
struct hid_report_enum *re;
struct mt_class *cls = &td->mtclass;
char *buf;
-int report_len;
+u32 report_len;

if (td->inputmode < 0)
return;
@@ -1463,6 +1479,10 @@
HID_DEVICE(BUS_I2C, HID_GROUP_MULTITOUCH_WIN_8,
USB_VENDOR_ID_ALPS_JP,
HID_DEVICE_ID_ALPS_U1_DUAL_3BTN_PTP },
+{ .driver_data = MT_CLS_WIN_8_DUAL,
+HID_DEVICE(BUS_I2C, HID_GROUP_MULTITOUCH_WIN_8,
+USB_VENDOR_ID_ALPS_JP,
+HID_DEVICE_ID_ALPS_1222 }},

/* Lenovo X1 TAB Gen 2 */
{ .driver_data = MT_CLS_WIN_8_DUAL,
@@ -1504,6 +1524,12 @@
MT_USBDEVICE(USB_VENDOR_ID_CHUNGHWAT,
USB_DEVICE_ID_CHUNGHWAT_MULTITOUCH) },

+/* Cirque devices */
+{ .driver_data = MT_CLS_WIN_8_DUAL,
+HID_DEVICE(BUS_I2C, HID_GROUP_MULTITOUCH_WIN_8,
+I2C_VENDOR_ID_CIRQUE,
+I2C_PRODUCT_ID_CIRQUE_121F }},
+
+/* CJTouch panels */
{ .driver_data = MT_CLS_NSMU,
MT_USBDEVICE(USB_VENDOR_ID_CJTOUCH,
@@ -1637,6 +1666,9 @@
{ .driver_data = MT_CLS_EGALAX_SERIAL,
MT_USBDEVICE(USB_VENDOR_ID_DWAV,
USB_DEVICE_ID_DWAV_EGALAX_MULTITOUCH_A001 }},
+{ .driver_data = MT_CLS_EGALAX,
+MT_USBDEVICE(USB_VENDOR_ID_DWAV,
+USBDEVICE_ID_DWAV_EGALAX_MULTITOUCH_C002 }},

/* Elitegroup panel */
{ .driver_data = MT_CLS_SERIAL,
@@ -1637,6 +1666,9 @@
struct plt_drv_data {


static int plantronics_input_mapping(struct hid_device *hdev,
    struct hid_input *hi,
    struct hid_field *field,
    unsigned long **bit, int *max)
{
    unsigned short mapped_key;
    unsigned long plt_type = drv_data->device_type;
    /* special case for PTT products */
    if (field->application == HID_GD_JOYSTICK)
        goto defaulted;

    /* handle volume up/down mapping */
    /* non-standard types or multi-HID interfaces - plt_type is PID */
    return 1;
}

static int plantronics_event(struct hid_device *hdev, struct hid_field *field,
			     struct hid_usage *usage, __s32 value)
{
    struct plt_drv_data *drv_data = hid_get_drvdata(hdev);
    if (drv_data->quirks & PLT_QUIRK_DOUBLE_VOLUME_KEYS) {
        unsigned long prev_ts, cur_ts;
        /* Usages are filtered in plantronics_usages. */
        if (!value) /* Handle key presses only. */
            return 0;
        prev_ts = drv_data->last_volume_key_ts;
        cur_ts = jiffies;
        if (jiffies_to_msecs(cur_ts - prev_ts) <= PLT_DOUBLE_KEY_TIMEOUT)
            return 1; /* Ignore the repeated key. */
        drv_data->last_volume_key_ts = cur_ts;
    }
    return 0;
static unsigned long plantronics_device_type(struct hid_device *hdev)
{
    unsigned i, col_page;
    static int plantronics_probe(struct hid_device *hdev,
        const struct hid_device_id *id)
    {
        struct plt_drv_data *drv_data;
        int ret;

        drv_data = devm_kzalloc(&hdev->dev, sizeof(*drv_data), GFP_KERNEL);
        if (!drv_data)
            return -ENOMEM;

        ret = hid_parse(hdev);
        if (ret) {
            hid_err(hdev, "parse failed\n");
            goto err;
        }

        hid_set_drvdata(hdev, (void *)plantronics_device_type(hdev));
        drv_data->device_type = plantronics_device_type(hdev);
        drv_data->quirks = id->driver_data;
        drv_data->last_volume_key_ts = jiffies - msecs_to_jiffies(PLT_DOUBLE_KEY_TIMEOUT);

        hid_set_drvdata(hdev, drv_data);

        ret = hid_hw_start(hdev, HID_CONNECT_DEFAULT |
                HID_CONNECT_HIDINPUT_FORCE | HID_CONNECT_HIDDEV_FORCE);
    }

    static const struct hid_device_id plantronics_devices[] = {
        { HID_USB_DEVICE(USB_VENDOR_ID_PLANTRONICS, 
                      USB_DEVICE_ID_PLANTRONICS_BLACKWIRE_3220_SERIES),
            .driver_data = PLT_QUIRK_DOUBLE_VOLUME_KEYS },
        { HID_USB_DEVICE(USB_VENDOR_ID_PLANTRONICS, HID_ANY_ID) },
        { }
    };
    MODULE_DEVICE_TABLE(hid, plantronics_devices);

    static const struct hid_usage_id plantronics_usages[] = {
        { HID_CP_VOLUMEUP, EV_KEY, HID_ANY_ID },
        { HID_CP_VOLUMEDOWN, EV_KEY, HID_ANY_ID },
        { HID_TERMINATOR, HID_TERMINATOR, HID_TERMINATOR }
    };
}
static struct hid_driver plantronics_driver = {
    .name = "plantronics",
    .id_table = plantronics_devices,
    .usage_table = plantronics_usages,
    .input_mapping = plantronics_input_mapping,
    .event = plantronics_event,
    .probe = plantronics_probe,
};
module_hid_driver(plantronics_driver);
--- linux-4.15.0.orig/drivers/hid/hid-prodikeys.c
+++ linux-4.15.0/drivers/hid/hid-prodikeys.c
@@ -555,10 +555,14 @@
 static int pcmidi_set_operational(struct pcmidi_snd *pm)
 {
     int rc;
+    if (pm->ifnum != 1)
         return 0; /* only set up ONCE for interace 1 */
     -pcmidi_get_output_report(pm);
+     rc = pcmidi_get_output_report(pm);
+     if (rc < 0)
+         return rc;
     pcmidi_submit_output_report(pm, 0xc1);
     return 0;
 }
@@ -687,7 +691,11 @@
 spin_lock_init(&pm->rawmidi_in_lock);

 init_sustain_timers(pm);
-pcmidi_set_operational(pm);
+err = pcmidi_set_operational(pm);
+if (err < 0) {
+    pk_error("failed to find output report\n");
+    goto fail_register;
+}

 /* register it */
 err = snd_card_register(card);
--- linux-4.15.0.orig/drivers/hid/hid-quirks.c
+++ linux-4.15.0/drivers/hid/hid-quirks.c
@@ -0,0 +1,1273 @@
/*
 *  HID quirks support for Linux
 + *
 + Copyright (c) 1999 Andreas Gal
 */
#include <linux/hid.h>
#include <linux/export.h>
#include <linux/slab.h>
#include <linux/mutex.h>
#include <linux/input/elan-i2c-ids.h>

#include "hid-ids.h"

/*
 * Alphabetically sorted by vendor then product.
 */

const struct hid_device_id hid_quirks[] = {
    { HID_USB_DEVICE(USB_VENDOR_ID_AASHIMA, USB_DEVICE_ID_AASHIMA_GAMEPAD),
        HID_QUIRK_BADPAD },
    { HID_USB_DEVICE(USB_VENDOR_ID_AASHIMA, USB_DEVICE_ID_AASHIMA_PREDATOR),
        HID_QUIRK_BADPAD },
    { HID_USB_DEVICE(USB_VENDOR_ID_AFATECH, USB_DEVICE_ID_AFATECH_AF9016),
        HID_QUIRK_FULLSPEED_INTERVAL },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIREN, USB_DEVICE_ID_AIREN_SLIMPLUS),
        HID_QUIRK_NOGET },
    { HID_USB_DEVICE(USB_VENDOR_ID_AMI, USB_DEVICE_ID_AMI_VIRT_KEYBOARD_AND_MOUSE),
        HID_QUIRK_ALWAYS_POLL },
    { HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_2PORTKVM),
        HID_QUIRK_NOGET },
    { HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_4PORTKVMC),
        HID_QUIRK_NOGET },
    { HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_4PORTKVM),
        HID_QUIRK_NOGET },};
+{ HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_CS124U), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_CS1758), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_CS682), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_CS692), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_UC100KM), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ATEN, USB_DEVICE_ID_ATEN_MULTI_TOUCH), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_PIXART_USB_OPTICAL_MOUSE), HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_WIRELESS), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHIC, USB_DEVICE_ID_CHIC_GAMEPAD), HID_QUIRK_BADPAD },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_3AXIS_5BUTTON_STICK), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_AXIS_295), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_COMBATSTICK), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_FIGHTERSTICK), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_FLIGHT_SIM_ECLIPSE_YOKE), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_FLIGHT_SIM_YOKE), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_PRO_PEDALS), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CH, USB_DEVICE_ID_CH_PRO_THROTTLE), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_K65RGB), HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_K65RGB_RAPIDFIRE), HID_QUIRK_NO_INIT_REPORTS | HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_K70RGB), HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_K70RGB_RAPIDFIRE), HID_QUIRK_NO_INIT_REPORTS | HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_K95RGB), HID_QUIRK_NO_INIT_REPORTS | HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_M65RGB), HID_QUIRK_NO_INIT REPORTS },
+{ HID_USB DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR,
USB_DEVICE_ID_CORSAIR_SCIMITAR_PRO_RGB), HID_QUIRK_NO_INIT_REPORTS | HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_STRAFE),
HID_QUIRK_NO_INIT_REPORTS | HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CREATIVELABS,
USB_DEVICE_ID_CREATIVE_SB_OMNI_SURROUND_51), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DELL,
USBDEVICE_ID_DELL_PIXART_USB_OPTICAL_MOUSE), HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DMI, USB_DEVICE_ID_DMI_ENC), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRACAL_RAPHNET,
USB_DEVICE_ID_RAPHNET_2NES2SNES), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRACAL_RAPHNET,
USB_DEVICE_ID_RAPHNET_4NES4SNES), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE,
USB_DEVICE_ID_DRAGONRISE_DOLPHINBAR), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE,
USB_DEVICE_ID_DRAGONRISE_GAMECUBE1), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE,
USB_DEVICE_ID_DRAGONRISE_GAMECUBE3), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_PS3),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_WIIU),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DWAV, USB_DEVICE_ID_EGALAX_TOUCHCONTROLLER),
HID_QUIRK_MULTI_INPUT | HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELAN, HID_ANY_ID), HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELO, USB_DEVICE_ID_ELO_TS2700), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_EMS, USB_DEVICE_ID_EMS_TRIO_LINKER_PLUS_II),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ETURBOTOUCH, USB_DEVICE_ID_ETURBOTOUCHE),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ETURBOTOUCH, USB_DEVICE_ID_ETURBOTOUCHE),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_FORMOSA, USB_DEVICE_ID_FORMOSA_IR_RECEIVER),
HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_FREESCALE, USB_DEVICE_ID_FREESCALE_MX28),
HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_FUTABA, USB_DEVICE_ID_LED_DISPLAY),
HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_GREENASIA,
USB_DEVICE_ID_GREENASIA_DUAL_SAT_ADAPTOR), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_GREENASIA,
USB_DEVICE_ID_GREENASIA_DUAL_USB_JOYPAD), HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HAPP, USB_DEVICE_ID_UGCI_DRIVING),
HID_QUIRK_BADPAD | HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HAPP, USB_DEVICE_ID_UGCI_FIGHTING),
HID_QUIRK_BADPAD | HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HAPP, USB_DEVICE_ID_UGCI_FLYING),
HID_QUIRK_BADPAD | HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT,
USB_DEVICE_ID_HOLTEK_ALT_KEYBOARD_A096), HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT,
USB_DEVICE_ID_HOLTEK_ALT_KEYBOARD_A293), HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HP,
USB_PRODUCT_ID_HP_LOGITECH_OEM_USB_OPTICAL_MOUSE_0A4A),
HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HP,
USB_PRODUCT_ID_HP_LOGITECH_OEM_USB_OPTICAL_MOUSE_0B4A), HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_HP,
USB_PRODUCT_ID_HP_PIXART_USB_OPTICAL_MOUSE), HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_IDEACOM, USB_DEVICE_ID_IDEACOM_IDC6680),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_INNOMEDIA, USB_DEVICE_ID_INNEX_GENESIS_ATARI),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_EASYPEN_M610X),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_MOUSEPEN_I608X),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_MOUSEPEN_I608X_V2),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_PENSKETCH_M912),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KYE,
USB_DEVICE_ID_PIXART_USB_OPTICAL_MOUSE_ID2), HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_C007),
HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_C077),
HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH,
USB_DEVICE_ID_LOGITECH_KEYBOARD_G710_PLUS), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_MOUSE_C01A),
HID_QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_MOUSE_C05A),
HID_QUIRK ALWAYS POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_MOUSE_C06A),
HID_QUIRK ALWAYS POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MCS, USB_DEVICE_ID_MCS_GAMEPADBLOCK),
HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MGE, USB_DEVICE_ID_MGE_UPS), HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_POWER_COVER),
HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_SURFACE_PRO_2),
HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_TOUCH_COVER_2),
HID_QUIRK_NO_INIT_REPORTS }.
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_TYPE_COVER_2),
  HID QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MOJO, USB_DEVICE_ID_RETO_ADAPTER),
  HID QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MSI, USB_DEVICE_ID_MSI_GT683R_LED_PANEL),
  HID QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MULTIPLE_1781, USB_DEVICE_ID_RAPHNET_4NES4SNES_OLD), HID QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NATSU, USB_DEVICE_ID_NATSU_GAMEPAD),
  HID QUIRK_BADPAD },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NEXIO, USB_DEVICE_ID_NEXIO_MULTITOUCH_PTI0750),
  HID QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NEXIO, USB_DEVICE_ID_NEXIO_MULTITOUCH_PTI0750),
  HID QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_DUOSENSE),
  HID QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PANTHERLORD, USB_DEVICE_ID_PANTHERLORD_TWIN_USB_JOYSTICK), HID QUIRK_MULTI_INPUT | HID QUIRK_SKIP_OUTPUT_REPORTS },
+{ HID_USBDEVICE(USB_VENDOR_ID_PENMOUNT, USB_DEVICE_ID_PENMOUNT_1610),
  HID QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PENMOUNT, USB_DEVICE_ID_PENMOUNT_1640),
  HID QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PI_ENGINEERING, USB_DEVICE_ID_PI_ENGINEERING_VEC_USB_FOOTPEDAL), HID QUIRK_HIDINPUT_FORCE },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PIXART, USB_DEVICE_ID_PIXART_OPTICAL_TOUCH_SCREEN1), HID QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PIXART, USB_DEVICE_ID_PIXART_OPTICAL_TOUCH_SCREEN2), HID QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PIXART, USB_DEVICE_ID_PIXART_OPTICAL_TOUCH_SCREEN), HID QUIRK_NO_INIT_REPORTS },
+{ HID_USBDEVICE(USB_VENDOR_ID_PRIMAX, USB_DEVICE_ID_PRIMAX_MOUSE_4D22), HID QUIRK ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PRIMAX_MOUSE_4D22), HID QUIRK_ALWAYS_POLL },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PRODIGE, USB_DEVICE_ID_PRODIGE_CORDLESS), HID QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_QUANTA, USB_DEVICE_ID_QUANTA_OPTICAL_TOUCH_3001), HID QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_QUANTA, USB_DEVICE_ID_QUANTA_OPTICAL_TOUCH_3003), HID QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_QUANTA, USB_DEVICE_ID_QUANTA_OPTICAL_TOUCH_3008), HID QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_REALTEK, USB_DEVICE_ID_REALTEK_READER),}
HID_QUIRK_NO_INIT_REPORTS),
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RUMBLEPAD),
  HID_QUIRK_BADPAD },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SEMICO, USB_DEVICE_ID_SEMICO_USB_KEYKOARD2),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SEMICO, USB_DEVICE_ID_SEMICO_USB_KEYKOARD),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SENNHEISER, USB_DEVICE_ID_SENNHEISER_BTD500USB),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SIGMA_MICRO, USB_DEVICE_ID_SIGMA_MICRO_KEYBOARD),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SIGMATEL, USB_DEVICE_ID_SIGMATEL_STMP3780),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SIS_TOUCH, USB_DEVICE_ID_SIS1030_TOUCH),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SIS_TOUCH, USB_DEVICE_ID_SIS817_TOUCH),
  HID_QUIRK_NOGET },
+{ HID_USBDEVICE(USB_VENDOR_ID_SIS_TOUCH, USB_DEVICE_ID_SIS9200_TOUCH),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SIS_TOUCH, USB_DEVICE_ID_SIS_TS),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SUN, USB_DEVICE_ID_RARITAN_KVM_DONGLE),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYMBOL, USB_DEVICE_ID_SYMBOL_SCANCODE_1),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYMBOL, USB_DEVICE_ID_SYMBOL_SCANCODE_2),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TRUST, USBDEVICE_ID_TRUST_PANORA_TABLET),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_LTS1),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_LTS2),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_QUAD_HD),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_TP_V103),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_DELL_K12A),
  HID_QUIRK_NO_INIT_REPORTS },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TOPMAX, USB_DEVICE_ID_TOPMAX_COBRAPAD),
  HID_QUIRK_BADPAD },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TOUCHPACK, USB_DEVICE_ID_TOUCHPACK_RTS),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TPV, USB_DEVICE_ID_TPV_OPTICAL_TOUCHSCREEN_8882),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TPV, USB_DEVICE_ID_TPV_OPTICAL_TOUCHSCREEN_8883),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TRUST, USB_DEVICE_ID_TRUST_PANORA_TABLET),
HID_QUIRK_MULTI_INPUT | HID_QUIRK_HIDINPUT_FORCE },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TURBOX, USB_DEVICE_ID_TURBOX_KEYBOARD),
  HID_QUIRK_NOGET },
+{ HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_KNA5),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_TWA60),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TURBOX, USB_DEVICE_ID_TURBOX_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_UCLOGIC, USB_DEVICE_ID_UCLOGIC_TABLET_T14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_14_1_INCH),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SIRIUS_BATTERY_FREE_TABLET),
  HID_QUIRK_MULTI_INPUT },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_MEDIA_TABLET_10_6_INCH),
  H
+{ HID_USB_DEVICE(USB_VENDOR_ID_ACRUX, 0xf705) },
+#endif
+
+if IS_ENABLED(CONFIG_HID_ALPS)
+{ HID_DEVICE(HID_BUS_ANY, HID_GROUP_ANY, USB_VENDOR_ID_ALPS_JP, 
HID_DEVICE_ID_ALPS_U1_DUAL) },
+#endif
+
+if IS_ENABLED(CONFIG_HID_APPLE)
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MIGHTYMOUSE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MIGHTYMOUSE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER3_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER3_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER3_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GHEYSER4_HF_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_MINI_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_JIS) },
+{ HID_USB DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB DEVICE_ID_APPLE_WELLSPRING4_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_ISO) },

+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB DEVICE_ID_APPLE_ALU_REVB_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_REVB_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_REVB_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB DEVICE_ID_APPLE_WELLSPRING6_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING8_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING8_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING8_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING9_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING9_ISO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB DEVICE_ID_APPLE_WELLSPRING9_JIS) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_2009_ANSI) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_2009_ISO) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_2009_JIS) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_ANSI) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_ISO) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_ALU_WIRELESS_2011_JIS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_ANSI) },
+{ HID_USB_DEVICE(BT_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_NUMPAD_ANSI) },
+{ HID_BLUETOOTH_DEVICE(BT_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_NUMPAD_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_NUMPAD_ANSI) },
+{ HID_BLUETOOTH_DEVICE(BT_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGIC_KEYBOARD_NUMPAD_ANSI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_TP_ONLY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER1_TP_ONLY) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL4) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_IRCONTROL5) },
+#endif
+{ HID_I2C_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_I2C_KEYBOARD) },
+{ HID_I2C_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_I2C_TOUCHPAD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_ROG_KEYBOARD1) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_ROG_KEYBOARD2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_ROG_KEYBOARD3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_T100_KEYBOARD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_JESS, USB_DEVICE_ID_ASUS_MD_5112) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TURBOX, USB_DEVICE_ID_ASUS_MD_5110) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_T100CHI_KEYBOARD) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_AUREAL, USB_DEVICE_ID_AUREAL_W01RN) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_BELKIN, USB_DEVICE_ID_FLIP_KVM) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LABTEC, USB_DEVICE_ID_LABTEC_WIRELESS_KEYBOARD) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185BFM, 0x2208) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185PC, 0x5506) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185V2PC, 0x1850) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_BETOP_2185V2BFM, 0x5500) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHERRY, USB_DEVICE_ID_CHERRY_CYMOTION) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHERRY, USB_DEVICE_ID_CHERRY_CYMOTION_SOLAR) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_TACTICAL_PAD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_CHICONY_WIRELESS2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_ASUS_AK1D) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CHICONY, USB_DEVICE_ID_ACER_SWITCH12) },
+#endif
+if IS_ENABLED(CONFIG_HID_CMEDIA)
+{ HID_USB_DEVICE(USB_VENDOR_ID_CMEDIA, USB_DEVICE_ID_CM6533) },
+endif
+if IS_ENABLED(CONFIG_HID_CORSAIR)
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_K90) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CORSAIR, USB_DEVICE_ID_CORSAIR_SCIMITAR_PRO_RGB) },
+endif
+if IS_ENABLED(CONFIG_HID_CP2112)
+{ HID_USB_DEVICE(USB_VENDOR_ID_CYGNAL, USB_DEVICE_ID_CYGNAL_CP2112) },
+endif
+if IS_ENABLED(CONFIG_HID_CYPRESS)
+{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_1) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_BARCODE_4) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_MOUSE) },
+endif
+if IS_ENABLED(CONFIG_HID_DRAGONRISE)
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, 0x0006) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, 0x0011) },
+endif
+if IS_ENABLED(CONFIG_HID_ELECOM)
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_BM084) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_DEFT_WIRED) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_DEFT_WIRELESS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_HUGE_WIRED) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELECOM, USB_DEVICE_ID_ELECOM_HUGE_WIRELESS) },
+endif
+if IS_ENABLED(CONFIG_HID_ELO)
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELO, 0x0009) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ELO, 0x0030) },
+endif
+if IS_ENABLED(CONFIG_HID_EMS_FF)
+{ HID_USB_DEVICE(USB_VENDOR_ID_EMS, USB_DEVICE_ID_EMS_TRIO_LINKER_PLUS_II) },
+endif
+if IS_ENABLED(CONFIG_HID_EZKEY)
+{ HID_USB_DEVICE(USB_VENDOR_ID_EZKEY, USB_DEVICE_ID_BTC_8193) },
+endif
+if IS_ENABLED(CONFIG_HID_GEMBIRD)
+{ HID_USB_DEVICE(USB_VENDOR_ID_GEMBIRD, USB_DEVICE_ID_GEMBIRD_JPD_DUALFORCE2) },
+endif
+if IS_ENABLED(CONFIG_HID_GFRM)
+{ HID_BLUETOOTH_DEVICE(0x58, 0x2000) },
+{ HID_BLUETOOTH_DEVICE(0x471, 0x2210) },
+endif
+#if IS_ENABLED(CONFIG_HID_GREENASIA)
+ * { HID_USB_DEVICE(USB_VENDOR_ID_GREENASIA, 0x0012) },
+#endif
+ #if IS_ENABLED(CONFIG_HID_GT683R)
+ * { HID_USB_DEVICE(USB_VENDOR_ID_MSI, USB_DEVICE_ID_MSI_GT683R_LED_PANEL) },
+#endif
+ #if IS_ENABLED(CONFIG_HID_GYRATION)
+ * { HID_USB_DEVICE(USB_VENDOR_ID_GYRATION, USB_DEVICE_ID_GYRATION_REMOTE) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_GYRATION, USB_DEVICE_ID_GYRATION_REMOTE_2) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_GYRATION, USB_DEVICE_ID_GYRATION_REMOTE_3) },
+#endif
+ #if IS_ENABLED(CONFIG_HID_HOLTEK)
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK, USB_DEVICE_ID_HOLTEK_ON_LINE_GRIP) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_KEYBOARD) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A04A) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A067) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A070) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A072) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A081) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_HOLTEK_ALT, USB_DEVICE_ID_HOLTEK_ALT_MOUSE_A0C2) },
+#endif
+ #if IS_ENABLED(CONFIG_HID_ICADE)
+ * { HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_ION, USB_DEVICE_ID_ICADE) },
+#endif
+ #if IS_ENABLED(CONFIG_HID_KENSINGTON)
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KENSINGTON, USB_DEVICE_ID_KS_SLIMBLADE) },
+#endif
+ #if IS_ENABLED(CONFIG_HID_KEYTOUCH)
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KEYTOUCH, USB_DEVICE_ID_KEYTOUCH_IEC) },
+#endif
+ #if IS_ENABLED(CONFIG_HID_KYE)
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_GENIUS_GILA_GAMING_MOUSE) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_GENIUS_MANTICORE) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_GENIUS_GX_IMPERATOR) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_ERGO_525V) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_EASYPEN_I405X) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_MOUSEPEN_I608X) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_MOUSEPEN_I608X_V2) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_EASYPEN_M610X) },
+ * { HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB DEVICE_ID_KYE_PENSKETCH_M912) },
+#endif
+#if IS_ENABLED(CONFIG_HID_LCPower)
+{ HID_USB_DEVICE(USB_VENDOR_ID_LCPower, USB_DEVICE_ID_LCPower_LC1000) },
+#endif
+#if IS_ENABLED(CONFIG_HID_LED)
+{ HID_USB_DEVICE(USB_VENDOR_ID_DELCOM, USB_DEVICE_ID_DELCOM_Visual_IND) },
+{ HID_USB DEVICE(USB_VENDOR_ID_DREAM_CHEEKY, USB_DEVICE_ID_DREAM_CHEEKY_WN) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DREAM_CHEEKY, USB_DEVICE_ID_DREAM_CHEEKY_FA) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_LUXAFOR) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_RISO_KAGAKU, USB_DEVICE_ID_RI_KA_WEBMAIL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_THINGM, USB DEVICE_ID_BLINK1) },
+#endif
+#if IS_ENABLED(CONFIG_HID_LENOVO)
+{ HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_TPKBD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_CUSBKBD) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_CBTKBD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_TPPRODOCK) },
+#endif
+#if IS_ENABLED(CONFIG_HID_LOGITECH)
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_MX3000_RECEIVER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_S510_RECEIVER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_S510_RECEIVER_2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RECEIVER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Desktop) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_DINOVO_EDGE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_MINI) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_ELITE_KBD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB DEVICE_ID_LOGITECH_Cordless_Desktop_LX500) },
+{ HID_USB DEVICE(USB_VENDOR_ID_LOGITECH, USB DEVICE_ID_LOGITECH_Extreme_3D) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Dual_Action) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_WHEEL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Rumblepad_Cord) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Rumblepad) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Rumblepad2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G29_WHEEL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Wingman_FD3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USBDEVICE_ID_LOGITECH_Wingman_FFG) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Force3D_Pro) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Flight_System_G940) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Momo_Wheel) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Momo_Wheel2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_Vibration_Wheel) },

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+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_DFP_WHEEL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_DFGT_WHEEL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G25_WHEEL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G27_WHEEL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_WII_WHEEL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_RUMBLEPAD2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_SPACETRAVELLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_SPACENAVIGATOR) }, #endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_T651) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_G920_WHEEL) }, #endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_UNIFYING_RECEIVER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_UNIFYING_RECEIVER_2) }, #endif
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_MAGICMOUSE) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_APPLE, USBDEVICE_ID_APPLE_MAGICTRACKPAD) }, #endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_PS3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_DOLPHINBAR) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_GAMECUBE1) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_GAMECUBE2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_DRAGONRISE, USB_DEVICE_ID_DRAGONRISE_GAMECUBE3) }, #endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_COMFORT_MOUSE_4500) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_COMFORT_KEYBOARD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_SIDEWINDER_GV) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_NE4K) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_NE4K_JP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_NE7K) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_LK6K) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_PRESENTER_8K_USB) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_DIGITAL_MEDIA_3K) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_COMFORT_MOUSE_4500) },
USB_DEVICE_ID_WIRELESS_OPTICAL_DESKTOP_3_0) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_OFFICE_KB) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_DIGITAL_MEDIA_7K) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_DIGITAL_MEDIA_600) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USBDEVICE_ID_MS_DIGITAL_MEDIA_3KV1) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_POWERCOVER) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_MICROSOFT, USB_DEVICE_ID_MS_PRESENTER_8K_BT) },
+##endif
+#if IS_ENABLED(CONFIG_HID_MONTEREY)
+{ HID_USB_DEVICE(USB_VENDOR_ID_MONTEREY, USB_DEVICE_ID_GENIUS_KB29E) },
+##endif
+#if IS_ENABLED(CONFIG_HID_MULTITOUCH)
+{ HID_USB_DEVICE(USB_VENDOR_ID_LG, USB_DEVICE_ID_LG_MELFAS_MT) },
+##endif
+#if IS_ENABLED(CONFIG_HID_WIIMOTE)
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_NINTENDO, USB_DEVICE_ID_NINTENDO_WIIMOTE) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_NINTENDO, USB_DEVICE_ID_NINTENDO_WIIMOTE2) },
+##endif
+#if IS_ENABLED(CONFIG_HID_NTI)
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTI, USB_DEVICE_ID_USB_SUN) },
+##endif
+#if IS_ENABLED(CONFIG_HID_NTRIG)
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_1) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_4) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_5) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_6) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_7) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_8) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_9) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_10) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_11) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_12) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_13) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_14) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_15) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_16) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USB_DEVICE_ID_NTRIG_TOUCH_SCREEN_17) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NTRIG, USBDEVICE_ID_NTRIG_TOUCH_SCREEN_18) },
+##endif
+#if IS_ENABLED(CONFIG_HID_ORTEK)
+{ HID_USB_DEVICE(USB_VENDOR_ID_ORTEK, USB_DEVICE_ID_ORTEK_PKB1700) },
}
+{ HID_USB_DEVICE(USB_VENDOR_ID_ORTEK, USB_DEVICE_ID_ORTEK_WKB2000) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ORTEK, USB_DEVICE_ID_ORTEK_IHOME_IMAC_A210S) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SKYCABLE, USB_DEVICE_ID_SKYCABLE_WIRELESS_PRESENTER) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_PANTHERLORD)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_GAMERON, USB_DEVICE_ID_GAMERON_DUAL_PSX_ADAPTOR) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_GAMERON, USB_DEVICE_ID_GAMERON_DUAL_PCS_ADAPTOR) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_PENMOUNT)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_PENMOUNT, USB_DEVICE_ID_PENMOUNT_6000) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_PETALYNX)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_PETALYNX, USB_DEVICE_ID_PETALYNX_MAXTER_REMOTE) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_PICOLCD)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICOLCD) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICOLCD_BOOTLOADER) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_PLANTRONICS)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_PLANTRONICS, HID_ANY_ID) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_PRIMAX)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_PRIMAX, USB_DEVICE_ID_PRIMAX_KEYPAD) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_PRODIKEYS)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_CREATIVELABS, USB_DEVICE_ID_PRODIKEYS_PCMIDI) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_RETRODE)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_FUTURE_TECHNOLOGY, USB_DEVICE_ID_RETRODE2) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_RMI)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_LENOVO, USB_DEVICE_ID_LENOVO_X1_COVER) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_RAZER, USB_DEVICE_ID_RAZER_BLADE_14) },
  +#endif
  +#if IS_ENABLED(CONFIG_HID_ROCCAT)
  +{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_ARVO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_SKULL) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_SKULLFX) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONE) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEPLUS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEPURE) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEPURE_OPTICAL) }


},
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KONEXTD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_KOVAPLUS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_LUAM) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_PYRA_WIRED) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_PYRA_WIRELESS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_RYOS_MK) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_RYOS_MK_GLOW) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_RYOS_MK_PRO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ROCCAT, USB_DEVICE_ID_ROCCAT_SAVU) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_OLD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_MMO7) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MADCATZ, USB_DEVICE_ID_MADCATZ_RAT5) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MADCATZ, USB_DEVICE_ID_MADCATZ_RAT9) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAMSUNG, USB_DEVICE_ID_SAMSUNG_IR_REMOTE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAMSUNG, USB_DEVICE_ID_SAMSUNG_WIRELESS_KBD_MOUSE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PLAYDOTCOM, USB_DEVICE_ID_PLAYDOTCOM_EMS_USBII) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP, USB_DEVICE_ID_SMARTJOYPLUS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP, USB_DEVICE_ID_SUPER_JOY_BOX_3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP, USB_DEVICE_ID_DUAL_USB_JOYPAD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP_LTD, USB_DEVICE_ID_SUPER_JOY_BOX_3_PRO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP_LTD, USB_DEVICE_ID_SUPER_DUAL_BOX_PRO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_WISEGROUP_LTD, USB_DEVICE_ID_SUPER_JOY_BOX_5_PRO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LOGITECH, USB_DEVICE_ID_LOGITECH_HARMONY_PS3) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SMK, USB_DEVICE_ID_SMK_PS3_BDREMOTE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_BUZZ_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_WIRELESS_BUZZ_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_MOTION_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_MOTION_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY,
    USB_DEVICE_ID_SONY_NAVIGATION_CONTROLLER) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY,
    USB_DEVICE_ID_SONY_NAVIGATION_CONTROLLER) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY,
    USB_DEVICE_ID_SONY_PS3_BDREMOTE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS3_CONTROLLER) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS3_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS3_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER_2) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER_2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_PS4_CONTROLLER_DONGLE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_VAIO_VGX_MOUSE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SONY, USB_DEVICE_ID_SONY_VAIO_VGP_MOUSE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SINO_LITE, USB_DEVICE_ID_SINO_LITE_CONTROLLER) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_X_TENSIONS,
    USB_DEVICE_ID_X_TENSIONS, USB_DEVICE_ID_SPEEDLINK_VAD_CEZANNE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_STEELSERIES, USB_DEVICE_ID_STEELSERIES_SRWS1) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_TIVO, USB_DEVICE_ID_TIVO_SLIDE_BT) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TIVO, USB_DEVICE_ID_TIVO_SLIDE_BT) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_TIVO, USB_DEVICE_ID_TIVO_SLIDE_PRO) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE) }.}
+	{ HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE_2) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE_2) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE_2) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE_2) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_BTC, USB_DEVICE_ID_BTC_EMPREX_REMOTE_2) },
+#endif
+
+if IS_ENABLED(CONFIG_HID_TWINHAN)
+	{ HID_USB_DEVICE(USB_VENDOR_ID_TWINHAN, USB_DEVICE_ID_TWINHAN_IR_REMOTE) },
+endif
+
+if IS_ENABLED(CONFIG_HID_UCLOGIC)
+	{ HID_USB_DEVICE(USB_VENDOR_ID_HUION, USB_DEVICE_ID_HUION_TABLET) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_HUION, USB_DEVICE_ID_HUION_TABLET) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_HUION, USB_DEVICE_ID_HUION_TABLET) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_HUION, USB_DEVICE_ID_HUION_TABLET) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_HUION, USB_DEVICE_ID_HUION_TABLET) },
+endif
+
+if IS_ENABLED(CONFIG_HID_UDRAW_PS3)
+	{ HID_USB_DEVICE(USB_VENDOR_ID_THQ, USB_DEVICE_ID_THQ_PS3_UDRAW) },
+endif
+
+if IS_ENABLED(CONFIG_HID_WALTOP)
+	{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SLIM_TABLET_5_8_INCH) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SLIM_TABLET_5_8_INCH) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SLIM_TABLET_5_8_INCH) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SLIM_TABLET_5_8_INCH) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_WALTOP, USB_DEVICE_ID_WALTOP_SLIM_TABLET_5_8_INCH) },
+endif
+
+if IS_ENABLED(CONFIG_HID_XINMO)
+	{ HID_USB_DEVICE(USB_VENDOR_ID_XIN_MO, USB_DEVICE_ID_XIN_MO_DUAL_ARCADE) },
+	{ HID_USB_DEVICE(USB_VENDOR_ID_XIN_MO, USB_DEVICE_ID_XIN_MO_DUAL_ARCADE) },
+endif
+
+if IS_ENABLED(CONFIG_HID_ZEROPLUS)
/* a list of devices that shouldn't be handled by HID core at all */
const struct hid_device_id hid_ignore_list[] = {
    { HID_USB_DEVICE(USB_VENDOR_ID_ACECAD, USB_DEVICE_ID_ACECAD_FLAIR) },
    { HID_USB_DEVICE(USB_VENDOR_ID_ACECAD, USB_DEVICE_ID_ACECAD_302) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_01) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_10) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_20) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_21) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_22) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_23) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIPTEK, USB_DEVICE_ID_AIPTEK_24) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AIRCABLE, USB_DEVICE_ID_AIRCABLE1) },
    { HID_USB_DEVICE(USB_VENDOR_ID_ALCOR, USB_DEVICE_ID_ALCOR_USBRS232) },
    { HID_USB_DEVICE(USB_VENDOR_ID_ASUSTEK, USB_DEVICE_ID_ASUSTEK_LCM) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AVERMEDIA, USB_DEVICE_ID_AVER_FM_MR800) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AVERMEDIA, USB_DEVICE_ID_AVER_FM_SI470X) },
    { HID_USB_DEVICE(USB_VENDOR_ID_AVERMEDIA, USB_DEVICE_ID_AVER_FM_SI470X) },
    { HID_USB_DEVICE(USB_VENDOR_ID_BERKSHIRE, USB_DEVICE_ID_BERKSHIRE_PCWD) },
    { hid_usb_device(USB_VENDOR_ID_CIDC, 0x0103) },
    { hid_usb_device(USB_VENDOR_ID_CYGNAL, USB_DEVICE_ID_CYGNAL_RADIO_SI470X) },
    { hid_usb_device(USB_VENDOR_ID_CYGNAL, USB_DEVICE_ID_CYGNAL_RADIO_SI4713) },
    { hid_usb_device(USB_VENDOR_ID_CMEDIA, USB_DEVICE_ID_CM109) },
    { hid_usb_device(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_SI4701) },
    { hid_usb_device(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_SI4713) },
    { hid_usb_device(USB_VENDOR_ID_CYPRESS, USB_DEVICE_ID_CYPRESS_SI4713) },
    { hid_usb_device(USB_VENDOR_ID_DEALExtreme, USB_DEVICE_ID_DEALEXtreme_RADIO_SI4701) },
    { hid_usb_device(USB_VENDOR_ID_DEALExtreme, USB_DEVICE_ID_DEALEXtreme_RADIO_SI4713) },
    { hid_usb_device(USB_VENDOR_ID_DEALExtreme, USB_DEVICE_ID_DEALEXtreme_RADIO_SI4713) },
    { hid_usb_device(USB_VENDOR_ID_DEALExtreme, USB_DEVICE_ID_DEALEXtreme_RADIO_SI4713) },
    { hid_usb_device(USB_VENDOR_ID_DEALExtreme, USB_DEVICE_ID_DEALEXtreme_RADIO_SI4713) },
};
+ { HID_USB_DEVICE(USB_VENDOR_ID_GOTOP, USB_DEVICE_ID_PENPOWER) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GRETAGMACBETH, USB_DEVICE_ID_GRETAGMACBETH_HUEY) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GRIFFIN, USB_DEVICE_ID_POWERMATE) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GRIFFIN, USB_DEVICE_ID_SOUNDKNOB) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GRIFFIN, USB_DEVICE_ID_RADIOSHARK) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_90) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_100) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_101) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_103) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_104) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_105) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_106) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_107) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_108) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_200) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_201) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_202) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_203) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_204) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_205) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_206) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_207) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_208) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_209) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_300) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_301) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_302) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_303) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_304) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_305) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_306) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_307) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_308) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_309) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_400) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_401) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_402) },
+ { HID_USB DEVICE (USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_403) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_404) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_405) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_500) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_501) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_502) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_503) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_504) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1000) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1001) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1002) },
+ { HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1003) }.  

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+{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1004) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1005) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1006) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_GTCO, USB_DEVICE_ID_GTCO_1007) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_IMATION, USB_DEVICE_ID_DISC_STAKKA) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_JABRA, USB_DEVICE_ID_JABRA_SPEAK_410) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_JABRA, USB_DEVICE_ID_JABRA_SPEAK_510) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_JABRA, USB_DEVICE_ID_JABRA_GN9350E) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KBGEAR, USB_DEVICE_ID_KBGEAR_JAMSTUDIO) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KWORLD, USB_DEVICE_ID_KWORLD_RADIO_FM700) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_KYE, USB_DEVICE_ID_KYE_GPEN_560) },
+{ HID_BLUETOOTH_DEVICE(USB_VENDOR_ID_KYE, 0x0058) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_CASSY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_CASSY2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LDPOCHETCASSY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LDPOCHETCASSY2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOBILCASSY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOBILCASSY2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYVOLTAGE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYCURRENT) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYTIME) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYTEMPERATURE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYPH) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_POWERANALYSERCASSY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_CONVERTERCONTROLLERCASSY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MACHINETESTCASSY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_JWM) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_DMMP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_UMIP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_UMIC) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_UMIB) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_XRAY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_XRAY2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_VIDEOCOM) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOTOR) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_COM3LAB) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_TELEPORT) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_NETWORKANALYSER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_POWERCONTROL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MACHINETEST) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOSTANALYSER) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MOSTANALYSER2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_ABSEESP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_AUTODATABUS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MCT) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_HYBRID) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_LD, USB DEVICE_ID_LD_HEATCONTROL) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MADCATZ, USB_DEVICE_ID_MADCATZ_BEATPAD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MCC, USB_DEVICE_ID_MCC_PMD1024LS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MCC, USB_DEVICE_ID_MCC_PMD1208LS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICKIT1) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICKIT2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICK16F1454) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_MICROCHIP, USB_DEVICE_ID_PICK16F1454_V2) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_NATIONAL_SEMICONDUCTOR, USB_DEVICE_ID_N_S_HARMONY) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 20) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 30) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 100) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 108) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 118) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 200) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 300) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 400) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_ONTRAK, USB_DEVICE_ID_ONTRAK_ADU100 + 500) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0001) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0002) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0003) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PANJIT, 0x0004) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PETZL, USB_DEVICE_ID_PETZL_HEADLAMP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_PHILIPS, USB_DEVICE_ID_PHILIPS_IEEE802154_DONGLE) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_POWERCOM, USB_DEVICE_ID_POWERCOM_UPS) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SAI, USB_DEVICE_ID_CYPRESS_HIDCOM) },
+#if IS_ENABLED(CONFIG_MOUSE_SYNAPTICS_USB)
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_TP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_INT_TP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_CPAD) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_STICK) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_WP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_COMP_TP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_WTP) },
+{ HID_USB_DEVICE(USB_VENDOR_ID_SYNAPTICS, USB_DEVICE_ID_SYNAPTICS_DPAD) },
+#endif
+{ HID_USB_DEVICE(USB_VENDOR_ID_YEALINK, USB_DEVICE_ID_YEALINK_P1K_P4K_B2K) },
+{ }
+;
+/** *
+ * hid_mouse_ignore_list - mouse devices which should not be handled by the hid layer *
+ *
+ * There are composite devices for which we want to ignore only a certain *
+ * interface. This is a list of devices for which only the mouse interface will *
+ * be ignored. This allows a dedicated driver to take care of the interface. *
+ */
+static const struct hid_device_id hid_mouse_ignore_list[] = {
  /* appletouch driver */
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_FOUNTAIN_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER3_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER3_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER3_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_HF_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_HF_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_GEYSER4_HF_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING2_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING3_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING4A_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING5A_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING6A_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_ISO) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7_JIS) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_ANSI) },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_APPLE, USB_DEVICE_ID_APPLE_WELLSPRING7A_ISO) },
bool hid_ignore(struct hid_device *hdev)
{
    int i;

    if (hdev->quirks & HID_QUIRK_NO_IGNORE)
        return false;
    if (hdev->quirks & HID_QUIRK_IGNORE)
        return true;

    switch (hdev->vendor) {
    case USB_VENDOR_ID_CODEMERCS:
        /* ignore all Code Mercenaries IOWarrior devices */
        if (hdev->product >= USB_DEVICE_ID_CODEMERCS_IOW_FIRST &&
            hdev->product <= USB_DEVICE_ID_CODEMERCS_IOW_LAST)
            return true;
        break;
    case USB_VENDOR_ID_LOGITECH:
        if (hdev->product >= USBDEVICEID_LOGITECH_HARMONYFIRST &&
            hdev->product <= USBDEVICEID_LOGITECH_HARMONYLAST)
            return true;
        break;
    case USB_VENDOR_ID_SOUNDGRAPH:
        if (hdev->product >= USBDEVICEID_SOUNDGRAPHIMONFIRST &&
            hdev->product <= USBDEVICEID_SOUNDGRAPHIMONLAST)
            return true;
        break;
    case USB_VENDOR_ID_APPLE:
        if (hdev->product >= USBDEVICEID_APPLE_WELLSPRING7FIRST &&
            hdev->product <= USBDEVICEID_APPLE_WELLSPRING7LAST) 
            return true;
        break;
    case USB_VENDOR_ID_APPLE:
        if (hdev->product >= USBDEVICEID_APPLE_WELLSPRING8FIRST &&
            hdev->product <= USBDEVICEID_APPLE_WELLSPRING8LAST) 
            return true;
        break;
    case USB_VENDOR_ID_APPLE:
        if (hdev->product >= USBDEVICEID_APPLE_WELLSPRING9FIRST &&
            hdev->product <= USBDEVICEID_APPLE_WELLSPRING9LAST) 
            return true;
        break;
    case USB_VENDOR_ID_APPLE:
        if (hdev->product >= USBDEVICEID_FOUNTAINTPONLY &&
            hdev->product <= USBDEVICEID_FOUNTAINTPONLY) 
            return true;
        break;
    case USB_VENDOR_ID_APPLE:
        if (hdev->product >= USBDEVICEID_GEYSERTPONLY &&
            hdev->product <= USBDEVICEID_GEYSERTPONLY) 
            return true;
        break;
    }
    return false;
}
+case USB_VENDOR_ID_HANWANG:
+    if (hdev->product >= USB_DEVICE_ID_HANWANG_TABLET_FIRST &&
+        hdev->product <= USB_DEVICE_ID_HANWANG_TABLET_LAST)
+        return true;
+    break;
+case USB_VENDOR_ID_JESS:
+    if (hdev->product == USB_DEVICE_ID_JESS_YUREX &&
+        hdev->type == HID_TYPE_USBNONE)
+        return true;
+    break;
+case USB_VENDOR_ID_VELLEMAN:
+    /* These are not HID devices. They are handled by comedi. */
+    if ((hdev->product >= USB_DEVICE_ID_VELLEMAN_K8055_FIRST &&
+         hdev->product <= USB_DEVICE_ID_VELLEMAN_K8055_LAST) ||
+        (hdev->product >= USB_DEVICE_ID_VELLEMAN_K8061_FIRST &&
+         hdev->product <= USB_DEVICE_ID_VELLEMAN_K8061_LAST))
+        return true;
+    break;
+case USB_VENDOR_ID_ATMEL_V_USB:
+    /* Masterkit MA901 usb radio based on Atmel tiny85 chip and
+    * it has the same USB ID as many Atmel V-USB devices. This
+    * usb radio is handled by radio-ma901.c driver so we want
+    * ignore the hid. Check the name, bus, product and ignore
+    * if we have MA901 usb radio.
+    */
+    if (hdev->product == USB_DEVICE_ID_ATMEL_V_USB &&
+        hdev->bus == BUS_USB &&
+        strncmp(hdev->name, "www.masterkit.ru MA901", 22) == 0)
+        return true;
+    break;
+case USB_VENDOR_ID_ELAN:
+    /*
+    * Blacklist of everything that gets handled by the elan_i2c
+    * input driver. This avoids disabling valid touchpads and
+    * other ELAN devices.
+    */
+    if ((hdev->product == 0x0401 || hdev->product == 0x0400))
+        for (i = 0; strlen(elan_acpi_id[i].id); ++i)
+            if (!strncmp(hdev->name, elan_acpi_id[i].id,
+                         strlen(elan_acpi_id[i].id)))
+                return true;
+    break;
+case USB_VENDOR_ID_USB_MOUSE:
+    if (hdev->type == HID_TYPE_USBMOUSE &&
+        hid_match_id(hdev, hid_mouse_ignore_list))
+        return true;
+return !!hid_match_id(hdev, hid_ignore_list);
+
+EXPORT_SYMBOL_GPL(hid_ignore);
+
+/* Dynamic HID quirks list - specified at runtime */
+struct quirks_list_struct {
+struct hid_device_id hid_bl_item;
+struct list_head node;
+};
+
+static LIST_HEAD(dquirks_list);
+static DEFINE_MUTEX(dquirks_lock);
+
+/* Runtime ("dynamic") quirks manipulation functions */
+
+/**
+ * hid_exists_dquirk: find any dynamic quirks for a HID device
+ * @hdev: the HID device to match
+ *
+ * Description:
+ * Scans dquirks_list for a matching dynamic quirk and returns
+ * the pointer to the relevant struct hid_device_id if found.
+ * Must be called with a read lock held on dquirks_lock.
+ *
+ * Returns: NULL if no quirk found, struct hid_device_id * if found.
+ */
+static struct hid_device_id *hid_exists_dquirk(const struct hid_device *hdev)
+{
+struct quirks_list_struct *q;
+struct hid_device_id *bl_entry = NULL;
+
+list_for_each_entry(q, &dquirks_list, node) {
+if (hid_match_one_id(hdev, &q->hid_bl_item)) {
+bl_entry = &q->hid_bl_item;
+break;
+}
+}
+
+if (bl_entry != NULL)
+dbg_hid("Found dynamic quirk 0x%lx for HID device 0x%hx:0x%hx\n",
+bl_entry->driver_data, bl_entry->vendor,
+bl_entry->product);
+
+return bl_entry;
+}
+
+/**
hid_modify_dquirk: add/replace a HID quirk
+ * @id: the HID device to match
+ * @quirks: the unsigned long quirks value to add/replace
+ *
+ * Description:
+ * If an dynamic quirk exists in memory for this device, replace its
+ * quirks value with what was provided. Otherwise, add the quirk
+ * to the dynamic quirks list.
+ *
+ * Returns: 0 OK, -error on failure.
+ */
+
+static int hid_modify_dquirk(const struct hid_device_id *id,
+     const unsigned long quirks)
+{
+struct hid_device *hdev;
+struct quirks_list_struct *q_new, *q;
+int list_edited = 0;
+int ret = 0;
+
+hdev = kzalloc(sizeof(*hdev), GFP_KERNEL);
+if (!hdev)
+    return -ENOMEM;
+
+q_new = kmalloc(sizeof(struct quirks_list_struct), GFP_KERNEL);
+if (!q_new) {
+    ret = -ENOMEM;
+    goto out;
+}
+
+hdev->bus = q_new->hid_bl_item.bus = id->bus;
+hdev->group = q_new->hid_bl_item.group = id->group;
+hdev->vendor = q_new->hid_bl_item.vendor = id->vendor;
+hdev->product = q_new->hid_bl_item.product = id->product;
+q_new->hid_bl_item.driver_data = quirks;
+
+mutex_lock(&dquirks_lock);
+
+list_for_each_entry(q, &dquirks_list, node) {
+    if (hid_match_one_id(hdev, &q->hid_bl_item)) {
+        list_replace(&q->node, &q_new->node);
+        kfree(q);
+        list_edited = 1;
+        break;
+    }
+}
+
+out: mutex_unlock(&dquirks_lock);
+
+return ret;
+}
```c
if (!list_edited)
	list_add_tail(&q_new->node, &dquirks_list);
+mutex_unlock(&dquirks_lock);
+out:
+kfree(hdev);
+return ret;
+
+/
+* hid_remove_all_dquirks: remove all runtime HID quirks from memory
+* @bus: bus to match against. Use HID_BUS_ANY if all need to be removed.
+*
+* Description:
+* Free all memory associated with dynamic quirks - called before
+* module unload.
+*
+*/
+static void hid_remove_all_dquirks(__u16 bus)
+{
+struct quirks_list_struct *q, *temp;
+
+mutex_lock(&dquirks_lock);
+list_for_each_entry_safe(q, temp, &dquirks_list, node) {
+if (bus == HID_BUS_ANY || bus == q->hid_bl_item.bus) {
+list_del(&q->node);
+kfree(q);
+}
+}
+mutex_unlock(&dquirks_lock);
+
+/
+* hid_quirks_init: apply HID quirks specified at module load time
+*/
+int hid_quirks_init(char **quirks_param, __u16 bus, int count)
+{
+struct hid_device_id id = { 0 };
+int n = 0, m;
+unsigned short int vendor, product;
+u32 quirks;
+
id.bus = bus;
+```
for (; n < count && quirks_param[n]; n++) {
    m = sscanf(quirks_param[n], "0x%hx:0x%hx:0x%x",
                &vendor, &product, &quirks);
    id.vendor = (__u16)vendor;
    id.product = (__u16)product;
    if (m != 3 ||
        hid_modify_dquirk(&id, quirks) != 0) {
        pr_warn("Could not parse HID quirk module param %s\n",
                quirks_param[n]);
    }
} + return 0;
+
+EXPORT_SYMBOL_GPL(hid_quirks_init);
+
+/**
+ * hid_quirks_exit: release memory associated with dynamic_quirks
+ * @bus: a bus to match against
+ *
+ * Description:
+ *     Release all memory associated with dynamic quirks for a given bus.
+ *     Called upon module unload.
+ *     Use HID_BUS_ANY to remove all dynamic quirks.
+ *
+ * Returns: nothing
+ */
+void hid_quirks_exit(__u16 bus)
+{
+hid_remove_all_dquirks(bus);
+
+EXPORT_SYMBOL_GPL(hid_quirks_exit);
+
+/**
+ * hid_gets_squirk: return any static quirks for a HID device
+ * @hdev: the HID device to match
+ *
+ * Description:
+ *     Given a HID device, return a pointer to the quirked hid_device_id entry
+ *     associated with that device.
+ *
+ * Returns: the quirks.
+ */
+static unsigned long hid_gets_squirk(const struct hid_device *hdev)
+{
const struct hid_device_id *bl_entry;
unsigned long quirks = 0;

if (hid_match_id(hdev, hid_ignore_list))
quirks |= HID_QUIRK_IGNORE;

if (hid_match_id(hdev, hid_have_special_driver))
quirks |= HID_QUIRK_HAVE_SPECIAL_DRIVER;

bl_entry = hid_match_id(hdev, hid_quirks);
if (bl_entry != NULL)
quirks |= bl_entry->driver_data;

if (quirks)
dbg_hid("Found squirk 0x%lx for HID device 0x%hx:0x%hx\n",
quirks, hdev->vendor, hdev->product);
return quirks;

/**
 * hid_lookup_quirk: return any quirks associated with a HID device
 * @hdev: the HID device to look for
 *
 * Description:
 *     Given a HID device, return any quirks associated with that device.
 *
 * Returns: an unsigned long quirks value.
 */
unsigned long hid_lookup_quirk(const struct hid_device *hdev)
{
unsigned long quirks = 0;
const struct hid_device_id *quirk_entry = NULL;

/* NCR devices must not be queried for reports */
if (hdev->bus == BUS_USB &&
    hdev->vendor == USB_VENDOR_ID_NCR &&
    hdev->product >= USB_DEVICE_ID_NCR_FIRST &&
    hdev->product <= USB_DEVICE_ID_NCR_LAST)
return HID_QUIRK_NO_INIT_REPORTS;

mutex_lock(&dquirks_lock);
quirk_entry = hid_exists_dquirk(hdev);
if (quirk_entry)
quirks = quirk_entry->driver_data;
else
quirks = hid_gets_squirk(hdev);
mutex_unlock(&dquirks_lock);


unsigned long flags;

struct rmi_data *hdata = hid_get_drvdata(hdev);

-/* I need to get my data in one piece */
+ /* I need to get my data in one piece */
if (off != 0 || count != sizeof(struct kone_settings))
    return -EINVAL;
mutex_lock(&kone->kone_lock);
-difference = memcmp(buf, &kone->settings, sizeof(struct kone_settings));
+ difference = memcmp(settings, &kone->settings,
                      sizeof(struct kone_settings));
if (difference) {
    retval = kone_set_settings(usb_dev,
                               const *)buf);
    -mutex_unlock(&kone->kone_lock);
    -return retval;
}

struct rmi_data *hdata = hid_get_drvdata(hdev);

-@@ -718,7 +718,8 @@
+    && test_bit(RMI_STARTED, &hdata->flags)) {
    clear_bit(RMI_STARTED, &hdata->flags);
    cancel_work_sync(&hdata->reset_work);
    rmi_unregister_transport_device(&hdata->xport);
--- linux-4.15.0.orig/drivers/hid/hid-roccat-kone.c
+++ linux-4.15.0/drivers/hid/hid-roccat-kone.c
@@ -297,31 +297,40 @@
                          sizeof(struct kone_settings));
struct usb_device *usb_dev = interface_to_usbdev(to_usb_interface(dev));
int retval = 0, difference, old_profile;
+struct kone_settings *settings = (struct kone_settings *)&buf;

    if (off != 0 || count != sizeof(struct kone_settings))
        return -EINVAL;
mutex_lock(&kone->kone_lock);
-difference = memcmp(buf, &kone->settings, sizeof(struct kone_settings));
+ difference = memcmp(settings, &kone->settings,
                      sizeof(struct kone_settings));
if (difference) {
    retval = kone_set_settings(usb_dev,
                               const *)buf);
    -mutex_unlock(&kone->kone_lock);
    -return retval;
}

--- linux-4.15.0.orig/drivers/hid/hid-rmi.c
+++ linux-4.15.0/drivers/hid/hid-rmi.c
@@ -89,8 +89,8 @@
    u8 *writeReport;
    u8 *readReport;

    int input_report_size;
    int output_report_size;
+    u32 input_report_size;
+    u32 output_report_size;

unsigned long flags;

@@ -718,7 +718,8 @@
          {
            struct rmi_data *hdata = hid_get_drvdata(hdev);

-/* I need to get my data in one piece */
+/* I need to get my data in one piece */
    if (off != 0 || count != sizeof(struct kone_settings))
        return -EINVAL;
mutex_lock(&kone->kone_lock);
-difference = memcmp(buf, &kone->settings, sizeof(struct kone_settings));
+ difference = memcmp(settings, &kone->settings,
                      sizeof(struct kone_settings));
if (difference) {
    retval = kone_set_settings(usb_dev,
                               const *)buf);
    -mutex_unlock(&kone->kone_lock);
    -return retval;
}
if (settings->startup_profile < 1 ||
    settings->startup_profile > 5)
{
    retval = -EINVAL;
    goto unlock;
}

retval = kone_set_settings(usb_dev, settings);
if (retval)
    goto unlock;

old_profile = kone->settings.startup_profile;
memcpy(&kone->settings, buf, sizeof(struct kone_settings));
memcpy(&kone->settings, settings, sizeof(struct kone_settings));

kone_profile_activated(kone, kone->settings.startup_profile);

if (kone->settings.startup_profile != old_profile)
kone_profile_report(kone, kone->settings.startup_profile);
}

unlock:
mutex_unlock(&kone->kone_lock);

if (retval)
    return retval;

return sizeof(struct kone_settings);
}

static BIN_ATTR(settings, 0660, kone_sysfs_read_settings,
--- linux-4.15.0.orig/drivers/hid/hid-roccat-kovaplus.c
+++ linux-4.15.0/drivers/hid/hid-roccat-kovaplus.c
@@ -37,6 +37,8 @@
static void kovaplus_profile_activated(struct kovaplus_device *kovaplus,
    uint new_profile_index)
{
    +if (new_profile_index >= ARRAY_SIZE(kovaplus->profile_settings))
        +return;
    kovaplus->actual_profile = new_profile_index;
kovaplus->actual_cpi = kovaplus->profile_settings[new_profile_index].cpi_startup_level;
kovaplus->actual_x_sensitivity = kovaplus->profile_settings[new_profile_index].sensitivity_x;
--- linux-4.15.0.orig/drivers/hid/hid-saitek.c
+++ linux-4.15.0/drivers/hid/hid-saitek.c
@@ -183,6 +183,8 @@
    },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT9),
        .driver_data = SAITEK_RELEASE_MODE_RAT9 },
    { HID_USB_DEVICE(USB_VENDOR_ID_SAITEK, USB_DEVICE_ID_SAITEK_RAT7_CONTAGION),
        .driver_data = SAITEK_RELEASE_MODE_RAT7 },
}
"driver_data = SAITEK_RELEASE_MODE_RAT7 },
{ HID_USB_DEVICE(USB_VENDOR_ID_MADCATZ, USB_DEVICE_ID_MADCATZ_RAT9),
--- linux-4.15.0.orig/drivers/hid/hid-sensor-custom.c
+++ linux-4.15.0/drivers/hid/hid-sensor-custom.c
@@ -358,7 +358,7 @@
sensor_inst->hsdev,
sensor_inst->hsdev->usage,
usage, report_id,
-SENSOR_HUB_SYNC);
+SENSOR_HUB_SYNC, false);
} else if (!strncmp(name, "units", strlen("units")))
value = sensor_inst->fields[field_index].attribute.units;
else if (!strncmp(name, "unit-expo", strlen("unit-expo")))
--- linux-4.15.0.orig/drivers/hid/hid-sensor-hub.c
+++ linux-4.15.0/drivers/hid/hid-sensor-hub.c
@@ -223,16 +223,21 @@
buffer_size = buffer_size / sizeof(__s32);
if (buffer_size) {
for (i = 0; i < buffer_size; ++i) {
-hid_set_field(report->field[field_index], i,
-(__force __s32)cpu_to_le32(*buf32));
+ret = hid_set_field(report->field[field_index], i,
+(__force __s32)cpu_to_le32(*buf32));
+if (ret)
+goto done_proc;
+
++buf32;
}
}
if (remaining_bytes) {
value = 0;
memcpy(&value, (u8 *)buf32, remaining_bytes);
-hid_set_field(report->field[field_index], i,
-(__force __s32)cpu_to_le32(value));
+ret = hid_set_field(report->field[field_index], i,
+(__force __s32)cpu_to_le32(value));
+if (ret)
+goto done_proc;
}
hid_hw_request(hsdev->hdev, report, HID_REQ_SET_REPORT);
hid_hw_wait(hsdev->hdev);
@@ -299,7 +304,8 @@
int sensor_hub_input_attr_get_raw_value(struct hid_sensor_hub_device *hsdev,
u32 usage_id,
u32 attr_usage_id, u32 report_id,
-enum sensor_hub_read_flags flag)
+enum sensor_hub_read_flags flag,
+bool is_signed)
struct sensor_hub_data *data = hid_get_drvdata(hsdev->hdev);
unsigned long flags;
@@ -331,10 +337,16 @@
&hsdev->pending.ready, HZ*5);
switch (hsdev->pending.raw_size) {
  case 1:
    ret_val = *(u8 *)hsdev->pending.raw_data;
+    if (is_signed)
+      ret_val = *(s8 *)hsdev->pending.raw_data;
    else
+      ret_val = *(u8 *)hsdev->pending.raw_data;
    break;
  case 2:
    ret_val = *(u16 *)hsdev->pending.raw_data;
+    if (is_signed)
+      ret_val = *(s16 *)hsdev->pending.raw_data;
    else
+      ret_val = *(u16 *)hsdev->pending.raw_data;
    break;
  case 4:
    ret_val = *(u32 *)hsdev->pending.raw_data;
@@ -489,7 +501,8 @@
    return 1;
  
  ptr = raw_data;
-  ptr++; /* Skip report id */
+  if (report->id)
+    ptr++; /* Skip report id */

spin_lock_irqsave(&pdata->lock, flags);
@@ -579,6 +592,28 @@
}
EXPORT_SYMBOL_GPL(sensor_hub_device_close);

+static __u8 *sensor_hub_report_fixup(struct hid_device *hdev, __u8 *rdesc,
+unsigned int *rsize)
+{
+  /*
+   * Checks if the report descriptor of Thinkpad Helix 2 has a logical
+   * minimum for magnetic flux axis greater than the maximum.
+   * */
+  if (hdev->product == USB_DEVICE_ID_TEXAS_INSTRUMENTS_LENOVO_YOGA &&
+      *rsize == 2558 && rdesc[913] == 0x17 && rdesc[914] == 0x40 &&
+      rdesc[915] == 0x81 && rdesc[916] == 0x08 &&
+      rdesc[917] == 0x00 && rdesc[918] == 0x27 &&
+      rdesc[921] == 0x07 && rdesc[922] == 0x00) {
/* Sets negative logical minimum for mag x, y and z */
+rdesc[914] = rdesc[935] = rdesc[956] = 0xc0;
+rdesc[915] = rdesc[936] = rdesc[957] = 0x7e;
+rdesc[916] = rdesc[937] = rdesc[958] = 0xf7;
+rdesc[917] = rdesc[938] = rdesc[959] = 0xff;
+
+
+return rdesc;
+
+
static int sensor_hub_probe(struct hid_device *hdev,
     const struct hid_device_id *id)
{
    ...
    .probe = sensor_hub_probe,
    .remove = sensor_hub_remove,
    .raw_event = sensor_hub_raw_event,
+
    +.report_fixup = sensor_hub_report_fixup,

    #ifdef CONFIG_PM
    .suspend = sensor_hub_suspend,
    .resume = sensor_hub_resume,
    --- linux-4.15.0.orig/drivers/hid/hid-sony.c
    +++ linux-4.15.0/drivers/hid/hid-sony.c
    @ @ -578,10 +578,14 @@
    static inline void sony_schedule_work(struct sony_sc *sc,
            enum sony_worker which)
    {
    +unsigned long flags;
    +
    switch (which) {
    case SONY_WORKER_STATE:
        ...
    +spin_lock_irqsave(&sc->lock, flags);
    +if (!sc->defer_initialization &
    +if (!sc->defer_initialization &

    +spin_unlock_irqrestore(&sc->lock, flags);
    break;

    case SONY_WORKER_HOTPLUG:
        ...
    if (sc->hotplug_worker_initialized)
    @ @ -833,6 +837,23 @@
    if (sc->quirks & PS3REMOTE)
    return ps3remote_fixup(hdev, rdesc, rsize);

    +/*
    + * Some knock-off USB dongles incorrectly report their button count
    + * as 13 instead of 16 causing three non-functional buttons.
    + */
    +if ((sc->quirks & SIXAXIS_CONTROLLER_USB) &
    +if ((sc->quirks & SIXAXIS_CONTROLLER_USB) &
/* Report Count (13) */
+rdesc[23] == 0x95 && rdesc[24] == 0x0D &
/* Usage Maximum (13) */
+rdesc[37] == 0x29 && rdesc[38] == 0x0D &
/* Report Count (3) */
+rdesc[43] == 0x95 && rdesc[44] == 0x03) {
    hid_info(hdev, "Fixing up USB dongle report descriptor\n");
+rdesc[24] = 0x10;
+rdesc[38] = 0x10;
+rdesc[44] = 0x00;
+
} +
return rdesc;
}

static int sony_init_ff(struct sony_sc *sc)
{
-struct hid_input *hidinput = list_entry(sc->hdev->inputs.next,
-struct hid_input, list);
-struct input_dev *input_dev = hidinput->input;
+struct hid_input *hidinput;
+struct input_dev *input_dev;
+
+if (list_empty(&sc->hdev->inputs)) {
+    hid_err(sc->hdev, "no inputs found\n");
+    return -ENODEV;
+}
+hidinput = list_entry(sc->hdev->inputs.next, struct hid_input, list);
+input_dev = hidinput->input;

    input_set_capability(input_dev, EV_FF, FF_RUMBLE);
    return input_ff_create_memless(input_dev, NULL, sony_play_effect);
}

static inline void sony_cancel_work_sync(struct sony_sc *sc)
{
+unsigned long flags;
+
    if (sc->hotplug_worker_initialized)
        cancel_work_sync(&sc->hotplug_worker);
    -if (sc->state_worker_initialized)
        spin_lock_irqsave(&sc->lock, flags);
    -sc->state_worker_initialized = 0;
    +spin_unlock_irqrestore(&sc->lock, flags);
    cancel_work_sync(&sc->state_worker);
static int sony_input_configured(struct hid_device *hdev,  
struct hid_input *hidinput)
{
    kfree(sc->output_report_dmbuf);  
    sony_remove_dev_list(sc);  
    sony_release_device_id(sc);  
    hid_hw_stop(hdev);  
    return ret;  
}

static const signed short ff_rumble[] = {
    FF_RUMBLE,
    -1
}

switch (effect->type) {
    case FF_CONSTANT:  
        ff_field->logical_minimum,  
        ff_field->logical_maximum);
    break;

    default:
        ff_field->logical_minimum,  
        ff_field->logical_maximum);
    break;

    /* 2-in-1 strong motor is left */
    if (hid->product == THRUSTMASTERDEVICE_ID_2_IN_1_DT) {
		/*
	*/
        ff_field = tmff->ff_field;  
        int x, y;  
        int left, right;/* Rumbling */
        +int motor_swap;

        switch (effect->type) {
            case FF_CONSTANT:  
                ff_field->logical_minimum,  
                ff_field->logical_maximum);
            break;

            default:
                ff_field->logical_minimum,  
                ff_field->logical_maximum);
            break;

            /* 2-in-1 strong motor is left */
            if (hid->product == THRUSTMASTERDEVICE_ID_2_IN_1_DT) {

motor_swap = left;
left = right;
right = motor_swap;
+
+  dbg_hid("(left,right)=%08x, %08x\n", left, right);
  ff_field->value[0] = left;
  ff_field->value[1] = right;
@@ -126,12 +136,18 @@
  struct hid_input *hidinput = list_entry(hid->inputs.next,
  struct hid_input, list);
  struct input_dev *input_dev = hidinput->input;
  int error;
  int i;

  if (list_empty(&hid->inputs)) {
    hid_err(hid, "no inputs found\n");
    return -ENODEV;
  }
  hidinput = list_entry(hid->inputs.next, struct hid_input, list);
  input_dev = hidinput->input;
  +tmff = kzalloc(sizeof(struct tmff_device), GFP_KERNEL);
  if (!tmff)
    return -ENOMEM;
  if (!tmff)
    return -ENOMEM;
  .driver_data = (unsigned long)ff_rumble ,
  { HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb304), /* FireStorm Dual Power 2 (and 3) */
    .driver_data = (unsigned long)ff_rumble },
  +{ HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, THRUSTMASTER_DEVICE_ID_2_IN_1_DT),
    /* Dual Trigger 2-in-1 */
    .driver_data = (unsigned long)ff_rumble },
  { HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb323), /* Dual Trigger 3-in-1 (PC Mode) */
    .driver_data = (unsigned long)ff_rumble },
  { HID_USB_DEVICE(USB_VENDOR_ID_THRUSTMASTER, 0xb324), /* Dual Trigger 3-in-1 (PS3 Mode) */
    .driver_data = (unsigned long)ff_rumble },
    --- linux-4.15.0.orig/drivers/hid/hid-zpff.c
    +++ linux-4.15.0/drivers/hid/hid-zpff.c
    @@ -66,11 +66,17 @@
    { struct zpff_device *zpff;
      struct hid_report *report;
      -struct hid_input *hidinput = list_entry(hid->inputs.next,
      -struct hid_input, list);
struct input_dev *dev = hidinput->input;
+struct hid_input *hidinput;
+struct input_dev *dev;
int i, error;

+if (list_empty(&hid->inputs)) {
+hid_err(hid, "no inputs found\n");
+return -ENODEV;
+}
+hidinput = list_entry(hid->inputs.next, struct hid_input, list);
+dev = hidinput->input;
+
for (i = 0; i < 4; i++) {
report = hid_validate_values(hid, HID_OUTPUT_REPORT, 0, i, 1);
if (!report)
--- linux-4.15.0.orig/drivers/hid/hidraw.c
+++ linux-4.15.0/drivers/hid/hidraw.c
@@ -192,6 +192,11 @@
int ret = 0, len;
unsigned char report_number;

+if (!hidraw_table[minor] || !hidraw_table[minor]->exist) {
+ret = -ENODEV;
+goto out;
+}
+dev = hidraw_table[minor]->hid;
if (!dev->ll_driver->raw_request) {
@@ -252,13 +257,14 @@
static unsigned int hidraw_poll(struct file *file, poll_table *wait)
{
struct hidraw_list *list = file->private_data;
+unsigned int mask = POLLOUT | POLLWRNORM; /* hidraw is always writable */
poll_wait(file, &list->hidraw->wait, wait);
if (list->head != list->tail)
-return POLLIN | POLLRDNORM;
+mask |= POLLIN | POLLRDNORM;
if (!list->hidraw->exist)
-return POLLERR | POLLHUP;
-return 0;
+mask |= POLLERR | POLLHUP;
+return mask;
}

static int hidraw_open(struct inode *inode, struct file *file)
@@ -373,7 +379,7 @@
mutex_lock(&minors_lock);
dev = hidraw_table[minor];
-if (!dev) {
+if (!dev || !dev->exist) {
  ret = -ENODEV;
  goto out;
}
--- linux-4.15.0.orig/drivers/hid/i2c-hid/Makefile
+++ linux-4.15.0/drivers/hid/i2c-hid/Makefile
@@ -3,3 +3,6 @@
#
obj-$(CONFIG_I2C_HID)+= i2c-hid.o
+
i2c-hid-objs= i2c-hid-core.o
+i2c-hid-$(CONFIG_DMI)+= i2c-hid-dmi-quirks.o
--- linux-4.15.0.orig/drivers/hid/i2c-hid/i2c-hid-core.c
+++ linux-4.15.0/drivers/hid/i2c-hid/i2c-hid-core.c
@@ -0,0 +1,1366 @@
+/*
+ * HID over I2C protocol implementation
+ *
+ * Copyright (c) 2012 Benjamin Tissoires <benjamin.tissoires@gmail.com>
+ * Copyright (c) 2012 Ecole Nationale de l'Aviation Civile, France
+ * Copyright (c) 2012 Red Hat, Inc
+ *
+ * This code is partly based on "USB HID support for Linux":
+ *
+ * Copyright (c) 1999 Andreas Gal
+ * Copyright (c) 2000-2005 Vojtech Pavlik <vojtech@suse.cz>
+ * Copyright (c) 2005 Michael Haboustak <mike-@cinci.rr.com> for Concept2, Inc
+ * Copyright (c) 2007-2008 Oliver Neukum
+ * Copyright (c) 2006-2010 Jiri Kosina
+ *
+ * This file is subject to the terms and conditions of the GNU General Public
+ * License. See the file COPYING in the main directory of this archive for
+ * more details.
+ */
+
+##include <linux/module.h>
+##include <linux/i2c.h>
+##include <linux/interrupt.h>
+##include <linux/input.h>
+##include <linux/irq.h>
+##include <linux/delay.h>
+##include <linux/slab.h>
+##include <linux/pm.h>
+ #include <linux/pm_runtime.h>
+ #include <linux/device.h>
+ #include <linux/wait.h>
+ #include <linux/err.h>
+ #include <linux/string.h>
+ #include <linux/list.h>
+ #include <linux/jiffies.h>
+ #include <linux/kernel.h>
+ #include <linux/hid.h>
+ #include <linux/mutex.h>
+ #include <linux/acpi.h>
+ #include <linux/of.h>
+ #include <linux/regulator/consumer.h>
+
+ #include <linux/platform_data/i2c-hid.h>
+
+ #include "./.hid-ids.h"
+ #include "i2c-hid.h"
+
+ /* quirks to control the device */
+ #define I2C_HID_QUIRK_SET_PWR_WAKEUP_DEV	BIT(0)
+ #define I2C_HID_QUIRK_NO_IRQ_AFTER_RESET	BIT(1)
+ #define I2C_HID_QUIRK_RESEND_REPORT_DESCR	BIT(2)
+ #define I2C_HID_QUIRK_NO_RUNTIME_PM		BIT(3)
+ #define I2C_HID_QUIRK_BOGUS_IRQ			BIT(4)
+ #define I2C_HID_QUIRK_RESET_ON_RESUME		BIT(5)
+ #define I2C_HID_QUIRK_BAD_INPUT_SIZE		BIT(6)
+
+
+ /* flags */
+ #define I2C_HID_STARTED		0
+ #define I2C_HID_RESET_PENDING	1
+ #define I2C_HID_READ_PENDING	2
+
+ #define I2C_HID_PWR_ON		0x00
+ #define I2C_HID_PWR_SLEEP	0x01
+
+ /* debug option */
+ static bool debug;
+ module_param(debug, bool, 0444);
+ MODULE_PARM_DESC(debug, "print a lot of debug information");
+
+ #define i2c_hid_dbg(ihid, fmt, arg...)					  \
+ do {									  \
+ if (debug)							  \
+ dev_printk(KERN_DEBUG, &(ihid)->client->dev, fmt, ##arg); \
+ } while (0)
+

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+struct i2c_hid_desc {
+  __le16 wHIDDescLength;
+  __le16 bcdVersion;
+  __le16 wReportDescLength;
+  __le16 wReportDescRegister;
+  __le16 wInputRegister;
+  __le16 wMaxInputLength;
+  __le16 wOutputRegister;
+  __le16 wMaxOutputLength;
+  __le16 wCommandRegister;
+  __le16 wDataRegister;
+  __le16 wVendorID;
+  __le16 wProductID;
+  __le16 wVersionID;
+  __le32 reserved;
+} __packed;
+
+struct i2c_hid_cmd {
+  unsigned int registerIndex;
+  __u8 opcode;
+  unsigned int length;
+  bool wait;
+};
+
+union command {
+  u8 data[0];
+  struct cmd {
+    __le16 reg;
+    __u8 reportTypeID;
+    __u8 opcode;
+  } __packed c;
+};
+
+#define I2C_HID_CMD(opcode_) \
+  .opcode = opcode_, .length = 4, \ 
+  .registerIndex = offsetof(struct i2c_hid_desc, wCommandRegister)
+
+/* fetch HID descriptor */
+static const struct i2c_hid_cmd hid_descr_cmd = { .length = 2 }; 
+/* fetch report descriptors */
+static const struct i2c_hid_cmd hid_report_descr_cmd = { 
+  .registerIndex = offsetof(struct i2c_hid_desc, 
+  wReportDescRegister),
+  .opcode = 0x00,
+  .length = 2 }; 
+/* commands */
+static const struct i2c_hid_cmd hid_reset_cmd = I2C_HID_CMD(0x01),
+  .wait = true
;
+static const struct i2c_hid_cmd hid_get_report_cmd = { I2C_HID_CMD(0x02) };
+static const struct i2c_hid_cmd hid_set_report_cmd = { I2C_HID_CMD(0x03) };
+static const struct i2c_hid_cmd hid_set_power_cmd = { I2C_HID_CMD(0x08) };
+static const struct i2c_hid_cmd hid_no_cmd = { .length = 0 };
+
+/*
+ * These definitions are not used here, but are defined by the spec.
+ * Keeping them here for documentation purposes.
+ */
+* static const struct i2c_hid_cmd hid_get_idle_cmd = { I2C_HID_CMD(0x04) };
+* static const struct i2c_hid_cmd hid_set_idle_cmd = { I2C_HID_CMD(0x05) };
+* static const struct i2c_hid_cmd hid_get_protocol_cmd = { I2C_HID_CMD(0x06) };
+* static const struct i2c_hid_cmd hid_set_protocol_cmd = { I2C_HID_CMD(0x07) };
+*/
+
+static DEFINE_MUTEX(i2c_hid_open_mut);
+
+/* The main device structure */
+struct i2c_hid {
+struct i2c_client*client;/* i2c client */
+struct hid_device*hid;/* pointer to corresponding HID dev */
+union {
+__u8 hdesc_buffer[sizeof(struct i2c_hid_desc)];
+struct i2c_hid_desc hdesc;/* the HID Descriptor */
+};
+__le16 HIDDescRegister;/* location of the i2c
+ * register of the HID
+ * descriptor. */
+unsigned intbufsize;/* i2c buffer size */
+u8*inbuf;/* Input buffer */
+u8*rawbuf;/* Raw Input buffer */
+u8*cmdbuf;/* Command buffer */
+u8*argsbuf;/* Command arguments buffer */
+
+unsigned longflags;/* device flags */
+unsigned longquirks;/* Various quirks */
+
+wait_queue_head_t twait;/* For waiting the interrupt */
+
+struct i2c_hid_platform_data pdata;
+
+bool irq_wake_enabled;
+struct mutex reset_lock;
+};
+
+static const struct i2c_hid_quirks {
+__u16 idVendor;
+__u16 idProduct;
+__u32 quirks;
+{ USB_VENDOR_ID_WEIDA, USB_DEVICE_ID_WEIDA_8752,
+I2C_HID_QUIRK_SET_PWR_WAKEUP_DEV },
+{ USB_VENDOR_ID_WEIDA, USB_DEVICE_ID_WEIDA_8755,
+I2C_HID_QUIRK_SET_PWR_WAKEUP_DEV },
+{ I2C_VENDOR_ID_HANTICK, I2C_PRODUCT_ID_HANTICK_5288,
+I2C_HID_QUIRK_NO_IRQ_AFTER_RESET }
+{ I2C_HID_QUIRK_NO_RUNTIME_PM },
+{ USB_VENDOR_ID_SIS_TOUCH, USB_DEVICE_ID_SIS10FB_TOUCH,
+I2C_HID_QUIRK_RESEND_REPORT_DESCR },
+{ USB_VENDOR_ID_LG, I2C_DEVICE_ID_LG_8001,
+I2C_HID_QUIRK_NO_RUNTIME_PM },
+{ I2C_VENDOR_ID_GOODIX, I2C_DEVICE_ID_GOODIX_01F0,
+I2C_HID_QUIRK_NO_RUNTIME_PM },
+{ USB_VENDOR_ID_ELAN, HID_ANY_ID,
+I2C_HID_QUIRK_BOGUS_IRQ },
+{ USB_VENDOR_ID_ALPS_JP, HID_ANY_ID,
+I2C_HID_QUIRK_RESET_ON_RESUME },
+{ I2C_VENDOR_ID_SYNAPTICS, I2C_PRODUCT_ID_SYNAPTICS_SYNA2393,
+I2C_HID_QUIRK_RESET_ON_RESUME },
+{ USB_VENDOR_ID_ITE, I2C_DEVICE_ID_ITE_LENOVO_LEGION_Y720,
+I2C_HID_QUIRK_BAD_INPUT_SIZE },
+{ 0, 0 }
+};
+*/
+ /* i2c_hid_lookup_quirk: return any quirks associated with a I2C HID device
+ @idVendor: the 16-bit vendor ID
+ @idProduct: the 16-bit product ID
+ */
+ * Returns: a u32 quirks value.
+ */
+static u32 i2c_hid_lookup_quirk(const u16 idVendor, const u16 idProduct)
+{
+u32 quirks = 0;
+int n;
+for (n = 0; i2c_hid_quirks[n].idVendor; n++)
+if (i2c_hid_quirks[n].idVendor == idVendor &&
+ (i2c_hid_quirks[n].idProduct == (__u16)HID_ANY_ID ||
+ i2c_hid_quirks[n].idProduct == idProduct))
+quirks = i2c_hid_quirks[n].quirks;
++return quirks;
+}
+*/
+static int __i2c_hid_command(struct i2c_client *client,
const struct i2c_hid_cmd *command, u8 reportID, u8 reportType, u8 *args, int args_len, unsigned char *buf_recv, int data_len)
{
    struct i2c_hid *ihid = i2c_get_clientdata(client);
    union command *cmd = (union command *)ihid->cmdbuf;
    int ret;
    struct i2c_msg msg[2];
    int msg_num = 1;

    int length = command->length;
    bool wait = command->wait;
    unsigned int registerIndex = command->registerIndex;

    /* special case for hid_descr_cmd */
    if (command == &hid_descr_cmd) {
        cmd->c.reg = ihid->wHIDDescRegister;
    } else {
        cmd->data[0] = ihid->hdesc_buffer[registerIndex];
        cmd->data[1] = ihid->hdesc_buffer[registerIndex + 1];
    }

    if (length > 2) {
        cmd->c.opcode = command->opcode;
        cmd->c.reportTypeID = reportID | reportType << 4;
    }

    memcpy(cmd->data + length, args, args_len);
    length += args_len;

    i2c_hid_dbg(ihid, "%s: cmd=%*ph\n", __func__, length, cmd->data);

    msg[0].addr = client->addr;
    msg[0].flags = client->flags & I2C_M_TEN;
    msg[0].len = length;
    msg[0].buf = cmd->data;
    if (data_len > 0) {
        msg[1].addr = client->addr;
        msg[1].flags = client->flags & I2C_M_TEN;
        msg[1].flags |= I2C_M_RD;
        msg[1].len = data_len;
        msg[1].buf = buf_recv;
        msg_num = 2;
        set_bit(I2C_HID_READ_PENDING, &ihid->flags);
    }

    if (wait)
        set_bit(I2C_HID_RESET_PENDING, &ihid->flags);
+ret = i2c_transfer(client->adapter, msg, msg_num);
+
+if (data_len > 0)
+clear_bit(I2C_HID_READ_PENDING, &ihid->flags);
+
+if (ret != msg_num)
+return ret < 0 ? ret : -EIO;
+
+ret = 0;
+
+if (wait && (ihid->quirks & I2C_HID_QUIRK_NO_IRQ_AFTER_RESET)) {
+msleep(100);
+} else if (wait) {
+i2c_hid_dbg(ihid, "%s: waiting...
", __func__);
+if (!wait_event_timeout(ihid->wait,
+!test_bit(I2C_HID_RESET_PENDING, &ihid->flags),
+msecs_to_jiffies(5000)))
+ret = -ENODATA;
+i2c_hid_dbg(ihid, "%s: finished.
", __func__);
+}
+
+return ret;
+
+
+static int i2c_hid_command(struct i2c_client *client,
+const struct i2c_hid_cmd *command,
+unsigned char *buf_recv, int data_len)
+{
+return __i2c_hid_command(client, command, 0, 0, NULL, 0,
+buf_recv, data_len);
+}
+
+static int i2c_hid_get_report(struct i2c_client *client, u8 reportType,
+u8 reportID, unsigned char *buf_recv, int data_len)
+{
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+u8 args[3];
+int ret;
+int args_len = 0;
+u16 readRegister = le16_to_cpu(ihid->hdesc.wDataRegister);
+
i2c_hid_dbg(ihid, "%s\n", __func__);
+
+if (reportID >= 0x0F) {
+args[args_len++] = reportID;
+reportID = 0x0F;
+}

---

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+ +ret = __i2c_hid_command(client, &hid_get_report_cmd, reportID, +reportType, args, args_len, buf_recv, data_len); +if (ret) { +dev_err(&client->dev, +"failed to retrieve report from device\n"); +return ret; +} + +return 0; +} + +/** + * i2c_hid_set_or_send_report: forward an incoming report to the device + * @client: the i2c_client of the device + * @reportType: 0x03 for HIDFEATURE_REPORT ; 0x02 for HIDOUTPUT_REPORT + * @reportID: the report ID + * @buf: the actual data to transfer, without the report ID + * @bufsize: size of buf + * @use_data: true: use SET_REPORT HID command, false: send plain OUTPUT report + */ +static int i2c_hid_set_or_send_report(struct i2c_client *client, u8 reportType, +u8 reportID, unsigned char *buf, size_t data_len, bool use_data) +{ +struct i2c_hid *ihid = i2c_get_clientdata(client); +u8 *args = ihid->argsbuf; +const struct i2c_hid_cmd *hidcmd; +int ret; +u16 dataRegister = le16_to_cpu(ihid->hdesc.wDataRegister); +u16 outputRegister = le16_to_cpu(ihid->hdesc.wOutputRegister); +u16 maxOutputLength = le16_to_cpu(ihid->hdesc.wMaxOutputLength); +u16 size; +int args_len; +int index = 0; +
+i2c_hid_dbg(ihid, "%s\n", __func__); +
+if (data_len > ihid->bufsize) +return -EINVAL; +
+size =2/* size */ ++(reportID ? 1 : 0)* reportID */ ++data_len/* buf */; ++args_len =(reportID >= 0x0F ? 1 : 0) /* optional third byte */ ++2/* dataRegister */;
+size/* args */;
+
+if (!use_data && maxOutputLength == 0)
+return -ENOSYS;
+
+if (reportID >= 0x0F) {
+args[index++] = reportID;
+reportID = 0x0F;
+}
+
+/*
+ * use the data register for feature reports or if the device does not
+ * support the output register
+ */
+if (use_data) {
+args[index++] = dataRegister & 0xFF;
+args[index++] = dataRegister >> 8;
+hidcmd = &hid_set_report_cmd;
+} else {
+args[index++] = outputRegister & 0xFF;
+args[index++] = outputRegister >> 8;
+hidcmd = &hid_no_cmd;
+}
+
+args[index++] = size & 0xFF;
+args[index++] = size >> 8;
+
+if (reportID)
+args[index++] = reportID;
+
+memcpy(&args[index], buf, data_len);
+
+ret = __i2c_hid_command(client, hidcmd, reportID,
+reportType, args, args_len, NULL, 0);
+if (ret) {
+dev_err(&client->dev, "failed to set a report to device.\n");
+return ret;
+}
+
+return data_len;
+
+static int i2c_hid_set_power(struct i2c_client *client, int power_state)
+{
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+int ret;
+
i2c_hid_dbg(ihid, "%s\n", __func__);
Some devices require to send a command to wake up before power on. The call will get a return value (EREMOTEIO) but device will be triggered and activated. After that, it goes like a normal device.

```c
if (power_state == I2C_HID_PWR_ON &&
    ihid->quirks & I2C_HID_QUIRK_SET_PWR_WAKEUP_DEV) {
    ret = i2c_hid_command(client, &hid_set_power_cmd, NULL, 0);
    /* Device was already activated */
    if (!ret)
        goto set_pwr_exit;
}
ret = __i2c_hid_command(client, &hid_set_power_cmd, power_state,
    0, NULL, 0, NULL, 0);
    /* The HID over I2C specification states that if a DEVICE needs time after the PWR_ON request, it should utilise CLOCK stretching. However, it has been observed that the Windows driver provides a 1ms sleep between the PWR_ON and RESET requests. According to Goodix Windows even waits 60 ms after (other?) PWR_ON requests. Testing has confirmed that several devices will not work properly without a delay after a PWR_ON request. */
    if (!ret && power_state == I2C_HID_PWR_ON)
        msleep(60);
return ret;
}
static int i2c_hid_hwreset(struct i2c_client *client) {
    struct i2c_hid *ihid = i2c_get_clientdata(client);
    int ret;
    i2c_hid_dbg(ihid, "%s\n", __func__);
    /* This prevents sending feature reports while the device is being reset. Otherwise we may lose the reset complete
    */
interrupt. */
mutex_lock(&ihid->reset_lock);
+ret = i2c_hid_set_power(client, I2C_HID_PWR_ON);
+if (ret)
+goto out_unlock;
+i2c_hid_dbg(ihid, "resetting...
");
+ret = i2c_hid_command(client, &hid_reset_cmd, NULL, 0);
+if (ret) {
+dev_err(&client->dev, "failed to reset device.

+i2c_hid_set_power(client, I2C_HID_PWR_SLEEP);
+
+out_unlock:
+mutex_unlock(&ihid->reset_lock);
+return ret;
+}
+
+static void i2c_hid_get_input(struct i2c_hid *ihid)
+{
+int ret;
+u32 ret_size;
+int size = le16_to_cpu(ihid->hdesc.wMaxInputLength);
+
+if (size > ihid->bufsize)
+size = ihid->bufsize;
+
+ret = i2c_master_recv(ihid->client, ihid->inbuf, size);
+if (ret != size) {
+if (ret < 0)
+return;
+
+dev_err(&ihid->client->dev, "%s: got %d data instead of %d
", __func__, ret, size);
+return;
+}
+
+ret_size = ihid->inbuf[0] | ihid->inbuf[1] << 8;
+
+if (!ret_size) {
+/* host or device initiated RESET completed */
+if (test_and_clear_bit(I2C_HID_RESET_PENDING, &ihid->flags))
+wake_up(&ihid->wait);
+return;
+}
+if (ihid->quirks & I2C_HID_QUIRK_BOGUS_IRQ && ret_size == 0xffff) {
+dev_warn_once(&ihid->client->dev, "%s: IRQ triggered but 
+"there's no data\n", __func__);
+return;
+
+if ((ret_size > size) || (ret_size < 2)) {
+if (ihid->quirks & I2C_HID_QUIRK_BAD_INPUT_SIZE) {
+ihid->inbuf[0] = size & 0xff;
+ihid->inbuf[1] = size >> 8;
+ret_size = size;
+} else {
+dev_err(&ihid->client->dev, "%s: incomplete report (%d/%d)\n",
+__func__, size, ret_size);
+return;
+
+i2c_hid_dbg(ihid, "input: %*ph
", ret_size, ihid->inbuf);
+
+if (test_bit(I2C_HID_STARTED, &ihid->flags))
+hid_input_report(ihid->hid, HID_INPUT_REPORT, ihid->inbuf + 2,
+ret_size - 2, 1);
+
+return;
+}
+
+static irqreturn_t i2c_hid_irq(int irq, void *dev_id)
+{
+struct i2c_hid *ihid = dev_id;
+
+if (test_bit(I2C_HID_READ_PENDING, &ihid->flags))
+return IRQ_HANDLED;
+
+i2c_hid_get_input(ihid);
+
+return IRQ_HANDLED;
+}
+
+static int i2c_hid_get_report_length(struct hid_report *report)
+{
+return ((report->size - 1) >> 3) + 1 +
+report->device->report_enum[report->type].numbered + 2;
+}
+
*/
+ * Traverse the supplied list of reports and find the longest
static void i2c_hid_find_max_report(struct hid_device *hid, unsigned int type,
	unsigned int *max)
{
	struct hid_report *report;

	/* We should not rely on wMaxInputLength, as some devices may set it to
	 * a wrong length. */
	list_for_each_entry(report, &hid->report_enum[type].report_list, list) {
		size = i2c_hid_get_report_length(report);
		if (*max < size)
			*max = size;
	}
	
	static void i2c_hid_free_buffers(struct i2c_hid *ihid)
{
	kfree(ihid->inbuf);
	kfree(ihid->rawbuf);
	kfree(ihid->argsbuf);
	kfree(ihid->cmdbuf);
	ihid->inbuf = NULL;
	ihid->rawbuf = NULL;
	ihid->cmdbuf = NULL;
	ihid->argsbuf = NULL;
	ihid->bufsize = 0;
	}

	static int i2c_hid_alloc_buffers(struct i2c_hid *ihid, size_t report_size)
{
	/* the worst case is computed from the set_report command with a
	 * reportID > 15 and the maximum report length */
	int args_len = sizeof(__u8) + /* ReportID */
		       sizeof(__u8) + /* optional ReportID byte */
		       sizeof(__u16) + /* data register */
		       sizeof(__u16) + /* size of the report */
		       report_size; /* report */

		ihid->inbuf = kzalloc(report_size, GFP_KERNEL);
		ihid->rawbuf = kzalloc(report_size, GFP_KERNEL);
		ihid->argsbuf = kzalloc(sizeof(union command) + args_len, GFP_KERNEL);
		ihid->cmdbuf = kzalloc(sizeof(union command) + args_len, GFP_KERNEL);

		if (!ihid->inbuf || !ihid->rawbuf || !ihid->argsbuf || !ihid->cmdbuf) {
		i2c_hid_free_buffers(ihid);
		return -ENOMEM;
	}
ihid->bufsize = report_size;
+
+return 0;
+
+static int i2c_hid_get_raw_report(struct hid_device *hid,
+unsigned char report_number, __u8 *buf, size_t count,
+unsigned char report_type)
+{
+struct i2c_client *client = hid->driver_data;
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+size_t ret_count, ask_count;
+int ret;
+
+if (report_type == HID_OUTPUT_REPORT)
+return -EINVAL;
+
+/* +2 bytes to include the size of the reply in the query buffer */
+ask_count = min(count + 2, (size_t)ihid->bufsize);
+
+ret = i2c_hid_get_report(client,
+report_type == HID_FEATURE_REPORT ? 0x03 : 0x01,
+report_number, ihid->rawbuf, ask_count);
+
+if (ret < 0)
+return ret;
+
+ret_count = ihid->rawbuf[0] | (ihid->rawbuf[1] << 8);
+
+if (ret_count <= 2)
+return 0;
+
+ret_count = min(ret_count, ask_count);
+
+/* The query buffer contains the size, dropping it in the reply */
+count = min(count, ret_count - 2);
+memcpy(buf, ihid->rawbuf + 2, count);
+
+return count;
+}
+
+static int i2c_hid_output_raw_report(struct hid_device *hid, __u8 *buf,
+size_t count, unsigned char report_type, bool use_data)
+{
+struct i2c_client *client = hid->driver_data;
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+int report_id = buf[0];
int ret;

if (report_type == HID_INPUT_REPORT)
    return -EINVAL;

mutex_lock(&ihid->reset_lock);

if (report_id) {
    buf++;
    count--;
}

ret = i2c_hid_set_or_send_report(client,
    report_type == HID_FEATURE_REPORT ? 0x03 : 0x02,
    report_id, buf, count, use_data);

if (report_id && ret >= 0)
    ret++; /* add report_id to the number of transferred bytes */

mutex_unlock(&ihid->reset_lock);

return ret;
}

static int i2c_hid_output_report(struct hid_device *hid, __u8 *buf,
    size_t count)
{
    return i2c_hid_output_raw_report(hid, buf, count, HID_OUTPUT_REPORT,
        false);
}

static int i2c_hid_raw_request(struct hid_device *hid, unsigned char reportnum,
    __u8 *buf, size_t len, unsigned char rtype,
    int reqtype)
{
    switch (reqtype) {
        case HID_REQ_GET_REPORT:
            return i2c_hid_get_raw_report(hid, reportnum, buf, len, rtype);
        case HID_REQ_SET_REPORT:
            if (buf[0] != reportnum)
                return -EINVAL;
            return i2c_hid_output_raw_report(hid, buf, len, rtype, true);
        default:
            return -EIO;
    }
}

static int i2c_hid_parse(struct hid_device *hid)
+{struct i2c_client *client = hid->driver_data;
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+struct i2c_hid_desc *hdesc = &ihid->hdesc;
+unsigned int rsize;
+char *rdesc;
+int ret;
+int tries = 3;
+char *use_override;
+
+i2c_hid_dbg(ihid, "entering %s", __func__);
+
+rsize = le16_to_cpu(hdesc->wReportDescLength);
+if (!rsize || rsize > HID_MAX_DESCRIPTOR_SIZE) {
+dbg_hid("weird size of report descriptor (%u)\n", rsize);
+return -EINVAL;
+}
+
do {
+ret = i2c_hid_hwreset(client);
+if (ret)
+msleep(1000);
+} while (tries-- > 0 && ret);
+
+if (ret)
+return ret;
+
+use_override = i2c_hid_get_dmi_hid_report_desc_override(client->name,
+
+&rsize);
+
+if (use_override) {
+rdesc = use_override;
+i2c_hid_dbg(ihid, "Using a HID report descriptor override\n");
+} else {
+rdesc = kzalloc(rsize, GFP_KERNEL);
+
+if (!rdesc) {
+dbg_hid("couldn't allocate rdesc memory\n");
+return -ENOMEM;
+}
+
+i2c_hid_dbg(ihid, "asking HID report descriptor\n");
+
+ret = i2c_hid_command(client, &hid_report_descr_cmd,
+
+rdesc, rsize);
+if (ret) {
+hid_err(hid, "reading report descriptor failed\n");
+kfree(rdesc);
+}
+return -EIO;
+
+i2c_hid_dbg(ihid, "Report Descriptor: %*ph\n", rsize, rdesc);
+
+ret = hid_parse_report(hid, rdesc, rsize);
+if (!use_override)
+kfree(rdesc);
+
+if (ret) {
+dbg_hid("parsing report descriptor failed\n");
+return ret;
+}
+
+return 0;
+
+static int i2c_hid_start(struct hid_device *hid)
+{
+struct i2c_client *client = hid->driver_data;
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+int ret;
+unsigned int bufsize = HID_MIN_BUFFER_SIZE;
+
i2c_hid_find_max_report(hid, HID_INPUT_REPORT, &bufsize);
i2c_hid_find_max_report(hid, HID_OUTPUT_REPORT, &bufsize);
i2c_hid_find_max_report(hid, HID_FEATURE_REPORT, &bufsize);
+
+if (bufsize > ihid->bufsize) {
+disable_irq(client->irq);
i2c_hid_free_buffers(ihid);
+
+ret = i2c_hid_alloc_buffers(ihid, bufsize);
+enable_irq(client->irq);
+
+if (ret)
+return ret;
+}
+
+return 0;
+
+static void i2c_hid_stop(struct hid_device *hid)
+{
+hid->claimed = 0;
+}
+
+static int i2c_hid_open(struct hid_device *hid)
+{
+struct i2c_client *client = hid->driver_data;
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+int ret = 0;
+
+ret = pm_runtime_get_sync(&client->dev);
+if (ret < 0)
+return ret;
+
+set_bit(I2C_HID_STARTED, &ihid->flags);
+return 0;
+
+static void i2c_hid_close(struct hid_device *hid)
+{
+struct i2c_client *client = hid->driver_data;
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+
+clear_bit(I2C_HID_STARTED, &ihid->flags);
+
+/* Save some power */
+pm_runtime_put(&client->dev);
+
+}
+
+static int i2c_hid_power(struct hid_device *hid, int lvl)
+{
+struct i2c_client *client = hid->driver_data;
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+
+i2c_hid_dbg(ihid, "%s lvl:%d\n", __func__, lvl);
+
+switch (lvl) {
+case PM_HINT_FULLON:
+pm_runtime_get_sync(&client->dev);
+break;
+case PM_HINT_NORMAL:
+pm_runtime_put(&client->dev);
+break;
+}
+
+return 0;
+
+}
+
+struct hid_ll_driver i2c_hid_ll_driver = {
+.parse = i2c_hid_parse,
+.start = i2c_hid_start,
+.stop = i2c_hid_stop,
+.open = i2c_hid_open,
+close = i2c_hid_close,
+power = i2c_hid_power,
+output_report = i2c_hid_output_report,
+raw_request = i2c_hid_raw_request,
+;
+EXPORT_SYMBOL_GPL(i2c_hid_ll_driver);
+
+static int i2c_hid_init_irq(struct i2c_client *client)
+{
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+unsigned long irqflags = 0;
+int ret;
+
+dev_dbg(&client->dev, "Requesting IRQ: %d\n", client->irq);
+
+if (!irq_get_trigger_type(client->irq))
+irqflags = IRQF_TRIGGER_LOW;
+
+ret = request_threaded_irq(client->irq, NULL, i2c_hid_irq,
+irqflags | IRQF_ONESHOT, client->name, ihid);
+
+if (ret < 0) {
+dev_warn(&client->dev,
+"Could not register for %s interrupt, irq = %d,",
+" ret = %d\n", 
+client->name, client->irq, ret);
+
+return ret;
+}
+
+return 0;
+}
+
+static int i2c_hid_fetch_hid_descriptor(struct i2c_hid *ihid)
+{
+struct i2c_client *client = ihid->client;
+struct i2c_hid_desc *hdesc = &ihid->hdesc;
+unsigned int dsize;
+int ret;
+
+/* i2c hid fetch using a fixed descriptor size (30 bytes) */
+
+if (i2c_hid_get_dmi_i2c_hid_desc_override(client->name)) {
+i2c_hid_dbg(ihid, "Using a HID descriptor override\n");
+ihid->hdesc =
+i2c_hid_get_dmi_i2c_hid_desc_override(client->name);
+} else {
+i2c_hid_dbg(ihid, "Fetching the HID descriptor\n");
+ret = i2c_hid_command(client, &hid_descr_cmd,
+ihid->hdesc_buffer,
+ sizeof(struct i2c_hid_desc));
+if (ret) {
+    dev_err(&client->dev, "hid_descr_cmd failed\n");
+    return -ENODEV;
+}
+
+/* Validate the length of HID descriptor, the 4 first bytes:
+ * bytes 0-1 -> length
+ * bytes 2-3 -> bcdVersion (has to be 1.00) */
+/* check bcdVersion == 1.0 */
+if (le16_to_cpu(hdesc->bcdVersion) != 0x0100) {
+    dev_err(&client->dev, 
+        "unexpected HID descriptor bcdVersion (0x%04hx)\n",
+        le16_to_cpu(hdesc->bcdVersion));
+    return -ENODEV;
+}
+
+/* Descriptor length should be 30 bytes as per the specification */
+dsz = le16_to_cpu(hdesc->wHIDDescLength);
+if (dsz != sizeof(struct i2c_hid_desc)) {
+    dev_err(&client->dev, "weird size of HID descriptor (%u)\n",
+        dsz);
+    return -ENODEV;
+}
+i2c_hid_dbg(ihid, "HID Descriptor: %*ph\n", dsz, ihid->hdesc_buffer);
+return 0;
+
+/*ifdef CONFIG_ACPI*/
+static int i2c_hid_acpi_pdata(struct i2c_client *client, 
+    struct i2c_hid_platform_data *pdata)
+{
+    static guid_t i2c_hid_guid =
+        GUID_INIT(0x3CDFF6F7, 0x4267, 0x4555,
+            0xAD, 0x05, 0xB3, 0x0A, 0x3D, 0x89, 0x38, 0xDE);
+    union acpi_object *obj;
+    struct acpi_device *adev;
+    acpi_object *obj;
+    acpi_device *adev;
+    acpi_handle handle;
+    +
+    handle = ACPI_HANDLE(&client->dev);
+    +if (!handle || acpi_bus_get_device(handle, &adev))
+        return -ENODEV;
+    +
+    +obj = acpi_evaluate_dsm.Typed(handle, &i2c_hid_guid, 1, 1, NULL,
+        ACPI_TYPE_INTEGER);
+    +if (!obj) {
+        dev_err(&client->dev, "device _DSM execution failed\n");
+    /*endif*/
+static void i2c_hid_acpi_fix_up_power(struct device *dev) {
+    ACPI_HANDLE(handle); 
+    acpi_device *adev;
+    if (handle && acpi_bus_get_device(handle, &adev) == 0)
+        ACPI_DEVICE_FIX_UP_POWER(adev);
+}
+
+static const struct acpi_device_id i2c_hid_acpi_match[] = {
+    "ACPI0C50", 0 },
+    "PNP0C50", 0 },
+};
+MODULE_DEVICE_TABLE(acpi, i2c_hid_acpi_match);
+    ACPI_FREE(obj);
+    return 0;
+
+static void i2c_hid_acpi_fix_up_power(struct device *dev) {
+    ACPI_HANDLE(handle); 
+    acpi_device *adev;
+    if (handle && acpi_bus_get_device(handle, &adev) == 0)
+        ACPI_DEVICE_FIX_UP_POWER(adev);
+}
+
+static inline int i2c_hid_acpi_pdata(struct i2c_client *client,
+    struct i2c_hid_platform_data *pdata)
+    return -ENODEV;
+}
+
+static inline void i2c_hid_acpi_fix_up_power(struct device *dev) {} 
+#endif
+
+if (val >> 16) {
+    ACPI_FREE(obj);
+    return 0;
+
+static const struct acpi_device_id i2c_hid_acpi_match[] = {
+    "ACPI0C50", 0 },
+    "PNP0C50", 0 },
+};
+MODULE_DEVICE_TABLE(acpi, i2c_hid_acpi_match);
+#else
+    ACPI_FREE(obj);
+    return 0;
+
+static void i2c_hid_acpi_fix_up_power(struct device *dev) {
+    ACPI_HANDLE(handle); 
+    acpi_device *adev;
+    if (handle && acpi_bus_get_device(handle, &adev) == 0)
+        ACPI_DEVICE_FIX_UP_POWER(adev);
+}
+
+static inline int i2c_hid_acpi_pdata(struct i2c_client *client,
+    struct i2c_hid_platform_data *pdata)
+    return -ENODEV;
+}
+
+static inline void i2c_hid_acpi_fix_up_power(struct device *dev) {} 
+#endif
+
+if (val >> 16) {

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+dev_err(&client->dev, "Bad HID register address: 0x%08x\n", +val);
+return -EINVAL;
+
+pdata->hid_descriptor_address = val;
+
+ret = of_property_read_u32(dev->of_node, "post-power-on-delay-ms", + &val);
+if (!ret)
+pdata->post_power_delay_ms = val;
+
+return 0;
+
+
+static const struct_of_device_id i2c_hid_of_match[] = {
+{ .compatible = "hid-over-i2c" },
+{ },
+};
+
+MODULE_DEVICE_TABLE(of, i2c_hid_of_match);
+#else
+static inline int i2c_hid_of_probe(struct i2c_client *client,
+struct i2c_hid_platform_data *pdata)
+{ +
+return -ENODEV;
+}
+#endif
+
+static int i2c_hid_probe(struct i2c_client *client,
+const struct i2c_device_id *dev_id)
+{
+int ret;
+struct i2c_hid *ihid;
+struct hid_device *hid;
+_u16 hidRegister;
+struct i2c_hid_platform_data *platform_data = client->dev.platform_data;
+
+dbg_hid("HID probe called for i2c 0x%02x\n", client->addr);
+
+if (!client->irq) {
+dev_err(&client->dev,
+"HID over i2c has not been provided an Int IRQ\n");
+return -EINVAL;
+}
+
+if (client->irq < 0) {
+if (client->irq != -EPROBE_DEFER)
+dev_err(&client->dev,
+"HID over i2c doesn't have a valid IRQ\n");
+}

+return client->irq;
+
+ihid = kzalloc(sizeof(struct i2c_hid), GFP_KERNEL);
+if (!ihid)
+    return -ENOMEM;
+
+if (client->dev.of_node) {
+    ret = i2c_hid_of_probe(client, &ihid->pdata);
+    if (ret)
+        goto err;
+} else if (!platform_data) {
+    ret = i2c_hid_acpi_pdata(client, &ihid->pdata);
+    if (ret) {
+        dev_err(&client->dev,
+                "HID register address not provided\n");
+        goto err;
+    } else {
+        ihid->pdata = *platform_data;
+    }
+
+    ihid->pdata.supply = devm_regulator_get(&client->dev, "vdd");
+    if (IS_ERR(ihid->pdata.supply)) {
+        ret = PTR_ERR(ihid->pdata.supply);
+        if (ret != -EPROBE_DEFER)
+            dev_err(&client->dev, "Failed to get regulator: %d\n",
+                    ret);
+    }
+}
+    if (ihid->pdata.post_power_delay_ms)
+        msleep(ihid->pdata.post_power_delay_ms);
+
+    i2c_set_clientdata(client, ihid);
+
+    hidRegister = ihid->pdata.hid_descriptor_address;
+    ihid->wHIDDescRegister = cpu_to_le16(hidRegister);
+
+    init_waitqueue_head(&ihid->wait);
mutex_init(&ihid->reset_lock);

/* we need to allocate the command buffer without knowing the maximum
 * size of the reports. Let's use HID_MIN_BUFFER_SIZE, then we do the
 * real computation later. */
+ret = i2c_hid_alloc_buffers(ihid, HID_MIN_BUFFER_SIZE);
+if (ret < 0)
+goto err_regulator;
+
+i2c_hid_acpi_fix_up_power(&client->dev);
+pm_runtime_get_noresume(&client->dev);
+pm_runtime_set_active(&client->dev);
+device_enable_async_suspend(&client->dev);
+
+/* Make sure there is something at this address */
+ret = i2c_smbus_read_byte(client);
+if (ret < 0) {
+dev_dbg(&client->dev, "nothing at this address: %d\n", ret);
+ret = -ENXIO;
+goto err_pm;
+}
+
+i2c_hid_fetch_hid_descriptor(ihid);
+if (ret < 0)
+goto err_pm;
+
+i2c_hid_init_irq(client);
+if (ret < 0)
+goto err_irq;
+
+hid = hid_allocate_device();
+if (IS_ERR(hid)) {
+ret = PTR_ERR(hid);
+goto err_irq;
+}
+
+ihid->hid = hid;
+
+hid->driver_data = client;
+hid->ll_driver = &i2c_hid_ll_driver;
+hid->dev.parent = &client->dev;
+hid->bus = BUS_I2C;
+hid->version = le16_to_cpu(ihid->hdesc.bcdVersion);
+hid->vendor = le16_to_cpu(ihid->hdesc.wVendorID);
+hid->product = le16_to_cpu(ihid->hdesc.wProductID);
snprintf(hid->name, sizeof(hid->name), "%s %04X:%04X",
client->name, (u16)hid->vendor, (u16)hid->product);
strlcpy(hid->phys, dev_name(&client->dev), sizeof(hid->phys));
+ihid->quirks = i2c_hid_lookup_quirk(hid->vendor, hid->product);
+ret = hid_add_device(hid);
+if (ret) {
+hid_err(client, "can't add hid device: %d\n", ret);
+goto err_mem_free;
+}
+if (!(ihid->quirks & I2C_HID_QUIRK_NO_RUNTIME_PM))
+pm_runtime_put(&client->dev);
+return 0;
+err_mem_free:
+hid_destroy_device(hid);
+err_irq:
+free_irq(client->irq, ihid);
+err_pm:
+pm_runtime_put_noidle(&client->dev);
+pm_runtime_disable(&client->dev);
+err_regulator:
+regulator_disable(ihid->pdata.supply);
+err:
+i2c_hid_free_buffers(ihid);
+kfree(ihid);
+return ret;
+
+static int i2c_hid_remove(struct i2c_client *client)
+{
+struct i2c_hid *ihid = i2c_get_clientdata(client);
+struct hid_device *hid;
+if (!(ihid->quirks & I2C_HID_QUIRK_NO_RUNTIME_PM))
+pm_runtime_get_sync(&client->dev);
+pm_runtime_disable(&client->dev);
+pm_runtime_set_suspended(&client->dev);
+pm_runtime_put_noidle(&client->dev);
hid = ihid->hid;
hid_destroy_device(hid);
+
free_irq(client->irq, ihid);
+
if (ihid->bufsize)
i2c_hid_free_buffers(ihid);
+
regulator_disable(ihid->pdata.supply);
+
kfree(ihid);
+
return 0;
+
static void i2c_hid_shutdown(struct i2c_client *client)
{
struct i2c_hid *ihid = i2c_get_clientdata(client);
+
i2c_hid_set_power(client, I2C_HID_PWR_SLEEP);
+
free_irq(client->irq, ihid);
+
}
+
#ifdef CONFIG_PM_SLEEP
static int i2c_hid_suspend(struct device *dev)
{
struct i2c_client *client = to_i2c_client(dev);
struct i2c_hid *ihid = i2c_get_clientdata(client);
struct hid_device *hid = ihid->hid;
int ret;
int wake_status;
+
if (hid->driver && hid->driver->suspend) {
/*
 * Wake up the device so that IO issues in
 * HID driver's suspend code can succeed.
 * */
ret = pm_runtime_resume(dev);
if (ret < 0)
return ret;
+
ret = hid->driver->suspend(hid, PMSG_SUSPEND);
if (ret < 0)
return ret;
+
if ('!pm_runtime_suspended(dev)) {
/* Save some power */
if (device_may_wakeup(&client->dev)) {
    wake_status = enable_irq_wake(client->irq);
    if (!wake_status)
        ihid->irq_wake_enabled = true;
    else
        hid_warn(hid, "Failed to enable irq wake: %d\n",
                wake_status);
} else {
    ret = regulator_enable(ihid->pdata.supply);
    if (ret < 0)
        hid_warn(hid, "Failed to disable supply: %d\n", ret);
}

/* We'll resume to full power */
pm_runtime_disable(dev);
pm_runtime_set_active(dev);
pm_runtime_enable(dev);
enable_irq(client->irq);

/* Instead of resetting device, simply powers the device on. This
 * solves "incomplete reports" on Raydium devices 2386:3118 and
 * 2386:4B33
 * However some ALPS touchpads generate IRQ storm without reset, so
 * let's still reset them here.
 */
if (ihid->quirks & I2C_HID_QUIRK_RESET_ON_RESUME)
    ret = i2c_hid_hwreset(client);
else
    ret = i2c_hid_set_power(client, I2C_HID_PWR_ON);

if (ihid->quirks & I2C_HID_QUIRK_RESEND_REPORT_DESCR) {
    ret = i2c_hid_command(client, &hid_report_descr_cmd, NULL, 0);
    if (ret)
        return ret;
}

if (hid->driver && hid->driver->reset_resume) {
    ret = hid->driver->reset_resume(hid);
    return ret;

    return 0;
}
#endif

#ifdef CONFIG_PM
static int i2c_hid_runtime_suspend(struct device *dev)
{
    struct i2c_client *client = to_i2c_client(dev);

    i2c_hid_set_power(client, I2C_HID_PWR_SLEEP);
    disable_irq(client->irq);
    return 0;
}

static int i2c_hid_runtime_resume(struct device *dev)
+{  
+struct i2c_client *client = to_i2c_client(dev);  
+  
+enable_irq(client->irq);  
+i2c_hid_set_power(client, I2C_HID_PWR_ON);  
+return 0;  
+}  
+#endif  
+
+static const struct dev_pm_ops i2c_hid_pm = {  
+SET_SYSTEM_SLEEP_PM_OPS(i2c_hid_suspend, i2c_hid_resume)  
+SET_RUNTIME_PM_OPS(i2c_hid_runtime_suspend, i2c_hid_runtime_resume,  
+ NULL)  
+};  
+
+static const struct i2c_device_id i2c_hid_id_table[] = {  
+{ "hid", 0 },  
+{ "hid-over-i2c", 0 },  
+{ },  
+};  
+MODULE_DEVICE_TABLE(i2c, i2c_hid_id_table);  
+
+static struct i2c_driver i2c_hid_driver = {  
+.driver = {  
+.name = "i2c_hid",  
+.pm = &i2c_hid_pm,  
+.acpi_match_table = ACPI_PTR(i2c_hid_acpi_match),  
+.of_match_table = of_match_ptr(i2c_hid_of_match),  
+},  
+.probe = i2c_hid_probe,  
+.remove = i2c_hid_remove,  
+.shutdown = i2c_hid_shutdown,  
+.id_table = i2c_hid_id_table,  
+};  
+
+module_i2c_driver(i2c_hid_driver);  
+
+MODULE_DESCRIPTION("HID over I2C core driver");  
+MODULE_AUTHOR("Benjamin Tissoires <benjamin.tissoires@gmail.com>");  
+MODULE_LICENSE("GPL");  
--- linux-4.15.0.orig/drivers/hid/i2c-hid/i2c-hid-dmi-quirks.c  
+++ linux-4.15.0/drivers/hid/i2c-hid/i2c-hid-dmi-quirks.c  
@@ -0,0 +1,444 @@  
+// SPDX-License-Identifier: GPL-2.0+  
+  
+*/
+ * Quirks for I2C-HID devices that do not supply proper descriptors
+ *
+ * Copyright (c) 2018 Julian Sax <jsbc@gmx.de>
+ *
+ */
+
+#include <linux/types.h>
+#include <linux/dmi.h>
+#include <linux/mod_devicetable.h>
+
+#include "i2c-hid.h"
+
+struct i2c_hid_desc_override {
+union {
+struct i2c_hid_desc *i2c_hid_desc;
+uint8_t *i2c_hid_desc_buffer;
+};
+uint8_t hid_report_desc;
+unsigned int hid_report_desc_size;
+uint8_t *i2c_name;
+};
+
+/#
+ * descriptors for the SIPODEV SP1064 touchpad
+ *
+ * This device does not supply any descriptors and on windows a filter
+ * driver operates between the i2c-hid layer and the device and injects
+ * these descriptors when the device is prompted. The descriptors were
+ * extracted by listening to the i2c-hid traffic that occurs between the
+ * windows filter driver and the windows i2c-hid driver.
+ */
+
+static const struct i2c_hid_desc_override sipodev_desc = {
+.i2c_hid_desc_buffer = (uint8_t [])
>+{0x1e, 0x00,                   /* Length of descriptor */
+ 0x00, 0x01,                   /* Version of descriptor */
+ 0xdb, 0x01,                   /* Length of report descriptor */
+ 0x21, 0x00,                   /* Location of report descriptor */
+ 0x24, 0x00,                   /* Location of input report */
+ 0x1b, 0x00,                   /* Max input report length */
+ 0x25, 0x00,                   /* Location of output report */
+ 0x11, 0x00,                   /* Max output report length */
+ 0x22, 0x00,                   /* Location of command register */
+ 0x23, 0x00,                   /* Location of data register */
+ 0x11, 0x09,                   /* Vendor ID */
+ 0x88, 0x52,                   /* Product ID */

+ 0x06, 0x00, /* Version ID */
+ 0x00, 0x00, 0x00, 0x00 /* Reserved */ +
+).
+
+.hid_report_desc = (uint8_t [])
+{0x05, 0x01, /* Usage Page (Desktop), */
+ 0x09, 0x02, /* Usage (Mouse), */
+ 0xA1, 0x01, /* Collection (Application), */
+ 0x85, 0x01, /* Report ID (1), */
+ 0x09, 0x01, /* Usage (Pointer), */
+ 0xA1, 0x00, /* Collection (Physical), */
+ 0x05, 0x09, /* Usage Page (Button), */
+ 0x19, 0x01, /* Usage Minimum (01h), */
+ 0x29, 0x02, /* Usage Maximum (02h), */
+ 0x25, 0x01, /* Logical Maximum (1), */
+ 0x75, 0x01, /* Report Size (1), */
+ 0x95, 0x02, /* Report Count (2), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x95, 0x06, /* Report Count (6), */
+ 0x81, 0x01, /* Input (Constant), */
+ 0x05, 0x01, /* Usage Page (Desktop), */
+ 0x09, 0x30, /* Usage (X), */
+ 0x09, 0x31, /* Usage (Y), */
+ 0x25, 0x81, /* Logical Minimum (-127), */
+ 0x75, 0x08, /* Report Size (8), */
+ 0x95, 0x02, /* Report Count (2), */
+ 0x81, 0x06, /* Input (Variable, Relative), */
+ 0xC0, /* End Collection, */
+ 0x05, 0x0D, /* Usage Page (Digitizer), */
+ 0x09, 0x05, /* Usage (Touchpad), */
+ 0xA1, 0x01, /* Collection (Application), */
+ 0x85, 0x04, /* Report ID (4), */
+ 0x05, 0x0D, /* Usage Page (Digitizer), */
+ 0x09, 0x22, /* Usage (Finger), */
+ 0xA1, 0x02, /* Collection (Logical), */
+ 0x15, 0x00, /* Logical Minimum (0), */
+ 0x25, 0x01, /* Logical Maximum (1), */
+ 0x09, 0x47, /* Usage (Touch Valid), */
+ 0x09, 0x42, /* Usage (Tip Switch), */
+ 0x95, 0x02, /* Report Count (2), */
+ 0x75, 0x01, /* Report Size (1), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x75, 0x03, /* Report Size (3), */
+ 0x25, 0x05, /* Logical Maximum (5), */
+ 0x09, 0x51, /* Usage (Contact Identifier), */
+ 0x81, 0x02,    /* Input (Variable), */
+ 0x75, 0x01,    /* Report Size (1), */
+ 0x95, 0x03,    /* Report Count (3), */
+ 0x81, 0x03,    /* Input (Constant, Variable), */
+ 0x05, 0x01,    /* Usage Page (Desktop), */
+ 0x26, 0x44, 0x0A,    /* Logical Maximum (2628), */
+ 0x75, 0x10,    /* Report Size (16), */
+ 0x55, 0x0E,    /* Unit Exponent (14), */
+ 0x65, 0x11,    /* Unit (Centimeter), */
+ 0x09, 0x30,    /* Usage (X), */
+ 0x46, 0x1A, 0x04, /* Physical Maximum (1050), */
+ 0x95, 0x01,    /* Report Count (1), */
+ 0x81, 0x02,    /* Input (Variable), */
+ 0x46, 0xBC, 0x02, /* Physical Maximum (700), */
+ 0x26, 0x34, 0x05,    /* Logical Maximum (1332), */
+ 0x95, 0x01,    /* Report Count (1), */
+ 0x81, 0x02,    /* Input (Variable), */
+ 0xC0,          /* End Collection, */
+ 0x05, 0x0D,    /* Usage Page (Digitizer), */
+ 0x09, 0x22,    /* Usage (Finger), */
+ 0xA1, 0x02,    /* Collection (Logical), */
+ 0x25, 0x01,    /* Logical Maximum (1), */
+ 0x09, 0x47,    /* Usage (Touch Valid), */
+ 0x09, 0x42,    /* Usage (Tip Switch), */
+ 0x95, 0x02,    /* Report Count (2), */
+ 0x75, 0x01,    /* Report Size (1), */
+ 0x81, 0x02,    /* Input (Variable), */
+ 0xC0,          /* End Collection, */
+ 0x05, 0x0D,    /* Usage Page (Digitizer), */
+ 0x09, 0x31,    /* Usage (Y), */
+ 0x81, 0x02,    /* Input (Variable), */
+ 0x09, 0x30,    /* Usage (X), */
+ 0x81, 0x02,    /* Input (Variable), */
+ 0xC0,          /* End Collection, */
+ 0x05, 0x0D,    /* Usage Page (Digitizer), */
+ 0x09, 0x22, /* Usage (Finger), */
+ 0xA1, 0x02, /* Collection (Logical), */
+ 0x25, 0x01, /* Logical Maximum (1), */
+ 0x09, 0x47, /* Usage (Touch Valid), */
+ 0x09, 0x42, /* Usage (Tip Switch), */
+ 0x95, 0x02, /* Report Count (2), */
+ 0x75, 0x01, /* Report Size (1), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x75, 0x03, /* Report Size (3), */
+ 0x25, 0x05, /* Logical Maximum (5), */
+ 0x09, 0x51, /* Usage (Contact Identifier), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x75, 0x01, /* Report Size (1), */
+ 0x95, 0x03, /* Report Count (3), */
+ 0x81, 0x03, /* Input (Constant, Variable), */
+ 0x05, 0x01, /* Usage Page (Desktop), */
+ 0x26, 0x44, 0x0A, /* Logical Maximum (2628), */
+ 0x75, 0x10, /* Report Size (16), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x25, 0x05, /* Logical Maximum (5), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x81, 0x03, /* Input (Constant, Variable), */
+ 0x05, 0x01, /* Usage Page (Desktop), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x81, 0x03, /* Input (Constant, Variable), */
+ 0x05, 0x01, /* Usage Page (Desktop), */
+ 0x26, 0x44, 0x0A, /* Logical Maximum (2628), */
+ 0x75, 0x10, /* Report Size (16), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x25, 0x05, /* Logical Maximum (5), */
+ 0x09, 0x51, /* Usage (Contact Identifier), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x75, 0x01, /* Report Size (1), */
+ 0x95, 0x03, /* Report Count (3), */
+ 0x81, 0x03, /* Input (Constant, Variable), */
+ 0x05, 0x01, /* Usage Page (Desktop), */
+ 0x26, 0x44, 0x0A, /* Logical Maximum (2628), */
+ 0x75, 0x10, /* Report Size (16), */
+ 0x09, 0x30, /* Usage (X), */
+ 0x46, 0x1A, 0x04, /* Physical Maximum (1050), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x46, 0xBC, 0x02, /* Physical Maximum (700), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x09, 0x31, /* Usage (Y), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0xC0, /* End Collection, */
+ 0x05, 0x0D, /* Usage Page (Digitizer), */
+ 0x55, 0x0C, /* Unit Exponent (12), */
+ 0x66, 0x01, 0x10, /* Unit (Seconds), */
+ 0x47, 0xFF, 0xFF, 0x00, 0x00, /* Physical Maximum (65535), */
+ 0x27, 0xFF, 0xFF, 0x00, 0x00, /* Logical Maximum (65535), */
+ 0x75, 0x10, /* Report Size (16), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x09, 0x56, /* Usage (Scan Time), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x95, 0x07, /* Report Count (7), */
+ 0x81, 0x03, /* Input (Constant, Variable), */
+ 0x05, 0x09, /* Usage Page (Button), */
+ 0x09, 0x01, /* Usage (01h), */
+ 0x25, 0x7F, /* Logical Maximum (127), */
+ 0x75, 0x08, /* Report Size (8), */
+ 0x85, 0x02, /* Report ID (2), */
+ 0x09, 0x55, /* Usage (Contact Count Maximum), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x81, 0x02, /* Input (Variable), */
+ 0x95, 0x07, /* Report Count (7), */
+ 0x81, 0x03, /* Input (Constant, Variable), */
+ 0x05, 0x0D, /* Usage Page (Digitizer), */
+ 0x85, 0x02, /* Report ID (2), */
+ 0x09, 0x59, /* Usage (59h), */
+ 0x75, 0x04, /* Report Size (4), */
+ 0x95, 0x02, /* Report Count (2), */
+ 0x25, 0x0F, /* Logical Maximum (15), */
+ 0xB1, 0x02, /* Feature (Variable), */
+ 0x05, 0x0D, /* Usage Page (Digitizer), */
+ 0x85, 0x07, /* Report ID (7), */
+ 0x09, 0x60, /* Usage (60h), */
+ 0x75, 0x01, /* Report Size (1), */
+ 0x95, 0x01, /* Report Count (1), */
+ 0x25, 0x01, /* Logical Maximum (1), */
+ 0xB1, 0x02, /* Feature (Variable), */
+ 0x95, 0x07, /* Report Count (7), */
+ 0xB1, 0x03, /* Feature (Constant, Variable), */
+ 0x85, 0x06, /* Report ID (6), */
+ 0x06, 0x00, 0xFF, /* Usage Page (FF00h), */
+ 0x09, 0xC5, /* Usage (C5h), */
+ 0x26, 0xFF, 0x00, /* Logical Maximum (255), */
+ 0x75, 0x08, /* Report Size (8), */
+ 0x96, 0x00, 0x01, /* Report Count (256), */
+ 0xB1, 0x02, /* Feature (Variable), */
+ 0xC0, /* End Collection, */
+ 0x06, 0x00, 0xFF, /* Usage Page (FF00h), */
+ 0x09, 0x01, /* Usage (01h), */
+ 0xA1, 0x01, /* Collection (Application), */
+ 0x85, 0x0D, /* Report ID (13), */
+ 0x26, 0xFF, 0x00, /* Logical Maximum (255), */
+ 0x19, 0x01, /* Usage Minimum (01h), */
+ 0x29, 0x02, /* Usage Maximum (02h), */
+ 0x75, 0x08, /* Report Size (8), */
+ 0x95, 0x02, /* Report Count (2), */
+ 0xB1, 0x02, /* Feature (Variable), */
+ 0xC0, /* End Collection, */
+ 0x05, 0x0D, /* Usage Page (Digitizer), */
+ 0x09, 0x0E, /* Usage (Configuration), */
+ 0xA1, 0x01, /* Collection (Application), */
+ 0x85, 0x03, /* Report ID (3), */
+ 0x09, 0x22, /* Usage (Finger), */
+ 0xA1, 0x02, /* Collection (Logical), */
+ 0x09, 0x52, /* Usage (Device Mode), */
+ 0x25, 0x0A, /* Logical Maximum (10), */
+ 0xB1, 0x02, /* Feature (Variable), */
+ 0xC0, /* End Collection, */
+ 0x09, 0x22, /* Usage (Finger), */
+ 0xA1, 0x00, /* Collection (Physical), */
+ 0x85, 0x05, /* Report ID (5), */
+ 0x09, 0x57, /* Usage (57h), */
+ 0x09, 0x58, /* Usage (58h), */
+ 0x75, 0x01, /* Report Size (1), */
+ 0x95, 0x02, /* Report Count (2), */
+ 0xB1, 0x01, /* Logical Maximum (1), */
+ 0x95, 0x06, /* Report Count (6), */
+ 0xB1, 0x03, /* Feature (Constant, Variable), */
+ 0xC0, /* End Collection, */
+ 0xC0 /* End Collection */
};

+ .hid_report_desc_size = 475,
+ .i2c_name = "SYNA3602:00"
+);
+

+static const struct dmi_system_id i2c_hid_dmi_desc_override_table[] = {
+{
+.ident = "Teclast F6 Pro",
+.matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "TECLAST"),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "F6 Pro"),
+},
+.driver_data = (void *)&sipodev_desc
+},
+{
+.ident = "Teclast F7",
+.matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "TECLAST"),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "F7"),
+},
+.driver_data = (void *)&sipodev_desc
+},
+{
+.ident = "Trekstor Primebook C13",
+.matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "TREKSTOR"),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "Primebook C13"),
+},
+.driver_data = (void *)&sipodev_desc
+},
+{
+.ident = "Trekstor Primebook C11",
+.matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "TREKSTOR"),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "Primebook C11"),
+},
+.driver_data = (void *)&sipodev_desc
+},
+/
+ * There are at least 2 Primebook C11B versions, the older
+ * version has a product-name of "Primebook C11B", and a
+ * bios version / release / firmware revision of:
+ * V2.1.2 / 05/03/2018 / 18.2
+ * The new version has "PRIMEBOOK C11B" as product-name and a
+ * bios version / release / firmware revision of:
+ * CFALKSW05_BIOS_V1.1.2 / 11/19/2018 / 19.2
+ * Only the older version needs this quirk, note the newer
+ * version will not match as it has a different product-name.
+ */
+.ident = "Trekstor Primebook C11B",
+.matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "TREKSTOR"),
+
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "Primebook C11B"),
+
+ .driver_data = (void *)&sipodev_desc
+
+
+ .ident = "Trekstor SURFBOOK E11B",
+ .matches = {
+  DMI_EXACT_MATCH(DMI_SYS_VENDOR, "TREKSTOR"),
+  DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "SURFBOOK E11B"),
+ },
+ .driver_data = (void *)&sipodev_desc
+
+
+ .ident = "Direkt-Tek DTLAPY116-2",
+ .matches = {
+  DMI_EXACT_MATCH(DMI_SYS_VENDOR, "Direkt-Tek"),
+  DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "DTLAPY116-2"),
+ },
+ .driver_data = (void *)&sipodev_desc
+
+
+ .ident = "Direkt-Tek DTLAPY133-1",
+ .matches = {
+  DMI_EXACT_MATCH(DMI_SYS_VENDOR, "Direkt-Tek"),
+  DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "DTLAPY133-1"),
+ },
+ .driver_data = (void *)&sipodev_desc
+
+
+ .ident = "Mediacom Flexbook Edge 11",
+ .matches = {
+  DMI_EXACT_MATCH(DMI_SYS_VENDOR, "MEDIACOM"),
+  DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "FlexBook edge11 - M-FBE11"),
+ },
+ .driver_data = (void *)&sipodev_desc
+
+
+ .ident = "Mediacom FlexBook edge 13",
+ .matches = {
+  DMI_EXACT_MATCH(DMI_SYS_VENDOR, "MEDIACOM"),
+  DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "FlexBook_edge13-M-FBE13"),
+ },
+ .driver_data = (void *)&sipodev_desc
+
+
+ .ident = "Odys Winbook 13",
+ .matches = {
+  DMI_EXACT_MATCH(DMI_SYS_VENDOR, "AXDIA International GmbH"),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "WINBOOK 13"),
+},
+driver_data = (void *)&sipodev_desc
+},
+{ 
+ident = "Schneider SCL142ALM",
+matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "SCHNEIDER"),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "SCL142ALM"),
+},
+driver_data = (void *)&sipodev_desc
+},
+{ /* Terminate list */
+},
+
+struct i2c_hid_desc *i2c_hid_get_dmi_i2c_hid_desc_override(uint8_t *i2c_name)
{ 
struct i2c_hid_desc_override *override;
const struct dmi_system_id *system_id;
+
+system_id = dmi_first_match(i2c_hid_dmi_desc_override_table);
+if (!system_id)
+return NULL;
+
+override = system_id->driver_data;
+if (strcmp(override->i2c_name, i2c_name))
+return NULL;
+
+return override->i2c_hid_desc;
+}
+
+char *i2c_hid_get_dmi_hid_report_desc_override(uint8_t *i2c_name,
+unsigned int *size)
{ 
struct i2c_hid_desc_override *override;
const struct dmi_system_id *system_id;
+
+system_id = dmi_first_match(i2c_hid_dmi_desc_override_table);
+if (!system_id)}
+return NULL;
+
+override = system_id->driver_data;
+if (strcmp(override->i2c_name, i2c_name))
+return NULL;
+
+*size = override->hid_report_desc_size;
+return override->hid_report_desc;
+
--- linux-4.15.0.orig/drivers/hid/i2c-hid/i2c-hid.h
+++ linux-4.15.0/drivers/hid/i2c-hid/i2c-hid.h
@@ -0,0 +1,20 @@
+/* SPDX-License-Identifier: GPL-2.0+ */
+
+#ifndef I2C_HID_H
+#define I2C_HID_H
+
+#ifdef CONFIG_DMI
+struct i2c_hid_desc *i2c_hid_get_dmi_i2c_hid_desc_override(uint8_t *i2c_name);
+char *i2c_hid_get_dmi_hid_report_desc_override(uint8_t *i2c_name,
+	unsigned int *size);
+#else
+static inline struct i2c_hid_desc
+	   *i2c_hid_get_dmi_i2c_hid_desc_override(uint8_t *i2c_name)
+{ return NULL; }
+static inline char
+  *i2c_hid_get_dmi_hid_report_desc_override(uint8_t *i2c_name,
+	unsigned int *size)
+{ return NULL; }
+#endif
+
+#endif

--- linux-4.15.0.orig/drivers/hid/intel-ish-hid/ipc/hw-ish.h
+++ linux-4.15.0/drivers/hid/intel-ish-hid/ipc/hw-ish.h
@@ -28,6 +28,9 @@
#define SPT_Ax_DEVICE_ID	0x9D35
#define CNL_Ax_DEVICE_ID	0x9DFC
#define GLK_Ax_DEVICE_ID	0x31A2
+#define CNL_H_DEVICE_ID	0xA37C
+#define SPT_H_DEVICE_ID	0xA135
+#define CML_LP_DEVICE_ID	0x02FC

--- linux-4.15.0.orig/drivers/hid/intel-ish-hid/ipc/ipc.c
+++ linux-4.15.0/drivers/hid/intel-ish-hid/ipc/ipc.c
@@ -91,7 +91,10 @@
IPC_INT_FROM_ISH_TO_HOST_CHV_AB(pisr_val);

#define SPT_AxDEVICE_ID0x9D35
#define CNL_AxDEVICE_ID0x9DFC
#define GLK_AxDEVICE_ID0x31A2
+#define CNL_HDEVICE_ID0xA37C
+#define SPT_HDEVICE_ID0xA135
+#define CML_LPDEVICE_ID0x02FC

#defineREVISION_ID_CHT_A00x6
#defineREVISION_ID_CHT_Ax_SI0x0
```c
} else {
    pisr_val = ish_reg_read(dev, IPC_REG_PISR_BXT);
    interrupt_generated = IPC_INT_FROM_ISH_TO_HOST_BXT(pisr_val);
    +interrupt_generated = !!pisr_val;
    +/\ only busy-clear bit is RW, others are RO */
    +if (pisr_val)
    +ish_reg_write(dev, IPC_REG_PISR_BXT, pisr_val);
}

return interrupt_generated;
@@ -843,11 +846,11 @@

    +set_host_ready(dev);
    +
    /* After that we can enable ISH DMA operation and wakeup ISHFW */
    ish_wakeup(dev);

    -set_host_ready(dev);
    -
    /* wait for FW-initiated reset flow */
    if (!dev->recvd_hw_ready)
        wait_event_interruptible_timeout(dev->wait_hw_ready,
--- linux-4.15.0.orig/drivers/hid/intel-ish-hid/ipc/pci-ish.c
+++ linux-4.15.0/drivers/hid/intel-ish-hid/ipc/pci-ish.c
@@ -37,6 +37,9 @@
     {PCI_DEVICE(PCI_VENDOR_ID_INTEL, SPT_Ax_DEVICE_ID)},
     {PCI_DEVICE(PCI_VENDOR_ID_INTEL, CNL_Ax_DEVICE_ID)},
     {PCI_DEVICE(PCI_VENDOR_ID_INTEL, GLK_Ax_DEVICE_ID)},
    +{PCI_DEVICE(PCI_VENDOR_ID_INTEL, CNL_H_DEVICE_ID)},
    +{PCI_DEVICE(PCI_VENDOR_ID_INTEL, SPT_H_DEVICE_ID)},
    +{PCI_DEVICE(PCI_VENDOR_ID_INTEL, CML_LP_DEVICE_ID)},
    {0, }
];
MODULE_DEVICE_TABLE(pci, ish_pci_tbl);
@@ -204,8 +207,7 @@
        kfree(ishtp_dev);
    }

-#ifdef CONFIG_PM
-    static struct device *ish_resume_device;
+    static struct device __maybe_unused *ish_resume_device;

    /* 50ms to get resume response */
    #define WAIT_FOR_RESUME_ACK_MS50
    @@ -219,7 +221,7 @@
        * in that case a simple resume message is enough, others we need
```
* a reset sequence.
*/
+static void __maybe_unused ish_resume_handler(struct work_struct *work)
{
    struct pci_dev *pdev = to_pci_dev(ish_resume_device);
    struct ishtp_device *dev = pci_get_drvdata(pdev);
    @ @ -261.7 +263.7 @ @
    *
    * Return: 0 to the pm core
    */
+static int __maybe_unused ish_suspend(struct device *device)
{
    struct pci_dev *pdev = to_pci_dev(device);
    struct ishtp_device *dev = pci_get_drvdata(pdev);
    @ @ -287.7 +289.7 @ @
    return 0;
}

-static DECLARE_WORK(resume_work, ish_resume_handler);
+static DECLARE_WORK(resume_work, ish_resume_handler);
/*
    * ish_resume() - ISH resume callback
    * @device: device pointer
    @ @ -296.7 +298.7 @ @
    *
    * Return: 0 to the pm core
    */
-static int ish_resume(struct device *device)
+static int __maybe_unused ish_resume(struct device *device)
{
    struct pci_dev *pdev = to_pci_dev(device);
    struct ishtp_device *dev = pci_get_drvdata(pdev);
    @ @ -310.21 +312.14 @ @
    return 0;
}

-const struct dev_pm_ops ish_pm_ops = {
    .suspend = ish_suspend,
    .resume = ish_resume,
    -};
#define ISHTP_ISH_PM_OPS(&ish_pm_ops)
-#else
-#define ISHTP_ISH_PM_OPSNULL
-#endif /* CONFIG_PM */
+static SIMPLE_DEV_PM_OPS(ish_pm_ops, ish_suspend, ish_resume);
static struct pci_driver ish_driver = {
    .name = KBUILD_MODNAME,
    .id_table = ish_pci_tbl,
    .probe = ish_probe,
    .remove = ish_remove,
    -.driver.pm = ISHTP_ISH_PM_OPS,
    +.driver.pm = &ish_pm_ops,
};

module_pci_driver(ish_driver);
--- linux-4.15.0.orig/drivers/hid/intel-ish-hid/ishtp-hid.c
+++ linux-4.15.0/drivers/hid/intel-ish-hid/ishtp-hid.c
@@ -222,7 +222,7 @@
err_hid_device:
    kfree(hid_data);
err_hid_data:
-    kfree(hid);
+    hid_destroy_device(hid);
    return rv;
};

--- linux-4.15.0.orig/drivers/hid/intel-ish-hid/ishtp/bus.c
+++ linux-4.15.0/drivers/hid/intel-ish-hid/ishtp/bus.c
@@ -418,7 +418,7 @@
    spin_unlock_irqrestore(&dev->device_list_lock);
    dev_err(dev->devc, "Failed to register ISHTP client device\n
test_free(device);
-    put_device(&device->dev);
+    put_device(&device->dev);
    return NULL;
};

@@ -623,7 +623,8 @@
    spin_lock_irqsave(&cl->dev->device_list_lock, flags);
    list_for_each_entry(cl_device, &cl->dev->device_list,
        device_link) {
-    if (cl_device->fw_client->client_id == cl->fw_client_id) {
+    if (cl_device->fw_client &&
        cl_device->fw_client->client_id == cl->fw_client_id) {
        cl->device = cl_device;
        rv = 0;
        break;
@@ -683,6 +684,7 @@
    spin_lock_irqsave(&ishtp_dev->device_list_lock, flags);
    list_for_each_entry_safe(cl_device, n, &ishtp_dev->device_list,
        device_link) {
+    cl_device->fw_client = NULL;
    if (warm_reset & & cl_device->reference_count)
continue;

--- linux-4.15.0.orig/drivers/hid/intel-ish-hid/ishtp/client-buffers.c
+++ linux-4.15.0/drivers/hid/intel-ish-hid/ishtp/client-buffers.c
@@ -90,7 +90,7 @@
         return 0;
     out:
     dev_err(&cl->device->dev, "error in allocating Tx pool\n");
-    ishtp_cl_free_rx_ring(cl);
+    ishtp_cl_free_tx_ring(cl);
     return -ENOMEM;
 }

--- linux-4.15.0.orig/drivers/hid/uhid.c
+++ linux-4.15.0/drivers/hid/uhid.c
@@ -12,6 +12,7 @@
 #include <linux/atomic.h>
 #include <linux/compat.h>
 +#include <linux/cred.h>
 #include <linux/device.h>
 #include <linux/fs.h>
 #include <linux/hid.h>
@@ -24,6 +25,7 @@
 #include <linux/spinlock.h>
 #include <linux/uhid.h>
 #include <linux/wait.h>
+#include <linux/eventpoll.h>

#define UHID_NAME "uhid"
#define UHID_BUFSIZE 32
@@ -722,6 +724,17 @@
 switch (uhid->input_buf.type) {
   case UHID_CREATE:
     /*
+      * 'struct uhid_create_req' contains a __user pointer which is
+      * copied from, so it's unsafe to allow this with elevated
+      * privileges (e.g. from a setuid binary) or via kernel_write().
+      */
+      if (file->f_cred != current_cred() || uaccess_kernel()) {
+        pr_err_once("UHID_CREATE from different security context by process %d (%s), this is not allowed.\n",
+            task_tgid_vnr(current), current->comm);
+        ret = -EACCES;
+        goto unlock;
+      }
   ret = uhid_dev_create(uhid, &uhid->input_buf);
   break;
case UHID_CREATE2:
    @ @ -756,13 +769,14 @@
static unsigned int uhid_char_poll(struct file *file, poll_table *wait)
{
    struct uhid_device *uhid = file->private_data;
    +unsigned int mask = POLLOUT | POLLWRNORM; /* uhid is always writable */

    poll_wait(file, &uhid->waitq, wait);

    if (uhid->head != uhid->tail)
        -return POLLIN | POLLRDNORM;
        +mask |= POLLIN | POLLRDNORM;

        -return 0;
        +return mask;
}

static const struct file_operations uhid_fops = {
    --- linux-4.15.0.orig/drivers/hid/usbhid/Makefile
    +++ linux-4.15.0/drivers/hid/usbhid/Makefile
    @ @ -3,7 +3,7 @@
    # Makefile for the USB input drivers
    #
    -usbhid-y:= hid-core.o hid-quirks.o
    +usbhid-y:= hid-core.o
    usbhid-S(CONFIG_USB_HIDDEV) += hiddev.o
    usbhid-S(CONFIG_HID_PID) += hid-pidff.o

    --- linux-4.15.0.orig/drivers/hid/usbhid/hid-core.c
    +++ linux-4.15.0/drivers/hid/usbhid/hid-core.c
    @ @ -373,7 +373,7 @@
    raw_report = usbhid->ctrl[usbhid->ctrltail].raw_report;
    dir = usbhid->ctrl[usbhid->ctrltail].dir;

    -len = ((report->size - 1) >> 3) + 1 + (report->id > 0);
    +len = hid_report_len(report);
    if (dir == USB_DIR_OUT) {
        usbhid->urbctrl->pipe = usb_sndctrlpipe(hid_to_usb_dev(hid), 0);
        usbhid->urbctrl->transfer_buffer_length = len;
        @ @ -501,7 +501,7 @@

        if (unplug) {
            usbhid->ctrltail = usbhid->ctrlhead;
            -} else {
                +} else if (usbhid->ctrlhead != usbhid->ctrltail) {
                    usbhid->ctrltail = (usbhid->ctrltail + 1) & (HID_CONTROL_FIFO_SIZE - 1);
if (usbhid->ctrlhead != usbhid->ctrltail &&
@@ -680,16 +680,21 @@
struct usbhid_device *usbhid = hid->driver_data;
int res;

+mutex_lock(&usbhid->mutex);
+
+set_bit(HID_OPENED, &usbhid->iofl);

-if (hid->quirks & HID_QUIRK_ALWAYS_POLL)
-    return 0;
+if (hid->quirks & HID_QUIRK_ALWAYS_POLL) {
+    res = 0;
+    goto Done;
+}

    res = usb_autopm_get_interface(usbhid->intf);
    /* the device must be awake to reliably request remote wakeu
    */
    if (res < 0) {
        clear_bit(HID_OPENED, &usbhid->iofl);
-        return -EIO;
+        res = -EIO;
+        goto Done;
    }

    usbhid->intf->needs_remote_wakeup = 1;
    @ @ -723,6 +728,9 @ @
    msleep(50);

    clear_bit(HID_RESUME_RUNNING, &usbhid->iofl);
    +
    + Done:
    +mutex_unlock(&usbhid->mutex);
    return res;
    }

    @ @ -730,6 +738,8 @ @
    {
    struct usbhid_device *usbhid = hid->driver_data;

    +mutex_lock(&usbhid->mutex);
    +
    /*
    * Make sure we don’t restart data acquisition due to
    * a resumption we no longer care about by avoiding racing
    @ @ -741,12 +751,13 @@
    clear_bit(HID_IN POLLING, &usbhid->iofl);
    spin_unlock_irq(&usbhid->lock);
-if (hid->quirks & HID_QUIRK_ALWAYS_POLL)
-    return;
+if (!(hid->quirks & HID_QUIRK_ALWAYS_POLL)) {
+    hid_cancel_delayed_stuff(usbhid);
+    usb_kill_urb(usbhid->urbin);
+    usbhid->intf->needs_remote_wakeup = 0;
+}

    hid_cancel_delayed_stuff(usbhid);
    usb_kill_urb(usbhid->urbin);
    usbhid->intf->needs_remote_wakeup = 0;
+    mutex_unlock(&usbhid->mutex);
    }

/*
@@ -978,8 +989,7 @@
    int num_descriptors;
    size_t offset = offsetof(struct hid_descriptor, desc);

    -quirks = usbhid_lookup_quirk(le16_to_cpu(dev->descriptor.idVendor),
    -le16_to_cpu(dev->descriptor.idProduct));
+quirks = hid_lookup_quirk(hid);

    if (quirks & HDR_QUIRK_IGNORE)
        return -ENODEV;
@@ -1056,6 +1066,8 @@
              unsigned int n, insize = 0;
              int ret;

+          mutex_lock(&usbhid->mutex);
+          clear_bit(HID_DISCONNECTED, &usbhid->iofl);

          usbhid->bufsize = HID_MIN_BUFFER_SIZE;
@@ -1170,6 +1182,8 @@
                usbhid_set_leds(hid);
                device_set_wakeup_enable(&dev->dev, 1);
            }
+            +          mutex_unlock(&usbhid->mutex);
            return 0;

            fail:
@@ -1180,6 +1194,7 @@
                usbhid->urbout = NULL;
                usbhid->urbctrl = NULL;
                hid_free_buffers(dev, hid);
mutex_unlock(&usbhid->mutex);
return ret;
}

@@ -1195,10 +1210,23 @@
usbhid->intf->needs_remote_wakeup = 0;
}

+mutex_lock(&usbhid->mutex);
+
clear_bit(HID_STARTED, &usbhid->iofl);
+
spin_lock_irq(&usbhid->lock); /* Sync with error and led handlers */
set_bit(HID_DISCONNECTED, &usbhid->iofl);
+while (usbhid->ctrltail != usbhid->ctrlhead) {
+if (usbhid->ctrl[usbhid->ctrltail].dir == USB_DIR_OUT) {
+kfree(usbhid->ctrl[usbhid->ctrltail].raw_report);
+usbhid->ctrl[usbhid->ctrltail].raw_report = NULL;
+}
+
+usbhid->ctrltail = (usbhid->ctrltail + 1) &
+((HID_CONTROL_FIFO_SIZE - 1);
+}
spin_unlock_irq(&usbhid->lock);
+
usb_kill_urb(usbhid->urbin);
usb_kill_urb(usbhid->urbout);
usb_kill_urb(usbhid->urbctrl);
@@ -1215,6 +1243,8 @@
usbhid->urbout = NULL;

hid_free_buffers(hid_to_usb_dev(hid), hid);
+
+mutex_unlock(&usbhid->mutex);
}

static int usbhid_power(struct hid_device *hid, int lvl)
@@ -1329,7 +1359,6 @@
hid->vendor = le16_to_cpu(dev->descriptor.idVendor);
hid->product = le16_to_cpu(dev->descriptor.idProduct);
hid->name[0] = 0;
-hid->quirks = usbhid_lookup_quirk(hid->vendor, hid->product);
if (intf->cur_altsetting->desc.bInterfaceProtocol ==
USB_INTERFACE_PROTOCOL_MOUSE)
hid->type = HID_TYPE_USBMOUSE;
@@ -1375,6 +1404,7 @@
INIT_WORK(&usbhid->reset_work, hid_reset);
timer_setup(&usbhid->io_retry, hid_retry_timeout, 0);
spin_lock_init(&usbhid->lock);
+mutex_init(&usbhid->mutex);

ret = hid_add_device(hid);
if (ret) {
@@ -1641,7 +1671,7 @@
int retval = -ENOMEM;
-
-reval = usbhid_quirks_init(quirks_param);
+retval = hid_quirks_init(quirks_param, BUS_USB, MAX_USBHID_BOOT QUIRKS);
if (retval)
goto usbhid_quirks_init_fail;
retval = usb_register(&hid_driver);
@@ -1651,7 +1681,7 @@
return 0;
usb_register_fail:
-usbhid_quirks_exit();
+hid_quirks_exit(BUS_USB);
usbhid_quirks_init_fail:
return retval;
}
@@ -1659,7 +1689,7 @@
static void __exit hid_exit(void)
{
usb_deregister(&hid_driver);
-usbhid_quirks_exit();
+hid_quirks_exit(BUS_USB);
}

module_init(hid_init);
--- linux-4.15.0.orig/drivers/hid/usbhid/hid-piddff.c
+++ linux-4.15.0/drivers/hid/usbhid/hid-piddff.c
@@ -1304,6 +1304,7 @@
if (pidff->pool[PID_DEVICE_MANAGED_POOL].value &&
    pidff->pool[PID_DEVICE_MANAGED_POOL].value[0] == 0) {
+error = -EPERM;
hid_notice(hid,
    "device does not support device managed pool\n");
goto fail;
--- linux-4.15.0.orig/drivers/hid/usbhid/hiddev.c
+++ linux-4.15.0/drivers/hid/usbhid/hiddev.c
@@ -36,6 +36,7 @@
#include <linux/hiddev.h>
#include <linux/compat.h>
#include <linux/vmalloc.h>
+static int __hiddev_open(struct hiddev *hiddev, struct file *file)
+{
+struct hiddev_list *list;
+int error;
+
+lockdep_assert_held(&hiddev->existancelock);
+
+list = vzalloc(sizeof(list));
+if (!list)
+    return -ENOMEM;
+
+mutex_init(&list->thread_lock);
+list->hiddev = hiddev;
+
+if (!hiddev->open++) {
+    error = hid_hw_power(hiddev->hid, PM_HINT_FULLON);
+    if (error < 0)
+        goto err_drop_count;
+    error = hid_hw_open(hiddev->hid);
+    if (error < 0)
+        goto err_normal_power;
+}
+
+spin_lock_irq(&hiddev->list_lock);
+list_add_tail(&list->node, &hiddev->list);
+spin_unlock_irq(&hiddev->list_lock);
+
+file->private_data = list;
+
+return 0;
+
+err_normal_power:
+hid_hw_power(hiddev->hid, PM_HINT_NORMAL);
+err_drop_count:
+hiddev->open--;
+vfree(list);
+return error;
+}
/**
 * open file op
 */
static int hiddev_open(struct inode *inode, struct file *file)
{
    struct hiddev_list *list;
    struct usb_interface *intf;
    struct hid_device *hid;
    struct hiddev *hiddev;
    intf = usbhid_find_interface(iminor(inode));
    if (!intf)
        return -ENODEV;
    hid = usb_get_intfdata(intf);
    hiddev = hid->hiddev;
    if (!(list = vzalloc(sizeof(struct hiddev_list))))
        return -ENOMEM;
    mutex_init(&list->thread_lock);
    list->hiddev = hiddev;
    file->private_data = list;
    /*
    * no need for locking because the USB major number
    * is shared which usbcore guards against disconnect
    */
    if (list->hiddev->exist) {
        if (!list->hiddev->open++)
            if (list->hiddev->exist) {
                dev_info(hiddev, HIDDEV_STRING

                hid = hiddev->hid;
                res = hid_hw_power(hid, PM_HINT_FULLON);
                if (res < 0)
                    goto bail;
            } else {
                res = -ENODEV;
                goto bail;
            }
        } else {
            list_add_tail(&list->node, &hiddev->list);
            spin_lock_irq(&list->hiddev->list_lock);
            list->hiddev->existancelock->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);
            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

            mutex_lock(&hiddev->existancelock);
            if (!list->hiddev->open++)
                if (list->hiddev->exist) {
                    struct hid_device *hid = hiddev->hid;
                    res = hid_hw_power(hid, PM_HINT_FULLON);
                    if (res < 0)
                        goto bail;
                } else {
                    res = -ENODEV;
                    goto bail;
                }
            spin_unlock_irq(&list->hiddev->list_lock);

-goto bail_unlock;
-res = hid_hw_open(hid);
-if (res < 0)
-goto bail_normal_power;
-}
+res = hiddev->exist ? __hiddev_open(hiddev, file) : -ENODEV;
mutex_unlock(&hiddev->existancelock);
-return 0;
-bail_normal_power:
-hid_hw_power(hid, PM_HINT_NORMAL);
-bail_unlock:
-mutex_unlock(&hiddev->existancelock);
-bail:
-file->private_data = NULL;
-vfree(list);
+
return res;
}
@@ -469,10 +469,14 @@
if (uref->field_index >= report->maxfield)
goto inval;
+uref->field_index = array_index_nospec(uref->field_index,
+
report->maxfield);
field = report->field[uref->field_index];
if (uref->usage_index >= field->maxusage)
goto inval;
+uref->usage_index = array_index_nospec(uref->usage_index,
+
field->maxusage);
uref->usage_code = field->usage[uref->usage_index].hid;
@@ -499,29 +503,45 @@
if (uref->field_index >= report->maxfield)
goto inval;
+uref->field_index = array_index_nospec(uref->field_index,
+
report->maxfield);
field = report->field[uref->field_index];
if (cmd == HIDIOCGCOLLECTIONINDEX) {
if (uref->usage_index >= field->maxusage)
goto inval;
+uref->usage_index =
+array_index_nospec(uref->usage_index,

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+ field->maxusage);
    } else if (uref->usage_index >= field->report_count)
    goto inval;
}

-if ((cmd == HIDIOCGUSAGES || cmd == HIDIOCSUSAGES) &&
    - (uref_multi->num_values > HID_MAX_MULTI_USAGES ||
    - uref->usage_index + uref_multi->num_values > field->report_count))
-goto inval;
+if (cmd == HIDIOCGUSAGES || cmd == HIDIOCSUSAGES) {
    if (uref_multi->num_values > HID_MAX_MULTI_USAGES ||
        uref->usage_index + uref_multi->num_values >
        field->report_count)
        goto inval;
    +uref->usage_index =
    +array_index_nospec(uref->usage_index,
        + field->report_count -
        + uref_multi->num_values);
    +}

switch (cmd) {
    case HIDIOCGUSAGE:
    +if (uref->usage_index >= field->report_count)
    +goto inval;
    uref->value = field->value[uref->usage_index];
    if (copy_to_user(user_arg, uref, sizeof(*uref)))
        goto fault;
        goto goodreturn;
    case HIDIOCSUSAGE:
    +if (uref->usage_index >= field->report_count)
    +goto inval;
    field->value[uref->usage_index] = uref->value;
    goto goodreturn;

    @@ -753,6 +773,8 @@
    if (finfo.field_index >= report->maxfield)
        break;
    +finfo.field_index = array_index_nospec(finfo.field_index,
    + report->maxfield);

    field = report->field[finfo.field_index];
    memset(&finfo, 0, sizeof(finfo));
    @@ -797,6 +819,8 @@

    if (cinfo.index >= hid->maxcollection)
break;
+ cinfo.index = array_index_nospec(cinfo.index,
+ hid->maxcollection);

cinfo.type = hid->collection[cinfo.index].type;
cinfo.usage = hid->collection[cinfo.index].usage;
@@ -934,9 +958,9 @@
hiddev->exist = 0;

if (hiddev->open) {
- mutex_unlock(&hiddev->existancelock);
hid_hw_close(hiddev->hid);
 wake_up_interruptible(&hiddev->wait);
+ mutex_unlock(&hiddev->existancelock);
 } else {
 mutex_unlock(&hiddev->existancelock);
kfree(hiddev);
--- linux-4.15.0.orig/drivers/hid/usbhid/usbhid.h
+++ linux-4.15.0/drivers/hid/usbhid/usbhid.h
@@ -93,6 +93,7 @@
dma_addr_t outbuf_dma; /* Output buffer dma */
unsigned long last_out;/* record of last output for timeouts */

+struct mutex mutex;/* start/stop/open/close */
spinlock_t lock;/* fifo spinlock */
unsigned long iofl; /* I/O flags (CTRL_RUNNING, OUT_RUNNING) */
struct timer_list io_retry; /* Retry timer */
--- linux-4.15.0.orig/drivers/hid/wacom.h
+++ linux-4.15.0/drivers/hid/wacom.h
@@ -205,6 +205,21 @@
}
}

+/*
+ * Convert a signed 32-bit integer to an unsigned n-bit integer. Undoes
+ * the normally-helpful work of 'hid_snto32' for fields that use signed
+ * ranges for questionable reasons.
+ */
+
+static inline __u32 wacom_s32tou(s32 value, __u8 n)
+{
+ switch (n) {
+ case 8: return ((__u8)value);
+ case 16: return ((__u16)value);
+ case 32: return ((__u32)value);
+ }
+ return value & (1 << (n - 1)) ? value & (~(~0U << n)) : value;
+}
extern const struct hid_device_id wacom_ids[];

void wacom_wac_irq(struct wacom_wac *wacom_wac, size_t len);
--- linux-4.15.0.orig/drivers/hid/wacom_sys.c
+++ linux-4.15.0/drivers/hid/wacom_sys.c
@@ -115,20 +115,27 @@
    unsigned int equivalent_usage = wacom_equivalent_usage(usage->hid);
    u8 *data;
    int ret;
-   int n;
+    u32 n;

    switch (equivalent_usage) {
+    case WACOM_HID_WD_TOUCH_RING_SETTING:
+        wacom->generic_has_leds = true;
+        break;
    case HID_DG_CONTACTMAX:
    /* leave touch_max as is if predefined */
    if (!features->touch_max) {
        /* read manually */
-       data = kzalloc(2, GFP_KERNEL);
+       n = hid_report_len(field->report);
+       data = hid_alloc_report_buf(field->report, GFP_KERNEL);

        if (!data)
            break;
        data[0] = field->report->id;
    ret = wacom_get_report(hdev, HID_FEATURE_REPORT,
-       data, 2, WAC_CMD_RETRIES);
-    if (ret == 2) {
-       data, n, WAC_CMD_RETRIES);
+       if (ret == n && features->type == HID_GENERIC) {
+           ret = hid_report_raw_event(hdev,
+             HID_FEATURE_REPORT, data, n, 0);
+       } else if (ret == 2 && features->type != HID_GENERIC) {
+           features->touch_max = data[1];
+       } else {
+           features->touch_max = 16;
+       }
+   }
+/* 2nd-generation Intuos Pro Large has incorrect Y maximum */
+if (hdev->vendor == USB_VENDOR_ID_WACOM &&
+    hdev->product == 0x0358 &&
+    WACOM_PEN_FIELD(field) &&
+    wacom_equivalent_usage(usage->hid) == HID_GD_Y) {
+    field->logical_maximum = 43200;
+}
switch (usage->hid) {
  case HID_GD_X:
    features->x_max = field->logical_maximum;
    u8 *rep_data;
    struct hid_report *r;
    struct hid_report_enum *re;
    int length;
    u32 length;
    int error = -ENOMEM, limit = 0;

    if (wacom_wac->mode_report < 0)
      int i;
      unsigned long flags;

      spin_lock_irqsave(&remote->remote_lock, flags);
      remote->remotes[index].registered = false;
      spin_unlock_irqrestore(&remote->remote_lock, flags);

      for (i = 0; i < WACOM_MAX_REMOTES; i++) {
        if (remote->remotes[i].serial == serial) {
          spin_lock_irqsave(&remote->remote_lock, flags);
          remote->remotes[i].registered = false;
          spin_unlock_irqrestore(&remote->remote_lock, flags);
        }
      }

      devres_add(&wacom->hdev->dev, devres);

      int i;
      unsigned long flags;

      spin_lock_irqsave(&remote->remote_lock, flags);
      remote->remotes[index].registered = false;
      spin_unlock_irqrestore(&remote->remote_lock, flags);

      devres_release_group(&wacom->hdev->dev, 
        &remote->remotes[index].battery.bat_desc);
      spin_lock_irqsave(&remote->remote_lock, flags);
      remote->remotes[i].registered = false;
      spin_unlock_irqrestore(&remote->remote_lock, flags);

      devres_release_group(&wacom->hdev->dev, 
        &remote->remotes[index].group.name);
      devres_release_group(&wacom->hdev->dev, 
        &remote->remotes[index].battery.bat_desc);
    }
if (remote->remotes[i].group.name)
    devres_release_group(&wacom->hdev->dev,
        &remote->remotes[i]);

for (i = 0; i < WACOM_MAX_REMOTES; i++) {
    if (remote->remotes[i].serial == serial) {
        remote->remotes[i].serial = 0;
        remote->remotes[i].group.name = NULL;
        remote->remotes[i].registered = false;
        remote->remotes[i].battery.battery = NULL;
        wacom->led.groups[i].select = WACOM_STATUS_UNKNOWN;
    }
}

buttons = (data[4] << 1) | (data[3] & 0x01);
} else if (features->type == CINTIQ_COMPANION_2) {
    /* d-pad right  -> data[4] & 0x10
       d-pad up     -> data[4] & 0x20
       d-pad left   -> data[4] & 0x40
       d-pad down   -> data[4] & 0x80
       d-pad center -> data[3] & 0x01
     */
    buttons = ((data[2] >> 4) << 7) |
                ((data[1] & 0x04) << 4) |
                (data[2] & 0x0F) << 2) |
                (data[1] & 0x03);
} else if (features->type == INTUOS5S && features->type <= INTUOSPL) {
    /* d-pad right  -> data[2] & 0x10
       d-pad up     -> data[2] & 0x20
       d-pad left   -> data[2] & 0x40
       d-pad down   -> data[2] & 0x80
       d-pad center -> data[1] & 0x01
     */
    return tool_type;
}

static void wacom_exit_report(struct wacom_wac *wacom)
{
    struct input dev *input = wacom->pen_input;
    struct wacom features *features = &wacom->features;
    unsigned char *data = wacom->data;
    int idx = (features->type == INTUOS) ? (data[1] & 0x01) : 0;
}
/*
+ * Reset all states otherwise we lose the initial states
+ * when in-prox next time
+ */
+input_report_abs(input, ABS_X, 0);
+input_report_abs(input, ABS_Y, 0);
+input_report_abs(input, ABS_DISTANCE, 0);
+input_report_abs(input, ABS_TILT_X, 0);
+input_report_abs(input, ABS_TILT_Y, 0);
+if (wacom->tool[idx] >= BTN_TOOL_MOUSE) {
+  input_report_key(input, BTN_LEFT, 0);
+  input_report_key(input, BTN_MIDDLE, 0);
+  input_report_key(input, BTN_RIGHT, 0);
+  input_report_key(input, BTN_SIDE, 0);
+  input_report_key(input, BTN_EXTRA, 0);
+  input_report_abs(input, ABS_THROTTLE, 0);
+  input_report_abs(input, ABS_RZ, 0);
+} else {
+  input_report_key(input, wacom->tool[idx], 0);
+  input_report_abs(input, ABS_MISC, 0); /* reset tool id */
+}
+input_report_abs(input, ABS_PRESSURE, 0);
+input_report_key(input, BTN_STYLUS, 0);
+input_report_key(input, BTN_STYLUS2, 0);
+input_report_key(input, BTN_TOUCH, 0);
+input_report_abs(input, ABS_WHEEL, 0);
+if (features->type >= INTUOS3S)
+  input_report_abs(input, ABS_Z, 0);
+}
+input_report_key(input, wacom->tool[idx], 0);
+input_report_abs(input, ABS_MISC, 0); /* reset tool id */
+input_event(input, EV_MSC, MSC_SERIAL, wacom->serial[idx]);
wacom->id[idx] = 0;
+
static int wacom_intuos_inout(struct wacom_wac *wacom)
{
  struct wacom_features *features = &wacom->features;
  @@ -.741,36 +780,7 @@
  if (!wacom->id[idx])
    return 1;

  /*
  - * Reset all states otherwise we lose the initial states
  - * when in-prox next time
  - */
  -input_report_abs(input, ABS_X, 0);
  -input_report_abs(input, ABS_Y, 0);
  -input_report_abs(input, ABS_DISTANCE, 0);
  -input_report_abs(input, ABS_TILT_X, 0);
  -input_report_abs(input, ABS_TILT_Y, 0);
  -if (wacom->tool[idx] >= BTN_TOOL_MOUSE) {
-input_report_key(input, BTN_LEFT, 0);
-input_report_key(input, BTN_MIDDLE, 0);
-input_report_key(input, BTN_RIGHT, 0);
-input_report_key(input, BTN_SIDE, 0);
-input_report_key(input, BTN_EXTRA, 0);
-input_report_abs(input, ABS_THROTTLE, 0);
-input_report_abs(input, ABS_RZ, 0);
} else {
-input_report_abs(input, ABS_PRESSURE, 0);
-input_report_key(input, BTN_STYLUS, 0);
-input_report_key(input, BTN_STYLUS2, 0);
-input_report_key(input, BTN_TOUCH, 0);
-input_report_abs(input, ABS_WHEEL, 0);
-if (features->type >= INTUOS3S)
-input_report_abs(input, ABS_Z, 0);
-
-} -input_report_key(input, wacom->tool[idx], 0);
-input_report_abs(input, ABS_MISC, 0); /* reset tool id */
-input_event(input, EV_MSC, MSC_SERIAL, wacom->serial[idx]);
-wacom->id[idx] = 0;
+wacom_exit_report(wacom);
return 2;
}

@@ -838,6 +848,8 @@
y >>= 1;
distance >>= 1;
}
+if (features->type == INTUOSHT2)
+distance = features->distance_max - distance;
-input_report_abs(input, ABS_X, x);
-input_report_abs(input, ABS_Y, y);
-input_report_abs(input, ABS_DISTANCE, distance);
@@ -1051,7 +1063,7 @@
-input_report_key(input, BTN_BASE2, (data[11] & 0x02));
if (data[12] & 0x80)
-input_report_abs(input, ABS_WHEEL, (data[12] & 0x7f));
+input_report_abs(input, ABS_WHEEL, (data[12] & 0x7f) - 1);
 else
 input_report_abs(input, ABS_WHEEL, 0);
@@ -1215,17 +1227,28 @@
/* Add back in missing bits of ID for non-USI pens */
wacom->id[0] |= (wacom->serial[0] >> 32) & 0xFFFFF;
} -wacom->tool[0] = wacom_intuos_get_tool_type(wacom_intuos_id_mangle(wacom->id[0]));
for (i = 0; i < pen_frames; i++) {
    unsigned char *frame = &data[i*pen_frame_len + 1];
    bool valid = frame[0] & 0x80;
    bool prox = frame[0] & 0x40;
    bool range = frame[0] & 0x20;
    +bool invert = frame[0] & 0x10;

    if (!valid)
        continue;

    +if (!prox) {
        +wacom->shared->stylus_in_proximity = false;
        +wacom_exit_report(wacom);
        +input_sync(pen_input);
        +
        +wacom->tool[0] = 0;
        +wacom->id[0] = 0;
        +wacom->serial[0] = 0;
        +return;
        +}
    +
    if (range) {
        /* Fix rotation alignment: userspace expects zero at left */
        int16_t rotation = (int16_t)get_unaligned_le16(&frame[9]);
        @@ -1233,6 +1256,16 @@
        if (rotation > 899)
            rotation -= 1800;
        +if (!wacom->tool[0]) { /* first in range */
            +/* Going into range select tool */
            +if (invert)
                +wacom->tool[0] = BTN_TOOL_RUBBER;
            +else if (wacom->id[0])
                +wacom->tool[0] = wacom_intuos_get_tool_type(wacom->id[0]);
            +else
                +wacom->tool[0] = BTN_TOOL_PEN;
            +}
        +
        input_report_abs(pen_input, ABS_X, get_unaligned_le16(&frame[1]));
        input_report_abs(pen_input, ABS_Y, get_unaligned_le16(&frame[3]));
        input_report_abs(pen_input, ABS_TILT_X, (char)frame[7]);
        @@ -1240,17 +1273,19 @@
        input_report_abs(pen_input, ABS_Z, rotation);
        input_report_abs(pen_input, ABS_WHEEL, get_unaligned_le16(&frame[11]));
    }
    -input_report_abs(pen_input, ABS_PRESSURE, get_unaligned_le16(&frame[5]));
    -input_report_abs(pen_input, ABS_DISTANCE, range ? frame[13] : wacom->features.distance_max);
    -
-input_report_key(pen_input, BTN_TOUCH, frame[0] & 0x01);
-input_report_key(pen_input, BTN_STYLUS, frame[0] & 0x02);
-input_report_key(pen_input, BTN_STYLUS2, frame[0] & 0x04);
-
-input_report_key(pen_input, wacom->tool[0], prox);
-input_event(pen_input, EV_MSC, MSC_SERIAL, wacom->serial[0]);
-input_report_abs(pen_input, ABS_MISC,
- wacom_intuos_id_mangle(wacom->id[0])); /* report tool id */
+if (wacom->tool[0]) {
+input_report_abs(pen_input, ABS_PRESSURE, get_unaligned_le16(&frame[5]));
+input_report_abs(pen_input, ABS_DISTANCE, range ? frame[13] : wacom->features.distance_max);
+
+input_report_key(pen_input, BTN_TOUCH, frame[0] & 0x09);
+input_report_key(pen_input, BTN_STYLUS, frame[0] & 0x02);
+input_report_key(pen_input, BTN_STYLUS2, frame[0] & 0x04);
+
+input_report_key(pen_input, wacom->tool[0], prox);
+input_event(pen_input, EV_MSC, MSC_SERIAL, wacom->serial[0]);
+input_report_abs(pen_input, ABS_MISC,
+ wacom_intuos_id_mangle(wacom->id[0])); /* report tool id */
+
}

wacom->shared->stylus_in_proximity = prox;

@@ -1312,11 +1347,17 @@
if (wacom->num_contacts_left <= 0) {
  wacom->num_contacts_left = 0;
  wacom->shared->touch_down = wacom_wac_finger_count_touches(wacom);
+  input_sync(touch_input);
  }
}

-input_report_switch(touch_input, SW_MUTE_DEVICE, !(data[281] >> 7));
-input_sync(touch_input);
+if (wacom->num_contacts_left == 0) {
+  // Be careful that we don't accidentally call input_sync with
+  // only a partial set of fingers of processed
+  input_report_switch(touch_input, SW_MUTE_DEVICE, !(data[281] >> 7));
+  input_sync(touch_input);
+}
+
static void wacom_intuos_pro2_bt_pad(struct wacom_wac *wacom)
@@ -1324,7 +1365,7 @@
struct input_dev *pad_input = wacom->pad_input;
 unsigned char *data = wacom->data;

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int buttons = (data[282] << 1) | ((data[281] >> 6) & 0x01);
int buttons = data[282] | ((data[281] & 0x40) << 2);
int ring = data[285] & 0x7F;
bool ringstatus = data[285] & 0x80;
bool prox = buttons || ringstatus;
features->device_type |= WACOM_DEVICETYPE_PAD;
break;
case WACOM_HID_WD_BUTTONCENTER:
    wacom->generic_has_leds = true;
    /* fall through */
case WACOM_HID_WD_BUTTONHOME:
    case WACOM_HID_WD_BUTTONUP:
    case WACOM_HID_WD_BUTTONDOWN:
        struct wacom_features *features = &wacom_wac->features;
        unsigned equivalent_usage = wacom_equivalent_usage(usage->hid);
        int i;
        -bool is_touch_on = value;
        bool do_report = false;
        /*
         * @ @ -1969,16 +2007,17 @ @
         * break;
         */
case WACOM_HID_WD_MUTE_DEVICE:
    -if (wacom_wac->shared->touch_input & value) {
    -wacom_wac->shared->is_touch_on = !wacom_wac->shared->is_touch_on;
    -is_touch_on = wacom_wac->shared->is_touch_on;
    -}
    -
    -/* fall through*/
    case WACOM_HID_WD_TOUCHONOFF:
        if (wacom_wac->shared->touch_input) {
            +bool *is_touch_on = &wacom_wac->shared->is_touch_on;
            +
            +if (equivalent_usage == WACOM_HID_WD_MUTE_DEVICE & value)
            +*is_touch_on = !(is_touch_on);
            +else if (equivalent_usage == WACOM_HID_WD_TOUCHONOFF)
            +*is_touch_on = value;
            +
            +input_report_switch(wacom_wac->shared->touch_input,
            -    SW_MUTE_DEVICE, !is_touch_on);
            +    SW_MUTE_DEVICE, !(is_touch_on));
            input_sync(wacom_wac->shared->touch_input);
        } break;
    @ @ -2149,7 +2188,7 @ @
case HID_DG_TOOLSERIALNUMBER:
    if (value) {
        wacom_wac->serial[0] = (wacom_wac->serial[0] & ~0xFFFFFFFFULL);
        wacom_wac->serial[0] |= ((__u32)value);
        wacom_wac->serial[0] |= wacom_s32tou(value, field->report_size);
    }
    return;

    case HID_DG_TWIST:
    @@ -2165,15 +2204,17 @@
    return;

    case WACOM_HID_WD_SERIALHI:
    if (value) {
        __u32 raw_value = wacom_s32tou(value, field->report_size);
        wacom_wac->serial[0] = (wacom_wac->serial[0] & 0xFFFFFFFF);
        wacom_wac->serial[0] |= ((__u64)raw_value) << 32;
        /*
         * Non-USI EMR devices may contain additional tool type
         * information here. See WACOM_HID_WD_TOOLTYPE case for
         * more details.
         */
        if (value >> 20 == 1) {
            wacom_wac->id[0] |= raw_value & 0xFFFFF;
        }
    }
    return;

    case WACOM_HID_WD_OFFSETLEFT:
    if (features->offset_left && value != features->offset_left)
    @@ -2362,7 +2403,7 @@
        !wacom_wac->shared->is_touch_on) {
            if (!wacom_wac->shared->touch_down)
                return;
            -prox = 0;
            +prox = false;
        }
    
    wacom_wac->hid_data.num_received++;
    @@ -2401,6 +2442,7 @@
    struct wacom *wacom = hid_get_drvdata(hdev);
struct wacom_wac *wacom_wac = &wacom->wacom_wac;
unsigned equivalent_usage = wacom_equivalent_usage(usage->hid);
+struct wacom_features *features = &wacom->wacom_wac.features;

switch (equivalent_usage) {
    case HID_GD_X:
        break;
    case HID_DG_TIPSWITCH:
        wacom_wac->hid_data.tipswitch = value;
        break;
+case HID_DG_CONTACTMAX:
+    if (!features->touch_max) {
+        features->touch_max = value;
+    } else {
+        hid_warn(hdev, "%s: ignoring attempt to overwrite non-zero touch_max "
+            "%d -> %d\\n", __func__, features->touch_max, value);
+    }
+    return;
}

@if (features->type >= INTUOSHT && features->type <= BAMBOO_PT)
features->device_type |= WACOM_DEVICETYPE_PAD;
-features->x_max = 4096;
-features->y_max = 4096;
+if (features->type == INTUOSHT2) {
+    features->x_max = features->x_max / 10;
+    features->y_max = features->y_max / 10;
+}
+else {
+    features->x_max = 4096;
+    features->y_max = 4096;
+}
} else if (features->pktlen == WACOM_PKGLEN_BBTOUCH) {
features->device_type |= WACOM_DEVICETYPE_PAD;
@@ -3302,8 +3358,6 @@
    }
    struct wacom_features *features = &wacom_wac->features;

    -input_dev->evbit[0] |= BIT_MASK(EV_KEY) | BIT_MASK(EV_ABS);
    -
    if (!(features->device_type & WACOM_DEVICETYPE_PEN))
        return -ENODEV;
    }
    
@@ -3318,6 +3372,7 @@
return 0;
}

+input_dev->evbit[0] |= BIT_MASK(EV_KEY) | BIT_MASK(EV_ABS);
__set_bit(BTN_TOUCH, input_dev->keybit);
__set_bit(ABS_MISC, input_dev->absbit);

@@ -3466,8 +3521,6 @@
{
    struct wacom_features *features = &wacom_wac->features;

    -input_dev->evbit[0] |= BIT_MASK(EV_KEY) | BIT_MASK(EV_ABS);
    -
    if (!(features->device_type & WACOM_DEVICETYPE_TOUCH))
        return -ENODEV;

    @@ -3480,6 +3533,7 @@
    /* setup has already been done */
    return 0;

    +input_dev->evbit[0] |= BIT_MASK(EV_KEY) | BIT_MASK(EV_ABS);
    __set_bit(BTN_TOUCH, input_dev->keybit);

    if (features->touch_max == 1) {
        @@ -3521,7 +3575,7 @@
            0, 5920, 4, 0);
    }
    input_abs_set_res(input_dev, ABS_MT_POSITION_X, 40);
    -input_abs_set_res(input_dev, ABS_MT_POSITION_X, 40);
    +input_abs_set_res(input_dev, ABS_MT_POSITION_Y, 40);

    /* fall through */

    @@ -3642,7 +3696,7 @@
    static bool wacom_is_led_toggled(struct wacom *wacom, int button_count,
        int mask, int group)
    {
        -int button_per_group;
        +int group_button;

        /*
         * 21UX2 has LED group 1 to the left and LED group 0
         * @@ -3652,9 +3706,12 @@
         * if (wacom->wacom_wac.features.type == WACOM_21UX2)
         * group = 1 - group;

         -button_per_group = button_count/wacom->led.count;
        +group_button = group * (button_count/wacom->led.count);
+if (wacom->wacom_wac.features.type == INTUOSP2_BT)
+group_button = 8;

- return mask & (1 << (group * button_per_group));
+ return mask & (1 << group_button);
}

static void wacom_update_led(struct wacom *wacom, int button_count, int mask,
--- linux-4.15.0.orig/drivers/hid/wacom_wac.h
+++ linux-4.15.0/drivers/hid/wacom_wac.h
@@ -121,7 +121,7 @@
#define WACOM_HID_WD_TOUCHONOFF         (WACOM_HID_UP_WACOMDIGITIZER | 0x0454)
#define WACOM_HID_WD_BATTERY_LEVEL      (WACOM_HID_UP_WACOMDIGITIZER | 0x043b)
#define WACOM_HID_WD_EXPRESSKEY00       (WACOM_HID_UP_WACOMDIGITIZER | 0x0910)
-#define WACOM_HID_WD_EXPRESSKEYCAP00   (WACOM_HID_UP_WACOMDIGITIZER | 0x0950)
+#define WACOM_HID_WD_EXPRESSKEYCAP00   (WACOM_HID_UP_WACOMDIGITIZER | 0x0940)
#define WACOM_HID_WD_MODE_CHANGE        (WACOM_HID_UP_WACOMDIGITIZER | 0x0980)
#define WACOM_HID_WD_MUTE_DEVICE        (WACOM_HID_UP_WACOMDIGITIZER | 0x0981)
#define WACOM_HID_WD_CONTROL_PANEL      (WACOM_HID_UP_WACOMDIGITIZER | 0x0982)
@ @ -140,6 +140,7 @@
#define WACOM_HID_WD_OFFSET_BOTTOM     (WACOM_HID_UP_WACOMDIGITIZER | 0x0d33)
#define WACOM_HID_WD_DATAMODE          (WACOM_HID_UP_WACOMDIGITIZER | 0x1002)
#define WACOM_HID_WD_DIGITIZERINFO     (WACOM_HID_UP_WACOMDIGITIZER | 0x1013)
+#define WACOM_HID_WD_TOUCH_RING_SETTING (WACOM_HID_UP_WACOMDIGITIZER | 0x1032)
#define WACOM_HID_UP_G9                 0xff090000
#define WACOM_HID_G9_PEN                (WACOM_HID_UP_G9 | 0x02)
#define WACOM_HID_G9_TOUCHSCREEN        (WACOM_HID_UP_G9 | 0x11)
--- linux-4.15.0.orig/drivers/hsi/controllers/omap_ssi_core.c
+++ linux-4.15.0/drivers/hsi/controllers/omap_ssi_core.c
@@ -389,7 +389,7 @@
err = ida_simple_get(&platform_omap_ssi_ida, 0, 0, GFP_KERNEL);
if (err < 0)
  goto out_err;
+return err;
ssi->id = err;

ssi->owner = THIS_MODULE;
--- linux-4.15.0.orig/drivers/hsi/hsi_core.c
+++ linux-4.15.0/drivers/hsi/hsi_core.c
@@ -223,8 +223,6 @@
if (err)
  goto err;
-dev_set_name(&cl->device, "%s", name);
-err = hsi_of_property_parse_mode(client, "hsi-mode", &mode);
if (err) {
    err = hsi_of_property_parse_mode(client, "hsi-rx-mode",
    cl->device.release = hsi_client_release;
    cl->device.of_node = client;

+dev_set_name(&cl->device, "%s", name);
if (device_register(&cl->device) < 0) {
    pr_err("hsi: failed to register client: %s\n", name);
    put_device(&cl->device);
--- linux-4.15.0.orig/drivers/hv/Kconfig
+++ linux-4.15.0/drivers/hv/Kconfig
@@ -2,7 +2,7 @@
   config HYPERV
   tristate "Microsoft Hyper-V client drivers"
   -depends on X86 && ACPI && PCI && X86_LOCAL_APIC && HYPERVISOR_GUEST
   +depends on X86 && ACPI && X86_LOCAL_APIC && HYPERVISOR_GUEST
   select PARAVIRT
   help
     Select this option to run Linux as a Hyper-V client operating
--- linux-4.15.0.orig/drivers/hv/channel.c
+++ linux-4.15.0/drivers/hv/channel.c
@@ -558,11 +566,8 @@
    channel->onchannel_callback = NULL;
}

-void vmbus_reset_channel_cb(struct vmbus_channel *channel)
+void vmbus_reset_channel_cb(struct vmbus_channel *channel)
{
-struct vmbus_channel_close_channel *msg;
-int ret;
-
/* 
* vmbus_on_event(), running in the per-channel tasklet, can race 
* with vmbus_close_internal() in the case of SMP guest, e.g., when 
*/ 
tasklet_disable(&channel->callback_event);

+channel->sc_creation_callback = NULL;
+
+/* Stop the callback asap */
+if (channel->target_cpu != get_cpu()) {
+put_cpu();
+smp_call_function_single(channel->target_cpu, reset_channel_cb,
+ channel, true);
+} else {
+reset_channel_cb(channel);
+put_cpu();
+
+/* Re-enable tasklet for use on re-open */
+tasklet_enable(&channel->callback_event);
+}
+
+static int vmbus_close_internal(struct vmbus_channel *channel)
+{
+struct vmbus_channel_close_channel *msg;
+int ret;
+
+vmbus_reset_channel_cb(channel);
+
*/

* In case a device driver's probe() fails (e.g.,
* util_probe() -> vmbus_open() returns -ENOMEM) and the device is
*/

channel->state = CHANNEL_OPEN_STATE;
-channel->sc_creation_callback = NULL;
-/* Stop callback and cancel the timer asap */
-if (channel->target_cpu != get_cpu()) {
-put_cpu();
-smp_call_function_single(channel->target_cpu, reset_channel_cb,
- channel, true);
-} else {
-reset_channel_cb(channel);
-put_cpu();
-}
/* Send a closing message */

@@ -639,8 +657,6 @@
    get_order(channel->ringbuffer_pagecount * PAGE_SIZE));

out:
-/* re-enable tasklet for use on re-open */
-tasklet_enable(&channel->callback_event);
return ret;
}

--- linux-4.15.0.orig/drivers/hv/channel_mgmt.c
+++ linux-4.15.0/drivers/hv/channel_mgmt.c
@@ -71,7 +71,7 @@
 /* PCIE */
 { .dev_type = HV_PCIE,
   HV_PCIE_GUID,
-  .perf_device = true,
+  .perf_device = false,
   },

/* Synthetic Frame Buffer */
@@ -447,61 +447,16 @@
}
}

-/*
- * vmbus_process_offer - Process the offer by creating a channel/device
- * associated with this offer
- */
-/*
- * static void vmbus_process_offer(struct vmbus_channel *newchannel)
+/* Note: the function can run concurrently for primary/sub channels. */
+static void vmbus_add_channel_work(struct work_struct *work)
{
-struct vmbus_channel *channel;
-bool fnew = true;
+struct vmbus_channel *newchannel =
+container_of(work, struct vmbus_channel, add_channel_work);
+struct vmbus_channel *primary_channel = newchannel->primary_channel;
 unsigned long flags;
 u16 dev_type;
 int ret;

-/* Make sure this is a new offer */
-mutex_lock(&vmbus_connection.channel_mutex);
-
-/*
- * Now that we have acquired the channel_mutex,
- * we can release the potentially racing rescind thread.
- */
-atomic_dec(&vmbus_connection.offer_in_progress);
-
-list_for_each_entry(channel, &vmbus_connection.chn_list, listentry) {
- if (!uuid_le_cmp(channel->offermsg.offer.if_type,
- newchannel->offermsg.offer.if_type) &&
- !uuid_le_cmp(channel->offermsg.offer.if_instance,
- newchannel->offermsg.offer.if_instance)) {
- fnew = false;
- break;
- }
- }
-
- if (fnew)
- list_add_tail(&newchannel->listentry,
- &vmbus_connection.chn_list);
-
- mutex_unlock(&vmbus_connection.channel_mutex);
-
- if (!fnew) {
- /*
- * Check to see if this is a sub-channel.
- */
- if (newchannel->offermsg.offer.sub_channel_index != 0) {
- /*
- * Process the sub-channel.
- */
- newchannel->primary_channel = channel;
- spin_lock_irqsave(&channel->lock, flags);
- list_add_tail(&newchannel->sc_list, &channel->sc_list);
- channel->num_sc++;
- spin_unlock_irqrestore(&channel->lock, flags);
- } else {
- goto err_free_chan;
- }
- }
-
- dev_type = hv_get_dev_type(newchannel);
-
- init_vp_index(newchannel, dev_type);
@@ -519,29 +474,26 @@
/
/*
 * This state is used to indicate a successful open
 * so that when we do close the channel normally, we
- * can cleanup properly
+ * can cleanup properly.
 */
newchannel->state = CHANNEL_OPEN_STATE;

- if (!fnew) {
- struct hv_device *dev
- = newchannel->primary_channel->device_obj;
- -
- if (vmbus_add_channel_kobj(dev, newchannel)) {
- atomic_dec(&vmbus_connection.offer_in_progress);
- goto err_free_chan;
- }
+ if (primary_channel != NULL) {
+ /* newchannel is a sub-channel. */
+ struct hv_device *dev = primary_channel->device_obj;
+ +
+ if (vmbus_add_channel_kobj(dev, newchannel))
+ goto err_deq_chan;
+ +
+ if (primary_channel->sc_creation_callback != NULL)
+ primary_channel->sc_creation_callback(newchannel);
- if (channel->sc_creation_callback != NULL)
- channel->sc_creation_callback(newchannel);
newchannel->probe_done = true;
return;
}

/ *
- * Start the process of binding this offer to the driver
- * We need to set the DeviceObject field before calling
- * vmbus_child_dev_add()
+ * Start the process of binding the primary channel to the driver
*/
newchannel->device_obj = vmbus_device_create(
&newchannel->offermsg.offer.if_type,
@@ -570,13 +522,28 @@
err_deq_chan:
mutex_lock(&vmbus_connection.channel_mutex);
-list_del(&newchannel->listentry);
+
+/*
+ * We need to set the flag, otherwise
+ * vmbus_onoffer_rescind() can be blocked.
+ */
+newchannel->probe_done = true;
+
+if (primary_channel == NULL) {
+list_del(&newchannel->listentry);

static void vmbus_process_offer(struct vmbus_channel *newchannel) {
    struct vmbus_channel *channel;
    struct workqueue_struct *wq;
    unsigned long flags;
    bool fnew = true;

    mutex_lock(&vmbus_connection.channel_mutex);

    /*
     * Now that we have acquired the channel_mutex,
     * we can release the potentially racing rescind thread.
     */
    atomic_dec(&vmbus_connection.offer_in_progress);

    /*
     * Now that we have acquired the channel_mutex,
     * and released the potentially racing rescind thread,
     * we can check if the offer is new.
     */
    if (!uuid_le_cmp(channel->offermsg.offer.if_type,
                     newchannel->offermsg.offer.if_type) &&
        !uuid_le_cmp(channel->offermsg.offer.if_instance,
                     newchannel->offermsg.offer.if_instance)) {
        vmbus_put_channel(channel);
        fnew = false;

        atomic_dec(&vmbus_connection.offer_in_progress);
        mutex_unlock(&vmbus_connection.channel_mutex);
        mutex_lock(&vmbus_connection.channel_mutex);

        /*
         * Process the offer by creating a channel/device
         */
        vmbus_release_relid(newchannel->offermsg.child_relid);
        spin_lock_irqsave(&primary_channel->lock, flags);
        list_del(&newchannel->sc_list);
        spin_unlock_irqrestore(&primary_channel->lock, flags);
        mutex_unlock(&vmbus_connection.channel_mutex);

        if (newchannel->target_cpu != get_cpu()) {
            put_cpu();
            sm_call_function_single(newchannel->target_cpu,
                                    percpu_channel_deq, newchannel, true);
            percpu_channel_deq(newchannel);
            put_cpu();
        } else {
            percpu_channel_deq(newchannel);
            put_cpu();
            err_free_chan:
            free_channel(newchannel);
        }
    }

    if (fnew) {
        /*
         * vmbus_process_offer - Process the offer by creating a channel/device
         * associated with this offer
         */
        struct vmbus_channel *channel;
        struct workqueue_struct *wq;
        unsigned long flags;
        bool fnew = true;

        mutex_lock(&vmbus_connection.channel_mutex);

        /*
         * Now that we have acquired the channel_mutex,
         * we can release the potentially racing rescind thread.
         */
        atomic_dec(&vmbus_connection.offer_in_progress);

        /*
         * Now that we have acquired the channel_mutex,
         * and released the potentially racing rescind thread,
         * we can check if the offer is new.
         */
        if (!uuid_le_cmp(channel->offermsg.offer.if_type,
                         newchannel->offermsg.offer.if_type) &&
            !uuid_le_cmp(channel->offermsg.offer.if_instance,
                         newchannel->offermsg.offer.if_instance)) {
            vmbus_put_channel(channel);
            fnew = false;

            atomic_dec(&vmbus_connection.offer_in_progress);
            mutex_unlock(&vmbus_connection.channel_mutex);
            mutex_lock(&vmbus_connection.channel_mutex);

            /*
             * Process the offer by creating a channel/device
             */
            vmbus_release_relid(newchannel->offermsg.child_relid);
            spin_lock_irqsave(&primary_channel->lock, flags);
            list_del(&newchannel->sc_list);
            spin_unlock_irqrestore(&primary_channel->lock, flags);
            mutex_unlock(&vmbus_connection.channel_mutex);

            if (newchannel->target_cpu != get_cpu()) {
                put_cpu();
                sm_call_function_single(newchannel->target_cpu,
                                        percpu_channel_deq, newchannel, true);
                percpu_channel_deq(newchannel);
                put_cpu();
            } else {
                percpu_channel_deq(newchannel);
                put_cpu();
                err_free_chan:
                free_channel(newchannel);
            }
        }
    }
}
newchannel->offermsg.offer.if_instance)) {
+fnew = false;
+break;
+}
+
+if (fnew)
+list_add_tail(&newchannel->listentry,
+    &vmbus_connection.chn_list);
+else {
+    /*
+     * Check to see if this is a valid sub-channel.
+     */
+    */
+    if (newchannel->offermsg.offer.sub_channel_index == 0) {
+        mutex_unlock(&vmbus_connection.channel_mutex);
+        /*
+         * Don't call free_channel(), because newchannel->kobj
+         * is not initialized yet.
+         */
+        kfree(newchannel);
+        WARN_ON_ONCE(1);
+        return;
+    }
+    /*
+     * Process the sub-channel.
+     */
+    */
+    newchannel->primary_channel = channel;
+    spin_lock_irqsave(&channel->lock, flags);
+    list_add_tail(&newchannel->sc_list, &channel->sc_list);
+    spin_unlock_irqrestore(&channel->lock, flags);
+}
+}
+mutex_unlock(&vmbus_connection.channel_mutex);
+
+/*
+ * vmbus_process_offer() mustn't call channel->sc_creation_callback()
+ * directly for sub-channels, because sc_creation_callback() ->
+ * vmbus_open() may never get the host's response to the
+ * OPEN_CHANNEL message (the host may rescind a channel at any time,
+ * e.g. in the case of hot removing a NIC), and vmbus_onoffer_rescind()
+ * may not wake up the vmbus_open() as it's blocked due to a non-zero
+ * vmbus_connection.offer_in_progress, and finally we have a deadlock.
+ *
+ * The above is also true for primary channels, if the related device
+ * drivers use sync probing mode by default.
+ *
+ * And, usually the handling of primary channels and sub-channels can
+ * depend on each other, so we should offload them to different
+ * workqueues to avoid possible deadlock, e.g. in sync-probing mode,
+ * NIC1's netvsc_subchan_work() can race with NIC2's netvsc_probe() ->
+ * rtnl_lock(), and causes deadlock: the former gets the rtnl_lock
+ * and waits for all the sub-channels to appear, but the latter
+ * can't get the rtnl_lock and this blocks the handling of
+ * sub-channels.
+ */
+INIT_WORK(&newchannel->add_channel_work, vmbus_add_channel_work);
+wq = fnew ? vmbus_connection.handle_primary_chan_wq :
+ vmbus_connection.handle_sub_chan_wq;
+queue_work(wq, &newchannel->add_channel_work);
+
+/*
* We use this state to statically distribute the channel interrupt load.
*/
static int next_numa_node_id;
+/
+ * init_vp_index() accesses global variables like next_numa_node_id, and
+ * it can run concurrently for primary channels and sub-channels: see
+ * vmbus_process_offer(), so we need the lock to protect the global
+ * variables.
+ */
+static DEFINE_SPINLOCK(bind_channel_to_cpu_lock);

/*
* Starting with Win8, we can statically distribute the incoming
@@ -610,16 +667,18 @@
bool perf_chn = vmbus_devs[dev_type].perf_device;
struct vmbus_channel *primary = channel->primary_channel;
int next_node;
-struct cpumask available_mask;
+tcpumask_var_t available_mask;
struct cpumask *alloced_mask;

if ((vmbus_proto_version == VERSION_WS2008) ||
- (vmbus_proto_version == VERSION_WIN7) || (!perf_chn)) {
+ (vmbus_proto_version == VERSION_WIN7) || (!perf_chn) ||
+ !alloc_cpumask_var(&available_mask, GFP_KERNEL)) {
/*
* Prior to win8, all channel interrupts are
* delivered on cpu 0.
* Also if the channel is not a performance critical
* channel, bind it to cpu 0.
+ * In case alloc_cpumask_var() fails, bind it to cpu 0.
*/
channel->numa_node = 0;
channel->target_cpu = 0;
return;
}

+spin_lock(&bind_channel_to_cpu_lock);
+
/*
 * Based on the channel affinity policy, we will assign the NUMA
 * nodes.
@@ -657,7 +718,7 @@
cpumask_clear(alloced_mask);
}

-cpumask_xor(&available_mask, alloced_mask,
+cpumask_xor(available_mask, alloced_mask,
    cpumask_of_node(primary->numa_node));

cur_cpu = -1;
@@ -675,10 +736,10 @@
}

while (true) {
    -cur_cpu = cpumask_next(cur_cpu, &available_mask);
    +cur_cpu = cpumask_next(cur_cpu, available_mask);
    if (cur_cpu >= nr_cpu_ids) {
        cur_cpu = -1;
        -cpumask_copy(&available_mask,
        +cpumask_copy(available_mask,
            cpumask_of_node(primary->numa_node));
        continue;
    }
@@ -708,15 +769,25 @@
channel->target_cpu = cur_cpu;
channel->target_vp = hv_cpu_number_to_vp_number(cur_cpu);
+
spin_unlock(&bind_channel_to_cpu_lock);
+
free_cpumask_var(available_mask);
}

+#define UNLOAD_DELAY_UNIT_MS	10	/* 10 milliseconds */
+#define UNLOAD_WAIT_MS	(100*1000)	/* 100 seconds */
+#define UNLOAD_WAIT_LOOPS(UNLOAD_WAIT_MS/UNLOAD_DELAY_UNIT_MS)
+#define UNLOAD_MSG_MS	(5*1000)	/* Every 5 seconds */
+#define UNLOAD_MSG_LOOPS(UNLOAD_MSG_MS/UNLOAD_DELAY_UNIT_MS)
+
static void vmbus_wait_for_unload(void)
int cpu;
void *page_addr;
struct hv_message *msg;
struct vmbus_channel_message_header *hdr;
-u32 message_type;
+u32 message_type, i;

/*
 * CHANNELMSG_UNLOAD_RESPONSE is always delivered to the CPU which was
 * functional and vmbus_unload_response() will complete
 * vmbus_connection.unload_event. If not, the last thing we can do is
 * read message pages for all CPUs directly.
 *+
 * Wait up to 100 seconds since an Azure host must writeback any dirty
 * data in its disk cache before the VMBus UNLOAD request will
 * complete. This flushing has been empirically observed to take up
 * to 50 seconds in cases with a lot of dirty data, so allow additional
 * leeway and for inaccuracies in mdelay(). But eventually time out so
 * that the panic path can't get hung forever in case the response
 * message isn't seen.
 * */
-while (1) {
+for (i = 1; i <= UNLOAD_WAIT_LOOPS; i++) {
if (completion_done(&vmbus_connection.unload_event))
-break;
+goto completed;

for_each_online_cpu(cpu) {
 struct hv_per_cpu_context *hv_cpu
 @@ -752,9 +831,18 @@
 vmbus_signal_eom(msg, message_type);
 }

-mdelay(10);
+/*
 * Give a notice periodically so someone watching the
 * serial output won't think it is completely hung.
 * */
+if (!((i % UNLOAD_MSG_LOOPS))
+pr_notice("Waiting for VMBus UNLOAD to complete\n");
+
+mdelay(UNLOAD_DELAY_UNIT_MS);
}
+pr_err("Continuing even though VMBus UNLOAD did not complete\n");
+
+completed:
/*
  We're crashing and already got the UNLOAD_RESPONSE, cleanup all
  maybe-pending messages on all CPUs to be able to receive new
@@ -778,6 +866,11 @@
/*
  This is a global event; just wakeup the waiting thread.
  Once we successfully unload, we can cleanup the monitor state.
+
+  * NB. A malicious or compromised Hyper-V could send a spurious
+  * message of type CHANNELMSG_UNLOAD_RESPONSE, and trigger a call
+  * of the complete() below. Make sure that unload_event has been
+  * initialized by the time this complete() is executed.
+*/
complete(&vmbus_connection.unload_event);
}
@@ -790,7 +883,7 @@
if (vmbus_proto_version < VERSION_WIN8_1)
return;

-init_completion(&vmbus_connection.unload_event);
+reinit_completion(&vmbus_connection.unload_event);
memset(&hdr, 0, sizeof(struct vmbus_channel_message_header));
hdr.msgtype = CHANNELMSG_UNLOAD;
vmbus_post_msg(&hdr, sizeof(struct vmbus_channel_message_header),
@@ -897,6 +990,12 @@
}
/*
  * Before setting channel->rescind in vmbus_rescind_cleanup(), we
  * should make sure the channel callback is not running any more.
  */
+vmbus_reset_channel_cb(channel);
+
+/*
  * Now wait for offer handling to complete.
  */
vmbus_rescind_cleanup(channel);
@@ -926,8 +1025,7 @@
vmbus_device_unregister(channel->device_obj);
put_device(dev);
}
-} else if (channel->primary_channel != NULL) {
+} else if (channel->primary_channel != NULL) {
/*
  * Sub-channel is being rescinded. Following is the channel
  * close sequence when initiated from the driveri (refer to
@@ -1177,6 +1275,8 @@

{ CHANNELMSG_19,0, NULL },
{ CHANNELMSG_20,0, NULL },
{ CHANNELMSG_TL_CONNECT_REQUEST,0, NULL },
+{ CHANNELMSG_22,0, NULL },
+{ CHANNELMSG_TL_CONNECT_RESULT,0, NULL },
};

/*@ -1188,25 +1288,16 @@
{
struct hv_message *msg = context;
struct vmbus_channel_message_header *hdr;
-int size;

hdr = (struct vmbus_channel_message_header *)msg->u.payload;
-size = msg->header.payload_size;

trace_vmbus_on_message(hdr);

-if (hdr->msgtype >= CHANNELMSG_COUNT) {
- pr_err("Received invalid channel message type %d size %d\n",
-   hdr->msgtype, size);
- print_hex_dump_bytes("", DUMP_PREFIX_NONE,
-   (unsigned char *)msg->u.payload, size);
- return;
- }

-if (channel_message_table[hdr->msgtype].message_handler)
- channel_message_table[hdr->msgtype].message_handler(hdr);
- else
- pr_err("Unhandled channel message type %d\n", hdr->msgtype);
+/*
+ * vmbus_on_msg_dpc() makes sure the hdr->msgtype here can not go
+ * out of bound and the message_handler pointer can not be NULL.
+ */
+ channel_message_table[hdr->msgtype].message_handler(hdr);
}

/*
--- linux-4.15.0.orig/drivers/hv/connection.c
+++ linux-4.15.0/drivers/hv/connection.c
@@ -39,6 +39,8 @@
struct vmbus_connection vmbus_connection = {
 .conn_state= DISCONNECTED,
 +.unload_event= COMPLETION_INITIALIZER(
+ vmbus_connection.unload_event),
 .next_gpadl_handle= ATOMIC_INIT(0xE1E10),
EXPORT_SYMBOL_GPL(vmbus_connection);

int ret = 0;
unsigned int cur_cpu;
struct vmbus_channel_initiate_contact *msg;
unsigned long flags;

if (version >= VERSION_WIN8_1) {
    msg->target_vcpu = hv_cpu_number_to_vp_number(smp_processor_id());
    vmbus_connection.connect_cpu = smp_processor_id();
    cur_cpu = get_cpu();
    msg->target_vcpu = hv_cpu_number_to_vp_number(cur_cpu);
    vmbus_connection.connect_cpu = cur_cpu;
    put_cpu();
} else {
    msg->target_vcpu = 0;
    vmbus_connection.connect_cpu = 0;
    goto cleanup;
}

vmbus_connection.handle_primary_chan_wq =
    create_workqueue("hv_pri_chan");
if (!vmbus_connection.handle_primary_chan_wq) {
    ret = -ENOMEM;
    goto cleanup;
}

vmbus_connection.handle_sub_chan_wq =
    create_workqueue("hv_sub_chan");
if (!vmbus_connection.handle_sub_chan_wq) {
    ret = -ENOMEM;
    goto cleanup;
}

INIT_LIST_HEAD(&vmbus_connection.chn_msg_list);
spin_lock_init(&vmbus_connection.channelmsg_lock);

vmbus_initiate_unload(false);
-if (vmbus_connection.work_queue) {
  -drain_workqueue(vmbus_connection.work_queue);
+if (vmbus_connection.handle_sub_chan_wq)
  +destroy_workqueue(vmbus_connection.handle_sub_chan_wq);
+
  +if (vmbus_connection.handle_primary_chan_wq)
  +destroy_workqueue(vmbus_connection.handle_primary_chan_wq);
+
  +if (vmbus_connection.work_queue)
  destroy_workqueue(vmbus_connection.work_queue);
-}

if (vmbus_connection.int_page) {
  free_pages((unsigned long)vmbus_connection.int_page, 0);
  --- linux-4.15.0.orig/drivers/hv/hv.c
  +++ linux-4.15.0/drivers/hv/hv.c
  @ @ -148,6 +148,17 @@
  int hv_synic_alloc(void)
  {
    int cpu;
+  struct hv_per_cpu_context *hv_cpu;
+  +
+  /*
+   * First, zero all per-cpu memory areas so hv_synic_free() can
+   * detect what memory has been allocated and cleanup properly
+   * after any failures.
+   */
+  +for_each_present_cpu(cpu) {
+    hv_cpu = per_cpu_ptr(hv_context.cpu_context, cpu);
+    memset(hv_cpu, 0, sizeof(*hv_cpu));
+  }

  hv_context.hv_numa_map = kzalloc(sizeof(struct cpumask) * nr_node_ids,
      GFP_ATOMIC);
  @ @ -157,10 +168,8 @@
  }

  for_each_present_cpu(cpu) {
    -struct hv_per_cpu_context *hv_cpu
    -= per_cpu_ptr(hv_context.cpu_context, cpu);
    +hv_cpu = per_cpu_ptr(hv_context.cpu_context, cpu);

    -memset(hv_cpu, 0, sizeof(*hv_cpu));
    tasklet_init(&hv_cpu->msg_dpc,
                    vmbus_on_msg_dpc, (unsigned long) hv_cpu);

  @ @ -196,6 +205,10 @@
return 0;
err:
+/*
+ * Any memory allocations that succeeded will be freed when
+ * the caller cleans up by calling hv_synic_free()
+ */
return -ENOMEM;
}

@@ -208,12 +221,10 @@
struct hv_per_cpu_context *hv_cpu
= per_cpu_ptr(hv_context.cpu_context, cpu);

-if (hv_cpu->synic_event_page)
- free_page((unsigned long)hv_cpu->synic_event_page);
-if (hv_cpu->synic_message_page)
- free_page((unsigned long)hv_cpu->synic_message_page);
-if (hv_cpu->post_msg_page)
- free_page((unsigned long)hv_cpu->post_msg_page);
+ kfree(hv_cpu->clk_evt);
+ free_page((unsigned long)hv_cpu->synic_event_page);
+ free_page((unsigned long)hv_cpu->synic_message_page);
+ free_page((unsigned long)hv_cpu->post_msg_page);
}

kfree(hv_context.hv_numa_map);
@@ -354,7 +365,6 @@

clockevents_unbind_device(hv_cpu->clk_evt, cpu);
hv_ce_shutdown(hv_cpu->clk_evt);
-put_cpu_ptr(hv_cpu);
}

hv_get_synint_state(HV_X64_MSR_SINT0 + VMBUS.MESSAGE_SINT,
--- linux-4.15.0.orig/drivers/hv/hv_balloon.c
+++ linux-4.15.0/drivers/hv/hv_balloon.c
@@ -846,12 +846,14 @@
pfn_cnt -= pgs_ol;
/*
 * Check if the corresponding memory block is already
 * online by checking its last previously backed page.
 * In case it is we need to bring rest (which was not
 * backed previously) online too.
 + * online. It is possible to observe struct pages still
 + * being uninitialized here so check section instead.
 + * In case the section is online we need to bring the
 + * rest of pfns (which were not backed previously)
if (start_pfn > has->start_pfn &&
- !PageReserved(pfn_to_page(start_pfn - 1))
+ online_section_nr(pfn_to_section_nr(start_pfn)))
    hv_bring_pgs_online(has, start_pfn, pgs_ol);

@@ -1168,10 +1170,7 @@
 unsigned int i = 0;
 struct page *pg;

-if (num_pages < alloc_unit)
-    return 0;
-
-for (i = 0; (i * alloc_unit) < num_pages; i++) {
+for (i = 0; i < num_pages / alloc_unit; i++) {
    if (bl_resp->hdr.size + sizeof(union dm_mem_page_range) >
        PAGE_SIZE)
        return i * alloc_unit;
@@ -1205,7 +1204,7 @@
 }
-    return num_pages;
+    return i * alloc_unit;
 }

static void balloon_up(struct work_struct *dummy)
 @@ -1220,9 +1219,6 @@
 long avail_pages;
 unsigned long floor;

-/* The host balloons pages in 2M granularity. */
-WARN_ON_ONCE(num_pages % PAGES_IN_2M != 0);
-
/*
 * We will attempt 2M allocations. However, if we fail to
 * allocate 2M chunks, we will go back to 4k allocations.
@@ -1232,14 +1228,13 @@
    floor = compute_balloon_floor();

-/* Refuse to balloon below the floor, keep the 2M granularity. */
+/* Refuse to balloon below the floor. */
    if (avail_pages < num_pages || avail_pages - num_pages < floor) {
        -pr_warn("Balloon request will be partially fulfilled. %s\n",
+pr_info("Balloon request will be partially fulfilled. %s\n",

avail_pages < num_pages ? "Not enough memory."
"Balloon floor reached.");

num_pages = avail_pages > floor ? (avail_pages - floor) : 0;
-num_pages -= num_pages % PAGES_IN_2M;
}

while (!done) {
--- linux-4.15.0.orig/drivers/hv/hv_kvp.c
+++ linux-4.15.0/drivers/hv/hv_kvp.c
@@ -353,7 +353,9 @@
out->body.kvp_ip_val.dhcp_enabled = in->kvp_ip_val.dhcp_enabled;

-defaul
+/* fallthrough */
+ +case KVP_OP_GET_IP_INFO:
utf16s_to_utf8s((wchar_t *)in->kvp_ip_val.adapter_id,
MAX_ADAPTER_ID_SIZE,
UTF16_LITTLE_ENDIAN,
@@ -406,6 +408,10 @@
process_ib_ipinfo(in_msg, message, KVP_OP_SET_IP_INFO);
break;
case KVP_OP_GET_IP_INFO:
+/*
+ * We only need to pass on the info of operation, adapter_id
+ * and addr_family to the userland kvp daemon.
+ */
process_ib_ipinfo(in_msg, message, KVP_OP_GET_IP_INFO);
break;
case KVP_OP_SET:
@@ -421,7 +427,7 @@
UTF16_LITTLE_ENDIAN,
message->body.kvp_set.data.value,
HV_KVP_EXCHANGE_MAX_VALUE_SIZE - 1) + 1;
-break;
+break;

case REG_U32:
/*
@@ -446,7 +452,10 @@
break;

} -case KVP_OP_GET:
+ +*/
+ * The key is always a string - utf16 encoding.
+ */
message->body.kvp_set.data.key_size =
utf16s_to_utf8s((wchar_t *)in_msg->body.kvp_set.data.key,
              @ @ -454,7 +463,18 @@
UTF16_LITTLE_ENDIAN,
message->body.kvp_set.data.key,
HV_KVP_EXCHANGE_MAX_KEY_SIZE - 1) + 1;
-@ -454,7 +463,18 @@
message->body.kvp_get.data.key_size =
utf16s_to_utf8s((wchar_t *)in_msg->body.kvp_get.data.key,
+in_msg->body.kvp_get.data.key_size,
UTF16_LITTLE_ENDIAN,
message->body.kvp_get.data.key,
+HV_KVP_EXCHANGE_MAX_KEY_SIZE - 1) + 1;
+break;
+case KVP_OP_DELETE:
message->body.kvp_delete.key_size =
@@ -464,12 +484,12 @@
UTF16_LITTLE_ENDIAN,
message->body.kvp_delete.key,
HV_KVP_EXCHANGE_MAX_KEY_SIZE - 1) + 1;
-@ -464,12 +484,12 @@
case KVP_OP_ENUMERATE:
message->body.kvp_enum_data.index =
in_msg->body.kvp_enum_data.index;
-@ -545,8 +545,8 @@
+break;
+}
kvp_transaction.state = HVUTIL_USERSPACE_REQ;
--- linux-4.15.0.orig/drivers/hv/hv_util.c
+++ linux-4.15.0/drivers/hv/hv_util.c
@@ -545,8 +545,8 @@

KVPTCLOCK = ptp_clock_register(&ptp_hyperv_info, NULL);
if (IS_ERR_OR_NULL(kvptc_clock)) {
-  pr_err("cannot register PTP clock: %ld\n",
-    PTR_ERR(kvptc_clock));
pr_err("cannot register PTP clock: %d\n",
+    PTR_ERR_OR_ZERO(hv_ptp_clock));
hv_ptp_clock = NULL;
}

--- linux-4.15.0.orig/drivers/hv/hyperv_vmbus.h
+++ linux-4.15.0/drivers/hv/hyperv_vmbus.h
@@ -329,7 +329,14 @@
struct list_head chn_list;
struct mutex channel_mutex;

+/*
+ * An offer message is handled first on the work_queue, and then
+ * is further handled on handle_primary_chan_wq or
+ * handle_sub_chan_wq.
+ */
struct workqueue_struct *work_queue;
+struct workqueue_struct *handle_primary_chan_wq;
+struct workqueue_struct *handle_sub_chan_wq;
};

--- linux-4.15.0.orig/drivers/hv/ring_buffer.c
+++ linux-4.15.0/drivers/hv/ring_buffer.c
@@ -141,26 +141,25 @@
}
/* Get various debug metrics for the specified ring buffer. */
-void hv_ringbuffer_get_debuginfo(const struct hv_ring_buffer_info *ring_info,
-                                  struct hv_ring_buffer_debug_info *debug_info)
+int hv_ringbuffer_get_debuginfo(const struct hv_ring_buffer_info *ring_info,
+                                 struct hv_ring_buffer_debug_info *debug_info)
{
    u32 bytes_avail_towrite;
    u32 bytes_avail_toread;

    -if (ring_info->ring_buffer) {
        hv_get_ringbuffer_availbytes(ring_info,
        &bytes_avail_toread,
        &bytes_avail_towrite);
        -
        -debug_info->bytes_avail_toread = bytes_avail_toread;
        -debug_info->bytes_avail_towrite = bytes_avail_towrite;
        -debug_info->current_read_index =
        -ring_info->ring_buffer->read_index;
        -debug_info->current_write_index =
        -ring_info->ring_buffer->write_index;
        -debug_info->current_interrupt_mask =
    -}
-ring_info->ring_buffer->interrupt_mask;
-
+if (!ring_info->ring_buffer)
+return -EINVAL;
+
+hv_get_ringbuffer_availbytes(ring_info,
+   &bytes_avail_toread,
+   &bytes_avail_towrite);
+debug_info->bytes_avail_toread = bytes_avail_toread;
+debug_info->bytes_avail_towrite = bytes_avail_towrite;
+debug_info->current_read_index = ring_info->ring_buffer->read_index;
+debug_info->current_write_index = ring_info->ring_buffer->write_index;
+debug_info->current_interrupt_mask
+   = ring_info->ring_buffer->interrupt_mask;
+return 0;
} EXPORT_SYMBOL_GPL(hv_ringbuffer_get_debuginfo);

@@ -394,13 +393,24 @@
} EXPORT_SYMBOL_GPL(__hv_pkt_iter_next);

+/* How many bytes were read in this iterator cycle */
+static u32 hv_pkt_iter_bytes_read(const struct hv_ring_buffer_info *rbi,
+   u32 start_read_index)
+{
+    if (rbi->priv_read_index >= start_read_index)
+        return rbi->priv_read_index - start_read_index;
+    else
+        return rbi->ring_datasize - start_read_index +
+               rbi->priv_read_index;
+}
+
+/*
 * Update host ring buffer after iterating over packets.
 * /
 void hv_pkt_iter_close(struct vmbus_channel *channel)
{ struct hv_ring_buffer_info *rbi = &channel->inbound;
   u32 orig_write_sz = hv_get_bytes_to_write(rbi);
   +u32 curr_write_sz, pending_sz, bytes_read, start_read_index;

   /*
   * Make sure all reads are done before we update the read index since
   */
   virt_rmb();
+start_read_index = rbi->ring_buffer->read_index;
+start_read_index = rbi->priv_read_index;

+if (!rbi->ring_buffer->feature_bits.feat_pending_send_sz)
+return;
+
/*
 * Issue a full memory barrier before making the signaling decision.
 * Here is the reason for having this barrier:
@@ -423,26 +437,29 @@
 */
+virt_mb();

-/* If host has disabled notifications then skip */
-if (rbi->ring_buffer->interrupt_mask)
+pending_sz = READ_ONCE(rbi->ring_buffer->pending_send_sz);
+if (!pending_sz)
return;

-if (rbi->ring_buffer->feature_bits.feat_pending_send_sz) {
-u32 pending_sz = READ_ONCE(rbi->ring_buffer->pending_send_sz);
+/*
+ * Ensure the read of write_index in hv_get_bytes_to_write()
+ * happens after the read of pending_send_sz.
+ */
+virt_rmb();
+curr_write_sz = hv_get_bytes_to_write(rbi);
+bytes_read = hv_pkt_iter_bytes_read(rbi, start_read_index);

-/*
- * If there was space before we began iteration,
- * then host was not blocked. Also handles case where
- * pending_sz is zero then host has nothing pending
- * and does not need to be signaled.
- */
-if (orig_write_sz > pending_sz)
-return;
+/*
+ * If there was space before we began iteration,
+ * then host was not blocked.
+ */

-/* If pending write will not fit, don't give false hope. */
-if (hv_get_bytes_to_write(rbi) < pending_sz)
-return;
-}
+if (curr_write_sz - bytes_read > pending_sz)
+return;
+/* If pending write will not fit, don't give false hope. */
+if (curr_write_sz <= pending_sz)
+return;

vmbus_setevent(channel);
}
--- linux-4.15.0.orig/drivers/hv/vmbus_drv.c
+++ linux-4.15.0/drivers/hv/vmbus_drv.c
@@ -299,10 +299,16 @@
{
 struct hv_device *hv_dev = device_to_hv_device(dev);
 struct hv_ring_buffer_debug_info outbound;
 +int ret;

 if (!hv_dev->channel)
 return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound, &outbound);
+-ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound,
+ &outbound);
+if (ret < 0)
+return ret;
+return sprintf(buf, "%d\n", outbound.current_interrupt_mask);
}
static DEVICE_ATTR_RO(out_intr_mask);
@@ -312,10 +318,15 @@
{
 struct hv_device *hv_dev = device_to_hv_device(dev);
 struct hv_ring_buffer_debug_info outbound;
 +int ret;

 if (!hv_dev->channel)
 return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound, &outbound);
+-ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound,
+ &outbound);
+if (ret < 0)
+return ret;
+return sprintf(buf, "%d\n", outbound.current_read_index);
}
static DEVICE_ATTR_RO(out_read_index);
@@ -326,10 +337,15 @@
{
 struct hv_device *hv_dev = device_to_hv_device(dev);
 struct hv_ring_buffer_debug_info outbound;
 +int ret;

 if (!hv_dev->channel)
 return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound, &outbound);
+-ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound,
+ &outbound);
+if (ret < 0)
+return ret;
+return sprintf(buf, "%d\n", outbound.current_read_index);
+int ret;

if (!hv_dev->channel)
return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound, &outbound);
+ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound,
+ &outbound);
+if (ret < 0)
+return ret;
return sprintf(buf, "%d\n", outbound.current_write_index);
}
static DEVICE_ATTR_RO(out_write_index);
@@ -340,10 +356,15 @@
{
struct hv_device *hv_dev = device_to_hv_device(dev);
struct hv_ring_buffer_debug_info outbound;
+int ret;

if (!hv_dev->channel)
return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound, &outbound);
+ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound,
+ &outbound);
+if (ret < 0)
+return ret;
return sprintf(buf, "%d\n", outbound.bytes_avail_toread);
}
static DEVICE_ATTR_RO(out_read_bytes_avail);
@@ -354,10 +375,15 @@
{
struct hv_device *hv_dev = device_to_hv_device(dev);
struct hv_ring_buffer_debug_info outbound;
+int ret;

if (!hv_dev->channel)
return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound, &outbound);
+ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->outbound,
+ &outbound);
+if (ret < 0)
+return ret;
return sprintf(buf, "%d\n", outbound.bytes_avail_towrite);
}
static DEVICE_ATTR_RO(out_write_bytes_avail);
@@ -367,10 +393,15 @@

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struct hv_device *hv_dev = device_to_hv_device(dev);
struct hv_ring_buffer_debug_info inbound;

if (!hv_dev->channel)
    return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +if (ret < 0)
        +return ret;
    +return sprintf(buf, "%d\n", inbound.current_interrupt_mask);
}
static DEVICE_ATTR_RO(in_intr_mask);
@@ -380,10 +411,15 @@
struct hv_device *hv_dev = device_to_hv_device(dev);
struct hv_ring_buffer_debug_info inbound;
    +int ret;

if (!hv_dev->channel)
    return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +if (ret < 0)
        +return ret;
    +return sprintf(buf, "%d\n", inbound.current_read_index);
}
static DEVICE_ATTR_RO(in_read_index);
@@ -393,10 +429,15 @@
struct hv_device *hv_dev = device_to_hv_device(dev);
struct hv_ring_buffer_debug_info inbound;
    +int ret;

if (!hv_dev->channel)
    return -ENODEV;
-hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +if (ret < 0)
        +return ret;
    +return sprintf(buf, "%d\n", inbound.current_write_index);
static DEVICEATTRRO(in_write_index);
@@ -407,10 +448,15 @@
{
    struct hv_device *hv_dev = device_to_hv_device(dev);
    struct hv_ring_buffer_debug_info inbound;
    int ret;

    if (!hv_dev->channel)
        return -ENODEV;
    hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +if (ret < 0)
        +return ret;
    +return sprintf(buf, "%d\n", inbound.bytes_avail_toread);
}
static DEVICEATTR_RO(in_read_bytes_avail);
@@ -421,10 +467,15 @@
{
    struct hv_device *hv_dev = device_to_hv_device(dev);
    struct hv_ring_buffer_debug_info inbound;
    int ret;

    if (!hv_dev->channel)
        return -ENODEV;
    hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +ret = hv_ringbuffer_get_debuginfo(&hv_dev->channel->inbound, &inbound);
    +if (ret < 0)
        +return ret;
    +return sprintf(buf, "%d\n", inbound.bytes_avail_towrite);
}
static DEVICEATTR_RO(in_write_bytes_avail);
@@ -843,6 +894,10 @@
}

entry = &channel_message_table[hdr->msgtype];
    +if (!entry->message_handler)
        +goto msg_handled;
    +if (entry->handler_type == VMHT_BLOCKING) {
        ctx = kmalloc(sizeof(*ctx), GFP_ATOMIC);
        if (ctx == NULL)
            @@ -1180,6 +1235,9 @@

if (!attribute->show)
    return -EIO;

+if (chan->state != CHANNEL_OPENED_STATE)
+  return -EINVAL;
+
return attribute->show(chan, buf);

--- linux-4.15.0.orig/drivers/hwmon/Kconfig
+++ linux-4.15.0/drivers/hwmon/Kconfig
@@ -275,7 +275,7 @@
config SENSORS_K10TEMP
    tristate "AMD Family 10h+ temperature sensor"
    -depends on X86 && PCI
    +depends on X86 && PCI && AMD_NB
    help
    If you say yes here you get support for the temperature
    sensor(s) inside your CPU. Supported are later revisions of
--- linux-4.15.0.orig/drivers/hwmon/acpi_power_meter.c
+++ linux-4.15.0/drivers/hwmon/acpi_power_meter.c
@@ -693,8 +693,8 @@
if (resource->caps.flags & POWER_METER_CAN_CAP) {
    if (!can_cap_in_hardware()) {
        -dev_err(&resource->acpi_dev->dev,
-"Ignoring unsafe software power cap!\n");
+dev_warn(&resource->acpi_dev->dev,
+"Ignoring unsafe software power cap!\n");
    goto skip_unsafe_cap;
}

@@ -895,7 +895,7 @@
res = setup_attrs(resource);
    if (res)
        goto exit_free;
+        goto exit_free_capability;

resource->hwmon_dev = hwmon_device_register(&device->dev);
if (IS_ERR(resource->hwmon_dev)) {
    @@ -908,6 +908,8 @@
exit_remove:
    remove_attrs(resource);
+    exit_free_capability:
+    free_capabilities(resource);
exit_free:
kfree(resource);
exit:
--- linux-4.15.0.orig/drivers/hwmon/ad7462.c
+++ linux-4.15.0/drivers/hwmon/ad7462.c
@@ -426,7 +426,7 @@
 return 0x95;
 break;
 }
-return -ENODEV;
+return 0;
 }

 /* Provide labels for sysfs */
--- linux-4.15.0.orig/drivers/hwmon/ad7475.c
+++ linux-4.15.0/drivers/hwmon/ad7475.c
@@ -297,20 +297,25 @@
 long reg;

 if (bypass_attn & (1 << channel))
- reg = (volt * 1024) / 2250;
+reg = DIV_ROUND_CLOSEST(volt * 1024, 2250);
 else
- reg = (volt * r[1] * 1024) / ((r[0] + r[1]) * 2250);
+reg = DIV_ROUND_CLOSEST(volt * r[1] * 1024,
+ (r[0] + r[1]) * 2250);
 return clamp_val(reg, 0, 1023) & (0xff << 2);
 }

- static u16 adt7475_read_word(struct i2c_client *client, int reg)
- static int adt7475_read_word(struct i2c_client *client, int reg)
 { 
- u16 val;
+int val1, val2;

- val = i2c_smbus_read_byte_data(client, reg);
- val |= (i2c_smbus_read_byte_data(client, reg + 1) << 8);
+val1 = i2c_smbus_read_byte_data(client, reg);
+if (val1 < 0)
+ return val1;
+val2 = i2c_smbus_read_byte_data(client, reg + 1);
+if (val2 < 0)
+ return val2;

- return val;
+ return val1 | (val2 << 8); 
 }
static void adt7475_write_word(struct i2c_client *client, int reg, u16 val)
--- linux-4.15.0.orig/drivers/hwmon/applesmc.c
+++ linux-4.15.0/drivers/hwmon/applesmc.c
@@ -760,15 +760,18 @@
{
    ret = applesmc_read_key(LIGHT_SENSOR_LEFT_KEY, buffer, data_length);
+    if (ret)
+        goto out;

    /* newer macbooks report a single 10-bit bigendian value */
    if (data_length == 10) {
        left = be16_to_cpu(*(__be16 *)(buffer + 6)) >> 2;
+    ret = applesmc_read_key(LIGHT_SENSOR_RIGHT_KEY, buffer, data_length);
        if (ret)
            goto out;
    }
    left = buffer[2];
+
    +ret = applesmc_read_key(LIGHT_SENSOR_RIGHT_KEY, buffer, data_length);
    if (ret)
        goto out;
    -ret = applesmc_read_key(LIGHT_SENSOR_RIGHT_KEY, buffer, data_length);
    right = buffer[2];

    out:
@@ -817,12 +820,11 @@
    ret = applesmc_read_key(newkey, buffer, 2);
    -speed = ((buffer[0] << 8 | buffer[1]) >> 2);
-        if (ret)
+        speed = ((buffer[0] << 8 | buffer[1]) >> 2);
-            return ret;
-            else
-                return snprintf(sysfsbuf, PAGE_SIZE, "%u\n", speed);
+        return snprintf(sysfsbuf, PAGE_SIZE, "%u\n", speed);
    }

static ssize_t applesmc_store_fan_speed(struct device *dev,
@@ -858,12 +860,11 @@
    u8 buffer[2];

    ret = applesmc_read_key(FANS_MANUAL, buffer, 2);
    -manual = ((buffer[0] << 8 | buffer[1]) >> to_index(attr)) & 0x01;
-        if (ret)
+        return ret;
-            return ret;
-            else
+        return ret;

---
static ssize_t applesmc_store_fan_manual(struct device *dev, char *sysfsbuf, size_t buf_size)
{
    u32 manual = ((buffer[0] << 8 | buffer[1]) >> to_index(attr)) & 0x01;
    return snprintf(sysfsbuf, PAGE_SIZE, "%d\n", manual);
}

static ssize_t applesmc_key_at_index_read_show(struct device *dev, char *sysfsbuf, size_t buf_size)
{
    u32 count;
    ret = applesmc_read_key(KEY_COUNT_KEY, buffer, 4);
    count = ((u32)buffer[0]<<24) + ((u32)buffer[1]<<16) +
             ((u32)buffer[2]<<8) + buffer[3];
    return snprintf(sysfsbuf, PAGE_SIZE, "%d\n", count);
}

--- linux-4.15.0.orig/drivers/hwmon/aspeed-pwm-tacho.c
+++ linux-4.15.0/drivers/hwmon/aspeed-pwm-tacho.c
@@ -879,10 +880,11 @@
    ret = applesmc_read_key(FANS_MANUAL, buffer, 2);
    val = (buffer[0] << 8 | buffer[1]);
    if (ret)
-        goto out;
+        goto out;
    if (input)
        val = val | (0x01 << to_index(attr));
    else
        u32 count;
    ret = applesmc_read_key(KEY_COUNT_KEY, buffer, 4);
-    count = ((u32)buffer[0]<<24) + ((u32)buffer[1]<<16) +
-             ((u32)buffer[2]<<8) + buffer[3];
+    count = ((u32)buffer[0]<<24) + ((u32)buffer[1]<<16) +
+             ((u32)buffer[2]<<8) + buffer[3];
    return snprintf(sysfsbuf, PAGE_SIZE, "%d\n", count);
}
For (i = 0; i < ARRAY_SIZE(tjmax_model_table); i++) {
    const struct tjmax_model *tm = &tjmax_model_table[i];
    if (c->x86_model == tm->model &&
        (tm->mask == ANY || c->x86_mask == tm->mask))
        return tm->tjmax;
    }

/* Early chips have no MSR for TjMax */

   -if (c->x86_model == 0xf && c->x86_mask < 4)
   +if (c->x86_model == 0xf && c->x86_stepping < 4)
    usemsr_ee = 0;

    if (c->x86_model > 0xe && usemsr_ee) {
        @ @ -425,7 +425,7 @@
           * Readings might stop update when processor visited too deep sleep,
           * fixed for stepping D0 (6E6).
           */
        -if (c->x86_model == 0xe && c->x86_mask < 0xc & & c->microcode < 0x39) {
        +if (c->x86_model == 0xe && c->x86_stepping < 0xc & & c->microcode < 0x39) {
            pr_err("Errata AE18 not fixed, update BIOS or microcode of the CPU!

            return -ENODEV;
        }

        --- linux-4.15.0.orig/drivers/hwmon/da9052-hwmon.c
        +++ linux-4.15.0/drivers/hwmon/da9052-hwmon.c
        @@ -250,9 +250,9 @@
        int channel = to_sensor_dev_attr(devattr)->index;
        int ret;

        -mutex_lock(&hwmon->hwmon_lock);
        +mutex_lock(&hwmon->da9052->auxadc_lock);
        ret = __da9052_read_tsi(dev, channel);
        -mutex_unlock(&hwmon->hwmon_lock);
        +mutex_unlock(&hwmon->da9052->auxadc_lock);

        if (ret < 0)
            return ret;

--- linux-4.15.0.orig/drivers/hwmon/dell-smm-hwmon.c
+++ linux-4.15.0/drivers/hwmon/dell-smm-hwmon.c
@@ -1035,6 +1035,13 @@
    DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "Inspiron 580 "),
    },
    },
```c
{
+ident = "Dell XPS13 9333",
+matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "XPS13 9333"),
+},
+},
};

--- linux-4.15.0.orig/drivers/hwmon/emc2103.c
+++ linux-4.15.0/drivers/hwmon/emc2103.c
@@ -454,7 +454,7 @@
}
result = read_u8_from_i2c(client, REG_FAN_CONF1, &conf_reg);
-if (result) {
+if (result < 0) {
    count = result;
    goto err;
}
--- linux-4.15.0.orig/drivers/hwmon/f71805f.c
+++ linux-4.15.0/drivers/hwmon/f71805f.c
@@ -96,17 +96,23 @@
 outb(ld, base + 1);
 }

-static inline void
+static inline int
+superio_enter(int base)
+{
+if (!request_muxed_region(base, 2, DRVNAME))
+return -EBUSY;
+outb(0x87, base);
+outb(0x87, base);
+return 0;
}

static inline void
superio_exit(int base)
{
 outb(0xaa, base);
+release_region(base, 2);
}

/*

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*/
@@ -1561,7 +1567,7 @@
static int __init f71805f_find(int sioaddr, unsigned short *address,
    struct f71805f_sio_data *sio_data)
{
    int err = -ENODEV;
    +int err;
    u16 devid;

    static const char * const names[] = {
@@ -1569,8 +1575,11 @@
"F71872F/FG or F71806F/FG",
    };

    -superio_enter(sioaddr);
    +err = superio_enter(sioaddr);
    +if (err)
    +return err;

    +err = -ENODEV;
    devid = superio_inw(sioaddr, SIO_REG_MANID);
    if (devid != SIO_FINTEK_ID)
    goto exit;

--- linux-4.15.0.orig/drivers/hwmon/hwmon-vid.c
+++ linux-4.15.0/drivers/hwmon/hwmon-vid.c
@@ -293,7 +293,7 @@
    if (c->x86 < 6) /* Any CPU with family lower than 6 */
    return 0; /* doesn't have VID */

    -vrm_ret = find_vrm(c->x86, c->x86_model, c->x86_mask, c->x86_vendor);
    +vrm_ret = find_vrm(c->x86, c->x86_model, c->x86_stepping, c->x86_vendor);
    if (vrm_ret == 134)
    vrm_ret = get_via_model_d_vrm();
    if (vrm_ret == 0)
@@ -51,6 +51,7 @@
#define to_hwmon_attr(d) \
    container_of(d, struct hwmon_device_attribute, dev_attr)
+#define to_dev_attr(a) container_of(a, struct device_attribute, attr)

    /*
    * Thermal zone information
    @ @ -58,7 +59,7 @ @
    * also provides the sensor index.
    */
    struct hwmon_thermal_data {
-    struct hwmon_device *hwdev; /* Reference to hwmon device */
    

+struct device *dev; /* Reference to hwmon device */
+int index; /* sensor index */
+
@@ -95,9 +96,27 @@
+static void hwmon_free_attrs(struct attribute **attrs)
+{
+int i;
+
+for (i = 0; attrs[i]; i++) {
+struct device_attribute *dattr = to_dev_attr(attrs[i]);
+struct hwmon_device_attribute *hattr = to_hwmon_attr(dattr);
+
+kfree(hattr);
+}
+kfree(attrs);
+}
+
static void hwmon_dev_release(struct device *dev)
{

-kfree(to_hwmon_device(dev));
+struct hwmon_device *hwdev = to_hwmon_device(dev);
+
+if (hwdev->group.attrs)
+hmon_free_attrs(hwdev->group.attrs);
+kfree(hwdev->groups);
+kfree(hwdev);
}

static struct class hwmon_class = {
@@ -121,11 +140,11 @@
static int hwmon_thermal_get_temp(void *data, int *temp)
{
 struct hwmon_thermal_data *tdata = data;
-struct hwmon_device *hwdev = tdata->hwdev;
+struct hwmon_device *hwdev = to_hwmon_device(tdata->dev);
+
+if (hwdev->group.attrs)
+hmon_free_attrs(hwdev->group.attrs);
+kfree(hwdev->groups);
+kfree(hwdev);
}

static struct class hwmon_class = {
@@ -139,8 +158,7 @@

-ret = hwdev->chip->ops->read(&hwdev->dev, hwmon_temp, hwmon_temp_input,
+ret = hwdev->chip->ops->read(tdata->dev, hwmon_temp, hwmon_temp_input,
    tdata->index, &t);
if (ret < 0)
return ret;
@@ -139,8 +158,7 @@


struct hwmon_thermal_data *tdata;
struct thermal_zone_device *tzd;

if (!tdata)
    return -ENOMEM;

-tdata->hwdev = hwdev;
+tdata->dev = dev;
tdata->index = index;

-tzd = devm_thermal_zone_of_sensor_register(&hwdev->dev, index, tdata,
+tzd = devm_thermal_zone_of_sensor_register(dev, index, tdata,
    &hwmon_thermal_ops);
/
*  
* If CONFIG_THERMAL_OF is disabled, this returns -ENODEV,
@@ -164,8 +182,7 @@
    return 0;
}
#else
-static int hwmon_thermal_add_sensor(struct device *dev, int index)
+static int hwmon_thermal_add_sensor(struct device *dev, int index)
    return 0;
#endif
@@ -242,8 +259,7 @@
(type == hwmon_fan && attr == hwmon_fan_label);
}

-static struct attribute *hwmon_genattr(struct device *dev,
-    const void *drvdata,
+static struct attribute *hwmon_genattr(const void *drvdata,
    enum hwmon_sensor_types type,
    u32 attr,
    int index,
@@ -271,7 +287,7 @@
    return ERR_PTR(-EINVAL);

    -hattr = devm_kzalloc(dev, sizeof(*hattr), GFP_KERNEL);
    +hattr = kzalloc(sizeof(*hattr), GFP_KERNEL);


if (!hattr)
  return ERR_PTR(-ENOMEM);

@@ -474,8 +490,7 @@
  return n;
 }

-static int hwmon_genattrs(struct device *dev,
-  const void *drvdata,
+static int hwmon_genattrs(const void *drvdata,
    struct attribute **attrs,
    const struct hwmon_ops *ops,
    const struct hwmon_channel_info *info)
@@ -501,7 +516,7 @@
  attr_mask &= ~BIT(attr);
  if (attr >= template_size)
    return -EINVAL;
-a = hwmon_genattr(dev, drvdata, info->type, attr, i,
+a = hwmon_genattr(drvdata, info->type, attr, i,
    templates[attr], ops);
  if (IS_ERR(a)) {
    if (PTR_ERR(a) != -ENOENT)
@@ -515,8 +530,7 @@
     return ERR_PTR(-EINVAL);
 static struct attribute **
@@ -527,15 +541,17 @@
   if (nattrs == 0)
     return ERR_PTR(-EINVAL);

-attrs = devm_kcalloc(dev, nattrs + 1, sizeof(*attrs), GFP_KERNEL);
+attrs = kcalloc(nattrs + 1, sizeof(*attrs), GFP_KERNEL);
  if (!attrs)
    return ERR_PTR(-ENOMEM);

  for (i = 0; chip->info[i]; ++i) {
    -ret = hwmon_genattrs(dev, drvdata, &attrs[aindex], chip->ops,
    +ret = hwmon_genattrs(drvdata, &attrs[aindex], chip->ops,
      chip->info[i]);
    -if (ret < 0)
    +if (ret < 0) {
      hwmon_free_attrs(attrs);
return ERR_PTR(ret);
+
+aindex += ret;
+
@@ -577,14 +593,13 @@
+for (i = 0; groups[i]; i++)
-ngroups++;
+
-hwdev->groups = devm_kcalloc(dev, ngroups, sizeof(*groups),
-    GFP_KERNEL);
+hwdev->groups = kcalloc(ngroups, sizeof(*groups), GFP_KERNEL);
+if (!hwdev->groups) {
+  err = -ENOMEM;
+  goto free_hwmon;
+}
+
-attrs = __hwmon_create_attrs(dev, drvdata, chip);
+attr = __hwmon_create_attrs(drvdata, chip);
+if (IS_ERR(attr)) {
+  err = PTR_ERR(attr);
+  goto free_hwmon;
+  @ @ -615,7 +630,7 @@
+  if (err)
+  goto free_hwmon;
+
-if (dev && chip && chip->ops->read &&
+if (dev && dev->of_node && chip && chip->ops->read &&
+    chip->info[0]->type == hwmon_chip &&
+    (chip->info[0]->config[0] & HWMON_C_REGISTER_TZ)) {
+const struct hwmon_channel_info **info = chip->info;
+  @ @ -629,10 +644,11 @@
+    hwmon_temp_input, j))
+    continue;
+if (info[j]->config[j] & HWMON_T_INPUT) {
+  -err = hwmon_thermal_add_sensor(dev,
-    hwdev, j);
-  -if (err)
-    goto free_device;
+  +err = hwmon_thermal_add_sensor(hdev, j);
+  +if (err) {
+    +device_unregister(hdev);
+    +goto ida_remove;
+  +}
+  }
+}
}
@ @ -640,10 +656,8 @@
return hdev;

-free_device:
-device_unregister(hdev);
free_hwmon:
-kfree(hwdev);
+hwmmon_dev_release(hdev);
ida_remove:
ida_simple_remove(&hwmon_ida, id);
return ERR_PTR(err);
--- linux-4.15.0.orig/drivers/hwmon/ibmpowernv.c
+++ linux-4.15.0/drivers/hwmon/ibmpowernv.c
@@ -126,7 +126,7 @@
      return sprintf(buf, "%s\n", sdata->label);
 }

-static int __init get_logical_cpu(int hwcpu)
+static int get_logical_cpu(int hwcpu)
{
  int cpu;

@@ -137,9 +137,8 @@
      return -ENOENT;
 }

-static void __init make_sensor_label(struct device_node *np,
-struct sensor_data *sdata,
-const char *label)
+static void make_sensor_label(struct device_node *np,
+  struct sensor_data *sdata, const char *label)
{
  u32 id;

--- linux-4.15.0.orig/drivers/hwmon/ina2xx.c
+++ linux-4.15.0/drivers/hwmon/ina2xx.c
@@ -17,7 +17,7 @@
    * Bi-directional Current/Power Monitor with I2C Interface
    *
@@ -95,18 +95,20 @@
    struct ina2xx_config {


u16 config_default;
-int calibration_factor;
+int calibration_value;
int registers;
int shunt_div;
int bus_voltage_shift;
int bus_voltage_lsb;/* uV */
-int power_lsb;/* uW */
+int power_lsb_factor;
};

struct ina2xx_data {
    const struct ina2xx_config *config;

    long rshunt;
    +long current_lsb_uA;
    +long power_lsb_uW;
    struct mutex config_lock;
    struct regmap *regmap;

    static const struct ina2xx_config ina2xx_config[] = {
        [ina219] = {
            .config_default = INA219_CONFIG_DEFAULT,
            .calibration_factor = 40960000,
            .calibration_value = 4096,
            .registers = INA219_REGISTERS,
            .shunt_div = 100,
            .bus_voltage_shift = 3,
            .bus_voltage_lsb = 4000,
            .power_lsb = 20000,
            .power_lsb_factor = 20,
        },
        [ina226] = {
            .config_default = INA226_CONFIG_DEFAULT,
            .calibration_factor = 5120000,
            .calibration_value = 2048,
            .registers = INA226_REGISTERS,
            .shunt_div = 400,
            .bus_voltage_shift = 0,
            .bus_voltage_lsb = 1250,
            .power_lsb = 25000,
            .power_lsb_factor = 25,
        },
    };

    return INA226_SHIFT_AVG(avg_bits);
static int ina2xx_calibrate(struct ina2xx_data *data) {
    u16 val = DIV_ROUND_CLOSEST(data->config->calibration_factor,
        data->rshunt);
    return regmap_write(data->regmap, INA2XX_CALIBRATION, val);
}

if (ret < 0)
    return ret;

val = DIV_ROUND_CLOSEST(val, 1000);
break;

case INA2XX_POWER:
    -val = regval * data->config->power_lsb;
    +val = regval * data->power_lsb_uW;
    break;

case INA2XX_CURRENT:
    /* signed register, LSB=1mA (selected), in mA */
    -val = regval;
   /+* signed register, result in mA */
    +val = (s16)regval * data->current_lsb_uA;
    +val = DIV_ROUND_CLOSEST(val, 1000);
    break;

case INA2XX_CALIBRATION:
    -val = DIV_ROUND_CLOSEST(data->config->calibration_factor,
        -regval);
    +val = regval;
break;
default:
/* programmer goofed */
@@ -304,9 +306,41 @@
ina2xx_get_value(data, attr->index, regval));
}

-static ssize_t ina2xx_set_shunt(struct device *dev,
-struct device_attribute *da,
-const char *buf, size_t count)
+/*
+ * In order to keep calibration register value fixed, the product
+ * of current_lsb and shunt_resistor should also be fixed and equal
+ * to shunt_voltage_lsb = 1 / shunt_div multiplied by 10^9 in order
+ * to keep the scale.
+ */
+static int ina2xx_set_shunt(struct ina2xx_data *data, long val)
+
/+unsigned int dividend = DIV_ROUND_CLOSEST(1000000000,
+ data->config->shunt_div);
+if (val <= 0 || val > dividend)
+return -EINVAL;
+
+mutex_lock(&data->config_lock);
+data->rshunt = val;
+data->current_lsb_uA = DIV_ROUND_CLOSEST(dividend, val);
+data->power_lsb_uW = data->config->power_lsb_factor *
+ data->current_lsb_uA;
+mutex_unlock(&data->config_lock);
+
+return 0;
+
+static ssize_t ina2xx_show_shunt(struct device *dev,
+struct device_attribute *da,
+char *buf)
+{
+struct ina2xx_data *data = dev_get_drvdata(dev);
+
+return snprintf(buf, PAGE_SIZE, "%li\n", data->rshunt);
+
+}
+
+static ssize_t ina2xx_store_shunt(struct device *dev,
+struct device_attribute *da,
+const char *buf, size_t count)
+
+unsigned long val;
+int status;
+

if (status < 0)
    return status;

-if (val == 0 ||
    /* Values greater than the calibration factor make no sense. */
    val > data->config->calibration_factor)
    return -EINVAL;
-
    mutex_lock(&data->config_lock);
-data->rshunt = val;
-status = ina2xx_calibrate(data);
-mutex_unlock(&data->config_lock);
+status = ina2xx_set_shunt(data, val);
if (status < 0)
    return status;
-
    return count;
}

/* shunt resistance */
static SENSOR_DEVICE_ATTR(shunt_resistor, S_IRUGO | S_IWUSR,
    ina2xx_show_value, ina2xx_set_shunt,
+    ina2xx_show_shunt, ina2xx_store_shunt,
    INA2XX_CALIBRATION);

/* update interval (ina226 only) */

/* set the device type */
data->config = &ina2xx_config[chip];
+mutex_init(&data->config_lock);

if (of_property_read_u32(dev->of_node, "shunt-resistor", &val) < 0) {
    struct ina2xx_platform_data *pdata = dev_get_platdata(dev);
    val = INA2XX_RSHUNT_DEFAULT;
}
return -ENODEV;
}

mutex_init(&data->config_lock);
-
data->groups[group++] = &ina2xx_group;
-if (id->driver_data == ina226)
+if (chip == ina226)
data->groups[group++] = &ina226_group;

hwmon_dev = devm_hwmon_device_register_with_groups(dev, client->name,
@@ -477,7 +500,7 @@
return PTR_ERR(hwmon_dev);

dev_info(dev, "power monitor %s (Rshunt = %li uOhm)\n",
- id->name, data->rshunt);
+ client->name, data->rshunt);

return 0;
}
--- linux-4.15.0.orig/drivers/hwmon/ina3221.c
+++ linux-4.15.0/drivers/hwmon/ina3221.c
@@ -38,9 +38,9 @@
#define INA3221_WARN3			0x0c
#define INA3221_MASK_ENABLE		0x0f

-#define INA3221_CONFIG_MODE_SHUNT	BIT(1)
-#define INA3221_CONFIG_MODE_BUS		BIT(2)
-#define INA3221_CONFIG_MODE_CONTINUOUS	BIT(3)
+#define INA3221_CONFIG_MODE_SHUNT	BIT(0)
+#define INA3221_CONFIG_MODE_BUS		BIT(1)
+#define INA3221_CONFIG_MODE_CONTINUOUS	BIT(2)

#define INA3221_RSHUNT_DEFAULT		10000

--- linux-4.15.0.orig/drivers/hwmon/jc42.c
+++ linux-4.15.0/drivers/hwmon/jc42.c
@@ -527,7 +527,7 @@
}
data->config = config;

-hwmon_dev = devm_hwmon_device_register_with_info(dev, client->name,
+hwmon_dev = devm_hwmon_device_register_with_info(dev, "jc42",
data, &jc42_chip_info,
    NULL);
return PTR_ERR_OR_ZERO(hwmon_dev);
--- linux-4.15.0.orig/drivers/hwmon/k10temp.c
+++ linux-4.15.0/drivers/hwmon/k10temp.c
@@ -23,6 +23,8 @@
 #include <linux/init.h>
 #include <linux/module.h>
 #include <linux/pci.h>
+#include <linux/pci_ids.h>
+#include <asm/amd_nb.h>
 #include <asm/processor.h>
 MODULE_DESCRIPTION("AMD Family 10h+ CPU core temperature monitor");
 @@ -36,8 +38,8 @@
 /* Provide lock for writing to NB_SMU_IND_ADDR */
 static DEFINE_MUTEX(nb_smu_ind_mutex);
-#ifndef PCI_DEVICE_ID_AMD_17H_DF_F3
-#define PCI_DEVICE_ID_AMD_17H_DF_F3	0x1463
+#ifndef PCI_DEVICE_ID_AMD_15H_M70H_NB_F3
+#define PCI_DEVICE_ID_AMD_15H_M70H_NB_F3	0x15b3
 #endif
 /* CPUID function 0x80000001, ebx */
 @@ -59,10 +61,12 @@
 #define NB_CAP_HTC	0x00000400
 /*
- * For F15h M60h, functionality of REG_REPORTED_TEMPERATURE
- * has been moved to D0F0xBC_xD820_0CA4 [Reported Temperature
- * Control]
+ * For F15h M60h and M70h, REG_HARDWARE_THERMAL_CONTROL
+ * and REG_REPORTED_TEMPERATURE have been moved to
+ * D0F0xBC_xD820_0C64 [Hardware Temperature Control]
+ * D0F0xBC_xD820_0CA4 [Reported Temperature Control]
+ */
+#define F15H_M60H_HARDWARE_TEMP_CTRL_OFFSET	0xd8200c64
#define F15H_M60H_REPORTED_TEMP_CTRL_OFFSET	0xd8200ca4
 /* F17h M01h Access through SMN */
 @@ -70,8 +74,10 @@
 struct k10temp_data {
 struct pci_dev *pdev;
 +void (*read_htcreg)(struct pci_dev *pdev, u32 *regval);
 void (*read_tempreg)(struct pci_dev *pdev, u32 *regval);
 int temp_offset;
 +u32 temp_adjust_mask;
 };
struct tctl_offset {
  @ @ -84,13 +90,22 @@
    { 0x17, "AMD Ryzen 5 1600X", 20000 },
    { 0x17, "AMD Ryzen 7 1700X", 20000 },
    { 0x17, "AMD Ryzen 7 1800X", 20000 },
    +{ 0x17, "AMD Ryzen 7 2700X", 10000 },
    { 0x17, "AMD Ryzen Threadripper 1950X", 27000 },
    { 0x17, "AMD Ryzen Threadripper 1920X", 27000 },
    +{ 0x17, "AMD Ryzen Threadripper 1900X", 27000 },
    { 0x17, "AMD Ryzen Threadripper 1950", 10000 },
    { 0x17, "AMD Ryzen Threadripper 1920", 10000 },
    { 0x17, "AMD Ryzen Threadripper 1910", 10000 },
    +{ 0x17, "AMD Ryzen Threadripper 2950X", 27000 },
    +{ 0x17, "AMD Ryzen Threadripper 2990WX", 27000 },
};

+static void read_htcreg_pci(struct pci_dev *pdev, u32 *regval)
+{
+  +pci_read_config_dword(pdev, REG_HARDWARE_THERMAL_CONTROL, regval);
+}
+
static void read_tempreg_pci(struct pci_dev *pdev, u32 *regval)
{
  pci_read_config_dword(pdev, REG_REPORTED_TEMPERATURE, regval);
  @ @ -107,6 +122,12 @@
  mutex_unlock(&nb_smu_ind_mutex);
}

+static void read_htcreg_nb_f15(struct pci_dev *pdev, u32 *regval)
+{
+  +amd_nb_index_read(pdev, PCI_DEVFN(0, 0), 0xb8,
+    F15H_M60H_HARDWARE_TEMP_CTRL_OFFSET, regval);
+}
+
static void read_tempreg_nb_f15(struct pci_dev *pdev, u32 *regval)
{
  amd_nb_index_read(pdev, PCI_DEVFN(0, 0), 0xb8,
  @ @ -115,8 +136,8 @@
  amd_nb_index_read(pdev, PCI_DEVFN(0, 0), 0xb8,
  }

static void read_tempreg_nb_f17(struct pci_dev *pdev, u32 *regval)
{
  -amd_nb_index_read(pdev, PCI_DEVFN(0, 0), 0x60,
  - F17H_M01H_REPORTED_TEMP_CTRL_OFFSET, regval);
  +amd_smn_read(amd_pci_dev_to_node_id(pdev),
  + F17H_M01H_REPORTED_TEMP_CTRL_OFFSET, regval);
}

static ssize_t temp1_input_show(struct device *dev,
@@ -128,7 +149,12 @@

data->read_tempreg(data->pdev, &regval);
temp = (regval >> 21) * 125;
-temp -= data->temp_offset;
+if (regval & data->temp_adjust_mask)
+temp -= 49000;
+if (temp > data->temp_offset)
+temp -= data->temp_offset;
+else
+temp = 0;

return sprintf(buf, "%u\n", temp);
}
@@ -148,8 +174,7 @@

u32 regval;
int value;

-pci_read_config_dword(data->pdev,
-    REG_HARDWARE_THERMAL_CONTROL, &regval);
+data->read_htcreg(data->pdev, &regval);
value = ((regval >> 16) & 0x7f) * 500 + 52000;
if (show_hyst)
value -= ((regval >> 24) & 0xf) * 500;
@@ -169,13 +194,18 @@
struct pci_dev *pdev = data->pdev;

if (index >= 2) {
-u32 reg_caps, reg_htc;
+u32 reg;
+    +
+if (!data->read_htcreg)
+return 0;

 pci_read_config_dword(pdev, REG_NORTHBRIDGE_CAPABILITIES,
    &reg_caps);
-pci_read_config_dword(pdev, REG_HARDWARE_THERMAL_CONTROL,
    &reg_htc);
-    -if (!(reg_caps & NB_CAP_HTC) || !(reg_htc & HTC_ENABLE))
+    +
+if (!!(reg & NB_CAP_HTC))
+return 0;
+    +
data->read_htcreg(data->pdev, &reg);
+if (!!(reg & HTC_ENABLE))
return 0;
}
return attr->mode;
* and AM3 formats, but that's the best we can do. */
return boot_cpu_data.x86_model < 4 ||
    (boot_cpu_data.x86_model == 4 && boot_cpu_data.x86_mask <= 2);
+	       (boot_cpu_data.x86_model == 4 && boot_cpu_data.x86_stepping <= 2);
}

static int k10temp_probe(struct pci_dev *pdev,
	       (boot_cpu_data.x86_model & 0xf0) == 0x60 ||
    (boot_cpu_data.x86_model & 0xf0) == 0x70)) {
+    data->temp_adjust_mask = 0x80000;
    data->read_tempreg = read_tempreg_nb_f17;
-} else if (boot_cpu_data.x86 == 0x15)
+    } else if (boot_cpu_data.x86 == 0x17) {
+        data->read_htcreg = read_htcreg_pci;
        data->read_tempreg = read_tempreg_pci;
      +}
for (i = 0; i < ARRAY_SIZE(tctl_offset_table); i++) {
    const struct tctl_offset *entry = &tctl_offset_table[i];
    [@ @ -285,9 +320,12 @ @
    ];
    MODULE_DEVICE_TABLE(pci, k10temp_id_table);
return -ENOMEM;

model = boot_cpu_data.x86_model;
-stepping = boot_cpu_data.x86_mask;
+stepping = boot_cpu_data.x86_stepping;

/* feature available since SH-C0, exclude older revisions */
if ((model == 4 && stepping == 0) ||
--- linux-4.15.0.orig/drivers/hwmon/lm75.c
+++ linux-4.15.0/drivers/hwmon/lm75.c
@@ -165,7 +165,7 @@
    temp = DIV_ROUND_CLOSEST(temp << (resolution - 8),
    1000) << (16 - resolution);

-return regmap_write(data->regmap, reg, temp);
+return regmap_write(data->regmap, reg, (u16)temp);
}

static umode_t lm75_is_visible(const void *data, enum hwmon_sensor_types type,
--- linux-4.15.0.orig/drivers/hwmon/lm80.c
+++ linux-4.15.0/drivers/hwmon/lm80.c
@@ -360,9 +360,11 @@
    struct i2c_client *client = data->client;
    unsigned long min, val;
    u8 reg;
-int err = kstrtoul(buf, 10, &val);
-if (err < 0)
+rv = kstrtoul(buf, 10, &val);
+if (rv < 0)
+return rv;

/* Save fan_min */
mutex_lock(&data->update_lock);
@@ -390,8 +392,13 @@
    return -EINVAL;
}

-reg = (lm80_read_value(client, LM80_REG_FANDIV) &
-- ~(3 << (2 * (nr + 1)))) | (data->fan_div[nr] << (2 * (nr + 1)));
+rv = lm80_read_value(client, LM80_REG_FANDIV);
+if (rv < 0) {
+mutex_unlock(&data->update_lock);
+return rv;
+
+reg = (rv & ~(3 << (2 * (nr + 1))))
+    | (data->fan_div[nr] << (2 * (nr + 1))); lm80_write_value(client, LM80_REG_FANDIV, reg);
// Restore fan_min */

/* LM90 status */
#define LM90_STATUS_LTHRM (1 << 0) /* local THERM limit tripped */

#define LM90_HAVE_EMERGENCY_ALARM (1 << 5)/* emergency alarm*/
#define LM90_HAVE_TEMP3 (1 << 6) /* 3rd temperature sensor*/
#define LM90_HAVE_BROKEN_ALERT (1 << 7) /* Broken alert*/
+#define LM90_PAUSE_FOR_CONFIG (1 << 8) /* Pause conversion for config*/

/* Save config and pause conversion */
+if (data->flags & LM90_PAUSE_FOR_CONFIG) {
+    config_orig = lm90_read_reg(client, LM90_REG_R_CONFIG1);
+    if (config_orig < 0) return config_orig;
+    config_stop = config_orig | 0x40;
+    if (config_orig != config_stop) {
+        err = i2c_smbus_write_byte_data(client, LM90_REG_W_CONFIG1, config_stop);
+        if (err < 0) return err;
+    }
+
+    /* Set conv rate */

err = i2c_smbus_write_byte_data(client, LM90_REG_W_CONVRATE, val);
+
+/* Revert change to config */
+if (data->flags & LM90_PAUSE_FOR_CONFIG && config_orig != config_stop)
+i2c_smbus_write_byte_data(client, LM90_REG_W_CONFIG1,
+  config_orig);
+
+return err;
+
}
+++ linux-4.15.0/drivers/hwmon/max31722.c
@@ -9,7 +9,6 @@
* directory of this archive for more details.
*/
-#include <linux/acpi.h>
#include <linux/hwmon.h>
#include <linux/hwmon-sysfs.h>
#include <linux/kernel.h>
@@ -138,20 +137,12 @@
{"max31723", 0},
{}
};
-static const struct acpi_device_id __maybe_unused max31722_acpi_id[] = {
-{"MAX31722", 0},
-{"MAX31723", 0},
-{}
-};
MODULE_DEVICE_TABLE(spi, max31722_spi_id);
static struct spi_driver max31722_driver = {
.driver = {
.name = "max31722",
.pm = &max31722_pm_ops,
-.acpi_match_table = ACPI_PTR(max31722_acpi_id),
},
.probe =
max31722_probe,
.remove =
max31722_remove,
--- linux-4.15.0.orig/drivers/hwmon/max31790.c
+++ linux-4.15.0/drivers/hwmon/max31790.c
@@ -179,7 +179,7 @@
switch (attr) {
case hwmon_fan_input:
-sr = get_tach_period(data->fan_dynamics[channel]);
+sr = get_tach_period(data->fan_dynamics[channel % NR_CHANNEL]);
rpm = RPM_FROM_REG(data->tach[channel], sr);
*val = rpm;
return 0;
--- linux-4.15.0.orig/drivers/hwmon/max6697.c
+++ linux-4.15.0/drivers/hwmon/max6697.c
@@ -47,8 +47,9 @@
* Map device tree / platform data register bit map to chip bit map.
* Applies to alert register and over-temperature register.
*/
-#define MAX6697_MAP_BITS(reg)((((reg) & 0x7e) >> 1) | \

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+\#define MAX6697_ALERT_MAP_BITS(reg)(((reg) & 0x7e) >> 1) | \
(((reg) & 0x01) << 6) | ((reg) & 0x80))
+\#define MAX6697_OVERT_MAP_BITS(reg) (((reg) >> 1) | (((reg) & 0x01) << 7))

#define MAX6697_REG_STAT(n)(0x44 + (n))

@@ -587,12 +588,12 @@
 return ret;

 ret = i2c_smbus_write_byte_data(client, MAX6697_REG_ALERT_MASK,
 -MAX6697_ALERT_MAP_BITS(pdata->alert_mask));
 +MAX6697_ALERT_MAP_BITS(pdata->alert_mask));
 if (ret < 0)
 return ret;

 ret = i2c_smbus_write_byte_data(client, MAX6697_REG_OVERT_MASK,
 -MAX6697_MAP_BITS(pdata->over_temperature_mask));
 +MAX6697_OVERT_MAP_BITS(pdata->over_temperature_mask));
 if (ret < 0)
 return ret;

 --- linux-4.15.0.orig/drivers/hwmon/nct6775.c
 +++ linux-4.15.0/drivers/hwmon/nct6775.c
 @@ -63,6 +63,7 @@
 #include <linux/bitops.h>
 #include <linux/dmi.h>
 #include <linux/io.h>
 +#include <linux/nospec.h>
 #include "lm75.h"

 #define USE_ALTERNATE
 @@ -768,7 +769,7 @@
 static const u16 NCT6106_REG_WEIGHT_TEMP_SEL[] = { 0x168, 0x178, 0x188 };
 static const u16 NCT6106_REG_WEIGHT_TEMP_STEP[] = { 0x169, 0x179, 0x189 };
 static const u16 NCT6106_REG_WEIGHT_TEMP_STEP_TOL[] = { 0x16a, 0x17a, 0x18a };
-static const u16 NCT6106_REG_WEIGHT_DUTY_STEP[] = { 0x16b, 0x17b, 0x18b };
+static const u16 NCT6106_REG_WEIGHT_DUTY_STEP[] = { 0x16b, 0x17b, 0x18b };
 static const u16 NCT6106_REG_WEIGHT_DUTY_BASE[] = { 0x16c, 0x17c, 0x18c };
 static const u16 NCT6106_REG_WEIGHT_DUTY_BASE[] = { 0x16d, 0x17d, 0x18d };

 @@ -1469,7 +1470,7 @@
 duty_is_dc = data->REG_PWM_MODE[i] &&
 (nct6775_read_value(data, data->REG_PWM_MODE[i])
 & data->PWM_MODE_MASK[i]);
-data->pwm_mode[i] = duty_is_dc;
+data->pwm_mode[i] = !duty_is_dc;

 fanmodecfg = nct6775_read_value(data, data->REG_FAN_MODE[i]);
for (j = 0; j < ARRAY_SIZE(data->REG_PWM); j++) {
    @@ -2350,7 +2351,7 @@

    struct nct6775_data *data = nct6775_update_device(dev);
    struct sensor_device_attribute *sattr = to_sensor_dev_attr(attr);

    return sprintf(buf, "%d\n", !data->pwm_mode[sattr->index]);
} +return sprintf(buf, "%d\n", data->pwm_mode[sattr->index]);

static ssize_t
@@ -2371,9 +2372,9 @@
    if (val > 1)
    return -EINVAL;

    /* Setting DC mode is not supported for all chips/channels */
    /* Setting DC mode (0) is not supported for all chips/channels */
    if (data->REG_PWM_MODE[nr] == 0) {
        -if (val)
        +if (!val)
        return -EINVAL;
        return count;
    }
@@ -2382,7 +2383,7 @@
    data->pwm_mode[nr] = val;
    reg = nct6775_read_value(data, data->REG_PWM_MODE[nr]);
    reg &= ~data->PWM_MODE_MASK[nr];
    -if (val)
    +if (!val)
    reg |= data->PWM_MODE_MASK[nr];
    nct6775_write_value(data, data->REG_PWM_MODE[nr], reg);
    mutex_unlock(&data->update_lock);
@@ -2642,6 +2643,7 @@
    return err;
    if (val > NUM_TEMP)
    return -EINVAL;
    +val = array_index_nospec(val, NUM_TEMP + 1);
    if (val && (!(data->have_temp & BIT(val - 1)) ||
        !data->temp_src[val - 1]))
        return -EINVAL;
@@ -3590,6 +3592,7 @@
    data->REG_FAN_TIME[0] = NCT6106_REG_FAN_STOP_TIME;
    data->REG_FAN_TIME[1] = NCT6106_REG_FAN_STEP_UP_TIME;
    +data->REG_TOLERANCE_H = NCT6106_REG_TOLERANCE_H;
    data->REG_PWM[0] = NCT6106_REG_PWM;
    data->REG_PWM[1] = NCT6106_REG_FAN_START_OUTPUT;
@@ -4107,7 +4110,7 @@
* The temperature is already monitored if the respective bit in `<mask>`
* is set.
*/

```c
-i for (i = 0; i < 31; i++) {
+for (i = 0; i < 32; i++) {
if (!(data->temp_mask & BIT(i + 1)))
    continue;
}
if (!reg_temp_alternate[i])
--- linux-4.15.0.orig/drivers/hwmon/nct7802.c
+++ linux-4.15.0/drivers/hwmon/nct7802.c
@@ -32,8 +32,8 @@
static const u8 REG_VOLTAGE[5] = { 0x09, 0x0a, 0x0c, 0x0d, 0x0e };:
static const u8 REG_VOLTAGE_LIMIT_LSB[2][5] = {
-\{ 0x40, 0x00, 0x42, 0x44, 0x46 },
-\{ 0x3f, 0x00, 0x41, 0x43, 0x45 },
+\{ 0x46, 0x00, 0x40, 0x42, 0x44 },
+\{ 0x45, 0x00, 0x3f, 0x41, 0x43 },
};
static const u8 REG_VOLTAGE_LIMIT_MSB[5] = { 0x48, 0x00, 0x47, 0x47, 0x48 };:
@@ -768,7 +768,7 @@
if (index >= 6 && index < 11 && (reg & 0x03) != 0x03) /* VSEN1 */
    return 0;
 if (index >= 11 && index < 17 && (reg & 0x0c) != 0x0c) /* VSEN2 */
+if (index >= 16 && index < 17 && (reg & 0x0c) != 0x0c) /* VSEN2 */
    return 0;
 if (index >= 17 && (reg & 0x30) != 0x30) /* VSEN3 */
+if (index >= 16 && (reg & 0x30) != 0x30) /* VSEN3 */
    return 0;
    return attr->mode;
--- linux-4.15.0.orig/drivers/hwmon/pc87427.c
+++ linux-4.15.0/drivers/hwmon/pc87427.c
@@ -106,6 +106,13 @@
#define LD_IN	1
#define LD_TEMP	1

-&sensor_dev_attr_in3_alarm.dev_attr.attr,
-&sensor_dev_attr_in3_beep.dev_attr.attr,
-
+&sensor_dev_attr_in4_input.dev_attr.attr, /* 17 */
+&sensor_dev_attr_in4_input.dev_attr.attr, /* 16 */
+&sensor_dev_attr_in4_min.dev_attr.attr,
+&sensor_dev_attr_in4_max.dev_attr.attr,
+&sensor_dev_attr_in4_alarm.dev_attr.attr,
@@ -794,9 +794,9 @@
if (index >= 6 && index < 11 && (reg & 0x03) != 0x03) /* VSEN1 */
    return 0;
 -if (index >= 11 && index < 17 && (reg & 0x0c) != 0x0c) /* VSEN2 */
 +if (index >= 16 && index < 17 && (reg & 0x0c) != 0x0c) /* VSEN2 */
    return 0;
 -if (index >= 17 && (reg & 0x30) != 0x30) /* VSEN3 */
 +if (index >= 16 && (reg & 0x30) != 0x30) /* VSEN3 */
    return 0;
    return attr->mode;
```

--- linux-4.15.0.orig/drivers/hwmon/pc87427.c
+++ linux-4.15.0/drivers/hwmon/pc87427.c
@@ -106,6 +106,13 @@
#define LD_IN	1
#define LD_TEMP	1
static inline int superio_enter(int sioaddr)
{
    if (!request_muxed_region(sioaddr, 2, DRVNAME))
        return -EBUSY;
    return 0;
}

static inline void superio_outb(int sioaddr, int reg, int val)
{
    outb(reg, sioaddr);
    outb(0x02, sioaddr);
    outb(0x02, sioaddr + 1);
    release_region(sioaddr, 2);
}

/*
 @@ -122,6 +129,7 @@
 {
     outb(0x02, sioaddr);
     outb(0x02, sioaddr + 1);
+    release_region(sioaddr, 2);
 }

 /*
 @@ -1220,7 +1228,11 @@
 {
     u16 val;
     u8 cfg, cfg_b;
-    int i, err = 0;
+    int i, err;
+    err = superio_enter(sioaddr);
+    if (err)
+        return err;
 /* Identify device */
 val = force_id ? force_id : superio_inb(sioaddr, SIOREG_DEVID);

 const struct adm1275_data *data = to_adm1275_data(info);
 int ret = 0;

 -if (page)
+if (page > 0)
    return -ENXIO;

 switch (reg) {
-    @ @ -240.7 +240.7 @ @
+    const struct adm1275_data *data = to_adm1275_data(info);
+    int ret;

-    if (page)
+    if (page > 0)
return -ENXIO;

switch (reg) {
--- linux-4.15.0.orig/drivers/hwmon/pmbus/ltc2978.c
+++ linux-4.15.0/drivers/hwmon/pmbus/ltc2978.c
@@ -89,8 +89,8 @@
#define LTC_POLL_TIMEOUT		100	/* in milli-seconds */
-#define LTC_NOT_BUSY			BIT(5)
-#define LTC_NOT_PENDING			BIT(4)
+#define LTC_NOT_BUSY			BIT(6)
+#define LTC_NOT_PENDING			BIT(5)

/*
  * LTC2978 clears peak data whenever the CLEAR_FAULTS command is executed, which
--- linux-4.15.0.orig/drivers/hwmon/pmbus/max34440.c
+++ linux-4.15.0/drivers/hwmon/pmbus/max34440.c
@@ -241,7 +241,6 @@
.func[11] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
.func[12] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
.func[13] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
-.read_byte_data = max34440_read_byte_data,
-.read_word_data = max34440_read_word_data,
-.write_word_data = max34440_write_word_data,
},
@@ -352,7 +351,6 @@
.func[15] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
.func[16] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
.func[17] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
-.read_byte_data = max34440_read_byte_data,
-.read_word_data = max34440_read_word_data,
-.write_word_data = max34440_write_word_data,
},
@@ -388,7 +386,6 @@
.func[19] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
.func[20] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
.func[21] = PMBUS_HAVE_TEMP | PMBUS_HAVE_STATUS_TEMP,
-.read_byte_data = max34440_read_byte_data,
-.read_word_data = max34440_read_word_data,
-.write_word_data = max34440_write_word_data,
},
--- linux-4.15.0.orig/drivers/hwmon/pmbus/max8688.c
+++ linux-4.15.0/drivers/hwmon/pmbus/max8688.c
@@ -45,7 +45,7 @@

int ret;
-if (page)
+if (page > 0)
return -ENXIO;

switch (reg) {
--- linux-4.15.0.orig/drivers/hwmon/pmbus/pmbus.c
+++ linux-4.15.0/drivers/hwmon/pmbus/pmbus.c
@@ -118,6 +118,8 @@
} else {
info->pages = 1;
}
+	pmbus_clear_faults(client);
}

if (pmbus_check_byte_register(client, 0, PMBUS_VOUT_MODE)) {
--- linux-4.15.0.orig/drivers/hwmon/pmbus/pmbus_core.c
+++ linux-4.15.0/drivers/hwmon/pmbus/pmbus_core.c
@@ -1055,7 +1055,8 @@
    const struct pmbus_driver_info *info,
    const char *name,
    int index, int page,
-    const struct pmbus_sensor_attr *attr)
+    const struct pmbus_sensor_attr *attr,
+    bool paged)
{
    struct pmbus_sensor *base;
    bool upper = !!(attr->gbit & 0xff00); /* need to check STATUS_WORD */
@@ -1063,7 +1064,7 @@
    if (attr->label) {
        ret = pmbus_add_label(data, name, index, attr->label,
-            attr->paged ? page + 1 : 0);
+            paged ? page + 1 : 0);
        if (ret)
            return ret;
    }
@@ -1096,6 +1097,30 @@
return 0;
}

+static bool pmbus_sensor_is_paged(const struct pmbus_driver_info *info,
+    const struct pmbus_sensor_attr *attr)
+{
+    int p;
+    +if (attr->paged)
+        return true;
/*
 * Some attributes may be present on more than one page despite
 * not being marked with the paged attribute. If that is the case,
 * then treat the sensor as being paged and add the page suffix to the
 * attribute name.
 * We don't just add the paged attribute to all such attributes, in
 * order to maintain the un-suffixed labels in the case where the
 * attribute is only on page 0.
 */

for (p = 1; p < info->pages; p++) {
  if (info->func[p] & attr->func)
    return true;
}

return false;

static int pmbus_add_sensor_attrs(struct i2c_client *client,
                                  struct pmbus_data *data,
                                  const char *name,
                                  ...)

  index = 1;
  for (i = 0; i < nattrs; i++) {
    int page, pages;
    bool paged = pmbus_sensor_is_paged(info, attrs);

    -pages = attrs->paged ? info->pages : 1;
    +pages = paged ? info->pages : 1;
    for (page = 0; page < pages; page++) {
      if (!(info->func[page] & attrs->func))
        continue;
      ret = pmbus_add_sensor_attrs_one(client, data, info,
                                     name, index, page,
                                     attrs, paged);
      if (ret)
        return ret;
      index++;
    }

    -pmbus_clear_faults(client);
    +if (data->info->pages)
      -pmbus_clear_faults(client);
      +else
        -pmbus_clear_fault_page(client, -1);
      
    ...
if (info->identify) {
    ret = (*info->identify)(client, info);
    --- linux-4.15.0.orig/drivers/hwmon/pmbus/tps53679.c
    +++ linux-4.15.0/drivers/hwmon/pmbus/tps53679.c
    @@ -80,7 +80,14 @@
    static int tps53679_probe(struct i2c_client *client,
    const struct i2c_device_id *id) {
    -return pmbus_do_probe(client, id, &tps53679_info);
    +struct pmbus_driver_info *info;
    +
    +info = devm_kmemdup(&client->dev, &tps53679_info, sizeof(*info),
    + GFP_KERNEL);
    +if (!info)
    +return -ENOMEM;
    +
    +return pmbus_do_probe(client, id, info);
    }

    static const struct i2c_device_id tps53679_id[] = {
    --- linux-4.15.0.orig/drivers/hwmon/pwm-fan.c
    +++ linux-4.15.0/drivers/hwmon/pwm-fan.c
    @@ -221,8 +221,12 @@
    ctx->pwm = devm_of_pwm_get(&pdev->dev, pdev->dev.of_node, NULL);
    if (IS_ERR(ctx->pwm)) {
    -dev_err(&pdev->dev, "Could not get PWM
    -return PTR_ERR(ctx->pwm);
    +ret = PTR_ERR(ctx->pwm);
    +
    +if (ret != -EPROBE_DEFER)
    +dev_err(&pdev->dev, "Could not get PWM: %d\n", ret);
    +
    +return ret;
    }

    platform_set_drvdata(pdev, ctx);
    @@ -250,7 +254,19 @@
    ret = pwm_fan_of_get_cooling_data(&pdev->dev, ctx);
    if (ret)
    -goto err_pwm_disable;
    
    ctx->pwm_fan_state = ctx->pwm_fan_max_state;
    if (IS_ENABLED(CONFIG_THERMAL)) {
    @@ -290,9 +294,19 @@
    static int pwm_fan_suspend(struct device *dev)
struct pwm_fan_ctx *ctx = dev_get_drvdata(dev);
+struct pwm_args args;
+int ret;
+
+pwm_get_args(ctx->pwm, &args);
+
+if (ctx->pwm_value) {
+ret = pwm_config(ctx->pwm, 0, args.period);
+if (ret < 0)
+return ret;
-
+if (ctx->pwm_value)
pwm_disable(ctx->pwm);
+
} 
+
return 0;
} 

--- linux-4.15.0.orig/drivers/hwmon/scpi-hwmon.c
+++ linux-4.15.0/drivers/hwmon/scpi-hwmon.c
@@ -107,6 +107,15 @@
scpi_scale_reading(&value, sensor);

+/*
+ * Temperature sensor values are treated as signed values based on
+ * observation even though that is not explicitly specified, and
+ * because an unsigned u64 temperature does not really make practical
+ * sense especially when the temperature is below zero degrees Celsius.
+ */
+if (sensor->info.class == TEMPERATURE)
+return sprintf(buf, "%lld\n", (s64)value);
+
return sprintf(buf, "%llu\n", value);
} 

--- linux-4.15.0.orig/drivers/hwmon/shtc1.c
+++ linux-4.15.0/drivers/hwmon/shtc1.c
@@ -38,7 +38,7 @@
/* constants for reading the ID register */
#define SHTC1_ID	0x07
#undef SHTC1_ID_REG_MASK 0x1f
+#define SHTC1_ID_REG_MASK 0x3f

/* delays for non-blocking i2c commands, both in us */
#define SHTC1_NONBLOCKING_WAIT_TIME_HPM 14400
--- linux-4.15.0.orig/drivers/hwmon/smsc47b397.c
+++ linux-4.15.0/drivers/hwmon/smsc47b397.c
@@ -72,14 +72,19 @@
 superio_outb(0x07, ld);
 }

-static inline void superio_enter(void)
+static inline int superio_enter(void)
 {
+  if (!request_muxed_region(REG, 2, DRVNAME))
+    return -EBUSY;
+  outb(0x55, REG);
+  return 0;
 }

 static inline void superio_exit(void)
 {
  outb(0xAA, REG);
+  release_region(REG, 2);
 }

#define SUPERIO_REG_DEVID	0x20
@@ -300,8 +305,12 @@
 u8 id, rev;
 char *name;
 unsigned short addr;
+  int err;
+  
+  err = superio_enter();
+  if (err)
+    return err;
  superio_enter();
 id = force_id ? force_id : superio_inb(SUPERIO_REG_DEVID);

 switch (id) {
-  superio_enter();
 id = force_id ? force_id : superio_inb(SUPERIO_REG_DEVID);

 switch (id) {
-  superio_enter();

 /* logical device for fans is 0x0A */
#define superio_select() superio_outb(0x07, 0x0A)

-static inline void
+static inline int
 superio_enter(void)
 {
+  if (!request_muxed_region(REG, 2, DRVNAME))
return -EBUSY;
outb(0x55, REG);
+return 0;
}

static inline void
superio_exit(void)
{
outb(0xAA, REG);
+release_region(REG, 2);
}

#define SUPERIO_REG_ACT 0x30
@@ -531,8 +536,12 @@
{
  u8 val;
  unsigned short addr;
  +int err;
  +
  +err = superio_enter();
  +if (err)
  +return err;
  -superio_enter();
  val = force_id ? force_id : superio_inb(SUPERIO_REG_DEVID);

 /*
 @@ -608,13 +617,14 @@
 static void smsc47m1_restore(const struct smsc47m1_sio_data *sio_data)
 {
  if (((sio_data->activate & 0x01) == 0) {
  -superio_enter();
  -superio_select();
  -
  -pr_info("Disabling device\n");
  -superio_outb(SUPERIO_REG_ACT, sio_data->activate);
  -
  -superio_exit();
  +if (!superio_enter()) {
  +superio_select();
  +pr_info("Disabling device\n");
  +superio_outb(SUPERIO_REG_ACT, sio_data->activate);
  +superio_exit();
  +} else {
  +pr_warn("Failed to disable device\n");
  +}
  }
--- linux-4.15.0.orig/drivers/hwmon/tmp421.c
+++ linux-4.15.0/drivers/hwmon/tmp421.c
@@ -88,7 +88,7 @@
 .data = (void *)2
 },
 {
-  .compatible = "ti,tmp422",
+  .compatible = "ti,tmp442",
   .data = (void *)3
 },
 },
 @@ -109,23 +109,17 @@
 s16 temp[4];
};

-static int temp_from_s16(s16 reg)
+static int temp_from_raw(u16 reg, bool extended)
{
  /* Mask out status bits */
  int temp = reg & ~0xf;

  -return (temp * 1000 + 128) / 256;
-}
-
-static int temp_from_u16(u16 reg)
{-
  /* Mask out status bits */
  -int temp = reg & ~0xf;
  -
  /* Add offset for extended temperature range. */
  -temp -= 64 * 256;
  +if (extended)
  +temp = temp - 64 * 256;
  +else
  +temp = (s16)temp;

  -return (temp * 1000 + 128) / 256;
  +return DIV_ROUND_CLOSEST(temp * 1000, 256);
}

static struct tmp421_data *tmp421_update_device(struct device *dev)
@@ -162,17 +156,15 @@
switch (attr) {
    case hwmon_temp_input:
      if (tmp421->config & TMP421_CONFIG_RANGE)
- *val = temp_from_u16(tmp421->temp[channel]);
- else
- *val = temp_from_s16(tmp421->temp[channel]);
+ *val = temp_from_raw(tmp421->temp[channel],
+     tmp421->config & TMP421_CONFIG_RANGE);
return 0;

case hwmon_temp_fault:
  /*
   - * The OPEN bit signals a fault. This is bit 0 of the temperature
   - * register (low byte).
   + * Any of OPEN or /PVLD bits indicate a hardware malfunction
   + * and the conversion result may be incorrect
   */
- *val = tmp421->temp[channel] & 0x01;
+ *val = !(tmp421->temp[channel] & 0x03);
return 0;

default:
    return -EOPNOTSUPP;
@@ -185,11 +177,8 @@
{
switch (attr) {
  case hwmon_temp_fault:
-   if (channel == 0)
-     return S_IRUGO;
-     return S_IRUGO;
  case hwmon_temp_input:
-     return S_IRUGO;
+     return 0444;
    default:
      return 0;
  }
  --- linux-4.15.0.orig/drivers/hwmon/vt1211.c
  +++ linux-4.15.0/drivers/hwmon/vt1211.c
@@ -226,15 +226,21 @@
  outb(ldn, sio_cip + 1);
}{
  static inline void superio_enter(int sio_cip)
+static inline int superio_enter(int sio_cip)
  {+
+if (!request_muxed_region(sio_cip, 2, DRVNAME))
+    return -EBUSY;
+    outb(0x87, sio_cip);
  outb(0x87, sio_cip);
+    outb(0x87, sio_cip);
+    return 0;
  }
static inline void superio_exit(int sio_cip)
{
    outb(0xaa, sio_cip);
    /* */
}

/* ---------------------------------------------------------------------
@@ -1282,11 +1288,14 @@
 static int __init vt1211_find(int sio_cip, unsigned short *address)
 {
     int err = -ENODEV;
     +int err;
     +int devid;
     -superio_enter(sio_cip);
     +err = superio_enter(sio_cip);
     +if (err)
     +return err;
     +err = -ENODEV;
     devid = force_id ? force_id : superio_inb(sio_cip, SIO_VT1211_DEVID);
     if (devid != SIO_VT1211_ID)
     goto EXIT;
     --- linux-4.15.0.orig/drivers/hwmon/w83627hf.c
     +++ linux-4.15.0/drivers/hwmon/w83627hf.c
     @@ -130,17 +130,23 @@
     outb(ld, sio->sioaddr + 1);
 }

 -static inline void
 +static inline int
 superio_enter(struct w83627hf_sio_data *sio)
 {
    +if (!request_muxed_region(sio->sioaddr, 2, DRVNAME))
    +return -EBUSY;
    +outb(0x87, sio->sioaddr);
    outb(0x87, sio->sioaddr);
    +
    +return 0;
 }

 static inline void
 superio_exit(struct w83627hf_sio_data *sio)
 {
    outb(0xaa, sio->sioaddr);
#define W627_DEVID 0x52
@@ -1278,7 +1284,7 @@
static int __init w83627hf_find(int sioaddr, unsigned short *addr, struct w83627hf_sio_data *sio_data)
{
- int err = -ENODEV;
+ int err;
 u16 val;

 static __initconst char *const names[] = {
@@ -1290,7 +1296,11 @@
sio_data->sioaddr = sioaddr;
- superio_enter(sio_data);
+ err = superio_enter(sio_data);
+ if (err)
+ return err;
+ err = -ENODEV;
 val = force_id ? force_id : superio_inb(sio_data, DEVID);
 switch (val) {
 case W627_DEVID:
@@ -1644,9 +1654,21 @@
 struct w83627hf_sio_data *sio_data = dev_get_platdata(&pdev->dev);
 int res = 0xff, sel;

- superio_enter(sio_data);
+ if (superio_enter(sio_data)) {
+ /*
+ * Some other driver reserved the address space for itself.
+ * We don't want to fail driver instantiation because of that,
+ * so display a warning and keep going.
+ */
+ dev_warn(&pdev->dev,
+ "Can not read VID data: Failed to enable SuperIO access\n");
+ return res;
+ }
+ superio_select(sio_data, W83627HF_LD_GPIO5);

+ res = 0xff;
+ /* Make sure these GPIO pins are enabled */
if (!(superio_inb(sio_data, W83627THF_GPIO5_EN) & (1<<3))) {
dev_dbg(&pdev->dev, "GPIO5 disabled, no VID function\n");

if (superio_enter(sio_data)) {
  /* Some other driver reserved the address space for itself.
   * We don't want to fail driver instantiation because of that,
   * so display a warning and keep going.
   */
  dev_warn(pdev->dev,
    "Can not read VID data: Failed to enable SuperIO access\n");
  return res;
}

superio_select(sio_data, W83627HF_LD_HWM);

/* Make sure these GPIO pins are enabled */
#define SENSOR_ATTR_TEMP(index) {
  SENSOR_ATTR_2(temp##index##_type, S_IRUGO | (index < 4 ? S_IWUSR : 0),
    show_temp_mode, store_temp_mode, NOT_USED, index - 1),
  SENSOR_ATTR_2(temp##index##_input, S_IRUGO, show_temp,
    NULL, TEMP_READ, index - 1),
}

pc = debug_adjust_pc(drvdata);
-dev_emerg(dev, " EDPCSR: [%p] %pS\n", (void *)pc, (void *)pc);
+dev_emerg(dev, " EDPCSR: [%px] %pS\n", (void *)pc, (void *)pc);

if (drvdata->edcidsr_present)
  dev_emerg(dev, " EDCIDSR: %08x\n", drvdata->edcidsr);
  @ @ -680,6 +680,10 @@
    .id= 0x000bbd08,
    .mask= 0x000fffff,
},
+{ /* Debug for Cortex-A73 */
  .id= 0x000bbd09,
+.mask= 0x000fffff,
+},
{ 0, 0 },
);

--- linux-4.15.0.orig/drivers/hwtracing/coresight/coresight-etb10.c
+++ linux-4.15.0/drivers/hwtracing/coresight/coresight-etb10.c
@@ -155,6 +155,10 @@
if (val == CS_MODE_PERF)
    return -EBUSY;
+/* Don't let perf disturb sysFS sessions */
+if (val == CS_MODE_SYSFS && mode == CS_MODE_PERF)
+    return -EBUSY;
+
+/* Nothing to do, the tracer is already enabled. */
if (val == CS_MODE_SYSFS)
    goto out;
@@ -283,9 +287,7 @@
    struct cs_buffers *buf;

    -if (cpu == -1)
-    -cpu = smp_processor_id();
-    -node = cpu_to_node(cpu);
-    +node = (cpu == -1) ? NUMA_NO_NODE : cpu_to_node(cpu);

    buf = kzalloc_node(sizeof(struct cs_buffers), GFP_KERNEL, node);
    if (!buf)
--- linux-4.15.0.orig/drivers/hwtracing/coresight/coresight-etm-perf.c
+++ linux-4.15.0/drivers/hwtracing/coresight/coresight-etm-perf.c
@@ -23,6 +23,7 @@
    #include <linux/mm.h>
    #include <linux/init.h>
    #include <linux/perf_event.h>
+    #include <linux/percpu-defs.h>
    #include <linux/slab.h>
    #include <linux/types.h>
    #include <linux/workqueue.h>
    @ @ -23,6 +23,7 @ @
    struct work_struct work;
    cpumask_t mask;
    void *snk_config;
    -struct list_head **path;
    +struct list_head *__percpu *path;
    ];

    static DEFINE_PER_CPU(struct perf_output_handle, ctx_handle);
static inline struct list_head **
etm_event_cpu_path_ptr(struct etm_event_data *data, int cpu)
{
  return per_cpu_ptr(data->path, cpu);
}

static inline struct list_head *
etm_event_cpu_path(struct etm_event_data *data, int cpu)
{
  return *etm_event_cpu_path_ptr(data, cpu);
}

static void etm_event_read(struct perf_event *event) {}
static int etm_addr_filters_alloc(struct perf_event *event)
{
  if (event_data->snk_config) {
    cpu = cpumask_first(mask);
    sink = coresight_get_sink(event_data->path[cpu]);
    sink = coresight_get_sink(etm_event_cpu_path(event_data, cpu));
    if (sink_ops(sink)->free_buffer)
      sink_ops(sink)->free_buffer(event_data->snk_config);
  }

  for_each_cpu(cpu, mask) {
    if (!((IS_ERR_OR_NULL(event_data->path[cpu]))))
      coresight_release_path(event_data->path[cpu]);
    struct list_head **ppath;
    +ppath = etm_event_cpu_path_ptr(event_data, cpu);
    +if (!((IS_ERR_OR_NULL(*ppath))))
      coresight_release_path(*ppath);
    +*ppath = NULL;
  }

  kfree(event_data->path);
  free_percpu(event_data->path);
  kfree(event_data);
}

static void *alloc_event_data(int cpu)
{
  -int size;

cpumask_t *mask;
struct etm_event_data *event_data;

>Nama -158,7 +174,6 @

/* Make sure nothing disappears under us */
get_online_cpus();
-size = num_online_cpus();

mask = &event_data->mask;
if (cpu != -1)
@@ -175,8 +190,8 @@
  * unused memory when dealing with single CPU trace scenarios is small
  * compared to the cost of searching through an optimized array.
  */
-event_data->path = kcalloc(size,
  - sizeof(struct list_head *), GFP_KERNEL);
+event_data->path = alloc_percpu(struct list_head *);
+
if (!event_data->path) {
  kfree(event_data);
  return NULL;
@@ -192,15 +207,15 @@
schedule_work(&event_data->work);
}

-static void *etm_setup_aux(int event_cpu, void **pages,
  +static void *etm_setup_aux(struct perf_event *event, void **pages,
  int nr_pages, bool overwrite)
  {+
  -int cpu;
  +int cpu = event->cpu;
  cpumask_t *mask;
  struct coresight_device *sink;
  struct etm_event_data *event_data = NULL;

  -event_data = alloc_event_data(event_cpu);
  +event_data = alloc_event_data(cpu);
  if (!event_data)
    return NULL;
  INIT_WORK(&event_data->work, free_event_data);
@@ -224,6 +239,7 @@

  /* Setup the path for each CPU in a trace session */
  for_each_cpu(cpu, mask) {
    +struct list_head *path;
    struct coresight_device *csdev;

  }
csdev = per_cpu(csdev_src, cpu);
@@ -235,9 +251,11 @@
 * list of devices from source to sink that can be
 * referenced later when the path is actually needed.
 */
-event_data->path[cpu] = coresight_build_path(csdev, sink);
-if (IS_ERR(event_data->path[cpu]))
+path = coresight_build_path(csdev, sink);
+if (IS_ERR(path))
goto err;
+
+*etm_event_cpu_path_ptr(event_data, cpu) = path;
}

if (!sink_ops(sink)->alloc_buffer)
@@ -266,6 +284,7 @@
    struct etm_event_data *event_data;
    struct perf_output_handle *handle = this_cpu_ptr(&ctx_handle);
    struct coresight_device *sink, *csdev = per_cpu(csdev_src, cpu);
    +struct list_head *path;

    if (!csdev)
goto fail;
@@ -278,8 +297,9 @@
    if (!event_data)
goto fail;

    +path = etm_event_cpu_path(event_data, cpu);
    /* We need a sink, no need to continue without one */
    -sink = coresight_get_sink(event_data->path[cpu]);
    +sink = coresight_get_sink(path);
    if (WARN_ON_ONCE(!sink || !sink_ops(sink)->set_buffer))
goto fail_end_stop;

    @@ -289,11 +309,13 @@
    goto fail_end_stop;

    /* Nothing will happen without a path */
    -if (coresight_enable_path(event_data->path[cpu], CS_MODE_PERF))
    +if (coresight_enable_path(path, CS_MODE_PERF))
goto fail_end_stop;

    /* Tell the perf core the event is alive */
    @@ -297,11 +317,13 @@

    /* Finally enable the tracer */
    if (source_ops(csdev)->enable(csdev, event, CS_MODE_PERF))
      -goto fail_end_stop;

    /*
+goto fail_disable_path;

out:
return;

+fail_disable_path:
+coresight_disable_path(path);
fail_end_stop:
perf_aux_output_flag(handle, PERF_AUX_FLAG_TRUNCATED);
perf_aux_output_end(handle, 0);
@@ -317,6 +339,7 @@
struct coresight_device *sink, *csdev = per_cpu(csdev_src, cpu);
struct perf_output_handle *handle = this_cpu_ptr(&ctx_handle);
struct etm_event_data *event_data = perf_get_aux(handle);
+struct list_head *path;

if (event->hw.state == PERF_HES_STOPPED)
return;
@@ -324,7 +347,11 @@
if (!csdev)
return;

-sink = coresight_get_sink(event_data->path[cpu]);
+path = etm_event_cpu_path(event_data, cpu);
+if (!path)
+return;
+
+sink = coresight_get_sink(path);
if (!sink)
return;

@@ -355,7 +382,7 @@
}
/* Disabling the path make its elements available to other sessions */
-coresight_disable_path(event_data->path[cpu]);
+coresight_disable_path(path);
}

static int etm_event_add(struct perf_event *event, int mode)
--- linux-4.15.0.orig/drivers/hwtracing/coresight/coresight-etm4x-sysfs.c
+++ linux-4.15.0/drivers/hwtracing/coresight/coresight-etm4x-sysfs.c
@@ -667,10 +667,13 @@
if (kstrtoul(buf, 16, &val))
return -EINVAL;
+/* mask off max threshold before checking min value */

val &= ETM_CYC_THRESHOLD_MASK;
if (val < drvdata->ccitmin)
return -EINVAL;

config->ccctlr = val & ETM_CYC_THRESHOLD_MASK;
return size;
}
static DEVICE_ATTR_RW(cyc_threshold);
@@ -701,14 +704,16 @@
return -EINVAL;
if (!drvdata->nr_addr_cmp)
return -EINVAL;
+/*
- * Bit[7:0] selects which address range comparator is used for
- * branch broadcast control.
- * Bit[8] controls include(1) / exclude(0), bits[0-7] select
- * individual range comparators. If include then at least 1
- * range must be selected.
- */
-if (BMVAL(val, 0, 7) > drvdata->nr_addr_cmp)
+if ((val & BIT(8)) && (BMVAL(val, 0, 7) == 0))
return -EINVAL;
-config->bb_ctrl = val;
+config->bb_ctrl = val & GENMASK(8, 0);
return size;
}
static DEVICE_ATTR_RW(bb_ctrl);
@@ -1341,8 +1346,8 @@
spin_lock(&drvdata->spinlock);
idx = config->seq_idx;
-/* RST, bits[7:0] */
-config->seq_ctrl[idx] = val & 0xFF;
+/* Seq control has two masks B[15:8] F[7:0] */
+config->seq_ctrl[idx] = val & 0xFFFF;
spin_unlock(&drvdata->spinlock);
return size;
}
@@ -1597,7 +1602,7 @@
if (idx % 2 != 0)
/* PAIRINV, bit[21] */
val &= ~BIT(21);
-config->res_ctrl[idx] = val;
+config->res_ctrl[idx] = val & GENMASK(21, 0);
spin_unlock(&drvdata->spinlock);
return size;
}
--- linux-4.15.0.orig/drivers/hwtracing/coresight/coresight-etm4x.c
+++ linux-4.15.0/drivers/hwtracing/coresight/coresight-etm4x.c
@@ -35,6 +35,7 @@
#include <linux/pm_runtime.h>
#include <asm/sections.h>
#include <asm/local.h>
+#include <asm/virt.h>

#include "coresight-etm4x.h"
#include "coresight-etm-perf.h"
@@ -61,7 +62,8 @@
static bool etm4_arch_supported(u8 arch)
{
    switch (arch) {
+/* Mask out the minor version number */
+switch (arch & 0xf0) {
    case ETM_ARCH_V4:
        break;
    default:
@@ -180,6 +182,12 @@
        dev_err(drvdata->dev,
"timeout while waiting for Idle Trace Status\n");
+/*
+ * As recommended by section 4.3.7 ("Synchronization when using the
+ * memory-mapped interface") of ARM IHI 0064D
+ */
+dsb(sy);
+isb();

CS_LOCK(drvdata->base);

@@ -330,8 +338,12 @@
/* EN, bit[0] Trace unit enable bit */
control &= ~0x1;

-/* make sure everything completes before disabling */
-mb();
+/* Make sure everything completes before disabling, as recommended
+ * by section 7.3.77 ("TRCVICTLR, ViewInst Main Control Register,
+ * STATUS") of ARM IHI 0064D
+ */
+dsb(sy);
isb();
writel_relaxed(control, drvdata->base + TRCPRGCTRL);

@@ -612,7 +624,7 @@
 config->vinst_ctrl |= BIT(0);
 }

-static u64 etm4_get_access_type(struct etmv4_config *config)
+static u64 etm4_get_ns_access_type(struct etmv4_config *config)
 {
 u64 access_type = 0;

@@ -623,17 +635,26 @@
 * Bit[13] Exception level 1 - OS
 * Bit[14] Exception level 2 - Hypervisor
 * Bit[15] Never implemented
 - *
- * Always stay away from hypervisor mode.
+ * Stay away from hypervisor mode for non-VHE
 */
  access_type = ETM_EXLEVEL_NS_HYP;
 -
- if (config->mode & ETM_MODE_EXCL_KERN)
-  access_type |= ETM_EXLEVEL_NS_OS;
+ if (!is_kernel_in_hyp_mode()) {
+  /* Stay away from hypervisor mode for non-VHE */
+  access_type = ETM_EXLEVEL_NS_HYP;
+  if (config->mode & ETM_MODE_EXCL_KERN)
+    access_type |= ETM_EXLEVEL_NS_OS;
+ } else if (config->mode & ETM_MODE_EXCL_KERN) {
+  access_type = ETM_EXLEVEL_NS_HYP;
+ }

 if (config->mode & ETM_MODE_EXCL_USER)
  access_type |= ETM_EXLEVEL_NS_APP;

+return access_type;
+}
+
+static u64 etm4_get_access_type(struct etmv4_config *config)
+{
+ u64 access_type = etm4_get_ns_access_type(config);
+}

/*
 * EXLEVEL_S, bits[11:8], don’t trace anything happening
 * in secure state.
 @@ -887,20 +908,10 @@

 addr_acc = config->addr_acc[ETM_DEFAULT_ADDR_COMP];
 /* clear default config */
addr_acc &= ~(ETM_EXLEVEL_NS_APP | ETM_EXLEVEL_NS_OS);
+addr_acc &= ~(ETM_EXLEVEL_NS_APP | ETM_EXLEVEL_NS_OS |
+      ETM_EXLEVEL_NS_HYP);

/*
-  * EXLEVEL_NS, bits[15:12]
-  * The Exception levels are:
-  *  Bit[12] Exception level 0 - Application
-  *  Bit[13] Exception level 1 - OS
-  *  Bit[14] Exception level 2 - Hypervisor
-  *  Bit[15] Never implemented
- */
-if (mode & ETM_MODE_EXCL_KERN)
-addr_acc |= ETM_EXLEVEL_NS_OS;
-else
-addr_acc |= ETM_EXLEVEL_NS_APP;
+addr_acc |= etm4_get_ns_access_type(config);

cfg->addr_acc[ETM_DEFAULT_ADDR_COMP] = addr_acc;
cfg->addr_acc[ETM_DEFAULT_ADDR_COMP + 1] = addr_acc;
@@ -1034,7 +1045,8 @@
}

pm_runtime_put(&adev->dev);
-dev_info(dev, "%s initialized\n", (char *)id->data);
+dev_info(dev, "CPU%d: ETM v%d.%d initialized\n",
+        drvdata->cpu, drvdata->arch >> 4, drvdata->arch & 0xf);

if (boot_enable) {
coresight_enable(drvdata->csdev);
@@ -1052,23 +1064,19 @@
return ret;
}

+#define ETM4x_AMBA_ID(pid)
+{.
+    .id= pid,
+    .mask= 0x000fffff,
+     }
+
static const struct amba_id etm4_ids[] = {
-{
+    /* ETM 4.0 - Cortex-A53 */
+.id= 0x000bb95d,
+.mask= 0x000fffff,
+.data= "ETM 4.0",
-},
-{
+    /* ETM 4.0 - Cortex-A57 */
+.id= 0x000bb95e,
- .mask = 0x000fffff,
- .data = "ETM 4.0",
- },
- { /* ETM 4.0 - A72, Maia, HiSilicon */
  .id = 0x000bb95a,
  .mask = 0x000fffff,
  .data = "ETM 4.0",
  },
- { 0, 0},
+ ETM4x_AMBA_ID(0x000bb95d), /* Cortex-A53 */
+ ETM4x_AMBA_ID(0x000bb95e), /* Cortex-A57 */
+ ETM4x_AMBA_ID(0x000bb95a), /* Cortex-A72 */
+ ETM4x_AMBA_ID(0x000bb959), /* Cortex-A73 */
+ ETM4x_AMBA_ID(0x000bb9da), /* Cortex-A35 */
+ {}.
};

static struct amba_driver etm4x_driver = {
--- linux-4.15.0.orig/drivers/hwtracing/coresight/coresight-tmc-etf.c
+++ linux-4.15.0/drivers/hwtracing/coresight/coresight-tmc-etf.c
@@ -308,9 +308,7 @@
 int node;
 struct cs_buffers *buf;

-if (cpu == -1)
- cpu = smp_processor_id();
- node = cpu_to_node(cpu);
+ node = (cpu == -1) ? NUMA_NO_NODE : cpu_to_node(cpu);

 /* Allocate memory structure for interaction with Perf */
 buf = kzalloc_node(sizeof(struct cs_buffers), GFP_KERNEL, node);
@@ -442,10 +440,10 @@
 case TMC_MEM_INTF_WIDTH_32BITS:
 case TMC_MEM_INTF_WIDTH_64BITS:
 case TMC_MEM_INTF_WIDTH_128BITS:
- mask = GENMASK(31, 5);
- mask = GENMASK(31, 4);
 break;
 case TMC_MEM_INTF_WIDTH_256BITS:
- mask = GENMASK(31, 6);
+ mask = GENMASK(31, 5);
 break;
 }

@@ -476,7 +474,7 @@
 buf_ptr = buf->data_pages[cur] + offset;
 *buf_ptr = readl_relaxed(drvdata->base + TMC_RRD);
if (lost && *barrier) {
+ if (lost && i < CORESIGHT_BARRIER_PKT_SIZE) {
*buf_ptr = *barrier;
barrier++;
}
@@ -589,15 +587,14 @@

spin_lock_irqsave(&drvdata->spinlock, flags);

-/* There is no point in reading a TMC in HW FIFO mode */
- mode = readl_relaxed(drvdata->base + TMC_MODE);
- if (mode != TMC_MODE_CIRCULAR_BUFFER) {
- spin_unlock_irqrestore(&drvdata->spinlock, flags);
- return -EINVAL;
- }
- 
- /* Re-enable the TMC if need be */
+ /* There is no point in reading a TMC in HW FIFO mode */
+ mode = readl_relaxed(drvdata->base + TMC_MODE);
+ if (mode != TMC_MODE_CIRCULAR_BUFFER) {
+ spin_unlock_irqrestore(&drvdata->spinlock, flags);
+ return -EINVAL;
+ }
+ /*
+ * The trace run will continue with the same allocated trace
+ * buffer. As such zero-out the buffer so that we don't end
--- linux-4.15.0.orig/drivers/hwtracing/coresight/coresight-tpiu.c
+++ linux-4.15.0/drivers/hwtracing/coresight/coresight-tpiu.c
@@ -46,8 +46,12 @@
#define TPIU_ITATBCTR0	0xef8
/** register definition **/
+ /* FFSR - 0x300 */
+#define FFSR_FT_STOPPED_BIT	1
/* FFCR - 0x304 */
+#define FFCR_FON_MAN_BIT	6
#define FFCR_FON_MAN	BIT(6)
+#define FFCR_STOP_FI	BIT(12)
/**
 * @base: memory mapped base address for this component.
 @@ -85,10 +89,14 @@
{
 CS_UNLOCK(drvdata->base);

-/* Clear formatter controle reg. */
-writel_relaxed(0x0, drvdata->base + TPIU_FFCR);
/* Clear formatter and stop on flush */
writel_relaxed(FFCR_STOP FI, drvdata->base + TPIU_FFCR);
/* Generate manual flush */
writel_relaxed(FFCR_FON_MAN, drvdata->base + TPIU_FFCR);
writel_relaxed(FFCR_STOP FI | FFCR_FON_MAN, drvdata->base + TPIU_FFCR);
/* Wait for flush to complete */
coresight_timeout(drvdata->base, TPIU_FFCR, FFCR_FON_MAN_BIT, 0);
/* Wait for formatter to stop */
coresight_timeout(drvdata->base, TPIU_FFSR, FFSR_FT_STOPPED_BIT, 1);

CS_LOCK(drvdata->base);
}
--- linux-4.15.0.orig-drivers/hwtracing/coresight/coresight.c
+++ linux-4.15.0/drivers/hwtracing/coresight/coresight.c
@@ -115,7 +115,7 @@
dev_err(&csdev->dev, "couldn’t find inport, parent: %s, child: %s\n",
dev_name(&parent->dev), dev_name(&csdev->dev));

-return 0;
+return -ENODEV;
}

static int coresight_find_link_outport(struct coresight_device *csdev,
@@ -133,19 +133,21 @@
dev_err(&csdev->dev, "couldn’t find outport, parent: %s, child: %s\n",
dev_name(&csdev->dev), dev_name(&child->dev));

-return 0;
+return -ENODEV;
}

static int coresight_enable_sink(struct coresight_device *csdev, u32 mode)
{
    int ret;

-    if (!csdev->enable) {
-        if (sink_ops(csdev)->enable) {
-            ret = sink_ops(csdev)->enable(csdev, mode);
-            if (ret)
-                return ret;
-        }
+    /*
+     * We need to make sure the "new" session is compatible with the
+     * existing "mode" of operation.
+     */
+    if (sink_ops(csdev)->enable) {
+        ret = sink_ops(csdev)->enable(csdev, mode);
+        if (ret)
+return ret;
csdev->enable = true;
}
@@ -186,6 +188,9 @@
else
    refport = 0;

+if (refport < 0)
+    return refport;
+
    if (atomic_inc_return(&csdev->refcnt[refport]) == 1) {
        if (link_ops(csdev)->enable) {
            ret = link_ops(csdev)->enable(csdev, inport, outport);
@@ -344,8 +349,14 @@
        switch (type) {
            case CORESIGHT_DEV_TYPE_SINK:
                ret = coresight_enable_sink(csdev, mode);
+/*
+   * Sink is the first component turned on. If we
+   * failed to enable the sink, there are no components
+   * that need disabling. Disabling the path here
+   * would mean we could disrupt an existing session.
+   */
+    if (ret)
+        goto err;
    /* Sink is the first component turned on. If we
+    failed to enable the sink, there are no components
+    that need disabling. Disabling the path here
+    would mean we could disrupt an existing session.
+    */
    if (ret)
        goto err;
+    goto out;
break;
    case CORESIGHT_DEV_TYPE_SOURCE:
/* sources are enabled from either sysFS or Perf */
--- linux-4.15.0.orig/drivers/hwtracing/intel_th/core.c
+++ linux-4.15.0/drivers/hwtracing/intel_th/core.c
@@ -147,7 +147,8 @@
        th->thdev[i] = NULL;
    }

    -th->num_thdevs = lowest;
+if (lowest >= 0)
+    th->num_thdevs = lowest;
    }

    if (thdrv->attr_group)
@@ -222,6 +223,22 @@
static DEVICE_ATTR_RO(port);

+static void intel_th_trace_prepare(struct intel_th_device *thdev)
+{


```c
+struct intel_th_device *hub = to_intel_th_hub(thdev);
+struct intel_th_driver *hubdrv = to_intel_th_driver(hub->dev.driver);
+
+if (hub->type != INTEL_TH_SWITCH)
+return;
+
+if (thdev->type != INTEL_TH_OUTPUT)
+return;
+
+pm_runtime_get_sync(&thdev->dev);
+hubdrv->prepare(hub, &thdev->output);
+pm_runtime_put(&thdev->dev);
+
+}
+
+static int intel_th_output_activate(struct intel_th_device *thdev)
+
{ }
struct intel_th_driver *thdrv = 
@@ -242,6 +259,7 @@
if (ret)
goto fail_put;

+intel_th_trace_prepare(thdev);
if (thdrv->activate)
ret = thdrv->activate(thdev);
else
@@ -495,7 +513,7 @@
.flags= IORESOURCE_MEM,
},
{ 
-.start= TH_MMIO_SW,
+.start= 1, /* use resource[1] */
.ends= 0,
.flags= IORESOURCE_MEM,
},
@@ -588,6 +606,7 @@
struct intel_th_device *thdev;
struct resource res[3];
unsigned int req = 0;
+bool is64bit = false;
int r, err;
thdev = intel_th_device_alloc(th, subdev->type, subdev->name,
@@ -597,12 +616,18 @@

thdev->drvdata = th->drvdata;
+
+for (r = 0; r < th->num_resources; r++)
+if (th->resource[r].flags & IORESOURCE_MEM_64) {
```
+is64bit = true;
+break;
+
+memcpy(res, subdev->res,
    sizeof(struct resource) * subdev->nres);

for (r = 0; r < subdev->nres; r++) {
    struct resource *devres = th->resource;
    -int bar = TH_MMIO_CONFIG;
    +int bar = 0; /* cut subdevices' MMIO from resource[0] */

    /* Take .end == 0 to mean 'take the whole bar',
     * @ @ -611,6 +636,8 @@
     */
    if (!res[r].end && res[r].flags == IORESOURCE_MEM) {
        bar = res[r].start;
        +if (is64bit)
        +bar *= 2;
        res[r].start = 0;
        res[r].end = resource_size(&devres[bar]) - 1;
    }
    @ @ -627,10 +654,8 @@
}

err = intel_th_device_add_resources(thdev, res, subdev->nres);
-if (err) {
    -put_device(&thdev->dev);
    +if (err)
        goto fail_put_device;
    -}

if (subdev->type == INTEL_TH_OUTPUT) {
    thdev->dev.devt = MKDEV(th->major, th->num_thdevs);
    @ @ -643,10 +668,8 @@
}

err = device_add(&thdev->dev);
-if (err) {
    -put_device(&thdev->dev);
    +if (err)
        goto fail_free_res;
    -}

/* need switch driver to be loaded to enumerate the rest */
if (subdev->type == INTEL_TH_SWITCH && !req) {
    @ @ -935,13 +958,28 @@
int intel_th_set_output(struct intel_th_device *thdev, unsigned int master)
{
    struct intel_th_device *hub = to_intel_th_device(thdev->dev.parent);
    struct intel_th_device *hub = to_intel_th_hub(thdev);
    struct intel_th_driver *hubdrv = to_intel_th_driver(hub->dev.driver);
    +int ret;
    +
    +/
    + * hub is instantiated together with the source device that
    + * calls here, so guaranteed to be present.
    + */
    +hubdrv = to_intel_th_driver(hub->dev.driver);
    +if (!hubdrv || !try_module_get(hubdrv->driver.owner))
        +return -EINVAL;
    +if (!hubdrv->set_output) {
        +ret = -ENOTSUPP;
        +goto out;
        +}
    +ret = hubdrv->set_output(hub, master);
    -return hubdrv->set_output(hub, master);
    +}
    +out:
    +module_put(hubdrv->driver.owner);
    +return ret;
}
EXPORT_SYMBOL_GPL(intel_th_set_output);

--- linux-4.15.0.orig/drivers/hwtracing/intel_th/gth.c
+++ linux-4.15.0/drivers/hwtracing/intel_th/gth.c
@@ -485,7 +485,7 @@
             output->active = false;
         for_each_set_bit(master, gth->output[output->port].master,
             - TH_CONFIGURABLE_MASTERS) {
         + TH_CONFIGURABLE_MASTERS + 1) {
             gth_master_set(gth, master, -1);
         }
         spin_unlock(&gth->gth_lock);
@@ -521,6 +521,21 @@
             iowrite32(reg, gth->base + REG_TSCU_TSUCTRL);
         }
         +static void intel_th_gth_prepare(struct intel_th_device *thdev,
struct intel_th_output *output)
+
+struct gth_device *gth = dev_get_drvdata(&thdev->dev);
+int count;
+
+/*
+ * Wait until the output port is in reset before we start
+ * programming it.
+ */
+for (count = GTH_PLE_WAITLOOP_DEPTH;
+     count && !(gth_output_get(gth, output->port) & BIT(5)); count--)
+cpu_relax();
+
+/*
* intel_th_gth_enable() - enable tracing to an output device
* @thdev: GTH device
@@ -615,6 +630,7 @@
{
struct gth_device *gth = dev_get_drvdata(&thdev->dev);
int port = othdev->output.port;
+int master;

if (thdev->host_mode)
    return;
@@ -623,6 +639,9 @@
    othdev->output.port = -1;
    othdev->output.active = false;
    gth->output[port].output = NULL;
+for (master = 0; master < TH_CONFIGURABLE_MASTERS + 1; master++)
+    if (gth->master[master] == port)
+        gth->master[master] = -1;
    spin_unlock(&gth->gth_lock);
}

@@ -738,6 +757,7 @@
    .assign= intel_th_gth_assign,
    .unassign= intel_th_gth_unassign,
    .set_output= intel_th_gth_set_output,
+    .prepare= intel_th_gth_prepare,
    .enable= intel_th_gth_enable,
    .disable= intel_th_gth_disable,
    .driver= {
--- linux-4.15.0.orig/drivers/hwtracing/intel_th/intel_th.h
+++ linux-4.15.0/drivers/hwtracing/intel_th/intel_th.h
@@ -140,6 +140,7 @@
* @remove: remove method
* @assign: match a given output type device against available outputs
* @unassign: deassociate an output type device from an output port
+ * @prepare: prepare output port for tracing
* @enable: enable tracing for a given output device
* @disable: disable tracing for a given output device
* @irq: interrupt callback
@@ -161,6 +162,8 @@
   struct intel_th_device *othdev);
void(*unassign)(struct intel_th_device *thdev,
   struct intel_th_device *othdev);
+void(*prepare)(struct intel_th_device *thdev,
+   struct intel_th_output *output);
void(*enable)(struct intel_th_device *thdev,
   struct intel_th_output *output);
void(*disable)(struct intel_th_device *thdev,
--- linux-4.15.0.orig/drivers/hwtracing/intel_th/msu.c
+++ linux-4.15.0/drivers/hwtracing/intel_th/msu.c
@@ -92,6 +92,7 @@
   * @reg_base: register window base address
   * @thdev: intel_th_device pointer
   * @win_list: list of windows in multiblock mode
+ * @single_sgt: single mode buffer
   * @nr_pages: total number of pages allocated for this buffer
   * @single_sz: amount of data in single mode
   * @single_wrap: single mode wrap occurred
   @@ -112,6 +113,7 @@
struct intel_th_device *thdev;

struct list_head win_list;
+struct sg_tablesingle_sgt;
unsigned long nr_pages;
unsigned long single_sz;
unsigned int single_wrap : 1;
@@ -497,7 +499,7 @@
lockdep_assert_held(&msc->buf_mutex);

if (msc->mode > MSC_MODE_MULTI)
   -return -ENOTSUPP;
+return -EINVAL;

if (msc->mode == MSC_MODE_MULTI)
   msc_buffer_clear_hw_header(msc);
@@ -625,22 +627,45 @@
   */
static int msc_buffer_contig_alloc(struct msc *msc, unsigned long size)
{
   +unsigned long nr_pages = size >> PAGE_SHIFT;
   unsigned int order = get_order(size);
   struct page *page:
```c
int ret;

if (!size)
    return 0;

- page = alloc_pages(GFP_KERNEL | __GFP_ZERO, order);
+ ret = sg_alloc_table(&msc->single_sgt, 1, GFP_KERNEL);
+ if (ret)
    goto err_out;

- msc->nr_pages = size >> PAGE_SHIFT;
+ sg_set_buf(msc->single_sgt.sgl, page_address(page), size);
+ ret = dma_map_sg(msc_dev(msc)->parent->parent, msc->single_sgt.sgl, 1,
    + DMA_FROM_DEVICE);
+ if (ret < 0)
    goto err_free_pages;

+ msc->base_addr = sg_dma_address(msc->single_sgt.sgl);

return 0;
+ err_free_pages:
+ __free_pages(page, order);
+ err_free_sgt:
+ sg_free_table(&msc->single_sgt);
+ err_out:
+ return ret;
}

/**
 @@ -651,6 +676,10 @@
 |
 unsigned long off;
 +dma_unmap_sg(msc_dev(msc)->parent->parent, msc->single_sgt.sgl,
```
+ 1, DMA_FROM_DEVICE);
+ sg_free_table(&msc->single_sgt);
+
+ for (off = 0; off < msc->nr_pages << PAGE_SHIFT; off += PAGE_SIZE) {
  struct page *page = virt_to_page(msc->base + off);

  @ @ -741,8 +770,8 @ @
  /* Reset the page to write-back before releasing */
  set_memory_wb((unsigned long)win->block[i].bdesc, 1);
  #endif
  -dma_free_coherent(msc_dev(msc), size, win->block[i].bdesc,
  -  win->block[i].addr);
  +dma_free_coherent(msc_dev(msc)->parent->parent, size,
  +  win->block[i].bdesc, win->block[i].addr);
  }
  kfree(win);

  @ @ -777,7 +806,7 @ @
  /* Reset the page to write-back before releasing */
  set_memory_wb((unsigned long)win->block[i].bdesc, 1);
  #endif
  -dma_free_coherent(msc_dev(win->msc), PAGE_SIZE,
  -  win->block[i].bdesc, win->block[i].addr);
  +dma_free_coherent(msc_dev(win->msc)->parent->parent, PAGE_SIZE,
  +  win->block[i].bdesc, win->block[i].addr);
  }

  @ @ -921,7 +950,7 @ @
} else if (msc->mode == MSC_MODE_MULTI) {
  ret = msc_buffer_multi_alloc(msc, nr_pages, nrWins);
  } else {
    -ret = -ENOTSUPP;
    +ret = -EINVAL;
  }

  put_count:
  @ @ -1431,7 +1460,8 @ @
  if (!end)
    break;
-len -= end - p;
+/* consume the number and the following comma, hence +1 */
+len -= end - p + 1;
+p = end + 1;
} while (len);

--- linux-4.15.0.orig/drivers/hwtracing/intel_th/pci.c
+++ linux-4.15.0/drivers/hwtracing/intel_th/pci.c
@@ -149,6 +149,11 @@
 .driver_data = (kernel_ulong_t)0,
 },
+/* Lewisburg PCH */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0xa226),
+.driver_data = (kernel_ulong_t)0,
+},
+{
+/* Gemini Lake */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x318e),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+},
+/* Ice Lake PCH */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x34a6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+},
+/* Comet Lake */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x02a6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+},
+/* Comet Lake PCH */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x06a6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+},
+/* Comet Lake PCH-V */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0xa3a6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+},
+/* Ice Lake NNPI */
+PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x45c5),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Ice Lake CPU */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x8a29),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Tiger Lake CPU */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x9a33),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Tiger Lake PCH */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0xa0a6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Tiger Lake PCH-H */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x43a6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Jasper Lake PCH */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x4da6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Jasper Lake CPU */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x4e29),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Elkhart Lake CPU */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x4529),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Elkhart Lake */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x4b26),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Alder Lake-P */
+\PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x51a6),
+.driver_data = (kernel_ulong_t)&intel_th_2x,
+\},
+\{" Emmitsburg PCH */

---

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PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x1bcc),
+ .driver_data = (kernel_ulong_t)&intel_th_2x,
+ },
+ {
+ /* Alder Lake-M */
+ PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x54a6),
+ .driver_data = (kernel_ulong_t)&intel_th_2x,
+ },
+ {
+ /* Rocket Lake CPU */
+ PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x4c19),
+ .driver_data = (kernel_ulong_t)&intel_th_2x,
+ },
+ [ 0 ],
+ ];

--- linux-4.15.0.orig/drivers/hwtracing/intel_th/sth.c
+++ linux-4.15.0/drivers/hwtracing/intel_th/sth.c
@@ -165,9 +165,7 @@
{
    struct sth_device *sth = container_of(stm_data, struct sth_device, stm);

-intel_th_set_output(to_intel_th_device(sth->dev), master);
-
-return 0;
+return intel_th_set_output(to_intel_th_device(sth->dev), master);
}

static int intel_th_sw_init(struct sth_device *sth)
--- linux-4.15.0.orig/drivers/hwtracing/stm/core.c
+++ linux-4.15.0/drivers/hwtracing/stm/core.c
@@ -27,6 +27,7 @@
 #include <linux/stm.h>
 #include <linux/mm.h>
 #include <linux/vmalloc.h>
+#include "stm.h"

 #include <uapi/linux/stm.h>
 @@ -225,8 +226,8 @@
     bitmap_release_region(&master->chan_map[0], output->channel,
         ilog2(output->nr_chans));

-    output->nr_chans = 0;
-master->nr_free += output->nr_chans;
+    output->nr_chans = 0;
 }
/*
 * @ @ -251.6 +252.9 @@
 * @ @ -255.7 +561.7 @@
 *
 * struct stm_device *stm = stmf->stm;
 * struct stp_policy_id *id;
 * int ret = -EINVAL;
 * int ret = -EINVAL, wlimit = 1;
 * u32 size;
 *
 * if (stm->output.nr_chans)
 * @ @ -585.8 +589.10 @@
 * if (id->__reserved_0 || id->__reserved_1)
 * goto err_free;
 *
 * -if (id->width < 1 ||
 * - id->width > PAGE_SIZE / stm->data->sw_mmiosz)
 * +if (stm->data->sw_mmiosz)  
 * +wlimit = PAGE_SIZE / stm->data->sw_mmiosz;
 * +
 * +if (id->width < 1 || id->width > wlimit)
 * goto err_free;
 *
 * ret = stm_file_assign(stmf, id->id, id->width);
 * @ @ -682.7 +688.7 @@
 * }
 * struct stm_device *stm = to_stm_device(dev);
 *
 * -kfree(stm);
 * +vfree(stm);
 * }
 *
 * int stm_register_device(struct device *parent, struct stm_data *stm_data,
 * @ @ -699.7 +705.7 @@
 * return -EINVAL;
 *
 * nmasters = stm_data->sw_end - stm_data->sw_start + 1;
 * -stm = kzalloc(sizeof(*stm) + nmasters * sizeof(void *), GFP_KERNEL);
 * +stm = vzalloc(sizeof(*stm) + nmasters * sizeof(void *));
 */
if (!stm)
return -ENOMEM;

@@ -752,7 +758,7 @@
/* matches device_initialize() above */
put_device(&stm->dev);
err_free:
-kfree(stm);
+vfree(stm);

return err;
}
@@ -1101,7 +1107,6 @@
err:
put_device(&src->dev);
-kfree(src);

return err;
}
--- linux-4.15.0.orig/drivers/hwtracing/stm/heartbeat.c
+++ linux-4.15.0/drivers/hwtracing/stm/heartbeat.c
@@ -72,7 +72,7 @@
static int stm_heartbeat_init(void)
{
-int i, ret = -ENOMEM;
+int i, ret;

if (nr_devs < 0 || nr_devs > STM_HEARTBEAT_MAX)
return -EINVAL;
@@ -80,8 +80,10 @@
for (i = 0; i < nr_devs; i++) {
stm_heartbeat[i].data.name =
kasprintf(GFP_KERNEL, "heartbeat.%d", i);
-if (!stm_heartbeat[i].data.name)
+if (!stm_heartbeat[i].data.name) {
+ ret = -ENOMEM;
goto fail_unregister;
+}

stm_heartbeat[i].data.nr_chans = 1;
stm_heartbeat[i].data.link= stm_heartbeat_link;
--- linux-4.15.0.orig/drivers/i2c/algos/i2c-algo-pca.c
+++ linux-4.15.0/drivers/i2c/algos/i2c-algo-pca.c
@@ -50,8 +50,22 @@
pca_outw(adap, I2C_PCA_INDPTR, I2C_PCA_IPRESET);
pca_outw(adap, I2C_PCA_IND, 0xA5);
pca_outw(adap, I2C_PCA_IND, 0x5A);
+
+/*
+ * After a reset we need to re-apply any configuration
+ * (calculated in pca_init) to get the bus in a working state.
+ */
+pca_outw(adap, I2C_PCA_INDPTR, I2C_PCA_IMODE);
+pca_outw(adap, I2C_PCA_IND, adap->bus_settings.mode);
+pca_outw(adap, I2C_PCA_INDPTR, I2C_PCA_ISCLL);
+pca_outw(adap, I2C_PCA_IND, adap->bus_settings.tlow);
+pca_outw(adap, I2C_PCA_INDPTR, I2C_PCA_ISCLH);
+pca_outw(adap, I2C_PCA_IND, adap->bus_settings.thi);
+
+
+pca_set_con(adap, I2C_PCA_CONstrtotime);
} else {
adap->reset_chip(adap->data);
+pca_set_con(adap, I2C_PCA_CONstrtotime | adap->bus_settings.clock_freq);
}
}

@@ -326,7 +340,8 @@
DEB2("BUS ERROR - SDA Stuck low\n");
pca_reset(adap);
goto out;
-case 0x90: /* Bus error - SCL stuck low */
+case 0x78: /* Bus error - SCL stuck low (PCA9665) */
+case 0x90: /* Bus error - SCL stuck low (PCA9564) */
DEB2("BUS ERROR - SCL Stuck low\n");
pca_reset(adap);
goto out;
@@ -434,13 +449,14 @@
" Use the nominal frequency.\n", adap->name);
}

-pca_reset(pca_data);
-
clock = pca_clock(pca_data);
printk(KERN_INFO "%s: Clock frequency is %dkHz\n", 
    adap->name, freqs[clock]);

-pca_set_con(pca_data, I2C_PCA_CONstrtotime | clock);
+/* Store settings as these will be needed when the PCA chip is reset */
+pca_data->bus_settings.clock_freq = clock;
+
+pca_reset(pca_data);
} else {
    int clock;
    int mode;
@@ -507,19 +523,15 @@
    thi = tlow * min_thi / min_tlow;
 }

+/* Store settings as these will be needed when the PCA chip is reset */
+pca_data->bus_settings.mode = mode;
+pca_data->bus_settings.tlow = tlow;
+pca_data->bus_settings.thi = thi;
+
pca_reset(pca_data);

printk(KERN_INFO
    "%s: Clock frequency is %dHz\n", adap->name, clock * 100);
-
-pca_outw(pca_data, I2C_PCA_INDPTR, I2C_PCA_IMODE);
-pca_outw(pca_data, I2C_PCA_IND, mode);
-pca_outw(pca_data, I2C_PCA_INDPTR, I2C_PCA_ISCLL);
-pca_outw(pca_data, I2C_PCA_IND, tlow);
-pca_outw(pca_data, I2C_PCA_INDPTR, I2C_PCA_ISCLH);
-pca_outw(pca_data, I2C_PCA_IND, thi);
-
-pca_set_con(pca_data, I2C_PCA_CON_ENSIO);
} 
udelay(500); /* 500 us for oscillator to stabilise */

--- linux-4.15.0.orig/drivers/i2c/busses/Kconfig
+++ linux-4.15.0/drivers/i2c/busses/Kconfig
@@ -77,6 +77,16 @@
 This driver can also be built as a module. If so, the module
 will be called i2c-amd8111.

+config I2C_AMD_MP2
+tristate "AMD MP2 PCIe"
+depends on PCI && ACPI
+help
+  If you say yes to this option, support will be included for the AMD
+  MP2 PCIe I2C adapter.
+
+  This driver can also be built as modules. If so, the modules will
+  be called i2c-amd-mp2-pci and i2c-amd-mp2-plat.
+
+config I2C_HIX5HD2
tristate "Hix5hd2 high-speed I2C driver"
depends on ARCH_HISI || ARCH_HIX5HD2 || COMPILE_TEST
@@ -132,6 +142,7 @@
 Cannon Lake-H (PCH)
 Cannon Lake-LP (PCH)
 Cedar Fork (PCH)
+ Comet Lake (PCH)

This driver can also be built as a module. If so, the module will be called i2c-i801.
@@ -434,12 +445,13 @@
If you do not need KONA I2C interface, say N.

config I2C_BRCMSTB
-tristate "BRCM Settop I2C controller"
+tristate "BRCM Settop/DSL I2C controller"
+-depends on ARCH_BRCMSTB || BMIPS_GENERIC || COMPILE_TEST
+tristate "BRCM Settop/DSL I2C controller"
+depends on ARCH_BRCMSTB || BMIPS_GENERIC || ARCH_BCM_63XX || \
+ COMPILE_TEST
default y
help
  If you say yes to this option, support will be included for the
  I2C interface on the Broadcom Settop SoCs.
  + I2C interface on the Broadcom Settop/DSL SoCs.

  If you do not need I2C interface, say N.
@@ -764,7 +776,7 @@

config I2C_OMAP
tristate "OMAP I2C adapter"
-depends on ARCH_OMAP
+depends on ARCH_OMAP || ARCH_K3
default y if MACH_OMAP_H3 || MACH_OMAP_OSK
help
  If you say yes to this option, support will be included for the
@@ -838,6 +850,16 @@
  is necessary for systems where the PXA may be a target on the
  I2C bus.
+config I2C_QCOM_CCI
+tristate "Qualcomm Camera Control Interface"
+depends on ARCH_QCOM
+help
  + If you say yes to this option, support will be included for the
  + built-in camera control interface on the Qualcomm SoCs.
  +
  + This driver can also be built as a module. If so, the module
  + will be called i2c-qcom-cci.
+
+config I2C_QUP
tristate "Qualcomm QUP based I2C controller"
depends on ARCH_QCOM
@@ -1099,6 +1121,7 @@
depends on HAS_DMA
depends on ARCH_RENESAS || COMPILE_TEST
select I2C_SLAVE
+select RESET_CONTROLLER if ARCH_RCAR_GEN3
help

If you say yes to this option, support will be included for the R-Car I2C controller.
--- linux-4.15.0.orig/drivers/i2c/busses/Makefile
+++ linux-4.15.0/drivers/i2c/busses/Makefile
@@ -32,6 +32,7 @@
# Embedded system I2C/SMBus host controller drivers
obj-$(CONFIG_I2C_ALTERA)+= i2c-altera.o
+obj-$(CONFIG_I2C_AMD_MP2)+= i2c-amd-mp2-pci.o i2c-amd-mp2-plat.o
obj-$(CONFIG_I2C_ASPPEED)+= i2c-aspeed.o
obj-$(CONFIG_I2C_AT91)+= i2c-at91.o
obj-$(CONFIG_I2C_AU1550)+= i2c-au1550.o
@@ -83,6 +85,7 @@
static struct i2c_adapter ioc_ops = {
    .nr= 0,
    .name= "ioc",
@@ -97,6 +98,7 @@
struct altr_i2c_dev {
    void __iomem *base;
    @ @ -97,6 +98,7 @@
    u32 isr_mask;
    u32 isr_mask;
spinlock_t lock;/* IRQ synchronization */
+struct mutex isr_mutex;
};

static void
@@ -182,7 +184,7 @@
/* SCL Low Time */
writel(t_low, idev->base + ALTR_I2C_SCL_LOW);
/* SDA Hold Time, 300ns */
-writel(div_u64(300 * clk_mhz, 1000), idev->base + ALTR_I2C_SDA_HOLD);
+writel(3 * clk_mhz / 10, idev->base + ALTR_I2C_SDA_HOLD);

/* Mask all master interrupt bits */
altr_i2c_int_enable(idev, ALTR_I2C_ALL_IRQ, false);
@@ -256,10 +258,11 @@
struct altr_i2c_dev *idev = _dev;
 u32 status = idev->isr_status;
+
+mutex_lock(&idev->isr_mutex);
+if (!idev->msg) {
+    dev_warn(idev->dev, "unexpected interrupt\n");
+    altr_i2c_int_clear(idev, ALTR_I2C_ALL_IRQ);
+    return IRQ_HANDLED;
+    goto out;
+}
+read = (idev->msg->flags & I2C_M_RD) != 0;
+
 @@ -312,6 +315,8 @@
complete(&idev->msg_complete);
 dev_dbg(idev->dev, "Message Complete\n");
+out:
+mutex_unlock(&idev->isr_mutex);

 return IRQ_HANDLED;
 }
@@ -323,6 +328,7 @@
u32 value;
u8 addr = i2c_8bit_addr_from_msg(msg);
+
+mutex_lock(&idev->isr_mutex);
+idev->msg = msg;
+idev->msg_len = msg->len;
+idev->buf = msg->buf;
+altr_i2c_int_enable(idev, imask, true);
+altr_i2c_fill_rx_fifo(idev);
+}
mutex_unlock(&idev->isr_mutex);

time_left = wait_for_completion_timeout(&idev->msg_complete, ALTR_I2C_XFER_TIMEOUT);
@@ -395,7 +402,6 @@
struct altr_i2c_dev *idev = NULL;
struct resource *res;
int irq, ret;
- u32 val;

idev = devm_kzalloc(&pdev->dev, sizeof(*idev), GFP_KERNEL);
if (!idev)
@@ -421,18 +427,19 @@
idev->dev = &pdev->dev;
init_completion(&idev->msg_complete);
spin_lock_init(&idev->lock);
+ mutex_init(&idev->isr_mutex);

-val = device_property_read_u32(idev->dev, "fifo-size",
+ret = device_property_read_u32(idev->dev, "fifo-size",
     &idev->fifo_size);
-if (val) {
+if (ret) {
    dev_err(&pdev->dev, "FIFO size set to default of %d\n",
        ALTR_I2C_DFLT_FIFO_SZ);
    idev->fifo_size = ALTR_I2C_DFLT_FIFO_SZ;
}

-val = device_property_read_u32(idev->dev, "clock-frequency",
+ret = device_property_read_u32(idev->dev, "clock-frequency",
     &idev->bus_clk_rate);
-if (val) {
+if (ret) {
    dev_err(&pdev->dev, "Default to 100kHz\n");
    idev->bus_clk_rate = 100000; /* default clock rate */
}
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-amd-mp2-pci.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-amd-mp2-pci.c
@@ -0,0 +1,483 @@
+// SPDX-License-Identifier: GPL-2.0 OR BSD-3-Clause
+/*
+ * AMD MP2 PCIe communication driver
+ *
+ * Authors: Shyam Sundar S K <Shyam-sundar.S-k@amd.com>
+ *          Elie Morisse <syniurge@gmail.com>
+ */
+#include <linux/dma-mapping.h>
```c
#include <linux/interrupt.h>
#include <linux/module.h>
#include <linux/pci.h>
#include <linux/slab.h>

#include "i2c-amd-mp2.h"

#include <linux/io-64-nonatomic-lo-hi.h>

static void amd_mp2_c2p_mutex_lock(struct amd_i2c_common *i2c_common)
{
    struct amd_mp2_dev *privdata = i2c_common->mp2_dev;

    /* there is only one data mailbox for two i2c adapters */
    mutex_lock(&privdata->c2p_lock);
    privdata->c2p_lock_busid = i2c_common->bus_id;
}

static void amd_mp2_c2p_mutex_unlock(struct amd_i2c_common *i2c_common)
{
    struct amd_mp2_dev *privdata = i2c_common->mp2_dev;

    if (unlikely(privdata->c2p_lock_busid != i2c_common->bus_id)) {
        dev_warn(ndev_dev(privdata),
            "bus %d attempting to unlock C2P locked by bus %d\n",
            i2c_common->bus_id, privdata->c2p_lock_busid);
        return;
    }

    mutex_unlock(&privdata->c2p_lock);
}

static int amd_mp2_c2p_cmd(struct amd_i2c_common *i2c_common,
    union i2c_cmd_base i2c_cmd_base)
{
    struct amd_mp2_dev *privdata = i2c_common->mp2_dev;
    void __iomem *reg;

    __iomem *reg = privdata->mmio + ((i2c_cmd_base.s.bus_id == 1) ?
        AMD_C2P_MSG1 : AMD_C2P_MSG0);
    writel(i2c_cmd_base.ul, reg);
    return 0;
}

int amd_mp2_bus_enable_set(struct amd_i2c_common *i2c_common, bool enable)
```
+
+struct amd_mp2_dev *privdata = i2c_common->mp2_dev;
+union i2c_cmd_base i2c_cmd_base;
+
+dev_dbg(ndev_dev(privdata), "%s id: %d\n", __func__,
+i2c_common->bus_id);
+
+i2c_cmd_base.ul = 0;
+i2c_cmd_base.s.i2c_cmd = enable ? i2c_enable : i2c_disable;
+i2c_cmd_base.s.bus_id = i2c_common->bus_id;
+i2c_cmd_base.s.i2c_speed = i2c_common->i2c_speed;
+
+amd_mp2_c2p_mutex_lock(i2c_common);
+
+return amd_mp2_cmd(i2c_common, i2c_cmd_base);
+
+EXPORT_SYMBOL_GPL(amd_mp2_bus_enable_set);
+
+static void amd_mp2_cmd_rw_fill(struct amd_i2c_common *i2c_common,
+union i2c_cmd_base *i2c_cmd_base,
+enum i2c_cmd reqcmd)
+
+
+int amd_mp2_rw(struct amd_i2c_common *i2c_common, enum i2c_cmd reqcmd)
+
+{
+i2c_cmd_base->s.i2c_cmd = reqcmd;
+i2c_cmd_base->s.bus_id = i2c_common->bus_id;
+i2c_cmd_base->s.i2c_speed = i2c_common->i2c_speed;
+i2c_cmd_base->s.slave_addr = i2c_common->msg->addr;
+i2c_cmd_base->s.length = i2c_common->msg->len;
+
+
+int amd_mp2_rw(struct amd_i2c_common *i2c_common, enum i2c_cmd reqcmd)
+
+{
+struct amd_mp2_dev *privdata = i2c_common->mp2_dev;
+union i2c_cmd_base i2c_cmd_base;
+
+amd_mp2_cmd_rw_fill(i2c_common, &i2c_cmd_base, reqcmd);
+amd_mp2_c2p_mutex_lock(i2c_common);
+
+if (i2c_common->msg->len <= 32) {
+i2c_cmd_base.s.mem_type = use_c2pmsg;
+if (reqcmd == i2c_write)
+memcpy_toio(privdata->mmio + AMD_C2P_MSG2,
+  i2c_common->msg->buf,
+  i2c_common->msg->len);
+} else {
+i2c_cmd_base.s.mem_type = use_dram;
+writeq((u64)i2c_common->dma_addr,
+  privdata->mmio + AMD_C2P_MSG2);
+}
+return amd_mp2_cmd(i2c_common, i2c_cmd_base);
+
+EXPORT_SYMBOL_GPL(amd_mp2_rw);
+
+static void amd_mp2_pci_check_rw_event(struct amd_i2c_common *i2c_common)
+{
+    struct amd_mp2_dev *privdata = i2c_common->mp2_dev;
+    int len = i2c_common->eventval.r.length;
+    u32 slave_addr = i2c_common->eventval.r.slave_addr;
+    bool err = false;
+    
+    if (unlikely(len != i2c_common->msg->len)) {
+        dev_err(ndev_dev(privdata),
+            "length %d in event doesn't match buffer length %d!\n",
+            len, i2c_common->msg->len);
+        err = true;
+    }
+    
+    if (unlikely(slave_addr != i2c_common->msg->addr)) {
+        dev_err(ndev_dev(privdata),
+            "unexpected slave address %x (expected: %x)!\n",
+            slave_addr, i2c_common->msg->addr);
+        err = true;
+    }
+    
+    if (!err)
+        i2c_common->cmd_success = true;
+    }
+
+static void __amd_mp2_process_event(struct amd_i2c_common *i2c_common)
+{
+    struct amd_mp2_dev *privdata = i2c_common->mp2_dev;
+    enum status_type sts = i2c_common->eventval.r.status;
+    enum response_type res = i2c_common->eventval.r.response;
+    int len = i2c_common->eventval.r.length;
+    
+    if (res != command_success) {
+        if (res != command_failed)
+            dev_err(ndev_dev(privdata), "invalid response to i2c command!\n");
+        return;
+    }
+    
+    switch (i2c_common->reqcmd) {
+    case i2c_read:
+        if (sts == i2c_readcomplete_event) {
+            amd_mp2_pci_check_rw_event(i2c_common);
+        if (len <= 32)
memcpy_fromio(i2c_common->msg->buf, privdata->mmio + AMD_C2P_MSG2, len);
} else if (sts != i2c_readfail_event) {
    dev_err(ndev_dev(privdata),
    "invalid i2c status after read (%d)!n", sts);
    break;
} else if (sts != i2c_writefail_event)
    dev_err(ndev_dev(privdata),
    "invalid i2c status after write (%d)!n", sts);
    break;
} else if (sts == i2c_writecomplete_event)
    amd_mp2_pci_check_rw_event(i2c_common);
    else if (sts != i2c_writeenableFailed)
    dev_err(ndev_dev(privdata),
    "invalid i2c status after bus enable (%d)!n",
    sts);
    break;
} else if (sts != i2c_busenable_failed)
    dev_err(ndev_dev(privdata),
    "invalid i2c status after bus enable (%d)!n",
    sts);
    break;
} else if (sts != i2c_busdisable_failed)
    dev_err(ndev_dev(privdata),
    "invalid i2c status after bus disable (%d)!n",
    sts);
    break;
} default:
    break;
} else if (unlikely(i2c_common->reqcmd == i2c_none)) {
    dev_warn(ndev_dev(privdata),
    "received msg but no cmd was sent (bus = %d)!n",
    i2c_common->bus_id);
    return;
} else
    amd_mp2_process_event(i2c_common);
+ i2c_common->reqcmd = i2c_none;
+ amd_mp2_c2p_mutex_unlock(i2c_common);
+}
+EXPORT_SYMBOL_GPL(amd_mp2_process_event);
+
+static irqreturn_t amd_mp2_irq_isr(int irq, void *dev)
+{
+struct amd_mp2_dev *privdata = dev;
+struct amd_i2c_common *i2c_common;
+u32 val;
+unsigned int bus_id;
+void __iomem *reg;
+enum irqreturn ret = IRQ_NONE;
+
+for (bus_id = 0; bus_id < 2; bus_id++) {
+i2c_common = privdata->busses[bus_id];
+if (!i2c_common)
+continue;
+
+reg = privdata->mmio + ((bus_id == 0) ?
+AMD_P2C_MSG1 : AMD_P2C_MSG2);
+val = readl(reg);
+if (val != 0) {
+writel(0, reg);
+writel(0, privdata->mmio + AMD_P2C_MSG_INTEN);
+i2c_common->eventval.ul = val;
+i2c_common->cmd_completion(i2c_common);
+
+ret = IRQ_HANDLED;
+}
+}
+
+if (ret != IRQ_HANDLED) {
+val = readl(privdata->mmio + AMD_P2C_MSG_INTEN);
+if (val != 0) {
+writel(0, privdata->mmio + AMD_P2C_MSG_INTEN);
+i2c_common->eventval.ul = val;
+i2c_common->cmd_completion(i2c_common);
+
+ret = IRQ_HANDLED;
+}
+}
+
+if (ret != IRQ_HANDLED) {
+val = readl(privdata->mmio + AMD_P2C_MSG_INTEN);
+if (val != 0) {
+writel(0, privdata->mmio + AMD_P2C_MSG_INTEN);
+dev_warn(ndev_dev(privdata),
+ "received irq without message\n");
+ret = IRQ_HANDLED;
+}
+}
+
+return ret;
+
+
+void amd_mp2_rwlock_timeout(struct amd_i2c_common *i2c_common)
+{
+i2c_common->reqcmd = i2c_none;
+amd_mp2_c2p_mutex_unlock(i2c_common);
+
+EXPORT_SYMBOL_GPL(amd_mp2_rwlock_timeout);
+
+int amd_mp2_register_cb(struct amd_i2c_common *i2c_common)
+{
+struct amd_mp2_dev *privdata = i2c_common->mp2_dev;
+
+if (i2c_common->bus_id > 1)
+    return -EINVAL;
+
+if (privdata->busses[i2c_common->bus_id]) {
+    dev_err(ndev_dev(privdata),
+        "Bus %d already taken\n", i2c_common->bus_id);
+    return -EINVAL;
+}
+
+privdata->busses[i2c_common->bus_id] = i2c_common;
+
+return 0;
+
+EXPORT_SYMBOL_GPL(amd_mp2_register_cb);
+
+int amd_mp2_unregister_cb(struct amd_i2c_common *i2c_common)
+{
+
+privdata->busses[i2c_common->bus_id] = NULL;
+
+return 0;
+
+EXPORT_SYMBOL_GPL(amd_mp2_unregister_cb);
+
+static void amd_mp2_clear_reg(struct amd_mp2_dev *privdata)
+{
+int reg;
+
+for (reg = AMD_C2P_MSG0; reg <= AMD_C2P_MSG9; reg += 4)
+    writel(0, privdata->mmio + reg);
+
+for (reg = AMD_P2C_MSG1; reg <= AMD_P2C_MSG2; reg += 4)
+    writel(0, privdata->mmio + reg);
+
+static int amd_mp2_pci_init(struct amd_mp2_dev *privdata,
    +
    +struct pci_dev *pci_dev)
+{


```c
int rc;

pci_set_drvdata(pci_dev, privdata);

rc = pcim_enable_device(pci_dev);
if (rc) {
    dev_err(ndev_dev(privdata), "Failed to enable MP2 PCI device\n");
    goto err_pci_enable;
}

rc = pcim_iomap_regions(pci_dev, 1 << 2, pci_name(pci_dev));
if (rc) {
    dev_err(ndev_dev(privdata), "I/O memory remapping failed\n");
    goto err_pci_enable;
}

privdata->mmio = pcim_iomap_table(pci_dev)[2];

pci_set_master(pci_dev);

rc = pci_set_dma_mask(pci_dev, DMA_BIT_MASK(64));
if (rc) {
    rc = pci_set_dma_mask(pci_dev, DMA_BIT_MASK(32));
    if (rc)
        goto err_dma_mask;
}

/* Set up intx irq */
writel(0, privdata->mmio + AMD_P2C_MSG_INTEN);
pci_intx(pci_dev, 1);
rc = devm_request_irq(&pci_dev->dev, pci_dev->irq, amd_mp2_irq_isr,
    IRQF_SHARED, dev_name(&pci_dev->dev), privdata);
if (rc)
    dev_err(&pci_dev->dev, "Failure requesting irq %i: %d\n",
        pci_dev->irq, rc);

return rc;

err_dma_mask:
    pci_clear_master(pci_dev);
    err_pci_enable:
    pci_set_drvdata(pci_dev, NULL);
    return rc;

static int amd_mp2_pci_probe(struct pci_dev *pci_dev,
    const struct pci_device_id *id)
{
    struct amd_mp2_dev *privdata;
```
int rc;

privdata = devm_kzalloc(&pci_dev->dev, sizeof(*privdata), GFP_KERNEL);
if (!privdata)
	return -ENOMEM;
rc = amd_mp2_pci_init(privdata, pci_dev);
if (rc)
	return rc;
mutex_init(&privdata->c2p_lock);
privdata->pci_dev = pci_dev;

pm_runtime_set_autosuspend_delay(&pci_dev->dev, 1000);
pm_runtime_use_autosuspend(&pci_dev->dev);
pm_runtime_put_autosuspend(&pci_dev->dev);
pm_runtime_allow(&pci_dev->dev);
privdata->probed = true;
dev_info(&pci_dev->dev, "MP2 device registered.
");
return 0;

static void amd_mp2_pci_remove(struct pci_dev *pci_dev)
{
struct amd_mp2_dev *privdata = pci_get_drvdata(pci_dev);

pm_runtime_forbid(&pci_dev->dev);
pm_runtime_get_noresume(&pci_dev->dev);
pci_intx(pci_dev, 0);
pci_clear_master(pci_dev);

amd_mp2_clear_reg(privdata);
}

#define CONFIG_PM
static int amd_mp2_pci_suspend(struct device *dev)
{
struct pci_dev *pci_dev = to_pci_dev(dev);
struct amd_mp2_dev *privdata = pci_get_drvdata(pci_dev);

pm_runtime_forbid(&pci_dev->dev);
pm_runtime_get_noresume(&pci_dev->dev);

pci_intx(pci_dev, 0);
pci_clear_master(pci_dev);

amd_mp2_clear_reg(privdata);

unsigned int bus_id;
int ret = 0;

for (bus_id = 0; bus_id < 2; bus_id++)
{i2c_common = privdata->busses[bus_id];

for (bus_id = 0; bus_id < 2; bus_id++)
{i2c_common = privdata->busses[bus_id];
if (i2c_common)
+ i2c_common->suspend(i2c_common);
+
+ret = pci_save_state(pci_dev);
+if (ret) {
+dev_err(ndev_dev(privdata),
+"pci_save_state failed = %d\n", ret);
+return ret;
+}
+
+pci_disable_device(pci_dev);
+return ret;
+}
+
+static int amd_mp2_pci_resume(struct device *dev)
+{
+struct pci_dev *pci_dev = to_pci_dev(dev);
+struct amd_mp2_dev *privdata = pci_get_drvdata(pci_dev);
+struct amd_i2c_common *i2c_common;
+unsigned int bus_id;
+int ret = 0;
+
+pci_restore_state(pci_dev);
+ret = pci_enable_device(pci_dev);
+if (ret < 0) {
+dev_err(ndev_dev(privdata),
+"pci_enable_device failed = %d\n", ret);
+return ret;
+}
+
+for (bus_id = 0; bus_id < 2; bus_id++) {
+i2c_common = privdata->busses[bus_id];
+if (i2c_common) {
+ret = i2c_common->resume(i2c_common);
+if (ret < 0)
+return ret;
+}
+}
+
+static UNIVERSAL_DEV_PM_OPS(amd_mp2_pci_pm_ops, amd_mp2_pci_suspend,
+ amd_mp2_pci_resume, NULL);
+#endif /* CONFIG_PM */
+
+static const struct pci_device_id amd_mp2_pci_tbl[] = {

static struct pci_driver amd_mp2_pci_driver = {
    .name = "i2c_amd_mp2",
    .id_table = amd_mp2_pci_tbl,
    .probe = amd_mp2_pci_probe,
    .remove = amd_mp2_pci_remove,
#ifdef CONFIG_PM
    .driver = {
        .pm = &amd_mp2_pci_pm_ops,
    },
#endif
};
module_pci_driver(amd_mp2_pci_driver);

static int amd_mp2_device_match(struct device *dev, void *data)
{
    return 1;
}

struct amd_mp2_dev *amd_mp2_find_device(void)
{
    struct device *dev;
    struct pci_dev *pci_dev;

    dev = driver_find_device(&amd_mp2_pci_driver.driver, NULL, NULL,
                           amd_mp2_device_match);
    if (!dev)
        return NULL;
    pci_dev = to_pci_dev(dev);
    return (struct amd_mp2_dev *)pci_get_drvdata(pci_dev);
}
EXPORT_SYMBOL_GPL(amd_mp2_find_device);

MODULE_DESCRIPTION("AMD(R) PCI-E MP2 I2C Controller Driver");
MODULE_AUTHOR("Shyam Sundar S K <Shyam-sundar.S-k@amd.com>");
MODULE_AUTHOR("Elie Morisse <syniurge@gmail.com>");
MODULE_LICENSE("Dual BSD/GPL");
+ * 
+ * Setup the I2C adapters enumerated in the ACPI namespace.
+ * MP2 controllers have 2 separate busses, up to 2 I2C adapters may be listed.
+ * 
+ * Authors: Nehal Bakulchandra Shah <Nehal-bakulchandra.shah@amd.com>
+ * Elie Morisse <syniurge@gmail.com>
+ */
+
+ #include <linux/acpi.h>
+ #include <linux/kernel.h>
+ #include <linux/module.h>
+ #include <linux/platform_device.h>
+ #include <linux/slab.h>
+ #include <linux/types.h>
+
+ #include "i2c-amd-mp2.h"
+
+ #define AMD_MP2_I2C_MAX_RW_LENGTH ((1 << 12) - 1)
+ #define AMD_I2C_TIMEOUT (msecs_to_jiffies(250))
+
+ /**
+ * struct amd_i2c_dev - MP2 bus/i2c adapter context
+ * @common: shared context with the MP2 PCI driver
+ * @pdev: platform driver node
+ * @adap: i2c adapter
+ * @cmd_complete: xfer completion object
+ */
+ struct amd_i2c_dev {
+ struct amd_i2c_common common;
+ struct platform_device *pdev;
+ struct i2c_adapter adap;
+ struct completion cmd_complete;
+ }
+
+ #define amd_i2c_dev_common(__common) \
+ container_of(__common, struct amd_i2c_dev, common)
+
+ static int i2c_amd_dma_map(struct amd_i2c_common *i2c_common)
+ {
+ struct device *dev_pci = &i2c_common->mp2_dev->pci_dev->dev;
+ struct amd_i2c_dev *i2c_dev = amd_i2c_dev_common(i2c_common);
+ enum dma_data_direction dma_direction =
+ i2c_common->msg->flags & I2C_M_RD ?
+ DMA_FROM_DEVICE : DMA_TO_DEVICE;
+ DMA_FROM_DEVICE : DMA_TO_DEVICE;
+ }
+ i2c_common->dma_buf = i2c_get_dma_safe_msg_buf(i2c_common->msg, 0);
+ i2c_common->dma_addr = dma_map_single(dev_pci, i2c_common->dma_buf,
+ i2c_common->msg->len,
+ dma_direction);
+
+ if (unlikely(dma_mapping_error(dev_pci, i2c_common->dma_addr))) {
+ dev_err(&i2c_dev->pdev->dev,
+ "Error while mapping dma buffer %p\n",
+ i2c_common->dma_buf);
+ return -EIO;
+ }
+
+ return 0;
+ }
+
+static void i2c_amd_dma_unmap(struct amd_i2c_common *i2c_common)
+{
+ struct device *dev_pci = &i2c_common->mp2_dev->pci_dev->dev;
+ enum dma_data_direction dma_direction =
+ i2c_common->msg->flags & I2C_M_RDM?
+ DMA_FROM_DEVICE : DMA_TO_DEVICE;
+ dma_unmap_single(dev_pci, i2c_common->dma_addr,
+ i2c_common->msg->len, dma_direction);
+
+ i2c_release_dma_safe_msg_buf(i2c_common->msg, i2c_common->dma_buf);
+ }
+
+static void i2c_amd_start_cmd(struct amd_i2c_dev *i2c_dev)
+{
+ struct amd_i2c_common *i2c_common = &i2c_dev->common;
+ reinit_completion(&i2c_dev->cmd_complete);
+ i2c_common->cmd_success = false;
+ }
+
+static void i2c_amd_cmd_completion(struct amd_i2c_common *i2c_common)
+{
+ struct amd_i2c_dev *i2c_dev = amd_i2c_dev_common(i2c_common);
+ union i2c_event *event = &i2c_common->eventval;
+ 
+ if (event->r.status == i2c_readcomplete_event)
+ dev_dbg(&i2c_dev->pdev->dev, "%s readdata:%*ph\n",
+ __func__, event->r.length,
+ i2c_common->msg->buf);
+ complete(&i2c_dev->cmd_complete);
+ }
+
+static int i2c_amd_check_cmd_completion(struct amd_i2c_dev *i2c_dev)
+{
struct amd_i2c_common *i2c_common = &i2c_dev->common;

unsigned long timeout;

timeout = wait_for_completion_timeout(&i2c_dev->cmd_complete,
    i2c_dev->adap.timeout);

if ((i2c_common->reqcmd == i2c_read ||
     i2c_common->reqcmd == i2c_write) &&
    i2c_common->msg->len > 32)
i2c_amd_dma_unmap(i2c_common);

if (timeout == 0) {
    amd_mp2_rw_timeout(i2c_common);
    return -ETIMEDOUT;
}

amd_mp2_process_event(i2c_common);

if (!i2c_common->cmd_success)
    return -EIO;

return 0;

static int i2c_amd_enable_set(struct amd_i2c_dev *i2c_dev, bool enable)
{
    struct amd_i2c_common *i2c_common = &i2c_dev->common;

    i2c_amd_start_cmd(i2c_dev);
    amd_mp2_bus_enable_set(i2c_common, enable);

    return i2c_amd_check_cmd_completion(i2c_dev);
}

static int i2c_amd_xfer_msg(struct amd_i2c_dev *i2c_dev, struct i2c_msg *pmsg)
{
    struct amd_i2c_common *i2c_common = &i2c_dev->common;

    i2c_amd_start_cmd(i2c_dev);
    i2c_common->msg = pmsg;

    if (pmsg->len > 32)
        if (i2c_amd_dma_map(i2c_common))
            return -EIO;

    if (pmsg->flags & I2C_M_RDONLY)
        amd_mp2_rw(i2c_common, i2c_read);

    else
```
+amd_mp2_rw(i2c_common, i2c_write);
+
+return i2c_amd_check_cmd_completion(i2c_dev);
+}
+
+static int i2c_amd_xfer(struct i2c_adapter *adap, struct i2c_msg *msgs, int num)
+{
+    struct i2c_dev *i2c_dev = i2c_get_adapdata(adap);
+    int i;
+    struct i2c_msg *pmsg;
+    int err;
+    +/* the adapter might have been deleted while waiting for the bus lock */
+    +if (unlikely(!i2c_dev->common.mp2_dev))
+        +return -EINVAL;
+        +amd_mp2_pm_runtime_get(i2c_dev->common.mp2_dev);
+        +
+    for (i = 0; i < num; i++) {
+        +pmsg = &msgs[i];
+        +err = i2c_amd_xfer_msg(i2c_dev, pmsg);
+            +if (err)
+                +break;
+    }
+    +amd_mp2_pm_runtime_put(i2c_dev->common.mp2_dev);
+    +
+    return err ? err : num;
+}
+
+static u32 i2c_amd_func(struct i2c_adapter *a)
+{
+    +return I2C_FUNC_I2C | I2C_FUNC_SMBUS_EMUL;
+}
+
+static const struct i2c_algorithm i2c_amd_algorithm = {
+    .master_xfer = i2c_amd_xfer,
+    .functionality = i2c_amd_func,
+};
+
+#ifdef CONFIG_PM
+static int i2c_amd_suspend(struct amd_i2c_common *i2c_common)
+{
+    struct i2c_dev *i2c_dev = amd_i2c_dev_common(i2c_common);
+    +i2c_amd_enable_set(i2c_dev, false);
+    +return 0;
+}
+```
static int i2c_amd_resume(struct amd_i2c_common *i2c_common) {
    struct amd_i2c_dev *i2c_dev = amd_i2c_dev_common(i2c_common);
    return i2c_amd_enable_set(i2c_dev, true);
} #endif

static enum speed_enum i2c_amd_get_bus_speed(struct platform_device *pdev) {
    u32 acpi_speed;
    static const u32 supported_speeds[] = {
        0, 100000, 400000, 1000000, 1400000, 3400000
    };

    acpi_speed = i2c_acpi_find_bus_speed(&pdev->dev);
    /* round down to the lowest standard speed */
    for (i = 1; i < ARRAY_SIZE(supported_speeds); i++) {
        if (acpi_speed < supported_speeds[i])
            break;
    }
    acpi_speed = supported_speeds[i - 1];

    switch (acpi_speed) {
        case 100000:
            return speed100k;
        case 400000:
            return speed400k;
        case 1000000:
            return speed1000k;
        case 1400000:
            return speed1400k;
        case 3400000:
            return speed3400k;
        default:
            return speed400k;
    }
}

static const struct i2c_adapter_quirks amd_i2c_dev_quirks = {
    .max_read_len = AMD_MP2_I2C_MAX_RW_LENGTH,
    .max_write_len = AMD_MP2_I2C_MAX_RW_LENGTH,
};

static int i2c_amd_probe(struct platform_device *pdev) {
    int ret;
+struct amd_i2c_dev *i2c_dev;
+acpi_handle handle = ACPI_HANDLE(&pdev->dev);
+struct acpi_device *adev;
+struct amd_mp2_dev *mp2_dev;
+const char *uid;
+
+if (acpi_bus_get_device(handle, &adev))
+return -ENODEV;
+
+/* The ACPI namespace doesn't contain information about which MP2 PCI
+ * device an AMDI0011 ACPI device is related to, so assume that there's
+ * only one MP2 PCI device per system.
+ */
+mp2_dev = amd_mp2_find_device();
+if (!mp2_dev || !mp2_dev->probed)
+/* The MP2 PCI device should get probed later */
+return -EPROBE_DEFER;
+
+i2c_dev = devm_kzalloc(&pdev->dev, sizeof(*i2c_dev), GFP_KERNEL);
+if (!i2c_dev)
+return -ENOMEM;
+
i2c_dev->common.mp2_dev = mp2_dev;
i2c_dev->pdev = pdev;
+platform_set_drvdata(pdev, i2c_dev);
+
i2c_dev->common.cmd_completion = &i2c_amd_cmd_completion;
+#ifdef CONFIG_PM
+i2c_dev->common.suspend = &i2c_amd_suspend;
i2c_dev->common.resume = &i2c_amd_resume;
+#endif
+
+uid = adev->pnp.unique_id;
+if (!uid) {
+dev_err(&pdev->dev, "missing UID/bus id!
");
+return -EINVAL;
+} else if (strcmp(uid, "0") == 0) {
+i2c_dev->common.bus_id = 0;
+} else if (strcmp(uid, "1") == 0) {
+i2c_dev->common.bus_id = 1;
+} else {
+dev_err(&pdev->dev, "incorrect UID/bus id \"%s\"!\n", uid);
+return -EINVAL;
+}
+dev_dbg(&pdev->dev, "bus id is %u\n", i2c_dev->common.bus_id);
+
+/* Register the adapter */
+amd_mp2_pm_runtime_get(mp2_dev);
i2c_dev->common.reqcmd = i2c_none;
if (amd_mp2_register_cb(&i2c_dev->common))
    return -EINVAL;
device_link_add(&i2c_dev->pdev->dev, &mp2_dev->pci_dev->dev,
    DL_FLAG_AUTOREMOVE);
+
    i2c_dev->common.i2c_speed = i2c_amd_get_bus_speed(pdev);
+
    /* Setup i2c adapter description */
    i2c_dev->adap.owner = THIS_MODULE;
    i2c_dev->adap.algo = &i2c_amd_algorithm;
    i2c_dev->adap.quirks = &amd_i2c_dev_quirks;
    i2c_dev->adap.dev.parent = &pdev->dev;
    i2c_dev->adap.algo_data = i2c_dev;
    i2c_dev->adap.timeout = AMD_I2C_TIMEOUT;
    ACPI_COMPANION_SET(&i2c_dev->adap.dev, ACPI_COMPANION(&pdev->dev));
    i2c_dev->adap.dev.of_node = pdev->dev.of_node;
    snprintf(i2c_dev->adap.name, sizeof(i2c_dev->adap.name),
             "AMD MP2 i2c bus %u", i2c_dev->common.bus_id);
    i2c_set_adapdata(&i2c_dev->adap, i2c_dev);
                      
    init_completion(&i2c_dev->cmd_complete);
+
    /* Enable the bus */
    if (i2c_amd_enable_set(i2c_dev, true))
        dev_err(&pdev->dev, "initial bus enable failed\n");
+
    /* Attach to the i2c layer */
    ret = i2c_add_adapter(&i2c_dev->adap);
+
    amd_mp2_pm_runtime_put(mp2_dev);
+
    if (ret < 0)
        dev_err(&pdev->dev, "i2c add adapter failed = %d\n", ret);
+
    return ret;
+}
+
+static int i2c_amd_remove(struct platform_device *pdev)
+{
+    struct i2c_dev *i2c_dev = platform_get_drvdata(pdev);
+    struct i2c_common *i2c_common = &i2c_dev->common;
+
+i2c_lock_bus(&i2c_dev->adap, I2C_LOCK_ROOT_ADAPTER);
+
+i2c_amd_enable_set(i2c_dev, false);
+amd_mp2_unregister_cb(i2c_common);
+i2c_common->mp2_dev = NULL;
+
+i2c_unlock_bus(&i2c_dev->adap, I2C_LOCK_ROOT_ADAPTER);
+
+i2c_del_adapter(&i2c_dev->adap);
+return 0;
+
+static const struct acpi_device_id i2c_amd_acpi_match[] = {
+    { "AMDI0011" },
+    {},
+};
+MODULE_DEVICE_TABLE(acpi, i2c_amd_acpi_match);
+
+static struct platform_driver i2c_amd_plat_driver = {
+    .probe = i2c_amd_probe,
+    .remove = i2c_amd_remove,
+    .driver = {
+        .name = "i2c_amd_mp2",
+        .acpi_match_table = ACPI_PTR(i2c_amd_acpi_match),
+    },
+};
+module_platform_driver(i2c_amd_plat_driver);
+
+MODULE_DESCRIPTION("AMD(R) MP2 I2C Platform Driver");
+MODULE_AUTHOR("Nehal Shah <nehal-bakulchandra.shah@amd.com>");
+MODULE_AUTHOR("Elie Morisse <syniurge@gmail.com>");
+MODULE_LICENSE("Dual BSD/GPL");

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-amd-mp2.h
+++ linux-4.15.0/drivers/i2c/busses/i2c-amd-mp2.h
@@ -0,0 +1,219 @@
+/* SPDX-License-Identifier: GPL-2.0 OR BSD-3-Clause */
+/
+* AMD MP2 I2C adapter driver
+*
+* Authors: Shyam Sundar S K <Shyam-sundar.S-k@amd.com>
+* Elie Morisse <syniurge@gmail.com>
+* /
+
+#ifndef I2C_AMD_PCI_MP2_H
+#define I2C_AMD_PCI_MP2_H
+
+#include <linux/i2c.h>
+#include <linux/pci.h>
+#include <linux/pm_runtime.h>
+
+#define PCI_DEVICE_ID_AMD_MP2	0x15E6
+
+struct amd_i2c_common;
+struct amd_mp2_dev;
+
+enum {
+/* MP2 C2P Message Registers */
+AMD_C2P_MSG0 = 0x10500,/* MP2 Message for I2C0 */
+AMD_C2P_MSG1 = 0x10504,/* MP2 Message for I2C1 */
+AMD_C2P_MSG2 = 0x10508,/* DRAM Address Lo / Data 0 */
+AMD_C2P_MSG3 = 0x1050c,/* DRAM Address HI / Data 1 */
+AMD_C2P_MSG4 = 0x10510,/* Data 2 */
+AMD_C2P_MSG5 = 0x10514,/* Data 3 */
+AMD_C2P_MSG6 = 0x10518,/* Data 4 */
+AMD_C2P_MSG7 = 0x1051c,/* Data 5 */
+AMD_C2P_MSG8 = 0x10520,/* Data 6 */
+AMD_C2P_MSG9 = 0x10524,/* Data 7 */
+
+/* MP2 P2C Message Registers */
+AMD_P2C_MSG0 = 0x10680,/* Do not use */
+AMD_P2C_MSG1 = 0x10684,/* I2C0 interrupt register */
+AMD_P2C_MSG2 = 0x10688,/* I2C1 interrupt register */
+AMD_P2C_MSG3 = 0x1068c,/* MP2 debug info */
+AMD_P2C_MSG_INTEN = 0x10690,/* MP2 interrupt gen register */
+AMD_P2C_MSG_INTSTS = 0x10694,/* Interrupt status */
+}
+
+/* Command register data structures */
+
+#define i2c_none (-1)
+enum i2c_cmd {
+    i2c_read = 0,
+    i2c_write,
+    i2c_enable,
+    i2c_disable,
+    number_of_sensor_discovered,
+    is_mp2_active,
+    invalid_cmd = 0xF,
+};
+
+enum speed_enum {
+    speed100k = 0,
+    speed400k = 1,
+    speed1000k = 2,
+    speed1400k = 3,
+    speed3400k = 4
+};
+
+enum mem_type {
+    use_dram = 0,
+use_c2pmsg = 1,
+};
+
+/**
+ * union i2c_cmd_base : bit access of C2P commands
+ * @i2c_cmd: bit 0..3 i2c R/W command
+ * @bus_id: bit 4..7 i2c bus index
+ * @slave_addr: bit 8..15 slave address
+ * @length: bit 16..27 read/write length
+ * @i2c_speed: bit 28..30 bus speed
+ * @mem_type: bit 31 0-DRAM; 1-C2P msg o/p
+ */
+union i2c_cmd_base {
+u32 ul;
+struct {
+enum i2c_cmd i2c_cmd : 4;
+u8 bus_id : 4;
+u32 slave_addr : 8;
+u32 length : 12;
+enum speed_enum i2c_speed : 3;
+enum mem_type mem_type : 1;
+} s;
+};
+
+enum response_type {
+invalid_response = 0,
+command_success = 1,
+command_failed = 2,
+};
+
+enum status_type {
+i2c_readcomplete_event = 0,
+i2c_readfail_event = 1,
+i2c_writecomplete_event = 2,
+i2c_writefail_event = 3,
+i2c_busenable_complete = 4,
+i2c_busenable_failed = 5,
+i2c_busdisable_complete = 6,
+i2c_busdisable_failed = 7,
+invalid_data_length = 8,
+invalid_slave_address = 9,
+invalid_i2cbus_id = 10,
+invalid_dram_addr = 11,
+invalid_command = 12,
+mp2_active = 13,
+numberof_sensors_discovered_resp = 14,
+i2c_bus_notinitialized
+};
union i2c_event {
    u32 ul;

    struct {
        enum response_type response : 2;
        enum status_type status : 5;
        enum mem_type mem_type : 1;
        u8 bus_id : 4;
        u32 length : 12;
        u32 slave_addr : 8;
    } r;
} r;

/**
 * struct amd_i2c_common - per bus/i2c adapter context, shared
 * between the pci and the platform driver
 * @eventval: MP2 event value set by the IRQ handler
 * @mp2_dev: MP2 pci device this adapter is part of
 * @msg: i2c message
 * @cmd_completion: function called by the IRQ handler to signal
 * the platform driver
 * @reqcmd: requested i2c command type
 * @cmd_success: set to true if the MP2 responded to a command with
 * the expected status and response type
 * @bus_id: bus index
 * @i2c_speed: i2c bus speed determined by the slowest slave
 * @dma_buf: if msg length > 32, holds the DMA buffer virtual address
 * @dma_addr: if msg length > 32, holds the DMA buffer address
 */

struct amd_i2c_common {
    union i2c_event eventval;
    struct amd_mp2_dev *mp2_dev;
    struct i2c_msg *msg;
    void (*cmd_completion)(struct amd_i2c_common *i2c_common);
    enum i2c_cmd reqcmd;
    u8 cmd_success;
    u8 bus_id;
    enum speed_enum i2c_speed;
    u8 *dma_buf;
+dma_addr_t dma_addr;
+﻿#ifdef CONFIG_PM
+int (*suspend)(struct amd_i2c_common *i2c_common);
+int (*resume)(struct amd_i2c_common *i2c_common);
+﻿#endif /* CONFIG_PM */
+
+/**
+ * struct amd_mp2_dev - per PCI device context
+ * @pci_dev: PCI driver node
+ * @busses: MP2 devices may have up to two busses,
+ *    each bus corresponding to an i2c adapter
+ * @mmio: iomapped registers
+ * @c2p_lock: controls access to the C2P mailbox shared between
+ *    the two adapters
+ * @c2p_lock_busid: id of the adapter which locked c2p_lock
+ */
+struct amd_mp2_dev {
+struct pci_dev *pci_dev;
+struct amd_i2c_common *busses[2];
+void __iomem *mmio;
+struct mutex c2p_lock;
+u8 c2p_lock_busid;
+unsigned int probed;
+};
+
+﻿#define ndev_pdev(ndev) ((ndev)->pci_dev)
+﻿#define ndev_name(ndev) pci_name(ndev_pdev(ndev))
+﻿#define ndev_dev(ndev) (&ndev_pdev(ndev)->dev)
+ +#define work_amd_i2c_common(__work)  
+     container_of(__work, struct amd_i2c_common, work.work)
+
+/* PCIe communication driver */
+ +int amd_mp2_rw(struct amd_i2c_common *i2c_common, enum i2c_cmd reqcmd);
+int amd_mp2_bus_enable_set(struct amd_i2c_common *i2c_common, bool enable);
+ +void amd_mp2_process_event(struct amd_i2c_common *i2c_common);
+ +void amd_mp2_rw_timeout(struct amd_i2c_common *i2c_common);
+ +int amd_mp2_register_cb(struct amd_i2c_common *i2c_common);
+int amd_mp2_unregister_cb(struct amd_i2c_common *i2c_common);
+ +struct amd_mp2_dev *amd_mp2_find_device(void);
+ +static inline void amd_mp2_pm_runtime_get(struct amd_mp2_dev *mp2_dev)
+{
+}
static inline void amd_mp2_pm_runtime_put(struct amd_mp2_dev *mp2_dev)
{
    pm_runtime_mark_last_busy(&mp2_dev->pci_dev->dev);
    pm_runtime_put_autosuspend(&mp2_dev->pci_dev->dev);
}

#define ASPEED_I2CD_DEV_ADDR_MASK GENMASK(6, 0)

enum aspeed_i2c_master_state {
    ASPEED_I2C_MASTER_INACTIVE,
    ASPEED_I2C_MASTER_START,
    ASPEED_I2C_MASTER_TX_FIRST,
    ASPEED_I2C_MASTER_TX,
    ASPEED_I2C_MASTER_RX_FIRST,
    ASPEED_I2C_MASTER_RX,
    ASPEED_I2C_MASTER_STOP,
    -ASPEED_I2C_MASTER_INACTIVE,
};

enum aspeed_i2c_slave_state {
    ASPEED_I2C_SLAVE_STOP,
    ASPEED_I2C_SLAVE_START,
    ASPEED_I2C_SLAVE_READ_REQUESTED,
    ASPEED_I2C_SLAVE_READ_PROCESSED,
    ASPEED_I2C_SLAVE_WRITE_REQUESTED,
    ASPEED_I2C_SLAVE_WRITE_RECEIVED,
    -ASPEED_I2C_SLAVE_STOP,
};

struct aspeed_i2c_bus {
    /* Synchronizes I/O mem access to base. */
    spinlock_tlock;
    struct completioncmd_complete;
    u32(*get_clk_reg_val)(u32 divisor);
    +u32(*get_clk_reg_val)(struct device *dev,
    + u32 divisor);
    unsigned longparent_clk_frequency;
    u32bus_frequency;
    /* Transaction state. */
    @ @ -681,16 +682,27 @@

static u32 aspeed_i2c_get_clk_reg_val(struct device *dev,
    u32 clk_high_low_mask,
    u32 divisor)
{
    u32 base_clk, clk_high, clk_low, tmp;
    
    /*
    * SCL_high and SCL_low represent a value 1 greater than what is stored
    * since a zero divider is meaningless. Thus, the max value each can
    * store is every bit set + 1. Since SCL_high and SCL_low are added
    * together (see below), the max value of both is the max value of one
    * them times two.
    * /
    +*/
    +clk_high_low_max = (clk_high_low_mask + 1) * 2;
    
    /*
    * The actual clock frequency of SCL is:
    * SCL_freq = APB_freq / (base_freq * (SCL_high + SCL_low))
    * = APB_freq / divisor
    * where base_freq is a programmable clock divider; its value is
    - *base_freq = 1 << base_clk
    + *base_freq = 1 << base_clk_divisor
    * SCL_high is the number of base_freq clock cycles that SCL stays high
    * and SCL_low is the number of base_freq clock cycles that SCL stays
    * low for a period of SCL.
    @ @ -700,47 +712,59 @@
    *SCL_low = clk_low + 1
    * Thus,
    *SCL_freq = APB_freq / 
    - *((1 << base_clk) * (clk_high + 1 + clk_low + 1))
    + *((1 << base_clk_divisor) * (clk_high + 1 + clk_low + 1))
    * The documentation recommends clk_high >= clk_high_max / 2 and
    * clk_low >= clk_low_max / 2 - 1 when possible; this last constraint
    * gives us the following solution:
    */
    -base_clk = divisor > clk_high_low_max ?
    +base_clk_divisor = divisor > clk_high_low_max ?
    ilog2((divisor - 1) / clk_high_low_max) + 1 : 0;
    -tmp = (divisor + (1 << base_clk) - 1) >> base_clk;
    -clk_low = tmp / 2;
    -clk_high = tmp - clk_low;
    
    -if (clk_high)
-clk_high--;  
+if (base_clk_divisor > ASPEED_I2CD_TIME_BASE_DIVISOR_MASK) {  
+base_clk_divisor = ASPEED_I2CD_TIME_BASE_DIVISOR_MASK;  
+clk_low = clk_high_low_mask;  
+clk_high = clk_high_low_mask;  
+dev_err(dev,  
+"clamping clock divider: divider requested, %u, is greater than largest possible divider, %u.\n",  
+divisor, (1 << base_clk_divisor) * clk_high_low_max);  
+} else {  
+tmp = (divisor + (1 << base_clk_divisor) - 1)  
+>> base_clk_divisor;  
+clk_low = tmp / 2;  
+clk_high = tmp - clk_low;  
+-if (clk_low)  
+-clk_low--;  
+-if (clk_high)  
+-clk_high--;  
+  
+if (clk_low)  
+-clk_low--;  
+return ((clk_high << ASPEED_I2CD_TIME_SCL_HIGH_SHIFT)  
& ASPEED_I2CD_TIME_SCL_HIGH_MASK)  
| ((clk_low << ASPEED_I2CD_TIME_SCL_LOW_SHIFT)  
& ASPEED_I2CD_TIME_SCL_LOW_MASK)  
-| (base_clk & ASPEED_I2CD_TIME_BASE_DIVISOR_MASK);  
+| (base_clk_divisor  
+ & ASPEED_I2CD_TIME_BASE_DIVISOR_MASK);  
}  

-static u32 aspeed_i2c_24xx_get_clk_reg_val(u32 divisor)  
+static u32 aspeed_i2c_24xx_get_clk_reg_val(struct device *dev, u32 divisor)  
{  
/*  
* clk_high and clk_low are each 3 bits wide, so each can hold a max  
* value of 8 giving a clk_high_low_max of 16.  
*/  
-return aspeed_i2c_get_clk_reg_val(16, divisor);  
+return aspeed_i2c_get_clk_reg_val(dev, GENMASK(2, 0), divisor);  
}  

-static u32 aspeed_i2c_25xx_get_clk_reg_val(u32 divisor)  
+static u32 aspeed_i2c_25xx_get_clk_reg_val(struct device *dev, u32 divisor)  
{  
/*
* clk_high and clk_low are each 4 bits wide, so each can hold a max
* value of 16 giving a clk_high_low_max of 32.
*
* return aspeed_i2c_get_clk_reg_val(32, divisor);
+ return aspeed_i2c_get_clk_reg_val(dev, GENMASK(3, 0), divisor);
}

/* precondition: bus.lock has been acquired. */
@@ -753,7 +777,7 @@
clk_reg_val &= (ASPEED_I2CD_TIME_TBUF_MASK |
ASPEED_I2CD_TIME_THDSTA_MASK |
ASPEED_I2CD_TIME_TACST_MASK);
- clk_reg_val |= bus->get_clk_reg_val(divisor);
+ clk_reg_val |= bus->get_clk_reg_val(dev, divisor);
+ writel(clk_reg_val, bus->base + ASPEED_I2C_AC_TIMING_REG1);
 writel(ASPEED_NO_TIMEOUT_CTRL, bus->base + ASPEED_I2C_AC_TIMING_REG2);

@@ -869,7 +893,8 @@
if (!match)
 bus->get_clk_reg_val = aspeed_i2c_24xx_get_clk_reg_val;
 else
- bus->get_clk_reg_val = match->data;
+ bus->get_clk_reg_val = (u32 (*)(struct device *, u32))
+ match->data;

/* Initialize the I2C adapter */
spin_lock_init(&bus->lock);
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-at91.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-at91.c
@@ -270,9 +270,11 @@
writeb_relaxed(*dev->buf, dev->base + AT91_TWI_THR);

/* send stop when last byte has been written */
-if (--dev->buf_len == 0)
+if (--dev->buf_len == 0) {
 if (!dev->use_alt_cmd)
 at91_twi_write(dev, AT91_TWI_CR, AT91_TWI_STOP);
+ at91_twi_write(dev, AT91_TWI_IDR, AT91_TWI_TXRDY);
+}

dev_dbg(dev->dev, "wrote 0x%x, to go %zu\n", *dev->buf, dev->buf_len);

@@ -682,9 +684,8 @@
] else {
 at91_twi_write_next_byte(dev);
 at91_twi_write(dev, AT91_TWI_IER,
- AT91_TWI_TXCOMP |
- AT91_TWI_NACK |
- AT91_TW1_TXRDY);
+ AT91_TW1_TXCOMP | AT91_TW1_NACK |
+ (dev->buf_len ? AT91_TW1_TXRDY : 0));
}
}

static struct at91_twi_pdata sama5d2_config = {
    .clk_max_div = 7,
    .clk_offset = 4,
    .has_unre_flag = true,
    .has_alt_cmd = true,
    .has_hold_field = true,
    --- linux-4.15.0.orig/drivers/i2c/busses/i2c-axxia.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-axxia.c
@@ -74,8 +74,7 @@
#define MST_STATUS_ND)
#define MST_STATUS_ERR(MST_STATUS_NAK | \
    MST_STATUS_AL | \
- MST_STATUS_IP | \
- MST_STATUS_TSS) + MST_STATUS_IP)
#define MST_TX_BYTES_XFRD0x50
#define MST_RX_BYTES_XFRD0x54
#define SCL_HIGH_PERIOD0x80
@@ -241,7 +240,7 @@
/*
if (c <= 0 || c > I2C_SMBUS_BLOCK_MAX) {
    idev->msg_err = -EPROTO;
-    i2c_int_disable(idev, ~0);
+    i2c_int_disable(idev, ~MST_STATUS_TSS);
    complete(&idev->msg_complete);
    break;
    }
@@ -297,17 +296,7 @@
i2c_int_disable(idev, MST_STATUS_TFL);
}

- if (status & MST_STATUS_SCC) {
- /* Stop completed */
-    i2c_int_disable(idev, ~0);
-    complete(&idev->msg_complete);
- } else if (status & MST_STATUS_SNS) {
- /* Transfer done */
-    i2c_int_disable(idev, ~0);
-    if (!i2c_m_rd(idev->msg) && idev->msg_xfrd < idev->msg->len)
-axxia_i2c_empty_rx_fifo(idev);
-complete(&idev->msg_complete);
-} else if (unlikely(status & MST_STATUS_ERR)) {
+if (unlikely(status & MST_STATUS_ERR)) {
  /* Transfer error */
  i2c_int_disable(idev, ~0);
  if (status & MST_STATUS_AL)
@@ -324,6 +313,21 @@
    readl(idev->base + MST_TX_BYTES_XFRD),
    readl(idev->base + MST_TX_XFER));
    complete(&idev->msg_complete);
+} else if (status & MST_STATUS_SCC) {
+  /* Stop completed */
+  i2c_int_disable(idev, ~MST_STATUS_TSS);
+  complete(&idev->msg_complete);
+} else if (status & MST_STATUS_SNS) {
+  /* Transfer done */
+  i2c_int_disable(idev, ~MST_STATUS_TSS);
+  if (i2c_m_rd(idev->msg) && idev->msg_xfrd < idev->msg->len)
+    axxia_i2c_empty_rx_fifo(idev);
+  complete(&idev->msg_complete);
+} else if (status & MST_STATUS_TSS) {
+  /* Transfer timeout */
+  idev->msg_err = -ETIMEDOUT;
+  i2c_int_disable(idev, ~MST_STATUS_TSS);
+  complete(&idev->msg_complete);
 }

 out:
@@ -339,10 +343,10 @@
     u32 rx_xfer, tx_xfer;
     u32 addr_1, addr_2;
     unsigned long time_left;
     unsigned int wt_value;
     idev->msg = msg;
     idev->msg_xfrd = 0;
     -idev->msg_err = 0;
     reinit_completion(&idev->msg_complete);
 if (i2c_m_ten(msg)) {
@@ -382,9 +386,18 @@
   int_mask |= MST_STATUS_TFL;
   wt_value = WT_VALUE(readl(idev->base + WAIT_TIMER_CONTROL));
+  /* Disable wait timer temporarily */
+  writel(wt_value, idev->base + WAIT_TIMER_CONTROL);
+  wt_value = WT_VALUE(readl(idev->base + WAIT_TIMER_CONTROL));
 ”Open Source Used In 5GaaS Edge AC-4  21835“}
/* Check if timeout error happened */
if (idev->msg_err)
    goto out;
+
/* Start manual mode */
writel(CMD_MANUAL, idev->base + MST_COMMAND);

+writel(WT_EN | wt_value, idev->base + WAIT_TIMER_CONTROL);
+
    i2c_int_enable(idev, int_mask);

time_left = wait_for_completion_timeout(&idev->msg_complete,
@@ -395,13 +408,15 @@
    if (readl(idev->base + MST_COMMAND) & CMD_BUSY)
        dev_warn(idev->dev, "busy after xfer\n");

            -if (time_left == 0)
            +if (time_left == 0) {
                idev->msg_err = -ETIMEDOUT;
            -
                -if (idev->msg_err == -ETIMEDOUT)
                    i2c_recover_bus(&idev->adapter);
                +axxia_i2c_init(idev);
                +}

            -if (unlikely(idev->msg_err) && idev->msg_err != -ENXIO)
            +out:
                +if (unlikely(idev->msg_err) && idev->msg_err != -ENXIO &&
                +idev->msg_err != -ETIMEDOUT)
                    axxia_i2c_init(idev);

            return idev->msg_err;
@@ -409,7 +424,7 @@

static int axxia_i2c_stop(struct axxia_i2c_dev *idev)
    {
    -u32 int_mask = MST_STATUS_ERR | MST_STATUS_SCC;
    +u32 int_mask = MST_STATUS_ERR | MST_STATUS_SCC | MST_STATUS_TSS;
    unsigned long time_left;

    reinit_completion(&idev->msg_complete);
@@ -436,6 +451,9 @@
    int ret = 0;

    +idev->msg_err = 0;
    +i2c_int_enable(idev, MST_STATUS_TSS);
    +
for (i = 0; ret == 0 && i < num; ++i)
ret = axxia_i2c_xfer_msg(i2c, &msgs[i]);

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-bcm2835.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-bcm2835.c
@@ -50,6 +50,9 @@
#define BCM2835_I2C_S_CLKT	BIT(9)
#define BCM2835_I2C_S_LEN	BIT(10) /* Fake bit for SW error reporting */

+#define BCM2835_I2C_FEDL_SHIFT	16
+#define BCM2835_I2C_REDL_SHIFT	0
+
#define BCM2835_I2C_CDIV_MIN	0x0002
#define BCM2835_I2C_CDIV_MAX	0xFFFE
@@ -81,7 +84,7 @@
static int bcm2835_i2c_set_divider(struct bcm2835_i2c_dev *i2c_dev)
{
- u32 divider;
+ u32 divider, redl, fedl;

divider = DIV_ROUND_UP(clk_get_rate(i2c.dev->clk),
    i2c.dev->bus_clk_rate);
@@ -100,6 +103,22 @@
bcm2835_i2c_writel(i2c_dev, BCM2835_I2C_DIV, divider);

+/*
+ * Number of core clocks to wait after falling edge before
+ * outputting the next data bit. Note that both FEDL and REDL
+ * can't be greater than CDIV/2.
+ */
+ fedl = max(divider / 16, 1u);
+
+/*
+ * Number of core clocks to wait after rising edge before
+ * sampling the next incoming data bit.
+ */
+ redl = max(divider / 4, 1u);
+
+bcm2835_i2c_writel(i2c_dev, BCM2835_I2C_DEL,
    (fedl << BCM2835_I2C_FEDL_SHIFT) |
    (redl << BCM2835_I2C_REDL_SHIFT));
return 0;
}

@@ -172,6 +191,15 @@
+static void bcm2835_i2c_finish_transfer(struct bcm2835_i2c_dev *i2c_dev)
+{
+i2c_dev->curr_msg = NULL;
+i2c_dev->num_msgs = 0;
+
+i2c_dev->msg_buf = NULL;
+i2c_dev->msg_buf_remaining = 0;
+
/*
 * Note about I2C_C_CLEAR on error:
 * The I2C_C_CLEAR on errors will take some time to resolve -- if you were in
 * @ @ -272.6 +300.9 @ @
 * time_left = wait_for_completion_timeout(&i2c_dev->completion,
 * adap->timeout);
 +
+bcm2835_i2c_finish_transfer(i2c_dev);
 +
 if (!time_left) {
 bcm2835_i2c_writel(i2c_dev, BCM2835_I2C_C,
 BCM2835_I2C_C_CLEAR);
 --- linux-4.15.0.orig/drivers/i2c/busses/i2c-brcmstb.c
 +++ linux-4.15.0/drivers/i2c/busses/i2c-brcmstb.c
 @@ -318,7 +318,7 @@
 goto cmd_out;
 }

 -if ((CMD_RD || CMD_WR) &&
 +if ((cmd == CMD_RD || cmd == CMD_WR) &&
 bsc_readl(dev, iic_enable) & BSC_IIC_EN_NOACK_MASK) {
 re = -EREMOTEIO;
 dev_dbg(dev->device, "controller received NOACK intr for %s\n",
 --- linux-4.15.0.orig/drivers/i2c/busses/i2c-cadence.c
 +++ linux-4.15.0/drivers/i2c/busses/i2c-cadence.c
 @@ -906,7 +906,10 @@
 if (IS_ERR(id->membase))
 return PTR_ERR(id->membase);

 -id->irq = platform_get_irq(pdev, 0);
 +ret = platform_get_irq(pdev, 0);
 +if (ret < 0)
 +return ret;
 +id->irq = ret;
id->adap.owner = THIS_MODULE;
id->adap.dev.of_node = pdev->dev.of_node;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-cht-wc.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-cht-wc.c
@@ -187,6 +187,51 @@
 .smbus_xfer = cht_wc_i2c_adap_smbus_xfer,
 }

+/*
+ * We are an i2c-adapter which itself is part of an i2c-client. This means that
+ * transfers done through us take adapter->bus_lock twice, once for our parent
+ * i2c-adapter and once to take our own bus_lock. Lockdep does not like this
+ * nested locking, to make lockdep happy in the case of busses with muxes, the
+ * i2c-core's i2c_adapter_lock_bus function calls:
+ * rt_mutex_lock_nested(&adapter->bus_lock, i2c_adapter_depth(adapter));
+ *
+ * But i2c_adapter_depth only works when the direct parent of the adapter is
+ * another adapter, as it is only meant for muxes. In our case there is an
+ * i2c-client and MFD instantiated platform_device in the parent->child chain
+ * between the 2 devices.
+ *
+ * So we override the default i2c_lock_operations and pass a hardcoded
+ * depth of 1 to rt_mutex_lock_nested, to make lockdep happy.
+ *
+ * Note that if there were to be a mux attached to our adapter, this would
+ * break things again since the i2c-mux code expects the root-adapter to have
+ * a locking depth of 0. But we always have only 1 client directly attached
+ * in the form of the Charger IC paired with the CHT Whiskey Cove PMIC.
+ */
+static void cht_wc_i2c_adap_lock_bus(struct i2c_adapter *adapter,
+unsigned int flags)
+{
+rt_mutex_lock_nested(&adapter->bus_lock, 1);
+}
+
+static int cht_wc_i2c_adap_trylock_bus(struct i2c_adapter *adapter,
+unsigned int flags)
+{
+return rt_mutex_trylock(&adapter->bus_lock);
+}
+
+static void cht_wc_i2c_adap_unlock_bus(struct i2c_adapter *adapter,
+unsigned int flags)
+{
+rt_mutex_unlock(&adapter->bus_lock);
+}
+
+static const struct i2c_lock_operations cht_wc_i2c_adap_lock_ops = {

.lock_bus = cht_wc_i2c_adap_lock_bus,
.trylock_bus = cht_wc_i2c_adap_trylock_bus,
.unlock_bus = cht_wc_i2c_adap_unlock_bus,
+);
+
/**** irqchip for the client connected to the extchgr i2c adapter ****/
static void cht_wc_i2c_irq_lock(struct irq_data *data)
{
@@ -294,6 +339,7 @@
adap->adapter.owner = THIS_MODULE;
adap->adapter.class = I2C_CLASS_HWMON;
adap->adapter.algo = &cht_wc_i2c_adap_algo;
+adap->adapter.lock_ops = &cht_wc_i2c_adap_lock_ops;
strlcpy(adap->adapter.name, "PMIC I2C Adapter",
sizeof(adap->adapter.name));
adap->adapter.dev.parent = &pdev->dev;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-cpm.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-cpm.c
@@ -74,6 +74,9 @@
char    res1[4];/* Reserved */
ushort  rpbase;/* Relocation pointer */
char    res2[2];/* Reserved */
+/* The following elements are only for CPM2 */
+char    res3[4];/* Reserved */
+uint    sdmatmp;/* Internal */
};

#define I2COM_START 0x80
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-davinci.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-davinci.c
@@ -238,12 +238,16 @@
	* It's not always possible to have 1 to 2 ratio when d=7, so fall back
	* to minimal possible clkh in this case.
+ *
+ * Note:
+ * CLKH is not allowed to be 0, in this case I2C clock is not generated
+ * at all
+*/
-if (clk >= clkl + d) {
+if (clk > clkl + d) {
  clkh = clk - clkl - d;
  clkl = d;
} else {
  clkh = 0;
+clkh = 1;
  clkl = clk - (d << 1);
}
/* Enable the adapter */
__i2c_dw_enable(dev, true);

/* Dummy read to avoid the register getting stuck on Bay Trail */
+dw_readl(dev, DW_IC_ENABLE_STATUS);
+
/* Clear and enable interrupts */
dw_readl(dev, DW_IC_CLR_INTR);
dw_writel(dev, DW_IC_CLR_INTR_MASTER_MASK, DW_IC_INTR_MASTER_MASK);

static void dw_i2c_set_fifo_size(struct dw_i2c_dev *dev, int id)
{
    u32 param, tx_fifo_depth, rx_fifo_depth;

    if (!dev->tx_fifo_depth) {
        dev->tx_fifo_depth = tx_fifo_depth;
        dev->rx_fifo_depth = rx_fifo_depth;
        -dev->adapter.nr = id;
    } else if (tx_fifo_depth >= 2) {
        dev->tx_fifo_depth = min_t(u32, dev->tx_fifo_depth, tx_fifo_depth);
    }

    dw_i2c_set_fifo_size(dev, pdev->id);
    +dw_i2c_set_fifo_size(dev);

    adap = &dev->adapter;
adap->owner = THIS_MODULE;
adap->class = I2C_CLASS_DEPRECATED;
ACPI_COMPANION_SET(&adap->dev, ACPI_COMPANION(&pdev->dev));
adap->dev.of_node = pdev->dev.of_node;
+adap->nr = -1;

/* The code below assumes runtime PM to be disabled. */
WARN_ON(pm_runtime_enabled(&pdev->dev));
--- linux-4.15.0.org/drivers/i2c/busses/i2c-designware-slave.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-designware-slave.c
@@ -206,6 +206,7 @@
dev->disable_int(dev);
dev->disable(dev);
+synchronize_irq(dev->irq);
dev->slave = NULL;
pm_runtime_put(dev->dev);

--- linux-4.15.0.org/drivers/i2c/busses/i2c-eg20t.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-eg20t.c
@@ -177,7 +177,6 @@
static DEFINE_MUTEX(pch_mutex);
/* Definition for ML7213 by LAPIS Semiconductor */
#define PCI_VENDOR_ID_ROHM		0x10DB
#define PCI_DEVICE_ID_ML7213_I2C	0x802D
#define PCI_DEVICE_ID_ML7223_I2C	0x8010
#define PCI_DEVICE_ID_ML7831_I2C	0x8817
@@ -189,6 +188,7 @@
{ PCI_VDEVICE(ROHM, PCI_DEVICE_ID_ML7831_I2C), 1, },

+MODULE_DEVICE_TABLE(pci, pch_pcidev_id);

static irqreturn_t pch_i2c_handler(int irq, void *pData);

--- linux-4.15.0.org/drivers/i2c/busses/i2c-emev2.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-emev2.c
@@ -72,6 +72,7 @@
struct completion msg_done;
struct clk *sclk;
struct i2c_client *slave;
+int irq;
};
static inline void em_clear_set_bit(struct em_i2c_device *priv, u8 clear, u8 set, u8 reg)
@@ -342,6 +343,12 @@
writeb(0, priv->base + I2C_OFS_SVA0);

+/
+ * Wait for interrupt to finish. New slave irqs cannot happen because we
+ * cleared the slave address and, thus, only extension codes will be
+ * detected which do not use the slave ptr.
+ */
+syncrhize_irq(priv->irq);
priv->slave = NULL;

return 0;
@@ -358,7 +365,7 @@
{
 struct em_i2c_device *priv;
 struct resource *r;
-int irq, ret;
+int ret;

 priv = devm_kzalloc(&pdev->dev, sizeof(*priv), GFP_KERNEL);
 if (!priv)
@@ -393,8 +400,11 @@
 em_i2c_reset(&priv->adap);

-irq = platform_get_irq(pdev, 0);
-ret = devm_request_irq(pdev, irq, em_i2c_irq_handler, 0,
+ret = platform_get_irq(pdev, 0);
+if (ret < 0)
+ goto err_clk;
+priv->irq = ret;
+ret = devm_request_irq(pdev, priv->irq, em_i2c_irq_handler, 0,
 "em_i2c", priv);
 if (ret)
 goto err_clk;
@@ -404,7 +414,8 @@
 if (ret)
 goto err_clk;
-dev_info(pdev->dev, "Added i2c controller %d, irq %d\n", priv->adap.nr, irq);
+dev_info(pdev->dev, "Added i2c controller %d, irq %d\n", priv->adap.nr, 
 + priv->irq);

 return 0;

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-gpio.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-gpio.c
@@ -112,7 +112,7 @@

retdesc = ERR_PTR(-EPROBE_DEFER);

-if (ret != -EPROBE_DEFER)
+if (PTR_ERR(retdesc) != -EPROBE_DEFER)
 dev_err(dev, "error trying to get descriptor: %d\n", ret);

return retdesc;
@@ -172,9 +172,9 @@
 * required for an I2C bus.
 */
 if (pdata->scl_is_open_drain)
-gflags = GPIOD_OUT_LOW;
+gflags = GPIOD_OUT_HIGH;
 else
-gflags = GPIOD_OUT_LOW_OPEN_DRAIN;
+gflags = GPIOD_OUT_HIGH_OPEN_DRAIN;
 priv->scl = i2c_gpio_get_desc(dev, "scl", 1, gflags);
 if (IS_ERR(priv->scl))
 return PTR_ERR(priv->scl);
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-highlander.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-highlander.c
@@ -382,7 +382,7 @@
 platform_set_drvdata(pdev, dev);
 dev->irq = platform_get_irq(pdev, 0);
-if (iic_force_poll)
+if (dev->irq < 0 || iic_force_poll)
 dev->irq = 0;

 if (dev->irq) {
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-hix5hd2.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-hix5hd2.c
@@ -498,6 +498,7 @@
i2c_del_adapter(&priv->adap);
 pm_runtime_disable(priv->dev);
 pm_runtime_set_suspended(priv->dev);
+clk_disable_unprepare(priv->clk);

 return 0;
 }
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-i801.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-i801.c
@@ -69,6 +69,7 @@
 * Cannon Lake-LP (PCH) 0x9da3 32 hardyesyesyes
 * Cedar Fork (PCH) 0x18df32hardyesyesyes
+* Comet Lake (PCH) 0x02a332hardyesyesyes
 *
* Features supported by this driver:
  * Software PECno
@@ -138,6 +139,7 @@
#define SBREG_BAR0x10
#define SBREG_SMBCTRL0xc6000c
+#define SBREG_SMBCTRL_DNV0xcf000c

/*! Host status bits for SMBPCISTS */
#define SMBPCISTS_INTS	BIT(3)
@@ -236,6 +238,7 @@
#define PCI_DEVICE_ID_INTEL_LEWISBURG_SSKU_SMBUS	0xa223
#define PCI_DEVICE_ID_INTEL_KABYLAKE_PCH_H_SMBUS0xa2a3
#define PCI_DEVICE_ID_INTEL_CANNONLAKE_H_SMBUS0xa323
+#define PCIDEVICE_ID_INTEL_COMETLAKE_SMBUS0x02a3

struct i801_mux_config {
  char *gpio_chip;
@@ -378,11 +381,9 @@
  dev_err(&priv->pci_dev->dev, "Transaction timeout\n");
  /* try to stop the current command */
  dev_dbg(&priv->pci_dev->dev, "Terminating the current operation\n");
-  -outb_p(inb_p(SMBHSTCNT(priv)) | SMBHSTCNT_KILL,
-           SMBHSTCNT(priv));
-  +outb_p(SMBHSTCNT_KILL, SMBHSTCNT(priv));
  usleep_range(1000, 2000);
-  -outb_p(inb_p(SMBHSTCNT(priv)) & (~SMBHSTCNT_KILL),
-           SMBHSTCNT(priv));
-  +outb_p(0, SMBHSTCNT(priv));

  /* Check if it worked */
  status = inb_p(SMBHSTSTS(priv));
@@ -965,8 +966,6 @@
  if (!(priv->features & FEATURE_HOST_NOTIFY))
    return;

-  -priv->original_slvcmd = inb_p(SMBSLVCMD(priv));
-  -
-  if (!((SMBSLVCMD_HST_NTFY_INTREN & priv->original_slvcmd))
+  outb_p(SMBSLVCMD_HST_NTFY_INTREN | priv->original_slvcmd,
    -SMBSLVCMD(priv));
@@ -1035,6 +1034,7 @@
      { PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_CANNONLAKE_LP_SMBUS) },
      { PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_COMETLAKE_SMBUS) },
      { 0, }
+{ PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_COMETLAKE_SMBUS) },
  ;
spin_unlock(&p2sb_spinlock);

res = &tco_res[ICH_RES_MEM_OFF];
-res->start = (resource_size_t)base64_addr + SBREG_SMBCTRL;
+if (pci_dev->device == PCI_DEVICE_ID_INTEL_DNV_SMBUS)
 +res->start = (resource_size_t)base64_addr + SBREG_SMBCTRL_DNV;
+else
+res->start = (resource_size_t)base64_addr + SBREG_SMBCTRL;
+
res->end = res->start + 3;
res->flags = IORESOURCE_MEM;

static bool i801_acpi_is_smbus_ioport(const struct i801_priv *priv,
				acpi_physical_address address)
{
+return address >= priv->smba &&
+address <= pci_resource_end(priv->pci_dev, SMBBAR);
+
static acpi_status
i801_acpi_io_handler(u32 function, acpi_physical_address address, u32 bits,
				u64 *value, void *handler_context, void *region_context)
{
+mutex_lock(&priv->acpi_lock);
-
-if (!priv->acpi_reserved) {
+if (!priv->acpi_reserved && i801_acpi_is_smbus_ioport(priv, address)) {

priv->acpi_reserved = true;

dev_warn(&pdev->dev, "BIOS is accessing SMBus registers\n");

static inline void i801_acpi_remove(struct i801_priv *priv) { }

+static unsigned char i801_setup_hstcfg(struct i801_priv *priv)
+
{ +
unsigned char hstcfg = priv->original_hstcfg;
+
+hstcfg &= ~SMBHSTCFG_I2C_EN; /* SMBus timing */
+hstcfg |= SMBHSTCFG_HST_EN;
+pci_write_config_byte(priv->pci_dev, SMBHSTCFG, hstcfg);
return hstcfg;
}
+
static int i801_probe(struct pci_dev *dev, const struct pci_device_id *id)
{
    unsigned char temp;
    case PCI_DEVICE_ID_INTEL_CDF_SMBUS:
    case PCI_DEVICE_ID_INTEL_DNV_SMBUS:
    case PCI_DEVICE_ID_INTEL_KABYLAKE_PCH_H_SMBUS:
    case PCI_DEVICE_ID_INTEL_COMETLAKE_SMBUS:
        priv->features |= FEATURE_I2C_BLOCK_READ;
        priv->features |= FEATURE_IRQ;
        priv->features |= FEATURE_SMBUS_PEC;
    return err;
}

-pci_read_config_byte(priv->pci_dev, SMBHSTCFG, &temp);
-priv->original_hstcfg = temp;
-temp &= ~SMBHSTCFG_I2C_EN;/* SMBus timing */
-if (!((temp & SMBHSTCFG_HST_EN)) { 
    +pci_read_config_byte(priv->pci_dev, SMBHSTCFG, &priv->original_hstcfg);
    +temp = i801_setup_hstcfg(priv);
    +if (!((priv->original_hstcfg & SMBHSTCFG_HST_EN))
    dev_info(&dev->dev, "Enabling SMBus device\n");
    -temp |= SMBHSTCFG_HST_EN;
    -}
    -pci_write_config_byte(priv->pci_dev, SMBHSTCFG, temp);

if (temp & SMBHSTCFG_SMB_SMI_EN) {
    dev_dbg(&dev->dev, "SMBus using interrupt SMI\n");
    outb_p(inb_p(SMBAUXCTL(priv)) &
    ~((SMBAUXCTL_CRC | SMBAUXCTL_E32B), SMBAUXCTL(priv));
    /* Remember original Host Notify setting */
    +if (priv->features & FEATURE_HOST_NOTIFY)
    +priv->original_slvcmd = inb_p(SMBSLVCMD(priv));
    +
    /* Default timeout in interrupt mode: 200 ms */
    priv->adapter.timeout = HZ / 5;
    @ @ -1669.6 +1691.7 @@
}

pci_set_drvdata(dev, priv);
+dev_pm_set_driver_flags(&dev->dev, DPM_FLAG_NEVER_SKIP);
pm_runtime_set_autosuspend_delay(&dev->dev, 1000);
pm_runtime_use_autosuspend(&dev->dev);
pm_runtime_put_autosuspend(&dev->dev);
@@ -1698,6 +1721,15 @@
 */
 }

+static void i801_shutdown(struct pci_dev *dev)
+{
+struct i801_priv *priv = pci_get_drvdata(dev);
+ /* Restore config registers to avoid hard hang on some systems */
+i801_disable_host_notify(priv);
+pci_write_config_byte(dev, SMBHSTCFG, priv->original_hstcfg);
+}
+
+#ifdef CONFIG_PM
static int i801_suspend(struct device *dev)
{
 @@ -1713,20 +1745,21 @@
 struct pci_dev *pci_dev = to_pci_dev(dev);
 struct i801_priv *priv = pci_get_drvdata(pci_dev);
 i801_setup_hstcfg(priv);
 i801_enable_host_notify(&priv->adapter);

 return 0;
 }
 #endif

-static UNIVERSAL_DEV_PM_OPS(i801_pm_ops, i801_suspend,
- i801_resume, NULL);
+static SIMPLE_DEV_PM_OPS(i801_pm_ops, i801_suspend, i801_resume);

 static struct pci_driver i801_driver = {
 .name = "i801_smbus",
 .id_table = i801_ids,
 .probe = i801_probe,
 .remove = i801_remove,
 +.shutdown = i801_shutdown,
 .driver = {
 .pm = &i801_pm_ops,
 },
 --- linux-4.15.0.orig/drivers/i2c/busses/i2c-imx.c
 +++ linux-4.15.0/drivers/i2c/busses/i2c-imx.c
 @@ -194,6 +194,7 @@
 struct imx_i2c_struct {
 struct i2c_adapter adapter;
struct clk *clk;
+struct notifier_block clk_change_nb;
void __iomem *base;
wait_queue_head_t *queue;
unsigned long i2csr;
@@ -376,6 +377,7 @@
goto err_desc;
 }

+reinit_completion(&dma->cmd_complete);
txdesc->callback = i2c_imx_dma_callback;
txdesc->callback_param = i2c_imx;
if (dma_submit_error(dmaengine_submit(txdesc))) {
 @@ -411,6 +413,19 @@
dma->chan_using = NULL;
 }

+static void i2c_imx_clear_irq(struct imx_i2c *i2c_imx, unsigned int bits)
+{
+unsigned int temp;
+
+/*
+ * i2sr_clr_opcode is the value to clear all interrupts. Here we want to
+ * clear only <bits>, so we write ~i2sr_clr_opcode with just <bits>
+ * toggled. This is required because i.MX needs W0C and Vybrid uses W1C.
+ */
+temp = ~i2c_imx->hwdata->i2sr_clr_opcode ^ bits;
+i2c_imx->write_reg(temp, i2c_imx, IMX_I2C_I2SR);
+}
+
+static int i2c_imx_bus_busy(struct imx_i2c *i2c_imx, int for_busy)
+{
+unsigned long orig_jiffies = jiffies;
+ @@ -423,8 +438,7 @@
+ /* check for arbitration lost */
+ if (temp & I2SR_IAL) {
+ -temp &= ~I2SR_IAL;
+ -i2c_imx_write_reg(temp, i2c_imx, IMX_I2C_I2SR);
+ i2c_imx_clear_irq(i2c_imx, I2SR_IAL);
+ return -EAGAIN;
+ }
+ @@ -451,6 +465,16 @@
+ dev_dbg(&i2c_imx->adapter.dev, "%s Timeout\n", __func__);
+ return -ETIMEDOUT;
+ }

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/* check for arbitration lost */
+if (i2c_imx->i2csr & I2SR_IAL) {
+dev_dbg(&i2c_imx->adapter.dev, "<%s> Arbitration lost\n", __func__);  
i2c_imx_clear_irq(i2c_imx, I2SR_IAL);
+  i2c_imx->i2csr = 0;
+  return -EAGAIN;
+}
+
dev_dbg(&i2c_imx->adapter.dev, "<%s> TRX complete\n", __func__);  
i2c_imx->i2csr = 0;
return 0;
@@ -467,15 +491,14 @@
return 0;
}

-static void i2c_imx_set_clk(struct imx_i2c_struct *i2c_imx)
+static void i2c_imx_set_clk(struct imx_i2c_struct *i2c_imx, 
+    unsigned int i2c_clk_rate)
{  
  struct imx_i2c_clk_pair *i2c_clk_div = i2c_imx->hwdata->clk_div;
-  unsigned int div = (unsigned int) (i2c_clk_rate * 1000000) / i2c_clk_div;
-unsigned int div = i2c_clk_rate;
  unsigned int div;
  int i;

  /* Divider value calculation */
  -i2c_clk_rate = clk_get_rate(i2c_imx->clk);
  if (i2c_imx->cur_clk == i2c_clk_rate)
  return;
@@ -510,6 +533,20 @@
  #endif
}

+static int i2c_imx_clk_notifier_call(struct notifier_block *nb, 
+    unsigned long action, void *data)
+{
+  struct clk_notifier_data *ndata = data;
+  struct imx_i2c_struct *i2c_imx = container_of(&ndata->clk, 
+    struct imx_i2c_struct,
+    clk);
+  
+  +if (action & POST_RATE_CHANGE)
+  i2c_imx_set_clk(i2c_imx, ndata->new_rate);
+  +return NOTIFY_OK;
+}
+
static int i2c_imx_start(struct imx_i2c_struct *i2c_imx) {
    unsigned int temp = 0;
    @ @ -517.8 +554.6 @ @

dev_dbg(&i2c_imx->adapter.dev, "<%s\n", __func__);

-i2c_imx_set_clk(i2c_imx);

    imx_i2c_write_reg(i2c_imx->ifrdr, i2c_imx, IMX_I2C_IFDR);
    /* Enable I2C controller */
    imx_i2c_write_reg(i2c_imx->hwdata->i2sr_clr_opcode, i2c_imx, IMX_I2C_I2SR);
    @ @ -582.9 +617.7 @ @
    if (temp & I2SR_IIF) {
    /* save status register */
    i2c_imx->i2csr = temp;
    -temp &= ~I2SR_IIF;
    -temp |= (i2c_imx->hwdata->i2sr_clr_opcode & I2SR_IIF);
    -imx_i2c_write_reg(temp, i2c_imx, IMX_I2C_I2SR);
    +i2c_imx_clear_irq(i2c_imx, I2SR_IIF);
    wake_up(&i2c_imx->queue);
    return IRQ_HANDLED;
    }
    @ @ -619.7 +652.6 @ @
    * The first byte must be transmitted by the CPU.
    */
    imx_i2c_write_reg(msgs->addr << 1, i2c_imx, IMX_I2C_I2DR);
    -reinit_completion(&i2c_imx->dma->cmd_complete);
    time_left = wait_for_completion_timeout(
        &i2c_imx->dma->cmd_complete,
        msecs_to_jiffies(DMA_TIMEOUT));
    @ @ -665.9 +697.6 @ @
    struct imx_i2c_dma *dma = i2c_imx->dma;
    struct device *dev = &i2c_imx->adapter.dev;

    -temp = imx_i2c_read_reg(i2c_imx, IMX_I2C_I2CR);
    -temp |= I2CR_DMAEN;
    -imx_i2c_write_reg(temp, i2c_imx, IMX_I2C_I2CR);

dma->chan_using = dma->chan_rx;
dma->dma_transfer_dir = DMA_DEV_TO_MEM;
    @ @ -678.7 +707.6 @ @
    if (result)
    return result;
    -reinit_completion(&i2c_imx->dma->cmd_complete);
    time_left = wait_for_completion_timeout(
        &i2c_imx->dma->cmd_complete,
msecs_to_jiffies(DMA_TIMEOUT));
@@ -781,6 +809,7 @@
int i, result;
unsigned int temp;
int block_data = msgs->flags & I2C_M_RECV_LEN;
+int use_dma = i2c_imx->dma && msgs->len >= DMA_THRESHOLD && !block_data;

dev_dbg(&i2c_imx->adapter.dev,
    "<%s> write slave address: addr=0x%x\n",
@@ -807,12 +836,14 @@
    */
    if ((msgs->len - 1) || block_data)
        temp &= ~I2CR_TXAK;
    +if (use_dma)
        +temp |= I2CR_DMAEN;
    imx_i2c_write_reg(temp, i2c_imx, IMX_I2C_I2CR);
    imx_i2c_read_reg(i2c_imx, IMX_I2C_I2DR); /* dummy read */

dev_dbg(&i2c_imx->adapter.dev, "<%s> read data\n", __func__);

-if (i2c_imx->dma && msgs->len >= DMA_THRESHOLD && !block_data)
    +if (use_dma)
        return i2c_imx_dma_read(i2c_imx, msgs, is_lastmsg);
    /* read data */
@@ -1089,7 +1120,8 @@
    /* Get I2C clock */
    i2c_imx->clk = devm_clk_get(&pdev->dev, NULL);
    if (IS_ERR(i2c_imx->clk)) {
        -dev_err(&pdev->dev, "can't get I2C clock\n");
        +if (PTR_ERR(i2c_imx->clk) != -EPROBE_DEFER)
            +dev_err(&pdev->dev, "can't get I2C clock\n");
        return PTR_ERR(i2c_imx->clk);
    }

@@ -1099,14 +1131,6 @@
    return ret;
}

-/* Request IRQ */
- ret = devm_request_irq(&pdev->dev, irq, i2c_imx_isr, IRQF_SHARED, 
-pdev->name, i2c_imx);
- if (ret) {
-    -dev_err(&pdev->dev, "can't claim irq %d\n", irq);
-    goto clk_disable;
- }
- /* Init queue */
init_waitqueue_head(&i2c_imx->queue);

@@ -1125,12 +1149,23 @@
 if (ret < 0)
 goto rpm_disable;

+/* Request IRQ */
+ret = request_threaded_irq(irq, i2c_imx_isr, NULL, IRQF_SHARED,
+    pdev->name, i2c_imx);
+if (ret) {
+    /* Request IRQ */
+    dev_err(&pdev->dev, "can't claim irq %d
", irq);
+    goto rpm_disable;
+}
+
+/* Set up clock divider */
i2c_imx->bitrate = IMX_I2C_BIT_RATE;
ret = of_property_read_u32(pdev->dev.of_node,
    "clock-frequency", &i2c_imx->bitrate);
if (ret < 0 && pdata && pdata->bitrate)
i2c_imx->bitrate = pdata->bitrate;
+i2c_imx->clk_change_nb.notifier_call = i2c_imx_clk_notifier_call;
+clk_notifier_register(i2c_imx->clk, &i2c_imx->clk_change_nb);
+i2c_imx_set_clk(i2c_imx, clk_get_rate(i2c_imx->clk));

/* Set up chip registers to defaults */
imx_i2c_write_reg(i2c_imx->hwdata->i2cr_ien_opcode ^ I2CR_IEN,
    @ @ -1141,12 +1176,12 @@
ret = i2c_imx_init_recovery_info(i2c_imx, pdev);
/* Give it another chance if pinctrl used is not ready yet */
if (ret == -EPROBE_DEFER)
    goto rpm_disable;
+goto clk_notifier_unregister;

/* Add I2C adapter */
ret = i2c_add_numbered_adapter(&i2c_imx->adapter);
if (ret < 0)
    goto rpm_disable;
+goto clk_notifier_unregister;

pm_runtime_mark_last_busy(&pdev->dev);
pm_runtime_put_autosuspend(&pdev->dev);
@@ -1162,13 +1197,14 @@
return 0; /* Return OK */

+clk_notifier_unregister:
+clk_notifier_unregister(i2c_imx->clk, &i2c_imx->clk_change_nb);
+free_irq(irq, i2c_imx);
rpm_disable:
    pm_runtime_put_noidle(&pdev->dev);
    pm_runtime_disable(&pdev->dev);
    pm_runtime_set_suspended(&pdev->dev);
    pm_runtime_dont_use_autosuspend(&pdev->dev);
-    clk_disable:
    clk_disable_unprepare(i2c_imx->clk);
    return ret;
}
@@ -1176,7 +1212,7 @@
static int i2c_imx_remove(struct platform_device *pdev)
{
    struct imx_i2c_struct *i2c_imx = platform_get_drvdata(pdev);
    -    int ret;
    +    int irq, ret;
    ret = pm_runtime_get_sync(&pdev->dev);
    if (ret < 0)
@@ -1195,6 +1231,10 @@
    imx_i2c_write_reg(0, i2c_imx, IMX_I2C_I2SR);
    +    clk_notifier_unregister(i2c_imx->clk, &i2c_imx->clk_change_nb);
    +    irq = platform_get_irq(pdev, 0);
    +    if (irq >= 0)
    +        free_irq(irq, i2c_imx);
    clk_disable_unprepare(i2c_imx->clk);

    pm_runtime_put_noidle(&pdev->dev);
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-iop3xx.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-iop3xx.c
@@ -456,16 +456,14 @@
    irq = platform_get_irq(pdev, 0);
    if (irq < 0) {
        -ret = -ENOXIO;
    +ret = irq;
        goto unmap;
    }
    ret = request_irq(irq, iop3xx_i2c_irq_handler, 0,
    pdev->name, adapter_data);
    -if (ret) {
    -ret = -EIO;
    +if (ret)
        goto unmap;
    -}
memcpy(new_adapter->name, pdev->name, strlen(pdev->name));
new_adapter->owner = THIS_MODULE;

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-jz4780.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-jz4780.c
@@ -82,25 +82,6 @@
#define JZ4780_I2C_STA_TFNF		BIT(1)
#define JZ4780_I2C_STA_ACT		BIT(0)

-static const char * const jz4780_i2c_abrt_src[] = {
-"ABRT_7B_ADDR_NOACK",
-"ABRT_10ADDR1_NOACK",
-"ABRT_10ADDR2_NOACK",
-"ABRT_XDATA_NOACK",
-"ABRT_GCALL_NOACK",
-"ABRT_GCALL_READ",
-"ABRT_HS_ACKD",
-"SBYTE_ACKDET",
-"ABRT_HS_NORSTRT",
-"SBYTE_NORSTRT",
-"ABRT_10B_RD_NORSTRT",
-"ABRT_MASTER_DIS",
-"ARB_LOST",
-"SLVFLUSH_TXFIFO",
-"SLV_ARBLOST",
-"SLVRD_INTX",
-};
-
#define JZ4780_I2C_INTST_IGC		BIT(11)
#define JZ4780_I2C_INTST_ISTT		BIT(10)
#define JZ4780_I2C_INTST_ISTP		BIT(9)

-static void jz4780_i2c_txabrt(struct jz4780_i2c *i2c, int src)
{| int i;
-  -dev_err(&i2c->adap.dev, "txabrt: 0x%08x\n", src);
-  -dev_err(&i2c->adap.dev, "device addr=%x\n",
-    jz4780_i2c_readw(i2c, JZ4780_I2C_TAR));
-  -dev_err(&i2c->adap.dev, "send cmd count:%d %d\n",
-    i2c->cmd, i2c->cmd_buff[i2c->cmd]);
-  -dev_err(&i2c->adap.dev, "receive data count:%d %d\n",
-    i2c->cmd, i2c->data_buf[i2c->cmd]);
-  -for (i = 0; i < 16; i++) {
-    -if (src & BIT(i))
-    -dev_dbg(&i2c->adap.dev, "%2C TXABRT[%d]=%s\n",
|
static inline int jz4780_i2c_xfer_read(struct jz4780_i2c *i2c, 
    @ @ -792,7 +760,10 @ @

jz4780_i2c_writew(i2c, JZ4780_I2C_INTM, 0x0);

-i2c->irq = platform_get_irq(pdev, 0);
+ret = platform_get_irq(pdev, 0);
+if (ret < 0)
++goto err;
+i2c->irq = ret;
ret = devm_request_irq(&pdev->dev, i2c->irq, jz4780_i2c_irq, 0,
    -- linux-4.15.0.orig/drivers/i2c/busses/i2c-meson.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-meson.c
@@ -8,6 +8,7 @@
 * published by the Free Software Foundation.
 */

+#include <linux/bitfield.h>
#include <linux/clk.h>
#include <linux/completion.h>
#include <linux/i2c.h>
@ @ -.34,12 +35,17 @ @
#define REG_CTRL_ACK_IGNOREBIT(1)
#define REG_CTRL_STATUSBIT(2)
#define REG_CTRL_ERRORBIT(3)
-#define REG_CTRL_CLKDIV_SHIFT12
-#define REG_CTRL_CLKDIV_MASKGENMASK(21, 12)
-#define REG_CTRL_CLKDIVEXIST_SHIFT 28
-#define REG_CTRL_CLKDIVEXIST_MASKGENMASK(29, 28)
+#define REG_CTRL_CLKDIVGENMASK(21, 12)
+#define REG_CTRL_CLKDIVEXISTGENMASK(29, 28)
+
+#define REG_SLV_ADDRGENMASK(7, 0)
+#define REG_SLV_SDA_FILTERGENMASK(10, 8)
+#define REG_SLV_SCL_FILTERGENMASK(13, 11)
+#define REG_SLV_SCL_LOWGENMASK(27, 16)
+#define REG_SLV_SCL_LOW_ENBIT(28)

#define I2C_TIMEOUT_MS	500
#define FILTER_DELAY	15

---
enum {
    TOKEN_END = 0,
    @@ -128,19 +134,24 @@
    unsigned long clk_rate = clk_get_rate(i2c->clk);
    unsigned int div;

    - div = DIV_ROUND_UP(clk_rate, freq * 4);
    + div = DIV_ROUND_UP(clk_rate, freq);
    + div = FILTER_DELAY;
    + div = DIV_ROUND_UP(div, 4);

    /* clock divider has 12 bits */
    - if (div >= (1 << 12)) {
    + if (div > GENMASK(11, 0)) {
        dev_err(i2c->dev, "requested bus frequency too low\n");
        - div = (1 << 12) - 1;
        + div = GENMASK(11, 0);
    }

    - meson_i2c_set_mask(i2c, REG_CTRL, REG_CTRL_CLKDIV_MASK,
    - (div & GENMASK(9, 0)) << REG_CTRL_CLKDIV_SHIFT);
    + meson_i2c_set_mask(i2c, REG_CTRL, REG_CTRL_CLKDIV,
    + FIELD_PREP(REG_CTRL_CLKDIV, div & GENMASK(9, 0)));
    +
    + meson_i2c_set_mask(i2c, REG_CTRL, REG_CTRL_CLKDIVEX,  
    + FIELD_PREP(REG_CTRL_CLKDIVEX, div >> 10));

    - meson_i2c_set_mask(i2c, REG_CTRL, REG_CTRL_CLKDIVEX_MASK,
    - (div >> 10) << REG_CTRL_CLKDIVEX_SHIFT);
    + /* Disable HIGH/LOW mode */
    + meson_i2c_set_mask(i2c, REG_SLAVE_ADDR, REG_SLV_SCL_LOW_EN, 0);

dev_dbg(i2c->dev, "$s: clk %lu, freq %u, div %u\n", __func__,
    clk_rate, freq, div);
    @@ -269,7 +280,10 @@
token = (msg->flags & I2C_M_RD) ? TOKEN_SLAVE_ADDR_READ :
    meson_i2c_add_token(i2c, TOKEN_START);
    meson_i2c_add_token(i2c, token);
}
@@ -425,6 +439,10 @@
return ret;
}

+/* Disable filtering */
+meson_i2c_set_mask(i2c, REG_SLAVE_ADDR, 
+ REG_SLV_SDA_FILTER | REG_SLV_SCL_FILTER, 0); 
+meson_i2c_set_clk_div(i2c, timings.bus_freq_hz);

return 0;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-mpc.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-mpc.c
@@ -23,6 +23,7 @@
#
#include <linux/clk.h>
#include <linux/io.h>
+#include <linux/iopoll.h>
#include <linux/fsl_devices.h>
#include <linux/i2c.h>
#include <linux/interrupt.h>
@@ -49,6 +50,7 @@
#define CCR_MTX  0x10
#define CCR_TXAK 0x08
#define CCR_RSTA 0x04
+#define CCR_RSVD 0x02

#define CSR_MCF  0x80
#define CSR_MAAS 0x40
@@ -70,6 +72,7 @@
   u8 fdr, dfsrr;
   #endif
   struct clk *clk_per;
+bool has_errata_A004447;
};

struct mpc_i2c_divider {
@@ -178,6 +181,75 @@
   return 0;
}

+static int i2c_mpc_wait_sr(struct mpc_i2c *i2c, int mask)
+{
+void __iomem *addr = i2c->base + MPC_I2C_SR;
+u8 val;
+return readb_poll_timeout(addr, val, val & mask, 0, 100);
+}
+/*
 + * Workaround for Erratum A004447. From the P2040CE Rev Q
 + *
 + * 1. Set up the frequency divider and sampling rate.
 + * 2. I2CCR - a0h
 + * 3. Poll for I2CSR[MBB] to get set.
 + * 4. If I2CSR[MAL] is set (an indication that SDA is stuck low), then go to
 + *    step 5. If MAL is not set, then go to step 13.
 + * 5. I2CCR - 00h
 + * 6. I2CCR - 22h
 + * 7. I2CCR - a2h
 + * 9. Issue read to I2CDR.
 + * 11. I2CCR - 82h
 + * 12. Workaround complete. Skip the next steps.
 + * 13. Issue read to I2CDR.
 + * 15. I2CCR - 80h
 + */
+static void mpc_i2c_fixup_A004447(struct mpc_i2c *i2c)
{+
  int ret;
  u32 val;

  writeccr(i2c, CCR_MEN | CCR_MSTA);
  ret = i2c_mpc_wait_sr(i2c, CSR_MBB);
  if (ret) {
    dev_err(i2c->dev, "timeout waiting for CSR_MBB\n");
    return;
  }

  val = readb(i2c->base + MPC_I2C_SR);
  if (val & CSR_MAL) {
    writeccr(i2c, 0x00);
    writeccr(i2c, CCR_MSTA | CCR_RSVD);
    writeccr(i2c, CCR_MEN | CCR_MSTA | CCR_RSVD);
    ret = i2c_mpc_wait_sr(i2c, CSR_MBB);
    if (ret) {
      dev_err(i2c->dev, "timeout waiting for CSR_MBB\n");
      return;
    }
    val = readb(i2c->base + MPC_I2C_SR);
  }

  ret = i2c_mpc_wait_sr(i2c, CSR_MIF);
  if (ret) {
    dev_err(i2c->dev, "timeout waiting for CSR_MIF\n");
    return;
  }

  val = readb(i2c->base + MPC_I2C_DR);
  ret = i2c_mpc_wait_sr(i2c, CSR_MIF);
  if (ret) {
    dev_err(i2c->dev, "timeout waiting for CSR_MIF\n");
    return;
  }
}
{ 
+ val = readb(i2c->base + MPC_I2C_DR); 
+ ret = i2c_mpc_wait_sr(i2c, CSR_MIF); 
+ if (ret) {
+ dev_err(i2c->dev, "timeout waiting for CSR_MIF\n"); 
+ return; 
+ }
+
+ writeccr(i2c, CCR_MEN | CCR_RSVD);
+}
}

if defined(CONFIG_PPC_MPC52xx) || defined(CONFIG_PPC_MPC512x)
static const struct mpc_i2c_divider mpc_i2c_dividers_52xx[] = {
    {20, 0x20}, {22, 0x21}, {24, 0x22}, {26, 0x23},
}

static int fsl_i2c_bus_recovery(struct i2c_adapter *adap)
{
	struct mpc_i2c *i2c = i2c_get_adapdata(adap);
	if (i2c->has_errata_A004447)
		mpc_i2c_fixup_A004447(i2c);
	else
		mpc_i2c_fixup(i2c);
	return 0;
}
static const struct i2c_algorithm mpc_algo = {
    .master_xfer = mpc_xfer,
    .functionality = mpc_functionality,
    .timeout = HZ,
};

static struct i2c_bus_recovery_info fsl_i2c_recovery_info = {
    .recovery = fsl_i2c_recovery,
};

static const struct of_device_id mpc_i2c_of_match[];

static int fsl_i2c_probe(struct platform_device *op)
{
    dev_info(i2c->dev, "timeout %u us\n", mpc_ops.timeout * 1000000 / HZ);

    platform_set_drvdata(op, i2c);

    if (of_property_read_bool(op->dev.of_node, "fsl,i2c-erratum-a004447"))
        i2c->has_errata_A004447 = true;

    i2c->adap = mpc_ops;
    of_address_to_resource(op->dev.of_node, 0, &res);

    i2c_set_adapdata(&i2c->adap, i2c);
    i2c->adap.dev.parent = &op->dev;
    i2c->adap.dev.of_node = of_node_get(op->dev.of_node);
    i2c->adap.bus_recovery_info = &fsl_i2c_recovery_info;

    result = i2c_add_adapter(&i2c->adap);
    if (result < 0)
        --- linux-4.15.0.orig/drivers/i2c/busses/i2c-mt65xx.c
        +++ linux-4.15.0/drivers/i2c/busses/i2c-mt65xx.c
        @@ -740,7 +740,7 @
        return PTR_ERR(i2c->pdmabase);

    irq = platform_get_irq(pdev, 0);
    if (irq <= 0)
        --- linux-4.15.0.orig/drivers/i2c/busses/i2c-mv64xxx.c
        +++ linux-4.15.0/drivers/i2c/busses/i2c-mv64xxx.c
        @@ -844,12 +844,16 @
        *
if (of_device_is_compatible(np, "marvell,mv78230-i2c")) {
    drv_data->offload_enabled = true;
    drv_data->errata_delay = true;
    /* The delay is only needed in standard mode (100kHz) */
    if (bus_freq <= 100000)
        drv_data->errata_delay = true;
}

if (of_device_is_compatible(np, "marvell,mv78230-a0-i2c")) {
    drv_data->offload_enabled = false;
    drv_data->errata_delay = true;
    /* The delay is only needed in standard mode (100kHz) */
    if (bus_freq <= 100000)
        drv_data->errata_delay = true;
}

if (of_device_is_compatible(np, "allwinner,sun6i-a31-i2c"))
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-octeon-core.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-octeon-core.c
@@ -233,6 +233,7 @@
     return -EOPNOTSUPP;
 case STAT_TXDATA_NAK:
     return -EIO;
 case STAT_TXADDR_NAK:
 case STAT_RXADDR_NAK:
@@ -346,7 +347,7 @@
     if (result)
         return result;
     if (recv_len && i == 0) {
-         if (data[i] > I2C_SMBUS_BLOCK_MAX + 1)
+         if (data[i] > I2C_SMBUS_BLOCK_MAX)
             return -EPROTO;
         length += data[i];
     }
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-omap.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-omap.c
@@ -43,7 +43,7 @@
 #define TWSI_CTL_AAK	0x04 /* Assert ACK */
 /* Status values */
 #define STAT_ERROR	0x00
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-omap.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-omap.c
@@ -43,7 +43,7 @@
 #define TWSI_CTL_AAK	0x04 /* Assert ACK */
 /* Status values */
 #define STAT_ERROR	0x00
"
```c
+++ linux-4.15.0/drivers/i2c/busses/i2c-omap.c
@@ -1498,8 +1498,7 @@
       return 0;
 }

-#ifdef CONFIG_PM
-#define omap_i2c_runtime_suspend(struct device *dev)
+static int omap_i2c_runtime_suspend(struct device *dev)
 {  
   struct omap_i2c_dev *omap = dev_get_drvdata(dev);

@@ -1525,7 +1524,7 @@
  return 0;
 }

-#define omap_i2c_runtime_resume(struct device *dev)
+#define omap_i2c_runtime_resume(struct device *dev)
 {  
   struct omap_i2c_dev *omap = dev_get_drvdata(dev);

@@ -1540,20 +1539,18 @@
 
 static struct pm_ops omap_i2c_pm_ops = {
   SET_NOIRQ_SYSTEM_SLEEP_PM_OPS(pm_runtime_force_suspend,
+   SET_RUNTIME_PM_OPS(omap_i2c_runtime_suspend,
       omap_i2c_runtime_resume, NULL)
   );
-#define OMAP_I2C_PM_OPS (&omap_i2c_pm_ops)
-#else
-#define OMAP_I2C_PM_OPS NULL
-#endif /* CONFIG_PM */

 static struct platform_driver omap_i2c_driver = {
   .probe = omap_i2c_probe,
   .remove = omap_i2c_remove,
   .driver = {
     .name = "omap_i2c",
     .pm = OMAP_I2C_PM_OPS,
+     pm = omap_i2c_pm_ops,
     .of_match_table = of_match_ptr(omap_i2c_of_match),
   },
   
```
} else if (np) {
    i2c->adap.timeout = HZ;
    -i2c->gpio = devm_gpiod_get_optional(&pdev->dev, "reset-gpios", GPIOD_OUT_LOW);
    +i2c->gpio = devm_gpiod_get_optional(&pdev->dev, "reset", GPIOD_OUT_LOW);
    if (IS_ERR(i2c->gpio))
        return PTR_ERR(i2c->gpio);
    of_property_read_u32_index(np, "clock-frequency", 0,
    --- linux-4.15.0.orig/drivers/i2c/busses/i2c-piix4.c
    +++ linux-4.15.0/drivers/i2c/busses/i2c-piix4.c
    @@ -99,7 +99,7 @@
    #define SB800_PII4_PORT_IDX_MASK0x06
    #define SB800_PII4_PORT_IDX_SHIFT1

    /* On kerncz, SmBus0Sel is at bit 20:19 of PMx00 DecodeEn */
    */ On kerncz and Hudson2, SmBus0Sel is at bit 20:19 of PMx00 DecodeEn */
    #define SB800_PII4_PORT_IDX_KERN0x02
    #define SB800_PII4_PORT_IDX_MASK_KERN0x18
    #define SB800_PII4_PORT_IDX_SHIFT_KERN0x3
    @@ -359,18 +359,16 @@
    /* Find which register is used for port selection */
    if (PIIX4_dev->vendor == PCI_VENDOR_ID_AMD) {
        -switch (PIIX4_dev->device) {
        -case PCI_DEVICE_ID_AMD_KERN0_SMBUS:
        +if (PIIX4_dev->device == PCI_DEVICE_ID_AMD_KERN0_SMBUS ||
        + PIIX4_dev->device == PCI_DEVICE_ID_AMD_HUDSON2_SMBUS &
        + PIIX4_dev->revision >= 0x1F)) {
            piix4_port_sel_sb800 = SB800_PII4_PORT_IDX_KERN0;
            piix4_port_mask_sb800 = SB800_PII4_PORT_IDX_MASK_KERN0;
            piix4_port_shift_sb800 = SB800_PII4_PORT_IDX_SHIFT_KERN0;
            -break;
        -case PCI_DEVICE_ID_AMD_HUDSON2_SMBUS:
        + default:
        + } else {
            piix4_port_sel_sb800 = SB800_PII4_PORT_IDX_ALT;
            piix4_port_mask_sb800 = SB800_PII4_PORT_IDX_MASK;
            piix4_port_shift_sb800 = SB800_PII4_PORT_IDX_SHIFT;
            -break;
        }
    }
    } else {
        mutex_lock(&piix4_mutex_sb800);
        @@ -962,7 +960,8 @@
        }

    if (dev->vendor == PCI_VENDOR_ID_AMD &
        - dev->device == PCI_DEVICE_ID_AMD_HUDSON2_SMBUS) {
    + (dev->device == PCI_DEVICE_ID_AMD_HUDSON2_SMBUS ||
    + dev->device == PCI_DEVICE_ID_AMD_KERN0_SMBUS)) {

retval = piix4_setup_sb800(dev, id, 1);
}

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-pmcmsp.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-pmcmsp.c
@@ -564,10 +564,10 @@
 * TODO: We could potentially loop and retry in the case
 * of MSP_TWI_XFER_TIMEOUT.
 */
-\t	return -1;
+\t	return -EIO;
}
-\treturn 0;
+\treturn num;
}

static u32 pmcmsptwi_i2c_func(struct i2c_adapter *adapter)
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-pxa.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-pxa.c
@@ -315,11 +315,10 @@
dev_err(dev, "IBMR: %08x IDBR: %08x ICR: %08x ISR: %08x\n",
        readl(_IBMR(i2c)), readl(_IDBR(i2c)), readl(_ICR(i2c)),
        readl(_ISR(i2c)));
-dev_dbg(dev, "log: ");
+dev_dbg(dev, "log: ");
for (i = 0; i < i2c->irqlogidx; i++)
-\tpr_debug("[%08x:%08x] ", i2c->isrlog[i], i2c->icrlog[i]);
-\tpr_debug("\n");
+\tpr_cont(" [%03x:%05x]", i2c->isrlog[i], i2c->icrlog[i]);
+\tpr_cont("\n");
}
#else /* ifdef DEBUG */
@@ -709,11 +708,9 @@
{
  u32 icr;

-/*
- * Clear the STOP and ACK flags
- */
+/* Clear the START, STOP, ACK, TB and MA flags */
  icr = readl(_ICR(i2c));
  icr &= ~(ICR_STOP | ICR_ACKNAK);
+  icr &= ~(ICR_START | ICR_STOP | ICR_ACKNAK | ICR_TB | ICR_MA);
  writel(icr, _ICR(i2c));
}
/* Copyright (c) 2012-2016, The Linux Foundation. All rights reserved. */
/* Copyright (C) 2017 Linaro Ltd. */
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* GNU General Public License for more details.
*/

#include <linux/clk.h>
#include <linux/completion.h>
#include <linux/i2c.h>
#include <linux/io.h>
#include <linux/interrupt.h>
#include <linux/module.h>
#include <linux/platform_device.h>
#include <linux/of.h>

#define CCI_HW_VERSION		0x0
#define CCI_RESET_CMD		0x004
#define CCI_RESET_CMD_MASK	0x0f73f3f7
#define CCI_RESET_CMD_M0_MASK	0x000003f1
#define CCI_RESET_CMD_M1_MASK	0x0003f001
#define CCI_QUEUE_START		0x008
#define CCI_HALT_REQ		0x034
#define CCI_HALT_REQ_I2C_M0_Q0Q1	BIT(0)
#define CCI_HALT_REQ_I2C_M1_Q0Q1	BIT(1)

#define CCI_I2C_Mm_SCL_CTL(m)		(0x100 + 0x100 * (m))
#define CCI_I2C_Mm_SDA_CTL_0(m)		(0x104 + 0x100 * (m))
#define CCI_I2C_Mm_SDA_CTL_1(m)		(0x108 + 0x100 * (m))
#define CCI_I2C_Mm_SDA_CTL_2(m)		(0x10c + 0x100 * (m))
#define CCI_I2C_Mm_MISC_CTL(m)		(0x110 + 0x100 * (m))

#define CCI_I2C_Mm_READ_DATA(m)		(0x118 + 0x100 * (m))
#define CCI_I2C_Mm_READ_BUF_LEVEL(m)	(0x11c + 0x100 * (m))
#define CCI_I2C_Mm_Qn_EXEC_WORD_CNT(m, n)	(0x300 + 0x200 * (m) + 0x100 * (n))
#define CCI_I2C_Mm_Qn_CUR_WORD_CNT(m, n)	(0x304 + 0x200 * (m) + 0x100 * (n))
#define CCI_I2C_Mm_Qn_REPORT_STATUS(m, n)	(0x308 + 0x200 * (m) + 0x100 * (n))
#define CCI_I2C_Mm_Qn_LOAD_DATA(m, n)(0x310 + 0x200 * (m) + 0x100 * (n))
+
#define CCI_IRQ_GLOBAL_CLEAR_CMD 0xc00
#define CCI_IRQ_MASK_00x04
#define CCI_IRQ_MASK_0_I2C_M0_RD_DONEBIT(0)
#define CCI_IRQ_MASK_0_I2C_M0_Q0_REPOTBTIT(4)
#define CCI_IRQ_MASK_0_I2C_M0_Q1_REPOTBTIT(8)
#define CCI_IRQ_MASK_0_I2C_M1_RD_DONEBIT(12)
#define CCI_IRQ_MASK_0_I2C_M1_Q0_REPOTBTIT(16)
#define CCI_IRQ_MASK_0_I2C_M1_Q1_REPOTBTIT(20)
#define CCI_IRQ_MASK_0_RST_DONE_ACK BIT(24)
#define CCI_IRQ_MASK_0_I2C_M0_Q0Q1_HALT_ACKBIT(25)
#define CCI_IRQ_MASK_0_I2C_M1_Q0Q1_HALT_ACKBIT(26)
#define CCI_IRQ_CLEAR_0 0xc08
#define CCI_IRQ_STATUS_0 0xc0c
#define CCI_IRQ_STATUS_0_I2C_M0_RD_DONE BIT(0)
#define CCI_IRQ_STATUS_0_I2C_M0_Q0_REPORT BIT(4)
#define CCI_IRQ_STATUS_0_I2C_M0_Q1_REPORT BIT(8)
#define CCI_IRQ_STATUS_0_I2C_M1_RD_DONE BIT(12)
#define CCI_IRQ_STATUS_0_I2C_M1_Q0_REPORT BIT(16)
#define CCI_IRQ_STATUS_0_I2C_M1_Q1_REPORT BIT(20)
#define CCI_IRQ_STATUS_0_RST_DONE_ACK BIT(24)
#define CCI_IRQ_STATUS_0_I2C_M0_Q0Q1_HALT_ACK BIT(25)
#define CCI_IRQ_STATUS_0_I2C_M1_Q0Q1_HALT_ACK BIT(26)
#define CCI_IRQ_STATUS_0_I2C_M0_ERROR 0x18000ee6
#define CCI_IRQ_STATUS_0_I2C_M1_ERROR 0x60ee6000
+
#define CCI_TIMEOUT_MS 100
#define NUM_MASTERS 1
#define NUM_QUEUES 2
+
/* Max number of resources + 1 for a NULL terminator */
#define CCI_RES_MAX 6
+
enum cci_i2c_cmd {
  CCI_I2C_SET_PARAM = 1,
  CCI_I2C_WAIT,
  CCI_I2C_WAIT_SYNC,
  CCI_I2C_WAIT_GPIO_EVENT,
  CCI_I2C_TRIG_I2C_EVENT,
  CCI_I2C_LOCK,
  CCI_I2C_UNLOCK,
  CCI_I2C_REPORT,
  CCI_I2C_WRITE,
  CCI_I2C_READ,
  CCI_I2C_WRITE_DISABLE_P,
++CCI_I2C_READ_DISABLE_P,
+};
+
+enum {
+I2C_MODE_STANDARD,
+I2C_MODE_FAST,
+I2C_MODE_FAST_PLUS,
+};
+
+enum cci_i2c_queue_t {
+QUEUE_0,
+QUEUE_1
+};
+
+struct cci_res {
+char *clock[CCI_RES_MAX];
+u32 clock_rate[CCI_RES_MAX];
+};
+
+struct hw_params {
+u16 thigh;
+u16 tlow;
+u16 tsu_sto;
+u16 tsu_sta;
+u16 thd_dat;
+u16 thd_sta;
+u16 tbuf;
+u8 sel_stretch_en;
+u16 trdhld;
+u16 tsp;
+};
+
+struct cci_clock {
+struct clk *clk;
+const char *name;
+u32 freq;
+};
+
+struct cci_master {
+int status;
+bool complete_pending;
+struct completion irq_complete;
+};
+
+struct cci {
+struct device *dev;
+struct i2c_adapter *adap;
+void __iomem *base;
+u32 irq;
+struct clk_bulk_data *clock;
+u32 *clock_freq;
+int nclocks;
+u16 queue_size[NUM_QUEUES];
+struct cci_master master[NUM_MASTERS];
+
+static const struct cci_res res_v1_0_8 = {
  .clock = { "camss_top_ahb",
    "cci_ahb",
    "camss_ahb",
    "cci" },
  .clock_rate = { 0,
    80000000,
    0,
    19200000 }
+};
+
+static const struct cci_res res_v1_4_0 = {
  .clock = { "mmss_mmagic_ahb",
    "camss_top_ahb",
    "cci_ahb",
    "camss_ahb",
    "cci" },
  .clock_rate = { 0,
    0,
    0,
    0,
    37500000 }
+};
+
+static const struct hw_params hw_params_v1_0_8[3] = {
  /* I2C_MODE_STANDARD */
  .thigh = 78,
  .tlow = 114,
  .tsu_sto = 28,
  .tsu_sta = 28,
  .thd_dat = 10,
  .thd_sta = 77,
  .tbuf = 118,
  .scl_stretch_en = 0,
  .trdhlld = 6,
  .tsp = 1
 },
  /* I2C_MODE_FAST */
  .thigh = 20,
  .tlow = 28,
static const struct hw_params hw_params_v1_4_0[3] = {
	{
		/* I2C_MODE_STANDARD */
		.thigh = 201,
		.tlow = 174,
		.tsu_sto = 204,
		.tsu_sta = 231,
		.thd_dat = 22,
		.thd_sta = 162,
		.tbuf = 227,
		.scl_stretch_en = 0,
		.trdhld = 6,
		.tsp = 3
	},
	{
		/* I2C_MODE_FAST */
		.thigh = 38,
		.tlow = 56,
		.tsu_sto = 40,
		.tsu_sta = 40,
		.thd_dat = 22,
		.thd_sta = 35,
		.tbuf = 62,
		.scl_stretch_en = 0,
		.trdhld = 6,
		.tsp = 3
	},
	{
		/* I2C_MODE_FAST_PLUS */
		.thigh = 16,
		.tlow = 22,
		.tsu_sto = 17,
		.tsu_sta = 18,
		.thd_dat = 16,
		.thd_sta = 15,
		.tbuf = 24,
		.scl_stretch_en = 0,
		.trdhld = 3,
		.tsp = 3
	}
};
static const u16 queue_0_size_v1_0_8 = 64;
static const u16 queue_1_size_v1_0_8 = 16;

static const u16 queue_0_size_v1_4_0 = 64;
static const u16 queue_1_size_v1_4_0 = 16;

/**
 * cci_clock_set_rate() - Set clock frequency rates
 * @nclocks: Number of clocks
 * @clock: Clock array
 * @clock_freq: Clock frequency rate array
 * @dev: Device
 * *
 * + Return 0 on success or a negative error code otherwise
 * */
+int cci_clock_set_rate(int nclocks, struct clk_bulk_data *clock,
+ u32 *clock_freq, struct device *dev)
+{
+int i;
+
+for (i = 0; i < nclocks; i++)
+if (clock_freq[i]) {
+long rate;
+int ret;
+
+rate = clk_round_rate(clock[i].clk, clock_freq[i]);
+if (rate < 0) {
+dev_err(dev, "clk round rate failed: %ld\n",
+rate);
+return rate;
+}
+
+ret = clk_set_rate(clock[i].clk, clock_freq[i]);
+if (ret < 0) {
+dev_err(dev, "clk set rate failed: %d\n", ret);
+return ret;
+}
+}
+
+return 0;
+}
+
+static irqreturn_t cci_isr(int irq, void *dev)
+{
+struct cci *cci = dev;
+u32 reset = 0;
+u32 val;
+
+val = readl(cci->base + CCI_IRQ.Status_0);
+writel(val, cci->base + CCI_IRQ.Clear_0);
+writel(0x1, cci->base + CCI_IRQ.Global_Clear_Cmd);
+
+if (val & CCI_IRQ.Status_0_RST_DONE_ACK) {
+  if (cci->master[0].complete_pending) {
+    cci->master[0].complete_pending = false;
+    complete(&cci->master[0].irq_complete);
+  }
+
+  if (cci->master[1].complete_pending) {
+    cci->master[1].complete_pending = false;
+    complete(&cci->master[1].irq_complete);
+  }
+
+  if (val & CCI_IRQ.Status_0_I2C_M0_RD_DONE ||
+      val & CCI_IRQ.Status_0_I2C_M0_Q0_REPORT ||
+      val & CCI_IRQ.Status_0_I2C_M0_Q1_REPORT) {
+    cci->master[0].status = 0;
+    complete(&cci->master[0].irq_complete);
+  }
+
+  if (val & CCI_IRQ.Status_0_I2C_M1_RD_DONE ||
+      val & CCI_IRQ.Status_0_I2C_M1_Q0_REPORT ||
+      val & CCI_IRQ.Status_0_I2C_M1_Q1_REPORT) {
+    cci->master[1].status = 0;
+    complete(&cci->master[1].irq_complete);
+  }
+
+  if (unlikely(val & CCI_IRQ.Status_0_I2C_M0_Q0Q1_HALT_ACK)) {
+    cci->master[0].complete_pending = true;
+    reset = CCI_RESET_CMD_M0_MASK;
+  }
+
+  if (unlikely(val & CCI_IRQ.Status_0_I2C_M1_Q0Q1_HALT_ACK)) {
+    cci->master[1].complete_pending = true;
+    reset = CCI_RESET_CMD_M1_MASK;
+  }
+
+  if (unlikely(reset))
+    writel(reset, cci->base + CCI_RESET_CMD);
+
+  if (unlikely(val & CCI_IRQ.Status_0_I2C_M0_ERROR)) {
+    dev_err_ratelimited(cci->dev, "Master 0 error 0x%08x\n", val);
+    cci->master[0].status = -EIO;
}
+writel(CCI_HALT_REQ_I2C_M0_Q0Q1, cci->base + CCI_HALT_REQ);
+
+if (unlikely(val & CCI_IRQ_STATUS_0_I2C_M1_ERROR)) {
+dev_err_ratelimited(cci->dev, "Master 1 error 0x%08x\n", val);
+cci->master[1].status = -EIO;
+writel(CCI_HALT_REQ_I2C_M1_Q0Q1, cci->base + CCI_HALT_REQ);
+
+}
+
+return IRQ_HANDLED;
+
+
+static void cci_halt(struct cci *cci)
+{
+unsigned long time;
+u32 val = CCI_HALT_REQ_I2C_M0_Q0Q1 | CCI_HALT_REQ_I2C_M1_Q0Q1;
+
+cci->master[0].complete_pending = true;
+writel(val, cci->base + CCI_HALT_REQ);
+
+time = wait_for_completion_timeout(
+&cci->master[0].irq_complete,
+msecs_to_jiffies(CCI_TIMEOUT_MS));
+
+if (!time)
+dev_err(cci->dev, "CCI halt timeout\n");
+
+
+static int cci_reset(struct cci *cci)
+{
+unsigned long time;
+
+cci->master[0].complete_pending = true;
+writel(CLI_RESET_CMD_MASK, cci->base + CCI_RESET_CMD);
+
+time = wait_for_completion_timeout(
+&cci->master[0].irq_complete,
+msecs_to_jiffies(CCI_TIMEOUT_MS));
+
+if (!time) {
+dev_err(cci->dev, "CCI reset timeout\n");
+return -ETIMEDOUT;
+
+}
+
+return 0;
+
+
+static int cci_init(struct cci *cci, const struct hw_params *hw)
+{
+u32 val = CCI_IRQ_MASK_0_I2C_M0_RD_DONE | CCI_IRQ_MASK_0_I2C_M0_Q0_REPORT | CCI_IRQ_MASK_0_I2C_M0_Q1_REPORT |
+CCI_IRQ_MASK_0_I2C_M1_RD_DONE |
+CCI_IRQ_MASK_0_I2C_M1_Q0_REPORT |
+CCI_IRQ_MASK_0_I2C_M1_Q1_REPORT |
+CCI_IRQ_MASK_0_RST_DONE_ACK |
+CCI_IRQ_MASK_0_I2C_M0_Q0Q1_HALT_ACK |
+CCI_IRQ_MASK_0_I2C_M1_Q0Q1_HALT_ACK |
+CCI_IRQ_MASK_0_I2C_M0_ERROR |
+CCI_IRQ_MASK_0_I2C_M1_ERROR;
+int i;
+
+writel(val, cci->base + CCI_IRQ_MASK_0);
+
+for (i = 0; i < NUM_MASTERS; i++) {
+val = hw->thigh << 16 | hw->tlow;
+writel(val, cci->base + CCI_I2C_Mm_SCL_CTL(i));
+
+writel(val, cci->base + CCI_I2C_Mm_SCL_CTL(i));
+
+writel(val, cci->base + CCI_I2C_Mm_SDA_CTL_0(i));
+
+writel(val, cci->base + CCI_I2C_Mm_SDA_CTL_1(i));
+
+writel(val, cci->base + CCI_I2C_Mm_SDA_CTL_2(i));
+
+writel(val, cci->base + CCI_I2C_Mm_MISC_CTL(i));
+
+return 0;
+
+
+static int cci_run_queue(struct cci *cci, u8 master, u8 queue)
+{
+unsigned long time;
+u32 val;
+int ret;
+
+writel(val, cci->base + CCI_I2C_Mm_Qn_CUR_WORD_CNT(master, queue));
+writel(val, cci->base + CCI_I2C_Mm_Qn_EXEC_WORD_CNT(master, queue));
+
+writel(val, cci->base + CCI_QUEUE_START);
+
+time = wait_for_completion_timeout(&cci->master[master].irq_complete,
+ msecs_to_jiffies(CCI_TIMEOUT_MS));
+if (!time) {
+dev_err(cci->dev, "master %d queue %d timeout
",
+master, queue);
+
+cci_halt(cci);
+
+return -ETIMEDOUT;
+
+ret = cci->master[master].status;
+if (ret < 0)
+dev_err(cci->dev, "master %d queue %d error %d\n",
+master, queue, ret);
+
+return ret;
+
+
+static int cci_validate_queue(struct cci *cci, u8 master, u8 queue)
+{
+int ret = 0;
+u32 val;
+
+val = readl(cci->base + CCI_I2C_Mm_Qn_CUR_WORD_CNT(master, queue));
+
+if (val == cci->queue_size[queue])
+return -EINVAL;
+
+if (val) {
+val = CCI_I2C_REPORT | BIT(8);
+writel(val, cci->base + CCI_I2C_Mm_Qn_LOAD_DATA(master, queue));
+
+ret = cci_run_queue(cci, master, queue);
+}
+
+return ret;
+
+
+static int cci_i2c_read(struct cci *cci, u16 addr, u8 *buf, u16 len)
+{
+u8 master = 0;
+u8 queue = QUEUE_1;
+u32 val;
+u32 words_read, words_exp;
+int i, index;
+bool first;
+int ret;
+
+/*
+ * Call validate queue to make sure queue is empty before starting.
+ * This is to avoid overflow / underflow of queue.
+ ret = cci_validate_queue(cci, master, queue);
+ if (ret < 0)
+ return ret;
+
+ val = CCI_I2C_SET_PARAM | (addr & 0x7f) << 4;
+ writel(val, cci->base + CCI_I2C_Mm_Qn_LOAD_DATA(master, queue));
+ val = CCI_I2C_READ | len << 4;
+ writel(val, cci->base + CCI_I2C_Mm_Qn_LOAD_DATA(master, queue));
+ ret = cci_run_queue(cci, master, queue);
+ if (ret < 0)
+ return ret;
+
+ words_read = readl(cci->base + CCI_I2C_Mm_READ_BUF_LEVEL(master));
+ words_exp = len / 4 + 1;
+ if (words_read != words_exp) {
+ dev_err(cci->dev, "words read = %d, words expected = %d\n",
+ words_read, words_exp);
+ return -EIO;
+ }
+ index = 0;
+ first = true;
+ do {
+ val = readl(cci->base + CCI_I2C_Mm_READ_DATA(master));
+ for (i = 0; i < 4 && index < len; i++) {
+ if (first) {
+ first = false;
+ continue;
+ }
+ buf[index++] = (val >> (i * 8)) & 0xff;
+ }
+ while (--words_read);
+ }
+ return 0;
+
+static int cci_i2c_write(struct cci *cci, u16 addr, u8 *buf, u16 len)
+{ u8 master = 0;
+ u8 queue = QUEUE_0;
+ u8 load[12] = { 0 };
+ int i, j;
+ u32 val;
+ int ret;
+ /*
+ * Call validate queue to make sure queue is empty before starting.
+ * This is to avoid overflow / underflow of queue.
+ */
+ ret = cci_validate_queue(cci, master, queue);
+ if (ret < 0)
+ return ret;
+
+ val = CCI_I2C_SET_PARAM | (addr & 0x7f) << 4;
+ writel(val, cci->base + CCI_I2C_Mm_Qn_LOAD_DATA(master, queue));
+ i = 0;
+ load[i++] = CCI_I2C_WRITE | len << 4;
+ for (j = 0; j < len; j++)
+ load[i++] = buf[j];
+ for (j = 0; j < i; j += 4) {
+ val = load[j];
+ val |= load[j + 1] << 8;
+ val |= load[j + 2] << 16;
+ val |= load[j + 3] << 24;
+ writel(val, cci->base + CCI_I2C_Mm_Qn_LOAD_DATA(master, queue));
+ }
+
+ val = CCI_I2C_REPORT | BIT(8);
+ writel(val, cci->base + CCI_I2C_Mm_Qn_LOAD_DATA(master, queue));
+
+ return cci_run_queue(cci, master, queue);
+ }
+
+ static int cci_xfer(struct i2c_adapter *adap, struct i2c_msg msgs[], int num)
+ {
+ struct cci *cci = i2c_get_adapdata(adap);
+ int i;
+ int ret = 0;
+ for (i = 0; i < num; i++) {
+ if (msgs[i].flags & I2C_M_RD)
+ ret = cci_i2c_read(cci, msgs[i].addr, msgs[i].buf,
+ + msgs[i].len);
+ else
+ ret = cci_i2c_write(cci, msgs[i].addr, msgs[i].buf,
+ + msgs[i].len);
+ if (ret < 0) {
+ dev_err(cci->dev, "cci i2c xfer error %d", ret);
+ }
+break;
+
+if (!ret)
+ret = num;
+
+return ret;
+
+static u32 cci_func(struct i2c_adapter *adap)
+{
+return I2C_FUNC_I2C;
+
+static const struct i2c_algorithm cci_algo = {
+.master_xfer= cci_xfer,
+.functionality= cci_func,
+};
+
+static const struct i2c_adapter_quirks cci_quirks_v1_0_8 = {
+.max_write_len = 10,
+.max_read_len = 12,
+};
+
+static const struct i2c_adapter_quirks cci_quirks_v1_4_0 = {
+.max_write_len = 11,
+.max_read_len = 12,
+}
+
/**
+ * cci_probe() - Probe CCI platform device
+ * @pdev: Pointer to CCI platform device
+ *
+ * Return 0 on success or a negative error code on failure
+ */
+static int cci_probe(struct platform_device *pdev)
+{
+struct device *dev = &pdev->dev;
+const struct cci_res *res;
+const struct hw_params *hw;
+struct cci *cci;
+struct resource *r;
+int ret = 0;
+u8 mode;
+u32 val;
+int i;
+
cci = devm_kzalloc(dev, sizeof(*cci), GFP_KERNEL);
+if (!cci)
+return -ENOMEM;
+
+cci->dev = dev;
+platform_set_drvdata(pdev, cci);
+
+if (of_device_is_compatible(dev->of_node, "qcom,cci-v1.0.8")) {
+res = &res_v1_0_8;
+hw = hw_params_v1_0_8;
+cci->queue_size[0] = queue_0_size_v1_0_8;
+cci->queue_size[1] = queue_1_size_v1_0_8;
+cci->adap quirks = &cci_quirks_v1_0_8;
+} else if (of_device_is_compatible(dev->of_node, "qcom,cci-v1.4.0")) {
+res = &res_v1_4_0;
+hw = hw_params_v1_4_0;
+cci->queue_size[0] = queue_0_size_v1_4_0;
+cci->queue_size[1] = queue_1_size_v1_4_0;
+cci->adap quirks = &cci_quirks_v1_4_0;
+} else {
+return -EINVAL;
+}
+
+cci->adap algo = &cci algo;
+cci->adap.dev.parent = cci->dev;
+cci->adap.dev.of_node = dev->of_node;
+i2c_set_adapdata(&cci->adap, cci);
+
+strlcpy(cci->adap.name, "Qualcomm Camera Control Interface",
+sizeof(cci->adap.name));
+
+mode = I2C_MODE_STANDARD;
+ret = of_property_read_u32(pdev->dev.of_node, "clock-frequency", &val);
+
+if (!ret) {
+if (val == 400000)
+mode = I2C_MODE_FAST;
+else if (val == 1000000)
+mode = I2C_MODE_FAST_PLUS;
+}
+
+/* Memory */
+
+r = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+cci->base = devm_ioremap_resource(dev, r);
+
+if (IS_ERR(cci->base)) {
+dev_err(dev, "could not map memory\n");
+return PTR_ERR(cci->base);
+}
+/* Interrupt */
+cci->irq = platform_get_irq(pdev, 0);
+if (cci->irq < 0) {
+    dev_err(dev, "missing IRQ\n");
+    return cci->irq;
+}
+
+ret = devm_request_irq(dev, cci->irq, cci_isr,
+    IRQF_TRIGGER_RISING, dev_name(dev), cci);
+if (ret < 0) {
+    dev_err(dev, "request_irq failed, ret: %d\n", ret);
+    return ret;
+}
+
+disable_irq(cci->irq);
+
+/* Clocks */
+
+cci->nclocks = 0;
+while (res->clock[cci->nclocks])
+    cci->nclocks++;
+
+cci->clock = devm_kzalloc(dev, cci->nclocks *
+    sizeof(*cci->clock), GFP_KERNEL);
+if (!cci->clock)
+    return -ENOMEM;
+
+cci->clock_freq = devm_kzalloc(dev, cci->nclocks *
+    sizeof(*cci->clock_freq), GFP_KERNEL);
+if (!cci->clock_freq)
+    return -ENOMEM;
+
+for (i = 0; i < cci->nclocks; i++) {
+    struct clk_bulk_data *clock = &cci->clock[i];
+    clock->clk = devm_clk_get(dev, res->clock[i]);
+    if (IS_ERR(clock->clk))
+        return PTR_ERR(clock->clk);
+    clock->id = res->clock[i];
+    cci->clock_freq[i] = res->clock_rate[i];
+}
+
+ret = cci_clock_set_rate(cci->nclocks, cci->clock,
+    cci->clock_freq, dev);
+if (ret < 0)
return ret;
+
ret = clk_bulk_prepare_enable(cci->nclocks, cci->clock);
+if (ret < 0)
+return ret;
+
val = readl_relaxed(cci->base + CCI_HW_VERSION);
+dev_dbg(dev, "%s: CCI HW version = 0x%08x", __func__, val);
+
init_completion(&cci->master[0].irq_complete);
+init_completion(&cci->master[1].irq_complete);
+
enable_irq(cci->irq);
+
ret = cci_reset(cci);
+if (ret < 0)
+goto error;
+
ret = cci_init(cci, &hw[mode]);
+if (ret < 0)
+goto error;
+
ret = i2c_add_adapter(&cci->adap);
+if (ret < 0)
+goto error;
+
return 0;
+
error:
+clk_bulk_disable_unprepare(cci->nclocks, cci->clock);
+
return ret;
+
/**
 * cci_remove() - Remove CCI platform device
 * @pdev: Pointer to CCI platform device
 *
 * Always returns 0.
 */
+static int cci_remove(struct platform_device *pdev)
+{
+struct cci *cci = platform_get_drvdata(pdev);
+
+disable_irq(cci->irq);
+clk_bulk_disable_unprepare(cci->nclocks, cci->clock);
+
i2c_del_adapter(&cci->adap);
return 0;
+
+static const struct of_device_id cci_dt_match[] = {
+  {.compatible = "qcom,cci-v1.0.8" },
+  {.compatible = "qcom,cci-v1.4.0" },
+  {};
+);
+MODULE_DEVICE_TABLE(of, cci_dt_match);
+
+static struct platform_driver qcom_cci_driver = {
+  .probe = cci_probe,
+  .remove = cci_remove,
+  .driver = {
+    .name = "i2c-qcom-cci",
+    .of_match_table = cci_dt_match,
+  },
+};
+
+module_platform_driver(qcom_cci_driver);
+
+MODULE_DESCRIPTION("Qualcomm Camera Control Interface driver");
+MODULE_AUTHOR("Todor Tomov <todor.tomov@linaro.org>");
+MODULE_LICENSE("GPL v2");

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-qup.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-qup.c
@@ -844,7 +844,10 @@
}
/* register offsets */
@@ -111,8 +112,9 @@
#define ID_ARBLOST	(1 << 3)
#define ID_NACK		(1 << 4)
/* persistent flags */
+#define ID_P_NO_RXDMA	(1 << 30) /* HW forbids RXDMA sometimes */
#define ID_P_PM_BLOCKED(1 << 31)
-#define ID_P_MASK	ID_P_PM_BLOCKED
+#define ID_P_MASK	(ID_P_PM_BLOCKED | ID_P_NO_RXDMA)
enum rcar_i2c_type {
  I2C_RCAR_GEN1,
  @@ -121,6 +123,7 @@
  enum rcar_i2c_type {
    +u32 flags;
    void __iomem *io;
    struct i2c_adapter adap;
    struct i2c_msg *msg;
  @@@ -131,7 +134,6 @@
    int pos;
    u32 icccr;
    -u32 flags;
    enum rcar_i2c_type devtype;
    struct i2c_client *slave;
  @@ -140,6 +142,9 @@
    struct dma_chan *dma_rx;
    struct scatterlist sg;
    enum dma_data_direction dma_direction;
    +
    +struct reset_control *rstc;
    +int irq;
  }
}
#define rcar_i2c_priv_to_dev(p)		((p)->adap.dev.parent)
@@ -321,6 +326,11 @@
dma_unmap_single(chan->device->dev, sg_dma_address(&priv->sg),
  sg_dma_len(&priv->sg), priv->dma_direction);
+/* Gen3 can only do one RXDMA per transfer and we just completed it */
+if (priv->devtype == I2C_RCAR_GEN3 &&
  + priv->dma_direction == DMA_FROM_DEVICE)
+priv->flags |= ID_P_NO_RXDMA;
+priv->dma_direction = DMA_NONE;
unsigned char *buf;
int len;

/* Do not use DMA if it's not available or for messages < 8 bytes */
- if (IS_ERR(chan) || msg->len < 8)
+ if (IS_ERR(chan) || msg->len < 8 ||
  (read && priv->flags & ID_P_NO_RXDMA))
return;

if (read) {
  rcar_i2c_write(priv, ICSIER, SDR | SSR | SAR);
}

-rcar_i2c_write(priv, ICSSR, ~SAR & 0xff);
+/* Clear SSR, too, because of old STOPs to other clients than us */
+rcar_i2c_write(priv, ICSCR, SIE | SDBS); /* clear our NACK */
+rcar_i2c_write(priv, ICSIER, ~SAR | SSR & 0xff);
}

/* master sent stop */
if (ssr_filtered & SSR) {
  i2c_slave_event(priv->slave, I2C_SLAVE_STOP, &value);
  -rcar_i2c_write(priv, ICSSR, ~SAR & 0xff);
  +rcar_i2c_write(priv, ICSCR, SIE | SDBS); /* clear our NACK */
  +rcar_i2c_write(priv, ICSIER, SAR);
  rcar_i2c_write(priv, ICSSR, ~SSR & 0xff);
}

/* I2C is a special case, we need to poll the status of a reset */
static int rcar_i2c_do_reset(struct rcar_i2c_priv *priv)
{
  int i, ret;
  +
  +ret = reset_control_reset(priv->rstc);
  +if (ret)
  +return ret;
  +
  +for (i = 0; i < LOOP_TIMEOUT; i++) {
  +ret = reset_control_status(priv->rstc);
  +if (ret == 0)
return 0;
+udelay(1);
+
+return -ETIMEDOUT;
+
+
static int rcar_i2c_master_xfer(struct i2c_adapter *adap,
struct i2c_msg *msgs,
int num)
@@ -699,12 +731,23 @@
pm_runtime_get_sync(dev);

-rcar_i2c_init(priv);
-
+/* Check bus state before init otherwise bus busy info will be lost */
ret = rcar_i2c_bus_barrier(priv);
if (ret < 0)
go to out;

+/* Gen3 needs a reset before allowing RXDMA once */
+if (priv->devtype == I2C_RCAR_GEN3) {
+priv->flags |= ID_P_NO_RXDMA;
+if (!IS_ERR(priv->rstc)) {
+ret = rcar_i2c_do_reset(priv);
+if (ret == 0)
+priv->flags &= ~ID_P_NO_RXDMA;
++}
++
++rcar_i2c_init(priv);
+
+for (i = 0; i < num; i++) {
/* This HW can’t send STOP after address phase */
if (msgs[i].len == 0) {
@@ -722,8 +765,12 @@
time_left = wait_event_timeout(priv->wait, priv->flags & ID_DONE,
num * adap->timeout);
-}if (!time_left) {
+/* cleanup DMA if it couldn’t complete properly due to an error */
+if (priv->dma_direction != DMA_NONE)
rcar_i2c_cleanup_dma(priv);
+}
+if (!time_left) {
rcar_i2c_init(priv);
ret = -ETIMEDOUT;
} else if (priv->flags & ID_NACK) {
   priv->slave = slave;
rcar_i2c_write(priv, ICSAR, slave->addr);
rcar_i2c_write(priv, ICSSR, 0);
rcar_i2c_write(priv, ICSIER, SAR | SSR);
rcar_i2c_write(priv, ICSCR, SIE | SDBS);
return 0;
}

WARN_ON(!priv->slave);

+ /* ensure no irq is running before clearing ptr */
+ disable_irq(priv->irq);
rcar_i2c_write(priv, ICSIER, 0);
rcar_i2c_write(priv, ICSCR, 0);
rcar_i2c_write(priv, ICSSR, 0);
enable_irq(priv->irq);
rcar_i2c_write(priv, ICSCR, SDBS);
rcar_i2c_write(priv, ICSAR, 0); /* Gen2: must be 0 if not using slave */

priv->slave = NULL;

struct i2c_adapter *adap;
struct device *dev = &pdev->dev;
struct i2c_timings i2c_t;
int irq, ret;
int ret;
priv = devm_kzalloc(dev, sizeof(struct rcar_i2c_priv), GFP_KERNEL);
if (!priv)
   goto out_pm_put;

rcar_i2c_write(priv, ICSAR, 0); /* Gen2: must be 0 if not using slave */

if (priv->devtype == I2C_RCAR_GEN3) {
   priv->rstc = devm_reset_control_get_exclusive(&pdev->dev, NULL);
   if (!IS_ERR(priv->rstc)) {
      ret = reset_control_status(priv->rstc);
      if (ret < 0)
         priv->rstc = ERR_PTR(-ENOTSUPP);
   }
}
if (of_property_read_bool(dev->of_node, "multi-master"))
priv->flags |= ID_P_PM_BLOCKED;
@ @ -875,10 +938,10 @@
pm_runtime_put(dev);

-irq = platform_get_irq(pdev, 0);
-ret = devm_request_irq(dev, irq, rcar_i2c_irq, 0, dev_name(dev), priv);
+priv->irq = platform_get_irq(pdev, 0);
+ret = devm_request_irq(dev, priv->irq, rcar_i2c_irq, 0, dev_name(dev), priv);
if (ret < 0) {
-dev_err(dev, "cannot get irq %d", irq);
+dev_err(dev, "cannot get irq %d", priv->irq);
goto out_pm_disable;
}

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-riic.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-riic.c
@@ -207,6 +207,7 @@
if (readb(riic->base + RIIC_ICSR2) & ICSR2_NACKF) {
 /* We got a NACKIE */
 readb(riic->base + RIIC_ICDRR); /* dummy read */
+riic_clear_set_bit(riic, ICSR2_NACKF, 0, RIIC_ICSR2);
 riic->err = -ENXIO;
 } else if (riic->bytes_left) {
 return IRQ_NONE;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-robotfuzz-osif.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-robotfuzz-osif.c
@@ -89,7 +89,7 @@
}
}

-ret = osif_usb_read(adapter, OSIFI2C_STOP, 0, 0, NULL, 0);
+ret = osif_usb_write(adapter, OSIFI2C_STOP, 0, 0, NULL, 0);
if (ret) {
 dev_err(&adapter->dev, "failure sending STOP\n");
 return -EREMOTEIO;
@ @ -159,7 +159,7 @@
* Set bus frequency. The frequency is:
* 120,000,000 / ( 16 + 2 * div * 4^prescale).
* Using dev = 52, prescale = 0 give 100KHz */
-ret = osif_usb_read(priv->adapter, OSIFI2C_SET_BIT_RATE, 52, 0,
+ret = osif_usb_write(&priv->adapter, OSIFI2C_SET_BIT_RATE, 52, 0,
 NULL, 0);
if (ret) {
dev_err(&interface->dev, "failure sending bit rate");
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-s3c2410.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-s3c2410.c
@@ -495,7 +495,10 @@
 * forces us to send a new START
 * when we change direction
 */
+dev_dbg(i2c->dev,
+"missing START before write->read"");
s3c24xx_i2c_stop(i2c, -EINVAL);
+break;
}

goto retry_write;
@@ -1178,7 +1181,7 @@
*/
if (!(i2c->quirks & QUIRK_POLL)) {
  i2c->irq = ret = platform_get_irq(pdev, 0);
  -if (ret <= 0) {
  +if (ret < 0) {
    dev_err(&pdev->dev, "cannot find IRQ\n");
    clk_unprepare(i2c->clk);
    return ret;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-scmi.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-scmi.c
@@ -152,6 +152,7 @@
    mt_params[4].buffer.length = len;
    mt_params[4].buffer.pointer = data->block + 1;
  }
  break;
@@ -363,6 +364,7 @@
{
  struct acpi_smbus_cmi *smbus_cmi;
  const struct acpi_device_id *id;
  +int ret;

  smbus_cmi = kzalloc(sizeof(struct acpi_smbus_cmi), GFP_KERNEL);
  -if (!smbus_cmi)
  +if (smbus_cmi)
    @ @ -384,8 +386,10 @@
    acpi_walk_namespace(ACPI_TYPE_METHOD, smbus_cmi->handle, 1,
      acpi_smbus_cmi_query_methods, NULL, smbus_cmi, NULL);

    -if (smbus_cmi->cap_info == 0)
    +if (smbus_cmi->cap_info == 0) { 
        +ret = -ENODEV;
goto err;
+

snprintf(smbus_cmi->adapter.name, sizeof(smbus_cmi->adapter.name),
"SMBus CMI adapter %s",
@@ -396,7 +400,8 @@
smbus_cmi->adapter.class = I2C_CLASS_HWMON | I2C_CLASS_SPD;
smbus_cmi->adapter.dev.parent = &device->dev;

-    if (i2c_add_adapter(&smbus_cmi->adapter)) {
+    ret = i2c_add_adapter(&smbus_cmi->adapter);
+    if (ret) {
        dev_err(&device->dev, "Couldn't register adapter!\n");
    goto err;
    }
@@ -406,7 +411,7 @@

test:
    kfree(smbus_cmi);
    device->driver_data = NULL;
-    return -EIO;
+    return ret;
}

static int acpi_smbus_cmi_remove(struct acpi_device *device)
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-sh7760.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-sh_mobile.c
@@ -471,7 +471,10 @@
    goto out2;
}

-id->irq = platform_get_irq(pdev, 0);
+ret = platform_get_irq(pdev, 0);
+if (ret < 0)
+    goto out3;
+id->irq = ret;
+id->adap.nr = pdev->id;
 id->adap.algo = &sh7760_i2c_algo;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-sh_mobile.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-sh_mobile.c
@@ -828,6 +828,7 @@
 static const struct of_device_id sh_mobile_i2c_dt_ids[] = {
  { .compatible = "renesas,iic-r8a73a4", .data = &fast_clock_dt_config },
  { .compatible = "renesas,iic-r8a7740", .data = &r8a7740_dt_config },
+  { .compatible = "renesas,iic-r8a774c0", .data = &fast_clock_dt_config },
  { .compatible = "renesas,iic-r8a7790", .data = &fast_clock_dt_config },
  { .compatible = "renesas,iic-r8a7791", .data = &fast_clock_dt_config },
  { .compatible = "renesas,iic-r8a7792", .data = &fast_clock_dt_config },
/* timeout (ms) for pm runtime autosuspend */
#define SPRD_I2C_PM_TIMEOUT 1000
/* timeout (ms) for transfer message */
#define I2C_XFER_TIMEOUT 1000

/* SPRD i2c data structure */
struct sprd_i2c {
    u32 count;
    int irq;
    int err;
    bool is_suspended;
};

static void sprd_i2c_set_count(struct sprd_i2c *i2c_dev, u32 count)
{
    i2c_dev->msg = msg;
    i2c_dev->buf = msg->buf;
}

sprd_i2c_opt_start(i2c_dev);

return i2c_dev->err;
struct sprd_i2c *i2c_dev = i2c_adap->algo_data;
int im, ret;

+if (i2c_dev->is_suspended)
+return -EBUSY;
+
ret = pm_runtime_get_sync(i2c_dev->dev);
if (ret < 0)
return ret;
@@ -364,13 +374,12 @@
struct sprd_i2c *i2c_dev = dev_id;
struct i2c_msg *msg = i2c_dev->msg;
bool ack = !(readl(i2c_dev->base + I2C_STATUS) & I2C_RX_ACK);
-u32 i2c_count = readl(i2c_dev->base + I2C_COUNT);
u32 i2c_tran;

if (msg->flags & I2C_M_RD)
i2c_tran = i2c_dev->count >= I2C_FIFO_FULL_THLD;
else
-i2c_tran = i2c_count;
+i2c_tran = i2c_dev->count;

/*
 * If we got one ACK from slave when writing data, and we did not
@@ -408,14 +417,13 @@
{
struct sprd_i2c *i2c_dev = dev_id;
struct i2c_msg *msg = i2c_dev->msg;
-u32 i2c_count = readl(i2c_dev->base + I2C_COUNT);
bool ack = !(readl(i2c_dev->base + I2C_STATUS) & I2C_RX_ACK);
u32 i2c_tran;

if (msg->flags & I2C_M_RD)
i2c_tran = i2c_dev->count >= I2C_FIFO_FULL_THLD;
else
-i2c_tran = i2c_count;
+i2c_tran = i2c_dev->count;

/*
 * If we did not get one ACK from slave when writing data, then we
@@ -586,11 +594,23 @@
static int __maybe_unused sprd_i2c_suspend_noirq(struct device *pdev)
{
+struct sprd_i2c *i2c_dev = dev_get_drvdata(pdev);
+    +i2c_lock_adapter(&i2c_dev->adap);
+i2c_dev->is_suspended = true;

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+i2c_unlock_adapter(&i2c_dev->adap);
+
+return pm_runtime_force_suspend(pdev);
}

static int __maybe_unused sprd_i2c_resume_noirq(struct device *pdev)
{
+struct sprd_i2c *i2c_dev = dev_get_drvdata(pdev);
+
+i2c_lock_adapter(&i2c_dev->adap);
+i2c_dev->is_suspended = false;
+i2c_unlock_adapter(&i2c_dev->adap);
+
+return pm_runtime_force_resume(pdev);
}

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-st.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-st.c
@@ -437,6 +437,7 @@

/**
 * st_i2c_rd_fill_tx_fifo() - Fill the Tx FIFO in read mode
 * @i2c_dev: Controller's private data
 * @max: Maximum amount of data to fill into the Tx FIFO
 * This functions fills the Tx FIFO with fixed pattern when
 * in read mode to trigger clock.
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-stm32f7.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-stm32f7.c
@@ -24,7 +24,6 @@

#define STM32F7_I2C_MAX_LEN		0xff

/* STM32F7 I2C control 1 */
#define STM32F7_I2C_CR1_ANFOFFBIT(12)
+#define STM32F7_I2C_CR1_DNF_MASKGENMASK(11, 8)
+##define STM32F7_I2C_CR1_DNF(n)(((n) & 0xf) << 8)
#define STM32F7_I2C_CR1_ERRIEBIT(7)
#define STM32F7_I2C_CR1_TCEIBIT(6)
#define STM32F7_I2C_CR1_STOPIEBIT(5)
@@ -96,7 +97,7 @@
#define STM32F7_I2C_MAX_LEN0xff
#define STM32F7_I2C_DNF_DEFAULT 0
-#define STM32F7_I2C_DNF_MAX 16
+#define STM32F7_I2C_DNF_MAX 15

#define STM32F7_I2C_ANALOG_FILTER_ENABLE 1
#define STM32F7_I2C_ANALOG_FILTER_DELAY_MIN 50 /* ns */
@@ -220,7 +221,7 @@
 struct stm32f7_i2c_timings timing;
 }

/*
 * All these values are coming from I2C Specification, Version 6.0, 4th of
 * April 2014.
 *
@@ -341,7 +342,7 @@
 sdadel_min = setup->fall_time - i2c_specs[setup->speed].hddat_min -
 +sdadel_min = i2c_specs[setup->speed].hddat_min + setup->fall_time -
 af_delay_min - (setup->dnf + 3) * i2cclk;

sdadel_max = i2c_specs[setup->speed].vddat_max - setup->rise_time -
@@ -544,6 +545,13 @@
 else
  stm32f7_i2c_set_bits(i2c_dev->base + STM32F7_I2C_CR1,
       STM32F7_I2C_CR1_ANFOFF);
+
+/* Program the Digital Filter */
+stm32f7_i2c_clr_bits(i2c_dev->base + STM32F7_I2C_CR1,
+        STM32F7_I2C_CR1_DNF_MASK);
+stm32f7_i2c_set_bits(i2c_dev->base + STM32F7_I2C_CR1,
+        STM32F7_I2C_CR1_DNF(STM32F7_I2C_CR1_DNF_MASK);
+
+stm32f7_i2c_set_bits(i2c_dev->base + STM32F7_I2C_CR1,
       STM32F7_I2C_CR1_PE);
}
@@ -808,14 +816,13 @@
 static int stm32f7_i2c_probe(struct platform_device *pdev)
 {
  struct device_node *np = pdev->dev.of_node;
  struct stm32f7_i2c_dev *i2c_dev;
  const struct stm32f7_i2c_setup *setup;
  struct resource *res;
  u32 irq_error, irq_event, clk_rate, rise_time, fall_time;
  +u32 clk_rate, rise_time, fall_time;

struct i2c_adapter *adap;
struct reset_control *rst;
-int ret;
+int irq_error, irq_event, ret;

i2c_dev = devm_kzalloc(&pdev->dev, sizeof(*i2c_dev), GFP_KERNEL);
if (!i2c_dev)
@@ -826,16 +833,20 @@
    if (IS_ERR(i2c_dev->base))
        return PTR_ERR(i2c_dev->base);
    irq_event = irq_of_parse_and_map(np, 0);
-    if (!irq_event) {
-        dev_err(&pdev->dev, "IRQ event missing or invalid\n");
-        return -EINVAL;
-    }
+    irq_event = platform_get_irq(pdev, 0);
+    if (irq_event <= 0) {
+        if (irq_event != -EPROBE_DEFER)
+            dev_err(&pdev->dev, "Failed to get IRQ event: %d\n",
+                     irq_event);
+        return irq_event ? : -ENOENT;
+    }
    irq_error = irq_of_parse_and_map(np, 1);
    if (!irq_error) {
        dev_err(&pdev->dev, "IRQ error missing or invalid\n");
        return -EINVAL;
    }
    irq_error = platform_get_irq(pdev, 1);
    if (irq_error <= 0) {
        if (irq_error != -EPROBE_DEFER)
            dev_err(&pdev->dev, "Failed to get IRQ error: %d\n",
                     irq_error);
        return irq_error ? : -ENOENT;
    }

    i2c_dev->clk = devm_clk_get(&pdev->dev, NULL);
@@ -888,6 +899,11 @@
            }
    setup = of_device_get_match_data(&pdev->dev);
+    if (!setup) {
+        dev_err(&pdev->dev, "Can't get device data\n");
+        ret = -ENODEV;
+        goto clk_free;
+    }
    i2c_dev->setup = *setup;

    ret = device_property_read_u32(i2c_dev->dev, "i2c-scl-rising-time-ns", 21894)
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-tegra-bpmp.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-tegra-bpmp.c
@@ -91,7 +91,7 @@
     flags &= ~I2C_M_RECV_LEN;
 }

-return (flags != 0) ? -EINVAL : 0;
+return 0;
 }

/**
 --- linux-4.15.0.orig/drivers/i2c/busses/i2c-tegra.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-tegra.c
@@ -133,8 +133,8 @@
     * @has_continue_xfer_support: Continue transfer supports.
     * @has_per_pkt_xfer_complete_irq: Has enable/disable capability for transfer
     * complete interrupt per packet basis.
- * @has_single_clk_source: The i2c controller has single clock source. Tegra30
- * and earlier SoCs has two clock sources i.e. div-clk and
+ * @has_single_clk_source: The I2C controller has single clock source. Tegra30
+ * and earlier SoCs have two clock sources i.e. div-clk and
     * fast-clk.
     * @has_config_load_reg: Has the config load register to load the new
     * configuration.
@@ -142,8 +142,17 @@
     * @clk_divisor_std_fast_mode: Clock divisor in standard/fast mode. It is
     * applicable if there is no fast clock source i.e. single clock
     * source.
+ * @clk_divisor_fast_plus_mode: Clock divisor in fast mode plus. It is
+ * applicable if there is no fast clock source (i.e. single
+ * clock source).
+ * @has_multi_master_mode: The I2C controller supports running in single-master
+ * or multi-master mode.
+ * @has_slcg_override_reg: The I2C controller supports a register that
+ * overrides the second level clock gating.
+ * @has_mst_fifo: The I2C controller contains the new MST FIFO interface that
+ * provides additional features and allows for longer messages to
+ * be transferred in one go.
 */
-
 struct tegra_i2c_hw_feature {
     bool has_continue_xfer_support;
     bool has_per_pkt_xfer_complete_irq;
@@ -157,23 +166,28 @@
     
 /**
- * struct tegra_i2c_dev - per device i2c context

---
+ * struct tegra_i2c_dev - per device I2C context
+ * @dev: device reference for power management
+ * @hw: Tegra i2c hw feature.
+ * @adapter: core i2c layer adapter information
+ * @div_clk: clock reference for div clock of i2c controller.
+ * @fast_clk: clock reference for fast clock of i2c controller.
+ * @rst: reset control for the I2C controller
+ * @base: ioremapped registers cookie
+ * @cont_id: i2c controller id, used for for packet header
+ * @irq: irq number of transfer complete interrupt
+ * @is_dvc: identifies the DVC i2c controller, has a different register layout
+ * @cnfg: I2C controller ID, used for packet header
+ * @irq: IRQ number of transfer complete interrupt
+ * @irq_disabled: used to track whether or not the interrupt is enabled
+ * @is_dvc: identifies the DVC I2C controller, has a different register layout
+ * @msg_complete: transfer completion notifier
+ * @msg_err: error code for completed message
+ * @msg_buf: pointer to current message data
+ * @msg_buf_remaining: size of unsent data in the message buffer
+ * @msg_read: identifies read transfers
+ * @bus_clk_rate: current i2c bus clock rate
+ * @is_suspended: prevents i2c controller accesses after suspend is called
+ * @clk_divisor_non_hs_mode: clock divider for non-high-speed modes
+ * @is_multimaster_mode: track if I2C controller is in multi-master mode
+ * @xfer_lock: lock to serialize transfer submission and processing
*/

struct tegra_i2c_dev {
    struct device *dev;
    u32 cnfg;

+/*
+ * NACK interrupt is generated before the I2C controller generates
+ * the STOP condition on the bus. So wait for 2 clock periods
+ * before disabling the controller so that the STOP condition has
+ * been delivered properly.
+ */
+udelay(DIV_ROUND_UP(2 * 1000000, i2c_dev->bus_clk_rate));
+
    cnfg = i2c_readl(i2c_dev, I2C_CNFG);
    if (!i2c_write(i2c_dev, cnfg & ~I2C_CNFG_PACKET_MODE_EN));
if (likely(i2c_dev->msg_err == I2C_ERR_NONE))
return 0;

/*
 * NACK interrupt is generated before the I2C controller generates
 * the STOP condition on the bus. So wait for 2 clock periods
 * before resetting the controller so that the STOP condition has
 * been delivered properly.
 */
-if (i2c_dev->msg_err == I2C_ERR_NO_ACK)
-udelay(DIV_ROUND_UP(2 * 1000000, i2c_dev->bus_clk_rate));
-
-tegra_i2c_init(i2c_dev);
if (i2c_dev->msg_err == I2C_ERR_NO_ACK) {
if (msg->flags & I2C_M_IGNORE_NAK)
/* payload size is only 12 bit */
static const struct i2c_adapter_quirks tegra_i2c_quirks = {
   .max_read_len = 4096,
   .max_write_len = 4096,
   +.max_write_len = 4096 - 12,
};

static const struct tegra_i2c_hw_feature tegra20_i2c_hw = {
   --- linux-4.15.0.orig/drivers/i2c/busses/i2c-uniphier-f.c
   +++ linux-4.15.0/drivers/i2c/busses/i2c-uniphier-f.c
   @ @ -98,6 +98,7 @@
   unsigned int flags;
   unsigned int busy_cnt;
   unsigned int clk_cycle;
   +spinlock_t lock; /* IRQ synchronization */
};

static void uniphier_fi2c_fill_txfifo(struct uniphier_fi2c_priv *priv,
   @ @ -142.9 +143.10 @@
   writel(priv->enabled_irqs, priv->membase + UNIPHIER_FI2C_IE);
}

-static void uniphier_fi2c_clear_irqs(struct uniphier_fi2c_priv *priv)
+static void uniphier_fi2c_clear_irqs(struct uniphier_fi2c_priv *priv,
   +   u32 mask)
   {
   -writel(~1, priv->membase + UNIPHIER_FI2C_IC);
   +writel(mask, priv->membase + UNIPHIER_FI2C_IC);
   }

static void uniphier_fi2c_stop(struct uniphier_fi2c_priv *priv)
@@ -162,7 +164,10 @@
 struct uniphier_fi2c_priv *priv = dev_id;
 u32 irq_status;

 +spin_lock(&priv->lock);
 +
 irq_status = readl(priv->membase + UNIPHIER_FI2C_INT);
 +irq_status &= priv->enabled_irqs;

 dev_dbg(&priv->adap.dev,
 "interrupt: enabled_irqs=%04x, irq_status=%04x\n",
@@ -207,7 +212,13 @@
 if (irq_status & (UNIPHIER_FI2C_INT_RF | UNIPHIER_FI2C_INT_RB)) {
 uniphier_fi2c_drain_rxfifo(priv);
 -if (!priv->len)
+/*
+ * If the number of bytes to read is multiple of the FIFO size
+ * (msg->len == 8, 16, 24, ...), the INT_RF bit is set a little
+ * earlier than INT_RB. We wait for INT_RB to confirm the
+ * completion of the current message.
+ */
+if (!priv->len && (irq_status & UNIPHIER_FI2C_INT_RB))
 goto data_done;

 if (unlikely(priv->flags & UNIPHIER_FI2C_MANUAL_NACK)) {
 @@ -230,6 +241,8 @@
 goto handled;
 }

 +spin_unlock(&priv->lock);
 +
 return IRQ_NONE;

 data_done:
@@ -244,7 +257,14 @@
 }

 handled:
 -uniphier_fi2c_clear_irqs(priv);
+/*
+ * This controller makes a pause while any bit of the IRQ status is
+ * asserted. Clear the asserted bit to kick the controller just before
+ * exiting the handler.
+ */
+uniphier_fi2c_clear_irqs(priv, irq_status);
+ +spin_unlock(&priv->lock);
return IRQ_HANDLED;
}
@@ -252,6 +272,8 @@
static void uniphier_fi2c_tx_init(struct uniphier_fi2c_priv *priv, u16 addr)
{
    priv->enabled_irqs |= UNIPHIER_FI2C_INT_TE;
    +uniphier_fi2c_set_irqs(priv);
    +
    /* do not use TX byte counter */
    writel(0, priv->membase + UNIPHIER_FI2C_TBC);
    /* set slave address */
    @@ -284,6 +306,8 @@
    priv->enabled_irqs |= UNIPHIER_FI2C_INT_RF;
}
    +uniphier_fi2c_set_irqs(priv);
    +
    /* set slave address with RD bit */
    writel(UNIPHIER_FI2C_DTTX_CMD | UNIPHIER_FI2C_DTTX_RD | addr << 1,
            priv->membase + UNIPHIER_FI2C_DTTX);
    @@ -307,14 +331,16 @@
}

static int uniphier_fi2c_master_xfer_one(struct i2c_adapter *adap,
-    struct i2c_msg *msg, bool stop)
+    struct i2c_msg *msg, bool repeat,
+    bool stop)
{
    struct uniphier_fi2c_priv *priv = i2c_get_adapdata(adap);
    bool is_read = msg->flags & I2C_M_RD;
    +unsigned long time_left, flags;
    -unsigned long time_left;
    +unsigned long time_left, flags;

    -dev_dbg(&adap->dev, "%s: addr=0x%02x, len=%d, stop=%d\n",
        -is_read ? "receive" : "transmit", msg->addr, msg->len, stop);
    +dev_dbg(&adap->dev, "%s: addr=0x%02x, len=%d, repeat=%d, stop=%d\n",
        +is_read ? "receive" : "transmit", msg->addr, msg->len,
        +repeat, stop);

    priv->len = msg->len;
    priv->buf = msg->buf;
    @@ -326,22 +352,36 @@
    priv->flags |= UNIPHIER_FI2C_STOP;

    reinit_completion(&priv->comp);
    -uniphier_fi2c_clear_irqs(priv);
    +uniphier_fi2c_clear_irqs(priv, U32_MAX);
writel(UNIPHIER_FI2C_RST_TBRST | UNIPHIER_FI2C_RST_RBRST,
    priv->membase + UNIPHIER_FI2C_RST); /* reset TX/RX FIFO */

+spin_lock_irqsave(&priv->lock, flags);
+
if (is_read)
   uniphier_fi2c_rx_init(priv, msg->addr);
else
   uniphier_fi2c_tx_init(priv, msg->addr);
-
-uniphier_fi2c_set_irqs(priv);
-
dev_dbg(&adap->dev, "start condition\n");
-writel(UNIPHIER_FI2C_CR_MST | UNIPHIER_FI2C_CR_STA,
    priv->membase + UNIPHIER_FI2C_CR);
+/*
   * For a repeated START condition, writing a slave address to the FIFO
   * kicks the controller. So, the UNIPHIER_FI2C_CR register should be
   * written only for a non-repeated START condition.
   */
+if (!repeat)
+   writel(UNIPHIER_FI2C_CR_MST | UNIPHIER_FI2C_CR_STA,
+           priv->membase + UNIPHIER_FI2C_CR);
+
+spin_unlock_irqrestore(&priv->lock, flags);


time_left = wait_for_completion_timeout(&priv->comp, adap->timeout);
+spin_lock_irqsave(&priv->lock, flags);
+priv->enabled_irqs = 0;
+uniphier_fi2c_set_irqs(priv);
+spin_unlock_irqrestore(&priv->lock, flags);
+
if (!time_left) {
    dev_err(&adap->dev, "transaction timeout.\n");
    uniphier_fi2c_recover(priv);
    @ @ -394,6 +434,7 @@
        struct i2c_msg *msgs, int num)
    {
        struct i2c_msg *msg, *emsg = msgs + num;
        +bool repeat = false;
        int ret;

        ret = uniphier_fi2c_check_bus_busy(adap);
        @ @ -401,15 +442,14 @@
        return ret;

        for (msg = msgs; msg < emsg; msg++) {
            
    
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-/* If next message is read, skip the stop condition */
-bool stop = !(msg + 1 < emsg && msg[1].flags & I2C_M_RD);
-/* but, force it if I2C_M_STOP is set */
-if (msg->flags & I2C_M_STOP)
-stop = true;
+/* Emit STOP if it is the last message or I2C_M_STOP is set. */
+bool stop = (msg + 1 == emsg) || (msg->flags & I2C_M_STOP);

-ret = uniphier_fi2c_master_xfer_one(adap, msg, stop);
+ret = uniphier_fi2c_master_xfer_one(adap, msg, repeat, stop);
if (ret)
return ret;
+
-repeat = !stop;
}

return num;
@@ -473,9 +513,26 @@
uniphier_fi2c_reset(priv);

+/*
 * Standard-mode: tLOW + tHIGH = 10 us
 * Fast-mode: tLOW + tHIGH = 2.5 us
 */
-writel(cyc, priv->membase + UNIPHIER_FI2C_CYC);
-writel(cyc / 2, priv->membase + UNIPHIER_FI2C_LCTL);
+/*
 * Standard-mode: tLOW = 4.7 us, tHIGH = 4.0 us, tBUF = 4.7 us
 * Fast-mode: tLOW = 1.3 us, tHIGH = 0.6 us, tBUF = 1.3 us
 * ”tLow/tHIGH = 5/4” meets both.
 */
+writel(cyc * 5 / 9, priv->membase + UNIPHIER_FI2C_LCTL);
+/*
 * Standard-mode: tHD;STA = 4.0 us, tSU;STA = 4.7 us, tSU;STO = 4.0 us
 * Fast-mode: tHD;STA = 0.6 us, tSU;STA = 0.6 us, tSU;STO = 0.6 us
 */
writel(cyc / 2, priv->membase + UNIPHIER_FI2C_SSUT);
+/*
 * Standard-mode: tSU;DAT = 250 ns
 * Fast-mode: tSU;DAT = 100 ns
 */
writel(cyc / 16, priv->membase + UNIPHIER_FI2C_DSUT);

uniphier_fi2c_prepare_operation(priv);
@@ -532,6 +589,7 @@
priv->clk_cycle = clk_rate / bus_speed;
init_completion(&priv->comp);
+spin_lock_init(&priv->lock);
priv->adap.owner = THIS_MODULE;
priv->adap.algo = &uniphier_fi2c_algo;
priv->adap.dev.parent = dev;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-uniphier.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-uniphier.c
@@ -248,11 +248,8 @@
    return ret;
    for (msg = msgs; msg < emsg; msg++) {
     /* If next message is read, skip the stop condition */
-     bool stop = !(msg + 1 < emsg && msg[1].flags & I2C_M_RD);
-    /* but, force it if I2C_M_STOP is set */
-    if (msg->flags & I2C_M_STOP)
-        stop = true;
+    /* Emit STOP if it is the last message or I2C_M_STOP is set. */
+    bool stop = (msg + 1 == emsg) || (msg->flags & I2C_M_STOP);

    ret = uniphier_i2c_master_xfer_one(adap, msg, stop);
    if (ret)
        @@ -323,7 +320,13 @@
            uniphier_i2c_reset(priv, true);

            -writel((cyc / 2 << 16) | cyc, priv->membase + UNIPHIER_I2C_CLK);
+/*
+ * Bit30-16: clock cycles of tLOW.
+ * Standard-mode: tLOW = 4.7 us, tHIGH = 4.0 us
+ * Fast-mode: tLOW = 1.3 us, tHIGH = 0.6 us
+ * "tLow/tHIGH = 5/4" meets both.
+ */
+  +writel((cyc * 5 / 9 << 16) | cyc, priv->membase + UNIPHIER_I2C_CLK);

    uniphier_i2c_reset(priv, false);
    }
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-xiic.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-xiic.c
@@ -337,7 +337,7 @@
    }
    mutex_unlock(&vb->lock);
    }
-  return 0;
+  return num;
    error:
    mutex_unlock(&vb->lock);
    return error;
--- linux-4.15.0.orig/drivers/i2c/busses/i2c-xiic.c

+++ linux-4.15.0/drivers/i2c/busses/i2c-xiic.c
@@ -538,6 +538,7 @@
{
    u8 rx_watermark;
    struct i2c_msg *msg = i2c->rx_msg = i2c->tx_msg;
   +unsigned long flags;

    /* Clear and enable Rx full interrupt. */
    xiic_irq_clr_en(i2c, XIIC_INTR_RX_FULL_MASK | XIIC_INTR_TX_ERROR_MASK);
@@ -553,6 +554,7 @@
    rx_watermark = IIC_RX_FIFO_DEPTH;
    xiic_setreg8(i2c, XIIC_RFD_REG_OFFSET, rx_watermark - 1);

   +local_irq_save(flags);
    if (!(msg->flags & I2C_M_NOSTART))
    /* write the address */
    xiic_setreg16(i2c, XIIC_DTR_REG_OFFSET,
@@ -563,6 +565,8 @@
                xiic_setreg16(i2c, XIIC_DTR_REG_OFFSET,
                msg->len | ((i2c->nmsgs == 1) ? XIIC_TX_DYN_STOP_MASK : 0));
   +local_irq_restore(flags);
   +
    if (i2c->nmsgs == 1)
    /* very last, enable bus not busy as well */
    xiic_irq_clr_en(i2c, XIIC_INTR_BNB_MASK);
@@ -721,11 +725,16 @@
                .functionality = xiic_func,
            };

   +static const struct i2c_adapter_quirks xiic_quirks = {
            +.max_read_len = 255,
            +};
   +
   +static const struct i2c_adapter xiic_adapter = {
            .owner = THIS_MODULE,
            .name = DRIVER_NAME,
            .class = I2C_CLASS_DEPRECATED,
            .algo = &xiic_algorithm,
            +.quirks = &xiic_quirks,
            +};

--- linux-4.15.0.orig/drivers/i2c/busses/i2c-xlp9xx.c
+++ linux-4.15.0/drivers/i2c/busses/i2c-xlp9xx.c
@@ -10,12 +10,14 @@
#include <linux/clk.h>
#include <linux/completion.h>
### Include Files

```c
#include <linux/i2c.h>
+include <linux/i2c-smbus.h>
#include <linux/init.h>
#include <linux/interrupt.h>
#include <linux/io.h>
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/platform_device.h>
+include <linux/delay.h>
```

### Definitions

```c
#define XLP9XX_I2C_DIV			0x0
#define XLP9XX_I2C_CTRL			0x1
@@ -36,6 +38,8 @@
#define XLP9XX_I2C_TIMEOUT		0X10
#define XLP9XX_I2C_GENCALLADDR		0x11
+define XLP9XX_I2C_STATUS_BUSY		BIT(0)
+
#define XLP9XX_I2C_CMD_START		BIT(7)
#define XLP9XX_I2C_CMD_STOP		BIT(6)
#define XLP9XX_I2C_CMD_READ		BIT(5)
@@ -71,6 +75,7 @@
#define XLP9XX_I2C_HIGH_FREQ		400000
#define XLP9XX_I2C_FIFO_SIZE		0x80U
#define XLP9XX_I2C_TIMEOUT_MS		1000
+define XLP9XX_I2C_BUSY_TIMEOUT		50
#define XLP9XX_I2C_FIFO_WCNT_MASK	0xff
#define XLP9XX_I2C_STATUS_ERRMASK	(XLP9XX_I2C_INTEN_ARLOST | 
@@ -80,6 +85,8 @@
struct device *dev;
struct i2c_adapter adapter;
struct completion msg_complete;
+struct i2c_smbus_alert_setup alert_data;
+struct i2c_client *ara;
int irq;
bool msg_read;
bool len_recv;
@@ -125,7 +132,16 @@
{
    u32 thres;

    thres = min(priv->msg_buf_remaining, XLP9XX_I2C_FIFO_SIZE);
+    if (priv->len_recv)
+        /* interrupt after the first read to examine
+         * the length byte before proceeding further
+         */
+        thres = 1;
```
else if (priv->msg_buf_remaining > XLP9XX_I2C_FIFO_SIZE)
+ thres = XLP9XX_I2C_FIFO_SIZE;
+ else
+ thres = priv->msg_buf_remaining;
+
++ xlp9xx_write_i2c_reg(priv, XLP9XX_I2C_MIFOCTRL,
      thres << XLP9XX_I2C_MIFOCTRL_HITH_SHIFT);
}
@@ -142,6 +158,27 @@
 priv->msg_buf += len;
 }

+static void xlp9xx_i2c_update_rlen(struct xlp9xx_i2c_dev *priv)
+{
+ u32 val, len;
+
+ /*
+ * Update receive length. Re-read len to get the latest value,
+ * and then add 4 to have a minimum value that can be safely
+ * written. This is to account for the byte read above, the
+ * transfer in progress and any delays in the register I/O
+ */
+ val = xlp9xx_read_i2c_reg(priv, XLP9XX_I2C_CTRL);
+ len = xlp9xx_read_i2c_reg(priv, XLP9XX_I2C_FIFOWCNT) &
+ XLP9XX_I2C_FIFO_WCNT_MASK;
+ len = max_t(u32, priv->msg_len, len + 4);
+ if (len >= I2C_SMBUS_BLOCK_MAX + 2)
+ return;
+ val = (val & ~XLP9XX_I2C_CTRL_MCTLEN_MASK) |
+ (len << XLP9XX_I2C_CTRL_MCTLEN_SHIFT);
+ xlp9xx_write_i2c_reg(priv, XLP9XX_I2C_CTRL, val);
+ }
+
+static void xlp9xx_i2c_drain_rx_fifo(struct xlp9xx_i2c_dev *priv)
+{
+ u32 len, i;
+ @@ -154,13 +191,35 @@
+ if (priv->len_recv) {
+ /* read length byte */
+ rlen = xlp9xx_read_i2c_reg(priv, XLP9XX_I2C_MRXFIFO);
+ *buf++ = rlen;
+ *
+ */
+ * We expect at least 2 interrupts for I2C_M_RECV_LEN
+ * transactions. The length is updated during the first
+ * interrupt, and the buffer contents are only copied
+ * during subsequent interrupts. If in case the interrupts
+ * get merged we would complete the transaction without
+ * copying out the bytes from RX fifo. To avoid this now we
+ * drain the fifo as and when data is available.
+ * We drained the rlen byte already, decrement total length
+ * by one.
+ */
+
len--;  
+*if (rlen > I2C_SMBUS_BLOCK_MAX || rlen == 0) {
+rlen = 0;/* abort transfer */
+priv->msg_buf_remaining = 0;
+priv->msg_len = 0;
+xlp9xx_i2c_update_rlen(priv);
+return;
+}
+
+*buf++ = rlen;
+if (priv->client_pec)
++rlen;
+++rlen;/* account for error check byte */
/* update remaining bytes and message length */
+priv->msg_buf_remaining = rlen;
+priv->msg_len = rlen + 1;
+xlp9xx_i2c_update_rlen(priv);
+priv->len_recv = false;
}

@@ -224,6 +283,26 @@
return IRQ_HANDLED;
}

+static int xlp9xx_i2c_check_bus_status(struct xlp9xx_i2c_dev *priv)
+{
+u32 status;
+u32 busy_timeout = XLP9XX_I2C_BUSY_TIMEOUT;
+
+while (busy_timeout) {
+status = xlp9xx_read_i2c_reg(priv, XLP9XX_I2C_STATUS);
+if ((status & XLP9XX_I2C_STATUS_BUSY) == 0)
+break;
+
+busy_timeout--;
+usleep_range(1000, 1100);
+}
+
+if (!busy_timeout)
+return -EIO;
+
+return 0;
static int xlp9xx_i2c_init(struct xlp9xx_i2c_dev *priv)
{
    u32 prescale;
    xlp9xx_write_i2c(priv, XLP9XX_I2C_MFIFOCTRL,
                XLP9XX_I2C_MFIFOCTRL_RST);

    /* set FIFO threshold if reading */
    if (priv->msg_read)
        xlp9xx_i2c_update_rx_fifo_thres(priv);

    /* set slave addr */
    xlp9xx_write_i2c(priv, XLP9XX_I2C_SLAVEADDR,
                (msg->addr << XLP9XX_I2C_SLAVEADDR_ADDR_SHIFT) |
                XLP9XX_I2C_CTRL_ADDMODE);

    priv->len_recv = msg->flags & I2C_M_RECV_LEN;
    len = priv->len_recv ? I2C_SMBUS_BLOCK_MAX + 2 : msg->len;
    if (len)
        cmd |= (priv->msg_read ? XLP9XX_I2C_CMD_READ : XLP9XX_I2C_CMD_WRITE);
    if (last_msg)
        cmd |= XLP9XX_I2C_CMD_STOP;

    timeleft = msecs_to_jiffies(XLP9XX_I2C_TIMEOUT_MS);
    timeleft = wait_for_completion_timeout(&priv->msg_complete, timeleft);

    if (priv->msg_err) {
        if (priv->msg_err & XLP9XX_I2C_INTEN_BUSERR) {

```
dev_dbg(priv->dev, "transfer error "\%x!n", priv->msg_err);
-if (priv->msg_err & XLP9XX_I2C_INTEN_BUSERR)
-xlp9xx_i2c_init(priv);
+xlp9xx_write_i2c_reg(priv, XLP9XX_I2C_CMD, XLP9XX_I2C_CMD_STOP);
return -EIO;
+} else if (priv->msg_err & XLP9XX_I2C_INTEN_NACKADDR) {
+return -ENXIO;
}

if (timeleft == 0) {
@@ -334,8 +416,11 @@

/* update msg->len with actual received length */
-if (msg->flags & I2C_M_RECV_LEN)
+if (msg->flags & I2C_M_RECV_LEN) {
+if (!priv->msg_len)
+return -EPROTO;
msg->len = priv->msg_len;
+}
return 0;
}

@@ -345,6 +430,14 @@
int i, ret;
struct xlp9xx_i2c_dev *priv = i2c_get_adapdata(adap);

+ret = xlp9xx_i2c_check_bus_status(priv);
+if (ret) {
+xlp9xx_i2c_init(priv);
+ret = xlp9xx_i2c_check_bus_status(priv);
+if (ret)
+return ret;
+}
+for (i = 0; i < num; i++) {
ret = xlp9xx_i2c_xfer_msg(priv, &msgs[i], i == num - 1);
if (ret != 0)
@@ -356,8 +449,8 @@
static u32 xlp9xx_i2c_functionality(struct i2c_adapter *adapter)
{
-return I2C_FUNC_SMBUS_EMUL | I2C_FUNC_I2C |
-12C_FUNC_10BIT_ADDR;
+return I2C_FUNC_SMBUS_EMUL | I2C_FUNC_SMBUS_READ_BLOCK_DATA |
+I2C_FUNC_I2C | I2C_FUNC_10BIT_ADDR;
static const struct i2c_algorithm xlp9xx_i2c_algo = {
    @ @ -395.6 +488.19 @ @
return 0;
}

+static int xlp9xx_i2c_smbus_setup(struct xlp9xx_i2c_dev *priv,
+    struct platform_device *pdev)
+{
+    +if (!priv->alert_data.irq)
+    +return -EINVAL;
+    +
+    +priv->ara = i2c_setup_smbus_alert(&priv->adapter, &priv->alert_data);
+    +if (!priv->ara)
+    +return -ENODEV;
+    +
+    +return 0;
+} 
+
+static int xlp9xx_i2c_probe(struct platform_device *pdev)
+{
+    struct xlp9xx_i2c_dev *priv;
+    @ @ -415.6 +521.10 @ @
+dev_err(&pdev->dev, "invalid irq!\n");
+return priv->irq;
}
+/* SMBAlert irq */
+priv->alert_data.irq = platform_get_irq(pdev, 1);
+if (priv->alert_data.irq <= 0)
+priv->alert_data.irq = 0;
+xlp9xx_i2c_get_frequency(pdev, priv);
+xlp9xx_i2c_init(priv);
+if (err)
+return err;
+
+err = xlp9xx_i2c_smbus_setup(priv, pdev);
+if (err)
+dev_dbg(&pdev->dev, "No active SMBus alert %d\n", err);
+platform_set_drvdata(pdev, priv);
+dev_dbg(&pdev->dev, "I2C bus:%d added\n", priv->adapter.nr);

--- linux-4.15.0.orig/drivers/i2c/i2c-core-acpi.c
+++ linux-4.15.0/drivers/i2c/i2c-core-acpi.c
@@ -415,6 +521,10 @@
int index;
 u32 speed;
static int i2c_acpi_fill_info(struct acpi_resource *ares, void *data)
{
    u32 min_speed;
    +u32 force_speed;
};

void i2c_acpi_register_devices(struct i2c_adapter *adap)
{
    acpi_status status;
    +acpi_handle handle;

    if (!has_acpi_companion(&adap->dev))
        return;
    @ @ -218,6 +219,7 @ @
    adap, NULL);
    if (ACPI_FAILURE(status))
        dev_warn(&adap->dev, "failed to enumerate I2C slaves\n");
        +
        +if (!adap->dev.parent)
        +return;
        +
        +handle = ACPI_HANDLE(adap->dev.parent);
        +if (!handle)
        +return;
        +
        +acpi_walk_dep_device_list(handle);
    }

    const struct acpi_device_id *
    @ @ -240,6 +251,19 @ @
    return acpi_match_device(matches, &client->dev);
    }

+static const struct acpi_device_id *
+{ "MSSL1680", 0 },
+{};
+
static acpi_status i2c_acpi_lookup_speed(acpi_handle handle, u32 level,
    void *data, void **return_value)
if (lookup->speed <= lookup->min_speed)
lookup->min_speed = lookup->speed;

if (acpi_match_device_ids(adev, i2c_acpi_force_400khz_device_ids) == 0)
lookup->force_speed = 400000;
+
return AE_OK;
}

return 0;
}

return lookup.min_speed != UINT_MAX ? lookup.min_speed : 0;
+if (lookup.force_speed) {
+if (lookup.force_speed != lookup.min_speed)
+dev_warn(dev, FW_BUG "DSDT uses known not-working I2C bus speed %d, forcing it to %d\n",
+ lookup.min_speed, lookup.force_speed);
+return lookup.force_speed;
+} else if (lookup.min_speed != UINT_MAX) {
+return lookup.min_speed;
+} else {
+return 0;
+}

EXPORT_SYMBOL_GPL(i2c_acpi_find_bus_speed);

static struct i2c_client *i2c_acpi_find_client_by_adev(struct acpi_device *adev)
{
struct device *dev;
+struct i2c_client *client;

dev = bus_find_device(&i2c_bus_type, NULL, adev,
+i2c_acpi_find_match_device);
-return dev ? i2c_verify_client(dev) : NULL;
+if (!dev)
+return NULL;
+
+client = i2c_verify_client(dev);
+if (!client)
+put_device(dev);
+
+return client;
}
static int i2c_acpi_notify(struct notifier_block *nb, unsigned long value,
@@ -351,6 +395,7 @@
       break;
i2c_acpi_register_device(adapter, adev, &info);
+    put_device(&adapter->dev);
       break;
case ACPI_RECONFIG_DEVICE_REMOVE:
       if (!acpi_device_enumerated(adev))
@@ -475,11 +520,16 @@
       msgs[0].buf = buffer;

       ret = i2c_transfer(client->adapter, msgs, ARRAY_SIZE(msgs));
       if (ret < 0)
-dev_err(&client->adapter->dev, "i2c write failed\n");
+kfree(buffer);
-    return ret;
+    if (ret < 0) {
+        dev_err(&client->adapter->dev, "i2c write failed: %d\n", ret);
+        return ret;
+    }
+    /* 1 transfer must have completed successfully */
+    return (ret == 1) ? 0 : -EIO;
    }

    static acpi_status
@@ -645,7 +695,6 @@
    return -ENOMEM;
 }

-acpi_walk_dep_device_list(handle);
return 0;
}

--- linux-4.15.0.orig/drivers/i2c/i2c-core-base.c
+++ linux-4.15.0/drivers/i2c/i2c-core-base.c
@@ -267,13 +268,14 @@
#include <linux/i2c-smbus.h>
#include <linux/idr.h>
#include <linux/init.h>
+##include <linux/interrupt.h>
#include <linux/irqflags.h>
#include <linux/jump_label.h>
#include <linux/kernel.h>
@@ -267,13 +268,14 @@
static void i2c_init_recovery(struct i2c_adapter *adap)
{
    struct i2c_bus_recovery_info *bri = adap->bus_recovery_info;
-    char *err_str;
+    char *err_str, *err_level = KERN_ERR;

    if (!bri)
        return;

    if (!bri->recover_bus) {
-        err_str = "no recover_bus() found";
+        err_str = "no suitable method provided";
+        err_level = KERN_DEBUG;
        goto err;
    }

    err:
    -    dev_err(&adap->dev, "Not using recovery: %s\n", err_str);
+    dev_printk(err_level, &adap->dev, "Not using recovery: %s\n", err_str);
    adap->bus_recovery_info = NULL;

    return;
}

@@ -301,7 +303,7 @@

return;
err:
-dev_err(&adap->dev, "Not using recovery: %s\n", err_str);
+dev_printk(err_level, &adap->dev, "Not using recovery: %s\n", err_str);
adap->bus_recovery_info = NULL;
}

@@ -316,10 +318,7 @@
if (client->flags & I2C_CLIENT_TEN)
    return -EINVAL;
-    irq = irq_find_mapping(adap->host_notify_domain, client->addr);
-    if (!irq)
-        irq = irq_create_mapping(adap->host_notify_domain,
-            client->addr);
+    irq = irq_create_mapping(adap->host_notify_domain, client->addr);
    return irq > 0 ? irq : -ENXIO;
}

@@ -340,6 +339,8 @@
if (client->flags & I2C_CLIENT_HOST_NOTIFY) {
    dev_dbg(dev, "Using Host Notify IRQ\n");
    /* Keep adapter active when Host Notify is required */
+    pm_runtime_get_sync(&client->adapter->dev);
    irq = i2c_smbus_host_notify_to_irq(client);
} else if (dev->of_node) {
    irq = of_irq_get_byname(dev->of_node, "irq");
@@ -443,6 +444,10 @@
    dev_pm_clear_wake_irq(&client->dev);
    }

    if (client->flags & I2C_CLIENT_HOST_NOTIFY) {
        dev_dbg(dev, "Using Host Notify IRQ\n");
        /* Keep adapter active when Host Notify is required */
        pm_runtime_get_sync(&client->adapter->dev);
        irq = i2c_smbus_host_notify_to_irq(client);
    } else if (dev->of_node) {
        irq = of_irq_get_byname(dev->of_node, "irq");
    }

    dev_pm_clear_wake_irq(&client->dev);
device_init_wakeup(&client->dev, false);

+client->irq = client->init_irq;
+if (client->flags & I2C_CLIENT_HOST_NOTIFY)
+pm_runtime_put(&client->adapter->dev);
+
+return status;
+
@@ -456,6 +461,8 @@
+driver = to_i2c_driver(dev->driver);
+if (driver->shutdown)
+driver->shutdown(client);
+else if (client->irq > 0)
+disable_irq(client->irq);
+
static void i2c_client_dev_release(struct device *dev)
@@ -643,7 +650,7 @@
{rt_mutex_lock(&adapter->bus_lock);
+rt_mutex_lock_nested(&adapter->bus_lock, i2c_adapter_depth(adapter));
}

/**
@@ -752,10 +759,11 @@
-client->flags = info->flags;
-client->addr = info->addr;
+
-client->irq = info->irq;
-else if (!client->irq)
-client->irq = i2c_dev_irq_from_resources(info->resources,
+client->init_irq = info->irq;
+else if (!client->init_irq)
+client->init_irq = i2c_dev_irq_from_resources(info->resources,
-info->num_resources);
+client->irq = client->init_irq;
+
+strlcpy(client->name, info->type, sizeof(client->name));
+
@@ -1298,8 +1306,8 @@
*/

/* create pre-declared device nodes */
of_i2c_register_devices(adap);
-i2c_acpi_register_devices(adap);
i2c_acpi_install_space_handler(adap);
+i2c_acpi_register_devices(adap);

if (adap->nr < __i2c_first_dynamic_bus_num)
i2c_scan_static_board_info(adap);
@@ -2265,6 +2273,57 @@
 }
 EXPORT_SYMBOL(i2c_put_adapter);

+/**
+ * i2c_get_dma_safe_msg_buf() - get a DMA safe buffer for the given i2c_msg
+ * @msg: the message to be checked
+ * @threshold: the minimum number of bytes for which using DMA makes sense.
+ * Should at least be 1.
+ *
+ * Return: NULL if a DMA safe buffer was not obtained. Use msg->buf with PIO.
+ * Or a valid pointer to be used with DMA. After use, release it by
+ * calling i2c_release_dma_safe_msg_buf().
+ *
+ * This function must only be called from process context!
+ */
+u8 *i2c_get_dma_safe_msg_buf(struct i2c_msg *msg, unsigned int threshold)
+{
+/* also skip 0-length msgs for bogus thresholds of 0 */
+if (!threshold)
+    pr_debug("DMA buffer for addr=0x%02x with length 0 is bogus\n",
+        msg->addr);
+if (msg->len < threshold || msg->len == 0)
+    return NULL;
+
+    if (msg->flags & I2C_M_DMA_SAFE)
+        return msg->buf;
+    pr_debug("using bounce buffer for addr=0x%02x, len=%d\n",
+        msg->addr, msg->len);
+    if (msg->flags & I2C_M_RD)
+        return kzalloc(msg->len, GFP_KERNEL);
+    else
+        return kmemdup(msg->buf, msg->len, GFP_KERNEL);
+}
+EXPORT_SYMBOL_GPL(i2c_get_dma_safe_msg_buf);
+
+/**
+ * i2c_release_dma_safe_msg_buf - release DMA safe buffer and sync with i2c_msg
+ * @msg: the message to be synced with
+ * @buf: the buffer obtained from i2c_get_dma_safe_msg_buf(). May be NULL.
+ */
+void i2c_release_dma_safe_msg_buf(struct i2c_msg *msg, u8 *buf)
+{ 
+    if (!buf || buf == msg->buf) 
+    +return;
+    +
+    +if (msg->flags & I2C_M_RD) 
+    +memcpy(msg->buf, buf, msg->len);
+    +
+    +kfree(buf);
+    +}
+EXPORT_SYMBOL_GPL(i2c_release_dma_safe_msg_buf);
+
+MODULE_AUTHOR("Simon G. Vogl <simon@tk.uni-linz.ac.at>");
+MODULE_DESCRIPTION("I2C-Bus main module");
+MODULE_LICENSE("GPL");
+--- linux-4.15.0.orig/drivers/i2c/i2c-core-of.c
+++ linux-4.15.0/drivers/i2c/i2c-core-of.c
@@ -118,6 +118,17 @@
return dev->of_node == data;
 }

+static int of_dev_or_parent_node_match(struct device *dev, void *data) 
+{
+    if (dev->of_node == data) 
+    +return 1;
+    +
+    +if (dev->parent) 
+    +return dev->parent->of_node == data;
+    +
+    +return 0;
+    +}
+  
+  /* must call put_device() when done with returned i2c_client device */
+  struct i2c_client *of_find_i2c_device_by_node(struct device_node *node) 
+  {
+    struct device *dev;
+    struct i2c_adapter *adapter;
+
+    -dev = bus_find_device(&i2c_bus_type, NULL, node, of_dev_node_match);
+    +dev = bus_find_device(&i2c_bus_type, NULL, node, 
+    +    +of_dev_or_parent_node_match);
+    if (!dev)
+    return NULL;
+
+    client = of_i2c_register_device(adap, rd->dn);
if (IS_ERR(client)) {
    dev_err(&adap->dev, "failed to create client for '%pOF'\n",
            rd->dn);
    put_device(&adap->dev);
    if (IS_ERR(client)) {
        dev_err(&adap->dev, "failed to create client for '%pOF'\n",
                rd->dn);
        put_device(&adap->dev);
        of_node_clear_flag(rd->dn, OF_POPULATED);
        return notifier_from_errno(PTR_ERR(client));
    }
    put_device(&adap->dev);
    break;
}

/* already depopulated? */
--- linux-4.15.0.orig/drivers/i2c/i2c-core-slave.c
+++ linux-4.15.0/drivers/i2c/i2c-core-slave.c
@@ -22,10 +22,8 @@
 {
     int ret;
     if (!client || !slave_cb) {
-        WARN(1, "insufficient data\n");
+        if (WARN(IS_ERR_OR_NULL(client) || !slave_cb, "insufficient data\n"))
         return -EINVAL;
     }
     if (!(client->flags & I2C_CLIENT_SLAVE))
--- linux-4.15.0.orig/drivers/i2c/i2c-core-smbus.c
+++ linux-4.15.0/drivers/i2c/i2c-core-smbus.c
@@ -435,6 +435,8 @@
         status = i2c_transfer(adapter, msg, num);
         if (status < 0)
             return status;
+        if (status != num)
+            return -EIO;
     }
     if (!client->flags & I2C_CLIENT_SLAVE))
         dev_warn(&client->dev, "%s: client slave flag not set. You might see address collisions\n", @ @ -64,6 +62,9 @@
     {
         int ret;
         if (IS_ERR_OR_NULL(client))
+        return -EINVAL;
+        if (!client->adapter->algo->unreg_slave) {
             dev_err(&client->dev, "%s: not supported by adapter\n", __func__);
             return -EOPNOTSUPP;
         }
         status = i2c_transfer(adapter, msg, num);
         if (status < 0)
             return status;
+        if (status != num)
+            return -EIO;
     */ Check PEC if last message is a read */
     if (i && (msg[num-1].flags & I2C_M_RD)) {

--- linux-4.15.0.orig/drivers/i2c/i2c-dev.c
+++ linux-4.15.0/drivers/i2c/i2c-dev.c
@@ -48,7 +48,7 @@
 struct i2c_dev {
     struct list_head list;
     struct i2c_adapter *adap;
-    struct device *dev;
+    struct device dev;
     struct cdev cdev;
   };

@@ -92,12 +92,14 @@
 return i2c_dev;
 }

-static void put_i2c_dev(struct i2c_dev *i2c_dev)
+static void put_i2c_dev(struct i2c_dev *i2c_dev, bool del_cdev)
 { spin_lock(&i2c_dev_list_lock);
   list_del(&i2c_dev->list);
   spin_unlock(&i2c_dev_list_lock);
-   kfree(i2c_dev);
+   if (del_cdev)
+       cdev_device_del(&i2c_dev->cdev, &i2c_dev->dev);
   put_device(&i2c_dev->dev);
 }

 static ssize_t name_show(struct device *dev,
@@ -147,7 +149,7 @@
 if (count > 8192)
     count = 8192;
 }
-    tmp = kmalloc(count, GFP_KERNEL);
+    tmp = kzalloc(count, GFP_KERNEL);
 if (tmp == NULL)
     return -ENOMEM;
@@ -156,7 +158,8 @@
     ret = i2c_master_recv(client, tmp, count);
 if (ret >= 0)
     ret = copy_to_user(buf, tmp, count) ? -EFAULT : ret;
+    if (copy_to_user(buf, tmp, ret))
+        ret = -EFAULT;
 kfree(tmp);
 return ret;
 }
@@ -278,9 +281,10 @@
if (msgs[i].flags & I2C_M_RECV_LEN) {
  if (!(msgs[i].flags & I2C_M_RD) ||
    msgs[i].len < 1 || msgs[i].buf[0] < 1 ||
    msgs[i].len < msgs[i].buf[0] +
    I2C_SMBUS_BLOCK_MAX) {
    i++;
    res = -EINVAL;
    break;
  }
}@@ -443,8 +447,13 @@
  sizeof(rdwr_arg)))
return -EFAULT;

-/\* Put an arbitrary limit on the number of messages that can
- * be sent at once */
+if (!rdwr_arg.msgs || rdwr_arg.nmsgs == 0)
+return -EINVAL;
 +
+/\*
 + * Put an arbitrary limit on the number of messages that can
 + * be sent at once
+/\*
if (rdwr_arg.nmsgs > I2C_RDWR_IOCTL_MAX_MSGS)
return -EINVAL;

@@ -468,9 +477,15 @@
  data_arg.data);
} case I2C_RETRIES:
+if (arg > INT_MAX)
+return -EINVAL;
 +
client->adapter->retries = arg;
break;
} case I2C_TIMEOUT:
+if (arg > INT_MAX)
+return -EINVAL;
 +
 /* For historical reasons, user-space sets the timeout
  * value in units of 10 ms.
 */
@@ -627,6 +642,14 @@
 static struct class *i2c_dev_class;

+static void i2cdev_dev_release(struct device *dev)
+{  
+struct i2c_dev *i2c_dev;
+  
i2c_dev = container_of(dev, struct i2c_dev, dev);
+kfree(i2c_dev);
+
+}
+
static int i2cdev_attach_adapter(struct device *dev, void *dummy)
{
struct i2c_adapter *adap;

    cdev_init(&i2c_dev->cdev, &i2cdev_fops);
    i2c_dev->cdev.owner = THIS_MODULE;
    -res = cdev_add(&i2c_dev->cdev, MKDEV(I2C_MAJOR, adap->nr), 1);
    -if (res)
        -goto error_cdev;
    -
    /* register this i2c device with the driver core */
    -i2c_dev->dev = device_create(i2c_dev_class, &adap->dev,
        -       MKDEV(I2C_MAJOR, adap->nr), NULL,
        -       "i2c-%d", adap->nr);
    -if (IS_ERR(i2c_dev->dev)) {
        -res = PTR_ERR(i2c_dev->dev);
        -goto error;
    }
    -device_initialize(&i2c_dev->dev);
    +
    +device_initialize(&i2c_dev->dev);
    +i2c_dev->dev.devt = MKDEV(I2C_MAJOR, adap->nr);
    +i2c_dev->dev.class = i2c_dev_class;
    +i2c_dev->dev.parent = &adap->dev;
    +i2c_dev->dev.release = i2cdev_dev_release;
    +dev_set_name(&i2c_dev->dev, "i2c-%d", adap->nr);
    +
    +res = cdev_device_add(&i2c_dev->cdev, &i2c_dev->dev);
    +if (res) {
        +put_i2c_dev(i2c_dev, false);
        +return res;
    }

    pr_debug("i2c-dev: adapter [%s] registered as minor %d\n", 
    adap->name, adap->nr);
    return 0;
-
-error:
-    cdev_del(&i2c_dev->cdev);
-    error_cdev:
-        put_i2c_dev(i2c_dev);
-        return res;
-    }

---

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static int i2cdev_detach_adapter(struct device *dev, void *dummy)
@@ -679,9 +698,7 @@
    if (!i2c_dev) /* attach_adapter must have failed */
    return 0;

    -cdev_del(&i2c_dev->cdev);
    -put_i2c_dev(i2c_dev);
    -device_destroy(i2c_dev_class, MKDEV(I2C_MAJOR, adap->nr));
    +put_i2c_dev(i2c_dev, true);

    pr_debug("i2c-dev: adapter [\%s] unregistered\n", adap->name);
    return 0;
--- linux-4.15.0.orig/drivers/i2c/i2c-mux.c
+++ linux-4.15.0/drivers/i2c/i2c-mux.c
@@ -144,7 +144,7 @@
    struct i2c_mux_priv *priv = adapter->algo_data;
    struct i2c_adapter *parent = priv->muxc->parent;

    -rt_mutex_lock(&parent->mux_lock);
    +rt_mutex_lock_nested(&parent->mux_lock, i2c_adapter_depth(adapter));
    if (!(flags & I2C_LOCK_ROOT_ADAPTER))
    return;
    i2c_lock_bus(parent, flags);
@@ -181,7 +181,7 @@
    struct i2c_mux_priv *priv = adapter->algo_data;
    struct i2c_adapter *parent = priv->muxc->parent;

    -rt_mutex_lock(&parent->mux_lock);
    +rt_mutex_lock_nested(&parent->mux_lock, i2c_adapter_depth(adapter));
    i2c_lock_bus(parent, flags);
}

--- linux-4.15.0.orig/drivers/i2c/muxes/i2c-demux-pinctrl.c
+++ linux-4.15.0/drivers/i2c/muxes/i2c-demux-pinctrl.c
@@ -270,6 +270,7 @@
    err_rollback_available:
    device_remove_file(&pdev->dev, &dev_attr_available_masters);
    err_rollback:
    +i2c_demux_deactivate_master(priv);
    for (j = 0; j < i; j++) {
        of_node_put(priv->chan[j].parent_np);
        of_changeset_destroy(&priv->chan[j].chgset);
    --- linux-4.15.0.orig/drivers/ide/cmd64x.c
    +++ linux-4.15.0/drivers/ide/cmd64x.c
    @@ -270,6 +270,7 @@
    struct ide_timing t;
    u8 arttim = 0;

+if (drive->dn >= ARRAY_SIZE(drwtim_regs))
+return;
+
ide_timing_compute(drive, mode, &t, T, 0);
/*
--- linux-4.15.0.orig/drivers/ide/ide-atapi.c
+++ linux-4.15.0/drivers/ide/ide-atapi.c
@@ -213,7 +213,6 @@
sense_rq->rq_disk = rq->rq_disk;
sense_rq->cmd_flags = REQ_OP_DRV_IN;
ide_req(sense_rq)->type = ATA_PRIV_SENSE;
- sense_rq->rq_flags |= RQF_PREEMPT;

req->cmd[0] = GPCMD_REQUEST_SENSE;
req->cmd[4] = cmd_len;
--- linux-4.15.0.orig/drivers/ide/ide-cd.c
+++ linux-4.15.0/drivers/ide/ide-cd.c
@@ -712,7 +712,7 @@
 struct request_queue *q = drive->queue;
 int write = rq_data_dir(rq) == WRITE;
 unsigned short sectors_per_frame =
-		queue_logical_block_size(q) >> SECTOR_BITS;
+ 		queue_logical_block_size(q) >> SECTOR_SHIFT;
ide_debug_log(IDE_DBG_RQ, "rq->cmd[0]: 0x%x, rq->cmd_flags: 0x%x, ",
 "secs_per_frame: %u",
@@ -919,7 +919,7 @@
 *sectors_per_frame = blocklen >> SECTOR_BITS;
 +sectors_per_frame = blocklen >> SECTOR_SHIFT;
switch (blocklen) {
case 512:
 case 1024:
@@ -935,7 +935,7 @@
}
*capacity = 1 + be32_to_cpu(capbuf.lba);
 -*sectors_per_frame = blocklen >> SECTOR_BITS;
 +*sectors_per_frame = blocklen >> SECTOR_SHIFT;
ide_debug_log(IDE_DBG_PROBE, "cap: %lu, sectors_per_frame: %lu",
 *capacity, *sectors_per_frame);
@@ -1012,7 +1012,7 @@
drive->probed_capacity = toc->capacity * sectors_per_frame;

blk_queue_logical_block_size(drive->queue,
-    sectors_per_frame << SECTOR_BITS);
+    sectors_per_frame << SECTOR_SHIFT);

/* first read just the header, so we know how long the TOC is */
stat = cdrom_read_tocentry(drive, 0, 1, 0, (char *)&toc->hdr,
@@ -1613,6 +1613,8 @@
struct cdrom_info *info;
int rc = -ENXIO;

+    check_disk_change(bdev);
+    mutex_lock(&ide_cd_mutex);
info = ide_cd_get(bdev->bd_disk);
if (!info)
--- linux-4.15.0.orig/drivers/ide/ide-cd.h
+++ linux-4.15.0/drivers/ide/ide-cd.h
@@ -21,11 +21,7 @@
/************************************************************************/
-#define SECTOR_BITS    9
-#ifndef SECTOR_SIZE
-#define SECTOR_SIZE  (1 << SECTOR_BITS)
-#endif
-#define SECTORS_PER_FRAME (CD_FRAMESIZE >> SECTOR_BITS)
+#define SECTORS_PER_FRAME (CD_FRAMESIZE >> SECTOR_SHIFT)
+#define SECTOR_BUFFER_SIZE (CD_FRAMESIZE * 32)

/* Capabilities Page size including 8 bytes of Mode Page Header */
--- linux-4.15.0.orig/drivers/ide/ide-io.c
+++ linux-4.15.0/drivers/ide/ide-io.c
@@ -531,11 +531,6 @@
* above to return us whatever is in the queue. Since we call
* ide_do_request() ourselves, we end up taking requests while
* the queue is blocked...
- *
- * We let requests forced at head of queue with ide-preempt
- * though. I hope that doesn't happen too much, hopefully not
- * unless the subdriver triggers such a thing in its own PM
- * state machine.
- */
if ((drive->dev_flags & IDE_DFLAG_BLOCKED) &&
    ata_pm_request(rq) == 0 &&
--- linux-4.15.0.orig/drivers/ide/pmac.c
+++ linux-4.15.0/drivers/ide/pmac.c
@@ -920,6 +920,7 @@
struct device_node *root = of_find_node_by_path("/");
const char *model = of_get_property(root, "model", NULL);

+of_node_put(root);
/* Get cable type from device-tree. */
if (cable && !strncmp(cable, "80-", 3)) {
/* Some drives fail to detect 80c cable in PowerBook */
--- linux-4.15.0.orig/drivers/ide/serverworks.c
+++ linux-4.15.0/drivers/ide/serverworks.c
@@ -114,6 +114,9 @@
    struct pci_dev *dev = to_pci_dev(hwif->dev);
    const u8 pio = drive->pio_mode - XFER_PIO_0;

    +if (drive->dn >= ARRAY_SIZE(drive_pci))
    +return;
    +pci_write_config_byte(dev, drive_pci[drive->dn], pio_modes[pio]);

    if (svwks_csb_check(dev)) {
    @@ -140,6 +143,9 @@
        u8 ultra_enable = 0, ultra_timing = 0, dma_timing = 0;

        +if (drive->dn >= ARRAY_SIZE(drive_pci2))
        +return;
        +pci_read_config_byte(dev, drive_pci[drive->dn], &ultra_timing);
        pci_read_config_byte(dev, 0x54, &ultra_enable);

--- linux-4.15.0.orig/drivers/idle/intel_idle.c
+++ linux-4.15.0/drivers/idle/intel_idle.c
@@ -1076,14 +1076,14 @@
    ICU(INEITL_FAM6_ATOM_BONNELL_MID,idle_cpu_tangier),
    ICU(INEITL_FAM6_ATOM_BONNELL,idle_cpu_atom),
    ICU(INEITL_FAM6_ATOM_LINCRFOF,idle_cpu_lincroft),
    ICU(INEITL_FAM6_ATOM_CEDARVIEW,idle_cpu_atom),
    ICU(INEITL_FAM6_ATOM_SILVERMONT1,idle_cpu_byt),
    ICU(INEITL_FAM6_ATOM_MERRIFIELD,idle_cpu_tangier),
    ICU(INEITL_FAM6_ATOM_SALTWELL,idle_cpu_atom),
    ICU(INEITL_FAM6_ATOM_SILVERMONT,idle_cpu_byt),
    ICU(INEITL_FAM6_ATOM_SILVERMONT_MID,idle_cpu_tangier),
ICPU(INTEL_FAM6_ATOM_AIRMONT, idle_cpu_cht),
ICPU(INTEL_FAM6_IVYBRIDGE, idle_cpu_ibv),
ICPU(INTEL_FAM6_IVYBRIDGE_X, idle_cpu_ivt),
@@ -1091,7 +1091,7 @@
ICPU(INTEL_FAM6_HASWELL_X, idle_cpu_hsw),
ICPU(INTEL_FAM6_HASWELL_ULT, idle_cpu_hsw),
ICPU(INTEL_FAM6_HASWELL_GT3E, idle_cpu_hsw),
-ICPU(INTEL_FAM6_ATOM_SILVERMONT2, idle_cpu_avn),
+ICPU(INTEL_FAM6_ATOM_SILVERMONT_X, idle_cpu_avn),
ICPU(INTEL_FAM6_BROADWELL_CORE, idle_cpu_bdw),
ICPU(INTEL_FAM6_BROADWELL_GT3E, idle_cpu_bdw),
ICPU(INTEL_FAM6_BROADWELL_X, idle_cpu_bdw),
@@ -1104,8 +1104,8 @@
ICPU(INTEL_FAM6_XEON_PHI_KNL, idle_cpu_knl),
ICPU(INTEL_FAM6_XEON_PHI_KNM, idle_cpu_knl),
ICPU(INTEL_FAM6_ATOM_GOLDMONT, idle_cpu_bxt),
-ICPU(INTEL_FAM6_ATOM_GEMINI_LAKE, idle_cpu_bxt),
-ICPU(INTEL_FAM6_ATOM_DENVERTON, idle_cpu_dnv),
+ICPU(INTEL_FAM6_ATOM_GOLDMONT_PLUS, idle_cpu_bxt),
+ICPU(INTEL_FAM6_ATOM_GOLDMONT_X, idle_cpu_dnv),
{};
@@ -1322,7 +1322,7 @@
ivt_idle_state_table_update();
break;
case INTEL_FAM6_ATOM_GOLDMONT:
- case INTEL_FAM6_ATOM_GEMINI_LAKE:
+ case INTEL_FAM6_ATOM_GOLDMONT_PLUS:
  bxt_idle_state_table_update();
  break;
case INTEL_FAM6_SKYLAKE_DESKTOP:
--- linux-4.15.0.orig/drivers/iio/accel/adxl345_core.c
+++ linux-4.15.0/drivers/iio/accel/adxl345_core.c
@@ -21,6 +21,8 @@
#define ADXL345_REG_DATAX0	(ADXL345_REG_DATAX0 + (index) * sizeof(__le16))
#define ADXL345_POWER_CTL_MEASURE	BIT(3)
#define ADXL345_POWER_CTL_STANDBY	0x00
@@ -47,19 +49,19 @@
  u8 data_range;
};

-#define ADXL345_CHANNEL(reg, axis) \
```c
#define ADXL345_CHANNEL(index, axis) {
    .type = IIO_ACCEL,
    .modified = 1,
    .channel2 = IIO_MOD_##axis,
    .address = reg,
    .address = index,
    .info_mask_separate = BIT(IIO_CHAN_INFO_RAW),
    .info_mask_shared_by_type = BIT(IIO_CHAN_INFO_SCALE),
}

static const struct iio_chan_spec adxl345_channels[] = {
    ADXL345_CHANNEL(ADXL345_REG_DATAX0, X),
    ADXL345_CHANNEL(ADXL345_REG_DATAY0, Y),
    ADXL345_CHANNEL(ADXL345_REG_DATAZ0, Z),
    ADXL345_CHANNEL(0, X),
    ADXL345_CHANNEL(1, Y),
    ADXL345_CHANNEL(2, Z),
};

static int adxl345_read_raw(struct iio_dev *indio_dev,
                           int *val, int *val2, long mask)
{
    struct adxl345_data *data = iio_priv(indio_dev);
    __le16 accel;
    int ret;

    switch (mask) {
        case IIO_CHAN_INFO_SCALE:
            *val = 0;
            return IIO_VAL_INT;
        default:

            __le16 regval;
            ret = regmap_bulk_read(data->regmap, chan->address, &regval,
                                    sizeof(regval));
            if (ret < 0)
                return ret;

            *val = sign_extend32(le16_to_cpu(regval), 12);
            return IIO_VAL_INT;
    }

    return IIO_VAL_INT;
}
```

--- linux-4.15.0.orig/drivers/iio/accel/bma180.c
+++ linux-4.15.0/drivers/iio/accel/bma180.c
u8 int_reset_reg, int_reset_mask;
    u8 sleep_reg, sleep_mask;
    -u8 bw_reg, bw_mask;
      +u8 bw_reg, bw_mask, bw_offset;
    u8 scale_reg, scale_mask;
    u8 power_reg, power_mask, lowpower_val;
    u8 int_enable_reg, int_enable_mask;

#define BMA250_RANGE_MASKGENMASK(3, 0) /**< Range of accel values */
#define BMA250_BW_MASKGENMASK(4, 0) /**< Accel bandwidth */
#define BMA250_BW_OFFSET8
#define BMA250_SUSPEND_MASKBIT(7) /**< chip will sleep */
#define BMA250_LOWPOWER_MASKBIT(6)
#define BMA250_DATA_INTEN_MASKBIT(4)

enum bma180_chan {
    @ @ -239,7 +244,8 @ @
    @ @ -121,7 +122,11 @ @
    int scale;
    int bw;
    bool pmode;
    -u8 buff[16]; /**< 3x 16-bit + 8-bit + padding + timestamp */
    /**< Ensure timestamp is naturally aligned */
    +struct {
        +s16 chan[4];
        +s64 timestamp __aligned(8);
        +} scan;
    };

static const struct bma180_part_info bma180_part_info[] = {
    [BMA180] = {
        -bma180_channels, ARRAY_SIZE(bma180_channels),
        -bma180_scale_table, ARRAY_SIZE(bma180_scale_table),
        -bma180_bw_table, ARRAY_SIZE(bma180_bw_table),
        -BMA180_CTRL_REG0, BMA180_RESET_INT,
    };

    for (i = 0; i < data->part_info->num_bw; ++i) {
        if (data->part_info->bw_table[i] == val) {
            ret = bma180_set_bits(data, data->part_info->bw_reg,
                                data->part_info->bw_mask, i);
            if (ret) {
                dev_err(&data->client->dev,
                        "failed to set bandwidth\n");
                @ @ -621,32 +627,53 @ @
            }
        }
-BMA180_CTRL_REG0, BMA180_SLEEP,
-BMA180_BW_TCS, BMA180_BW,
-BMA180_OFFSET_LSB1, BMA180_RANGE,
-BMA180_TCO_Z, BMA180_MODE_CONFIG, BMA180_LOW_POWER,
-BMA180_CTRL_REG3, BMA180_NEW_DATA_INT,
-BMA180_RESET,
-bma180_chip_config,
-bma180_chip_disable,
+ channels = bma180_channels,
+.channels = ARRAY_SIZE(bma180_channels),
+.scale_table = bma180_scale_table,
+.num_scales = ARRAY_SIZE(bma180_scale_table),
+.bw_table = bma180_bw_table,
+.num_bw = ARRAY_SIZE(bma180_bw_table),
+.int_reset_reg = BMA180_CTRL_REG0,
+.int_reset_mask = BMA180_RESET_INT,
+.sleep_reg = BMA180_CTRL_REG0,
+.sleep_mask = BMA180_SLEEP,
+.bw_reg = BMA180_BW_TCS,
+.bw_mask = BMA180_BW,
+.scale_reg = BMA180_OFFSET_LSB1,
+.scale_mask = BMA180_RANGE,
+.power_reg = BMA180_TCO_Z,
+.power_mask = BMA180_MODE_CONFIG,
+.lowpower_val = BMA180_LOW_POWER,
+.int_enable_reg = BMA180_CTRL_REG3,
+.int_enable_mask = BMA180_NEW_DATA_INT,
+.softreset_reg = BMA180_RESET,
+.chip_config = bma180_chip_config,
+.chip_disable = bma180_chip_disable,
},
[BMA250] = {
-bma250_channels, ARRAY_SIZE(bma250_channels),
-bma250_scale_table, ARRAY_SIZE(bma250_scale_table),
-bma250_bw_table, ARRAY_SIZE(bma250_bw_table),
-BMA250_INT_RESET_REG, BMA250_INT_RESET_MASK,
-BMA250_POWER_REG, BMA250_SUSPEND_MASK,
-BMA250_BW_REG, BMA250_BW_MASK,
-BMA250_RANGE_REG, BMA250_RANGE_MASK,
-BMA250_POWER_REG, BMA250_LOWPOWER_MASK, 1,
-BMA250_INT_ENABLE_REG, BMA250_DATA_INTEN_MASK,
-BMA250_RESET_REG,
-bma250_chip_config,
-bma250_chip_disable,
+.channels = bma250_channels,
+.num_channels = ARRAY_SIZE(bma250_channels),
+.scale_table = bma250_scale_table,
+.num_scales = ARRAY_SIZE(bma250_scale_table),
mutex_unlock(&data->mutex);
}
-
+-((s16 *)data->buff)[i++] = ret;
+data->scan.chan[i++] = ret;
}
mutex_unlock(&data->mutex);

-iio_push_to_buffers_with_timestamp(indio_dev, data->buff, time_ns);
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan, time_ns);
err:
iio_trigger_notify_done(indio_dev->trig);

--- linux-4.15.0.orig/drivers/iio/accel/bma220_spi.c
+++ linux-4.15.0/drivers/iio/accel/bma220_spi.c
@@ -76,7 +76,11 @@ struct bma220_data {
     struct mutex lock;
-     s8 buffer[16]; /* 3x8-bit channels + 5x8 padding + 8x8 timestamp */
+     struct {
+         s8 chans[3];
+         /* Ensure timestamp is naturally aligned. */
+         s64 timestamp __aligned(8);
     }
     struct spi_device *spi_device;
     

mutex_lock(&data->lock);
data->tx_buf[0] = BMA220_REG_ACCEL_X | BMA220_READ_MASK;
-ret = spi_write_then_read(spi, data->tx_buf, 1, data->buffer,
+ret = spi_write_then_read(spi, data->tx_buf, 1, &data->scan.chans,
   ARRAY_SIZE(bma220_channels) - 1);
if (ret < 0)
goto err;

-iio_push_to_buffers_with_timestamp(indio_dev, data->buffer,
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
   pf->timestamp);
err:
mutex_unlock(&data->lock);
--- linux-4.15.0.orig/drivers/iio/accel/bmc150-accel-core.c
+++ linux-4.15.0/drivers/iio/accel/bmc150-accel-core.c
@@ -125,7 +125,7 @@
#define BMC150_ACCEL_SLEEP_1_SEC		0x0F
#define BMC150_ACCEL_REG_TEMP		0x08
-#define BMC150_ACCEL_TEMP_CENTER_VAL	24
+#define BMC150_ACCEL_TEMP_CENTER_VAL	23
#define BMC150_ACCEL_AXIS_TO_REG(axis) (BMC150_ACCEL_REG_XOUT_L + (axis * 2))
#define BMC150_AUTO_SUSPEND_DELAY_MS	2000
@@ -197,6 +197,14 @@
struct mutex mutex;
 u8 fifo_mode, watermark;
 s16 buffer[8];
+/
+ * Ensure there is sufficient space and correct alignment for
+ * the timestamp if enabled
+ */
+struct {
+ __le16 channels[3];
+ s64 ts __aligned(8);
+} scan;
 u8 bw_bits;
 u32 slope_dur;
 u32 slope_thres;
@@ -933,15 +941,16 @@
 * now.
 */
```c
for (i = 0; i < count; i++) {
    u16 sample[8];
    int j, bit;

    j = 0;
    for_each_set_bit(bit, indio_dev->active_scan_mask,
        indio_dev->masklength)
        memcpy(&sample[j++], &buffer[i * 3 + bit], 2);
    memcpy(&data->scan.channels[j++], &buffer[i * 3 + bit],
        sizeof(data->scan.channels[0]));
    iio_push_to_buffers_with_timestamp(indio_dev, sample, tstamp);
    iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
        tstamp);

    tstamp += sample_period;
}

--- linux-4.15.0.orig/drivers/iio/accel/cros_ec_accel_legacy.c
+++ linux-4.15.0/drivers/iio/accel/cros_ec_accel_legacy.c
@@ -328,7 +328,6 @@
     .modified = 1,
     .info_mask_separate =
     BIT(IIO_CHAN_INFO_RAW) | BIT(IIO_CHAN_INFO_SCALE) |
-BIT(IIO_CHAN_INFO_CALIBBIAS),
     .info_mask_shared_by_all = BIT(IIO_CHAN_INFO_SCALE),
     .ext_info = cros_ec_accel_legacy_ext_info,
--- linux-4.15.0.orig/drivers/iio/accel/hid-sensor-accel-3d.c
+++ linux-4.15.0/drivers/iio/accel/hid-sensor-accel-3d.c
@@ -42,8 +42,11 @@
 struct hid_sensor_hub_callbacks callbacks;
 struct hid_sensor_common common_attributes;
 struct hid_sensor_hub_attribute_info accel[ACCEL_3D_CHANNEL_MAX];
-/* Reserve for 3 channels + padding + timestamp */
+/* Ensure timestamp is naturally aligned */
+struct {
+    u32 accel_val[3];
+s64 timestamp __aligned(8);
+} scan;
    int scale_pre_decml;
    int scale_post_decml;
    int scale_precision;
@@ -149,6 +152,7 @@
     int report_id = -1;
     u32 address;
     int ret_type;
+s32 min;
```

struct hid_sensor_hub_device *hsdev =
accel_state->common_attributes.hsdev;

@ @ -158,12 +162,14 @@

 case 0:
     hid_sensor_power_state(&accel_state->common_attributes, true);
     report_id = accel_state->accel[chan->scan_index].report_id;
     +min = accel_state->accel[chan->scan_index].logical_minimum;
     address = accel_3d_addresses[chan->scan_index];

     if (report_id >= 0)
     *val = sensor_hub_input_attr_get_raw_value(
         accel_state->common_attributes.hsdev,
         hsdev->usage, address, report_id,
         SENSOR_HUB_SYNC);
     +SENSOR_HUB_SYNC,
     +min < 0);
 else {
     *val = 0;
     hid_sensor_power_state(&accel_state->common_attributes,
     @ @ -251,8 +257,8 @@
     accel_state->timestamp = iio_get_time_ns(indio_dev);

     hid_sensor_push_data(indio_dev,
     - accel_state->accel_val,
     - sizeof(accel_state->accel_val),
     + &accel_state->scan,
     + sizeof(accel_state->scan),
     accel_state->timestamp);

     accel_state->timestamp = 0;
     @ @ -277,7 +283,7 @@

case HID_USAGE_SENSOR_ACCEL_Y_AXIS:
case HID_USAGE_SENSOR_ACCEL_Z_AXIS:
    offset = usage_id - HID_USAGE_SENSOR_ACCEL_X_AXIS;
    -accel_state->accel_val[CHANNEL_SCAN_INDEX_X + offset] =
    +accel_state->scan.accel_val[CHANNEL_SCAN_INDEX_X + offset] =
    *(u32 *)raw_data;
    ret = 0;
    break;
--- linux-4.15.0.orig/drivers/iio/accel/kxcjk-1013.c
+++ linux-4.15.0/drivers/iio/accel/kxcjk-1013.c
@@ -134,12 +134,29 @@

 enum kx_acpi_type {
     ACPI_GENERIC,
     ACPI_SMO8500,

 };
+enum kxcjk1013_axis {
+  AXIS_X,
+  AXIS_Y,
+  AXIS_Z,
+  AXIS_MAX
+};
+
+struct kxcjk1013_data {
+  struct i2c_client *client;
+  struct iio_trigger *dready_trig;
+  struct iio_trigger *motion_trig;
+  struct mutex mutex;
+  s16 buffer[8];
+  /* Ensure timestamp naturally aligned */
+  struct {
+    s16 chans[AXIS_MAX];
+    s64 timestamp __aligned(8);
+  } scan;
+  u8 odr_bits;
+  u8 range;
+  int wake_thres;
+  bool motion_trigger_on;
+  int64_t timestamp;
+  enum kx_chipset chipset;
+  bool is_smo8500_device;
+};
+
+enum kxcjk1013_axis {
+  AXIS_X,
+  AXIS_Y,
+  AXIS_Z,
+  AXIS_MAX,
+  enum kx_acpi_type acpi_type;
+};

enum kxcjk1013_mode {
  @ @ -277.6 +287.32 @ @
  {19163, 1, 0},
  {38326, 0, 1 }
};

+#ifdef CONFIG_ACPI
+enum kiox010a_fn_index {
+  KIOX010A_SET_LAPTOP_MODE = 1,
+  KIOX010A_SET_TABLET_MODE = 2,
static int kiox010a_dsm(struct device *dev, int fn_index)
{
    acpi_handle handle = ACPI_HANDLE(dev);
    guid_t kiox010a_dsm_guid;
    union acpi_object *obj;
    
    if (!handle)
        return -ENODEV;
    
    guid_parse("1f339696-d475-4e26-8cad-2e9f8e6d7a91", &kiox010a_dsm_guid);
    
    obj = acpi_evaluate_dsm(handle, &kiox010a_dsm_guid, 1, fn_index, NULL);
    
    if (!obj)
        return -EIO;
    
    ACPI_FREE(obj);
    return 0;
}

static int kxcjk1013_set_mode(struct kxcjk1013_data *data, enum kxcjk1013_mode mode)
{
    int ret;
    
#define CONFIG_ACPI
    if (data->acpi_type == ACPI_KIOX010A) {
        /* Make sure the kbd and touchpad on 2-in-1s using 2 KXCJ91008-s work */
        kiox010a_dsm(&data->client->dev, KIOX010A_SET_LAPTOP_MODE);
    }
    
#undef CONFIG_ACPI
    
    ret = i2c_smbus_read_byte_data(data->client, KXCJK1013_REG_WHO_AM_I);
    if (ret < 0) {
        dev_err(&data->client->dev, "Error reading who_am_i\n");
        @ @ -1047,12 +1090,12 @ @
        ret = i2c_smbus_read_i2c_block_data_or_emulated(data->client,
        KXCJK1013_REG_XOUT_L,
        AXIS_MAX * 2,
        -(u8 *)data->buffer);
    +(u8 *)data->scan.chans);
    mutex_unlock(&data->mutex);
    if (ret < 0)
        goto err;
static const char *kxcjk1013_match_acpi_device(struct device *dev,
    enum kx_chipset *chipset,
    -   bool *is_smo8500_device)
+   enum kx_acpi_type *acpi_type)
{
    const struct acpi_device_id *id;

    if (strcmp(id->id, "SMO8500") == 0)
-*is_smo8500_device = true;
+*acpi_type = ACPI_SMO8500;
+else if (strcmp(id->id, "KIOX010A") == 0)
+*acpi_type = ACPI_KIOX010A;

*chipset = (enum kx_chipset)id->driver_data;

} else if (ACPI_HANDLE(&client->dev)) {
    name = kxcjk1013_match_acpi_device(&client->dev,
        &data->chipset,
-   &data->is_smo8500_device);
+   &data->acpi_type);
} else
    return -ENODEV;

indio_dev->modes = INDIO_DIRECT_MODE;
indio_dev->info = &kxcjk1013_info;

-if (client->irq > 0 && !data->is_smo8500_device) {
+if (client->irq > 0 && data->acpi_type != ACPI_SMO8500) {
    ret = devm_request_threaded_irq(&client->dev, client->irq,
        kxcjk1013_data_rdy_trig_poll,
        kxcjk1013_event_handler,
        @@ -1437,6 +1482,8 @@
        mutex_lock(&data->mutex);
        ret = kxcjk1013_set_mode(data, OPERATION);
+if (ret == 0)
+ret = kxcjk1013_set_range(data, data->range);
mutex_unlock(&data->mutex);
return ret;
@@ -1490,6 +1537,7 @@
{"KXCJ1008", KXCJ91008},
{"KXCJ9000", KXCJ91008},
{"KIOX000A", KXCJ91008},
+{"KIOX010A", KXCJ91008}, /* KXCJ91008 inside the display of a 2-in-1 */
{"KXTJ1009", KXTJ21009},
{"SMO8500", KXCJ91008},
{ },
--- linux-4.15.0.orig/drivers/iio/accel/kxsd9-i2c.c
+++ linux-4.15.0/drivers/iio/accel/kxsd9-i2c.c
@@ -63,3 +63,6 @@
.id_table= kxsd9_i2c_id,
};
module_i2c_driver(kxsd9_i2c_driver);
+
+MODULE_LICENSE("GPL v2");
+MODULE_DESCRIPTION("KXSD9 accelerometer I2C interface");
--- linux-4.15.0.orig/drivers/iio/accel/kxsd9.c
+++ linux-4.15.0/drivers/iio/accel/kxsd9.c
@@ -212,14 +212,20 @@
const struct iio_poll_func *pf = p;
struct iio_dev *indio_dev = pf->indio_dev;
struct kxsd9_state *st = iio_priv(indio_dev);
+/*
+ * Ensure correct positioning and alignment of timestamp.
+ * No need to zero initialize as all elements written.
+ */
+struct {
+__be16 chan[4];
+s64 ts __aligned(8);
+} hw_values;
int ret;
-/* 4 * 16bit values AND timestamp */
-__be16 hw_values[8];
ret = regmap_bulk_read(st->map,
KXSD9_REG_X,
&hw_values,
8);
+
hw_values.chan,
+
sizeof(hw_values.chan));
if (ret) {
dev_err(st->dev,

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"error reading data\n");
@@ -227,7 +233,7 @@

iio_push_to_buffers_with_timestamp(indio_dev, 
  hw_values, 
+ &hw_values, 
    iio_get_time_ns(indio_dev)); 
  iio_trigger_notify_done(indio_dev->trig); 

--- linux-4.15.0.orig/drivers/iio/accel/mma7455_core.c
+++ linux-4.15.0/drivers/iio/accel/mma7455_core.c
@@ -55,6 +55,14 @@

struct mma7455_data {
  struct regmap *regmap;
  
+/*
+ * Used to reorganize data. Will ensure correct alignment of
+ * the timestamp if present
+ */
  +struct {
    +__le16 channels[3];
    +-s64 ts __aligned(8);
    +} scan;
  };

static int mma7455_drdy(struct mma7455_data *mma7455) 
@@ -85,19 +93,19 @@
  struct iio_poll_func *pf = p;
  struct iio_dev *indio_dev = pf->indio_dev;
  struct mma7455_data *mma7455 = iio_priv(indio_dev);
-  u8 buf[16]; /* 3 x 16-bit channels + padding + ts */
+  ret = mma7455_drdy(mma7455);
  int ret;

  ret = mma7455_drdy(mma7455);
  if (ret)
    goto done;

  -ret = regmap_bulk_read(mma7455->regmap, MMA7455_REG_XOUTL, buf, 
-    sizeof(__le16) * 3);
+ret = regmap_bulk_read(mma7455->regmap, MMA7455_REG_XOUTL, 
+    mma7455->scan.channels, 
+    sizeof(mma7455->scan.channels));
  if (ret)
    goto done;

  -iio_push_to_buffers_with_timestamp(indio_dev, buf, 
+iio_push_to_buffers_with_timestamp(indio_dev, &mma7455->scan, 

iio_get_time_ns(indio_dev));

done:
--- linux-4.15.0.orig/drivers/iio/accel/mma8452.c
+++ linux-4.15.0/drivers/iio/accel/mma8452.c
@@ -108,6 +108,12 @@
 u8 ctrl_reg1;
 u8 data_cfg;
 const struct mma_chip_info *chip_info;
+/* Ensure correct alignment of time stamp when present */
+struct {
+__be16 channels[3];
+si64 ts __aligned(8);
+} buffer;
};
/**
@@ -1036,7 +1042,7 @@
 if (src < 0)
 return IRQ_NONE;

-if (!(src & data->chip_info->enabled_events))
+if (!(src & (data->chip_info->enabled_events | MMA8452_INT_DRDY)))
 return IRQ_NONE;

 if (src & MMA8452_INT_DRDY) {
 @@ -1071,14 +1077,13 @@
 struct iio_poll_func *pf = p;
 struct iio_dev *indio_dev = pf->indio_dev;
 struct mma8452_data *data = iio_priv(indio_dev);
-u8 buffer[16]; /* 3 16-bit channels + padding + ts */
+int ret = mma8452_read(data, data->buffer.channels);
 if (ret < 0)
 goto done;

-iio_push_to_buffers_with_timestamp(indio_dev, buffer,
 +iio_push_to_buffers_with_timestamp(indio_dev, &data->buffer,
   iio_get_time_ns(indio_dev));

done:
@@ -1630,10 +1635,13 @@
 ret = mma8452_set_freefall_mode(data, false);
 if (ret < 0)
-goto buffer_cleanup;
+goto unregister_device;

return 0;

+unregister_device:
+iio_device_unregister(indio_dev);
+
buffer_cleanup:
  iio_triggered_buffer_cleanup(indio_dev);

--- linux-4.15.0.orig/drivers/iio/accel/sca3000.c
+++ linux-4.15.0/drivers/iio/accel/sca3000.c
@@ -797,6 +797,7 @@
mutex_lock(&st->lock);
ret = sca3000_write_3db_freq(st, val);
mutex_unlock(&st->lock);
+return ret;
default:
return -EINVAL;
}
@@ -981,7 +982,7 @@
st->tx[0] = SCA3000_READ_REG(reg_address_high);
ret = spi_sync_transfer(st->us, xfer, ARRAY_SIZE(xfer));
if (ret) {
-dev_err(get_device(&st->us->dev), "problem reading register");
+dev_err(&st->us->dev, "problem reading register\n");
return ret;
}
@@ -1277,7 +1278,7 @@
{
struct iio_buffer *buffer;

-buffer = iio_kfifo_allocate();
+buffer = devm_iio_kfifo_allocate(&indio_dev->dev);
if (!buffer)
return -ENOMEM;

@@ -1287,11 +1288,6 @@
return 0;
}

-static void sca3000_unconfigure_ring(struct iio_dev *indio_dev)
-{
-iio_kfifo_free(indio_dev->buffer);
-}
-
static inline
int __sca3000_hw_ring_state_set(struct iio_dev *indio_dev, bool state)
{
    if (spi->irq)
        free_irq(spi->irq, indio_dev);

    return 0;
}

--- linux-4.15.0.orig/drivers/iio/accel/st_accel_core.c
+++ linux-4.15.0/drivers/iio/accel/st_accel_core.c
@@ -951,7 +951,7 @@
    if (!pdata)
        pdata = (struct st_sensors_platform_data *)default_accel_pdata;

-err = st_sensors_init_sensor(indio_dev, adata->dev->platform_data);
+err = st_sensors_init_sensor(indio_dev, pdata);
    if (err < 0)
        goto st_accel_power_off;

--- linux-4.15.0.orig/drivers/iio/accel/st_accel_i2c.c
+++ linux-4.15.0/drivers/iio/accel/st_accel_i2c.c
@@ -107,6 +107,7 @@
    #ifdef CONFIG_ACPI
    static const struct acpi_device_id st_accel_acpi_match[] = {
        {"SMO8840", LIS2DH12},
        {"SMO8A90", LNG2DM},
    
--- linux-4.15.0.orig/drivers/iio/accel/stk8312.c
+++ linux-4.15.0/drivers/iio/accel/stk8312.c
@@ -106,7 +106,11 @@
    u8 mode;
    struct iio_trigger *dready_trig;
    bool dready_trigger_on;
-    s8 buffer[16]; /* 3x8-bit channels + 5x8 padding + 64-bit timestamp */
+    /* Ensure timestamp is naturally aligned */
+    struct {
+        s8 chans[3];
+        s64 timestamp __aligned(8);
+    } scan;
+};

    static IIO_CONST_ATTR(in_accel_scale_available, STK8312_SCALE_AVAIL);
ret = i2c_smbus_read_i2c_block_data(data->client,
    STK8312_REG_XOUT,
    STK8312_ALL_CHANNEL_SIZE,
    data->buffer);
+ data->scan.chans);
if (ret < STK8312_ALL_CHANNEL_SIZE) {
    dev_err(&data->client->dev, "register read failed\n");
    mutex_unlock(&data->lock);
    goto err;
}
-data->buffer[i++] = ret;
+data->scan.chans[i++] = ret;
}
}
mutex_unlock(&data->lock);

-iio_push_to_buffers_with_timestamp(indio_dev, data->buffer,
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
    pf->timestamp);
err:
    iio_trigger_notify_done(indio_dev->trig);
--- linux-4.15.0.orig/drivers/iio/accel/stk8ba50.c
+++ linux-4.15.0/drivers/iio/accel/stk8ba50.c
@@ -94,12 +94,11 @
    u8 sample_rate_idx;
    struct iio_trigger *dready_trig;
    bool dready_trigger_on;
-/*
- * 3 x 16-bit channels (10-bit data, 6-bit padding) +
- * 1 x 16 padding +
- * 4 x 16 64-bit timestamp
- */
-s16 buffer[8];
+/* Ensure timestamp is naturally aligned */
+struct {
+s16 chans[3];
+u64 timetamp __aligned(8);
+} scan;
};

#define STK8BA50_ACCEL_CHANNEL(index, reg, axis) {
    @ @ -327.7 +326.7 @ @
    ret = i2c_smbus_read_i2c_block_data(data->client,
        STK8BA50_REG_XOUT,
        STK8BA50_ALL_CHANNEL_SIZE,
(u8 *)data->buffer);
+ (u8 *)data->scan.chans);
if (ret < STK8BA50_ALL_CHANNEL_SIZE) {
    dev_err(&data->client->dev, "register read failed\n");
goto err;
    @ @ -340,10 +339,10 @@
if (ret < 0)
    goto err;

-data->buffer[i++] = ret;
+data->scan.chans[i++] = ret;
}
}
-iio_push_to_buffers_with_timestamp(indio_dev, data->buffer,
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
    pf->timestamp);
err:
mutex_unlock(&data->lock);
--- linux-4.15.0.orig/drivers/iio/adc/Kconfig
+++ linux-4.15.0/drivers/iio/adc/Kconfig
@@ -158,6 +158,7 @@
    tristate "Atmel AT91 SAMA5D2 ADC"
    depends on ARCH_AT91 || COMPILE_TEST
    depends on HAS_IOMEM
+select IIO_BUFFER
select IIO_TRIGGERED_BUFFER
help
    Say yes here to build support for Atmel SAMA5D2 ADC which is
    @ @ -635,6 +636,7 @@
    depends on HAS_DMA
    depends on OF
    depends on REGULATOR
+depends on HAS_IOMEM
select IIO_BUFFER
select MFD_STM32_TIMERS
select IIO_STM32_TIMER_TRIGGER
--- linux-4.15.0.orig/drivers/iio/adc/ad7791.c
+++ linux-4.15.0/drivers/iio/adc/ad7791.c
@@ -244,58 +244,9 @@
return -EINVAL;

-static const char * const ad7791_sample_freq_avail[] = {
-    [AD7791_FILTER_RATE_120] = "120",
-    [AD7791_FILTER_RATE_100] = "100",
-    [AD7791_FILTER_RATE_33_3] = "33.3",
-    [AD7791_FILTER_RATE_20] = "20",
-    [AD7791_FILTER_RATE_16_6] = "16.6",

- [AD7791_FILTER_RATE_16_7] = "16.7",
  - [AD7791_FILTER_RATE_13_3] = "13.3",
  - [AD7791_FILTER_RATE_9_5] = "9.5",
-
- static ssize_t ad7791_read_frequency(struct device *dev,
  - struct device_attribute *attr, char *buf)
  - {
    - struct iio_dev *indio_dev = dev_to_iio_dev(dev);
    - struct ad7791_state *st = iio_priv(indio_dev);
    - unsigned int rate = st->filter & AD7791_FILTER_RATE_MASK;
      -
    - return sprintf(buf, "%s\n", ad7791_sample_freq_avail[rate]);
  - }

- static ssize_t ad7791_write_frequency(struct device *dev,
  - struct device_attribute *attr, const char *buf, size_t len)
  - {
    - struct iio_dev *indio_dev = dev_to_iio_dev(dev);
    - struct ad7791_state *st = iio_priv(indio_dev);
      -
    - int i, ret;
      -
    - i = sysfs_match_string(ad7791_sample_freq_avail, buf);
      -
    - if (i < 0)
      - return i;
      -
    - ret = iio_device_claim_direct_mode(indio_dev);
      -
    - if (ret)
      - return ret;
      -
    - st->filter &= ~AD7791_FILTER_RATE_MASK;
      -
    - st->filter |= i;
      -
    - ad_sd_write_reg(&st->sd, AD7791_REG_FILTER, sizeof(st->filter),
      -
      - st->filter);
      -
    - iio_device_release_direct_mode(indio_dev);
      -
    - return len;
  - }

- static IIO_DEV_ATTR_SAMP_FREQ(S_IWUSR | S_IRUGO,
  - &iio_dev_attr_sampling_frequency.dev_attr.attr,
    &iio_const_attr_sampling_frequency_available.dev_attr.attr,
    NULL

static struct attribute *ad7791_attributes[] = {
  -
  - static IIO_CONST_ATTR_SAMP_FREQ_AVAIL("120 100 33.3 20 16.7 16.6 13.3 9.5");
if (id != st->chip_info->id) {
    ret = -ENODEV;
    dev_err(&st->sd.spi->dev, "device ID query failed
");
    goto out;
}

static const u16 ad7797_sample_freq_avail[16] = {0, 0, 0, 123, 62, 50, 0,

33, 0, 17, 16, 12, 10, 8, 6, 4};

ssize_t ad7793_read_frequency(struct device *dev,
struct device_attribute *attr,
char *buf)
{
    struct iio_dev *indio_dev = dev_to_iio_dev(dev);
    struct ad7793_state *st = iio_priv(indio_dev);

    return sprintf(buf, "%d

", st->chip_info->sample_freq_avail[AD7793_MODE_RATE(st->mode)]);
}

ssize_t ad7793_write_frequency(struct device *dev,
struct device_attribute *attr,
const char *buf,
size_t len)
{
    struct iio_dev *indio_dev = dev_to_iio_dev(dev);
    struct ad7793_state *st = iio_priv(indio_dev);

    long lval;
    int i, ret;

    ret = kstrtol(buf, 10, &lval);
    if (ret)
        return ret;
    if (lval == 0)
        return -EINVAL;
    for (i = 0; i < 16; i++)
        if (lval == st->chip_info->sample_freq_avail[i])
            break;
    if (i == 16)
        return -EINVAL;
ret = iio_device_claim_direct_mode(indio_dev);
if (ret)
    return ret;
st->mode &= ~AD7793_MODE_RATE(-1);
st->mode |= AD7793_MODE_RATE(i);
ad_sd_write_reg(&st->sd, AD7793_REG_MODE, sizeof(st->mode), st->mode);
iio_device_release_direct_mode(indio_dev);
return len;
}

static IIO_DEV_ATTR_SAMP_FREQ(S_IWUSR | S_IRUGO,
ad7793_read_frequency,
ad7793_write_frequency);

static IIO_CONST_ATTR_SAMP_FREQ_AVAIL(
    "470 242 123 62 50 39 33 19 17 16 12 10 8 6 4");

@@ -424,7 +376,6 @@
ad7793_show_scale_available, NULL, 0);

static struct attribute *ad7793_attributes[] = {
    &iio_dev_attr_sampling_frequency.dev_attr.attr,
    &iio_const_attr_sampling_frequency_available.dev_attr.attr,
    &iio_dev_attr_in_m_in_scale_available.dev_attr.attr,
    NULL
    @ @ -435,7 +386,6 @ @
};

static struct attribute *ad7797_attributes[] = {
    &iio_dev_attr_sampling_frequency.dev_attr.attr,
    &iio_const_attr_sampling_frequency_available_ad7797.dev_attr.attr,
    NULL
    @ @ -505,6 +455,10 @ @
*val -= offset;
}
return IIO_VAL_INT;
+case IIO_CHAN_INFO_SAMP_FREQ:
+    *val = st->chip_info
+    ->sample_freq_avail[AD7793_MODE_RATE(st->mode)];
+    return IIO_VAL_INT;
}
return -EINVAL;
@@ -542,6 +496,26 @@
break;
break;
+case IIO_CHAN_INFO_SAMP_FREQ:
+if (!val) {
+ret = -EINVAL;
+break;
+}
+
+for (i = 0; i < 16; i++)
+if (val == st->chip_info->sample_freq_avail[i])
+break;
+
+if (i == 16) {
+ret = -EINVAL;
+break;
+}
+
+st->mode &= ~AD7793_MODE_RATE(-1);
+st->mode |= AD7793_MODE_RATE(i);
+ad_sd_write_reg(&st->sd, AD7793_REG_MODE, sizeof(st->mode),
+st->mode);
+break;
default:
ret = -EINVAL;
}
@@ -569,7 +543,7 @@
.read_raw = &ad7793_read_raw,
.write_raw = &ad7793_write_raw,
.write_raw_get_fmt = &ad7793_write_raw_get_fmt,
.attrs = &ad7793_attribute_group,
+attrs = &ad7797_attribute_group,
.validate_trigger = ad_sd_validate_trigger,
};

--- linux-4.15.0.orig/drivers/iio/adc/ad799x.c
+++ linux-4.15.0/drivers/iio/adc/ad799x.c
@@ -814,10 +814,10 @@
ret = ad799x_write_config(st, st->chip_config->default_config);
if (ret < 0)
  goto error_disable_reg;
+goto error_disable_vref;
ret = ad799x_read_config(st);
if (ret < 0)
  goto error_disable_reg;
+goto error_disable_vref;
st->config = ret;
ret = iio_triggered_buffer_setup(indio_dev, NULL,
--- linux-4.15.0.orig/drivers/iio/adc/ad_sigma_delta.c
+++ linux-4.15.0/drivers/iio/adc/ad_sigma_delta.c
@@ -62,7 +62,7 @@
 struct spi_transfer t = {
 .tx_buf= data,
 .len= size + 1,
-.cs_change= sigma_delta->bus_locked,
+.cs_change= sigma_delta->keep_cs_asserted,

};
struct spi_message m;
int ret;
@@ -121,6 +121,7 @@
 if (sigma_delta->info->has_registers) {
 data[0] = reg << sigma_delta->info->addr_shift;
 data[0] |= sigma_delta->info->read_mask;
+data[0] |= sigma_delta->comm;
 spi_message_add_tail(&t[0], &m);
 }
 spi_message_add_tail(&t[1], &m);
@@ -216,6 +217,7 @@
 spi_bus_lock(sigma_delta->spi->master);
 sigma_delta->bus_locked = true;
+sigma_delta->keep_cs_asserted = true;
 reinit_completion(&sigma_delta->completion);

 ret = ad_sigma_delta_set_mode(sigma_delta, mode);
@@ -233,9 +235,10 @@
 ret = 0;
 }
 out:
+sigma_delta->keep_cs_asserted = false;
+ad_sigma_delta_set_mode(sigma_delta, AD_SD_MODE_IDLE);
 sigma_delta->bus_locked = false;
 spi_bus_unlock(sigma_delta->spi->master);
-ad_sigma_delta_set_mode(sigma_delta, AD_SD_MODE_IDLE);

 return ret;
}
@@ -287,6 +290,7 @@
 spi_bus_lock(sigma_delta->spi->master);
 sigma_delta->bus_locked = true;
+sigma_delta->keep_cs_asserted = true;
 reinit_completion(&sigma_delta->completion);

 ad_sigma_delta_set_mode(sigma_delta, AD_SD_MODE_SINGLE);
ret = wait_for_completion_interruptible_timeout(&sigma_delta->completion, HZ);

-sigma_delta->bus_locked = false;
-spi_bus_unlock(sigma_delta->spi->master);
-
if (ret == 0)
ret = -EIO;
if (ret < 0)
@@ -314,7 +315,10 @@
sigma_delta->irq_dis = true;
}

+sigma_delta->keep_cs_asserted = false;
ad_sigma_delta_set_mode(sigma_delta, AD_SD_MODE_IDLE);
+sigma_delta->bus_locked = false;
+spi_bus_unlock(sigma_delta->spi->master);
mutex_unlock(&indio_dev->mlock);

if (ret)
@@ -351,6 +355,8 @@
spi_bus_lock(sigma_delta->spi->master);
sigma_delta->bus_locked = true;
+sigma_delta->keep_cs_asserted = true;
+
ret = ad_sigma_delta_set_mode(sigma_delta, AD_SD_MODE_CONTINUOUS);
if (ret)
goto err_unlock;
@@ -379,6 +385,7 @@
sigma_delta->irq_dis = true;
}

+sigma_delta->keep_cs_asserted = false;
ad_sigma_delta_set_mode(sigma_delta, AD_SD_MODE_IDLE);

sigma_delta->bus_locked = false;
--- linux-4.15.0.orig/drivers/iio/adc/aspeed_adc.c
+++ linux-4.15.0/drivers/iio/adc/aspeed_adc.c
@@ -186,6 +186,7 @@
data = iio_priv(indio_dev);
data->dev = &pdev->dev;
+platform_set_drvdata(pdev, indio_dev);

res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
data->base = devm_ioremap_resource(&pdev->dev, res);
+static int at91_adc_chan_xlate(struct iio_dev *indio_dev, int chan)
+{
+    int i;
+    +for (i = 0; i < indio_dev->num_channels; i++) {
+        if (indio_dev->channels[i].scan_index == chan)
+            return i;
+    }
+    +return -EINVAL;
+}
+
+static inline struct iio_chan_spec const *
+at91_adc_chan_get(struct iio_dev *indio_dev, int chan)
+{
+    int index = at91_adc_chan_xlate(indio_dev, chan);
+    +if (index < 0)
+        return NULL;
+    +return indio_dev->channels + index;
+}
+
+static int at91_adc_configure_trigger(struct iio_trigger *trig, bool state)
+{
+    struct iio_dev *indio = iio_trigger_get_drvdata(trig);
+    +for_each_set_bit(bit, indio->active_scan_mask, indio->num_channels) {
+        struct iio_chan_spec const *chan = indio->channels + bit;
+        u32 cor;
+        +if (!chan)
+            continue;
+        +if (state) {
+            cor = at91_adc_readl(st, AT91_SAMA5D2_COR);
+            +if (chan->differential)
+                cor |= (BIT(chan->channel) | BIT(chan->channel2)) <<
+                    AT91_SAMA5D2_COR_DIFF_OFFSET;
+            else
+                cor |= BIT(chan->channel) << AT91_SAMA5D2_COR_DIFF_OFFSET;
+        }
+    }
+
---

--- linux-4.15.0.orig/drivers/iio/adc/at91-sama5d2_adc.c
+++ linux-4.15.0/drivers/iio/adc/at91-sama5d2_adc.c
@@ -300,6 +300,27 @@
+ AT91_SAMA5D2_DIFF_CHAN_CNT + 1),
 ];

+static int at91_adc_chan_xlate(struct iio_dev *indio_dev, int chan)
+{
+    int i;
+    +for (i = 0; i < indio_dev->num_channels; i++) {
+        if (indio_dev->channels[i].scan_index == chan)
+            return i;
+    }
+    +return -EINVAL;
+}
+
+static inline struct iio_chan_spec const *
+at91_adc_chan_get(struct iio_dev *indio_dev, int chan)
+{
+    int index = at91_adc_chan_xlate(indio_dev, chan);
+    +if (index < 0)
+        return NULL;
+    +return indio_dev->channels + index;
+}
+
+static int at91_adc_configure_trigger(struct iio_trigger *trig, bool state)
+{
+    struct iio_dev *indio = iio_trigger_get_drvdata(trig);
+    +for_each_set_bit(bit, indio->active_scan_mask, indio->num_channels) {
+        struct iio_chan_spec const *chan = indio->channels + bit;
+        u32 cor;
+        +if (!chan)
+            continue;
+        +if (state) {
+            cor = at91_adc_readl(st, AT91_SAMA5D2_COR);
+            +if (chan->differential)
+                cor |= (BIT(chan->channel) | BIT(chan->channel2)) <<
+                    AT91_SAMA5D2_COR_DIFF_OFFSET;
+            else
+                cor |= BIT(chan->channel) << AT91_SAMA5D2_COR_DIFF_OFFSET;
+        }
+    }
+
---
cor &= ~(BIT(chan->channel) <<
    AT91_SAMA5D2_COR_DIFF_OFFSET);

at91_adc_writel(st, AT91_SAMA5D2_COR, cor);

if (state) {
at91_adc_writel(st, AT91_SAMA5D2_CHER,
@@ -397,8 +435,11 @@
    u8 bit;

    for_each_set_bit(bit, indio->active_scan_mask, indio->num_channels) {
-        struct iio_chan_spec const *chan = indio->channels + bit;
+        struct iio_chan_spec const *chan =
+        at91_adc_chan_get(indio, bit);

+        if (!chan)
+            continue;

        st->buffer[i] = at91_adc_readl(st, chan->address);
        i++;
    }
--- linux-4.15.0.orig/drivers/iio/adc/at91_adc.c
+++ linux-4.15.0/drivers/iio/adc/at91_adc.c
@@ -248,12 +248,14 @@
        struct iio_poll_func *pf = p;
        struct iio_dev *idev = pf->indio_dev;
        struct at91_adc_state *st = iio_priv(idev);
+        struct iio_chan_spec const *chan;
        int i, j = 0;

        for (i = 0; i < idev->masklength; i++) {
            if (!test_bit(i, idev->active_scan_mask))
                continue;
-            st->buffer[j] = at91_adc_readl(st, AT91_ADC_CHAN(st, i));
+            chan = idev->channels + i;
+            st->buffer[j] = at91_adc_readl(st, AT91_ADC_CHAN(st, chan->channel));
            j++;
        }
    }

@@ -279,6 +281,8 @@
        iio_trigger_poll(idev->trig);
    } else {
        st->last_value = at91_adc_readl(st, AT91_ADC_CHAN(st, st->chnb));
+/* Needed to ACK the DRDY interruption */
+    at91_adc_readl(st, AT91_ADC_LCDR);
        st->done = true;
        wake_up_interruptible(&st->wq_data_avail);
    }

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ret = wait_event_interruptible_timeout(st->wq_data_avail,
    st->done,
    msecs_to_jiffies(1000));
-if (ret == 0)
-ret = -ETIMEDOUT;
-if (ret < 0) {
    mutex_unlock(&st->lock);
    return ret;
-

-*val = st->last_value;

+/* Disable interrupts, regardless if adc conversion was
+ * successful or not
+ */
+at91_adc_writel(st, AT91_ADC_CHDR,
    AT91_ADC_CH(chan->channel));
at91_adc_writel(st, AT91_ADC_IDR, BIT(chan->channel));

-st->last_value = 0;
-st->done = false;
+if (ret > 0) {
+  /* a valid conversion took place */
+  *val = st->last_value;
+  st->last_value = 0;
+  st->done = false;
+  ret = IIO_VAL_INT;
+} else if (ret == 0) {
+  /* conversion timeout */
+  dev_err(&idev->dev, "ADC Channel %d timeout.\n", chan->channel);
+  ret = -ETIMEDOUT;
+}
+mutex_unlock(&st->lock);
-return IIO_VAL_INT;
+return ret;

-case IIO_CHAN_INFO_SCALE:
-  *val = st->vref_mv;
--- linux-4.15.0.orig/drivers/iio/adc/axp288_adc.c
+++ linux-4.15.0/drivers/iio/adc/axp288_adc.c
@@ -16,6 +16,7 @@
 */
#
#include <linux/dmi.h>
#include <linux/module.h>
#include <linux/kernel.h>
#include <linux/device.h>

#define AXP288_ADC_EN_MASK		0xF1
#define AXP288_ADC_TS_PIN_GPADC0xF2
#define AXP288_ADC_TS_PIN_ON0xF3

/*
 * This mask enables all ADCs except for the battery temp-sensor (TS), that is
 * left as-is to avoid breaking charging on devices without a temp-sensor.
 */
#define AXP288_ADC_EN_MASK				0xF0
#define AXP288_ADC_TS_ENABLE				0x01

#define AXP288_ADC_TS_BIAS_MASK				GENMASK(5, 4)
#define AXP288_ADC_TS_BIAS_20UA				(0 << 4)
#define AXP288_ADC_TS_BIAS_40UA				(1 << 4)
#define AXP288_ADC_TS_BIAS_60UA				(2 << 4)
#define AXP288_ADC_TS_BIAS_80UA				(3 << 4)

enum axp288_adc_id {
    AXP288_ADC_TS,
    ...
}

static const struct iio_chan_spec axp288_adc_channels[] = {
    ...
}

enum axp288_adc_id { 
    AXP288_ADC_TS,
    ...
} 

struct axp288_adc_info { 
    int irq;
    struct regmap *regmap;
    +bool ts_enabled;
};

static const struct iio_channel_spec axp288_adc_channels[] = {
    @ @ -123,21 +139,33 @@
    return IIO_VAL_INT;
};

-#static int axp288_adc_set_ts(struct regmap *regmap, unsigned int mode,
-unsigned long address)
+/**
+ * The current-source used for the battery temp-sensor (TS) is shared
+ * with the GPADC. For proper fuel-gauge and charger operation the TS
+ * current-source needs to be permanently on. But to read the GPADC we
/* need to temporary switch the TS current-source to ondemand, so that
   * the GPADC can use it, otherwise we will always read an all 0 value.
   */
static int axp288_adc_set_ts(struct axp288_adc_info *info,
   unsigned int mode, unsigned long address)
{
    int ret;

    /* channels other than GPADC do not need to switch TS pin */
    /* No need to switch the current-source if the TS pin is disabled */
    if (!info->ts_enabled)
        return 0;

    /* Channels other than GPADC do not need the current source */
    if (address != AXP288_GP_ADC_H)
        return 0;

    ret = regmap_write(regmap, AXP288_ADC_TS_PIN_CTRL, mode);
    ret = regmap_update_bits(info->regmap, AXP288_ADC_TS_PIN_CTRL,
        AXP288_ADC_TS_CURRENT_ON_OFF_MASK, mode);
    if (ret)
        return ret;

    /* When switching to the GPADC pin give things some time to settle */
    if (mode == AXP288_ADC_TS_PIN_GPADC)
        usleep_range(6000, 10000);
    return 0;
}

mutex_lock(&indio_dev->mlock);
switch (mask) {
    case IIO_CHAN_INFO_RAW:
        if (axp288_adc_set_ts(info->regmap, AXP288_ADC_TS_PIN_GPADC,
            chan->address)) {
            dev_err(&indio_dev->dev, "GPADC mode\n");
            ret = -EINVAL;
            break;
        }
        ret = axp288_adc_read_channel(val, chan->address, info->regmap);
        if (axp288_adc_set_ts(info->regmap, AXP288_ADC_TS_PIN_ON,
            chan->address)) {
            dev_err(&indio_dev->dev, "TS pin restore\n");
            break;
        }
        return ret;
}

return ret;
static int axp288_adc_set_state(struct regmap *regmap)
{
    /*
    * We rely on the machine's firmware to correctly setup the TS pin bias current
    * at boot. This lists systems with broken fw where we need to set it ourselves.
    */
+static const struct dmi_system_id axp288_adc_ts_bias_override[] = {
+    
+    /* Lenovo Ideapad 100S (11 inch) */
+    .matches = {
+        DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+        DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 100S-11IBY"),
+    },
+    .driver_data = (void *)(uintptr_t)AXP288_ADC_TS_BIAS_80UA,
+},
+};
+
static int axp288_adc_initialize(struct axp288_adc_info *info)
{
    /* ADC should be always enabled for internal FG to function */
    -if (regmap_write(regmap, AXP288_ADC_TS_PIN_CTRL, AXP288_ADC_TS_PIN_ON))
    -return -EIO;
    +const struct dmi_system_id *bias_override;
    +int ret, adc_enable_val;

    +bias_override = dmi_first_match(axp288_adc_ts_bias_override);
    +if (bias_override) {
    +    ret = regmap_update_bits(info->regmap, AXP288_ADC_TS_PIN_CTRL,
    +        AXP288_ADC_TS_BIAS_MASK,
    +        (uintptr_t)bias_override->driver_data);
    +    if (ret)
    +        return ret;
    +}
    +
    +    /* Determine if the TS pin is enabled and set the TS current-source
    +    * accordingly.
    */
    +    +ret = regmap_read(info->regmap, AXP20X_ADC_EN1, &adc_enable_val);
    +    +if (ret)
    +        return ret;
    +    +return ret;
    +
    +if (adc_enable_val & AXP288_ADC_TS_ENABLE) {
    +    info->ts_enabled = true;
    +    ret = regmap_update_bits(info->regmap, AXP288_ADC_TS_PIN_CTRL,
    +        AXP288_ADC_TS_CURRENT_ON_OFF_MASK,
static const struct iio_info axp288_adc_iio_info = {
    @ @ -208.7 +284.7 @ @
    * Set ADC to enabled state at all time, including system suspend.
    * otherwise internal fuel gauge functionality may be affected.
    */
    -ret = axp288_adc_set_state(axp20x->regmap);
    +ret = axp288_adc_initialize(info);
    if (ret) {
        dev_err(&pdev->dev, "unable to enable ADC device\n");
        return ret;
        --- linux-4.15.0.orig/drivers/iio/adc/dln2-adc.c
        +++ linux-4.15.0/drivers/iio/adc/dln2-adc.c
        @@ -527,6 +527,10 @@
        u16 conflict;
        unsigned int trigger_chan;

        +ret = iio_triggered_buffer_postenable(indio_dev);
        +if (ret)
        +return ret;
        +mutex_lock(&dln2->mutex);

        /* Enable ADC */
        @@ -540,6 +544,7 @@
        (int)conflict);
        ret = -EBUSY;
        }
    +iio_triggered_buffer_predisable(indio_dev);
    return ret;
    }

    @@ -553,6 +558,7 @@
mutex_unlock(&dln2->mutex);
if (ret < 0) {
    dev_dbg(&dln2->pdev->dev, "Problem in %s\n", __func__);
    +iio_triggered_buffer_predisable(indio_dev);
    return ret;
} } else {
@@ -560,12 +566,12 @@
    mutex_unlock(&dln2->mutex);
}

-return iio_triggered_buffer_postenable(indio_dev);
+return 0;
}

static int dln2_adc_triggered_buffer_predisable(struct iio_dev *indio_dev)
{
-int ret;
+int ret, ret2;
 struct dln2_adc *dln2 = iio_priv(indio_dev);

 mutex_lock(&dln2->mutex);
@@ -580,12 +586,14 @@
 ret = dln2_adc_set_port_enabled(dln2, false, NULL);
 mutex_unlock(&dln2->mutex);
-if (ret < 0) {
+if (ret < 0)
    dev_dbg(&dln2->pdev->dev, "Problem in %s\n", __func__);
    -return ret;
-}

-return iio_triggered_buffer_predisable(indio_dev);
+ret2 = iio_triggered_buffer_predisable(indio_dev);
+if (ret == 0)
+    ret = ret2;
+}
  +return ret;
}

static const struct iio_buffer_setup_ops dln2_adc_buffer_setup_ops = {
--- linux-4.15.0.orig/drivers/iio/adc/exynos_adc.c
+++ linux-4.15.0/drivers/iio/adc/exynos_adc.c
@@ -115,6 +115,8 @@
 #define MAX_ADC_V1_CHANNELS		8
 #define MAX_EXYNOS3250_ADC_CHANNELS	2
+#define MAX_EXYNOS4212_ADC_CHANNELS	4
+define MAX_S5PV210_ADC_CHANNELS=10

/* Bit definitions common for ADC_V1 and ADC_V2 */
#define ADC_CON_EN_START(1u << 0)
@@ -270,6 +272,19 @@
writel(con1 | ADC_CON_EN_START, ADC_V1_CON(info->regs));
} 

+/* Exynos4212 and 4412 is like ADCv1 but with four channels only */
+static const struct exynos_adc_data exynos4212_adc_data = { 
+    .num_channels= MAX_EXYNOS4212_ADC_CHANNELS,
+    .mask= ADC_DATX_MASK,/* 12 bit ADC resolution */
+    .phy_offset= EXYNOS_ADCV1_PHY_OFFSET,
+    .init_hw= exynos_adc_v1_init_hw,
+    .exit_hw= exynos_adc_v1_exit_hw,
+    .clear_irq= exynos_adc_v1_clear_irq,
+    .start_conv= exynos_adc_v1_start_conv,
+};
+
static const struct exynos_adc_data exynos_adc_v1_data = {
    .num_channels= MAX_ADC_V1_CHANNELS,
    .mask= ADC_DATX_MASK,/* 12 bit ADC resolution */
@@ -282,6 +297,16 @@
    .start_conv= exynos_adc_v1_start_conv,
};

+static const struct exynos_adc_data exynos_adc_s5pv210_data = {
+    .num_channels= MAX_S5PV210_ADC_CHANNELS,
+    .mask= ADC_DATX_MASK,/* 12 bit ADC resolution */
+    .init_hw= exynos_adc_v1_init_hw,
+    .exit_hw= exynos_adc_v1_exit_hw,
+    .clear_irq= exynos_adc_v1_clear_irq,
+    .start_conv= exynos_adc_v1_start_conv,
+};
+
static void exynos_adc_s3c2416_start_conv(struct exynos_adc *info,
    unsigned long addr)
{
@@ -479,6 +504,12 @@
    .compatible = "samsung,s3c6410-adc",
    .data = &exynos_adc_s3c64xx_data,
 }, {
+    .compatible = "samsung,s5pv210-adc",
+    .data = &exynos_adc_s5pv210_data,
+}, {

+.compatible = "samsung.exynos4212-adc",
+.data = &exynos4212_adc_data,
+},
+.compatible = "samsung.exynos-adc-v1",
+.data = &exynos_adc_v1_data,
 },
@@ -915,7 +946,7 @@
 struct iio_dev *indio_dev = platform_get_drvdata(pdev);
 struct exynos_adc *info = iio_priv(indio_dev);

-if (IS_REACHABLE(CONFIG_INPUT)) {
+if (IS_REACHABLE(CONFIG_INPUT) && info->input) {
    free_irq(info->tsirq, info);
    input_unregister_device(info->input);
 }
if ((refp & MX25_ADCQ_CFG_REFP_MASK) != refp) {
    dev_err(dev, "Invalid fsl,adc-refp property value\n");
    of_node_put(child);
    return -EINVAL;
}
if ((refn & MX25_ADCQ_CFG_REFN_MASK) != refn) {
    dev_err(dev, "Invalid fsl,adc-refn property value\n");
    of_node_put(child);
    return -EINVAL;
}

--- linux-4.15.0.orig/drivers/iio/adc/hx711.c
+++ linux-4.15.0/drivers/iio/adc/hx711.c
@@ -89,20 +89,35 @@
     int			gain_set; /* gain set on device */
     int			gain_chan_a; /* gain for channel A */
     struct mutex		lock; /*
+     int delay after a rising edge on SCK until the data is ready DOUT
+     * this is dependent on the hx711 where the datasheet tells a
+     * maximum value of 100 ns
+     * but also on potential parasitic capacities on the wiring
+     */
+     u32 data_ready_delay_ns;
+     u32 clock_frequency;
};

static int hx711_cycle(struct hx711_data *hx711_data)
{
    int val;
    unsigned long flags;

    /*
     * if preempted for more then 60us while PD_SCK is high:
     * hx711 is going in reset
     * ==> measuring is false
     */
    preempt_disable();
    local_irq_save(flags);
    gpiod_set_value(hx711_data->gpiod_pd_sck, 1);
    -val = gpiod_get_value(hx711_data->gpiod_dout);
+    val = gpiod_get_value(hx711_data->gpiod_dout);
+    /*
+     * wait until DOUT is ready
+     * it turned out that parasitic capacities are extending the time
+     * until DOUT has reached it's value
+     */
static int hx711_read(struct hx711_data *hx711_data)
{
    struct device *dev = &pdev->dev;
    struct device_node *np = dev->of_node;
    struct iio_dev *hx711_data;
    struct iio_dev *indio_dev;
    int ret;
    hx711_data->gain_set = 128;
    hx711_data->gain_chan_a = 128;
    hx711_data->clock_frequency = 400000;
    ret = of_property_read_u32(np, "clock-frequency",
        &hx711_data->clock_frequency);
    if (hx711_data->clock_frequency < 20000) {
        dev_warn(dev, "clock-frequency too low - assuming 400 kHz\n");
        hx711_data->clock_frequency = 400000;
    }
    /* make it a square wave for addressing cases with capacitance on
     * PC_SCK
     */
    ndelay(hx711_data->data_ready_delay_ns);
    /* sample as late as possible */
    return gpiod_get_value(hx711_data->gpiod_dout);
}

static int hx711_probe(struct platform_device *pdev)
{
    struct device *dev = &pdev->dev;
    struct device_node *np = dev->of_node;
    struct iio_dev *hx711_data;
    struct iio_dev *indio_dev;
    int ret;
    hx711_data->gain_set = 128;
    hx711_data->gain_chan_a = 128;
    hx711_data->clock_frequency = 400000;
    ret = of_property_read_u32(np, "clock-frequency",
        &hx711_data->clock_frequency);
    if (hx711_data->clock_frequency < 20000) {
        dev_warn(dev, "clock-frequency too low - assuming 400 kHz\n");
        hx711_data->clock_frequency = 400000;
    }
    /* here we are not waiting for 0.2 us as suggested by the datasheet,
     * because the oscilloscope showed in a test scenario
     * and 0.56 us for PD_SCK low on TI Sitara with 800 MHz
     */
gpiod_set_value(hx711_data->gpiod_pd_sck, 0);
    preempt_enable();
    local_irq_restore(flags);
    /* make it a square wave for addressing cases with capacitance on
     * PC_SCK
     */
    ndelay(hx711_data->data_ready_delay_ns);
    /* sample as late as possible */
    return gpiod_get_value(hx711_data->gpiod_dout);
}
hxx711_data->data_ready_delay_ns =
	1000000000 / hxx711_data->clock_frequency;
+
platform_set_drvdata(pdev, indio_dev);

indio_dev->name = "hx711";
--- linux-4.15.0.orig/drivers/iio/adc/ina2xx-adc.c
+++ linux-4.15.0/drivers/iio/adc/ina2xx-adc.c
@@ -30,6 +30,7 @@
#include <linux/module.h>
#include <linux/of_device.h>
#include <linux/regmap.h>
+#include <linux/sched/task.h>
#include <linux/platform_data/ina2xx.h>
@@ -44,7 +45,6 @@
#define INA226_MASK_ENABLE	0x06
#define INA226_CVRFBIT(3)
-#define INA219_CNVR	BIT(1)
#define INA2XX_MAX_REGISTERS            8
@@ -79,6 +79,11 @@
#define INA226_ITS_MASK	GENMASK(5, 3)
#define INA226_SHIFT_ITS(val)	((val) << 3)
+/* INA219 Bus voltage register, low bits are flags */
+#define INA219_OVFBIT(0)
+#define INA219_CNVRBIT(1)
+#define INA219_BUS_VOLTAGE_SHIFT	3
+
/* Cosmetic macro giving the sampling period for a full P=UxI cycle */
#define SAMPLING_PERIOD(c)((c->int_time_vbus + c->int_time_vshunt) \
										(c->avg)
@@ -112,7 +117,7 @@
int bus_voltage_shift;	/* position of lsb */
int bus_voltage_lsb;	/* uV */
int power_lsb;		/* uW */
enum ina2xx_ids chip_id;
@@ -128,6 +133,11 @@
# Open Source Used In 5GaaS Edge AC-4

```c
int int_time_vbus; /* Bus voltage integration time uS */
int int_time_vshunt; /* Shunt voltage integration time uS */
bool allow_async_readout;
/* data buffer needs space for channel data and timestamp */
+struct {
+u16 chan[4];
+u64 ts __aligned(8);
+} scan;
};

static const struct ina2xx_config ina2xx_config[] = {
    @ @ -135.7 +145.7 @@
    .config_default = INA219_CONFIG_DEFAULT,
    .calibration_factor = 40960000,
    .shunt_div = 100,
    -.bus_voltage_shift = 3,
    +.bus_voltage_shift = INA219_BUS_VOLTAGE_SHIFT,
    .bus_voltage_lsb = 4000,
    .power_lsb = 20000,
    .chip_id = ina219,
    @ @ -170.6 +180.9 @@
else
    *val = regval;

    +if (chan->address == INA2XX_BUS_VOLTAGE)
    +*val >>= chip->config->bus_voltage_shift;
    +
    return IIO_VAL_INT;

    case IIO_CHAN_INFO_OVERSAMPLING_RATIO:
    @ @ -203.9 +216.9 @@
    return IIO_VAL_FRACTIONAL;

    case INA2XX_BUS_VOLTAGE:
    -* processed (mV) = raw*lsb (uV) / (1000 << shift) */
    +/* processed (mV) = raw * lsb (uV) / 1000 */
    *val = chip->config->bus_voltage_lsb;
    -*val2 = 1000 << chip->config->bus_voltage_shift;
    +*val2 = 1000;
    return IIO_VAL_FRACTIONAL;

    case INA2XX_POWER:
    @ @ -532.7 +545.7 @@
    * Sampling Freq is a consequence of the integration times of
    * the Voltage channels.
    */
    +#define INA219_CHAN_VOLTAGE(_index, _address) { \
    +#define INA219_CHAN_VOLTAGE(_index, _address, _shift) { \
```
.type = IIO_VOLTAGE, 
.address = (_address), 
.indexed = 1, 
@@ -544,7 +557,8 @@
.scan_index = (_index), 
.scan_type = { 
.sign = 'u', 
.realbits = 16, 
+.shift = _shift, 
+.realbits = 16 - _shift, 
.storagebits = 16, 
.endianness = IIO_LE, 
} 
@@ -579,8 +593,8 @@
};

static const struct iio_chan_spec ina219_channels[] = {
-INA219_CHAN_VOLTAGE(0, INA2XX_SHUNT_VOLTAGE),
-INA219_CHAN_VOLTAGE(1, INA2XX_BUS_VOLTAGE),
+INA219_CHAN_VOLTAGE(0, INA2XX_SHUNT_VOLTAGE, 0),
+INA219_CHAN_VOLTAGE(1, INA2XX_BUS_VOLTAGE, INA219_BUS_VOLTAGE_SHIFT),
INA219_CHAN(IIO_POWER, 2, INA2XX_POWER),
INA219_CHAN(IIO_CURRENT, 3, INA2XX_CURRENT),
IIO_CHAN_SOFT_TIMESTAMP(4),
@@ -589,7 +603,6 @@
static int ina2xx_work_buffer(struct iio_dev *indio_dev)
{
 struct ina2xx_chip_info *chip = iio_priv(indio_dev);
-unsigned short data[8];
+unsigned short data[8];
 int bit, ret, i = 0;
 s64 time_a, time_b;
 unsigned int alert;
@@ -639,7 +652,7 @@
 if (ret < 0)
 return ret;
-data[i++] = val;
+chip->scan.chan[i++] = val;

 if (INA2XX_SHUNT_VOLTAGE + bit == INA2XX_POWER)
 cnvr_need_clear = 0;
@@ -656,8 +669,7 @@
time_b = iio_get_time_ns(indio_dev);

 -iio_push_toBuffers_with_timestamp(indio_dev,
 - (unsigned int *)data, time_a);
 +iio_push_toBuffers_with_timestamp(indio_dev, &chip->scan, time_a);
return (unsigned long)(time_b - time_a) / 1000;
};
@@ -693,6 +705,7 @@
{
    struct ina2xx_chip_info *chip = iio_priv(indio_dev);
    unsigned int sampling_us = SAMPLING_PERIOD(chip);
    +struct task_struct *task;

    dev_dbg(&indio_dev->dev, "Enabling buffer w/ scan_mask %02x, freq = %d, avg =%u\n",
            (unsigned int)(*indio_dev->active_scan_mask),
        @ @ -702.11 +715.17 @@
    dev_dbg(&indio_dev->dev, "Async readout mode: %d\n",
            chip->allow_async_readout);

    /* Internal reset */
    -chip->task = kthread_run(ina2xx_capture_thread, (void *)indio_dev,
        - "%s:%d-%uus", indio_dev->name, indio_dev->id,
        - sampling_us);
    +task = kthread_create(ina2xx_capture_thread, (void *)indio_dev,
        + "%s:%d-%uus", indio_dev->name, indio_dev->id,
        + sampling_us);
    +if (IS_ERR(task))
    +return PTR_ERR(task);
    +
    +get_task_struct(task);
    +wake_up_process(task);
    +chip->task = task;

    -return PTR_ERR_OR_ZERO(chip->task);
    +return 0;
}

static int ina2xx_buffer_disable(struct iio_dev *indio_dev)
@@ -715,6 +734,7 @@
    if (chip->task) {
        kthread_stop(chip->task);
        +put_task_struct(chip->task);
        chip->task = NULL;
    }

    --- linux-4.15.0.orig/drivers/iio/adc/max1027.c
    +++ linux-4.15.0/drivers/iio/adc/max1027.c
    @@ -460,6 +460,14 @@
goto fail_dev_register;
    }

    +/* Internal reset */
+st->reg = MAX1027_RST_REG;
+ret = spi_write(st->spi, &st->reg, 1);
+if (ret < 0) {
+dev_err(&indio_dev->dev, "Failed to reset the ADC\n");
+return ret;
+
+/* Disable averaging */
+st->reg = MAX1027_AVG_REG;
+ret = spi_write(st->spi, &st->reg, 1);
--- linux-4.15.0.orig/drivers/iio/adc/max1118.c
+++ linux-4.15.0/drivers/iio/adc/max1118.c
@@ -38,6 +38,11 @@
 struct spi_device *spi;
 struct mutex lock;
 struct regulator *reg;
+/* Ensure natural alignment of buffer elements */
+struct {
+u8 channels[2];
+s64 ts __aligned(8);
+} scan;

 u8 data ____cacheline_aligned;
 );
@@ -162,7 +167,6 @@
 struct iio_poll_func *pf = p;
 struct iio_dev *indio_dev = pf->indio_dev;
 struct max1118 *adc = iio_priv(indio_dev);
-08 u8 data[16] = { }; /* 2x 8-bit ADC data + padding + 8 bytes timestamp */
+08 u8 data[16] = { }; /* 2x 8-bit ADC data + padding + 8 bytes timestamp */
 int scan_index;
 int i = 0;

@@ -180,10 +184,10 @@
 goto out;
 }
-08 data[i] = ret;
+08 adc->scan.channels[i] = ret;
 i++;
 }
-08 -iio_push_to_buffers_with_timestamp(indio_dev, data,
+08 -iio_push_to_buffers_with_timestamp(indio_dev, &adc->scan,
+ 08 -iio_get_time_ns(indio_dev));
 out:
 mutex_unlock(&adc->lock);
 --- linux-4.15.0.orig/drivers/iio/adc/max9611.c
+++ linux-4.15.0/drivers/iio/adc/max9611.c
@@ -86,12 +86,18 @@

#define MAX9611_TEMP_MAX_POS 0x7f80
#define MAX9611_TEMP_MAX_NEG 0xff80
-#define MAX9611_TEMP_MIN_NEG 0xd980
+#define MAX9611_TEMP_MIN_NEG 0xd980
#define MAX9611_TEMP_MASK GENMASK(7, 15)
#define MAX9611_TEMP_SHIFT 0x07
#define MAX9611_TEMP_RAW(_r) ((_r) >> MAX9611_TEMP_SHIFT)
#define MAX9611_TEMP_SCALE_NUM 1000000
#define MAX9611_TEMP_SCALE_DIV 2083

+/
+/* Conversion time is 2 ms (typically) at Ta=25 degreeC
+ * No maximum value is known, so play it safe.
+ */
+#define MAX9611_CONV_TIME_US_RANGE 3000, 3300
+
struct max9611_dev {
    struct device *dev;
    struct i2c_client *i2c_client;
}

/* need a delay here to make register configuration stabilize. */
+usleep_range(MAX9611_CONV_TIME_US_RANGE);

ret = i2c_smbus_read_word_swapped(max9611->i2c_client, reg_addr);
if (ret < 0) {
    return ret;
}
if (*adc_raw > 0) {
    /*csa_gain = gain_selectors[i];
    +*csa_gain = (enum max9611_csa_gain)gain_selectors[i];
    return 0;
    */
    @ @ -483,7 +487,7 @@
    if (ret)
        return ret;
-
-regval = ret & MAX9611_TEMP_MASK;


```c
+regval &= MAX9611_TEMP_MASK;

if ((regval > MAX9611_TEMP_MAX_POS &&
    regval < MAX9611_TEMP_MIN_NEG) ||
@@ -510,7 +514,7 @@
    MAX9611_REG_CTRL2, 0);
   return ret;
 }
-ulleep_range(1000, 2000);
+ulleep_range(MAX9611_CONV_TIME_US_RANGE);

return 0;
}
--- linux-4.15.0.orig/drivers/iio/adc/mcp3422.c
+++ linux-4.15.0/drivers/iio/adc/mcp3422.c
@@ -99,16 +99,12 @@
 {
   int ret;

-mutex_lock(&adc->lock);
-
   ret = i2c_master_send(adc->i2c, &newconfig, 1);
   if (ret > 0) {
      adc->config = newconfig;
      ret = 0;
   }

-mutex_unlock(&adc->lock);
-
   return ret;
 }

@@ -141,6 +137,18 @@
 u8 config;
 u8 req_channel = channel->channel;

+mutex_lock(&adc->lock);
 +
   if (req_channel != MCP3422_CHANNEL(adc->config)) {
      config = adc->config;
      config &= ~MCP3422_CHANNEL_MASK;
@@ -148,12 +146,18 @@
      config &= ~MCP3422_PGA_MASK;
      config |= MCP3422_PGA_VALUE(adc->pga[req_channel]);
      ret = mcp3422_update_config(adc, config);
-    if (ret < 0)
+    if (ret < 0) {
      +mutex_unlock(&adc->lock);
```
static int mcp3422_read_raw(struct iio_dev *iio,
--- linux-4.15.0.orig/drivers/iio/adc/meson_saradc.c
+++ linux-4.15.0/drivers/iio/adc/meson_saradc.c
@@ -462,8 +462,10 @@
    regmap_read(priv->regmap, MESON_SAR_ADC_DELAY, &val);
} while (val & MESON_SAR_ADC_DELAY_BL30_BUSY && timeout--);
-     if (timeout < 0)
-        return -ETIMEDOUT;
+        if (timeout < 0) {
+            mutex_unlock(&indio_dev->mlock);
+        return -ETIMEDOUT;
+    }

    return 0;
@@ -581,8 +583,11 @@
    struct clk_init_data init;
    const char *clk_parents[1];

-    init.name = devm_kasprintf(&indio_dev->dev, GFP_KERNEL, "%pOF#adc_div",
-        indio_dev->dev.of_node);
+    init.name = devm_kasprintf(&indio_dev->dev, GFP_KERNEL, "%s#adc_div",
+        dev_name(indio_dev->dev.parent));
    if (!init.name)
        return -ENOMEM;
    init.flags = 0;
    init.ops = &clk_divider_ops;
    clk_parents[0] = __clk_get_name(priv->clkin);
@@ -600,8 +605,11 @@
    return PTR_ERR(priv->adc_div_clk);

-    init.name = devm_kasprintf(&indio_dev->dev, GFP_KERNEL, "%pOF#adc_en",
-        indio_dev->dev.of_node);
    if (WARN_ON(IS_ERR(priv->adc_div_clk)))
        return PTR_ERR(priv->adc_div_clk);

    return ret;
}
+init.name = devm_kasprintf(&indio_dev->dev, GFP_KERNEL, "%s#adc_en",
+    dev.name(indio_dev->dev.parent));
+if (!init.name)
+return -ENOMEM;
+
+init.flags = CLK_SET_RATE_PARENT;
+init.ops = &clk_gate_ops;
+clk_parents[0] = __clk_get_name(priv->adc_div_clk);
@@ -967,6 +975,11 @@
+if (IS_ERR(base))
+return PTR_ERR(base);
+
_priv->regmap = devm_regmap_init_mmio(&pdev->dev, base,
+    priv->data->regmap_config);
+if (IS_ERR(priv->regmap))
+return PTR_ERR(priv->regmap);
+
+irq = irq_of_parse_and_map(pdev->dev.of_node, 0);
+if (!irq)
+return -EINVAL;
+ret = devm_regmap_init_mmio(&pdev->dev, base,
+    priv->data->regmap_config);
+priv->regmap = devm_regmap_init_mmio(&pdev->dev, base,
+    priv->data->regmap_config);
+priv->regmap = devm_regmap_init_mmio(&pdev->dev, base,
+    priv->data->regmap_config);
+if (IS_ERR(priv->regmap))
-priv->regmap = devm_regmap_init_mmio(&pdev->dev, base,
+    priv->data->regmap_config);
+priv->clkin = devm_clk_get(&pdev->dev, "clkin");
+if (IS_ERR(priv->clkin)) {
+    dev_err(&pdev->dev, "failed to get clkin
++");
++ Linux-4.15.0/drivers/iio/adc/mxs-lradc-adc.c
+++ Linux-4.15.0/drivers/iio/adc/mxs-lradc-adc.c
@@ -124,7 +124,8 @@
    struct device		*dev;
    void __iomem		*base;
-    u32			buffer[10];
+    /* Maximum of 8 channels + 8 byte ts */
+    u32buffer[10] __aligned(8);
    struct iio_trigger*trig;
    struct completion		*completion;
    spinlock_t	lock;
--- Linux-4.15.0.orig/drivers/iio/adc/palmas_gpadc.c
+++ Linux-4.15.0/drivers/iio/adc/palmas_gpadc.c
@@ -659,8 +659,8 @@

adc_period = adc->auto_conversion_period;
for (i = 0; i < 16; ++i) {
- if (((1000 * (1 << i)) / 32) < adc_period)
- continue;
+ if (((1000 * (1 << i)) / 32) >= adc_period)
+ break;
} if (i > 0) i--;

--- linux-4.15.0.orig/drivers/iio/adc/qcom-pm8xxx-xoadc.c
+++ linux-4.15.0/drivers/iio/adc/qcom-pm8xxx-xoadc.c
@@ -423,18 +423,14 @@
 static struct pm8xxx_chan_info *
 pm8xxx_get_channel(struct pm8xxx_xoadc *adc, u8 chan)
 {
- struct pm8xxx_chan_info *ch;
+ struct pm8xxx_chan_info *ch = &adc->chans[i];
 int i;

 for (i = 0; i < adc->nchans; i++) {
- ch = &adc->chans[i];
+ struct pm8xxx_chan_info *ch = &adc->chans[i];
 if (ch->hwchan->amux_channel == chan)
- break;
+ return ch;
 } if (i == adc->nchans)
- return NULL;
- return ch;

 static int pm8xxx_read_channel_rsv(struct pm8xxx_xoadc *adc,
 --- linux-4.15.0.orig/drivers/iio/adc/qcom-spmi-vadc.c
+++ linux-4.15.0/drivers/iio/adc/qcom-spmi-vadc.c
@@ -606,7 +606,7 @@
 VADC_CHAN_NO_SCALE(P_MUX16_1_3, 1)
 VADC_CHAN_NO_SCALE(LR_MUX1_BAT_THERM, 0)
- VADC_CHAN_NO_SCALE(LR_MUX2_BAT_ID, 0)
+ VADC_CHAN_VOLT(LR_MUX2_BAT_ID, 0, SCALE_DEFAULT)
 VADC_CHAN_NO_SCALE(LR_MUX3_XO_THERM, 0)
 VADC_CHAN_NO_SCALE(LR_MUX4_AMUX_THM1, 0)
 VADC_CHAN_NO_SCALE(LR_MUX5_AMUX_THM2, 0)
- --- linux-4.15.0.orig/drivers/iio/adc/qcom-vadc-common.c
+++ linux-4.15.0/drivers/iio/adc/qcom-vadc-common.c
@@ -5,6 +5,7 @@
 #include <linux/math64.h>
```c
#include <linux/log2.h>
#include <linux/err.h>
+#include <linux/module.h>
#include "qcom-vadc-common.h"

@@ -229,3 +230,6 @@
return __ffs64(value / VADC_DECIMATION_MIN);
}
EXPORT_SYMBOL(qcom_vadc_decimation_from_dt);
+
+MODULE_LICENSE("GPL v2");
+MODULE_DESCRIPTION("Qualcomm ADC common functionality");
--- linux-4.15.0.orig/drivers/iio/adc/rcar-gyroadc.c
+++ linux-4.15.0/drivers/iio/adc/rcar-gyroadc.c
@@ -391,7 +391,7 @@
    dev_err(dev,
          "Only %i channels supported with %s, but reg = <%i>,\n",
          num_channels, child->name, reg);
-    return ret;
+    return -EINVAL;
}
@@ -400,7 +400,7 @@
    dev_err(dev,
          "Channel %i uses different ADC mode than the rest.\n",
          reg);
-    return ret;
+    return -EINVAL;
}
/* Channel is valid, grab the regulator. */
--- linux-4.15.0.orig/drivers/iio/adc/rockchip_saradc.c
+++ linux-4.15.0/drivers/iio/adc/rockchip_saradc.c
@@ -383,7 +383,7 @@
    ret = clk_prepare_enable(info->clk);
    if (ret)
-        return ret;
+        clk_disable_unprepare(info->pclk);
    return ret;
```
#include "stm32-adc-core.h"

-/* STM32F4 - common registers for all ADC instances: 1, 2 & 3 */
-#define STM32F4_ADC_CSR(STM32_ADCX_COMN_OFFSET + 0x00)
-#define STM32F4_ADC_CCR(STM32_ADCX_COMN_OFFSET + 0x04)
-
-/* STM32F4_ADC_CSR - bit fields */
-#define STM32F4_EOC3_BIT(17)
-#define STM32F4_EOC2_BIT(9)
-#define STM32F4_EOC1_BIT(1)
-
-/* STM32F4_ADC_CCR - bit fields */
-#define STM32F4_ADC_ADCPRE_SHIFT(16)
-#define STM32F4_ADC_ADCPRE_MASK(GENMASK(17, 16))
-
-/* STM32 H7 maximum analog clock rate (from datasheet) */
-#define STM32F4_ADC_MAX_CLK_RATE(36000000)
-
-/* STM32H7 - common registers for all ADC instances */
-#define STM32H7_ADC_CSR(STM32_ADCX_COMN_OFFSET + 0x00)
-#define STM32H7_ADC_CCR(STM32_ADCX_COMN_OFFSET + 0x08)
-
-/* STM32H7_ADC_CSR - bit fields */
-#define STM32H7_EOC_SLVBIT(18)
-#define STM32H7_EOC_MSTBIT(2)
-
-/* STM32H7_ADC_CCR - bit fields */
-#define STM32H7_PRESC_SHIFT(18)
-#define STM32H7_PRESC_MASK(GENMASK(21, 18))
-#define STM32H7_CKMODE_SHIFT(16)
-#define STM32H7_CKMODE_MASK(GENMASK(17, 16))
-
-/* STM32 H7 maximum analog clock rate (from datasheet) */
-#define STM32H7_ADC_MAX_CLK_RATE(36000000)
-
@@ -72,12 +45,16 @@
* @eoc1:	adc1 end of conversion flag in @csr
* @eoc2:	adc2 end of conversion flag in @csr
* @eoc3:	adc3 end of conversion flag in @csr
+ * @ier:interrupt enable register offset for each adc
+ * @eocie_msk:end of conversion interrupt enable mask in @ier
 */

struct stm32_adc_common_regs {
    u32 csr;
    u32 eoc1_msk;
    u32 eoc2_msk;
    u32 eoc3_msk;
    +u32 ier;
+u32 eocie_msk;
};

struct stm32_adc_priv;
@@ -284,6 +261,8 @@
 .eoc1_msk = STM32F4_EOC1,
 .eoc2_msk = STM32F4_EOC2,
 .eoc3_msk = STM32F4_EOC3,
+.ier = STM32F4_ADC_CR1,
+ .eocie_msk = STM32F4_EOCIE,
};

/* STM32H7 common registers definitions */
@@ -291,8 +270,24 @@
 .csr = STM32H7_ADC_CSR,
 .eoc1_msk = STM32H7_EOC_MST,
 .eoc2_msk = STM32H7_EOC_SLV,
+ .ier = STM32H7_ADC_IER,
+ .eocie_msk = STM32H7_EOCIE,
+};
+
+static const unsigned int stm32_adc_offset[STM32_ADC_MAX_ADCS] = {
+ 0, STM32_ADC_OFFSET, STM32_ADC_OFFSET * 2,
+};

+static unsigned int stm32_adc_eoc_enabled(struct stm32_adc_priv *priv,
+  unsigned int adc)
+{
+  u32 ier, offset = stm32_adc_offset[adc];
+  +ier = readl_relaxed(priv->common.base + offset + priv->cfg->regs->ier);
+  +return ier & priv->cfg->regs->eocie_msk;
+}
+
+ /* ADC common interrupt for all instances */
+ static void stm32_adc_irq_handler(struct irq_desc *desc)
+ {
+   chained_irq_enter(chip, desc);
+   status = readl_relaxed(priv->common.base + priv->cfg->regs->csr);
+   -if (status & priv->cfg->regs->eoc1_msk)
+   /*
+    * End of conversion may be handled by using IRQ or DMA. There may be a
+    * race here when two conversions complete at the same time on several
+    * ADCs. EOC may be read 'set' for several ADCs, with:
+    * - an ADC configured to use DMA (EOC triggers the DMA request, and

+ * is then automatically cleared by DR read in hardware
+ * - an ADC configured to use IRQs (EOCIE bit is set. The handler must
+ *   be called in this case)
+ * So both EOC status bit in CSR and EOCIE control bit must be checked
+ * before invoking the interrupt handler (e.g. call ISR only for
+ * IRQ-enabled ADCs).
+ */
+if (status & priv->cfg->regs->eoc1_msk &&
+    stm32_adc_eoc_enabled(priv, 0))
generic_handle_irq(irq_find_mapping(priv->domain, 0));

-if (status & priv->cfg->regs->eoc2_msk)
+if (status & priv->cfg->regs->eoc2_msk &&
+    stm32_adc_eoc_enabled(priv, 1))
generic_handle_irq(irq_find_mapping(priv->domain, 1));

-if (status & priv->cfg->regs->eoc3_msk)
+if (status & priv->cfg->regs->eoc3_msk &&
+    stm32_adc_eoc_enabled(priv, 2))
generic_handle_irq(irq_find_mapping(priv->domain, 2));

chained_irq_exit(chip, desc);
--- linux-4.15.0.orig/drivers/iio/adc/stm32-adc-core.h
+++ linux-4.15.0/drivers/iio/adc/stm32-adc-core.h
@@ -37,8 +37,134 @@
*/
#define STM32_ADC_MAX_ADCS 3
#define STM32_ADC_OFFSET 0x100
#define STM32_ADCX_COMN_OFFSET 0x300
+/* STM32F4 - Registers for each ADC instance */
#define STM32F4_ADC_SR 0x00
#define STM32F4_ADC_CR1 0x04
#define STM32F4_ADC_CR2 0x08
#define STM32F4_ADC_SMPR1 0x0C
#define STM32F4_ADC_SMPR2 0x10
#define STM32F4_ADC_HTR 0x24
#define STM32F4_ADC_LTR 0x28
#define STM32F4_ADC_SQR1 0x2C
#define STM32F4_ADC_SQR2 0x30
#define STM32F4_ADC_SQR3 0x34
#define STM32F4_ADC_JSQR 0x38
#define STM32F4_ADC_JDR1 0x3C
#define STM32F4_ADC_JDR2 0x40
#define STM32F4_ADC_JDR3 0x44
#define STM32F4_ADC_JDR4 0x48
#define STM32F4_ADC_DR 0x4C
+/*/
/* STM32F4 - common registers for all ADC instances: 1, 2 & 3 */
#define STM32F4_ADC_CSR(STM32_ADCX_COMN_OFFSET + 0x00)
#define STM32F4_ADC_CCR(STM32_ADCX_COMN_OFFSET + 0x04)

/* STM32F4_ADC_SR - bit fields */
#define STM32F4_STRTBIT(4)
#define STM32F4_EOCBIT(1)

/* STM32F4_ADC_CR1 - bit fields */
#define STM32F4_RES_SHIFT(24)
#define STM32F4_RES_MASK(GENMASK(25, 24))
#define STM32F4_SCANBIT(8)
#define STM32F4_EOCIEBIT(5)

/* STM32F4_ADC_CR2 - bit fields */
#define STM32F4_SWSTARTBIT(30)
#define STM32F4_EXTEN_SHIFT(28)
#define STM32F4_EXTEN_MASK(GENMASK(29, 28))
#define STM32F4_EXTSEL_SHIFT(24)
#define STM32F4_EXTSEL_MASK(GENMASK(27, 24))
#define STM32F4_EOCSBIT(10)
#define STM32F4_DDSBIT(9)
#define STM32F4_DMABIT(8)
#define STM32F4_ADONBIT(0)

/* STM32F4_ADC_CSR - bit fields */
#define STM32F4_EOC3BIT(17)
#define STM32F4_EOC2BIT(9)
#define STM32F4_EOC1BIT(1)

/* STM32F4_ADC_CCR - bit fields */
#define STM32F4_ADC_ADCPRE_SHIFT(16)
#define STM32F4_ADC_ADCPRE_MASK(GENMASK(17, 16))

/* STM32H7 - Registers for each ADC instance */
#define STM32H7_ADC_ISR(0x00)
#define STM32H7_ADC_IER(0x04)
#define STM32H7_ADC_CR(0x08)
#define STM32H7_ADC_CFGR(0x0C)
#define STM32H7_ADC_SMPR1(0x14)
#define STM32H7_ADC_SMPR2(0x18)
#define STM32H7_ADC_PCSCHAR(0x1C)
#define STM32H7_ADC_SQR1(0x30)
#define STM32H7_ADC_SQR2(0x34)
#define STM32H7_ADC_SQR3(0x38)
#define STM32H7_ADC_SQR4(0x3C)
#define STM32H7_ADC_DR(0x40)
+\#define STM32H7_ADC_CALFACT0xC4
+\#define STM32H7_ADC_CALFACT20xC8
+
+/* STM32H7 - common registers for all ADC instances */
+\#define STM32H7_ADC_CSR(STM32_ADCX_COMN_OFFSET + 0x00)
+\#define STM32H7_ADC_CCR(STM32_ADCX_COMN_OFFSET + 0x08)
+
+/* STM32H7_ADC_ISR - bit fields */
+\#define STM32H7_EOCBIT(2)
+\#define STM32H7_ADRDYBIT(0)
+
+/* STM32H7_ADC_IER - bit fields */
+\#define STM32H7_EOCIESTM32H7_EOC
+
+/* STM32H7_ADC_CR - bit fields */
+\#define STM32H7_ADCAL(31)
+\#define STM32H7_ADCALDIFBIT(30)
+\#define STM32H7_DEEPPWDBIT(29)
+\#define STM32H7_Advregenbit(28)
+\#define STM32H7_Lincalrdyw6bit(27)
+\#define STM32H7_Lincalrdyw5bit(26)
+\#define STM32H7_Lincalrdyw4bit(25)
+\#define STM32H7_Lincalrdyw3bit(24)
+\#define STM32H7_Lincalrdyw2bit(23)
+\#define STM32H7_Lincalrdyw1bit(22)
+\#define STM32H7_ADCALLINBIT(16)
+\#define STM32H7_BOOSTBIT(8)
+\#define STM32H7_ADSTPBBit(4)
+\#define STM32H7_ADSTARTBIT(2)
+\#define STM32H7_ADDISBIT(1)
+\#define STM32H7_ADENBIT(0)
+
+/* STM32H7_ADC_CFGR bit fields */
+\#define STM32H7_EXTEN_SHIFT(10)
+\#define STM32H7_EXTEN_MASKGENMASK(11, 10)
+\#define STM32H7_EXTSEL_SHIFT(5)
+\#define STM32H7_EXTSEL_MASKGENMASK(9, 5)
+\#define STM32H7_RES_SHIFT2
+\#define STM32H7_RES_MASKGENMASK(4, 2)
+\#define STM32H7_DMNGT_SHIFT0
+\#define STM32H7_DMNGT_MASKGENMASK(1, 0)
+
+enum stm32h7_adc_dmngt {
+STM32H7_DMNGT_DR_ONLY,/* Regular data in DR only */
+STM32H7_DMNGT_DMA_ONESHOT,/* DMA one shot mode */
+STM32H7_DMNGT_DFSDM,/* DFSDM mode */
+STM32H7_DMNGT_DMA_CIRC,/* DMA circular mode */
+};
/* STM32H7_ADC_CALFACT - bit fields */
#define STM32H7_CALFACT_D_SHIFT	16
#define STM32H7_CALFACT_D_MASK	GENMASK(26, 16)
#define STM32H7_CALFACT_S_SHIFT	0
#define STM32H7_CALFACT_S_MASK	GENMASK(10, 0)

/* STM32H7_ADC_CALFACT2 - bit fields */
#define STM32H7_LINCALFACT_SHIFT	0
#define STM32H7_LINCALFACT_MASK	GENMASK(29, 0)

/* STM32H7_ADC_CSR - bit fields */
#define STM32H7_EOC_SLV	BIT(18)
#define STM32H7_EOC_MST	BIT(2)

/* STM32H7_ADC_CCR - bit fields */
#define STM32H7_PRESC_SHIFT	18
#define STM32H7_PRESC_MASK	GENMASK(21, 18)
#define STM32H7_CKMODE_SHIFT	16
#define STM32H7_CKMODE_MASK	GENMASK(17, 16)

#include "stm32-adc-core.h"

-/* STM32F4 - Registers for each ADC instance */
-#define STM32F4_ADC_SR0x00
-#define STM32F4_ADC_CR1x04
-#define STM32F4_ADC_CR2x08
-#define STM32F4_ADC_SMPR1x0C
-#define STM32F4_ADC_SMPR2x10
-#define STM32F4_ADC_HTR0x24
-#define STM32F4_ADC_LTR0x28
-#define STM32F4_ADC_SQR1x2C
-#define STM32F4_ADC_SQR2x30
-#define STM32F4_ADC_SQR3x34
-#define STM32F4_ADC_JSQR0x38
-#define STM32F4_ADC_JDR1x3C
-#define STM32F4_ADC_JDR2x40
-#define STM32F4_ADC_JDR3x44
-#define STM32F4_ADC_JDR4x48
-#define STM32F4_ADC_DR0x4C
-
/* STM32F4_ADC_SR - bit fields */
#define STM32F4_STRTBIT(4)
#define STM32F4_EOCBIT(1)

/* STM32F4_ADC_CR1 - bit fields */
#define STM32F4_RES_SHIFT	24
#define STM32F4_RES_MASK	GENMASK(25, 24)
#define STM32F4_SCAN	8
#define STM32F4_EOCIE	5

/* STM32F4_ADC_CR2 - bit fields */
#define STM32F4_SWSTART	30
#define STM32F4_EXTEN_SHIFT	28
#define STM32F4_EXTEN_MASK	GENMASK(29, 28)
#define STM32F4_EXTSEL_SHIFT	24
#define STM32F4_EXTSEL_MASK	GENMASK(27, 24)
#define STM32F4_EOCS	10
#define STM32F4_DDS	9
#define STM32F4_DMA	8
#define STM32F4_ADON	0

/* STM32H7 - Registers for each ADC instance */
#define STM32H7_ADC_ISR	0x00
#define STM32H7_ADC_IER	0x04
#define STM32H7_ADC_CR	0x08
#define STM32H7_ADC_CFGR	0x0C
#define STM32H7_ADC_SMPR1	0x14
#define STM32H7_ADC_SMPR2	0x18
#define STM32H7_ADC_PCSEL	0x1C
#define STM32H7_ADC_SQR1	0x30
#define STM32H7_ADC_SQR2	0x34
#define STM32H7_ADC_SQR3	0x38
#define STM32H7_ADC_SQR4	0x3C
#define STM32H7_ADC_DR	0x40
#define STM32H7_ADC_CALFACT	0xC4
#define STM32H7_ADC_CALFACT2	0xC8

/* STM32H7_ADC_ISR - bit fields */
#define STM32H7_EOC	2
#define STM32H7_ADRDY	0

/* STM32H7_ADC_IER - bit fields */
#define STM32H7_EOCIE	STM32H7_EOC

/* STM32H7_ADC_CR - bit fields */
#define STM32H7_ADCAL	31
#define STM32H7_ADCALDIF	30
#define STM32H7_DEEPPWD	29
-#define STM32H7_ADVREGENBIT(28)
-#define STM32H7_LINCALRDYW6BIT(27)
-#define STM32H7_LINCALRDYW5BIT(26)
-#define STM32H7_LINCALRDYW4BIT(25)
-#define STM32H7_LINCALRDYW3BIT(24)
-#define STM32H7_LINCALRDYW2BIT(23)
-#define STM32H7_LINCALRDYW1BIT(22)
-#define STM32H7_ADCALLINBIT(16)
-#define STM32H7_BOOSTBIT(8)
-#define STM32H7_ADSTPBIT(4)
-#define STM32H7_ADSTARTBIT(2)
-#define STM32H7_ADDISBIT(1)
-#define STM32H7_ADENBIT(0)
-
-/* STM32H7_ADC_CFGR bit fields */
-#define STM32H7_EXTEN_SHIFT10
-#define STM32H7_EXTEN_MASK(11, 10)
-#define STM32H7_EXTSEL_SHIFT5
-#define STM32H7_EXTSEL_MASK(9, 5)
-#define STM32H7_RES_SHIFT2
-#define STM32H7_RES_MASKGENMASK(4, 2)
-#define STM32H7_DMNGT_SHIFT0
-#define STM32H7_DMNGT_MASKGENMASK(1, 0)
-
-enum stm32h7_adc_dmngt {
-STM32H7_DMNGT_DR_ONLY, /* Regular data in DR only */
-STM32H7_DMNGT_DMA_ONESHOT, /* DMA one shot mode */
-STM32H7_DMNGT_DFSDM, /* DFSDM mode */
-STM32H7_DMNGT_DMA_CIRC, /* DMA circular mode */
-};
-
-/* STM32H7_ADC_CALFACT - bit fields */
-#define STM32H7_CALFACT_D_SHIFT16
-#define STM32H7_CALFACT_D_MASKGENMASK(26, 16)
-#define STM32H7_CALFACT_S_SHIFT0
-#define STM32H7_CALFACT_S_MASKGENMASK(10, 0)
-
-/* STM32H7_ADC_CALFACT2 - bit fields */
-#define STM32H7_LINCALFACT_SHIFT0
-#define STM32H7_LINCALFACT_MASKGENMASK(29, 0)
-
/* Number of linear calibration shadow registers / LINCALRDYW control bits */
#define STM32H7_LINCALFACT_NUM6

@@ -765,8 +658,6 @@ int ret;
   u32 val;
/* Clear ADRDY by writing one, then enable ADC */
stm32_adc_set_bits(adc, STM32H7_ADC_ISR, STM32H7_ADRDY);
stm32_adc_set_bits(adc, STM32H7_ADC_CR, STM32H7_ADEN);

/* Poll for ADRDY to be set (after adc startup time) */
@@ -774,8 +665,11 @@
    val & STM32H7_ADRDY,
    100, STM32_ADC_TIMEOUT_US);
if (ret) {
-    stm32_adc_clr_bits(adc, STM32H7_ADC_CR, STM32H7_ADEN);
+    stm32_adc_set_bits(adc, STM32H7_ADC_CR, STM32H7_ADDIS);
    dev_err(&indio_dev->dev, "Failed to enable ADC\n");
+} else {
+/* Clear ADRDY by writing one */
+stm32_adc_set_bits(adc, STM32H7_ADC_ISR, STM32H7_ADRDY);
}
return ret;
@@ -1315,6 +1209,7 @@
{
struct stm32_adc *adc = iio_priv(indio_dev);
unsigned int watermark = STM32_DMA_BUFFER_SIZE / 2;
+unsigned int rx_buf_sz = STM32_DMA_BUFFER_SIZE;

/*
dma cyclic transfers are used, buffer is split into two periods.
@@ -1323,7 +1218,7 @@
    * one buffer (period) driver can push with iio_trigger_poll().
    */
watermark = min(watermark, val * (unsigned)(sizeof(u16)));
-    adc->rx_buf_sz = watermark * 2;
+    adc->rx_buf_sz = min(rx_buf_sz, watermark * 2 * adc->num_conv);

return 0;
}
@@ -1416,8 +1311,30 @@
static void stm32_adc_dma_buffer_done(void *data)
{
struct iio_dev *indio_dev = data;
+struct stm32_adc *adc = iio_priv(indio_dev);
+int residue = stm32_adc_dma_residue(adc);
+
+/*
+ In DMA mode the trigger services of IIO are not used
+ * (e.g. no call to iio_trigger_poll).
+ * Calling irq handler associated to the hardware trigger is not
+ * relevant as the conversions have already been done. Data
+ * transfers are performed directly in DMA callback instead.
This implementation avoids to call trigger irq handler that
may sleep, in an atomic context (DMA irq handler context).

```c
+ * This implementation avoids to call trigger irq handler that
+ * may sleep, in an atomic context (DMA irq handler context).
+ */
+dev_dbg(&indio_dev->dev,"%s bufi=%d\n", __func__, adc->bufi);
+
+while (residue >= indio_dev->scan_bytes) {
++u16 *buffer = (u16 *)&adc->rx_buf[adc->bufi];

-iio_trigger_poll_chained(indio_dev->trig);
+iio_push_to_buffers(indio_dev, buffer);
+
+residue -= indio_dev->scan_bytes;
+adc->bufi += indio_dev->scan_bytes;
+if (adc->bufi >= adc->rx_buf_sz)
+adc->bufi = 0;
+
}
}

static int stm32_adc_dma_start(struct iio_dev *indio_dev)
@@ -1448,7 +1365,7 @@
cookie = dmaengine_submit(desc);
ret = dma_submit_error(cookie);
if (ret) {
-dmaengine_terminate_all(adc->dma_chan);
+dmaengine_terminate_sync(adc->dma_chan);
return ret;
}

@@ -1521,7 +1438,7 @@
dev_err(&indio_dev->dev, "predisable failed\n");

if (adc->dma_chan)
-dmaengine_terminate_all(adc->dma_chan);
+dmaengine_terminate_sync(adc->dma_chan);

if (stm32_adc_set_trig(indio_dev, NULL))
dev_err(&indio_dev->dev, "Can't clear trigger\n");
@@ -1710,15 +1627,27 @@
return 0;
}

-static int stm32_adc_dma_request(struct iio_dev *indio_dev)
+static int stm32_adc_dma_request(struct device *dev, struct iio_dev *indio_dev)
{
 struct stm32_adc *adc = iio_priv(indio_dev);
 struct dma_slave_config config;
 int ret;
```
-adc->dma_chan = dma_request_slave_channel(&indio_dev->dev, "rx");
-if (!adc->dma_chan)
+adc->dma_chan = dma_request_chan(dev, "rx");
+if (IS_ERR(adc->dma_chan)) {
    +ret = PTR_ERR(adc->dma_chan);
    +if (ret != -ENODEV) {
    +    if (ret != -EPROBE_DEFER)
    +        dev_err(dev,
    +            +"DMA channel request failed with %d\n",
    +            +ret);
    +    return ret;
    +}
    +
    +# DMA is optional: fall back to IRQ mode */
+adc->dma_chan = NULL;
return 0;
+
adc->rx_buf = dma_alloc_coherent(adc->dma_chan->device->dev,
    STM32_DMA_BUFFER_SIZE,
    @ @ -1753,6 +1682,7 @@
    }
struct iio_dev *indio_dev;
struct device *dev = &pdev->dev;
+irrqreturn_t (*handler)(int irq, void *p) = NULL;
struct stm32_adc *adc;
int ret;

@@ -1831,13 +1761,15 @@
} if (ret < 0)
    goto err_clk_disable;
-ret = stm32_adc_dma_request(indio_dev);
+ret = stm32_adc_dma_request(dev, indio_dev);
if (ret < 0)
    goto err_clk_disable;
+if (!adc->dma_chan)
+    handler = &stm32_adc_trigger_handler;
+    ret = iio_triggered_buffer_setup(indio_dev,
+        - &iio_pollfunc_store_time,
+        - &stm32_adc_trigger_handler,
+        + &iio_pollfunc_store_time, handler,
+        &stm32_adc_buffer_setup_ops);
if (ret) {
    dev_err(&pdev->dev, "buffer setup failed\n");
--- linux-4.15.0.orig/drivers/iio/adc/ti-adc081c.c
/* 8, 10 or 12 */

int bits;
+
+/* Ensure natural alignment of buffer elements */
+struct {
+u16 channel;
+s64 ts __aligned(8);
+} scan;
};

#define REG_CONV_RES 0x00

int ret;
ret = i2c_smbus_read_word_swapped(data->i2c, REG_CONV_RES);
if (ret < 0)
goto out;
-buf[0] = ret;
-iio_push_to_buffers_with_timestamp(indio_dev, buf,
+data->scan.channel = ret;
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
   iio_get_time_ns(indio_dev));
out:
iio_trigger_notify_done(indio_dev->trig);
--- linux-4.15.0.orig/drivers/iio/adc/ti-adc0832.c
+++ linux-4.15.0/drivers/iio/adc/ti-adc0832.c
@@ -202,7 +208,6 @@
struct iio_poll_func *pf = p;

+/* Max size needed: 16x 1 byte ADC data + 8 bytes timestamp
+ * May be shorter if not all channels are enabled subject
+ * to the timestamp remaining 8 byte aligned.
+ */
+u8 data[24] __aligned(8);

    u8 tx_buf[2] ____cacheline_aligned;
    u8 rx_buf[2];
    @ @ -202,7 +208,6 @ @
struct iio_poll_func *pf = p;
struct iio_dev *indio_dev = pf->indio_dev;
struct adc0832 *adc = iio_priv(indio_dev);
-u8 data[24] = { }; /* 16x 1 byte ADC data + 8 bytes timestamp */
int scan_index;
int i = 0;

@@ -220,10 +225,10 @@
goto out;
}

-data[i] = ret;
+adc->data[i] = ret;
i++;
}
-iio_push_to_buffers_with_timestamp(indio_dev, data,
+iio_push_to_buffers_with_timestamp(indio_dev, adc->data,
    iio_get_time_ns(indio_dev));
out:
mutex_unlock(&adc->lock);
--- linux-4.15.0.orig/drivers/iio/adc/ti-adc084s021.c
+++ linux-4.15.0/drivers/iio/adc/ti-adc084s021.c
@@ -28,6 +28,11 @@
struct spi_transfer spi_trans;
struct regulator *reg;
struct mutex lock;
+/* Buffer used to align data */
+struct {
+    __be16 channels[4];
+    s64 ts __aligned(8);
+} scan;
/*
 * DMA (thus cache coherency maintenance) requires the
 * transfer buffers to live in their own cache line.
 @@ -143,14 +148,13 @@
 struct iio_poll_func *pf = pollfunc;
 struct iio_dev *indio_dev = pf->indio_dev;
 struct adc084s021 *adc = iio_priv(indio_dev);
-__be16 data[8] = {0}; /* 4 * 16-bit words of data + 8 bytes timestamp */
+__be16 data[8] = {0}; /* 4 * 16-bit words of data + 8 bytes timestamp */
 mutex_lock(&adc->lock);

-if (adc084s021_adc_conversion(adc, &data) < 0)
+if (adc084s021_adc_conversion(adc, adc->scan.channels) < 0)
    dev_err(&adc->spi->dev, "Failed to read data\n");

-iio_push_to_buffers_with_timestamp(indio_dev, data,
+iio_push_to_buffers_with_timestamp(indio_dev, &adc->scan,
    iio_get_time_ns(indio_dev));
mutex_unlock(&adc->lock);
iio_trigger_notify_done(indio_dev->trig);
--- linux-4.15.0.orig/drivers/iio/adc/ti-adc12138.c
+++ linux-4.15.0/drivers/iio/adc/ti-adc12138.c
@@ -50,6 +50,12 @@
 struct completion complete;
 /* The number of cclk periods for the S/H's acquisition time */
 unsigned int acquisition_time;
+/*
+ * Maximum size needed: 16x 2 bytes ADC data + 8 bytes timestamp.
+ * Less may be need if not all channels are enabled, as long as
+ * the 8 byte alignment of the timestamp is maintained.
+ */
+__be16 data[20] __aligned(8);

 u8 tx_buf[2] ____cacheline_aligned;
u8 rx_buf[2];
@@ -332,7 +338,6 @@
 struct iio_poll_func *pf = p;
 struct iio_dev *indio_dev = pf->indio_dev;
 struct adc12138 *adc = iio_priv(indio_dev);
-%__be16 data[20] = { }; /* 16x 2 bytes ADC data + 8 bytes timestamp */
-%__be16 trash;
+__be16 data[20] __aligned(8);

 reinit_completion(&adc->complete);
 ret = adc12138_start_and_read_conv(adc, scan_chan,
- i ? &data[i - 1] : &trash);
+ i ? &adc->data[i - 1] : &trash);
 if (ret) {
 dev_warn(&adc->spi->dev,
 "failed to start conversion\n");
@@ -365,7 +370,7 @@
 }

 if (i) {
- ret = adc12138_read_conv_data(adc, &data[i - 1]);
+ ret = adc12138_read_conv_data(adc, &adc->data[i - 1]);
 if (ret) {
 dev_warn(&adc->spi->dev,
 "failed to get conversion data\n");
@@ -373,7 +378,7 @@
 }
 }

 -iio_push_to_buffers_with_timestamp(indio_dev, data,
+iio_push_toBuffers_with_timestamp(indio_dev, adc->data, 
   iio_get_time_ns(indio_dev));
out:
mutex_unlock(&adc->lock);
--- linux-4.15.0.orig/drivers/iio/adc/ti-adc128s052.c
+++ linux-4.15.0/drivers/iio/adc/ti-adc128s052.c
@@ -168,7 +168,13 @@
mutex_init(&adc->lock);
ret = iio_device_register(indio_dev);
+if (ret)
+goto err_disable_regulator;
+return 0;
++err_disable_regulator:
+regulator_disable(adc->reg);
return ret;
}
--- linux-4.15.0.orig/drivers/iio/adc/ti-ads1015.c
+++ linux-4.15.0/drivers/iio/adc/ti-ads1015.c
@@ -312,6 +312,7 @@
IIO_CHAN_SOFT_TIMESTAMP(ADS1015_TIMESTAMP),
}
+#ifdef CONFIG_PM
static int ads1015_set_power_state(struct ads1015_data *data, bool on)
{
int ret;
@@ -329,6 +330,15 @@
return ret < 0 ? ret : 0;
}
+#endif /* !CONFIG_PM */
static int ads1015_get_adc_result(struct ads1015_data *data, int chan, int *val)
{ 
@@ -381,10 +391,14 @@
struct iio_poll_func *pf = p;
struct iio_dev *indio_dev = pf->indio_dev;
struct ads1015_data *data = iio_priv(indio_dev);
-s16 buf[8]; /* 1x s16 ADC val + 3x s16 padding + 4x s16 timestamp */
+/* Ensure natural alignment of timestamp */
+struct {
+  +s16 chan;
+  +s64 timestamp __aligned(8);
+} scan;
int chan, ret, res;

-memset(buf, 0, sizeof(buf));
+memset(&scan, 0, sizeof(scan));

mutex_lock(&data->lock);
chan = find_first_bit(indio_dev->active_scan_mask,
@@ -395,10 +409,10 @@
goto err;
}

-buf[0] = res;
+scan.chan = res;
mutex_unlock(&data->lock);

-iio_push_to_buffers_with_timestamp(indio_dev, buf,
+iio_push_to_buffers_with_timestamp(indio_dev, &scan,
   iio_get_time_ns(indio_dev));

err:
--- linux-4.15.0.orig/drivers/iio/adc/vf610_adc.c
+++ linux-4.15.0/drivers/iio/adc/vf610_adc.c
@@ -180,7 +180,11 @@
 u32 sample_freq_avail[5];

 struct completion completion;
-u16 buffer[8];
+/* Ensure the timestamp is naturally aligned */
+struct {
+  +u16 chan;
+  +s64 timestamp __aligned(8);
+} scan;
+};

static const u32 vf610_hw_avgs[] = { 1, 4, 8, 16, 32 };
@@ -592,9 +596,9 @@
 if (coco & VF610_ADC_HS_COCO0) {
   info->value = vf610_adc_read_data(info);
   if (iio_buffer_enabled(indio_dev)) {
     -info->buffer[0] = info->value;
     +iio_buffer_enabled(indio_dev));
   }
struct iio_buffer_info info;
info.scan.chan = info.value;
iio_push_to_buffers_with_timestamp(indio_dev, 
    -info.buffer, 
    +&info.scan, 
    iio_get_time_ns(indio_dev));
iio_trigger_notify_done(indio_dev->trig);
} else

--- linux-4.15.0.orig/drivers/iio/adc/xilinx-xadc-core.c
+++ linux-4.15.0/drivers/iio/adc/xilinx-xadc-core.c
@@ -103,6 +103,16 @@
#define XADC_FLAGS_BUFFERED BIT(0)

+/*
+ * The XADC hardware supports a samplerate of up to 1MSPS. Unfortunately it does
+ * not have a hardware FIFO. Which means an interrupt is generated for each
+ * conversion sequence. At 1MSPS sample rate the CPU in ZYNQ7000 is completely
+ * overloaded by the interrupts that it soft-lockups. For this reason the driver
+ * limits the maximum samplerate 150kSPS. At this rate the CPU is fairly busy,
+ * but still responsive.
+ */
+#define XADC_MAX_SAMPLERATE 150000
+
static void xadc_write_reg(struct xadc *xadc, unsigned int reg,
    uint32_t val)
{
@@ -660,7 +670,7 @@
    +xadc_write_reg(xadc, XADC_AXI_REG_IPISR, XADC_AXI_INT_EOS);
    if (state)
        val |= XADC_AXI_INT_EOS;
    else
@@ -708,13 +718,14 @@
        }
        uint16_t val;

+/* Powerdown the ADC-B when it is not needed. */
switch (seq_mode) {
case XADC_CONF1_SEQ_SIMULTANEOUS:
case XADC_CONF1_SEQ_INDEPENDENT:
    -val = XADC_CONF2_PD_ADC_B;
    +val = 0;
    break;
default:
    -val = 0;
val = XADC_CONF2_PD_ADC_B;
break;
}

if (ret)
goto err;

/*
 * In simultaneous mode the upper and lower aux channels are samples at
 * the same time. In this mode the upper 8 bits in the sequencer
 * register are don't care and the lower 8 bits control two channels
 * each. As such we must set the bit if either the channel in the lower
 * group or the upper group is enabled.
 * */
if (seq_mode == XADC_CONF1_SEQ_SIMULTANEOUS)
	scan_mask = ((scan_mask >> 8) | scan_mask) & 0xff0000;
ret = xadc_write_adc_reg(xadc, XADC_REG_SEQ(1), scan_mask >> 16);
if (ret)
goto err;

static int xadc_read_samplerate(struct xadc *xadc)
{
	unsigned int div;
	uint16_t val16;
	int ret;

	ret = xadc_read_adc_reg(xadc, XADC_REG_CONF2, &val16);
	if (ret)
		return ret;

	div = (val16 & XADC_CONF2_DIV_MASK) >> XADC_CONF2_DIV_OFFSET;
	if (div < 2)
		div = 2;

	return xadc_get_dclk_rate(xadc) / div / 26;
}

static int xadc_read_raw(struct iio_dev *indio_dev,
struct iioChanSpec const *chan, int *val, int *val2, long info)
{
struct xadc *xadc = iioPriv(indio_dev);

-unsigned int div;
uint16_t val16;
int ret;

@@ -866,38 +903,28 @@
*val = -((273150 << 12) / 503975);
return IIO_VAL_INT;

case IIO_CHAN_INFO_SAMP_FREQ:
- ret = xadc_read_adc_reg(xadc, XADC_REG_CONF2, &val16);
- if (ret)
+ ret = xadc_read_samplerate(xadc);
+ if (ret < 0)
   return ret;

-div = (val16 & XADC_CONF2_DIV_MASK) >> XADC_CONF2_DIV_OFFSET;
- if (div < 2)
- div = 2;
  -*val = xadc_get_pll_rate(xadc) / div / 26;
  *
  +*val = ret;
  return IIO_VAL_INT;
 default:
   return -EINVAL;
 }

- static int xadc_write_raw(struct iio_dev *indio_dev,
-  struct iio_chan_spec const *chan, int val, int val2, long info)
+ static int xadc_write_samplerate(struct xadc *xadc, int val)
 {  
  struct xadc *xadc = iio_priv(indio_dev);
  unsigned long clk_rate = xadc_get_pll_rate(xadc);
  unsigned int div;

  -if (info != IIO_CHAN_INFO_SAMP_FREQ)
- return -EINVAL;
  -
  if (val <= 0)
   return -EINVAL;

  /* Max. 150 kSPS */
  -if (val > 150000)
- val = 150000;
+ if (val > XADC_MAX_SAMPLERATE)
+ val = XADC_MAX_SAMPLERATE;

  val *= 26;

@@ -910,7 +937,7 @@
/* limit. */
div = clk_rate / val;
-if (clk_rate / div / 26 > 150000)
+if (clk_rate / div / 26 > XADC_MAX_SAMPLERATE)
div++;
if (div < 2)
div = 2;
@@ -921,6 +948,17 @@
div <<= XADC_CONF2_DIV_OFFSET);
}
+static int xadc_write_raw(struct iio_dev *indio_dev,
+struct iio_chan_spec const *chan, int val, int val2, long info)
+{
+struct xadc *xadc = iio_priv(indio_dev);
+
+if (info != IIO_CHAN_INFO_SAMP_FREQ)
+return -EINVAL;
+
+return xadc_write_samplerate(xadc, val);
+}
+
+static const struct iio_event_spec xadc_temp_events[] = {
+{
+.type = IIO_EV_TYPE_THRESH,
@@ -1207,6 +1245,21 @@
if (ret)
goto err_free_samplerate_trigger;

+/*
+ * Make sure not to exceed the maximum samplerate since otherwise the
+ * resulting interrupt storm will soft-lock the system.
+ */
+if (xadc->ops->flags & XADC_FLAGS_BUFFERED) {
+ret = xadc_read_samplerate(xadc);
+if (ret < 0)
+goto err_free_samplerate_trigger;
+if (ret > XADC_MAX_SAMPLERATE) {
+ret = xadc_write_samplerate(xadc, XADC_MAX_SAMPLERATE);
+if (ret < 0)
+goto err_free_samplerate_trigger;
+}
+}
+
+ ret = xadc->ops->setup(pdev, indio_dev, irq);
+if (ret)
goto err_clk_disable_unprepare;
err_free_irq:
free_irq(irq, indio_dev);
+cancel_delayed_work_sync(&xadc->zynq_unmask_work);
err_clk_disable_unprepare:
clk_disable_unprepare(xadc->clk);
err_free_samplerate_trigger:
@@ -1299,8 +1353,8 @@
 iio_triggered_buffer_cleanup(indio_dev);
 }
free_irq(irq, indio_dev);
+cancel_delayed_work_sync(&xadc->zynq_unmask_work);
clk_disable_unprepare(xadc->clk);
-cancel_delayed_work(&xadc->zynq_unmask_work);
kfree(xadc->data);
kfree(indio_dev->channels);

--- linux-4.15.0.orig/drivers/iio/buffer/industrialio-buffer-dma.c
+++ linux-4.15.0/drivers/iio/buffer/industrialio-buffer-dma.c
@@ -587,7 +587,7 @@
 * Should be used as the set_length callback for iio_buffer_access_ops
 * struct for DMA buffers.
 */
-int iio_dma_buffer_set_length(struct iio_buffer *buffer, int length)
+int iio_dma_buffer_set_length(struct iio_buffer *buffer, unsigned int length)
 {  
 /* Avoid an invalid state */
 if (length < 2)
--- linux-4.15.0.orig/drivers/iio/buffer/kfifo_buf.c
+++ linux-4.15.0/drivers/iio/buffer/kfifo_buf.c
@@ -22,11 +22,18 @@
 #define iio_to_kfifo(r) container_of(r, struct iio_kfifo, buffer)

 static inline int __iio_allocate_kfifo(struct iio_kfifo *buf,
-  int bytes_per_datum, int length)
+  size_t bytes_per_datum, unsigned int length)
 {  
 if ((length == 0) || (bytes_per_datum == 0))
  return -EINVAL;
+/*
+ * Make sure we don't overflow an unsigned int after kfifo rounds up to
+ * the next power of 2.
+ */
+if (roundup_pow_of_two(length) > UINT_MAX / bytes_per_datum)
+return -EINVAL;
+*/
return __kfifo_alloc((struct __kfifo *)&buf->kf, length,
    bytes_per_datum, GFP_KERNEL);
}
@@ -67,7 +74,7 @@
return 0;
}

-static int iio_set_length_kfifo(struct iio_buffer *r, int length)
+static int iio_set_length_kfifo(struct iio_buffer *r, unsigned int length)
{
    /* Avoid an invalid state */
    if (length < 2)
--- linux-4.15.0.orig/drivers/iio/chemical/atlas-ph-sensor.c
+++ linux-4.15.0/drivers/iio/chemical/atlas-ph-sensor.c
@@ -452,9 +452,8 @@
    case IIO_CHAN_INFO_SCALE:
        switch (chan->type) {
        case IIO_TEMP:
-            *val = 1; /* 0.01 */
-            *val2 = 100;
-            break;
+            *val = 10;
+            return IIO_VAL_INT;
            case IIO_PH:
                *val = 1; /* 0.001 */
                *val2 = 1000;
@@ -485,7 +484,7 @@
               int val, int val2, long mask)
{
    struct atlas_data *data = iio_priv(indio_dev);
-    __be32 reg = cpu_to_be32(val);
+    __be32 reg = cpu_to_be32(val / 10);
    if (val2 != 0 || val < 0 || val > 20000)
        return -EINVAL;
--- linux-4.15.0.orig/drivers/iio/chemical/ccs811.c
+++ linux-4.15.0/drivers/iio/chemical/ccs811.c
@@ -78,6 +78,11 @@
               struct ccs811_reading buffer;
               struct iio_trigger *drdy_trig;
               bool drdy_trig_on;
+ /* Ensures correct alignment of timestamp if present */
+ struct {
+     s16 channels[2];
+     s64 ts __aligned(8);
+ } scan;
+};
static const struct iio_chan_spec ccs811_channels[] = {
    .channel2 = IIO_MOD_CO2,
    .modified = 1,
    .info_mask_separate = BIT(IIO_CHAN_INFO_RAW) |
    BIT(IIO_CHAN_INFO_OFFSET) |
    BIT(IIO_CHAN_INFO_SCALE),
    .scan_index = 0,
    .scan_type = {
        @ @ -134,6 +138,9 @ @
    }
if (ret < 0)
return ret;

+if ((ret & CCS811_STATUS_FW_MODE_APPLICATION))
+return 0;
+
if ((ret & CCS811_STATUS_APP_VALID_MASK) !=
    CCS811_STATUS_APP_VALID_LOADED)
return -EIO;
@ @ -255,24 +262,18 @ @
switch (chan->channel2) {
    case IIO_MOD_CO2:
        *val = 0;
        -*val2 = 12834;
        +*val2 = 100;
        return IIO_VAL_INT_PLUS_MICRO;
    case IIO_MOD_VOC:
        *val = 0;
        -*val2 = 84246;
        -return IIO_VAL_INT_PLUS_MICRO;
        +*val2 = 100;
        +return IIO_VAL_INT_PLUS_NANO;
        default:
        return -EINVAL;
    }
    default:
    return -EINVAL;
}
-@ @ -313,17 +314,17 @ @

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struct iio_dev *indio_dev = pf->indio_dev;
struct ccs811_data *data = iio_priv(indio_dev);
struct i2c_client *client = data->client;
-s16 buf[8]; /* s16 eCO2 + s16 TVOC + padding + 8 byte timestamp */
int ret;

-ret = i2c_smbus_read_i2c_block_data(client, CCS811_ALG_RESULT_DATA, 4,
	(u8 *)&buf);
+ret = i2c_smbus_read_i2c_block_data(client, CCS811_ALG_RESULT_DATA,
+	sizeof(data->scan.channels),
+	(u8 *)data->scan.channels);
if (ret != 4) {
dev_err(&client->dev, "cannot read sensor data\n");
goto err;
}
-iio_push_to_buffers_with_timestamp(indio_dev, buf,
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
	iio_get_time_ns(indio_dev));

err:
--- linux-4.15.0.orig/drivers/iio/common/cros_ec_sensors/cros_ec_sensors.c
+++ linux-4.15.0/drivers/iio/common/cros_ec_sensors/cros_ec_sensors.c
@@ -104,9 +104,10 @@
 Do not use IIO_DEGREE_TO_RAD to avoid precision
 loss. Round to the nearest integer.
 */
-*val = div_s64(val64 * 314159 + 9000000ULL, 1000);
-*val2 = 18000 << (CROS_EC_SENSOR_BITS - 1);
-*ret = IIO_VAL_FRACTIONAL;
+*val = 0;
+*val2 = div_s64(val64 * 3141592653ULL, 180 << (CROS_EC_SENSOR_BITS - 1));
+*ret = IIO_VAL_INT_PLUS_NANO;
break;
case MOTIONSENSE_TYPE_MAG:
/*
--- linux-4.15.0.orig/drivers/iio/common/hid-sensors/hid-sensor-trigger.c
+++ linux-4.15.0/drivers/iio/common/hid-sensors/hid-sensor-trigger.c
@@ -178,14 +178,14 @@
 #ifdef CONFIG_PM
 int ret;
-atomic_set(&st->user_requested_state, state);
-
 if (atomic_add_unless(&st->runtime_pm_enable, 1, 1))
 pm_runtime_enable(&st->pdev->dev);
-if (state)
+if (state) {
+atomic_inc(&st->user_requested_state);
ret = pm_runtime_get_sync(&st->pdev->dev);
-} else {
+} else {
+atomic_dec(&st->user_requested_state);
pm_runtime_mark_last_busy(&st->pdev->dev);
pm_runtime_use_autosuspend(&st->pdev->dev);
ret = pm_runtime_put_autosuspend(&st->pdev->dev);
--- linux-4.15.0.orig/drivers/iio/common/ssp_sensors/ssp_iio.c
+++ linux-4.15.0/drivers/iio/common/ssp_sensors/ssp_iio.c
@@ -81,7 +81,7 @@
unsigned int len, int64_t timestamp)
{
__le32 time;
-int64_t calculated_time;
+int64_t calculated_time = 0;
struct ssp_sensor_data *spd = iio_priv(indio_dev);

if (indio_dev->scan_bytes == 0)
--- linux-4.15.0.orig/drivers/iio/common/ssp_sensors/ssp_spi.c
+++ linux-4.15.0/drivers/iio/common/ssp_sensors/ssp_spi.c
@@ -147,7 +147,7 @@
if (length > received_len - *data_index || length <= 0) {
ssp_dbg("[SSP]: MSG From MCU-invalid debug length(%d/%d)\n",
length, received_len);
-return length ? length : -EPROTO;
+return -EPROTO;
}

ssp_dbg("[SSP]: MSG From MCU - %s\n", &data_frame[*data_index]);
@@ -286,6 +286,8 @@
for (idx = 0; idx < len;) {
switch (dataframe[idx++]) {
case SSP_MSG2AP_INST_BYPASS_DATA:
+if (idx >= len)
+return -EPROTO;
sd = dataframe[idx++];
if (sd < 0 || sd >= SSP_SENSOR_MAX) {
dev_err(SSP_DEV,
@@ -295,10 +297,13 @@
if (indio_devs[sd]) {
spd = iio_priv(indio_devs[sd]);
-if (spd->process_data)
+if (spd->process_data) {
+if (idx >= len)
return -EPROTO;
}
} else {
    dev_err(SSP_DEV, "no client for frame\n");
}
@@ -306,6 +311,8 @@
    idx += ssp_offset_map[sd];
    break;
    case SSP_MSG2AP_INST_DEBUG_DATA:
+if (idx >= len)
+    return -EPROTO;
    sd = ssp_print_mcu_debug(dataframe, &idx, len);
    if (sd) {
        dev_err(SSP_DEV,
--- linux-4.15.0.orig/drivers/iio/common/st_sensors/st_sensors_core.c
+++ linux-4.15.0/drivers/iio/common/st_sensors/st_sensors_core.c
@@ -93,7 +93,7 @@
            struct st_sensor_odr_avl odr_out = {0, 0};
            struct st_sensor_data *sdata = iio_priv(indio_dev);

-if (!sdata->sensor_settings->odr.addr)
+if (!sdata->sensor_settings->odr.mask)
    return 0;
    err = st_sensors_match_odr(sdata->sensor_settings, odr, &odr_out);
--- linux-4.15.0.orig/drivers/iio/counter/104-quad-8.c
+++ linux-4.15.0/drivers/iio/counter/104-quad-8.c
@@ -138,7 +138,7 @@
            /* Reset Borrow, Carry, Compare, and Sign flags */
            outb(0x02, base_offset + 1);
            /* Reset Error flag */
--- linux-4.15.0.orig/drivers/iio/dac/Kconfig
+++ linux-4.15.0/drivers/iio/dac/Kconfig
@@ -59,8 +59,8 @@
            help
            Say yes here to build support for Analog Devices AD5300, AD5301, AD5310,
            AD5311, AD5320, AD5321, AD5444, AD5446, AD5450, AD5451, AD5452, AD5453,
            AD5512A, AD5541A, AD5542A, AD5543, AD5553, AD5601, AD5602, AD5611, AD5612,
            AD5620, AD5621, AD5622, AD5640, AD5641, AD5660, AD5662 DACs
            + AD5512A, AD5541A, AD5542A, AD5543, AD5553, AD5600, AD5601, AD5602, AD5611,
To compile this driver as a module, choose M here:

```c
static int ad5064_request_vref(struct ad5064_state *st, struct device *dev)
{
    unsigned int i;
    int ret;
    for (i = 0; i < ad5064_num_vref(st); ++i)
        st->vref_reg[i].supply = ad5064_vref_name(st, i);
    if (!st->chip_info->internal_vref)
        return devm_regulator_bulk_get(dev, ad5064_num_vref(st),
            st->vref_reg);
    /* This assumes that when the regulator has an internal VREF
     * there is only one external VREF connection, which is
     * currently the case for all supported devices.
     */
    st->vref_reg[0].consumer = devm_regulator_get_optional(dev, "vref");
    if (!IS_ERR(st->vref_reg[0].consumer))
        return 0;
    ret = PTR_ERR(st->vref_reg[0].consumer);
    if (ret != -ENODEV)
        return ret;
    /* If no external regulator was supplied use the internal VREF */
    /* use_internal_vref = true; */
    ret = ad5064_set_config(st, AD5064_CONFIG_INT_VREF_ENABLE);
    if (ret)
        dev_err(dev, "Failed to enable internal vref: %d\n", ret);
    + return ret;
    }]
```
st->dev = dev;
st->write = write;

- for (i = 0; i < ad5064_num_vref(st); ++i)
- st->vref_reg[i].supply = ad5064_vref_name(st, i);
+ret = ad5064_request_vref(st, dev);
+if (ret)
+return ret;

- ret = devm_regulator_bulk_get(dev, ad5064_num_vref(st),
- st->vref_reg);
- if (ret) {
- if (!st->chip_info->internal_vref)
- return ret;
- st->use_internal_vref = true;
- ret = ad5064_set_config(st, AD5064_CONFIG_INT_VREF_ENABLE);
- if (ret) {
- dev_err(dev, "Failed to enable internal vref: %d\n",
- ret);
- return ret;
- }
- } else {
+ if (!st->use_internal_vref) {
ret = regulator_bulk_enable(ad5064_num_vref(st), st->vref_reg);
if (ret)
return ret;
--- linux-4.15.0.orig/drivers/iio/dac/ad5380.c
+++ linux-4.15.0/drivers/iio/dac/ad5380.c
@@ -221,7 +221,7 @@
if (ret)
return ret;
*val >>= chan->scan_type.shift;
- val -= (1 << chan->scan_type.realbits) / 2;
+*val -= (1 << chan->scan_type.realbits) / 2;
return IIO_VAL_INT;
case IIO_CHAN_INFO_SCALE:
*val = 2 * st->vref;
--- linux-4.15.0.orig/drivers/iio/dac/ad5446.c
+++ linux-4.15.0/drivers/iio/dac/ad5446.c
@@ -328,6 +328,7 @@
ID_AD5541A,
ID_AD5512A,
ID_AD5553,
+ID_AD5600,
ID_AD5601,
ID_AD5611,
ID_AD5621,
@@ -382,6 +383,10 @@
.channel = AD5446_CHANNEL(14, 16, 0),
.write = ad5446_write,
+
+[ID_AD5600] = {
+    .channel = AD5446_CHANNEL(16, 16, 0),
+    .write = ad5446_write,
+},
[ID_AD5601] = {
    .channel = AD5446_CHANNEL_POWERDOWN(8, 16, 6),
    .write = ad5446_write,
    @ @ -449.6 +454.7 @ @
["ad5542a", ID_AD5541A], /* ad5541a and ad5542a are compatible */
["ad5543", ID_AD5541A], /* ad5541a and ad5543 are compatible */
["ad5553", ID_AD5553],
+["ad5600", ID_AD5600],
["ad5601", ID_AD5601],
["ad5611", ID_AD5611],
["ad5621", ID_AD5621],
--- linux-4.15.0.orig/drivers/iio/dac/ad5504.c
+++ linux-4.15.0/drivers/iio/dac/ad5504.c
@@ -189,9 +189,9 @@
     return ret;
     if (pwr_down)
     -      st->pwr_down_mask |= (1 << chan->channel);
-else
-      st->pwr_down_mask &= ~(1 << chan->channel);
+else
+      st->pwr_down_mask |= (1 << chan->channel);

     ret = ad5504_spi_write(st, AD5504_ADDR_CTRL,
     AD5504_DAC_PWRDWN_MODE(st->pwr_down_mode) |
--- linux-4.15.0.orig/drivers/iio/dac/ad5592r-base.c
+++ linux-4.15.0/drivers/iio/dac/ad5592r-base.c
@@ -417,7 +417,7 @@
     s64 tmp = *val * (3767897513LL / 25LL);
     *val = div_s64_rem(tmp, 1000000000LL, val2);
     -      ret = IIO_VAL_INT_PLUS_MICRO;
+      return IIO_VAL_INT_PLUS_MICRO;
 } else {
     int mult;

@@ -448,7 +448,7 @@
     ret = IIO_VAL_INT;
     break;
     default:
-      ret = -EINVAL;

unlock:
--- linux-4.15.0.orig/drivers/iio/dac/ad5624r_spi.c
+++ linux-4.15.0/drivers/iio/dac/ad5624r_spi.c
@@ -230,7 +230,7 @@
 if (!indio_dev)
 return -ENOMEM;
 st = iio_priv(indio_dev);
-st->reg = devm_regulator_get(&spi->dev, "vcc");
+st->reg = devm_regulator_get_optional(&spi->dev, "vref");
 if (!IS_ERR(st->reg)) {
  ret = regulator_enable(st->reg);
  if (ret)
@@ -241,6 +241,22 @@ goto error_disable_reg;
   goto error_disable_reg;
 }
 voltage_uv = ret;
+} else {
+  if (PTR_ERR(st->reg) != -ENODEV)
+  return PTR_ERR(st->reg);
+  /* Backwards compatibility. This naming is not correct */
+  st->reg = devm_regulator_get_optional(&spi->dev, "vcc");
+  if (!IS_ERR(st->reg)) {
+    ret = regulator_enable(st->reg);
+    if (ret)
+      return ret;
+    ret = regulator_get_voltage(st->reg);
+    if (ret < 0)
+      goto error_disable_reg;
+    +voltage_uv = ret;
  +}
  }
}

spi_set_drvdata(spi, indio_dev);
--- linux-4.15.0.orig/drivers/iio/dac/ad5686.c
+++ linux-4.15.0/drivers/iio/dac/ad5686.c
@@ -210,7 +210,8 @@
 mutex_unlock(&indio_dev->mlock);
 if (ret < 0)
 return ret;
-  ^*val = ret;
+  ^*val = (ret >> chan->scan_type.shift) &
+  GENMASK(chan->scan_type.realbits - 1, 0);
 return IIO_VAL_INT;

case IIO_CHAN_INFO_SCALE:
    *val = st->vref_mv;
--- linux-4.15.0.orig/drivers/iio/dac/ds4424.c
+++ linux-4.15.0/drivers/iio/dac/ds4424.c
@@ -166,7 +166,7 @@
 {
     int ret, val;

-    ret = ds4424_get_value(indio_dev, &val, DS4424_DAC_ADDR(0));
+    ret = ds4424_get_value(indio_dev, &val, 0);
     if (ret < 0)
         dev_err(&indio_dev->dev, "%s failed. ret: %d
", __func__, ret);
--- linux-4.15.0.orig/drivers/iio/dac/mcp4725.c
+++ linux-4.15.0/drivers/iio/dac/mcp4725.c
@@ -98,6 +98,7 @@
     inoutbuf[0] = data->ref_mode << 3;
     +inoutbuf[0] |= data->powerdown ? ((data->powerdown_mode + 1) << 1) : 0;
     inoutbuf[1] = data->dac_value >> 4;
     inoutbuf[2] = (data->dac_value & 0xf) << 4;

--- linux-4.15.0.orig/drivers/iio/dac/mcp4922.c
+++ linux-4.15.0/drivers/iio/dac/mcp4922.c
@@ -94,17 +94,22 @@
     long mask)
 {
     struct mcp4922_state *state = iio_priv(indio_dev);
+    int ret;

     if (val2 != 0)
         return -EINVAL;
     switch (mask) {
         case IIO_CHAN_INFO_RAW:
-            if (val > GENMASK(chan->scan_type.realbits-1, 0))
+            if (val < 0 || val > GENMASK(chan->scan_type.realbits - 1, 0))
                 return -EINVAL;
             val <<= chan->scan_type.shift;
             -state->value[chan->channel] = val;
             -return mcp4922_spi_write(state, chan->channel, val);
             +
             +ret = mcp4922_spi_write(state, chan->channel, val);
             +if (!ret)
                 +state->value[chan->channel] = val;
             +return ret;
             +
             +
default:
    return -EINVAL;
}
--- linux-4.15.0.orig/drivers/iio/dac/vf610_dac.c
+++ linux-4.15.0/drivers/iio/dac/vf610_dac.c
@@ -234,6 +234,7 @@
    return 0;
error_iio_device_register:
    vf610_dac_exit(info);
clk_disable_unprepare(info->clk);

return ret;
--- linux-4.15.0.orig/drivers/iio/frequency/ad9523.c
+++ linux-4.15.0/drivers/iio/frequency/ad9523.c
@@ -508,7 +508,7 @@
    return ret;
    if (!state)
        return 0;
    return len;

mutex_lock(&indio_dev->mlock);
switch ((u32)this_attr->address) {
    case -642.7 +642.7 @ @
    code = (AD9523_CLK_DIST_DIV_PHASE_REV(ret) * 3141592) / AD9523_CLK_DIST_DIV_REV(ret);
    *val = code / 1000000;
    -*val2 = (code % 10000000) * 10;
    +*val2 = code % 1000000;
    return IIO_VAL_INT_PLUS_MICRO;
default:
    return -EINVAL;
--- linux-4.15.0.orig/drivers/iio/gyro/bmg160_core.c
+++ linux-4.15.0/drivers/iio/gyro/bmg160_core.c
@@ -104,7 +104,11 @@
         struct iio_trigger *dready_trig;
         struct iio_trigger *motion_trig;
         struct mutex mutex;
-s16 buffer[8];
+ /* Ensure naturally aligned timestamp */
+ struct {
+     s16 chans[3];
+     s64 timestamp __aligned(8);
+ } scan;
         u32 dps_range;
         int ev_enable_state;
         int slope_thres;
case IIO_CHAN_INFO_LOW_PASS_FILTER_3DB_FREQUENCY:
    return bmg160_get_filter(data, val);

case IIO_CHAN_INFO_SCALE:
    -*val = 0;
    switch (chan->type) {
    case IIO_TEMP:
        -*val2 = 500000;
        -return IIO_VAL_INT_PLUS_MICRO;
        -*val = 500;
        +return IIO_VAL_INT;
        case IIO_ANGL_VEL:
            int i;
            @@ -595,6 +598,7 @@
            for (i = 0; i < ARRAY_SIZE(bmg160_scale_table); ++i) {
                if (bmg160_scale_table[i].dps_range ==
                    data->dps_range) {
                    -*val = 0;
                    *val2 = bmg160_scale_table[i].scale;
                    return IIO_VAL_INT_PLUS_MICRO;
                }

        mutex_lock(&data->mutex);
        ret = regmap_bulk_read(data->regmap, BMG160_REG_XOUT_L,
            - data->buffer, AXIS_MAX * 2);
            + data->scan.chans, AXIS_MAX * 2);
        mutex_unlock(&data->mutex);
        if (ret < 0)
            goto err;

        -iio_push_to_buffers_with_timestamp(indio_dev, data->buffer,
            +iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
                pf->timestamp);
        err:
        iio_trigger_notify_done(indio_dev->trig);
        --- linux-4.15.0.orig/drivers/iio/gyro/hid-sensor-gyro-3d.c
        +++ linux-4.15.0/drivers/iio/gyro/hid-sensor-gyro-3d.c
        @@ -111,6 +111,7 @@
        int report_id = -1;
        u32 address;
        int ret_type;
        +s32 min;

        -*val = 0;
        -*val2 = 0;
        @@ -118,13 +119,15 @@
case 0:
    hid_sensor_power_state(&gyro_state->common_attributes, true);
    report_id = gyro_state->gyro[chan->scan_index].report_id;
    +min = gyro_state->gyro[chan->scan_index].logical_minimum;
    address = gyro_3d_addresses[chan->scan_index];
    if (report_id >= 0)
        *val = sensor_hub_input_attr_get_raw_value(
            gyro_state->common_attributes.hsdev,
            HID_USAGE_SENSOR_GYRO_3D, address,
            report_id,
            SENSOR_HUB_SYNC);
    +SENSOR_HUB_SYNC,
    +min < 0);
    else {
        *val = 0;
        hid_sensor_power_state(&gyro_state->common_attributes,
            --- linux-4.15.0.orig/drivers/iio/gyro/itg3200_buffer.c
            +++ linux-4.15.0/drivers/iio/gyro/itg3200_buffer.c
            @@ -49,13 +49,20 @@
            struct iio_dev *indio_dev;
            struct itg3200 *st = iio_priv(indio_dev);
            -__be16 buf[ITG3200_SCAN_ELEMENTS + sizeof(s64)/sizeof(u16)];
            +/ *
            + * Ensure correct alignment and padding including for the
            + * timestamp that may be inserted.
            + */
            +struct {
            +__be16 buf[ITG3200_SCAN_ELEMENTS];
            +s64 ts __aligned(8);
            +} scan;
            -int ret = itg3200_read_all_channels(st->i2c, buf);
            +int ret = itg3200_read_all_channels(st->i2c, scan.buf);
            if (ret < 0)
                goto error_ret;
            -iio_push_to_buffers_with_timestamp(indio_dev, buf, pf->timestamp);
            +iio_push_to_buffers_with_timestamp(indio_dev, &scan, pf->timestamp);
            iio_trigger_notify_done(indio_dev->trig);
            --- linux-4.15.0.orig/drivers/iio/gyro/mpu3050-core.c
            +++ linux-4.15.0/drivers/iio/gyro/mpu3050-core.c
            @@ -29,7 +29,8 @@
            #@include "mpu3050.h"
-#define MPU3050_CHIP_ID 0x69
+#define MPU3050_CHIP_ID 0x68
+#define MPU3050_CHIP_ID_MASK 0x7E

/*
 * Register map: anything suffixed * _H is a big-endian high byte and always
 * case IIO_CHAN_INFO_OFFSET:
 * switch (chan->type) {
 * case IIO_TEMP:
 */
+* The temperature scaling is (x+23000)/280 Celsius */
+*/
+* The temperature scaling is (x+23000)/280 Celsius
+* for the "best fit straight line" temperature range
+* of -30C..85C. The 23000 includes room temperature
+* offset of +35C, 280 is the precision scale and x is
+* the 16-bit signed integer reported by hardware.
+*
+* Temperature value itself represents temperature of
+* the sensor die.
+*/
*val = 23000;
return IIO_VAL_INT;
default:
@ @ -326,7 +336,7 @@
goto out_read_raw_unlock;
}

-*val = be16_to_cpu(raw_val);
+*val = (s16)be16_to_cpu(raw_val);
ret = IIO_VAL_INT;

go to out_read_raw_unlock;
@ @ -548,6 +558,8 @@
MPU3050_FIFO_R,
&fifo_values[offset],
toread);
+if (ret)
+goto out_trigger_unlock;

dev_dbg(mpu3050->dev,
"%04x %04x %04x %04x %04x\n",
@ @ -1176,8 +1188,9 @@
goto err_power_down;
}

-if (val != MPU3050_CHIP_ID) {
-dev_err(dev, "unsupported chip id %02x\n", (u8)val);
```c
if ((val & MPU3050_CHIP_ID_MASK) != MPU3050_CHIP_ID) {
    dev_err(dev, "unsupported chip id %02x
",
    (u8)(val & MPU3050_CHIP_ID_MASK));
    ret = -ENODEV;
    goto err_power_down;
}
```

--- linux-4.15.0.orig/drivers/iio/gyro/st_gyro_core.c

+++ linux-4.15.0/drivers/iio/gyro/st_gyro_core.c

@@ -141,7 +141,6 @@
```
```
```
+.enable_axis = {
+.addr = ST_SENSORS_DEFAULT_AXIS_ADDR,
+.mask = ST_SENSORS_DEFAULT_AXIS_MASK,
+},
+.fs = {
+.addr = 0x23,
+.mask = GENMASK(5, 4),
+.fs_avl = {
+[0] = {
+.num = ST_GYRO_FS_AVL_245DPS,
+.value = 0x00,
+.gain = IIO_DEGREE_TO_RAD(8750),
+},
+[1] = {
+.num = ST_GYRO_FS_AVL_500DPS,
+.value = 0x01,
+.gain = IIO_DEGREE_TO_RAD(17500),
+},
+[2] = {
+.num = ST_GYRO_FS_AVL_2000DPS,
+.value = 0x02,
+.gain = IIO_DEGREE_TO_RAD(70000),
+},
+},
+.bdu = {
+.addr = 0x23,
+.mask = BIT(7),
+},
+.drdy_irq = {
+.int2 = {
+.addr = 0x22,
+.mask = BIT(3),
+},
+,*/
+ * The sensor has IHL (active low) and open
+ * drain settings, but only for INT1 and not
+ * for the DRDY line on INT2.
+ */
+.stat_drdy = {
+.addr = ST_SENSORS_DEFAULT_STAT_ADDR,
+.mask = GENMASK(2, 0),
+},
+},
+.sim = {
+.addr = 0x23,
+.value = BIT(0),
struct afe4403_data {
    struct device *dev;
    struct regulator *regulator;
    struct iio_trigger *trig;
    int irq;
    /* Ensure suitable alignment for timestamp */
    +s32 buffer[8] __aligned(8);
};

enum afe4403-chan_id {
    +AFE440X_CONTROL0, 0x0, 0x0, AFE440X_CONTROL0_READ};

/* Disable reading from the device */
-iio_push_to_buffers_with_timestamp(indio_dev, buffer, pf->timestamp);
+iio_push_to_buffers_with_timestamp(indio_dev, afe->buffer, pf->timestamp);
err:
iio_trigger_notify_done(indio_dev->trig);

--- linux-4.15.0.orig/drivers/iio/health/afe4404.c
+++ linux-4.15.0/drivers/iio/health/afe4404.c
@@ -91,6 +91,7 @@
 * @regulator: Pointer to the regulator for the IC
 * @trig: IIO trigger for this device
 * @irq: ADC_RDY line interrupt number
+ * @buffer: Used to construct a scan to push to the iio buffer.
 */
struct afe4404_data {
    struct device *dev;
@@ -99,6 +100,7 @@
    struct regulator *regulator;
    struct iio_trigger *trig;
    int irq;
+    s32 buffer[10] __aligned(8);
};

enum afe4404_chan_id {
    @@ -336,17 +338,17 @@
    struct iio_dev *indio_dev = pf->indio_dev;
    struct afe4404_data *afe = iio_priv(indio_dev);
    int ret, bit, i = 0;
-    s32 buffer[10];
+    s32 buffer[10];

    for_each_set_bit(bit, indio_dev->active_scan_mask,
        indio_dev->masklength) {
        ret = regmap_read(afe->regmap, afe4404_channel_values[bit],
            &buffer[i++]);
+        &afe->buffer[i++]);
    if (ret)
        goto err;
    }

-    iio_push_to_buffers_with_timestamp(indio_dev, buffer, pf->timestamp);
+    iio_push_to_buffers_with_timestamp(indio_dev, afe->buffer,
+        pf->timestamp);
    err:
    iio_trigger_notify_done(indio_dev->trig);

--- linux-4.15.0.orig/drivers/iio/health/max30102.c
+++ linux-4.15.0/drivers/iio/health/max30102.c
@@ -329,20 +329,31 @@
    return 0;
    }

-static int max30102_get_temp(struct max30102_data *data, int *val)
+static int max30102_get_temp(struct max30102_data *data, int *val, bool en)
{
    int ret;

    +if (en) {
    +ret = max30102_set_powermode(data, true);
    +if (ret)
    +return ret;
    +}
    +
    /* start acquisition */
    ret = regmap_update_bits(data->regmap, MAX30102_REG_TEMP_CONFIG,
    MAX30102_REG_TEMP_CONFIG_TEMP_EN,
    MAX30102_REG_TEMP_CONFIG_TEMP_EN);
    if (ret)
    -return ret;
    +goto out;

    msleep(35);
    +ret = max30102_read_temp(data, val);
    +
    +out:
    +if (en)
    +max30102_set_powermode(data, false);

    -return max30102_read_temp(data, val);
    +return ret;
}

static int max30102_read_raw(struct iio_dev *indio_dev,
@@ -355,20 +366,19 @@
switch (mask) {
    case IIO_CHAN_INFO_RAW:
    /*
    - * Temperature reading can only be acquired while engine
    - * is running
    + * Temperature reading can only be acquired when not in
    + * shutdown; leave shutdown briefly when buffer not running
    */
    mutex_lock(&indio_dev->mlock);
    -
    if (!iio_buffer_enabled(indio_dev))
    -ret = -EBUSY;
    -else {
    -ret = max30102_get_temp(data, val);
    -if (!ret)
    -ret = IIO_VAL_INT;
    

-}
-
+ret = max30102_get_temp(data, val, true);
+else
+ret = max30102_get_temp(data, val, false);
mutex_unlock(&indio_dev->mlock);
+if (ret)
+return ret;
+
+ret = IIO_VAL_INT;
break;

case IIO_CHAN_INFO_SCALE:
*val = 1000; /* 62.5 */
--- linux-4.15.0.orig/drivers/iio/humidity/am2315.c
+++ linux-4.15.0/drivers/iio/humidity/am2315.c
@@ -36,7 +36,11 @@
 struct am2315_data {
 struct i2c_client *client;
 struct mutex lock;
-s16 buffer[8]; /* 2x16-bit channels + 2x16 padding + 4x16 timestamp */
+/* Ensure timestamp is naturally aligned */
+struct {
+s16 chans[2];
+s64 timestamp __aligned(8);
+} scan;
+
};

struct am2315_sensor_data {
@@ -170,20 +174,20 @@
 mutex_lock(&data->lock);
 if (*((indio_dev->active_scan_mask) == AM2315_ALL_CHANNEL_MASK) {
-data->buffer[0] = sensor_data.hum_data;
+data->scan.chans[0] = sensor_data.hum_data;
+data->scan.chans[1] = sensor_data.temp_data;
 } else {
 i = 0;
 for_each_set_bit(bit, indio_dev->active_scan_mask,
-indio_dev->masklength) {
-data->buffer[i] = (bit ? sensor_data.temp_data :
- sensor_data.hum_data);
+data->scan.chans[i] = (bit ? sensor_data.temp_data :
+ sensor_data.hum_data);
 i++;
 }
 mutex_unlock(&data->lock);
- iio_push_to_buffers_with_timestamp(indio_dev, data->buffer,
+ iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
    pf->timestamp);
    err:
    iio_trigger_notify_done(indio_dev->trig);
--- linux-4.15.0.orig/drivers/iio/humidity/hdc100x.c
+++ linux-4.15.0/drivers/iio/humidity/hdc100x.c
@@ -32,6 +32,8 @@
 #include <linux/iio/trigger_consumer.h>
 #include <linux/iio/triggered_buffer.h>

 +#include <linux/time.h>
 +
 #define HDC100X_REG_TEMP		0x00
 #define HDC100X_REG_HUMIDITY	0x01

 @@ -46,6 +48,11 @@
 /* integration time of the sensor */
 int adc_int_us[2];
 +/* Ensure natural alignment of timestamp */
 +struct {
 +	__be16 channels[2];
 +s64 ts __aligned(8);
 +} scan;
 +};

 /* integration time in us */
 @@ -168,7 +175,7 @@
 *val = 100;
 } else {
  *val = 100000;
 *val2 = 65536;
 return IIO_VAL_FRACTIONAL;
 } else {
  -*val = 100;
  +*val = 100000;
  *val2 = 65536;
  return IIO_VAL_FRACTIONAL;
 }
struct iio_dev *indio_dev = pf->indio_dev;
struct hdc100x_data *data = iio_priv(indio_dev);
struct i2c_client *client = data->client;

-int delay = data->adc_int_us[0] + data->adc_int_us[1];
+int delay = data->adc_int_us[0] + data->adc_int_us[1] + 2*USEC_PER_MSEC;
int ret;
-s16 buf[8]; /* 2x s16 + padding + 8 byte timestamp */

/* dual read starts at temp register */
mutex_lock(&data->lock);
@@ -338,13 +344,13 @@
} 
usleep_range(delay, delay + 1000);

-ret = i2c_master_recv(client, (u8 *)buf, 4);
+ret = i2c_master_recv(client, (u8 *)data->scan.channels, 4);
if (ret < 0) {
    dev_err(&client->dev, "cannot read sensor data\n");
goto err;
}

-iio_push_to_buffers_with_timestamp(indio_dev, buf,
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
    iio_get_time_ns(indio_dev));
err:
mutex_unlock(&data->lock);
--- linux-4.15.0.orig/drivers/iio/humidity/hid-sensor-humidity.c
+++ linux-4.15.0/drivers/iio/humidity/hid-sensor-humidity.c
@@ -28,7 +28,10 @@
struct hid_humidity_state {
    struct hid_sensor_common common_attributes;
    struct hid_sensor_hub_attribute_info humidity_attr;
    -s32 humidity_data;
+    struct {
+        s32 humidity_data;
+        u64 timestamp __aligned(8);
+    } scan;
    int scale_pre_decml;
    int scale_post_decml;
    int scale_precision;
@@ -75,7 +78,8 @@
    HID_USAGE_SENSOR_HUMIDITY,
    HID_USAGE_SENSOR_ATMOSPHERIC_HUMIDITY,
    humid_st->humidity_attr.report_id,
-HID_USAGE_SENSOR_HUMIDITY, 
-HID_USAGE_SENSOR_ATMOSPHERIC_HUMIDITY, 
    humid_st->humidity_attr.logical_minimum < 0);
    hid_sensor_power_state(&humid_st->common_attributes, false);
return IIO_VAL_INT;
@@ -137,9 +141,8 @@
    struct hid_humidity_state *humid_st = iio_priv(indio_dev);

    if (atomic_read(&humid_st->common_attributes.data_ready))
-    -iio_push_to_buffers_with_timestamp(indio_dev,
-    -&humid_st->humidity_data,
-    -iio_get_time_ns(indio_dev));
+    +iio_push_to_buffers_with_timestamp(indio_dev, &humid_st->scan,
+        + iio_get_time_ns(indio_dev));

    return 0;
}
@@ -154,7 +157,7 @@

    switch (usage_id) {
    case HID_USAGE_SENSOR_ATMOSPHERIC_HUMIDITY:
-    	    humid_st->humidity_data = *(s32 *)raw_data;
+    	    humid_st->scan.humidity_data = *(s32 *)raw_data;

    return 0;
    default:
--- linux-4.15.0.orig/drivers/iio/humidity/hts221_core.c
+++ linux-4.15.0/drivers/iio/humidity/hts221_core.c
@@ -671,13 +671,40 @@
{
    struct iio_dev *iio_dev = dev_get_drvdata(dev);
    struct hts221_hw *hw = iio_priv(iio_dev);
+    const struct hts221_avg *avg;
+    u8 data, idx;
+    int err = 0;
+
+    /* Restore contents of AV_CONF (RH & TEMP. oversampling ratio's) */
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_H, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_T];
+    idx = hw->sensors[HTS221_SENSOR_T].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221_SENSOR_T, data);
+    if (err < 0)
+        goto fail_err;
+    avg = &hts221_avg_list[HTS221_SENSOR_H];
+    idx = hw->sensors[HTS221_SENSOR_H].cur_avg_idx;
+    data = avg->avg_avl[idx];
+    err = hts221_update_avg(hw, HTS221SENSOR_H);
/* Restore contents of CTRL1 (BDU & ODR) */
+err = hts221_write_with_mask(hw, HTS221_REG_CNTRL1_ADDR,
   HTS221_BDU_MASK, 1);
+if (err < 0)
+goto fail_err;
+
+err = hts221_update_odr(hw, hw->odr);
+if (err < 0)
+goto fail_err;
+
if (hw->enabled)
  err = hts221_write_with_mask(hw, HTS221_REG_CNTRL1_ADDR,
   HTS221_ENABLE_MASK, true);
-
-fail_err:
+return err < 0 ? err : 0;
}

const struct dev_pm_ops hts221_pm_ops = {
--- linux-4.15.0.orig/drivers/iio/imu/adis16400_buffer.c
+++ linux-4.15.0/drivers/iio/imu/adis16400_buffer.c
@@ -38,8 +38,11 @@
return -ENOMEM;
adis->buffer = kzalloc(burst_length + sizeof(u16), GFP_KERNEL);
-if (!adis->buffer)
+if (!adis->buffer) {
+kfree(adis->xfer);
+adis->xfer = NULL;
return -ENOMEM;
+}
}

tx = adis->buffer + burst_length;
tx[0] = ADIS_READ_REG(ADIS16400_GLOB_CMD);
--- linux-4.15.0.orig/drivers/iio/imu/adis16400_core.c
+++ linux-4.15.0/drivers/iio/imu/adis16400_core.c
@@ -288,8 +288,7 @@
if (ret)
 goto err_ret;
ret = sscanf(indio_dev->name, "adis%u\n", &device_id);
-if (ret != 1) {
+if (sscanf(indio_dev->name, "adis%u\n", &device_id) != 1) {
 ret = -EINVAL;
 goto err_ret;
 }
--- linux-4.15.0.orig/drivers/iio/imu/adis16480.c
struct adis16480 *st = iio_priv(indio_dev);
unsigned int t;

if (val < 0 || val2 < 0)
  return -EINVAL;
  
  t =  val * 1000 + val2 / 1000;
  if (t <= 0)
    if (t == 0)
      return -EINVAL;
      
      t = 2460000 / t;
      
      case IIO_MAGN:
      case IIO_PRESSURE:
        ret = adis_read_reg_16(&st->adis, reg, &val16);
          *bias = sign_extend32(val16, 15);
            if (ret == 0)
              *bias = sign_extend32(val16, 15);
              break;
    case IIO_ANGL_VEL:
    case IIO_ACCEL:
      ret = adis_read_reg_32(&st->adis, reg, &val32);
        *bias = sign_extend32(val32, 31);
          if (ret == 0)
            *bias = sign_extend32(val32, 31);
            break;
    default:
      ret = -EINVAL;

      adis->buffer = kzalloc(indio_dev->scan_bytes * 2, GFP_KERNEL);
        if (!adis->buffer)
          kfree(adis->xfer);
adis->xfer = NULL;
return -ENOMEM;
+
rx = adis->buffer;
tx = rx + scan_count;
@@ -80,9 +83,6 @@
struct adis *adis = iio_device_get_drvdata(indio_dev);
int ret;

-if (!adis->buffer)
return -ENOMEM;
-
if (adis->data->has_paging) {
    mutex_lock(&adis->txrx_lock);
if (adis->current_page != 0) {
    --- linux-4.15.0.orig/drivers/iio/imu/adis_trigger.c
+++ linux-4.15.0/drivers/iio/imu/adis_trigger.c
@@ -46,6 +46,10 @@
if (adis->trig == NULL)
    return -ENOMEM;
ret = request_irq(adis->spi->irq,
    &iio_trigger_generic_data_rdy_poll,
    IRQF_TRIGGER_RISING,
    @ @ -54.9 +58.6 @@
if (ret)
go to error_free_trig;

+adis->trig->dev.parent = &adis->spi->dev;
+adis->trig->ops = &adis_trigger_ops;
+iio_trigger_set_drvdata(adis->trig, adis);
+
ret = iio_trigger_register(adis->trig);
indio_dev->trig = iio_trigger_get(adis->trig);

-adi s->trig->dev.parent = &adi s->spi->dev;
-adi s->trig->ops = &adis_trigger_ops;
-iio_trigger_set_drvdata(adis->trig, adis);
ret = iio_trigger_register(adis->trig);

struct bmi160_data {
    struct regmap *regmap;
    +/*
    + * Ensure natural alignment for timestamp if present.
    + * Max length needed: 2 * 3 channels + 4 bytes padding + 8 byte ts.

* If fewer channels are enabled, less space may be needed, as long as the timestamp is still aligned to 8 bytes.
+ */
+ __le16 buf[12] __aligned(8);
};

const struct regmap_config bmi160_regmap_config = {
    .poll_func = pf,
    .dev = pf->indio_dev,
    .data = iio_priv(indio_dev);
}__le16 buf[16];
/* 3 sens x 3 axis x __le16 + 3 x __le16 pad + 4 x __le16 tstamp */
int i, ret, j = 0, base = BMI160_REG_DATA_MAGN_XOUT_L;
__le16 sample;

-iio_push_to_buffers_with_timestamp(indio_dev, buf,
+iio_push_to_buffers_with_timestamp(indio_dev, data->buf,
    iio_get_time_ns(indio_dev));
done:
iio_trigger_notify_done(indio_dev->trig);

--- linux-4.15.0.orig/drivers/iio/imu/st_lsm6dsx/st_lsm6dsx.h
+++ linux-4.15.0/drivers/iio/imu/st_lsm6dsx/st_lsm6dsx.h
@@ -130,6 +130,7 @@
     * @irq: Device interrupt line (I2C or SPI).
     * @lock: Mutex to protect read and write operations.
     * @fifo_lock: Mutex to prevent concurrent access to the hw FIFO.
+ * @conf_lock: Mutex to prevent concurrent FIFO configuration update.
     * @fifo_mode: FIFO operating mode supported by the device.
     * @enable_mask: Enabled sensor bitmask.
     * @sip: Total number of samples (acc/gyro) in a given pattern.
@@ -144,6 +145,7 @@
     struct mutex lock;
     struct mutex fifo_lock;
     +struct mutex conf_lock;

enum st_lsm6dsxfifo_mode fifo_mode;
u8 enable_mask;
--- linux-4.15.0.orig/drivers/iio/imu/st_lsm6dsx/st_lsm6dsx_buffer.c
int st_lsm6dsx_update_watermark(struct st_lsm6dsx_sensor *sensor, u16 watermark)
{
-u16 fifo_watermark = ~0, cur_watermark, sip = 0, fifo_th_mask;
+u16 fifo_watermark = ~0, cur_watermark, fifo_th_mask;
struct st_lsm6dsx_hw *hw = sensor->hw;
struct st_lsm6dsx_sensor *cur_sensor;
__le16 wdata;
int i, err;
u8 data;

+if (!hw->sip)
+return 0;
+
for (i = 0; i < ST_LSM6DSX_ID_MAX; i++) {
cur_sensor = iio_priv(hw->iio_devs[i]);

@@ -177,14 +180,10 @@
 : cur_sensor->watermark;

 fifo_watermark = min_t(u16, fifo_watermark, cur_watermark);
-sip += cur_sensor->sip;
 } 

-if (!sip)
-return 0;
-
-fifo_watermark = max_t(u16, fifo_watermark, sip);
-fifo_watermark = (fifo_watermark / sip) * sip;
+fifo_watermark = max_t(u16, fifo_watermark, hw->sip);
+fifo_watermark = (fifo_watermark / hw->sip) * hw->sip;
 fifo_watermark = fifo_watermark * hw->settings->fifo_ops.th_wl;

mutex_lock(&hw->lock);
@@ -325,38 +324,40 @@
struct st_lsm6dsx_hw *hw = sensor->hw;
int err;

+mutex_lock(&hw->conf_lock);
+
if (hw->fifo_mode != ST_LSM6DSX_FIFO_BYPASS) {
  err = st_lsm6dsx_flush_fifo(hw);
  if (err < 0)
    -return err;
+goto out;
 }
if (enable) {
    err = st_lsm6dsx_sensor_enable(sensor);
    if (err < 0)
        return err;
    goto out;
} else {
    err = st_lsm6dsx_sensor_disable(sensor);
    if (err < 0)
        return err;
    goto out;
}

err = st_lsm6dsx_set_fifo_odr(sensor, enable);
if (err < 0)
    return err;
    goto out;

err = st_lsm6dsx_update_decimators(hw);
if (err < 0)
    return err;
    goto out;

err = st_lsm6dsx_update_watermark(sensor, sensor->watermark);
if (err < 0)
    return err;
    goto out;

if (hw->enable_mask) {
    err = st_lsm6dsx_set_fifo_mode(hw, ST_LSM6DSX_FIFO_CONT);
    if (err < 0)
        return err;
    goto out;
}

/*
 * store enable buffer timestamp as reference to compute
 * @ @ -365.7 +366.10 @ @
 * sensor->ts = iio_get_time_ns(iio_dev);
 */

-out:
    mutex_unlock(&hw->conf_lock);
    return err;
}

static irqreturn_t st_lsm6dsx_handler_irq(int irq, void *private)
static irqreturn_t st_lsm6dsx_handler_thread(int irq, void *private) {
  struct st_lsm6dsx_hw *hw = private;
  int count;
  int fifo_len = 0, len;

  mutex_lock(&hw->fifo_lock);
  count = st_lsm6dsx_read_fifo(hw);
  mutex_unlock(&hw->fifo_lock);
/+*
  /* If we are using edge IRQs, new samples can arrive while
  * processing current interrupt since there are no hw
  * guarantees the irq line stays "low" long enough to properly
  * detect the new interrupt. In this case the new sample will
  * be missed.
  * Polling FIFO status register allow us to read new
  * samples even if the interrupt arrives while processing
  * previous data and the timeslot where the line is "low" is
  * too short to be properly detected.
  */
  do {
    mutex_lock(&hw->fifo_lock);
    len = st_lsm6dsx_read_fifo(hw);
    mutex_unlock(&hw->fifo_lock);
    if (len > 0)
      fifo_len += len;
  } while (len > 0);

  return !count ? IRQ_NONE : IRQ_HANDLED;
}
return -EINVAL;
+
+mutex_lock(&hw->conf_lock);
+
+err = st_lsm6dsx_update_watermark(sensor, val);
+
+mutex_unlock(&hw->conf_lock);
+
   if (err < 0)
      return err;

@@ -739,6 +744,7 @@
    mutex_init(&hw->lock);
    mutex_init(&hw->fifo_lock);
    +mutex_init(&hw->conf_lock);

    hw->dev = dev;
    hw->irq = irq;
    --- linux-4.15.0.orig/drivers/iio/industrialio-buffer.c
+++ linux-4.15.0/drivers/iio/industrialio-buffer.c
@@ -175,7 +175,7 @@
    struct iio_dev *indio_dev = filp->private_data;
    struct iio_buffer *rb = indio_dev->buffer;

    -if (!indio_dev->info)
    +if (!indio_dev->info || rb == NULL)
      return 0;

    poll_wait(filp, &rb->pollq, wait);
@@ -320,9 +320,8 @@
    const unsigned long *mask, bool timestamp)
    {
        unsigned bytes = 0;
    -    int length, i;
    -    GFP_KERNEL);
    +    sizeof(*trialmask), GFP_KERNEL);
    if (trialmask == NULL)
        return -ENOMEM;
    if (!indio_dev->masklength) {
@@ -571,7 +570,7 @@
            if (timestamp)
                const unsigned long *mask, bool timestamp)
            {
                unsigned bytes = 0;
    -            int length, i;
    +            int length, i, largest = 0;
/* How much space will the demuxed element take? */
for_each_set_bit(i, mask,
   length = iio_storage_bytes_for_si(indio_dev, i);
   bytes = ALIGN(bytes, length);
   bytes += length;
   +largest = max(largest, length);
 }

if (timestamp) {
   length = iio_storage_bytes_for_timestamp(indio_dev);
   bytes = ALIGN(bytes, length);
   bytes += length;
   +largest = max(largest, length);
 }

+bytes = ALIGN(bytes, largest);
return bytes;
}

indio_dev->masklength,
   in_ind + 1);
while (in_ind != out_ind) {
   length = iio_storage_bytes_for_si(indio_dev, in_ind);
   /* Make sure we are aligned */
   in_loc = roundup(in_loc, length) + length;
   +in_ind = find_next_bit(indio_dev->active_scan_mask,
      +indio_dev->masklength,
      +in_ind + 1);
} 
length = iio_storage_bytes_for_si(indio_dev, in_ind);

/**
  * void iio_device_unregister(struct iio_dev *indio_dev)
  */
  -mutex_lock(&indio_dev->info_exist_lock);
  -
cdev_device_del(&indio_dev->chrdev, &indio_dev->dev);
  +mutex_lock(&indio_dev->info_exist_lock);
+iio_device_unregister_debugfs(indio_dev);

iio_disable_all_buffers(indio_dev);
--- linux-4.15.0.orig/drivers/iio/light/bh1750.c
+++ linux-4.15.0/drivers/iio/light/bh1750.c
@@ -62,9 +62,9 @@
             
 u16 int_time_low_mask;
 u16 int_time_high_mask;
-}
+
 static const bh1750_chip_info_tbl[] = {
  +static const struct bh1750_chip_info bh1750_chip_info_tbl[] = {
  [BH1710] = { 140, 1022, 300, 400, 250000000, 2, 0x001F, 0x03E0 },
  [BH1721] = { 140, 1020, 300, 400, 250000000, 2, 0x0010, 0x03E0 },
  [BH1750] = { 31, 254, 69, 1740, 5750000, 1, 0x001F, 0x00E0 },
--- linux-4.15.0.orig/drivers/iio/light/hid-sensor-als.c
+++ linux-4.15.0/drivers/iio/light/hid-sensor-als.c
@@ -93,6 +93,7 @@
         int report_id = -1;
         u32 address;
         int ret_type;
+        s32 min;

 *val = 0;
 *val2 = 0;
-//@ -102.8 +103.8 @@
 case CHANNEL_SCAN_INDEX_INTENSITY:
 case CHANNEL_SCAN_INDEX_ILLUM:
         report_id = als_state->als_illum.report_id;
-        address =
-        -HID_USAGE_SENSOR_LIGHT_ILLUM;
+        min = als_state->als_illum.logical_minimum;
+        address = HID_USAGE_SENSOR_LIGHT_ILLUM;
         break;
 default:
         report_id = -1;
-//@ -116.7 +117.8 @@
         als_state->common_attributes.hsdev,
         HID_USAGE_SENSOR_ALS, address,
         report_id,
-        SENSOR_HUB_SYNC);
+        SENSOR_HUB_SYNC,
+        min < 0);
         hid_sensor_power_state(&als_state->common_attributes,
         false);
struct hid_sensor_common common_attributes;
struct hid_sensor_hub_attribute_info prox_attr;
u32 human_presence;
+int scale_pre_decml;
+int scale_post_decml;
+int scale_precision;
};

/* Channel definitions */
int report_id = -1;
u32 address;
int ret_type;
+s32 min;

*val = 0;
*val2 = 0;
switch (chan->scan_index) {
case CHANNEL_SCAN_INDEX_PRESENCE:
    report_id = prox_state->prox_attr.report_id;
    address = HID_USAGE_SENSOR_HUMAN_PRESENCE;
    min = prox_state->prox_attr.logical_minimum;
    address = HID_USAGE_SENSOR_HUMAN_PRESENCE;
    break;
default:
    report_id = -1;
    prox_state->common_attributes.hsdev,HID_USAGE_SENSOR_PROX, address,
    report_id,
    -SENSOR_HUB_SYNC);
    +SENSOR_HUB_SYNC;
    +min < 0);
    hid_sensor_power_state(&prox_state->common_attributes,
    false);
    break;
} else {
    ret_type = IIO_VAL_INT;
    break;
    case IIO_CHAN_INFO_SCALE:
    -*val = prox_state->prox_attr.units;
    -ret_type = IIO_VAL_INT;
    break;
value = prox_state->scale_pre_decml;
*val2 = prox_state->scale_post_decml;
ret_type = prox_state->scale_precision;
break;
case IIO_CHAN_INFO_OFFSET:
    *val = hid_sensor_convert_exponent(
        @ -246,6 +252,11 @@
        HID_USAGE_SENSOR_HUMAN_PRESENCE,
        &st->common_attributes.sensitivity);
    +st->scale_precision = hid_sensor_format_scale(
        +hsdev->usage,
        +&st->prox_attr,
        +&st->scale_pre_decml, &st->scale_post_decml);
    +
    return ret;
}
--- linux-4.15.0.orig/drivers/iio/light/isl29125.c
+++ linux-4.15.0/drivers/iio/light/isl29125.c
@@ -54,7 +54,11 @@
 struct isl29125_data {
     struct i2c_client *client;
     u8 conf1;
-    u16 buffer[8]; /* 3x 16-bit, padding, 8 bytes timestamp */
+    /* Ensure timestamp is naturally aligned */
+    struct {
+        u16 chans[3];
+        s64 timestamp __aligned(8);
+    } scan;
+};

#define ISL29125_CHANNEL(_color, _si) { \n
    if (ret < 0)
        goto done;

    data->buffer[j++] = ret;
    +data->scan.chans[j++] = ret;

    -iio_push_to_buffers_with_timestamp(indio_dev, data->buffer,
    +iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
        iio_get_time_ns(indio_dev));

    done:
--- linux-4.15.0.orig/drivers/iio/light/ltr501.c
+++ linux-4.15.0/drivers/iio/light/ltr501.c
static int ltr501_read_ps(struct ltr501_data *data)
{
    int ret, status;
    __le16 status;
    int ret;

    ret = ltr501_drdy(data, LTR501_STATUS_PS_RDY);
    if (ret < 0)
        return ret;

    ret = regmap_bulk_read(data->regmap, LTR501_PS_DATA,
                              &status, sizeof(status));
    if (ret < 0)
        return ret;

    return le16_to_cpu(status);
}

static int ltr501_read_intr_prst(struct ltr501_data *data,
                                   struct iio_poll_func *pf,
                                   struct iio_dev *indio_dev);
struct ltr501_data *data = iio_priv(indio_dev);
-u16 buf[8];
+struct {
+u16 channels[3];
+s64 ts __aligned(8);
+} scan;
@@ -1270,9 +1277,9 @@
@@ -1280,10 +1287,10 @@
@@ -1353,9 +1360,12 @@
}
case LTR501_ALS_PS_STATUS:
case LTR501_PS_DATA:
+case LTR501_PS_DATA_UPPER:
    return true;
default:
    return false;
--- linux-4.15.0.orig/drivers/iio/light/max44000.c
+++ linux-4.15.0/drivers/iio/light/max44000.c
@@ -78,6 +78,11 @@
 struct max44000_data {
     struct mutex lock;
     struct regmap *regmap;
+    /* Ensure naturally aligned timestamp */
+    struct {
+        u16 channels[2];
+        s64 ts __aligned(8);
+    } scan;
+};

 /* Default scale is set to the minimum of 0.03125 or 1 / (1 << 5) lux */
 @@ -491,7 +496,6 @@
 struct iio_poll_func *pf = p;
 struct iio_dev *indio_dev = pf->indio_dev;
 struct max44000_data *data = iio_priv(indio_dev);
-    u16 buf[8]; /* 2x u16 + padding + 8 bytes timestamp */
+    data->scan.channels[index++] = ret;
    if (test_bit(MAX44000_SCAN_INDEX_PRX, indio_dev->active_scan_mask)) {
        ret = regmap_read(data->regmap, MAX44000_REG_PRX_DATA, &regval);
        if (ret < 0)
            goto out_unlock;
        -buf[index] = regval;
+        data->scan.channels[index] = regval;
    }
    mutex_unlock(&data->lock);

    -iio_push_to_buffers_with_timestamp(indio_dev, buf,
+    iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
        iio_get_time_ns(indio_dev));
    iio_trigger_notify_done(indio_dev->trig);
return IRQ_HANDLED;
--- linux-4.15.0.orig/drivers/iio/light/opt3001.c
+++ linux-4.15.0/drivers/iio/light/opt3001.c
@@ -283,6 +283,8 @@
    ret = wait_event_timeout(opt->result_ready_queue,
    opt->result_ready,
    msecs_to_jiffies(OPT3001_RESULT_READY_LONG));
+if (ret == 0)
+    return -ETIMEDOUT;
} else {
    /* Sleep for result ready time */
timeout = (opt->int_time == OPT3001_INT_TIME_SHORT) ?
@@ -319,9 +321,7 @@
    /* Disallow IRQ to access the device while lock is active */
    opt->ok_to_ignore_lock = false;

-if (ret == 0)
-    return -ETIMEDOUT;
-else if (ret < 0)
+if (ret < 0)
    return ret;

    if (opt->use_irq) {
@@ -694,6 +694,7 @@
    struct iio_dev *iio = _iio;
    struct opt3001 *opt = iio_priv(iio);
    int ret;
+    bool wake_result_ready_queue = false;

    if (!opt->ok_to_ignore_lock)
        mutex_lock(&opt->lock);
@@ -728,13 +729,16 @@
    }
    opt->result = ret;
    opt->result_ready = true;
-wake_up(&opt->result_ready_queue);
+    wake_result_ready_queue = true;
    }

    out:
    if (!opt->ok_to_ignore_lock)
        mutex_unlock(&opt->lock);
+    if (wake_result_ready_queue)
+        wake_up(&opt->result_ready_queue);
+    return IRQ_HANDLED;
    }
bool pxs_need_dis;

struct regmap *regmap;
+
+/*
+ * Ensure correct naturally aligned timestamp.
+ * Note that the read will put garbage data into
+ * the padding but this should not be a problem
+ */
+struct {
+__le16 channels[3];
+u8 garbage;
+s64 ts __aligned(8);
+} scan;
};

static IIO_CONST_ATTR(in_intensity_scale_available, RPR0521_ALS_SCALE_AVAIL);

-452,8 +463,6 @@
struct rpr0521_data *data = iio_priv(indio_dev);
int err;

-u8 buffer[16]; /* 3 16-bit channels + padding + ts */
-
-/* Use irq timestamp when reasonable. */
if (iio_trigger_using_own(indio_dev) && data->irq_timestamp) {
  pf->timestamp = data->irq_timestamp;
  @ @ -464,11 +473,11 @@
  pf->timestamp = iio_get_time_ns(indio_dev);
}

err = regmap_bulk_read(data->regmap, RPR0521_REG_PXS_DATA,
-&buffer,
+&data->scan.channels,
(3 * 2) + 1); /* 3 * 16-bit + (discarded) int clear reg. */
if (!err)
iio_push_to_buffers_with_timestamp(indio_dev,
- buffer, pf->timestamp);
+ &data->scan, pf->timestamp);
else
dev_err(&data->client->dev,
  "Trigger consumer can't read from sensor:\n");
struct si1145_data {
    struct i2c_client *client;
    bool autonomous;
    struct iio_trigger *trig;
    int meas_rate;

    /*
     * Ensure timestamp will be naturally aligned if present.
     * Maximum buffer size (may be only partly used if not all
     * channels are enabled):
     *   6*2 bytes channels data + 4 bytes alignment +
     *   8 bytes timestamp
     */
    u8 buffer[24] __aligned(8);
};

ret = i2c_smbus_read_i2c_block_data_or_emulated(
    data->client, indio_dev->channels[i].address,
    sizeof(u16) * run, &buffer[j]);
if (ret < 0)
goto done;
    j += run * sizeof(u16);
    irq_status = 0;
    if (ret < 0)
goto done;
}
+iio_push_toBuffers_with_timestamp(indio_dev, data->buffer, iio_get_time_ns(indio_dev));

done:
--- linux-4.15.0.orig/drivers/iio/light/tcs3414.c
+++ linux-4.15.0/drivers/iio/light/tcs3414.c
@@ -56,7 +56,11 @@
u8 control;
u8 gain;
u8 timing;
-u16 buffer[8]; /* 4x 16-bit + 8 bytes timestamp */
+/* Ensure timestamp is naturally aligned */
+struct {
+u16 chans[4];
+s64 timestamp __aligned(8);
+} scan;
};

#define TCS3414_CHANNEL(_color, _si, _addr) { \
@@ -212,10 +216,10 @@
if (ret < 0)
goto done;

-data->buffer[j++] = ret;
+data->scan.chans[j++] = ret;
}

+iio_push_toBuffers_with_timestamp(indio_dev, data->buffer, iio_push_toBuffers_with_timestamp(indio_dev, &data->scan, iio_get_time_ns(indio_dev));

done:
--- linux-4.15.0.orig/drivers/iio/light/tcs3472.c
+++ linux-4.15.0/drivers/iio/light/tcs3472.c
@@ -67,7 +67,11 @@
u8 control;
u8 atime;
u8 apers;
-u16 buffer[8]; /* 4 16-bit channels + 64-bit timestamp */
+/* Ensure timestamp is naturally aligned */
+struct {
+u16 chans[4];
+s64 timestamp __aligned(8);
+} scan;
};

static const struct iio_event_spec tcs3472_events[] = {
@@ -389,10 +393,10 @@

if (ret < 0)
goto done;

-data->buffer[j++] = ret;
+data->scan.chans[j++] = ret;
}

-iio_push_to_buffers_with_timestamp(indio_dev, data->buffer, 
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan, 
iio_get_time_ns(indio_dev));

done:
@@ -535,7 +539,8 @@
return 0;

free_irq:
-free_irq(client->irq, indio_dev);
+if (client->irq)
+free_irq(client->irq, indio_dev);
buffer_cleanup:
    iio_triggered_buffer_cleanup(indio_dev);
return ret;
@@ -563,7 +568,8 @@
struct iio_dev *indio_dev = i2c_get_clientdata(client);

iio_device_unregister(indio_dev);
-free_irq(client->irq, indio_dev);
+if (client->irq)
+free_irq(client->irq, indio_dev);
    iio_triggered_buffer_cleanup(indio_dev);
tcs3472_powerdown(iio_priv(indio_dev));

--- linux-4.15.0.orig/drivers/iio/light/tsl2583.c
+++ linux-4.15.0/drivers/iio/light/tsl2583.c
@@ -350,6 +350,14 @@
return lux_val;
+	/* Avoid division by zero of lux_value later on */
+if (lux_val == 0) {
+    dev_err(&chip->client->dev,
+        "%s: lux_val of 0 will produce out of range trim_value\n", 
+        __func__); 
+    -return -ENODATA;
+}
+    gain_trim_val = (unsigned int)(((chip->als_settings.als_cal_target)
* chip->als_settings.als_gain_trim) / lux_val);
if ((gain_trim_val < 250) || (gain_trim_val > 4000)) {
--- linux-4.15.0.orig/drivers/iio/light/vcnl4000.c
+++ linux-4.15.0/drivers/iio/light/vcnl4000.c
@@ -61,7 +61,6 @@
    u8 rdy_mask, u8 data_reg, int *val)
{
    int tries = 20;
-   __be16 buf;
    int ret;

    mutex_lock(&data->lock);
    if (ret < 0)
        goto fail;
}

    -ret = i2c_smbus_read_i2c_block_data(data->client,
      -data_reg, sizeof(buf), (u8 *) &buf);
    +ret = i2c_smbus_read_word_swapped(data->client, data_reg);
    if (ret < 0)
        goto fail;

    mutex_unlock(&data->lock);
    -*val = be16_to_cpu(buf);
    +*val = ret;

    return 0;

--- linux-4.15.0.orig/drivers/iio/magnetometer/ak8974.c
+++ linux-4.15.0/drivers/iio/magnetometer/ak8974.c
@@ -184,6 +184,11 @@
    bool drdy_irq;
    struct completion drdy_complete;
    bool drdy_active_low;
+   /* Ensure timestamp is naturally aligned */
        +struct {
            +__le16 channels[3];
            +s64 ts __aligned(8);
            +} scan;
    }

    static const char ak8974_reg_avdd[] = "avdd";
    @ @ -563,7 +568,7 @@
        * We read all axes and discard all but one, for optimized
        * reading, use the triggered buffer.
        */
        -*val = le16_to_cpu(hw_values[chan->address]);
        +*val = (s16)le16_to_cpu(hw_values[chan->address]);
ret = IIO_VAL_INT;
}
@@ -580,7 +585,6 @@
{
struct ak8974 *ak8974 = iio_priv(indio_dev);
int ret;
-__le16 hw_values[8]; /* Three axes + 64bit padding */
pm_runtime_get_sync(&ak8974->i2c->dev);
mutex_lock(&ak8974->lock);
@@ -590,13 +594,13 @@
dev_err(&ak8974->i2c->dev, "error triggering measure\n");
goto out_unlock;
}
-ret = ak8974_getresult(ak8974, hw_values);
+ret = ak8974_getresult(ak8974, ak8974->scan.channels);
if (ret) {
  dev_err(&ak8974->i2c->dev, "error getting measures\n");
goto out_unlock;
}
-iio_push_to_buffers_with_timestamp(indio_dev, hw_values,
+iio_push_to_buffers_with_timestamp(indio_dev, &ak8974->scan,
   iio_get_time_ns(indio_dev));

out_unlock:
@@ -.764,19 +768,21 @@
ak8974->map = devm_regmap_init_i2c(i2c, &ak8974_regmap_config);
if (IS_ERR(ak8974->map)) {
  dev_err(&i2c->dev, "failed to allocate register map\n");
+pm_runtime_put_noidle(&i2c->dev);
+pm_runtime_disable(&i2c->dev);
return PTR_ERR(ak8974->map);
}
-
ret = ak8974_set_power(ak8974, AK8974_PWR_ON);
if (ret) {
  dev_err(&i2c->dev, "could not power on\n");
  -goto power_off;
  +goto disable_pm;
}
-
ret = ak8974_detect(ak8974);
if (ret) {
  dev_err(&i2c->dev, "neither AK8974 nor AMI30x found\n");
  -goto power_off;
  +goto disable_pm;
}
ret = ak8974_selftest(ak8974);
ret = ak8974_reset(ak8974);
if (ret) {
    dev_err(&i2c->dev, "AK8974 reset failed\n");
    goto power_off;
    goto disable_pm;
}

/pm_runtime_set_autosuspend_delay(&i2c->dev,
    - AK8974_AUTOSUSPEND_DELAY);
/pm_runtime_use_autosuspend(&i2c->dev);
/pm_runtime_put(&i2c->dev);

indio_dev->dev.parent = &i2c->dev;
indio_dev->channels = ak8974_channels;
indio_dev->num_channels = ARRAY_SIZE(ak8974_channels);
@g -846.6 +847.11 @
goto cleanup_buffer;
}

+pm_runtime_set_autosuspend_delay(&i2c->dev,
    + AK8974_AUTOSUSPEND_DELAY);
+pm_runtime_use_autosuspend(&i2c->dev);
+pm_runtime_put(&i2c->dev);
+
return 0;

cleanup_buffer:
@g -854.7 +860.6 @
pm_runtime_put_noidle(&i2c->dev);
pm_runtime_disable(&i2c->dev);
ak8974_set_power(ak8974, AK8974_PWR_OFF);
-power_off:
regulator_bulk_disable(ARRAY_SIZE(ak8974->regs), ak8974->regs);

return ret;

--- linux-4.15.0.orig/drivers/iio/magnetometer/ak8975.c
+++ linux-4.15.0/drivers/iio/magnetometer/ak8975.c
@g -381.6 +381.12 @
struct iio_mount_matrix orientation;
struct regulator*vdd;
struct regulator*vid;
+
+/* Ensure natural alignment of timestamp */
+struct {
+s16 channels[3];
s64 ts __aligned(8);
} scan;

/* Enable attached power regulator if any. */
@@ -814,7 +820,6 @@
const struct i2c_client *client = data->client;
const struct ak_def *def = data->def;
int ret;
-s16 buff[8]; /* 3 x 16 bits axis values + 1 aligned 64 bits timestamp */
-__le16 fval[3];

mutex_lock(&data->lock);
@@ -837,12 +842,13 @@
mutex_unlock(&data->lock);

/* Clamp to valid range. */
-buf[0] = clamp_t(s16, le16_to_cpu(fval[0]), -def->range, def->range);
-buf[1] = clamp_t(s16, le16_to_cpu(fval[1]), -def->range, def->range);
-buf[2] = clamp_t(s16, le16_to_cpu(fval[2]), -def->range, def->range);
+data->scan.channels[0] = clamp_t(s16, le16_to_cpu(fval[0]), -def->range, def->range);
+data->scan.channels[1] = clamp_t(s16, le16_to_cpu(fval[1]), -def->range, def->range);
+data->scan.channels[2] = clamp_t(s16, le16_to_cpu(fval[2]), -def->range, def->range);

-iio_push_to_buffers_with_timestamp(indio_dev, buf,
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
-     iio_get_time_ns(indio_dev));
+
+return;

unlock:
--- linux-4.15.0.orig/drivers/iio/magnetometer/hid-sensor-magn-3d.c
+++ linux-4.15.0/drivers/iio/magnetometer/hid-sensor-magn-3d.c
@@ -163,21 +163,23 @@
int report_id = -1;
 u32 address;
 int ret_type;
+  s32 min;

 *val = 0;
 *val2 = 0;
 switch (mask) {
 case 0:
 hid_sensor_power_state(&magn_state->magn_flux_attributes, true);
-    report_id =
-        magn_state->magn[chan->address].report_id;
+    report_id = magn_state->magn[chan->address].report_id;
+    min = magn_state->magn[chan->address].logical_minimum;
address = magn_3d_addresses[chan->address];
if (report_id >= 0)
    *val = sensor_hub_input_attr_get_raw_value(
        magn_state->magn_flux_attributes.hsdev,
        HID_USAGE_SENSOR_COMPASS_3D, address,
        report_id,
        SENSOR_HUB_SYNC);
+SENSOR_HUB_SYNC,
+min < 0);
else {
    *val = 0;
    hid_sensor_power_state(
        --- linux-4.15.0.orig/drivers/iio/magnetometer/hmc5843_i2c.c
+++ linux-4.15.0/drivers/iio/magnetometer/hmc5843_i2c.c
@@ -58,8 +58,13 @@
static int hmc5843_i2c_probe(struct i2c_client *cli,
    const struct i2c_device_id *id)
{
+struct regmap *regmap = devm_regmap_init_i2c(cli,
    +#hmc5843_i2c_regmap_config);
+if (IS_ERR(regmap))
+return PTR_ERR(regmap);
+
return hmc5843_common_probe(&cli->dev,
-    -devm_regmap_init_i2c(cli, &hmc5843_i2c_regmap_config),
+    +regmap,
    id->driver_data, id->name);
}

--- linux-4.15.0.orig/drivers/iio/magnetometer/hmc5843_spi.c
+++ linux-4.15.0/drivers/iio/magnetometer/hmc5843_spi.c
@@ -58,6 +58,7 @@
static int hmc5843_spi_probe(struct spi_device *spi)
{
    int ret;
+struct regmap *regmap;
    const struct spi_device_id *id = spi_get_device_id(spi);

    spi->mode = SPI_MODE_3;
    @@ -67,8 +68,12 @@
    if (ret)
        return ret;

+    regmap = devm_regmap_init_spi(spi, &hmc5843_spi_regmap_config);
+    if (IS_ERR(regmap))
+        return PTR_ERR(regmap);
+    return hmc5843_common_probe(&spi->dev,
-devm_regmap_init_spi(spi, &hmc5843_spi_regmap_config),
+regmap,
   id->driver_data, id->name);
}

--- linux-4.15.0.orig/drivers/iio/magnetometer/mag3110.c
+++ linux-4.15.0/drivers/iio/magnetometer/mag3110.c
@@ -52,6 +52,12 @@
 struct i2c_client *client;
 struct mutex lock;
 u8 ctrl_reg1;
+/* Ensure natural alignment of timestamp */
+struct {
+  __be16 channels[3];
+  u8 temperature;
+  s64 ts __aligned(8);
+} scan;
+};

 static int mag3110_request(struct mag3110_data *data)
 @@ -262,10 +268,9 @@
 struct iio_poll_func *pf = p;
 struct iio_dev *indio_dev = pf->indio_dev;
 struct mag3110_data *data = iio_priv(indio_dev);
-  u8 buffer[16]; /* 3 16-bit channels + 1 byte temp + padding + ts */
+  ret = mag3110_read(data, data->scan.channels);
  if (ret < 0)
    goto done;

 @ @ -274.10 +279.10 @@
 MAG3110_DIE_TEMP);
 if (ret < 0)
  goto done;
+  data->scan.temperature = ret;
  }

 -iio_push_to_buffers_with_timestamp(indio_dev, buffer,
   +iio_push_to_buffers_with_timestamp(indio_dev, &data->scan, 
   iio_get_time_ns(indio_dev));

 done:
--- linux-4.15.0.orig/drivers/iio/magnetometer/st_magn_buffer.c
+++ linux-4.15.0/drivers/iio/magnetometer/st_magn_buffer.c
@@ -30,11 +30,6 @@
return st_sensors_set_dataready_irq(indio_dev, state);
}

- static int st_magn_buffer_preenable(struct iio_dev *indio_dev)
-{
- return st_sensors_set_enable(indio_dev, true);
-}

static int st_magn_buffer_postenable(struct iio_dev *indio_dev)
{
 int err;
 @@ -50,7 +45,7 @@
 if (err < 0)
 goto st_magn_buffer_postenable_error;

- return err;
+ return st_sensors_set_enable(indio_dev, true);

st_magn_buffer_postenable_error:
kfree(mdata->buffer_data);
@@ -63,11 +58,11 @@
 int err;
 struct st_sensor_data *mdata = iio_priv(indio_dev);

- err = iio_triggered_buffer_predisable(indio_dev);
+ err = st_sensors_set_enable(indio_dev, false);
 if (err < 0)
 goto st_magn_buffer_predisable_error;

- err = st_sensors_set_enable(indio_dev, false);
+ err = iio_triggered_buffer_predisable(indio_dev);

st_magn_buffer_predisable_error:
kfree(mdata->buffer_data);
@@ -75,7 +70,6 @@
 }

static const struct iio_buffer_setup_ops st_magn_buffer_setup_ops = {
 .preenable = &st_magn_buffer_preenable,
 .postenable = &st_magn_buffer_postenable,
 .predisable = &st_magn_buffer_predisable,
};
--- linux-4.15.0.orig/drivers/iio/orientation/hid-sensor-incl-3d.c
+++ linux-4.15.0/drivers/iio/orientation/hid-sensor-incl-3d.c
@@ -111,21 +111,23 @@
 int report_id = -1;
 u32 address;
 int ret_type;
+s32 min;

*val = 0;
*val2 = 0;
switch (mask) {
    case IIO_CHAN_INFO_RAW:
        hid_sensor_power_state(&incl_state->common_attributes, true);
        -report_id = -incl_state->incl[chan->scan_index].report_id;
        +report_id = incl_state->incl[chan->scan_index].report_id;
        +min = incl_state->incl[chan->scan_index].logical_minimum;
        address = incl_3d_addresses[chan->scan_index];
        if (report_id >= 0)
            *val = sensor_hub_input_attr_get_raw_value(
                incl_state->common_attributes.hsdev,
                HID_USAGE_SENSOR_INCLINOMETER_3D, address,
                report_id,
                -SENSOR_HUB_SYNC);
            +SENSOR_HUB_SYNC;
            +min < 0);
        else {  
            hid_sensor_power_state(&incl_state->common_attributes,
                false);
        }
--- linux-4.15.0.orig/drivers/iio/potentiostat/lmp91000.c
+++ linux-4.15.0/drivers/iio/potentiostat/lmp91000.c
@@ -79,8 +79,8 @@
        struct completion completion;
        u8 chan_select;
        -u32 buffer[4]; /* 64-bit data + 64-bit timestamp */
-/+/* 64-bit data + 64-bit naturally aligned timestamp */
-+u32 buffer[4] __aligned(8);
-}
+
}
static const struct iio_chan_spec lmp91000_channels[] = {
    - -- linux-4.15.0.orig/drivers/iio/pressure/bmp280-core.c
    +++ linux-4.15.0/drivers/iio/pressure/bmp280-core.c
    @ @ -182.6 +182.8 @@
    + (s32)2097152) * H2 + 8192) >> 14);
    var -= (((var >> 15) * (var >> 15)) >> 7) * (s32)H1) >> 4;

    +var = clamp_val(var, 0, 419430400);
    +
    return var >> 12;
    };
@@ -362,10 +364,9 @@

comp_humidity = bmp280_compensate_humidity(data, adc_humidity);

-"val = comp_humidity;
-*val2 = 1024;
+*val = comp_humidity * 1000 / 1024;

-return IIO_VAL_FRACTIONAL;
+return IIO_VAL_INT;
}

static int bmp280_read_raw(struct iio_dev *indio_dev, unsigned int ctrl;

if (data->use_eoc)
-init_completion(&data->done);
+reinit_completion(&data->done);

ret = regmap_write(data->regmap, BMP280_REG_CTRL_MEAS, ctrl_meas);
if (ret)
@@ -907,6 +908,9 @@
"trying to enforce it\n"
irq_trig = IRQF_TRIGGER_RISING;
}
+
+init_completion(&data->done);
+
ret = devm_request_threaded_irq(dev, irq, bmp085_eoc_irq.
--- linux-4.15.0.orig/drivers/iio/pressure/hid-sensor-press.c
+++ linux-4.15.0/drivers/iio/pressure/hid-sensor-press.c
@@ -77,6 +77,7 @@
int report_id = -1;
 u32 address;
 int ret_type;
+s32 min;

*val = 0;
*val2 = 0;
@@ -85,8 +86,8 @@
switch (chan->scan_index) {
    case CHANNEL_SCAN_INDEX_PRESSURE:
        report_id = press_state->press_attr.report_id;
        -address =
-HID_USAGE_SENSOR_ATMOSPHERIC_PRESSURE;
+min = press_state->press_attr.logical_minimum;

+address = HID_USAGE_SENSOR_ATMOSPHERIC_PRESSURE;
break;
default:
report_id = -1;
@@ -99,7 +100,8 @@
    press_state->common_attributes.hsdev,
    HID_USAGE_SENSOR_PRESSURE, address,
    report_id,
    SENSOR_HUB_SYNC);
+SSENSOR_HUB_SYNC,
+min < 0);
hid_sensor_power_state(&press_state->common_attributes,
false);
} else {
--- linux-4.15.0.orig/drivers/iio/pressure/mpl3115.c
+++ linux-4.15.0/drivers/iio/pressure/mpl3115.c
@@ -147,7 +147,14 @@
    struct iio_poll_func *pf = p;
    struct iio_dev *indio_dev = pf->indio_dev;
    struct mpl3115_data *data = iio_priv(indio_dev);
-u8 buffer[16]; /* 32-bit channel + 16-bit channel + padding + ts */
+u8 buffer[16] __aligned(8);
(ret, pos = 0;

mutation_lock(&data->lock);
--- linux-4.15.0.orig/drivers/iio/pressure/ms5611_core.c
+++ linux-4.15.0/drivers/iio/pressure/ms5611_core.c
@@ -215,16 +215,21 @@
    struct iio_poll_func *pf = p;
    struct iio_dev *indio_dev = pf->indio_dev;
    struct ms5611_state *st = iio_priv(indio_dev);
-s32 buf[4]; /* s32 (pressure) + s32 (temp) + 2 * s32 (timestamp) */
+# struct { 
+  s32 channels[2];
+  s64 ts __aligned(8);
+} scan;
int ret;

mutex_lock(&st->lock);
-ret = ms5611_read_temp_and_pressure(indio_dev, &buf[1], &buf[0]);
ret = ms5611_read_temp_and_pressure(indio_dev, &scan.channels[1],
  &scan.channels[0]);
mutex_unlock(&st->lock);
if (ret < 0)
goto err;

-iio_push_to_buffers_with_timestamp(indio_dev, buf,
+iio_push_to_buffers_with_timestamp(indio_dev, &scan,
   iio_get_time_ns(indio_dev));

err:
--- linux-4.15.0.orig/drivers/iio/pressure/st_pressure_core.c
+++ linux-4.15.0/drivers/iio/pressure/st_pressure_core.c
@@ -640,7 +640,7 @@
    press_data->sensor_settings->drdy_irq.int2.addr))
pdata = (struct st_sensors_platform_data *)&default_press_pdata;

-err = st_sensors_init_sensor(indio_dev, press_data->dev->platform_data);
+err = st_sensors_init_sensor(indio_dev, pdata);
if (err < 0)
goto st_press_power_off;

--- linux-4.15.0.orig/drivers/iio/pressure/zpa2326.c
+++ linux-4.15.0/drivers/iio/pressure/zpa2326.c
@@ -672,8 +672,10 @@
int err;

err = pm_runtime_get_sync(indio_dev->dev.parent);
- if (err < 0)
+ if (err < 0) {
+ pm_runtime_put(indio_dev->dev.parent);
return err;
+}

if (err > 0) {
/*
--- linux-4.15.0.orig/drivers/iio/proximity/Kconfig
+++ linux-4.15.0/drivers/iio/proximity/Kconfig
@@ -68,6 +68,8 @@
config SRF08
 tristate "Devantech SRF02/SRF08/SRF10 ultrasonic ranger sensor"
+select IIO_BUFFER
+select IIO_TRIGGERED_BUFFER
depends on I2C
help
 Say Y here to build a driver for Devantech SRF02/SRF08/SRF10
--- linux-4.15.0.orig/drivers/iio/proximity/as3935.c
+++ linux-4.15.0/drivers/iio/proximity/as3935.c
@@ -70,7 +70,11 @@
 unsigned long noise_tripped;
 u32 tune_cap;
 u32 nfwdth_reg;
-tu8 buffer[16]; /* 8-bit data + 56-bit padding + 64-bit timestamp */
 +struct {
     +u8 chan;
     +s64 timestamp __aligned(8);
     +} scan;
+tu8 buf[2] ____cacheline_aligned;
+n8 buffer[0] = val & AS3935_DATA_MASK;
+iio_push_to_buffers_with_timestamp(indio_dev, &st->buffer,
+st->scan.chan = val & AS3935_DATA_MASK;
+iio_push_to_buffers_with_timestamp(indio_dev, &st->scan,
    iio_get_time_ns(indio_dev));
err_read:
  iio_trigger_notify_done(indio_dev->trig);
--- linux-4.15.0.orig/drivers/iio/proximity/pulsedlight-lidar-lite-v2.c
+++ linux-4.15.0/drivers/iio/proximity/pulsedlight-lidar-lite-v2.c
@@ -51,7 +51,11 @@
 int (*xfer)(struct lidar_data *data, u8 reg, u8 *val, int len);
 int i2c_enabled;
-u16 buffer[8]; /* 2 byte distance + 8 byte timestamp */
+struct {
 +u16 chan;
 +s64 timestamp __aligned(8);
 +} scan;

 static const struct iio_chan_spec lidar_channels[] = {
    @@ -166,6 +170,7 @@
    ret = lidar_write_control(data, LIDAR_REG_CONTROL_ACQUIRE);
    if (ret < 0) {
        dev_err(&client->dev, "cannot send start measurement command");
        +pm_runtime_put_noidle(&client->dev);
        return ret;
    }
struct lidar_data *data = iio_priv(indio_dev);
int ret;

-ret = lidar_get_measurement(data, data->buffer);
+ret = lidar_get_measurement(data, &data->scan.chan);
if (!ret) {
-iio_push_to_buffers_with_timestamp(indio_dev, data->buffer,
+iio_push_to_buffers_with_timestamp(indio_dev, &data->scan,
    iio_get_time_ns(indio_dev));
} else if (ret != -EINVAL) {
    dev_err(&data->client->dev, "cannot read LIDAR measurement");
--- linux-4.15.0.orig/drivers/iio/proximity/srf04.c
+++ linux-4.15.0/drivers/iio/proximity/srf04.c
@@ -105,7 +105,7 @@
udelay(10);
gpiod_set_value(data->gpiod_trig, 0);

-/* it cannot take more than 20 ms */
+/* it should not take more than 20 ms until echo is rising */
ret = wait_for_completion_killable_timeout(&data->rising, HZ/50);
if (ret < 0) {
    mutex_unlock(&data->lock);
@@ -115,7 +115,8 @@
return -ETIMEDOUT;
}

-ret = wait_for_completion_killable_timeout(&data->falling, HZ/50);
+ret = wait_for_completion_killable_timeout(&data->falling, HZ/20);
if (ret < 0) {
    mutex_unlock(&data->lock);
    return ret;
@@ -130,19 +131,19 @@
dt_ns = ktime_to_ns(ktime_dt);
/*
- * measuring more than 3 meters is beyond the capabilities of
- * the sensor
+ * measuring more than 6,45 meters is beyond the capabilities of
+ * the supported sensors
* ==> filter out invalid results for not measuring echos of
* another us sensor
*
* formula:
- * distance       3 m
- * time = --------- = --------- = 9404389 ns
- * speed        319 m/s
```c
+ * distance   6.45 * 2 m
+ * time = -------- = ------------ = 40438871 ns
+ * speed      319 m/s
 *
* using a minimum speed at -20 C of 319 m/s
 */
-if (dt_ns > 9404389)
+if (dt_ns > 40438871)
return -EIO;

time_ns = dt_ns;
@@ -154,20 +155,20 @@
*   with Temp in C
*   and speed in m/s
 *
- * use 343 m/s as ultrasonic speed at 20 C here in absence of the
+ * use 343,5 m/s as ultrasonic speed at 20 C here in absence of the
* temperature
 *
* therefore:
- *   time     343
- * distance = ------ * -----
- *      10^6       2
+ *   time     343,5   time  * 106
+ * distance = ------ * ------ = ---------------
+ *      10^6         2         617176
 *   with time in ns
 *   and distance in mm (one way)
 *
- * because we limit to 3 meters the multiplication with 343 just
+ * because we limit to 6,45 meters the multiplication with 106 just
* fits into 32 bit
 */
-distance_mm = time_ns * 343 / 2000000;
+distance_mm = time_ns * 106 / 617176;

return distance_mm;
}
--- linux-4.15.0.orig/drivers/iio/proximity/srf08.c
+++ linux-4.15.0/drivers/iio/proximity/srf08.c
@@ -66,11 +66,11 @@
int			range_mm;
struct mutex		lock;
@@ -154,20 +155,20 @@
 * triggered buffer
 * 1x16-bit channel + 3x16 padding + 4x16 timestamp
 */
```
/* Ensure timestamp is naturally aligned */
struct {
  s16 chan;
  s64 timestamp __aligned(8);
} scan;

/* Sensor-Type */
enum srf08_sensor_typesensor_type;
@@ -193,9 +193,9 @@
mutex_lock(&data->lock);

-data->buffer[0] = sensor_data;
+data->scan.chan = sensor_data;
iio_push_to_buffers_with_timestamp(indio_dev,
-data->buffer, pf->timestamp);
+ &data->scan, pf->timestamp);
 mutex_unlock(&data->lock);

err:
--- linux-4.15.0.orig/drivers/iio/temperature/hid-sensor-temperature.c
+++ linux-4.15.0/drivers/iio/temperature/hid-sensor-temperature.c
@@ -28,7 +28,10 @@
 struct temperature_state {
   struct hid_sensor_common common_attributes;
   struct hid_sensor_hub_attribute_info temperature_attr;
-s32 temperature_data;
+struct {
+  s32 temperature_data;
+  u64 timestamp __aligned(8);
+} scan;
   int scale_pre_decml;
   int scale_post_decml;
   int scale_precision;
@@ -45,7 +48,7 @@
 BIT(IIO_CHAN_INFO_SAMP_FREQ) |
 BIT(IIO_CHAN_INFO_HYSTERESIS),
   },
-IIO_CHAN_SOFT_TIMESTAMP(3),
+IIO_CHAN_SOFT_TIMESTAMP(1),
};

/* Adjust channel real bits based on report descriptor */
@@ -76,7 +79,8 @@
   BIT(IIO_CHAN_INFO_SAMP_FREQ) |
   BIT(IIO_CHAN_INFO_HYSTERESIS),
 },
-IIO_CHAN_SOFT_TIMESTAMP(3),
+IIO_CHAN_SOFT_TIMESTAMP(1),
};

/* Adjust channel real bits based on report descriptor */
SENSOR_HUB_SYNC);
+SENSOR_HUB_SYNC,
+temp_st->temperature_attr.logical_minimum < 0);
hid_sensor_power_state(
 &temp_st->common_attributes,
false);
@@ -135,9 +139,8 @@
struct temperature_state *temp_st = iio_priv(indio_dev);

if (atomic_read(&temp_st->common_attributes.data_ready))
-    iio_push_to_buffers_with_timestamp(indio_dev,
-    &temp_st->temperature_data,
-    iio_get_time_ns(indio_dev));
+    iio_push_to_buffers_with_timestamp(indio_dev, &temp_st->scan,
+    iio_get_time_ns(indio_dev));

return 0;
}
@@ -152,7 +155,7 @@
switch (usage_id) {
    case HID_USAGE_SENSOR_DATA_ENVIRONMENTAL_TEMPERATURE:
-        temp_st->temperature_data = *(s32 *)raw_data;
+        temp_st->scan.temperature_data = *(s32 *)raw_data;
        return 0;
    default:
        return -EINVAL;
    }
--- linux-4.15.0.orig/drivers/iio/temperature/maxim_thermocouple.c
+++ linux-4.15.0/drivers/iio/temperature/maxim_thermocouple.c
@@ -266,7 +266,6 @@
 static const struct spi_device_id maxim_thermocouple_id[] = {
     {"max6675", MAX6675},
     {"max31855", MAX31855},
-    {"max31856", MAX31855},
     {};
 }
 MODULE_DEVICE_TABLE(spi, maxim_thermocouple_id);
--- linux-4.15.0.orig/drivers/iio/trigger/stm32-timer-trigger.c
+++ linux-4.15.0/drivers/iio/trigger/stm32-timer-trigger.c
@@ -161,7 +161,8 @@
 return 0;
}
static void stm32_timer_stop(struct stm32_timer_trigger *priv,
+static void stm32_timer_stop(struct stm32_timer_trigger *priv,
+    struct iio_trigger *trig)
{ u32 ccer, cr1:
regmap_write(priv->regmap, TIM_PSC, 0);
regmap_write(priv->regmap, TIM_ARR, 0);

/* Force disable master mode */
+if (stm32_timer_is_trgo2_name(trig->name))
+regmap_update_bits(priv->regmap, TIM_CR2, TIM_CR2_MMS2, 0);
+else
+regmap_update_bits(priv->regmap, TIM_CR2, TIM_CR2_MMS, 0);
+
/* Make sure that registers are updated */
regmap_update_bits(priv->regmap, TIM_EGR, TIM_EGR_UG, TIM_EGR_U);
}
return ret;

if (freq == 0) {
-stm32_timer_stop(priv);
+stm32_timer_stop(priv, trig);
} else {
ret = stm32_timer_start(priv, trig, freq);
if (ret)
--- linux-4.15.0.orig/drivers/infiniband/Kconfig
+++ linux-4.15.0/drivers/infiniband/Kconfig
@@ -33,6 +33,18 @@
   libibverbs, libibcm and a hardware driver library from
   <http://www.openfabrics.org/git/>.

+config INFINIBAND_USER_ACCESS_UCM
+bool "Userspace CM (UCM, DEPRECATED)"
+depends on BROKEN
+depends on INFINIBAND_USER_ACCESS
+help
+ The UCM module has known security flaws, which no one is
+ interested to fix. The user-space part of this code was
+ dropped from the upstream a long time ago.
+
+ This option is DEPRECATED and planned to be removed.
+
+config INFINIBAND_EXP_USER_ACCESS
bool "Allow experimental support for Infiniband ABI"
depends on INFINIBAND_USER_ACCESS
@@ -60,9 +72,12 @@
   pages on demand instead.

config INFINIBAND_ADDR_TRANS
bool
+bool "RDMA/CM"
depends on INFINIBAND
default y
+--help---
+ Support for RDMA communication manager (CM).
+ This allows for a generic connection abstraction over RDMA.

config INFINIBAND_ADDR_TRANS_CONFIGFS
bool
--- linux-4.15.0.orig/drivers/infiniband/core/Makefile
+++ linux-4.15.0/drivers/infiniband/core/Makefile
@@ -5,8 +5,8 @@
 obj-$(CONFIG_INFINIBAND) +=	ib_core.o ib_cm.o iw_cm.o \ 
 $(infiniband-y)
 obj-$(CONFIG_INFINIBAND_USER_MAD) +=ib_umad.o
 -obj-$(CONFIG_INFINIBAND_USER_ACCESS) +=ib_uverbs.o ib_ucm.o \ 
 -$(user_access-y)
 +obj-$(CONFIG_INFINIBAND_USER_ACCESS) += ib_uverbs.o $(user_access-y)
 +obj-$(CONFIG_INFINIBAND_USER_ACCESS_UCM) += ib_ucm.o $(user_access-y)

 ib_core-y :=packer.o ud_header.o verbs.o cq.o rw.o sysfs.o \ 
 device.o fmr_pool.o cache.o netlink.o \ 
 --- linux-4.15.0.orig/drivers/infiniband/core/addr.c
 +++ linux-4.15.0/drivers/infiniband/core/addr.c
 @@ -140,7 +140,7 @@
 if (ib_nl_is_good_ip_resp(nlh))
 ib_nl_process_good_ip_rsep(nlh);

-return skb->len;
+return 0;
}

static int ib_nl_ip_send_msg(struct rdma_dev_addr *dev_addr,
@@ -207,6 +207,22 @@
}
EXPORT_SYMBOL(rdma_addr_size);

+int rdma_addr_size_in6(struct sockaddr_in6 *addr)
+{
+int ret = rdma_addr_size((struct sockaddr *) addr);
+ +return ret <= sizeof(*addr) ? ret : 0;
+} +EXPORT_SYMBOL(rdma_addr_size_in6);

+int rdma_addr_size_kss(struct __kernel_sockaddr_storage *addr)
+{"
int ret = rdma_addr_size((struct sockaddr *) addr);
+
+return ret <= sizeof(*addr) ? ret : 0;
+
EXPORT_SYMBOL(rdma_addr_size_kss);
+
static struct rdma_addr_client self;

void rdma_addr_register_client(struct rdma_addr_client *client)
@@ -433,16 +449,15 @@
    struct flowi6 fl6;
    struct dst_entry *dst;
    struct rt6_info *rt;
-    int ret;
    memset(&fl6, 0, sizeof fl6);
    fl6.daddr = dst_in->sin6_addr;
    fl6.saddr = src_in->sin6_addr;
    fl6.flowi6_oif = addr->bound_dev_if;
-    ret = ipv6_stub->ipv6_dst_lookup(addr->net, NULL, &dst, &fl6);
-    if (ret < 0)
-        return ret;
+    dst = ipv6_stub->ipv6_dst_lookup_flow(addr->net, NULL, &fl6, NULL);
+    if (IS_ERR(dst))
+        return PTR_ERR(dst);
    rt = (struct rt6_info *)dst;
    if (ipv6_addr_any(&src_in->sin6_addr)) {
        list_del(&req->list);
        mutex_unlock(&lock);
    */
    + * Although the work will normally have been canceled by the
    + * workqueue, it can still be requeued as long as it is on the
    + * req_list, so it could have been requeued before we grabbed &lock.
    + * We need to cancel it after it is removed from req_list to really be
    + * sure it is safe to free.
    + */
    +cancel_delayed_work(&req->work);
    +
    req->callback(req->status, (struct sockaddr *)&req->src_addr,
    req->addr, req->context);
    put_client(req->client);
@@ -770,14 +794,13 @@
    struct net_device *dev;
union {
-struct sockaddr _sockaddr;
struct sockaddr_in _sockaddr_in;
struct sockaddr_in6 _sockaddr_in6;
} sgid_addr, dgid_addr;

-rdma_gid2ip(&sgid_addr._sockaddr, sgid);
-rdma_gid2ip(&dgid_addr._sockaddr, dgid);
+rdma_gid2ip((struct sockaddr *)&sgid_addr, sgid);
+rdma_gid2ip((struct sockaddr *)&dgid_addr, dgid);

memset(&dev_addr, 0, sizeof(dev_addr));
if (if_index)
@@ -786,8 +809,9 @@
    ctx.addr = &dev_addr;
    init_completion(&ctx.comp);
-    ret = rdma_resolve_ip(&self, &sgid_addr._sockaddr, &dgid_addr._sockaddr,
-        &dev_addr, 1000, resolve_cb, &ctx);
+    ret = rdma_resolve_ip(&self, (struct sockaddr *)&sgid_addr,
+        (struct sockaddr *)&dgid_addr, &dev_addr, 1000, 
+        resolve_cb, &ctx);
    if (ret)
        return ret;
@@ -817,16 +841,15 @@
    int ret = 0;
    struct rdma_dev_addr dev_addr;
    union {
-        struct sockaddr _sockaddr;
+        struct sockaddr _sockaddr;
struct sockaddr_in _sockaddr_in;
struct sockaddr_in6 _sockaddr_in6;
} gid_addr;

-    rdma_gid2ip(&gid_addr._sockaddr, sgid);
+    rdma_gid2ip((struct sockaddr *)&gid_addr, sgid);

memset(&dev_addr, 0, sizeof(dev_addr));
    dev_addr.net = &init_net;
    ret = rdma_translate_ip(&gid_addr._sockaddr, &dev_addr, vlan_id);
+    ret = rdma_translate_ip((struct sockaddr *)&gid_addr, &dev_addr, vlan_id);
    if (ret)
        return ret;

--- linux-4.15.0.orig/drivers/infiniband/core/cache.c
+++ linux-4.15.0/drivers/infiniband/core/cache.c
@@ -434,7 +434,7 @@

return -EINVAL;

if (table->data_vec[index].props & GID_TABLE_ENTRY_INVALID)
    return -EAGAIN;
+return -EINVAL;

memcpy(gid, &table->data_vec[index].gid, sizeof(*gid));
if (attr) {
    spin_unlock_irqrestore(&cm.lock, flags);
+ib_destroy_cm_id(cm_id);
    return ERR_PTR(-EINVAL);
}
atomic_inc(&cm_id_priv->refcount);
@@ -1348,6 +1349,7 @@
    id.local_id);
    if (IS_ERR(cm_id_priv->timewait_info)) {
        ret = PTR_ERR(cm_id_priv->timewait_info);
+        cm_id_priv->timewait_info = NULL;
        goto destroy;
    }
    cm_id_priv->timewait_info->work.remote_id = req_msg->local_comm_id;
--- linux-4.15.0.orig/drivers/infiniband/core/cma.c
+++ linux-4.15.0/drivers/infiniband/core/cma.c
@@ -420,6 +420,8 @@
#define CMA_VERSION 0x00

struct cma_req_info {
    +struct sockaddr_storage listen_addr_storage;
    +struct sockaddr_storage src_addr_storage;
    struct ib_device *device;
    int port;
    union ib_gid local_gid;
--- linux-4.15.0.orig/drivers/infiniband/core/cm.c
+++ linux-4.15.0/drivers/infiniband/core/cm.c
@@ -624,11 +626,13 @@
    CM_VERSION)

struct cm_id_priv {
    +struct sockaddr_storage listen_addr_storage;
    +struct sockaddr_storage src_addr_storage;

struct cm_id {
    +struct sockaddr_storage listen_addr_storage;
    +struct sockaddr_storage src_addr_storage;
    struct ib_device *device;
    int port;
    union ib_gid local_gid;

if ((dev_type != ARPHRD_INFINIBAND) && rdma_protocol_ib(device, port))
    return ret;
-if (dev_type == ARPHRD_ETHER && rdma_protocol_roce(device, port))
+if (dev_type == ARPHRD_ETHER && rdma_protocol_roce(device, port)) {
    ndev = dev_get_by_index(&init_net, bound_if_index);
-else
+    } else {
      if (!ndev)
+        return ret;
+    } else {
      gid_type = IB_GID_TYPE_IB;
-    
  +}
  
  ret = ib_find_cached_gid_by_port(device, gid, gid_type, port,
  ndev, NULL);
@@ -726,6 +730,7 @@
  dgid = (union ib_gid *) &addr->sib_addr;
  pkey = ntohs(addr->sib_pkey);
+
  +mutex_lock(&lock);
  list_for_each_entry(cur_dev, &dev_list, list) {
      for (p = 1; p <= cur_dev->device->phys_port_cnt; ++p) {
        if (!rdma_cap_af_ib(cur_dev->device, p))
@@ -752,18 +757,19 @@
          cma_dev = cur_dev;
          sgid = gid;
          id_priv->id.port_num = p;
+          goto found;
          }
          }
          }
-    
-    -if (!cma_dev)
-      -return -ENODEV;
+    } mutex_unlock(&lock);
+      return -ENODEV;
     
     found:
     cma_attach_to_dev(id_priv, cma_dev);
     -addr = (struct sockaddr_ib *) cma_src_addr(id_priv);
-    +memcpy(&addr->sib_addr, &sgid, sizeof sgid);
+    +mutex_unlock(&lock);
+    +addr = (struct sockaddr_ib *)cma_src_addr(id_priv);
+    +memcpy(&addr->sib_addr, &sgid, sizeof(sgid));
+    cma_translate_ib(addr, &id_priv->id.route.addr.dev_addr);
     return 0;

@@ -896,7 +902,6 @@
struct ib_qp_attr qp_attr;
int qp_attr_mask, ret;
-union ib_gid sgid;

mutex_lock(&id_priv->qp_mutex);
if (!id_priv->id.qp) {
    @@ -919,12 +924,6 @@
        if (ret)
        goto out;

        ret = ib_query_gid(id_priv->id.device, id_priv->id.port_num,
            rdma_ah_read_grh(&qp_attr.ah_attr)->sgid_index,
            &sgid, NULL);
    -if (ret)
    -goto out;
    -
    BUG_ON(id_priv->cma_dev->device != id_priv->id.device);

    if (conn_param)
        @@ -1077,18 +1076,31 @@
        return cma_zero_addr(addr) || cma_loopback_addr(addr);
    }

static int cma_addr_cmp(struct sockaddr *src, struct sockaddr *dst)
{ return cma_zero_addr(addr) || cma_loopback_addr(addr); }

+static int cma_addr_cmp(const struct sockaddr *src, const struct sockaddr *dst)
{ if (src->sa_family != dst->sa_family) return -1;

    switch (src->sa_family) {
    case AF_INET:
        return ((struct sockaddr_in *) src)->sin_addr.s_addr !=
            ((struct sockaddr_in *) dst)->sin_addr.s_addr;
    case AF_INET6:
        return ipv6_addr_cmp(&((struct sockaddr_in6 *) src)->sin6_addr,
            &((struct sockaddr_in6 *) dst)->sin6_addr);
        return ((struct sockaddr_in *)src)->sin_addr.s_addr !=
            ((struct sockaddr_in *)dst)->sin_addr.s_addr;
    case AF_INET6: {
        struct sockaddr_in6 *src_addr6 = (struct sockaddr_in6 *)src;
        struct sockaddr_in6 *dst_addr6 = (struct sockaddr_in6 *)dst;
        bool link_local;
        +if (ipv6_addr_cmp(&src_addr6->sin6_addr,
            &dst_addr6->sin6_addr))
            return 1;
        +link_local = ipv6_addr_type(&dst_addr6->sin6_addr) &
IPV6_ADDR_LINKLOCAL;
+/* Link local must match their scope_ids */
+return link_local ? (src_addr6->sin6_scope_id !=
+ dst_addr6->sin6_scope_id) :
+ 0;
+
default:
return ib_addr_cmp(&((struct sockaddr_ib *) src)->sib_addr,
 &((struct sockaddr_ib *) dst)->sib_addr);
@@ -1370,11 +1382,11 @@
}

static struct net_device *cma_get_net_dev(struct ib_cm_event *ib_event,
-    const struct cma_req_info *req)
+ struct cma_req_info *req)
{
    struct sockaddr_storage listen_addr_storage, src_addr_storage;
    struct sockaddr *listen_addr = (struct sockaddr *)&listen_addr_storage,
    *src_addr = (struct sockaddr *)&src_addr_storage;
    struct sockaddr *listen_addr =
    (struct sockaddr *)&req->listen_addr_storage;
    struct sockaddr *src_addr = (struct sockaddr *)&req->src_addr_storage;
    struct net_device *net_dev;
    const union ib_gid *gid = req->has_gid ? &req->local_gid : NULL;
    int err;
@@ -1389,11 +1401,6 @@
    if (!net_dev)
     return ERR_PTR(-ENODEV);
    if (!validate_net_dev(net_dev, listen_addr, src_addr)) {
@@ -1467,9 +1474,16 @@
       (addr->dev_addr.ss_family == AF_IB ||
       cma_protocol_roce_dev_port(id->device, port_num));

       return ERR_PTR(-EHOSTUNREACH);
@@ -1475,11 +1482,16 @@
       addr->dev_addr.bound_dev_if ||
       (net_eq(dev_net(net_dev), addr->dev_addr.net) &&
       addr->dev_addr.bound_dev_if == net_dev->ifindex);
+/
+ * Net namespaces must match, and if the listener is listening
+ * on a specific netdevice than netdevice must match as well.
static struct rdma_id_private *cma_find_listener(
{struct rdma_id_private *id_priv, *id_priv_dev;

+mutex_lock(&lock);
+/
+ * Net namespace might be getting deleted while route lookup, 
+ * cm_id lookup is in progress. Therefore, perform netdevice 
+ * validation, cm_id lookup under rcu lock. 
+ * RCU lock along with netdevice state check, synchronizes with 
+ * netdevice migrating to different net namespace and also avoids 
+ * case where net namespace doesn’t get deleted while lookup is in 
+ * progress. 
+ * If the device state is not IFF_UP, its properties such as ifindex 
+ * and nd_net cannot be trusted to remain valid without rcu lock. 
+ * net/core/dev.c change_net_namespace() ensures to synchronize with 
+ * ongoing operations on net device after device is closed using 
+ * synchronize_net(). 
+ */
+rcu_read_lock();
+if (*net_dev) {
+/*
+ * If netdevice is down, it is likely that it is administratively 
+ * down or it might be migrating to different namespace. 
+ * In that case avoid further processing, as the net namespace 
+ * or ifindex may change. 
+ */
+if (((*net_dev)->flags & IFF_UP) == 0) {
+id_priv = ERR_PTR(-EHOSTUNREACH);
goto err;
+
+if (!validate_net_dev(*net_dev,
+ (struct sockaddr *)&req.listen_addr_storage,
+ (struct sockaddr *)&req.src_addr_storage)) {
+    id_priv = ERR_PTR(-EHOSTUNREACH);
+    goto err;
+}
+
+bind_list = cma_ps_find(*net_dev ? dev_net(*net_dev) : &init_net,
rdma_ps_from_service_id(req.service_id),
cma_port_from_service_id(req.service_id));
id_priv = cma_find_listener(bind_list, cm_id, ib_event, &req, *net_dev);
+err:
+rcu_read_unlock();
+mutex_unlock(&lock);
if (IS_ERR(id_priv) && *net_dev) {
    dev_put(*net_dev);
    *net_dev = NULL;
}
-
return id_priv;
}

@@ -2171,9 +2225,10 @@
conn_id->cm_id.iw = NULL;
cma_exch(conn_id, RDMA_CM_DESTROYING);
mutex_unlock(&conn_id->handler_mutex);
+mutex_unlock(&listen_id->handler_mutex);
cma_deref_id(conn_id);
rdma_destroy_id(&conn_id->id);
-goto out;
+return ret;
}
mutex_unlock(&conn_id->handler_mutex);
@@ -2245,6 +2300,8 @@
struct net *net = id_priv->id.route.addr.dev_addr.net;
int ret;
+
+lockdep_assert_held(&lock);
+
+if (cma_family(id_priv) == AF_IB && !rdma_cap_ib_cm(cma_dev->device, 1))
return;

@@ -2430,7 +2487,8 @@
work->new_state = RDMA_CM_ROUTE_RESOLVED;
work->event.event = RDMA_CM_EVENT_ROUTE_RESOLVED;

-route->path_rec = kmalloc(sizeof *route->path_rec, GFP_KERNEL);
+route->path_rec = kmalloc(sizeof *route->path_rec, GFP_KERNEL);
if (!route->path_rec) {
  ret = -ENOMEM;
  goto err1;
@@ -2619,6 +2677,7 @@
err2:
  kfree(route->path_rec);
  route->path_rec = NULL;
+route->num_paths = 0;
err1:
  kfree(work);
  return ret;
@@ -2734,6 +2793,8 @@
{
  struct rdma_id_private *id_priv = context;
  struct rdma_cm_event event;
-+struct sockaddr *addr;
+  struct sockaddr_storage old_addr;
  memset(&event, 0, sizeof event);
  mutex_lock(&id_priv->handler_mutex);
@@ -2741,17 +2802,26 @@
            RDMA_CM_ADDR_RESOLVED))
  goto out;
-+memcpy(cma_src_addr(id_priv), src_addr, rdma_addr_size(src_addr));
+/*
+ * Store the previous src address, so that if we fail to acquire
+ * matching rdma device, old address can be restored back, which helps
+ * to cancel the cma listen operation correctly.
+ */
+addr = cma_src_addr(id_priv);
+memcpy(&old_addr, addr, rdma_addr_size(addr));
+memcpy(addr, src_addr, rdma_addr_size(src_addr));
  if (!status && !(id_priv->cma_dev) {
    status = cma_acquire_dev(id_priv, NULL);
  if (status)
    pr_debug_ratelimited("RDMA CM: ADDR_ERROR: failed to acquire device. status %d\n",
                        status);
- } else {
+ } else if (status) {
    pr_debug_ratelimited("RDMA CM: ADDR_ERROR: failed to resolve IP. status %d\n", status);
  }
if (status) {
    memcpy(addr, &old_addr,
            rdma_addr_size((struct sockaddr *)&old_addr));
    if (!cma_comp_exch(id_priv, RDMA_CM_ADDR_RESOLVED,
                 RDMA_CM_ADDR_BOUND))
        goto out;
    @ @ -2950,6 +3020,8 @ @
    u64 sid, mask;
    __be16 port;
}

+lockdep_assert_held(&lock);
+
addr = cma_src_addr(id_priv);
port = htons(bind_list->port);

@@ -2978,6 +3050,8 @@
    struct rdma_bind_list *bind_list;
    int ret;

+lockdep_assert_held(&lock);
+
bind_list = kzalloc(sizeof *bind_list, GFP_KERNEL);
if (!bind_list)
    return -ENOMEM;

@@ -3013,7 +3089,8 @@
    struct sockaddr  *cur_daddr = cma_dst_addr(cur_id);
    __be16 dport = cma_port(daddr);
    continue;

/* different dest port -> unique */
- if (!cma_any_port(cur_daddr) &&
+ if (!cma_any_port(cur_daddr) &&
    !cma_any_port(cur_daddr) &&
    (dport != cur_dport))
    continue;

@@ -3024,7 +3101,8 @@
    continue;

/* different dst address -> unique */
if (!cma_any_addr(cur_daddr) &&
  !cma_any_addr(daddr) &&
  !cma_any_addr(cur_daddr) &&
cma_addr_cmp(daddr, cur_daddr))
continue;

@@ -3041,6 +3119,8 @@
unsigned int rover;
struct net *net = id_priv->id.route.addr.dev_addr;

+lockdep_assert_held(&lock);
+
inet_get_local_port_range(net, &low, &high);
remaining = (high - low) + 1;
rover = prandom_u32() % remaining + low;
@@ -3088,6 +3168,8 @@
struct rdma_id_private *cur_id;
struct sockaddr *addr, *cur_addr;

+lockdep_assert_held(&lock);
+
addr = cma_src_addr(id_priv);
for_each_entry(cur_id, &bind_list->owners, node) {
  if (id_priv == cur_id)
@@ -3118,6 +3200,8 @@
unsigned short snum;
int ret;

+lockdep_assert_held(&lock);
+
snum = ntohs(cma_port(cma_src_addr(id_priv)));
if (snum < PROT_SOCK && !capable(CAP_NET_BIND_SERVICE))
  return -EACCES;
@@ -3322,13 +3406,13 @@
}  #endif
}
+daddr = cma_dst_addr(id_priv);
+daddr->sa_family = addr->sa_family;
+ret = cma_get_port(id_priv);
if (ret)
goto err2;

-daddr = cma_dst_addr(id_priv);
-daddr->sa_family = addr->sa_family;
-
return 0;
int rdma_accept(struct rdma_cm_id *id, struct rdma_conn_param *conn_param)
{
    struct rdma_id_private *id PRIV;
    +struct rdma_id_private *id PRIV =
    +container_of(id, struct rdma_id_private, id);
    int ret;

    id PRIV = container_of(id, struct rdma_id_private, id);
    +lockdep_assert_held(&id PRIV->handler_mutex);

    id PRIV->owner = task_pid_nr(current);

    -if (!cma_comp(id PRIV, RDMA CM CONNECT))
    +if (READ_ONCE(id PRIV->state) != RDMA CM CONNECT)
    return -EINVAL;

    if (!id->qp && conn_param) {
        @ @ -3763,6+3848,24 @ @
    }
    EXPORT_SYMBOL(rdma_accept);

    +void rdma_lock_handler(struct rdma_cm_id *id)
    +{
        +struct rdma_id_private *id PRIV =
        +container_of(id, struct rdma_id_private, id);
        +
        +mutex_lock(&id PRIV->handler_mutex);
        +}
    +EXPORT_SYMBOL(rdma_lock_handler);
    +
    +void rdma_unlock_handler(struct rdma_cm_id *id)
    +{
        +struct rdma_id_private *id PRIV =
        +container_of(id, struct rdma_id_private, id);
        +
        +mutex_unlock(&id PRIV->handler_mutex);
        +}
    +EXPORT_SYMBOL(rdma_unlock_handler);
    +
    int rdma_notify(struct rdma_cm_id *id, enum ib_event_type event)
    {
        struct rdma_id_private *id PRIV;
        @ @ -3856,15+3959,6 @ @
    else
pr_debug_ratelimited("RDMA CM: MULTICAST_ERROR: failed to join multicast. status %d\n",
            status);
mutex_lock(&id_priv->qp_mutex);
if (!status && id_priv->id.qp) {
    status = ib_attach_mcast(id_priv->id.qp, &multicast->rec.mgid,
        &be16_to_cpu(multicast->rec.mlid));
    if (status)
        pr_debug_ratelimited("RDMA CM: MULTICAST_ERROR: failed to attach QP. status %d\n",
            status);
}
mutex_unlock(&id_priv->qp_mutex);

memset(&event, 0, sizeof event);
event.status = status;
@@ -4114,6 +4208,13 @@
struct cma_multicast *mc;
int ret;

/*! Not supported for kernel QPs */
+if (WARN_ON(id->qp))
+    return -EINVAL;
+
+if (!id->device)
+    return -EINVAL;
+
id_priv = container_of(id, struct rdma_id_private, id);
if (!cma_comp(id_priv, RDMA_CM_ADDR_BOUND) &&
    !cma_comp(id_priv, RDMA_CM_ADDR_RESOLVED))
@@ -4162,11 +4263,6 @@
    list_del(&mc->list);
    spin_unlock_irq(&id_priv->lock);

    if (id->qp)
        -ib_detach_mcast(id->qp,
            &mc->multicast.ib->rec.mgid,
            &be16_to_cpu(mc->multicast.ib->rec.mlid));
    -BUG_ON(id_priv->cma_dev->device != id->device);

    if (rdma_cap_ib_mcast(id->device, id->port_num)) {
        @@ -4332,7 +4428,7 @@
            RDMA_NL_RDMA_CM_ATTR_SRC_ADDR))
goto out;
    if (ibnl_put_attr(skb, nlh,
        -rdma_addr_size(cma_src_addr(id_priv)),
        +rdma_addr_size(cma_dst_addr(id_priv)),
            cma_dst_addr(id_priv),
            RDMA_NL_RDMA_CM_ATTR_DST_ADDR))
out:
goto out;
@@ -4444,6 +4540,7 @@
id_stats->qp_type = id->qp_type;
    
    i_id++;
   + nlmmsg_end(skb, nlh);
   }

   cb->args[1] = 0;
@@ -4495,6 +4592,19 @@
   {
   int ret;

   +/*
   + * There is a rare lock ordering dependency in cma_netdev_callback()
   + * that only happens when bonding is enabled. Teach lockdep that rtnl
   + * must never be nested under lock so it can find these without having
   + * to test with bonding.
   + */
   +if (IS_ENABLED(CONFIG_LOCKDEP)) {
   +    rtnl_lock();
   +    mutex_lock(&lock);
   +    mutex_unlock(&lock);
   +    rtnl_unlock();
   +    }
   +
   +    cma_wq = alloc_ordered_workqueue("rdma_cm", WQ_MEM_RECLAIM);
   if (!cma_wq)
   return -ENOMEM;
   @@ -4520,6 +4630,7 @@
   unregister_netdevice_notifier(&cma_nb);
   rdma_addr_unregister_client(&addr_client);
   ib_sa_unregister_client(&sa_client);
   +  unregister_pernet_subsys(&cma_pernet_operations);
   err_wq:
   destroy_workqueue(cma_wq);
   return ret;
--- linux-4.15.0.orig/drivers/infiniband/core/cma_configfs.c
+++ linux-4.15.0/drivers/infiniband/core/cma_configfs.c
@@ -319,8 +319,21 @@
   return ERR_PTR(err);
   }

   +static void drop_cma_dev(struct config_group *cgroup, struct config_item *item)
   +{
   +    struct config_group *group =
   +    container_of(item, struct config_group, cg_item);
   +    struct cma_dev_group *cma_dev_group =
container_of(group, struct cma_dev_group, device_group);
+
+configfs_remove_default_groups(&cma_dev_group->ports_group);
+configfs_remove_default_groups(&cma_dev_group->device_group);
+config_item_put(item);
+
+static struct configfs_group_operations cma_subsys_group_ops = {
  .make_group= make_cma_dev,
  .drop_item= drop_cma_dev,
};

static const struct config_item_type cma_subsys_type = {
  --- linux-4.15.0.orig/drivers/infiniband/core/cq.c
  +++ linux-4.15.0/drivers/infiniband/core/cq.c
  @@ -17,6 +17,7 @@
  /* # of WCs to poll for with a single call to ib_poll_cq */
  #define IB_POLL_BATCH16
  +#define IB_POLL_BATCH_DIRECT8

  /* # of WCs to iterate over before yielding */
  #define IB_POLL_BUDGET_IRQ256
  @@ -25,7 +26,8 @@
  #define IB_POLL_FLAGS \n  (IB_CQ_NEXT_COMP | IB_CQ_REPORT_MISSED_EVENTS)

  -static int __ib_process_cq(struct ib_cq *cq, int budget)
  +static int __ib_process_cq(struct ib_cq *cq, int budget, struct ib_wc *wcs,
  +  int batch)
  {
    int i, n, completed = 0;

    @@ -34,10 +36,10 @@
    * want to bound this call, thus we need unsigned
    * minimum here.
    */
    -while ((n = ib_poll_cq(cq, min_t(u32, IB_POLL_BATCH,
    -budget - completed), cq->wc)) > 0) {
    +while ((n = ib_poll_cq(cq, min_t(u32, batch,
        + budget - completed), wcs)) > 0) {
      for (i = 0; i < n; i++) {
        -struct ib_wc *wc = &cq->wc[i];
        +struct ib_wc *wc = &wcs[i];

        if (wc->wr_cqe)
          wc->wr_cqe->done(cq, wc);
    @@ -47,8 +49,7 @@

completed += n;

- if (n != IB_POLL_BATCH ||
  (budget != -1 && completed >= budget))
+ if (n != batch || (budget != -1 && completed >= budget))
    break;
}

@@ -60,18 +61,20 @@
 * @cq:		CQ to process
 * @budget:	number of CQEs to poll for
 *
- * This function is used to process all outstanding CQ entries on a
- * %IB_POLL DIRECT CQ. It does not offload CQ processing to a different
- * context and does not ask for completion interrupts from the HCA.
+ * This function is used to process all outstanding CQ entries.
+ * It does not offload CQ processing to a different context and does
+ * not ask for completion interrupts from the HCA.
+ * Using direct processing on CQ with non IB_POLL DIRECT type may trigger
+ * concurrent processing.
 *
* Note: do not pass -1 as %budget unless it is guaranteed that the number
* of completions that will be processed is small.
*/
int ib_process_cq_direct(struct ib_cq *cq, int budget)
{
- WARN_ON_ONCE(cq->poll_ctx != IB_POLL_DIRECT);
+ struct ib_wc wcs[IB_POLL_BATCH_DIRECT];

- return __ib_process_cq(cq, budget);
+ return __ib_process_cq(cq, budget, wcs, IB_POLL_BATCH_DIRECT);
}
EXPORT_SYMBOL(ib_process_cq_direct);

@@ -85,7 +88,7 @@
 struct ib_cq *cq = container_of(iop, struct ib_cq, iop);
 int completed;

-completed = __ib_process_cq(cq, budget);
+completed = __ib_process_cq(cq, budget, cq->wc, IB_POLL_BATCH);
 if (completed < budget) {
  irq_poll_complete(&cq->iop);
  if (ib_req_notify_cq(cq, IB_POLL_FLAGS) > 0)
- @ @ -105.15 +108.16 @@
completed = __ib_process_cq(cq, IB_POLL_BUDGET_WORKQUEUE);
+completed = __ib_process_cq(cq, IB_POLL_BUDGET_WORKQUEUE, cq->wc,
+    IB_POLL_BATCH);
if (completed >= IB_POLL_BUDGET_WORKQUEUE ||
    ib_req_notify_cq(cq, IB_POLL_FLAGS) > 0)
-    queue_work(ib_comp_wq, &cq->work);
+    queue_work(cq->comp_wq, &cq->work);
}

static void ib_cq_completion_workqueue(struct ib_cq *cq, void *private)
{
-    queue_work(ib_comp_wq, &cq->work);
+    queue_work(cq->comp_wq, &cq->work);
}

/**
 @@ -165,9 +169,12 @@
    ib_req_notify_cq(cq, IB_CQ_NEXT_COMP);
 break;
 case IB_POLL_WORKQUEUE:
+    case IB_POLL_UNBOUND_WORKQUEUE:
    cq->comp_handler = ib_cq_completion_workqueue;
    INIT_WORK(&cq->work, ib_cq_poll_work);
    ib_req_notify_cq(cq, IB_CQ_NEXT_COMP);
+    cq->comp_wq = (cq->poll_ctx == IB_POLL_WORKQUEUE) ?
+        ib_comp_wq : ib_comp_unbound_wq;
 break;
 default:
    ret = -EINVAL;
 @@ -202,6 +209,7 @@
    irq_poll_disable(&cq->iop);
 break;
 case IB_POLL_WORKQUEUE:
+    case IB_POLL_UNBOUND_WORKQUEUE:
    cancel_work_sync(&cq->work);
 break;
 default:
 --- linux-4.15.0.orig/drivers/infiniband/core/device.c
+++ linux-4.15.0/drivers/infiniband/core/device.c
 @@ -61,6 +61,7 @@}
 struct workqueue_struct *ib_comp_wq;
 +struct workqueue_struct *ib_comp_unbound_wq;
 struct workqueue_struct *ib_wq;
 EXPORT_SYMBOL_GPL(ib_wq);
 @@ -462,7 +463,6 @@
struct ib_udata uhw = {.outlen = 0, .inlen = 0};
struct device *parent = device->dev.parent;

-WARN_ON_ONCE(!parent);
WARN_ON_ONCE(device->dma_device);
if (device->dev.dma_ops) {
/*
@@ -471,16 +471,25 @@
 * into device->dev.
 */
device->dma_device = &device->dev;
-if (!device->dev.dma_mask)
-device->dev.dma_mask = parent->dma_mask;
-if (!device->dev.coherent_dma_mask)
-device->dev.coherent_dma_mask =
-parent->coherent_dma_mask;
+if (!device->dev.dma_mask) {
+if (parent)
+device->dev.dma_mask = parent->dma_mask;
+else
+WARN_ON_ONCE(true);
+}
+if (!device->dev.coherent_dma_mask) {
+if (parent)
+device->dev.coherent_dma_mask =
+parent->coherent_dma_mask;
+else
+WARN_ON_ONCE(true);
+}
} else {
 *
 /*
 * The caller did not provide custom DMA operations. Use the
 * DMA mapping operations of the parent device.
 */
+WARN_ON_ONCE(!parent);
device->dma_device = parent;
}

@@ -526,14 +535,14 @@
ret = device->query_device(device, &device->attrs, &uhw);
if (ret) {
 pr_warn("Couldn't query the device attributes\n");
-goto cache_cleanup;
+goto cg_cleanup;
}

ret = ib_device_register_sysfs(device, port_callback);
if (ret) {
pr_warn("Couldn't register device %s with driver model\n", device->name);
-goto cache_cleanup;
+goto cg_cleanup;
}

device->reg_state = IB_DEV_REGISTERED;
@@ -549,6 +558,8 @@
 mutex_unlock(&device_mutex);
 return 0;

+cg_cleanup:
+ib_device_unregister_rdmacg(device);
 cache_cleanup:
 ib_cache_cleanup_one(device);
 ib_cache_release_one(device);
@@ -588,8 +599,8 @@
 }
 up_read(&lists_rwlock);

-ib_device_unregister_rdmacg(device);
 ib_device_unregister_sysfs(device);
+ib_device_unregister_rdmacg(device);

 mutex_unlock(&device_mutex);
@@ -1192,10 +1203,19 @@
 goto err;
 }

+ib_comp_unbound_wq =
 +alloc_workqueue("ib-comp-unb-wq",
 +WQ_UNBOUND | WQ_HIGHPRI | WQ_MEM_RECLAIM |
 +WQ_SYSFS, WQ_UNBOUND_MAX_ACTIVE);
+if (!ib_comp_unbound_wq) {
+ret = -ENOMEM;
+goto err_comp;
+}
+
 ret = class_register(&ib_class);
 if (ret) {
 pr_warn("Couldn't create InfiniBand device class\n");
-goto err_comp;
+goto err_comp_unbound;
 }

 ret = rdma_nl_init();
@@ -1244,6 +1264,8 @@
rdma_nl_exit();
err_sysfs:
class_unregister(&ib_class);
+err_comp_unbound:
+destroy_workqueue(ib_comp_unbound_wq);
err_comp:
destroy_workqueue(ib_comp_wq);
err:
@@ -1262,6 +1284,7 @@
addr_cleanup();
rdma_nl_exit();
class_unregister(&ib_class);
+destroy_workqueue(ib_comp_unbound_wq);
destroy_workqueue(ib_comp_wq);
/* Make sure that any pending umem accounting work is done. */
destroy_workqueue(ib_wq);
--- linux-4.15.0.orig/drivers/infiniband/core/iwcm.c
+++ linux-4.15.0/drivers/infiniband/core/iwcm.c
@@ -158,8 +158,10 @@
{
struct list_head *e, *tmp;

- list_for_each_safe(e, tmp, &cm_id_priv->work_free_list)
+ list_for_each_safe(e, tmp, &cm_id_priv->work_free_list) {
+ list_del(e);
kfree(list_entry(e, struct iwcm_work, free_list));
+}

static int alloc_work_entries(struct iwcm_id_private *cm_id_priv, int count)
@@ -1171,29 +1173,34 @@
ret = iwpm_init(RDMA_NL_IWCM);
if (ret)
- pr_err("iw_cm: couldn't init iwpm\n");
-else
- rdma_nl_register(RDMA_NL_IWCM, iwcm_nl_cb_table);
+return ret;
+ iwcm_wq = alloc_ordered_workqueue("iw_cm_wq", 0);
if (!iwcm_wq)
- return -ENOMEM;
+ goto err_alloc;

iwcm_ctl_table_hdr = register_net_sysctl(&init_net, "net/iw_cm",
iwcm_ctl_table);
if (!iwcm_ctl_table_hdr)
pr_err("iw_cm: couldn't register syscall paths\n");
-destroy_workqueue(iwcm_wq);
-return -ENOMEM;
+goto err_sysctl;
}

+rdma_nl_register(RDMA_NL_IWCM, iwcm_nl_cb_table);
return 0;
+
+err_sysctl:
+destroy_workqueue(iwcm_wq);
+err_alloc:
+iwpm_exit(RDMA_NL_IWCM);
+return -ENOMEM;
}

static void __exit iw_cm_cleanup(void)
{
+rdma_nl_unregister(RDMA_NL_IWCM);
unregister_net_sysctl_table(iwcm_ctl_table_hdr);
destroy_workqueue(iwcm_wq);
-rdma_nl_unregister(RDMA_NL_IWCM);
iwpm_exit(RDMA_NL_IWCM);
}

--- linux-4.15.0.orig/drivers/infiniband/core/iwpm_util.c
+++ linux-4.15.0/drivers/infiniband/core/iwpm_util.c
@@ -114,7 +114,7 @@
     struct sockaddr_storage *mapped_sockaddr,
     u8 nl_client)
 {
-struct hlist_head *hash_bucket_head;
+struct hlist_head *hash_bucket_head = NULL;
     struct iwpm_mapping_info *map_info;
     unsigned long flags;
     ret = -EINVAL;
@@ -142,6 +142,9 @@
 }
 }

spin_unlock_irqrestore(&iwpm_mapinfo_lock, flags);
+
+if (!hash_bucket_head)
+kfree(map_info);
+return ret;
}

@@ -654,6 +657,7 @@
 skb_num++;
spin_lock_irqsave(&iwpm_mapinfo_lock, flags);
+ret = -EINVAL;
for (i = 0; i < IWPM_MAPINFO_HASH_SIZE; i++) {
    hlist_for_each_entry(map_info, &iwpm_hash_bucket[i],
        hlist_node) {
--- linux-4.15.0.orig/drivers/infiniband/core/mad.c
+++ linux-4.15.0/drivers/infiniband/core/mad.c
@@ -60,7 +60,7 @@
 MODULE_PARM_DESC(recv_queue_size, "Size of receive queue in number of work requests");

 static struct list_head ib_mad_port_list;
- static u32 ib_mad_client_id = 0;
+ static atomic_t ib_mad_client_id = ATOMIC_INIT(0);

 /* Port list lock */
 static DEFINE_SPINLOCK(ib_mad_port_list_lock);
@@ -217,30 +217,30 @@
 /* Validate parameters */
 qpn = get_spl_qp_index(qp_type);
 if (qpn == -1) {
- dev_notice(&device->dev,
- "ib_register_mad_agent: invalid QP Type %d\n",
- qpn_type);
+ dev_dbg_ratelimited(&device->dev, "%s: invalid QP Type %d\n",
+ __func__, qpn_type);
 goto error1;
 }

 if (rmpp_version && rmpp_version != IB_MGMT_RMPP_VERSION) {
- dev_notice(&device->dev,
- "ib_register_mad_agent: invalid RMPP Version %u\n",
- rmpp_version);
+ dev_dbg_ratelimited(&device->dev, "%s: invalid RMPP Version %u\n",
+ __func__, rmpp_version);
 goto error1;
 }

 /* Validate MAD registration request if supplied */
 if (mad_reg_req) {
 if (mad_reg_req->mgmt_class_version >= MAX_MGMT_VERSION) {
- dev_notice(&device->dev,
- "ib_register_mad_agent: invalid Class Version %u\n",
- mad_reg_req->mgmt_class_version);
+ dev_dbg_ratelimited(&device->dev, "%s: invalid Class Version %u\n",
+ __func__, mad_reg_req->mgmt_class_version);
 }
goto error1;
}
if (!recv_handler) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: no recv_handler\n");
    dev_dbg_ratelimited(&device->dev,
        "%s: no recv_handler", __func__); 
    goto error1;
}
if (mad_reg_req->mgmt_class >= MAX_MGMT_CLASS) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: Invalid Mgmt Class 0x%x
", mad_reg_req->mgmt_class);
    dev_dbg_ratelimited(&device->dev,
        "%s: Invalid Mgmt Class 0x%x
", __func__, mad_reg_req->mgmt_class);
    goto error1;
} else if (mad_reg_req->mgmt_class == 0) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: Invalid Mgmt Class 0
" );
    dev_dbg_ratelimited(&device->dev,
        "%s: Invalid Mgmt Class 0
", __func__); 
    goto error1;
} else if (is_vendor_class(mad_reg_req->mgmt_class)) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: Invalid Mgmt Class 0x%\n");
    dev_dbg_ratelimited(&device->dev,
        "%s: Invalid Mgmt Class 0\n", __func__); 
    goto error1;
} else if (is_vendor_oui(mad_reg_req->oui)) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: No OUI specified for class 0x%\n");
    dev_dbg_ratelimited(&device->dev,
        "%s: No OUI specified for class 0x\n", __func__);
    goto error1;
}
/* * Class 0 is reserved in IBA and is used for
   * aliasing of IB_MGMT_CLASS_SUBN_DIRECTED_ROUTE
*/
if (is_vendor_oui(mad_reg_req->oui)) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: No OUI specified for class 0x%\n");
    dev_dbg_ratelimited(&device->dev,
        "%s: No OUI specified for class 0x\n", __func__);
    goto error1;
}
/* Make sure class supplied is consistent with RMPP */
if (!ib_is_mad_class_rmpp(mad_reg_req->mgmt_class)) {
    if (rmpp_version) {
        dev_notice(&device->dev,
            "ib_register_mad_agent: RMPP version for non-RMPP class 0x%x\n",
            mad_reg_req->mgmt_class);
        dev_dbg_ratelimited(&device->dev,
            "%s: RMPP version for non-RMPP class 0x%x\n",
            __func__, mad_reg_req->mgmt_class);
        goto error1;
    }
}

IB_MGMT_CLASS_SUBN_LID_ROUTED) &&
    (mad_reg_req->mgmt_class !=
    IB_MGMT_CLASS_SUBN_DIRECTED_ROUTE)) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: Invalid SM QP type: class 0x%x\n",
        mad_reg_req->mgmt_class);
    dev_dbg_ratelimited(&device->dev,
        "%s: Invalid SM QP type: class 0x%x\n",
        __func__, mad_reg_req->mgmt_class);
    goto error1;
}
}

IB_MGMT_CLASS_SUBN_LID_ROUTED) ||
    (mad_reg_req->mgmt_class ==
    IB_MGMT_CLASS_SUBN_DIRECTED_ROUTE)) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: Invalid GS QP type: class 0x%x\n",
        mad_reg_req->mgmt_class);
    dev_dbg_ratelimited(&device->dev,
        "%s: Invalid GS QP type: class 0x%x\n",
        __func__, mad_reg_req->mgmt_class);
    goto error1;
}
}

/* Validate device and port */
port_priv = ib_get_mad_port(device, port_num);
if (!port_priv) {
    dev_notice(&device->dev,
        "ib_register_mad_agent: Invalid port %d\n",
        port_num);
    dev_dbg_ratelimited(&device->dev, "%s: Invalid port %d\n",
        __func__, port_num);
}}
ret = ERR_PTR(-ENODEV);
goto error1;
}
/* Verify the QP requested is supported. For example, Ethernet devices */
/* will not have QP0 */
/* Verify the QP requested is supported. For example, Ethernet devices */
/* will not have QP0. */
if (!port_priv->qp_info[qpn].qp) {
	dev_notice(&device->dev,
			"ib_register_mad_agent: QP %d not supported\n", qpn);
+dev_dbg_ratelimited(&device->dev,"%s: QP %d not supported\n",
+				__func__, qpn);
ret = ERR_PTR(-EPROTONOSUPPORT);
goto error1;
}
@@ -378,7 +380,7 @@}
spin_lock_irqsave(&port_priv->reg_lock, flags);
-mad_agent_priv->agent.hi_tid = ++ib_mad_client_id;
+mad_agent_priv->agent.hi_tid = atomic_inc_return(&ib_mad_client_id);
/*
 * Make sure MAD registration (if supplied)
 @@ -594,10 +596,10 @@
 spin_unlock_irqrestore(&port_priv->reg_lock, flags);

 flush_workqueue(port_priv->wq);
-ib_cancel_rmpp_recvs(mad_agent_priv);

deref_mad_agent(mad_agent_priv);
wait_for_completion(&mad_agent_priv->comp);
+ib_cancel_rmpp_recvs(mad_agent_priv);
ib_mad_agent_security_cleanup(&mad_agent_priv->agent);

@@ -1558,7 +1560,8 @@}
			BUG_ON(!*method);
+if (!*method)
+goto error3;
goto check_in_use;
}
vclass[i]) {
    method = &(*vendor_table)->vendor_class[vclass[0]]->method_table[i];
    BUG_ON(*method);
    /* Allocate method table for this OUI */
    if ((ret = allocate_method_table(method)))
        goto error3;
    if (!*method) {
        ret = allocate_method_table(method);
        if (ret)
            goto error3;
    }
    memcpy((*vendor_table)->vendor_class[vclass[0]]->oui[i],
           mad_reg_req->oui, 3);
    goto check_in_use;
}

DMA_FROM_DEVICE);
if (unlikely(ib_dma_mapping_error(qp_info->port_priv->device,
                                  sg_list.addr))) {
    kfree(mad_priv);
    ret = -ENOMEM;
    break;
}

port_priv->cq = ib_alloc_cq(port_priv->device, port_priv, cq_size, 0,
                           IB_POLL_WORKQUEUE);
if (IS_ERR(port_priv->cq)) {
    dev_err(&device->dev, "Couldn't create ib_mad CQ\n");
    ret = PTR_ERR(port_priv->cq);
    goto error3;
}
port_priv->pd = ib_alloc_pd(device, 0);
if (IS_ERR(port_priv->pd)) {
    dev_err(&device->dev, " Couldn't create ib_mad PD\n");
    ret = PTR_ERR(port_priv->pd);
    goto error3;
}
port_priv->pd = ib_alloc_pd(device, 0);
if (IS_ERR(port_priv->pd)) {
    dev_err(&device->dev, " Couldn't create ib_mad PD\n");
    ret = PTR_ERR(port_priv->pd);
    goto error3;
}
port_priv->cq = ib_alloc_cq(port_priv->device, port_priv, cq_size, 0,
                        IB_POLL_UNBOUND_WORKQUEUE);
if (IS_ERR(port_priv->cq)) {
    dev_err(&device->dev, " Couldn't create ib_mad CQ\n");
    ret = PTR_ERR(port_priv->cq);
}
goto error4;
}

@@ -3221,11 +3227,11 @@
error7:
destroy_mad_qp(&port_priv->qp_info[0]);
error6:
-ib_dealloc_pd(port_priv->pd);
-error4:
ib_free_cq(port_priv->cq);
cleanup_recv_queue(&port_priv->qp_info[1]);
cleanup_recv_queue(&port_priv->qp_info[0]);
+error4:
+ib_dealloc_pd(port_priv->pd);
error3:
kfree(port_priv);

@@ -3255,8 +3261,8 @@
destroy_workqueue(port_priv->wq);
destroy_mad_qp(&port_priv->qp_info[1]);
destroy_mad_qp(&port_priv->qp_info[0]);
-ib_dealloc_pd(port_priv->pd);
-ib_free_cq(port_priv->cq);
+ib_dealloc_pd(port_priv->pd);
cleanup_recv_queue(&port_priv->qp_info[1]);
cleanup_recv_queue(&port_priv->qp_info[0]);
/* XXX: Handle deallocation of MAD registration tables */
--- linux-4.15.0.orig/drivers/infiniband/core/multicast.c
+++ linux-4.15.0/drivers/infiniband/core/multicast.c
@@ -724,21 +724,19 @@
{
  int ret;
  u16 gid_index;
  -u8 p;
  -if (rdma_protocol_roce(device, port_num)) {
  -ret = ib_find_cached_gid_by_port(device, &rec->port_gid,
  -  gid_type, port_num,
  -  ndev,
  -  &gid_index);
  -} else if (rdma_protocol_ib(device, port_num)) {
  -ret = ib_find_cached_gid(device, &rec->port_gid,
  -  IB_GID_TYPE_IB, NULL, &p,
  -  &gid_index);
  -} else {
  -ret = -EINVAL;
  -}
  */
  GID table is not based on the netdevice for IB link layer,
if (rdma_protocol_ib(device, port_num))
    ndev = NULL;
else if (!rdma_protocol_roce(device, port_num))
    return -EINVAL;
ret = ib_find_cached_gid_by_port(device, &rec->port_gid,
    gid_type, port_num,
    ndev,
    &gid_index);
if (ret)
    return ret;

--- linux-4.15.0.orig/drivers/infiniband/core/rdma_core.c
+++ linux-4.15.0/drivers/infiniband/core/rdma_core.c
@@ -196,7 +196,15 @@
 goto free;
 }

-uvverbs_uobject_get(uobj);
+/
+ * The idr_find is guaranteed to return a pointer to something that
+ * isn't freed yet, or NULL, as the free after idr_remove goes through
+ * kfree_rcu(). However the object may still have been released and
+ * kfree() could be called at any time.
+ */
+if (!kref_get_unless_zero(&uobj->ref))
+    uobj = ERR_PTR(-ENOENT);
+
free:
    rcu_read_unlock();
    return uobj;
@@ -399,13 +407,13 @@
return ret;
 }

-static void lockdep_check(struct ib_uobject *uobj, bool exclusive)
+static void assert_uverbs_usecnt(struct ib_uobject *uobj, bool exclusive)  
{  
    #ifdef CONFIG_LOCKDEP
    if (exclusive)
-        WARN_ON(atomic_read(&uobj->usecnt) > 0);  
+        WARN_ON(atomic_read(&uobj->usecnt) != -1);  
    else
-        WARN_ON(atomic_read(&uobj->usecnt) == -1);  
+        WARN_ON(atomic_read(&uobj->usecnt) <= 0);  
#endif

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WARN(true, "ib_uverbs: Cleanup is running while removing an uobject\n");
return 0;
}
-	lockdep_check(uobj, true);
+assert_uverbs_usecnt(uobj, true);
ret = _rdma_remove_commit_uobject(uobj, RDMA_REMOVE_DESTROY);
up_read(&ucontext->cleanup_rwlock);
WARN(true, "ib_uverbs: Cleanup is running while removing an uobject\n");
return 0;
}
-	lockdep_check(uobject, true);
+assert_uverbs_usecnt(uobject, true);
ret = uobject->type->type_class->remove_commit(uobject,
    RDMA_REMOVE_DESTROY);
if (ret)
-    return ret;
+    goto out;

uobject->type = &null_obj_type;
+out:
up_read(&ucontext->cleanup_rwlock);
-    return 0;
+    return ret;
}

static void alloc_commit_idr_uobject(struct ib_uobject *uobj)
@
    lockdep_check(uobj, exclusive);
-    uobj->type->type_class->lookup_put(uobj, exclusive);
+    assert_uverbs_usecnt(uobj, exclusive);
/*
 * In order to unlock an object, either decrease its usecnt for
 * read access or zero it in case of exclusive access. See
 @
-    atomic_set(&uobj->usecnt, 0);
else
atomic_set(&uobj->usecnt, 0);
+    uobj->type->type_class->lookup_put(uobj, exclusive);
uverbs_uobject_put(uobj);

void rdma_lookup_put_uobject(struct ib_uobject *uobj, bool exclusive)
{
    lockdep_check(uobj, exclusive);
-    uobj->type->type_class->lookup_put(uobj, exclusive);
+    assert_uverbs_usecnt(uobj, exclusive);
/*
 * In order to unlock an object, either decrease its usecnt for
 * read access or zero it in case of exclusive access. See
 @
-    atomic_set(&uobj->usecnt, 0);
else
atomic_set(&uobj->usecnt, 0);
+    uobj->type->type_class->lookup_put(uobj, exclusive);
uverbs_uobject_put(uobj);
ret = ib_map_mr_sg(reg->mr, sg, nents, &offset, PAGE_SIZE);
if (ret < nents) {
    +if (ret < 0 || ret < nents) {
        ib_mr_pool_put(qp, &qp->rdma_mrs, reg->mr);
        return -EINVAL;
    }

    --- linux-4.15.0.orig/drivers/infiniband/core/sa_query.c
    +++ linux-4.15.0/drivers/infiniband/core/sa_query.c
    @@ -1078,7 +1078,7 @@
    }
    
    static inline int ib_nl_is_good_resolve_resp(const struct nlmsghdr *nlh)
    @@ -1149,7 +1149,7 @@
    }
    
    resp_out:
    -return skb->len;
    +return 0;
    }
    
    static void free_sm_ah(struct kref *kref)
    @@ -1263,7 +1263,6 @@
    &init_net
    };
    union {
        -struct sockaddr __sockaddr;
        struct sockaddr_in __sockaddr_in;
        struct sockaddr_in6 __sockaddr_in6;
    } sgid_addr, dgid_addr;
    @@ -1271,12 +1270,13 @@
    if (!device->get_netdev)
    return -EOPNOTSUPP;
    -rdma_gid2ip(&sgid_addr.__sockaddr, &rec->sgid);
    -rdma_gid2ip(&dgid_addr.__sockaddr, &rec->dgid);
    +rdma_gid2ip(struct sockaddr *)&sgid_addr, &rec->sgid);
/* validate the route */
.ret = rdma_resolve_ip_route(&sgid_addr._sockaddr,
 - &dgid_addr._sockaddr, &dev_addr);
+ret = rdma_resolve_ip_route((struct sockaddr *)&sgid_addr,
+ (struct sockaddr *)&dgid_addr,
+ &dev_addr);
if (ret)
return ret;

@@ -1291,10 +1291,9 @@
resolved_dev = dev_get_by_index(dev_addr.net,
 dev_addr.bound_dev_if);
-if (resolved_dev->flags & IFF_LOOPBACK) {
- dealloc_put(resolved_dev);
- resolved_dev = idev;
- dealloc_hold(resolved_dev);
+if (!resolved_dev) {
+ dealloc_put(idev);
+return -ENODEV;
}
ndev = ib_get_ndev_from_path(rec);
rcu_read_lock();
--- linux-4.15.0.orig/drivers/infiniband/core/security.c
+++ linux-4.15.0/drivers/infiniband/core/security.c
@@ -338,27 +338,20 @@
if (!new_pps)
return NULL;

-if (qp_attr_mask & (IB_QP_PKEY_INDEX | IB_QP_PORT)) {
- if (!qp_pps) {
- new_pps->main.port_num = qp_attr->port_num;
- new_pps->main.pkey_index = qp_attr->pkey_index;
- } else {
- new_pps->main.port_num = (qp_attr_mask & IB_QP_PORT) ?
- qp_attr->port_num :
- qp_pps->main.port_num;
- new_pps->main.pkey_index =
- ((qp_attr_mask & IB_QP_PKEY_INDEX) ?
- qp_attr->pkey_index :
- qp_pps->main.pkey_index);
- }
- new_pps->main.state = IB_PORT_PKEY_VALID;
- } else if (qp_pps) {
- if (qp_attr_mask & IB_QP_PORT)
new_pps->main.port_num = qp_attr->port_num;
+else if (qp_pps)
new_pps->main.port_num = qp_pps->main.port_num;
+
+if (qp_attr_mask & IB_QP_PKEY_INDEX)
new_pps->main.pkey_index = qp_attr->pkey_index;
+else if (qp_pps)
new_pps->main.pkey_index = qp_pps->main.pkey_index;
-if (qp_pps->main.state != IB_PORT_PKEY_NOT_VALID)
-new_pps->main.state = IB_PORT_PKEY_VALID;
-
+if (((qp_attr_mask & IB_QP_PKEY_INDEX) &&
+ (qp_attr_mask & IB_QP_PORT)) ||
+ (qp_pps && qp_pps->main.state != IB_PORT_PKEY_NOT_VALID))
+new_pps->main.state = IB_PORT_PKEY_VALID;

if (qp_attr_mask & IB_QP_ALT_PATH) {
new_pps->alt.port_num = qp_attr->alt_port_num;
@@ -715,16 +708,20 @@
agent->device->name,
agent->port_num);
if (ret)
-return ret;
+goto free_security;

agent->lsm_nb.notifier_call = ib_mad_agent_security_change;
ret = register_lsm_notifier(&agent->lsm_nb);
if (ret)
-return ret;
+goto free_security;

agent->smp_allowed = true;
agent->lsm_nb_reg = true;
return 0;
+
+free_security:
+security_ib_free_security(agent->security);
+return ret;
}

void ib_mad_agent_security_cleanup(struct ib_mad_agent *agent)
@@ -732,9 +729,10 @@
if (!rdma_protocol_ib(agent->device, agent->port_num))
return;

-security_ib_free_security(agent->security);
if (agent->lsm_nb_reg)
unregister_lsm_notifier(&agent->lsm_nb);
+
+security_ib_free_security(agent->security);
}

int ib_mad_enforce_security(struct ib_mad_agent_private *map, u16 pkey_index)
--- linux-4.15.0.orig/drivers/infiniband/core/sysfs.c
+++ linux-4.15.0/drivers/infiniband/core/sysfs.c
@@ -503,7 +503,7 @@
 ret = get_perf_mad(p->ibdev, p->port_num, tab_attr->attr_id, &data,
 40 + offset / 8, sizeof(data));
 if (ret < 0)
-  return sprintf(buf, "N/A (no PMA)\n");
+  return ret;

 switch (width) {
   case 4:
@@ -1026,10 +1026,12 @@
 goto err_put;
 }

-p->pma_table = get_counter_table(device, port_num);
-ret = sysfs_create_group(&p->kobj, p->pma_table);
-if (ret)
-goto err_put_gid_attrs;
+if (device->process_mad) {
+  p->pma_table = get_counter_table(device, port_num);
+  ret = sysfs_create_group(&p->kobj, p->pma_table);
+  if (ret)
+    goto err_put_gid_attrs;
+}

-p->gid_group.name  = "gids";
-p->gid_group.attrs = alloc_group_attrs(show_port_gid, attr.gid_tbl_len);
@@ -1142,7 +1144,8 @@
 p->gid_group.attrs = NULL;
 err_remove_pma:
-  sysfs_remove_group(&p->kobj, p->pma_table);
+  if (p->pma_table)
+    sysfs_remove_group(&p->kobj, p->pma_table);

 err_put_gidattrs:
  kobject_put(&p->gid_attr_group->kobj);
@@ -1254,7 +1257,9 @@
 kfree(port->hw_stats);
 free_hsag(&port->kobj, port->hw_stats_ag);
 }
sysfs_remove_group(p, port->pma_table);
+
+if (port->pma_table)
+sysfs_remove_group(p, port->pma_table);
sysfs_remove_group(p, &port->pkey_group);
sysfs_remove_group(p, &port->gid_group);
sysfs_remove_group(&port->gid_attr_group->kobj,
@@ -1276,7 +1281,6 @@
int ret;
int i;

-WARN_ON_ONCE(!device->dev.parent);
ret = dev_set_name(class_dev, "%s", device->name);
if (ret)
return ret;
--- linux-4.15.0.orig/drivers/infiniband/core/ucm.c
+++ linux-4.15.0/drivers/infiniband/core/ucm.c
@@ -46,6 +46,8 @@
#include <linux/slab.h>
+#include <linux/nospec.h>

#include <linux/uaccess.h>
#include <rdma/ib.h>
@@ -1118,6 +1120,7 @@
if (hdr.cmd >= ARRAY_SIZE(ucm_cmd_table))
return -EINVAL;
+hdr.cmd = array_index_nospec(hdr.cmd, ARRAY_SIZE(ucm_cmd_table));

if (hdr.in + sizeof(hdr) > len)
return -EINVAL;
--- linux-4.15.0.orig/drivers/infiniband/core/ucma.c
+++ linux-4.15.0/drivers/infiniband/core/ucma.c
@@ -44,6 +44,8 @@
#include <rdma/rdma_user_cm.h>
#include <rdma/rdma_cm.h>
@@ -87,6 +89,7 @@
struct ucma_file*file;
struct rdma_cm_id *cm_id;
+struct mutex mutex;
u64 uid;

struct list_head list;
@@ -124,6 +127,8 @@
static DEFINE_IDR(ctx_idr);
static DEFINE_IDR(multicast_idr);

+static const struct file_operations ucma_fops;
+
static inline struct ucma_context *_ucma_find_context(int id,
 struct ucma_file *file)
{
@@ -132,7 +137,7 @@
 ctx = idr_find(&ctx_idr, id);
 if (!ctx)
 ctx = ERR_PTR(-ENOENT);
-else if (ctx->file != file)
+else if (ctx->file != file || !ctx->cm_id)
 ctx = ERR_PTR(-EINVAL);
 return ctx;
}
@@ -194,6 +199,7 @@
 init_completion(&ctx->comp);
 INIT_LIST_HEAD(&ctx->mc_list);
 ctx->file = file;
+mutex_init(&ctx->mutex);

mutex_lock(&mut);
ctx->id = idr_alloc(&ctx_idr, ctx, 0, 0, GFP_KERNEL);
@@ -218,7 +224,7 @@
 return NULL;

mutex_lock(&mut);
-mc->id = idr_alloc(&multicast_idr, mc, 0, 0, GFP_KERNEL);
+mc->id = idr_alloc(&multicast_idr, NULL, 0, 0, GFP_KERNEL);
mutex_unlock(&mut);
if (mc->id < 0)
goto error;
@@ -456,6 +462,7 @@
 struct rdma_ucm_create_id cmd;
 struct rdma_ucm_create_id_resp resp;
 struct ucma_context *ctx;
 struct rdma_cm_id *cm_id;
 enum ib_qp_type qp_type;
 int ret;
@ @ -476,10 +483,10 @@
return -ENOMEM;

cx->uid = cmd.uid;
-ctx->cm_id = rdma_create_id(current->nsproxy->net_ns, 
-    ucma_event_handler, ctx, cmd.ps, qp_type);
-    if (IS_ERR(ctx->cm_id)) {
-        ret = PTR_ERR(ctx->cm_id);
-        +cm_id = rdma_create_id(current->nsproxy->net_ns, 
-            ucma_event_handler, ctx, cmd.ps, qp_type);
-        +ret = PTR_ERR(cm_id);
-        goto err1;
-    }
-    ctx->cm_id = cm_id;
-    return 0;
+
+ctx->cm_id = cm_id;
+return 0;

e := -EFAULT;
   goto err2;
+
+ctx->cm_id = cm_id;
+return 0;

er2:
-rdma_destroy_id(ctx->cm_id);
+rdma_destroy_id(cm_id);
err1:
mutex_lock(&mut);
    idr_remove(&ctx_idr, ctx->id);
mutex_unlock(&mut);
+list_del(&ctx->list);
+mutex_unlock(&file->mut);
kfree(ctx);
return ret;
}@ @ -518,6 +530,7 @@
{
struct ucma_event *uevent, *tmp;
+
+rdma_lock_handler(mc->ctx->cm_id);
list_for_each_entry_safe(uevent, tmp, &mc->ctx->file->event_list, list) {
    if (uevent->mc != mc)
        continue;
}@ @ -525,6 +538,7 @@
    list_del(&uevent->list);
kfree(uevent);
}
// -554,6 +568,7 @@
list_move_tail(&uevent->list, &list);
} list_del(&ctx->list);
+events_reported = ctx->events_reported;
mutex_unlock(&ctx->file->mut);

list_for_each_entry_safe(uevent, tmp, &list, list) {
@@ -563,7 +578,7 @@
kfree(uevent);
}

-events_reported = ctx->events_reported;
+mutex_destroy(&ctx->mutex);
kfree(ctx);
return events_reported;
}
@@ -626,11 +641,17 @@
if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
    return -EFAULT;

+if (!rdma_addr_size_in6(&cmd.addr))
+return -EINVAL;
+
ctx = ucma_get_ctx(file, cmd.id);
if (IS_ERR(ctx))
    return PTR_ERR(ctx);
@@ -639,22 +660,23 @@
    ret = rdma_bind_addr(ctx->cm_id, (struct sockaddr *) &cmd.addr);
+mutex_unlock(&ctx->mutex);
+ucma_put_ctx(ctx);
return ret;
}@ -639,22 +660,23 @@
    int in_len, int out_len)
{
    struct rdma_ucm_bind cmd;
-struct sockaddr *addr;
+struct ucma_context *ctx;

    if (copy_from_user(&cmd, inbuf, sizeof(cmd)))

return -EFAULT;

addr = (struct sockaddr *)&cmd.addr;
-if (cmd.reserved || !cmd.addr_size || (cmd.addr_size != rdma_addr_size(addr)))
+if (cmd.reserved || !cmd.addr_size ||
     cmd.addr_size != rdma_addr_size_kss(&cmd.addr))
return -EINVAL;

cxt = ucma_get_ctx(file, cmd.id);
if (IS_ERR(cxt))
    return PTR_ERR(cxt);
-
+mutex_lock(&cxt->mutex);
ret = rdma_bind_addr(cxt->cm_id, addr);
+mutex_unlock(&cxt->mutex);
    ucma_put_ctx(cxt);
return ret;
}
@@ -670,13 +692,18 @@
if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
    return -EFAULT;

+if ((cmd.src_addr.sin6_family && !rdma_addr_size_in6(&cmd.src_addr)) ||
    !rdma_addr_size_in6(&cmd.dst_addr))
+    return -EINVAL;
+
  cxt = ucma_get_ctx(file, cmd.id);
  if (IS_ERR(cxt))
      return PTR_ERR(cxt);
+mutex_lock(&cxt->mutex);
    ret = rdma_resolve_addr(cxt->cm_id, (struct sockaddr *)&cmd.src_addr,
             (struct sockaddr *)&cmd.dst_addr, cmd.timeout_ms);
+mutex_unlock(&cxt->mutex);
    ucma_put_ctx(cxt);
    return ret;
}
@@ -686,24 +713,25 @@
  int in_len, int out_len)
{
  struct rdma_ucm_resolve_addr cmd;
  -struct sockaddr *src, *dst;
  struct ucma_context *ctx;
  int ret;
if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
return -EFAULT;

-src = (struct sockaddr *)&cmd.src_addr;
-dst = (struct sockaddr *)&cmd.dst_addr;
-if (cmd.reserved || (cmd.src_size & (cmd.src_size != rdma_addr_size(src)))
   || !cmd.dst_size || (cmd.dst_size != rdma_addr_size(dst)))
+if (cmd.reserved ||
   (cmd.src_size & (cmd.src_size != rdma_addr_size_kss(&cmd.src_addr))) ||
   !cmd.dst_size || (cmd.dst_size != rdma_addr_size_kss(&cmd.dst_addr)))
return -EINVAL;

ctx = ucma_get_ctx(file, cmd.id);
if (IS_ERR(ctx))
return PTR_ERR(ctx);

-ret = rdma_resolve_addr(ctx->cm_id, src, dst, cmd.timeout_ms);
+mutex_lock(&ctx->mutex);
+ret = rdma_resolve_addr(ctx->cm_id, (struct sockaddr *)&cmd.src_addr,
+(struct sockaddr *)&cmd.dst_addr, cmd.timeout_ms);
+mutex_unlock(&ctx->mutex);
ucma_put_ctx(ctx);
return ret;
}

@@ -723,7 +751,9 @@
-if (IS_ERR(ctx))
return PTR_ERR(ctx);

+mutex_lock(&ctx->mutex);
ret = rdma_resolve_route(ctx->cm_id, cmd.timeout_ms);
+mutex_unlock(&ctx->mutex);
ucma_put_ctx(ctx);
return ret;
}

@@ -812,6 +842,7 @@
-if (IS_ERR(ctx))
return PTR_ERR(ctx);

+mutex_lock(&ctx->mutex);
memset(&resp, 0, sizeof resp);
addr = (struct sockaddr *)&ctx->cm_id->route.addr.src_addr;
memcpy(&resp.src_addr, addr, addr->sa_family == AF_INET ?
@@ -835,6 +866,7 @@
ucma_copy_iw_route(&resp, &ctx->cm_id->route);

out:
+mutex_unlock(&ctx->mutex);
if (copy_to_user((void __user *)(unsigned long)cmd.response,
&resp, sizeof(resp)))
ret = -EFAULT;
@@ -904,13 +936,14 @@
resp->path_data[i].flags = IB_PATH_GMP | IB_PATH_PRIMARY |
    IB_PATH_BIDIRECTIONAL;
-if (rec->rec_type == SA_PATH_REC_TYPE_IB) {
-ib_sa_pack_path(rec, &resp->path_data[i].path_rec);
-} else {
+if (rec->rec_type == SA_PATH_REC_TYPE_OPA) {
struct sa_path_rec ib;

sa_convert_path_opa_to_ib(&ib, rec);
ib_sa_pack_path(&ib, &resp->path_data[i].path_rec);
+
+} else {
+ib_sa_pack_path(rec, &resp->path_data[i].path_rec);
}
}

@@ -985,6 +1018,7 @@
if (IS_ERR(ctx))
    return PTR_ERR(ctx);
+mutex_lock(&ctx->mutex);
switch (cmd.option) {
    case RDMA_USER_CM_QUERY_ADDR:
        ret = ucma_query_addr(ctx, response, out_len);
@@ -999,6 +1033,7 @@
        ret = -ENOSYS;
        break;
    }
+mutex_unlock(&ctx->mutex);
    ucmacmmeta_put_ctx(ctx);
    return ret;
@@ -1039,7 +1074,9 @@@
    return PTR_ERR(ctx);
    ucma_copy_conn_param(ctx->cm_id, &conn_param, &cmd.conn_param);
+mutex_lock(&ctx->mutex);
    ret = rdma_connect(ctx->cm_id, &conn_param);
+mutex_unlock(&ctx->mutex);
    ucmacmmeta_put_ctx(ctx);
    return ret;
}
if (cmd.conn_param.valid) {
  ucma_copy_conn_param(ctx->cm_id, &conn_param, &cmd.conn_param);
  mutex_lock(&ctx->mutex);
  rdma_lock_handler(ctx->cm_id);
  ret = rdma_accept(ctx->cm_id, &conn_param);
  if (!ret) {
    /* The uid must be set atomically with the handler */
    ctx->uid = cmd.uid;
    mutex_unlock(&ctx->mutex);
  } else {
    mutex_lock(&ctx->mutex);
    rdma_unlock_handler(ctx->cm_id);
    mutex_unlock(&ctx->mutex);
  }
  ret = rdma_accept(ctx->cm_id, NULL);
  rdma_unlock_handler(ctx->cm_id);
  mutex_unlock(&ctx->mutex);
  ucma_put_ctx(ctx);
  return ret;
}
else {
  mutex_lock(&ctx->mutex);
  rdma_lock_handler(ctx->cm_id);
  mutex_unlock(&ctx->mutex);
  rdma_lock_handler(ctx->cm_id);
  ret = rdma_accept(ctx->cm_id, NULL);
  rdma_unlock_handler(ctx->cm_id);
  mutex_unlock(&ctx->mutex);
  ucma_put_ctx(ctx);
  return ret;
}
if (IS_ERR(ctx))
  return PTR_ERR(ctx);
else {
  mutex_lock(&ctx->mutex);
  rdma_unlock_handler(ctx->cm_id);
  mutex_unlock(&ctx->mutex);
  ucma_put_ctx(ctx);
  return PTR_ERR(ctx);
}
else {
  mutex_lock(&ctx->mutex);
  ret = rdma_reject(ctx->cm_id, cmd.private_data, cmd.private_data_len);
  mutex_unlock(&ctx->mutex);
  ucma_put_ctx(ctx);
  return ret;
}
if (IS_ERR(ctx))
  return PTR_ERR(ctx);
return PTR_ERR(ctx);

+mutex_lock(&ctx->mutex);
ret = rdma_disconnect(ctx->cm_id);
+mutex_unlock(&ctx->mutex);
ucma_put_ctx(ctx);
return ret;
}
@@ -1148,14 +1199,24 @@
if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
return -EFAULT;

+if (cmd.qp_state > IB_QPS_ERR)
+return -EINVAL;
+ctx = ucma_get_ctx(file, cmd.id);
if (IS_ERR(ctx))
return PTR_ERR(ctx);

+if (!ctx->cm_id->device) {
+ret = -EINVAL;
+goto out;
+}
+
resp.qp_attr_mask = 0;
memset(&qp_attr, 0, sizeof qp_attr);
qp_attr.qp_state = cmd.qp_state;
+mutex_lock(&ctx->mutex);
ret = rdma_init_qp_attr(ctx->cm_id, &qp_attr, &resp.qp_attr_mask);
+mutex_unlock(&ctx->mutex);
if (ret)
goto out;

@@ -1222,6 +1283,9 @@
if (!optlen)
return -EINVAL;

+if (!ctx->cm_id->device)
+return -EINVAL;
+
memset(&sa_path, 0, sizeof(sa_path));

sa_path.rec_type = SA_PATH_REC_TYPE_IB;
@@ -1231,9 +1295,13 @@
struct sa_path_rec opa;

sa_convert_path_ib_to_opa(&opa, &sa_path);
+mutex_lock(&ctx->mutex);
switch (level) {
    case RDMA_OPTION_ID:
        mutex_lock(&ctx->mutex);
        ret = ucma_set_option_id(ctx, optname, optval, optlen);
        mutex_unlock(&ctx->mutex);
        break;
    case RDMA_OPTION_IB:
        ret = ucma_set_option_ib(ctx, optname, optval, optlen);
        if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
            return -EFAULT;
        if (unlikely(cmd.optlen > KMALLOC_MAX_SIZE))
            return -EINVAL;
        ctx = ucma_get_ctx(file, cmd.id);
        if (IS_ERR(ctx))
            return PTR_ERR(ctx);
        ret = rdma_notify(ctx->cm_id, (enum ib_event_type) cmd.event);
        if (ctx->cm_id->device)
            ret = rdma_notify(ctx->cm_id, (enum ib_event_type)cmd.event);
        mutex_unlock(&ctx->mutex);
}

int ret = rdma_set_ib_paths(ctx->cm_id, &opma, 1);
mutex_unlock(&ctx->mutex);
} else {
    mutex_lock(&ctx->mutex);
    ret = rdma_set_ib_paths(ctx->cm_id, &sa_path, 1);
    mutex_unlock(&ctx->mutex);
}
if (ret)
return ret;
@@ -1266,7 +1334,9 @@

    switch (level) {
        case RDMA_OPTION_ID:
            mutex_lock(&ctx->mutex);
            ret = ucma_set_option_id(ctx, optname, optval, optlen);
            mutex_unlock(&ctx->mutex);
            break;
        case RDMA_OPTION_IB:
            ret = ucma_set_option_ib(ctx, optname, optval, optlen);
            if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
                return -EFAULT;
            if (unlikely(cmd.optlen > KMALLOC_MAX_SIZE))
                return -EINVAL;
            ctx = ucma_get_ctx(file, cmd.id);
            if (IS_ERR(ctx))
                return PTR_ERR(ctx);
            
            struct rdma_ucm_notify cmd;
            struct ucma_context *ctx;
            int ret = -EINVAL;
            if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
                return -EFAULT;
            if (IS_ERR(ctx))
                return PTR_ERR(ctx);

            -ret = rdma_notify(ctx->cm_id, (enum ib_event_type) cmd.event);
            +mutex_lock(&ctx->mutex);
            +if (ctx->cm_id->device)
                +ret = rdma_notify(ctx->cm_id, (enum ib_event_type)cmd.event);
            +mutex_unlock(&ctx->mutex);
            +
ucma_put_ctx(ctx);
return ret;
}
@@ -1342,7 +1419,7 @@
return -ENOSPC;

addr = (struct sockaddr *) &cmd->addr;
-if (!cmd->addr_size || (cmd->addr_size != rdma_addr_size(addr)))
+if (cmd->addr_size != rdma_addr_size(addr))
return -EINVAL;

if (cmd->join_flags == RDMA_MC_JOIN_FLAG_FULLMEMBER)
@@ -1365,8 +1442,10 @@
mc->join_state = join_state;
mc->uid = cmd->uid;
memcpy(&mc->addr, addr, cmd->addr_size);
+mutex_lock(&ctx->mutex);
ret = rdma_join_multicast(ctx->cm_id, (struct sockaddr *)&mc->addr,
-joint_state, mc);
+mutex_unlock(&ctx->mutex);
if (ret)
goto err2;

@@ -1377,12 +1456,18 @@
goto err3;
}

+mutex_lock(&mut);
+idr_replace(&multicast_idr, mc, mc->id);
+mutex_unlock(&mut);
+
+mutex_unlock(&file->mut);
ucma_put_ctx(ctx);
return 0;

err3:
+mutex_lock(&ctx->mutex);
rdma_leave_multicast(ctx->cm_id, (struct sockaddr *) &mc->addr);
+mutex_unlock(&ctx->mutex);
ucma_cleanup_mc_events(mc);
err2:
mutex_lock(&mut);
@@ -1409,7 +1494,10 @@
join_cmd.response = cmd.response;
join_cmd.uid = cmd.uid;
join_cmd.id = cmd.id;
-join_cmd.addr_size = rdma_addr_size((struct sockaddr *) &cmd.addr);
+join_cmd.addr_size = rdma_addr_size_in6(&cmd.addr);
if (!join_cmd.addr_size)
    return -EINVAL;

join_cmd.join_flags = RDMA_MC_JOIN_FLAG_FULLMEMBER;
memcpy(&join_cmd.addr, &cmd.addr, join_cmd.addr_size);

if (copy_from_user(&cmd, inbuf, sizeof(cmd)))
    return -EFAULT;

if (!rdma_addr_size_kss(&cmd.addr))
    return -EINVAL;

return ucma_process_join(file, &cmd, out_len);
}

mc = idr_find(&multicast_idr, cmd.id);
if (!mc)
    mc = ERR_PTR(-ENOENT);
else if (mc->ctx->file != file)
    mc = ERR_PTR(-EINVAL);
else if (!atomic_inc_not_zero(&mc->ctx->ref))
    mc = ERR_PTR(-ENXIO);

mutex_lock(&mc->ctx->mutex);
rdma_leave_multicast(mc->ctx->cm_id, (struct sockaddr *) &mc->addr);
mutex_unlock(&mc->ctx->mutex);
mutex_lock(&mc->ctx->file->mut);
ucma_cleanup_mc_events(mc);
list_del(&mc->list);

return ret;

-static void ucma_lock_files(struct ucma_file *file1, struct ucma_file *file2)
  {
  /* Acquire mutex's based on pointer comparison to prevent deadlock. */
  -if (file1 < file2) {
    -mutex_lock(&file1->mut);
    -mutex_lock_nested(&file2->mut, SINGLE_DEPTH_NESTING);
  } else {
    -mutex_lock(&file2->mut);
  }
-mutex_lock_nested(&file1->mut, SINGLE_DEPTH_NESTING);
-
-
-static void ucma_unlock_files(struct ucma_file *file1, struct ucma_file *file2)
-{  
  if (file1 < file2) {  
    mutex_unlock(&file2->mut);  
    mutex_unlock(&file1->mut);  
  } else {  
    mutex_unlock(&file1->mut);  
    mutex_unlock(&file2->mut);  
  }
  
  }
-
-
-static void ucma_move_events(struct ucma_context *ctx, struct ucma_file *file)
-{  
  struct ucma_event *uevent, *tmp;
  
  list_for_each_entry_safe(uevent, tmp, &ctx->file->event_list, list)
  -if (uevent->ctx == ctx)
  -list_move_tail(&uevent->list, &file->event_list);
  
  }
-
-
-static ssize_t ucma_migrate_id(struct ucma_file *new_file, const char __user *inbuf, int in_len, int out_len)
{
    struct rdma_ucm_migrate_id cmd;
    struct rdma_ucm_migrate_resp resp;
    +struct ucma_event *uevent, *tmp;
    struct ucma_context *ctx;
    +LIST_HEAD(event_list);
    struct fd f;
    struct ucma_file *cur_file;
    int ret = 0;
    @ @ -1527,40 +1591,58 @ @
    f = fdget(cmd.fd);
    if (!f.file)
      return -ENOENT;
    +if (f.file->f_op != &ucma_fops) {
      +ret = -EINVAL;
      +goto file_put;
    }
    +cur_file = f.file->private_data;

    /* Validate current fd and prevent destruction of id. */
    -ctx = ucma_get_ctx(f.file->private_data, cmd.id);
ctx = ucma_get_ctx(cur_file, cmd.id);
if (IS_ERR(ctx)) {
    ret = PTR_ERR(ctx);
    goto file_put;
}

cur_file = ctx->file;
if (cur_file == new_file) {
    resp.events_reported = ctx->events_reported;
    goto response;
}

rdma_lock_handler(ctx->cm_id);

ucma_lock_files(cur_file, new_file);
mutex_lock(&mut);

list_move_tail(&ctx->list, &new_file->ctx_list);
ucma_move_events(ctx, new_file);
if (_ucma_find_context(cmd.id, cur_file) != ctx) {
    mutex_unlock(&mut);
    ret = -ENOENT;
    goto err_unlock;
}
ctx->file = new_file;
mutex_unlock(&mut);
mutex_lock(&new_file->mut);

list_move_tail(&ctx->list, &new_file->ctx_list);
ucma_move_events(ctx, new_file);
if (!ucma_find_context(cmd.id, cur_file) || ctx) {
    mutex_unlock(&mut);
    +list_del(&ctx->list);
    */
    +* At this point lock_handler() prevents addition of new uevents for
    +* this ctx.
    +*/
    +list_for_each_entry_safe(uevent, tmp, &cur_file->event_list, list)
    +if (uevent->ctx == ctx)
    +list_move_tail(&uevent->list, &event_list);
    resp.events_reported = ctx->events_reported;
    mutex_unlock(&cur_file->mut);

    mutex_unlock(&mut);
    ucma_unlock_files(cur_file, new_file);
    mutex_lock(&new_file->mut);
if (hdr.cmd >= ARRAY_SIZE(ucma_cmd_table))
    return -EINVAL;
+hdr.cmd = array_index_nospec(hdr.cmd, ARRAY_SIZE(ucma_cmd_table));

if (hdr.in + sizeof(hdr) > len)
    return -EINVAL;

mutex_lock(&mut);
if (!ctx->closing) {
    mutex_unlock(&mut);
    ucma_put_ctx(ctx);
    wait_for_completion(&ctx->comp);
    /* rdma_destroy_id ensures that no event handlers are
     * inflight for that id before releasing it.
     */
    --- linux-4.15.0.orig/drivers/infiniband/core/umem.c
    +++ linux-4.15.0/drivers/infiniband/core/umem.c
    @ @ -119,20 +119,9 @@
    umem->length    = size;
    umem->address   = addr;
    umem->page_shift = PAGE_SHIFT;
-umem->pid	 = get_task_pid(current, PIDTYPE_PID);
-/*
- * We ask for writable memory if any of the following
- * access flags are set. "Local write" and "remote write"
- * obviously require write access. "Remote atomic" can do
- * things like fetch and add, which will modify memory, and
- * "MW bind" can change permissions by binding a window.
- */
-umem->writable = !!(access &
- (IB_ACCESS_LOCAL_WRITE | IB_ACCESS_REMOTE_WRITE |
- IB_ACCESS_REMOTE_ATOMIC | IB_ACCESS_MW_BIND));
+umem->writable = ib_access_writable(access);

if (access & IB_ACCESS_ON_DEMAND) {
-put_pid(umem->pid);
ret = ib_umem_odp_get(context, umem, access);
if (ret) {
  kfree(umem);
@@ -148,7 +137,6 @@
      page_list = (struct page **) __get_free_page(GFP_KERNEL);
    if (!page_list) {
-      put_pid(umem->pid);
        kfree(umem);
      return ERR_PTR(-ENOMEM);
    }
@@ -231,7 +219,6 @@
    if (ret < 0) {
      if (need_release)
        __ib_umem_release(context->device, umem, 0);
-      put_pid(umem->pid);
        kfree(umem);
      } else
        current->mm->pinned_vm = locked;
@@ -352,7 +338,7 @@
    return -EINVAL;
}

-task = get_pid_task(umem->pid, PIDTYPE_PID);
-put_pid(umem->pid);
+task = get_pid_task(umem->context->tgid, PIDTYPE_PID);
if (!task)
  goto out;
mm = get_task_mm(task);
@@ -352,7 +338,7 @@
    return -EINVAL;
}

-ret = sg_pcopy_to_buffer(umem->sg_head.sgl, umem->nmap, dst, length,
+ret = sg_pcopy_to_buffer(umem->sg_head.sgl, umem->npages, dst, length,
    offset + ib_umem_offset(umem));

if (ret < 0)
  --- linux-4.15.0.orig/drivers/infiniband/core/umem_odp.c
+++ linux-4.15.0/drivers/infiniband/core/umem_odp.c
@@ -339,7 +339,8 @@
    vma = find_vma(mm, ib_umem_start(umem));
if (!vma || !is_vm_hugetlb_page(vma)) {
  up_read(&mm->mmap_sem);
-return -EINVAL;
+ret_val = -EINVAL;
+goto out_mm;
}
h = hstate_vma(vma);
umem->page_shift = huge_page_shift(h);
@@ -670,7 +671,7 @@
while (bcnt > 0) {
const size_t gup_num_pages = min_t(size_t,
-(bcnt + BIT(page_shift) - 1) >> page_shift,
+ALIGN(bcnt, PAGE_SIZE) / PAGE_SIZE,
PAGE_SIZE / sizeof(struct page *));
down_read(&owning_mm->mmap_sem);
--- linux-4.15.0.orig/drivers/infiniband/core/user_mad.c
+++ linux-4.15.0/drivers/infiniband/core/user_mad.c
@@ -49,6 +49,7 @@
#include <linux/sched.h>
#include <linux/semaphore.h>
#include <linux/slab.h>
+#include <linux/nospec.h>
#include <linux/uaccess.h>
@@ -353,6 +354,11 @@
mutex_lock(&file->mutex);
+if (file->agents_dead) {
+mutex_unlock(&file->mutex);
+return -EIO;
+}
+
while (list_empty(&file->recv_list)) {
mutex_unlock(&file->mutex);
@@ -495,12 +501,12 @@
agent = __get_agent(file, packet->mad.hdr.id);
if (!agent) {
-ret = -EINVAL;
+ret = -EIO;
goto err_up;
}
memset(&ah_attr, 0, sizeof ah_attr);
-ah_attr.type = rdma_ah_find_type(file->port->ib_dev,

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+ah_attr.type = rdma_ah_find_type(agent->device,
file->port->port_num);
rdma_ah_set_dlid(&ah_attr, be16_to_cpu(packet->mad.hdr.lid));
rdma_ah_set_sl(&ah_attr, packet->mad.hdr.sl);
@@ -856,11 +862,14 @@
if (get_user(id, arg))
return -EFAULT;
+if (id >= IB_UMAD_MAX_AGENTS)
+return -EINVAL;
mutex_lock(&file->port->file_mutex);
mutex_lock(&file->mutex);
-if (id >= IB_UMAD_MAX_AGENTS || !__get_agent(file, id)) {
+id = array_index_nospec(id, IB_UMAD_MAX_AGENTS);
+if (!__get_agent(file, id)) {
ret = -EINVAL;
goto out;
}
--- linux-4.15.0.orig/drivers/infiniband/core/uverbs.h
+++ linux-4.15.0/drivers/infiniband/core/uverbs.h
@@ -94,7 +94,7 @@
struct ib_uverbs_device {
atomic_trefcount;
-intnum_comp_vectors;
+u32num_comp_vectors;
struct completioncomp;
struct device
*dev;
struct ib_device__rcu
*ib_dev;
--- linux-4.15.0.orig/drivers/infiniband/core/uverbs_cmd.c
+++ linux-4.15.0/drivers/infiniband/core/uverbs_cmd.c
@@ -560,9 +560,10 @@
if (f.file)
fdput(f);
+mutex_unlock(&file->device->xrcd_tree_mutex);
+
uobj_alloc_commit(&obj->uobject);
-mutex_unlock(&file->device->xrcd_tree_mutex);
return in_len;
err_copy:
@@ -601,10 +602,8 @@
uobj = uobj_get_write(uobj_get_type(xrcd), cmd.xrcd_handle,

Open Source Used In 5GaaS Edge AC-4 22104


- if (IS_ERR(uobj)) {
  - mutex_unlock(&file->device->xrcd_tree_mutex);
+ if (IS_ERR(uobj))
    return PTR_ERR(uobj);
  -}

  ret = uobj_remove_commit(uobj);
  return ret ?: in_len;
@@ -1971,34 +1970,111 @@
goto release_qp;
 }

+if ((cmd->base.attr_mask & IB_QP_AV)) {
+  +if (!rdma_is_port_valid(qp->device, cmd->base.port_num)) {
+    +ret = -EINVAL;
+    +goto release_qp;
+  +} else {
+    +/* Check for both IB_QP_PORT and IB_QP_AV, these can be set
+      +in the SQD->SQD transition.
+      +*/
+    +if (cmd->dest.port_num != qp->real_qp->port) {
+      +ret = -EINVAL;
+      +goto release_qp;
+    +} else {
+      +/* We are in SQD->SQD. (If we are not, this transition will
+         +be rejected later in the verbs layer checks).
+         +Check for both IB_QP_PORT and IB_QP_AV, these can be set
+         +in the SQD->SQD transition.
+         +*/
+    +} else {
+      +/* We are in SQD->SQD. (If we are not, this transition will
+         +be rejected later in the verbs layer checks).
+         +Check for both IB_QP_PORT and IB_QP_AV, these can be set
+         +in the SQD->SQD transition.
+         +*/
+    +} else {
+      +/* Only if IP_QP_AV was set, add in IB_QP_PORT as well (the
+         +verbs layer driver does not track primary port changes
+         +resulting from path migration). Thus, in SQD, if the primary
+ * AV is modified, the primary port should also be modified).
+ *
+ * Note that in this transition, the IB_QP_STATE flag
+ * is not allowed.
+ */
+if (((cmd->base.attr_mask & (IB_QP_AV | IB_QP_PORT))
  + == (IB_QP_AV | IB_QP_PORT)) &&
  + cmd->base.port_num != cmd->base.dest.port_num) {
  +ret = -EINVAL;
  +goto release_qp;
  +}
+if ((cmd->base.attr_mask & (IB_QP_AV | IB_QP_PORT))
  + == IB_QP_AV) {
  +cmd->base.attr_mask |= IB_QP_PORT;
  +cmd->base.port_num = cmd->base.dest.port_num;
  +}
+}
+
+if ((cmd->base.attr_mask & IB_QP_ALT_PATH) &&
    -!rdma_is_port_valid(qp->device, cmd->base.alt_port_num)) {
  +(!rdma_is_port_valid(qp->device, cmd->base.alt_port_num) ||
    +!rdma_is_port_valid(qp->device, cmd->base.alt_dest.port_num)) ||
    +cmd->base.alt_port_num != cmd->base.alt_dest.port_num) {
    ret = -EINVAL;
    goto release_qp;
  }
  }

-attr->qp_state = cmd->base.qp_state;
-attr->cur_qp_state = cmd->base.cur_qp_state;
-attr->path_mtu = cmd->base.path_mtu;
-attr->path_mig_state = cmd->base.path_mig_state;
-attr->qkey = cmd->base.qkey;
-attr->rq_psn = cmd->base.rq_psn;
-attr->sq_psn = cmd->base.sq_psn;
-attr->dest_qp_num = cmd->base.dest_qp_num;
-attr->qp_access_flags = cmd->base.qp_access_flags;
-attr->pkey_index = cmd->base.pkey_index;
-attr->alt_pkey_index = cmd->base.alt_pkey_index;
-attr->en_sqd_async_notify = cmd->base.en_sqd_async_notify;
-attr->max_rd_atomic = cmd->base.max_rd_atomic;
-attr->max_dest_rd_atomic = cmd->base.max_dest_rd_atomic;
-attr->min_rnr_timer = cmd->base.min_rnr_timer;
-attr->port_num = cmd->base.port_num;
-attr->timeout = cmd->base.timeout;
-attr->retry_cnt = cmd->base.retry_cnt;
-attr->rnr_retry = cmd->base.rnr_retry;
-attr->alt_port_num = cmd->base.alt_port_num;
attr->alt_timeout = cmd->base.alt_timeout;
attr->rate_limit = cmd->rate_limit;
if (cmd->base.attr_mask & IB_QP_STATE)
    attr->qp_state = cmd->base.qp_state;
if (cmd->base.attr_mask & IB_QP_CUR_STATE)
    attr->cur_qp_state = cmd->base.cur_qp_state;
if (cmd->base.attr_mask & IB_QP_PATH_MTU)
    attr->path_mtu = cmd->base.path_mtu;
if (cmd->base.attr_mask & IB_QP_PATH_MIG_STATE)
    attr->path_mig_state = cmd->base.path_mig_state;
if (cmd->base.attr_mask & IB_QP_QKEY)
    attr->qkey = cmd->base.qkey;
if (cmd->base.attr_mask & IB_QP_RQ_PSN)
    attr->rq_psn = cmd->base.rq_psn;
if (cmd->base.attr_mask & IB_QP_SQ_PSN)
    attr->sq_psn = cmd->base.sq_psn;
if (cmd->base.attr_mask & IB_QP_DEST_QPN)
    attr->dest_qp_num = cmd->base.dest_qp_num;
if (cmd->base.attr_mask & IB_QP_ACCESS_FLAGS)
    attr->qp_access_flags = cmd->base.qp_access_flags;
if (cmd->base.attr_mask & IB_QP_PKEY_INDEX)
    attr->pkey_index = cmd->base.pkey_index;
if (cmd->base.attr_mask & IB_QP_EN_SQD_ASYNC_NOTIFY)
    attr->en_sqd_async_notify = cmd->base.en_sqd_async_notify;
if (cmd->base.attr_mask & IB_QP_MAX_QP_RD_ATOMIC)
    attr->max_rd_atomic = cmd->base.max_rd_atomic;
if (cmd->base.attr_mask & IB_QP_MAX_DEST_RD_ATOMIC)
    attr->max_dest_rd_atomic = cmd->base.max_dest_rd_atomic;
if (cmd->base.attr_mask & IB_QP_MIN_RNR_TIMER)
    attr->min_rnr_timer = cmd->base.min_rnr_timer;
if (cmd->base.attr_mask & IB_QP_PORT)
    attr->port_num = cmd->base.port_num;
if (cmd->base.attr_mask & IB_QP_TIMEOUT)
    attr->timeout = cmd->base.timeout;
if (cmd->base.attr_mask & IB_QP_RETRY_CNT)
    attr->retry_cnt = cmd->base.retry_cnt;
if (cmd->base.attr_mask & IB_QP_RNR_RETRY)
    attr->mrr_retry = cmd->base.mrr_retry;
if (cmd->base.attr_mask & IB_QP_ALT_PATH) {
    attr->alt_port_num = cmd->base.alt_port_num;
    attr->alt_timeout = cmd->base.alt_timeout;
    attr->alt_pkey_index = cmd->base.alt_pkey_index;
}
if (cmd->base.attr_mask & IB_QP_RATE_LIMIT)
    attr->rate_limit = cmd->rate_limit;
if (cmd->base.attr_mask & IB_QP_AV)
    copy_ah_attr_from_uverbs(qp->device, &attr->ah_attr,
+flow_attr = kzalloc(sizeof(*flow_attr) + cmd.flow_attr.num_of_specs *
      sizeof(union ib_flow_spec), GFP_KERNEL);
if (!flow_attr) {
--- linux-4.15.0.orig/drivers/infiniband/core/uverbs_ioctl.c
+++ linux-4.15.0/drivers/infiniband/core/uverbs_ioctl.c
@@ -59,6 +59,9 @@
return 0;
}

+if (test_bit(attr_id, attr_bundle_h->valid_bitmap))
+return -EINVAL;
+
+spec = &attr_spec_bucket->attrs[attr_id];
e = &elements[attr_id];
e->uattr = uattr_ptr;
@@ -188,6 +191,24 @@
return -EINVAL;
}

+for (; i < method_spec->num_buckets; i++) {
+struct uverbs_attr_spec_hash *attr_spec_bucket =
+method_spec->attr_buckets[i];
+
+if (!bitmap_empty(attr_spec_bucket->mandatory_attrs_bitmask,
+    attr_spec_bucket->num_attrs))
+return -EINVAL;
+}
+
+for (; i < method_spec->num_buckets; i++) {
+struct uverbs_attr_spec_hash *attr_spec_bucket =
+method_spec->attr_buckets[i];
+
+if (!bitmap_empty(attr_spec_bucket->mandatory_attrs_bitmask,
+    attr_spec_bucket->num_attrs))
+return -EINVAL;
+}
size_t ctx_size;
uintptr_t data[UVERBS_OPTIMIZE_USING_STACK_SZ / sizeof(uintptr_t)];

-if (hdr->reserved)
-return -EINVAL;
-
object_spec = uverbs_get_object(ib_dev, hdr->object_id);
if (!object_spec)
-return -EOPNOTSUPP;
+return -EPROTONOSUPPORT;

method_spec = uverbs_get_method(object_spec, hdr->method_id);
if (!method_spec)
-return -EOPNOTSUPP;
+return -EPROTONOSUPPORT;

if ((method_spec->flags & UVERBS_ACTION_FLAG_CREATE_ROOT) ^ !file->ucontext)
return -EINVAL;

out:
if (ctx != (void *)data)
kfree(ctx);

if (hdr.reserved) {
-err = -EOPNOTSUPP;
+err = -EPROTONOSUPPORT;
+err = -EPROTONOSUPPORT;
goto out;
}

--- linux-4.15.0.orig/drivers/infiniband/core/uverbs_ioctl_merge.c
+++ linux-4.15.0/drivers/infiniband/core/uverbs_ioctl_merge.c
short min = SHRT_MAX;
const void *elem;
int i, j, last_stored = -1;
unsigned int equal_min = 0;

for_each_element(elem, i, j, elements, num_elements, num_offset,
data_offset) {
    @ @ -146,15 +151,10 @@
    * Therefore, we need to clean the beginning of the array to make sure
    * all ids of final elements are equal to min.
    */
    -for (i = num_iters - 1; i >= 0 &&
     -  GET_ID(*((u16 *)(iters[i] + id_offset)) == min; i--)
    -;
    -
    -num_iters -= i + 1;
    -memmove(iters, iters + i + 1, sizeof(*iters) * num_iters);
    +memmove(iters, iters + num_iters - equal_min, sizeof(*iters) * equal_min);
    
    *min_id = min;
    -return num_iters;
    +return equal_min;
}

#define find_max_element_entry_id(num_elements, elements, num_objects_fld, \ 
    hash = kzalloc(sizeof(*hash) +
    ALIGN(sizeof(*hash->attrs) * (attr_max_bucket + 1),
    sizeof(long)) +
    -  BITS_TO_LONGS(attr_max_bucket) * sizeof(long),
    +  BITS_TO_LONGS(attr_max_bucket + 1) * sizeof(long),
    GFP_KERNEL);
if (!hash) {
    res = -ENOMEM;
    @ @ -509,7 +509,7 @@
    * first handler which != NULL. This also defines the
* set of flags used for this handler.
*/

for (i = num_object_defs - 1;
     for (i = num_method_defs - 1;
          i >= 0 && !method_defs[i]->handler; i--)
    ;

hash->methods[min_id++] = method;

--- linux-4.15.0.orig/drivers/infiniband/core/uverbs_main.c
+++ linux-4.15.0/drivers/infiniband/core/uverbs_main.c
@@ -252,12 +252,14 @@
    if (atomic_dec_and_test(&file->device->refcount))
        ib_uverbs_comp_dev(file->device);

+if (file->async_file)
+    kref_put (&file->async_file->ref,
+        ib_uverbs_release_async_event_file);
+    kobject_put (&file->device->kobj);
+    kfree (file);
}

static ssize_t ib_uverbs_event_read (struct ib_uverbs_event_queue *ev_queue,
    struct ib_uverbs_file *uverbs_file,
    struct file *filp, char __user *buf,
    size_t count, loff_t *pos,
    size_t eventsz)
@@ -275,19 +277,16 @@
    if (wait_event_interruptible (ev_queue->poll_wait,
        (!list_empty (&ev_queue->event_list) ||
            /* The barriers built into wait_event_interruptible()
             * and wake_up() guarantee this will see the null set
             * without using RCU
             */
            !uverbs_file->device->ib_dev)))
        ev_queue->is_closed)))
    return -ERESTARTSYS;

+spin_lock_irq (&ev_queue->lock);
+
/* If device was disassociated and no event exists set an error */
-if (list_empty (&ev_queue->event_list) &&
    !uverbs_file->device->ib_dev)
+if (list_empty (&ev_queue->event_list) && ev_queue->is_closed) {
+    spin_unlock_irq (&ev_queue->lock);
    return -EIO;
-
    -spin_lock_irq (&ev_queue->lock);
    +
event = list_entry(ev_queue->event_list.next, struct ib_uverbs_event, list);

struct ib_uverbs_async_event_file *file = filp->private_data;

- return ib_uverbs_event_read(&file->ev_queue, file->uverbs_file, filp, 
  - buf, count, pos,
  + return ib_uverbs_event_read(&file->ev_queue, filp, buf, count, pos,
   + sizeof(struct ib_uverbs_async_event_desc));
}

@@ -333,9 +331,8 @@
struct ib_uverbs_completion_event_file *comp_ev_file =
filp->private_data;

- return ib_uverbs_event_read(&comp_ev_file->ev_queue,
-   - comp_ev_file->uobj_file.ufile, filp,
-     - buf, count, pos,
- + return ib_uverbs_event_read(&comp_ev_file->ev_queue, filp, buf, count, 
- + pos,
   + sizeof(struct ib_uverbs_comp_event_desc));
}

@@ -358,7 +355,9 @@
static unsigned int ib_uverbs_async_event_poll(struct file *filp,
  
- return ib_uverbs_event_poll(filp->private_data, filp, wait);
+ struct ib_uverbs_async_event_file *file = filp->private_data;
+ return ib_uverbs_event_poll(&file->ev_queue, filp, wait);
}

static unsigned int ib_uverbs_comp_event_poll(struct file *filp,
@@ -372,9 +371,9 @@
static int ib_uverbs_async_event_fasync(int fd, struct file *filp, int on)
  
- struct ib_uverbs_async_event_queue *ev_queue = filp->private_data;
+ struct ib_uverbs_async_event_file *file = filp->private_data;

- return fasync_helper(fd, filp, on, &ev_queue->async_queue);
+ return fasync_helper(fd, filp, on, &file->ev_queue.async_queue);
}

static int ib_uverbs_comp_event_fasync(int fd, struct file *filp, int on)
list_del(&entry->obj_list);
kfree(entry);
}
+file->ev_queue.is_closed = 1;
spin_unlock_irq(&file->ev_queue.lock);

uverbs_close_fd(filp);

+static bool verify_command_idx(u32 command, bool extended)
+
+{ +
+if (extended)
+return command < ARRAY_SIZE(uverbs_ex_cmd_table); +
+return command < ARRAY_SIZE(uverbs_cmd_table); +
+
+} +
+static ssize_t ib_uverbs_write(struct file *filp, const char __user *buf,
 size_t count, loff_t *pos)
+
+{ +struct ib_uverbs_file *file = filp->private_data;
+struct ib_device *ib_dev;
+struct ib_uverbs_cmd_hdr hdr;
+bool extended_command;
+__u32 command;
+__u32 flags;
+int srcu_key;
+@
+@ -686,6 +695,15 @
+
+command = hdr.command & IB_USER_VERBS_CMD_COMMAND_MASK;
+flags = (hdr.command &
+ IB_USER_VERBS_CMD_FLAGS_MASK) >> IB_USER_VERBS_CMD_FLAGS_SHIFT;
+ +
+extended_command = flags & IB_USER_VERBS_CMD_FLAG_EXTENDED;
+if (!verify_command_idx(command, extended_command)) {
+ret = -EINVAL;
+goto out;
+}
+
+if (verify_command_mask(ib_dev, command)) {
+ret = -EOPNOTSUPP;
+goto out;
+@
+@
+ goto out;
+@ -697,12 +715,8 @
+ goto out;
flags = (hdr.command &
  IB_USER_VERBS_CMD_FLAGS_MASK) >> IB_USER_VERBS_CMD_FLAGS_SHIFT;

if (!flags) {
  if (command >= ARRAY_SIZE(uverbs_cmd_table) ||
      !uverbs_cmd_table[command]) {
    ret = -EINVAL;
    goto out;
  }
}

struct ib_udata uhw;
size_t written_count = count;

if (command >= ARRAY_SIZE(uverbs_ex_cmd_table) ||
    !uverbs_ex_cmd_table[command]) {
  if (!uverbs_ex_cmd_table[command]) {
    ret = -ENOSYS;
    goto out;
  }
}

mutex_unlock(&file->device->lists_mutex);

-kref_put(&file->async_file->ref,
  ib_uverbs_release_async_event_file);
-kref_put(&file->ref, ib_uverbs_release_file);

return 0;

--- linux-4.15.0.orig/drivers/infiniband/core/uverbs_std_types.c
+++ linux-4.15.0/drivers/infiniband/core/uverbs_std_types.c
@@ -315,7 +315,7 @@

cq->uobject       = &obj->uobject;
cq->comp_handler  = ib_uverbs_comp_handler;
cq->event_handler = ib_uverbs_cq_event_handler;
-cq->cq_context   = &ev_file->ev_queue;
obj->uobject.object = cq;
obj->uobject.user_handle = user_handle;
atomic_set(&cq->usecnt, 0);
--- linux-4.15.0.orig/drivers/infiniband/core/verbs.c
+++ linux-4.15.0/drivers/infiniband/core/verbs.c
@@ -805,8 +805,8 @@

EXPORT_SYMBOL(ib_open_qp);

-static struct ib_qp *ib_create_xrc_qp(struct ib_qp *qp,
-struct ib_qp_init_attr *qp_init_attr)
+static struct ib_qp *create_xrc_qp(struct ib_qp *qp,
+ struct ib_qp_init_attr *qp_init_attr)
{
struct ib_qp *real_qp = qp;

qp = __ib_open_qp(real_qp, qp_init_attr->event_handler,
    qp_init_attr->qp_context);
-if (!IS_ERR(qp))
    __ib_insert_xrcd_qp(qp_init_attr->xrcd, real_qp);
-else
    -real_qp->device->destroy_qp(real_qp);
+if (IS_ERR(qp))
    +return qp;
    +__ib_insert_xrcd_qp(qp_init_attr->xrcd, real_qp);
return qp;
}

@@ -855,10 +855,8 @@
return qp;

ret = ib_create_qp_security(qp, device);
-if (ret) {
    -ib_destroy_qp(qp);
    -return ERR_PTR(ret);
-}
+if (ret)
+    goto err;

qp->device     = device;
qp->real_qp    = qp;
@@ -873,8 +871,15 @@
INIT_LIST_HEAD(&qp->sig_mrs);
qp->port = 0;

-if (qp_init_attr->qp_type == IB_QPT_XRC_TGT)
    return ib_create_xrc_qp(qp, qp_init_attr);
+if (qp_init_attr->qp_type == IB_QPT_XRC_TGT) {
+    struct ib_qp *xrc_qp = create_xrc_qp(qp, qp_init_attr);
+    +if (IS_ERR(xrc_qp)) {
+        +ret = PTR_ERR(xrc_qp);
+    }

Open Source Used In 5GaaS Edge AC-4 22115
qp->event_handler = qp_init_attr->event_handler;
qp->qp_context = qp_init_attr->qp_context;

if (qp_init_attr->cap.max_rdma_ctxs) {
    ret = rdma_rw_init_mrs(qp, qp_init_attr);
    if (ret) {
        pr_err("failed to init MR pool ret= %d\n", ret);
        ib_destroy_qp(qp);
        return ERR_PTR(ret);
    }
    +if (ret)
    +goto err;
}
*/

ib_destroy_qp(qp);
return ERR_PTR(ret);
*/
EXPORT_SYMBOL(ib_create_qp);

/**
 * ib_modify_qp_with_udata - Modifies the attributes for the specified QP.
 * @qp: The QP to modify.
 * @attr: On input, specifies the QP attributes to modify. On output,
 *   the current values of selected QP attributes are returned.
 * @attr_mask: A bit-mask used to specify which attributes of the QP
 *   are being modified.
 * It returns 0 on success and returns appropriate error code on error.
 */
-int ib_modify_qp_with_udata(struct ib_qp *qp, struct ib_qp_attr *attr,
+int ib_modify_qp_with_udata(struct ib_qp *ib_qp, struct ib_qp_attr *attr,
int attr_mask, struct ib_udata *udata)
{
    struct ib_qp *qp = ib_qp->real_qp;
    int ret;

    if (attr_mask & IB_QP_AV) {
        sdev_put(netdev);

        if (!rc) {
            if (rc && lksettings.base.speed != (u32)SPEED_UNKNOWN) {
                netdev_speed = lksettings.base.speed;
            } else {
                netdev_speed = SPEED_1000;
            }
        }
    }

    struct ib_cq *cq = qp->send_cq;
    struct ib_qp_attr attr = { .qp_state = IB_QPS_ERR };
    struct ib_drain_cqe sdrain;
    struct ib_send_wr swr = {}, *bad_swr;
    struct ib_rdma_wr swr = {
        .wr = {
            .next = NULL,
            .wr_cqe = &sdrain.cqe,
            .opcode = IB_WR_RDMA_WRITE,
        },
    };
    int ret;

    swr.wr_cqe = &sdrain.cqe;
    sdrain.cqe.done = ib_drain_qp_done;
    init_completion(&sdrain.done);

    return;
}

-ret = ib_post_send(qp, &swr, &bad_swr);
+ret = ib_post_send(qp, &swr.wr, &bad_swr);
if (ret) {
    WARN_ONCE(ret, "failed to drain send queue: %d\n", ret);
    return;
}

--- linux-4.15.0.orig/drivers/infiniband/hw/bnxt_re/ib_verbs.c
+++ linux-4.15.0/drivers/infiniband/hw/bnxt_re/ib_verbs.c
@@ -1169,7 +1169,7 @@
    rc = bnxt_qplib_create_qp(&rdev->qplib_res, &qp->qplib_qp);
    if (rc) {
dev_err(rdev_to_dev(rdev), "Failed to create HW QP");
-goto fail;
-goto free_umem;
}
}

@@ -1197,6 +1197,13 @@
return &qp->ib_qp;
qp_destroy:
bnxt_qplib_destroy_qp(&rdev->qplib_res, &qp->qplib_qp);
+free_umem:
+if (udata) {
+if (qp->rumem)
+ib_umem_release(qp->rumem);
+if (qp->sumem)
+ib_umem_release(qp->sumem);
+}
fail:
kfree(qp);
return ERR_PTR(rc);
@@ -1572,6 +1579,7 @@
goto out;
}
qp_attr->qp_state = __to_ib_qp_state(qplib_qp->state);
+qp_attr->cur_qp_state = __to_ib_qp_state(qplib_qp->cur_qp_state);
qp_attr->en_sqd_async_notify = qplib_qp->en_sqd_async_notify ? 1 : 0;
qp_attr->qp_access_flags = __to_ib_access_flags(qplib_qp->access);
qp_attr->pkey_index = qplib_qp->pkey_index;
@@ -1945,10 +1953,13 @@
wqe->type = BNXT_QPLIB_SWQE_TYPE_LOCAL_INV;
wqe->local_inv.inv_l_key = wr->ex.invalidate_rkey;

/* Need unconditional fence for local invalidate
+ * opcode to work as expected.
+ */
wqe->flags |= BNXT_QPLIB_SWQE_FLAGS_UC_FENCE;
+ if (wr->send_flags & IB_SEND_SIGNALED)
wqe->flags |= BNXT_QPLIB_SWQE_FLAGS_SIGNAL_COMP;
-if (wr->send_flags & IB_SEND_FENCE)
-wqe->flags |= BNXT_QPLIB_SWQE_FLAGS_UC_FENCE;
if (wr->send_flags & IB_SEND_SOLICITED)
wqe->flags |= BNXT_QPLIB_SWQE_FLAGS_SOLICIT_EVENT;
@@ -1969,8 +1980,12 @@
wqe->frmr.levels = qplib_frpl->hwq.level + 1;
wqe->type = BNXT_QPLIB_SWQE_TYPE_REG_MR;
-if (wr->wr.send_flags & IB_SEND_FENCE)
-wqe->flags |= BNXT_QPLIB_SWQE_FLAGS_UC_FENCE;
+/* Need unconditional fence for reg_mr
+ * opcode to function as expected.
+ */
+
wqe->flags |= BNXT_QPLIB_SWQE_FLAGS_UC_FENCE;
+
if (wr->wr.send_flags & IB_SEND_SIGNALED)
wqe->flags |= BNXT_QPLIB_SWQE_FLAGS_SIGNAL_COMP;

@@ -2769,6 +2784,19 @@
wc->wc_flags |= IB_WC_GRH;
 }

+static bool bnxt_re_check_if_vlan_valid(struct bnxt_re_dev *rdev,
+u16 vlan_id)
+{
+/*
+ * Check if the vlan is configured in the host. If not configured, it
+ * can be a transparent VLAN. So dont report the vlan id.
+ */
+if (!__vlan_find_dev_deep_rcu(rdev->netdev,
+htons(ETH_P_8021Q), vlan_id))
+return false;
+return true;
+}
+
static bool bnxt_re_is_vlan_pkt(struct bnxt_qplib_cqe *orig_cqe,
u16 *vid, u8 *sl)
{
@@ -2837,9 +2865,11 @@
-wc->src_qp = orig_cqe->src_qp;
-memcpy(wc->smac, orig_cqe->smac, ETH_ALEN);
-if (bnxt_re_is_vlan_pkt(orig_cqe, &vlan_id, &sl)) {
-wc->vlan_id = vlan_id;
-wc->sl = sl;
-wc->wc_flags |= IB_WC_WITH_VLAN;
+if (bnxt_re_check_if_vlan_valid(rdev, vlan_id)) {
+wc->vlan_id = vlan_id;
+wc->sl = sl;
+wc->wc_flags |= IB_WC_WITH_VLAN;
+}
+}
+wc->port_num = 1;
w->vendor_err = orig_cqe->status;
--- linux-4.15.0.orig/drivers/infiniband/hw/bnxt_re/main.c
+++ linux-4.15.0/drivers/infiniband/hw/bnxt_re/main.c

static DEFINE_MUTEX(bnxt_re_dev_lock);
static struct workqueue_struct *bnxt_re_wq;

/* Mutex to protect the list of bnxt_re devices added */
static DEFINE_MUTEX(bnxt_re_dev_lock);
static struct workqueue_struct *bnxt_re_wq;

/* Mutex to protect the list of bnxt_re devices added */
static DEFINE_MUTEX(bnxt_re_dev_lock);
static struct workqueue_struct *bnxt_re_wq;

/* for handling bnxt_en callbacks later */
static void bnxt_re_stop(void *p)
{
    if (!rdev)
        return;

    bnxt_re_ib_unreg(rdev, false);
}

static struct bnxt_ulp_ops bnxt_re_ulp_ops = {
    /* Driver registration routines used to let the networking driver (bnxt_en) *
     * to know that the RoCE driver is now installed *
     */
    static int bnxt_re_unregister_netdev(struct bnxt_re_dev *rdev, bool lock_wait)
    +static int bnxt_re_unregister_netdev(struct bnxt_re_dev *rdev)
    {
        struct bnxt_en_dev *en_dev;
        int rc;
        @@ -125,14 +125,9 @@
        return -EINVAL;
        en_dev = rdev->en_dev;
        -/* Acquire rtnl lock if it is not invoked from netdev event */
        -if (lock_wait)
        -rtnl_lock();
        rc = en_dev->en_ops->bnxt_unregister_device(rdev->en_dev, BNXT_ROCE_ULP);
        -if (lock_wait)
        -rtnl_unlock();
        return rc;
    }

    @@ -146,14 +141,12 @@

    en_dev = rdev->en_dev;
    -rtnl_lock();
    rc = en_dev->en_ops->bnxt_register_device(en_dev, BNXT_ROCE_ULP,
static int bnxt_re_free_msix(struct bnxt_re_dev *rdev)
{
    struct bnxt_en_dev *en_dev;
    int rc;
    @ @ -163,13 +156,9 @ @

    en_dev = rdev->en_dev;

    -if (lock_wait)
    -rtln_lock();

    rc = en_dev->en_ops->bnxt_free_msix(rdev->en_dev, BNXT_ROCE_ULP);

    -if (lock_wait)
    -rtln_unlock();
    return rc;
}

@@ -185,7 +174,6 @@
    num_msix_want = min_t(u32, BNXT_RE_MAX_MSIX, num_online_cpus());

    -rtln_lock();
    num_msix_got = en_dev->en_ops->bnxt_request_msix(en_dev, BNXT_ROCE_ULP,
            rdev->msix_entries,
            num_msix_want);
    @ @ -200,7 +188,6 @ @
}
    rdev->num_msix = num_msix_got;
    done:
    -rtln_unlock();
    return rc;
}

@@ -223,24 +210,18 @@
    fw_msg->timeout = timeout;
}

-static int bnxt_re_net_ring_free(struct bnxt_re_dev *rdev, u16 fw_ring_id,
    -bool lock_wait)
+static int bnxt_re_net_ring_free(struct bnxt_re_dev *rdev, u16 fw_ring_id)
{
struct bnxt_en_dev *en_dev = rdev->en_dev;
struct hwrm_ring_free_input req = {0};
struct hwrm_ring_free_output resp;
struct bnxt_fw_msg fw_msg;
-bool do_unlock = false;
int rc = -EINVAL;

if (!en_dev)
    return rc;

memset(&fw_msg, 0, sizeof(fw_msg));
-if (lock_wait) {
    -rtnl_lock();
    -do_unlock = true;
}

bnxt_re_init_hwrm_hdr(rdev, (void *)&req, HWRM_RING_FREE, -1, -1);
req.ring_type = RING_ALLOC_REQ_RING_TYPE_L2_CMPL;
@@ -251,8 +232,6 @@
if (rc)
    dev_err(rdev_to_dev(rdev),
    "Failed to free HW ring:%d :%#x", req.ring_id, rc);
-if (do_unlock)
    -rtnl_unlock();
    return rc;
}
@@ -270,7 +249,6 @@
return rc;

memset(&fw_msg, 0, sizeof(fw_msg));
-rtnl_lock();
bnxt_re_init_hwrm_hdr(rdev, (void *)&req, HWRM_RING_ALLOC, -1, -1);
req.enables = 0;
req.page_tbl_addr = cpu_to_le64(dma_arr[0]);
@@ -291,27 +269,21 @@
if (!rc)
    *fw_ring_id = le16_to_cpu(resp.ring_id);

-rtnl_unlock();
return rc;
}

static int bnxt_re_net_stats_ctx_free(struct bnxt_re_dev *rdev,
    -u32 fw_stats_ctx_id, bool lock_wait)
    +u32 fw_stats_ctx_id)
{ 
    struct bnxt_en_dev *en_dev = rdev->en_dev;

struct hwrm_stat_ctx_free_input req = {0};
struct bnxt_fw_msg fw_msg;
bool do_unlock = false;
int rc = -EINVAL;

if (!en_dev)
    return rc;

memset(&fw_msg, 0, sizeof(fw_msg));
-if (lock_wait) {
    -rtnl_lock();
    -do_unlock = true;
-
    bnxt_re_init_hwrm_hdr(rdev, (void *)&req, HWRM_STAT_CTX_FREE, -1, -1);
    req.stat_ctx_id = cpu_to_le32(fw_stats_ctx_id);
    @@ -322,8 +294,6 @@
    dev_err(rdev_to_dev(rdev),
    "Failed to free HW stats context %#x", rc);
-
    -if (do_unlock)
    -rtnl_unlock();
    return rc;
    }

@@ -343,7 +313,6 @@
    bnxt_re_init_hwrm_hdr(rdev, (void *)&req, HWRM_STAT_CTX_ALLOC, -1, -1);
    req.update_period_ms = cpu_to_le32(1000);
    @@ -355,7 +324,6 @@
    if (!rc)
        *fw_stats_ctx_id = le32_to_cpu(resp.stat_ctx_id);
    -rtnl_unlock();
    return rc;
}
@@ -703,19 +671,19 @@
    return rc;
}

- static void bnxt_re_free_nq_res(struct bnxt_re_dev *rdev, bool lock_wait)
+static void bnxt_re_free_nq_res(struct bnxt_re_dev *rdev)
int i;

for (i = 0; i < rdev->num_msix - 1; i++) {
  bnxt_re_net_ring_free(rdev, rdev->nq[i].ring_id, lock_wait);
+  bnxt_re_net_ring_free(rdev, rdev->nq[i].ring_id);
  bnxt_qplib_free_nq(&rdev->nq[i]);
}

-static void bnxt_re_free_res(struct bnxt_re_dev *rdev, bool lock_wait)
+static void bnxt_re_free_res(struct bnxt_re_dev *rdev)
{
  -bnxt_re_free_nq_res(rdev, lock_wait);
  +bnxt_re_free_nq_res(rdev);

  if (rdev->qplib_res.dpi_tbl.max) {
    bnxt_qplib_dealloc_dpi(&rdev->qplib_res,
                      @ @ -794,12 +762,17 @ @
    struct ib_event ib_event;

    ib_event.device = ibdev;
    -if (qp)
    +if (qp) {
      ib_event.element.qp = qp;
    -else
    +ib_event.event = event;
    +if (qp->event_handler)
    +qp->event_handler(&ib_event, qp->qp_context);
    +
    +} else {
      ib_event.element.port_num = port_num;
    -ib_event.event = event;
    -ib_dispatch_event(&ib_event);
    +ib_event.event = event;
    +ib_dispatch_event(&ib_event);,
    +}
  }

#define HWRM_QUEUE_PRI2COS_QCFG_INPUT_FLAGS_IVLAN 0x02
@ @ -992,7 +965,7 @ @
return 0;
}

-static void bnxt_re_ib_unreg(struct bnxt_re_dev *rdev, bool lock_wait)
+static void bnxt_re_ib_unreg(struct bnxt_re_dev *rdev)
{
  int i, rc;
cancel_delayed_work(&rdev->worker);

bnxt_re_cleanup_res(rdev);
-bnxt_re_free_res(rdev, lock_wait);
+bnxt_re_free_res(rdev);

if (test_and_clear_bit(BNXT_RE_FLAG_RCFW_CHANNEL_EN, &rdev->flags)) {
    rc = bnxt_qplib_deinit_rcfw(&rdev->rcfw);
    if (rc) dev_warn(rdev_to_dev(rdev),
        "Failed to deinitialize RCFW: %#x", rc);

    -bnxt_re_net_stats_ctx_free(rdev, rdev->qplib_ctx.stats.fw_id, lock_wait);
    +bnxt_re_net_stats_ctx_free(rdev, rdev->qplib_ctx.stats.fw_id);
    bnxt_qplib_free_ctx(rdev->en_dev->pdev, &rdev->qplib_ctx);
    bnxt_qplib_disable_rcfw_channel(&rdev->rcfw);
    -bnxt_re_net_ring_free(rdev, rdev->rcfw.creq_ring_id, lock_wait);
    +bnxt_re_net_ring_free(rdev, rdev->rcfw.creq_ring_id);
    bnxt_qplib_free_rcfw_channel(&rdev->rcfw);
}

if (test_and_clear_bit(BNXT_RE_FLAG_GOT_MSIX, &rdev->flags)) {
    -rc = bnxt_re_free_msix(rdev, lock_wait);
    +rc = bnxt_re_free_msix(rdev);
    if (rc) dev_warn(rdev_to_dev(rdev),
        "Failed to free MSI-X vectors: %#x", rc);
}

if (test_and_clear_bit(BNXT_RE_FLAG_NETDEV_REGISTERED, &rdev->flags)) {
    -rc = bnxt_re_unregister_netdev(rdev, lock_wait);
    +rc = bnxt_re_unregister_netdev(rdev);
    if (rc) dev_warn(rdev_to_dev(rdev),
        "Failed to unregister with netdev: %#x", rc);
}

int i, j, rc;

+bool locked;
+
+/* Acquire rtnl lock through out this function */
+rtnl_lock();
+locked = true;
+
+/* Registered a new RoCE device instance to netdev */
rc = bnxt_re_register_netdev(rdev);
if (rc) {
    +rtnl_unlock();
}
pr_err("Failed to register with netdev: %#x\n", rc);
return -EINVAL;
}
@@ -1152,12 +1131,16 @@
    set_bit(BNXT_RE_FLAG_QOS_WORK_REG, &rdev->flags);
schedule_delayed_work(&rdev->worker, msecs_to_jiffies(30000));
    +rtnl_unlock();
    +locked = false;
+
    /* Register ib dev */
    rc = bnxt_re_register_ib(rdev);
    if (rc) {
        pr_err("Failed to register with IB: %#x\n", rc);
        goto fail;
    }
    +set_bit(BNXT_RE_FLAG_IBDEV_REGISTERED, &rdev->flags);
    dev_info(rdev_to_dev(rdev), "Device registered successfully");
    for (i = 0; i < ARRAY_SIZE(bnxt_re_attributes); i++) {
        rc = device_create_file(&rdev->ibdev.dev,
            @@ -1173,7 +1156,6 @@
            +set_bit(BNXT_RE_FLAG_IBDEV_REGISTERED, &rdev->flags);
            ib_get_eth_speed(&rdev->ibdev, 1, &rdev->active_speed,
                &rdev->active_width);
            bnxt_re_dispatch_event(&rdev->ibdev, NULL, 1, IB_EVENT_PORT_ACTIVE);
            @@ -1181,17 +1163,21 @@
            return 0;
            free_sctx:
                -bnxt_re_net_stats_ctx_free(rdev, rdev->qplib_ctx.stats.fw_id, true);
                +bnxt_re_net_stats_ctx_free(rdev, rdev->qplib_ctx.stats.fw_id);
                free_ctx:
                    bnxt_qplib_free_ctx(rdev->en_dev->pdev, &rdev->qplib_ctx);
                    disable_rcfw:
                        bnxt_qplib_disable_rcfw_channel(&rdev->rcfw);
                        free_ring:
                            -bnxt_re_net_ring_free(rdev, rdev->rcfw.creq_ring_id, true);
                            +bnxt_re_net_ring_free(rdev, rdev->rcfw.creq_ring_id);
                            free_rcfw:
                                bnxt_qplib_free_rcfw_channel(&rdev->rcfw);
                                fail:
                                    -bnxt_re_ib_unreg(rdev, true);
                                    +if (!locked)
                                    +rtnl_lock();
                                    +bnxt_re_ib_unreg(rdev);
+rtnl_unlock();
+
+return rc;
+
}

@@ -1253,9 +1239,13 @@
switch (re_work->event) {
  case NETDEV_REGISTER:
    rc = bnxt_re_ib_reg(rdev);
-  if (rc)
+  if (rc) {
+    dev_err(rdev_to_dev(rdev),
"Failed to register with IB: %#x", rc);
+    bnxt_re_remove_one(rdev);
+    bnxt_re_dev_unreg(rdev);
+    goto exit;
+  }
  break;
  case NETDEV_UP:
    bnxt_re_dispatch_event(&rdev->ibdev, NULL, 1,
@@ -1278,6 +1268,7 @@
  }
  smp_mb__before_atomic();
  clear_bit(BNXT_RE_FLAG_TASK_IN_PROG, &rdev->flags);
+exit:  kfree(re_work);
+
}

@@ -1341,7 +1332,7 @@
/*
if (test_bit(BNXT_RE_FLAG_TASK_IN_PROG, &rdev->flags))
goto exit;
-bnxt_re_ib_unreg(rdev, false);
+bnxt_re_ib_unreg(rdev);
bnxt_re_remove_one(rdev);
bnxt_re_dev_unreg(rdev);
break;
@@ -1411,8 +1402,16 @@

list_for_each_entry(rdev, &to_be_deleted, list) {
  dev_info(rdev_to_dev(rdev), "Unregistering Device");
  +/*
  + * Flush out any scheduled tasks before destroying the
  + * resources
  + */
  +flush_workqueue(bnxt_re_wq);
  bnxt_re_dev_stop(rdev);
  -bnxt_re_ib_unreg(rdev, true);
  


/* Acquire the rtnl_lock as the L2 resources are freed here */
+rtnl_lock();
+bnxt_re_ib_unreg(rdev);
+rtnl_unlock();
bnxt_re_remove_one(rdev);
bnxt_re_dev_unreg(rdev);
}
--- linux-4.15.0.orig/drivers/infiniband/hw/bnxt_re/qplib_fp.c
+++ linux-4.15.0/drivers/infiniband/hw/bnxt_re/qplib_fp.c
@@ -2035,13 +2035,13 @@
bnxt_qplib_mark_qp_error(qp);
bnxt_qplib_unlock_buddy_cq(qp, cq);
} else {
/+* Before we complete, do WA 9060 */
+if (do_wa9060(qp, cq, cq_cons, sw_sq_cons,
+    cqe_sq_cons)) {
+    *lib_qp = qp;
+    goto out;
+}
if (swq->flags & SQ_SEND_FLAGS_SIGNAL_COMP) {
  /* Before we complete, do WA 9060 */
  -if (do_wa9060(qp, cq, cq_cons, sw_sq_cons,
   -    cqe_sq_cons)) {
  -    *lib_qp = qp;
  -    goto out;
  -}
  cqe->status = CQ_REQ_STATUS_OK;
cqe++;
(*budget)--;
@@ -2103,7 +2103,7 @@
wr_id_idx = le32_to_cpu(hwcqe->srq_or_rq_wr_id) &
     CQ_RES_RC_SRQ_OR_RQ_WR_ID_MASK;
rq = &qp->rq;
-    if (wr_id_idx > rq->hwq.max_elements) {
-        if (wr_id_idx >= rq->hwq.max_elements) {
-            dev_err(&cq->hwq.pdev->dev, "QPLIB: FP: CQ Process RC ");
-            dev_err(&cq->hwq.pdev->dev,
-"QPLIB: wr_id idx 0x%x exceeded RQ max 0x%x",
-@@ -2167,7 +2167,7 @@
     CQ_RES_UD_SRC_QP_HIGH_MASK) >> 8);
     rq = &qp->rq;
-        if (wr_id_idx > rq->hwq.max_elements) {
-            if (wr_id_idx >= rq->hwq.max_elements) {
-                dev_err(&cq->hwq.pdev->dev, "QPLIB: FP: CQ Process UD ");
-                dev_err(&cq->hwq.pdev->dev,
-"QPLIB: wr_id idx %#x exceeded RQ max %#x",
-@@ -2257,7 +2257,7 @@

cqe->raweth_qp1_metadata = le32_to_cpu(hwcqe->raweth_qp1_metadata);

rq = &qp->rq;
-if (wr_id_idx > rq->hwq.max_elements) {
+if (wr_id_idx >= rq->hwq.max_elements) {
    dev_err(&cq->hwq.pdev->dev, "QPLIB: FP: CQ Process Raw/QP1 RQ wr_id ");
    dev_err(&cq->hwq.pdev->dev, "QPLIB: ix 0x%x exceeded RQ max 0x%x",
            wr_id_idx, rq->hwq.max_elements);
--- linux-4.15.0.orig/drivers/infiniband/hw/bnxt_re/qplib_rcfw.c
+++ linux-4.15.0/drivers/infiniband/hw/bnxt_re/qplib_rcfw.c
@@ -309,8 +309,17 @@
    bnxt_qplib_release_cq_locks(qp, &flags);
-break;

default:
- /* Command Response */
- spin_lock_irqsave(&cmdq->lock, flags);
+ /* Command Response
+  * cmdq->lock needs to be acquired to synchronie
+  * the command send and completion reaping. This function
+  * is always called with creq->lock held. Using
+  * the nested variant of spin_lock.
+  *
+  */

+spin_lock_irqsave_nested(&cmdq->lock, flags,
+ SINGLE_DEPTH_NESTING);
+cookie = le16_to_cpu(qp_event->cookie);
mcookie = qp_event->cookie;
blocked = cookie & RCFW_CMD_IS_BLOCKING;
@@ -459,7 +468,11 @@
 int rc;

RCFW_CMD_PREP(req, INITIALIZE_FW, cmd_flags);
- /* Supply (log-base-2-of-host-page-size - base-page-shift)
+ /* to bono to adjust the doorbell page sizes.
+ */
+req.log2_dbr_pg_size = cpu_to_le16(PAGE_SHIFT -	+ RCFW_DBR_BASE_PAGE_SHIFT);
/*
 * VFs need not setup the HW context area, PF
 * shall setup this area for VF. Skipping the
--- linux-4.15.0.orig/drivers/infiniband/hw/bnxt_re/qplib_rcfw.h
+++ linux-4.15.0/drivers/infiniband/hw/bnxt_re/qplib_rcfw.h
@@ -49,6 +49,7 @@
#define RCFW_COMM_SIZE		 0x104
#define RCFW_DBR_PCI_BAR_REGION		2
+#define RCFW_DBR_BASE_PAGE_SHIFT	12

#define RCFW_CMD_PREP(req, CMD, cmd_flags)
do {
--- linux-4.15.0.orig/drivers/infiniband/hw/bnxt_re/qplib_res.c
+++ linux-4.15.0/drivers/infiniband/hw/bnxt_re/qplib_res.c
@@ -708,6 +708,7 @@
    dpit->app_tbl = kcalloc(dpit->max, sizeof(void *), GFP_KERNEL);
    if (!dpit->app_tbl) {
      dpit->dbr_bar_reg_iomem = NULL;
+      dev_err(&res->pdev->dev, "QPLIB: DPI app tbl allocation failed");
      return -ENOMEM;
    }
    pci_iounmap(res->pdev, dpit->dbr_bar_reg_iomem);
@@ -720,6 +721,7 @@
    dpit->tbl = kmalloc(bytes, GFP_KERNEL);
    if (!dpit->tbl) {
      dpit->dbr_bar_reg_iomem = NULL;
-     kfree(dpit->app_tbl);
-     dpit->app_tbl = NULL;
+     kfree(dpit->app_tbl);
+     dpit->app_tbl = NULL;
+     dev_err(&res->pdev->dev, "QPLIB: DPI app tbl allocation failed");
      return -ENOMEM;
    }
@@ -130,8 +130,9 @@
    attr->l2_db_size = (sb->l2_db_space_size + 1) * PAGE_SIZE;
-    attr->max_sgid = le32_to_cpu(sb->max_gid);
-    attr->max_pkey = le32_to_cpu(sb->max_pkeys);
  strlcpy(attr->fw_ver, "20.6.28.0", sizeof(attr->fw_ver));
@@ -360,7 +361,7 @@
    *pkey = 0xFFFF;

attr->max_inline_data = le32_to_cpu(sb->max_inline_data);
-attr->l2_db_size = (sb->l2_db_space_size + 1) * PAGE_SIZE;
-attr->max_sgid = le32_to_cpu(sb->max_gid);
+attr->l2_db_size = (sb->l2_db_space_size + 1) *
+  (0x01 << RCFW_DBR_BASE_PAGE_SHIFT);
+attr->max_sgid = BNXT_QPLIB_NUM_GIDS_SUPPORTED;

strlcpy(attr->fw_ver, "20.6.28.0", sizeof(attr->fw_ver));
@@ -155,7 +156,7 @@
    struct bnxt_qplib_sgid_tbl *sgid_tbl, int index,
    struct bnxt_qplib_gid *gid)
    {
-      if (index > sgid_tbl->max) {
+      if (index >= sgid_tbl->max) {
        dev_err(&res->pdev->dev, "QPLIB: Index %d exceeded SGID table max (%d)",
          index, sgid_tbl->max);
      @ @ -360,7 +361,7 @@
      *pkey = 0xFFFF;
if (index > pkey_tbl->max) {
  dev_err(&res->pdev->dev,
          "QPLIB: Index %d exceeded PKEY table max (%d)",
          index, pkey_tbl->max);
  return 0;
} else {
  if (index >= pkey_tbl->max) {
    return 0;
  } else {
    return bnxt_qplib_rcfw_send_message(rcfw, (void *)&req, (void *)&resp, NULL, 0);
  }
}

--- linux-4.15.0.orig/drivers/infiniband/hw/bnxt_re/qplib_sp.h
+++ linux-4.15.0/drivers/infiniband/hw/bnxt_re/qplib_sp.h
@@ -1734,7 +1734,30 @@
#define CMDQ_INITIALIZE_FW_TIM_PG_SIZE_PG_2M (0x3UL << 4)
#define CMDQ_INITIALIZE_FW_TIM_PG_SIZE_PG_8M (0x4UL << 4)
#define CMDQ_INITIALIZE_FW_TIM_PG_SIZE_PG_1G (0x5UL << 4)
-__le16 reserved16;
+/* This value is (log-base-2-of-DBR-page-size - 12).
+ * 0 for 4KB. HW supported values are enumerated below.
+ */
+__le16 log2_dbr_pg_size;
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_MASK0xfUL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_SFT0
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_4K0x0UL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_8K0x1UL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_16K0x2UL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_32K0x3UL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_64K0x4UL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_128K0x5UL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_256K0x6UL
+#define CMDQInicialize_FW_LOG2_DBR_PG_SIZE_PG_512K0x7UL

```c
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_1M 0x8UL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_2M 0x9UL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_4M 0xaUL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_8M 0xbUL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_16M 0xcUL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_32M 0xdUL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_64M 0xeUL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_128M 0xfUL
#define CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_LAST CMDQ_INITIALIZE_FW_LOG2_DBR_PG_SIZE_PG_128M

__le64 qpc_page_dir;
__le64 mrw_page_dir;
__le64 srq_page_dir;
```

--- linux-4.15.0.orig/drivers/infiniband/hw/cxgb4/cm.c
+++ linux-4.15.0/drivers/infiniband/hw/cxgb4/cm.c
@@ -458,6 +458,8 @@
skb_reset_transport_header(skb);
                      }
                      skb = alloc_skb(len, gfp);
                      +if (!skb)
-            return NULL;
                      +return NULL;
                      }
t4_set_arp_err_handler(skb, NULL, NULL);
return skb;
@@ -491,7 +493,6 @@
ep = *((struct c4iw_ep **)(skb->cb + 2 * sizeof(void *)));
release_ep_resources(ep);
-kfree_skb(skb);
return 0;
}
```

@@ -502,7 +503,6 @@
ep = *((struct c4iw_ep **)(skb->cb + 2 * sizeof(void *)));
release_ep_resources(ep);
-kfree_skb(skb);
return 0;
}
```

@@ -1879,8 +1879,10 @@
mutex_unlock(&ep->com.mutex);
```

-if (release)
+if (release) {
+close_complete_upcall(ep, -ECONNRESET);
-release_ep_resources(ep);
```
++
c4iw_put_ep(&ep->com);
return 0;
}
@@ -2049,7 +2051,7 @@
} else {
pdev = get_real_dev(n->dev);
ep->l2t = cxgb4_l2t_get(cdev->rdev.lldi.l2t,
-  n, pdev, 0);
+  n, pdev, rt_tos2priority(tos));
if (!ep->l2t)
goto out;
ep->mtu = dst_mtu(dst);
@@ -2139,7 +2141,8 @@
laddr6->sin6_addr.s6_addr,
raddr6->sin6_addr.s6_addr,
laddr6->sin6_port,
-  raddr6->sin6_port, 0,
+  raddr6->sin6_port,
+  ep->com.cm_id->tos,
raddr6->sin6_scope_id);
iptype = 6;
ra = (__u8 *)&raddr6->sin6_addr;
@@ -2351,20 +2354,6 @@
enum chip_type adapter_type = ep->com.dev->rdev.lldi.adapter_type;

pr_debug("ep %p tid %u\n", ep, ep->hwtid);
-  -skb_get(skb);
-  rpl = cplhdr(skb);
-  if (!is_t4(adapter_type)) {
-    skb_trim(skb, roundup(sizeof(*rpl5), 16));
-    rpl5 = (void *)rpl;
-    INIT_TP_WR(rpl5, ep->hwtid);
-  } else {
-    skb_trim(skb, sizeof(*rpl));
-    INIT_TP_WR(rpl, ep->hwtid);
-  }
-  OPCODE_TID(rpl) = cpu_to_be32(MK_OPCODE_TID(CPL_PASS_ACCEPT_RPL,
-  ep->hwtid));
-  cxgb_best_mtu(ep->com.dev->rdev.lldi.mtus, ep->mtu, &mtu_idx,
- enable_tcp_timestamps && req->tcpopt.tstamp,
-   (ep->com.remote_addr.ss_family == AF_INET) ? 0 : 1);
@@ -2410,6 +2399,20 @@
if (tcph->ece && tcph->cwr)
  opt2 |= CTRL_ECN_V(1);
}

+skb_get(skb);
+rpl = cplhdr(skb);
+if (!is_t4(adapter_type)) {
+ skb_trim(skb, roundup(sizeof(*rpl5), 16));
+ rpl5 = (void *)rpl;
+ INIT_TP_WR(rpl5, ep->hwtid);
+} else {
+ skb_trim(skb, sizeof(*rpl));
+ INIT_TP_WR(rpl, ep->hwtid);
+}
+OPCODE_TID(rpl) = cpu_to_be32(MK_OPCODE_TID(CPL_PASS_ACCEPT_RPL,
+ ep->hwtid));
+
+if (CHELSIO_CHIP_VERSION(adapter_type) > CHELSIO_T4) {
+ u32 isn = (prandom_u32() & ~7UL) - 1;
+ opt2 |= T5_OPT_2_VALID_F;
+ @@ -2912,15 +2915,18 @@
+ ep = get_ep_from_tid(dev, tid);
+
+ if (ep && ep->com.qp) {
+ pr_warn("TERM received tid %u qpid %u\n", 
+ tid, ep->com.qp->wq.sq.qid);
+ attrs.next_state = C4IW_QP_STATE_TERMINATE;
+ c4iw_modify_qp(ep->com.qp->rhp, ep->com.qp,
+ - C4IW_QP_ATTR_NEXT_STATE, &attrs, 1);
+ } if (ep) {
+ if (ep->com.qp) {
+ pr_warn("TERM received tid %u qpid %u\n", tid,
+ ep->com.qp->wq.sq.qid);
+ attrs.next_state = C4IW_QP_STATE_TERMINATE;
+ c4iw_modify_qp(ep->com.qp->rhp, ep->com.qp,
+ + C4IW_QP_ATTR_NEXT_STATE, &attrs, 1);
+ }
+ + c4iw_put_ep(&ep->com);
+ } else 
+ pr_warn("TERM received tid %u no ep/qp\n", tid);
+ c4iw_put_ep(&ep->com);
+
+ return 0;
+ }
+ @@ -3253,7 +3259,7 @@
+ if (raddr->sin_addr.s_addr == htonl(INADDR_ANY)) {
+ err = pick_local_ipaddrs(dev, cm_id);
+ if (err)
+ - goto fail2;
+ }
if (ipv6_addr_type(&raddr6->sin6_addr) == IPV6_ADDR_ANY) {
    err = pick_local_ip6addrs(dev, cm_id);
    if (err)
        goto fail2;
    goto fail3;
}

/* find a route */
@@ -3275,7 +3281,7 @@
    if (err)
        goto fail2;
    goto fail3;
}

/* find a route */
@@ -3287,7 +3293,7 @@
    laddr6->sin6_addr.s6_addr,
    raddr6->sin6_addr.s6_addr,
    laddr6->sin6_port,
-   raddr6->sin6_port, 0,
+   raddr6->sin6_port, cm_id->tos,
    raddr6->sin6_scope_id);
}

if (!ep->dst) {
@@ -3480,13 +3486,14 @@
    ep->com.local_addr.ss_family == AF_INET) {
        err = cxgb4_remove_server_filter(
            ep->com.dev->rdev.lldi.ports[0], ep->stid,
            -ep->com.dev->rdev.lldi.rxq_ids[0], 0);
        +ep->com.dev->rdev.lldi.rxq_ids[0], false);
    } else {
        struct sockaddr_in6 *sin6;
        c4iw_init_wr_wait(ep->com.wr_waitp);
        err = cxgb4_remove_server(
            ep->com.dev->rdev.lldi.ports[0], ep->stid,
            -ep->com.dev->rdev.lldi.rxq_ids[0], 0);
-       +ep->com.dev->rdev.lldi.rxq_ids[0],
            +ep->com.local_addr.ss_family == AF_INET6);
        if (err)
            goto done;
    }

    err = c4iw_wait_for_reply(&ep->dev.rdev, ep->com.wr_waitp,
@@ -3578,7 +3585,6 @@
        if (close) {
            if (abrupt) {
                set_bit(EP_DISC_ABORT, &ep->com.history);
                -close_complete_upcall(ep, -ECONNRESET);
                ret = send_abort(ep);
            } else {
                set_bit(EP_DISC_CLOSE, &ep->com.history);
--- linux-4.15.0.orig/drivers/infiniband/hw/cxgb4/cq.c
```c
void c4iw_flush_hw_cq(struct c4iw_cq *chp)
{
    struct t4_cqe *hw_cqe, *swcqe, read_cqe;
    struct c4iw_qp *qhp;
    if (qhp == NULL)
        goto next_cqe;

    if (CQE_OPCODE(hw_cqe) == FW_RI_TERMINATE)
        goto next_cqe;

    if (flush_qhp != qhp) {
        spin_lock(&qhp->lock);
        if (qhp->wq.flushed == 1)
            goto next_cqe;
    }
    if (flush_qhp != qhp)
        spin_unlock(&qhp->lock);
}

if (entries < 1 || entries > ibdev->attrs.max_cqe)
    return ERR_PTR(-EINVAL);
if (vector >= rhp->rdev.lldi.nciq)
    return ERR_PTR(-EINVAL);
```

---

```
+if (entries < 1 || entries > ibdev->attrs.max_cqe)
+return ERR_PTR(-EINVAL);
+
+if (vector >= rhp->rdev.lldi.nciq)
+return ERR_PTR(-EINVAL);
```

---

```
rdev->status_page->db_off = 0;
```
static void c4iw_rdev_close(struct c4iw_rdev *rdev)
{
    destroy_workqueue(rdev->free_workq);
    kfree(rdev->wr_log);
    c4iw_release_dev_ucontext(rdev, &rdev->uctx);
    free_page((unsigned long)rdev->status_page);
    c4iw_pblpool_destroy(rdev);
    c4iw_rqtpool_destroy(rdev);
    wait_for_completion(&rdev->pbl_compl);
    wait_for_completion(&rdev->rqt_compl);
    c4iw_ocqp_pool_destroy(rdev);
    destroy_workqueue(rdev->free_workq);
    c4iw_destroy_resource(&rdev->resource);
}

static void c4iw_remove(struct uld_ctx *ctx)
{
    pr_debug("c4iw_dev %p\n", ctx->dev);
    debugfs_remove_recursive(ctx->dev->debugfs_root);
    c4iw_unregister_device(ctx->dev);
    c4iw_dealloc(ctx);
}

struct wr_log_entry *wr_log;
int wr_log_size;
struct workqueue_struct *free_workq;
+struct completion rqt_compl;
+struct completion pbl_compl;
+struct kref rqt_kref;
+struct kref pbl_kref;
};

static inline int c4iw_fatal_error(struct c4iw_rdev *rdev)
@@ -1049,7 +1053,7 @@

--- linux-4.15.0.orig/drivers/infiniband/hw/cxgb4/iw_cxgb4.h
+++ linux-4.15.0/drivers/infiniband/hw/cxgb4/iw_cxgb4.h
@@ -185,6 +185,10 @@

+init_completion(&rdev->rqt_compl);
+init_completion(&rdev->pbl_compl);
+kref_init(&rdev->rqt_kref);
+kref_init(&rdev->pbl_kref);
+
+return 0;

err_free_status_page_and_wr_log:
if (c4iw_wr_log && rdev->wr_log)
@@ -897,13 +902,15 @@
static void c4iw_rdev_close(struct c4iw_rdev *rdev)
{
    destroy_workqueue(rdev->free_workq);
    kfree(rdev->wr_log);
    c4iw_release_dev_ucontext(rdev, &rdev->uctx);
    free_page((unsigned long)rdev->status_page);
    c4iw_pblpool_destroy(rdev);
    c4iw_rqtpool_destroy(rdev);
    +wait_for_completion(&rdev->pbl_compl);
    +wait_for_completion(&rdev->rqt_compl);
    c4iw_ocqp_pool_destroy(rdev);
    +destroy_workqueue(rdev->free_workq);
    c4iw_destroy_resource(&rdev->resource);
}

static void c4iw_remove(struct uld_ctx *ctx)
{
    pr_debug("c4iw_dev %p\n", ctx->dev);
    +debugfs_remove_recursive(ctx->dev->debugfs_root);
    c4iw_unregister_device(ctx->dev);
    c4iw_dealloc(ctx);
}

--- linux-4.15.0.orig/drivers/infiniband/hw/cxgb4/iw_cxgb4.h
+++ linux-4.15.0/drivers/infiniband/hw/cxgb4/iw_cxgb4.h
@@ -185,6 +185,10 @@

+struct wr_log_entry *wr_log;
+int wr_log_size;
+struct workqueue_struct *free_workq;
+@+ struct completion rqt_compl;
+@+ struct completion pbl_compl;
+@+ struct kref rqt_kref;
+@+ struct kref pbl_kref;
+};

static inline int c4iw_fatal_error(struct c4iw_rdev *rdev)
@@ -1049,7 +1053,7 @@
void c4iw_pblpool_free(struct c4iw_rdev *rdev, u32 addr, int size);
void c4iw_ocqp_pool_alloc(struct c4iw_rdev *rdev, u32 addr, int size);
void c4iw_ocqp_pool_free(struct c4iw_rdev *rdev, u32 addr, int size);
void c4iw_flush_hw_cq(struct c4iw_cq *cq);
+void c4iw_flush_hw_cq(struct c4iw_cq *chp, struct c4iw_qp *flush_qhp);
void c4iw_count_rcqes(struct t4_cq *cq, struct t4_wq *wq, int *count);
int c4iw_ep_disconnect(struct c4iw_ep *ep, int abrupt, gfp_t gfp);
int c4iw_flush_rq(struct t4_wq *wq, struct t4_cq *cq, int count);
--- linux-4.15.0.orig/drivers/infiniband/hw/cxgb4/mem.c
+++ linux-4.15.0/drivers/infiniband/hw/cxgb4/mem.c
@@ -274,13 +274,17 @@
 struct sk_buff *skb, struct c4iw_wr_wait *wr_waitp)
{
 int err;
-struct fw_ri_tpte tpt;
+struct fw_ri_tpte *tpt;
 u32 stag_idx;
 static atomic_t key;

 if (c4iw_fatal_error(rdev))
 return -EIO;

 +tpt = kmalloc(sizeof(*tpt), GFP_KERNEL);
+if (!tpt)
+return -ENOMEM;
+
 stag_state = stag_state > 0;
 stag_idx = (*stag) >> 8;
@@ -290,6 +294,7 @@
 mutex_lock(&rdev->stats.lock);
 rdev->stats.stag.fail++;
 mutex_unlock(&rdev->stats.lock);
+kfree(tpt);
 return -ENOMEM;
 }
mutex_lock(&rdev->stats.lock);
@@ -304,28 +309,28 @@
/* write TPT entry */
if (reset_tpt_entry)
-memset(&tpt, 0, sizeof(tpt));
+memset(tpt, 0, sizeof(*tpt));
else {
-tpt.valid_to_pdid = cpu_to_be32(FW_RI_TPTE_VALID_F |
+tpt->valid_to_pdid = cpu_to_be32(FW_RI_TPTE_VALID_F |
 FW_RI_TPTE_STAGKEY_V(*stag & FW_RI_TPTE_STAGKEY_M) |
 FW_RI_TPTE_STAGSTATE_V(stag_state) |
FW_RI_TPTE_STAGTYPE_V(type) | FW_RI_TPTE_PDID_V(pdid));
-tpt.locread_to_qpid = cpu_to_be32(FW_RI_TPTE_PERM_V(perm) |
+ tpt->locread_to_qpid = cpu_to_be32(FW_RI_TPTE_PERM_V(perm) |
(bind_enabled ? FW_RI_TPTE_MWBINDEN_F : 0) |
FW_RI_TPTE_ADDRTYPE_V((zbva ? FW_RI_ZERO_BASED_TO :
  FW_RI_VA_BASED_TO))]
FW_RI_TPTE_PS_V(page_size));
-tpt.nosnoop_pbladdr = !pbl_size ? 0 : cpu_to_be32(  
+ tpt->nosnoop_pbladdr = !pbl_size ? 0 : cpu_to_be32(FW_RI_TPTE_PBLADDR_V(PBL_OFF(rdev, pbl_addr)>>3));
-tpt.len_lo = cpu_to_be32((u32)(len & 0xffffffffUL));
-tpt.va_hi = cpu_to_be32((u32)(to >> 32));
-tpt.va_lo_fbo = cpu_to_be32((u32)(to & 0xffffffffUL));
-tpt.dca_mwbcnt_pstag = cpu_to_be32(0);
-tpt.len_hi = cpu_to_be32((u32)(len >> 32));
+
+tpt->len_lo = cpu_to_be32((u32)(len & 0xffffffffUL));
+tpt->va_hi = cpu_to_be32((u32)(to >> 32));
+tpt->va_lo_fbo = cpu_to_be32((u32)(to & 0xffffffffUL));
+tpt->dca_mwbcnt_pstag = cpu_to_be32(0);
+tpt->len_hi = cpu_to_be32((u32)(len >> 32));
}  
err = write_adapter_mem(rdev, stag_idx +
(rdev->ldi.vr->stag.start >> 5),
-sizeof(tpt), skb, wr_waitp);
+sizeof(*tpt), skb, wr_waitp);

if (reset_tpt_entry) {
c4iw_put_resource(&rdev->resource.tpt_table, stag_idx);
@@ -333,6 +338,7 @@
    rdev->stats.stag.cur -= 32;
    mutex_unlock(&rdev->stats.lock);
  }
  +kfree(tpt);
  return err;
}
@@ -771,7 +777,7 @@
{
    struct c4iw_mr *mhp = to_c4iw_mr(ibmr);

    -if (unlikely(mhp->mpl_len == mhp->max_mpl_len))
    +if (unlikely(mhp->mpl_len == mhp->attr.pbl_size))
        return -ENOMEM;

    mhp->mpl[mhp->mpl_len++] = addr;
--- linux-4.15.0.orig/drivers/infiniband/hw/cxgb4/qp.c
+++ linux-4.15.0/drivers/infiniband/hw/cxgb4/qp.c
@@ -277,6 +277,7 @@

if (user && (!wq->sq.bar2_pa || !wq->rq.bar2_pa)) {
    pr_warn("%s: sqid %u or rqid %u not in BAR2 range\n",
            pci_name(rdev->lldi(pdev)), wq->sq.qid, wq->rq.qid);
    ret = -EINVAL;
    goto free_dma;
}
@@ -1343,12 +1344,12 @@
    t4_set_wq_in_error(&qhp->wq);

    -c4iw_flush_hw_cq(rchp);
    +c4iw_flush_hw_cq(rchp, qhp);
    c4iw_count_rxqes(&rchp->cq, &qhp->wq, &count);
    rq_flushed = c4iw_flush_rq(&qhp->wq, &rchp->cq, count);

    if (schp != rchp)
        -c4iw_flush_hw_cq(schp);
        +c4iw_flush_hw_cq(schp, qhp);
    sq_flushed = c4iw_flush_sq(qhp);

    spin_unlock(&qhp->lock);
@@ -1389,6 +1390,12 @@
    schp = to_c4iw_cq(qhp->ibqp.send_cq);

    if (qhp->ibqp.uobject) {
        +/* for user qps, qhp->wq.flushed is protected by qhp->mutex */
        +if (qhp->wq.flushed)
            +return;
       +
        +qhp->wq.flushed = 1;
        t4_set_wq_in_error(&qhp->wq);
        t4_set_cq_in_error(&rchp->cq);
        spin_lock_irqsave(&rchp->comp_handler_lock, flag);
@@ -2102,7 +2109,7 @@
        init_attr->cap.max_send_wr = qhp->attr.sq_num_entries;
        init_attr->cap.max_recv_wr = qhp->attr.rq_num_entries;
        init_attr->cap.max_send_sge = qhp->attr.sq_max_sges;
        -init_attr->cap.max_recv_sge = qhp->attr.rq_max_sges;
        +init_attr->cap.max_recv_sge = qhp->attr.sq_max_sges;
        init_attr->cap.max_inline_data = T4_MAX_SEND_INLINE;
        init_attr->sq_sig_type = qhp->sq_sig_all ? IB_SIGNAL_ALL_WR : 0;
        return 0;
--- linux-4.15.0.orig/drivers/infiniband/hw/cxgb4/resource.c
+++ linux-4.15.0/drivers/infiniband/hw/cxgb4/resource.c
@@ -260,12 +260,22 @@
        rdev->stats.pbl.cur += roundup(size, 1 << MIN_PBL_SHIFT);
if (rdev->stats.pbl.cur > rdev->stats.pbl.max)
    rdev->stats.pbl.max = rdev->stats.pbl.cur;
+kref_get(&rdev->pbl_kref);
} else
    rdev->stats.pbl.fail++;
mutex_unlock(&rdev->stats.lock);
return (u32)addr;
}

+static void destroy_pblpool(struct kref *kref)
+
+static void destroy_pblpool(struct kref *kref)
+{
+    struct c4iw_rdev *rdev;
+
+rdev = container_of(kref, struct c4iw_rdev, pbl_kref);
+    gen_pool_destroy(rdev->pbl_pool);
+    complete(&rdev->pbl_compl);
+}
+
+ void c4iw_pblpool_free(struct c4iw_rdev *rdev, u32 addr, int size)
+
int c4iw_pblpool_create(struct c4iw_rdev *rdev)
@@ -310,7 +321,7 @@
    void c4iw_pblpool_destroy(struct c4iw_rdev *rdev)
    {
        -gen_pool_destroy(rdev->pbl_pool);
-    kref_put(&rdev->pbl_kref, destroy_pblpool);
+
/*
@@ -331,12 +342,22 @@
    if (rdev->stats.rqt.cur > rdev->stats.rqt.max)
        rdev->stats.rqt.max = rdev->stats.rqt.cur;
+kref_get(&rdev->rqt_kref);
} else
    rdev->stats.rqt.fail++;
mutex_unlock(&rdev->stats.lock);
return (u32)addr;
*/
+static void destroy_rqtpool(struct kref *kref)
+
+struct c4iw_rdev *rdev;
+
+rdev = container_of(kref, struct c4iw_rdev, rqt_kref);
+gen_pool_destroy(rdev->rqt_pool);
+complete(&rdev->rqt_compl);
+
+}
+
+void c4iw_rqtpool_free(struct c4iw_rdev *rdev, u32 addr, int size)
+{
+pr_debug("addr 0x%x size %d\n", addr, size << 6);
+rdev->stats.rqt.cur -= roundup(size << 6, 1 << MIN_RQT_SHIFT);
+mutex_unlock(&rdev->stats.lock);
+gen_pool_free(rdev->rqt_pool, (unsigned long)addr, size << 6);
+kref_put(&rdev->rqt_kref, destroy_rqtpool);
+
+}
+
+int c4iw_rqtpool_create(struct c4iw_rdev *rdev)
+{
+gen_pool_destroy(rdev->rqt_pool);
+kref_put(&rdev->rqt_kref, destroy_rqtpool);
+
+}
+
/*
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/affinity.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/affinity.c
@@ -146,7 +146,7 @@
 while ((dev = pci_get_device(ids->vendor, ids->device, dev))) {
 node = pcibus_to_node(dev->bus);
 if (node < 0)
@@ -154,6 +154,18 @@
 }
@@ -154,6 +154,18 @@

 return 0;
+
+out:
+*/
* Invalid PCI NUMA node information found, note it, and populate our database 1:1.
*
+pr_err("HFI: Invalid PCI NUMA node. Performance may be affected\n");
+pr_err("HFI: System BIOS may need to be upgraded\n");
+for (node = 0; node < node_affinity.num_possible_nodes; node++)
+hfi1_per_node_cntr[node] = 1;
+
+return 0;
}

void node_affinity_destroy(void)
@@ -227,8 +239,14 @@
const struct cpumask *local_mask;
int curr_cpu, possible, i;

-if (node < 0)
-node = numa_node_id();
+/*
+ * If the BIOS does not have the NUMA node information set, select
+ * NUMA 0 so we get consistent performance.
+ */
+if (node < 0) {
+dd_dev_err(dd, "Invalid PCI NUMA node. Performance may be affected\n");
+node = 0;
+
+}
-dd->node = node;

local_mask = cpumask_of_node(dd->node);
@@ -412,7 +430,6 @@
static int get_irq_affinity(struct hfi1_devdata *dd,
    struct hfi1_msix_entry *msix)
{
    -int ret;
    cpumask_var_t diff;
    struct hfi1_affinity_node *entry;
    struct cpu_mask_set *set = NULL;
    @@ -424,10 +441,6 @@
        extra[0] = '\0';
        cpumask_clear(&msix->mask);

        -ret = zalloc_cpumask_var(&diff, GFP_KERNEL);
        -if (!ret)
        -return -ENOMEM;
        
        entry = node_affinity_lookup(dd->node);

        switch (msix->type) {
* finds its CPU here.
*/
if (cpu == -1 && set) {
    if (!zalloc_cpumask_var(&diff, GFP_KERNEL))
        return -ENOMEM;
    if (cpumask_equal(&set->mask, &set->used)) {
        /*
         * We've used up all the CPUs, bump up the generation
         * @ @ -469,6 +485,8 @ @
         * cpumask_andnot(diff, &set->mask, &set->used);
         * cpu = cpumask_first(diff);
         * cpumask_set_cpu(cpu, &set->used);
         +
         +free_cpumask_var(diff);
        */
        cpumask_set_cpu(cpu, &msix->mask);
    }
    free_cpumask_var(diff);
    return 0;
}

--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/chip.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/chip.c
@@ -1073,6 +1073,8 @@
 static void log_physical_state(struct hfi1_pportdata *ppd, u32 state);
 static int wait_physical_linkstate(struct hfi1_pportdata *ppd, u32 state,
     int msecs);
+static int wait_phys_link_out_of_offline(struct hfi1_pportdata *ppd,
+    int msecs);
 static void read_planned_down_reason_code(struct hfi1_devdata *dd, u8 *pdrrc);
 static void read_link_down_reason(struct hfi1_devdata *dd, u8 *ldr);
 static void handle_temp_err(struct hfi1_devdata *dd);
@@ -1683,6 +1685,14 @@
 return dd->verbs_dev.n_piodrain;
 }
+static u64 access_sw_ctx0_seq_drop(const struct cntr_entry *entry,
+    void *context, int vl, int mode, u64 data)
+{
+    struct hfi1_devdata *dd = context;
+    +return dd->ctx0_seq_drop;
static u64 access_sw_vtx_wait(const struct cntr_entry *entry,
   void *context, int vl, int mode, u64 data)
{
   unsigned long irq_flags;
   sw_index = dd->hw_to_sw[hw_context];
   if (sw_index >= dd->num_send_contexts) {
       return;
   }
   sci = &dd->send_contexts[sw_index];
   spin_lock_irqsave(&dd->sc_lock, irq_flags);
   sc = sci->sc;
   if (!sc) {
       dd_dev_err(dd, "%s: context %u(%u): no sc?n", __func__,
       sw_index, hw_context);
       spin_unlock_irqrestore(&dd->sc_lock, irq_flags);
       return;
   }
   /*
   * Update the counters for the corresponding status bits.
   */
   struct hfi1_devdata *dd = ppd->dd;
   struct send_context *sc;
   int i;
   int sc_flags;
if (flags & FREEZE_SELF)
write_csr(dd, CCE_CTRL, CCE_CTRL_SPC_FREEZE_SMASK);
@@ -6725,11 +6742,13 @@
/* do halt pre-handling on all enabled send contexts */
for (i = 0; i < dd->num_send_contexts; i++) {
    sc = dd->send_contexts[i].sc;
    if (sc && (sc->flags & SCF_ENABLED))
        -sc_stop(sc, SCF_FROZEN | SCF_HALTED);
        +sc_stop(sc, sc_flags);
    } /* Send context are frozen. Notify user space */
@@ -6823,7 +6842,7 @@
rcvmask = HFI1_RCVCTRL_CTXT_ENB;
/* HFI1_RCVCTRL_TAILUPD_ENB|DIS needs to be set explicitly */
-rcvmask |= HFI1_CAP_KGET_MASK(rcd->flags, DMA_RTAIL) ?
+rcvmask |= rcd->rcvhdrtail_kvaddr ?
    HFI1_RCVCTRL_TAILUPD_ENB : HFI1_RCVCTRL_TAILUPD_DIS;
    hfi1_rcvctrl(dd, rcvmask, rcd);
    hfi1_rcd_put(rcd);
    /* handle the interrupt(s) */
    sdma_engine_interrupt(sde, status);
    } else {
        -dd_dev_err_ratelimited(dd, "SDMA engine %u interrupt, but no status bits set\n",
        -    sde->this_idx);
        +dd_dev_info_ratelimited(dd, "SDMA engine %u interrupt, but no status bits set\n",
        +sde->this_idx);
    }
    return IRQ_HANDLED;
}
@@ -8306,7 +8325,7 @@
u32 tail;
int present;

-!HF1_CAP_IS_KSET(DMA_RTAIL))
+!rcd->rcvhdrtail_kvaddr
    present = (rcd->seq_cnt ==
        rhf_rcv_seq(rhf_to_cpu(get_rhf_addr(rcd))));
    else /* is RDMA rtail */
    @ @ -9793,6 +9812,7 @@
/* disable the port */
clear_rcvctrl(dd, RCV_CTRL_RCV_PORT_ENABLE_SMASK);
+cancel_work_sync(&ppd->freeze_work);
}

static inline int init_cpu_counters(struct hfi1_devdata *dd)
@@ -10521,12 +10541,29 @@
}
}

-/*
- * Verify if BCT for data VLs is non-zero.
-/**
- + * data_vls_operational() - Verify if data VL BCT credits and MTU
- + * are both set.
- + * @ppd: pointer to hfi1_pportdata structure
- + *
- + * Return: true - Ok, false -otherwise.
- */
- static inline bool data_vls_operational(struct hfi1_pportdata *ppd)
{
- return !!ppd->actual_vls_operational;
+int i;
+u64 reg;
+
+if (!ppd->actual_vls_operational)
+ return false;
+
+for (i = 0; i < ppd->vls_supported; i++) {
+ reg = read_csr(ppd->dd, SEND_CM_CREDIT_VL + (8 * i));
+ if ((reg && !ppd->dd->vld[i].mtu) ||
+ (!reg && ppd->dd->vld[i].mtu))
+ return false;
+}
+
+return true;
}

/*
@@ -10621,6 +10658,8 @@
 add_rcvctrl(dd, RCV_CTRL_RCV_PORT_ENABLE_SMASK);

 handle_linkup_change(dd, 1);
+pio_kernel_linkup(dd);
+ppd->host_link_state = HLS_UP_INIT;
 update_statusp(ppd, IB_PORT_INIT);
if (!data_vls_operational(ppd)) {
    dd_dev_err(dd,
        "%s: data VLs not operational\n", __func__);
    ++ ret = -EINVAL;
    break;
}
@@ -10630,7 +10669,8 @@
    if (quick_linkup) {
        /* quick linkup does not go into polling */
        ret = do_quick_linkup(dd);
    } else {
        ret1 = set_physical_link_state(dd, PLS_POLLING);
        if (!ret1)
            ret1 = wait_phys_link_out_of_offline(ppd,
                3000);
        if (ret1 != HCMD_SUCCESS) {
            dd_dev_err(dd,
                "Failed to transition to Polling link state, return 0x%x\n",
                ret = -EINVAL;
        }
    }
} +
    /* Change the host link state after requesting DC8051 to
    * change its physical state so that we can ignore any
    * interrupt with stale LNI(XX) error, which will not be
    * cleared until DC8051 transitions to Polling state.
    * */
    *ppd->host_link_state = HLS_DN_POLL;
    ppd->offline_disabled_reason =
        HFI1_ODR_MASK(OPA_LINKDOWN_REASON_NONE);
    /*
    @@ -11791,7 +11841,7 @@
        write_kctxt_csr(dd, ctxt, RCV_HDR_ADDR,
            rcd->rcvhdrq_dma);
        if (HFI1_CAP_KGET_MASK(rcd->flags, DMA_RTAIL))
+if (rcd->rcvhdrtail_kvaddr)
write_kctxt_csr(dd, ctxt, RCV_HDR_TAIL_ADDR,
rcd->rcvhdrqtailaddr_dma);
rcd->seq_cnt = 1;
@@ -11871,7 +11921,7 @@
rcvctrl |= RCV_CTXT_CTRL_INTR_AVAIL_SMASK;
if (op & HFI1_RCVCTRL_INTRAVAIL_DIS)
rcvctrl &= ~RCV_CTXT_CTRL_INTR_AVAIL_SMASK;
- if (op & HFI1_RCVCTRL_TAILUPD_ENB && rcd->rcvhdrqtailaddr_dma)
+ if ((op & HFI1_RCVCTRL_TAILUPD_ENB) && rcd->rcvhdrtail_kvaddr)
rcvctrl |= RCV_CTXT_CTRL_TAIL_UPD_SMASK;
if (op & HFI1_RCVCTRL_TAILUPD_DIS) {
/* See comment on RcvCtxtCtrl.TailUpd above */
@@ -12420,7 +12470,8 @@
}

/* allocate space for the counter values */
-dd->cntrs = kcalloc(dd->ndevcntrs, sizeof(u64), GFP_KERNEL);
+dd->cntrs = kcalloc(dd->ndevcntrs + num_driver_cntrs, sizeof(u64),
+ GFP_KERNEL);
if (!dd->cntrs)
goto bail;
@@ -12847,6 +12898,39 @@
return read_state;
}

+/*
+ * wait_phys_link_out_of_offline - wait for any out of offline state
+ * @ppd: port device
+ * @msecs: the number of milliseconds to wait
+ *
+ * Wait up to msecs milliseconds for any out of offline physical link
+ * state change to occur.
+ * Returns 0 if at least one state is reached, otherwise -ETIMEDOUT.
+ */
+static int wait_phys_link_out_of_offline(struct hfi1_pportdata *ppd,
+ int msecs)
+{
+u32 read_state;
+unsigned long timeout;
+
+timeout = jiffies + msecs_to_jiffies(msecs);
+while (1) {
+read_state = read_physical_state(ppd->dd);
+if (!(read_state & 0xF0) != PLS_OFFLINE)
+break;
+if (time_after(jiffies, timeout)) {
dd_dev_err(ppd->dd, "timeout waiting for phy link out of offline. Read state 0x%lx, %dms\n", read_state, msecs);
+return -ETIMEDOUT;
+
+usleep_range(1950, 2050); /* sleep 2ms-ish */
+
+log_state_transition(ppd, read_state);
+return read_state;
+
+#define CLEAR_STATIC_RATE_CONTROL_SMASK(r) (r &= ~SEND_CTXT_CHECK_ENABLE_DISALLOW_PBC_STATIC_RATE_CONTROL_SMASK)

@@ -12984,7 +13068,14 @@
pci_intx(pdev, 0);

-static void clean_up_interrupts(struct hfi1_devdata *dd)
+/**
+ * hfi1_clean_up_interrupts() - Free all IRQ resources
+ * @dd: valid device data data structure
+ *
+ * Free the MSI or INTx IRQs and assoicated PCI resources,
+ * if they have been allocated.
+ */
+void hfi1_clean_up_interrupts(struct hfi1_devdata *dd)
{
  int i;

@@ -13345,7 +13436,7 @@
return 0;

fail:
- clean_up_interrupts(dd);
+ hfi1_clean_up_interrupts(dd);
  return ret;
 }

@@ -13367,7 +13458,7 @@
int total_contexts;
int ret;
unsigned ngroups;
-int qos_rmt_count;
+int rmt_count;
int user_rmt_reduced;
u32 n_usr_ctxts;
n_usr_ctxs = dd->chip_rcv_contexts - total_contexts;
}

/* each user context requires an entry in the RMT */
-qos_rmt_count = qos_rmt_entries(dd, NULL, NULL);
-if (qos_rmt_count + n_usr_ctxts > NUM_MAP_ENTRIES) {
- user_rmt_reduced = NUM_MAP_ENTRIES - qos_rmt_count;
+/*
+ * The RMT entries are currently allocated as shown below:
+ * 1. QOS (0 to 128 entries);
+ * 2. FECN for PSM (num_user_contexts + num_vnic_contexts);
+ * 3. VNIC (num_vnic_contexts).
+ * It should be noted that PSM FECN oversubscribe num_vnic_contexts
+ * entries of RMT because both VNIC and PSM could allocate any receive
+ * context between dd->first_dyn_alloc_text and dd->num_rcv_contexts,
+ * and PSM FECN must reserve an RMT entry for each possible PSM receive
+ * context.
+ */
+rmt_count = qos_rmt_entries(dd, NULL, NULL) + (num_vnic_contexts * 2);
+if (rmt_count + n_usr_ctxts > NUM_MAP_ENTRIES) {
+ user_rmt_reduced = NUM_MAP_ENTRIES - rmt_count;
+dd_dev_err(dd, "RMT size is reducing the number of user receive contexts from %u to %d\n", n_usr_ctxts,
@@ -14418,7 +14519,11 @@
  u64 reg;
  int i, idx, regoff, regidx;
  u8 offset;
+ u32 total_cnt;

 /* there needs to be enough room in the map table */
-if (rmt->used + dd->num_user_contexts >= NUM_MAP_ENTRIES) {
+total_cnt = dd->num_rcv_contexts - dd->first_dyn_alloc_ctxt;
+if (rmt->used + total_cnt >= NUM_MAP_ENTRIES) {
+ dd_dev_err(dd, "User FECN handling disabled - too many user contexts allocated\n");
+ return;
+}
@@ -14474,7 +14577,7 @@
 /* add rule 1 */
 add_rsm_rule(dd, RSM_INS_FECN, &rrd);
-rmt->used += dd->num_user_contexts;
+rmt->used += total_cnt;
}

/* Initialize RSM for VNIC */
static void init_rxe(struct hfi1_devdata *dd)
{
struct rsm_map_table *rmt;

write_csr(dd, RCV_ERR_MASK, ~0ull);
rapped = alloc_rsm_map_table(dd);

if (!rmt)
    return -ENOMEM;

/* set up QOS, including the QPN map table */
init_qos(dd, rmt);

val = read_csr(dd, RCV_BYPASS);
val |= (4ull << 16);
write_csr(dd, RCV_BYPASS, val);
}

static void init_other(struct hfi1_devdata *dd)
{
aspm_exit(dd);
free_cntrs(dd);
free_rcverr(dd);
-clean_up_interruptions(dd);
finish_chip_resources(dd);
}

goto bail_cleanup;

/* set initial RXE CSRs */
-init_rxe(dd);

/* set initial TXE CSRs */
init_txe(dd);
/* set initial non-RXE, non-TXE CSRs */
bail_free_cntrs:
free_cntrs(dd);
bail_clear_intr:
- clean_up_interrups(dd);
+ hfi1_clean_up_interrups(dd);
bail_cleanup:
hfi1_pcie_ddcleanup(dd);
bail_free:
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/chip.h
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/chip.h
@@ -868,6 +868,7 @@
 C_DC_PG_STS_TX_MBE_CNT,
 C_SW_CPU_INTR,
 C_SW_CPU_RCV_LIM,
+C_SW_CTX0_SEQ_DROP,
 C_SW_VTX_WAIT,
 C_SW_PIO_WAIT,
 C_SW_PIO_DRAIN,
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/debugfs.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/debugfs.c
@@ -1220,7 +1220,8 @@
 static void fault_exit_opcode_debugfs(struct hfi1_ibdev *ibd)
 {
- debugfs_remove_recursive(ibd->fault_opcode->dir);
+ if (ibd->fault_opcode)
+ debugfs_remove_recursive(ibd->fault_opcode->dir);
 kfree(ibd->fault_opcode);
 ibd->fault_opcode = NULL;
 }
@@ -1248,6 +1249,7 @@
 &ibd->fault_opcode->attr);
 if (IS_ERR(ibd->fault_opcode->dir)) {
 kfree(ibd->fault_opcode);
+ibd->fault_opcode = NULL;
 return -ENOENT;
 }
@@ -1271,7 +1273,8 @@
 static void fault_exit_packet_debugfs(struct hfi1_ibdev *ibd)
 {
- debugfs_remove_recursive(ibd->fault_packet->dir);
+ if (ibd->fault_packet)
+ debugfs_remove_recursive(ibd->fault_packet->dir);
 kfree(ibd->fault_packet);
 ibd->fault_packet = NULL;
 }
if (IS_ERR(ibd->fault_packet->dir)) {
    kfree(ibd->fault_packet);
    ibd->fault_packet = NULL;
    return -ENOENT;
}

--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/driver.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/driver.c
@@ -439,35 +439,67 @@
    [HFI1_PKT_TYPE_16B] = &return_cnp_16B
   );

-void hfi1_process_ecn_slowpath(struct rvt_qp *qp, struct hfi1_packet *pkt,
-                              bool do_cnp)
+/**
+ * hfi1_process_ecn_slowpath - Process FECN or BECN bits
+ * @qp: The packet's destination QP
+ * @pkt: The packet itself.
+ * @prescan: Is the caller the RXQ prescan
+ *
+ * Process the packet's FECN or BECN bits. By now, the packet
+ * has already been evaluated whether processing of those bit should
+ * be done.
+ * The significance of the @prescan argument is that if the caller
+ * is the RXQ prescan, a CNP will be send out instead of waiting for the
+ * normal packet processing to send an ACK with BECN set (or a CNP).
+ */
+bool hfi1_process_ecn_slowpath(struct rvt_qp *qp, struct hfi1_packet *pkt,
+                               bool prescan)
+
struct hfi1_ibport *ibp = to_iport(qp->ibqp.device, qp->port_num);
+struct hfi1_pportdata *ppd = ppd_from_ibp(ibp);
struct ib_other_headers *ohdr = pkt->ohdr;
struct ib_grh *grh = pkt->grh;
-u32 rqpn = 0, bth1;
-u16 pkey, rlid, dlid = ib_get_dlid(pkt->hdr);
-u8 hdr_type, sc, svc_type;
-bool is_mcast = false;
+u32 rqpn = 0;
+u16 pkey;
+u32 rlid, slid, dlid = 0;
+u8 hdr_type, sc, svc_type, opcode;
+bool is_mcast = false, ignore_fecn = false, do_cnp = false,
+fecn, been;

+/* can be called from prescan */
if (pkt->etype == RHF_RCV_TYPE_BYPASS) {
    -is_mcast = hfi1_is_16B_mcast(dlid);
    pkey = hfi1_16B_get_pkey(pkt->hdr);
    sc = hfi1_16B_get_sc(pkt->hdr);
    +dlid = hfi1_16B_get_dlid(pkt->hdr);
    +slid = hfi1_16B_get_slid(pkt->hdr);
    +is_mcast = hfi1_is_16B_mcast(dlid);
    +opcode = ib_bth_get_opcode(ohdr);
    hdr_type = HFI1_PKT_TYPE_16B;
    +fecn = hfi1_16B_get_fecn(pkt->hdr);
    +becn = hfi1_16B_get_becn(pkt->hdr);
} else {
    -is_mcast = (dlid > be16_to_cpu(IB_MULTICAST_LID_BASE)) &&
             - (dlid != be16_to_cpu(IB_LID_PERMISSIVE));
    pkey = ib_bth_get_pkey(ohdr);
    sc = hfi1_9B_get_sc5(pkt->hdr, pkt->rhf);
    +dlid = qp->ibqp.qp_type != IB_QPT_UD ? ib_get_dlid(pkt->hdr) :
             +ppd->lid;
    +slid = ib_get_slid(pkt->hdr);
    +is_mcast = (dlid > be16_to_cpu(IB_MULTICAST_LID_BASE)) &&
             + (dlid != be16_to_cpu(IB_LID_PERMISSIVE));
    +opcode = ib_bth_get_opcode(ohdr);
    hdr_type = HFI1_PKT_TYPE_9B;
    +fecn = ib_bth_get_fecn(ohdr);
    +becn = ib_bth_get_becn(ohdr);
}

switch (qp->ibqp.qp_type) {
    +case IB_QPT_UD:
        +rlid = slid;
        +rqpn = ib_get_sqpn(pkt->ohdr);
        +svc_type = IB_CC_SVCTYPE_UD;
        +break;
    case IB_QPT_SMI:
    case IB_QPT_GSI:
        -case IB_QPT_UD:
        -rlid = ib_get_slid(pkt->hdr);
        -rlid = slid;
        rqpn = ib_get_sqpn(pkt->ohdr);
        svc_type = IB_CC_SVCTYPE_UD;
        break;
    @@ -482,23 +514,31 @@
        svc_type = IB_CC_SVCTYPE_RC;
        break;
    default:
        -return;
        +return false;
    }

-bth1 = be32_to_cpu(ohdr->bth[1]);
+ignore_fecn = is_mcast || (opcode == IB_OPCODE_CNP) ||
+(opcode == IB_OPCODE_RC_ACKNOWLEDGE);
+/
  + * ACKNOWLEDGE packets do not get a CNP but this will be
  + * guarded by ignore_fecn above.
  + */
  +do_cnp = prescan ||
+(opcode >= IB_OPCODE_RC_RDMA_READ_RESPONSE_FIRST &&
+ opcode <= IB_OPCODE_RC_ATOMIC_ACKNOWLEDGE);
+
/* Call appropriate CNP handler */
-if (do_cnp && (bth1 & IB_FECN_SMASK))
+if (!ignore_fecn && do_cnp && fecn)
  hfi1_handle_cnp_tbl[hdr_type](ibp, qp, rqpn, pkey,
    dlid, rlid, sc, grh);

-if (!is_mcast && (bth1 & IB_BECN_SMASK)) {
-  struct hfi1_pportdata *ppd = ppd_from_ibp(ibp);
-  u32 lqpn = bth1 & RVT_QPN_MASK;
+  u32 lqpn = be32_to_cpu(ohdr->bth[1]) & RVT_QPN_MASK;
+if (becn) {
+    u32 sl = ibp->sc_to_sl[sc];

    process_becn(ppd, sl, rlid, lqpn, rqpn, svc_type);
  }
-
+return !ignore_fecn && fecn;
  }

struct ps_mdata {
  u64 rhf = rhf_to_cpu(rhf_addr);
  u32 etype = rhf_rcv_type(rhf), qpn, bth1;
  -int is_ecn = 0;
  u8 lnh;

  if (ps_done(&mdata, rhf, rcd))
@@ -598,7 +638,6 @@
@@ -624,12 +663,10 @@
    goto next; /* just in case */
  }

-bth1 = be32_to_cpu(packet->ohdr->bth[1]);
-is_ecn = !!((bth1 & (IB_FECN_SMASK | IB_BECN_SMASK));
-
```c
if (!hfi1_may_ecn(packet))
goto next;

bth1 = be32_to_cpu(packet->ohdr->bth[1]);
qpn = bth1 & RVT_QPN_MASK;
rcu_read_lock();
qp = rvt_lookup_qpn(rdi, &ibp->rvp, qpn);  
@@ -639,7 +676,7 @@
goto next;
}
-hfi1_process_ecn_slowpath(qp, packet, true);
+hfi1_process_ecn_slowpath(qp, packet, true);
rcu_read_unlock();

/* turn off BECN, FECN */
@@ -705,6 +742,7 @@
{
    int ret;

    packet->rcd->dd->ctx0_seq_drop++;
    /* Set up for the next packet */
    packet->rhqoff += packet->rsize;
    if (packet->rhqoff >= packet->maxcnt)
-      /* Just take a ref now. Not all opens result in a context assign */
-      kobject_get(&dd->kobj);
-      "
-    /* The real work is performed later in assign_ctxt() */

    fd = kzalloc(sizeof(*fd), GFP_KERNEL);

    -if (fd) {
      -fd->rec_cpu_num = -1; /* no cpu affinity by default */
      -fd->mm = current->mm;
      -mmgrab(fd->mm);
      -fd->dd = dd;
      -fp->private_data = fd;
      -} else {
      -fp->private_data = NULL;
      -}
    -if (atomic_dec_and_test(&dd->user_refcount))
      -complete(&dd->user_comp);
```
-return -ENOMEM;
-
+
+if (!fd) {
+    return -ENOMEM;
+}
+
+if (!fd || init_srcu_struct(&fd->pq_srcu))
+    goto nomem;
+
+spin_lock_init(&fd->pq_rcu_lock);
+spin_lock_init(&fd->tid_lock);
+spin_lock_init(&fd->invalid_lock);
+fd->rec_cpu_num = -1; /* no cpu affinity by default */
+fd->mm = current->mm;
+mmgrab(fd->mm);
+fd->dd = dd;
+kobject_get(&fd->dd->kobj);
+fp->private_data = fd;
+nomem:
    kfree(fd);
    fp->private_data = NULL;
    if (atomic_dec_and_test(&dd->user_refcount))
        complete(&dd->user_comp);
+    return -ENOMEM;
}

static long hfi1_file_ioctl(struct file *fp, unsigned int cmd,
@@ -303,21 +302,30 @@
static ssize_t hfi1_write_iter(struct kiocb *kiocb, struct iov_iter *from)
{
    struct hfi1_filedata *fd = kiocb->ki_filp->private_data;
-    struct hfi1_user_sdma_pkt_q *pq = fd->pq;
+    struct hfi1_user_sdma_pkt_q *pq;
    struct hfi1_user_sdma_comp_q *cq = fd->cq;
    int done = 0, reqs = 0;
    unsigned long dim = from->nr_segs;
+    int idx;

-    if (!pq)
+    idx = srcu_read_lock(&fd->pq_srcu);
    if (!pq)
        pq = srcu_dereference(fd->pq, &fd->pq_srcu);
+    if (!pq) {
+        srcu_read_unlock(&fd->pq_srcu, idx);
+        return -EIO;
+    }

-    if (!iter_is_iovec(from) || !dim)
+    if (!iter_is_iovec(from) || !dim) {
+        srcu_read_unlock(&fd->pq_srcu, idx);
+        return -EINVAL;
trace_hfi1_sdma_request(fd->dd, fd->uctxt->ctxt, fd->subctxt, dim);

+if (atomic_read(&pq->n_reqs) == pq->n_max_reqs) {
+srcu_read_unlock(&fd->pq_srcu, idx);
+}

while (dim) {
    int ret;
    reqs++;
}
+srcu_read_unlock(&fd->pq_srcu, idx);
return reqs;
}

vmf = 1;
break;
case STATUS:
    -if (flags & (unsigned long)(VM_WRITE | VM_EXEC)) {
        +if (flags & VM_WRITE) {
            ret = -EPERM;
            goto done;
        }
        +if ((flags & VM_WRITE) || !uctxt->rcvhdrtail_kvaddr) {
            ret = -EPERM;
            goto done;
        }
    }
    -if (flags & VM_WRITE) {
        +if ((flags & VM_WRITE) || !uctxt->rcvhdrtail_kvaddr) {
            ret = -EPERM;
            goto done;
        }
    }
    @@ -691,8 +700,8 @@
    * checks to default and disable the send context.
    */
    if (uctxt->sc) {
        -set_pio_integrity(uctxt->sc);
        sc_disable(uctxt->sc);
        +set_pio_integrity(uctxt->sc);
    }

    hfi1_free_ctxt_rcv_groups(uctxt);
if (atomic_dec_and_test(&dd->user_refcount))
complete(&dd->user_comp);

cleanup_srcu_struct(&fdata->pq_srcu);
kfree(fdata);
return 0;

--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/firmware.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/firmware.c
@@ -1956,6 +1956,7 @@
    dd_dev_err(dd, "%s: Failed CRC check at offset %ld",
            __func__, (ptr -
            (u32 *)dd->platform_config.data));
+ret = -EINVAL;
goto bail;
}
/* Jump the CRC DWORD */
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/hfi.h
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/hfi.h
@@ -155,6 +155,8 @@
extern struct hfi1_ib_stats hfi1_stats;
extern const struct pci_error_handlers hfi1_pci_err_handler;
+extern int num_driver_cntrs;
+
/* First-cut criterion for "device is active" is
 * two thousand dwords combined Tx, Rx traffic per
@@ -1044,6 +1046,8 @@
    char *boardname; /* human readable board info */

+u64 ctx0_seq_drop;
+/* reset value */
+u64 z_int_counter;
+u64 z_rcv_limit;
@@ -1353,10 +1357,13 @@
        /* Private data for file operations */
        struct hfi1_filedata {
            +struct srcu_struct pq_srcu;
            struct hfi1_devdata *dd;
            struct hfi1_ctxtdata *uctxt;
            struct hfi1_user_sdma_comp_q *cq;
+            /* update side lock for SRCU */
+spinlock_t pq_rcu_lock;
+struct hfi1_user_sdma_pkt_q __rcu *pq;
+u16 subctxt;
/* for cpu affinity; -1 if none */
+int rec_cpu_num;
@@ -1402,7 +1409,7 @@
 struct hfi1_devdata *dd, u8 hw_pidx, u8 port);
 void hfi1_free_ctxtdata(struct hfi1_devdata *dd, struct hfi1_ctxtdata *rcd);
 int hfi1_rcd_put(struct hfi1_ctxtdata *rcd);
-void hfi1_rcd_get(struct hfi1_ctxtdata *rcd);
+int hfi1_rcd_get(struct hfi1_ctxtdata *rcd);
 struct hfi1_ctxtdata *hfi1_rcd_get_by_index_safe(struct hfi1_devdata *dd,
 u16 ctxt);
 struct hfi1_ctxtdata *hfi1_rcd_get_by_index(struct hfi1_devdata *dd, u16 ctxt);
@@ -1531,13 +1538,13 @@
 void process_becn(struct hfi1_pportdata *ppd, u8 sl, u32 rlid, u32 lqpn,
 u832 qpn, u8 svc_type);
 void return_cnp(struct hfi1_ibport *ibp, struct rvt_qp *qp, u32 remote_qpn,
- u32 pkey, u32 slid, u32 dlid, u8 sc5,
+ u16 pkey, u32 slid, u32 dlid, u8 sc5,
+u16 pkey, u32 slid, u32 dlid, u8 sc5,
 const struct ib_grh *old_grh);
 void return_cnp_16B(struct hfi1_ibport *ibp, struct rvt_qp *qp,
- u32 remote_qpn, u32 pkey, u32 slid, u32 dlid,
+ u32 remote_qpn, u16 pkey, u32 slid, u32 dlid,
 + u32 remote_qpn, u16 pkey, u32 slid, u32 dlid,
 u8 sc5, const struct ib_grh *old_grh);
 typedef void (*hfi1_handle_cnp)(struct hfi1_ibport *ibp, struct rvt_qp *qp,
- u32 remote_qpn, u32 pkey, u32 slid, u32 dlid,
+ u32 remote_qpn, u16 pkey, u32 slid, u32 dlid,
 + u32 remote_qpn, u16 pkey, u32 slid, u32 dlid,
 u8 sc5, const struct ib_grh *old_grh);

#define PKEY_CHECK_INVALID -1
@@ -1774,16 +1781,23 @@
 return &rcd->ppd->ibport_data;
 }

-void hfi1_process_ecn_slowpath(struct rvt_qp *qp, struct hfi1_packet *pkt,
- bool do_cnp);
-void inline bool process_ecn(struct rvt_qp *qp, struct hfi1_packet *pkt,
- bool do_cnp)
+/**
+ * hfi1_may_ecn - Check whether FECN or BECN processing should be done
+ * @pkt: the packet to be evaluated
+ *
+ * Check whether the FECN or BECN bits in the packet's header are
+ * enabled, depending on packet type.
+ *
+ * This function only checks for FECN and BECN bits. Additional checks
+ * are done in the slowpath (hfi1_process_ecn_slowpath()) in order to
+ * ensure correct handling.
+ */
+static inline bool hfi1_may_ecn(struct hfi1_packet *pkt)
{
    struct ib_other_headers *ohdr = pkt->ohdr;

    u32 bth1;
    -bool becn = false;
    -bool fecn = false;
    +bool fecn, becn;

    if (pkt->etype == RHF_RCV_TYPE_BYPASS) {
        fecn = hfi1_16B_get_fecn(pkt->hdr);
        fecn = bth1 & IB_FECN_SMASK;
        becn = bth1 & IB_BECN_SMASK;
    }
    -if (unlikely(fecn || becn)) {
        hfi1_process_ecn_slowpath(qp, pkt, do_cnp);
        return fecn;
    }
    +return fecn || becn;
+
    +bool hfi1_process_ecn_slowpath(struct rvt_qp *qp, struct hfi1_packet *pkt,
    +    bool prescan);
    +static inline bool process_ecn(struct rvt_qp *qp, struct hfi1_packet *pkt)
    +{
    +    bool do_work;
    +
    +    do_work = hfi1_may_ecn(pkt);
    +    if (unlikely(do_work))
    +        return hfi1_process_ecn_slowpath(qp, pkt, false);
    +    return false;
    }

    @ @ -1854,6 +1876,7 @@
    #define HFI1_HAS_SDMA_TIMEOUT  0x8
    #define HFI1_HAS_SEND_DMA      0x10 /* Supports Send DMA */
    #define HFI1_FORCED_FREEZE     0x80 /* driver forced freeze mode */
    +#define HFI1_SHUTDOWN          0x100 /* device is shutting down */

    /* IB dword length mask in PBC (lower 11 bits); same for all chips */
    #define HFI1_PBC_LENGTH_MASK                     ((1 << 11) - 1)
    @ @ -1957,6 +1980,7 @@
    int qsfp_dump(struct hfi1_pportdata *ppd, char *buf, int len);

    int hfi1_pcie_init(struct pci_dev *pdev, const struct pci_device_id *ent);
void hfi1_clean_up_interrupts(struct hfi1_devdata *dd);
void hfi1_pcie_cleanup(struct pci_dev *pdev);
int hfi1_pcie_ddinit(struct hfi1_devdata *dd, struct pci_dev *pdev);
void hfi1_pcie_ddcleanup(struct hfi1_devdata *);

((slid >> OPA_16B_SLID_SHIFT) << OPA_16B_SLID_HIGH_SHIFT);
lrh2 = (lrh2 & ~OPA_16B_DLID_MASK) |
((dlid >> OPA_16B_DLID_SHIFT) << OPA_16B_DLID_HIGH_SHIFT);
lrh2 = (lrh2 & ~OPA_16B_PKEY_MASK) | ((u32)pkey << OPA_16B_PKEY_SHIFT);
lrh2 = (lrh2 & ~OPA_16B_L4_MASK) | l4;

hdr->lrh[0] = lrh0;
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/init.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/init.c
@@ -88,9 +88,9 @@
* pio buffers per ctxt, etc.) Zero means use one user context per CPU.
 */
int num_user_contexts = -1;
-module_param_named(num_user_contexts, num_user_contexts, uint, S_IRUGO);
+module_param_named(num_user_contexts, num_user_contexts, int, 0444);
MODULE_PARM_DESC(
  num_user_contexts, "Set max number of user contexts to use");
+num_user_contexts, "Set max number of user contexts to use (default: -1 will use the real (non-HT) CPU count"));

uint krcvqs[RXE_NUM_DATA_VL];
int krcvqsset;
@@ -213,12 +213,12 @@
struct hfi1_ctxtdata *rcd =
  container_of(kref, struct hfi1_ctxtdata, kref);

-hfi1_free_ctxtdata(rcd->dd, rcd);
- 
spin_lock_irqsave(&rcd->dd->uctxt_lock, flags);
rcd->dd->rcd[rcd->ctxt] = NULL;
spin_unlock_irqrestore(&rcd->dd->uctxt_lock, flags);

+hfi1_free_ctxtdata(rcd->dd, rcd);
+
kfree(rcd);
}

@@ -241,10 +241,13 @@
 * @rcd: pointer to an initialized rcd data structure
 *
 * Use this to get a reference after the init.
 + *
 + * Return : reflect kref_get_unless_zero(), which returns non-zero on
+ * increment, otherwise 0.
+ */
+ int hfi1_rcd_get(struct hfi1_ctxtdata *rcd)
+ { kref_get_unless_zero(&rcd->kref); return kref_get_unless_zero(&rcd->kref); }

/** @ @ .324,7 +327,8 @ @ spin_lock_irqsave(&dd->uctxt_lock, flags); if (dd->rcd[ctxt]) {
rcd = dd->rcd[ctxt];
hfi1_rcd_get(rcd);
@if (!hfi1_rcd_get(rcd))
rcd = NULL;
} spin_unlock_irqrestore(&dd->uctxt_lock, flags);
@@ -784,7 +788,8 @@
ppd->hfi1_wq = alloc_workqueue(
    "hfi%d_%d",
    - WQ_SYSFS | WQ_HIGHPRI | WQ_CPU_INTENSIVE,
+ WQ_SYSFS | WQ_HIGHPRI | WQ_CPU_INTENSIVE |
+ WQ_MEM_RECLAIM,
    HFI1_MAX_ACTIVE_WORKQUEUE_ENTRIES,
    dd->unit, pidx);
if (!ppd->hfi1_wq)
@@ -1048,6 +1053,10 @@
unsigned pidx;
int i;
+if (dd->flags & HFI1_SHUTDOWN)
+return;
+dd->flags |= HFI1_SHUTDOWN;
+for (pidx = 0; pidx < dd->num_pports; ++pidx) {
ppd = dd->pport + pidx;
@@ -1058,8 +1067,9 @@
} dd->flags &= ~HFI1_INITTED;

-/* mask interrupts, but not errors */
+/* mask and clean up interrupts, but not errors */
set_intr_state(dd, 0);
for (pidx = 0; pidx < dd->num_pports; ++pidx) {
    ppd = dd->pport + pidx;
    return ERR_PTR(-ENOMEM);
    dd->num_pports = nports;
    dd->pport = (struct hfi1_pportdata *)(dd + 1);
    dd->pcidev = pdev;
    pci_set_drvdata(pdev, dd);
}

static void remove_one(struct pci_dev *);
static int init_one(struct pci_dev *, const struct pci_device_id *);
+static void shutdown_one(struct pci_dev *);

#define DRIVER_LOAD_MSG "Intel " DRIVER_NAME " loaded: "
#define PFX DRIVER_NAME": 
@@ -1374,6 +1387,7 @@
    .name = DRIVER_NAME,
    .probe = init_one,
    .remove = remove_one,
    .shutdown = shutdown_one,
    .id_table = hfi1_pci_tbl,
    .err_handler = &hfi1_pci_err_handler,
};
@@ -1702,6 +1716,7 @@
    dd_dev_err(dd, "Failed to create /dev devices: %d\n", -j);

if (initfail || ret) {
    +hfi1_clean_up_interrups(dd);
    stop_timers(dd);
    flush_workqueue(ib_wq);
    for (pidx = 0; pidx < dd->num_pports; ++pidx) {
        postinit_cleanup(dd);
    }
+static void shutdown_one(struct pci_dev *pdev)
+{
+    +struct hfi1_devdata *dd = pci_get_drvdata(pdev);
+    +shutdown_device(dd);
+}
/**
 * hfi1_create_rcvhdrq - create a receive header queue
 * @dd: the hfi1_ib device
 * @ -1797,7 +1819,6 @@
 @

 u64 reg;

 if (!rcd->rcvhdrq) {
 -dma_addr_t dma_hdrqtail;
 gfp_t gfp_flags;

 /*
 @ -1822,13 +1843,13 @@
 goto bail;
 }

 -if (HFI1_CAP_KGET_MASK(rcd->flags, DMA_RTAIL)) {
 +if (HFI1_CAP_KGET_MASK(rcd->flags, DMA_RTAIL)) ||
 + HFI1_CAP_UGET_MASK(rcd->flags, DMA_RTAIL)) {
 rcd->rcvhdrtail_kvaddr = dma_zalloc_coherent(
 -&dd->pcidev->dev, PAGE_SIZE, &dma_hdrqtail,
 -gfp_flags);
 +&dd->pcidev->dev, PAGE_SIZE,
 +&rcd->rcvhdrqtailaddr_dma, gfp_flags);
 if (!rcd->rcvhdrtail_kvaddr)
 goto bail_free;
 -rcd->rcvhdrqtailaddr_dma = dma_hdrqtail;
 }

 rcd->rcvhdrq_size = amt;
 --- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/mad.c
 +++ linux-4.15.0/drivers/infiniband/hw/hfi1/mad.c
 @@ -1,5 +1,5 @@
 /*
 - * Copyright(c) 2015-2017 Intel Corporation.
 + * Copyright(c) 2015-2018 Intel Corporation.
 * 
 * This file is provided under a dual BSD/GPLv2 license. When using or
 * redistributing this file, you may do so under either license.
 @@ -2326,7 +2326,7 @@
 __be32 vl_select_mask;
 }

 -#define VL_MASK_ALL 0x000080ff
 +#define VL_MASK_ALL 0x0000000000000080ffUL

 struct opa_port_status_rsp {
 ___u8 port_num;
 @@ -2625,15 +2625,14 @@
static void a0_portstatus(struct hfi1_pportdata *ppd,  
  struct opa_port_status_rsp *rsp, u32 vl_select_mask)
+ struct opa_port_status_rsp *rsp)
{
  if (!is_bx(ppd->dd)) {
    unsigned long vl;
    u64 sum_vl_xmit_wait = 0;
    -u32 vl_all_mask = VL_MASK_ALL;
  +unsigned long vl_all_mask = VL_MASK_ALL;
    for_each_set_bit(vl, (unsigned long *)&(vl_all_mask),  
        8 * sizeof(vl_all_mask)) {
        u64 tmp = sum_vl_xmit_wait +  
          read_port_cntr(ppd, C_TX_WAIT_VL,  
           idx_from_vl(vl));
        @@ -2657,12 +2656,12 @@  
          (struct opa_port_status_req *)pmp->data;
   struct hfi1_devdata *dd = dd_from_ibdev(ibdev);  
  +struct opa_port_status_rsp *rsp;  
    -u32 vl_select_mask = be32_to_cpu(req->vl_select_mask);
    +unsigned long vl_select_mask = be32_to_cpu(req->vl_select_mask);
    unsigned long vl;
    size_t response_data_size;
    u32 nports = be32_to_cpu(pmp->mad_hdr.attr_mod) >> 24;
    u8 port_num = req->port_num;
    -u8 num_vls = hweight32(vl_select_mask);
    +u8 num_vls = hweight64(vl_select_mask);
    struct _vls_pctrs *vlinfo;
    struct hfi1_ibport *ibp = to_iport(ibdev, port);
    struct hfi1_pportdata *ppd = ppd_from_ibp(ibp);
    @@ -2696,7 +2695,7 @@  
        hfi1_read_link_quality(dd, &rsp->link_quality_indicator);

        -rsp->vl_select_mask = cpu_to_be32(vl_select_mask);
        +rsp->vl_select_mask = cpu_to_be32((u32)vl_select_mask);
        rsp->port_xmit_data = cpu_to_be64(read_dev_cntr(dd, C_DC_XMIT_FLITS,  
          CNTR_INVALID_VL));
        rsp->port_rcv_data = cpu_to_be64(read_dev_cntr(dd, C_DC_RCV_FLITS,  
          @ @ -2759,8 +2758,7 @@
            * So in the for_each_set_bit() loop below, we don't need
            * any additional checks for vl.
            */
        -for_each_set_bit(vl, (unsigned long *)&(vl_select_mask),  
          -8 * sizeof(vl_select_mask)) {
for_each_set_bit(vl, &vl_select_mask, BITS_PER_LONG) {
    memset(vlinfo, 0, sizeof(*vlinfo));

    tmp = read_dev_cntr(dd, C_DC_RX_FLIT_VL, idx_from_vl(vl));
    vfi++;
}
-a0_portstatus(ppd, rsp, vl_select_mask);
+a0_portstatus(ppd, rsp);

if (resp_len)
    *resp_len += response_data_size;
return error_counter_summary;

static void a0_datacounters(struct hfi1_pportdata *ppd, struct _port_dctrs *rsp, u32 vl_select_mask)
+static void a0_datacounters(struct hfi1_pportdata *ppd, struct _port_dctrs *rsp)
{
    if (!is_bx(ppd->dd)) {
        unsigned long vl;
        u64 sum_vl_xmit_wait = 0;
        -u32 vl_all_mask = VL_MASK_ALL;
        +unsigned long vl_all_mask = VL_MASK_ALL;

        -for_each_set_bit(vl, (unsigned long *)&(vl_select_mask), 8 * sizeof(vl_select_mask),
                        8 * sizeof(req->vl_select_mask),)
        +for_each_set_bit(vl, &vl_all_mask, BITS_PER_LONG) {
            u64 tmp = sum_vl_xmit_wait +
              read_port_cntr(ppd, C_TX_WAIT_VL, idx_from_vl(vl));
            u64 port_mask;
            u8 port_num;
            unsigned long vl;
            -u32 vl_select_mask;
            +unsigned long vl_select_mask;
            int vfi;

            num_ports = be32_to_cpu(pmp->mad_hdr.attr_mod) >> 24;
            vfi++;
    
    * So in the for_each_set_bit() loop below, we don't need
    * any additional checks for vl.
    */
    -for_each_set_bit(vl, (unsigned long *)&(vl_select_mask), 8 * sizeof(req->vl_select_mask),
    +for_each_set_bit(vl, &vl_select_mask, BITS_PER_LONG) {
        u64 tmp = sum_vl_xmit_wait +
          read_port_cntr(ppd, C_TX_WAIT_VL, idx_from_vl(vl));
        u64 port_mask;
        u8 port_num;
        unsigned long vl;
        -u32 vl_select_mask;
        +unsigned long vl_select_mask;
        int vfi;

        num_ports = be32_to_cpu(pmp->mad_hdr.attr_mod) >> 24;
        vfi++;
    */
    for_each_set_bit(vl, &vl_all_mask, BITS_PER_LONG) {
        u64 tmp = sum_vl_xmit_wait +
          read_port_cntr(ppd, C_TX_WAIT_VL, idx_from_vl(vl));
        u64 port_mask;
        u8 port_num;
        unsigned long vl;
        -u32 vl_select_mask;
        +unsigned long vl_select_mask;
        int vfi;

        num_ports = be32_to_cpu(pmp->mad_hdr.attr_mod) >> 24;
        vfi++;
    }
for_each_set_bit(vl, &vl_select_mask, BITS_PER_LONG) {
    memset(vlinfo, 0, sizeof(*vlinfo));
    rsp->vls[vfi].port_vl_xmit_data = 
        @ @ .3020,7 +3015,7 @@ 
    vfi++;
}

-a0_datacounters(ppd, rsp, vl_select_mask);
+a0_datacounters(ppd, rsp);

if (resp_len)
    *resp_len += response_data_size;

struct _vls_ectrs *vlinfo;
unsigned long vl;
unsigned long port_mask, tmp;
+unsigned long vl_select_mask;
int vfi;

req = (struct opa_port_error_counters64_msg *)pmp->data;

vlinfo = &rsp->vls[0];
vfi = 0;
vl_select_mask = be32_to_cpu(req->vl_select_mask);

for_each_set_bit(vl, &vl_select_mask, BITS_PER_LONG) {
    memset(vlinfo, 0, sizeof(*vlinfo));
    rsp->vls[vfi].port_vl_xmit_discards =
        cpu_to_be64(read_port_cntr(ppd, C_SW_XMIT_DSCD_VL,
            @ @ .3385,7 +3379,7 @@ 
        u32 nports = be32_to_cpu(pmp->mad_hdr.attr_mod) >> 24;
        u64 portn = be64_to_cpu(req->port_select_mask[3]);
        u32 counter_select = be32_to_cpu(req->counter_select_mask);
        -u32 vl_select_mask = VL_MASK_ALL; /* clear all per-vl cnts */
        +unsigned long vl_select_mask = VL_MASK_ALL; /* clear all per-vl cnts */
        unsigned long vl;
        if ((nports != 1) || (portn != 1 << port)) {
            @ @ .3477,8 +3471,7 @@
            if (counter_select & CS_UNCORRECTABLE_ERRORS)
                write_dev_cntr(dd, C_DC_UNC_ERR, CNTR_INVALID_VL, 0);

    for_each_set_bit(vl, (unsigned long *)&(vl_select_mask),
        - 8 * sizeof(vlinfo));
    }

    -for_each_set_bit(vl, (unsigned long *)&(vl_select_mask),
        - 8 * sizeof(vlinfo));
    }
if (counter_select & CS_PORT_XMIT_DATA)
write_port_cntr(ppd, C_TX_FLIT_VL, idx_from_vl(vl), 0);

@@ -4729,7 +4722,7 @@
 |
 int ret;
 int pkey_idx;
- u32 resp_len = 0;
+ u32 resp_len = in_wc->byte_len - sizeof(*in_grh);
 struct hfi1_ibport *ibp = to_iport(ibdev, port);

 pkey_idx = hfi1_lookup_pkey_idx(ibp, LIM_MGMT_P_KEY);
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/pcie.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/pcie.c
@@ -163,9 +163,6 @@
 resource_size_t addr;
 int ret = 0;

-dd->pcidev = pdev;
-pci_set_drvdata(pdev, dd);
-
- addr = pci_resource_start(pdev, 0);
 len = pci_resource_len(pdev, 0);

@@ -330,7 +327,9 @@
*/
 /*
 */
- if (parent && dd->pcidev->bus->max_bus_speed != PCIE_SPEED_8_0GT) {
+ if (parent &&
+ (dd->pcidev->bus->max_bus_speed == PCIE_SPEED_2_5GT ||
+ dd->pcidev->bus->max_bus_speed == PCIE_SPEED_5_0GT)) {
 dd_dev_info(dd, "Parent PCIe bridge does not support Gen3\n");
 dd->link_gen3_capable = 0;
 }
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/pio.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/pio.c
@@ -50,8 +50,6 @@
 #include "qp.h"
 #include "trace.h"

-#define SC_CTX_PACKET_EGRESS_TIMEOUT 350 /* in chip cycles */
-
 #define SC(name) SEND_CTX_##name /*
 * Send Context functions
@@ -88,6 +86,7 @@
 unsigned long flags;

 4729,7 +4722,7 @@
int write = 1; /* write sendctrl back */
int flush = 0; /* re-read sendctrl to make sure it is flushed */
+int i;

spin_lock_irqsave(&dd->sendctrl_lock, flags);

@@ -97,9 +96,13 @@
reg |= SEND_CTRL_SEND_ENABLE_SMASK;
/* Fall through */
case PSC_DATA_VL_ENABLE:
+mask = 0;
+for (i = 0; i < ARRAY_SIZE(dd->vld); i++)
+if (!dd->vld[i].mtu)
+mask |= BIT_ULL(i);
/* Disallow sending on VLs not enabled */
-mask = (((~0ull) << num_vls) & SEND_CTRL_UNSUPPORTED_VL_MASK) <<
-SEND_CTRL_UNSUPPORTED_VL_SHIFT;
+mask = (mask & SEND_CTRL_UNSUPPORTED_VL_MASK) <<
+SEND_CTRL_UNSUPPORTED_VL_SHIFT;
reg = (reg & ~SEND_CTRL_UNSUPPORTED_VL_SMASK) | mask;
break;
case PSC_GLOBAL_DISABLE:
@@ -922,20 +925,18 @@
void sc_disable(struct send_context *sc)
{
    u64 reg;
    -unsigned long flags;
    struct pio_buf *pbuf;

    if (!sc)
        return;

    /* do all steps, even if already disabled */
-    spin_lock_irqsave(&sc->alloc_lock, flags);
+    spin_lock_irq(&sc->alloc_lock);
    reg = read_kctxt_csr(sc->dd, sc->hw_context, SC(CTRL));
    reg &= ~SC(CTRL_CTXT_ENABLE_SMASK);
    sc->flags &= ~SCF_ENABLED;
    sc_wait_for_packet_egress(sc, 1);
    write_kctxt_csr(sc->dd, sc->hw_context, SC(CTRL), reg);
-    spin_unlock_irqrestore(&sc->alloc_lock, flags);

/*
 * Flush any waiters. Once the context is disabled,
@@ -945,7 +946,7 @@
 * proceed with the flush.
 */
    udelay(1);
spin_lock_irqsave(&sc->release_lock, flags);
spin_lock(&sc->release_lock);
if (sc->sr) /* this context has a shadow ring */
    while (sc->sr_tail != sc->sr_head) {
        pbuf = &sc->sr[sc->sr_tail].pbuf;
        if (!(sc->sr_tail == sc->sr_head)) {
            sc->sr_tail = 0;
        }
        spin_unlock_irq(&sc->alloc_lock);
    }
    spin_unlockirqrestore(&sc->release_lock, flags);
spin_unlock(&sc->release_lock);
spin_unlock_irq(&sc->alloc_lock);

/* return SendEgressCtxtStatus.PacketOccupancy */
#define packet_occupancy(r) ((r) & SEND_EGRESS_CTXT_STATUS_CTXT_EGRESS_PACKET_OCCUPANCY_SMASK)\
   >> SEND_EGRESS_CTXT_STATUS_CTXT_EGRESS_PACKET_OCCUPANCY_SHIFT)
+static u64 packet Occupancy(u64 reg)
+{
    return (reg &
      SEND_EGRESS_CTXT_STATUS_CTXT_EGRESS_PACKET_OCCUPANCY_SMASK)\
      >> SEND_EGRESS_CTXT_STATUS_CTXT_EGRESS_PACKET_OCCUPANCY_SHIFT;
+
/* is egress halted on the context? */
#define egress_halted(r) ((r) & SEND_EGRESS_CTXT_STATUS_CTXT_EGRESS_HALT_STATUS_SMASK)
+static bool egress_halted(u64 reg)
+{
    return !!((reg & SEND_EGRESS_CTXT_STATUS_CTXT_EGRESS_HALT_STATUS_SMASK);
+
/* wait for packet egress, optionally pause for credit return */
+/* is the send context halted? */
+static bool is_sc_halted(struct hfi1_devdata *dd, u32 hw_context)
+{
    return !!((read_kctxt_csr(dd, hw_context, SC(STATUS)) &
         SC(STATUS_CTXT_HALTED_SMASK));
+}
+*/
+* sc_wait_for_packet_egress
+* @sc: valid send context
+* @pause: wait for credit return
+*
+* Wait for packet egress, optionally pause for credit return
+*
+ * Egress halt and Context halt are not necessarily the same thing, so
+ * check for both.
+ *
+ * NOTE: The context halt bit may not be set immediately. Because of this,
+ * it is necessary to check the SW SFC_HALTED bit (set in the IRQ) and the HW
+ * context bit to determine if the context is halted.
+ */
static void sc_wait_for_packet_egress(struct send_context *sc, int pause) {
  struct hfi1_devdata *dd = sc->dd;
  reg_prev = reg;
  reg = read_csr(dd, sc->hw_context * 8 + SEND_EGRESS_CTX_STATUS);
-/* done if egress is stopped */
-if (egress_halted(reg))
+/* done if any halt bits, SW or HW are set */
+if (sc->flags & SCF_HALTED ||
    is_sc_halted(dd, sc->hw_context) || egress_halted(reg))
    break;
  reg = packet_occupancy(reg);
  if (reg == 0)
    sc_enable(sc); /* will clear the sc frozen flag */
}

+/**
+ * pio_kernel_linkup() - Re-enable send contexts after linkup event
+ * @dd: valid devive data
+ *
+ * When the link goes down, the freeze path is taken. However, a link down
+ * event is different from a freeze because if the send context is re-enabled
+ * whoever is sending data will start sending data again, which will hang
+ * any QP that is sending data.
+ *
+ * The freeze path now looks at the type of event that occurs and takes this
+ * path for link down event.
+ */
+void pio_kernel_linkup(struct hfi1_devdata *dd) {
+  struct send_context *sc;


+int i;
+
+for (i = 0; i < dd->num_send_contexts; i++) {
+  sc = dd->send_contexts[i].sc;
+  if (!sc || !(sc->flags & SCF_LINK_DOWN) || sc->type == SC_USER)
+    continue;
+
+  sc_enable(sc); /* will clear the sc link down flag */
+}
+
/*
 * Wait for the SendPioInitCtxt.PioInitInProgress bit to clear.
 * Returns:
 @@ -1357,11 +1413,10 @@
 { unsigned long flags;

-* mark the context */
-* sc->flags |= flag;
-
+/* mark the context */
+sc->flags |= flag;
+sc->flags &= ~SCF_ENABLED;
spin_unlock_irqrestore(&sc->alloc_lock, flags);
/* stop buffer allocations */
spin_lock_irqsave(&sc->alloc_lock, flags);

/* @cb: optional callback to call when the buffer is finished sending */
/* @arg: argument for cb */

- * Return a pointer to a PIO buffer if successful, NULL if not enough room.
+ * Return a pointer to a PIO buffer, NULL if not enough room, -ECOMM
+ * when link is down.
 */
struct pio_buf *sc_buffer_alloc(struct send_context *sc, u32 dw_len,
pio_releaseCb cb, void *arg)
@@ -1394,7 +1450,7 @@
spin_lock_irqsave(&sc->alloc_lock, flags);
if (!((sc->flags & SCF_ENABLED)) { 
  spin_unlock_irqrestore(&sc->alloc_lock, flags);
  goto done;
+return ERR_PTR(-ECOMM);
}

retry:
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/pio.h
struct send_context_info {
    struct send_context *sc; /* allocated working context */
}

void pio_reset_all(struct hfi1_devdata *dd);
void pio_freeze(struct hfi1_devdata *dd);
void pio_kernel_unfreeze(struct hfi1_devdata *dd);
+void pio_kernel_linkup(struct hfi1_devdata *dd);

/* global PIO send control operations */
#define PSC_GLOBAL_ENABLE 0

lockdep_assert_held(&qp->s_lock);
ps->s_txreq = get_txreq(ps->dev, qp);
@if (IS_ERR(ps->s_txreq))
+if (!ps->s_txreq)
    goto bail_no_tx;
if (priv->hdr_type == HFI1_PKT_TYPE_9B) {
    if (priv->hdr_type == HFI1_PKT_TYPE_9B) {
        pbc = create_pbc(pdev, pbc_flags, qp->srate_mbps,
              sc_to_vlt(pdev->dd, sc5), plen);
pbuf = sc_buffer_alloc(rcd->sc, plen, NULL, NULL);
-if (!pbuf) {
+if (IS_ERR_OR_NULL(pbuf)) {
        /* We have no room to send at the moment. Pass
         * responsibility for sending the ACK to the send engine
        @ @ -918,7 +918,7 @ @
        if (cmp_psn(wqe->lpsn, qp->s_sending_psn) >= 0 &&
            cmp_psn(qp->s_sending_psn, qp->s_sending_hpsn) <= 0)
            break;
+rtv_qp_wqe_unreserve(qp, wqe);
s_last = qp->s_last;
trace_hfi1_qp_send_completion(qp, wqe, s_last);
-if (+s_last >= qp->s_size)
    @ @ -1213,6 +1214,7 @ @
u32 s_last;
rvt_put_swqe(wqe);
+rvt_qp_wqe_unreserve(qp, wqe);
s_last = qp->s_last;
trace_hfi1_qp_send_completion(qp, wqe, s_last);
if (++s_last >= qp->s_size)
@@ -2052,8 +2054,7 @@
struct ib_reth *reth;
unsigned long flags;
int ret;
-bool is_fecn = false;
-bool copy_last = false;
+bool copy_last = false, fecn;
u32 rkey;
u8 extra_bytes = pad + packet->extra_byte + (SIZE_OF_CRC << 2);

@@ -2062,7 +2063,7 @@
if (hfi1_ruc_check_hdr(ibp, packet))
return;

-is_fecn = process_ecn(qp, packet, false);
+fecn = process_ecn(qp, packet);

/ *
 * Process responses (ACKs) before anything else. Note that the
@@ -2073,8 +2074,6 @@
if (opcode >= OP(RDMA_READ_RESPONSE_FIRST) &&
  opcode <= OP(ATOMIC_ACKNOWLEDGE)) {
  rc_rcv_resp(packet);
-  if (is_fecn)
-    goto send_ack;
  return;
}

@@ -2306,7 +2305,7 @@
update_ack_queue(qp, next);
}
e = &qp->s_ack_queue[qp->r_head_ack_queue];
-if (e->opcode == OP(RDMA_READ_REQUEST) && e->rdma_sge.mr) {
+if (e->rdma_sge.mr) {
  rvt_put_mr(e->rdma_sge.mr);
e->rdma_sge.mr = NULL;
}
@@ -2350,11 +2349,11 @@

/* Schedule the send engine. */
qp->s_flags |= RVT_S_RESP_PENDING;
+if (fecn)
+qp->s_flags |= RVT_S_ECN;
hfi1_schedule_send(qp);

spin_unlock_irqrestore(&qp->s_lock, flags);
-if (is_fecn)
 goto send_ack;
return;
}

@@ -2380,7 +2379,7 @@
 update_ack_queue(qp, next);
 }
 e = &qp->s_ack_queue[qp->r_head_ack_queue];
-if (e->opcode == OP(RDMA_READ_REQUEST) && e->rdma_sge.mr) {
 +if (e->rdma_sge.mr) {
 rvt_put_mr(e->rdma_sge.mr);
 e->rdma_sge.mr = NULL;
 }
@@ -2416,11 +2415,11 @@
 /* Schedule the send engine. */
 qp->s_flags |= RVT_S_RESP_PENDING;
 +if (fecn)
 +qp->s_flags |= RVT_S_ECN;
 hfi1_schedule_send(qp);

-spin_unlock_irqrestore(&qp->s_lock, flags);
-if (is_fecn)
 goto send_ack;
return;
}

@@ -2433,16 +2432,9 @@
 qp->r_ack_psn = psn;
 qp->r_nak_state = 0;
 /* Send an ACK if requested or required. */
-if (psn & IB_BTH_REQ_ACK) {
 -if (packet->numpkt == 0) {
 -rc_cancel_ack(qp);
 -goto send_ack;
 -}
 -if (qp->r_adefered >= HFI1_PSN_CREDIT) {
 -rc_cancel_ack(qp);
 -goto send_ack;
 -}
-if (unlikely(is_fecn)) {
 +if (psn & IB_BTH_REQ_ACK || fecn) {
 +if (packet->numpkt == 0 || fecn ||
 +qp->r_adefered >= HFI1_PSN_CREDIT) {

rc_cancel_ack(qp);
goto send_ack;
}
@@ -2483,7 +2475,7 @@
qp->r_nak_state = IB_NAK_REMOTE_ACCESS_ERROR;
qp->r_ack_psn = qp->r_psn;
send_ack:
- hfi1_send_rc_ack(rcd, qp, is_fecn);
+ hfi1_send_rc_ack(rcd, qp, fecn);
}

void hfi1_rc_hdrerr(
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/ruc.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/ruc.c
@@ -440,6 +440,8 @@
goto op_err;
if (!ret)
goto rnr_nak;
+if (wqe->length > qp->r_len)
+goto inv_err;
break;

case IB_WR_RDMA_WRITE_WITH_IMM:
@@ -607,7 +609,10 @@
goto err;
inv_err:
-send_status = IB_WC_REM_INV_REQ_ERR;
+send_status =
+sqp->ibqp.qp_type == IB_QPT_RC ?
+IB_WC_REM_INV_REQ_ERR : 
+IB_WC_SUCCESS;
wc.status = IB_WC_LOC_QP_OP_ERR;
goto err;
@@ -745,6 +750,20 @@
ohdr->bth[2] = cpu_to_be32(bth2);
}

+/**
+- hfi1_make_ruc_header_16B - build a 16B header
+- @qp: the queue pair
+- @ohdr: a pointer to the destination header memory
+- @bth0: bth0 passed in from the RC/UC builder
+- @bth2: bth2 passed in from the RC/UC builder
+- @middle: non zero implies indicates ahg "could" be used
+- @ps: the current packet state
+- */
+ * This routine may disarm ahg under these situations:
+ * - packet needs a GRH
+ * - BECN needed
+ * - migration state not IB_MIG_MIGRATED
+ */

static inline void hfi1_make_ruc_header_16B(struct rvt_qp *qp,
   struct ib_other_headers *ohdr,
   u32 bth0, u32 bth2, int middle,
   @@ -789,6 +808,12 @@
else
    middle = 0;
+    if (qp->s_flags & RVT_S_ECN) {
+      qp->s_flags &= ~RVT_S_ECN;
+      /* we recently received a FECN, so return a BECN */
+      becn = true;
+      middle = 0;
+    }
    if (middle)
      build_ahg(qp, bth2);
else
@@ -796,11 +821,6 @@
    bth0 |= pkey;
    bth0 |= extra_bytes << 20;
-    if (qp->s_flags & RVT_S_ECN) {
-      qp->s_flags &= ~RVT_S_ECN;
-      /* we recently received a FECN, so return a BECN */
-      becn = 1;
-    }
    hfi1_make_ruc_bth(qp, ohdr, bth0, bth1, bth2);

if (!ppd->lid)
@@ -818,6 +838,20 @@
    pkey, becn, 0, 14, priv->s_sc);
} 

+/**
+ * hfi1_make_ruc_header_9B - build a 9B header
+ * @qp: the queue pair
+ * @ohdr: a pointer to the destination header memory
+ * @bth0: bth0 passed in from the RC/UC builder
+ * @bth2: bth2 passed in from the RC/UC builder
+ * @middle: non zero implies indicates ahg "could" be used
+ * @ps: the current packet state
+ *
+ * This routine may disarm ahg under these situations:
+ * - packet needs a GRH
+ */

Open Source Used In 5GaaS Edge AC-4 22179
+ * - BECN needed
+ * - migration state not IB_MIG_MIGRATED
+ */
static inline void hfi1_make_ruc_header_9B(struct rvt_qp *qp,
   struct ib_other_headers *ohdr,
   u32 bth0, u32 bth2, int middle,
   @@ -851,6 +885,12 @@
else
    middle = 0;

+if (qp->s_flags & RVT_S_ECN) {
+qp->s_flags &= ~RVT_S_ECN;
+/* we recently received a FECN, so return a BECN */
+bth1 |= (IB_BECN_MASK << IB_BECN_SHIFT);
+middle = 0;
+}
if (middle)
   build_ahg(qp, bth2);
else
   @@ -858,11 +898,6 @@
       bth0 |= pkey;
       bth0 |= extra_bytes << 20;
-    if (qp->s_flags & RVT_S_ECN) {
-    qp->s_flags &= ~RVT_S_ECN;
-    /* we recently received a FECN, so return a BECN */
-    bth1 |= (IB_BECN_MASK << IB_BECN_SHIFT);
-    }
   hf1_make_ruc_bth(qp, ohdr, bth0, bth1, bth2);
   hf1_make_ib_hdr(&ps->s_txreq->phdr.ibh,
      lrh0,
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/sdma.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/sdma.c
@@ -65,6 +65,7 @@
#define SDMA_DESCQ_CNT 2048
#define SDMA_DESC_INTR 64
#define INVALID_TAIL 0xffff
+#define SDMA_PAD max_t(size_t, MAX_16B_PADDING, sizeof(u32))

static uint sdma_descq_cnt = SDMA_DESCQ_CNT;
module_param(sdma_descq_cnt, uint, S_IRUGO);
@@ -410,10 +411,7 @@
sdma_flush_descq(sde);
    spin_lock_irqsave(&sde->flushlist_lock, flags);
    /* copy flush list */
   -list_for_each_entry_safe(txp, txp_next, &sde->flushlist, list) {
   -list_del_init(&txp->list);
   -list_add_tail(&txp->list, &flushlist);

static uint sdma_descq_cnt = SDMA_DESCQ_CNT;
module_param(sdma_descq_cnt, uint, S_IRUGO);
@@ -410,10 +411,7 @@
sdma_flush_descq(sde);
    spin_lock_irqsave(&sde->flushlist_lock, flags);
    /* copy flush list */
   -list_for_each_entry_safe(txp, txp_next, &sde->flushlist, list) {
   -list_del_init(&txp->list);
   -list_add_tail(&txp->list, &flushlist);
list_splice_init(&sde->flushlist, &flushlist);
spin_unlock_irqrestore(&sde->flushlist_lock, flags);
/* flush from flush list */
list_for_each_entry_safe(txp, txp_next, &flushlist, list)
@@ -1288,7 +1286,7 @@
struct sdma_engine *sde;

if (dd->sdma_pad_dma) {
-dma_free_coherent(&dd->pcidev->dev, 4,
+dma_free_coherent(&dd->pcidev->dev, SDMA_PAD,
 (void *)dd->sdma_pad_dma,
 dd->sdma_pad_phys);
 dd->sdma_pad_dma = NULL;
 @@ -1487,7 +1485,7 @@
 /* Allocate memory for pad */
 dd->sdma_pad_dma = dma_zalloc_coherent(
 &dd->pcidev->dev,
-sizeof(u32),
 +SDMA_PAD,
 &dd->sdma_pad_phys,
 GFP_KERNEL
 );
 @@ -1524,8 +1522,11 @@
}

ret = rhashtable_init(tmp_sdma_rht, &sdma_rht_params);
-if (ret < 0)
+if (ret < 0) {
+kfree(tmp_sdma_rht);
goto bail;
+
+}
+dd->sdma_rht = tmp_sdma_rht;

dd_dev_info(dd, "SDMA num_sdma: %u\n", dd->num_sdma);
@@ -2430,7 +2431,7 @@
wait->tx_count++;
wait->count += tx->num_desc;
}
-schedule_work(&sde->flush_worker);
+queue_work_on(sde->cpu, system_highpri_wq, &sde->flush_worker);
ret = -ECOMM;
goto unlock;
nodec:
@@ -2530,7 +2531,7 @@
}
spin_unlock(&sde->flushlist_lock);
-schedule_work(&sde->flush_worker);
+queue_work_on(sde->cpu, system_highpri_wq, &sde->flush_worker);
ret = -ECOMM;
goto update_tail;

nodesc:
@@ -3058,6 +3059,7 @@
static int _extend_sdma_tx_descs(struct hfi1_devdata *dd, struct sdma_txreq *tx)
 {
 int i;
+struct sdma_desc *descp;

 /* Handle last descriptor */
 if (unlikely((tx->num_desc == (MAX_DESC - 1)))) {
@@ -3078,12 +3080,10 @@
        if (unlikely(tx->num_desc == MAX_DESC))
goto enomem;

        -tx->descp = kmalloc_array(
-       MAX_DESC,
-       sizeof(struct sdma_desc),
-       GFP_ATOMIC);
-       if (!tx->descp)
-          goto enomem;
-       tx->descp = descp;
+descp = kmalloc_array(MAX_DESC, sizeof(struct sdma_desc), GFP_ATOMIC);
+if (!descp)
+    goto enomem;
+    tx->descp = descp;

        /* reserve last descriptor for coalescing */
        tx->desc_limit = MAX_DESC - 1;
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/sysfs.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/sysfs.c
@@ -670,7 +670,11 @@
    dd_dev_err(dd,
            "Skipping sc2vl sysfs info, (err %d) port %u
",
            ret, port_num);
@@ -680,7 +684,7 @@
    goto bail_sc2vl;
 
    /* Based on the documentation for kobject_init_and_add(), the
+   * caller should call kobject_put even if this call fails.
+   */
+    goto bail_sc2vl;
    } }
    kobject_uevent(&ppd->sc2vl_kobj, KOBJ_ADD);

    @ @ -680,7 +684,7 @@
    dd_dev_err(dd,
            "Skipping sl2sc sysfs info, (err %d) port %u
",
ret, port_num);
-goto bail_sc2vl;
+goto bail_sl2sc;
}
kobject_uevent(&ppd->sl2sc_kobj, KOBJ_ADD);

@@ -690,7 +694,7 @@
dd_dev_err(dd,
    "Skipping vl2mtu sysfs info, (err %d) port %u\n",
    ret, port_num);
-goto bail_sl2sc;
+goto bail_vl2mtu;
}
kobject_uevent(&ppd->vl2mtu_kobj, KOBJ_ADD);

@@ -700,7 +704,7 @@
dd_dev_err(dd,
    "Skipping Congestion Control sysfs info, (err %d) port %u\n",
    ret, port_num);
-goto bail_vl2mtu;
+goto bail_cc;
}
kobject_uevent(&ppd->pport_cc_kobj, KOBJ_ADD);

@@ -738,7 +742,6 @@
kobject_put(&ppd->sl2sc_kobj);
bail_sc2vl:
kobject_put(&ppd->sc2vl_kobj);
    -bail:
    return ret;
}

@@ -858,8 +861,13 @@
for (i = 0; i < ARRAY_SIZE(hfi1_attributes); ++i)
device_remove_file(&dev->dev, hfi1_attributes[i]);

    -for (i = 0; i < dd->num_sdma; i++)
    -kobject_del(&dd->per_sdma[i].kobj);
+/*
+ * The function kobject_put() will call kobject_del() if the kobject
+ * has been added successfully. The sysfs files created under the
+ * kobject directory will also be removed during the process.
+ */
+for (; i >= 0; i--)
+kobject_put(&dd->per_sdma[i].kobj);

    return ret;
}
/* Unwind operations in hfi1_verbs_register_sysfs() */
+for (i = 0; i < dd->num_sdma; i++)
+kobject_put(&dd->per_sdma[i].kobj);
+
+for (i = 0; i < dd->num_pports; i++) {
  ppd = &dd->pport[i];

--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/uc.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/uc.c
@@ -1,5 +1,5 @@
/*
- * Copyright(c) 2015, 2016 Intel Corporation.
- * Copyright(c) 2015 - 2018 Intel Corporation.
- *
- This file is provided under a dual BSD/GPLv2 license. When using or
- redistributing this file, you may do so under either license.
@@ -72,7 +72,7 @@
int middle = 0;

ps->s_txreq = get_txreq(ps->dev, qp);
-if (IS_ERR(ps->s_txreq))
+if (!ps->s_txreq)
goto bail_no_tx;

if (!(ib_rvt_state_ops[qp->state] & RVT_PROCESS_SEND_OK)) {
 @ @ -327.7 +327.7 @@
 if (hfi1_ruc_check_hdr(ibp, packet))
 return;

-process_ecn(qp, packet, true);
+process_ecn(qp, packet);

psn = ib_bth_get_psn(ohdr);
/* Compare the PSN verses the expected PSN. */
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/ud.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/ud.c
@@ -1,5 +1,5 @@
/*
- * Copyright(c) 2015, 2016 Intel Corporation.
- * Copyright(c) 2015 - 2018 Intel Corporation.
- *
- This file is provided under a dual BSD/GPLv2 license. When using or
- redistributing this file, you may do so under either license.
@@ -51,6 +51,7 @@
/* We support only two types - 9B and 16B for now */
@
-479,7 +480,7 @

u32 lid;

ps->s_txreq = get_txreq(ps->dev, qp);
-if (IS_ERR(ps->s_txreq))
+if (!ps->s_txreq)
goto bail_no_tx;

if (!(ib_rvt_state_ops[qp->state] & RVT_PROCESS_NEXT_SEND_OK)) {
@@
-630,36 +631,37 @@
}

void return_cnp_16B(struct hfi1_ibport *ibp, struct rvt_qp *qp,
- u32 remote_qpn, u32 pkey, u32 slid, u32 dlid,
+ u32 remote_qpn, u16 pkey, u32 slid, u32 dlid,
    u8 sc5, const struct ib_grh *old_grh)
{
    struct hfi1_16b_header hdr;
+struct hfi1_opa_header hdr;
    struct ib_other_headers *ohdr;
    struct pio_buf *pbuf;
    struct send_context *ctxt = qp_to_send_context(qp, sc5);
    struct hfi1_pportdata *ppd = ppd_from_ibp(ibp);
    u32 nwords;

+hdr.hdr_type = HFI1_PKT_TYPE_16B;
/* Populate length */
    nwords = ((hfi1_get_16b_padding(hwords << 2, 0) +
        SIZE_OF_LT) >> 2) + SIZE_OF_CRC;
    if (old_grh) {
        struct ib_grh *grh = &hdr.u.l.grh;
+struct ib_grh *grh = &hdr.opah.u.l.grh;
        grh->version_tclass_flow = old_grh->version_tclass_flow;
        grh->paylen = cpu_to_be16((hwords - 4 + nwords) << 2);
        grh->hop_limit = 0xff;
        grh->sgid = old_grh->dgid;
grh->dgid = old_grh->sgid;
-ohdr = &hdr.u.oth;
+ohdr = &hdr.opah.u.oth;

l4 = OPA_16B_L4_IB_GLOBAL;
hwords += sizeof(struct ib_grh) / sizeof(u32);
} else {
-ohdr = &hdr.u.oth;
+ohdr = &hdr.opah.u.oth;

l4 = OPA_16B_L4_IB_LOCAL;
}

@@ -673,7 +675,7 @@
/* Convert dwords to flits */
len = (hwords + nwords) >> 1;

-hfi1_make_16b_hdr(&hdr, slid, dlid, len, pkey, 1, 0, l4, sc5);
+hfi1_make_16b_hdr(&hdr.opah, slid, dlid, len, pkey, 1, 0, l4, sc5);

plen = 2 /* PBC */ + hwords + nwords;
pbc_flags |= PBC_PACKET_BYPASS | PBC_INSERT_BYPASS_ICRC;
@@ -681,39 +683,42 @@
pbc = create_pbc(ppd, pbc_flags, qp->srate_mbps, vl, plen);
if (ctxt) {
    pbuf = sc_buffer_alloc(ctxt, plen, NULL, NULL);
    -if (pbuf)
    +if (!IS_ERR_OR_NULL(pbuf)) {
        +trace_pio_output_ibhdr(ppd->dd, &hdr, sc5);
        ppd->dd->pio_inline_send(ppd->dd, pbuf, pbc, &hdr, hwords);
        +}
    }
}

void return_cnp(struct hfi1_ibport *ibp, struct rvt_qp *qp, u32 remote_qpn,
-  u32 pkey, u32 slid, u32 dlid, u8 sc5,
+  u16 pkey, u32 slid, u32 dlid, u8 sc5,
    const struct ib_grh *old_grh)
{
    u64 pbc, pbc_flags = 0;
    u32 bth0, plen, vl, hwords = 5;
    u16 lrh0;
    u8 sl = ibp->sc_to_sl[sc5];
    -struct ib_header hdr;
    +struct hfi1_opa_header hdr;
    struct ib_other_headers *ohdr;
    struct pio_buf *pbuf;
    struct send_context *ctxt = qp_to_send_context(qp, sc5);
    struct hfi1_pportdata *ppd = ppd_from_ibp(ibp);
```c
if (old_grh) {
    struct ib_grh *grh = &hdr.u.l.grh;
+    struct ib_grh *grh = &hdr.ibh.u.l.grh;

grh->version_tclass_flow = old_grh->version_tclass_flow;
grh->paylen = cpu_to_be16((hwords - 2 + SIZE_OF_CRC) << 2);
grh->hop_limit = 0xff;
grh->sgid = old_grh->dgid;
grh->dgid = old_grh->sgid;
-    ohdr = &hdr.u.oth;
+    ohdr = &hdr.ibh.u.oth;
    lrh0 = HFI1_LRH_GRH;
    hwords += sizeof(struct ib_grh) / sizeof(u32);
} else {
-    ohdr = &hdr.u.oth;
+    ohdr = &hdr.ibh.u.oth;
    lrh0 = HFI1_LRH_BTH;
}

@@ -725,16 +730,18 @@
ohdr->bth[1] = cpu_to_be32(remote_qpn | (1 << IB_BECN_SHIFT));
ohdr->bth[2] = 0; /* PSN 0 */

-hfi1_make_ib_hdr(&hdr, lrh0, hwords + SIZE_OF_CRC, dlid, slid);
+hfi1_make_ib_hdr(&hdr.ibh, lrh0, hwords + SIZE_OF_CRC, dlid, slid);
plen = 2 /* PBC */ + hwords;
pbc_flags |= (ib_is_sc5(sc5) << PBC_DC_INFO_SHIFT);
vl = sc_to_vlt(ppd->dd, sc5);
pbc = create_pbc(ppd, pbc_flags, qp->srate_mbps, vl, plen);
if (ctxt) {
    pbuf = sc_buffer_alloc(ctxt, plen, NULL, NULL);
    -if (pbuf)
+    if (!IS_ERR_OR_NULL(pbuf)) {
        +trace_pio_output_ibhdr(ppd->dd, &hdr, sc5);
        ppd->dd->pio_inline_send(ppd->dd, pbuf, pbc, &hdr, hwords);
    +}
}

@@ -885,7 +892,7 @@
}
sl_from_sc = ibp->sc_to_sl[sc5];

-process_ecn(qp, packet, (opcode != IB_OPCODE_CNP));
+process_ecn(qp, packet);
```
/*
* Get the number of bytes the message was padded by
* and drop incomplete packets.
* @ @ -952,7 +959,6 @@
* opcode == IB_OPCODE_UD_SEND_ONLY_WITH_IMMEDIATE) {
wc.ex.imm_data = ohdr->u.ud.imm_data;
wc.wc_flags = IB_WC_WITH_IMM;
-tlen -= sizeof(u32);
} else if (opcode == IB_OPCODE_UD_SEND_ONLY) {
wc.ex.imm_data = 0;
wc.wc_flags = 0;
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/user_exp_rcv.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/user_exp_rcv.c
@@ -90,9 +90,6 @@
struct hfi1_devdata *dd = uctxt->dd;
int ret = 0;

-spin_lock_init(&fd->tid_lock);
-spin_lock_init(&fd->invalid_lock);
-
fd->entry_to_rb = kalloc(uctxt->expected_count,
 sizeof(struct rb_node *),
 GFP_KERNEL);
@@ -324,6 +321,9 @@
 u32 *tidlist = NULL;
 struct tid_user_buf *tidbuf;

+if (!PAGE_ALIGNED(tinfo->vaddr))
+return -EINVAL;
+
+tidbuf = kzalloc(sizeof(*tidbuf), GFP_KERNEL);
if (!tidbuf)
return -ENOMEM;
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/user_sdma.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/user_sdma.c
@@ -132,25 +132,22 @@
 struct hfi1_ibdev *dev = &pq->dd->verbs_dev;
 struct hfi1_user_sdma_pkt_q *pq =
 container_of(wait, struct hfi1_user_sdma_pkt_q, busy);
 struct hfi1_ibdev *dev = &pq->dd->verbs_dev;
-struct user_sdma_txreq *tx =
 -container_of(txreq, struct user_sdma_req, txreq);

 -if (sdma_progress(sde, seq, txreq)) {
 -if (tx->busycount++ < MAX_DEFER_RETRY_COUNT)
 -goto eagain;
 -}
 +write_seqlock(&dev->iowait_lock);
 +if (sdma_progress(sde, seq, txreq))

---
+goto eagain;
/*
 * We are assuming that if the list is enqueued somewhere, it
 * is to the dmawait list since that is the only place where
 * it is supposed to be enqueued.
 */
xchg(&pq->state, SDMA_PKT_Q_DEFERRED);
-write_seqlock(&dev->iowait_lock);
if (list_empty(&pq->busy.list))
iowait_queue(pkts_sent, &pq->busy, &sde->dmawait);
write_sequnlock(&dev->iowait_lock);
return -EBUSY;
eagain:
+write_sequnlock(&dev->iowait_lock);
return -EAGAIN;
}

@@ -182,12 +179,10 @@
pq = kzalloc(sizeof(*pq), GFP_KERNEL);
if (!pq)
return -ENOMEM;
-pq->dd = dd;
pq->ctxt = uctxt->ctxt;
pq->subctxt = fd->subctxt;
pq->n_max_reqs = hfi1_sdma_comp_ring_size;
-pq->state = SDMA_PKT_Q_INACTIVE;
atomic_set(&pq->n_reqs, 0);
init_waitqueue_head(&pq->wait);
atomic_set(&pq->n_locked, 0);
@@ -240,7 +235,7 @@
goto pq_mmu_fail;
}

-fd->pq = pq;
+rcu_assign_pointer(fd->pq, pq);
fd->cq = cq;

return 0;
@@ -268,20 +263,27 @@
trace_hfi1_sdma_user_free_queues(uctxt->dd, uctxt->ctxt, fd->subctxt);
-pq = fd->pq;
+spin_lock(&fd->pq_rcu_lock);
+pq = srcu_dereference_check(fd->pq, &fd->pq_srcu,
+lockdep_is_held(&fd->pq_rcu_lock));
if (pq) {


+rcu_assign_pointer(fd->pq, NULL);
+spin_unlock(&fd->pq_rcu_lock);
+synchronize_srcu(&fd->pq_srcu);
/* at this point there can be no more new requests */
if (pq->handler)
  hfi1_mmu_rb_unregister(pq->handler);
iowait_sdma_drain(&pq->busy);
/* Wait until all requests have been freed. */
wait_event_interruptible(pq->wait,
  (READ_ONCE(pq->state) == SDMA_PKT_Q_INACTIVE);
  !atomic_read(&pq->n_reqs));
kfree(pq->reqs);
kfree(pq->req_in_use);
kmem_cache_destroy(pq->txreq_cache);
kfree(pq);
-fd->pq = NULL;
+} else {
  +spin_unlock(&fd->pq_rcu_lock);
}
if (fd->cq) {
  vfree(fd->cq->comps);
  @@ -312,13 +314,21 @@
  return mapping[hash];
 }

+/**
 + * hfi1_user_sdma_process_request() - Process and start a user sdma request
 + * @fd: valid file descriptor
 + * @iovec: array of io vectors to process
 + * @dim: overall iovec array size
 + * @count: number of io vector array entries processed
 + */
 int hfi1_user_sdma_process_request(struct hfi1_filedata *fd,
   struct iovec *iovec, unsigned long dim,
   unsigned long *count)
 {
   int ret = 0, i;
   struct hfi1_ctxtdata *uctxt = fd->uctxt;
   -struct hfi1_user_sdma_pkt_q *pq = fd->pq;
 +struct hfi1_user_sdma_pkt_q *pq =
 +srcu_dereference(fd->pq, &fd->pq_srcu);
   struct hfi1_user_sdma_comp_q *cq = fd->cq;
   struct hfi1_devdata *dd = pq->dd;
   unsigned long idx = 0;
   @@ -328,7 +338,6 @@
   u8 opcode, sc, vl;
   u16 pkey;
u32 slid;
-int req_queued = 0;
u16 dlid;
u32 selector;

@@ -392,7 +401,6 @@
 req->data_len = 0;
 req->pq = pq;
 req->cq = cq;
-req->status = -1;
 req->ahg_idx = -1;
 req->iov_idx = 0;
 req->sent = 0;
@@ -400,12 +408,14 @@
 req->seqcomp = 0;
 req->sequesmitted = 0;
 req->tids = NULL;
-req->done = 0;
 req->has_error = 0;
INIT_LIST_HEAD(&req->txps);

memcpy(&req->info, &info, sizeof(info));

+/* The request is initialized, count it */
+atomic_inc(&pq->n_reqs);
+
if (req_opcode(info.ctrl) == EXPECTED) {
 /* expected must have a TID info and at least one data vector */
if (req->data_iovs < 2) {
@@ -500,7 +510,6 @@
 ret = pin_vector_pages(req, &req->iovs[i]);
 if (ret) {
 req->data_iovs = i;
-req->status = ret;
 goto free_req;
 }
 req->data_len += req->iovs[i].iov.iov_len;
@@ -561,23 +570,11 @@
 req->ahg_idx = sdma_ahg_alloc(req->sde);

set_comp_state(pq, cq, info.comp_idx, QUEUED, 0);
-atomic_inc(&pq->n_reqs);
-req_queued = 1;
+pq->state = SDMA_PKT_Q_ACTIVE;
 /* Send the first N packets in the request to buy us some time */
ret = user_sdma_send_pkts(req, pcount);
-if (unlikely(ret < 0 && ret != -EBUSY)) {
-req->status = ret;

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 +if (unlikely(ret < 0 && ret != -EBUSY))
goto free_req;
-
-/*
 - * It is possible that the SDMA engine would have processed all the
 - * submitted packets by the time we get here. Therefore, only set
 - * packet queue state to ACTIVE if there are still uncompleted
 - * requests.
 - */
-if (atomic_read(&pq->n_reqs))
-xchg(&pq->state, SDMA_PKT_Q_ACTIVE);

 /* This is a somewhat blocking send implementation.  
@@ -588,14 +585,8 @@
 while (req->seqsubmitted != req->info.npkts) {
 ret = user_sdma_send_pkts(req, pcount);
 if (ret < 0) {
-+if (ret != -EBUSY) {
-++req->status = ret;
-+-WRITE_ONCE(req->has_error, 1);
-+if (READ_ONCE(req->seqcomp) ==
-+req->seqsubmitted - 1)
-+goto free_req;
-+-return ret;
 - }
 +if (ret != -EBUSY)
 +goto free_req;
 wait_event_interruptible_timeout(
     pq->busy.wait_dma,
     (pq->state == SDMA_PKT_Q_ACTIVE),  
@@ -606,10 +597,19 @@
     *count += idx;
 return 0;
 free_req:
-user_sdma_free_request(req, true);
-if (req_queued)
+/*
 + * If the submitted seqsubmitted == npkts, the completion routine
 + * controls the final state. If seqsubmitted < npkts, wait for any
 + * outstanding packets to finish before cleaning up.
 + */
+if (req->seqsubmitted < req->info.npkts) {
+if (req->seqsubmitted)
+wait_event(pq->busy.wait_dma,
++ (req->seqcomp == req->seqsubmitted - 1));
+user_sdma_free_request(req, true);
pq_update(pq);
- set_comp_state(pq, cq, info.comp_idx, ERROR, req->status);
+ set_comp_state(pq, cq, info.comp_idx, ERROR, ret);
+
+ return ret;
+
}@@ -807,7 +807,6 @@

tx->flags = 0;
tx->req = req;
-tx->busycount = 0;
INIT_LIST_HEAD(&tx->list);

/*
@@ -828,7 +827,7 @@
if (READ_ONCE(iovec->offset) == iovec->iov.iov_len) {
 if (++req->iov_idx == req->data_iovs) {
   ret = -EFAULT;
- goto free_txreq;
+ goto free_tx;
   }
   iovec = &req->iovs[req->iov_idx];
   WARN_ON(iovec->offset);
@@ -864,8 +863,10 @@
changes = set_txreq_header_ahg(req, tx,
   datalen);
- if (changes < 0)
+ if (changes < 0) {
+   ret = changes;
+   goto free_tx;
+ }
} else {
   ret = sdma_txinit(&tx->txreq, 0, sizeof(req->hdr) +
   @ @ -917,7 +918,6 @ @
   ret = sdma_send_txlist(req->sde, &pq->busy, &req->txps, &count);
   req->seqsubmitted += count;
   if (req->seqsubmitted == req->info.npkts) {
     -WRITE_ONCE(req->done, 1);
+/*
+ * The txreq has already been submitted to the HW queue
+ * so we can free the AHG entry now. Corruption will not
@@ -1365,11 +1365,15 @@
    return idx;
    }

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*/
- * SDMA tx request completion callback. Called when the SDMA progress
- * state machine gets notification that the SDMA descriptors for this
- * tx request have been processed by the DMA engine. Called in
- * interrupt context.
+/**
+ * user_sdma_txreq_cb() - SDMA tx request completion callback.
+ * @txreq: valid sdma tx request
+ * @status: success/failure of request
+ *
+ * Called when the SDMA progress state machine gets notification that
+ * the SDMA descriptors for this tx request have been processed by the
+ * DMA engine. Called in interrupt context.
+ * Only do work on completed sequences.
+ */
static void user_sdma_txreq_cb(struct sdma_txreq *txreq, int status)
{
@@ -1378,7 +1382,7 @@
    int idx;
    enum hfi1_sdma_comp_state state = COMPLETE;

    if (!tx->req)
        return;
@@ -1391,39 +1395,25 @@
        struct user_sdma_request *req;
        struct hfi1_user_sdma_pkt_q *pq;
        struct hfi1_user_sdma_comp_q *cq;
        -u16 idx;
+enum hfi1_sdma_comp_state state = COMPLETE;

        req->seqcomp = tx->seqnum;
        kmem_cache_free(pq->txreq_cache, tx);
        -tx = NULL;
@@ -1449,17 +1451,15 @@
            -req->status == 0;
            -user_sdma_free_request(req, false);
            -pq_update(pq);
            -set_comp_state(pq, cq, idx, COMPLETE, 0);
        -}
        -} else {
        -if (status != SDMA_TXREQ_S_OK)
        -req->status = status;

        req->seqcomp = tx->seqnum;
        kmem_cache_free(pq->txreq_cache, tx);
        -tx = NULL;
        -idx = req->info.comp_idx;
        -if (req->status == -1 && status == SDMA_TXREQ_S_OK) {
            -if (req->seqcomp == req->info.npkts - 1) {
                -req->status = 0;
                -user_sdma_free_request(req, false);
                -pq_update(pq);
                -set_comp_state(pq, cq, idx, COMPLETE, 0);
            -}
            -} else {
             -if (status != SDMA_TXREQ_S_OK)
                      status;
if (req->seqcomp == (READ_ONCE(req->seqsubmitted) - 1) &&
- (READ_ONCE(req->done) ||
- READ_ONCE(req->has_error))) {
-user_sdma_free_request(req, false);
-pq_update(pq);
-set_comp_state(pq, cq, idx, ERROR, req->status);
-
-
+/* sequence isn't complete? We are done */
+if (req->seqcomp != req->info.npkts - 1)
+return;
+
+user_sdma_free_request(req, false);
+set_comp_state(pq, cq, req->info.comp_idx, state, status);
+pq_update(pq);
}

static inline void pq_update(struct hfi1_user_sdma_pkt_q *pq)
{
-if (atomic_dec_and_test(&pq->n_reqs)) {
-xchg(&pq->state, SDMA_PKT_Q_INACTIVE);
+if (atomic_dec_and_test(&pq->n_reqs))
  wake_up(&pq->wait);
-
-
}

static void user_sdma_free_request(struct user_sdma_request *req, bool unpin)
@@ -1448,6 +1438,8 @@
if (!node)
  continue;

+req->iovs[i].node = NULL;
+
  if (unpin)
    hfi1_mmu_rb_remove(req->pq->handler,
&node->rb);
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/user_sdma.h
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/user_sdma.h
@@ -105,9 +105,10 @@
#define TXREQ_FLAGS_REQ_ACK   BIT(0)      /* Set the ACK bit in the header */
#define TXREQ_FLAGS_REQ_DISABLE_SH BIT(1) /* Disable header suppression */

-#define SDMA_PKT_Q_INACTIVE BIT(0)
-#define SDMA_PKT_Q_ACTIVE BIT(1)
-#define SDMA_PKT_Q_DEFERRED BIT(2)
+enum pkt_q_sdma_state {
+SDMA_PKT_Q_ACTIVE,
+SDMA_PKT_Q_DEFERRED,
/*
 * Maximum retry attempts to submit a TX request
 */
#define TXMAX 135   /**<
      * Maximum retry attempts to submit a TX request
      */
struct user_sdma_request *reqs;
unsigned long *req_in_use;
struct iowait busy;
unsigned state;
unsigned pkt_q_sdma_state;
wait_queue_head_t wait;
unsigned long unpinned;
struct mmu_rb_handler *handler;
/* Writeable fields shared with interrupt */
__cacheline_aligned_in_smp seqcomp;
__cacheline_aligned_in_smp seqsubmitted;
/* status of the last txreq completed */
int status;

/* Send side fields */
struct list_head txps;
/* progress index moving along the iovs array */
tididx;
/* Send side fields */
struct list_head list;
struct user_sdma_request *req;
flags;
unsigned int busycount;
seqnum;

--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/verbs.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/verbs.c
@@ -54,6 +54,7 @@
#include <linux/mm.h>
#include <linux/vmalloc.h>
#include <rdma/opa_addr.h>
#include <linux/nospec.h>
+#include "hfi.h"
+#include "common.h"
/* Length of buffer to create verbs txreq cache name */
#define TXREQ_NAME_LEN 24

/* 16B trailing buffer */
static const u8 trail_buf[MAX_16B_PADDING];

static uint wss_threshold;
module_param(wss_threshold, uint, S_IRUGO);
MODULE_PARM_DESC(wss_threshold, "Percentage (1-100) of LLC to use as a threshold for a cacheless copy");
@@ -595,10 +593,11 @@
     opa_get_lid(packet->dlid, 9B));
 if (!mcast)
goto drop;
+rcu_read_lock();
list_for_each_entry_rcu(p, &mcast->qp_list, list) {
packet->qp = p->qp;
if (hfi1_do_pkey_check(packet))
-goto drop;
+goto unlock_drop;
spin_lock_irqsave(&packet->qp->r_lock, flags);
packet_handler = qp_ok(packet);
if (likely(packet_handler))
@@ -607,6 +606,7 @@
ibp->rvp.n_pkt_drops++;
spin_unlock_irqrestore(&packet->qp->r_lock, flags);
}
+rcu_read_unlock();
/*
 * Notify rvt_multicast_detach() if it is waiting for us
 * to finish.
@@ -889,8 +889,8 @@
 /* add icrc, lt byte, and padding to flit */
 if (extra_bytes)
-ret = sdma_txadd_kvaddr(sde->dd, &tx->txreq,
-(void *)trail_buf, extra_bytes);
+ret = sdma_txadd_daddr(sde->dd, &tx->txreq,
 + sde->dd->sdma_pad_phys, extra_bytes);

bail_txadd:
return ret;
@@ -1095,10 +1095,10 @@
 if (cb)
iowait_pio_inc(&priv->s_iowait);
pbuf = sc_buffer_alloc(sc, plen, cb, qp);
- if (unlikely(!pbuf)) {
+ if (unlikely(IS_ERR_OR_NULL(pbuf))) {

if (cb)
    verbs_pio_complete(qp, 0);
- if (ppd->host_link_state != HLS_UP_ACTIVE) {
+ if (IS_ERR(pbuf)) {
    /*
    * If we have filled the PIO buffers to capacity and are
    * not in an active state this request is not going to
    @ @ -1138,6 +1138,8 @@

    if (slen > len)
        slen = len;
+ if (slen > ss->sge.sge_length)
+ slen = ss->sge.sge_length;
    rvt_update_sge(ss, slen, false);
+ seg_pio_copy_mid(pbuf, addr, slen);
    len -= slen;
    @ @ -1145,7 +1147,8 @@
    }
    /* add icrc, lt byte, and padding to flit */
    if (extra_bytes)
    - seg_pio_copy_mid(pbuf, trail_buf, extra_bytes);
    + seg_pio_copy_mid(pbuf, ppd->dd->sdma_pad_dma,
    + extra_bytes);

    seg_pio_copy_end(pbuf);
    }
    @ @ -1406,8 +1409,6 @@
    rdi->dparms.props.max_cq = hfi1_max_cqs;
    rdi->dparms.props.max_ah = hfi1_max_ahs;
    rdi->dparms.props.max_cqe = hfi1_max_cqes;
    -rdi->dparms.props.max_mr = rdi->lkey_table.max;
    -rdi->dparms.props.max_fmr = rdi->lkey_table.max;
    rdi->dparms.props.max_map_per_fmr = 32767;
    rdi->dparms.props.max_pd = hfi1_max_pds;
    rdi->dparms.props.max_qp_rd_atom = HFI1_MAX_RDMA_ATOMIC;
    @ @ -1581,6 +1582,7 @@
    struct hfi1_pportdata *ppd;
    struct hfi1_devdata *dd;
    u8 sc5;
    +u8 sl;

    if (hfi1_check_mcast(rdma_ah_get_dlid(ah_attr)) &&
        !rdma_ah_get_ah_flags(ah_attr) & IB_AH_GRH))
        @ @ -1589,8 +1591,14 @@
    /* test the mapping for validity */
    ibp = to_iport(ibdev, rdma_ah_get_port_num(ah_attr));
    ppd = ppd_from_ibp(ibp);
    -sc5 = ibp->sl_to_sc[rdma_ah_get_sl(ah_attr)];
dd = dd_from_ppd(ppd);
+
+sl = rdma_ah_get_sl(ah_attr);
+if (sl >= ARRAY_SIZE(ibp->sl_to_sc))
+return -EINVAL;
+sl = array_index_nospec(sl, ARRAY_SIZE(ibp->sl_to_sc));
+
+sc5 = ibp->sl_to_sc[sl];
if (sc_to_vlt(dd, sc5) > num_vls & & sc_to_vlt(dd, sc5) != 0xf)
return -EINVAL;
return 0;
@@ -1694,7 +1702,7 @@
static DEFINE_MUTEX(cntr_names_lock); /* protects the *_cntr_names bufers */
static const char **dev_cntr_names;
static const char **port_cntr_names;
-static int num_driver_cntrs = ARRAY_SIZE(driver_cntr_names);
+int num_driver_cntrs = ARRAY_SIZE(driver_cntr_names);
static int num_dev_cntrs;
static int num_port_cntrs;
static int cntr_names_initialized;
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/verbs_txreq.c
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/verbs_txreq.c
@@ -1,5 +1,5 @@
/*
- * Copyright(c) 2016 - 2017 Intel Corporation.
+ * Copyright(c) 2016 - 2018 Intel Corporation.
 * This file is provided under a dual BSD/GPLv2 license. When using or
 * redistributing this file, you may do so under either license.
@@ -94,13 +94,13 @@
struct rvt_qp *qp)
 __must_hold(&qp->s_lock)
} 
-struct verbs_txreq *tx = ERR_PTR(-EBUSY);
+struct verbs_txreq *tx = NULL;

write_seqlock(&dev->txwait_lock);
if (ib_rvt_state_ops[qp->state] & RVT_PROCESS_RECV_OK) {
struct hfi1_qp_priv *priv = priv;

-tx = kmem_cache_alloc(dev->verbs_txreq_cache, GFP_ATOMIC);
+tx = kmem_cache_alloc(dev->verbs_txreq_cache, VERBS_TXREQ_GFP);
if (tx)
goto out;
priv = qp->priv;
--- linux-4.15.0.orig/drivers/infiniband/hw/hfi1/verbs_txreq.h
+++ linux-4.15.0/drivers/infiniband/hw/hfi1/verbs_txreq.h
@@ -1,5 +1,5 @@
/*
   * Copyright(c) 2016 Intel Corporation.
+ * Copyright(c) 2016 - 2018 Intel Corporation.
   *
   * This file is provided under a dual BSD/GPLv2 license. When using or
   * redistributing this file, you may do so under either license.
   */

#define VERBS_TXREQ_GFP (GFP_ATOMIC | __GFP_NOWARN)
static inline struct verbs_txreq *get_txreq(struct hfi1_ibdev *dev,
    struct rvt_qp *qp)
{
    struct verbs_txreq *tx;
    struct hfi1_qp_priv *priv = qp->priv;

    tx = kmem_cache_alloc(dev->verbs_txreq_cache, VERBS_TXREQ_GFP);
    if (unlikely(!tx)) {
        /* call slow path to get the lock */
        tx = __get_txreq(dev, qp);
        if (!tx)
            return tx;
    }
    tx->qp = qp;
    return tx;
}

#define HFI1_VNIC_TXREQ_NAME_LEN   32
#define HFI1_VNIC_SDMA_DESC_WTRMRK 64
#define HFI1_VNIC_SDMA_RETRY_COUNT 1

/*
 * struct vnic_txreq - VNIC transmit descriptor
 */

struct vnic_txreq {
    struct sdma_txreq       txreq;
    unsigned char           pad[HFI1_VNIC_MAX_PAD];
};
u16          plen;
__le64       pbc_val;
-
-u32         retry_count;
}

static void vnic_sdma_complete(struct sdma_txreq *txreq,
@@ -196,7 +192,6 @@
ret = build_vnic_tx_desc(sde, tx, pbc);
if (unlikely(ret))
goto free_desc;
-tx->retry_count = 0;

ret = sdma_send_txreq(sde, &vnic_sdma->wait, &tx->txreq,
    vnic_sdma->pkts_sent);
@@ -238,14 +233,14 @@
struct hfi1_vnic_sdma *vnic_sdma =
    container_of(wait, struct hfi1_vnic_sdma, wait);
struct hfi1_ibdev *dev = &vnic_sdma->dd->verbs_dev;
-struct vnic_txreq *tx = container_of(txreq, struct vnic_txreq, txreq);
-if (sdma_progress(sde, seq, txreq))
-    if (tx->retry_count++ < HFI1_VNIC_SDMA_RETRY_COUNT)
-        return -EAGAIN;
+    write_seqlock(&dev->iowait_lock);
+    if (sdma_progress(sde, seq, txreq)) {
+        write_sequnlock(&dev->iowait_lock);
+        return -EAGAIN;
+    }

vnic_sdma->state = HFI1_VNIC_SDMA_Q_DEFERRED;
-    write_seqlock(&dev->iowait_lock);
if (list_empty(&vnic_sdma->wait.list))
iowait_queue(pkts_sent, wait, &sde->dmawait);
write_sequnlock(&dev->iowait_lock);
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/Kconfig
+++ linux-4.15.0/drivers/infiniband/hw/hns/Kconfig
@@ -1,6 +1,7 @@
config INFINIBAND_HNS
tristate "HNS RoCE Driver"
depends on NET_VENDOR_HISILICON
+depends on INFINIBAND_USER_ACCESS || !INFINIBAND_USER_ACCESS
depends on ARM64 || (COMPILE_TEST && 64BIT)
---help---
This is a RoCE/RDMA driver for the Hisilicon RoCE engine. The engine
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/Makefile
+++ linux-4.15.0/drivers/infiniband/hw/hns/Makefile
@@ -5,9 +5,9 @@
ccflags-y := -ldrivers/net/ethernet/hisilicon/hns3

obj-$(CONFIG_INFINIBAND_HNS) += hns-roce.o
-hns-roce-objs := hns_roce_main.o hns_roce_cmd.o hns_roce_eq.o hns_roce_pd.o
+hns-roce-objs := hns_roce_main.o hns_roce_cmd.o hns_roce_pd.o
hns_roce_ah.o hns_roce_hem.o hns_roce_mr.o hns_roce_qp.o
-hns_roce_eq.o hns_roce_alloc.o
+hns_roce_eq.o hns_roce_alloc.o hns_roce_db.o

obj-$(CONFIG_INFINIBAND_HNS_HIP06) += hns-roce-hw-v1.o

--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_ah.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_ah.c
@@ -79,7 +79,7 @@
    HNS_ROCE_VLAN_SL_BIT_MASK) <<
    HNS_ROCE_VLAN_SL_SHIFT;

-ah->av.port_pd = cpu_to_be32(to_hr_pd(ibpd)->pdn |
+ah->av.port_pd = cpu_to_le32(to_hr_pd(ibpd)->pdn |
    (rdma_ah_get_port_num(ah_attr) <<
    HNS_ROCE_PORT_NUM_SHIFT));

ah->av.gid_index = grh->sgid_index;
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_cmd.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_cmd.c
@@ -103,6 +103,7 @@
    context->out_param = out_param;
    complete(&context->done);
}
+EXPORT_SYMBOL_GPL(hns_roce_cmd_event);
	/* this should be called with "use_events" */
static int __hns_roce_cmd_mbox_wait(struct hns_roce_dev *hr_dev, u64 in_param,
@@ -175,6 +176,9 @@
    unsigned long in_modifier, u8 op_modifier, u16 op,
    unsigned long timeout)
{
    if (hr_dev->is_reset)
+    if (hr_dev->cmd.use_events)
        return hns_roce_cmd_mbox_wait(hr_dev, in_param, out_param,
    in_modifier, op_modifier, op,
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_cmd.h
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_cmd.h
@@ -88,6 +88,16 @@
    HNS_ROCE_CMD_DESTROY_SRQC_BT0 = 0x38,
    HNS_ROCE_CMD_DESTROY_SRQC_BT1 = 0x39,
    HNS_ROCE_CMD_DESTROY_SRQC_BT2 = 0x3a,
+ /* EQC commands */
+ HNS_ROCE_CMD_CREATE_AEQC = 0x80,
+ HNS_ROCE_CMD_MODIFY_AEQC = 0x81,
+ HNS_ROCE_CMD_QUERY_AEQC = 0x82,
+ HNS_ROCE_CMD_DESTROY_AEQC = 0x83,
+ HNS_ROCE_CMD_CREATE_CEQC = 0x90,
+ HNS_ROCE_CMD_MODIFY_CEQC = 0x91,
+ HNS_ROCE_CMD_QUERY_CEQC = 0x92,
+ HNS_ROCE_CMD_DESTROY_CEQC = 0x93,
+
enum {
    --- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_common.h
    +++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_common.h
    @@ -43,15 +43,15 @@
    __raw_writel((__force u32)cpu_to_le32(value), (addr))

    #define roce_get_field(origin, mask, shift) \ 
    - (((origin) & (mask)) >> (shift)) \ 
    + ((le32_to_cpu(origin)) & (mask)) >> (shift)) \ 

    #define roce_get_bit(origin, shift) \ 
    roce_get_field((origin), (1ul << (shift)), (shift)) \ 

    #define roce_set_field(origin, mask, shift, val) \ 
    do { \ 
    - (origin) &= (~(mask)); \ 
    - (origin) |= (((u32)(val) << (shift)) & (mask)); \ 
    + (origin) &= ~cpu_to_le32(mask); \ 
    + (origin) |= cpu_to_le32(((u32)(val) << (shift)) & (mask)); \ 
    } while (0) \ 

    #define roce_set_bit(origin, shift, val) \ 
    @@ -376,6 +391,9 @@
    #define ROCEE_RX_CMQ_TAIL_REG			0x07024
    #define ROCEE_RX_CMQ_HEAD_REG			0x07028
    +#define ROCEE_VF_MB_CFG0_REG			0x40
    +#define ROCEE_VF_MB_STATUS_REG			0x58
    +
    +#define ROCEE_VF_EQ_DB_CFG0_REG			0x238
    +#define ROCEE_VF_EQ_DB_CFG1_REG			0x23C
    +
    +#define ROCEE_VF_SMAC_CFG0_REG			0x12000
    +#define ROCEE_VF_SMAC_CFG1_REG			0x12004
    @@ -385,4 +391,9 @@
#define ROCEE_VF_SGID_CFG3_REG		0x1000c
#define ROCEE_VF_SGID_CFG4_REG		0x10010
+#define ROCEE_VF_ABN_INT_CFG_REG	0x13000
+#define ROCEE_VF_ABN_INT_ST_REG	0x13004
+#define ROCEE_VF_ABN_INT_EN_REG	0x13008
+#define ROCEE_VF_EVENT_INT_EN_REG	0x1300c
+
#endif /* _HNS_ROCE_COMMON_H */
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_cq.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_cq.c
@@ -196,15 +196,14 @@
if (ret)
    dev_err(dev, "HW2SW_CQ failed (%d) for CQN %06lx\n", ret,
          hr_cq->cqn);
-    if (hr_dev->eq_table.eq) {
-        /* Waiting interrupt process procedure carried out */
-        synchronize_irq(hr_dev->eq_table.eq[hr_cq->vector].irq);
-        /* wait for all interrupt processed */
-        if (atomic_dec_and_test(&hr_cq->refcount))
-        complete(&hr_cq->free);
-        wait_for_completion(&hr_cq->free);
-    }
+    /* Waiting interrupt process procedure carried out */
+    synchronize_irq(hr_dev->eq_table.eq[hr_cq->vector].irq);
+    /* wait for all interrupt processed */
+    if (atomic_dec_and_test(&hr_cq->refcount))
+    complete(&hr_cq->free);
+    wait_for_completion(&hr_cq->free);

spin_lock_irq(&cq_table->lock);
radi
struct hns_roce_dev *hr_dev = to_hr_dev(ib_dev);
struct device *dev = hr_dev->dev;
struct hns_roce_ib_create_cq ucmd;
+++ struct hns_roce_ib_create_cqResp resp = {};
struct hns_roce_cq *hr_cq = NULL;
struct hns_roce_uar *uar = NULL;
int vector = attr->comp_vector;
@@ -316,6 +315,7 @@
goto err_cq;
}
+if ((hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) &

+ (udata->outlen >= sizeof(resp)) {
+ ret = hns_roce_db_map_user(to_hr_ucontext(context),
+ ucmd.db_addr, &hr_cq->db);
+ if (ret) {
+ dev_err(dev, "cq record doorbell map failed!
");
+ goto err_mtt;
+ }
+ hr_cq->db_en = 1;
+ resp.cap_flags |= HNS_ROCE_SUPPORT_CQ_RECORD_DB;
+ }
+
/* Get user space parameters */
uar = &to_hr_ucontext(context)->uar;
} else {
+ if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) {
+ ret = hns_roce_alloc_db(hr_dev, &hr_cq->db, 1);
+ if (ret)
+ goto err_cq;
+ }
+
/* Init mmt table and write buff address to mtt table */
ret = hns_roce_ib_alloc_cq_buf(hr_dev, &hr_cq->hr_buf,
cq_entries);
if (ret) {
dev_err(dev, "Failed to alloc_cq_buf.
");
-goto err_cq;
+goto err_db;
}

uar = &hr_dev->priv_uar;
@@ -376,7 +398,7 @@
hr_cq, vector);
if (ret) {
dev_err(dev, "Creat CQ .Failed to cq_alloc.
");
-goto err_mtt;
+goto err_dbmap;
}

/*
@@ -394,10 +416,10 @@
hrcq->cq_depth = cq_entries;

if (context) {
 -if (ib_copy_to_udata(udata, &hr_cq->cqn, sizeof(u64))) {

ret = -EFAULT;
resp.cqn = hr_cq->cqn;
ret = ib_copy_to_udata(udata, &resp, sizeof(resp));
if (ret)
goto err_cqc;
}
return hr_cq->ib_cq;

err_cqc:
hns_roce_free_cq(hr_dev, hr_cq);

err_dbmap:
if (context && (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) &&
    (udata->outlen >= sizeof(resp)))
hns_roce_db_unmap_user(to_hr_ucontext(context), &hr_cq->db);

err_mtt:
hns_roce_mtt_cleanup(hr_dev, &hr_cq->hr_buf.hr_mtt);
if (context)
    hns_roce_ib_free_cq_buf(hr_dev, &hr_cq->hr_buf, hr_cq->ib_cq.cqe);

err_db:
if (!context && (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB))
hns_roce_free_db(hr_dev, &hr_cq->db);

err_cq:
kfree(hr_cq);
return ERR_PTR(ret);

if (ib_cq->uobject) {
ib_umem_release(hr_cq->umem);
}
else {
    if (hr_cq->db_en == 1)
hns_roce_db_unmap_user(
to_hr_ucontext(ib_cq->uobject->context), &hr_cq->db);
}
/* Free the buff of stored cq */
hns_roce_ib_free_cq_buf(hr_dev, &hr_cq->hr_buf, ib_cq->cqe);
+if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB)
+hns_roce_free_db(hr_dev, &hr_cq->db);
+
kfree(hr_cq);
}
@@ -460,6 +500,7 @@
++cq->arm_sn;
cq->comp(cq);
}
+EXPORT_SYMBOL_GPL(hns_roce_cq_completion);

void hns_roce_cq_event(struct hns_roce_dev *hr_dev, u32 cqn, int event_type)
{
@@ -482,6 +523,7 @@
if (atomic_dec_and_test(&cq->refcount))
complete(&cq->free);
}
+EXPORT_SYMBOL_GPL(hns_roce_cq_event);

int hns_roce_init_cq_table(struct hns_roce_dev *hr_dev)
{
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_db.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_db.c
@@ -0,0 +1,180 @@
+/* SPDX-License-Identifier: (GPL-2.0 OR BSD-2-Clause) */
+/*
 + * Copyright (c) 2017 Hisilicon Limited.
 + * Copyright (c) 2007, 2008 Mellanox Technologies. All rights reserved.
 + */
 +
+#include <linux/platform_device.h>
+#include <rdma/ib_umem.h>
+#include "hns_roce_device.h"
+
+int hns_roce_db_map_user(struct hns_roce_ucontext *context, unsigned long virt,
+ struct hns_roce_db *db)
+{
+struct hns_roce_user_db_page *page;
+int ret = 0;
+
+mutex_lock(&context->page_mutex);
+
+list_for_each_entry(page, &context->page_list, list)
+if (page->user_virt == (virt & PAGE_MASK))
goto found;
page = kmalloc(sizeof(*page), GFP_KERNEL);
if (!page) {
    ret = -ENOMEM;
    goto out;
}
refcount_set(&page->refcount, 1);
page->user_virt = (virt & PAGE_MASK);
page->umem = ib_umem_get(&context->ibucontext, virt & PAGE_MASK,
    PAGE_SIZE, 0, 0);
if (IS_ERR(page->umem)) {
    ret = PTR_ERR(page->umem);
    kfree(page);
    goto out;
}
list_add(&page->list, &context->page_list);
found:
    db->dma = sg_dma_address(page->umem->sg_head.sgl) +
    (virt & ~PAGE_MASK);
    db->u.user_page = page;
    refcount_inc(&page->refcount);
out:
    mutex_unlock(&context->page_mutex);
    return ret;
}
EXPORT_SYMBOL(hns_roce_db_map_user);

void hns_roce_db_unmap_user(struct hns_roce_ucontext *context,
    struct hns_roce_db *db)
{
    mutex_lock(&context->page_mutex);
    refcount_dec(&db->u.user_page->refcount);
    if (refcount_dec_if_one(&db->u.user_page->refcount)) {
        list_del(&db->u.user_page->list);
        ib_umem_release(db->u.user_page->umem);
        kfree(db->u.user_page);
    }
    mutex_unlock(&context->page_mutex);
}
EXPORT_SYMBOL(hns_roce_db_unmap_user);
+static struct hns_roce_db_pgdir *hns_roce_alloc_db_pgdir(
+struct device *dma_device)
+{
+struct hns_roce_db_pgdir *pgdir;
+
+pgdir = kzalloc(sizeof(*pgdir), GFP_KERNEL);
+if (!pgdir)
+return NULL;
+
+bitmap_fill(pgdir->order1, HNS_ROCE_DB_PER_PAGE / 2);
+pgdir->bits[0] = pgdir->order0;
+pgdir->bits[1] = pgdir->order1;
+pgdir->page = dma_alloc_coherent(dma_device, PAGE_SIZE,
+ &pgdir->db_dma, GFP_KERNEL);
+if (!pgdir->page) {
+kfree(pgdir);
+return NULL;
+}
+
+return pgdir;
+}
+
+static int hns_roce_alloc_db_from_pgdir(struct hns_roce_db_pgdir *pgdir,
+struct hns_roce_db *db, int order)
+{
+int o;
+int i;
+
+for (o = order; o <= 1; ++o) {
+i = find_first_bit(pgdir->bits[o], HNS_ROCE_DB_PER_PAGE >> o);
+if (i < HNS_ROCE_DB_PER_PAGE >> o)
+goto found;
+}
+
+return -ENOMEM;
+found:
+clear_bit(i, pgdir->bits[o]);
+
i <<= o;
+
+if (o > order)
+set_bit(i ^ 1, pgdir->bits[order]);
+
+db->u.pgdir= pgdir;
+db->index= i;
+db->db_record= pgdir->page + db->index;
+db->dma= pgdir->db_dma + db->index * 4;
+db->order= order;
+
+return 0;
+
+int hns_roce_alloc_db(struct hns_roce_dev *hr_dev, struct hns_roce_db *db,
+    int order)
+{
+    struct hns_roce_db_pgdir *pgdir;
+    int ret = 0;
+
+    mutex_lock(&hr_dev->pgdir_mutex);
+    
+    list_for_each_entry(pgdir, &hr_dev->pgdir_list, list)
+        if (!hns_roce_alloc_db_from_pgdir(pgdir, db, order))
+            goto out;
+        
+    pgdir = hns_roce_alloc_db_pgdir(hr_dev->dev);
+    if (!pgdir) {
+        ret = -ENOMEM;
+        goto out;
+    }
+
+    list_add(&pgdir->list, &hr_dev->pgdir_list);
+    
+    /* This should never fail -- we just allocated an empty page: */
+    WARN_ON(hns_roce_alloc_db_from_pgdir(pgdir, db, order));
+    
+    out:
+    mutex_unlock(&hr_dev->pgdir_mutex);
+    
+    return ret;
+
+} 
+
+EXPORT_SYMBOL_GPL(hns_roce_alloc_db);
+
+void hns_roce_free_db(struct hns_roce_dev *hr_dev, struct hns_roce_db *db)
+{
+    int o;
+    int i;
+
+    mutex_lock(&hr_dev->pgdir_mutex);
+    
+    o = db->order;
+    i = db->index;
+
+    if (db->order == 0 && test_bit(i ^ 1, db->u.pgdir->order0)) {
+        clear_bit(i ^ 1, db->u.pgdir->order0);
+        ++o;
+        }
```c
+} 
+
+i >>= o; 
+set_bit(i, db->u.pgdir->bits[o]); 
+ 
+if (bitmap_full(db->u.pgdir->order1, HNS_ROCE_DB_PER_PAGE / 2)) { 
+dma_free_coherent(hr_dev->dev, PAGE_SIZE, db->u.pgdir->page, 
+ db->u.pgdir->db_dma); 
+list_del(&db->u.pgdir->list); 
+kfree(db->u.pgdir); 
+} 
+
+mutex_unlock(&hr_dev->pgdir_mutex); 
+
+EXPORT_SYMBOL_GPL(hns_roce_free_db); 
+
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_device.h 
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_device.h 
@@ -62,12 +62,16 @@
#define HNS_ROCE_CQE_WCMD_EMPTY_BIT		0x2 
#define HNS_ROCE_MIN_CQE_CNT			16 
-#define HNS_ROCE_MAX_irq_num			34 
+#define HNS_ROCE_MAX_IRQ_NUM		128 
-#define HNS_ROCE_COMP_VEC_NUM			32 
-#define HNS_ROCE_AEQE_VEC_NUM			1 
-#define HNS_ROCE_AEQE_OF_VEC_NUM		1 
+#define EQ_ENABLE				1 
+#define EQ_DISABLE				0 
+ 
+#define HNS_ROCE_CEQ				0 
+#define HNS_ROCE_AEQ				1 
+ 
+#define HNS_ROCE_CEQ_ENTRY_SIZE			0x4 
+#define HNS_ROCE_AEQ_ENTRY_SIZE			0x10 
*/ 4G/4K = 1M */ 
#define HNS_ROCE_SL_SHIFT			28 
@@ -96,11 +100,22 @@
#define SERV_TYPE_UC				2 
#define SERV_TYPE_UD				3 
+/* Configure to HW for PAGE_SIZE larger than 4KB */ 
+#define PG_SHIFT_OFFSET(PAGE_SHIFT - 12) 
+ 
+#define PAGES_SHIFT_88 
+#define PAGES_SHIFT_1616 
+#define PAGES_SHIFT_2424 
```

#define PAGES_SHIFT_32

+enum {
+HNS_ROCE_SUPPORT_RQ_RECORD_DB = 1 << 0,
+};
+
+enum {
+HNS_ROCE_SUPPORT_CQ_RECORD_DB = 1 << 0,
+};
+
enum hns_roce_qp_state {
HNS_ROCE_QP_STATE_RST,
HNS_ROCE_QP_STATE_INIT,
}@ @ -130,6 +145,7 @ @
HNS_ROCE_EVENT_TYPE_DB_OVERFLOW = 0x12,
HNS_ROCE_EVENT_TYPE_MB = 0x13,
HNS_ROCE_EVENT_TYPE_CEQ_OVERFLOW = 0x14,
+HNS_ROCE_EVENT_TYPE_FLR = 0x15,
};

/* Local Work Queue Catastrophic Error, SUBTYPE 0x5 */
@@ -173,6 +189,8 @@
enum {
HNS_ROCE_CAP_FLAG_REREG_MR = BIT(0),
HNS_ROCE_CAP_FLAG_ROCE_V1_V2 = BIT(1),
+HNS_ROCE_CAP_FLAG_RQ_INLINE = BIT(2),
+HNS_ROCE_CAP_FLAG_RECORD_DB = BIT(3)
};

enum hns_roce_mtt_type {
@@ -180,6 +198,10 @@
MTT_TYPE_CQE,
};

+enum {
+HNS_ROCE_DB_PER_PAGE = PAGE_SIZE / 4
+};
+
#define HNS_ROCE_CMD_SUCCESS1

#define HNS_ROCE_PORT_DOWN0
@@ -192,11 +214,22 @@
struct hns_roce_uar {
  u64 pfn;
  unsigned long index;
+  unsigned long logic_idx;
+};
+
+struct hns_roce_vma_data {
+struct list_head list;
+struct vm_area_struct *vma;
+struct mutex *vma_list_mutex;
};

struct hns_roce_ucontext {
 struct ib_ucontextibucontext;
 struct hns_roce_uaruar;
 +struct list_headpage_list;
 +struct mutexpage_mutex;
 +struct list_headvmam_list;
 +struct mutexvma_list_mutex;
};

struct hns_roce_pd {
 @@ -329,6 +362,33 @@
 intpage_shift;
 
 +struct hns_roce_db_pgdir {
+struct list_headlist;
+DECLARE_BITMAP(order0, HNS_ROCE_DB_PER_PAGE);
+DECLARE_BITMAP(order1, HNS_ROCE_DB_PER_PAGE / 2);
+unsigned long*bits[2];
+u32*page;
+dma_addr_tdb_dma;
+}
+ 
+struct hns_roce_user_db_page {
+struct list_headdb_page;
+struct ib_umem*umem;
+unsigned longuser_virt;
+refcount_trefcount;
+}
+
+struct hns_roce_db {
+u32*db_record;
+union {
+struct hns_roce_db_pgdirdbgdir;
+struct hns_roce_user_db_page *user_page;
+} u;
+dma_addr_tdma;
+intindex;
+intorder;
+}
+
 struct hns_roce_cq_buf {
struct hns_roce_buf hr_buf;
struct hns_roce_mtt hr_mtt;
@@ -337,14 +397,17 @@
struct hns_roce_cq {
    struct ib_cq ib_cq;
    struct hns_roce_cq_buf hr_buf;
+    struct hns_roce_db db;
    u8 db_en;
    spinlock_tlock;
    struct ib_umem*umem;
-    void (*comp)(struct hns_roce_cq *);
-    void (*event)(struct hns_roce_cq *, enum hns_roce_event);
+    void (*comp)(struct hns_roce_cq *cq);
+    void (*event)(struct hns_roce_cq *cq, enum hns_roce_event event_type);

    struct hns_roce_uar*uar;
    u32 cq_depth;
    u32 cons_index;
+    u32*set_ci_db;
    void __iomem*cq_db_l;
    u16*tptr_addr;
    int arm_sn;
@@ -441,11 +504,28 @@
+    struct hns_roce_rinl_sge {
+        void *addr;
+        u32 len;
+    };
+    struct hns_roce_rinl_wqe {
+        struct hns_roce_rinl_sge *sg_list;
+        u32 sge_cnt;
+    };
+    struct hns_roce_rinl_buf {
+        struct hns_roce_rinl_wqe *wqe_list;
+        u32 wqe_cnt;
+    };
+    struct hns_roce_qp {
        struct ib_qp ibqp;
        struct hns_roce_bufhr_buf;
        struct hns_roce_wq*q;
-        __le64 doorbell_qpn;
+        struct hns_roce_dbrdb;
+        u8 db_en;
+u32 doorbell_qpn;
 u32 sq_signal_bits;
 sq_next_wqe;
 sq_max_wqes_per_wr;
 +u8 resp_depth;
 u8 state;
 u32 access_flags;
 +u32 atomic_rd_en;
 u32 pkey_index;
 -void(*event)(struct hns_roce_qp *,
 - enum hns_roce_event);
 +u32 qkey;
 +void(*event)(struct hns_roce_qp *qp,
 + enum hns_roce_event event_type);
 unsigned long qpn;

 atomic_trefcount;
 @@ -472,6 +554,8 @@

 struct hns_roce_sge se;
 u32 next_sge;
 +
 +struct hns_roce_rinl_buf rq_inl_buf;
 };

 struct hns_roce_sqp {
 @@ -485,6 +569,45 @@
 u8 phy_port[HNS_ROCE_MAX_PORTS];
 };

 +enum {
 +HNS_ROCE_EQ_STAT_INVALID = 0,
 +HNS_ROCE_EQ_STAT_VALID = 2,
 +};
 +
 +struct hns_roce_ceqe {
 +u32 comp;
 +};
 +
 +struct hns_roce_aeqe {
 +u32 asyn;
 +union {
 +struct {
 +u32 qp;
 +u32 rsv0;
 +u32 rsv1;
 +} q_event;
+ struct { 
+ u32 cq; 
+ u32 rsv0; 
+ u32 rsv1; 
+ } cq_event; 
+ 
+ struct { 
+ u32 ceqe; 
+ u32 rsv0; 
+ u32 rsv1; 
+ } ce_event; 
+ 
+ struct { 
+ __le64 out_param; 
+ __le16 token; 
+ u8 status; 
+ u8 rsv0; 
+ } __packed cmd; 
+ } event; 
+ 
+ struct hns_roce_eq { 
  struct hns_roce_dev*hr_dev; 
  void __iomem*doorbell; 
  @ @ -498,11 +621,31 @@ 
  int log_page_size; 
  int cons_index; 
  struct hns_roce_buf_list*buf_list; 
  *intover_ignore; 
  *intcoalesce; 
  *intarm_st; 
  *u64 ceqe_ba; 
  *inteqe_ba_pg_sz; 
  *inteqe_buf_pg_sz; 
  *inthop_num; 
  *u64 bt_l0;/* Base address table for L0 */
  *u64 bt_l1; /* Base address table for L1 */
  *u64 *buf; 
  *dma_addr_t*tl0_dma; 
  *dma_addr_t*tl1_dma; 
  *dma_addr_t*buf_dma; 
  *u32 l0_last_num; /* L0 last chunk num */
  *u32 l1_last_num; /* L1 last chunk num */
  *inteq_max_cnt; 
  *inteq_period; 
  *intshift; 
  *dma_addr_tcur_eqe_ba;
+dma_addr_t ntxt_eqe_ba;
};

struct hns_roce_eq_table {
struct hns_roce_eq*eq;
-void __iomem**eqc_base;
+void __iomem**eqc_base; /* only for hw v1 */
};

struct hns_roce_caps {
@@ -515,7 +658,9 @@
 u32 max_sq_sg;/* 2 */
 u32 max_sq_inline;/* 32 */
 u32 max_rq_sg;/* 2 */
+u32 max_extend_sg;
 intnum_qps;/* 256k */
 +int reserved_qps;
 u32 max_wqes;/* 16k */
 u32 max_sq_desc_sz;/* 64 */
 u32 max_rq_desc_sz;/* 64 */
@@ -528,7 +673,7 @@
 u32 min_wqes;
 int reserved_cqs;
 intnum_aeq_vectors;/* 1 */
-intnum_comp_vectors;/* 32 ceq */
+intnum_comp_vectors;
 intnum_other_vectors;
 intnum_mtpts;
 u32 num_mtt_segs;
@@ -550,7 +695,7 @@
 u32 pbl_buf_pg_sz;
 u32 pbl_hop_num;
 int aeqe_depth;
-int ceqe_depth[HNS_ROCE_COMP_VEC_NUM];
+int ceqe_depth;
 enum ib_mtu max_mtu;
 u32 qpc_bt_num;
 u32 srqc_bt_num;
@@ -574,6 +719,9 @@
 u32 cqe_ba_pg_sz;
 u32 cqe_buf_pg_sz;
 u32 cqe_hop_num;
+u32 cqe_ba_pg_sz;
+u32 cqe_buf_pg_sz;
+u32 cqe_hop_num;
 u32 chunk_sz;/* chunk size in non multihop mode*/
 u64 qflags;
};
int (*dereg_mr)(struct hns_roce_dev *hr_dev, struct hns_roce_mr *mr);
int (*destroy_cq)(struct ib_cq *ibcq);
int (*modify_cq)(struct ib_cq *cq, u16 eq_count, u16 eq_period);
+int (*init_eq)(struct hns_roce_dev *hr_dev);
+void (*cleanup_eq)(struct hns_roce_dev *hr_dev);

};

struct hns_roce_dev {
    /*
     * Implementation details
     */
    const char irq_names[HNS_ROCE_MAX_IRQ_NUM];
    spinlock_t sm_lock;
    spinlock_t tbt_cmd_lock;
    bool active;
    bool is_reset;
    struct hns_roce_ib_iboe iboe;

    struct list_head pgdir_list;
    struct mutex pgdir_mutex;
    int irq[HNS_ROCE_MAX_IRQ_NUM];
    u8 __iomem reg_base;
    struct hns_roce_caps caps;

    int hns_roce_db_map_user(struct hns_roce_ucontext *context, unsigned long virt,
        struct hns_roce_db *db);
    void hns_roce_db_unmap_user(struct hns_roce_ucontext *context,
        struct hns_roce_db *db);
    int hns_roce_alloc_db(struct hns_roce_dev *hr_dev, struct hns_roce_db *db,
        int order);
    void hns_roce_free_db(struct hns_roce_dev *hr_dev, struct hns_roce_db *db);
    void hns_roce_cq_completion(struct hns_roce_dev *hr_dev, u32 cqn);
    void hns_roce_cq_event(struct hns_roce_dev *hr_dev, u32 cqn, int event_type);
    void hns_roce_qp_event(struct hns_roce_dev *hr_dev, u32 qpn, int event_type);

    static bool hns_roce_check_hem_null(struct hns_roce_hem **hem, u64 start_idx,
        u32 bt_chunk_num,
        u32 bt_chunk_num, u64 hem_max_num)
    {
        int i;
        u64 check_max_num = start_idx + bt_chunk_num;

        int i;
+u64 i;
-
-#if (unlikely(hem_idx >= table->num_hem)) {
-  +dev_err(dev, "Table \%d exceed hem limit idx = %lld, max = %lu\n",
-+table->type, hem_idx, table->num_hem);
-+return -EINVAL;
-+
-mutex_lock(&table->mutex);
-
-if (table->hem[hem_idx]) {
-  step_idx = 1;
-} else if (hop_num == HNS_ROCE_HOP_NUM_0) {
-  step_idx = 0;
-} else {
-  +ret = -EINVAL;
-+goto err_dma_alloc_l1;
-+
-/* set HEM base address to hardware */
-
-if (check_whether_bt_num_2(table->type, hop_num)) {
-  start_idx = mhop.l0_idx * chunk_ba_num;
-} else if (hr_dev->hw->clear_hem(hr_dev, table, obj, 0))
-dev_warn(dev, "Clear HEM base address failed\n");
-
-start_idx = mhop.l0_idx * chunk_ba_num * chunk_ba_num +
-mhop.l1_idx * chunk_ba_num;
-if (hr_dev->hw->clear_hem(hr_dev, table, obj, 1))
dev_warn(dev, "Clear HEM base address failed.
"");

@@ -742,6 +752,8 @@
idx_offset = (obj & (table->num_obj - 1)) % obj_per_chunk;
dma_offset = offset = idx_offset * table->obj_size;
} else {
+u32 seg_size = 64; /* 8 bytes per BA and 8 BA per segment */
+  hns_roce_calc_hem_mhop(hr_dev, table, &mhop_obj, &mhop);
/* mtt mhop */
i = mhop.l0_idx;
@@ -753,8 +765,8 @@
  hem_idx = i;
  dma_offset = offset = (obj & (table->num_obj - 1)) * seg_size %
+    mhop.bt_chunk_size;
if (mhop.hop_num == 2)
  dma_offset = offset = 0;
}
@@ -912,7 +924,7 @@
obj_per_chunk = buf_chunk_size / obj_size;
num_hem = (nobj + obj_per_chunk - 1) / obj_per_chunk;
bt_chunk_num = bt_chunk_size / 8;
-  if (table->type >= HEM_TYPE_MTT)
+  if (type >= HEM_TYPE_MTT)
num_bt_l0 = bt_chunk_num;

table->hem = kcalloc(num_hem, sizeof(*table->hem),
@@ -920,7 +932,7 @@
if (!table->hem)
goto err_kcalloc_hem_buf;
-  if (check_whether_bt_num_3(table->type, hop_num)) {
+  if (check_whether_bt_num_2(type, hop_num) ||
    unsigned long num_bt_l1;
    num_bt_l1 = (num_hem + bt_chunk_num - 1) / 8;
@@ -939,8 +951,8 @@
goto err_kcalloc_l1_dma;
}
-  if (check_whether_bt_num_2(table->type, hop_num) ||
-    check_whether_bt_num_3(table->type, hop_num)) {
+  if (check_whether_bt_num_2(type, hop_num) ||
+    check_whether_bt_num_3(type, hop_num)) {

table->bt_l0 = kcalloc(num_bt_l0, sizeof(*table->bt_l0), GFP_KERNEL);
if (!table->bt_l0)
    @ @ -1039,14 +1051,14 @@
void hns_roce_cleanup_hem(struct hns_roce_dev *hr_dev)
{
    hns_roce_cleanup_hem_table(hr_dev, &hr_dev->cq_table.table);
    hns_roce_cleanup_hem_table(hr_dev, &hr_dev->qp_table.irrl_table);
    if (hr_dev->caps.trrl_entry_sz)
        hns_roce_cleanup_hem_table(hr_dev, &hr_dev->qp_table.trrl_table);
    hns_roce_cleanup_hem_table(hr_dev, &hr_dev->mr_table.mtpt_table);
    if (hr_dev->caps.mtt_entry_sz)
        hns_roce_cleanup_hem_table(hr_dev, &hr_dev->mr_table.mtt_table);
    if (hns_roce_check_whether_mhop(hr_dev, HEM_TYPE_CQE))
        hns_roce_cleanup_hem_table(hr_dev, &hr_dev->mr_table.mtt_cqe_table);
    hns_roce_cleanup_hem_table(hr_dev, &hr_dev->mr_table.mtt_table);
}
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_hem.h
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_hem.h
@@ -54,7 +54,7 @@
#define HNS_ROCE_HEM_CHUNK_LEN
    ((256 - sizeof(struct list_head) - 2 * sizeof(int)) / \n    (sizeof(struct scatterlist)))
+    (sizeof(struct scatterlist) + sizeof(void *))
)

#define check_whether_bt_num_3(type, hop_num) \
    (type < HEM_TYPE_MTT && hop_num == 2)
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_hw_v1.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_hw_v1.c
@@ -33,6 +33,7 @@
        memcpy(&ud_sq_wqe->dgid[0], &ah->av.dgid[0], GID_LEN);
-        ud_sq_wqe->va0_l = (u32)wr->sg_list[0].addr;
-        ud_sq_wqe->va0_h = (wr->sg_list[0].addr) >> 32;
-        ud_sq_wqe->l_key0 = wr->sg_list[0].lkey;

memcpy(&ud_sq_wqe->dgid[0], &ah->av.dgid[0], GID_LEN);
-ud_sq_wqe->va0_l = (u32)wr->sg_list[0].addr;
-ud_sq_wqe->va0_h = (wr->sg_list[0].addr) >> 32;
-ud_sq_wqe->l_key0 = wr->sg_list[0].lkey;

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ud_sq_wqe->va1_l = (u32)wr->sg_list[1].addr;
ud_sq_wqe->va1_h = (wr->sg_list[1].addr) >> 32;
ud_sq_wqe->l_key1 = wr->sg_list[1].lkey;
++ud_sq_wqe->va0_l =
    cpu_to_le32((u32)wr->sg_list[0].addr);
++ud_sq_wqe->va0_h =
    cpu_to_le32((wr->sg_list[0].addr) >> 32);
++ud_sq_wqe->l_key0 =
    cpu_to_le32(wr->sg_list[0].lkey);
++
++ud_sq_wqe->va1_l =
    cpu_to_le32((u32)wr->sg_list[1].addr);
++ud_sq_wqe->va1_h =
    cpu_to_le32((wr->sg_list[1].addr) >> 32);
++ud_sq_wqe->l_key1 =
    cpu_to_le32(wr->sg_list[1].lkey);
ind++;
} else if (ibqp->qp_type == IB_QPT_RC) {
    u32 tmp_len = 0;
    +
    ctrl = wqe;
    memset(ctrl, 0, sizeof(struct hns_roce_wqe_ctrl_seg));
    for (i = 0; i < wr->num_sge; i++)
        -ctrl->msg_length += wr->sg_list[i].length;
        +tmp_len += wr->sg_list[i].length;
        +
        +ctrl->msg_length =
        +    cpu_to_le32(le32_to_cpu(ctrl->msg_length) + tmp_len);
        
        ctrl->sgl_pa_h = 0;
        ctrl->flag = 0;
        -ctrl->imm_data = send_ieth(wr);
        +
        +switch (wr->opcode) {
        +case IB_WR_SEND_WITH_IMM:
        +case IB_WR_RDMA_WRITE_WITH_IMM:
        +ctrl->imm_data = wr->ex.imm_data;
        +break;
        +case IB_WR_SEND_WITH_INV:
        +ctrl->inv_key =
        +    cpu_to_le32(wr->ex.invalidate_rkey);
        +break;
        +default:
        +ctrl->imm_data = 0;
        +break;
        +}

/* Ctrl field, ctrl set type: sig, solic, imm, fence */
/* SO wait for conforming application scenarios */
@@ -244,7 +269,6 @@
    ps_opcode = HNS_ROCE_WQE_OPCODE_SEND;
    break;
    case IB_WR_LOCAL_INV:
-        break;
+        break;
    case IB_WR_ATOMIC_CMP_AND_SWP:
    case IB_WR_ATOMIC_FETCH_AND_ADD:
    case IB_WR_LSO:
        @@ -257,8 +281,8 @@
dseg = wqe;
    if (wr->send_flags & IB_SEND_INLINE && wr->num_sge) {
        -if ((ctrl->msg_length >
            -hr_dev->caps.max_sq_inline) {
            +if (le32_to_cpu(ctrl->msg_length) >
                +hr_dev->caps.max_sq_inline) {
        ret = -EINVAL;
        *bad_wr = wr;
        dev_err(dev, "inline len(1-%d)=%d, illegal",
            @@ -272,7 +296,7 @@
            wr->sg_list[i].length);
        wqe += wr->sg_list[i].length;
    } -ctrl->flag |= HNS_ROCE_WQE_INLINE;
-    +ctrl->flag |= cpu_to_le32(HNS_ROCE_WQE_INLINE);
    } else {
    /* sqe num is two */
    for (i = 0; i < wr->num_sge; i++)
        @@ -305,8 +329,8 @@
            roce_set_bit(sq_db.u32_8_QPN_S, qp->doorbell_qpn);
            roce_set_bit(sq_db.u32_8, SQ_DOORBELL_HW_SYNC_S, 1);

            -doorbell[0] = sq_db.u32_4;
            -doorbell[1] = sq_db.u32_8;
            +doorbell[0] = le32_to_cpu(sq_db.u32_4);
            +doorbell[1] = le32_to_cpu(sq_db.u32_8);

            hns_roce_write64_k(doorbell, qp->sq.db_reg_l);
            qp->sq_next_wqe = ind;
            @@ -402,8 +426,8 @@
            roce_set_bit(rq_db.u32_8, RQ_DOORBELL_U32_8_HW_SYNC_S, 1);

            -doorbell[0] = rq_db.u32_4;
            -doorbell[1] = rq_db.u32_8;
            +doorbell[0] = le32_to_cpu(rq_db.u32_4);
+doorbell[1] = le32_to_cpu(rq_db.u32_8);

hns_roce_write64_k(doorbell, hr_qp->rq.db_reg_l);
}
@@ -697,6 +721,7 @@
free_mr->mr_free_pd = to_hr_pd(pd);
free_mr->mr_free_pd->ibpd.device  = &hr_dev->ib_dev;
free_mr->mr_free_pd->ibpd.uobject = NULL;
+free_mr->mr_free_pd->ibpd.__internal_mr = NULL;
atomic_set(&free_mr->mr_free_pd->ibpd.usecnt, 0);

attr.qp_access_flags = IB_ACCESS_REMOTE_WRITE;
@@ -774,7 +799,7 @@
go to create_lp_qp_failed;
}

-ret = hr_dev->hw->modify_qp(&hr_qp->ibqp, &attr, attr_mask,
+ret = hr_dev->hw->modify_qp(&hr_qp->ibqp, &attr, IB_QP_DEST_QPN,
   IB_QPS_INIT, IB_QPS_RTR);
if (ret) {
  dev_err(dev, "modify qp failed(%d)!\n", ret);

@@ -1011,7 +1036,7 @@
do {
  ret = hns_roce_v1_poll_cq(&mr_free_cq->ib_cq, ne, wc);
  -if (ret < 0) {
+if (ret < 0 && hr_qp) {
    dev_err(dev,
      "(qp:0x%lx) starts, Poll cqe failed(%d) for mr 0x%x free! Remain %d cqe\n",
      hr_qp->qpn, ret, hr_mr->key, ne);
@@ -1492,9 +1517,9 @@
caps->max_sq_inline = HNS_ROCE_V1_INLINE_SIZE;
caps->num_uars = HNS_ROCE_V1_UAR_NUM;
caps->phy_num_uars = HNS_ROCE_V1_PHY_UAR_NUM;
- caps->num_aeq_vectors = HNS_ROCE_AEQE_VEC_NUM;
- caps->num_comp_vectors = HNS_ROCE_COMP_VEC_NUM;
- caps->num_other_vectors = HNS_ROCE_AEQE_OF_VEC_NUM;
+ caps->num_aeq_vectors = HNS_ROCE_V1_AEQE_VEC_NUM;
+ caps->num_comp_vectors = HNS_ROCE_V1_COMP_VEC_NUM;
+ caps->num_other_vectors = HNS_ROCE_V1_ABNORMAL_VEC_NUM;
caps->num_mtpts = HNS_ROCE_V1_MAX_MTPT_NUM;
caps->num_mtt_segs = HNS_ROCE_V1_MAX_MTT_SEGS;
caps->num_pds = HNS_ROCE_V1_MAX_PD_NUM;
@@ -1529,10 +1554,8 @@
caps->num_ports + 1;
}

-for (i = 0; i < caps->num_comp_vectors; i++)
caps->ceqe_depth[i] = HNS_ROCE_V1_NUM_COMP_EQE;
-
caps->aeqe_depth = HNS_ROCE_V1_NUM_ASYNC_EQE;
+caps->ceqe_depth = HNS_ROCE_V1_COMP_EQE_NUM;
+caps->aeqe_depth = HNS_ROCE_V1_ASYNC_EQE_NUM;
caps->local_ca_ack_delay = le32_to_cpu(roce_read(hr_dev,
ROCEE_ACK_DELAY_REG));
caps->max_mtu = IB_MTU_2048;
@@ -1664,13 +1687,13 @@
roce_set_field(val, ROCEE_MB6_ROCEE_MB_TOKEN_M,
ROCEE_MB6_ROCEE_MB_TOKEN_S, token);

-__raw_writeq(cpu_to_le64(in_param), hcr + 0);
-__raw_writeq(cpu_to_le64(out_param), hcr + 2);
-__raw_writel(cpu_to_le32(in_modifier), hcr + 4);
+writeq(in_param, hcr + 0);
+writeq(out_param, hcr + 2);
+writel(in_modifier, hcr + 4);
/* Memory barrier */
wmb();

-__raw_writel(cpu_to_le32(val), hcr + 5);
+writel(val, hcr + 5);

mmiowb();

@@ -2262,7 +2285,7 @@
CQE_BYTE_4_WQE_INDEX_M,
CQE_BYTE_4_WQE_INDEX_S)&
((*cur_qp)->sq.wqe_cnt-1));
-switch (sq_wqe->flag & HNS_ROCE_WQE_OPCODE_MASK) {
+switch (le32_to_cpu(sq_wqe->flag) & HNS_ROCE_WQE_OPCODE_MASK) {
case HNS_ROCE_WQE_OPCODE_SEND:
wc->opcode = IB_WC_SEND;
break;
@@ -2283,7 +2306,7 @@
wc->status = IB_WC_GENERAL_ERR;
break;
}
-wc->wc_flags = (sq_wqe->flag & HNS_ROCE_WQE_IMM ?
+wrc->wc_flags = (le32_to_cpu(sq_wqe->flag) & HNS_ROCE_WQE_IMM ?
IB_WC_WITH_IMM : 0);

wq = &(*cur_qp)->sq;
@@ -2312,15 +2335,16 @@
case HNS_ROCE_OPCODE_RDMA_WITH_IMM_RECEIVE:
wc->opcode = IB_WC_RECV_RDMA_WITH_IMM;
w->wc_flags = IB_WC_WITH_IMM;

wc->ex.imm_data = le32_to_cpu(cqe->immediate_data);
+wc->ex.imm_data =
+cpu_to_be32(le32_to_cpu(cqe->immediate_data));
break;
case HNS_ROCE_OPCODE_SEND_DATA_RECEIVE:
if (roce_get_bit(cqe->cqe_byte_4,
    CQE_BYTE_4_IMM_INDICATOR_S)) {
    wc->opcode = IB_WC_RECV;
    wc->wc_flags = IB_WC_WITH_IMM;
    -wc->ex.imm_data = le32_to_cpu(
    -cqe->immediate_data);
    +wc->ex.imm_data = cpu_to_be32(
    +le32_to_cpu(cqe->immediate_data));
} else {
    wc->opcode = IB_WC_RECV;
    wc->wc_flags = 0;
    @@ -3960,6 +3984,732 @@
    return ret;
}

+static void set_eq_cons_index_v1(struct hns_roce_eq *eq, int req_not)
+{
+    roce_raw_write((eq->cons_index & HNS_ROCE_V1_CONSIDX_M) |
+        (req_not << eq->log_entries), eq->doorbell);
+
+
+static void hns_roce_v1_wq_catas_err_handle(struct hns_roce_dev *hr_dev,
+    struct hns_roce_aeqe *aeqe, int qpn)
+{
+    struct device *dev = &hr_dev->pdev->dev;
+    +dev_warn(dev, "Local Work Queue Catastrophic Error: \n");
+    +switch (roce_get_field(aeqe->asyn, HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_M,
+        HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_S)) {
+        +case HNS_ROCE_LWQCE_QPC_ERROR:
+            +dev_warn(dev, "QP %d, QPC error: \n", qpn);
+            +break;
+        +case HNS_ROCE_LWQCE_MTU_ERROR:
+            +dev_warn(dev, "QP %d, MTU error: \n", qpn);
+            +break;
+        +case HNS_ROCE_LWQCE_WQE_BA_ADDR_ERROR:
+            +dev_warn(dev, "QP %d, WQE BA addr error: \n", qpn);
+            +break;
+        +case HNS_ROCE_LWQCE_WQE_ADDR_ERROR:
+            +dev_warn(dev, "QP %d, WQE addr error: \n", qpn);
+            +break;
+        +case HNS_ROCE_LWQCE_SQ_WQE_SHIFT_ERROR:
+            +dev_warn(dev, "QP %d, WQE shift error: \n", qpn);
+            +break;
+        }
+break;
+case HNS_ROCE_LWQCE_SL_ERROR:
+dev_warn(dev, "QP %d, SL error.\n", qpn);
+break;
+case HNS_ROCE_LWQCE_PORT_ERROR:
+dev_warn(dev, "QP %d, port error.\n", qpn);
+break;
+default:
+break;
+
+static void hns_roce_v1_local_wq_access_err_handle(struct hns_roce_dev *hr_dev,
+ struct hns_roce_aeqe *aeqe,
+ int qpn)
+{
+struct device *dev = &hr_dev->pdev->dev;
+
+dev_warn(dev, "Local Access Violation Work Queue Error.\n");
+switch (roce_get_field(aeqe->asyn, HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_M,
+ HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_S)) {
+case HNS_ROCE_LAVWQE_R_KEY_VIOLATION:
+dev_warn(dev, "QP %d, R_key violation.\n", qpn);
+break;
+case HNS_ROCE_LAVWQE_LENGTH_ERROR:
+dev_warn(dev, "QP %d, length error.\n", qpn);
+break;
+case HNS_ROCE_LAVWQE_VA_ERROR:
+dev_warn(dev, "QP %d, VA error.\n", qpn);
+break;
+case HNS_ROCE_LAVWQE_PD_ERROR:
+dev_err(dev, "QP %d, PD error.\n", qpn);
+break;
+case HNS_ROCE_LAVWQE_RW_ACC_ERROR:
+dev_warn(dev, "QP %d, rw acc error.\n", qpn);
+break;
+case HNS_ROCE_LAVWQE_KEY_STATE_ERROR:
+dev_warn(dev, "QP %d, key state error.\n", qpn);
+break;
+case HNS_ROCE_LAVWQE_MR_OPERATION_ERROR:
+dev_warn(dev, "QP %d, MR operation error.\n", qpn);
+break;
+default:
+break;
+
+static void hns_roce_v1_qp_err_handle(struct hns_roce_dev *hr_dev,
```c
struct hns_roce_aeqe *aeqe,
int event_type)
+
+struct device *dev = &hr_dev->pdev->dev;
+int phy_port;
+int qpn;
+
+qpn = roce_get_field(aeqe->event.qp_event.qp,
+ HNS_ROCE_AEQE_EVENT_OP_EVENT_QP_QPN_M,
+ HNS_ROCE_AEQE_EVENT_OP_EVENT_QP_QPN_S);
+phy_port = roce_get_field(aeqe->event.qp_event.qp,
+ HNS_ROCE_AEQE_EVENT_OP_EVENT_PORT_NUM_M,
+ HNS_ROCE_AEQE_EVENT_OP_EVENT_PORT_NUM_S);
+if (qpn <= 1)
+qpn = HNS_ROCE_MAX_PORTS * qpn + phy_port;
+
+switch (event_type) {
+case HNS_ROCE_EVENT_TYPE_INV_REQ_LOCAL_WQ_ERROR:
+dev_warn(dev, "Invalid Req Local Work Queue Error:\n"
+ "QP %d, phy_port %d\n", qpn, phy_port);
+break;
+case HNS_ROCE_EVENT_TYPE_WQ_CATAS_ERROR:
+hns_roce_v1_wq_catas_err_handle(hr_dev, aeqe, qpn);
+break;
+case HNS_ROCE_EVENT_TYPE_LOCAL_WQ_ACCESS_ERROR:
+hns_roce_v1_local_wq_access_err_handle(hr_dev, aeqe, qpn);
+break;
+default:
+break;
+
+hns_roce_qp_event(hr_dev, qpn, event_type);
+
+static void hns_roce_v1_cq_err_handle(struct hns_roce_dev *hr_dev,
+ struct hns_roce_aeqe *aeqe,
+ int event_type)
+
+struct device *dev = &hr_dev->pdev->dev;
+u32 cqn;
+
cqn = le32_to_cpu(roce_get_field(aeqe->event.cq_event.cq,
+ HNS_ROCE_AEQE_EVENT_CQ_EVENT_CQ_CQN_M,
+ HNS_ROCE_AEQE_EVENT_CQ_EVENT_CQ_CQN_S));
+
+switch (event_type) {
+case HNS_ROCE_EVENT_TYPE_CQ_ACCESS_ERROR:
+dev_warn(dev, "CQ 0x%x access err:\n", cqn);
```
+
+break;
+case HNS_ROCE_EVENT_TYPE_CQ_OVERFLOW:
+dev_warn(dev, "%x %x CQ overflow\n", cqn);
+break;
+case HNS_ROCE_EVENT_TYPE_CQ_ID_INVALID:
+dev_warn(dev, "%x %x CQ ID invalid.\n", cqn);
+break;
+default:
+break;
+
+hns_roce_cq_event(hr_dev, cqn, event_type);
+}
+
+static void hns_roce_v1_db_overflow_handle(struct hns_roce_dev *hr_dev,
+struct hns_roce_aeqe *aeqe)
+{
+struct device *dev = &hr_dev->pdev->dev;
+
+switch (roce_get_field(aeqe->asyn, HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_M,
+HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_S)) { [omitted for brevity]
+case HNS_ROCE_DB_SUBTYPE_SDB_OVF:
+dev_warn(dev, "SDB overflow.\n");
+break;
+case HNS_ROCE_DB_SUBTYPE_SDB_ALM_OVF:
+dev_warn(dev, "SDB almost overflow.\n");
+break;
+case HNS_ROCE_DB_SUBTYPE_SDB_ALM_EMP:
+dev_warn(dev, "SDB almost empty.\n");
+break;
+case HNS_ROCE_DB_SUBTYPE_ODB_OVF:
+dev_warn(dev, "ODB overflow.\n");
+break;
+case HNS_ROCE_DB_SUBTYPE_ODB_ALM_OVF:
+dev_warn(dev, "ODB almost overflow.\n");
+break;
+case HNS_ROCE_DB_SUBTYPE_ODB_ALM_EMP:
+dev_warn(dev, "SDB almost empty.\n");
+break;
+default:
+break;
+
+static struct hns_roce_aeqe *get_aeqe_v1(struct hns_roce_eq *eq, u32 entry)
+{
+unsigned long off = (entry & (eq->entries - 1)) *
+HNS_ROCE_AEQ_ENTRY_SIZE;
+}
+return (struct hns_roce_aeqe *)((u8 *)
+(eq->buf_list[off / HNS_ROCE_BA_SIZE].buf) +
+off % HNS_ROCE_BA_SIZE);
+
+static struct hns_roce_aeqe *next_aeqe_sw_v1(struct hns_roce_eq *eq)
+{
+struct hns_roce_aeqe *aeqe = get_aeqe_v1(eq, eq->cons_index);
+
+return (roce_get_bit(aeqe->asyn, HNS_ROCE_AEQE_U32_4_OWNER_S) ^
+!!(eq->cons_index & eq->entries)) ? aeqe : NULL;
+}
+
+static int hns_roce_v1_aeq_int(struct hns_roce_dev *hr_dev,
+    struct hns_roce_eq *eq)
+{
+struct device *dev = &hr_dev->pdev->dev;
+struct hns_roce_aeqe *aeqe;
+int aeqes_found = 0;
+int event_type;
+
+while ((aeqe = next_aeqe_sw_v1(eq))) {
+
+ /* Make sure we read the AEQ entry after we have checked the
+  * ownership bit
+ */
+dma_rmb();
+
+dev_dbg(dev, "aeqe = %p, aeqe->asyn.event_type = 0x%lx\n", aeqe,
+roce_get_field(aeqe->asyn,
+    HNS_ROCE_AEQE_U32_4_EVENT_TYPE_M,
+    HNS_ROCE_AEQE_U32_4_EVENT_TYPE_S));
+event_type = roce_get_field(aeqe->asyn,
+    HNS_ROCE_AEQE_U32_4_EVENT_TYPE_M,
+    HNS_ROCE_AEQE_U32_4_EVENT_TYPE_S);
+switch (event_type) {
+case HNS_ROCE_EVENT_TYPE_PATH_MIG:
+dev_warn(dev, "PATH MIG not supported\n");
+break;
+case HNS_ROCE_EVENT_TYPE_COMM_EST:
+dev_warn(dev, "COMMUNICATION established\n");
+break;
+case HNS_ROCE_EVENT_TYPE_SQ_DRAINED:
+dev_warn(dev, "SQ DRAINED not supported\n");
+break;
+case HNS_ROCE_EVENT_TYPE_PATH_MIG_FAILED:
+dev_warn(dev, "PATH MIG failed\n");
+break;
+break;
+case HNS_ROCE_EVENT_TYPE_INV_REQ_LOCAL_WQ_ERROR:
+case HNS_ROCE_EVENT_TYPE_WQ_CATAS_ERROR:
+hns_roce_v1_qp_err_handle(hr_dev, aeqe, event_type);
+break;
+case HNS_ROCE_EVENT_TYPE_SRQ_LIMIT_REACH:
+case HNS_ROCE_EVENT_TYPE_SRQ_CATAS_ERROR:
+case HNS_ROCE_EVENT_TYPE_SRQ_LAST_WQE_REACH:
+dev_warn(dev, "SRQ not support!
");
+break;
+case HNS_ROCE_EVENT_TYPE_CQ_ACCESS_ERROR:
+case HNS_ROCE_EVENT_TYPE_CQ_OVERFLOW:
+case HNS_ROCE_EVENT_TYPE_CQ_ID_INVALID:
+hns_roce_v1_cq_err_handle(hr_dev, aeqe, event_type);
+break;
+case HNS_ROCE_EVENT_TYPE_PORT_CHANGE:
+dev_warn(dev, "port change.
");
+break;
+case HNS_ROCE_EVENT_TYPE_MB:
+hns_roce_cmd_event(hr_dev,
+ le16_to_cpu(aeqe->event.cmd.token),
+ aeqe->event.cmd.status,
+ le64_to_cpu(aeqe->event.cmd.out_param
+ ));
+break;
+case HNS_ROCE_EVENT_TYPE_DB_OVERFLOW:
+hns_roce_v1_db_overflow_handle(hr_dev, aeqe);
+break;
+case HNS_ROCE_EVENT_TYPE_CEQ_OVERFLOW:
+dev_warn(dev, "CEQ 0x%lx overflow.
",
+ roce_get_field(aeqe->event.ce_event.ceqe,
+ HNS_ROCE_AEQE_EVENT_CE_EVENT_CEQE_CEQN_M,
+ HNS_ROCE_AEQE_EVENT_CE_EVENT_CEQE_CEQN_S));
+break;
+default:
+dev_warn(dev, "Unhandled event %d on EQ %d at idx %u.
",
+ event_type, eq->eqn, eq->cons_index);
+break;
+}
+
+eq->cons_index++;
+aeqes_found = 1;
+
+if (eq->cons_index > 2 * hr_dev->caps.aeqe_depth - 1) {
+dev_warn(dev, "cons_index overflow, set back to 0.
");
+eq->cons_index = 0;
+}
+}  
+set_eq_cons_index_v1(eq, 0);  
+  
+return aeqes_found;  
+}  
+  
+static struct hns_roce_ceqe *get_ceqe_v1(struct hns_roce_eq *eq, u32 entry)  
+{  
+  unsigned long off = (entry & (eq->entries - 1)) *  
+    HNS_ROCE_CEQ_ENTRY_SIZE;  
+  
+  return (struct hns_roce_ceqe *)(u8 *)  
+    (eq->buf_list[off / HNS_ROCE_BA_SIZE].buf) +  
+    off % HNS_ROCE_BA_SIZE);  
+}  
+  
+static struct hns_roce_ceqe *next_ceqe_sw_v1(struct hns_roce_eq *eq)  
+{  
+  struct hns_roce_ceqe *ceqe = get_ceqe_v1(eq, eq->cons_index);  
+  
+  return (!!(roce_get_bit(ceqe->comp,  
+    HNS_ROCE_CEQE_CEQE_COMP_OWNER_S))) ^  
+    (!(eq->cons_index & eq->entries)) ? ceqe : NULL;  
+}  
+  
+static int hns_roce_v1_ceq_int(struct hns_roce_dev *hr_dev,  
+    struct hns_roce_eq *eq)  
+{  
+  struct hns_roce_ceqe *ceqe;  
+  int ceqes_found = 0;  
+  u32 cqn;  
+  
+  while ((ceqe = next_ceqe_sw_v1(eq))) {  
+    * Make sure we read CEQ entry after we have checked the  
+    * ownership bit  
+    */  
+    dma_rmb();  
+    
+    cqn = roce_get_field(ceqe->comp,  
+      HNS_ROCE_CEQE_CEQE_COMP_CQN_M,  
+      HNS_ROCE_CEQE_CEQE_COMP_CQN_S);  
+    hns_roce_cq_completion(hr_dev, cqn);  
+    
+    ++eq->cons_index;  
+    ceqes_found = 1;  
+    
+  }
if (eq->cons_index > 2 * hr_dev->caps.ceqe_depth - 1) {
+dev_warn(&eq->hr_dev->pdev->dev,
+"cons_index overflow, set back to 0.
");
+eq->cons_index = 0;
+
+set_eq_cons_index_v1(eq, 0);
+
+return ceqes_found;
+
+
+static irqreturn_t hns_roce_v1_msix_interrupt_eq(int irq, void *eq_ptr)
+{
+struct hns_roce_eq *eq = eq_ptr;
+struct hns_roce_dev *hr_dev = eq->hr_dev;
+int int_work = 0;
+
+if (eq->type_flag == HNS_ROCE_CEQ)
+  /* CEQ irq routine, CEQ is pulse irq, not clear */
+  int_work = hns_roce_v1_ceq_int(hr_dev, eq);
+else
+  /* AEQ irq routine, AEQ is pulse irq, not clear */
+  int_work = hns_roce_v1_aeq_int(hr_dev, eq);
+
+  return IRQ_RETVAL(int_work);
+}
+
+static irqreturn_t hns_roce_v1_msix_interrupt_abn(int irq, void *dev_id)
+{
+struct hns_roce_dev *hr_dev = dev_id;
+struct device *dev = &hr_dev->pdev->dev;
+int int_work = 0;
+u32 caepaemask_val;
+u32 cealmovf_val;
+u32 caepaest_val;
+u32 aeshift_val;
+u32 ceshift_val;
+u32 cemask_val;
+int i;
+
+/*
+ * Abnormal interrupt:
+ * AEQ overflow, ECC multi-bit err, CEQ overflow must clear
+ * interrupt, mask irq, clear irq, cancel mask operation
+ */
+aeshift_val = roce_read(hr_dev, ROCEE_CAEQ_CEAEQ_EEQE_SHIFT_REG);
+}
/* AEQE overflow */
if (roce_get_bit(aeshift_val, ROCEE_CAEP_AEQC_AEQE_SHIFT_CAEP_AEQ_ALM_OVF_INT_ST_S) == 1) {
  dev_warn(dev, "AEQ overflow!\n");
}

/* Set mask */
caepaemask_val = roce_read(hr_dev, ROCEE_CAEP_AE_MASK_REG);
roce_set_bit(caepaemask_val, ROCEE_CAEP_AE_MASK_CAEP_AEQ_ALM_OVF_MASK_S, HNS_ROCE_INT_MASK_ENABLE);
roce_write(hr_dev, ROCEE_CAEP_AE_MASK_REG, caepaemask_val);

/* Clear int state(INT_WC : write 1 clear) */
caepaest_val = roce_read(hr_dev, ROCEE_CAEP_AE_ST_REG);
roce_set_bit(caepaest_val, ROCEE_CAEP_AE_ST_CAEP_AEQ_ALM_OVF_S, 1);
roce_write(hr_dev, ROCEE_CAEP_AE_ST_REG, caepaest_val);

/* Clear mask */
caepaemask_val = roce_read(hr_dev, ROCEE_CAEP_AE_MASK_REG);
roce_set_bit(caepaemask_val, ROCEE_CAEP_AE_MASK_CAEP_AEQ_ALM_OVF_MASK_S, HNS_ROCE_INT_MASK_DISABLE);
roce_write(hr_dev, ROCEE_CAEP_AE_MASK_REG, caepaemask_val);

/* CEQ almost overflow */
for (i = 0; i < hr_dev->caps.num_comp_vectors; i++) {
  ceshift_val = roce_read(hr_dev, ROCEE_CAEP_CEQ_SHIFT_0_REG + i * CEQ_REG_OFFSET);
  if (roce_get_bit(ceshift_val, ROCEE_CAEP_CEQ_SHIFT_CAEP_CEQ_ALM_OVF_INT_ST_S) == 1) {
    dev_warn(dev, "CEQ[%d] almost overflow!\n", i);
    int_work++;
  }
}

/* Set mask */
cemask_val = roce_read(hr_dev, ROCEE_CAEP_CE_IRQ_MASK_0_REG + i * CEQ_REG_OFFSET);
roce_set_bit(cemask_val, ROCEE_CAEP_CE_IRQ_MASK_CAEP_CEQ_ALM_OVF_MASK_S, HNS_ROCE_INT_MASK_ENABLE);
roce_write(hr_dev, ROCEE_CAEP_CE_IRQ_MASK_0_REG + i * CEQ_REG_OFFSET, cemask_val);

/* Clear int state(INT_WC : write 1 clear) */
cealmovf_val = roce_read(hr_dev,
ROCEE_CAEP_CEQ_ALM_OVF_0_REG + 1);
+roce_write(hr_dev, ROCEE_CAEP_CEQ_ALM_OVF_0_REG + i * CEQ_REG_OFFSET, cealmovf_val);
+
+/* Clear mask */
+cemask_val = roce_read(hr_dev, ROCEE_CAEP_CE_IRQ_MASK_0_REG + i * CEQ_REG_OFFSET);
+roce_set_bit(cemask_val, ROCEE_CAEP_CE_IRQ_MASK_CAEP_CEQ_ALM_OVF_MASK_S, HNS_ROCE_INT_MASK_DISABLE);
+roce_write(hr_dev, ROCEE_CAEP_CE_IRQ_MASK_0_REG + i * CEQ_REG_OFFSET, cemask_val);
+
+/* ECC multi-bit error alarm */
+dev_warn(dev, "ECC UCERR ALARM: 0x%x, 0x%x, 0x%x\n",
+    roce_read(hr_dev, ROCEE_ECC_UCERR_ALM0_REG),
+    roce_read(hr_dev, ROCEE_ECC_UCERR_ALM1_REG),
+    roce_read(hr_dev, ROCEE_ECC_UCERR_ALM2_REG));
+
+dev_warn(dev, "ECC CERR ALARM: 0x%x, 0x%x, 0x%x\n",
+    roce_read(hr_dev, ROCEE_ECC_CERR_ALM0_REG),
+    roce_read(hr_dev, ROCEE_ECC_CERR_ALM1_REG),
+    roce_read(hr_dev, ROCEE_ECC_CERR_ALM2_REG));
+
+return IRQ_RETVAL(int_work);
+}
+
+static void hns_roce_v1_int_mask_enable(struct hns_roce_dev *hr_dev)
+{
+    u32 aemask_val;
+    int masken = 0;
+    int i;
+    
+    /* AEQ INT */
+    aemask_val = roce_read(hr_dev, ROCEE_CAEP_AE_MASK_REG);
+    roce_set_bit(aemask_val, ROCEE_CAEP_AE_MASK_CAEP_AEQ_ALM_OVF_MASK_S, masken);
+    roce_write(hr_dev, ROCEE_CAEP_AE_MASK_REG, aemask_val);
+
+    /* CEQ INT */
for (i = 0; i < hr_dev->caps.num_comp_vectors; i++) {
    /* IRQ mask */
    roce_write(hr_dev, ROCEE_CAEP_CE_IRQ_MASK_0_REG +
              i * CEQ_REG_OFFSET, masken);
}
}

static void hns_roce_v1_free_eq(struct hns_roce_dev *hr_dev,
                                struct hns_roce_eq *eq)
{
    int npages = (PAGE_ALIGN(eq->eqe_size * eq->entries) +
                  HNS_ROCE_BA_SIZE - 1) / HNS_ROCE_BA_SIZE;
    int i;
    
    if (!eq->buf_list)
        return;

    for (i = 0; i < npages; ++i)
        dma_free_coherent(&hr_dev->pdev->dev, HNS_ROCE_BA_SIZE,
                           eq->buf_list[i].buf, eq->buf_list[i].map);

    kfree(eq->buf_list);
}

static void hns_roce_v1_enable_eq(struct hns_roce_dev *hr_dev, int eq_num,
                                  int enable_flag)
{
    void __iomem *eqc = hr_dev->eq_table.eqc_base[eq_num];
    u32 val;

    if (enable_flag)
        roce_set_field(val,
                       ROCEE_CAEP_AEQC_AEQE_SHIFT_CAEP_AEQC_STATE_M,
                       ROCEE_CAEP_AEQC_AEQC_SHIFT_CAEP_AEQC_STATE_S,
                       HNS_ROCE_EQ_STAT_VALID);
    else
        roce_set_field(val,
                       ROCEE_CAEP_AEQC_AEQE_SHIFT_CAEP_AEQC_STATE_M,
                       ROCEE_CAEP_AEQC_AEQC_SHIFT_CAEP_AEQC_STATE_S,
                       HNS_ROCE_EQ_STAT_INVALID);
    writel(val, eqc);
}

static int hns_roce_v1_create_eq(struct hns_roce_dev *hr_dev,
                                  struct hns_roce_eq *eq)
+void _i_nomem *eqc = hr_dev->eq_table.eqc_base[eq->eqn];
+struct device *dev = &hr_dev->pdev->dev;
+dma_addr_t tmp_dma_addr;
+u32 eqconsindx_val = 0;
+u32 eqcuridx_val = 0;
+u32 eqshift_val = 0;
+int num_bas;
+int ret;
+int i;
+
+num_bas = (PAGE_ALIGN(eq->entries * eq->eqe_size) +
+ HNS_ROCE BA_SIZE - 1) / HNS_ROCE BA_SIZE;
+
+if ((eq->entries * eq->eqe_size) > HNS_ROCE BA_SIZE) {
+dev_err(dev, "[error]eq buf %d gt ba size(%d) need bas=%d
",
+ (eq->entries * eq->eqe_size), HNS_ROCE BA_SIZE,
+ num_bas);
+return -EINVAL;
+}
+
+eq->buf_list = kcalloc(num_bas, sizeof(*eq->buf_list), GFP_KERNEL);
+if (!eq->buf_list)
+return -ENOMEM;
+
+for (i = 0; i < num_bas; ++i) {
+eq->buf_list[i].buf = dma_alloc_coherent(dev, HNS_ROCE BA_SIZE,
+ &tmp_dma_addr,
+ GFP_KERNEL);
+if (!eq->buf_list[i].buf)
+ret = -ENOMEM;
+goto err_out_free_pages;
+}
+
+eq->cons_index = 0;
+rocee_set_field(eqshift_val,
+ ROCEE_CAEP_AEQC_AEQE_SHIFT_CAEP_AEQC_STATE_M,
+ ROCEE_CAEP_AEQC_AEQE_SHIFT_CAEP_AEQC_STATE_S,
+ HNS ROCE_EQ STAT INVALID);
+rocee_set_field(eqshift_val,
+ ROCEE_CAEP_AEQC_AEQE_SHIFT_CAEP_AEQC_STATE_M,
+ ROCEE_CAEP_AEQC_AEQE SHIFT_CAEP_AEQC_STATE_S,
+ eq->log_entries);
+writel(eqshift_val, eqc);
+
+/* Configure eq extended address 12~44bit */
+writel((u32)(eq->buf_list[0].map >> 12), eqc + 4);
+
+/*
+ * Configure eq extended address 45~49 bit.
+ * 44 = 32 + 12, When evaluating addr to hardware, shift 12 because of
+ * using 4K page, and shift more 32 because of
+ * calculating the high 32 bit value evaluated to hardware.
+ */
+roce_set_field(equridx_val, ROCEE_CAEP_AEQE_CUR_IDX_CAEP_AEQ_BT_H_M,
+ROCEE_CAEP_AEQE_CUR_IDX_CAEP_AEQ_BT_H_S,
+eq->buf_list[0].map >> 44);
+roce_set_field(equridx_val,
+ROCEE_CAEP_AEQE_CUR_IDX_CAEP_AEQ_CURIDX_M,
+ROCEE_CAEP_AEQE_CUR_IDX_CAEP_AEQ_CURIDX_S, 0);
+writel(equridx_val, eqc + 8);
+
+/* Configure eq consumer index */
+roce_set_field(eqconsindx_val,
+ROCEE_CAEP_AEQE_CONS_IDX_CAEP_AEQE_CONSIDX_M,
+ROCEE_CAEP_AEQE_CONS_IDX_CAEP_AEQE_CONSIDX_S, 0);
+writel(eqconsindx_val, eqc + 0xc);
+
+return 0;
+
+err_out_free_pages:
+for (i -= 1; i >= 0; i--)
+dma_free_coherent(dev, HNS_ROCE_BA_SIZE, eq->buf_list[i].buf,
+eq->buf_list[i].map);
+
+kfree(eq->buf_list);
+return ret;
+
+static int hns_roce_v1_init_eq_table(struct hns_roce_dev *hr_dev)
+{ 
+struct hns_roce_eq_table *eq_table = &hr_dev->eq_table;
+struct device *dev = &hr_dev->pdev->dev;
+struct hns_roce_eq *eq;
+int irq_num;
+int eq_num;
+int ret;
+int i, j;
+
+eq_num = hr_dev->caps.num_comp_vectors + hr_dev->caps.num_aeq_vectors;
+irq_num = eq_num + hr_dev->caps.num_other_vectors;
+
+eq_table->eq = kcalloc(eq_num, sizeof(*eq_table->eq), GFP_KERNEL);
+if (!eq_table->eq)
+return -ENOMEM;
+
+eq_table->eqc_base = kcalloc(eq_num, sizeof(*eq_table->eqc_base),
+   GFP_KERNEL);
+if (!eq_table->eqc_base) {
+   ret = -ENOMEM;
+   goto err_eqc_base_alloc_fail;
+}
+
+for (i = 0; i < eq_num; i++) {
+eq = &eq_table->eq[i];
+eq->hr_dev = hr_dev;
+eq->eqn = i;
+eq->irq = hr_dev->irq[i];
+eq->log_page_size = PAGE_SHIFT;
+
+if (i < hr_dev->caps.num_comp_vectors) {
+   /* CEQ */
+   eq_table->eqc_base[i] = hr_dev->reg_base +
+      ROCEE_CAEP_CEQC_SHIFT_0_REG +
+      CEQ_REG_OFFSET * i;
+   eq->type_flag = HNS_ROCE_CEQ;
+   eq->doorbell = hr_dev->reg_base +
+      ROCEE_CAEP_CEQC_CONS_IDX_0_REG +
+      CEQ_REG_OFFSET * i;
+   eq->entries = hr_dev->caps.ceqe_depth;
+   eq->log_entries = ilog2(eq->entries);
+   eq->eqe_size = HNS_ROCE_CEQ_ENTRY_SIZE;
+} else {
+   /* AEQ */
+   eq_table->eqc_base[i] = hr_dev->reg_base +
+      ROCEE_CAEP_AEQC_AEQE_SHIFT_REG;
+   eq->type_flag = HNS_ROCE_AEQ;
+   eq->doorbell = hr_dev->reg_base +
+      ROCEE_CAEP_AEQE_CONS_IDX_REG;
+   eq->entries = hr_dev->caps.aeqe_depth;
+   eq->log_entries = ilog2(eq->entries);
+   eq->eqe_size = HNS_ROCE_AEQ_ENTRY_SIZE;
+}
+}
+
+/* Disable irq */
+hns_roce_v1_int_mask_enable(hr_dev);
+
+/* Configure ce int interval */
+roce_write(hr_dev, ROCEE_CAEP_CE_INTERVAL_CFG_REG,
+   HNS_ROCE_CEQ_DEFAULT_INTERVAL);
+

/* Configure ce int burst num */
roc_write(hr_dev, ROCEE_CAEP_CE_BURST_NUM_CFG_REG, 
   HNS_ROCE_CEQ_DEFAULT_BURST_NUM);

for (i = 0; i < eq_num; i++) {
   ret = hns_roce_v1_create_eq(hr_dev, &eq_table->eq[i]);
   if (ret) {
      dev_err(dev, "eq create failed\n");
      goto err_create_eq_fail;
   }
}

for (j = 0; j < irq_num; j++) {
   if (j < eq_num)
      ret = request_irq(hr_dev->irq[j], 
         hns_roce_v1_msix_interrupt_eq, 0, 
         hr_dev->irq_names[j], 
         &eq_table->eq[j]);
   else
      ret = request_irq(hr_dev->irq[j], 
         hns_roce_v1_msix_interrupt_abn, 0, 
         hr_dev->irq_names[j], hr_dev);
   if (ret) {
      dev_err(dev, "request irq error!\n");
      goto err_request_irq_fail;
   }
}

for (i = 0; i < eq_num; i++)
   hns_roce_v1_enable_eq(hr_dev, i, EQ_ENABLE);

return 0;

err_request_irq_fail:
   for (j -= 1; j >= 0; j--)
      free_irq(hr_dev->irq[j], &eq_table->eq[j]);

err_create_eq_fail:
   for (i -= 1; i >= 0; i--)
      hns_roce_v1_free_eq(hr_dev, &eq_table->eq[i]);

kfree(eq_table->eqc_base);

err_eqc_base_alloc_fail:
   kfree(eq_table->eq);

return ret;
static void hns_roce_v1_cleanup_eq_table(struct hns_roce_dev *hr_dev)
{
+struct hns_roce_eq_table *eq_table = &hr_dev->eq_table;
+int irq_num;
+int eq_num;
+int i;
+
+eq_num = hr_dev->caps.num_comp_vectors + hr_dev->caps.num_aeq_vectors;
+irq_num = eq_num + hr_dev->caps.num_other_vectors;
+for (i = 0; i < eq_num; i++) {
+  /* Disable EQ */
+  hns_roce_v1_enable_eq(hr_dev, i, EQ_DISABLE);
+  free_irq(hr_dev->irq[i], &eq_table->eq[i]);
+  hns_roce_v1_free_eq(hr_dev, &eq_table->eq[i]);
+}
+for (i = eq_num; i < irq_num; i++)
+  free_irq(hr_dev->irq[i], hr_dev);
+
+kfree(eq_table->eqc_base);
+kfree(eq_table->eq);
+}
+
static const struct hns_roce_hw hns_roce_hw_v1 = {
  .reset = hns_roce_v1_reset,
  .hw_profile = hns_roce_v1_profile,
  .poll_cq = hns_roce_v1_poll_cq,
  .dereg_mr = hns_roce_v1_dereg_mr,
  .destroy_cq = hns_roce_v1_destroy_cq,
  .init_eq = hns_roce_v1_init_eq_table,
  .cleanup_eq = hns_roce_v1_cleanup_eq_table,
};

static const struct of_device_id hns_roce_of_match[] = {
/* get the mapped register base address */
  res = platform_get_resource(hr_dev->pdev, IORESOURCE_MEM, 0);
  if (!res) {
    dev_err(dev, "memory resource not found!
    return -EINVAL;
  }
  hr_dev->reg_base = devm_ioremap_resource(dev, res);
  if (IS_ERR(hr_dev->reg_base))
return PTR_ERR(hr_dev->reg_base);
@@ -4132,14 +4880,14 @@
 /* read the interrupt names from the DT or ACPI */
 ret = device_property_read_string_array(dev, "interrupt-names",
 hr_dev->irq_names,
-HNS_ROCE_MAX_IRQ_NUM);
+HNS_ROCE_V1_MAX_IRQ_NUM);
 if (ret < 0) {
   dev_err(dev, "couldn't get interrupt names from DT or ACPI\n"");
 return ret;
 }

 /* fetch the interrupt numbers */
-#for (i = 0; i < HNS_ROCE_MAX_IRQ_NUM; i++) {
+#for (i = 0; i < HNS_ROCE_V1_MAX_IRQ_NUM; i++) {
   hr_dev->irq[i] = platform_get_irq(hr_dev->pdev, i);
   if (hr_dev->irq[i] <= 0) {
     dev_err(dev, "platform get of irq[=%d] failed\n", i);
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_hw.h
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_hw_v1.h
@@ -60,8 +60,13 @@
 #define HNS_ROCE_V1_GID_NUM				16
 #define HNS_ROCE_V1_RESV_QP				8
-#define HNS_ROCE_V1_NUM_COMP_EQE			0x8000
-#define HNS_ROCE_V1_NUM_ASYNC_EQE			0x400
+#define HNS_ROCE_V1_MAX_IRQ_NUM				34
+#define HNS_ROCE_V1_COMP_VEC_NUM			32
+#define HNS_ROCE_V1_AEQE_VEC_NUM			1
+#define HNS_ROCE_V1_ABNORMAL_VEC_NUM			1
+#define HNS_ROCE_V1_COMP_EQE_NUM			0x8000
+#define HNS_ROCE_V1_ASYNC_EQE_NUM			0x400
 #define HNS_ROCE_V1_QPC_ENTRY_SIZE			256
 #define HNS_ROCE_V1_IRRL_ENTRY_SIZE			8
@@ -159,15 +164,50 @@
 #define SDB_INV_CNT_OFFSET				8
 #define SDB_ST_CMP_VAL					8
+#define HNS_ROCE_CEQ_DEFAULT_INTERVAL			0x10
+#define HNS_ROCE_CEQ_DEFAULT_BURST_NUM			0x10
+
+#define HNS_ROCE_INT_MASK_DISABLE			0
+#define HNS_ROCE_INT_MASK_ENABLE			1
+
+#define CEQ_REG_OFFSET					0x18
 ++#define HNS_ROCE_V1_QPC_ENTRY_SIZE256
 #define HNS_ROCE_V1_IRRL_ENTRY_SIZE8
@@ -159,15 +164,50 @@
 #define SDB_INV_CNT_OFFSET8
 #define SDB_ST_CMP_VAL8
+#+define HNS_ROCE_CEQ_DEFAULT_INTERVAL0x10
+#+define HNS_ROCE_CEQ_DEFAULT_BURST_NUM0x10
+
+#+define HNS_ROCE_INT_MASK_DISABLE0
+#+define HNS_ROCE_INT_MASK_ENABLE1
+
+#+define CEQ_REG_OFFSET0x18
+}

+define HNS_ROCE_CEQE_CEQE_COMP_OWNER_S0  
+define HNS_ROCE_V1_CONS_IDX_M GENMASK(15, 0)  
+define HNS_ROCE_CEQE_CEQE_COMP_CQN_S 16  
+define HNS_ROCE_CEQE_CEQE_COMP_CQN_M GENMASK(31, 16)  
+define HNS_ROCE_AEQE_U32_4_EVENT_TYPE_S 16  
+define HNS_ROCE_AEQE_U32_4_EVENT_TYPE_M GENMASK(23, 16)  
+define HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_S 24  
+define HNS_ROCE_AEQE_U32_4_EVENT_SUB_TYPE_M GENMASK(30, 24)  
+define HNS_ROCE_AEQE_U32_4_OWNER_S 31  
+define HNS_ROCE_AEQE_EVENT_QP_EVENT_QP_QPN_S 0  
+define HNS_ROCE_AEQE_EVENT_QP_EVENT_QP_QPN_M GENMASK(23, 0)  
+define HNS_ROCE_AEQE_EVENT_QP_EVENT_PORT_NUM_S 25  
+define HNS_ROCE_AEQE_EVENT_QP_EVENT_PORT_NUM_M GENMASK(27, 25)  
+define HNS_ROCE_AEQE_EVENT_CQ_EVENT_CQ_CQN_S 0  
+define HNS_ROCE_AEQE_EVENT_CQ_EVENT_CQ_CQN_M GENMASK(15, 0)  
+define HNS_ROCE_AEQE_EVENT_CE_EVENT_CEQE_CEQN_S 0  
+define HNS_ROCE_AEQE_EVENT_CE_EVENT_CEQE_CEQN_M GENMASK(4, 0)  
+struct hns_roce_cq_context {
    -u32 cqc_byte_4;
    -u32 cq_bt_l;
    -u32 cqc_byte_12;
    -u32 cur_cqe_ba0_l;
    -u32 cqc_byte_20;
    -u32 cqe_tptr_addr_l;
    -u32 cur_cqe_ba1_l;
    -u32 cqc_byte_32;
    __le32 cqc_byte_4;
    __le32 cq_bt_l;
    __le32 cqc_byte_12;
    __le32 cur_cqe_ba0_l;
    __le32 cqc_byte_20;
    __le32 cqe_tptr_addr_l;
    __le32 cur_cqe_ba1_l;
    __le32 cqc_byte_32;
};

#define CQ_CONTEXT_CQC_BYTE_4_CQC_STATE_S 0
@@ -217,17 +257,17 @@
typedef struct hns_roce_cqe {
  u32 cqe_byte_4;
  __le32 cqe_byte_4;
  union {
    u32 r_key;
    u32 immediate_data;
    __le32 r_key;
    __be32 immediate_data;
  }
  u32 byte_cnt;
  u32 cqe_byte_16;
  u32 cqe_byte_20;
  u32 s_mac_l;
  u32 cqe_byte_28;
  u32 reserved;
  __le32 byte_cnt;
  __le32 cqe_byte_16;
  __le32 cqe_byte_20;
  __le32 s_mac_l;
  __le32 cqe_byte_28;
  __le32 reserved;
} hns_roce_cqe_t;

#define CQE_BYTE_4_OWNER_S 7
#define CQ_DB_REQ_NOT (1 << 16)

struct hns_roce_v1_mpt_entry {
  u32 mpt_byte_4;
  __le32 pbl_addr_l;
  u32 mpt_byte_12;
  u32 virt_addr_l;
  u32 virt_addr_h;
  u32 length;
  u32 mpt_byte_28;
  u32 pa0_l;
  u32 mpt_byte_36;
  u32 mpt_byte_40;
  u32 mpt_byte_44;
  u32 mpt_byte_48;
  u32 pa4_l;
  u32 mpt_byte_56;
  u32 mpt_byte_60;
  u32 mpt_byte_64;
  __le32 mpt_byte_4;
  __le32 pbl_addr_l;
+__le32 mpt_byte_12;
+__le32 virt_addr_l;
+__le32 virt_addr_h;
+__le32 length;
+__le32 mpt_byte_28;
+__le32 pa0_l;
+__le32 mpt_byte_36;
+__le32 mpt_byte_40;
+__le32 mpt_byte_44;
+__le32 mpt_byte_48;
+__le32 pa4_l;
+__le32 mpt_byte_56;
+__le32 mpt_byte_60;
+__le32 mpt_byte_64;
};

#define MPT_BYTE_4_KEY_STATE_S 0
@
68.30 +408.32 @@
(((1UL << 8) - 1) << MPT_BYTE_64_L_KEY_IDX_H_S)

struct hns_roce_wqe_ctrl_seg {
  __be32 sgl_pa_h;
  __be32 flag;
  __be32 imm_data;
  __be32 msg_length;
  __le32 sgl_pa_h;
  __le32 flag;
  union {
    __be32 imm_data;
    __le32 inv_key;
  };
  __le32 msg_length;
};

struct hns_roce_wqe_data_seg {
  __be64    addr;
  __be32    lkey;
  __be32    len;
  __le64    addr;
  __le32    lkey;
  __le32    len;
};

struct hns_roce_wqe_raddr_seg {
  __be32 rkey;
  __be32 len;/* reserved */
  __be64 raddr;
  __le32 rkey;
}
struct hns_roce_rq_wqe_ctrl {

- u32 rwqe_byte_4;
- u32 rocee_sgl_ba_l;
- u32 rwqe_byte_12;
- u32 reserved[5];
+ __le32 rwqe_byte_4;
+ __le32 rocee_sgl_ba_l;
+ __le32 rwqe_byte_12;
+ __le32 reserved[5];
};

#define RQ_WQE_CTRL_RWQE_BYTE_12_RWQE_SGE_NUM_S 16
@@ -403,31 +445,31 @@
#define GID_LEN					16
@@ -403,31 +445,31 @@

struct hns_roce_ud_send_wqe {

- u32 dmac_h;
- u32 u32_8;
- u32 immediate_data;
+ __le32 dmac_h;
+ __le32 u32_8;
+ __le32 immediate_data;

- u32 u32_16;
+ __le32 u32_16;

union {

unsigned char dgid[GID_LEN];
struct {
- u32 u32_20;
- u32 u32_24;
- u32 u32_28;
- u32 u32_32;
+ __le32 u32_20;
+ __le32 u32_24;
+ __le32 u32_28;
+ __le32 u32_32;
};
};

- u32 u32_36;
- u32 u32_40;
+ __le32 u32_36;
+ __le32 u32_40;
-u32 va0_l;
-u32 va0_h;
-u32 l_key0;
-
-u32 va1_l;
-u32 va1_h;
-u32 l_key1;
+	__le32 va0_l;
+	__le32 va0_h;
+	__le32 l_key0;
+
+	__le32 va1_l;
+	__le32 va1_h;
+	__le32 l_key1;
};

#define UD_SEND_WQE_U32_40_DMAC_0_S 0
@@ -495,16 +537,16 @@
((((1UL << 8) - 1) << UD_SEND_WQE_U32_40_TRAFFIC_CLASS_S)

struct hns_roce_sqp_context { 
-u32 qp1c_bytes_4;
-u32 sq_rq_bt_l;
-u32 qp1c_bytes_12;
-u32 qp1c_bytes_16;
-u32 qp1c_bytes_20;
-u32 cur_rq_wqe_ba_l;
-u32 qp1c_bytes_28;
-u32 qp1c_bytes_32;
-u32 cur_sq_wqe_ba_l;
-u32 qp1c_bytes_40;
+	__le32 qp1c_bytes_4;
+	__le32 sq_rq_bt_l;
+	__le32 qp1c_bytes_12;
+	__le32 qp1c_bytes_16;
+	__le32 qp1c_bytes_20;
+	__le32 cur_rq_wqe_ba_l;
+	__le32 qp1c_bytes_28;
+	__le32 qp1c_bytes_32;
+	__le32 cur_sq_wqe_ba_l;
+	__le32 qp1c_bytes_40;
};

#define QP1C_BYTES_4_QP_STATE_S 0
@@ -586,64 +628,64 @@
#define HNS_ROCE_WQE_OPCODE_MASK (15<<16)
struct hns_roce_qp_context {
- u32 qpc_bytes_4;
- u32 qpc_bytes_8;
- u32 qpc_bytes_12;
- u32 qpc_bytes_16;
- u32 sq_rq_bt_l;
- u32 qpc_bytes_24;
- u32 irrl_ba_l;
- u32 qpc_bytes_32;
- u32 qpc_bytes_36;
- u32 dmac_l;
- u32 qpc_bytes_44;
- u32 qpc_bytes_48;
- u8 dgid[16];
- u32 qpc_bytes_68;
- u32 cur_rq_wqe_ba_l;
- u32 qpc_bytes_76;
- u32 rx_rnr_time;
- u32 qpc_bytes_84;
- u32 qpc_bytes_88;
+ __le32 qpc_bytes_4;
+ __le32 qpc_bytes_8;
+ __le32 qpc_bytes_12;
+ __le32 qpc_bytes_16;
+ __le32 sq_rq_bt_l;
+ __le32 qpc_bytes_24;
+ __le32 irrl_ba_l;
+ __le32 qpc_bytes_32;
+ __le32 qpc_bytes_36;
+ __le32 dmac_l;
+ __le32 qpc_bytes_44;
+ __le32 qpc_bytes_48;
+ u8     dgid[16];
+ __le32 qpc_bytes_68;
+ __le32 cur_rq_wqe_ba_l;
+ __le32 qpc_bytes_76;
+ __le32 rx_rnr_time;
+ __le32 qpc_bytes_84;
+ __le32 qpc_bytes_88;
union {
- u32 rx_sge_len;
- u32 dma_length;
+ __le32 rx_sge_len;
+ __le32 dma_length;
};
union {
- u32 rx_sge_num;
- u32 rx_send_pktn;
-u32 r_key;
+__le32 rx_sge_num;
+__le32 rx_send_pkt;
+__le32 r_key;
};
-u32 va_l;
-u32 va_h;
-u32 qpc_bytes_108;
-u32 qpc_bytes_112;
-u32 rx_cur_sq_wqe_ba_l;
-u32 qpc_bytes_120;
-u32 qpc_bytes_124;
-u32 qpc_bytes_128;
-u32 qpc_bytes_132;
-u32 qpc_bytes_136;
-u32 qpc_bytes_140;
-u32 qpc_bytes_144;
-u32 qpc_bytes_148;
+__le32 va_l;
+__le32 va_h;
+__le32 qpc_bytes_108;
+__le32 qpc_bytes_112;
+__le32 rx_cur_sq_wqe_ba_l;
+__le32 qpc_bytes_120;
+__le32 qpc_bytes_124;
+__le32 qpc_bytes_128;
+__le32 qpc_bytes_132;
+__le32 qpc_bytes_136;
+__le32 qpc_bytes_140;
+__le32 qpc_bytes_144;
+__le32 qpc_bytes_148;
union {
- u32 mr_retry;
- u32 ack_time;
+__le32 mr_retry;
+__le32 ack_time;
};
-u32 qpc_bytes_156;
-u32 pkt_use_len;
-u32 qpc_bytes_164;
-u32 qpc_bytes_168;
+__le32 qpc_bytes_156;
+__le32 pkt_use_len;
+__le32 qpc_bytes_164;
+__le32 qpc_bytes_168;
union {
- u32 sge_use_len;
- u32 pa_use_len;
+__le32 sge_use_len;
+__le32 pa_use_len;
};
-u32 qpc_bytes_176;
-u32 qpc_bytes_180;
-u32 tx_cur_sq_wqe.ba_l;
-u32 qpc_bytes_188;
-u32 rvd21;
+__le32 qpc_bytes_176;
+__le32 qpc_bytes_180;
+__le32 tx_cur_sq_wqe.ba_l;
+__le32 qpc_bytes_188;
+__le32 rvd21;
};

#define QPCONTEXT_QPC_BYTES_4_TRANSPORT_SERVICE_TYPE_S 0
@@ -956,8 +998,8 @@
#define HCR_GO_BIT 15

struct hns_roce_rq_db {
- u32    u32_4;
- u32    u32_8;
+__le32    u32_4;
+__le32    u32_8;
};

#define RQ_DOORBELL_U32_4_RQ_HEAD_S 0
@@ -973,8 +1015,8 @@
#define RQ_DOORBELL_U32_8_HW_SYNC_S 31

struct hns_roce_sq_db {
- u32    u32_4;
- u32    u32_8;
+__le32    u32_4;
+__le32    u32_8;
};

#define SQ_DOORBELL_U32_4_SQ_HEAD_S 0
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_hw_v2.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_hw_v2.c
@@ -34,6 +34,8 @@
#include <linux/etherdevice.h>
#include <linux/interrupt.h>
#include <linux/kernel.h>
+#include <linux/types.h>
+#include <net/addrconf.h>
#include <rdma/ib_umem.h>

---
#include "hnae3.h"

dseg->len = cpu_to_le32(sg->length);
}

+static void set_extend_sge(struct hns_roce_qp *qp, struct ib_send_wr *wr,
+    unsigned int *sge_ind)
+{
+    struct hns_roce_v2_wqe_data_seg *dseg;
+    struct ib_sge *sg;
+    int num_in_wqe = 0;
+    int extend_sge_num;
+    int fi_sge_num;
+    int se_sge_num;
+    int shift;
+    int i;
+    
+    if (qp->ibqp.qp_type == IB_QPT_RC || qp->ibqp.qp_type == IB_QPT_UC)
+        num_in_wqe = HNS_ROCE_V2_UC_RC_SGE_NUM_IN_WQE;
+    extend_sge_num = wr->num_sge - num_in_wqe;
+    sg = wr->sg_list + num_in_wqe;
+    shift = qp->hr_buf.page_shift;
+    
+    /*
+     * Check whether wr->num_sge sges are in the same page. If not, we
+     * should calculate how many sges in the first page and the second
+     * page.
+     */
+    +
+    +dseg = get_send_extend_sge(qp, (*sge_ind) & (qp->sge.sge_cnt - 1));
+    +fi_sge_num = (round_up((uintptr_t)dseg, 1 << shift) -
+        (uintptr_t)dseg) /
+         sizeof(struct hns_roce_v2_wqe_data_seg);
+    +if (extend_sge_num > fi_sge_num) {
+        +se_sge_num = extend_sge_num - fi_sge_num;
+        +for (i = 0; i < fi_sge_num; i++) {
+            +set_data_seg_v2(dseg++, sg + i);
+            +(*sge_ind)++;
+        +}
+        +dseg = get_send_extend_sge(qp,
+            +(*sge_ind) & (qp->sge.sge_cnt - 1));
+        +for (i = 0; i < se_sge_num; i++) {
+            +set_data_seg_v2(dseg++, sg + fi_sge_num + i);
+            +(*sge_ind)++;
+        }
+    } else {
+        +for (i = 0; i < extend_sge_num; i++) {
+            +set_data_seg_v2(dseg++, sg + i);
+            +(*sge_ind)++;
+        }
+    }
static int set rwqe_data_seg(struct ib_qp *ibqp, struct ib_send_wr *wr,
    struct hns_roce_v2_rc_send_wqe *rc_sq_wqe,
    void *wqe, unsigned int *sge_ind,
    struct ib_send_wr **bad_wr)
{
    struct hns_roce_dev *hr_dev = to_hr_dev(ibqp->device);
    struct hns_roce_v2_wqe_data_seg *dseg = wqe;
    struct hns_roce_qp *qp = to_hr_qp(ibqp);
    int i;
    if (wr->send_flags & IB_SEND_INLINE && wr->num_sge) {
        if (le32_to_cpu(rc_sq_wqe->msg_len) >
            hr_dev->caps.max_sq_inline) {
            *bad_wr = wr;
            dev_err(hr_dev->dev, "inline len(1-%d)=%d, illegal",
                    rc_sq_wqe->msg_len, hr_dev->caps.max_sq_inline);
            return -EINVAL;
        }
        if (wr->opcode == IB_WR_RDMA_READ) {
            *bad_wr = wr;
            dev_err(hr_dev->dev, "Not support inline data!\n");
            return -EINVAL;
        }
        for (i = 0; i < wr->num_sge; i++) {
            memcpy(wqe, ((void *)wr->sg_list[i].addr),
                    wr->sg_list[i].length);
            wqe += wr->sg_list[i].length;
        }
        roce_set_bit(rc_sq_wqe->byte_4, V2_RC_SEND_WQE_BYTE_4_INLINE_S,
                     1);
    } else {
        if (wr->num_sge <= HNS_ROCE_V2_UC_RC_SGE_NUM_IN_WQE) {
            for (i = 0; i < wr->num_sge; i++) {
                if (likely(wr->sg_list[i].length)) {
                    set_data_seg_v2(dseg, wr->sg_list + i);
                    dseg++;
                }
            }
        }
    }
    return 0;
}
+} else {
+  roce_set_field(rc_sq_wqe->byte_20,
+    V2_RC_SEND_WQE_BYTE_20_MSG_START_SGE_IDX_M,
+    V2_RC_SEND_WQE_BYTE_20_MSG_START_SGE_IDX_S,
+    (*sge_ind) & (qp->sge.sge_cnt - 1));
+  +for (i = 0; i < HNS_ROCE_V2_UC_RC_SGE_NUM_IN_WQE; i++) {
+    +if (likely(wr->sg_list[i].length)) {
+      +set_data_seg_v2(dseg, wr->sg_list + i);
+      +dseg++;
+    +}
+  +}
+  +set_extend_sge(qp, wr, sge_ind);
+} +
+  roce_set_field(rc_sq_wqe->byte_16,
+    V2_RC_SEND_WQE_BYTE_16_SGE_NUM_M,
+    V2_RC_SEND_WQE_BYTE_16_SGE_NUM_S, wr->num_sge);
+} +
+return 0;
+}
+
+static int hns_roce_v2_post_send(struct ib_qp *ibqp, struct ib_send_wr *wr,
+struct ib_send_wr **bad_wr)
+{
+  struct hns_roce_dev *hr_dev = to_hr_dev(ibqp->device);
+  struct hns_roce_ah *ah = to_hr_ah(ud_wr(wr)->ah);
+  struct hns_roce_v2_ud_send_wqe *ud_sq_wqe;
+  struct hns_roce_v2_rc_send_wqe *rc_sq_wqe;
+  struct hns_roce_qp *qp = to_hr_qp(ibqp);
+  struct hns_roce_v2_wqe_data_seg *dseg;
+  struct device *dev = hr_dev->dev;
+  struct hns_roce_v2_db sq_db;
+  unsigned int sge_ind = 0;
+  unsigned int wqe_sz = 0;
+  unsigned int owner_bit;
+  unsigned long flags;
+  unsigned int ind;
+  void *wqe = NULL;
+  bool loopback;
+  u32 tmp_len;
+  int ret = 0;
+  u8 *smac;
+  int nreq;
int i;

-if (unlikely(ibqp->qp_type != IB_QPT_RC)) {
+    if (unlikely(ibqp->qp_type != IB_QPT_RC &&
+        ibqp->qp_type != IB_QPT_GSI &&
+        ibqp->qp_type != IB_QPT_UD)) {
        dev_err(dev, "Not supported QP(0x%x)type!\n", ibqp->qp_type);
        *bad_wr = NULL;
        *bad_wr = wr;
        return -EOPNOTSUPP;
    }

-if (unlikely(qp->state != IB_QPS_RTS && qp->state != IB_QPS_SQD)) {
+    if (unlikely(qp->state == IB_QPS_RESET || qp->state == IB_QPS_INIT ||
+        qp->state == IB_QPS_RTR)) {
        dev_err(dev, "Post WQE fail, QP state %d err!\n", qp->state);
        *bad_wr = wr;
        return -EINVAL;
    }

    owner_bit = ~(qp->sq.head >> ilog2(qp->sq.wqe_cnt)) & 0x1;
    rc_sq_wqe = wqe;
    memset(rc_sq_wqe, 0, sizeof(*rc_sq_wqe));
    for (i = 0; i < wr->num_sge; i++)
        rc_sq_wqe->msg_len += wr->sg_list[i].length;
    +owner_bit =
        ~(((qp->sq.head + nreq) >> ilog2(qp->sq.wqe_cnt)) & 0x1);
    +tmp_len = 0;

+    /* Corresponding to the QP type, wqe process separately */
+    if (ibqp->qp_type == IB_QPT_GSI) {
        ud_sq_wqe = wqe;
        memset(ud_sq_wqe, 0, sizeof(*ud_sq_wqe));
        +roce_set_field(ud_sq_wqe->dmac, V2_UD_SEND_WQE_DMAC_0_M,
            V2_UD_SEND_WQE_DMAC_0_S, ah->av.mac[0]);
        +roce_set_field(ud_sq_wqe->dmac, V2_UD_SEND_WQE_DMAC_1_M,
            V2_UD_SEND_WQE_DMAC_1_S, ah->av.mac[1]);
        +roce_set_field(ud_sq_wqe->dmac, V2_UD_SEND_WQE_DMAC_2_M,
            V2_UD_SEND_WQE_DMAC_2_S, ah->av.mac[2]);
        +roce_set_field(ud_sq_wqe->dmac, V2_UD_SEND_WQE_DMAC_3_M,
            V2_UD_SEND_WQE_DMAC_3_S, ah->av.mac[3]);
        +roce_set_field(ud_sq_wqe->byte_48,
            V2_UD_SEND_WQE_BYTE_48_DMAC_4_M,
            V2_UD_SEND_WQE_BYTE_48_DMAC_4_S,
            ah->av.mac[4]);
+roce_set_field(ud_sq_wqe->byte_48,
+ V2_UD_SEND_WQE_BYTE_48_DMAC_5_M,
+ V2_UD_SEND_WQE_BYTE_48_DMAC_5_S,
+ ah->av.mac[5]);
+
+/* MAC loopback */
+smac = (u8 *)hr_dev->dev_addr[qp->port];
+loopback = ether_addr_equal_unaligned(ah->av.mac,
+ smac) ? 1 : 0;
+
+roce_set_bit(ud_sq_wqe->byte_40,
+ V2_UD_SEND_WQE_BYTE_40_LBI_S, loopback);
+
+roce_set_field(ud_sq_wqe->byte_4,
+ V2_UD_SEND_WQE_BYTE_4_OPCODE_M,
+ V2_UD_SEND_WQE_BYTE_4_OPCODE_S,
+ HNS_ROCE_V2_WQE_OP_SEND);

-rc_sq_wqe->inv_key_immtdata = send_ieth(wr);

+for (i = 0; i < wr->num_sge; i++)
+tmp_len += wr->sg_list[i].length;

-rc_sq_wqe->inv_key_immtdata = send_ieth(wr);

+for (i = 0; i < wr->num_sge; i++)
+tmp_len += wr->sg_list[i].length;

+roce_set_bit(rc_sq_wqe->byte_4, V2_RC_SEND_WQE_BYTE_4_FENCE_S,
- (wr->send_flags & IB_SEND_FENCE) ? 1 : 0);
+ud_sq_wqe->msg_len =
+ cpu_to_le32(le32_to_cpu(ud_sq_wqe->msg_len) + tmp_len);

-rc_sq_wqe->inv_key_immtdata = send_ieth(wr);

+for (i = 0; i < wr->num_sge; i++)
+tmp_len += wr->sg_list[i].length;

+switch (wr->opcode) {
+case IB_WR_SEND_WITH_IMM:
+case IB_WR_RDMA_WRITE_WITH_IMM:
+ud_sq_wqe->immtdata =
+ cpu_to_le32(be32_to_cpu(wr->ex.imm_data));
+break;
+default:
+ud_sq_wqe->immtdata = 0;
+break;
+
+roce_set_bit(rc_sq_wqe->byte_4, V2_RC_SEND_WQE_BYTE_4_CQE_S,
- (wr->send_flags & IB_SEND_SIGNED) ? 1 : 0);
+/* Set sig attr */
+roce_set_bit(ud_sq_wqe->byte_4,
+ V2_UD_SEND_WQE_BYTE_4_CQE_S,
+ (wr->send_flags & IB_SEND_SIGNED) ? 1 : 0);
+
+/* Set se attr */
roce_set_bit(ud_sq_wqe->byte_4,
+ V2_UD_SEND_WQE_BYTE_4_SE_S,
+ (wr->send_flags & IB_SEND_SOLICITED) ? 1 : 0);
+
+roce_set_bit(ud_sq_wqe->byte_4,
+ V2_UD_SEND_WQE_BYTE_4_OWNER_S, owner_bit);
+
+roce_set_field(ud_sq_wqe->byte_16,
+ V2_UD_SEND_WQE_BYTE_16_PD_M,
+ V2_UD_SEND_WQE_BYTE_16_PD_S,
+ to_hr_pd(ibqp->pd)->pdn);
+
+roce_set_field(ud_sq_wqe->byte_16,
+ V2_UD_SEND_WQE_BYTE_16_SGE_NUM_M,
+ V2_UD_SEND_WQE_BYTE_16_SGE_NUM_S,
+ wr->num_sge);
-
-roce_set_bit(rc_sq_wqe->byte_4, V2_RC_SEND_WQE_BYTE_4_OWNER_S,
-    owner_bit);
+
+roce_set_field(ud_sq_wqe->byte_20,
+ V2_UD_SEND_WQE_BYTE_20_MSG_START_SGE_IDX_M,
+ V2_UD_SEND_WQE_BYTE_20_MSG_START_SGE_IDX_S,
+ sge_ind & (qp->sge.sge_cnt - 1));
+
+roce_set_field(ud_sq_wqe->byte_24,
+ V2_UD_SEND_WQE_BYTE_24_UDPSPN_M,
+ V2_UD_SEND_WQE_BYTE_24_UDPSPN_S, 0);
+ud_sq_wqe->qkey =
+    cpu_to_le32(ud_wr(wr)->remote_qkey & 0x80000000 ?
+        qp->qkey : ud_wr(wr)->remote_qkey);
+
+roce_set_field(ud_sq_wqe->byte_32,
+ V2_UD_SEND_WQE_BYTE_32_DQPN_M,
+ V2_UD_SEND_WQE_BYTE_32_DQPN_S,
+ ud_wr(wr)->remote_qpn);
+
+roce_set_field(ud_sq_wqe->byte_36,
+ V2_UD_SEND_WQE_BYTE_36_VLAN_M,
+ V2_UD_SEND_WQE_BYTE_36_VLAN_S,
+ le16_to_cpu(ah->av.vlan));
+
+roce_set_field(ud_sq_wqe->byte_36,
+ V2_UD_SEND_WQE_BYTE_36_HOPLIMIT_M,
+ V2_UD_SEND_WQE_BYTE_36_HOPLIMIT_S,
+ ah->av.hop_limit);
+
+roce_set_field(ud_sq_wqe->byte_36,
+ V2_UD_SEND_WQE_BYTE_36_TCLASS_M,
+ V2_UD_SEND_WQE_BYTE_36_TCLASS_S,
+ 0);
+
+roce_set_field(ud_sq_wqe->byte_36,
roce_set_field(ud_sq_wqe->byte_40,
+ V2_UD_SEND_WQE_BYTE_40_FLOW_LABEL_M,
+ V2_UD_SEND_WQE_BYTE_40_FLOW_LABEL_S, 0);
+roce_set_field(ud_sq_wqe->byte_40,
+ V2_UD_SEND_WQE_BYTE_40_SL_M,
+ V2_UD_SEND_WQE_BYTE_40_SL_S,
+ le32_to_cpu(ah->av.sl_tclass_flowlabel) >>
+ HNS_ROCE_SL_SHIFT);
+roce_set_field(ud_sq_wqe->byte_40,
+ V2_UD_SEND_WQE_BYTE_40_PORTN_M,
+ V2_UD_SEND_WQE_BYTE_40_PORTN_S,
+ qp->port);
+
+roce_set_field(ud_sq_wqe->byte_48,
+ V2_UD_SEND_WQE_BYTE_48_SGID_INDX_M,
+ V2_UD_SEND_WQE_BYTE_48_SGID_INDX_S,
+ hns_get_gid_index(hr_dev, qp->phy_port,
+ ah->av.gid_index));
+
+memcpy(&ud_sq_wqe->dgid[0], &ah->av.dgid[0],
+ GID_LEN_V2);
+
+set_extend_sge(qp, wr, &sge_ind);
+ind++;
+} else if (ibqp->qp_type == IB_QPT_RC) {
+rc_sq_wqe = wqe;
+memset(rc_sq_wqe, 0, sizeof(*rc_sq_wqe));
+for (i = 0; i < wr->num_sge; i++)
+tmp_len += wr->sg_list[i].length;
+
+rc_sq_wqe->msg_len =
+ cpu_to_le32(le32_to_cpu(rc_sq_wqe->msg_len) + tmp_len);
+
+switch (wr->opcode) {
+case IB_WR_SEND_WITH_IMM:
+case IB_WR_RDMA_WRITE_WITH_IMM:
+rc_sq_wqe->immtdata =
+ cpu_to_le32(be32_to_cpu(wr->ex.imm_data));
+break;
+case IB_WR_SEND_WITH_INV:
+rc_sq_wqe->inv_key =
+cpu_to_le32(wr->ex.invalidate_rkey);
+break;
+default:
+rc_sq_wqe->immtdata = 0;
+break;
+break;
+
+switch (wr->opcode) {
+ case IB_WR_RDMA_READ:
+  roce_set_field(rc_sq_wqe->byte_4,
+  - V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
+  - V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
+  - HNS_ROCE_V2_WQE_OP_RDMA_READ);
+  -rc_sq_wqe->rkey = cpu_to_le32(rdma_wr(wr)->rkey);
+  -rc_sq_wqe->va = cpu_to_le64(rdma_wr(wr)->remote_addr);
+  -break;
+ case IB_WR_RDMA_WRITE:
+  roce_set_field(rc_sq_wqe->byte_4,
+  - V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
+  - V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
+  - HNS_ROCE_V2_WQE_OP_RDMA_WRITE);
+  -rc_sq_wqe->rkey = cpu_to_le32(rdma_wr(wr)->rkey);
+  -rc_sq_wqe->va = cpu_to_le64(rdma_wr(wr)->remote_addr);
+  -break;
+ case IB_WR_RDMA_WRITE_WITH_IMM:
+  roce_set_field(rc_sq_wqe->byte_4,
+  +roce_set_bit(rc_sq_wqe->byte_4,
+  + V2_RC_SEND_WQE_BYTE_4_FENCE_S,
+  + (wr->send_flags & IB_SEND_FENCE) ? 1 : 0);
+  +roce_set_bit(rc_sq_wqe->byte_4,
+  + V2_RC_SEND_WQE_BYTE_4_SE_S,
+  + (wr->send_flags & IB_SEND_SOLICITED) ? 1 : 0);
+  +roce_set_bit(rc_sq_wqe->byte_4,
+  + V2_RC_SEND_WQE_BYTE_4_CQE_S,
+  + (wr->send_flags & IB_SEND_SIGNALED) ? 1 : 0);
+  +roce_set_bit(rc_sq_wqe->byte_4,
+  + V2_RC_SEND_WQE_BYTE_4_OWNER_S, owner_bit);
+  +switch (wr->opcode) {
+  +case IB_WR_RDMA_READ:
+  +  roce_set_field(rc_sq_wqe->byte_4,
+  +  + V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
+  +  + V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
+  +  + HNS_ROCE_V2_WQE_OP_RDMA_READ);
+  +  +rc_sq_wqe->rkey =
+  +  +cpu_to_le32(rdma_wr(wr)->rkey);
+  +  +rc_sq_wqe->va =
+  +  +cpu_to_le64(rdma_wr(wr)->remote_addr);
+  +  +break;
+case IB_WR_RDMA_WRITE:
+roce_set_field(rc_sq_wqe->byte_4,
+    V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
+    V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
+    HNS_ROCE_V2_WQE_OP_RDMA_WRITE);
+rc_sq_wqe->rkey =
+    cpu_to_le32(rdma_wr(wr)->rkey);
+rc_sq_wqe->va =
+    cpu_to_le64(rdma_wr(wr)->remote_addr);
+break;
+case IB_WR_RDMA_WRITE_WITH_IMM:
+roce_set_field(rc_sq_wqe->byte_4,
+    V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
+    V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
+    HNS_ROCE_V2_WQE_OP_RDMA_WRITE_WITH_IMM);
-rc_sq_wqe->rkey = cpu_to_le32(rdma_wr(wr)->rkey);
-rc_sq_wqe->va = cpu_to_le64(rdma_wr(wr)->remote_addr);
-break;
-case IB_WR_SEND:
-    roce_set_field(rc_sq_wqe->byte_4,
-        V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
-        V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
-        HNS_ROCE_V2_WQE_OP_SEND);
-break;
-case IB_WR_SEND_WITH_INV:
-    roce_set_field(rc_sq_wqe->byte_4,
-        V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
-        V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
-        HNS_ROCE_V2_WQE_OP_SEND_WITH_INV);
-break;
-case IB_WR_SEND_WITH_IMM:
-    roce_set_field(rc_sq_wqe->byte_4,
-        V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
-        V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
-        HNS_ROCE_V2_WQE_OP_SEND_WITH_IMM);
- break;  
- case IB_WR_LOCAL_INV:  
  roce_set_field(rc_sq_wqe->byte_4,  
- V2_RC_SEND_WQE_BYTE_4_OPCODE_M,  
- V2_RC_SEND_WQE_BYTE_4_OPCODE_S,  
- HNS_ROCE_V2_WQE_OP_LOCAL_INV);  
- break;  
- case IB_WR_ATOMIC_CMP_AND_SWAP:  
  roce_set_field(rc_sq_wqe->byte_4,  
- V2_RC_SEND_WQE_BYTE_4_OPCODE_M,  
- V2_RC_SEND_WQE_BYTE_4_OPCODE_S,  
- HNS_ROCE_V2_WQE_OP_ATOM_CMP_AND_SWAP);  
- break;  
- case IB_WR_ATOMIC_FETCH_AND_ADD:  
  roce_set_field(rc_sq_wqe->byte_4,  
- V2_RC_SEND_WQE_BYTE_4_OPCODE_M,  
- V2_RC_SEND_WQE_BYTE_4_OPCODE_S,  
- HNS_ROCE_V2_WQE_OP_ATOM_FETCH_AND_ADD);  
- break;  
- case IB_WR_MASKED_ATOMIC_CMP_AND_SWAP:  
  roce_set_field(rc_sq_wqe->byte_4,  
+ break;  
+ case IB_WR_SEND_WITH_IMM:  
+ roce_set_field(rc_sq_wqe->byte_4,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_M,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_S,  
+ HNS_ROCE_V2_WQE_OP_SEND_WITH_IMM);  
+ break;  
+ case IB_WR_LOCAL_INV:  
+ roce_set_field(rc_sq_wqe->byte_4,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_M,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_S,  
+ HNS_ROCE_V2_WQE_OP_LOCAL_INV);  
+ break;  
+ case IB_WR_ATOMIC_CMP_AND_SWAP:  
+ roce_set_field(rc_sq_wqe->byte_4,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_M,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_S,  
+ HNS_ROCE_V2_WQE_OP_ATOM_CMP_AND_SWAP);  
+ break;  
+ case IB_WR_ATOMIC_FETCH_AND_ADD:  
+ roce_set_field(rc_sq_wqe->byte_4,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_M,  
+ V2_RC_SEND_WQE_BYTE_4_OPCODE_S,  
+ HNS_ROCE_V2_WQE_OP_ATOM_FETCH_AND_ADD);  
+ break;  
+ case IB_WR_MASKED_ATOMIC_CMP_AND_SWAP:  
+ roce_set_field(rc_sq_wqe->byte_4,
V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
HNS_ROCE_V2_WQE_OP_ATOM_MSK_CMP_AND_SWAP);
-break;
-case IB_WR_MASKED_ATOMIC_FETCH_AND_ADD:
  roce_set_field(rc_sq_wqe->byte_4,
  +break;
+case IB_WR_MASKED_ATOMIC_FETCH_AND_ADD:
+  roce_set_field(rc_sq_wqe->byte_4,
    V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
    V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
    HNS_ROCE_V2_WQE_OP_ATOM_MSK_FETCH_AND_ADD);
-break;
-default:
  roce_set_field(rc_sq_wqe->byte_4,
    V2_RC_SEND_WQE_BYTE_4_OPCODE_M,
    V2_RC_SEND_WQE_BYTE_4_OPCODE_S,
    HNS_ROCE_V2_WQE_OP_MASK);
-break;
-}
-
-wqe += sizeof(struct hns_roce_v2_rc_send_wqe);
-dseg = wqe;
-if (wr->send_flags & IB_SEND_INLINE && wr->num_sge) {
  if (rc_sq_wqe->msg_len >
    hr_dev->caps.max_sq_inline) {
    ret = -EINVAL;
    *bad_wr = wr;
    dev_err(dev, "inline len(1-%d)=%d, illegal",
      rc_sq_wqe->msg_len, hr_dev->caps.max_sq_inline);
    goto out;
  } else {
    for (i = 0; i < wr->num_sge; i++) {
      memcpy(wqe, ((void *)wr->sg_list[i].addr),
        wr->sg_list[i].length);
      wqe += sizeof(struct hns_roce_v2_rc_send_wqe);
+dseg = wqe;

- roce_set_bit(rc_sq_wqe->byte_4,
  - V2_RC_SEND_WQE_BYTE_4_INLINE_S, 1);
+ret = set_rwqe_data_seg(ibqp, wr, rc_sq_wqe, wqe,
+&sge_ind, bad_wr);
+if (ret)
+goto out;
+ind++;
} else {
  -if (wr->num_sge <= 2) {
    -for (i = 0; i < wr->num_sge; i++)
      -set_data_seg_v2(dseg + i,
        -wr->sg_list + i);
  -} else {
    -roce_set_field(rc_sq_wqe->byte_20,
      -V2_RC_SEND_WQE_BYTE_20_MSG_START_SGE_ID_M,
      -V2_RC_SEND_WQE_BYTE_20_MSG_START_SGE_ID_S,
      -sge_ind & (qp->sge.sge_cnt - 1));
    -for (i = 0; i < 2; i++)
      -set_data_seg_v2(dseg + i,
        -wr->sg_list + i);
    -dseg = get_send_extend_sge(qp,
      -sge_ind & (qp->sge.sge_cnt - 1));
    -for (i = 0; i < wr->num_sge - 2; i++) {
      -set_data_seg_v2(dseg + i,
        -wr->sg_list + 2 + i);
      -sge_ind++;
    -}
  -}

- roce_set_field(rc_sq_wqe->byte_16,
  - V2_RC_SEND_WQE_BYTE_16_SGE_NUM_M,
  - V2_RC_SEND_WQE_BYTE_16_SGE_NUM_S,
  - wr->num_sge);
-wqe_sz += wr->num_sge *
  - sizeof(struct hns_roce_v2_wqe_data_seg);
+dev_err(dev, "Illegal qp_type(0x%x)\n", ibqp->qp_type);
+*bad_wr = wr;
+return -EOPNOTSUPP;
} else {
  -ind++;
}
out:
@@ -276,13 +521,13 @@
     V2_DB_BYTE_4_TAG_S, qp->doorbell_qpn);
   roce_set_field(sq_db.byte_4, V2_DB_BYTE_4_CMD_M,
     V2_DB_BYTE_4_CMD_S, HNS_ROCE_V2_SQ_DB);
-  -roce_set_field(sq_db.parameter, V2_DB_PARAMETERCONS_IDX_M,
-    V2_DB_PARAMETERCONS_IDX_S,
+  +roce_set_field(sq_db.parameter, V2_DB_PARAMETERIDX_M,
+    V2_DB_PARAMETERIDX_S,
     qp->sq.head & ((qp->sq.wqe_cnt << 1) - 1));
   roce_set_field(sq_db.parameter, V2_DB_PARAMETERSL_M,
     V2_DB_PARAMETERSL_S, qp->sl);
-  -hns_roce_write64_k((__be32 *)&sq_db, qp->sq.db_reg_l);
+  +hns_roce_write64_k((__le32 *)&sq_db, qp->sq.db_reg_l);

qp->sq.next_wqe = ind;
qp->next_sge = sge_ind;
@@ -299,8 +544,8 @@
   struct hns_roce_dev *hr_dev = to_hr_dev(ibqp->device);
   struct hns_roce_qp *hr_qp = to_hr_qp(ibqp);
   struct hns_roce_v2_wqe_data_seg *dseg;
+  +struct hns_roce_rinl_sge *sge_list;
   struct device *dev = hr_dev->dev;
-  -struct hns_roce_v2_db rq_db;
   unsigned long flags;
   void *wqe = NULL;
   int ret = 0;
@@ -343,8 +588,20 @@
   }
   if (i < hr_qp->rq.max_gs) {
-     -dseg[i].lkey = cpu_to_be32(HNS_ROCE_INVALID_LKEY);
-     -dseg[i].addr = 0;
+     +dseg->lkey = cpu_to_le32(HNS_ROCE_INVALID_LKEY);
+     +dseg->addr = 0;
+   }
+   /* rq support inline data */
+   if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RQ_INLINE) {
+     +sge_list = hr_qp->rq_inl_buf.wqe_list[ind].sg_list;
+     +hr_qp->rq_inl_buf.wqe_list[ind].sge_cnt =
+       (u32)wr->num_sge;
+     +for (i = 0; i < wr->num_sge; i++) {
+       +sge_list[i].addr =
+         (void *)u64)wr->sg_list[i].addr;
+       +sge_list[i].len = wr->sg_list[i].length;
+   }
hr_qp->rq.wrid[ind] = wr->wr_id;
/* Memory barrier */
wmb();

-rq_db.byte_4 = 0;
-rq_db.parameter = 0;
-
-roce_set_field(rq_db.byte_4, V2_DB_BYTE_4_TAG_M,
   V2_DB_BYTE_4_TAG_S, hr_qp->qpn);
-roce_set_field(rq_db.byte_4, V2_DB_BYTE_4_CMD_M,
   V2_DB_BYTE_4_CMD_S, HNS_ROCE_V2_RQ_DB);
-roce_set_field(rq_db.parameter, V2_DB_PARAMETER_CONS_IDX_M,
   V2_DB_PARAMETER_CONS_IDX_S, hr_qp->rq.head);
-
-hns_roce_write64_k((__be32 *)&rq_db, hr_qp->rq.db_reg_l);
+*hr_qp->rdb.db_record = hr_qp->rq.head & 0xffff;
}

spin_unlock_irqrestore(&hr_qp->rq.lock, flags);

++ -411,6 +658,8 @@
dma_unmap_single(hr_dev->dev, ring->desc_dma_addr,
   ring->desc_num * sizeof(struct hns_roce_cmq_desc),
   DMA_BIDIRECTIONAL);
+ +ring->desc_dma_addr = 0;
kfree(ring->desc);
}

++ -566,6 +815,9 @@
int ret = 0;
int ntc;

+if (hr_dev->is_reset)
+return 0;
+
spin_lock_bh(&csq->lock);

if (num > hns_roce_cmq_space(csq)) {
++ -822,40 +1074,40 @@
roce_set_field(req->vf_qpc_cfg, CFG_BT_ATTR_DATA_0_VF_QPC_BA_PGSZ_M,
   CFG_BT_ATTR_DATA_0_VF_QPC_BA_PGSZ_S,
   hr_dev->caps.qpc_ba_pg_sz);
+   hr_dev->caps.qpc_ba_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_qpc_cfg, CFG_BT_ATTR_DATA_0_VF_QPC_BUF_PGSZ_M,
CFG_BT_ATTR_DATA_0_VF_QPC_BUF_PGSZ_S,
- hr_dev->caps.qpc_buf_pg_sz);
+ hr_dev->caps.qpc_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_qpc_cfg, CFG_BT_ATTR_DATA_0_VF_QPC_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_QPC_HOPNUM_S,
                qpc_hop_num == HNS_ROCE_HOP_NUM_0 ? 0 : qpc_hop_num);

roce_set_field(req->vf_srqc_cfg, CFG_BT_ATTR_DATA_0_VF_SRQC_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_SRQC_BUF_PGSZ_S,
                hr_dev->caps.srqc_buf_pg_sz);
+ hr_dev->caps.srqc_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_srqc_cfg, CFG_BT_ATTR_DATA_0_VF_SRQC_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_SRQC_BUF_PGSZ_S,
                hr_dev->caps.srqc_buf_pg_sz);
+ hr_dev->caps.srqc_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_srqc_cfg, CFG_BT_ATTR_DATA_0_VF_SRQC_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_SRQC_BUF_PGSZ_S,
                srqc_hop_num == HNS_ROCE_HOP_NUM_0 ? 0 : srqc_hop_num);

roce_set_field(req->vf_cqc_cfg, CFG_BT_ATTR_DATA_0_VF_CQC_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_CQC_BUF_PGSZ_S,
                hr_dev->caps.cqc_buf_pg_sz);
+ hr_dev->caps.cqc_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_cqc_cfg, CFG_BT_ATTR_DATA_0_VF_CQC_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_CQC_BUF_PGSZ_S,
                hr_dev->caps.cqc_buf_pg_sz);
+ hr_dev->caps.cqc_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_cqc_cfg, CFG_BT_ATTR_DATA_0_VF_CQC_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_CQC_BUF_PGSZ_S,
                cqc_hop_num == HNS_ROCE_HOP_NUM_0 ? 0 : cqc_hop_num);

roce_set_field(req->vf_mpt_cfg, CFG_BT_ATTR_DATA_0_VF_MPT_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_MPT_BUF_PGSZ_S,
                hr_dev->caps.mpt_buf_pg_sz);
+ hr_dev->caps.mpt_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_mpt_cfg, CFG_BT_ATTR_DATA_0_VF_MPT_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_MPT_BUF_PGSZ_S,
                hr_dev->caps.mpt_buf_pg_sz);
+ hr_dev->caps.mpt_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(req->vf_mpt_cfg, CFG_BT_ATTR_DATA_0_VF_MPT_BUF_PGSZ_M,
                CFG_BT_ATTR_DATA_0_VF_MPT_BUF_PGSZ_S,
                mpt_hop_num == HNS_ROCE_HOP_NUM_0 ? 0 : mpt_hop_num);
@@ -879,6 +1131,7 @@
if (ret) {
    dev_err(hr_dev->dev, "Configure global param fail, ret = %d\n",
            ret);
+return ret;
}
/* Get pf resource owned by every pf */
@@ -904,13 +1157,14 @@
caps->num_cqs = HNS_ROCE_V2_MAX_CQ_NUM;
caps->max_cqes = HNS_ROCE_V2_MAX_CQE_NUM;
caps->max_sq_sg = HNS_ROCE_V2_MAX_SQ_SGE_NUM;
caps->max_extend_sg = HNS_ROCE_V2_MAX_EXTEND_SGE_NUM;
caps->max_rq_sg = HNS_ROCE_V2_MAX_RQ_SGE_NUM;
caps->max_sq-inline = HNS_ROCE_V2_MAX_SQ_INLINE;
caps->num_uars = HNS_ROCE_V2_UAR_NUM;
caps->phy_num_uars = HNS_ROCE_V2_PHY_UAR_NUM;
caps->num_aeq_vectors = 1;
caps->num_comp_vectors = 63;
caps->num_other_vectors = 0;
+caps->num_aeq_vectors = HNS_ROCE_V2_AEQE_VEC_NUM;
+caps->num_comp_vectors = HNS_ROCE_V2_COMP_VEC_NUM;
+caps->num_other_vectors = HNS_ROCE_V2_ABNORMAL_VEC_NUM;
caps->num_mtpts = HNS_ROCE_V2_MAX_MTPT_NUM;
caps->num_mtt_segs = HNS_ROCE_V2_MAX_MTT_SEGS;
caps->num_cqe_segs = HNS_ROCE_V2_MAX_CQE_SEGS;
@@ -933,6 +1187,13 @@
caps->reserved_mrws = 1;
caps->reserved_uars = 0;
caps->reserved_cqs = 0;
+caps->reserved_qps = HNS_ROCE_V2_RSV_QPS;
caps->qpc_ba_pg_sz = 0;
caps->qpc_buf_pg_sz = 0;
@@ -955,12 +1210,19 @@
caps->cqe_ba_pg_sz = 0;
caps->cqe_buf_pg_sz = 0;
caps->cqe_hop_num = HNS_ROCE_CQE_HOP_NUM;
+caps->eqe_ba_pg_sz = 0;
+caps->eqe_buf_pg_sz = 0;
+caps->eqe_hop_num = HNS_ROCE_EQE_HOP_NUM;
caps->chunk_sz = HNS_ROCE_V2_TABLE_CHUNK_SIZE;
caps->flags = HNS_ROCE_CAP_FLAG_REREG_MR |
- HNS_ROCE_CAP_FLAG_ROCE_V1_V2;
+ HNS_ROCE_CAP_FLAG_ROCE_V1_V2 |
+ HNS_ROCE_CAP_FLAG_RQ_INLINE |
+ HNS_ROCE_CAP_FLAG_RECORD_DB;
caps->pkey_table_len[0] = 1;
caps->gid_table_len[0] = HNS_ROCE_V2_GID_INDEX_NUM;
+caps->ceqe_depth = HNS_ROCE_V2_COMP_EQE_NUM;
+caps->aeqe_depth = HNS_ROCE_V2_ASYNC_EQE_NUM;
caps->local_ca_ack_delay = 0;
caps->max_mtu = IB_MTU_4096;
roce_set_field(val1, HNS_ROCE_VF_MB5_TOKEN_MASK,
               HNS_ROCE_VF_MB5_TOKEN_SHIFT, token);

-__raw_writeq(cpu_to_le64(in_param), hcr + 0);
-__raw_writeq(cpu_to_le64(out_param), hcr + 2);
+writeq(in_param, hcr + 0);
+writeq(out_param, hcr + 2);

/* Memory barrier */
wmb();

-__raw_writel(cpu_to_le32(val0), hcr + 4);
-__raw_writel(cpu_to_le32(val1), hcr + 5);
+writel(val0, hcr + 4);
+writel(val1, hcr + 5);

mmiowb();

return 0;
}

static int hns_roce_v2_write_mtpt(void *mb_buf, struct hns_roce_mr *mr,
                                 unsigned long mtpt_idx)
static int set_mtpt_pbl(struct hns_roce_v2_mpt_entry *mpt_entry,
                        struct hns_roce_mr *mr)
{

    struct hns_roce_v2_mpt_entry *mpt_entry;
    struct scatterlist *sg;
    u64 page_addr;
    u64 *pages;
    @ @ -1132,6 +1393,53 @@
    int len;
    int entry;

    mpt_entry->pbl_size = cpu_to_le32(mr->pbl_size);
    mpt_entry->pbl_ba_l = cpu_to_le32(lower_32_bits(mr->pbl_ba >> 3));
    //roce_set_field(mpt_entry->byte_48_mode_ba,
    + V2_MPT_BYTE_48_PBL_BA_H_M, V2_MPT_BYTE_48_PBL_BA_H_S,
    + upper_32_bits(mr->pbl_ba >> 3));
    +
    +pages = (u64 *)__get_free_page(GFP_KERNEL);
    +if (!pages)
        +return -ENOMEM;
    +
    +i = 0;
for_each_sg(mr->umem->sg_head.sgl, sg, mr->umem->nmap, entry) {
    len = sg_dma_len(sg) >> PAGE_SHIFT;
    for (j = 0; j < len; ++j) {
        page_addr = sg_dma_address(sg) +
                    (j << mr->umem->page_shift);
        pages[i] = page_addr >> 6;
    }

    /* Record the first 2 entry directly to MTPT table */
    if (i >= HNS_ROCE_V2_MAX_INNER_MTPT_NUM - 1)
        goto found;
    i++;
}

found:
    mpt_entry->pa0_l = cpu_to_le32(lower_32_bits(pages[0]));
    roce_set_field(mpt_entry->byte_56_pa0_h, V2_MPT_BYTE_56_PA0_H_M,
                   V2_MPT_BYTE_56_PA0_H_S, upper_32_bits(pages[0]));
    
    mpt_entry->pa1_l = cpu_to_le32(lower_32_bits(pages[1]));
    roce_set_field(mpt_entry->byte_64_buf_pa1, V2_MPT_BYTE_64_PA1_H_M,
                   V2_MPT_BYTE_64_PA1_H_S, upper_32_bits(pages[1]));
    roce_set_field(mpt_entry->byte_64_buf_pa1,
                   V2_MPT_BYTE_64_PBL_BUF_PG_SZ_M,
                   V2_MPT_BYTE_64_PBL_BUF_PG_SZ_S,
                   mr->pbl_buf_pg_sz + PG_SHIFT_OFFSET);

    free_page((unsigned long)pages);
    return 0;
}

static int hns_roce_v2_write_mtpt(void *mb_buf, struct hns_roce_mr *mr,
				  unsigned long mtpt_idx)
{
    mpt_entry = mb_buf;
    memset(mpt_entry, 0, sizeof(*mpt_entry));
    
    roce_set_field(mpt_entry->byte_4_pd_hop_st,
                   V2_MPT_BYTE_4_PD_M,
                   V2_MPT_BYTE_4_PD_S,
                   mr->pd);

    @ @ -1142,10 +1450,10 @@
    HNS_ROCE_HOP_NUM_0 ? 0 : mr->pbl_hop_num);
    roce_set_field(mpt_entry->byte_4_pbl_hop_st,
                   V2_MPT_BYTE_4_PBL_BA_PG_SZ_M,
                   V2_MPT_BYTE_4_PBL_BA_PG_SZ_S,
                   mr->pbl_ba_pg_sz + PG_SHIFT_OFFSET);
    roce_set_field(mpt_entry->byte_4_pbl_hop_st, V2_MPT_BYTE_4_PD_M,
                   V2_MPT_BYTE_4_PD_S, mr->pd);
-mpt_entry->byte_4_pd_hop_st = cpu_to_le32(mpt_entry->byte_4_pd_hop_st);

roce_set_bit(mpt_entry->byte_8_mw_cnt_en, V2_MPT_BYTE_8_RA_EN_S, 0);
roce_set_bit(mpt_entry->byte_8_mw_cnt_en, V2_MPT_BYTE_8_R_INV_EN_S, 1);
@@ -1159,11 +1467,11 @@
    (mr->access & IB_ACCESS_REMOTE_WRITE ? 1 : 0));
roce_set_bit(mpt_entry->byte_8_mw_cnt_en, V2_MPT_BYTE_8_LW_EN_S,
    (mr->access & IB_ACCESS_LOCAL_WRITE ? 1 : 0));
-mpt_entry->byte_8_mw_cnt_en = cpu_to_le32(mpt_entry->byte_8_mw_cnt_en);

roce_set_bit(mpt_entry->byte_12_mw_pa, V2_MPT_BYTE_12_PA_S,
    mr->type == MR_TYPE_MR ? 0 : 1);
-mpt_entry->byte_12_mw_pa = cpu_to_le32(mpt_entry->byte_12_mw_pa);
+roce_set_bit(mpt_entry->byte_12_mw_pa, V2_MPT_BYTE_12_INNER_PA_VLD_S,
+     1);

mpt_entry->len_l = cpu_to_le32(lower_32_bits(mr->size));
mpt_entry->len_h = cpu_to_le32(upper_32_bits(mr->size));
@@ -1174,52 +1482,9 @@
if (mr->type == MR_TYPE_DMA)
    return 0;

-mpt_entry->pbl_size = cpu_to_le32(mr->pbl_size);
-mpt_entry->pbl_ba_l = cpu_to_le32(lower_32_bits(mr->pbl_ba >> 3));
-roce_set_field(mpt_entry->byte_48_mode_ba, V2_MPT_BYTE_48_PBL_BA_H_M,
-    V2_MPT_BYTE_48_PBL_BA_H_S,
-    upper_32_bits(mr->pbl_ba >> 3));
-mpt_entry->byte_48_mode_ba = cpu_to_le32(mpt_entry->byte_48_mode_ba);
-
-pages = (u64 *)__get_free_page(GFP_KERNEL);
-if (!pages)
    return -ENOMEM;
-
i = 0;
-for_each_sg(mr->umem->sg_head.sgl, sg, mr->umem->nmap, entry) {
    len = sg_dma_len(sg) >> PAGE_SHIFT;
-for (j = 0; j < len; ++j) {
    page_addr = sg_dma_address(sg) +
        (j << mr->umem->page_shift);
    pages[i] = page_addr >> 6;
-
    /* Record the first 2 entry directly to MTPT table */
-if (i >= HNS_ROCE_V2_MAX_INNER_MTPT_NUM - 1)
    goto found;
-i++;
-
}
+ret = set_mtpt_pbl(mpt_entry, mr);

-found:
-mpt_entry->pa0_l = cpu_to_le32(lower_32_bits(pages[0]));
-roce_set_field(mpt_entry->byte_56_pa0_h, V2_MPT_BYTE_56_PA0_H_M,
-   V2_MPT_BYTE_56_PA0_H_S,
-   upper_32_bits(pages[0]));
-mpt_entry->byte_56_pa0_h = cpu_to_le32(mpt_entry->byte_56_pa0_h);
-
-mpt_entry->pa1_l = cpu_to_le32(lower_32_bits(pages[1]));
-roce_set_field(mpt_entry->byte_64_buf_pa1, V2_MPT_BYTE_64_PA1_H_M,
-   V2_MPT_BYTE_64_PA1_H_S, upper_32_bits(pages[1]));
-
-free_page((unsigned long)pages);
-
-roce_set_field(mpt_entry->byte_64_buf_pa1,
-   V2_MPT_BYTE_64_PBL_BUF_PG_SZ_M,
-   V2_MPT_BYTE_64_PBL_BUF_PG_SZ_S, mr->pbl_buf_pg_sz);
-mpt_entry->byte_64_buf_pa1 = cpu_to_le32(mpt_entry->byte_64_buf_pa1);
-
+return ret;
}

static int hns_roce_v2_rereg_write_mptp(struct hns_roce_dev *hr_dev,
@@ -1228,6 +1493,10 @@
 u64 size, void *mb_buf)
 {
 struct hns_roce_v2_mpt_entry *mpt_entry = mb_buf;
+int ret = 0;
 +
+roce_set_field(mpt_entry->byte_4_pd_hop_st, V2_MPT_BYTE_4_MPT_ST_M,
+   V2_MPT_BYTE_4_MPT_ST_S, V2_MPT_ST_VALID);

 if (flags & IB_MR_REREG_PD) {
  roce_set_field(mpt_entry->byte_4_pd_hop_st, V2_MPT_BYTE_4_MPT_ST_M,
@@ -1240,14 +1509,14 @@
   V2_MPT_BYTE_8_BIND_EN_S,
   (mr_access_flags & IB_ACCESS_MW_BIND ? 1 : 0));
  roce_set_bit(mpt_entry->byte_8_mw_cnt_en, 
-   V2_MPT_BYTE_8_ATOMIC_EN_S,
-   (mr_access_flags & IB_ACCESS_REMOTE_ATOMIC ? 1 : 0));
+   mr_access_flags & IB_ACCESS_REMOTE_ATOMIC ? 1 : 0);
  roce_set_bit(mpt_entry->byte_8_mw_cnt_en, V2_MPT_BYTE_8_RR_EN_S,
-   (mr_access_flags & IB_ACCESS_REMOTE_READ ? 1 : 0));
+   mr_access_flags & IB_ACCESS_REMOTE_READ ? 1 : 0);
  roce_set_bit(mpt_entry->byte_8_mw_cnt_en, V2_MPT_BYTE_8_RW_EN_S,
- (mr_access_flags & IB_ACCESS_REMOTE_WRITE ? 1 : 0));
+ mr_access_flags & IB_ACCESS_REMOTE_WRITE ? 1 : 0);
roce_set_bit(mpt_entry->byte_8_mw_cnt_en, V2_MPT_BYTE_8_LW_EN_S,
- (mr_access_flags & IB_ACCESS_LOCAL_WRITE ? 1 : 0));
+ mr_access_flags & IB_ACCESS_LOCAL_WRITE ? 1 : 0);
}

if (flags & IB_MR_REREG_TRANS) {
@@ -1256,21 +1525,13 @@
    mpt_entry->len_l = cpu_to_le32(lower_32_bits(size));
mpt_entry->len_h = cpu_to_le32(upper_32_bits(size));

    -mpt_entry->pbl_size = cpu_to_le32(mr->pbl_size);
    -mpt_entry->pbl_ba_l =
    -cpu_to_le32(lower_32_bits(mr->pbl_ba >> 3));
    -roce_set_field(mpt_entry->byte_48_mode_ba,
        - V2_MPT_BYTE_48_PBL_BA_H_M,
        - V2_MPT_BYTE_48_PBL_BA_H_S,
        - upper_32_bits(mr->pbl_ba >> 3));
    -mpt_entry->byte_48_mode_ba =
    -cpu_to_le32(mpt_entry->byte_48_mode_ba);
    -
    mr->iova = iova;
    mr->size = size;
+    +ret = set_mtpt_pbl(mpt_entry, mr);
    }

    -return 0;
    +return ret;
    }

static void *get_cqe_v2(struct hns_roce_cq *hr_cq, int n)
@@ -1295,24 +1556,7 @@

static void hns_roce_v2_cq_set_ci(struct hns_roce_cq *hr_cq, u32 cons_index)
{
    -struct hns_roce_v2_cq_db cq_db;
    -
    -cq_db.byte_4 = 0;
    -cq_db.parameter = 0;
    -
    -roce_set_field(cq_db.byte_4, V2_CQ_DB_BYTE_4_TAG_M,
        - V2_CQ_DB_BYTE_4_TAG_S, hr_cq->cqn);
    -roce_set_field(cq_db.byte_4, V2_CQ_DB_BYTE_4_CMD_M,
        - V2_CQ_DB_BYTE_4_CMD_S, HNS_ROCE_V2_CQ_DB_PTR);
    -
    -roce_set_field(cq_db.parameter, V2_CQ_DB_PARAMETER_CONS_IDX_M,
- V2_CQ_DB_PARAMETER_CONS_IDX_S,
- cons_index & ((hr_cq->cq_depth << 1) - 1));  
-roce_set_field(cq_db.parameter, V2_CQ_DB_PARAMETER_CMD_SN_M,
- V2_CQ_DB_PARAMETER_CMD_SN_S, 1);
-
-hns_roce_write64_k((__be32 *)&cq_db, hr_cq->cq_db_l);
-
+*hr_cq->set_ci_db = cons_index & 0xffffffff;

static void __hns_roce_v2_cq_clean(struct hns_roce_cq *hr_cq, u32 qpn,
@@ -1382,6 +1626,8 @@

roce_set_field(cq_context->byte_4_pg_ceqn, V2_CQC_BYTE_4_CQ_ST_M,
  V2_CQC_BYTE_4_CQ_ST_S, V2_CQ_STATE_VALID);
+roce_set_field(cq_context->byte_4_pg_ceqn, V2_CQC_BYTE_4_ARM_ST_M,
+  V2_CQC_BYTE_4_ARM_ST_S, REG_NXT_CEQE);
-roce_set_field(cq_context->byte_4_pg_ceqn, V2_CQC_BYTE_4_SHIFT_M,
-roce_set_field(cq_context->byte_4_pg_ceqn, V2_CQC_BYTE_4_CEQN_M,
@@ -1412,16 +1658,35 @@
          - hr_dev->caps.cqe_ba_pg_sz);
+          - hr_dev->caps.cqe_ba_pg_sz + PG_SHIFT_OFFSET);
-roce_set_field(cq_context->byte_24_pgsz_addr,
   V2_CQC_BYTE_24_CQE_BA_PG_SZ_M,
   V2_CQC_BYTE_24_CQE_BA_PG_SZ_S,
-          - hr_dev->caps.cqe_ba_pg_sz);
+          - hr_dev->caps.cqe_ba_pg_sz + PG_SHIFT_OFFSET);
-roce_set_field(cq_context->byte_24_pgsz_addr,
   V2_CQC_BYTE_24_CQE_BUF_PG_SZ_M,
   V2_CQC_BYTE_24_CQE_BUF_PG_SZ_S,
-          - hr_dev->caps.cqe_buf_pg_sz);
+          - hr_dev->caps.cqe_buf_pg_sz + PG_SHIFT_OFFSET);

cq_context->cqe_ba = (u32)(dma_handle >> 3);

roce_set_field(cq_context->byte_40_cqe_ba, V2_CQC_BYTE_40_CQE_BA_M,
  V2_CQC_BYTE_40_CQE_BA_S, (dma_handle >> (32 + 3)));
+  
+  +if (hr_cq->db_en)
+  +roce_set_bit(cq_context->byte_44_db_record,
+  +  V2_CQC_BYTE_44_DB_RECORD_EN_S, 1);
+  +
+  +roce_set_field(cq_context->byte_44_db_record,
+  +  V2_CQC_BYTE_44_DB_RECORD_ADDR_M,
+  +  V2_CQC_BYTE_44_DB_RECORD_ADDR_S,
+  +  (u32)hr_cq->db.dma) >> 1);
+  +cq_context->db_record_addr = hr_cq->db.dma >> 32;
+  +
+  +roce_set_field(cq_context->byte_56_cqe_period_maxcnt,
static int hns_roce_v2_item_notify_cq(struct ib_cq *ibcq,
    @ @ -1457,6 +1722,40 @@
return 0;
}

+static int hns_roce_v2_recv_inl_wqe(struct hns_roce_v2_cqe *cqe,
+    +struct hns_roce_qp **cur_qp,
+    +struct ib_wc *wc)
+{ +
+    +struct hns_roce_rinl_sge *sge_list;
+    +u32 wr_num, wr_cnt, sge_num;
+    +u32 sge_cnt, data_len, size;
+    +void *wqe_buf;
+    +
+    +wr_num = roce_get_field(cqe->byte_4, V2_CQE_BYTE_4_WQE_INDX_M,
+    +V2_CQE_BYTE_4_WQE_INDX_S) & 0xffff;
+    +wr_cnt = wr_num & ((*cur_qp)->rq.wqe_cnt - 1);
+    +
+    +sge_list = (*cur_qp)->rq_inl_buf.wqe_list[wr_cnt].sg_list;
+    +sge_num = (*cur_qp)->rq_inl_buf.wqe_list[wr_cnt].sge_cnt;
+    +wqe_buf = get_recv_wqe(*cur_qp, wr_cnt);
+    +data_len = wc->byte_len;
+    +
+    +for (sge_cnt = 0; (sge_cnt < sge_num) && (data_len); sge_cnt++) {
+    +    +size = min(sge_list[sge_cnt].len, data_len);
+    +    +memcpy((void *)sge_list[sge_cnt].addr, wqe_buf, size);
+    +    +data_len -= size;
+    +    +wqe_buf += size;
+    +}
+    +
+    +if (data_len) {
+    +    +wc->status = IB_WC_LOC_LEN_ERR;
+    +    +return -EAGAIN;
+    +}
+    +return 0;
+} +
static int hns_roce_v2_poll_one(struct hns_roce_cq *hr_cq,
struct hns_roce_qp **cur_qp, struct ib_wc *wc)
{
    @@ -1469,6 +1768,7 @@
    u32 opcode;
    u32 status;
    int qpn;
    +int ret;

    /* Find cqe according to consumer index */
    cqe = next_cqe_sw_v2(hr_cq);
    @@ -1636,7 +1936,8 @@
    case HNS_ROCE_V2_OPCODE_RDMA_WRITE_IMM:
        wc->opcode = IB_WC_RECV_RDMA_WITH_IMM;
        wc->wc_flags = IB_WC_WITH_IMM;
        -wc->ex.imm_data = le32_to_cpu(cqe->rkey_immtdata);
        +wc->ex.imm_data =
        +cpu_to_be32(le32_to_cpu(cqe->immtdata));
        break;
    case HNS_ROCE_V2_OPCODE_SEND:
        wc->opcode = IB_WC_RECV;
        @@ -1645,18 +1946,30 @@
        case HNS_ROCE_V2_OPCODE_SEND_WITH_IMM:
            wc->opcode = IB_WC_RECV;
            wc->wc_flags = IB_WC_WITH_IMM;
            -wc->ex.imm_data = le32_to_cpu(cqe->rkey_immtdata);
            +wc->ex.imm_data =
            +cpu_to_be32(le32_to_cpu(cqe->immtdata));
            break;
        case HNS_ROCE_V2_OPCODE_SEND_WITH_INV:
            wc->opcode = IB_WC_RECV;
            wc->wc_flags = IB_WC_WITH_INVALIDATE;
            -wc->ex.invalidate_rkey = cqe->rkey_immtdata;
            +wc->ex.invalidate_rkey = le32_to_cpu(cqe->rkey);
            break;
        default:
            wc->status = IB_WC_GENERAL_ERR;
            break;
    }

    +if ((wc->qp->qp_type == IB_QPT_RC ||
        +wc->qp->qp_type == IB_QPT_UC) &&
    + (opcode == HNS_ROCE_V2_OPCODE_SEND ||
    + opcode == HNS_ROCE_V2_OPCODE_SEND_WITH_IMM ||
    + opcode == HNS_ROCE_V2_OPCODE_SEND_WITH_INV) &&
    + (roce_get_bit(cqe->byte_4, V2_CQE_BYTE_4_RQ_INLINE_S))) {
        +ret = hns_roce_handle_recv_inl_wqe(cqe, cur_qp, wc);
        +if (ret)
+return -EAGAIN;
+
+/* Update tail pointer, record wr_id */
+wq = &(*cur_qp)->rq;
+wc->wr_id = wq->wrid[wq->tail & (wq->wqe_cnt - 1)];
+@ -1667.9 +1980.25 @@
+wc->src_qp = (u8)roce_get_field(cqe->byte_32,
+V2_CQE_BYTE_32_RMT_QPN_M,
+V2_CQE_BYTE_32_RMT_QPN_S);
+wc->slid = 0;
+wc->wc_flags |= (roce_get_bit(cqe->byte_32,
+V2_CQE_BYTE_32_GRH_S) ?
+IB_WC_GRH : 0);
+wc->port_num = roce_get_field(cqe->byte_32,
+V2_CQE_BYTE_32_PORTN_M, V2_CQE_BYTE_32_PORTN_S);
+wcmpeq(wc->smac, cqe->smac, 4);
+wcmpeq[4] = roce_get_field(cqe->byte_28,
+V2_CQE_BYTE_28_SMAC_4_M,
+V2_CQE_BYTE_28_SMAC_4_S);
+wcmpeq[5] = roce_get_field(cqe->byte_28,
+V2_CQE_BYTE_28_SMAC_5_M,
+V2_CQE_BYTE_28_SMAC_5_S);
+wcmpeq->vlan_id = 0xffff;
+wcmpeq->wc_flags |= (IB_WC_WITH_VLAN | IB_WC_WITH_SMAC);
+wcmpeq->network_hdr_type = roce_get_field(cqe->byte_28,
+V2_CQE_BYTE_28_PORT_TYPE_M,
+V2_CQEBYTE_28_PORT_TYPE_S);
+
{return 0;
+}
@@ -1859,11 +2188,43 @@
+return ret;
+
+static void set_access_flags(struct hns_roce_qp *hr_qp,
+struct hns_roce_v2_qp_context *context,
+struct hns_roce_v2_qp_context *qpc_mask,
+const struct ib_qp_attr *attr, int attr_mask)
+{
+u8 dest_rd_atomic;
+u32 access_flags;
+
+dest_rd_atomic = (attr_mask & IB_QP_MAX_DEST_RD_ATOMIC) ?
+attr->max_dest_rd_atomic : hr_qp->resp_depth;
+
+access_flags = (attr_mask & IB_QP_ACCESS_FLAGS) ?
+
attr->qp_access_flags : hr_qp->atomic_rd_en;
+
+if (!dest_rd_atomic)
+access_flags &= IB_ACCESS_REMOTE_WRITE;
+
+roce_set_bit(context->byte_76_srqn_op_en, V2_QPC_BYTE_76_RRE_S,
+       !!(access_flags & IB_ACCESS_REMOTE_READ));
+roce_set_bit(qpc_mask->byte_76_srqn_op_en, V2_QPC_BYTE_76_RRE_S, 0);
+
+roce_set_bit(context->byte_76_srqn_op_en, V2_QPC_BYTE_76_RWE_S,
+       !!(access_flags & IB_ACCESS_REMOTE_WRITE));
+roce_set_bit(qpc_mask->byte_76_srqn_op_en, V2_QPC_BYTE_76_RWE_S, 0);
+
+roce_set_bit(context->byte_76_srqn_op_en, V2_QPC_BYTE_76_ATE_S,
+       !!(access_flags & IB_ACCESS_REMOTE_ATOMIC));
+roce_set_bit(qpc_mask->byte_76_srqn_op_en, V2_QPC_BYTE_76_ATE_S, 0);
+
static void modify_qp_reset_to_init(struct ib_qp *ibqp,
    const struct ib_qp_attr *attr,
    int attr_mask,
    struct hns_roce_v2_qp_context *context,
    struct hns_roce_v2_qp_context *qpc_mask)
{
    struct hns_roce_dev *hr_dev = to_hr_dev(ibqp->device);
    struct hns_roce_qp *hr_qp = to_hr_qp(ibqp);

    /*
@@ -1877,9 +2238,18 @@
            roce_set_field(qpc_mask->byte_4_sqpn_tst, V2_QPC_BYTE_4_TST_M,
            V2_QPC_BYTE_4_TST_S, 0);

            -roce_set_field(context->byte_4_sqpn_tst, V2_QPC_BYTE_4_SGE_SHIFT_M,
            -        V2_QPC_BYTE_4_SGE_SHIFT_S, hr_qp->sq.max_gs > 2 ?
            -        ilog2((unsigned int)hr_qp->sge.sge_cnt) : 0);
            +if (ibqp->qp_type == IB_QPT_GSI)
            +roce_set_field(context->byte_4_sqpn_tst,
            +        V2_QPC_BYTE_4_SGE_SHIFT_M,
            +        V2_QPC_BYTE_4_SGE_SHIFT_S,
            +        ilog2((unsigned int)hr_qp->sge.sge_cnt));
            +else
            +roce_set_field(context->byte_4_sqpn_tst,
            +        V2_QPC_BYTE_4_SGE_SHIFT_M,
            +        V2_QPC_BYTE_4_SGE_SHIFT_S,
            +        hr_qp->sq.max_gs > 2 ?
            +        ilog2((unsigned int)hr_qp->sge.sge_cnt) : 0);
            +
            roce_set_field(qpc_mask->byte_4_sqpn_tst, V2_QPC_BYTE_4_SGE_SHIFT_M,
roce_set_bit(qpc_mask->byte_28_at_fl, V2_QPC_BYTE_28_CNP_TX_FLAG_S, 0);
roce_set_bit(qpc_mask->byte_28_at_fl, V2_QPC_BYTE_28_CE_FLAG_S, 0);

- roce_set_bit(context->byte_76_srqn_op_en, V2_QPC_BYTE_76_RRE_S,
  -  (!!attr->qp_access_flags & IB_ACCESS_REMOTE_READ));
- roce_set_bit(qpc_mask->byte_76_srqn_op_en, V2_QPC_BYTE_76_RRE_S, 0);

- roce_set_bit(context->byte_76_srqn_op_en, V2_QPC_BYTE_76_RWE_S,
  -  (!!attr->qp_access_flags & IB_ACCESS_REMOTE_WRITE));
- roce_set_bit(qpc_mask->byte_76_srqn_op_en, V2_QPC_BYTE_76_RWE_S, 0);

- roce_set_bit(context->byte_76_srqn_op_en, V2_QPC_BYTE_76_ATE_S,
  -  (!!attr->qp_access_flags & IB_ACCESS_REMOTE_ATOMIC));
- roce_set_bit(qpc_mask->byte_76_srqn_op_en, V2_QPC_BYTE_76_ATE_S, 0);
+ if (attr_mask & IB_QP_QKEY) {
  + context->qkey_xrcd = attr->qkey;
  + qpc_mask->qkey_xrcd = 0;
  + hr_qp->qkey = attr->qkey;
  + }
  +
  + if (hr_qp->rdb_en) {
    + roce_set_bit(context->byte_68_rq_db,
      + V2_QPC_BYTE_68_RQ_RECORD_EN_S, 1);
    + roce_set_bit(qpc_mask->byte_68_rq_db,
      + V2_QPC_BYTE_68_RQ_RECORD_EN_S, 0);
    + }
    +
    + roce_set_field(context->byte_68_rq_db,
      + V2_QPC_BYTE_68_RQ_DB_RECORD_ADDR_M,
      + V2_QPC_BYTE_68_RQ_DB_RECORD_ADDR_S,
      + ((u32)hr_qp->rdb.dma) >> 1);
    + roce_set_field(qpc_mask->byte_68_rq_db,
      + V2_QPC_BYTE_68_RQ_DB_RECORD_ADDR_M,
      + V2_QPC_BYTE_68_RQ_DB_RECORD_ADDR_S, 0);
    + context->rq_db_record_addr = hr_qp->rdb.dma >> 32;
    + qpc_mask->rq_db_record_addr = 0;
    +
    + roce_set_bit(context->byte_76_srqn_op_en, V2_QPC_BYTE_76_RQIE_S,
      + (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RQ_INLINE) ? 1 : 0);
    roce_set_bit(qpc_mask->byte_76_srqn_op_en, V2_QPC_BYTE_76_RQIE_S, 0);
    roce_set_field(context->byte_80_rmr_rx_cqn, V2_QPC_BYTE_80_RX_CQN_M,
      + (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RQ_INLINE) ? 1 : 0);
  +
  + roce_set_field(qpc_mask->byte_4_sqpn_tst, V2_QPC_BYTE_4_TST_M,
    + V2_QPC_BYTE_4_TST_S, 0);
-roce_set_field(context->byte_4_sqpn_tst, V2_QPC_BYTE_4_SGE_SHIFT_M,  
- V2_QPC_BYTE_4_SGE_SHIFT_S, hr_qp->sq.max_gs > 2 ?  
- ilog2((unsigned int)hr_qp->sge.sge_cnt) : 0);  
+if (ibqp->qp_type == IB_QPT_GSI)  
+roce_set_field(context->byte_4_sqpn_tst,  
+ V2_QPC_BYTE_4_SGE_SHIFT_M,  
+ V2_QPC_BYTE_4_SGE_SHIFT_S,  
+ ilog2((unsigned int)hr_qp->sge.sge_cnt));  
+else  
+roce_set_field(context->byte_4_sqpn_tst,  
+ V2_QPC_BYTE_4_SGE_SHIFT_M,  
+ V2_QPC_BYTE_4_SGE_SHIFT_S,  
+ ilog2((unsigned int)hr_qp->sge.sge_cnt) ? 0);  
+roce_set_field(qpc_mask->byte_4_sqpn_tst, V2_QPC_BYTE_4_SGE_SHIFT_M,  
V2_QPC_BYTE_4_SGE_SHIFT_S, 0);

@@ -2239,7 +2630,7 @@
  V2_QPC_BYTE_80_RX_CQN_S, 0);

roce_set_field(context->byte_252_err_txcqn, V2_QPC_BYTE_252_TX_CQN_M,  
- V2_QPC_BYTE_252_TX_CQN_S, to_hr_cq(ibqp->recv_cq)->cqn);  
+ V2_QPC_BYTE_252_TX_CQN_S, to_hr_cq(ibqp->send_cq)->cqn);  
roce_set_field(qpc_mask->byte_252_err_txcqn, V2_QPC_BYTE_252_TX_CQN_M,  
V2_QPC_BYTE_252_TX_CQN_S, 0);

@@ -2255,20 +2646,22 @@
  V2_QPC_BYTE_76_SRQN_M, V2_QPC_BYTE_76_SRQN_S, 0);  
}

-if (attr_mask & IB_QP_PKEY_INDEX)  
-context->qkey_xrcd = attr->pkey_index;  
-else  
-context->qkey_xrcd = hr_qp->pkey_index;  
+if (attr_mask & IB_QP_QKEY) {  
+context->qkey_xrcd = attr->qkey;  
+qpc_mask->qkey_xrcd = 0;  
+}

roce_set_field(context->byte_4_sqpn_tst, V2_QPC_BYTE_4_SQPN_M,  
V2_QPC_BYTE_4_SQPN_S, hr_qp->qpn);  
roce_set_field(qpc_mask->byte_4_sqpn_tst, V2_QPC_BYTE_4_SQPN_M,  
V2_QPC_BYTE_4_SQPN_S, 0);

-roce_set_field(context->byte_56_dqpn_err, V2_QPC_BYTE_56_DQPN_M,  
- V2_QPC_BYTE_56_DQPN_S, hr_qp->qpn);  
-roce_set_field(qpc_mask->byte_56_dqpn_err, V2_QPC_BYTE_56_DQPN_M,  
-V2_QPC_BYTE_56_DQPN_S, 0);  

- V2_QPC_BYTE_56_DQPN_S, 0);
+if (attr_mask & IB_QP_DEST_QPN) {
+roce_set_field(context->byte_56_dqpn_err, V2_QPC_BYTE_56_DQPN_M,
+ V2_QPC_BYTE_56_DQPN_S, hr_qp->qpn);
+roce_set_field(qpc_mask->byte_56_dqpn_err,
+ V2_QPC_BYTE_56_DQPN_M, V2_QPC_BYTE_56_DQPN_S, 0);
+}
roce_set_field(context->byte_168_irrl_idx,
   V2_QPC_BYTE_168_SQ_SHIFT_BAK_M,
   V2_QPC_BYTE_168_SQ_SHIFT_BAK_S,
@@ -2323,8 +2716,7 @@
return -EINVAL;
}

-if ((attr_mask & IB_QP_ALT_PATH) || (attr_mask & IB_QP_ACCESS_FLAGS) ||
- (attr_mask & IB_QP_PKEY_INDEX) || (attr_mask & IB_QP_QKEY)) {
+if (attr_mask & IB_QP_ALT_PATH) {
  dev_err(dev, "INIT2RTR attr_mask (0x%x) error\n", attr_mask);
  return -EINVAL;
}
@@ -2354,7 +2746,8 @@
roce_set_field(context->byte_20_smac_sgid_idx,
   V2_QPC_BYTE_20_SGE_HOP_NUM_M,
   V2_QPC_BYTE_20_SGE_HOP_NUM_S,
- hr_qp->sq.max_gs > 2 ? hr_dev->caps.mtt_hop_num : 0);
+ ((ibqp->qp_type == IB_QPT_GSI) || hr_qp->sq.max_gs > 2) ?
+ hr_dev->caps.mtt_hop_num : 0);
roce_set_field(qpc_mask->byte_20_smac_sgid_idx,
   V2_QPC_BYTE_20_SGE_HOP_NUM_M,
   V2_QPC_BYTE_20_SGE_HOP_NUM_S, 0);
@@ -2371,7 +2764,7 @@
roce_set_field(context->byte_16_buf_ba_pg_sz,
   V2_QPC_BYTE_16_WQE_SGE_BA_PG_SZ_M,
   V2_QPC_BYTE_16_WQE_SGE_BA_PG_SZ_S,
- hr_dev->caps.mtt_ba_pg_sz);
+ hr_dev->caps.mtt_ba_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(qpc_mask->byte_16_buf_ba_pg_sz,
   V2_QPC_BYTE_16_WQE_SGE_BA_PG_SZ_M,
   V2_QPC_BYTE_16_WQE_SGE_BA_PG_SZ_S, 0);
@@ -2379,7 +2772,7 @@
roce_set_field(context->byte_16_buf_ba_pg_sz,
   V2_QPC_BYTE_16_WQE_SGE_BUF_PG_SZ_M,
   V2_QPC_BYTE_16_WQE_SGE_BUF_PG_SZ_S,
- hr_dev->caps.mtt_buf_pg_sz);
+ hr_dev->caps.mtt_buf_pg_sz + PG_SHIFT_OFFSET);
roce_set_field(qpc_mask->byte_16_buf_ba_pg_sz,
   V2_QPC_BYTE_16_WQE_SGE_BUF_PG_SZ_M,
   V2_QPC_BYTE_16_WQE_SGE_BUF_PG_SZ_S, 0);
@@ -2463,16 +2856,21 @@
 roce_set_bit(qpc_mask->byte_28_at_fl, V2_QPC_BYTE_28_LBI_S, 0);
 }

- roce_set_field(context->byte_140_raq, V2_QPC_BYTE_140_RR_MAX_M,
-     V2_QPC_BYTE_140_RR_MAX_S,
-     ilog2((unsigned int)attr->max_dest_rd_atomic));
- roce_set_field(qpc_mask->byte_140_raq, V2_QPC_BYTE_140_RR_MAX_M,
-     V2_QPC_BYTE_140_RR_MAX_S, 0);
-
- roce_set_field(context->byte_56_dqpn_err, V2_QPC_BYTE_56_DQPN_M,
-     V2_QPC_BYTE_56_DQPN_S, attr->dest_qp_num);
- roce_set_field(qpc_mask->byte_56_dqpn_err, V2_QPC_BYTE_56_DQPN_M,
-     V2_QPC_BYTE_56_DQPN_S, 0);
+ if ((attr_mask & IB_QP_MAX_DEST_RD_ATOMIC) &&
+     attr->max_dest_rd_atomic) {
+     roce_set_field(context->byte_140_raq, V2_QPC_BYTE_140_RR_MAX_M,
+                     V2_QPC_BYTE_140_RR_MAX_S,
+                     fls(attr->max_dest_rd_atomic - 1));
+     roce_set_field(qpc_mask->byte_140_raq, V2_QPC_BYTE_140_RR_MAX_M,
+                     V2_QPC_BYTE_140_RR_MAX_S, 0);
+ }
+ }
+
+ if (attr_mask & IB_QP_DEST_QPN) {
+     roce_set_field(context->byte_56_dqpn_err, V2_QPC_BYTE_56_DQPN_M,
+                     V2_QPC_BYTE_56_DQPN_S, attr->dest_qp_num);
+     roce_set_field(qpc_mask->byte_56_dqpn_err,
+                     V2_QPC_BYTE_56_DQPN_M, V2_QPC_BYTE_56_DQPN_S, 0);
+ }
+
/* Configure GID index */
port_num = rdma_ah_get_port_num(&attr->ah_attr);
@@ -2511,8 +2909,13 @@
 roce_set_field(qpc_mask->byte_24_mtu_tc, V2_QPC_BYTE_24_TC_M,
                 V2_QPC_BYTE_24_TC_S, 0);

- roce_set_field(context->byte_24_mtu_tc, V2_QPC_BYTE_24_MTU_M,
-     V2_QPC_BYTE_24_MTU_S, attr->path_mtu);
+ if (ibqp->qp_type == IB_QPT_GSI || ibqp->qp_type == IB_QPT_UD)
+     roce_set_field(context->byte_24_mtu_tc, V2_QPC_BYTE_24_MTU_M,
+                     V2_QPC_BYTE_24_MTU_S, IB_MTU_4096);
+ else if (attr_mask & IB_QP_PATH_MTU)
+     roce_set_field(context->byte_24_mtu_tc, V2_QPC_BYTE_24_MTU_M,
+                     V2_QPC_BYTE_24_MTU_S, attr->path_mtu);
+     roce_set_field(qpc_mask->byte_24_mtu_tc, V2_QPC_BYTE_24_MTU_M,
+                     V2_QPC_BYTE_24_MTU_S, 0);
@@ -2557,12 +2960,6 @@
            V2_QPC_BYTE_168_LP_SGEN_INI_M,
            V2_QPC_BYTE_168_LP_SGEN_INI_S, 0);
            
            -roce_set_field(context->byte_208_irrl, V2_QPC_BYTE_208_SR_MAX_M,
            - V2_QPC_BYTE_208_SR_MAX_S,
            - ilog2((unsigned int)attr->max_rd_atomic));
            -roce_set_field(qpc_mask->byte_208_irrl, V2_QPC_BYTE_208_SR_MAX_M,
            - V2_QPC_BYTE_208_SR_MAX_S, 0);
            -
            roce_set_field(context->byte_28_at_fl, V2_QPC_BYTE_28_SL_M,
            V2_QPC_BYTE_28_SL_S, rdma_ah_get_sl(&attr->ah_attr));
            roce_set_field(qpc_mask->byte_28_at_fl, V2_QPC_BYTE_28_SL_M,
            @@ -2592,11 +2989,9 @@
            return -EINVAL;
        }
        
        /* If exist optional param, return error */
        -if ((attr_mask & IB_QP_ALT_PATH) || (attr_mask & IB_QP_ACCESS_FLAGS) ||
        - (attr_mask & IB_QP_QKEY) || (attr_mask & IB_QP_PATH_MIG_STATE) ||
        - (attr_mask & IB_QP_CUR_STATE) ||
        - (attr_mask & IB_QP_MIN_RNR_TIMER)) {
        +/* Not support alternate path and path migration */
        +if ((attr_mask & IB_QP_ALT_PATH) ||
        + (attr_mask & IB_QP_PATH_MIG_STATE)) {
            dev_err(dev, "RTR2RTS attr_mask (0x%x)error\n", attr_mask);
            return -EINVAL;
        }
    }
    @@ -2625,13 +3020,14 @@
            V2_QPC_BYTE_168_SQ_CUR_BLK_ADDR_S, 0);
            
            page_size = 1 << (hr_dev->caps.mtt_buf_pg_sz + PAGE_SHIFT);
            context->sq_cur_sge_blk_addr = hr_qp->sq.max_gs > 2 ?
            +context->sq_cur_sge_blk_addr =
            + ((ibqp->qp_type == IB_QPT_GSI) || hr_qp->sq.max_gs > 2) ?
            + ((u32)(mtts[hr_qp->sge.offset / page_size]
            >> PAGE_ADDR_SHIFT)) : 0;
            qpc_mask->sq_cur_sge_blk_addr = 0;
            roce_set_field(context->byte_184_irrl_idx,
            V2_QPC_BYTE_184_SQ_CUR_SGE_BLK_ADDR_M,
            V2_QPC_BYTE_184_SQ_CUR_SGE_BLK_ADDR_S,
            - hr_qp->sq.max_gs > 2 ?
            + ((ibqp->qp_type == IB_QPT_GSI) || hr_qp->sq.max_gs > 2) ?
            + (mtts[hr_qp->sge.offset / page_size] >>
            (32 + PAGE_ADDR_SHIFT)) : 0);
            qpc_mask->sq_cur_sge_blk_addr = 0;
    }
    @@ -2766,6 +3162,14 @@
            V2_QPC_BYTE_196_SQ_MAX_PSN_M,
            V2_QPC_BYTE_196_SQ_MAX_PSN_S, 0);
+if ((attr_mask & IB_QP_MAX_QP_RD_ATOMIC) && attr->max_rd_atomic) {
    roce_set_field(context->byte_208_irrl, V2_QPC_BYTE_208_SR_MAX_M,
    + V2_QPC_BYTE_208_SR_MAX_S,
    + fls(attr->max_rd_atomic - 1));
+roce_set_field(qpc_mask->byte_208_irrl,
    +V2_QPC_BYTE_208_SR_MAX_M,
    +V2_QPC_BYTE_208_SR_MAX_S, 0);
}
return 0;
}
@@ -2794,7 +3198,8 @@
memset(qpc_mask, 0xff, sizeof(*qpc_mask));
if (cur_state == IB_QPS_RESET && new_state == IB_QPS_INIT) {
    -modify_qp_reset_to_init(ibqp, attr, context, qpc_mask);
+modify_qp_reset_to_init(ibqp, attr, attr_mask, context,
+qpc_mask);
} else if (cur_state == IB_QPS_INIT && new_state == IB_QPS_INIT) {
modify_qp_init_to_init(ibqp, attr, attr_mask, context,
    qpc_mask);
@@ -2821,7 +3226,8 @@
    if (cur_state == IB_QPS_RST && new_state == IB_QPS_ERR) ||
    (cur_state == IB_QPS_QD && new_state == IB_QPS_ERR) ||
    (cur_state == IB_QPS_QE && new_state == IB_QPS_ERR)) {
+    (cur_state == IB_QPS_QE && new_state == IB_QPS_ERR) ||
+    (cur_state == IB_QPS_ERR && new_state == IB_QPS_ERR)) {
    /* Nothing */
    ;
    } else {
    @@ -2829,6 +3235,9 @@
goto out;
    }

+if ((attr_mask & (IB_QP_ACCESS_FLAGS | IB_QP_MAX_DEST_RD_ATOMIC))
+set_access_flags(hr_qp, context, qpc_mask, attr, attr_mask);
+/* Every status migrate must change state */
+roce_set_field(context->byte_60_qpst_mapid, V2_QPC_BYTE_60_QP_ST_M,
    V2_QPC_BYTE_60_QP_ST_S, new_state);
@@ -2845,6 +3254,9 @@
hr_qp->state = new_state;

+if (attr_mask & IB_QP_ACCESS_FLAGS)
+hr_qp->atomic_rd_en = attr->qp_access_flags;
if (attr_mask & IB_QP_MAX_DEST_RD_ATOMIC)
hr_qp->resp_depth = attr->max_dest_rd_atomic;
if (attr_mask & IB_QP_PORT) {

out:
}

qp_init_attr->cap = qp_attr->cap;
+qp_init_attr->sq_sig_type = hr_qp->sq_signal_bits;

out:
mutex_unlock(&hr_qp->mutex);

if (is_user) {
+if (hr_qp->rq.wqe_cnt && (hr_qp->rdb_en == 1))
+hns_roce_db_unmap_user(
+to_hr_ucontext(hr_qp->ibqp.uobject->context),
+&hr_qp->rdb);
ib_umem_release(hr_qp->umem);
} else {
kfree(hr_qp->sq.wrid);
kfree(hr_qp->rq.wrid);
hns_roce_buf_free(hr_dev, hr_qp->buff_size, &hr_qp->hr_buf);
+if (hr_qp->rq.wqe_cnt)
+hns_roce_free_db(hr_dev, &hr_qp->rdb);
+
+hns_roce_mtt_cleanup(hr_dev, &hr_qp->mtt);
}

return 0;

return ret;
static void set_eq_cons_index_v2(struct hns_roce *eq) {
    u32 doorbell[2];
    doorbell[0] = 0;
    doorbell[1] = 0;
    if (eq->type_flag == HNS_ROCE_AEQ) {
        roce_set_field(doorbell[0], HNS_ROCE_V2_EQ_DB_CMD_M,
                       HNS_ROCE_V2_EQ_DB_CMD_S,
                       eq->arm_st == HNS_ROCE_V2_EQ_ALWAYS_ARMED ?
                       HNS_ROCE_EQ_DB_CMD_AEQ :
                       HNS_ROCE_EQ_DB_CMD_AEQ_ARMED);
    } else {
        roce_set_field(doorbell[0], HNS_ROCE_V2_EQ_DB_TAG_M,
                       HNS_ROCE_V2_EQ_DB_TAG_S, eq->eqn);
        roce_set_field(doorbell[0], HNS_ROCE_V2_EQ_DB_CMD_M,
                       HNS_ROCE_V2_EQ_DB_CMD_S,
                       eq->arm_st == HNS_ROCE_V2_EQ_ALWAYS_ARMED ?
                       HNS_ROCE_EQ_DB_CMD_CEQ :
                       HNS_ROCE_EQ_DB_CMD_CEQ_ARMED);
    }
    roce_set_field(doorbell[1], HNS_ROCE_V2_EQ_DB_PARA_M,
                   HNS_ROCE_V2_EQ_DB_PARA_S,
                   (eq->cons_index & HNS_ROCE_V2_CONS_IDX_M));
    hns_roce_write64_k(doorbell, eq->doorbell);
}

static void hns_roce_v2_wq_catas_err_handle(struct hns_roce_dev *hr_dev,
                                             struct hns_roce_aeqe *aeqe,
                                             u32 qpn) {
    struct device *dev = hr_dev->dev;
    int sub_type;
    dev_warn(dev, "Local work queue catastrophic error.
    sub_type = roce_get_field(aeqe->asyn, HNS_ROCE_V2_AEQE_SUB_TYPE_M,
                             HNS_ROCE_V2_AEQE_SUB_TYPE_S);
    switch (sub_type) {
    case HNS_ROCE_LWQCE_QPC_ERROR:
        dev_warn(dev, "QP %d, QPC error.
        break;
    case HNS_ROCE_LWQCE_MTU_ERROR:
        dev_warn(dev, "QP %d, MTU error.
        break;
+case HNS_ROCE_LWQCE_WQE_BA_ADDR_ERROR:
    +dev_warn(dev, "QP %d, WQE BA addr error\n", qpn);
    +break;
+case HNS_ROCE_LWQCE_WQE_ADDR_ERROR:
    +dev_warn(dev, "QP %d, WQE addr error\n", qpn);
    +break;
+case HNS_ROCE_LWQCE_SQ_WQE_SHIFT_ERROR:
    +dev_warn(dev, "QP %d, WQE shift error\n", qpn);
    +break;
+default:
    +dev_err(dev, "Unhandled sub_event type %d\n", sub_type);
    +break;
+
+static void hns_roce_v2_local_wq_access_err_handle(struct hns_roce_dev *hr_dev,
    +    struct hns_roce_aeqe *aeqe, u32 qpn)
    +{
    +struct device *dev = hr_dev->dev;
    +int sub_type;
    +
    +dev_warn(dev, "Local access violation work queue error\n");
    +sub_type = roce_get_field(aeqe->asyn, HNS_ROCE_V2_AEQE_SUB_TYPE_M,
    +    struct hns_roce_aeqe *aeqe, u32 qpn)
    +{
    +struct device *dev = hr_dev->dev;
    +int sub_type;
    +
    +dev_warn(dev, "Local access violation work queue error\n");
    +sub_type = roce_get_field(aeqe->asyn, HNS_ROCE_V2_AEQE_SUB_TYPE_M,
    +HNS_ROCE_V2_AEQE_SUB_TYPE_S);
    +switch (sub_type) {
    +case HNS_ROCE_LAVWQE_R_KEY_VIOLATION:
    +    dev_warn(dev, "QP %d, R_key violation\n", qpn);
    +    break;
    +case HNS_ROCE_LAVWQE_LENGTH_ERROR:
    +    dev_warn(dev, "QP %d, length error\n", qpn);
    +    break;
    +case HNS_ROCE_LAVWQE_VA_ERROR:
    +    dev_warn(dev, "QP %d, VA error\n", qpn);
    +    break;
    +case HNS_ROCE_LAVWQE_PD_ERROR:
    +    dev_err(dev, "QP %d, PD error\n", qpn);
    +    break;
    +case HNS_ROCE_LAVWQE_RW_ACC_ERROR:
    +    dev_warn(dev, "QP %d, rw acc error\n", qpn);
    +    break;
    +case HNS_ROCE_LAVWQE_KEY_STATE_ERROR:
    +    dev_warn(dev, "QP %d, key state error\n", qpn);
    +    break;
    +case HNS_ROCE_LAVWQE_MR_OPERATION_ERROR:
    +    dev_warn(dev, "QP %d, MR operation error\n", qpn);
    +    break;
    +default:
    +    dev_err(dev, "Unhandled sub_event type %d\n", sub_type);
+static void hns_roce_v2_qp_err_handle(struct hns_roce_dev *hr_dev,
+    struct hns_roce_aeqe *aeqe,
+    int event_type)
+{
+    struct device *dev = hr_dev->dev;
+    u32 qpn;
+
+    qpn = roce_get_field(aeqe->event.qp_event.qp,
+        HNS_ROCE_V2_AEQE_EVENT_QUEUE_NUM_M,
+        HNS_ROCE_V2_AEQE_EVENT_QUEUE_NUM_S);
+
+    switch (event_type) {
+    case HNS_ROCE_EVENT_TYPE_COMM_EST:
+        dev_warn(dev, "Communication established.\n");
+        break;
+    case HNS_ROCE_EVENT_TYPE_SQ_DRAINED:
+        dev_warn(dev, "Send queue drained.\n");
+        break;
+    case HNS_ROCE_EVENT_TYPE_WQ_CATAS_ERROR:
+        hns_roce_v2_wq_catas_err_handle(hr_dev, aeqe, qpn);
+        break;
+    case HNS_ROCE_EVENT_TYPE_INV_REQ_LOCAL_WQ_ERROR:
+        dev_warn(dev, "Invalid request local work queue error.\n");
+        break;
+    case HNS_ROCE_EVENT_TYPE_LOCAL_WQ_ACCESS_ERROR:
+        hns_roce_v2_local_wq_access_err_handle(hr_dev, aeqe, qpn);
+        break;
+    default:
+        break;
+    }
+
+    hns_roce_qp_event(hr_dev, qpn, event_type);
+}
+
+static void hns_roce_v2_cq_err_handle(struct hns_roce_dev *hr_dev,
+    struct hns_roce_aeqe *aeqe,
+    int event_type)
+{
+    struct device *dev = hr_dev->dev;
+    u32 cqn;
+
+    cqn = roce_get_field(aeqe->event.cq_event.cq,
+        HNS_ROCE_V2_AEQE_EVENT_QUEUE_NUM_M,
+        HNS_ROCE_V2_AEQE_EVENT_QUEUE_NUM_S);
switch (event_type) {
    case HNS_ROCE_EVENT_TYPE_CQ_ACCESS_ERROR:
        dev_warn(dev, "CQ 0x%x access err\n", cqn);
        break;
    case HNS_ROCE_EVENT_TYPE_CQ_OVERFLOW:
        dev_warn(dev, "CQ 0x%x overflow\n", cqn);
        break;
    default:
        break;
}
+hns_roce_cq_event(hr_dev, cqn, event_type);
}

static struct hns_roce_aeqe *get_aeqe_v2(struct hns_roce_eq *eq, u32 entry)
{
    u32 buf_chk_sz;
    unsigned long off;

    buf_chk_sz = 1 << (eq->eqe_buf_pg_sz + PAGE_SHIFT);
    off = (entry & (eq->entries - 1)) * HNS_ROCE_AEQ_ENTRY_SIZE;

    return (struct hns_roce_aeqe *)((char *)(eq->buf_list->buf) +
        off % buf_chk_sz);
}

static struct hns_roce_aeqe *mhop_get_aeqe(struct hns_roce_eq *eq, u32 entry)
{
    u32 buf_chk_sz;
    unsigned long off;

    buf_chk_sz = 1 << (eq->eqe_buf_pg_sz + PAGE_SHIFT);
    off = (entry & (eq->entries - 1)) * HNS_ROCE_AEQ_ENTRY_SIZE;

    if (eq->hop_num == HNS_ROCE_HOP_NUM_0)
        return (struct hns_roce_aeqe *)((u8 *)(eq->bt_l0) +
            off % buf_chk_sz);
    else
        return (struct hns_roce_aeqe *)((u8 *)(eq->buf[off / buf_chk_sz]) + off % buf_chk_sz);
}

static struct hns_roce_aeqe *next_aeqe_sw_v2(struct hns_roce_eq *eq)
{
    struct hns_roce_aeqe *aeqe;

    /*
    +
    +
    */

    if (eq->hop_num == HNS_ROCE_HOP_NUM_0)
if (!eq->hop_num)
+aeqe = get_aeqe_v2(eq, eq->cons_index);
+else
+aeqe = mhop_get_aeqe(eq, eq->cons_index);
+
+return (roce_get_bit(aeqe->asyn, HNS_ROCE_V2_AEQE_AEQE_OWNER_S) ^
+!!(eq->cons_index & eq->entries)) ? aeqe : NULL;
+
+
+static int hns_roce_v2_aeq_int(struct hns_roce_dev *hr_dev,
+ struct hns_roce_eq *eq)
+
+
+struct device *dev = hr_dev->dev;
+struct hns_roce_aeqe *aeqe;
+int aeqe_found = 0;
+int event_type;
+
+while ((aeqe = next_aeqe_sw_v2(eq))) {
+
+ /* Make sure we read AEQ entry after we have checked the
+ * ownership bit
+ */
+dma_rmb();
+
+event_type = roce_get_field(aeqe->asyn,
+ HNS_ROCE_V2_AEQE_EVENT_TYPE_M,
+ HNS_ROCE_V2_AEQE_EVENT_TYPE_S);
+
+switch (event_type) {
+case HNS_ROCE_EVENT_TYPE_PATH_MIG:
+dev_warn(dev, "Path migrated succeeded\n");
+break;
+case HNS_ROCE_EVENT_TYPE_PATH_MIG_FAILED:
+dev_warn(dev, "Path migration failed\n");
+break;
+case HNS_ROCE_EVENT_TYPE_COMM_EST:
+case HNS_ROCE_EVENT_TYPE_SQ_DRAINED:
+case HNS_ROCE_EVENT_TYPE_WQ_CATAS_ERROR:
+case HNS_ROCE_EVENT_TYPE_INV_REQ_LOCAL_WQ_ERROR:
+case HNS_ROCE_EVENT_TYPE_LOCAL_WQ_ACCESS_ERROR:
+hns_roce_v2_qp_err_handle(hr_dev, aeqe, event_type);
+break;
+case HNS_ROCE_EVENT_TYPE_SRQ_LIMIT_REACH:
+case HNS_ROCE_EVENT_TYPE_SRQ_LAST_WQE_REACH:
+case HNS_ROCE_EVENT_TYPE_SRQ_CATAS_ERROR:
+dev_warn(dev, "SRQ not support\n");
+break;
+case HNS_ROCE_EVENT_TYPE_CQ_ACCESS_ERROR:
+case HNS_ROCE_EVENT_TYPE_CQ_OVERFLOW:
+hns_roce_v2_cq_err_handle(hr_dev, aeqe, event_type);
+break;
+case HNS_ROCE_EVENT_TYPE_DB_OVERFLOW:
+dev_warn(dev, "DB overflow.");
+break;
+case HNS_ROCE_EVENT_TYPE_MB:
+hns_roce_cmd_event(hr_dev,
+le16_to_cpu(aeqe->event.cmd.token),
aeqe->event.cmd.status,
+le64_to_cpu(aeqe->event.cmd.out_param));
+break;
+case HNS_ROCE_EVENT_TYPE_CEQ_OVERFLOW:
+dev_warn(dev, "CEQ overflow.");
+break;
+case HNS_ROCE_EVENT_TYPE_FLR:
+dev_warn(dev, "Function level reset.");
+break;
+default:
+dev_err(dev, "Unhandled event %d on EQ %d at idx %u.",
+event_type, eq->eqn, eq->cons_index);
+break;
+
+++eq->cons_index;
+aeqe_found = 1;
+
+if (eq->cons_index > (2 * eq->entries - 1)) {
+dev_warn(dev, "cons_index overflow, set back to 0.");
+eq->cons_index = 0;
+}
+
+set_eq_cons_index_v2(eq);
+return aeqe_found;
+
+static struct hns_roce_ceqe *get_ceqe_v2(struct hns_roce_eq *eq, u32 entry)
+{
+u32 buf_chk_sz;
+unsigned long off;
+
+buf_chk_sz = 1 << (eq->eqe_buf_pg_sz + PAGE_SHIFT);
+off = (entry & (eq->entries - 1)) * HNS_ROCE_CEQ_ENTRY_SIZE;
+
+return (struct hns_roce_ceqe *)((char *)(eq->buf_list->buf) +
+off % buf_chk_sz);
+}
+static struct hns_roce_ceqe *mhop_get_ceqe(struct hns_roce_eq *eq, u32 entry)
+{
+u32 buf_chk_sz;
+unsigned long off;
+
+buf_chk_sz = 1 << (eq->eqe_buf_pg_sz + PAGE_SHIFT);
+
+off = (entry & (eq->entries - 1)) * HNS_ROCE_CEQ_ENTRY_SIZE;
+
+if (eq->hop_num == HNS_ROCE_HOP_NUM_0)
+return (struct hns_roce_ceqe *)((u8 *)(eq->bt_l0) +
+off % buf_chk_sz);
+else
+return (struct hns_roce_ceqe *)((u8 *)(eq->buf[off /
+buf_chk_sz]) + off % buf_chk_sz);
+}
+
+static struct hns_roce_ceqe *next_ceqe_sw_v2(struct hns_roce_eq *eq)
+{
+struct hns_roce_ceqe *ceqe;
+
+if (!eq->hop_num)
+ceqe = get_ceqe_v2(eq, eq->cons_index);
+else
+ceqe = mhop_get_ceqe(eq, eq->cons_index);
+
+return (!!(roce_get_bit(ceqe->comp, HNS_ROCE_V2_CEQ_CEQE_OWNER_S))) ^
+(!!(eq->cons_index & eq->entries)) ? ceqe : NULL;
+}
+
+static int hns_roce_v2_ceq_int(struct hns_roce_dev *hr_dev,
+struct hns_roce_eq *eq)
+{
+struct device *dev = hr_dev->dev;
+struct hns_roce_ceqe *ceqe;
+
+int ceqe_found = 0;
+
u32 cqn;
+
+while ((ceqe = next_ceqe_sw_v2(eq))) {
+
+/* Make sure we read CEQ entry after we have checked the
+ * ownership bit
+ */
+dma_rmb();
+
+cqn = roce_get_field(ceqe->comp, HNS_ROCE_V2_CEQ_COMBO_CQN_M,
HNS_ROCE_V2_CEQE_COMP_CQN_S);

hns_roce_cq_completion(hr_dev, cqn);

++eq->cons_index;

ceqe_found = 1;

if (eq->cons_index > (2 * eq->entries - 1)) {
    dev_warn(dev, "cons_index overflow, set back to 0.
    eq->cons_index = 0;
}

++eq->cons_index_v2(eq);

return ceqe_found;
}

static irqreturn_t hns_roce_v2_msix_interrupt_abn(int irq, void *dev_id)
{
    struct hns_roce_dev *hr_dev = dev_id;
    struct device *dev = hr_dev->dev;
    int int_work = 0;
    u32 int_st;
    u32 int_en;

    /* Abnormal interrupt */
    int_st = roce_read(hr_dev, ROCEE_VF_ABN_INT_ST_REG);
    int_en = roce_read(hr_dev, ROCEE_VF_ABN_INT_EN_REG);

    if (roce_get_bit(int_st, HNS_ROCE_V2_VF_INT_ST_AEQ_OVERFLOW_S)) {
        dev_err(dev, "AEQ overflow!");

        +static irqreturn_t hns_roce_v2_msix_interrupt_abn(int irq, void *dev_id)
        +{
            struct hns_roce_dev *hr_dev = dev_id;
            struct device *dev = hr_dev->dev;
            int int_work = 0;
            u32 int_st;
            u32 int_en;

            /* Abnormal interrupt */
            int_st = roce_read(hr_dev, ROCEE_VF_ABN_INT_ST_REG);
            int_en = roce_read(hr_dev, ROCEE_VF_ABN_INT_EN_REG);

            if (roce_get_bit(int_st, HNS_ROCE_V2_VF_INT_ST_AEQ_OVERFLOW_S)) {
                dev_err(dev, "AEQ overflow!");
            }
roce_set_bit(int_st, HNS_ROCE_V2_VF_INT_ST_AEQ_OVERFLOW_S, 1);
roce_write(hr_dev, ROCEE_VF_ABN_INT_ST_REG, int_st);

roce_set_bit(int_en, HNS_ROCE_V2_VF_ABN_INT_EN_S, 1);
roce_write(hr_dev, ROCEE_VF_ABN_INT_EN_REG, int_en);

int_work = 1;
}
}
	} else if (roce_get_bit(int_st, HNS_ROCE_V2_VF_INT_ST_BUS_ERR_S)) {
	dev_err(dev, "BUS ERR!");
+
roce_set_bit(int_st, HNS_ROCE_V2_VF_INT_ST_BUS_ERR_S, 1);
roce_write(hr_dev, ROCEE_VF_ABN_INT_ST_REG, int_st);
+
roce_set_bit(int_en, HNS_ROCE_V2_VF_ABN_INT_EN_S, 1);
roce_write(hr_dev, ROCEE_VF_ABN_INT_EN_REG, int_en);
+
int_work = 1;
}
	} else if (roce_get_bit(int_st, HNS_ROCE_V2_VF_INT_ST_OTHER_ERR_S)) {
	dev_err(dev, "OTHER ERR!");
+
roce_set_bit(int_st, HNS_ROCE_V2_VF_INT_ST_OTHER_ERR_S, 1);
roce_write(hr_dev, ROCEE_VF_ABN_INT_ST_REG, int_st);
+
roce_set_bit(int_en, HNS_ROCE_V2_VF_ABN_INT_EN_S, 1);
roce_write(hr_dev, ROCEE_VF_ABN_INT_EN_REG, int_en);
+
int_work = 1;
} else {
	dev_err(dev, "There is no abnormal irq found!");
+
return IRQ_RETVAL(int_work);
+
static void hns_roce_v2_int_mask_enable(struct hns_roce_dev *hr_dev, int eq_num, int enable_flag) {
    int i;
+
    if (enable_flag == EQ_ENABLE) {
        for (i = 0; i < eq_num; i++)
            roce_write(hr_dev, ROCEE_VF_EVENT_INT_EN_REG + i * EQ_REG_OFFSET,
                HNS_ROCE_V2_VF_EVENT_INT_EN_M);
        +
} else {
    +
}
+ HNS_ROCE_V2_VF_ABN_INT_CFG_M);
+} else {
+for (i = 0; i < eq_num; i++)
+roce_write(hr_dev, ROCEE_VF_EVENT_INT_EN_REG +
+ i * EQ_REG_OFFSET,
+ HNS_ROCE_V2_VF_EVENT_INT_EN_M & 0x0);
+
+roce_write(hr_dev, ROCEE_VF_ABN_INT_EN_REG,
+ HNS_ROCE_V2_VF_ABN_INT_EN_M & 0x0);
+roce_write(hr_dev, ROCEE_VF_ABN_INT_CFG_REG,
+ HNS_ROCE_V2_VF_ABN_INT_CFG_M & 0x0);
+
+
+static void hns_roce_v2_destroy_eqc(struct hns_roce_dev *hr_dev, int eqn)
+{
+struct device *dev = hr_dev->dev;
+int ret;
+
+if (eqn < hr_dev->caps.num_comp_vectors)
+ret = hns_roce_cmd_mbox(hr_dev, 0, 0, eqn & HNS_ROCE_V2_EQN_M,
+0, HNS_ROCE_CMD_DESTROY_CEQC,
+HNS_ROCE_CMD_TIMEOUT_MSECS);
+else
+ret = hns_roce_cmd_mbox(hr_dev, 0, 0, eqn & HNS_ROCE_V2_EQN_M,
+0, HNS_ROCE_CMD_DESTROY_AEQC,
+HNS_ROCE_CMD_TIMEOUT_MSECS);
+if (ret)
+dev_err(dev, "[mailbox cmd] destroy eqc(%d) failed.
",
+eqn);
+
+static void hns_roce_mhop_free_eq(struct hns_roce_dev *hr_dev,
+ struct hns_roce_eq *eq)
+{
+struct device *dev = hr_dev->dev;
+u64 idx;
+u64 size;
+u32 buf_chk_sz;
+u32 bt_chk_sz;
+u32 mhop_num;
+int eqe_alloc;
+int ba_num;
+int i = 0;
+int j = 0;
+
+mhop_num = hr_dev->caps.eqe_hop_num;
+buf_chk_sz = 1 << (hr_dev->caps.eqe_buf_pg_sz + PAGE_SHIFT);
+bt_chk_sz = 1 << (hr_dev->caps.eqe_ba_pg_sz + PAGE_SHIFT);
ba_num = (PAGE_ALIGN(eq->entries * eq->eqe_size) + buf_chk_sz - 1) / buf_chk_sz;

/* hop_num = 0 */
if (mhop_num == HNS_ROCE_HOP_NUM_0) {
    dma_free_coherent(dev, (unsigned int)(eq->entries * eq->eqe_size), eq->bt_l0, eq->l0_dma);
    return;
}

/* hop_num = 1 or hop = 2 */
dma_free_coherent(dev, bt_chk_sz, eq->bt_l0, eq->l0_dma);
if (mhop_num == 1) {
    for (i = 0; i < eq->l0_last_num; i++) {
        if (i == eq->l0_last_num - 1) {
            eqe_alloc = i * (buf_chk_sz / eq->eqe_size);
            size = (eq->entries - eqe_alloc) * eq->eqe_size;
            dma_free_coherent(dev, size, eq->buf[i], eq->buf_dma[i]);
            break;
        }
        dma_free_coherent(dev, buf_chk_sz, eq->buf[i], eq->buf_dma[i]);
    }
} else if (mhop_num == 2) {
    for (i = 0; i < eq->l0_last_num; i++) {
        dma_free_coherent(dev, bt chk_sz, eq->bt_l1[i], eq->l1_dma[i]);
        for (j = 0; j < bt_chk_sz / 8; j++) {
            idx = i * (bt_chk_sz / 8) + j;
            if ((i == eq->l0_last_num - 1) && (j == eq->l1_last_num - 1)) {
                eqe_alloc = (buf_chk_sz / eq->eqe_size) * idx;
                size = (eq->entries - eqe_alloc) * eq->eqe_size;
                dma_free_coherent(dev, size, eq->buf[idx], eq->buf_dma[idx]);
                break;
            }
            dma_free_coherent(dev, buf_chk_sz, eq->buf[idx], eq->buf_dma[idx]);
        }
    }
}
kfree(eq->buf_dma);
+kfree(eq->buf);  
+kfree(eq->l1_dma);  
+kfree(eq->bt_l1);  
+eq->buf_dma = NULL;  
+eq->buf = NULL;  
+eq->l1_dma = NULL;  
+eq->bt_l1 = NULL;  
+}
+
+static void hns_roce_v2_free_eq(struct hns_roce_dev *hr_dev,  
+struct hns_roce_eq *eq)
+{
+u32 buf_chk_sz;
+
+buf_chk_sz = 1 << (eq->eqe_buf_pg_sz + PAGE_SHIFT);
+
+if (hr_dev->caps.eqe_hop_num) {
+hns_roce_mhop_free_eq(hr_dev, eq);
+return;
+}
+
+dma_free_coherent(hr_dev->dev, buf_chk_sz, eq->buf_list->buf,
+ eq->buf_list->map);
+kfree(eq->buf_list);
+}
+
+static void hns_roce_config_eqc(struct hns_roce_dev *hr_dev,
+struct hns_roce_eq *eq,
+void *mb_buf)
+{
+struct hns_roce_eq_context *eqc;
+
+eqc = mb_buf;
+memset(eqc, 0, sizeof(struct hns_roce_eq_context));
+
+/* init eqc */
+eq->doorbell = hr_dev->reg_base + ROCEE_VF_EQ_DB_CFG0_REG;
+eq->hop_num = hr_dev->caps.eqe_hop_num;
+eq->cons_index = 0;
+eq->over_ignore = HNS_ROCE_V2_EQ_OVER_IGNORE_0;
+eq->coalesce = HNS_ROCE_V2_EQ_COALESCE_0;
+eq->arm_st = HNS_ROCE_V2_EQ_ALWAYS_ARMED;
+eq->eqe_ba_pg_sz = hr_dev->caps.eqe_ba_pg_sz;
+eq->eqe_buf_pg_sz = hr_dev->caps.eqe_buf_pg_sz;
+eq->shift = ilog2((unsigned int)eq->entries);
+
+if (!eq->hop_num)
+eq->eqe_ba = eq->buf_list->map;
+else
+eq->eqe_ba = eq->l0_dma;
+
+/* set eqc state */
+roce_set_field(eqc->byte_4,
+    HNS_ROCE_EQC_EQ_ST_M,
+    HNS_ROCE_EQC_EQ_ST_S,
+    HNS_ROCE_V2_EQ_STATE_VALID);
+
+/* set eqe hop num */
+roce_set_field(eqc->byte_4,
+    HNS_ROCE_EQC_HOP_NUM_M,
+    HNS_ROCE_EQC_HOP_NUM_S, eq->hop_num);
+
+/* set eqc over_ignore */
+roce_set_field(eqc->byte_4,
+    HNS_ROCE_EQC_OVER_IGNORE_M,
+    HNS_ROCE_EQC_OVER_IGNORE_S, eq->over_ignore);
+
+/* set eqc coalesce */
+roce_set_field(eqc->byte_4,
+    HNS_ROCE_EQC_COALESCE_M,
+    HNS_ROCE_EQC_COALESCE_S, eq->coalesce);
+
+/* set eqc arm state */
+roce_set_field(eqc->byte_4,
+    HNS_ROCE_EQC_ARM_ST_M,
+    HNS_ROCE_EQC_ARM_ST_S, eq->arm_st);
+
+/* set eqn */
+roce_set_field(eqc->byte_4,
+    HNS_ROCE_EQC_EQN_M,
+    HNS_ROCE_EQC_EQN_S, eq->eqn);
+
+/* set eqe_cnt */
+roce_set_field(eqc->byte_4,
+    HNS_ROCE_EQC_EQE_CNT_M,
+    HNS_ROCE_EQC_EQE_CNT_S,
+    HNS_ROCE_EQ_INIT_EQE_CNT);
+
+/* set eqe_ba_pg_sz */
+roce_set_field(eqc->byte_8,
+    HNS_ROCE_EQC_BA_PG_SZ_M,
+    HNS_ROCE_EQC_BA_PG_SZ_S,
+    eq->eqe_ba_pg_sz + PG_SHIFT_OFFSET);
+
+/* set eqe_buf_pg_sz */
+roce_set_field(eqc->byte_8,
+ HNS_ROCE_EQC_BUF_PG_SZ_M,
+ HNS_ROCE_EQC_BUF_PG_SZ_S,
+ eq->eqe_buf_pg_sz + PG_SHIFT_OFFSET);
+
+ /* set eq_producer_idx */
+ roce_set_field(eqc->byte_8,
+   + HNS_ROCE_EQC_PROD_INDX_M,
+   + HNS_ROCE_EQC_PROD_INDX_S,
+   + HNS_ROCE_EQ_INIT_PROD_IDX);
+
+ /* set eq_max_cnt */
+ roce_set_field(eqc->byte_12,
+   + HNS_ROCE_EQC_MAX_CNT_M,
+   + HNS_ROCE_EQC_MAX_CNT_S, eq->eq_max_cnt);
+
+ /* set eq_period */
+ roce_set_field(eqc->byte_12,
+   + HNS_ROCE_EQC_PERIOD_M,
+   + HNS_ROCE_EQC_PERIOD_S, eq->eq_period);
+
+ /* set eqe_report_timer */
+ roce_set_field(eqc->eqe_report_timer,
+   + HNS_ROCE_EQC_REPORT_TIMER_M,
+   + HNS_ROCE_EQC_REPORT_TIMER_S,
+   + HNS_ROCE_EQ_INIT_REPORT_TIMER);
+
+ /* set eqe_ba [34:3] */
+ roce_set_field(eqc->eqe_ba0,
+   + HNS_ROCE_EQC_EQE_BA_L_M,
+   + HNS_ROCE_EQC_EQE_BA_L_S, eq->eqe_ba >> 3);
+
+ /* set eqe_ba [64:35] */
+ roce_set_field(eqc->eqe_ba1,
+   + HNS_ROCE_EQC_EQE_BA_H_M,
+   + HNS_ROCE_EQC_EQE_BA_H_S, eq->eqe_ba >> 35);
+
+ /* set eq shift */
+ roce_set_field(eqc->byte_28,
+   + HNS_ROCE_EQC_SHIFT_M,
+   + HNS_ROCE_EQC_SHIFT_S, eq->shift);
+
+ /* set eq MSI_IDX */
+ roce_set_field(eqc->byte_28,
+   + HNS_ROCE_EQC_MSI_INDX_M,
+   + HNS_ROCE_EQC_MSI_INDX_S,
+   + HNS_ROCE_EQ_INIT_MSI_IDX);
+
+ /* set cur_eqe_ba [27:12] */
roce_set_field(eqc->byte_28,  
+ HNS_ROCE_EQC_CUR_EQE_BA_L_M,  
+ HNS_ROCE_EQC_CUR_EQE_BA_L_S, eq->cur_eqe_ba >> 12);
+
+/* set cur_eqe_ba [59:28] */
+roce_set_field(eqc->byte_32,  
+ HNS_ROCE_EQC_CUR_EQE_BA_M_M,  
+ HNS_ROCE_EQC_CUR_EQE_BA_M_S, eq->cur_eqe_ba >> 28);
+
+/* set cur_eqe_ba [63:60] */
+roce_set_field(eqc->byte_36,  
+ HNS_ROCE_EQC_CUR_EQE_BA_H_M,  
+ HNS_ROCE_EQC_CUR_EQE_BA_H_S, eq->cur_eqe_ba >> 60);
+
+/* set eq consumer idx */
+roce_set_field(eqc->byte_36,  
+ HNS_ROCE_EQC_CONS_INDEX_M,  
+ HNS_ROCE_EQC_CONS_INDEX_S,  
+ HNS_ROCE_EQ_INIT_CONS_IDX);
+
+/* set nex_eqe_ba[43:12] */
+roce_set_field(eqc->nxt_eqe_ba0,  
+ HNS_ROCE_EQC_NXT_EQE_BA_L_M,  
+ HNS_ROCE_EQC_NXT_EQE_BA_L_S, eq->nxt_eqe_ba >> 12);
+
+/* set nex_eqe_ba[63:44] */
+roce_set_field(eqc->nxt_eqe_ba1,  
+ HNS_ROCE_EQC_NXT_EQE_BA_H_M,  
+ HNS_ROCE_EQC_NXT_EQE_BA_H_S, eq->nxt_eqe_ba >> 44);
+
+static int hns_roce_mhop_alloc_eq(struct hns_roce_dev *hr_dev,  
+ struct hns_roce_eq *eq)
+{
+ struct device *dev = hr_dev->dev;
+ int eq_alloc_done = 0;
+ int eq_buf_cnt = 0;
+ int eqe_alloc;
+ u32 buf_chk_sz;
+ u32 bt_chk_sz;
+ u32 mhop_num;
+ u64 size;
+ u64 idx;
+ int ba_num;
+ int bt_num;
+ int record_i;
+ int record_j;
+ int i = 0;
int j = 0;
+
+mhop_num = hr_dev->caps.eqe_hop_num;
+buf_chk_sz = 1 << (hr_dev->caps.eqe_buf_pg_sz + PAGE_SHIFT);
+bt_chk_sz = 1 << (hr_dev->caps.eqe_ba_pg_sz + PAGE_SHIFT);
+
+ba_num = (PAGE_ALIGN(eq->entries * eq->eqe_size) + buf_chk_sz - 1)
+ / buf_chk_sz;
+bt_num = (ba_num + bt_chk_sz / 8 - 1) / (bt_chk_sz / 8);
+
+/* hop_num = 0 */
+if (mhop_num == HNS_ROCE_HOP_NUM_0) {
+if (eq->entries > buf_chk_sz / eq->eqe_size) {
+dev_err(dev, "eq entries %d is larger than buf_pg_sz!",
+eq->entries);
+return -EINVAL;
+}
+eq->bt_l0 = dma_alloc_coherent(dev, eq->entries * eq->eqe_size,
+ &eq->l0_dma), GFP_KERNEL);
+if (!eq->bt_l0)
+return -ENOMEM;
+
+eq->buf_dma = kcalloc(ba_num, sizeof(*eq->buf_dma), GFP_KERNEL);
+if (!eq->buf_dma)
+return -ENOMEM;
+eq->buf = kcalloc(ba_num, sizeof(*eq->buf), GFP_KERNEL);
+if (!eq->buf)
+goto err_kcalloc_buf;
+
+if (mhop_num == 2) {
+eq->l1_dma = kcalloc(bt_num, sizeof(*eq->l1_dma), GFP_KERNEL);
+if (!eq->l1_dma)
+return -ENOMEM;
+eq->bt_l1 = kcalloc(bt_num, sizeof(*eq->bt_l1), GFP_KERNEL);
+if (!eq->bt_l1)
+goto err_kcalloc_bt_l1;
+
+if (mhop_num == 2) {
+eq->l1_dma = kcalloc(bt_num, sizeof(*eq->l1_dma), GFP_KERNEL);
+if (!eq->l1_dma)
+goto err_kalloc_l1_dma;
+
+if (mhop_num == 2) {
+eq->l1_dma = kcalloc(bt_num, sizeof(*eq->l1_dma), GFP_KERNEL);
+if (!eq->l1_dma)
+goto err_kalloc_l1_dma;
+
+/* alloc L0 BT */
eq->bt_l0 = dma_alloc_coherent(dev, bt_chk_sz, &eq->l0_dma, GFP_KERNEL);
+if (!eq->bt_l0)
+goto err_dma_alloc_l0;
+
+if (mhop_num == 1) {
+if (ba_num > (bt_chk_sz / 8))
+dev_err(dev, "ba_num %d is too large for 1 hop\n", ba_num);
+
+/* alloc buf */
+for (i = 0; i < bt_chk_sz / 8; i++) {
+if (eq_buf_cnt + 1 < ba_num) {
+size = buf_chk_sz;
+} else {
+eqe_alloc = i * (buf_chk_sz / eq->eqe_size);
+size = (eq->entries - eqe_alloc) * eqe_size;
+}
+eq->buf[i] = dma_alloc_coherent(dev, size,
+&(eq->buf_dma[i]),
+GFP_KERNEL);
+if (!eq->buf[i])
+goto err_dma_alloc_buf;
+
+memset(eq->buf[i], 0, size);
+*(eq->bt_l0 + i) = eq->buf_dma[i];
+
+eq_buf_cnt++;
+if (eq_buf_cnt >= ba_num)
+break;
+}
+eq->cur_eqe_ba = eq->buf_dma[0];
+if (ba_num > 1)
+eq->nxt_eqe_ba = eq->buf_dma[1];
+
+} else if (mhop_num == 2) {
+/* alloc L1 BT and buf */
+for (i = 0; i < bt_chk_sz / 8; i++) {
+eq->bt_l1[i] = dma_alloc_coherent(dev, bt_chk_sz,
+&(eq->l1_dma[i]),
+GFP_KERNEL);
+if (!eq->bt_l1[i])
+goto err_dma_alloc_l1;
+
+*(eq->bt_l0 + i) = eq->l1_dma[i];
+
+for (j = 0; j < bt_chk_sz / 8; j++) {
+idx = i * bt_chk_sz / 8 + j;
+if (eq_buf_cnt + 1 < ba_num) {
+size = buf_chk_sz;
+
else {
  eqe_alloc = (buf_chk_sz / eq->eqe_size) / idx;
  size = (eq->entries - eqe_alloc) * eq->eqe_size;
} 
if (!eq->buf[idx]) 
  goto err_dma_alloc_buf;
+memset(eq->buf[idx], 0, size);
+(eq->bt_l1[i] + j) = eq->buf_dma[idx];
+eq_buf_cnt++;
+break;
+}
+}
+if (eq_alloc_done) 
  break;
+}
+if (eq_alloc_done) 
  break;
+eq->cur_eqe_ba = eq->buf_dma[0];
+if (ba_num > 1) 
  eq->nxt_eqe_ba = eq->buf_dma[1];
+}
+
+eq->l0_last_num = i + 1;
+if (mhop_num == 2) 
  eq->l1_last_num = j + 1;
+-return 0;
+
+err_dma_alloc_l1:
+dma_free_coherent(dev, bt_chk_sz, eq->bt_l0, eq->l0_dma);
+eq->bt_l0 = NULL;
+eq->l0_dma = 0;
+for (i -= 1; i >= 0; i--) 
  dma_free_coherent(dev, bt_chk_sz, eq->bt_l1[i], eq->l1_dma[i]);
+}
+for (j = 0; j < bt_chk_sz / 8; j++) 
  idx = i * bt_chk_sz / 8 + j;
+dma_free_coherent(dev, buf_chk_sz, eq->buf[idx], eq->buf_dma[idx]);
} 
+} 
+} 
+goto err_dma_alloc_l0; 
+ 
+err_dma_alloc_buf: 
+dma_free_coherent(dev, bt_chk_sz, eq->bt_l0, eq->l0_dma); 
+eq->bt_l0 = NULL; 
+eq->l0_dma = 0; 
+ 
+if (mhop_num == 1) 
+for (i -= 1; i >= 0; i--) 
+dma_free_coherent(dev, buf_chk_sz, eq->buf[i], 
+eq->buf_dma[i]); 
+else if (mhop_num == 2) { 
+record_i = i; 
+record_j = j; 
+for (; i >= 0; i--) { 
+dma_free_coherent(dev, bt_chk_sz, eq->bt_l1[i], 
+eq->bt_l1_dma[i]); 
+ 
+for (j = 0; j < bt_chk_sz / 8; j++) { 
+if (i == record_i && j >= record_j) 
+break; 
+ 
+idx = i * bt_chk_sz / 8 + j; 
+dma_free_coherent(dev, buf_chk_sz, 
+eq->buf[idx], 
+eq->buf_dma[idx]); 
+} 
+} 
+} 
+ 
+err_dma_alloc_l0: 
kfree(eq->bt_l1); 
+eq->bt_l1 = NULL; 
+ 
+err_kcalloc_bt_l1: 
kfree(eq->l1_dma); 
+eq->l1_dma = NULL; 
+ 
+err_kcalloc_l1_dma: 
kfree(eq->buf); 
+eq->buf = NULL; 
+ 
+err_kcalloc_buf: 
kfree(eq->buf_dma); 
+eq->buf_dma = NULL; 
+ 

static int hns_roce_v2_create_eq(struct hns_roce_dev *hr_dev, struct hns_roce_eq *eq, unsigned int eq_cmd)
{
    struct device *dev = hr_dev->dev;
    struct hns_roce_cmd_mailbox *mailbox;
    u32 buf_chk_sz = 0;
    int ret;

    /* Allocate mailbox memory */
    mailbox = hns_roce_alloc_cmd_mailbox(hr_dev);
    if (IS_ERR(mailbox))
        return PTR_ERR(mailbox);

    if (!hr_dev->caps.eqe_hop_num) {
        buf_chk_sz = 1 << (hr_dev->caps.eqe_buf_pg_sz + PAGE_SHIFT);
        eq->buf_list = kzalloc(sizeof(struct hns_roce_buf_list), GFP_KERNEL);
        if (!eq->buf_list) {
            ret = -ENOMEM;
            goto free_cmd_mbox;
        }

        eq->buf_list->buf = dma_alloc_coherent(dev, buf_chk_sz,
                                              &(eq->buf_list->map),
                                              GFP_KERNEL);
        if (!eq->buf_list->buf) {
            ret = -ENOMEM;
            goto err_alloc_buf;
        }

        memset(eq->buf_list->buf, 0, buf_chk_sz);
    } else {
        ret = hns_roce_mhop_alloc_eq(hr_dev, eq);
        if (ret) {
            ret = -ENOMEM;
            goto free_cmd_mbox;
        }

        hns_roce_config_eqc(hr_dev, eq, mailbox->buf);
        ret = hns_roce_cmd_mbox(hr_dev, mailbox->dma, 0, eq->eqn, 0,
                                eq_cmd, HNS_ROCE_CMD_TIMEOUT_MSECS);
    }
```c
+if (ret) {
+dev_err(dev, "[mailbox cmd] create eqc failed.
");
+goto err_cmd_mbox;
+}
+
+hns_roce_free_cmd_mailbox(hr_dev, mailbox);
+
+return 0;
+
+err_cmd_mbox:
+if (!hr_dev->caps.eqe_hop_num)
+dma_free_coherent(dev, buf_chk_sz, eq->buf_list->buf,
+  eq->buf_list->map);
+else {
+hns_roce_mhop_free_eq(hr_dev, eq);
+goto free_cmd_mbox;
+}
+
+err_alloc_buf:
+kfree(eq->buf_list);
+
+free_cmd_mbox:
+hns_roce_free_cmd_mailbox(hr_dev, mailbox);
+
+return ret;
+}
+
+static int hns_roce_v2_init_eq_table(struct hns_roce_dev *hr_dev)
+{
+struct hns_roce_eq_table *eq_table = &hr_dev->eq_table;
+struct device *dev = hr_dev->eq_table;
+struct hns_roce_eq *eq;
+unsigned int eq_cmd;
+int irq_num;
+int eq_num;
+int other_num;
+int comp_num;
+int aeq_num;
+int i, j, k;
+int ret;
+
+other_num = hr_dev->caps.num_other_vectors;
+comp_num = hr_dev->caps.num_comp_vectors;
+aeq_num = hr_dev->caps.num_aeq_vectors;
+
+eq_num = comp_num + aeq_num;
+irq_num = eq_num + other_num;
+```
+eq_table->eq = kmalloc(eq_num, sizeof(*eq_table->eq), GFP_KERNEL);
+if (!eq_table->eq)
+return -ENOMEM;
+
+for (i = 0; i < irq_num; i++) {
+hr_dev->irq_names[i] = kmalloc(HNS_ROCE_INT_NAME_LEN,
+GFP_KERNEL);
+if (!hr_dev->irq_names[i]) {
+ret = -ENOMEM;
+goto err_failed_kzalloc;
+}
+}
+
+/* create eq */
+for (j = 0; j < eq_num; j++) {
+eq = &eq_table->eq[j];
+eq->hr_dev = hr_dev;
+eq->eqn = j;
+if (j < comp_num) { /* CEQ */
+eq_cmd = HNS_ROCE_CMD_CREATE_CEQC;
+eq->type_flag = HNS_ROCE_CEQ;
+eq->entries = hr_dev->caps.ceqe_depth;
+eq->eqe_size = HNS_ROCE_CEQ_ENTRY_SIZE;
+eq->irq = hr_dev->irq[j + other_num + aeq_num];
+eq->eq_max_cnt = HNS_ROCE_CEQ_DEFAULT_BURST_NUM;
+eq->eq_period = HNS_ROCE_CEQ_DEFAULT_INTERVAL;
+} else { /* AEQ */
+eq_cmd = HNS_ROCE_CMD_CREATE_AEQC;
+eq->type_flag = HNS_ROCE_AEQ;
+eq->entries = hr_dev->caps.aeqe_depth;
+eq->eqe_size = HNS_ROCE_AEQ_ENTRY_SIZE;
+eq->irq = hr_dev->irq[j - comp_num + other_num];
+eq->eq_max_cnt = HNS_ROCE_AEQ_DEFAULT_BURST_NUM;
+eq->eq_period = HNS_ROCE_AEQ_DEFAULT_INTERVAL;
+}
+
+ret = hns_roce_v2_create_eq(hr_dev, eq, eq_cmd);
+if (ret) {
+dev_err(dev, "eq create failed.\n");
+goto err_create_eq_fail;
+}
+}
+
+/* enable irq */
+hns_roce_v2_int_mask_enable(hr_dev, eq_num, EQ_ENABLE);
+
/* irq contains: abnormal + AEQ + CEQ*/
+for (k = 0; k < irq_num; k++)
+if (k < other_num)
+snprintf((char *)hr_dev->irq_names[k],
+ HNS_ROCE_INT_NAME_LEN, "hns-abn-%d", k);
+else if (k < (other_num + aeq_num))
+snprintf((char *)hr_dev->irq_names[k],
+ HNS_ROCE_INT_NAME_LEN, "hns-aeq-%d",
+ k - other_num);
+else
+snprintf((char *)hr_dev->irq_names[k],
+ HNS_ROCE_INT_NAME_LEN, "hns-ceq-%d",
+ k - other_num - aeq_num);
+
+for (k = 0; k < irq_num; k++) {
+if (k < other_num)
+ret = request_irq(hr_dev->irq[k],
+ hns_roce_v2_msix_interrupt_abn,
+ 0, hr_dev->irq_names[k], hr_dev);
+
+else if (k < (other_num + comp_num))
+ret = request_irq(eq_table->eq[k - other_num].irq,
+ hns_roce_v2_msix_interrupt_eq,
+ 0, hr_dev->irq_names[k + aeq_num],
+ &eq_table->eq[k - other_num]);
+else
+ret = request_irq(eq_table->eq[k - other_num].irq,
+ hns_roce_v2_msix_interrupt_eq,
+ 0, hr_dev->irq_names[k - comp_num],
+ &eq_table->eq[k - other_num]);
+if (ret) {
+dev_err(dev, "Request irq error!
++goto err_request_irq_fail;
+
+err_request_irq_fail:
+for (k -= 1; k >= 0; k--)
+if (k < other_num)
+free_irq(hr_dev->irq[k], hr_dev);
+else
+free_irq(eq_table->eq[k - other_num].irq,
+ &eq_table->eq[k - other_num]);
+
+err_create_eq_fail:
+for (j -= 1; j >= 0; j--)
hns_roce_v2_free_eq(hr_dev, &eq_table->eq[j]);
+
+err_failed_kzalloc:
+for (i -= 1; i >= 0; i--)
+kfree(hr_dev->irq_names[i]);
+kfree(eq_table->eq);
+
+return ret;
+}
+
+static void hns_roce_v2_cleanup_eq_table(struct hns_roce_dev *hr_dev)
+{
+struct hns_roce_eq_table *eq_table = &hr_dev->eq_table;
+int irq_num;
+int eq_num;
+int i;
+
+eq_num = hr_dev->caps.num_comp_vectors + hr_dev->caps.num_aeq_vectors;
+irq_num = eq_num + hr_dev->caps.num_other_vectors;
+
+/* Disable irq */
+hns_roce_v2_int_mask_enable(hr_dev, eq_num, EQ_DISABLE);
+
+for (i = 0; i < hr_dev->caps.num_other_vectors; i++)
+free_irq(hr_dev->irq[i], hr_dev);
+
+for (i = 0; i < eq_num; i++) {
+hns_roce_v2_destroy_eqc(hr_dev, i);
+
+free_irq(eq_table->eq[i].irq, &eq_table->eq[i]);
+
+hns_roce_v2_free_eq(hr_dev, &eq_table->eq[i]);
+}
+
+for (i = 0; i < irq_num; i++)
+kfree(hr_dev->irq_names[i]);
+
+kfree(eq_table->eq);
+}
+
+static const struct hns_roce_hw hns_roce_hw_v2 = {
.cmq_init = hns_roce_v2_cmq_init,
.cmq_exit = hns_roce_v2_cmq_exit,
@@ .cmq_init = hns_roce_v2_cmq_init,
.cmq_exit = hns_roce_v2_cmq_exit,
@@ .cmq_init = hns_roce_v2_cmq_init,
.cmq_exit = hns_roce_v2_cmq_exit,
@@ .cmq_init = hns_roce_v2_cmq_init,
.cmq_exit = hns_roce_v2_cmq_exit,
@@ .cmq_init = hns_roce_v2_cmq_init,
.cmq_exit = hns_roce_v2_cmq_exit,


```
+cleanup_eq = hns_roce_v2_cleanup_eq_table,
+
static const struct pci_device_id hns_roce_hw_v2_pci_tbl[] = {
  @ @ -3193,10 +4765,13 @@
  {0, },
};

+MODULE_DEVICE_TABLE(pci, hns_roce_hw_v2_pci_tbl);
+
static int hns_roce_hw_v2_get_cfg(struct hns_roce_dev *hr_dev,
  struct hnae3_handle *handle)
{
  const struct pci_device_id *id;
  +int i;

  id = pci_match_id(hns_roce_hw_v2_pci_tbl, hr_dev->pci_dev);
  if (!id) {
    @ @ -3214,8 +4789,15 @@
    hr_dev->iboe.netdevs[0] = handle->rinfo.netdev;
    hr_dev->iboe.phy_port[0] = 0;

    +addrconf_addr_eui48((u8 *)&hr_dev->ib_dev.node_guid,
    +  hr_dev->iboe.netdevs[0]->dev_addr);
    +
    +for (i = 0; i < HNS_ROCE_V2_MAX_IRQ_NUM; i++)
    +hr_dev->irq[i] = pci_irq_vector(handle->pdev,
    +  i + handle->rinfo.base_vector);
    +
    /* cmd issue mode: 0 is poll, 1 is event */
    -hr_dev->cmd_mod = 0;
    +hr_dev->cmd_mod = 1;
    hr_dev->loop_idc = 0;

    return 0;
    @ @ -3268,14 +4850,87 @@
  }
  struct hns_roce_dev *hr_dev = (struct hns_roce_dev *)handle->priv;

  +if (!hr_dev)
  +return;
  +
  hns_roce_exit(hr_dev);
  kfree(hr_dev->priv);
  ib_dealloc_device(&hr_dev->ib_dev);
}

+static int hns_roce_hw_v2_reset_notify_down(struct hnae3_handle *handle)
```
struct hns_roce_dev *hr_dev = (struct hns_roce_dev *)handle->priv;

if (!hr_dev) {
    dev_err(&handle->pdev->dev, 
        "Input parameter handle->priv is NULL!\n");
    return -EINVAL;
}

hr_dev->active = false;
hr_dev->is_reset = true;

event.event = IB_EVENT_DEVICE_FATAL;
event.device = &hr_dev->ib_dev;
event.element.port_num = 1;
ib_dispatch_event(&event);

return 0;

static int hns_roce_hw_v2_reset_notify_init(struct hnae3_handle *handle) {
    int ret;
    ret = hns_roce_hw_v2_init_instance(handle);
    if (ret) {
        /* when reset notify type is HNAE3_INIT_CLIENT In reset notify
         * callback function, RoCE Engine reinitialize. If RoCE reinit
         * failed, we should inform NIC driver.
         */
        handle->priv = NULL;
        dev_err(&handle->pdev->dev, 
            "In reset process RoCE reinit failed %d\n", ret);
    }
    return ret;
}

static int hns_roce_hw_v2_reset_notify_uninit(struct hnae3_handle *handle) {
    msleep(100);
    hns_roce_hw_v2_uninit_instance(handle, false);
    return 0;
}

static int hns_roce_hw_v2_reset_notify(struct hnae3_handle *handle, 
    enum hnae3_reset_notify_type type) {
+{  
+    int ret = 0;  
+    switch (type) {  
+        case HNAE3_DOWN_CLIENT:  
+            ret = hns_roce_hw_v2_reset_notify_down(handle);  
+            break;  
+        case HNAE3_INIT_CLIENT:  
+            ret = hns_roce_hw_v2_reset_notify_init(handle);  
+            break;  
+        case HNAE3_UNINIT_CLIENT:  
+            ret = hns_roce_hw_v2_reset_notify_uninit(handle);  
+            break;  
+        default:  
+            break;  
+    }  
+    return ret;  
+}

static const struct hnae3_client_ops hns_roce_hw_v2_ops = {  
    .init_instance = hns_roce_hw_v2_init_instance,  
    .uninit_instance = hns_roce_hw_v2_uninit_instance,  
    .reset_notify = hns_roce_hw_v2_reset_notify,  
};

static struct hnae3_client hns_roce_hw_v2_client = {  
    --- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_hw_v2.h  
    +++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_hw_v2.h  
    @ @ -.50,9 +50,14 @@  
    #define HNS_ROCE_V2_MAX_CQE_NUM 0x10000  
    #define HNS_ROCE_V2_MAX_RQ_SGE_NUM 0x100  
    #define HNS_ROCE_V2_MAX_SQ_SGE_NUM 0xff  
    +#define HNS_ROCE_V2_MAX_EXTEND_SGE_NUM 0x200000  
    #define HNS_ROCE_V2_MAX_SQ_INLINE 0x20  
    #define HNS_ROCE_V2_UAR_NUM 256  
    #define HNS_ROCE_V2_PHY_UAR_NUM 1  
    +#define HNS_ROCE_V2_MAX_IRQ_NUM 65  
    +#define HNS_ROCE_V2_COMP_VEC_NUM 63  
    +#define HNS_ROCE_V2_AEQE_VEC_NUM 1  
    +#define HNS_ROCE_V2_ABNORMAL_VEC_NUM 1  
    #define HNS_ROCE_V2_MAX_MTPT_NUM 0x8000  
    #define HNS_ROCE_V2_MAX_MTT_SEGs 0x1000000  
    #define HNS_ROCE_V2_MAX_CQE_SEGs 0x1000000  
    @ @ -.72,12 +77,16 @@  
    #define HNS_ROCE_V2_PAGE_SIZE_SUPPORTED 0xFFFFF000  
    #define HNS_ROCE_V2_MAX_INNER_MTPT_NUM 2  
    #define HNS_ROCE_INVALID_LKEY 0x100  

---
-#define HNS_ROCE_CMQ_TX_TIMEOUT200
+#define HNS_ROCE_CMQ_TX_TIMEOUT30000
+#define HNS_ROCE_V2_UC_RC_SGE_NUM_IN_WQE2
+#define HNS_ROCE_V2_RSV_QPS8

#define HNS_ROCE_CONTEXT_HOP_NUM1
#define HNS_ROCE_MTT_HOP_NUM1
#define HNS_ROCE_CQE_HOP_NUM1
#define HNS_ROCE_PBL_HOP_NUM2
+#define HNS_ROCE_EQE_HOP_NUM2
+
#define HNS_ROCE_V2_GID_INDEX_NUM256

#define HNS_ROCE_V2_TABLE_CHUNK_SIZE(1 << 18)
@@ -105,6 +114,12 @@
    
    (step_idx == 1 && hop_num == 1) || 
    (step_idx == 2 && hop_num == 2))

+enum {
+    NO_ARMED = 0x0,
+    REG_NXT_CEQE = 0x2,
+    REG_NXT_SE_CEQE = 0x3
+};
+
#define V2_CQ_DB_REQ_NOT_SOL0
#define V2_CQ_DB_REQ_NOT1
@@ -212,23 +227,26 @@
}

struct hns_roce_v2_cq_context {
    u32 byte_4_pg_ceqn;
-    u32 byte_8_cqn;
-    u32 cqe_cur_blk_addr;
-    u32 byte_16_hop_addr;
-    u32 cqe_nxt_blk_addr;
-    u32 byte_24_pgsz_addr;
-    u32 byte_28_cq_pi;
-    u32 byte_32_cq_ci;
-    u32 cqe_ba;
-    u32 byte_40_cqe_ba;
-    u32 byte_44_db_record;
-    u32 db_record_addr;
-    u32 byte_52_cqe_cnt;
-    u32 byte_56_cqe_period_maxcnt;
-    u32 cqe_report_timer;
-    u32 byte_64_se_cqe_idx;
+    __le32 byte_4_pg_ceqn;
+__le32byte_8_cqn;
+__le32cque_cur_blk_addr;
+__le32byte_16_hop_addr;
+__le32cque_nxt_blk_addr;
+__le32byte_24_pgsz_addr;
+__le32byte_28_cq_pi;
+__le32byte_32_cq_ci;
+__le32cque_ba;
+__le32byte_40_cqe_ba;
+__le32byte_44_db_record;
+__le32db_record_addr;
+__le32byte_52_cqe_cnt;
+__le32byte_56_cqe_period_maxcnt;
+__le32cque_report_timer;
+__le32byte_64_se_cqe_idx;
};

+#define HNS_ROCE_V2_CQ_DEFAULT_BURST_NUM 0x0
+#define HNS_ROCE_V2_CQ_DEFAULT_INTERVAL 0x0
+
#define V2_CQC_BYTE_4_CQ_ST_S 0
#define V2_CQC_BYTE_4_CQ_ST_M GENMASK(1, 0)

@@ -284,6 +302,9 @@

#define V2_CQC_BYTE_44_DB_RECORD_EN_S 0
+
#define V2_CQC_BYTE_44_DB_RECORD_ADDR_S 1
#define V2_CQC_BYTE_44_DB_RECORD_ADDR_M GENMASK(31, 1)
+
#define V2_CQC_BYTE_52_CQE_CNT_S 0
#define V2_CQC_BYTE_52_CQE_CNT_M GENMASK(23, 0)

@@ -313,66 +334,66 @@
 });

struct hns_roce_v2_qp_context {
-  u32byte_4_sqpn_tst;
-  u32wqe_sge_ba;
-  u32byte_12_sq_hop;
-  u32byte_16_buf_ba_pg_sz;
-  u32byte_20_smac_sgid_idx;
-  u32byte_24_mtu_tc;
-  u32byte_28_at_fl;
+  __le32byte_4_sqpn_tst;
+  __le32wqe_sge_ba;
+  __le32byte_12_sq_hop;
+  __le32byte_16_buf_ba_pg_sz;
+  __le32byte_20_smac_sgid_idx;

+ _le32byte_24_mtu_tc;
+ _le32byte_28_at_fl;
u8gId[GID_LEN_V2];
-u32dmac;
-u32byte_52_udpspn_dmac;
-u32byte_56_dqpn_err;
-u32byte_60_qpst_mapid;
-u32qkey_xrcd;
-u32byte_68_rq_db;
-u32rq_db_record_addr;
-u32byte_76_sqrn_op_en;
-u32byte_80_rnr_rx_cqn;
-u32byte_84_rq_ci_pi;
-u32rq_cur_blk_addr;
-u32byte_92_sq_info;
-u32byte_96_rx_reqmsn;
-u32rq_nxt_blk_addr;
-u32byte_104_rq_sge;
-u32byte_108_rx_quepsn;
-u32rq_rnr_timer;
-u32rx_msg_len;
-u32rx_rkey_pkt_info;
-u64rx_va;
-u32byte_132_trrl;
-u32trrl_ba;
-u32byte_140_raq;
-u32byte_144_raq;
-u32byte_148_raq;
-u32byte_152_raq;
-u32byte_156_raq;
-u32byte_160_sq_ci_pi;
-u32sq_cur_blk_addr;
-u32byte_168_irrl_idx;
-u32byte_172_sq_psn;
-u32byte_176_msg_pkttn;
-u32sq_cur_sge_blk_addr;
-u32byte_184_irrl_idx;
-u32cur_sge_offset;
-u32byte_192_ext_sge;
-u32byte_196_sq_psn;
-u32byte_200_sq_max;
-u32irrl_ba;
-u32byte_208_irrl;
-u32byte_212_lsn;
-u32sq_timer;
-u32byte_220_retry_psn_msn;
-u32byte_224_retry_msg;
-u32rx_sq_cur_blk_addr;
- u32 byte_232_irrl_sge;
- u32 irrl_cur_sge_offset;
- u32 byte_240_irrl_tail;
- u32 byte_244_mr_rxack;
- u32 byte_248_ack_psn;
- u32 byte_252_err_txcqcn;
- u32 byte_256_sqflush_rqcqe;
+ __le32 dmac;
+ __le32 byte_52_udp_isn_dmac;
+ __le32 byte_56_dqpn_err;
+ __le32 byte_60_qpsn_mapid;
+ __le32 qkey_xrcd;
+ __le32 byte_68_rq_db;
+ __le32 rq_db_record_addr;
+ __le32 byte_76_sqpn_op_en;
+ __le32 byte_80_mr_rx_cqn;
+ __le32 byte_84_rq_ci_pi;
+ __le32 rq_cur_blk_addr;
+ __le32 byte_92_sq_info;
+ __le32 byte_96_rx_remsn;
+ __le32 rq_nxt_blk_addr;
+ __le32 byte_104_rq_sge;
+ __le32 byte_108_rx_rem_psn;
+ __le32 rq_mr_timer;
+ __le32 rx_msg_len;
+ __le32 rx_rkey_pkt_info;
+ __le64 rx_va;
+ __le32 byte_132_trrl;
+ __le32 trrl ba;
+ __le32 byte_140 raq;
+ __le32 byte_144 raq;
+ __le32 byte_148 raq;
+ __le32 byte_152 raq;
+ __le32 byte_156 raq;
+ __le32 byte_160_sq_ci_pi;
+ __le32 sq_cur_blk_addr;
+ __le32 byte_168_irrl_idx;
+ __le32 byte_172_sq_psn;
+ __le32 byte_176_msg_pkttn;
+ __le32 sq_cur_sge_blk_addr;
+ __le32 byte_184_irrl_idx;
+ __le32 cur_sge_offset;
+ __le32 byte_192 ext_sge;
+ __le32 byte_196_sq_psn;
+ __le32 byte_200_sq_max;
+ __le32 trrl ba;
+ __le32 byte_208 irrl;
+ __le32 byte_212 lsn;
struct hns_roce_v2_cqe {
    u32 byte_4;
    u32 rkey_immtdata;
    u32 byte_12;
    u32 byte_16;
    u32 byte_cnt;
    u32 smac;
    u32 byte_28;
    u32 byte_32;
    __le32 byte_4;
    union {
        __le32 rkey;
        __le32 immtdata;
    };
    __le32 byte_12;
    __le32 byte_16;
    __le32 byte_cnt;
    u8 smac[4];
    __le32 byte_28;
    __le32 byte_32;
};

#define V2_CQE_BYTE_4_OPCODE_S 0
@@ -876,15 +900,15 @@
#define V2_DB_BYTE_4_CMD_S 24
#define V2_DB_BYTE_4_CMD_M GENMASK(27, 24)

-#define V2_DB_PARAMETER_CONS_IDX_S 0
-#define V2_DB_PARAMETER_CONS_IDX_M GENMASK(15, 0)
+#define V2_DB_PARAMETER_IDX_S 0
+#define V2_DB_PARAMETER_IDX_M GENMASK(15, 0)
#define V2_DB_PARAMETER_SL_S 16
#define V2_DB_PARAMETER_SL_M GENMASK(18, 16)

struct hns_roce_v2_cq_db {
    u32 byte_4;
    u32 parameter;
    __le32 byte_4;
    __le32 parameter;
};
#define V2_CQ_DB_BYTE_4_TAG_S 0
@@ -901,14 +925,101 @@
#define V2_CQ_DB_PARAMETER_NOTIFY_S 24

+struct hns_roce_v2_ud_send_wqe {
    __le32 byte_4;
    __le32 msg_len;
    __le32 immtdata;
    __le32 byte_16;
    __le32 byte_20;
    __le32 byte_24;
    __le32 qkey;
    __le32 byte_32;
    __le32 byte_36;
    __le32 byte_40;
    __le32 dmac;
    __le32 byte_48;
    u8 dgid[GID_LEN_V2];
    +
    +};
+﻿#define V2_UD_SEND_WQE_BYTE_4_OPCODE_S 0
+﻿#define V2_UD_SEND_WQE_BYTE_4_OPCODE_M GENMASK(4, 0)
+
+﻿#define V2_UD_SEND_WQE_BYTE_4_OWNER_S 7
+
+﻿#define V2_UD_SEND_WQE_BYTE_4_CQE_S 8
+
+﻿#define V2_UD_SEND_WQE_BYTE_4_SE_S 11
+
+﻿#define V2_UD_SEND_WQE_BYTE_16_PD_S 0
+﻿#define V2_UD_SEND_WQE_BYTE_16_PD_M GENMASK(23, 0)
+
+﻿#define V2_UD_SEND_WQE_BYTE_16_SGE_NUM_S 24
+﻿#define V2_UD_SEND_WQE_BYTE_16_SGE_NUM_M GENMASK(31, 24)
+
+﻿#define V2_UD_SEND_WQE_BYTE_20_MSG_START_SGE_IDX_S 0
+#define V2_UD_SEND_WQE_BYTE_20_MSG_START_SGE_IDX_M GENMASK(23, 0)
+
+#define V2_UD_SEND_WQE_BYTE_24_UDPSPN_S 16
+#define V2_UD_SEND_WQE_BYTE_24_UDPSPN_M GENMASK(31, 16)
+
+#define V2_UD_SEND_WQE_BYTE_32_DQPN_S 0
+#define V2_UD_SEND_WQE_BYTE_32_DQPN_M GENMASK(23, 0)
+
+#define V2_UD_SEND_WQE_BYTE_36_VLAN_S 0
+#define V2_UD_SEND_WQE_BYTE_36_VLAN_M GENMASK(15, 0)
+
+#define V2_UD_SEND_WQE_BYTE_36_HOPLIMIT_S 16
+#define V2_UD_SEND_WQE_BYTE_36_HOPLIMIT_M GENMASK(23, 16)
+
+#define V2_UD_SEND_WQE_BYTE_36_TCLASS_S 24
+#define V2_UD_SEND_WQE_BYTE_36_TCLASS_M GENMASK(31, 24)
+
+#define V2_UD_SEND_WQE_BYTE_40_FLOW_LABEL_S 0
+#define V2_UD_SEND_WQE_BYTE_40_FLOW_LABEL_M GENMASK(19, 0)
+
+#define V2_UD_SEND_WQE_BYTE_40_SL_S 20
+#define V2_UD_SEND_WQE_BYTE_40_SL_M GENMASK(23, 20)
+
+#define V2_UD_SEND_WQE_BYTE_40_PORTN_S 24
+#define V2_UD_SEND_WQE_BYTE_40_PORTN_M GENMASK(26, 24)
+
+#define V2_UD_SEND_WQE_BYTE_40_LBI_S 31
+
+#define V2_UD_SEND_WQE_DMAC_0_S 0
+#define V2_UD_SEND_WQE_DMAC_0_M GENMASK(7, 0)
+
+#define V2_UD_SEND_WQE_DMAC_1_S 8
+#define V2_UD_SEND_WQE_DMAC_1_M GENMASK(15, 8)
+
+#define V2_UD_SEND_WQE_DMAC_2_S 16
+#define V2_UD_SEND_WQE_DMAC_2_M GENMASK(23, 16)
+
+#define V2_UD_SEND_WQE_DMAC_3_S 24
+#define V2_UD_SEND_WQE_DMAC_3_M GENMASK(31, 24)
+
+#define V2_UD_SEND_WQE_BYTE_48_DMCA_4_S 0
+#define V2_UD_SEND_WQE_BYTE_48_DMCA_4_M GENMASK(7, 0)
+
+#define V2_UD_SEND_WQE_BYTE_48_DMCA_5_S 8
+#define V2_UD_SEND_WQE_BYTE_48_DMCA_5_M GENMASK(15, 8)
+
+#define V2_UD_SEND_WQE_BYTE_48_SGID_INDEX_S 16
+#define V2_UD_SEND_WQE_BYTE_48_SGID_INDEX_M GENMASK(23, 16)
#define V2_UD_SEND_WQE_BYTE_48_SMAC_INDX_S 24
+#define V2_UD_SEND_WQE_BYTE_48_SMAC_INDX_M GENMASK(31, 24)
+
struct hns_roce_v2_rc_send_wqe {
    u32 byte_4;
    u32 msg_len;
    u32 inv_key_immtdata;
    u32 byte_16;
    u32 byte_20;
    u32 rkey;
    u64 va;
    __le32 byte_4;
    __le32 msg_len;
    union {
        __le32 inv_key;
        __le32 immtdata;
    };
    __le32 byte_16;
    __le32 byte_20;
    __le32 rkey;
    __le64 va;
};

#define V2_RC_SEND_WQE_BYTE_4_OPCODE_S 0
@@ -936,14 +1047,14 @@
#define V2_RC_SEND_WQE_BYTE_20_MSG_START_SGE_IDX_M GENMASK(23, 0)

struct hns_roce_v2_wqe_data_seg {
    __be32 len;
    __be32 lkey;
    __be64 addr;
    __le32 len;
    __le32 lkey;
    __le64 addr;
};

struct hns_roce_v2_db {
    u32 byte_4;
    u32 parameter;
    __le32 byte_4;
    __le32 parameter;
};

struct hns_roce_query_version {
    @@ -1003,12 +1114,12 @@
#define PF_RES_DATA_5_PF_EQC_BT_NUM_M GENMASK(25, 16)
struct hns_roce_vf_res_a {
    u32 vf_id;
    u32 vf_qpc_bt_idx_num;
    u32 vf_srqc_bt_idx_num;
    u32 vf_cqc_bt_idx_num;
    u32 vf_mpt_bt_idx_num;
    u32 vf_eqc_bt_idx_num;
    __le32 vf_id;
    __le32 vf_qpc_bt_idx_num;
    __le32 vf_srqc_bt_idx_num;
    __le32 vf_cqc_bt_idx_num;
    __le32 vf_mpt_bt_idx_num;
    __le32 vf_eqc_bt_idx_num;
};

#define VF_RES_A_DATA_1_VF_QPC_BT_IDX_S 0
@@ -1042,11 +1153,11 @@
#define VF_RES_A_DATA_5_VF_EQC_NUM_M GENMASK(25, 16)

struct hns_roce_vf_res_b {
    u32 rsv0;
    u32 vf_smac_idx_num;
    u32 vf_sgid_idx_num;
    u32 vf_qid_idx_sl_num;
    u32 rsv[2];
    __le32 rsv0;
    __le32 vf_smac_idx_num;
    __le32 vf_sgid_idx_num;
    __le32 vf_qid_idx_sl_num;
    __le32 rsv[2];
};

#define VF_RES_B_DATA_0_VF_ID_S 0
@@ -1078,11 +1189,11 @@
#define ROCEE_VF_SGID_CFG4_SGID_TYPE_M GENMASK(1, 0)

struct hns_roce_cfg_bt_attr {
    u32 vf_qpc_cfg;
    u32 vf_srqc_cfg;
    u32 vf_cqc_cfg;
    u32 vf_mpt_cfg;
    u32 rsv[2];
    __le32 vf_qpc_cfg;
    __le32 vf_srqc_cfg;
    __le32 vf_cqc_cfg;
    __le32 vf_mpt_cfg;
    __le32 rsv[2];
};
#define CFG_BT_ATTR_DATA_0_VF_QPC_BA_PGSZ_S 0
@@ -1122,16 +1233,13 @@
#define CFG_BT_ATTR_DATA_3_VF_MPT_HOPNUM_M GENMASK(9, 8)

struct hns_roce_cmq_desc {
- u16 opcode;
- u16 flag;
- u16 retval;
- u16 rsv;
- u32 data[6];
+ __le16 opcode;
+ __le16 flag;
+ __le16 retval;
+ __le16 rsv;
+ __le32 data[6];
};

- #define ROCEE_VF_MB_CFG0_REG		0x40
- #define ROCEE_VF_MB_STATUS_REG		0x58
- 
- #define HNS_ROCE_V2_GO_BIT_TIMEOUT_MSECS	10000

#define HNS_ROCE_HV_RUN_BIT_SHIFT31
@@ -1174,4 +1282,178 @@
 struct hns_roce_v2_cmq cmq;
 }; 

+ struct hns_roce_eq_context {
+ __le32 byte_4;
+ __le32 byte_8;
+ __le32 byte_12;
+ __le32 eqe_report_timer;
+ __le32 eqe_ba0;
+ __le32 eqe_ba1;
+ __le32 byte_28;
+ __le32 byte_32;
+ __le32 byte_36;
+ __le32 nxe_eqe_ba0;
+ __le32 nxe_eqe_ba1;
+ __le32 rsv[5];
+ 
+ +
+ +
+ +#define HNS_ROCE_AEQ_DEFAULT_BURST_NUM0x0
+ +#define HNS_ROCE_AEQ_DEFAULT_INTERVAL0x0
+ +#define HNS_ROCE_CEQ_DEFAULT_BURST_NUM0x0
+ +#define HNS_ROCE_CEQ_DEFAULT_INTERVAL0x0
+ +

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+#define HNS_ROCE_V2_EQ_STATE_INVALID0
+#define HNS_ROCE_V2_EQ_STATE_VALID1
+#define HNS_ROCE_V2_EQ_STATE_OVERFLOW2
+#define HNS_ROCE_V2_EQ_STATE_FAILURE3
+
+#define HNS_ROCE_V2_EQ_OVER_IGNORE_00
+#define HNS_ROCE_V2_EQ_OVER_IGNORE_11
+
+#define HNS_ROCE_V2_EQ_COALESCE_00
+#define HNS_ROCE_V2_EQ_COALESCE_11
+
+#define HNS_ROCE_V2_EQ_FIRED0
+#define HNS_ROCE_V2_EQ_ARMED1
+#define HNS_ROCE_V2_EQ_ALWAYS_ARMED3
+
+#define HNS_ROCE_EQ_INIT_EQE_CNT0
+#define HNS_ROCE_EQ_INIT_PROD_IDX0
+#define HNS_ROCE_EQ_INIT_REPORT_TIMER0
+#define HNS_ROCE_EQ_INIT_MSI_IDX0
+#define HNS_ROCE_EQ_INIT_CONS_IDX0
+#define HNS_ROCE_EQ_INIT_NXT_EQE_BA0
+
+#define HNS_ROCE_V2_CEQ_CEQE_OWNER_S31
+#define HNS_ROCE_V2_AEQ_AEQE_OWNER_S31
+
+#define HNS_ROCE_V2_COMP_EQE_NUM0x1000
+#define HNS_ROCE_V2ASYNC_EQE_NUM0x1000
+
+#define HNS_ROCE_V2_VF_INT_ST_AEQ_OVERFLOW_S0
+#define HNS_ROCE_V2_VF_INT_ST_BUS_ERR_S1
+#define HNS_ROCE_V2_VF_INT_ST_OTHER_ERR_S2
+
+#define HNS_ROCE_EQ_DB_CMD_AEQ0x0
+#define HNS_ROCE_EQ_DB_CMD_AEQ_ARMED0x1
+#define HNS_ROCE_EQ_DB_CMD_CEQ0x2
+#define HNS_ROCE_EQ_DB_CMD_CEQ_ARMED0x3
+
+#define EQ_ENABLE1
+#define EQ_DISABLE0
+
+#define EQ_REG_OFFSET0x4
+
+#define HNS_ROCE_INT_NAME_LEN32
+#define HNS_ROCE_V2_EQN_M GENMASK(23, 0)
+
+#define HNS_ROCE_V2_CONS_IDX_M GENMASK(23, 0)
+
+#define HNS_ROCE_V2_VF_ABN_INT_EN_S 0
+\#define HNS_ROCE_V2_VF_ABN_INT_EN_M GENMASK(0, 0)
+\#define HNS_ROCE_V2_VF_ABN_INT_ST_M GENMASK(2, 0)
+\#define HNS_ROCE_V2_VF_ABN_INT_CFG_M GENMASK(2, 0)
+\#define HNS_ROCE_V2_VF_EVENT_INT_EN_M GENMASK(0, 0)

+/* WORD0 */
+\#define HNS_ROCE_EQC_EQ_ST_S 0
+\#define HNS_ROCE_EQC_EQ_ST_M GENMASK(1, 0)

+\#define HNS_ROCE_EQC_HOP_NUM_S 2
+\#define HNS_ROCE_EQC_HOP_NUM_M GENMASK(3, 2)

+\#define HNS_ROCE_EQC_OVER_IGNORE_S 4
+\#define HNS_ROCE_EQC_OVER_IGNORE_M GENMASK(4, 4)

+\#define HNS_ROCE_EQC_COALESCE_S 5
+\#define HNS_ROCE_EQC_COALESCE_M GENMASK(5, 5)

+\#define HNS_ROCE_EQC_ARM_ST_S 6
+\#define HNS_ROCE_EQC_ARM_ST_M GENMASK(7, 6)

+\#define HNS_ROCE_EQC_EQN_S 8
+\#define HNS_ROCE_EQC_EQN_M GENMASK(15, 8)

+\#define HNS_ROCE_EQC_EQE_CNT_S 16
+\#define HNS_ROCE_EQC_EQE_CNT_M GENMASK(31, 16)

+/* WORD1 */
+\#define HNS_ROCE_EQC_BA_PG_SZ_S 0
+\#define HNS_ROCE_EQC_BA_PG_SZ_M GENMASK(3, 0)

+\#define HNS_ROCE_EQC_BUF_PG_SZ_S 4
+\#define HNS_ROCE_EQC_BUF_PG_SZ_M GENMASK(7, 4)

+\#define HNS_ROCE_EQC_PROD_INDX_S 8
+\#define HNS_ROCE_EQC_PROD_INDX_M GENMASK(31, 8)

+/* WORD2 */
+\#define HNS_ROCE_EQC_MAX_CNT_S 0
+\#define HNS_ROCE_EQC_MAX_CNT_M GENMASK(15, 0)

+\#define HNS_ROCE_EQC_PERIOD_S 16
+\#define HNS_ROCE_EQC_PERIOD_M GENMASK(31, 16)

+/* WORD3 */
+\#define HNS_ROCE_EQC_REPORT_TIMER_S 0
+\#define HNS_ROCE_EQC_REPORT_TIMER_M GENMASK(31, 0)
+/* WORD4 */
+#define HNS_ROCE_EQC_EQE_BA_L_S 0
+#define HNS_ROCE_EQC_EQE_BA_L_M GENMASK(31, 0)
+
+/* WORD5 */
+#define HNS_ROCE_EQC_EQE_BA_H_S 0
+#define HNS_ROCE_EQC_EQE_BA_H_M GENMASK(28, 0)
+
+/* WORD6 */
+#define HNS_ROCE_EQC_SHIFT_S 0
+#define HNS_ROCE_EQC_SHIFT_M GENMASK(7, 0)
+
+/* WORD7 */
+#define HNS_ROCE_EQC_CUR_EQE_BA_L_S 16
+#define HNS_ROCE_EQC_CUR_EQE_BA_L_M GENMASK(31, 16)
+
+/* WORD8 */
+#define HNS_ROCE_EQC_CUR_EQE_BA_M_S 0
+#define HNS_ROCE_EQC_CUR_EQE_BA_M_M GENMASK(31, 0)
+
+/* WORD9 */
+#define HNS_ROCE_EQC_NXT_EQE_BA_L_S 0
+#define HNS_ROCE_EQC_NXT_EQE_BA_L_M GENMASK(31, 0)
+
+/* WORD10 */
+#define HNS_ROCE_EQC_NXT_EQE_BA_H_S 0
+#define HNS_ROCE_EQC_NXT_EQE_BA_H_M GENMASK(19, 0)
+
+#define HNS_ROCE_V2_CEQE_COMP_CQN_S 0
+#define HNS_ROCE_V2_CEQE_COMP_CQN_M GENMASK(23, 0)
+
+#define HNS_ROCE_V2_AEQE_EVENT_TYPE_S 0
+#define HNS_ROCE_V2_AEQE_EVENT_TYPE_M GENMASK(7, 0)
+
+#define HNS_ROCE_V2_AEQE_SUB_TYPE_S 8
+#define HNS_ROCE_V2_AEQE_SUB_TYPE_M GENMASK(15, 8)
+
+#define HNS_ROCE_V2_EQ_DB_CMD_S 16
+#define HNS_ROCE_V2_EQ_DB_CMD_M GENMASK(17, 16)
+\#define HNS_ROCE_V2_EQ_DB_TAG_S 0
+\#define HNS_ROCE_V2_EQ_DB_TAG_M GENMASK(7, 0)
+
+\#define HNS_ROCE_V2_EQ_DB_PARA_S 0
+\#define HNS_ROCE_V2_EQ_DB_PARA_M GENMASK(23, 0)
+
+\#define HNS_ROCE_V2_AEQE_EVENT_QUEUE_NUM_S 0
+\#define HNS_ROCE_V2_AEQE_EVENT_QUEUE_NUM_M GENMASK(23, 0)
+
#endif

--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_main.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_main.c
@@ -100,7 +100,7 @@
 unsigned int index, void **context)
 {
 struct hns_roce_dev *hr_dev = to_hr_dev(device);
-\tunion ib_gid zgid = { {0} };
+\tstruct ib_gid_attr zattr = { };
 u8 port = port_num - 1;
 unsigned long flags;
 int ret;
@@ -110,7 +110,7 @@
 spin_lock_irqsave(&hr_dev->iboe.lock, flags);

 -ret = hr_dev->hw->set_gid(hr_dev, port, index, &zgid, NULL);
+ret = hr_dev->hw->set_gid(hr_dev, port, index, &zgid, &zattr);

 spin_unlock_irqrestore(&hr_dev->iboe.lock, flags);

@@ -200,7 +200,7 @@
 memset(props, 0, sizeof(*props));

 -props->sys_image_guid = hr_dev->sys_image_guid;
+props->sys_image_guid = cpu_to_be64(hr_dev->sys_image_guid);
 props->max_mr_size = (u64)(~(0ULL));
 props->page_size_cap = hr_dev->caps.page_size_cap;
 props->vendor_id = hr_dev->vendor_id;
@@ -337,9 +337,12 @@
 {
 int ret = 0;
 struct hns_roce_ucontext *context;
-\tstruct hns_roce_ib_alloc_ucontext_resp resp;
+\tstruct hns_roce_ib_alloc_ucontext_resp resp = { };
 struct hns_roce_dev *hr_dev = to_hr_dev(ib_dev);
+if (!hr_dev->active)
+return ERR_PTR(-EAGAIN);
+
+resp.qp_tab_size = hr_dev->caps.num_qps;

context = kmalloc(sizeof(*context), GFP_KERNEL);
@@ -350,6 +353,13 @@
 if (ret)
goto error_fail_uar_alloc;

+INIT_LIST_HEAD(&context->vma_list);
+mutex_init(&context->vma_list_mutex);
+if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) {
+INIT_LIST_HEAD(&context->page_list);
+mutex_init(&context->page_mutex);
+
+ret = ib_copy_to_udata(udata, &resp, sizeof(resp));
 if (ret)
goto error_fail_copy_to_udata;
@@ -375,6 +385,50 @@
 return 0;
 }

+static void hns_roce_vma_open(struct vm_area_struct *vma)
+{
+vma->vm_ops = NULL;
+}
+
+static void hns_roce_vma_close(struct vm_area_struct *vma)
+{
+struct hns_roce_vma_data *vma_data;
+
+vma_data = (struct hns_roce_vma_data *)vma->vm_private_data;
+vma_data->vma = NULL;
+mutex_lock(vma_data->vma_list_mutex);
+list_del(&vma_data->list);
+mutex_unlock(vma_data->vma_list_mutex);
+kfree(vma_data);
+}
+
+static const struct vm_operations_struct hns_roce_vm_ops = {
+open = hns_roce_vma_open,
+close = hns_roce_vma_close,
+};
+
+static int hns_roce_set_vma_data(struct vm_area_struct *vma,
+struct hns_roce_ucontext *context)
struct list_head *vma_head = &context->vma_list;

struct hns_roce_vma_data *vma_data;

vma_data = kzalloc(sizeof(*vma_data), GFP_KERNEL);
if (!vma_data)
    return -ENOMEM;

vma_data->vma = vma;

vma_data->vma_list_mutex = &context->vma_list_mutex;

vma->vm_private_data = vma_data;

vma->vm_ops = &hns_roce_vm_ops;

mutex_lock(&context->vma_list_mutex);
list_add(&vma_data->list, vma_head);
mutex_unlock(&context->vma_list_mutex);

return 0;

static int hns_roce_mmap(struct ib_ucontext *context,
        struct vm_area_struct *vma)
{
    if (vma->vm_start == NULL)
        return -EINVAL;
    return hns_roce_set_vma_data(vma, to_hr_ucontext(context));
}

static int hns_roce_port_immutable(struct ib_device *ib_dev, u8 port_num,
{
    return 0;
}

+static void hns_roce_disassociate_ucontext(struct ib_ucontext *ibcontext)
+
+{
    +struct hns_roce_ucontext *context = to_hr_ucontext(ibcontext);
    +struct hns_roce_vma_data *vma_data, *n;
    +struct vm_area_struct *vma;
    +int ret;
    +
    +mutex_lock(&context->vma_list_mutex);
    +list_for_each_entry_safe(vma_data, n, &context->vma_list, list) { 
        +vma = vma_data->vma;
        +ret = zap_vma_ptes(vma, vma->vm_start, PAGE_SIZE);
        +WARN_ONCE(ret, "%s: zap_vma_ptes failed", __func__);
+ vma->vm_flags &= ~(VM_SHARED | VM_MAYSHARE);
+ vma->vm_ops = NULL;
+ list_del(&vma_data->list);
+ kfree(vma_data);
+
+ mutex_unlock(&context->vma_list_mutex);
+
+ static void hns_roce_unregister_device(struct hns_roce_dev *hr_dev)
+ {
+ struct hns_roce_ib_iboe *iboe = &hr_dev->iboe;
+
+ hr_dev->active = false;
+ unregister_netdevice_notifier(&iboe->nb);
+ ib_unregister_device(&hr_dev->ib_dev);
+ }
+
+ /* OTHERS */
+ ib_dev->get_port_immutable = hns_roce_port_immutable;
+ +ib_dev->disassociate_ucontext = hns_roce_disassociate_ucontext;
+
+ ret = ib_register_device(ib_dev, NULL);
+ if (ret) {
+ @ @ -519,6 +595,7 @@
+
+ error_failed_setup_mtu_mac:
+ @ @ -636,7 +714,6 @@
+ hns_roce_cleanup_hem_table(hr_dev, &hr_dev->mr_table.mtpt_table);
+
+ err_unmap_mtt;
+ -hns_roce_cleanup_hem_table(hr_dev, &hr_dev->mr_table.mtt_table);
+ if (hns_roce_check_whether_mhop(hr_dev, HEM_TYPE_CQE))
+ hns_roce_cleanup_hem_table(hr_dev,
+ &hr_dev->mr_table.mtt_cqe_table);
+ @ @ -660,6 +737,11 @@
+ spin_lock_init(&hr_dev->sm_lock);
+ spin_lock_init(&hr_dev->bt_cmd_lock);
+
+ +if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) {
+ +INIT_LIST_HEAD(&hr_dev->pgdir_list);
+ +mutex_init(&hr_dev->pgdir_mutex);
ret = hns_roce_init_uar_table(hr_dev);
if (ret) {
    dev_err(dev, "Failed to initialize uar table. aborting\n");
    return ret;
}
hr_dev->is_reset = false;

if (hr_dev->hw->cmq_init) {
    ret = hr_dev->hw->cmq_init(hr_dev);
    if (ret) {
        goto error_failed_cmd_init;
    }
}

if (hr_dev->cmd_mod) {
    ret = hns_roce_init_eq_table(hr_dev);
    if (ret) {
        dev_err(dev, "eq init failed!\n");
        goto error_failed_eq_table;
    }
    ret = hr_dev->hw->init_eq(hr_dev);
    if (ret) {
        dev_err(dev, "eq init failed!\n");
        goto error_failed_eq_table;
    }
}

if (hr_dev->cmd_mod) {
    hns_roce_cmd_use_polling(hr_dev);
    if (hr_dev->cmd_mod)
        hns_roce_cleanup_eq_table(hr_dev);
    error_failed_use_event:
    -if (hr_dev->cmd_mod)
        -hns_roce_cleanupeq_table(hr_dev);
        +hr_dev->hw->cleanup_eq(hr_dev);
    error_failed_eq_table:
    hns_roce_cmd_cleanup(hr_dev);
    void hns_roce_exit(struct hns_roce_dev *hr_dev)
    {
        hns_roce_unregister_device(hr_dev);
        if (hr_dev->hw->hw_exit)
            hr_dev->hw->hw_exit(hr_dev);
        hns_roce_cleanup_bitmap(hr_dev);
@@ -837,8 +918,7 @@
     if (hr_dev->cmd_mod)
         hns_roce_cmd_use_polling(hr_dev);

    -if (hr_dev->cmd_mod)
    -hns_roce_cleanup_eq_table(hr_dev);
    +hr_dev->hw->cleanup_eq(hr_dev);
    hns_roce_cmd_cleanup(hr_dev);
    if (hr_dev->hw->cmq_exit)
        hr_dev->hw->cmq_exit(hr_dev);
--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_mr.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_mr.c
@@ -707,7 +707,6 @@
     struct hns_roce_hem_table *table;
     dma_addr_t dma_handle;
     __le64 *mtts;
-    u32 s = start_index * sizeof(u64);
     u32 bt_page_size;
     u32 i;
@@ -730,7 +729,8 @@
         table = &hr_dev->mr_table.mtt_cqe_table;

         mttts = hns_roce_table_find(hr_dev, table,
-        -mtt->first_seg + s / hr_dev->caps.mtt_entry_sz,
+        +mtt->first_seg +
+        +start_index / HNS_ROCE_MTT_ENTRY_PER_SEG,
             &dma_handle);
     if (!mtts)
         return -ENOMEM;
@@ -933,7 +933,7 @@
         ret = hns_roce_write_mtt(hr_dev, mtt, n, i, pages);

         out:
-        -free_page((unsigned long) pages);
+        +free_pages((unsigned long) pages, order);
         return ret;
     }
@@ -1007,12 +1007,6 @@
 }

 n = ib_umem_page_count(mr->umem);
-    if (mr->umem->page_shift != HNS_ROCE_HEM_PAGE_SHIFT) {
-        dev_err(dev, "Just support 4K page size but is 0x%lx now!\n",
-               BIT(mr->umem->page_shift));
-        ret = -EINVAL;
-        goto err_umem;
+    }
if (!hr_dev->caps.pbl_hop_num) {
    if (n > HNS_ROCE_MAX_MTPT_PBL_NUM) {
        goto err_umem;
    } else {
        int pbl_size = 1;
        u64 pbl_size = 1;
    }
}

bt_size = (1 << (hr_dev->caps.pbl_ba_pg_sz + PAGE_SHIFT)) / 8;
for (i = 0; i < hr_dev->caps.pbl_hop_num; i++)
    pbl_size *= bt_size;

int pbl_size;
if (n > pbl_size) {
    dev_err(dev,
    " MR len %lld err. MR page num is limited to %d!
", length, pbl_size);
    ret = -EINVAL;
    goto err_umem;
}

--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_pd.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_pd.c
@@ -32,11 +32,12 @@

#include <linux/platform_device.h>
#include <linux/pci.h>
+#include <uapi/rdma/hns-abi.h>
#include "hns_roce_device.h"

static int hns_roce_pd_alloc(struct hns_roce_dev *hr_dev, unsigned long *pdn)
{
    return hns_roce_bitmap_alloc(&hr_dev->pd_bitmap, pdn) ? -ENOMEM : 0;
}

static void hns_roce_pd_free(struct hns_roce_dev *hr_dev, unsigned long pdn)
{
    hns_roce_bitmap_free(&hr_dev->pd_bitmap, pdn);
}

if (context) {
    if (ib_copy_to_udata(udata, &pd->pdn, sizeof(u64))) {
        struct hns_roce_ib_alloc_pd_resp uresp = {.pdn = pd->pdn};
        if (ib_copy_to_udata(udata, &uresp, sizeof(uresp))) {
            hns_roce_pd_free(to_hr_dev(ib_dev), pd->pdn);
            dev_err(dev, "[alloc_pd]ib_copy_to_udata failed!
");
            kfree(pd);
        }
    }
}

if (ib_copy_to_udata(u-data, &pd->pdn, sizeof(u64))) {
    struct hns_roce_ib_alloc_pd_resp uresp = { .pdn = pd->pdn };
    +if (ib_copy_to_udata(udata, &uresp, sizeof(uresp))) {
        hns_roce_pd_free(to_hr_dev(ib_dev), pd->pdn);
        dev_err(dev, "[alloc_pd]ib_copy_to_udata failed!
");
        kfree(pd);
int ret = 0;

/* Using bitmap to manager UAR index */
-ret = hns_roce_bitmap_alloc(&hr_dev->uar_table.bitmap, &uar->index);
+ret = hns_roce_bitmap_alloc(&hr_dev->uar_table.bitmap, &uar->logic_idx);
if (ret == -1)
    return -ENOMEM;

-if (uar->index > 0)
-uar->index = (uar->index - 1) %
+if (uar->logic_idx > 0 && hr_dev->caps.phy_num_uars > 1)
  +uar->index = (uar->logic_idx - 1) %
      (hr_dev->caps.phy_num_uars - 1) + 1;
+else
+uar->index = 0;

if (!dev_is_pci(hr_dev->dev)) {
    res = platform_get_resource(hr_dev->pdev, IORESOURCE_MEM, 0);
}

void hns_roce_uar_free(struct hns_roce_dev *hr_dev, struct hns_roce_uar *uar)
{
-    hns_roce_bitmap_free(&hr_dev->uar_table.bitmap, uar->index,
+    hns_roce_bitmap_free(&hr_dev->uar_table.bitmap, uar->logic_idx,
        BITMAP_NO_RR);
}

--- linux-4.15.0.orig/drivers/infiniband/hw/hns/hns_roce_qp.c
+++ linux-4.15.0/drivers/infiniband/hw/hns/hns_roce_qp.c
@@ -31,6 +31,7 @@
*/

#include <linux/pci.h>
#include <linux/platform_device.h>
#include <rdma/ib_addr.h>
#include <rdma/ib_umem.h>
@@ -65,6 +66,7 @@
if (atomic_dec_and_test(&qp->refcount))
    complete(&qp->free);
}
+EXPORT_SYMBOL_GPL(hns_roce_qp_event);

static void hns_roce_ib_qp_event(struct hns_roce_qp *hr_qp,
    enum hns_roce_event type)
@@ -114,7 +116,10 @@

struct hns_roce_qp_table *qp_table = &hr_dev->qp_table;

return hns_roce_bitmap_alloc_range(&qp_table->bitmap, cnt, align, base);
+ return hns_roce_bitmap_alloc_range(&qp_table->bitmap, cnt, align,
+     base) ?
+     -ENOMEM :
+     0;
}

enum hns_roce_qp_state to_hns_roce_state(enum ib_qp_state state)
@@ -257,7 +262,6 @@
    hns_roce_table_put(hr_dev, &qp_table->trrl_table,
        hr_qp->qpn);
    hns_roce_table_put(hr_dev, &qp_table->irrl_table, hr_qp->qpn);
-    hns_roce_table_put(hr_dev, &qp_table->qp_table, hr_qp->qpn);
}
}

EXPORT_SYMBOL_GPL(hns_roce_qp_free);
@@ -368,6 +372,16 @@
    if (hr_qp->sq.max_gs > 2)
        hr_qp->sge.sge_cnt = roundup_pow_of_two(hr_qp->sq.wqe_cnt *
            (hr_qp->sq.max_gs - 2));
+    if ((hr_qp->sq.max_gs > 2) && (hr_dev->pci_dev->revision == 0x20)) {
+        if (hr_qp->sge.sge_cnt > hr_dev->caps.max_extend_sg) {
+            dev_err(hr_dev->dev,
+                "The extended sge cnt error! sge_cnt=%d\n",
+                hr_qp->sge.sge_cnt);
+            return -EINVAL;
+        }
+    }
+    hr_qp->sge.sge_shift = 4;

    /* Get buf size, SQ and RQ are aligned to page_szie */
@@ -454,6 +468,21 @@
        hr_qp->sge.sge_shift = 4;
    }

+    /* ud sqwqe's sge use extend sge */
+    if (hr_dev->caps.max_sq_sg > 2 && hr_qp->ibqp.qp_type == IB_QPT_GSI) {
+        hr_qp->sge.sge_cnt = roundup_pow_of_two(hr_qp->sq.wqe_cnt *
+            hr_qp->sq.max_gs);
+        hr_qp->sge.sge_shift = 4;
+    }
dev_err(dev, "The extended sge cnt error! sge_cnt=%d\n",
hr_qp->sge.sge_cnt);
return -EINVAL;
}
}
+
/* Get buf size, SQ and RQ are aligned to PAGE_SIZE */
page_size = 1 << (hr_dev->caps.mtt_buf_pg_sz + PAGE_SHIFT);
hr_qp->sq.offset = 0;
return 0;
}
}
+static int hns_roce_qp_has_rq(struct ib_qp_init_attr *attr)
+{
+if (attr->qp_type == IB_QPT_XRC_INI ||
+ attr->qp_type == IB_QPT_XRC_TGT || attr->srq ||
+ !attr->cap.max_recv_wr)
+return 0;
+
+return 1;
+
+static int hns_roce_create_qp_common(struct hns_roce_dev *hr_dev,
 struct ib_pd *ib_pd,
 struct ib_qp_init_attr *init_attr,
 struct device *dev = hr_dev->dev;
 struct hns_roce_ib_create_qp ucmd;
 struct hns_roce_ib_create_qp_resp resp = {};
 unsigned long qpn = 0;
 int ret = 0;
 u32 page_shift;
 u32 npages;
 int i;

 mutex_init(&hr_qp->mutex);
 spin_lock_init(&hr_qp->sq.lock);

 hr_qp->state = IB_QPS_RESET;

 +hr_qp->ibqp.qp_type = init_attr->qp_type;
 +
 if (init_attr->sq_sig_type == IB_SIGNAL_ALL_WR)
 -hr_qp->sq_signal_bits = IB_SIGNAL_ALL_WR;
 +hr_qp->sq_signal_bits = cpu_to_le32(IB_SIGNAL_ALL_WR);
else
- hr_qp->sq_signal_bits = IB_SIGNAL_REQ_WR;
+ hr_qp->sq_signal_bits = cpu_to_le32(IB_SIGNAL_REQ_WR);

ret = hns_roce_set_rq_size(hr_dev, &init_attr->cap, !!ib_pd->uobject,
    !!init_attr->srq, hr_qp);
@@ -512,18 +555,48 @@
goto err_out;
}

+if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RQ_INLINE) {
+ /* allocate recv inline buf */
+ hr_qp->rq_inl_buf.wqe_list = kcalloc(hr_qp->rq.wqe_cnt,
+     sizeof(struct hns_roce_rinl_wqe),
+     GFP_KERNEL);
+ if (!hr_qp->rq_inl_buf.wqe_list) {
+     ret = -ENOMEM;
+     goto err_out;
+ }
+
+ hr_qp->rq_inl_buf.wqe_cnt = hr_qp->rq.wqe_cnt;
+
+ /* Firstly, allocate a list of sge space buffer */
+ hr_qp->rq_inl_buf.wqe_list[0].sg_list =
+     kcalloc(hr_qp->rq_inl_buf.wqe_cnt,
+             sizeof(struct hns_roce_rinl_sge),
+             GFP_KERNEL);
+ if (!hr_qp->rq_inl_buf.wqe_list[0].sg_list) {
+     ret = -ENOMEM;
+     goto err_wqe_list;
+ }
+
+ for (i = 1; i < hr_qp->rq_inl_buf.wqe_cnt; i++)
+     /* Secondly, reallocate the buffer */
+     hr_qp->rq_inl_buf.wqe_list[i].sg_list =
+         &hr_qp->rq_inl_buf.wqe_list[0].sg_list[i *
+             init_attr->cap.max_recv_sge];
+ }
+
+ if (ib_pd->uobject) {
+ if (ib_copy_from_udata(&ucmd, udata, sizeof(ucmd))) {
+     dev_err(dev, "ib_copy_from_udata error for create qp\n");
+     ret = -EFAULT;
+     goto err_out;
+     goto err_rq_sge_list;
+ }
}
ret = hns_roce_set_user_sq_size(hr_dev, &init_attr->cap, hr_qp, &ucmd);
if (ret) {
    dev_err(dev, "hns_roce_set_user_sq_size error for create qp\n");
    - goto err_out;
    + goto err_rq_sge_list;
}

hr_qp->umem = ib_umem_get(ib_pd->uobject->context,
@@ -532,7 +605,7 @@
    if (IS_ERR(hr_qp->umem)) {
        dev_err(dev, "ib_umem_get error for create qp\n");
        ret = PTR_ERR(hr_qp->umem);
    - goto err_out;
    + goto err_rq_sge_list;
    }

hr_qp->mtt.mtt_type = MTT_TYPE_WQE;
@@ -561,18 +634,30 @@
    dev_err(dev, "hns_roce_ib_umem_write_mtt error for create qp\n");
    goto err_mtt;
    +
    + if ((hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) &&
    +      (udata->outlen >= sizeof(resp)) &&
    +      hns_roce_qp_has_rq(init_attr)) {
        ret = hns_roce_db_map_user(
            to_hr_ucontext(ib_pd->uobject->context),
            + ucmd.db_addr, &hr_qp->rdb);
        + if (ret) {
            + dev_err(dev, "rq record doorbell map failed!\n");
            + goto err_mtt;
            + }
        + }
    } else {
    if (init_attr->create_flags &
        IB_QP_CREATE_BLOCK_MULTICAST_LOOPBACK) {
        dev_err(dev, "init_attr->create_flags error!\n");
        ret = -EINVAL;
        - goto err_out;
        + goto err_rq_sge_list;
    }

    if (init_attr->create_flags & IB_QP_CREATE_IPOIB_UD_LSO) {
        dev_err(dev, "init_attr->create_flags error!\n");
        ret = -EINVAL;
        - goto err_out;
        + goto err_rq_sge_list;
    }
/* Set SQ size */
hr_qp);
if (ret) {
dev_err(dev, "hns_roce_set_kernel_sq_size error!");
go_to err_out;
go_to err_rq_sge_list;
}

/* QP doorbell register address */
hr_qp->rq.db_reg_l = hr_dev->reg_base + hr_dev->odb_offset +
    DB_REG_OFFSET * hr_dev->priv_uar.index;

+if ((hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) &&
    +hns_roce_qp_has_rq(init_attr)) {
+ret = hns_roce_alloc_db(hr_dev, &hr_qp->rdb, 0);
+if (ret) {
+dev_err(dev, "rq record doorbell alloc failed!");
go_to err_rq_sge_list;
+}
+hr_qp->rdb.db_record = 0;
+hr_qp->rdb_en = 1;
+}
+
/* Allocate QP buf */
page_shift = PAGE_SHIFT + hr_dev->caps.mtt_buf_pg_sz;
if (hns_roce_buf_alloc(hr_dev, hr_qp->buff_size,
    ib_pd->uobject && (udata->outlen >= sizeof(resp)) &&
    (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB)) {
    dev_err(dev, "hns_roce_buf_alloc error!");
    ret = -ENOMEM;
go_to err_out;
go_to err_db;
}

hr_qp->mtt.mtt_type = MTT_TYPE_WQE;
else
hr_qp->doorbell_qpn = cpu_to_le64(hr_qp->qpn);

+if (ib_pd->uobject && (udata->outlen >= sizeof(resp)) &&
+(hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB)) {
    +/* indicate kernel supports record db */
    +resp.cap_flags |= HNS_ROCE_SUPPORT_RQ_RECORD_DB;

}
+ret = ib_copy_to_udata(udata, &resp, sizeof(resp));
+if (ret)
+goto err_qp;
+
+hr_qp->rdb_en = 1;
+}
hr_qp->event = hns_roce_ib_qp_event;

return 0;

+err_qp:
+if (init_attr->qp_type == IB_QPT_GSI &&
+hr_dev->hw_rev == HNS_ROCE_HW_VER1)
+hns_roce_qp_remove(hr_dev, hr_qp);
+else
+hns_roce_qp_free(hr_dev, hr_qp);
+
err_qpn:
if (!sqpn)
hns_roce_release_range_qp(hr_dev, qpn, 1);

err_wrid:
-kfree(hr_qp->sq.wrid);
-kfree(hr_qp->rq.wrid);
+if (ib_pd->uobject) {
+if ((hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB) &&
+ (udata->outlen >= sizeof(resp)) &&
+ hns_roce_qp_has_rq(init_attr))
+hns_roce_db_unmap_user(
+to_hr_ucontext(ib_pd->uobject->context),
+&hr_qp->rdb);
+} else {
+kfree(hr_qp->sq.wrid);
+kfree(hr_qp->rq.wrid);
+
}

err_mtt:
hns_roce_mtt_cleanup(hr_dev, &hr_qp->mtt);
@@ -678,6 +801,19 @@
else
hns_roce_buf_free(hr_dev, hr_qp->buff_size, &hr_qp->hr_buf);

+err_db:
+if (!ib_pd->uobject && hns_roce_qp_has_rq(init_attr) &&
+ (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RECORD_DB))
+hns_roce_free_db(hr_dev, &hr_qp->rdb);
+
+err_rq_sge_list:
+if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RQ_INLINE)
+kfree(hr_qp->rq_inl_buf.wqe_list[0].sg_list);
+
+err_wqe_list:
+if (hr_dev->caps.flags & HNS_ROCE_CAP_FLAG_RQ_INLINE)
+kfree(hr_qp->rq_inl_buf.wqe_list);
+
err_out:
return ret;
}
@@ -724,8 +860,13 @@
hr_qp = &hr_sqp->hr_qp;
hr_qp->port = init_attr->port_num - 1;
hr_qp->phy_port = hr_dev->iboe.phy_port[hr_qp->port];
- hr_qp->ibqp.qp_num = HNS_ROCE_MAX_PORTS +
- hr_dev->iboe.phy_port[hr_qp->port];
+
/* when hw version is v1, the sqpn is allocated */
+if (hr_dev->caps.max_sq_sg <= 2)
+hr_qp->ibqp.qp_num = HNS_ROCE_MAX_PORTS +
  hr_dev->iboe.phy_port[hr_qp->port];
+else
+hr_qp->ibqp.qp_num = 1;

ret = hns_roce_create_qp_common(hr_dev, pd, init_attr, udata,
hr_qp->ibqp.qp_num, hr_qp);
@@ -837,7 +978,14 @@
}

if (cur_state == new_state && cur_state == IB_QPS_RESET) {
  -ret = 0;
  +if (hr_dev->caps.min_wqes) {
  +  ret = -EPERM;
  +  dev_err(dev, "cur_state=\%d new_state=\%d\n", cur_state,
  +           new_state);
  +} else {
  +  ret = 0;
  +}
  +
  goto out;
}
@@ -883,20 +1031,6 @@
}
EXPORT_SYMBOL_GPL(hns_roce_unlock_cqs);

-__be32 send_ieth(struct ib_send_wr *wr)
-{

- switch (wr->opcode) {
- case IB_WR_SEND_WITH_IMM:
- case IB_WR_RDMA_WRITE_WITH_IMM:
- return cpu_to_le32(wr->ex.imm_data);
- case IB_WR_SEND_WITH_INV:
- return cpu_to_le32(wr->ex.invalidate_rkey);
- default:
- return 0;
- }
- }
- EXPORT_SYMBOL_GPL(send_ieth);
-
static void *get_wqe(struct hns_roce_qp *hr_qp, int offset)
{
@@ -945,14 +1079,20 @@
{
 struct hns_roce_qp_table *qp_table = &hr_dev->qp_table;
 int reserved_from_top = 0;
 +int reserved_from_bot;
 int ret;

 spin_lock_init(&qp_table->lock);
 INIT_RADIX_TREE(&hr_dev->qp_table_tree, GFP_ATOMIC);

 /* A port include two SQP, six port total 12 */
 +/* In hw v1, a port include two SQP, six ports total 12 */
 +if (hr_dev->caps.max_sq_sg <= 2)
 +reserved_from_bot = SQP_NUM;
 +else
 +reserved_from_bot = hr_dev->caps.reserved_qps;
 +
 ret = hns_roce_bitmap_init(&qp_table->bitmap, hr_dev->caps.num_qps,
 + hr_dev->caps.num_qps - 1, SQP_NUM,
 + hr_dev->caps.num_qps - 1, reserved_from_bot,
 + reserved_from_top);
 if (ret) {
 dev_err(hr_dev->dev, "qp bitmap init failed!error=%d\n",
 --- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw.h
 +++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw.h
 @@ -207,6 +207,7 @@
 u32 irq;
 u32 cpu_affinity;
 u32 ceq_id;
 +cpumask_t mask;
};

 struct l2params_work {
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_cm.c
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_cm.c
@@ -125,7 +125,8 @@
 * @conn_ird: connection IRD
 * @conn_ord: connection ORD
 */
-static void i40iw_record_ird_ord(struct i40iw_cm_node *cm_node, u16 conn_ird, u16 conn_ord)
+static void i40iw_record_ird_ord(struct i40iw_cm_node *cm_node, u32 conn_ird,
+                                    u32 conn_ord)
 {
 if (conn_ird > I40IW_MAX_IRD_SIZE)
     conn_ird = I40IW_MAX_IRD_SIZE;
@@ -1667,7 +1668,7 @@
 unsigned long flags;
 rtnl_lock();
-  for_each_netdev_rcu(&init_net, ip_dev) {
+  for_each_netdev(&init_net, ip_dev) {
 if (((rdma_vlan_dev_vlan_id(ip_dev) < I40IW_NO_VLAN) &&
     (rdma_vlan_dev_real_dev(ip_dev) == iwdev->netdev)) ||
     (ip_dev == iwdev->netdev)) && (ip_dev->flags & IFF_UP)) {
@@ -1960,7 +1961,6 @@
 struct rtable *rt;
 struct neighbour *neigh;
 int rc = arpindex;
-  struct net_device *netdev = iwdev->netdev;
+  struct net_device *netdev = iwdev->netdev;
__be32 dst_ipaddr = htonl(dst_ip);
__be32 src_ipaddr = htonl(src_ip);
@@ -1970,9 +1970,6 @@
 return rc;
 }
dst = i40iw_get_dst_ipv6(&src_addr, &dst_addr);
if (!dst || !dst->error) {
  if (dst) {
    dst_release(dst);
    dst = i40iw_pr_err("ip6_route_output returned dst->error = %d\n",
          dst->error);
  }
  if (netif_is_bond_slave(netdev))
    netdev = netdev_master_upper_dev_get(netdev);
  neigh = dst_neigh_lookup(dst, &dst_addr);
}
rcu_read_lock();
@@ -3849,7 +3842,7 @@
cm_node->apbvt_set = true;
-i40iw_record_ird_ord(cm_node, (u16)conn_param->ird, (u16)conn_param->ord);
+i40iw_record_ird_ord(cm_node, conn_param->ird, conn_param->ord);
if (cm_node->send_rdma0_op == SEND_RDMA_READ_ZERO &&
    !cm_node->ord_size)
  cm_node->ord_size = 1;
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_ctrl.c
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_ctrl.c
@@ -3928,8 +3928,10 @@
hmc_info->hmc_obj[I40IW_HMC_IW_XF].cnt = 1;
hmc_info->hmc_obj[I40IW_HMC_IW_MR].cnt = mrwanted;

-hmc_info->hmc_obj[I40IW_HMC_IW_XF].cnt = I40IW_MAX_WQ_ENTRIES * qpwanted;
-hmc_info->hmc_obj[I40IW_HMC_IW_Q1].cnt = 4 * I40IW_MAX_IRD_SIZE * qpwanted;
+i40iw_record_ird_ord(cm_node, conn_param->ird, conn_param->ord);
+i40iw_record_ird_ord(cm_node, conn_param->ird, conn_param->ord);
if (cm_node->send_rdma0_op == SEND_RDMA_READZERO &&
    !cm_node->ord_size)
  cm_node->ord_size = 1;
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_d.h
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_d.h
@@ -97,6 +97,7 @@
#define RDMA_OPCODE_MASK 0x0f
#define RDMA_READ_REQ_OPCODE 1
#define Q2_BAD_FRAME_OFFSET 72
+#define Q2_FPSN_OFFSET 64
#define CQE_MAJOR_DRV 0x8000

#define I40IW_TERM_SENT 0x01

--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_hw.c
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_hw.c
@@ -484,7 +484,7 @@
    int arp_index;

    arp_index = i40iw_arp_table(iwdev, ip_addr, ipv4, mac_addr, action);
    -if (arp_index == -1)
    +if (arp_index < 0)
       return;
    cqp_request = i40iw_get_cqp_request(&iwdev->cqp, false);
    if (!cqp_request)
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_main.c
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_main.c
@@ -54,10 +54,6 @@
     "\n     __stringify(DRV_VERSION_MINOR) "." __stringify(DRV_VERSION_BUILD)

 static int push_mode;
 -module_param(push_mode, int, 0644);
 -MODULE_PARM_DESC(push_mode, "Low latency mode: 0=disabled (default), 1=enabled");
 -
 static int debug;
 module_param(debug, int, 0644);
 MODULE_PARM_DESC(debug, "debug flags: 0=disabled (default), 0x7ffffff=all");
 @@ -682,7 +678,6 @@
     struct i40iw_msix_vector *msix_vec)
 {
     enum i40iw_status_code status;
     -cpumask_t mask;

     if (iwdev->msix_shared && !ceq_id) {
         tasklet_init(&iwdev->dpc_tasklet, i40iw_dpc, (unsigned long)iwdev);
         @@ -692,9 +687,9 @@
                 status = request_irq(msix_vec->irq, i40iw_ceq_handler, 0, "CEQ", iwceq);
             }
if (status)
goto exit;
iwdev->obj_next = iwdev->obj_mem;
-iwdev->push_mode = push_mode;

init_waitqueue_head(&iwdev->vchnl_waitq);
init_waitqueue_head(&dev->vf_reqs);
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_pble.c
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_pble.c
@@ -1580,7 +1575,6 @@
 if (status)
 goto exit;
 iwdev->obj_next = iwdev->obj_mem;
-iwdev->push_mode = push_mode;

i40iw_debug(dev, I40IW_DEBUG_PBLE, "next_fpm_addr = %llx chunk_size[%u] = 0x%x\n",
 pble_rsrc->next_fpm_addr, chunk->size, chunk->size);
pble_rsrc->unallocated_pble -= (chunk->size >> 3);
-list_add(&chunk->list, &pble_rsrc->pinfo.clist);
sd_reg_val = (sd_entry_type == I40IW_SD_TYPE_PAGED) ?
 sd_entry->u.pd_table.pd_page_addr.pa : sd_entry->u.bp.addr.pa;
-if (sd_entry->valid)
 -return 0;
-if (dev->is_pf) {
+if (dev->is_pf && !sd_entry->valid) {
 ret_code = i40iw_hmc_sd_one(dev, hmc_info->hmc_fn_id,
 sd_reg_val, idx->sd_idx,
 sd_entry->entry_type, true);
@@ -408,6 +405,7 @@
 }
 sd_entry->valid = true;
+list_add(&chunk->list, &pble_rsrc->pinfo.clist);
 return 0;
 error:
 kfree(chunk);
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_puda.c
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_puda.c
@@ -48,7 +48,6 @@
 static void i40iw_ilq_putback_rcvbuf(struct i40iw_sc_qp *qp, u32 wqe_idx);
 static enum i40iw_status_code i40iw_puda_replenish_rq(struct i40iw_puda_rsrc
 static void i40iw_ieq_cleanup_qp(struct i40iw_puda_rsrc *rsrc, bool initial);
-static void i40iw_puda_get_listbuf(struct i40iw_puda_rsrc *rsrc, struct i40iw_sc_qp *qp);
-**
+static void i40iw_puda_get_listbuf - get buffer from puda list
+ * @list: list to use for buffers (ILQ or IEQ)
+ @ @ -1378,7 +1377,7 @@
+ u32 *hw_host_ctx = (u32 *)qp->hw_host_ctx;
+ u32 rcv_wnd = hw_host_ctx[23];
+ /* first partial seq # in q2 */
+ -u32 fps = qp->q2_buf[16];
+ +u32 fps = *(u32 *)(qp->q2_buf + Q2_FPSN_OFFSET);
struct list_head *rxlist = &pfpdu->rxlist;
struct list_head *plist;

@@ -1483,7 +1482,7 @@
 * @ieq: ieq resource
 * @qp: all pending fpdu buffers
 */
-static void i40iw_ieq_cleanup_qp(struct i40iw_puda_rsrc *ieq, struct i40iw_sc_qp *qp)
+void i40iw_ieq_cleanup_qp(struct i40iw_puda_rsrc *ieq, struct i40iw_sc_qp *qp)
 {
 struct i40iw_puda_buf *buf;
 struct i40iw_pfpdu *pfpdu = &qp->pfpdu;
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_puda.h
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_puda.h
@@ -184,4 +184,5 @@
 enum i40iw_status_code i40iw_cqp_cq_create_cmd(struct i40iw_sc_dev *dev, struct i40iw_sc_cq *cq);
 void i40iw_cqp_qp_destroy_cmd(struct i40iw_sc_dev *dev, struct i40iw_sc_qp *qp);
 void i40iw_cqp_cq_destroy_cmd(struct i40iw_sc_dev *dev, struct i40iw_sc_cq *cq);
+void i40iw_ieq_cleanup_qp(struct i40iw_puda_rsrc *ieq, struct i40iw_sc_qp *qp);
#endif
--- linux-4.15.0.orig/drivers/infiniband/hw/i40iw/i40iw_utils.c
+++ linux-4.15.0/drivers/infiniband/hw/i40iw/i40iw_utils.c
@@ -173,7 +173,12 @@
 rcu_read_lock();
 in = __in_dev_get_rcu(upper_dev);
-local_ipaddr = ntohl(in->ifa_list->ifa_address);
+    local_ipaddr = ntohl(in->ifa_list->ifa_address);
     +
     +if (!in->ifa_list)
     +local_ipaddr = 0;
     +else
     +local_ipaddr = ntohl(in->ifa_list->ifa_address);
     +
     rcu_read_unlock();
 } else {
     local_ipaddr = ntohl(iwdev->dev_addr);
@@ -185,6 +190,11 @@
case NETDEV_UP:
     /* Fall through */
case NETDEV_CHANGEADDR:
+     */ Just skip if no need to handle ARP cache */
+    +if (!local_ipaddr)
+    +break;
+    +
i40iw_manage_arp_cache(iwdev,
                 netdev->dev_addr,
                 &local_ipaddr,
static int i40iw_mmap(struct ib_ucontext *context, struct vm_area_struct *vma)
{
    struct i40iw_ucontext *ucontext = to_ucontext(context);
    u64 dbaddr;

    if (ucontext->iwdev->sc_dev.is_pf) {
        ucontext = to_ucontext(context);
        db_addr_offset = I40IW_DB_ADDR_OFFSET;
        push_offset = I40IW_PUSH_OFFSET;
        if (vma->vm_pgoff)
            vma->vm_pgoff += I40IW_PF_FIRST_PUSH_PAGE_INDEX - 1;
    } else {
        db_addr_offset = I40IW_VF_DB_ADDR_OFFSET;
        push_offset = I40IW_VF_PUSH_OFFSET;
        if (vma->vm_pgoff)
            vma->vm_pgoff += I40IW_VF_FIRST_PUSH_PAGE_INDEX - 1;
    }
    if (vma->vm_pgoff || vma->vm_end - vma->vm_start != PAGE_SIZE)
        return -EINVAL;

    vma->vm_pgoff += db_addr_offset >> PAGE_SHIFT;
    dbaddr = I40IW_DB_ADDR_OFFSET + pci_resource_start(ucontext->iwdev->ldev->pcidev, 0);
    if (io_remap_pfn_range(vma, vma->vm_start, dbaddr >> PAGE_SHIFT, PAGE_SIZE, pgprot_noncached(vma->vm_page_prot)))
        return -EAGAIN;

    if (vma->vm_pgoff == (db_addr_offset >> PAGE_SHIFT)) {
        vma->vm_page_prot = pgprot_noncached(vma->vm_page_prot);
        vma->vm_private_data = ucontext;
    } else {
        if ((vma->vm_pgoff - (push_offset >> PAGE_SHIFT)) % 2)
            vma->vm_page_prot = pgprot_noncached(vma->vm_page_prot);
        else
            vma->vm_page_prot = pgprot_writecombine(vma->vm_page_prot);
    }

    if (io_remap_pfn_range(vma, vma->vm_start, vma->vm_pgoff + (pci_resource_start(ucontext->iwdev->ldev->pcidev, 0) >> PAGE_SHIFT), PAGE_SIZE, vma->vm_page_prot))
        return -EAGAIN;

    return 0;
@@ -412,6 +390,7 @@
{
    struct i40iw_pbl *iwpbl = &iwqp->iwpbl;

+i40iw_ieq_cleanup_qp(iwdev->vsi.ieq, &iwqp->sc_qp);
    i40iw_dealloc_push_page(iwdev, &iwqp->sc_qp);
    if (qp_num)
        i40iw_free_resource(iwdev, iwdev->allocated_qps, qp_num);
@@ -612,6 +591,7 @@
    return ERR_PTR(-ENOMEM);

    iwqp = (struct i40iw_qp *)mem;
    +iwqp->allocated_buffer = mem;
    qp = &iwqp->sc_qp;
    qp->back_qp = (void *)iwqp;
    qp->push_idx = I40IW_INVALID_PUSH_PAGE_INDEX;
@@ -640,7 +620,6 @@
        goto error;
    }

-iwqp->allocated_buffer = mem;
    iwqp->iwdev = iwdev;
    iwqp->iwpd = iwpd;
    iwqp->ibqp.qp_num = qp_num;
@@ -802,6 +781,8 @@
    struct i40iw_qp *iwqp = to_iwqp(ibqp);
    struct i40iw_sc_qp *qp = &iwqp->sc_qp;

+attr->qp_state = iwqp->ibqp_state;
+attr->cur_qp_state = attr->qp_state;
    attr->qp_access_flags = 0;
    attr->cap.max_send_wr = qp->qp_uk.sq_size;
    attr->cap.max_recv_wr = qp->qp_uk.rq_size;
@@ -1389,6 +1370,7 @@
    struct vm_area_struct *vma;
    struct hstate *h;

+down_read(&current->mm->mmap_sem);
    vma = find_vma(current->mm, addr);
    if (vma && &is_vm_hugetlb_page(vma)) {
        h = hstate_vma(vma);
@@ -1397,6 +1379,7 @@
        iwmr->page_msk = huge_page_mask(h);
    }
    }
+up_read(&current->mm->mmap_sem);
    }
/**
   @ -1637.6 +1620.7 @@
   err_code = -EOVERFLOW;
   goto err;
}
+stag &= ~I40IW_CQPSQ_STAG_KEY_MASK;
iwmr->stag = stag;
iwmr->ibmr.rkey = stag;
iwmr->ibmr.lkey = stag;
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/Kconfig
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/Kconfig
@@ -1,6 +1,7 @@
config MLX4_INFINIBAND
 tristate "Mellanox ConnectX HCA support"
depends on NETDEVICES && ETHERNET && PCI && INET
+depends on INFINIBAND_USER_ACCESS || !INFINIBAND_USER_ACCESS
depends on MAY_USE_DEVLINK
select NET_VENDOR_MELLANOX
select MLX4_CORE
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/alias_GUID.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/alias_GUID.c
@@ -804,8 +804,8 @@
    unsigned long flags;

    for (i = 0 ; i < dev->num_ports; i++) {
-      cancel_delayed_work(&dev->sriov.alias.guid.ports_guid[i].alias_guid_work);
    det = &sriov->alias_guid.ports_guid[i];
+      cancel_delayed_work_sync(&det->alias_guid_work);
    spin_lock_irqsave(&sriov->alias_guid.ag_work_lock, flags);
    while (!list_empty(&det->cb_list)) {
      cb_ctx = list_entry(det->cb_list.next,
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/cm.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/cm.c
@@ -39,7 +39,7 @@
    #include "mlx4_ib.h"

    -#define CM_CLEANUP_CACHE_TIMEOUT  (5 * HZ)
+#define CM_CLEANUP_CACHE_TIMEOUT  (30 * HZ)

    struct id_map_entry {
    struct rb_node node;
    @ -307.6 +307.9 @@
    if (!sriov->is_going_down) {
      id->scheduled_delete = 1;
      schedule_delayed_work(&id->timeout, CM_CLEANUP_CACHE_TIMEOUT);
+    } else if (id->scheduled_delete) {
+      /* Adjust timeout if already scheduled */
+mod_delayed_work(system_wq, &id->timeout, CM_CLEANUP_CACHE_TIMEOUT);
}  
spin_unlock_irqrestore(&sriov->going_down_lock, flags);
// spin_unlock(&sriov->id_map_lock);
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/cq.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/cq.c
@@ -601,6 +601,7 @@
wc->dlid_path_bits = 0;
    if (is_eth) {
        wc->slid = 0;
        wc->vlan_id = be16_to_cpu(hdr->tun.sl_vid);
-memcpy((&wc->smac[0]), (char *)&hdr->tun.mac_31_0, 4);
-memcpy((&wc->smac[4]), (char *)&hdr->tun.slid_mac_47_32, 2);
-@@ -851,7 +852,6 @@
    }
}

-wc->slid = be16_to_cpu(cqe->rlid);
-g_mlpath_rqpn = be32_to_cpu(cqe->g_mlpath_rqpn);
-wc->src_qp = g_mlpath_rqpn & 0xffffffff;
-wc->dlid_path_bits = (g_mlpath_rqpn >> 24) & 0x7f;
-@@ -860,6 +860,7 @@
wc->wc_flags |= mlx4_ib_ipoib_csum_ok(cqe->status, cqe->checksum) ? IB_WC_IP_CSUM_OK : 0;
    if (is_eth) {
        wc->slid = 0;
        wc->sl = be16_to_cpu(cqe->sl_vid) >> 13;
-if (be32_to_cpu(cqe->vlan_my_qpn) &
-MLX4_CQE_CVLAN_PRESENT_MASK) {
-@@ -871,6 +872,7 @@
-memcpy(wc->smac, cqe->smac, ETH_ALEN);
-wc->wc_flags |= (IB_WC_WITH_VLAN | IB_WC_WITH_SMAC);
-} else {
-if (be32_to_cpu(cqe->vlan_my_qpn) &
-wc->sl = be16_to_cpu(cqe->sl_vid) >> 12;
-wc->vlan_id = 0xffffffff;
-}
-- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/mad.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/mad.c
@@ -1305,6 +1305,18 @@
spin_unlock_irqrestore(&dev->sriov.going_down_lock, flags);
}

+static void mlx4_ib_wire_comp_handler(struct ib_cq *cq, void *arg)
+{  
+//unsigned long flags;
+struct mlx4_ib_demux_pv_ctx *ctx = cq->cq_context;

--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/mad.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/mad.c
@@ -1305,6 +1305,18 @@

Open Source Used In 5GaaS Edge AC-4 22348
+struct mlx4_ib_dev *dev = to_mdev(ctx->ib_dev);
+
+spin_lock_irqsave(&dev->sriov.going_down_lock, flags);
+if (!dev->sriov.is_going_down && ctx->state == DEMUX PV_STATE_ACTIVE)
+queue_work(ctx->wi_wq, &ctx->work);
+spin_unlock_irqrestore(&dev->sriov.going_down_lock, flags);
+
+static int mlx4_ib_post_pv_qp_buf(struct mlx4_ib_demux_pv_ctx *ctx,
+struct mlx4_ib_demux_pv_qp *tun_qp,
+int index)
+{
+ tx_buf_size, DMA_TO_DEVICE);
+kfree(tun_qp->tx_ring[i].buf.addr);
+}
-kfree(tun_qp->tx_ring);
-tun_qp->tx_ring = NULL;
+i = MLX4_NUM_TUNNEL_BUFS;
+err:
+while (i > 0) {
+ rx_buf_size, DMA_FROM_DEVICE);
+kfree(tun_qp->ring[i].addr);
+}
+kfree(tun_qp->tx_ring);
+tun_qp->tx_ring = NULL;
+kfree(tun_qp->ring);
+kfree(tun_qp->ring);
+return -ENOMEM;
+)
"buf: %ld
", wc.wr_id);
+break;
+default:
-BUG_ON(1);
+break;
+}
+} else  {
+} else  {
+cq_size *= 2;
+cq_attr.cqe = cq_size;
-ctx->cq = ib_create_cq(ctx->ib_dev, mlx4_ib_tunnel_comp_handler,
+ctx->cq = ib_create_cq(ctx->ib_dev, mlx4_ib_tunnel_comp_handler, mlx4_ib_wire_comp_handler,
+create_tun ? mlx4_ib_tunnel_comp_handler : mlx4_ib_wire_comp_handler,
+NULL, ctx, &cq_attr);
INIT_WORK(&ctx->work, mlx4_ib_sqp_comp_worker);

tctx->wq = to_mdev(ibdev)->sriov.demux[port - 1].wq;
+ctx->wi_wq = to_mdev(ibdev)->sriov.demux[port - 1].wi_wq;

ret = ib_req_notify_cq(ctx->cq, IB_CQ_NEXT_COMP);
if (ret) {
   @@ -2193,7 +2206,7 @@
goto err_mcg;
}

-snprintf(name, sizeof name, "mlx4_ibt%d", port);
+snprintf(name, sizeof(name), "mlx4_ibt%d", port);
ctx->wq = alloc_ordered_workqueue(name, WQ_MEM_RECLAIM);
if (!ctx->wq) {
   pr_err("Failed to create tunnelling WQ for port %d\n", port);
@@ -2201,7 +2214,15 @@
goto err_wq;
}

-snprintf(name, sizeof name, "mlx4_ibud%d", port);
+snprintf(name, sizeof(name), "mlx4_ibwi%d", port);
+ctx->wi_wq = alloc_ordered_workqueue(name, WQ_MEM_RECLAIM);
+if (!ctx->wi_wq) {
+   pr_err("Failed to create wire WQ for port %d\n", port);
+   +ret = -ENOMEM;
+   +goto err_wiwq;
+}
+
snprintf(name, sizeof(name), "mlx4_ibud%d", port);
ctx->ud_wq = alloc_ordered_workqueue(name, WQ_MEM_RECLAIM);
if (!ctx->ud_wq) {
   pr_err("Failed to create up/down WQ for port %d\n", port);
@@ -2212,6 +2233,10 @@
return 0;

err_udwq:
+destroy_workqueue(ctx->wi_wq);
+ctx->wi_wq = NULL;
+
+err_wiwq:
destroy_workqueue(ctx->wi_wq);
ctx->wq = NULL;

@@ -2259,12 +2284,14 @@
ctx->tun[i]->state = DEMUX_PV_STATE_DOWNING;
}
flush_workqueue(ctx->wq);
+flush_workqueue(ctx->wi_wq);
for (i = 0; i < dev->dev->caps.sqp_demux; i++) {
    destroy_pv_resources(dev, i, ctx->port, ctx->tun[i], 0);
    free_pv_object(dev, i, ctx->port);
}
kfree(ctx->tun);
destroy_workqueue(ctx->ud_wq);
+destroy_workqueue(ctx->wi_wq);
destroy_workqueue(ctx->wq);
}
}

--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/main.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/main.c
@@ -219,8 +219,6 @@
gid_tbl[i].version = 2;
if (!ipv6_addr_v4mapped((struct in6_addr *)&gids[i].gid))
gid_tbl[i].type = 1;
-else
-    memset(&gid_tbl[i].gid, 0, 12);
}
}
@@ -366,8 +364,13 @@
if (!gids) {
    ret = -ENOMEM;
} else {
-    for (i = 0; i < MLX4_MAX_PORT_GIDS; i++)
-        memcpy(&gids[i].gid, &port_gid_table->gids[i].gid, sizeof(union ib_gid));
+    for (i = 0; i < MLX4_MAX_PORT_GIDS; i++) {
+        memcpy(&gids[i].gid,
+               &port_gid_table->gids[i].gid,
+               sizeof(union ib_gid));
+        gids[i].gid_type =
+                           port_gid_table->gids[i].gid_type;
+    }
    spin_unlock_bh(&iboe->lock);
    @ @ -566,12 +569,9 @@
    props->cq_caps.max_cq_moderation_count = MLX4_MAX_CQ_COUNT;
    props->cq_caps.max_cq_moderation_period = MLX4_MAX_CQ_PERIOD;

    -if (!mlx4_is_slave(dev->dev))
    -err = mlx4_get_internal_clock_params(dev->dev, &clock_params);
if (!mlx4_get_internal_clock_params(dev->dev, &clock_params)) {
    resp.comp_mask |= QUERY_DEVICE_RESP_MASK_TIMESTAMP;
    resp.hca_core_clock_offset = clock_params.offset % PAGE_SIZE;
}
//@ -1214,6 +1214,8 @@
* mlx4_ib_vma_close().
*
down_write(&owning_mm->mmap_sem);
+if (!mmget_still_valid(owning_mm))
+goto skip_mm;
for (i = 0; i < HW_BAR_COUNT; i++) {
    vma = context->hw_bar_info[i].vma;
    if (!vma)
        goto skip_mm;
//@ -1232,7 +1234,7 @@
/* context going to be destroyed, should not access ops any more */
context->hw_bar_info[i].vma->vm_ops = NULL;
}
-
+skip_mm:
up_write(&owning_mm->mmap_sem);
mmput(owning_mm);
put_task_struct(owning_process);
//@ -1629,8 +1631,9 @@
int i;

for (i = 0; i < ARRAY_SIZE(pdefault_rules->rules_create_list); i++) {
    +union ib_flow_spec ib_spec = {};
    int ret;
    -union ib_flow_spec ib_spec;
    +
    switch (pdefault_rules->rules_create_list[i]) {
    case 0:
        /* no rule */
        @@ -2995,9 +2998,8 @@
        kfree(ibdev->ib_uc_qpns_bitmap);

        err_steer_qp_release:
        -if (ibdev->steering_support == MLX4_STEERING_MODE_DEVICE_MANAGED)
        -mlx4_qp_release_range(dev, ibdev->steer_qpn_base,
        -    ibdev->steer_qpn_count);
        +mlx4_qp_release_range(dev, ibdev->steer_qpn_base,
        +    ibdev->steer_qpn_count);
        err_counter:
        for (i = 0; i < ibdev->num_ports; ++i)
            mlx4_ib_delete_counters_table(ibdev, &ibdev->counters_table[i]);
        @@ -3092,21 +3094,20 @@
        ibdev->ib_active = false;
        flush_workqueue(wq);
-mlx4_ib_close_sriov(ibdev);
-mlx4_ib_mad_cleanup(ibdev);
-ib_unregister_device(&ibdev->ib_dev);
-mlx4_ib_diag_cleanup(ibdev);
if (ibdev->iboe.nb.notifier_call) {
  if (unregister_netdevice_notifier(&ibdev->iboe.nb))
    pr_warn("failure unregistering notifier\n");
  ibdev->iboe.nb.notifier_call = NULL;
}

-if (ibdev->steering_support == MLX4_STEERING_MODE_DEVICE_MANAGED) {
-mlx4_qp_release_range(dev, ibdev->steer_qpn_base,
  - ibdev->steer_qpn_count);
-kfree(ibdev->ib_uc_qpns_bitmap);
-}
+mlx4_ib_close_sriov(ibdev);
+mlx4_ib_mad_cleanup(ibdev);
+ib_unregister_device(&ibdev->ib_dev);
+mlx4_ib_diag_cleanup(ibdev);
+
+mlx4_qp_release_range(dev, ibdev->steer_qpn_base,
  + ibdev->steer_qpn_count);
+kfree(ibdev->ib_uc_qpns_bitmap);

iounmap(ibdev->uar_map);
for (p = 0; p < ibdev->num_ports; ++p)
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/mlx4_ib.h
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/mlx4_ib.h
@@ -464,6 +464,7 @@
 struct ib_pd *pd;
 struct work_struct work;
 struct workqueue_struct *wq;
+struct workqueue_struct *wi_wq;
 struct mlx4_ib_demux_pv_qp qp[2];
};

@@ -471,6 +472,7 @@
 struct ib_device *ib_dev;
 int port;
 struct workqueue_struct *wq;
+struct workqueue_struct *wi_wq;
 struct workqueue_struct *ud_wq;
 spinlock_t ud_lock;
 atomic64_t subnet_prefix;
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/mr.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/mr.c
@@ -346,7 +346,7 @@

/* Add to the first block the misalignment that it suffers from. */
total_len += (first_block_start & ((1ULL << block_shift) - 1ULL));
last_block_end = current_block_start + current_block_len;
-last_block_aligned_end = round_up(last_block_end, 1 << block_shift);
+last_block_aligned_end = round_up(last_block_end, 1ULL << block_shift);
total_len += (last_block_aligned_end - last_block_end);

if (total_len & ((1ULL << block_shift) - 1ULL))
@@ -367,6 +367,40 @@
return block_shift;
}

+static struct ib_umem *mlx4_get_umem_mr(struct ib_ucontext *context, u64 start,
+u64 length, u64 virt_addr,
+int access_flags)
+{
+/*
+ * Force registering the memory as writable if the underlying pages
+ * are writable. This is so rereg can change the access permissions
+ * from readable to writable without having to run through ib_umem_get
+ * again
+ */
+if (!ib_access_writable(access_flags)) {
+struct vm_area_struct *vma;
+
+down_read(&current->mm->mmap_sem);
+/*
+ * FIXME: Ideally this would iterate over all the vmas that
+ * cover the memory, but for now it requires a single vma to
+ * entirely cover the MR to support RO mappings.
+ */
+vma = find_vma(current->mm, start);
+if (vma && vma->vm_end >= start + length &&
+ vma->vm_start <= start) {
+if (vma->vm_flags & VM_WRITE)
+ access_flags |= IB_ACCESS_LOCAL_WRITE;
+} else {
+ access_flags |= IB_ACCESS_LOCAL_WRITE;
+}
+
+up_read(&current->mm->mmap_sem);
+}
+
+return ib_umem_get(context, start, length, access_flags, 0);
+}
+
struct ib_mr *mlx4_ib_reg_user_mr(struct ib_pd *pd, u64 start, u64 length,
 u64 virt_addr, int access_flags,
struct ib_udata *uda)
@@ -381,10 +415,8 @@
if (!mr)
return ERR_PTR(-ENOMEM);

" Force registering the memory as writable. */
" Used for memory re-registration. HCA protects the access */
-mr->umem = ib_umem_get(pd->uobject->context, start, length,
-     access_flags | IB_ACCESS_LOCAL_WRITE, 0);
+mr->umem = mlx4_get_umem_mr(pd->uobject->context, start, length,
+     virt_addr, access_flags);
if (IS_ERR(mr->umem)) {
err = PTR_ERR(mr->umem);
goto err_free;
@@ -451,6 +483,12 @@
}

if (flags & IB_MR_REREG_ACCESS) {
+if (ib_access_writable(mr_access_flags) &&
+    !mmr->umem->writable) {
+err = -EPERM;
+goto release_mpt_entry;
+}
+
err = mlx4_mr_hw_change_access(dev->dev, *pmpt_entry,
     convert_access(mr_access_flags));
@@ -464,10 +502,9 @@
mlx4_mr_rereg_mem_cleanup(dev->dev, &mmr->mmr);
ib_umem_release(mmr->umem);
-mmr->umem = ib_umem_get(mr->uobject->context, start, length,
-     mr_access_flags | IB_ACCESS_LOCAL_WRITE, 0);
+mmr->umem = mlx4_get_umem_mr(mr->uobject->context, start, length,
+     virt_addr, mr_access_flags);
if (IS_ERR(mmr->umem)) {
err = PTR_ERR(mmr->umem);
/* Prevent mlx4_ib_dereg_mr from free'ing invalid pointer */
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/qp.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/qp.c
@@ -2921,6 +2921,7 @@
int send_size;
int header_size;
int spc;
+int err;
int i;

if (wr->wr.opcode != IB_WR_SEND)
@@ -2955,7 +2956,9 @@
    sqp->ud_header.lrh.virtual_lane    = 0;
    sqp->ud_header.bth.solicited_event = !!(wr->wr.send_flags & IB_SEND_SOLICITED);
-ib_get_cached_pkey(ib_dev, sqp->qp.port, 0, &pkey);
+err = ib_get_cached_pkey(ib_dev, sqp->qp.port, 0, &pkey);
+if (err)
+return err;

    sqp->ud_header.bth.pkey = cpu_to_be16(pkey);
    if (err)
        return err;
@@ -3244,9 +3247,14 @@
    }
    sqp->ud_header.bth.solicited_event = !!(wr->wr.send_flags & IB_SEND_SOLICITED);
    if (!sqp->qp.ibqp.qp_num)
-ib_get_cached_pkey(ib_dev, sqp->qp.port, sqp->pkey_index, &pkey);
+err = ib_get_cached_pkey(ib_dev, sqp->qp.port, sqp->pkey_index, &pkey);
+if (err)
+return err;
else
    -ib_get_cached_pkey(ib_dev, sqp->qp.port, wr->pkey_index, &pkey);
    +err = ib_get_cached_pkey(ib_dev, sqp->qp.port, wr->pkey_index, &pkey);
    +if (err)
    +return err;
    sqp->ud_header.bth.pkey = cpu_to_be16(pkey);
    sqp->ud_header.bth.destination_qpn = cpu_to_be32(wr->remote_qpn);
@@ -4018,9 +4026,9 @@
    u8 port_num = path->sched_queue & 0x40 ? 2 : 1;

    memset(ah_attr, 0, sizeof(*ah_attr));
-ah_attr->type = rdma_ah_find_type(&ibdev->ib_dev, port_num);
if (port_num == 0 || port_num > dev->caps.num_ports)
    return;
+ah_attr->type = rdma_ah_find_type(&ibdev->ib_dev, port_num);

if (ah_attr->type == RDMA_AH_ATTR_TYPE_ROCE)
    rdma_ah_set_sl(ah_attr, ((path->sched_queue >> 3) & 0x7) |
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx4/sysfs.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx4/sysfs.c
@@ -353,16 +353,12 @@
static void get_name(struct mlx4_ib_dev *dev, char *name, int i, int max)
-char base_name[9];
-
-/* pci_name format is: bus:dev:func -> xxxx:yy:zz.n */
-strlcpy(name, pci_name(dev->dev->persist->pdev), max);
-strncpy(base_name, name, 8); /* till xxxx:yy:* */
-base_name[8] = '0';
-/* with no ARI only 3 last bits are used so when the fn is higher than 8 */
-/* pci_name format is: bus:dev:func -> xxxx:yy:zz.n */
+ * with no ARI only 3 last bits are used so when the fn is higher than 8
+ * need to add it to the dev num, so count in the last number will be
+ * modulo 8 */
+ snprintf(name, max, "%.8s%.2d.%d", pci_name(dev->dev->persist->pdev),
+ i / 8, i % 8);
}  

struct mlx4_port {
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/Kconfig
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/Kconfig
@@ -1,6 +1,7 @@
config MLX5_INFINIBAND
+depends on INFINIBAND_USER_ACCESS || INFINIBAND_USER_ACCESS=n
---help---
This driver provides low-level InfiniBand support for
Mellanox Connect-IB PCI Express host channel adapters (HCAs).
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/cong.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/cong.c
@@ -337,9 +337,6 @@
int ret;
char lbuf[11];

-if (*pos)
-return 0;
-
-ret = mlx5_ib_get_cc_params(param->dev, offset, &var);
if (ret)
    return ret;
    @ @ -348,11 +345,7 @@
if (ret < 0)
    return ret;

-if (copy_to_user(buf, lbuf, ret))
-return -EFAULT;
-
-*pos += ret;
-return ret;
return simple_read_from_buffer(buf, count, pos, lbuf, ret);
}

static const struct file_operations dbg_cc_fops = {
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/cq.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/cq.c
@@ -226,7 +226,6 @@
wc->ex.invalidate_rkey = be32_to_cpu(cqe->imm_inval_pkey);
break;
}
-wc->slid = be16_to_cpu(cqe->slid);
wc->src_qp = be32_to_cpu(cqe->flags_rqpn) & 0xffffff;
wc->dlid_path_bits = cqe->ml_path;

wc->slid = 0;
vlan_present = cqe->l4_l3_hdr_type & 0x1;
roce_packet_type = (be32_to_cpu(cqe->flags_rqpn) >> 24) & 0x3;
if (vlan_present) {
@@ -647,7 +648,7 @@
}

static int poll_soft_wc(struct mlx5_ib_cq *cq, int num_entries,
-wc)
+wc, bool is_fatal_err)
{
    struct mlx5_ib_dev *dev = to_mdev(cq->ibcq.device);
    struct mlx5_ib_wc *soft_wc, *next;
    mlx5_ib_dbg(dev, "polled software generated completion on CQ 0x%"x\n",
        cq->mcq.cqn):

+if (unlikely(is_fatal_err)) {
+    soft_wc->wc.status = IB_WC_WR_FLUSH_ERR;
+    soft_wc->wc.vendor_err = MLX5_CQE_SYNDROME_WR_FLUSH_ERR;
+}
    wc[npollled++] = soft_wc->wc;
    list_del(&soft_wc->list);
    kfree(soft_wc);
    @@ -680,12 +685,17 @@
spin_lock_irqsave(&cq->lock, flags);
if (mdev->state == MLX5_DEVICE_STATE_INTERNAL_ERROR) {
    /* make sure no soft wqe's are waiting */
    if (unlikely(!list_empty(&cq->wc_list)))
        soft_polled = poll_soft_wc(cq, num_entries, wc, false);
    goto out;
}

for (npolled = 0; npolled < num_entries - soft_polled; npolled++) {
    if (mlx5_poll_one(cq, &cur_qp, wc + soft_polled + npolled))
        return -EINVAL;
    umem = ib_umem_get(context, ucmd.buf_addr, entries * ucmd.cqe_size,
                       IB_ACCESS_LOCAL_WRITE, 1);
    if (IS_ERR(umem)) {
        err = PTR_ERR(umem);
        --- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/gsi.c
        +++ linux-4.15.0/drivers/infiniband/hw/mlx5/gsi.c
        @@ -507,8 +507,7 @@
        ret = ib_post_send(tx_qp, &cur_wr.wr, bad_wr);
        if (ret) {
            /* Undo the effect of adding the outstanding wr */
            - gsi->outstanding_pi = (gsi->outstanding_pi - 1) %
            - gsi->cap.max_send_wr;
            + gsi->outstanding_pi--;
            goto err;
        }
        spin_unlock_irqrestore(&gsi->lock, flags);
    }
}
if (err)
    return err;

+props->active_width     = IB_WIDTH_4X;
+props->active_speed     = IB_SPEED_QDR;
+
translate_eth_proto_oper(eth_prot_oper, &props->active_speed,
                      &props->active_width);

@@ -682,7 +685,8 @@
MLX5_RX_HASH_SRC_PORT_TCP |
MLX5_RX_HASH_DST_PORT_TCP |
MLX5_RX_HASH_SRC_PORT_UDP |
-MLX5_RX_HASH_DST_PORT_UDP;
+MLX5_RX_HASH_DST_PORT_UDP |
+MLX5_RX_HASH_INNER;
resp.response_length += sizeof(resp.rss_caps);
} else {
@@ -781,15 +785,19 @@
if (MLX5_CAP_GEN(mdev, tag_matching)) {
    -props->tm_caps.max_rndv_hdr_size = MLX5_TM_MAX_RNDV_MSG_SIZE;
    props->tm_caps.max_num_tags =
        (1 << MLX5_CAP_GEN(mdev, log_tag_matching_list_sz)) - 1;
    -props->tm_caps.flags = IB_TM_CAP_RC;
    props->tm_caps.max_ops =
        1 << MLX5_CAP_GEN(mdev, log_max_qp_sz);
    props->tm_caps.max_sge = MLX5_TM_MAX_SGE;
} 

+if (MLX5_CAP_GEN(mdev, tag_matching) &&
    +MLX5_CAP_GEN(mdev, rndv_offload_rc)) {
    +props->tm_caps.flags = IB_TM_CAP_RNDV_RC;
    +props->tm_caps.max_rndv_hdr_size = MLX5_TM_MAX_RNDV_MSG_SIZE;
    +}
+
if (MLX5_CAP_GEN(dev->mdev, cq_moderation)) {
    props->cq_caps.max_cq_moderation_count =
        MLX5_MAX_CQ_COUNT;
@@ -914,31 +922,26 @@
MLX5_IB_WIDTH_12X = 1 << 4
};

    -static int translate_active_width(struct ib_device *ibdev, u8 active_width,
    +static void translate_active_width(struct ib_device *ibdev, u8 active_width,
                      u8 *ib_width)
struct mlx5_ib_dev *dev = to_mdev(ibdev);

- if (active_width & MLX5_IB_WIDTH_1X) {
  *ib_width = IB_WIDTH_1X;
} else if (active_width & MLX5_IB_WIDTH_2X) {
  mlx5_ib_dbg(dev, "active_width %d is not supported by IB spec\n",
              (int)active_width);
  err = -EINVAL;
} else if (active_width & MLX5_IB_WIDTH_4X) {
  *ib_width = IB_WIDTH_4X;
} else if (active_width & MLX5_IB_WIDTH_8X) {
  *ib_width = IB_WIDTH_8X;
} else if (active_width & MLX5_IB_WIDTH_12X) {
  mlx5_ib_dbg(dev, "Invalid active_width %d\n",
               (int)active_width);
  err = -EINVAL;
  *ib_width = IB_WIDTH_4X;
} else {
  mlx5_ib_dbg(dev, "Invalid active_width %d, setting width to default value: 4x\n",
               (int)active_width);
  err = -EINVAL;
  *ib_width = IB_WIDTH_4X;
}

return err;
return;
}

static int mlx5_mtu_to_ib_mtu(int mtu)
{ if (err)
  goto out;

  -err = translate_active_width(ibdev, ib_link_width_oper,
    &props->active_width);
  -if (err)
    goto out;
  +translate_active_width(ibdev, ib_link_width_oper, &props->active_width);
  +err = mlx5_query_port_ib_proto_oper(mdev, &props->active_speed, port);
  if (err)
    goto out;
}

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 mlx5_ib_vma_close.
*/
down_write(&owning_mm->mmap_sem);
+if (!mmget_still_valid(owning_mm))
+goto skip_mm;
mutex_lock(&context->vma_private_list_mutex);
list_for_each_entry_safe(vma_private, n, &context->vma_private_list,
    list) {
    kfree(vma_private);
}
mutex_unlock(&context->vma_private_list_mutex);
+skip_mm:
up_write(&owning_mm->mmap_sem);
mmput(owning_mm);
@ @ -1714,6 +1717,7 @@
    }
struct mlx5_ib_dev *dev = to_mdev(ibdev);

-return mlx5_get_vector_affinity(dev->mdev, comp_vector);
+return mlx5_get_vector_affinity_hint(dev->mdev, comp_vector);
}

static void *mlx5_ib_add(struct mlx5_core_dev *mdev)
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/mlx5_ib.h
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/mlx5_ib.h
@@ -440,6 +440,7 @@
    u64				length;
    int				access_flags;
    u32				mkey;
+    u8				ignore_free_state:1;
    );

static inline struct mlx5_umr_wr *umr_wr(struct ib_send_wr *wr)
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/mr.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/mr.c
@@ -248,16 +248,16 @@
    struct mlx5_cache_ent *ent = filp->private_data;
    struct mlx5_ib_dev *dev = ent->dev;
    -char lbuf[20];
    +char lbuf[20] = {0};
    u32 var;
    int err;
    int c;

    -if (copy_from_user(lbuf, buf, sizeof(lbuf)))
count = min(count, sizeof(lbuf) - 1);
if (copy_from_user(lbuf, buf, count))
return -EFAULT;

c = order2idx(dev, ent->order);
-lbuf[sizeof(lbuf) - 1] = 0;

if (sscanf(lbuf, "%u", &var) != 1)
return -EINVAL;

char lbuf[20];
int err;
-if (*pos)
  return 0;
-
err = snprintf(lbuf, sizeof(lbuf), "%d\n", ent->size);
if (err < 0)
return err;

-if (copy_to_user(buf, lbuf, err))
  return -EFAULT;
-
*pos += err;
-
return err;
+return simple_read_from_buffer(buf, count, pos, lbuf, err);
}

static const struct file_operations size_fops = {
 @@ -314,16 +306,16 @@
 {
 struct mlx5_cache_ent *ent = filp->private_data;
 struct mlx5_ib_dev *dev = ent->dev;
-  char lbuf[20];
+  char lbuf[20] = {0};
 u32 var;
 int err;
 int c;

-  if (copy_from_user(lbuf, buf, sizeof(lbuf)))
+  count = min(count, sizeof(lbuf) - 1);
+  if (copy_from_user(lbuf, buf, count))
  return -EFAULT;

  c = order2idx(dev, ent->order);
  -lbuf[sizeof(lbuf) - 1] = 0;


if (sscanf(lbuf, "%u", &var) != 1)
    return -EINVAL;
@@ -349,19 +341,11 @@
    char lbuf[20];
    int err;

-if (*pos)
-    return 0;
-
    err = snprintf(lbuf, sizeof(lbuf), "%d\n", ent->limit);
    if (err < 0)
        return err;

    -if (copy_to_user(buf, lbuf, err))
        -return -EFAULT;
    -
    -*pos += err;
    -
    -return err;
    +return simple_read_from_buffer(buf, count, pos, lbuf, err);
}

static const struct file_operations limit_fops = {
    @@ -460,7 +444,7 @@
        if (entry < 0 || entry >= MAX_MR_CACHE_ENTRIES) {
            mlx5_ib_err(dev, "cache entry %d is out of range\n", entry);
            -return NULL;
            +return ERR_PTR(-EINVAL);
        }

        ent = &cache->ent[entry];
    @@ -537,14 +521,20 @@
        int shrink = 0;
        int c;

        -c = order2idx(dev, mr->order);
        -if (c < 0 || c >= MAX_MR_CACHE_ENTRIES) {
            -mlx5_ib_warn(dev, "order %d, cache index %d\n", mr->order, c);
            +if (!mr->allocated_from_cache)
                return;
            -}

        -if (unreg_umr(dev, mr))
            +c = order2idx(dev, mr->order);
            +WARN_ON(c < 0 || c >= MAX_MR_CACHE_ENTRIES);
            +
            +if (unreg_umr(dev, mr)) {
mr->allocated_from_cache = false;
destroy_mkey(dev, mr);
ent = &cache->ent[c];
if (ent->cur < ent->limit)
queue_work(cache->wq, &ent->work);
return;
+
ent = &cache->ent[c];
spin_lock_irq(&ent->lock);
init_completion(&ent->compl);
INIT_WORK(&ent->work, cache_work_func);
INIT_DELAYED_WORK(&ent->dwork, delayed_cache_work_func);
queue_work(cache->wq, &ent->work);

if (i > MR_CACHE_LAST_STD_ENTRY) {
mlx5_odp_init_mr_cache_entry(ent);
ent->limit = dev->mdev->profile->mr_cache[i].limit;
else
ent->limit = 0;
queue_work(cache->wq, &ent->work);
}

err = mlx5_mr_cache_debugfs_init(dev);
struct mlx5_ib_dev *dev = to_mdev(pd->device);
+struct ib_umem *u;
int err;

-*umem = ib_umem_get(pd->uobject->context, start, length,
-    access_flags, 0);
-err = PTR_ERR_OR_ZERO(*umem);
-if (err < 0) {
-mlx5_ib_err(dev, "umem get failed (%d)\n", err);
-*umem = NULL;
+
+u = ib_umem_get(pd->uobject->context, start, length, access_flags, 0);
+err = PTR_ERR_OR_ZERO(u);
+if (err) {
+mlx5_ib_dbg(dev, "umem get failed (%d)\n", err);
+return err;
+

-mlx5_ib_cont_pages(*umem, start, MLX5_MKEY_PAGE_SHIFT_MASK, npages,
mlx5_ib_cont_pages(u, start, MLX5_MKEY_PAGE_SHIFT_MASK, npages, page_shift, ncont, order);
if (!*npages) {
    mlx5_ib_warn(dev, "avoid zero region\n");
    ib_umem_release(*umem);
    +ib_umem_release(u);
    return -EINVAL;
}
+*umem = u;
+
mlx5_ib_dbg(dev, "npages %d, ncont %d, order %d, page_shift %d\n",
    *npages, *ncont, *order, *page_shift);

int err;
bool use_umr = true;
+if (!IS_ENABLED(CONFIG_INFINIBAND_USER_MEM))
  +return ERR_PTR(-EINVAL);
  +mlx5_ib_dbg(dev, "start 0x%llx, virt_addr 0x%llx, length 0x%llx, access_flags 0x%x\n",
    start, virt_addr, length, access_flags);

mr = mlx5_ib_alloc_implicit_mr(to_mpd(pd), access_flags);
+if (IS_ERR(mr))
  +return ERR_CAST(mr);
return &mr->ibmr;
#endif

umrwr.wr.send_flags = MLX5_IB_SEND_UMR_DISABLE_MR |
    - MLX5_IB_SEND_UMR_FAIL_IF_FREE;
    + MLX5_IB_SEND_UMR_UPDATE_PD_ACCESS;
umrwr.wr.opcode = MLX5_IB_WR_UMR;
+umrwr.pd = dev->umrc.pd;
umrwr.mkey = mr->mmkey.key;
+umrwr.ignore_free_state = 1;

return mlx5_ib_post_send_wait(dev, &umrwr);
}
new_access_flags:
        mr->access_flags;
        -u64 addr = (flags & IB_MR_REREG_TRANS) ? virt_addr : mr->umem->address;
        -u64 len = (flags & IB_MR_REREG_TRANS) ? length : mr->umem->length;
        int page_shift = 0;
        int upd_flags = 0;
        int npages = 0;
        int ncont = 0;
        int order = 0;
        +u64 addr, len;
        int err;

        mlx5_ib_dbg(dev, "start 0x%llx, virt_addr 0x%llx, length 0x%llx, access_flags 0x%llx\n",
@@ -1348,6 +1348,17 @@

        atomic_sub(mr->npages, &dev->mdev->priv.reg_pages);

        +if (!mr->umem)
        +return -EINVAL;
        +
        +if (flags & IB_MR_REREG_TRANS) {
        +addr = virt_addr;
        +len = length;
        +} else {
        +addr = mr->umem->address;
        +len = mr->umem->length;
        +}
        +
        if (flags != IB_MR_REREG_PD) {
/*
 * Replace umem. This needs to be done whether or not UMR is
@@ -1355,6 +1366,7 @@
*/
        flags |= IB_MR_REREG_TRANS;
        ib_umem_release(mr->umem);
        +mr->umem = NULL;
        err = mr_umem_get(pd, addr, len, access_flags, &mr->umem,
        &npages, &page_shift, &ncont, &order);
        if (err < 0) {
        @@ -1412,6 +1424,7 @@
        if (err) {
        mlx5_ib_warn(dev, "Failed to rereg UMR\n");
        ib_umem_release(mr->umem);
        +mr->umem = NULL;
        clean_mr(dev, mr);
        return err;
    }
@@ -1489,20 +1502,16 @@


mr->sig = NULL;
}

-mlx5_free_priv_descs(mr);
-
if (!allocated_from_cache) {
  u32 key = mr->mmkey.key;

  err = destroy_mkey(dev, mr);
  -kfree(mr);
  +mlx5_free_priv_descs(mr);
  if (err) {
    mlx5_ib_warn(dev, "failed to destroy mkey 0x%x (%d)\n",
      key, err);
    return err;
  }
} else {
  -mlx5_mr_cache_free(dev, mr);
}

return 0;
@@ -1537,13 +1546,19 @@
umem = NULL;
}
#endif
-
clean_mr(dev, mr);
+
+/*
+ * We should unregister the DMA address from the HCA before
+ * remove the DMA mapping.
+ */
+mlx5_mr_cache_free(dev, mr);
if (umem) {
  ib_umem_release(umem);
  atomic_sub(npages, &dev->mdev->priv.reg_pages);
}
+if (!mr->allocated_from_cache)
+kfree(mr);

return 0;
}
@@ -1813,7 +1828,6 @@
mr->ibmr.iova = sg_dma_address(sg) + sg_offset;
mr->ibmr.length = 0;
-mr->ndescs = sg_nents;

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for_each_sg(sgl, sg, sg_nents, i) {
    if (unlikely(i >= mr->max_descs))
        @ @ -1825,6 +1839,7 @ @

    sg_offset = 0;
}
+mr->ndescs = i;

if (sg_offset_p)
    *sg_offset_p = sg_offset;
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/odp.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/odp.c
@@ -497,7 +497,7 @@
static int pagefault_mr(struct mlx5_ib_dev *dev, struct mlx5_ib_mr *mr,
    u64 io_virt, size_t bcnt, u32 *bytes_mapped)
{
-    u64 access_mask = ODP_READ_ALLOWED_BIT;
+    u64 access_mask;
    int npages = 0, page_shift, np;
    u64 start_idx, page_mask;
    struct ib_umem_odp *odp;
@@ -522,6 +522,7 @@
        page_mask = ~(BIT(page_shift) - 1);
        start_idx = (io_virt - (mr->mmkey.iova & page_mask)) >> page_shift;
        +access_mask = ODP_READ_ALLOWED_BIT;

    if (mr->umem->writable)
        access_mask |= ODP_WRITE_ALLOWED_BIT;
-    @ @ -724,6 +725,7 @ @
    head = frame;

    bcnt = frame->bcnt;
    +offset = 0;
}
break;

--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/qp.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/qp.c
@@ -256,7 +256,11 @@
        if (ucmd) {
            qp->rq.wqe_cnt = ucmd->rq_wqe_count;
            +if (ucmd->rq_wqe_shift > BITS_PER_BYTE * sizeof(ucmd->rq_wqe_shift))
+                return -EINVAL;
            qp->rq.wqe_shift = ucmd->rq_wqe_shift;
            +if ((1 << qp->rq.wqe_shift) / sizeof(struct mlx5_wqe_data_seg)) < qp->wq_sig)
+                return -EINVAL;
++    if (ucmd->rq_wqe_shift > BITS_PER_BYTE * sizeof(ucmd->rq_wqe_shift))
+        return -EINVAL;
++    qp->rq.wqe_shift = ucmd->rq_wqe_shift;
++    if ((1 << qp->rq.wqe_shift) / sizeof(struct mlx5_wqe_data_seg)) < qp->wq_sig)
+        return -EINVAL;
qp->rq.max.gs = (1 << qp->rq.wqe_shift) / sizeof(struct mlx5_wqe_data_seg) - qp->wq_sig;
qp->rq.max_post = qp->rq.wqe_cnt;
} else {
    @ @ -1130,7 +1134,7 @@
    ib_umem_release(sq->ubuffer.umem);
}

-static int get_rq_pas_size(void *qpc)
+static size_t get_rq_pas_size(void *qpc)
{
    u32 log_page_size = MLX5_GET(qpc, qpc, log_page_size) + 12;
    u32 log_rq_stride = MLX5_GET(qpc, qpc, log_rq_stride);
    @ @ -1146,7 +1150,8 @@
}

static int create_raw_packet_qp_rq(struct mlx5_ib_dev *dev,
-    struct mlx5_ib_rq *rq, void *qpin)
+    struct mlx5_ib_rq *rq, void *qpin,
+    size_t qpinlen)
{
    struct mlx5_ib_qp *mqp = rq->base.container_mibqp;
    __be64 *pas;
    @ @ -1155,9 +1160,12 @@
    void *rqc;
    void *wq;
    void *qpc = MLX5_ADDR_OF(create_qp_in, qpin, qpc);
-    int inlen;
+    size_t rq_pas_size = get_rq_pas_size(qpc);
+    size_t inlen;
    int err;
-    u32 rq_pas_size = get_rq_pas_size(qpc);
+    if (qpinlen < rq_pas_size + MLX5_BYTE_OFF(create_qp_in, pas))
+       return -EINVAL;

    inlen = MLX5_ST_SZ_BYTES(create_rq_in) + rq_pas_size;
    in = kvzalloc(inlen, GFP_KERNEL);
    @ @ -1246,7 +1254,7 @@
}

static int create_raw_packet_qp(struct mlx5_ib_dev *dev, struct mlx5_ib_qp *qp,
-    u32 *in,
+    u32 *in, size_t inlen,
    struct ib_pd *pd)
{
    struct mlx5_ib_raw_packet_qp *raw_packet_qp = &qp->raw_packet_qp;
    @ @ -1278,7 +1286,7 @@
    rq->flags |= MLX5_IB_RQ_CVLAN_STRIPING;
}
if (qp->flags & MLX5_IB_QP_PCI_WRITE_END_PADDING)
    rq->flags |= MLX5_IB_RQ_PCI_WRITE_END_PADDING;
-err = create_raw_packet_qp_rq(dev, rq, in);
+err = create_raw_packet_qp_rq(dev, rq, in, inlen);
if (err)
    goto err_destroy_sq;

@@ -1451,7 +1459,6 @@
MLX5_SET(tirc, tirc, rx_hash_fn, MLX5_RX_HASH_FN_TOEPLITZ);
-MLX5_SET(tirc, tirc, rx_hash_symmetric, 1);
memcp(y(rss_key, ucmd.rx_hash_key, len);
break;
}
@@ -1546,13 +1553,14 @@
struct mlx5_ib_resources *devr = &dev->devr;
int inlen = MLX5_ST_SZ_BYTES(create_qp_in);
struct mlx5_core_dev *mdev = dev->mdev;
-struct mlx5_ib_create_qp resp;
+struct mlx5_ib_create_qp resp = {};
struct mlx5_ib_cq *send_cq;
struct mlx5_ib_cq *recv_cq;
unsigned long flags;
u32 uidx = MLX5_IB_DEFAULT_UIDX;
struct mlx5_ib_create_qp ucmd;
struct mlx5_ib_qp_base *base;
+int mlx5_st;
void *qpc;
u32 *in;
int err;
@@ -1561,6 +1569,10 @@
spin_lock_init(&qp->sq.lock);
spin_lock_init(&qp->rq.lock);
+
+mlx5_st = to_mlx5_st(init_attr->qp_type);
+if (mlx5_st < 0)
+    return -EINVAL;
+
    if (init_attr->rwq_ind_tbl)
        if (!udata)
            return -ENOSYS;
@@ -1722,7 +1734,7 @@
qpc = MLX5_ADDR_OF(create_qp_in, in, qpc);
-
-MLX5_SET(qpc, qpc, st, to_mlx5_st(init_attr->qp_type));
+MLX5_SET(qpc, qpc, st, mlx5_st);

MLX5_SET(qpc, qpc, pm_state, MLX5_QP_PM_MIGRATED);

if (init_attr->qp_type != MLX5_IB_QPT_REG_UMR)
@@ -1836,11 +1848,16 @@
}

if (inlen < 0) {
+err = -EINVAL;
+goto err;
+}
+
+if (init_attr->qp_type == IB_QPT_RAW_PACKET ||
qp->flags & MLX5_IB_QP_UNDERLAY) {
qp->raw_packet_qp.sq.ubuffer.buf_addr = ucmd.sq_buf_addr;
raw_packet_qp_copy_info(qp, &qp->raw_packet_qp);
-err = create_raw_packet_qp(dev, qp, in, pd);
+err = create_raw_packet_qp(dev, qp, in, inlen, pd);
} else {
err = mlx5_core_create_qp(dev->mdev, &base->mqp, in, inlen);
}
@@ -2241,18 +2258,18 @@
static int ib_rate_tomlx5(struct mlx5_ib *dev, u8 rate)
{
-if (rate == IB_RATE_PORT_CURRENT) {
+if (rate == IB_RATE_PORT_CURRENT)
return 0;
-} else if (rate < IB_RATE_2_5_GBPS || rate > IB_RATE_300_GBPS) {
+} else if (rate < IB_RATE_2_5_GBPS || rate > IB_RATE_300_GBPS)
return -EINVAL;
-} else {
-while (rate != IB_RATE_2_5_GBPS &&
-!(1 << (rate + MLX5_STAT_RATE_OFFSET) &
-MLX5_CAP_GEN(dev->mdev, stat_rate_support)))
--rate;
-
-return rate + MLX5_STAT_RATE_OFFSET;
+while (rate != IB_RATE_PORT_CURRENT &&
 + !(1 << (rate + MLX5_STAT_RATE_OFFSET) &
 + MLX5_CAP_GEN(dev->mdev, stat_rate_support)))
 +--rate;
 +
 +return rate ? rate + MLX5_STAT_RATE_OFFSET : rate;
}
static int modify_raw_packet_eth_prio(struct mlx5_core_dev *dev,
@@ -2399,6 +2416,11 @@
[MLX5_QP_ST_UD] = MLX5_QP_OPTSPAR_PKEY_INDEX | 
MLX5_QP_OPTSPAR_Q_KEY | 
MLX5_QP_OPTSPAR_PRI_PORT,
+ [MLX5_QP_ST_XRC] = MLX5_QP_OPTSPAR_RRE | 
+ MLX5_QP_OPTSPAR_RAE | 
+ MLX5_QP_OPTSPAR_RWE | 
+ MLX5_QP_OPTSPAR_PKEY_INDEX | 
+ MLX5_QP_OPTSPAR_PRI_PORT,
},
[MLX5_QP_STATE_RTR] = {
[MLX5_QP_ST_RC] = MLX5_QP_OPTSPAR_ALT_ADDR_PATH | 
@@ -2432,6 +2454,12 @@
MLX5_QP_OPTSPAR_RWE | 
MLX5_QP_OPTSPAR_PM_STATE,
[MLX5_QP_ST_UD] = MLX5_QP_OPTSPAR_Q_KEY,
+ [MLX5_QP_ST_XRC] = MLX5_QP_OPTSPAR_ALT_ADDR_PATH | 
+ MLX5_QP_OPTSPAR_RRE | 
+ MLX5_QP_OPTSPAR_RAE | 
+ MLX5_QP_OPTSPAR_RWE | 
+ MLX5_QP_OPTSPAR_PM_STATE | 
+ MLX5_QP_OPTSPAR_RNR_TIMEOUT,
},
[MLX5_QP_STATE_RTS] = {
@@ -2448,6 +2476,12 @@
MLX5_QP_OPTSPAR_RWE | 
MLX5_QP_OPTSPAR_RAE | 
MLX5_QP_OPTSPAR_RRE,
+ [MLX5_QP_ST_XRC] = MLX5_QP_OPTSPAR_RNR_TIMEOUT | 
+ MLX5_QP_OPTSPAR_RWE | 
+ MLX5_QP_OPTSPAR_RAE | 
+ MLX5_QP_OPTSPAR_RRE | 
+ MLX5_QP_OPTSPAR_PM_STATE | 
+ MLX5_QP_OPTSPAR_ALT_ADDR_PATH,
},
[MLX5_QP_STATE_SQER] = {
@@ -2459,6 +2493,10 @@
MLX5_QP_OPTSPAR_RWE | 
MLX5_QP_OPTSPAR_RAE | 
MLX5_QP_OPTSPAR_RRE,
+ [MLX5_QP_ST_XRC] = MLX5_QP_OPTSPAR_RNR_TIMEOUT | 
+ MLX5_QP_OPTSPAR_RWE | 
+ MLX5_QP_OPTSPAR_RAE | 
+ MLX5_QP_OPTSPAR_RRE,
if (mlx5_cur >= MLX5_QP_NUM_STATE || mlx5_new >= MLX5_QP_NUM_STATE ||

- !optab[mlx5_cur][mlx5_new])
+
+ !optab[mlx5_cur][mlx5_new]) {
+ err = -EINVAL;

goto out;
+
}

op = optab[mlx5_cur][mlx5_new];

optpar = ib_mask_to_mlx5_opt(attr_mask);

* If we moved a kernel QP to RESET, clean up all old CQ
* entries and reinitialize the QP.
*/
- if (new_state == IB_QPS_RESET && !ibqp->uobject) {
+ if (new_state == IB_QPS_RESET &&
+ !ibqp->uobject && ibqp->qp_type != IB_QPT_XRC_TGT) {

mlx5_ib_cq_clean(recv_cq, base->mqp.qpn,
ibqp->srq ? to_msrq(ibqp->srq) : NULL);

if (send_cq != recv_cq)

memset(umr, 0, sizeof(*umr));

- if (wr->send_flags & MLX5_IB_SEND_UMR_FAIL_IF_FREE)
- umr->flags = MLX5_UMR_CHECK_FREE; /* fail if free */
- else
- umr->flags = MLX5_UMR_CHECK_NOT_FREE; /* fail if not free */
+ if (!umrwr->ignore_free_state) {
+ umr->flags = MLX5_UMR_CHECK_FREE;
+ else
+ /* fail if not free */
+ umr->flags = MLX5_UMR_CHECK_NOT_FREE;
+ }

umr->xlt_octowords = cpu_to_be16(get_xlt_octo(umrwr->xlt_size));

if (wr->send_flags & MLX5_IB_SEND_UMR_UPDATE_XLT) {

goto out;
}

- if (wr->opcode == IB_WR_LOCAL_INV ||
- if (wr->opcode == IB_WR_REG_MR) {
  fence = dev->umr_fence;
  next_fence = MLX5_FENCE_MODE_INITIATOR_SMALL;
  } else if (wr->send_flags & IB_SEND_FENCE) {
    if (qp->next_fence)
      fence = MLX5_FENCE_MODE_SMALL_AND_FENCE;
    else
      fence = MLX5_FENCE_MODE_FENCE;
  } else {
    fence = qp->next_fence;
  }
}

switch (ibqp->qp_type) {
  @@ -4374,7 +4420,9 @@
    rdma_ah_set_path_bits(ah_attr, path->grh_mlid & 0x7f);
    rdma_ah_set_static_rate(ah_attr, 
      path->static_rate ? path->static_rate - 5 : 0);
-  if (path->grh_mlid & (1 << 7)) {
+  if (path->grh_mlid & (1 << 7) ||
      ah_attr->type == RDMA_AH_ATTR_TYPE_ROCE) {
      u32 tc_fl = be32_to_cpu(path->tclass_flowlabel);

      rdma_ah_set_grh(ah_attr, NULL,
      @ @ -4685,13 +4733,10 @@
      int err;

      err = mlx5_core_xrcd_dealloc(dev->mdev, xrcdn);
-    if (err) {
-      mlx5_ib_warn(dev, "failed to dealloc xrcdn 0x%x\n", xrcdn);
-      return err;
      -}

      kfree(xrcd);
      -
      return 0;
      }

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if (udata->outlen && udata->outlen < min_resp_len)
    return ERR_PTR(-EINVAL);

+if (!capable(CAP_SYS_RAWIO) &&
    + init_attr->create_flags & IB_WQ_FLAGS_DELAY_DROP)
+return ERR_PTR(-EPERM);
+
    dev = to_mdev(pd->device);
    switch (init_attr->wq_type) {
    case IB_WQT_RQ:
--- linux-4.15.0.orig/drivers/infiniband/hw/mlx5/srq.c
+++ linux-4.15.0/drivers/infiniband/hw/mlx5/srq.c
@@ -241,8 +241,8 @@
{
    struct mlx5_ib_dev *dev = to_mdev(pd->device);
    struct mlx5_ib_srq *srq;
-	int desc_size;
-	int buf_size;
+	size_t desc_size;
+	size_t buf_size;
    int err;
    struct mlx5_srq_attr in = {0};
    __u32 max_srq_wqes = 1 << MLX5_CAP_GEN(dev->mdev, log_max_srq_sz);
@@ -266,15 +266,24 @@
--- mlx5_ib_dbg(dev, "desc_size 0x%x, req wr 0x%x, srq size 0x%x, max gs 0x%x, max avail gather 0x%x"
+++ mlx5_ib_dbg(dev, "desc_size 0x%x, req wr 0x%x, srq size 0x%x, max gs 0x%x, max avail gather 0x%x"
@@ -264,15 +264,24 @@
        +if (desc_size == 0 || srq->msrq.max_gs > desc_size) {
            +err = -EINVAL;
            +goto err_srq;
        }
        desc_size = roundpow_two(desc_size);
        -desc_size = max_t(int, 32, desc_size);
        +desc_size = max_t(size_t, 32, desc_size);
        +if (desc_size < sizeof(struct mlx5_wqe_srq_next_seg)) {
            +err = -EINVAL;
            +goto err_srq;
        }
        srq->msrq.max_avail_gather = (desc_size - sizeof(struct mlx5_wqe_srq_next_seg)) / 
        sizeof(struct mlx5_wqe_data_seg);
        srq->msrq.wqe_shift = ilog2(desc_size);
        buf_size = srq->msrq.max * desc_size;
        -mlx5_ib_dbg(dev, "desc_size 0x%x, req wr 0x%x, srq size 0x%x, max gs 0x%x, max avail gather 0x%x"
--- mlx5_ib_dbg(dev, "desc_size 0x%x, req wr 0x%x, srq size 0x%x, max gs 0x%x, max avail gather 0x%x"
+++ mlx5_ib_dbg(dev, "desc_size 0x%x, req wr 0x%x, srq size 0x%x, max gs 0x%x, max avail gather 0x%x"
@@ -238,16 +238,15 @@
                        -mdev, log_max_srq_sz);
                        -mdev, log_max_srq_sz);
                        +mdev, log_max_srq_sz);
                        
                        if (buf_size < desc_size) {
err = -EINVAL;
+goto err_srq;
+

in.type = init_attr->srq_type;

if (pd->uobject)
@@ -609,7 +609,7 @@
entry->byte_len = MTHCA_ATOMIC_BYTE_LEN;
break;
default:
-entry->opcode = MTHCA_OPCODE_INVALID;
+entry->opcode = 0xFF;
break;
}
} else {
@@ -808,8 +808,10 @@
}

mailbox = mthca_alloc_mailbox(dev, GFP_KERNEL);
@if (IS_ERR(mailbox))
+if (IS_ERR(mailbox)) {
+err = PTR_ERR(mailbox);
goto err_out_arm;
+

cq_context = mailbox->buf;

@@ -851,9 +853,9 @@
}

spin_lock_irq(&dev->cq_table.lock);
-if (mthca_array_set(&dev->cq_table.cq,
- cq->cqn & (dev->limits.num_cqs - 1),
- cq)) {
+err = mthca_array_set(&dev->cq_table.cq,
+ cq->cqn & (dev->limits.num_cqs - 1), cq);
+if (err) {
spin_unlock_irq(&dev->cq_table.lock);
goto err_out_free_mr;
+

MTHCA_OPCODE_ATOMIC_CS = 0x11,
MTHCA_OPCODE_ATOMIC_FA = 0x12,
MTHCA_OPCODE_BIND_MW = 0x18,
MTHCA_OPCODE_INVALID = 0xff

enum {
    --- linux-4.15.0.orig/drivers/infiniband/hw/mthca/mthca_main.c
    +++ linux-4.15.0/drivers/infiniband/hw/mthca/mthca_main.c
    @ @ -986,7 +986,8 @@
    goto err_free_dev;
}

-if (mthca_cmd_init(mdev)) {
    +err = mthca_cmd_init(mdev);
    +if (err) {
        mthca_err(mdev, "Failed to init command interface, aborting.\n");
        goto err_free_dev;
    }
    --- linux-4.15.0.orig/drivers/infiniband/hw/mthca/mthca_provider.c
    +++ linux-4.15.0/drivers/infiniband/hw/mthca/mthca_provider.c
    @@ -532,7 +532,7 @@
    }
    struct mthca_ucontext *context;

    -qp = kmalloc(sizeof *qp, GFP_KERNEL);
    +qp = kzalloc(sizeof(*qp), GFP_KERNEL);
    if (!qp)
        return ERR_PTR(-ENOMEM);

    --- linux-4.15.0.orig/drivers/infiniband/hw/ocrdma/ocrdma_ah.c
    +++ linux-4.15.0/drivers/infiniband/hw/ocrdma/ocrdma_ah.c
    @@ -83,7 +83,6 @@
    struct iphdr ipv4;
    const struct ib_global_route *ib_grh;
    union {
        -struct sockaddr _sockaddr;
        struct sockaddr_in _sockaddr_in;
        struct sockaddr_in6 _sockaddr_in6;
    } sgid_addr, dgid_addr;
    @@ -133,9 +132,9 @@
    ipv4.tot_len = htons(0);

    @ @ -598,7 +598,7 @@
    if (pd->uobject)
        return ERR_PTR(-EINVAL);
    -qp = kmalloc(sizeof (struct mthca_sqp), GFP_KERNEL);
    +qp = kzalloc(sizeof(struct mthca_sqp), GFP_KERNEL);
    if (!qp)
        return ERR_PTR(-ENOMEM);

    --- linux-4.15.0.orig/drivers/infiniband/hw/ocrdma/ocrdma_ah.c
    +++ linux-4.15.0/drivers/infiniband/hw/ocrdma/ocrdma_ah.c
    @@ -83,7 +83,6 @@
    struct iphdr ipv4;
    const struct ib_global_route *ib_grh;
    union {
        -struct sockaddr _sockaddr;
        struct sockaddr_in _sockaddr_in;
        struct sockaddr_in6 _sockaddr_in6;
    } sgid_addr, dgid_addr;
    @@ -133,9 +132,9 @@
    ipv4.tot_len = htons(0);
ipv4.ttl = ib_grh->hop_limit;
ipv4.protocol = nxthdr;
-rdma_gid2ip(&sgid_addr._sockaddr, sgid);
+rdma_gid2ip(struct sockaddr *)&sgid_addr, sgid);
ipv4.saddr = sgid_addr._sockaddr_in.sin_addr.s_addr;
-rdma_gid2ip(&dgid_addr._sockaddr, &ib_grh->dgid);
+rdma_gid2ip((struct sockaddr *)&dgid_addr, &ib_grh->dgid);
ipv4.daddr = dgid_addr._sockaddr_in.sin_addr.s_addr;
memcpy((u8 *)ah->av + eth_sz, &ipv4, sizeof(struct iphdr));
} else {
--- linux-4.15.0.orig/drivers/infiniband/hw/ocrdma/ocrdma_hw.c
+++ linux-4.15.0/drivers/infiniband/hw/ocrdma/ocrdma_hw.c
@@ -2506,7 +2506,6 @@
 u32 vlan_id = 0xFFFF;
u8 mac_addr[6], hdr_type;
union {
-struct sockaddr _sockaddr;
struct sockaddr_in _sockaddr_in;
struct sockaddr_in6 _sockaddr_in6;
} sgid_addr, dgid_addr;
@@ -2554,8 +2553,8 @@
hdr_type = ib_gid_to_network_type(sgid_attr.gid_type, &sgid);
if (hdr_type == RDMA_NETWORK_IPV4) {
-rdma_gid2ip(&sgid_addr._sockaddr, &sgid);
-rdma_gid2ip(&dgid_addr._sockaddr, &grh->dgid);
+rdma_gid2ip((struct sockaddr *)&sgid_addr, &sgid);
+rdma_gid2ip((struct sockaddr *)&dgid_addr, &grh->dgid);
memcpy(&cmd->params.dgid[0],
     &dgid_addr._sockaddr_in.sin_addr.s_addr, 4);
memcpy(&cmd->params.sgid[0],
--- linux-4.15.0.orig/drivers/infiniband/hw/ocrdma/ocrdma_stats.c
+++ linux-4.15.0/drivers/infiniband/hw/ocrdma/ocrdma_stats.c
@@ -834,7 +834,7 @@
 dev->reset_stats.type = OCRDMA_RESET_STATS;
dev->reset_stats.dev = dev;
-if (!debugfs_create_file("reset_stats", S_IRUSR, dev->dir,
+if (!debugfs_create_file("reset_stats", 0200, dev->dir,
     &dev->reset_stats, &ocrdma_dbg_ops))
goto err;
--- linux-4.15.0.orig/drivers/infiniband/hw/ocrdma/ocrdma_verbs.c
+++ linux-4.15.0/drivers/infiniband/hw/ocrdma/ocrdma_verbs.c
@@ -55,7 +55,7 @@
 int ocrdma_query_pkey(struct ib_device *ibdev, u8 port, u16 index, u16 *pkey)
if (index > 1)
+ if (index > 0)
return -EINVAL;

*pkey = 0xffff;
--- linux-4.15.0.orig/drivers/infiniband/hw/qedr/main.c
+++ linux-4.15.0/drivers/infiniband/hw/qedr/main.c
@@ -77,7 +77,7 @@
 struct qedr_dev *qedr = get_qedr_dev(ibdev);
 u32 fw_ver = (u32) qedr->attr.fw_ver;

-snprintf(str, IB_FW_VERSION_NAME_MAX, "%d. %d. %d. %d",
+sprintf(str, IB_FW_VERSION_NAME_MAX, "%d.%d.%d.%d",
    (fw_ver >> 24) & 0xFF, (fw_ver >> 16) & 0xFF,
    (fw_ver >> 8) & 0xFF, fw_ver & 0xFF);
}
@@ -640,7 +640,7 @@
qed_attr = dev->ops->rdma_query_device(dev->rdma_ctx);

/* Part 2 - check capabilities */
-page_size = ~dev->attr.page_size_caps + 1;
+page_size = ~qed_attr->page_size_caps + 1;
if (page_size > PAGE_SIZE)
    DP_ERR(dev,
        "Kernel PAGE_SIZE is %ld which is smaller than minimum page size (%d) required by qedr\n",
    @ @ -876,7 +876,8 @@
    dev->num_cnq = dev->ops->rdma_get_min_cnq_msi(cdev);
if (!dev->num_cnq) {
    -DP_ERR(dev, "not enough CNQ resources.\n");
+DP_ERR(dev, "Failed. At least one CNQ is required.\n");
+rc = -ENOMEM;
goto init_err;
}

--- linux-4.15.0.orig/drivers/infiniband/hw/qedr_iw_cm.c
+++ linux-4.15.0/drivers/infiniband/hw/qedr_iw_cm.c
@@ -128,8 +128,17 @@
if (params->cm_info) {
    event.ird = params->cm_info->ird;
    event.ord = params->cm_info->ord;
-    event.private_data_len = params->cm_info->private_data_len;
-    event.private_data = (void *)params->cm_info->private_data;
+/* Only connect_request and reply have valid private data
+ * the rest of the events this may be left overs from
+ * connection establishment. CONNECT_REQUEST is issued via
+ * qedr_iw_mpa_request
+ */
```c
if (event_type == IW_CM_EVENT_CONNECT_REPLY) {
    event.private_data_len =
    params->cm_info->private_data_len;
    event.private_data =
    /*(void *)params->cm_info->private_data;*/
}
}

if (ep->cm_id)
@@ -451,10 +460,10 @@
@@ -493,6 +502,8 @@
    int i;
    qp = idr_find(&dev->qpidr, conn_param->qpn);
    +if (unlikely(!qp))
    +return -EINVAL;
    laddr = (struct sockaddr_in *)&cm_id->local_addr;
    raddr = (struct sockaddr_in *)&cm_id->remote_addr;
    listener->qed_handle);
    cm_id->rem_ref(cm_id);
    kfree(listener);
    return rc;
}

--- linux-4.15.0.orig/drivers/infiniband/hw/qedr/verbs.c
+++ linux-4.15.0/drivers/infiniband/hw/qedr/verbs.c
@@ -63,7 +63,7 @@
    int qedr_query_pkey(struct ib_device *ibdev, u8 port, u16 index, u16 *pkey)
    { 
    -if (index > QEDR_ROCE_PKEY_TABLE_LEN)
    +if (index >= QEDR_ROCE_PKEY_TABLE_LEN)
        return -EINVAL;
    ```
*pkey = QEDR_ROCE_PKEY_DEFAULT;
@@ -192,54 +192,47 @@
    return 0;
}

-#define QEDR_SPEED_SDR	(1)
-#define QEDR_SPEED_DDR	(2)
-#define QEDR_SPEED_QDR	(4)
-#define QEDR_SPEED_FDR10(8)
-#define QEDR_SPEED_FDR	(16)
-#define QEDR_SPEED_EDR	(32)
-
 static inline void get_link_speed_and_width(int speed, u8 *ib_speed,
    u8 *ib_width)
 {
    switch (speed) {
    case 1000:
        -*ib_speed = QEDR_SPEED_SDR;
        +*ib_speed = IB_SPEED_SDR;
        *ib_width = IB_WIDTH_1X;
        break;
    case 10000:
        -*ib_speed = QEDR_SPEED_QDR;
        +*ib_speed = IB_SPEED_QDR;
        *ib_width = IB_WIDTH_1X;
        break;
    case 20000:
        -*ib_speed = QEDR_SPEED_DDR;
        +*ib_speed = IB_SPEED_DDR;
        *ib_width = IB_WIDTH_4X;
        break;
    case 25000:
        -*ib_speed = QEDR_SPEED_EDR;
        +*ib_speed = IB_SPEED_EDR;
        *ib_width = IB_WIDTH_1X;
        break;
    case 40000:
        -*ib_speed = QEDR_SPEED_QDR;
        +*ib_speed = IB_SPEED_QDR;
        *ib_width = IB_WIDTH_4X;
        break;
    case 50000:
        -*ib_speed = QEDR_SPEED_QDR;
        -*ib_width = IB_WIDTH_4X;
case 100000:
-ib_speed = QEDR_SPEED_EDR;
+ib_speed = IB_SPEED_EDR;
*ib_width = IB_WIDTH_4X;
break;

default:
/* Unsupported */
-ib_speed = QEDR_SPEED_SDR;
+ib_speed = IB_SPEED_SDR;
*ib_width = IB_WIDTH_1X;
}
}
@@ -1435,6 +1428,14 @@
if (qp->urq.umem)
ib_umem_release(qp->urq.umem);
qp->urq.umem = NULL;
+
+if (rdma_protocol_roce(&dev->ibdev, 1)) {
+qedr_free_pbl(dev, &qp->usq.pbl_info, qp->usq.pbl_tbl);
+qedr_free_pbl(dev, &qp->urq.pbl_info, qp->urq.pbl_tbl);
+} else {
+kfree(qp->usq.pbl_tbl);
+kfree(qp->urq.pbl_tbl);
+
}
}

static int qedr_create_user_qp(struct qedr_dev *dev, 
@@ -1842,14 +1843,15 @@
static int qedr_update_qp_state(struct qedr_dev *dev, 
struct qedr_qp *qp,
+enum qed_roce_qp_state cur_state,
enum qed_roce_qp_state new_state)
{
int status = 0;

-if (new_state == qp->state)
+if (new_state == cur_state)
return 0;

-switch (qp->state) {
+switch (cur_state) {
 case QED_ROCE_QP_STATE_RESET:
switch (new_state) {
    case QEDROCE_qp_STATE_INIT:
        @ @ -1956,6 +1958,7 @ @
struct qedr_dev *dev = get_qedr_dev(&qp->dev->ibdev);
const struct ib_global_route *grh = rdma_ah_read_grh(&attr->ah_attr);
enum ib_qp_state old_qp_state, new_qp_state;
+enum qed_roce_qp_state cur_state;
int rc = 0;

DP_DEBUG(dev, QEDR_MSG_QP,
@@ -2018,6 +2021,9 @@
} }

if (attr_mask & (IB_QP_AV | IB_QP_PATH_MTU)) {
    if (rdma_protocol_iwarp(&dev->ibdev, 1))
+return -EINVAL;
+
    if (attr_mask & IB_QP_PATH_MTU) {
        if (attr->path_mtu < IB_MTU_256 ||
            attr->path_mtu > IB_MTU_4096) {
@@ -2087,18 +2093,23 @@
        SET_FIELD(qp_params.modify_flags,
            QEDROCE_MODIFY_QP_VALID_ACK_TIMEOUT, 1);

-qp_params.ack_timeout = attr->timeout;
-}
-if (attr->timeout) {
-u32 temp;
-
-temp = 4096 * (1UL << attr->timeout) / 1000 / 1000;
-/* FW requires [msec] */
-qp_params.ack_timeout = temp;
-} else {
-/* Infinite */
+/* The received timeout value is an exponent used like this:
+ * 12.7.34 LOCAL ACK TIMEOUT
+ * Value representing the transport (ACK) timeout for use by
+ * the remote, expressed as: 4.096 * 2^timeout [usec]"
+ * The FW expects timeout in msec so we need to divide the usec
+ * result by 1000. We'll approximate 1000~2^10, and 4.096 ~ 2^2,
+ * so we get: 2^2 * 2^timeout / 2^10 = 2^(timeout - 8).
+ * The value of zero means infinite so we use a 'max_t' to make
+ * sure that sub 1 msec values will be configured as 1 msec.
+ */
+if (attr->timeout)
+qp_params.ack_timeout =
+1 << max_t(int, attr->timeout - 8, 0);
+else
qp_params.ack_timeout = 0;
if (attr_mask & IB_QP_RETRY_CNT) {
    SET_FIELD(qp_params.modify_flags,
              QED_ROCE_MODIFY_QP_VALID_RETRY_CNT, 1);
}

qp->dest_qp_num = attr->dest_qp_num;
}

+cur_state = qp->state;
+
+/* Update the QP state before the actual ramrod to prevent a race with
+ * fast path. Modifying the QP state to error will cause the device to
+ * flush the CQEs and while polling the flushed CQEs will considered as
+ * a potential issue if the QP isn't in error state.
+ */
+if ((attr_mask & IB_QP_STATE) && qp->qp_type != IB_QPT_GSI &&
    !udata && & qp_params.new_state == QED_ROCE_QP_STATE_ERR)
+qp->state = QED_ROCE_QP_STATE_ERR;
+
if (qp->qp_type != IB_QPT_GSI)
    rc = dev->ops->rdma_modify_qp(dev->rdma_ctx,
        qp->qed_qp, &qp_params);

if (attr_mask & IB_QP_STATE) {
    if (!udata)
        rc =qedr_update_qp_state(dev, qp, qp_params.new_state);
    else
        rc =qedr_update_qp_state(dev, qp, cur_state,
            qp_params.new_state);
    qp->state = qp_params.new_state;
}

qp_attr->cap.max_recv_wr = qp->rq.max_wr;
qp_attr->cap.max_send_sge = qp->sq.max_sges;
qp_attr->cap.max_recv_sge = qp->rq.max_sges;
-qp_attr->cap.max_inline_data = ROCE_REQ_MAX_INLINE_DATA_SIZE;
+qp_attr->cap.max_inline_data = dev->attr.max_inline;
qp_init_attr->cap = qp_attr->cap;
qp_attr->ah_attr.type = RDMA_AH_ATTR_TYPE_ROCE;

dev->ops->rdma_free_tid(dev->rdma_ctx, mr->hw_mr.itid);

-if ((mr->type != QEDR_MR_DMA) && (mr->type != QEDR_MR_FRMR))
    qedr_free_pbl(dev, &mr->info.pbl_info, mr->info.pbl_table);
+if (mr->type != QEDR_MR_DMA)
+free_mr_info(dev, &mr->info);

/* it could be user registered memory. */
if (mr->umem)
@@ -3035,6 +3058,11 @@

switch (wr->opcode) {
  case IB_WR_SEND_WITH_IMM:
+    if (unlikely(rdma_protocol_iwarp(&dev->ibdev, 1))) {
+      rc = -EINVAL;
+      *bad_wr = wr;
+      break;
+    }
  wqe->req_type = RDMA_SQ_REQ_TYPE_SEND_WITH_IMM;
  swqe = (struct rdma_sq_send_wqe_1st *)wqe;
  swqe->wqe_size = 2;
@@ -3076,6 +3104,11 @@
  break;

  case IB_WR_RDMA_WRITE_WITH_IMM:
+    if (unlikely(rdma_protocol_iwarp(&dev->ibdev, 1))) {
+      rc = -EINVAL;
+      *bad_wr = wr;
+      break;
+    }
  wqe->req_type = RDMA_SQ_REQ_TYPE_RDMA_WR_WITH_IMM;
  rwqe = (struct rdma_sq_rdma_wqe_1st *)wqe;

@@ -3725,7 +3758,7 @@
 {
  struct qedr_dev *dev = get_qedr_dev(ibcq->device);
  struct qedr_cq *cq = get_qedr_cq(ibcq);
-union rdma_cqe *cqe = cq->latest_cqe;
+union rdma_cqe *cqe;
  u32 old_cons, new_cons;
  unsigned long flags;
  int update = 0;
@@ -3742,6 +3775,7 @@
  return qedr_gsi_poll_cq(ibcq, num_entries, wc);

  spin_lock_irqsave(&cq->cq_lock, flags);
  +cqe = cq->latest_cqe;
  old_cons = qedr_chain_get_cons_idx_u32(&cq->pbl);
  while (num_entries && is_valid_cqe(cq, cqe)) {
    struct qedr_qp *qp;
    --linux-4.15.0.orig/drivers/infiniband/hw/qib/qib.c
    +++ linux-4.15.0/drivers/infiniband/hw/qib/qib.c

@@ -1231,6 +1231,7 @@
#define QIB_BADINTR           0x8000 /* severe interrupt problems */
#define QIB_DCA_ENABLED       0x10000 /* Direct Cache Access enabled */
#define QIB_HAS_QSFP          0x20000 /* device (card instance) has QSFP */
+#define QIB_SHUTDOWN          0x40000 /* device is shutting down */

/*
 * values for ppd->lflags (_ib_port_ related flags)
 @ @ -1426,8 +1427,7 @@
/*
 * dma_addr wrappers - all 0's invalid for hw
 */
-dma_addr_t qib_map_page(struct pci_dev *, struct page *, unsigned long,
-    size_t, int);
+int qib_map_page(struct pci_dev *d, struct page *p, dma_addr_t *daddr);
const char *qib_get_unit_name(int unit);
const char *qib_get_card_name(struct rvt_dev_info *rdi);
struct pci_dev *qib_get_pci_dev(struct rvt_dev_info *rdi);
--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_file_ops.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_file_ops.c
@@ -364,6 +364,8 @@
goto done;
} 
for (i = 0; i < cnt; i++, vaddr += PAGE_SIZE) {
+dma_addr_t daddr;
  
  for (; ntids--; tid++) {
    if (tid == tidcnt)
-      dd->physshadow[ctxttid + tid] = qib_map_page(dd->pcidev, pagep[i], 0, PAGE_SIZE,
-         PCI_DMA_FROMDEVICE);
+      dd->physshadow[ctxttid + tid] = daddr;
      
      /* we "know" system pages and TID pages are same size */
      dd->pageshadow[ctxttid + tid] = pagep[i];
-    dd->physshadow[ctxttid + tid] =
-      qib_map_page(dd->pcidev, pagep[i], 0, PAGE_SIZE,
-        PCI_DMA_FROMDEVICE);
+    dd->physshadow[ctxttid + tid] = daddr;
*/
    * don't need atomic or it's overhead
*/
--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_init.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_init.c
@@ -843,6 +843,10 @@
  struct qib_pportdata *ppd;
  unsigned pidx;

+if (dd->flags & QIB_SHUTDOWN)
+  return;
+dd->flags |= QIB_SHUTDOWN;
+
+for (pidx = 0; pidx < dd->num_pports; ++pidx) {
  ppd = dd->pport + pidx;

@@ -1182,6 +1186,7 @@
 static void qib_remove_one(struct pci_dev *);
 static int qib_init_one(struct pci_dev *, const struct pci_device_id *);
+static void qib_shutdown_one(struct pci_dev *);

 #define DRIVER_LOAD_MSG "Intel " QIB_DRV_NAME " loaded: "
 #define PFX QIB_DRV_NAME " : ";
@@ -1199,6 +1204,7 @@
 .name = QIB_DRV_NAME,
 .probe = qib_init_one,
 .remove = qib_remove_one,
+ shutdown = qib_shutdown_one,
 .id_table = qib_pci_tbl,
 .err_handler = &qib_pci_err_handler,
};
@@ -1549,6 +1555,13 @@
 qib_postinit_cleanup(dd);
 }

+static void qib_shutdown_one(struct pci_dev *pdev)
+{
+  struct qib_devdata *dd = pci_get_drvdata(pdev);
+  +qib_shutdown_device(dd);
+}
+/**
+ * qib_create_rcvhdrq - create a receive header queue
+ * @dd: the qlogic_ib device
+--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_rc.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_rc.c
@@ -434,13 +434,13 @@
 qp->s_state = OP(COMPARE_SWAP);
 put_ib_ateth_swap(wqe->atomic_wr.swap,
   &ohdr->u.atomic_eth);

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-put_ib_ateth_swap(wqe->atomic_wr.compare_add, &ohdr->u.atomic_eth);
+put_ib_ateth_compare(wqe->atomic_wr.compare_add, &ohdr->u.atomic_eth);
} else {
qp->s_state = OP(FETCH_ADD);
put_ib_ateth_swap(wqe->atomic_wr.compare_add, &ohdr->u.atomic_eth);
-put_ib_ateth_swap(0, &ohdr->u.atomic_eth);
+put_ib_ateth_compare(0, &ohdr->u.atomic_eth);
}
put_ib_ateth_vaddr(wqe->atomic_wr.remote_addr, &ohdr->u.atomic_eth);
--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_ruc.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_ruc.c
@@ -425,6 +425,8 @@
goto op_err;
if (!ret)
goto rnr_nak;
+if (wqe->length > qp->r_len)
+goto inv_err;
break;

case IB_WR_RDMA_WRITE_WITH_IMM:
@@ -585,7 +587,10 @@
goto err;
inv_err:
-send_status = IB_WC_REM_INV_REQ_ERR;
+send_status =
+sqp->ibqp.qp_type == IB_QPT_RC ?
+IB_WC_REM_INV_REQ_ERR :
+IB_WC_SUCCESS;
wc.status = IB_WC_LOC_QP_OP_ERR;
goto err;
--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_sdma.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_sdma.c
@@ -600,8 +600,10 @@
    dw = (len + 3) >> 2;
    addr = dma_map_single(&ppd->dd->pcidev->dev, sge->vaddr,
        dw << 2, DMA_TO_DEVICE);
-    if (dma_mapping_error(&ppd->dd->pcidev->dev, addr))
+    if (dma_mapping_error(&ppd->dd->pcidev->dev, addr)) {
+        ret = -ENOMEM;
    goto unmap;
}
make_sdma_desc(ppd, sdmdesc, (u64) addr, dw, dwoffset);
/* SDmaUseLargeBuf has to be set in every descriptor */
--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_sysfs.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_sysfs.c
@@ -301,6 +301,9 @@
    struct qib_pportdata *ppd = container_of(kobj, struct qib_pportdata, pport_kobj);

+if (pattr->show)
+return -EIO;
+return pattr->show(ppd, buf);
}

@@ -312,6 +315,9 @@
    struct qib_pportdata *ppd = container_of(kobj, struct qib_pportdata, pport_kobj);

+if (pattr->store)
+return -EIO;
+return pattr->store(ppd, buf, len);
}

@@ -750,7 +756,7 @@
    qib_dev_err(dd,
         "Skipping linkcontrol sysfs info, (err %d) port %u\n",
        ret, port_num);
-    goto bail;
+    goto bail_link;
    } kobject_uevent(&ppd->pport_kobj, KOBJ_ADD);

@@ -760,7 +766,7 @@
    qib_dev_err(dd,
         "Skipping sl2vl sysfs info, (err %d) port %u\n",
        ret, port_num);
-    goto bail_link;
+    goto bail_sl;
    } kobject_uevent(&ppd->sl2vl_kobj, KOBJ_ADD);

@@ -770,7 +776,7 @@
    qib_dev_err(dd,
         "Skipping diag_counters sysfs info, (err %d) port %u\n",
        ret, port_num);
-    goto bail_sl;
+    goto bail_diagc;
kobject_uevent(&ppd->diagc_kobj, KOBJ_ADD);

@@ -783,7 +789,7 @@
qib_dev_err(dd, 
"Skipping Congestion Control sysfs info, (err %d) port %u\n", 
ret, port_num);
-goto bail_diagc;
+goto bail_cc;
}

kobject_uevent(&ppd->pport_cc_kobj, KOBJ_ADD);
@@ -865,6 +871,7 @@
&cc_table_bin_attr);
kobject_put(&ppd->pport_cc_kobj);
}
+koject_put(&ppd->diagc_kobj);
kobject_put(&ppd->sl2vl_kobj);
kobject_put(&ppd->pport_kobj);
}
--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_ud.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_ud.c
@@ -515,7 +515,6 @@
opcode == IB_OPCODE_UD_SEND_ONLY_WITH_IMMEDIATE) {
wc.ex.imm_data = ohdr->u.ud.imm_data;
w.c.wc_flags = IB_WC_WITH_IMM;
-tlen -= sizeof(u32);
} else if (opcode == IB_OPCODE_UD_SEND_ONLY) {
wc.ex.imm_data = 0;
w.c.wc_flags = 0;
--- linux-4.15.0.orig/drivers/infiniband/hw/qib/qib_user_pages.c
+++ linux-4.15.0/drivers/infiniband/hw/qib/qib_user_pages.c
@@ -99,23 +99,27 @@
* 
*I'm sure we won't be so lucky with other iommu's, so FIXME.*
*/
-dma_addr_t qib_map_page(struct pci_dev *hwdev, struct page *page,
-unsigned long offset, size_t size, int direction)
+int qib_map_page(struct pci_dev *hwdev, struct page *page, dma_addr_t *daddr)
{
dma_addr_t phys;

-phys = pci_map_page(hwdev, page, offset, size, direction);
+phys = pci_map_page(hwdev, page, 0, PAGE_SIZE, PCI_DMA_FROMDEVICE);
+if (pci_dma_mapping_error(hwdev, phys))
+return -ENOMEM;

-if (phys == 0) {
pci_unmap_page(hwdev, phys, size, direction);
phys = pci_map_page(hwdev, page, offset, size, direction);
if (!phys) {
    pci_unmap_page(hwdev, phys, PAGE_SIZE, PCI_DMA_FROMDEVICE);
    phys = pci_map_page(hwdev, page, 0, PAGE_SIZE,
    PCI_DMA_FROMDEVICE);
    if (pci_dma_mapping_error(hwdev, phys))
        return -ENOMEM;
        /*
            * FIXME: If we get 0 again, we should keep this page,
            * map another, then free the 0 page.
            */
    
-
    return phys;
    
    pdev = dev_list;
    
}
/* Try to find resources on an unused vf */
qpgrp_check:
if (IS_ERR_OR_NULL(qpgrp)) {
    usnic_err("Failed to allocate qpgrp\n");
    if (usnic_ib_share_vf)
        usnic_uiom_free_dev_list(dev_list);
    return ERR_PTR(qpgrp ? PTR_ERR(qpgrp) : -ENOMEM);
}
return qpgrp;
@@ -335,13 +338,16 @@
usnic_dbg("\n");

-mutex_lock(&us_ibdev->usdev_lock);
if (ib_get_eth_speed(ibdev, port, &props->active_speed,
-  &props->active_width)) {
-mutex_unlock(&us_ibdev->usdev_lock);
+  &props->active_width))
    return -EINVAL;
}
/* props being zeroed by the caller, avoid zeroing it here */

props->lid = 0;
@@ -445,7 +451,7 @@
int usnic_ib_query_pkey(struct ib_device *ibdev, u8 port, u16 index,
  u16 *pkey)
{
  -if (index > 1)
+if (index > 0)
      return -EINVAL;

  *pkey = 0xffff;
@@ -667,7 +673,7 @@
usnic_dbg("va 0x%lx length 0x%zx\n", mr->umem->va, mr->umem->length);

-usnic_uiom_reg_release(mr->umem, ibmr->pd->uobject->context->closing);
+usnic_uiom_reg_release(mr->umem, ibmr->uobject->context);
kfree(mr);
return 0;
}
--- linux-4.15.0.orig/drivers/infiniband/hw/usnic/usnic_uiom.c
+++ linux-4.15.0/drivers/infiniband/hw/usnic/usnic_uiom.c
@@ -41,6 +41,7 @@
#include <linux/workqueue.h>
#include <linux/list.h>
#include <linux/pci.h>
+#include <rdma/ibverbs.h>

#include "usnic_log.h"
#include "usnic_uiom.h"
@@ -88,7 +89,7 @@
for_each_sg(chunk->page_list, sg, chunk->nents, i) {
 page = sg_page(sg);
 pa = sg_phys(sg);
-if (dirty)
+if (!PageDirty(page) && dirty)
 set_page_dirty_lock(page);
 put_page(page);
 usnic_dbg("pa: %pa\n", &pa);
@@ -114,6 +115,16 @@
dma_addr_t pa;
 unsigned int gup_flags;

+/*
+ * If the combination of the addr and size requested for this memory
+ * region causes an integer overflow, return error.
+ */
+if (((addr + size) < addr) || PAGE_ALIGN(addr + size) < (addr + size))
+return -EINVAL;
+
+if (!size)
+return -EINVAL;
+
if (!can_do_mlock())
return -EPERM;
@@ -127,7 +138,7 @@
down_write(&current->mm->mmap_sem);

-locked = npages + current->mm->locked_vm;
+locked = npages + current->mm->pinned_vm;
 lock_limit = rlimit(RLIMIT_MEMLOCK) >> PAGE_SHIFT;
if ((locked > lock_limit) && !capable(CAP_IPC_LOCK)) {
    ret = 0;

    while (npages) {
        ret = get_user_pages(cur_base,
        while (npages) {
        ret = get_user_pages_longterm(cur_base,
            min_t(unsigned long, npages,
            PAGE_SIZE / sizeof(struct page *)),
            gup_flags, page_list, NULL);
    if (ret < 0)
        usnic_uiom_put_pages(chunk_list, 0);
    else
        current->mm->locked_vm = locked;
        current->mm->pinned_vm = locked;

        up_write(&current->mm->mmap_sem);
        free_page((unsigned long) page_list);
    return ERR_PTR(err);
}

void usnic_uiom_reg_release(struct usnic_uiom_reg *uiomr, int closing)
+void usnic_uiom_reg_release(struct usnic_uiom_reg *uiomr,
+    struct ib_ucontext *ucontext)
{
    struct task_struct *task;
    struct mm_struct *mm;
    unsigned long diff;

    __usnic_uiom_reg_release(uiomr->pd, uiomr, 1);

    -mm = get_task_mm(current);
    -if (!mm) {
        -kfree(uiomr);
        -return;
    }
    +task = get_pid_task(ucontext->tgid, PIDTYPE_PID);
    +if (!task)
        goto out;
    +mm = get_task_mm(task);
    +put_task_struct(task);
    +if (!mm)
        goto out;

    diff = PAGE_ALIGN(uiomr->length + uiomr->offset) >> PAGE_SHIFT;
* up here and not be able to take the mmap_sem. In that case
* we defer the vm_locked accounting to the system workqueue.
*/
-if (closing) {
+if (ucontext->closing) {
  if (!down_write_trylock(&mm->mmap_sem)) {
    INIT_WORK(&uiomr->work, usnic_uiom_reg_account);
    uiomr->mm = mm;
    if (-455.9 +470.10 @@
      else
        down_write(&mm->mmap_sem);

        -current->mm->locked_vm -= diff;
        +mm->pinned_vm -= diff;
        up_write(&mm->mmap_sem);
        mmput(mm);
        +out:
        kfree(uiomr);
      }

      --- linux-4.15.0.orig/drivers/infiniband/hw/usnic/usnic_uiom.h
      +++ linux-4.15.0/drivers/infiniband/hw/usnic/usnic_uiom.h
      @@ -39,6 +39,8 @@

      #include "usnic_uiom_interval_tree.h"

      +struct ib_ucontext;
      +
      #define USNIC_UIOM_READ		(1)
      #define USNIC_UIOM_WRITE	(2)

      @@ -89,7 +91,8 @@
      struct usnic_uiom_reg *usnic_uiom_reg_get(struct usnic_uiom_pd *pd,
                                              unsigned long addr, size_t size,
                                              int access, int dmasync);
      -void usnic_uiom_reg_release(struct usnic_uiom_reg *uiomr, int closing);
      +void usnic_uiom_reg_release(struct usnic_uiom_reg *uiomr,
                                 + struct ib_ucontext *ucontext);
      int usnic_uiom_init(char *drv_name);
      void usnic_uiom_fini(void);
      #endif /* USNIC_UIOM_H */
      --- linux-4.15.0.orig/drivers/infiniband/hw/vmw_pvrdma/pvrdma.h
      +++ linux-4.15.0/drivers/infiniband/hw/vmw_pvrdma/pvrdma.h
      @@ -432,7 +432,40 @@

      static inline enum pvrdma_wr_opcode ib_wr_opcode_to_pvrdma(enum ib_wr_opcode op)
-return (enum pvrdma_wr_opcode)op;
+switch (op) {
  +case IB_WR_RDMA_WRITE:
  +return PVRDMA_WR_RDMA_WRITE;
  +case IB_WR_RDMA_WRITE_WITH_IMM:
  +return PVRDMA_WR_RDMA_WRITE_WITH_IMM;
  +case IB_WR_SEND:
  +return PVRDMA_WR_SEND;
  +case IB_WR_SEND_WITH_IMM:
  +return PVRDMA_WR_SEND_WITH_IMM;
  +case IB_WR_RDMA_READ:
  +return PVRDMA_WR_RDMA_READ;
  +case IB_WR_ATOMIC_CMP_AND_SWP:
  +return PVRDMA_WR_ATOMIC_CMP_AND_SWP;
  +case IB_WR_ATOMIC_FETCH_AND_ADD:
  +return PVRDMA_WR_ATOMIC_FETCH_AND_ADD;
  +case IB_WR_LSO:
  +return PVRDMA_WR_LSO;
  +case IB_WR_SEND_WITH_INV:
  +return PVRDMA_WR_SEND_WITH_INV;
  +case IB_WR_RDMA_READ_WITH_INV:
  +return PVRDMA_WR_RDMA_READ_WITH_INV;
  +case IB_WR_LOCAL_INV:
  +return PVRDMA_WR_LOCAL_INV;
  +case IB_WR_REG_MR:
  +return PVRDMA_WR_FAST_REG_MR;
  +case IB_WR_MASKED_ATOMIC_CMP_AND_SWP:
  +return PVRDMA_WR_MASKED_ATOMIC_CMP_AND_SWP;
  +case IB_WR_MASKED_ATOMIC_FETCH_AND_ADD:
  +return PVRDMA_WR_MASKED_ATOMIC_FETCH_AND_ADD;
  +case IB_WR_REG_SIG_MR:
  +return PVRDMA_WR_REG_SIG_MR;
  +default:
  +return PVRDMA_WR_ERROR;
+
};
}

static inline enum ib_wc_status pvrdma_wc_status_to_ib(
  ...

union pvrdma_cmd_resp rsp;
struct pvrdma_cmd_create_cq *cmd = &req.create_cq;
struct pvrdma_cmd_create_cq *resp = &rsp.create_cq_resp;
+struct pvrdma_create_cq_resp cq_resp = {0};
struct pvrdma_create_cq ucmd;

BUILD_BUG_ON(sizeof(struct pvrdma_cqe) != 64);
cq->ibcq.cqe = resp->cqe;
cq->cq_handle = resp->cq_handle;
+cq_resp.cqn = resp->cq_handle;
spin_lock_irqsave(&dev->cq_tbl_lock, flags);
dev->cq_tbl[cq->cq_handle % dev->dsr->caps.max_cq] = cq;
spin_unlock_irqrestore(&dev->cq_tbl_lock, flags);
@@ -206,7 +208,7 @@
cq->uar = &(to_vucontext(context)->uar);

/* Copy udata back. */
-if (ib_copy_to_udata(udata, &cq->cq_handle, sizeof(__u32))) {
+if (ib_copy_to_udata(udata, &cq_resp, sizeof(cq_resp))) {
    dev_warn(&dev->pdev->dev, "failed to copy back udata\n");
    pvrdma_destroy_cq(&cq->ibcq);
--- linux-4.15.0.orig/drivers/infiniband/hw/vmw_pvrdma/pvrdma_main.c
+++ linux-4.15.0/drivers/infiniband/hw/vmw_pvrdma/pvrdma_main.c
@@ -827,7 +827,7 @@
 ! (pci_resource_flags(pdev, 1) & IORESOURCE_MEM)) {
    dev_err(&pdev->dev, "PCI BAR region not MMIO\n");
    ret = -ENOMEM;
-dev_free_free_device;
+goto err_disable_pdev;
    goto err_free_device;
 }

ret = pci_request_regions(pdev, DRV_NAME);
@@ -1108,6 +1108,8 @@
    pvrdma_page_dir_cleanup(dev, &dev->cq_pdir);
    pvrdma_page_dir_cleanup(dev, &dev->async_pdir);
    pvrdma_free_slots(dev);
    +dma_free_coherent(pdev->dev, sizeof(*dev->dsr), dev->dsr,
+    +dev->dsrbase);
}

iounmap(dev->regs);
kfree(dev->sgid_tbl);
--- linux-4.15.0.orig/drivers/infiniband/hw/vmw_pvrdma/pvrdma_qp.c
+++ linux-4.15.0/drivers/infiniband/hw/vmw_pvrdma/pvrdma_qp.c
@@ -721,6 +721,12 @@
     wr->opcode == IB_WR_RDMA_WRITE_WITH_IMM)
    wqe_hdr->ex.imm_data = wr->ex.imm_data;
+    if (unlikely(wqe_hdr->opcode == PVRDMA_WR_ERROR)) {
+        *bad_wr = wr;
+        ret = -EINVAL;
+        goto out;
+    }

switch (qp->ibqp.qp_type) {
    case IB_QPT_GSI:
    case IB_QPT_UD:
        union pvrdma_cmd.resp rsp;
        struct pvrdma_cmd_create_srq *cmd = &req.create_srq;
        struct pvrdma_cmd_create_srq_resp *resp = &rsp.create_srq_resp;
        struct pvrdma_create_srq_resp srq_resp = {0};
        struct pvrdma_create_srq ucmd;
        unsigned long flags;
        int ret;

        srq->srq_handle = resp->srqn;
        srq_resp.srqn = resp->srqn;
        spin_lock_irqsave(&dev->srq_tbl_lock, flags);
        dev->srq_tbl[srq->srq_handle % dev->dsr->caps.max_srq] = srq;
        spin_unlock_irqrestore(&dev->srq_tbl_lock, flags);

        /* Copy udata back. */
        if (ib_copy_to_udata(udata, &srq->srq_handle, sizeof(__u32))) {
        +if (ib_copy_to_udata(udata, &srq_resp, sizeof(srq_resp))) {
            dev_warn(&dev->pdev->dev, "failed to copy back udata\n");
            pvrdma_destroy_srq(&srq->ibsrq);
            return ERR_PTR(-EINVAL);
        }

        /* Copy cmd back. */
        if (ib_copy_to_udata(udata, &cmd->cmd, sizeof(cmd->cmd))) {
        +if (ib_copy_to_udata(udata, &resp->cmd, sizeof(resp->cmd))) {
            dev_warn(&dev->pdev->dev, "failed to copy back cmd\n");
            pvrdma_destroy_cmd(&cmd->cmd);
            return ERR_PTR(-EINVAL);
        }

        if (context) {
            pd->privileged = !context;
            pd->pd_handle = resp->pd_handle;
            pd->pdn = resp->pdn;
            +pd_resp.pdn = resp->pdn;
            if (context) {
                -if (ib_copy_to_udata(udata, &pd->pdn, sizeof(__u32))) {
                +if (ib_copy_to_udata(udata, &pd_resp.pdn, sizeof(pd_resp.pdn))) {
                    dev_warn(&dev->pdev->dev, "failed to copy back pdn\n");
                    pvrdma_destroy_pd(&pd->pdn);
                    return ERR_PTR(-EINVAL);
                }
dev_warn(&dev->pdev->dev, 
"failed to copy back protection domain\n");
pvrdma_dealloc_pd(&pd->ibpd);
@@ -551,7 +553,7 @@
if (!atomic_add_unless(&dev->num_ahs, 1, dev->dsr->caps.max_ah))
return ERR_PTR(-ENOMEM);

-ah = kzalloc(sizeof(*ah), GFP_KERNEL);
+ah = kzalloc(sizeof(*ah), GFP_ATOMIC);
if (!ah) {
atomic_dec(&dev->num_ahs);
return ERR_PTR(-ENOMEM);
--- linux-4.15.0.orig/drivers/infiniband/sw/rdmavt/Kconfig
+++ linux-4.15.0/drivers/infiniband/sw/rdmavt/Kconfig
@@ -1,6 +1,6 @@
cfg INFINIBAND_RDMAVT
tristate "RDMA verbs transport library"
-depends on 64BIT
+depends on 64BIT && ARCH_DMA_ADDR_T_64BIT
depends on PCI
select DMA_VIRT_OPS
---help---
--- linux-4.15.0.orig/drivers/infiniband/sw/rdmavt/ah.c
+++ linux-4.15.0/drivers/infiniband/sw/rdmavt/ah.c
@@ -91,13 +91,15 @@

* rvt_create_ah - create an address handle
* @pd: the protection domain
* @ah_attr: the attributes of the AH
+ * @udata: pointer to user's input output buffer information.
*
* This may be called from interrupt context.
*
* Return: newly allocated ah
*/
struct ib_ah *rvt_create_ah(struct ib_pd *pd,
-struct rdma_ah_attr *ah_attr)
+struct rdma_ah_attr *ah_attr,
+struct ib_udata *udata)
{
struct rvt_ah *ah;
struct rvt_dev_info *dev = ib_to_rvt(pd->device);
--- linux-4.15.0.orig/drivers/infiniband/sw/rdmavt/ah.h
+++ linux-4.15.0/drivers/infiniband/sw/rdmavt/ah.h
@@ -51,7 +51,8 @@
#include <rdma/rdma_vt.h>

struct ib_ah *rvt_create_ah(struct ib_pd *pd,
-struct rdma_ah_attr *ah_attr);

struct rdma_ah_attr *ah_attr,
struct ib_data *udata);
int rvt_destroy_ah(struct ib_ah *ibah);
int rvt_modify_ah(struct ib_ah *ibah, struct rdma_ah_attr *ah_attr);
int rvt_query_ah(struct ib_ah *ibah, struct rdma_ah_attr *ah_attr);
--- linux-4.15.0.orig/drivers/infiniband/sw/rdmavt/cq.c
+++ linux-4.15.0/drivers/infiniband/sw/rdmavt/cq.c
@@ -121,17 +121,20 @@
if (cq->notify == IB_CQ_NEXT_COMP ||
    (cq->notify == IB_CQ_SOLICITED &&
     (solicited || entry->status != IB_WC_SUCCESS))) {
+struct kthread_worker *worker;
+
/*
 * This will cause send_complete() to be called in
 * another thread.
 */
-if (likely(cq->rdi->n_cqs_lock)) {
+rcu_read_lock();
+worker = rcu_dereference(cq->rdi->worker);
+if (likely(worker)) {
    cq->notify = RVT_CQ_NONE;
    cq->triggered++;
    kthread_queue_work(cq->rdi->worker, &cq->comptask);
+} rcu_read_unlock();
}
spin_unlock_irqrestore(&cq->lock, flags);
@@ -198,7 +201,7 @@
return ERR_PTR(-EINVAL);
/* Allocate the completion queue structure. */
-cq = kzalloc(sizeof(*cq), GFP_KERNEL);
+cu = kzalloc_node(sizeof(*cq), GFP_KERNEL, rdi->dparms.node);
if (!cq)
    return ERR_PTR(-ENOMEM);
@@ -214,7 +217,9 @@
sz += sizeof(struct ib_uverbs_wc) * (entries + 1);
else
    sz += sizeof(struct ib_wc) * (entries + 1);
-wc = vmalloc_user(sz);
+wc = udata ?
+wv = kthread_queue_work(worker, &cq->comptask);
} 
-spin_unlock(&cq->rdi->n_cqs_lock);
+rcu_read_unlock();
}

spin_unlock_irqrestore(&cq->lock, flags);
@@ -198,7 +201,7 @@
return ERR_PTR(-EINVAL);
/* Allocate the completion queue structure. */
-cq = kzalloc(sizeof(*cq), GFP_KERNEL);
+cu = kzalloc_node(sizeof(*cq), GFP_KERNEL, rdi->dparms.node);
if (!cq)
    return ERR_PTR(-ENOMEM);
@@ -214,7 +217,9 @@
sz += sizeof(struct ib_uverbs_wc) * (entries + 1);
else
    sz += sizeof(struct ib_wc) * (entries + 1);
-wc = vmalloc_user(sz);
+wc = udata ?
+wv = kthread_queue_work(worker, &cq->comptask);
} 
-spin_unlock(&cq->rdi->n_cqs_lock);
+rcu_read_unlock();
}
vzalloc_node(sz, rdi->dparms.node);
if (!wc) {
    ret = ERR_PTR(-ENOMEM);
    goto bail_cq;
}
@@ -369,7 +374,9 @@
sz += sizeof(struct ib_uverbs_wc) * (cqe + 1);
else
    sz += sizeof(struct ib_wc) * (cqe + 1);
-wc = vmalloc_user(sz);
+wc = udata ? 
+    vmalloc_user(sz) :
+vzalloc_node(sz, rdi->dparms.node);
if (!wc)
    return -ENOMEM;
@@ -509,7 +516,7 @@
    int cpu;
    struct kthread_worker *worker;

-    if (rdi->worker)
-        +if (rcu_access_pointer(rdi->worker))
+        return 0;

spin_lock_init(&rdi->n_cqs_lock);
    @@ -521,7 +528,7 @@
    return PTR_ERR(worker);

set_user_nice(worker->task, MIN_NICE);
    -rdi->worker = worker;
    +RCU_INIT_POINTER(rdi->worker, worker);
    return 0;
}
@@ -533,15 +540,19 @@
{
    struct kthread_worker *worker;

-/* block future queuing from send_complete() */
-    spin_lock_irq(&rdi->n_cqs_lock);
-    worker = rdi->worker;
+    if (!rcu_access_pointer(rdi->worker))
+        return;
+    spin_lock(&rdi->n_cqs_lock);
+    worker = rcu_dereference_protected(rdi->worker,
+        lockdep_is_held(&rdi->n_cqs_lock));
    if (!worker) {
        spin_unlock_irq(&rdi->n_cqs_lock);
spin_unlock(&rdi->n_cqs_lock);
return;
}
-rdi->worker = NULL;
-spin_unlock_irq(&rdi->n_cqs_lock);
+RCU_INIT_POINTER(rdi->worker, NULL);
+spin_unlock(&rdi->n_cqs_lock);
+synchronize_rcu();

kthread_destroy_worker(worker);
}
--- linux-4.15.0.orig/drivers/infiniband/sw/rdmavt/mr.c
+++ linux-4.15.0/drivers/infiniband/sw/rdmavt/mr.c
@@ -96,6 +96,8 @@
    for (i = 0; i < rdi->lkey_table.max; i++)
    RCU_INIT_POINTER(rdi->lkey_table.table[i], NULL);

+rdi->dparms.props.max_mr = rdi->lkey_table.max;
+rdi->dparms.props.max_fmr = rdi->lkey_table.max;
return 0;
}

@@ -489,11 +491,13 @@
    unsigned long timeout;
    struct rvt_dev_info *rdi = ib_to_rvt(mr->pd->device);

-    if (percpu_ref_is_zero(&mr->refcount))
-        return 0;
-    /* avoid dma mr */
-    if (mr->lkey)
+    if (mr->lkey) {
+        /* avoid dma mr */
         rvt_dereg_clean_qps(mr);
+        /* @mr was indexed on rcu protected @lkey_table */
+        synchronize_rcu();
+    }
+    timeout = wait_for_completion_timeout(&mr->comp, 5 * HZ);
    if (!timeout) {
        rvt_pr_err(rdi,
@@ -609,11 +613,6 @@
            if (unlikely(mapped_segs == mr->mr.max_segs))
                return -ENOMEM;
-        if (mr->mr.length == 0) {
-            mr->mr.user_base = addr;
-            mr->mr.iova = addr;
-        }


m = mapped_segs / RVT_SEGSZ;
n = mapped_segs % RVT_SEGSZ;
mr->mr.map[m]->segs[n].vaddr = (void *)addr;
@@ -631,17 +630,24 @@
   * @sg_nents: number of entries in sg
   * @sg_offset: offset in bytes into sg
   *
   * Overwrite rvt_mr length with mr length calculated by ib_sg_to_pages.
   *
   * Return: number of sg elements mapped to the memory region

int rvt_map_mr_sg(struct ib_mr *ibmr, struct scatterlist *sg,
int sg_nents, unsigned int *sg_offset)
{
    struct rvt_mr *mr = to_imr(ibmr);
    +int ret;

    mr->mr.length = 0;
    mr->mr.page_shift = PAGE_SHIFT;
    -return ib_sg_to_pages(ibmr, sg, sg_nents, sg_offset,
    -    rvt_set_page);
    +ret = ib_sg_to_pages(ibmr, sg, sg_nents, sg_offset, rvt_set_page);
    +mr->mr.user_base = ibmr->iova;
    +mr->mr.iova = ibmr->iova;
    +mr->mr.offset = ibmr->iova - (u64)mr->mr.map[0]->segs[0].vaddr;
    +mr->mr.length = (size_t)ibmr->length;
    +return ret;

.grid 0;
    --- linux-4.15.0.orig/drivers/infiniband/sw/rdmavt/qp.c
    +++ linux-4.15.0/drivers/infiniband/sw/rdmavt/qp.c
    @@ -58,6 +58,8 @@
    @ @ -58.6 +58.8 @@
    #include "trace.h"

    static void rvt_rc_timeout(struct timer_list *t);
    +static void rvt_reset_qp(struct rvt_dev_info *rdi, struct rvt_qp *qp,
    +    enum ib_qp_type type);
/ * Convert the AETH RNR timeout code into the number of microseconds.
@@ -268,40 +270,41 @@

/ *
 * free_all_qps - check for QPs still in use
- * @qpt: the QP table to empty
+ * rvt_free_qp_cb - callback function to reset a qp
+ * @qp: the qp to reset
+ * @v: a 64-bit value
+ *
+ * This function resets the qp and removes it from the
+ * qp hash table.
+ */
+static void rvt_free_qp_cb(struct rvt_qp *qp, u64 v)
+{
+unsigned int *qp_inuse = (unsigned int *)v;
+struct rvt_dev_info *rdi = ib_to_rvt(qp->ibqp.device);
+
+/* Reset the qp and remove it from the qp hash list */
+rvt_reset_qp(rdi, qp, qp->ibqp.qp_type);
+
+/* Increment the qp_inuse count */
+(*qp_inuse)++;
+
+}
+
+/**
+ * rvt_free_all_qps - check for QPs still in use
+ * @rdi: rvt device info structure
+ * There should not be any QPs still in use.
+ * Free memory for table.
+ * Return the number of QPs still in use.
+ */
static unsigned rvt_free_all_qps(struct rvt_dev_info *rdi)
{
-unsigned long flags;
-struct rvt_qp *qp;
-unsigned n, qp_inuse = 0;
-spinlock_t *ql; /* work around too long line below */
-
- if (rdi->driver_f.free_all_qps)
-qp_inuse = rdi->driver_f.free_all_qps(rdi);
+unsigned int qp_inuse = 0;

qp_inuse += rvt_mcast_tree_empty(rdi);
-if (!rdi->qp_dev)
  return qp_inuse;
+rvt_qp_iter(rdi, (u64)&qp_inuse, rvt_free_qp_cb);

-ql = &rdi->qp_dev->qpt_lock;
-spin_lock_irqsave(ql, flags);
-for (n = 0; n < rdi->qp_dev->qp_table_size; n++) {
-qp = rcu_dereference_protected(rdi->qp_dev->qp_table[n],
-  lockdep_is_held(ql));
-RCU_INIT_POINTER(rdi->qp_dev->qp_table[n], NULL);
-
-for (; qp; qp = rcu_dereference_protected(qp->next,
-  lockdep_is_held(ql)))
-qp_inuse++;
-
-spin_unlock_irqrestore(ql, flags);
-synchronize_rcu();
return qp_inuse;
}

@@ -412,7 +415,8 @@
offset = qpt->incr | ((offset & 1) ^ 1);
}
/* there can be no set bits in low-order QoS bits */
-WARN_ON(offset & (BIT(rdi->dparms.qos_shift) - 1));
+WARN_ON(rdi->dparms.qos_shift > 1 &&
 +offset & ((BIT(rdi->dparms.qos_shift - 1) - 1) << 1));
qpn = mk_qpn(qpt, map, offset);
}

@@ -683,14 +687,14 @@

/**
- * rvt_reset_qp - initialize the QP state to the reset state
- */
+ * _rvt_reset_qp - initialize the QP state to the reset state
+ * @qp: the QP to reset
+ * @type: the QP type
+ *
+ * r_lock, s_hlock, and s_lock are required to be held by the caller
+ */
-static void rvt_reset_qp(struct rvt_dev_info *rdi, struct rvt_qp *qp,
-  enum ib_qp_type type)
+static void _rvt_reset_qp(struct rvt_dev_info *rdi, struct rvt_qp *qp,
+  enum ib_qp_type type)
  __must_hold(&qp->s_lock)
  __must_hold(&qp->s_hlock)
  __must_hold(&qp->r_lock)
lockdep_assert_held(&qp->s_lock);

/**
 * rvt_reset_qp - initialize the QP state to the reset state
 * @rdi: the device info
 * @qp: the QP to reset
 * @type: the QP type
 * 
 * This is the wrapper function to acquire the r_lock, s_hlock, and s_lock
 * before calling _rvt_reset_qp().
 */
static void rvt_reset_qp(struct rvt_dev_info *rdi, struct rvt_qp *qp, enum ib_qp_type type)
{
    spin_lock_irq(&qp->r_lock);
    spin_lock(&qp->s_hlock);
    spin_lock(&qp->s_lock);
    _rvt_reset_qp(rdi, qp, type);
    spin_unlock(&qp->s_lock);
    spin_unlock(&qp->s_hlock);
    spin_unlock_irq(&qp->r_lock);
}

/** rvt_free_qpn - Free a qpn from the bit map
 * @qpt: QP table
 * @qpn: queue pair number to free
 */
switch (new_state) {
    case IB_QPS_RESET:
        if (qp->state != IB_QPS_RESET)
            rvt_reset_qp(rdi, qp, ibqp->qp_type);
        rvt_reset_qp(rdi, qp, ibqp->qp_type);
        break;

    case IB_QPS_RTR:
        struct rvt_qp *qp = ibqp_to_rvtqp(ibqp);
        struct rvt_dev_info *rdi = ib_to_rvt(ibqp->device);

        -spin_lock_irq(&qp->r_lock);
        -spin_lock(&qp->s_hlock);
        -spin_lock(&qp->s_lock);
        rvt_reset_qp(rdi, qp, ibqp->qp_type);
        -spin_unlock(&qp->s_lock);
        -spin_unlock(&qp->s_hlock);
        -spin_unlock_irq(&qp->r_lock);
wait_event(qp->wait, !atomic_read(&qp->refcount));
/* qpn is now available for use again */
--- linux-4.15.0.orig/drivers/infiniband/sw/rdmavt/vt.c
+++ linux-4.15.0/drivers/infiniband/sw/rdmavt/vt.c
@@ -97,9 +97,7 @@
if (!rdi)
    return rdi;
-rdi->ports = kcalloc(nports,
-    sizeof(struct rvt_ibport **),
-    GFP_KERNEL);
+rdi->ports = kcalloc(nports, sizeof(*rdi->ports), GFP_KERNEL);
if (!rdi->ports)
    ib_dealloc_device(&rdi->ibdev);

--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/Kconfig
+++ linux-4.15.0/drivers/infiniband/sw/rxe/Kconfig
@@ -1,6 +1,7 @@
config RDMA_RXE
    tristate "Software RDMA over Ethernet (RoCE) driver"
depends on INET && PCI && INFINIBAND
+depends on !64BIT || ARCH_DMA_ADDR_T_64BIT
depends on NET_UDP_TUNNEL
depends on CRYPTO_CRC32
select DMA_VIRT_OPS
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe.c
@@ -126,6 +126,8 @@
rxe->attr.max_fast_reg_page_list_len	= RXE_MAX_FMR_PAGE_LIST_LEN;
rxe->attr.max_pkeys		= RXE_MAX_PKEYS;
rxe->attr.local_ca_ack_delay		= RXE_LOCAL_CA_ACK_DELAY;
+addrconf_addr_eui48((unsigned char *)&rxe->attr.sys_image_guid,
+                &rxe->ndev->dev_addr);
rxe->max_ucontext		= RXE_MAX_UCONTEXT;

@@ -170,9 +172,6 @@
rxe_init_port_param(port);
-if (!port->attr.pkey_tbl_len || !port->attr.gid_tbl_len)
    return -EINVAL;
-
port->pkey_tbl = kcalloc(port->attr.pkey_tbl_len,
    sizeof(*port->pkey_tbl), GFP_KERNEL);

--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_comp.c
struct rxe_qp *qp, 
@@ -253,6 +254,17 @@
case IB_OPCODE_RC_RDMA_READ_RESPONSE_MIDDLE:
    if (pkt->opcode != IB_OPCODE_RC_RDMA_READ_RESPONSE_MIDDLE &&
        pkt->opcode != IB_OPCODE_RC_RDMA_READ_RESPONSE_LAST) {
+/* read retries of partial data may restart from
+ * read response first or response only.
+ */
+if (((pkt->psn == wqe->first_psn &&
+     pkt->opcode ==
+     IB_OPCODE_RC_RDMA_READ_RESPONSE_FIRST) ||
+     (wqe->first_psn == wqe->last_psn &&
+      pkt->opcode ==
+     IB_OPCODE_RC_RDMA_READ_RESPONSE_ONLY))
+break;
+
return COMPST_ERROR;
}
break;
@@ -276,6 +288,7 @@
case IB_OPCODE_RC_RDMA_READ_RESPONSE_MIDDLE:
    if (wqe->wr.opcode != IB_WR_RDMA_READ &&
        wqe->wr.opcode != IB_WR_RDMA_READ_WITH_INV) {
+wqe->status = IB_WC_FATAL_ERR;
return COMPST_ERROR;
}
reset_retry_counters(qp);
@@ -316,7 +329,7 @@
qp->comp.psn = pkt->psn;
if (qp->req.wait_psn) {
    qp->req.wait_psn = 0;
    -rxe_run_task(&qp->req.task, 1);
    +rxe_run_task(&qp->req.task, 0);
}
}
return COMPST_ERROR_RETRY;
@@ -446,7 +459,7 @@
*/
if (qp->req.wait_fence) {
    qp->req.wait_fence = 0;
}

@@ -462,7 +475,7 @@
 if (qp->req.need_rd_atomic) {
     qp->comp.timeout_retry = 0;
     qp->req.need_rd_atomic = 0;
-    rxe_run_task(&qp->req.task, 1);
+    rxe_run_task(&qp->req.task, 0);
 }
 }

@@ -500,11 +513,11 @@
 struct rxe_pkt_info *pkt,
     struct rxe_send_wqe *wqe)
 {
-    qp->comp.opcode = -1;
-    
-    if (pkt) {
-        if (psn_compare(pkt->psn, qp->comp.psn) >= 0)
-            qp->comp.psn = (pkt->psn + 1) & BTH_PSN_MASK;
+        if (pkt && wqe->state == wqe_state_pending) {
+            if (psn_compare(wqe->last_psn, qp->comp.psn) >= 0) {
+                qp->comp.psn = (wqe->last_psn + 1) & BTH_PSN_MASK;
+                qp->comp.opcode = -1;
+            }
+        }

        if (qp->req.wait_psn) {
            qp->req.wait_psn = 0;
@@ -679,6 +692,20 @@
 goto exit;
 }

+/* if we've started a retry, don't start another
+ * retry sequence, unless this is a timeout.
+ */
+if (qp->comp_started_retry &&
+    !qp->comp.timeout_retry) {
+    if (pkt) {
+        rxe_drop_ref(pkt->qp);
+        kfree_skb(skb);
+        skb = NULL;
+    }
+    goto done;
+}
+ if (qp->comp.retry_cnt > 0) {
+ if (qp->comp.retry_cnt != 7)
+ qp->comp.retry_cnt--;
+ rxe_counter_inc(rxe, RXE_CNT_COMP_RETRY);
+ qp->req.need_retry = 1;
+ -rxe_run_task(&qp->req.task, 1);
+ +qp->comp.started_retry = 1;
+ +rxe_run_task(&qp->req.task, 0);
+ }

if (pkt) {
+ WARN_ON_ONCE(skb);
+ goto done;
+ }

} else {
rxe_counter_inc(rxe, RXE_CNT_RETRY_EXCEEDED);
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_cq.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_cq.c
@@ -30,7 +30,7 @@
 * CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
 * SOFTWARE.
 */
-
+#include <linux/vmalloc.h>
#include "rxe.h"
#include "rxe_loc.h"
#include "rxe_queue.h"
@@ -97,7 +97,7 @@
 err = do_mmap_info(rxe, udata, false, context, cq->queue->buf,
    cq->queue->buf_size, &cq->queue->ip);
if (err) {
  -kvfree(cq->queue->buf);
  +vfree(cq->queue->buf);
  kfree(cq->queue);
  return err;
} 
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_hw_counters.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_hw_counters.c
@@ -59,7 +59,7 @@
 return -EINVAL;

for (cnt = 0; cnt < ARRAY_SIZE(rxe_counter_name); cnt++)
-stats->value[cnt] = dev->stats_counters[cnt];
+stats->value[cnt] = atomic64_read(&dev->stats_counters[cnt]);

return ARRAY_SIZE(rxe_counter_name);
}
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_loc.h
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_loc.h
@@ -237,7 +237,6 @@
 void rxe_release(struct kref *kref);

-void rxe_drain_req_pkts(struct rxe_qp *qp, bool notify);
 int rxe_completer(void *arg);
 int rxe_requester(void *arg);
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_mr.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_mr.c
@@ -175,7 +175,7 @@
 if (IS_ERR(umem)) {
 pr_warn("err %d from rxe_umem_get\n",
 (int)PTR_ERR(umem));
-err = -EINVAL;
+err = PTR_ERR(umem);
 goto err1;
 }
@@ -203,6 +203,7 @@
 vaddr = page_address(sg_page(sg));
 if (!vaddr) {
 pr_warn("null vaddr\n");
+ib_umem_release(umem);
 err = -ENOMEM;
 goto err1;
 }
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_net.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_net.c
@@ -154,10 +154,12 @@
 memcpy(&fl6.daddr, daddr, sizeof(*daddr));
 fl6.flowi6_proto = IPPROTO_UDP;
-if (unlikely(ipv6_stub->ipv6_dst_lookup(sock_net(recv_sockets.sk6->sk),
-recv_sockets.sk6->sk, &ndst, &fl6))) { }
+ndst = ipv6_stub->ipv6_dst_lookup_flow(sock_net(recv_sockets.sk6->sk),
+recv_sockets.sk6->sk, &fl6,
+NULL);
+if (unlikely(IS_ERR(ndst))) { 
 pr_err_ratelimited("no route to %pI6", daddr);
goto put;
+return NULL;
}

if (unlikely(ndst->error)) {
@@ -267,10 +269,8 @@
   /* Create UDP socket */
   err = udp_sock_create(net, &udp_cfg, &sock);
   -if (err < 0) {
   -pr_err("failed to create udp socket. err = \%d\n", err);
   +if (err < 0)
   return ERR_PTR(err);
   -}

   tnl_cfg.encap_type = 1;
   tnl_cfg.encap_rcv = rxe_udp_encap_recv;
@@ -491,6 +491,11 @@
int rxe_loopback(struct sk_buff *skb)
{
   +if (skb->protocol == htons(ETH_P_IP))
   +skb_pull(skb, sizeof(struct iphdr));
   +else
   +skb_pull(skb, sizeof(struct ipv6hdr));
   +
   return rxe_rcv(skb);
}
@@ -694,6 +699,12 @@
recv_sockets.sk6 = rxe_setup_udp_tunnel(&init_net,
   htons(ROCE_V2_UDP_DPORT), true);
   +if (PTR_ERR(recv_sockets.sk6) == -EAFNOSUPPORT) {
   +recv_sockets.sk6 = NULL;
   +pr_warn("IPv6 is not supported, can not create a UDPv6 socket\n");
   +return 0;
   +}
   +
   if (IS_ERR(recv_sockets.sk6)) {
   recv_sockets.sk6 = NULL;
   pr_err("Failed to create IPv6 UDP tunnel\n");
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_opcode.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_opcode.c
@@ -390,7 +390,7 @@
   .name="IB_OPCODE_RC_SEND_ONLY_INV",
   .mask= RXE_IETH_MASK | RXE_PAYLOAD_MASK | RXE_REQ_MASK
   | RXE_COMP_MASK | RXE_RWR_MASK | RXE_SEND_MASK

+ struct rxe_type_info *type;
+}
+for (i = 0; i < cnt; i++) {
+type = &rxe_type_info[i];
+kmem_cache_destroy(type->cache);
+type->cache = NULL;
+}
+
+int rxe_cache_init(void)
+{
+int err;
@@ -136,24 +148,14 @@
return err;

err1:
-while (--i >= 0) {
-kmem_cache_destroy(type->cache);
-type->cache = NULL;
-}
+rxe_cache_clean(i);

return err;
}

void rxe_cache_exit(void)
{
-int i;
-struct rxe_type_info *type;
-
-for (i = 0; i < RXE_NUM_TYPES; i++) {
-type = &rxe_type_info[i];
-kmem_cache_destroy(type->cache);
-type->cache = NULL;
-}
static int rxe_pool_init_index(struct rxe_pool *pool, u32 max, u32 min)
{
#include <linux/skbuff.h>
#include <linux/delay.h>
#include <linux/sched.h>
+include <linux/vmalloc.h>
#include "rxe.h"
#include "rxe_loc.h"

qp->sq.queue->buf_size, &qp->sq.queue->ip);

if (err) {
-kvfree(qp->sq.queue->buf);
+vfree(qp->rq.queue->buf);
kfree(qp->rq.queue);
+qp->rq.queue = NULL;
return err;
}

qp->rq.queue->buf_size,
&qp->rq.queue->ip);
if (err) {
-kvfree(qp->rq.queue->buf);
+vfree(qp->rq.queue->buf);
kfree(qp->rqqueue);
+qp->rq.queue = NULL;
return err;
}

qp->rq.queue = NULL;
return err;
}

err2:
rxp_queue_cleanup(qp->sq.queue);
err1:
+qp->pd = NULL;
+qp->rcq = NULL;
+qp->scq = NULL;
+qp->srq = NULL;
+
if (srq)
rxp_drop_ref(srq);
rxe_drop_ref(scq);
@@ -592,15 +600,16 @@
 struct ib_gid_attr sgid_attr;

 if (mask & IB_QP_MAX_QP_RD_ATOMIC) {
- int max_rd_atomic = __roundup_pow_of_two(attr->max_rd_atomic);
+ int max_rd_atomic = attr->max_rd_atomic ?
+ roundup_pow_of_two(attr->max_rd_atomic) : 0;

 qp->attr.max_rd_atomic = max_rd_atomic;
 atomic_set(&qp->req.rd_atomic, max_rd_atomic);
 }

 if (mask & IB_QP_MAX_DEST_RD_ATOMIC) {
- int max_dest_rd_atomic = __roundup_pow_of_two(attr->max_dest_rd_atomic);
+ int max_dest_rd_atomic = attr->max_dest_rd_atomic ?
+ roundup_pow_of_two(attr->max_dest_rd_atomic) : 0;

 qp->attr.max_dest_rd_atomic = max_dest_rd_atomic;

 @@ -824,9 +833,9 @@
 /* called when the last reference to the qp is dropped */
 void rxe_qp_cleanup(struct rxe_pool_entry *arg)
+ static void rxe_qp_do_cleanup(struct work_struct *work)
 {
- struct rxe_qp *qp = container_of(arg, typeof(*qp), pelem);
+ struct rxe_qp *qp = container_of(work, typeof(*qp), cleanup_work.work);

 rxe_drop_all_mcast_groups(qp);

 @@ -859,3 +868,11 @@
 kernel_sock_shutdown(qp->sk, SHUT_RDWR);
 sock_release(qp->sk);
 }
+/* called when the last reference to the qp is dropped */
+void rxe_qp_cleanup(struct rxe_pool_entry *arg)
+{
+ struct rxe_qp *qp = container_of(arg, typeof(*qp), pelem);
+ +execute_in_process_context(rxe_qp_do_cleanup, &qp->cleanup_work);
+ }
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_recv.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_recv.c
 @@ -36,21 +36,26 @@
/* check that QP matches packet opcode type and is in a valid state */
static int check_type_state(struct rxe_dev *rxe, struct rxe_pkt_info *pkt,
        struct rxe_qp *qp)
{
        unsigned int pkt_type;
        +
        if (unlikely(!qp->valid))
goto err1;

        +pkt_type = pkt->opcode & 0xe0;
        +
switch (qp_type(qp)) {
        case IB_QPT_RC:
-        if (unlikely((pkt->opcode & IB_OPCODE_RC) != 0)) {
+        if (unlikely(pkt_type != IB_OPCODE_RC)) {
pr_warn_ratelimited("bad qp type\n");
goto err1;
}  
break;
        case IB_QPT_UC:
-        if (unlikely(!(pkt->opcode & IB_OPCODE_UC))) {
+        if (unlikely(pkt_type != IB_OPCODE_UC)) {
pr_warn_ratelimited("bad qp type\n");
goto err1;
}
        @ @ -58,7 +63,7 @@
case IB_QPT_UD:
case IB_QPT_SMI:
case IB_QPT_GSI:
-        if (unlikely(!(pkt->opcode & IB_OPCODE_UD))) {
+        if (unlikely(pkt_type != IB_OPCODE_UD)) {
pr_warn_ratelimited("bad qp type\n");
goto err1;
}  
@@ -225,9 +230,14 @@
goto err1;
}

+if (unlikely(qpn == 0)) {
+pr_warn_once("QP 0 not supported");
goto err1;
+}
+
if (qpn != IB_MULTICAST_QPN) {
        -index = (qpn == 0) ? port->qp_smi_index :
```c
-((qpn == 1) ? port->qp_gsi_index : qpn);
+index = (qpn == 1) ? port->qp_gsi_index : qpn;

qp = rxe_pool_get_index(&rxe->qp_pool, index);
if (unlikely(!qp)) {
    pr_warn_ratelimited("no qp matches qpn 0x%x\n", qpn);
@@ -334,10 +344,14 @@
}

static int rxe_match_dgid(struct rxe_dev *rxe, struct sk_buff *skb)
{
+struct rxe_pkt_info *pkt = SKB_TO_PKT(skb);
union ib_gid dgid;
union ib_gid *pdgid;
    u16 index;

+if (pkt->mask & RXE_LOOPBACK_MASK)
    return 0;
+
    if (skb->protocol == htons(ETH_P_IP)) {
        ipv6_addr_set_v4mapped(ip_hdr(skb)->daddr,
            (struct in6_addr *)&dgid);
@@ -365,7 +379,7 @@
    if (unlikely(skb->len < pkt->offset + RXE_BTH_BYTES))
        goto drop;

    -if (unlikely(rxe_match_dgid(rxe, skb) < 0)) {
    +if (rxe_match_dgid(rxe, skb) < 0) {
        pr_warn_ratelimited("failed matching dgid\n");
        goto drop;
    }
@@ -388,7 +402,7 @@

calc_icrc = rxe_icrc_hdr(pkt, skb);
calc_icrc = rxe_crc32(rxe, calc_icrc, (u8 *)payload_addr(pkt),
  -    payload_size(pkt));
+    payload_size(pkt) + bth_pad(pkt));
calc_icrc = (__force u32)cpu_to_be32(~calc_icrc);
if (unlikely(calc_icrc != pack_icrc)) {
    if (skb->protocol == htons(ETH_P_IPV6))
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_req.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_req.c
@@ -73,9 +73,6 @@

int npsn;
int first = 1;

-wqe = queue_head(qp->sq.queue);
-npsn = (qp->comp.psn - wqe->first_psn) & BTH_PSN_MASK;
-```
qp->req.wqe_index = consumer_index(qp->sq.queue);
qp->req.psn = qp->comp.psn;
qp->req.opcode = -1;
@@ -107,11 +104,17 @@
if (first) {
    first = 0;

    -if (mask & WR_WRITE_OR_SEND_MASK)
+if (mask & WR_WRITE_OR_SEND_MASK) {
    +npsn = (qp->comp.psn - wqe->first_psn) &
    +BTH_PSN_MASK;
    retry_first_write_send(qp, wqe, mask, npsn);
    +}

    -if (mask & WR_READ_MASK)
+if (mask & WR_READ_MASK) {
    +npsn = (wqe->dma.length - wqe->dma.resid) /
    +qp->mtu;
    wqe->iova += npsn * qp->mtu;
    +}
}

wqe->state = wqe_state_posted;
@@ -435,7 +438,7 @@
if (pkt->mask & RXE_RETH_MASK) {
    reth_set_rkey(pkt, ibwr->wr.rdma.rkey);
    reth_set_va(pkt, wqe->iova);
    -reth_set_len(pkt, wqe->dma.length);
+reth_set_len(pkt, wqe->dma.resid);
    }

if (pkt->mask & RXE_IMMDT_MASK)
@@ -497,6 +500,12 @@
if (err)
    return err;
}
+if (bth_pad(pkt)) {
+    u8 *pad = payload_addr(pkt) + paylen;
+    +memset(pad, 0, bth_pad(pkt));
+    +crc = rxe_crc32(rxe, crc, pad, bth_pad(pkt));
+    +}
}
p = payload_addr(pkt) + paylen + bth_pad(pkt);
@@ -594,15 +603,8 @@
rxe_add_ref(qp);
next_wqe:
- if (!qp->valid) {
- rxe_drain_req_pkts(qp, true);
+ if (!qp->valid || qp->req.state == QP_STATE_ERROR)
  goto exit;
- }
- 
- if (unlikely(qp->req.state == QP_STATE_ERROR)) {
- rxe_drain_req_pkts(qp, true);
- goto exit;
- }

if (unlikely(qp->req.state == QP_STATE_RESET)) {
  qp->req.wqe_index = consumer_index(qp->sq.queue);
  rmr->access = wqe->wr.wr.reg.access;
  rmr->lkey = wqe->wr.wr.reg.key;
  rmr->rkey = wqe->wr.wr.reg.key;
  rmr->iova = wqe->wr.wr.reg.mr->iova;
  wqe->state = wqe_state_done;
  wqe->status = IB_WC_SUCCESS;
} else {
  goto exit;
}
+ if ((wqe->wr.send_flags & IB_SEND_SIGNALED) ||
  qp->sq_sig_type == IB_SIGNAL_ALL_WR)
+ rxe_run_task(&qp->comp.task, 1);
qp->req.wqe_index = next_index(qp->sq.queue,
qp->req.wqe_index);
  goto next_wqe;
}

if (unlikely(qp_type(qp) == IB_QPT_RC &&
  qp->req.psn > (qp->comp.psn + RXE_MAX_UNACKED_PSNS))) {
  +psn_compare(qp->req.psn, (qp->comp.psn +
  +RXE_MAX_UNACKED_PSNS)) > 0)) {
    qp->req.wait_psn = 1;
  goto exit;
}
@@ -716,6 +723,7 @@

if (fill_packet(qp, wqe, &pkt, skb, payload)) {
  pr_debug("qp#%d Error during fill packet\n", qp_num(qp));
  +kfree_skb(skb);
  goto err;
}
@@ -735,7 +743,6 @@
rollback_state(wqe, qp, &rollback_wqe, rollback_psn);

if (ret == -EAGAIN) {
    kfree_skb(skb);
    rxe_run_task(&qp->req.task, 1);
    goto exit;
}
@@ -748,7 +755,6 @@
    goto next_wqe;
err:
    kfree_skb(skb);
    wqe->status = IB_WC_LOC_PROT_ERR;
    wqe->state = wqe_state_error;
-__rxe_do_task(&qp->comp.task);
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_resp.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_resp.c
@@ -435,6 +435,7 @@
    qp->resp.va = reth_va(pkt);
    qp->resp.rkey = reth_rkey(pkt);
    qp->resp.resid = reth_len(pkt);
++pq->resp.length = reth_len(pkt);
}  
access = (pkt->mask & RXE_READ_MASK) ? IB_ACCESS_REMOTE_READ
    : IB_ACCESS_REMOTE_WRITE;
@@ -683,6 +684,7 @@
    rxe_advance_resp_resource(qp);
res->type= RXE_READ_MASK;
+res->replay= 0;

res->read.va= qp->resp.va;
res->read.va_org= qp->resp.va;
@@ -736,13 +738,19 @@
    if (err)
        pr_err("Failed copying memory\n");

+if (bth_pad(&ack_pkt)) {
+    struct rxe_dev *rxe = to_rdev(qp->ibqp.device);
+    u8 *pad = payload_addr(&ack_pkt) + payload;
+    memset(pad, 0, bth_pad(&ack_pkt));
+    icrc = rxe_crc32(rxe, icrc, pad, bth_pad(&ack_pkt));
+}  
    p = payload_addr(&ack_pkt) + payload + bth_pad(&ack_pkt);
    *p = ~icrc;
    err = rxe_xmit_packet(rxe, qp, &ack_pkt, skb);
if (err) {
    pr_err("Failed sending RDMA reply.\n");
    kfree_skb(skb);
    return RESPST_ERR_RNR;
}

@@ -754,7 +762,8 @@
    state = RESPST_DONE;
 } else {
    qp->resp.res = NULL;
-qp->resp.opcode = -1;
+if (!res->replay)
+    qp->resp.opcode = -1;
    if (psn_compare(res->cur_psn, qp->resp.psn) >= 0)
        qp->resp.psn = res->cur_psn;
    state = RESPST_CLEANUP;
@@ -816,6 +825,7 @@
/* next expected psn, read handles this separately */
    qp->resp.psn = (pkt->psn + 1) & BTH_PSN_MASK;
    qp->resp.opcode = pkt->opcode;
    qp->resp.status = IB_WC_SUCCESS;
@@ -843,17 +853,24 @@
    memset(&cqe, 0, sizeof(cqe));
    -wc->wr_id= wqe->wr_id;
    -wc->status= qp->resp.status;
    -wc->qp= &qp->ibqp;
    +if (qp->rcq->is_user) {
    +    uwc->status             = qp->resp.status;
    +    uwc->qp_num             = qp->ibqp.qp_num;
    +    uwc->wr_id              = wqe->wr_id;
    +} else {
    +wc->status = qp->resp.status;
    +wc->qp = &qp->ibqp;
    +wc->wr_id = wqe->wr_id;
    +}
/* fields after status are not required for errors */
    if (wc->status == IB_WC_SUCCESS) {
        wc->opcode = (pkt->mask & RXE_IMMDT_MASK &&
                      pkt->mask & RXE_WRITE_MASK) ?
            IB_WC_RECV_RDMA_WITH_IMM : IB_WC_RECV;
        wc->vendor_err = 0;
-        wc->byte_len = wqe->dma.length - wqe->dma.resid;
+wc->byte_len = (pkt->mask & RXE_IMMDT_MASK &&
+pkt->mask & RXE_WRITE_MASK) ?
+qp->resp.length : wqe->dma.length - wqe->dma.resid;

/* fields after byte_len are different between kernel and user
 * space
@@ -955,10 +972,8 @@
 }

 err = rxe_xmit_packet(rxe, qp, &ack_pkt, skb);
- if (err) {
-  pr_err_ratelimited("Failed sending ack\n");
-  kfree_skb(skb);
-}

 err1:
 return err;
@@ -1074,7 +1089,7 @@
struct rxe_pkt_info *pkt)
{
  enum resp_states rc;
- u32 prev_psn = (qp->resp.psn - 1) & BTH_PSN_MASK;
+ u32 prev_psn = (qp->resp.ack_psn - 1) & BTH_PSN_MASK;

  if (pkt->mask & RXE_SEND_MASK ||
       pkt->mask & RXE_WRITE_MASK) {
@@ -1117,6 +1132,7 @@
    res->state = (pkt->psn == res->first_psn) ?
    rdatm_res_state_new :
    rdatm_res_state_replay;
-    res->replay = 1;
+
 /* Reset the resource, except length. */
    res->read.va_org = iova;
@@ -1151,7 +1225,7 @@
    if (rc) {
      pr_err("Failed resending result. This flow is not handled - skb ignored\n");
      rxe_drop_ref(qp);
-     kfree_skb(skb_copy);
+     rc = RESPST_CLEANUP;
     goto out;
    }
@@ -1210,7 +1225,7 @@
    }
 }

-void rxe_drain_req_pkts(struct rxe_qp *qp, bool notify)
+static void rxe_drain_req_pkts(struct rxe_qp *qp, bool notify)
{
    struct sk_buff *skb;

    --- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_srq.c
    +++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_srq.c
    @@ -31,6 +31,7 @@
    /* SOFTWARE.
    */

    #+#include <linux/vmalloc.h>
    #include "rxe.h"
    #include "rxe_loc.h"
    #include "rxe_queue.h"
    @@ -128,13 +129,18 @@
    err = do_mmap_info(rxe, udata, false, context, q->buf,
        q->buf_size, &q->ip);
    -if (err)
    +if (err) {
        +vfree(q->buf);
        +kfree(q);
        return err;
    +}

    if (udata && udata->outlen >= sizeof(struct mminfo) + sizeof(u32)) {
        if (copy_to_user(udata->outbuf + sizeof(struct mminfo),
            &srq->srq_num, sizeof(u32))) {
            +rxe_queue_cleanup(q);
            return -EFAULT;
        +}
    }
    return 0;
}

--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_verbs.c
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_verbs.c
@@ -713,9 +713,8 @@
 memcpy(wqe->dma.sge, ibwr->sg_list,
     num_sge * sizeof(struct ib_sge));

-wqe->iova = (mask & WR_ATOMIC_MASK) ?
-atomic_wr(ibwr)->remote_addr :
-rdma_wr(ibwr)->remote_addr;
+wqe->iova = mask & WR_ATOMIC_MASK ? atomic_wr(ibwr)->remote_addr :
    +mask & WR_READ_OR_WRITE_MASK ? rdma_wr(ibwr)->remote_addr : 0;
    wqe->mask = mask;
    wqe->dma.length= length;
wqe->dma.resid= length;
@@ -776,6 +775,7 @@
unsigned int mask;
unsigned int length = 0;
int i;
+struct ib_send_wr *next;
int must_sched;

while (wr) {
@@ -793,6 +793,8 @@
    break;
}
+next = wr->next;
+
length = 0;
for (i = 0; i < wr->num_sge; i++)
    length += wr->sg_list[i].length;
@@ -803,7 +805,7 @@
*bad_wr = wr;
    break;
    wr = wr->next;
+    wr = next;
}

/*
@@ -814,6 +816,8 @@
(queue_count(qp->sq.queue) > 1);

rxe_run_task(&qp->req.task, must_sched);
+if (unlikely(qp->req.state == QP_STATE_ERROR))
+rxe_run_task(&qp->comp.task, 1);

return err;
}
@@ -1178,7 +1182,7 @@
struct rxe_dev *rxe = container_of(device, struct rxe_dev,
    ib_dev.dev);

-return snprintf(buf, 16, "%s\n", rxe_parent_name(rxe, 1));
+return scnprintf(buf, PAGE_SIZE, "%s\n", rxe_parent_name(rxe, 1));
}

static DEVICE_ATTR_RO(parent);
@@ -1207,7 +1211,7 @@
    rxe->ndev->dev_addr);
    dev->dev.dma_ops = &dma_virt_ops;
dma_coerce_mask_and_coherent(&dev->dev,
-       dma_get_required_mask(dev->dev.parent));
+       dma_get_required_mask(&dev->dev));

dev->uverbs_abi_ver = RXE_UVERBS_ABI_VERSION;
dev->uverbs_cmd_mask = BIT_ULL(IB_USER_VERBS_CMD_GET_CONTEXT)
--- linux-4.15.0.orig/drivers/infiniband/sw/rxe/rxe_verbs.h
+++ linux-4.15.0/drivers/infiniband/sw/rxe/rxe_verbs.h
@@ -35,6 +35,7 @@
#define RXE_VERBS_H
#include <linux/interrupt.h>
+    #include <linux/workqueue.h>
#include <rdma/rdma_user_rxe.h>
#include "rxe_pool.h"
#include "rxe_task.h"
@@ -159,6 +160,7 @@
    int	    timeout_retry;
    u32retry_cnt;
    u32mr_retry;
-  struct rxe_task	task;
+  struct rxe_task	task;
@@ -172,6 +174,7 @@
    struct resp_res {
    inttype;
+    intreplay;
    u32first_psn;
    u32last_psn;
    u32cur_psn;
-  @ @ -196,6 +199,7 @@
-  enum rxe_qp_state	state;
+  @ @ -196,6 +199,7 @@
-        u32msn;
+        u32msn;
-        u32psn;
+        u32psn;
      +u32ack_psn;
        intopcode;
        intdrop_msg;
        intgoto_error;
-  @ @ -211,6 +215,7 @@
-  struct rxe_mem*mr;
+  @ @ -211,6 +215,7 @@
    u32resid;
    u32rkey;
    +u32length;
    u64atomic_orig;

    /* SRQ only */
@@ -281,6 +286,8 @@
    struct timer_list rnr_nak_timer;

 spinlock_t tstate_lock; /* guard requester and completer */
+   struct execute_work cleanup_work;
};

 enum rxe_mem_state {
@@ -402,18 +409,18 @@
    struct list_head pending_mmaps;

 spinlock_t tmmap_offset_lock; /* guard mmap_offset */
-   int mmap_offset;
+   u64 tmmap_offset;

   -u64 stats_counters[RXE_NUM_OF_COUNTERS];
+   atomic64_t stats_counters[RXE_NUM_OF_COUNTERS];

    struct rxe_port port;
    struct list_head list;
    struct crypto_shash *tfm;
};

 static inline void rxe_counter_inc(struct rxe_dev *rxe, enum rxe_counters cnt)
+   static inline void rxe_counter_inc(struct rxe_dev *rxe, enum rxe_counters index)
{
   rxe->stats_counters[cnt]++;
+   atomic64_inc(&rxe->stats_counters[index]);
}

 static inline struct rxe_dev *to_rdev(struct ib_device *dev)
--- linux-4.15.0.orig/drivers/infiniband/ulp/ipoib/ipoib.h
+++ linux-4.15.0/drivers/infiniband/ulp/ipoib/ipoib.h
@@ -255,7 +255,6 @@
    struct list_head list;
    struct net_device *dev;
    struct ipoib_neigh *neigh;
-   struct ipoib_path *path;
    struct ipoib_tx_buf *tx_ring;
    unsigned tx_head;
    unsigned tx_tail;
@@ -378,8 +377,12 @@
    struct ipoib_rx_buf *tx_ring;

    +/* cyclic ring variables for managing tx_ring, for UD only */
    unsigned tx_head;


unsigned tx_tail;
+ /* cyclic ring variables for counting overall outstanding send WRs */
+ unsigned int global_tx_head;
+ unsigned int global_tx_tail;
struct ib_sge tx_sge[MAX_SKB_FRAGS + 1];
struct ib_ud_wr tx_wr;
struct ib_wc send_wc[MAX_SEND_CQE];
@@ -509,7 +512,7 @@

int ipoib_ib_dev_open_default(struct net_device *dev);
int ipoib_ib_dev_open(struct net_device *dev);
-int ipoib_ib_dev_stop(struct net_device *dev);
+void ipoib_ib_dev_stop(struct net_device *dev);
void ipoib_ib_dev_up(struct net_device *dev);
void ipoib_ib_dev_down(struct net_device *dev);
int ipoib_ib_dev_stop_default(struct net_device *dev);
--- linux-4.15.0.orig/drivers/infiniband/ulp/ipoib/ipoib_cm.c
+++ linux-4.15.0/drivers/infiniband/ulp/ipoib/ipoib_cm.c
@@ -757,7 +757,8 @@

return;
}

-if ((priv->tx_head - priv->tx_tail) == ipoib_sendq_size - 1) {
+if ((priv->global_tx_head - priv->global_tx_tail) ==
+    ipoib_sendq_size - 1) {
ipoib_dbg(priv, "TX ring 0x%x full, stopping kernel net queue\n",
    tx->qp->qp_num);
netif_stop_queue(dev);
@@ -766,12 +767,14 @@
skb_orphan(skb);
skb_dst_drop(skb);
-if (netif_queue_stopped(dev))
+if (netif_queue_stopped(dev)) {
    IB_CQ_REPORT_MISSED_EVENTS)) {
+    rc = ib_req_notify_cq(priv->send_cq, IB_CQ_NEXT_COMP |
+        IB_CQ_REPORT_MISSED_EVENTS);
+    if (unlikely(rc < 0))
ipoib_warn(priv, "IPoIB/CM:request notify on send CQ failed\n");
+else if (rc)
napi_schedule(&priv->send_napi);
-}
+}

rc = post_send(priv, tx, tx->tx_head & (ipoib_sendq_size - 1), tx_req);
@ @ -785,7 +788,7 @@
} else {
    netif_trans_update(dev);
    ++tx->tx_head;
    -++priv->tx_head;
    ++priv->global_tx_head;
}
}

@@ -819,10 +822,11 @@
netif_tx_lock(dev);

++tx->tx_tail;
-++priv->tx_tail;
+++priv->global_tx_tail;

if (unlikely(netif_queue_stopped(dev) &&
    - (priv->tx_head - priv->tx_tail) <= ipoib_sendq_size >> 1 &&
    + ((priv->global_tx_head - priv->global_tx_tail) <=
    + ipoib_sendq_size >> 1) &&
    test_bit(IPOIB_FLAG_ADMIN_UP, &priv->flags))
netif_wake_queue(dev);

@@ -1025,12 +1029,14 @@
skb_queue_head_init(&skqueue);

+netif_tx_lock_bh(p->dev);
spin_lock_irq(&priv->lock);
set_bit(IPOIB_FLAG_OPER_UP, &p->flags);
if (p->neigh)
while ((skb = __skb_dequeue(&p->neigh->queue)))
    __skb_queue_tail(&skqueue, skb);
spin_unlock_irq(&priv->lock);
+netif_tx_unlock_bh(p->dev);

while ((skb = __skb_dequeue(&skqueue))) {
    skb->dev = p->dev;
@@ -1229,8 +1235,9 @@
dev_kfree_skb_any(tx_req->skb);
netif_tx_lock_bh(p->dev);
++p->tx_tail;
-++priv->tx_tail;
-if (unlikely(priv->tx_head - priv->tx_tail == ipoib_sendq_size >> 1) &&
+++priv->global_tx_tail;
+if (unlikely((priv->global_tx_head - priv->global_tx_tail) <=
    + ipoib_sendq_size >> 1) &&
    test_bit(IPOIB_FLAG_ADMIN_UP, &priv->flags))
netif_wake_queue(p->dev);
@@ -1308,7 +1315,6 @@
neigh->cm = tx;
tx->neigh = neigh;
-tx->path = path;
tx->dev = dev;
list_add(&tx->list, &priv->cm.start_list);
set_bit(IPOIB_FLAG_INITIALIZED, &tx->flags);
@@ -1367,7 +1373,7 @@
neigh->daddr + QPN_AND_OPTIONS_OFFSET);
goto free_neigh;
}
-memcpy(&pathrec, &p->path->pathrec, sizeof pathrec);
+memcpy(&pathrec, &path->pathrec, sizeof(pathrec));
spin_unlock_irqrestore(&priv->lock, flags);
netif_tx_unlock_bh(dev);
@@ -1434,11 +1440,15 @@
spin_unlock_irqrestore(&priv->lock, flags);
netif_tx_unlock_bh(dev);
-\t	if (skb->protocol == htons(ETH_P_IP))
+\t	if (skb->protocol == htons(ETH_P_IP)) {
+\t\t\tmemset(IPCB(skb), 0, sizeof(*IPCB(skb)));
\ticmp_send(skb, ICMP_DEST_UNREACH, ICMP_FRAG_NEEDED, htonl(mtu));
+\t}\n#if IS_ENABLED(CONFIG_IPV6)
-\t\telse if (skb->protocol == htons(ETH_P_IPV6))
+\t\telse if (skb->protocol == htons(ETH_P_IPV6)) {
+\t\t\tmemset(IP6CB(skb), 0, sizeof(*IP6CB(skb)));
\ticmpv6_send(skb, ICMPV6_PKT_TOOBIG, 0, mtu);
+\t}\n#endif
\t\tdev_kfree_skb_any(skb);
\t\t++priv->tx_tail;
++priv->global_tx_tail;
if (unlikely(netif_queue_stopped(dev) &&
-\t ((priv->tx_head - priv->tx_tail) <= ipoib_sendq_size >> 1) &&
+\t ((priv->global_tx_head - priv->global_tx_tail) <=
+\t ipoib_sendq_size >> 1)) &&
--- linux-4.15.0.orig/drivers/infiniband/ulp/ipoib/ipoib_ib.c
+++ linux-4.15.0/drivers/infiniband/ulp/ipoib/ipoib_ib.c
@@ -406,9 +406,11 @@
dev_kfree_skb_any(tx_req->skb);
++priv->tx_tail;
++priv->global_tx_tail;

if (unlikely(netif_queue_stopped(dev) &&
-\t ((priv->tx_head - priv->tx_tail) <= ipoib_sendq_size >> 1) &&
+\t ((priv->global_tx_head - priv->global_tx_tail) <=
+\t ipoib_sendq_size >> 1)) &&
test_bit(IPOIB_FLAG_ADMIN_UP, &priv->flags))
netif_wake_queue(dev);

else
priv->tx_wr.wr.send_flags &= ~IB_SEND_IP_CSUM;
/* increase the tx_head after send success, but use it for queue state */
-if (priv->tx_head - priv->tx_tail == ipoib_sendq_size - 1) {
+if ((priv->global_tx_head - priv->global_tx_tail) ==
+  ipoib_sendq_size - 1) {
ipoib_dbg(priv, "TX ring full, stopping kernel net queue\n");
netif_stop_queue(dev);
}
#endif -634,7 +636,8

if (netif_queue_stopped(dev))
if (ib_req_notify_cq(priv->send_cq, IB_CQ_NEXT_COMP |
-  IB_CQ_REPORT_MISSED_EVENTS))
+  IB_CQ_REPORT_MISSED_EVENTS) < 0)
ipoib_warn(priv, "request notify on send CQ failed\n");
rc = post_send(priv, priv->tx_head & (ipoib_sendq_size - 1),
#endif -662,18 +665,18

rc = priv->tx_head;
++priv->tx_head;
+++priv->global_tx_head;
} return rc;
}

- static void __ipoib_reap_ah(struct net_device *dev)
+ static void ipoib_reap_dead_ahs(struct ipoib_dev_priv *priv)
{
- struct ipoib_dev_priv *priv = ipoib_priv(dev);
+ struct ipoib_dev_priv *priv = priv;
struct ipoib_ah *ah, *tah;
LIST_HEAD(remove_list);
unsigned long flags;

- netif_tx_lock_bh(dev);
+ netif_tx_lock_bh(priv->dev);
spin_lock_irqsave(&priv->lock, flags);

list_for_each_entry_safe(ah, tah, &priv->dead_ahs, list)
#endif -684,37 +687,37
}

spin_unlock_irqrestore(&priv->lock, flags);
void ipoib_reap_ah(struct work_struct *work)
{
    struct ipoib_dev_priv *priv =
        container_of(work, struct ipoib_dev_priv, ah_reap_task.work);
    struct net_device *dev = priv->dev;

    if (!test_bit(IPOIB_STOP_REAPER, &priv->flags))
        queue_delayed_work(priv->wq, &priv->ah_reap_task,
            round_jiffies_relative(HZ));
}

static void ipoib_flush_ah(struct net_device *dev)
static void ipoib_start_ah_reaper(struct ipoib_dev_priv *priv)
{
    struct ipoib_dev_priv *priv = ipoib_priv(dev);
    cancel_delayed_work(&priv->ah_reap_task);
    flush_workqueue(priv->wq);
    ipoib_reap_ah(&priv->ah_reap_task.work);
    clear_bit(IPOIB_STOP_REAPER, &priv->flags);
    queue_delayed_work(priv->wq, &priv->ah_reap_task,
        round_jiffies_relative(HZ));
}

static void ipoib_stop_ah(struct net_device *dev)
static void ipoib_stop_ah_reaper(struct ipoib_dev_priv *priv)
{
    struct ipoib_dev_priv *priv = ipoib_priv(dev);
    set_bit(IPOIB_STOP_REAPER, &priv->flags);
    ipoib_flush_ah(dev);
    cancel_delayed_work(&priv->ah_reap_task);
    /*
     * After ipoib_stop_ah_reaper() we always go through
     * ipoib_reap_dead_ahs() which ensures the work is really stopped and
     * does a final flush out of the dead_ah's list
     */
}

static int recvs_pending(struct net_device *dev)
@@ -808,6 +811,7 @@
ipoib_dma_unmap_tx(priv, tx_req);
dev_kfree_skb_any(tx_req->skb);
++priv->tx_tail;
+++priv->global_tx_tail;
}

for (i = 0; i < ipoib_recvq_size; ++i) {
@@ -842,18 +846,6 @@
    return 0;
}

-int ipoib_ib_dev_stop(struct net_device *dev)
-{ struct ipoib_dev_priv *priv = ipoib_priv(dev);
    priv->rn_ops->ndo_stop(dev);
  
  -clear_bit(IPOIB_FLAG_INITIALIZED, &priv->flags);
  -ipoib_flush_ah(dev);
  -
    return 0;
-
-int ipoib_ib_dev_open_default(struct net_device *dev)
{
  struct ipoib_dev_priv *priv = ipoib_priv(dev);
  @@ -897,10 +889,7 @@
    return -1;
  }

  -clear_bit(IPOIB_STOP_REAPER, &priv->flags);
  -queue_delayed_work(priv->wq, &priv->ah_reap_task,
    - round_jiffies_relative(HZ));
  -
    +ipoib_start_ah_reaper(priv);
    if (priv->rn_ops->ndo_open(dev)) {
        pr_warn("%s: Failed to open dev\n", dev->name);
        goto dev_stop;
    @@ -911,13 +900,20 @@
            return 0;
            
        dev_stop:
    -set_bit(IPOIB_STOP_REAPER, &priv->flags);
    -cancel_delayed_work(&priv->ah_reap_task);
    -set_bit(IPOIB_FLAG_INITIALIZED, &priv->flags);
    -ipoib_ib_dev_stop(dev);
    +ipoib_stop_ah_reaper(priv);
    return -1;


+void ipoib_ib_dev_stop(struct net_device *dev)
+{
+struct ipoib_dev_priv *priv = ipoib_priv(dev);
+
+priv->ndo_ops->ndo_stop(dev);
+
+clear_bit(IPOIB_FLAG_INITIALIZED, &priv->flags);
+ipoib_stop_ah_reaper(priv);
+}
+
+void ipoib_pkey_dev_check_presence(struct net_device *dev)
+
+struct ipoib_dev_priv *priv = ipoib_priv(dev);
@@ -1229,7 +1225,7 @@
+ipoib_mcast_dev_flush(dev);
+if (oper_up)
+    set_bit(IPOIB_FLAG_OPER_UP, &priv->flags);
+    -ipoib_flush_ah(dev);
+    +ipoib_reap_dead_ahs(priv);
+}
+
+if (level >= IPOIB_FLUSH_NORMAL)
+    @ @ -1304,7 +1300,7 @@
+    * the neighbor garbage collection is stopped and reaped.
+    * That should all be done now, so make a final ah flush.
+    */
+    -ipoib_stop_ah(dev);
+    +ipoib_reap_dead_ahs(priv);
+
+clear_bit(IPOIB_PKEY_ASSIGNED, &priv->flags);
+
--- linux-4.15.0.orig/drivers/infiniband/ulp/ipoib/ipoib_main.c
+++ linux-4.15.0/drivers/infiniband/ulp/ipoib/ipoib_main.c
@@ -775,6 +776,22 @@
    return 0;
 }

-if (new_mtu > IPOIB_UD_MTU(priv->max_ib_mtu))
+if (new_mtu < (ETH_MIN_MTU + IPOIB_ENCAP_LEN) ||
    + new_mtu > IPOIB_UD_MTU(priv->max_ib_mtu))
    return -EINVAL;

    priv->admin_mtu = new_mtu;
@@ -775,6 +776,22 @@
    spin_lock_irqsave(&priv->lock, flags);
if (!IS_ERR_OR_NULL(ah)) {
+/*
+ * pathrec.dgid is used as the database key from the LLADDR,
+ * it must remain unchanged even if the SA returns a different
+ * GID to use in the AH.
+ */
+if (memcmp(pathrec->dgid.raw, path->pathrec.dgid.raw,
+           sizeof(union ib_gid))) {
+    ipoib_dbg(  
+        priv,
+        "%s got PathRec for gid %pI6 while asked for %pI6\n",
+        dev->name, pathrec->dgid.raw,  
+        path->pathrec.dgid.raw);  
+    memcpy(pathrec->dgid.raw, path->pathrec.dgid.raw,
+            sizeof(union ib_gid));
+    
+    path->pathrec = *pathrec;
+}
+old_ah   = path->ah;
UTOR -1153,9 +1170,11 @ @

ipoib_warn(priv, "transmit timeout: latency %d msecs\n",
            jiffies_to_msecs(jiffies - dev_trans_start(dev)));
-ipoib_warn(priv, "queue stopped %d, tx_head %u, tx_tail %u\n",
            - netif_queue_stopped(dev),
            - priv->tx_head, priv->tx_tail);
+ipoib_warn(priv,
+    "queue stopped %d, tx_head %u, tx_tail %u, global_tx_head %u, global_tx_tail %u\n",
+    netif_queue_stopped(dev), priv->tx_head, priv->tx_tail,
+    priv->global_tx_head, priv->global_tx_tail);
+/
+ /* XXX reset QP, etc. */
+}
UTOR -1679,7 +1698,7 @ @
goto out_rx_ring_cleanup;
}

/* priv->tx_head, tx_tail & tx_outstanding are already 0 */
+%/* priv->tx_head, tx_tail and global_tx_tail/head are already 0 */

if (ipoib_transport_dev_init(dev, priv->ca)) {
    pr_warn("%s: ipoib_transport_dev_init failed\n",
            @ @ -1748,7 +1767,8 @ @
goto out_free_pd;
}
-if (ipoib_neigh_hash_init(priv) < 0) {  
+ret = ipoib_neigh_hash_init(priv);  
+if (ret) {  
pr_warn("%s failed to init neigh hash\n", dev->name);  
goto out_dev_uninit;  
}  
@@ -1804,6 +1824,8 @@  
/* no more works over the priv->wq */  
if (priv->wq) {  
+/* See ipoib_mcast_carrier_on_task() */  
+WARN_ON(test_bit(IPOIB_FLAG_OPER_UP, &priv->flags));  
flush_workqueue(priv->wq);  
destroy_workqueue(priv->wq);  
priv->wq = NULL;  
@@ -1828,6 +1850,7 @@  
return err;  
ivf->vf = vf;  
+memcpy(ivf->mac, dev->dev_addr, dev->addr_len);  

return 0;  
}  
@@ -2207,8 +2230,10 @@  
int result = -ENOMEM;  
priv = ipoib_intf_alloc(hca, port, format);  
- if (!priv)  
+if (!priv) {  
+pr_warn("%s, %d: ipoib_intf_alloc failed\n", hca->name, port);  
goto alloc_mem_failed;  
+}  

SET_NETDEV_DEV(priv->dev, hca->dev.parent);  
priv->dev->dev_id = port - 1;  
@@ -2269,6 +2294,9 @@  
 priv->ca, ipoib_event);  
ib_register_event_handler(&priv->event_handler);  

+/* call event handler to ensure pkey in sync */  
+queue_work(ipoib_workqueue, &priv->flush_heavy);  
+  
result = register_netdev(priv->dev);  
if (result) {  
printk(KERN_WARNING "%s: couldn't register ipoib port %d; error %d\n",  
@@ -2337,8 +2365,7 @@  
}
if (!count) {
   pr_err("Failed to init port, removing it\n");
   ipoib_remove_one(device, dev_list);
   kfree(dev_list);
   return;
}

--- linux-4.15.0.orig/drivers/infiniband/ulp/iser/iscsi_iser.c
+++ linux-4.15.0/drivers/infiniband/ulp/iser/iscsi_iser.c
@@ -648,6 +648,7 @@
   if (ib_conn->pi_support) {
      u32 sig_caps = ib_conn->device->ib_device->attrs.sig_prot_cap;

      +shost->sg_prot_tablesize = shost->sg_tablesize;
      scsi_host_set_prot(shost, iser_dif_prot_caps(sig_caps));
      scsi_host_set_guard(shost, SHOST_DIX_GUARD_IP |
      SHOST_DIX_GUARD_CRC);
--- linux-4.15.0.orig/drivers/infiniband/ulp/iser/iscsi_iser.h
+++ linux-4.15.0/drivers/infiniband/ulp/iser/iscsi_iser.h
@@ -197,7 +197,7 @@
   struct scatterlist *sg;
   int size;
   unsigned long data_len;
-  unsigned int dma_nents;
+  int dma_nents;
   }

 /* fwd declarations */
--- linux-4.15.0.orig/drivers/infiniband/ulp/iser/iser_initiator.c
+++ linux-4.15.0/drivers/infiniband/ulp/iser/iser_initiator.c
@@ -592,13 +592,19 @@
     ib_conn->post_recv_buf_count--;
 }

-static inline void
+static inline int
   iser_inv_desc(struct iser_fr_desc *desc, u32 rkey)
   {
     -if (likely(rkey == desc->rsc.mr->rkey))
+if (likely(rkey == desc->rsc.mr->rkey)) {
      desc->rsc.mr_valid = 0;
     -else if (likely(rkey == desc->pi_ctx->sig_mr->rkey))
+  } else if (likely(desc->pi_ctx && rkey == desc->pi_ctx->sig_mr->rkey)) {
      desc->pi_ctx->sig_mr_valid = 0;
     +} else {
+isер_err("Bogus remote invalidation for rkey %\x\n", rkey);
+   return -EINVAL;
+   }
+ return 0;
}

static int
@@ -626,12 +632,14 @@
        if (iser_task->dir[ISER_DIR_IN]) {
            desc = iser_task->rdma_reg[ISER_DIR_IN].mem_h;
            -iser_inv_desc(desc, rkey);
+            if (unlikely(iser_inv_desc(desc, rkey)))
+                return -EINVAL;
        }

        if (iser_task->dir[ISER_DIR_OUT]) {
            desc = iser_task->rdma_reg[ISER_DIR_OUT].mem_h;
-            iser_inv_desc(desc, rkey);
+            if (unlikely(iser_inv_desc(desc, rkey)))
+                return -EINVAL;
        }
    }

    else {
        iser_err("failed to get task for itt=%d", hdr->itt);
-        --- linux-4.15.0.orig/drivers/infiniband/ulp/iser/iser_memory.c
+++ linux-4.15.0/drivers/infiniband/ulp/iser/iser_memory.c
@@ -240,8 +240,8 @@
            page_vec->npages = 0;
            page_vec->fake_mr.page_size = SIZE_4K;
            plen = ib_sg_to_pages(&page_vec->fake_mr, mem->sg,
-               mem->size, NULL, iser_set_page);
-            if (unlikely(plen < mem->size)) {
+               mem->dma_nents, NULL, iser_set_page);
+            if (unlikely(plen < mem->dma_nents)) {
                iser_err("page vec too short to hold this SG\n");
                iser_data_buf_dump(mem, device->ib_device);
                iser_dump_page_vec(page_vec);
@@ -450,10 +450,10 @@
                ib_update_fast_reg_key(mr, ib_inc_rkey(mr->rkey));

-                n = ib_map_mr_sg(mr, mem->sg, mem->size, NULL, SIZE_4K);
-                if (unlikely(n != mem->size)) {
+                n = ib_map_mr_sg(mr, mem->sg, mem->dma_nents, NULL, SIZE_4K);
+                if (unlikely(n != mem->dma_nents)) {
                    iser_err("failed to map sg (%d/%d)\n",
                        - n, mem->size);
                        + n, mem->dma_nents);
                    return n < 0 ? n : -EINVAL;
                }
--- linux-4.15.0.orig/drivers/infiniband/ulp/iser/iser_verbs.c
+++ linux-4.15.0/drivers/infiniband/ulp/iser/iser_verbs.c
@@ -1108,7 +1108,9 @@
     IB_MR_CHECK_SIG_STATUS, &mr_status);
 if (ret) {
     pr_err("ib_check_mr_status failed, ret %d\n", ret);
-    goto err;
-    /* Not a lot we can do, return ambiguous guard error */
+    /*sector = 0;
+    return 0x1;
+    */
 }

 if (mr_status.fail_status & IB_MR_CHECK_SIG_STATUS) {
@@ -1136,9 +1138,6 @@
 }
 return 0;
-err:
-/* Not alot we can do here, return ambiguous guard error */
-    return 0x1;
 }

void iser_err_comp(struct ib_wc *wc, const char *type)
--- linux-4.15.0.orig/drivers/infiniband/ulp/isert/ib_isert.c
+++ linux-4.15.0/drivers/infiniband/ulp/isert/ib_isert.c
@@ -886,15 +886,9 @@
 }
 static void
 -isert_create_send_desc(struct isert_conn *isert_conn,
-          struct isert_cmd *isert_cmd,
-          struct iser_tx_desc *tx_desc)
+__isert_create_send_desc(struct isert_device *device,
+                      struct iser_tx_desc *tx_desc)
 {
    struct isert_device *device = isert_conn->device;
    struct ib_device *ib_dev = device->ib_device;
-    ib_dma_sync_single_for_cpu(ib_dev, tx_desc->dma_addr,
-ISER_HEADERS_LEN, DMA_TO_DEVICE);
    memset(&tx_desc->iser_header, 0, sizeof(struct iser_ctrl));
    tx_desc->iser_header.flags = ISCSI_CTRL;
@@ -907,6 +907,20 @@
 }

static void
-isert_create_send_desc(struct isert_conn *isert_conn,
-          struct isert_cmd *isert_cmd,
-          struct iser_tx_desc *tx_desc)
+__isert_create_send_desc(struct isert_device *device,
+                      struct iser_tx_desc *tx_desc)
 {
    struct isert_device *device = isert_conn->device;
    struct ib_device *ib_dev = device->ib_device;
-    ib_dma_sync_single_for_cpu(ib_dev, tx_desc->dma_addr,
-ISER_HEADERS_LEN, DMA_TO_DEVICE);
    memset(&tx_desc->iser_header, 0, sizeof(struct iser_ctrl));
    tx_desc->iser_header.flags = ISCSI_CTRL;
@@ -907,6 +907,20 @@
 }

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+++ linux-4.15.0/drivers/infiniband/ulp/iser/iser_verbs.c
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@@ -886,15 +886,9 @@
 }
 static void
 -isert_create_send_desc(struct isert_conn *isert_conn,
-          struct isert_cmd *isert_cmd,
-          struct iser_tx_desc *tx_desc)
+__isert_create_send_desc(struct isert_device *device,
+                      struct iser_tx_desc *tx_desc)
 {
    struct isert_device *device = isert_conn->device;
    struct ib_device *ib_dev = device->ib_device;
-    ib_dma_sync_single_for_cpu(ib_dev, tx_desc->dma_addr,
-ISER_HEADERS_LEN, DMA_TO_DEVICE);
    memset(&tx_desc->iser_header, 0, sizeof(struct iser_ctrl));
    tx_desc->iser_header.flags = ISCSI_CTRL;
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-          struct isert_cmd *isert_cmd,
-          struct iser_tx_desc *tx_desc)
+__isert_create_send_desc(struct isert_device *device,
+                      struct iser_tx_desc *tx_desc)
 {
    struct isert_device *device = isert_conn->device;
    struct ib_device *ib_dev = device->ib_device;
-    ib_dma_sync_single_for_cpu(ib_dev, tx_desc->dma_addr,
-ISER_HEADERS_LEN, DMA_TO_DEVICE);
    memset(&tx_desc->iser_header, 0, sizeof(struct iser_ctrl));
    tx_desc->iser_header.flags = ISCSI_CTRL;
@@ -907,6 +907,20 @@
 }

--- linux-4.15.0.orig/drivers/infiniband/ulp/iser/iser_verbs.c
+++ linux-4.15.0/drivers/infiniband/ulp/iser/iser_verbs.c
@@ -1108,7 +1108,9 @@
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 if (ret) {
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-    goto err;
-    /* Not a lot we can do, return ambiguous guard error */
+    /*sector = 0;
+    return 0x1;
+    */
 }

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@@ -1136,9 +1138,6 @@
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-err:
-/* Not alot we can do here, return ambiguous guard error */
-    return 0x1;
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+++ linux-4.15.0/drivers/infiniband/ulp/isert/ib_isert.c
@@ -886,15 +886,9 @@
 }
 static void
 -isert_create_send_desc(struct isert_conn *isert_conn,
-          struct isert_cmd *isert_cmd,
-          struct iser_tx_desc *tx_desc)
+__isert_create_send_desc(struct isert_device *device,
+                      struct iser_tx_desc *tx_desc)
 {
    struct isert_device *device = isert_conn->device;
    struct ib_device *ib_dev = device->ib_device;
-    ib_dma_sync_single_for_cpu(ib_dev, tx_desc->dma_addr,
-ISER_HEADERS_LEN, DMA_TO_DEVICE);
    memset(&tx_desc->iser_header, 0, sizeof(struct iser_ctrl));
    tx_desc->iser_header.flags = ISCSI_CTRL;
@@ -907,6 +907,20 @@
 }

static void
-isert_create_send_desc(struct isert_conn *isert_conn,
-          struct isert_cmd *isert_cmd,
-          struct iser_tx_desc *tx_desc)
+__isert_create_send_desc(struct isert_device *device,
+                      struct iser_tx_desc *tx_desc)
 {
    struct isert_device *device = isert_conn->device;
    struct ib_device *ib_dev = device->ib_device;
-    ib_dma_sync_single_for_cpu(ib_dev, tx_desc->dma_addr,
-ISER_HEADERS_LEN, DMA_TO_DEVICE);
    memset(&tx_desc->iser_header, 0, sizeof(struct iser_ctrl));
    tx_desc->iser_header.flags = ISCSI_CTRL;
@@ -907,6 +907,20 @@
 }

--- linux-4.15.0.orig/drivers/infiniband/ulp/iser/iser_verbs.c
+++ linux-4.15.0/drivers/infiniband/ulp/iser/iser_verbs.c
@@ -1108,7 +1108,9 @@
     IB_MR_CHECK_SIG_STATUS, &mr_status);
 if (ret) {
     pr_err("ib_check_mr_status failed, ret %d\n", ret);
-    goto err;
-    /* Not a lot we can do, return ambiguous guard error */
+    /*sector = 0;
+    return 0x1;
+    */
 }

 if (mr_status.fail_status & IB_MR_CHECK_SIG_STATUS) {
@@ -1136,9 +1138,6 @@
 }
 return 0;
-err:
-/* Not alot we can do here, return ambiguous guard error */
-    return 0x1;
 }

void iser_err_comp(struct ib_wc *wc, const char *type)
static void
isert_create_send_desc(struct isert_conn *isert_conn,
    struct isert_cmd *isert_cmd,
    struct iser_tx_desc *tx_desc)
{
    struct isert_device *device = isert_conn->device;
    struct ib_device *ib_dev = device->ib_device;
    ib_dma_sync_single_for_cpu(ib_dev, tx_desc->dma_addr,
        ISER_HEADERS_LEN, DMA_TO_DEVICE);
    __isert_create_send_desc(device, tx_desc);
}

static int
isert_init_tx_hdrs(struct isert_conn *isert_conn,
        struct iser_tx_desc *tx_desc)
{
    struct iser_tx_desc *tx_desc = &isert_conn->login_tx_desc;
    int ret;
    -isert_create_send_desc(isert_conn, NULL, tx_desc);
    __isert_create_send_desc(device, tx_desc);
    memcpy(&tx_desc->iscsi_header, &login->rsp[0],
        sizeof(struct iscsi_hdr));
    sig_attrs->check_mask =
        (se_cmd->prot_checks & TARGET_DIF_CHECK_GUARD ? 0xc0 : 0) |
        (se_cmd->prot_checks & TARGET_DIF_CHECK_REFTAG ? 0x30 : 0) |
        (se_cmd->prot_checks & TARGET_DIF_CHECK_APPTAG ? 0x30 : 0) |
        (se_cmd->prot_checks & TARGET_DIF_CHECK_REFTAG ? 0x0f : 0);
    return 0;
}
if (cmd->ctx_init_done)
    goto rdma_ctx_post;
if (dir == DMA_FROM_DEVICE) {
    addr = cmd->write_va;
    rkey = cmd->write_stag;
    se_cmd->t_data_sg, se_cmd->t_data_nents,
    offset, addr, rkey, dir);
if (ret < 0) {
    isert_err("Cmd: %p failed to prepare RDMA res\n", cmd);
    return ret;
}

+cmd->ctx_init_done = true;
+
+rdma_ctx_post:
ret = rdma_rw_ctx_post(&cmd->rw, conn->qp, port_num, cqe, chain_wr);
if (ret < 0)
    isert.Err("Cmd: %p failed to post RDMA res\n", cmd);
--- linux-4.15.0.orig/drivers/infiniband/ulp/isert/ib_isert.h
+++ linux-4.15.0/drivers/infiniband/ulp/isert/ib_isert.h
@@ -126,6 +126,7 @@
struct rdma_rw_ctx	 rw;
struct work_struct	 comp_work;
struct scatterlist	 sg;
+bool			ctx_init_done;
};

static inline struct isert_cmd *tx_desc_to_cmd(struct iser_tx_desc *desc)
--- linux-4.15.0.orig/drivers/infiniband/ulp/opa_vnic/opa_vnic_encap.c
+++ linux-4.15.0/drivers/infiniband/ulp/opa_vnic/opa_vnic_encap.c
@@ -351,7 +351,8 @@
if (unlikely(!dlid))
    v_warn("Null dlid in MAC address\n");
} else if (def_port != OPA_VNIC_INVALID_PORT) {
-    dlid = info->vesw.u_ucast_dlid[def_port];
++    if (def_port < OPA_VESW_MAX_NUM_DEF_PORT)
++        dlid = info->vesw.u_ucast_dlid[def_port];

--- linux-4.15.0.orig/drivers/infiniband/ulp/srp/Kconfig
+++ linux-4.15.0/drivers/infiniband/ulp/srp/Kconfig
@@ -1,6 +1,6 @@
config INFINIBAND_SRP
tristate "InfiniBand SCSI RDMA Protocol"
-depends on SCSI
++depends on SCSI && INFINIBAND_ADDR_TRANS
select SCSI_SRP_ATTRS
---help---
Support for the SCSI RDMA Protocol over InfiniBand. This
--- linux-4.15.0.orig/drivers/infiniband/ulp/srp/ib_srp.c
+++ linux-4.15.0/drivers/infiniband/ulp/srp/ib_srp.c
@@ -2227,6 +2227,7 @@

if (srp_post_send(ch, iu, len)) {
    shost_printk(KERN_ERR, target->scsi_host, PFX "Send failed\n");
    +scmnd->result = DID_ERROR << 16;
go to err_unmap;
}

@@ -2673,9 +2674,11 @@
ret = FAST_IO_FAIL;
else
    ret = FAILED;
-srp_free_req(ch, req, scmnd, 0);
-srpm->result = DID_ABORT << 16;
-scmnd->scsi_done(scmnd);
+if (ret == SUCCESS) {
    +srp_free_req(ch, req, scmnd, 0);
    +scmnd->result = DID_ABORT << 16;
    +scmnd->scsi_done(scmnd);
    +}

return ret;
}
@@ -2684,7 +2687,6 @@
{
    struct srp_target_port *target = host_to_target(scmnd->device->host);
    struct srp_rdma_ch *ch;
-int i;
    u8 status;

    shost_printk(KERN_ERR, target->scsi_host, "SRP reset_device called\n");
@@ -2696,15 +2698,6 @@
if (status)
    return FAILED;

    -for (i = 0; i < target->ch_count; i++) {
        -ch = &target->ch[i];
        -for (i = 0; i < target->req_ring_size; ++i) {
            -struct srp_request *req = &ch->req_ring[i];
            -srp_finish_req(ch, req, scmnd->device, DID_RESET << 16);
        -}
    -}

    return SUCCESS;
}

@@ -3445,12 +3438,10 @@
    num_online_nodes());
const int ch_end = ((node_idx + 1) * target->ch_count / num_online_nodes());
-const int cv_start = (node_idx * ibdev->num_comp_vectors / - num_online_nodes() + target->comp_vector)
- % ibdev->num_comp_vectors;
-const int cv_end = ((node_idx + 1) * ibdev->num_comp_vectors / - num_online_nodes() + target->comp_vector)
- % ibdev->num_comp_vectors;
+const int cv_start = node_idx * ibdev->num_comp_vectors / + num_online_nodes();
+const int cv_end = (node_idx + 1) * ibdev->num_comp_vectors / + num_online_nodes();

int cpu_idx = 0;

for_each_online_cpu(cpu) {
    --- linux-4.15.0.orig/drivers/infiniband/ulp/srpt/Kconfig
    +++ linux-4.15.0/drivers/infiniband/ulp/srpt/Kconfig
    @ @ -1,6 +1,6 @@
    config INFINIBAND_SRPT
    tristate "InfiniBand SCSI RDMA Protocol target support"
    -depends on INFINIBAND && TARGET_CORE
    +depends on INFINIBAND && INFINIBAND_ADDR_TRANS && TARGET_CORE
    ---help---

    Support for the SCSI RDMA Protocol (SRP) Target driver. The
    --- linux-4.15.0.orig/drivers/infiniband/ulp/srpt/ib_srpt.c
    +++ linux-4.15.0/drivers/infiniband/ulp/srpt/ib_srpt.c
    @ @ -800,13 +800,17 @@
    */
    static int srpt_zerolength_write(struct srpt_rdma_ch *ch)
    {
        -struct ib_send_wr wr, *bad_wr;
        +struct ib_send_wr *bad_wr;
        +struct ib_rdma_wr wr = {
        +.wr = {
        +.next= NULL,
        +{ .wr_cqe= &ch->zw_cqe, },
        +.opcode= IB_WR_RDMA_WRITE,
        +.send_flags= IB_SEND_SIGNALED,
        +}
        +};

        memset(&wr, 0, sizeof(wr));
        -wr.opcode = IB_WR_RDMA_WRITE;
        -wr.wr_cqe = &ch->zw_cqe;
        -wr.send_flags = IB_SEND_SIGNALED;
        -return ib_post_send(ch->qp, &wr, &bad_wr);
        +return ib_post_send(ch->qp, &wr.wr, &bad_wr);
static void srpt_zerolength_write_done(struct ib_cq *cq, struct ib_wc *wc)
{
    struct srpt_send_iotctx *ioctx, u64 tag,
    int status)
{
    struct se_cmd *cmd = &ioctx->cmd;
    struct srp_rsp *srp_rsp;
    const u8 *sense_data;
    int sense_data_len, max_sense_len;
    +u32 resid = cmd->residual_count;

    /* The lowest bit of all SAM-3 status codes is zero (see also
     * @ -1279.6 +1285.28 @
     * srp_rsp->tag = tag;
     * srp_rsp->status = status;

    +if (cmd->se_cmd_flags & SCF_UNDERFLOW_BIT) {
    +if (cmd->data_direction == DMA_TO_DEVICE) {
        /* residual data from an underflow write */
        +srp_rsp->flags = SRP_RSP_FLAG_DOUNDER;
        +srp_rsp->data_out_res_cnt = cpu_to_be32(resid);
        +} else if (cmd->data_direction == DMA_FROM_DEVICE) {
            /* residual data from an underflow read */
            +srp_rsp->flags = SRP_RSP_FLAG_DIUNDER;
            +srp_rsp->data_in_res_cnt = cpu_to_be32(resid);
        +} else if (cmd->se_cmd_flags & SCF_OVERFLOW_BIT) {
            /* residual data from an overflow write */
            +srp_rsp->flags = SRP_RSP_FLAG_DOOVER;
            +srp_rsp->data_out_res_cnt = cpu_to_be32(resid);
            +} else if (cmd->data_direction == DMA_FROM_DEVICE) {
                /* residual data from an overflow read */
                +srp_rsp->flags = SRP_RSP_FLAG_DOOVER;
                +srp_rsp->data_in_res_cnt = cpu_to_be32(resid);
            +} else if (sense_data_len) {
            BUILD_BUG_ON(MIN_MAX_RSP_SIZE <= sizeof(*srp_rsp));
            max_sense_len = ch->max_ti_iu_len - sizeof(*srp_rsp);
            @ -1731.8 +1759.7 @@
            int ret;

            if (!srpt_set_ch_state(ch, CH_DRAINING)) {


pr_debug("%s-%d: already closed\n", ch->sess_name, ch->qp->qp_num);
+pr_debug("%s: already closed\n", ch->sess_name);
return false;
}

@@ -2469,8 +2496,19 @@
srpt_queue_response(cmd);
}
+/*
 * This function is called for aborted commands if no response is sent to the
 * initiator. Make sure that the credits freed by aborting a command are
 * returned to the initiator the next time a response is sent by incrementing
 * ch->req_lim_delta.
 * */
static void srpt_aborted_task(struct se_cmd *cmd) {
    struct srpt_send_ioctx *ioctx = container_of(cmd, struct srpt_send_ioctx, cmd);
    struct srpt_rdma_ch *ch = ioctx->ch;
    +atomic_inc(&ch->req_lim_delta);
}

static int srpt_queue_status(struct se_cmd *cmd) {
    struct srpt_send_ioctx *ioctx = container_of(cmd, struct srpt_send_ioctx, cmd);
    struct srpt_rdma_ch *ch = ioctx->ch;
    +atomic_inc(&ch->req_lim_delta);
}

static int srpt_queue_status(struct se_cmd *cmd)
--- linux-4.15.0.orig/drivers/input/evdev.c
+++ linux-4.15.0/drivers/input/evdev.c
@@ -342,20 +342,6 @@
return fasync_helper(fd, file, on, &client->fasync);
}

-static int evdev_flush(struct file *file, fl_owner_t id)
-{
-    struct evdev_client *client = file->private_data;
-    struct evdev *evdev = client->evdev;
-    -mutex_lock(&evdev->mutex);
-    -if (evdev->exist && !client->revoked)
-        -input_flush_device(&evdev->handle, file);
-    -mutex_unlock(&evdev->mutex);
-    -return 0;
-}
-
-static void evdev_free(struct device *dev) {

struct evdev *evdev = container_of(dev, struct evdev, dev);
unsigned int i;

mutex_lock(&evdev->mutex);
+
+if (evdev->exist && !client->revoked)
+input_flush_device(&evdev->handle, file);
+
+evdev_ungrab(evdev, client);
mutex_unlock(&evdev->mutex);

@@ -469,6 +455,10 @@
unsigned int i;
mutex_lock(&evdev->mutex);
+	if (evdev->exist && !client->revoked)
+input_flush_device(&evdev->handle, file);
+
+evdev_ungrab(evdev, client);
mutex_unlock(&evdev->mutex);

@@ -1331,7 +1321,6 @@
 .compat_ioctl = evdev_ioctl_compat,
 #endif
 .fasync = evdev_fasync,
- .flush = evdev_flush,
-.llseek = no_llseek,
 .llseek = no_llseek,
};

--- linux-4.15.0.orig/drivers/input/ff-memless.c
+++ linux-4.15.0/drivers/input/ff-memless.c
@@ -501,6 +501,15 @@
{
struct ml_device *ml = ff->private;

+/*
+ * Even though we stop all playing effects when tearing down
+ * an input device (via input_device_flush() that calls into
+ * input_ff_flush() that stops and erases all effects), we
+ * do not actually stop the timer, and therefore we should
+ * do it here.
+ */
+del_timer_sync(&ml->timer);
+
+kfree(ml->private);
}

--- linux-4.15.0.orig/drivers/input/input-leds.c
+++ linux-4.15.0/drivers/input/input-leds.c
@@ -88,6 +88,7 @@
const struct input_device_id *id)
{
struct input_leds *leds;
+struct input_led *led;
unsigned int num_leds;
unsigned int led_code;
int led_no;
led_no = 0;
for_each_set_bit(led_code, dev->ledbit, LED_CNT) {
    struct input_led *led = &leds->leds[led_no];
    if (!input_led_info[led_code].name)
        continue;

    led = &leds->leds[led_no];
    led->handle = &leds->handle;
    led->code = led_code;

    -if (!input_led_info[led_code].name)
        continue;
    -

    led->cdev.name = kasprintf(GFP_KERNEL, "%s::%s",
        dev_name(&dev->dev),
        input_led_info[led_code].name);
--- linux-4.15.0.orig/drivers/input/input.c
+++ linux-4.15.0/drivers/input/input.c
@@ -480,11 +480,19 @@
*/
void input_alloc_absinfo(struct input_dev *dev)
{
    if (!dev->absinfo)
        return;

    dev->absinfo = kcalloc(ABS_CNT, sizeof(*dev->absinfo),
-GFP_KERNEL);
+if (dev->absinfo)
+    return;

-WARN(!dev->absinfo, "%s(): kcalloc() failed\n", __func__); 
+dev->absinfo = kcalloc(ABS_CNT, sizeof(*dev->absinfo), GFP_KERNEL);
+if (!dev->absinfo) {
+    dev_err(dev->dev.parent ?: &dev->dev,
+        "%s: unable to allocate memory\n", __func__); 
+    /*
+        * We will handle this allocation failure in
+        * input_register_device() when we refuse to register input
+        * device with ABS bits but without absinfo.
+        */
+    +}
+}
EXPORT_SYMBOL(input_alloc_absinfo);

@@ -850,16 +858,18 @@
}
- __clear_bit(*old_keycode, dev->keybit);
- __set_bit(ke->keycode, dev->keybit);

- for (i = 0; i < dev->keycodemax; i++) {
  - if (input_fetch_keycode(dev, i) == *old_keycode) {
    - __set_bit(*old_keycode, dev->keybit);
  - break; /* Setting the bit twice is useless, so break */
  + if (*old_keycode <= KEY_MAX) {
    + __clear_bit(*old_keycode, dev->keybit);
    + for (i = 0; i < dev->keycodemax; i++) {
    +   if (input_fetch_keycode(dev, i) == *old_keycode) {
    +     __set_bit(*old_keycode, dev->keybit);
    +   /* Setting the bit twice is useless, so break */
    +   break;
    + }
    + }
    + }
  }
+ __set_bit(ke->keycode, dev->keybit);
return 0;
}

@@ -915,9 +925,13 @@
* Simulate keyup event if keycode is not present
* in the keymap anymore
 */
- if (test_bit(EV_KEY, dev->evbit) &&
  - is_event_supported(old_keycode, dev->keybit, KEY_MAX) &&
  - __test_and_clear_bit(old_keycode, dev->key)) {
+ if (old_keycode > KEY_MAX) {
  + dev_warn(dev->dev.parent ?: &dev->dev,
  + "\%s: got too big old keycode \%#x\n",
  + __func__, old_keycode);
+ | else if (test_bit(EV_KEY, dev->evbit) &&
+ | is_event_supported(old_keycode, dev->keybit, KEY_MAX) &&
+ | __test_and_clear_bit(old_keycode, dev->key)) {
  struct input_value vals[] = {
  [ EV_KEY, old_keycode, 0 ],
  input_value_sync
  --- linux-4.15.0.orig/drivers/input/joydev.c
  +++ linux-4.15.0/drivers/input/joydev.c
@@ -460,7 +460,7 @@
if (IS_ERR(abspam))
return PTR_ERR(abspam);

- for (i = 0; i < joydev->nabs; i++) {
+ for (i = 0; i < len && i < joydev->nabs; i++) {
  if (absspam[i] > ABS_MAX) {
retval = -EINVAL;
goto out;
@@ -484,6 +484,9 @@
int i;
int retval = 0;

+if (len % sizeof(*keypam))
+return -EINVAL;
+
len = min(len, sizeof(joydev->keypam));

/* Validate the map. */
@@ -491,7 +494,7 @@
if (IS_ERR(keypam))
    return PTR_ERR(keypam);

-    for (i = 0; i < joydev->nkey; i++) {
+    for (i = 0; i < (len / 2) && i < joydev->nkey; i++) {
        if (keypam[i] > KEY_MAX || keypam[i] < BTN_MISC) {
            retval = -EINVAL;
            goto out;
@@ -501,7 +504,7 @@
    memcpy(joydev->keypam, keypam, len);

    for (i = 0; i < joydev->nkey; i++)
    -joydev->keymap[keypam[i] - BTN_MISC] = i;
    +joydev->keymap[joydev->keypam[i] - BTN_MISC] = i;

out:
kfree(keypam);
--- linux-4.15.0.orig/drivers/input/joystick/iforce/iforce-usb.c
+++ linux-4.15.0/drivers/input/joystick/iforce/iforce-usb.c
@@ -145,7 +145,12 @@
    return -ENODEV;
    epirq = &interface->endpoint[0].desc;
    +if (!usb_endpoint_is_int_in(epirq))
    +return -ENODEV;
    +
    epout = &interface->endpoint[1].desc;
    +if (!usb_endpoint_is_int_out(epout))
    +return -ENODEV;

if (!(iforce = kzalloc(sizeof(struct iforce) + 32, GFP_KERNEL)))
goto fail;
--- linux-4.15.0.orig/drivers/input/joystick/psxpad-spi.c
+++ linux-4.15.0/drivers/input/joystick/psxpad-spi.c
@@ -292,7 +292,7 @@
    return -ENODEV;
    epirq = &interface->endpoint[0].desc;
    +if (!usb_endpoint_is_int_in(epirq))
    +return -ENODEV;
    +
    epout = &interface->endpoint[1].desc;
    +if (!usb_endpoint_is_int_out(epout))
    +return -ENODEV;

if (!(iforce = kzalloc(sizeof(struct iforce) + 32, GFP_KERNEL)))
goto fail;
if (!pad)
return -ENOMEM;

-pdev = input_allocate_polled_device();
+pdev = devm_inputAllocate_polled_device(&spi->dev);
if (!pdev) {
    dev_err(&spi->dev, "failed to allocate input device\n");
return -ENOMEM;
--- linux-4.15.0.orig/drivers/input/joystick/xpad.c
+++ linux-4.15.0/drivers/input/joystick/xpad.c
@@ -89,8 +89,10 @@
#define XPAD_PKT_LEN 64
-/* xbox d-pads should map to buttons, as is required for DDR pads
- but we map them to axes when possible to simplify things */
+/*
xbox d-pads should map to buttons, as is required for DDR pads
+ but we map them to axes when possible to simplify things
+ */
#define MAP_DPAD_TO_BUTTONS		(1 << 0)
#define MAP_TRIGGERS_TO_BUTTONS	(1 << 1)
#define MAP_STICKS_TO_NULL		(1 << 2)
@@ -126,6 +128,7 @@
u8 mapping;
u8 xtype;
    ] xpad_device[] = [
+    { 0x0079, 0x18d4, "GPD Win 2 X-Box Controller", 0, XTYPE_XBOX360 },
    { 0x044f, 0x0f00, "Thrustmaster Wheel", 0, XTYPE_XBOX },
    { 0x044f, 0x0f03, "Thrustmaster Wheel", 0, XTYPE_XBOX },
    { 0x044f, 0x0f07, "Thrustmaster, Inc. Controller", 0, XTYPE_XBOX },
    @@ -126,6 +128,7 @@
+    { 0x0e6f, 0x02a0, "PDP Xbox One Controller", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x02a1, "PDP Xbox One Controller", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x02a2, "PDP Wired Controller for Xbox One - Crimson Red", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x02a4, "PDP Wired Controller for Xbox One - Stealth Series", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x02a6, "PDP Wired Controller for Xbox One - Camo Series", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x02a7, "PDP Xbox One Controller", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x02a8, "PDP Xbox One Controller", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x02ab, "Logic3 Controller", 0, XTYPE_XBOXONE },
+    { 0x0e6f, 0x0346, "Rock Candy Gamepad for Xbox One 2016", 0, XTYPE_XBOXONE },
{ 0x0e6f, 0x0401, "Logic3 Controller", 0, XTYPE_XBOX360 },
{ 0x0f30, 0x0202, "Joytech Advanced Controller", 0, XTYPE_XBOX },
{ 0x0f30, 0x8888, "BigBen XBMIniPad Controller", 0, XTYPE_XBOX },
{ 0x102c, 0xff0c, "Joytech Wireless Advanced Controller", 0, XTYPE_XBOX },
+{ 0x1038, 0x1430, "SteelSeries Stratus Duo", 0, XTYPE_XBOX360 },
+{ 0x1038, 0x1431, "SteelSeries Stratus Duo", 0, XTYPE_XBOX360 },
+{ 0x11c9, 0x55f0, "Nacon GC-100XF", 0, XTYPE_XBOX360 },
+{ 0x1209, 0x2882, "Ardwino Controller", 0, XTYPE_XBOX360 },
{ 0x12ab, 0x0004, "Honey Bee Xbox360 dancepad", MAP_DPAD_TO_BUTTONS, XTYPE_XBOX360 },
{ 0x12ab, 0x0301, "PDP AFTERGLOW AX.1", 0, XTYPE_XBOX360 },
{ 0x12ab, 0x0303, "Mortal Kombat Klassic FightStick", MAP_TRIGGERS_TO_BUTTONS, XTYPE_XBOX360 },
@@ -250,7 +263,10 @@
{ 0x1bad, 0xfa01, "MadCatz GamePad", 0, XTYPE_XBOX360 },
{ 0x1bad, 0xfd00, "Razer Onza TE", 0, XTYPE_XBOX360 },
{ 0x1bad, 0xfd01, "Razer Onza", 0, XTYPE_XBOX360 },
+{ 0x20d6, 0x2001, "BDA Xbox Series X Wired Controller", 0, XTYPE_XBOXONE },
+{ 0x20d6, 0x2009, "PowerA Enhanced Wired Controller for Xbox Series X[S]", 0, XTYPE_XBOXONE },
+{ 0x20d6, 0x281f, "PowerA Wired Controller For Xbox 360", 0, XTYPE_XBOX360 },
+{ 0x24c6, 0x5000, "Razer Atrox Arcade Stick", MAP_TRIGGERS_TO_BUTTONS, XTYPE_XBOX360 },
+{ 0x24c6, 0x5300, "PowerA MINI PROEX Controller", 0, XTYPE_XBOX360 },
+{ 0x24c6, 0x5303, "Xbox Airflo wired controller", 0, XTYPE_XBOX360 },
@@ -305,6 +321,10 @@
{ 0x24c6, 0x5b03, "Thrustmaster Ferrari 458 Racing Wheel", 0, XTYPE_XBOX360 },
{ 0x24c6, 0x5d04, "Razer Sabertooth", 0, XTYPE_XBOX360 },
{ 0x24c6, 0xfafe, "Rock Candy Gamepad for Xbox 360", 0, XTYPE_XBOX360 },
+{ 0x3285, 0x0607, "Nacon GC-100", 0, XTYPE_XBOX360 },
+{ 0x3767, 0x0101, "Fanatec Speedster 3 Forceshock Wheel", 0, XTYPE_XBOX },
+{ 0xffff, 0xffff, "Chinese-made Xbox Controller", 0, XTYPE_XBOX },
{ 0x0000, 0x0000, "Generic X-Box pad", 0, XTYPE_UNKNOWN }
@@ -389,15 +410,15 @@
* match against vendor id as well. Wired Xbox 360 devices have protocol 1,
* wireless controllers have protocol 129.
* 
+#define XPAD_XBOX360_VENDOR_PROTOCOL(vend,pr) \
+  { XPAD_XBOX360_VENDOR_PROTOCOL((vend), 1) }, \
+  { XPAD_XBOX360_VENDOR_PROTOCOL((vend), 129) }
*/ The Xbox One controller uses subclass 71 and protocol 208. */
#endif XBOXONE_VENDOR_PROTOCOL(vend, pr) \ 
@@ -407,10 +428,11 @@
    .bInterfaceSubClass = 71, \
    .bInterfaceProtocol = (pr)
#endif XBOXONE_VENDOR(vend) \ 
-{ XBOXONE_VENDOR_PROTOCOL(vend, 208) } 
+{ XBOXONE_VENDOR_PROTOCOL((vend), 208) }

static const struct usb_device_id xpad_table[] = {
    { USB_INTERFACE_INFO('X', 'B', 0) },/* X-Box USB-IF not approved class */
+    XBOX360_VENDOR(0x0079),/* GPD Win 2 Controller */
+    XBOX360_VENDOR(0x044f),/* Thrustmaster X-Box 360 controllers */
+    XBOX360_VENDOR(0x045e),/* Microsoft X-Box controllers */
+    XBOX360_VENDOR(0x0e6f),/* 0x0e6f X-Box controllers */
+    XBOX360_VENDOR(0x1038),/* SteelSeries Controllers */
+    XBOX360_VENDOR(0x11c9),/* Nacon GC100XF */
+    XBOX360_VENDOR(0x1209),/* Ardwiino Controllers */
+    XBOX360_VENDOR(0x12ab),/* X-Box 360 dance pads */
+    XBOX360_VENDOR(0x1430),/* RedOctane X-Box 360 controllers */
+    XBOX360_VENDOR(0x146b),/* BigBen Interactive Controllers */
@@ -425,7 +447,9 @@
+    XBOX360_VENDOR(0x162e),/* Joytech X-Box 360 controllers */
+    XBOX360_VENDOR(0x1689),/* Razer Onza */
    XBOX360_VENDOR(0x1bad),/* Harminix Rock Band Guitar and Drums */
+    XBOX360_VENDOR(0x20d6),/* PowerA Controllers */
+    XBOX360_VENDOR(0x2f24),/* GameSir Controllers */
+    XBOX360_VENDOR(0x3285),/* Nacon GC-100 */
    { }
};
@@ -467,6 +496,16 @@
};

/+ * This packet is required for Xbox One S (0x045e:0x02ea)
+ * and Xbox One Elite Series 2 (0x045e:0x0b00) pads to
+ * initialize the controller that was previously used in
+ * Bluetooth mode.
static const u8 xboxone_s_init[] = {
 0x05, 0x20, 0x00, 0x0f, 0x06
};

/*
 * This packet is required for the Titanfall 2 Xbox One pads
 * (0x0e6f:0x165) to finish initialization and for Hori pads
 * (0x0f0d:0x0067) to make the analog sticks work.
 @@ -477,16 +516,18 @@
};

/*
- * This packet is required for some of the PDP pads to start
- * sending input reports. One of those pads is (0x0e6f:0x02ab).
+ * This packet is required for most (all?) of the PDP pads to start
+ * sending input reports. These pads include: (0x0e6f:0x02ab),
+ * (0x0e6f:0x02a4), (0x0e6f:0x02a6).
 */
static const u8 xboxone_pdp_init1[] = {
 0xa, 0x20, 0x0, 0x03, 0x00, 0x01, 0x14
};

/*
- * This packet is required for some of the PDP pads to start
- * sending input reports. One of those pads is (0x0e6f:0x02ab).
+ * This packet is required for most (all?) of the PDP pads to start
+ * sending input reports. These pads include: (0x0e6f:0x02ab),
+ * (0x0e6f:0x02a4), (0x0e6f:0x02a6).
 */
static const u8 xboxone_pdp_init2[] = {
 0x6, 0x20, 0x0, 0x02, 0x01, 0x00
 @ @ -522.8 +563.10 @ @
XBOXONE_INIT_PKT(0x0e6f, 0x0165, xboxone_hori_init),
XBOXONE_INIT_PKT(0x0f0d, 0x0067, xboxone_hori_init),
XBOXONE_INIT_PKT(0x0000, 0x0000, xboxone_fw2015_init),
- XBOXONE_INIT_PKT(0x0e6f, 0x02ab, xboxone_pdp_init1),
- XBOXONE_INIT_PKT(0x0e6f, 0x02ab, xboxone_pdp_init2),
+ XBOXONE_INIT_PKT(0x045e, 0x02ea, xboxone_s_init),
+ XBOXONE_INIT_PKT(0x045e, 0x0b00, xboxone_s_init),
+ XBOXONE_INIT_PKT(0x0e6f, 0x0000, xboxone_pdp_init1),
+ XBOXONE_INIT_PKT(0x0e6f, 0x0000, xboxone_pdp_init2),
XBOXONE_INIT_PKT(0x24c6, 0x541a, xboxone_rumblebegin_init),
XBOXONE_INIT_PKT(0x24c6, 0x542a, xboxone_rumblebegin_init),
XBOXONE_INIT_PKT(0x24c6, 0x543a, xboxone_rumblebegin_init),
 @ @ -1571.7 +1614.6 @ @
static void xpad_set_up_abs(struct input_dev *input_dev, signed short abs) {

struct usb_xpad *xpad = input_get_drvdata(input_dev);
-set_bit(abs, input_dev->absbit);

switch (abs) {
case ABS_X:
@@ -1591,6 +1633,9 @@
case ABS_HAT0Y:/* the d-pad (only if dpad is mapped to axes */
    input_set_abs_params(input_dev, abs, -1, 1, 0, 0);
    break;
    +default:
    +input_set_abs_params(input_dev, abs, 0, 0, 0, 0);
    +break;
    }
}

@@ -1631,10 +1676,7 @@
    input_dev->close = xpad_close;
    }

    -_set_bit(EV_KEY, input_dev->evbit);
    -
    if (!(xpad->mapping & MAP_STICKS_TO_NULL)) {
    -_set_bit(EV_ABS, input_dev->evbit);
    /* set up axes */
    for (i = 0; xpad_abs[i] >= 0; i++)
        xpad_set_up_abs(input_dev, xpad_abs[i]);
    @@ -1642,21 +1684,22 @@
    /* set up standard buttons */
    for (i = 0; xpad_common_btn[i] >= 0; i++)
        -_set_bit(xpad_common_btn[i], input_dev->keybit);
        +input_set_capability(input_dev, EV_KEY, xpad_common_btn[i]);

    /* set up model-specific ones */
    if (xpad->xtype == XTYPE_XBOX360 || xpad->xtype == XTYPE_XBOX360W ||
        xpad->xtype == XTYPE_XBOXONE) {
        for (i = 0; xpad360_btn[i] >= 0; i++)
            -_set_bit(xpad360_btn[i], input_dev->keybit);
            +input_set_capability(input_dev, EV_KEY, xpad360_btn[i]);
    } else {
        for (i = 0; xpad_btn[i] >= 0; i++)
            -_set_bit(xpad_btn[i], input_dev->keybit);
            +input_set_capability(input_dev, EV_KEY, xpad_btn[i]);
    }

    if (xpad->mapping & MAP_DPAD_TO_BUTTONS) {
        for (i = 0; xpad_btn_pad[i] >= 0; i++)
            -_set_bit(xpad_btn_pad[i], input_dev->keybit);

    }
+input_set_capability(input_dev, EV_KEY, 
+     xpad_btm_pad[i]); 
} 

/*
@@ -1673,7 +1716,8 @@
  if (xpad->mapping & MAP_TRIGGERS_TO_BUTTONS) {
    for (i = 0; xpad_btn_triggers[i] >= 0; i++)
      __set_bit(xpad_btn_triggers[i], input_dev->keybit);
+    input_set_capability(input_dev, EV_KEY, 
+        xpad_btn_triggers[i]);
  } else {
    for (i = 0; xpad_abs_triggers[i] >= 0; i++)
      xpad_set_up_abs(input_dev, xpad_abs_triggers[i]);
--- linux-4.15.0.orig/drivers/input/keyboard/atakbd.c
+++ linux-4.15.0/drivers/input/keyboard/atakbd.c
@@ -79,8 +79,7 @@
 /*
-  static unsigned char atakbd_keycode[0x72] = {/*! American layout */
-    [0] = KEY_GRAVE,
-    [1] = KEY_ESC,
-    [2] = KEY_1,
-    [3] = KEY_2,
@ @ -121.9 +120.9 @@
-    [38] = KEY_L,
-    [39] = KEY_SEMICOLON,
-    [40] = KEY_APOSTROPHE,
-    [41] = KEY_BACKSLASH,/*! FIXME, '#' */
+    [41] = KEY_GRAVE,
+    [42] = KEY_LEFTSHIFT,
-    [43] = KEY_GRAVE,/*! FIXME: '~' */
+    [43] = KEY_BACKSLASH,
    [44] = KEY_Z,
    [45] = KEY_X,
    [46] = KEY_C,
@ @ -149.45 +148.34 @@
    [66] = KEY_F8,
    [67] = KEY_F9,
    [68] = KEY_F10,
-    [69] = KEY_ESC,
-    [70] = KEY_DELETE,
-    [71] = KEY_KP7,
-    [72] = KEY_KP8,
-    [73] = KEY_KP9,
+[108] = KEY_KP6,
+[109] = KEY_KP1,
+[110] = KEY_KP2,
+[111] = KEY_KP3,
+[112] = KEY_KP0,
+[113] = KEY_KPDOT,
+[114] = KEY_KPENTER,
};

static struct input_dev *atakbd_dev;
@@ -195,21 +183,15 @@
static void atakbd_interrupt(unsigned char scancode, char down)
{
    -if (scancode < 0x72) { /* scancodes < 0xf2 are keys */
        -if (scancode < 0x73) { /* scancodes < 0xf3 are keys */

            // report raw events here?

            scancode = atakbd_keycode[scancode];

            -if (scancode == KEY_CAPSLOCK) { /* CapsLock is a toggle switch key on Amiga */
+          -if (scancode < 0x72) { /* scancodes < 0xf2 are keys */
+            -if (scancode < 0x73) { /* scancodes < 0xf3 are keys */
+                // report raw events here?

            -} else {
+                // report raw events here?

                -input_report_key(atakbd_dev, scancode, 1);
+                -input_report_key(atakbd_dev, scancode, 1);
+                -input_report_key(atakbd_dev, scancode, 0);
+                -input_report_key(atakbd_dev, scancode, 1);
+                -input_report_key(atakbd_dev, scancode, 0);
+                -input_sync(atakbd_dev);
+                -input_sync(atakbd_dev);
+                -} else /* scancodes >= 0xf2 are mouse data, most likely */

+            +input_report_key(atakbd_dev, scancode, down);
+            +input_sync(atakbd_dev);
+            +} else /* scancodes >= 0xf3 are mouse data, most likely */

+            printk(KERN_INFO "atakbd: unhandled scancode \%x\n", scancode);

            return;

--- linux-4.15.0.orig/drivers/input/keyboard/cap11xx.c
+++ linux-4.15.0/drivers/input/keyboard/cap11xx.c
@@ -75,9 +75,7 @@
 struct cap11xx_led {
     struct cap11xx_priv *priv;
     struct led_classdev cdev;
-    struct work_struct work;
+    struct work_struct work;
     u32 reg;
     -enum led_brightness new_brightness;
     
     #endif


#ifdef CONFIG_LEDS_CLASS
- static void cap11xx_led_work(struct work_struct *work)  
+ static int cap11xx_led_set(struct led_classdev *cdev,  
    + enum led_brightness value)  
{  
  - struct cap11xx_led *led = container_of(work, struct cap11xx_led, work);  
+ struct cap11xx_led *led = container_of(cdev, struct cap11xx_led, cdev);  
  struct cap11xx_priv *priv = led->priv;  
  - int value = led->new_brightness;  

  /*  
   * All LEDs share the same duty cycle as this is a HW limitation.  
   * Brightness levels per LED are either 0 (OFF) and 1 (ON).  
   * All LEDs share the same duty cycle as this is a HW limitation. Brightness levels per LED are either 0 (OFF) and 1 (ON).  
   */  
  - regmap_update_bits(priv->regmap, CAP11XX_REG_LED_OUTPUT_CONTROL,  
    - BIT(led->reg), value ? BIT(led->reg) : 0);  
  -}  
  -  
- static void cap11xx_led_set(struct led_classdev *cdev,  
- enum led_brightness value)  
{  
  - struct cap11xx_led *led = container_of(cdev, struct cap11xx_led, cdev);  
  -  
  - if (led->new_brightness == value)  
    - return;  

  - led->new_brightness = value;  
  - schedule_work(&led->work);  
+ return regmap_update_bits(priv->regmap,  
    + CAP11XX_REG_LED_OUTPUT_CONTROL,  
    + BIT(led->reg),  
    + value ? BIT(led->reg) : 0);  
} 

static int cap11xx_init_leds(struct device *dev,  
@@ -299,7 +288,7 @@
    -led->cdev.default_trigger =  
      of_get_property(child, "linux,default-trigger", NULL);  
    -led->cdev.flags = 0;  
+ led->cdev.brightness_set = cap11xx_led_set;  
+ led->cdev.brightness_set_blocking = cap11xx_led_set;  
+ led->cdev.max_brightness = 1;
led->cdev.brightness = LED_OFF;

@@ -312,8 +301,6 @@
    led->reg = reg;
    led->priv = priv;

-INIT_WORK(&led->work, cap11xx_led_work);
- error = devm_led_classdev_register(dev, &led->cdev);
if (error) {
    of_node_put(child);
    --- linux-4.15.0.orig/drivers/input/keyboard/cros_ec_keyb.c
+++ linux-4.15.0/drivers/input/keyboard/cros_ec_keyb.c
@@ -196,6 +196,7 @@
        "changed: [r%d c%d]: byte %02x\n",
        row, col, new_state);

+input_event(dev, EV_MSC, MSC_SCAN, pos);
+input_report_key(dev, keycodes[pos],
+    new_state);
+
@@ -506,7 +507,8 @@
         for (i = 0; i < ARRAY_SIZE(cros_ec_keyb_bs); i++) {
             const struct cros_ec_bs_map *map = &cros_ec_keyb_bs[i];

-      if (buttons & BIT(map->bit))
-          + if ((map->ev_type == EV_KEY && (buttons & BIT(map->bit))) ||
+          (map->ev_type == EV_SW && (switches & BIT(map->bit))))
+              input_set_capability(dev, map->ev_type, map->code);
+
--- linux-4.15.0.orig/drivers/input/keyboard/dlink-dir685-touchkeys.c
+++ linux-4.15.0/drivers/input/keyboard/dlink-dir685-touchkeys.c
@@ -142,7 +142,7 @@
 static struct i2c_driver dir685_tk_i2c_driver = {
     .driver = {
         .name = "dlink-dir685-touchkeys",
--- linux-4.15.0.orig/drivers/input/keyboard/ep93xx_keypad.c
+++ linux-4.15.0/drivers/input/keyboard/ep93xx_keypad.c
@@ -257,8 +257,8 @@
         keypad->irq = platform_get_irq(pdev, 0);
-if (!keypad->irq) {
  -err = -ENXIO;
+if (keypad->irq < 0) {
+  +err = keypad->irq;
  goto failed_free;
}

--- linux-4.15.0.orig/drivers/input/keyboard/hil_kbd.c
+++ linux-4.15.0/drivers/input/keyboard/hil_kbd.c
@@ -512,6 +512,7 @@
HIL_IDD_NUM_AXES_PER_SET(*idd)) {
  printk(KERN_INFO PREFIX
"combo devices are not supported.\n");
+  +error = -EINVAL;
  goto bail1;
}

--- linux-4.15.0.orig/drivers/input/keyboard/imx_keypad.c
+++ linux-4.15.0/drivers/input/keyboard/imx_keypad.c
@@ -530,11 +530,12 @@
return 0;
}

-static int __maybe_unused imx_kbd_suspend(struct device *dev)
+static int __maybe_unused imx_kbd_noirq_suspend(struct device *dev)
{ }
 struct platform_device *pdev = to_platform_device(dev);
 struct imx_keypad *kbd = platform_get_drvdata(pdev);
 struct input_dev *input_dev = kbd->input_dev;
+  unsigned short reg_val = readw(kbd->mmio_base + KPSR);
/* imx kbd can wake up system even clock is disabled */
 mutex_lock(&input_dev->mutex);
@@ -544,13 +545,20 @@
 mutex_unlock(&input_dev->mutex);

-if (device_may_wakeup(&pdev->dev))
+if (device_may_wakeup(&pdev->dev)) {
+  if (reg_val & KBD_STAT_KPKD)
+    reg_val |= KBD_STAT_KRIE;
+  if (reg_val & KBD_STAT_KPKR)
+    reg_val |= KBD_STAT_KDIE;
+  writew(reg_val, kbd->mmio_base + KPSR);
+  enable_irq_wake(kbd->irq);
return 0;
}

- static int __maybe_unused imx_kbd_resume(struct device *dev)
+ static int __maybe_unused imx_kbd_noirq_resume(struct device *dev)
{
 struct platform_device *pdev = to_platform_device(dev);
 struct imx_keypad *kbd = platform_get_drvdata(pdev);
 return ret;
}

- static SIMPLE_DEV_PM_OPS(imx_kbd_pm_ops, imx_kbd_suspend, imx_kbd_resume);
+ static const struct dev_pm_ops imx_kbd_pm_ops = {
+ \tSET_NOIRQ_SYSTEM_SLEEP_PM_OPS(imx_kbd_noirq_suspend, imx_kbd_noirq_resume)
+ };

static struct platform_driver imx_keypad_driver = {
 .driver = {
 --- linux-4.15.0.orig/drivers/input/keyboard/matrix_keypad.c
 +++ linux-4.15.0/drivers/input/keyboard/matrix_keypad.c
 @@ -218,9 +218,11 @@
 {
 struct matrix_keypad *keypad = input_get_drvdata(dev);
+	spin_lock_irq(&keypad->lock);
 keypad->stopped = true;
 -mb();
-flush_work(&keypad->work.work);
+spin_unlock_irq(&keypad->lock);
+	flush_delayed_work(&keypad->work);
/*
 * matrix_keypad_scan() will leave IRQs enabled;
 * we should disable them now.
@@ -405,7 +407,7 @@
 struct matrix_keypad_platform_data *pdata;
 struct device_node *np = dev->of_node;
 unsigned int *gpios;
-int i, nrow, ncol;
+int ret, i, nrow, ncol;

 if (!np) {
 dev_err(dev, "device lacks DT data\n");
@@ -450,12 +452,19 @@
 return ERR_PTR(-ENOMEM);
 }


for (i = 0; i < pdata->num_row_gpios; i++)
gpios[i] = of_get_named_gpio(np, "row-gpios", i);
+for (i = 0; i < nrow; i++) {
+ret = of_get_named_gpio(np, "row-gpios", i);
+if (ret < 0)
+return ERR_PTR(ret);
+gpios[i] = ret;
+
- for (i = 0; i < pdata->num_col_gpios; i++)
- gpios[pdata->num_row_gpios + i] =
- of_get_named_gpio(np, "col-gpios", i);
+ for (i = 0; i < ncol; i++) {
+ret = of_get_named_gpio(np, "col-gpios", i);
+if (ret < 0)
+return ERR_PTR(ret);
+gpios[nrow + i] = ret;
+
pdata->row_gpios = gpios;
pdata->col_gpios = &gpios[pdata->num_row_gpios];
@@ -482,10 +491,8 @@
pdata = dev_get_platdata(&pdev->dev);
if (!pdata) {
    pdata = matrix_keypad_parse_dt(&pdev->dev);
    if (!pdata) {
-    if (IS_ERR(pdata)) {
-        dev_err(&pdev->dev, "no platform data defined\n");
+    if (IS_ERR(pdata))
        return PTR_ERR(pdata);
    } else if (!pdata->keymap_data) {
        dev_err(&pdev->dev, "no keymap data defined\n");
        return -EINVAL;
    }
} else if (!timeout)
    return -EINVAL;

-while ((readl(keypad->reg_base + SKE_RIS) != 0x00000000) && timeout--)
cpu_relax();
-
-if (!timeout)
+if (timeout == -1)
    return -EINVAL;

/*
--- linux-4.15.0.orig/drivers/input/keyboard/nomadik-ske-keypad.c
+++ linux-4.15.0/drivers/input/keyboard/nomadik-ske-keypad.c
@@ -100,7 +100,15 @@
 while ((readl(keypad->reg_base + SKE_RIS) != 0x00000000) &&& timeout--)
cpu_relax();

- if (!timeout)
+ if (timeout == -1)
    return -EINVAL;
*/

--- linux-4.15.0.orig/drivers/input/keyboard/nspire-keypad.c
+++ linux-4.15.0/drivers/input/keyboard/nspire-keypad.c
@@ -96,9 +96,15 @@
 while ((readl(keypad->reg_base + SKE_RIS) != 0x00000000) &&& timeout--)
cpu_relax();

- if (!timeout)
+ if (timeout == -1)
    return -EINVAL;

/*
--- linux-4.15.0.orig/drivers/input/keyboard/nspire-keypad.c
+++ linux-4.15.0/drivers/input/keyboard/nspire-keypad.c
@@ -96,9 +96,15 @@
 while ((readl(keypad->reg_base + SKE_RIS) != 0x00000000) &&& timeout--)
cpu_relax();

- if (!timeout)
+ if (timeout == -1)
    return -EINVAL;
*/

--- linux-4.15.0.orig/drivers/input/keyboard/nomadik-ske-keypad.c
+++ linux-4.15.0/drivers/input/keyboard/nomadik-ske-keypad.c
@@ -100,7 +100,15 @@
 while ((readl(keypad->reg_base + SKE_RIS) != 0x00000000) &&& timeout--)
cpu_relax();

- if (!timeout)
+ if (timeout == -1)
    return -EINVAL;
*/
static int nspire_keypad_chip_init(struct nspire_keypad *keypad)
{
    unsigned long val = 0, cycles_per_us, delay_cycles, row_delay_cycles;
    int error;
    
    error = clk_prepare_enable(keypad->clk);
    if (error)
        return error;
    
    cycles_per_us = (clk_get_rate(keypad->clk) / 1000000);
    if (cycles_per_us == 0)
        return -124,30 +130,6 @@
    keypad->int_mask = 1 << 1;
    writel(keypad->int_mask, keypad->reg_base + KEYPAD_INTMSK);
    
    /* Disable GPIO interrupts to prevent hanging on touchpad */
    /* Possibly used to detect touchpad events */
    writel(0, keypad->reg_base + KEYPAD_UNKNOWN_INT);
    /* Acknowledge existing interrupts */
    writel(~0, keypad->reg_base + KEYPAD_UNKNOWN_INT_STS);
    
    return 0;
}

static int nspire_keypad_open(struct input_dev *input)
{
    struct nspire_keypad *keypad = input_get_drvdata(input);
    int error;
    
    error = clk_prepare_enable(keypad->clk);
    if (error)
        return error;
    
    error = nspire_keypad_chip_init(keypad);
    if (error) {
        clk_disable_unprepare(keypad->clk);
        return error;
    }
    return 0;
}

#define -155,6 +137,11 @@
struct nspire_keypad *keypad = input_get_drvdata(input);

/* Disable interrupts */
+writel(0, keypad->reg_base + KEYPAD_INTMSK);
/* Acknowledge existing interrupts */
+writel(~0, keypad->reg_base + KEYPAD_INT);
+
clk_disable_unprepare(keypad->clk);
}

@@ -215,6 +202,25 @@
return -ENOMEM;
}

+error = clk_prepare_enable(keypad->clk);
+if (error) {
+dev_err(&pdev->dev, "failed to enable clock\n");
+return error;
+}
+
+/* Disable interrupts */
+writel(0, keypad->reg_base + KEYPAD_INTMSK);
+/* Acknowledge existing interrupts */
+writel(~0, keypad->reg_base + KEYPAD_INT);
+
+/* Disable GPIO interrupts to prevent hanging on touchpad */
+/* Possibly used to detect touchpad events */
+writel(0, keypad->reg_base + KEYPAD_UNKNOWN_INT);
+/* Acknowledge existing GPIO interrupts */
+writel(~0, keypad->reg_base + KEYPAD_UNKNOWN_INT_STS);
+
+clk_disable_unprepare(keypad->clk);
+
input_set_drvdata(input, keypad);

input->id.bustype = BUS_HOST;
--- linux-4.15.0.orig/drivers/input/keyboard/omap4-keypad.c
+++ linux-4.15.0/drivers/input/keyboard/omap4-keypad.c
@@ -60,8 +60,18 @@
/* OMAP4 values */
#define OMAP4_VAL_IRQDISABLE	0x0
#define OMAP4_VAL_DEBOUNCINGTIME	0x7
#define OMAP4_VAL_PVT		0x7
+/
+/* OMP4 values */
+#define OMAP4_VAL_IRQDISABLE0x0
-#define OMAP4_VAL_DEBOUNCINGTIME0x7
-#define OMAP4_VAL_PVT0x7
+
+/* Errata i689: If a key is released for a time shorter than debounce time,
+ the keyboard will idle and never detect the key release. The workaround
/* is to use at least a 12ms debounce time. See omap5432 TRM chapter
 */
+#define OMAP4_KEYPAD_PTV_DIV_128 0x6
+#define OMAP4_KEYPAD_DEBOUNCINGTIME_MS(dbms, ptv) \ 
+(((dbms) * 1000) / ((1 << ((ptv) + 1)) * (1000000 / 32768))) - 1)
+#define OMAP4_VAL_DEBOUNCINGTIME_16MS
+OMAP4_KEYPAD_DEBOUNCINGTIME_MS(16, OMAP4_KEYPAD_PTV_DIV_128)

enum {
  KBD_REVISION_OMAP4 = 0,
  @@ -116,12 +126,8 @@
  
  struct omap4_keypad *keypad_data = dev_id;

  -if (kbd_read_irqreg(keypad_data, OMAP4_KBD_IRQSTATUS)) {
  -/* Disable interrupts */
  -kbd_write_irqreg(keypad_data, OMAP4_KBD_IRQENABLE, 
  - OMAP4_DEF_IRQENABLE_EVENTEN | 
  - OMAP4_DEF_IRQENABLE_LONGKEY);
  +if (kbd_read_irqreg(keypad_data, OMAP4_KBD_IRQSTATUS))
  return IRQ_WAKE_THREAD;
  -}

  return IRQ_NONE;
  }
@@ -163,11 +169,6 @@
  
  kbd_write_irqreg(keypad_data, OMAP4_KBD_IRQENABLE, 
  OMAP4_DEF_IRQENABLE_EVENTEN | 
  OMAP4_DEF_IRQENABLE_LONGKEY);
  -
  return IRQ_HANDLED;
  }

@@ -181,9 +182,9 @@
  
  kbd_writel(keypad_data, OMAP4_KBD_CTRL, 
  OMAP4_DEF_CTRL_NOSOFTMODE | 
  -(OMAP4_VAL_PVT << OMAP4_DEF_CTRL_PTV_SHIFT));
  +(OMAP4_KEYPAD_PTV_DIV_128 << OMAP4_DEF_CTRL_PTV_SHIFT));
  kbd_writel(keypad_data, OMAP4_KBD_DEBOUNCINGTIME, 
  OMAP4_VAL_DEBOUNCINGTIME);
  +OMAP4_VAL_DEBOUNCINGTIME_16MS);
  /* clear pending interrupts */
  kbd_write_irqreg(keypad_data, OMAP4_KBD_IRQSTATUS, 

kbd_read_irqreg(keypad_data, OMAP4_KBD_IRQSTATUS));
@@ -198,20 +199,25 @@
return 0;
}

-static void omap4_keypad_close(struct input_dev *input)
+static void omap4_keypad_stop(struct omap4_keypad *keypad_data)
{
-struct omap4_keypad *keypad_data = input_get_drvdata(input);
-}
-disable_irq(keypad_data->irq);

-/* Disable interrupts */
+/* Disable interrupts and wake-up events */
kbd_write_irqreg(keypad_data, OMAP4_KBD_IRQENABLE, OMAP4_VAL_IRQDISABLE);
+kbd_writel(keypad_data, OMAP4_KBD_WAKEUPENABLE, 0);

/* clear pending interrupts */
kbd_write_irqreg(keypad_data, OMAP4_KBD_IRQSTATUS, kbd_read_irqreg(keypad_data, OMAP4_KBD_IRQSTATUS));
+
+*static void omap4_keypad_close(struct input_dev *input)
+{
+struct omap4_keypad *keypad_data;

+keypad_data = input_get_drvdata(input);
+disable_irq(keypad_data->irq);
+omap4_keypad_stop(keypad_data);
+enable_irq(keypad_data->irq);

pm_runtime_put_sync(input->dev.parent);
@@ -234,13 +240,37 @@
return 0;
}

+static int omap4_keypad_check_revision(struct device *dev,
+    struct omap4_keypad *keypad_data)
+{
+unsigned int rev;
+
+rev = __raw_readl(keypad_data->base + OMAP4_KBD_REVISION);
+rev &= 0x03 << 30;
+rev >>= 30;
+switch (rev) {
+case KBD_REVISION_OMAP4:
+keypad_data->reg_offset = 0x00;
+keypad_data->irqreg_offset = 0x00;
+break;
+case KBD_REVISION_OMAP5:
+keypad_data->reg_offset = 0x10;
+keypad_data->irqreg_offset = 0x0c;
+break;
+default:
+dev_err(dev, "Keypad reports unsupported revision %d", rev);
+return -EINVAL;
+
+return 0;
+
+static int omap4_keypad_probe(struct platform_device *pdev)
{
  struct omap4_keypad *keypad_data;
  struct input_dev *input_dev;
  struct resource *res;
  unsigned int max_keys;
  int rev;
  int irq;
  int error;

  irq = platform_get_irq(pdev, 0);
  -if (!irq) {
    -dev_err(&pdev->dev, "no keyboard irq assigned\n");
    -return -EINVAL;
  -}
  +if (irq < 0)
  +return irq;

  keypad_data = kzalloc(sizeof(struct omap4_keypad), GFP_KERNEL);
  if (!keypad_data) {
    goto err_release_mem;
  }
  pm_runtime_enable(&pdev->dev);

  /*
   * Enable clocks for the keypad module so that we can read
   * revision register.
   */
  -pm_runtime_enable(&pdev->dev);
error = pm_runtime_get_sync(&pdev->dev);
if (error) {
    dev_err(&pdev->dev, "pm_runtime_get_sync() failed\n");
    goto err_unmap;
}

-rev = __raw_readl(keypad_data->base + OMAP4_KBD_REVISION);
-rev &= 0x03 << 30;
-rev >>= 30;
-switch (rev) {
    case KBD_REVISION_OMAP4:
        keypad_data->reg_offset = 0x00;
        keypad_data->irqreg_offset = 0x00;
        break;
    case KBD_REVISION_OMAP5:
        keypad_data->reg_offset = 0x10;
        keypad_data->irqreg_offset = 0x0c;
        break;
    default:
        dev_err(&pdev->dev,
                 "Keypad reports unsupported revision %d", rev);
        error = -EINVAL;
        goto err_pm_put_sync;
} else {
    +pm_runtime_put_noidle(&pdev->dev);
    +error = omap4_keypad_check_revision(&pdev->dev,
            keypad_data);
    +if (!error) {
        kepmap4 keybd_stop(keypad_data);
        +pm_runtime_put_sync(&pdev->dev);
    }
    +if (error)
        goto err_pm_disable;
     goto err_pm_disable;
}

/* input device allocation */
keypad_data->input = input_dev = input_allocate_device();
if (!input_dev) {
    error = -ENOMEM;
    goto err_smsput_sync;
}

input_dev->name = pdev->name;
@ @ -354.35 +374.32 @ @
}

error = request_threaded_irq(keypad_data->irq, omap4_keypad_irq_handler,
omap4_keypad_irq_thread_fn, 0,
 omap4_keypad_irq_thread_fn, IRQF_ONESHOT,
 "omap4-keypad", keypad_data);
if (error) {
 dev_err(&pdev->dev, "failed to register interrupt
");
goto err_free_keymap;
}

-device_init_wakeup(&pdev->dev, true);
-pm_runtime_put_sync(&pdev->dev);
-
error = input_register_device(keypad_data->input);
if (error < 0) {
 dev_err(&pdev->dev, "failed to register input device\n");
-goto err_pm_disable;
+goto err_free_irq;
}

+device_init_wakeup(&pdev->dev, true);
platform_set_drvdata(pdev, keypad_data);
+
return 0;

-err_pm_disable:
-err_free_irq:
fine_irq(keypad_data->irq, keypad_data);
err_free_keymap:
kfree(keypad_data->keymap);
err_free_input:
input_free_device(input_dev);
-err_pm_put_sync:
-pm_runtime_put_sync(&pdev->dev);
-err_unmap:
+err_pm_disable:
+pm_runtime_disable(&pdev->dev);
iounmap(keypad_data->base);
er_runlease_mem:
release_mem_region(res->start, resource_size(res));
--- linux-4.15.0.orig/drivers/input/keyboard/snvs_pwrkey.c
+++ linux-4.15.0/drivers/input/keyboard/snvs_pwrkey.c
@@ -155,6 +155,9 @@
return error;
}
+pdata->input = input;
+platform_set_drvdata(pdev, pdata);
+

error = devm_request_irq(&pdev->dev, pdata->irq, 
    imx_snvs_pwrkey_interrupt, 
    0, pdev->name, pdev);
@@ -170,9 +173,6 @@
return error;
}
-pdata->input = input;
-platform_set_drvdata(pdev, pdata);
-
device_init_wakeup(&pdev->dev, pdata->wakeup);

return 0;
--- linux-4.15.0.orig/drivers/input/keyboard/st-keyscan.c
+++ linux-4.15.0/drivers/input/keyboard/st-keyscan.c
@@ -153,6 +153,8 @@
input_dev->id.bustype = BUS_HOST;
+
+keypad_data->input_dev = input_dev;
+
error = keypad_matrix_key_parse_dt(keypad_data);
if (error)
return error;
@@ -168,8 +170,6 @@
input_set_drvdata(input_dev, keypad_data);
-
-keypad_data->input_dev = input_dev;
-
res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
keypad_data->base = devm_ioremap_resource(&pdev->dev, res);
if (IS_ERR(keypad_data->base))
--- linux-4.15.0.orig/drivers/input/keyboard/sunkbd.c
+++ linux-4.15.0/drivers/input/keyboard/sunkbd.c
@@ -115,7 +115,8 @@
switch (data) {
    case SUNKBD_RET_RESET:
        -schedule_work(&sunkbd->tq);
+if (sunkbd->enabled)
+    -schedule_work(&sunkbd->tq);
        sunkbd->reset = -1;
break;

@@ -216,16 +217,12 @@
}
/*
  * sunkbd_reinit() sets leds and beeps to a state the computer remembers they
  * were in.
  * sunkbd_set_leads_beeps() sets leds and beeps to a state the computer remembers
  * they were in.
  */

- static void sunkbd_reinit(struct work_struct *work)
+ static void sunkbd_set_leads_beeps(struct sunkbd *sunkbd)
{
- struct sunkbd *sunkbd = container_of(work, struct sunkbd, tq);
- serio_write(sunkbd->serio, SUNKBD_CMD_SETLED);
- serio_write(sunkbd->serio, (!test_bit(LED_CAPSL, sunkbd->dev->led) << 3) |
- SUNKBD_CMD_BELLOFF - !!test_bit(SND_BELL, sunkbd->dev->snd));
}
+
+ /*
+ * sunkbd_reinit() wait for the keyboard reset to complete and restores state
+ * of leds and beeps.
+ */
+
+ static void sunkbd_reinit(struct work_struct *work)
+ {
+ struct sunkbd *sunkbd = container_of(work, struct sunkbd, tq);
+
+/*
+ * It is OK that we check sunkbd->enabled without pausing serio,
+ * as we only want to catch true->false transition that will
+ * happen once and we will be woken up for it.
+ */
+ wait_event_interruptible_timeout(sunkbd->wait, sunkbd->reset >= 0, HZ);
+ if (sunkbd->reset >= 0 && sunkbd->enabled)
+ sunkbd_set_leads_beeps(sunkbd);
+
static void sunkbd_enable(struct sunkbd *sunkbd, bool enable)
{ serio_pause_rx(sunkbd->serio);
sunkbd->enabled = enable;
serio_continue_rx(sunkbd->serio);
+
+if (!enable) {
+wake_up_interruptible(&sunkbd->wait);
+cancel_work_sync(&sunkbd->tq);
+}
}

/*
--- linux-4.15.0.orig/drivers/input/keyboard/twl4030_keypad.c
+++ linux-4.15.0/drivers/input/keyboard/twl4030_keypad.c
@@ -63,7 +63,7 @@
     bool		autorepeat;
     unsigned int	n_rows;
     unsigned int	n_cols;
-    unsigned int	irq;
+    int		irq;
struct device *dbg_dev;
struct input_dev *input;
@@ -389,10 +389,8 @@
 }

kp->irq = platform_get_irq(pdev, 0);
-if (!kp->irq) {
-dev_err(&pdev->dev, "no keyboard irq assigned
-  return -EINVAL;
-}
+if (kp->irq < 0)
+    return kp->irq;

error = matrix_keypad_build_keymap(keymap_data, NULL,
    TWL4030_MAX_ROWS,
--- linux-4.15.0.orig/drivers/input/misc/adxl34x.c
+++ linux-4.15.0/drivers/input/misc/adxl34x.c
@@ -696,7 +696,7 @@
     struct input_dev *input_dev;
     const struct adxl34x_platform_data *pdata;
     int err, range, i;
-    unsigned char revid;
+    int revid;

if (!irq) {
    dev_err(dev, "no IRQ?
--- linux-4.15.0.orig/drivers/input/misc/bma150.c
+++ linux-4.15.0/drivers/input/misc/bma150.c
@@ -481,13 +481,14 @@
     idev->close = bma150_irq_close;

if (!irq) {
    dev_err(dev, "no IRQ?\n");
input_set_drvdata(idev, bma150);

+bma150->input = idev;
+
error = input_register_device(idev);
if (error) {
    input_free_device(idev);
    return error;
}

-bma150->input = idev;
return 0;
}

@@ -510,15 +511,15 @@

bma150_init_input_device(bma150, ipoll_dev->input);

+bma150->input_polled = ipoll_dev;
+bma150->input = ipoll_dev->input;
+
error = input_register_polled_device(ipoll_dev);
if (error) {
    input_free_polled_device(ipoll_dev);
    return error;
}

-bma150->input_polled = ipoll_dev;
-bma150->input = ipoll_dev->input;
-
return 0;
}

--- linux-4.15.0.orig/drivers/input/misc/cm109.c
+++ linux-4.15.0/drivers/input/misc/cm109.c
@@ -571,12 +571,15 @@

dev->ctl_data->byte[HID_OR2] = dev->keybit;

dev->ctl_data->byte[HID_OR3] = 0x00;

+dev->ctl_urb_pending = 1;
error = usb_submit_urb(dev->urb_ctl, GFP_KERNEL);
-if (error)
+if (error) {
+    dev->ctl_urb_pending = 0;
    dev_err(&dev->intf->dev, "%s: usb_submit_urb (urb_ctl) failed %d\n", 
__func__, error);
-} else
+} else {


dev->open = 1;
+
mutex_unlock(&dev->pm_mutex);

--- linux-4.15.0.orig/drivers/input/misc/da9063_onkey.c
+++ linux-4.15.0/drivers/input/misc/da9063_onkey.c
@@ -248,10 +248,7 @@
onkey->input->phys = onkey->phys;
onkey->input->dev.parent = &pdev->dev;
   
-if (onkey->key_power)
-  input_set_capability(onkey->input, EV_KEY, KEY_POWER);
-
- input_set_capability(onkey->input, EV_KEY, KEY_SLEEP);
+input_set_capability(onkey->input, EV_KEY, KEY_POWER);

INIT_DELAYED_WORK(&onkey->work, da9063_poll_on);

--- linux-4.15.0.orig/drivers/input/misc/keyspan_remote.c
+++ linux-4.15.0/drivers/input/misc/keyspan_remote.c
@@ -344,7 +344,8 @@
int retval = 0;

retval = usb_control_msg(dev, usb_sndctrlpipe(dev, 0), 
- 0x11, 0x40, 0x5601, 0x0, NULL, 0, 0);
+ 0x11, 0x40, 0x5601, 0x0, NULL, 0,
+  USB_CTRL_SET_TIMEOUT);
   if (retval) {
     dev_dbg(&dev->dev, "%s - failed to set bit rate due to error: %d\n", __func__, retval);
     @@ -352,7 +353,8 @@
   }

retval = usb_control_msg(dev, usb_sndctrlpipe(dev, 0),
-  0x44, 0x40, 0x0, 0x0, NULL, 0, 0);
+  0x44, 0x40, 0x0, 0x0, NULL, 0,
+  USB_CTRL_SET_TIMEOUT);
   if (retval) {
     dev_dbg(&dev->dev, "%s - failed to set resume sensitivity due to error: %d\n", __func__, retval);
     @@ -360,7 +362,8 @@
   }

retval = usb_control_msg(dev, usb_sndctrlpipe(dev, 0),
-  0x22, 0x40, 0x0, 0x0, NULL, 0, 0);
+  0x22, 0x40, 0x0, 0x0, NULL, 0,
+  USB_CTRL_SET_TIMEOUT);
if (retval) {
    dev_dbg(&dev->dev, "%s - failed to turn receive on due to error: %d\n",
            __func__, retval);
--- linux-4.15.0.orig/drivers/input/misc/pm8xxx-vibrator.c
+++ linux-4.15.0/drivers/input/misc/pm8xxx-vibrator.c
@@ -98,7 +98,7 @@
if (regs->enable_mask)
    rc = regmap_update_bits(vib->regmap, regs->enable_addr,
-       on ? regs->enable_mask : 0, val);
+       regs->enable_mask, on ? ~0 : 0);
    return rc;
}
--- linux-4.15.0.orig/drivers/input/misc/pwm-vibra.c
+++ linux-4.15.0/drivers/input/misc/pwm-vibra.c
@@ -34,6 +34,7 @@
   struct work_struct play_work;
   u16 level;
   u32 direction_duty_cycle;
+   bool vcc_on;
};

static int pwm_vibrator_start(struct pwm_vibrator *vibrator)
@@ -42,10 +43,13 @@
   struct pwm_state state;
   int err;
   -err = regulator_enable(vibrator->vcc);
-   if (err) {
-      dev_err(pdev, "failed to enable regulator: %d", err);
-      return err;
+   if (!vibrator->vcc_on) {
+      err = regulator_enable(vibrator->vcc);
+      if (err) {
+         dev_err(pdev, "failed to enable regulator: %d", err);
+         return err;
+      }
+      vibrator->vcc_on = true;
+   }

   pwm_get_state(vibrator->pwm, &state);
@@ -76,11 +80,14 @@

 static void pwm_vibrator_stop(struct pwm_vibrator *vibrator)
 { }
   -regulator_disable(vibrator->vcc);
-
if (vibrator->pwm_dir)
pwm_disable(vibrator->pwm_dir);

if (vibrator->pwm)
pwm_disable(vibrator->pwm);

if (vibrator->vcc_on) {
    regulator_disable(vibrator->vcc);
    vibrator->vcc_on = false;
}
}

static void pwm_vibrator_play_work(struct work_struct *work)

--- linux-4.15.0.orig/drivers/input/misc/uinput.c
+++ linux-4.15.0/drivers/input/misc/uinput.c
@@ -32,6 +32,7 @@

*/
#include <uapi/linux/uinput.h>
#include <linux/overflow.h>
#include <linux/poll.h>
#include <linux/sched.h>
#include <linux/slab.h>
@@ -402,7 +403,7 @@
static int uinput_validate_absinfo(struct input_dev *dev, unsigned int code,
    const struct input_absinfo *abs)
{
    int min, max;
+    int min, max, range;
    min = abs->minimum;
    max = abs->maximum;
    return -EINVAL;
}

@if (abs->flat > max - min) {
+if (!check_sub_overflow(max, min, &range) && abs->flat > range) {
    printk(KERN_DEBUG
        "%s: abs_flat #%02x out of range: %d (min:%d/max:%d)\n",
        UINPUT_NAME, code, abs->flat, min, max);
    return -EINVAL;
}

ifdef CONFIG_COMPAT

#define UI_SET_PHYS_COMPAT	_IOW(UINPUT_IOCTL_BASE, 108, compat_uptr_t)
+*/
+ * These IOCTLs change their size and thus their numbers between
+ * 32 and 64 bits.
+ */
```c
#define UI_SET_PHYS_COMPAT   
  _IOW(UINPUT_IOCTL_BASE, 108, compat_uptr_t)
#define UI_BEGIN_FF_UPLOAD_COMPAT
  _IOWR(UINPUT_IOCTL_BASE, 200, struct uinput_ff_upload_compat)
#define UI_END_FF_UPLOAD_COMPAT   
  _IOW(UINPUT_IOCTL_BASE, 201, struct uinput_ff_upload_compat)

static long uinput_compat_ioctl(struct file *file, 
  unsigned int cmd, unsigned long arg)
{
  if (cmd == UI_SET_PHYS_COMPAT)
    switch (cmd) {
    case UI_SET_PHYS_COMPAT:
      cmd = UI_SET_PHYS;
      break;
    case UI_BEGIN_FF_UPLOAD_COMPAT:
      cmd = UI_BEGIN_FF_UPLOAD;
      break;
    case UI_END_FF_UPLOAD_COMPAT:
      cmd = UI_END_FF_UPLOAD;
      break;
    }
  return uinput_ioctl_handler(file, cmd, arg, compat_ptr(arg));
}

-- linux-4.15.0.orig/drivers/input/misc/xen-kbdfront.c
+++ linux-4.15.0/drivers/input/misc/xen-kbdfront.c
@@ -229,7 +229,7 @@
 }
}

touch = xenbus_read_unsigned(dev->nodename, 
+touch = xenbus_read_unsigned(dev->otherend, 
  XENKBD_FIELD_FEAT_MTOUCH, 0);
if (touch) {
  ret = xenbus_write(XBT_NIL, dev->nodename, 
- @ @ -304,13 +304,13 @ @
  if (!mtouch)
    goto error_nomem;
	num_cont = xenbus_read_unsigned(info->xbdev->nodename, 
+num_cont = xenbus_read_unsigned(info->xbdev->otherend, 
  XENKBD_FIELD_MT_NUM_CONTACTS, 1);
  width = xenbus_read_unsigned(info->xbdev->nodename, 
+width = xenbus_read_unsigned(info->xbdev->otherend, 
    XENKBD_FIELD_MT_WIDTH, 
    XENFB_WIDTH);
```

height = xenbus_read_unsigned(info->xbdev->nodename,
   XENKBD_FIELD_MT_HEIGHT,
   XENFB_HEIGHT);

--- linux-4.15.0.orig/drivers/input/mouse/alps.c
+++ linux-4.15.0/drivers/input/mouse/alps.c
@@ -24,6 +24,7 @@
 #include "psmouse.h"
 #include "alps.h"
 +#include "trackpoint.h"

 /*
  * Definitions for ALPS version 3 and 4 command mode protocol
@@ -2544,13 +2545,31 @@
 }}
 static int alps_update_dual_info_ss4_v2(unsigned char otp[][4],
   struct alps_data *priv)
+struct alps_data *priv,
+struct psmouse *psmouse)
 {
   bool is_dual = false;
+int reg_val = 0;
+struct ps2dev *ps2dev = &psmouse->ps2dev;
-
-if (IS_SS4PLUS_DEV(priv->dev_id))
+if (IS_SS4PLUS_DEV(priv->dev_id)) {
   is_dual = (otp[0][0] >> 4) & 0x01;
   if (!is_dual) {
     /* For support TrackStick of Thinkpad L/E series */
+if (alps_exit_command_mode(psmouse) == 0 &&
+alps_enter_command_mode(psmouse) == 0) {
+reg_val = alps_command_mode_read_reg(psmouse,
+0xD7);
+}
+alps_exit_command_mode(psmouse);
+ps2_command(ps2dev, NULL, PSMOUSE_CMD_ENABLE);
+if (reg_val == 0x0C || reg_val == 0x1D)
+is_dual = true;
+}
+}
+if (is_dual)
priv->flags |= ALPS_DUALPOINT |
ALPS_DUALPOINT_WITH_PRESSURE;
@@ -2573,7 +2592,7 @@
 alps_update_btn_info_ss4_v2(otp, priv);

-alps_update_dual_info_ss4_v2(otp, priv);
+alps_update_dual_info_ss4_v2(otp, priv, psmouse);

 return 0;
 }
@@ -2842,6 +2861,23 @@ return NULL;
 }

+static bool alps_is_cs19_trackpoint(struct psmouse *psmouse)
+{
+u8 param[2] = { 0 };
+
+if (ps2_command(&psmouse->ps2dev,
+param, MAKE_PS2_CMD(0, 2, TP_READ_ID)))
+return false;
+
+/*
+ * param[0] contains the trackpoint device variant_id while
+ * param[1] contains the firmware_id. So far all alps
+ * trackpoint-only devices have their variant_ids equal
+ * TP_VARIANT_ALPS and their firmware_ids are in 0x20~0x2f range.
+ */
+return param[0] == TP_VARIANT_ALPS && ((param[1] & 0xf0) == 0x20);
+
}

static int alps_identify(struct psmouse *psmouse, struct alps_data *priv)
{
const struct alps_protocol_info *protocol;
@@ -3143,6 +3179,20 @@ return error;
/*
 * ALPS cs19 is a trackpoint-only device, and uses different
 * protocol than DualPoint ones, so we return -EINVAL here and let
 * trackpoint.c drive this device. If the trackpoint driver is not
 * enabled, the device will fall back to a bare PS/2 mouse.
 * If ps2_command() fails here, we depend on the immediately
 * followed psmouse_reset() to reset the device to normal state.
 */
+if (alps_is_cs19_trackpoint(psmouse)) {
+psmouse_dbg(psmouse,
+  "ALPS CS19 trackpoint-only device detected, ignoring\n");
return -EINVAL;
+
+/*
 * Reset the device to make sure it is fully operational:
 * on some laptops, like certain Dell Latitudes, we may
 * fail to properly detect presence of trackstick if device
--- linux-4.15.0.orig/drivers/input/mouse/cyapa_gen6.c
+++ linux-4.15.0/drivers/input/mouse/cyapa_gen6.c
@@ -573,7 +573,7 @@
 memset(&cmd, 0, sizeof(cmd));
 put_unaligned_le16(PIP_OUTPUT_REPORT_ADDR, &cmd.head.addr);
 -put_unaligned_le16(sizeof(cmd), &cmd.head.length - 2);
+put_unaligned_le16(sizeof(cmd) - 2, &cmd.head.length);
 cmd.head.report_id = PIP_APP_CMD_REPORT_ID;
 cmd.head.cmd_code = PIP_RETRIEVE_DATA_STRUCTURE;
 put_unaligned_le16(read_offset, &cmd.read_offset);
--- linux-4.15.0.orig/drivers/input/mouse/cypress_ps2.c
+++ linux-4.15.0/drivers/input/mouse/cypress_ps2.c
@@ -390,7 +390,9 @@
 if (ret < 0)
 return ret;

+if ( CYPRESS_SIMULATED_MT != 1 )
+  __set_bit(INPUT_PROP_SEMI_MT, input->propbit);
+endif

input_abs_set_res(input, ABS_X, cytp->tp_res_x);
input_abs_set_res(input, ABS_Y, cytp->tp_res_y);
@@ -476,6 +478,22 @@
((packet[5] & 0x0f) << 8) | packet[7];
if (cytp->mode & CYTP_BIT_ABS_PRESSURE)
  report_data->contacts[1].z = report_data->contacts[0].z;
+if ( CYPRESS_SIMULATED_MT == 1 )
+/* simulate contact positions for >2 fingers */
+if ( report_data->contact_cnt >= 3 ) {
+  int i;
+  for ( i=1; i<report_data->contact_cnt; i++ ) {
+    report_data->contacts[i].x =
+    report_data->contacts[0].x
+    + 100*(i%2?-1:1);
+    report_data->contacts[i].y =
+    report_data->contacts[0].y;
+    if (cytp->mode & CYTP_BIT_ABS_PRESSURE)
+      report_data->contacts[i].z =
+      report_data->contacts[0].z;
+  }
report_data->left = (header_byte & BTN_LEFT_BIT) ? 1 : 0;
--- linux-4.15.0.orig/drivers/input/mouse/cypress_ps2.h
+++ linux-4.15.0/drivers/input/mouse/cypress_ps2.h
@@ -131,7 +131,18 @@
#define RESP_REMOTE_BIT     0x40
#define RESP_SMBUS_BIT      0x80
-#define CYTP_MAX_MT_SLOTS 2
+/*
+ * CYPRESS_SIMULATED_MT
+ *     set to 1 for simulated multitouch (up to 5 contact points)
+ *     set to 0 for SEMI_MT (only 2 corner points, and count of fingers)
+ */
+#define CYPRESS_SIMULATED_MT 1
+
+#if ( CYPRESS_SIMULATED_MT == 1 )
+# define CYTP_MAX_MT_SLOTS 5
+#else
+# define CYTP_MAX_MT_SLOTS 2
+#endif

struct cytp_contact {
int x;
--- linux-4.15.0.orig/drivers/input/mouse/elan_i2c.h
+++ linux-4.15.0/drivers/input/mouse/elan_i2c.h
@@ -27,6 +27,8 @@
#define ETP_DISABLE_POWER	0x0001
#define ETP_PRESSURE_OFFSET	25
+#define ETP_CALIBRATE_MAX_LEN	3
+
/* IAP Firmware handling */
#define ETP_PRODUCT_ID_FORMAT_STRING	"%d.0"
#define ETP_FW_NAME		"elan_i2c_" ETP_PRODUCT_ID_FORMAT_STRING ".bin"
--- linux-4.15.0.orig/drivers/input/mouse/elan_i2c_core.c
+++ linux-4.15.0/drivers/input/mouse/elan_i2c_core.c
@@ -36,6 +36,7 @@
#include <linux/jiffies.h>
#include <linux/completion.h>
#endif
#include <linux/of.h>
+#include <linux/input/elan-i2c-ids.h>
#include <linux/regulated/consumer.h>
#include <asm/unaligned.h>

int tries = 20;
int retval;
int error;
-u8 val[3];
+u8 val[ETP_CALIBRATE_MAX_LEN];

retval = mutex_lock_interruptible(&data->sysfs_mutex);
if (retval)
@@ -1252,20 +1253,6 @@
MODULE_DEVICE_TABLE(i2c, elan_id);

#ifdef CONFIG_ACPI
-static const struct acpi_device_id elan_acpi_id[] = {
-    "ELAN0000", 0,
-    "ELAN0100", 0,
-    "ELAN0600", 0,
-    "ELAN0602", 0,
-    "ELAN0605", 0,
-    "ELAN0608", 0,
-    "ELAN0609", 0,
-    "ELAN060B", 0,
-    "ELAN060C", 0,
-    "ELAN0611", 0,
-    "ELAN1000", 0,
-};
-MODULE_DEVICE_TABLE(acpi, elan_acpi_id);
#endif
--- linux-4.15.0.orig/drivers/input/mouse/elan_i2c_smbus.c
+++ linux-4.15.0/drivers/input/mouse/elan_i2c_smbus.c
@@ -56,7 +56,7 @@
static int elan_smbus_initialize(struct i2c_client *client)
{
    u8 check[ETP_SMBUS_HELLOPACKET_LEN] = { 0x55, 0x55, 0x55, 0x55, 0x55 };
-    u8 values[ETP_SMBUS_HELLOPACKET_LEN] = { 0, 0, 0, 0, 0 };
+    u8 values[I2C_SMBUS_BLOCK_MAX] = {0};
    int len, error;

    /* Get hello packet */
    @@ -117,12 +117,16 @@
    static int elan_smbus_calibrate_result(struct i2c_client *client, u8 *val)
    {
        int error;
        +u8 buf[I2C_SMBUS_BLOCK_MAX] = {0};
        +BUILD_BUG_ON(ETP_CALIBRATE_MAX_LEN > sizeof(buf));
error = i2c_smbus_read_block_data(client,
    - ETP_SMBUS_CALIBRATE_QUERY, val);
+ ETP_SMBUS_CALIBRATE_QUERY, buf);
if (error < 0)
    return error;

+memcpy(val, buf, ETP_CALIBRATE_MAX_LEN);
return 0;
}

@@ -130,7 +134,7 @@
bool max_baseline, u8 *value)
{
    int error;
-    u8 val[3];
+    u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    error = i2c_smbus_read_block_data(client,
        max_baseline ?
@@ -149,7 +153,7 @@
bool iap, u8 *version)
{
    int error;
-    u8 val[3];
+    u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    error = i2c_smbus_read_block_data(client,
        iap ? ETP_SMBUS_IAP_VERSION_CMD :
@@ -170,7 +174,7 @@
u8 *clickpad)
{
    int error;
-    u8 val[3];
+    u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    error = i2c_smbus_read_block_data(client,
        ETP_SMBUS_SM_VERSION_CMD, val);
@@ -188,7 +192,7 @@
static int elan_smbus_get_product_id(struct i2c_client *client, u16 *id)
{
    int error;
-    u8 val[3];
+    u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    error = i2c_smbus_read_block_data(client,
        ETP_SMBUS_UNIQUEID_CMD, val);
bool iap, u16 *csum)
{
    int error;
    -u8 val[3];
+u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    error = i2c_smbus_read_block_data(client,
        iap ? ETP_SMBUS_FW_CHECKSUM_CMD :
        @ @ -226,7 +230,7 @ @
    {
        int ret;
        int error;
    -u8 val[3];
+u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    ret = i2c_smbus_read_block_data(client, ETP_SMBUS_RANGE_CMD, val);
    if (ret != 3) {
        @ @ -246,7 +250,7 @ @
    {
        int ret;
        int error;
    -u8 val[3];
+u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    ret = i2c_smbus_read_block_data(client, ETP_SMBUS_RESOLUTION_CMD, val);
    if (ret != 3) {
        @ @ -267,7 +271,7 @ @
    {
        int ret;
        int error;
    -u8 val[3];
+u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    ret = i2c_smbus_read_block_data(client, ETP_SMBUS_XY_TRACENUM_CMD, val);
    if (ret != 3) {
        @ @ -294,7 +298,7 @ @
    {
        int error;
        u16 constant;
    -u8 val[3];
+u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

    error = i2c_smbus_read_block_data(client, ETP_SMBUS_IAP_CTRL_CMD, val);
    if (error < 0) {
        @ @ -345,7 +349,7 @ @
        int len;
        int error;
        enum tp_mode mode;
u8 val[3];
+u8 val[I2C_SMBUS_BLOCK_MAX] = {0};
u8 cmd[4] = {0x0F, 0x78, 0x00, 0x06};
u16 password;

@@ -419,7 +423,7 @@
struct device *dev = &client->dev;
int error;
+u8 val[3];
+u8 val[I2C_SMBUS_BLOCK_MAX] = {0};

/*
 * Due to the limitation of smbus protocol limiting
@@ -472,6 +476,8 @@
len = i2c_smbus_read_block_data(client,
ETP_SMBUS_PACKET_QUERY,
&report[ETP_SMBUS_REPORT_OFFSET]);
--- linux-4.15.0.orig/drivers/input/mouse/elantech.c
+++ linux-4.15.0/drivers/input/mouse/elantech.c
@@ -804,7 +804,7 @@
else if (ic_version == 7 && etd->samples[1] == 0x2A)
    sanity_check = ((packet[3] & 0x1c) == 0x10);
else
    -sanity_check = ((packet[0] & 0x0c) == 0x04 &&
+sanity_check = ((packet[0] & 0x08) == 0x00 &&
    (packet[3] & 0x1c) == 0x10);

if (!sanity_check)
@@ -1121,6 +1121,8 @@
* Asus UX31               0x361f00        20, 15, 0e      clickpad
* Asus UX32VD             0x361f02        00, 15, 0e      clickpad
* Avatar AVIU-145A2       0x361f00        ?               clickpad
+* Fujitsu CELSIUS H760   0x570f02        40, 14, 0c      3 hw buttons (**)
+* Fujitsu CELSIUS H780   0x5d0f02        41, 16, 0d      3 hw buttons (**)
* Fujitsu LIFEBOOK E544   0x470f00        d0, 12, 09      2 hw buttons
* Fujitsu LIFEBOOK E546   0x470f00        50, 12, 09      2 hw buttons
* Fujitsu LIFEBOOK E547   0x470f00        50, 12, 09      2 hw buttons
@@ -1173,10 +1175,28 @@
DMIMATCH(DMI_PRODUCT_NAME, "CELSIUS H760"),
],
],
+{
/* Fujitsu H780 also has a middle button */
.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "FUJITSU"),
+DMI_MATCH(DMI_PRODUCT_NAME, "CELSIUS H780"),
},
}
#endif
{

+static const char * const middle_button_pnp_ids[] = {
+"LEN2131", /* ThinkPad P52 w/ NFC */
+"LEN2132", /* ThinkPad P52 */
+"LEN2133", /* ThinkPad P72 w/ NFC */
+"LEN2134", /* ThinkPad P72 */
+"LEN0407",
+"LEN0408",
+"LEN040a",
+NULL
+};
+
/*
* Set the appropriate event bits for the input subsystem
*/
@@ -1196,7 +1216,8 @@
__clear_bit(EV_REL, dev->evbit);

__set_bit(BTN_LEFT, dev->keybit);
-if (dmi_check_system(elantech_dmi_has_middle_button))
+if (dmi_check_system(elantech_dmi_has_middle_button) ||
++psmouse_matches_pnp_id(psmouse, middle_button_pnp_ids))
__set_bit(BTN_MIDDLE, dev->keybit);
__set_bit(BTN_RIGHT, dev->keybit);

--- linux-4.15.0.org/drivers/input/mouse/psmouse-base.c
+++ linux-4.15.0/drivers/input/mouse/psmouse-base.c
@@ -975,6 +975,21 @@
psmouse->pt_deactivate = NULL;
}

+static bool psmouse_do_detect(int (*detect)(struct psmouse *, bool),
+    struct psmouse *psmouse, bool allow_passthrough,
+    bool set_properties)
+{
+if (psmouse->ps2dev.serio->id.type == SERIO_PS_PSTHRU &&
++  !allow_passthrough) {
+return false;
+}
+if (set_properties)
+psmouse_apply_defaults(psmouse);
+
+return detect(psmouse, set_properties) == 0;
+
+}
+
+static bool psmouse_try_protocol(struct psmouse *psmouse,
   enum psmouse_type type,
   unsigned int *max_proto,
   @ @ -986,15 +1001,8 @ @
if (!proto)
return false;

-if (psmouse->ps2dev.serio->id.type == SERIO_PS_PSTHRU &&
- !proto->try_passthru) {
-return false;
-}
-
-if (set_properties)
-psmouse_apply_defaults(psmouse);
-
-if (proto->detect(psmouse, set_properties) != 0)
+if (!psmouse_do_detect(proto->detect, psmouse, proto->try_passthru,
 + set_properties))
return false;

if (set_properties && proto->init && init_allowed) {
   @ @ -1027,8 +1035,8 @ @
   * Always check for focaltech, this is safe as it uses pnp-id
   * matching.
   */
-if (psmouse_try_protocol(psmouse, PSMOUSE_FOCALTECH,
   + &max_proto, set_properties, false)) {
+if (psmouse_do_detect(focaltech_detect,
   + psmouse, false, set_properties)) {
if (max_proto > PSMOUSE_IMEX &&
   IS_ENABLED(CONFIG_MOUSE_PS2_FOCALTECH) &&
   (!set_properties || focaltech_init(psmouse) == 0)) {
   @ @ -1074,8 +1082,8 @ @
   * probing for IntelliMouse.
   */
if (max_proto > PSMOUSE_PS2 &&
 - psmouse_try_protocol(psmouse, PSMOUSE_SYNAPTICS, &max_proto,
   - set_properties, false)) {
+ psmouse_do_detect(synaptics_detect,
 + psmouse, false, set_properties)) {
   synaptics_hardware = true;


if (max_proto > PS_MOUSE_IMEX) {
    return sprintf(buffer, "%s", psmouse_protocol_by_type(type)->name);
}

-- linux-4.15.0.orig/drivers/input/mouse/sentelic.c
+++ linux-4.15.0/drivers/input/mouse/sentelic.c
@@ -454,7 +454,7 @@
     fsp_reg_write_enable(psmouse, false);

     return count;
     +return retval;
 }

PS_MOUSE_DEFINE_WO_ATTR(setreg, S_IWUSR, NULL, fsp_attr_set_setreg);
-- linux-4.15.0.orig/drivers/input/mouse/synaptics.c
+++ linux-4.15.0/drivers/input/mouse/synaptics.c
@@ -99,9 +99,7 @@
     int synaptics_detect(struct psmouse *psmouse, bool set_properties)
     {
         struct ps2dev *ps2dev = &psmouse->ps2dev;
-        u8 param[4];
-        -param[0] = 0;
+        u8 param[4] = { 0 };

         ps2_command(ps2dev, param, PS_MOUSE_CMD_SETRES);
         ps2_command(ps2dev, param, PS_MOUSE_CMD_SETRES);
@@ -151,7 +151,6 @@
 "LEN0042", /* Yoga */
 "LEN0045",
 "LEN0047",
-"LEN0049",
 "LEN2000", /* S540 */
 "LEN2001", /* Edge E431 */
 "LEN2002", /* Edge E531 */
@@ -169,11 +166,32 @@
 static const char * const smbus_pnp_ids[] = {
     /* all of the topbuttonpad_pnp_ids are valid, we just add some extras */
-"LEN0048", /* X1 Carbon 3 */

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"LEN0046", /* X250 */
"LEN0048", /* X1 Carbon 3 */
"LEN0049", /* Yoga 11e */
"LEN004a", /* W541 */
"LEN005b", /* P50 */
"LEN005e", /* T560 */
"LEN006c", /* T470s */
"LEN007a", /* T470s */
"LEN0071", /* T480 */
"LEN0072", /* X1 Carbon Gen 5 (2017) - Elan/ALPS trackpoint */
"LEN0073", /* X1 Carbon 5 */
"LEN0091", /* X1 Carbon 6 */
"LEN0092", /* X1 Carbon 6 */
"LEN0093", /* T480 */
"LEN0096", /* X280 */
"LEN0097", /* X280 -> ALPS trackpoint */
"LEN0099", /* X1 Extreme 1st */
"LEN009b", /* T580 */
"LEN200f", /* T450s */
"LEN2018", /* T460p */
"LEN2044", /* L470 */
"LEN2054", /* E480 */
"LEN2055", /* E580 */
"SYN3052", /* HP EliteBook 840 G4 */
"SYN3221", /* HP 15-ay000 */
"SYN323d", /* HP Spectre X360 13-w013dx */
"SYN3257", /* HP Envy 13-ad105ng */
NULL
};

@@ -1281,6 +1299,16 @@
INPUT_MT_POINTER |
     (cr48_profile_sensor ?
INPUT_MT_TRACK | INPUT_MT_SEMI_MT));
+        */
    +        /* For semi-mt devices we send ABS_X/Y ourselves instead of
    +        input_mt_report_pointer_emulation. But
    +        input_mt_init_slots() resets the fuzz to 0, leading to a
    +        filtered ABS_MT_POSITION_X but an unfiltered ABS_X
    +        position. Let's re-initialize ABS_X/Y here.
    +        */
    +    if (!cr48_profile_sensor)
    +        set_abs_position_params(dev, &priv->info, ABS_X, ABS_Y);
}

if (SYN_CAP_PALMDETECT(info->capabilities))
--- linux-4.15.0.orig/drivers/input/mouse/trackpoint.c
static const char * const trackpoint_variants[] = {
    [TP_VARIANT_IBM] = "IBM",
    [TP_VARIANT_ALPS] = "ALPS",
    [TP_VARIANT_ELAN] = "Elan",
    [TP_VARIANT_NXP] = "NXP",
    [TP_VARIANT_JYT_SYNAPTICS] = "JYT_Synaptics",
    [TP_VARIANT_SYNAPTICS] = "Synaptics",
};

/*
   case TP_VARIANT_ALPS:
   case TP_VARIANT_ELAN:
   case TP_VARIANT_NXP:
   +case TP_VARIANT_JYT_SYNAPTICS:
   +case TP_VARIANT_SYNAPTICS:
   if (variant_id)
   *variant_id = param[0];
   if (firmware_id)
   --- linux-4.15.0.orig/drivers/input/mouse/trackpoint.h
   +++ linux-4.15.0/drivers/input/mouse/trackpoint.h
   @@ -27,10 +27,12 @@
   * 0x01 was the original IBM trackpoint, others implement very limited
   * subset of trackpoint features.
   */
#define TP_VARIANT_IBM 0x01
#define TP_VARIANT_ALPS 0x02
#define TP_VARIANT_ELAN 0x03
#define TP_VARIANT_NXP 0x04
#define TP_VARIANT_JYT_SYNAPTICS 0x05
#define TP_VARIANT_SYNAPTICS 0x06
/
   * Commands
   @@ -161,7 +163,8 @@
   ifdef CONFIG_MOUSE_PS2_TRACKPOINT

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int trackpoint_detect(struct psmouse *psmouse, bool set_properties);
#else
-inline int trackpoint_detect(struct psmouse *psmouse, bool set_properties)
+static inline int trackpoint_detect(struct psmouse *psmouse,
+    bool set_properties)
{
    return -ENOSYS;
}
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_2d_sensor.c
+++ linux-4.15.0/drivers/input/rmi4/rmi_2d_sensor.c
@@ -32,15 +32,15 @@
    if (obj->type == RMI_2D_OBJECT_NONE)
    return;

-if (axis_align->swap_axes)
-    swap(obj->x, obj->y);
-
-if (axis_align->flip_x)
-    obj->x = sensor->max_x - obj->x;
-
-if (axis_align->flip_y)
-    obj->y = sensor->max_y - obj->y;
+
+if (axis_align->swap_axes)
+    swap(obj->x, obj->y);
+
/*
   * Here checking if X offset or y offset are specified is
   * redundant. We just add the offsets or clip the values.
@@ -120,15 +120,15 @@
    x = min(RMI_2D_REL_POS_MAX, max(RMI_2D_REL_POS_MIN, (int)x));
    y = min(RMI_2D_REL_POS_MAX, max(RMI_2D_REL_POS_MIN, (int)y));

-if (axis_align->swap_axes)
-    swap(x, y);
-
-if (axis_align->flip_x)
-    x = min(RMI_2D_REL_POS_MAX, -x);
-
-if (axis_align->flip_y)
-    y = min(RMI_2D_REL_POS_MAX, -y);
+
+if (axis_align->swap_axes)
+    swap(x, y);
+
    if (x || y) {
        input_report_rel(sensor->input, REL_X, x);
        input_report_rel(sensor->input, REL_Y, y);
struct input_dev *input = sensor->input;
int res_x;
int res_y;
+int max_x, max_y;
int input_flags = 0;

if (sensor->report_abs) {
    -if (sensor->axis_align.swap_axes) {
      -swap(sensor->max_x, sensor->max_y);
      -swap(sensor->axis_align.clip_x_low,
            sensor->axis_align.clip_y_low);
      -swap(sensor->axis_align.clip_x_high,
            sensor->axis_align.clip_y_high);
    }
    +
    max_x = sensor->max_x;
    max_y = sensor->max_y;
    +if (sensor->axis_align.swap_axes)
       +swap(max_x, max_y);
    +input_set_abs_params(input, ABS_MT_POSITION_X, 0, max_x, 0, 0);
    +input_set_abs_params(input, ABS_MT_POSITION_Y, 0, max_y, 0, 0);
}

if (sensor->x_mm && sensor->y_mm) {
    res_x = (sensor->max_x - sensor->min_x) / sensor->x_mm;
    res_y = (sensor->max_y - sensor->min_y) / sensor->y_mm;
    +if (sensor->axis_align.swap_axes)
       +swap(res_x, res_y);
    input_abs_set_res(input, ABS_X, res_x);
    input_abs_set_res(input, ABS_Y, res_y);
+++
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_driver.c
@@ -163,14 +156,19 @@
     sensor->max_x = sensor->axis_align.clip_x_high;
+++
@@ -141,17 +141,10 @@

    sensor->min_x = sensor->axis_align.clip_x_low;
    if (sensor->axis_align.clip_x_high)
@@ -163,14 +156,19 @@
     sensor->max_x = min(sensor->max_x,
@@ -163,14 +156,19 @@
     sensor->max_x = sensor->axis_align.clip_x_high;

    set_bit(EV_ABS, input->evbit);
    -input_set_abs_params(input, ABS_MT_POSITION_X, 0, sensor->max_x,
@@ -163,14 +156,19 @@
    -input_set_abs_params(input, ABS_MT_POSITION_Y, 0, sensor->max_y,
@@ -163,14 +156,19 @@
    +
    +max_x = sensor->max_x;
    +max_y = sensor->max_y;
    +if (sensor->axis_align.swap_axes)
       +swap(max_x, max_y);
    +input_set_abs_params(input, ABS_MT_POSITION_X, 0, max_x, 0, 0);
    +input_set_abs_params(input, ABS_MT_POSITION_Y, 0, max_y, 0, 0);

if (sensor->x_mm && sensor->y_mm) {
    res_x = (sensor->max_x - sensor->min_x) / sensor->x_mm;
    res_y = (sensor->max_y - sensor->min_y) / sensor->y_mm;
    +if (sensor->axis_align.swap_axes)
       +swap(res_x, res_y);
    input_abs_set_res(input, ABS_X, res_x);
    input_abs_set_res(input, ABS_Y, res_y);
+++
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_driver.c
@@ -163,14 +156,19 @@
    sensor->x_mm && sensor->y_mm) {
        res_x = (sensor->max_x - sensor->min_x) / sensor->x_mm;
        res_y = (sensor->max_y - sensor->min_y) / sensor->y_mm;
        +if (sensor->axis_align.swap_axes)
           +swap(res_x, res_y);
        input_abs_set_res(input, ABS_X, res_x);
        input_abs_set_res(input, ABS_Y, res_y);
+++
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_driver.c
@@ -163,14 +156,19 @@

    set_bit(EV_ABS, input->evbit);
    -input_set_abs_params(input, ABS_MT_POSITION_X, 0, sensor->max_x,
@@ -163,14 +156,19 @@
    -input_set_abs_params(input, ABS_MT_POSITION_Y, 0, sensor->max_y,
@@ -163,14 +156,19 @@
    +
    +max_x = sensor->max_x;
    +max_y = sensor->max_y;
    +if (sensor->axis_align.swap_axes)
       +swap(max_x, max_y);
    +input_set_abs_params(input, ABS_MT_POSITION_X, 0, max_x, 0, 0);
    +input_set_abs_params(input, ABS_MT_POSITION_Y, 0, max_y, 0, 0);

if (sensor->x_mm && sensor->y_mm) {
    res_x = (sensor->max_x - sensor->min_x) / sensor->x_mm;
    res_y = (sensor->max_y - sensor->min_y) / sensor->y_mm;
    +if (sensor->axis_align.swap_axes)
       +swap(res_x, res_y);
    input_abs_set_res(input, ABS_X, res_x);
    input_abs_set_res(input, ABS_Y, res_y);
+++
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_driver.c
@@ -163,14 +156,19 @@

    set_bit(EV_ABS, input->evbit);
    -input_set_abs_params(input, ABS_MT_POSITION_X, 0, sensor->max_x,
@@ -163,14 +156,19 @@
    -input_set_abs_params(input, ABS_MT_POSITION_Y, 0, sensor->max_y,
@@ -163,14 +156,19 @@
    +
    +max_x = sensor->max_x;
    +max_y = sensor->max_y;
    +if (sensor->axis_align.swap_axes)
       +swap(max_x, max_y);
    +input_set_abs_params(input, ABS_MT_POSITION_X, 0, max_x, 0, 0);
    +input_set_abs_params(input, ABS_MT_POSITION_Y, 0, max_y, 0, 0);

if (sensor->x_mm && sensor->y_mm) {
    res_x = (sensor->max_x - sensor->min_x) / sensor->x_mm;
    res_y = (sensor->max_y - sensor->min_y) / sensor->y_mm;
    +if (sensor->axis_align.swap_axes)
       +swap(res_x, res_y);
    input_abs_set_res(input, ABS_X, res_x);
    input_abs_set_res(input, ABS_Y, res_y);
+++
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_driver.c
@@ -163,14 +156,19 @@

    set_bit(EV_ABS, input->evbit);
    -input_set_abs_params(input, ABS_MT_POSITION_X, 0, sensor->max_x,
@@ -163,14 +156,19 @@
    -input_set_abs_params(input, ABS_MT_POSITION_Y, 0, sensor->max_y,
@@ -163,14 +156,19 @@
    +
    +max_x = sensor->max_x;
    +max_y = sensor->max_y;
    +if (sensor->axis_align.swap_axes)
       +swap(max_x, max_y);
    +input_set_abs_params(input, ABS_MT_POSITION_X, 0, max_x, 0, 0);
    +input_set_abs_params(input, ABS_MT_POSITION_Y, 0, max_y, 0, 0);

if (sensor->x_mm && sensor->y_mm) {
    res_x = (sensor->max_x - sensor->min_x) / sensor->x_mm;
    res_y = (sensor->max_y - sensor->min_y) / sensor->y_mm;
    +if (sensor->axis_align.swap_axes)
       +swap(res_x, res_y);
    input_abs_set_res(input, ABS_X, res_x);
    input_abs_set_res(input, ABS_Y, res_y);
+++
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_driver.c
@@ -163,14 +156,19 @@

    set_bit(EV_ABS, input->evbit);
    -input_set_abs_params(input, ABS_MT_POSITION_X, 0, sensor->max_x,
@@ -163,14 +156,19 @@
    -input_set_abs_params(input, ABS_MT_POSITION_Y, 0, sensor->max_y,
@@ -163,14 +156,19 @@
    +
    +max_x = sensor->max_x;
    +max_y = sensor->max_y;
    +if (sensor->axis_align.swap_axes)
       +swap(max_x, max_y);
    +input_set_abs_params(input, ABS_MT_POSITION_X, 0, max_x, 0, 0);
    +input_set_abs_params(input, ABS_MT_POSITION_Y, 0, max_y, 0, 0);

if (sensor->x_mm && sensor->y_mm) {
    res_x = (sensor->max_x - sensor->min_x) / sensor->x_mm;
    res_y = (sensor->max_y - sensor->min_y) / sensor->y_mm;
    +if (sensor->axis_align.swap_axes)
       +swap(res_x, res_y);
    input_abs_set_res(input, ABS_X, res_x);
    input_abs_set_res(input, ABS_Y, res_y);
    --- linux-4.15.0.orig/drivers/input/rmi4/rmi_driver.c
    +++ linux-4.15.0/drivers/input/rmi4/rmi_driver.c
    @@ -41,6 +41,13 @@

    rmi_dbg(RMI_DEBUG_CORE, &rmi_dev->dev, "Freeing function list\n");
+/* Doing it in the reverse order so F01 will be removed last */
+list_for_each_entry_safe_reverse(fn, tmp,
+ &data->function_list, node) {
+list_del(&fn->node);
+rmi_unregister_function(fn);
+}
+
+devm_kfree(&rmi_dev->dev, data->irq_memory);
data->irq_memory = NULL;
data->irq_status = NULL;
@@ -50,13 +57,6 @@
data->f01_container = NULL;
data->f34_container = NULL;
-
-/* Doing it in the reverse order so F01 will be removed last */
-list_for_each_entry_safe_reverse(fn, tmp,
- &data->function_list, node) {
- list_del(&fn->node);
- rmi_unregister_function(fn);
- }
-}

static int reset_one_function(struct rmi_function *fn)
@@ -232,7 +232,7 @@
if (count) {
kfree(attn_data.data);
-attn_data.data = NULL;
+drvdata->attn_data.data = NULL;
}

if (!kfifo_is_empty(&drvdata->attn_fifo))
@@ -883,7 +883,7 @@
error = rmi_register_function(fn);
if (error)
-goto err_put_fn;
+return error;

if (pdt->function_number == 0x01)
data->f01_container = fn;
@@ -893,10 +893,6 @@
list_add_tail(&fn->node, &data->function_list);

return RMI_SCAN_CONTINUE;
-
-err_put_fn:
-put_device(&fn->dev);
-return error;
}

void rmi_enable_irq(struct rmi_device *rmi_dev, bool clear_wake)
@@ -1224,7 +1220,8 @@
if (data->input) {
    rmi_driver_set_input_name(rmi_dev, data->input);
    if (!rmi_dev->xport->input) {
-        if (input_register_device(data->input)) {
+        retval = input_register_device(data->input);
+        if (retval) {
            dev_err(dev, "\%s: Failed to register input device.\n", __func__); goto err_destroy_functions;
        }
    }

--- linux-4.15.0.orig/drivers/input/rmi4/rmi_f03.c
+++ linux-4.15.0/drivers/input/rmi4/rmi_f03.c
@@ -32,6 +32,7 @@
    struct rmi_function *fn;

    struct serio *serio;
+    bool serio_registered;

    unsigned int overwrite_buttons;
@@ -138,6 +139,37 @@
    return 0;
}

+static int rmi_f03_pt_open(struct serio *serio)
+{*
+*    struct f03_data *f03 = serio->port_data;
+*    struct rmi_function *fn = f03->fn;
+*    const u8 ob_len = f03->rx_queue_length * RMI_F03_OB_SIZE;
+*    const u16 data_addr = fn->fd.data_base_addr + RMI_F03_OB_OFFSET;
+*    u8 obs[RMI_F03_QUEUE_LENGTH * RMI_F03_OB_SIZE];
+*    int error;
+*
+*    /* Consume any pending data. Some devices like to spam with
+*     * 0xaa 0x00 announcements which may confuse us as we try to
+*     * probe the device.
+*     */
+*    error = rmi_read_block(fn->rmi_dev, data_addr, &obs, ob_len);
+*    if (!error)
+*        rmi_dbg(RMI_DEBUG_FN, &fn->dev,
+*            "%s: Consumed %ph (%d) from PS2 guest\n", __func__);
+__func__, ob_len, obs, ob_len);
+
+return fn->rmi_dev->driver->set_irq_bits(fn->rmi_dev, fn->irq_mask);
+
+static void rmi_f03_pt_close(struct serio *serio)
+
+{ struct f03_data *f03 = serio->port_data;
+ struct rmi_function *fn = f03->fn;
+ fn->rmi_dev->driver->clear_irq_bits(fn->rmi_dev, fn->irq_mask);
+
+static int rmi_f03_register_pt(struct f03_data *f03)
+
+ struct serio *serio;
+ @ @ -148,6 +180,8 @@
+
+ serio->id.type = SERIO_PS_PSTHRU;
+ serio->write = rmi_f03_pt_write;
+ serio->open = rmi_f03_pt_open;
+ serio->close = rmi_f03_pt_close;
+ serio->port_data = f03;
+
+ strlcpy(serio->name, "Synaptics RMI4 PS/2 pass-through",
+ @ @ -184,17 +218,27 @@
+ f03->device_count);
+
+ dev_set_drvdata(dev, f03);
+
- error = rmi_f03_register_pt(f03);
- if (error)
- return error;
+
+ return 0;
+
+ static int rmi_f03_config(struct rmi_function *fn)
+
+ { fn->rmi_dev->driver->set_irq_bits(fn->rmi_dev, fn->irq_mask);
+ struct f03_data *f03 = dev_get_drvdata(&fn->dev);
+ int error;
+ +
+ if (!f03->serio_registered) { error = rmi_f03_register_pt(f03);
+ if (error)
+ return error;
+f03->serio_registered = true;
+} else {
+*/
+ * We must be re-configuring the sensor, just enable
+ * interrupts for this function.
+ */
+fn->rmi_dev->driver->set_irq_bits(fn->rmi_dev, fn->irq_mask);
+
return 0;
}
@@ -204,7 +248,7 @@
struct rmi_device *rmi_dev = fn->rmi_dev;
struct rmi_driver_data *drvdata = dev_get_drvdata(&rmi_dev->dev);
struct f03_data *f03 = dev_get_drvdata(&fn->dev);
-\t16 data_addr = fn->fd.data_base_addr;
+\tconst 16 data_addr = fn->fd.data_base_addr + RMI_F03_OB_OFFSET;
const 8 ob_len = f03->rx_queue_length * RMI_F03_OB_SIZE;
8 obs[RMI_F03_QUEUE_LENGTH * RMI_F03_OB_SIZE];
\tob ob_status;
@@ -226,8 +270,7 @@
\terror = rmi_read_block(fn->rmi_dev, data_addr + RMI_F03_OB_OFFSET,
-\t&obs, ob_len);
+\terror = rmi_read_block(fn->rmi_dev, data_addr, &obs, ob_len);
if (error) {
    dev_err(&fn->dev,
    "%.s: Failed to read F03 output buffers: %d\n",
@@ -266,7 +309,8 @@
    {\n    struct f03_data *f03 = dev_get_drvdata(&fn->dev);
    -serio_unregister_port(f03->serio);
+    if (f03->serio_registered)
+        serio_unregister_port(f03->serio);
    }

struct rmi_function_handler rmi_f03_handler = {\n    --- linux-4.15.0.orig/drivers/input/rmi4/rmi_f11.c
    +++ linux-4.15.0/drivers/input/rmi4/rmi_f11.c
    @ @ -1239,7 +1239,7 @ @
}

rc = f11_write_control_regs(fn, &f11->sens_query,
- &f11->dev_controls, fn->fd.query_base_addr);
+ &f11->dev_controls, fn->fd.control_base_addr);
if (rc)
    dev_warn(&fn->dev, "Failed to write control registers
");

@@ -1295,8 +1295,8 @@
     valid_bytes = f11->sensor.attn_size;
     memcpy(f11->sensor.data_pkt, drvdata->attn_data.data,
             valid_bytes);
-    drvdata->attn_data.data += f11->sensor.attn_size;
-    drvdata->attn_data.size -= f11->sensor.attn_size;
+    drvdata->attn_data.data += valid_bytes;
+    drvdata->attn_data.size -= valid_bytes;
  } else {
    error = rmi_read_block(rmi_dev,
                           data_base_addr, f11->sensor.data_pkt,
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_f11.c
+++ linux-4.15.0/drivers/input/rmi4/rmi_f11.c
@@ -58,6 +58,9 @@
            const struct rmi_register_desc_item *data15;
            u16 data15_offset;
            +unsigned long *abs_mask;
            +unsigned long *rel_mask;
        
        static int rmi_f12_read_sensor_tuning(struct f12_data *f12)
@@ -214,8 +217,8 @@
     valid_bytes = sensor->attn_size;
     memcpy(sensor->data_pkt, drvdata->attn_data.data,
             valid_bytes);
-    drvdata->attn_data.data += sensor->attn_size;
-    drvdata->attn_data.size -= sensor->attn_size;
+    drvdata->attn_data.data += valid_bytes;
+    drvdata->attn_data.size -= valid_bytes;
  } else {
    retval = rmi_read_block(rmi_dev, f12->data_addr,
                            sensor->data_pkt, sensor->pkt_size);
--- linux-4.15.0.orig/drivers/input/rmi4/rmi_f12.c
+++ linux-4.15.0/drivers/input/rmi4/rmi_f12.c
@@ -296,9 +299,18 @@
    static int rmi_f12_config(struct rmi_function *fn)
    {
        struct rmi_driver *drv = fn->rmi_dev->driver;
        +struct f12_data *f12 = dev_get_drvidata(&fn->dev);
        +struct rmi_2d_sensor *sensor;
        int ret;

        -drv->set_irq_bits(fn->rmi_dev, fn->irq_mask);
        +sensor = &f12->sensor;
        +
+if (!sensor->report_abs)
+drv->clear_irq_bits(fn->rmi_dev, f12->abs_mask);
+else
+drv->set_irq_bits(fn->rmi_dev, f12->abs_mask);
+
+drv->clear_irq_bits(fn->rmi_dev, f12->rel_mask);

ret = rmi_f12_write_control_regs(fn);
if (ret)
@@ -320,9 +332,12 @@
struct rmi_device_platform_data *pdata = rmi_get_platform_data(rmi_dev);
struct rmi_driver_data *drvdata = dev_get_drvdata(&rmi_dev->dev);
int mask_size;

+mask_size = BITS_TO_LONGS(drvdata->irq_count) * sizeof(unsigned long);
+
ret = rmi_read(fn->rmi_dev, query_addr, &buf);
if (ret < 0) {
   dev_err(&fn->dev, "Failed to read general info register: \%d\n",
@@ -337,10 +352,19 @@
return -ENODEV;
} 

-f12 = devm_kzalloc(&fn->dev, sizeof(struct f12_data), GFP_KERNEL);
+f12 = devm_kzalloc(&fn->dev, sizeof(struct f12_data) + mask_size * 2,
+GFP_KERNEL);
if (!f12)
return -ENOMEM;

+f12->abs_mask = (unsigned long *)((char *)f12
+   + sizeof(struct f12_data));
+f12->rel_mask = (unsigned long *)((char *)f12
+   + sizeof(struct f12_data) + mask_size);
+
+set_bit(fn->irq_pos, f12->abs_mask);
+set_bit(fn->irq_pos + 1, f12->rel_mask);
+
if (fn->dev.of_node) {
   --- linux-4.15.0.orig/drivers/input/rmi4/rmi_f34v7.c
   +++ linux-4.15.0/drivers/input/rmi4/rmi_f34v7.c
@@ -1192,6 +1192,9 @@
   int ret;
   
   +f12->has_dribble = !(buf & BIT(3));

if (fn->dev.of_node) {


```c
int rmi_f54v7_read_queries_bl_version(f34);

f34->v7.image = fw->data;
```

--- linux-4.15.0.orig/drivers/input/rmi4/rmi_f54.c
+++ linux-4.15.0/drivers/input/rmi4/rmi_f54.c
@@ -362,7 +362,7 @@
 static const struct vb2_queue rmi_f54_queue = {
     .type = V4L2_BUF_TYPE_VIDEO_CAPTURE,
     .io_modes = VB2_MMAP | VB2_USERPTR | VB2_DMABUF | VB2_READ,
-    .buf_struct_size = sizeof(struct vb2_buffer),
+    .buf_struct_size = sizeof(struct vb2_v4l2_buffer),
     .ops = &rmi_f54_queue_ops,
     .mem_ops = &vb2_vmalloc_memops,
     .timestamp_flags = V4L2_BUF_FLAG_TIMESTAMP_MONOTONIC,
@@ -619,7 +619,7 @@
{
     struct rmi_driver *drv = fn->rmi_dev->driver;

-drv->set_irq_bits(fn->rmi_dev, fn->irq_mask);
+drv->clear_irq_bits(fn->rmi_dev, fn->irq_mask);

     return 0;
     }
@@ -747,6 +747,7 @@
 video_unregister_device(&f54->vdev);
 v4l2_device_unregister(&f54->v4l2);
 +destroy_workqueue(f54->workqueue);
 };

 struct rmi_function_handler rmi_f54_handler = {
     --- linux-4.15.0.orig/drivers/input/rmi4/rmi_spi.c
+++ linux-4.15.0/drivers/input/rmi4/rmi_spi.c
 @@ -147,8 +147,11 @@
 if (len > RMI_SPI_XFER_SIZE_LIMIT)
     return -EINVAL;

-    if (rmi_spi->xfer_buf_size < len)
-        rmi_spi_manage_pools(rmi_spi, len);
+    if (rmi_spi->xfer_buf_size < len) {
+        ret = rmi_spi_manage_pools(rmi_spi, len);
+        if (ret < 0)
+            return ret;
+    }
```
if (addr == 0)
/*
--- linux-4.15.0.orig/drivers/input/serio/gscps2.c
+++ linux-4.15.0/drivers/input/serio/gscps2.c
@@ -382,9 +382,9 @@
goto fail;
#endif
-printk(KERN_INFO "serio: %s port at 0x%p irq %d @ %s\n",
+pr_info("serio: %s port at 0x%08lx irq %d @ %s\n",
ps2port->port->name,
-ps2port->addr,
+hpa,
-ps2port->padev->irq,
ps2port->port->phys);

--- linux-4.15.0.orig/drivers/input/serio/hil_mlc.c
+++ linux-4.15.0/drivers/input/serio/hil_mlc.c
@@ -74,7 +74,7 @@
static struct timer_list hil_mlcs_kicker;
-static int hil_mlcs_probe;
+static int hil_mlcs_probe, hil_mlc_stop;
static void hil_mlcs_process(unsigned long unused);
static DECLARE_TASKLET_DISABLED(hil_mlcs_tasklet, hil_mlcs_process, 0);
@@ -704,9 +721,13 @@
mlc->ostarted = 1;
mlc->opacket = pack;
-mlc->out(mlc);
+rc = mlc->out(mlc);
nextidx = HILSEN_DOZE;
write_unlock_irqrestore(&mlc->lock, flags);
+if (rc) {
+hil_mlc_stop = 1;
+return 1;
+}
break;
} mlc->ostarted = 0;
@@ -717,8 +721,13 @@
case HILSE_CTS:
write_lock_irqsave(&mlc->lock, flags);
-nextidx = mlc->cts(mlc) ? node->bad : node->good;
+nextidx = mlc->cts(mlc) ? node->bad : node->good;
+rc = mlc->cts(mlc);
+nextidx = rc ? node->bad : node->good;
write_unlock_irqrestore(&mlc->lock, flags);
+if (rc) {
+hil_mlc_stop = 1;
+return 1;
+}
break;

default:
@@ -786,6 +795,12 @@
static void hil_mlcs_timer(struct timer_list *unused)
{
+if (hil_mlc_stop) {
+"" could not send packet - stop immediately. */
+pr_warn(PREFIX "HIL seems stuck - Disabling HIL MLC\n");
+return;
+}
+
+hil_mlcs_probe = 1;
tasklet_schedule(&hil_mlcs_tasklet);
/* Re-insert the periodic task. */
--- linux-4.15.0.orig/drivers/input/serio/hp_sdc.c
+++ linux-4.15.0/drivers/input/serio/hp_sdc.c
@@ -887,8 +887,8 @@
"HP SDC NMI", &hp_sdc))
goto err2;

-printk(KERN_INFO PREFIX "HP SDC at 0x%p, IRQ %d (NMI IRQ %d)\n",
- (void *)hp_sdc.base_io, hp_sdc.irq, hp_sdc.nmi);
+pr_info(PREFIX "HP SDC at 0x%08lx, IRQ %d (NMI IRQ %d)\n",
+ hp_sdc.base_io, hp_sdc.irq, hp_sdc.nmi);

hp_sdc_status_in8();
hp_sdc_data_in8();
--- linux-4.15.0.orig/drivers/input/serio/hp_sdc_mlc.c
+++ linux-4.15.0/drivers/input/serio/hp_sdc_mlc.c
@@ -213,7 +213,7 @@
priv->tseq[2] = 1;
priv->tseq[3] = 0;
priv->tseq[4] = 0;
- __hp_sdc_enqueue_transaction(&priv->trans);
+return __hp_sdc_enqueue_transaction(&priv->trans);
busy:
return 1;
done:
@@ -222,7 +222,7 @@
return 0;
}

+static int hp_sdc_mlc_out(hil_mlc *mlc)
{
    struct hp_sdc_mlc_priv_s *priv;

    /* Shouldn't be sending commands when loop may be busy */
    BUG_ON(down_trylock(&mlc->csem));
    BUG_ON(down_trylock(&mlc->osem));
    enqueue:
    +return hp_sdc_enqueue_transaction(&priv->trans);
    +return hp_sdc_enqueue_transaction(&priv->trans);
}

static int __init hp_sdc_mlc_init(void)
{
    /* state because the Enter-UP can trigger a wakeup at once. */
    if (!((info & IS_BREAK))
        -pm_wakeup_event(&hv_dev->device, 0);
        +pm_wakeup_hard_event(&hv_dev->device);

        break;

static void hv_kbd_on_channel_callback(void *context)
{
    +struct vmpacket_descriptor *desc;
    struct hv_device *hv_dev = context;
    -void *buffer;
    -int bufferlen = 0x100; /* Start with sensible size */
    u32 bytes_recvd;
    u64 req_id;
    -int error;
buffer = kmalloc(bufferlen, GFP_ATOMIC);
-if (!buffer)
-return;
-
-while (1) {
-error = vmbus_recvpacket_raw(hv_dev->channel, buffer, bufferlen,
- &bytes_recvd, &req_id);
-switch (error) {
-case 0:
-if (bytes_recvd == 0) {
-kfree(buffer);
-return;
-
} +foreach_vmbus_pkt(desc, hv_dev->channel) {
+bytes_recvd = desc->len8 * 8;
+req_id = desc->trans_id;

-hv_kbd_handle_received_packet(hv_dev, buffer,
- bytes_recvd, req_id);
-break;
-
-case -ENOBUFS:
-kfree(buffer);
-/* Handle large packet */
-bufferlen = bytes_recvd;
-buffer = kmalloc(bytes_recvd, GFP_ATOMIC);
-if (!buffer)
-return;
-break;
-
} +hv_kbd_handle_received_packet(hv_dev, desc, bytes_recvd,
+ req_id);
}
}

--- linux-4.15.0.orig/drivers/input/serio/i8042-x86ia64io.h
+++ linux-4.15.0/drivers/input/serio/i8042-x86ia64io.h
@@ -224,6 +224,12 @@

DMI_MATCH(DMI_SYS_VENDOR, "ByteSpeed LLC"),
+{.
+}..matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "ByteSpeed LLC"),
+DMI_MATCH(DMI_PRODUCT_NAME, "ByteSpeed Laptop C15B"),
+}
+}.

{ };

@@ -430,6 +436,13 @@
 },
 },
 {
+/* Lenovo XiaoXin Air 12 */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_PRODUCT_NAME, "80UN"),
+},
+},
+{
+.matches = {
 DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
 DMI_MATCH(DMI_PRODUCT_NAME, "Aspire 1360"),
@@ -527,6 +540,46 @@
 DMI_MATCH(DMI_PRODUCT_NAME, "N24_25BU"),
 },
 },
+/* Lenovo LaVie Z */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo LaVie Z"),
+},
+},
+{
+/*
+ * Acer Aspire 5738z
+ * Touchpad stops working in mux mode when dis- + re-enabled
+ * with the touchpad enable/disable toggle hotkey
+ */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire 5738"),
+},
+},
+{
+/* Entroware Proteus */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Entroware"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Proteus"),
+DMI_MATCH(DMI_PRODUCT_VERSION, "EL07R4"),
+},
+},
+{ }
static const struct dmi_system_id i8042_dmi_forcemux_table[] __initconst = {
	{
		/*
		 * Sony Vaio VGN-CS series require MUX or the touch sensor
		 * buttons will disturb touchpad operation
		 */
		.matches = {

			DMI_MATCH(DMI_SYS_VENDOR, "Sony Corporation"),
			DMI_MATCH(DMI_PRODUCT_NAME, "VGN-CS"),
			},
		},
	{ }{
	};

@@ -539,6 +592,11 @@
DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
DMI_MATCH(DMI_CHASSIS_TYPE, "10"), /* Notebook */
},
+}, {
+matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
+DMI_MATCH(DMI_CHASSIS_TYPE, "31"), /* Convertible Notebook */
+ },
+}, {
+},
+}, {
+matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire A114-31"),
+ },
+},
+}, {
+matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire A314-31"),
+ },
+},
+}, {
+matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire A315-31"),
+ }}
;
+{
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire ES1-132"),
+}. 
+}. 
+{
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire ES1-332"),
+}. 
+}. 
+{
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire ES1-432"),
+}. 
+}. 
+{
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "TravelMate Spin B118-RN"),
+}. 
+}. 
+{
/*. Advent 4211 */
.matches = {
DMI_MATCH(DMI_SYS_VENDOR, "DIXONSXP"),  
@ @ -621,12 +721,34 @@
}, 
], },  
{ /* Lenovo ThinkPad L460 */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_PRODUCT_VERSION, "ThinkPad L460"),
+}. 
+}. 
+{
/*. Clevo P650RS, 650RP6, Sager NP8152-S, and others */
.matches = {
DMI_MATCH(DMI_SYS_VENDOR, "Notebook"),
DMI_MATCH(DMI_PRODUCT_NAME, "P65xRP"),
}, 
], }, 
+{ /* Lenovo ThinkPad Twist S230u */

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+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_PRODUCT_NAME, "33474HU"),
+},
+{ /* Entroware Proteus */
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Entroware"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Proteus"),
+DMI_MATCH(DMI_PRODUCT_VERSION, "EL07R4"),
+},
+{ /* Acer Aspire 5 A515 */
+.matches = {
+DMI_MATCH(DMI_BOARD_NAME, "Grumpy_PK"),
+DMI_MATCH(DMI_BOARD_VENDOR, "PK"),
+},
+
+
+@ @ -656,6 +778,13 @@
DMI_MATCH(DMI_BOARD_VENDOR, "MICRO-STAR INTERNATIONAL CO., LTD"),
},
},
+
+@ @ -1163,6 +1292,9 @@
if (dmi_check_system(i8042_dmi_nomux_table))
i8042_nomux = true;

+if (dmi_check_system(i8042_dmi_forcemux_table))
i8042_nomux = false;
+
if (dmi_check_system(i8042_dmi_notimeout_table))
i8042_notimeout = true;

--- linux-4.15.0.orig/drivers/input/serio/i8042.c
+++ linux-4.15.0/drivers/input/serio/i8042.c
@@ -125,6 +125,7 @@
MODULE_PARM_DESC(unmask_kbd_data, "Unconditional enable (may reveal sensitive data) of normally
sanitize-filtered kbd data traffic debug log [pre-condition: i8042.debug=1 enabled]");
@endif

+static bool i8042_present;
static bool i8042_bypass_aux_irq_test;
static char i8042_kbd_firmware_id[128];
static char i8042_aux_firmware_id[128];
unsigned long flags;
int retval;

if (!i8042_present)
    return -1;

spin_lock_irqsave(&i8042_lock, flags);
retval = __i8042_command(param, command);
spin_unlock_irqrestore(&i8042_lock, flags);

if (i8042_command(&i8042_ctr, I8042_CMD_CTL_WCTR)) {
    i8042_ctr &= ~I8042_CTR_KBDINT;
    i8042_ctr |= I8042_CTR_KBDDIS;
    pr_info("Failed to enable KBD port\n");
    return -EIO;
}

if (i8042_command(&i8042_ctr, I8042_CMD_CTL_WCTR)) {
    i8042_ctr &= ~I8042_CTR_AUXINT;
    i8042_ctr |= I8042_CTR_AUXDIS;
    pr_info("Failed to enable AUX port\n");
    return -EIO;
}

i8042_ctr &= ~I8042_CTR_AUXINT;

if (i8042_command(&i8042_ctr, I8042_CMD_CTL_WCTR)) {
    pr_info("Failed to disable AUX port, can't use MUX\n");
    return -EIO;
}

unsigned char param;
int i = 0;
int ret;

/*
 * We try this 5 times; on some really fragile systems this does not
* take the first time...
/*
-do {
+while (i++ < 5) {

-if (i8042_command(&param, I8042_CMD_CTL_TEST)) {
+pr_err("i8042 controller selftest timeout\n");
-return -ENODEV;
-}
-
-if (param == I8042_RET_CTL_TEST)
+ret = i8042_command(&param, I8042_CMD_CTL_TEST);
+if (ret)
+pr_info("i8042 controller selftest timeout (%d/5)\n", i);
+else if (param == I8042_RET_CTL_TEST)
return 0;
+else
+dbg("i8042 controller selftest: %#x != %#x\n",
+ param, I8042_RET_CTL_TEST);

-dbgs("i8042 controller selftest: %#x != %#x\n",
- param, I8042_RET_CTL_TEST);
msleep(50);
-} while (i++ < 5);
+
+
+if (ret)
+return -ENODEV;

#ifdef CONFIG_X86
/*
 @@ -957,7 +964,7 @@
 pr_info("giving up on controller selftest, continuing anyway...\n");
 return 0;
#else
-pr_err("i8042 controller selftest failed\n");
+pr_info("i8042 controller selftest failed\n");
return -EIO;
#endif

@@ -1392,15 +1399,26 @@
for (i = 0; i < I8042_NUM_PORTS; i++) {
 struct serio *serio = i8042_ports[i].serio;

-if (serio) {
-printk(KERN_INFO "serio: %s at %#lx,##lx irq %d\n",
- serio->name,
- {unsigned long} I8042_DATA_REG,
if (!serio)
    continue;

printk(KERN_INFO "serio: %s at %#lx,%#lx irq %d\n",
    serio->name,
    (unsigned long) I8042_DATA_REG,
    (unsigned long) I8042_COMMAND_REG,
    i8042_ports[i].irq);

if (pm_suspend_via_s2idle() && i == I8042_KBD_PORT_NO)
    device_set_wakeup_enable(&serio->dev, true);

if (error)
    goto err_free_ports;

if (aux_enable())
    error = aux_enable();

if (error)
    goto err_free_irq;

i8042_aux_irq_registered = true;

err = i8042_platform_init();
if (err)
    -return err;
+return (err == -ENODEV) ? 0 : err;

err = i8042_controller_check();
if (err)
    goto err_platform_exit;
/* Set this before creating the dev to allow i8042_command to work right away */
+i8042_present = true;
+
pdev = platform_create_bundle(&i8042_driver, i8042_probe, NULL, 0, NULL, 0);
if (IS_ERR(pdev)) {
    err = PTR_ERR(pdev);
    @ @ -1623.6 +1645.9 @@
}

static void __exit i8042_exit(void)
{
    +if (!i8042_present)
    +return;
    +
    platform_device_unregister(i8042_platform_device);
    platform_driver_unregister(&i8042_driver);
    i8042_platform_exit();
    --- linux-4.15.0.orig/drivers/input/serio/ps2-gpio.c
    +++ linux-4.15.0/drivers/input/serio/ps2-gpio.c
    @@ -76,6 +76,7 @@
    }
    struct ps2_gpio_data *drvdata = serio->port_data;

    +flush_delayed_work(&drvdata->tx_work);
    disable_irq(drvdata->irq);
    }

    --- linux-4.15.0.orig/drivers/input/serio/sun4i-ps2.c
    +++ linux-4.15.0/drivers/input/serio/sun4i-ps2.c
    @@ -210,7 +210,6 @@
    struct sun4i_ps2data *drvdata;
    struct serio *serio;
    struct device *dev = &pdev->dev;
    -unsigned int irq;
    int error;

    drvdata = kzalloc(sizeof(struct sun4i_ps2data), GFP_KERNEL);
    @ @ -263.14 +262.12 @@
    writel(0, drvdata->reg_base + PS2_REG_GCTL);

    /* Get IRQ for the device */
    -irq = platform_get_irq(pdev, 0);
    -if (!irq) {
    -dev_err(dev, "no IRQ found\n");
    -error = -ENXIO;
    +drvdata->irq = platform_get_irq(pdev, 0);
    +if (drvdata->irq < 0) {
    +error = drvdata->irq;

goto err_disable_clk;
}

drvdata->irq = irq;
drvdata->serio = serio;
drvdata->dev = dev;

--- linux-4.15.0.orig/drivers/input/tablet/aiptek.c
+++ linux-4.15.0/drivers/input/tablet/aiptek.c
@@ -1822,14 +1822,14 @@
input_set_abs_params(inputdev, ABS_WHEEL, AIPTEK_WHEEL_MIN, AIPTEK_WHEEL_MAX - 1, 0, 0);

/* Verify that a device really has an endpoint */
-if (intf->altsetting[0].desc.bNumEndpoints < 1) {
+if (intf->cur_altsetting->desc.bNumEndpoints < 1) {
    dev_err(&intf->dev, 
    "interface has %d endpoints, but must have minimum 1\n",
    -intf->altsetting[0].desc.bNumEndpoints);
+intf->cur_altsetting->desc.bNumEndpoints);
    err = -EINVAL;
    goto fail3;
}
-endpoint = &intf->altsetting[0].endpoint[0].desc;
+endpoint = &intf->cur_altsetting->endpoint[0].desc;

/* Go set up our URB, which is called when the tablet receives 
input.*/
--- linux-4.15.0.orig/drivers/input/tablet/gtco.c
+++ linux-4.15.0/drivers/input/tablet/gtco.c
@@ -78,6 +78,7 @@
#define REPORT_MAX_SIZE       10
+#define MAX_COLLECTION_LEVELS 10

/* Bitmask whether pen is in range */
@@ -223,8 +224,7 @@
    char maintype = 'x';
    char globtype[12];
    int indent = 0;
-    char indentstr[10] = "";
-    
+    char indentstr[MAX_COLLECTION_LEVELS + 1] = { 0 };
    
    dev_dbg(ddev, "================PARSE=============\n");
@@ -350,6 +350,13 @@
case TAG_MAIN_COL_START:
maintype = 'S';

+if (indent == MAX_COLLECTION_LEVELS) {
+dev_err(ddev, "Collection level %d would exceed limit of %d\n",
+indent + 1, 
+MAX_COLLECTION_LEVELS);
+break;
+}
+
+if (data == 0) {
+dev_dbg(ddev, "======>>>>>> Physical\n");
strcpy(globtype, "Physical");
@@ -369,8 +376,15 @@
break;
}

case TAG_MAIN_COL_END:
-dev_dbg(ddev, "<<<<<<======\n");
maintype = 'E';
+
+if (indent == 0) {
+dev_err(ddev, "Collection level already at zero\n");
+break;
+}
+
+dev_dbg(ddev, "<<<<<<======\n");
+
indent--;
for (x = 0; x < indent; x++)
indentstr[x] = '-';
@@ -861,18 +875,14 @@
}

/* Sanity check that a device has an endpoint */
-if (usbinterface->altsetting[0].desc.bNumEndpoints < 1) {
+if (usbinterface->cur_altsetting->desc.bNumEndpoints < 1) {
 dev_err(&usbinterface->dev,
 "Invalid number of endpoints\n");
 error = -EINVAL;
 goto err_free_urb;
}

-/*
- * The endpoint is always altsetting 0, we know this since we know
- * this device only has one interrupt endpoint
- */
-endpoint = &usbinterface->altsetting[0].endpoint[0].desc;
+endpoint = &usbinterface->cur_altsetting->endpoint[0].desc;

---
/* Some debug */
dev_dbg(&usbinterface->dev, "gtco # interfaces: %d\n", usbinterface->num_altsetting);
@@ -959,7 +969,7 @@
    input_dev->dev.parent = &usbinterface->dev;

/* Setup the URB, it will be posted later on open of input device */
@endpoint = &usbinterface->altsetting[0].endpoint[0].desc;
@endpoint = &usbinterface->cur_altsetting->endpoint[0].desc;

usb_fill_int_urb(gtco->urbinfo,
udev,
--- linux-4.15.0.orig/drivers/input/tablet/kbtab.c
+++ linux-4.15.0/drivers/input/tablet/kbtab.c
@@ -125,6 +125,10 @@
    if (intf->cur_altsetting->desc.bNumEndpoints < 1)
        return -ENODEV;

@endpoint = &intf->cur_altsetting->endpoint[0].desc;
+if (!usb_endpoint_is_int_in(endpoint))
    +return -ENODEV;
+kbtab = kzalloc(sizeof(struct kbtab), GFP_KERNEL);
    input_dev = input_allocate_device();
    if (!kbtab || !input_dev)
        @ @ -163,8 +167,6 @@
            input_set_abs_params(input_dev, ABS_Y, 0, 0x1750, 4, 0);
            input_set_abs_params(input_dev, ABS_PRESSURE, 0, 0xff, 0, 0);

@endpoint = &intf->cur_altsetting->endpoint[0].desc;
-usb_fill_int_urb(kbtab->irq, dev,
usb_rcvintpipe(dev, endpoint->bEndpointAddress),
    kbtab->data, 8,
--- linux-4.15.0.orig/drivers/input/tablet/pegasus_notetaker.c
+++ linux-4.15.0/drivers/input/tablet/pegasus_notetaker.c
@@ -260,7 +260,7 @@
    return -ENODEV;
    /* Sanity check that the device has an endpoint */
    if (intf->altsetting[0].desc.bNumEndpoints < 1) { 
        +if (intf->cur_altsetting->desc.bNumEndpoints < 1) { 
            dev_err(&intf->dev, "Invalid number of endpoints\n");
            return -EINVAL;
        }
--- linux-4.15.0.orig/drivers/input/tablet/wacom_serial4.c
+++ linux-4.15.0/drivers/input/tablet/wacom_serial4.c
@@ -187,6 +187,7 @@

static void wacom_handle_model_response(struct wacom *wacom)
@@ -245,6 +246,7 @@
wacom->flags = F_HAS_STYLUS2 | F_HAS_SCROLLWHEEL;
break;

+case MODEL_ARTPAD_II:
case MODEL_DIGITIZER_II:
wacom->dev->name = "Wacom Digitizer II";
wacom->dev->id.version = MODEL_DIGITIZER_II;
--- linux-4.15.0.orig/drivers/input/touchscreen/ads7846.c
+++ linux-4.15.0/drivers/input/touchscreen/ads7846.c
@@ -35,6 +35,7 @@
#include <linux/regulator/consumer.h>
#include <linux/module.h>
#include <asm/irq.h>
+#include <asm/unaligned.h>

/*
 * This code has been heavily tested on a Nokia 770, and lightly
@@ -199,6 +200,26 @@
#define REF_ON(READ_12BIT_DFR(x, 1, 1))
#define REF_OFF(READ_12BIT_DFR(y, 0, 0))

+static int get_pendown_state(struct ads7846 *ts)
+{
+ if (ts->get_pendown_state)
+ return ts->get_pendown_state();
+ return !gpio_get_value(ts->gpio_pendown);
+}
+
+static void ads7846_report_pen_up(struct ads7846 *ts)
+{
+ struct input_dev *input = ts->input;
+ input_report_key(input, BTN_TOUCH, 0);
+ input_report_abs(input, ABS_PRESSURE, 0);
+ input_sync(input);
+ ts->pendown = false;
+dev_vdbg(&ts->spi->dev, "UP\n");
+}
/* Must be called with ts->lock held */
static void ads7846_stop(struct ads7846 *ts)
{
    static void ads7846_restart(struct ads7846 *ts)
    {
        if (!ts->disabled && !ts->suspended) {
            /* Check if pen was released since last stop */
            if (ts->pendown && !get_pendown_state(ts))
                ads7846_report_pen_up(ts);

            /* Tell IRQ thread that it may poll the device. */
            ts->stopped = false;
            mb();
        }

        if (status == 0) {
            /* BE12 value, then padding */
            status = be16_to_cpu(*((u16 *)&req->sample[1]));
            status = get_unaligned_be16(&req->sample[1]);
            status = status >> 3;
            status &= 0x0fff;
        }
    }
}

/*-----------------------------------------------*/

static int get_pendown_state(struct ads7846 *ts)
{
    if (ts->get_pendown_state)
        return ts->get_pendown_state();

    return !gpio_get_value(ts->gpio_pendown);
}

static void null_wait_for_sync(void)
{
}

/* compute touch pressure resistance using equation #2 */
Rt = z2;
Rt -= z1;
-Rt *= x;
Rt *= ts->x_plate_ohms;
+Rt = DIV_ROUND_CLOSEST(Rt, 16);
+Rt *= x;
Rt /= z1;
-Rt = (Rt + 2047) >> 12;
+Rt = DIV_ROUND_CLOSEST(Rt, 256);
} else {
Rt = 0;
}
@@ -871,16 +889,8 @@
   msecs_to_jiffies(TS_POLL_PERIOD));
}

-  if (ts->pendown && !ts->stopped) {
-    struct input_dev *input = ts->input;
-    input_report_key(input, BTN_TOUCH, 0);
-    input_report_abs(input, ABS_PRESSURE, 0);
-    input_sync(input);
-    ts->pendown = false;
-    dev_vdbg(&ts->spi->dev, "UP\n");
-  }  
+  if (ts->pendown && !ts->stopped)
+    ads7846_report_pen_up(ts);
+  return IRQ_HANDLED;
}
--- linux-4.15.0.orig/drivers/input/touchscreen/atmel_mxt_ts.c
+++ linux-4.15.0/drivers/input/touchscreen/atmel_mxt_ts.c
@@ -275,7 +275,8 @@
  char phys[64];  /* device physical location */
  const struct mxt_platform_data *pdata;
  struct mxt_object *object_table;
-  struct mxt_info info;
+  struct mxt_info *info;
+  void *raw_info_block;
  unsigned int irq;
  unsigned int max_x;
  unsigned int max_y;
@@ -450,12 +451,13 @@
  
  u8 appmode = data->client->addr;
  u8 bootloader;
+  u8 family_id = data->info ? data->info->family_id : 0;

 switch (appmode) {
 case 0x4a:
case 0x4b:
 /* Chips after 1664S use different scheme */
-  if (retry || data->info.family_id >= 0xa2) {
-  +if (retry || family_id >= 0xa2) { 

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bootloader = appmode - 0x24;
break;
}
@@ -682,7 +684,7 @@
struct mxt_object *object;
int i;

- for (i = 0; i < data->info.object_num; i++) {
+ for (i = 0; i < data->info->object_num; i++) {
    object = data->object_table + i;
    if (object->type == type)
        return object;
@@ -1453,12 +1455,12 @@
data_pos += offset;
 }

- if (cfg_info.family_id != data->info.family_id) {
+ if (cfg_info.family_id != data->info->family_id) {
    dev_err(dev, "Family ID mismatch!\n");
    return -EINVAL;
 }

- if (cfg_info.variant_id != data->info.variant_id) {
+ if (cfg_info.variant_id != data->info->variant_id) {
    dev_err(dev, "Variant ID mismatch!\n");
    return -EINVAL;
 }
@@ -1503,7 +1505,7 @@
 /* Malloc memory to store configuration */
 cfg_start_ofs = MXT_OBJECT_START +
 -data->info.object_num * sizeof(struct mxt_object) +
+data->info->object_num * sizeof(struct mxt_object) +
 MXT_INFO_CHECKSUM_SIZE;
 config_mem_size = data->mem_size - cfg_start_ofs;
 config_mem = kzalloc(config_mem_size, GFP_KERNEL);
@@ -1554,20 +1556,6 @@
 return ret;
 }

- static int mxt_get_info(struct mxt_data *data)
-{
-    struct i2c_client *client = data->client;
-    struct mxt_info *info = &data->info;
-    int error;
-    
-    /* Read 7-byte info block starting at address 0 */
-    error = __mxt_read_reg(client, 0, sizeof(*info), info);
if (error)
    return error;
-
    return 0;
-
static void mxt_free_input_device(struct mxt_data *data)
{
    if (data->input_dev) {
@@ -1582,9 +1570,10 @@
        video_unregister_device(&data->dbg.vdev);
        v4l2_device_unregister(&data->dbg.v4l2);
        #endif
-
        kfree(data->object_table);
    data->object_table = NULL;
    +data->info = NULL;
    +kfree(data->raw_info_block);
    +data->raw_info_block = NULL;
    kfree(data->msg_buf);
    data->msg_buf = NULL;
    data->T5_address = 0;
@@ -1600,34 +1589,18 @@
    data->max_reportid = 0;
    }
}

-stat int mxt_get_object_table(struct mxt_data *data)
+static int mxt_parse_object_table(struct mxt_data *data,
    + struct mxt_object *object_table)
{
    struct i2c_client *client = data->client;
    -size_t table_size;
    -struct mxt_object *object_table;
    -int error;
    int i;
    u8 reportid;
    u16 end_address;

    -table_size = data->info.object_num * sizeof(struct mxt_object);
    -object_table = kzalloc(table_size, GFP_KERNEL);
    -if (!object_table) {
    -dev_err(&data->client->dev, "Failed to allocate memory\n");
    -return -ENOMEM;
    -}
    
    -error = __mxt_read_reg(client, MXT_OBJECT_START, table_size,
    -object_table);
    -if (error) {
    

- kfree(object_table);
- return error;
-
/* Valid Report IDs start counting from 1 */
reportid = 1;
data->mem_size = 0;
- for (i = 0; i < data->info.object_num; i++) {
+ for (i = 0; i < data->info->object_num; i++) {
    struct mxt_object *object = object_table + i;
    u8 min_id, max_id;

    @ @ -1651.8 +1624.8 @ @

    switch (object->type) {
    case MXT_GEN_MESSAGE_T5:

        - if (data->info.family_id == 0x80 &&
            - data->info.version < 0x20) {
+ if (data->info->family_id == 0x80 &&
+     data->info->version < 0x20) {
/*
 * On mXT224 firmware versions prior to V2.0
 * read and discard unused CRC byte otherwise
 @@ -1674,10 +1647,11 @@
 break;
 case MXT_TOUCH_MULTI_T9:

        - data->T9_reportid_min = min_id;
        - data->T9_reportid_max = max_id;
        - data->num_touchids = object->num_report_ids
        -* mxt_obj_instances(object);
+ data->T9_reportid_max = min_id +
+ object->num_report_ids - 1;
+ data->num_touchids = object->num_report_ids;
        break;
 case MXT_SPT_MESSAGECOUNT_T44:

data->T44_address = object->start_address;
@@ -1707,24 +1681,102 @@
/* If T44 exists, T5 position has to be directly after */
 if (data->T44_address && (data->T5_address != data->T44_address + 1)) {
    dev_err(&client->dev, "Invalid T44 position\n");
    -error = -EINVAL;
    -goto free_object_table;
+ return -EINVAL;
 }

 data->msg_buf = kmalloc(data->max_reportid,
data->T5_msg_size, GFP_KERNEL);
-if (!data->msg_buf) {
-dev_err(&client->dev, "Failed to allocate message buffer\n");
+if (!data->msg_buf)
+return -ENOMEM;
+
+return 0;
+}
+
+static int mxt_read_info_block(struct mxt_data *data)
+{
+struct i2c_client *client = data->client;
+int error;
+size_t size;
+void *id_buf, *buf;
+uint8_t num_objects;
+u32 calculated_crc;
+u8 *crc_ptr;
+
+/* If info block already allocated, free it */
+if (data->raw_info_block)
+mxt_free_object_table(data);
+
+/* Read 7-byte ID information block starting at address 0 */
+size = sizeof(struct mxt_info);
+id_buf = kzalloc(size, GFP_KERNEL);
+if (!id_buf)
+error = -ENOMEM;
+
+error = __mxt_read_reg(client, 0, size, id_buf);
+if (error)
+goto err_free_mem;
+
+/* Resize buffer to give space for rest of info block */
+num_objects = ((struct mxt_info *)id_buf)->object_num;
+size += (num_objects * sizeof(struct mxt_object))
++ MXT_INFO_CHECKSUM_SIZE;
+
+buf = krealloc(id_buf, size, GFP_KERNEL);
+if (!buf) {
+error = -ENOMEM;
+goto free_object_table;
+} err_free_mem;
+
+/* Read rest of info block */
+error = __mxt_read_reg(client, MXT_OBJECT_START,
size - MXT_OBJECT_START,
id_buf + MXT_OBJECT_START);
if (error)
+goto err_free_mem;
+/* Extract & calculate checksum */
crc_ptr = id_buf + size - MXT_INFO_CHECKSUM_SIZE;
data->info_crc = crc_ptr[0] | (crc_ptr[1] << 8) | (crc_ptr[2] << 16);
+calculated_crc = mxt_calculate_crc(id_buf, 0,
+ size - MXT_INFO_CHECKSUM_SIZE);
+
*/
+ /* CRC mismatch can be caused by data corruption due to I2C comms
+ * issue or else device is not using Object Based Protocol (eg i2c-hid)
+ */
+if (((data->info_crc == 0) || (data->info_crc != calculated_crc)) {
+dev_err(&client->dev, "Info Block CRC error calculated=0x%06X read=0x%06X\n",
+calculated_crc, data->info_crc);
+error = -EIO;
+goto err_free_mem;
}
-data->object_table = object_table;
+data->raw_info_block = id_buf;
+data->info = (struct mxt_info *)id_buf;
+
+dev_info(&client->dev,
+ "Family: %u Variant: %u Firmware V%u.%u.%02X Objects: %u\n",
+ data->info->family_id, data->info->variant_id,
+ data->info->version >> 4, data->info->version & 0xf,
+ data->info->build, data->info->object_num);
+
+/* Parse object table information */
+error = mxt_parse_object_table(data, id_buf + MXT_OBJECT_START);
+if (error) {
+dev_err(&client->dev, "Error %d parsing object table\n", error);
+mxt_free_object_table(data);
+goto err_free_mem;
+}
+
+data->object_table = (struct mxt_object *)(id_buf + MXT_OBJECT_START);

return 0;

-free_object_table:
-mxt_free_object_table(data);
+err_free_mem:
+kfree(id_buf);
return error;
}

@@ -2039,7 +2091,7 @@
int error;

while (1) {
-error = mxt_get_info(data);
+error = mxt_read_info_block(data);
if (!error)
break;

@@ -2070,16 +2122,9 @@
msleep(MXT_FW_RESET_TIME);
}

/* Get object table information */
-error = mxt_get_object_table(data);
-if (error) {
-dev_err(&client->dev, "Error %d reading object table\n", error);
-return error;
-
-error = mxt_acquire_irq(data);
-if (error)
-goto err_free_object_table;
+return error;

error = request_firmware_nowait(THIS_MODULE, true, MXT_CFG_NAME,
-&client->dev, GFP_KERNEL, data,
-@@ -2087,14 +2132,10 @@
-if (error) {
-dev_err(&client->dev, "Failed to invoke firmware loader: %d\n", error);
-goto err_free_object_table;
+return error;
}

return 0;
-
-err_free_object_table:
-mxt_free_object_table(data);
-return error;
}

static int mxt_set_t7_power_cfg(struct mxt_data *data, u8 sleep)
static u16 mxt_get_debug_value(struct mxt_data *data, unsigned int x,
    unsigned int y)
{
    struct mxt_info *info = &data->info;
    struct mxt_dbg *dbg = &data->dbg;
    unsigned int ofs, page;
    unsigned int col = 0;
}

static void mxt_debug_init(struct mxt_data *data)
{
    struct mxt_info *info = &data->info;
    struct mxt_dbg *dbg = &data->dbg;
    struct mxt_object *object;
    int error;
    const struct firmware *cfg)
{
    struct device *dev = &data->client->dev;
    struct mxt_info *info = &data->info;
    int error;

    error = mxt_init_t7_power_cfg(data);

    mxt_debug_init(data);

    -dev_info(dev),
    - "Family: %u Variant: %u Firmware V%u.%u.%02X Objects: %u
";
    - info->family_id, info->variant_id, info->version >> 4,
    - info->version & 0xf, info->build, info->object_num);

    return 0;
}

struct device_attribute *attr, char *buf)
{
    struct mxt_data *data = dev_get_drvdata(dev);
    struct mxt_info *info = &data->info;
    struct mxt_dbg *dbg = &data->dbg;
    return scnprintf(buf, PAGE_SIZE, "%u.%u.%02X
", info->version >> 4, info->version & 0xf, info->build);
}

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struct device_attribute *attr, char *buf)
{
    struct mxt_data *data = dev_get_drvdata(dev);
    struct mxt_info *info = &data->info;
    return scnprintf(buf, PAGE_SIZE, "%u.%u\n",
        info->family_id, info->variant_id);
}
@@ -2656,7 +2691,7 @@
return -ENOMEM;
error = 0;
-for (i = 0; i < data->info.object_num; i++) {
+for (i = 0; i < data->info->object_num; i++) {
    object = data->object_table + i;

    if (!mxt_object_readable(object->type))
@@ -3031,6 +3066,24 @@
    },
    +/* Samsung Chromebook Pro */
    +.ident = "Samsung Chromebook Pro",
    +.matches = {
    +DMI_MATCH(DMI_SYS_VENDOR, "Google"),
    +DMI_MATCH(DMI_PRODUCT_NAME, "Caroline"),
    +},
    +.driver_data = samus_platform_data,
    +},
    +{ /* Samsung Chromebook Pro */
    +.ident = "Samsung Chromebook Pro",
    +.matches = {
    +DMI_MATCH(DMI_SYS_VENDOR, "Google"),
    +DMI_MATCH(DMI_PRODUCT_NAME, "Caroline"),
    +},
    +.driver_data = samus_platform_data,
    +},
    +{ /* Other Google Chromebooks */
    +.ident = "Chromebook",
    +.matches = {
    @@ -3213,6 +3266,8 @@
        mutex_unlock(&input_dev->mutex);

        disable_irq(data->irq);
    +
return 0;
}

@@ -3225,6 +3280,8 @@
if (!input_dev)
    return 0;
+
enable_irq(data->irq);
+
mutex_lock(&input_dev->mutex);

if (input_dev->users)
--- linux-4.15.0.orig/drivers/input/touchscreen/cyttsp4_core.c
+++ linux-4.15.0/drivers/input/touchscreen/cyttsp4_core.c
@@ -2000,11 +2000,6 @@
    /* get sysinfo */
    md->si = &cd->sysinfo;
-   if (!md->si) {
-     dev_err(dev, "%s: Fail get sysinfo pointer from core p=%p\n",
-        __func__, md->si);
-     goto error_get_sysinfo;
-   }

rc = cyttsp4_setup_input_device(cd);
if (rc)
    return 0;

error_init_input:
input_free_device(md->input);
-error_get_sysinfo:
    input_set_drvdata(md->input, NULL);
-error_alloc_failed:
    dev_err(dev, "%s failed.\n", __func__);  
    rc = cyttsp4_setup_input_device(md->input);
    if (rc)
        return error;
    dev_err(dev, "%s failed\n", __func__);
    return rc;
--- linux-4.15.0.orig/drivers/input/touchscreen/edt-ft5x06.c
+++ linux-4.15.0/drivers/input/touchscreen/edt-ft5x06.c
@@ -970,6 +970,7 @@
{
    const struct edt_i2c_chip_data *chip_data;
    struct edt_ft5x06_ts_data *tsdata;
+   u8 buf[2] = { 0xfc, 0x00 };
    struct input_dev *input;
    unsigned long irq_flags;
    int error;
@@ -1039,6 +1040,12 @@
    return error;
}
/ * Dummy read access. EP0700MLP1 returns bogus data on the first
 * register read access and ignores writes.
 */
edt_ft5x06_ts_readwrite(tsdata->client, 2, buf, 2, buf);
+
edt_ft5x06_ts_set_regs(tsdata);
edt_ft5x06_ts_get_defaults(&client->dev, tsdata);
edt_ft5x06_ts_get_parameters(tsdata);
--- linux-4.15.0.orig/drivers/input/touchscreen/elants_i2c.c
+++ linux-4.15.0/drivers/input/touchscreen/elants_i2c.c
@@ -41,6 +41,7 @@
#include <linux/of.h>
#include <linux/gpio/consumer.h>
#include <linux/regulator/consumer.h>
+#include <linux/uuid.h>
#include <asm/unaligned.h>

/* Device, Driver information */
@@ -1000,7 +1001,7 @@
     "Normal" : "Recovery" );
 }

-static DEVICE_ATTR(calibrate, S_IWUSR, NULL, calibrate_store);
+static DEVICE_ATTR_WO(calibrate);
static DEVICE_ATTR(iap_mode, S_IRUGO, show_iap_mode, NULL);
static DEVICE_ATTR(update_fw, S_IWUSR, NULL, write_update_fw);

@@ -1132,6 +1133,40 @@
}
}

+#ifdef CONFIG_ACPI
+static const struct acpi_device_id i2c_hid_ids[] = {
+  "{"ACPI0C50", 0 },
+  "{"PNP0C50", 0 },
+  { },
+};
+
+static const guid_t i2c_hid_guid =
+GUID_INIT(0x3CDFF6F7, 0x4267, 0x4555,
+  0xAD, 0x05, 0xB3, 0x0A, 0x3D, 0x89, 0x38, 0xDE);
+
+static bool elants_acpi_is_hid_device(struct device *dev)
+{
+  acpi_handle handle = ACPI_HANDLE(dev);
+  union acpi_object *obj;


+if (acpi_match_device_ids(ACPI_COMPANION(dev), i2c_hid_ids))
+return false;
+
+obj = acpi_evaluate_dsm_typed(handle, &i2c_hid_guid, 1, 1, NULL, ACPI_TYPE_INTEGER);
+if (obj) {
+ACPI_FREE(obj);
+return true;
+
+return false;
+}
+
+#endif
+
static bool elants_acpi_is_hid_device(struct device *dev)
+
{+return false;
+}
+
static int elants_i2c_probe(struct i2c_client *client,
const struct i2c_device_id *id)
{
	/* Don't bind to i2c-hid compatible devices, these are handled by the i2c-hid drv. */
+if (elants_acpi_is_hid_device(&client->dev)) {
+dev_warn(&client->dev, "This device appears to be an I2C-HID device, not binding\n");
+return -ENODEV;
+
+}
+
+if (!i2c_check_functionality(client->adapter, I2C_FUNC_I2C)) {
-dev_err(&client->dev,
-"%s: i2c check functionality error\n", DEVICE_NAME);
+dev_err(&client->dev, "I2C check functionality error\n");
return -ENXIO;
}

--- linux-4.15.0.orig/drivers/input/touchscreen/elo.c
+++ linux-4.15.0/drivers/input/touchscreen/elo.c
@@ -345,8 +345,10 @@
switch (elo->id) {
    case 0: /* 10-byte protocol */
-    if (elo_setup_10(elo)) {
+    if (elo_setup_10(elo)) {
+err = -EIO;
goto fail3;
+

break;

--- linux-4.15.0.orig/drivers/input/touchscreen/goodix.c
+++ linux-4.15.0/drivers/input/touchscreen/goodix.c
@@ -131,6 +131,27 @@
     static const struct dmi_system_id rotated_screen[] = {
     #if defined(CONFIG_DMI) && defined(CONFIG_X86)
     
     +.ident = "Teclast X89",
     +.matches = {
     +/* tPAD is too generic, also match on bios date */
     +DMI_MATCH(DMI_BOARD_VENDOR, "TECLAST"),
     +DMI_MATCH(DMI_BOARD_NAME, "tPAD"),
     +DMI_MATCH(DMI_BIOS_DATE, "12/19/2014"),
     +},
     +}
     +
     +.ident = "Teclast X98 Pro",
     +.matches = {
     +/*
     + * Only match BIOS date, because the manufacturers
     + * BIOS does not report the board name at all
     + * (sometimes)... 
     + */
     +DMI_MATCH(DMI_BOARD_VENDOR, "TECLAST"),
     +DMI_MATCH(DMI_BIOS_DATE, "10/28/2015"),
     +},
     +}
     +
     +{.
     .ident = "WinBook TW100",
     .matches = {
DMI_MATCH(DMI_SYS_VENDOR, "WinBook"),
@@ -878,8 +899,10 @@
 int error;

 /* We need gpio pins to suspend/resume */
- if (!ts->gpiod_int || !ts->gpiod_rst)
+ if (!ts->gpiod_int || !ts->gpiod_rst) {
+ disable_irq(client->irq);
 return 0;
+ }

 wait_for_completion(&ts->firmware_loading_complete);

@@ -919,8 +942,10 @@
struct goodix_ts_data *ts = i2c_get_clientdata(client);
int error;

- if (!ts->gpiod_int || !ts->gpiod_rst)
+ if (!ts->gpiod_int || !ts->gpiod_rst) {
    + enable_irq(client->irq);
    return 0;
+ }

    /*
     * Exit sleep mode by outputting HIGH level to INT pin
     @ @ -954,6 +979,7 @ @
     #ifdef CONFIG_ACPI
     static const struct acpi_device_id goodix_acpi_match[] = {
     +{ "GDIX1002", 0 },
     +{ "GDIX1003", 0 },
     +{ };
     MODULE_DEVICE_TABLE(acpi, goodix_acpi_match);
     --- linux-4.15.0.orig/drivers/input/touchscreen/imx6ul_tsc.c
     +++ linux-4.15.0/drivers/input/touchscreen/imx6ul_tsc.c
     @ @ -542,20 +542,25 @ @

     mutex_lock(&input_dev->mutex);

     - if (input_dev->users) {
     -retval = clk_prepare_enable(tsc->adc_clk);
     -if (retval)
     - goto out;
     + if (!input_dev->users)
     + goto out;

     -retval = clk_prepare_enable(tsc->tsc_clk);
     -if (retval) {
     - clk_disable_unprepare(tsc->adc_clk);
     - goto out;
     -}
     +retval = clk_prepare_enable(tsc->tsc_clk);
     +if (retval)
     + goto out;

     -retval = imx6ul_tsc_init(tsc);
     +retval = clk_prepare_enable(tsc->tsc_clk);
     +if (retval) {
     + clk_disable_unprepare(tsc->adc_clk);
     + goto out;
     }

     */
+retval = imx6ul_tsc_init(tsc);
+if (retval) {
+clk_disable_unprepare(tsc->tsc_clk);
+clk_disable_unprepare(tsc->adc_clk);
+goto out;
+
out:
mutex_unlock(&input_dev->mutex);
return retval;
--- linux-4.15.0.orig/drivers/input/touchscreen/mms114.c
+++ linux-4.15.0/drivers/input/touchscreen/mms114.c
@@ -82,15 +82,15 @@
if (reg <= MMS114_MODE_CONTROL && reg + len > MMS114_MODE_CONTROL)
BUG();

-/* Write register: use repeated start */
+/* Write register */
xfer[0].addr = client->addr;
xfer[0].flags = I2C_M_TEN | I2C_M_NOSTART;
+xfer[0].flags = client->flags & I2C_M_TEN;
xfer[0].len = 1;
xfer[0].buf = &buf;

/* Read data */
xfer[1].addr = client->addr;
-xfer[1].flags = I2C_M_RD;
+xfer[1].flags = (client->flags & I2C_M_TEN) | I2C_M_RD;
xfer[1].len = len;
xfer[1].buf = val;

@@ -437,10 +437,8 @@
return -EINVAL;
}

-if (!i2c_check_functionality(client->adapter,
-12C_FUNC_PROTOCOL_MANGLING)) {
-dev_err(&client->dev,
-"Need i2c bus that supports protocol mangling\n");
+if (!i2c_check_functionality(client->adapter, I2C_FUNC_I2C)) {
+dev_err(&client->dev, "Not supported I2C adapter\n");
return -ENODEV;
}

--- linux-4.15.0.orig/drivers/input/touchscreen/raydium_i2c_ts.c
+++ linux-4.15.0/drivers/input/touchscreen/raydium_i2c_ts.c
@@ -419,6 +419,7 @@
 enum raydium_bl_ack state) {

int error;
+static const u8 cmd[] = { 0xFF, 0x39 };  

error = raydium_i2c_send(client, RM_CMD_BOOT_WRT, data, len);
if (error) {
    return error;
}

-error = raydium_i2c_send(client, RM_CMD_BOOT_ACK, NULL, 0);
+error = raydium_i2c_send(client, RM_CMD_BOOT_ACK, cmd, sizeof(cmd));
if (error) {
    dev_err(&client->dev, "Ack obj command failed: \%d\\n", error);
    return error;
}

return 0;
}

-station bool raydium_i2c_boot_trigger(struct i2c_client *client)
+static int raydium_i2c_boot_trigger(struct i2c_client *client)
{
    static const u8 cmd[7][6] = {
        { 0x08, 0x0C, 0x09, 0x00, 0x50, 0xD7 },
    }
    return 0;
}

-station bool raydium_i2c_fw_trigger(struct i2c_client *client)
+static int raydium_i2c_fw_trigger(struct i2c_client *client)
{
    static const u8 cmd[5][11] = {
        { 0, 0x09, 0x71, 0x0C, 0x09, 0x00, 0x50, 0xD7, 0, 0, 0 },
    }
    --- linux-4.15.0.orig/drivers/input/touchscreen/rohm_bu21023.c
    +++ linux-4.15.0/drivers/input/touchscreen/rohm_bu21023.c
    @@ -304,7 +304,7 @@
    msg[1].len = len;
    msg[1].buf = buf;

    i2c_lock_adapter(adap);
+    i2c_lock_bus(adap, I2C_LOCK_SEGMENT);

    for (i = 0; i < 2; i++) {
        if (__i2c_transfer(adap, &msg[i], 1) < 0) {
            return -errno;
        }
    }

    i2c_unlock_adapter(adap);
+i2c_unlock_bus(adap, I2C_LOCK_SEGMENT);

return ret;
}
--- linux-4.15.0.orig/drivers/input/touchscreen/s6sy761.c
+++ linux-4.15.0/drivers/input/touchscreen/s6sy761.c
@@ -145,8 +145,8 @@
u8 major = event[4];
u8 minor = event[5];
u8 z = event[6] & S6SY761_MASK_Z;
-u16 x = (event[1] << 3) | ((event[3] & S6SY761_MASK_X) >> 4);
-u16 y = (event[2] << 3) | (event[3] & S6SY761_MASK_Y);
+r16 x = (event[1] << 4) | ((event[3] & S6SY761_MASK_X) >> 4);
+r16 y = (event[2] << 4) | (event[3] & S6SY761_MASK_Y);

input_mt_slot(sdata->input, tid);

--- linux-4.15.0.orig/drivers/input/touchscreen/silead.c
+++ linux-4.15.0/drivers/input/touchscreen/silead.c
@@ -28,6 +28,7 @@
#include <linux/input/mt.h>
#include <linux/input/touchscreen.h>
#include <linux/pm.h>
+#include <linux/pm_runtime.h>
#include <linux/irq.h>
#include <linux/regulator/consumer.h>

@@ -319,10 +320,8 @@
error = i2c_smbus_read_i2c_block_data(client, SILEAD_REG_ID,
    sizeof(chip_id), (u8 *)&chip_id);
    -if (error < 0) {
    -dev_err(&client->dev, "Chip ID read error %d\n", error);
    +if (error < 0)
    return error;
    -}

    data->chip_id = le32_to_cpu(chip_id);
    dev_info(&client->dev, "Silead chip ID: 0x%8X", data->chip_id);
@@ -335,12 +334,49 @@
int error;
    u32 status;
+
/*
 + * Some buggy BIOS-es bring up the chip in a stuck state where it
 + * blocks the I2C bus. The following steps are necessary to
 + * unstuck the chip / bus:
 + * 1. Turn off the Silead chip.
 */
+ * 2. Try to do an I2C transfer with the chip, this will fail in
+ * response to which the I2C-bus-driver will call:
+ * i2c_recover_bus() which will unstuck the I2C-bus. Note the
+ * unstuck-ing of the I2C bus only works if we first drop the
+ * chip off the bus by turning it off.
+ * 3. Turn the chip back on.
+ *
+ * On the x86/ACPI systems were this problem is seen, step 1. and
+ * 3. require making ACPI calls and dealing with ACPI Power
+ * Resources. The workaround below runtime-suspends the chip to
+ * turn it off, leaving it up to the ACPI subsystem to deal with
+ * this.
+ */
+
+ if (device_property_read_bool(&client->dev,
+     "silead,stuck-controller-bug")) {
+     pm_runtime_set_active(&client->dev);
+     pm_runtime_enable(&client->dev);
+     pm_runtime_allow(&client->dev);
+     pm_runtime_suspend(&client->dev);
+     dev_warn(&client->dev, FW_BUG "Stuck I2C bus: please ignore the next 'controller timed out' error\n");
+     silead_ts_get_id(client);
+     */ The forbid will also resume the device */
+     pm_runtime_forbid(&client->dev);
+     pm_runtime_disable(&client->dev);
+ }  
+ silead_ts_set_power(client, SILEAD_POWER_OFF);
+ silead_ts_set_power(client, SILEAD_POWER_ON);
+error = silead_ts_get_id(client);
- if (error)
+ if (error) {
+     dev_err(&client->dev, "Chip ID read error %d\n", error);
+     return error;
+ }
+error = silead_ts_init(client);
+ if (error)
+     error = silead_ts_init(client);
+ @ @ -534,20 +570,33 @ @
+ static int __maybe_unused silead_ts_resume(struct device *dev)
+ {
+     struct i2c_client *client = to_i2c_client(dev);
+     bool second_try = false;
+     int error, status;
silead_ts_set_power(client, SILEAD_POWER_ON);

+ retry:
error = silead_ts_reset(client);
if (error)
return error;

+if (second_try) {
+error = silead_ts_load_fw(client);
+if (error)
+return error;
+
+error = silead_ts_startup(client);
if (error)
return error;

status = silead_ts_get_status(client);
if (status != SILEAD_STATUS_OK) {
+second_try = true;
+dev_dbg(dev, "Reloading firmware after unsuccessful resume\n");
+goto retry;
+
dev_err(dev, "Resume error, status: 0x%02x\n", status);
return -ENODEV;
}
@@ -578,6 +627,9 @@
}{ "GSL3675", 0 },
{ "GSL3692", 0 },
{ "MSSL1680", 0 },
+{ "MSSL0001", 0 },
+{ "MSSL0002", 0 },
+{ "MSSL0017", 0 },
{ }
):
MODULE_DEVICE_TABLE(acpi, silead_ts_acpi_match);
--- linux-4.15.0.orig/drivers/input/touchscreen/st1232.c
+++ linux-4.15.0/drivers/input/touchscreen/st1232.c
@@ -195,6 +195,7 @@
input_dev->id.bustype = BUS_I2C;
input_dev->dev.parent = &client->dev;

+_set_bit(INPUT_PROP_DIRECT, input_dev->propbit);
_set_bit(EV_SYN, input_dev->evbit);
_set_bit(EV_KEY, input_dev->evbit);
_set_bit(EV_ABS, input_dev->evbit);
--- linux-4.15.0.orig/drivers/input/touchscreen/stmfts.c
+++ linux-4.15.0/drivers/input/touchscreen/stmfts.c
@@ -106,27 +106,29 @@
   bool running;
   }

-static void stmfts_brightness_set(struct led_classdev *led_cdev, 
+static int stmfts_brightness_set(struct led_classdev *led_cdev, 
   enum led_brightness value)
   {
   struct stmfts_data *sdata = container_of(led_cdev, 
   struct stmfts_data, led_cdev);
   int err;

   -if (value == sdata->led_status || !sdata->ledvdd)
      return;
   -if (!value) {
      -regulator_disable(sdata->ledvdd);
      -} else {
      -err = regulator_enable(sdata->ledvdd);
      -if (err)
        -dev_warn(&sdata->client->dev, 
          -"failed to disable ledvdd regulator: %d\n",
          -err);
      +if (value != sdata->led_status && sdata->ledvdd) {
      +if (!value) {
        +regulator_disable(sdata->ledvdd);
      +} else {
        +err = regulator_enable(sdata->ledvdd);
        +if (err) 
          +dev_warn(&sdata->client->dev, 
            +"failed to disable ledvdd regulator: %d\n",
            +err);
          +return err;
        +}
      +} 
      +sdata->led_status = value;
   }

   -sdata->led_status = value;
   +return 0;
   }

 static enum led_brightness stmfts_brightness_get(struct led_classdev *led_cdev)
@@ -477,7 +479,7 @@
      +} else {
      +err = regulator_enable(sdata->ledvdd);
      +if (err) 
        +dev_warn(&sdata->client->dev, 
          +"failed to disable ledvdd regulator: %d\n",
          +err);
          +return err;
      +}
   +sdata->led_status = value;
   }

 mutex_lock(&sdata->mutex);
-if (value & sdata->hover_enabled)
+if (value && sdata->hover_enabled)
    goto out;

if (sdata->running)
@@ -608,7 +610,7 @@
    sdata->led_cdev.name = STMFTS_DEV_NAME;
    sdata->led_cdev.max_brightness = LED_ON;
    sdata->led_cdev.brightness = LED_OFF;
-    sdata->led_cdev.brightness_set = stmfts_brightness_set;
+    sdata->led_cdev.brightness_set_blocking = stmfts_brightness_set;
    sdata->led_cdev.brightness_get = stmfts_brightness_get;

    err = devmLed_classdev_register(&sdata->client->dev, &sdata->led_cdev);
@@ -682,6 +684,14 @@
    input_set_drvdata(sdata->input, sdata);

    /*
+     * stmfts_power_on expects interrupt to be disabled, but
+     * at this point the device is still off and I do not trust
+     * the status of the irq line that can generate some spurious
+     * interrupts. To be on the safe side it's better to not enable
+     * the interrupts during their request.
+     */
+    irq_set_status_flags(client->irq, IRQ_NOAUTOEN);
    err = devm_request_threaded_irq(&client->dev, client->irq,
        NULL, stmfts_irq_handler,
        IRQF_ONESHOT,
        @@ -689,9 +699,6 @@
        if (err)
            return err;

-/* stmfts_power_on expects interrupt to be disabled */
-disable_irq(client->irq);
-
    dev_dbg(&client->dev, "initializing ST-Microelectronics FTS...\n");

    err = stmfts_power_on(sdata);
--- linux-4.15.0.orig/drivers/input/touchscreen/sun4i-ts.c
+++ linux-4.15.0/drivers/input/touchscreen/sun4i-ts.c
@@ -246,6 +246,7 @@
    struct device *dev = &pdev->dev;
    struct device_node *np = dev->of_node;
    struct device *hwmon;
+    struct thermal_zone_device *thermal;
    int error;
u32 reg;
bool ts_attached;
@@ -365,7 +366,10 @@
if (IS_ERR(hwmon))
    return PTR_ERR(hwmon);

-devm_thermal_zone_of_sensor_register(ts->dev, 0, ts, &sun4i_ts_tz_ops);
+thermal = devm_thermal_zone_of_sensor_register(ts->dev, 0, ts,
+       &sun4i_ts_tz_ops);
+if (IS_ERR(thermal))
+return PTR_ERR(thermal);

writel(TEMP_IRQ_EN(1), ts->base + TP_INT_FIFOC);

--- linux-4.15.0.orig/drivers/input/touchscreen/sur40.c
+++ linux-4.15.0/drivers/input/touchscreen/sur40.c
@@ -537,7 +537,7 @@
     /* Check if we really have the right interface. */
     iface_desc = &interface->altsetting[0];
     +iface_desc = interface->cur_altsetting;
     if (iface_desc->desc.bInterfaceClass != 0xFF)
         return -ENODEV;

--- linux-4.15.0.orig/drivers/input/touchscreen/usbtouchscreen.c
+++ linux-4.15.0/drivers/input/touchscreen/usbtouchscreen.c
@@ -197,6 +197,7 @@
     #ifdef CONFIG_TOUCHSCREEN_USB_IRTOUCH
     +{USB_DEVICE(0x255e, 0x0001), .driver_info = DEVTYPE_IRTOUCH},
     {USB_DEVICE(0x595a, 0x0001), .driver_info = DEVTYPE_IRTOUCH},
     {USB_DEVICE(0x6615, 0x0001), .driver_info = DEVTYPE_IRTOUCH},
     {USB_DEVICE(0x6615, 0x0012), .driver_info = DEVTYPE_IRTOUCH_HIRES},
@@ -265,7 +266,7 @@
     int ret;
     struct usb_device *udev = interface_to_usbdev(usbtouch->interface);

-    ret = usb_control_msg(udev, usb_rcvctrlpipe(udev, 0),
+    ret = usb_control_msg(udev, usb_sndctrlpipe(udev, 0),
        0x01, 0x02, 0x0000, 0x0081,
        NULL, 0, USB_CTRL_SET_TIMEOUT);
@@ -461,7 +462,7 @@
     int ret, i;
     struct usb_device *udev = interface_to_usbdev(usbtouch->interface);
-ret = usb_control_msg(udev, usb_rcvctrlpipe(udev, 0),
+ret = usb_control_msg(udev, usb_sndctrlpipe(udev, 0),
    MTOUCHUSB_RESET,
    USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
    1, 0, NULL, 0, USB_CTRL_SET_TIMEOUT);
@@ -473,7 +474,7 @@
msleep(150);

for (i = 0; i < 3; i++) {
-    ret = usb_control_msg(udev, usb_rcvctrlpipe(udev, 0),
+    ret = usb_control_msg(udev, usb_sndctrlpipe(udev, 0),
        MTOUCHUSB_ASYNC_REPORT,
        USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
        1, 1, NULL, 0, USB_CTRL_SET_TIMEOUT);
@@ -644,7 +645,7 @@
}

/* start sending data */
-ret = usb_control_msg(dev, usb_rcvctrlpipe (dev, 0),
+ret = usb_control_msg(dev, usb_sndctrlpipe(dev, 0),
    TSC10_CMD_DATA1,
    USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
    0, 0, NULL, 0, USB_CTRL_SET_TIMEOUT);
--- linux-4.15.0.orig/drivers/input/touchscreen/wm97xx-core.c
+++ linux-4.15.0/drivers/input/touchscreen/wm97xx-core.c
@@ -929,7 +929,8 @@
static void __exit wm97xx_exit(void)
{
    -driver_unregister(&wm97xx_driver);
+if (IS_BUILTIN(CONFIG_AC97_BUS))
+    driver_unregister(&wm97xx_driver);
platform_driver_unregister(&wm97xx_mfd_driver);
}

--- linux-4.15.0.orig/drivers/iommu/Kconfig
+++ linux-4.15.0/drivers/iommu/Kconfig
@@ -338,6 +338,14 @@
Enables bits of IOMMU API required by VFIO. The iommu_ops
    is not implemented as it is not necessary for VFIO.

+config S390_AP_IOMMU
+bool "S390 AP IOMMU Support"
+depends on S390 && ZCRYPT
+select IOMMU_API
+help
+    Enables bits of IOMMU API required by VFIO. The iommu_ops
+    is not implemented as it is not necessary for VFIO.
config MTK_IOMMU
bool "MTK IOMMU Support"
depends on ARM || ARM64
--- linux-4.15.0.orig/drivers/iommu/amd_iommu.c
+++ linux-4.15.0/drivers/iommu/amd_iommu.c
@@ -138,10 +138,14 @@
 static inline int match_hid_uid(struct device *dev,
 struct acpihid_map_entry *entry)
 {
+struct acpi_device *adev = ACPI_COMPANION(dev);
 const char *hid, *uid;

 -hid = acpi_device_hid(ACPI_COMPANION(dev));
 -uid = acpi_device_uid(ACPI_COMPANION(dev));
+if (!adev)
+  return -ENODEV;
 +
+hid = acpi_device_hid(adev);
+uid = acpi_device_uid(adev);

 if (!hid || !(*hid))
  return -ENODEV;
@@ -252,7 +256,13 @@
 /* The callers make sure that get_device_id() does not fail here */
 devid = get_device_id(dev);
+
+/* For ACPI HID devices, we simply return the devid as such */
+if (!dev_is_pci(dev))
+  return devid;
+
 ivrs_alias = amd_iommu_alias_table[devid];
+
 pci_for_each_dma_alias(pdev, __last_alias, &pci_alias);

 if (ivrs_alias == pci_alias)
@@ -310,6 +320,8 @@
 if (dev_data == NULL) {
 dev_data = alloc_dev_data(devid);
+if (!dev_data)
+  return NULL;

 if (translation_pre_enabled(iommu))
 dev_data->defer_attach = true;
@@ -433,7 +445,14 @@
dev_data->alias = get_alias(dev);

- if (dev_is_pci(dev) && pci_iommu2_capable(to_pci_dev(dev))) {
  + /* By default we use passthrough mode for IOMMUv2 capable device.
  +  But if amd_iommu=force_isolation is set (e.g. to debug DMA to
  +  invalid address), we ignore the capability for the device so
  +  it'll be forced to go into translation mode.
  + */
  + if ((iommu_pass_through || !amd_iommu_force_isolation) &&
  + dev_is_pci(dev) && pci_iommu2_capable(to_pci_dev(dev))) {
    struct amd_iommu *iommu;

    iommu = amd_iommu_rlookup_table[dev_data->devid];
    iommu_completion_wait(iommu);
  }

  + static void amd_iommu_flush_tlb_domid(struct amd_iommu *iommu, u32 dom_id)
  + {
    + struct iommu_cmd cmd;
    +
    + build_inv_iommu_pages(&cmd, 0, CMD_INV_IOMMU_ALL_PAGES_ADDRESS,
    +   dom_id, 1);
    + iommu_queue_command(iommu, &cmd);
    +
    + iommu_completion_wait(iommu);
    + }
  +
  + static void amd_iommu_flush_all(struct amd_iommu *iommu)
  + {
    struct iommu_cmd cmd;
    @ @ -1310,26 +1340,34 @ @
    * another level increases the size of the address space by 9 bits to a size up
    * to 64 bits.
    */
  - static bool increase_address_space(struct protection_domain *domain,
  + static void increase_address_space(struct protection_domain *domain,
    gfp_t gfp)
  + {
    + unsigned long flags;
    u64 *pte;

    - if (domain->mode == PAGE_MODE_6_LEVEL)
    - /* address space already 64 bit large */
    - return false;
    -
    pte = (void *)get_zeroed_page(gfp);
if (!pte)
-    return false;
+    return;
+
+    spin_lock_irqsave(&domain->lock, flags);
+
+    if (WARN_ON_ONCE(domain->mode == PAGE_MODE_6_LEVEL))
+    /* address space already 64 bit large */
+    goto out;

    *pte = PM_LEVEL_PDE(domain->mode,
     iommu_virt_to_phys(domain->pt_root));
    domain->pt_root = pte;
    domain->mode += 1;
    domain->updated = true;
    +pte = NULL;

    -return true;
+out:
  +spin_unlock_irqrestore(&domain->lock, flags);
  +free_page((unsigned long)pte);
  +
  +return;
}

static u64 *alloc_pte(struct protection_domain *domain,
@@ -1819,6 +1857,7 @@
{ u64 pte_root = 0;
    u64 flags = 0;
    +u32 old_domid;

    if (domain->mode != PAGE_MODE_NONE)
    pte_root = iommu_virt_to_phys(domain->pt_root);
@@ -1861,8 +1900,20 @@
    flags &= ~DEV_DOMID_MASK;
    flags |= domain->id;

    +old_domid = amd_iommu_dev_table[devid].data[1] & DEV_DOMID_MASK;
    amd_iommu_dev_table[devid].data[1] = flags;
    amd_iommu_dev_table[devid].data[0] = pte_root;
+  +*/
+  +// A kdump kernel might be replacing a domain ID that was copied from
+  +// the previous kernel--if so, it needs to flush the translation cache
+  +// entries for the old domain ID that is being overwritten
+  +*/
+  +if (old_domid) {

static void clear_dte_entry(u16 devid)
@@ -1903,6 +1954,7 @@

static void do_detach(struct iommu_dev_data *dev_data)
{
+struct protection_domain *domain = dev_data->domain;
    struct amd_iommu *iommu;
    u16 alias;
@@ -1918,10 +1970,6 @@
    iommu = amd_iommu_rlookup_table[dev_data->devid];
    alias = dev_data->domain->domid;
-/* decrease reference counters */
-    dev_data->domain->dev_iommu[iommu->index] -= 1;
-    dev_data->domain->dev_cnt -= 1;
-    /* Update data structures */
-    dev_data->domain = NULL;
-    list_del(&dev_data->list);
@@ -1931,6 +1979,16 @@
    /* Flush the DTE entry */
    device_flush_dte(dev_data);
+    /* Flush IOTLB */
+    domain_flush_tlb_pde(domain);
+    /* Wait for the flushes to finish */
+    domain_flush_complete(domain);
+    /* decrease reference counters - needs to happen after the flushes */
+    domain->dev_iommu[iommu->index] -= 1;
+    domain->dev_cnt -= 1;
}
@@ -2103,6 +2161,8 @@
*/
    domain_flush_tlb_pde(domain);
+domain_flush_complete(domain);
return ret;
}

if (amd_iommu_unmap_flush) {
    dma_ops_free_iova(dma_dom, dma_addr, pages);
domain_flush_tlb(&dma_dom->domain);
domain_flush_complete(&dma_dom->domain);
} else {
    pages = __roundup_pow_of_two(pages);
    queue_iova(&dma_dom->iovad, dma_addr >> PAGE_SHIFT, pages, 0);
}

bus_addr = address + s->dma_address + (j << PAGE_SHIFT);
phys_addr = (sg_phys(s) & PAGE_MASK) + (j << PAGE_SHIFT);
ret = iommu_map_page(domain, bus_addr, phys_addr, PAGE_SIZE, prot, GFP_ATOMIC);
+ PAGE_SIZE, prot,
+ GFP_ATOMIC | __GFP_NOWARN);
if (ret)
goto out_unmap;

/* Everything is mapped - write the right values into s->dma_address */
for_each_sg(sglst, s, nelems, i) {
    s->dma_address += address + s->offset;
/+*
+ * Add in the remaining piece of the scatter-gather offset that
+ * was masked out when we were determining the physical address
+ * via (sg_phys(s) & PAGE_MASK) earlier.
+ */
+s->dma_address += address + (s->offset & ~PAGE_MASK);
s->dma_length = s->length;
}

/* if (--mapped_pages) */
+if (--mapped_pages == 0)
goto out_free_iova;
}
out_free_iova:
-free_iova_fast(&dma_dom->iovad, address, npages);
+free_iova_fast(&dma_dom->iovad, address >> PAGE_SHIFT, npages);

out_err:
return 0;
@@ -3065,7 +3132,7 @@

offset_mask = pte_pgsizel - 1;
- __pte = *pte & PM_ADDR_MASK;
+ __pte = __sme_clr(*pte & PM_ADDR_MASK);

return (__pte & ~offset_mask) | (iova & offset_mask);
}
@@ -3096,21 +3163,24 @@

if (devid < entry->devid_start || devid > entry->devid_end)
continue;

+type = IOMMU_RESV_DIRECT;

length = entry->address_end - entry->address_start;
if (entry->prot & IOMMU_PROT_IR)
 prot |= IOMMU_READ;
if (entry->prot & IOMMU_PROT_IW)
 prot |= IOMMU_WRITE;
+if (entry->prot & IOMMUUNITY_MAP_FLAGEXCL_RANGE)
+/* Exclusion range */
 +type = IOMMU_RESV_RESERVED;

region = iommu_alloc_resv_region(entry->address_start,
- length, prot,
- IOMMU_RESV_DIRECT);
+ length, prot, type);
if (!region) {
 pr_err("Out of memory allocating dm-regions for %s
, dev_name(dev));
@@ -3814,7 +3884,8 @@
 irte->lo. fields_remap.int_type = delivery_mode;
 irte->lo. fields_remap.dm = dest_mode;

---
irte->hi.fields.vector = vector;
-irte->lo.fields_remap.destination = dest_apicid;
+irte->lo.fields_remap.destination = APICID_TO_IRTE_DEST_LO(dest_apicid);
+irte->hi.fields.destination = APICID_TO_IRTE_DEST_HI(dest_apicid);
irte->lo.fields_remap.valid = 1;
}
@@ -3869,7 +3940,10 @@
if (!dev_data || !dev_data->use_vapic ||
   !irte->lo.fields_remap.guest_mode) {
  irte->hi.fields.vector = vector;
-irte->lo.fields_remap.destination = dest_apicid;
+irte->lo.fields_remap.destination = APICID_TO_IRTE_DEST_LO(dest_apicid);
+irte->hi.fields.destination = APICID_TO_IRTE_DEST_HI(dest_apicid);
modify_irte_ga(devid, index, irte, NULL);
}
@@ -4270,7 +4344,10 @@
irte->lo.val = 0;
  irte->hi.fields.vector = cfg->vector;
  irte->lo.fields_remap.guest_mode = 0;
-irte->lo.fields_remap.destination = cfg->dest_apicid;
+irte->lo.fields_remap.destination = APICID_TO_IRTE_DEST_LO(cfg->dest_apicid);
+irte->hi.fields.destination = APICID_TO_IRTE_DEST_HI(cfg->dest_apicid);
  irte->lo.fields_remap.int_type = apic->irq_delivery_mode;
  irte->lo.fields_remap.dm = apic->irq_dest_mode;
@@ -4337,7 +4414,7 @@
static struct irq_chip amd_ir_chip = {
  .name = "AMD-IR",
  .irq_ack = ir_ack_apic_edge,
+  .irq_ack = apic_ack_irq,
  .irq_set_affinity = amd_ir_set_affinity,
  .irq_set_vcpu_affinity = amd_ir_set_vcpu_affinity,
  .irq_compose_msi_msg = ir_compose_msi_msg,
@@ -4351,9 +4428,10 @@
if (!fn)
  return -ENOMEM;
  iommu->ir_domain = irq_domain_create_tree(fn, &amd_ir_domain_ops, iommu);
-  irq_domain_free_fwnode(fn);
-if (!iommu->ir_domain)
+if (!iommu->ir_domain) {
  +irq_domain_free_fwnode(fn);
return -ENOMEM;
+

iommu->ir_domain->parent = arch_get_ir_parent_domain();
iommu->msi_domain = arch_create_remap_msi_irq_domain(iommu->ir_domain,
@@ -4387,8 +4465,12 @@
spin_lock_irqsave(&irt->lock, flags);

if (ref->lo.fields_vapic.guest_mode) {
- if (cpu >= 0)
- ref->lo.fields_vapic.destination = cpu;
+ if (cpu >= 0) {
+ ref->lo.fields_vapic.destination =
+ APICID_TO_IRTE_DEST_LO(cpu);
+ ref->hi.fields.destination =
+ APICID_TO_IRTE_DEST_HI(cpu);
+ }
ref->lo.fields_vapic.is_run = is_run;
barrier();}

--- linux-4.15.0.orig/drivers/iommu/amd_iommu_init.c
+++ linux-4.15.0/drivers/iommu/amd_iommu_init.c
@@ -153,6 +153,7 @@

bool amd_iommu_irq_remap __read_mostly;

int amd_iommu_guest_ir = AMD_IOMMU_GUEST_IR_VAPIC;
+static int amd_iommu_xt_mode = IRQ_REMAP_X2APIC_MODE;

static bool amd_iommu_detected;
static bool __initdata amd_iommu_disabled;
@@ -280,9 +281,9 @@

static void init_translation_status(struct amd_iommu *iommu)
{
- u32 ctrl;
+ u64 ctrl;

-ctrl = readl(iommu->mmio_base + MMIO_CONTROL_OFFSET);
+ctrl = readq(iommu->mmio_base + MMIO_CONTROL_OFFSET);
if (ctrl & (1<<CONTROL_IOMMU_EN))
iommu->flags |= AMD_IOMMU_FLAG_TRANS_PRE_ENABLED;
}
@@ -355,7 +356,7 @@
static void iommu_set_exclusion_range(struct amd_iommu *iommu)
{
 u64 start = iommu->exclusion_start & PAGE_MASK;
- u64 limit = (start + iommu->exclusion_length) & PAGE_MASK;
+ u64 limit = (start + iommu->exclusion_length - 1) & PAGE_MASK;
void iommu_feature_enable(struct amd_iommu *iommu, u8 bit) {
    u64 ctrl;
    +u64 ctrl;
    -ctrl = readq(iommu->mmio_base + MMIO_CONTROL_OFFSET);
    -ctrl |= (1ULL << bit);
    +writeq(ctrl, iommu->mmio_base + MMIO_CONTROL_OFFSET);
}

void iommu_feature_disable(struct amd_iommu *iommu, u8 bit) {
    u64 ctrl;
    +u64 ctrl;
    -ctrl = readq(iommu->mmio_base + MMIO_CONTROL_OFFSET);
    -ctrl &= ~(1ULL << bit);
    +writeq(ctrl, iommu->mmio_base + MMIO_CONTROL_OFFSET);
}

void iommu_set_inv_tlb_timeout(struct amd_iommu *iommu, int timeout) {
    u64 ctrl;
    +u64 ctrl;
    -ctrl = readq(iommu->mmio_base + MMIO_CONTROL_OFFSET);
    +writeq(ctrl, iommu->mmio_base + MMIO_CONTROL_OFFSET);
    ctrl &= ~CTRL_INV_TO_MASK;
    ctrl |= (timeout << CONTROL_INV_TIMEOUT) & CTRL_INV_TO_MASK;
    +writeq(ctrl, iommu->mmio_base + MMIO_CONTROL_OFFSET);
}

/* Function to enable the hardware */
//@ -420,6 +421,9 @@
void iommu_disable(struct amd_iommu *iommu)

{ 
+if (!iommu->mmio_base) 
+return; 
+
/* Disable command buffer */
  iommu_feature_disable(iommu, CONTROL_CMDBUF_EN);

@@ -796,7 +800,8 @@
     entry = (iommu->mmio_base + MMIO_GA_LOG_BASE_OFFSET, &entry, sizeof(entry));
-    entry = (iommu_virt_to_phys(iommu->ga_log) & 0xFFFFFFFFFFFFFULL) & ~7ULL; 
+    entry = (iommu_virt_to_phys(iommu->ga_log_tail) & (BIT_ULL(52)-1)) & ~7ULL; 
    memcpy_toio(iommu->mmio_base + MMIO_GA_LOG_TAIL_OFFSET, &entry, sizeof(entry));
    writel(0x00, iommu->mmio_base + MMIO_GA_HEAD_OFFSET);
@@ -827,6 +832,19 @@
          return ret; 
} 

+static void iommu_enable_xt(struct amd_iommu *iommu) 
+{ 
+#ifdef CONFIG_IRQ_REMAP 
+/#
+ /* XT mode (32-bit APIC destination ID) requires
+ * GA mode (128-bit IRTE support) as a prerequisite.
+ */
+if (AMD_IOMMU_GUEST_IR_GA(amd_iommu_guest_ir) &&
+ amd_iommu_xt_mode == IRQ_REMAP_X2APIC_MODE) 
+iommu_feature_enable(iommu, CONTROL_XT_EN); 
+#endif /* CONFIG_IRQ_REMAP */ 
+} 
+
static void iommu_enable_gt(struct amd_iommu *iommu) 
{ 
  if (!iommu_feature(iommu, FEATURE_GT)) 
@@ -1313,8 +1331,8 @@
} 

case IVHD_DEV_ACPI_HID: { 
  u16 devid;
-u8  hid[ACPIHID_HID_LEN] = {0};
-u8  uid[ACPIHID_UID_LEN] = {0};
+u8  hid[ACPIHID_HID_LEN];
+u8  uid[ACPIHID_UID_LEN];
  int ret;

  if (h->type != 0x40) { 

@@ -1331,6 +1349,7 @@
         break;
 }
 +uid[0] = '\0';
 switch (e->uidf) {
     case UID_NOT_PRESENT:
         @@ -1345,8 +1364,8 @@
             break;
         case UID_IS_CHARACTER:
             -memcpy(uid, (u8 *)(&e->uid), ACPIHID_UID_LEN - 1);
             -uid[ACPIHID_UID_LEN - 1] = '\0';
             +memcpy(uid, &e->uid, e->uidl);
             +uid[e->uidl] = '\0';
             break;
         default:
             @@ -1507,6 +1526,8 @@
             iommu->mmio_phys_end = MMIO_CNTR_CONF_OFFSET;
             if (((h->efr_attr & (0x1 << IOMMU_FEAT_GASUP_SHIFT)) == 0))
                 amd_iommu_guest_ir = AMD_IOMMU_GUEST_IR_LEGACY;
             +if (((h->efr_attr & (0x1 << IOMMU_FEAT_XTSUP_SHIFT)) == 0))
                 +amd_iommu_xt_mode = IRQ_REMAP_XAPIC_MODE;
             break;
             case 0x11:
             case 0x40:
         @@ -1516,6 +1537,8 @@
             iommu->mmio_phys_end = MMIO_CNTR_CONF_OFFSET;
             if (((h->efr_reg & (0x1 << IOMMU_EFR_GASUP_SHIFT)) == 0))
                 amd_iommu_guest_ir = AMD_IOMMU_GUEST_IR_LEGACY;
             +if (((h->efr_reg & (0x1 << IOMMU_EFR_XTSUP_SHIFT)) == 0))
                 +amd_iommu_xt_mode = IRQ_REMAP_XAPIC_MODE;
             break;
             default:
             return -EINVAL;
@@ -1691,7 +1714,7 @@
             NULL,
         void*;
         static int iommu_init_pci(struct amd_iommu *iommu)
+static int __init iommu_init_pci(struct amd_iommu *iommu)
     {
         int cap_ptr = iommu->cap_ptr;
         u32 range, misc, low, high;
@@ -1831,6 +1854,8 @@
             pr_info("AMD-Vi: Interrupt remapping enabled\n");
if (AMD_IOMMU_GUEST_IR_VAPIC(amd_iommu_guest_ir))
    pr_info("AMD-Vi: virtual APIC enabled\n");
+if (amd_iommu_xt_mode == IRQ_REMAP_X2APIC_MODE)
+    pr_info("AMD-Vi: X2APIC enabled\n");
}
}

@@ -1979,6 +2004,9 @@
    if (e == NULL)
        return -ENOMEM;
+	if (m->flags & IVMD_FLAG_EXCL_RANGE)
+	    init_exclusion_range(m);
+    }
    switch (m->type) {
        default:
            kfree(e);
@@ -2025,9 +2053,7 @@
            while (p < end) {
                m = (struct ivmd_header *)p;
-        if (m->flags & IVMD_FLAG_EXCL_RANGE)
-            init_exclusion_range(m);
-        else if (m->flags & IVMD_FLAG_UNITY_MAP)
+        if (m->flags & (IVMD_FLAG_UNITY_MAP | IVMD_FLAG_EXCL_RANGE))
            init_unity_map_range(m);
            p += m->length;
@@ -2167,6 +2193,7 @@
                iommu_enable_event_buffer(iommu);
                iommu_set_exclusion_range(iommu);
                iommu_enable_gap(iommu);
+            iommu_enable_xt(iommu);
                iommu_enable(iommu);
                iommu_flush_all_caches(iommu);
            }
@@ -2211,6 +2238,7 @@
                iommu_enable_command_buffer(iommu);
                iommu_enable_event_buffer(iommu);
                iommu_enable_gap(iommu);
+            iommu_enable_xt(iommu);
                iommu_set_device_table(iommu);
                iommu_flush_all_caches(iommu);
            }
@@ -2690,8 +2718,7 @@
                return ret;
        irq_remapping_enabled = 1;

void amd_iommu_enable(void)
    @@ -2804,7 +2831,7 @@
    }
    for (; *str; ++str) {
        if (strncmp(str, "legacy", 6) == 0) {
            amd_iommu_guest_ir = AMD_IOMMU_GUEST_IR_LEGACY;
            amd_iommu_guest_ir = AMD_IOMMU_GUEST_IR_LEGACY_GA;
            break;
        }
    }
    if (strncmp(str, "vapic", 5) == 0) {

--- linux-4.15.0.orig/drivers/iommu/amd_iommu_types.h
+++ linux-4.15.0/drivers/iommu/amd_iommu_types.h
@@ -159,6 +159,7 @@
#define CONTROL_GAM_EN          0x19ULL
#define CONTROL_GALOG_EN        0x1CULL
#define CONTROL_GAINT_EN        0x1DULL
+#define CONTROL_XT_EN           0x32ULL
#define CTRL_INV_TO_MASK	(7 << CONTROL_INV_TIMEOUT)
#define CTRL_INV_TO_NONE	0
@@ -255,7 +256,7 @@
#define DTE_IRQ_REMAP_INTCTL_MASK	(0x3ULL << 60)
#define DTE_IRQ_TABLE_LEN_MASK	(0xfULL << 1)
#define DTE_IRQ_REMAP_INTCTL    (2ULL << 60)
-#define DTE_IRQ_TABLE_LEN       (8ULL << 1)
+#define DTE_IRQ_TABLE_LEN       (9ULL << 1)
#define DTE_IRQ_REMAP_ENABLE    1ULL

#define PAGE_MODE_NONE    0x00
@@ -348,7 +349,7 @@
#define DTE_GCR3_VAL_A(x)	(((x) >> 12) & 0x00007ULL)
#define DTE_GCR3_VAL_B(x)	(((x) >> 15) & 0xfffffULL)
-#define DTE_GCR3_VAL_C(x)	(((x) >> 31) & 0xfffffULL)
+#define DTE_GCR3_VAL_C(x)	(((x) >> 31) & 0x1ffffffULL)
#define DTE_GCR3_INDEX_A	0
#define DTE_GCR3_INDEX_B	1

#define IOMMU_PROT_IR 0x01
#define IOMMU_PROT_IW 0x02
+#define IOMMU_UNITY_MAP_FLAG_EXCL_RANGE	(1 << 2)
/* IOMMU capabilities */
#define IOMMU_CAP_IOTLB 24
#define IOMMU_CAP_NPCACHE 26
#define IOMMU_CAP_EFR 27

/* IOMMU Feature Reporting Field (for IVHD type 10h */
+#define IOMMU_FEAT_XTSUP_SHIFT0
#define IOMMU_FEAT_GASUP_SHIFT6

/* IOMMU Extended Feature Register (EFR) */
+#define IOMMU_EFR_XTSUP_SHIFT2
#define IOMMU_EFR_GASUP_SHIFT7

#define MAX_DOMAIN_ID 65536
@@ -402,7 +407,11 @@
 /* Only true if all IOMMUs support device IOTLBs */
 extern bool amd_iommu_iotlb_sup;

-#define MAX_IRQS_PER_TABLE	256
+/*
+ * AMD IOMMU hardware only support 512 IRTEs despite
+ * the architectural limitation of 2048 entries.
+ */
+#define MAX_IRQS_PER_TABLE	512
#define IRQ_TABLE_ALIGNMENT	128

struct irq_remap_table {
@@ -434,7 +443,6 @@
#define APERTURE_RANGE_INDEX(a) ((a) >> APERTURE_RANGE_SHIFT)
#define APERTURE_PAGE_INDEX(a) (((a) >> 21) & 0x3fULL)

-*
/*
 * This struct is used to pass information about
 * incoming PPR faults around.
@@ -807,6 +815,9 @@
 } fields;
 }

+#define APICID_TO_IRTE_DEST_LO(x)    (x & 0xffffff)
+#define APICID_TO_IRTE_DEST_HI(x)    ((x >> 24) & 0xff)
+
union irte_ga_lo {
    u64 val;
@@ -820,8 +831,8 @@
        dm: 1,
/* ------ */
guest_mode: 1,
- destination: 8,
- rsvd: 48;
+ destination: 24,
+ ga_tag: 32;
} fields_remap;

/* For guest vAPIC */
@@ -834,8 +845,7 @@
is_run: 1,
/* ------ */
guest_mode: 1,
- destination: 8,
- rsvd2: 16,
+ destination: 24,
+ ga_tag: 32;
} fields_vapic;
};
@@ -846,7 +856,8 @@
u64 vector: 8,
    rsvd_1: 4,
    ga_root_ptr: 40,
- rsvd_2: 12;
+ rsvd_2: 4,
+ destination : 8;
} fields;
};

--- linux-4.15.0.orig/drivers/iommu/amd_iommu_v2.c
+++ linux-4.15.0/drivers/iommu/amd_iommu_v2.c
@@ -774,6 +774,13 @@
   might_sleep();

+/*
+ * When memory encryption is active the device is likely not in a
+ * direct-mapped domain. Forbid using IOMMUv2 functionality for now.
+ */
+ if (mem_encrypt_active())
+ return -ENODEV;
+
--- linux-4.15.0.orig/drivers/iommu/arm-smmu-v3.c
+++ linux-4.15.0/drivers/iommu/arm-smmu-v3.c
@@ -22,6 +22,7 @@
#include <linux/acpi.h>
#include <linux/acpi_iort.h>
#include <linux/crash_dump.h>
#include <linux/delay.h>
#include <linux/dma-iommu.h>
#include <linux/err.h>

int err_irq;
int combined_irq;
-atomic_t sync_nr;
+u32 sync_nr;

unsigned long ias; /* IPA */
unsigned long oas; /* PA */
-atomic_t sync_count;
+union {
    u32 sync_count;
    u64 padding;
};

/* Hi16xx adds an extra 32 bits of goodness to its MSI payload */
+union {
    u32 sync_count;
    u64 padding;
};

/* IOMMU core code handle */
struct iommu_device iommu;
-atomic_t sync_count;
+union {
    u32 sync_count;
    u64 padding;
};

struct arm_smmu_strtab configstrtab;

/* Protects smmu pointer */
struct mutex init_mutex;

bool non_strict;

enum arm_smmu_domain stage 
union {
    @ -740,7 +746,13 @
    u32 cons = (Q_WRP(q, q->cons) | Q_IDX(q, q->cons)) + 1;

    q->cons = Q_OVF(q, q->cons) | Q_WRP(q, cons) | Q_IDX(q, cons);
    -writel(q->cons, q->cons_reg);
    +
    +/*
    + * Ensure that all CPU accesses (reads and writes) to the queue
    + * are complete before we update the cons pointer.
    + */
    +mb();

    -writel(q->cons, q->cons_reg);
    +
    +/*
    + * Ensure that all CPU accesses (reads and writes) to the queue
    + * are complete before we update the cons pointer.
    + */
    +mb();
static int queue_sync_prod(struct arm_smmu_queue *q)
@@ -1007,14 +1019,13 @@

    .sync = {
        .msidata = atomic_inc_return_relaxed(&smmu->sync_nr),
        .msiaddr = virt_to_phys(&smmu->sync_count),
    },
};

-arm_smmu_cmdq_build_cmd(cmd, &ent);
-
spin_lock_irqsave(&smmu->cmdq.lock, flags);
+ent.sync.msidata = ++smmu->sync_nr;
+arm_smmu_cmdq_build_cmd(cmd, &ent);
arm_smmu_cmdq_insert_cmd(smmu, cmd);
spin_unlock_irqrestore(&smmu->cmdq.lock, flags);

@@ -1238,7 +1249,8 @@

    /* See comment in arm_smmu_write_ctx_desc() */
    +WRITE_ONCE(dst[0], cpu_to_le64(val));
    arm_smmu_sync_ste_for_sid(smmu, sid);

/* It's likely that we'll want to use the new STE soon */
@@ -1371,6 +1383,7 @@

    /* Sync our overflow flag, as we believe we're up to speed */
    q->cons = Q_OVF(q, q->prod) | Q_WRP(q, q->cons) | Q_IDX(q, q->cons);
    +writel(q->cons, q->cons_reg);
    return IRQ_HANDLED;
}

@@ -1466,6 +1479,12 @@

    cmd.tlbi.vmid= smmu_domain->s2_cfg.vmid;
}

+/*
+ * NOTE: when io-pgtable is in non-strict mode, we may get here with
+ * PTEs previously cleared by unmaps on the current CPU not yet visible
+ * to the SMMU. We are relying on the DSB implicit in queue_inc_prod()
+ * to guarantee those are observed before the TLBI. Do be careful, 007.
arm_smmu_cmdq_issue_cmd(smmu, &cmd);
__arm_smmu_tlb_sync(smmu);
}
@@ -1691,6 +1710,9 @@
if (smmu->features & ARM_SMMU_FEAT_COHERENCY)
pgtbl_cfg.quirks = IO_PGTABLE_QUIRK_NO_DMA;

+if (smmu_domain->non_strict)
+pgtbl_cfg.quirks |= IO_PGTABLE_QUIRK_NON_STRICT;
+
pgtbl_ops = alloc_io_pgtable_ops(fmt, &pgtbl_cfg, smmu_domain);
if (!pgtbl_ops)
  return -ENOMEM;
@@ -1839,6 +1861,14 @@
return ops->unmap(ops, iova, size);
}

+static void arm_smmu_flush_iotlb_all(struct iommu_domain *domain)
+{
+  struct arm_smmu_domain *smmu_domain = to_smmu_domain(domain);
+  +if (smmu_domain->smmu)
+    arm_smmu_tlb_inv_context(smmu_domain);
+  }
+
+static void arm_smmu_iotlb_sync(struct iommu_domain *domain)
{
struct arm_smmu_device *smmu = to_smmu_domain(domain)->smmu;
@@ -1984,15 +2014,27 @@
      return 0;
    }
    +static void arm_smmu_iotlb_sync(struct iommu_domain *domain)
    {
      struct arm_smmu_device *smmu = to_smmu_domain(domain)->smmu;
      @@ -1984,15 +2014,27 @@
      return 0;
    }
    }

-if (domain->type != IOMMU_DOMAIN_UNMANAGED)
-  return -EINVAL;
-  -switch (attr) {
-      -case DOMAIN_ATTR_NESTING:
-        -* (int *) data = (smmu_domain->stage == ARM_SMMU_DOMAIN_NESTED);
-        -return 0;
-      +switch (domain->type) {
-        +case IOMMU_DOMAIN_UNMANAGED:
-          +switch (attr) {
-          +case DOMAIN_ATTR_NESTING:
-            +* (int *) data = (smmu_domain->stage == ARM_SMMU_DOMAIN_NESTED);
-            +return 0;
-          +default:
-            +return -ENODEV;
-      +default:
-        +return -ENODEV;
-      -default:
-        -return -EINVAL;
-    -}
-}

Open Source Used In 5GaaS Edge AC-4  22557
+break;
+case IOMMU_DOMAIN_DMA:
+switch (attr) {
+case DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE:
+(int *)data = smmu_domain->non_strict;
+return 0;
+default:
+return -ENODEV;
+
+break;

default:
堤
return -ENODEV;
+return -EINVAL;
}
}

@@ -2002,26 +2044,37 @@
int ret = 0;
struct arm_smmu_domain *smmu_domain = to_smmu_domain(domain);

-if (domain->type != IOMMU_DOMAIN_UNMANAGED)
-return -EINVAL;
-
mutex_lock(&smmu_domain->init_mutex);

-switch (attr) {
-case DOMAIN_ATTR_NESTING:
-if (smmu_domain->smmu) {
-ret = -EPERM;
-goto out_unlock;
+switch (domain->type) {
+case IOMMU_DOMAIN_UNMANAGED:
+switch (attr) {
+case DOMAIN_ATTR_NESTING:
+if (smmu_domain->smmu) {
+ret = -EPERM;
+goto out_unlock;
+}
+
+if (*(int *)data)
+smmu_domain->stage = ARM_SMMU_DOMAIN_NESTED;
+else
+smmu_domain->stage = ARM_SMMU_DOMAIN_S1;
+break;
+default:
+ret = -ENODEV;
+
}
+break;
+case IOMMU_DOMAIN_DMA:
+switch(attr) {
+case DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE:
+smmu_domain->non_strict = *(int *)data;
+break;
+default:
+ret = -ENODEV;
} 
-
-if (*(int *)data)
-smmu_domain->stage = ARM_SMMU_DOMAIN_NESTED;
-else
-smmu_domain->stage = ARM_SMMU_DOMAIN_S1;
-
break;
default:
-ret = -ENODEV;
+ret = -EINVAL;
}

out_unlock:
@@ -2067,7 +2120,7 @@
.map			= arm_smmu_map,
.unmap			= arm_smmu_unmap,
.map_sg			= default_iommu_map_sg,
-\flush_iotlb_all	= arm_smmu_iotlb_sync,
+\flush_iotlb_all	= arm_smmu_flush_iotlb_all,
.iotlb_sync		= arm_smmu_iotlb_sync,
.iova_to_phys		= arm_smmu_iova_to_phys,
.add_device		= arm_smmu_add_device,
@@ -2253,7 +2306,6 @@
{
int ret;

-atomic_set(&smmu->sync_nr, 0);
ret = arm_smmu_init_queues(smmu);
if (ret)
return ret;
@@ -2285,8 +2337,12 @@
reg &|= ~clr;
reg |= set;
write_relaxed(reg | GBPA_UPDATE, gba);
-return readl_relaxed_poll_timeout(gba, reg, !((reg & GBPA_UPDATE),
 1, ARM_SMMU_POLL_TIMEOUT_US);
+ret = readl_relaxed_poll_timeout(gba, reg, !(reg & GBPA_UPDATE),
+1, ARM_SMMU_POLL_TIMEOUT_US);
+if (ret)
+dev_err(smmu->dev, "GBPA not responding to update\n");
+return ret;
}

static void arm_smmu_free_msis(void *data)
@@ -2455,8 +2511,11 @@
/* Clear CR0 and sync (disables SMMU and queue processing) */
reg = readl_relaxed(smmu->base + ARM_SMMU_CR0);
-if (reg & CR0_SMMUEN)
+if (reg & CR0_SMMUEN) {
  dev_warn(smmu->dev, "SMMU currently enabled! Resetting...
");
+WARN_ON(is_kdump_kernel() && !disable_bypass);
+arm_smmu_update_gbpa(smmu, GBPA_ABORT, 0);
+
  ret = arm_smmu_device_disable(smmu);
  if (ret)
@@ -2548,16 +2607,16 @@
      return ret;
  }

+if (is_kdump_kernel())
+enables &= ~(CR0_EVTQEN | CR0_PRIQEN);

/* Enable the SMMU interface, or ensure bypass */
if (!bypass || disable_bypass) {
  enables |= CR0_SMMUEN;
} else {
  ret = arm_smmu_update_gbpa(smmu, 0, GBPA_ABORT);
-  if (ret) {
-    dev_err(smmu->dev, "GBPA not responding to update\n");
+  if (ret)
+    return ret;
  -
  }
}

  ret = arm_smmu_write_reg_sync(smmu, enables, ARM_SMMU_CR0,
      ARM_SMMU_CR0ACK);
--- linux-4.15.0.orig/drivers/iommu/arm-smmu.c
+++ linux-4.15.0/drivers/iommu/arm-smmu.c
@@ -56,6 +56,15 @@
#include "io-pgtable.h"
#include "arm-smmu-regs.h"

+/*
+ * Apparently, some Qualcomm arm64 platforms which appear to expose their SMMU
+ * global register space are still, in fact, using a hypervisor to mediate it
+ * by trapping and emulating register accesses. Sadly, some deployed versions
+ * of said trapping code have bugs wherein they go horribly wrong for stores
+ * using r31 (i.e. XZR/WZR) as the source register.
+ */
+#define QCOM_DUMMY_VAL -1
+
#define ARM_MMU500_ACTLR_CPRE		(1 << 1)
#define ARM_MMU500_ACR_CACHE_LOCK	(1 << 26)
@@ -118,6 +127,7 @@
 GENERIC_SMMU,
 ARM_MMU500,
 CAVIUM_SMMUV2,
+QCOM_SMMUV2,
 
};

struct arm_smmu_s2cr {
 @ @ -246,6 +256,7 @ @
const struct iommu_gather_ops*tlb_ops;
struct arm_smmu_cfgcfg;
enum arm_smmu_domain_stagestage;
+boolnon_strict;
struct mutexinit_mutex; /* Protects smmu pointer */
spinlock_tcb_lock; /* Serialises ATS1* ops and TLB syncs */
struct iommu_domaindomain;
@ @ -397,7 +408,7 @ @
}{
unsigned int spin_cnt, delay;

-writel_relaxed(0, sync);
+writel_relaxed(QCOM_DUMMY_VAL, sync);
for (delay = 1; delay < TLB_LOOP_TIMEOUT; delay *= 2) {
for (spin_cnt = TLB_SPIN_COUNT; spin_cnt > 0; spin_cnt--) {
if (!(readl_relaxed(status) & sTLBGSTATUS_GSACTIVE))
@@ -447,7 +458,11 @@
struct arm_smmu_cfg *cfg = &smmu_domain->cfg;
void __iomem *base = ARM_SMMU_CB(smmu_domain->smmu, cfg->cbndx);

-writel_relaxed(cfg->asid, base + ARM_SMMU_CB_S1_TLBIASID);
+/*
+ * NOTE: this is not a relaxed write; it needs to guarantee that PTEs
+ * cleared by the current CPU are visible to the SMMU before the TLBI.
+ */
+writel(cfg->asid, base + ARM_SMMU_CB_S1_TLBIASID);
arm_smmu_tlb_sync_context(cookie);
}

@@ -457,7 +472,8 @@
struct arm_smmu_device *smmu = smmu_domain->smmu;
void __iomem *base = ARM_SMMU_GRO(smmu);

-writel_relaxed(smmu_domain->cfg.vmid, base + ARM_SMMU_GRO_TLBIVMID);
+/* NOTE: see above */
+writel(smmu_domain->cfg.vmid, base + ARM_SMMU_GRO_TLBIVMID);
arm_smmu_tlb_sync_global(smmu);
}

@@ -469,6 +485,9 @@
bool stage1 = cfg->cbar != CBAR_TYPE_S2_TRANS;
void __iomem *reg = ARM_SMMU_CB(smmu_domain->smmu, cfg->cbndx);

+if (smmu_domain->smmu->features & ARM_SMMU_FEAT_COHERENT_WALK)
+wmb();
+ if (stage1) {
reg += leaf ? ARM_SMMU_CB_S1_TLBIVAL : ARM_SMMU_CB_S1_TLBIVA;
]

@@ -510,6 +529,9 @@
struct arm_smmu_domain *smmu_domain = cookie;
void __iomem *base = ARM_SMMU_GRO(smmu_domain->smmu);

+if (smmu_domain->smmu->features & ARM_SMMU_FEAT_COHERENT_WALK)
+wmb();
+ writel_relaxed(smmu_domain->cfg.vmid, base + ARM_SMMU_GRO_TLBIVMID);
}

@@ -863,6 +885,9 @@
if (smmu->features & ARM_SMMU_FEAT_COHERENT_WALK)
pgtbl_cfg.quirks = IO_PGTABLE QUIRK_NO_DMA;

+if (smmu_domain->non_strict)
+pgtbl_cfg.quirks |= IO_PGTABLE QUIRK_NON STRICT;
+ smmu_domain->smmu = smmu;
pgtbl_ops = alloc_io_pgtable_ops(fmt, &pgtbl_cfg, smmu_domain);
if (!pgtbl_ops) {
@@ -1252,6 +1277,14 @@
        return ops->unmap(ops, iova, size);
    }

+static void arm_smmu_flush_iotlb_all(struct iommu_domain *domain)
+{+
+    struct arm_smmu_domain *smmu_domain = to_smmu_domain(domain);
+    +if (smmu_domain->tlb_ops

static void arm_smmu_iotlb_sync(struct iommu_domain *domain)
{
    struct arm_smmu_domain *smmu_domain = to_smmu_domain(domain);
    if (domain->type != IOMMU_DOMAIN_UNMANAGED)
        return -EINVAL;
    switch (attr) {
    case DOMAIN_ATTR_NESTING:
        *(int *)data = (smmu_domain->stage == ARM_SMMU_DOMAIN_NESTED);
        return 0;
    case IOMMU_DOMAIN_UNMANAGED:
        switch (attr) {
        case DOMAIN_ATTR_NESTING:
            *(int *)data = (smmu_domain->stage == ARM_SMMU_DOMAIN_NESTED);
            return 0;
        default:
            return -ENODEV;
        }
        break;
    case IOMMU_DOMAIN_DMA:
        switch (attr) {
        case DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE:
            *(int *)data = smmu_domain->non_strict;
            return 0;
        default:
            return -ENODEV;
        }
        break;
    default:
        return -EINVAL;
    }
}

int ret = 0;
struct arm_smmu_domain *smmu_domain = to_smmu_domain(domain);
if (domain->type != IOMMU_DOMAIN_UNMANAGED)
    return -EINVAL;
mutex_lock(&smmu_domain->init_mutex);

- switch (attr) {
  - case DOMAIN_ATTR_NESTING:
    - if (smmu_domain->smmu) {
      - ret = -EPERM;
      - goto out_unlock;
    - }
    switch(domain->type) {
      + case IOMMU_DOMAIN_UNMANAGED:
        + switch (attr) {
          + case DOMAIN_ATTR_NESTING:
            + if (smmu_domain->smmu) {
              + ret = -EPERM;
              + goto out_unlock;
            + } +
          + }
          + if (*(int *)data)
          + smmu_domain->stage = ARM_SMMU_DOMAIN_NESTED;
          + else
          + smmu_domain->stage = ARM_SMMU_DOMAIN_S1;
          + break;
          + default:
          + ret = -ENODEV;
          + }
          + break;
          + case IOMMU_DOMAIN_DMA:
            + switch (attr) {
              + case DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE:
                + smmu_domain->non_strict = *(int *)data;
                + break;
                + default:
                + ret = -ENODEV;
                + }
              - if (*(int *)data)
              - smmu_domain->stage = ARM_SMMU_DOMAIN_NESTED;
              - else
              - smmu_domain->stage = ARM_SMMU_DOMAIN_S1;
              - break;
            default:
            - ret = -ENODEV;
            + ret = -EINVAL;
          }
        - out_unlock:
        mutex_unlock(&smmu_domain->init_mutex);
return ret;
@@ -1563,7 +1618,7 @@
 .map= arm_smmu_map,
 .unmap= arm_smmu_unmap,
 .map_sg= default_iommu_map_sg,
-.flush_iotlb_all= arm_smmu_iotlb_sync,
+.flush_iotlb_all= arm_smmu_flush_iotlb_all,
 .iotlb_sync= arm_smmu_iotlb_sync,
 .iova_to_phys= arm_smmu_iova_to_phys,
 .add_device= arm_smmu_add_device,
@@ -1631,8 +1686,8 @@
 }

/* Invalidate the TLB, just in case */
-writel_relaxed(0, gr0_base + ARM_SMMU_GR0_TLBIALLH);
-writel_relaxed(0, gr0_base + ARM_SMMU_GR0_TLBIALLNSNH);
+writel_relaxed(QCOM_DUMMY_VAL, gr0_base + ARM_SMMU_GR0_TLBIALLH);
+writel_relaxed(QCOM_DUMMY_VAL, gr0_base + ARM_SMMU_GR0_TLBIALLNSNH);

reg = readl_relaxed(ARM_SMMU_GR0_NS(smmu) + ARM_SMMU_GR0_sCR0);

@@ -1907,6 +1962,7 @@
 ARM_SMMU_MATCH_DATA(arm_mmu401, ARM_SMMU_V1_64K, GENERIC_SMMU);
 ARM_SMMU_MATCH_DATA(arm_mmu500, ARM_SMMU_V2, ARM_MMU500);
 ARM_SMMU_MATCH_DATA(cavium_smmuv2, ARM_SMMU_V2, CAVIUM_SMMUV2);
+ARM_SMMU_MATCH_DATA(qcom_smmuv2, ARM_SMMU_V2, QCOM_SMMUV2);
 static const struct of_device_id arm_smmu_of_match[] = {
  {.compatible = "arm,smmu-v1", .data = &smmu_generic_v1 },
@@ -1915,6 +1971,7 @@
  {.compatible = "cavium,smmu-v2", .data = &cavium_smmuv2 },
  {.compatible = "qcom,smmu-v2", .data = &qcom_smmuv2 },
  
+  {.compatible = "arm,mmu-401", .data = &arm_mmu401 },
  {.compatible = "arm,mmu-500", .data = &arm_mmu500 },
  {.compatible = "cavium,smmu-v2", .data = &cavium_smmuv2 },
  
  
  
+  
  
+};
+MODULE_DEVICE_TABLE(of, arm_smmu_of_match);
@@ -2103,12 +2160,16 @@
 if (err)
 return err;

-if (smmu->version == ARM_SMMU_V2 &&
-  smmu->num_context_banks != smmu->num_context_irqs) {
-  dev_err(dev,
-  "found only %d context interrupt(s) but %d required\n",
-  smmu->num_context_irqs, smmu->num_context_banks);
-  return -ENODEV;
+if (smmu->version == ARM_SMMU_V2) {

+if (smmu->num_context_banks > smmu->num_context_irqs) {
+    dev_err(dev,
+        "found only %d context irq(s) but %d required\n",
+        smmu->num_context_irqs, smmu->num_context_banks);
+    return -ENODEV;
+}
+
+/* Ignore superfluous interrupts */
+smmu->num_context_irqs = smmu->num_context_banks;
}

for (i = 0; i < smmu->num_global_irqs; ++i) {
    struct list_head msi_page_list;
    spinlock_t msi_lock;

    /* Domain for flush queue callback; NULL if flush queue not in use */
    struct iommu_domain *fq_domain;
};

static inline size_t cookie_msi_granule(struct iommu_dma_cookie *cookie)

    -msi_page = kcalloc(num_pages, sizeof(*msi_page), GFP_KERNEL);
    -if (!msi_page)
    -    return -ENOMEM;

    for (i = 0; i < num_pages; i++) {
        -msi_page[i].phys = start;
        -msi_page[i].iova = start;
        -INIT_LIST_HEAD(&msi_page[i].list);
        -list_add(&msi_page[i].list, &cookie->msi_page_list);
        +msi_page = kmalloc(sizeof(*msi_page), GFP_KERNEL);
        +if (!msi_page)
        +    return -ENOMEM;
        +msi_page->phys = start;
        +msi_page->iova = start;
        +INIT_LIST_HEAD(&msi_page->list);
        +list_add(&msi_page->list, &cookie->msi_page_list);
        +start += iovad->granule;
    }
static void iommu_dma_flush_iotlb_all(struct iova_domain *iovad)
{
 struct iommu_dma_cookie *cookie;
 struct iommu_domain *domain;

 cookie = container_of(iovad, struct iommu_dma_cookie, iovad);
 domain = cookie->fq_domain;

 /*
  * The IOMMU driver supporting DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE
  * implies that ops->flush_iotlb_all must be non-NULL.
  */
  domain->ops->flush_iotlb_all(domain);
}

static void iommu_dma_init_domain(struct iommu_domain *domain)
{
 struct iommu_dma_cookie *cookie = domain->iova_cookie;
 struct iova_domain *iovad = &cookie->iovad;
 unsigned long order, base_pfn, end_pfn;

 if (!cookie || cookie->type != IOMMU_DMA_IOVA_COOKIE)
 return -EINVAL;

 init_iova_domain(iovad, 1UL << order, base_pfn);

 if (!cookie->fq_domain && !iommu_domain_get_attr(domain,
     DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE, &attr) && attr) {
     cookie->fq_domain = domain;
     init_iova_flush_queue(iovad, iommu_dma_flush_iotlb_all, NULL);
 }

 if (!dev)
 return 0;

 /* The MSI case is only ever cleaning up its most recent allocation */
 if (cookie->type == IOMMU_DMA_MSI_COOKIE)
     cookie->msi_iova -= size;
 else if (cookie->fq_domain) /* non-strict mode */
+queue_iova(iovd, iova_pfn(iovd, iova),
+size >> iova_shift(iovd), 0);
else
  free_iova_fast(iovd, iova_pfn(iovd, iova),
  size >> iova_shift(iovd));
@@ -403,7 +431,9 @@
dma_addr -= iova_off;
size = iova_align(iovd, size + iova_off);

-WARN_ON(iommu_unmap(domain, dma_addr, size) != size);
+WARN_ON(iommu_unmap_fast(domain, dma_addr, size) != size);
+if (!cookie->fq_domain)
+iommu_tlb_sync(domain);
iommu_dma_free_iova(cookie, dma_addr, size);
}

@@ -670,7 +700,7 @@
* - and wouldn't make the resulting output segment too long
 */
if (cur_len && !s_iova_off && (dma_addr & seg_mask) &&
 - (cur_len + s_length <= max_len)) {
+ (max_len - cur_len >= s_length)) {
/* ...then concatenate it with the previous one */
cur_len += s_length;
} else {
--- linux-4.15.0.orig/drivers/iommu/dmar.c
+++ linux-4.15.0/drivers/iommu/dmar.c
@@ -39,6 +39,7 @@
#include <linux/dmi.h>
#include <linux/slab.h>
#include <linux/iommu.h>
+#include <linux/limits.h>
#include <asm/irq_remapping.h>
#include <asm/iommu_table.h>

@@ -139,12 +140,19 @@
BUG_ON(dev->is_virtfn);

+/*
-Ignore devices that have a domain number higher than what can
- be looked up in DMAR, e.g. VMD subdevices with domain 0x10000
 */
+if (pci_domain_nr(dev->bus) > U16_MAX)
+return NULL;
+
/* Only generate path[] for device addition event */
if (event == BUS_NOTIFY_ADD_DEVICE)
for (tmp = dev; tmp; tmp = tmp->bus->self)
    level++;

    // Size calculation
    -size = sizeof(*info) + level * sizeof(struct acpi_dmar_pci_path);
    +size = sizeof(*info) + level * sizeof(info->path[0]);
    if (size <= sizeof(dmar_pci_notify_info_buf)) {
        info = (struct dmar_pci_notify_info *)dmar_pci_notify_info_buf;
    } else {
        @@ -451,12 +459,13 @@
            /* Check for NUL termination within the designated length */
        if (strnlen(andd->device_name, header->length - 8) == header->length - 8) {
            -WARN_TAINT(1, TAINT_FIRMWARE_WORKAROUND,
            +pr_warn(FW_BUG
                "Your BIOS is broken; ANDD object name is not NUL-terminated\n";
                "BIOS vendor: %s; Ver: %s; Product Version: %s\n",
                dmi_get_system_info(DMI_BIOS_VENDOR),
                dmi_get_system_info(DMI_BIOS_VERSION),
                dmi_get_system_info(DMI_PRODUCT_VERSION));
            +add_taint(TAINT_FIRMWARE_WORKAROUND, LOCKDEP_STILL_OK);
            return -EINVAL;
        }
        pr_info("ANDD device: %x name: %s\n", andd->device_number,
            @@ -482,14 +491,14 @@
                  return 0;
        }
    }
    -WARN_TAINT(
    -1, TAINT_FIRMWARE_WORKAROUND,
    +pr_warn(FW_BUG
            "Your BIOS is broken; RHSA refers to non-existent DMAR unit at %llx\n";
            "BIOS vendor: %s; Ver: %s; Product Version: %s\n",
            drhd->reg_base_addr,
        +rhsa->base_address,
            dmi_get_system_info(DMI_BIOS_VENDOR),
            dmi_get_system_info(DMI_BIOS_VERSION),
            dmi_get_system_info(DMI_PRODUCT_VERSION));
            +add_taint(TAINT_FIRMWARE_WORKAROUND, LOCKDEP_STILL_OK);
            return 0;
        }
        @@ -838,14 +847,14 @@

        static void warn_invalid_dmar(u64 addr, const char *message)
        {
            -WARN_TAINT_ONCE(
            -1, TAINT_FIRMWARE_WORKAROUND,
            +pr_warn_once(FW_BUG
                "Your BIOS is broken; DMAR refers to non-existent DMAR unit at %llx\n";
                "BIOS vendor: %s; Ver: %s; Product Version: %s\n",
                -drhd->reg_base_addr,
                +raddr->reg_base_addr,
                dmi_get_system_info(DMI_BIOS_VENDOR),
                dmi_get_system_info(DMI_BIOS_VERSION),
                dmi_get_system_info(DMI_PRODUCT_VERSION));
                +add_taint(TAINT_FIRMWARE_WORKAROUND, LOCKDEP_STILL_OK);
                return 0;
            }
            @@ -883,14 +892,14 @@

            static void warn_invalid_dmar(u64 addr, const char *message)
            {
                -WARN_TAINT_ONCE(
                -1, TAINT_FIRMWARE_WORKAROUND,
                +pr_warn_once(FW_BUG
                    "Your BIOS is broken; DMAR refers to non-existent DMAR unit at %llx\n";
                    "BIOS vendor: %s; Ver: %s; Product Version: %s\n",
                    -drhd->reg_base_addr,
                    +raddr->reg_base_addr,
                    dmi_get_system_info(DMI_BIOS_VENDOR),
                    dmi_get_system_info(DMI_BIOS_VERSION),
                    dmi_get_system_info(DMI_PRODUCT_VERSION));
                    +add_taint(TAINT_FIRMWARE_WORKAROUND, LOCKDEP_STILL_OK);
                    return 0;
                }
                @@ -933,14 +942,14 @@

                static void warn_invalid_dmar(u64 addr, const char *message)
                {
                    -WARN_TAINT_ONCE(
                    -1, TAINT_FIRMWARE_WORKAROUND,
                    +pr_warn_once(FW_BUG
                        "Your BIOS is broken; DMAR refers to non-existent DMAR unit at %llx\n";
                        "BIOS vendor: %s; Ver: %s; Product Version: %s\n",
                        -drhd->reg_base_addr,
                        +raddr->reg_base_addr,
                        dmi_get_system_info(DMI_BIOS_VENDOR),
                        dmi_get_system_info(DMI_BIOS_VERSION),
                        dmi_get_system_info(DMI_PRODUCT_VERSION));
                        +add_taint(TAINT_FIRMWARE_WORKAROUND, LOCKDEP_STILL_OK);
                        return 0;
                    }
                    @@ -983,14 +992,14 @@

"Your BIOS is broken; DMAR reported at address %llx%s\n"
"BIOS vendor: %s; Ver: %s; Product Version: %s\n",
addr, message,
dmi_get_system_info(DMI_BIOS_VENDOR),
dmi_get_system_info(DMI_BIOS_VERSION),
dmi_get_system_info(DMI_PRODUCT_VERSION));
+add_taint(TAINT_FIRMWARE_WORKAROUND, LOCKDEP_STILL_OK);
}

static int __ref
@@ -1020,8 +1029,8 @@
{
 struct intel_iommu *iommu;
 u32 ver, sts;
-int agaw = 0;
-int msagaw = 0;
+int agaw = -1;
+int msagaw = -1;
 int err;

 if (!drhd->reg_base_addr) {
@@ -1046,17 +1055,28 @@
	error = -EINVAL;
-agaw = iommu_calculate_agaw(iommu);
-if (agaw < 0) {
-    pr_err("Cannot get a valid agaw for iommu (seq_id = %d)\n",
-           iommu->seq_id);
-    goto err_unmap;
-}
-msagaw = iommu_calculate_max_sagaw(iommu);
-if (msagaw < 0) {
-    pr_err("Cannot get a valid max agaw for iommu (seq_id = %d)\n",
-           iommu->seq_id);
-    goto err_unmap;
+    if (cap_sagaw(iommu->cap) == 0) {
+        pr_info("%s: No supported address widths. Not attempting DMA translation.\n", 
+           iommu->name);
+        drhd->ignored = 1;
+    }
+    +
+    if (!drhd->ignored) {
+        agaw = iommu_calculate_agaw(iommu);
+        if (agaw < 0) {
+            pr_err("Cannot get a valid agaw for iommu (seq_id = %d)\n",
+                   iommu->seq_id);
+            drhd->ignored = 1;
+    }

+}  
+}  
+if (!drhd->ignored) {  
+msagaw = iommu_calculate_max_sagaw(iommu);  
+if (msagaw < 0) {  
+pr_err("Cannot get a valid max agaw for iommu (seq_id = %d)\n",  
+ iommu->seq_id);  
+drhd->ignored = 1;  
+agaw = -1;  
+}  
}  
iommu->agaw = agaw;  
iommu->msagaw = msagaw;  
@@ -1083,7 +1103,12 @@

raw_spin_lock_init(&iommu->register_lock);  

-if (intel_iommu_enabled) {  
+/*  
+ * This is only for hotplug; at boot time intel_iommu_enabled won't  
+ * be set yet. When intel_iommu_init() runs, it registers the units  
+ * present at boot time, then sets intel_iommu_enabled.  
+ */  
+if (intel_iommu_enabled && !drhd->ignored) {  
err = iommu_device_sysfs_add(&iommu->iommu, NULL,  
    intel_iommu_groups,  
    "%s", iommu->name);  
@@ -1094,13 +1119,16 @@

err = iommu_device_register(&iommu->iommu);  
if (err)  
    -goto err_unmap;  
    +goto err_sysfs;  
}  

drhd->iommu = iommu;  
+iommu->drhd = drhd;  

return 0;  

+err_sysfs:  
+iommu_device_sysfs_remove(&iommu->iommu);  
err_unmap:  
unmap_iommu(iommu);  
error_free_seq_id:  
@@ -1112,7 +1140,7 @@

static void free_iommu(struct intel_iommu *iommu)


```c
{ 
if (intel_iommu_enabled) {
+if (intel_iommu_enabled && !iommu->drhd->ignored) {
iommu_device_unregister(&iommu->iommu);
iommu_device_sysfs_remove(&iommu->iommu);
}
@@ -1339,13 +1367,13 @@
qi_submit_sync(&desc, iommu);
}

-void qi_flush_dev_iotlb(struct intel_iommu *iommu, u16 sid, u16 qdep,
-u64 addr, unsigned mask)
+void qi_flush_dev_iotlb(struct intel_iommu *iommu, u16 sid, u16 pfsid,
+u16 qdep, u64 addr, unsigned mask)
{ 
struct qi_desc desc;

if (mask) {
-BUG_ON(addr & ((1 << (VTD_PAGE_SHIFT + mask)) - 1));
+BUG_ON(addr & ((1ULL << (VTD_PAGE_SHIFT + mask)) - 1));
addr |= (1ULL << (VTD_PAGE_SHIFT + mask - 1)) - 1;
desc.high = QI_DEV_IOTLB_ADDR(addr) | QI_DEV_IOTLB_SIZE;
} else
@@ -1355,7 +1383,7 @@
qdep = 0;

desc.low = QI_DEV_IOTLB_SID(sid) | QI_DEV_IOTLB_QDEP(qdep) |
  - QI_DIOTLB_TYPE;
  + QI_DIOTLB_TYPE | QI_DEV_IOTLB_PFSID(pfsid);

qi_submit_sync(&desc, iommu);
}
@@ -2044,3 +2072,28 @@
{
return dmar_device_hotplug(handle, false);
}
+
+/*
+ * dmar_platform_optin - Is %DMA_CTRL_PLATFORM_OPT_IN_FLAG set in DMAR table
+ *
+ * Returns true if the platform has %DMA_CTRL_PLATFORM_OPT_IN_FLAG set in
+ * the ACPI DMAR table. This means that the platform boot firmware has made
+ * sure no device can issue DMA outside of RMRR regions.
+ */
+bool dmar_platform_optin(void)
+{
+struct acpi_table_dmar *dmar;
+acpi_status status;
```
bool ret;
+
status = acpi_get_table(ACPI_SIG_DMAR, 0,
+(struct acpi_table_header **)&dmar);
+if (ACPI_FAILURE(status))
+return false;
+
+ret = !!((dmar->flags & DMAR_PLATFORM_OPT_IN));
+acpi_put_table((struct acpi_table_header *)dmar);
+
+return ret;
+}
+EXPORT_SYMBOL_GPL(dmar_platform_optin);

--- linux-4.15.0.orig/drivers/iommu/exynos-iommu.c
+++ linux-4.15.0/drivers/iommu/exynos-iommu.c
@@ -1312,13 +1312,17 @@
 return -ENODEV;
 data = platform_get_drvdata(sysmmu);
 -if (!data)
-+if (!data) {
+put_device(&sysmmu->dev);
 return -ENODEV;
 +}

 if (!owner) {
 owner = kzalloc(sizeof(*owner), GFP_KERNEL);
 -if (!owner)
 -+if (!owner) {
+-put_device(&sysmmu->dev);
 return -ENOMEM;
 +}

 INIT_LIST_HEAD(&owner->controllers);
 mutex_init(&owner->rpm_lock);
@@ -1353,8 +1357,15 @@

 static int __init exynos_iommu_init(void)
 {
+struct device_node *np;
 int ret;

 +np = of_find_matching_node(NULL, sysmmu_of_match);
 +if (!np)
 +return 0;
 +
 +of_node_put(np);
lv2table_kmem_cache = kmem_cache_create("exynos-iommu-lv2table",
LV2TABLE_SIZE, LV2TABLE_SIZE, 0, NULL);
if (!lv2table_kmem_cache) {
    @ -182,6 +182,7 @@
    static int force_on = 0;
    int intel_iommu_tboot_noforce;
+    static int no_platform_optin;

    /**
     * 0: Present
     * @ @ -420,6 +421,7 @@
     * struct list_head global; /* link to global list */
     * u8 bus; /* PCI bus number */
     * u8 devfn; /* PCI devfn number */
     + u16 pfsid; /* SRIOV physical function source ID */
     * u8 pasid_supported:3;
     * u8 pasid_enabled:1;
     * u8 pri_supported:1;
     * @@ -439,7 +441,6 @@
     * struct dmar_dev_scope *devices; /* target devices */
     * int devices_cnt; /* target device count */
     - struct iommu_resv_region *resv; /* reserved region handle */
    }

    struct dmar_atsr_unit {
    @ @ -559,6 +560,7 @@
        pr_info("IOMMU enabled\n");
    } else if (!strncmp(str, "off", 3)) {
        dmar_disabled = 1;
+        no_platform_optin = 1;
        pr_info("IOMMU disabled\n");
    } else if (!strncmp(str, "igfx_off", 8)) {
        dmar_map_gfx = 0;
    @@ -1500,6 +1502,20 @@
    return;

    pdev = to_pci_dev(info->dev);
+    /* For IOMMU that supports device IOTLB throttling (DIT), we assign
+     * PFSID to the invalidation desc of a VF such that IOMMU HW can gauge
+     * queue depth at PF level. If DIT is not set, PFSID will be treated as
+     * reserved, which should be set to 0.
+     */
+    if (!ecap_dit(info->iommu->ecap))
+        info->pfsid = 0;
+else {
+struct pci_dev *pf_pdev;
+
+/* pdev will be returned if device is not a vf */
+pf_pdev = pci_physfn(pdev);
+info->pfsid = PCI_DEVID(pf_pdev->bus->number, pf_pdev->devfn);
+
+#ifdef CONFIG_INTEL_IOMMU_SVM
/* The PCIe spec, in its wisdom, declares that the behaviour of
@@ -1513,7 +1529,8 @@
if (info->pri_supported && !pci_reset_pri(pdev) && !pci_enable_pri(pdev, 32))
info->pri_enabled = 1;
#endif
-if (info->ats_supported && !pci_enable_ats(pdev, VTD_PAGE_SHIFT)) {
+if (!pdev->untrusted && info->ats_supported &&
+ !pci_enable_ats(pdev, VTD_PAGE_SHIFT)) {
info->ats_enabled = 1;
domain_update_iotlb(info->domain);
info->ats_qdep = pci_ats_queue_depth(pdev);
@@ -1565,7 +1582,8 @@
sid = info->bus << 8 | info->devfn;
qdep = info->ats_qdep;
qi flushing_dev_iotlb(info->iommu, sid, qdep, addr, mask);
+qi flushing_dev_iotlb(info->iommu, sid, info->pfsid,
+qdep, addr, mask);
}
spin_unlock_irqrestore(&device_domain_lock, flags);
}
@@ -1601,8 +1619,7 @@
* flush. However, device IOTLB doesn't need to be flushed in this case.
*/
if (!cap_caching_mode(iommu->cap) || !map)
-iommu flushing_dev_iotlb(get_iommu_domain(iommu, did),
- addr, mask);
+iommu flushing_dev_iotlb(domain, addr, mask);
}

static void iommu_flush_iova(struct iova_domain *iovad)
@@ -1629,6 +1646,9 @@
unsigned long flags;
+if (!cap_plmr(iommu->cap) && !cap_phmr(iommu->cap))
+return;
+
raw_spin_lock_irqsave(&iommu->register_lock, flags);
pmen = readl(iommu->reg + DMAR_PMEN_REG);
pmen &= ~DMA_PMEN_EPM;
@@ -2074,7 +2094,7 @@
    * than default. Unnecessary for PT mode.
    */
    if (translation != CONTEXT_TT_PASS_THROUGH) {
@@ -2458,7 +2478,8 @@
        if (dev && dev_is_pci(dev)) {
            struct pci_dev *pdev = to_pci_dev(info->dev);
@@ -2887,6 +2908,13 @@
                if (device_is_rmrr_locked(dev))
                    return 0;
                /*
                */
                if (pdev->untrusted)
                    return 0;
            } else {
@@ -3067,7 +3095,7 @@
            if (old_ce)
-iounmap(old_ce);
+memunmap(old_ce);

ret = 0;
if (devfn < 0x80)
@@ -3317,6 +3345,12 @@
    if (!ecap_pass_through(iommu->ecap))
    hw_pass_through = 0;
+    if (!intel_iommu_strict && cap_caching_mode(iommu->cap)) {
+        pr_info("Disable batched IOTLB flush due to virtualization");
+        intel_iommu_strict = 1;
+    } +
#ifdef CONFIG_INTEL_IOMMU_SVM
    if (pasid_enabled(iommu))
        intel_svm_alloc_pasid_tables(iommu);
@@ -3339,9 +3373,12 @@
    iommu_identity_mapping |= IDENTMAP_ALL;
#endif

    #ifdef CONFIG_INTEL_IOMMU_BROKEN_GFX_WA
    -iommu_identity_mapping |= IDENTMAP_GFX;
    +dmar_map gfx = 0;
    #endif

    +if (!dmar_map gfx)
    +iommu_identity_mapping |= IDENTMAP_GFX;
    +
    check_tylerburg_isoch();

    if (iommu_identity_mapping) {
@@ -3681,7 +3718,7 @@
        freelist = domain_unmap(domain, start_pfn, last_pfn);

        -if (intel_iommu_strict) {
        +if (intel_iommu_strict || !has_iova_flush_queue(&domain->iovad)) {
            iommu_flush_iotlb_psi(iommu, domain, start_pfn,
            -nrpages, !freelist, 0);
            /* free iova */
            @@ -3961,7 +3998,11 @@
*/
        @@ -3961,10 +3998,11 @@
            /* we know that the this iommu should be at offset 0xa000 from vtbar */
            drhd = dmar_find_matched_drhd_unit(pdev);
            -if (WARN_TAINT_ONCE(!drhd || drhd->reg_base_addr - vtbar != 0xa000,
            - TAIINT_FIRMWARE_WORKAROUND,
            - "BIOS assigned incorrect VT-d unit for Intel(R) QuickData Technology device\n")

/* This IOMMU has *only* gfx devices. Either bypass it or
  set the gfx_mapped flag, as appropriate */
- if (dmar_map gfx) {
-   intel_iommu gfx mapped = 1;
- } else {
+ if (!dmar_map gfx) {
   drhd ignored = 1;
   for each active dev scope(drhd devices,
   drhd devices cnt, i, dev)
@ -4149.7 +4185.6 @@
   int __init dmar_parse_one_rmrr(struct acpi dmar header *header, void *arg)
   {
      struct acpi dmar reserved memory *rmrr;
- int prot = DMA PTE READ|DMA PTE WRITE;
- struct dmar rmrr unit *rmrru;
- size_t length;
@ -4163.22 +4198.16 @@
   rmrru end address = rmrr end address;

   length = rmrr end address - rmrr base address + 1;
- rmrr resv = iommu alloc resv region(rmrr base address, length, prot,
-   IOMMU RESV DIRECT);
- if (!rmrr resv)
-   goto free rmrru;

   rmrru devices = dmar alloc dev scope(void *)(rmrr + 1),
   ((void *)rmrr) + rmrr header length,
   &rmrr devices cnt);
   if (rmrr devices cnt && rmrr devices == NULL)
   - goto free all;
   + goto free rmrru;

   list add(&rmrru list, &dmar rmrr units);

   return 0;
   -free all:
-kfree(rmrru->resv);
free_rmrru:
kfree(rmrru);
out:
@@ -4396,7 +4425,6 @@
list_for_each_entry_safe(rmrru, rmrr_n, &dmar_rmrr_units, list) {
    list_del(&rmrru->list);
dmar_free_dev_scope(&rmrru->devices, &rmrru->devices_cnt);
-kfree(rmrru->resv);
    kfree(rmrru);
}

@@ -4723,14 +4751,54 @@
NULL,
};

+static int __init platform_optin_force_iommu(void)
+{ 
+    struct pci_dev *pdev = NULL;
+    bool has_untrusted_dev = false;
+    
+    if (!dmar_platform_optin() || no_platform_optin)
+        return 0;
+    
+    for_each_pci_dev(pdev) { 
+        if (pdev->untrusted) {
+            has_untrusted_dev = true;
+            break;
+        }
+    }
+    
+    if (!has_untrusted_dev)
+        return 0;
+    
+    if (no_iommu || dmar_disabled)
+        pr_info("Intel-IOMMU force enabled due to platform opt in\n");
+    
+    /*
+     * If Intel-IOMMU is disabled by default, we will apply identity
+     * map for all devices except those marked as being untrusted.
+     */
+    if (dmar_disabled)
+        iommu_identity_mapping |= IDENTMAP_ALL;
+    
+    dmar_disabled = 0;
+    +#if defined(CONFIG_X86) && defined(CONFIG_SWIOTLB)
+    swioldb = 0;
+    +#endif
int __init intel_iommu_init(void) {
    int ret = -ENODEV;
    struct dmar_drhd_unit *drhd;
    struct intel_iommu *iommu;

    /* VT-d is required for a TXT/tboot launch, so enforce that */
    -force_on = tboot_force_iommu();
    /*
    * Intel IOMMU is required for a TXT/tboot launch or platform
    * opt in, so enforce that.
    */
    +force_on = tboot_force_iommu() || platform_optin_force_iommu();

    if (iommu_init_mempool()) {
        if (force_on)
            goto out_free_reserved_range;
    }

    +if (dmar_map_gfx)
        intel_iommu_gfx_mapped = 1;
    +init_no_remapping_devices();

    ret = init_dmars();
    @@ -5116,8 +5187,10 @@
    u64 phys = 0;

    pte = pfn_to_dma_pte(dmar_domain, iova >> VTD_PAGE_SHIFT, &level);
    -if (pte)
    -phys = dma_pte_addr(pte);
    +if (pte && dma_pte_present(pte))
    +phys = dma_pte_addr(pte) +
    +(iova & (BIT_MASK(level_to_offset_bits(level) +
    +VTD_PAGE_SHIFT) - 1));

    return phys;
    }
@@ -5170,22 +5243,33 @@
 static void intel_iommu_get_resv_regions(struct device *device, struct list_head *head) {

```c
int prot = DMA_PTE_READ | DMA_PTE_WRITE;
struct iommu_resv_region *reg;
struct dmar_rmrr_unit *rmrr;
struct device *i_dev;

rcu_read_lock();
down_read(&dmar_global_lock);
for_each_rmrr_units(rmrr) {
    for_each_active_dev_scope(rmrr->devices, rmrr->devices_cnt, i, i_dev) {
        struct iommu_resv_region *resv;
        size_t length;
        if (i_dev != device)
            continue;

        list_add_tail(&rmrr->resv->list, head);
        length = rmrr->end_address - rmrr->base_address + 1;
        resv = iommu_alloc_resv_region(rmrr->base_address, length, prot,
                                      IOMMU_RESV_DIRECT);
        if (!resv)
            break;

        list_add_tail(&resv->list, head);
    }
}
rcu_read_unlock();
up_read(&dmar_global_lock);

reg = iommu_alloc_resv_region(IOAPIC_RANGE_START, IOAPIC_RANGE_END - IOAPIC_RANGE_START + 1,
                              @ @ -5200,10 +5284,8 @ @
                             }
struct iommu_resv_region *entry, *next;

-list_for_each_entry_safe(entry, next, head, list) {
    if (entry->type == IOMMU_RESV_RESERVED)
        kfree(entry);
-
    list_for_each_entry_safe(entry, next, head, list)
    kfree(entry);
}

#endif CONFIG_INTEL_IOMMU_SVM
--- linux-4.15.0.orig/drivers/iommu/intel-svm.c
+++ linux-4.15.0/drivers/iommu/intel-svm.c
```

pr_err("IOMMU: %s: Failed to request IRQ for page request queue\n", iommu->name);
dmar_free_hwirq(irq);
+iommu->pr_irq = 0;
goto err;
}
dmar_writeq(iommu->reg + DMAR_PQH_REG, 0ULL);
@ @ -144.9 +145.11 @@
dmar_writeq(iommu->reg + DMAR_PQT_REG, 0ULL);
dmar_writeq(iommu->reg + DMAR_PQA_REG, 0ULL);
-
+free_irq(iommu->pr_irq, iommu);
+free_irq(iommu->pr_irq, iommu);
+free_irq(iommu->pr_irq, iommu);
+free_irq(iommu->pr_irq, iommu);
+iommu->pr_irq = 0;
+
if (iommu->pr_irq) {
  free_irq(iommu->pr_irq, iommu);
  free_irq(iommu->pr_irq, iommu);
  free_irq(iommu->pr_irq, iommu);
  iommu->pr_irq = 0;
  }
free_pages((unsigned long)iommu->prq, PRQ_ORDER);
iommu->prq = NULL;
@ @ -292.7 +295.7 @@
int pasid_max;
int ret;
-
+if (WARN_ON(!iommu || !iommu->pasid_table) || dmar_disabled)
return -EINVAL;
if (dev_is_pci(dev)) {
  @ @ -379.6 +382.7 @@
pasid_max - 1, GFP_KERNEL);
  if (ret < 0) {
    kfree(svm);
    +kfree(sdev);
    goto out;
  }
  svm->pasid = ret;
  @ @ -587.7 +591.7 @@
pr_err("%s: Page request without PASID: %08llx %08llx\n", iommu->name, (unsigned long long *)req[0],
    ((unsigned long long *)req)[1]);
-goto bad_req;
+goto no_pasid;
}
if (!svm || svm->pasid != req->pasid) {
    @ @ -611,14 +615,15 @@
    * any faults on kernel addresses. */
if (!svm->mm)
    goto bad_req;
-/* If the mm is already defunct, don't handle faults. */
-if (!mmget_not_zero(svm->mm))
-    goto bad_req;
+/* If the mm is already defunct, don't handle faults. */
+if (!mmget_not_zero(svm->mm))
+    goto bad_req;
+
    down_read(&svm->mm->mmap_sem);
    vma = find_extend_vma(svm->mm, address);
if (!vma || address < vma->vm_start)
    --- linux-4.15.0.orig/drivers/iommu/intel_irq_remapping.c
    +++ linux-4.15.0/drivers/iommu/intel_irq_remapping.c
    @ @ -479,12 +479,18 @@
    /* Enable interrupt-remapping */
    iommu->gcmd |= DMA_GCMD_IRE;
    -iommu->gcmd &= ~DMA_GCMD_CFI; /* Block compatibility-format MSIs */
    writel(iommu->gcmd, iommu->reg + DMAR_GCMD_REG);
    -
    IOMMU_WAIT_OP(iommu, DMAR_GSTS_REG,
        readl, (sts & DMA_GSTS_IRES), sts);
+
    /* Block compatibility-format MSIs */
    +if (sts & DMA_GSTS_CFIIS) {
        +iommu->gcmd &= ~DMA_GCMD_CFI;
        +writel(iommu->gcmd, iommu->reg + DMAR_GCMD_REG);
        +IOMMU_WAIT_OP(iommu, DMAR_GSTS_REG,
            + readl, !(sts & DMA_GSTS_CFIIS), sts);
        +}
    +
    /*
    * With CFI clear in the Global Command register, we should be
    * protected from dangerous (i.e. compatibility) interrupts
    @ @ -536,8 +542,8 @@
        0, INTR_REMAP_TABLE_ENTRIES,
        fn, &intel_ir_domain_ops,
        iommu);
    -irq_domain_free_fwnode(fn);
static void intel_teardown_irq_remapping(struct intel_iommu *iommu)
{
    struct fwnode_handle *fn;
    if (iommu && iommu->ir_table) {
        if (iommu->ir_msi_domain) {
            fn = iommu->ir_msi_domain->fwnode;
            irq_domain_remove(iommu->ir_msi_domain);
            irq_domain_free_fwnode(fn);
            iommu->ir_msi_domain = NULL;
        }
        if (iommu->ir_domain) {
            fn = iommu->ir_domain->fwnode;
            irq_domain_remove(iommu->ir_domain);
            irq_domain_free_fwnode(fn);
            iommu->ir_domain = NULL;
        }
        free_pages((unsigned long)iommu->ir_table->base,
                   iommu->ir_table->size);
    }

    irq_data =irq_domain_get_irq_data(domain, virq + i);
    irq_cfg = irqd_cfg(irq_data);

    /* Update the hardware only if the interrupt is in remapped mode. */
    if (force || ir_data->irq_2_iommu.mode == IRQ_REMAPPING)
        modify_irte(&ir_data->irq_2_iommu, irte);
}

static struct irq_chip intel_ir_chip = {
    .name = "INTEL-IR",
    .irq_ack = ir_ack_apic_edge,
    .irq_set_affinity = intel_ir_set_affinity,
    .irq_compose_msi_msg = intel_ir_compose_msi_msg,
    .irq_set_vcpu_affinity = intel_ir_set_vcpu_affinity,
    irq_data = irq_domain_get_irq_data(domain, virq + i);
    irq_cfg = irqd_cfg(irq_data);
if (!irq_data || !irq_cfg) {
+if (!i)
+kfree(data);
+ret = -EINVAL;
+goto out_free_data;
}
--- linux-4.15.0.orig/drivers/iommu/io-pgtable-arm-v7s.c
+++ linux-4.15.0/drivers/iommu/io-pgtable-arm-v7s.c
@@ -161,6 +161,14 @@
#define ARM_V7S_TCR_PD1BIT(5)
+CONFIG_ZONE_DMA32
+define ARM_V7S_TABLE_GFP_DMA GFP_DMA32
+define ARM_V7S_TABLE_SLAB_FLAGS SLAB_CACHE_DMA32
+else
+define ARM_V7S_TABLE_GFP_DMA GFP_DMA
+define ARM_V7S_TABLE_SLAB_FLAGS SLAB_CACHE_DMA
+endif
+
typedef u32 arm_v7s_ioppe;

static bool selftest_running;
@@ -192,14 +200,22 @@
{
 struct io_pgtable_cfg *cfg = &data->iop.cfg;
 struct device *dev = cfg->iommu_dev;
+phys_addr_t phys;
+dma_addr_t dma;
+size_t size = ARM_V7S_TABLE_SIZE(lvl);
 void *table = NULL;

 if (lvl == 1)
- table = (void *)__get_dma_pages(__GFP_ZERO, get_order(size));
+ table = (void *)__get_free_pages( +__GFP_ZERO | ARM_V7S_TABLE_GFP_DMA, get_order(size));
 else if (lvl == 2)
- table = kmem_cache_zalloc(data->l2_tables, gfp | GFP_DMA);
+ table = kmem_cache_zalloc(data->l2_tables, gfp);
+phys = virt_to_phys(table);
+if (phys != (arm_v7s_ioppte)phys) {
+ /* Doesn't fit in PTE */
+ dev_err(dev, "Page table does not fit in PTE: %pa", &phys);
+ goto out_free;
+}
 if (table && (!(cfg->quirks & IO_PGTABLE_QUIRK_NO_DMA))) {
 dma = dma_map_single(dev, table, size, DMA_TO_DEVICE);
 if (dma_mapping_error(dev, dma))
address directly, so if the DMA layer suggests otherwise by
translating or truncating them, that bodes very badly...
*/
-if (dma != virt_to_phys(table))
+if (dma != phys)
goto out_unmap;
}
-kmemleak_ignore(table);
+if (lvl == 2)
+kmemleak_ignore(table);
return table;

out_unmap:
@@ -581,6 +598,7 @@
}
io_pgtable_tlb_add_flush(&data->iop, iova, size, size, true);
+io_pgtable_tlb_sync(&data->iop);
return size;
}

@@ -636,6 +654,13 @@
io_pgtable_tlb_sync(iop);
ptep = iopte_deref(pte[i], lvl);
__arm_v7s_free_table(ptep, lvl + 1, data);
+} else if (iop->cfg.quirks & IO_PGTABLE_QUIRK_NON_STRICT) {
+/*
+ * Order the PTE update against queueing the IOVA, to
+ * guarantee that a flush callback from a different CPU
+ * has observed it before the TLBIALL can be issued.
+ */
+smp_wmb();
} else {
io_pgtable_tlb_add_flush(iop, iova, blk_size,
blk_size, true);
@@ -706,7 +731,8 @@
IO_PGTABLE_QUIRK_NO_PERMS |
IO_PGTABLE_QUIRK_TLBI_ON_MAP |
IO_PGTABLE_QUIRK_ARM_MTK_4GB |
- IO_PGTABLE_QUIRK_NO_DMA))
+ IO_PGTABLE_QUIRK_NO_DMA |
+ IO_PGTABLE_QUIRK_NON_STRICT))
return NULL;

/* If ARM_MTK_4GB is enabled, the NO_PERMS is also expected. */
@@ -722,7 +748,7 @@
data->l2_tables = kmem_cache_create("io-pgtblv7s_l2",

ARM_V7S_TABLE_SIZE(2),
ARM_V7S_TABLE_SIZE(2),
- SLAB_CACHE_DMA, NULL);
+ ARM_V7S_TABLE SLAB_FLAGS, NULL);
if (!data->l2_tables)
goto out_free_data;

--- linux-4.15.0.orig/drivers/iommu/io-pgtable-arm.c
+++ linux-4.15.0/drivers/iommu/io-pgtable-arm.c
@@ -551,13 +551,13 @
return 0;

tablep = iopte_deref(pte, data);
+} else if (unmap_idx >= 0) {
+io_pgtable_tlb_add_flush(&data->iop, iova, size, size, true);
+io_pgtable_tlb_sync(&data->iop);
+return size;
}

-if (unmap_idx < 0)
-return __arm_lpae_unmap(data, iova, size, lvl, tablep);
-
-io_pgtable_tlb_add_flush(&data->iop, iova, size, size, true);
-return size;
+return __arm_lpae_unmap(data, iova, size, lvl, tablep);
}

static int __arm_lpae_unmap(struct arm_lpae_io_pgtable *data,
@@ -587,6 +587,13 @@
io_pgtable_tlb_sync(iop);
ptep = iopte_deref(pte, data);
__arm_lpae_free_pgtable(data, lvl + 1, ptep);
+} else if (iop->cfg.quirks & IO_PGTABLE_QUIRK_NON_STRICT) {
+/*
+ * Order the PTE update against queueing the IOVA, to
+ * guarantee that a flush callback from a different CPU
+ * has observed it before the TLBIALL can be issued.
+ */
+smp_wmb();
} else {
    io_pgtable_tlb_add_flush(iop, iova, size, size, true);
}
@@ -741,7 +748,8 @
u64 reg;
 struct arm_lpae_io_pgtable *data;

-if (cfg->quirks & ~(IO_PGTABLE_QUIRK_ARM_NS | IO_PGTABLE_QUIRK_NO_DMA))
+if (cfg->quirks & ~(IO_PGTABLE_QUIRK_ARM_NS | IO_PGTABLE_QUIRK_NO_DMA |
data = arm_lpa_e alloc_pgtable (cfg);
    return NULL;

/* The NS quirk doesn't apply at stage 2 */
-if (cfg-> quirks & ~IO_PGTABLE_QUIRK_NO_DMA)
+if (cfg-> quirks & ~(IO_PGTABLE_QUIRK_NO_DMA |
+    IO_PGTABLE_QUIRK_NON_STRICT))
    return NULL;

data = arm_lpa_e alloc_pgtable (cfg);
--- linux-4.15.0.orig/drivers/iommu/io-pgtable.h
+++ linux-4.15.0/drivers/iommu/io-pgtable.h
@@ -71,12 +71,17 @@
 *
 *
+ * IO_PGTABLE_QUIRK_NON_STRICT: Skip issuing synchronous leaf TLBIs
+ * on unmap, for DMA domains using the flush queue mechanism for
+ * delayed invalidation.
+ *
+#define IO_PGTABLE_QUIRK_ARM_NS		BIT(0)
#define IO_PGTABLE_QUIRK_NO_PERMS	BIT(1)
#define IO_PGTABLE_QUIRK_TLBI_ON_MAP	BIT(2)
#define IO_PGTABLE_QUIRK_ARM_MTK_4GB	BIT(3)
#define IO_PGTABLE_QUIRK_NO_DMA		BIT(4)
+define IO_PGTABLE_QUIRK_NON_STRICT	BIT(5)
unsigned long		quirks;
unsigned long		pgsize_bitmap;
unsigned int		ias;
--- linux-4.15.0.orig/drivers/iommu/iommu.c
+++ linux-4.15.0/drivers/iommu/iommu.c
@@ -37,6 +37,7 @@
 static struct kset *iommu_group_kset;
 static DEFINE_IDA(iommu_group_ida);
 static unsigned int iommu_def_domain_type = IOMMU_DOMAIN_DMA;
+static bool iommu_dma_strict __read_mostly = true;

 struct iommu_callback_data {
     const struct iommu_ops *ops;
     } early_param("iommu.passthrough", iommu_set_def_domain_type);
static int __init iommu_dma_setup(char *str)
{
    return kstrtobool(str, &iommu_dma_strict);
}

early_param("iommu.strict", iommu_dma_setup);

static ssize_t iommu_group_attr_show(struct kobject *kobj,
    struct attribute *__attr, char *buf)
{
    pos = pos->next;
} else if ((start >= a) && (end <= b)) {
    if (new->type == type)
        goto done;
    +return 0;
else
    pos = pos->next;
} else {
    if (new->type == type) {
        phys_addr_t new_start = min(a, start);
        phys_addr_t new_end = max(b, end);
        int ret;
    list_del(&entry->list);
    entry->start = new_start;
    entry->length = new_end - new_start + 1;
    -iommu_insert_resv_region(entry, regions);
    +kfree(entry);
    +return ret;
} else {
    pos = pos->next;
}
    done:
return 0;
}

list_add_tail(&region->list, pos);
-done:
return 0;
}

-ENOMEM;

list_add_tail(&region->list, pos);
-done:
return 0;
}

-ENOMEM;

list_add_tail(&region->list, pos);
-done:
return 0;
}
mutex_unlock(&group->mutex);
dev->iommu_group = NULL;
kobject_put(group->devices_kobj);
+sysfs_remove_link(group->devices_kobj, device->name);
err_free_name:
kfree(device->name);
err_remove_link:

group->default_domain = dom;
if (!group->domain)
    group->domain = dom;
+
+if (dom && !iommu_dma_strict) {
+    int attr = 1;
+    iommu_domain_set_attr(dom,
+        + DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE,
+        + &attr);
+}

ret = iommu_group_add_device(group, dev);

/* Device must already be in a group before calling this function */
-group = iommu_group_get_for_dev(dev);
-if (IS_ERR(group))
-    return PTR_ERR(group);
+group = iommu_group_get(dev);
+if (!group)
+    return -EINVAL;
+return -EINVAL;
+
mutex_lock(&group->mutex);

--- linux-4.15.0.orig/drivers/iommu/iova.c
+++ linux-4.15.0/drivers/iommu/iova.c
@@ -65,9 +65,14 @@
 EXPORT_SYMBOL_GPL(init_iova_domain);
+
+bool has_iova_flush_queue(struct iova_domain *iovad)
+{
+    !iovad->fq;
+}
static void free_iova_flush_queue(struct iova_domain *iovad)
{
    -if (!iovad->fq)
    +if (!has_iova_flush_queue(iovad))
        return;

    if (timer_pending(&iovad->fq_timer))
        int init_iova_flush_queue(struct iova_domain *iovad,
        iova_flush_cb flush_cb, iova_entry_dtor entry_dtor)
        {
            +struct iova_fq __percpu *queue;
            int cpu;

            atomic64_set(&iovad->fq_flush_start_cnt, 0);
            atomic64_set(&iovad->fq_flush_finish_cnt, 0);

            -iovad->fq = alloc_percpu(struct iova_fq);
            -if (!iovad->fq)
            +queue = alloc_percpu(struct iova_fq);
            +if (!queue)
                return -ENOMEM;

            iovad->flush_cb   = flush_cb;
            for_each_possible_cpu(cpu) {
                struct iova_fq *fq;

                -fq = per_cpu_ptr(iovad->fq, cpu);
                +fq = per_cpu_ptr(queue, cpu);
                fq->head = 0;
                fq->tail = 0;

                spin_lock_init(&fq->lock);
            }

            +smp_wmb();
            +iovad->fq = queue;
            +timer_setup(&iovad->fq_timer, fq_flush_timeout, 0);
            atomic_set(&iovad->fq_timer_on, 0);

            struct iova *cached_iova;
            cached_iova = rb_entry(iovad->cached32_node, struct iova, node);
            -if (free->pfn_hi < iovad->dma_32bit_pfn &&
- free->pfn_lo >= cached_iova->pfn_lo
+if (free == cached_iova ||
 +  (free->pfn_hi < iovad->dma_32bit_pfn &&
 +  free->pfn_lo >= cached_iova->pfn_lo))
iovad->cached32_node = rb_next(&free->node);

    cached_iova = rb_entry(iovad->cached_node, struct iova, node);
@@ -225,7 +236,7 @@
struct iova *alloc_iova_mem(void)
{
    return kmem_cache_alloc(iova_cache, GFP_ATOMIC);
+  return kmem_cache_zalloc(iova_cache, GFP_ATOMIC);
}  
EXPORT_SYMBOL(alloc_iova_mem);
@@ -569,7 +580,9 @@
    mod_timer(&iovad->fq_timer,
             jiffies + msecs_to_jiffies(IOVA_FQ_TIMEOUT));
}
@@ -801,7 +814,9 @@
for (i = 0 ; i < mag->size; ++i) {
    struct iova *iova = private_find_iova(iovad, mag->pfns[i]);

-BUG_ON(!iova);
+if (WARN_ON(!iova))
+  continue;
+
private_free_iova(iovad, iova);
}

--- linux-4.15.0.orig/drivers/iommu/ipmmu-vmsa.c
+++ linux-4.15.0/drivers/iommu/ipmmu-vmsa.c
@@ -47,6 +47,7 @@
unsigned int number_of_contexts;
bool setup_imbuscr;
bool twobit_imttbcr_sl0;
+bool reserved_context;
};

struct ipmmu_vmsa_device {


struct io_pgtable_ops *iop;

unsigned int context_id;
-spinlock_t lock;/* Protects mappings */
+struct mutex mutex;/* Protects mappings */
};

static struct ipmmu_vmsa_domain *to_vmsa_domain(struct iommu_domain *dom)

static void ipmmu_domain_destroy_context(struct ipmmu_vmsa_domain *domain)
{
+if (!domain->mmu)
+return;
+
+/*
+ * Disable the context. Flush the TLB as required when modifying the
+ * context registers.
+ @ @ -595.7 +599.7 @@
+if (!domain)
+return NULL;

-spin_lock_init(&domain->lock);
+mutex_init(&domain->mutex);

return &domain->io_domain;
}

struct iommu_fwspec *fwspec = dev->iommu_fwspec;
struct ipmmu_vmsa_device *mmu = to_ipmmu(dev);
struct ipmmu_vmsa_domain *domain = to_vmsa_domain(io_domain);
-unsigned long flags;
unsigned int i;
int ret = 0;

@ @ -650.7 +653.7 @@
return -ENXIO;
}

-spin_lock_irqsave(&domain->lock, flags);
+mutex_lock(&domain->mutex);

if (!domain->mmu) {
/* The domain hasn't been used yet, initialize it. */
@ @ -674.7 +677.7 @@
} else
dev_info(dev, "Reusing IPMMU context %u\n", domain->context_id);
-spin_unlock_irqrestore(&domain->lock, flags);
+mutex_unlock(&domain->mutex);

if (ret < 0)
    return ret;
@@ -917,6 +920,7 @@
    .number_of_contexts = 1, /* software only tested with one context */
    .setup_imbuscr = true,
    .twobit_imttbcr_sl0 = false,
+    .reserved_context = false,
};

static const struct ipmmu_features ipmmu_features_r8a7795 = {
@@ -925,6 +929,7 @@
    .number_of_contexts = 8,
    .setup_imbuscr = false,
    .twobit_imttbcr_sl0 = true,
+    .reserved_context = true,
};

static const struct of_device_id ipmmu_of_ids[] = {
@@ -1018,6 +1023,11 @@
    }

ipmmu_device_reset(mmu);
+    if (mmu->features->reserved_context) {
+        dev_info(&pdev->dev, "IPMMU context 0 is reserved\n");
+        set_bit(0, mmu->ctx);
+    }
+
/*
@@ -1081,12 +1091,19 @@
static int __init ipmmu_init(void)
{
    struct device_node *np;
    static bool setup_done;
    int ret;

    if (setup_done)
        return 0;

    +np = of_find_matching_node(NULL, ipmmu_of_ids);
+    if (!np)
+        return 0;

    dev_info(&pdev->dev, "IPMMU context 0 is reserved\n");
    set_bit(0, mmu->ctx);
    return 0;
*/
of_node_put(np);
ret = platform_driver_register(&ipmmu_driver);
if (ret < 0)
    return ret;

--- linux-4.15.0.orig/drivers/iommu/irq_remapping.c
+++ linux-4.15.0/drivers/iommu/irq_remapping.c
@@ -156,11 +156,6 @@
    panic(msg);
 }

-void ir_ack_apic_edge(struct irq_data *data)
-{  
    -ack_APIC_irq();
           }

/**
 * irq_remapping_get_ir_irq_domain - Get the irqdomain associated with the IOMMU
 *    device serving request @info
 --- linux-4.15.0.orig/drivers/iommu/irq_remapping.h
 +++ linux-4.15.0/drivers/iommu/irq_remapping.h
 @@ -65,8 +65,6 @@
 extern struct irq_remap_ops intel_irq_remap_ops;
 extern struct irq_remap_ops amd_iommu_irq_ops;

 -extern void ir_ack_apic_edge(struct irq_data *data);

 #else /* CONFIG_IRQ_REMAP */

 #define irq_remapping_enabled 0
 --- linux-4.15.0.orig/drivers/iommu/msm_iommu.c
 +++ linux-4.15.0/drivers/iommu/msm_iommu.c
 @@ -395,20 +395,15 @@
 struct msm_iommu_dev *iommu;
 struct iommu_group *group;
 unsigned long flags;
-int ret = 0;

 spin_lock_irqsave(& msm_iommu_lock, flags);
-
 iommu = find_iommu_for_dev(dev);
 +spin_unlock_irqrestore(& msm_iommu_lock, flags);
 +if (iommu)
   iommu_device_link(& iommu->iommu, dev);
 else
   -ret = -ENODEV;
- spin_unlock_irqrestore(&msm_iommu_lock, flags);
-
- if (ret)
- return ret;
+ return -ENODEV;

  group = iommu_group_get_for_dev(dev);
  if (IS_ERR(group))
@@ -425,13 +420,12 @@
    unsigned long flags;

    spin_lock_irqsave(&msm_iommu_lock, flags);
- iommu = find_iommu_for_dev(dev);
+ spin_unlock_irqrestore(&msm_iommu_lock, flags);
+ if (iommu)
  iommu_device_unlink(&iommu->iommu, dev);
+
    spin_unlock_irqrestore(&msm_iommu_lock, flags);
-
    iommu_group_remove_device(dev);
  }

--- linux-4.15.0.orig/drivers/iommu/mtk_iommu.c
+++ linux-4.15.0/drivers/iommu/mtk_iommu.c
@@ -60,7 +60,7 @@
  
 #define REG_MMU_IVRP_PADDR0x114
-#define F_MMU_IVRP_PA_SET(pa, ext)(((pa) >> 1) | ((!!(ext)) << 31))
+  #define REG_MMU_VLD_PA_RNG0x118
 #define F_MMU_VLD_PA_RNG(EA, SA)(((EA) << 8) | (SA))

@@ -115,6 +115,30 @@

 static struct iommu_ops mtk_iommu_ops;

+/*
+ * In M4U 4GB mode, the physical address is remapped as below:
+ * 
+ * CPU Physical address:
+ * ---------------------
+ * + 0 1G 2G 3G 4G 5G
+ * |---A---|---B---|---C---|---D---|---E---|
* +---I/O---+-------Memory-------+
+ * 4G 5G 6G 7G 8G
+ * |--E--|--B--|--C--|--D--|
+ * +-------Memory-------+
+ *
+ * The Region 'A'(I/O) can NOT be mapped by M4U; For Region 'B'/C'/D', the
+ * bit32 of the CPU physical address always is needed to set, and for Region
+ * 'E', the CPU physical address keep as is.
+ *
+ * Additionally, The iommu consumers always use the CPU phyiscal address.
+ */

#define MTK_IOMMU_4GB_MODE_REMAP_BASE 0x40000000
+
static LIST_HEAD(m4ulist); /* List all the M4U HWs */

#define for_each_m4u(data) list_for_each_entry(data, &m4ulist, list)
@@ -394,7 +418,7 @@
static void mtk_iommu_iotlb_sync(struct iommu_domain *domain)
{
- mtk_iommu_tlb_sync(mtk_iommu_get_m4u_data());
+ mtk_iommu_tlb_flush_all(mtk_iommu_get_m4u_data());
}

static phys_addr_t mtk_iommu_iova_to_phys(struct iommu_domain *domain,
@@ -409,7 +433,7 @@
        pa = dom->iop->iova_to_phys(dom->iop, iova);
        spin_unlock_irqrestore(&dom->pgtlock, flags);

-        if (data->enable_4GB)
+      if (data->enable_4GB && pa < MTK_IOMMU_4GB_MODE_REMAP_BASE)
               pa |= BIT_ULL(32);

return pa;
@@ -539,8 +563,13 @@
F_INT_PRETETCH_TRANSATION_FIFO_FAULT;
        writel_relaxed(regval, data->base + REG_MMU_INT_MAIN_CONTROL);

-        writel_relaxed(F_MMU_IVRP_PA_SET(data->protect_base, data->enable_4GB),
- data->base + REG_MMU_IVRP_PADDR);
+        if (data->m4u_plat == M4U_MT8173)
+            regval = (data->protect_base >> 1) | (data->enable_4GB << 31);
+        else
+            regval = lower_32_bits(data->protect_base) |
+            upper_32_bits(data->protect_base);
+writel_relaxed(regval, data->base + REG_MMU_IVRP_PADDR);
+
+if (data->enable_4GB && data->m4u_plat != M4U_MT8173) {
+/*
+ * If 4GB mode is enabled, the validate PA range is from
+@@ -695,6 +724,7 @@
+reg->ctrl_reg = readl_relaxed(base + REG_MMU_CTRL_REG);
+reg->int_control0 = readl_relaxed(base + REG_MMU_INT_CONTROL0);
+reg->int_main_control = readl_relaxed(base + REG_MMU_INT_MAIN_CONTROL);
+reg->ivrp_paddr = readl_relaxed(base + REG_MMU_IVRP_PADDR);
+clk_disable_unprepare(data->bclk);
+return 0;
+
@@ -717,8 +747,7 @@
+writel_relaxed(reg->ctrl_reg, base + REG_MMU_CTRL_REG);
+writel_relaxed(reg->int_control0, base + REG_MMU_INT_CONTROL0);
+writel_relaxed(reg->int_main_control, base + REG_MMU_INT_MAIN_CONTROL);
+writel_relaxed(F_MMU_IVRP_PA_SET(data->protect_base, data->enable_4GB),
+    base + REG_MMU_IVRP_PADDR);
+writel_relaxed(reg->ivrp_paddr, base + REG_MMU_IVRP_PADDR);
+if (data->m4u_dom)
+writel(data->m4u_dom->cfg.arm_v7s_cfg.ttbr[0],
+    base + REG_MMU_PT_BASE_ADDR);
+--- linux-4.15.0.orig/drivers/iommu/mtk_iommu.h
+++ linux-4.15.0/drivers/iommu/mtk_iommu.h
@@ -32,6 +32,7 @@
  u32				ctrl_reg;
  u32				int_control0;
  u32				int_main_control;
+  u32				ivrp_paddr;

enum mtk_iommu_plat {
--- linux-4.15.0.orig/drivers/iommu/omap-iommu-debug.c
+++ linux-4.15.0/drivers/iommu/omap-iommu-debug.c
@@ -101,8 +101,11 @@
 mutex_lock(&iommu_debug_lock);

 bytes = omap_iommu_dump_ctx(obj, p, count);
+if (bytes < 0)
+goto err;
+err:
 bytes = simple_read_from_buffer(userbuf, count, ppos, buf, bytes);

+err:
 mutex_unlock(&iommu_debug_lock);
 kfree(buf);

--- linux-4.15.0.orig/drivers/iommu/omap-iommu.c
+++ linux-4.15.0/drivers/iommu/qcom_iommu.c
@@ -333,21 +333,19 @@
 struct qcom_iommu_domain *qcom_domain = to_qcom_iommu_domain(domain);

-if (WARN_ON(qcom_domain->iommu)) /* forgot to detach? */
-          return;
-          iommu_put_dma_cookie(domain);

-/* NOTE: unmap can be called after client device is powered off,
- * for example, with GPUs or anything involving dma-buf. So we
- * cannot rely on the device_link. Make sure the IOMMU is on to
- * avoid unclocked accesses in the TLB inv path:
- */
-         pm_runtime_get_sync(qcom_domain->iommu->dev);
-         -free_io_ptgtable_ops(qcom_domain->pgtbl_ops);
-         -pm_runtime_put_sync(qcom_domain->iommu->dev);
+if (qcom_domain->iommu) {
+        /*
+         * NOTE: unmap can be called after client device is powered
+         * off, for example, with GPUs or anything involving dma-buf.
+         * So we cannot rely on the device_link. Make sure the IOMMU
+         * is on to avoid unclocked accesses in the TLB inv path:
+         */
+         pm_runtime_get_sync(qcom_domain->iommu->dev);
+free_io_ptable_ops(qcom_domain->pgtbl_ops);
+pm_runtime_put_sync(qcom_domain->iommu->dev);
+
} kfree(qcom_domain);
}
@@ -392,7 +390,7 @@
struct qcom_iommu_domain *qcom_domain = to_qcom_iommu_domain(domain);
unsigned i;

- if (!qcom_domain->iommu)
+ if (WARN_ON(!qcom_domain->iommu))
 return;

pm_runtime_get_sync(qcom_iommu->dev);
@@ -405,8 +403,6 @@
 ctx->domain = NULL;
 }
 pm_runtime_put_sync(qcom_iommu->dev);
-
-qcom_domain->iommu = NULL;
}

static int qcom_iommu_map(struct iommu_domain *domain, unsigned long iova,
@@ -802,8 +798,11 @@
qcom_iommu->dev = dev;

res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
- if (res)
+ if (res) {
qcom_iommu->local_base = devm_ioremap_resource(dev, res);
+ if (IS_ERR(qcom_iommu->local_base))
+ return PTR_ERR(qcom_iommu->local_base);
+ }

qcom_iommu->iface_clk = devm_clk_get(dev, "iface");
if (IS_ERR(qcom_iommu->iface_clk)) {
--- linux-4.15.0.orig/drivers/iommu/tegra-smmu.c
+++ linux-4.15.0/drivers/iommu/tegra-smmu.c
@@ -94,7 +94,6 @@
#define SMMU_TLB_FLUSH_VA_MATCH_ALL     (0 << 0)
#define SMMU_TLB_FLUSH_VA_MATCH_SECTION (2 << 0)
#define SMMU_TLB_FLUSH_VA_MATCH_GROUP   (3 << 0)
-#define SMMU_TLB_FLUSH_VA_MATCH_SECTION(addr) ((((addr) & 0xffc00000) >> 12) | SMMU_TLB_FLUSH_VA_MATCH_SECTION)
#define SMMU_TLB_FLUSH_VA_MATCH_SECTION(addr) ((((addr) & 0xfff00000) >> 12) | 

@@ -157,9 +156,9 @@
return (addr & smmu->pfn_mask) == addr;
}

static dma_addr_t smmu_pde_to_dma(u32 pde)

+static dma_addr_t smmu_pde_to_dma(struct tegra_smmu *smmu, u32 pde)
{
    -return pde << 12;
    +return (dma_addr_t)(pde & smmu->pfn_mask) << 12;
}

static void smmu_flush_ptc_all(struct tegra_smmu *smmu)
@@ -197,8 +196,12 @@
{
    u32 value;

    -value = SMMU_TLB_FLUSH_ASID_MATCH | SMMU_TLB_FLUSH_ASID(asid) |
    -SMMU_TLB_FLUSH_VA_MATCH_ALL;
    +if (smmu->soc->num_asids == 4)
    +value = (asid & 0x3) << 29;
    +else
    +value = (asid & 0x7f) << 24;
    +
    +value |= SMMU_TLB_FLUSH_ASID_MATCH | SMMU_TLB_FLUSH_VA_MATCH_ALL;
    smmu_writel(smmu, value, SMMU_TLB_FLUSH);
}
@@ -208,8 +211,12 @@
{
    u32 value;

    -value = SMMU_TLB_FLUSH_ASID_MATCH | SMMU_TLB_FLUSH_ASID(asid) |
    -SMMU_TLB_FLUSH_VA_SECTION(iova);
    +if (smmu->soc->num_asids == 4)
    +value = (asid & 0x3) << 29;
    +else
    +value = (asid & 0x7f) << 24;
    +
    +value |= SMMU_TLB_FLUSH_ASID_MATCH | SMMU_TLB_FLUSH_VA_SECTION(iova);
    smmu_writel(smmu, value, SMMU_TLB_FLUSH);
}
@@ -219,8 +226,12 @@
{
    u32 value;

    -value = SMMU_TLB_FLUSH_ASID_MATCH | SMMU_TLB_FLUSH_ASID(asid) |
    -SMMU_TLB_FLUSH_VA_GROUP(iova);
    +if (smmu->soc->num_asids == 4)
value = (asid & 0x3) << 29;
else
value = (asid & 0x7f) << 24;
value |= SMMU_TLB_FLUSH_ASID_MATCH | SMMU_TLB_FLUSH_VA_GROUP(iova);
smmu_writel(smmu, value, SMMU_TLB_FLUSH);
}

@@ -532,6 +543,7 @@
dma_addr_t *dmap)
{
    unsigned int pd_index = iova_pd_index(iova);
+struct tegra_smmu *smmu = as->smmu;
    struct page *pt_page;
    u32 *pd;

@@ -540,7 +552,7 @@
    return NULL;
    pd = page_address(as->pd);
-    *dmap = smmu_pde_to_dma(pd[pd_index]);
+    *dmap = smmu_pde_to_dma(smmu, pd[pd_index]);
    return tegra_smmu_pte_offset(pt_page, iova);
}
@@ -582,7 +594,7 @@
} else {
    u32 *pd = page_address(as->pd);

@@ -607,7 +619,7 @@
    struct tegra_smmu *smmu = as->smmu;
    u32 *pd = page_address(as->pd);
-    dma_addr_t pte_dma = smmu_pde_to_dma(pd[pde]);
+    dma_addr_t pte_dma = smmu_pde_to_dma(smmu, pd[pde]);
    return tegra_smmu_pte_offset(as->pts[pde], iova);
    @ -607,7 +619,7 @@
    if (--as->count[pde] == 0) {
        struct tegra_smmu *smmu = as->smmu;
        u32 *pd = page_address(as->pd);
-        dma_addr_t pte_dma = smmu_pde_to_dma(pd[pde]);
+        dma_addr_t pte_dma = smmu_pde_to_dma(smmu, pd[pde]);
        tegra_smmu_set_pde(as, iova, 0);

--- linux-4.15.0.orig/drivers/ipack/carriers/tpci200.c
+++ linux-4.15.0/drivers/ipack/carriers/tpci200.c
@@ -94,16 +94,13 @@
    free_irq(tpci200->info->pdev->irq, (void*) tpci200);
pci_iounmap(tpci200->info->pdev, tpci200->info->interface_regs);
-pci_iounmap(tpci200->info->pdev, tpci200->info->cfg_regs);

pci_release_region(tpci200->info->pdev, TPCI200_IP_INTERFACE_BAR);
pci_release_region(tpci200->info->pdev, TPCI200_IO_ID_INT_SPACES_BAR);
pci_release_region(tpci200->info->pdev, TPCI200_MEM16_SPACE_BAR);
pci_release_region(tpci200->info->pdev, TPCI200_MEM8_SPACE_BAR);
-pci_release_region(tpci200->info->pdev, TPCI200_CFG_MEM_BAR);

pci_disable_device(tpci200->info->pdev);
-pci_dev_put(tpci200->info->pdev);
}

static void tpci200_enable_irq(struct tpci200_board *tpci200,
      @@ -524,7 +521,7 @@
tpci200->info = kzalloc(sizeof(struct tpci200_infos), GFP_KERNEL);
  if (!tpci200->info) {
    ret = -ENOMEM;
    -goto out_err_info;
+    goto err_tpci200;
  }

  pci_dev_get(pdev);
  @@ -535,7 +532,7 @@
  if (ret) {
    dev_err(&pdev->dev, "Failed to allocate PCI Configuration Memory");
    ret = -EBUSY;
    -goto out_err_pci_request;
+    goto err_tpci200_info;
  }

  tpci200->info->cfg_regs = ioremap_nocache(
      pci_resource_start(pdev, TPCI200_CFG_MEM_BAR),
      @@ -543,7 +540,7 @@
      if (!tpci200->info->cfg_regs) {
        dev_err(&pdev->dev, "Failed to map PCI Configuration Memory");
        ret = -EFAULT;
        -goto out_err_ioremap;
        +goto err_request_region;
      }

      /* Disable byte swapping for 16 bit IP module access. This will ensure
      @@ -566,7 +563,7 @@
      if (ret) {
        dev_err(&pdev->dev, "error during tpci200 install\n");
        ret = -ENODEV;
        -goto out_err_install;
        +goto err_cfg_regs;
      }
/* Register the carrier in the industry pack bus driver */
@@ -578,7 +575,7 @@
    dev_err(&pdev->dev, 
    "error registering the carrier on ipack driver\n");
    ret = -EFAULT;
    -goto out_err_bus_register;
    +goto err_tpci200_install;
    }

/* save the bus number given by ipack to logging purpose */
@@ -589,16 +586,16 @@
    tpci200_create_device(tpci200, i);
    return 0;

    -out_err_bus_register:
    +err_tpci200_install:
    tpci200_uninstall(tpci200);
    -out_err_install:
    -iounmap(tpci200->info->cfg_regs);
    -out_err_ioremap:
    +err_cfg_regs:
    +pci_iounmap(tpci200->info->pdev, tpci200->info->cfg_regs);
    +err_request_region:
    pci_release_region(pdev, TPCI200_CFG_MEM_BAR);
    -out_err_pci_request:
    -pci_dev_put(pdev);
    +err_tpci200_info:
    kfree(tpci200->info);
    -out_err_info:
    +pci_dev_put(pdev);
    +err_tpci200:
    kfree(tpci200);
    return ret;
    }
@@ -608,6 +605,12 @@
    ipack_bus_unregister(tpci200->info->ipack_bus);
    tpci200_uninstall(tpci200);

    +pci_iounmap(tpci200->info->pdev, tpci200->info->cfg_regs);
    +pci_release_region(tpci200->info->pdev, TPCI200_CFG_MEM_BAR);
    +pci_dev_put(tpci200->info->pdev);
    kfree(tpci200->info);
    kfree(tpci200);
    }
--- linux-4.15.0.orig/drivers-ipack/devices/ipoctal.c
+++ linux-4.15.0/drivers-ipack/devices/ipoctal.c
@@ -38,6 +38,7 @@
 unsigned int			pointer_read;
 unsigned int			pointer_write;
 struct tty_port			tty_port;
+bool			tty_registered;
 union scc2698_channel __iomem*regs;
 union scc2698_block __iomem*block_regs;
 unsigned intboard_id;
@@ -86,22 +87,34 @@
 return 0;
 }

-static int ipoctal_open(struct tty_struct *tty, struct file *file)
+static int ipoctal_install(struct tty_driver *driver, struct tty_struct *tty)
 {
 struct ipoctal_channel *channel = dev_get_drvdata(tty->dev);
 struct ipoctal *ipoctal = chan_to_ipoctal(channel, tty->index);
-int err;
-	tty->driver_data = channel;
+int res;
 if (!ipack_get_carrier(ipoctal->dev))
 return -EBUSY;

-err = tty_port_open(&channel->tty_port, tty, file);
-if (err)
-ipoctal_put_carrier(ipoctal->dev);
+res = tty_standard_install(driver, tty);
+if (res)
+goto err_put_carrier;
+
tty->driver_data = channel;
+return 0;
+
+err_put_carrier:
+ipoctal_put_carrier(ipoctal->dev);
+return res;
+
+static int ipoctal_open(struct tty_struct *tty, struct file *file)
+{
+struct ipoctal_channel *channel = tty->driver_data;

static void ipoctal_reset_stats(struct ipoctal_stats *stats)
{
    int res;
    int i;
    struct tty_driver *tty;
    char name[20];
    struct ipoctal_channel *channel;
    struct ipack_region *region;
    void __iomem *addr;

    /* Fill struct tty_driver with ipoctal data */
    tty->owner = THIS_MODULE;
    tty->driver_name = KBUILD_MODNAME;
    sprintf(name, KBUILD_MODNAME ".%d.%d.", bus_nr, slot);
    tty->name = name;
    tty->name = kasprintf(GFP_KERNEL, KBUILD_MODNAME ".%d.%d.", bus_nr, slot);
    if (!tty->name) {
        res = -ENOMEM;
        goto err_put_driver;
    }
    tty->major = 0;
    tty->minor_start = 0;

    res = tty_register_driver(tty);
    if (res) {
        dev_err(&ipoctal->dev->dev, "Can't register tty driver\n");
        put_tty_driver(tty);
        return res;
    }
    /* Save struct tty_driver for use it when uninstalling the device */

    channel = &ipoctal->channel[i];
    tty_port_init(&channel->tty_port);
    -tty_port_alloc_xmit_buf(&channel->tty_port);
    +res = tty_port_alloc_xmit_buf(&channel->tty_port);
    +if (res)
        +continue;
    channel->tty_port.ops = &ipoctal_tty_port_ops;

    ipoctal_reset_stats(&channel->stats);
spin_lock_init(&channel->lock);
channel->pointer_read = 0;
channel->pointer_write = 0;
tty_dev = tty_port_register_device(&channel->tty_port, tty, i, NULL);
tty_dev = tty_port_register_device_attr(&channel->tty_port, tty, i, NULL, channel, NULL);
if (IS_ERR(tty_dev)) {
    dev_err(&ipoctal->dev->dev, "Failed to register tty device.\n");
tty_port_free_xmit_buf(&channel->tty_port);
tty_port_destroy(&channel->tty_port);
    continue;
}
-dev_set_drvdata(tty_dev, channel);
+channel->tty_registered = true;
}
/*

ipoctal_irq_handler, ipoctal);

return 0;
+
+err_free_name:
+kfree(tty->name);
+err_put_driver:
+put tty_driver(tty);
+
+return res;
}

static inline int ipoctal_copy_write_buffer(struct ipoctal_channel *channel,
static const struct tty_operations ipoctal_fops = {
    .ioctl =NULL,
    .install =ipoctal_install,
    .open =ipoctal_open,
    .close =ipoctal_close,
    .write =ipoctal_write_tty.
}

for (i = 0; i < NR_CHANNELS; i++) {
    struct ipoctal_channel *channel = &ipoctal->channel[i];
    +
    +if (!channel->tty_registered)
    +continue;
    +
tty_unregister_device(ipoctal->tty_drv, i);
tty_port_free_xmit_buf(&channel->tty_port);
tty_port_destroy(&channel->tty_port);
}
tty_unregister_driver(ipoctal->tty_drv);
+kfree(ipoctal->tty_drv->name);
put_tty_driver(ipoctal->tty_drv);
+kfree(ipoctal);
}
--- linux-4.15.0.orig/drivers/irqchip/irq-alpine-msi.c
+++ linux-4.15.0/drivers/irqchip/irq-alpine-msi.c
@@ -165,8 +165,7 @@
return 0;
err_sgi:
-while (--i >= 0)
-irq_domain_free_irqs_parent(domain, virq, i);
+irq_domain_free_irqs_parent(domain, virq, i - 1);
alpine_msix_free_sgi(priv, sgi, nr_irqs);
return err;
}
--- linux-4.15.0.orig/drivers/irqchip/irq-bcm7038-l1.c
+++ linux-4.15.0/drivers/irqchip/irq-bcm7038-l1.c
@@ -217,6 +217,7 @@
return 0;
}
#ifdef CONFIG_SMP
static void bcm7038_l1_cpu_offline(struct irq_data *d)
{
 struct cpumask *mask = irq_data_get_affinity_mask(d);
@@ -241,6 +242,7 @@
irq_set_affinity_locked(d, &new_affinity, false);
}
@endif

static int __init bcm7038_l1_init_one(struct device_node *dn, unsigned int idx,
@@ -282,6 +284,10 @@
pr_err("failed to map parent interrupt %d\n", parent_irq);
return -EINVAL;
}
+if (of_property_read_bool(dn, "brcm,irq-can-wake"))
+enable_irq_wake(parent_irq);
+
irq_set_chained_handler_and_data(parent_irq, bcm7038_11_irq_handle, inte);

@@ -293,7 +299,9 @@
 .irq_mask	= bcm7038_11_mask,
 .irq_unmask	= bcm7038_11_unmask,
 .irq_set_affinity	= bcm7038_11_set_affinity,
+ifdef CONFIG_SMP
 .irq_cpu_offline	= bcm7038_11_cpu_offline,
+endif
 };  

static int bcm7038_11_map(struct irq_domain *d, unsigned int virq,
 --- linux-4.15.0.orig/drivers/irqchip/irq-brcmstb-l2.c
+++ linux-4.15.0/drivers/irqchip/irq-brcmstb-l2.c
@@ -129,8 +129,9 @@
 struct irq_chip_generic *gc = irq_data_get_irq_chip_data(d);
 struct irq_chip_type *ct = irq_data_get_chip_type(d);
 struct brcmstb_l2_intc_data *b = gc->private;
+unsigned long flags;

-irq_gc_lock(gc);
+irq_gc_lock_irqsave(gc, flags);
 /* Save the current mask */
 b->saved_mask = irq_reg_readl(gc, ct->regs.mask);
@@ -139,7 +140,7 @@
 irq_reg_writel(gc, ~b->saved_mask & ~gc->wake_active, ct->regs.disable);
 irq_reg_writel(gc, gc->wake_active, ct->regs.enable);
 }  
-irq_gc_unlock(gc);
+irq_gc_unlock_irqrestore(gc, flags);
 }

static void brcmstb_l2_intc_resume(struct irq_data *d)
 @@ -147,8 +148,9 @@
 struct irq_chip_generic *gc = irq_data_get_irq_chip_data(d);
 struct irq_chip_type *ct = irq_data_get_chip_type(d);
 struct brcmstb_l2_intc_data *b = gc->private;
+unsigned long flags;

-irq_gc_lock(gc);
+irq_gc_lock_irqsave(gc, flags);
 if (ct->chip.irq_ack) {
 /* Clear unmasked non-wakeup interrupts */
 irq_reg_writel(gc, ~b->saved_mask & ~gc->wake_active,
 @@ -158,7 +160,7 @@
 /* Restore the saved mask */

irq_reg_writel(gc, b->saved_mask, ct->regs.disable);
irq_reg_writel(gc, ~b->saved_mask, ct->regs.enable);
-irq_gc_unlock(gc);
+irq_gc_unlock_irqrestore(gc, flags);
}

static int __init brcmstb_l2_intc_of_init(struct device_node *np,
--- linux-4.15.0.orig/drivers/irqchip/irq-gic-common.c
+++ linux-4.15.0/drivers/irqchip/irq-gic-common.c
@@ -21,6 +21,8 @@
#include "irq-gic-common.h"

+static DEFINE_RAW_SPINLOCK(irq_controller_lock);
+
static const struct gic_kvm_info *gic_kvm_info;

const struct gic_kvm_info *gic_get_kvm_info(void)
@@ -53,11 +55,13 @@
unsigned long flags;
/*
 * Read current configuration register, and insert the config
 * for “irq”, depending on “type”.
 */
+raw_spin_lock_irqsave(&irq_controller_lock, flags);
val = oldval = readl_relaxed(base + GIC_DIST_CONFIG + confoff);
if (type & IRQ_TYPE_LEVEL_MASK)
val &= ~confmask;
@@ -65,8 +71,10 @@
val |= confmask;
/* If the current configuration is the same, then we are done */
-if (val == oldval)
+if (val == oldval) {
+raw_spin_unlock_irqrestore(&irq_controller_lock, flags);
return 0;
+}

/*
 * Write back the new configuration, and possibly re-enable
 @@ -84,6 +90,7 @@
 pr_warn("GIC: PPI%d is secure or misconfigured\n", irq - 16);
}
raw_spin_unlock_irqrestore(&irq_controller_lock, flags);

if (sync_access)
sync_access();
--- linux-4.15.0.orig/drivers/irqchip/irq-gic-v3-its-pci-msi.c
+++ linux-4.15.0/drivers/irqchip/irq-gic-v3-its-pci-msi.c
@@ -132,6 +132,8 @@
for (np = of_find_matching_node(NULL, its_device_id); np;
      np = of_find_matching_node(np, its_device_id)) {
+  if (!of_device_is_available(np))
      continue;
  if (!of_property_read_bool(np, "msi-controller"))
      continue;

--- linux-4.15.0.orig/drivers/irqchip/irq-gic-v3-its-platform-msi.c
+++ linux-4.15.0/drivers/irqchip/irq-gic-v3-its-platform-msi.c
@@ -154,6 +154,8 @@
for (np = of_find_matching_node(NULL, its_device_id); np;
      np = of_find_matching_node(np, its_device_id)) {
+  if (!of_device_is_available(np))
      continue;
  if (!of_property_read_bool(np, "msi-controller"))
      continue;

--- linux-4.15.0.orig/drivers/irqchip/irq-gic-v3-its.c
+++ linux-4.15.0/drivers/irqchip/irq-gic-v3-its.c
@@ -89,9 +89,14 @@
* The ITS structure - contains most of the infrastructure, with the
* top-level MSI domain, the command queue, the collections, and the
* list of devices writing to it.
+ *
+ * dev_alloc_lock has to be taken for device allocations, while the
+ * spinlock must be taken to parse data structures such as the device
+ * list.
+ *
struct its_node {
  raw_spinlock_t lock;
+struct mutexdev_alloc_lock;
struct list_head entry;
void __iomem* base;
phys_addr_t phys_base;
@@ -146,7 +151,7 @@
    void*itt;
    u32nr_ites;
    u32device_id;
+boolshared;
static struct {
    static u16 get_its_list(struct its_vm *vm)
    {
        struct its_node *its;
        unsigned long its_list = 0;

        list_for_each_entry(its, &its_nodes, entry) {
            if (!its->is_v4)
                continue;
            if (vm->vlpi_count[its->list_nr])
                __set_bit(its->list_nr, &its_list);
        }
        return (u16)its_list;
    }

    static struct its_collection *dev_event_to_col(struct its_device *its_dev,
                                                  u32 event)
    {
        static struct its_cmd_desc *desc)
        {
            its_encode_cmd(cmd, GITS_CMD_INVALL);
            its_encode_collection(cmd, desc->its_mapc_cmd.col->col_id);
            its_encode_collection(cmd, desc->its_invall_cmd.col->col_id);
            its_fixup_cmd(cmd);
        }

        static int its_wait_for_range_completion(struct its_node *its,
                                                  struct its_cmd_block *from,
                                                  u64 prev_idx,
                                                  struct its_cmd_block *to)
        {
            u64 rd_idx, from_idx, to_idx;
            u32 count = 1000000; /* 1s! */

            from_idx = its_cmd_ptr_to_offset(its, from);
            to_idx = its_cmd_ptr_to_offset(its, to);
            rd_idx = rd_base + to_idx - from_idx;
            while (count--) /* inclusive */
                if (rd_idx == prev_idx)
                    return 1;
            return 0;
        }
    }
}

#define gic_data_rdist_rd_base()  (gic_data_rdist()->rd_base)
#define gic_data_rdist_vlpi_base() (gic_data_rdist_rd_base() + SZ_128K)

+static void its_init()
+
+static void its_deinit()
+
+static void its_wait_for_range_completion(u64 rd_idx, from_idx, to_idx);
+
+static u16 get_its_list(struct its_vm *vm)
+
+static struct its_node *its;
+
+unsigned long its_list = 0;
+
+list_for_each_entry(its, &its_nodes, entry) {
+    if (!its->is_v4)
+        continue;
+    if (vm->vlpi_count[its->list_nr])
+        __set_bit(its->list_nr, &its_list);
+
+    return (u16)its_list;
+
+static struct its_collection *dev_event_to_col(struct its_device *its_dev,
                                              u32 event)
+    {
+        struct its_cmd_desc *desc)
+        {
+            its_encode_cmd(cmd, GITS_CMD_INVALL);
+            its_encode_collection(cmd, desc->its_mapc_cmd.col->col_id);
+            its_encode_collection(cmd, desc->its_invall_cmd.col->col_id);
+            its_fixup_cmd(cmd);
+    }
+}

-@ -170,6 +176,22 @@
-#define gic_data_rdist_rd_base()  (gic_data_rdist()->rd_base)
-#define gic_data_rdist_vlpi_base() (gic_data_rdist_rd_base() + SZ_128K)
+
+static u16 get_its_list(struct its_vm *vm)
+
+{ +
+    struct its_node *its;
+    unsigned long its_list = 0;
+ +
+    list_for_each_entry(its, &its_nodes, entry) {
+        if (!its->is_v4)
+            continue;
+        if (vm->vlpi_count[its->list_nr])
+            __set_bit(its->list_nr, &its_list);
+    }
+    return (u16)its_list;
+}

+static struct its_collection *dev_event_to_col(struct its_device *its_dev,
                                              u32 event)
+    {
+        struct its_cmd_desc *desc)
+        {
+            its_encode_cmd(cmd, GITS_CMD_INVALL);
+            its_encode_collection(cmd, desc->its_mapc_cmd.col->col_id);
+            its_encode_collection(cmd, desc->its_invall_cmd.col->col_id);
+            its_fixup_cmd(cmd);
+    }
+}

static int its_wait_for_range_completion(struct its_node *its,
                                          struct its_cmd_block *from,
                                          u64 prev_idx,
                                          struct its_cmd_block *to)
    {
        u64 rd_idx, from_idx, to_idx;
        u32 count = 1000000; /* 1s! */

        from_idx = its_cmd_ptr_to_offset(its, from);

-@ -534,7 +556,7 @@
-    struct its_cmd_desc *desc)
-{
-    its_encode_cmd(cmd, GITS_CMD_INVALL);
-    its_encode_collection(cmd, desc->its_mapc_cmd.col->col_id);
-    its_encode_collection(cmd, desc->its_invall_cmd.col->col_id);
-    its_fixup_cmd(cmd);
-
-@ -712,32 +734,43 @@
-}
/* Linearize to_idx if the command set has wrapped around */
to_idx = its_cmd_ptr_to_offset(its, to);
+if (to_idx < prev_idx)
+to_idx += ITS_CMD_QUEUE_SZ;
+
+linear_idx = prev_idx;

while (1) {
+s64 delta;
+
rd_idx = readl_relaxed(its->base + GITS_CREADR);

/* Direct case */
-if (from_idx < to_idx && rd_idx >= to_idx)
-break;
+/
+ * Compute the read pointer progress, taking the
+ * potential wrap-around into account.
+ */
+delta = rd_idx - prev_idx;
+if (rd_idx < prev_idx)
+delta += ITS_CMD_QUEUE_SZ;

/* Wrapped case */
-if (from_idx >= to_idx && rd_idx >= to_idx && rd_idx < from_idx)
+linear_idx += delta;
+if (linear_idx >= to_idx)
break;

count--; 
-if (!count) {
+pr_err_ratelimited("ITS queue timeout (%llu %llu)
+to_idx, linear_idx);
return -1;
+
+prev_idx = rd_idx;
+cpu_relax();
+udelay(1);
+
-raw_spin_lock_irqsave(&its->lock, flags);

@@ -754,6 +787,7 @@
 struct its_cmd_block *cmd, *sync_cmd, *next_cmd;
 synctype *sync_obj;
 unsigned long flags;
+u64 rd_idx;
 \
 raw_spin_lock_irqsave(&its->lock, flags);\n
static void its_send_vmovp(struct its_vpe *vpe)
{
    struct its_cmd_desc desc = {0};
    struct its_node *its;
    unsigned long flags;
    int col_id = vpe->col_idx;

    desc.its_vmovp_cmd.vpe = vpe;
    desc.its_vmovp_cmd.its_list = get_its_list(vpe->its_vm);
    if (!its_list_map) {
        its = list_first_entry(&its_nodes, struct its_node, entry);
        desc.its_vmovp_cmd.seq_num = 0;
        desc.its_vmovp_cmd.col = &its->collections[col_id];
        its_send_single_vcommand(its, its_build_vmovp_cmd, &desc);
        return;
    }
    raw_spin_lock_irqsave(&vmovp_lock, flags);
    desc.its_vmovp_cmd.seq_num = vmovp_seq_num++;
    desc.its_vmovp_cmd.its_list = get_its_list(vpe->its_vm);

    /* Emit VMOVPs */
    list_for_each_entry(its, &its_nodes, entry) {
        raw_spin_unlock_irqrestore(&its->lock, flags);

        /* This gives us (((1UL << id_bits) - 8192) >> 5) possible allocations. */
        #define IRQS_PER_CHUNK_SHIFT 5
        #define IRQS_PER_CHUNK (1UL << IRQS_PER_CHUNK_SHIFT)
        #define ITS_MAX_LPI_NRBITS 16 /* 64K LPIs */
    }
}
static unsigned long *lpi_bitmap;
@@ -1795,6 +1829,8 @@
 indirect = its_parse_indirect_baser(its, baser,
     psz, &order,
     its->device_ids);
+break;
+
+case GITS_BASER_TYPE_VCPU:
indirect = its_parse_indirect_baser(its, baser,
     psz, &order,
@@ -1851,6 +1887,29 @@
     get_order(max_t(u32, LPI_PENDBASE_SZ, SZ_64K));
 }

+static u64 its_clear_vpend_valid(void __iomem *vlpi_base)
+{
+    u32 count = 1000000; /* 1s! */
+    bool clean;
+    u64 val;
+    
+    val = gits_read_vpendbaser(vlpi_base + GICR_VPENDBASER);
+    val &= ~GICR_VPENDBASER_Valid;
+    gits_write_vpendbaser(val, vlpi_base + GICR_VPENDBASER);
+    
+    do {
+        val = gits_read_vpendbaser(vlpi_base + GICR_VPENDBASER);
+        clean = !(val & GICR_VPENDBASER_Dirty);
+        if (!clean) {
+            count--;
+            cpu_relax();
+            udelay(1);
+        }
+    } while (!clean && count);
+    
+    return val;
+}
+
+static void its_cpu_init_lpis(void)
+
+static void __iomm *rbase = gic_data_rdist_rd_base();
@@ -1934,6 +1993,30 @@
     val |= GICR_CTLR_ENABLE_LPI;
     writel_relaxed(val, rbase + GICR_CTLR);
+
+    if (gic_rdists->has_vlpis) {
+        void __iomm *vlpi_base = gic_data_rdist_vlpi_base();
+        
+        static u64 its_clear_vpend_valid(void __iomem *vlpi_base)
+        {
+            u32 count = 1000000; /* 1s! */
+            bool clean;
+            u64 val;
+            
+            val = gits_read_vpendbaser(vlpi_base + GICR_VPENDBASER);
+            val &= ~GICR_VPENDBASER_Valid;
+            gits_write_vpendbaser(val, vlpi_base + GICR_VPENDBASER);
+            
+            do {
+                val = gits_read_vpendbaser(vlpi_base + GICR_VPENDBASER);
+                clean = !(val & GICR_VPENDBASER_Dirty);
+                if (!clean) {
+                    count--;
+                    cpu_relax();
+                    udelay(1);
+                }
+            } while (!clean && count);
+            
+            return val;
+        }
+        
+        static void its_cpu_init_lpis(void)
+        {
+            void __iomm *rbase = gic_data_rdist_rd_base();
@@ -1934,6 +1993,30 @@
             val |= GICR_CTLR_ENABLE_LPI;
             writel_relaxed(val, rbase + GICR_CTLR);
+        }
+
+        if (gic_rdists->has_vlpis) {
+            void __iomm *vlpi_base = gic_data_rdist_vlpi_base();
+            
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/*
 * It's possible for CPU to receive VLPIs before it is
 * sheduled as a vPE, especially for the first CPU, and the
 * VLPI with INTID larger than 2^(IDbits+1) will be considered
 * as out of range and dropped by GIC.
 * So we initialize IDbits to known value to avoid VLPI drop.
 */
val = (LPI_NRBITS - 1) & GICR_VPROPBASER_IDBITS_MASK;
pr_debug("GICv4: CPU%d: Init IDbits to 0x%llx for GICR_VPROPBASER\n", smp_processor_id(), val);
gits_write_vpropbaser(val, vlpi_base + GICR_VPROPBASER);
+
/*
 * Also clear Valid bit of GICR_VPENDBASER, in case some
 * ancient programming gets left in and has possibility of
 * corrupting memory.
 */
val = its_clear_vpend_valid(vlpi_base);
WARN_ON(val & GICR_VPENDBASER_Dirty);
+
/* Make sure the GIC has seen the above */
dsb(sy);
}
@@ -2119,11 +2202,10 @@
dev = kzalloc(sizeof(*dev), GFP_KERNEL);
/*
 - * At least one bit of EventID is being used, hence a minimum
 - * of two entries. No, the architecture doesn't let you
 - * express an ITT with a single entry.
 + * We allocate at least one chunk worth of LPIs bet device,
 + * and thus that many ITEs. The device may require less though.
 */
-nr_ites = max(2UL, roundup_pow_of_two(nvecs));
+nr_ites = max(IRQS_PER_CHUNK, roundup_pow_of_two(nvecs));
sz = nr_ites * its->ite_size;
 sz = max(sz, ITS_ITT_ALIGN) + ITS_ITT_ALIGN - 1;
itt = kzalloc(sz, GFP_KERNEL);
@@ -2180,13 +2262,14 @@
kfree(its_dev);
}

-static int its_alloc_device_irq(struct its_device *dev, irq_hw_number_t *hwirq)
+static int its_alloc_device_irq(struct its_device *dev, int nvecs, irq_hw_number_t *hwirq)
 { int idx;
-idx = find_first_zero_bit(dev->event_map.lpi_map,
  dev->event_map.nr_lpis);
-if (idx == dev->event_map.nr_lpis)
+idx = bitmap_find_free_region(dev->event_map.lpi_map,
  dev->event_map.nr_lpis,
  get_count_order(nvecs));
+if (idx < 0)
return -ENOSPC;

*hirq = dev->event_map.lpi_base + idx;
@@ -2202,6 +2285,7 @@
struct its_device *its_dev;
struct msi_domain_info *msi_info;
u32 dev_id;
+int err = 0;

/*@ -2202,6 +2285,7 @@*/
/*
 * We ignore "dev" entirely, and rely on the dev_id that has
@@ -2224,6 +2308,7 @@*/
return -EINVAL;
}

+mutex_lock(&its->dev_alloc_lock);
its_dev = its_find_device(its, dev_id);
if (its_dev) {
/*
 @@ -2231,18 +2316,22 @@*/
  * another alias (PCI bridge of some sort). No need to
  * create the device.
  */
+its_dev->shared = true;
pr_debug("Reusing ITT for devID %x\n", dev_id);
goto out;
}

its_dev = its_create_device(its, dev_id, nvec, true);
-if (!its_dev)
-return -ENOMEM;
+if (!its_dev) {
+err = -ENOMEM;
+goto out;
+}

pr_debug("ITT %d entries, %d bits\n", ilog2(nvec));
out:
+mutex_unlock(&its->dev_alloc_lock);
info->scratchpad[0].ptr = its_dev;
-return 0;

static struct msi_domain_ops its_msi_domain_ops = {
    msi_alloc_info_t *info = args;
    struct its_device *its_dev = info->scratchpad[0].ptr;
    struct irq_data *irqd;
    irq_hw_number_t hwirq;
    int err;
    int i;

    for (i = 0; i < nr_irqs; i++) {
        err = its_alloc_device_irq(its_dev, &hwirq);
        if (err)
            return err;
    
        err = its_irq_gic_domain_alloc(domain, virq + i, hwirq);
        if (err)
            return err;

    
        err = its_irq_gic_domain_alloc(domain, virq + i, hwirq + i);
        if (err)
            return err;

        irq_domain_set_hwirq_and_chip(domain, virq + i, hwirq + i - its_dev->event_map.lpi_base, &its_irq_chip, its_dev);
        irqd = irq_get_irq_data(virq + i);
        irqd_set_single_target(irqd);
        irqd_set_affinity_on_activate(irqd);
        pr_debug("ID:%d pID:%d vID:%d\n",
            (int)(hwirq + i), &its_irq_chip, its_dev);
    }

    return 0;
}

cpu_mask = cpumask_of_node(its_dev->its->numa_node);

/* Bind the LPI to the first possible CPU */
-cpu = cpumask_first(cpu_mask);
+cpu = cpumask_first_and(cpu_mask, cpu_online_mask);
+if (cpu >= nr_cpu_ids) {
+if (its_dev->its->flags & ITS_FLAGS_WORKAROUND_CAVIUM_23144)
+return -EINVAL;
+
+cpu = cpumask_first(cpu_online_mask);
+
+}
+
+its_dev->event_map.col_map[event] = cpu;
 irq_data_update_effective_affinity(d, cpumask_of(cpu));

@@ -2339,22 +2438,28 @@
 {
 struct irq_data *d = irq_domain_get_irq_data(domain, virq);
 struct its_device *its_dev = irq_data_get_irq_chip_data(d);
+struct its_node *its = its_dev->its;
 int i;
+
 bitmap_release_region(its_dev->event_map.lpi_map,
 + its_get_event_id(irq_domain_get_irq_data(domain, virq)),
 + get_count_order(nr_irqs));
+
 for (i = 0; i < nr_irqs; i++) {
 struct irq_data *data = irq_domain_get_irq_data(domain,
 virq + i);
- u32 event = its_get_event_id(data);
- 
- /* Mark interrupt index as unused */
- clear_bit(event, its_dev->event_map.lpi_map);
- 
- /* Nuke the entry in the domain */
 irq_domain_reset_irq_data(data);
 } 

-/* If all interrupts have been freed, start mopping the floor */
-if (bitmap_empty(its_dev->event_map.lpi_map,
 +mutex_lock(&its->dev_alloc_lock);
 +
+/*
+ * If all interrupts have been freed, start mopping the
+ * floor. This is conditionned on the device not being shared.
+ */
+if (!its_dev->shared &&
+ bitmap_empty(its_dev->event_map.lpi_map,
+ its_dev->event_map.nr_lpis)) {
 its_lpi_free_chunks(its_dev->event_map.lpi_map,
 its_dev->event_map.lpi_base,
@@ -2366,6 +2471,8 @@
 its_free_device(its_dev);
mutex_unlock(&its->dev_alloc_lock);
+
irq_domain_free_irqs_parent(domain, virq, nr_irqs);
}

static void its_vpe_deschedule(struct its_vpe *vpe)
{
    void * __iomem vlpi_base = gic_data_rdist_vlpi_base();
    u32 count = 1000000; /* 1s */
    bool clean;
    u64 val;

    /* We're being scheduled out */
    val = gits_read_vpendbaser(vlpi_base + GICR_VPENDBASER);
    val &= ~GICR_VPENDBASER_Valid;
    gits_write_vpendbaser(val, vlpi_base + GICR_VPENDBASER);
    
    do {
        val = gits_read_vpendbaser(vlpi_base + GICR_VPENDBASER);
        clean = !(val & GICR_VPENDBASER_Dirty);
        if (!clean) {
            count--;
            cpu_relax();
            udelay(1);
        }
    } while (!clean && count);
    val = its_clear_vpend_valid(vlpi_base);

    if (unlikely(!clean && !count)) {
        if (unlikely(val & GICR_VPENDBASER_Dirty)) {
            pr_err_ratelimited("ITS virtual pending table not cleaning\n");
            vpe->idai = false;
            vpe->pending_last = true;
        }
        return 0;
    }

    static int its_vpe_retrigger(struct irq_data *d)
    { return !its_vpe_set_irqchip_state(d, IRQCHIP_STATE_PENDING, true); }

    static struct irq_chip its_vpe_irq_chip = {
        .name = "GICv4-vpe",
        .irq_mask = its_vpe_mask_irq,
.irq_unmask= its_vpe_unmask_irq,
.irq_eoi= irq_chip_eoi_parent,
.irq_set_affinity= its_vpe_set_affinity,
+ .irq_retrigger= its_vpe_retrigger,
.irq_set_irqchip_state= its_vpe_set_irqchip_state,
.irq_set_vcpu_affinity= its_vpe_set_vcpu_affinity,
};
@ @ -2717,7 +2815,7 @@

if (!its_alloc_vpe_table(vpe_id)) {
    its_vpe_id_free(vpe_id);
    -its_free_pending_table(vpe->vpt_page);
+ its_free_pending_table(vpt_page);
    return -ENOMEM;
}
@ @ -2808,7 +2906,7 @@

if (err) {
    if (i > 0)
        -its_vpe_irq_domain_free(domain, virq, i - 1);
+ its_vpe_irq_domain_free(domain, virq, i);

    its_lpi_free_chunks(bitmap, base, nr_ids);
    its_free_prop_table(vprop_page);
@@ -3183,6 +3281,7 @@
}

raw_spin_lock_init(&its->lock);
+mutex_init(&its->dev_alloc_lock);
INIT_LIST_HEAD(&its->entry);
INIT_LIST_HEAD(&its->its_device_list);
typer = gic_read_typer(its_base + GITS_TYPER);
@@ -3314,6 +3413,8 @@
for (np = of_find_matching_node(node, its_device_id); np;
    np = of_find_matching_node(np, its_device_id)) {
    +if (!of_device_is_available(np))
        +continue;
    if (!of_property_read_bool(np, "msi-controller")) {
        pr_warn("%pOF: no msi-controller property, ITS ignored\n", np);
--- linux-4.15.0.orig/drivers/irqchip/irq-gic-v3.c
+++ linux-4.15.0/drivers/irqchip/irq-gic-v3.c
@@ -673,7 +673,7 @@
    MPIDR_TO_SGI_RS(cluster_id)		|
tlist << ICC_SGI1R_TARGET_LIST_SHIFT);
pr_debug("CPU%d: ICC_SGI1R_EL1 %llx\n", smp_processor_id(), val);
+pr_devel("CPU%d: ICC_SGI1R_EL1 %llx\n", smp_processor_id(), val);
gic_write_sgi1r(val);
}

@@ -688,7 +688,7 @@
* Ensure that stores to Normal memory are visible to the
* other CPUs before issuing the IPI.
 */
-smp_wmb();
+wmb();

for_each_cpu(cpu, mask) {
    u64 cluster_id = MPIDR_TO_SGI_CLUSTER_ID(cpu_logical_map(cpu));
@@ -1287,6 +1287,7 @@
    struct redist_region *redist_regs;
    u32 nr_redist_regions;
    bool single_redist;
+int enabled_rdists;
    u32 maint_irq;
    int maint_irq_mode;
    phys_addr_t vcpu_base;
@@ -1331,6 +1332,10 @@
    void __iomem *redist_base;

    /* GICC entry which has !ACPI_MADT_ENABLED is not unusable so skip */
+if (!((gicc->flags & ACPI_MADT_ENABLED)))
    +return 0;
    +
    redist_base = ioremap(gicc->gicr_base_address, size);
    if (!redist_base)
        return -ENOMEM;
@@ -1377,7 +1382,16 @@
  * If GICC is enabled and has valid gicr base address, then it means
  * GICR base is presented via GICC
  */
-    if (((gicc->flags & ACPI_MADT_ENABLED) && gicc->gicr_base_address)
+    if (((gicc->flags & ACPI_MADT_ENABLED) && gicc->gicr_base_address) {
+        acpi_data.enabled_rdists++;
+        return 0;
+    }
+    +
+    +/*
+    + * It's perfectly valid firmware can pass disabled GICC entry, driver
+    + * should not treat as errors, skip the entry instead of probe fail.
+    + */
+    +if (!((gicc->flags & ACPI_MADT_ENABLED)))


return 0;

return -ENODEV;
@@ -1401,8 +1415,10 @@
count = acpi_table_parse_madt(ACPI_MADT_TYPE_GENERIC_INTRERRUPT,
gic_acpi_match_gicc, 0);
-if (count > 0)
+if (count > 0) {
  acpi_data.single_redist = true;
+count = acpi_data.enabled_rdists;
+}

return count;
}
--- linux-4.15.0.orig/drivers/irqchip/irq-gic.c
+++ linux-4.15.0/drivers/irqchip/irq-gic.c
@@ -324,10 +324,8 @@
static int gic_set_affinity(struct irq_data *d, const struct cpumask *mask_val,
        bool force)
{
-void __iomem *reg = gic_dist_base(d) + GIC_DIST_TARGET + (gic_irq(d) & ~3);
-unsigned int cpu, shift = (gic_irq(d) % 4) * 8;
-unsigned long flags;
-unsigned long flags;
+void __iomem *reg = gic_dist_base(d) + GIC_DIST_TARGET + gic_irq(d);
+unsigned int cpu;

if (!force)
  cpu = cpumask_any_and(mask_val, cpu_online_mask);
@@ -337,13 +335,7 @@
          return -EINVAL;
-   gic_lock_irqsave(flags);
-   -mask = 0xff << shift;
-   -bit = gic_cpu_map[cpu] << shift;
-   -val = readl_relaxed(reg) & ~mask;
-   -writel_relaxed(val | bit, reg);
-   -gic_unlock_irqrestore(flags);
-   
-   +writeb_relaxed(gic_cpu_map[cpu], reg);
   irq_data_update_effective_affinity(d, cpumask_of(cpu));

   return IRQ_SET_MASK_OK_DONE;
--- linux-4.15.0.orig/drivers/irqchip/irq-imx-gpcv2.c
+++ linux-4.15.0/drivers/irqchip/irq-imx-gpcv2.c
@@ -145,6 +145,7 @@

.irq_unmask= imx_gpcv2_irq_unmask,
.irq_set_wake= imx_gpcv2_irq_set_wake,
.irq_retrigger= irq_chip_retrigger_hierarchy,
+ .irq_set_type= irq_chip_set_type_parent,
#endif
.irq_set_affinity= irq_chip_set_affinity_parent,
--- linux-4.15.0.orig/drivers/irqchip/irq-ingenic.c
+++ linux-4.15.0/drivers/irqchip/irq-ingenic.c
@@ -117,6 +117,14 @@
   goto out_unmap_irq;
 }
+domain = irq_domain_add_legacy(node, num_chips * 32,
+   JZ4740_IRQ_BASE, 0,
+   &irq_domain_simple_ops, NULL);
+if (!domain) {
+  err = -ENOMEM;
+  goto out_unmap_base;
+}
+
+for (i = 0; i < num_chips; i++) {
+  /* Mask all irqs */
+  writel(0xffffffff, intc->base + (i * CHIP_SIZE) +
+   IRQ_NOPROBE | IRQ_LEVEL);
}
-domain = irq_domain_add_legacy(node, num_chips * 32, JZ4740_IRQ_BASE, 0,
-   &irq_domain_simple_ops, NULL);
-if (!domain)
-  pr_warn("unable to register IRQ domain\n");
-
-setup_irq(parent_irq, &intc_cascade_action);
-return 0;
+
+out_unmap_base:
+  iounmap(intc->base);
+out_unmap_irq:
  irq_dispose_mapping(parent_irq);
out_free:
--- linux-4.15.0.orig/drivers/irqchip/irq-ls-scfg-msi.c
+++ linux-4.15.0/drivers/irqchip/irq-ls-scfg-msi.c
@@ -21,6 +21,7 @@
 #include <linux/of_pci.h>
 #include <linux/of_platform.h>
 #include <linux/spinlock.h>
+#include <linux/dma-iommu.h>
```c
#define MSI_IRQS_PER_MSIR32
#define MSI_MSIR_OFFSET 4
@@ -94,6 +95,8 @@
    if (msi_affinity_flag)
        msg->data |= cpumask_first(data->common->affinity);
    +
    +iommu_dma_map_msi_msg(data->irq, msg);
    }

static int ls_scfg_msi_set_affinity(struct irq_data *irq_data,
--- linux-4.15.0.orig/drivers/irqchip/irq-mbigen.c
+++ linux-4.15.0/drivers/irqchip/irq-mbigen.c
@@ -161,6 +161,9 @@
    void __iomem *base = d->chip_data;
    u32 val;

    +if (!msg->address_lo && !msg->address_hi)
    +return;
    +
    base += get_mbigen_vec_reg(d->hwirq);
    val = readl_relaxed(base);

@@ -228,10 +231,16 @@
    return 0;
    }

+static void mbigen_irq_domain_free(struct irq_domain *domain, unsigned int virq,
+                                    unsigned int nr_irqs)
+{
+    platform_msi_domain_free(domain, virq, nr_irqs);
+}

+static const struct irq_domain_ops mbigen_domain_ops = {
+    .translate= mbigen_domain_translate,
+    .alloc= mbigen_irq_domain_alloc,
+    .free= irq_domain_free_irqs_common,
+    .free= mbigen_irq_domain_free,
+};

static int mbigen_of_create_domain(struct platform_device *pdev,
@@ -378,6 +387,7 @@
    .name= "Hisilicon MBIGEN-V2",
    .of_match_table= mbigen_of_match,
    .acpi_match_table = ACPI_PTR(mbigen_acpi_match),
    +.suppress_bind_attrs = true,
    },
```
.probe= mbigen_device_probe,
];
--- linux-4.15.0.orig/drivers/irqchip/irq-mips-cpu.c
+++ linux-4.15.0/drivers/irqchip/irq-mips-cpu.c
@@ -201,6 +201,13 @@
 if (ret)
 return ret;
+	ret = irq_domain_set_hwirq_and_chip(domain->parent, virq + i, hwirq,
+    &mips_mt_cpu_irq_controller,
+    NULL);
+    if (ret)
+        return ret;
+
 ret = irq_set_irq_type(virq + i, IRQ_TYPE_LEVEL_HIGH);
 if (ret)
 return ret;
--- linux-4.15.0.orig/drivers/irqchip/irq-mips-gic.c
+++ linux-4.15.0/drivers/irqchip/irq-mips-gic.c
@@ -388,7 +388,7 @@
 intr = GIC_HWIRQ_TO_LOCAL(d->hwirq);
 cd = irq_data_get_irq_chip_data(d);

-    write_gic_vl_map(intr, cd->map);
+    write_gic_vl_map(mips_gic_vx_map_reg(intr), cd->map);
 if (cd->mask)
     write_gic_vl_smask(BIT(intr));
 }
@@ -424,8 +424,6 @@
 spin_lock_irqsave(&gic_lock, flags);
 write_gic_map_pin(intr, GIC_MAP_PIN_MAP_TO_PIN | gic_cpu_pin);
 write_gic_map_vp(intr, BIT(mips_cm_vp_id(cpu)));
-    gic_clear_pcpu_masks(intr);
-    set_bit(intr, per_cpu_ptr(pcpu_masks, cpu));
 irq_data_update_effective_affinity(data, cpumask_of(cpu));
 spin_unlock_irqrestore(&gic_lock, flags);
@@ -519,7 +517,7 @@
 spin_lock_irqsave(&gic_lock, flags);
 for_each_online_cpu(cpu) {
     write_gic_vl_other(mips_cm_vp_id(cpu));
-    write_gic_vo_map(intr, map);
+    write_gic_vo_map(mips_gic_vx_map_reg(intr), map);
 }
 spin_unlock_irqrestore(&gic_lock, flags);
--- linux-4.15.0.orig/drivers/irqchip/irq-mmp.c
#define SEL_INT_PENDING (1 << 6)
#define SEL_INT_NUM_MASK 0x3f

#define MMP2_ICU_INT_ROUTE_PJ4_IRQ (1 << 5)
#define MMP2_ICU_INT_ROUTE_PJ4_FIQ (1 << 6)

struct icu_chip_data {
    int nr_irqs;
    unsigned int virq_base;
}

static const struct mmp_intc_conf mmp2_conf = {
    .conf_enable = 0x20,
    .conf_disable = 0x0,
    .conf_mask = MMP2_ICU_INT_ROUTE_PJ4_IRQ | MMP2_ICU_INT_ROUTE_PJ4_FIQ,
};

static void __exception_irq_entry mmp_handle_irq(struct pt_regs *regs) { }

---

---

struct mtk_sysirq_chip_data {
    spinlock_t lock;
    +raw_spinlock_t lock;
    u32 nr_intpol_bases;
    void __iomem **intpol_bases;
    u32 *intpol_words;
    @ @ -45,7 +45,7 @@
    reg_index = chip_data->which_word[hwirq];
    offset = hwirq & 0x1f;

    -spin_lock_irqsave(&chip_data->lock, flags);
    +raw_spin_lock_irqsave(&chip_data->lock, flags);
    value = readl_relaxed(base + reg_index * 4);
    if (type == IRQ_TYPE_LEVEL_LOW || type == IRQ_TYPE_EDGE_FALLING) {
    if (type == IRQ_TYPE_LEVEL_LOW)
@ @ -61,7 +61,7 @@

    data = data->parent_data;
    ret = data->chip->irq_set_type(data, type);
    -spin_unlock_irqrestore(&chip_data->lock, flags);
    +raw_spin_unlock_irqrestore(&chip_data->lock, flags);
    return ret;
ret = -ENOMEM;
goto out_free_which_word;
}

spin_lock_init(&chip_data->lock);
+raw_spin_lock_init(&chip_data->lock);
return 0;

--- linux-4.15.0.orig/drivers/irqchip/irq-mvebu-icu.c
+++ linux-4.15.0/drivers/irqchip/irq-mvebu-icu.c
@@ -92,7 +92,7 @@
mvebu_icu_irq_domain_translate(struct irq_domain *d, struct irq_fwspec *fwspec,

/* Check the count of the parameters in dt */
--- linux-4.15.0.orig/drivers/irqchip/irq-ompic.c
+++ linux-4.15.0/drivers/irqchip/irq-ompic.c
@@ -171,9 +171,9 @@

ompic_base = ioremap(res.start, resource_size(&res));
-if (IS_ERR(ompic_base)) {
+if (!ompic_base) {
    pr_err("ompic: unable to map registers");
    -return PTR_ERR(ompic_base);
    +return -ENOMEM;
}

irq = irq_of_parse_and_map(node, 0);
--- linux-4.15.0.orig/drivers/irqchip/irq-versatile-fpga.c
+++ linux-4.15.0/drivers/irqchip/irq-versatile-fpga.c
@@ -6,6 +6,7 @@
#include <linux/irq.h>
#include <linux/io.h>
#include <linux/irqchip.h>
+#include <linux/irqchip/chained_irq.h>
#include <linux/irqchip/versatile-fpga.h>
#include <linux/irqdomain.h>
#include <linux/module.h>
@@ -68,12 +69,16 @@
static void fpga_irq_handle(struct irq_desc *desc) {
    struct irq_chip *chip = irq_desc_get_chip(desc);
    struct fpga_irq_data *f = irq_desc_get_handler_data(desc);
    u32 status = readl(f->base + IRQ_STATUS);
    +u32 status;
    +
    +chained_irq_enter(chip, desc);

    +status = readl(f->base + IRQ_STATUS);
    if (status == 0) {
        do_bad_IRQ(desc);
        -return;
        +goto out;
    }
    do {
        @@ -82,6 +87,9 @@
        status &= ~(1 << irq);
        generic_handle_irq(irq_find_mapping(f->domain, irq));
    } while (status);
    +
    +out:
    +chained_irq_exit(chip, desc);
}

/*
 @@ -204,6 +212,9 @@
after (of_property_read_u32(node, "valid-mask", &valid_mask))
 valid_mask = 0;

 +writel(clear_mask, base + IRQ_ENABLE_CLEAR);
 +writel(clear_mask, base + FIQ_ENABLE_CLEAR);
 +
 /* Some chips are cascaded from a parent IRQ */
 parent_irq = irq_of_parse_and_map(node, 0);
 if (!parent_irq) {
 @@ -213,9 +224,6 @@

 fpga_irq_init(base, node->name, 0, parent_irq, valid_mask, node);

 -writel(clear_mask, base + IRQ_ENABLE_CLEAR);
 -writel(clear_mask, base + FIQ_ENABLE_CLEAR);
 -
 /*
 * On Versatile AB/PB, some secondary interrupts have a direct
 * pass-thru to the primary controller for IRQs 20 and 22-31 which need
 --- linux-4.15.0.orig/drivers/irqchip/qcom-irq-combiner.c
/* Copyright (c) 2015-2016, The Linux Foundation. All rights reserved. */

/* Copyright (c) 2015-2018, The Linux Foundation. All rights reserved. */

* This program is free software; you can redistribute it and/or modify
* it under the terms of the GNU General Public License version 2 and
*/

bit = readl_relaxed(combiner->regs[reg].addr);
status = bit & combiner->regs[reg].enabled;

if (!status)
    pr_warn_ratelimited("Unexpected IRQ on CPU%d: (%08x %08lx %p)n",
                        smp_processor_id(), bit,
                        combiner->regs[reg].enabled,
                        --- linux-4.15.0.orig/drivers/isdn/capi/capi.c
+++ linux-4.15.0/drivers/isdn/capi/capi.c
@@ -687,6 +687,9 @@
if (!cdev->ap.applid)
    return -ENODEV;

+if (count < CAPIMSG_BASELEN)
+return -EINVAL;
+
skb = alloc_skb(count, GFP_USER);
if (!skb)
    return -ENOMEM;
@@ -697,7 +700,8 @@
    }
    mlen = CAPIMSG_LEN(skb->data);
    if (CAPIMSG_CMD(skb->data) == CAPI_DATA_B3_REQ) {
-        if ((size_t)(mlen + CAPIMSG_DATALEN(skb->data)) != count) {
+        if (count < CAPI_DATA_B3_REQ_LEN ||
+            (size_t)(mlen + CAPIMSG_DATALEN(skb->data)) != count) {
            kfree_skb(skb);
            return -EINVAL;
    }
@@ -710,6 +714,10 @@
    CAPIMSG_SETAPPID(skb->data, cdev->ap.applid);

    if (CAPIMSG_CMD(skb->data) == CAPI_DISCONNECT_B3_RESP) {
+        if (count < CAPI_DISCONNECT_B3_RESP_LEN) {
+            kfree_skb(skb);
+            return -EINVAL;
+    }
    mutex_lock(&cdev->lock);
capincci_free(cdev, CAPIMSG_NCCI(skb->data));
mutex_unlock(&cdev->lock);
@@ -735,7 +743,7 @@
poll_wait(file, &(cdev->recvwait), wait);
mask = POLLOUT | POLLWRNORM;
-if (!skb_queue_empty(&cdev->recvqueue))
+if (!skb_queue_empty_lockless(&cdev->recvqueue))
mask |= POLLIN | POLLRDNORM;
return mask;
}
--- linux-4.15.0.orig/drivers/isdn/capi/kcapi.c
+++ linux-4.15.0/drivers/isdn/capi/kcapi.c
@@ -564,6 +564,11 @@
ctr_down(ctr, CAPI_CTR_DETACHED);

+if (ctr->cnr < 1 || ctr->cnr - 1 >= CAPI_MAXCONTR) {
+err = -EINVAL;
+goto unlock_out;
+}
+
+if (capi_controller[ctr->cnr - 1] != ctr) {
err = -EINVAL;
goto unlock_out;
@@ -845,13 +850,13 @@
 * Return value: CAPI result code
 */

-u16 capi20_get_manufacturer(u32 contr, u8 *buf)
+u16 capi20_get_manufacturer(u32 contr, u8 buf[CAPI_MANUFACTURER_LEN])
{
 struct capi_ctr *ctr;
u16 ret;

 if (contr == 0) {
-strlcpy(buf, capi_manufakturer, CAPI_MANUFACTURER_LEN);
+strncpy(buf, capi_manufakturer, CAPI_MANUFACTURER_LEN);
 return CAPI_NOERROR;
 }
@@ -859,7 +864,7 @@
ctr = get_capi_ctr_by_nr(contr);
if (ctr && ctr->state == CAPI_CTR_RUNNING) {
-strlcpy(buf, ctr->manu, CAPI_MANUFACTURER_LEN);
+strncpy(buf, ctr->manu, CAPI_MANUFACTURER_LEN);
 ret = CAPI_NOERROR;
 } else
ret = CAPI_REGNOTINSTALLED;
@@ -915,7 +920,7 @@
 * Return value: CAPI result code
 */

-u16 capi20_get_serial(u32 contr, u8 *serial)
+u16 capi20_get_serial(u32 contr, u8 serial[CAPI_SERIAL_LEN])
 {
  struct capi_ctr *ctr;
  u16 ret;
--- linux-4.15.0.orig/drivers/isdn/gigaset/usb-gigaset.c
+++ linux-4.15.0/drivers/isdn/gigaset/usb-gigaset.c
@@ -574,8 +574,7 @@
{
  struct usb_cardstate *ucs;

 -cs->hw.usb = ucs =
-  kmalloc(sizeof(struct usb_cardstate), GFP_KERNEL);
+  ucs = kzalloc(sizeof(struct usb_cardstate), GFP_KERNEL);
  if (!ucs) {
    pr_err("out of memory\n");
    return -ENOMEM;
@@ -587,9 +586,6 @@
      ucs->bchars[3] = 0;
      ucs->bchars[4] = 0x11;
      ucs->bchars[5] = 0x13;
-     ucs->bulk_out_buffer = NULL;
-     ucs->bulk_out_urb = NULL;
-     ucs->read_urb = NULL;
     tasklet_init(&cs->write_tasklet,
       gigaset_modem_fill, (unsigned long) cs);

 @@ -688,6 +684,11 @@
 return -ENODEV;
 }
+if (hostif->desc.bNumEndpoints < 2) {
+  dev_err(&interface->dev, "missing endpoints\n");
+  return -ENODEV;
+}
+dev_info(&udev->dev, "%s: Device matched ... !\n", __func__);   /* allocate memory for our device state and initialize it */
@@ -707,6 +708,12 @@
 endpoint = &hostif->endpoint[0].desc;
if (!usb_endpoint_is_bulk_out(endpoint)) {
    dev_err(&interface->dev, "missing bulk-out endpoint\n");
    retval = -ENODEV;
    goto error;
}

buffer_size = le16_to_cpu(endpoint->wMaxPacketSize);
ucs->bulk_out_size = buffer_size;
ucs->bulk_out_epnum = usb_endpoint_num(endpoint);

endpoint = &hostif->endpoint[1].desc;

if (!usb_endpoint_is_int_in(endpoint)) {
    dev_err(&interface->dev, "missing int-in endpoint\n");
    retval = -ENODEV;
    goto error;
}

ucs->busy = 0;

ucs->read_urb = usb_alloc_urb(0, GFP_KERNEL);

for (j = 0; j < AVM_MAXVERSION; j++)
    cinfo->version[j] = "\0\0" + 1;
for (i = 0, j = 0;
    j < AVM_MAXVERSION && i < cinfo->versionlen;
    j++, i += cinfo->versionbuf[i] + 1)

void *diva_xdi_open_adapter(void *os_handle, const void __user *src,
                          int length,
                          void *mptr,
                          divas_xdi_copy_from_user_fn_t cp_fn)
{  
    -diva_xdi_um_cfg_cmd_t msg;
    +diva_xdi_um_cfg_cmd_t *msg = (diva_xdi_um_cfg_cmd_t *)mptr;
    diva_os_xdi_adapter_t *a = NULL;
    diva_os_spin_lock_magic_t old_irql;
    struct list_head *tmp;
length, sizeof(diva_xdi_um_cfg_cmd_t)))
return NULL;
}
-if ((\*cp_fn) (os_handle, &msg, src, sizeof(msg)) <= 0) {
+if ((\*cp_fn) (os_handle, msg, src, sizeof(*msg)) <= 0) {
  DBG_ERR("A: A(?) open, write error")
return NULL;
}
diva_os_enter_spin_lock(&adapter_lock, &old_irql, "open_adapter");
list_for_each(tmp, &adapter_queue) {
  a = list_entry(tmp, diva_os_xdi_adapter_t, link);
  -if (a->controller == (int)msg.adapter)
  +if (a->controller == (int)msg->adapter)
    break;
  a = NULL;
}
diva_os_leave_spin_lock(&adapter_lock, &old_irql, "open_adapter");

if (!a) {
  -DBG_ERR("A: A(%d) open, adapter not found", msg.adapter))
+DBG_ERR("A: A(%d) open, adapter not found", msg->adapter))
} }
return (a);
@@ -437,8 +437,10 @@
int
  diva_xdi_write(void *adapter, void *os_handle, const void __user *src,
-             int length, divas_xdi_copy_from_user_fn_t cp_fn)
+             int length, void *mptr,
+             divas_xdi_copy_from_user_fn_t cp_fn)
  {
  +diva_xdi_um_cfg_cmd_t *msg = (diva_xdi_um_cfg_cmd_t *)mptr;
  diva_os_xdi_adapter_t *a = (diva_os_xdi_adapter_t *) adapter;
  void *data;

@@ -459,7 +461,13 @@
return (-2);
  }

  -length = (*cp_fn) (os_handle, data, src, length);
  +if (msg) {
  +*(diva_xdi_um_cfg_cmd_t *)data = *msg;
  +length = (*cp_fn) (os_handle, (char *)data + sizeof(*msg),
  +  src + sizeof(*msg), length - sizeof(*msg));
  +} else {
  +length = (*cp_fn) (os_handle, data, src, length);

```c
if (length > 0) {
    if (((a->interface.cmd_proc))
        (a, (diva_xdi_um_cfg_cmd_t *) data, length)) {
        --- linux-4.15.0.orig/drivers/isdn/hardware/eicon/diva.h
        +++ linux-4.15.0/drivers/isdn/hardware/eicon/diva.h
        @@ -20,10 +20,11 @@
            int max_length, divas_xdi_copy_to_user_fn_t cp_fn);

        int diva_xdi_write(void *adapter, void *os_handle, const void __user *src,
            - int length, divas_xdi_copy_from_user_fn_t cp_fn);
        + int length, void *msg,
            + divas_xdi_copy_from_user_fn_t cp_fn);

        void *diva_xdi_open_adapter(void *os_handle, const void __user *src,
            - int length,
            + int length, void *msg,
            divas_xdi_copy_from_user_fn_t cp_fn);

        void diva_xdi_close_adapter(void *adapter, void *os_handle);
        --- linux-4.15.0.orig/drivers/isdn/hardware/eicon/divasmain.c
        +++ linux-4.15.0/drivers/isdn/hardware/eicon/divasmain.c
        @@ -591,19 +591,22 @@
            static ssize_t divas_write(struct file *file, const char __user *buf,
                size_t count, loff_t *ppos)
                +diva_xdi_um_cfg_cmd_t msg;
            int ret = -EINVAL;

            if (!file->private_data) {
                file->private_data = diva_xdi_open_adapter(file, buf,
                    - count,
                    + count, &msg,
                    xdi_copy_from_user);
                -}
            -if (!file->private_data) {
                -return (-ENODEV);
            +if (!file->private_data)
                +return (-ENODEV);
            +ret = diva_xdi_write(file->private_data, file,
                + buf, count, &msg, xdi_copy_from_user);
            +} else {
                +ret = diva_xdi_write(file->private_data, file,
                    + buf, count, NULL, xdi_copy_from_user);
            +} else {
                +ret = diva_xdi_write(file->private_data, file,
                    + buf, count, xdi_copy_from_user);
            }

            -ret = diva_xdi_write(file->private_data, file,
                - buf, count, xdi_copy_from_user);
```

switch (ret) {
    case -1: /* Message should be removed from rx mailbox first */
    ret = -EBUSY;
   @@ -622,11 +625,12 @@
    static ssize_t divas_read(struct file *file, char __user *buf,
        size_t count, loff_t *ppos)
    {
+    diva_xdi_um_cfg_cmd_t msg;
    int ret = -EINVAL;

    if (!file->private_data) {
        file->private_data = diva_xdi_open_adapter(file, buf,
            - count,
            + count, &msg,
            - xdi_copy_from_user);
    }
    if (!file->private_data) {
        --- linux-4.15.0.orig/drivers/isdn/hardware/mISDN/hfcmulti.c
        +++ linux-4.15.0/drivers/isdn/hardware/mISDN/hfcmulti.c
        @@ -4365,7 +4365,8 @@
         if (ent->device == 0xB410) {
+            if (ent->vendor == PCI_VENDOR_ID_DIGIUM &&
+                ent->device == PCI_DEVICE_ID_DIGIUM_HFC4S) {
                test_and_set_bit(HFC_CHIP_CLOCK2, &hc->chip);

-            if (ent->device == 0x0B410) {
+            if (ent->device == 0x0B410) {
                --- linux-4.15.0.orig/drivers/isdn/hardware/mISDN/hfcpci.c
                +++ linux-4.15.0/drivers/isdn/hardware/mISDN/hfcpci.c
                @@ -2347,7 +2347,7 @@
                  HFC_cleanup(void)
            {
                if (timer_pending(&hfc_tl))
                    -del_timer(&hfc_tl);
                    +del_timer_sync(&hfc_tl);

                    pci_unregister_driver(&hfc_driver);
            }
            --- linux-4.15.0.orig/drivers/isdn/hardware/mISDN/hfcsusb.c
            +++ linux-4.15.0/drivers/isdn/hardware/mISDN/hfcsusb.c
            @@ -1402,6 +1402,7 @@
            printk(KERN_DEBUG
                    "%s: %s: alloc urb for fifo %i failed",
                    hw->name, __func__, fifo->fifonum);
                +continue;
            }

            }
fifo->iso[i].owner_fifo = (struct usb_fifo *) fifo;
fifo->iso[i].indx = i;
@@ -1700,13 +1701,23 @@
static int
setup_hfcsusb(struct hfcsusb *hw)
{
+void *dmabuf = kmalloc(sizeof(u_char), GFP_KERNEL);
  u_char b;
+int ret;

  if (debug & DBG_HFC_CALL_TRACE)
    printk(KERN_DEBUG "%s: %s\n", hw->name, __func__);
+if (!dmabuf)
+  return -ENOMEM;
++ret = read_reg_atomic(hw, HFCUSB_CHIP_ID, dmabuf);
+  memcpy(&b, dmabuf, sizeof(u_char));
+kfree(dmabuf);
+  /* check the chip id */
-  if (read_reg_atomic(hw, HFCUSB_CHIP_ID, &b) != 1) {
+   if (ret != 1) {
      printk(KERN_DEBUG "%s: %s: cannot read chip id\n", hw->name, __func__);
        return 1;
@@ -1963,6 +1974,9 @@
/* get endpoint base */
  idx = ((ep_addr & 0x7f) - 1) * 2;
+if (idx > 15)
+  return -EIO;
+  if (ep_addr & 0x80)
    attr = ep->desc.bmAttributes;
--- linux-4.15.0.orig/drivers/isdn/hardware/mISDN/mISDNinfineon.c
+++ linux-4.15.0/drivers/isdn/hardware/mISDN/mISDNinfineon.c
@@ @ -645,17 +645,19 @@
release_io(struct inf_hw *hw)
{
  if (hw->cfg.mode) {
+    if (hw->cfg.p) {
      if (hw->cfg.mode == AM_MEMIO) {
        release_mem_region(hw->cfg.start, hw->cfg.size);
        iounmap(hw->cfg.p);
+      if (hw->cfg.p)
+iounmap(hw->cfg.p);
} else
release_region(hw->cfg.start, hw->cfg.size);
hw->cfg.mode = AM_NONE;
}
if (hw->addr.mode) {
- if (hw->addr.p) {
+ if (hw->addr.mode == AM_MEMIO) {
 release_mem_region(hw->addr.start, hw->addr.size);
- iounmap(hw->addr.p);
+ if (hw->addr.p)
+ iounmap(hw->addr.p);
} else
release_region(hw->addr.start, hw->addr.size);
hw->addr.mode = AM_NONE;
@@ -685,9 +687,12 @@
 (ulong)hw->cfg.start, (ulong)hw->cfg.size);
 return err;
}
- if (hw->ci->cfg_mode == AM_MEMIO)
- hw->cfg.p = ioremap(hw->cfg.start, hw->cfg.size);
hw->cfg.mode = hw->ci->cfg_mode;
+ if (hw->ci->cfg_mode == AM_MEMIO) {
+ hw->cfg.p = ioremap(hw->cfg.start, hw->cfg.size);
+ if (!hw->cfg.p)
+ return -ENOMEM;
+}
if (debug & DEBUG_HW)
pr_notice("%s: IO cfg %lx (%lu bytes) mode%d
",
 hw->name, (ulong)hw->cfg.start,
@@ -712,9 +717,12 @@
 (ulong)hw->addr.start, (ulong)hw->addr.size);
 return err;
}
- if (hw->ci->addr_mode == AM_MEMIO)
- hw->addr.p = ioremap(hw->addr.start, hw->addr.size);
hw->addr.mode = hw->ci->addr_mode;
+ if (hw->ci->addr_mode == AM_MEMIO) {
+ hw->addr.p = ioremap(hw->addr.start, hw->addr.size);
+ if (!hw->addr.p)
+ return -ENOMEM;
+}
if (debug & DEBUG_HW)
pr_notice("%s: IO addr %lx (%lu bytes) mode%d
",
 hw->name, (ulong)hw->addr.start,
if (isac->type & IPAC_TYPE_ISACX)
WriteISAC(isac, ISAC_MASK, 0xff);
else
+else if (isac->type != 0)
WriteISAC(isac, ISAC_MASK, 0xff);
if (isac->dch.timer.function != NULL) {
  del_timer(&isac->dch.timer);
--- linux-4.15.0.orig/drivers/isdn/hardware/mISDN/netjet.c
+++ linux-4.15.0/drivers/isdn/hardware/mISDN/netjet.c
@@ -963,8 +963,8 @@
jn_disable_hwirq(card);
mode_tiger(&card->bc[0], ISDN_P_NONE);
mode_tiger(&card->bc[1], ISDN_P_NONE);
-card->isac.release(&card->isac);
+card->isac.release(&card->isac);
spin_unlock_irqrestore(&card->lock, flags);
+card->isac.release(&card->isac);
release_region(card->base, card->base_s);
card->base_s = 0;
}  
@@ -1114,7 +1114,6 @@
card->typ = NETJET_S_TJ300;

card->base = pci_resource_start(pdev, 0);
-card->irq = pdev->irq;
pci_set_drvdata(pdev, card);
err = setup_instance(card);
if (err)
--- linux-4.15.0.orig/drivers/isdn/hardware/mISDN/w6692.c
+++ linux-4.15.0/drivers/isdn/hardware/mISDN/w6692.c
@@ -52,10 +52,7 @@
{W6692_USR, "USR W6692"}
};

-#ifndef PCI_VENDOR_ID_USR
-#define PCI_VENDOR_ID_USR	0x16ec
#define PCI_DEVICE_ID_USR_6692	0x3409
+#endif

struct w6692_ch {  
struct bchannelbch;
--- linux-4.15.0.orig/drivers/isdn/hisax/hfc_pci.c
+++ linux-4.15.0/drivers/isdn/hisax/hfc_pci.c
@@ -1170,11 +1170,13 @@
if (cs->debug & L1_DEB_LAPD)
debgs1(cs, "-> PH_REQUEST_PULL");
#endif
+spin_lock_irqsave(&cs->lock, flags);
if (!cs->tx_skb) {
    test_and_clear_bit(FLG_L1_PULL_REQ, &st->l1.Flags);
    st->l1.l1l2(st, PH_PULL | CONFIRM, NULL);
} else
    test_and_set_bit(FLG_L1_PULL_REQ, &st->l1.Flags);

+spin_unlock_irqrestore(&cs->lock, flags);
break;

case (HW_RESET | REQUEST):
    spin_lock_irqsave(&cs->lock, flags);

--- linux-4.15.0.orig/drivers/isdn/i4l/isdn_common.c
+++ linux-4.15.0/drivers/isdn/i4l/isdn_common.c
@@ -1640,13 +1640,7 @@
} else
    return -EINVAL;
    case IIOCDBGVAR:
    -if (arg) {
    -if (copy_to_user(argp, &dev, sizeof(ulong)))
    --return -EFAULT;
    -return 0;
    -} else
    -return -EINVAL;
    -break;
    +return -EINVAL;
    break;
    +return -EINVAL;
    default:
    if ((cmd & IIOCDRVCTL) == IIOCDRVCTL)
    cmd = ((cmd >> _IOC_NRSHIFT) & _IOC_NRMASK) & ISDN_DRVIOCTL_MASK;
--- linux-4.15.0.orig/drivers/isdn/i4l/isdn_tty.c
+++ linux-4.15.0/drivers/isdn/i4l/isdn_tty.c
@@ -1456,15 +1456,19 @@
{
    modem_info *info = (modem_info *) tty->driver_data;

    +mutex_lock(&modem_info_mutex);
    if (!old_termios)
        isdn_tty_change_speed(info);
    else {
        if (tty->termios.c_cflag == old_termios->c_cflag &&
            tty->termios.c_ispeed == old_termios->c_ispeed &&
            tty->termios.c_ospeed == old_termios->c_ospeed)
            +mutex_unlock(&modem_info_mutex);
    return;
    +}
    isdn_tty_change_speed(info);
    }  
    +mutex_unlock(&modem_info_mutex);  
}
config MISDN_DSP
tristate "Digital Audio Processing of transparent data"
depends on MISDN
+select BITREVERSE
help
  Enable support for digital audio processing capability.

/*
--- linux-4.15.0.orig/drivers/isdn/mISDN/Kconfig
+++ linux-4.15.0/drivers/isdn/mISDN/Kconfig
@@ -12,6 +12,7 @@
config MISDN_DSP
tristate "Digital Audio Processing of transparent data"
depends on MISDN
+select BITREVERSE
help
  Enable support for digital audio processing capability.
*/

--- linux-4.15.0.orig/drivers/isdn/mISDN/socket.c
+++ linux-4.15.0/drivers/isdn/mISDN/socket.c
@@ -394,7 +394,7 @@
    memcpy(di.channelmap, dev->channelmap,
    sizeof(di.channelmap));
    di.nrbchan = dev->nrbchan;
-    strcpy(di.name, dev_name(&dev->dev));
+    strscpy(di.name, dev_name(&dev->dev), sizeof(di.name));
    if (copy_to_user((void __user *)arg, &di, sizeof(di)))
      err = -EFAULT;
 } else
@@ -678,7 +678,7 @@
    memcpy(di.channelmap, dev->channelmap,
    sizeof(di.channelmap));
    di.nrbchan = dev->nrbchan;
-    strcpy(di.name, dev_name(&dev->dev));
+    strscpy(di.name, dev_name(&dev->dev), sizeof(di.name));
    if (copy_to_user((void __user *)arg, &di, sizeof(di)))
      err = -EFAULT;
 } else
@@ -692,6 +692,7 @@
      err = -EFAULT;
      break;
 }
+dn.name[sizeof(dn.name) - 1] = '\0';
    dev = get_mdevice(dn.id);
    if (dev)
      err = device_rename(&dev->dev, dn.name);
@@ -712,10 +713,10 @@
      struct sock *sk = sock->sk;
      int err = 0;
    -if (!maddr || maddr->family != AF_ISDN)
+if (addr_len < sizeof(struct sockaddr_mISDN))
      return -EINVAL;

    -if (addr_len < sizeof(struct sockaddr_mISDN))
      return -EINVAL;
+if (!maddr || maddr->family != AF_ISDN)
    return -EINVAL;

lock_sock(sk);
@@ -765,6 +766,8 @@
    if (sock->type != SOCK_RAW)
        return -ESOCKTNOSUPPORT;
+    if (!capable(CAP_NET_RAW))
+        return -EPERM;

sk = sk_alloc(net, PF_ISDN, GFP_KERNEL, &mISDN_proto, kern);
if (!sk)
--- linux-4.15.0.orig/drivers/isdn/mISDN/tei.c
+++ linux-4.15.0/drivers/isdn/mISDN/tei.c
@@ -1180,8 +1180,7 @@
    ctrl_teimanager(struct manager *mgr, void *arg)
    { /* currently we only have one option */
        int *val = (int *)arg;
-       int *ret = 0;
+       unsigned int *val = (unsigned int *)arg;
        switch (val[0]) {
            case IMCLEAR_L2:
                test_and_clear_bit(OPTION_L1_HOLD, &mgr->options);
                break;
            default:
-               ret = -EINVAL;
+               return -EINVAL;
                }
            -return ret;
            +return 0;
        }

/* This function does create a L2 for fixed TEI in NT Mode */
--- linux-4.15.0.orig/drivers/isdn/mISDN/timerdev.c
+++ linux-4.15.0/drivers/isdn/mISDN/timerdev.c
@@ -170,8 +170,8 @@
    spin_lock_irqsave(&timer->dev->lock, flags);
    if (timer->id >= 0)
        list_move_tail(&timer->list, &timer->dev->expired);
-   spin_unlock_irqsave(&timer->dev->lock, flags);
+   spin_unlock_irqrestore(&timer->dev->lock, flags);
    if (timer->id >= 0)
        list_move_tail(&timer->list, &timer->dev->expired);
    }
static int
--- linux-4.15.0.orig/drivers/leds/Kconfig
+++ linux-4.15.0/drivers/leds/Kconfig
@@ -290,7 +290,6 @@
tristate "Common Driver for TI/National LP5521/5523/55231/5562/8501"
depends on LEDS_LP5521 || LEDS_LP5523 || LEDS_LP5562 || LEDS_LP8501
select FW_LOADER
-select FW_LOADER_USER_HELPER
help
 This option supports common operations for LP5521/5523/55231/5562/8562/8501
devices.
@@ -661,6 +660,13 @@
To compile this driver as a module, choose 'm' here: the module
will be called leds-powernv.
+config LEDS_QCOM_LPG
+tristate "LED support for Qualcomm LPG"
+depends on LEDS_CLASS
+help
+ This option enables support for the Light Pulse Generator found in a
+ wide variety of Qualcomm PMICs.
+ config LEDS_SYSCON
bool "LED support for LEDs on system controllers"
depends on LEDS_CLASS=y
--- linux-4.15.0.orig/drivers/leds/Makefile
+++ linux-4.15.0/drivers/leds/Makefile
@@ -64,6 +64,7 @@
obj-$(CONFIG_LEDS_MAX8997)	+= leds-max8997.o
 obj-$(CONFIG_LEDS_LM355x)	+= leds-lm355x.o
 obj-$(CONFIG_LEDS_BLINKM)	+= leds-blinkm.o
+obj-$(CONFIG_LEDS_QCOM_LPG)	+= leds-qcom-lpg.o
 obj-$(CONFIG_LEDS_SYSCON)	+= leds-syscon.o
 obj-$(CONFIG_LEDS_MENF21BMC)	+= leds-menf21bmc.o
 obj-$(CONFIG_LEDS_KTD2692)	+= leds-ktd2692.o
--- linux-4.15.0.orig/drivers/leds/led-class.c
+++ linux-4.15.0/drivers/leds/led-class.c
@@ -173,6 +173,7 @@
{
 led_cdev->flags |= LED_SUSPENDED;
 led_set_brightness_no_pm(led_cdev, 0);
+flush_work(&led_cdev->set_brightness_work);
}
EXPORT_SYMBOL_GPL(led_classdev_suspend);
--- linux-4.15.0.orig/drivers/leds/led-triggers.c
+++ linux-4.15.0/drivers/leds/led-triggers.c
@@ -283,14 +283,15 @@
enum led_brightness brightness
{
    struct led_classdev *led_cdev;
    +unsigned long flags;

    if (!trig)
    return;

    -read_lock(&trig->leddev_list_lock);
    +read_lock_irqsave(&trig->leddev_list_lock, flags);
    list_for_each_entry(led_cdev, &trig->led_cdevs, trig_list)
    led_set_brightness(led_cdev, brightness);
    -read_unlock(&trig->leddev_list_lock);
    +read_unlock_irqrestore(&trig->leddev_list_lock, flags);
}
EXPORT_SYMBOL_GPL(led_trigger_event);

@@ -301,11 +302,12 @@
    printf(int invert)
    {
        struct led_classdev *led_cdev;
        +unsigned long flags;

        if (!trig)
        return;

        -read_lock(&trig->leddev_list_lock);
        +read_lock_irqsave(&trig->leddev_list_lock, flags);
        list_for_each_entry(led_cdev, &trig->led_cdevs, trig_list)
            if (oneshot)
                led_blink_set_oneshot(led_cdev, delay_on, delay_off,
                    @@ -313,7 +315,7 @@
                else
                    led_blink_set(led_cdev, delay_on, delay_off);
        }
        -read_unlock(&trig->leddev_list_lock);
        +read_unlock_irqrestore(&trig->leddev_list_lock, flags);
    }

void led_trigger_blink(struct led_trigger *trig,
    --- linux-4.15.0.orig/drivers/leds/leds-88pm860x.c
    +++ linux-4.15.0/drivers/leds/leds-88pm860x.c
    @@ -207,21 +207,33 @@
    data->cdev.brightness_set_blocking = pm860x_led_set;
    mutex_init(&data->lock);

    -ret = devm_led_classdev_register(chip->dev, &data->cdev);
    +ret = led_classdev_register(chip->dev, &data->cdev);

if (ret < 0) {
    dev_err(&pdev->dev, "Failed to register LED: %d\n", ret);
    return ret;
}
pm860x_led_set(&data->cdev, 0);
+platform_set_drvdata(pdev, data);
+
return 0;
}

+static int pm860x_led_remove(struct platform_device *pdev)
+
+struct pm860x_led *data = platform_get_drvdata(pdev);
+
+led_classdev_unregister(&data->cdev);
+
+return 0;
+
}

static struct platform_driver pm860x_led_driver = {
    .driver= {
        .name= "88pm860x-led",
    },
    .probe= pm860x_led_probe,
    .remove= pm860x_led_remove,
};

module_platform_driver(pm860x_led_driver);
--- linux-4.15.0.orig/drivers/leds/leds-as3645a.c
+++ linux-4.15.0/drivers/leds/leds-as3645a.c
@@ -564,6 +564,7 @@
if (!flash->indicator_node) {
    dev_warn(&flash->client->dev,
        "can't find indicator node\n");
+rval = -ENODEV;
    goto out_err;
}

--- linux-4.15.0.orig/drivers/leds/leds-bcm6328.c
+++ linux-4.15.0/drivers/leds/leds-bcm6328.c
@@ -336,7 +336,7 @@
    led->cdev.brightness_set = bcm6328_led_set;
    led->cdev.blink_set = bcm6328_blink_set;
    -rc = led_classdev_register(dev, &led->cdev);
+rc = devm_led_classdev_register(dev, &led->cdev);
    if (rc < 0)
return rc;

--- linux-4.15.0.orig/drivers/leds/leds-bcm6358.c
+++ linux-4.15.0/drivers/leds/leds-bcm6358.c
@@ -141,7 +141,7 @@
     led->cdev.brightness_set = bcm6358_led_set;

     -rc = led_classdev_register(dev, &led->cdev);
+rc = devm_led_classdev_register(dev, &led->cdev);
     if (rc < 0)
         return rc;

--- linux-4.15.0.orig/drivers/leds/leds-da903x.c
+++ linux-4.15.0/drivers/leds/leds-da903x.c
@@ -113,12 +113,23 @@
     led->flags = pdata->flags;
     led->master = pdev->dev.parent;

     -ret = devm_led_classdev_register(led->master, &led->cdev);
+ret = led_classdev_register(led->master, &led->cdev);
     if (ret) {
         dev_err(&pdev->dev, "failed to register LED %d\n", id);
         return ret;
     }

+platform_set_drvdata(pdev, led);
+
+return 0;
+
+static int da903x_led_remove(struct platform_device *pdev)
+{
+    struct da903x_led *led = platform_get_drvdata(pdev);
+    +led_classdev_unregister(&led->cdev);
+    return 0;
+
+}

@@ -127,6 +138,7 @@
 .name = "da903x-led",
 },
 .probe = da903x_led_probe,
+ .remove = da903x_led_remove,
};

module_platform_driver(da903x_led_driver);
--- linux-4.15.0.orig/drivers/leds/leds-ktd2692.c
+++ linux-4.15.0/drivers/leds/leds-ktd2692.c
@@ -259,6 +259,17 @@
 | KTD2692_REG_FLASH_CURRENT_BASE);
 }

+static void regulator_disable_action(void *data)
+{
+    struct device *dev = data;
+    struct ktd2692_context *led = dev_get_drvdata(dev);
+    int ret;
+    +
+    +ret = regulator_disable(led->regulator);
+    +if (ret)
+        dev_err(dev, "Failed to disable supply: %d\n", ret);
+    +}
+}

static int ktd2692_parse_dt(struct ktd2692_context *led, struct device *dev,
    struct ktd2692_led_config_data *cfg)
{
    if (led->regulator) {
        ret = regulator_enable(led->regulator);
        -if (ret)
        +if (ret) {
        dev_err(dev, "Failed to enable supply: %d\n", ret);
        +} else {
        +ret = devm_add_action_or_reset(dev,
            +regulator_disable_action, dev);
        +if (ret)
        +return ret;
        +}
    }

    child_node = of_get_next_available_child(np, NULL);
    @@ -380,17 +397,9 @@
 static int ktd2692_remove(struct platform_device *pdev)
 {
     struct ktd2692_context *led = platform_get_drvdata(pdev);
     -int ret;

     led_classdev_flash_unregister(&led->fled_cdev);

     -if (led->regulator) {
         -ret = regulator_disable(led->regulator);
         -if (ret)
         -dev_err(&pdev->dev,}
"Failed to disable supply: %d\n", ret);
-
mutex_destroy(&led->lock);

return 0;
--- linux-4.15.0.orig/drivers/leds/leds-lm3533.c
+++ linux-4.15.0/drivers/leds/leds-lm3533.c
@@ -698,7 +698,7 @@
   -ret = devm_led_classdev_register(pdev->dev.parent, &led->cdev);
   +ret = led_classdev_register(pdev->dev.parent, &led->cdev);
   if (ret) {
      dev_err(&pdev->dev, "failed to register LED %d\n", pdev->id);
      return ret;
@@ -708,13 +708,18 @@
   ret = lm3533_led_setup(led, pdata);
   if (ret)
      -return ret;
+goto err_deregister;
   ret = lm3533_ctrlbank_enable(&led->cb);
   if (ret)
      -return ret;
+goto err_deregister;

   return 0;
   +
   +err_deregister:
   +led_classdev_unregister(&led->cdev);
   +
   +return ret;
 }

static int lm3533_led_remove(struct platform_device *pdev)
@@ -724,6 +729,7 @@
   dev_dbg(&pdev->dev, "%s\n", __func__);
   lm3533_ctrlbank_disable(&led->cb);
   +led_classdev_unregister(&led->cdev);
   +
   +return ret;
 }

--- linux-4.15.0.orig/drivers/leds/leds-lm355x.c
+++ linux-4.15.0/drivers/leds/leds-lm355x.c

/* input and output pins configuration */
switch (chip->type) {
  case CHIP_LM3554:
    -reg_val = pdata->pin_tx2 | pdata->ntc_pin;
    +reg_val = (u32)pdata->pin_tx2 | (u32)pdata->ntc_pin;
    ret = regmap_update_bits(chip->regmap, 0xE0, 0x28, reg_val);
    if (ret < 0)
      goto out;
    -reg_val = pdata->pass_mode;
    +reg_val = (u32)pdata->pass_mode;
    ret = regmap_update_bits(chip->regmap, 0xA0, 0x04, reg_val);
    if (ret < 0)
      goto out;
    break;

  case CHIP_LM3556:
    -reg_val = pdata->pin_tx2 | pdata->ntc_pin | pdata->pass_mode;
    +reg_val = (u32)pdata->pin_tx2 | (u32)pdata->ntc_pin |
      + (u32)pdata->pass_mode;
    ret = regmap_update_bits(chip->regmap, 0x0A, 0xC4, reg_val);
    if (ret < 0)
      goto out;

/* Let the programs run for couple of ms and check the engine status */
usleep_range(3000, 6000);
-lp55xx_read(chip, LP5523_REG_STATUS, &status);
+ret = lp55xx_read(chip, LP5523_REG_STATUS, &status);
+if (ret)
+  goto out;
status &= LP5523_ENG_STATUS_MASK;

if (status != LP5523_ENG_STATUS_MASK) {
  --- linux-4.15.0.orig/drivers/leds/leds-lp5523.c
  +++ linux-4.15.0/drivers/leds/leds-lp5523.c
  @@ -318,7 +318,9 @@
  }
  --- linux-4.15.0.orig/drivers/leds/leds-lp5562.c
  +++ linux-4.15.0/drivers/leds/leds-lp5562.c
  @@ -263,7 +263,11 @@
  {
    const struct firmware *fw = chip->fw;

    -if (fw->size > LP5562_PROGRAM_LENGTH) {
    +/*
    + * the firmware is encoded in ascii hex character, with 2 chars
    + * per byte
    + */
    +if (fw->size > (LP5562_PROGRAM_LENGTH * 2)) {
dev_err(&chip->cl->dev, "firmware data size overflow: %zu\n", fw->size);
return;
--- linux-4.15.0.orig/drivers/leds/leds-lp55xx-common.c
+++ linux-4.15.0/drivers/leds/leds-lp55xx-common.c
@@ -201,7 +201,7 @@
if (!fw) {
    dev_err(dev, "firmware request failed\n");
    goto out;
    +return;
    }

/* handling firmware data is chip dependent */
@@ -214,9 +214,9 @@
mutex_unlock(&chip->lock);

-out:
/* firmware should be released for other channel use */
release_firmware(chip->fw);
+chip->fw = NULL;
}

static int lp55xx_request_firmware(struct lp55xx_chip *chip)
--- linux-4.15.0.orig/drivers/leds/leds-pca9532.c
+++ linux-4.15.0/drivers/leds/leds-pca9532.c
@@ -513,6 +513,7 @@
const struct i2c_device_id *id)
{
    int devid;
+    const struct of_device_id *of_id;
    struct pca9532_data *data = i2c_get_clientdata(client);
    struct pca9532_platform_data *pca9532_pdata =
    dev_get_platdata(&client->dev);
    @@ -528,8 +529,11 @@
    dev_err(&client->dev, "no platform data\n");
    return -EINVAL;
}

-devid = (int)(uintptr_t)of_match_device(
    -of_pca9532_leds_match, &client->dev)->data;
    +of_id = of_match_device(of_pca9532_leds_match, 
    +&client->dev);
    +if (unlikely(!of_id))
    +return -EINVAL;
    +devid = (int)(uintptr_t) of_id->data;
    } else {
    devid = id->driver_data;
--- linux-4.15.0.orig/drivers/leds/leds-pca963x.c
+++ linux-4.15.0/drivers/leds/leds-pca963x.c
@@ -43,6 +43,8 @@
 #define PCA963X_LED_PWM		0x2	/* Controlled through PWM */
 #define PCA963X_LED_GRP_PWM	0x3	/* Controlled through PWM/GRPPWM */

+#define PCA963X_MODE2_OUTDRV	0x04	/* Open-drain or totem pole */
+#define PCA963X_MODE2_INVRT	0x10	/* Normal or inverted direction */
#define PCA963X_MODE2_DMBLNK	0x20	/* Enable blinking */

#define PCA963X_MODE1		0x00
@@ -462,12 +464,12 @@
 PCA963X_MODE2);
 /* Configure output: open-drain or totem pole (push-pull) */
 if (pdata->outdrv == PCA963X_OPEN_DRAIN)
- 			mode2 |= 0x01;
+ 			mode2 &= ~PCA963X_MODE2_OUTDRV;
 else
- 			mode2 |= 0x05;
+ 			mode2 |= PCA963X_MODE2_OUTDRV;
 /* Configure direction: normal or inverted */
 if (pdata->dir == PCA963X_INVERTED)
- 			mode2 |= 0x10;
+ 			mode2 |= PCA963X_MODE2_INVRT;
 i2c_smbus_write_byte_data(pca963x->chip->client, PCA963X_MODE2,
 mode2);
}

--- linux-4.15.0.orig/drivers/leds/leds-pm8058.c
+++ linux-4.15.0/drivers/leds/leds-pm8058.c
@@ -106,7 +106,7 @@
if (!led)
 return -ENOMEM;
- 	led->ledtype = (u32)of_device_get_match_data(&pdev->dev);
+ 	led->ledtype = (u32)(unsigned long)of_device_get_match_data(&pdev->dev);
 map = dev_get_regmap(pdev->dev.parent, NULL);
 if (!map) {
 --- linux-4.15.0.orig/drivers/leds/leds-pwm.c
+++ linux-4.15.0/drivers/leds/leds-pwm.c
@@ -101,8 +101,9 @@
 led_data->pwm = devm_pwm_get(dev, led->name);
if (IS_ERR(led_data->pwm)) {
 ret = PTR_ERR(led_data->pwm);
- 	dev_err(dev, "unable to request PWM for %s: %d\n",
- 			led->name, ret);
+ 	if (ret != -EPROBE_DEFER)
dev_err(dev, "unable to request PWM for %s: %d\n",
+led->name, ret);
return ret;
}

--- linux-4.15.0.orig/drivers/leds/leds-qcom-lpg.c
+++ linux-4.15.0/drivers/leds/leds-qcom-lpg.c
@@ -0,0 +1,1232 @@
+/*
+ * Copyright (c) 2017 Linaro Ltd
+ * Copyright (c) 2010-2012, The Linux Foundation. All rights reserved.
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License version 2 and
+ * only version 2 as published by the Free Software Foundation.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ */
+/#include <linux/leds.h>
+/#include <linux/module.h>
+/#include <linux/of.h>
+/#include <linux/of_device.h>
+/#include <linux/platform_device.h>
+/#include <linux/pwm.h>
+/#include <linux/regmap.h>
+/#include <linux/slab.h>
+
+/#define LPG_PATTERN_CONFIG_REG	0x40
+/#define LPG_SIZE_CLK_REG	0x41
+/#define LPG_PREDIV_CLK_REG	0x42
+/#define PWM_TYPE_CONFIG_REG	0x43
+/#define PWM_VALUE_REG		0x44
+/#define PWM_ENABLE_CONTROL_REG	0x46
+/#define PWM_SYNC_REG		0x47
+/#define LPG_RAMP_DURATION_REG	0x50
+/#define LPG_HI_PAUSE_REG	0x52
+/#define LPG_LO_PAUSE_REG	0x54
+/#define LPG_HI_IDX_REG		0x56
+/#define LPG_LO_IDX_REG		0x57
+/#define PWM_SEC_ACCESS_REG	0xd0
+/#define PWM_DTEST_REG(x)	(0xe2 + (x) - 1)
+
+/#define TRI_LED_SRC_SEL		0x45
+/#define TRI_LED_EN_CTL		0x46
+/#define TRI_LED_ATC_CTL		0x47
+ * struct lpg_channel;
+ * struct lpg_data;
+ */
+ */
+ */ struct lpg - LPG device context
+ */ @dev: struct device for LPG device
+ */ @map: regmap for register access
+ */ @pwm: PWM-chip object, if operating in PWM mode
+ */ @pwm_9bit_mask: bitmask for enabling 9bit pwm
+ */ @lut_base: base address of the LUT block (optional)
+ */ @lut_size: number of entries in the LUT block
+ */ @lut_bitmap: allocation bitmap for LUT entries
+ */ @triled_base: base address of the TRILED block (optional)
+ */ @triled_src: power-source for the TRILED
+ */ @channels: list of PWM channels
+ */ @num_channels: number of @channels
+ */
+ */ struct lpg {
+ */ struct device *dev;
+ */ struct regmap *map;
+ */ struct pwm_chip pwm;
+ */
+ */ const struct lpg_data *data;
+ */
+ */ u32 lut_base;
+ */ u32 lut_size;
+ */ unsigned long *lut_bitmap;
+ */
+ */ u32 triled_base;
+ */ u32 triled_src;
+ */
+ */ struct lpg_channel *channels;
+ */ unsigned int num_channels;
+ */};
+ */
+ */ struct lpg_channel - per channel data
+ */ @lpg: reference to parent lpg
+ */ @base: base address of the PWM channel
+ */ @triled_mask: mask in TRILED to enable this channel
+ */ @lut_mask: mask in LUT to start pattern generator for this channel
+ */ @in_use: channel is exposed to LED framework
+ */ @dtest_line: DTEST line for output, or 0 if disabled
+ * @dtest_value: DTEST line configuration
+ * @pwm_value: duty (in microseconds) of the generated pulses, overridden by LUT
+ * @enabled: output enabled?
+ * @period_us: period (in microseconds) of the generated pulses
+ * @pwm_size: resolution of the @pwm_value, 6 or 9 bits
+ * @clk: base frequency of the clock generator
+ * @pre_div: divider of @clk
+ * @pre_div_exp: exponential divider of @clk
+ * @ramp_enabled: duty cycle is driven by iterating over lookup table
+ * @ramp_ping_pong: reverse through pattern, rather than wrapping to start
+ * @ramp_oneshot: perform only a single pass over the pattern
+ * @ramp_reverse: iterate over pattern backwards
+ * @ramp_duration_ms: length (in milliseconds) of one pattern run
+ * @ramp_lo_pause_ms: pause (in milliseconds) before iterating over pattern
+ * @ramp_hi_pause_ms: pause (in milliseconds) after iterating over pattern
+ * @pattern_lo_idx: start index of associated pattern
+ * @pattern_hi_idx: last index of associated pattern
+ */
+
+struct lpg_channel {
+    struct lpg *lpg;
+
+    u32 base;
+    unsigned int triled_mask;
+    unsigned int lut_mask;
+    
+    bool in_use;
+    
+    u32 dtest_line;
+    u32 dtest_value;
+    
+    u16 pwm_value;
+    bool enabled;
+    
+    unsigned int period_us;
+    unsigned int pwm_size;
+    unsigned int clk;
+    unsigned int pre_div;
+    unsigned int pre_div_exp;
+    
+    bool ramp_enabled;
+    bool ramp_ping_pong;
+    bool ramp_oneshot;
+    bool ramp_reverse;
+    unsigned long ramp_duration_ms;
+    unsigned long ramp_lo_pause_ms;
+    unsigned long ramp_hi_pause_ms;
+    
+    unsigned int pattern_lo_idx;
}
unsigned int pattern_hi_idx;

/**
 * struct lpg_led - logical LED object
 * @lpg:		lpg context reference
 * @cdev:		LED class device
 * @num_channels:	number of channels
 * @channels:
 */
+ struct lpg_led {
+ struct lpg *lpg;
+
+ struct led_classdev cdev;
+
+ unsigned int num_channels;
+ struct lpg_channel *channels[];
+};
+
+/**
 * struct lpg_channel_data - per channel initialization data
 * @base:		base address for PWM channel registers
 * @triled_mask:	bitmask for controlling this channel in TRILED
 */
+ struct lpg_channel_data {
+ unsigned int base;
+ u8 triled_mask;
+};
+
+/**
 * struct lpg_data - initialization data
 * @lut_base:		base address of LUT block
 * @lut_size:	number of entries in LUT
 * @triled_base:	base address of TRILED
 * @pwm_9bit_mask:	bitmask for switching from 6bit to 9bit pwm
 * @num_channels:
 */
+ struct lpg_data {
+ unsigned int lut_base;
+ unsigned int lut_size;
+ unsigned int triled_base;
+ unsigned int pwm_9bit_mask;
+ int num_channels;
+ struct lpg_channel_data *channels;
+};
+
+static int triled_set(struct lpg *lpg, unsigned int mask, bool enable)
+* Skip if we don't have a triled block */
+if (!lpg->triled_base)
+return 0;
+
+return regmap_update_bits(lpg->map, lpg->triled_base + TRI_LED_EN_CTL,
+   mask, enable ? mask : 0);
+

+static int lpg_lut_store(struct lpg *lpg, const u16 *values, size_t len,
+   unsigned int *lo_idx, unsigned int *hi_idx)
+
  +unsigned int idx;
  +u8 val[2];
  +int i;
  +
  +/* Hardware does not behave when LO_IDX == HI_IDX */
  +if (len == 1)
  +return -EINVAL;
  +
  +idx = bitmap_find_next_zero_area(lpg->lut_bitmap, lpg->lut_size,
  +   0, len, 0);
  +if (idx >= lpg->lut_size)
  +return -ENOMEM;
  +
  +for (i = 0; i < len; i++) {
  +val[0] = values[i] & 0xff;
  +val[1] = values[i] >> 8;
  +
  +regmap_bulk_write(lpg->map,
  +   lpg->lut_base + LPG_LUT_REG(idx + i), val, 2);
  +
  +bitmap_set(lpg->lut_bitmap, idx, len);
  +
  +%lo_idx = idx;
  +%hi_idx = idx + len - 1;
  +
  +return 0;
  +

+static u16 *lpg_lut_read(struct lpg *lpg, unsigned int lo_idx,
+   unsigned int hi_idx, size_t *len)
+{
+u16 *values;
+u8 val[2];
+int ret;
+int i;
+ *len = hi_idx - lo_idx + 1;
+
+ values = kcalloc(*len, sizeof(u16), GFP_KERNEL);
+ if (!values)
+     return ERR_PTR(-ENOMEM);
+ for (i = 0; i < *len; i++) {
+     ret = regmap_bulk_read(lpg->map,
+         lpg->lut_base + LPG_LUT_REG(lo_idx + i),
+         &val, 2);
+     if (ret < 0) {
+         kfree(values);
+         return ERR_PTR(ret);
+     }
+     values[i] = val[0] | val[1] << 8;
+ }
+ return values;
+
+static void lpg_lut_free(struct lpg *lpg, unsigned int lo_idx, unsigned int hi_idx)
+{
+     int len;
+     if (lo_idx == hi_idx)
+         return;
+     len = hi_idx - lo_idx + 1;
+     bitmap_clear(lpg->lut_bitmap, lo_idx, len);
+ }
+
+static int lpg_lut_sync(struct lpg *lpg, unsigned int mask)
+{
+     return regmap_update_bits(lpg->map, lpg->lut_base + RAMP_CONTROL_REG,
+         mask, 0xff);
+ }
+
+#define NUM_PWM_PREDIV 4
+#define NUM_PWM_CLK 3
+#define NUM_EXP 7
+
+static const unsigned int lpg_clk_table[NUM_PWM_PREDIV][NUM_PWM_CLK] = {
+     1 * (NSEC_PER_SEC / 1024),
+     1 * (NSEC_PER_SEC / 32768),
+     1 * (NSEC_PER_SEC / 19200000),
/*
 * PWM Frequency = Clock Frequency / (N * T)
 * or
 * PWM Period = Clock Period * (N * T)
 * where
 * N = 2^9 or 2^6 for 9-bit or 6-bit PWM size
 * T = Pre-divide * 2^m, where m = 0..7 (exponent)
 * This is the formula to figure out m for the best pre-divide and clock:
 * (PWM Period / N) = (Pre-divide * Clock Period) * 2^m
 */

static void lpg_calc_freq(struct lpg_channel *chan, unsigned int period_us)
{
    int             n, m, clk, div;
    int             best_m, best_div, best_clk;
    unsigned int    last_err, cur_err, min_err;
    unsigned int    tmp_p, period_n;

    /* PWM Period / N */
    if (period_us < ((unsigned int)(-1) / NSEC_PER_USEC)) {
        period_n = (period_us * NSEC_PER_USEC) >> 6;
        n = 6;
    } else {
        period_n = (period_us >> 9) * NSEC_PER_USEC;
        n = 9;
    }
}
min_err = last_err = (unsigned int)(-1);
best_m = 0;
best_clk = 0;
best_div = 0;
for (clk = 0; clk < NUM_PWM_CLK; clk++) {
  for (div = 0; div < NUM_PWM_PREDIV; div++) {
    /* period_n = (PWM Period / N) */
    /* tmp_p = (Pre-divide * Clock Period) * 2^m */
    tmp_p = lpg_clk_table[div][clk];
    for (m = 0; m <= NUM_EXP; m++) {
      cur_err = period_n - tmp_p;
      if (cur_err < min_err) {
        min_err = cur_err;
        best_m = m;
        best_clk = clk;
        best_div = div;
      }
      if (m && cur_err > last_err)
        /* Break for bigger cur_err */
        break;
      last_err = cur_err;
      tmp_p <<= 1;
    }  
    /* Use higher resolution */
    if (best_m >= 3 && n == 6) {
      n += 3;
      best_m -= 3;
    }
    chan->clk = best_clk;
    chan->pre_div = best_div;
    chan->pre_div_exp = best_m;
    chan->pwm_size = n;
    chan->period_us = period_us;
  }
  /* Use lower resolution */
  if (best_m < 3) {
    n -= 3;
    best_m += 3;
    chan->clk = best_clk;
    chan->pre_div = best_div;
    chan->pre_div_exp = best_m;
    chan->pwm_size = n;
    chan->period_us = period_us;
  }
  /* Use default resolution */
  n = 6;
  chan->clk = best_clk;
  chan->pre_div = best_div;
  chan->pre_div_exp = best_m;
  chan->pwm_size = n;
  chan->period_us = period_us;
}

static void lpg_calc_duty(struct lpg_channel *chan, unsigned int duty_us) {
unsigned long max = (1 << chan->pwm_size) - 1;
unsigned long val;

/* Figure out pwm_value with overflow handling */
if (duty_us < 1 << (sizeof(val) * 8 - chan->pwm_size))
val = (duty_us << chan->pwm_size) / chan->period_us;
else
val = duty_us / (chan->period_us >> chan->pwm_size);
+
if (val > max)
val = max;
+
chan->pwm_value = val;
+
static void lpg_apply_freq(struct lpg_channel *chan)
{
unsigned long val;
struct lpg *lpg = chan->lpg;
+
if (!chan->enabled)
return;
+
/* Clock register values are off-by-one from lpg_clk_table */
val = chan->clk + 1;
+
if (chan->pwm_size == 9)
val |= lpg->data->pwm_9bit_mask;
+
regmap_write(lpg->map, chan->base + LPG_SIZE_CLK_REG, val);
+
val = chan->pre_div << 5 | chan->pre_div_exp;
regmap_write(lpg->map, chan->base + LPG_PREDIV_CLK_REG, val);
+
#define LPG_ENABLE_GLITCH_REMOVAL BIT(5)

static void lpg_enable_glitch(struct lpg_channel *chan)
{
struct lpg *lpg = chan->lpg;
+
regmap_update_bits(lpg->map, chan->base + PWM_TYPE_CONFIG_REG, 
+ LPG_ENABLE_GLITCH_REMOVAL, 0);
+
static void lpg_disable_glitch(struct lpg_channel *chan)
{+
struct lpg *lpg = chan->lpg;
+
+regmap_update_bits(lpg->map, chan->base + PWM_TYPE_CONFIG_REG,
+    LPG_ENABLE_GLITCH_REMOVAL,
+    LPG_ENABLE_GLITCH_REMOVAL);
+
+static void lpg_apply_pwm_value(struct lpg_channel *chan)
+{
+    u8 val[] = { chan->pwm_value & 0xff, chan->pwm_value >> 8 };
+    struct lpg *lpg = chan->lpg;
+    
+    if (!chan->enabled)
+        return;
+    
+    regmap_bulk_write(lpg->map, chan->base + PWM_VALUE_REG, val, 2);
+}
+
+#define LPG_PATTERN_CONFIG_LO_TO_HI	BIT(4)
+#define LPG_PATTERN_CONFIG_REPEAT	BIT(3)
+#define LPG_PATTERN_CONFIG_TOGGLE	BIT(2)
+#define LPG_PATTERN_CONFIG_PAUSE_HI	BIT(1)
+#define LPG_PATTERN_CONFIG_PAUSE_LO	BIT(0)
+
+static void lpg_apply_lut_control(struct lpg_channel *chan)
+{
+    struct lpg *lpg = chan->lpg;
+    unsigned int hi_pause;
+    unsigned int lo Pause;
+    unsigned int step;
+    unsigned int conf = 0;
+    unsigned int lo_idx = chan->pattern_lo_idx;
+    unsigned int hi_idx = chan->pattern_hi_idx;
+    int pattern_len;
+    
+    if (!chan->ramp_enabled || chan->pattern_lo_idx == chan->pattern_hi_idx)
+        return;
+    
+    pattern_len = hi_idx - lo_idx + 1;
+    
+    step = DIV_ROUND_UP(chan->ramp_duration_ms, pattern_len);
+    hi_pause = DIV_ROUND_UP(chan->ramp_hi_pause_ms, step);
+    lo_pause = DIV_ROUND_UP(chan->ramp_lo_pause_ms, step);
+    
+    if (!chan->ramp_reverse)
+        conf |= LPG_PATTERN_CONFIG_LO_TO_HI;
+    if (!chan->ramp_oneshot)
+        conf |= LPG_PATTERN_CONFIG_REPEAT;
+    if (chan->ramp_ping_pong)
conf |= LPG_PATTERN_CONFIG_TOGGLE;
+ if (chan->ramp_hi_pause_ms)
+ conf |= LPG_PATTERN_CONFIG_PAUSE_HI;
+ if (chan->ramp_lo_pause_ms)
+ conf |= LPG_PATTERN_CONFIG_PAUSE_LO;
+
+ regmap_write(lpg->map, chan->base + LPG_PATTERN_CONFIG_REG, conf);
+ regmap_write(lpg->map, chan->base + LPG_HIIDX_REG, hi_idx);
+ regmap_write(lpg->map, chan->base + LPG_LOIDX_REG, lo_idx);
+
+ regmap_write(lpg->map, chan->base + LPG_RAMP_DURATION_REG, step);
+ regmap_write(lpg->map, chan->base + LPG_HI_PAUSE_REG, hi_pause);
+ regmap_write(lpg->map, chan->base + LPG_LO_PAUSE_REG, lo_pause);
+ }
+
+ #define LPG_ENABLE_CONTROL_OUTPUT BIT(7)
+ #define LPG_ENABLE_CONTROL_BUFFER_TRISTATE BIT(5)
+ #define LPG_ENABLE_CONTROL_SRC_PWM BIT(2)
+ #define LPG_ENABLE_CONTROL_RAMP_GEN BIT(1)
+
+ static void lpg_apply_control(struct lpg_channel *chan)
+ {
+ unsigned int ctrl;
+ struct lpg *lpg = chan->lpg;
+ 
+ ctrl = LPG_ENABLE_CONTROL_BUFFER_TRISTATE;
+
+ if (chan->enabled)
+ ctrl |= LPG_ENABLE_CONTROL_OUTPUT;
+
+ if (chan->pattern_lo_idx != chan->pattern_hi_idx)
+ ctrl |= LPG_ENABLE_CONTROL_RAMP_GEN;
+ else
+ ctrl |= LPG_ENABLE_CONTROL_SRC_PWM;
+
+ /*
+ * Due to LPG hardware bug, in the PWM mode, having enabled PWM,
+ * We have to write PWM values one more time.
+ */
+ if (chan->enabled)
+ lpg_apply_pwm_value(chan);
+ }
+
+ #define LPG_SYNC_PWM BIT(0)
+
+ static void lpg_apply_sync(struct lpg_channel *chan)
struct lpg *lpg = chan->lpg;
regmap_write(lpg->map, chan->base + PWM_SYNC_REG, LPG_SYNC_PWM);
}

static void lpg_apply_dtest(struct lpg_channel *chan)
{
struct lpg *lpg = chan->lpg;

if (!chan->dtest_line)
    return;
regmap_write(lpg->map, chan->base + PWM_SEC_ACCESS_REG, 0xa5);
regmap_write(lpg->map, chan->base + PWM_DTEST_REG(chan->dtest_line),
    chan->dtest_value);
}

static void lpg_apply(struct lpg_channel *chan)
{
    lpg_disable_glitch(chan);
    lpg_apply_freq(chan);
    lpg_apply_pwm_value(chan);
    lpg_apply_control(chan);
    lpg_apply_sync(chan);
    lpg_apply_lut_control(chan);
    lpg_enable_glitch(chan);
}

static void lpg_brightness_set(struct led_classdev *cdev,
    enum led_brightness value)
{
struct lpg_led *led = container_of(cdev, struct lpg_led, cdev);
struct lpg_channel *chan;
struct lpg *lpg = led->lpg;
unsigned int duty_us;
unsigned int triled_mask = 0;
unsigned int lut_mask = 0;
int i;

for (i = 0; i < led->num_channels; i++) {
    chan = led->channels[i];
    if (value == LED_OFF) {
        chan->enabled = false;
        chan->ramp_enabled = false;
    } else if (chan->pattern_lo_idx != chan->pattern_hi_idx) {
        lpg_calc_freq(chan, NSEC_PER_USEC);
    }
}
}
+chan->enabled = true;
+chan->ramp_enabled = true;
+
+lut_mask |= chan->lut_mask;
+triled_mask |= chan->triled_mask;
+} else {
+lpg_calc_freq(chan, NSEC_PER_USEC);
+
+duty_us = value * chan->period_us / cdev->max_brightness;
+lpg_calc_duty(chan, duty_us);
+chan->enabled = true;
+chan->ramp_enabled = false;
+
+triled_mask |= chan->triled_mask;
+}
+
+lpg_apply(chan);
+
+/* Toggle triled lines */
+if (triled_mask)
+triled_set(lpg, triled_mask, chan->enabled);
+
+/* Trigger start of ramp generator(s) */
+if (lut_mask)
+lpg_lut_sync(lpg, lut_mask);
+}
+
+static enum led_brightness lpg_brightness_get(struct led_classdev *cdev)
+{
+struct lpg_led *led = container_of(cdev, struct lpg_led, cdev);
+struct lpg_channel *chan = led->channels[0];
+unsigned long max = (1 << chan->pwm_size) - 1;
+
+if (!chan->enabled)
+return LED_OFF;
+else if (chan->pattern_lo_idx != chan->pattern_hi_idx)
+return LED_FULL;
+else
+return chan->pwm_value * cdev->max_brightness / max;
+}
+
+static int lpg_blink_set(struct led_classdev *cdev,
+unsigned long *delay_on, unsigned long *delay_off)
+{
+struct lpg_led *led = container_of(cdev, struct lpg_led, cdev);
+struct lpg_channel *chan = led->channels[0];
+
+if (!chan->enabled)
+return LED_OFF;
+else if (chan->pattern_lo_idx != chan->pattern_hi_idx)
+return LED_FULL;
+else
+return chan->pwm_value * cdev->max_brightness / max;
+}
unsigned int period_us;
unsigned int duty_us;
+
if (!*delay_on && !*delay_off) {
*delay_on = 500;
*delay_off = 500;
+
+duty_us = *delay_on * USEC_PER_MSEC;
+period_us = (*delay_on + *delay_off) * USEC_PER_MSEC;
+
+lpg_calc_freq(chan, period_us);
+lpg_calc_duty(chan, duty_us);
+
+chan->enabled = true;
+chan->ramp_enabled = false;
+
+lpg_apply(chan);
+
+return 0;
+
+}
+
+//interpolate(x1, y1, x2, y2, x) \n+(y1) + ((y2) - (y1)) * ((x) - (x1)) / ((x2) - (x1))
+
+static int lpg_pattern_set(struct led_classdev *led_cdev, 
+ struct led_pattern *led_pattern, int len,
+ bool repeat)
+{ 
+ struct lpg_led *led = container_of(led_cdev, struct lpg_led, cdev);
+ struct lpg_channel *chan = led->channels[0];
+ struct lpg *lp = led->lp;
+ unsigned int duration = 0;
+ unsigned int min_delta = (unsigned int)-1;
+ unsigned int hi_pause;
+ unsigned int lo_pause = 0;
+ unsigned int lo_idx;
+ unsigned int hi_idx;
+ unsigned int max = (1 << chan->pwm_size) - 1;
+ bool ping_pong = true;
+ int brightness_a;
+ int brightness_b;
+ u16 *pattern;
+ int src_idx;
+ int dst_idx;
+ int step_t;
+ int time_a;
+ int time_b;
```c
int value;
int steps;
int ret = 0;
int i;
+
+/
+ * The led_pattern specifies brightness values, potentially distributed
+ * unevenly over the duration of the pattern. The LPG only support
+ * evenly distributed values, so we interpolate new values from the
+ * led_pattern.
+ */
+
+/* Sum the duration over the inner delta_ts and the tail is hi_pause */
+for (src_idx = 0; src_idx < len - 1; src_idx++)
+duration += led_pattern[src_idx].delta_t;
+hi_pause = led_pattern[src_idx].delta_t;
+
+for (src_idx = 0; src_idx < len; src_idx++) {
+  min_delta = min_t(unsigned int, min_delta,
+    led_pattern[src_idx].delta_t);
+
+  steps = duration / min_delta + 1;
+pattern = kcalloc(steps, sizeof(*pattern), GFP_KERNEL);
+if (!pattern)
+  return -ENOMEM;
+
+  time_a = 0;
+for (src_idx = 0, dst_idx = 0; dst_idx < steps; dst_idx++) {
+  /* The timestamp of this evenly distributed data point */
+  step_t = dst_idx * min_delta;
+
+  /* Find time_a - time_b interval from source pattern that spans
+   * step_t */
+  while (time_a + led_pattern[src_idx].delta_t < step_t) {
+    if (src_idx >= len - 1)
+      break;
+    time_a += led_pattern[++src_idx].delta_t;
+  }
+
+  if (src_idx < len - 1) {
+    time_b = time_a + led_pattern[src_idx].delta_t;
+    +brightness_a = led_pattern[src_idx].brightness;
+    +brightness_b = led_pattern[src_idx + 1].brightness;
+  }
+  }
```
/* Interpolate over the source pattern segment */
+value = interpolate(time_a, brightness_a, time_b,
    brightness_b, step_t);
+} else {
+value = led_pattern[src_idx].brightness;
+
+/* Scale calculated value to the hardware brightness value */
+pattern[dst_idx] = value * max / led_cdev->max_brightness;
+
+/* Detect palindromes and use "ping pong" to reduce LUT usage */
+for (dst_idx = 0; dst_idx < steps / 2; dst_idx++) {
+if (pattern[dst_idx] != pattern[len - dst_idx - 1]) {
+ping_pong = false;
+break;
+}
+
+if (ping_pong) {
+steps = (steps + 1) / 2;
+
+/* When ping_pong is set the hi_pause will happen in the middle
+ of the pattern, so we need to use lo_pause to delay between
+ the loops.
+ */
+if (repeat)
+lo_pause = hi_pause;
+
+hi_pause = 0;
+
+ret = lpg_lut_store(lpg, pattern, steps, &lo_idx, &hi_idx);
+if (ret < 0)
+goto out;
+
+chan = led->channels[0];
+
+lpg_lut_free(lpg, chan->pattern_lo_idx, chan->pattern_hi_idx);
+
+/* Update settings on each associated channel */
+for (i = 0; i < led->num_channels; i++) {
+chan = led->channels[i];
+
+chan->ramp_duration_ms = duration;
+chan->ramp_ping_pong = ping_pong;
+chan->ramp_oneshot = !repeat;
+}
chan->pattern_lo_idx = lo_idx;
chan->pattern_hi_idx = hi_idx;
+
+out:
+kfree(pattern);
+
+return ret;
+
+static int lpg_pattern_clear(struct led_classdev *cdev)
+
{+
    struct lpg_led *led = container_of(cdev, struct lpg_led, cdev);
    struct lpg_channel *chan;
    struct lpg *lpg = led->lpg;
    +int i;
    +
    +chan = led->channels[0];
    +
    +lpg_lut_free(lpg, chan->pattern_lo_idx, chan->pattern_hi_idx);
    +
    +for (i = 0; i < led->num_channels; i++) {
    +chan = led->channels[i];
    +chan->pattern_lo_idx = 0;
    +chan->pattern_hi_idx = 0;
    +}
    +
    +return 0;
    +}
    
+static struct led_pattern *lpg_pattern_get(struct led_classdev *cdev,
    +size_t *len, bool *repeat)
+
{+
    struct led_pattern *led_pattern;
    struct lpg_led *led = container_of(cdev, struct lpg_led, cdev);
    struct lpg *lpg = led->lpg;
    struct lpg_channel *chan = led->channels[0];
    +unsigned int delta_t;
    +unsigned int max = (1 << chan->pwm_size) - 1;
    +size_t all_steps;
    +size_t steps;
    +u16 *pattern;
    +size_t i;
    +u16 val;
    +
    +pattern = lpg_lut_read(lpg, chan->pattern_lo_idx, chan->pattern_hi_idx,
    +    &steps);
    +if (IS_ERR_OR_NULL(pattern))


+return ERR_CAST(pattern);
+
+all_steps = chan->ramp_ping_pong ? steps * 2 - 1 : steps;
+
+delta_t = (chan->ramp_duration_ms + chan->ramp_hi_pause_ms) / all_steps;
+
+led_pattern = kmalloc(all_steps, sizeof(*pattern), GFP_KERNEL);
+if (!led_pattern) {
+    led_pattern = ERR_PTR(-ENOMEM);
+    goto out;
+}
+
+for (i = 0; i < all_steps; i++) {
+    if (i < steps)
+        val = pattern[i];
+    else
+        val = pattern[steps - i];
+    led_pattern[i].delta_t = delta_t;
+    led_pattern[i].brightness = val * cdev->max_brightness / max;
+}
+
+*len = all_steps;
+*repeat = !chan->ramp_oneshot;
+
+out:
+kfree(pattern);
+return led_pattern;
+
+
+static int lpg_pwm_request(struct pwm_chip *chip, struct pwm_device *pwm)
+{
+    struct lpg *lpg = container_of(chip, struct lpg, pwm);
+    struct lpg_channel *chan = &lpg->channels[pwm->hwpwm];
+    +return chan->in_use ? -EBUSY : 0;
+}
+
+static int lpg_pwm_apply(struct pwm_chip *chip, struct pwm_device *pwm,  
+    struct pwm_state *state)
+{
+    struct lpg *lpg = container_of(chip, struct lpg, pwm);
+    struct lpg_channel *chan = &lpg->channels[pwm->hwpwm];
+    +lpg_calc_freq(chan, state->period / NSEC_PER_USEC);
+    +lpg_calc_duty(chan, state->duty_cycle / NSEC_PER_USEC);
+    chan->enabled = state->enabled;
+}
+lpg_apply(chan);
+
+triled_set(lpg, chan->triled_mask, chan->enabled);
+
+state->polarity = PWM_POLARITY_NORMAL;
+state->period = chan->period_us * NSEC_PER_USEC;
+
+return 0;
+}
+
+static const struct pwm_ops lpg_pwm_ops = {
+request = lpg_pwm_request,
+.apply = lpg_pwm_apply,
+.owner = THIS_MODULE,
+};
+
+static int lpg_add_pwm(struct lpg *lpg)
+{
+int ret;
+
+lpg->pwm.base = -1;
+lpg->pwm.dev = lpg->dev;
+lpg->pwm.npwm = lpg->num_channels;
+lpg->pwm.ops = &lpg_pwm_ops;
+
+ret = pwmchip_add(&lpg->pwm);
+if (ret)
+dev_err(lpg->dev, "failed to add PWM chip: ret %d\n", ret);
+
+return ret;
+}
+
+static int lpg_add_led(struct lpg *lpg, struct device_node *np)
+{
+struct lpg_led *led;
+const char *state;
+int sources;
+int size;
+u32 chan;
+int ret;
+int i;
+
+sources = of_property_count_u32_elems(np, "led-sources");
+if (sources <= 0) {
+dev_err(lpg->dev, "invalid led-sources of %s\n", np->name);
+return -EINVAL;
+}
size = sizeof(*led) + sources * sizeof(struct lpg_channel*);
led = devm_kzalloc(lpg->dev, size, GFP_KERNEL);
if (!led)
    return -ENOMEM;
led->lpg = lpg;
led->num_channels = sources;
for (i = 0; i < sources; i++) {
    ret = of_property_read_u32_index(np, "led-sources", +, i, &chan);
    if (ret || chan > lpg->num_channels) {
        dev_err(lpg->dev,
        "invalid led-sources of %s\n",
        np->name);
        return -EINVAL;
    }
    led->channels[i] = &lpg->channels[chan - 1];
}
led->channels[i]->in_use = true;
/* Use label else node name */
led->cdev.name = of_get_property(np, "label", NULL) ? : np->name;
led->cdev.default_trigger = of_get_property(np, "linux,default-trigger", NULL);
led->cdev.brightness_set = lpg_brightness_set;
led->cdev.brightness_get = lpg_brightness_get;
led->cdev.blink_set = lpg_blink_set;
led->cdev.max_brightness = 255;
/* Register pattern accessors only if we have a LUT block */
if (lpg->lut_base) {
    led->cdev.pattern_set = lpg_pattern_set;
    led->cdev.pattern_clear = lpg_pattern_clear;
    led->cdev.pattern_get = lpg_pattern_get;
}
/* Set default state */
if (!of_property_read_string(np, "default-state", &state) &&
    !strcmp(state, "on"))
    led->cdev.brightness = LED_FULL;
else
    led->cdev.brightness = LED_OFF;

lpg_brightness_set(&led->cdev, led->cdev.brightness);
ret = devm_led_classdev_register(lpg->dev, &led->cdev);
if (ret)
+dev_err(lpg->dev, "unable to register %s\n", led->cdev.name);
+
+return ret;
+
} 
+
+static int lpg_init_channels(struct lpg *lpg)
+{ 
+    const struct lpg_data *data = lpg->data;
+    int i;
+    
+    lpg->num_channels = data->num_channels;
+    lpg->channels = devm_kcalloc(lpg->dev, data->num_channels,
+    +    sizeof(struct lpg_channel), GFP_KERNEL);
+    if (!lpg->channels)
+        return -ENOMEM;
+    
+    for (i = 0; i < data->num_channels; i++) {
+        lpg->channels[i].lpg = lpg;
+        lpg->channels[i].base = data->channels[i].base;
+        lpg->channels[i].triled_mask = data->channels[i].triled_mask;
+        lpg->channels[i].lut_mask = BIT(i);
+    }
+
+    return 0;
+
} 
+
+static int lpg_init_triled(struct lpg *lpg)
+{ 
+    struct device_node *np = lpg->dev->of_node;
+    int ret;
+    
+    /* Skip initialization if we don't have a triled block */
+    if (!lpg->data->triled_base)
+        return 0;
+    
+    lpg->triled_base = lpg->data->triled_base;
+    
+    ret = of_property_read_u32(np, "qcom,power-source", &lpg->triled_src);
+    if (ret || lpg->triled_src == 2 || lpg->triled_src > 3) {
+        dev_err(lpg->dev, "invalid power source\n");
+        return -EINVAL;
+    }
+    
+    /* Disable automatic trickle charge LED */
+    regmap_write(lpg->map, lpg->triled_base + TRI_LED_ATC_CTL, 0);
+    
+    /* Configure power source */
+regmap_write(lpg->map, lpg->triled_base + TRI_LED_SRC_SEL,
  +  lpg->triled_src);
+
+/* Default all outputs to off */
+regmap_write(lpg->map, lpg->triled_base + TRI_LED_EN_CTL, 0);
+  +
+  +return 0;
+}
+
+static int lpg_init_lut(struct lpg *lpg)
+{
+  const struct lpg_data *data = lpg->data;
+  size_t bitmap_size;
+  +
+  +if (!data->lut_base)
+  +return 0;
+  +
+  +lpg->lut_base = data->lut_base;
+  +lpg->lut_size = data->lut_size;
+  +
+  +bitmap_size = BITS_TO_LONGS(lpg->lut_size) / sizeof(unsigned long);
+  +lpg->lut_bitmap = devm_kzalloc(lpg->dev, bitmap_size, GFP_KERNEL);
+  +
+  +return lpg->lut_bitmap ? 0 : -ENOMEM;
+}
+
+static int lpg_parse_dtest(struct lpg *lpg)
+{
+  struct lpg_channel *chan;
+  struct device_node *np = lpg->dev->of_node;
+  int count;
+  int ret;
+  int i;
+  +
+  +count = of_property_count_u32_elements(np, "qcom,dtest");
+  +if (count == -EINVAL) {
+  +return 0;
+  +} else if (count < 0 || count != lpg->data->num_channels * 2) {
+  +ret = count;
+  +goto err_malformed;
+  +}
+  +for (i = 0; i < lpg->data->num_channels; i++) {
+  +chan = &lpg->channels[i];
+  +
+  +ret = of_property_read_u32_index(np, "qcom,dtest", i * 2,
+  +  +  chan->dtest_line);
+  +if (ret)
goto err_malformed;
+
+ret = of_property_read_u32_index(np, "qcom,dtest", i * 2 + 1,
+ &chan->dtest_value);
+if (ret)
+goto err_malformed;
+
+return 0;
+
+err_malformed:
+dev_err(lpg->dev, "malformed qcom,dtest\n");
+return ret;
+
+static int lpg_probe(struct platform_device *pdev)
+
+struct device_node *np;
+struct lpg *lpg;
+int ret;
+int i;
+
+lpg = devm_kzalloc(&pdev->dev, sizeof(*lpg), GFP_KERNEL);
+if (!lpg)
+return -ENOMEM;
+
+lpg->data = of_device_get_match_data(&pdev->dev);
+if (!lpg->data)
+return -EINVAL;
+
+lpg->dev = &pdev->dev;
+
+lpg->map = dev_get_regmap(pdev->dev.parent, NULL);
+if (!lpg->map) {
+dev_err(&pdev->dev, "parent regmap unavailable\n");
+return -ENXIO;
+}
+
+lpg->map = dev_get_regmap(pdev->dev.parent, NULL);
+if (!lpg->map) {
+dev_err(&pdev->dev, "parent regmap unavailable\n");
+return -ENXIO;
+}
+
+ret = lpg_init_channels(lpg);
+if (ret < 0)
+return ret;
+
+ret = lpg_init_triled(lpg);
+if (ret < 0)
+return ret;
+
+ret = lpg_init_lut(lpg);
+if (ret < 0)
+return ret;
+
+ret = lpg_parse_dtest(lpg);
+if (ret < 0)
+return ret;
+
+for_each_available_child_of_node(pdev->dev.of_node, np) {
+ret = lpg_add_led(lpg, np);
+if (ret)
+return ret;
+}
+
+for (i = 0; i < lpg->num_channels; i++)
+lpg_apply_dtest(&lpg->channels[i]);
+
+ret = lpg_add_pwm(lpg);
+if (ret)
+return ret;
+
+platform_set_drvdata(pdev, lpg);
+
+return 0;
+
+static int lpg_remove(struct platform_device *pdev)
+{
+struct lpg *lpg = platform_get_drvdata(pdev);
+
+pwmchip_remove(&lpg->pwm);
+
+return 0;
+
+static const struct lpg_data pm8916_pwm_data = {
+.pwm_9bit_mask = BIT(2),
+
+.num_channels = 1,
+.channels = (struct lpg_channel_data[]) {
+{ .base = 0xbc00 },
+},
+};
+
+static const struct lpg_data pm8941_lpg_data = {
+.lut_base = 0xb000,
+.lut_size = 64,
+
+.triled_base = 0xd000,
+}
.pwm_9bit_mask = 3 << 4,
+
+.num_channels = 8,
+.channels = (struct lpg_channel_data[]) {
+{ .base = 0xb100 },
+{ .base = 0xb200 },
+{ .base = 0xb300 },
+{ .base = 0xb400 },
+{ .base = 0xb500, .triled_mask = BIT(5) },
+{ .base = 0xb600, .triled_mask = BIT(6) },
+{ .base = 0xb700, .triled_mask = BIT(7) },
+{ .base = 0xb800 },
+);
+};
+
+static const struct lpg_data pm8994_lpg_data = {
+.lut_base = 0xb000,
+.lut_size = 64,
+
+.pwm_9bit_mask = 3 << 4,
+
+.num_channels = 6,
+.channels = (struct lpg_channel_data[]) {
+{ .base = 0xb100 },
+{ .base = 0xb200 },
+{ .base = 0xb300 },
+{ .base = 0xb400 },
+{ .base = 0xb500 },
+{ .base = 0xb600 },
+};
+};
+
+static const struct lpg_data pmi8994_lpg_data = {
+.lut_base = 0xb000,
+.lut_size = 24,
+
+.triled_base = 0xd000,
+
+.pwm_9bit_mask = BIT(4),
+
+.num_channels = 4,
+.channels = (struct lpg_channel_data[]) {
+{ .base = 0xb100, .triled_mask = BIT(5) },
+{ .base = 0xb200, .triled_mask = BIT(6) },
+{ .base = 0xb300, .triled_mask = BIT(7) },
+{ .base = 0xb400 },
+};
+};
+static const struct lpg_data pmi8998_lpg_data = {
+    .lut_base = 0xb000,
+    .lut_size = 49,
+    .pwm_9bit_mask = BIT(4),
+    .num_channels = 6,
+    .channels = (struct lpg_channel_data[]) {
+        {.base = 0xb100 },
+        {.base = 0xb200 },
+        {.base = 0xb300, .triled_mask = BIT(5)},
+        {.base = 0xb400, .triled_mask = BIT(6)},
+        {.base = 0xb500, .triled_mask = BIT(7)},
+        {.base = 0xb600 },
+    },
+};
+
+static const struct of_device_id lpg_of_table[] = {
+    { .compatible = "qcom,pm8916-pwm", .data = &pm8916_pwm_data },
+    { .compatible = "qcom,pm8941-lpg", .data = &pm8941_lpg_data },
+    { .compatible = "qcom,pm8994-lpg", .data = &pm8994_lpg_data },
+    { .compatible = "qcom,pmi8994-lpg", .data = &pmi8994_lpg_data },
+    { .compatible = "qcom,pmi8998-lpg", .data = &pmi8998_lpg_data },
+};
+
+MODULE_DEVICE_TABLE(of, lpg_of_table);
+
+static struct platform_driver lpg_driver = {
+    .probe = lpg_probe,
+    .remove = lpg_remove,
+    .driver = {
+        .name = "qcom-spmi-lpg",
+        .of_match_table = lpg_of_table,
+    },
+};
+
+module_platform_driver(lpg_driver);
+
+MODULE_DESCRIPTION("Qualcomm TRI LED driver");
+MODULE_LICENSE("GPL v2");

--- linux-4.15.0.orig/drivers/leds/leds-wm831x-status.c
+++ linux-4.15.0/drivers/leds/leds-wm831x-status.c
@@ -283,12 +283,23 @@
drvdata->cdev.blink_set = wm831x_status_blink_set;
drvdata->cdev.groups = wm831x_status_groups;

    ret = devm_led_classdev_register(wm831x->dev, &drvdata->cdev);
    ret = led_classdev_register(wm831x->dev, &drvdata->cdev);

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if (ret < 0) {
    dev_err(&pdev->dev, "Failed to register LED: %d\n", ret);
    return ret;
}

+platform_set_drvdata(pdev, drvdata);
+
+return 0;
+
+}
+
+static int wm831x_status_remove(struct platform_device *pdev) {
+
+struct wm831x_status *drvdata = platform_get_drvdata(pdev);
+
+led_classdev_unregister(&drvdata->cdev);
+
+return 0;
+
+
@ @ -297,6 +308,7 @@
     .name = "wm831x-status",
 },
     .probe = wm831x_status_probe,
     .remove = wm831x_status_remove,
 };}

module_platform_driver(wm831x_status_driver);
--- linux-4.15.0.orig/drivers/lightnvm/Kconfig
+++ linux-4.15.0/drivers/lightnvm/Kconfig
@@ -4,8 +4,7 @@
 menuconfig NVM
 bool "Open-Channel SSD target support"
 -depends on BLOCK && HAS_DMA && PCI
-+select BLK_DEV_NVME
  +depends on BLOCK && HAS_DMA

 help
 Say Y here to get to enable Open-channel SSDs.

@@ -36,6 +35,7 @@
 menuconfig NVM_PBLK
 tristate "Physical Block Device Open-Channel SSD target"
 +select CRC32
  ---help---
 Allows an open-channel SSD to be exposed as a block device to the host. The target assumes the device exposes raw flash and must be
 --- linux-4.15.0.orig/drivers/lightnvm/pblk-core.c
+++ linux-4.15.0/drivers/lightnvm/pblk-core.c
@@ -222,7 +222,9 @@ return;
 }

- nvm_dev_dma_free(dev->parent, rqd->meta_list, rqd->dma_meta_list);
+ if (rqd->meta_list)
+  nvm_dev_dma_free(dev->parent, rqd->meta_list, rqd->dma_meta_list);
 mempool_free(rqd, pool);
 }

@@ -260,7 +262,7 @@
 return 0;
 err:
- pblk_bio_free_pages(pblk, bio, 0, i - 1);
+ pblk_bio_free_pages(pblk, bio, (bio->bi_vcnt - i), i);
 return -1;
 }

@@ -838,10 +840,8 @@
 static int pblk_blk_erase_sync(struct pblk *pblk, struct ppa_addr ppa)
 {
- struct nvm_rq rqd;
- int ret = 0;
- 
- memset(&rqd, 0, sizeof(struct nvm_rq));
+ struct nvm_rq rqd = {NULL};
+ int ret;
 
 pblk_setup_e_rq(pblk, &rqd, ppa);

@@ -849,19 +849,6 @@
 * with writes. Thus, there is no need to take the LUN semaphore.
 */
 ret = pblk_submit_io_sync(pblk, &rqd);
- if (ret) {
- struct nvm_tgt_dev *dev = pblk->dev;
- struct nvm_geo *geo = &dev->geo;
- 
- pr_err("pblk: could not sync erase line:%d.blk:%d
",
- pblk_dev_ppa_to_line(geo, ppa),
- pblk_dev_ppa_to_pos(geo, ppa));
- 
- rqd.error = ret;
- goto out;
 }
rqd.private = pblk;
__pblk_end_io_erase(pblk, &rqd);

unsigned int left_seblks;
int is_next = 0;

cur = l_mg->data_line;
new = l_mg->data_next;
if (!new)
goto out;
-l_mg->data_line = new;

spin_lock(&l_mg->free_lock);
if (pblk->state != PBLK_STATE_RUNNING) {
    spin_unlock(&l_mg->free_lock);
goto out;
}
+cur = l_mg->data_line;
+l_mg->data_line = new;

pblk_line_setup_metadata(new, l_mg, &pblk->lm);
spin_unlock(&l_mg->free_lock);
--- linux-4.15.0.orig/drivers/lightnvm/pblk-rb.c
+++ linux-4.15.0/drivers/lightnvm/pblk-rb.c
@@ -142,10 +142,9 @@
{
    int flags;
    try:
+WARN_ONCE(!(flags & PBLK_SUBMITTED_ENTRY),
    "pblk: overwriting unsubmitted data\n")

/* Release flags on context. Protect from writes and reads */
smp_store_release(&w_ctx->flags, PBLK_WRITABLE_ENTRY);
@@ -820,8 +819,8 @@
}
+spin_unlock(&rb->w_lock);

return ret;
}
--- linux-4.15.0.orig/drivers/lightnvm/pblk-recovery.c
+++ linux-4.15.0/drivers/lightnvm/pblk-recovery.c
@@ -968,12 +968,14 @@
{
+	spin_lock(&l_mg->free_lock);
if (!open_lines) {
+		spin_lock(&l_mg->free_lock);
	WARN_ON_ONCE(!test_and_clear_bit(meta_line, &l_mg->meta_bitmap));
+		spin_unlock(&l_mg->free_lock);
	pblk_line_replace_data(pblk);
} else {
+		spin_lock(&l_mg->free_lock);
/* Allocate next line for preparation */
	l_mg->data_next = pblk_line_get(pblk);
if (l_mg->data_next) {
@@ -981,8 +983,8 @@
	l_mg->data_next->type = PBLK_LINETYPE_DATA;
is_next = 1;
}
+		spin_unlock(&l_mg->free_lock);
}
+spin_unlock(&l_mg->free_lock);
}

if (is_next) {
  pblk_line_erase(pblk, l_mg->data_next);
--- linux-4.15.0.orig/drivers/lightnvm/pblk-sysfs.c
+++ linux-4.15.0/drivers/lightnvm/pblk-sysfs.c
@@ -227,8 +227,14 @@
  sec_in_line = l_mg->data_line->sec_in_line;
  meta_weight =(bitmap_weight(&l_mg->meta_bitmap, PBLK_DATA_LINES);
  -map_weight = bitmap_weight(l_mg->data_line->map_bitmap, +
  +spin_lock(&l_mg->data_line->lock);
  +if (l_mg->data_line->map_bitmap)
  +map_weight = bitmap_weight(l_mg->data_line->map_bitmap, l_m->sec_per_line);
  +else
  +map_weight = 0;
  +spin_unlock(&l_mg->data_line->lock);
  }

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spin_unlock(&l_mg->free_lock);

--- linux-4.15.0.orig/drivers/lightnvm/pblk-write.c
+++ linux-4.15.0/drivers/lightnvm/pblk-write.c
@@ -343,12 +343,11 @@
 rqd->ppa_list[i] = addr_to_gen_ppa(pblk, paddr, id);
 }

+spin_lock(&l_mg->close_lock);
 emeta->mem += rq_len;
- if (emeta->mem >= lm->emeta_len[0]) {
- spin_lock(&l_mg->close_lock);
+ if (emeta->mem >= lm->emeta_len[0])
 list_del(&meta_line->list);
- spin_unlock(&l_mg->close_lock);
- }
+ spin_unlock(&l_mg->close_lock);

 pblk_down_page(pblk, rqd->ppa_list, rqd->nr_ppas);

 @@ -417,14 +416,15 @@
 struct pblk_line *meta_line;

 spin_lock(&l_mg->close_lock);
 retry:
 if (list_empty(&l_mg->emeta_list)) {
 spin_unlock(&l_mg->close_lock);
 return NULL;
 }
 meta_line = list_first_entry(&l_mg->emeta_list, struct pblk_line, list);
- if (meta_line->emeta->mem >= lm->emeta_len[0])
- goto retry;
+ if (meta_line->emeta->mem >= lm->emeta_len[0]) {
+ spin_unlock(&l_mg->close_lock);
+ return NULL;
+ }
 spin_unlock(&l_mg->close_lock);

 if (!pblk_valid_meta_ppa(pblk, meta_line, data_rqd))
 --- linux-4.15.0.orig/drivers/macintosh/rack-meter.c
 +++ linux-4.15.0/drivers/macintosh/rack-meter.c
 @@ -154,8 +154,8 @@
 DBDMA_DO_STOP(rm->dma_regs);
 return;
 }
- memset(rdma->buf1, 0, ARRAY_SIZE(rdma->buf1));
- memset(rdma->buf2, 0, ARRAY_SIZE(rdma->buf2));
+ memset(rdma->buf1, 0, sizeof(rdma->buf1));
+memset(rdma->buf2, 0, sizeof(rdma->buf2));

rm->dma_buf_v->mark = 0;

--- linux-4.15.0.orig/drivers/macintosh/therm_windtunnel.c
+++ linux-4.15.0/drivers/macintosh/therm_windtunnel.c
@@ -300,9 +300,11 @@
    /*
     * i2c probing and setup
     */
-/* scan 0x48-0x4f (DS1775) and 0x2c-2x2f (ADM1030) */
 static const unsigned short scan_ds1775[] = {
 0x48, 0x49, 0x4a, 0x4b, 0x4c, 0x4d, 0x4e, 0x4f,
 @ @ -313,25 +315,24 @ @
I2C_CLIENT_END
    }

-/* scan 0x48-0x4f (DS1775) and 0x2c-2x2f (ADM1030) */
 static const unsigned short scan_adm1030[] = {
 0x2c, 0x2d, 0x2e, 0x2f, 0x30, 0x31, 0x32, 0x33,
 @ @ -313,25 +315,24 @ @
I2C_CLIENT_END
    }

-#ifdef CONFIG_THERM_WINDTUNNEL
-#include <linux/i2c.h>
-#define i2c_new_probed_device(adapter, &info, scan, match)
+static int
+do_attach( struct i2c_adapter *adapter )
+static void do_attach(struct i2c_adapter *adapter)
{
    struct i2c_board_info info = { }; 
    struct device_node *np;
    /* scan 0x48-0x4f (DS1775) and 0x2c-2x2f (ADM1030) */
    static const unsigned short scan_ds1775[] = {
        0x48, 0x49, 0x4a, 0x4b, 0x4c, 0x4d, 0x4e, 0x4f,
        @ @ -313,25 +315,24 @ @
        I2C_CLIENT_END
    };

    -if( strncmp(adapter->name, "uni-n", 5) )
        -return 0;
    -
    -if( !x.running ) {
        struct i2c_board_info info;
        +if (x.running || strncmp(adapter->name, "uni-n", 5))
            +return;
        -memset(&info, 0, sizeof(struct i2c_board_info));
        -strlcpy(info.type, "therm_ds1775", I2C_NAME_SIZE);
        +np = of_find_compatible_node(adapter->dev.of_node, NULL, "MAC,ds1775");
        +if (np) {
            +of_node_put(np);
            +} else {
                +strlcpy(info.type, "MAC,adm1030", I2C_NAME_SIZE);
                i2c_new_probed_device(adapter, &info, scan_ds1775, NULL);
            +}
        -strlcpy(info.type, "therm_adm1030", I2C_NAME_SIZE);
        +np = of_find_compatible_node(adapter->dev.of_node, NULL, "MAC,adm1030");
        +if (np) {
            +of_node_put(np);
            +} else {
                +strlcpy(info.type, "MAC,adm1030", I2C_NAME_SIZE);
static int
@@ -404,8 +405,8 @@
enum chip { ds1775, adm1030 };

static const struct i2c_device_id therm_windtunnel_id[] = {
-    { "therm_ds1775", ds1775 },
-    { "therm_adm1030", adm1030 },
+    { "MAC,ds1775", ds1775 },
+    { "MAC,adm1030", adm1030 },
    { }
};
MODULE_DEVICE_TABLE(i2c, therm_windtunnel_id);
@@ -414,6 +415,7 @@
do_probe(struct i2c_client *cl, const struct i2c_device_id *id)
{
    struct i2c_adapter *adapter = cl->adapter;
    int ret = 0;

    if( !i2c_check_functionality(adapter, I2C_FUNC_SMBUS_WORD_DATA
        | I2C_FUNC_SMBUS_WRITE_BYTE) )
@@ -421,11 +423,19 @@

        switch (id->driver_data) {
            case adm1030:
                -return attach_fan( cl );
                +ret = attach_fan(cl);
                +break;
            case ds1775:
                -return attach_thermostat(cl);
                +ret = attach_thermostat(cl);
                +break;
            }
            -return 0;
            +
            +if (!x.running && x.thermostat && x.fan) {
                +x.running = 1;
                +x.poll_task = kthread_run(control_loop, NULL, "g4fand");
                +}
static struct i2c_driver g4fan_driver = {
   \--- linux-4.15.0.orig/drivers/macintosh/via-pmu.c
   +++ linux-4.15.0/drivers/macintosh/via-pmu.c
   @ @ -532,8 +532,9 @@
   int timeout;
   struct adb_request req;

   -out_8(&via[B], via[B] | TREQ);/* negate TREQ */
   -out_8(&via[DIRB], (via[DIRB] | TREQ) & ~TACK);/* TACK in, TREQ out */
   +/* Negate TREQ. Set TACK to input and TREQ to output. */
   +out_8(&via[B], in_8(&via[B]) | TREQ);
   +out_8(&via[DIRB], (in_8(&via[DIRB]) | TREQ) & ~TACK);

   pmu_request(&req, NULL, 2, PMU_SET_INTR_MASK, pmu_intr_mask);
   timeout = 100000;
   @ @ -1455,8 +1456,8 @@
   struct adb_request *req;
   int bite = 0;

   -if (via[B] & TREQ) {
      -printk(KERN_ERR "PMU: spurious SR intr (%x)\n", via[B]);
      +if (in_8(&via[B]) & TREQ) {
      +printk(KERN_ERR "PMU: spurious SR intr (%x)\n", in_8(&via[B]));
      out_8(&via[IFR], SR_INT);
      return NULL;
   }
   \--- linux-4.15.0.orig/drivers/macintosh/windfarm_ad7417_sensor.c
   +++ linux-4.15.0/drivers/macintosh/windfarm_ad7417_sensor.c
   @ @ -313,9 +313,16 @@
   }
   MODULE_DEVICE_TABLE(i2c, wf_ad7417_id);

   +static const struct of_device_id wf_ad7417_of_id[] = {
      +{ .compatible = "ad7417", },
      +{ };
   +MODULE_DEVICE_TABLE(of, wf_ad7417_of_id);
   +
   static struct i2c_driver wf_ad7417_driver = {
      .driver = {
         .name = "wf_ad7417",
         .of_match_table = wf_ad7417_of_id,
      },
      .probe = wf_ad7417_probe,
}
static const struct of_device_id wf_fcu_of_id[] = {
    { .compatible = "fcu", },
    {},
};
static struct i2c_driver wf_fcu_driver = {
    .driver = {
        .name = "wf_fcu",
        .of_match_table = wf_fcu_of_id,
    },
    .probe = wf_fcu_probe,
    .remove = wf_fcu_remove,
};
static struct i2c_device_id *id)
{
    struct wf_lm75_sensor *lm;
    int rc, ds1775 = id->driver_data;
    int rc, ds1775;
    const char *name, *loc;

    if (id)
        ds1775 = id->driver_data;
    else
        ds1775 = !!of_device_get_match_data(&client->dev);
    
    DBG("wf_lm75: creating %s device at address 0x%02x\n",
        ds1775 ? "ds1775" : "lm75", client->addr);

    @ @ -165,9 +171,17 @@
static const struct of_device_id wf_lm75_of_id[] = {
    { .compatible = "lm75", .data = (void *)0 },
    { .compatible = "ds1775", .data = (void *)1 },
    { }
};

MODULE_DEVICE_TABLE(of, wf_lm75_of_id);

static struct i2c_driver wf_lm75_driver = {
    .driver = {
        .name = "wf_lm75",
        .of_match_table = wf_lm75_of_id,
    },
    .probe = wf_lm75_probe,
    .remove = wf_lm75_remove,
};

static struct i2c_driver wf_lm87_driver = {
    .driver = {
        .name = "wf_lm87",
        .of_match_table = wf_lm87_of_id,
    },
    .probe = wf_lm87_probe,
    .remove = wf_lm87_remove,
};

static struct i2c_driver wf_max6690_driver = {
    .driver = {
        .name = "wf_max6690",
        .of_match_table = wf_max6690_of_id,
    },
    .probe = wf_max6690_probe,
    .remove = wf_max6690_remove,
};
.driver = {
    .name = "wf_max6690",
    .of_match_table = wf_max6690_of_id,
},
.probe = wf_max6690_probe,
.remove = wf_max6690_remove,
--- linux-4.15.0.orig/drivers/macintosh/windfarm_pm112.c
+++ linux-4.15.0/drivers/macintosh/windfarm_pm112.c
@@ -133,14 +133,6 @
s32 tmax;
int fmin;

-/* Get PID params from the appropriate SAT */
-hdr = smu_sat_get_sdb_partition(chip, 0xC8 + core, NULL);
-if (hdr == NULL) {
-    printk(KERN_WARNING"windfarm: can't get CPU PID fan config\n");
-    return -EINVAL;
-}
-piddata = (struct smu_sdbp_cpupiddata *)&hdr[1];
-
-/* Get FVT params to get Tmax; if not found, assume default */
-hdr = smu_sat_get_sdb_partition(chip, 0xC4 + core, NULL);
-if (hdr) {
    @ @ -153,6 +145,16 @ @
    if (tmax < cpu_all_tmax)
    cpu_all_tmax = tmax;

    +kfree(hdr);
    +
    +/* Get PID params from the appropriate SAT */
    +hdr = smu_sat_get_sdb_partition(chip, 0xC8 + core, NULL);
    +if (hdr == NULL) {
    +    printk(KERN_WARNING"windfarm: can't get CPU PID fan config\n");
    +    return -EINVAL;
    +}
    +piddata = (struct smu_sdbp_cpupiddata *)&hdr[1];
    +
    /*
     * Darwin has a minimum fan speed of 1000 rpm for the 4-way and
     * 515 for the 2-way. That appears to be overkill, so for now,
     @@ -175,6 +177,9 @@
     pid.min = fmin;
     
     wf_cpu_pid_init(&cpu_pid[cpu], &pid);
     +
     +kfree(hdr);
     +
     return 0;
--- linux-4.15.0.orig/drivers/macintosh/windfarm_smu_sat.c
+++ linux-4.15.0/drivers/macintosh/windfarm_smu_sat.c
@@ -22,14 +22,6 @@

#define VERSION "1.0"
-
-#ifdef DEBUG
-  
-  #define DBG(args...) printk(args)
-  
-  #ifdef DEBUG
-    
-    #define DBG(args...) do {} while(0)
-  
-  #endif
-
-/* If the cache is older than 800ms we'll refetch it */

#define MAX_AGE msecs_to_jiffies(800)

@@ -106,13 +98,10 @@
        buf[i+2] = data[3];
        buf[i+3] = data[2];
    }
-  #ifdef DEBUG
-    
-    
-    printk(KERN_DEBUG "sat %d partition %x:", sat_id, id);
-    for (i = 0; i < len; ++i)
-      DBG(" %x", buf[i]);
-    
-    DBG("\n");
-  
-  #endif

+printk(KERN_DEBUG "sat %d partition %x:", sat_id, id);
+print_hex_dump(KERN_DEBUG, "  ", DUMP_PREFIX_OFFSET,
+   16, 1, buf, len, false);
if (size)
    *size = len;
return (struct smu_sdbp_header *) buf;
@@ -132,13 +121,13 @@
if (err < 0)
return err;
sat->last_read = jiffies;
+
#ifdef LOTSA_DEBUG
{
    int i;
-  DBG(KERN_DEBUG "wf_sat_get: data is");
-  for (i = 0; i < 16; ++i)
-    DBG(" %.2x", sat->cache[i]);
-  DBG("\n");

  }
printk(KERN_DEBUG "wf_sat_get: data is");
print_hex_dump(KERN_DEBUG, " ", DUMP_PREFIX_OFFSET,
+ 16, 1, sat->cache, 16, false);
}
#endif
return 0;
@ @ -354,9 +343,16 @@
];
MODULE_DEVICE_TABLE(i2c, wf_sat_id);

+static const struct of_device_id wf_sat_of_id[] = {
+{ .compatible = "smu-sat", },
+{ }
+};
+MODULE_DEVICE_TABLE(of, wf_sat_of_id);
+
static struct i2c_driver wf_sat_driver = {
 .driver = {
 .name		= "wf_smu_sat",
 .of_match_table = wf_sat_of_id,
 },
 .probe= wf_sat_probe,
 .remove= wf_sat_remove,
 --- linux-4.15.0.orig/drivers/mailbox/bcm-flexrm-mailbox.c
+++ linux-4.15.0/drivers/mailbox/bcm-flexrm-mailbox.c
@@ -1397,9 +1397,9 @@
/* Clear ring flush state */
timeout = 1000; /* timeout of 1s */
-writel_relaxed(0x0, ring + RING_CONTROL);
+writel_relaxed(0x0, ring->regs + RING_CONTROL);
 do {
 -if (!(readl_relaxed(ring + RING_FLUSH_DONE) &
 +if (!(readl_relaxed(ring->regs + RING_FLUSH_DONE) &
 FLUSH_DONE_MASK))
 break;
 mdelay(1);
 --- linux-4.15.0.orig/drivers/mailbox/mailbox-test.c
+++ linux-4.15.0/drivers/mailbox/mailbox-test.c
@@ -363,22 +363,24 @@
/* It's okay for MMIO to be NULL */
 res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
 -size = resource_size(res);
 tdev->tx_mmio = devm_ioremap_resource(&pdev->dev, res);
-if (PTR_ERR(tdev->tx_mmio) == -EBUSY)
+if (PTR_ERR(tdev->tx_mmio) == -EBUSY) {
 /* if reserved area in SRAM, try just ioremap */
size = resource_size(res);
tdev->tx_mmio = devm_ioremap(&pdev->dev, res->start, size);
-else if (IS_ERR(tdev->tx_mmio))
+} else if (IS_ERR(tdev->tx_mmio)) {
tdev->tx_mmio = NULL;
+
/* If specified, second reg entry is Rx MMIO */
res = platform_get_resource(pdev, IORESOURCE_MEM, 1);
-size = resource_size(res);
tdev->rx_mmio = devm_ioremap_resource(&pdev->dev, res);
-if (PTR_ERR(tdev->rx_mmio) == -EBUSY)
+if (PTR_ERR(tdev->rx_mmio) == -EBUSY) {
+size = resource_size(res);
tdev->rx_mmio = devm_ioremap(&pdev->dev, res->start, size);
-else if (IS_ERR(tdev->rx_mmio))
+} else if (IS_ERR(tdev->rx_mmio)) {
tdev->rx_mmio = tdev->tx_mmio;
+
}

platform_set_drvdata(pdev, ctx);
regs = platform_get_resource(pdev, IORESOURCE_MEM, 0);
-mb_base = devm_ioremap(&pdev->dev, regs->start, resource_size(regs));
-if (!mb_base)
-return -ENOMEM;
+mb_base = devm_ioremap_resource(&pdev->dev, regs);
+if (IS_ERR(mb_base))
+return PTR_ERR(mb_base);

/* Setup mailbox links */
for (i = 0; i < MBOX_CNT; i++) {
-err && (chan->txdone_method & TXDONE_BY_POLL))
 */ kick start the timer immediately to avoid delays */
-hrtimer_start(&chan->mbox->poll_hrt, 0, HRTIMER_MODE_REL);
+/* kick start the timer immediately to avoid delays */
+err && (chan->txdone_method & TXDONE_BY_POLL)) {
/* but only if not already active */
+if (!hrtimer_active(&chan->mbox->poll_hrt))
+hrtimer_start(&chan->mbox->poll_hrt, 0, HRTIMER_MODE_REL);
+

static void tx_tick(struct mbox_chan *chan, int r)
@@ -125,11 +128,10 @@
struct mbox_chan *chan = &mbox->chans[i];

if (chan->active_req && chan->cl) {
+resched = true;
txdone = chan->mbox->ops->last_tx_done(chan);
if (txdone)
+tx_tick(chan, 0);
-else
-+resched = true;
}
}

@@ -391,11 +393,13 @@
of_property_for_each_string(np, "mbox-names", prop, mbox_name) {
if (!strncmp(name, mbox_name, strlen(name)))
-+break;
+return mbox_request_channel(cl, index);
index++;
}

-return mbox_request_channel(cl, index);
+dev_err(cl->dev, "%s() could not locate channel named \"%s\"\n", __func__, name);
+return ERR_PTR(-EINVAL);
}
EXPORT_SYMBOL_GPL(mbox_request_channel_byname);

--- linux-4.15.0.orig/drivers/mailbox/pcc.c
+++ linux-4.15.0/drivers/mailbox/pcc.c
@@ -373,33 +373,24 @@
};

/**
- * parse_pcc_subspace - Parse the PCC table and verify PCC subspace
- * entries. There should be one entry per PCC client.
+ * parse_pcc_subspaces -- Count PCC subspaces defined
 * @header: Pointer to the ACPI subtable header under the PCCT.
 * @end: End of subtable entry.
 *
- * Return: 0 for Success, else errno.
+ * Return: If we find a PCC subspace entry of a valid type, return 0.
+ * Otherwise, return -EINVAL.
*
* This gets called for each entry in the PCC table.
*/
static int parse_pcc_subspace(struct acpi_subtable_header *header,
       const unsigned long end)
{
    struct acpi_pcct_hw_reduced *pcct_ss;
-
    -if (pcc_mbox_ctrl.num_chans <= MAX_PCC_SUBSPACES) {
      pcct_ss = (struct acpi_pcct_hw_reduced *) header;
      +struct acpi_pcct_subspace *ss = (struct acpi_pcct_subspace *) header;

      -if ((pcct_ss->header.type !=
          ACPI_PCCT_TYPE_HW_REDUCED_SUBSPACE)
        && (pcct_ss->header.type !=
          ACPI_PCCT_TYPE_HW_REDUCED_SUBSPACE_TYPE2)) {
          pr_err("Incorrect PCC Subspace type detected
");
          return -EINVAL;
        }
    }
    +if (ss->header.type < ACPI_PCCT_TYPE_RESERVED)
      return 0;

    return 0;
    +return -EINVAL;
}
/**
@@ -449,8 +440,8 @@
struct acpi_table_header *pcct_tbl;
struct acpi_subtable_header *pcct_entry;
struct acpi_table_pcct *acpi_pcct_tbl;
+struct acpi_subtable_proc proc[ACPI_PCCT_TYPE_RESERVED];
int count, i, rc;
-int sum = 0;
acpi_status status = AE_OK;

/* Search for PCCT */
@@ -459,43 +450,44 @@
if (ACPI_FAILURE(status) || !pcct_tbl)
   return -ENODEV;

-count = acpi_table_parseEntries(ACPI_SIG_PCCT,
-sizeof(struct acpi_table_pcct),
-ACPI_PCCT_TYPE_HW_REDUCED_SUBSPACE,
-parse_pcc_subspace, MAX_PCC_SUBSPACES);
-sum += (count > 0) ? count : 0;
-
-count = acpi_table_parse_entries(ACPI_SIG_PCCT,
-sizeof(struct acpi_table_pcct),
-ACPI_PCCT_TYPE_HW_REDUCED_SUBSPACE_TYPE2,
-parse_pcc_subspace, MAX_PCC_SUBSPACES);
-sum += (count > 0) ? count : 0;
-
-if (sum == 0 || sum >= MAX_PCC_SUBSPACES) {
-pr_err("Error parsing PCC subspaces from PCCT\n");
+/* Set up the subtable handlers */
+for (i = ACPI_PCCT_TYPE_GENERIC_SUBSPACE;
+ i < ACPI_PCCT_TYPE_RESERVED; i++) {
+proc[i].id = i;
+proc[i].count = 0;
+proc[i].handler = parse_pcc_subspace;
+}
+
+count = acpi_table_parse_entries_array(ACPI_SIG_PCCT,
+sizeof(struct acpi_table_pcct), proc,
+ACPI_PCCT_TYPE_RESERVED, MAX_PCC_SUBSPACES);
+if (count <= 0 || count > MAX_PCC_SUBSPACES) {
+if (count < 0)
+pr_warn("Error parsing PCC subspaces from PCCT\n");
+else
+pr_warn("Invalid PCCT: %d PCC subspaces\n", count);
+return -EINVAL;
+}

-pcc_mbox_channels = kzalloc(sizeof(struct mbox_chan) * count, GFP_KERNEL);
if (!pcc_mbox_channels) {
+pr_err("Could not allocate space for PCC mbox channels\n");
+return -ENOMEM;
+}

-pcc_doorbell_vaddr = kcalloc(count, sizeof(void *), GFP_KERNEL);
if (!pcc_doorbell_vaddr) {
+rc = -ENOMEM;
+goto err_free_mbox;
+}

-pcc_doorbell_ack_vaddr = kcalloc(count, sizeof(void *), GFP_KERNEL);
if (!pcc_doorbell_ack_vaddr) {

rc = -ENOMEM;
goto err_free_db_vaddr;
}

-pcc_doorbell_irq = kcalloc(sum, sizeof(int), GFP_KERNEL);
+pcc_doorbell_irq = kcalloc(count, sizeof(int), GFP_KERNEL);
if (!pcc_doorbell_irq) {
  rc = -ENOMEM;
goto err_free_db_ack_vaddr;
@@ -509,18 +501,24 @@
if (acpi_pcct_tbl->flags & ACPI_PCCT_DOORBELL)
  pcc_mbox_ctrl.txdone_irq = true;

-for (i = 0; i < sum; i++) {
+-for (i = 0; i < count; i++) {
  struct acpi_generic_address *db_reg;
-struct acpi_pcct_hw_reduced *pcct_ss;
+-struct acpi_pcct_subspace *pcct_ss;
  pcc_mbox_channels[i].con_priv = pcct_entry;

  -pcct_ss = (struct acpi_pcct_hw_reduced *) pcct_entry;
  -
  -if (pcc_mbox_ctrl.txdone_irq) {
  -rc = pcc_parse_subspace_irq(i, pcct_ss);
  -if (rc < 0)
  -goto err;
  +if (pcct_entry->type == ACPI_PCCT_TYPE_HW_REduced_SUBSPACE ||
  +  pcct_entry->type == ACPI_PCCT_TYPE_HW_REduced_SUBSPACE_TYPE2) {
  +struct acpi_pcct_hw_reduced *pcct_hrss;
  +
  +pcct_hrss = (struct acpi_pcct_hw_reduced *) pcct_entry;
  +
  +if (pcc_mbox_ctrl.txdone_irq) {
  +rc = pcc_parse_subspace_irq(i, pcct_hrss);
  +if (rc < 0)
  +goto err;
  +}
  +}
  +pcct_ss = (struct acpi_pcct_subspace *) pcct_entry;

  /* If doorbell is in system memory cache the virt address */
  db_reg = &pcct_ss->doorbell_register;
  @ @ -531.7 +529.7 @@
  (unsigned long) pcct_entry + pcct_entry->length);
}

-pcc_mbox_ctrl.num_chans = sum;
+pcc_mbox_ctrl.num_chans = count;
pr_info("Detected %d PCC Subspaces\n", pcc_mbox_ctrl.num_chans);

--- linux-4.15.0.orig/drivers/mailbox/qcom-apcs-ipc-mailbox.c
+++ linux-4.15.0/drivers/mailbox/qcom-apcs-ipc-mailbox.c
@@ -16,6 +18,7 @@
#include <linux/of.h>
#include <linux/of_platform.h>
#include <linux/platform_device.h>
+#include <linux/regmap.h>
#include <linux/mailbox_controller.h>

#define QCOM_APCS_IPC_BITS32
@@ -26,8 +27,17 @@
struct mbox_controller mbox;
struct mbox_chan mbox_chans[QCOM_APCS_IPC_BITS];

-void __iomem *reg;
+struct regmap *regmap;
unsigned long offset;
+struct platform_device *clk;
+
+
+static const struct regmap_config apcs_regmap_config = {
+ .reg_bits = 32,
+ .reg_stride = 4,
+ .val_bits = 32,
+ .max_register = 0xFFC,
+ .fast_io = true,
+};
+
static int qcom_apcs_ipc_send_data(struct mbox_chan *chan, void *data)
@@ -36,9 +46,7 @@
   struct qcom_apcs_ipc, mbox);
   unsigned long idx = (unsigned long)chan->con_priv;

-writel(BIT(idx), apcs->reg);
-
-return 0;
+return regmap_write(apcs->regmap, apcs->offset, BIT(idx));
}

static const struct mbox_chan_ops qcom_apcs_ipc_ops = {
@@ -48,11 +56,17 @@
   static int qcom_apcs_ipc_probe(struct platform_device *pdev)
   {
   struct qcom_apcs_ipc *apcs;
+ struct regmap *regmap;

struct resource *res;
unsigned long offset;
void __iomem *base;
unsigned long i;
int ret;

const struct of_device_id apcs_clk_match_table[] = {
    { .compatible = "qcom,msm8916-apcs-kpss-global", },
    { .compatible = "qcom,qcs404-apcs-apps-global", },
    {} 
};

apcs = devm_kzalloc(&pdev->dev, sizeof(*apcs), GFP_KERNEL);
if (!apcs)
    return PTR_ERR(base);

regmap = devm_regmap_init_mmio(&pdev->dev, base, &apcs_regmap_config);
if (IS_ERR(regmap))
    return PTR_ERR(regmap);

offset = (unsigned long)of_device_get_match_data(&pdev->dev);
apcs->reg = base + offset;
apcs->regmap = regmap;
apcs->offset = offset;

/* Initialize channel identifiers */
for (i = 0; i < ARRAY_SIZE(apcs->mbox_chans); i++)
    offset = (unsigned long)of_device_get_match_data(&pdev->dev);

-apcs->reg = base + offset;
apcs->regmap = regmap;
apcs->offset = offset;

/* Initialize channel identifiers */
for (i = 0; i < ARRAY_SIZE(apcs->mbox_chans); i++)
    offset = (unsigned long)of_device_get_match_data(&pdev->dev);

-if (of_match_device(apcs_clk_match_table, &pdev->dev)) {
    apcs->clk = platform_device_register_data(&pdev->dev,
        "qcom-apcs-msm8916-clk",
        -1, NULL, 0);
    if (IS_ERR(apcs->clk))
        dev_err(&pdev->dev, "failed to register APCS clk\n");
}
+platform_set_drvdata(pdev, apcs);

return 0;

static int qcom_apcs_ipc_remove(struct platform_device *pdev)
{
    struct qcom_apcs_ipc *apcs = platform_get_drvdata(pdev);
    return 0;

    return PTR_ERR(base);
+regmap = devm_regmap_init_mmio(&pdev->dev, base, &apcs_regmap_config);
+if (IS_ERR(regmap))
+    return PTR_ERR(regmap);
+
+offset = (unsigned long)of_device_get_match_data(&pdev->dev);

-apcs->reg = base + offset;
apcs->regmap = regmap;
apcs->offset = offset;

/* Initialize channel identifiers */
for (i = 0; i < ARRAY_SIZE(apcs->mbox_chans); i++)
    offset = (unsigned long)of_device_get_match_data(&pdev->dev);

-if (of_match_device(apcs_clk_match_table, &pdev->dev)) {
    apcs->clk = platform_device_register_data(&pdev->dev,
        "qcom-apcs-msm8916-clk",
        -1, NULL, 0);
    if (IS_ERR(apcs->clk))
        dev_err(&pdev->dev, "failed to register APCS clk\n");
}
+platform_set_drvdata(pdev, apcs);

return 0;

static int qcom_apcs_ipc_remove(struct platform_device *pdev)
{
    struct qcom_apcs_ipc *apcs = platform_get_drvdata(pdev);
    return 0;

struct platform_device *clk = apcs->clk;

mbox_controller_unregister(&apcs->mbox);
+platform_device_unregister(clk);

return 0;
}
--- linux-4.15.0.orig/drivers/mcb/mcb-core.c
+++ linux-4.15.0/drivers/mcb/mcb-core.c
@@ -280,8 +280,8 @@
 bus_nr = ida_simple_get(&mcb_ida, 0, 0, GFP_KERNEL);
 if (bus_nr < 0) {
 -rc = bus_nr;
-goto err_free;
+kfree(bus);
+return ERR_PTR(bus_nr);
+}

 bus->bus_nr = bus_nr;
 @@ -296,12 +296,12 @@
 dev_set_name(&bus->dev, "mcb:%d", bus_nr);
 rc = device_add(&bus->dev);
 if (rc)
 -goto err_free;
+goto err_put;
+return ERR_PTR(rc);
 }

 return bus;
-err_free:
-put_device(carrier);
-kfree(bus);
+
+err_put:
+put_device(&bus->dev);
 return ERR_PTR(rc);
}
EXPORT_SYMBOL_GPL(mcb_alloc_bus);
--- linux-4.15.0.orig/drivers/md/bcache/alloc.c
+++ linux-4.15.0/drivers/md/bcache/alloc.c
@@ -287,8 +287,11 @@
\break;
\}\
mutex_unlock(&(ca)->set->bucket_lock);\
-if (kthread_should_stop())\
-\return 0;\
+test_bit(CACHE_SET_IO_DISABLE, &ca->set->flags)) {\
+set_current_state(TASK_RUNNING);\}\

goto out;
|
|
schedule();
mutex_lock(&(ca)->set->bucket_lock);
@@ -323,10 +326,11 @@
* possibly issue discards to them, then we add the bucket to
* the free list:
*/
-while (!fifo_empty(&ca->free_inc)) {
+while (1) {
long bucket;

-fifo_pop(&ca->free_inc, bucket);
+if (!fifo_pop(&ca->free_inc, bucket))
+break;

if (ca->discard) {
mutex_unlock(&ca->set->bucket_lock);
@@ -372,9 +376,15 @@
if (!fifo_full(&ca->free_inc))
goto retry_invalidate;

-bch_prio_write(ca);
+if (bch_prio_write(ca, false) < 0) {
+ca->invalidate_needs_gc = 1;
+wake_up_gc(ca->set);
+}
}
}
+out:
+wait_for_kthread_stop();
+return 0;
}

/* Allocation */
@@ -385,6 +395,11 @@
struct bucket *b;
long r;

+/* No allocation if CACHE_SET_IO_DISABLE bit is set */
+if (unlikely(test_bit(CACHE_SET_IO_DISABLE, &ca->set->flags)))
+return -1;
+
/* fastpath */
if (fifo_pop(&ca->free[RESERVE_NONE], r) ||
     fifo_pop(&ca->free[reserve], r))
int i;

/* No allocation if CACHE_SET_IO_DISABLE bit is set */
if (unlikely(test_bit(CACHE_SET_IO_DISABLE, &c->flags)))
    return -1;
+
lockdep_assert_held(&c->bucket_lock);
BUG_ON(!n || n > c->caches_loaded || n > 8);

/*
 * We keep multiple buckets open for writes, and try to segregate different
 * write streams for better cache utilization: first we look for a bucket where
 * the last write to it was sequential with the current write, and failing that
 * we look for a bucket that was last used by the same task.
 * write streams for better cache utilization: first we try to segregate flash
 * only volume write streams from cached devices, secondly we look for a bucket
 * where the last write to it was sequential with the current write, and
 * failing that we look for a bucket that was last used by the same task.
 *
 * The ideas is if you've got multiple tasks pulling data into the cache at the
 * same time, you'll get better cache utilization if you try to segregate their
 * data and preserve locality.
 *
 * For example, say you've starting Firefox at the same time you're copying a
 * bunch of files. Firefox will likely end up being fairly hot and stay in the
 * cache awhile, but the data you copied might not be; if you wrote all that
 * data to the same buckets it'd get invalidated at the same time.
 */

struct open_bucket *ret, *ret_task = NULL;

list_for_each_entry_reverse(ret, &c->data_buckets, list)
    -if (!bkey_cmp(&ret->key, search))
    +if (UUID_FLASH_ONLY(&c->uuids[KEY_INODE(&ret->key)]) !=
       UUID_FLASH_ONLY(&c->uuids[KEY_INODE(search)]))
        +continue;
    +else if (!bkey_cmp(&ret->key, search))
        goto found;
else if (ret->last_write_point == write_point)
ret_task = ret;
--- linux-4.15.0.orig/drivers/md/bcache/bcache.h
+++ linux-4.15.0/drivers/md/bcache/bcache.h
@@ -188,6 +188,7 @@
#include <linux/refcount.h>
#include <linux/types.h>
#include <linux/workqueue.h>
+#include <linux/kthread.h>

#include "bset.h"
#include "util.h"
@@ -258,10 +259,11 @@
struct gendisk *disk;

unsigned long flags;
#define BCACHE_DEV_CLOSING 0
#define BCACHE_DEV_DETACHING 1
#define BCACHE_DEV_UNLINK_DONE 2
-
+enum stop_on_failure {
+BCH_CACHED_DEV_STOP_AUTO = 0,
+BCH_CACHED_DEV_STOP_ALWAYS,
+BCH_CACHED_DEV_STOP_MODE_MAX,
+};
+
+struct cached_dev {
+struct list_head list;
+struct bcache_device disk;
+};

+enum stop_on_failure {
+BCH_CACHED_DEV_STOP_AUTO = 0,
+BCH_CACHED_DEV_STOP_ALWAYS,
+BCH_CACHED_DEV_STOP_MODE_MAX,
+};
+
+unsigned intcache_readahead_policy;
+struct bch_ratelimit writeback_rate;
struct delayed_work writeback_rate_update;

@@ -336,6 +347,7 @@
 struct keybuf writeback_keys;

 +struct task_struct*status_update_thread;
 /* For tracking sequential IO */
 #define RECENT_IO_BITS7
 #define RECENT_IO(1 << RECENT_IO_BITS)
@@ -350,12 +362,14 @@
 unsigned sequential_cutoff;
 unsigned readahead;
 +unsigned io_disable:1;
 unsigned verify:1;
 unsigned bypass_torture_test:1;

 unsigned partial_stripes_expensive:1;
 unsigned writeback_metadata:1;
 unsigned writeback_running:1;
 +unsigned writeback_consider_fragment:1;
 unsigned char writeback_percent;
 unsigned writeback_delay;

@@ -369,6 +383,17 @@
 unsigned writeback_rate_i_term_inverse;
 unsigned writeback_rate_p_term_inverse;
 unsigned writeback_rate_minimum;
 +unsigned writeback_rate_fp_term_low;
 +unsigned writeback_rate_fp_term_mid;
 +unsigned writeback_rate_fp_term_high;
 +
 +enum stop_on_failure stop_when_cache_set_failed;
 +#define DEFAULT_CACHED_DEV_ERROR_LIMIT 64
 +atomic_tio_errors;
 +unsigned error_limit;
 +unsigned offline_seconds;
 +
 +char backing_dev_name[BDEVNAME_SIZE];
 };

 enum alloc_reserve {
 @@ -441,6 +466,8 @@
 atomic_long_tmeta_sectors_written;
 atomic_long_ttree_sectors_written;
 atomic_long_tsectors_written;
 +
 en
+char cache_dev_name[BDEVNAME_SIZE];
};

struct gc_stat {
@@ -465,10 +492,15 @@
 *
 * CACHE_SET_RUNNING means all cache devices have been registered and journal
 * replay is complete.
+ *
+ * CACHE_SET_IO_DISABLE is set when bcache is stopping the whole cache set, all
+ * external and internal I/O should be denied when this flag is set.
+ *
 */
#define CACHE_SET_UNREGISTERING0
#define CACHE_SET_STOPPING1
#define CACHE_SET_RUNNING2
+#define CACHE_SET_IO_DISABLE3

struct cache_set {
 struct closure;
@@ -548,6 +580,7 @@
*/
 wait_queue_head_t btree_cache_wait;
 struct task_struct*btree_cache_alloc_lock;
+spinlock_t btree_cannibalize_lock;

/*
 * When we free a btree node, we increment the gen of the bucket the
@@ -648,6 +681,10 @@
 atomic_long_t writeback_keys_done;
 atomic_long_t writeback_keys_failed;

+atomic_long_t reclaim;
+atomic_long_t tflush_write;
+atomic_long_t tretry_flush_write;
+enum{
+ ON_ERROR_UNREGISTER,
+ ON_ERROR_PANIC,
@@ -665,6 +702,8 @@
#define BUCKET_HASH_BITS 12
 struct hlist_head bucket_hash[1 << BUCKET_HASH_BITS];
+ +DECLARE_HEAP(struct btree *, flush_btree);
};

 struct bbio {
wake_up_process(ca->alloc_thread);
}

+static inline void closure_bio_submit(struct cache_set *c,
  + struct bio *bio,
  + struct closure *cl)
+{
  +closure_get(cl);
  +if (unlikely(test_bit(CACHE_SET_IO_DISABLE, &c->flags))) {
  +bio->bi_status = BLK_STS_IOERR;
  +bio_endio(bio);
  +return;
  +}
  +generic_make_request(bio);
  +}
+
+/*
 + * Prevent the kthread exits directly, and make sure when kthread_stop()
 + * is called to stop a kthread, it is still alive. If a kthread might be
 + * stopped by CACHE_SET_IO_DISABLE bit set, wait_for_kthread_stop() is
 + * necessary before the kthread returns.
 + */
+static inline void wait_for_kthread_stop(void)
+{
  +while (!kthread_should_stop()) {
  +set_current_state(TASK_INTERRUPTIBLE);
  +schedule();
  +}
  +}
+
+/* Forward declarations */

+void bch_count_backing_io_errors(struct cached_dev *dc, struct bio *bio);
void bch_count_io_errors(struct cache *, blk_status_t, const char *);
void bch_bbio_count_io_errors(struct cache_set *, struct bio *,
  blk_status_t, const char *);
@@ -879,15 +946,15 @@
struct bkey *, int, bool);
bool bch_alloc_sectors(struct cache_set *, struct bkey *, unsigned,
  unsigned, unsigned, bool);
+bool bch_cached_dev_error(struct cached_dev *dc);

@@ -850,8 +889,36 @@


-void bch_prio_write(struct cache *);
+int bch_prio_write(struct cache *ca, bool wait);
void bch_write_bdev_super(struct cached_dev *, struct closure *);

extern struct workqueue_struct *bcache_wq;
extern const char * const bch_cache_modes[];
extern struct mutex bch_register_lock;
extern struct list_head bch_cache_sets;

@@ -907,8 +974,9 @@

int bch_flash_dev_create(struct cache_set *c, uint64_t size);

-int bch_cached_dev_attach(struct cached_dev *, struct cache_set *);
+int bch_cached_dev_attach(struct cached_dev *, struct cache_set *, uint8_t *);

int bch_cached_dev_detach(struct cached_dev *);
+void bch_cached_dev_emit_change(struct cached_dev *);
void bch_cached_dev_run(struct cached_dev *);
void bcache_device_stop(struct bcache_device *);

--- linux-4.15.0.orig/drivers/md/bcache/bset.c
+++ linux-4.15.0/drivers/md/bcache/bset.c
@@ -319,7 +319,7 @@
 b->page_order = page_order;
 -t->data = (void *)__get_free_pages(gfp, b->page_order);
 +t->data = (void *)__get_free_pages(__GFP_COMP|gfp, b->page_order);
 if (!t->data)
   goto err;

@@ -825,12 +825,22 @@
 struct bset *i = bset_tree_last(b)->data;
 struct bkey *m, *prev = NULL;
 struct btree_iter iter;
+struct bkey preceding_key_on_stack = ZERO_KEY;
+struct bkey *preceding_key_p = &preceding_key_on_stack;
 if (b->ops->is_extents)
   preceding_key(&START_KEY(k), &preceding_key_p);
 BUG_ON(b->ops->is_extents && !KEY_SIZE(k));

-? bch_btree_iter_init(b, &iter, b->ops->is_extents
 -? PRECEDING_KEY(&START_KEY(k))
 -? PRECEDING_KEY(k));
+/*
+ * If k has preceding key, preceding_key_p will be set to address
+ * of k's preceding key; otherwise preceding_key_p will be set
+ * to NULL inside preceding_key().
+ */
+if (b->ops->is_extents)
+preceding_key(&START_KEY(k), &preceding_key_p);
else
+ preceding_key(k, &preceding_key_p);
+
+m = bch_btree_iter_init(b, &iter, preceding_key_p);

if (b->ops->insert_fixup(b, k, &iter, replace_key))
return status;
@@ -1072,7 +1082,7 @@
static inline struct bkey *__bch_btree_iter_next(struct btree_iter *iter,
 btree_iter_cmp_fn *cmp)
{
-struct btree_iter_set unused;
+-struct btree_iter_set __maybe_unused;

struct bkey *ret = NULL;

if (!btree_iter_end(iter)) {
@@ -1087,7 +1097,7 @@
}
if (iter->data->k == iter->data->end)
-heap_pop(iter, unused, cmp);
+heap_pop(iter, b, cmp);
else
heap_sift(iter, 0, cmp);
}
--- linux-4.15.0.orig/drivers/md/bcache/bset.h
+++ linux-4.15.0/drivers/md/bcache/bset.h
@@ -381,7 +381,8 @@
/* Bkey utility code */

#define bset_bkey_last(i) bkey_idx((struct bkey *) (i)->d, (i)->keys)
+#define bset_bkey_last(i) bkey_idx((struct bkey *) (i)->d, 
+ (unsigned int)(i)->keys)

static inline struct bkey *bset_bkey_idx(struct bset *i, unsigned idx)
{
@@ -418,20 +419,26 @@
return __bch_cut_back(where, k);
}

#define PRECEDING_KEY(_k) \
-{
-struct bkey * _ret = NULL;
-\} \
-if (KEY_INODE(_k) || KEY_OFFSET(_k)) { \
-_ret = &KEY(KEY_INODE(_k), KEY_OFFSET(_k), 0);
-\}

-if (_ret->low)\n- _ret->high--;\n- _ret->low--;\n-);\n- \n- _ret;\n-});
*/
+ /*
  * Pointer '*preceeding_key_p' points to a memory object to store preceding
  * key of k. If the preceding key does not exist, set '*preceeding_key_p' to
  * NULL. So the caller of preceding_key() needs to take care of memory
  * which '*preceeding_key_p' pointed to before calling preceding_key().
  * Currently the only caller of preceding_key() is bch_btree_insert_key(),
  * and it points to an on-stack variable, so the memory release is handled
  * by stackframe itself.
  */
+static inline void preceding_key(struct bkey *k, struct bkey **preceeding_key_p)
+{
+ if (KEY_INODE(k) || KEY_OFFSET(k)) {
+ (**preceeding_key_p) = KEY(KEY_INODE(k), KEY_OFFSET(k), 0);
+ if (!(*preceeding_key_p)->low)
+ (*preceeding_key_p)->high--;
+ (*preceeding_key_p)->low--;
+ } else {
+ (*preceeding_key_p) = NULL;
+ }
+ }
+
static inline bool bch_ptr_invalid(struct btree_keys *b, const struct bkey *k)
{ }
@@ -531,14 +538,15 @@
#ifdef CONFIG_BCACHE_DEBUG
#endif

int __bch_count_data(struct btree_keys *);
-void __bch_check_keys(struct btree_keys *, const char *, ...);
+void __printf(2, 3) __bch_check_keys(struct btree_keys *, const char *, ...);
void bch_dump_bset(struct btree_keys *, struct bset *, unsigned);
void bch_dump_bucket(struct btree_keys *);

#else

static inline int __bch_count_data(struct btree_keys *) { return -1; }
- static inline void __bch_check_keys(struct btree_keys *b, const char *fmt, ...) {}
+ static inline void __printf(2, 3) __bch_check_keys(struct btree_keys *b, const char *fmt, ...) {}
 static inline void bch_dump_bucket(struct btree_keys *b) {}
 void bch_dump_bset(struct btree_keys *, struct bset *, unsigned);

---

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--- linux-4.15.0.orig/drivers/md/bcache/btree.c
+++ linux-4.15.0/drivers/md/bcache/btree.c
@@ -640,6 +640,11 @@
 up(&b->io_mutex);
 }

+/*
+ * BTREE_NODE_dirty might be cleared in btree_flush_btree() by
+ * __bch_btree_node_write(). To avoid an extra flush, acquire
+ * b->write_lock before checking BTREE_NODE_dirty bit.
+ */
+mutex_lock(&b->write_lock);
if (btree_node_dirty(b))
 __bch_btree_node_write(b, &cl);
@@ -664,6 +669,7 @@
 struct btree *b, *t;
 unsigned long i, nr = sc->nr_to_scan;
 unsigned long freed = 0;
+unsigned int btree_cache_used;

 if (c->shrinker_disabled)
  return SHRINK_STOP;
@@ -685,40 +691,42 @@
 */
 nr /= c->btree_pages;
 +if (nr == 0)
+ nr = 1;
 nr = min_t(unsigned long, nr, mca_can_free(c));

 i = 0;
-list_for_each_entry_safe(b, t, &c->btree_cache_freeable, list) {
- if (freed >= nr)
- break;
+list_for_each_entry_safe_reverse(b, t, &c->btree_cache_freeable, list) {
+ if (nr <= 0)
+ goto out;

-if (++i > 3 &&
- !mca_reap(b, 0, false)) {
-+if (!mca_reap(b, 0, false)) {
 mca_data_free(b);
 rw_unlock(true, b);
 freed++;
 } 
+nr--;
+i++;
-for (i = 0; (nr--) && i < c->btree_cache_used; i++) {
-if (list_empty(&c->btree_cache))
+list_for_each_entry_safe_reverse(b, t, &c->btree_cache, list) {
+if (nr <= 0 || i >= btree_cache_used)
    goto out;

    -b = list_first_entry(&c->btree_cache, struct btree, list);
    -list_rotate_left(&c->btree_cache);
    -
    -if (!b->accessed &&
    -   !mca_reap(b, 0, false)) {
    +if (!mca_reap(b, 0, false)) {
        mca_bucket_free(b);
        mca_data_free(b);
        rw_unlock(true, b);
        freed++;
    -} else
    -b->accessed = 0;
    +}
    +nr--;
    +i++;
}
out:
mutex_unlock(&c->bucket_lock);
-return freed;
+return freed * c->btree_pages;
}

static unsigned long bch_mca_count(struct shrinker *shrink,
@@ -759,10 +767,15 @@
while (!list_empty(&c->btree_cache)) {
    b = list_first_entry(&c->btree_cache, struct btree, list);

    -if (btree_node_dirty(b))
+/*
+ * This function is called by cache_set_free(), no I/O
+ * request on cache now, it is unnecessary to acquire
+ * b->write_lock before clearing BTREE_NODE_dirty anymore.
+ */
+if (btree_node_dirty(b)) {
    btree_complete_write(b, btree_current_write(b));
    -clear_bit(BTREE_NODE_dirty, &b->flags);
    -
    +clear_bit(BTREE_NODE_dirty, &b->flags);
    +}
mca_data_free(b);
}

@@ -792,7 +805,7 @@
mutex_init(&c->verify_lock);

c->verify_ondisk = (void *)
-__get_free_pages(GFP_KERNEL, ilog2(bucket_pages(c)));
+__get_free_pages(GFP_KERNEL|__GFP_COMP, ilog2(bucket_pages(c)));

c->verify_data = mca_bucket_alloc(c, &ZERO_KEY, GFP_KERNEL);
@@ -838,15 +851,17 @@
static int mca_cannibalize_lock(struct cache_set *c, struct btree_op *op)
{
-struct task_struct *
-old = cmpxchg(&c->btree_cache_alloc_lock, NULL, current);
-if (old & old != current) {
+spin_lock(&c->btree_cannibalize_lock);
+if (likely(c->btree_cache_alloc_lock == NULL)) {
+ c->btree_cache_alloc_lock = current;
+} else if (c->btree_cache_alloc_lock != current) {
 if (op)
 prepare_to_wait(&c->btree_cache_wait, &op->wait,
 TASK_UNINTERRUPTIBLE);
+spin_unlock(&c->btree_cannibalize_lock);
 return -EINTR;
 } +spin_unlock(&c->btree_cannibalize_lock);

 return 0;
}
@@ -881,10 +896,12 @@*/
static void bch_cannibalize_unlock(struct cache_set *c)
{
+spin_lock(&c->btree_cannibalize_lock);
 if (c->btree_cache_alloc_lock == current) {
 c->btree_cache_alloc_lock = NULL;
 wake_up(&c->btree_cache_wait);
 }
+spin_unlock(&c->btree_cannibalize_lock);
}

static struct btree *mca_alloc(struct cache_set *c, struct btree_op *op,
@@ -958,7 +975,7 @@
return b;
}

/**
 * bch_btree_node_get - find a btree node in the cache and lock it, reading it
 * in from disk if necessary.
 *
 @@ -1005,7 +1022,6 @@
 }

 b->parent = parent;
 -b->accessed = 1;
 for (; i <= b->keys.nsets && b->keys.set[i].size; i++) {
  prefetch(b->keys.set[i].tree);
 @@ -1050,9 +1066,10 @@
 mutex_lock(&b->write_lock);

 -if (btree_node_dirty(b))
 +if (btree_node_dirty(b)) {
 btree_complete_write(b, btree_current_write(b));
 -clear_bit(BTREE_NODE_dirty, &b->flags);
 +clear_bit(BTREE_NODE_dirty, &b->flags);
 +}

 mutex_unlock(&b->write_lock);
 @@ -1089,7 +1106,6 @@
 goto retry;
 }

 -b->accessed = 1;
 b->parent = parent;
bch_bset_init_next(&b->keys, b->keys.set->data, bset_magic(&b->c->sb));

 @@ -1377,7 +1393,7 @@
 if (__set_blocks(n1, n1->keys + n2->keys,
  block_bytes(b->c)) >
   btree_blocks(new_nodes[i]))
 -goto out_nocoalesce;
 +goto out_unlock_nocoalesce;

 keys = n2->keys;
 /* Take the key of the node we're getting rid of */
 @@ -1406,7 +1422,7 @@
if (__bch_keylist_realloc(&keylist,
    bkey_u64s(&new_nodes[i]->key)))
    goto out_nocoalesce;
+    goto out_unlock_nocoalesce;

bch_btree_node_write(new_nodes[i], &cl);
bch_keylist_add(&keylist, &new_nodes[i]->key);
@@ -1452,6 +1468,10 @@
/* Invalidated our iterator */
return -EINTR;

+out_unlock_nocoalesce:
+for (i = 0; i < nodes; i++)
+    mutex_unlock(&new_nodes[i]->write_lock);
+out_nocoalesce:
closure_sync(&cl);
bch_keylist_free(&keylist);
@@ -1743,6 +1763,7 @@
btree_gc_start(c);

+/* if CACHE_SET_IO_DISABLE set, gc thread should stop too */
do {
    ret = btree_root(gc_root, c, &op, &writes, &stats);
closure_sync(&writes);
@@ -1750,7 +1771,7 @@
    if (ret && ret != -EAGAIN)
        pr_warn("gc failed!");
-} while (ret);
+} while (ret && !test_bit(CACHE_SET_IO_DISABLE, &c->flags));

bch_btree_gc_finish(c);
wake_up_allocators(c);
@@ -1788,15 +1809,19 @@
while (1) {
    wait_event_interruptible(c->gc_wait,
-        kthread_should_stop() || gc_should_run(c));
+        kthread_should_stop() ||
+        test_bit(CACHE_SET_IO_DISABLE, &c->flags) ||
+        gc_should_run(c));

-    if (kthread_should_stop())
-        break;
+    if (kthread_should_stop() ||
+        test_bit(CACHE_SET_IO_DISABLE, &c->flags))
break;
set_gc_sectors(c);
bch_btree_gc(c);
}

+wait_for_kthread_stop();
return 0;
}

@@ -1871,14 +1896,17 @@
/*
 for_each_cache(ca, c, i) {
 for_each_bucket(b, ca) {
-  if (fifo_full(&ca->free[RESERVE_PRIO]))
+  if (fifo_full(&ca->free[RESERVE_PRIO]) &&
+      fifo_full(&ca->free[RESERVE_BTREE]))
    break;

    if (bch_can_invalidate_bucket(ca, b) &&
      !GC_MARK(b)) {
-        bch_invalidate_one_bucket(ca, b);
-        fifo_push(&ca->free[RESERVE_PRIO],
-                  b - ca->buckets);
+        if (!fifo_push(&ca->free[RESERVE_PRIO],
+                     b - ca->buckets))
+          fifo_push(&ca->free[RESERVE_BTREE],
+                    b - ca->buckets);
    }
  }
}
@@ -2169,7 +2197,7 @@
          if (b->key.ptr[0] != btree_ptr ||
              b->seq != seq + 1) {
            op->lock = b->level;
@@ -2371,7 +2399,7 @@
          struct keybuf *buf = refill->buf;
          int ret = MAP_CONTINUE;
          -if (bkey_cmp(k, refill->end) >= 0) {
+if (bkey_cmp(k, refill->end) > 0) {
              ret = MAP_DONE;
            goto out;
          }
          @ @ -2399,7 +2427,7 @@
          if (b->key.ptr[0] != btree_ptr ||
              b->seq != seq + 1) {
            op->lock = b->level;
            goto out;
          }
          @ @ -2399,7 +2427,7 @@
          if (bkey_cmp(k, refill->end) >= 0) {
+if (bkey_cmp(k, refill->end) > 0) {
            ret = MAP_DONE;
            goto out;
          }
/* Key/pointer for this btree node */
BKEY_PADDED(key);

/* Single bit - set when accessed, cleared by shrinker */
unsigned long			accessed;
unsigned long			seq;
struct rw_semaphore	lock;
struct cache_set	*c;

/**
 * closure_put - decrement a closure's refcount
 */
void closure_put(struct closure *cl)

/**
 * closure_wait - add a closure to a waitlist
 * @waitlist: will own a ref on @cl, which will be released when
 * closure_wait() is called on @waitlist.
 * @cl: closure pointer.
 */
bool closure_wait(struct closure_waitlist *waitlist, struct closure *cl)

void bch_data_verify(struct cached_dev *dc, struct bio *bio)
struct bio *check;
struct bio_vec bv, cbv;
struct bvec_iter iter, citer = { 0 };
@@ -134,7 +133,7 @@
       bv.bv_len),
       dc->disk.c,
       "verify failed at dev %s sector %llu",
-      bdevname(dc->bdev, name),
+      dc->backing_dev_name,
       (uint64_t) bio->bi_iter.bi_sector);

kunmap_atomic(p1);
@@ -175,9 +174,8 @@
       unsigned bytes = min(i->bytes, size);

       int err = copy_to_user(buf, i->buf, bytes);
-      if (err)
-        return err;
+      if (copy_to_user(buf, i->buf, bytes))
+        return -EFAULT;

       ret += bytes;
       buf += bytes;
@@ -245,8 +243,7 @@

 void bch_debug_exit(void)
 {
-      if (!IS_ERR_OR_NULL(debug))
-        debugfs_remove_recursive(debug);
+      debugfs_remove_recursive(debug);
 }

 int __init bch_debug_init(struct kobject *kobj)
 {  
-      if (!IS_ERR_OR_NULL(debug))
-        debugfs_remove_recursive(debug);
+      debugfs_remove_recursive(debug);
  }

 static bool bch_extent_bad(struct btree_keys *bk, const struct bkey *k)
 {  
       struct btree *b = container_of(bk, struct btree, keys);
-      struct bucket *g;
       unsigned i, stale;
+      char buf[80];

       if (!KEY_PTRS(k) ||
           bch_extent_invalid(bk, k))

if (!ptr_available(b->c, k, i))
    return true;

-if (!expensive_debug_checks(b->c) && KEY_DIRTY(k))
-return false;
-
for (i = 0; i < KEY_PTRS(k); i++) {
-    g = PTR_BUCKET(b->c, k, i);
-    stale = ptr_stale(b->c, k, i);
-
-btree_bug_on(stale > 96, b,
+if (stale && KEY_DIRTY(k)) {
+    bch_extent_to_text(buf, sizeof(buf), k);
+    pr_info("stale dirty pointer, stale \%u, key: \%s",
+             stale, buf);
+    
+    btree_bug_on(stale > BUCKET_GC_GEN_MAX, b,
+       "key too stale: \%i, need_gc \%u",
+       stale, b->c->need_gc);
-    btree_bug_on(stale && KEY_DIRTY(k) && KEY_SIZE(k),
-        b, "stale dirty pointer");
-
    if (stale)
        return true;

--- linux-4.15.0.orig/drivers/md/bcache/io.c
+++ linux-4.15.0/drivers/md/bcache/io.c
@@ -38,7 +38,7 @@
    bio_set_dev(bio, PTR_CACHE(c, &b->key, 0)->bdev);
}

void bch_submit_bbio(struct bio *bio, struct cache_set *c,
@@ -50,6 +50,31 @@
 b->submit_time_us = local_clock_us();
-closure_bio_submit(bio, bio->bi_private);
+closure_bio_submit(c, bio, bio->bi_private);
 }

void bch_submit_bbio(struct bio *bio, struct cache_set *
@@ -50,6 +50,31 @@
 }

/* IO errors */
+void bch_count_backing_io_errors(struct cached_dev *dc, struct bio *bio)
+{
+    unsigned errors;
+    
+    WARN_ONCE(!dc, "NULL pointer of struct cached_dev");
*/
+ * Read-ahead requests on a degrading and recovering md raid
+ * (e.g. raid6) device might be failed immediately by md
+ * raid code, which is not a real hardware media failure. So
+ * we shouldn't count failed REQ_RAHEAD bio to dc->io_errors.
+ */
+if (bio->bi_opf & REQ_RAHEAD) {
+    pr_warn_ratelimited("%s: Read-ahead I/O failed on backing device, ignore",
+                        dc->backing_dev_name);
+    return;
+}
+
+errors = atomic_add_return(1, &dc->io_errors);
+if (errors < dc->error_limit)
+    pr_err("%s: IO error on backing device, unrecoverable",
+            dc->backing_dev_name);
+else
+    bch_cached_dev_error(dc);
+
void bch_count_io_errors(struct cache *ca, blk_status_t error, const char *m)
{
    char buf[BDEVNAME_SIZE];
    unsigned errors = atomic_add_return(1 << IO_ERROR_SHIFT,
                                             &ca->io_errors);
    errors >>= IO_ERROR_SHIFT;
    if (error) {
        if (error) {
            pr_err("%s: IO error on %s, recovering",
                    bdevname(ca->bdev, buf), m);
            + ca->cache_dev_name, m);
        else
            bch_cache_set_error(ca->set,
                                "%s: too many IO errors %s",
                                bdevname(ca->bdev, buf), m);
            + ca->cache_dev_name, m);
        }
    } else
        bch_cache_set_error(ca->set,
                            "%s: too many IO errors %s",
                            bdevname(ca->bdev, buf), m);
    + ca->cache_dev_name, m);
    }

--- linux-4.15.0.orig/drivers/md/bcache/journal.c
+++ linux-4.15.0/drivers/md/bcache/journal.c
@@ -62,7 +62,7 @@
 bio_set_op_attrs(bio, REQ_OP_READ, 0);
bch_bio_map(bio, data);

closure_bio_submit(bio, &cl);
closure_bio_submit(ca->set, bio, &cl);
closure_sync(&cl);

/* This function could be simpler now since we no longer write */
@@ -315,6 +315,18 @@
 } }
 }

+bool is_discard_enabled(struct cache_set *s)
+{ 
+struct cache *ca;
+unsigned int i;
+
+for_each_cache(ca, s, i)
+if (ca->discard)
+return true;
+
+return false;
+}
+
+int bch_journal_replay(struct cache_set *s, struct list_head *list)
+{ 
+int ret = 0, keys = 0, entries = 0;
+list_for_each_entry(i, list, list) {
+BUG_ON(i->pin && atomic_read(i->pin) != 1);
+	if (n != i->j.seq) {
+if (n == start && is_discard_enabled(s))
+pr_info("bcache: journal entries %llu-%llu may be discarded! (replaying %llu-%llu)",
+n, i->j.seq - 1, start, end);
+else {
+pr_err("bcache: journal entries %llu-%llu missing! (replaying %llu-%llu)",
+n, i->j.seq - 1, start, end);
+}
+}
+} 
+
+for (k = i->j.start;
+ k < bset_bkey_last(&i->j);
+ @@ -368,6 +388,12 @@
static void btree_flush_write(struct cache_set *c)
{
    @ @ -375,28 +401,41 @@

    * Try to find the btree node with that references the oldest journal
    * entry, best is our current candidate and is locked if non NULL:
    */
    -struct btree *b, *best;
    -unsigned i;
    -retry:
    -best = NULL;
    +struct btree *b;
    +int i;

    -for_eachCached_btree(b, c, i)
    -if (btreeCurrentWrite(b)->journal) {
    -if (!best)
    -best = b;
    -else if (journalPinCmp(c,
    -btreeCurrentWrite(best)->journal,
    -btreeCurrentWrite(b)->journal)) {
    -best = b;
    +atomic_long_inc(&c->flush_write);
    +
    +retry:
    +spin_lock(&c->journal.lock);
    +if (heap_empty(&c->flush_btree)) {
    +for_eachCached_btree(b, c, i)
    +if (btreeCurrentWrite(b)->journal) {
    +if (!heap_full(&c->flush_btree))
    +heap_add(&c->flush_btree, b,
    + journal_max_cmp);
    +else if (journal_max_cmp(b,
    + heap_peek(&c->flush_btree))) {
    +c->flush_btree.data[0] = b;
    +heap_sift(&c->flush_btree, 0,
    + journal_max_cmp);
    +}
    +}
}
b = best;
+for (i = c->flush_btree.used / 2 - 1; i >= 0; --i)
+heap_sift(&c->flush_btree, i, journal_min_cmp);
+
+b = NULL;
+heap_pop(&c->flush_btree, b, journal_min_cmp);
+spin_unlock(&c->journal.lock);
+
if (b) {
mutex_lock(&b->write_lock);
if (!btree_current_write(b)->journal) {
mutex_unlock(&b->write_lock);
/* We raced */
+atomic_long_inc(&c->retry_flush_write);
goto retry;
}

---

struct cache *ca;
uint64_t last_seq;
unsigned iter, n = 0;
-atomic_t p;
+atomic_t p __maybe_unused;
+
+atomic_long_inc(&c->reclaim);
while (!atomic_read(&fifo_front(&c->journal.pin)))
fifo_pop(&c->journal.pin, p);
---

c->sb.nr_this_dev);
}

-bkey_init(k);
-SET_KEY_PTRS(k, n);
-
-if (n)
+if (n) {
+bkey_init(k);
+SET_KEY_PTRS(k, n);
c->journal.blocks_free = c->sb.bucket_size >> c->block_bits;
+}
out:
if (!journal_full(&c->journal))
__closure_wake_up(&c->journal.wait);
---
static void journal_write_unlock(struct closure *cl)
{  
    struct cache_set *c = container_of(cl, struct cache_set, journal.io);

    ca->journal.seq[ca->journal.cur_idx] = w->data->seq;
}

/* If KEY_PTRS(k) == 0, this jset gets lost in air */
+BUG_ON(i == 0);
+
    atomic_dec_bug(&fifo_back(&c->journal.pin));
    bch_journal_next(&c->journal);
    journal_reclaim(c);

while ((bio = bio_list_pop(&list)))
-    closure_bio_submit(bio, cl);
+    closure_bio_submit(c, bio, cl);

continue_at(cl, journal_write_done, NULL);
}

static struct journal_write *journal_wait_for_write(struct cache_set *c,
    unsigned nkeys)
+__acquires(&c->journal.lock)
{
    size_t sectors;
    struct closure cl;

    struct journal_write *w;
    atomic_t *ret;

    /* No journaling if CACHE_SET_IO_DISABLE set already */
    +if (unlikely(test_bit(CACHE_SET_IO_DISABLE, &c->flags)))
    +return NULL;

    if (!CACHE_SYNC(&c->sb))
    return NULL;

    j->w[0].c = c;
    j->w[1].c = c;
if (!(init_fifo(&j->pin, JOURNAL_PIN, GFP_KERNEL)) ||
    !(j->w[0].data = (void *)__get_free_pages(GFP_KERNEL, JSET_BITS)) ||
    !(j->w[1].data = (void *)__get_free_pages(GFP_KERNEL, JSET_BITS)))
return -ENOMEM;
return 0;

--- linux-4.15.0.orig/drivers/md/bcache/request.c
+++ linux-4.15.0/drivers/md/bcache/request.c
@@ -139,6 +139,7 @@
{ }
op->insert_data_done = true;
+/* get in bch_data_insert() */
bio_put(bio);
out:
continue_at(cl, bch_data_insert_keys, op->wq);
@@ -295,6 +296,7 @@
/**
 * bch_data_insert - stick some data in the cache
 + * @cl: closure pointer.
 "
 * This is the starting point for any data to end up in a cache device; it could
 * be from a normal write, or a writeback write, or a write to a flash only
@@ -386,12 +388,20 @@
goto skip;
/*
 -* Flag for bypass if the IO is for read-ahead or background,
 -* unless the read-ahead request is for metadata (eg, for gfs2).
 + * If the bio is for read-ahead or background IO, bypass it or
 + * not depends on the following situations,
 + * - If the IO is for meta data, always cache it and no bypass
 + * - If the IO is not meta data, check dc->cache_reada_policy,
 + *   BCH_CACHE_READA_ALL: cache it and not bypass
 + *   BCH_CACHE_READA_META_ONLY: not cache it and bypass
 + * That is, read-ahead request for metadata always get cached
 + * (eg, for gfs2 or xfs).
 */
- if (bio->bi_opf & (REQ_RAHEAD|REQ_BACKGROUND) &&
- !(bio->bi_opf & REQ_META))
- goto skip;
+if ((bio->bi_opf & (REQ_RAHEAD|REQ_BACKGROUND))) {

if (!(bio->bi_opf & (REQ_META|REQ_PRIO)) &&
    (dc->cache_readahead_policy != BCH_CACHE_READA_ALL))
    goto skip;
}

if (bio->bi_iter.bi_sector & (c->sb.block_size - 1) ||
    bio_sectors(bio) & (c->sb.block_size - 1)) {
    struct search *s = container_of(cl, struct search, iop.cl);
    struct bio *bio = &s->bio.bio;
    struct cached_dev *dc;
    int ret;

    bch_btree_op_init(&s->op, -1);
    /*
     * We might meet err when searching the btree, If that happens, we will
     * get negative ret, in this scenario we should not recover data from
     * backing device (when cache device is dirty) because we don't know
     * whether bkeys the read request covered are all clean.
     * And after that happened, s->iop.status is still its initial value
     * before we submit s->bio.bio
     */
    if (ret < 0) {
        BUG_ON(ret == -EINTR);
        if (s->d && s->d->c &&
            !UUID_FLASH_ONLY(&s->d->c->uuids[s->d->id])) {
            dc = container_of(s->d, struct cached_dev, disk);
            if (dc && atomic_read(&dc->has_dirty))
                s->recoverable = false;
        } /*
        if (!s->iop.status)
        s->iop.status = BLK_STS_IOERR;
        */
    }
    closure_return(cl);
}

static void backing_request_endio(struct bio *bio)
+ struct closure *cl = bio->bi_private;
+ if (bio->bi_status) {
  struct search *s = container_of(cl, struct search, cl);
  struct cached_dev *dc = container_of(s->d, struct cached_dev, disk);
  /*
   * If a bio has REQ_PREFLUSH for writeback mode, it is
   * specically assembled in cached_dev_write() for a non-zero
   * write request which has REQ_PREFLUSH. we don't set
   * s->iop.status by this failure, the status will be decided
   * by result of bch_data_insert() operation.
   */
  + if (unlikely(s->iop.writeback && bio->bi_opf & REQ_PREFLUSH)) {
    pr_err("Can't flush %s: returned bi_status %i",
            dc->backing_dev_name, bio->bi_status);
  } else {
    /* set to orig_bio->bi_status in bio_complete() */
    s->recoverable = false;
    /* should count I/O error for backing device here */
    bch_count_backing_io_errors(dc, bio);
  }
  + bio_put(bio);
  + closure_put(cl);
  +
  static void bio_complete(struct search *s)
  {
    if (s->orig_bio) {
      @@ -622,13 +686,21 @@
    }
  }

  -static void do_bio_hook(struct search *s, struct bio *orig_bio)
  +static void do_bio_hook(struct search *s, struct bio *orig_bio,
  +struct bio *orig_bio,
  +bio_end_io_t *end_io_fn)
  {
    struct bio *bio = &s->bio.bio;

    bio_init(bio, NULL, 0);
    __bio_clone_fast(bio, orig_bio);
    -bio->bi_end_io = request_endio;
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+/
+ * bi_end_io can be set separately somewhere else, e.g. the
+ * variants in,
+ * - cache_bio->bi_end_io from cached_dev_cache_miss()
+ * - n->bi_end_io from cache_lookup_fn()
+ */
+bio->bi_end_io= end_io_fn;
bio->bi_private= &s->cl;

bio_cnt_set(bio, 3);
@@ -637,11 +709,11 @@
static void search_free(struct closure *cl)
{
struct search *s = container_of(cl, struct search, cl);
- bio_complete(s);
if (s->iop.bio)
 bio_put(s->iop.bio);

+ bio_complete(s);
closure_debug_destroy(cl);
mempool_free(s, s->d->c->search);
}  
@@ -654,7 +726,7 @@
s = mempool_alloc(d->c->search, GFP_NOIO);
closure_init(&s->cl, NULL);
-do_bio_hook(s, bio);
+do_bio_hook(s, bio, request_endio);

s->orig_bio= bio;
s->cache_miss= NULL;
@@ -721,11 +793,12 @@
trace_bcache_read_retry(s->orig_bio);

s->iop.status = 0;
-do_bio_hook(s, s->orig_bio);
+do_bio_hook(s, s->orig_bio, backing_request_endio);

/* XXX: invalidate cache */

-closure_bio_submit(bio, cl);
+/* 1/O request sent to backing device */
+closure_bio_submit(s->iop.c, bio, cl);
}

continue_at(cl, cached_dev_cache_miss_done, NULL);
@@ -778,7 +851,7 @@
bch_mark_cache_accounting(s->iop.c, s->d,  
!s->cache_missed, s->iop.bypass);
-trace_bcache_read(s->orig_bio, !s->cache_miss, s->iop.bypass);
+trace_bcache_read(s->orig_bio, !s->cache_missed, s->iop.bypass);

if (s->iop.status)
continue_at_nobarrier(cl, cached_dev_read_error, bcache_wq);
@@ -805,7 +878,7 @@
}

if (!(bio->bi_opf & REQ_RAHEAD) &&
- !(bio->bi_opf & REQ_META) &&
+ !(bio->bi_opf & (REQ_META|REQ_PRIO)) &&
  s->iop.c->gc_stats.in_use < CUTOFF_CACHE_READA)
reada = min_t(sector_t, dc->readahead >> 9,
    get_capacity(bio->bi_disk) - bio_end_sector(bio));
@@ -837,7 +910,7 @@
bio_copy_dev(cache_bio, miss);
cache_bio->bi_iter.bi_size= s->insert_bio_sectors << 9;

-cache_bio->bi_end_io= request_endio;
+cache_bio->bi_end_io= backing_request_endio;
cache_bio->bi_private= &s->cl;

bch_bio_map(cache_bio, NULL);
@@ -850,15 +923,17 @@
s->cache_miss= miss;
s->iop.bio= cache_bio;
bio_get(cache_bio);
-closure_bio_submit(cache_bio, &s->cl);
+/* I/O request sent to backing device */
+closure_bio_submit(s->iop.c, cache_bio, &s->cl);

return ret;
out_put:
bio_put(cache_bio);
out_submit:
-miss->bi_end_io= request_endio;
+miss->bi_end_io= backing_request_endio;
miss->bi_private= &s->cl;
-closure_bio_submit(miss, &s->cl);
+/* I/O request sent to backing device */
+closure_bio_submit(s->iop.c, miss, &s->cl);
return ret;
}

@@ -921,31 +996,46 @@
s->iop.bio = s->orig_bio;
bio_get(s->iop.bio);

- if ((bio_op(bio) != REQ_OP_DISCARD) ||
  - blk_queue_discard(bdev_get_queue(dc->bdev)))
- closure_bio_submit(bio, cl);
+ if (bio_op(bio) == REQ_OP_DISCARD &&
+ !blk_queue_discard(bdev_get_queue(dc->bdev)))
+ goto insert_data;
+
+ /* I/O request sent to backing device */
+ bio->bi_end_io = backing_request_endio;
+ closure_bio_submit(s->iop.c, bio, cl);
+
} else if (s->iop.writeback) {
  bch_writeback_add(dc);
  s->iop.bio = bio;

  if (bio->bi_opf & REQ_PREFLUSH) {
    /* Also need to send a flush to the backing device */
    struct bio *flush = bio_alloc_bioset(GFP_NOIO, 0,
    - dc->disk.bio_split);
    +
    */
    + * Also need to send a flush to the backing
    + * device.
    + */
    +struct bio *flush;

    +flush = bio_alloc_bioset(GFP_NOIO, 0,
    + dc->disk.bio_split);
    +if (!flush) {
    +s->iop.status = BLK_STS_RESOURCE;
    +goto insert_data;
    +}
    bio_copy_dev(flush, bio);
    -flush->bi_end_io = request_endio;
    +flush->bi_end_io = backing_request_endio;
    flush->bi_private = cl;
    flush->bi_opf = REQ_OP_WRITE | REQ_PREFLUSH;
    -
    -closure_bio_submit(flush, cl);
    +/* I/O request sent to backing device */
    +closure_bio_submit(s->iop.c, flush, cl);
  }
} else {
  s->iop.bio = bio_clone_fast(bio, GFP_NOIO, dc->disk.bio_split);
  -
  -closure_bio_submit(bio, cl);
/** I/O request sent to backing device */
+bio->bi_end_io = backing_request_endio;
+closure_bio_submit(s->iop.c, bio, cl);
}

+insert_data:
closure_call(&s->iop.cl, bch_data_insert, NULL, cl);
continue_at(cl, cached_dev_write_complete, NULL);
}
@@ -959,11 +1049,67 @@
bch_journal_meta(s->iop.c, cl);

/* If it's a flush, we send the flush to the backing device too */
-closure_bio_submit(bio, cl);
+bio->bi_end_io = backing_request_endio;
+closure_bio_submit(s->iop.c, bio, cl);

continue_at(cl, cached_dev_bio_complete, NULL);
}

+struct detached_dev_io_private {
+struct bcache_device*d;
+unsigned longstart_time;
+bio_end_io_t*bi_end_io;
+void*bi_private;
+
+static void detached_dev_end_io(struct bio *bio)
+{
+struct detached_dev_io_private *ddip;
+
+ddip = bio->bi_private;
+bio->bi_end_io = ddip->bi_end_io;
+bio->bi_private = ddip->bi_private;
+
generic_end_io_acct(ddip->d->disk->queue,
+bio_data_dir(bio),
+&ddip->d->disk->part0, ddip->start_time);
+
+if (bio->bi_status) {
+struct cached_dev *dc = container_of(ddip->d,
+ struct cached_dev, disk);
+/* should count I/O error for backing device here */
+bch_count_backing_io_errors(dc, bio);
+}
+
kfree(ddip);
+bio->bi_end_io(bio);
static void detached_dev_do_request(struct bcache_device *d, struct bio *bio) {
    struct detached_dev_io_private *ddip;
    struct cached_dev *dc = container_of(d, struct cached_dev, disk);
    
    /* no need to call closure_get(&dc->disk.cl),
    * because upper layer had already opened bcache device,
    * which would call closure_get(&dc->disk.cl)
    */
    ddip = kzalloc(sizeof(struct detached_dev_io_private), GFP_NOIO);
    ddip->d = d;
    ddip->start_time = jiffies;
    ddip->bi_end_io = bio->bi_end_io;
    ddip->bi_private = bio->bi_private;
    bio->bi_end_io = detached_dev_end_io;
    bio->bi_private = ddip;
    
    if ((bio_op(bio) == REQ_OP_DISCARD) &&
        !blk_queue_discard(bdev_get_queue(dc->bdev)))
        bio->bi_end_io(bio);
    else
        generic_make_request(bio);
}

/* Cached devices - read & write stuff */
static blk_qc_t cached_dev_make_request(struct request_queue *q,
struct cached_dev *dc = container_of(d, struct cached_dev, disk);
int rw = bio_data_dir(bio);

    if (unlikely((d->c && test_bit(CACHE_SET_IO_DISABLE, &d->c->flags)) ||
        dc->io_disable)) {
        bio->bi_status = BLK_STS_IOERR;
        bio_endio(bio);
        return BLK_QC_T_NONE;
    }
    generic_start_io_acct(q, rw, bio_sectors(bio), &d->disk->part0);

    bio_set_dev(bio, dc->bdev);
    cached_dev_read(dc, s);
```c
} else {
-    if ((bio_op(bio) == REQ_OP_DISCARD) &&
-        !(blk_queue_discard(bdev_get_queue(dc->bdev))))
-        bio_endio(bio);
-    else
-        generic_make_request(bio);
-}
+
+*/ I/O request sent to backing device */
+detached_dev_do_request(d, bio);

    return BLK_QC_T_NONE;
}
@@ -1014,6 +1163,10 @@
 unsigned int cmd, unsigned long arg)
 {
     struct cached_dev *dc = container_of(d, struct cached_dev, disk);
+
+    if (dc->io_disable)
+        return -EIO;
+
     return __blkdev_driver_ioctl(dc->bdev, mode, cmd, arg);
 }
@@ -1089,6 +1242,12 @@
 struct bcache_device *d = bio->bi_disk->private_data;
 int rw = bio_data_dir(bio);

+    if (unlikely(d->c && test_bit(CACHE_SET_IO_DISABLE, &d->c->flags))) {
+        bio->bi_status = BLK_STS_IOERR;
+        bio_endio(bio);
+        return BLK_QC_T_NONE;
+    }
+    
     generic_start_io_acct(q, rw, bio_sectors(bio), &d->disk->part0);

     s = search_alloc(bio, d);
 --- linux-4.15.0.orig/drivers/md/bcache/super.c
+++ linux-4.15.0/drivers/md/bcache/super.c
 @@ -37,16 +37,6 @@
 0xc8, 0x50, 0xfc, 0x5e, 0xcb, 0x16, 0xcd, 0x99
-/* Default is -1; we skip past it for struct cached_dev's cache mode */
-const char * const bch_cache_modes[] = {
-    "default",
-    "writethrough",
-    "writeback",
```
"writearound",
"none",
-NULL
-);
-
static struct kobject *bcache_kobj;
struct mutex bch_register_lock;
LIST_HEAD(bch_cache_sets);
@@ -265,6 +255,7 @@
bio->bi_private = dc;

closure_get(cl);
+/* I/O request sent to backing device */
__write_super(&dc->sb, bio);

closure_return_with_destructor(cl, bch_write_bdev_super_unlock);
@@ -422,6 +413,8 @@
	/* Only one bucket used for uuid write */
+ca = PTR_CACHE(c, &k.key, 0);
+atomic_long_add(ca->sb.bucket_size, &ca->meta_sectors_written);
+
bkey_copy(&c->uuid_bucket, &k.key);
bkey_put(c, &k.key);
return 0;
@@ -519,16 +516,33 @@
bch_bio_map(bio, ca->disk_buckets);
-closure_bio_submit(bio, &ca->prio);
+closure_bio_submit(ca->set, bio, &ca->prio);
 closure_sync(cl);
}

-void bch_prio_write(struct cache *ca)
+int bch_prio_write(struct cache *ca, bool wait)
int i;
struct bucket *b;
struct closure cl;

+pr_debug("free_prio=%zu, free_none=%zu, free_inc=%zu",
+ fifo_used(&ca->free[RESERVE_Prio]),
+ fifo_used(&ca->free[RESERVE_NONE]),
+ fifo_used(&ca->free_inc));
+
+/*
+ * Pre-check if there are enough free buckets. In the non-blocking
+ * scenario it's better to fail early rather than starting to allocate
+ * buckets and do a cleanup later in case of failure.
+ */
+if (!wait) {
+size_t avail = fifo_used(&ca->free[RESERVE_Prio]) +
+ fifo_used(&ca->free[RESERVE_NONE]);
+if (prio_buckets(ca) > avail)
+return -ENOMEM;
+
+/*
+ * For the for loop do:
+ */
+closure_init_stack(&cl);
+
+atomic_long_add(ca->sb.bucket_size * prio_buckets(ca),
+&ca->meta_sectors_written);

-//pr_debug("free %zu, free_inc %zu, unused %zu", fifo_used(&ca->free),
-// fifo_used(&ca->free_inc), fifo_used(&ca->unused));
-
- for (i = prio_buckets(ca) - 1; i >= 0; --i) {
-long bucket;
-struct prio_set *p = ca->disk_buckets;
-@@ -558,7 +569,7 @@
-p->magic= pset_magic(&ca->sb);
-p->csum= bch_crc64(&p->magic, bucket_bytes(ca) - 8);
-
- bucket = bch_bucket_alloc(ca, RESERVE_PRIO, true);
+bucket = bch_bucket_alloc(ca, RESERVE_PRIO, wait);
BUG_ON(bucket == -1);
+
+mutex_unlock(&ca->set->bucket_lock);
+
+ca->prio_last_buckets[i] = ca->prio_buckets[i];
+}
+return 0;
static void prio_read(struct cache *ca, uint64_t bucket)
@@ -643,6 +655,7 @@
               unsigned int cmd, unsigned long arg)
 {
     struct bcache_device *d = b->bd_disk->private_data;
+    return d->ioctl(d, mode, cmd, arg);
 }
@@ -736,20 +749,31 @@
 static void bcache_device_free(struct bcache_device *d)
 {
     struct gendisk *disk = d->disk;
+    lockdep_assert_held(&bch_register_lock);
     -pr_info("%s stopped", d->disk->disk_name);
+    if (disk)
+       pr_info("%s stopped", disk->disk_name);
+    else
+       pr_err("bcache device (NULL gendisk) stopped");

     if (d->c)
         bcache_device_detach(d);
-    if (d->disk && d->disk->flags & GENHD_FL_UP)
-        del_gendisk(d->disk);
-    if (d->disk && d->disk->queue)
-        blk_cleanup_queue(d->disk->queue);
-    if (d->disk) {
+    if (disk) {
+        bool disk_added = (disk->flags & GENHD_FL_UP) != 0;
+    +    if (disk_added)
+        del_gendisk(disk);
+    +    if (disk->queue)
+        blk_cleanup_queue(disk->queue);
+    +    ida_simple_remove(&bcache_device_idx,
+        -first_minor_to_idx(d->disk->first_minor));
+        -put_disk(d->disk);
+        +first_minor_to_idx(disk->first_minor));
+        +if (disk_added)
+        +put_disk(disk);
static int bcache_device_init(struct bcache_device *d, unsigned block_size,
-    sector_t sectors)
+    sector_t sectors, struct block_device *cached_bdev)
{
    struct request_queue *q;
+    const size_t max_stripes = min_t(size_t, INT_MAX,
+    SIZE_MAX / sizeof(atomic_t));
    size_t n;
    int idx;

    d->nr_stripes = DIV_ROUND_UP_ULL(sectors, d->stripe_size);

-    if (!d->nr_stripes ||
-        d->nr_stripes > INT_MAX ||
-        d->nr_stripes > SIZE_MAX / sizeof(atomic_t)) {
+    if (!d->nr_stripes || d->nr_stripes > max_stripes) {
        pr_err("nr_stripes too large or invalid: %u (start sector beyond end of disk?)",
            (unsigned)d->nr_stripes);
        return -ENOMEM;
    }

    q->limits.io_min = block_size;
    q->limits.logical_block_size = block_size;
    q->limits.physical_block_size = block_size;

    +    if (q->limits.logical_block_size > PAGE_SIZE && cached_bdev) {
+        /*
+         * This should only happen with BCACHE_SB_VERSION_BDEV.
+         * Block/page size is checked for BCACHE_SB_VERSION_CDEV.
+         */
+        pr_info("%s: sb/logical block size (%u) greater than page size 
+        (%lu) falling back to device logical block size (%u)",
+            d->disk->disk_name, q->limits.logical_block_size,
+            PAGE_SIZE, bdev_logical_block_size(cached_bdev));
+        +/*
+        */
+        blk_queue_logical_block_size(q, bdev_logical_block_size(cached_bdev));
+    }
+    +    set_bit(QUEUE_FLAG_NONROT,&d->disk->queue->queue_flags);
+    clear_bit(QUEUE_FLAG_ADD_RANDOM, &d->disk->queue->queue_flags);
void bch_cached_dev_run(struct cached_dev *dc)
+
#define BACKING_DEV_OFFLINE_TIMEOUT 5
+static int cached_dev_status_update(void *arg)
+
+struct cached_dev *dc = arg;
+struct request_queue *q;
+
+/
+ * If this delayed worker is stopping outside, directly quit here.
+ * dc->io_disable might be set via sysfs interface, so check it
+ * here too.
+ */
+while (!kthread_should_stop() && !dc->io_disable) {
+q = bdev_get_queue(dc->bdev);
+if (blk_queue_dying(q))
+dc->offline_seconds++;
+else
+dc->offline_seconds = 0;
+
+if (dc->offline_seconds >= BACKING_DEV_OFFLINE_TIMEOUT) {
+pr_err("%s: device offline for %d seconds", 
+ dc->backing_dev_name, 
+ BACKING_DEV_OFFLINE_TIMEOUT);
+pr_err("%s: disable I/O request due to backing " 
+ "device offline", dc->disk.name);
+dc->io_disable = true;
+/" let others know earlier that io_disable is true */
+smp_mb();
+bcache_device_stop(&dc->disk);
+break;
+}
+schedule_timeout_interruptible(HZ);
+}
+
+wait_for_kthread_stop();
+return 0;
+
+void bch_cached_dev_emit_change(struct cached_dev *dc)
+
struct bcache_device *d = &dc->disk;
char buf[SB_LABEL_SIZE + 1];
buf[SB_LABEL_SIZE] = '\0';
env[2] = kasprintf(GFP_KERNEL, "CACHED_LABEL=%s", buf);

+/* won't show up in the uevent file, use udevadm monitor -e instead
+ * only class / kset properties are persistent */
+ kobject_uevent_env(&disk_to_dev(d->disk)->kobj, KOBJ_CHANGE, env);
+ kfree(env[1]);
+ kfree(env[2]);
+
+}
+
+void bch_cached_dev_run(struct cached_dev *dc)
+{
+ struct bcache_device *d = &dc->disk;
+ if (atomic_xchg(&dc->running, 1)) {
+ -kfree(env[1]);
+ -kfree(env[2]);
+ return;
+ }
+
+/* emit change event */
+bch_cached_dev_emit_change(dc);
+
+if (sysfs_create_link(&d->kobj, &disk_to_dev(d->disk)->kobj, "dev") ||
+ sysfs_create_link(&disk_to_dev(d->disk)->kobj, &d->kobj, "bcache"))
+ pr_debug("error creating sysfs link");
+
+ dc->status_update_thread = kthread_run(cached_dev_status_update,
+ dc, "bcache_status_update");
+ if (IS_ERR(dc->status_update_thread)) {
+ pr_warn("failed to create bcache_status_update kthread, 
+ "continue to run without monitoring backing 
+ "device status");
+ }
+ }
+ /*
If `BCACHE_DEV_RATE_DW_RUNNING` is set, it means routine of the delayed work `dc->writeback_rate_update` is running. Wait until the routine quits (`BCACHE_DEV_RATE_DW_RUNNING` is clear), then continue to cancel it. If `BCACHE_DEV_RATE_DW_RUNNING` is not clear after `time_out` seconds, give up waiting here and continue to cancel it too.

```c
static void cancel_writeback_rate_update_dwork(struct cached_dev *dc)
{
    int time_out = WRITEBACK_RATE_UPDATE_SECS_MAX * HZ;
    do {
        if (!test_bit(BCACHE_DEV_RATE_DW_RUNNING, &dc->disk.flags))
            break;
        time_out--;
    } while (time_out > 0);
    if (time_out == 0)
        pr_warn("give up waiting for dc->writeback_rate_update to quit");
    cancel_delayed_work_sync(&dc->writeback_rate_update);
}
```

```c
static void cached_dev_detach_finish(struct work_struct *w)
{
    struct cached_dev *dc = container_of(w, struct cached_dev, detach);
    mutex_lock(&bch_register_lock);
    if (test_and_clear_bit(BCACHE_DEV_WB_RUNNING, &dc->disk.flags))
        cancel_writeback_rate_update_dwork(dc);
    if (!IS_ERR_OR_NULL(dc->writeback_thread)) {
        kthread_stop(dc->writeback_thread);
        dc->writeback_thread = NULL;
    }
    memset(&dc->sb.set_uuid, 0, 16);
    SET_BDEV_STATE(&dc->sb, BDEV_STATE_NONE);
    bch_write_bdev_super(dc, &cl);
    closure_sync(&cl);
}
```
calc_cached_dev_sectors(dc->disk.c);
bcache_device_detach(&dc->disk);
list_move(&dc->list, &uncached_devices);

mutex_unlock(&bch_register_lock);

- pr_info("Caching disabled for %s", bdevname(dc->bdev, buf));
+ pr_info("Caching disabled for %s", dc->backing_dev_name);

/* Drop ref we took in cached_dev_detach() */
closure_put(&dc->disk.cl);
@@ -943,37 +1068,50 @@
closure_get(&dc->disk.cl);

bch_writeback_queue(dc);
+
cached_dev_put(dc);
}

-int bch_cached_dev_attach(struct cached_dev *dc, struct cache_set *c)
+int bch_cached_dev_attach(struct cached_dev *dc, struct cache_set *c,
+        uint8_t *set_uuid)
{
    uint32_t rtime = cpu_to_le32(get_seconds());
    struct uuid_entry *u;
    -char buf[BDEVNAME_SIZE];
    -
    -bdevname(dc->bdev, buf);
    +struct cached_dev *exist_dc, *t;

    -if (memcmp(dc->sb.set_uuid, c->sb.set_uuid, 16))
    +if ((set_uuid && memcmp(set_uuid, c->sb.set_uuid, 16)) ||
        (!set_uuid && memcmp(dc->sb.set_uuid, c->sb.set_uuid, 16)))
    return -ENOENT;

    if (dc->disk.c) {
        -pr_err("Can't attach %s: already attached", buf);
        +pr_err("Can't attach %s: already attached",
            +    dc->backing_dev_name);
        return -EINVAL;
    }

    if (test_bit(CACHE_SET_STOPPING, &c->flags)) {
        -pr_err("Can't attach %s: shutting down", buf);
        +pr_err("Can't attach %s: shutting down",}
+ dc->backing_dev_name);
return -EINVAL;
}

if (dc->sb.block_size < c->sb.block_size) {
/* Will die */
    pr_err("Couldn't attach %s: block size less than set's block size",
              buf);
+ dc->backing_dev_name);
    return -EINVAL;
}

/* Check whether already attached */
list_for_each_entry_safe(exist_dc, t, &c->cached_devs, list) {
    if (!memcmp(dc->sb.uuid, exist_dc->sb.uuid, 16)) {
+ pr_err("Tried to attach %s but duplicate UUID already attached",
+ dc->backing_dev_name);
+ return -EINVAL;
+ }
+ }
+ u = uuid_find(c, dc->sb.uuid);

if (u &&
@@ -986,13 +1124,15 @@
    if (!u) {
+ pr_err("Couldn't find uuid for %s in set", buf);
+ dc->backing_dev_name);
    return -ENOENT;
}
+ u = uuid_find_empty(c);

if (!u) {
    if (BDEV_STATE(&dc->sb) == BDEV_STATE_DIRTY) {
+ pr_err("Couldn't find uuid for %s in set", buf);
+ dc->backing_dev_name);
    return -ENOENT;
    }
    } else {
    if (BDEV_STATE(&dc->sb) == BDEV_STATE_DIRTY) {
+ pr_err("Not caching %s, no room for UUID", buf);
+ dc->backing_dev_name);
    return -EINVAL;
    }
@ @ -1039,12 +1179,12 @ @
}

if (BDEV_STATE(&dc->sb) == BDEV_STATE_DIRTY) {
    -bch_sectors_dirty_init(&dc->disk);
atomic_set(&dc->has_dirty, 1);
-refcount_inc(&dc->count);
bch_writeback_queue(dc);
}

+bch_sectors_dirty_init(&dc->disk);
+
bch_cached_dev_run(dc);
bcache_device_link(&dc->disk, c, "bdev");

up_write(&dc->writeback_lock);

pr_info("Caching %s as %s on set %pU",
-t	bdevname(dc->bdev, buf), dc->disk.disk->disk_name,
+t	dc->backing_dev_name,
+t	dc->disk.disk->disk_name,
		dc->disk.c->sb.set_uuid);
return 0;
}
@@ -1069,11 +1210,13 @@
{
    struct cached_dev *dc = container_of(cl, struct cached_dev, disk.cl);

    -cancel_delayed_work_sync(&dc->writeback_rate_update);
    +if (test_and_clear_bit(BCACHE_DEV_WB_RUNNING, &dc->disk.flags))
    +cancel_writeback_rate_update_dwork(dc);
    +
    if (!IS_ERR_OR_NULL(dc->writeback_thread))
        kthread_stop(dc->writeback_thread);
    -if (dc->writeback_write_wq)
    -destroy_workqueue(dc->writeback_write_wq);
    +if (!IS_ERR_OR_NULL(dc->status_update_thread))
    +kthread_stop(dc->status_update_thread);

    mutex_lock(&bch_register_lock);

@@ -1138,7 +1281,7 @@
    q->limits.raid_partial_stripes_expensive;

    ret = bcache_device_init(&dc->disk, block_size,
-t	bd->bd_part->nr_sects - b->data_offset);
    +b->bd_part->nr_sects - b->data_offset, dc->bdev);
    if (ret)
        return ret;

@@ -1146,6 +1289,12 @@
        max(dc->disk.disk->queue->backing_dev_info->ra_pages,

q->backing_dev_info->ra_pages);

+atomic_set(&dc->io_errors, 0);
+dc->io_disable = false;
+dc->error_limit = DEFAULT_CACHED_DEV_ERROR_LIMIT;
+/* default to auto */
+dc->stop_when_cache_set_failed = BCH_CACHED_DEV_STOP_AUTO;
+bch_cached_dev_request_init(dc);
bch_cached_dev_writeback_init(dc);
return 0;
@@ -1157,10 +1306,10 @@
     struct block_device *bdev,
     struct cached_dev *dc)
{
-    char name[BDEVNAME_SIZE];
     const char *err = "cannot allocate memory";
     struct cache_set *c;

     bdevname(bdev, dc->backing_dev_name);
     memcpy(&dc->sb, sb, sizeof(struct cache_sb));
     dc->bdev = bdev;
     dc->bdev->bd_holder = dc;
@@ -1169,6 +1318,7 @@
     dc->sb_bio.bi_io_vec[0].bv_page = sb_page;
     get_page(sb_page);

     if (cached_dev_init(dc, sb->block_size << 9))
         goto err;
@@ -1179,11 +1329,11 @@
     if (bch_cache_accounting_add_kobjs(&dc->accounting, &dc->disk.kobj))
         goto err;
-     pr_info("registered backing device %s", bdevname(bdev, name));
+     pr_info("registered backing device %s", dc->backing_dev_name);
     list_add(&dc->list, &uncached_devices);
     list_for_each_entry(c, &bch_cache_sets, list)
-     bch_cached_dev_attach(dc, c);
+     bch_cached_dev_attach(dc, c, NULL);
     if (BDEV_STATE(&dc->sb) == BDEV_STATE_NONE ||
       BDEV_STATE(&dc->sb) == BDEV_STATE_STALE)
@@ -1191,7 +1341,7 @@
         return;
err:
-pr_notice("error opening %s: %s", bdevname(bdev, name), err);
+pr_notice("error %s: %s", dc->backing_dev_name, err);
bcache_device_stop(&dc->disk);
}

@@ -1236,7 +1386,7 @@
kobject_init(&d->kobj, &bch_flash_dev_ktype);

-if (bcache_device_init(d, block_bytes(c), u->sectors))
+if (bcache_device_init(d, block_bytes(c), u->sectors, NULL))
goto err;

bcache_device_attach(d, c, u - c->uuids);
@@ -1297,6 +1447,22 @@
return flash_dev_run(c, u);
}

+bool bch_cached_dev_error(struct cached_dev *dc)
+{
+if (!dc || test_bit(BCACHE_DEV_CLOSING, &dc->disk.flags))
+return false;
+ + dc->io_disable = true;
+ /* make others know io_disable is true earlier */
+ smp_mb();
+ + pr_err("stop %s: too many IO errors on backing device %s\n",
+ dc->disk.disk->disk_name, dc->backing_dev_name);
+ + bcache_device_stop(&dc->disk);
+ return true;
+ +
+ /* Cache set */

__printf(2, 3)
@@ -1308,6 +1474,9 @@
 test_bit(CACHE_SET_STOPPING, &c->flags))
 return false;

+if (test_and_set_bit(CACHE_SET_IO_DISABLE, &c->flags))
+pr_info("CACHE_SET_IO_DISABLE already set");
+ /* XXX: we can be called from atomic context
 acquire_console_sem();
 */
struct cache *ca;
unsigned i;

-if (!IS_ERR_OR_NULL(c->debug))
-debugfs_remove(c->debug);
+debugfs_remove(c->debug);

bch_open_buckets_free(c);
bch_btree_cache_free(c);
bch_journal_free(c);

+mutex_lock(&bch_register_lock);
for_each_cache(ca, c, i)
if (ca) {
ca->set = NULL;
@@ -1369,7 +1538,6 @@
mempool_destroy(c->search);
kfree(c->devices);

-mutex_lock(&bch_register_lock);
-list_del(&c->list);
-mutex_unlock(&bch_register_lock);

@@ -1392,7 +1560,7 @@
kobject_put(&c->internal);
kobject_del(&c->kobj);

-if (c->gc_thread)
+if (!IS_ERR_OR_NULL(c->gc_thread))
kthread_stop(c->gc_thread);

if (!IS_ERR_OR_NULL(c->root))
@@ -1419,25 +1587,86 @@
closure_return(cl);
}

+/*
+ * This function is only called when CACHE_SET_IO_DISABLE is set, which means
+ * cache set is unregistering due to too many I/O errors. In this condition,
+ * the bcache device might be stopped, it depends on stop_when_cache_set_failed
+ * value and whether the broken cache has dirty data:
+ * dc->stop_when_cache_set_failed dc->has_dirty stop bcache device
+ * BCH_CACHED_STOP_AUTO 0 NO
+ * BCH_CACHED_STOP_AUTO 1 YES
+ * BCH_CACHED_DEV_STOP_ALWAYS 0 YES
+ * BCH_CACHED_DEV_STOP_ALWAYS 1 YES
*/
The expected behavior is, if stop_when_cache_set_failed is configured to "auto" via sysfs interface, the bcache device will not be stopped if the backing device is clean on the broken cache device.

```
static void conditional_stop_bcache_device(struct cache_set *c, struct bcache_device *d, struct cached_dev *dc)
{
    if (dc->stop_when_cache_set_failed == BCH_CACHED_DEV_STOP_ALWAYS) {
        pr_warn("stop_when_cache_set_failed of %s is "always", stop it for failed cache set %pU.\n", d->disk->disk_name, c->sb.set_uuid);
        bcache_device_stop(d);
    } else if (atomic_read(&dc->has_dirty)) {
        /*
         * dc->stop_when_cache_set_failed == BCH_CACHED_STOP_AUTO
         * and dc->has_dirty == 1
         */
        pr_warn("stop_when_cache_set_failed of %s is "auto" and cache is dirty, stop it to avoid potential data corruption.\n", d->disk->disk_name);
        /* make others know io_disable is true earlier */
        smp_mb();
        bcache_device_stop(d);
    } else {
        /*
         * dc->stop_when_cache_set_failed == BCH_CACHED_STOP_AUTO
         * and dc->has_dirty == 0
         */
        pr_warn("stop_when_cache_set_failed of %s is "auto" and cache is clean, keep it alive.\n", d->disk->disk_name);
    }
}
```

There might be a small time gap that cache set is released but bcache device is not. Inside this time gap, regular I/O requests will directly go into backing device as no cache set attached to. This behavior may also introduce potential inconsistency data in writeback mode while cache is dirty.

Therefore before calling bcache_device_stop() due to a broken cache device, dc->io_disable should be explicitly set to true.

```
static void __cache_set_unregister(struct closure *cl)
{
```

struct cache_set *c = container_of(cl, struct cache_set, caching);
struct cached_dev *dc;
+struct bcache_device *d;
size_t i;

mutex_lock(&bch_register_lock);

- for (i = 0; i < c->nr_uuids; i++)
- if (c->devices[i]) {
- if (!UUID_FLASH_ONLY(&c->uuids[i]) &&
- test_bit(CACHE_SET_UNREGISTERING, &c->flags)) {
- dc = container_of(c->devices[i],
- struct cached_dev, disk);
- bch_cached_dev_detach(dc);
- } else {
- bcache_device_stop(c->devices[i]);
- }
+ for (i = 0; i < c->nr_uuids; i++) {
+ d = c->devices[i];
+ if (!d)
+ continue;
+ 
+ if (!UUID_FLASH_ONLY(&c->uuids[i]) &&
+ test_bit(CACHE_SET_UNREGISTERING, &c->flags)) {
+ dc = container_of(d, struct cached_dev, disk);
+ bch_cached_dev_detach(dc);
+ if (test_bit(CACHE_SET_IO_DISABLE, &c->flags))
+ conditional_stop_bcache_device(c, d, dc);
+ } else {
+ bcache_device_stop(d);
+ }
+ }

mutex_unlock(&bch_register_lock);

@@ -1457,7 +1686,7 @@
}

#define alloc_bucket_pages(gfp, c)
-((void *) __get_free_pages(__GFP_ZERO|gfp, ilog2(bucket_pages(c))))
+((void *) __get_free_pages(__GFP_ZERO|__GFP_COMP|gfp, ilog2(bucket_pages(c))))

struct cache_set *bch_cache_set_alloc(struct cache_sb *sb)
{
@@ -1499,6 +1728,7 @@
sema_init(&c->sb_write_mutex, 1);
mutex_init(&c->bucket_lock);
init_waitqueue_head(&c->btree_cache_wait);

+spin_lock_init(&c->btree_cannibalize_lock);
init_waitqueue_head(&c->bucket_wait);
init_waitqueue_head(&c->gc_wait);
sema_init(&c->uuid_write_mutex, 1);
@@ -1543,6 +1773,7 @@
c->congested_read_threshold_us = 2000;
c->congested_write_threshold_us = 20000;
c->error_limit = 8 << IO_ERROR_SHIFT;
+WARN_ON(test_and_clear_bit(CACHE_SET_IO_DISABLE, &c->flags));

return c;
err:
@@ -1550,13 +1781,15 @@
return NULL;
}

-static void run_cache_set(struct cache_set *c)
+static int run_cache_set(struct cache_set *c)
{
    const char *err = "cannot allocate memory";
    struct cached_dev *dc, *t;
    struct cache *ca;
    struct closure cl;
    unsigned i;
+    LIST_HEAD(journal);
+    struct journal_replay *l;
    closure_init_stack(&cl);

    @@ -1565,7 +1798,6 @@
    set_gc_sectors(c);

    if (CACHE_SYNC(&c->sb)) {
+        LIST_HEAD(journal);
        struct bkey *k;
        struct jset *j;

@@ -1642,7 +1874,9 @@
        if (j->version < BCACHE_JSET_VERSION_UUID)
            __uuid_write(c);

@@ -1642,7 +1874,9 @@
        if (j->version < BCACHE_JSET_VERSION_UUID)
            __uuid_write(c);
+        bch_journal_replay(c, &journal);
+        err = "bcache: replay journal failed";
+        if (bch_journal_replay(c, &journal))
+            goto err;
    } else {
        pr_notice("invalidating existing data");
    }
mutex_lock(&c->bucket_lock);
for_each_cache(ca, c, i)
  -bch_prio_write(ca);
+ bch_prio_write(ca, true);
mutex_unlock(&c->bucket_lock);

err = "cannot allocate new UUID bucket";
@@ -1665,7 +1899,7 @@
mutex_lock(&c->bucket_lock);
for_each_cache(ca, c, i)
- bch_prio_write(ca);
+ bch_prio_write(ca, true);
mutex_unlock(&c->bucket_lock);

err = "cannot allocate new UUID bucket";
@@ -1705,16 +1939,24 @@
bcache_write_super(c);
list_for_each_entry_safe(dc, t, &uncached_devices, list)
- bch_cached_dev_attach(dc, c);
+ bch_cached_dev_attach(dc, c, NULL);

flash_devs_run(c);

set_bit(CACHE_SET_RUNNING, &c->flags);
-return;
+return 0;
err:
+while (!list_empty(&journal)) {
+  l = list_first_entry(&journal, struct journal_replay, list);
+  list_del(&l->list);
+  kfree(l);
+}  
+closure_sync(&cl);
/* XXX: test this, it's broken */
bch_cache_set_error(c, "%s", err);
+  return -EIO;
}

static bool can_attach_cache(struct cache *ca, struct cache_set *c)
@@ -1765,7 +2007,14 @@
sysfs_create_link(&c->kobj, &ca->kobj, buf))
goto err;
-if (ca->sb.seq > c->sb.seq) {
+ /*
+ * A special case is both ca->sb.seq and c->sb.seq are 0,
+ * such condition happens on a new created cache device whose
+ * super block is never flushed yet. In this case c->sb.version
+ * and other members should be updated too, otherwise we will
+ * have a mistaken super block version in cache set.
+ */

if (ca->sb.seq > c->sb.seq || c->sb.seq == 0) {
  c->sb.version = ca->sb.version;
  memcpy(c->sb.set_uuid, ca->sb.set_uuid, 16);
  c->sb.flags = ca->sb.flags;
}

ca->set->cache[ca->sb.nr_this_dev] = ca;
cache_by_alloc[ca->caches_loaded++] = ca;

-if (c->caches_loaded == c->sb.nr_in_set)
  run_cache_set(c);
+if (c->caches_loaded == c->sb.nr_in_set) {
  +err = "failed to run cache set";
  +if (run_cache_set(c) < 0)
  +goto err;
  +}

return NULL;
err:
 @@ -1822,6 +2074,7 @@
static int cache_alloc(struct cache *ca)
{
  size_t free;
  +size_t btree_buckets;
  struct bucket *b;

  module_get(THE_MODULE);
  @@ -1829,9 +2082,19 @@
  bio_init(&ca->journal.bio, ca->journal.bio.bi_inline_vecs, 8);

  +/*
  + * when ca->sb.njournal_buckets is not zero, journal exists,
  + * and in bch_jornal_replay(), tree node may split,
  + * so bucket of RESERVE_BTREE type is needed,
  + * the worst situation is all journal buckets are valid journal,
  + * and all the keys need to replay,
  + * so the number of RESERVE_BTREE type buckets should be as much
  + * as journal buckets
  + */
  +btree_buckets = ca->sb.njournal_buckets ?: 8;
  free = roundup_pow_of_two(ca->sb.nbuckets) >> 10;

  -if (!init_fifo(&ca->free[RESERVE_BTREE], 8, GFP_KERNEL) ||
  +if (!init_fifo(&ca->free[RESERVE_BTREE], btree_buckets, GFP_KERNEL) ||
    !init_fifo_exact(&ca->free[RESERVE_Prio], prio_buckets(ca), GFP_KERNEL) ||
    !init_fifo(&ca->free[RESERVE_MOVINGGC], free, GFP_KERNEL) ||
    !init_fifo(&ca->free[RESERVE_NONE], free, GFP_KERNEL) ||
  @@ -1855,10 +2118,10 @@
static int register_cache(struct cache_sb *sb, struct page *sb_page, 
struct block_device *bdev, struct cache *ca) 
{
    char name[BDEVNAME_SIZE];
    const char *err = NULL; /* must be set for any error case */
    int ret = 0;

+bdevname(bdev, ca->cache_dev_name);
memcpy(&ca->sb, sb, sizeof(struct cache_sb));
ca->bdev = bdev;
ca->bdev->bd_holder = ca;
@@ -1867,11 +2130,12 @@
ca->sb_bio.bi_io_vec[0].bv_page = sb_page;
    get_page(sb_page);

-if (blk_queue_discard(bdev_get_queue(ca->bdev)))
+if (blk_queue_discard(bdev_get_queue(bdev)))
    ca->discard = CACHE_DISCARD(&ca->sb);

    ret = cache_alloc(ca);
    if (ret != 0) {
+blkdev_put(bdev, FMODE_READ|FMODE_WRITE|FMODE_EXCL);
      if (ret == -ENOMEM)
          err = "cache_alloc(): -ENOMEM";
      else
@@ -1894,14 +2158,14 @@
            goto out;
        }

-pr_info("registered cache device %s", bdevname(bdev, name));
+pr_info("registered cache device %s", ca->cache_dev_name);

    out:
    kobject_put(&ca->kobj);

    err:
      if (err)
-pr_notice("error opening %s: %s", bdevname(bdev, name), err);
+pr_notice("error %s: %s", ca->cache_dev_name, err);

      return ret;
    }
@@ -1928,6 +2192,21 @@
    return false;

+static struct cached_dev *bch_find_cached_dev(struct block_device *bdev) {
+struct cache_set *c, *tc;


+struct cached_dev *dc, *t;
+
+list_for_each_entry_safe(c, tc, &bch_cache_sets, list)
+list_for_each_entry_safe(dc, t, &cached_devs, list)
+if (dc->bdev == bdev)
+return dc;
+list_for_each_entry_safe(dc, t, &uncached_devices, list)
+if (dc->bdev == bdev)
+return dc;
+
+return NULL;
+
static bool bch_is_open_cache(struct block_device *bdev) {
    struct cache_set *c, *tc;
    struct cache *ca;
    struct cache_sb *sb = NULL;
    struct block_device *bdev = NULL;
    struct page *sb_page = NULL;
    struct cached_dev *dc = NULL;

    if (!try_module_get(THIS_MODULE))
        return -EBUSY;
    sb);
    if (IS_ERR(bdev)) {
        bdev = lookup_bdev(strim(path));
        bdev = lookup_bdev(strim(path), 0);
        mutex_lock(&bch_register_lock);
        if (!IS_ERR(bdev) && bch_is_open(bdev)) {
            err = "device already registered";
        } else {
            /* emit CHANGE event for backing devices to export
               CACHED_{UUID/LABEL} values to udev */
            if (bch_is_open_backing(bdev)) {
                dc = bch_find_cached_dev(bdev);
                if (dc) {
                    bch_cached_dev_emit_change(dc);
                    err = "device already registered (emitting change event)";
                } else {
                    err = "device busy";
                }
            }
            mutex_unlock(&bch_register_lock);
        } else {
            err = "device already registered";
        }

        if (IS_ERR(bdev)) {
            bdev = ERR_PTR(-EBUSY)) {
                bdev = lookup_bdev(strim(path));
                bdev = lookup_bdev(strim(path), 0);
                mutex_lock(&bch_register_lock);
                if (!IS_ERR(bdev) && bch_is_open(bdev)) {
                    err = "device already registered";
                } else {
                    /* emit CHANGE event for backing devices to export
                       CACHED_{UUID/LABEL} values to udev */
                    if (bch_is_open_backing(bdev)) {
                        dc = bch_find_cached_dev(bdev);
                        if (dc) {
                            bch_cached_dev emit_change(dc);
                            err = "device already registered (emitting change event)";
                        }
                    } else {
                        err = "device busy";
                    }
                }
                mutex_unlock(&bch_register_lock);
            } else { /* device busy */
                err = "device busy";
            }
        }
    }
}
if (IS_ERR(bdev))
    bdput(bdev);
@@ -1990,6 +2280,7 @@
if (err)
    goto err_close;

+err = "failed to register device";
if (SB_IS_BDEV(sb)) {
    struct cached_dev *dc = kzalloc(sizeof(*dc), GFP_KERNEL);
    if (!dc)
@@ -2004,7 +2295,7 @@
        goto err_close;
    if (register_cache(sb, sb_page, bdev, ca) != 0)
        goto err;
} out:
if (sb_page)
@@ -2017,7 +2308,7 @@
err_close:
    blkdev_put(bdev, FMODE_READ|FMODE_WRITE|FMODE_EXCL);
    err:
    -pr_info("error opening %s: %s", path, err);
+pr_info("error %s: %s", path, err);
    ret = -EINVAL;
    goto out;
} out:
@@ -2048,10 +2339,19 @@
    list_for_each_entry_safe(dc, tdc, &uncached_devices, list)
    bcache_device_stop(&dc->disk);

+mutex_unlock(&bch_register_lock);
+
+/*
+ * Give an early chance for other kthreads and
+ * kworkers to stop themselves
+ */
+schedule();
+
+/* What's a condition variable? */
while (1) {
    -long timeout = start + 2 * HZ - jiffies;
+long timeout = start + 10 * HZ - jiffies;

+mutex_lock(&bch_register_lock);
    stopped = list_empty(&bch_cache_sets) &&
    list_empty(&uncached_devices);
mutex_unlock(&bch_register_lock);
schedule_timeout(timeout);
.mutex_lock(&bch_register_lock);
}

finish_wait(&unregister_wait, &wait);
--- linux-4.15.0.orig/drivers/md/bcache/sysfs.c
+++ linux-4.15.0/drivers/md/bcache/sysfs.c
@@ -16,6 +16,28 @@
#include <linux/sort.h>
#include <linux/sched/clock.h>

+/* Default is -1; we skip past it for struct cached_dev's cache mode */
+static const char * const bch_cache_modes[] = {
+  "writethrough",
+  "writeback",
+  "writearound",
+  "none",
+  NULL
+};
+
+static const char * const bch_reada_cache_policies[] = {
+  "all",
+  "meta-only",
+  NULL
+};
+
+/* Default is -1; we skip past it for stop_when_cache_set_failed */
+static const char * const bch_stop_on_failure_modes[] = {
+  "auto",
+  "always",
+  NULL
+};
+
+static const char * const cache_replacement_policies[] = {
+  "lru",
+  "fifo",
+  "ru",
+  "ru",
+  NULL
+};

read_attribute(state);
read_attribute(cache_read_races);
+read_attribute(reclaim);
+read_attribute(flush_write);
+read_attribute(retry_flush_write);
read_attribute(writeback_keys_done);
read_attribute(writeback_keys_failed);
read_attribute(io_errors);
@@ -75,15 +100,21 @@
rw_attribute(sequential_cutoff);
rw_attribute(data_csum);
rw_attribute(cache_mode);
+rw_attribute(readahead_cache_policy);
+rw_attribute(stop_when_cache_set_failed);
rw_attribute(writeback_metadata);
rw_attribute(writeback_running);
rw_attribute(writeback_percent);
rw_attribute(writeback_delay);
rw_attribute(writeback_rate);
+rw_attribute(writeback_consider_fragment);

rw_attribute(writeback_rate_update_seconds);
rw_attribute(writeback_rate_i_term_inverse);
rw_attribute(writeback_rate_p_term_inverse);
+rw_attribute(writeback_rate_fp_term_low);
+rw_attribute(writeback_rate_fp_term_mid);
+rw_attribute(writeback_rate_fp_term_high);
rw_attribute(writeback_rate_minimum);
read_attribute(writeback_rate_debug);

@@ -92,6 +123,7 @@
rw_attribute(synchronous);
rw_attribute(journal_delay_ms);
+rw_attribute(io_disable);
rw_attribute(discard);
rw_attribute(running);
rw_attribute(label);
@@ -109,6 +141,20 @@
rw_attribute(copy_gc_enabled);
rw_attribute(size);

+static ssize_t bch_snprint_string_list(char *buf, size_t size, const char * const list[],
+    size_t selected)
+{
+    char *out = buf;
+    size_t i;
+    for (i = 0; list[i]; i++)
+        out += snprintf(out, buf + size - out,
+            i == selected ? "[%s] " : "%s ", list[i]);
+    out[-1] = '\n';
+    return out - buf;
if (attr == &sysfs_cache_mode)
    return bch_snprint_string_list(buf, PAGE_SIZE,
        bch_cache_modes + 1,
        BDEV_CACHE_MODE(&dc->sb));

if (attr == &sysfs_readahead_cache_policy)
    return bch_snprint_string_list(buf, PAGE_SIZE,
        bch_reada_cache_policies,
        dc->cache_readahead_policy);

if (attr == &sysfs_stop_when_cache_set_failed)
    return bch_snprint_string_list(buf, PAGE_SIZE,
        bch_stop_on_failure_modes,
        dc->stop_when_cache_set_failed);

sysfs_printf(data_csum, "%i", dc->disk.data_csum);
var_printf(verify, "%i");
var_printf(bypass_torture_test, "%i");
var_printf(writeback_metadata, "%i");
var_printf(writeback_running, "%i");
+var_printf(writeback_consider_fragment, "%i");
var_printf(writeback_delay);
var_printf(writeback_percent);
sysfs_hprint(writeback_rate, dc->writeback_rate.rate << 9);
-sysfs_printf(io_errors, "%i", atomic_read(&dc->io_errors));
sysfs_printf(io_error_limit, "%i", dc->error_limit);
sysfs_printf(io_disable, "%i", dc->io_disable);
var_printf(writeback_rate_update_seconds);
var_printf(writeback_rate_i_term_inverse);
var_printf(writeback_rate_p_term_inverse);
+var_printf(writeback_rate_fp_term_low);
+var_printf(writeback_rate_fp_term_mid);
+var_printf(writeback_rate_fp_term_high);
var_printf(writeback_rate_minimum);

if (attr == &sysfs_writeback_rate_debug) {
    sysfs_hprint(dirty_data,

bcache_dev_sectors_dirty(&dc->disk) << 9);  

-sysfs_hprint(stripe_size, dc->disk.stripe_size << 9);  
+sysfs_hprint(stripe_size, ((uint64_t)dc->disk.stripe_size) << 9);  
var_printf(partial_stripes_expensive,"%u");  

var_hprint(sequential_cutoff);  
@@ -195,7 +258,7 @@  
{  
struct cached_dev *dc = container_of(kobj, struct cached_dev,  
disk.kobj);  
-ssize_t v = size;  
+ssize_t v;  
struct cache_set *c;  
struct kobj_uevent_env *env;  

@@ -209,17 +272,47 @@  
d_strtoul(writeback_metadata);  
d_strtoul(writeback_running);  
d_strtoul(writeback_delay);  
+d_strtoul(writeback_consider_fragment);  

sysfs_strtoul_clamp(writeback_percent, dc->writeback_percent, 0, 40);  

sysfs_strtoul_clamp(writeback_rate,  
dc->writeback_rate.rate, 1, INT_MAX);  

-d_strtoul_nonzero(writeback_rate_update_seconds);  
-d_strtoul(writeback_rate_i_term_inverse);  
-d_strtoul_nonzero(writeback_rate_p_term_inverse);  
+sysfs_strtoul_clamp(writeback_rate_update_seconds,  
+ dc->writeback_rate_update_seconds,  
+ 1, WRITEBACK_RATE_UPDATE_SECS_MAX);  
+sysfs_strtoul_clamp(writeback_rate_i_term_inverse,  
+ dc->writeback_rate_i_term_inverse,  
+ 1, UINT_MAX);  
+sysfs_strtoul_clamp(writeback_rate_p_term_inverse,  
+ dc->writeback_rate_p_term_inverse,  
+ 1, UINT_MAX);  
+sysfs_strtoul_clamp(writeback_rate_fp_term_low,  
+ dc->writeback_rate_fp_term_low,  
+ 1, dc->writeback_rate_fp_term_mid - 1);  
+sysfs_strtoul_clamp(writeback_rate_fp_term_mid,  
+ dc->writeback_rate_fp_term_mid,  
+ dc->writeback_rate_fp_term_low + 1,  
+ dc->writeback_rate_fp_term_high - 1);  
+sysfs_strtoul_clamp(writeback_rate_fp_term_high,  
+ dc->writeback_rate_fp_term_high,
dc->writeback_rate_fp_term_mid + 1, UINT_MAX);
+sysfs_strtoul_clamp(writeback_rate_minimum,
  dc->writeback_rate_minimum,
  1, UINT_MAX);
+
+sysfs_strtoul_clamp(io_error_limit, dc->error_limit, 0, INT_MAX);
+
+if (attr == &sysfs_io_disable) {
  int v = strtoul_or_return(buf);

  -d_strtoi_h(sequential_cutoff);
  +dc->io_disable = v ? 1 : 0;
+}
+
  +sysfs_strtoul_clamp(sequential_cutoff,
    dc->sequential_cutoff,
    0, UINT_MAX);
  d_strtoi_h(readahead);

if (attr == &sysfs_clear_stats)
@@ -230,8 +323,7 @@
  bch_cached_dev_run(dc);

if (attr == &sysfs_cache_mode) {
  -v = bch_read_string_list(buf, bch_cache_modes + 1);
  +v = __sysfs_match_string(bch_cache_modes, -1, buf);
  if (v < 0)
    return v;

@@ -241,6 +333,23 @@
}

+if (attr == &sysfs_readahead_cache_policy) {
  +v = __sysfs_match_string(bch_reada_cache_policies, -1, buf);
  +if (v < 0)
    +return v;
  +
  +if ((unsigned int) v != dc->cache_readahead_policy)
    +dc->cache_readahead_policy = v;
  +}
+
+if (attr == &sysfs_stop_when_cache_set_failed) {
  +v = __sysfs_match_string(bch_stop_on_failure_modes, -1, buf);
  +if (v < 0)
    +return v;
  +

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if (attr == &sysfs_label) {
    if (size > SB_LABEL_SIZE)
        return -EINVAL;
    dc->stop_when_cache_set_failed = v;
}
+
if (attr == &sysfs_attach) {
    if (bch_parse_uuid(buf, dc->sb.set_uuid) < 16)
        uint8_t set_uuid[16];
    if (bch_parse_uuid(buf, set_uuid) < 16)
        return -EINVAL;
    v = -ENOENT;
    list_for_each_entry(c, &bch_cache_sets, list) {
        v = bch_cached_dev_attach(dc, c, set_uuid);
        if (!v)
            return size;
    }
    pr_err("Can't attach %s: cache set not found", buf);
    -size = v;
    +return v;
}
+
if (attr == &sysfs_detach && dc->disk.c)
    if (attr == &sysfs_writeback_running)
        bch_writeback_queue(dc);
+
    + Only set BCACHE_DEV_WB_RUNNING when cached device attached to
    + a cache set, otherwise it doesn't make sense.
    +*/
    if (attr == &sysfs_writeback_percent)
        schedule_delayed_work(&dc->writeback_rate_update,
            +if ((dc->disk.c != NULL) &&
                +(!test_and_set_bit(BCACHE_DEV_WB_RUNNING, &dc->disk.flags))
            +schedule_delayed_work(&dc->writeback_rate_update,
                dc->writeback_rate_update_seconds * HZ);
mutex_unlock(&bch_register_lock);

#endif
&sysfs_cache_mode,
+&sysfs_readahead_cache_policy,
+&sysfs_stop_when_cache_set_failed,
&sysfs_writeback_metadata,
&sysfs_writeback_running,
&sysfs_writeback_delay,
&sysfs_writeback_percent,
&sysfs_writeback_rate,
+&sysfs_writeback_consider_fragment,
&sysfs_writeback_rate_update_seconds,
&sysfs_writeback_rate_i_term_inverse,
&sysfs_writeback_rate_p_term_inverse,
+&sysfs_writeback_rate_fp_term_low,
+&sysfs_writeback_rate_fp_term_mid,
+&sysfs_writeback_rate_fp_term_high,
+&sysfs_writeback_rate_minimum,
+&sysfs_writeback_rate_debug,
+&sysfs_io_errors,
+&sysfs_io_error_limit,
+&sysfs_io_disable,
&sysfs_dirty_data,
&sysfs_stripe_size,
&sysfs_partial_stripes_expensive,
@@ -545,6 +673,15 @@
sysfs_print(cache_read_races,
    atomic_long_read(&c->cache_read_races));

+sysfs_print(reclaim,
+    atomic_long_read(&c->reclaim));
+sysfs_print(flush_write,
+    atomic_long_read(&c->flush_write));
+sysfs_print(retry_flush_write,
+    atomic_long_read(&c->retry_flush_write));
+sysfs_print(writeback_keys_done,
    atomic_long_read(&c->writeback_keys_done));
sysfs_print(writeback_keys_failed,
@@ -573,6 +710,8 @@
sysfs_printf(gc_always_rewrite,	"%i", c->gc_always_rewrite);
sysfs_printf(btree_shrinker_disabled,	"%i", c->shrinker_disabled);
sysfs_printf(copy_gc_enabled,	"%i", c->copy_gc_enabled);
+sysfs_printf(io_disable,	"%i",
+    test_bit(CACHE_SET_IO_DISABLE, &c->flags));

if (attr == &sysfs_bset_tree_stats)
return bch_bset_print_stats(c, buf);
@@ -584,6 +723,7 @@
struct cache_set *c = container_of(kobj, struct cache_set, kobj);
+ssize_t v;

if (attr == &sysfs_unregister)
bch_cache_set_unregister(c);
@@ -647,8 +787,7 @@
c->congested_write_threshold_us);

if (attr == &sysfs_errors) {
-ssize_t v = bch_read_string_list(buf, error_actions);
-
+v = __sysfs_match_string(error_actions, -1, buf);
if (v < 0)
return v;

@@ -659,8 +798,30 @@
c->error_limit = strtoul_or_return(buf) << IO_ERROR_SHIFT;

/* See count_io_errors() for why 88 */
-if (attr == &sysfs_io_error_halflife)
-c->error_decay = strtoul_or_return(buf) / 88;
+if (attr == &sysfs_io_error_halflife) {
+unsigned long v = 0;
+ssize_t ret;
+
+ret = strtoul_safe_clamp(buf, v, 0, UINT_MAX);
+if (!ret) {
+c->error_decay = v / 88;
+return size;
+
+if (attr == &sysfs_io_disable) {
+v = strtoul_or_return(buf);
+if (v) {
+if (test_and_set_bit(CACHE_SET_IO_DISABLE,
+&c->flags))
+pr_warn("CACHE_SET_IO_DISABLE already set");
+} else {
+if (!test_and_clear_bit(CACHE_SET_IO_DISABLE,
+&c->flags))
+pr_warn("CACHE_SET_IO_DISABLE already cleared");
+}


sysfs_strtoul(journal_delay_ms, c->journal_delay_ms);
sysfs_strtoul(verify, c->verify);
@@ -731,6 +892,9 @@
 &sysfs_bset_tree_stats,
 &sysfs_cache_read_races,
 +&sysfs_reclaim,
+&sysfs_flush_write,
+&sysfs_retry_flush_write,
 &sysfs_writeback_keys_done,
 &sysfs_writeback_keys_failed,
@@ -744,12 +908,14 @@
 &sysfs_gc_always_rewrite,
 &sysfs_btree_shrinker_disabled,
 &sysfs_copy_gc_enabled,
+&sysfs_io_disable,
 NULL
 }; KTYPE(bch_cache_set_internal);

static int __bch_cache_cmp(const void *l, const void *r)
{ +cond_resched();
 return *((uint16_t *)r) - *((uint16_t *)l);
}
@@ -860,6 +1026,7 @@

STORE(__bch_cache)
{
struct cache *ca = container_of(kobj, struct cache, kobj);
+ssize_t v;

if (attr == &sysfs_discard) {
 bool v = strtoul_or_return(buf);
@@ -874,8 +1041,7 @@
 }

if (attr == &sysfs_cache_replacement_policy) {
 -ssize_t v = bch_read_string_list(buf, cache_replacement_policies);
 -
 +v = __sysfs_match_string(cache_replacement_policies, -1, buf);
 if (v < 0)
 return v;

--- linux-4.15.0.orig/drivers/md/bcache/sysfs.h
```c
#define sysfs_strtoul_clamp(file, var, min, max)
do {
    if (attr == &sysfs_ ## file) {
        unsigned long v = 0;
        ssize_t ret = strtoul_safe_clamp(buf, v, min, max);
        if (!ret) {
            var = v;
            return size;
        }
    } else { (ssize_t) size;
    }
} while (0)

#define strtoul_or_return(cp)
--- linux-4.15.0.orig/drivers/md/bcache/util.c
+++ linux-4.15.0/drivers/md/bcache/util.c
@@ -32,20 +32,27 @@
case 'y':
case 'z':
u++;
    /* fall through */
case 'e':
u++;
    /* fall through */
case 'p':
u++;
    /* fall through */
case 't':
u++;
    /* fall through */
case 'g':
u++;
    /* fall through */
case 'm':
u++;
    /* fall through */
case 'k':
if (e++ == cp)
    return -EINVAL;
    /* fall through */
    /* fall through */
    /* fall through */
    /* fall through */
    /* fall through */
if (e++ == cp)
    return -EINVAL;
    /* fall through */
```

case '\n':
case '0':
if (*e == '\n')
@@ -75,10 +82,9 @@
STRT0_H(strtoull, unsigned long long)

/**
 - * bch_hprint() - formats @v to human readable string for sysfs.
 - *
 - * @v - signed 64 bit integer
 - * @buf - the (at least 8 byte) buffer to format the result into.
 + * bch_hprint - formats @v to human readable string for sysfs.
 + * @buf: the (at least 8 byte) buffer to format the result into.
 + * @v: signed 64 bit integer
 *
 + * Returns the number of bytes used by format.
 */
@@ -114,41 +120,6 @@
return sprintf(buf, "%llu.%i%c", q, t * 10 / 1024, units[u]);
}

ssize_t bch_snprint_string_list(char *buf, size_t size, const char * const list[],
- size_t selected)
-{
- char *out = buf;
- size_t i;
-}
- for (i = 0; list[i]; i++)
- out += snprintf(out, buf + size - out,
- i == selected ? "[\%s] " : "%s " , list[i]);
- out[-1] = '\n';
- return out - buf;
- }
-
-ssize_t bch_read_string_list(const char *buf, const char * const list[])
-{
- size_t i;
- char *s, *d = kstrndup(buf, PAGE_SIZE - 1, GFP_KERNEL);
- if (!d)
- return -ENOMEM;
- s = strim(d);
-}
- for (i = 0; list[i]; i++)
- if (!strcmp(list[i], s))
- break;
-
bool bch_is_zero(const char *p, size_t n)
{
    size_t i;
    @ @ -218,13 +189,12 @@
}

/**
 * bch_next_delay() - increment @d by the amount of work done, and return how long to delay until the next time to do some work.
 *
 * @d - the struct bch_ratelimit to update
 * @done - the amount of work done, in arbitrary units
 * @done - the amount of work done, in arbitrary units
 */
uint64_t bch_next_delay(struct bch_ratelimit *d, uint64_t done)
{
    --- linux-4.15.0.orig/drivers/md/bcache/util.h
    +++ linux-4.15.0/drivers/md/bcache/util.h
    @@ -112,6 +112,8 @@
    #define heap_full(h)	((h)->used == (h)->size)
    +#define heap_empty(h)((h)->used == 0)
    +
    #define DECLARE_FIFO(type, name)
    struct {
        size_t front, back, size, mask;
        @ @ -363,11 +365,6 @@
        bool bch_is_zero(const char *p, size_t n);
        int bch_parse_uuid(const char *s, char *uuid);

        ssize_t bch_snprint_string_list(char *buf, size_t size, const char * const list[],
        -       size_t selected);
        -
- ssize_t bch_read_string_list(const char *buf, const char * const list[]);
-
struct time_stats {
    spinlock_t lock;
/*
@@ -564,12 +561,6 @@
return bdev->bd_inode->i_size >> 9;
 */
-
#define closure_bio_submit(bio, cl) do {
    closure_get(cl);
    generic_make_request(bio);
} while (0)
-
uint64_t bch_crc64_update(uint64_t, const void *, size_t);
uint64_t bch_crc64(const void *, size_t);
--- linux-4.15.0.orig/drivers/md/bcache/writeback.c
+++ linux-4.15.0/drivers/md/bcache/writeback.c
@@ -18,17 +18,39 @@
    include <trace/events/bcache.h>

#ifndef __update_writeback_rate
- static void __update_writeback_rate(struct cached_dev *dc)
+static uint64_t __calc_target_rate(struct cached_dev *dc)
 {
     struct cache_set *c = dc->disk.c;
     +/*
     * This is the size of the cache, minus the amount used for
     * flash-only devices
     */
     uint64_t cache_sectors = c->nbuckets * c->sb.bucket_size -
     bcache_flash_devs_sectors_dirty(c);
     +
+/*
     * Unfortunately there is no control of global dirty data. If the
     * user states that they want 10% dirty data in the cache, and has,
     * e.g., 5 backing volumes of equal size, we try and ensure each
     * backing volume uses about 2% of the cache for dirty data.
     */
+uint32_t bdev_share =
+dives64_u64(bdev_sectors(dc->bdev) << WRITEBACK_SHARE_SHIFT,
+            cached_dev_sectors);
+ uint64_t cache_dirty_target =
div_u64(cache_sectors * dc->writeback_percent, 100);
-int64_t target = div64_u64(cache_dirty_target * bdev_sectors(dc->bdev),
- c->cached_dev_sectors);

+/* Ensure each backing dev gets at least one dirty share */
+if (bdev_share < 1)
+bdev_share = 1;
+
+return (cache_dirty_target * bdev_share) >> WRITEBACK_SHARE_SHIFT;
+
+
+static void __update_writeback_rate(struct cached_dev *dc)
+{
+/*
+ * PI controller:
+ * Figures out the amount that should be written per second.
+ @ @ -49.6 +71.7 @ @
+ * This acts as a slow, long-term average that is not subject to
+ * variations in usage like the p term.
+ */
+int64_t target = __calc_target_rate(dc);
+int64_t dirty = bcache_dev_sectors_dirty(&dc->disk);
+int64_t error = dirty - target;
+int64_t proportional_scaled =
+int64_t integral_scaled;
+uint32_t new_rate;
+
+/*
+ * We need to consider the number of dirty buckets as well
+ * when calculating the proportional_scaled, Otherwise we might
+ * have an unreasonable small writeback rate at a highly fragmented situation
+ * when very few dirty sectors consumed a lot dirty buckets, the
+ * worst case is when dirty buckets reached cutoff_writeback_sync and
+ * dirty data is still not even reached to writeback percent, so the rate
+ * still will be at the minimum value, which will cause the write
+ * stuck at a non-writeback mode.
+ */
+struct cache_set *c = dc->disk.c;
+
+int64_t dirty_buckets = c->nbuckets - c->avail_nbuckets;
+
+if (dc->writeback_consider_fragment &&
+c->gc_stats.in_use > BCH_WRITEBACK_FRAGMENT_THRESHOLD_LOW && dirty > 0) {
+int64_t fragment =
+div_s64((dirty_buckets * c->sb.bucket_size), dirty);
+int64_t fp_term;
+int64_t fps;
+ if (c->gc_stats.in_use <= BCH_WRITEBACK_FRAGMENT_THRESHOLD_MID) {
  +fp_term = dc->writeback_rate_fp_term_low *
  +(c->gc_stats.in_use - BCH_WRITEBACK_FRAGMENT_THRESHOLD_LOW);
+} else if (c->gc_stats.in_use <= BCH_WRITEBACK_FRAGMENT_THRESHOLD_HIGH) {
  +fp_term = dc->writeback_rate_fp_term_mid *
  +(c->gc_stats.in_use - BCH_WRITEBACK_FRAGMENT_THRESHOLD_MID);
+} else {
  +fp_term = dc->writeback_rate_fp_term_high *
  +(c->gc_stats.in_use - BCH_WRITEBACK_FRAGMENT_THRESHOLD_HIGH);
+} fps = div_s64(dirty, dirty_buckets) * fp_term;
+if (fragment > 3 && fps > proportional_scaled) {
+  /* Only override the p when fragment > 3 */
+  proportional_scaled = fps;
+}
+
+ if ((error < 0 && dc->writeback_rate_integral > 0) ||
+     (error > 0 && time_before64(local_clock(),
+      dc->writeback_rate.next + NSEC_PER_MSEC)) )
+   @ @ -91.6 +152.27 @ @
+struct cached_dev *dc = container_of(to_delayed_work(work),
+    struct cached_dev,
+    writeback_rate_update);
+struct cache_set *c = dc->disk.c;
+
+/*
+ * should check BCACHE_DEV_RATE_DW_RUNNING before calling
+ * cancel_delayed_work_sync().
+ */
+set_bit(BCACHE_DEV_RATE_DW_RUNNING, &dc->disk.flags);
+/* paired with where BCACHE_DEV_RATE_DW_RUNNING is tested */
+smpl_mb();
+
+/*
+ * CACHE_SET_IO_DISABLE might be set via sysfs interface,
+ * check it here too.
+ */
+if (!(test_bit(BCACHE_DEV_WB_RUNNING, &dc->disk.flags) ||
+     test_bit(CACHE_SET_IO_DISABLE, &c->flags)) )
+   +clear_bit(BCACHE_DEV_RATE_DW_RUNNING, &dc->disk.flags);
+/* paired with where BCACHE_DEV_RATE_DW_RUNNING is tested */
+smpl_mb();
+return;
+}
+
down_read(&dc->writeback_lock);
up_read(&dc->writeback_lock);

-schedule_delayed_work(&dc->writeback_rate_update,
+/*
+ * CACHE_SET_IO_DISABLE might be set via sysfs interface,
+ * check it here too.
+ */
+if (test_bit(BCACHE_DEV_WB_RUNNING, &dc->disk.flags) &&
+    !test_bit(CACHE_SET_IO_DISABLE, &c->flags)) {
+schedule_delayed_work(&dc->writeback_rate_update,
    dc->writeback_rate_update_seconds * HZ);
+
+/*
+ * should check BCACHE_DEV_RATE_DW_RUNNING before calling
+ * cancel_delayed_work_sync().
+ */
+clear_bit(BCACHE_DEV_RATE_DW_RUNNING, &dc->disk.flags);
+/* paired with where BCACHE_DEV_RATE_DW_RUNNING is tested */
+smp_mb();
}

static unsigned writeback_delay(struct cached_dev *dc, unsigned sectors)
@@ -184,8 +281,10 @@
struct keybuf_key *w = bio->bi_private;
struct dirty_io *io = w->private;

- if (bio->bi_status)
+ if (bio->bi_status) {
    SET_KEY_DIRTY(&w->key, false);
    bch_count_backing_io_errors(io->dc, bio);
+}

    closure_put(&io->cl);
 }@
@@ -208,7 +307,8 @@
bio_set_dev(&io->bio, io->dc->bdev);
io->bio.bi_end_io = dirty_endio;

-closure_bio_submit(&io->bio, cl);
+/* I/O request sent to backing device */
+closure_bio_submit(io->dc->disk.c, &io->bio, cl);
}

continue_at(cl, write_dirty_finish, io->dc->writeback_write_wq);
{ struct dirty_io *io = container_of(cl, struct dirty_io, cl);

closure_bio_submit(&io->bio, cl);
+closure_bio_submit(io->dc->disk.c, &io->bio, cl);

continue_at(cl, write_dirty, io->dc->writeback_write_wq);
}

*/

-while (!kthread_should_stop()) {
+while (!kthread_should_stop() &&
+       !test_bit(CACHE_SET_IO_DISABLE, &dc->disk.c->flags)) {

w = bch_keybuf_next(&dc->writeback_keys);
if (!w)
@@ -439,33 +540,54 @@
static int bch_writeback_thread(void *arg)
{
   struct cached_dev *dc = arg;
+   struct cache_set *c = dc->disk.c;
   bool searched_full_index;

   bch_ratelimit_reset(&dc->writeback_rate);

-while (!kthread_should_stop()) {
+while (!kthread_should_stop() &&
+       !test_bit(CACHE_SET_IO_DISABLE, &c->flags)) {
   down_write(&dc->writeback_lock);
-   if (!atomic_read(&dc->has_dirty) ||
-       (!test_bit(BCACHE_DEV_DETACHING, &dc->disk.flags) &&
-        !dc->writeback_running)) {
+   if (!test_bit(BCACHE_DEV_DETACHING, &dc->disk.flags) &&
+       (!atomic_read(&dc->has_dirty) ||
+        !dc->writeback_running)) {
+     set_current_state(TASK_INTERRUPTIBLE);
+   /*
+     * If the bache device is detaching, skip here and continue
+     * to perform writeback. Otherwise, if no dirty data on cache,
+     * or there is dirty data on cache but writeback is disabled,
+     * the writeback thread should sleep here and wait for others
+     * to wake up it.
+     */
+   }
   up_write(&dc->writeback_lock);
-   set_current_state(TASK_INTERRUPTIBLE);
if (kthread_should_stop())
  return 0;
+if (kthread_should_stop() ||
  +test_bit(CACHE_SET_IO_DISABLE, &c->flags)) {
+set_current_state(TASK_RUNNING);
+break;
+
}  

schedule();
continue;
}
+set_current_state(TASK_RUNNING);

searched_full_index = refill_dirty(dc);

if (searched_full_index &&
    RB_EMPTY_ROOT(&dc->writeback_keys.keys)) {
  atomic_set(&dc->has_dirty, 0);
  -cached_dev_put(dc);
  SET_BDEV_STATE(&dc->sb, BDEV_STATE_CLEAN);
  bch_write_bdev_super(dc, NULL);
  +/*
  +  * If bcache device is detaching via sysfs interface,
  +  * writeback thread should stop after there is no dirty
  +  * data on cache. BCACHE_DEV_DETACHING flag is set in
  +  * bch_cached_dev_detach().
  +  */
  +if (test_bit(BCACHE_DEV_DETACHING, &dc->disk.flags)) {
  +up_write(&dc->writeback_lock);
  +break;
  +}
  }

up_write(&dc->writeback_lock);
@@ -477,6 +599,7 @@

while (delay &&
    !kthread_should_stop() &&
    !test_bit(CACHE_SET_IO_DISABLE, &c->flags) &&
    !test_bit(BCACHE_DEV_DETACHING, &dc->disk.flags))
  delay = schedule_timeout_interruptible(delay);

@@ -484,6 +607,13 @@

+if (dc->writeback_write_wq) {
+flush_workqueue(dc->writeback_write_wq);
destroy_workqueue(dc->writeback_write_wq);
+
+cached_dev_put(dc);
+wait_for_kthread_stop();
+
return 0;
}

bch_keybuf_init(&dc->writeback_keys);

dc->writeback_metadata = true;
-dc->writeback_running = true;
+dc->writeback_running = false;
+dc->writeback_consider_fragment = true;
dc->writeback_percent = 10;
dc->writeback_delay = 30;
dc->writeback_rate.rate = 1024;
dc->writeback_rate_minimum = 8;

-dc->writeback_rate_update_seconds = 5;
+dc->writeback_rate_update_seconds = WRITEBACK_RATE_UPDATE_SECS_DEFAULT;
dc->writeback_rate_p_term_inverse = 40;
+dc->writeback_rate_fp_term_low = 1;
+dc->writeback_rate_fp_term_mid = 10;
+dc->writeback_rate_fp_term_high = 1000;
dc->writeback_rate_i_term_inverse = 10000;

+WARN_ON(test_and_clear_bit(BCACHE_DEV_WB_RUNNING, &dc->disk.flags));
INIT_DELAYED_WORK(&dc->writeback_rate_update, update_writeback_rate);
}

if (!dc->writeback_write_wq)
return -ENOMEM;
+
cached_dev_get(dc);

dc->writeback_thread = kthread_create(bch_writeback_thread, dc,
    "bcache_writeback");
-#if (IS_ERR(dc->writeback_thread))
+if (IS_ERR(dc->writeback_thread)) {
+cached_dev_put(dc);
+destroy_workqueue(dc->writeback_write_wq);
return PTR_ERR(dc->writeback_thread);
+#}
+dc->writeback_running = true;

+WARN_ON(test_and_set_bit(BCACHE_DEV_WB_RUNNING, &dc->disk.flags));
schedule_delayed_work(&dc->writeback_rate_update,
   dc->writeback_rate_update_seconds * HZ);

--- linux-4.15.0.orig/drivers/md/bcache/writeback.h
+++ linux-4.15.0/drivers/md/bcache/writeback.h
@@ -5,6 +5,21 @@
#define CUTOFF_WRITEBACK	40
#define CUTOFF_WRITEBACK_SYNC	70

+#define WRITEBACK_RATE_UPDATE_SECS_MAX60
+#define WRITEBACK_RATE_UPDATE_SECS_DEFAULT5
+
+#define BCH_WRITEBACK_FRAGMENT_THRESHOLD_LOW 50
+#define BCH_WRITEBACK_FRAGMENT_THRESHOLD_MID 57
+#define BCH_WRITEBACK_FRAGMENT_THRESHOLD_HIGH 64
+
/+ *
/+ * 14 (16384ths) is chosen here as something that each backing device
/+ * should be a reasonable fraction of the share, and not to blow up
/+ * until individual backing devices are a petabyte.
/+ */
+#define WRITEBACK_SHARE_SHIFT   14
+
static inline uint64_t bcache_dev_sectors_dirty(struct bcache_device *d)
{
    uint64_t i, ret = 0;
    @@ -26,7 +41,7 @@

    if (!d || !UUID_FLASH_ONLY(&c->uuids[i]))
        continue;
-   ret += bcache_dev_sectors_dirty(d);
+ret += bcache_dev_sectors_dirty(d);
}

mutex_unlock(&bch_register_lock);
@@ -69,6 +84,12 @@
    in_use > CUTOFF_WRITEBACK_SYNC)
    return false;

+#if (bio_op(bio) == REQ_OP_DISCARD)
+return false;
+
+#if (bio_op(bio) == REQ_OP_DISCARD)
+return false;
+
if (dc->partial_stripes_expensive &&
    bcache_dev_stripe_dirty(dc, bio->bi_iter.bi_sector,
bio_sectors(bio)))
@@ -92,8 +113,6 @@
{
    if (!atomic_read(&dc->has_dirty) &&
         !atomic_xchg(&dc->has_dirty, 1)) {
        -refcount_inc(&dc->count);
-
        if (BDEV_STATE(&dc->sb) != BDEV_STATE_DIRTY) {
            SET_BDEV_STATE(&dc->sb, BDEV_STATE_DIRTY);
            /* XXX: should do this synchronously */
--- linux-4.15.0.orig/drivers/md/dm-bio-prison-v1.c
+++ linux-4.15.0/drivers/md/dm-bio-prison-v1.c
@@ -33,7 +33,7 @@
*/

struct dm_bio_prison *dm_bio_prison_create(void)
{
    -struct dm_bio_prison *prison = kmalloc(sizeof(*prison), GFP_KERNEL);
    +struct dm_bio_prison *prison = kzalloc(sizeof(*prison), GFP_KERNEL);
    if (!prison)
        return NULL;
--- linux-4.15.0.orig/drivers/md/dm-bio-prison-v2.c
+++ linux-4.15.0/drivers/md/dm-bio-prison-v2.c
@@ -35,7 +35,7 @@
*/

struct dm_bio_prison_v2 *dm_bio_prison_create_v2(struct workqueue_struct *wq)
{
    -struct dm_bio_prison_v2 *prison = kmalloc(sizeof(*prison), GFP_KERNEL);
    +struct dm_bio_prison_v2 *prison = kzalloc(sizeof(*prison), GFP_KERNEL);
    if (!prison)
        return NULL;
--- linux-4.15.0.orig/drivers/md/dm-bio-record.h
+++ linux-4.15.0/drivers/md/dm-bio-record.h
@@ -20,8 +20,13 @@
struct dm_bio_details {
    struct gendisk *bi_disk;
    u8 bi_partno;
    +int __bi_remaining;
    unsigned long bi_flags;
    struct bvec_iter bi_iter;
    +bio_end_io_t *bi_end_io;
    +#if defined(CONFIG_BLK_DEV_INTEGRITY)
    +struct bio_integrity_payload *bi_integrity;
    +#endif
    
};

static inline void dm_bio_record(struct dm_bio_details *bd, struct bio *bio)
static inline void dm_bio_restore(struct dm_bio_details *bd, struct bio *bio) {
    bio->bi_partno = bd->bi_partno;
    bio->bi_flags = bd->bi_flags;
    bio->bi_iter = bd->bi_iter;
    +atomic_set(&bio->__bi_remaining, bd->__bi_remaining);
    bio->bi_end_io = bd->bi_end_io;
    +#if defined(CONFIG_BLK_DEV_INTEGRITY)
    bio->bi_integrity = bd->bi_integrity;
    +#endif
}

#endif
--- linux-4.15.0.orig/drivers/md/dm-bufio.c
+++ linux-4.15.0/drivers/md/dm-bufio.c
@@ -386,9 +386,6 @@
 static void *alloc_buffer_data(struct dm_bufio_client *c, gfp_t gfp_mask,
                                 enum data_mode *data_mode) {
-    unsigned noio_flag;
-    void *ptr;
-
    if (c->block_size <= DM_BUFIO_BLOCK_SIZE_SLAB_LIMIT) {
        *data_mode = DATA_MODE_SLAB;
        return kmem_cache_alloc(DM_BUFIO_CACHE(c), gfp_mask);
@@ -412,16 +409,15 @@
     */
+    if (gfp_mask & __GFP_NORETRY) {
+        unsigned noio_flag = memalloc_noio_save();
+        void *ptr = __vmalloc(c->block_size, gfp_mask, PAGE_KERNEL);
+    }
-
-    if (gfp_mask & __GFP_NORETRY)
-        noio_flag = memalloc_noio_save();
-    void *ptr = __vmalloc(c->block_size, gfp_mask, PAGE_KERNEL);
if (gfp_mask & __GFP_NORETRY)
    memalloc_noio_restore(noio_flag);
    return ptr;
+
	return __vmalloc(c->block_size, gfp_mask, PAGE_KERNEL);
}

/*
--- linux-4.15.0.orig/drivers/md/dm-cache-metadata.c
+++ linux-4.15.0/drivers/md/dm-cache-metadata.c
@@ -363,7 +363,7 @@
disk_super->version = cpu_to_le32(cmd->version);
    memset(disk_super->policy_name, 0, sizeof(disk_super->policy_name));
    memset(disk_super->policy_version, 0, sizeof(disk_super->policy_version));
-disk_super->policy_hint_size = 0;
+disk_super->policy_hint_size = cpu_to_le32(0);
+disk_super->policy_hint_size = cpu_to_le32(0);

    __copy_sm_root(cmd, disk_super);

    @ @ -537,12 +537,16 @@
        CACHE_MAX_CONCURRENT_LOCKS);
    if (IS_ERR(cmd->bm)) {
        DMERR("could not create block manager");
        -return PTR_ERR(cmd->bm);
        +r = PTR_ERR(cmd->bm);
        +cmd->bm = NULL;
        +return r;
    }

    r = __open_or_format_metadata(cmd, may_format_device);
    -if (r)
    +if (r) {
        dm_block_manager_destroy(cmd->bm);
        +cmd->bm = NULL;
        +}

    return r;
}

/*
@@ -701,6 +705,7 @@
    disk_super->policy_version[0] = cpu_to_le32(cmd->policy_version[0]);
    disk_super->policy_version[1] = cpu_to_le32(cmd->policy_version[1]);
    +disk_super->policy_hint_size = cpu_to_le32(cmd->policy_hint_size);

    disk_super->read_hits = cpu_to_le32(cmd->stats.read_hits);
disk_super->read_misses = cpu_to_le32(cmd->stats.read_misses);
@@ -929,6 +934,10 @@
 bool dirty_flag;
 *result = true;

 +if (from_cblock(cmd->cache_blocks) == 0)
 +/* Nothing to do */
 +return 0;
 +
 r = dm_bitset_cursor_begin(&cmd->dirty_info, cmd->dirty_root,
   from_cblock(cmd->cache_blocks), &cmd->dirty_cursor);
 if (r) {
 @@ -1162,11 +1171,18 @@
 if (r)
 return r;

 -for (b = 0; b < from_dblock(cmd->discard_nr_blocks); b++) {
 +for (b = 0; ; b++) {
 r = fn(context, cmd->discard_block_size, to_dblock(b),
   dm_bitset_cursor_get_value(&c));
 if (r)
 break;
 +
 +if (b >= (from_dblock(cmd->discard_nr_blocks) - 1))
 +break;
 +
 +r = dm_bitset_cursor_next(&c);
 +if (r)
 +break;
 }

 dm_bitset_cursor_end(&c);
@@ -1322,6 +1338,10 @@
 dm_oblock_t oblock;
 unsigned flags;
 +bool dirty = true;

 dm_array_cursor_get_value(mapping_cursor, (void **) &mapping_value_le);
 memcpy(&mapping, mapping_value_le, sizeof(mapping));
@@ -1332,8 +1349,10 @@
 dm_array_cursor_get_value(hint_cursor, (void **) &hint_value_le);
 memcpy(&hint, hint_value_le, sizeof(hint));
 }
 +if (cmd->clean_when_opened)
 +dirty = flags & M_DIRTY;

 -r = fn(context, oblock, to_cblock(cb), flags & M_DIRTY,
+r = fn(context, oblock, to_cblock(cb), dirty,
    le32_to_cpu(hint), hints_valid);
if (r) {
    DMERR("policy couldn't load cache block %llu",
@@ -1361,7 +1380,7 @@
    dm_oblock_t oblock;
    unsigned flags;
    -bool dirty;
+bool dirty = true;

    dm_array_cursor_get_value(mapping_cursor, (void **) &mapping_value_le);
    memcpy(&mapping, mapping_value_le, sizeof(mapping));
@@ -1372,8 +1391,9 @@
    dm_array_cursor_get_value(hint_cursor, (void **) &hint_value_le);
    memcpy(&hint, hint_value_le, sizeof(hint));
} +if (cmd->clean_when_opened)
+dirty = dm_bitset_cursor_get_value(dirty_cursor);

-dirty = dm_bitset_cursor_get_value(dirty_cursor);
  r = fn(context, oblock, to_cblock(cb), dirty,
       le32_to_cpu(hint), hints_valid);
  if (r) {
@@ -1450,8 +1470,8 @@
    if (hints_valid) {
        r = dm_array_cursor_next(&cmd->hint_cursor);
        if (r) {
-DMERR("dm_array_cursor_next for hint failed");
-goto out;
+dm_array_cursor_end(&cmd->hint_cursor);
+hints_valid = false;
        } 
    } 

--- linux-4.15.0.orig/drivers/md/dm-cache-target.c
+++ linux-4.15.0/drivers/md/dm-cache-target.c
@@ -538,7 +538,7 @@
 static struct dm_bio_prison_cell_v2 *alloc_prison_cell(struct cache *cache)
 {
-    return dm_bio_prison_alloc_cell_v2(cache->prison, GFP_NOWAIT);
+    return dm_bio_prison_alloc_cell_v2(cache->prison, GFP_NOIO);
 } 

 static void free_prison_cell(struct cache *cache, struct dm_bio_prison_cell_v2 *cell)
@@ -550,9 +550,7 @@

struct dm_cache_migration *mg;

- mg = mempool_alloc(cache-&gt;migration_pool, GFP_NOWAIT);
- if (!mg)
- return NULL;
+ mg = mempool_alloc(cache-&gt;migration_pool, GFP_NOIO);

memset(mg, 0, sizeof(*mg));

@@ -660,10 +658,6 @@
        struct dm_bio_prison_cell_v2 *cell_prealloc, *cell;

        cell_prealloc = alloc_prison_cell(cache); /* FIXME: allow wait if calling from worker */
        -if (!cell_prealloc) {
        - defer_bio(cache, bio);
        - return false;
        -}

        build_key(oblock, end, &key);
        r = dm_cell_get_v2(cache-&gt;prison, &key, lock_level(bio), bio, cell_prealloc, &cell);
@@ -1497,11 +1491,6 @@
        struct dm_bio_prison_cell_v2 *prealloc;

        prealloc = alloc_prison_cell(cache);
        -if (!prealloc) {
        - DMERR_LIMIT(”%s: alloc_prison_cell failed”, cache_device_name(cache));
        - mg_complete(mg, false);
        - return -ENOMEM;
        -}

        /*
        * Prevent writes to the block, but allow reads to continue.
@@ -1539,11 +1528,6 @@
        }

        mg = alloc_migration(cache);
        -if (!mg) {
        - policy_complete_background_work(cache-&gt;policy, op, false);
        - background_work_end(cache);
        - return -ENOMEM;
        -}

        mg-&gt;op = op;
        mg-&gt;overwrite_bio = bio;
@@ -1632,10 +1616,6 @@
        struct dm_bio_prison_cell_v2 *prealloc;

        prealloc = alloc_prison_cell(cache);
-if (!prealloc) {
-invalidate_complete(mg, false);
-return -ENOMEM;
-}

build_key(mg->invalidate_oblock, oblock_succ(mg->invalidate_oblock), &key);
if (!prealloc) {
  invalidate_complete(mg, false);
  return -ENOMEM;
}
	int r = dm_cell_lock_v2(cache->prison, &key,
return -EPERM;
mg = alloc_migration(cache);
-if (!mg) {
  background_work_end(cache);
  return -ENOMEM;
-}

mg->overwrite_bio = bio;
mg->invalidate_cblock = cblock;
{0, 2, "Invalid number of cache feature arguments"},
}

-int r;
+int r, mode_ctr = 0;
unsigned argc;
const char *arg;
struct cache_features *cf = &ca->features;
while (argc--) {
  arg = dm_shift_arg(as);

  -if (!strcasecmp(arg, "writeback"))
  +if (!strcasecmp(arg, "writeback")) {
  cf->io_mode = CM_IO_WRITEBACK;
  +mode_ctr++;
  +}

  -else if (!strcasecmp(arg, "writethrough"))
  +else if (!strcasecmp(arg, "writethrough")) {
  cf->io_mode = CM_IO_WRITETHROUGH;
  +mode_ctr++;
  +}

  -else if (!strcasecmp(arg, "passthrough"))
  +else if (!strcasecmp(arg, "passthrough")) {
  cf->io_mode = CM_IO_PASSTHROUGH;
  +mode_ctr++;
  +}
else if (!strcasecmp(arg, "metadata2"))
    cf->metadata_version = 2;
@@ -2280,6 +2262,11 @@
 }
 }

+if (mode_ctr > 1) {
    +*error = "Duplicate cache io_mode features requested";
    +return -EINVAL;
    +}
    +}
    return 0;
 }

@@ -2878,8 +2865,8 @@
    prevent_background_work(cache);
    BUG_ON(atomic_read(&cache->nr_io_migrations));

    -cancel_delayed_work(&cache->waker);
    -flush_workqueue(cache->wq);
    +cancel_delayed_work_sync(&cache->waker);
    +drain_workqueue(cache->wq);
    WARN_ON(cache->tracker.in_flight);

    /*
    @@ -3004,8 +2991,13 @@
    static bool can_resize(struct cache *cache, dm_cblock_t new_size)
    {
      -if (from_cblock(new_size) > from_cblock(cache->cache_size))
        -return true;
      +if (from_cblock(new_size) > from_cblock(cache->cache_size)) {
        +if (cache->sized) {
          +DMERR("%s: unable to extend cache due to missing cache table reload",
              + cache_device_name(cache));
          +return false;
          +}
          +}

          /*
          * We can't drop a dirty block when shrinking the cache.
          @@ -3473,14 +3465,13 @@
          int r;

          migration_cache = KMEM_CACHE(dm_cache_migration, 0);
          -if (!migration_cache) {
          -dm_unregister_target(&cache_target);
if (!migration_cache)
    return -ENOMEM;
}

r = dm_register_target(&cache_target);
if (r) {
    DMERR("cache target registration failed: %d", r);
    kmem_cache_destroy(migration_cache);
    return r;
}

--- linux-4.15.0.orig/drivers/md/dm-crypt.c
+++ linux-4.15.0/drivers/md/dm-crypt.c
@@ -49,7 +49,7 @@
    struct bio *bio_out;
    struct bvec_iter iter_in;
    struct bvec_iter iter_out;
-    sector_t cc_sector;
+    u64 cc_sector;
    atomic_t cc_pending;
    union {
        struct skcipher_request *req;
@@ -81,7 +81,7 @@
        struct convert_context *ctx;
        struct scatterlist sg_in[4];
        struct scatterlist sg_out[4];
-       sector_t iv_sector;
+       u64 iv_sector;
    };

    struct crypt_config;
@@ -148,6 +148,8 @@
    mempool_t *tag_pool;
    unsigned tag_pool_max_sectors;

+    struct percpu_counter n_allocated_pages;
+    struct bio_set *bs;
    struct mutex bio_alloc_lock;

@@ -170,7 +172,7 @@
    struct iv_lmk_private lmk;
    struct iv_tcw_private tcw;
 } iv_gen_private;
-    sector_t iv_offset;
+    u64 iv_offset;
    unsigned int iv_size;
    unsigned short int sector_size;
unsigned char sector_shift;
#define MAX_TAG_SIZE 480
#define POOL_ENTRY_SIZE 512

+static DEFINE_SPINLOCK(dm_crypt_clients_lock);
+static unsigned dm_crypt_clients_n = 0;
+static volatile unsigned long dm_crypt_pages_per_client;
+#define DM_CRYPT_MEMORY_PERCENT 2
+#define DM_CRYPT_MIN_PAGES_PER_CLIENT (BIO_MAX_PAGES * 16)
+
static void clone_init(struct dm_crypt_io *, struct bio *);
static void kcryptd_queue_crypt(struct dm_crypt_io *io);
static struct scatterlist *crypt_get_sg_data(struct crypt_config *cc,
static struct scatterlist *crypt_get_sg_data(struct crypt_config *cc,
    @ @ -326,7 +334,7 @ @

sg_init_one(&sg, cc->key, cc->key_size);
ahash_request_set_tfm(req, essiv->hash_tfm);
-ahash_request_set_callback(req, CRYPTO_TFM_REQ_MAY_SLEEP, NULL, NULL);
+ahash_request_set_callback(req, 0, NULL, NULL);
ahash_request_set_crypt(req, &sg, essiv->salt, cc->key_size);

err = crypto_ahash_digest(req);
@ @ -477,8 +485,14 @ @
static int crypt_iv_benbi_ctr(struct crypt_config *cc, struct dm_target *ti,
    const char *opts)
{
    -unsigned bs = crypto_skcipher_blocksize(any_tfm(cc));
    -int log = ilog2(bs);
    +unsigned bs;
    +int log;
    +
    +if (test_bit(CRYPTO_MODE_INTEGRITY_AEAD, &cc->cipher_flags))
    +bs = crypto_aead_blocksize(any_tfm_aead(cc));
    +else
    +bs = crypto_skcipher_blocksize(any_tfm(cc));
    +log = ilog2(bs);

    /* we need to calculate how far we must shift the sector count
    * to get the cipher block count, we use this shift in _gen */
    @ @ -601,7 +615,7 @ @
    int i, r;

desc->tfm = lmk->hash_tfm;
-desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
+desc->flags = 0;

    r = crypto_shash_init(desc);
if (r)
@@ -763,7 +777,7 @@
    /* calculate crc32 for every 32bit part and xor it */
    desc->tfm = tcw->crc32_tfm;
    desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
+    desc->flags = 0;
    for (i = 0; i < 4; i++) {
        r = crypto_shash_init(desc);
        if (r)
@@ -927,7 +941,7 @@
            if (IS_ERR(bip))
                return PTR_ERR(bip);

-    tag_len = io->cc->on_disk_tag_size * bio_sectors(bio);
+    tag_len = io->cc->on_disk_tag_size * (bio_sectors(bio) >> io->cc->sector_shift);

    bip->bip_iter.bi_size = tag_len;
    bip->bip_iter.bi_sector = io->cc->start + io->sector;
@@ -944,6 +958,7 @@
    {
        #ifdef CONFIG_BLK_DEV_INTEGRITY
            struct blk_integrity *bi = blk_get_integrity(cc->dev->bdev->bd_disk);
+        struct mapped_device *md = dm_table_get_md(ti->table);
            if (!bi || strcasecmp(bi->profile->name, "DM-DIF-EXT-TAG")) {
                @ @ -963,7 +978,7 @@
                    if (crypt_integrity_aead(cc)) {
                        cc->integrity_tag_size = cc->on_disk_tag_size - cc->integrity_iv_size;
                        -DMINFO("Integrity AEAD, tag size %u, IV size %u.",
+                        DMDEBUG("%s: Integrity AEAD, tag size %u, IV size %u.", dm_device_name(md),
                            cc->integrity_tag_size, cc->integrity_iv_size);

                        if (crypto_aead_setauthsize(any_tfm_aead(cc), cc->integrity_tag_size)) {
                            @ @ -971,7 +986,7 @@
                                return -EINVAL;
                        } else if (cc->integrity_iv_size)
                            -DMINFO("Additional per-sector space %u bytes for IV.",
+                            DMDEBUG("%s: Additional per-sector space %u bytes for IV.", dm_device_name(md),
                                cc->integrity_iv_size);

                        if ((cc->integrity_tag_size + cc->integrity_iv_size) != bi->tag_size) {
                            @ @ -1246,7 +1261,7 @@
                            * requests if driver request queue is full.
                            */
skcipher_request_set_callback(ctx->r.req,
- CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
+ CRYPTO_TFM_REQ_MAY_BACKLOG,
    kcryptd_async_done, dmreq_of_req(cc, ctx->r.req));
}

@@ -1263,7 +1278,7 @@
 * requests if driver request queue is full.
 */
aead_request_set_callback(ctx->r.req_aead,
- CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
+ CRYPTO_TFM_REQ_MAY_BACKLOG,
    kcryptd_async_done, dmreq_of_req(cc, ctx->r.req_aead));
}

@@ -2156,6 +2171,48 @@
 return r;
 }

+static void crypt_calculate_pages_per_client(void)
+{
+    unsigned long pages = (totalram_pages - totalhigh_pages) * DM_CRYPT_MEMORY_PERCENT / 100;
+    +
+    if (!dm_crypt_clients_n)
+        return;
+
+    *pages /= dm_crypt_clients_n;
+    +if (pages < DM_CRYPT_MIN_PAGES_PER_CLIENT)
+        pages = DM_CRYPT_MIN_PAGES_PER_CLIENT;
+    +dm_crypt_pages_per_client = pages;
+}
+
+static void *crypt_page_alloc(gfp_t gfp_mask, void *pool_data)
+{
+    struct crypt_config *cc = pool_data;
+    struct page *page;
+
+    /*
+     * Note, percpu_counter_read_positive() may over (and under) estimate
+     * the current usage by at most (batch - 1) * num_online_cpus() pages,
+     * but avoids potential spinlock contention of an exact result.
+     */
+    +if (unlikely(percpu_counter_read_positive(&cc->n_allocated_pages) >= dm_crypt_pages_per_client) &&
+        likely(gfp_mask & __GFP_NORETRY))
+        return NULL;
+
+    page = alloc_page(gfp_mask);
+    +if (likely(page != NULL))


percpu_counter_add(&cc->n_allocated_pages, 1);
+
+return page;
+
+static void crypt_page_free(void *page, void *pool_data)
+{
+struct crypt_config *cc = pool_data;
+
+_free_page(page);
+percpu_counter_sub(&cc->n_allocated_pages, 1);
+
+
+static void crypt_dtr(struct dm_target *ti)
+
+struct crypt_config *cc = ti->private;
+@@ -2182,6 +2239,10 @@
mempool_destroy(cc->req_pool);
mempool_destroy(cc->tag_pool);
+
+if (cc->page_pool)
+WARN_ON(percpu_counter_sum(&cc->n_allocated_pages) != 0);
+percpu_counter_destroy(&cc->n_allocated_pages);
+
+if (cc->iv_gen_ops && cc->iv_gen_ops->dtr)
+cc->iv_gen_ops->dtr(cc);
+@@ -2196,6 +2257,12 @@

/* Must zero key material before freeing */
kzfree(cc);
+
+spin_lock(&dm_crypt_clients_lock);
+WARN_ON(!dm_crypt_clients_n);
+dm_crypt_clients_n--;
+crypt_calculate_pages_per_client();
+spin_unlock(&dm_crypt_clients_lock);
}

static int crypt_ctr_ivmode(struct dm_target *ti, const char *ivmode)
@@ -2358,9 +2425,21 @@
* capi:cipher_api_spec-iv:ivopts
*/
tmp = &cipher_in[strlen("capi:")];
-cipher_api = strerror(tmp, "-");
-*ivmode = strerror(tmp, ":"); 
-*ivopts = tmp;
/* Separate IV options if present, it can contain another `:` in hash name */
*tivopts = strchr(tmp, ':');
if (*tivopts) {
	**tivopts = '\0';
	(*tivopts)++;
+
/* Parse IV mode */
*tivmode = strchr(tmp, '-');
if (*tivmode) {
	**tivmode = '\0';
	(*tivmode)++;
+
/* The rest is crypto API spec */
cipher_api = tmp;

if (*tivmode && !strcmp(*tivmode, "lmk"))
cc->tfms_count = 64;
@@ -2430,11 +2509,8 @@
goto bad_mem;
chainmode = strsep(&tmp, "-"),
-*tivopts = strsep(&tmp, ":")
-*tivmode = strsep(&*tivopts, ",")
-
-if (tmp)
-DMWARN("Ignoring unexpected additional cipher options");
+*tivmode = strsep(&tmp, ",");
+*tivopts = tmp;

/*
 * For compatibility with the original dm-crypt mapping format, if
 @@ -2643,6 +2719,15 @@

ti->private = cc;

+spin_lock(&dm_crypt_clients_lock);
+dm_crypt_clients_n++;
+encrypt_calculate_pages_per_client();
+spin_unlock(&dm_crypt_clients_lock);
+
+ret = percpu_counter_init(&cc->n_allocated_pages, 0, GFP_KERNEL);
+if (ret < 0)
+goto bad;
+
/* Optional parameters need to be read before cipher constructor */
if (argc > 5) {
ret = crypt_ctr_optional(ti, argc - 5, &argv[5]);
@@ -2697,7 +2782,7 @@
ALIGN(sizeof(struct dm_crypt_io) + cc->dmreq_start + additional_req_size, ARCH_KMALLOC_MINALIGN);

-cc->page_pool = mempool_create_page_pool(BIO_MAX_PAGES, 0);
+cc->page_pool = mempool_create(BIO_MAX_PAGES, crypt_page_alloc, crypt_page_free, cc);
if (!cc->page_pool) {
  ti->error = "Cannot allocate page mempool";
  goto bad;
}

ret = -EINVAL;
-if (sscanf(argv[4], "%llu%c", &tmpll, &dummy) != 1) {
+if (sscanf(argv[4], "%llu%c", &tmpll, &dummy) != 1 || tmpll != (sector_t)tmpll) {
  ti->error = "Invalid device sector";
  goto bad;
}
  @ @ -2727,7 +2812,7 @@
}

limits->max_segment_size = PAGE_SIZE;
-if (cc->sector_size != (1 << SECTOR_SHIFT)) {
  -limits->logical_block_size = cc->sector_size;
  -limits->physical_block_size = cc->sector_size;
  -blk_limits_io_min(limits, cc->sector_size);
  -}
+limits->logical_block_size =
+  max_t(unsigned, limits->logical_block_size, cc->sector_size);
+limits->physical_block_size =
+  max_t(unsigned, limits->physical_block_size, cc->sector_size);
+limits->io_min = max_t(unsigned, limits->io_min, cc->sector_size);
}

static struct target_type crypt_target = {

@end -222,7 +222,8 @@

dc->reads = dc->writes = 0;

ret = -EINVAL;
-if (sscanf(argv[1], "%llu%c", &tmpll, &dummy) != 1) {
+if (sscanf(argv[1], "%llu%c", &tmpll, &dummy) != 1 || tmpll != (sector_t)tmpll) {
  ti->error = "Invalid device sector";
  goto bad;
}
  @ @ -146,7 +146,7 @@

-destroy_workqueue(dc->kdelayd_wq);
+if (dc->kdelayd_wq)
+destroy_workqueue(dc->kdelayd_wq);

dm_put_device(i, dc->dev_read);

--- linux-4.15.0.orig/drivers/md/dm-era-target.c
+++ linux-4.15.0/drivers/md/dm-era-target.c
@@ -46,6 +46,7 @@
static void writeset_free(struct writeset *ws)
{
    vfree(ws->bits);
+    ws->bits = NULL;
}

static int setup_on_disk_bitset(struct dm_disk_bitset *info,
@@ -70,8 +71,6 @@
    ws->bits = vzalloc(bitset_size(nr_blocks));
    if (!ws->bits) {
        DMERR("%s: couldn't allocate in memory bitset", __func__);  
@@ -84,12 +83,14 @@
  /*
  * Wipes the in-core bitset, and creates a new on disk bitset.
  */
-    static int writeset_init(struct dm_disk_bitset *info, struct writeset *ws)
+static int writeset_init(struct dm_disk_bitset *info, struct writeset *ws,
+    dm_block_t nr_blocks)
{
    int r;

    -memset(ws->bits, 0, bitset_size(ws->md.nr_bits));
    +memset(ws->bits, 0, bitset_size(nr_blocks));

    +ws->md.nr_bits = nr_blocks;
    r = setup_on_disk_bitset(info, ws->md.nr_bits, &ws->md.root);
    if (r) {
        DMERR("%s: setup_on_disk_bitset failed", __func__);  
@@ -133,7 +134,7 @@
    int r;

    -if (!test_and_set_bit(block, ws->bits)) {
    +if (!test_and_set_bit(block, ws->bits)) {
+if (!test_bit(block, ws->bits)) {
    r = dm_bitset_set_bit(info, ws->md.root, block, &ws->md.root);
    if (r) {
        /* FIXME: fail mode */
        @@ -387,7 +388,7 @@
    }
}

static int ws_eq(void *context, const void *value1, const void *value2) {
    return !memcmp(value1, value2, sizeof(struct writeset_metadata));
} +return !memcmp(value1, value2, sizeof(struct writeset_disk));
}

/*----------------------------------------------------------------*/
@@ -563,6 +564,15 @@
    disk = dm_block_data(sblock);
    +*/ Verifying the data block size hasn't changed */
    +if (le32_to_cpu(disk->data_block_size) != md->block_size) {
        +DMERR("changing the data block size (from %u to %llu) is not supported",
        +    le32_to_cpu(disk->data_block_size), md->block_size);
        +r = -EINVAL;
        +goto bad;
        +}
    +
    r = dm_tm_open_with_sm(md->bm, SUPERBLOCK_LOCATION,
        disk->metadata_space_map_root,
        sizeof(disk->metadata_space_map_root),
        @@ -574,10 +584,10 @@
    setup_infos(md);

-    md->block_size = le32_to_cpu(disk->data_block_size);
-    md->nr_blocks = le32_to_cpu(disk->nr_blocks);
-    md->current_era = le32_to_cpu(disk->current_era);
+    ws_unpack(&disk->current_writeset, &md->current_writeset->md);
    md->writeset_tree_root = le64_to_cpu(disk->writeset_tree_root);
    md->era_array_root = le64_to_cpu(disk->era_array_root);
    md->metadata_snap = le64_to_cpu(disk->metadata_snap);
    @@ -745,6 +755,12 @@
    ws_unpack(&disk, &d->writeset);
    d->value = cpu_to_le32(key);
    +*/
    + * We initialise another bitset info to avoid any caching side effects
    + * with the previous one.

+ */
+dm_disk_bitset_init(md->tm, &d->info);
+
d->nr_bits = min(d->writeset.nr_bits, md->nr_blocks);
d->current_bit = 0;
d->step = metadata_digest_transcribe_writeset;
@@ -758,12 +774,6 @@
return 0;

memset(d, 0, sizeof(*d));
-
-/*
- * We initialise another bitset info to avoid any caching side
- * effects with the previous one.
- */
-*/
-dm_disk_bitset_init(md->tm, &d->info);
d->step = metadata_digest_lookup_writeset;

return 0;
@@ -801,6 +811,8 @@
static void metadata_close(struct era_metadata *md)
{
+writeset_free(&md->writesets[0]);
+writeset_free(&md->writesets[1]);
destroy_persistent_data_objects(md);
kfree(md);
}
@@ -838,6 +850,7 @@
r = writeset_alloc(&md->writesets[1], *new_size);
if (r) {
DMERR("%s: writeset_alloc failed for writeset 1", __func__);
+writeset_free(&md->writesets[0]);
return r;
}

@@ -848,6 +861,8 @@
    &value, &md->era_array_root);
if (r) {
DMERR("%s: dm_array_resize failed", __func__);
+writeset_free(&md->writesets[0]);
+writeset_free(&md->writesets[1]);
return r;
}

@@ -869,7 +884,6 @@
}
ws_pack(&md->current_writeset->md, &value);
-md->current_writeset->md.root = INVALID_WRITESET_ROOT;

keys[0] = md->current_era;
__dm_bless_for_disk(&value);
@@ -881,6 +895,7 @@
 return r;
 }

+md->current_writeset->md.root = INVALID_WRITESET_ROOT;
 md->archived_writesets = true;

return 0;
@@ -897,7 +912,7 @@
 int r;
 struct writeset *new_writeset = next_writeset(md);

- r = writeset_init(&md->bitset_info, new_writeset);
+ r = writeset_init(&md->bitset_info, new_writeset, md->nr_blocks);
 if (r) {
 DMERR("%s: writeset_init failed", __func__); return r;
@@ -950,7 +965,7 @@
 int r;
 struct dm_block *sblock;

- if (md->current_writeset->md.root != SUPERBLOCK_LOCATION) {
+ if (md->current_writeset->md.root != INVALID_WRITESET_ROOT) {
 r = dm_bitset_flush(&md->bitset_info, md->current_writeset->md.root,
    &md->current_writeset->md.root);
 if (r) {
@@ -1225,8 +1240,10 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
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 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
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 bio_list_init(&marked_bios);
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 int r;
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 struct bio *bio;
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 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
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 struct bio *bio;
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 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
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 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
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 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
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 struct bio *bio;
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 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;

 bio_list_init(&deferred_bios);
 bio_list_init(&marked_bios);
@@ -1236,9 +1253,11 @@
 int r;
 struct bio_list deferred_bios, marked_bios;
 struct bio *bio;
+struct blk_plug plug;
 bool commit_needed = false;
 bool failed = false;
+struct writeset *ws = era->md->current_writeset;
while ((bio = bio_list_pop(&deferred_bios))) {
+  r = writeset_test_and_set(&era->md->bitset_info, ws, 
+  get_block(era, bio));
if (r < 0) {
/*
  @ @ -1246,7 +1265,6 @ @
  * FIXME: finish.
  */
  failed = true;
  
  } else if (r == 0)
  commit_needed = true;

@@ -1262,9 +1280,19 @@
if (failed)
  while ((bio = bio_list_pop(&marked_bios)))
    bio_io_error(bio);
  else
    while ((bio = bio_list_pop(&marked_bios))) {
+  blk_start_plug(&plug);
+  while ((bio = bio_list_pop(&marked_bios))) {
+/*
+  * Only update the in-core writeset if the on-disk one
+  * was updated too.
+ */
+  if (commit_needed)
+    set_bit(get_block(era, bio), ws->bits);
+  generic_make_request(bio);
+}
+  blk_finish_plug(&plug);
  
}

static void process_rpc_calls(struct era *era)
@@ -1485,15 +1513,6 @@
}
 era->md = md;

-era->nr_blocks = calc_nr_blocks(era);
- 
-  r = metadata_resize(era->md, &era->nr_blocks);
-  if (r) {
-    -ti->error = "couldn't resize metadata";
-    era_destroy(era);
era->nr_blocks = new_size;
}

start_worker(era);

- r = in_worker0(era, metadata_new_era);
+ r = in_worker0(era, metadata_era_rollover);
if (r) {
 DMERR("%s: metadata_era_rollover failed", __func__);
 return r;
--- linux-4.15.0.orig/drivers/md/dm-flakey.c
+++ linux-4.15.0/drivers/md/dm-flakey.c
@@ -70,6 +70,11 @@
 arg_name = dm_shift_arg(as);
 argc--;

+if (!arg_name) {
+ ti->error = "Insufficient feature arguments";
+ return -EINVAL;
+}
+
/*
 * drop_writes
 */
devname = dm_shift_arg(&as);

r = -EINVAL;
-if (sscanf(dm_shift_arg(&as), "%%llu%c", &tmpll, &dummy) != 1) {
+if (sscanf(dm_shift_arg(&as), "%%llu%c", &tmpll, &dummy) != 1 || tmpll != (sector_t)tmpll) {
ti->error = "Invalid device sector";
goto bad;
}

static void corrupt_bio_data(struct bio *bio, struct flakey_c *fc)
{
unsigned bio_bytes = bio_cur_bytes(bio);
-char *data = bio_data(bio);
+unsigned int corrupt_bio_byte = fc->corrupt_bio_byte - 1;
+
+struct bvec_iter iter;
+struct bio_vec bvec;
+
+if (!bio_has_data(bio))
+return;

/*
 * Overwrite the Nth byte of the data returned.
++++ Overwrite the Nth byte of the bio's data, on whichever page
++++ it falls.
 */
- if (data && bio_bytes >= fc->corrupt_bio_byte) {
- data[fc->corrupt_bio_byte - 1] = fc->corrupt_bio_value;
- DMDEBUG("Corrupting data bio=%p by writing %u to byte %u 
- "("rw=%c bi_opf=%u bi_sector=%llu cur_bytes=%u\n"
- ,bio, fc->corrupt_bio_value, fc->corrupt_bio_byte,
- (bio_data_dir(bio) == WRITE) ? 'w' : 'r', bio->bi_opf,
- (unsigned long long)bio->bi_iter.bi_sector, bio->cur_bytes);
- bio_for_each_segment(bvec, bio, iter) {
+ bio_for_each_segment(bvec, bio, iter) {
+ char *segment = (page_address(bio_iter_page(bio, iter))
+ bio_iter_offset(bio, iter));
+ segment[corrupt_bio_byte] = fc->corrupt_bio_value;
+ DMDEBUG("Corrupting data bio=%p by writing %u to byte %u 
+ "("rw=%c bi_opf=%u bi_sector=%llu size=%u\n"
+ ,bio, fc->corrupt_bio_value, fc->corrupt_bio_byte,
+ (bio_data_dir(bio) == WRITE) ? 'w' : 'r', bio->bi_opf,
+ (unsigned long long)bio->bi_iter.bi_sector, bio->bi_iter.bi_size);
+ break;
+ }

static struct target_type flakey_target = {
    .name = "flakey",
    .version = {1, 5, 0},
    .features = DM_TARGET_ZONED_HM,
    .module = THIS_MODULE,
    .ctr = flakey_ctr,
    .dtr = flakey_dtr,
    --- linux-4.15.0.orig/drivers/md/dm-integrity.c
    +++ linux-4.15.0/drivers/md/dm-integrity.c
    @@ -6,6 +6,8 @@
    * This file is released under the GPL.
    */
    +#include "dm-bio-record.h"
    +
    #include <linux/compiler.h>
    #include <linux/module.h>
    #include <linux/device-mapper.h>
    @@ -178,7 +180,7 @@
    __u8 sectors_per_block;
    unsigned char mode;
    -bool suspending;
    +int suspending;
    
    int failed;
    @@ -188,6 +190,7 @@
    struct rb_root in_progress;
    wait_queue_head_t endio_wait;
    struct workqueue_struct *wait_wq;
    +struct workqueue_struct *offload_wq;
    unsigned char commit_seq;
    commit_id_t commit_ids[N_COMMIT_IDS];
    @@ -253,11 +256,7 @@
    struct completion *completion;
    -struct gendisk *orig_bi_disk;
    -u8 orig_bi_partno;
struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
    struct dm_integrity_io *dio = dm_per_bio_data(bio, sizeof(struct dm_integrity_io));
    -bio_end_io_t *orig_bi_end_io;
    -struct bio_integrity_payload *orig_bi_integrity;
    -struct bvec_iter orig_bi_iter;
    +struct dm_bio_details bio_details;
    }
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    do_crypt(true, req, comp);
    do_crypt(false, req, comp);
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
    struct dm_integrity_io *dio = dm_per_bio_data(bio, sizeof(struct dm_integrity_io));
    -bio_end_io_t *orig_bi_end_io;
    -struct bio_integrity_payload *orig_bi_integrity;
    -struct bvec_iter orig_bi_iter;
    +struct dm_bio_details bio_details;
    }
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    do_crypt(true, req, comp);
    do_crypt(false, req, comp);
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
    struct dm_integrity_io *dio = dm_per_bio_data(bio, sizeof(struct dm_integrity_io));
    -bio_end_io_t *orig_bi_end_io;
    -struct bio_integrity_payload *orig_bi_integrity;
    -struct bvec_iter orig_bi_iter;
    +struct dm_bio_details bio_details;
    }
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    do_crypt(true, req, comp);
    do_crypt(false, req, comp);
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
    struct dm_integrity_io *dio = dm_per_bio_data(bio, sizeof(struct dm_integrity_io));
    -bio_end_io_t *orig_bi_end_io;
    -struct bio_integrity_payload *orig_bi_integrity;
    -struct bvec_iter orig_bi_iter;
    +struct dm_bio_details bio_details;
    }
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    do_crypt(true, req, comp);
    do_crypt(false, req, comp);
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
    struct dm_integrity_io *dio = dm_per_bio_data(bio, sizeof(struct dm_integrity_io));
    -bio_end_io_t *orig_bi_end_io;
    -struct bio_integrity_payload *orig_bi_integrity;
    -struct bvec_iter orig_bi_iter;
    +struct dm_bio_details bio_details;
    }
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    do_crypt(true, req, comp);
    do_crypt(false, req, comp);
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
    struct dm_integrity_io *dio = dm_per_bio_data(bio, sizeof(struct dm_integrity_io));
    -bio_end_io_t *orig_bi_end_io;
    -struct bio_integrity_payload *orig_bi_integrity;
    -struct bvec_iter orig_bi_iter;
    +struct dm_bio_details bio_details;
    }
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    do_crypt(true, req, comp);
    do_crypt(false, req, comp);
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
    struct dm_integrity_io *dio = dm_per_bio_data(bio, sizeof(struct dm_integrity_io));
    -bio_end_io_t *orig_bi_end_io;
    -struct bio_integrity_payload *orig_bi_integrity;
    -struct bvec_iter orig_bi_iter;
    +struct dm_bio_details bio_details;
    }
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    do_crypt(true, req, comp);
    do_crypt(false, req, comp);
    do_endio_flush(ic, dio);
    do_endio_flush(ic, dio);
    }
    struct journal_completion {
    unsigned j, size;
    desc->tfm = ic->journal_mac;
    -desc->flags = CRYPTO_TFM_REQ_MAY_SLEEP;
    +desc->flags = 0;
    r = crypto_shash_init(desc);
    if (unlikely(r)) {
        static bool do_crypt(bool encrypt, struct skcipher_request *req, struct journal_completion *comp) {
            int r;
            -skcipher_request_set_callback(req, CRYPTO_TFM_REQ_MAY_BACKLOG | CRYPTO_TFM_REQ_MAY_SLEEP,
                complete_journal_encrypt, comp);
            if (likely(encrypt))
                r = crypto_skcipher_encrypt(req);
        }
        do_crypt(true, req, comp);
        do_crypt(false, req, comp);
        do_endio_flush(ic, dio);
        do_endio_flush(ic, dio);
    }
-bio->bi_end_io = dio->orig_bi_end_io;

if (dio->completion)
    complete(dio->completion);
@@ -1256,7 +1250,7 @@
if (!checksums)
    checksums = checksums_onstack;

-__bio_for_each_segment(bv, bio, dio->orig_bi_iter) {
+__bio_for_each_segment(bv, bio, dio->bio_details.bi_iter) {
    unsigned pos;
    char *mem, *checksums_ptr;

@@ -1277,8 +1271,8 @@
checksums_ptr - checksums, !dio->write ? TAG_CMP : TAG_WRITE);
if (unlikely(r)) {
    if (r > 0) {
        -DMERR("Checksum failed at sector 0x%llx",
-        (unsigned long long)(sector - ((r + ic->tag_size - 1) / ic->tag_size)));
+DMERR_LIMIT("Checksum failed at sector 0x%llx",
+        (unsigned long long)(sector - ((r + ic->tag_size - 1) / ic->tag_size)));
    r = -EILSEQ;
    atomic64_inc(&ic->number_of_mismatches);
} }
@@ -1300,7 +1294,7 @@
else {
    -struct bio_integrity_payload *bip = dio->orig_bi_integrity;
+struct bio_integrity_payload *bip = dio->bio_details.bi_integrity;

    if (bip) {
        struct bio_vec biv;
@@ -1470,8 +1464,8 @@
        integrity_sector_checksum(ic, logical_sector, mem + bv.bv_offset, checksums_onstack);
        if (unlikely(memcmp(checksums_onstack, journal_entry_tag(ic, je), ic->tag_size))) {
            -DMERR("Checksum failed when reading from journal, at sector 0x%llx",
-            (unsigned long long)logical_sector);
+DMERR_LIMIT("Checksum failed when reading from journal, at sector 0x%llx",
+            (unsigned long long)logical_sector);
        }
    }
#endif
@@ -1578,7 +1572,7 @@
if (need_sync_io && from_map) {
    INIT_WORK(&dio->work, integrity_bio_wait);
-queue_work(ic->metadata_wq, &dio->work);
+queue_work(ic->offload_wq, &dio->work);
return;
}

@@ -1687,21 +1681,14 @@
} else
 dio->completion = NULL;

-dio->orig_bi_iter = bio->bi_iter;
-dio->orig_bi_disk = bio->bi_disk;
-dio->orig_bi_partno = bio->bi_partno;
+dm_bio_record(&dio->bio_details, bio);
 bio_set_dev(bio, ic->dev->bdev);
-
-dio->orig_bi_integrity = bio_integrity(bio);
-bio->bi_integrity = NULL;
-bio->bi_opf &= ~REQ_INTEGRITY;
-
-dio->orig_bi_end_io = bio->bi_end_io;
-bio->bi_end_io = integrity_end_io;
-
bio->bi_iter.bi_size = dio->range.n_sectors << SECTOR_SHIFT;
bio->bi_iter.bi_sector += ic->start;
+generic_make_request(bio);

if (need_sync_io) {
 @@ -2210,7 +2197,7 @@
 del_timer_sync(&ic->autocommit_timer);

-ic->suspending = true;
+WRITE_ONCE(ic->suspending, 1);

queue_work(ic->commit_wq, &ic->commit_work);
drain_workqueue(ic->commit_wq);
@@ -2220,7 +2207,7 @@
 dm_integrity_flush_buffers(ic);
}

-ic->suspending = false;
+WRITE_ONCE(ic->suspending, 0);

BUG_ON(!RB_EMPTY_ROOT(&ic->in_progress));

@@ -2440,7 +2427,7 @@
unsigned i;
for (i = 0; i < ic->journal_sections; i++)
    kvfree(sl[i]);
-kfree(sl);
+kvfree(sl);
}

static struct scatterlist **dm_integrity_alloc_journal_scatterlist(struct dm_integrity_c *ic, struct page_list *pl)
@@ -2548,6 +2535,9 @@
    *error = error_key;
    return r;
 }
+} else if (crypto_shash_get_flags(*hash) & CRYPTO_TFM_NEED_KEY) {
+    *error = error_key;
+    return -ENOKEY;
+}

@@ -2915,17 +2905,17 @@
    goto bad;
 }
 ic->sectors_per_block = val >> SECTOR_SHIFT;
-} else if (!memcmp(opt_string, "internal_hash:", strlen("internal_hash:"))) {
+} else if (!strncmp(opt_string, "internal_hash:", strlen("internal_hash:"))) {
    r = get_alg_and_key(opt_string, &ic->internal_hash_alg, &ti->error,
        "Invalid internal_hash argument");
    if (r)
        goto bad;
-} else if (!memcmp(opt_string, "journal_crypt:", strlen("journal_crypt:"))) {
+} else if (!strncmp(opt_string, "journal_crypt:", strlen("journal_crypt:"))) {
    r = get_alg_and_key(opt_string, &ic->journal_crypt_alg, &ti->error,
        "Invalid journal_crypt argument");
    if (r)
        goto bad;
-} else if (!memcmp(opt_string, "journal_mac:", strlen("journal_mac:"))) {
+} else if (!strncmp(opt_string, "journal_mac:", strlen("journal_mac:"))) {
    r = get_alg_and_key(opt_string, &ic->journal_mac_alg, &ti->error,
        "Invalid journal_mac argument");
    if (r)
        goto bad;
@@ -3003,6 +2993,14 @@
    goto bad;
 }

+ic->offload_wq = alloc_workqueue("dm-integrity-offload", WQ_MEM_RECLAIM,
+    METADATA_WORKQUEUE_MAX_ACTIVE);
+if (!ic->offload_wq) {
+    ti->error = "Cannot allocate workqueue";
+    r = -ENOMEM;

goto bad;
+
+ic->commit_wq = alloc_workqueue("dm-integrity-commit", WQ_MEM_RECLAIM, 1);
if (!ic->commit_wq) {
    ti->error = "Cannot allocate workqueue";
    @ @ -3187.6 +3185.8 @@
    destroy_workqueue(ic->metadata_wq);
    if (ic->wait_wq)
        destroy_workqueue(ic->wait_wq);
    +if (ic->offload_wq)
        +destroy_workqueue(ic->offload_wq);
    if (ic->commit_wq)
        destroy_workqueue(ic->commit_wq);
    if (ic->writer_wq)
        --- linux-4.15.0.orig/drivers/md/dm-io.c
        +++ linux-4.15.0/drivers/md/dm-io.c
        @ @ -50.7 +50.7 @@
        struct dm_io_client *client;
        unsigned min_ios = dm_get_reserved_bio_based_ios();

        -client = kmalloc(sizeof(*client), GFP_KERNEL);
        +client = kzalloc(sizeof(*client), GFP_KERNEL);
        if (!client)
            return ERR_PTR(-ENOMEM);
        --- linux-4.15.0.orig/drivers/md/dm-ioctl.c
        +++ linux-4.15.0/drivers/md/dm-ioctl.c
        @ @ -529.7 +529.7 @@
        /* Grab our output buffer. */
        nl = orig_nl = get_result_buffer(param, param_size, &len);
        -if (len < needed) {
            +if (len < needed || len < sizeof(nl->dev)) {
                param->flags |= DM_BUFFER_FULL_FLAG;
                goto out;
            }
            @ @ -1574.6 +1574.7 @@

            if (!argc) {
                DMWARN("Empty message received.");
                +r = -EINVAL;
                goto out_argv;
            }
            @ @ -1719.8 +1720.7 @@
        }
static int copy_params(struct dm_ioctl __user *user, struct dm_ioctl *param_kernel, int ioctl_flags, struct dm_ioctl **param, int *param_flags)
{
    struct dm_ioctl *dmi;
    int secure_data;
    /* Copy from param_kernel (which was already copied from user) */
    memcpy(dmi, param_kernel, minimum_data_size);

    data_copied:
    /* Abort if something changed the ioctl data while it was being copied. */
    if (dmi->data_size != param_kernel->data_size) {
        DMERR("rejecting ioctl: data size modified while processing parameters");
        goto bad;
    }
    goto data_copied;

    /* Wipe the user buffer so we do not return it to userspace */
    if (secure_data && clear_user(user, param_kernel->data_size))
        goto bad;

    /* We maintain four lists of jobs: */
    /* i) jobs waiting for pages */
    /* ii) jobs that have pages, and are waiting for the io to be issued. */
    /* iii) jobs that don't need to do any IO and just run a callback */
    /* iv) jobs that have completed. */
    /* All four of these are protected by job_lock. */

    struct dm_kcopyd_throttle *throttle;

    /*
      * We maintain three lists of jobs:
      * i) jobs waiting for pages
      * ii) jobs that have pages, and are waiting for the io to be issued.
      * iii) jobs that have completed.
      * All three of these are protected by job_lock.
      */

    *param_flags |= DM_PARAMS_MALLOC;

    -if (copy_from_user(dmi, user, param_kernel->data_size))
        goto bad;
    +/* Copy from param_kernel (which was already copied from user) */
    +memcpy(dmi, param_kernel, minimum_data_size);

    -data_copied:
    /*Abort if something changed the ioctl data while it was being copied.*/
    -*/
    -if (dmi->data_size != param_kernel->data_size) {
        DMERR("rejecting ioctl: data size modified while processing parameters");
        goto bad;
    }
*/
spinlock_t job_lock;
+struct list_head callback_jobs;
struct list_head complete_jobs;
struct list_head io_jobs;
struct list_head pages_jobs;
@@ -484,6 +486,8 @@
if (atomic_dec_and_test(&kc->nr_jobs))
    wake_up(&kc->destroyq);

+cond_resched();
+
return 0;
}

@@ -541,8 +545,10 @@
 * no point in continuing.
 */
if (test_bit(DM_KCOPYD_WRITE_SEQ, &job->flags) &&
-    job->master_job->write_err)
+    job->master_job->write_err) {
+    job->write_err = job->master_job->write_err;
    return -EIO;
+}

io_job_start(job->kc->throttle);

@@ -594,6 +600,7 @@
else
    job->read_err = 1;
push(&kc->complete_jobs, job);
+  wake(kc);
break;
}

@@ -620,6 +627,7 @@
struct dm_kcopyd_client *kc = container_of(work,
struct dm_kcopyd_client, kcopyd_work);
struct blk_plug plug;
+unsigned long flags;

/*
 * The order that these are called is *very* important.
@@ -628,6 +636,10 @@
 * list. io jobs call wake when they complete and it all
 * starts again.
 */
+spin_lock_irqsave(&kc->job_lock, flags);
+list_splice_tail_init(&kc->callback_jobs, &kc->complete_jobs);
+spin_unlock_irqrestore(&kc->job_lock, flags);
+
+blk_start_plug(&plug);
+process_jobs(&kc->complete_jobs, kc, run_complete_job);
+process_jobs(&kc->pages_jobs, kc, run_pages_job);
@@ -645,7 +657,7 @@
+struct dm_kcopyd_client *kc = job->kc;
+atomic_inc(&kc->nr_jobs);
+if (unlikely(!job->source.count))
+	push(&kc->callback_jobs, job);
+else if (job->pages == &zero_page_list)
+	push(&kc->io_jobs, job);
+else
+@@ -855,7 +867,7 @@
+push(&kc->io_jobs, job);
+else
+	push(&kc->complete_jobs, job);
+	wake(kc);
+EXPORT_SYMBOL(dm_kcopyd_do_callback);
+}
+int r = -ENOMEM;
+struct dm_kcopyd_client *kc;
-
+kc = kmalloc(sizeof(*kc), GFP_KERNEL);
+kc = kzalloc(sizeof(*kc), GFP_KERNEL);
+if (!kc)
+return ERR_PTR(-ENOMEM);
+spin_lock_init(&kc->job_lock);
+INIT_LIST_HEAD(&kc->callback_jobs);
+INIT_LIST_HEAD(&kc->complete_jobs);
+INIT_LIST_HEAD(&kc->io_jobs);
+INIT_LIST_HEAD(&kc->pages_jobs);
+/* Wait for completion of all jobs submitted by this client. */
+wait_event(kc->destroyq, !atomic_read(&kc->nr_jobs));
+
+BUG_ON(!list_empty(&kc->callback_jobs));
+BUG_ON(!list_empty(&kc->complete_jobs));
+BUG_ON(!list_empty(&kc->io_jobs));
+BUG_ON(!list_empty(&kc->pages_jobs));
--- linux-4.15.0.orig/drivers/md/dm-linear.c
+++ linux-4.15.0/drivers/md/dm-linear.c

ret = -EINVAL;
    if (sscanf(argv[1], "%llu\%c", &tmp, &dummy) != 1) {
        ti->error = "Invalid device sector";
        goto bad;
    }

    ret = -EINVAL;
    if (sscanf(argv[1], "%llu\%c", &tmp, &dummy) != 1 || tmp != (sector_t)tmp) {
        ti->error = "Invalid device sector";
        goto bad;
    }

    return DM_MAPIO_REMAPPED;
}

#ifdef CONFIG_BLK_DEV_ZONED
static int linear_end_io(struct dm_target *ti, struct bio *bio,
                        blk_status_t *error)
{
    return DM_ENDIO_DONE;
}
#endif

static void linear_status(struct dm_target *ti, status_type_t type,
                          unsigned status_flags, char *result, unsigned maxlen)
{
    static struct target_type linear_target = {
        .name   = "linear",
        .version = {1, 4, 0},
        .end_io = linear_end_io,
        .features = DM_TARGET_PASSES_INTEGRITY | DM_TARGET_ZONED_HM,
        .module = THIS_MODULE,
        .ctr    = linear_ctr,
        .dtr    = linear_dtr,
        .map    = linear_map,
        .end_io = linear_end_io,
        .status = linear_status,
        .prepare_ioctl = linear_prepare_ioctl,
        .iterate_devices = linear_iterate_devices,
    };

#define WRITE_LOG_MAGIC 0x6a736677736872ULL
+#define WRITE_LOG_SUPER_SECTOR 0

/*
 * The disk format for this is braindead simple.
@@ -114,6 +115,7 @@
 struct list_head logging_blocks;
 wait_queue_head_t wait;
 struct task_struct *log_kthread;
+struct completion super_done;
};

 struct pending_block {
@@ -179,6 +181,14 @@
 bio_put(bio);
 }

+static void log_end_super(struct bio *bio)
+{
+ struct log_writes_c *lc = bio->bi_private;
+ +
+ complete(&lc->super_done);
+ log_end_io(bio);
+ +
+ /*
 * Meant to be called if there is an error, it will free all the pages
 * associated with the block.
@@ -214,7 +224,8 @@
 bio->bi_iter.bi_size = 0;
 bio->bi_iter.bi_sector = sector;
 bio_set_dev(bio, lc->logdev->bdev);
-+bio->bi_end_io = log_end_io;
+bio->bi_end_io = (sector == WRITE_LOG_SUPER_SECTOR) ?
+ log_end_super : log_end_io;
 bio->bi_private = lc;
 bio_set_op_attrs(bio, REQ_OP_WRITE, 0);
@@ -417,11 +428,18 @@
 super.nr_entries = cpu_to_le64(lc->logged_entries);
 super.sectorsize = cpu_to_le32(lc->sectorsize);

@if (write_metadata(lc, &super, sizeof(super), NULL, 0, 0)) {
+if (write_metadata(lc, &super, sizeof(super), NULL, 0,
+ WRITE_LOG_SUPER_SECTOR)) {
 DMERR("Couldn't write super");
 return -1;
}

/*
 * Super sector should be written in-order, otherwise the
 * nr_entries could be rewritten incorrectly by an old bio.
 */
+wait_for_completion_io(&lc->super_done);
+
return 0;
}

@@ -530,6 +548,7 @@
INIT_LIST_HEAD(&lc->unflushed_blocks);
INIT_LIST_HEAD(&lc->logging_blocks);
init_waitqueue_head(&lc->wait);
+init_completion(&lc->super_done);
atomic_set(&lc->io_blocks, 0);
atomic_set(&lc->pending_blocks, 0);

--- linux-4.15.0.orig/drivers/md/dm-mpath.c
+++ linux-4.15.0/drivers/md/dm-mpath.c
@@ -534,8 +534,20 @@
    if (queue_dying) {
atomic_inc(&m->pg_init_in_progress);
activate_or_offline_path(pgpath);
+return DM_MAPIO_DELAY_REQUEUE;
    }
-  return DM_MAPIO_DELAY_REQUEUE;
+
+  
+  /* blk-mq's SCHED_RESTART can cover this requeue, so we
+     needn't deal with it by DELAY_REQUEUE. More importantly,
+     we have to return DM_MAPIO_REQUEUE so that blk-mq can
+     get the queue busy feedback (via BLK_STS_RESOURCE),
+     otherwise I/O merging can suffer.
+     */
+  if (q->mq_ops)
+    return DM_MAPIO_REQUEUE;
  else
+return DM_MAPIO_DELAY_REQUEUE;
}
clone->bio = clone->biotail = NULL;
clone->rq_disk = bdev->bd_disk;
@@ -549,8 +561,23 @@
    return DM_MAPIO_REMAPPED;
}

-static void multipath_release_clone(struct request *clone)
+static void multipath_release_clone(struct request *clone,


union map_info *map_context) {
  if (unlikely(map_context)) {
    /*
    * non-NULL map_context means caller is still map
    * method; must undo multipath_clone_and_map()
    */
    struct dm_mpath_io *mpio = get_mpio(map_context);
    struct pgpath *pgpath = mpio->pgpath;
    +
    if (pgpath &
        pgpath->pg->ps.type->end_io)
        pgpath->pg->ps.type->end_io(&pgpath->pg->ps,
        +
        &pgpath->path,
        +
        mpio->nr_bytes);
    +
    +
    blk_put_request(clone);
  }

  current_pgpath = READ_ONCE(m->current_pgpath);
  -
  if (!current_pgpath)
  +
  if (!current_pgpath || !test_bit(MPATHF_QUEUE_IO, &m->flags))
    current_pgpath = choose_pgpath(m, 0);

  if (current_pgpath) {
    int r;
    
    static struct target_type multipath_target = {
      .name = "multipath",
      .version = {1, 12, 0},
      .features = DM_TARGET_SINGLETON | DM_TARGET_IMMUTABLE,
      .version = {1, 13, 0},
      .features = DM_TARGET_SINGLETON | DM_TARGET_IMMUTABLE |
      +
      DM_TARGET_PASSES_INTEGRITY,
      .module = THIS_MODULE,
      .ctr = multipath_ctr,
      .dtr = multipath_dtr,
      --- linux-4.15.0.org/drivers/md/dm-raid.c
      +++ linux-4.15.0/drivers/md/dm-raid.c
      @ @ -675,15 +675,11 @ @
      return NULL;
    }

    -/*
    - * Conditionally change bdev capacity of @rs
/* Adjust rdev sectors */
+static void rs_set_rdev_sectors(struct raid_set *rs)
{
    struct mddev *mddev = &rs->md;
    struct md_rdev *rdev;
    struct gendisk *gendisk = dm_disk(dm_table_get_md(rs->ti->table));

    /* raid10 sets rdev->sector to the device size, which
     * Change bdev capacity of @rs in case of a disk add/remove reshape
     */
    +static void rs_set_capacity(struct raid_set *rs)
    +{
        +struct gendisk *gendisk = dm_disk(dm_table_get_md(rs->ti->table));

        -set_capacity(gendisk, mddev->array_sectors);
        +set_capacity(gendisk, rs->md.array_sectors);
        revalidate_disk(gendisk);
    }

    if (!rs_is_reshaping(rs)) {
        if (rs_is_raid10(rs))
            rs_set_rdev_sectors(rs);
        rs_set_capacity(rs);

        dm_table_event(rs->ti->table);
    }

    return rs->md.new_level != rs->md.level;
}

+/* True if layout is set to reshape. */
+static bool rs_is_layout_change(struct raid_set *rs, bool use_mddev)
+{
+  return (use_mddev ? rs->md.delta_disks : rs->delta_disks) ||
+          rs->md.new_layout != rs->md.layout ||
+          rs->md.new_chunk_sectors != rs->md.chunk_sectors;
+
+  /* True if @rs is requested to reshape by ctr */
+  static bool rs_reshape_requested(struct raid_set *rs)
+  {
+    if (!mddev->level)
+      return false;
+    change = rs_is_layout_change(rs, false);
+    /* Historical case to support raid1 reshape without delta disks */
+    if (mddev->level == 1) {
+      mddev->bitmap_info.offset = (rt_is_raid0(rs->raid_type) || rs->journal_dev.dev) ? 0 : to_sector(4096);
+      mddev->bitmap_info.default_offset = mddev->bitmap_info.offset;
+      if (!test_and_clear_bit(FirstUse, &rdev->flags)) {
+        mddev->bitmap_info.offset = rt_is_raid0(rs->raid_type) ? 0 : to_sector(4096);
+        mddev->bitmap_info.default_offset = mddev->bitmap_info.offset;
+      }
+    }
+
+    /* Enable bitmap creation for RAID levels != 0 */
+    if (!test_and_clear_bit(FirstUse, &rdev->flags)) {
+      mddev->bitmap_info.offset = rt_is_raid0(rs->raid_type) ? 0 : to_sector(4096);
+      mddev->bitmap_info.default_offset = mddev->bitmap_info.offset;
+    }
+  }
+
+  /* Historical case to support raid1 reshape without delta disks */
+  if (mddev->level == 1) {
+    @ -2434,7 +2447,7 @
+  }
+
+  /* Enable bitmap creation for RAID levels != 0 */
+  if (!test_and_clear_bit(FirstUse, &rdev->flags)) {
+    @ -2778,7 +2791,7 @
+  }
+
+  /* * Reshape:
+  * - change raid layout
+  * - change chunk size
+  * - add disks
+  @ -2878,6 +2891,20 @
+  }
+
+  /* * If the md resync thread has updated superblock with max reshape position
+  * at the end of a reshape but not (yet) reset the layout configuration
+  * changes -> reset the latter.
+  */
+  static void rs_reset_inconclusive_reshape(struct raid_set *rs)
+{ 
+if (!rs_is_reshaping(rs) && rs_is_layout_change(rs, true)) { 
+rs_set_cur(rs); 
+rs->md.delta_disks = 0; 
+rs->md.reshape_backwards = 0; 
+} 
+} 
+
+/*
* Enable/disable discard support on RAID set depending on
* RAID level and discard properties of underlying RAID members.
*/
@@ -3048,6 +3075,11 @@
set_bit(RT_FLAG_UPDATE_SBS, &rs->runtime_flags); 
rs_set_new(rs); 
} else if (rs_is_recovering(rs)) { 
+/* Rebuild particular devices */
+if (test_bit(__CTR_FLAG_REBUILD, &rs->ctr_flags)) { 
+set_bit(RT_FLAG_UPDATE_SBS, &rs->runtime_flags); 
+rs_setup_recovery(rs, MaxSector); 
+} 
+/* A recovering raid set may be resized */
+/* skip setup rs */
} else if (rs_is_reshaping(rs)) { 
@@ -3135,9 +3167,14 @@
if (r)
goto bad;

+/* Catch any inconclusive reshape superblock content. */
+rs_reset_inconclusive_reshape(rs); 
+
+/* Start raid set read-only and assumed clean to change in raid_resume() */
+rs->md.ro = 1; 
+rs->md.in_sync = 1; 
+
+/* Keep array frozen until resume. */
+set_bit(MD_RECOVERY_FROZEN, &rs->md.recovery); 

+/* Has to be held on running the array */
@@ -3842,11 +3879,10 @@
mddev->resync_min = mddev->recovery_cp; 
}

-rs_set_capacity(rs); 
-
+/* Check for any reshape request unless new raid set */
if (test_and_clear_bit(RT_FLAG_RESHAPE_RS, &rs->runtime_flags)) { 
/* Initiate a reshape. */

+rs_set_rdev_sectors(rs);
mddev_lock_nointr(mddev);
rs = rs_start_reshape(rs);
mddev_unlock(mddev);
@@ -3875,6 +3911,10 @@
    mddev->ro = 0;
    mddev->in_sync = 0;

    /* Only reduce raid set size before running a disk removing reshape. */
+if (mddev->delta_disks < 0)
+rs_set_capacity(rs);
    +
/*
* Keep the RAID set frozen if reshape/rebuild flags are set.
* The RAID set is unfrozen once the next table load/resume,
--- linux-4.15.0.orig/drivers/md/dm-raid1.c
+++ linux-4.15.0/drivers/md/dm-raid1.c
@@ -948,7 +948,8 @@
    char dummy;
    int ret;

-if (sscanf(argv[1], "%llu%c", &offset, &dummy) != 1) {
+if (sscanf(argv[1], "%llu%c", &offset, &dummy) != 1 ||
    offset != (sector_t)offset) {
        ti->error = "Invalid offset";
        return -EINVAL;
    }
--- linux-4.15.0.orig/drivers/md/dm-region-hash.c
+++ linux-4.15.0/drivers/md/dm-region-hash.c
@@ -179,7 +179,7 @@
    nr_buckets >>= 1;

-rh = kmalloc(sizeof(*rh), GFP_KERNEL);
+rh = kzalloc(sizeof(*rh), GFP_KERNEL);
    if (!rh) {
        DMERR("unable to allocate region hash memory");
        return ERR_PTR(-ENOMEM);
--- linux-4.15.0.orig/drivers/md/dm-rq.c
+++ linux-4.15.0/drivers/md/dm-rq.c
@@ -95,9 +95,6 @@
 static void dm_mq_stop_queue(struct request_queue *q) {
 }

 static void dm_mq_stop_queue(struct request_queue *q) {
-    if (blk_mq_queue_stopped(q))
-        return;
-    blk_mq_quiesce_queue(q);
struct request *rq = tio->orig;

blk_rq_unprep_clone(clone);
-tio->ti->type->release_clone_rq(clone);
+ti->type->release_clone_rq(clone, NULL);

rq_end_stats(md, rq);
if (!rq->q->mq_ops)
@@ -270,7 +267,7 @@
rq_end_stats(md, rq);
if (tio->clone) {
  blk_rq_unprep_clone(tio->clone);
  -tio->type->release_clone_rq(tio->clone);
  +ti->type->release_clone_rq(tio->clone, NULL);
}

if (!rq->q->mq_ops)
@@ -395,7 +392,7 @@
dm_complete_request(tio->orig, error);
}

-static void dm_dispatch_clone_request(struct request *clone, struct request *rq)
+static blk_status_t dm_dispatch_clone_request(struct request *clone, struct request *rq)
{
  blk_status_t r;
@@ -404,9 +401,10 @@
  clone->start_time = jiffies;
  r = blk_insert_cloned_request(clone->q, clone);
  -if (r)
  +if (r != BLK_STS_OK && r != BLK_STS_RESOURCE && r != BLK_STS_DEV_RESOURCE)
     /* must complete clone in terms of original request */
     dm_complete_request(rq, r);
  +return r;
  }

static int dm_rq_bio_constructor(struct bio *bio, struct bio *bio_orig,
@@ -476,8 +474,10 @@
  struct mapped_device *md = tio->md;
  struct request *rq = tio->orig;
  struct request *clone = NULL;
  +blk_status_t ret;

  r = ti->type->clone_and_map_rq(ti, rq, &tio->info, &clone);
+check_again:
switch (r) {
  case DM_MAPIO_SUBMITTED:
    /* The target has taken the I/O to submit by itself later */
    @@ -485,14 +485,24 @@
      case DM_MAPIO_REMAPPED:
        if (setup_clone(clone, rq, tio, GFP_ATOMIC)) {
          /* -ENOMEM */
          -ti->type->release_clone_rq(clone);
          +ti->type->release_clone_rq(clone, &tio->info);
          return DM_MAPIO_REQUEUE;
        }
    /* The target has remapped the I/O so dispatch it */
    trace_block_rq_remap(clone->q, clone, disk_dev(dm_disk(md)),
      blk_rq_pos(rq));
    -dm_dispatch_clone_request(clone, rq);
    +ret = dm_dispatch_clone_request(clone, rq);
    +if (ret == BLK_STS_Resource || ret == BLK_STS_DEV_Resource) {
      +blk_rq_unprep_clone(clone);
      +tio->type->release_clone_rq(clone, &tio->info);
      +tio->clone = NULL;
      +if (!rq->q->mq_ops)
      +  r = DM_MAPIO_DELAY_REQUEUE;
      +else
      +  r = DM_MAPIO_REQUEUE;
      +goto check_again;
    +}
    break;
  case DM_MAPIO_REQUEUE:
    /* The target wants to requeue the I/O */
    @@ -758,7 +768,6 @@
      /* Undo dm_start_request() before requeuing */
    rq_end_stats(md, rq);
    rq_completed(md, rq_data_dir(rq), false);
    -blk_mq_delay_run_hw_queue(hctx, 100/*ms*/);
    return BLK_STS_RESOURCE;
    }
    @@ -825,6 +834,7 @@
    blk_mq_free_tag_set(md->tag_set);
    out_kfree_tag_set:
    kfree(md->tag_set);
    +md->tag_set = NULL;
    return err;
    }
    @@ -834,6 +844,7 @@
if (md->tag_set) {
    blk_mq_free_tag_set(md->tag_set);
    kfree(md->tag_set);
    md->tag_set = NULL;
}
}

--- linux-4.15.0.orig/drivers/md/dm-snap-persistent.c
+++ linux-4.15.0/drivers/md/dm-snap-persistent.c
@@ -17,7 +17,7 @@
#include "dm-bufio.h"
#define DM_MSG_PREFIX "persistent snapshot"
-#define DM_CHUNK_SIZE_DEFAULT_SECTORS 32/* 16KB */
+#define DM_CHUNK_SIZE_DEFAULT_SECTORS 32U/* 16KB */

#define DM_PREFETCH_CHUNKS12

--- linux-4.15.0.orig/drivers/md/dm-snap.c
+++ linux-4.15.0/drivers/md/dm-snap.c
@@ -47,7 +47,7 @@
};

struct dm_snapshot {
-struct rw_semaphore lock;
+struct mutex lock;

struct dm_dev *origin;
struct dm_dev *cow;
@@ -105,6 +105,9 @@
/* The on disk metadata handler */
struct dm_exception_store *store;

+unsigned in_progress;
+struct wait_queue_head in_progress_wait;
+
+struct dm_kcopyd_client *kcopyd_client;

/* Wait for events based on state_bits */
@@ -134,6 +137,11 @@
* for them to be committed.
*/
struct bio_list bios_queued_during_merge;
+
+/*
+ * Flush data after merge.
+ */
+struct bio flush_bio;
*/
@@ -145,6 +153,19 @@
#define RUNNING_MERGE 0
#define SHUTDOWN_MERGE 1

+/*
+ * Maximum number of chunks being copied on write.
+ *
+ * The value was decided experimentally as a trade-off between memory
+ * consumption, stalling the kernel's workqueues and maintaining a high enough
+ * throughput.
+ */
+#define DEFAULT_COW_THRESHOLD 2048
+
+static unsigned cow_threshold = DEFAULT_COW_THRESHOLD;
+module_param_named(snapshot_cow_threshold, cow_threshold, uint, 0644);
+MODULE_PARM_DESC(snapshot_cow_threshold, "Maximum number of chunks being copied on write");
+
+DECLARE_DM_KCOPYD_THROTTLE_WITH_MODULE_PARM(snapshot_copy_throttle,
+"A percentage of time allocated for copy on write");

@@ -439,9 +460,9 @@
if (!bdev_equal(s->cow->bdev, snap->cow->bdev))
continue;

-down_read(&s->lock);
+mutex_lock(&s->lock);
active = s->active;
-up_read(&s->lock);
+mutex_unlock(&s->lock);

if (active) {
if (snap_src)  
@@ -772,7 +793,7 @@
static uint32_t __minimum_chunk_size(struct origin *o)
{
struct dm_snapshot *snap;
-unsigned chunk_size = 0;
+unsigned chunk_size = rounddown_pow_of_two(UINT_MAX);

if (o)
list_for_each_entry(snap, &o->snapshots, list)
@@ -909,7 +930,7 @@
int r;
chunk_t old_chunk = s->first_merging_chunk + s->num_merging_chunks - 1;
-down_write(&s->lock);
+mutex_lock(&s->lock);

/ *
 * Process chunks (and associated exceptions) in reverse order
@@ -924,7 +945,7 @@
 b = __release_queued_bios_after_merge(s);
 out:
-up_write(&s->lock);
+mutex_unlock(&s->lock);
 if (b)
 flush_bios(b);
@@ -983,9 +1004,9 @@
 if (linear_chunks < 0) {
 DMERR("Read error in exception store: ",
   "shutting down merge");
-down_write(&s->lock);
+mutex_lock(&s->lock);
 s->merge_failed = 1;
-up_write(&s->lock);
+mutex_unlock(&s->lock);
 } goto shut;
 }
@@ -1026,10 +1047,10 @@
 previous_count = read_pending_exceptions_done_count();
 }
-down_write(&s->lock);
+mutex_lock(&s->lock);
 s->first_merging_chunk = old_chunk;
 s->num_merging_chunks = linear_chunks;
-up_write(&s->lock);
+mutex_unlock(&s->lock);

/* Wait until writes to all 'linear_chunks' drain */
for (i = 0; i < linear_chunks; i++)
@@ -1044,6 +1065,17 @@
 static void error_bios(struct bio *bio);

 +static int flush_data(struct dm_snapshot *s)
 +{
 +struct bio *flush_bio = &s->flush_bio;
 +
 +bio_reset(flush_bio);
bio_set_dev(flush_bio, s->origin->bdev);
flush_bio->bi_opf = REQ_OP_WRITE | REQ_PREFLUSH;
+
+return submit_bio_wait(flush_bio);
+
static void merge_callback(int read_err, unsigned long write_err, void *context)
{
    struct dm_snapshot *s = context;
    goto shut;
}

if (flush_data(s) < 0) {
    DMERR("Flush after merge failed: shutting down merge");
    goto shut;
    +}
    +
    if (s->store->type->commit_merge(s->store,
        s->num_merging_chunks) < 0) {
        DMERR("Write error in exception store: shutting down merge");
        goto shut;
    
    -down_write(&s->lock);
    +mutex_lock(&s->lock);
    s->merge_failed = 1;
    b = __release_queued_bios_after_merge(s);
    -up_write(&s->lock);
    +mutex_unlock(&s->lock);
    error_bios(b);

    merge_shutdown(s);
    goto shut;
}

- s = kmalloc(sizeof(*s), GFP_KERNEL);
+ s = kzalloc(sizeof(*s), GFP_KERNEL);
    if (!s) {
        ti->error = "Cannot allocate private snapshot structure";
        r = -ENOMEM;
        goto shut;
    
s->exception_start_sequence = 0;
    s->exception_complete_sequence = 0;
    INIT_LIST_HEAD(&s->out_of_order_list);
    -init_rwlock(&s->lock);
    +init_rwlock(&s->lock);
    origin_mode = FMODE_WRITE;
    }

    - s = kmalloc(sizeof(*s), GFP_KERNEL);
    + s = kzalloc(sizeof(*s), GFP_KERNEL);
    if (!s) {
        ti->error = "Cannot allocate private snapshot structure";
        r = -ENOMEM;
        goto shut;
    
s->exception_start_sequence = 0;
    s->exception_complete_sequence = 0;
    INIT_LIST_HEAD(&s->out_of_order_list);
    -init_rwlock(&s->lock);
    +init_rwlock(&s->lock);
    origin_mode = FMODE_WRITE;
    }
+mutex_init(&s->lock);
INIT_LIST_HEAD(&s->list);
spin_lock_init(&s->pe_lock);
s->state_bits = 0;
@@ -1181,6 +1218,7 @@
s->first_merging_chunk = 0;
s->num_merging_chunks = 0;
bio_list_init(&s->bios_queued_during_merge);
+bio_init(&s->flush_bio, NULL, 0);

/* Allocate hash table for COW data */
if (init_hash_tables(s)) {
@@ -1189,6 +1227,8 @@
goto bad_hash_tables;
}

+init_waitqueue_head(&s->in_progress_wait);
+
s->kcopyd_client = dm_kcopyd_client_create(&dm_kcopyd_throttle);
if (IS_ERR(s->kcopyd_client)) {
    r = PTR_ERR(s->kcopyd_client);
@@ -1246,6 +1286,7 @@

if (!s->store->chunk_size) {
    ti->error = "Chunk size not set";
    +r = -EINVAL;
    goto bad_read_metadata;
}

@@ -1338,9 +1379,9 @@
/* Check whether exception handover must be cancelled */
(void) __find_snapshots_sharing_cow(s, &snap_src, &snap_dest, NULL);
if (snap_src && snap_dest && (s == snap_src)) {
    -down_write(&snap_dest->lock);
    +mutex_lock(&snap_dest->lock);
    snap_dest->valid = 0;
    -up_write(&snap_dest->lock);
    +mutex_unlock(&snap_dest->lock);
    DMERR("Cancelling snapshot handover.");
}
up_read(&_origins_lock);
@@ -1371,13 +1412,64 @@

dm_exception_store_destroy(s->store);

+mutex_destroy(&s->lock);
+
+bio_uninit(&s->flush_bio);
+ dm_put_device(ti, s->cow);

dm_put_device(ti, s->origin);

+WARN_ON(s->in_progress);
+
kfree(s);
}

+static void account_start_copy(struct dm_snapshot *s)
+{
+spin_lock(&s->in_progress_wait.lock);
+s->in_progress++;
+spin_unlock(&s->in_progress_wait.lock);
+
+
+static void account_end_copy(struct dm_snapshot *s)
+{
+spin_lock(&s->in_progress_wait.lock);
+BUG_ON(!s->in_progress);
+s->in_progress--;
+if (likely(s->in_progress <= cow_threshold) &&
    unlikely(waitqueue_active(&s->in_progress_wait)))
+wake_up_locked(&s->in_progress_wait);
+spin_unlock(&s->in_progress_wait.lock);
+
+
+static bool wait_for_in_progress(struct dm_snapshot *s, bool unlock_origins)
+{
+if (unlikely(s->in_progress > cow_threshold)) {
+spin_lock(&s->in_progress_wait.lock);
+if (likely(s->in_progress > cow_threshold)) {
+#
+ * NOTE: this throttle doesn't account for whether
+ * the caller is servicing an IO that will trigger a COW
+ * so excess throttling may result for chunks not required
+ * to be COW'd. But if cow_threshold was reached, extra
+ * throttling is unlikely to negatively impact performance.
+ */
+DECLARE_WAITQUEUE(wait, current);
+__add_wait_queue(&s->in_progress_wait, &wait);
+__set_current_state(TASK_UNINTERRUPTIBLE);
+spin_unlock(&s->in_progress_wait.lock);
+if (unlock_origins)
+up_read(&_origins_lock);
+io_schedule();
+remove_wait_queue(&s->in_progress_wait, &wait);
+}
return false;
+
spin_unlock(&s->in_progress_wait.lock);
+
return true;
+
/*
 * Flush a list of buffers.
 */
@@ -1393,7 +1485,7 @@
 }
 }

-static int do_origin(struct dm_dev *origin, struct bio *bio);
+static int do_origin(struct dm_dev *origin, struct bio *bio, bool limit);

/*
 * Flush a list of buffers.
@@ -1406,7 +1498,7 @@

t = do_origin(s->origin, bio);    
if (t == DM_MAPIO_REMAPPED)      
generic_make_request(bio);       
bio = n;                         
@@ -1458,7 +1550,7 @@

if (!success) {
    /* Read/write error - snapshot is unusable */
-    down_write(&s->lock);
+    mutex_lock(&s->lock);
     __invalidate_snapshot(s, -EIO);
     error = 1;
    goto out;
@@ -1466,14 +1558,14 @@

e = alloc_completed_exception(GFP_NOIO);
if (!e) {
    /* Read/write error - snapshot is unusable */
-    down_write(&s->lock);
+    mutex_lock(&s->lock);
     __invalidate_snapshot(s, -EIO);
     error = 1;
    goto out;
    }
    *e = pe->e;
-down_write(&s->lock);
+mutex_lock(&s->lock);
if (!s->valid) {
    free_completed_exception(e);
    error = 1;
    @ @ -1498,7 +1590,7 @@
    full_bio->bi_end_io = pe->full_bio_end_io;
    increment_pending_exceptions_done_count();

    -up_write(&s->lock);
+mutex_unlock(&s->lock);

    /* Submit any pending write bios */
    if (error) {
        @ @ -1560,6 +1652,7 @@
    }
    list_add(&pe->out_of_order_entry, lh);
    }
+account_end_copy(s);
    }

    /*
    @ @ -1583,6 +1676,7 @@
    dest.count = src.count;
    
    /* Hand over to kcopyd */
    +account_start_copy(s);
    dm_kcopyd_copy(s->kcopyd_client, &src, 1, &dest, 0, copy_callback, pe);
    }

    @ @ -1602,6 +1696,7 @@
    pe->full_bio = bio;
    pe->full_bio_end_io = bio->bi_end_io;

    +account_start_copy(s);
    callback_data = dm_kcopyd_prepare_callback(s->kcopyd_client,
        copy_callback, pe);

    @ @ -1692,9 +1787,12 @@
    if (!s->valid)
        return DM_MAPIO_KILL;

    /* FIXME: should only take write lock if we need
    - * to copy an exception */
    -down_write(&s->lock);
+if (bio_data_dir(bio) == WRITE) {
+    while (unlikely(!wait_for_in_progress(s, false)))
/* wait_for_in_progress() has slept */
+
+mutex_lock(&s->lock);

if (!s->valid || ( unlikely(s->snapshot_overflowed) &&
   bio_data_dir(bio) == WRITE)) {
   @@ -1717,9 +1815,9 @@
   if (bio_data_dir(bio) == WRITE) {
      pe = __lookup_pending_exception(s, chunk);
      if (!pe) {
         -up_write(&s->lock);
         +mutex_unlock(&s->lock);
         pe = alloc_pending_exception(s);
         -down_write(&s->lock);
         +mutex_lock(&s->lock);
      }
      if (bio_data_dir(bio) == WRITE) {
""
chunk = sector_to_chunk(s->store, bio->bi_iter.bi_sector);

-down_write(&s->lock);
+mutex_lock(&s->lock);

/* Full merging snapshots are redirected to the origin */
if (!s->valid)
@@ -1841,12 +1939,12 @@
bio_set_dev(bio, s->origin->bdev);

if (bio_data_dir(bio) == WRITE) {
-\t\tup_write(&s->lock);
-\t\treturn do_origin(s->origin, bio);
-\tmutex_unlock(&s->lock);
-\t+return do_origin(s->origin, bio, false);
+\tmutex_unlock(&s->lock);
}

out_unlock:
-\tup_write(&s->lock);
+\tmutex_unlock(&s->lock);

return r;
}
@@ -1878,7 +1976,7 @@
down_read(&_origins_lock);
(void) __find_snapshots_sharing_cow(s, &snap_src, &snap_dest, NULL);
if (snap_src && snap_dest) {
-\t\tdown_write(&snap_src->lock);
-\tdown_write_nested(&snap_dest->lock, SINGLE_DEPTH_NESTING);
+\t\tmutex_lock(&snap_src->lock);
if (s == snap_src) {
  DMERR("Unable to resume snapshot source until "
        "handover completes.");
@@ -1888,7 +1986,7 @@
      "source is suspended.");
r = -EINVAL;
} 
-\tdown_read(&snap_src->lock);
+\t\tmutex_unlock(&snap_src->lock);
} 
up_read(&_origins_lock);
@@ -1934,11 +2032,11 @@

(void) __find_snapshots_sharing_cow(s, &snap_src, &snap_dest, NULL);
if (snap_src && snap_dest) {
-\tdown_write(&snap_src->lock);
-\tdown_write_nested(&snap_dest->lock, SINGLE_DEPTH_NESTING);
+\tdown_write(&snap_src->lock);
+\tdown_write_nested(&snap_dest->lock, SINGLE_DEPTH_NESTING);
+\tmutex_lock(&snap_src->lock);

mutex_lock_nested(&snap_dest->lock, SINGLE_DEPTH_NESTING);
__handover_exceptions(snap_src, snap_dest);
-up_write(&snap_dest->lock);
-up_write(&snap_src->lock);
+mutex_unlock(&snap_dest->lock);
+mutex_unlock(&snap_src->lock);
}

up_read(&_origins_lock);
@@ -1953,9 +2051,9 @@
/* Now we have correct chunk size, reregister */
reregister_snapshot(s);

-down_write(&s->lock);
+mutex_lock(&s->lock);
s->active = 1;
-up_write(&s->lock);
+mutex_unlock(&s->lock);
}

static uint32_t get_origin_minimum_chunksize(struct block_device *bdev)
@@ -1995,7 +2093,7 @@
switch (type) {
    case STATUSTYPE_INFO:

-down_write(&snap->lock);
+mutex_lock(&snap->lock);

    if (!snap->valid)
        DMEMIT("Invalid");
@@ -2020,7 +2118,7 @@
DMEMIT("Unknown");
    }

-up_write(&snap->lock);
+mutex_unlock(&snap->lock);

    break;

@@ -2086,7 +2184,7 @@
    if (dm_target_is_snapshot_merge(snap->ti))
        continue;

-down_write(&snap->lock);
+mutex_lock(&snap->lock);

    /* Only deal with valid and active snapshots */
    if (!snap->valid || !snap->active)
pe = __lookup_pending_exception(snap, chunk);
if (!pe) {
    up_write(&snap->lock);
    mutex_unlock(&snap->lock);
    pe = alloc_pending_exception(snap);
    down_write(&snap->lock);
    mutex_lock(&snap->lock);
}

if (!snap->valid) {
    free_pending_exception(pe);
    @@ -2158,7 +2256,7 @@
    }

next_snapshot:
    up_write(&snap->lock);
    mutex_unlock(&snap->lock);

    if (pe_to_start_now) {
        start_copy(pe_to_start_now);
        @@ -2179,15 +2277,24 @@
        /*
         * Called on a write from the origin driver.
         */
        -static int do_origin(struct dm_dev *origin, struct bio *bio)
        +static int do_origin(struct dm_dev *origin, struct bio *bio, bool limit)
        {
            struct origin *o;
            int r = DM_MAPIO_REMAPPED;

            +again:
            down_read(&_origins_lock);
            o = __lookup_origin(origin->bdev);
            -if (o)
            +if (o) {
                +if (limit) {
                    +struct dm_snapshot *s;
                    +list_for_each_entry(s, &o->snapshots, list)
                    +if (unlikely(!wait_for_in_progress(s, true)))
                        goto again;
                +}
                +}
                r = __origin_write(&o->snapshots, bio->bi_iter.bi_sector, bio);
                +}
            up_read(&_origins_lock);

            return r;
/* Only tell snapshots if this is a write */
-return do_origin(o->dev, bio);
+return do_origin(o->dev, bio, true);
}

static long origin_dax_direct_access(struct dm_target *ti, pgoff_t pgoff,
--- linux-4.15.0.orig/drivers/md/dm-table.c
+++ linux-4.15.0/drivers/md/dm-table.c
@@ -410,7 +410,7 @@

dev_t dev;
struct block_device *bdev;

-bdev = lookup_bdev(path);
+bdev = lookup_bdev(path, 0);
if (IS_ERR(bdev))
dev = name_to_dev_t(path);
else {
@ @ -431,14 +431,13 @@
{
int r;
dev_t dev;
+unsigned int major, minor;
+char dummy;
struct dm_dev_internal *dd;
struct dm_table *t = ti->table;

BUG_ON(!t);

-dev = dm_get_dev_t(path);
-if (!dev)
-return -ENODEV;
+if (sscanf(path, "%u:%u%c", &major, &minor, &dummy) == 2) {
+/* Extract the major/minor numbers */
+dev = MKDEV(major, minor);
+if (MAJOR(dev) != major || MINOR(dev) != minor)
+return -EOVERFLOW;
+} else {
+dev = dm_get_dev_t(path);
+if (!dev)
+return -ENODEV;
+

dd = find_device(&t->devices, dev);
if (!dd) {
@ @ -548,14 +557,14 @@
* On the other hand, dm-switch needs to process bulk data using messages and
* excessive use of GFP_NOIO could cause trouble.
*/

- static char **realloc_argv(unsigned *array_size, char **old_argv)
+ static char **realloc_argv(unsigned *size, char **old_argv)
{
    char **argv;
    unsigned new_size;
    gfp_t gfp;

    - if (*array_size) {
      - new_size = *array_size * 2;
      + if (*size) {
        + new_size = *size * 2;
        gfp = GFP_KERNEL;
      } else {
        new_size = 8;
        @@ -563,8 +572,8 @@
      }
      argv = kmalloc(new_size * sizeof(*argv), gfp);
      if (argv) {
        - memcpy(argv, old_argv, *array_size * sizeof(*argv));
        + memcpy(argv, old_argv, *size * sizeof(*argv));
        + size = new_size;
      }
      kfree(old_argv);
      @@ -881,12 +890,10 @@
    }
    EXPORT_SYMBOL_GPL(dm_table_set_type);

    - static int device_supports_dax(struct dm_target *ti, struct dm_dev *dev, sector_t start, sector_t len, void *data)
    + static int device_not_dax_capable(struct dm_target *ti, struct dm_dev *dev, sector_t start, sector_t len, void *data)
    {
      - struct request_queue *q = bdev_get_queue(dev->bdev);
      -
      - return q && blk_queue_dax(q);
      + return !bdev_dax_supported(dev->bdev, PAGE_SIZE);
    }

    static bool dm_table_supports_dax(struct dm_table *t)
    @@ -902,7 +909,7 @@
    return false;

    if (!ti->type->iterate_devices ||
      !ti->type->iterate_devices(ti, device_supports_dax, NULL))
+  ti->type->iterate_devices(ti, device_not_dax_capable, NULL))
+  return false;
+
@@ -1298,12 +1305,6 @@
void dm_table_event(struct dm_table *t)
{
  /*
-   * You can no longer call dm_table_event() from interrupt
-   * context, use a bottom half instead.
-   */
-  BUG_ON(in_interrupt());
-  
mutex_lock(&_event_lock);
  if (t->event_fn)
    t->event_fn(t->event_context);
@@ -1311,7 +1312,7 @@
}
EXPORT_SYMBOL(dm_table_event);

-sector_t dm_table_get_size(struct dm_table *t)
+inline sector_t dm_table_get_size(struct dm_table *t)
{
  return t->num_targets ? (t->highs[t->num_targets - 1] + 1) : 0;
}
@@ -1336,6 +1337,9 @@
unsigned int l, n = 0, k = 0;
  sector_t *node;

+if (unlikely(sector >= dm_table_get_size(t)))
+return &t->targets[t->num_targets];
+
  for (l = 0; l < t->depth; l++) {
    n = get_child(n, k);
    node = get_node(t, l, n);
@@ -1348,6 +1352,46 @@
    return &t->targets[(KEYS_PER_NODE * n) + k];
  }
+
+/*
+ * type->iterate_devices() should be called when the sanity check needs to
+ * iterate and check all underlying data devices. iterate_devices() will
+ * iterate all underlying data devices until it encounters a non-zero return
+ * code, returned by whether the input iterate_devices_callout_fn, or
+ * iterate_devices() itself internally.
+ *
+ * For some target type (e.g. dm-stripe), one call of iterate_devices() may
iterate multiple underlying devices internally, in which case a non-zero
return code returned by iterate_devices_callout_fn will stop the iteration
in advance.

* Cases requiring _any_ underlying device supporting some kind of attribute,
  should use the iteration structure like dm_table_any_dev_attr(), or call
  it directly. @func should handle semantics of positive examples, e.g.
  capable of something.

* Cases requiring _all_ underlying devices supporting some kind of attribute,
  should use the iteration structure like dm_table_supports_nowait() or
  dm_table_supports_discards(). Or introduce dm_table_all_devs_attr() that
  uses an @anti_func that handle semantics of counter examples, e.g. not
  capable of something. So: return !dm_table_any_dev_attr(t, anti_func, data);

static bool dm_table_any_dev_attr(struct dm_table *t,
				  iterate_devices_callout_fn func, void *data)
{
struct dm_target *ti;
unsigned int i;

for (i = 0; i < dm_table_get_num_targets(t); i++) {
  ti = dm_table_get_target(t, i);
  if (ti->type->iterate_devices &&
      ti->type->iterate_devices(ti, func, data))
    return true;
}

return false;
}

static int count_device(struct dm_target *ti, struct dm_dev *dev,
sector_t start, sector_t len, void *data)
{
  int i = 0;
  for (; i < dm_table_get_num_targets(t); i++) {
    struct dm_table *table = dm_table_get_target(t, i);
    if (table->type->iterate_devices &&
        table->type->iterate_devices(ti, func, data))
      return true;
  }

  return false;
}

static int device_is_zoned_model(struct dm_target *ti, struct dm_dev *dev,

sector_t start, sector_t len, void *data)
{
  return blk_queue_zoned_model(bdev_get_queue(dev-bdev)) == ZONED_MODEL;
}

static int device_not_zoned_model(struct dm_target *ti, struct dm_dev *dev,

sector_t start, sector_t len, void *data)
{
  struct request_queue *q = bdev_get_queue(dev->bdev);
  return blk_queue_zoned_model(q) == ZONED_MODEL;
}
+return !q || blk_queue_zoned_model(q) != *zoned_model;
}

static bool dm_table_supports_zoned_model(struct dm_table *t,
@@ -1407,37 +1451,20 @@

return false;

if (!ti->type->iterate_devices ||
- !ti->type->iterate_devices(ti, device_is_zoned_model, &zoned_model))
+ ti->type->iterate_devices(ti, device_not_zoned_model, &zoned_model))

return false;
}

return true;
}

-static int device_matches_zone_sectors(struct dm_target *ti, struct dm_dev *dev,
- sector_t start, sector_t len, void *data)
+static int device_not_matches_zone_sectors(struct dm_target *ti, struct dm_dev *dev,
+ sector_t start, sector_t len, void *data)
{
 struct request_queue *q = bdev_get_queue(dev->bdev);

-unsigned int *zone_sectors = data;
-}
-}
-
- static int validate_hardware_zoned_model(struct dm_table *table,
-@@ -1457,7 +1484,7 @@

if (!zone_sectors || !is_power_of_2(zone_sectors))

static int validate_hardware_zoned_model(struct dm_table *table,
@@ -1457,7 +1484,7 @@

if (!zone_sectors || !is_power_of_2(zone_sectors))
return -EINVAL;

-if (!dm_table_matches_zone_sectors(table, zone_sectors)) {
+if (dm_table_any_dev_attr(table, device_not_matches_zone_sectors, &zone_sectors)) {
DMERR("%s: zone sectors is not consistent across all devices",
     dm_device_name(table->md));
return -EINVAL;
@@ -1647,29 +1674,12 @@
return false;
}

-static int dm_table_supports_dax_write_cache(struct dm_table *t)
-{
-struct dm_target *ti;
-unsigned i;
-
-for (i = 0; i < dm_table_get_num_targets(t); i++) {
-    ti = dm_table_get_target(t, i);
-
-    if (ti->type->iterate_devices &&
-        ti->type->iterate_devices(ti,
-          device_dax_write_cache_enabled, NULL))
-        return true;
-    }
-
-return false;
-}
-
-static int device_is_nonrot(struct dm_target *ti, struct dm_dev *dev,
-    sector_t start, sector_t len, void *data)
+static int device_is_rotation(struct dm_target *ti, struct dm_dev *dev,
+    sector_t start, sector_t len, void *data)
 {
 struct request_queue *q = bdev_get_queue(dev->bdev);

-return q && blk_queue_nonrot(q);
+return q && !blk_queue_nonrot(q);
 }

-static int device_is_not_random(struct dm_target *ti, struct dm_dev *dev,
-    sector_t start, sector_t len, void *data)
+static int device_no_sg_merge(struct dm_target *ti, struct dm_dev *dev,
+    sector_t start, sector_t len, void *data)
 {
 struct request_queue *q = bdev_get_queue(dev->bdev);

-return q && blk_queue_add_random(q);
+return q && !blk_queue_add_random(q);
 }

-static int queue_supports_sg_merge(struct dm_target *ti, struct dm_dev *dev,
-    sector_t start, sector_t len, void *data)
+static int queue_no_sg_merge(struct dm_target *ti, struct dm_dev *dev,
+    sector_t start, sector_t len, void *data)
struct request_queue *q = bdev_get_queue(dev->bdev);

return q && !test_bit(QUEUE_FLAG_NO_SG_MERGE, &q->queue_flags);

static bool dm_table_all_devices_attribute(struct dm_table *t,
   iterate_devices_callout_fn func)
{
    struct dm_target *ti;
    unsigned i;
    
    for (i = 0; i < dm_table_get_num_targets(t); i++) {
      ti = dm_table_get_target(t, i);
      
      if (!ti->type->iterate_devices ||
          !ti->type->iterate_devices(ti, func, NULL))
        return false;
    }

    return true;
}

+static int device_requires_stable_pages(struct dm_target *ti,
    struct dm_dev *dev, sector_t start,
    sector_t len, void *data)
{
    struct request_queue *q = bdev_get_queue(dev->bdev);
    
    return q && bdi_cap_stable_pages_required(q->backing_dev_info);
}

+void dm_table_set_restrictions(struct dm_table *t, struct request_queue *q,
    struct queue_limits *limits)
{
    blk_queue_write_cache(q, wc, fua);

    +if (dm_table_supports_dax(t))
    +queue_flag_set_unlocked(QUEUE_FLAG_DAX, q);
/* Ensure that all underlying devices are non-rotational. */
-if (dm_table_all_devices_attribute(t, device_is_nonrot))
	queue_flag_set_unlocked(QUEUE_FLAG_NONROT, q);
-else
	-if (dm_table_any_dev_attr(t, device_is_rotational, NULL))
		queue_flag_clear_unlocked(QUEUE_FLAG_NONROT, q);
+else
+queue_flag_set_unlocked(QUEUE_FLAG_NONROT, q);

*/
/* Some devices don't use blk_integrity but still want stable pages
   * because they do their own checksumming.
   * If any underlying device requires stable pages, a table must require
   * them as well. Only targets that support iterate_devices are considered:
   * don't want error, zero, etc to require stable pages.
   */
+if (dm_table_any_dev_attr(t, device_requires_stable_pages, NULL))
+q->backing_dev_info->capabilities |= BDI_CAP_STABLE_WRITES;
+else
+q->backing_dev_info->capabilities &= ~BDI_CAP_STABLE_WRITES;

/* Determine whether or not this queue's I/O timings contribute
   * to the entropy pool, Only request-based targets use this.
   * Clear QUEUE_FLAG_ADD_RANDOM if any underlying device does not
   * have it set.
   */
- if (blk_queue_add_random(q) && dm_table_all_devices_attribute(t, device_is_not_random))
+ if (blk_queue_add_random(q) &&
   + dm_table_any_dev_attr(t, device_is_not_random, NULL))
queue_flag_clear_unlocked(QUEUE_FLAG_ADD_RANDOM, q);
}

--- linux-4.15.0.orig/drivers/md/dm-target.c  
+++ linux-4.15.0/drivers/md/dm-target.c  
@@ -138,7 +138,8 @@
return DM_MAPIO_KILL;
}

-static void io_err_release_clone_rq(struct request *clone)  
+static void io_err_release_clone_rq(struct request *clone,  
+    union map_info *map_context)  
{

--- linux-4.15.0.orig/drivers/md/dm-thin-metadata.c  
+++ linux-4.15.0/drivers/md/dm-thin-metadata.c  
@@ -189,6 +189,12 @@
  }
  */
  + * We reserve a section of the metadata for commit overhead.
  + * All reported space does *not* include this.
  + */
  +dm_block_t metadata_reserve;
  +
  +/*
  * Set if a transaction has to be aborted but the attempt to roll back
  * to the previous (good) transaction failed. The only pool metadata
  * operation possible in this state is the closing of the device.
  @ @ -692,12 +698,16 @@
  THIN_MAX_CONCURRENT_LOCKS);
 if (IS_ERR(pmd->bm)) {
    DMERR("could not create block manager");
    -return PTR_ERR(pmd->bm);
+ r = PTR_ERR(pmd->bm);
   +pmd->bm = NULL;
   +return r;
   }

 r = __open_or_format_metadata(pmd, format_device);
-if (r)
+if (r) {
   +dm_block_manager_destroy(pmd->bm);
   +pmd->bm = NULL;
   }
static void __set_metadata_reserve(struct dm_pool_metadata *pmd)
{
    int r;
    dm_block_t total;
    dm_block_t max_blocks = 4096; /* 16M */
    r = dm_sm_get_nr_blocks(pmd->metadata_sm, &total);
    if (r) {
        DMERR("could not get size of metadata device");
        pmd->metadata_reserve = max_blocks;
    } else
        pmd->metadata_reserve = min(max_blocks, div_u64(total, 10));
}

struct dm_pool_metadata *dm_pool_metadata_open(struct block_device *bdev,
    sector_t data_block_size,
    bool format_device)
{
    __set_metadata_reserve(pmd);
    return pmd;
}

-int dm_pool_block_is_used(struct dm_pool_metadata *pmd, dm_block_t b, bool *result)
+int dm_pool_block_is_shared(struct dm_pool_metadata *pmd, dm_block_t b, bool *result)
{
    int r;
    uint32_t ref_count;
    down_read(&pmd->root_lock);
    r = dm_sm_get_count(pmd->data_sm, b, &ref_count);
    if (!r)
        -*result = (ref_count != 0);
result = (ref_count > 1);
up_read(&pmd->root_lock);

return r;
@@ -1829,6 +1855,13 @@
down_read(&pmd->root_lock);
if (!pmd->fail_io)
r = dm_sm_get_nr_free(pmd->metadata_sm, result);
+
+if (!r) {
+if (*result < pmd->metadata_reserve)
+  *result = 0;
+else
+  *result -= pmd->metadata_reserve;
+}
up_read(&pmd->root_lock);

return r;
@@ -1941,8 +1974,11 @@
int r = -EINVAL;
down_write(&pmd->root_lock);
  -if (!pmd->fail_io)
    +if (!pmd->fail_io) {
      r = __resize_space_map(pmd->metadata_sm, new_count);
    +if (!r)
      +__set_metadata_reserve(pmd);
    +}
up_write(&pmd->root_lock);

return r;
@@ -1978,16 +2014,19 @@
int dm_pool_metadata_set_needs_check(struct dm_pool_metadata *pmd)
{
  -int r;
  +int r = -EINVAL;
  struct dm_block *sblock;
  struct thin_disk_superblock *disk_super;

down_write(&pmd->root_lock);
  +if (pmd->fail_io)
  +goto out;
  +
pmd->flags |= THIN_METADATA_NEEDS_CHECK_FLAG;

  r = superblock_lock(pmd, &sblock);
  if (r) {

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DMERR("couldn't read superblock");
+DMERR("couldn't lock superblock");
goto out;
}

--- linux-4.15.0.orig/drivers/md/dm-thin-metadata.h
+++ linux-4.15.0/drivers/md/dm-thin-metadata.h
@@ -195,7 +195,7 @@
int dm_pool_get_data_dev_size(struct dm_pool_metadata *pmd, dm_block_t *result);
-int dm_pool_block_is_used(struct dm_pool_metadata *pmd, dm_block_t b, bool *result);
+int dm_pool_block_is_shared(struct dm_pool_metadata *pmd, dm_block_t b, bool *result);

int dm_pool_inc_data_range(struct dm_pool_metadata *pmd, dm_block_t b, dm_block_t e);
int dm_pool_dec_data_range(struct dm_pool_metadata *pmd, dm_block_t b, dm_block_t e);
--- linux-4.15.0.orig/drivers/md/dm-thin.c
+++ linux-4.15.0/drivers/md/dm-thin.c
@@ -195,12 +195,18 @@
struct dm_thin_new_mapping;
/*
- * The pool runs in 4 modes. Ordered in degraded order for comparisons.
+ * The pool runs in various modes. Ordered in degraded order for comparisons.
 */
enum pool_mode {
 PM_WRITE, /**< metadata may be changed */
 PM_OUT_OF_DATA_SPACE, /**< metadata may be changed, though data may not be allocated */
+ /*
+ * Like READ_ONLY, except may switch back to WRITE on metadata resize. Reported as READ_ONLY.
+ */
+ PM_OUT_OF_METADATA_SPACE,
 PM_READ_ONLY, /**< metadata may not be changed */
+ PM_FAIL /**< all I/O fails */
};
@@ -251,6 +257,38 @@
spinlock_t lock;
struct bio_list deferred_flush_bios;
+struct bio_list deferred_flush_completions;
struct list_head prepared_mappings;
struct list_head prepared_discards;
struct list_head prepared_discards_pt2;
@@ -275,9 +282,38 @@
struct dm_bio_prison_cell **cell_sort_array;
static enum pool_mode get_pool_mode(struct pool *pool) {
    return pool->pf.mode;
}

static void notify_of_pool_mode_change(struct pool *pool) {
    const char *descs[] = {
        "write",
        "out-of-data-space",
        "read-only",
        "read-only",
        "fail"
    };
    const char *extra_desc = NULL;
    enum pool_mode mode = get_pool_mode(pool);

    if (mode == PM_OUT_OF_DATA_SPACE) {
        if (!pool->pf.error_if_no_space)
            extra_desc = " (queue IO)";
        else
            extra_desc = " (error IO)";
    }

    dm_table_event(pool->ti->table);
    DMINFO("%s: switching pool to %s%s mode
           
           @ @ -915,6 +951,39 @@
mempool_free(m, m->tc->pool->mapping_pool);
    } }

static void complete_overwrite_bio(struct thin_c *tc, struct bio *bio) {
    struct pool *pool = tc->pool;
    unsigned long flags;

    /*
     * Target context for a pool.
     */
    @@ -915,6 +951,39 @@
mempool_free(m, m->tc->pool->mapping_pool);
    }

    static void complete_overwrite_bio(struct thin_c *tc, struct bio *bio) {
    struct pool *pool = tc->pool;
    unsigned long flags;
    
    */
    static void complete_overwrite_bio(struct thin_c *tc, struct bio *bio) {
    struct pool *pool = tc->pool;
    unsigned long flags;
    
    */
+ * If the bio has the REQ_FUA flag set we must commit the metadata
+ * before signaling its completion.
+ */
+if (!bio_triggers_commit(tc, bio)) {
+bio_endio(bio);
+return;
+}
+
+*/
+ * Complete bio with an error if earlier I/O caused changes to the
+ * metadata that can't be committed, e.g, due to I/O errors on the
+ * metadata device.
+ */
+if (dm_thin_aborted_changes(tc->td)) {
+bio_io_error(bio);
+return;
+}
+
+*/
+ * Batch together any bios that trigger commits and then issue a
+ * single commit for them in process_deferred_bios().
+ */
+spin_lock_irqsave(&pool->lock, flags);
+bio_list_add(&pool->deferred_flush_completions, bio);
+spin_unlock_irqrestore(&pool->lock, flags);
+
static void process_prepared_mapping(struct dm_thin_new_mapping *m)
{
 struct thin_c *tc = m->tc;
@@ -947,7 +1016,7 @@
 if (bio) {
 inc_remap_and_issue_cell(tc, m->cell, m->data_block);
 -bio_endio(bio);
+complete_overwrite_bio(tc, bio);
 } else {
 inc_all_io_entry(tc->pool, m->cell->holder);
 remap_and_issue(tc, m->cell->holder, m->data_block);
@@ -1007,7 +1076,7 @@
 * passdown we have to check that these blocks are now unused.
 */
 int r = 0;
-bool used = true;
+bool shared = true;
 struct thin_c *tc = m->tc;
 struct pool *pool = tc->pool;
 dm_block_t b = m->data_block, e, end = m->data_block + m->virt_end - m->virt_begin;
while (b != end) {
/* find start of unmapped run */
for (; b < end; b++) {
    r = dm_pool_block_is_used(pool->pmd, b, &used);
    if (r)
        goto out;
    if (!used)
        break;
}

/* find end of run */
for (e = b + 1; e != end; e++) {
    r = dm_pool_block_is_used(pool->pmd, e, &used);
    if (r)
        goto out;
    if (used)
        break;
}

static void set_pool_mode(struct pool *pool, enum pool_mode new_mode);

static void check_for_space(struct pool *pool)
+static bool is_read_only_pool_mode(enum pool_mode mode)
+{
+    return (mode == PM_OUT_OF_METADATA_SPACE || mode == PM_READ_ONLY);
+}
+static bool is_read_only(struct pool *pool)
+{
+    return is_read_only_pool_mode(get_pool_mode(pool));
+}
+static void check_for_metadata_space(struct pool *pool)
+{ int r;
const char *ooms_reason = NULL;
dm_block_t nr_free;

if (dm_pool_get_free_metadata_block_count(pool->pmd, &nr_free))
+ ooms_reason = "Could not get free metadata blocks";
+ else if (!nr_free)
+ ooms_reason = "No free metadata blocks";
+
+ if (ooms_reason && !is_read_only(pool)) {
+ DMERR("%s", ooms_reason);
+ set_pool_mode(pool, PM_OUT_OF_METADATA_SPACE);
+ }
+
+ static void check_for_data_space(struct pool *pool)
+ {
+ dm_block_t nr_free;
+ if (nr_free)
+ set_pool_mode(pool, PM_WRITE);
+ requeue_bios(pool);
+ }
+
+ /*
+ @@ -1392,8 +1491,10 @@
+ if (r)
+ return;
+ +if (nr_free)
+ +if (nr_free) {
+ set_pool_mode(pool, PM_WRITE);
+ requeue_bios(pool);
+ +}
+ }
+
+ /*
+ @@ -1404,14 +1505,16 @@
+ int r;
+ +if (get_pool_mode(pool) >= PM_READ_ONLY)
+ +if (get_pool_mode(pool) >= PM_OUT_OF_METADATA_SPACE)
+ return -EINVAL;
+ +
+ r = dm_pool_commit_metadata(pool->pmd);
+ if (r)
+ metadata_operation_failed(pool, "dm_pool_commit_metadata", r);
+ +else
+ +check_for_space(pool);
+ +else {
+ +check_for_metadata_space(pool);
+ +check_for_data_space(pool);
+ +}
return r;
}
@@ -1470,10 +1573,26 @@
    r = dm_pool_alloc_data_block(pool->pmd, result);
    if (r) {
        -metadata_operation_failed(pool, "dm_pool_alloc_data_block", r);
+        if (r == -ENOSPC)
+            set_pool_mode(pool, PM_OUT_OF_DATA_SPACE);
+        else
+            metadata_operation_failed(pool, "dm_pool_alloc_data_block", r);
+        return r;
+    }
+    
+    r = dm_pool_get_free_metadata_block_count(pool->pmd, &free_blocks);
+    if (r) {
+        metadata_operation_failed(pool, "dm_pool_get_free_metadata_block_count", r);
+        return r;
+    }
+    
+    if (!free_blocks) {
+        /* Let's commit before we use up the metadata reserve. */
+        r = commit(pool);
+        if (r)
+            return r;
+    }
+    
+    return 0;
}
@@ -1505,6 +1624,7 @@
case PM_OUT_OF_DATA_SPACE:
    return pool->pf.error_if_no_space ? BLK_STS_NOSPC : 0;
+
case PM_OUT_OF_METADATA_SPACE:
    case PM_READ_ONLY:
    case PM_FAIL:
@@ -2242,7 +2362,7 @@
    {
        unsigned long flags;
        struct bio *bio;
@@ -1505,6 +1624,7 @@
        case PM_OUT_OF_DATA_SPACE: return pool->pf.error_if_no_space ? BLK_STS_NOSPC : 0;
        +case PM_OUT_OF_METADATA_SPACE: case PM_READ_ONLY: case PM_FAIL: return BLK_STS_IOERR; @ @ -2242,7 +2362,7 @@
                              
        tc = get_first_thin(pool);
- If there are any deferred flush bios, we must commit the metadata before issuing them or signaling their completion.

```c
bio_list_init(&bios);
+bio_list_init(&bio_completions);
+
spin_lock_irqsave(&pool->lock, flags);
bio_list_merge(&bios, &pool->deferred_flush_bios);
bio_list_init(&pool->deferred_flush_bios);
+
+bio_list_merge(&bio_completions, &pool->deferred_flush_completions);
+bio_list_init(&pool->deferred_flush_completions);
spin_unlock_irqrestore(&pool->lock, flags);
```

- If (bio_list_empty(&bios) &&
  +if (bio_list_empty(&bios) && bio_list_empty(&bio_completions) &&
      !dm_pool_changed_this_transaction(pool->pmd) && need_commit_due_to_time(pool))
  return;

if (commit(pool)) {
  +bio_list_merge(&bios, &bio_completions);
  +
  while ((bio = bio_list_pop(&bios))
    bio_io_error(bio);
  return;
}
pool->last_commit_jiffies = jiffies;

+while ((bio = bio_list_pop(&bio_completions)))
  +bio_endio(bio);
  +
  while ((bio = bio_list_pop(&bios))
generic_make_request(bio);
}
```

/*
- We're holding onto IO to allow userland time to react. After the
*/

static void notify_of_pool_mode_change_to_oods(struct pool *pool);

-
timeout either the pool will have been resized (and thus back in
@@ -2319,7 +2447,7 @@
             pool->pf.error_if_no_space = true;
         notify_of_pool_mode_change_to_oods(pool);
         notify_of_pool_mode_change(pool);
         error_retry_list_with_code(pool, BLK_STS_NOSPC);
     }
@@ -2387,26 +2515,6 @@
 } /*-----------------------------------------------*/

 -static enum pool_mode get_pool_mode(struct pool *pool)
 -{
     return pool->pf.mode;
 -}
 -
- static void notify_of_pool_mode_change(struct pool *pool, const char *new_mode)
-{
-    dm_table_event(pool->ti->table);
-    DMINFO("%s: switching pool to %s mode",
-            dm_device_name(pool->pool_md), new_mode);
-    }
-
- static void notify_of_pool_mode_change_to_oods(struct pool *pool)
-{
-    if (!pool->pf.error_if_no_space)
-        notify_of_pool_mode_change(pool, "out-of-data-space (queue IO)");
-    else
-        notify_of_pool_mode_change(pool, "out-of-data-space (error IO)");
-    }
-
 static bool passdown_enabled(struct pool_c *pt)
 {
     return pt->adjusted_pf.discard_passdown;
@@ -2455,8 +2563,6 @@
         }
         switch (new_mode) {
             case PM_FAIL:
 case PM_FAIL:
             -if (old_mode != new_mode)
             -if (old_mode != new_mode)
-                notify_of_pool_mode_change(pool, "failure");
-                notify_of_pool_mode_change(pool, "failure");
             dm_pool_metadata_read_only(pool->pmd);
             pool->process_bio = process_bio_fail;
             pool->process_discard = process_bio_fail;
@@ -2468,9 +2574,8 @@
             error_retry_list(pool);
break;

+case PM_OUT_OF_METADATA_SPACE:
case PM_READ_ONLY:
 -if (old_mode ! = new_mode)
-notify_of_pool_mode_change(pool,"read-only");
dm_pool_metadata_read_only(pool->pmd);
pool->process_bio = process_bio_read_only;
pool->process_discard = process_bio_success;
@@ -2491,8 +2596,6 @@
 * alarming rate. Adjust your low water mark if you're
 * frequently seeing this mode.
 */
-if (old_mode != new_mode)
-notify_of_pool_mode_change_to_oods(pool);
pool->out_of_data_space = true;
pool->process_bio = process_bio_read_only;
pool->process_discard = process_discard_bio;
@@ -2505,8 +2608,8 @@
break;

case PM_WRITE:
 -if (old_mode != new_mode)
-notify_of_pool_mode_change(pool, "write");
+if (old_mode == PM_OUT_OF_DATA_SPACE)
+cANCEL_DELAYED_WORK_SYNC(&pool->no_space_timeout);
pool->out_of_data_space = false;
pool->pf.error_if_no_space = pt->requested_pf.error_if_no_space;
dm_pool_metadata_read_write(pool->pmd);
@@ -2524,6 +2627,9 @@
 * doesn't cause an unexpected mode transition on resume.
 */
pt->adjusted_pf.mode = new_mode;
+
+if (old_mode != new_mode)
+notify_of_pool_mode_change(pool);

static void abort_transaction(struct pool *pool)
@@ -2856,7 +2962,7 @@
return (struct pool *)pmd;
}

-pool = kmalloc(sizeof(*pool), GFP_KERNEL);
+pool = kzalloc(sizeof(*pool), GFP_KERNEL);
if (!pool) {
 *error = "Error allocating memory for pool";
err_p = ERR_PTR(-ENOMEM);
INIT_DELAYED_WORK(&pool->no_space_timeout, do_no_space_timeout);
spin_lock_init(&pool->lock);
bio_list_init(&pool->deferred_flush_bios);
+bio_list_init(&pool->deferred_flush_completions);
INIT_LIST_HEAD(&pool->prepared_mappings);
INIT_LIST_HEAD(&pool->prepared_discards);
INIT_LIST_HEAD(&pool->prepared_discards_pt2);

as.argv = argv;

/* make sure metadata and data are different devices */
+if (!strcmp(argv[0], argv[1])) {
+ti->error = "Error setting metadata or data device";
+}
+goto out_unlock;
+
+/*
 * Set default pool features.
 */
+DMINFO("%s: growing the metadata device from %llu to %llu blocks",
    dm_device_name(pool->pool_md),
    sb_metadata_dev_size, metadata_dev_size);
+
+if (get_pool_mode(pool) == PM_OUT_OF_METADATA_SPACE)
+set_pool_mode(pool, PM_WRITE);
+
+r = dm_pool_resize_metadata_dev(pool->pmd, metadata_dev_size);
+if (r) {
    metadata_operation_failed(pool, "dm_pool_resize_metadata_dev", r);
    @ @ -3706,7 +3824,7 @@
    struct pool_c *pt = ti->private;
    struct pool *pool = pt->pool;

    -if (get_pool_mode(pool) >= PM_READ_ONLY) {
    +if (get_pool_mode(pool) >= PM_OUT_OF_METADATA_SPACE) {
        DMERR("%s: unable to service pool target messages in READ_ONLY or FAIL mode",
            dm_device_name(pool->pool_md));
        return -EOPNOTSUPP;
        @ @ -3780,6 +3898,7 @@
        dm_block_t nr_blocks_data;
        dm_block_t nr_blocks_metadata;
        dm_block_t held_root;
        +enum pool_mode mode;
        char buf[BDEVNAME_SIZE];
char buf2[BDEVNAME_SIZE];
struct pool_c *pt = ti->private;
@@ -3850,9 +3969,10 @@
 else
 DMEMIT(".- ");

- if (pool->pf.mode == PM_OUT_OF_DATA_SPACE)
+ mode = get_pool_mode(pool);
+ if (mode == PM_OUT_OF_DATA_SPACE)
 DMEMIT("out_of_data_space ");
- else if (pool->pf.mode == PM_READ_ONLY)
+ else if (is_read_only_pool_mode(mode))
 DMEMIT("ro ");
 else
 DMEMIT("rw ");
@@ -4060,6 +4180,12 @@
tc->sort_bio_list = RB_ROOT;

if (argc == 3) {
+ if (!strcmp(argv[0], argv[2])) {
 + ti->error = "Error setting origin device";
 + r = -EINVAL;
 + goto bad_origin_dev;
 + }
+
+ r = dm_get_device(ti, argv[2], FMODE_READ, &origin_dev);
if (r) {
+ ti->error = "Error opening origin device";
--- linux-4.15.0.orig/drivers/md/dm-verity-fec.c
+++ linux-4.15.0/drivers/md/dm-verity-fec.c
@@ -436,7 +436,7 @@
fio->level++;

if (type == DM_VERITY_BLOCK_TYPE_METADATA)
- block += v->data_blocks;
+ block = block - v->hash_start + v->data_blocks;

/*
 * For RS(M, N), the continuous FEC data is divided into blocks of N
@@ -552,6 +552,7 @@
mempool_destroy(f->rs_pool);
 mempool_destroy(f->prealloc_pool);
 mempool_destroy(f->extra_pool);
+mempool_destroy(f->output_pool);
 kmem_cache_destroy(f->cache);

 if (f->data_bufio)
--- linux-4.15.0.orig/drivers/md/dm-verity-target.c
### linux-4.15.0/drivers/md/dm-verity-target.c

```c
#define DM_VERITY_OPT_RESTART "restart_on_corruption"
#define DM_VERITY_OPT_IGN_ZEROES "ignore_zero_blocks"

#define DM_VERITY_OPTS_MAX (2 + DM_VERITY_OPTS_FEC)
+#define DM_VERITY_OPTS_MAX (3 + DM_VERITY_OPTS_FEC)

static unsigned dm_verity_prefetch_cluster = DM_VERITY_DEFAULT_PREFETCH_SIZE;

if (likely(!is_vmalloc_addr(data))) {
    sg_init_one(&sg, data, len);
    ahash_request_set_crypt(req, &sg, NULL, len);
    return crypto_wait_req(crypto_ahash_update(req), wait);
} else {
    do {
        int r;
        size_t this_step = min_t(size_t, len, PAGE_SIZE - offset_in_page(data));
        flush_kernel_vmap_range((void *)data, this_step);
        sg_init_table(&sg, 1);
        sg_set_page(&sg, vmalloc_to_page(data), this_step, offset_in_page(data));
        ahash_request_set_crypt(req, &sg, NULL, this_step);
        r = crypto_wait_req(crypto_ahash_update(req), wait);
        if (unlikely(r))
            return r;
        data += this_step;
        len -= this_step;
    } while (len);
    return 0;
}
```

/*
 @@ -219,8 +235,8 @@
 BUG();
 }

-DMERR("%s: %s block %llu is corrupted", v->data_dev->name, type_str, -block);
+DMERR_LIMIT("%s: %s block %llu is corrupted", v->data_dev->name,
```
if (v->corrupted_errs == DM_VERITY_MAX_CORRUPTED_ERRS)
    DMERR("%s: reached maximum errors", v->data_dev->name);
@@ -495,6 +511,15 @@
}

/*
 * Skip verity work in response to I/O error when system is shutting down.
 + */
+static inline bool verity_is_system_shutting_down(void)
+{
+    return system_state == SYSTEM_HALT || system_state == SYSTEM_POWER_OFF
+        || system_state == SYSTEM_RESTART;
+
+/*
 * End one "io" structure with a given error.
 */
static void verity_finish_io(struct dm_verity_io *io, blk_status_t status)
@@ -521,7 +546,8 @@
{
    struct dm_verity_io *io = bio->bi_private;

-    if (bio->bi_status && !verity_fec_is_enabled(io->v)) {
-        verity_finish_io(io, bio->bi_status);
    return;
+    if (bio->bi_status && (!verity_fec_is_enabled(io->v) || verity_is_system_shutting_down())) {
+        verity_finish_io(io, bio->bi_status);
    return;

--- linux-4.15.0.orig/drivers/md/dm-zoned-metadata.c
+++ linux-4.15.0/drivers/md/dm-zoned-metadata.c
@@ -99,7 +99,7 @@
    struct rb_node		 node;
    struct list_head		 link;
    sector_t		 no;
-    atomic_t		 ref;
+    unsigned int		 ref;
    unsigned long		 state;
    struct page		 *page;
    void			 *data;
@@ -132,6 +132,7 @@
    sector_tzone_bitmap_size;
    unsigned intzone_nr_bitmap_blocks;
+    unsigned intzone_bits_per_mblk;

    unsigned intnr_bitmap_blocks;

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unsigned int nr_map_blocks;
@@ -296,7 +297,7 @@
 RB_CLEAR_NODE(&mblk->node);
 INIT_LIST_HEAD(&mblk->link);
-atomic_set(&mblk->ref, 0);
+mblk->ref = 0;
 mblk->state = 0;
 mblk->no = mblk_no;
 mblk->data = page_address(mblk->page);
@@ -339,10 +340,11 @@
 */
-/* Lookup a metadata block in the rbtree.
+/* Lookup a metadata block in the rbtree. If the block is found, increment
+ * its reference count.
+ */
-static struct dmz_mblock *dmz_lookup_mblock(struct dmz_metadata *zmd,
-    sector_t mblk_no)
+static struct dmz_mblock *dmz_get_mblock_fast(struct dmz_metadata *zmd,
+    sector_t mblk_no)
 { 
 struct rb_root *root = &zmd->mblk_rbtree;
 struct rb_node *node = root->rb_node;
@@ -350,8 +352,17 @@
 while (node) {
 mblk = container_of(node, struct dmz_mblock, node);
-if (mblk->no == mblk_no)
+if (mblk->no == mblk_no) {
+    /*
+     * If this is the first reference to the block,
+     * remove it from the LRU list.
+     */
+    mblk->ref++;
+    if (mblk->ref == 1 &&
+        !test_bit(DMZ_META_DIRTY, &mblk->state))
+        list_del_init(&mblk->link);
+    return mblk;
+}
 node = (mblk->no < mblk_no) ? node->rb_left : node->rb_right;
 }
@@ -382,32 +393,50 @@
 /*
- * Read a metadata block from disk.
+ * Read an uncached metadata block from disk and add it to the cache.
*/

- static struct dmz_mblock *dmz_fetch_mblock(struct dmz_metadata *zmd,
-     sector_t mblk_no)
+ static struct dmz_mblock *dmz_get_mblock_slow(struct dmz_metadata *zmd,
+     sector_t mblk_no)
{
- struct dmz_mblock *mblk;
+ struct dmz_mblock *mblk, *m;

sector_t block = zmd->sb[zmd->mblk_primary].block + mblk_no;
struct bio *bio;

- /* Get block and insert it */
+ if (dmz_bdev_is_dying(zmd->dev))
+ return ERR_PTR(-EIO);
+ /* Get a new block and a BIO to read it */
+ mblk = dmz_alloc_mblock(zmd, mblk_no);
+ if (!mblk)
+ return NULL;
-
- spin_lock(&zmd->mblk_lock);
- atomic_inc(&mblk->ref);
- set_bit(DMZ_META_READING, &mblk->state);
- dmz_insert_mblock(zmd, mblk);
- spin_unlock(&zmd->mblk_lock);
+ return ERR_PTR(-ENOMEM);
+ bio = bio_alloc(GFP_NOIO, 1);
+ if (!bio) {
+ dmz_free_mblock(zmd, mblk);
+ return NULL;
+ return ERR_PTR(-ENOMEM);
+ }
+ /* Make sure that another context did not start reading
+ * the block already.
+ */
+ m = dmz_get_mblock_fast(zmd, mblk_no);
+ if (m) {
+ spin_unlock(&zmd->mblk_lock);
+ dmz_free_mblock(zmd, mblk);
+ bio_put(bio);
+ return m;
+mblk->ref++;  
+set_bit(DMZ_META_READING, &mblk->state);  
+dmz_insert_mblock(zmd, mblk);  
+spin_unlock(&zmd->mblk_lock);  
+/* Submit read BIO */  
bio->bi_iter.bi_sector = dmz_blk2sect(block);  
bio_set_dev(bio, zmd->dev->bdev);  
bio->bi_private = mblk;  
@@ -484,7 +513,8 @@
spin_lock(&zmd->mblk_lock);

-if (atomic_dec_and_test(&mblk->ref)) {
+  mblk->ref--;  
+if (mblk->ref == 0) {
if (test_bit(DMZ_META_ERROR, &mblk->state)) {
    rb_erase(&mblk->node, &zmd->mblk_rbtree);  
dmz_free_mblock(zmd, mblk);  
@@ -508,20 +538,14 @@
/* Check rbtree */  
spin_lock(&zmd->mblk_lock);  
-mblk = dmz_lookup_mblock(zmd, mblk_no);  
-if (mblk) {
-/* Cache hit: remove block from LRU list */  
-if (atomic_inc_return(&mblk->ref) == 1 &&
-!test_bit(DMZ_META_DIRTY, &mblk->state)) {
  list_del_init(&mblk->link);  
}  
+mblk = dmz_get_mblock_fast(zmd, mblk_no);  
spin_unlock(&zmd->mblk_lock);

if (!mblk) {
/* Cache miss: read the block from disk */  
-mblk = dmz_fetch_mblock(zmd, mblk_no);  
-if (!mblk)  
-return ERR_PTR(-ENOMEM);  
+mblk = dmz_get_mblock_slow(zmd, mblk_no);  
+if (IS_ERR(mblk))  
+return mblk;  
}

/* Wait for on-going read I/O and check for error */  
@@ -529,6 +553,7 @@
if (test_bit(DMZ_META_ERROR, &mblk->state)) {
    dmz_release_mblock(zmd, mblk);
    dmz_check_bdev(zmd->dev);
    return ERR_PTR(-EIO);
}

/* Issue a metadata block write BIO. */

- static void dmz_write_mblock(struct dmz_metadata *zmd, struct dmz_mblock *mblk, 
    unsigned int set)
+ static int dmz_write_mblock(struct dmz_metadata *zmd, struct dmz_mblock *mblk, 
  
  

  sector_t block = zmd->sb[set].block + mblk->no;

  set_bit(DMZ_META_WRITING, &mblk->state);
  bio_set_op_attrs(bio, REQ_OP_WRITE, REQ_META | REQ_PRIO);
  bio_add_page(bio, mblk->page, DMZ_BLOCK_SIZE, 0);
  submit_bio(bio);
  
  return 0;
}

/*
 * struct bio *bio;
 */

# if (dmz_bdev_is_dying(zmd->dev))
+ return -EIO;
  
  bio = bio_alloc(GFP_NOIO, 1);
  if (!bio) {
    set_bit(DMZ_META_ERROR, &mblk->state);
    -return;
    +return -ENOMEM;
  }
  
  set_bit(DMZ_META_WRITING, &mblk->state);
  bio_set_op_attrs(bio, REQ_OP_WRITE, REQ_META | REQ_PRIO);
  bio_add_page(bio, mblk->page, DMZ_BLOCK_SIZE, 0);
  submit_bio(bio);
+ return 0;
  
  /*
   * struct bio *bio;
   */

  # if (dmz_bdev_is_dying(zmd->dev))
  + return -EIO;
+ 
  bio = bio_alloc(GFP_NOIO, 1);
  if (!bio)
return -ENOMEM;
@@ -592,6 +625,8 @@
    ret = submit_bio_wait(bio);
    bio_put(bio);

    +if (ret)
    +dmz_check_bdev(zmd->dev);
    return ret;
}

@@ -638,22 +673,30 @@
{
    struct dmz_mblock *mblk;
    struct blk_plug plug;
    -int ret = 0;
    +int ret = 0, nr_mblks_submitted = 0;

    /* Issue writes */
    blk_start_plug(&plug);
    -list_for_each_entry(mblk, write_list, link)
    -dmz_write_mblock(zmd, mblk, set);
    +list_for_each_entry(mblk, write_list, link) {
    +    ret = dmz_write_mblock(zmd, mblk, set);
    +    if (ret)
    +        break;
    +    nr_mblks_submitted++;
    +}
    blk_finish_plug(&plug);

    /* Wait for completion */
    list_for_each_entry(mblk, write_list, link) {
    +if (!nr_mblks_submitted)
    +    break;
    wait_on_bit_io(&mblk->state, DMZ_META_WRITING,
                  TASK_UNINTERRUPTIBLE);
    if (test_bit(DMZ_META_ERROR, &mblk->state)) {
        clear_bit(DMZ_META_ERROR, &mblk->state);
        +dmz_check_bdev(zmd->dev);
        ret = -EIO;
    }
    +nr_mblks_submitted--;
    }

    /* Flush drive cache (this will also sync data) */
    @@ -715,6 +758,11 @@
    */
    dmz_lock_flush(zmd);
+if (dmz_bdev_is_dying(zmd->dev)) {
+ret = -EIO;
+goto out;
+
+} /* Get dirty blocks */
+spin_lock(&zmd->mblk_lock);
+list_splice_init(&zmd->mblk_dirty_list, &write_list);
+@@ -723,7 +771,7 @@*/
+/* If there are no dirty metadata blocks, just flush the device cache */
+if (list_empty(&write_list)) {
+ret = blkdev_issue_flush(zmd->dev->bdev, GFP_NOIO, NULL);
-+goto out;
+goto err;
+
+} /*
+@ @ -733,7 +781,7 @@*/
+ret = dmz_log_dirty_mblocks(zmd, &write_list);
+if (ret)
+-goto out;
+goto err;
+
+/*
+* The log is on disk. It is now safe to update in place
+@ @ -741,11 +789,11 @@*/
+ret = dmz_write_dirty_mblocks(zmd, &write_list, zmd->mblk_primary);
+if (ret)
+-goto out;
+goto err;
+
+ret = dmz_write_sb(zmd, zmd->mblk_primary);
+if (ret)
+-goto out;
+goto err;
+
+while (!list_empty(&write_list)) {
+ mblk = list_first_entry(&write_list, struct dmz_mblock, link);
+ @@ -753,23 +801,27 @@
+ spin_lock(&zmd->mblk_lock);
+ clear_bit(DMZ_META_DIRTY, &mblk->state);
+ -if (atomic_read(&mblk->ref) == 0)
+ +if (mblk->ref == 0)
+ list_add_tail(&mblk->link, &zmd->mblk_lru_list);
+ spin_unlock(&zmd->mblk_lock);
+}
zmd->sb_gen++;  
out:
-  if (ret && !list_empty(&write_list)) {
-    spin_lock(&zmd->mblk_lock);
-    list_splice(&write_list, &zmd->mblk_dirty_list);
-    spin_unlock(&zmd->mblk_lock);
-  }
-  
-  dmz_unlock_flush(zmd);
up_write(&zmd->mblk_sem);

return ret;
+
+err:
+  if (!list_empty(&write_list)) {
+    spin_lock(&zmd->mblk_lock);
+    list_splice(&write_list, &zmd->mblk_dirty_list);
+    spin_unlock(&zmd->mblk_lock);
+  }
+  if (!dmz_check_bdev(zmd->dev))
+    ret = -EIO;
+  goto out;
 }

/*
@@ -1053,7 +1105,6 @@
if (blkz->type == BLK_ZONE_TYPE_CONVENTIONAL) {
  set_bit(DMZ_RND, &zone->flags);
  -zmd->nr_rnd_zones++;
 } else if (blkz->type == BLK_ZONE_TYPE_SEQWRITE_REQ ||
@@ -1114,7 +1165,10 @@
/* Init */
zmd->zone_bitmap_size = dev->zone_nr_blocks >> 3;
-zmd->zone_nr_bitmap_blocks = zmd->zone_bitmap_size >> DMZ_BLOCK_SHIFT;
+zmd->zone_nr_bitmap_blocks =
+max_t(sector_t, 1, zmd->zone_bitmap_size >> DMZ_BLOCK_SHIFT);
+zmd->zone_bits_per_mblk = min_t(sector_t, dev->zone_nr_blocks,
+DMZ_BLOCK_SIZEBITS);
/* Allocate zone array */
zmd->zones = kmalloc(dev->nr_zones, sizeof(struct dm_zone), GFP_KERNEL);
@@ -1149,6 +1203,9 @@
goto out;
}

if (!nr_blkz)
	break;
+
/* Process report */
for (i = 0; i < nr_blkz; i++) {
 ret = dmz_init_zone(zmd, zone, &blkz[i]);
@@ -1184,9 +1241,12 @@
/* Get zone information from disk */
 ret = blkdev_report_zones(zmd->dev->bdev, dmz_start_sect(zmd, zone),
   &blkz, &nr_blkz, GFP_NOIO);
+if (!nr_blkz)
+ret = -EIO;
if (ret) {
 dmz_dev_err(zmd->dev, "Get zone %u report failed",
                 dmz_id(zmd, zone));
+dmz_check_bdev(zmd->dev);
 return ret;
}

@@ -1509,7 +1569,7 @@
struct dm_zone *zone;

if (list_empty(&zmd->map_rnd_list))
-    return NULL;
+    return ERR_PTR(-EBUSY);

list_for_each_entry(zone, &zmd->map_rnd_list, link) {
    if (dmz_is_buf(zone))
@@ -1531,7 +1591,7 @@
 struct dm_zone *zone;

if (list_empty(&zmd->map_seq_list))
-    return NULL;
+    return ERR_PTR(-EBUSY);

list_for_each_entry(zone, &zmd->map_seq_list, link) {
    if (!zone->bzone)
@@ -1569,30 +1629,6 @@
 }

/*
 - * Activate a zone (increment its reference count).
 - */
-void dmz_activate_zone(struct dm_zone *zone)
-{

- set_bit(DMZ_ACTIVE, &zone->flags);
- atomic_inc(&zone->refcount);
-
- /* Deactivate a zone. This decrement the zone reference counter
- * and clears the active state of the zone once the count reaches 0,
- * indicating that all BIOs to the zone have completed. Returns
- * true if the zone was deactivated.
- */
- void dmz_deactivate_zone(struct dm_zone *zone)
- {
- if (atomic_dec_and_test(&zone->refcount)) {
- WARN_ON(!test_bit(DMZ_ACTIVE, &zone->flags));
- clear_bit_unlock(DMZ_ACTIVE, &zone->flags);
- smp_mb__after_atomic();
- }
- }
- 
- /* Get the zone mapping a chunk, if the chunk is mapped already.
- * If no mapping exist and the operation is WRITE, a zone is
- * allocated and used to map the chunk.
- @ @ -1622,6 +1658,10 @@
- /* Alloate a random zone */
- dzone = dmz_alloc_zone(zmd, DMZ_ALLOC_RND);
- if (!dzone) {
+ if (dmz_bdev_is_dying(zmd->dev)) {
+ dzone = ERR_PTR(-EIO);
+ goto out;
+ }
+ dmz_wait_for_free_zones(zmd);
+ goto out;
} 
@@ -1719,6 +1759,10 @@
- /* Alloate a random zone */
- bzone = dmz_alloc_zone(zmd, DMZ_ALLOC_RND);
- if (!bzone) {
+ if (dmz_bdev_is_dying(zmd->dev)) {
+ bzone = ERR_PTR(-EIO);
+ goto out;
+ }
+ dmz_wait_for_free_zones(zmd);
+ goto out;
} 
@@ -1941,7 +1985,7 @@
 dmz_release_mblock(zmd, to_mblk);
 dmz_release_mblock(zmd, from_mblk);
-chunk_block += DMZ_BLOCK_SIZE_BITS;
+chunk_block += zmd->zone_bits_per_mblk;
}

to_zone->weight = from_zone->weight;
@@ -2002,7 +2046,7 @@

/* Set bits */
bit = chunk_block & DMZ_BLOCK_MASK_BITS;
-nr_bits = min(nr_blocks, DMZ_BLOCK_SIZE_BITS - bit);
+nr_bits = min(nr_blocks, zmd->zone_bits_per_mblk - bit);

count = dmz_set_bits((unsigned long *)mblk->data, bit, nr_bits);
if (count) {
    @@ -2081,7 +2125,7 @@

    /* Clear bits */
    bit = chunk_block & DMZ_BLOCK_MASK_BITS;
    -nr_bits = min(nr_blocks, DMZ_BLOCK_SIZE_BITS - bit);
    +nr_bits = min(nr_blocks, zmd->zone_bits_per_mblk - bit);

    count = dmz_clear_bits((unsigned long *)mblk->data,
                     bit, nr_bits);
    @@ -2141,6 +2185,7 @@
    }
    struct dmz_mblock *mblk;
    unsigned int bit, set_bit, nr_bits;
    +unsigned int zone_bits = zmd->zone_bits_per_mblk;
    unsigned long *bitmap;
    int n = 0;

    @@ -2155,15 +2200,15 @@
    /* Get offset */
    bitmap = (unsigned long *) mblk->data;
    bit = chunk_block & DMZ_BLOCK_MASK_BITS;
    -nr_bits = min(nr_blocks, DMZ_BLOCK_SIZE_BITS - bit);
    +nr_bits = min(nr_blocks, zone_bits - bit);
    if (set)
        -set_bit = find_next_bit(bitmap, DMZ_BLOCK_SIZE_BITS, bit);
        +set_bit = find_next_bit(bitmap, zone_bits, bit);
    else
        -set_bit = find_next_zero_bit(bitmap, DMZ_BLOCK_SIZE_BITS, bit);
        +set_bit = find_next_zero_bit(bitmap, zone_bits, bit);
    dmz_release_mblock(zmd, mblk);

    n += set_bit - bit;
    -if (set_bit < DMZ_BLOCK_SIZE_BITS)
+if (set_bit < zone_bits)
break;

nr_blocks -= nr_bits;
@@ -2266,7 +2311,7 @@
/* Count bits in this block */
bitmap = mblk->data;
bit = chunk_block & DMZ_BLOCK_MASK_BITS;
-nr_bits = min(nr_blocks, DMZ_BLOCK_SIZE_BITS - bit);
+nr_bits = min(nr_blocks, zmd->zone_bits_per_mblk - bit);
n += dmz_count_bits(bitmap, bit, nr_bits);

dmz_release_mblock(zmd, mblk);
@@ -2308,7 +2353,7 @@
mblk = list_first_entry(&zmd->mblk_dirty_list,
struct dmz_mblock, link);
dmz_dev_warn(zmd->dev, "mblock %llu still in dirty list (ref %u)",
- (u64)mblk->no, atomic_read(&mblk->ref));
+ (u64)mblk->no, mblk->ref);
list_del_init(&mblk->link);
rb_erase(&mblk->node, &zmd->mblk_rbtree);
dmz_free_mblock(zmd, mblk);
@@ -2326,8 +2371,8 @@
root = &zmd->mblk_rbtree;
rmtree_postorder_for_each_entry_safe(mblk, next, root, node) {
    dmz_dev_warn(zmd->dev, "mblock %llu ref %u still in rbtree",
- (u64)mblk->no, atomic_read(&mblk->ref));
+ (u64)mblk->no, mblk->ref);
atomic_set(&mblk->ref, 0);
+mblk->ref = 0;
dmz_free_mblock(zmd, mblk);
}

--- linux-4.15.0.orig/drivers/md/dm-zoned-reclaim.c
+++ linux-4.15.0/drivers/md/dm-zoned-reclaim.c
@@ -37,7 +37,7 @@
/*
* Number of seconds of target BIO inactivity to consider the target idle.
*/
-#define DMZ_IDLE_PERIOD (10UL * HZ)
+##define DMZ_IDLE_PERIOD(10UL * HZ)

/*
* Percentage of unmapped (free) random zones below which reclaim starts
@ @ -81,6 +81,7 @ @
"Align zone %u wp %llu to %llu (wp+%u) blocks failed %d",
    dmz_id(zmd, zone), (unsigned long long)wp_block,
    (unsigned long long)block, nr_blocks, ret);
+dmz_check_bdev(zrc->dev);
return ret;
}

set_bit(DM_KCOPYD_WRITE_SEQ, &flags);

while (block < end_block) {
+if (dev->flags & DMZ_BDEV_DYING)
+return -EIO;
+
/* Get a valid region from the source zone */
ret = dmz_first_valid_block(zmd, src_zone, &block);
if (ret <= 0)
@@ -217,7 +221,7 @@
dmz_unlock_flush(zmd);

-return 0;
+return ret;
}

/*
@@ -261,7 +265,7 @@
dmz_unlock_flush(zmd);

-return 0;
+return ret;
}

/*
@@ -314,7 +318,7 @@
dmz_unlock_flush(zmd);

-return 0;
+return ret;
}

/*
@@ -336,7 +340,7 @@
/*
 * Find a candidate zone for reclaim and process it.
 */
-static void dmz_reclaim(struct dmz_reclaim *zrc)
+static int dmz_do_reclaim(struct dmz_reclaim *zrc)
{
struct dmz_metadata *zmd = zrc->metadata;
struct dm_zone *dzone;
/* Get a data zone */
dzone = dmz_get_zone_for_reclaim(zmd);
if (!dzone)
    return;
+return -EBUSY;

start = jiffies;

(void) dmz_flush_metadata(zrc->metadata);
+ret = dmz_flush_metadata(zrc->metadata);
+if (ret) {
+    dmz_dev_debug(zrc->dev, "Metadata flush for zone %u failed, err %d\n",
+                   dmz_id(zmd, rzone), ret);
+    return ret;
+}

dmz_dev_debug(zrc->dev, "Reclaimed zone %u in %u ms",
              dmz_id(zmd, rzone), jiffies_to_msecs(jiffies - start));
+return 0;
}

/*@ -444,6 +455,10 @@*/
struct dmz_metadata *zmd = zrc->metadata;
unsigned int nrRnd, nr_unmapRnd;
unsigned int p_unmapRnd;
+int ret;
+
+if (dmz_bdev_is_dying(zrc->dev))
+    return;

if (!dmz_should_reclaim(zrc)) {
    mod_delayed_work(zrc->wq, &zrc->work, DMZ_IDLE_PERIOD);
    (dmz_target_idle(zrc) ? "Idle" : "Busy"),
    p_unmapRnd, nr_unmapRnd, nrRnd);
- dmz_reclaim(zrc);
+ ret = dmz_do_reclaim(zrc);
+ if (ret) {
+ dmz_dev_debug(zrc->dev, "Reclaim error %d\n", ret);
+ if (!dmz_check_bdev(zrc->dev))
+ return;
+ }

dmz_schedule_reclaim(zrc);
}
--- linux-4.15.0.orig/drivers/md/dm-zoned-target.c
+++ linux-4.15.0/drivers/md/dm-zoned-target.c
@@ -20,7 +20,6 @@
 struct dm_zone *zone;
 struct bio *bio;
 atomic_t ref;
- blk_status_t status;
};

/*
@@ -78,65 +77,68 @@
 { struct dmz_bioctx *bioctx = dm_per_bio_data(bio, sizeof(struct dmz_bioctx));

- if (bioctx->status == BLK_STS_OK && status != BLK_STS_OK)
- bioctx->status = status;
- bio_endio(bio);
+ if (status != BLK_STS_OK && bio->bi_status == BLK_STS_OK)
+ bio->bi_status = status;
+ if (bio->bi_status != BLK_STS_OK)
+ bioctx->target->dev->flags |= DMZ_CHECK_BDEV;
+ + if (atomic_dec_and_test(&bioctx->ref)) {
+ struct dm_zone *zone = bioctx->zone;
+ if (zone) {
+ if (bio->bi_status != BLK_STS_OK &&
+ bio_op(bio) == REQ_OP_WRITE &&
+ dmz_is_seq(zone))
+ set_bit(DMZ_SEQ_WRITE_ERR, &zone->flags);
+ dmz_deactivate_zone(zone);
+ }
+ bio_endio(bio);
+ }
+ }
/

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- * Partial clone read BIO completion callback. This terminates the
+ * Completion callback for an internally cloned target BIO. This terminates the
  * target BIO when there are no more references to its context.
 */
-static void dmz_read_bio_end_io(struct bio *bio)
+static void dmz_clone_endio(struct bio *clone)
{
  struct dmz_bioctx *bioctx = bio->bi_private;
  blk_status_t status = bio->bi_status;
+  struct dmz_bioctx *bioctx = clone->bi_private;
+  blk_status_t status = clone->bi_status;

  -bio_put(bio);
  +bio_put(clone);
  dmz_bio_endio(bioctx->bio, status);
}

/*
- * Issue a BIO to a zone. The BIO may only partially process the
+ * Issue a clone of a target BIO. The clone may only partially process the
  * original target BIO.
 */
-static int dmz_submit_read_bio(struct dmz_target *dmz, struct dm_zone *zone,
-  struct bio *bio, sector_t chunk_block,
-  unsigned int nr_blocks)
+static int dmz_submit_bio(struct dmz_target *dmz, struct dm_zone *zone,
+  struct bio *bio, sector_t chunk_block,
+  unsigned int nr_blocks)
{
  struct dmz_bioctx *bioctx = dm_per_bio_data(bio, sizeof(struct dmz_bioctx));
  -sector_t sector;
  struct bio *clone;

  -/* BIO remap sector */
  -sector = dmz_start_sect(dmz->metadata, zone) + dmz_blk2sect(chunk_block);
  -
  -/* If the read is not partial, there is no need to clone the BIO */
  -if (nr_blocks == dmz_bio_blocks(bio)) {
  -/* Setup and submit the BIO */
  -bio->bi_iter.bi_sector = sector;
  -atomic_inc(&bioctx->ref);
  -generic_make_request(bio);
  -return 0;
  -}
  -
  -/* Partial BIO: we need to clone the BIO */
  clone = bio_clone_fast(bio, GFP_NOIO, dmz->bio_set);
  if (!clone)
return -ENOMEM;

-/* Setup the clone */
-clone->bi_iter.bi_sector = sector;
+bio_set_dev(clone, dmz->dev->bdev);
+clone->bi_iter.bi_sector =
+dmz_start_sect(dmz->metadata, zone) + dmz_blk2sect(chunk_block);
-clone->bi_iter.bi_size = dmz_blk2sect(nr_blocks) << SECTOR_SHIFT;
-clone->bi_end_io = dmz_read_bio_end_io;
+clone->bi_end_io = dmz_clone_endio;
-clone->bi_private = bioctx;

bio_advance(bio, clone->bi_iter.bi_size);

-/* Submit the clone */
atomic_inc(&bioctx->ref);
generic_make_request(clone);

+if (bio_op(bio) == REQ_OP_WRITE && dmz_is_seq(zone))
+zone->wp_block += nr_blocks;
+
return 0;
}
@@ -214,7 +216,7 @@
if (nr_blocks) {
    /* Valid blocks found: read them */
    nr_blocks = min_t(unsigned int, nr_blocks, end_block - chunk_block);
-    ret = dmz_submit_read_bio(dmz, rzone, bio, chunk_block, nr_blocks);
+    ret = dmz_submit_bio(dmz, rzone, bio, chunk_block, nr_blocks);
    if (ret)
        return ret;
    chunk_block += nr_blocks;
@@ -229,25 +231,6 @@
} /*
- * Issue a write BIO to a zone.
- */
-station void dmz_submit_write_bio(struct dmz_target *dmz, struct dm_zone *zone,
-struct bio *bio, sector_t chunk_block,
-unsigned int nr_blocks)
-{  
-struct dmz_bioctx *bioctx = dm_per_bio_data(bio, sizeof(struct dmz_bioctx));
-  
-/* Setup and submit the BIO */
-bio_set_dev(bio, dmz->dev->bdev);
-bio->bi_iter.bi_sector = dmz_start_sect(dmz->metadata, zone) + dmz_blk2sect(chunk_block);
-atomic_inc(&bioctx->ref);
-generic_make_request(bio);
-
-if (dmz_is_seq(zone))
-zone->wp_block += nr_blocks;
-
-/*
 * Write blocks directly in a data zone, at the write pointer.
 * If a buffer zone is assigned, invalidate the blocks written
 * in place.
 @ @ -265,7 +248,9 @ @
 return -EROFS;
 */
/* Submit write */
-dmz_submit_write_bio(dmz, zone, bio, chunk_block, nr_blocks);
+ret = dmz_submit_bio(dmz, zone, bio, chunk_block, nr_blocks);
+if (ret)
+return ret;

/*
 * Validate the blocks in the data zone and invalidate
 @ @ -294,14 +279,16 @ @
 */
/* Get the buffer zone. One will be allocated if needed */
bzone = dmz_get_chunk_buffer(zmd, zone);
-if (!bzone)
-return -ENOSPC;
+if (IS_ERR(bzone))
+return PTR_ERR(bzone);
if (dmz_is_readonly(bzone))
return -EROFS;

/* Submit write */
-dmz_submit_write_bio(dmz, bzone, bio, chunk_block, nr_blocks);
+ret = dmz_submit_bio(dmz, bzone, bio, chunk_block, nr_blocks);
+if (ret)
+return ret;

/*
 * Validate the blocks in the buffer zone
 @ @ -404,6 +391,11 @ @

dmz_lock_metadata(zmd);
+
+if (dmz->dev->flags & DMZ_BDEV_DYING) {
+ret = -EIO;
/* Get the data zone mapping the chunk. There may be no
mapping for read and discard. If a mapping is obtained,
@@ -508,6 +500,8 @@ */

/* Flush dirty metadata blocks */
ret = dmz_flush_metadata(dmz->metadata);
+if (ret)
+dmz_dev_debug(dmz->dev, "Metadata flush failed, rc=%d\n", ret);

/* Process queued flush requests */
while (1) {
@@ -528,22 +522,24 @@
  * Get a chunk work and start it to process a new BIO.
  * If the BIO chunk has no work yet, create one.
  */
-static void dmz_queue_chunk_work(struct dmz_target *dmz, struct bio *bio)
+static int dmz_queue_chunk_work(struct dmz_target *dmz, struct bio *bio)
{
  unsigned int chunk = dmz_bio_chunk(dmz->dev, bio);
  struct dm_chunk_work *cw;
  +int ret = 0;
  mutex_lock(&dmz->chunk_lock);

  /* Get the BIO chunk work. If one is not active yet, create one */
  cw = radix_tree_lookup(&dmz->chunk_rxtree, chunk);
  if (!cw) {
    -int ret;
    +int ret = 0;
    mutex_lock(&dmz->chunk_lock);
    /* Create a new chunk work */
    cw = kmalloc(sizeof(struct dm_chunk_work), GFP_NOIO);
    -if (!cw)
    +if (unlikely(!cw)) {
      +ret = -ENOMEM;
      goto out;
    +}
    INIT_WORK(&cw->work, dmz_chunk_work);
    atomic_set(&cw->refcount, 0);
    @@ -554,7 +550,6 @@
    ret = radix_tree_insert(&dmz->chunk_rxtree, chunk, cw);
    if (unlikely(ret)) {
      kfree(cw);
      -cw = NULL;
    }
goto out;
}
}
@@ -562,10 +557,58 @@
bio_list_add(&cw->bio_list, bio);
dmz_get_chunk_work(cw);

+dmz_reclaim_bio_acc(dmz->reclaim);
if (queue_work(dmz->chunk_wq, &cw->work))
dmz_get_chunk_work(cw);
out:
mutex_unlock(&dmz->chunk_lock);
+return ret;
+
+/*
+ * Check if the backing device is being removed. If it's on the way out,
+ * start failing I/O. Reclaim and metadata components also call this
+ * function to cleanly abort operation in the event of such failure.
+ */
+bool dmz_bdev_is_dying(struct dmz_dev *dmz_dev)
+{
+if (dmz_dev->flags & DMZ_BDEV_DYING)
+return true;
+
+if (dmz_dev->flags & DMZ_CHECK_BDEV)
+return !dmz_check_bdev(dmz_dev);
+
+if (blk_queue_dying(bdev_get_queue(dmz_dev->bdev))) {
+dmz_dev_warn(dmz_dev, "Backing device queue dying");
+dmz_dev->flags |= DMZ_BDEV_DYING;
+}
+
+return dmz_dev->flags & DMZ_BDEV_DYING;
+}
+
+/*
+ * Check the backing device availability. This detects such events as
+ * backing device going offline due to errors, media removals, etc.
+ * This check is less efficient than dmz_bdev_is_dying() and should
+ * only be performed as a part of error handling.
+ */
+bool dmz_check_bdev(struct dmz_dev *dmz_dev)
+{
+struct gendisk *disk;
+
+dmz_dev->flags &= ~DMZ_CHECK_BDEV;
+if (dmz_bdev_is_dying(dmz_dev))
+return false;
+
+disk = dmz_dev->bdev->bd_disk;
+if (disk->fops->check_events &&
+    disk->fops->check_events(disk, 0) & DISK_EVENT_MEDIA_CHANGE) {
+dmz_dev_warn(dmz_dev, "Backing device offline");
+dmz_dev->flags |= DMZ_BDEV_DYING;
+
}
+
+return !(dmz_dev->flags & DMZ_BDEV_DYING);
}
/*
@@ -579,6 +622,10 @@
sector_t sector = bio->bi_iter.bi_sector;
unsigned int nr_sectors = bio_sectors(bio);
sector_t chunk_sector;
+int ret;
+
+if (dmz_bdev_is_dying(dmz->dev))
+return DM_MAPIO_KILL;
+
dmz_dev_debug(dev, "BIO op %d sector %llu + %u => chunk %llu, block %llu, %u blocks",
     bio_op(bio), (unsigned long long)sector, nr_sectors,
@@ -600,7 +647,6 @@
bioctx->zone = NULL;
atomic_set(&bioctx->ref, 1);
-bioctx->status = BLK_STS_OK;
/* Set the BIO pending in the flush list */
if (!nr_sectors && bio_op(bio) == REQ_OP_WRITE) {
@@ -617,39 +663,16 @@
dm_accept_partial_bio(bio, dev->zone_nr_sectors - chunk_sector);
/* Now ready to handle this BIO */
-dmz_reclaim_bio_acc(dmz->reclaim);
-dmz_queue_chunk_work(dmz, bio);
-
-return DM_MAPIO_SUBMITTED;
-}
-
-/*
-* Completed target BIO processing.
-*
- static int dmz_end_io(struct dm_target *ti, struct bio *bio, blk_status_t *error)
-{
-struct dmz_bioctx *bioctx = dm_per_bio_data(bio, sizeof(struct dmz_bioctx));
-
-if (bioctx->status == BLK_STS_OK && *error)
-bioctx->status = *error;
-
-if (!atomic_dec_and_test(&bioctx->ref))
-return DM_ENDIO_INCOMPLETE;
-
/* Done */
-bio->bi_status = bioctx->status;
-
-if (bioctx->zone) {
-struct dm_zone *zone = bioctx->zone;
-
-if (*error && bio_op(bio) == REQ_OP_WRITE) {
-if (dmz_is_seq(zone))
-set_bit(DMZ_SEQ_WRITE_ERR, &zone->flags);
-}
-dmz_deactivate_zone(zone);
+ret = dmz_queue_chunk_work(dmz, bio);
+if (ret) {
+dmz_dev_debug(dmz->dev,
+    "BIO op %d, can't process chunk %llu, err %i\n",
+    bio_op(bio), (u64)dmz_bio_chunk(dmz->dev, bio),
+    ret);
+return DM_MAPIO_REQUEUE;
}

-return DM_ENDIO_DONE;
+return DM_MAPIO_SUBMITTED;
} }

/*
@@ -766,7 +789,7 @@
}
/* Set target (no write same support) */
-ti->max_io_len = dev->zone_nr_sectors << 9;
+ti->max_io_len = dev->zone_nr_sectors;
+ti->num_flush_bios = 1;
ti->num_discard_bios = 1;
ti->num_write_zeroes_bios = 1;
@@ -788,7 +811,7 @@
/* Chunk BIO work */
mutex_init(&dmz->chunk_lock);
-INIT_RADIX_TREE(&dmz->chunk_rxtree, GFP_KERNEL);
+INIT_RADIX_TREE(&dmz->chunk_rxtree, GFP_NOIO);
dmz->chunk_wq = alloc_workqueue("dmz_cwq_%s", WQ_MEM_RECLAIM | WQ_UNBOUND, 0, dev->name);
if (!dmz->chunk_wq) {
    @ @ -900,6 +923,9 @@
    }
    struct dmz_target *dmz = ti->private;

    +if (!dmz_check_bdev(dmz->dev))
    +return -EIO;
    +
    *bdev = dmz->dev->bdev;

    return 0;
    @ @ -946,7 +972,6 @ @
    .ctr = dmz_ctr,
    .dtr = dmz_dtr,
    .map = dmz_map,
    .end_io = dmz_end_io,
    .io_hints = dmz_io_hints,
    .prepare_ioctl = dmz_prepare_ioctl,
    .postsuspend = dmz_suspend,
    --- linux-4.15.0.orig/drivers/md/dm-zoned.h
    +++ linux-4.15.0/drivers/md/dm-zoned.h
    @ @ -56,6 +56,8 @@

    unsigned intnr_zones;

    +unsigned intflags;
    +
    sector_tzone_nr_sectors;
    unsigned intzone_nr_sectors_shift;

    @ @ -67,6 +69,10 @@
    (dev)->zone_nr_sectors_shift)
    #define dmz_chunk_block(dev, b)((b) & ((dev)->zone_nr_blocks - 1))

    +/* Device flags. */
    +#define DMZ_BDEV_DYING(1 << 0)
    +#define DMZ_CHECK_BDEV(2 << 0)
    +
    /*
    * Zone descriptor.
    */
    @ @ -115,7 +121,6 @@
    DMZ_BUF,

    /* Zone internal state */
    -DMZ_ACTIVE,
DMZ_RECLAIM,
DMZ_SEQ_WRITE_ERR,
);
@@ -128,7 +133,6 @@
#define dmz_is_empty(z)((z)->wp_block == 0)
#define dmz_is_offline(z) test_bit(DMZ_OFFLINE, &(z)->flags)
#define dmz_is_readonly(z) test_bit(DMZ_READ_ONLY, &(z)->flags)
-#define dmz_is_active(z) test_bit(DMZ_ACTIVE, &(z)->flags)
#define dmz_in_reclaim(z) test_bit(DMZ_RECLAIM, &(z)->flags)
#define dmz_seq_write_err(z) test_bit(DMZ_SEQ_WRITE_ERR, &(z)->flags)
@@ -188,8 +192,30 @@
unsigned int dmz_nr_rnd_zones(struct dmz_metadata *zmd);
unsigned int dmz_nr_unmap_rnd_zones(struct dmz_metadata *zmd);
-void dmz_activate_zone(struct dm_zone *zone);
-void dmz_deactivate_zone(struct dm_zone *zone);
+/*
+ * Activate a zone (increment its reference count).
+ */
+static inline void dmz_activate_zone(struct dm_zone *zone)
+{
+atomic_inc(&zone->refcount);
+}
+
+/*
+ * Deactivate a zone. This decrement the zone reference counter
+ * indicating that all BIOs to the zone have completed when the count is 0.
+ */
+static inline void dmz_deactivate_zone(struct dm_zone *zone)
+{
+atomic_dec(&zone->refcount);
+}
+
+/*
+ * Test if a zone is active, that is, has a refcount > 0.
+ */
+static inline bool dmz_is_active(struct dm_zone *zone)
+{
+return atomic_read(&zone->refcount);
+}

int dmz_lock_zone_reclaim(struct dm_zone *zone);
void dmz_unlock_zone_reclaim(struct dm_zone *zone);
@@ -225,4 +251,10 @@
void dmz_reclaim_bio_acc(struct dmz_reclaim *zrc);
void dmz_schedule_reclaim(struct dmz_reclaim *zrc);
/*
 * Functions defined in dm-zoned-target.c
 */

bool dmz_bdev_is_dying(struct dmz_dev *dmz_dev);
bool dmz_check_bdev(struct dmz_dev *dmz_dev);

#ifndef DM_ZONED_H
--- linux-4.15.0.orig/drivers/md/dm.c
+++ linux-4.15.0/drivers/md/dm.c
@@ -12,6 +12,7 @@
#include <linux/init.h>
#include <linux/module.h>
#include <linux/mutex.h>
+#include <linux/sched/mm.h>
#include <linux/sched/signal.h>
#include <linux/blkpg.h>
#include <linux/bio.h>
@@ -60,13 +61,13 @@
} {
/*
 - * One of these is allocated per bio.
 + * One of these is allocated per original bio.
 */
 struct dm_io {
 struct mapped_device *md;
 blk_status_t status;
-atomic_t io_count;
+struct bio *bio;
 +struct bio *orig_bio;
 unsigned long start_time;
 spinlock_t endio_lock;
 struct dm_stats_aux stats_aux;
@@ -472,7 +473,7 @@
 * subset of the parent bdev; require extra privileges.
 */
 if (!capable(CAP_SYS_RAWIO)) {
-DMWARN_LIMIT(
+DMDEBUG_LIMIT(
 "%s: sending ioctl \%x to DM device without required privilege.
 current->comm, cmd);
 r = -ENOIOCTLCMD;
@@ -510,7 +511,7 @@
 static void start_io_acct(struct dm_io *io) {
 struct mapped_device *md = io->md;
 -struct bio *bio = io->bio;
+struct bio *bio = io->orig_bio;

```c
int cpu;
int rw = bio_data_dir(bio);

static void end_io_acct(struct dm_io *io) {
    struct mapped_device *md = io->md;
    struct bio *bio = io->bio;
    unsigned long duration = jiffies - io->start_time;
    int pending;
    int rw = bio_data_dir(bio);

    /* Push-back supersedes any I/O errors */
    if (unlikely(error)) {
        spin_lock_irqsave(&io->endio_lock, flags);
        -if (!(io->status == BLK_STS_DM_REQUEUE && __noflush_suspending(md))
           +if (!(io->status == BLK_STS_DM_REQUEUE && __noflush_suspending(md)))
            io->status = error;
        spin_unlock_irqrestore(&io->endio_lock, flags);
    }
    /* NOTE early return due to BLK_STS_DM_REQUEUE below */
    +bio_list_add_head(&md->deferred, io->bio);
    else
        /* noflush suspend was interrupted. */
        io->status = BLK_STS_IOERR;

    io_error = io->status;
    -bio = io->bio;
    +bio = io->orig_bio;
    end_io_acct(io);
    free_io(md, io);

    queue_io(md, bio);
} else {
    /* done with normal IO or empty flush */
    -bio->bi_status = io_error;
    +if (io_error)
        +bio->bi_status = io_error;
```
bio_endio(bio);
}
}
@@ -962,8 +964,7 @@
if (len < 1)
goto out;
    nr_pages = min(len, nr_pages);
-    if (ti->type->direct_access)
-        ret = ti->type->direct_access(ti, pgoff, nr_pages, kaddr, pfn);
+    ret = ti->type->direct_access(ti, pgoff, nr_pages, kaddr, pfn);

out:
    dm_put_live_table(md, srcu_idx);
@@ -1036,22 +1037,25 @@
EXPORT_SYMBOL_GPL(dm_accept_partial_bio);

/*
   * The zone descriptors obtained with a zone report indicate
   * zone positions within the target device. The zone descriptors
   * must be remapped to match their position within the dm device.
   * A target may call dm_remap_zone_report after completion of a
   * REQ_OP_ZONE_REPORT bio to remap the zone descriptors obtained
   * from the target device mapping to the dm device.
   * The zone descriptors obtained with a zone report indicate zone positions
   * within the target backing device, regardless of that device is a partition
   * and regardless of the target mapping start sector on the device or partition.
   * The zone descriptors start sector and write pointer position must be adjusted
   * to match their relative position within the dm device.
   * A target may call dm_remap_zone_report() after completion of a
   * REQ_OP_ZONE_REPORT bio to remap the zone descriptors obtained from the
   * backing device.
*/
void dm_remap_zone_report(struct dm_target *ti, struct bio *bio, sector_t start) {
    #ifdef CONFIG_BLK_DEV_ZONED
    struct dm_target_io *tio = container_of(bio, struct dm_target_io, clone);
-    struct bio *report_bio = tio->io->bio;
+    struct bio *report_bio = tio->io->orig_bio;
    struct blk_zone_report_hdr *hdr = NULL;
    struct blk_zone *zone;
    unsigned int nr_rep = 0;
    unsigned int ofst;
+    sector_t part_offset;
    struct bio_vec bvec;
    struct bvec_iter iter;
    void *addr;
    @@ -1060,6 +1064,15 @@
    return;
/*
 + * bio sector was incremented by the request size on completion. Taking
 + * into account the original request sector, the target start offset on
 + * the backing device and the target mapping offset (ti->begin), the
 + * start sector of the backing device. The partition offset is always 0
 + * if the target uses a whole device.
 + */
+part_offset = bio->bi_iter.bi_sector + ti->begin - (start + bio_end_sector(report_bio));
+
+/*
 * Remap the start sector of the reported zones. For sequential zones,
 * also remap the write pointer position.
 */
@@ -1076,6 +1089,7 @@
 /* Set zones start sector */
 while (hdr->nr_zones && ofst < bvec.bv_len) {
     zone = addr + ofst;
+zone->start -= part_offset;
     if (zone->start >= start + ti->len) {
         hdr->nr_zones = 0;
         break;
@@ -1087,7 +1101,7 @@
     } else if (zone->cond == BLK_ZONE_COND_EMPTY)
         zone->wp = zone->start;
     else
-        zone->wp = zone->wp + ti->begin - start;
+        zone->wp = zone->wp + ti->begin - start - part_offset;
     }
     ofst += sizeof(struct blk_zone);
     hdr->nr_zones--;
@@ -1196,7 +1210,7 @@
 case DM_MAPIO_REMAPPED:
 /* the bio has been remapped so dispatch it */
     trace_block_bio_remap(clone->bi_disk->queue, clone,
-        bio_dev(tio->io->bio), sector);
+        bio_dev(tio->io->orig_bio), sector);
     generic_make_request(clone);
     break;
 case DM_MAPIO_KILL:
@@ -1474,12 +1488,14 @@
     return;
 }
+blk_queue_split(md->queue, &bio);
+
 ci.map = map;
 ci.md = md;
ci.io = alloc_io(md);

atomic_set(&ci.io->io_count, 1);

-ci.io->bio = bio;
+ci.io->orig_bio = bio;

-ci.io->md = md;

spin_lock_init(&ci.io->endio_lock);

ci.sector = bio->bi_iter.bi_sector;
@@ -1498,8 +1514,28 @@
} else {

-ci.bio = bio;

-ci.sector_count = bio_sectors(bio);
+while (ci.sector_count && !error) {
+  error = __split_and_process_non_flush(&ci);
+  if (current->bio_list && ci.sector_count && !error) {
+    /* Remainder must be passed to generic_make_request()
+    * so that it gets handled *after* bios already submitted
+    * have been completely processed.
+    * We take a clone of the original to store in
+    * ci.io->orig_bio to be used by end_io_acct() and
+    * for dec_pending to use for completion handling.
+    * As this path is not used for REQ_OP_ZONE_REPORT,
+    * the usage of io->orig_bio in dm_remap_zone_report()
+    * won't be affected by this reassignment.
+    */
+    struct bio *b = bio_split(bio, bio_sectors(bio) - ci.sector_count,
+      GFP_NOIO, md->queue->bio_split);
+    ci.io->orig_bio = b;
+    bio_chain(b, bio);
+    generic_make_request(bio);
+    break;
+  }
+}
+
+/* drop the extra reference count */
@@ -1510,8 +1546,8 @@
                         *
                        */

/*
-* The request function that just remaps the bio built up by
-* dm_merge_bvec.
+* The request function that remaps the bio to one target and
+* splits off any remainder.
*/

static blk_qc_t dm_make_request(struct request_queue *q, struct bio *bio)
void dm_init_normal_md_queue(struct mapped_device *md)
{
/*
 * Initialize aspects of queue that aren't relevant for blk-mq
 */
+md->queue->backing_dev_info->congested_data = md;
+(struct md_operations)_blk_queue_make_request(md->queue, dm_make_request);
+blk_queue_make_request(md->queue, dm_make_request);
}

md->disk = alloc_disk_node(1, numa_node_id);
if (!md->disk)
@@ -2033,16 +2075,6 @@
case DM_TYPE_BIO_BASED:
case DM_TYPE_DAX_BIO_BASED:
dm_init_normal_md_queue(md);
+-blk_queue_make_request(md->queue, dm_make_request);
-/*
-* DM handles splitting bios as needed. Free the bio_split bioset
-* since it won't be used (saves 1 process per bio-based DM device).
-*
-bioset_free(md->queue->bio_split);
-md->queue->bio_split = NULL;
-
-if (type == DM_TYPE_DAX_BIO_BASED)
-queue_flag_set_unlocked(QUEUE_FLAG_DAX, md->queue);
-break;
-case DM_TYPE_NONE:
WARN_ON_ONCE(true);
@@ -2636,17 +2668,25 @@
int dm_kobject_uevent(struct mapped_device *md, enum kobject_action action,
    unsigned cookie)
{
    int r;
    unsigned noio_flag;
    char udev_cookie[DM_COOKIE_LENGTH];
    char *envp[] = { udev_cookie, NULL };

    noio_flag = memalloc_noio_save();
    if (!cookie)
        return kobject_uevent(&disk_to_dev(md->disk)->kobj, action);
    r = kobject_uevent(&disk_to_dev(md->disk)->kobj, action);
    else {
        snprintf(udev_cookie, DM_COOKIE_LENGTH, "%s=%u",
            DM_COOKIE_ENV_VAR_NAME, cookie);
        r = kobject_uevent_env(&disk_to_dev(md->disk)->kobj,
            action, envp);
    }
    memalloc_noio_restore(noio_flag);
    return r;
}

uint32_t dm_next_uevent_seq(struct mapped_device *md)
uint32_t dm_next_uevent_seq(struct mapped_device *md)
{
    if (bitmap->bp[page].hijacked ||
        bitmap->bp[page].map == NULL)
        { 
            csize = ((sector_t)1) << (bitmap->chunkshift +
                PAGE_COUNTER_SHIFT - 1);
        } else 
        { 
            csize = ((sector_t)1) << bitmap->chunkshift;
        }
    *blocks = csize - (offset & (csize - 1));
    /*
    * free memory that was allocated
    */
    bitmap_free(struct bitmap *bitmap)
    void md_bitmap_free(struct bitmap *bitmap)
    {
        unsigned long k, pages;
        struct bitmap_page *bp;

        /*
        */
        /*
        */
@@ -1767,7 +1767,7 @@
kfree(bp);
kfree(bitmap);
}
-EXPORT_SYMBOL(bitmap_free);
+EXPORT_SYMBOL(md_bitmap_free);

void bitmap_wait_behind_writes(struct mddev *mddev)
{
@@ -1800,7 +1800,7 @@
if (mddev->thread)
    mddev->thread->timeout = MAX_SCHEDULE_TIMEOUT;

- bitmap_free(bitmap);
+ md_bitmap_free(bitmap);
}
/*
@@ -1891,7 +1891,7 @@
return bitmap;
 error:
- bitmap_free(bitmap);
+ md_bitmap_free(bitmap);
    return ERR_PTR(err);
 }
@@ -1962,7 +1962,7 @@
rv = bitmap_init_from_disk(bitmap, 0);
    if (rv) {
- bitmap_free(bitmap);
+ md_bitmap_free(bitmap);
        return ERR_PTR(rv);
    }
@@ -2134,6 +2134,7 @@
    memcpy(page_address(store.sb_page),
        page_address(bitmap->storage.sb_page),
        sizeof(bitmap_super_t));
+    spin_lock_irq(&bitmap->counts.lock);
    bitmap_file_unmap(&bitmap->storage);
    bitmap->storage = store;
@@ -2149,7 +2150,6 @@
    blocks = min(old_counts.chunks << old_counts.chunkshift,
        chunks << chunkshift);

/* For cluster raid, need to pre-allocate bitmap */
if (mddev_is_clustered(bitmap->mddev)) {
    unsigned long page;

    -- linux-4.15.0.orig/drivers/md/md-bitmap.h
    +++ linux-4.15.0/drivers/md/md-bitmap.h
    @@ -271,7 +271,7 @@
           struct bitmap *get_bitmap_from_slot(struct mddev *mddev, int slot);
           int bitmap_copy_from_slot(struct mddev *mddev, int slot, 
            sector_t *lo, sector_t *hi, bool clear_bits);
-        void bitmap_free(struct bitmap *bitmap);
+        void md_bitmap_free(struct bitmap *bitmap);
        void bitmap_wait_behind_writes(struct mddev *mddev);
    }

    -- linux-4.15.0.orig/drivers/md/md-cluster.c
    +++ linux-4.15.0/drivers/md/md-cluster.c
    @@ -304,15 +304,6 @@
        list_for_each_entry_safe(s, tmp, &cinfo->suspend_list, list)
            if (slot == s->slot) {
                list_del(&s->list);
-            kfree(s);
-        }
-        spin_unlock_irq(&cinfo->suspend_lock);
-        snprintf(str, 64, "bitmap%04d", slot);
-        bm_lockres = lockres_init(mddev, str, NULL, 1);
-        if (!bm_lockres) {
-            pr_err("md-cluster: Could not copy data from bitmap %d\n", slot);
-            goto clear_bit;
-        }
+        spin_lock_irq(&cinfo->suspend_lock);
+        list_for_each_entry_safe(s, tmp, &cinfo->suspend_list, list)
+            if (slot == s->slot) {
+                list_del(&s->list);
+                kfree(s);
+            }
+        spin_unlock_irq(&cinfo->suspend_lock);
+        if (hi > 0) {

if (lo < mddev->recovery_cp)
mddev->recovery_cp = lo;
@@ -658,9 +659,27 @@
    * node can communicate while the operation is underway.
    */
-static int lock_token(struct md_cluster_info *cinfo, bool mddev_locked)
+static int lock_token(struct md_cluster_info *cinfo)
+
+
+static int lock_comm(struct md_cluster_info *cinfo, bool mddev_locked)
+ { 
+  int error;
+  
+  error = dlm_lock_sync(cinfo->token_lockres, DLM_LOCK_EX);
+  if (error) {
+    pr_err("md-cluster(%s:%d): failed to get EX on TOKEN (%d)\n",
+        __func__, __LINE__, error);
+  } else {
+    /* Lock the receive sequence */
+    mutex_lock(&cinfo->recv_mutex);
+  }
+  +return error;
+  +}
+  +
+  /* lock_comm()
+   * Sets the MD_CLUSTER_SEND_LOCK bit to lock the send channel.
+   */
+  +
+static int lock_comm(struct md_cluster_info *cinfo, bool mddev_locked)
+ { 
  int error, set_bit = 0;
+  int rv, set_bit = 0;
  struct mddev *mddev = cinfo->mddev;

  /*
   @@ -671,34 +690,19 @@
   */
   if (mddev_locked && !test_bit(MD_CLUSTER_HOLDING_MUTEX_FOR_RECVD,
      &cinfo->state)) {
     -error = test_and_set_bit_lock(MD_CLUSTER_HOLDING_MUTEX_FOR_RECVD,
     +rv = test_and_set_bit_lock(MD_CLUSTER_HOLDING_MUTEX_FOR_RECVD,
      &cinfo->state);
     -WARN_ON_ONCE(error);
     +WARN_ON_ONCE(rv);
     md_wakeup_thread(mddev->thread);
     set_bit = 1;
   }
   -error = dlm_lock_sync(cinfo->token_lockres, DLM_LOCK_EX);
   -if (set_bit)
   -clear_bit_unlock(MD_CLUSTER_HOLDING_MUTEX_FOR_RECVD, &cinfo->state);
   -
-if (error)
-pr_err("md-cluster(%s:%d): failed to get EX on TOKEN (%d)\n",
-__func__, __LINE__, error);

-/* Lock the receive sequence */
-mutex_lock(&cinfo->recv_mutex);
-return error;
-
-/* lock_comm() */
-/* Sets the MD_CLUSTERSEND_LOCK bit to lock the send channel. */
-*/
-static int lock_comm(struct md_cluster_info *cinfo, bool mddev_locked)
-{
-wait_event(cinfo->wait,
-!test_and_set_bit(MD_CLUSTERSEND_LOCK, &cinfo->state));
-
-return lock_token(cinfo, mddev_locked);
+rval = lock_token(cinfo);
+if (set_bit)
+clear_bit_unlock(MD_CLUSTER_HOLDING_MUTEX_FOR_RECD, &cinfo->state);
+return rval;
 }

static void unlock_comm(struct md_cluster_info *cinfo)
@@ -778,9 +782,11 @@
{
-int ret;

-lock_comm(cinfo, mddev_locked);
-ret = __sendmsg(cinfo, cmsg);
-unlock_comm(cinfo);
+ret = lock_comm(cinfo, mddev_locked);
+if (!ret) {
+unlock_comm(cinfo);
+}
-return ret;
 }

@@ -1052,7 +1058,7 @@
return 0;
 }

-ret = lock_token(cinfo, 1);
+ret = lock_token(cinfo);
-clear_bit_unlock(MD_CLUSTER_HOLDING_MUTEX_FOR_RECD, &cinfo->state);
-return ret;
bm_lockres = lockres_init(mddev, str, NULL, 1);
if (!bm_lockres) {
    pr_err("md-cluster: Cannot initialize %s\n", str);
    bitmap_free(bitmap);
    +md_bitmap_free(bitmap);
    return -1;
}
bm_lockres->flags |= DLM_LKF_NOQUEUE;

sync_size = sb->sync_size;
else if (sync_size != sb->sync_size) {
    kunmap_atomic(sb);
    bitmap_free(bitmap);
    +md_bitmap_free(bitmap);
    return -1;
}
}
kunmap_atomic(sb);
bitmap_free(bitmap);
+md_bitmap_free(bitmap);
}
return (my_sync_size == sync_size) ? 0 : -1;

int raid_slot = -1;

dev = sb;

md_update_sb(mddev, 1);
-lock_comm(cinfo, 1);

if (lock_comm(cinfo, 1)) {
    pr_err("%s: lock_comm failed\n", __func__);
    +return;
}

memset(&cmsg, 0, sizeof(cmsg));
cmsg.type = cpu_to_le32(METADATA_UPDATED);
cmsg.type = cpu_to_le32(NEWDISK);
memcpy(cmsg.uuid, uuid, 16);
cmsg.raid_slot = cpu_to_le32(rdev->desc_nr);
-lock_comm(cinfo, 1);

if (lock_comm(cinfo, 1))
    +return -EAGAIN;
ret = __sendmsg(cinfo, &cmsg);
if (ret) {
    unlock_comm(cinfo);
}

kfree(cinfo->other_bitmap_lockres);
+cinfo->other_bitmap_lockres = NULL;
}
}

--- linux-4.15.0.orig/drivers/md/md-linear.c
+++ linux-4.15.0/drivers/md/md-linear.c
@@ -252,10 +252,9 @@
sector_t start_sector, end_sector, data_offset;
sector_t bio_sector = bio->bi_iter.bi_sector;

-if (unlikely(bio->bi_opf & REQ_PREFLUSH)) {
-    md_flush_request(mddev, bio);
+    if (unlikely(bio->bi_opf & REQ_PREFLUSH)
+        && md_flush_request(mddev, bio))
    return true;
-}

    tmp_dev = which_dev(mddev, bio_sector);
    start_sector = tmp_dev->end_sector - tmp_dev->rdev->sectors;
@@ -266,6 +265,11 @@
(goto out_of_bounds);

    +if (unlikely(is_mddev_broken(tmp_dev->rdev, "linear"))) {
    +    bio_io_error(bio);
    +    return true;
    +}
    +
    if (unlikely(bio_end_sector(bio) > end_sector)) {
        /* This bio crosses a device boundary, so we have to split it */
        struct bio *split = bio_split(bio, end_sector - bio_sector,
--- linux-4.15.0.orig/drivers/md/md-multipath.c
+++ linux-4.15.0/drivers/md/md-multipath.c
@@ -112,10 +112,9 @@
struct multipath_bh * mp_bh;
struct multipath_info *multipath;

-if (unlikely(bio->bi_opf & REQ_PREFLUSH)) {
-    md_flush_request(mddev, bio);
+    if (unlikely(bio->bi_opf & REQ_PREFLUSH)
+        && md_flush_request(mddev, bio))
    return true;
-}

    mp_bh = mempool_alloc(conf->pool, GFP_NOIO);
unsigned int sectors;
int cpu;

+if (unlikely(test_bit(MD_BROKEN, &mddev->flags)) && (rw == WRITE)) {
+bio_io_error(bio);
+return BLK_QC_T_NONE;
+
+blk_queue_split(q, &bio);

if (mddev == NULL || mddev->pers == NULL) {

}@ @ -434,6 +439,7 @@
struct mddev *mddev = container_of(ws, struct mddev, flush_work);
struct md_rdev *rdev;

+mddev->start_flush = ktime_get_boottime();
INIT_WORK(&mddev->flush_work, md_submit_flush_data);
atomic_set(&mddev->flush_pending, 1);
rcu_read_lock();
}@ @ -474,7 +480,10 @@
/* could wait for this and below md_handle_request could wait for those
* bios because of suspend check
*/
+spin_lock_irq(&mddev->lock);
+mddev->last_flush = mddev->start_flush;
mddev->flush_bio = NULL;
+spin_unlock_irq(&mddev->lock);
wake_up(&mddev->sb_wait);

if (bio->bi_iter.bi_size == 0)
}@ @ -486,17 +495,41 @@
}
}

-void md_flush_request(struct mddev *mddev, struct bio *bio)
+
+ * Manages consolidation of flushes and submitting any flushes needed for
+ * a bio with REQ_PREFLUSH. Returns true if the bio is finished or is
+ * being finished in another context. Returns false if the flushing is
+ * complete but still needs the I/O portion of the bio to be processed.
+ */
+bool md_flush_request(struct mddev *mddev, struct bio *bio)
{
+ktime_t start = ktime_get_boottime();
spin_lock_irq(&mddev->lock);
wait_event_lock_irq(mddev->sb_wait,
   !mddev->flush_bio,  
   !mddev->flush_bio ||  
   ktime_after(mddev->last_flush, start),  
   mddev->lock);
-mddev->flush_bio = bio;
+if (!ktime_after(mddev->last_flush, start)) {
  +WARN_ON(mddev->flush_bio);
  +mddev->flush_bio = bio;
  +bio = NULL;
  +}
spin_unlock_irq(&mddev->lock);

-INIT_WORK(&mddev->flush_work, submit_flushes);
-queue_work(md_wq, &mddev->flush_work);
+if (!bio) {
  +INIT_WORK(&mddev->flush_work, submit_flushes);
  +queue_work(md_wq, &mddev->flush_work);
  +} else {
  +/* flush was performed for some other bio while we waited. */
  +if (bio->bi_iter.bi_size == 0)
  +/* an empty barrier - all done */
  +bio_endio(bio);
  +else {
  +bio->bi_opf &= ~REQ_PREFLUSH;
  +return false;
  +}
  +}
  +
  +return true;
}
EXPORT_SYMBOL(md_flush_request);

@@ -567,8 +600,35 @@
}
EXPORT_SYMBOL_GPL(mddev_init);

+static struct mddev *mddev_find_locked(dev_t unit)
+{
+struct mddev *mddev;
+
+list_for_each_entry(mddev, &all_mddevs, all_mddevs)
+if (mddev->unit == unit)
+return mddev;
+
+return NULL;
+}
+
static struct mddev *mddev_find(dev_t unit)
{ 
+struct mddev *mddev;
+
+if (MAJOR(unit) != MD_MAJOR)
+    unit &= ~(1 << MdpMinorShift) - 1);
+
+spin_lock(&all_mddevs_lock);
+mddev = mddev_find_locked(unit);
+if (mddev)
+    mddev_get(mddev);
+spin_unlock(&all_mddevs_lock);
+
+return mddev;
+
+
+static struct mddev *mddev_find_or_alloc(dev_t unit)
+{
+    struct mddev *mddev, *new = NULL;
+
+    if (unit && MAJOR(unit) != MD_MAJOR)
@@ -578,13 +638,13 @@
@@ -578,13 +638,13 @@
+    list_add(&new->all_mddevs, &all_mddevs);
@@ -610,12 +670,7 @@
+    return NULL;
+
+    is_free = 1;
+    list_for_each_entry(mddev, &all_mddevs, all_mddevs)
+    if (mddev->unit == dev) {

- is_free = 0;
- break;
- }
+ is_free = !mddev_find_locked(dev);
} 
new->unit = dev;
new->md_minor = MINOR(dev);
@@ -800,6 +855,9 @@ 
struct bio *bio;
int ff = 0;

+ if (!page)
+ return;
+
+ if (test_bit(Faulty, &rdev->flags))
+ return;

@@ -1164,6 +1222,8 @@ 
mddev->new_layout = mddev->layout;
mddev->new_chunk_sectors = mddev->chunk_sectors;
} 
+if (mddev->level == 0)
+mddev->layout = -1:

if (sb->state & (1<<MD_SB_CLEAN))
mtdev->recovery_cp = MaxSector;
@@ -1580,6 +1640,10 @@ 
rdev->ppl.sector = rdev->sb_start + rdev->ppl.offset;
} 
+if ((le32_to_cpu(sb->feature_map) & MD_FEATURE_RAID0_LAYOUT) &&
+ sb->level != 0)
+return -EINVAL;
+
+ if (!refdev) {
+ ret = 1;
+ } else {
+ @@ -1690,6 +1754,10 @@ 
mddev->new_chunk_sectors = mddev->chunk_sectors;
} 
+if (mddev->level == 0 &&
+ !(le32_to_cpu(sb->feature_map) & MD_FEATURE_RAID0_LAYOUT))
+mddev->layout = -1;
+
+ if (le32_to_cpu(sb->feature_map) & MD_FEATURE_JOURNAL)
set_bit(MD_HAS_JOURNAL, &mddev->flags);
if (!(le32_to_cpu(sb->feature_map) &
    MD_FEATURE_RECOVERY_BITMAP))
rdev->saved_raid_disk = -1;
} else
-set_bit(In_sync, &rdev->flags);
+} else {
*/
+ /* If the array is FROZEN, then the device can't
+ * be in_sync with rest of array.
+ */
+if (!test_bit(MD_RECOVERY_FROZEN,
+   &mddev->recovery))
+set_bit(In_sync, &rdev->flags);
+}
rdev->raid_disk = role;
break;
}
} else if (cmd_match(buf, "re-add")) {
-if (test_bit(Faulty, &rdev->flags) && (rdev->raid_disk == -1)) {
+if (!rdev->mddev->pers)
+err = -EINVAL;
+else if (test_bit(Faulty, &rdev->flags) && (rdev->raid_disk == -1) &&
+rdev->saved_raid_disk >= 0) {
/* clear_bit is performed _after_ all the devices
 * have their local Faulty bit cleared. If any writes
 * happen in the meantime in the local node, they
@@ -2849,7 +2924,10 @@
 */
 enum array_state { clear, inactive, suspended, readonly, read_auto, clean, active,
 - write_pending, active_idle, bad_word};
 + write_pending, active_idle, broken, bad_word};
 static char *array_states[] = {
"clear", "inactive", "suspended", "readonly", "read-auto", "clean", "active",
-"write-pending", "active-idle", NULL };
+"write-pending", "active-idle", "broken", NULL };

static int match_word(const char *word, char **list)
{
    if (mddev->pers)
+    if (mddev->pers && !test_bit(MD_NOT_READY, &mddev->flags)) {
        switch(mddev->ro) {
            case 1:
                st = readonly;
            @@ -4122,7 +4205,10 @@
                st = active;
                spin_unlock(&mddev->lock);
            } -else {
            +            if (test_bit(MD_BROKEN, &mddev->flags) && st == clean)
            +                st = broken;
            +} else {
            if (list_empty(&mddev->disks) &&
                mddev->raid_disks == 0 &&
                mddev->dev_sectors == 0)
            @@ -4236,6 +4322,7 @@
                break;
            case write_pending:
            case active_idle:
            +            case broken:
                /* these cannot be set */
                break;
            }
            @@ -5260,7 +5347,7 @@
                * writing to /sys/module/md_mod/parameters/new_array.
                */
        static DEFINE_MUTEX(disks_mutex);
        -struct mddev *mddev = mddev_find(dev);
        +struct mddev *mddev = mddev_find_or_alloc(dev);
        struct gendisk *disk;
        int partitioned;
        int shift;
            @@ -5337,10 +5424,6 @@
                * disk->flags |= GENHD_FL_EXT_DEVT;
                mddev->gendisk = disk;
                /* As soon as we call add_disk(), another thread could get
                * through to md_open, so make sure it doesn't get too far
                */
                -mutex_lock(&mddev->open_mutex);
add_disk(disk);

error = kobject_init_and_add(&mddev->kobj, &md_ktype,
@@ -5356,7 +5439,6 @@
if (mddev->kobj.sd &
    sysfs_create_group(&mddev->kobj, &md_bitmap_group))
pr_debug("pointless warning\n");
-mutex_unlock(&mddev->open_mutex);
abort:
mutex_unlock(&disks_mutex);
if (!$error & mddev->kobj.sd) {
@@ -5451,6 +5533,7 @@
 /* the only valid external interface is through the md
 * device.
 */
+mddev->has_superblocks = false;
rdev_for_each(rdev, mddev) {
if (test_bit(Faulty, &rdev->flags))
    continue;
@@ -5464,6 +5547,9 @@
    set_disk_ro(mddev->gendisk, 1);
}

+if ($rdev->sb_page)
+mddev->has_superblocks = true;
+
/* perform some consistency tests on the device.
 * We don't want the data to overlap the metadata,
 * Internal Bitmap issues have been handled elsewhere.
@@ -5496,8 +5582,10 @@
}
if (mddev->sync_set == NULL) {
    mddev->sync_set = bioset_create(BIO_POOL_SIZE, 0, BIOSET_NEED_BVECS);
-if (!$mddev->sync_set)
-    return -ENOMEM;
+    if (!$mddev->sync_set) {
+        err = -ENOMEM;
+        goto abort;
+    }
}

spin_lock(&pers_lock);
@@ -5510,7 +5598,8 @@
else
    pr_warn("md: personality for level %s is not loaded!\n",
    mddev->clevel);
-return -EINVAL;
+err = -EINVAL;
+goto abort;
} 

spin_unlock(&pers_lock);
if (mddev->level != pers->level) {
  if (pers->start_reshape == NULL) {
    /* This personality cannot handle reshaping... */
    module_put(pers->owner);
    -return -EINVAL;
    +err = -EINVAL;
    +goto abort;
  }
}

if (pers->sync_request) {
  mddev->private = NULL;
  module_put(pers->owner);
  bitmap_destroy(mddev);
  -return err;
  +goto abort;
}

if (mddev->queue) {
  bool nonrot = true;
  md_update_sb(mddev, 0);
  md_new_event(mddev);
  -sysfs_notify dirent_safe(mddev->sysfs_state);
  -sysfs_notify dirent_safe(mddev->sysfs_action);
  -sysfs_notify(&mddev->kobj, NULL, "degraded");
  return 0;
  +
  +abort:
  +if (mddev->bio_set) {
  +bioset_free(mddev->bio_set);
  +mddev->bio_set = NULL;
  +}
  +if (mddev->sync_set) {
  +bioset_free(mddev->sync_set);
  +mddev->sync_set = NULL;
  +}
  +
  +return err;
}

EXPORT_SYMBOL_GPL(md_run);

@@ -5666,6 +5765,7 @@
{

@@ -5523,7 +5612,8 @@

@@ -5597,7 +5687,7 @@

@@ -5655,10 +5745,19 @@

@@ -5666,6 +5765,7 @@

int err;

+set_bit(MD_NOT_READY, &mddev->flags);
err = md_run(mddev);
if (err)
goto out;
@@ -5683,9 +5783,14 @@
set_capacity(mddev->gendisk, mddev->array_sectors);
revalidate_disk(mddev->gendisk);
+clear_bit(MD_NOT_READY, &mddev->flags);
mddev->changed = 1;
kobject_uevent(&disk_to_dev(mddev->gendisk)->kobj, KOBJ_CHANGE);
+sysfs_notify_dirent_safe(mddev->sysfs_state);
+sysfs_notify_dirent_safe(mddev->sysfs_action);
+sysfs_notify(mddev->kobj, NULL, "degraded");
out:
+clear_bit(MD_NOT_READY, &mddev->flags);
return err;
}
@@ -5818,7 +5923,7 @@
static void mddev_detach(struct mddev *mddev)
{
bitmap_wait_behind_writes(mddev);
-if (mddev->pers && mddev->pers->quiesce) {
 +if (mddev->pers && mddev->pers->quiesce && !mddev->suspended) {
 mddev->pers->quiesce(mddev, 1);
 mddev->pers->quiesce(mddev, 0);
 }
@@ -6093,11 +6198,9 @@
md_probe(dev, NULL, NULL);
mddev = mddev_find(dev);
-if (!mddev || !mddev->gendisk) {
 -if (!mddev)
- mddev_put(mddev);
+if (!mddev)
break;
-}
+
if (mddev_lock(mddev))
pr_warn("md: %s locked, cannot run\n", mdname(mddev));
else if (mddev->raid_disks || mddev->major_version
@@ -6487,6 +6590,9 @@
char b[BDEVNAME_SIZE];
struct md_rdev *rdev;

+if (!mddev->pers)
+return -ENODEV;
+
rdev = find_rdev(mddev, dev);
if (!rdev)
return -ENXIO;
@@ -6501,8 +6607,10 @@
goto busy;

kick_rdev:
- if (mddev_is_clustered(mddev))
- md_cluster_ops->remove_disk(mddev, rdev);
+ if (mddev_is_clustered(mddev)) {
+ if (md_cluster_ops->remove_disk(mddev, rdev))
+ goto busy;
+ }

md_kick_rdev_from_array(rdev);
set_bit(MD_SB_CHANGE_DEVS, &mddev->sb_flags);
@@ -6731,6 +6839,9 @@

mddev->external = 0;

mddev->layout = info->layout;
+ if (mddev->level == 0)
+ /* Cannot trust RAID0 layout info here */
+ mddev->layout = -1;
+ mddev->chunk_sectors = info->chunk_size >> 9;

if (mddev->persistent) {
@@ -7148,8 +7259,11 @@
er = -EBUSY;
goto out;
 }
-WARN_ON_ONCE(test_bit(MD_CLOSING, &mddev->flags));
-set_bit(MD_CLOSING, &mddev->flags);
+ if (test_and_set_bit(MD_CLOSING, &mddev->flags)) {
+ mutex_unlock(&mddev->open_mutex);
+ err = -EBUSY;
+ goto out;
+ }
+ did_set_md_closing = true;
mutex_unlock(&mddev->open_mutex);
sync_blockdev(bdev);
@@ -7385,9 +7499,9 @@
 /* Wait until bdev->bd_disk is definitely gone */
-flush_workqueue(md_misc_wq);


-/* Then retry the open from the top */
-return -ERESTARTSYS;
+if (work_pending(&mddev->del_work))
+flush_workqueue(md_misc_wq);
+return -EBUSY;
}
BUG_ON(mddev != bdev->bd_disk->private_data);

@@ -7589,9 +7703,9 @@
static int status_resync(struct seq_file *seq, struct mddev *mddev)
{
    sector_t max_sectors, resync, res;
    unsigned long dt, db;
-    sector_t rt;
-    int scale;
+    unsigned long dt, db = 0;
+    sector_t rt, curr_mark_cnt, resync_mark_cnt;
+    int scale, recovery_active;
    unsigned int per_milli;

    if (test_bit(MD_RECOVERY_SYNC, &mddev->recovery) ||
@@ -7663,22 +7777,30 @@
    * rt: remaining time
    *
    - * rt is a sector_t, so could be 32bit or 64bit.
    - * So we divide before multiply in case it is 32bit and close
    - * to the limit.
    - * We scale the divisor (db) by 32 to avoid losing precision
    - * near the end of resync when the number of remaining sectors
    - * is close to 'db'.
    - * We then divide rt by 32 after multiplying by db to compensate.
    - * The '+1' avoids division by zero if db is very small.
    + * rt is a sector_t, which is always 64bit now. We are keeping
    + * the original algorithm, but it is not really necessary.
    + *
    + * Original algorithm:
    + * So we divide before multiply in case it is 32bit and close
    + * to the limit.
    + * We scale the divisor (db) by 32 to avoid losing precision
    + * near the end of resync when the number of remaining sectors
    + * is close to 'db'.
    + * We then divide rt by 32 after multiplying by db to compensate.
    + * The '+1' avoids division by zero if db is very small.
    */
    dt = ((jiffies - mddev->resync_mark) / HZ);
    if (!dt) dt++;
    -db = (mddev->curr_mark_cnt - atomic_read(&mddev->recovery_active))
mddev->resync_mark_cnt;
+
curr_mark_cnt = mddev->curr_mark_cnt;
+recovery_active = atomic_read(&mddev->recovery_active);
+resync_mark_cnt = mddev->resync_mark_cnt;
+
if (curr_mark_cnt >= (recovery_active + resync_mark_cnt))
+db = curr_mark_cnt - (recovery_active + resync_mark_cnt);

rt = max_sectors - resync;  /* number of remaining sectors */
-sector_div(rt, db/32+1);
+rt = div64_u64(rt, db/32+1);
rt *= dt;
rt >>= 5;

@ @ -7695,7 +7817,11 @@
loff_t l = *pos;
struct mddev *mddev;

-if (l >= 0x10000)
+if (l == 0x10000) {
+++*pos;
+return (void *)2;
+
+if (l > 0x10000)
return NULL;
if (!l--)
/* header */
@ @ -8035,6 +8161,7 @@
bool md_write_start(struct mddev *mddev, struct bio *bi)
{
int did_change = 0;
+
if (bio_data_dir(bi) != WRITE)
return true;

@ @ -8067,6 +8194,8 @@
rcu_read_unlock();
if (did_change)
sysfs_notify_dirent_safe(mddev->sysfs_state);
+if (!mddev->has_superblocks)
+return true;
wait_event(mddev->sb_wait,
!test_bit(MD_SB_CHANGE_PENDING, &mddev->sb_flags) ||
mddev->suspended);
@ @ -8112,6 +8241,26 @@
EXPORT_SYMBOL(md_write_end);

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+/* This is used by raid0 and raid10 */
+void md_submit_discard_bio(struct mddev *mddev, struct md_rdev *rdev,
+struct bio *bio, sector_t start, sector_t size)
+{
+struct bio *discard_bio = NULL;
+
+if (__blkdev_issue_discard(rdev->bdev, start, size, GFP_NOIO, 0,
+&discard_bio) || !discard_bio)
+return;
+
+bio_chain(discard_bio, bio);
+bio_clone_blkcg_association(discard_bio, bio);
+if (mddev->gendisk)
+trace_block_bio_remap(bdev_get_queue(rdev->bdev),
+discard_bio, disk_devt(mddev->gendisk),
+bio->bi_iter.bi_sector);
+generic_make_request(discard_bio);
+}
+EXPORT_SYMBOL_GPL(md_submit_discard_bio);
+
/* md_allow_write(mddev)
* Calling this ensures that the array is marked 'active' so that writes
* may proceed without blocking. It is important to call this before
@@ -8528,6 +8677,19 @@
set_mask_bits(&mddev->sb_flags, 0,
+if (test_bit(MD_RECOVERY_RESHAPE, &mddev->recovery) &&
+!test_bit(MD_RECOVERY_INTR, &mddev->recovery) &&
+mddev->delta_disks > 0 &&
+mddev->pers->finish_reshape &&
+mddev->pers->size &&
+mddev->queue) {
+mddev_lock_nointr(mddev);
+md_set_array_sectors(mddev, mddev->pers->size(mddev, 0, 0));
+mddev_unlock(mddev);
+set_capacity(mddev->gendisk, mddev->array_sectors);
+revalidate_disk(mddev->gendisk);
+}
+
spin_lock(&mddev->lock);
if (!test_bit(MD_RECOVERY_INTR, &mddev->recovery)) {
/* We completed so min/max setting can be forgotten if used. */
@@ -8554,6 +8716,10 @@
int removed = 0;
bool remove_some = false;
if (this && test_bit(MD_RECOVERY_RUNNING, &mddev->recovery))
#endif Mustn't remove devices when resync thread is running */
+return 0;
+
+ rdev_for_each(rdev, mddev) {
if ((this == NULL || rdev == this) &&
    rdev->raid_disk >= 0 &&
@@ -8583,6 +8749,7 @@
if (mddev->pers->hot_remove_disk(
    mddev, rdev) == 0) {
 sysfs_unlink_rdev(mddev, rdev);
+ rdev->saved_raid_disk = rdev->raid_disk;
 rdev->raid_disk = -1;
 removed++;
 }
@@ -8686,6 +8853,18 @@ */
 void md_check_recovery(struct mddev *mddev)
 {
+if (test_bit(MD_ALLOW_SB_UPDATE, &mddev->flags) && mddev->sb_flags) {
+ /* Write superblock - thread that called mddev_suspend()
+ * holds reconfig_mutex for us.
+ */
+ set_bit(MD_UPDATING_SB, &mddev->flags);
+ smp_mb__after_atomic();
+if (test_bit(MD_ALLOW_SB_UPDATE, &mddev->flags))
+ md_update_sb(mddev, 0);
+ clear_bit_unlock(MD_UPDATING_SB, &mddev->flags);
+ wake_up(&mddev->sb_wait);
+ 
+ if (mddev->suspended)
return;
@@ -8715,6 +8894,7 @@

 if (mddev->trylock(mddev)) {
int spares = 0;
+bool try_set_sync = mddev->safemode != 0;

if (!mddev->external && mddev->safemode == 1)
 mddev->safemode = 0;
@@ -8749,18 +8929,18 @@
 }

if (mddev_is_clustered(mddev)) {
-struct md_rdev *rdev;
+struct md_rdev *rdev, *tmp;
/* kick the device if another node issued a
 * remove disk. */
-rdev_for_each(rdev, mddev) {
+rdev_for_each_safe(rdev, tmp, mddev) {
if (test_and_clear_bit(ClusterRemove, &rdev->flags) &&
rdev->raid_disk < 0)
    mdKick_rdev_from_array(rdev);
}

-if (!mddev->external && !mddev->in_sync) {
+if (try_set_sync && !mddev->external && !mddev->in_sync) {
    spin_lock(&mddev->lock);
    set_in_sync(mddev);
    spin_unlock(&mddev->lock);
    @ @ -8845,16 +9025,6 @@
unlock:
    wake_up(&mddev->sb_wait);
    mddev_unlock(mddev);
- } else if (test_bit(MD_ALLOW_SB_UPDATE, &mddev->flags) &&
- mddev->sb_flags) {
- */ Write superblock - thread that called mddev_suspend()
- * holds reconfig_mutex for us.
- */
- set_bit(MD_UPDATING_SB, &mddev->flags);
- smp_mb__after_atomic();
- if (test_bit(MD_ALLOW_SB_UPDATE, &mddev->flags))
- md_update_sb(mddev, 0);
- clear_bit_unlock(MD_UPDATING_SB, &mddev->flags);
- wake_up(&mddev->sb_wait);
} }
EXPORT_SYMBOL(md_check_recovery);
@@ -8866,7 +9036,8 @@
/* resync has finished, collect result */
    md_unregister_thread(&mddev->sync_thread);
if (!test_bit(MD_RECOVERY_INTR, &mddev->recovery) &&
- !test_bit(MD_RECOVERY_REQUESTED, &mddev->recovery)) {
+ !test_bit(MD_RECOVERY_REQUESTED, &mddev->recovery) &&
+ mddev->degraded != mddev->raid_disks) {
/* success...*/
/* activate any spares */
    if (mddev->pers->spare_active(mddev)) {
@@ -9062,7 +9233,7 @@
       static void check_sb_changes(struct mddev *mddev, struct md_rdev *rdev)
           { }
       struct mdp_superblock_1 *sb = page_address(rdev->sb_page);
-struct md_rdev *rdev2;
int role, ret;
char b[BDEVNAME_SIZE];

/* Check for change of roles in the active devices */
-rdev_for_each(rdev2, mddev) {
+rdev_for_each_safe(rdev2, tmp, mddev) {
if (test_bit(Faulty, &rdev2->flags))
continue;

--- linux-4.15.0.orig/drivers/md/md.h
+++ linux-4.15.0/drivers/md/md.h
@@ -243,6 +243,12 @@
      MD_UPDATING_SB,  * md_check_recovery is updating the metadata
        * without explicitly holding reconfig_mutex.
        */
+        MD_NOT_READY,  /* do_md_run() is active, so 'array_state'
+                      * must not report that array is ready yet
+                      */
+        MD_BROKEN,      /* This is used in RAID-0/LINEAR only, to stop
+                      * I/O in case an array member is gone/failed.
+                      */
+    }

enum mddev_sb_flags {
@@ -463,11 +469,16 @@
        */
    struct bio *flush_bio;
    atomic_t flush_pending;
+    ktime_t start_flush, last_flush; /* last_flush is when the last completed
+                      * flush was started.
+                      */
    struct work_struct flush_work;
    struct work_struct event_work;  /* used by dm to report failure event */
    void (*sync_super)(struct mddev *mddev, struct md_rdev *rdev);
    struct md_cluster_info*cluster_info;
    unsigned int good_device_nr;    /* good device num within cluster raid */
+    +bool has_superblocks:1;
    }

enum recovery_flags {    /*
@@ -522,7 +533,7 @@
    int level;
    struct list_head list;
    
--- linux-4.15.0.orig/drivers/md/md.h
+++ linux-4.15.0/drivers/md/md.h
@@ -9079,7 +9250,7 @@
    }
struct module *owner;
-bool (*make_request)(struct mddev *mddev, struct bio *bio);
+bool __must_check (*make_request)(struct mddev *mddev, struct bio *bio);
int (*run)(struct mddev *mddev);
void (*free)(struct mddev *mddev, void *priv);
void (*status)(struct seq_file *seq, struct mddev *mddev);
@@ -666,9 +677,11 @@
extern void md_done_sync(struct mddev *mddev, int blocks, int ok);
extern void md_error(struct mddev *mddev, struct md_rdev *rdev);
extern void md_finish_reshape(struct mddev *mddev);
+void md_submit_discard_bio(struct mddev *mddev, struct md_rdev *rdev, 
+struct bio *bio, sector_t start, sector_t size);

extern int mddev_congested(struct mddev *mddev, int bits);
-extern void md_flush_request(struct mddev *mddev, struct bio *bio);
+extern bool __must_check md_flush_request(struct mddev *mddev, struct bio *bio);
extern void md_super_write(struct mddev *mddev, struct md_rdev *rdev, 
 sector_t sector, int size, struct page *page);
extern int md_super_wait(struct mddev *mddev);
@@ -703,6 +716,19 @@
extern void md_kick_rdev_from_array(struct md_rdev * rdev);
struct md_rdev *md_find_rdev_nr_rcu(struct mddev *mddev, int nr);

+static inline bool is_mddev_broken(struct md_rdev *rdev, const char *md_type)
+{
+    int flags = rdev->bdev->bd_disk->flags;
+    +if (!(flags & GENHD_FL_UP)) {
+        +if (!test_and_set_bit(MD_BROKEN, &rdev->mddev->flags))
+            pr_warn("md: %s: %s array has a missing/failed member\n", 
+                mdname(rdev->mddev), md_type);
+        +return true;
+    +}
+    +return false;
+}
+
static inline void rdev_dec_pending(struct md_rdev *rdev, struct mddev *mddev)
{
    int faulty = test_bit(Faulty, &rdev->flags);
--- linux-4.15.0.orig/drivers/md/persistent-data/dm-btree-internal.h
+++ linux-4.15.0/drivers/md/persistent-data/dm-btree-internal.h
@@ -34,12 +34,12 @@
__le32 max_entries;
__le32 value_size;
__le32 padding;
-} __packed;
+} __attribute__((packed, aligned(8)));
struct btree_node {
    struct node_header header;
    __le64 keys[0];
} __attribute__((packed));

/*
--- linux-4.15.0.orig/drivers/md/persistent-data/dm-btree-remove.c
+++ linux-4.15.0/drivers/md/persistent-data/dm-btree-remove.c
@@ -203,7 +203,13 @@
    struct btree_node *right = r->n;
    uint32_t nr_left = le32_to_cpu(left->header.nr_entries);
    uint32_t nr_right = le32_to_cpu(right->header.nr_entries);
-    unsigned threshold = 2 * merge_threshold(left) + 1;
+    /* Ensure the number of entries in each child will be greater
+     * than or equal to (max_entries / 3 + 1), so no matter which
+     * child is used for removal, the number will still be not
+     * less than (max_entries / 3).
+    */
+    unsigned int threshold = 2 * (merge_threshold(left) + 1);
+*/
    if (nr_left + nr_right < threshold) {
+        /*new_root = shadow_root(&spine);
+         *r = new_block(s->info, &left);
+         */
        *new_root = shadow_root(&spine);
        if (!r)
            return r;
    }

new_parent = shadow_current(s);
+pn = dm_block_data(new_parent);
+size = le32_to_cpu(pn->header.flags) & INTERNAL_NODE ?
+sizeof(__le64) : s->info->value_type.size;
  r = new_block(s->info, &left);
  if (r < 0)
return r;

+ln = dm_block_data(left);
+nr_left = le32_to_cpu(pn->header.nr_entries) / 2;
  +
+ln->header.flags = pn->header.flags;
+ln->header.nr_entries = cpu_to_le32(nr_left);
+ln->header.max_entries = pn->header.max_entries;
+ln->header.value_size = pn->header.value_size;
+memcpy(ln->keys, pn->keys, nr_left * sizeof(pn->keys[0]));
+memcpy(value_ptr(ln, 0), value_ptr(pn, 0), nr_left * size);

/* create & init the right block */
r = new_block(s->info, &right);
if (r < 0) {
  unlock_block(s->info, left);
  return r;
}

-pn = dm_block_data(new_parent);
-ln = dm_block_data(left);
-rn = dm_block_data(right);
-
-nr_right = le32_to_cpu(pn->header.nr_entries) - nr_left;

-ln->header.flags = pn->header.flags;
-ln->header.nr_entries = cpu_to_le32(nr_left);
-ln->header.max_entries = pn->header.max_entries;
-ln->header.value_size = pn->header.value_size;
-
-rn->header.flags = pn->header.flags;
-rn->header.nr_entries = cpu_to_le32(nr_right);
-rn->header.max_entries = pn->header.max_entries;
-rn->header.value_size = pn->header.value_size;
-
-memcpy(ln->keys, pn->keys, nr_left * sizeof(pn->keys[0]));
-memcpy(rn->keys, pn->keys + nr_left, nr_right * sizeof(pn->keys[0]));
-
-size = le32_to_cpu(pn->header.flags) & INTERNAL_NODE ?
-sizeof(__le64) : s->info->value_type.size;
-memcpy(value_ptr(ln, 0), value_ptr(pn, 0), nr_left * size);
-memcpy(value_ptr(rn, 0), value_ptr(pn, nr_left),
  nr_right * size);

--- linux-4.15.0.orig/drivers/md/persistent-data/dm-space-map-common.c
+++ linux-4.15.0/drivers/md/persistent-data/dm-space-map-common.c
@@ -337,6 +337,8 @@

begin = do_div(index_begin, ll->entries_per_block);
end = do_div(end, ll->entries_per_block);
+if (end == 0)
+end = ll->entries_per_block;

for (i = index_begin; i < index_end; i++, begin = 0) {
struct dm_block *blk;
return -ENOSPC;
}

+int sm_ll_find_common_free_block(struct ll_disk *old_ll, struct ll_disk *new_ll,
+       dm_block_t begin, dm_block_t end, dm_block_t *b)
+{
+int r;
+uint32_t count;
+
+do {
+r = sm_ll_find_free_block(new_ll, begin, new_ll->nr_blocks, b);
+if (!r)
+break;
+
+/* double check this block wasn’t used in the old transaction */
+if (*b >= old_ll->nr_blocks)
+count = 0;
+else {
+r = sm_ll_lookup(old_ll, *b, &count);
+if (!r)
+break;
+
+if (count)
+begin = *b + 1;
+}
+} while (count);
+
+return r;
+
+static int sm_ll_mutate(struct ll_disk *ll, dm_block_t b,
int (*mutator)(void *context, uint32_t old, uint32_t *new),
void *context, enum allocation_event *ev)
--- linux-4.15.0.orig/drivers/md/persistent-data/dm-space-map-common.h
+++ linux-4.15.0/drivers/md/persistent-data/dm-space-map-common.h
@@ -33,7 +33,7 @@
__le64 blocknr;
__le32 nr_free;
__le32 none_free_before;
#define MAX_METADATA_BITMAPS 255
@@ -43,7 +43,7 @@
 __le64 blocknr;

 struct disk_index_entry index[MAX_METADATA_BITMAPS];
-} __packed;
+} __attribute__((packed, aligned(8)));

 struct ll_disk;
@@ -86,7 +86,7 @@
 __le64 nr_allocated;
 __le64 bitmap_root;
 __le64 ref_count_root;
-} __packed;
+} __attribute__((packed, aligned(8)));

 #define ENTRIES_PER_BYTE 4
@@ -94,7 +94,7 @@
 __le32 csum;
 __le32 not_used;
 __le64 blocknr;
-} __packed;
+} __attribute__((packed, aligned(8)));

 enum allocation_event {
 SM_NONE,
@@ -109,6 +109,8 @@
 int sm_ll_lookup(struct ll_disk *ll, dm_block_t b, uint32_t *result);
 int sm_ll_find_free_block(struct ll_disk *ll, dm_block_t begin,
   dm_block_t end, dm_block_t *result);
+int sm_ll_find_common_free_block(struct ll_disk *old_ll, struct ll_disk *new_ll,
  + dm_block_t begin, dm_block_t end, dm_block_t *result);
 int sm_ll_insert(struct ll_disk *ll, dm_block_t b, uint32_t ref_count, enum allocation_event *ev);
 int sm_ll_inc(struct ll_disk *ll, dm_block_t b, enum allocation_event *ev);
 int sm_ll_dec(struct ll_disk *ll, dm_block_t b, enum allocation_event *ev);
--- linux-4.15.0.orig/drivers/md/persistent-data/dm-space-map-disk.c
+++ linux-4.15.0/drivers/md/persistent-data/dm-space-map-disk.c
@@ -167,8 +167,18 @@
 enum allocation_event ev;
 struct sm_disk *smd = container_of(sm, struct sm_disk, sm);

 /* FIXME: we should loop round a couple of times */
- r = sm_ll_find_free_block(&smd->old_ll, smd->begin, smd->old_ll.nr_blocks, b);
+ /*
+ * Any block we allocate has to be free in both the old and current ll.
+ */
++ r = sm_ll_find_common_free_block(&smd->old_ll, &smd->ll, smd->begin, smd->ll.nr_blocks, b);
+ if (r == -ENOSPC) {
++ /*
++ * There's no free block between smd->begin and the end of the metadata device.
++ * We search before smd->begin in case something has been freed.
++ */
++ r = sm_ll_find_common_free_block(&smd->old_ll, &smd->ll, 0, smd->begin, b);
+ }+
+ if (r)
return r;

@@ -197,7 +207,6 @@
return r;
memcpy(&smd->old_ll, &smd->ll, sizeof(smd->old_ll));
-smd->begin = 0;
-smd->nr_allocated_this_transaction = 0;

r = sm_disk_get_nr_free(sm, &nr_free);
--- linux-4.15.0.orig/drivers/md/persistent-data/dm-space-map-metadata.c
+++ linux-4.15.0/drivers/md/persistent-data/dm-space-map-metadata.c
@@ -249,7 +249,7 @@
}
if (smm->recursion_count == 1)
-apply_bops(smm);
+ r = apply_bops(smm);

smm->recursion_count--;

@@ -448,7 +448,18 @@
enum allocation_event ev;
struct sm_metadata *smm = container_of(sm, struct sm_metadata, sm);

- r = sm_ll_find_free_block(&smm->old_ll, smm->begin, smm->old_ll.nr_blocks, b);
+ /*
+ * Any block we allocate has to be free in both the old and current ll.
+ */
++ r = sm_ll_find_common_free_block(&smm->old_ll, &smm->ll, smm->begin, smm->ll.nr_blocks, b);
+ if (r == -ENOSPC) {
++ /*
++ * There's no free block between smm->begin and the end of the metadata device.
++ * We search before smm->begin in case something has been freed.
++ */
++

+ */
+r = sm_ll_find_common_free_block(&smm->old_ll, &smm->ll, 0, smm->begin, b);
+
+ if (r)
+ return r;

memcpy(&smm->old_ll, &smm->ll, sizeof(smm->old_ll));
-smm->begin = 0;
smm->allocated_this_transaction = 0;

return 0;
--- linux-4.15.0.orig/drivers/md/raid0.c
+++ linux-4.15.0/drivers/md/raid0.c
@@ -26,6 +26,9 @@
#include "raid0.h"
#include "raid5.h"

+static int default_layout = 0;
+module_param(default_layout, int, 0644);
+
+#define UNSUPPORTED_MDDEV_FLAGS		\((1L << MD_HAS_JOURNAL) |\)
+(1L << MD_JOURNAL_CLEAN) |\)
@@ -91,7 +94,7 @@
char b[BDEVNAME_SIZE];
char b2[BDEVNAME_SIZE];
struct r0conf *conf = kzalloc(sizeof(*conf), GFP_KERNEL);
-unsigned short blksize = 512;
+unsigned blksize = 512;

*private_conf = ERR_PTR(-ENOMEM);
if (!conf)
@@ -146,6 +149,23 @@
+ *conf = err->kzalloc(sizeof(*conf), GFP_KERNEL);
+ if (conf->nr_strip_zones == 1) {
+ conf->layout = RAID0_ORIG_LAYOUT;
+ } else if (mddev->layout == RAID0_ORIG_LAYOUT ||
+ mddev->layout == RAID0_ALT_MULTIZONE_LAYOUT) {
+ conf->layout = mddev->layout;
+ } else if (default_layout == RAID0_ORIG_LAYOUT ||
+ default_layout == RAID0_ALT_MULTIZONE_LAYOUT) {
+conf->layout = default_layout;
+} else {
+conf->layout = RAID0_ALT_MULTIZONE_LAYOUT;
+pr_warn("md/raid0:%s: !!! DEFAULTING TO ALTERNATE LAYOUT !!!\n",
+    mdname(mddev));
+pr_warn("md/raid0: Please set raid0.default_layout to 1 or 2\n";
+pr_warn("md/raid0: Read the following page for more information:\n";
+pr_warn("md/raid0: https://wiki.ubuntu.com/Kernel/Raid0LayoutMigration\n");
+
*/

* now since we have the hard sector sizes, we can make sure
* chunk size is a multiple of that sector size
@@ -511,7 +531,6 @@

for (disk = 0; disk < zone->nb_dev; disk++) {
    sector_t dev_start, dev_end;
-    struct bio *discard_bio = NULL;
    struct md_rdev *rdev;

    if (disk < start_disk_index)
@@ -534,35 +553,27 @@

    rdev = conf->devlist[(zone - conf->strip_zone) *
        conf->strip_zone[0].nb_dev + disk];
-    if (__blkdev_issue_discard(rdev->bdev,
+    md_submit_discard_bio(mddev, rdev, bio,
        dev_start + zone->dev_start + rdev->data_offset,
-        dev_end - dev_start, GFP_NOIO, 0, &discard_bio) ||
-        !discard_bio)
-    continue;
-    bio_chain(discard_bio, bio);
-    bio_clone_blkcg_association(discard_bio, bio);
-    if (mddev->gendisk)
-        trace_block_bio_remap(bdev_get_queue(rdev->bdev),
-        discard_bio, disk_dev(mddev->gendisk),
-        &bio->bi_iter.bi_sector);
-    generic_make_request(discard_bio);
+    dev_end - dev_start);}

bio_endio(bio);
}

static bool raid0_make_request(struct mddev *mddev, struct bio *bio)
{
    struct r0conf *conf = mddev->private;
    struct strip_zone *zone;
    struct md_rdev *tmp_dev;
    sector_t bio_sector;

sector_t sector;
+sector_t orig_sector;
unsigned chunk_sects;
unsigned sectors;

-if (unlikely(bio->bi_opf & REQ_PREFLUSH)) {
-  md_flush_request(mddev, bio);
+  if (unlikely(bio->bi_opf & REQ_PREFLUSH) && md_flush_request(mddev, bio))
return true;
-}

if (unlikely((bio_op(bio) == REQ_OP_DISCARD))) {
  raid0_handle_discard(mddev, bio);
  bio = split;
}

+orig_sector = sector;
zone = find_zone(mddev->private, &sector);
}tmp_dev = map_sector(mddev, zone, sector, &sector);
+switch (conf->layout) {
+  case RAID0_ORIG_LAYOUT:
+    tmp_dev = map_sector(mddev, zone, orig_sector, &sector);
+    break;
+  case RAID0_ALT_MULTIZONE_LAYOUT:
+    tmp_dev = map_sector(mddev, zone, sector, &sector);
+    break;
+  default:
+    WARN(1, "md/raid0:%s: Invalid layout
", mdname(mddev));
+    bio_io_error(bio);
+    return true;
+}
+
+if (unlikely(is_mddev_broken(tmp_dev, "raid0"))) {
+  bio_io_error(bio);
+  return true;
+}
+
bio_set_dev(bio, tmp_dev->bdev);
bio->bi_iter.bi_sector = sector + zone->dev_start +
tmp_dev->data_offset;
--- linux-4.15.0.orig/drivers/md/raid0.h
+++ linux-4.15.0/drivers/md/raid0.h
@@ -8,11 +8,25 @@
int nb_dev; /* # of devices attached to the zone */
+/* Linux 3.14 (20d0189b101) made an unintended change to
+ * the RAID0 layout for multi-zone arrays (where devices aren't all
+ * the same size.
+ * RAID0_ORIG_LAYOUT restores the original layout
+ * RAID0_ALT_MULTIZONE_LAYOUT uses the altered layout
+ * The layouts are identical when there is only one zone (all
+ * devices the same size).
+ */
+
+enum r0layout {
+ RAID0_ORIG_LAYOUT = 1,
+ RAID0_ALT_MULTIZONE_LAYOUT = 2,
+};
+struct r0conf {
+ struct strip_zone *strip_zone;
+ struct md_rdev **devlist; /* lists of rdevs, pointed to
+ * by strip_zone->dev */
+ int nr_strip_zones;
+ enum r0layout layout;
+};

*/
--- linux-4.15.0.orig/drivers/md/raid1.c
+++ linux-4.15.0/drivers/md/raid1.c
@@ -434,19 +434,23 @@
 /* We never try FailFast to WriteMostly devices */
 !test_bit(WriteMostly, &rdev->flags)) {
 md_error(r1_bio->mddev, rdev);
- if (!test_bit(Faulty, &rdev->flags))
- /* This is the only remaining device,
- * We need to retry the write without
- * FailFast
- */
- set_bit(R1BIO_WriteError, &r1_bio->state);
- } else {
- /* Finished with this branch */
- r1_bio->bios[mirror] = NULL;
- to_put = bio;
- }
- } else
+ /* When the device is faulty, it is not necessary to
+ * handle write error.
+ * For failfast, this is the only remaining device,
+ * We need to retry the write without FailFast.
+ */
if (!test_bit(Faulty, &rdev->flags))
    set_bit(R1BIO_WriteError, &r1_bio->state);
else {
    /* Fail the request */
    set_bit(R1BIO_Degraded, &r1_bio->state);
    /* Finished with this branch */
    r1_bio->bios[mirror] = NULL;
    to_put = bio;
    }
} else {
/*
 * Set R1BIO_Uptodate in our master bio, so that we
@@ -1514,10 +1518,9 @@
{
    sector_t sectors;

    if (unlikely(bio->bi_opf & REQ_PREFLUSH)) {
        md_flush_request(mddev, bio);
    + if (unlikely(bio->bi_opf & REQ_PREFLUSH)
    +    && md_flush_request(mddev, bio))
    return true;
    -}
    */
    * There is a limit to the maximum size, but
@@ -1714,6 +1717,7 @@
    */
    if (rdev->saved_raid_disk >= 0 &&
        rdev->saved_raid_disk == first &&
    + rdev->saved_raid_disk < conf->raid_disks &&
        conf->mirrors[rdev->saved_raid_disk].rdev == NULL)
    first = last = rdev->saved_raid_disk;

@@ -1798,6 +1802,17 @@
    struct md_rdev *repl =
        conf->mirrors[conf->raid_disks + number].rdev;
    freeze_array(conf, 0);
    +if (atomic_read(&repl->nr_pending)) {
    +/* It means that some queued IO of retry_list
    + hold repl. Thus, we cannot set replacement
    + as NULL, avoiding rdev NULL pointer
    + dereference in sync_request_write and
    + handle_write_finished.
    +*/
    +err = -EBUSY;
    +unfreeze_array(conf);
    +goto abort;
    +}
clear_bit(Replacement, &repl->flags);
p->rdev = repl;
conf->mirrors[conf->raid_disks + number].rdev = NULL;
@@ -1831,6 +1846,20 @@
reschedule_retry(r1_bio);
}

+static void abort_sync_write(struct mddev *mddev, struct r1bio *r1_bio)
+{
+sector_t sync_blocks = 0;
+sector_t s = r1_bio->sector;
+long sectors_to_go = r1_bio->sectors;
+*/
+/* make sure these bits don't get cleared. */
+do {
+bitmap_end_sync(mddev->bitmap, s, &sync_blocks, 1);
+s += sync_blocks;
+sectors_to_go -= sync_blocks;
+} while (sectors_to_go > 0);
+}
+
static void end_sync_write(struct bio *bio)
{
int uptodate = !bio->bi_status;
@@ -1842,16 +1871,7 @@
struct md_rdev *rdev = conf->mirrors[find_bio_disk(r1_bio, bio)].rdev;
if (!uptodate) {
-sector_t sync_blocks = 0;
-sector_t s = r1_bio->sector;
-long sectors_to_go = r1_bio->sectors;
-/* make sure these bits doesn't get cleared. */
-do {
-bitmap_end_sync(mddev->bitmap, s,
-&sync_blocks, 1);
-s += sync_blocks;
-sectors_to_go -= sync_blocks;
-} while (sectors_to_go > 0);
+abort_sync_write(mddev, r1_bio);
 set_bit(WriteErrorSeen, &rdev->flags);
if (!test_and_set_bit(WantReplacement, &rdev->flags))
set_bit(MD_RECOVERY_NEEDED, &
@@ -2141,8 +2161,10 @@
(i == r1_bio->read_disk ||
  !test_bit(MD_RECOVERY_SYNC, &mddev->recovery))))
continue;
-if (test_bit(Faulty, &conf->mirrors[i].rdev->flags))
+if (test_bit(Faulty, &conf->mirrors[i].rdev->flags))

+abort_sync_write(mddev, r1_bio);
continue;
+
}

bio_set_op_attrs(whbio, REQ_OP_WRITE, 0);
if (test_bit(FailFast, &conf->mirrors[i].rdev->flags))
@@ -2440,6 +2462,8 @@
fix_read_error(conf, r1_bio->read_disk,
        r1_bio->sector, r1_bio->sectors);
unfreeze_array(conf);
+} else if (mddev->ro == 0 && test_bit(FailFast, &rdev->flags)) {
+    md_error(mddev, rdev);
} else {
    r1_bio->bios[r1_bio->read_disk] = IO_BLOCKED;
}
@@ -2715,7 +2739,7 @@
write_targets++;
}

-if (bio->bi_end_io) {
+if (rdev && bio->bi_end_io) {
    atomic_inc(&rdev->nr_pending);
    bio->bi_iter.bi_sector = sector_nr + rdev->data_offset;
    bio_set_dev(bio, rdev->bdev);
@@ -3065,6 +3089,13 @@
        !test_bit(In_sync, &conf->mirrors[i].rdev->flags) ||
        test_bit(Faulty, &conf->mirrors[i].rdev->flags))
    mddev->degraded++;
+*/
+ * RAID1 needs at least one disk in active
+ */
+if (conf->raid_disks - mddev->degraded < 1) {
+    ret = -EINVAL;
+    goto abort;
+}

if (conf->raid_disks - mddev->degraded == 1)
    mddev->recovery_cp = MaxSector;
@@ -3098,8 +3129,12 @@
    ret = md_integrity_register(mddev);
    if (ret) {
        md_unregister_thread(&mddev->thread);
-raid1_free(mddev, conf);
+    goto abort;
    }
+    return 0;
+    
+    abort:
+raid1_free(mddev, conf);
return ret;
}

--- linux-4.15.0.orig/drivers/md/raid1.h
+++ linux-4.15.0/drivers/md/raid1.h
@@ -26,6 +26,18 @@
#define BARRIER_BUCKETS_NR_BITS PAGE_SHIFT - ilog2(sizeof(atomic_t))
#define BARRIER_BUCKETS_NR 1<<BARRIER_BUCKETS_NR_BITS

+/* Note: raid1_info.rdev can be set to NULL asynchronously by raid1_remove_disk.
+ * There are three safe ways to access raid1_info.rdev.
+ * 1/ when holding mddev->reconfig_mutex
+ * 2/ when resync/recovery is known to be happening - i.e. in code that is
+ * called as part of performing resync/recovery.
+ * 3/ while holding rcu_read_lock(), use rcu_dereference to get the pointer
+ * and if it is non-NULL, increment rdev->nr_pending before dropping the
+ * RCU lock.
+ * When .rdev is set to NULL, the nr_pending count checked again and if it has
+ * been incremented, the pointer is put back in .rdev.
+ */
+
+struct raid1_info {
    struct md_rdev*rdev;
    sector_t*thead_position;

--- linux-4.15.0.orig/drivers/md/raid10.c
+++ linux-4.15.0/drivers/md/raid10.c
@@ -124,7 +124,7 @@
static void * r10bio_pool_alloc(gfp_t gfp_flags, void *data)
{
    struct r10conf *conf = data;
    -int size = offsetof(struct r10bio, devs[conf->copies]);
    +int size = offsetof(struct r10bio, devs[conf->geo.raid_disks]);

    /* allocate a r10bio with room for raid_disks entries in the
    * bios array */
    @ @ -229,7 +229,7 @@

out_free_pages:
while (--j >= 0)
    -resync_free_pages(&rps[j * 2]);
    +resync_free_pages(&rps[j]);

    j = 0;
out_free_bio:
@ @ -274,7 +274,7 @@
{
    int i;
for (i = 0; i < conf->copies; i++) {
    for (i = 0; i < conf->geo.raid_disks; i++) {
        struct bio **bio = & r10_bio->devs[i].bio;
        if (!BIO_SPECIAL(*bio))
            bio_put(*bio);
    }
}

int slot;
int repl = 0;

for (slot = 0; slot < conf->copies; slot++) {
    for (slot = 0; slot < conf->geo.raid_disks; slot++) {
        if (r10_bio->devs[slot].bio == bio)
            break;
        if (r10_bio->devs[slot].repl_bio == bio) {
            @ @ -363,7 +363,7 @@

        }
    }
    BUG_ON(slot == conf->copies);
    update_head_pos(slot, r10_bio);
}

if (slotp)
    @ @ -1124,7 +1123,7 @@
    struct md_rdev *err_rdev = NULL;
    gfp_t gfp = GFP_NOIO;

    if (r10_bio->devs[slot].rdev) {
        * This is an error retry, but we cannot
        * safely dereference the rdev in the r10_bio,
        @ @ -1194,7 +1193,9 @@
        struct bio *split = bio_split(bio, max_sectors,
            gfp, conf->bio_split);
        bio_chain(split, bio);
        allow_barrier(conf);
        generic_make_request(bio);
        wait_barrier(conf);
        bio = split;
        r10_bio->master_bio = bio;
        r10_bio->sectors = max_sectors;
        @ @ -1292,12 +1293,77 @@
    }
}

+static void wait_blocked_dev(struct mddev *mddev, struct r10bio *r10_bio)
+{
+int i;
+struct r10conf *conf = mddev->private;
+struct md_rdev *blocked_rdev;
+
+retry_wait:
+blocked_rdev = NULL;
+rcu_read_lock();
+for (i = 0; i < conf->copies; i++) {
+struct md_rdev *rdev = rcu_dereference(conf->mirrors[i].rdev);
+struct md_rdev *rrdev = rcu_dereference(
+conf->mirrors[i].replacement);
+if (rdev == rrdev)
+rrdev = NULL;
+if (rdev && unlikely(test_bit(Blocked, &rdev->flags))) {
+atomic_inc(&rdev->nr_pending);
+blocked_rdev = rdev;
+break;
+}
+if (rrdev && unlikely(test_bit(Blocked, &rrdev->flags))) {
+atomic_inc(&rrdev->nr_pending);
+blocked_rdev = rrdev;
+break;
+}
+
+if (rdev && test_bit(WriteErrorSeen, &rdev->flags)) {
+sector_t first_bad;
+sector_t dev_sector = r10_bio->devs[i].addr;
+int bad_sectors;
+int is_bad;
+
+/*
+ * Discard request doesn't care the write result
+ * so it doesn't need to wait blocked disk here.
+ */
+if (!r10_bio->sectors)
+continue;
+
+is_bad = is_badblock(rdev, dev_sector, r10_bio->sectors,
+        &first_bad, &bad_sectors);
+if (is_bad < 0) {
+/*
+ * Mustn't write here until the bad block
+ * is acknowledged
+ */
+atomic_inc(&rdev->nr_pending);
+set_bit(BlockedBadBlocks, &rdev->flags);
+blocked_rdev = rdev;
+break;
static void raid10_write_request(struct mddev *mddev, struct bio *bio, 
    struct r10bio *r10_bio)
{
    struct r10conf *conf = mddev->private;
    int i;
    -struct md_rdev *blocked_rdev;
    sector_t sectors;
    int max_sectors;

retry_write:
    blocked_rdev = NULL;
    +
    wait_blocked_dev(mddev, r10_bio);
    +
    rcu_read_lock();
    max_sectors = r10_bio->sectors;

    @@ -1377,8 +1443,9 @@
    r10_bio->read_slot = -1; /* make sure repl_bio gets freed */
    raid10_find_phys(conf, r10_bio);
    -retry_write:
        blocked_rdev = NULL;
        +
        +wait_blocked_dev(mddev, r10_bio);
        +
    rcu_read_lock();
    max_sectors = r10_bio->sectors;

    @@ -1389,16 +1456,6 @@
    conf->mirrors[d].replacement);
    if (rdev == rrdev)
      rrdev = NULL;
    -if (rdev && unlikely(test_bit(Blocked, &rdev->flags))) {
        -atomic_inc(&rdev->nr_pending);
        -blocked_rdev = rdev;
        -break;
        -}
    -if (rrdev && unlikely(test_bit(Blocked, &rrdev->flags))) {
        -atomic_inc(&rrdev->nr_pending);


- blocked_rdev = rdev;
- break;
- }
if (rdev && (test_bit(Faulty, &rdev->flags)))
  rdev = NULL;
if (rrdev && (test_bit(Faulty, &rrdev->flags)))
  @ @ -1419,15 +1476,6 @@

  is_bad = is_badblock(rdev, dev_sector, max_sectors,
                      &first_bad, &bad_sectors);
- if (is_bad < 0) {
-/* Mustn't write here until the bad block
- * is acknowledged
- */
- atomic_inc(&rdev->nr_pending);
- set_bit(BlockedBadBlocks, &rdev->flags);
- blocked_rdev = rdev;
- break;
- }
  if (is_bad && first_bad <= dev_sector) {
  /* Cannot write here at all */
  bad_sectors -= (dev_sector - first_bad);
  @ @ -1463,35 +1511,6 @@
  }
rcu_read_unlock();

- if (unlikely(blocked_rdev)) {
-/* Have to wait for this device to get unblocked, then retry */
- int j;
- int d;
-
- for (j = 0; j < i; j++) {
- if (r10_bio->devs[j].bio) {
-   d = r10_bio->devs[j].devnum;
-   rdev_dec_pending(conf->mirrors[d].rdev, mddev);
- }
- if (r10_bio->devs[j].repl_bio) {
-   struct md_rdev *rdev;
-   d = r10_bio->devs[j].devnum;
-   rdev = conf->mirrors[d].replacement;
-   if (!rdev) {
-    /* Race with remove_disk */
-    smp_mb();
-    rdev = conf->mirrors[d].rdev;
-   }
-   rdev_dec_pending(rdev, mddev);
- }
- }
-}
-allow_barrier(conf);
-raid10_log(conf->mddev, "wait rdev %d blocked", blocked_rdev->raid_disk);
-md_wait_for_blocked_rdev(blocked_rdev, mddev);
-wait_barrier(conf);
-goto retry_write;
-}
-
if (max_sectors < r10_bio->sectors)
r10_bio->sectors = max_sectors;

@@ -1499,7 +1518,9 @@
struct bio *split = bio_split(bio, r10_bio->sectors,
    GFP_NOIO, conf->bio_split);
bio_chain(split, bio);
+allow_barrier(conf);
generic_make_request(bio);
+wait_barrier(conf);
bio = split;
r10_bio->master_bio = bio;
}
@@ -1529,7 +1550,9 @@
r10_bio->mddev = mddev;
r10_bio->sector = bio->bi_iter.bi_sector;
r10_bio->state = 0;
-memset(r10_bio->devs, 0, sizeof(r10_bio->devs[0]) * conf->copies);
+r10_bio->read_slot = -1;
+memset(r10_bio->devs, 0, sizeof(r10_bio->devs[0]) *
+conf->geo.raid_disks);

if (bio_data_dir(bio) == READ)
raid10_read_request(mddev, bio, r10_bio);
@@ -1537,6 +1560,304 @@
raid10_write_request(mddev, bio, r10_bio);
}

+static void raid_end_discard_bio(struct r10bio *r10bio)
+{
+struct r10conf *conf = r10bio->mddev->private;
+struct r10bio *first_r10bio;
+  +
+while (atomic_dec_and_test(&r10bio->remaining)) {
+  +
+allow_barrier(conf);
+  +
+if (!test_bit(R10BIO_Discard, &r10bio->state)) {
+  +first_r10bio = (struct r10bio *)r10bio->master_bio;
+  +free_r10bio(r10bio);
+  +r10bio = first_r10bio;


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```c
} else {
    md_write_end(r10bio->mddev);
    bio_endio(r10bio->master_bio);
    free_r10bio(r10bio);
    break;
}
}

static void raid10_end_discard_request(struct bio *bio) {
{
    struct r10bio *r10_bio = bio->bi_private;
    struct r10conf *conf = r10_bio->mddev->private;
    struct md_rdev *rdev = NULL;
    int dev;
    int slot, repl;
    
    /*
     * We don't care the return value of discard bio
     */
    if (!test_bit(R10BIO_Uptodate, &r10_bio->state))
        set_bit(R10BIO_Uptodate, &r10_bio->state);
    dev = find_bio_disk(conf, r10_bio, bio, &slot, &repl);
    if (repl)
        rdev = conf->mirrors[dev].replacement;
    if (!rdev) {
        /*
         * raid10_remove_disk uses smp_mb to make sure rdev is set to
         * replacement before setting replacement to NULL. It can read
         * rdev first without barrier protect even replacement is NULL
         */
        smp_rmb();
        rdev = conf->mirrors[dev].rdev;
    }
    raid_end_discard_bio(r10_bio);
    rdev_dec_pending(rdev, conf->mddev);
}

/*
 * There are some limitations to handle discard bio
 * 1st, the discard size is bigger than stripe_size*2.
 * 2st, if the discard bio spans reshape progress, we use the old way to
 * handle discard bio
 */
static int raid10_handle_discard(struct mddev *mddev, struct bio *bio)
{
```
struct r10conf *conf = mddev->private;
struct geom *geo = &conf->geo;
int far_copies = geo->far_copies;
bool first_copy = true;
struct r10bio *r10_bio, *first_r10bio;
struct bio *split;
int disk;
sector_t chunk;
unsigned int stripe_size;
unsigned int stripe_data_disks;
sector_t split_size;
sector_t bio_start, bio_end;
sector_t first_stripe_index, last_stripe_index;
sector_t start_disk_offset;
unsigned int start_disk_index;
sector_t end_disk_offset;
unsigned int end_disk_index;
unsigned int remainder;

if (test_bit(MD_RECOVERY_RESHAPE, &mddev->recovery))
    return -EAGAIN;

wait_barrier(conf);

/*
 * Check reshape again to avoid reshape happens after checking
 * MD_RECOVERY_RESHAPE and before wait_barrier
 */
if (test_bit(MD_RECOVERY_RESHAPE, &mddev->recovery))
goto out;

if (geo->near_copies)
    stripe_data_disks = geo->raid_disks / geo->near_copies +
    geo->raid_disks % geo->near_copies;
else
    stripe_data_disks = geo->raid_disks;

+stripe_size = stripe_data_disks << geo->chunk_shift;
+bio_start = bio->bi_iter.bi_sector;
+bio_end = bio_end_sector(bio);

*/
+ * Maybe one discard bio is smaller than strip size or across one
+ * stripe and discard region is larger than one stripe size. For far
+ * offset layout, if the discard region is not aligned with stripe
+ * size, there is hole when we submit discard bio to member disk.
+ * For simplicity, we only handle discard bio which discard region
+ * is bigger than stripe_size * 2
+ */
+if (bio_sectors(bio) < stripe_size*2)
+goto out;
+
+/*
+ * Keep bio aligned with strip size.
+ */
+div_u64_rem(bio_start, stripe_size, &remainder);
+if (remainder) {
+split_size = stripe_size - remainder;
+split = bio_split(bio, split_size, GFP_NOIO, conf->bio_split);
+bio_chain(split, bio);
+allow_barrier(conf);
+/* Resend the fist split part */
+generic_make_request(split);
+wait_barrier(conf);
+}
+div_u64_rem(bio_end, stripe_size, &remainder);
+if (remainder) {
+split_size = bio_sectors(bio) - remainder;
+split = bio_split(bio, split_size, GFP_NOIO, conf->bio_split);
+bio_chain(split, bio);
+allow_barrier(conf);
+/* Resend the second split part */
+generic_make_request(bio);
+bio = split;
+wait_barrier(conf);
+}
+
+bio_start = bio->bi_iter.bi_sector;
+bio_end = bio_end_sector(bio);
+
+/*
+ * Raid10 uses chunk as the unit to store data. It's similar like raid0.
+ * One stripe contains the chunks from all member disk (one chunk from
+ * one disk at the same HBA address). For layout detail, see 'man md 4'
+ */
+chunk = bio_start >> geo->chunk_shift;
+chunk *= geo->near_copies;
+first_stripe_index = chunk;
+start_disk_index = sector_div(first_stripe_index, geo->raid_disks);
+if (geo->far_offset)
+first_stripe_index *= geo->far_copies;
+start_disk_offset = (bio_start & geo->chunk_mask) +
+(first_stripe_index << geo->chunk_shift);
+
+chunk = bio_end >> geo->chunk_shift;
chunk *= geo->near_copies;
+last_stripe_index = chunk;
+end_disk_index = sector_div(last_stripe_index, geo->raid_disks);
+if (geo->far_offset)
+last_stripe_index *= geo->far_copies;
+end_disk_offset = (bio_end & geo->chunk_mask) +
+(last_stripe_index << geo->chunk_shift);
+
retry_discard:
+r10_bio = mempool_alloc(conf->r10bio_pool, GFP_NOIO);
+r10_bio->mddev = mddev;
+r10_bio->state = 0;
+r10_bio->sectors = 0;
+memset(r10_bio->devs, 0, sizeof(r10_bio->devs[0]) * geo->raid_disks);
+wait_blocked_dev(mddev, r10_bio);
+
+/*
+ * For far layout it needs more than one r10bio to cover all regions.
+ * Inspired by raid10_sync_request, we can use the first r10bio->master_bio
+ * to record the discard bio. Other r10bio->master_bio record the first
+ * r10bio. The first r10bio only release after all other r10bios finish.
+ * The discard bio returns only first r10bio finishes
+ */
+if (first_copy) {
+r10_bio->master_bio = bio;
+set_bit(R10BIO_Discard, &r10_bio->state);
+first_copy = false;
+first_r10bio = r10_bio;
+} else
+r10_bio->master_bio = (struct bio *)first_r10bio;
+
rcu_read_lock();
+for (disk = 0; disk < geo->raid_disks; disk++) {
+struct md_rdev *rdev = rcu_dereference(conf->mirrors[disk].rdev);
+struct md_rdev *rrdev = rcu_dereference(
+conf->mirrors[disk].replacement);
+
+r10_bio->devs[disk].bio = NULL;
+r10_bio->devs[disk].repl_bio = NULL;
+
+if (rdev && (test_bit(Faulty, &rdev->flags)))
+rdev = NULL;
+if (rrdev && (test_bit(Faulty, &rrdev->flags)))
+rrdev = NULL;
+if (!rdev && !rrdev)
+continue;
+
+if (rdev) {
r10_bio->devs[disk].bio = bio;
atomic_inc(&rdev->nr_PENDING);
}
if (rrdev) {
    r10_bio->devs[disk].repl_bio = bio;
    atomic_inc(&rrdev->nr_PENDING);
}
rcu_read_unlock();
atomic_set(&r10_bio->remaining, 1);
for (disk = 0; disk < geo->raid_disks; disk++) {
    sector_t dev_start, dev_end;
    struct bio *mbio, *rbio = NULL;
    struct md_rdev *rdev = rcu_dereference(conf->mirrors[disk].rdev);
    struct md_rdev *rrdev = rcu_dereference(conf->mirrors[disk].replacement);
    /*
     * Now start to calculate the start and end address for each disk.
     * The space between dev_start and dev_end is the discard region.
     *
     * For dev_start, it needs to consider three conditions:
     * 1st, the disk is before start_disk, you can imagine the disk in
     * the next stripe. So the dev_start is the start address of next
     * stripe.
     * 2st, the disk is after start_disk, it means the disk is at the
     * same stripe of first disk
     * 3st, the first disk itself, we can use start_disk_offset directly
     */
    if (disk < start_disk_index)
        dev_start = (first_stripe_index + 1) * mddev->chunk_sectors;
    else if (disk > start_disk_index)
        dev_start = first_stripe_index * mddev->chunk_sectors;
    else
        dev_start = start_disk_offset;
    /*
     * dev_end > dev_start all the time
     */
    if (disk < end_disk_index)
        dev_end = (last_stripe_index + 1) * mddev->chunk_sectors;
    else if (disk > end_disk_index)
        dev_end = last_stripe_index * mddev->chunk_sectors;
    else
        dev_end = end_disk_offset;
    /*
     * It only handles discard bio which size is >= stripe size, so
     */

+if (r10_bio->devs[disk].bio) {
+mbio = bio_clone_fast(bio, GFP_NOIO, mddev->bio_set);
+mbio->bi_end_io = raid10_end_discard_request;
+mbio->bi_private = r10_bio;
+r10_bio->devs[disk].bio = mbio;
+r10_bio->devs[disk].devnum = disk;
+atomic_inc(&r10_bio->remaining);
+md_submit_discard_bio(mddev, rdev, mbio,
+dev_start + choose_data_offset(r10_bio, rdev),
+dev_end - dev_start);
+bio_endio(mbio);
+}
+
+if (r10_bio->devs[disk].repl_bio) {
+rbio = bio_clone_fast(bio, GFP_NOIO, mddev->bio_set);
+rbio->bi_end_io = raid10_end_discard_request;
+rbio->bi_private = r10_bio;
+r10_bio->devs[disk].repl_bio = rbio;
+r10_bio->devs[disk].devnum = disk;
+atomic_inc(&r10_bio->remaining);
+md_submit_discard_bio(mddev, rrdev, rbio,
+dev_start + choose_data_offset(r10_bio, rrdev),
+dev_end - dev_start);
+bio_endio(rbio);
+}
+}
+
+if (!geo->far_offset && --far_copies) {
+first_stripe_index += geo->stride >> geo->chunk_shift;
+start_disk_offset += geo->stride;
+last_stripe_index += geo->stride >> geo->chunk_shift;
+end_disk_offset += geo->stride;
+atomic_inc(&first_r10bio->remaining);
+raid_end_discard_bio(r10_bio);
+wait_barrier(conf);
+goto retry_discard;
+}
+raid_end_discard_bio(r10_bio);
+
+return 0;
+out:
+allow_barrier(conf);
+return -EAGAIN;
+}
+
static bool raid10_make_request(struct mddev *mddev, struct bio *bio)
{
struct r10conf *conf = mddev->private;
int chunk_sects = chunk_mask + 1;

int sectors = bio_sectors(bio);

;if (unlikely(bio->bi_opf & REQ_PREFLUSH)) {
    md_flush_request(mddev, bio);
+    if (unlikely(bio->bi_opf & REQ_PREFLUSH)
+        && md_flush_request(mddev, bio))
    return true;
-}

if (!md_write_start(mddev, bio))
return false;

+if (unlikely(bio_op(bio) == REQ_OP_DISCARD))
+    if (!raid10_handle_discard(mddev, bio))
+    return true;
+
/*
 * If this request crosses a chunk boundary, we need to split
 * it.
 */
@@ -1795,6 +2119,7 @@
first = last = rdev->raid_disk;

if (rdev->saved_raid_disk >= first &&
+    rdev->saved_raid_disk < conf->geo.raid_disks &&
    conf->mirrors[rdev->saved_raid_disk].rdev == NULL)
mirror = rdev->saved_raid_disk;
else
@@ -2643,7 +2968,8 @@
for (m = 0; m < conf->copies; m++) {
    int dev = r10_bio->devs[m].devnum;
    rdev = conf->mirrors[dev].rdev;
-    if (r10_bio->devs[m].bio == NULL)
+    if (r10_bio->devs[m].bio == NULL ||
+        r10_bio->devs[m].bio->bi_end_io == NULL)
    continue;
    if (!r10_bio->devs[m].bio->bi_status) {
        rdev_clear_badblocks(
@@ -2658,7 +2984,8 @@
        md_error(conf->mddev, rdev);
    }
    rdev = conf->mirrors[dev].replacement;
-    if (r10_bio->devs[m].repl_bio == NULL)
+    if (r10_bio->devs[m].repl_bio == NULL ||
+        r10_bio->devs[m].repl_bio->bi_end_io == NULL)
    continue;
if (!r10_bio->devs[m].repl_bio->bi_status) {
    chunk_size = mddev->chunk_sectors << 9;
    if (mddev->queue) {
        blk_queue_max_discard_sectors(mddev->queue,
            - mddev->chunk_sectors);
        blk_queue_max_write_same_sectors(mddev->queue, 0);
        blk_queue_max_write_zeroes_sectors(mddev->queue, 0);
        blk_queue_io_min(mddev->queue, chunk_size);
    }
    if (disk->replacement &&
        !test_bit(In_sync, &disk->replacement->flags) &&
        disk->replacement->saved_raid_disk < 0) {
        conf->fullsync = 1;
    }
    disk->recovery_disabled = mddev->recovery_disabled - 1;
}

set_bit(MD_RECOVERY_RUNNING, &mddev->recovery);
mddev->sync_thread = md_register_thread(md_do_sync, mddev, "reshape");
+if (!mddev->sync_thread)
+goto out_free_conf;

return 0;

allow_barrier(conf);

+raise_barrier(conf, 0);
read_more:
/* Now schedule reads for blocks from sector_nr to last */
r10_bio = raid10_alloc_init_r10buf(conf);
r10_bio->state = 0;
+raise_barrier(conf, sectors_done != 0);
+raise_barrier(conf, 1);
atomic_set(&r10_bio->remaining, 0);
r10_bio->mddev = mddev;
r10_bio->sector = sector_nr;
+raise_barrier(conf, 0);

atomic_inc(&r10_bio->remaining);
read_bio->bi_next = NULL;
generic_make_request(read_bio);
-sector_nr += nr_sectors;
sectors_done += nr_sectors;
if (sector_nr <= last)
goto read_more;

+lower_barrier(conf);
+
/* Now that we have done the whole section we can
 * update reshape_progress
 */
@@ -4818,17 +5156,11 @@
return;

if (mddev->delta_disks > 0) {
-    sector_t size = raid10_size(mddev, 0, 0);
-    md_set_array_sectors(mddev, size);
-    if (mddev->recovery_cp > mddev->resync_max_sectors) {
-        mddev->recovery_cp = mddev->resync_max_sectors;
-        set_bit(MD_RECOVERY_NEEDED, &mddev->recovery);
-    }
-    mddev->resync_max_sectors = size;
-    if (mddev->queue) {
-        set_capacity(mddev->gendisk, mddev->array_sectors);
-        revalidate_disk(mddev->gendisk);
-    }
+    mddev->resync_max_sectors = mddev->array_sectors;
} else {
    int d;
    rcu_read_lock();
--- linux-4.15.0.orig/drivers/md/raid10.h
+++ linux-4.15.0/drivers/md/raid10.h
@@ -2,6 +2,19 @@
#ifndef _RAID10_H
#define _RAID10_H
+/* Note: raid10_info.rdev can be set to NULL asynchronously by
+ * raid10_remove_disk.
+ * There are three safe ways to access raid10_info.rdev.
+ * 1/ when holding mddev->reconfig_mutex
+ * 2/ when resync/recovery/reshape is known to be happening - i.e. in code
+ * that is called as part of performing resync/recovery/reshape.
+ * 3/ while holding rcu_read_lock(), use rcu_dereference to get the pointer
+ * and if it is non-NULL, increment rdev->nr_pending before dropping the
+ * RCU lock.
+ * When .rdev is set to NULL, the nr_pending count checked again and if it has

+*/
struct raid10_info {
    struct md_rdev*rdev, *replacement;
    sector_tthead_position;
    R10BIO_Previous,
    /* failfast devices did receive failfast requests. */
    R10BIO_FailFast,
    + R10BIO_Discard,
}

static struct stripe_head *
r5c_recovery_alloc_stripe(struct r5conf *conf,
-    sector_t stripe_sect)
+ r5c_recovery_alloc_stripe(
+    struct r5conf *conf,
+    sector_t stripe_sect,
+    int noblock)
{
    struct stripe_head *sh;

-    sh = raid5_get_active_stripe(conf, stripe_sect, 0, 1, 0);
+    sh = raid5_get_active_stripe(conf, stripe_sect, 1);
    if (!sh)
        return NULL; /* no more stripe available */

    @ @ -2157,7 +2159,7 @@
    stripe_sect);

    if (!sh) {
        -sh = r5c_recovery_alloc_stripe(conf, stripe_sect);
        +sh = r5c_recovery_alloc_stripe(conf, stripe_sect, 1);
        /*
         * cannot get stripe from raid5_get_active_stripe
         * try replay some stripes
         @ @ -2166,20 +2168,29 @@
         r5c_recovery_replay_stripes(
             cached_stripe_list, ctx);
         sh = r5c_recovery_alloc_stripe(
             -conf, stripe_sect);
             +conf, stripe_sect, 1);
if (!sh) {
    int new_size = conf->min_nr_stripes * 2;
    pr_debug("md/raid:%s: Increasing stripe cache size to %d to recovery data on journal.\n", mdname(mddev),
             -conf->min_nr_stripes * 2);
    raid5_set_cache_size(mddev,
             - conf->min_nr_stripes * 2);
    sh = r5c_recovery_alloc_stripe(conf,
             -  stripe_sect);
    +new_size);
    +ret = raid5_set_cache_size(mddev, new_size);
    +if (conf->min_nr_stripes <= new_size / 2) {
        +pr_err("md/raid:%s: Cannot increase cache size, ret=%d, new_size=%d, min_nr_stripes=%d,
            + md_name(mddev),
            + ret,
            +new_size,
            +conf->min_nr_stripes,
            +conf->max_nr_stripes);
        +return -ENOMEM;
    }
    +sh = r5c_recovery_alloc_stripe(
            +conf, stripe_sect, 0);
}
if (!sh) {
    pr_err("md/raid:%s: Cannot get enough stripes due to memory pressure. Recovery failed.\n", mdname(mddev));
    mdname(mddev));
    return -ENOMEM;
}
list_add_tail(&sh->lru, cached_stripe_list);
--- linux-4.15.0.orig/drivers/md/raid5-log.h
+++ linux-4.15.0/drivers/md/raid5-log.h
@@ -43,6 +43,11 @@
extern void ppl_stripe_write_finished(struct stripe_head *sh);
extern int ppl_modify_log(struct r5conf *conf, struct md_rdev *rdev, bool add);

+static inline bool raid5_has_log(struct r5conf *conf)
+{
+    +return test_bit(MD_HAS_JOURNAL, &conf->mddev->flags);
+}+
+static inline bool raid5_has_ppl(struct r5conf *conf)
{    return test_bit(MD_HAS_PPL, &conf->mddev->flags);
--- linux-4.15.0.orig/drivers/md/raid5.c
+++ linux-4.15.0/drivers/md/raid5.c
struct r5conf *conf = sh->raid_conf;

- if (conf->log || raid5_has_ppl(conf))
- if (raid5_has_log(conf) || raid5_has_ppl(conf))
  return false;
  return test_bit(STRIPE_BATCH_READY, &sh->state) &&
  !test_bit(STRIPE_BITMAP_PENDING, &sh->state) &&
  static int grow_stripes(struct r5conf *conf, int num)
  }
  struct kmem_cache *sc;
  +size_t namelen = sizeof(conf->cache_name[0]);
  int devs = max(conf->raid_disks, conf->previous_raid_disks);

  if (conf->mddev->gendisk)
  -sprintf(conf->cache_name[0],
  +snprintf(conf->cache_name[0], namelen,
    "raid%d-%s", conf->level, mdname(conf->mddev));
  else
  -sprintf(conf->cache_name[0],
  +snprintf(conf->cache_name[0], namelen,
    "raid%d-%p", conf->level, conf->mddev);
  -sprintf(conf->cache_name[1], "%s-alt", conf->cache_name[0]);
  +snprintf(conf->cache_name[1], namelen, "%.27s-alt", conf->cache_name[0]);

  conf->active_name = 0;
  sc = kmem_cache_create(conf->cache_name[conf->active_name],
  @ @ -2413,8 +2414,6 @@
  } else
  err = -ENOMEM;

  -mutex_unlock(&conf->cache_size_mutex);
  -conf->slab_cache = sc;
  conf->active_name = 1-conf->active_name;

  @ @ -2437,6 +2436,8 @@

  if (!err)
  conf->pool_size = newsize;
  +mutex_unlock(&conf->cache_size_mutex);
  +
  return err;
  }

  @ @ -2536,7 +2537,8 @@
int set_bad = 0;

clear_bit(R5_UPTODATE, &sh->dev[i].flags);
-atomic_inc(&rdev->read_errors);
+atomic_inc(&rdev->read_errors);
if (!((bi->bi_status == BLK_STS_PROTECTION))
+atomic_inc(&rdev->read_errors);
if (test_bit(R5_ReadRepl, &sh->dev[i].flags))
  pr_warn_ratelimited(  
"md/raid:%s: read error on replacement device (sector %llu on %s).
",  
@@ -2568,7 +2570,9 @@
   & & !test_bit(R5_ReadNoMerge, &sh->dev[i].flags))
retry = 1;
if (retry)
-  if (test_bit(R5_ReadNoMerge, &sh->dev[i].flags)) {
+  if (sh->qd_idx >= 0 & & sh->pd_idx == i) {
+    set_bit(R5_ReadError, &sh->dev[i].flags);
+  else if (test_bit(R5_ReadNoMerge, &sh->dev[i].flags)) {
+    set_bit(R5_ReadError, &sh->dev[i].flags);
+  clear_bit(R5_ReadNoMerge, &sh->dev[i].flags);
+    } else
@@ -3588,6 +3592,7 @@
  * is missing/faulty, then we need to read everything we can.
  */
if (sh->raid_conf->level != 6 & &
+  sh->raid_conf->rmw_level != PARITY_DISABLE_RMW & &
       sh->sector < sh->raid_conf->mddev->recovery_cp)
/* reconstruct-write isn't being forced */
  return 0;
@@ -4180,7 +4185,7 @@
/* now write out any block on a failed drive,
 * or P or Q if they were recomputed
 */
-BUG_ON(s->uptodate < disks - 1); /* We don't need Q to recover */
+dev = NULL;
if (s->failed == 2) {
  dev = &sh->dev[s->failed_num[1]];
  s->locked++;
@@ -4205,6 +4210,14 @@
  set_bit(R5_LOCKED, &dev->flags);
  set_bit(R5_Wantwrite, &dev->flags);
}
+if (WARN_ONCE(dev & & !test_bit(R5_UPTODATE, &dev->flags),
+ "%s: disk%td not up to date\n",
+ mdname(conf->mddev),
+  dev - (struct r5dev *) &sh->dev)) {
+  clear_bit(R5_LOCKED, &dev->flags);
+  clear_bit(R5_Wantwrite, &dev->flags);
+  s->locked--;
clear_bit(STRIPE_DEGRADED, &sh->state);

set_bit(STRIPE_INSYNC, &sh->state);

if (rdev && !test_bit(Faulty, &rdev->flags))
  do_recovery = 1;
+else if (!rdev) {
+rdev = rcu_dereference(conf->disks[i].replacement);
+if (rdev && !test_bit(Faulty, &rdev->flags))
+  do_recovery = 1;
+}
}

if (test_bit(R5_InJournal, &dev->flags))
  * or to load a block that is being partially written.
 */
if (s.to_read || s.non_overwrite
- || (conf->level == 6 && s.to_write && s.failed)
+ || (s.to_write && s.failed)
|| s.syncing && (s.uptodate + s.compute < disks)
|| s.replacing
|| s.expanding)
 @@ -5568,8 +5587,8 @@
  if (ret == 0)
   return true;
  if (ret == -ENODEV) {
-    md_flush_request(mddev, bi);
-    return true;
+    if (md_flush_request(mddev, bi))
+      return true;
  }
  /* ret == -EAGAIN, fallback */
  /*
 @@ -5702,7 +5721,8 @@
 do_flush = false;
 }
int
raid5_set_cache_size(struct mddev *mddev, int size)
{
    int result = 0;
    struct r5conf *conf = mddev->private;

    if (size <= 16 || size > 32768)
        @ @ -6362,11 +6383,14 @@

        mutex_lock(&conf->cache_size_mutex);
        while (size > conf->max_nr_stripes)
            -if (!grow_one_stripe(conf, GFP_KERNEL))
            +if (!grow_one_stripe(conf, GFP_KERNEL)) {
                +conf->min_nr_stripes = conf->max_nr_stripes;
                +result = -ENOMEM;
                break;
            +}
        mutex_unlock(&conf->cache_size_mutex);

        -return 0;
        +return result;
    }
EXPORT_SYMBOL(raid5_set_cache_size);

    @ @ -7376,6 +7400,8 @@
    set_bit(MD_RECOVERY_RUNNING, &mddev->recovery);
    mddev->sync_thread = md_register_thread(md_do_sync, mddev,
        "reshape");
    +if (!mddev->sync_thread)
    +goto abort;
}

/* Ok, everything is just fine now */
@@ -7727,7 +7753,7 @@
sector_t newsize;
    struct r5conf *conf = mddev->private;

    -if (conf->log || raid5_has_ppl(conf))
    +if (raid5_has_log(conf) || raid5_has_ppl(conf))
        return -EINVAL;
    sectors &= ~((sector_t)conf->chunk_sectors - 1);
    newsize = raid5_size(mddev, sectors, mddev->raid_disks);
@@ -7778,7 +7804,7 @@
{
    struct r5conf *conf = mddev->private;

    -if (conf->log || raid5_has_ppl(conf))
    +if (raid5_has_log(conf) || raid5_has_ppl(conf))
        return -EINVAL;
    sectors &= ~((sector_t)conf->chunk_sectors - 1);
    newsize = raid5_size(mddev, sectors, mddev->raid_disks);
        @ @ -7778,7 +7804,7 @@
return -EINVAL;
if (mddev->delta_disks == 0 &&
     mddev->new_layout == mddev->layout &&
@@ -8001,13 +8027,7 @@
     if (!test_bit(MD_RECOVERY_INTR, &mddev->recovery)) {

-if (mddev->delta_disks > 0) {
-    md_set_array_sectors(mddev, raid5_size(mddev, 0, 0));
-if (mddev->queue) {
-    set_capacity(mddev->gendisk, mddev->array_sectors);
-    revalidate_disk(mddev->gendisk);
-}  }
-} else {
+    if (mddev->delta_disks <= 0) {

    if (mddev->delta_disks <= 0) {

        int d;
        spin_lock_irq(&conf->device_lock);
        mddev->degraded = raid5_calc_degraded(conf);
--- linux-4.15.0.orig/drivers/md/raid5.h
+++ linux-4.15.0/drivers/md/raid5.h
@@ -450,6 +450,18 @@
*/
/* Note: disk_info.rdev can be set to NULL asynchronously by raid5_remove_disk.
+ * There are three safe ways to access disk_info.rdev.
+ * 1/ when holding mddev->reconfig_mutex
+ * 2/ when resync/recovery/reshape is known to be happening - i.e. in code that
+ *    is called as part of performing resync/recovery/reshape.
+ * 3/ while holding rcu_read_lock(), use rcu_dereference to get the pointer
+ *    and if it is non-NULL, increment rdev->nr_pending before dropping the RCU
+ *    lock.
+ * When .rdev is set to NULL, the nr_pending count checked again and if
+ * it has been incremented, the pointer is put back in .rdev.
+ */
+
+ struct disk_info {
+ struct md_rdev*rdev, *replacement;
+ struct page*extra_page; /* extra page to use in prexor */
--- linux-4.15.0.orig/drivers/media/cec/cec-adap.c
+++ linux-4.15.0/drivers/media/cec/cec-adap.c
@@ -346,7 +346,8 @@
} else {
 list_del_init(&data->list);
 if (!(data->msg.tx_status & CEC_TX_STATUS_OK))
-        data->adap->transmit_queue_sz--;
+        if (!WARN_ON(!data->adap->transmit_queue_sz))
+            data->adap->transmit_queue_sz--;
}
/* Mark it as an error */
@@ -393,6 +394,14 @@
 * need to do anything special in that case.
 */
+
+/*
+ * If something went wrong and this counter isn't what it should
+ * be, then this will reset it back to 0. Warn if it is not 0,
+ * since it indicates a bug, either in this framework or in a
+ * CEC driver.
+ */
+if (WARN_ON(adap->transmit_queue_sz))
+adap->transmit_queue_sz = 0;
+
/*
@@ -417,7 +426,7 @@
 bool timeout = false;
 u8 attempts;

 -if (adap->transmitting) {
 +if (adap->transmit_in_progress) {
 int err;

 /*
 @@ -431,7 +440,7 @@
 (adap->needs_hpd &&
   (!adap->is_configured && !adap->is_configuring)) ||
 kthread_should_stop() ||
-(!adap->transmitting &&
+(!adap->transmit_in_progress &&
   !list_empty(&adap->transmit_queue)),
 msecs_to_jiffies(CEC_XFER_TIMEOUT_MS));
 timeout = err == 0;
 @@ -439,7 +448,7 @@
 /* Otherwise we just wait for something to happen. */
 wait_event_interruptible(adap->kthread_waitq,
 kthread_should_stop() ||
-(!adap->transmitting &&
+(!adap->transmit_in_progress &&
   !list_empty(&adap->transmit_queue)));
 }

 @@ -452,7 +461,7 @@
goto unlock;
}
if (adap->transmitting && timeout) {
    if (adap->transmit_in_progress && timeout) {
        /*
         * If we timeout, then log that. Normally this does
         * not happen and it is an indication of a faulty CEC
         *@ @ -461.12 +470.17 @@
         * so much traffic on the bus that the adapter was
         * unable to transmit for CEC_XFER_TIMEOUT_MS (2.1s).
         */
        printk printk(1, "%s: message %*ph timed out\n", __func__,
                        adap->transmitting->msg.len,
                        adap->transmitting->msg.msg);
        if (adap->transmitting) {
            pr_warn("cec-%s: message %*ph timed out\n", adap->name,
                 adap->transmitting->msg.len,
                 adap->transmitting->msg.msg);
            /* Just give up on this. */
            cec_data_cancel(adap->transmitting);
        } else {
            pr_warn("cec-%s: transmit timed out\n", adap->name);
        }
        adap->transmit_in_progress = false;
        adap->tx_timeouts++;
        /* Just give up on this. */
    } goto unlock;
}

/* Get a new message to transmit */
data = list_first_entry(&adap->transmit_queue,
                      struct cec_data, list);
list_del_init(&data->list);
-adapter->transmit_queue_sz--;
+if (!WARN_ON(!data->adapter->transmit_queue_sz))
+adapter->transmit_queue_sz--;

/* Make this the current transmitting message */
adapter->transmitting = data;
@@ -518,6 +533,8 @@
if (adap->ops->adap_transmit(adap, data->attempts, 
    signal_free_time, &data->msg))
    cec_data_cancel(data);
+else
+    adap->transmit_in_progress = true;

unlock:
mutex_unlock(&adap->lock);
@@ -548,14 +565,17 @@
data = adap->transmitting;
if (!data) {
    /*
    - * This can happen if a transmit was issued and the cable is
    + * This might happen if a transmit was issued and the cable is
    * unplugged while the transmit is ongoing. Ignore this
    * transmit in that case.
    */
    */
-dprintfk(1, "%s was called without an ongoing transmit!\n", 
    -__func__); 
-goto unlock; 
+if (!adap->transmit_in_progress) 
+dprintfk(1, "%s was called without an ongoing transmit!\n", 
    +__func__); 
+    adap->transmit_in_progress = false; 
+    goto wake_thread; 
} 
+    adap->transmit_in_progress = false;

msg = &data->msg;
@@ -621,7 +641,6 @@
* for transmitting or to retry the current message.
 */
wake_up_interruptible(&adap->kthread_waitq);
-unlock:
mutex_unlock(&adap->lock);
} 
EXPORT_SYMBOL_GPL(cec_transmit_done_ts);
@@ -1047,11 +1066,11 @@
valid_la = false; 
else if (!cec_msg_is_broadcast(msg) && !(dir_fl & DIRECTED))
    valid_la = false; 
-else if (cec_msg_is_broadcast(msg) && !(dir_fl & BCAST1_4))
+else if (cec_msg_is_broadcast(msg) && !(dir_fl & BCAST))
    valid_la = false; 
else if (cec_msg_is_broadcast(msg) &&
    - adap->log_addrs.cec_version >= CEC_OP_CEC_VERSION_2_0 &&
    - !(dir_fl & BCAST2_0))
adap->log_addrs.cec_version < CEC_OP_CEC_VERSION_2_0 &&
! (dir_fl & BCAST1_4))
valid_la = false;
}
if (valid_la && min_len) {
@@ -1419,6 +1438,13 @@
las->log_addr[i],
 cec_phys_addr_exp(adap->phys_addr);
 cec_transmit_msg_fh(adap, &msg, NULL, false);
+
+/* Report Vendor ID */
+if (adap->log_addrs.vendor_id != CEC_VENDOR_ID_NONE) {
+  cec_msg_device_vendor_id(&msg,
+    adap->log_addrs.vendor_id);
+  cec_transmit_msg_fh(adap, &msg, NULL, false);
+}
}
adap->kthread_config = NULL;
complete(&adap->config_completion);
@@ -1483,14 +1509,18 @@
if (adap->monitor_all_cnt)
WARN_ON(call_op(adap, adap_monitor_all_enable, false));
mutex_lock(&adap->devnode.lock);
-if (adap->needs_hpd || list_empty(&adap->devnode.fhs))
+if (adap->needs_hpd || list_empty(&adap->devnode.fhs)) {
WARN_ON(adap->ops->adap_enable(adap, true));
+adap->transmit_in_progress = false;
+wake_up_interruptible(&adap->kthread_waitq);
+}
mutex_unlock(&adap->devnode.lock);
if (phys_addr == CEC_PHYS_ADDR_INVALID)
return;
}
mutex_lock(&adap->devnode.lock);
+adap->transmit_in_progress = false;
if ((adap->needs_hpd || list_empty(&adap->devnode.fhs)) &&
    adap->ops->adap_enable(adap, true)) {
mutex_unlock(&adap->devnode.lock);
@@ -1623,6 +1653,10 @@
unsigned j;
log_addrs->log_addr[i] = CEC_LOG_ADDR_INVALID;
+if (log_addrs->log_addr_type[i] > CEC_LOG_ADDR_TYPE_UNREGISTERED) {
+dprintf(1, "unknown logical address type\n");
+return -EINVAL;
+}
if (type_mask & (1 << log_addrs->log_addr_type[i])) {
```c
static int cec_validate_phys_addr(u16 phys_addr)
{
  int i;

  if (phys_addr == CEC_PHYS_ADDR_INVALID)
    return 0;
  for (i = 0; i < 16; i += 4)
    if ((phys_addr & (0xf << i)) == 0)
      return -EINVAL;
  return 0;
}

static long cec_adap_s_phys_addr(struct cec_adapter *adap, struct cec_fh *fh,
bool block, __u16 __user *parg)
{
  if (copy_from_user(&phys_addr, parg, sizeof(phys_addr)))
    return -EFAULT;

  err = cec_phys_addr_validate(phys_addr, NULL, NULL);
  if (err)
    return err;
  mutex_lock(&adap->lock);
```
mutext_lock(&adap->lock);
-log_addrs = adap->log_addrs;
+/
+ * We use memcpy here instead of assignment since there is a
+ * hole at the end of struct cec_log_addrs that an assignment
+ * might ignore. So when we do copy_to_user() we could leak
+ * one byte of memory.
+ */
+memcpy(log_addrs, adap->log_addrs, sizeof(log_addrs));
if (!adap->is_configured)
memset(log_addrs.log_addr, CEC_LOG_ADDR_INVALID,
    sizeof(log_addrs.log_addr));
--- linux-4.15.0.orig/drivers/media/cec/cec-edid.c
+++ linux-4.15.0/drivers/media/cec/cec-edid.c
@@ -22,66 +22,6 @@
#include <linux/types.h>
#include <media/cec.h>
-/*
- * This EDID is expected to be a CEA-861 compliant, which means that there are
- * at least two blocks and one or more of the extensions blocks are CEA-861
- * blocks.
- *
- * The returned location is guaranteed to be < size - 1.
- */
-static unsigned int cec_get_edid_spa_location(const u8 *edid, unsigned int size)
-
-unsigned int blocks = size / 128;
-unsigned int block;
-u8 d;
-
-/* Sanity check: at least 2 blocks and a multiple of the block size */
-if (blocks < 2 || size % 128)
-return 0;
-
-/*
-* If there are fewer extension blocks than the size, then update
-* 'blocks'. It is allowed to have more extension blocks than the size,
-* since some hardware can only read e.g. 256 bytes of the EDID, even
-* though more blocks are present. The first CEA-861 extension block
-* should normally be in block 1 anyway.
-* */
-if (edid[0x7e] + 1 < blocks)
-blocks = edid[0x7e] + 1;
-
for (block = 1; block < blocks; block++) {
    unsigned int offset = block * 128;
    
    /* Skip any non-CEA-861 extension blocks */
    if (edid[offset] != 0x02 || edid[offset + 1] != 0x03)
        continue;
    
    /* search Vendor Specific Data Block (tag 3) */
    d = edid[offset + 2] & 0x7f;
    /* Check if there are Data Blocks */
    if (d <= 4)
        continue;
    if (d > 4) {
        unsigned int i = offset + 4;
        unsigned int end = offset + d;
        
        /* Note: 'end' is always < 'size' */
        do {
            u8 tag = edid[i] >> 5;
            u8 len = edid[i] & 0x1f;
            
            if (tag == 3 && len >= 5 && i + len <= end &&
                edid[i + 1] == 0x03 &&
                edid[i + 2] == 0x0c &&
                edid[i + 3] == 0x00)
                return i + 4;
            i += len + 1;
        } while (i < end);
        
    } while (i < end);
    
    return 0;
}

u16 cec_get_edid_phys_addr(const u8 *edid, unsigned int size, unsigned int *offset)
{
    mutex_lock(&n->lock);
    n->callback = NULL;
    +n->cec_adap->notifier = NULL;
    +n->cec_adap = NULL;
    mutex_unlock(&n->lock);
    cec_notifier_put(n);
}

--- linux-4.15.0.orig/drivers/media/cec/cec-notifier.c
+++ linux-4.15.0/drivers/media/cec/cec-notifier.c
@@ -130,6 +130,8 @@
{
 mutex_lock(&n->lock);
 n->callback = NULL;
 +n->cec_adap->notifier = NULL;
+ n->cec_adap = NULL;
 mutex_unlock(&n->lock);
 cec_notifier_put(n);
}
/* Start bit, switch to receive state */
pin->ts = ts;
pin->state = CEC_ST_RX_START_BIT_LOW;
*/

/* If a transmit is pending, then that transmit should
 * use a signal free time of no more than
 * CEC_SIGNAL_FREE_TIME_NEW_INITIATOR since it will
 * have a new initiator due to the receive that is now
 * starting.
 * */
if (pin->tx_msg.len && pin->tx_signal_free_time >
    CEC_SIGNAL_FREE_TIME_NEW_INITIATOR)
pin->tx_signal_free_time =
    CEC_SIGNAL_FREE_TIME_NEW_INITIATOR;
break;

if (ktime_to_ns(pin->ts) == 0)
{ /* If a receive is in progress, then this transmit should use
   * a signal free time of max CEC_SIGNAL_FREE_TIME_NEW_INITIATOR
   * since when it starts transmitting it will have a new initiator.
   * */
if (pin->state != CEC_ST_IDLE &&
    signal_free_time > CEC_SIGNAL_FREE_TIME_NEW_INITIATOR)
    signal_free_time = CEC_SIGNAL_FREE_TIME_NEW_INITIATOR;
    pin->tx_signal_free_time = signal_free_time;
    pin->tx_msg = *msg;
    pin->work_tx_status = 0;
--- linux-4.15.0.orig/drivers/media/common/siano/smscoreapi.c
+++ linux-4.15.0/drivers/media/common/siano/smscoreapi.c
@@ -908,7 +908,7 @@
     void *buffer, size_t size)
 { struct sms_firmware *firmware = (struct sms_firmware *) buffer;
     -struct sms_msg_data4 *msg;
     +struct sms_msg_data5 *msg;
     u32 mem_address, calc_checksum = 0;
     u32 i, *ptr;
     u8 *payload = firmware->payload;
@@ -989,24 +989,20 @@
goto exit_fw_download;
if (coredev->mode == DEVICE_MODE_NONE) {
	-struct sms_msg_data *trigger_msg =
		(struct sms_msg_data *) msg;

    pr_debug("sending MSG_SMS_SWDOWNLOAD_TRIGGER_REQ\n");
    SMS_INIT_MSG(&msg->x_msg_header,
        MSG_SMS_SWDOWNLOAD_TRIGGER_REQ,
        -sizeof(struct sms_msg_hdr) +
        sizeof(*msg));

    -trigger_msg->msg_data[0] = firmware->start_address;
    +msg->msg_data[0] = firmware->start_address;
    /* Entry point */
    -trigger_msg->msg_data[1] = 6; /* Priority */
    -trigger_msg->msg_data[2] = 0x200; /* Stack size */
    -trigger_msg->msg_data[3] = 0; /* Parameter */
    -trigger_msg->msg_data[4] = 4; /* Task ID */
    +msg->msg_data[1] = 6; /* Priority */
    +msg->msg_data[2] = 0x200; /* Stack size */
    +msg->msg_data[3] = 0; /* Parameter */
    +msg->msg_data[4] = 4; /* Task ID */

    -rc = smscore_sendrequest_and_wait(coredev, trigger_msg,
        -trigger_msg->x_msg_header.msg_length,
        &coredev->trigger_done);
    +rc = smscore_sendrequest_and_wait(coredev, msg,
        +msg->x_msg_header.msg_length,
        &coredev->trigger_done);
} else {
    SMS_INIT_MSG(&msg->x_msg_header, MSG_SW_RELOAD_EXEC_REQ,
        --- linux-4.15.0.orig/drivers/media/common/siano/smscoreapi.h
        +++ linux-4.15.0/drivers/media/common/siano/smscoreapi.h
        @ @ -636,9 +636,9 @@
        u32 msg_data[2];
        );

    -struct sms_msg_data4 {
    +struct sms_msg_data5 {
        struct sms_msg_hdr x_msg_header;
        -u32 msg_data[4];
        +u32 msg_data[5];
    };

    struct sms_data_download {
        --- linux-4.15.0.orig/drivers/media/common/siano/smsdvb-main.c
        +++ linux-4.15.0/drivers/media/common/siano/smsdvb-main.c
        @ @ -1180,12 +1180,19 @@
rc = dvb_create_media_graph(&client->adapter, true);
if (rc < 0) {
    pr_err("dvb_create_media_graph failed %d\n", rc);
    goto client_error;
    goto media_graph_error;
}

pr_info("DVB interface registered.\n");
return 0;

+media_graph_error:
+mutex_lock(&g_smsdvb_clientslock);
+list_del(&client->entry);
+mutex_unlock(&g_smsdvb_clientslock);
+
+smsdvb_debugfs_release(client);
+
client_error:
    dvb_unregister_frontend(&client->frontend);

--- linux-4.15.0.orig/drivers/media/common/siano/smsendian.c
+++ linux-4.15.0/drivers/media/common/siano/smsendian.c
@@ -35,7 +35,7 @@
            switch (msg->x_msg_header.msg_type) {
                case MSG_SMS_DATA_DOWNLOAD_REQ:
                    
@@ -44,7 +44,7 @@
                    break;
            }
@@ -64,7 +64,7 @@
            for (i = 0; i < msg_words; i++)
                -msg->msg_data[i] = le32_to_cpu(msg->msg_data[i]);
                +msg->msg_data[i] = le32_to_cpu((__force __le32)(msg->msg_data[i]));
                break;

@@ -35,7 +35,7 @@
            break;
        }
@@ -64,7 +64,7 @@
            break;
        }

for (i = 0; i < msg_words; i++)
    msg->msg_data[i] = le32_to_cpu(msg->msg_data[i]);

break;
}

#ifdef __BIG_ENDIAN
struct sms_msg_hdr *phdr = (struct sms_msg_hdr *)msg;

    -phdr->msg_type = le16_to_cpu(phdr->msg_type);
    -phdr->msg_length = le16_to_cpu(phdr->msg_length);
    -phdr->msg_flags = le16_to_cpu(phdr->msg_flags);
    +#phdr->msg_type = le16_to_cpu((__force __le16)phdr->msg_type);
    +#phdr->msg_length = le16_to_cpu((__force __le16)phdr->msg_length);
    +#phdr->msg_flags = le16_to_cpu((__force __le16)phdr->msg_flags);
#endif /* __BIG_ENDIAN */

EXPORT_SYMBOL_GPL(smsendian_handle_message_header);

--- linux-4.15.0.orig/drivers/media/common/v4l2-tpg/v4l2-tpg-colors.c
+++ linux-4.15.0/drivers/media/common/v4l2-tpg/v4l2-tpg-colors.c
@@ -614,14 +614,14 @@

[\V4L2_COLORSPACE_SMPTE170M][\V4L2_XFER_FUNC_OPRGB][0] = { 3033, 3033, 3033 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_OPRGB][1] = { 3046, 3054, 886 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_OPRGB][2] = { 0, 3058, 3031 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_OPRGB][3] = { 360, 3079, 877 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_OPRGB][4] = { 3103, 587, 3027 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_OPRGB][5] = { 3116, 723, 861 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_OPRGB][6] = { 789, 744, 3025 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_SMPTE240M][1] = { 2941, 2950, 546 },
+\[V4L2_COLORSPACE_SMPTE170M][V4L2_XFER_FUNC_SMPTE240M][2] = { 0, 2954, 2924 },
[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_SRGB][5] = { 3138, 657, 810 },
[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_SRGB][7] = { 800, 799, 800 },
-V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_ADOBERGB][0] = { 3033, 3033, 3033 },
-V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_ADOBERGB][1] = { 3046, 3054, 886 },
-V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_ADOBERGB][2] = { 0, 3058, 3031 },
-V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_ADOBERGB][3] = { 360, 3079, 877 },
-V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_ADOBERGB][5] = { 3116, 723, 861 },
-V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_ADOBERGB][6] = { 789, 744, 3025 },
-V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_ADOBERGB][7] = { 851, 851, 851 },
+V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_OPRGB][0] = { 3033, 3033, 3033 },
+V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_OPRGB][1] = { 3046, 3054, 886 },
+V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_OPRGB][2] = { 0, 3058, 3031 },
+V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_OPRGB][3] = { 360, 3079, 877 },
+V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_OPRGB][5] = { 3116, 723, 861 },
+V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_OPRGB][6] = { 789, 744, 3025 },
+V[V4L2_COLORSPACE_SMPTE240M][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_SRGB][5] = { 3056, 800, 800 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_SRGB][6] = { 800, 800, 3056 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_SRGB][7] = { 800, 800, 800 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][0] = { 3033, 3033, 3033 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][1] = { 3033, 3033, 851 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][2] = { 851, 3033, 3033 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][3] = { 851, 3033, 851 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][4] = { 3033, 851, 3033 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][5] = { 3033, 851, 851 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][6] = { 851, 851, 3033 },
-V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_ADOBERGB][7] = { 851, 851, 851 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][0] = { 3033, 3033, 3033 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][1] = { 3033, 3033, 851 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][2] = { 851, 3033, 3033 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][3] = { 851, 3033, 851 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][4] = { 3033, 851, 3033 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][5] = { 3033, 851, 851 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][6] = { 851, 851, 3033 },
+V[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },
[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },
[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_SMPTE240M][1] = { 2926, 2926, 2926 },
[V4L2_COLORSPACE_REC709][V4L2_XFER_FUNC_SMPTE240M][2] = { 0, 2954, 2924 },
-V[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_SRGB][5] = { 2599, 901, 909 }. 
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_SRGB][6] = { 991, 0, 2966 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_SRGB][7] = { 800, 799, 800 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][0] = { 3033, 3033, 3033 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][1] = { 2989, 3120, 1180 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][2] = { 1913, 3011, 3009 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][3] = { 1836, 3099, 1105 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][4] = { 2627, 413, 2966 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][5] = { 2576, 943, 951 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][6] = { 1026, 0, 2942 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_ADOBERGB][7] = { 851, 851, 851 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][0] = { 3033, 3033, 3033 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][1] = { 2989, 3120, 1180 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][2] = { 1913, 3011, 3009 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][3] = { 1836, 3099, 1105 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][4] = { 2627, 413, 2966 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][5] = { 2576, 943, 951 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][6] = { 1026, 0, 2942 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_SMPTE240M][1] = { 2879, 3022, 874 },
[V4L2_COLORSPACE_470_SYSTEM_M][V4L2_XFER_FUNC_SMPTE240M][2] = { 1688, 2903, 2901 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_SRGB][5] = { 3001, 800, 799 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_SRGB][6] = { 800, 800, 3071 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_SRGB][7] = { 800, 800, 799 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][0] = { 3033, 3033, 3033 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][1] = { 3033, 3033, 776 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][2] = { 1068, 3033, 3033 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][3] = { 1068, 3033, 776 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][4] = { 2977, 851, 3048 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][5] = { 2977, 851, 851 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][6] = { 851, 851, 3048 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_ADOBERGB][7] = { 851, 851, 851 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][0] = { 3033, 3033, 3033 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][1] = { 3033, 3033, 776 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][2] = { 1068, 3033, 3033 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][3] = { 1068, 3033, 776 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][4] = { 2977, 851, 3048 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][5] = { 2977, 851, 851 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][6] = { 851, 851, 3048 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_SMPTE240M][1] = { 2879, 3022, 874 },
[V4L2_COLORSPACE_470_SYSTEM_BG][V4L2_XFER_FUNC_SMPTE240M][2] = { 1688, 2903, 2901 },
[V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SRGB][5] = { 3056, 800, 800 },
[V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SRGB][6] = { 800, 800, 3056 },
[V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SRGB][7] = { 800, 800, 800 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][0] = { 3033, 3033, 3033 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][1] = { 3033, 3033, 851 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][2] = { 851, 3033, 3033 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][3] = { 851, 3033, 851 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][4] = { 3033, 851, 3033 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][5] = { 3033, 851, 851 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][6] = { 851, 851, 3033 },
- [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_ADOBERGB][7] = { 851, 851, 851 },
+ [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },
+ [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SMPTE240M][1] = { 2926, 2926, 507 },
+ [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SMPTE240M][2] = { 507, 2926, 2926 },
+ [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SMPTE2084][5] = { 1812, 886, 886 },
+ [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SMPTE2084][6] = { 886, 886, 1812 },
+ [V4L2_COLORSPACE_SRGB][V4L2_XFER_FUNC_SMPTE2084][7] = { 886, 886, 886 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][0] = { 2939, 2939, 2939 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][1] = { 2939, 2939, 781 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][2] = { 1622, 2939, 2939 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][3] = { 1622, 2939, 781 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][4] = { 2502, 547, 2881 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][5] = { 2502, 547, 547 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][6] = { 547, 547, 2881 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_709][7] = { 547, 547, 547 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][1] = { 2926, 2926, 2926 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][2] = { 507, 2926, 2926 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][3] = { 507, 2926, 2926 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][4] = { 507, 2926, 2926 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][5] = { 507, 2926, 2926 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][6] = { 507, 2926, 2926 },
- [V4L2_COLORSPACE_ADOBERGB][V4L2_XFER_FUNC_SMPTE240M][7] = { 507, 2926, 2926 },

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+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_OPRGB][1] = { 3033, 3033, 1063 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_OPRGB][2] = { 1828, 3033, 3033 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_OPRGB][3] = { 1828, 3033, 1063 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_OPRGB][4] = { 2633, 851, 2979 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_OPRGB][5] = { 2633, 851, 851 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_OPRGB][6] = { 851, 851, 2979 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][1] = { 2926, 2926, 744 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][2] = { 1594, 2926, 2926 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][3] = { 1594, 2926, 744 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][4] = { 2484, 507, 2867 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][5] = { 2484, 507, 507 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][6] = { 507, 507, 2867 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE240M][7] = { 507, 507, 507 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][0] = { 2125, 2125, 2125 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][1] = { 2125, 2125, 212 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][2] = { 698, 2125, 2125 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][3] = { 698, 2125, 212 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][4] = { 1557, 130, 2043 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][5] = { 1557, 130, 130 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][6] = { 130, 130, 2043 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_NONE][7] = { 130, 130, 130 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][0] = { 3175, 3175, 3175 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][1] = { 3175, 3175, 1308 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][2] = { 2069, 3175, 3175 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][3] = { 2069, 3175, 1308 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][4] = { 2816, 1084, 3127 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][5] = { 2816, 1084, 1084 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][6] = { 1084, 1084, 3127 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_DCI_P3][7] = { 1084, 1084, 1084 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][0] = { 1812, 1812, 1812 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][1] = { 1812, 1812, 1022 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][2] = { 1402, 1812, 1812 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][3] = { 1402, 1812, 1022 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][4] = { 1692, 886, 1797 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][5] = { 1692, 886, 886 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][6] = { 886, 886, 1797 },
+[V4L2_COLORSPACE_OPRGB][V4L2_XFER_FUNC_SMPTE2084][7] = { 886, 886, 886 },
+[V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_BT2020][0] = { 2939, 2939, 2939 },
+[V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_BT2020][1] = { 2877, 2923, 1058 },
+[V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_BT2020][2] = { 1837, 2840, 2916 },
@@ -1006,14 +1006,14 @@
+[V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_SRGB][5] = { 2517, 1159, 900 },
+[V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_SRGB][6] = { 1042, 870, 2917 },
+[V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_SRGB][7] = { 800, 800, 800 },
-]V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_ADOBERGB][0] = { 3033, 3033, 3033 },
-]V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_ADOBERGB][1] = { 2976, 3018, 1315 },
<table>
<thead>
<tr>
<th>V4L2_COLORSPACE_BT2020</th>
<th>V4L2_XFER_FUNC_ADOBERGB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[2] = { 2024, 2942, 3011 },</td>
</tr>
<tr>
<td></td>
<td>[3] = { 1930, 2926, 1256 },</td>
</tr>
<tr>
<td></td>
<td>[4] = { 2563, 1227, 2916 },</td>
</tr>
<tr>
<td></td>
<td>[5] = { 2494, 1183, 943 },</td>
</tr>
<tr>
<td></td>
<td>[6] = { 1073, 916, 2894 },</td>
</tr>
<tr>
<td></td>
<td>[7] = { 851, 851, 851 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][0] = { 3033, 3033, 3033 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][1] = { 2976, 3018, 1315 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][2] = { 2024, 2942, 3011 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][3] = { 1930, 2926, 1256 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][4] = { 2563, 1227, 2916 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][5] = { 2494, 1183, 943 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][6] = { 1073, 916, 2894 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_SMPTE240M][1] = { 2864, 2910, 1024 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_BT2020][V4L2_XFER_FUNC_SMPTE240M][2] = { 1811, 2826, 2903 },</td>
</tr>
<tr>
<td></td>
<td>@ @ -1062.14 +1062.14 @@</td>
</tr>
<tr>
<td></td>
<td>[V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_SRGB][5] = { 2880, 998, 902 },</td>
</tr>
<tr>
<td></td>
<td>[V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_SRGB][6] = { 816, 823, 2940 },</td>
</tr>
<tr>
<td></td>
<td>[V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_SRGB][7] = { 800, 800, 799 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_ADOBERGB][0] = { 3033, 3033, 3033 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFERFUNC_ADOBERGB][1] = { 3029, 3028, 1255 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_ADOBERGB][2] = { 1406, 2988, 3011 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_ADOBERGB][3] = { 1398, 2983, 1190 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_ADOBERGB][4] = { 2860, 1050, 2939 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_ADOBERGB][5] = { 2857, 1033, 945 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_ADOBERGB][6] = { 866, 873, 2916 },</td>
</tr>
<tr>
<td></td>
<td>- [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_ADOBERGB][7] = { 851, 851, 851 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][0] = { 3033, 3033, 3033 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][1] = { 3029, 3028, 1255 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][2] = { 1406, 2988, 3011 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][3] = { 1398, 2983, 1190 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][4] = { 2860, 1050, 2939 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][5] = { 2857, 1033, 945 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][6] = { 866, 873, 2916 },</td>
</tr>
<tr>
<td></td>
<td>+ [V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_OPRGB][7] = { 851, 851, 851 },</td>
</tr>
<tr>
<td></td>
<td>[V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_SMPTE240M][0] = { 2926, 2926, 2926 },</td>
</tr>
<tr>
<td></td>
<td>[V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_SMPTE240M][1] = { 2923, 2921, 957 },</td>
</tr>
<tr>
<td></td>
<td>[V4L2_COLORSPACE_DCI_P3][V4L2_XFER_FUNC_SMPTE240M][2] = { 1125, 2877, 2902 },</td>
</tr>
<tr>
<td></td>
<td>@ @ -1140.7 +1140.7 @@</td>
</tr>
<tr>
<td></td>
<td>{ 0.0016327, 0.0044133, 0.9939540 },</td>
</tr>
<tr>
<td></td>
<td>];</td>
</tr>
</tbody>
</table>

- static const double rec709_to_adobergb[3][3] = { |
+ static const double rec709_to_oprgb[3][3] = { |
| { 0.7151627, 0.2848373, -0.0000000 }, |
| { 0.0000000, 1.0000000, 0.0000000 }, |
return (v < 0.081) ? v / 4.5 : pow((v + 0.099) / 1.099, 1.0 / 0.45);
}

- static double transfer_rgb_to_adobergb(double v)
+ static double transfer_rgb_to_oprgb(double v)
{
    return pow(v, 1.0 / 2.19921875);
}

@ @ -1263,8 +1263,8 @@
 case V4L2_COLORSPACE_470_SYSTEM_M:
    mult_matrix(r, g, b, rec709_to_ntsc1953);
    break;
- case V4L2_COLORSPACE_ADOBERGB:
+ case V4L2_COLORSPACE_OPRGB:
    - mult_matrix(r, g, b, rec709_to_adobergb);
    + mult_matrix(r, g, b, rec709_to_oprgb);
    break;
 case V4L2_COLORSPACE_BT2020:
    mult_matrix(r, g, b, rec709_to_bt2020);
    @ @ -1296,10 +1296,10 @@
    *g = transfer_rgb_to_srgb(*g);
    *b = transfer_rgb_to_srgb(*b);
    break;
- case V4L2_XFER_FUNC_ADOBERGB:
+ case V4L2_XFER_FUNC_OPRGB:
    - *r = transfer_rgb_to_adobergb(*r);
    - *g = transfer_rgb_to_adobergb(*g);
    - *b = transfer_rgb_to_adobergb(*b);
    + *r = transfer_rgb_to_oprgb(*r);
    + *g = transfer_rgb_to_oprgb(*g);
    + *b = transfer_rgb_to_oprgb(*b);
    break;
 case V4L2_XFER_FUNC_DCI_P3:
    *r = transfer_rgb_to_dcip3(*r);
    @ @ -1333,7 +1333,7 @@
 V4L2_COLORSPACE_470_SYSTEM_BG,
 0,
 V4L2_COLORSPACE_SRGB,
- V4L2_COLORSPACE_ADOBERGB,
+ V4L2_COLORSPACE_OPRGB,
 V4L2_COLORSPACE_BT2020,
 0,
 V4L2_COLORSPACE_DCI_P3,
 @ @ -1348,7 +1348,7 @@
 "V4L2_COLORSPACE_470_SYSTEM_BG",
 ""
"V4L2_COLORSPACE_SRGB",
"V4L2_COLORSPACE_Adobergb",
"V4L2_COLORSPACE_Oprgb",
"V4L2_COLORSPACE_BT2020",
  "V4L2_COLORSPACE_DCI_P3",
@@ -1357,7 +1357,7 @@
  "V4L2_XFER_FUNC_709",
  "V4L2_XFER_FUNC_SRGB",
  "V4L2_XFER_FUNC_Adobergb",
+  "V4L2_XFER_FUNC_Oprgb",
  "V4L2_XFER_FUNC_SMpte240M",
  "V4L2_XFER_FUNC_NONE",
  "V4L2_XFER_FUNC_DCI_P3",
--- linux-4.15.0.orig/drivers/media/common/v4l2-tpg/v4l2-tpg-core.c
+++ linux-4.15.0/drivers/media/common/v4l2-tpg/v4l2-tpg-core.c
@@ -1745,7 +1745,7 @@
 for (s = 0; s < len; s++) {
     u8 chr = font8x16[text[s] * 16 + line];
     if (hdiv == 2 && tpg->hflip) {
@@ -1777,7 +1777,7 @@
         pos[7] = (chr & (0x01 << 0) ? fg : bg);
     @ @ -1745,7 +1745,7 @@
         unsigned s;
         for (s = 0; s < len; s++) {
             u8 chr = font8x16[text[s] * 16 + line];
             if (hdiv == 2 && tpg->hflip) {
                 pos[3] = (chr & (0x01 << 6) ? fg : bg);
@@ -1789,7 +1789,7 @@
                 pos[7] = (chr & (0x01 << 0) ? fg : bg);
             } 
@@ -1801,7 +1801,7 @@
             -pos += (tpg->hflip ? -8 : 8) / hdiv;
             +pos += (tpg->hflip ? -8 : 8) / (int)hdiv;
         } 
@@ -1813,7 +1813,7 @@
         } 
         } 
     } while (0)
--- linux-4.15.0.orig/drivers/media/dvb-core/dmxdev.c
+++ linux-4.15.0/drivers/media/dvb-core/dmxdev.c
@@ -1053,7 +1053,7 @@
         break;
         break:
         default:
@@ -1067,7 +1067,7 @@
         +ret = -ENOTTY;
         break;
     } 
@@ -1079,7 +1079,7 @@
         mutex_unlock(&dmxdev->mutex);
--- linux-4.15.0.orig/drivers/media/dvb-core/dvb_ca_en50221.c
+++ linux-4.15.0/drivers/media/dvb-core/dvb_ca_en50221.c
@@ -1053,7 +1053,7 @@
         break;
```c
#include <linux/slab.h>
#include <linux/list.h>
#include <linux/module.h>
#include <linux/nospec.h>
#include <linux/vmalloc.h>
#include <linux/delay.h>
#include <linux/spinlock.h>

return -EFAULT;
buf += 2;
count -= 2;
+
+if (slot >= ca->slot_count)
+return -EINVAL;
+slot = array_index_nospec(slot, ca->slot_count);

sl = &ca->slot_info[slot];

/* check if the slot is actually running */
--- linux-4.15.0.orig/drivers/media/dvb-core/dvb_frontend.c
+++ linux-4.15.0/drivers/media/dvb-core/dvb_frontend.c
@@ -275,8 +275,20 @@
    wake_up_interruptible (&events->wait_queue);
 }

+static int dvb_frontend_test_event(struct dvb_frontend_private *fepriv,
+    struct dvb_fe_events *events)
+{
+    int ret;
+    up(&fepriv->sem);
+    ret = events->eventw != events->eventr;
+    down(&fepriv->sem);
+    return ret;
+}
+
static int dvb_frontend_get_event(struct dvb_frontend *fe,
    struct dvb_frontend_event *event, int flags)
{
    struct dvb_frontend_private *fepriv = fe->frontend_priv;
    struct dvb_frontend_event *event, int flags)
    struct dvb_frontend_private *fepriv = fe->frontend_priv;
    struct dvb_fe_events *events = &fepriv->events;
    @ @ -294,13 +306,8 @@
    if (flags & O_NONBLOCK)
        return -EWOULDBLOCK;

-up(&fepriv->sem);
```
- ret = wait_event_interruptible(events->wait_queue, 
- events->eventw != events->eventr);
-
- if (down_interruptible (&fepriv->sem))
  return -ERESTARTSYS;
+ ret = wait_event_interruptible(events->wait_queue, 
+       dvb_frontend_test_event(fepriv, events));

  if (ret < 0)
    return ret;
@@ -2110,7 +2117,7 @@
    struct dvb_frontend *fe = dvbdev->priv;
    struct dvb_frontend_private *fepriv = fe->frontend_priv;
    struct dtv_frontend_properties *c = &fe->dtv_property_cache;
-   int i, err;
+   int i, err = -EOPNOTSUPP;

    dev_dbg(fe->dvb->device, "%s:\n", __func__);

@@ -2145,6 +2152,7 @@
     kfree(tvp);
   + err = 0;
   break;
   }
   case FE_GET_PROPERTY: {
@@ -2196,6 +2204,7 @@
     return -EFAULT;
   }
   kfree(tvp);
-   + err = 0;
   break;
   }

--- linux-4.15.0.orig/drivers/media/dvb-core/dvb_net.c
+++ linux-4.15.0/drivers/media/dvb-core/dvb_net.c
@@ -56,6 +56,7 @@
 #include <linux/module.h>
 #include <linux/kernel.h>
 #include <linux/netdevice.h>
+  #include <linux/nospec.h>
 #include <linux/etherdevice.h>
 #include <linux/dvb/net.h>
 #include <linux/uio.h>
@@ -1482,14 +1483,20 @@
 struct net_device *netdev;
struct dvb_net_priv *priv_data;
struct dvb_net_if *dvbnetif = parg;
+int if_num = dvbnetif->if_num;

-if (dvbnetif->if_num >= DVB_NET_DEVICES_MAX ||
-   !dvbnet->state[dvbnetif->if_num]) { 
+if (if_num >= DVB_NET_DEVICES_MAX) {
    ret = -EINVAL;
    goto ioctl_error;
} 
+if_num = array_index_nospec(if_num, DVB_NET_DEVICES_MAX);

-netdev = dvbnet->device[dvbnetif->if_num];
+if (!dvbnet->state[if_num]) {
    +ret = -EINVAL;
    +goto ioctl_error;
+}
+netdev = dvbnet->device[if_num];

priv_data = netdev_priv(netdev);
dvbnetif->pid=priv_data->pid;
@@ -1542,14 +1549,20 @@
+
-     struct net_device *netdev;
-     struct dvb_net_priv *priv_data;
-     struct __dvb_net_if_old *dvbnetif = parg;
-     +int if_num = dvbnetif->if_num;
-     +
-     +if (if_num >= DVB_NET_DEVICES_MAX) {
-     +ret = -EINVAL;
-     +goto ioctl_error;
-     +}
-     +if_num = array_index_nospec(if_num, DVB_NET_DEVICES_MAX);

-if (dvbnetif->if_num >= DVB_NET_DEVICES_MAX ||
-   !dvbnet->state[dvbnetif->if_num]) { 
+if (!dvbnet->state[if_num]) {
    ret = -EINVAL;
    goto ioctl_error;
} 

-netdev = dvbnet->device[dvbnetif->if_num];
+netdev = dvbnet->device[if_num];

priv_data = netdev_priv(netdev);
dvbnetif->pid=priv_data->pid;
--- linux-4.15.0.orig/drivers/media/dvb-core/dvbdev.c
+++ linux-4.15.0/drivers/media/dvb-core/dvbdev.c
if (dvbdev->adapter->conn) {
    media_device_unregister_entity(dvbdev->adapter->conn);
+kfree(dvbdev->adapter->conn);  
dvbdev->adapter->conn = NULL;
    kfree(dvbdev->adapter->conn_pads);
    dvbdev->adapter->conn_pads = NULL;
}
@@ -338,8 +339,10 @@
if (npads) {
    dvbdev->pads = kalloc(npads, sizeof(*dvbdev->pads),
                           GFP_KERNEL);
-    if (!dvbdev->pads)
    +    if (!dvbdev->pads) {
        +kfree(dvbdev->entity);
        return -ENOMEM;
    }
}

switch (type) {
 --- linux-4.15.0.orig/drivers/media/dvb-frontends/ascot2e.c
+++ linux-4.15.0/drivers/media/dvb-frontends/ascot2e.c
@@ -155,7 +155,9 @@
static int ascot2e_write_reg(struct ascot2e_priv *priv, u8 reg, u8 val)
    }
    return ascot2e_write_regs(priv, reg, &val, 1);
+u8 tmp = val; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
+    return ascot2e_write_regs(priv, reg, &tmp, 1);
}

static int ascot2e_read_regs(struct ascot2e_priv *priv,
 --- linux-4.15.0.orig/drivers/media/dvb-frontends/cxd2841er.c
+++ linux-4.15.0/drivers/media/dvb-frontends/cxd2841er.c
@@ -257,7 +257,9 @@
static int cxd2841er_write_reg(struct cxd2841er_priv *priv,
    return cxd2841er_write_regs(priv, addr, reg, &val, 1);
+u8 tmp = val; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
+    return cxd2841er_write_regs(priv, addr, reg, &tmp, 1);
}

static int cxd2841er_write_regs(struct cxd2841er_priv *priv,
 --- linux-4.15.0.orig/drivers/media/dvb-frontends/dib8000.c
+++ linux-4.15.0/drivers/media/dvb-frontends/dib8000.c
static u16 dib8000_get_init_prbs(struct dib8000_state *state, u16 subchannel)  
{  
    int sub_channel_prbs_group = 0;  
    int prbs_group;  
    
    -sub_channel_prbs_group = (subchannel / 3) + 1;  
    -dprintf("sub_channel_prbs_group = %d , subchannel=%d prbs = 0x%04x\n", sub_channel_prbs_group, subchannel, lut_prbs_8k[sub_channel_prbs_group]);  
    +sub_channel_prbs_group = subchannel / 3;  
    +if (sub_channel_prbs_group >= ARRAY_SIZE(lut_prbs_2k))  
        +return 0;  
    
    switch (state->fe[0]->dtv_property_cache.transmission_mode) {  
        case TRANSMISSION_MODE_2K:  

-return lut_prbs_2k[sub_channel_prbs_group];
+prbs_group = lut_prbs_2k[sub_channel_prbs_group];
+break;
case TRANSMISSION_MODE_4K:
-return lut_prbs_4k[sub_channel_prbs_group];
+prbs_group = lut_prbs_4k[sub_channel_prbs_group];
+break;
default:
case TRANSMISSION_MODE_8K:
-return lut_prbs_8k[sub_channel_prbs_group];
+prbs_group = lut_prbs_8k[sub_channel_prbs_group];
}
+
+dprintf("sub_channel_prbs_group = %d , subchannel =%d prbs = 0x%04x\n",
+sub_channel_prbs_group, subchannel, prbs_group);
+
+return prbs_group;
}

static void dib8000_set_13seg_channel(struct dib8000_state *state) {
@@ -2412,10 +2435,8 @@
/* TSB or ISDBT ? apply it now * /
if (c->isdbt_sb_mode) {
  dib8000_set_sb_channel(state);
-if (c->isdbt_sb_subchannel < 14)
-  init_prbs = dib8000_get_init_prbs(state, c->isdbt_sb_subchannel);
-else
-  init_prbs = 0;
+  init_prbs = dib8000_get_init_prbs(state, c->isdbt_sb_subchannel);
 } else {
  dib8000_set_13seg_channel(state);
  init_prbs = 0xfff;
@@ -3007,6 +3028,7 @@
         timeout = &state->timeout;
 unsigned long now = jiffies;
+u16 init_prbs;
 #ifdef DIB8000_AGC_FREEZE
 u16 agc1, agc2;
 #endif
@@ -3305,8 +3327,10 @@
 break;

 case CT_DEMOD_STEP_11: /* 41 : init prbs autosearch */
-if (state->subchannel <= 41) {
-  dib8000_set_subchannel_prbs(state, dib8000_get_init_prbs(state, state->subchannel));
+  init_prbs = dib8000_get_init_prbs(state, state->subchannel);
+if (init_prbs) {
+    dib8000_set_subchannel_prbs(state, init_prbs);
    *tune_state = CT_DEMOD_STEP_9;
} else {
    *tune_state = CT_DEMOD_STOP;
}

-if (frequency & (frequency < desc->min || frequency > desc->max))
    return -EINVAL;
-
    for (i = 0; i < desc->count; i++) {
        if (frequency > desc->entries[i].limit)
            continue;
    }

static int helene_write_reg(struct helene_priv *priv, u8 reg, u8 val)
{
    return helene_write_regs(priv, reg, &val, 1);
}
+
    u8 tmp = val; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
    return helene_write_regs(priv, reg, &tmp, 1);
}

static int helene_read_regs(struct helene_priv *priv,
@@ -895,7 +897,10 @@
    helene_write_regs(priv, 0x99, cdata, sizeof(cdata));

    /* 0x81 - 0x94 */
-    data[0] = 0x18; /* xtal 24 MHz */
+    if (priv->xtal == SONY_HELENE_XTL_16000)
+        data[0] = 0x10; /* xtal 16 MHz */
+    else
+        data[0] = 0x18; /* xtal 24 MHz */
    data[1] = (uint8_t)(0x80 | (0x04 & 0x1F)); /* 4 x 25 = 100uA */
    data[2] = (uint8_t)(0x80 | (0x26 & 0x7F)); /* 38 x 0.25 = 9.5pF */
    data[3] = 0x80; /* REFOUT signal output 500mVpp */

static int horus3a_write_reg(struct horus3a_priv *priv, u8 reg, u8 val)
{
    return horus3a_write_regs(priv, reg, &val, 1);
}

/* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
+u8 tmp = val;
+return horus3a_write_regs(priv, reg, &tmp, 1);
}

static int horus3a_enter_power_save(struct horus3a_priv *priv)
--- linux-4.15.0.orig/drivers/media/dvb-frontends/itd1000.c
+++ linux-4.15.0/drivers/media/dvb-frontends/itd1000.c
@@ -95,8 +95,9 @@
static inline int itd1000_write_reg(struct itd1000_state *state, u8 r, u8 v)
{
    int ret = itd1000_write_regs(state, r, &v, 1);
    state->shadow[r] = v;
+    /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
+    int ret = itd1000_write_regs(state, r, &tmp, 1);
+    state->shadow[r] = tmp;
    return ret;
}

--- linux-4.15.0.orig/drivers/media/dvb-frontends/lgdt3306a.c
+++ linux-4.15.0/drivers/media/dvb-frontends/lgdt3306a.c
@@ -1768,7 +1768,13 @@
struct lgdt3306a_state *state = fe->demodulator_priv;

dbg_info("\n");
    kfree(state);
+    /*
+     * If state->muxc is not NULL, then we are an i2c device
+     * and lgdt3306a_remove will clean up state
+     */
+    if (!state-> muxc)
+        kfree(state);
    }

static const struct dvb_frontend_ops lgdt3306a_ops;
@@ -2169,7 +2175,7 @@
    sizeof(struct lgdt3306a_config));
config->i2c_addr = client->addr;
-fe = lgdt3306a_attach(config, client->adapter);
+fe = dvb_attach(lgdt3306a_attach, config, client->adapter);
if (fe == NULL) {
    ret = -ENODEV;
    goto err_fe;

--- linux-4.15.0.orig/drivers/media/dvb-frontends/m88ds3103.c
+++ linux-4.15.0/drivers/media/dvb-frontends/m88ds3103.c
@@ -309,6 +309,9 @@
 u16 u16tmp;
 u32 tuner_frequency_khz, target_mclk;
 s32 s32tmp;
+static const struct reg_sequence reset_buf[] = {
+    {0x07, 0x80}, {0x07, 0x00}
+};

 dev_dbg(&client->dev,
 "delivery_system=%d modulation=%d frequency=%u symbol_rate=%d inversion=%d pilot=%d rolloff=%d
", @ @ -321,11 +324,7 @@}

 /* reset */
-ret = regmap_write(dev->regmap, 0x07, 0x80);
-if (ret)
-goto err;
-
-ret = regmap_write(dev->regmap, 0x07, 0x00);
+ret = regmap_multi_reg_write(dev->regmap, reset_buf, 2);
-if (ret)
-goto err;
@@ -1262,11 +1261,12 @@
* New users must use I2C client binding directly!
*/
struct dvb_frontend *m88ds3103_attach(const struct m88ds3103_config *cfg,
				      struct i2c_adapter *i2c, struct i2c_adapter **tuner_i2c_adapter)
+              struct i2c_adapter *i2c,
+              struct i2c_adapter **tuner_i2c_adapter)
{                      
  struct i2c_client *client;
  struct i2c_board_info board_info;
-  struct m88ds3103_platform_data pdata;
+  struct m88ds3103_platform_data pdata = {};

  pdata.clk = cfg->clock;
  pdata.i2c_wr_max = cfg->i2c_wr_max;
@@ -1409,6 +1409,8 @@
    case M88DS3103_CHIP_ID:
      break;
    default:
+    ret = -ENODEV;
+    dev_err(&client->dev, "Unknown device. Chip_id=%02x\n", dev->chip_id);
  goto err_kfree;
}
--- linux-4.15.0.orig/drivers/media/dvb-frontends/mt312.c
+++ linux-4.15.0/drivers/media/dvb-frontends/mt312.c
@@ -142,7 +142,10 @@
     static inline int mt312_writereg(struct mt312_state *state,
       const enum mt312_reg_addr reg, const u8 val)
     {
-       return mt312_write(state, reg, &val, 1);
+       u8 tmp = val; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
+       +
+       +
+       return mt312_write(state, reg, &tmp, 1);
     }

     static inline u32 mt312_div(u32 a, u32 b)
--- linux-4.15.0.orig/drivers/media/dvb-frontends/si2165.c
+++ linux-4.15.0/drivers/media/dvb-frontends/si2165.c
@@ -304,19 +304,21 @@
 static int si2165_wait_init_done(struct si2165_state *state)
 {
-   int ret = -EINVAL;
+   int ret;
   u8 val = 0;
   int i;

   for (i = 0; i < 3; ++i) {
-      si2165_readreg8(state, 0x0054, &val);
+      ret = si2165_readreg8(state, 0x0054, &val);
+      if (ret < 0)
+        return ret;
   if (val == 0x01)
     return 0;
   usleep_range(1000, 50000);
-   dev_err(&state->client->dev, "%s: init_done was not set\n",
+   !KBUILD_MODNAME);
   -return ret;
   +return -EINVAL;
  }

  static int si2165_upload_firmware_block(struct si2165_state *state,
--- linux-4.15.0.orig/drivers/media/dvb-frontends/si2168.c
+++ linux-4.15.0/drivers/media/dvb-frontends/si2168.c
@@ -14,6 +14,8 @@
 *    GNU General Public License for more details.
 */

```c
#include <linux/delay.h>
+
#include "si2168_priv.h"

static const struct dvb_frontend_ops si2168_ops;
@@ -435,6 +437,7 @@
    if (ret)
    goto err;

+    udelay(100);
    memcpy(cmd.args, "\x85", 1);
    cmd.wlen = 1;
    cmd.rlen = 1;
--- linux-4.15.0.orig/drivers/media/dvb-frontends/sp8870.c
+++ linux-4.15.0/drivers/media/dvb-frontends/sp8870.c
@@ -293,7 +295,9 @@
    sp8870_readreg(state, 0x200);
    if (err < 0)
        return err;
// system controller start
sp8870_microcontroller_start(state);
--- linux-4.15.0.orig/drivers/media/dvb-frontends/stb0899_drv.c
+++ linux-4.15.0/drivers/media/dvb-frontends/stb0899_drv.c
@@ -539,7 +541,8 @@
    stb0899_write_reg(struct stb0899_state *state, unsigned int reg, u8 data)
    { }
    +    tmp = data; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
+++ linux-4.15.0/drivers/media/dvb-frontends/stb6100.c
@@ -226,12 +228,14 @@
    stb6100_write_reg(struct stb6100_state *state, u8 reg, u8 data)
    { +
        if (unlikely(reg >= STB6100_NUMREGS)) {
            printk(verbatim, FE_ERROR, 1, "Invalid register offset 0x%0x", reg);
```
return -EREMOTEIO;
}
data = (data & stb6100_template[reg].mask) | stb6100_template[reg].set;
return stb6100_write_reg_range(state, &data, reg, 1);
+tmp = (tmp & stb6100_template[reg].mask) | stb6100_template[reg].set;
+return stb6100_write_reg_range(state, &tmp, reg, 1);
}

--- linux-4.15.0.orig/drivers/media/dvb-frontends/stv0367.c
+++ linux-4.15.0/drivers/media/dvb-frontends/stv0367.c
@@ -166,7 +166,9 @@
static int stv0367_writereg(struct stv0367_state *state, u16 reg, u8 data)
{
- return stv0367_writeregs(state, reg, &data, 1);
+ u8 tmp = data; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
 +
+ return stv0367eregs(state, reg, &tmp, 1);
}

static u8 stv0367_readreg(struct stv0367_state *state, u16 reg)
--- linux-4.15.0.orig/drivers/media/dvb-frontends/stv090x.c
+++ linux-4.15.0/drivers/media/dvb-frontends/stv090x.c
@@ -755,7 +755,9 @@
static int stv090x_write_reg(struct stv090x_state *state, unsigned int reg, u8 data)
{
- return stv090x_write_regs(state, reg, &data, 1);
+ u8 tmp = data; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
 +
+ return stv090x_write_regs(state, reg, &tmp, 1);
}

static int stv090x_i2c_gate_ctrl(struct stv090x_state *state, int enable)
--- linux-4.15.0.orig/drivers/media/dvb-frontends/stv6110x.c
+++ linux-4.15.0/drivers/media/dvb-frontends/stv6110x.c
@@ -97,7 +97,9 @@
static int stv6110x_write_reg(struct stv6110x_state *stv6110x, u8 reg, u8 data)
{
- return stv6110x_write_regs(stv6110x, reg, &data, 1);
+ u8 tmp = data; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
 +
+ return stv6110x_write_regs(stv6110x, reg, &tmp, 1);
}

static int stv6110x_init(struct dvb_frontend *fe)
--- linux-4.15.0.orig/drivers/media/dvb-frontends/tda10071.c
+++ linux-4.15.0/drivers/media/dvb-frontends/tda10071.c
@@ -483,10 +483,11 @@
goto error;
if (dev->delivery_system == SYS_DVBS)
    -dev->dvbv3_ber = buf[0] << 24 | buf[1] << 16 |
    -dev->post_bit_error += buf[0] << 24 | buf[1] << 16 |
    +u32 bit_error = buf[0] << 24 | buf[1] << 16 |
    +
    +dev->dvbv3_ber = bit_error;
    +dev->post_bit_error += bit_error;
    c->post_bit_error.stat[0].scale = FE_SCALE_COUNTER;
    c->post_bit_error.stat[0].uvalue = dev->post_bit_error;
--- linux-4.15.0.orig/drivers/media/dvb-frontends/ts2020.c
+++ linux-4.15.0/drivers/media/dvb-frontends/ts2020.c
@@ -368,7 +368,7 @@
    +
    +_gain = -((__s64)gain1 * 2330 +
    +gain2 * 3500 +
    +v_agc * 24 / 10 * 10 +
    +10000);  
    +
    +gain3 = clamp_t(long, gain3, 0, 6);
    +v_agc = clamp_t(long, v_agc, 400, 1100);
    -*_gain = -(gain1 * 2330 +
    +_gain = -((__s64)gain1 * 2330 +
    +gain2 * 3500 +
    +v_agc * 24 / 10 * 10 +
    +10000);  
    +
    +gain3 = clamp_t(long, gain3, 0, 6);
    +v_agc = clamp_t(long, v_agc, 400, 1100);
    -*_gain = -(gain1 * 2650 +
    +_gain = -((__s64)gain1 * 2650 +
    +gain2 * 3380 +
    +gain3 * 2850 +
    +v_agc * 176 / 100 * 10 -
    --- linux-4.15.0.orig/drivers/media/dvb-frontends/tua6100.c
+++ linux-4.15.0/drivers/media/dvb-frontends/tua6100.c
@@ -75,8 +75,8 @@
    struct i2c_msg msg1 = { .addr = priv->i2c_address, .flags = 0, .buf = reg1, .len = 4 };
    struct i2c_msg msg2 = { .addr = priv->i2c_address, .flags = 0, .buf = reg1, .len = 4 };
    
    #define _R 4
    #define _P 32
    +#define _R_VAL 4
    +#define _P_VAL 32

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#define _ri 4000000

// setup register 0
@@ -91,14 +91,14 @@
else
    reg1[1] = 0x0c;

-if (_P == 64)
+if (_P_VAL == 64)
    reg1[1] |= 0x40;
if (c->frequency >= 1525000)
    reg1[1] |= 0x80;

// register 2
-reg2[1] = (_R >> 8) & 0x03;
-reg2[2] = _R;
+reg2[1] = (_R_VAL >> 8) & 0x03;
+reg2[2] = _R_VAL;
if (c->frequency < 1455000)
    reg2[1] |= 0x1c;
else if (c->frequency < 1630000)
@@ -110,18 +110,18 @@
    * The N divisor ratio (note: c->frequency is in kHz, but we
    * need it in Hz)
    */
-prediv = (c->frequency * _R) / (_ri / 1000);
-div = prediv / _P;
+prediv = (c->frequency * _R_VAL) / (_ri / 1000);
+div = prediv / _P_VAL;
reg1[1] |= (div >> 9) & 0x03;
reg1[2] = div >> 1;
reg1[3] = (div << 7);
.priv->frequency = ((div * _P) * (_ri / 1000)) / _R;
+priv->frequency = ((div * _P_VAL) * (_ri / 1000)) / _R_VAL;

// Finally, calculate and store the value for A
-reg1[3] |= (prediv - (div*_P)) & 0x7f;
+reg1[3] |= (prediv - (div*_P_VAL)) & 0x7f;

-#undef _R
-#undef _P
+#undef _R_VAL
+#undef _P_VAL
#undef _ri

if (fe->ops.i2c_gate_ctrl)
const enum zl10039_reg_addr reg,
const u8 val)
{
const u8 tmp = val; /* see gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 */
+return zl10039_write(state, reg, &tmp, 1);
}

static int zl10039_init(struct dvb_frontend *fe)
--- linux-4.15.0.orig/drivers/media/firewire/firedtv-avc.c
+++ linux-4.15.0/drivers/media/firewire/firedtv-avc.c
@@ -1009,7 +1010,8 @@
return ret;
}

-int avc_ca_app_info(struct firedtv *fdtv, char *app_info, unsigned int *len)
+int avc_ca_app_info(struct firedtv *fdtv, unsigned char *app_info,
+unsigned int *len)
{
struct avc_command_frame *c = (void *)fdtv->avc_data;
struct avc_response_frame *r = (void *)fdtv->avc_data;
@@ -271,6 +271,10 @@
name_len = fw_csr_string(unit->directory, CSR_MODEL,
name, sizeof(name));
+if (name_len < 0) {
+err = name_len;
+goto fail_free;
+}
for (i = ARRAY_SIZE(model_names); --i; )
if (strlen(model_names[i]) <= name_len &&
    strcmp(name, model_names[i], name_len) == 0)
--- linux-4.15.0.orig/drivers/media/firewire/firedtv-fw.c
+++ linux-4.15.0/drivers/media/firewire/firedtv-fw.c
@@ -271,6 +271,10 @@
void avc_remote_ctrl_work(struct work_struct *work);
int avc_register_remote_control(struct firedtv *fdtv);
-int avc_ca_app_info(struct firedtv *fdtv, char *app_info, unsigned int *len);
-int avc_ca_info(struct firedtv *fdtv, char *app_info, unsigned int *len);
+int avc_ca_app_info(struct firedtv *fdtv, unsigned char *app_info,
+    unsigned int *len);
+int avc_ca_info(struct firedtv *fdtv, unsigned char *app_info,
+ undeclared
int avc_ca_reset(struct firedtv *fdtv);
int avc_ca_pmt(struct firedtv *fdtv, char *app_info, int length);
int avc_ca_get_time_date(struct firedtv *fdtv, int *interval);

tristate "Sony IMX274 sensor support"
depends on I2C && VIDEO_V4L2 && VIDEO_V4L2_SUBDEV_API
depends on MEDIA_CAMERA_SUPPORT
+select REGMAP_I2C
---help---
This is a V4L2 sensor-level driver for the Sony IMX274
CMOS image sensor.
--- linux-4.15.0.orig/drivers/media/i2c/Makefile
+++ linux-4.15.0/drivers/media/i2c/Makefile
@@ -33,7 +33,7 @@
 obj-$(CONFIG_VIDEO_ADV7604) += adv7604.o
 obj-$(CONFIG_VIDEO_ADV7842) += adv7842.o
 obj-$(CONFIG_VIDEO_ADM9389B) += ad9389b.o
-obj-$(CONFIG_VIDEO_ADV7511) += adv7511.o
+obj-$(CONFIG_VIDEO_ADV7511) += adv7511-v4l2.o
 obj-$(CONFIG_VIDEO_VPX3220) += vpx3220.o
 obj-$(CONFIG_VIDEO_VS6624) += vs6624.o
 obj-$(CONFIG_VIDEO_BT819) += bt819.o
--- linux-4.15.0.orig/drivers/media/i2c/adv748x/adv748x-core.c
+++ linux-4.15.0/drivers/media/i2c/adv748x/adv748x-core.c
@@ -642,7 +642,8 @@
 .type = V4L2_DV_BT_656_1120,
 /* keep this initialization for compatibility with GCC < 4.4.6 */
 .reserved = { 0 },
-V4L2_INIT_BT_TIMINGS(0, 1920, 0, 1200, 25000000, 170000000,
+V4L2_INIT_BT_TIMINGS(640, 1920, 350, 1200, 25000000, 170000000,
 V4L2_DV_BT_STD_CEA861 | V4L2_DV_BT_STD_DMT |
 V4L2_DV_BT_STD_GTF | V4L2_DV_BT_STD_CVT,
 V4L2_DV_BT_CAP_PROGRESSIVE | V4L2_DV_BT_CAP_REduced_BLANKING |
--- linux-4.15.0.orig/drivers/media/i2c/adv748x/ad748x-core.c
+++ linux-4.15.0/drivers/media/i2c/adv748x/ad748x-core.c
@@ -642,8 +642,8 @@
struct device_node *ep_np = NULL;
struct of_endpoint ep;

bool found = false;
bool out_found = false;
bool in_found = false;

for_each_endpoint_of_node(state->dev->of_node, ep_np) {
    of_graph_parse_endpoint(ep_np, &ep);
    of_node_get(ep_np);
    state->endpoints[ep.port] = ep_np;

    found = true;
/+*
+ * At least one input endpoint and one output endpoint shall
+ * be defined.
+ */
+if (ep.port < ADV748X_PORT_TXA)
+in_found = true;
+else
+out_found = true;
}

-return found ? 0 : -ENODEV;
+return in_found && out_found ? 0 : -ENODEV;
}

static void adv748x_dt_cleanup(struct adv748x_state *state)
@@ -702,6 +710,17 @@
    state->i2c_clients[ADV748X_PAGE_IO] = client;
    i2c_set_clientdata(client, state);

/+*
+ * We can not use container_of to get back to the state with two TXs;
+ * Initialize the TXs's fields unconditionally on the endpoint
+ * presence to access them later.
+ */
+state->txa.state = state->txb.state = state;
+state->txa.page = ADV748X_PAGE_TXA;
+state->txb.page = ADV748X_PAGE_TXB;
+state->txa.port = ADV748X_PORT_TXA;
+state->txb.port = ADV748X_PORT_TXB;
+
/* Discover and process ports declared by the Device tree endpoints */
ret = adv748x_parse_dt(state);
if (ret) {
--- linux-4.15.0.org/drivers/media/i2c/adv748x/adv748x-csi2.c
int adv748x_csi2_init(struct adv748x_state *state, struct adv748x_csi2 *tx) {
    struct device_node *ep;
    int ret;

    /* We can not use container_of to get back to the state with two TXs */
    tx->state = state;
    tx->page = is_txa(tx) ? ADV748X_PAGE_TXA : ADV748X_PAGE_TXB;
    ep = state->endpoints[is_txa(tx) ? ADV748X_PORT_TXA : ADV748X_PORT_TXB];
    if (!ep) {
        adv_err(state, "No endpoint found for %s\n",
                is_txa(tx) ? "txa" : "txb");
        return -ENODEV;
    }
    if (!is_tx_enabled(tx))
        return 0;

    /* Initialise the virtual channel */
    adv748x_csi2_set_virtual_channel(tx, 0);
    if (is_txa(tx) ? "txa" : "txb");

    /* Ensure that matching is based upon the endpoint fwnodes */
    tx->sd.fwnode = of_fwnode_handle(ep);
    tx->sd.fwnode = of_fwnode_handle(state->endpoints[tx->port]);

    /* Register internal ops for incremental subdev registration */
    tx->sd.internal_ops = &adv748x_csi2_internal_ops;

    void adv748x_csi2_cleanup(struct adv748x_csi2 *tx) {
        if (!is_tx_enabled(tx))
            return;
        v4l2_async_unregister_subdev(&tx->sd);
        media_entity_cleanup(&tx->sd.entity);
        v4l2_ctrl_handler_free(&tx->ctrl_hdl);
        return;
    }

    fmt->width = hdmi->timings.bt.width;
    fmt->height = hdmi->timings.bt.height;
+if (fmt->field == V4L2_FIELD_ALTERNATE)
+fmt->height /= 2;
}

static void adv748x_fill_optional_dv_timings(struct v4l2_dv_timings *timings)
--- linux-4.15.0.orig/drivers/media/i2c/adv748x/adv748x.h
+++ linux-4.15.0/drivers/media/i2c/adv748x/adv748x.h
@@ -94,6 +94,7 @@
 struct adv748x_state *state;
 struct v4l2_mbus_framefmt format;
 unsigned int page;
+unsigned int port;

 struct media_pad pads[ADV748X_CSI2_NR_PADS];
 struct v4l2_ctrl_handler ctrl_hdl;
@@ -102,6 +103,7 @@
 #define notifier_to_csi2(n) container_of(n, struct adv748x_csi2, notifier)
 #define adv748x_sd_to_csi2(sd) container_of(sd, struct adv748x_csi2, sd)
 +#define is_tx_enabled(_tx) ((_tx)->state->endpoints[(_tx)->port] != NULL)

 enum adv748x_hdmi_pads {
 ADV748X_HDMI_SINK,
@@ -370,10 +372,10 @@
 #define io_read(s, r) adv748x_read(s, ADV748X_PAGE_IO, r)
 #define io_write(s, r, v) adv748x_write(s, ADV748X_PAGE_IO, r, v)
 -#define io_clrset(s, r, m, v) io_write(s, r, (io_read(s, r) & ~m) | v)
+  #define io_clrset(s, r, m, v) io_write(s, r, (io_read(s, r) & ~(m)) | (v))

 #define hdmi_read(s, r) adv748x_read(s, ADV748X_PAGE_HDMI, r)
 -#define hdmi_read16(s, r, m) (((hdmi_read(s, r) << 8) | hdmi_read(s, r+1)) & m)
+  #define hdmi_read16(s, r, m) (((hdmi_read(s, r) << 8) | hdmi_read(s, (r)+1)) & (m))
 #define hdmi_write(s, r, v) adv748x_write(s, ADV748X_PAGE_HDMI, r, v)

 #define repeater_read(s, r) adv748x_read(s, ADV748X_PAGE_REPEATER, r)
@@ -381,11 +383,11 @@
 #define sdp_read(s, r) adv748x_read(s, ADV748X_PAGE_SDP, r)
 #define sdp_write(s, r, v) adv748x_write(s, ADV748X_PAGE_SDP, r, v)
 -#define sdp_clrset(s, r, m, v) sdp_write(s, r, (sdp_read(s, r) & ~m) | v)
+  #define sdp_clrset(s, r, m, v) sdp_write(s, r, (sdp_read(s, r) & ~(m)) | (v))

 #define cp_read(s, r) adv748x_read(s, ADV748X_PAGE_CP, r)
 #define cp_write(s, r, v) adv748x_write(s, ADV748X_PAGE_CP, r, v)
 -#define cp_clrset(s, r, m, v) cp_write(s, r, (cp_read(s, r) & ~m) | v)
+  #define cp_clrset(s, r, m, v) cp_write(s, r, (cp_read(s, r) & ~(m)) | (v))
/* Analog Devices ADV7511 HDMI Transmitter Device Driver
 *
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 *
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 */

/* This file is named adv7511-v4l2.c so it doesn't conflict with the Analog
 * Device ADV7511 (config fragment CONFIG_DRM_I2C_ADV7511).
 */

#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/slab.h>
#include <linux/i2c.h>
#include <linux/delay.h>
#include <linux/videodev2.h>
#include <linux/gpio.h>
#include <linux/workqueue.h>
#include <linux/hdmi.h>
#include <linux/v4l2-dv-timings.h>
#include <media/v4l2-device.h>
#include <media/v4l2-common.h>
#include <media/v4l2-ctrls.h>
#include <media/v4l2-dv-timings.h>
#include <media/i2c/adv7511.h>
#include <media/cec.h>

#define txa_read(s, r) adv748x_read(s, ADV748X_PAGE_TXA, r)
#define txb_read(s, r) adv748x_read(s, ADV748X_PAGE_TXB, r)
+static int debug;
+module_param(debug, int, 0644);
+MODULE_PARM_DESC(debug, "debug level (0-2)");
+
+#define MASK_ADV7511_EDID_RDY_INT   0x04
+#define MASK_ADV7511_MSEN_INT       0x40
+#define MASK_ADV7511_HPD_INT        0x80
+
+#define MASK_ADV7511_HPD_DETECT     0x40
+#define MASK_ADV7511_MSEN_DETECT    0x20
+#define MASK_ADV7511_EDID_RDY       0x10
+
+#define EDID_MAX_RETRIES (8)
+#define EDID_DELAY 250
+#define EDID_MAX_SEGM 8
+
+#define ADV7511_MAX_WIDTH 1920
+#define ADV7511_MAX_HEIGHT 1200
+#define ADV7511_MIN_PIXELCLOCK 20000000
+#define ADV7511_MAX_PIXELCLOCK 225000000
+
+#define ADV7511_MAX_ADDRS (3)
+
+/*
+ **********************************************************************
+ *  Arrays with configuration parameters for the ADV7511
+ **********************************************************************
+ */
+
+struct i2c_reg_value {
+  unsigned char reg;
+  unsigned char value;
+};

+struct adv7511_state_edid {
+  /* total number of blocks */
+  u32 blocks;
+  /* Number of segments read */
+  u32 segments;
+  u8 data[EDID_MAX_SEGM * 256];
+  /* Number of EDID read retries left */
+  unsigned read_retries;
+bool complete;
+
+};
+
+struct adv7511_state {
+struct adv7511_platform_data pdata;
+struct v4l2_subdev sd;
+struct media_pad pad;
+struct v4l2_ctrl_handler hdl;
+int chip_revision;
+u8 i2c_edid_addr;
+u8 i2c_pktmem_addr;
+u8 i2c_cec_addr;
+
+struct i2c_client *i2c_cec;
+struct cec_adapter *cec_adap;
+u8  cec_addr[ADV7511_MAX_ADDRS];
+u8  cec_valid_addrs;
+bool cec_enabled_adap;
+
+/* Is the adv7511 powered on? */
+bool power_on;
+
+/* Did we receive hotplug and rx-sense signals? */
+bool have_monitor;
+bool enabled_irq;
+
+/* timings from s_dv_timings */
+struct v4l2_dv_timings dv_timings;
+u32 fmt_code;
+u32 colorspace;
+u32 ycbcr_enc;
+u32 quantization;
+u32 xfer_func;
+u32 content_type;
+
+/* controls */
+struct v4l2_ctrl *hdmi_mode_ctrl;
+struct v4l2_ctrl *hotplug_ctrl;
+struct v4l2_ctrl *rx_sense_ctrl;
+struct v4l2_ctrl *have_edid0_ctrl;
+struct v4l2_ctrl *rgb_quantization_range_ctrl;
+struct v4l2_ctrl *content_type_ctrl;
+struct i2c_client *i2c_edid;
+struct i2c_client *i2c_pktmem;
+struct adv7511_state_edid edid;
+
+/* Running counter of the number of detected EDIDs (for debugging) */
+unsigned edid_detect_counter;
+
+struct workqueue_struct *work_queue;
+struct delayed_work edid_handler; /* work entry */
+};
+
static void adv7511_check_monitor_present_status(struct v4l2_subdev *sd);
static bool adv7511_check_edid_status(struct v4l2_subdev *sd);
static void adv7511_setup(struct v4l2_subdev *sd);
static int adv7511_s_i2s_clock_freq(struct v4l2_subdev *sd, u32 freq);
static int adv7511_s_clock_freq(struct v4l2_subdev *sd, u32 freq);

static const struct v4l2_dv_timings_cap adv7511_timings_cap = {
.type = V4L2_DV_BT_656_1120,
/* keep this initialization for compatibility with GCC < 4.4.6 */
.reserved = { 0 },
V4L2_INIT_BT_TIMINGS(640, ADV7511_MAX_WIDTH, 350, ADV7511_MAX_HEIGHT,
ADV7511_MIN_PIXELCLOCK, ADV7511_MAX_PIXELCLOCK,
V4L2_DV_BT_STD_CEA861 | V4L2_DV_BT_STD_DMT | V4L2_DV_BT_STD_GTF | V4L2_DV_BT_STD_CVT,
V4L2_DV_BT_CAP_PROGRESSIVE | V4L2_DV_BT_CAP_RECED_BLANKING | V4L2_DV_BT_CAP_CUSTOM)
};

static inline struct adv7511_state *get_adv7511_state(struct v4l2_subdev *sd)
{
	return container_of(sd, struct adv7511_state, sd);
}

static inline struct v4l2_subdev *to_sd(struct v4l2_ctrl *ctrl)
{
	return &container_of(ctrl->handler, struct adv7511_state, hdl)->sd;
}

/* ------------------------ I2C ----------------------------------------------- */

static s32 adv_smbus_read_byte_data_check(struct i2c_client *client,
	u8 command, bool check)
{
union i2c_smbus_data data;

if (!i2c_smbus_xfer(client->adapter, client->addr, client->flags,
	I2C_SMBUS_READ, command,
	I2C_SMBUS_BYTE_DATA, &data))
return data.byte;
if (check)
v4l_err(client, "error reading %02x, %02x\n",
client->addr, command);
return -1;
}

static s32 adv_smbus_read_byte_data(struct i2c_client *client, u8 command)
{...
+int i;
+for (i = 0; i < 3; i++) {
+int ret = adv_smbus_read_byte_data_check(client, command, true);
+if (ret >= 0) {
+if (i)
+v4l_err(client, "read ok after %d retries\n", i);
+return ret;
+}
+}
+v4l_err(client, "read failed\n");
+return -1;
+}
+
+static int adv7511_rd(struct v4l2_subdev *sd, u8 reg)
+{
+struct i2c_client *client = v4l2_get_subdevdata(sd);
+
+return adv_smbus_read_byte_data(client, reg);
+}
+
+static int adv7511_wr(struct v4l2_subdev *sd, u8 reg, u8 val)
+{
+struct i2c_client *client = v4l2_get_subdevdata(sd);
+int ret;
+int i;
+
+for (i = 0; i < 3; i++) {
+ret = i2c_smbus_write_byte_data(client, reg, val);
+if (ret == 0)
+return 0;
+}
+v4l2_err(sd, "%s: i2c write error\n", __func__);
+return ret;
+}
+
+/* To set specific bits in the register, a clear-mask is given (to be AND-ed),
+ and then the value-mask (to be OR-ed). */
+static inline void adv7511_wr_and_or(struct v4l2_subdev *sd, u8 reg, u8 clr_mask, u8 val_mask)
+{
+adv7511_wr(sd, reg, (adv7511_rd(sd, reg) & clr_mask) | val_mask);
+}
+
+static int adv_smbus_read_i2c_block_data(struct i2c_client *client,
+u8 command, unsigned length, u8 *values)
+{
+union i2c_smbus_data data;
+int ret;
+
+if (length > I2C_SMBUS_BLOCK_MAX)
+    length = I2C_SMBUS_BLOCK_MAX;
+data.block[0] = length;
+
+ret = i2c_smbus_xfer(client->adapter, client->addr, client->flags,
+    I2C_SMBUS_READ, command,
+    I2C_SMBUS_I2C_BLOCK_DATA, &data);
+memcpy(values, data.block + 1, length);
+return ret;
+
+
+static void adv7511_edid_rd(struct v4l2_subdev *sd, uint16_t len, uint8_t *buf)
+{
+    struct adv7511_state *state = get_adv7511_state(sd);
+    int i;
+    int err = 0;
+    
+    v4l2_dbg(1, debug, sd, "%s:
", __func__);
+    
+    for (i = 0; !err && i < len; i += I2C_SMBUS_BLOCK_MAX)
+        err = adv_smbus_read_i2c_block_data(state->i2c_edid, i,
+            I2C_SMBUS_BLOCK_MAX, buf + i);
+    if (err)
+        v4l2_err(sd, "%s: i2c read error
", __func__);
+}
+
+static inline int adv7511_cec_read(struct v4l2_subdev *sd, u8 reg)
+{
+    struct adv7511_state *state = get_adv7511_state(sd);
+    return i2c_smbus_read_byte_data(state->i2c_cec, reg);
+}
+
+static int adv7511_cec_write(struct v4l2_subdev *sd, u8 reg, u8 val)
+{
+    struct adv7511_state *state = get_adv7511_state(sd);
+    int ret;
+    int i;
+    
+    for (i = 0; i < 3; i++) {
+        ret = i2c_smbus_write_byte_data(state->i2c_cec, reg, val);
+        if (ret == 0)
+            return 0;
+    }
+    v4l2_err(sd, "%s: I2C Write Problem\n", __func__);
+    return ret;
+}
+static inline int adv7511_cec_write_and_or(struct v4l2_subdev *sd, u8 reg, u8 mask,
+    u8 val)
+{
+    return adv7511_cec_write(sd, reg, (adv7511_cec_read(sd, reg) & mask) | val);
+}
+
+static int adv7511_pktmem_rd(struct v4l2_subdev *sd, u8 reg)
+{
+    struct adv7511_state *state = get_adv7511_state(sd);
+    return adv_smbus_read_byte_data(state->i2c_pktmem, reg);
+}
+
+static int adv7511_pktmem_wr(struct v4l2_subdev *sd, u8 reg, u8 val)
+{
+    struct adv7511_state *state = get_adv7511_state(sd);
+    int ret;
+    int i;
+    for (i = 0; i < 3; i++) {
+        ret = i2c_smbus_write_byte_data(state->i2c_pktmem, reg, val);
+        if (ret == 0)
+            return 0;
+    }
+    v4l2_err(sd, "\%s: i2c write error\n", __func__);
+    return ret;
+}
+
+/* To set specific bits in the register, a clear-mask is given (to be AND-ed),
+ and then the value-mask (to be OR-ed). */
+static inline void adv7511_pktmem_wr_and_or(struct v4l2_subdev *sd, u8 reg, u8 clr_mask, u8 val_mask)
+{
+    adv7511_pktmem_wr(sd, reg, (adv7511_pktmem_rd(sd, reg) & clr_mask) | val_mask);
+}
+
+static inline bool adv7511_have_hotplug(struct v4l2_subdev *sd)
+{
+    return adv7511_rd(sd, 0x42) & MASK_ADV7511_HPD_DETECT;
+}
+
+static inline bool adv7511_have_rx_sense(struct v4l2_subdev *sd)
+{
+    return adv7511_rd(sd, 0x42) & MASK_ADV7511_MSEN_DETECT;
+}
+
+static void adv7511_csc_conversion_mode(struct v4l2_subdev *sd, u8 mode)
+{
+    adv7511_wr_and_or(sd, 0x18, 0x9f, (mode & 0x3)<<5);
+}
```c
static void adv7511_csc_coeff(struct v4l2_subdev *sd,
    u16 A1, u16 A2, u16 A3, u16 A4,
    u16 B1, u16 B2, u16 B3, u16 B4,
    u16 C1, u16 C2, u16 C3, u16 C4)
{
    /* A */
    adv7511_wr_and_or(sd, 0x18, 0xe0, A1>>8);
    adv7511_wr(sd, 0x19, A1);
    adv7511_wr_and_or(sd, 0x1A, 0xe0, A2>>8);
    adv7511_wr(sd, 0x1B, A2);
    adv7511_wr_and_or(sd, 0x1c, 0xe0, A3>>8);
    adv7511_wr(sd, 0x1d, A3);
    adv7511_wr_and_or(sd, 0x1e, 0xe0, A4>>8);
    adv7511_wr(sd, 0x1f, A4);

    /* B */
    adv7511_wr_and_or(sd, 0x20, 0xe0, B1>>8);
    adv7511_wr(sd, 0x21, B1);
    adv7511_wr_and_or(sd, 0x22, 0xe0, B2>>8);
    adv7511_wr(sd, 0x23, B2);
    adv7511_wr_and_or(sd, 0x24, 0xe0, B3>>8);
    adv7511_wr(sd, 0x25, B3);
    adv7511_wr_and_or(sd, 0x26, 0xe0, B4>>8);
    adv7511_wr(sd, 0x27, B4);

    /* C */
    adv7511_wr_and_or(sd, 0x28, 0xe0, C1>>8);
    adv7511_wr(sd, 0x29, C1);
    adv7511_wr_and_or(sd, 0x2A, 0xe0, C2>>8);
    adv7511_wr(sd, 0x2B, C2);
    adv7511_wr_and_or(sd, 0x2C, 0xe0, C3>>8);
    adv7511_wr(sd, 0x2D, C3);
    adv7511_wr_and_or(sd, 0x2E, 0xe0, C4>>8);
    adv7511_wr(sd, 0x2F, C4);
}

static void adv7511_csc_rgb_full2limit(struct v4l2_subdev *sd, bool enable)
{
    if (enable) {
        u8 csc_mode = 0;
        adv7511_csc_conversion_mode(sd, csc_mode);
        adv7511_csc_coeff(sd,
            4096-564, 0, 0, 256,
            0, 4096-564, 0, 256,
            0, 0, 4096-564, 256);
        /* enable CSC */
    }
}
```
adv7511_wr_and_or(sd, 0x18, 0x7f, 0x80);
+/* AVI infoframe: Limited range RGB (16-235) */
adv7511_wr_and_or(sd, 0x57, 0xf3, 0x04);
} else {
+/* disable CSC */
adv7511_wr_and_or(sd, 0x18, 0x7f, 0x0);
+/* AVI infoframe: Full range RGB (0-255) */
adv7511_wr_and_or(sd, 0x57, 0xf3, 0x08);
} 
+
static void adv7511_set_rgb_quantization_mode(struct v4l2_subdev *sd, struct v4l2_ctrl *ctrl)
+
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+/* Only makes sense for RGB formats */
+if (state->fmt_code != MEDIA_BUS_FMT_RGB888_1X24) {
+/* so just keep quantization */
+adv7511_csc_rgb_full2limit(sd, false);
+return;
+
+switch (ctrl->val) {
+case V4L2_DV_RGB_RANGE_AUTO:
+/* automatic */
+if (state->dv_timings.bt.flags & V4L2_DV_FL_IS_CE_VIDEO) {
+/* CE format, RGB limited range (16-235) */
+adv7511_csc_rgb_full2limit(sd, true);
+} else {
+/* not CE format, RGB full range (0-255) */
+adv7511_csc_rgb_full2limit(sd, false);
+}
+break;
+case V4L2_DV_RGB_RANGE_LIMITED:
+/* RGB limited range (16-235) */
+adv7511_csc_rgb_full2limit(sd, true);
+break;
+case V4L2_DV_RGB_RANGE_FULL:
+/* RGB full range (0-255) */
+adv7511_csc_rgb_full2limit(sd, false);
+break;
+}
+}
+
+/* ------------------------------ CTRL OPS ------------------------------ */
+
+static int adv7511_s_ctrl(struct v4l2_ctrl *ctrl)
+struct v4l2_subdev *sd = to_sd(ctrl);
+struct adv7511_state *state = get_adv7511_state(sd);
+
+v4l2_dbg(1, debug, sd, "%s: ctrl id: %d, ctrl->val %d\n", __func__, ctrl->id, ctrl->val);
+
+if (state->hdmi_mode_ctrl == ctrl) {
+    /* Set HDMI or DVI-D */
+adv7511_wr_and_or(sd, 0xaf, 0xfd, ctrl->val == V4L2_DV_TX_MODE_HDMI ? 0x02 : 0x00);
+    return 0;
+}
+if (state->rgb_quantization_range_ctrl == ctrl) {
+adv7511_set_rgb_quantization_mode(sd, ctrl);
+    return 0;
+}
+if (state->content_type_ctrl == ctrl) {
+    u8 itc, cn;
+
+    state->content_type = ctrl->val;
+    itc = state->content_type != V4L2_DV_IT_CONTENT_TYPE_NO_ITC;
+    cn = itc ? state->content_type : V4L2_DV_IT_CONTENT_TYPE_GRAPHICS;
+adv7511_wr_and_or(sd, 0x57, 0x7f, itc << 7);
+adv7511_wr_and_or(sd, 0x59, 0xcf, cn << 4);
+    return 0;
+}
+
+return -EINVAL;
+}
+
+static const struct v4l2_ctrl_ops adv7511_ctrl_ops = {
+    .s_ctrl = adv7511_s_ctrl,
+};
+
+/* ---------------------------- CORE OPS ------------------------------------------- */
+
+#ifdef CONFIG_VIDEO_ADV_DEBUG
+static void adv7511_inv_register(struct v4l2_subdev *sd)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+v4l2_info(sd, "0x000-0x0ff: Main Map\n");
+if (state->i2c_cec)
+v4l2_info(sd, "0x100-0x1ff: CEC Map\n");
+}
+
+static int adv7511_g_register(struct v4l2_subdev *sd, struct v4l2_dbg_register *reg)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+reg->size = 1;
+switch (reg->reg >> 8) {
+case 0:
+reg->val = adv7511_rd(sd, reg->reg & 0xff);
+break;
+case 1:
+if (state->i2c_cec) {
+reg->val = adv7511_cec_read(sd, reg->reg & 0xff);
+break;
+} /* fall through */
+default:
+v4l2_info(sd, "Register %03llx not supported\n", reg->reg);
+adv7511_inv_register(sd);
+break;
+} /* fall through */
+}
+return 0;
+
+static int adv7511_s_register(struct v4l2_subdev *sd, const struct v4l2_dbg_register *reg)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+switch (reg->reg >> 8) {
+case 0:
+adv7511_wr(sd, reg->reg & 0xff, reg->val & 0xff);
+break;
+case 1:
+if (state->i2c_cec) {
+adv7511_cec_write(sd, reg->reg & 0xff, reg->val & 0xff);
+break;
+} /* fall through */
+default:
+v4l2_info(sd, "Register %03llx not supported\n", reg->reg);
+adv7511_inv_register(sd);
+break;
+} /* fall through */
+return 0;
+
+struct adv7511_cfg_read_infoframe {
+const char *desc;
+u8 present_reg;
+u8 present_mask;
+u8 header[3];
+u16 payload_addr;
static u8 hdmi_infoframe_checksum(u8 *ptr, size_t size)
{
    u8 csum = 0;
    size_t i;
    /* compute checksum */
    for (i = 0; i < size; i++)
        csum += ptr[i];
    return 256 - csum;
}

static void log_infoframe(struct v4l2_subdev *sd, const struct adv7511_cfg_read_infoframe *cri)
{
    struct i2c_client *client = v4l2_get_subdevdata(sd);
    struct device *dev = &client->dev;
    union hdmi_infoframe frame;
    u8 buffer[32];
    u8 len;
    int i;

    if (!(adv7511_rd(sd, cri->present_reg) & cri->present_mask)) {
        v4l2_info(sd, "%s infoframe not transmitted\n", cri->desc);
        return;
    }

    memcpy(buffer, cri->header, sizeof(cri->header));
    len = buffer[2];

    if (len + 4 > sizeof(buffer)) {
        v4l2_err(sd, "%s: invalid %s infoframe length %d\n", __func__, cri->desc, len);
        return;
    }

    if (cri->payload_addr >= 0x100) {
        for (i = 0; i < len; i++)
            buffer[i + 4] = adv7511_pktmem_rd(sd, cri->payload_addr + i - 0x100);
    } else {
        for (i = 0; i < len; i++)
            buffer[i + 4] = adv7511_rd(sd, cri->payload_addr + i);
    }
    buffer[3] = 0;
    buffer[3] = hdmi_infoframe_checksum(buffer, len + 4);
    if (hdmi_infoframe_unpack(&frame, buffer) < 0) {

+v4l2_err(sd, "%s: unpack of %s infoframe failed\n", __func__, cri->desc);
+return;
+
+hdmi_infoframe_log(KERN_INFO, dev, &frame);
+
+static void adv7511_log_infoframes(struct v4l2_subdev *sd)
+
+static const struct adv7511_cfg_read_infoframe cri[] = {
+{ "AVI", 0x44, 0x10, { 0x82, 2, 13 }, 0x55 },
+{ "Audio", 0x44, 0x08, { 0x84, 1, 10 }, 0x73 },
+{ "SDP", 0x40, 0x40, { 0x83, 1, 25 }, 0x103 },
+};
+int i;
+
+for (i = 0; i < ARRAY_SIZE(cri); i++)
+log_infoframe(sd, &cri[i]);
+
+static int adv7511_log_status(struct v4l2_subdev *sd)
+
+struct adv7511_state *state = get_adv7511_state(sd);
+struct adv7511_state_edid *edid = &state->edid;
+int i;
+
+static const char * const states[] = {
+"in reset",
+"reading EDID",
+"idle",
+"initializing HDCP",
+"HDCP enabled",
+"initializing HDCP repeater",
+"6", "7", "8", "9", "A", "B", "C", "D", "E", "F"
+};
+static const char * const errors[] = {
+"no error",
+"bad receiver BKSV",
+"Ri mismatch",
+"Pj mismatch",
+"i2c error",
+"timed out",
+"max repeater cascade exceeded",
+"hash check failed",
+"too many devices",
+"9", "A", "B", "C", "D", "E", "F"
+};
+};
```c
+v4l2_info(sd, "power %s\n", state->power_on ? "on" : "off");
+v4l2_info(sd, "%s hotplug, %s Rx Sense, %s EDID (%d block(s))\n",
  + (adv7511_rd(sd, 0x42) & MASK_ADV7511_HPD_DETECT) ? "detected" : "no",
  + (adv7511_rd(sd, 0x42) & MASK_ADV7511_MSEN_DETECT) ? "detected" : "no",
  + edid->segments ? "found" : "no",
  + edid->blocks);
+v4l2_info(sd, "%s output %s\n",
  + (adv7511_rd(sd, 0xaf) & 0x02) ?
  + "HDMI" : "DVI-D",
  + (adv7511_rd(sd, 0xa1) & 0x3c) ?
  + "disabled" : "enabled";
+v4l2_info(sd, "state: %s, error: %s, detect count: %u, msk/irq: %02x/%02x\n",
  + states[adv7511_rd(sd, 0xc8) & 0xf],
  + errors[adv7511_rd(sd, 0xc8) >> 4], state->edid_detect_counter,
  + adv7511_rd(sd, 0x94), adv7511_rd(sd, 0x96));
+v4l2_info(sd, "RGB quantization: %s range\n", adv7511_rd(sd, 0x18) & 0x80 ? "limited" : "full");
+if (adv7511_rd(sd, 0xf0) & 0x02) {
  +/* HDMI only */
  +u8 manual_cts = adv7511_rd(sd, 0x0a) & 0x80;
  +u32 N = (adv7511_rd(sd, 0x01) & 0xf) << 16 |
  +adv7511_rd(sd, 0x02) << 8 |
  +adv7511_rd(sd, 0x03);
  +u8 vic_detect = adv7511_rd(sd, 0x3e) >> 2;
  +u8 vic_sent = adv7511_rd(sd, 0x3d) & 0x3f;
  +u32 CTS;
  +
  +if (manual_cts)
    +CTS = (adv7511_rd(sd, 0x07) & 0xf) << 16 |
    +adv7511_rd(sd, 0x08) << 8 |
    +adv7511_rd(sd, 0x09);
  +else
    +CTS = (adv7511_rd(sd, 0x04) & 0xf) << 16 |
    +adv7511_rd(sd, 0x05) << 8 |
    +adv7511_rd(sd, 0x06);
+v4l2_info(sd, "CTS %s mode: N %d, CTS %d\n",
  + manual_cts ? "manual" : "automatic", N, CTS);
+v4l2_info(sd, "VIC: detected %d, sent %d\n",
  + vic_detect, vic_sent);
+adv7511_log_infoframes(sd);
+}
+if (state->dv_timings.type == V4L2_DV_BT_656_1120)
  +v4l2_print_dv_timings(sd->name, "timings: ",
    +&state->dv_timings, false);
+else
  +v4l2_info(sd, "no timings set\n");
+v4l2_info(sd, "i2c edid addr: 0x%x\n", state->i2c_edid_addr);
+
+if (state->i2c_cec == NULL)
```
return 0;
+
  v4l2_info(sd, "i2c cec addr: 0x%x\n", state->i2c_cec_addr);
+
  v4l2_info(sd, "CEC: %s\n", state->cec_enabled_adap ?
  "enabled" : "disabled");
+if (state->cec_enabled_adap) {
  for (i = 0; i < ADV7511_MAX_ADDRS; i++) {
    bool is_valid = state->cec_valid_addrs & (1 << i);
    +
    +if (is_valid)
    +  v4l2_info(sd, "CEC Logical Address: 0x%x\n", state->cec_addr[i]);
    +}
  +}
  v4l2_info(sd, "i2c pktmem addr: 0x%x\n", state->i2c_pktmem_addr);
+return 0;
+
+ /* Power up/down adv7511 */
+static int adv7511_s_power(struct v4l2_subdev *sd, int on)
+
+{  
+  struct adv7511_state *state = get_adv7511_state(sd);
+  const int retries = 20;
+  int i;
+  +
+  +v4l2_dbg(1, debug, sd, "%s: power %s\n", __func__, on ? "on" : "off");
+  +
+  +state->power_on = on;
+  +
+  +if (!on) {
+    /* Power down */
+    adv7511_wr_and_or(sd, 0x41, 0xbf, 0x40);
+    return true;
+  +}
+  +
+  +/* Power up */
+  +/* The adv7511 does not always come up immediately.
+   * Retry multiple times. */
+  +for (i = 0; i < retries; i++) {
+    adv7511_wr_and_or(sd, 0x41, 0xbf, 0x0);
+    if ((adv7511_rd(sd, 0x41) & 0x40) == 0)
+      break;
+    adv7511_wr_and_or(sd, 0x41, 0xbf, 0x40);
+    msleep(10);
+  +}
+  +
+  +if (i == retries) {
+    v4l2_dbg(1, debug, sd, "%s: failed to powerup the adv7511!\n", __func__);
+adv7511_s_power(sd, 0);
+return false;
+
+if (i > 1)
+v4l2_dbg(1, debug, sd, "%s: needed %d retries to powerup the adv7511\n", __func__, i);
+
+/* Reserved registers that must be set */
+adv7511_wr(sd, 0x98, 0x03);
+adv7511_wr_and_or(sd, 0x9a, 0x70);
+adv7511_wr(sd, 0x9c, 0x30);
+adv7511_wr_and_or(sd, 0x9d, 0xfc, 0x01);
+adv7511_wr(sd, 0xa2, 0xa4);
+adv7511_wr(sd, 0xa3, 0xa4);
+adv7511_wr(sd, 0xe0, 0xdf);
+adv7511_wr(sd, 0xf9, 0x00);
+
+adv7511_wr(sd, 0x43, state->i2c_edid_addr);
+adv7511_wr(sd, 0x45, state->i2c_pktmem_addr);
+
+/* Set number of attempts to read the EDID */
+adv7511_wr(sd, 0xc9, 0xf);
+return true;
+
+#if IS_ENABLED(CONFIG_VIDEO_ADV7511_CEC)
+static int adv7511_cec_adap_enable(struct cec_adapter *adap, bool enable)
+{
+struct adv7511_state *state = cec_get_drvdata(adap);
+struct v4l2_subdev *sd = &state->sd;
+
+if (state->i2c_cec == NULL)
+return -EIO;
+
+if (!state->cec_enabled_adap && enable) {
+/* power up cec section */
+adv7511_cec_write_and_or(sd, 0x4e, 0xfc, 0x01);
+/* legacy mode and clear all rx buffers */
+adv7511_cec_write(sd, 0x4a, 0x07);
+adv7511_cec_write(sd, 0x4a, 0);
+adv7511_cec_write_and_or(sd, 0x11, 0xfe, 0); /* initially disable tx */
+/* enabled irqs: */
+/* tx: ready */
+/* tx: arbitration lost */
+/* tx: retry timeout */
+/* rx: ready 1 */
+if (state->enabled_irq)
+adv7511_wr_and_or(sd, 0x95, 0xc0, 0x39);
+}
+else if (state->cec_enabled_adap && !enable) 
+}
if (state->enabled_irq)
			adv7511_wr_and_or(sd, 0x95, 0xc0, 0x00);
		/* disable address mask 1-3 */
+adv7511_cec_write_and_or(sd, 0x4b, 0x8f, 0x00);
+/* power down cec section */
+adv7511_cec_write_and_or(sd, 0x4e, 0xfc, 0x00);
+state->cec_valid_addrs = 0;
+
+state->cec_enabled_adap = enable;
+return 0;
+
+static int adv7511_cec_adap_log_addr(struct cec_adapter *adap, u8 addr)
+{
+    struct adv7511_state *state = cec_get_drvdata(adap);
+    struct v4l2_subdev *sd = &state->sd;
+    unsigned int i, free_idx = ADV7511_MAX_ADDRS;
+    
+    if (!state->cec_enabled_adap)
+        return addr == CEC_LOG_ADDR_INVALID ? 0 : -EIO;
+    
+    if (addr == CEC_LOG_ADDR_INVALID) {
+        adv7511_cec_write_and_or(sd, 0x4b, 0x8f, 0);
+        state->cec_valid_addrs = 0;
+        return 0;
+    }
+    
+    for (i = 0; i < ADV7511_MAX_ADDRS; i++) {
+        bool is_valid = state->cec_valid_addrs & (1 << i);
+        
+        if (free_idx == ADV7511_MAX_ADDRS && !is_valid)
+            free_idx = i;
+        if (is_valid && state->cec_addr[i] == addr)
+            return 0;
+    }
+    
+    if (i == ADV7511_MAX_ADDRS) {
+        i = free_idx;
+    } else if (i == ADV7511_MAX_ADDRS)
+        return -ENXIO;
+    
+    state->cec_addr[i] = addr;
+    state->cec_valid_addrs |= 1 << i;
+    
+    switch (i) {
+    case 0:
+        /* enable address mask 0 */
+        adv7511_cec_write_and_or(sd, 0x4b, 0x8f, 0x00);
+        /* set address for mask 0 */
advc7511_cec_write_and_or(sd, 0x4c, 0xf0, addr);
+break;
+case 1:
+ /* enable address mask 1 */
+ adv7511_cec_write_and_or(sd, 0x4b, 0xdf, 0x20);
+ /* set address for mask 1 */
+ adv7511_cec_write_and_or(sd, 0x4c, 0x0f, addr << 4);
+break;
+case 2:
+ /* enable address mask 2 */
+ adv7511_cec_write_and_or(sd, 0x4b, 0xbf, 0x40);
+ /* set address for mask 1 */
+ adv7511_cec_write_and_or(sd, 0x4d, 0xf0, addr);
+break;
+
+return 0;
+
+static int adv7511_cec_adap_transmit(struct cec_adapter *adap, u8 attempts,
+ u32 signal_free_time, struct cec_msg *msg)
+
+{[
+struct adv7511_state *state = cec_get_drvdata(adap);
+struct v4l2_subdev *sd = &state->sd;
+u8 len = msg->len;
+unsigned int i;
+
+v4l2_dbg(1, debug, sd, "%s: len %d\n", __func__, len);
+
+if (len > 16) {
+v4l2_err(sd, "%s: len exceeded 16 (%d)\n", __func__, len);
+return -EINVAL;
+}
+
+/*
+ * The number of retries is the number of attempts - 1, but retry
+ * at least once. It's not clear if a value of 0 is allowed, so
+ * let's do at least one retry.
+ */
+adv7511_cec_write_and_or(sd, 0x12, ~0x70, max(1, attempts - 1) << 4);
+
+/* blocking, clear cec tx irq status */
+adv7511_wr_and_or(sd, 0x97, 0xc7, 0x38);
+
+/* write data */
+for (i = 0; i < len; i++)
+adv7511_cec_write(sd, i, msg->msg[i]);
+
+/* set length (data + header) */
+adv7511_cec_write(sd, 0x10, len);
+/* start transmit, enable tx */
+adv7511_cec_write(sd, 0x11, 0x01);
+return 0;
+
+static void adv_cec_tx_raw_status(struct v4l2_subdev *sd, u8 tx_raw_status)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+if ((adv7511_cec_read(sd, 0x11) & 0x01) == 0) {
+v4l2_dbg(1, debug, sd, "%s: tx raw: tx disabled\n", __func__);
+return;
+}
+
+if (tx_raw_status & 0x10) {
+v4l2_dbg(1, debug, sd,
+"%s: tx raw: arbitration lost\n", __func__);
+cec_transmit_done(state->cec_adap, CEC_TX_STATUS_ARB_LOST,
+ 1, 0, 0, 0);
+return;
+}
+
+if (tx_raw_status & 0x08) {
+u8 status;
+u8 nack_cnt;
+u8 low_drive_cnt;
+
+v4l2_dbg(1, debug, sd,
+"%s: tx raw: retry failed\n", __func__);
+/*
+ * We set this status bit since this hardware performs
+ * retransmissions.
+ */
+status = CEC_TX_STATUS_MAX_RETRIES;
+nack_cnt = adv7511_cec_read(sd, 0x14) & 0xf;
+if (nack_cnt)
+status |= CEC_TX_STATUS_NACK;
+low_drive_cnt = adv7511_cec_read(sd, 0x14) >> 4;
+if (low_drive_cnt)
+status |= CEC_TX_STATUS_LOW_DRIVE;
+cec_transmit_done(state->cec_adap, status,
+ 0, nack_cnt, low_drive_cnt, 0);
+return;
+}
+
+if (tx_raw_status & 0x20) {
+v4l2_dbg(1, debug, sd,
+"%s: tx raw: ready ok\n", __func__);
+cec_transmit_done(state->cec_adap, CEC_TX_STATUS_OK, 0, 0, 0, 0);
+return;
+}
static const struct cec_adap_ops adv7511_cec_adap_ops = {
+  .adap_enable = adv7511_cec_adap_enable,
+  .adap_log_addr = adv7511_cec_adap_log_addr,
+  .adap_transmit = adv7511_cec_adap_transmit,
+};
+}  
+}  
+/* Enable interrupts */
+static void adv7511_set_isr(struct v4l2_subdev *sd, bool enable)
+
+{  
+  struct adv7511_state *state = get_adv7511_state(sd);
+  u8 irqs = MASK_ADV7511_HPD_INT | MASK_ADV7511_MSEN_INT;
+  u8 irqs_rd;
+  int retries = 100;
+  
+  /* The datasheet says that the EDID ready interrupt should be  
+   * disabled if there is no hotplug. */
+  if (!enable)
+    irqs = 0;
+  else if (adv7511_have_hotplug(sd))
+    irqs |= MASK_ADV7511_EDID_RDY_INT;
+  
+  adv7511_wr_and_or(sd, 0x95, 0xc0,
+    (state->cec_enabled_adap && enable) ? 0x39 : 0x00);
+  
+  /* This i2c write can fail (approx. 1 in 1000 writes). But it
+   * is essential that this register is correct, so retry it
+   * multiple times.
+   *
+   * Note that the i2c write does not report an error, but the readback
+   * clearly shows the wrong value.
+   */
+  do {
+    adv7511_wr(sd, 0x94, irqs);
+    irqs_rd = adv7511_rd(sd, 0x94);
+  } while (retries-- && irqs_rd != irqs);
+  
+  if (irqs_rd == irqs)
+    return;
+v4l2_err(sd, "Could not set interrupts: hw failure?\n");
+
+/* Interrupt handler */
+static int adv7511_isr(struct v4l2_subdev *sd, u32 status, bool *handled)
+{
+u8 irq_status;
+u8 cec_irq;
+
+/* disable interrupts to prevent a race condition */
+adv7511_set_isr(sd, false);
+irq_status = adv7511_rd(sd, 0x96);
+cec_irq = adv7511_rd(sd, 0x97);
+/* clear detected interrupts */
+adv7511_wr(sd, 0x96, irq_status);
+adv7511_wr(sd, 0x97, cec_irq);
+
+v4l2_dbg(1, debug, sd, "%s: irq 0x%x, cec-irq 0x%x\n", __func__,
+  irq_status, cec_irq);
+
+if (irq_status & (MASK_ADV7511_HPD_INT | MASK_ADV7511_MSEN_INT))
+adv7511_check_monitor_present_status(sd);
+if (irq_status & MASK_ADV7511_EDID_RDY_INT)
+adv7511_check_edid_status(sd);
+
+if IS_ENABLED(CONFIG_VIDEO_ADV7511_CEC)
+if (cec_irq & 0x38)
+adv_cec_tx_raw_status(sd, cec_irq);
+
+if (cec_irq & 1) {
+struct adv7511_state *state = get_adv7511_state(sd);
+struct cec_msg msg;
+
+msg.len = adv7511_cec_read(sd, 0x25) & 0x1f;
+
+v4l2_dbg(1, debug, sd, "%s: cec msg len %d\n", __func__,
+  msg.len);
+
+if (msg.len > 16)
+msg.len = 16;
+
+if (msg.len) {
+u8 i;
+
+for (i = 0; i < msg.len; i++)
+msg.msg[i] = adv7511_cec_read(sd, i + 0x15);
+
+adv7511_cec_write(sd, 0x4a, 1); /* toggle to re-enable rx 1 */
+	adv7511_cec_write(sd, 0x4a, 0);
+cec_received_msg(state->cec_adap, &msg);
+
+
+/* enable interrupts */
+adv7511_set_isr(sd, true);
+
+if (handled)
+*handled = true;
+return 0;
+
+static const struct v4l2_subdev_core_ops adv7511_core_ops = {
+  .log_status = adv7511_log_status,
+  #ifdef CONFIG_VIDEO_ADV_DEBUG
+    .g_register = adv7511_g_register,
+    .s_register = adv7511_s_register,
+  #endif
+  .s_power = adv7511_s_power,
+  .interrupt_service_routine = adv7511_isr,
+};
+
+/* --------------------------------- VIDEO OPS --------------------------------- */
+
+/* Enable/disable adv7511 output */
+static int adv7511_s_stream(struct v4l2_subdev *sd, int enable)
+{
+  struct adv7511_state *state = get_adv7511_state(sd);
+
+  v4l2_dbg(1, debug, sd, "%s: %sable\n", __func__, (enable ? "en" : "dis");
+  adv7511_wr_and_or(sd, 0xa1, ~0x3c, (enable ? 0 : 0x3c));
+  if (enable) {
+    adv7511_check_monitor_present_status(sd);
+  } else {
+    adv7511_s_power(sd, 0);
+    state->have_monitor = false;
+  }
+  return 0;
+}
+
+static int adv7511_s_dv_timings(struct v4l2_subdev *sd,
+    struct v4l2_dv_timings *timings)
+{
+  struct adv7511_state *state = get_adv7511_state(sd);
+  struct v4l2_bt_timings *bt = &timings->bt;
+  u32 fps;
+v4l2_dbg(1, debug, sd, "%s:\n", __func__);
+
+/* quick sanity check */
+if (!v4l2_valid_dv_timings(timings, &adv7511_timings_cap, NULL, NULL))
+return -EINVAL;
+
+/* Fill the optional fields .standards and .flags in struct v4l2_dv_timings
+ if the format is one of the CEA or DMT timings. */
+v4l2_find_dv_timings_cap(timings, &adv7511_timings_cap, 0, NULL, NULL);
+
+/* save timings */
+state->dv_timings = *timings;
+
+/* set h/vsync polarities */
+adv7511_wr_and_or(sd, 0x17, 0x9f,
+((bt->polarities & V4L2_DV_VSYNC_POS_POL) ? 0 : 0x40) |
+((bt->polarities & V4L2_DV_HSYNC_POS_POL) ? 0 : 0x20));
+
+fps = (u32)bt->pixelclock / (V4L2_DV_BT_FRAME_WIDTH(bt) * V4L2_DV_BT_FRAME_HEIGHT(bt));
+switch (fps) {
+case 24:
+adv7511_wr_and_or(sd, 0xfb, 0xf9, 1 << 1);
+break;
+case 25:
+adv7511_wr_and_or(sd, 0xfb, 0xf9, 2 << 1);
+break;
+case 30:
+adv7511_wr_and_or(sd, 0xfb, 0xf9, 3 << 1);
+break;
+default:
+adv7511_wr_and_or(sd, 0xfb, 0xf9, 0);
+break;
+
+/* update quantization range based on new dv_timings */
+adv7511_set_rgb_quantization_mode(sd, state->rgb_quantization_range_ctrl);
+
+return 0;
+
+}
+
+static int adv7511_g_dv_timings(struct v4l2_subdev *sd,
+struct v4l2_dv_timings *timings)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+v4l2_dbg(1, debug, sd, "%s:\n", __func__);
if (!timings)
	return -EINVAL;

*timings = state->dv_timings;

return 0;
}

static int adv7511_enum_dv_timings(struct v4l2_subdev *sd,
				   struct v4l2_enum_dv_timings *timings)
{
+if (timings->pad != 0)
+return -EINVAL;

+return v4l2_enum_dv_timings_cap(timings, &adv7511_timings_cap, NULL, NULL);
+
+static int adv7511_dv_timings_cap(struct v4l2_subdev *sd,
+    struct v4l2_dv_timings_cap *cap)
+{
+if (cap->pad != 0)
+return -EINVAL;

+*cap = adv7511_timings_cap;
+return 0;
+
+static const struct v4l2_subdev_video_ops adv7511_video_ops = {
+    .s_stream = adv7511_s_stream,
+    .s_dv_timings = adv7511_s_dv_timings,
+    .g_dv_timings = adv7511_g_dv_timings,
+};
+
+/* ------------------------------ AUDIO OPS ------------------------------ */
+static int adv7511_s_audio_stream(struct v4l2_subdev *sd, int enable)
+{
+v4l2_dbg(1, debug, sd, "%s: %sable\n", __func__, (enable ? "en" : "dis"));
+
+if (enable)
+adv7511_wr_and_or(sd, 0x4b, 0x3f, 0x80);
+else
+adv7511_wr_and_or(sd, 0x4b, 0x3f, 0x40);
+
+return 0;
+
+static int adv7511_s_clock_freq(struct v4l2_subdev *sd, u32 freq)
+{
+u32 N;
+
+switch (freq) {
+case 32000:  N = 4096;  break;
+case 44100:  N = 6272;  break;
+case 48000:  N = 6144;  break;
+case 88200:  N = 12544; break;
+case 96000:  N = 12288; break;
+case 176400: N = 25088; break;
+case 192000: N = 24576; break;
+default:
+return -EINVAL;
+}
+
+/* Set N (used with CTS to regenerate the audio clock) */
+adv7511_wr(sd, 0x01, (N >> 16) & 0xf);
+adv7511_wr(sd, 0x02, (N >> 8) & 0xff);
+adv7511_wr(sd, 0x03, N & 0xff);
+
+return 0;
+}
+
+static int adv7511_s_i2s_clock_freq(struct v4l2_subdev *sd, u32 freq)
+{
+u32 i2s_sf;
+
+switch (freq) {
+case 32000:  i2s_sf = 0x30; break;
+case 44100:  i2s_sf = 0x00; break;
+case 48000:  i2s_sf = 0x20; break;
+case 88200:  i2s_sf = 0x80; break;
+case 96000:  i2s_sf = 0xa0; break;
+case 176400: i2s_sf = 0xc0; break;
+case 192000: i2s_sf = 0xe0; break;
+default:
+return -EINVAL;
+}
+
+/* Set sampling frequency for I2S audio to 48 kHz */
+adv7511_wr_and_or(sd, 0x15, 0xf, i2s_sf);
+
+return 0;
+}
+
+static int adv7511_s_routing(struct v4l2_subdev *sd, u32 input, u32 output, u32 config)
+{
+/* Only 2 channels in use for application */
+adv7511_wr_and_or(sd, 0x73, 0xf8, 0x1);
/* Speaker mapping */
+adv7511_wr(sd, 0x76, 0x00);
+
/* 16 bit audio word length */
+adv7511_wr_and_or(sd, 0x14, 0xf0, 0x02);
+
+return 0;
+
+}
+
+static const struct v4l2_subdev_audio_ops adv7511_audio_ops = {
+s_stream = adv7511_s_audio_stream,
+s_clock_freq = adv7511_s_clock_freq,
+s_i2s_clock_freq = adv7511_s_i2s_clock_freq,
+s_routing = adv7511_s_routing,
+};
+
+/* ---------------------------- PAD OPS ------------------------------------- */
+
+static int adv7511_get_edid(struct v4l2_subdev *sd, struct v4l2_edid *edid)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+memset(edid->reserved, 0, sizeof(edid->reserved));
+
+if (edid->pad != 0)
+return -EINVAL;
+
+if (edid->start_block == 0 && edid->blocks == 0) {
+edid->blocks = state->edid.segments * 2;
+return 0;
+}
+
+if (state->edid.segments == 0)
+return -ENODATA;
+
+if (edid->start_block >= state->edid.segments * 2)
+return -EINVAL;
+
+if (edid->start_block + edid->blocks > state->edid.segments * 2)
+edid->blocks = state->edid.segments * 2 - edid->start_block;
+
+memcpy(edid->edid, &state->edid.data[edid->start_block * 128],
+128 * edid->blocks);
+
+return 0;
+}
+
+static int adv7511_enum_mbus_code(struct v4l2_subdev *sd,
struct v4l2_subdev_pad_config *cfg,
struct v4l2_subdev_mbus_code_enum *code)
{
	if (code->pad != 0)
	return -EINVAL;
+
+switch (code->index) {
+case 0:
+code->code = MEDIA_BUS_FMT_RGB888_1X24;
+break;
+case 1:
+code->code = MEDIA_BUS_FMT_YUYV8_1X16;
+break;
+case 2:
+code->code = MEDIA_BUS_FMT_UYVY8_1X16;
+break;
+default:
+return -EINVAL;
+}
+return 0;
+
+static void adv7511_fill_format(struct adv7511_state *state,
+struct v4l2_mbus_framefmt *format)
+{
+format->width = state->dv_timings.bt.width;
+format->height = state->dv_timings.bt.height;
+format->field = V4L2_FIELD_NONE;
+}
+
+static int adv7511_get_fmt(struct v4l2_subdev *sd,
+struct v4l2_subdev_pad_config *cfg,
+struct v4l2_subdev_format *format)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+if (format->pad != 0)
+return -EINVAL;
+
+memset(&format->format, 0, sizeof(format->format));
+adv7511_fill_format(state, &format->format);
+
+if (format->which == V4L2_SUBDEV_FORMAT_TRY) {
+struct v4l2_mbus_framefmt *fmt;
+
+fmt = v4l2_subdev_get_try_format(sd, cfg, format->pad);
+format->format.code = fmt->code;
+format->format.colorspace = fmt->colorspace;
```c
+format->format.ycbcr_enc = fmt->ycbcr_enc;
+format->format.quantization = fmt->quantization;
+format->format.xfer_func = fmt->xfer_func;
+} else {
+format->format.code = state->fmt_code;
+format->format.colorspace = state->colorspace;
+format->format.ycbcr_enc = state->ycbcr_enc;
+format->format.quantization = state->quantization;
+format->format.xfer_func = state->xfer_func;
+}
+
+return 0;
+}
+
+static int adv7511_set_fmt(struct v4l2_subdev *sd,
+    struct v4l2_subdev_pad_config *cfg,
+    struct v4l2_subdev_format *format)
+{
+    struct adv7511_state *state = get_adv7511_state(sd);
+    /*
+     * Bitfield namings come the CEA-861-F standard, table 8 "Auxiliary
+     * Video Information (AVI) InfoFrame Format"
+     *
+     * c = Colorimetry
+     * ec = Extended Colorimetry
+     * y = RGB or YCbCr
+     * q = RGB Quantization Range
+     * yq = YCC Quantization Range
+     */
+   u8 c = HDMI_COLORIMETRY_NONE;
+   u8 ec = HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
+   u8 y = HDMI_COLORSPACE_RGB;
+   u8 q = HDMI_QUANTIZATION_RANGE_DEFAULT;
+   u8 yq = HDMI_YCC_QUANTIZATION_RANGE_LIMITED;
+   u8 itc = state->content_type != V4L2_DV_ITCONTENT_TYPE_NO_ITC;
+   u8 cn = itc ? state->content_type : V4L2_DV_ITCONTENT_TYPE_GRAPHICS;
+
+   if (format->pad != 0)
+     return -EINVAL;
+   switch (format->format.code) {
+   case MEDIA_BUS_FMT_UYVY8_1X16:
+   case MEDIA_BUS_FMT_YUYV8_1X16:
+   case MEDIA_BUS_FMT_RGB888_1X24:
+       break;
+   default:
+     return -EINVAL;
+   }
+   }
+```
+adv7511_fill_format(state, &format->format);
+if (format->which == V4L2_SUBDEV_FORMAT_TRY) {
+struct v4l2_mbus_framefmt *fmt;
+
+fmt = v4l2_subdev_get_try_format(sd, cfg, format->pad);
+fmt->code = format->format.code;
+fmt->colorspace = format->format.colorspace;
+fmt->ycbcr_enc = format->format.ycbcr_enc;
+fmt->quantization = format->format.quantization;
+fmt->xfer_func = format->format.xfer_func;
+return 0;
+}
+
+switch (format->format.code) {
+case MEDIA_BUS_FMT_UYVY8_1X16:
+adv7511_wr_and_or(sd, 0x15, 0xf0, 0x01);
+adv7511_wr_and_or(sd, 0x16, 0x03, 0xb8);
+y = HDMI_COLORSPACE_YUV422;
+break;
+case MEDIA_BUS_FMT_YUYV8_1X16:
+adv7511_wr_and_or(sd, 0x15, 0xf0, 0x01);
+adv7511_wr_and_or(sd, 0x16, 0x03, 0xbc);
+y = HDMI_COLORSPACE_YUV422;
+break;
+case MEDIA_BUS_FMT_RGB888_1X24:
+default:
+adv7511_wr_and_or(sd, 0x15, 0xf0, 0x00);
+adv7511_wr_and_or(sd, 0x16, 0x03, 0x00);
+break;
+}
+
+state->fmt_code = format->format.code;
+state->colorspace = format->format.colorspace;
+state->ycbcr_enc = format->format.ycbcr_enc;
+state->quantization = format->format.quantization;
+state->xfer_func = format->format.xfer_func;
+
+switch (format->format.colorspace) {
+case V4L2_COLORSPACE_OPRGB:
+ce = HDMI_COLORIMETRY_EXTENDED;
+ec = y ? HDMI_EXTENDED_COLORIMETRY_OPYCC_601:
+ HDMI_EXTENDED_COLORIMETRY_OPRGB;
+break;
+case V4L2_COLORSPACE_SMPTE170M:
+ce = y ? HDMI_COLORIMETRY_ITU_601 : HDMI_COLORIMETRY_NONE;
+if (y && format->ycbcr_enc == V4L2_YCBCR_ENC_XV601) {
+ce = HDMI_COLORIMETRY_EXTENDED;
+ec = HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
+}
break;
+case V4L2_COLORSPACE_REC709:
+  c = y ? HDMI_COLORIMETRY_ITU_709 : HDMI_COLORIMETRY_NONE;
+if (y && format->format.ycbcr_enc == V4L2_YCBCR_ENC_XV709) {
+  c = HDMI_COLORIMETRY_EXTENDED;
+  ec = HDMI_EXTENDED_COLORIMETRY_XV_YCC_709;
+}
+break;
+case V4L2_COLORSPACE_SRGB:
+  c = y ? HDMI_COLORIMETRY_EXTENDED : HDMI_COLORIMETRY_NONE;
+  ec = y ? HDMI_EXTENDED_COLORIMETRY_S_YCC_601 : HDMI_EXTENDED_COLORIMETRY_XV_YCC_601;
+break;
+case V4L2_COLORSPACE_BT2020:
+  c = HDMI_COLORIMETRY_EXTENDED;
+if (y && format->format.ycbcr_enc == V4L2_YCBCR_ENC_BT2020_CONST_LUM) {
+  ec = 5; /* Not yet available in hdmi.h */
+  else
+  ec = 6; /* Not yet available in hdmi.h */
+break;
+default:
+break;
+}
+
+/*
+ * CEA-861-F says that for RGB formats the YCC range must match the
+ * RGB range, although sources should ignore the YCC range.
+ *
+ * The RGB quantization range shouldn't be non-zero if the EDID doesn't
+ * have the Q bit set in the Video Capabilities Data Block, however this
+ * isn't checked at the moment. The assumption is that the application
+ * knows the EDID and can detect this.
+ *
+ * The same is true for the YCC quantization range: non-standard YCC
+ * quantization ranges should only be sent if the EDID has the YQ bit
+ * set in the Video Capabilities Data Block.
+ */
+switch (format->format.quantization) {
+case V4L2_QUANTIZATION_FULL_RANGE:
+  q = y ? HDMI_QUANTIZATION_RANGE_DEFAULT : HDMI_QUANTIZATION_RANGE_FULL;
+  yq = q ? q - 1 : HDMI_YCC_QUANTIZATION_RANGE_FULL;
+break;
+case V4L2_QUANTIZATION_LIM_RANGE:
+  q = y ? HDMI_QUANTIZATION_RANGE_DEFAULT : HDMI_QUANTIZATION_RANGE_LIMITED;
+  yq = q ? q - 1 : HDMI_YCC_QUANTIZATION_RANGE_LIMITED;
+break;
+adv7511_wr_and_or(sd, 0x4a, 0xbf, 0);
+adv7511_wr_and_or(sd, 0x55, 0x9f, y << 5);
+adv7511_wr_and_or(sd, 0x56, 0x3f, c << 6);
+adv7511_wr_and_or(sd, 0x57, 0x83, (ec << 4) | (q << 2) | (itc << 7));
+adv7511_wr_and_or(sd, 0x59, 0x0f, (yq << 6) | (cn << 4));
+adv7511_wr_and_or(sd, 0x4a, 0xff, 1);
+adv7511_set_rgb_quantization_mode(sd, state->rgb_quantization_range_ctrl);
+
+return 0;
+
+static const struct v4l2_subdev_pad_ops adv7511_pad_ops = {
+  .get_edid = adv7511_get_edid,
+  .enum_mbus_code = adv7511_enum_mbus_code,
+  .get_fmt = adv7511_get_fmt,
+  .set_fmt = adv7511_set_fmt,
+  .enum_dv_timings = adv7511_enum_dv_timings,
+  .dv_timings_cap = adv7511_dv_timings_cap,
+};
+
+/* --------------------- SUBDEV OPS --------------------------------------- */
+
+static const struct v4l2_subdev_ops adv7511_ops = {
+  .core = &adv7511_core_ops,
+  .pad = &adv7511_pad_ops,
+  .video = &adv7511_video_ops,
+  .audio = &adv7511_audio_ops,
+};
+
+/* ----------------------------------------------------------------------- */
+static void adv7511_dbg_dump_edid(int lvl, int debug, struct v4l2_subdev *sd, int segment, u8 *buf)
{+
+  if (debug >= lvl) {
+    int i, j;
+    v4l2_dbg(lvl, debug, sd, "edid segment %d
", segment);
+    for (i = 0; i < 256; i += 16) {
+      u8 b[128];
+      u8 *bp = b;
+      if (i == 128)
+        v4l2_dbg(lvl, debug, sd, ","");
+      for (j = i; j < i + 16; j++) {
+        sprintf(bp, "0x%02x", buff[j]);
+        bp += 6;
+        }
+        bp[0] = '\0';
+    v4l2_dbg(lvl, debug, sd, "%s\n", b);
+  }
+}
+static void adv7511_notify_no_edid(struct v4l2_subdev *sd)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+struct adv7511_edid_detect ed;
+
+/* We failed to read the EDID, so send an event for this. */
+ed.present = false;
+ed.segment = adv7511_rd(sd, 0xc4);
+ed.phys_addr = CEC_PHYS_ADDR_INVALID;
+cec_s_phys_addr(state->cec_adap, ed.phys_addr, false);
+v4l2_subdev_notify(sd, ADV7511_EDID_DETECT, (void *)&ed);
+v4l2_ctrl_s_ctrl(state->have_edid0_ctrl, 0x0);
+
+
+static void adv7511_edid_handler(struct work_struct *work)
+{
+struct delayed_work *dwork = to_delayed_work(work);
+struct adv7511_state *state = container_of(dwork, struct adv7511_state, edid_handler);
+struct v4l2_subdev *sd = &state->sd;
+
+v4l2_dbg(1, debug, sd, "%s:\n", __func__);
+
+if (adv7511_check_edid_status(sd)) {
+/* Return if we received the EDID. */
+return;
+}
+
+if (adv7511_have_hotplug(sd)) {
+/* We must retry reading the EDID several times, it is possible
+ * that initially the EDID couldn't be read due to i2c errors
+ * (DVI connectors are particularly prone to this problem). */
+if (state->edid_read_retries) {
+state->edid_read_retries--;
+v4l2_dbg(1, debug, sd, "%s: edid read failed\n", __func__);
+state->have_monitor = false;
+adv7511_s_power(sd, false);
+adv7511_s_power(sd, true);
+queue_delayed_work(state->work_queue, &state->edid_handler, EDID_DELAY);
+return;
+}
+}
+
+/* We failed to read the EDID, so send an event for this. */
+adv7511_notify_no_edid(sd);
static void adv7511_audio_setup(struct v4l2_subdev *sd)
{
	v4l2_dbg(1, debug, sd, "%s
", __func__);

	adv7511_s_i2s_clock_freq(sd, 48000);
	adv7511_s_clock_freq(sd, 48000);
	adv7511_s_routing(sd, 0, 0, 0);
}

/* Configure hdmi transmitter. */
static void adv7511_setup(struct v4l2_subdev *sd)
{
	struct adv7511_state *state = get_adv7511_state(sd);
	v4l2_dbg(1, debug, sd, "%s
", __func__);

	/* Input format: RGB 4:4:4 */
	adv7511_wr_and_or(sd, 0x15, 0xf0, 0x0);
	/* Output format: RGB 4:4:4 */
	adv7511_wr_and_or(sd, 0x16, 0x7f, 0x0);
	/* 1st order interpolation 4:2:2 -> 4:4:4 up conversion, Aspect ratio: 16:9 */
	adv7511_wr_and_or(sd, 0x17, 0xf9, 0x06);
	/* Disable pixel repetition */
	adv7511_wr_and_or(sd, 0x3b, 0x9f, 0x0);
	/* Disable CSC */
	adv7511_wr_and_or(sd, 0x18, 0x7f, 0x0);
	/* Output format: RGB 4:4:4, Active Format Information is valid,
	 * underscanned */
	adv7511_wr_and_or(sd, 0x55, 0x9c, 0x12);
	/* AVI Info frame packet enable, Audio Info frame disable */
	adv7511_wr_and_or(sd, 0x44, 0xe7, 0x10);
	/* Colorimetry, Active format aspect ratio: same as picture. */
	adv7511_wr(sd, 0x56, 0xa8);
	/* No encryption */
	adv7511_wr_and_or(sd, 0xaf, 0xed, 0x0);

	/* Positive clk edge capture for input video clock */
	adv7511_wr_and_or(sd, 0xba, 0x1f, 0x60);

	adv7511_audio_setup(sd);

	v4l2_ctrl_handler_setup(&state->hdl);
}

/* Configure hdmi transmitter. */
static void adv7511_notify_monitor_detect(struct v4l2_subdev *sd)
{
+struct adv7511_monitor_detect mdt;
+struct adv7511_state *state = get_adv7511_state(sd);
+
+mdt.present = state->have_monitor;
+v4l2_subdev_notify(sd, ADV7511_MONITOR_DETECT, (void *)&mdt);
+
+static void adv7511_check_monitor_present_status(struct v4l2_subdev *sd)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+/* read hotplug and rx-sense state */
+u8 status = adv7511_rd(sd, 0x42);
+
+v4l2_dbg(1, debug, sd, "%s: status: 0x%x%s%s
",
+__func__,
+status,
+status & MASK_ADV7511_HPD_DETECT ? ", hotplug" : "",
+status & MASK_ADV7511_MSEN_DETECT ? ", rx-sense" : "");
+
+/* update read only ctrls */
+v4l2_ctrl_s_ctrl(state->hotplug_ctrl, adv7511_have_hotplug(sd) ? 0x1 : 0x0);
+v4l2_ctrl_s_ctrl(state->rx_sense_ctrl, adv7511_have_rx_sense(sd) ? 0x1 : 0x0);
+
+if ((status & MASK_ADV7511_HPD_DETECT) && ((status & MASK_ADV7511_MSEN_DETECT) || state->edid.segments)) {
+v4l2_dbg(1, debug, sd, "%s: hotplug and (rx-sense or edid)\n", __func__);
+if (!state->have_monitor) {
+v4l2_dbg(1, debug, sd, "%s: monitor detected\n", __func__);
+state->have_monitor = true;
+adv7511_set_isr(sd, true);
+if (!adv7511_s_power(sd, true)) {
+        v4l2_dbg(1, debug, sd, "%s: monitor detected, powerup failed\n", __func__);
+        return;
+    }
+    adv7511_setup(sd);
+    adv7511_notify_monitor_detect(sd);
+    state->edid.read_retries = EDID_MAX_RETRIES;
+    queue_delayed_work(state->work_queue, &state->edid_handler, EDID_DELAY);
+}
+} else if (status & MASK_ADV7511_HPD_DETECT) {
+v4l2_dbg(1, debug, sd, "%s: hotplug detected\n", __func__);
+state->edid.read_retries = EDID_MAX_RETRIES;
+queue_delayed_work(state->work_queue, &state->edid_handler, EDID_DELAY);
+} else if (!((state & MASK_ADV7511_HPD_DETECT)) {
+v4l2_dbg(1, debug, sd, "%s: hotplug not detected\n", __func__);
+if (state->have_monitor) {
+v4l2_dbg(1, debug, sd, "%s: monitor not detected\n", __func__);
+state->have_monitor = false;
+adv7511_notify_monitor_detect(sd);
+
+adv7511_s_power(sd, false);
+memset(&state->edid, 0, sizeof(struct adv7511_state_edid));
+adv7511_notify_no_edid(sd);
+}
+
+}
+
+static bool edid_block_verify_crc(u8 *edid_block)
+{
+u8 sum = 0;
+int i;
+
+for (i = 0; i < 128; i++)
+sum += edid_block[i];
+return sum == 0;
+}
+
+static bool edid_verify_crc(struct v4l2_subdev *sd, u32 segment)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+u32 blocks = state->edid.blocks;
+u8 *data = state->edid.data;
+
+if (!edid_block_verify_crc(&data[segment * 256]))
+return false;
+
+if ((segment + 1) * 2 <= blocks)
+return edid_block_verify_crc(&data[segment * 256 + 128]);
+return true;
+}
+
+static bool edid_verify_header(struct v4l2_subdev *sd, u32 segment)
+{
+static const u8 hdmi_header[] = {
+0x00, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0x00
+};
+struct adv7511_state *state = get_adv7511_state(sd);
+u8 *data = state->edid.data;
+
+if (segment != 0)
+return true;
+return memcmp(data, hdmi_header, sizeof(hdmi_header));
+}
+
+static bool adv7511_check_edid_status(struct v4l2_subdev *sd)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+u8 edidRdy = adv7511_rd(sd, 0xc5);
+\v4l2_dbg(1, debug, sd, "%s: edid ready (retries: %d)n", +\__func__, EDID_MAX_RETRIES - state->edid.read_retries);
+    +if (state->edid.complete)
+        +return true;
+    +if (edidRdy & MASK_ADV7511_EDID_RDY) {
+        +int segment = adv7511_rd(sd, 0xc4);
+        +struct adv7511_edid_detect ed;
+    +if (segment >= EDID_MAX_SEGM) {
+        +v4l2_err(sd, "edid segment number too big\n");
+        +return false;
+    +v4l2_dbg(1, debug, sd, "%s: got segment %d\n", __func__, segment);
+    +adv7511_edid_rd(sd, 256, &state->edid.data[segment * 256]);
+    +adv7511_dbg_dump_edid(2, debug, sd, segment, &state->edid.data[segment * 256]);
+    +if (segment == 0) {
+        +state->edid.blocks = state->edid.data[0x7e] + 1;
+        +v4l2_dbg(1, debug, sd, "%s: %d blocks in total\n", __func__, state->edid.blocks);
+    +} +if (!edid_verify_crc(sd, segment) ||
+    +!edid_verify_header(sd, segment)) {
+        +# edid crc error, force reread of edid segment */
+    +v4l2_err(sd, "%s: edid crc or header error\n", __func__);
+    +state->have_monitor = false;
+    +adv7511_s_power(sd, false);
+    +adv7511_s_power(sd, true);
+    +return false;
+    +}
+    +# one more segment read ok */
+    +state->edid.segments = segment + 1;
+    +v4l2_ctrl_s_ctrl(state->have_edid0_ctrl, 0x1);
+    +if (((state->edid.data[0x7e] >> 1) + 1) > state->edid.segments) {
+        +# Request next EDID segment */
+    +v4l2_dbg(1, debug, sd, "%s: request segment %d\n", __func__, state->edid.segments);
+    +adv7511_wr(sd, 0xc9, 0xf);
+    +adv7511_wr(sd, 0xc4, state->edid.segments);
+    +state->edid.read_retries = EDID_MAX_RETRIES;
+    +queue_delayed_work(state->work_queue, &state->edid_handler, EDID_DELAY);
+    +return false;
+    +}
+    +
+    +v4l2_dbg(1, debug, sd, "%s: edid complete with %d segment(s)\n", __func__, state->edid.segments);
+    +state->edid.complete = true;
+    +ed.phys_addr = cec_get_edid_phys_addr(state->edid.data,
+        +state->edid.segments * 256,
/* report when we have all segments 
+ but report only for segment 0 
+ */
ed.present = true;
ed.segment = 0;
state->edid_detect_counter++;
+cecc_s_phys_addr(state->cec_adap, ed.phys_addr, false);
+v4l2_subdev_notify(sd, ADV7511_EDID_DETECT, (void *)&ed);
+return ed.present;
+
+return false;
+}
+
+static int adv7511_registered(struct v4l2_subdev *sd)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+struct i2c_client *client = v4l2_get_subdevdata(sd);
+int err;
+
+err = cec_register_adapter(state->cec_adap, &client->dev);
+if (err)
+cecc_delete_adapter(state->cec_adap);
+return err;
+
+static void adv7511_unregistered(struct v4l2_subdev *sd)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+
+cecc_unregister_adapter(state->cec_adap);
+}
+
+static const struct v4l2_subdev_internal_ops adv7511_int_ops = {
+.registered = adv7511_registered,
+.unregistered = adv7511_unregistered,
+};
+
+/* Setup ADV7511 */
+static void adv7511_init_setup(struct v4l2_subdev *sd)
+{
+struct adv7511_state *state = get_adv7511_state(sd);
+struct adv7511_state_edid *edid = &state->edid;
+u32 cec_clk = state->pdata.cec_clk;
+u8 ratio;
+
```c
+ v4l2_dbg(1, debug, sd, "\%s\n", __func__); +
+ /* clear all interrupts */ +adv7511_wr(sd, 0x96, 0xff);
+adv7511_wr(sd, 0x97, 0xff);
+/*
+ * Stop HPD from resetting a lot of registers.
+ * It might leave the chip in a partly un-initialized state,
+ * in particular with regards to hotplug bounces.
+ */
+adv7511_wr_and_or(sd, 0xd6, 0x3f, 0xc0);
+memset(edid, 0, sizeof(struct adv7511_state_edid));
+state->have_monitor = false;
+adv7511_set_isr(sd, false);
+adv7511_s_stream(sd, false);
+adv7511_s_audio_stream(sd, false);
+
+if (state->i2c_cec == NULL)
+return;
+
v4l2_dbg(1, debug, sd, "%s: cec_clk %d\n", __func__, cec_clk);
+/* cec soft reset */
+adv7511_cec_write(sd, 0x50, 0x01);
+adv7511_cec_write(sd, 0x50, 0x00);
+
+/* legacy mode */
+adv7511_cec_write(sd, 0x4a, 0x00);
+
+if (cec_clk % 750000 != 0)
+v4l2_err(sd, "%s: cec_clk %d, not multiple of 750 Khz\n",
+__func__, cec_clk);
+
+ratio = (cec_clk / 750000) - 1;
+adv7511_cec_write(sd, 0x4e, ratio << 2);
+
+static int adv7511_probe(struct i2c_client *client, const struct i2c_device_id *id)
+{
+struct adv7511_state *state;
+struct adv7511_platform_data *pdata = client->dev.platform_data;
+struct v4l2_ctrl_handler *hdl;
+struct v4l2_subdev *sd;
+u8 chip_id[2];
+int err = -EIO;
+
+/* Check if the adapter supports the needed features */
+if (!i2c_check_functionality(client->adapter, I2C_FUNC_SMBUS_BYTE_DATA))
```
return -EIO;
+
+state = devm_kzalloc(&client->dev, sizeof(struct adv7511_state), GFP_KERNEL);
+if (!state)
+    return -ENOMEM;
+
+/* Platform data */
+if (!pdata) {
+v4l_err(client, "No platform data!\n");
+    return -ENODEV;
+}
+memcpy(&state->pdata, pdata, sizeof(state->pdata));
+state->fmt_code = MEDIA_BUS_FMT_RGB888_1X24;
+state->colorspace = V4L2_COLORSPACE_SRGB;
+
+sd = &state->sd;
+
+v4l2_dbg(1, debug, sd, "detecting adv7511 client on address 0x%x\n",
+    client->addr << 1);
+
+v4l2_i2c_subdev_init(sd, client, &adv7511_ops);
+sd->internal_ops = &adv7511_int_ops;
+
+hdl = &state->hdl;
+v4l2_ctrl_handler_init(hdl, 10);
+
+/* add in ascending ID order */
+state->hdmi_mode_ctrl = v4l2_ctrl_new_std_menu(hdl, &adv7511_ctrl_ops,
+    V4L2_CID_DV_TX_MODE, V4L2_DV_TX_MODE_HDMI,
+    0, V4L2_DV_TX_MODE_DVI_D);
+state->hotplug_ctrl = v4l2_ctrl_new_std(hdl, NULL,
+    V4L2_CID_DV_TX_HOTPLUG, 0, 1, 0, 0);
+state->rx_sense_ctrl = v4l2_ctrl_new_std(hdl, NULL,
+    V4L2_CID_DV_TX_RXSENSE, 0, 1, 0, 0);
+state->have_edid0_ctrl = v4l2_ctrl_new_std(hdl, NULL,
+    V4L2_CID_DV_TX_EDID_PRESENT, 0, 1, 0, 0);
+state->rgb_quantization_range_ctrl =
+    v4l2_ctrl_new_std_menu(hdl, &adv7511_ctrl_ops,
+        V4L2_CID_DV_TX_RGB_RANGE, V4L2_DV_RGB_RANGE_FULL,
+        0, V4L2_DV_RGB_RANGE_AUTO);
+state->content_type_ctrl =
+    v4l2_ctrl_new_std_menu(hdl, &adv7511_ctrl_ops,
+        V4L2_CID_DV_TX_ITCONTENT_TYPE, V4L2_DV_ITCONTENT_TYPE_NO_ITC,
+        0, V4L2_DV_ITCONTENT_TYPE_NO_ITC);
+sd->ctrl_handler = hdl;
+if (hdl->error) {
+    err = hdl->error;
+    goto err_hdl;
+}
+state->pad.flags = MEDIA_PAD_FL_SINK;
+err = media_entity_pads_init(&sd->entity, 1, &state->pad);
+if (err)
+goto err_hdl;
+
+/* EDID and CEC i2c addr */
+state->i2c_edid_addr = state->pdata.i2c_edid << 1;
+state->i2c_cec_addr = state->pdata.i2c_cec << 1;
+state->i2c_pktmem_addr = state->pdata.i2c_pktmem << 1;
+
+state->chip_revision = adv7511_rd(sd, 0x0);
+chip_id[0] = adv7511_rd(sd, 0xf5);
+chip_id[1] = adv7511_rd(sd, 0xf6);
+if (chip_id[0] != 0x75 || chip_id[1] != 0x11) {
+v4l2_err(sd, "chip_id != 0x7511, read 0x%02x%02x\n", chip_id[0],
+    chip_id[1]);
+err = -EIO;
+goto err_entity;
+
+state->i2c_edid = i2c_new_dummy(client->adapter,
+state->i2c_edid_addr >> 1);
+if (state->i2c_edid == NULL) {
+v4l2_err(sd, "failed to register edid i2c client\n");
+err = -ENOMEM;
+goto err_entity;
+
+adv7511_wr(sd, 0xe1, state->i2c_cec_addr);
+if (state->pdata.cec_clk < 3000000 ||
+    state->pdata.cec_clk > 100000000) {
+v4l2_err(sd, "%s: cec_clk %u outside range, disabling cec\n",
+    __func__, state->pdata.cec_clk);
+err = -ENOMEM;
+goto err_entity;
+}
+
+adv7511_wr(sd, 0xe2, 0x00); /* power up cec section */
+} else {
+adv7511_wr(sd, 0xe2, 0x01); /* power down cec section */
+}
+state->i2c_pktmem = i2c_new_dummy(client->adapter, state->i2c_pktmem_addr >> 1);
+if (state->i2c_pktmem == NULL) {
+v4l2_err(sd, "failed to register pktmem i2c client\n");
+err = -ENOMEM;
+goto err_unreg_pktmem;
+}
+
+state->work_queue = create_singlethread_workqueue(sd->name);
+if (state->work_queue == NULL) {
+v4l2_err(sd, "could not create workqueue\n");
+err = -ENOMEM;
+goto err_unreg_pktmem;
+}
+
+INIT_DELAYED_WORK(&state->edid_handler, adv7511_edid_handler);
+
+adv7511_init_setup(sd);
+
+#if IS_ENABLED(CONFIG_VIDEO_ADV7511_CEC)
+state->ce_adap = cec_allocate_adapter(&adv7511_cec_adap_ops,
+state, dev_name(&client->dev), CEC_CAP_DEFAULTS,
+ADV7511_MAX_ADDRS);
+err = PTR_ERR_OR_ZERO(state->ce_adap);
+if (err) {
+destroy_workqueue(state->work_queue);
+goto err_unreg_pktmem;
+}
+#endif
+
+adv7511_set_isr(sd, true);
+adv7511_check_monitor_present_status(sd);
+
+v4l2_info(sd, "%s found @ 0x%x (%s)\n", client->name,
+ client->addr << 1, client->adapter->name);
+return 0;
+
+err_unreg_pktmem:
+i2c_unregister_device(state->i2c_pktmem);
+err_unreg_cec:
+if (state->i2c_cec)
+i2c_unregister_device(state->i2c_cec);
+err_unreg_edid:
+i2c_unregister_device(state->i2c_edid);
+err_entity:
+media_entity_cleanup(&sd->entity);
+err_hdl:
+v4l2_ctrl_handler_free(&state->hdl);
return err;
+
+/* ----------------------------------------------------------------------- */
+
+static int adv7511_remove(struct i2c_client *client)
+{
+struct v4l2_subdev *sd = i2c_get_clientdata(client);
+struct adv7511_state *state = get_adv7511_state(sd);
+
+state->chip_revision = -1;
+
+v4l2_dbg(1, debug, sd, "%s removed @ 0x%x (%s)\n", client->name,
+client->addr << 1, client->adapter->name);
+
+adv7511_set_isr(sd, false);
+adv7511_init_setup(sd);
+cancel_delayed_work_sync(&state->edid_handler);
+i2c_unregister_device(state->i2c_edid);
+if (state->i2c_cec)
+i2c_unregister_device(state->i2c_cec);
+i2c_unregister_device(state->i2c_pktmem);
+destroy_workqueue(state->work_queue);
+v4l2_device_unregister_subdev(sd);
+media_entity_cleanup(&sd->entity);
+v4l2_ctrl_handler_free(sd->ctrl_handler);
+return 0;
+}
+
+/* ----------------------------------------------------------------------- */
+
+static const struct i2c_device_id adv7511_id[] = {
+{ "adv7511", 0 },
+};
+MODULE_DEVICE_TABLE(i2c, adv7511_id);
+
+static struct i2c_driver adv7511_driver = {
+.driver = {
+.name = "adv7511",
+},
+.probe = adv7511_probe,
+.remove = adv7511_remove,
+.id_table = adv7511_id,
+};
+
+module_i2c_driver(adv7511_driver);
--- linux-4.15.0.orig/drivers/media/i2c/adv7604.c
+++ linux-4.15.0/drivers/media/i2c/adv7604.c
@@ -778,7 +778,7 @@
      .type = V4L2_DV_BT_656_1120,
     /* keep this initialization for compatibility with GCC < 4.4.6 */
     .reserved = { 0 },
     -V4L2_INIT_BT_TIMINGS(0, 1920, 0, 1200, 25000000, 170000000,
     +V4L2_INIT_BT_TIMINGS(640, 1920, 350, 1200, 25000000, 170000000,
     V4L2_DV_BT_STD_CEA861 | V4L2_DV_BT_STD_DMT | V4L2_DV_BT_STD_GTF | V4L2_DV_BT_STD_CVT,
     V4L2_DV_BT_CAP_PROGRESSIVE | V4L2_DV_BT_CAP_REDUCED_BLANKING |
     @@ -789,7 +789,7 @@
      .type = V4L2_DV_BT_656_1120,
     /* keep this initialization for compatibility with GCC < 4.4.6 */
      .reserved = { 0 },
     -V4L2_INIT_BT_TIMINGS(0, 1920, 0, 1200, 25000000, 225000000,
     +V4L2_INIT_BT_TIMINGS(640, 1920, 350, 1200, 25000000, 225000000,
     V4L2_DV_BT_STD_CEA861 | V4L2_DV_BT_STD_DMT | V4L2_DV_BT_STD_GTF | V4L2_DV_BT_STD_CVT,
     V4L2_DV_BT_CAP_PROGRESSIVE | V4L2_DV_BT_CAP_REDUCED_BLANKING |
     @@ -2295,8 +2295,10 @@
      state->aspect_ratio.numerator = 16;
      state->aspect_ratio.denominator = 9;

     -if (!state->edid.present)
+if (!state->edid.present) {
      state->edid.blocks = 0;
      +ccc_phys_addr_invalidate(state->cec_adap);
    +}

     v4l2_dbg(2, debug, sd, "%s: clear EDID pad %d, edid.present = 0x%x\n", __func__, edid->pad, state->edid.present);
@@ -2485,7 +2487,7 @@
      "YCbCr Bt.601 (16-235)", "YCbCr Bt.709 (16-235)",
      "xvYCC Bt.601!", "xvYCC Bt.709",
      "YCbCr Bt.601 (0-255)", "YCbCr Bt.709 (0-255)",
     +"syYCC", "opYCC 601!", "opRGB", "invalid", "invalid",
      "invalid", "invalid", "invalid"
    );
    static const char * const rgb_quantization_range_txt[] = {
@@ -3553,7 +3555,7 @@
      io_write(sd, 0x6e, 0);
      io_write(sd, 0x73, 0);

     -cancel_delayed_work(&state->delayed_work_enable_hotplug);
+cancel_delayed_work_sync(&state->delayed_work_enable_hotplug);
     v4l2_async_unregister_subdev(sd);
     media_entity_cleanup(&sd->entity);
adv76xx_unregister_clients(to_state(sd));
--- linux-4.15.0.orig/drivers/media/i2c/adv7842.c
+++ linux-4.15.0/drivers/media/i2c/adv7842.c
@@ -676,7 +676,7 @@
 .type = V4L2_DV_BT_656_1120, /* keep this initialization for compatibility with GCC < 4.4.6 */
 .reserved = { 0 ,
 -V4L2_INIT_BT_TIMINGS(0, 1920, 0, 1200, 25000000, 170000000,
 +V4L2_INIT_BT_TIMINGS(640, 1920, 350, 1200, 25000000, 170000000,
 @@ -687,7 +687,7 @@
 .type = V4L2_DV_BT_656_1120, /* keep this initialization for compatibility with GCC < 4.4.6 */
 .reserved = { 0 ,
 -V4L2_INIT_BT_TIMINGS(0, 1920, 0, 1200, 25000000, 225000000,
 +V4L2_INIT_BT_TIMINGS(640, 1920, 350, 1200, 25000000, 225000000,
 @@ -799,8 +799,10 @@ /* Disable I2C access to internal EDID ram from HDMI DDC ports */
 rep_write_and_or(sd, 0x77, 0xf3, 0x00);

 -if (!state->hdmi_edid.present)
 +if (!state->hdmi_edid.present) {
 + cec_phys_addr_invalidate(state->cec_adap);
 return 0;
 +}

 pa = cec_get_edid_phys_addr(edid, 256, &spa_loc);
 err = cec_phys_addr_validate(pa, &pa, NULL);
 @@ -3597,7 +3597,7 @@
 struct adv7842_state *state = to_state(sd);

 adv7842_irq_enable(sd, false);
-cancel_delayed_work(&state->delayed_work_enable_hotplug); 
+cancel_delayed_work_sync(&state->delayed_work_enable_hotplug);
 v4l2_device_unregister_subdev(sd);
 media_entity_cleanup(&sd->entity);
 adv7842_unregister_clients(sd);
--- linux-4.15.0.orig/drivers/media/i2c/cx25840/cx25840-core.c
+++ linux-4.15.0/drivers/media/i2c/cx25840/cx25840-core.c
@@ -463,8 +463,13 @@
 { 
 DEFINE_WAIT(wait);
 struct cx25840_state *state = to_state(i2c_get_clientdata(client));
+u32 clk_freq = 0;
struct workqueue_struct *q;

+/* cx23885 sets hostdata to clk_freq pointer */
+if (v4l2_get_subdev_hostdata(&state->sd))
+clk_freq = *((u32 *)v4l2_get_subdev_hostdata(&state->sd));
+
+/
+* Come out of digital power down
+* The CX23888, at least, needs this, otherwise registers aside from
+@ @ -500.8 +505,13 @ @
+* 50.0 MHz * (0xb + 0xe8ba26/0x2000000)/4 = 5 * 28.636363 MHz
+* 572.73 MHz before post divide
+*/
-/* HVR1850 or 50MHz xtal */
-cx25840_write(client, 0x2, 0x71);
+if (clk_freq == 25000000) {
+/* 888/ImpactVCBe or 25Mhz xtal */
+; /* nothing to do */
+} else {
+/* HVR1850 or 50MHz xtal */
+cx25840_write(client, 0x2, 0x71);
+
+cx25840_write4(client, 0x11c, 0x01b6db7b);
+cx25840_write4(client, 0x108, 0x00000512);
+/* HVR1850 */
+switch (state->id) {
+case CX23888_AV:
-/* 888/HVR1250 specific */
-cx25840_write4(client, 0x10c, 0x13333333);
-cx25840_write4(client, 0x108, 0x00000515);
+if (clk_freq == 25000000) {
+/* 888/ImpactVCBe or 25MHz xtal */
+cx25840_write4(client, 0x10c, 0x01b6db7b);
+cx25840_write4(client, 0x108, 0x00000512);
+} else {
+/* 888/HVR1250 or 50MHz xtal */
+cx25840_write4(client, 0x10c, 0x13333333);
+cx25840_write4(client, 0x108, 0x00000515);
+}
++break;
+default:
+cx25840_write4(client, 0x10c, 0x0002be2c9);
+@ @ -576.7 +592.7 @ @
+* 368.64 MHz before post divide
+* 122.88 MHz / 0xa = 12.288 MHz
HVR1850 or 50MHz xtal
HVR1850 or 50MHz xtal or 25MHz xtal

```c

cx25840_write4(client, 0x114, 0x017dbf48);
cx25840_write4(client, 0x110, 0x000a030e);
break;
```

---

```c
return 0;

dw9714_subdev_cleanup(dw9714_dev);
```

---

```c
static inline int imx274_read_reg(struct stimx274 *priv, u16 addr, u8 *val)
{
    unsigned int uint_val;
    int err;

    err = regmap_read(priv->regmap, addr, (unsigned int *)val);
    if (err)
        dev_err(&priv->client->dev, "%s: i2c read failed, addr = %x\n", __func__, addr);
    else
        dev_dbg(&priv->client->dev, "%s: addr 0x%x, val=0x%x\n", __func__, addr, *val);

    *val = uint_val;
}
```

---

```c
ret = imx274_set_frame_interval(imx274, fi->interval);
if (!ret) {
    fi->interval = imx274->frame_interval;
```

---

```c
return 0;
```
/*
 * exposure time range is decided by frame interval
 * need to update it after frame interal changes
 */
__func__, frame_interval.numerator,
frame_interval.denominator);

-if (frame_interval.numerator == 0) {
-err = -EINVAL;
-goto fail;
+if (frame_interval.numerator == 0 || frame_interval.denominator == 0) {
+frame_interval.denominator = IMX274_DEF_FRAME_RATE;
+frame_interval.numerator = 1;
}

req_frame_rate = (u32)(frame_interval.denominator
--- linux-4.15.0.orig/drivers/media/i2c/m5mols/m5mols_core.c
+++ linux-4.15.0/drivers/media/i2c/m5mols/m5mols_core.c
@@ -768,7 +768,8 @@
ret = regulator_bulk_enable(ARRAY_SIZE(supplies), supplies);
if (ret) {
- info->set_power(&client->dev, 0);
+ if (info->set_power)
+ info->set_power(&client->dev, 0);

--- linux-4.15.0.orig/drivers/media/i2c/max2175.c
+++ linux-4.15.0/drivers/media/i2c/max2175.c
@@ -511,7 +511,7 @@
} }

-static bool max2175_set_csm_mode(struct max2175 *ctx,
+static int max2175_set_csm_mode(struct max2175 *ctx,
  enum max2175_csm_mode new_mode)
{
  int ret = max2175_poll_csm_ready(ctx);
--- linux-4.15.0.orig/drivers/media/i2c/mt9m111.c
+++ linux-4.15.0/drivers/media/i2c/mt9m111.c
@@ -974,6 +974,8 @@
  mt9m111->width = mt9m111->rect.width;
  mt9m111->height = mt9m111->rect.height;
  mt9m111->fmt = &mt9m111_colour_fmts[0];
Open Source Used In 5GaaS Edge AC-4  23021

mt9m111->lastpage = -1;
mutex_init(&mt9m111->power_lock);
--- linux-4.15.0.orig/drivers/media/i2c/mt9v032.c
+++ linux-4.15.0/drivers/media/i2c/mt9v032.c
@@ -423,10 +423,12 @@
    struct v4l2_subdev_pad_config *cfg,
    struct v4l2_subdev_mbus_code_enum *code)
{
+    struct mt9v032 *mt9v032 = to_mt9v032(subdev);
    +if (code->index > 0)
        return -EINVAL;
-code->code = MEDIA_BUS_FMT_SGRBG10_1X10;
+    code->code = mt9v032->format.code;
    return 0;
}

@@ -434,7 +436,11 @@
    struct v4l2_subdev_pad_config *cfg,
    struct v4l2_subdev_frame_size_enum *fse)
{
-    if (fse->index >= 3 || fse->code != MEDIA_BUS_FMT_SGRBG10_1X10)
+    if (fse->index >= 3)
+        return -EINVAL;
+    if (mt9v032->format.code != fse->code)
        return -EINVAL;
    fse->min_width = MT9V032_WINDOW_WIDTH_DEF / (1 << fse->index);
--- linux-4.15.0.orig/drivers/media/i2c/ov13858.c
+++ linux-4.15.0/drivers/media/i2c/ov13858.c
@@ -1646,7 +1646,8 @@
    OV13858_NUM_OF_LINK_FREQS - 1,
    0,
    link_freq_menu_items);
-ov13858->link_freq->flags |= V4L2_CTRL_FLAG_READ_ONLY;
+if (ov13858->link_freq)
+    ov13858->link_freq->flags |= V4L2_CTRL_FLAG_READ_ONLY;

    pixel_rate_max = link_freq_to_pixel_rate(link_freq_menu_items[0]);
    pixel_rate_min = link_freq_to_pixel_rate(link_freq_menu_items[1]);
@@ -1669,7 +1670,8 @@
    ov13858->hblank = v4l2_ctrl_new_std(
        ctrl_hdlr, &ov13858_ctrl_ops, V4L2_CID_HBLANK,
        hblank, hblank, 1, hblank);
-ov13858->hblank->flags |= V4L2_CTRL_FLAG_READ_ONLY;
if (ov13858->hblank)
  ov13858->hblank->flags |= V4L2_CTRL_FLAG_READ_ONLY;

exposure_max = mode->vts_def - 8;

ov13858->exposure = v4l2_ctrl_new_std(

--- linux-4.15.0.orig/drivers/media/i2c/ov2659.c
+++ linux-4.15.0/drivers/media/i2c/ov2659.c
@@ -419,10 +419,14 @@
     { REG_TIMING_YINC, 0x11 },
     { REG_TIMING_VERT_FORMAT, 0x80 },
     { REG_TIMING_HORIZ_FORMAT, 0x00 },
+
     { 0x370a, 0x12 },
     { 0x3a03, 0xe8 },
     { 0x3a09, 0x6f },
     { 0x3a0b, 0x5d },
+
     { REG_VFIFO_READ_START_H, 0x00 },
     { REG_VFIFO_READ_START_L, 0x80 },
     { REG_ISP_CTRL02, 0x00 },
     { REG_NULL, 0x00 },

); @ @ -1117,8 +1121,10 @@

if (ov2659_formats[index].code == mf->code)
  break;

-if (index < 0)
-  return -EINVAL;
+if (index < 0) {
+  index = 0;
+  mf->code = ov2659_formats[index].code;
+
}

mf->colorspace = V4L2_COLORSPACE_SRGB;
mf->field = V4L2_FIELD_NONE;
@@ -1130,7 +1136,7 @@
  mf = v4l2_subdev_get_try_format(sd, cfg, fmt->pad);
  *mf = fmt->format;
  
#else
-  return -ENOTTY;
+  ret = -ENOTTY;
#endif
} else {
  s64 val;
  @@ -1201,11 +1207,15 @@
  goto unlock;
}
-ov2659_set_pixel_clock(ov2659);
-ov2659_set_frame_size(ov2659);
-ov2659_set_format(ov2659);
-ov2659_set_streaming(ov2659, 1);
-ov2659->streaming = on;
+ret = ov2659_set_pixel_clock(ov2659);
+if (!ret)
+ret = ov2659_set_frame_size(ov2659);
+if (!ret)
+ret = ov2659_set_format(ov2659);
+if (!ret) {
+ov2659_set_streaming(ov2659, 1);
+ov2659->streaming = on;
+
unlock:
mutex_unlock(&ov2659->lock);
--- linux-4.15.0.orig/drivers/media/i2c/ov5640.c
+++ linux-4.15.0/drivers/media/i2c/ov5640.c
@@ -1216,7 +1216,7 @@
return ov5640_write_reg(sensor, OV5640_REG_AEC_CTRL1F, fast_low);
}

-static int ov5640_binning_on(struct ov5640_dev *sensor)
+static int ov5640_get_binning(struct ov5640_dev *sensor)
{
    u8 temp;
    int ret;
@@ -1224,8 +1224,8 @@
ret = ov5640_read_reg(sensor, OV5640_REG_TIMING_TC_REG21, &temp);
if (ret)
    return ret;
-temp &= 0xfe;
-return temp ? 1 : 0;
+
+return temp & BIT(0);
}

static int ov5640_set_virtual_channel(struct ov5640_dev *sensor)
@@ -1293,7 +1293,7 @@
if (ret < 0)
    return ret;
prev_shutter = ret;
-ret = ov5640_binning_on(sensor); 
+ret = ov5640_get_binning(sensor);
if (ret < 0)
    return ret;
if (ret && mode->id != OV5640_MODE_720P_1280_720 &&
usleep_range(1000, 2000);

@ @ -1544,7 +1544,7 @@
gpiod_set_value(sensor->reset_gpio, 0);
- usleep_range(5000, 10000);
+ usleep_range(20000, 25000);
}

static int ov5640_set_power(struct ov5640_dev *sensor, bool on)
@ @ -1900,16 +1900,12 @@

switch (ctrl->id) {
  case V4L2_CID_AUTOGAIN:
    if (!ctrl->val)
      return 0;
    val = ov5640_get_gain(sensor);
    if (val < 0)
      return val;
    sensor->ctrls.gain->val = val;
    break;
  case V4L2_CID_EXPOSURE_AUTO:
    if (ctrl->val == V4L2_EXPOSURE_MANUAL)
      return 0;
    val = ov5640_get_exposure(sensor);
    if (val < 0)
      return val;
    @ @ -2265,9 +2261,14 @@
    /* request optional power down pin */
    sensor->pwdn_gpio = devm_gpiod_get_optional(dev, "powerdown",
      GPIOD_OUT_HIGH);
    if (IS_ERR(sensor->pwdn_gpio))
      return PTR_ERR(sensor->pwdn_gpio);
    
    /* request optional reset pin */
    sensor->reset_gpio = devm_gpiod_get_optional(dev, "reset",
      GPIOD_OUT_HIGH);
    if (IS_ERR(sensor->reset_gpio))
      return PTR_ERR(sensor->reset_gpio);

  v4l2_i2c_subdev_init(&sensor->sd, client, &ov5640_subdev_ops);

  @ @ -2297,8 +2298,8 @@
  free_ctrls:
  v4l2_ctrl_handler_free(&sensor->ctrls.handler);
  entity_cleanup:
  -mutex_destroy(&sensor->lock);
  media_entity_cleanup(&sensor->sd.entity);
  +mutex_destroy(&sensor->lock);
return ret;
}

@@ -2308,9 +2309,9 @@
 struct ov5640_dev *sensor = to_ov5640_dev(sd);

 v4l2_async_unregister_subdev(&sensor->sd);
-mutex_destroy(&sensor->lock);
-media_entity_cleanup(&sensor->sd.entity);
 v4l2_ctrl_handler_free(&sensor->ctrls.handler);
+mutex_destroy(&sensor->lock);

 return 0;
}
--- linux-4.15.0.orig/drivers/media/i2c/ov5645.c
+++ linux-4.15.0/drivers/media/i2c/ov5645.c
@@ -33,6 +33,7 @@
 #include <linux/i2c.h>
 #include <linux/init.h>
 #include <linux/module.h>
+#include <linux/mutex.h>
 #include <linux/of.h>
 #include <linux/of_graph.h>
 #include <linux/regulator/consumer.h>
@@ -42,6 +43,8 @@
 #include <media/v4l2-fwnode.h>
 #include <media/v4l2-subdev.h>

 +static DEFINE_MUTEX(ov5645_lock);
 +
 #define OV5645_VOLTAGE_ANALOG 2800000
 #define OV5645_VOLTAGE_DIGITAL_CORE 1500000
 #define OV5645_VOLTAGE_DIGITAL_IO 1800000
@@ -53,6 +56,7 @@
 #define OV5645_CHIP_ID_HIGH_BYTE 0x56
 #define OV5645_CHIP_ID_LOW 0x300b
 #define OV5645_CHIP_ID_LOW_BYTE 0x45
+#define OV5645_IO_MIPI_CTRL00 0x300e
+#define OV5645_PAD_OUTPUT00 0x3019
 #define OV5645_AWB_MANUAL_CONTROL 0x3406
 #define OV5645_AWB_MANUAL_ENABLE BIT(0)
 #define OV5645_AEC_PK_MANUAL 0x3503
@@ -63,6 +68,7 @@
 #define OV5645_AEC_PK_MANUAL 0x3503
 #define OV5645_ISP_VFLIP BIT(2)
 #define OV5645_TIMING_TC_REG21 0x3821
+#define OV5645_MIPI_CTRL00 0x4800
 #define OV5645_PRE_ISP_TEST_SETTING_1 0x503d

---
#define OV5645_TEST_PATTERN_MASK 0x3
#define OV5645_SET_TEST_PATTERN(x) ((x) & OV5645_TEST_PATTERN_MASK)
@@ -129,7 +135,6 @@
  { 0x3503, 0x07 },
  { 0x3002, 0x1c },
  { 0x3006, 0xc3 },
- { 0x300e, 0x45 },
  { 0x3017, 0x00 },
  { 0x3018, 0x00 },
  { 0x302e, 0x0b },
@@ -358,7 +363,10 @@
  { 0x3a1f, 0x14 },
  { 0x0601, 0x02 },
  { 0x3008, 0x42 },
- { 0x3008, 0x02 }
+ { 0x3008, 0x02 },
+ { OV5645_IO_MIPI_CTRL00, 0x40 },
+ { OV5645_MIPI_CTRL00, 0x24 },
+ { OV5645_PAD_OUTPUT00, 0x70 }
};

static const struct reg_value ov5645_setting_sxga[] = {
  @@ -510,8 +518,8 @@
};

static const s64 link_freq[] = {
- 222880000,
- 334320000
+ 224000000,
+ 336000000
};

static const struct ov5645_mode_info ov5645_mode_info_data[] = {
@@ -528,7 +536,7 @@
  .height = 960,
  .data = ov5645_setting_sxga,
  .data_size = ARRAY_SIZE(ov5645_setting_sxga),
- .pixel_clock = 111440000,
+ .pixel_clock = 112000000,
  .link_freq = 0 /* an index in link_freq[] */
};
@@ -129,7 +135,6 @@
  { 0x3503, 0x07 },
  { 0x3002, 0x1c },
  { 0x3006, 0xc3 },
- { 0x300e, 0x45 },
  { 0x3017, 0x00 },
  { 0x3018, 0x00 },
  { 0x302e, 0x0b },
@@ -358,7 +363,10 @@
  { 0x3a1f, 0x14 },
  { 0x0601, 0x02 },
  { 0x3008, 0x42 },
- { 0x3008, 0x02 }
+ { 0x3008, 0x02 },
+ { OV5645_IO_MIPI_CTRL00, 0x40 },
+ { OV5645_MIPI_CTRL00, 0x24 },
+ { OV5645_PAD_OUTPUT00, 0x70 }
};

static const struct reg_value ov5645_setting_sxga[] = {
  @@ -510,8 +518,8 @@
};

static const s64 link_freq[] = {
- 222880000,
- 334320000
+ 224000000,
+ 336000000
};

static const struct ov5645_mode_info ov5645_mode_info_data[] = {
@@ -528,7 +536,7 @@
  .height = 960,
  .data = ov5645_setting_sxga,
  .data_size = ARRAY_SIZE(ov5645_setting_sxga),
- .pixel_clock = 111440000,
+ .pixel_clock = 112000000,
  .link_freq = 0 /* an index in link_freq[] */
};
@@ -129,7 +135,6 @@
  { 0x3503, 0x07 },
  { 0x3002, 0x1c },
  { 0x3006, 0xc3 },
- { 0x300e, 0x45 },
  { 0x3017, 0x00 },
  { 0x3018, 0x00 },
  { 0x302e, 0x0b },
@@ -358,7 +363,10 @@
  { 0x3a1f, 0x14 },
  { 0x0601, 0x02 },
  { 0x3008, 0x42 },
- { 0x3008, 0x02 }
+ { 0x3008, 0x02 },
+ { OV5645_IO_MIPI_CTRL00, 0x40 },
+ { OV5645_MIPI_CTRL00, 0x24 },
+ { OV5645_PAD_OUTPUT00, 0x70 }
};

static const struct reg_value ov5645_setting_sxga[] = {
  @@ -510,8 +518,8 @@
};

static const s64 link_freq[] = {
- 222880000,
- 334320000
+ 224000000,
+ 336000000
};

static const struct ov5645_mode_info ov5645_mode_info_data[] = {
@@ -528,7 +536,7 @@
  .height = 960,
  .data = ov5645_setting_sxga,
  .data_size = ARRAY_SIZE(ov5645_setting_sxga),
- .pixel_clock = 111440000,
+ .pixel_clock = 112000000,
  .link_freq = 0 /* an index in link_freq[] */
};

.link_freq = 1 /* an index in link_freq[] */
},
{
@@ -536,7 +544,7 @@
      .height = 1944,
      .data = ov5645_setting_full,
      .data_size = ARRAY_SIZE(ov5645_setting_full),
-    .pixel_clock = 167160000,
+    .pixel_clock = 168000000,
      .link_freq = 1 /* an index in link_freq[] */
    },
    @ @ -590,6 +598,70 @@
  dev_err(ov5645->dev, "io regulator disable failed\n");
}

+static int ov5645_read_reg_from(struct ov5645 *ov5645, u16 reg, u8 *val,
+    u16 i2c_addr)
+{
+  u8 regbuf[2] = {
+    reg >> 8,
+    reg & 0xff,
+  };
+  struct i2c_msg req = {
+    .addr = i2c_addr,
+    .flags = 0,
+    .len = 2,
+    .buf = regbuf
+  };
+  struct i2c_msg read = {
+    .addr = i2c_addr,
+    .flags = I2C_M_RD,
+    .len = 1,
+    .buf = val
+  };
+  int ret;
+  +ret = i2c_transfer(ov5645->i2c_client->adapter, &req, 1);
+  if (ret < 0)
+    dev_err(ov5645->dev,
+      "%s: req reg error %d on addr 0x%x: reg=0x%x\n",
+      __func__, ret, i2c_addr, reg);
+  +
+  +ret = i2c_transfer(ov5645->i2c_client->adapter, &read, 1);
+  if (ret < 0) {
+    dev_err(ov5645->dev,
+      "%s: read reg error %d on addr 0x%x: reg=0x%x\n",
+      __func__, ret, i2c_addr, reg);
+__func__, ret, i2c_addr, reg);
+return ret;
+
+static int ov5645_write_reg_to(struct ov5645 *ov5645, u16 reg, u8 val,
+       u16 i2c_addr)
+{
+    u8 regbuf[3] = {
+        reg >> 8,  
+        reg & 0xff,  
+        val  
+    };
+    struct i2c_msg msgs = {
+        .addr = i2c_addr,
+        .flags = 0,
+        .len = 3,
+        .buf = regbuf
+    };
+    int ret;
+    ret = i2c_transfer(ov5645->i2c_client->adapter, &msgs, 1);
+    if (ret < 0)
+        dev_err(ov5645->dev,
+            "%s: write reg error %d on addr 0x%x: reg=0x%x, val=0x%x\n",
+                __func__, ret, i2c_addr, reg, val);
+    return ret;
+
+static int ov5645_write_reg(struct ov5645 *ov5645, u16 reg, u8 val)
+{
+    u8 regbuf[3];
+    struct ov5645 *ov5645 = to_ov5645(sd);
+    int ret = 0;
+    u8 addr;
+
+    mutex_lock(&ov5645->power_lock);
+
+    if (ov5645->power_count != !on) {
+        if (on) {
+            mutex_lock(&ov5645_lock);
+            int ret = 0;
+            u8 addr;
+            struct ov5645 *ov5645 = to_ov5645(sd);
+            u8 regbuf[3];
+            struct i2c_msg msgs = {
+                .addr = i2c_addr,
+                .flags = 0,
+                .len = 3,
+                .buf = regbuf
+            };
+            int ret;
+            ret = i2c_transfer(ov5645->i2c_client->adapter, &msgs, 1);
+            if (ret < 0)
+                dev_err(ov5645->dev,
+                    "%s: write reg error %d on addr 0x%x: reg=0x%x, val=0x%x\n",
+                    __func__, ret, i2c_addr, reg, val);
+            return ret;
+        }
+    }
+    return ret;
+}
ret = ov5645_set_power_on(ov5645);
-if (ret < 0)
+if (ret < 0) {
+mutex_unlock(&ov5645_lock);
goto exit;
+
-
-ret = ov5645_set_register_array(ov5645,
-ov5645_global_init_setting,
-ARRAY_SIZE(ov5645_global_init_setting));
+ret = ov5645_read_reg_from(ov5645, 0x3100, &addr, 0x3c);
if (ret < 0) {
  dev_err(ov5645->dev,
    -"could not set init registers\n");
  +"could not read sensor address\n");
  ov5645_set_power_off(ov5645);
  +mutex_unlock(&ov5645_lock);
goto exit;
}

-ret = ov5645_write_reg(ov5645, OV5645_SYSTEM_CTRL0,
-  OV5645_SYSTEM_CTRL0_STOP);
+/
+ * change sensor address only if the one supplied in the
+ * DT is different from the default one
+ * /
+if (addr != ov5645->i2c_client->addr) {
+ret = ov5645_write_reg_to(ov5645, 0x3100,
+ov5645->i2c_client->addr << 1, 0x3c);
+if (ret < 0) {
+  dev_err(ov5645->dev,
+    "could not change i2c address\n");
+  ov5645_set_power_off(ov5645);
+  mutex_unlock(&ov5645_lock);
+goto exit;
+}
+}
+
+mutex_unlock(&ov5645_lock);
+
+ret = ov5645_set_register_array(ov5645,
+ov5645_global_init_setting,
+ARRAY_SIZE(ov5645_global_init_setting));
if (ret < 0) {
  dev_err(ov5645->dev,
    "could not set init registers\n");
  ov5645_set_power_off(ov5645);
goto exit;
}
+
+usleep_range(500, 1000);
} else {
    +ov5645_write_reg(ov5645, OV5645_IO_MIPI_CTRL00, 0x58);
    ov5645_set_power_off(ov5645);
}

@@ -1069,11 +1169,20 @@
dev_err(ov5645->dev, "could not sync v4l2 controls\n");
return ret;
}
+
+ret = ov5645_write_reg(ov5645, OV5645_IO_MIPI_CTRL00, 0x45);
+if (ret < 0)
+    return ret;
+
+ret = ov5645_write_reg(ov5645, OV5645_SYSTEM_CTRL0, 
    OV5645_SYSTEM_CTRL0_START);
if (ret < 0)
return ret;
} else {
    +ret = ov5645_write_reg(ov5645, OV5645_IO_MIPI_CTRL00, 0x40);
    +if (ret < 0)
        +return ret;
+
    ret = ov5645_write_reg(ov5645, OV5645_SYSTEM_CTRL0, 
        OV5645_SYSTEM_CTRL0_STOP);
if (ret < 0)
    @@ -1131,13 +1240,14 @@
    ret = v4l2_fwnode_endpoint_parse(of_fwnode_handle(endpoint),
        &ov5645->ep);
    +
        +of_node_put(endpoint);
    +
    if (ret < 0) {
        dev_err(dev, "parsing endpoint node failed\n");
        return ret;
    }
-
    -of_node_put(endpoint);
-
    if (ov5645->ep.bus_type != V4L2_MBUS_CSI2) {
        dev_err(dev, "invalid bus type, must be CSI2\n");
        return -EINVAL;
    }
    @@ -1156,7 +1266,8 @@
return ret;
}

- if (xclk_freq != 23880000) {
+ /* external clock must be 24MHz, allow 1% tolerance */
+ if (xclk_freq < 23760000 || xclk_freq > 24240000) {
   dev_err(dev, "external clock frequency %u is not supported\n", xclk_freq);
   return -EINVAL;
--- linux-4.15.0.orig/drivers/media/i2c/ov5670.c
+++ linux-4.15.0/drivers/media/i2c/ov5670.c
@@ -2091,7 +2091,8 @@
   /* By default, V4L2_CID_PIXEL_RATE is read only */
   ov5670->pixel_rate = v4l2_ctrl_new_std(ctrl_hdlr, &ov5670_ctrl_ops,
      - V4L2_CID_PIXEL_RATE, 0,
+ V4L2_CID_PIXEL_RATE,
+   link_freq_configs[0].pixel_rate,
   link_freq_configs[0].pixel_rate,
      1,
      link_freq_configs[0].pixel_rate);
--- linux-4.15.0.orig/drivers/media/i2c/ov6650.c
+++ linux-4.15.0/drivers/media/i2c/ov6650.c
@@ -203,7 +203,6 @@
   unsigned long		pclk_max; /* from resolution and format */
   struct v4l2_fract		tpf; /* as requested with s_parm */
   u32 code;
- enum v4l2_colorspace	colorspace;
   }

MEDIA_BUS_FMT_Y8_1X8,
};

+static const struct v4l2_mbus_framefmt ov6650_def_fmt = {
+   .width= W_CIF,
+   .height= H_CIF,
+   .code= MEDIA_BUS_FMT_SBGGR8_1X8,
+   .colorspace= V4L2_COLORSPACE_SRGB,
+   .field= V4L2_FIELD_NONE,
+   .ycbcr_enc= V4L2_YCBCR_ENC_DEFAULT,
+   .quantization= V4L2_QUANTIZATION_DEFAULT,
+   .xfer_func= V4L2_XFER_FUNC_DEFAULT,
+   +
+   /* read a register */
+ static int ov6650_reg_read(struct i2c_client *client, u8 reg, u8 *val)
struct i2c_client *client = v4l2_get_subdevdata(sd);
struct ov6650 *priv = to_ov6650(client);
-struct v4l2_rect rect = sel->r;
int ret;

if (sel->which != V4L2_SUBDEV_FORMAT_ACTIVE ||
    sel->target != V4L2_SEL_TGT_CROP)
return -EINVAL;

-v4l_bound_align_image(&rect.width, 2, W_CIF, 1,
-    &rect.height, 2, H_CIF, 1, 0);
-v4l_bound_align_image(&rect.left, DEF_HSTRT << 1,
-    (DEF_HSTRT << 1) + W_CIF - (___s32)rect.width, 1,
-    &rect.top, DEF_VSTRT << 1,
-    (DEF_VSTRT << 1) + H_CIF - (___s32)rect.height, 1,
-    0);
+v4l_bound_align_image(&sel->r.width, 2, W_CIF, 1,
+    &sel->r.height, 2, H_CIF, 1, 0);
+v4l_bound_align_image(&sel->r.left, DEF_HSTRT << 1,
+    (DEF_HSTRT << 1) + W_CIF - (___s32)sel->r.width, 1,
+    &sel->r.top, DEF_VSTRT << 1,
+    (DEF_VSTRT << 1) + H_CIF - (___s32)sel->r.height,
+    1, 0);

-ret = ov6650_reg_write(client, REG_HSTRT, rect.left >> 1);
+ret = ov6650_reg_write(client, REG_HSTRT, sel->r.left >> 1);
if (!ret) {
    -priv->rect.left = rect.left;
+priv->rect.width += priv->rect.left - sel->r.left;
+priv->rect.left = sel->r.left;
    ret = ov6650_reg_write(client, REG_HSTOP,
-        (rect.left + rect.width) >> 1);
+        (sel->r.left + sel->r.width) >> 1);
}
if (!ret) {
    -priv->rect.width = rect.width;
-    ret = ov6650_reg_write(client, REG_VSTRT, rect.top >> 1);
+    priv->rect.width = sel->r.width;
+    ret = ov6650_reg_write(client, REG_VSTRT, sel->r.top >> 1);
}
if (!ret) {
    -priv->rect.top = rect.top;
+    priv->rect.height += priv->rect.top - sel->r.top;
+    priv->rect.top = sel->r.top;
    ret = ov6650_reg_write(client, REG_VSTOP,
-(rect.top + rect.height) >> 1);
+  (sel->r.top + sel->r.height) >> 1);
}
if (!ret)
-priv->rect.height = rect.height;
+priv->rect.height = sel->r.height;

return ret;
}
@@ -516,12 +527,20 @@
if (format->pad)
return -EINVAL;

-mf->width = priv->rect.width >> priv->half_scale;
-mf->height = priv->rect.height >> priv->half_scale;
-mf->code = priv->code;
-mf->colorspace = priv->colorspace;
-mf->field = V4L2_FIELD_NONE;
+/* initialize response with default media bus frame format */
+*mf = ov6650_def_fmt;
+
+/* update media bus format code and frame size */
+if (format->which == V4L2_SUBDEV_FORMAT_TRY) {
+mf->width = cfg->try_fmt.width;
+mf->height = cfg->try_fmt.height;
+mf->code = cfg->try_fmt.code;
+
+} else {
+mf->width = priv->rect.width >> priv->half_scale;
+mf->height = priv->rect.height >> priv->half_scale;
+mf->code = priv->code;
+
+}
return 0;
}
@@ -614,7 +633,6 @@
dev_err(&client->dev, "Pixel format not handled: 0x%nxn", code);
return -EINVAL;
}
-priv->code = code;

if (code == MEDIA_BUS_FMT_Y8_1X8 ||
code == MEDIA_BUS_FMT_SBGGR8_1X8) {
@@ -627,11 +645,6 @@
priv->pclk_max = 8000000;
}

-if (code == MEDIA_BUS_FMT_SBGGR8_1X8)
-priv->colorspace = V4L2_COLORSPACE_SRGB;
-else if (code != 0)
-priv->colorspace = V4L2_COLORSPACE_JPEG;
-
if (half_scale) {
  dev_dbg(&client->dev, "max resolution: QCIF\n");
  coma_set |= COMA_QCIF;
  @ @ -640,7 +653,6 @@
  dev_dbg(&client->dev, "max resolution: CIF\n");
  coma_mask |= COMA_QCIF;
}
-priv->half_scale = half_scale;

clkrc = CLKRC_12MHz;
mclk = 12000000;
@@ -658,7 +670,14 @@
ret = ov6650_reg_rmw(client, REG_COMA, coma_set, coma_mask);
if (!ret)
  ret = ov6650_reg_write(client, REG_CLKRC, clkrc);
-@ if (!ret)
-ret = ov6650_reg_rmw(client, REG_COML, coml_set, coml_mask);
-
if (!ret) {
-@ if (!ret)
-@ mf->colorspace = priv->colorspace;
-@ mf->width = priv->rect.width >> half_scale;
-@ mf->height = priv->rect.height >> half_scale;
+priv->half_scale = half_scale;
+ret = ov6650_reg_rmw(client, REG_COML, coml_set, coml_mask);
}
+@ if (!ret)
+priv->code = code;
+
return ret;
}

@@ -684,8 +705,39 @@
v4l_bound_align_image(&mf->width, 2, W_CIF, 1,
&mf->height, 2, H_CIF, 1, 0);

-mf->field = V4L2_FIELD_NONE;
-
switch (mf->code) {
  case MEDIA_BUS_FMT_Y10_1X10:
    mf->code = MEDIA_BUS_FMT_Y8_1X8;
    @ @ -695,20 +705,39 @@
    case MEDIA_BUS_FMT_YUYV8_2X8:
    case MEDIA_BUS_FMT_VYUY8_2X8:
case MEDIA_BUS_FMT_UYVY8_2X8:
  - mf->colorspace = V4L2_COLORSPACE_JPEG;
  break;
default:
  mf->code = MEDIA_BUS_FMT_SBGGR8_1X8;
  /* fall through */
case MEDIA_BUS_FMT_SBGGR8_1X8:
  - mf->colorspace = V4L2_COLORSPACE_SRGB;
  break;
}

@if (format->which == V4L2_SUBDEV_FORMAT_ACTIVE)
  - return ov6650_s_fmt(sd, mf);
  - cfg->try_fmt = *mf;
+ if (format->which == V4L2_SUBDEV_FORMAT_TRY) {
    /* store media bus format code and frame size in pad config */
    + cfg->try_fmt.width = mf->width;
    + cfg->try_fmt.height = mf->height;
    + cfg->try_fmt.code = mf->code;
    +
    /* return default mbus frame format updated with pad config */
    + *mf = ov6650_def_fmt;
    + mf->width = cfg->try_fmt.width;
    + mf->height = cfg->try_fmt.height;
    + mf->code = cfg->try_fmt.code;
    +
    } else {
    /* apply new media bus format code and frame size */
    + int ret = ov6650_s_fmt(sd, mf);
    +
    + if (ret)
      + return ret;
    +
    /* return default format updated with active size and code */
    + *mf = ov6650_def_fmt;
    + mf->width = priv->rect.width >> priv->half_scale;
    + mf->height = priv->rect.height >> priv->half_scale;
    + mf->code = priv->code;
    +
    } return 0;
}

@@ -822,9 +851,18 @@
u8 pidh, pidl, midh, midl;
     int ret;
     +priv->clk = v4l2_clk_get(&client->dev, NULL);
     +if (IS_ERR(priv->clk)) {
ret = PTR_ERR(priv->clk);
+dev_err(&client->dev, "v4l2_clk request err: %d\n", ret);
+return ret;
+
ret = ov6650_s_power(&priv->subdev, 1);
if (ret < 0)
-    return ret;
+    goto eclkput;
+
    msleep(20);
*/

/*
 * check and show product ID and manufacturer ID
* @@ -859,6 +897,11 @@

done:
    ov6650_s_power(&priv->subdev, 0);
+    if (!ret)
+        return 0;
+    eclkput:
+    v4l2_clk_put(priv->clk);
+    return ret;
 */

@@ -999,20 +1042,10 @@
    priv->rect.height = H_CIF;
    priv->half_scale  = false;
    priv->code = MEDIA_BUS_FMT_YUYV8_2X8;
-    priv->colorspace  = V4L2_COLORSPACE_JPEG;
-    priv->clk = v4l2_clk_get(&client->dev, NULL);
-    if (IS_ERR(priv->clk)) {
-        ret = PTR_ERR(priv->clk);
-        goto eclkget;
-    }
    ret = ov6650_video_probe(client);
-    if (ret) {
-        v4l2_clk_put(priv->clk);
-        eclkget:
-        if (ret)
-            v4l2_ctrl_handler_free(&priv->hdl);
-    }

    ret = ov6650_video_probe(client);
-    if (ret) {
-        v4l2_clk_put(priv->clk);
-        eclkget:
+        if (ret)
+            v4l2_ctrl_handler_free(&priv->hdl);
+    }

    return ret;
}
--- linux-4.15.0.orig/drivers/media/i2c/ov7670.c
+++ linux-4.15.0/drivers/media/i2c/ov7670.c
@@ -158,10 +158,10 @@
     #define REG_GFIX "0x69 /* Fix gain control */

     #define REG_DBLV0x6b/* PLL control an debugging */
- #define   DBLV_BYPASS "0x00 /* Bypass PLL */
- #define   DBLV_X4 "0x01 /* clock x4 */
- #define   DBLV_X6 "0x10 /* clock x6 */
- #define   DBLV_X8 "0x11 /* clock x8 */
+ #define   DBLV_BYPASS "0x0a /* Bypass PLL */
+ #define   DBLV_X4 "0x4a /* clock x4 */
+ #define   DBLV_X6 "0x8a /* clock x6 */
+ #define   DBLV_X8 "0xca /* clock x8 */

     #define REG_REG760x76 /* OV's name */
     #define R76_BLKPCOR "0x80 /* Black pixel correction enable */
     @ @ -841,7 +841,7 @@
     if (ret < 0)
         return ret;

         -return ov7670_write(sd, REG_DBLV, DBLV_X4);
         +return 0;
 }

 static void ov7670_get_framerate_legacy(struct v4l2_subdev *sd,
     @ @ -1692,28 +1692,31 @@
     if (config->clock_speed)
         info->clock_speed = config->clock_speed;

     /*
     - * It should be allowed for ov7670 too when it is migrated to
     - * the new frame rate formula.
     - */
     -if (config->pll_bypass && id->driver_data != MODEL_OV7670)
     +if (config->pll_bypass)
         info->pll_bypass = true;

     if (config->pclk_hb_disable)
         info->pclk_hb_disable = true;
     }

     -info->clk = devm_clk_get(&client->dev, "xclk");
     -if (IS_ERR(info->clk))
         -return PTR_ERR(info->clk);
     -ret = clk_prepare_enable(info->clk);
     -if (ret)
         -return ret;

---
+info->clk = devm_clk_get(&client->dev, "xclk"); /* optional */
+if (IS_ERR(info->clk)) {
+ret = PTR_ERR(info->clk);
+if (ret == -ENOENT)
+info->clk = NULL;
+} else
+return ret;
+
+if (info->clk) {
+ret = clk_prepare_enable(info->clk);
+if (ret)
+return ret;

-info->clock_speed = clk_get_rate(info->clk) / 1000000;
-if(info->clock_speed < 10 || info->clock_speed > 48) {
-ret = -EINVAL;
-goto clk_disable;
+info->clock_speed = clk_get_rate(info->clk) / 1000000;
+if (info->clock_speed < 10 || info->clock_speed > 48) {
+ret = -EINVAL;
+goto clk_disable;
+}
} ret = ov7670_init_gpio(client, info);
--- linux-4.15.0.orig/drivers/media/i2c/ov9650.c
+++ linux-4.15.0/drivers/media/i2c/ov9650.c
@@ -710,6 +710,11 @@
for (m = 6; m >= 0; m--)
if (gain >= (1 << m) * 16)
break;
+
+/* Sanity check: don't adjust the gain with a negative value */
+if (m < 0)
+return -EINVAL;
+
+rgain = (gain - ((1 << m) * 16)) / (1 << m);
+rgain |= (((1 << m) - 1) << 4);

--- linux-4.15.0.orig/drivers/media/i2c/s5c73m3/s5c73m3-core.c
+++ linux-4.15.0/drivers/media/i2c/s5c73m3/s5c73m3-core.c
@@ -1394,7 +1394,7 @@
s5c73m3_gpio_deassert(state, STBY);
usleep_range(100, 200);

-s5c73m3_gpio_deassert(state, RST);
+s5c73m3_gpio_deassert(state, RSET);
usleep_range(50, 100);
return 0;
@@ -1409,7 +1409,7 @@
{
    int i, ret;

    -if (s5c73m3_gpio_assert(state, RST))
+    if (s5c73m3_gpio_assert(state, RSET))
        usleep_range(10, 50);

    if (s5c73m3_gpio_assert(state, STBY))
@@ -1614,7 +1614,7 @@

    state->mclk_frequency = pdata->mclk_frequency;
    state->gpio[STBY] = pdata->gpio_stby;
    -state->gpio[RST] = pdata->gpio_reset;
+    state->gpio[RSET] = pdata->gpio_reset;
    return 0;
}

--- linux-4.15.0.orig/drivers/media/i2c/s5c73m3/s5c73m3.h
+++ linux-4.15.0/drivers/media/i2c/s5c73m3/s5c73m3.h
@@ -361,7 +361,7 @@

    enum s5c73m3_gpio_id {
    STBY,
    -RST,
+    RSET,
    GPIO_NUM,
    
    --- linux-4.15.0.orig/drivers/i2c/s5k4ecgx.c
+++ linux-4.15.0/drivers/i2c/s5k4ecgx.c
@@ -177,7 +177,7 @@

    enum s5k4ecgx_gpio_id {
    STBY,
    -RST,
+    RSET,
    GPIO_NUM,
    
    --- linux-4.15.0.orig/drivers/i2c/s5k4ecgx.c
+++ linux-4.15.0/drivers/i2c/s5k4ecgx.c
@@ -482,7 +482,7 @@

    if (s5k4ecgx_gpio_set_value(priv, STBY, priv->gpio[STBY].level))
        usleep_range(30, 50);

    -if (s5k4ecgx_gpio_set_value(priv, RST, priv->gpio[RST].level))
+    if (s5k4ecgx_gpio_set_value(priv, RSET, priv->gpio[RSET].level))

usleep_range(30, 50);

return 0;
@@ -490,7 +490,7 @@
static int __s5k4ecgx_power_off(struct s5k4ecgx *priv)
{
    -if (s5k4ecgx_gpio_set_value(priv, RST, !priv->gpio[RST].level))
    +if (s5k4ecgx_gpio_set_value(priv, RSET, !priv->gpio[RSET].level))
        usleep_range(30, 50);

    if (s5k4ecgx_gpio_set_value(priv, STBY, !priv->gpio[STBY].level))
@@ -878,7 +878,7 @@
        int ret;

        priv->gpio[STBY].gpio = -EINVAL;
        -priv->gpio[RST].gpio = -EINVAL;
        +priv->gpio[RSET].gpio = -EINVAL;

        ret = s5k4ecgx_config_gpio(gpio->gpio, gpio->level, "S5K4ECGX_STBY");

    } @@ -897,7 +897,7 @@

    s5k4ecgx_free_gpios(priv);
    return ret;
}
    -priv->gpio[RST] = *gpio;
    +priv->gpio[RSET] = *gpio;
    if (gpio_is_valid(gpio->gpio))
        gpio_set_value(gpio->gpio, 0);

--- linux-4.15.0.orig/drivers/media/i2c/s5k5baf.c
+++ linux-4.15.0/drivers/media/i2c/s5k5baf.c
@@ -238,7 +238,7 @@

    enum s5k5baf_gpio_id {
        STBY,
        RST,
    "S5K4ECGX_STBY"");

    s5k5baf_gpio_deassert(state, STBY);
    usleep_range(50, 100);
    -s5k5baf_gpio_deassert(state, RST);
    +s5k5baf_gpio_deassert(state, RSET);
    return 0;
    

err_reg_dis:
@@ -991,7 +991,7 @@
    state->apply_cfg = 0;
    state->apply_crop = 0;

-    s5k5baf_gpio_assert(state, RST);
+    s5k5baf_gpio_assert(state, RSET);
    s5k5baf_gpio_assert(state, STBY);

    if (!IS_ERR(state->clock))
--- linux-4.15.0.orig/drivers/media/i2c/s5k6aa.c
+++ linux-4.15.0/drivers/media/i2c/s5k6aa.c
@@ -181,7 +181,7 @@
enum s5k6aa_gpio_id {
    STBY,
    -RST,
+    RSET,
    GPIO_NUM,
    };

@@ -845,7 +845,7 @@
    ret = s5k6aa->s_power(1);
    usleep_range(4000, 5000);

-    if (s5k6aa_gpio_deassert(s5k6aa, RST))
+    if (s5k6aa_gpio_deassert(s5k6aa, RSET))
      msleep(20);

    return ret;
@@ -855,7 +855,7 @@
    {
      int ret;

-    if (s5k6aa_gpio Assert(s5k6aa, RST))
+    if (s5k6aa_gpio Assert(s5k6aa, RSET))
      usleep_range(100, 150);

    if (s5k6aa->s_power) {
@@ -1514,7 +1514,7 @@
        s5k6aa->gpio[STBY].gpio = -EINVAL;
-        s5k6aa->gpio[RST].gpio  = -EINVAL;
+        s5k6aa->gpio[RSET].gpio  = -EINVAL;
        gpio = &pdata->gpio_stby;
if (gpio_is_valid(gpio->gpio)) {
    @ @ -1537,7 +1537,7 @@
    if (ret < 0)
        return ret;

    -s5k6aa->gpio[RST] = *gpio;
    +s5k6aa->gpio[RSET] = *gpio;
}

return 0;
--- linux-4.15.0.orig/drivers/media/i2c/saa6588.c
+++ linux-4.15.0/drivers/media/i2c/saa6588.c
@@ -392,7 +392,7 @@
/* ---------------------------------------------------------------------- */
 static long saa6588_ioctl(struct v4l2_subdev *sd, unsigned int cmd, void *arg)
+static long saa6588_command(struct v4l2_subdev *sd, unsigned int cmd, void *arg)
{
    struct saa6588 *s = to_saa6588(sd);
    struct saa6588_command *a = arg;
@@ -445,7 +445,7 @@
/* ----------------------------------------------------------------------- */
 static const struct v4l2_subdev_core_ops saa6588_core_ops = {
    .ioctl = saa6588_ioctl,
    .command = saa6588_command,
};

 static const struct v4l2_subdev_tuner_ops saa6588_tuner_ops = {
    --- linux-4.15.0.orig/drivers/media/i2c/smiapp/smiapp-core.c
+++ linux-4.15.0/drivers/media/i2c/smiapp/smiapp-core.c
@@ -1001,7 +1001,7 @@
    if (rval)
        goto out;

-    -for (i = 0; i < 1000; i++) {
-    +for (i = 1000; i > 0; i--) {
    rval = smiapp_read(
        sensor,
        SMIAPP_REG_U8_DATA_TRANSFER_IF_1_STATUS, &s);
@@ -1012,11 +1012,10 @@
    if (s & SMIAPP_DATA_TRANSFER_IF_1_STATUS_RD_READY)
        break;

-    -if (--i == 0) {
-    +rval = -ETIMEDOUT;
-        goto out;
    */
}
if (!i) {
    rval = -ETIMEDOUT;
    goto out;
}

for (i = 0; i < SMIAPP_NVM_PAGE_SIZE; i++) {
    if (rval < 0) {
        if (rval != -EBUSY && rval != -EAGAIN)
            pm_runtime_set_active(&client->dev);
        pm_runtime_put(&client->dev);
        return -ENODEV;
    }
    if (smiapp_read_nvm(sensor, sensor->nvm)) {
        pm_runtime_put(&client->dev);
        dev_err(&client->dev, "nvm read failed
");
        return -ENODEV;
    }
}
@@ -3093,19 +3093,23 @@
    if (rval < 0)
        goto out_media_entity_cleanup;

    -rval = v4l2_async_register_subdev_sensor_common(&sensor->src->sd);
    -if (rval < 0)
        -goto out_media_entity_cleanup;
    -
        pm_runtime_set_active(&client->dev);
        pm_runtime_get_noresume(&client->dev);
        pm_runtime_enable(&client->dev);
    +
        +rval = v4l2_async_register_subdev_sensor_common(&sensor->src->sd);
        +if (rval < 0)
        +goto out_disable_runtime_pm;
    +
        pm_runtime_set_autosuspend_delay(&client->dev, 1000);
        pm_runtime_use_autosuspend(&client->dev);
        pm_runtime_put_autosuspend(&client->dev);

    return 0;

    +out_disable_runtime_pm:
    +pm_runtime_disable(&client->dev);
    +
out_media_entity_cleanup:
media_entity_cleanup(&sensor->src->sd.entity);

--- linux-4.15.0.orig/drivers/media/i2c/soc_camera/ov772x.c
+++ linux-4.15.0/drivers/media/i2c/soc_camera/ov772x.c
@@ -513,9 +513,19 @@
return container_of(sd, struct ov772x_priv, subdev);
}

-static inline int ov772x_read(struct i2c_client *client, u8 addr)
+static int ov772x_read(struct i2c_client *client, u8 addr)
{
- return i2c_smbus_read_byte_data(client, addr);
+ int ret;
+ u8 val;
+
+ ret = i2c_master_send(client, &addr, 1);
+ if (ret < 0)
+ return ret;
+ ret = i2c_master_recv(client, &val, 1);
+ if (ret < 0)
+ return ret;
+ return val;
}

static inline int ov772x_write(struct i2c_client *client, u8 addr, u8 value)
@@ -834,7 +844,7 @@
 * set COM8
 */
if (priv->band_filter) {
- ret = ov772x_mask_set(client, COM8, BNDF_ON_OFF, 1);
+ ret = ov772x_mask_set(client, COM8, BNDF_ON_OFF, BNDF_ON_OFF);
if (!ret)
 ret = ov772x_mask_set(client, BDBASE,
0xff, 256 - priv->band_filter);
@@ -932,7 +942,7 @@
static int ov772x_video_probe(struct ov772x_priv *priv)
{
 struct i2c_client *client = v4l2_get_subdevdata(&priv->subdev);
- u8 pid, ver;
+ int pid, ver, midh, midl;
 const char *devname;
 int ret;

@@ -944,7 +954,11 @@
 * check and show product ID and manufacturer ID
 */
pid = ov772x_read(client, PID);
+if (pid < 0)
+return pid;
ver = ov772x_read(client, VER);
+if (ver < 0)
+return ver;

switch (VERSION(pid, ver)) {
    case OV7720:
        goto done;
}

+midh = ov772x_read(client, MIDH);
+if (midh < 0)
+return midh;
+midl = ov772x_read(client, MIDL);
+if (midl < 0)
+return midl;
+dev_info(&client->dev,
    "%s Product ID %0x:%0x Manufacturer ID %x:%x\n",
    - devname,
    - pid,
    - ver,
    - ov772x_read(client, MIDH),
    - ov772x_read(client, MIDL));
+ devname, pid, ver, midh, midl);
+
ret = v4l2_ctrl_handler_setup(&priv->hdl);

done:
@@ -1047,13 +1065,11 @@
    return -EINVAL;
}

-If (!i2c_check_functionality(adapter, I2C_FUNC_SMBUS_BYTE_DATA |
-    I2C_FUNC_PROTOCOL_MANGLING)) {
+if (!i2c_check_functionality(adapter, I2C_FUNC_SMBUS_BYTE_DATA)) {
    dev_err(&adapter->dev,
    "I2C-Adapter doesn't support SMBUS_BYTE_DATA or PROTOCOL_MANGLING\n");
    return -EIO;
}
-client->flags |= I2C_CLIENT_SCCB;

priv = devm_kzalloc(&client->dev, sizeof(*priv), GFP_KERNEL);
if (!priv)
--- linux-4.15.0.orig/drivers/media/i2c/tc358743.c
+++ linux-4.15.0/drivers/media/i2c/tc358743.c
@@ -72,7 +72,7 @@
 /* keep this initialization for compatibility with GCC < 4.4.6 */
 .reserved = { 0 },
 /* Pixel clock from REF_01 p. 20. Min/max height/width are unknown */
- V4L2_INIT_BT_TIMINGS(1, 10000, 1, 10000, 0, 165000000,
+ V4L2_INIT_BT_TIMINGS(640, 1920, 350, 1200, 13000000, 165000000,
    V4L2_DV_BT_STD_CEA861 | V4L2_DV_BT_STD_DMT |
    V4L2_DV_BT_STD_GTF | V4L2_DV_BT_STD_CVT,
    V4L2_DV_BT_CAP_PROGRESSIVE |
@@ -932,8 +932,8 @@
   .adap_monitor_all_enable = tc358743_cec_adap_monitor_all_enable,
 });

-static void tc358743_cec_isr(struct v4l2_subdev *sd, u16 intstatus,
-                      bool *handled)
+static void tc358743_cec_handler(struct v4l2_subdev *sd, u16 intstatus,
+                      bool *handled)
{  
    struct tc358743_state *state = to_state(sd);
    unsigned int cec_rxint, cec_txint;
@@ -966,7 +966,8 @@
       cec_transmit_attempt_done(state->cec_adap,
                   CEC_TX_STATUS_ERROR);
    }
-   -*handled = true;
+   if (handled)
+      -*handled = true;
    }
    if ((intstatus & MASK_CEC_RINT) &&
          (cec_rxint & MASK_CECRIEND)) {
@@ -981,7 +982,8 @@
          msg.msg[i] = v & 0xff;
       }
       cec_received_msg(state->cec_adap, &msg);
-      -*handled = true;
+      if (handled)
+         -*handled = true;
    }
  i2c_wr16(sd, INTSTATUS,
         intstatus & (MASK_CEC_RINT | MASK_CEC_TINT));
@@ -1256,9 +1258,9 @@
     u8 vi_status3 = i2c_rd8(sd, VI_STATUS3);
     const int deep_color_mode[4] = { 8, 10, 12, 16 };
     static const char * const input_color_space[] = {
-   "RGB", "YCbCr 601", "Adobe RGB", "YCbCr 709", "NA (4)",
+   "RGB", "YCbCr 601", "opRGB", "YCbCr 709", "NA (4)",

"xvYCC 601", "NA(6)", "xvYCC 709", "NA(8)", "sYCC601",
"NA(10)", "NA(11)", "NA(12)", "Adobe YCC 601");
+"NA(10)", "NA(11)", "NA(12)", "opYCC 601");

v4l2_info(sd, "-----Chip status-----");
v4l2_info(sd, "Chip ID: 0x%02x", @ @ -1445,7 +1447,7 @ @

#ifndef CONFIG_VIDEO_TC358743_CEC
if (intstatus & (MASK_CEC_RINT | MASK_CEC_TINT)) {
-tc358743_cec_isr(sd, intstatus, handled);
+tc358743_cec_handler(sd, intstatus, handled);
i2c_wr16(sd, INTSTATUS,
    intstatus & (MASK_CEC_RINT | MASK_CEC_TINT));
intstatus &= ~(MASK_CEC_RINT | MASK_CEC_TINT);
@@ -1474,7 +1476,7 @@
static irqreturn_t tc358743_irq_handler(int irq, void *dev_id)
{
    struct tc358743_state *state = dev_id;
    -bool handled;
    +bool handled = false;

tc358743_isr(&state->sd, 0, &handled);
@@ -1982,6 +1984,7 @@
    bps_pr_lane = 2 * endpoint->link_frequencies[0];
    if (bps_pr_lane < 62500000U || bps_pr_lane > 1000000000U) {
        dev_err(dev, "unsupported bps per lane: %u bps\n", bps_pr_lane);
        +ret = -EINVAL;
        goto disable_clk;
    }
    @@ -2200,7 +2203,7 @@
    del_timer_sync(&state->timer);
    flush_work(&state->work_i2c_poll);
    -cancel_delayed_work(&state->delayed_work_enable_hotplug);
    +cancel_delayed_work_sync(&state->delayed_work_enable_hotplug);
    cec_unregister_adapter(state->cec_adap);
    v4l2_async_unregister_subdev(sd);
    v4l2_device_unregister_subdev(sd);
--- linux-4.15.0.orig/drivers/media/i2c/ths8200.c
+++ linux-4.15.0/drivers/media/i2c/ths8200.c
@@ -49,7 +49,7 @@
    .type = V4L2_DV_BT_656_1120,
    /* keep this initialization for compatibility with GCC < 4.4.6 */
    .reserved = { 0 },
-V4L2_INIT_BT_TIMINGS(0, 1920, 0, 1080, 25000000, 1485000000,
);

--- linux-4.15.0.orig/drivers/media/i2c/tvp5150.c
+++ linux-4.15.0/drivers/media/i2c/tvp5150.c
@@ -506,80 +506,77 @@
/* FIXME: Current api doesn't handle all VBI types, those not
 yet supported are placed under #if 0 */
#if 0
-0x10, /* Teletext, SECAM, WST System A */
+0x10 /* Teletext, SECAM, WST System A */
{V4L2_SLICED_TELETEXT_SECAM,6,23,1},
 0xaa, 0xaa, 0xff, 0xff, 0xe7, 0x2e, 0x20, 0x26, 0xe6, 0xb4, 0x0e, 0x00, 0x00, 0x00, 0x10, 0x00 }
},
#endif
-0x30, /* Teletext, PAL, WST System B */
+0x30 /* Teletext, PAL, WST System B */
{V4L2_SLICED_TELETEXT_B,6,22,1},
 0xaa, 0xea, 0xff, 0xff, 0x27, 0x2e, 0x20, 0x2b, 0xa6, 0x72, 0x10, 0x00, 0x00, 0x00, 0x10, 0x00 }
},
#endif
-0x50, /* Teletext, PAL, WST System C */
+0x50 /* Teletext, PAL, WST System C */
{V4L2_SLICED_TELETEXT_PAL_C,6,22,1},
 0xaa, 0xea, 0xff, 0xff, 0xe7, 0x2e, 0x20, 0x22, 0xa6, 0x98, 0x0d, 0x00, 0x00, 0x00, 0x10, 0x00 }
},
-0x70, /* Teletext, NTSC, WST System B */
+0x70 /* Teletext, NTSC, WST System B */
{V4L2_SLICED_TELETEXT_NTSC_B,10,21,1},
 0xaa, 0xa9, 0xff, 0xff, 0x27, 0x2e, 0x20, 0x23, 0x69, 0x93, 0x0d, 0x00, 0x00, 0x00, 0x10, 0x00 }
},
-0x90, /* Teletext, NTSC NABTS System C */
+0x90 /* Teletext, NTSC NABTS System C */
{V4L2_SLICED_TELETEXT_NTSC_C,10,21,1},
 0xaa, 0xa9, 0xff, 0xff, 0xe7, 0x2e, 0x20, 0x22, 0x69, 0x93, 0x0d, 0x00, 0x00, 0x00, 0x15, 0x00 }
},
-0x0b0, /* Teletext, NTSC-J, NABTS System D */
+0x0b0 /* Teletext, NTSC-J, NABTS System D */
{V4L2_SLICED_TELETEXT_NTSC_J,10,21,1},
 0xaa, 0xa9, 0xff, 0xff, 0xa7, 0x2e, 0x20, 0x23, 0x69, 0x93, 0x0d, 0x00, 0x00, 0x00, 0x10, 0x00 }
},

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-0x0d0, /* Closed Caption, PAL/SECAM */
+0x0d0, /* Closed Caption, PAL/SECAM */
  [V4L2_SLICED_CAPTION_625,22,22,1],
  { 0xa9, 0x2a, 0xff, 0x3f, 0x04, 0x51, 0x6e, 0x02,
    0xa6, 0x7b, 0x09, 0x00, 0x00, 0x00, 0x27, 0x00 }
},
#endif
-0x0f0, /* Closed Caption, NTSC */
+0x0f0, /* Closed Caption, NTSC */
  [V4L2_SLICED_CAPTION_525,21,21,1],
  { 0xa9, 0x2a, 0xff, 0x3f, 0x04, 0x51, 0x6e, 0x02,
    0x69, 0x8c, 0x09, 0x00, 0x00, 0x00, 0x27, 0x00 }
},
-0x110, /* Wide Screen Signal, PAL/SECAM */
+0x110, /* Wide Screen Signal, PAL/SECAM */
  [V4L2_SLICED_WSS_625,23,23,1],
  { 0x5b, 0x55, 0xc5, 0xff, 0x00, 0x71, 0x6e, 0x42,
    0xa6, 0xcd, 0x0f, 0x00, 0x00, 0x00, 0x3a, 0x00 }
},
#if 0
-0x130, /* Wide Screen Signal, NTSC C */
+0x130, /* Wide Screen Signal, NTSC C */
  [V4L2_SLICED_WSS_525,20,20,1],
  { 0x38, 0x00, 0x3f, 0x00, 0x00, 0x71, 0x6e, 0x43,
    0x69, 0x7c, 0x08, 0x00, 0x00, 0x00, 0x39, 0x00 }
},
-0x150, /* Vertical Interval Timecode (VITC), PAL/SECAM */
+0x150, /* Vertical Interval Timecode (VITC), PAL/SECAM */
  [V4L2_SLICED_VITC_625,6,22,0],
  { 0x00, 0x00, 0x00, 0x00, 0x08, 0x6d, 0x49,
    0xa6, 0x85, 0x08, 0x00, 0x00, 0x00, 0x4c, 0x00 }
},
-0x170, /* Vertical Interval Timecode (VITC), NTSC */
+0x170, /* Vertical Interval Timecode (VITC), NTSC */
  [V4L2_SLICED_VITC_525,10,20,0],
  { 0x00, 0x00, 0x00, 0x00, 0x08, 0x6d, 0x49,
    0x94, 0x94, 0x08, 0x00, 0x00, 0x00, 0x4c, 0x00 }
},
#endif
-0x190, /* Video Program System (VPS), PAL */
+0x190, /* Video Program System (VPS), PAL */
  [V4L2_SLICED_VPS_16,16,0],
  { 0xaa, 0xaa, 0xff, 0xff, 0xba, 0xce, 0x2b, 0xd0,
    0xa6, 0xda, 0xb0, 0x00, 0x00, 0x00, 0x60, 0x00 }
},
/* 0x1d0 User programmable */
-/* End of struct */
static int tvp5150_vdp_init(struct v4l2_subdev *sd)
{
    unsigned int i;
    int j;

    /* Disable Full Field */
    tvp5150_write(sd, TVP5150_FULL_FIELD_ENA, 0);

    /* Load Ram Table */
    for (j = 0; j < ARRAY_SIZE(vbi_ram_default); j++) {
        const struct i2c_vbi_ram_value *regs = &vbi_ram_default[j];

        if (!regs->type.vbi_type)
            continue;

        tvp5150_write(sd, TVP5150_CONF_RAM_ADDR_HIGH, regs->reg >> 8);
        tvp5150_write(sd, TVP5150_CONF_RAM_ADDR_LOW, regs->reg);
        for (i = 0; i < 16; i++)
            tvp5150_write(sd, TVP5150_VDP_CONF_RAM_DATA, regs->values[i]);
    }
    return 0;
}

static int tvp5150_g_sliced_vbi_cap(struct v4l2_subdev *sd,
struct v4l2_sliced_vbi_cap *cap)
{
    const struct i2c_vbi_ram_value *regs = vbi_ram_default;

    for (i = 0; i < 16; i++)
        tvp5150_write(sd, TVP5150_VDP_CONF_RAM_DATA, regs->values[i]);

    return 0;
}

static int tvp5150_write_init(struct v4l2_subdev *sd,
@@ -592,10 +589,10 @@
    return 0;
}

-static int tvp5150_vdp_init(struct v4l2_subdev *sd,
-static const struct i2c_vbi_ram_value *regs)
+static int tvp5150_vdp_init(struct v4l2_subdev *sd)
{
    unsigned int i;
    int j;

    /* Disable Full Field */
    tvp5150_write(sd, TVP5150_FULL_FIELD_ENA, 0);

    /* Load Ram Table */
    for (j = 0; j < ARRAY_SIZE(vbi_ram_default); j++) {
        const struct i2c_vbi_ram_value *regs = &vbi_ram_default[j];

        if (!regs->type.vbi_type)
            continue;

        tvp5150_write(sd, TVP5150_CONF_RAM_ADDR_HIGH, regs->reg >> 8);
        tvp5150_write(sd, TVP5150_CONF_RAM_ADDR_LOW, regs->reg);
        for (i = 0; i < 16; i++)
            tvp5150_write(sd, TVP5150_VDP_CONF_RAM_DATA, regs->values[i]);
    }
    return 0;
}

static int tvp5150_vdp_init(struct v4l2_subdev *sd,
@@ -605,14 +602,17 @@
    while (regs->reg != (u16)-1) {
        for (j = 0; j < ARRAY_SIZE(vbi_ram_default); j++) {
            const struct i2c_vbi_ram_value *regs = &vbi_ram_default[j];

            if (!regs->type.vbi_type)
                continue;

            tvp5150_write(sd, TVP5150_CONF_RAM_ADDR_HIGH, regs->reg >> 8);
            tvp5150_write(sd, TVP5150_CONF_RAM_ADDR_LOW, regs->reg);

            for (i = 0; i < 16; i++)
                tvp5150_write(sd, TVP5150_VDP_CONF_RAM_DATA, regs->values[i]);
        }
        regs++;
    }
    return 0;
}
while (regs->reg != (u16)-1) {
    for (line=regs->type.ini_line;line<=regs->type.end_line;line++) {
        for (i = 0; i < ARRAY_SIZE(vbi_ram_default); i++) {
            const struct i2c_vbi_ram_value *regs = &vbi_ram_default[i];
            if (!regs->type.vbi_type)
                continue;
            for (line = regs->type.ini_line;
                 line <= regs->type.end_line;
                 line++) {
                cap->service_lines[0][line] |= regs->type.vbi_type;
            }
            cap->service_set |= regs->type.vbi_type;
        }
        regs++;
    }
    return 0;
}

int pos = 0;
if (std == V4L2_STD_ALL) {
    dev_err(sd->dev, "VBI can't be configured without knowing number of lines\n");
    if (line < 6 || line > 27)
        return 0;
    while (regs->reg != (u16)-1) {
        for (i = 0; i < ARRAY_SIZE(vbi_ram_default); i++) {
            const struct i2c_vbi_ram_value *regs = &vbi_ram_default[i];
            if (!regs->type.vbi_type)
                continue;
            if ((type & regs->type.vbi_type) &&

*/
static int tvp5150_set_vbi(struct v4l2_subdev *sd,
    const struct i2c_vbi_ram_value *regs,
    unsigned int type,u8 flags, int line,
    const int fields)
{
    struct tvp5150 *decoder = to_tvp5150(sd);
    v4l2_std_id std = decoder->norm;
    u8 reg;
    int pos = 0;
    int i, pos = 0;

    if (std == V4L2_STD_ALL) {
        dev_err(sd->dev, "VBI can't be configured without knowing number of lines\n");
        if (line < 6 || line > 27)
            return 0;
        while (regs->reg != (u16)-1) {
            for (i = 0; i < ARRAY_SIZE(vbi_ram_default); i++) {
                const struct i2c_vbi_ram_value *regs = &vbi_ram_default[i];
                if (!regs->type.vbi_type)
                    continue;
                if ((type & regs->type.vbi_type) &&

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(line >= regs->type.ini_line) &&
(line <= regs->type.end_line))
break;
-
-reg++;
-pos++;
}

-if (regs->reg == (u16)-1)
-return 0;
-
-type = pos | (flags & 0xf0);
reg = ((line - 6) << 1) + TVP5150_LINE_MODE_INI;

return type;
}

static int tvp5150_get_vbi(struct v4l2_subdev *sd,
				const struct i2c_vbi_ram_value *regs, int line)
{
struct tvp5150 *decoder = to_tvp5150(sd);
v4l2_std_id std = decoder->norm;

return 0;
}

return type;
	@ @ -789,7 +791,7 @@
tvp5150_write_inittab(sd, tvp5150_init_default);

/* Initializes VDP registers */
tvp5150_vdp_init(sd, vbi_ram_default);

tvp5150_vdp_init(sd);

/* Selects decoder input */
tvp5150_selmux(sd);

return 0;
case V4L2_CID_HUE:
tvp5150_write(sd, TVP5150_HUE_CTL, ctrl->val);
break;
+return 0;
case V4L2_CID_TEST_PATTERN:
    decoder->enable = ctrl->val ? false : true;
    tvp5150_selmux(sd);
    f = &format->format;
    f->width = decoder->rect.width;
    f->height = decoder->rect.height;
    f->height = decoder->rect.height / 2;
    f->code = MEDIA_BUS_FMT_UYVY8_2X8;
    f->field = V4L2_FIELD_ALTERNATE;
    /* tvp5150 has some special limits */
    rect.left = clamp(rect.left, 0, TVP5150_MAX_CROP_LEFT);
    -rect.width = clamp_t(unsigned int, rect.width, 
    -TVP5150_H_MAX - TVP5150_MAX_CROP_LEFT - rect.left,
    -TVP5150_H_MAX - rect.left);
    rect.top = clamp(rect.top, 0, TVP5150_MAX_CROP_TOP);
    /* Calculate height based on current standard */
    hmax = TVP5150_V_MAX_OTHERS;
    -rect.height = clamp_t(unsigned int, rect.height, 
    +/*
    + * alignments:
    + * - width = 2 due to UYVY colorspace
    + * - height, image = no special alignment
    + */
    +v4l_bound_align_image(&rect.width, 
    +TVP5150_H_MAX - TVP5150_MAX_CROP_LEFT - rect.left, 
    +TVP5150_H_MAX - rect.left, 1, &rect.height, 
    +hmax - TVP5150_MAX_CROP_TOP - rect.top, 
    -hmax - rect.top); 
    +hmax - rect.top, 0, 0);
    tvp5150_write(sd, TVP5150_VERT_BLANKING_START, rect.top);
    tvp5150_write(sd, TVP5150_VERT_BLANKING_STOP, 
    @ @ -1122.8 +1128.8 @ @
    for (i = 0; i <= 23; i++) {} 
    svbi->service_lines[1][i] = 0;
    svbi->service_lines[0][i] = 
    -tvp5150_set_vbi(sd, vbi_ram_default,
for (i = 0; i <= 23; i++) {
    svbi->service_lines[0][i] =
    -tvp5150_get_vbi(sd, vbi_ram_default, i);
    +tvp5150_get_vbi(sd, i);
    mask |= svbi->service_lines[0][i];
}
svbi->service_set = mask;
//@ -1528,7 +1534,7 @@
27000000, 1, 27000000);
v4l2_ctrl_new_std_menu_items(&core->hdl, &tvp5150_ctrl_ops,
    V4L2_CID_TEST_PATTERN,
    - ARRAY_SIZE(tvp5150_test_patterns),
    + ARRAY_SIZE(tvp5150_test_patterns) - 1,
    0, 0, tvp5150_test_patterns);
sd->ctrl_handler = &core->hdl;
if (core->hdl.error) {
    --- linux-4.15.0.orig/drivers/media/media-device.c
    +++ linux-4.15.0/drivers/media/media-device.c
    @ @ -54,9 +54,10 @@
    return 0;
}

- static int media_device_get_info(struct media_device *dev,
- struct media_device_info *info)
+ static long media_device_get_info(struct media_device *dev, void *arg)
{
    + struct media_device_info *info = arg;
    + memset(info, 0, sizeof(*info));
    
    if (dev->driver_name[0])
        @ @ -93,9 +94,9 @@
    return NULL;
}

- static long media_device_enum_entities(struct media_device *mdev,
-        struct media_entity_desc *entd)
+ static long media_device_enum_entities(struct media_device *mdev, void *arg)
{
    + struct media_entity_desc *entd = arg;
    

struct media_entity *ent;

ten = find_entity(mdev, entd->id);
@@ -146,9 +147,9 @@
upad->flags = kpad->flags;
}

-static long media_device_enum_links(struct media_device *mdev,
- struct media_links_enum *links)
+static long media_device_enum_links(struct media_device *mdev, void *arg)
{
+struct media_links_enum *links = arg;
struct media_entity *entity;

entity = find_entity(mdev, links->entity);
@@ -194,9 +195,9 @@
return 0;
}

-static long media_device_setup_link(struct media_device *mdev,
- struct media_link_desc *linkd)
+static long media_device_setup_link(struct media_device *mdev, void *arg)
{
+struct media_link_desc *linkd = arg;
struct media_link *link = NULL;
struct media_entity *source;
struct media_entity *sink;
@@ -222,9 +223,9 @@
return __media_entity_setup_link(link, linkd->flags);
}

-static long media_device_get_topology(struct media_device *mdev,
- struct media_v2_topology *topo)
+static long media_device_get_topology(struct media_device *mdev, void *arg)
{
+struct media_v2_topology *topo = arg;
struct media_entity *entity;
struct media_interface *intf;
struct media_pad *pad;
@@ -469,6 +470,7 @@
{
 struct media_links_enum links;
compat_uptr_t pads_ptr, links_ptr;
+int ret;

memset(&links, 0, sizeof(links));
@@ -480,7 +482,14 @@
links.pads = compat_ptr(pads_ptr);
links.links = compat_ptr(links_ptr);

- return media_device_enum_links(mdev, &links);
+ ret = media_device_enum_links(mdev, &links);
+ if (ret)
+ return ret;
+
+ if (copy_to_user(ulinks->reserved, links.reserved,
+ sizeof(ulinks->reserved)))
+ return -EFAULT;
+ return 0;
}

#define MEDIA_IOC_ENUM_LINKS32 _IOWR('|', 0x02, struct media_links_enum32)

@@ -542,6 +551,38 @@
 dev_dbg(devnode->parent, "Media device released\n");
 }

+static void __media_device_unregister_entity(struct media_entity *entity)
+{
+ struct media_device *mdev = entity->graph_obj.mdev;
+ struct media_link *link, *tmp;
+ struct media_interface *intf;
+ unsigned int i;
+ + ida_simple_remove(&mdev->entity_internal_idx, entity->internal_idx);
+ + /* Remove all interface links pointing to this entity */
+ list_for_each_entry(intf, &mdev->interfaces, graph_obj.list) {
+ list_for_each_entry_safe(link, tmp, &intf->links, list) {
+ if (link->entity == entity)
+ __media_remove_intf_link(link);
+ }
+ }
+ + /* Remove all data links that belong to this entity */
+ __media_entity_remove_links(entity);
+ + /* Remove all pads that belong to this entity */
+ for (i = 0; i < entity->num_pads; i++)
+ media_gobj_destroy(&entity->pads[i].graph_obj);
+ + /* Remove the entity */
+ media_gobj_destroy(&entity->graph_obj);
+ + /* invoke entity_notify callbacks to handle entity removal?? */
+ +
+entity->graph_obj.mdev = NULL;
+
+/**
 * media_device_register_entity - Register an entity with a media device
 * @mdev: The media device
 */
ret = media_graph_walk_init(&new, mdev);
if (ret) {
	__media_device_unregister_entity(entity);
mutex_unlock(&mdev->graph_mutex);
return ret;
}
EXPORT_SYMBOL_GPL(media_device_register_entity);

-static void __media_device_unregister_entity(struct media_entity *entity)
-{
-struct media_device *mdev = entity->graph_obj.mdev;
-struct media_link *link, *tmp;
-struct media_interface *intf;
-unsigned int i;
-
-idasimple_remove(&mdev->entity_internal_idx, entity->internal_idx);
-
-/* Remove all interface links pointing to this entity */
-list_for_each_entry(intf, &mdev->interfaces, graph_obj.list) {
-list_for_each_entry_safe(link, tmp, &intf->links, list) {
-if (link->entity == entity)
-__media_remove_intf_link(link);
-}
-
-/* Remove all data links that belong to this entity */
-__media_entity_remove_links(entity);
-
-/* Remove all pads that belong to this entity */
-for (i = 0; i < entity->num_pads; i++)
-media_gobj_destroy(&entity->pads[i].graph_obj);
-
-/* Remove the entity */
-media_gobj_destroy(&entity->graph_obj);
-
-/* invoke entity_notify callbacks to handle entity removal?? */
-
-entity->graph_obj.mdev = NULL;
void media_device_unregister_entity(struct media_entity *entity)
{
    struct media_device *mdev = entity->graph_obj.mdev;
    --- linux-4.15.0.orig/drivers/media/pci/bt8xx/bt878.c
    +++ linux-4.15.0/drivers/media/pci/bt8xx/bt878.c
    @@ -422,8 +422,7 @@
        bt878_num);
    if (bt878_num >= BT878_MAX) {
        printk(KERN_ERR "bt878: Too many devices inserted\n");
        -result = -ENOMEM;
        -goto fail0;
        +return -ENOMEM;
    }
    if (pci_enable_device(dev))
        return -EIO;
    @@ -495,6 +494,9 @@
        btwrite(0, BT878_AINT_MASK);
        bt878_num++;

    +if (!bt->tasklet.func)
    +tasklet_disable(&bt->tasklet);
    +
    return 0;

fail2:
    --- linux-4.15.0.orig/drivers/media/pci/bt8xx/bttv-driver.c
    +++ linux-4.15.0/drivers/media/pci/bt8xx/bttv-driver.c
    @@ -3243,7 +3243,7 @@
        bt->radio_user--;

    -bttv_call_all(btv, core, ioctl, SAA6588_CMD_CLOSE, &cmd);
    +bttv_call_all(btv, core, command, SAA6588_CMD_CLOSE, &cmd);

    if (btv->radio_user == 0)
        btv->has_radio_tuner = 0;
    @@ -3324,7 +3324,7 @@
        cmd.result = -ENODEV;
        radio_enable(btv);

    -bttv_call_all(btv, core, ioctl, SAA6588_CMD_READ, &cmd);
    +bttv_call_all(btv, core, command, SAA6588_CMD_READ, &cmd);

    return cmd.result;
}
cmd.instance = file;
cmd.event_list = wait;
cmd.result = res;
-bttv_call_all(btv, core, ioctl, SAA6588_CMD_POLL, &cmd);
+bttv_call_all(btv, core, command, SAA6588_CMD_POLL, &cmd);

return cmd.result;
}
@@ -4055,11 +4055,13 @@
btv->id  = dev->device;
if (pci_enable_device(dev)) {
    pr_warn("%d: Can't enable device\n", btv->c.nr);
    -return -EIO;
    +result = -EIO;
    +goto free_mem;
} 
if (pci_set_dma_mask(dev, DMA_BIT_MASK(32))) {
    pr_warn("%d: No suitable DMA available\n", btv->c.nr);
    -return -EIO;
    +result = -EIO;
    +goto free_mem;
}
if (!request_mem_region(pci_resource_start(dev,0),
        pci_resource_len(dev,0),
@@ -4067,7 +4069,8 @@
    pr_warn("%d: can't request iomem (0x%llx)\n",
        btv->c.nr,
        (unsigned long long)pci_resource_start(dev, 0));
    -return -EBUSY;
    +result = -EBUSY;
    +goto free_mem;
    }
pci_set_master(dev);
pci_set_command(dev);
@@ -4253,6 +4256,10 @@
release_mem_region(pci_resource_start(btv->c.pci,0),
        pci_resource_len(btv->c.pci,0));
pci_disable_device(btv->c.pci);
+
        +free_mem:
        +btvs[btv->c.nr] = NULL;
        +kfree(btv);
        return result;
    }
return -ENOMEM;
cobalt->pci_dev = pci_dev;
cobalt->instance = i;
+mutex_init(&cobalt->pci_lock);

retval = v4l2_device_register(&pci_dev->dev, &cobalt->v4l2_dev);
if (retval) {
--- linux-4.15.0.orig/drivers/media/pci/cobalt/cobalt-driver.h
+++ linux-4.15.0/drivers/media/pci/cobalt/cobalt-driver.h
@@ -262,6 +262,8 @@
 struct pci_dev *pci_dev;
 struct v4l2_device v4l2_dev;
+/* serialize PCI access in cobalt_s_bit_sysctrl() */
+struct mutex pci_lock;

 void __iomem *bar0, *bar1;

@@ -331,10 +333,13 @@ static inline void cobalt_s_bit_sysctrl(struct cobalt *
- u32 ctrl = cobalt_read_bar1(cobalt, COBALT_SYS_CTRL_BASE);
+ u32 ctrl;
+mutex_lock(&cobalt->pci_lock);
+ctrl = cobalt_read_bar1(cobalt, COBALT_SYS_CTRL_BASE);
cobalt_write_bar1(cobalt, COBALT_SYS_CTRL_BASE,
(ctrl & ~(1UL << bit)) | (val << bit));
+mutex_unlock(&cobalt->pci_lock);
}

static inline u32 cobalt_g_sysstat(struct cobalt *cobalt)
--- linux-4.15.0.orig/drivers/media/pci/cx18/cx18-driver.c
+++ linux-4.15.0/drivers/media/pci/cx18/cx18-driver.c
@@ -1254,7 +1254,7 @@
 }
 int i;
 for (i = 0; i < CX18_MAX_STREAMS; i++)
- if (&cx->streams[i].video_dev)
+ if (cx->streams[i].video_dev.v4l2_dev)
 cancel_work_sync(&cx->streams[i].out_work_order);
}

--- linux-4.15.0.orig/drivers/media/pci/cx18/cx18-fileops.c
+++ linux-4.15.0/drivers/media/pci/cx18/cx18-fileops.c
@@ -484,7 +484,7 @@
CX18_DEBUG_HI_FILE("read %zd from %s, got %zd\n", count, s->name, rc);
if (rc > 0)
- pos += rc;
+ *pos += rc;
return rc;
}

--- linux-4.15.0.orig/drivers/media/pci/cx23885/altera-ci.c
+++ linux-4.15.0/drivers/media/pci/cx23885/altera-ci.c
@@ -665,6 +665,10 @@
}

temp_int = append_internal(inter);
+if (!temp_int) {
+ ret = -ENOMEM;
+ goto err;
+ }
inter->filts_used = 1;
inter->dev = config->dev;
inter->fpga_rw = config->fpga_rw;
@@ -699,6 +703,7 @@
_kfree(pid_filt);
+kfree(inter);

return ret;
}
@@ -733,6 +738,10 @@
}

temp_int = append_internal(inter);
+if (!temp_int) {
+ ret = -ENOMEM;
+ goto err;
+ }
inter->cis_used = 1;
inter->dev = config->dev;
inter->fpga_rw = config->fpga_rw;
@@ -801,6 +810,7 @@
.ci_dbg_print("%s: Cannot initialize CI: Error %d\n", __func__, ret);

kfree(state);
+kfree(inter);

return ret;
}
--- linux-4.15.0.orig/drivers/media/pci/cx23885/cx23885-cards.c
+++ linux-4.15.0/drivers/media/pci/cx23885/cx23885-cards.c
@@ -776,6 +776,25 @@
   ,.portb        = CX23885_MPEG_DVB,
   ,.portc        = CX23885_MPEG_DVB,
   },
+    [CX23885_BOARD_AVERMEDIA_CE310B] = {
+      .name		= "AVerMedia CE310B",
+      .porta= CX23885_ANALOG_VIDEO,
+      .force_bff= 1,
+      .input		= {{
+        .type = CX23885_VMUX_COMPOSITE1,
+        .vmux = CX25840_VIN1_CH1 |
+             CX25840_NONE_CH2 |
+             CX25840_NONE0_CH3,
+        .amux = CX25840_AUDIO7,
+      },
+        .type = CX23885_VMUX_SVIDEO,
+        .vmux = CX25840_VIN8_CH1 |
+             CX25840_NONE_CH2 |
+             CX25840_VIN7_CH3 |
+             CX25840_SVIDEO_ON,
+        .amux = CX25840_AUDIO7,
+    }},
+},
+};
const unsigned int cx23885_bcount = ARRAY_SIZE(cx23885_boards);

@@ -1087,6 +1106,10 @@
   ,.subvendor = 0x0070,
   ,.subdevice = 0x6b18,
   ,.card      = CX23885_BOARD_HAUPPAUGE_QUADHD_ATSC, /* Tuner Pair 2 */
+    },
+      .subvendor = 0x1461,
+      .subdevice = 0x3100,
+      .card      = CX23885_BOARD_AVERMEDIA_CE310B,
    },
    ];
const unsigned int cx23885_idcount = ARRAY_SIZE(cx23885_subids);
@@ -2282,10 +2305,15 @@
       case CX23885_BOARD_DVBSKY_T982:
       case CX23885_BOARD_VIEWCAST_260E:
       case CX23885_BOARD_VIEWCAST_460E:
+      case CX23885_BOARD_AVERMEDIA_CE310B:
         dev->sd_cx25840 = v4l2_i2c_new_subdev(&dev->v4l2_dev,
             &dev->i2c_bus[2],i2c_adap,
             "cx25840", 0x88 >> 1, NULL);
         if (dev->sd_cx25840) {
             /* set host data for clk_freq configuration */
         }
v4l2_set_subdev_hostdata(dev->sd_cx25840, &dev->clk_freq);
+
dev->sd_cx25840->grp_id = CX23885_HW_AV_CORE;
v4l2_subdev_call(dev->sd_cx25840, core, load_fw);
}
--- linux-4.15.0.orig/drivers/media/pci/cx23885/cx23885-core.c
+++ linux-4.15.0/drivers/media/pci/cx23885/cx23885-core.c
@@ -873,6 +873,16 @
if (cx23885_boards[dev->board].clk_freq > 0)
  dev->clk_freq = cx23885_boards[dev->board].clk_freq;

+if (dev->board == CX23885_BOARD_HAUPPAUGE_IMPACTVCBE &&
+dev->pci->subsystem_device == 0x7137) {
+  /* Hauppauge ImpactVCBe device ID 0x7137 is populated
+   * with an 888, and a 25Mhz crystal, instead of the
+   * usual third overtone 50Mhz. The default clock rate must
+   * be overridden so the cx25840 is properly configured
+   */
+  dev->clk_freq = 25000000;
+}
+
+dev->pci_bus  = dev->pci->bus->number;
+dev->pci_slot = PCI_SLOT(dev->pci->devfn);
cx23885_irq_add(dev, 0x001f00);
--- linux-4.15.0.orig/drivers/media/pci/cx23885/cx23885-dvb.c
+++ linux-4.15.0/drivers/media/pci/cx23885/cx23885-dvb.c
@@ -1460,8 +1460,9 @@
if (fe0->dvb.frontend != NULL) {
  struct i2c_adapter *tun_i2c;
  -fe0->dvb.frontend->sec_priv = kmalloc(sizeof(dib7000p_ops), GFP_KERNEL);
  -memcpy(fe0->dvb.frontend->sec_priv, &dib7000p_ops, sizeof(dib7000p_ops));
  +fe0->dvb.frontend->sec_priv = kmemdup(&dib7000p_ops, sizeof(dib7000p_ops), GFP_KERNEL);
  +if (!fe0->dvb.frontend->sec_priv)
  +  return -ENOMEM;
  tun_i2c = dib7000p_ops.get_i2c_master(fe0->dvb.frontend, DIBX000_12C_INTERFACE_TUNER, 1);
  if (!dibv_attach(dib0070_attach, fe0->dvb.frontend, tun_i2c, &dib7070p_dib0070_config))
    return -ENODEV;
--- linux-4.15.0.orig/drivers/media/pci/cx23885/cx23885-video.c
+++ linux-4.15.0/drivers/media/pci/cx23885/cx23885-video.c
@@ -267,7 +267,8 @@
 (dev->board == CX23885_BOARD_MYGICA_X8507) ||
 (dev->board == CX23885_BOARD_AVERMEDIA_HC81R) ||
 (dev->board == CX23885_BOARD_VIEWCAST_260E) ||
-(dev->board == CX23885_BOARD_VIEWCAST_460E)) {
+(dev->board == CX23885_BOARD_VIEWCAST_460E)) {
+(dev->board == CX23885_BOARD_AVERMEDIA_CE310B)) {
/* Configure audio routing */
v4l2_subdev_call(dev->sd_cx25840, audio, s_routing,
INPUT(input)->amux, 0, 0);
--- linux-4.15.0.orig/drivers/media/pci/cx23885/cx23885.h
+++ linux-4.15.0/drivers/media/pci/cx23885/cx23885.h
@@ -107,6 +107,7 @@
#define CX23885_BOARD_VIEWCAST_460E 55
#define CX23885_BOARD_HAUPPAUGE_QUADHD_DVB 56
#define CX23885_BOARD_HAUPPAUGE_QUADHD_ATSC 57
+#define CX23885_BOARD_AVERMEDIA_CE310B 58

#define GPIO_0 0x00000001
#define GPIO_1 0x00000002
--- linux-4.15.0.orig/drivers/media/pci/cx23885/cx23888-ir.c
+++ linux-4.15.0/drivers/media/pci/cx23885/cx23888-ir.c
@@ -1178,8 +1178,11 @@
 return -ENOMEM;
 spin_lock_init(&state->rx_kfifo_lock);
 -if (kfifo_alloc(&state->rx_kfifo, CX23888_IR_RX_KFIFO_SIZE, GFP_KERNEL))
+if (kfifo_alloc(&state->rx_kfifo, CX23888_IR_RX_KFIFO_SIZE,
+GFP_KERNEL)) {
+ kfree(state);
 return -ENOMEM;
+
 state->dev = dev;
 sd = &state->sd;
--- linux-4.15.0.orig/drivers/media/pci/cx25821/cx25821-core.c
+++ linux-4.15.0/drivers/media/pci/cx25821/cx25821-core.c
@@ -867,6 +867,10 @@
 dev->nr = ++cx25821_devcount;
 sprintf(dev->name, "cx25821[%d]", dev->nr);

+if (dev->nr >= ARRAY_SIZE(card)) {
+ CX25821_INFO("dev->nr >= %zd", ARRAY_SIZE(card));
+ return -ENOMEM;
+}

 if (dev->pci->device != 0x8210) { 
 pr_info("%s(): Exiting. Incorrect Hardware device = 0x%02x\n", 
 __func__, dev->pci->device);
-@ @ -882.9 +886.6 @@
 dev->channels[i].sram_channels = &cx25821_sram_channels[i];
 }

-if (dev->nr > 1)
-CX25821_INFO("dev->nr > 1!");
-
/* board config */
dev->board = 1;/* card[dev->nr]; */
dev->_max_num_decoders = MAX_DECODERS;
@@ -985,8 +986,10 @@
    __le32 *cpu;
dma_addr_t dma = 0;

-if (NULL != risc->cpu && risc->size < size)
+if (risc->cpu && risc->size < size) {
    pci_free_consistent(pci, risc->size, risc->cpu, risc->dma);
+    risc->cpu = NULL;
+}
if (NULL == risc->cpu) {
    cpu = pci_zalloc_consistent(pci, size, &dma);
    if (NULL == cpu)
--- linux-4.15.0.orig/drivers/media/pci/cx88/cx88-video.c
+++ linux-4.15.0/drivers/media/pci/cx88/cx88-video.c
@@ -1310,7 +1310,7 @@
    core = cx88_core_get(dev->pci);
    if (!core) {
        err = -EINVAL;
-        goto fail_free;
+        goto fail_disable;
    }
    dev->core = core;

@@ -1356,7 +1356,7 @@
    cc->step, cc->default_value);
    if (!vc) {
        err = core->audio_hdl.error;
-        goto fail_core;
+        goto fail_irq;
    }
    vc->priv = (void *)cc;
}
@@ -1370,7 +1370,7 @@
    cc->step, cc->default_value);
    if (!vc) {
        err = core->video_hdl.error;
-        goto fail_core;
+        goto fail_irq;
    }
    vc->priv = (void *)cc;
    if (vc->id == V4L2_CID_CHROMA_AGC)
@@ -1533,11 +1533,14 @@
    fail_unreg:
    cx8800_unregister_video(dev);
- free_irq(pci_dev->irq, dev);
mutex_unlock(&core->lock);
+ fail_irq:
+ free_irq(pci_dev->irq, dev);
fail_core:
core->v4ldev = NULL;
cx88_core_put(core, dev->pci);
+ fail_disable:
+ pci_disable_device(pci_dev);
fail_free:
kfree(dev);
return err;

--- linux-4.15.0.orig/drivers/media/pci/ivtv/ivtv-fileops.c
+++ linux-4.15.0/drivers/media/pci/ivtv/ivtv-fileops.c
@@ -420,7 +420,7 @@
IVTV_DEBUG_HI_FILE("read %zd from %s, got %zd\n", count, s->name, rc);
  if (rc > 0)
    *pos += rc;
  return rc;

--- linux-4.15.0.orig/drivers/media/pci/ivtv/ivtv-yuv.c
+++ linux-4.15.0/drivers/media/pci/ivtv/ivtv-yuv.c
@@ -935,7 +935,7 @@
} /* We need a buffer for blanking when Y plane is offset - non-fatal if we can't get one */
-yi->blanking_ptr = kzalloc(720 * 16, GFP_KERNEL|__GFP_NOWARN);
+yi->blanking_ptr = kzalloc(720 * 16, GFP_ATOMIC|__GFP_NOWARN);
if (yi->blanking_ptr) {
  yi->blanking_dmaptr = pci_map_single(itv->pdev, yi->blanking_ptr, 720*16, PCI_DMA_TODEVICE);
} else {

--- linux-4.15.0.orig/drivers/media/pci/meye/meye.c
+++ linux-4.15.0/drivers/media/pci/meye/meye.c
@@ -1460,7 +1460,7 @@
   unsigned long page, pos;
mutex_lock(&meye.lock);
-  if (size > gbuffers * gbuFSIZE) {
+  if (size > gbuffers * gbuFSIZE || offset > gbuffers * gbuFSIZE - size) {
    mutex_unlock(&meye.lock);
    return -EINVAL;
  }

--- linux-4.15.0.orig/drivers/media/pci/netup_unidvb/netup_unidvb_spi.c
+++ linux-4.15.0/drivers/media/pci/netup_unidvb/netup_unidvb_spi.c
@@ -184,7 +184,7 @@

struct spi_master *master;
struct netup_spi *nspi;

-master = spi_alloc_master(&ndev->pci_dev->dev,
+master = devm_spi_alloc_master(&ndev->pci_dev->dev,
sizeof(struct netup_spi));
if (!master) {
    dev_err(&ndev->pci_dev->dev,
@@ -217,6 +217,7 @@
    ndev->pci_slot,
    ndev->pci_func);
if (!spi_new_device(master, &netup_spi_board)) {
+    spi_unregister_master(master);
    ndev->spi = NULL;
    dev_err(&ndev->pci_dev->dev,
    "%s(): unable to create SPI device\n", __func__);}
@@ -235,13 +236,13 @@
if (!spi)
    return;
+
    +spi_unregister_master(master);
spin_lock_irqsave(&spi->lock, flags);
reg = readw(&spi->regs->control_stat);
writew(reg | NETUP_SPI_CTRL_IRQ, &spi->regs->control_stat);
reg = readw(&spi->regs->control_stat);
writew(reg & ~NETUP_SPI_CTRL_IMASK, &spi->regs->control_stat);
spin_unlock_irqrestore(&spi->lock, flags);
-    spi_unregister_master(spi->master);
    ndev->spi = NULL;
}

--- linux-4.15.0.orig/drivers/media/pci/ngene/ngene-core.c
+++ linux-4.15.0/drivers/media/pci/ngene/ngene-core.c
@@ -398,7 +398,7 @@
    com.cmd.hdr.Opcode = CMD_CONFIGURE_FREE_BUFFER;
    com.cmd.hdr.Length = 6;
-memcpy(&com.cmd.ConfigureBuffers.config, config, 6);
+memcpy(&com.cmd.ConfigureFreeBuffers.config, config, 6);
    com.in_len = 6;
    com.out_len = 0;

--- linux-4.15.0.orig/drivers/media/pci/ngene/ngene.h
+++ linux-4.15.0/drivers/media/pci/ngene/ngene.h
@@ -403,12 +403,14 @@

struct FW_CONFIGURE_FREE_BUFFERS {
    struct FW_HEADER hdr;
}
-u8 UVI1_BufferLength;
-u8 UVI2_BufferLength;
-u8 TVO_BufferLength;
- u8 AUD1_BufferLength;
- u8 AUD2_BufferLength;
- u8 TVA_BufferLength;
+ struct {
+ u8 UVI1_BufferLength;
+ u8 UVI2_BufferLength;
+ u8 TVO_BufferLength;
+ u8 AUD1_BufferLength;
+ u8 AUD2_BufferLength;
+ u8 TVA_BufferLength;
} __packed config;

struct FW_CONFIGURE_UART {
--- linux-4.15.0.orig/drivers/media/pci/saa7134/saa7134-empress.c
+++ linux-4.15.0/drivers/media/pci/saa7134/saa7134-empress.c
@@ -293,8 +293,11 @@
q->lock = &dev->lock;
q->dev = &dev->pci->dev;
err = vb2_queue_init(q);
-if (err)
+if (err) {
+video_device_release(dev->empress_dev);
+dev->empress_dev = NULL;
return err;
+}
dev->empress_dev->queue = q;

video_set_drvdata(dev->empress_dev, dev);
--- linux-4.15.0.orig/drivers/media/pci/saa7134/saa7134-i2c.c
+++ linux-4.15.0/drivers/media/pci/saa7134/saa7134-i2c.c
@@ -351,7 +351,11 @@
/* ----------------------------------------------------------- */
-/* On Medion 7134 reading EEPROM needs DVB-T demod i2c gate open */
+/*
+ * On Medion 7134 reading the SAA7134 chip config EEPROM needs DVB-T
+ * demod i2c gate closed due to an address clash between this EEPROM
+ * and the demod one.
+ */
static void saa7134_i2c_eeprom_md7134_gate(struct saa7134_dev *dev)
{
  u8 subaddr = 0x7, dmdregval;
@@ -368,14 +372,14 @@
ret = i2c_transfer(&dev->i2c_adap, i2cgatemsg_r, 2);
if ((ret == 2) & (dmdregval & 0x2)) {
    pr_debug("%s: DVB-T demod i2c gate was left closed\n",
            dev->name);
    data[0] = subaddr;
    data[1] = (dmdregval & ~0x2);
    if (i2c_transfer(&dev->i2c_adap, i2cgatemsg_w, 1) != 1)
        pr_err("%s: EEPROM i2c gate open failure\n",
                dev->name);
}

--- linux-4.15.0.orig/drivers/media/pci/saa7134/saa7134-tvaudio.c
+++ linux-4.15.0/drivers/media/pci/saa7134/saa7134-tvaudio.c
@@ -693,7 +693,8 @@
{
    int err;
    audio_dbg(2, "dsp write reg 0x%x = 0x%06x\n", reg << 2, value);
+audio_dbg(2, "dsp write reg 0x%x = 0x%06x\n",
            (reg << 2) & 0xffffffff, value);
    err = saa_dsp_wait_bit(dev, SAA7135_DSP_RWSTATE_WRR);
    if (err < 0)
        return err;
--- linux-4.15.0.orig/drivers/media/pci/saa7134/saa7134-video.c
+++ linux-4.15.0/drivers/media/pci/saa7134/saa7134-video.c
@@ -1202,7 +1202,7 @@


saa_call_all(dev, core, s_power, 0);
if (vdev->vfl_type == VFL_TYPE_RADIO)
    saa_call_all(dev, core, ioctl, SAA6588_CMD_CLOSE, &cmd);
+saa_call_all(dev, core, command, SAA6588_CMD_CLOSE, &cmd);
mutex_unlock(&dev->lock);

return 0;
@@ -1221,7 +1221,7 @@
    cmd.result = -ENODEV;

mutex_lock(&dev->lock);
-saa_call_all(dev, core, ioctl, SAA6588_CMD_READ, &cmd);
+saa_call_all(dev, core, command, SAA6588_CMD_READ, &cmd);
mutex_unlock(&dev->lock);
return cmd.result;
@@ -1237,7 +1237,7 @@
 cmd.event_list = wait;
 cmd.result = 0;
 mutex_lock(&dev->lock);
- ssa_call_all(dev, core, ioctl, SAA6588_CMD_POLL, &cmd);
+ ssa_call_all(dev, core, command, SAA6588_CMD_POLL, &cmd);
 mutex_unlock(&dev->lock);

 return rc | cmd.result;
--- linux-4.15.0.orig/drivers/media/pci/saa7146/hexium_gemini.c
+++ linux-4.15.0/drivers/media/pci/saa7146/hexium_gemini.c
 @@ -269,9 +269,8 @@
 /* enable i2c-port pins */
 saa7146_write(dev, MC1, (MASK_08 | MASK_24 | MASK_10 | MASK_26));

-hexium->i2c_adapter = (struct i2c_adapter) {
-.name = "hexium gemini",
-};
+strncpy(hexium->i2c_adapter.name, "hexium gemini",
+sizeof(hexium->i2c_adapter.name));
 saa7146_i2c_adapter_prepare(dev, &hexium->i2c_adapter, SAA7146_I2C_BUS_BIT_RATE_480);
 if (i2c_add_adapter(&hexium->i2c_adapter) < 0) {
 DEB_S("cannot register i2c-device. skipping.\n");
- @@ -304,6 +303,9 @@
 ret = saa7146_register_device(&hexium->video_dev, dev, "hexium gemini", VFL_TYPE_GRABBER);
 if (ret < 0) {
 pr_err("cannot register capture v4l2 device. skipping.\n");
+ saa7146_vv_release(dev);
+i2c_del_adapter(&hexium->i2c_adapter);
+kfree(hexium);
 return ret;
 }

--- linux-4.15.0.orig/drivers/media/pci/saa7146/hexium_orion.c
+++ linux-4.15.0/drivers/media/pci/saa7146/hexium_orion.c
 @@ -230,9 +230,8 @@
 saa7146_write(dev, DD1_STREAM_B, 0x00000000);
 saa7146_write(dev, MC2, (MASK_09 | MASK_25 | MASK_10 | MASK_26));

-hexium->i2c_adapter = (struct i2c_adapter) {
-.name = "hexium orion",
-};
+strncpy(hexium->i2c_adapter.name, "hexium orion",
+sizeof(hexium->i2c_adapter.name));
 saa7146_i2c_adapter_prepare(dev, &hexium->i2c_adapter, SAA7146_I2C_BUS_BIT_RATE_480);
 if (i2c_add_adapter(&hexium->i2c_adapter) < 0) {
 DEB_S("cannot register i2c-device. skipping.\n");
DEB_D("VIDIOC_S_AUDIO %d\n", a->index);
  -if (mxb_inputs[mxb->cur_input].audioset & (1 << a->index)) {
    -if (mxb->cur_audinput != a->index) {
      -mxb->cur_audinput = a->index;
      -tea6420_route(mxb, a->index);
      -if (mxb->cur_audinput == 0)
        -mxb_update_audmode(mxb);
    -}
    -return 0;
    +if (a->index >= 32 ||
      !mxb_inputs[mxb->cur_input].audioset & (1 << a->index)))
      +return -EINVAL;
      +
      +if (mxb->cur_audinput != a->index) {
        +mxb->cur_audinput = a->index;
        +tea6420_route(mxb, a->index);
        +if (mxb->cur_audinput == 0)
          +mxb_update_audmode(mxb);
      }
    -return -EINVAL;
    +return 0;
  }

#ifdef CONFIG_VIDEO_ADV_DEBUG

#endif

/ * Establish encoder defaults here */
  @ @ -1078.7 +1078.7 @@
  100000, ENCODER_DEF_BITRATE);
if (hdl->error) {
  result = hdl->error;
  -goto failed;
  +goto fail_hdl;
}
port->std = V4L2_STD_NTSC_M;
@@ -1096,7 +1096,7 @@
    printk(KERN_INFO "%s: can't allocate mpeg device\n",
        dev->name);
    result = -ENOMEM;
-goto failed;
-goto fail_hdl;
}

port->v4l_device->ctrl_handler = hdl;
@@ -1107,10 +1107,7 @@
    if (result < 0) {
        printk(KERN_INFO "%s: can't register mpeg device\n",
            dev->name);
-        /* TODO: We're going to leak here if we don't dealloc
-           The buffers above. The unreg function can't deal wit it.
-        */
-        goto failed;
+        goto fail_reg;
    }

    printk(KERN_INFO "%s: registered device video%d [mpeg]\n",
        @@ -1132,9 +1129,14 @@
    saa7164_api_set_encoder(port);
    saa7164_api_get_encoder(port);
    +return 0;

   -result = 0;
   -failed:
   +fail_reg:
   +video_device_release(port->v4l_device);
   +port->v4l_device = NULL;
   +fail_hdl:
   +v4l2_ctrl_handler_free(hdl);
   +fail_pci:
    return result;
}

--- linux-4.15.0.orig/drivers/media/pci/saa7164/saa7164-fw.c
+++ linux-4.15.0/drivers/media/pci/saa7164/saa7164-fw.c
@@ -426,7 +426,8 @@
     __func__, fw->size);
 if (fw->size != fwlength) {
     -printk(KERN_ERR "xc5000: firmware incorrect size\n");
-    printk(KERN_ERR "saa7164: firmware incorrect size %zu != %zu\n",
+    printk(KERN_ERR "saa7164: firmware incorrect size %zu != %zu\n",
+    fw->size, fwlength);

ret = -ENOMEM;
goto out;
}
--- linux-4.15.0.orig/drivers/media/pci/solo6x10/solo6x10-g723.c
+++ linux-4.15.0/drivers/media/pci/solo6x10/solo6x10-g723.c
@@ -401,7 +401,7 @@
ret = snd_ctl_add(card, snd_ctl_new1(&kctl, solo_dev));
if (ret < 0)
  -return ret;
+goto snd_error;
ret = solo_snd_pcm_init(solo_dev);
if (ret < 0)
--- linux-4.15.0.orig/drivers/media/pci/sta2x11/Kconfig
+++ linux-4.15.0/drivers/media/pci/sta2x11/Kconfig
@@ -2,6 +2,7 @@
tristate "STA2X11 VIP Video For Linux"
depends on STA2X11
depends on HAS_DMA
+select GPIOLIB if MEDIA_SUBDRV_AUTOSELECT
select VIDEO_ADV7180 if MEDIA_SUBDRV_AUTOSELECT
select VIDEOBUF2_DMA_CONTIG
depends on PCI & VIDEO_V4L2 & VIRT_TO_BUS
--- linux-4.15.0.orig/drivers/media/pci/ttpci/av7110.c
+++ linux-4.15.0/drivers/media/pci/ttpci/av7110.c
@@ -423,14 +423,15 @@
case DATA_CI_GET:
  {
    u8 *data = av7110->debi_virt;
+    u8 data_0 = data[0];

    -if ((data[0] < 2) && data[2] == 0xff) {
+    if (data_0 < 2 && data[2] == 0xff) {
      int flags = 0;
      if (data[5] > 0)
        flags |= CA_CI_MODULE_PRESENT;
      if (data[5] > 5)
        flags |= CA_CI_MODULE_READY;
-av7110->ci_slot[data[0]].flags = flags;
+av7110->ci_slot[data_0].flags = flags;
  } else
    ci_get_data(&av7110->ci_rbuffer,
    av7110->debi_virt,
--- linux-4.15.0.orig/drivers/media/pci/ttpci/budget-core.c
+++ linux-4.15.0/drivers/media/pci/ttpci/budget-core.c
@@ -383,20 +383,25 @@
ret = dvbdemux->dmx.add_frontend(&dvbdemux->dmx, &budget->hw_frontend);
if (ret < 0)
-    return ret;
+    goto err_release_dmx;

budget->mem_frontend.source = DMX_MEMORY_FE;
ret = dvbdemux->dmx.add_frontend(&dvbdemux->dmx, &budget->mem_frontend);
if (ret < 0)
-    return ret;
+    goto err_release_dmx;

ret = dvbdemux->dmx.connect_frontend(&dvbdemux->dmx, &budget->hw_frontend);
if (ret < 0)
-    return ret;
+    goto err_release_dmx;

dvb_net_init(&budget->dvb_adapter, &budget->dvb_net, &dvbdemux->dmx);

return 0;
+
+err_release_dmx:
+dvb_dmxdev_release(&budget->dmxdev);
+dvb_dmx_release(&budget->demux);
+return ret;
}

static void budget_unregister(struct budget *budget)
--- linux-4.15.0.orig/drivers/media/pci/tw5864/tw5864-video.c
+++ linux-4.15.0/drivers/media/pci/tw5864/tw5864-video.c
@@ -776,6 +776,9 @@
    fintv->type = V4L2_FRMIVAL_TYPE_STEPWISE;

    ret = tw5864_frameinterval_get(input, &frameinterval);
+    if (ret)
+        return ret;
+    fintv->stepwise.step = frameinterval;
    fintv->stepwise.min = frameinterval;
    fintv->stepwise.max = frameinterval;
    @ @ -794.6 +797.9 @@
    cp->capability = V4L2_CAP_TIMEPERFRAME;

    ret = tw5864_frameinterval_get(input, &cp->timeperframe);
+    if (ret)
+        return ret;
+        cp->timeperframe.numerator *= input->frame_interval;
    cp->capturemode = 0;
cp->readbuffers = 2;
@@ -1395,13 +1401,13 @@
 input->vb = NULL;
 spin_unlock_irqrestore(&input->slock, flags);

-v4l2_buf = to_vb2_v4l2_buffer(&vb->vb.vb2_buf);
-
if (!vb) { /* Gone because of disabling */
    dev_dbg(&dev->pci->dev, "vb is empty, dropping frame\n");
    return;
}

+v4l2_buf = to_vb2_v4l2_buffer(&vb->vb.vb2_buf);
+
/*
 * Check for space.
 * Mind the overhead of startcode emulation prevention.
--- linux-4.15.0.orig/drivers/media/pci/tw686x/tw686x-video.c
+++ linux-4.15.0/drivers/media/pci/tw686x/tw686x-video.c
@@ -1190,6 +1190,14 @@
 return err;
 }

+/* Initialize vc->dev and vc->ch for the error path */
+for (ch = 0; ch < max_channels(dev); ch++) {
+    struct tw686x_video_channel *vc = &dev->video_channels[ch];
+    +vc->dev = dev;
+    +vc->ch = ch;
+
+for (ch = 0; ch < max_channels(dev); ch++) {
struct tw686x_video_channel *vc = &dev->video_channels[ch];
struct video_device *vdev;
@@ -1198,9 +1206,6 @@
 spin_lock_init(&vc->qlock);
 INIT_LIST_HEAD(&vc->vidq_queued);

-vc->dev = dev;
-vc->ch = ch;
-
/* default settings */
err = tw686x_set_standard(vc, V4L2_STD_NTSC);
if (err)
@@ -1228,7 +1233,8 @@
 vc->vidq.timestamp_flags = V4L2_BUF_FLAG_TIMESTAMP_MONOTONIC;
 vc->vidq.min_buffers_needed = 2;
 vc->vidq.lock = &vc->vb_mutex;

vc->vidq.gfp_flags = GFP_DMA32;
+vc->vidq.gfp_flags = dev->dma_mode != TW686X_DMA_MODE_MEMCPY ?
+ GFP_DMA32 : 0;
vc->vidq.dev = &dev->pci_dev->dev;

err = vb2_queue_init(&vc->vidq);
--- linux-4.15.0.orig/drivers/media/platform/am437x/am437x-vpfe.c
+++ linux-4.15.0/drivers/media/platform/am437x/am437x-vpfe.c
@@ -1848,6 +1848,10 @@
if (!(sdinfo->inputs[0].capabilities & V4L2_IN_CAP_STD))
    return -ENODATA;
+    /* if trying to set the same std then nothing to do */
+    if (vpfe_standards[vpfe->std_index].std_id == std_id)
+        return 0;
    +/* If streaming is started, return error */
    if (vb2_is_busy(&vpfe->buffer_queue)) {
        vpfe_err(vpfe, "%s device busy\n", __func__);
--- linux-4.15.0.orig/drivers/media/platform/atmel/atmel-isc.c
+++ linux-4.15.0/drivers/media/platform/atmel/atmel-isc.c
@@ -1901,6 +1901,8 @@
struct vb2_queue *q = &isc->vb2_vidq;
    int ret;

    +INIT_WORK(&isc->awb_work, isc_awb_work);
    +
    ret = v4l2_device_register_subdev_nodes(&isc->v4l2_dev);
    if (ret < 0) {
        v4l2_err(&isc->v4l2_dev, "Failed to register subdev nodes\n");
@@ -1954,8 +1956,6 @@
    return ret;
    }

    -INIT_WORK(&isc->awb_work, isc_awb_work);
    -
    /* Register video device */
strlcpy(vdev->name, ATMEL_ISC_NAME, sizeof(vdev->name));
vdev->release = video_device_release_empty;
@@ -2068,8 +2068,11 @@
    break;
    }

    -subdev_entity->asd = devm_kzalloc(dev,
-    - sizeof(*subdev_entity->asd), GFP_KERNEL);
    +/* asd will be freed by the subsystem once it's added to the
    + * notifier list
    + */

+subdev_entity->asd = kzalloc(sizeof(*subdev_entity->asd),
  GFP_KERNEL);
if (!subdev_entity->asd) {
  of_node_put(rem);
  ret = -ENOMEM;
  @@ -2215,6 +2218,7 @@
     &subdev_entity->notifier);
  if (ret) {
    dev_err(dev, "fail to register async notifier\n");
    kfree(subdev_entity->asd);
    goto cleanup_subdev;
  }

--- linux-4.15.0.orig/drivers/media/platform/atmel/atmel-isi.c
+++ linux-4.15.0/drivers/media/platform/atmel/atmel-isi.c
@@ -496,7 +496,7 @@
   spin_unlock_irq(&isi->irqlock);

if (!isi->enable_preview_path) {
-  timeout = jiffies + FRAME_INTERVAL_MILLI_SEC * HZ;
+  timeout = jiffies + (FRAME_INTERVAL_MILLI_SEC * HZ) / 1000;
/* Wait until the end of the current frame. */
   while ((isi_readl(isi, ISI_STATUS) & ISI_CTRL_CDC) &&
         time_before(jiffies, timeout))
--- linux-4.15.0.orig/drivers/media/platform/coda/coda-bit.c
+++ linux-4.15.0/drivers/media/platform/coda/coda-bit.c
@@ -957,16 +957,15 @@
 else
coda_write(dev, CODA_STD_H264,
     CODA_CMD_ENC_SEQ_COD_STD);
-if (ctx->params.h264_deblk_enabled) {
-  -value = ((ctx->params.h264_deblk_alpha &
-       CODA_264PARAM_DEBLKFILTEROFFSETALPHA_MASK) <<
-       CODA_264PARAM_DEBLKFILTEROFFSETALPHA_OFFSET)
-       |
-       ((ctx->params.h264_deblk_beta &
-       CODA_264PARAM_DEBLKFILTEROFFSETBETA_MASK) <<
-       CODA_264PARAM_DEBLKFILTEROFFSETBETA_OFFSET);
-} else {
-  -value = 1 << CODA_264PARAM_DISABLEDEBLK_OFFSET;
-}
+value = ((ctx->params.h264_disable_deblocking_filter_idc &
+       CODA_264PARAM_DISABLEDEBLK_MASK) <<
+       CODA_264PARAM_DISABLEDEBLK_OFFSET)
+       |
+       ((ctx->params.h264_slice_alpha_c0_offset_div2 &
+       CODA_264PARAM_DEBLKFILTEROFFSETALPHA_MASK) <<
+       CODA_264PARAM_DEBLKFILTEROFFSETALPHA_OFFSET)
+       |
+       ((ctx->params.h264_slice_beta_offset_div2 &
+       CODA_264PARAM_DEBLKFILTEROFFSETBETA_MASK) <<
+       CODA_264PARAM_DEBLKFILTEROFFSETBETA_OFFSET)
+ CODA_264PARAM_DEBLKFILTEROFFSETBETA_OFFSET);
coda_write(dev, value, CODA_CMD_ENC_SEQ_264_PARA);
break;
case V4L2_PIX_FMT_JPEG:
@@ -1684,6 +1683,7 @@
v4l2_err(&dev->v4l2_dev, "CODA_COMMAND_SEQ_INIT timeout\n");
return ret;
} +ctx->sequence_offset = ~0U;
ctx->initialized = 1;

/* Update kfifo out pointer from coda bitstream read pointer */
@@ -1953,6 +1953,9 @@
* Clear decode success flag */
coda_write(dev, 0, CODA_RET_DEC_PIC_SUCCESS);

+/* Clear error return value */
+coda_write(dev, 0, CODA RET DEC_PIC_ERR MB);
+
trace_coda_dec_pic_run(ctx, meta);

coda_command_async(ctx, CODA_COMMAND_PIC_RUN);
@@ -2092,12 +2095,17 @@
 else if (ctx->display_idx < 0)
 ctx->hold = true;
 } else if (decoded_idx == -2) {
+if (ctx->display_idx >= 0 &&
 + ctx->display_idx < ctx->num_internal_frames)
 +ctx->sequence_offset++; +/* no frame was decoded, we still return remaining buffers */
 } else if (decoded_idx < 0 || decoded_idx >= ctx->num_internal_frames) {
 v4l2_err(&dev->v4l2_dev,
 "decoded frame index out of range: %d\n", decoded_idx);
 } else {
- val = coda_read(dev, CODA_RET_DEC_PIC_FRAME_NUM) - 1;
+ val = coda_read(dev, CODA RET DEC_PIC_FRAME_NUM);
 +if (ctx->sequence_offset == -1)
 +ctx->sequence_offset = val;
 val = ctx->sequence_offset;
 spin_lock_irqsave(&ctx->buffer_meta_lock, flags);
 if (!list_empty(&ctx->buffer_meta_list)) {
@@ -2253,7 +2261,6 @@
 if (ctx == NULL) {
 v4l2_err(&dev->v4l2_dev,
 "Instance released before the end of transaction\n");
- mutex_unlock(&dev->coda_mutex);
 return IRQ_HANDLED;
 }
/* Set the stream-end flag on this context */
ctx->bit_stream_param |= CODA_BIT_STREAM_END_FLAG;

+flush_work(&ctx->pic_run_work);
+
/* If there is no buffer in flight, wake up */
if (!ctx->streamon_out || ctx->qsequence == ctx->osequence) {

dst_vq = v4l2_m2m_get_vq(ctx->fh.m2m_ctx,
@@ -1675,18 +1677,18 @@
 ctx->params.h264_max_qp = ctrl->val;
 break;
 case V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_ALPHA:
-ctx->params.h264_deblk_alpha = ctrl->val;
+ctx->params.h264_slice_alpha_c0_offset_div2 = ctrl->val;
  break;
 case V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_BETA:
-ctx->params.h264_deblk_beta = ctrl->val;
+ctx->params.h264_slice_beta_offset_div2 = ctrl->val;
  break;
 case V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_MODE:
-ctx->params.h264_deblk_enabled = (ctrl->val ==
-V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_ENABLED);
+ctx->params.h264_disable_deblocking_filter_idc = ctrl->val;
  break;
 case V4L2_CID_MPEG_VIDEO_H264_PROFILE:
/* TODO: switch between baseline and constrained baseline */
-ctx->params.h264_profile_idc = 66;
+if (ctx->inst_type == CODA_INST_ENCODER)
+  ctx->params.h264_profile_idc = 66;
  break;
 case V4L2_CID_MPEG_VIDEO_H264_LEVEL:
/* nothing to do, this is set by the encoder */
@@ -1763,13 +1765,13 @@
 v4l2_ctrl_new_std_menu(&ctx->ctrls, &coda_ctrl_ops,
 V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_ALPHA, 0, 15, 1, 0);
 v4l2_ctrl_new_std_menu(&ctx->ctrls, &coda_ctrl_ops,
-V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_MODE_ENABLED);
+V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_MODE, 0x0,
-V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_ENABLED);
-
```c
-V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_ENABLED);
+V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_DISABLED_AT_SLICE_BOUNDARY,
+0x0, V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_ENABLED);
v4l2_ctrl_new_std_menu(&ctx->ctrls, &coda_ctrl_ops,
V4L2_CID_MPEG_VIDEO_H264_PROFILE,
V4L2_MPEG_VIDEO_H264_PROFILE_BASELINE, 0x0,
--- linux-4.15.0.orig/drivers/media/platform/coda/coda.h
+++ linux-4.15.0/drivers/media/platform/coda/coda.h
@@ -114,9 +114,9 @@
   u8		h264_inter_qp;
   u8		h264_min_qp;
   u8		h264_max_qp;
-u8		h264_deblk_enabled;
-u8		h264_deblk_alpha;
-u8		h264_deblk_beta;
+u8		h264_disable_deblocking_filter_idc;
+s8		h264_slice_alpha_c0_offset_div2;
+s8		h264_slice_beta_offset_div2;
   u8		h264_profile_idc;
   u8		h264_level_idc;
   u8mpeg4_intra_qp;
--- linux-4.15.0.orig/drivers/media/platform/coda/coda_regs.h
+++ linux-4.15.0/drivers/media/platform/coda/coda_regs.h
@@ -292,7 +292,7 @@
#define	
tollinux-4.15.0.orig/drivers/media/platform/davinci/isif.c
+++ linux-4.15.0/drivers/media/platform/davinci/isif.c
@@ -886,9 +886,7 @@
static int isif_config_ycbcr(void)
{
   struct isif_ycbcr_config *params = &isif_cfg.ycbcr;
-struct vpss_pg_frame_size frame_size;
   u32 modeset = 0, ccdcfg = 0;
-struct vpss_sync_pol sync;
   dev_dbg(isif_cfg.dev, " unstating isif_config_ycbcr...");
```
/* Setup test pattern if enabled */
-if (isif_cfg.bayer.config_params.test_pat_gen) {
-sync.ccdpg_hdpol = params->hd_pol;
-sync.ccdpg_vdpol = params->vd_pol;
-dm365_vpss_set_sync_pol(sync);
-dm365_vpss_set_pg_frame_size(frame_size);
-
} return 0;
}
@@ -1102,7 +1093,8 @@
while (i >= 0) {
    res = platform_get_resource(pdev, IORESOURCE_MEM, i);
    -release_mem_region(res->start, resource_size(res));
    +if (res)
    +release_mem_region(res->start, resource_size(res));
    i--;
}
vpfe_unregister_ccdc_device(&isif_hw_dev);
--- linux-4.15.0.orig/drivers/media/platform/davinci/vpbe.c
+++ linux-4.15.0/drivers/media/platform/davinci/vpbe.c
@@ -126,7 +126,7 @@
        struct v4l2_output *output)
    {
        struct vpbe_config *cfg = vpbe_dev->cfg;
-    int temp_index = output->index;
+    unsigned int temp_index = output->index;
        if (temp_index >= cfg->num_outputs)
            return -EINVAL;
        @ @ -739,7 +739,7 @@
            if (ret) {
                v4l2_err(&vpbe_dev->v4l2_dev, "Failed to set default output %s",
                        def_output);
                -return ret;
                +goto fail_kfree_amp;
            }

            printk(KERN_NOTICE "Setting default mode to %s\n", def_mode);
-        @ @ -747,12 +747,15 @@
            if (ret) {
                v4l2_err(&vpbe_dev->v4l2_dev, "Failed to set default mode %s",
                        def_mode);
                -return ret;
                +goto fail_kfree_amp;
            }
            vpbe_dev->initialized = 1;
return 0;

+fail_kfree_amp:
+mutex_lock(&vpbe_dev->lock);
+kfree(vpbe_dev->amp);
fail_kfree_encoders:
kfree(vpbe_dev->encoders);
fail_dev_unregister:
--- linux-4.15.0.orig/drivers/media/platform/davinci/vpbe_display.c
+++ linux-4.15.0/drivers/media/platform/davinci/vpbe_display.c
@@ -58,7 +58,7 @@
ret = v4l2_subdev_call(vpbe_dev->venc,
    core,
    -ioctl,
    +command,
        VENC_GET_FLD,
        &val);
if (ret < 0) {
@@ -518,7 +518,7 @@
else if (v_scale == 4)
    layer_info->v_zoom = ZOOM_X4;
    if (v_exp)
    -layer_info->h_exp = V_EXP_6_OVER_5;
++layer_info->v_exp = V_EXP_6_OVER_5;
} else {
/* no scaling, only cropping. Set display area to crop area */
cfg->ysize = expected_ysize;
--- linux-4.15.0.orig/drivers/media/platform/davinci/vpbe_venc.c
+++ linux-4.15.0/drivers/media/platform/davinci/vpbe_venc.c
@@ -531,9 +531,7 @@
return ret;
}

-static long venc_ioctl(struct v4l2_subdev *sd,
-unsigned int cmd,
-void *arg)
+static long venc_command(struct v4l2_subdev *sd, unsigned int cmd, void *arg)
{
u32 val;

@@ -552,7 +550,7 @@

static const struct v4l2_subdev_core_ops venc_core_ops = {
    .ioctl = venc_ioctl,
    +.command = venc_command,
static const struct v4l2_subdev_video_ops venc_video_ops = {
    .open = NULL,
    .release = NULL,
    .getPixFormat = NULL,
    .getPixRect = NULL,
    .setPixRect = NULL,
    .getPixStride = NULL,
    .getPixSize = NULL,
    .setPixSize = NULL,
    .getPixFramerate = NULL,
    .setPixFramerate = NULL,
    .setFormat = NULL,
    .selectPixFormat = NULL,
    .ioctl = NULL,
    .control = NULL,
    .set_menu = NULL,
    .get_menu = NULL,
    .set_bytesperline = NULL,
    .set_memory_type = NULL,
    .set_memory_size = NULL,
    .set_memory_area = NULL,
    .set_memory_type_and_area = NULL,
    .videscr_query = NULL,
    .videscr_set = NULL,
    .query_framebuffer = NULL,
    .set_memory = NULL,
    .query_resolution = NULL,
    .query_supervisory = NULL,
    .query_resource = NULL,
    .query_settings = NULL,
    .set_active_range = NULL,
    .set_preset_range = NULL,
    .set_white_balance = NULL,
    .do_pix_caption = NULL,
    .set_white_balance = NULL,
    .do_pix_caption = NULL,
    .set_attribute = NULL,
    .get_attribute = NULL,
    .do_preset = NULL,
    .set_preset = NULL,
    .get_preset = NULL,
    .do_generator = NULL,
    .set_generator = NULL,
    .do_debug = NULL,
    .set_type = NULL,
    .query_type = NULL,
    .set_yuv_range = NULL,
    .do_auto = NULL,
    .do_television = NULL,
    .videscr_query = NULL,
    .videscr_set = NULL,
    .query_framebuffer = NULL,
    .set_memory = NULL,
    .query_resolution = NULL,
    .query_supervisory = NULL,
    .query_resource = NULL,
    .query_settings = NULL,
    .set_active_range = NULL,
    .set_preset_range = NULL,
    .set_white_balance = NULL,
    .do_pix_caption = NULL,
    .set_white_balance = NULL,
    .do_pix_caption = NULL,
    .set_attribute = NULL,
    .get_attribute = NULL,
    .do_preset = NULL,
    .set_preset = NULL,
    .get_preset = NULL,
    .do_generator = NULL,
    .set_generator = NULL,
    .do_debug = NULL,
    .set_type = NULL,
    .query_type = NULL,
    .set_yuv_range = NULL,
    .do_auto = NULL,
    .do_television = NULL,
    .do_pix_caption = NULL,
    .set_pix_rect = NULL,
    .do_pix_caption = NULL,
    .set_pix_format = NULL,
    .do_pix_caption = NULL,
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    .do_pix_caption = NULL,
    .do_pix_caption = NULL,
    .do_pix_caption = NULL,
    .do_pix_caption = NULL,
    .do_pix_caption = NULL,
static int vpif_async_bound(struct v4l2.async_notifier *notifier,
    struct v4l2_subdev *subdev,
    struct v4l2_async_subdev *asd)
@@ -1255,11 +1263,6 @@
    return -EINVAL;
}

-if (!pdev->dev.platform_data) {
-    dev_warn(&pdev->dev, "Missing platform data. Giving up.\n");
-return -EINVAL;
-}
-
-vpif_dev = &pdev->dev;
err = initialize_vpif();

@@ -1271,7 +1274,7 @@
    err = v4l2_device_register(vpif_dev, &vpif_obj.v4l2_dev);
    if (err) {
        v4l2_err(vpif_dev->driver, "Error registering v4l2 device\n");
@@ -1314,7 +1317,10 @@
    if (vpif_obj.sd[i])
        vpif_obj.sd[i]->grp_id = 1 << i;
    }
-vpif_probe_complete();
+err = vpif_probe_complete();
+if (err) {
+    goto probe_subdev_out;
+} else {
    vpif_obj.notifier.subdevs = vpif_obj.config->asd;
    vpif_obj.notifier.num_subdevs = vpif_obj.config->asd_sizes[0];
@@ -1334,6 +1340,8 @@
    kfree(vpif_obj.sd);
    vpif_unregister:
    v4l2_device_unregister(&vpif_obj.v4l2_dev);
@@ -1355,8 +1363,8 @@
    ch = vpif_obj.dev[i];
/* Unregister video device */
video_unregister_device(&ch->video_dev);
-kfree(vpif_obj.dev[i]);
}
+free_vpif_objs();

return 0;
}
--- linux-4.15.0.orig/drivers/media/platform/davinci/vpss.c
+++ linux-4.15.0/drivers/media/platform/davinci/vpss.c
@@ -514,14 +514,31 @@
static int __init vpss_init(void)
{
+int ret;
+
+if (!request_mem_region(VPSS_CLK_CTRL, 4, "vpss_clock_control"))
+    return -EBUSY;

    oper_cfg.vpss_REGS_base2 = ioremap(VPSS_CLK_CTRL, 4);
+    if (unlikely(!oper_cfg.vpss_REGS_base2)) {
+        ret = -ENOMEM;
+        goto err_ioremap;
+    }
+
+writel(VPSS_CLK_CTRL_VENCCLKEN |
+    - VPSS_CLK_CTRL_DACCLKEN, oper_cfg.vpss_REGS_base2);
+    VPSS_CLK_CTRL_DACCLKEN, oper_cfg.vpss_REGS_base2);
+    
+    ret = platform_driver_register(&vpss_driver);
+    if (ret)
+        goto err_pd_register;
+    
+    return 0;

-    return platform_driver_register(&vpss_driver);
+err_pd_register:
+iounmap(oper_cfg.vpss_REGS_base2);
+err_ioremap:
+release_mem_region(VPSS_CLK_CTRL, 4);
+return ret;
}
subsys_initcall(vpss_init);
module_exit(vpss_exit);
--- linux-4.15.0.orig/drivers/media/platform/exynos4-is/fimc-is.c
+++ linux-4.15.0/drivers/media/platform/exynos4-is/fimc-is.c
@@ -819,6 +819,7 @@
return -ENODEV;

is->pmu_regs = of_iomap(node, 0);
+of_node_put(node);
if (!is->pmu_regs)
  return -ENOMEM;

--- linux-4.15.0.orig/drivers/media/platform/exynos4-is/fimc-isp-video.c
+++ linux-4.15.0/drivers/media/platform/exynos4-is/fimc-isp-video.c
@@ -308,17 +308,20 @@
    struct fimc_is_video *ivc = &isp->video_capture;
    struct media_entity *entity = &ivc->ve.vdev.entity;
    struct media_device *mdev = entity->graph_obj.mdev;
+  bool is_singular_file;

  mutex_lock(&isp->video_lock);

-  if (v4l2_fh_is_singular_file(file) && ivc->streaming) {
+  is_singular_file = v4l2_fh_is_singular_file(file);
+  if (is_singular_file && ivc->streaming) {
    media_pipeline_stop(entity);
    ivc->streaming = 0;
  }

-  vb2_fop_release(file);
+  _vb2_fop_release(file, NULL);

-  if (v4l2_fh_is_singular_file(file)) {
+  if (is_singular_file) {
    fimc_pipeline_call(&ivc->ve, close);

    mutex_lock(&mdev->graph_mutex);
@@ -384,12 +387,17 @@
    struct v4l2_pix_format_mplane *pixm,
    const struct fimc_fmt **fmt)
  {
-    *fmt = fimc_isp_find_format(&pixm->pixelformat, NULL, 2);
+    const struct fimc_fmt *__fmt;
+    __fmt = fimc_isp_find_format(&pixm->pixelformat, NULL, 2);
+    if (fmt)
+      *fmt = __fmt;

    pixm->colorspace = V4L2_COLORSPACE_SRGB;
    pixm->field = V4L2_FIELD_NONE;
-    pixm->num_planes = (*fmt)->memplanes;
-    pixm->pixelformat = (*fmt)->fourcc;


pixm->num_planes = __fmt->memplanes;
pixm->pixelformat = __fmt->fourcc;

/*
 * TODO: double check with the documentation these width/height
 * constraints are correct.
--- linux-4.15.0.orig/drivers/media/platform/exynos4-is/fimc-isp.c
+++ linux-4.15.0/drivers/media/platform/exynos4-is/fimc-isp.c
 @@ -311,8 +311,10 @@
if (on) {
 ret = pm_runtime_get_sync(&is->pdev->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put(&is->pdev->dev);
 return ret;
+ }
 set_bit(IS_ST_PWR_ON, &is->state);

 ret = fimc_is_start_firmware(is);
--- linux-4.15.0.orig/drivers/media/platform/exynos4-is/fimc-lite.c
+++ linux-4.15.0/drivers/media/platform/exynos4-is/fimc-lite.c
 @@ -480,7 +480,7 @@
 set_bit(ST_FLITE_IN_USE, &fimc->state);
 ret = pm_runtime_get_sync(&fimc->pdev->dev);
 if (ret < 0)
- goto unlock;
+ goto err_pm;
 return ret;
+of_node_put(port);
if (ret < 0) {
    of_node_put(node);
goto rpm_put;
@@ -531,6 +534,7 @@
if (!np)
    return -EINVAL;
of_property_read_u32(np, "reg", &reg);
+of_node_put(np);
return reg - FIMC_INPUT_MIPI_CSI2_0;
}

@@ -1257,6 +1261,7 @@
if (IS_ERR(pctl->state_default))
    return PTR_ERR(pctl->state_default);

+/* PINCTRL_STATE_IDLE is optional */
pctl->state_idle = pinctrl_lookup_state(pctl->pinctrl,
PINCTRL_STATE_IDLE);
return 0;
--- linux-4.15.0.orig/drivers/media/platform/exynos4-is/mipi-csis.c
+++ linux-4.15.0/drivers/media/platform/exynos4-is/mipi-csis.c
@@ -513,8 +513,10 @@
if (enable) {
s5pcsis_clear_counters(state);
    ret = pm_runtime_get_sync(&state->pdev->dev);
    -if (ret && ret != 1)
+    if (ret && ret != 1) {
+        pm_runtime_put_noidle(&state->pdev->dev);
    return ret;
+} }

mutex_lock(&state->lock);
--- linux-4.15.0.orig/drivers/media/platform/fsl-viu.c
+++ linux-4.15.0/drivers/media/platform/fsl-viu.c
@@ -1417,7 +1417,7 @@
    if (!viu_regs) {
        dev_err(&op->dev, "Can't map register set\n");
        ret = -EBUSY;
-    goto err;
+    goto err_irq;
    }
    /* remap registers */
@@ -1425,7 +1425,7 @@
    dev_err(&op->dev, "Error while requesting mem region\n");
    ret = -EBUSY;
    -goto err;
+    goto err_irq;
}

/* remap registers */
@@ -1425,7 +1425,7 @@
    dev_err(&op->dev, "Can't map register set\n");
ret = -ENOMEM;
-goto err;
+goto err_irq;
}

/* Prepare our private structure */
@@ -1433,7 +1433,7 @@
    if (!viu_dev) {
        dev_err(&op->dev, "Can't allocate private structure\n");
        ret = -ENOMEM;
-    goto err;
+    goto err_irq;
    }

    viu_dev->vr = viu_regs:
@@ -1449,16 +1449,21 @@
    ret = v4l2_device_register(viu_dev->dev, &viu_dev->v4l2_dev);
    if (ret < 0) {
        dev_err(&op->dev, "v4l2_device_register() failed: \%d\n", ret);
-    goto err;
+    goto err_irq;
    }

    ad = i2c_get_adapter(0);
    +if (!ad) {
    +ret = -EFAULT;
    +dev_err(&op->dev, "couldn't get i2c adapter\n");
    +goto err_v4l2;
    +}

    v4l2_ctrl_handler_init(&viu_dev->hdl, 5);
    if (viu_dev->hdl.error) {
        ret = viu_dev->hdl.error;
        dev_err(&op->dev, "couldn't register control\n");
        -goto err_vdev;
        +goto err_i2c;
        +}

    v4l2_ctrl_handler_init(&viu_dev->hdl, 5);
    if (viu_dev->hdl.error) {
        ret = viu_dev->hdl.error;
        dev_err(&op->dev, "couldn't register control\n");
        -goto err_vdev;
        +goto err_i2c;
        +}

    /* This control handler will inherit the control(s) from the
    * sub-device(s).
    @@ -1474,7 +1479,7 @@
        vdev = video_device_alloc();
        if (vdev == NULL) {
            ret = -ENOMEM;
-        goto err_vdev;
+        goto err_hdl;
            }

        *vdev = viu_template;
ret = video_register_device(viu_dev->vdev, VFL_TYPE_GRABBER, -1);
if (ret < 0) {
    video_device_release(viu_dev->vdev);
    goto err_vdev;
    +goto err_unlock;
}

/* enable VIU clock */
ret = clk_prepare_enable(clk);
if (ret) {
    dev_err(&op->dev, "failed to enable the clock!
");
    -goto err_clk;
    +goto err_vdev;
}

mutex_unlock(&viu_dev->lock);

return ret;

-err_irq:
-clk_disable_unprepare(viu_dev->clk);
err_clk:
-video_unregister_device(viu_dev->vdev);
+clk_disable_unprepare(viu_dev->clk);
err_vdev:
-v4l2_ctrl_handler_free(&viu_dev->hdl);
+video_unregister_device(viu_dev->vdev);
+err_unlock:
mutex_unlock(&viu_dev->lock);
+err_hdl:
+v4l2_ctrl_handler_free(&viu_dev->hdl);
+err_i2c:
  i2c_put_adapter(ad);
+err_v4l2:
  v4l2_device_unregister(&viu_dev->v4l2_dev);
-err:
+err_irq:
  irq_dispose_mapping(viu_irq);
return ret;
}
--- linux-4.15.0.orig/drivers/media/platform/marvell-ccic/mcam-core.c
+++ linux-4.15.0/drivers/media/platform/marvell-ccic/mcam-core.c
@@ -200,7 +200,6 @@
 struct list_head queue;
 struct mcam_dma_desc *dma_desc;/* Descriptor virtual address */
 dma_addr_t dma_desc_pa;/* Descriptor physical address */
-int dma_desc_nent;/* Number of mapped descriptors */
 }

 static inline struct mcam_vb_buffer *vb_to_mvb(struct vb2_v4l2_buffer *vb)
@@ -608,9 +607,11 @@
 static void mcam_sg_next_buffer(struct mcam_camera *cam)
 {
  struct mcam_vb_buffer *buf;
+  struct sg_table *sg_table;

  buf = list_first_entry(&cam->buffers, struct mcam_vb_buffer, queue);
  list_del_init(&buf->queue);
+  sg_table = vb2_dma_sg_plane_desc(&buf->vb_buf.vb2_buf, 0);
 /*
   * Very Bad Not Good Things happen if you don't clear
   * C1_DESC_ENA before making any descriptor changes.
@@ -618,7 +619,7 @@
  mcam_reg_clear_bit(cam, REG_CTRL1, C1_DESC_ENA);
  mcam_reg_write(cam, REG_DMA_DESC_Y, buf->dma_desc_pa);
  mcam_reg_write(cam, REG_DESC_LEN_Y,
-    buf->dma_desc_nent*sizeof(struct mcam_dma_desc));
+    sg_table->nents * sizeof(struct mcam_dma_desc));
  mcam_reg_write(cam, REG_DESC_LEN_U, 0);
  mcam_reg_write(cam, REG_DESC_LEN_V, 0);
  mcam_reg_set_bit(cam, REG_CTRL1, C1_DESC_ENA);
--- linux-4.15.0.orig/drivers/media/platform/mtk-jpeg/mtk_jpeg_core.c
+++ linux-4.15.0/drivers/media/platform/mtk-jpeg/mtk_jpeg_core.c
@@ -579,6 +579,13 @@
  if (!q_data)
 return -EINVAL;
+  if (*num_planes) {


for (i = 0; i < *num_planes; i++)
+if (sizes[i] < q_data->sizeimage[i])
+return -EINVAL;
+return 0;
+
+*num_planes = q_data->fmt->colplanes;
+for (i = 0; i < q_data->fmt->colplanes; i++) {
+sizes[i] = q_data->sizeimage[i];
+
702, v4l2_m2m_buf_queue(ctx->fh.m2m_ctx, to_vb2_v4l2_buffer(vb));
}

-static void *mtk_jpeg_buf_remove(struct mtk_jpeg_ctx *ctx,
+static struct vb2_v4l2_buffer *mtk_jpeg_buf_remove(struct mtk_jpeg_ctx *ctx,
enum v4l2_buf_type type)
{
if (V4L2_TYPE_IS_OUTPUT(type))
@@ -714,7 +721,7 @@
static int mtk_jpeg_start_streaming(struct vb2_queue *q, unsigned int count)
{
struct mtk_jpeg_ctx *ctx = vb2_get_drv_priv(q);
-struct vb2_buffer *vb;
+struct vb2_v4l2_buffer *vb;
+int ret = 0;

ret = pm_runtime_get_sync(ctx->jpeg->dev);
@@ -724,14 +731,14 @@
return 0;
err:
while ((vb = mtk_jpeg_buf_remove(ctx, q->type)))
-v4l2_m2m_buf_done(to_vb2_v4l2_buffer(vb), VB2_BUF_STATE_QUEUED);
+v4l2_m2m_buf_done(vb, VB2_BUF_STATE_QUEUED);
return ret;
}

static void mtk_jpeg_stop_streaming(struct vb2_queue *q)
{
struct mtk_jpeg_ctx *ctx = vb2_get_drv_priv(q);
-struct vb2_buffer *vb;
+struct vb2_v4l2_buffer *vb;

/*
 * STREAMOFF is an acknowledgment for source change event.
@@ -743,7 +750,7 @@
struct mtk_jpeg_src_buf *src_buf;
        vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_CTX);
src_buf = mtk_jpeg_vb2_to_srcbuf(vb);
src_buf = mtk_jpeg_vb2_to_srcbuf(&vb->vb2_buf);
mtk_jpeg_set_queue_data(ctx, &src_buf->dec_param);
ctx->state = MTK_JPEG_RUNNING;
} else if (V4L2_TYPE_IS_OUTPUT(q->type)) {
    @ @ -751,7 +758,7 @@
}

while ((vb = mtk_jpeg_buf_remove(ctx, q->type)))
    v4l2_m2m_buf_done(to_vb2_v4l2_buffer(vb), VB2_BUF_STATE_ERROR);
+4v12_m2m_buf_done(vb, VB2_BUF_STATE_ERROR);

pm_runtime_put_sync(ctx->jpeg->dev);
} @ @ -807,7 +814,7 @@
{
    struct mtk_jpeg_ctx *ctx = priv;
    struct mtk_jpeg_dev *jpeg = ctx->jpeg;
-struct vb2_buffer *src_buf, *dst_buf;
+struct vb2_v4l2_buffer *src_buf, *dst_buf;
    enum vb2_buffer_state buf_state = VB2_BUF_STATE_ERROR;
    unsigned long flags;
    struct mtk_jpeg_src_buf *jpeg_src_buf;
@@ -817,11 +824,11 @@
    src_buf = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
    dst_buf = v4l2_m2m_next_dst_buf(ctx->fh.m2m_ctx);
-    jpeg_src_buf = mtk_jpeg_vb2_to_srcbuf(src_buf);
+    jpeg_src_buf = mtk_jpeg_vb2_to_srcbuf(&src_buf->vb2_buf);
    if (jpeg_src_buf->flags & MTK_JPEG_BUF_FLAGS_LAST_FRAME) {
        @@ -817,11 +824,11 @@
            -for (i = 0; i < dst_buf->num_planes; i++)
              -vb2_set_plane_payload(dst_buf, i, 0);
+            for (i = 0; i < dst_buf->vb2_buf.num_planes; i++)
+              vb2_set_plane_payload(&dst_buf->vb2_buf, i, 0);
        buf_state = VB2_BUF_STATE_DONE;
        goto dec_end;
    }
@@ -833,8 +840,8 @@
    return;
}

-    mtk_jpeg_set_dec_src(ctx, src_buf, &bs);
-    if (mtk_jpeg_set_dec_dst(ctx, &jpeg_src_buf->dec_param, dst_buf, &fb))
+    mtk_jpeg_set_dec_src(ctx, &src_buf->vb2_buf, &bs);
+    if (mtk_jpeg_set_dec_dst(ctx, &jpeg_src_buf->dec_param, &dst_buf->vb2_buf, &fb))
        goto dec_end;

spin_lock_irqsave(&jpeg->hw_lock, flags);
@@ -849,8 +856,8 @@
dec_end:
v4l2_m2m_src_buf_remove(ctx->fh.m2m_ctx);
v4l2_m2m_dst_buf_remove(ctx->fh.m2m_ctx);
-v4l2_m2m_buf_done(to_vb2_v4l2_buffer(src_buf), buf_state);
-v4l2_m2m_buf_done(to_vb2_v4l2_buffer(dst_buf), buf_state);
+v4l2_m2m_buf_done(src_buf, buf_state);
+v4l2_m2m_buf_done(dst_buf, buf_state);
v4l2_m2m_job_finish(jpeg->m2m_dev, ctx->fh.m2m_ctx);
}

@@ -926,7 +933,7 @@
{
    struct mtk_jpeg_dev *jpeg = priv;
    struct mtk_jpeg_ctx *ctx;
-    struct vb2_buffer *src_buf, *dst_buf;
+    struct vb2_v4l2_buffer *src_buf, *dst_buf;
    struct v4l2_buffer *src_buf, *dst_buf;
    struct mtk_jpeg_src_buf *jpeg_src_buf;
    enum vb2_buffer_state buf_state = VB2_BUF_STATE_ERROR;
    u32 dec_irq_ret;
    @@ -943,7 +950,7 @@

    src_buf = v4l2_m2m_src_buf_remove(ctx->fh.m2m_ctx);
    dst_buf = v4l2_m2m_dst_buf_remove(ctx->fh.m2m_ctx);
-    jpeg_src_buf = mtk_jpeg_vb2_to_srcbuf(src_buf);
+    jpeg_src_buf = mtk_jpeg_vb2_to_srcbuf(&src_buf->vb2_buf);

    if (dec_irq_ret >= MTK_JPEG_DEC_RESULT_UNDERFLOW)
        mtk_jpeg_dec_reset(jpeg->dec_reg_base);
    @@ -953,15 +960,15 @@
goto dec_end;
}

-    for (i = 0; i < dst_buf->num_planes; i++)
+    for (i = 0; i < dst_buf->vb2_buf.num_planes; i++)
        vb2_set_plane_payload(&dst_buf->vb2_buf, i,
            jpeg_src_buf->dec_param.comp_size[i]);

    buf_state = VB2_BUF_STATE_DONE;

dec_end:
-    v4l2_m2m_buf_done(to_vb2_v4l2_buffer(src_buf), buf_state);
-    v4l2_m2m_buf_done(to_vb2_v4l2_buffer(dst_buf), buf_state);
+    v4l2_m2m_buf_done(src_buf, buf_state);
+    v4l2_m2m_buf_done(dst_buf, buf_state);
    v4l2_m2m_job_finish(jpeg->m2m_dev, ctx->fh.m2m_ctx);
return IRQ_HANDLED;
}

--- linux-4.15.0.orig/drivers/media/platform/mtk-mdp/mtk_mdp_core.c
+++ linux-4.15.0/drivers/media/platform/mtk-mdp/mtk_mdp_core.c
@@ -118,7 +118,9 @@
mutex_init(&mdp->vpulock);

/* Old dts had the components as child nodes */
-if (of_get_next_child(dev->of_node, NULL)) {
+if (node = of_get_next_child(dev->of_node, NULL)) {
+ if (node) {
+of_node_put(node);
parent = dev->of_node;
dev_warn(dev, "device tree is out of date\n");
} else {
--- linux-4.15.0.orig/drivers/media/platform/mtk-vcodec/mtk_vcodec_dec_pm.c
+++ linux-4.15.0/drivers/media/platform/mtk-vcodec/mtk_vcodec_dec_pm.c
@@ -103,6 +103,7 @@
void mtk_vcodec_release_dec_pm(struct mtk_vcodec_dev *dev)
{
    pm_runtime_disable(dev->pm.dev);
+    put_device(dev->pm.larbvdec);
}

void mtk_vcodec_dec_pw_on(struct mtk_vcodec_pm *pm)
--- linux-4.15.0.orig/drivers/media/platform/mtk-vcodec/mtk_vcodec_enc_pm.c
+++ linux-4.15.0/drivers/media/platform/mtk-vcodec/mtk_vcodec_enc_pm.c
@@ -41,25 +41,27 @@
        node = of_parse_phandle(dev->of_node, "mediatek,larb", 0);
        if (!node) {
            mtk_v4l2_err("no mediatek,larb found");
-        return -1;
+        return -ENODEV;
        }
        pdev = of_find_device_by_node(node);
        +of_node_put(node);
        if (!pdev) {
            mtk_v4l2_err("no mediatek,larb device found");
-        return -1;
+        return -ENODEV;
        }
        pm->larbvenc = &pdev->dev;

        node = of_parse_phandle(dev->of_node, "mediatek,larb", 1);
        if (!node) {
            mtk_v4l2_err("no mediatek,larb found");
-        return -1;
+        return -ENODEV;
pdev = of_find_device_by_node(node);
+of_node_put(node);
if (!pdev) {
    mtk_v4l2_err("no mediatek,larb device found");
-    return -1;
+    return -ENODEV;
}

pm->larbvenclt = &pdev->dev;
--- linux-4.15.0.orig/drivers/media/platform/mtk-vcodec/mtk_vcodec_util.c
+++ linux-4.15.0/drivers/media/platform/mtk-vcodec/mtk_vcodec_util.c
@@ -115,3 +115,6 @@
    return ctx;
}
EXPORT_SYMBOL(mtk_vcodec_get_curr_ctx);
+
+MODULE_LICENSE("GPL v2");
+MODULE_DESCRIPTION("Mediatek video codec driver");
--- linux-4.15.0.orig/drivers/media/platform/mx2_emmaprp.c
+++ linux-4.15.0/drivers/media/platform/mx2_emmaprp.c
@@ -288,7 +288,7 @@
{
    struct emmaprp_ctx *ctx = priv;
    struct emmaprp_q_data *s_q_data, *d_q_data;
-    struct vb2_buffer *src_buf, *dst_buf;
+    struct vb2_v4l2_buffer *src_buf, *dst_buf;
    struct vb2_v4l2_buffer *src_buf, *dst_buf;
    struct emmaprp_dev *pcdev = ctx->dev;
    unsigned int s_width, s_height;
    unsigned int d_width, d_height;
@@ -308,8 +308,8 @@
    d_height = d_q_data->height;
    d_size = d_width * d_height;

    -p_in = vb2_dma_contig_plane_dma_addr(src_buf, 0);
-    p_out = vb2_dma_contig_plane_dma_addr(dst_buf, 0);
+    p_in = vb2_dma_contig_plane_dma_addr(&src_buf->vb2_buf, 0);
+    p_out = vb2_dma_contig_plane_dma_addr(&dst_buf->vb2_buf, 0);
    if (!p_in || !p_out) {
        v4l2_err(&pcdev->v4l2_dev,
"Acquiring kernel pointers to buffers failed\n");
@@ -942,8 +942,11 @@
platform_set_drvdata(pdev, pcdev);

    irq = platform_get_irq(pdev, 0);
-    if (irq < 0)
-        return irq;
+if (irq < 0) {
+ret = irq;
+goto rel_vdev;
+}
+
+ret = devm_request_irq(&pdev->dev, irq, emmaprp_irq, 0,
    dev_name(&pdev->dev), pcdev);
if (ret)
    --- linux-4.15.0.orig/drivers/media/platform/omap/omap_vout.c
+++ linux-4.15.0/drivers/media/platform/omap/omap_vout.c
@@ -1528,23 +1528,20 @@
unsigned long size;
struct videobuf_buffer *vb;
-vb = q->bufs[b->index];
-
if (!vout->streaming)
    return -EINVAL;
-if (file->f_flags & O_NONBLOCK)
	/* Call videobuf_dqbuf for non blocking mode */
-ret = videobuf_dqbuf(q, (struct v4l2_buffer *)b, 1);
-else
-/* Call videobuf_dqbuf for blocking mode */
-ret = videobuf_dqbuf(q, (struct v4l2_buffer *)b, 0);
+ret = videobuf_dqbuf(q, b, !!((file->f_flags & O_NONBLOCK));
+if (ret)
+    return ret;
+
+vb = q->bufs[b->index];

addr = (unsigned long) vout->buf_phy_addr[vb->i];
size = (unsigned long) vb->size;
dma_unmap_single(vout->vid_dev->v4l2_dev.dev, addr,
size, DMA_TO_DEVICE);
-return ret;
+return 0;
}

static int vidioc_streamon(struct file *file, void *fh, enum v4l2_buf_type i)
    --- linux-4.15.0.orig/drivers/media/platform/omap/omap_vout_vrfb.c
+++ linux-4.15.0/drivers/media/platform/omap/omap_vout_vrfb.c
@@ -254,8 +254,7 @@
*/

pixsize = vout->bpp * vout->vrfb_bpp;
-dst_icg = ((MAX_PIXELS_PER_LINE * pixsize) -
- (vout->pix.width * vout->bpp)) + 1;
dst_icg = MAX_PIXELS_PER_LINE * pixsize - vout->pix.width * vout->bpp;

xt->src_start = vout->buf_phy_addr[vb->i];
xt->dst_start = vout->vrfb_context[vb->i].paddr[0];
--- linux-4.15.0.orig/drivers/media/platform/omap3isp/isp.c
+++ linux-4.15.0/drivers/media/platform/omap3isp/isp.c
@@ -305,7 +305,7 @@
 static int isp_xclk_init(struct isp_device *isp)
 {
     struct device_node *np = isp->dev->of_node;
-    struct clk_init_data init;
+    struct clk_init_data init = { 0 };
     unsigned int i;

     for (i = 0; i < ARRAY_SIZE(isp->xclks); ++i)
@@ -727,6 +727,10 @@
         s_stream, mode);
         pipe->do_propagation = true;
     }
+    /* Stop at the first external sub-device. */
+    if (subdev->dev != isp->dev)
+        break;
 }

 return 0;
@@ -841,6 +845,10 @@
         &subdev->entity);
     failure = -ETIMEDOUT;
 }
+    /* Stop at the first external sub-device. */
+    if (subdev->dev != isp->dev)
+        break;
 }

 return failure;
@@ -1592,6 +1600,8 @@
 static void isp_unregister_entities(struct isp_device *isp)
 {
     media_device_unregister(&isp->media_dev);
+    omap3isp_csi2_unregister_entities(&isp->isp_csi2a);
     omap3isp_ccp2_unregister_entities(&isp->isp_ccp2);
     omap3isp_ccdc_unregister_entities(&isp->isp_ccdc);
@@ -1602,7 +1612,6 @@
     omap3isp_stat_unregister_entities(&isp->isp_hist);


v4l2_device_unregister(&isp->v4l2_dev);
-media_device_unregister(&isp->media_dev);
media_device_cleanup(&isp->media_dev);
}

static void isp_detach_iommu(struct isp_device *isp)
{
+arm_iommu_detach_device(isp->dev);
arm_iommu_release_mapping(isp->mapping);
isp->mapping = NULL;
}

mapping = arm_iommu_create_mapping(&platform_bus_type, SZ_1G, SZ_2G);
if (IS_ERR(mapping)) {
    dev_err(isp->dev, "failed to create ARM IOMMU mapping\n");
    -ret = PTR_ERR(mapping);
    -goto error;
    +return PTR_ERR(mapping);
}

isp->mapping = mapping;

mem = platform_get_resource(pdev, IORESOURCE_MEM, i);
isp->mmio_base[map_idx] =
devm_ioremap_resource(isp->dev, mem);
-if (IS_ERR(isp->mmio_base[map_idx]))
    -return PTR_ERR(isp->mmio_base[map_idx]);
+if (IS_ERR(isp->mmio_base[map_idx]))
    +return PTR_ERR(isp->mmio_base[map_idx]);
+goto error;
+
}

ret = isp_get_clocks(isp);
--- linux-4.15.0.orig/drivers/media/platform/omap3isp/ispccdc.c
int ret;

/* Register the subdev and video node. */
+ccdc->subdev.dev = vdev->mdev->dev;
ret = v4l2_device_register_subdev(vdev, &ccdc->subdev);
if (ret < 0)
goto error;
--- linux-4.15.0.orig/drivers/media/platform/omap3isp/ispccp2.c
+++ linux-4.15.0/drivers/media/platform/omap3isp/ispccp2.c
@@ -1034,6 +1034,7 @@
int ret;

/* Register the subdev and video nodes. */
+ccp2->subdev.dev = vdev->mdev->dev;
ret = v4l2_device_register_subdev(vdev, &ccp2->subdev);
if (ret < 0)
goto error;
--- linux-4.15.0.orig/drivers/media/platform/omap3isp/ispcsi2.c
+++ linux-4.15.0/drivers/media/platform/omap3isp/ispcsi2.c
@@ -1201,6 +1201,7 @@
int ret;

/* Register the subdev and video nodes. */
+prev->subdev.dev = vdev->mdev->dev;
ret = v4l2_device_register_subdev(vdev, &prev->subdev);
if (ret < 0)
goto error;
--- linux-4.15.0.orig/drivers/media/platform/omap3isp/isppreview.c
+++ linux-4.15.0/drivers/media/platform/omap3isp/isppreview.c
@@ -2228,6 +2228,7 @@
int ret;

/* Register the subdev and video nodes. */
+prev->subdev.dev = vdev->mdev->dev;
ret = v4l2_device_register_subdev(vdev, &prev->subdev);
if (ret < 0)
goto error;
@@ -2289,7 +2289,7 @@
me->ops = &preview_media_ops;
ret = media_entity_pads_init(me, PREV_PADS_NUM, pads);
if (ret < 0)
-       return ret;
+       goto error_handler_free;

 preview_init_formats(sd, NULL);
omap3isp_video_cleanup(&prev->video_in);

media_entity_cleanup(&prev->subdev.entity);
+error_handler_free:
+v4l2_ctrl_handler_free(&prev->ctrls);
return ret;
}

--- linux-4.15.0.orig/drivers/media/platform/omap3isp/ispresizer.c
+++ linux-4.15.0/drivers/media/platform/omap3isp/ispresizer.c
@@ -1684,6 +1684,7 @@
        int ret = v4l2_device_register_subdev(vdev, &res->subdev);
        if (ret < 0)
            goto error;
--- linux-4.15.0.orig/drivers/media/platform/omap3isp/ispstat.c
+++ linux-4.15.0/drivers/media/platform/omap3isp/ispstat.c
@@ -1018,6 +1018,8 @@
        int omap3isp_stat_register_entities(struct ispstat *stat,
            struct v4l2_device *vdev)
        {
+            stat->subdev.dev = vdev->mdev->dev;
+            return v4l2_device_register_subdev(vdev, &stat->subdev);
        }

--- linux-4.15.0.orig/drivers/media/platform/pxa_camera.c
+++ linux-4.15.0/drivers/media/platform/pxa_camera.c
@@ -1453,6 +1453,9 @@
        struct pxa_camera_dev *pcdev = vb2_get_drv_priv(vb->vb2_queue);
        struct pxa_buffer *buf = vb2_to_pxa_buffer(vb);
        int ret = 0;
+    #ifdef DEBUG
+        int i;
+    #endif

        switch (pcdev->channels) {
            case 1:
                pcdev->res = res;
                pcdev->pdata = pdev->dev.platform_data;
                -if (&pdev->dev.of_node && !pcdev->pdata) {
                +if (pdev->dev.of_node && !pcdev->pdata) {


err = pxa_camera_pdata_from_dt(&pdev->dev, pcdev, &pcdev->asd);
} else {
    pcdev->platform_flags = pcdev->pdata->flags;

--- linux-4.15.0.orig/drivers/media/platform/qcom/camss-8x16/camss-csid.c
+++ linux-4.15.0/drivers/media/platform/qcom/camss-8x16/camss-csid.c
@@ -392,9 +392,6 @@
    return -ENOLINK;

-dt = csid_get_fmt_entry(csid->fmt[MSM_CSID_PAD_SRC].code)->
data_type;
-
if (tg->enabled) {
    /* Config Test Generator */
struct v4l2_mbus_framefmt *f =
@@ -416,6 +413,9 @@
    dt = csid_get_fmt_entry(csid->fmt[MSM_CSID_PAD_SRC].code)->data_type;
    /* 5:0 data type */
    val = dt;
    @ @ -425,6 +425,9 @ @
    writel_relaxed(val, csid->base +
        CAMSS_CSID_TG_DT_n_CGG_2(0));

    +dt = csid_get_fmt_entry(
    +csid->fmt[MSM_CSID_PAD_SRC].code)->data_type;
+/* 5:0 data type */
    val = dt;
    writel_relaxed(val, csid->base +
        CAMSS_CSID_TG_DT_n_CGG_2(0));
    +df = csid_get_fmt_entry(
    +csid->fmt[MSM_CSID_PAD_SRC].code)->decode_format;
    } else {
        struct csid_phy_config *phy = &csid->phy;
        @ @ -439,13 +442,16 @ @

    writel_relaxed(val,
        csid->base + CAMSS_CSID_CORE_CTRL_1);
+    +dt = csid_get_fmt_entry(
    +csid->fmt[MSM_CSID_PAD_SINK].code)->data_type;
    +df = csid_get_fmt_entry(
    +csid->fmt[MSM_CSID_PAD_SINK].code)->decode_format;
}

/* Config LUT */
dt_shift = (cid % 4) * 8;
-df = csid_get_fmt_entry(csid->fmt[MSM_CSID_PAD_SINK].code)->
-decode_format;

val = readl_relaxed(csid->base + CAMSS_CSID_CID_LUT_VC_n(vc));
val &= ~(0xff << dt_shift);
--- linux-4.15.0.orig/drivers/media/platform/qcom/camss-8x16/camss-vfe.c
+++ linux-4.15.0/drivers/media/platform/qcom/camss-8x16/camss-vfe.c
@@ -1399,10 +1399,12 @@
    switch (output->state) {
    case VFE_OUTPUT_SINGLE:
        vfe_output_frame_drop(vfe, output, 1);
+        /* Skip 4 bad frames from sensor */
+        vfe_output_frame_drop(vfe, output, 1 << 4);
        break;
    case VFE_OUTPUT_CONTINUOUS:
        vfe_output_frame_drop(vfe, output, 3);
+        /* Skip 4 bad frames from sensor */
+        vfe_output_frame_drop(vfe, output, 3 << 4);
        break;
    default:
        vfe_output_frame_drop(vfe, output, 0);
    --- linux-4.15.0.orig/drivers/media/platform/qcom/venus/core.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/core.c
@@ @ -633,6 +633,8 @@
    ret = camss_of_parse_ports(dev, &camss->notifier);
    if (ret < 0)
        return ret;
+    else if (ret == 0)
+        return -ENODEV;

    ret = camss_init_subdevices(camss);
    if (ret < 0)
        --- linux-4.15.0.orig/drivers/media/platform/qcom/venus/core.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/core.c
@@ @ -187,6 +187,14 @@
        if (ret)
            return ret;
+    if (!dev->dma_parms) {
+        dev->dma_parms = devm_kzalloc(dev, sizeof(*dev->dma_parms),
+                GFP_KERNEL);
+        if (!dev->dma_parms)
+            return -ENOMEM;
+    }
+    dma_set_max_seg_size(dev, DMA_BIT_MASK(32));
+    

INIT_LIST_HEAD(&core->instances);
mutex_init(&core->lock);
INIT_DELAYED_WORK(&core->work, venus_sys_error_handler);
@@ -228,8 +236,10 @@
goto err_dev_unregister;

ret = pm_runtime_put_sync(dev);
-if (ret)
+if (ret) {
+pm_runtime_get_noresume(dev);
goto err_dev_unregister;
+
}

return 0;

@@ -240,6 +250,7 @@
err_venus_shutdown:
venus_shutdown(dev);
err_runtime_disable:
+pm_runtime_put_noidle(dev);
pm_runtime_set_suspended(dev);
pm_runtime_disable(dev);
hfi_destroy(core);
@@ -337,10 +348,11 @@
};

static const struct freq_tbl msm8996_freq_table[] = {
- { 1944000, 490000000 }, /* 4k UHD @ 60 */
- {  972000, 320000000 }, /* 4k UHD @ 30 */
- {  489600, 150000000 }, /* 1080p @ 60 */
- {  244800,  75000000 }, /* 1080p @ 30 */
+ { 1944000, 520000000 }, /* 4k UHD @ 60 (decode only) */
+ {  972000, 520000000 }, /* 4k UHD @ 30 */
+ {  489600, 346666667 }, /* 1080p @ 60 */
+ {  244800, 150000000 }, /* 1080p @ 30 */
+ {  108000,  75000000 }, /* 720p @ 30 */
};

static const struct reg_val msm8996_reg_preset[] = {
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/core.h
+++ linux-4.15.0/drivers/media/platform/qcom/venus/core.h
@@ -144,8 +144,8 @@
u32 h264_min_qp;
u32 h264_max_qp;
u32 h264_loop_filter_mode;
-u32 h264_loop_filter_alpha;
-u32 h264_loop_filter_beta;
+s32 h264_loop_filter_alpha;
u32 vp8_min_qp;
u32 vp8_max_qp;
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/hfi_cmds.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/hfi_cmds.c
@@ -421,12 +421,12 @@
 pkt->shdr.hdr.pkt_type = HFI_CMD_SESSION_SET_PROPERTY;
 pkt->shdr.session_id = hash32_ptr(cookie);
 pkt->num_properties = 1;
+pkt->data[0] = ptype;

 switch (ptype) {
   case HFI_PROPERTY_CONFIG_FRAME_RATE:
     struct hfi_framerate *in = pdata, *frate = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_FRAME_RATE;
     frate->buffer_type = in->buffer_type;
     frate->framerate = in->framerate;
     pkt->shdr.hdr.size += sizeof(u32) + sizeof(*frate);
     @@ -436,7 +436,6 @@
       struct hfi_uncompressed_format_select *in = pdata;
       struct hfi_uncompressed_format_select *hfi = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_UNCOMPRESSED_FORMAT_SELECT;
       hfi->buffer_type = in->buffer_type;
       hfi->format = in->format;
       pkt->shdr.hdr.size += sizeof(u32) + sizeof(*hfi);
     @@ -445,7 +444,6 @@
       case HFI_PROPERTY_PARAM_FRAME_SIZE:
       struct hfi_framesize *in = pdata, *fsize = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_FRAME_SIZE;
       fsize->buffer_type = in->buffer_type;
       fsize->height = in->height;
       fsize->width = in->width;
       @@ -455,7 +453,6 @@
       case HFI_PROPERTY_CONFIG_REALTIME:
       struct hfi_enable *in = pdata, *en = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_REALTIME;
       en->enable = in->enable;
       pkt->shdr.hdr.size += sizeof(u32) * 2;
       break;
     @@ -463,7 +460,6 @@
       case HFI_PROPERTY_PARAM_BUFFER_COUNT_ACTUAL:
       struct hfi_buffer_count_actual *in = pdata, *count = prop_data;
     
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/hfi_cmds.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/hfi_cmds.c
@ @ -421,12 +421,12 @@
 pkt->shdr.hdr.pkt_type = HFI_CMD_SESSION_SET_PROPERTY;
 pkt->shdr.session_id = hash32_ptr(cookie);
 pkt->num_properties = 1;
+pkt->data[0] = ptype;

 switch (ptype) {
   case HFI_PROPERTY_CONFIG_FRAME_RATE:
     struct hfi_framerate *in = pdata, *frate = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_FRAME_RATE;
     frate->buffer_type = in->buffer_type;
     frate->framerate = in->framerate;
     pkt->shdr.hdr.size += sizeof(u32) + sizeof(*frate);
     @@ -436,7 +436,6 @@
       struct hfi_uncompressed_format_select *in = pdata;
       struct hfi_uncompressed_format_select *hfi = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_UNCOMPRESSED_FORMAT_SELECT;
       hfi->buffer_type = in->buffer_type;
       hfi->format = in->format;
       pkt->shdr.hdr.size += sizeof(u32) + sizeof(*hfi);
     @@ -445,7 +444,6 @@
       case HFI_PROPERTY_PARAM_FRAME_SIZE:
       struct hfi_framesize *in = pdata, *fsize = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_FRAME_SIZE;
       fsize->buffer_type = in->buffer_type;
       fsize->height = in->height;
       fsize->width = in->width;
       @@ -455,7 +453,6 @@
       case HFI_PROPERTY_CONFIG_REALTIME:
       struct hfi_enable *in = pdata, *en = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_REALTIME;
       en->enable = in->enable;
       pkt->shdr.hdr.size += sizeof(u32) * 2;
       break;
     @@ -463,7 +460,6 @@
       case HFI_PROPERTY_PARAM_BUFFER_COUNT_ACTUAL:
       struct hfi_buffer_count_actual *in = pdata, *count = prop_data;
     
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/hfi_cmds.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/hfi_cmds.c
@ @ -421,12 +421,12 @@
 pkt->shdr.hdr.pkt_type = HFI_CMD_SESSION_SET_PROPERTY;
 pkt->shdr.session_id = hash32_ptr(cookie);
 pkt->num_properties = 1;
+pkt->data[0] = ptype;

 switch (ptype) {
   case HFI_PROPERTY_CONFIG_FRAME_RATE:
     struct hfi_framerate *in = pdata, *frate = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_FRAME_RATE;
     frate->buffer_type = in->buffer_type;
     frate->framerate = in->framerate;
     pkt->shdr.hdr.size += sizeof(u32) + sizeof(*frate);
     @@ -436,7 +436,6 @@
       struct hfi_uncompressed_format_select *in = pdata;
       struct hfi_uncompressed_format_select *hfi = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_UNCOMPRESSED_FORMAT_SELECT;
       hfi->buffer_type = in->buffer_type;
       hfi->format = in->format;
       pkt->shdr.hdr.size += sizeof(u32) + sizeof(*hfi);
     @@ -445,7 +444,6 @@
       case HFI_PROPERTY_PARAM_FRAME_SIZE:
       struct hfi_framesize *in = pdata, *fsize = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_FRAME_SIZE;
       fsize->buffer_type = in->buffer_type;
       fsize->height = in->height;
       fsize->width = in->width;
       @@ -455,7 +453,6 @@
       case HFI_PROPERTY_CONFIG_REALTIME:
       struct hfi_enable *in = pdata, *en = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_REALTIME;
       en->enable = in->enable;
       pkt->shdr.hdr.size += sizeof(u32) * 2;
       break;
     @@ -463,7 +460,6 @@
       case HFI_PROPERTY_PARAM_BUFFER_COUNT_ACTUAL:
       struct hfi_buffer_count_actual *in = pdata, *count = prop_data;
     
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/hfi_cmds.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/hfi_cmds.c
@ @ -421,12 +421,12 @@
 pkt->shdr.hdr.pkt_type = HFI_CMD_SESSION_SET_PROPERTY;
 pkt->shdr.session_id = hash32_ptr(cookie);
 pkt->num_properties = 1;
+pkt->data[0] = ptype;

 switch (ptype) {
   case HFI_PROPERTY_CONFIG_FRAME_RATE:
     struct hfi_framerate *in = pdata, *frate = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_FRAME_RATE;
     frate->buffer_type = in->buffer_type;
     frate->framerate = in->framerate;
     pkt->shdr.hdr.size += sizeof(u32) + sizeof(*frate);
     @@ -436,7 +436,6 @@
       struct hfi_uncompressed_format_select *in = pdata;
       struct hfi_uncompressed_format_select *hfi = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_UNCOMPRESSED_FORMAT_SELECT;
       hfi->buffer_type = in->buffer_type;
       hfi->format = in->format;
       pkt->shdr.hdr.size += sizeof(u32) + sizeof(*hfi);
     @@ -445,7 +444,6 @@
       case HFI_PROPERTY_PARAM_FRAME_SIZE:
       struct hfi_framesize *in = pdata, *fsize = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_FRAME_SIZE;
       fsize->buffer_type = in->buffer_type;
       fsize->height = in->height;
       fsize->width = in->width;
       @@ -455,7 +453,6 @@
       case HFI_PROPERTY_CONFIG_REALTIME:
       struct hfi_enable *in = pdata, *en = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_REALTIME;
       en->enable = in->enable;
       pkt->shdr.hdr.size += sizeof(u32) * 2;
       break;
     @@ -463,7 +460,6 @@
       case HFI_PROPERTY_PARAM_BUFFER_COUNT_ACTUAL:
       struct hfi_buffer_count_actual *in = pdata, *count = prop_data;
     
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/hfi_cmds.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/hfi_cmds.c
@ @ -421,12 +421,12 @@
 pkt->shdr.hdr.pkt_type = HFI_CMD_SESSION_SET_PROPERTY;
 pkt->shdr.session_id = hash32_ptr(cookie);
 pkt->num_properties = 1;
+pkt->data[0] = ptype;

 switch (ptype) {
   case HFI_PROPERTY_CONFIG_FRAME_RATE:
     struct hfi_framerate *in = pdata, *frate = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_FRAME_RATE;
     frate->buffer_type = in->buffer_type;
     frate->framerate = in->framerate;
     pkt->shdr.hdr.size += sizeof(u32) + sizeof(*frate);
     @@ -436,7 +436,6 @@
       struct hfi_uncompressed_format_select *in = pdata;
       struct hfi_uncompressed_format_select *hfi = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_UNCOMPRESSED_FORMAT_SELECT;
       hfi->buffer_type = in->buffer_type;
       hfi->format = in->format;
       pkt->shdr.hdr.size += sizeof(u32) + sizeof(*hfi);
     @@ -445,7 +444,6 @@
       case HFI_PROPERTY_PARAM_FRAME_SIZE:
       struct hfi_framesize *in = pdata, *fsize = prop_data;
     -pkt->data[0] = HFI_PROPERTY_PARAM_FRAME_SIZE;
       fsize->buffer_type = in->buffer_type;
       fsize->height = in->height;
       fsize->width = in->width;
       @@ -455,7 +453,6 @@
       case HFI_PROPERTY_CONFIG_REALTIME:
       struct hfi_enable *in = pdata, *en = prop_data;
     -pkt->data[0] = HFI_PROPERTY_CONFIG_REALTIME;
       en->enable = in->enable;
       pkt->shdr.hdr.size += sizeof(u32) * 2;
       break;
     @@ -463,7 +460,6 @@
       case HFI_PROPERTY_PARAM_BUFFER_COUNT_ACTUAL:
       struct hfi_buffer_count_actual *in = pdata, *count = prop_data;
pkt->data[0] = HFI_PROPERTY_PARAM_BUFFER_COUNT_ACTUAL;
count->count_actual = in->count_actual;
count->type = in->type;
pkt->shdr.hdr.size += sizeof(u32) + sizeof(*count);
@@ -472,7 +468,6 @@
case HFI_PROPERTY_PARAM_BUFFER_SIZE_ACTUAL: {
    struct hfi_buffer_size_actual *in = pdata, *sz = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_BUFFER_SIZE_ACTUAL;
    sz->size = in->size;
    sz->type = in->type;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*sz);
    @@ -482,8 +477,6 @@
    struct hfi_buffer_display_hold_count_actual *in = pdata;
    struct hfi_buffer_display_hold_count_actual *count = prop_data;

    -pkt->data[0] =
    -HFI_PROPERTY_PARAM_BUFFER_DISPLAY_HOLD_COUNT_ACTUAL;
    count->hold_count = in->hold_count;
    count->type = in->type;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*count);
    @@ -493,7 +486,6 @@
    struct hfi_nal_stream_format_select *in = pdata;
    struct hfi_nal_stream_format_select *fmt = prop_data;

    -pkt->data[0] =
    -HFI_PROPERTY_PARAM_NAL_STREAM_FORMAT_SELECT;
    fmt->format = in->format;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*fmt);
    break;
    @@ -510,7 +502,6 @@
    break;
    break;
}

-pkt->data[0] = HFI_PROPERTY_PARAM_VDEC_OUTPUT_ORDER;
-pkt->data[1] = *in;
-pkt->shdr.hdr.size += sizeof(u32) * 2;
-break;
@@ -518,7 +510,6 @@
case HFI_PROPERTY_PARAM_VDEC_PICTURE_TYPE_DECODE: {
    struct hfi_enable_picture *in = pdata, *en = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_VDEC_PICTURE_TYPE_DECODE;
    en->picture_type = in->picture_type;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
    @@ -526,8 +516,6 @@
case HFI_PROPERTY_PARAM_VDEC_OUTPUT2_KEEP_ASPECT_RATIO: {
    struct hfi_enable *in = pdata, *en = prop_data;
-pkt->data[0] =
-HFI_PROPERTY_PARAM_VDEC_OUTPUT2_KEEP_ASPECT_RATIO;
en->enable = in->enable;
pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
break;
@@ -536,7 +524,6 @@
struct hfi_enable *in = pdata;
struct hfi_enable *en = prop_data;

-pkt->data[0] = HFI_PROPERTY_CONFIG_VDEC_POST_LOOP_DEBLOCKER;
en->enable = in->enable;
pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
break;
@@ -544,7 +531,6 @@
case HFI_PROPERTY_PARAM_VDEC_MULTI_STREAM: {
    struct hfi_multi_stream *in = pdata, *multi = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_VDEC_MULTI_STREAM;
    multi->buffer_type = in->buffer_type;
    multi->enable = in->enable;
    multi->width = in->width;
    @@ -556,8 +542,6 @@
    struct hfi_display_picture_buffer_count *in = pdata;
    struct hfi_display_picture_buffer_count *count = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_VDEC_DISPLAY_PICTURE_BUFFER_COUNT;
    count->count = in->count;
    count->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*count);
    @@ -576,7 +560,6 @@
    break;
}

-pkt->data[0] = HFI_PROPERTY_PARAM_DIVX_FORMAT;
pkt->data[1] = *in;
pkt->shdr.hdr.size += sizeof(u32) * 2;
break;
@@ -584,7 +567,6 @@
case HFI_PROPERTY_CONFIG_VDEC_MB_ERROR_MAP_REPORTING: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFI_PROPERTY_CONFIG_VDEC_MB_ERROR_MAP_REPORTING;
    en->enable = in->enable;
pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
break;
@@ -592,7 +574,6 @@
case HFI_PROPERTY_PARAM_VDEC_CONTINUE_DATA_TRANSFER: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFIPROPERTY_PARAM_VDEC_CONTINUE_DATA_TRANSFER;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
    @ @ -600,7 +581,6 @ @
}
case HFIPROPERTY_PARAM_VDEC_THUMBNAIL_MODE: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFIPROPERTY_PARAM_VDEC_THUMBNAIL_MODE;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
    @ @ -608,14 +588,11 @ @
}
case HFI_PROPERTY_CONFIG_VENC_SYNC_FRAME_SEQUENCE_HEADER: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFIPROPERTY_CONFIG_VENC_SYNC_FRAME_SEQUENCE_HEADER;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
    }
case HFI_PROPERTY_CONFIG_VENC_REQUEST_SYNC_FRAME: {
    -pkt->data[0] = HFIPROPERTY_CONFIG_VENC_REQUEST_SYNC_FRAME;
    pkt->shdr.hdr.size += sizeof(u32);
    break;
    }
case HFI_PROPERTY_PARAM_VENC_MPEG4_SHORT_HEADER: {
    @ @ -625,7 +602,6 @ @
}
case HFI_PROPERTY_CONFIG_VENC_TARGET_BITRATE: {
    struct hfi_bitrate *in = pdata, *brate = prop_data;

    -pkt->data[0] = HFIPROPERTY_CONFIG_VENC_TARGET_BITRATE;
    brate->bitrate = in->bitrate;
    brate->layer_id = in->layer_id;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*brate);
    @ @ -634,7 +610,6 @ @
}
case HFI_PROPERTY_CONFIG_VENC_MAX_BITRATE: {
    struct hfi_bitrate *in = pdata, *hfi = prop_data;

    -pkt->data[0] = HFIPROPERTY_CONFIG_VENC_MAX_BITRATE;
    hfi->bitrate = in->bitrate;
    hfi->layer_id = in->layer_id;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*hfi);
    @ @ -643,7 +618,6 @ @
}
struct hfi_profile_level *in = pdata, *pl = prop_data;

-pkt->data[0] = HFIPROPERTY_PARAM_PROFILE_LEVEL_CURRENT;
pl->level = in->level;
pl->profile = in->profile;
if (pl->profile <= 0)
  @ @ -660,7 +634,6 @@
case HFIPROPERTY_PARAM_VENC_H264_ENTROPY_CONTROL: {
  struct hfi_h264_entropy_control *in = pdata, *hfi = prop_data;

  -pkt->data[0] = HFIPROPERTY_PARAM_VENC_H264_ENTROPY_CONTROL;
  hfi->entropy_mode = in->entropy_mode;
  if (hfi->entropy_mode == HFI_H264_ENTROPY_CABAC)
    hfi->cabac_model = in->cabac_model;
  @ @ -682,7 +655,6 @@
  break;
}

-pkt->data[0] = HFIPROPERTY_PARAM_VENC_RATE_CONTROL;
pkt->data[1] = *in;
pkt->shdr.hdr.size += sizeof(u32) * 2;
break;
@ @ -690,7 +662,6 @@
case HFIPROPERTY_PARAM_VENC_MPEG4_TIME_RESOLUTION: {
  struct hfi_mpeg4_time_resolution *in = pdata, *res = prop_data;

  -pkt->data[0] = HFIPROPERTY_PARAM_VENC_MPEG4_TIME_RESOLUTION;
  res->time_increment_resolution = in->time_increment_resolution;
  pkt->shdr.hdr.size += sizeof(u32) + sizeof(*res);
  break;
  @ @ -698,7 +669,6 @@
  case HFIPROPERTY_PARAM_VENC_MPEG4_HEADER_EXTENSION: {
    struct hfi_mpeg4_header_extension *in = pdata, *ext = prop_data;

    -pkt->data[0] = HFIPROPERTY_PARAM_VENC_MPEG4_HEADER_EXTENSION;
    ext->header_extension = in->header_extension;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*ext);
    break;
    @ @ -716,7 +686,6 @@
    break;
  }

-pkt->data[0] = HFIPROPERTY_PARAM_VENC_H264_DEBLOCK_CONTROL;
db->mode = in->mode;
db->slice_alpha_offset = in->slice_alpha_offset;
db->slice_beta_offset = in->slice_beta_offset;
@ @ -726,7 +695,6 @@
case HFIPROPERTY_PARAM_VENC_SESSION_QP: {

struct hfi_quantization *in = pdata, *quant = prop_data;

-pkt->data[0] = HFI_PROPERTY_PARAM_VENC_SESSION_QP;
quant->qp_i = in->qp_i;
quant->qp_p = in->qp_p;
quant->qp_b = in->qp_b;
@@ -738,7 +706,6 @@
struct hfi_quantization_range *in = pdata, *range = prop_data;
   u32 min_qp, max_qp;

-pkt->data[0] = HFI_PROPERTY_PARAM_VENC_SESSION_QP_RANGE;
min_qp = in->min_qp;
max_qp = in->max_qp;
@@ -764,8 +731,6 @@
case HFI_PROPERTY_PARAM_VENC_VC1_PERF_CFG: {
   struct hfi_vc1e_perf_cfg_type *in = pdata, *perf = prop_data;

-pkt->data[0] = HFI_PROPERTY_PARAM_VENC_VC1_PERF_CFG;
   memcpy(perf->search_range_x_subsampled,
         in->search_range_x_subsampled,
         sizeof(perf->search_range_x_subsampled));
@@ -780,7 +745,6 @@
case HFI_PROPERTY_CONFIG_VENC_INTRA_PERIOD: {
   struct hfi_intra_period *in = pdata, *intra = prop_data;

-pkt->data[0] = HFI_PROPERTY_CONFIG_VENC_MAX_NUM_B_FRAMES;
bframes->max_num_b_frames = *in;
pkt->shdr.hdr.size += sizeof(u32) + sizeof(*bframes);
break;
@@ -788,7 +752,6 @@
case HFI_PROPERTY_CONFIG_VENC_IDR_PERIOD: {
   struct hfi_idr_period *in = pdata, *idr = prop_data;

-pkt->data[0] = HFI_PROPERTY_CONFIG_VENC_INTRA_PERIOD;
intra->pframes = in->pframes;
intra->bframes = in->bframes;
pkt->shdr.hdr.size += sizeof(u32) + sizeof(*intra);
@@ -797,7 +760,6 @@
case HFI_PROPERTY_CONFIG_VENC_IDR_PERIOD: {
   struct hfi_idr_period *in = pdata, *idr = prop_data;

-pkt->data[0] = HFI_PROPERTY_CONFIG_VENC_IDR_PERIOD;
idr->idr_period = in->idr_period;
pkt->shdr.hdr.size += sizeof(u32) + sizeof(*idr);
break;
@@ -806,7 +768,6 @@
struct hfi_conceal_color *color = prop_data;
uint32_t *in = pdata;

-pkt->data[0] = HFIPROPERTY_PARAM_VDEC_CONCEAL_COLOR;
color->conceal_color = *in;
pkt->shdr.hdr.size += sizeof(uint32_t) + sizeof(*color);
break;
@@ -835,7 +796,6 @@
break;
}

-pkt->data[0] = HFIPROPERTY_CONFIG_VPE_OPERATIONS;
ops->rotation = in->rotation;
ops->flip = in->flip;
pkt->shdr.hdr.size += sizeof(uint32_t) + sizeof(*ops);
@@ -856,7 +816,6 @@
break;
}

-pkt->data[0] = HFIPROPERTY_PARAM_VENC_INTRA_REFRESH;
intra->mode = in->mode;
intra->air_mbs = in->air_mbs;
intra->air_ref = in->air_ref;
@@ -878,7 +837,6 @@
break;
}

-pkt->data[0] = HFIPROPERTY_PARAM_VENC_MULTI_SLICE_CONTROL;
multi->multi_slice = in->multi_slice;
multi->slice_size = in->slice_size;
pkt->shdr.hdr.size += sizeof(uint32_t) + sizeof(*multi);
@@ -887,7 +845,6 @@
case HFIPROPERTY_PARAM_VENC_SLICE_DELIVERY_MODE: {
 struct hfi_enable *in = pdata, *en = prop_data;

-pkt->data[0] = HFIPROPERTY_PARAM_VENC_SLICE_DELIVERY_MODE;
en->enable = in->enable;
pkt->shdr.hdr.size += sizeof(uint32_t) + sizeof(*en);
break;
@@ -895,7 +852,6 @@
case HFIPROPERTY_PARAM_VENC_H264_VUI_TIMING_INFO: {
 struct hfi_h264_vui_timing_info *in = pdata, *vui = prop_data;

-pkt->data[0] = HFIPROPERTY_PARAM_VENC_H264_VUI_TIMING_INFO;
vui->enable = in->enable;
vui->fixed_framerate = in->fixed_framerate;
vui->time_scale = in->time_scale;
@@ -905,7 +861,6 @@
case HFI_PROPERTY_CONFIG_VPE_DEINTERLACE: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFI_PROPERTY_CONFIG_VPE_DEINTERLACE;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
}

case HFI_PROPERTY_PARAM_VENC_H264_GENERATE_AUDNAL: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_VENC_H264_GENERATE_AUDNAL;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
}

case HFI_PROPERTY_PARAM_BUFFER_ALLOC_MODE: {
    struct hfi_buffer_alloc_mode *in = pdata, *mode = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_BUFFER_ALLOC_MODE;
    mode->type = in->type;
    mode->mode = in->mode;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*mode);
    break;
}

case HFI_PROPERTY_PARAM_VDEC_FRAME_ASSEMBLY: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_VDEC_FRAME_ASSEMBLY;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
}

case HFI_PROPERTY_PARAM_VENC_H264_VUI_BITSTREAM_RESTRC: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFI_PROPERTY_PARAM_VENC_H264_VUI_BITSTREAM_RESTRC;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
}

case HFI_PROPERTY_PARAM_VENC_PRESERVE_TEXT_QUALITY: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFIPROPERTY_PARAM_VENC_PRESERVE_TEXT_QUALITY;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
}
struct hfi_scs_threshold *thres = prop_data;

u32 *in = pdata;

(pkt->data[0] = HFI_PROPERTY_PARAM_VDEC_SCS_THRESHOLD;
  thres->threshold_value = *in;
  pkt->shdr.hdr.size += sizeof(u32) + sizeof(*thres);
  break;
}

(pkt->data[0] = HFI_PROPERTY_PARAM_MVC_BUFFER_LAYOUT;
  mvc->layout_type = in->layout_type;
  mvc->bright_view_first = in->bright_view_first;
  mvc->ngap = in->ngap;
  @ @ -994,7 +941,6 @@
  break;
}

(pkt->data[0] = HFI_PROPERTY_PARAM_VENC_LTRMODE;
  ltr->ltr_mode = in->ltr_mode;
  ltr->ltr_count = in->ltr_count;
  ltr->trust_mode = in->trust_mode;
  @ @ -1004,7 +950,6 @@
  case HFI_PROPERTY_CONFIG_VENC_USELTRFRAME: {
    struct hfi_ltr_use *in = pdata, *ltr_use = prop_data;

    (pkt->data[0] = HFI_PROPERTY_CONFIG_VENC_USELTRFRAME;
      ltr_use->frames = in->frames;
      ltr_use->ref_ltr = in->ref_ltr;
      ltr_use->use_constrnt = in->use_constrnt;
      @ @ -1014,7 +959,6 @@
      case HFI_PROPERTY_CONFIG_VENC_MARKLTRFRAME: {
        struct hfi_ltr_mark *in = pdata, *ltr_mark = prop_data;

        (pkt->data[0] = HFIPROPERTY_CONFIG_VENC_MARKLTRFRAME;
          ltr_mark->mark_frame = in->mark_frame;
          pkt->shdr.hdr.size += sizeof(u32) + sizeof(*ltr_mark);
          break;
    @ @ -1022,7 +966,6 @@
    case HFI_PROPERTY_PARAM_VENC_HIER_P_MAX_NUM_ENH_LAYER: {
      u32 *in = pdata;

      (pkt->data[0] = HFI_PROPERTY_PARAM_VENC_HIER_P_MAX_NUM_ENH_LAYER;
        pkt->data[1] = *in;
        pkt->shdr.hdr.size += sizeof(u32) * 2;
        break;
case HFI_PROPERTY_CONFIG_VENC_HIER_P_ENH_LAYER: {
    u32 *in = pdata;
    -pkt->data[0] = HFI_PROPERTY_CONFIG_VENC_HIER_P_ENH_LAYER;
    pkt->data[1] = *in;
    pkt->shdr.hdr.size += sizeof(u32) * 2;
    break;
}

case HFI_PROPERTY_PARAM_VENC_DISABLE_RC_TIMESTAMP: {
    struct hfi_enable *in = pdata, *en = prop_data;
    -pkt->data[0] = HFI_PROPERTY_PARAM_VENC_DISABLE_RC_TIMESTAMP;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
}

case HFI_PROPERTY_PARAM_VENC_INITIAL_QP: {
    struct hfi_initial_quantization *in = pdata, *quant = prop_data;
    -pkt->data[0] = HFI_PROPERTY_PARAM_VENC_INITIAL_QP;
    quant->init_qp_enable = in->init_qp_enable;
    quant->qp_i = in->qp_i;
    quant->qp_p = in->qp_p;
    @ @ -1058,7 +998,6 @@
    struct hfi_vpe_color_space_conversion *in = pdata;
    struct hfi_vpe_color_space_conversion *csc = prop_data;
    -pkt->data[0] = HFI_PROPERTY_PARAM_VPE_COLOR_SPACE_CONVERSION;
    memcpy(csc->csc_matrix, in->csc_matrix,
           sizeof(csc->csc_matrix));
    memcpy(csc->csc_bias, in->csc_bias, sizeof(csc->csc_bias));
    @ @ -1069,8 +1008,6 @@
    case HFI_PROPERTY_PARAM_VENC_VPX_ERROR_RESILIENCE_MODE: {
    struct hfi_enable *in = pdata, *en = prop_data;
    -pkt->data[0] = HFI_PROPERTY_PARAM_VPX_ERROR_RESILIENCE_MODE;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;
    }

case HFI_PROPERTY_PARAM_VENC_H264_NAL_SVC_EXT: {
    struct hfi_enable *in = pdata, *en = prop_data;
    -pkt->data[0] = HFI_PROPERTY_PARAM_VENC_H264_NAL_SVC_EXT;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
case HFIPROPERTY_CONFIG_VENC_PERF_MODE: {
    u32 *in = pdata;

    -pkt->data[0] = HFIPROPERTY_CONFIG_VENC_PERF_MODE;
    pkt->data[1] = *in;
    pkt->shdr.hdr.size += sizeof(u32) * 2;
    break;

    @ @ -1094,7 +1029,6 @@
    case HFIPROPERTY_PARAM_VENC_HIER_B_MAX_NUM_ENH_LAYER: {
    u32 *in = pdata;

    -pkt->data[0] = HFIPROPERTY_PARAM_VENC_HIER_B_MAX_NUM_ENH_LAYER;
    pkt->data[1] = *in;
    pkt->shdr.hdr.size += sizeof(u32) * 2;
    break;

    @ @ -1102,7 +1036,6 @@
    case HFIPROPERTY_PARAM_VDEC_NONCP_OUTPUT2: {
    struct hfi_enable *in = pdata, *en = prop_data;

    -pkt->data[0] = HFIPROPERTY_PARAM_VDEC_NONCP_OUTPUT2;
    en->enable = in->enable;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*en);
    break;

    @ @ -1110,7 +1043,6 @@
    case HFIPROPERTY_PARAM_VENC_HIER_P_HYBRID_MODE: {
    struct hfi_hybrid_hierp *in = pdata, *hierp = prop_data;

    -pkt->data[0] = HFIPROPERTY_PARAM_VENC_HIER_P_HYBRID_MODE;
    hierp->layers = in->layers;
    pkt->shdr.hdr.size += sizeof(u32) + sizeof(*hierp);
    break;

    @ @ -1185,6 +1117,7 @@
    pkt->shdr.hdr.type = HFI_CMD_SESSION_SET_PROPERTY;
    pkt->shdr.session_id = hash32_ptr(cookie);
    pkt->num_properties = 1;
    +pkt->data[0] = ptype;

    /*
     * Any session set property which is different in 3XX packetization
    @ @ -1196,7 +1129,6 @@
    struct hfi_multi_stream *in = pdata;
    struct hfi_multi_stream_3x *multi = prop_data;

    -pkt->data[0] = HFIPROPERTY_PARAM_VDEC_MULTI_STREAM;
    multi->buffer_type = in->buffer_type;
    multi->enable = in->enable;
struct hfi_h264_db_control {
    u32 mode;
    -u32 slice_alpha_offset;
    -u32 slice_beta_offset;
    +s32 slice_alpha_offset;
    +s32 slice_beta_offset;
};

#define HFI_H264_ENTROPY_CAVLC0x1
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/vdec.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/vdec.c
@@ -1060,9 +1060,6 @@
     .unlocked_ioctl = video_ioctl2,
     .poll = v4l2_m2m_fop_poll,
     .mmap = v4l2_m2m_fop_mmap,
-#ifdef CONFIG_COMPAT
-    .compat_ioctl32 = v4l2_compat_ioctl32,
-#endif
     .compat_ioctl32 = v4l2_compat_ioctl32,
    +endif
};

static int vdec_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/media/platform/qcom/venus/venc.c
+++ linux-4.15.0/drivers/media/platform/qcom/venus/venc.c
@@ -234,6 +234,16 @@
     case 3:
         return HFI_VPX_PROFILE_VERSION_3;
     }
+case V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_MODE:
+    switch (value) {
+    case V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_ENABLED:
+        default:
+            return HFI_H264_DB_MODE_ALL_BOUNDARY;
+            case V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_DISABLED:
+                return HFI_H264_DB_MODE_DISABLE;
+                case V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_DISABLED_AT.Slice_BOUNDARY:

+return HFI_H264_DB_MODE_SKIP_SLICE_BOUNDARY;
+
return 0;
@@ -286,6 +296,8 @@
 else
 return NULL;
 fmt = find_format(inst, pixmp->pixelformat, f->type);
+if (!fmt)
+return NULL;
 pixmp->width = 1280;
 pixmp->height = 720;
 }
@@ -641,6 +653,8 @@

 if (inst->fmt_cap->pixfmt == V4L2_PIX_FMT_H264) {
 struct hfi_h264_vui_timing_info info;
+struct hfi_h264_entropy_control entropy;
+struct hfi_h264_db_control deblock;

 ptype = HFI_PROPERTY_PARAM_VENC_H264_VUI_TIMING_INFO;
 info.enable = 1;
@@ -650,10 +664,36 @@
 ret = hfi_session_set_property(inst, ptype, &info);
 if (ret)
 return ret;
+
+ptype = HFI_PROPERTY_PARAM_VENC_H264_ENTROPY_CONTROL;
+entropy.entropy_mode = venc_v4l2_to_hfi(
+ V4L2_CID_MPEG_VIDEO_H264_ENTROPY_MODE,
+ ctr->h264_entropy_mode);
+entropy.cabac_model = HFI_H264_CABAC_MODEL_0;
+
+ret = hfi_session_set_property(inst, ptype, &entropy);
+if (ret)
+return ret;
+
+ptype = HFI_PROPERTY_PARAM_VENC_H264_DEBLOCK_CONTROL;
+deblock.mode = venc_v4l2_to_hfi(
+ V4L2_CID_MPEG_VIDEO_H264_LOOP_FILTER_MODE,
+ ctr->h264_loop_filter_mode);
+deblock.slice_alpha_offset = ctr->h264_loop_filter_alpha;
+deblock.slice_beta_offset = ctr->h264_loop_filter_beta;
+
+ret = hfi_session_set_property(inst, ptype, &deblock);
+if (ret)
+return ret;
### IDR periodicity, n:
- n = 0 - only the first I-frame is IDR frame
- n = 1 - all I-frames will be IDR frames
- n > 1 - every n-th I-frame will be IDR frame

```c
ptype = HFI_PROPERTY_CONFIG_VENC_IDR_PERIOD;
-idrp.idr_period = ctr->gop_size;
+idrp.idr_period = 0;
ret = hfi_session_set_property(inst, ptype, &idrp);
if (ret)
    return ret;
@@ -667,10 +707,6 @@
return ret;
}
```

```c
/* intra_period = pframes + bframes + 1 */
-if (!ctr->num_p_frames)
-ctr->num_p_frames = 2 * 15 - 1,
-
-ptype = HFI_PROPERTY_CONFIG_VENC_INTRA_PERIOD;
intra_period.pframes = ctr->num_p_frames;
intra_period.bframes = ctr->num_b_frames;
@@ -767,6 +803,10 @@
if (ret)
    goto deinit;
+
+ret = venc_set_properties(inst);
+if (ret)
+    goto deinit;
+
+return 0;

deinit:
    hfi_session_deinit(inst);
@@ -1166,9 +1206,6 @@
    .unlocked_ioctl = video_ioctl2,
    .poll = v4l2_m2m_fop_poll,
    .mmap = v4l2_m2m_fop_mmap,
-#ifdef CONFIG_COMPAT
-    .compat_ioctl32 = v4l2_compat_ioctl32,
-#endif
-    .compat_ioctl32 = v4l2_compat_ioctl32,
-    #endif

};
```

static int venc_probe(struct platform_device *pdev)
```c
#define AT_SLICE_BOUNDARY
V4L2_MPEG_VIDEO_H264_LOOP_FILTER_MODE_DISABLED_AT_SLICE_BOUNDARY

+static int venc_calc_bpframes(u32 gop_size, u32 conseq_b, u32 *bf, u32 *pf)
+{
  +u32 half = (gop_size - 1) >> 1;
  +u32 b, p, ratio;
  +bool found = false;
  +
  +if (!gop_size)
  +return -EINVAL;
  +
  +*bf = *pf = 0;
  +
  +if (!conseq_b) {
  +  +*pf = gop_size - 1;
  +  +return 0;
  +}
  +
  +b = p = half;
  +
  +for (; b <= gop_size - 1; b++, p--) {
  +  +if (b % p)
  +  +continue;
  +
  +  +ratio = b / p;
  +
  +  +if (ratio == conseq_b) {
  +    +found = true;
  +    +break;
  +  +}
  +
  +  +if (ratio > conseq_b)
  +  +break;
  +  +}
  +
  +if (!found)
  +return -EINVAL;
  +
  +if (b + p + 1 != gop_size)
  +return -EINVAL;
  +
  +*bf = b;
  +*pf = p;
  +
  +return 0;
  +}
  +
```

static int venc_op_s_ctrl(struct v4l2_ctrl *ctrl)
{
    struct venus_inst *inst = ctrl_to_inst(ctrl);
    struct venc_controls *ctr = &inst->controls.enc;
    +u32 bframes;
    +int ret;

    switch (ctrl->id) {
    case V4L2_CID_MPEG_VIDEO_BITRATE_MODE:
        @@ -102,6 +149,11 @@
case V4L2_CID_MPEG_VIDEO_CYCLIC_INTRA_REFRESH_MB:
        break;
case V4L2_CID_MPEG_VIDEO_GOP_SIZE:
        +ret = venc_calc_bpframes(ctrl->val, ctr->num_b_frames, &bframes,
            + &ctr->num_p_frames);
        +if (ret)
        +return ret;
        +ctr->gop_size = ctrl->val;
        +break;
case V4L2_CID_MPEG_VIDEO_H264_I_PERIOD:
        @@ -114,7 +166,12 @@
        ctr->vp8_max_qp = ctrl->val;
        break;
case V4L2_CID_MPEG_VIDEO_B_FRAMES:
        -ctr->num_b_frames = ctrl->val;
        +ret = venc_calc_bpframes(ctr->gop_size, ctrl->val, &bframes,
            + &ctr->num_p_frames);
        +if (ret)
        +return ret;
        +ctr->num_b_frames = bframes;
        +break;
default:
        return -EINVAL;
    } -- linux-4.15.0.orig/drivers/media/platform/rcar-fcp.c
    +++ linux-4.15.0/drivers/media/platform/rcar-fcp.c
    @@ -12,6 +12,7 @@
    */

    #include <linux/device.h>
    +#include <linux/dma-mapping.h>
    #include <linux/list.h>
    #include <linux/module.h>
    #include <linux/mutex.h>
    @@ -24,6 +25,7 @@
    struct rcar_fcp_device {
    struct list_head list;


struct device *dev;
+struct device_dma_parameters dma_parms;
};

static LIST_HEAD(fcp_devices);
@@ -104,8 +106,10 @@
 return 0;

 ret = pm_runtime_get_sync(fcp->dev);
-if (ret < 0)
+if (ret < 0) {
 +pm_runtime_put_noidle(fcp->dev);
 return ret;
 +}

 return 0;
 }
@@ -139,6 +143,9 @@
 fcp->dev = &pdev->dev;

 +fcp->dev->dma_parms = &fcp->dma_parms;
+dma_set_max_seg_size(fcp->dev, DMA_BIT_MASK(32));
 +pm_runtime_enable(&pdev->dev);

 mutex_lock(&fcp_lock);
 --- linux-4.15.0.orig/drivers/media/platform/rcar_fdp1.c
+++ linux-4.15.0/drivers/media/platform/rcar_fdp1.c
@@ -261,6 +261,8 @@
#define FD1_IP_H3_ES1			0x02010101
#define FD1_IP_M3W			0x02010202
#define FD1_IP_H3			0x02010203
+#define FD1_IP_M3N			0x02010204
+#define FD1_IP_E3			0x02010205

 /* LUTs */
 #define FD1_LUT_DIF_ADJx1000
@@ -2308,7 +2310,7 @@
 fdp1->fcp = rcar_fcp_get(fcp_node);
 of_node_put(fcp_node);
 if (IS_ERR(fdp1->fcp)) {
-+dev_err(&pdev->dev, "FCP not found (%ld)\n",
+dev_dbg(&pdev->dev, "FCP not found (%ld)\n",
 PTR_ERR(fdp1->fcp));
 return PTR_ERR(fdp1->fcp);
 } 
@@ -2369,6 +2371,12 @@
case FD1_IP_H3:
dprintk(fdp1, "FDP1 Version R-Car H3\n");
break;
+case FD1_IP_M3N:
+  dprintk(fdp1, "FDP1 Version R-Car M3-N\n");
+  break;
+case FD1_IP_E3:
+  dprintk(fdp1, "FDP1 Version R-Car E3\n");
+  break;
default:
dev_err(fdp1->dev, "FDP1 Unidentifiable (0x%08x)\n", hw_version);
--- linux-4.15.0.orig/drivers/media/platform/rcar_jpu.c
+++ linux-4.15.0/drivers/media/platform/rcar_jpu.c
@@ -1280,7 +1280,7 @@
 /* ...issue software reset */
 ret = jpu_reset(jpu);
 if (ret)
-goto device_prepare_rollback;
+goto jpu_reset_rollback;
 }

 jpu->ref_count++;
@@ -1288,6 +1288,8 @@
 mutex_unlock(&jpu->mutex);
 return 0;

+  jpu_reset_rollback:
+  clk_disable_unprepare(jpu->clk);
  device_prepare_rollback:
  mutex_unlock(&jpu->mutex);
  v4l_prepare_rollback:
@@ -208,22 +208,25 @@
 dst_info.data.format = ctx->out.fmt->hw_format;
 dst_info.data.swap = ctx->out.fmt->color_swap;

 -if (ctx->in.fmt->hw_format >= RGA_COLOR_FMT_YUV422SP) {
 -if (ctx->out.fmt->hw_format < RGA_COLOR_FMT_YUV422SP) {
 -  switch (ctx->in.colorspace) {
 -  case V4L2_COLORSPACE_REC709:
 -    src_info.data.csc_mode =
 -      RGA_SRC_CSC_MODE_BT709_R0;
 -    break;
 -    default:
 -      src_info.data.csc_mode =
 -      RGA_SRC_CSC_MODE_BT601_R0;
 -  }
 -}
 -}


+/*
+ * CSC mode must only be set when the colorspace families differ between
+ * input and output. It must remain unset (zeroed) if both are the same.
+ * +*/
+
+if (RGA_COLOR_FMT_IS_YUV(ctx->in.fmt->hw_format) &&
    RGA_COLOR_FMT_IS_RGB(ctx->out.fmt->hw_format)) {
+    switch (ctx->in.colorspace) {
+        case V4L2_COLORSPACE_REC709:
+            src_info.data.csc_mode = RGA_SRC_CSC_MODE_BT709_R0;
+            break;
+        default:
+            src_info.data.csc_mode = RGA_SRC_CSC_MODE_BT601_R0;
+            break;
+    }
+}
-
-#define RGA_COLOR_FMT_CP_8BPP 15
-#define RGA_COLOR_FMT_MASK 15
+#define RGA_COLOR_FMT_IS_YUV(fmt) 
+    (((fmt) >= RGA_COLOR_FMT_YUV422SP) && ((fmt) < RGA_COLOR_FMT_CP_1BPP))
+#define RGA_COLOR_FMT_IS_RGB(fmt) 
+    ((fmt) < RGA_COLOR_FMT_YUV422SP)
+
+#define RGA_COLOR_NONE_SWAP 0
+#define RGA_COLOR_RB_SWAP 1
+#define RGA_COLOR_ALPHA_SWAP 2
--- linux-4.15.0.orig/drivers/media/platform/rockchip/rga/rga.c
+++ linux-4.15.0/drivers/media/platform/rockchip/rga.c
@@ -55,7 +55,7 @@
{
    struct rga_ctx *ctx = prv;
    struct rockchip_rga *rga = ctx->rga;
-    struct vb2_buffer *src, *dst;
+    struct vb2_v4l2_buffer *src, *dst;
    unsigned long flags;

--- linux-4.15.0.orig/drivers/media/platform/rockchip/rga/rga-hw.h
+++ linux-4.15.0/drivers/media/platform/rockchip/rga/rga-hw.h
@@ -103,6 +103,11 @@
#define RGA_COLOR_FMT_CP_8BPP 15
#define RGA_COLOR_FMT_MASK 15
spin_lock_irqsave(&rga->ctrl_lock, flags);
@@ -65,8 +65,8 @@
 src = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
 dst = v4l2_m2m_next_dst_buf(ctx->fh.m2m_ctx);

-rga_buf_map(src);
-rga_buf_map(dst);
+rga_buf_map(&src->vb2_buf);
+rga_buf_map(&dst->vb2_buf);

rga_hw_start(rga);

--- linux-4.15.0.orig/drivers/media/platform/s3c-camif/camif-capture.c
+++ linux-4.15.0/drivers/media/platform/s3c-camif/camif-capture.c
@@ -117,6 +117,8 @@
 if (camif->sensor.power_count == !on)
 err = v4l2_subdev_call(sensor->sd, core, s_power, on);
+if (err == -ENOIOCTLCMD)
 +err = 0;
 if (!err)
 sensor->power_count += on ? 1 : -1;

@@ -1256,16 +1258,17 @@
 {  
 const struct s3c_camif_variant *variant = camif->variant;
 const struct vp_pix_limits *pix_lim;
-int i = ARRAY_SIZE(camif_mbus_formats);
+unsigned int i;
 /* FIXME: constraints against codec or preview path ? */
 pix_lim = &variant->vp_pix_limits[VP_CODEC];
+unsigned int i;

-while (i-- >= 0)
+for (i = 0; i < ARRAY_SIZE(camif_mbus_formats); i++)
 if (camif_mbus_formats[i] == mf->code)
 break;

-mf->code = camif_mbus_formats[i];
+if (i == ARRAY_SIZE(camif_mbus_formats))
 +mf->code = camif_mbus_formats[0];

if (pad == CAMIF_SD_PAD_SINK) {
 v4l_bound_align_image(&mf->width, 8, CAMIF_MAX_PIX_WIDTH,
--- linux-4.15.0.orig/drivers/media/platform/s3c-camif/camif-core.c
+++ linux-4.15.0/drivers/media/platform/s3c-camif/camif-core.c
@@ -476,7 +476,7 @@
*/
/* FIXME: constraints against codec or preview path ? */
pix_lim = &variant->vp_pix_limits[VP_CODEC];
-while (i-- >= 0)
+for (i = 0; i < ARRAY_SIZE(camif_mbus_formats); i++)
 if (camif_mbus_formats[i] == mf->code)
 break;

-mf->code = camif_mbus_formats[i];
+if (i == ARRAY_SIZE(camif_mbus_formats))
 +mf->code = camif_mbus_formats[0];

if (pad == CAMIF_SD_PAD_SINK) {

ret = camif_media_dev_init(camif);
if (ret < 0)
    goto err_alloc;
+goto err_pm;
ret = camif_register_sensor(camif);
if (ret < 0)
    media_device_unregister(&camif->media_dev);
    media_device_cleanup(&camif->media_dev);
camif_unregister_media_entities(camif);

err_alloc:
+err_pm:
    pm_runtime_put(dev);
    pm_runtime_disable(dev);
    camif_clk_put(camif);
err_clk:
s3c_camif_unregister_subdev(camif);

--- linux-4.15.0.orig/drivers/media/platform/s5p-cec/s5p_cec.c
+++ linux-4.15.0/drivers/media/platform/s5p-cec/s5p_cec.c
@@ -510,10 +510,9 @@
media_device_unregister(&camif->media_dev);
    media_device_cleanup(&camif->media_dev);
camif_unregister_media_entities(camif);
    -err_alloc:
    +err_pm:
        pm_runtime_put(dev);
        pm_runtime_disable(dev);
        camif_clk_put(camif);
err_clk:
s3c_camif_unregister_subdev(camif);

--- linux-4.15.0.orig/drivers/media/platform/s5p-g2d/g2d.c
+++ linux-4.15.0/drivers/media/platform/s5p-g2d/g2d.c
@@ -283,6 +283,9 @@
    struct g2d_dev *dev = video_drvdata(file);
    struct g2d_ctx *ctx = fh2ctx(file->private_data);
+    mutex_lock(&dev->mutex);
+    v4l2_m2m_ctx_release(ctx->fh.m2m_ctx);
+    mutex_unlock(&dev->mutex);
    v4l2_ctrl_handler_free(&ctx->ctrl_handler);
    v4l2_fh_exit(&ctx->fh);
@@ -498,7 +501,7 @@
    } else {
        s5p_cec_mask_tx_interrupts(cec);
        s5p_cec_mask_rx_interrupts(cec);
-        pm_runtime_disable(cec->dev);
+        pm_runtime_put(cec->dev);
    }

return 0;
--- linux-4.15.0.orig/drivers/media/platform/s5p-g2d/g2d.c
+++ linux-4.15.0/drivers/media/platform/s5p-g2d/g2d.c
@@ -283,6 +283,9 @@
    struct g2d_dev *dev = video_drvdata(file);
    struct g2d_ctx *ctx = fh2ctx(file->private_data);
+    mutex_lock(&dev->mutex);
+    v4l2_m2m_ctx_release(ctx->fh.m2m_ctx);
+    mutex_unlock(&dev->mutex);
    v4l2_ctrl_handler_free(&ctx->ctrl_handler);
    v4l2_fh_exit(&ctx->fh);
@@ -498,7 +501,7 @@
    } else {
        s5p_cec_mask_tx_interrupts(cec);
        s5p_cec_mask_rx_interrupts(cec);
-        pm_runtime_disable(cec->dev);
+        pm_runtime_put(cec->dev);
    }

return 0;
struct vb2_v4l2_buffer *src, *dst;
unsigned long flags;
u32 cmd = 0;

@@ -513,10 +516,10 @@
spin_lock_irqsave(&dev->ctrl_lock, flags);

  g2d_set_src_size(dev, &ctx->in);
-g2d_set_src_addr(dev, vb2_dma_contig_plane_dma_addr(src, 0));
+g2d_set_src_addr(dev, vb2_dma_contig_plane_dma_addr(&src->vb2_buf, 0));

  g2d_set_dst_size(dev, &ctx->out);
-g2d_set_dst_addr(dev, vb2_dma_contig_plane_dma_addr(dst, 0));
+g2d_set_dst_addr(dev, vb2_dma_contig_plane_dma_addr(&dst->vb2_buf, 0));

  g2d_set_rop4(dev, ctx->rop);
  g2d_set_flip(dev, ctx->flip);
--- linux-4.15.0.orig/drivers/media/platform/s5p-jpeg/jpeg-core.c
+++ linux-4.15.0/drivers/media/platform/s5p-jpeg/jpeg-core.c
@@ -793,14 +793,14 @@
static void exynos4_jpeg_parse_decode_h_tbl(struct s5p_jpeg_ctx *ctx)
{
  struct s5p_jpeg *jpeg = ctx->jpeg;
-  struct vb2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
+  struct vb2_v4l2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
  struct s5p_jpeg_buffer jpeg_buffer;
  unsigned int word;
  int c, x, components;

-  jpeg_buffer.size = 2; /* Ls */
+  jpeg_buffer.size = ctx->out_q.dht.len[j];
  jpeg_buffer.data =
-    (unsigned long)vb2_plane_vaddr(vb, 0) + ctx->out_q.sos + 2;
+    (unsigned long)vb2_plane_vaddr(&vb->vb2_buf, 0) + ctx->out_q.sos + 2;
  jpeg_buffer.curr = 0;

  word = 0;
@@ -830,14 +830,14 @@
static void exynos4_jpeg_parse_huff_tbl(struct s5p_jpeg_ctx *ctx)
{
  struct s5p_jpeg *jpeg = ctx->jpeg;
-  struct vb2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
+  struct vb2_v4l2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
  struct s5p_jpeg_buffer jpeg_buffer;
  unsigned int word;
  int c, i, n, j;

  for (j = 0; j < ctx->out_q.dht.n; ++j) {
    jpeg_buffer.size = ctx->out_q.dht.len[j];

struct s5p_jpeg *jpeg = ctx->jpeg;
-struct vb2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
+struct vb2_v4l2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
struct s5p_jpeg_buffer jpeg_buffer;
int c, x, components;

jpeg_buffer.size = ctx->out_q.sof_len;
jpeg_buffer.data =
-(unsigned long)vb2_plane_vaddr(vb, 0) + ctx->out_q.sof;
+(unsigned long)vb2_plane_vaddr(&vb->vb2_buf, 0) + ctx->out_q.sof;
jpeg_buffer.curr = 0;

skip(&jpeg_buffer, 5); /* P, Y, X */
@@ -920,14 +920,14 @@
static void exynos4_jpeg_parse_q_tbl(struct s5p_jpeg_ctx *ctx)
{
    struct s5p_jpeg *jpeg = ctx->jpeg;
    -struct vb2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
    +struct vb2_v4l2_buffer *vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
    struct s5p_jpeg_buffer jpeg_buffer;
    unsigned int word;
    int c, i, j;

    for (j = 0; j < ctx->out_q.dqt.n; ++j) {
        jpeg_buffer.size = ctx->out_q.dqt.len[j];
        -jpeg_buffer.data = (unsigned long)vb2_plane_vaddr(vb, 0) +
        +(unsigned long)vb2_plane_vaddr(&vb->vb2_buf, 0) +
            ctx->out_q.dqt.marker[j];
        jpeg_buffer.curr = 0;

        @@ -1293,13 +1293,16 @@
        return 0;
    }

    -static int enum_fmt(struct s5p_jpeg_fmt *sjpeg_formats, int n,
    +static int enum_fmt(struct s5p_jpeg_ctx *ctx,
        struct s5p_jpeg_fmt *sjpeg_formats, int n,
        struct v4l2_fmtdesc *f, u32 type)
    {
        int i, num = 0;

    }
+unsigned int fmt_ver_flag = ctx->jpeg->variant->fmt_ver_flag;

for (i = 0; i < n; ++i) {
    -if (sjpeg_formats[i].flags & type) {
    +if (sjpeg_formats[i].flags & type &&
        sjpeg_formats[i].flags & fmt_ver_flag) {
/* index-th format of type type found ? */
    if (num == f->index)
        break;
@@ -1326,11 +1329,11 @@
    struct s5p_jpeg_ctx *ctx = fh_to_ctx(priv);

    if (ctx->mode == S5P_JPEG_ENCODE)
        -return enum_fmt(sjpeg_formats, SJPEG_NUM_FORMATS, f, SJPEG_FMT_FLAG_DEC_CAPTURE);
    +return enum_fmt(ctx, sjpeg_formats, SJPEG_NUM_FORMATS, f, SJPEG_FMT_FLAG_DEC_CAPTURE);

    -return enum_fmt(sjpeg_formats, SJPEG_NUM_FORMATS, f, -SJPEG_FMT_FLAG_DEC_CAPTURE);
    +return enum_fmt(ctx, sjpeg_formats, SJPEG_NUM_FORMATS, f, +SJPEG_FMT_FLAG_DEC_CAPTURE);
    }

static int s5p_jpeg_enum_fmt_vid_out(struct file *file, void *priv,
@@ -1339,11 +1342,11 @@
    struct s5p_jpeg_ctx *ctx = fh_to_ctx(priv);

    if (ctx->mode == S5P_JPEG_ENCODE)
        -return enum_fmt(sjpeg_formats, SJPEG_NUM_FORMATS, f, SJPEG_FMT_FLAG_ENC_OUTPUT);
    +return enum_fmt(ctx, sjpeg_formats, SJPEG_NUM_FORMATS, f, SJPEG_FMT_FLAG_ENC_OUTPUT);

    -return enum_fmt(sjpeg_formats, SJPEG_NUM_FORMATS, f, -SJPEG_FMT_FLAG_DEC_OUTPUT);
    +return enum_fmt(ctx, sjpeg_formats, SJPEG_NUM_FORMATS, f, +SJPEG_FMT_FLAG_DEC_OUTPUT);
    }

static struct s5p_jpeg_q_data *get_q_data(struct s5p_jpeg_ctx *ctx,
@@ -2002,7 +2005,7 @@
    v4l2_ctrl_new_std(&ctx->ctrl_handler, &s5p_jpeg_ctrl_ops,
        V4L2_CID_JPEG_RESTART_INTERVAL,
        - 0, 3, 0xffffffff, 0);
    + 0, 0xffffffff, 1, 0);
    if (ctx->jpeg->variant->version == SJPEG_S5P)
        mask = ~0x06; /* 422, 420 */
struct s5p_jpeg_ctx *ctx = priv;
struct s5p_jpeg *jpeg = ctx->jpeg;
struct vb2_buffer *src_buf, *dst_buf;
unsigned long src_addr, dst_addr, flags;

spin_lock_irqsave(&ctx->jpeg->slock, flags);

src_buf = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);
dst_buf = v4l2_m2m_next_dst_buf(ctx->fh.m2m_ctx);
-src_addr = vb2_dma_contig_plane_dma_addr(src_buf, 0);
-dst_addr = vb2_dma_contig_plane_dma_addr(dst_buf, 0);
+src_addr = vb2_dma_contig_plane_dma_addr(&src_buf->vb2_buf, 0);
+dst_addr = vb2_dma_contig_plane_dma_addr(&dst_buf->vb2_buf, 0);

s5p_jpeg_reset(jpeg->regs);
s5p_jpeg_poweron(jpeg->regs);

struct s5p_jpeg *jpeg = ctx->jpeg;
struct s5p_jpegFmt *fmt;
struct vb2_buffer *vb;
struct vb2_v4l2_buffer *vb;
struct s5p_jpeg_addr jpeg_addr = {};
unsigned int jpeg_addr = 0;

vb = v4l2_m2m_next_dst_buf(ctx->fh.m2m_ctx);

-jpeg_addr.y = vb2_dma_contig_plane_dma_addr(vb, 0);
+jpeg_addr.y = vb2_dma_contig_plane_dma_addr(&vb->vb2_buf, 0);

if (fmt->colplanes == 2) {
-jpeg_addr.cb = jpeg_addr.y + pix_size - padding_bytes;
+jpeg_addr.cb = jpeg_addr.y + pix_size - padding_bytes;
}

static void exynos4_jpeg_set_jpeg_addr(struct s5p_jpeg_ctx *ctx)
{
struct s5p_jpeg *jpeg = ctx->jpeg;
-struct vb2_buffer *vb;
+struct vb2_v4l2_buffer *vb;
unsigned int jpeg_addr = 0;

if (ctx->mode == S5P_JPEG_ENCODE)

else
vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);

-jpeg_addr = vb2_dma_contig_plane_dma_addr(vb, 0);
+jpeg_addr = vb2_dma_contig_plane_dma_addr(&vb->vb2_buf, 0);
if (jpeg->variant->version == SJPEG_EXYNOS5433 &&
    ctx->mode == S5P_JPEG_DECODE)
jpeg_addr += ctx->out_q.sos;
@@ -2314,7 +2317,7 @@
{
    struct s5p_jpeg *jpeg = ctx->jpeg;
    struct s5p_jpeg_fmt *fmt;
    -struct vb2_buffer *vb;
+jstruct vb2_v4l2_buffer *vb;
    struct s5p_jpeg_addr jpeg_addr = { };
    u32 pix_size;

    @@ -2328,7 +2331,7 @@
    fmt = ctx->cap_q.fmt;
}

-jpeg_addr.y = vb2_dma_contig_plane_dma_addr(vb, 0);
+jpeg_addr.y = vb2_dma_contig_plane_dma_addr(&vb->vb2_buf, 0);

if (fmt->colplanes == 2) {
    jpeg_addr.cb = jpeg_addr.y + pix_size;
    @@ -2346,7 +2349,7 @@
static void exynos3250_jpeg_set_jpeg_addr(struct s5p_jpeg_ctx *ctx)
{
    struct s5p_jpeg *jpeg = ctx->jpeg;
    -struct vb2_buffer *vb;
+jstruct vb2_v4l2_buffer *vb;
    unsigned int jpeg_addr = 0;

    if (ctx->mode == S5P_JPEG_ENCODE)
    @@ -2354,7 +2357,7 @@
    else
    vb = v4l2_m2m_next_src_buf(ctx->fh.m2m_ctx);

-jpeg_addr = vb2_dma_contig_plane_dma_addr(vb, 0);
+jpeg_addr = vb2_dma_contig_plane_dma_addr(&vb->vb2_buf, 0);
exynos3250_jpeg_jpgadr(jpeg->regs, jpeg_addr);
}

--- linux-4.15.0.orig/drivers/media/platform/s5p-mfc/s5p_mfc.c
+++ linux-4.15.0/drivers/media/platform/s5p-mfc/s5p_mfc.c
@@ -254,24 +254,24 @@
static void s5p_mfc_handle_frame_copy_time(struct s5p_mfc_ctx *ctx)
struct s5p_mfc_dev *dev = ctx->dev;
-struct s5p_mfc_buf *dst_buf, *src_buf;
-size_t dec_y_addr;
+struct s5p_mfc_buf *dst_buf, *src_buf;
+u32 dec_y_addr;
unsigned int frame_type;

/* Make sure we actually have a new frame before continuing. */
frame_type = s5p_mfc_hw_call(dev->mfc_ops, get_dec_frame_type, dev);
if (frame_type == S5P_FIMV_DECODE_FRAME_SKIPPED)
    return;
-dec_y_addr = s5p_mfc_hw_call(dev->mfc_ops, get_dec_y_adr, dev);
+dec_y_addr = (u32)s5p_mfc_hw_call(dev->mfc_ops, get_dec_y_adr, dev);

/* Copy timestamp / timecode from decoded src to dst and set
   appropriate flags. */
src_buf = list_entry(ctx->src_queue.next, struct s5p_mfc_buf, list);
list_for_each_entry(dst_buf, &ctx->dst_queue, list) {
    if (vb2_dma_contig_plane_dma_addr(&dst_buf->b->vb2_buf, 0)
        != dec_y_addr)
        return;
    dst_buf->b->timecode =
    -src_buf->b->timecode;
    +u32 addr = (u32)vb2_dma_contig_plane_dma_addr(&dst_buf->b->vb2_buf, 0);
    +
    +if (addr == dec_y_addr) {
        dst_buf->b->timecode = src_buf->b->timecode;
        dst_buf->b->vb2_buf.timestamp =
        src_buf->b->vb2_buf.timestamp;
        dst_buf->b->flags &=
        +@ @ -307,10 +307,10 @
    }
}
struct s5p_mfc_dev *dev = ctx->dev;
struct s5p_mfc_buf *dst_buf;
-size_t dspl_y_addr;
+u32 dspl_y_addr;
unsigned int frame_type;

-dspl_y_addr = s5p_mfc_hw_call(dev->mfc_ops, get_dspl_y_adr, dev);
+dspl_y_addr = (u32)s5p_mfc_hw_call(dev->mfc_ops, get_dspl_y_adr, dev);
if (IS_MFCV6_PLUS(dev))
    frame_type = s5p_mfc_hw_call(dev->mfc_ops,
        get_disp_frame_type, ctx);
    @ @ -329,9 +329,10 @
/* The MFC returns address of the buffer, now we have to
   * check which videobuf does it correspond to */
list_for_each_entry(dst_buf, &ctx->dst_queue, list) {
    +u32 addr = (u32)vb2_dma_contig_plane_dma_addr(&dst_buf->b->vb2_buf, 0);
    +
/* Check if this is the buffer we're looking for */
-if (vb2_dma_contig_plane_dma_addr(&dst_buf->b->vb2_buf, 0)
-== dspl_y_addr) {
+if (addr == dspl_y_addr) {
 list_del(&dst_buf->list);
 ctx->dst_queue_cnt--;
 dst_buf->b->sequence = ctx->sequence;
 device_initialize(child);
 dev_set_name(child, "%s:%s", dev_name(dev), name);
 child->parent = dev;
 -child->bus = dev->bus;
 child->coherent_dma_mask = dev->coherent_dma_mask;
 child->dma_mask = dev->dma_mask;
 child->release = s5p_mfc_memdev_release;
 goto err_dma;
 }

 /* Load fails if fs isn't mounted. Try loading anyway.
 * _open() will load it, it it fails now. Ignore failure.
 * */
+s5p_mfc_load_firmware(dev);

 mutex_init(&dev->mfc_mutex);
 init_waitqueue_head(&dev->queue);
 dev->hw_lock = 0;
--- linux-4.15.0.orig/drivers/media/platform/s5p-mfc/s5p_mfc_common.h
+++ linux-4.15.0/drivers/media/platform/s5p-mfc/s5p_mfc_common.h
@@ -290,6 +290,8 @@
 * @mfc_regs:		structure holding MFC registers
 * @fw_ver:		loaded firmware sub-version
 + * @fw_get_done		flag set when request_firmware() is complete and
+ * copied into fw_buf
 * risc_on:		flag indicates RISC is on or off
 */

 struct s5p_mfc_hw_cmds *mfc_cmds;
 const struct s5p_mfc_regs *mfc_regs;
 enum s5p_mfc_fw_ver fw_ver;
+bool fw_get_done;
 bool risc_on; /* indicates if RISC is on or off */
```c
+++ linux-4.15.0/drivers/media/platform/s5p-mfc/s5p_mfc_ctrl.c
@@ -55,6 +55,9 @@
    * into kernel. */
 mfc_debug_enter();

+if (dev->fw_get_done)
+    return 0;
+    
for (i = MFC_FW_MAX_VERSIONS - 1; i >= 0; i--) {
if (!dev->variant->fw_name[i])
    continue;
@@ -82,6 +85,7 @@
} 
memcpy(dev->fw_buf.virt, fw_blob->data, fw_blob->size);
    wmb();
+    dev->fw_get_done = true;
release_firmware(fw_blob);
    mfc_debug_leave();
return 0;
@@ -93,6 +97,7 @@
/* Before calling this function one has to make sure
    * that MFC is no longer processing */
s5p_mfc_release_priv_buf(dev, &dev->fw_buf);
+    dev->fw_get_done = false;
return 0;
}

--- linux-4.15.0.orig/drivers/media/platform/s5p-mfc/s5p_mfc_pm.c
+++ linux-4.15.0/drivers/media/platform/s5p-mfc/s5p_mfc_pm.c
@@ -38,6 +38,11 @@
for (i = 0; i < pm->num_clocks; i++) {
    pm->clocks[i] = devm_clk_get(pm->device, pm->clk_names[i]);
if (IS_ERR(pm->clocks[i])) {
    /* additional clocks are optional */
+    if (i && PTR_ERR(pm->clocks[i]) == -ENOENT) {
+        pm->clocks[i] = NULL;
+        continue;
+    }
    mfc_err("Failed to get clock: \%s\n", pm->clk_names[i]);
    return PTR_ERR(pm->clocks[i]);
@@ -78,8 +83,10 @@
    int i, ret = 0;

    ret = pm_runtime_get_sync(pm->device);
-    if (ret < 0)
+    if (ret < 0) {
+        pm_runtime_put_noidle(pm->device);
```
return ret;
+
/* clock control */
for (i = 0; i < pm->num_clocks; i++) {
    --- linux-4.15.0.orig/drivers/media/platform/sh_veu.c
    +++ linux-4.15.0/drivers/media/platform/sh_veu.c
    @@ -276,13 +276,13 @@
    static void sh_veu_device_run(void *priv)
    {
        struct sh_veu_dev *veu = priv;
        -struct vb2_buffer *src_buf, *dst_buf;
        +struct vb2_v4l2_buffer *src_buf, *dst_buf;

        src_buf = v4l2_m2m_next_src_buf(veu->m2m_ctx);
        dst_buf = v4l2_m2m_next_dst_buf(veu->m2m_ctx);

        if (src_buf && dst_buf)
            -sh_veu_process(veu, src_buf, dst_buf);
            +sh_veu_process(veu, &src_buf->vb2_buf, &dst_buf->vb2_buf);
        }

    /* =========== video ioctls =========== */
    --- linux-4.15.0.orig/drivers/media/platform/soc_camera/soc_scale_crop.c
    +++ linux-4.15.0/drivers/media/platform/soc_camera/soc_scale_crop.c
    @@ -420,3 +420,7 @@
        mf->height = soc_camera_shift_scale(rect->height, shift, scale_v);
    }
    EXPORT_SYMBOL(soc_camera_calc_client_output);
    +
    +MODULE_DESCRIPTION("soc-camera scaling-cropping functions");
    +MODULE_AUTHOR("Guennadi Liakhovetski <kernel@pengutronix.de>");
    +MODULE_LICENSE("GPL");
    --- linux-4.15.0.orig/drivers/media/platform/sti/bdisp/bdisp-hw.c
    +++ linux-4.15.0/drivers/media/platform/sti/bdisp/bdisp-hw.c
    @@ -14,8 +14,8 @@
    #define MAX_SRC_WIDTH 2048

    /* Reset & boot poll config */
    -#define POLL_RST_MAX 50
    -#define POLL_RST_DELAY_MS 20
    +#define POLL_RST_MAX 500
    +#define POLL_RST_DELAY_MS 2

    enum bdisp_target_plan {
        BDISP_RGB,
        @@ -382,7 +382,7 @@
        for (i = 0; i < POLL_RST_MAX; i++) {
if (readl(bdisp->regs + BLT_STA1) & BLT_STA1_IDLE)
break;
-msleep(POLL_RST_DELAY_MS);
+udelay(POLL_RST_DELAY_MS * 1000);
}
if (i == POLL_RST_MAX)
dev_err(bdisp->dev, "Reset timeout\n");
--- linux-4.15.0.orig/drivers/media/platform/sti/bdisp/bdisp-v4l2.c
+++ linux-4.15.0/drivers/media/platform/sti/bdisp/bdisp-v4l2.c
@@ -651,8 +651,7 @@
dev_dbg(bdisp->dev, "\%s\", __func__);
-if (mutex_lock_interruptible(&bdisp->lock))
-return -ERESTARTSYS;
+mutex_lock(&bdisp->lock);

v4l2_m2m_ctx_release(ctx->fh.m2m_ctx);

@@ -1368,7 +1367,7 @@
ret = pm_runtime_get_sync(dev);
if (ret < 0) {
  dev_err(dev, "failed to set PM\n");
-goto err_dbg;
+goto err_pm;
}

/* Filters */
@@ -1396,7 +1395,6 @@
bdisp_hw_free_filters(bdisp->dev);
err_pm:
  pm_runtime_put(dev);
-err_dbg:
  bdisp_debugfs_remove(bdisp);
err_v4l2:
  v4l2_device_unregister(&bdisp->v4l2_dev);
--- linux-4.15.0.orig/drivers/media/platform/sti/c8sectpfe/c8sectpfe-core.c
+++ linux-4.15.0/drivers/media/platform/sti/c8sectpfe/c8sectpfe-core.c
@@ -83,7 +83,7 @@
static void channel_swdemux_tsklet(unsigned long data)
{
  struct channel_info *channel = (struct channel_info *)data;
-struct c8sectpfei *fei = channel->fei;
+struct c8sectpfei *fei;
  unsigned long wp, rp;
  int pos, num_packets, n, size;
  u8 *buf;
@@ -91,6 +91,8 @@
if (unlikely(!channel || !channel->irec))
return;

+fei = channel->fei;
+
wp = readl(channel->irec + DMA_PRDS_BUSWP_TP(0));
rp = readl(channel->irec + DMA_PRDS_BUSRP_TP(0));

--- linux-4.15.0.orig/drivers/media/platform/sti/delta/delta-v4l2.c
+++ linux-4.15.0/drivers/media/platform/sti/delta-v4l2.c
@@ -970,8 +970,10 @@
/* enable the hardware */
if (!dec->pm) {
      ret = delta_get_sync(ctx);
   -if (ret)
+      if (ret) {
+         delta_put_autosuspend(ctx);
         goto err;
+      }
}

/* decode this access unit */
--- linux-4.15.0.orig/drivers/media/platform/sti/hva/hva-hw.c
+++ linux-4.15.0/drivers/media/platform/sti/hva/hwa-hw.c
@@ -130,8 +130,7 @@
     ctx_id = (hva->sts_reg & 0xFF00) >> 8;
   if (ctx_id >= HVA_MAX_INSTANCES) {
      dev_err(dev, "%s     %s: bad context identifier: %d\n",
-            ctx->name, __func__, ctx_id);
-      ctx->hw_err = true;
+      HVA_PREFIX, __func__, ctx_id);
         goto out;
   }

@@ -272,6 +271,7 @@
   if (pm_runtime_get_sync(dev) < 0) {
      dev_err(dev, "%s     failed to get pm_runtime\n", HVA_PREFIX);
      pm_runtime_put_noidle(dev);
      mutex_unlock(&hva->protect_mutex);
      return -EFAULT;
   }

@@ -392,7 +392,7 @@
   if (pm_runtime_get_sync(dev) < 0) {
      dev_err(dev, "%s     failed to set PM\n", HVA_PREFIX);
      goto err_clk;
-   goto err_pm;
+   goto err_pm;
/* check IP hardware version */
@@ -557,6 +557,7 @@
if (pm_runtime_get_sync(dev) < 0) {
    seq_puts(s, "Cannot wake up IP\n");
+    pm_runtime_put_noidle(dev);
    mutex_unlock(&hva->protect_mutex);
    return;
}
--- linux-4.15.0.orig/drivers/media/platform/stm32/stm32-dcmi.c
+++ linux-4.15.0/drivers/media/platform/stm32/stm32-dcmi.c
@@ -161,6 +161,9 @@
    misr;
    errors_count;
    buffers_count;
+    /* Ensure DMA operations atomicity */
+    struct mutex dma_lock;
    
static inline struct stm32_dcmi *notifier_to_dcmi(struct v4l2_async_notifier *n)
@@ -291,6 +294,13 @@
    return ret;
}
+    /* Avoid call of dmaengine_terminate_all() between
+    * dmaengine_prep_slave_single() and dmaengine_submit()
+    * by locking the whole DMA submission sequence
+    */
+    mutex_lock(&dcmi->dma_lock);
+    
+    /* Prepare a DMA transaction */
+    desc = dmaengine_prep_slave_single(dcmi->dma_chan, buf->paddr,
buf->size,
@@ -298,6 +308,7 @@
    if (!desc) {
        dev_err(dcmi->dev, "%s: DMA dmaengine_prep_slave_single failed for buffer size %zu\n",
              __func__, buf->size);
+        mutex_unlock(&dcmi->dma_lock);
        return -EINVAL;
    }
@@ -309,9 +320,12 @@
    dcmi->dma_cookie = dmaengine_submit(desc);
    if (dma_submit_error(dcmi->dma_cookie)) {
        
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dev_err(dcmi->dev, "%s: DMA submission failed\n", __func__);  
+mutex_unlock(&dcmi->dma_lock);  
return -ENXIO;  
}  
+mutex_unlock(&dcmi->dma_lock);  
+  
+dma_async_issue_pending(dcmi->dma_chan);  
  
return 0;  
@@ -690,7 +704,9 @@  
+  
+spin_unlock_irq(&dcmi->irqlock);  

/* Stop all pending DMA operations */  
+mutex_lock(&dcmi->dma_lock);  
+dmaengine_terminate_all(dcmi->dma_chan);  
+mutex_unlock(&dcmi->dma_lock);  

clk_disable(dcmi->mclk);  
@@ -775,6 +791,9 @@  

ds_fmt = find_format_by_fourcc(dcmi, pix->pixelformat);  
if (!sd_fmt) {  
  +if (!dcmi->num_of_sd_formats)  
  +return -ENODATA;  
  +sd_fmt = dcmi->sd_formats[dcmi->num_of_sd_formats - 1];  
  +pix->pixelformat = sd_fmt->fourcc;  
}  
@@ -946,6 +965,9 @@  

ds_fmt = find_format_by_fourcc(dcmi, pix->pixelformat);  
if (!sd_fmt) {  
  +if (!dcmi->num_of_sd_formats)  
  +return -ENODATA;  
  +sd_fmt = dcmi->sd_formats[dcmi->num_of_sd_formats - 1];  
  +pix->pixelformat = sd_fmt->fourcc;  
}  
@@ -1585,7 +1607,7 @@  
  
  }  
  
  dcmi->rstc = devm_reset_control_get_exclusive(&pdev->dev, NULL);  
  if (IS_ERR(dcmi->rstc)) {  
  dev_err(pdev->dev, "Could not get reset control\n");  
  -return -ENODEV;  
  +return PTR_ERR(dcmi->rstc);  
  }  

/* Get bus characteristics from devicetree */
@@ -1600,7 +1622,7 @@
    if (ret) {
        dev_err(&pdev->dev, "Could not parse the endpoint\n");
        of_node_put(np);
-       return -ENODEV;
+       return ret;
    }

    if (ep.bus_type == V4L2_MBUS_CSI2) {
@@ -1616,8 +1638,9 @@
        irq = platform_get_irq(pdev, 0);
        if (irq <= 0) {
            -dev_err(&pdev->dev, "Could not get irq\n");
-           return -ENODEV;
+           if (irq != -EPROBE_DEFER)
+              dev_err(&pdev->dev, "Could not get irq\n");
+           return irq ? irq : -ENXIO;
        }

        dcmi->res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
@@ -1637,12 +1660,13 @@
        dev_name(&pdev->dev), dcmi);
        if (ret) {
            dev_err(&pdev->dev, "Unable to request irq %d\n", irq);
-           return -ENODEV;
+           return ret;
        }

        mclk = devm_clk_get(&pdev->dev, "mclk");
        if (IS_ERR(mclk)) {
@@ -1660,6 +1684,7 @@
            spin_lock_init(&dcmi->irqlock);
            mutex_init(&dcmi->lock);
            +mutex_init(&dcmi->dma_lock);
            init_completion(&dcmi->complete);
            INIT_LIST_HEAD(&dcmi->buffers);

            --- linux-4.15.0.orig/drivers/media/platform/tegra-cec/tegra_cec.c
            +++ linux-4.15.0/drivers/media/platform/tegra-cec/tegra_cec.c

-if (status & (TEGRA_CEC_INT_STAT_RX_REGISTER_OVERRUN | TEGRA_CEC_INT_STAT_RX_BUS_ANOMALY_DETECTED | TEGRA_CEC_INT_STAT_RX_START_BIT_DETECTED | TEGRA_CEC_INT_STAT_RX_BUS_ERROR_DETECTED)) {
+if (status & TEGRA_CEC_INT_STAT_RX_START_BIT_DETECTED) {
    cec_write(cec, TEGRA_CEC_INT_STAT, (TEGRA_CEC_INT_STAT_RX_REGISTER_OVERRUN | TEGRA_CEC_INT_STAT_RX_BUS_ANOMALY_DETECTED | TEGRA_CEC_INT_STAT_RX_START_BIT_DETECTED | TEGRA_CEC_INT_STAT_RX_BUS_ERROR_DETECTED));
} else if (status & TEGRA_CEC_INT_STAT_RX_REGISTER_FULL) {
+    cec->rx_done = false;
+    cec->rx_buf_cnt = 0;
+}
+if (status & TEGRA_CEC_INT_STAT_RX_REGISTER_FULL) {
    u32 v;

    cec_write(cec, TEGRA_CEC_INT_STAT, TEGRA_CEC_INT_MASK_TX_BUS_ANOMALY_DETECTED | TEGRA_CEC_INT_MASK_TX_FRAME_TRANSMITTED | TEGRA_CEC_INT_MASK_RX_REGISTER_FULL | TEGRA_CEC_INT_MASK_RX_REGISTER_OVERRUN);
+    TEGRA_CEC_INT_MASK_RX_START_BIT_DETECTED);
}

printk(KERN_INFO "module platform driver(tegra_cec_driver);
+
+MODULE_DESCRIPTION("Tegra HDMI CEC driver");
+MODULE_AUTHOR("NVIDIA CORPORATION");
+MODULE_AUTHOR("Cisco Systems, Inc. and/or its affiliates");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/media/platform/ti-vpe/cal.c
+++ linux-4.15.0/drivers/media/platform/ti-vpe/cal.c
@@ -544,16 +544,16 @@
 static void disable_irqs(struct cal_ctx *ctx)
 {
+    u32 val;
/* Disable IRQ_WDMA_END 0/1 */
reg_write_field(ctx->dev,
   CAL_HL_IRQENABLE_CLR(2),
   CAL_HL_IRQ_CLEAR,
   CAL_HL_IRQ_MASK(ctx->csi2_port));
val = 0;
set_field(&val, CAL_HL_IRQ_CLEAR, CAL_HL_IRQ_MASK(ctx->csi2_port));
reg_write(ctx->dev, CAL_HL_IRQENABLE_CLR(2), val);
/* Disable IRQ_WDMA_START 0/1 */
reg_write_field(ctx->dev,
   CAL_HL_IRQENABLE_CLR(3),
   CAL_HL_IRQ_CLEAR,
   CAL_HL_IRQ_MASK(ctx->csi2_port));
val = 0;
set_field(&val, CAL_HL_IRQ_CLEAR, CAL_HL_IRQ_MASK(ctx->csi2_port));
reg_write(ctx->dev, CAL_HL_IRQENABLE_CLR(3), val);
/* Todo: Add VC_IRQ and CSI2_COMPLEXIO_IRQ handling */
reg_write(ctx->dev, CAL_CSI2_VC_IRQENABLE(1), 0);
}
@@ -687,12 +687,13 @@
}

static void cal_wr_dma_config(struct cal_ctx *ctx,
   unsigned int width)
{
   u32 val;
   val = reg_read(ctx->dev, CAL_WR_DMA_CTRL(ctx->csi2_port));
   set_field(&val, ctx->csi2_port, CAL_WR_DMA_CTRL_CPORT_MASK);
   set_field(&val, height, CAL_WR_DMA_CTRL_YSIZE_MASK);
   set_field(&val, CAL_WR_DMA_CTRL_DTAG_PIX_DAT, CAL_WR_DMA_CTRL_DTAG_MASK);
   set_field(&val, height, CAL_WR_DMA_CTRL_DTAG_PIX_DAT, CAL_WR_DMA_CTRL_DTAG_MASK);
   set_field(&val, CAL_WR_DMA_CTRL_DTAG_MASK);
   csi2_lane_config(ctx);
   csi2_ctx_config(ctx);
   pix_proc_config(ctx);
   -cal_wr_dma_config(ctx, ctx->v_fmt.fmt.pix.bytesperline);
   +cal_wr_dma_config(ctx, ctx->v_fmt.fmt.pix.bytesperline,
   + ctx->v_fmt.fmt.pix.height);
   cal_wr_dma_addr(ctx, addr);
   csi2_ppi_enable(ctx);

--- linux-4.15.0.orig/drivers/media/platform/ti-vpe/vpdma.h
+++ linux-4.15.0/drivers/media/platform/ti-vpe/vpdma.h
@@ -61,6 +61,7 @@
* line stride of source and dest
* buffers should be 16 byte aligned */

#define VPDMA_MAX_STRIDE 65520 /* Max line stride 16 byte aligned */
#define VPDMA_DTD_DESC_SIZE 32 /* 8 words */
#define VPDMA_CFD_CTD_DESC_SIZE 16 /* 4 words */

--- linux-4.15.0.orig/drivers/media/platform/ti-vpe/vpe.c
+++ linux-4.15.0/drivers/media/platform/ti-vpe/vpe.c
@@ -352,20 +352,25 @@
};
/* find our format description corresponding to the passed v4l2_format */

-static struct vpe_fmt *find_format(struct v4l2_format *f)
+static struct vpe_fmt *__find_format(u32 fourcc)
{
    struct vpe_fmt *fmt;
    unsigned int k;

    for (k = 0; k < ARRAY_SIZE(vpe_formats); k++) {
        fmt = &vpe_formats[k];
        -if (fmt->fourcc == f->fmt.pix.pixelformat)
+        if (fmt->fourcc == fourcc)
            return fmt;
    }
    return NULL;
}

+static struct vpe_fmt *find_format(struct v4l2_format *f)
+{
+    return __find_format(f->fmt.pix.pixelformat);
+}
+
+/*
* there is one vpe_dev structure in the driver, it is shared by
* all instances.
@@ -1044,11 +1049,14 @@
dma_addr_t dma_addr;
    u32 flags = 0;
    u32 offset = 0;
    +u32 stride;

    if (port == VPE_PORT_MV_OUT) {
        vpdma_fmt = &vpdma_misc_fmts[VPDMA_DATA_FMT_MV];
        dma_addr = ctx->mv_buf_dma[mv_buf_selector];
        q_data = &ctx->q_data[Q_DATA_SRC];
        +stride = ALIGN((q_data->width * vpdma_fmt->depth) >> 3,
+ VPDMACONV_STRIDE_ALIGN); 
} else {
/* to incorporate interleaved formats */
int plane = fmt->coplanar ? p_data->vb_part : 0;
@@ -1075,6 +1083,7 @@
}
/* Apply the offset */
dma_addr += offset;
+stride = q_data->bytesperline[VPE_LUMA];
}

if (q_data->flags & Q_DATA_FRAME_1D) 
@@ -1086,7 +1095,7 @@
MAX_W, MAX_H);

vpdma_add_out_dtd(&ctx->desc_list, q_data->width,
- q_data->bytesperline[VPE_LUMA], &q_data->c_rect,
+ stride, &q_data->c_rect,
 vpdma_fmt, dma_addr, MAX_OUT_WIDTH_REG1,
 MAX_OUT_HEIGHT_REG1, p_data->channel, flags);
} 
@@ -1105,10 +1114,13 @@
dma_addr_t dma_addr;
u32 flags = 0;
u32 offset = 0;
+u32 stride;

if (port == VPE_PORT_MV_IN) {
 vpdma_fmt = &vpdma_misc_fmts[VPDMA_DATA_FMT_MV];
dma_addr = ctx->mv_buf_dma[mv_buf_selector];
+stride = ALIGN((q_data->width * vpdma_fmt->depth) >> 3,
+ VPDMACONV_STRIDE_ALIGN);
} else {
/* to incorporate interleaved formats */
int plane = fmt->coplanar ? p_data->vb_part : 0;
@@ -1135,10 +1147,13 @@
}
/* Apply the offset */
dma_addr += offset;
+stride = q_data->bytesperline[VPE_LUMA];

if (q_data->flags & Q_DATA_INTERLACED_SEQ_TB) {
/*
@@ -1170,10 +1183,10 @@
if (p_data->vb_part && fmt->fourcc == V4L2_PIX_FMT_NV12)
frame_height /= 2;

-vpdma_add_in_dtd(&ctx->desc_list, q_data->width,
vpdma_add_in_dtd(&ctx->desc_list, q_data->width, stride,
			 &q_data->c_rect, vpdma_fmt, dma_addr,
			 p_data->channel, field, flags, frame_width,
			 frame_height, 0, 0);

/* the previous dst mv buffer becomes the next src mv buffer */
ctx->src_mv_buf_selector = !ctx->src_mv_buf_selector;

@if (ctx->aborting)
@ goto finished;
-
+ s_vb = ctx->src_vbs[0];
d_vb = ctx->dst_vb;

d_vb->timecode = s_vb->timecode;
d_vb->sequence = ctx->sequence;
+s_vb->sequence = ctx->sequence;

d_q_data = &ctx->q_data[Q_DATA_DST];
@if (d_q_data->flags & Q_IS_INTERLACED) {
+ @ @ -1488,6 +1499,9 @@ 
ctx->src_vbs[0] = NULL;
ctx->dst_vb = NULL;

+if (ctx->aborting)
+ goto finished;
+
+ ctx->bufs_completed++;
+ if (ctx->bufs_completed < ctx->bufs_per_job && & job_ready(ctx)) {
device_run(ctx);
+ @ @ -1600,9 +1614,9 @@

unsigned int stride = 0;
@if (!fmt || (!fmt->types & type)) {
- vpe_err(ctx->dev, "Fourcc format (0x%08x) invalid.\n",
+ vpe_dbg(ctx->dev, "Fourcc format (0x%08x) invalid.\n",
pix->pixelformat);
- return -EINVAL;
+ fmt = __find_format(V4L2_PIX_FMT_YUYV);
}
if (pix->field != V4L2_FIELD_NONE && pix->field != V4L2_FIELD_ALTERNATE
@@ -1649,7 +1663,7 @@
                &pix->height, MIN_H, MAX_H, H_ALIGN,
                S_ALIGN);

-    if (!pix->num_planes)
+    if (!pix->num_planes || pix->num_planes > 2)
        pix->num_planes = fmt->coplanar ? 2 : 1;
    else if (pix->num_planes > 1 && !fmt->coplanar)
        pix->num_planes = 1;
@@ -1688,6 +1702,10 @@
    if (stride > plane_fmt->bytesperline)
        plane_fmt->bytesperline = stride;

+        plane_fmt->bytesperline = clamp_t(u32, plane_fmt->bytesperline,
+                                         + stride,
+                                         + VPDMA_MAX_STRIDE);
+        plane_fmt->bytesperline = ALIGN(plane_fmt->bytesperline,
+                                          VPDMA_STRIDE_ALIGN);

@@ -2308,7 +2326,7 @@
 v4l2_ctrl_handler_setup(hdl);

 s_q_data = &ctx->q_data[Q_DATA_SRC];
-s_q_data->fmt = &vpe_formats[2];
+s_q_data->fmt = __find_format(V4L2_PIX_FMT_YUYV);
 s_q_data->width = 1920;
 s_q_data->height = 1080;
 s_q_data->nplanes = 1;
@@ -2386,6 +2404,12 @@
 mutex_lock(&dev->dev_mutex);
 free_mv_buffers(ctx);
+    + vpdma_unmap_desc_buf(dev->vpdma, &ctx->desc_list.buf);
+    + vpdma_unmap_desc_buf(dev->vpdma, &ctx->mmr_adb);
+    + vpdma_unmap_desc_buf(dev->vpdma, &ctx->sc_coeff_h);
+    + vpdma_unmap_desc_buf(dev->vpdma, &ctx->sc_coeff_v);
+    + vpdma_free_desc_list(&ctx->desc_list);
     vpdma_free_desc_buf(&ctx->mmr_adb);

@@ -2446,6 +2470,8 @@
 r = pm_runtime_get_sync(&pdev->dev);
 WARN_ON(r < 0);
+if (r)
+ pm_runtime_put_noidle(&pdev->dev);
return r < 0 ? r : 0;
}

--- linux-4.15.0.orig/drivers/media/platform/video-mux.c
+++ linux-4.15.0/drivers/media/platform/video-mux.c
@@ -242,9 +242,14 @@
vmux->active = -1;
vmux->pads = devm_kcalloc(dev, num_pads, sizeof(*vmux->pads),
GFP_KERNEL);
+if (!vmux->pads)
+ return -ENOMEM;
+
vmux->format_mbus = devm_kcalloc(dev, num_pads,
sizeof(*vmux->format_mbus),
GFP_KERNEL);
+if (!vmux->format_mbus)
+ return -ENOMEM;
+
for (i = 0; i < num_pads - 1; i++)
vmux->pads[i].flags = MEDIA_PAD_FL_SINK;
--- linux-4.15.0.orig/drivers/media/platform/vim2m.c
+++ linux-4.15.0/drivers/media/platform/vim2m.c
@@ -3,7 +3,8 @@
/*
 * This is a virtual device driver for testing mem-to-mem videobuf framework.
 * It simulates a device that uses memory buffers for both source and
- * destination, processes the data and issues an "irq" (simulated by a timer).
+ * destination, processes the data and issues an "irq" (simulated by a delayed
+ * workqueue).
 * The device is capable of multi-instance, multi-buffer-per-transaction
 * operation (via the mem2mem framework).
 */
@@ -19,7 +20,6 @@
 #include <linux/module.h>
 #include <linux/delay.h>
 #include <linux/fs.h>
-#include <linux/timer.h>
 #include <linux/sched.h>
 #include <linux/slab.h>

@@ -145,7 +145,7 @@
struct mutex		dev_mutex;
spinlock_t		irqlock;
@@ -197,6 +198,6 @@

struct timer_list	timer;

+struct delayed_work	work_run;

struct v4l2_m2m_dev *m2m_dev;
;
return 0;
}

-int void schedule_irq(struct vim2m_dev *dev, int msec_timeout)
{
-dprintfk(dev, "Scheduling a simulated irq\n");
-mod_timer(&dev->timer, jiffies + msecs_to_jiffies(msec_timeout));
-
-
/* mem2mem callbacks */
@
*/

device_process(ctx, src_buf, dst_buf);

-/* Run a timer, which simulates a hardware irq */
-schedule_irq(dev, ctx->transtime);
+/* Run delayed work, which simulates a hardware irq */
+schedule_delayed_work(&dev->work_run, msecs_to_jiffies(ctx->transtime));
}

-int void device_isr(struct timer_list *t)
+
tstructure work_struct *w)
{
-struct vim2m_dev *vim2m_dev = from_timer(vim2m_dev, t, timer);
+struct vim2m_dev *vim2m_dev =
+container_of(w, struct vim2m_dev, work_run.work);
+ struct vim2m_ctx *curr_ctx;
+ struct vb2_v4l2_buffer *src_vb, *dst_vb;
+ unsigned long flags;
+
for (;;)
{
if (V4L2_TYPE_IS_OUTPUT(q->type))

static void vim2m_stop_streaming(struct vb2_queue *q)
{
struct vim2m_ctx *ctx = vb2_get_drv_priv(q);
+struct vim2m_dev *dev = ctx->dev;
+struct vb2_v4l2_buffer *vbuf;
+unsigned long flags;
+
+if (v4l2_m2m_get_curr_priv(dev->m2m_dev) == ctx)
+cancel_delayed_work_sync(&dev->work_run);
+
for (;;) {
if (V4L2_TYPE_IS_OUTPUT(q->type))

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vbuf = v4l2_m2m_src_buf_remove(ctx->fh.m2m_ctx);
@@ -1012,6 +1011,7 @@
 vfd = &dev->vfd;
 vfd->lock = &dev->dev_mutex;
 vfd->v4l2_dev = &dev->v4l2_dev;
+INIT_DELAYED_WORK(&dev->work_run, device_work);

 ret = video_register_device(vfd, VFL_TYPE_GRABBER, 0);
 if (ret) {
 @@ -1024,7 +1024,6 @@
 v4l2_info(&dev->v4l2_dev,
 "Device registered as /dev/video%d
num); 

 -timer_setup(&dev->timer, device_isr, 0);
 platform_set_drvdata(pdev, dev);

dev->m2m_dev = v4l2_m2m_init(&m2m_ops);
@@ -1051,7 +1050,6 @@
 v4l2_info(&dev->v4l2_dev, "Removing " MEM2MEM_NAME);
 v4l2_m2m_release(dev->m2m_dev);
 -del_timer_sync(&dev->timer);
 video_unregister_device(&dev->vfd);
 v4l2_device_unregister(&dev->v4l2_dev);

--- linux-4.15.0.orig/drivers/media/platform/vimc/Makefile
+++ linux-4.15.0/drivers/media/platform/vimc/Makefile
@@ -5,6 +5,7 @@
 vimc_debayer-objs := vimc-debayer.o
 vimc_scaler-objs := vimc-scaler.o
 vimc_sensor-objs := vimc-sensor.o
+vimc_streamer-objs := vimc-streamer.o
 obj-$(CONFIG_VIDEO_VIMC) += vimc.o vimc_capture.o vimc_common.o vimc-debayer.o \
 -vimc_scaler.o vimc_sensor.o
 + vimc_scaler.o vimc_sensor.o vimcStreamer.o
 --- linux-4.15.0.orig/drivers/media/platform/vimc/vimc-capture.c
 +++ linux-4.15.0/drivers/media/platform/vimc/vimc-capture.c
@@ -23,6 +23,7 @@
 #include <media/videobuf2-vmalloc.h>
 #include "vimc-common.h"
+#include "vimc-streamer.h"

 #define VIMC_CAP_DRV_NAME "vimc-capture"

@@ -43,7 +44,7 @@
 spinlock_t qlock;

---
struct mutex lock;
static const struct v4l2_pix_format fmt_default = {
    -130,12 +131,15
};
int ret;
/* Do not change the format while stream is on */
if (vb2_is_busy(&vcap->queue))
    return -EBUSY;
/* Start the media pipeline */
if (ret) {
    vimc_cap_return_all_buffers(vcap, VB2_BUF_STATE_QUEUED);
    return ret;
    dev_dbg(vcap->dev, "%s: format update: 
            old:%dx%d (0x%x, %d, %d, %d, %d) 
            @ @ -247,14 +251,13 @ @
        vcap->sequence = 0;
    vimc_cap_returns_all(vcap, VB2_BUF_STATE_QUEUED);
    return ret;
    /* Enable streaming from the pipe */
    if (ret) {
        media_pipeline_stop(entity);
        vimc_cap_return_all_buffers(vcap, VB2_BUF_STATE_QUEUED);
        @ @ -272,8 +275,7 @ @
    vimc_cap_returns_all(vcap, VB2_BUF_STATE_QUEUED);
    /* Disable streaming from the pipe */
    vimc_streamer_s_stream(&vcap->stream, &vcap->ved, 0);
    vimc_streamer_s_stream(&vcap->stream, &vcap->ved, 0);
/* Stop the media pipeline */
media_pipeline_stop(&vcap->vdev.entity);
@@ -354,8 +356,8 @@
kfree(vcap);
}

-static void vimc_cap_process_frame(struct vimc_ent_device *ved,
-    struct media_pad *sink, const void *frame)
+static void *vimc_cap_process_frame(struct vimc_ent_device *ved,
+    const void *frame)
{
    struct vimc_cap_device *vcap = container_of(ved, struct vimc_cap_device,
        vded);
@@ -369,7 +371,7 @@
       typeof(*vimc_buf), list);
    if (!vimc_buf) {
        spin_unlock(&vcap->qlock);
-      return;
+      return ERR_PTR(-EAGAIN);
    }
/* Remove this entry from the list */
@@ -390,6 +392,7 @@
vb2_set_plane_payload(&vimc_buf->vb2.vb2_buf, 0,
        cap->format.sizeimage);
vb2_buffer_done(&vimc_buf->vb2.vb2_buf, VB2_BUF_STATE_DONE);
+    return NULL;
}

/* Remove this entry from the list */
@@ -390,6 +392,7 @@
vb2_set_plane_payload(&vimc_buf->vb2.vb2_buf, 0,
        cap->format.sizeimage);
vb2_buffer_done(&vimc_buf->vb2.vb2_buf, VB2_BUF_STATE_DONE);
+    return NULL;
}
-struct vimc_ent_device *ved = NULL;
-struct media_entity *entity = link->sink->entity;
-
-if (is_media_entity_v4l2_subdev(entity)) {
-struct v4l2_subdev *sd =
-container_of(entity, struct v4l2_subdev,
-    entity);
-ved = v4l2_get_subdevdata(sd);
} else if (is_media_entity_v4l2_video_device(entity)) {
-struct video_device *vdev =
-container_of(entity,
-    struct video_device,
-    entity);
-ved = video_get_drvdata(vdev);
}
-if (ved && ved->process_frame)
-ved->process_frame(ved, link->sink, frame);
-
-return 0;
-
-EXPORT_SYMBOL_GPL(vimc_propagate_frame);
-
/* Helper function to allocate and initialize pads */
struct media_pad *vimc_pads_init(u16 num_pads, const unsigned long *pads_flag)
{
@@ -276,6 +241,8 @@
 /* Start the stream in the subdevice direct connected */
 pad = media_entity_remote_pad(&ent->pads[i]);
 +if (!pad)
+continue;

 if (!is_media_entity_v4l2_subdev(pad->entity))
 return -EINVAL;
--- linux-4.15.0.orig/drivers/media/platform/vimc/vimc-common.h
+++ linux-4.15.0/drivers/media/platform/vimc/vimc-common.h
@@ -108,24 +108,13 @@
 struct vimc_ent_device {
 struct media_entity *ent;
 struct media_pad *pads;
-void (*process_frame)(struct vimc_ent_device *ved,
-    struct media_pad *sink, const void *frame);
+void * (*process_frame)(struct vimc_ent_device *ved,
+    const void *frame);
 void (*vdev_get_format)(struct vimc_ent_device *ved,
     struct v4l2_pix_format *fmt);
```c
/**
 * vimc_propagate_frame - propagate a frame through the topology
 * @src: the source pad where the frame is being originated
 * @frame: the frame to be propagated
 * 
 * This function will call the process_frame callback from the vimc_ent_device
 * struct of the nodes directly connected to the @src pad
 */

int vimc_propagate_frame(struct media_pad *src, const void *frame);

/**
 * vimc_pads_init - initialize pads
 * 
 * @num_pads: number of pads to initialize
 */

static int vimc_comp_compare(struct device *comp, void *data)
{
    const struct platform_device *pdev = to_platform_device(comp);
    const char *name = data;
    
    return !strcmp(pdev->dev.platform_data, name);
+
    return comp == data;
}

static struct component_match *vimc_add_subdevs(struct vimc_device *vimc)
{
    for (int i = 0; i < vimc->pipe_cfg->num_ents; i++)
    {
        component_match_add(&vimc->pdev.dev, &match, vimc_comp_compare,
            (void *)vimc->pipe_cfg->ents[i].name);
    }

    return match;
}
```

The code snippet provides functions to propagate a frame through a topology and to initialize pads. It also includes a comparison function and a loop to add component matches for each entity in the topology.
static int vimc_deb_s_stream(struct v4l2_subdev *sd, int enable)
{
    struct vimc_deb_device *vdeb = v4l2_get_subdevdata(sd);
    int ret;

    if (enable) {
        const struct vimc_pix_map *vpix;
        if (!vdeb->src_frame)
            return -ENOMEM;
        /* Turn the stream on in the subdevices directly connected */
        ret = vimc_pipeline_s_stream(&vdeb->sd.entity, 1);
        if (ret) {
            vfree(vdeb->src_frame);
            vdeb->src_frame = NULL;
            return ret;
        }
    } else {
        if (!vdeb->src_frame)
            return 0;
        /* Disable streaming from the pipe */
        ret = vimc_pipeline_s_stream(&vdeb->sd.entity, 0);
        if (ret)
            return ret;
        vfree(vdeb->src_frame);
        vdeb->src_frame = NULL;
    }
}

static void vimc_deb_process_frame(struct vimc_ent_device *ved,
    const void *sink_frame)
{
    struct vimc_deb_device *vdeb = container_of(ved, struct vimc_deb_device,
        ved);
    /* other code */
/* If the stream in this node is not active, just return */
if (!vdeb->src_frame)
    return;
+return ERR_PTR(-EINVAL);

for (i = 0; i < vdeb->sink_fmt.height; i++)
    for (j = 0; j < vdeb->sink_fmt.width; j++) {
@@ -498,12 +484,8 @@
vdeb->set_rgb_src(vdeb, i, j, rgb);
}

-/* Propagate the frame through all source pads */
-for (i = 1; i < vdeb->sd.entity.num_pads; i++) {
-    struct media_pad *pad = &vdeb->sd.entity.pads[i];
+return vdeb->src_frame;
     vimc_propagate_frame(pad, vdeb->src_frame);
     -}
}

static void vimc_deb_comp_unbind(struct device *comp, struct device *master,
--- linux-4.15.0.orig/drivers/media/platform/vimc/vimc-scaler.c
+++ linux-4.15.0/drivers/media/platform/vimc/vimc-scaler.c
@@ -216,7 +216,6 @@
static int vimc_sca_s_stream(struct v4l2_subdev *sd, int enable)
{
    struct vimc_sca_device *vsca = v4l2_get_subdevdata(sd);
    -int ret;

    if (enable) {
        const struct vimc_pix_map *vpix;
@@ -244,22 +243,10 @@
            if (!vsca->src_frame)
                return -ENOMEM;
-            /* Turn the stream on in the subdevices directly connected */
-            ret = vimc_pipeline_s_stream(&vsca->sd.entity, 1);
-            if (ret) {
-                vfree(vsca->src_frame);
-                vsca->src_frame = NULL;
-                return ret;
-            }
-        } else {
            if (!vsca->src_frame)
                return 0;
-            /* Disable streaming from the pipe */
-            ret = vimc_pipeline_s_stream(&vsca->sd.entity, 0);


if (ret)
return ret;
-
vfree(vsca->src_frame);
vsca->src_frame = NULL;
}

vimc_sca_scale_pix(vsca, i, j, sink_frame);
}

static void vimc_sca_process_frame(struct vimc_ent_device *ved,
  struct media_pad *sink,
  const void *sink_frame)
+static void *vimc_sca_process_frame(struct vimc_ent_device *ved,
  const void *sink_frame)
{
struct vimc_sca_device *vsca = container_of(ved, struct vimc_sca_device,
  ved);
unsigned int i;

/* If the stream in this node is not active, just return */
if (!vsca->src_frame)
  return;
  return ERR_PTR(-EINVAL);

vimc_sca_fill_src_frame(vsca, sink_frame);

/* Propagate the frame through all source pads */
for (i = 1; i < vsca->sd.entity.num_pads; i++) {
  struct media_pad *pad = &vsca->sd.entity.pads[i];
  vimc_propagate_frame(pad, vsca->src_frame);
}
+return vsca->src_frame;
};

static void vimc_sca_comp_unbind(struct device *comp, struct device *master,
static int vimc_sen_tpg_thread(void *data)
+static void *vimc_sen_process_frame(struct vimc_ent_device *ved,
+    const void *sink_frame)
{
  struct vimc_sen_device *vsen = data;
  unsigned int i;
  -
  -set_freezable();
  -set_current_state(TASK_UNINTERRUPTIBLE);
  -
  -for (;;) {
    -try_to_freeze();
    -if (kthread_should_stop())
      -break;
    -
    -tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
    -
    /* Send the frame to all source pads */
    -for (i = 0; i < vsen->sd.entity.num_pads; i++)
      -vimc_propagate_frame(&vsen->sd.entity.pads[i],
        -vsen->frame);
    -
    /* 60 frames per second */
    -schedule_timeout(HZ/60);
  -}
  +struct vimc_sen_device *vsen = container_of(ved, struct vimc_sen_device,
    +ved);

  -return 0;
  +tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
  +return vsen->frame;
}

static int vimc_sen_s_stream(struct v4l2_subdev *sd, int enable)
{
  struct vimc_sen_device *vsen =
  container_of(sd, struct vimc_sen_device, sd);
  -int ret;

  if (enable) {
    const struct vimc_pix_map *vpix;
    @@ -197,38 +195,20 @@
    .set_fmt = vimc_sen_set_fmt,
    }

    -static int vimc_sen_tpg_thread(void *data)
    +static void *vimc_sen_process_frame(struct vimc_ent_device *ved,
      +    const void *sink_frame)
    {
      struct vimc_sen_device *vsen = data;
      unsigned int i;
      -
      -set_freezable();
      -set_current_state(TASK_UNINTERRUPTIBLE);
      -
      -for (;;) {
        -try_to_freeze();
        -if (kthread_should_stop())
          -break;
        -
        -tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
    -/* Send the frame to all source pads */
    -for (i = 0; i < vsen->sd.entity.num_pads; i++)
      -vimc_propagate_frame(&vsen->sd.entity.pads[i],
      -vsen->frame);
    -
    /* 60 frames per second */
    -schedule_timeout(HZ/60);
  -}
  +struct vimc_sen_device *vsen = container_of(ved, struct vimc_sen_device,
    +ved);

  -return 0;
  +tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
  +return vsen->frame;
}

static int vimc_sen_s_stream(struct v4l2_subdev *sd, int enable)
{
  struct vimc_sen_device *vsen =
  container_of(sd, struct vimc_sen_device, sd);
  -int ret;

  if (enable) {
    const struct vimc_pix_map *vpix;
    @@ -197,38 +195,20 @@
    .set_fmt = vimc_sen_set_fmt,
    }

    -static int vimc_sen_tpg_thread(void *data)
    +static void *vimc_sen_process_frame(struct vimc_ent_device *ved,
      +    const void *sink_frame)
    {
      struct vimc_sen_device *vsen = data;
      unsigned int i;
      -
      -set_freezable();
      -set_current_state(TASK_UNINTERRUPTIBLE);
      -
      -for (;;) {
        -try_to_freeze();
        -if (kthread_should_stop())
          -break;
        -
        -tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
    -/* Send the frame to all source pads */
    -for (i = 0; i < vsen->sd.entity.num_pads; i++)
      -vimc_propagate_frame(&vsen->sd.entity.pads[i],
      -vsen->frame);
    -
    /* 60 frames per second */
    -schedule_timeout(HZ/60);
  -}
  +struct vimc_sen_device *vsen = container_of(ved, struct vimc_sen_device,
    +ved);

  -return 0;
  +tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
  +return vsen->frame;
}

static int vimc_sen_s_stream(struct v4l2_subdev *sd, int enable)
{
  struct vimc_sen_device *vsen =
  container_of(sd, struct vimc_sen_device, sd);
  -int ret;

  if (enable) {
    const struct vimc_pix_map *vpix;
    @@ -197,38 +195,20 @@
    .set_fmt = vimc_sen_set_fmt,
    }

    -static int vimc_sen_tpg_thread(void *data)
    +static void *vimc_sen_process_frame(struct vimc_ent_device *ved,
      +    const void *sink_frame)
    {
      struct vimc_sen_device *vsen = data;
      unsigned int i;
      -
      -set_freezable();
      -set_current_state(TASK_UNINTERRUPTIBLE);
      -
      -for (;;) {
        -try_to_freeze();
        -if (kthread_should_stop())
          -break;
        -
        -tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
    -/* Send the frame to all source pads */
    -for (i = 0; i < vsen->sd.entity.num_pads; i++)
      -vimc_propagate_frame(&vsen->sd.entity.pads[i],
      -vsen->frame);
    -
    /* 60 frames per second */
    -schedule_timeout(HZ/60);
  -}
  +struct vimc_sen_device *vsen = container_of(ved, struct vimc_sen_device,
    +ved);

  -return 0;
  +tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
  +return vsen->frame;
}

static int vimc_sen_s_stream(struct v4l2_subdev *sd, int enable)
{
  struct vimc_sen_device *vsen =
  container_of(sd, struct vimc_sen_device, sd);
  -int ret;

  if (enable) {
    const struct vimc_pix_map *vpix;
    @@ -197,38 +195,20 @@
    .set_fmt = vimc_sen_set_fmt,
    }

    -static int vimc_sen_tpg_thread(void *data)
    +static void *vimc_sen_process_frame(struct vimc_ent_device *ved,
      +    const void *sink_frame)
    {
      struct vimc_sen_device *vsen = data;
      unsigned int i;
      -
      -set_freezable();
      -set_current_state(TASK_UNINTERRUPTIBLE);
      -
      -for (;;) {
        -try_to_freeze();
        -if (kthread_should_stop())
          -break;
        -
        -tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
    -/* Send the frame to all source pads */
    -for (i = 0; i < vsen->sd.entity.num_pads; i++)
      -vimc_propagate_frame(&vsen->sd.entity.pads[i],
      -vsen->frame);
    -
    /* 60 frames per second */
    -schedule_timeout(HZ/60);
  -}
  +struct vimc_sen_device *vsen = container_of(ved, struct vimc_sen_device,
    +ved);

  -return 0;
  +tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
  +return vsen->frame;
}

static int vimc_sen_s_stream(struct v4l2_subdev *sd, int enable)
{
  struct vimc_sen_device *vsen =
  container_of(sd, struct vimc_sen_device, sd);
  -int ret;

  if (enable) {
    const struct vimc_pix_map *vpix;
    @@ -197,38 +195,20 @@
    .set_fmt = vimc_sen_set_fmt,
    }

    -static int vimc_sen_tpg_thread(void *data)
    +static void *vimc_sen_process_frame(struct vimc_ent_device *ved,
      +    const void *sink_frame)
    {
      struct vimc_sen_device *vsen = data;
      unsigned int i;
      -
      -set_freezable();
      -set_current_state(TASK_UNINTERRUPTIBLE);
      -
      -for (;;) {
        -try_to_freeze();
        -if (kthread_should_stop())
          -break;
        -
        -tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
    -/* Send the frame to all source pads */
    -for (i = 0; i < vsen->sd.entity.num_pads; i++)
      -vimc_propagate_frame(&vsen->sd.entity.pads[i],
      -vsen->frame);
    -
    /* 60 frames per second */
    -schedule_timeout(HZ/60);
  -}
  +struct vimc_sen_device *vsen = container_of(ved, struct vimc_sen_device,
    +ved);

  -return 0;
  +tpg_fill_plane_buffer(&vsen->tpg, 0, 0, vsen->frame);
  +return vsen->frame;
}

static int vimc_sen_s_stream(struct v4l2_subdev *sd, int enable)
{
  struct vimc_sen_device *vsen =
  container_of(sd, struct vimc_sen_device, sd);
  -int ret;

  if (enable) {
    const struct vimc_pix_map *vpix;
    @@ -197,38 +195,20 @@
    .set_fmt = vimc_sen_set_fmt,
/* Initialize the image generator thread */
-vsen->kthread_sen = kthread_run(vimc_sen_tpg_thread, vsen,
-"%s-sen", vsen->sd.v4l2_dev->name);
-if (IS_ERR(vsen->kthread_sen)) {
-dev_err(vsen->dev, "%s: kernel_thread() failed\n",
-vsen->sd.name);
-vfree(vsen->frame);
-vsen->frame = NULL;
-return PTR_ERR(vsen->kthread_sen);
} else {
-if (!vsen->kthread_sen)
-return 0;
-
-/* Stop image generator */
-ret = kthread_stop(vsen->kthread_sen);
-if (ret)
-return ret;
-
-vsen->kthread_sen = NULL;
-vfree(vsen->frame);
-vsen->frame = NULL;
-return 0;
@@ -325,6 +287,7 @@
-if (ret)
-goto err_free_vsen;
+	vsen->ved.process_frame = vimc_sen_process_frame;
-dev_set_drvdata(comp, &vsen->ved);
-vsen->dev = comp;

--- linux-4.15.0.orig/drivers/media/platform/vimc/vimc-streamer.c
+++ linux-4.15.0/drivers/media/platform/vimc/vimc-streamer.c
@@ -0,0 +1,188 @@
+// SPDX-License-Identifier: GPL-2.0+
+/*
+ * vimc-streamer.c Virtual Media Controller Driver
+ *
+ * Copyright (C) 2018 Lucas A. M. Magalhes <lucmaga@gmail.com>
+ *
+ */
+
+#include <linux/init.h>
+#include <linux/module.h>
+#include <linux/freezer.h>
+#include <linux/kthread.h>
+"
+include "vimc-streamer.h"
+
+/**
+ * vimc_get_source_entity - get the entity connected with the first sink pad
+ *
+ * @ent: reference media_entity
+ * 
+ * Helper function that returns the media entity containing the source pad
+ * linked with the first sink pad from the given media entity pad list.
+ */
+static struct media_entity *vimc_get_source_entity(struct media_entity *ent)
+{
+    struct media_pad *pad;
+    int i;
+    
+    for (i = 0; i < ent->num_pads; i++) {
+        if (ent->pads[i].flags & MEDIA_PAD_FL_SOURCE)
+            continue;
+        pad = media_entity_remote_pad(&ent->pads[i]);
+        return pad ? pad->entity : NULL;
+    }
+    return NULL;
+}
+
+/*
+ * vimc_streamer_pipeline_terminate - Disable stream in all ved in stream
+ *
+ * @stream: the pointer to the stream structure with the pipeline to be
+ * disabled.
+ *
+ * Calls s_stream to disable the stream in each entity of the pipeline
+ */
+static void vimc_streamer_pipeline_terminate(struct vimc_stream *stream)
+{
+    struct media_entity *entity;
+    struct v4l2_subdev *sd;
+    
+    while (stream->pipe_size) {
+        stream->pipe_size--;
+        entity = stream->ved_pipeline[stream->pipe_size]->ent;
+        entity = vimc_get_source_entity(entity);
+        stream->ved_pipeline[stream->pipe_size] = NULL;
+        
+        if (!is_media_entity_v4l2_subdev(entity))
+            continue;
+        
+        sd = media_entity_to_v4l2_subdev(entity);
+        
+        (void)s_stream(entity, sd);
+    }
+}
+v4l2_subdev_call(sd, video, s_stream, 0);
+
+/*
+ * vimc_streamer_pipeline_init - initializes the stream structure
+ *
+ * @stream: the pointer to the stream structure to be initialized
+ * @ved: the pointer to the vimc entity initializing the stream
+ *
+ * Initializes the stream structure. Walks through the entity graph to
+ * construct the pipeline used later on the streamer thread.
+ * Calls s_stream to enable stream in all entities of the pipeline.
+ */
+static int vimc_streamer_pipeline_init(struct vimc_stream *stream,
+    struct vimc_ent_device *ved)
+{
+    struct media_entity *entity;
+    struct video_device *vdev;
+    struct v4l2_subdev *sd;
+    int ret = 0;
+
+    stream->pipe_size = 0;
+    while (stream->pipe_size < VIMC_STREAMER_PIPELINE_MAX_SIZE) {
+        if (!ved) {
+            vimc_streamer_pipeline_terminate(stream);
+            return -EINVAL;
+        }
+        stream->ved_pipeline[stream->pipe_size++] = ved;
+        entity = vimc_get_source_entity(ved->ent);
+        /* Check if the end of the pipeline was reached*/
+        if (!entity) {
+            vimc_streamer_pipeline_terminate(stream);
+            return 0;
+        }
+        entity = vimc_get_source_entity(ved->ent);
+        if (is_media_entity_v4l2_subdev(entity)) {
+            sd = media_entity_to_v4l2_subdev(entity);
+            ret = v4l2_subdev_call(sd, video, s_stream, 1);
+            if (ret && ret != -ENOIOCTLCMD) {
+                vimc_streamer_pipeline_terminate(stream);
+                return ret;
+            }
+            v4l2_get_subdevdata(sd);
+        } else {
+            vdev = container_of(entity,
+                struct video_device,
+                entity);
+            video_get_drvdata(vdev);
+        }
+    }
+}
+}
+} 
+} 
+} 
vimc_streamer_pipeline_terminate(stream); 
+return -EINVAL; 
+} 
+} 
+static int vimc_streamer_thread(void *data) 
+{ 
+struct vimc_stream *stream = data; 
+int i; 
+ 
+set_freezable(); 
+ 
+for (;;) { 
+try_to_freeze(); 
+if (kthread_should_stop()) 
+break; 
+ 
+for (i = stream->pipe_size - 1; i >= 0; i--) { 
+stream->frame = stream->ved_pipeline[i]->process_frame( 
+stream->ved_pipeline[i], 
+stream->frame); 
+if (!stream->frame) 
+break; 
+if (IS_ERR(stream->frame)) 
+break; 
+} 
+//wait for 60hz 
+set_current_state(TASK_UNINTERRUPTIBLE); 
schedule_timeout(HZ / 60); 
+} 
+ 
+return 0; 
+} 
+} 
+int vimc_streamer_s_stream(struct vimc_stream *stream, 
+struct vimc_ent_device *ved, 
+int enable) 
+{ 
+int ret; 
+ 
+if (!stream || !ved) 
+return -EINVAL; 
+ 
+if (enable) { 
+if (stream->kthread) 
+return 0; 

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ret = vimc_streamer_pipeline_init(stream, ved);
if (ret)
    return ret;

stream->kthread = kthread_run(vimc_streamer_thread, stream,
    "vimc-streamer thread");

if (IS_ERR(stream->kthread))
    return PTR_ERR(stream->kthread);
} else {
    if (!stream->kthread)
        return 0;

    ret = kthread_stop(stream->kthread);
    if (ret)
        return ret;

    stream->kthread = NULL;

    vimc_streamer_pipeline_terminate(stream);
}

return 0;

EXPORT_SYMBOL_GPL(vimc_streamer_s_stream);

MODULE_DESCRIPTION("Virtual Media Controller Driver (VIMC) Streamer");
MODULE_AUTHOR("Lucas A. M. Magalhes <lucmaga@gmail.com>");
MODULE_LICENSE("GPL");

--- linux-4.15.0.orig/drivers/media/platform/vimc/vimc-streamer.h
+++ linux-4.15.0/drivers/media/platform/vimc/vimc-streamer.h
@@ -0,0 +1,38 @@
+/* SPDX-License-Identifier: GPL-2.0+ */
+/# SPDX-License-Identifier: GPL-2.0+ */
+/#
+ * vimc-streamer.h Virtual Media Controller Driver
+ *
+ * Copyright (C) 2018 Lucas A. M. Magalhes <lucmaga@gmail.com>
+ *
+ */
+
+ifndef _VIMC_STREAMER_H_
+#define _VIMC_STREAMER_H_
+
+#include <media/media-device.h>
+
+#include "vimc-common.h"
```c
#define VIMC_STREAMER_PIPELINE_MAX_SIZE 16

struct vimc_stream {
    struct media_pipeline pipe;
    struct vimc_ent_device *ved_pipeline[VIMC_STREAMER_PIPELINE_MAX_SIZE];
    unsigned int pipe_size;
    u8 *frame;
    struct task_struct *kthread;
};

/**
 * vimc_streamer_s_streamer - start/stop the stream
 *
 * @stream: the pointer to the stream to start or stop
 * @ved: The last entity of the streamer pipeline
 * @enable: any non-zero number start the stream, zero stop
 *
 */
int vimc_streamer_s_stream(struct vimc_stream *stream, 
    struct vimc_ent_device *ved, 
    int enable);
```

---

```
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x01, 0x7b, 
0x02, 0x03, 0x3f, 0xf0, 0x51, 0x61, 0x60, 0x5f, 
0x5e, 0x5d, 0x10, 0x1f, 0x04, 0x13, 0x22, 0x21, 
0x20, 0x05, 0x14, 0x02, 0x11, 0x01, 0x23, 0x09, 
0x07, 0x07, 0x83, 0x01, 0x00, 0x00, 0x6d, 0x03, 
0x0c, 0x00, 0x10, 0x00, 0x00, 0x3c, 0x21, 0x00, 
0x60, 0x01, 0x02, 0x03, 0x67, 0x8d, 0x51, 0x05, 
0x00, 0x00, 0x1a, 0x1a, 0x1d, 0x00, 0x80, 0x51, 
0xd0, 0x1c, 0x20, 0x40, 0x80, 0x35, 0x00, 0xc0, 
0x1c, 0x32, 0x00, 0x00, 0x1c, 0x00, 0x00, 0x00, 
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x82, 
```
static int vidioc_querycap(struct file *file, void *priv,
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-core.h
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-core.h
@@ -123,7 +123,7 @@
 VIVID_CS_170M,
 VIVID_CS_709,
 VIVID_CS_SRGB,
-VIVID_CS_ADOBERGB,
+VIVID_CS_OPRGB,
 VIVID_CS_2020,
 VIVID_CS_DCI_P3,
 VIVID_CS_240M,
@@ -154,6 +154,7 @@
 struct v4l2_ctrl_handler	ctrl_hdl_streaming;
 struct v4l2_ctrl_handler	ctrl_hdl_sdtv_cap;
 struct v4l2_ctrl_handler	ctrl_hdl_loop_cap;
+struct v4l2_ctrl_handler	ctrl_hdl_fb;
 struct video_device		vid_cap_dev;
 struct v4l2_ctrl_handler	ctrl_hdl_vid_cap;
 struct video_device		vid_out_dev;
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-ctrls.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-ctrls.c
@@ -120,9 +120,6 @@
 clear_bit(V4L2_FL_REGISTERED, &dev->radio_rx_dev.flags);
 clear_bit(V4L2_FLREGISTERED, &dev->radio tx_dev.flags);
 break;
-case VIVID_CID_CLEAR_FB:
-case VIVID_CID_BUTTON:
-dev->button_pressed = 30;
-break;
@@ -274,8 +271,28 @@
 .type = V4L2_CTRL_TYPE_BUTTON,
 };
+
+/* Framebuffer Controls */
+
+static int vivid_fb_s_ctrl(struct v4l2_ctrl *ctrl)
+{ 
+ +struct vivid_dev *dev = container_of(ctrl->handler,
+ + struct vivid_dev, ctrl_hdl_fb);
+ +
+ +switch (ctrl->id) {
+ +case VIVID_CID_CLEAR_FB:
+};
vivid_clear_fb(dev);
+break;
+
+return 0;
+
+static const struct v4l2_ctrl_ops vivid_fb_ctrl_ops = {
+s_ctrl = vivid_fb_s_ctrl,
+};
+
static const struct v4l2_ctrl_config vivid_ctrl_clear_fb = {
.ops = &vivid_fb_ctrl_ops,
.id = VIVID_CID_CLEAR_FB,
.name = "Clear Framebuffer",
.type = V4L2_CTRL_TYPE_BUTTON,
@@ -343,7 +360,7 @@
V4L2_COLORSPACE_SMPTE170M,
V4L2_COLORSPACE_REC709,
V4L2_COLORSPACE_SRGB,
-V4L2_COLORSPACE_ADOBERGB,
+V4L2_COLORSPACE_OPRGB,
V4L2_COLORSPACE_BT2020,
V4L2_COLORSPACE_DCI_P3,
V4L2_COLORSPACE_SMPTE240M,
@@ -724,7 +741,7 @@
"SMPTE 170M",
"Rec. 709",
"sRGB",
-"AdobeRGB",
+"opRGB",
"BT.2020",
"DCI-P3",
"SMPTE 240M",
@@ -747,7 +764,7 @@
"Default",
"Rec. 709",
"sRGB",
-"AdobeRGB",
+"opRGB",
"SMPTE 240M",
"None",
"DCI-P3",
@@ -1191,6 +1208,7 @@
v4l2_ctrl_activate(dev->radio_rx_rds_ta, dev->radio_rx_rds_controls);
v4l2_ctrl_activate(dev->radio_rx_rds_tp, dev->radio_rx_rds_controls);
v4l2_ctrl_activate(dev->radio_rx_rds_ms, dev->radio_rx_rds_controls);
+dev->radio_rx_dev.device_caps = dev->radio_rx_caps;
break;
case V4L2_CID_RDS_RECEPTION:
dev->radio_rx_rds_enabled = ctrl->val;
@@ -1265,6 +1283,7 @@
dev->radio_tx_caps &= ~V4L2_CAP_READWRITE;
if (!dev->radio_rx_caps)
    dev->radio_rx_caps |= V4L2_CAP_READWRITE;
+dev->radio_tx_dev.device_caps = dev->radio_tx_caps;
break;
case V4L2_CID_RDS_TXPTY:
if (dev->radio_rx_rds_controls)
    dev->radio_rx_caps = dev->radio_rx_caps;
@@ -1357,6 +1376,7 @@
    struct v4l2_ctrl_handler *hdl_streaming = &dev->ctrl_hdl_streaming;
    struct v4l2_ctrl_handler *hdl_sdtv_cap = &dev->ctrl_hdl_sdtv_cap;
    struct v4l2_ctrl_handler *hdl_loop_cap = &dev->ctrl_hdl_loop_cap;
+    struct v4l2_ctrl_handler *hdl_fb = &dev->ctrl_hdl_fb;
    struct v4l2_ctrl_handler *hdl_vid_cap = &dev->ctrl_hdl_vid_cap;
    struct v4l2_ctrl_handler *hdl_vid_out = &dev->ctrl_hdl_vid_out;
    struct v4l2_ctrl_handler *hdl_vbi_cap = &dev->ctrl_hdl_vbi_cap;
    @ @ -1384,10 +1404,12 @@
    v4l2_ctrl_new_custom(hdl_sdtv_cap, &vivid_ctrl_class, NULL);
    v4l2_ctrl_handler_init(hdl_loop_cap, 1);
    v4l2_ctrl_new_custom(hdl_loop_cap, &vivid_ctrl_class, NULL);
+    v4l2_ctrl_handler_init(hdl_fb, 1);
    v4l2_ctrl_new_custom(hdl_fb, &vivid_ctrl_class, NULL);
    v4l2_ctrl_handler_init(hdl_vid_cap, 55);
    v4l2_ctrl_new_custom(hdl_vid_out, &vivid_ctrl_class, NULL);
    v4l2_ctrl_handler_init(hdl_vid_out, 26);
-if (!no_error_inj)
+    if (!no_error_inj || dev->has_fb)
    v4l2_ctrl_new_custom(hdl_vid_out, &vivid_ctrl_class, NULL);
    v4l2_ctrl_handler_init(hdl_vbi_cap, 21);
    v4l2_ctrl_new_custom(hdl_vbi_cap, &vivid_ctrl_class, NULL);
@@ -1561,7 +1583,7 @@
    v4l2_ctrl_new_custom(hdl_loop_cap, &vivid_ctrl_loop_video, NULL);
    if (hdl_vid_cap->error)
       v4l2_ctrl_new_custom(hdl_user_gen, &vivid_ctrl_clear_fb, NULL);
+    v4l2_ctrl_new_custom(hdl_fb, &vivid_ctrl_clear_fb, NULL);

    if (dev->has_fb)
       v4l2_ctrl_new_custom(hdl_user_gen, &vivid_ctrl_clear_fb, NULL);
+    v4l2_ctrl_new_custom(hdl_fb, &vivid_ctrl_clear_fb, NULL);

    if (dev->has_radio_rx)
       v4l2_ctrl_new_custom(hdl_radio_rx, &vivid_ctrl_radio_hw_seek_mode, NULL);
@@ -1658,6 +1680,7 @@
       v4l2_ctrl_add_handler(hdl_vid_cap, hdl_streaming, NULL);
       v4l2_ctrl_add_handler(hdl_vid_cap, hdl_sdtv_cap, NULL);
       v4l2_ctrl_add_handler(hdl_vid_cap, hdl_loop_cap, NULL);
+      v4l2_ctrl_add_handler(hdl_vid_cap, hdl_fb, NULL);
       if (hdl_vid_cap->error)
return hdl_vid_cap->error;
dev->vid_cap.dev.ctrl_handler = hdl_vid_cap;
@@ -1666,6 +1689,7 @@
v4l2_ctrl_add_handler(hdl_vid_out, hdl_user_gen, NULL);
v4l2_ctrl_add_handler(hdl_vid_out, hdl_user_aud, NULL);
v4l2_ctrl_add_handler(hdl_vid_out, hdl_streaming, NULL);
+v4l2_ctrl_add_handler(hdl_vid_out, hdl_fb, NULL);
if (hdl_vid_out->error)
return hdl_vid_out->error;
dev->vid_out.dev.ctrl_handler = hdl_vid_out;
@@ -1725,4 +1749,5 @@
v4l2_ctrl_handler_free(&dev->ctrl_hdl_streaming);
v4l2_ctrl_handler_free(&dev->ctrl_hdl_sdtv_cap);
v4l2_ctrl_handler_free(&dev->ctrl_hdl_loop_cap);
+v4l2_ctrl_handler_free(&dev->ctrl_hdl_fb);
}
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-kthread-cap.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-kthread-cap.c
@@ -777,7 +777,11 @@
if (kthread_should_stop())
break;

-mutex_lock(&(dev->mutex);
+if (!(mutex_trylock(&(dev->mutex))) {
+ schedule_timeout_uninterruptible(1);
+ continue;
+}
+
+cur_jiffies = jiffies;
const if (dev->cap_seq_resync) {
dev->jiffies_vid_cap = cur_jiffies;
@@ -877,8 +881,11 @@
 "%s-vid-cap", dev->v4l2_dev.name);

if (IS_ERR(dev->kthread_vid_cap)) {
+int err = PTR_ERR(dev->kthread_vid_cap);
+dev->kthread_vid_cap = NULL;
 v4l2_err(&(dev->v4l2_dev, "kernel_thread() failed\n");
-return PTR_ERR(dev->kthread_vid_cap);
+return err;
}
*pstreaming = true;
vivid_grab_controls(dev, true);
@@ -927,8 +934,6 @@
/* shutdown control thread */
vivid_grab_controls(dev, false);
-mutex_unlock(&dev->mutex);
kthread_stop(dev->kthread_vid_cap);
dev->kthread_vid_cap = NULL;
.mutex_lock(&dev->mutex);
}
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-kthread-out.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-kthread-out.c
@@ -147,7 +147,11 @@
if (kthread_should_stop())
  break;

-mutex_lock(&dev->mutex);
+if (!mutex_trylock(&dev->mutex)) {
+  schedule_timeout_uninterruptible(1);
+  continue;
+
  cur_jiffies = jiffies;
  if (dev->out_seq_resync) {
    dev->jiffies_vid_out = cur_jiffies;
-  return PTR_ERR(dev->kthread_vid_out);
+  return err;
  }
  *
  cur_jiffies = jiffies;
if (dev->out_seq_resync) {
  dev->jiffies_vid_out = cur_jiffies;
@@ -248,8 +252,11 @@
 "%s-vid-out", dev->v4l2_dev.name);

 if (IS_ERR(dev->kthread_vid_out)) {
+  int err = PTR_ERR(dev->kthread_vid_out);
+  dev->kthread_vid_out = NULL;
 v4l2_err(&dev->v4l2_dev, "kernel_thread() failed\n");
 return PTR_ERR(dev->kthread_vid_out);
+  return err;
  }
  *
  *pstreaming = true;
 vivid_grab_controls(dev, true);
@@ -298,8 +305,6 @@
 /* shutdown control thread */
 vivid_grab_controls(dev, false);
-mutex_unlock(&dev->mutex);
kthread_stop(dev->kthread_vid_out);
dev->kthread_vid_out = NULL;
-mutex_lock(&dev->mutex);
}
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-osd.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-osd.c
@@ -167,7 +167,7 @@
 var->nonstd = 0;
 var->vmode &= ~FB_VMODE_MASK;

- var->vmode = FB_VMODE_NONINTERLACED;
+ var->vmode |= FB_VMODE_NONINTERLACED;

/* Dummy values */
var->hsync_len = 24;

--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-sdr-cap.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-sdr-cap.c
@@ -149,7 +149,11 @@
 if (kthread_should_stop())
 break;

- mutex_lock(&dev->mutex);
+ if (!mutex_trylock(&dev->mutex)) {
+ schedule_timeout_uninterruptible(1);
+ continue;
+ }
 cur_jiffies = jiffies;
 if (dev->sdr_cap_seq_resync) {
 dev->jiffies_sdr_cap = cur_jiffies;
@@ -309,10 +313,8 @@
 } /* shutdown control thread */
- mutex_unlock(&dev->mutex);
- kthread_stop(dev->kthread_sdr_cap);
- dev->kthread_sdr_cap = NULL;
- mutex_lock(&dev->mutex);
}

const struct vb2_ops vivid_sdr_cap_qops = {
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-vid-cap.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-vid-cap.c
@@ -239,9 +239,6 @@
 if (vb2_is_streaming(&dev->vb_vid_out_q))
 dev->can_loop_video = vivid_vid_can_loop(dev);

- if (dev->kthread_vid_cap)
- return 0;
- dev->vid_cap_seq_count = 0;
- printk(dev, 1, "%s\n", __func__);
- for (i = 0; i < VIDEO_MAX_FRAME; i++)
- printk("%d\n", i);
- tpg_s_rgb_range(&dev->tpg, v4l2_ctrl_g_ctrl(dev->rgb_range_cap));
- break;
+
+ vfree(dev->bitmap_cap);
dev->bitmap_cap = NULL;
vivid_update_quality(dev);
tpg_reset_source(&dev->tpg, dev->src_rect.width, dev->src_rect.height, dev->field_cap);
dev->crop_cap = dev->src_rect;
@@ -1005,7 +1004,7 @@
v4l2_rect_map_inside(&s->r, &dev->fmt_cap_rect);
if (dev->bitmap_cap && (compose->width != s->r.width ||
    compose->height != s->r.height)) {
-kfree(dev->bitmap_cap);
+vfree(dev->bitmap_cap);
dev->bitmap_cap = NULL;
} *compose = s->r;
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-vid-common.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-vid-common.c
@@ -33,7 +33,7 @@
        .type = V4L2_DV_BT_656_1120,
/* keep this initialization for compatibility with GCC < 4.4.6 */
    .reserved = { 0 },
-V4L2_INIT_BT_TIMINGS(0, MAX_WIDTH, 0, MAX_HEIGHT, 14000000, 775000000,
+V4L2_INIT_BT_TIMINGS(16, MAX_WIDTH, 16, MAX_HEIGHT, 14000000, 775000000,
    V4L2_DV_BT_STD_CEA861 | V4L2_DV_BT_STD_DMT |
    V4L2_DV_BT_STD_CVT | V4L2_DV_BT_STD_GTF,
    V4L2_DV_BT_CAP_PROGRESSIVE | V4L2_DV_BT_CAP_INTERLACED)
@@ -874,7 +874,8 @@
return -EINVAL;
if (edid->start_block + edid->blocks > dev->edid_blocks)
edid->blocks = dev->edid_blocks - edid->start_block;
-    cec_set_edid_phys_addr(dev->edid, dev->edid_blocks * 128, adap->phys_addr);
+    if (adap)
+        cec_set_edid_phys_addr(dev->edid, dev->edid_blocks * 128, adap->phys_addr);
    memcpy(edid->edid, dev->edid + edid->start_block * 128, edid->blocks * 128);
return 0;
}
--- linux-4.15.0.orig/drivers/media/platform/vivid/vivid-vid-out.c
+++ linux-4.15.0/drivers/media/platform/vivid/vivid-vid-out.c
@@ -158,9 +158,6 @@
    if (vb2_is_streaming(&dev->vb_vid_cap_q))
    dev->can_loop_video = vivid_vid_can_loop(dev);

-if (dev->kthread_vid_out)
-    return 0;
-
    dev->out_seq_count = 0;
dprintf(dev, 1, "%s\n", __func__);
if (dev->start_streaming_error) {
    @@ -425,7 +422,7 @@
        mp->colorspace = V4L2_COLORSPACE_SMPTE170M;

} else if (mp->colorspace != V4L2_COLORSPACE_SMPTE170M &&
    mp->colorspace != V4L2_COLORSPACE_REC709 &&
    mp->colorspace != V4L2_COLORSPACE_ADOBERGB &&
    mp->colorspace != V4L2_COLORSPACE_OPRGB &&
    mp->colorspace != V4L2_COLORSPACE_BT2020 &&
    mp->colorspace != V4L2_COLORSPACE_SRGB) {
    mp->colorspace = V4L2_COLORSPACE_REC709;

    dev->fbuf_out_flags &= ~(chroma_flags | alpha_flags);
    -dev->fbuf_out_flags = a->flags & (chroma_flags | alpha_flags);
    +dev->fbuf_out_flags |= a->flags & (chroma_flags | alpha_flags);
    return 0;
}

--- linux-4.15.0.orig/drivers/media/platform/vsp1/vsp1_dl.c
+++ linux-4.15.0/drivers/media/platform/vsp1/vsp1_dl.c
@@ -509,7 +509,8 @@
             return !!(vsp1_read(vsp1, VI6_DL_BODY_SIZE)
               & VI6_DL_BODY_SIZE_UPD);
    else
-        return !!(vsp1_read(vsp1, VI6_CMD(dlm->index) & VI6_CMD_UPDHDR));
+        return !!(vsp1_read(vsp1, VI6_CMD(dlm->index))
+            & VI6_CMD_UPDHDR);
    }

static void vsp1_dl_list_hw_enqueue(struct vsp1_dl_list *dl)
--- linux-4.15.0.orig/drivers/media/platform/vsp1/vsp1_drm.c
+++ linux-4.15.0/drivers/media/platform/vsp1/vsp1_drm.c
@@ -307,6 +307,7 @@
             struct vsp1_device *vsp1 = dev_get_drvdata(dev);
             struct vsp1_drm_pipeline *drm_pipe = &vsp1->drm->pipe[pipe_index];
             const struct vsp1_format_info *fmtinfo;
+            unsigned int chroma_hsub;
             struct vsp1_rwpf *rpf;

             if (rpf_index >= vsp1->info->rpf_count)
                return -EINVAL;
@@ -346,10 +347,18 @@
                }

+/*
+ * Only formats with three planes can affect the chroma planes pitch.
+ * All formats with two planes have a horizontal subsampling value of 2,
+ * but combine U and V in a single chroma plane, which thus results in
+ * the luma plane and chroma plane having the same pitch.
+ */
chroma_hsub = (fmtinfo->planes == 3) ? fmtinfo->hsub : 1;
+
rpf->fmtinfo = fmtinfo;
rpf->format.num_planes = fmtinfo->planes;
rpf->format.plane_fmt[0].bytesperline = cfg->pitch;
- rpf->format.plane_fmt[1].bytesperline = cfg->pitch;
+ rpf->format.plane_fmt[1].bytesperline = cfg->pitch / chroma_hsub;
rpf->alpha = cfg->alpha;

rpf->mem.addr[0] = cfg->mem[0];
@@ -504,6 +513,15 @@
 struct vsp1_rwpf *rpf = vsp1->rpf[i];
 unsigned int j;

+/*
+ * Make sure we don't accept more inputs than the hardware can
+ * handle. This is a temporary fix to avoid display stall, we
+ * need to instead allocate the BRU or BRS to display pipelines
+ * dynamically based on the number of planes they each use.
+ */
+if (pipe->num_inputs >= pipe->bru->source_pad)
+pipe->inputs[i] = NULL;
+
if (!pipe->inputs[i])
continue;

--- linux-4.15.0.orig/drivers/media/platform/vsp1/vsp1_drv.c
+++ linux-4.15.0/drivers/media/platform/vsp1/vsp1_drv.c
@@ -549,7 +549,12 @@
 int ret;

 ret = pm_runtime_get_sync(vsp1->dev);
-return ret < 0 ? ret : 0;
+if (ret < 0) {
+pm_runtime_put_noidle(vsp1->dev);
+return ret;
+}
+
+return 0;
}

/*
@@ -571,7 +576,13 @@
 {
 struct vsp1_device *vsp1 = dev_get_drvdata(dev);

-vsp1_pipelines_suspend(vsp1);
+/*
* When used as part of a display pipeline, the VSP is stopped and
* restarted explicitly by the DU.
+ */
+if (!vsp1->drm)
+vsp1_pipelines_suspend(vsp1);
+
pm_runtime_force_suspend(vsp1->dev);

return 0;
@@ -582,7 +593,13 @@
struct vsp1_device *vsp1 = dev_get_drvdata(dev);

pm_runtime_force_resume(vsp1->dev);
-vsp1_pipelines_resume(vsp1);
+
+/*
+ * When used as part of a display pipeline, the VSP is stopped and
+ * restarted explicitly by the DU.
+ */
+if (!vsp1->drm)
+vsp1_pipelines_resume(vsp1);

return 0;
    }
@@ -817,12 +834,12 @@
/* Configure device parameters based on the version register. */
pm_runtime_enable(&pdev->dev);

-ret = pm_runtime_get_sync(&pdev->dev);
+ret = vsp1_device_get(vsp1);
if (ret < 0)
goto done;

vsp1->version = vsp1_read(vsp1, VI6_IP_VERSION);
-pm_runtime_put_sync(&pdev->dev);
+vsp1_device_put(vsp1);

for (i = 0; i < ARRAY_SIZE(vsp1_device_infos); ++i) {
    if ((vsp1->version & VI6_IP_VERSION_MODEL_MASK) ==
        @ @ -849,8 +866,10 @ @
    }

done:
-if (ret)
+if (ret) {
    pm_runtime_disable(&pdev->dev);
+rcar_fcp_put(vsp1->fcp);
    +}
return ret;
}
--- linux-4.15.0.orig/drivers/media/platform/vsp1/vsp1_video.c
+++ linux-4.15.0/drivers/media/platform/vsp1/vsp1_video.c
@@ -849,9 +849,8 @@
return 0;
}

-static void vsp1_video_cleanup_pipeline(struct vsp1_pipeline *pipe)
+static void vsp1_video_release_buffers(struct vsp1_video *video)
{
	struct vsp1_video *video = pipe->output->video;
struct vsp1_vb2_buffer *buffer;
unsigned long flags;

@@ -861,12 +860,18 @@
  vb2_buffer_done(&buffer->buf.vb2_buf, VB2_BUF_STATE_ERROR);
  INIT_LIST_HEAD(&video->irqqueue);
  spin_unlock_irqrestore(&video->irqlock, flags);
+}
+
+static void vsp1_video_cleanup_pipeline(struct vsp1_pipeline *pipe)
+{
+  +lockdep_assert_held(&pipe->lock);
+
/* Release our partition table allocation */
-mutex_lock(&pipe->lock);
  kfree(pipe->part_table);
  pipe->part_table = NULL;
-mutex_unlock(&pipe->lock);
+
      +vsp1_dl_list_put(pipe->dl);
      +pipe->dl = NULL;
  }
}

static int vsp1_video_start_streaming(struct vb2_queue *vq, unsigned int count)
@@ -881,8 +886,9 @@
  if (pipe->stream_count == pipe->num_inputs) {
    ret = vsp1_video_setup_pipeline(pipe);
    if (ret < 0) {
-      mutex_unlock(&pipe->lock);
+      vsp1_video_release_buffers(video);
        vsp1_video_cleanup_pipeline(pipe);
+      mutex_unlock(&pipe->lock);
        return ret;
    }
    /*
if (ret == -ETIMEDOUT)
    dev_err(video->vsp1->dev, "pipeline stop timeout\n");

-vsp1_dl_list_put(pipe->dl);
-pipe->dl = NULL;
+vsp1_video_cleanup_pipeline(pipe);
}
mutex_unlock(&pipe->lock);

media_pipeline_stop(&video->video.entity);
-vsp1_video_cleanup_pipeline(pipe);
+vsp1_video_release_buffers(video);
vsp1_video_pipeline_put(pipe);
}

--- linux-4.15.0.orig/drivers/media/platform/vsp1/vsp1_wpf.c
+++ linux-4.15.0/drivers/media/platform/vsp1/vsp1_wpf.c
@@ -452,7 +452,7 @@
     VI6_WPF_SRCPF_RPF_ACT_SUB(input->entity.index);
 }

-    if (pipe->bru || pipe->num_inputs > 1)
+    if (pipe->bru)
        srcrpf |= pipe->bru->type == VSP1_ENTITY_BRU
         ? VI6_WPF_SRCPF_VIRACT_MST
         : VI6_WPF_SRCPF_VIRACT2_MST;
--- linux-4.15.0.orig/drivers/media/radio/radio-raremono.c
+++ linux-4.15.0/drivers/media/radio/radio-raremono.c
@@ -283,6 +283,14 @@
     return 0;
 
 static void raremono_device_release(struct v4l2_device *v4l2_dev)
+{
+    struct raremono_device *radio = to_raremono_dev(v4l2_dev);
+    +kfree(radio->buffer);
+    +kfree(radio);
+    +}
+    +
+    /* File system interface */
 static const struct v4l2_file_operations usb_raremono_fops = {
     .owner= THIS_MODULE,
@@ -307,12 +315,14 @@ int retval = 0;
     +{ struct raremono_device *radio = to_raremono_dev(v4l2_dev);
     +
     +kfree(radio->buffer);
+    +kfree(radio);
+    +}
-radio = devm_kzalloc(&intf->dev, sizeof(struct raremono_device), GFP_KERNEL);
-if (radio)
-radio->buffer = devm_kmalloc(&intf->dev, BUFFER_LENGTH, GFP_KERNEL);
-
-if (!radio || !radio->buffer)
+radio = kzalloc(sizeof(*radio), GFP_KERNEL);
+if (!radio)
+return -ENOMEM;
+radio->buffer = kmalloc(BUFFER_LENGTH, GFP_KERNEL);
+if (!radio->buffer) {
+kfree(radio);
+return -ENOMEM;
+
} radio->usbdev = interface_to_usbdev(intf);
radio->intf = intf;
@@ -336,7 +346,8 @@
if (retval != 3 ||
(get_unaligned_be16(&radio->buffer[1]) & 0xfff) == 0x0242) {
-dev_info(&intf->dev, "this is not Thanko's Raremono:\n");
-return -ENODEV;
+retval = -ENODEV;
+goto free_mem;
}
-dev_info(&intf->dev, "Thanko’s Raremono connected: (%04X:%04X)\n", 
-@ @ -345,7 +356,7 @@
-retval = v4l2_device_register(&intf->dev, &radio->v4l2_dev);
-if (retval < 0) {
-dev_err(&intf->dev, "couldn’t register v4l2_device\n");
-return retval;
+goto free_mem;
+
} mutex_init(&radio->lock);
@@ -357,6 +368,7 @@
radio->vdev.ioctl_ops = &usb_raremono_ioctl_ops;
radio->vdev.lock = &radio->lock;
radio->vdev.release = video_device_release_empty;
+radio->v4l2_dev.release = raremono_device_release;

usb_set_intfdata(intf, &radio->v4l2_dev);

@@ -372,6 +384,10 @@
}
-dev_err(&intf->dev, "could not register video device\n");
v4l2_device_unregister(&radio->v4l2_dev);
+free_mem:
+kfree(radio->buffer);
+kfree(radio);
return retval;
}

--- linux-4.15.0.orig/drivers/media/radio/radio-wl1273.c
+++ linux-4.15.0/drivers/media/radio/radio-wl1273.c
@@ -1156,8 +1156,7 @@
 if (radio->rds_users > 0) {
     radio->rds_users--;
 if (radio->rds_users == 0) {
-    if (mutex_lock_interruptible(&core->lock))
-        return -EINTR;
+    mutex_lock(&core->lock);
     radio->irq_flags &= ~WL1273_RDS_EVENT;
 }

--- linux-4.15.0.orig/drivers/media/radio/si470x/radio-si470x-i2c.c
+++ linux-4.15.0/drivers/media/radio/si470x/radio-si470x-i2c.c
@@ -92,7 +92,7 @@
 */
 int si470x_get_register(struct si470x_device *radio, int regnr)
 { system
-        u16 buf[READ_REG_NUM];
-        __be16 buf[READ_REG_NUM];
 struct i2c_msg msgs[1] = {
 { system
 .addr = radio->client->addr,
@@ -117,7 +117,7 @@ int si470x_set_register(struct si470x_device *radio, int regnr)
 { system
 int i;
-        u16 buf[WRITE_REG_NUM];
-        __be16 buf[WRITE_REG_NUM];
 struct i2c_msg msgs[1] = {
 { system
 .addr = radio->client->addr,
@@ -147,7 +147,7 @@ static int si470x_get_all_registers(struct si470x_device *radio)
 { system
 int i;
-        u16 buf[READ_REG_NUM];
-        __be16 buf[READ_REG_NUM];
 struct i2c_msg msgs[1] = {
 { system
 .addr = radio->client->addr,
free_irq(client->irq, radio);
video_unregister_device(&radio->videodev);
-kfree(radio);

+v4l2_ctrl_handler_free(&radio->hdl);
+v4l2_device_unregister(&radio->v4l2_dev);
+kfree(radio);
return 0;
}

--- linux-4.15.0.orig/drivers/media/radio/si470x/radio-si470x-usb.c
+++ linux-4.15.0/drivers/media/radio/si470x/radio-si470x-usb.c
@@ -737,7 +737,7 @@
 /* start radio */
 retval = si470x_start_usb(radio);
 if (retval < 0)
-goto err_all;
+goto err_buf;
 /* set initial frequency */
 si470x_set_freq(radio, 87.5 * FREQ_MUL); /* available in all regions */
 @@ -752,6 +752,8 @@
 return 0;
 err_all:
 +usb_kill_urb(radio->int_in_urb);
+err_buf:
 kfree(radio->buffer);
 err_ctrl:
 v4l2_ctrl_handler_free(&radio->hdl);
@@ -825,6 +827,7 @@
 mutex_lock(&radio->lock);
 v4l2_device_disconnect(&radio->v4l2_dev);
 video_unregister_device(&radio->videodev);
+usb_kill_urb(radio->int_in_urb);
 usb_set_intfdata(intf, NULL);
 mutex_unlock(&radio->lock);
 v4l2_device_put(&radio->v4l2_dev);
--- linux-4.15.0.orig/drivers/media/radio/wl128x/fmdrv_common.c
+++ linux-4.15.0/drivers/media/radio/wl128x/fmdrv_common.c
@@ -489,7 +489,8 @@
 return -EIO;
 /* Send response data to caller */
-if (response != NULL && response_len != NULL && evt_hdr->dlen) {
+if (response != NULL && response_len != NULL && evt_hdr->dlen &&
+ && evt_hdr->dlen <= payload_len) {


/* Skip header info and copy only response data */
skb_pull(skb, sizeof(struct fm_event_msg_hdr));
memcpy(response, skb->data, evt_hdr->dlen);
return;

fm_evt_hdr = (void *)skb->data;
+if (fm_evt_hdr->dlen > sizef(fmdev->irq_info.flag))
+return;

/* Skip header info and copy only response data */
skb_pull(skb, sizeof(struct fm_event_msg_hdr));
@@ -1268,8 +1271,9 @@
switch (action->type) {
case ACTION_SEND_COMMAND: /* Send */
- if (fmc_send_cmd(fmdev, 0, 0, action->data,
- action->size, NULL, NULL))
+ ret = fmc_send_cmd(fmdev, 0, 0, action->data,
+ action->size, NULL, NULL);
+if (ret)
goto rel_fw;

cmd_cnt++;  
@@ -1308,7 +1312,7 @@
static int fm_power_up(struct fmdev *fmdev, u8 mode)
 {
 u16 payload;
- __be16 asic_id, asic_ver;
+ __be16 asic_id = 0, asic_ver = 0;
 int resp_len, ret;
 u8 fw_name[50];

--- linux-4.15.0.orig/drivers/media/radio/wl128x/fmdrv_v4l2.c
+++ linux-4.15.0/drivers/media/radio/wl128x/fmdrv_v4l2.c
@@ -549,6 +549,7 @@
/* Register with V4L2 subsystem as RADIO device */
if (video_register_device(&gradio_dev, VFL_TYPE_RADIO, radio_nr)) {
 +v4l2_device_unregister(&fmdev->v4l2_dev);
 fmerr("Could not register video device\n");
 return -ENOMEM;
 }
@@ -562,6 +563,8 @@
if (ret < 0) {
 fmerr("(fmdev): Can't init ctrl handler\n");
v4l2_ctrl_handler_free(&fmdev->ctrl_handler);
+video_unregister_device(fmdev->radio_dev);
v4l2_device_unregister(&fmdev->v4l2_dev);
return -EBUSY;
}

--- linux-4.15.0.orig/drivers/media/rc/ati_remote.c
+++ linux-4.15.0/drivers/media/rc/ati_remote.c
@@ -845,6 +845,10 @@
     err("%s: endpoint_in message size==0? \n", __func__);
     return -ENODEV;
 }
+if (!usb_endpoint_is_int_out(endpoint_out)) {
+    err("%s: Unexpected endpoint_out\n", __func__);
+    return -ENODEV;
+}

ati_remote = kzalloc(sizeof (struct ati_remote), GFP_KERNEL);
rc_dev = rc_allocate_device(RC_DRIVER_SCANCODE);
--- linux-4.15.0.orig/drivers/media/rc/gpio-ir-tx.c
+++ linux-4.15.0/drivers/media/rc/gpio-ir-tx.c
@@ -87,13 +87,8 @@
     // space
     edge = ktime_add_us(edge, txbuf[i]);
     delta = ktime_us_delta(edge, ktime_get());
-    if (delta > 10) {
-        spin_unlock_irqrestore(&gpio_ir->lock, flags);
-        usleep_range(delta, delta + 10);
-        spin_lock_irqsave(&gpio_ir->lock, flags);
-    } else if (delta > 0) {
+    if (delta > 0)
        udelay(delta);
    -}
    } else {
     // pulse
     ktime_t last = ktime_add_us(edge, txbuf[i]);
--- linux-4.15.0.orig/drivers/media/rc/iguanair.c
+++ linux-4.15.0/drivers/media/rc/iguanair.c
@@ -427,6 +427,10 @@
     int ret, pipein, pipeout;
     struct usb_host_interface *idesc;

+    idesc = intf->cur_altsetting;
+    if (idesc->desc.bNumEndpoints < 2)
+       return -ENODEV;
+    ir = kzalloc(sizeof(*ir), GFP_KERNEL);
    rc = rc_allocate_device(RC_DRIVER_IR_RAW);
    if (!ir || !rc) {
        @@ -441,18 +445,13 @@
ir->urb_in = usb_alloc_urb(0, GFP_KERNEL);
ir->urb_out = usb_alloc_urb(0, GFP_KERNEL);

-if (!ir->buf_in || !ir->packet || !ir->urb_in || !ir->urb_out) {
+if (!ir->buf_in || !ir->packet || !ir->urb_in || !ir->urb_out ||
    !usb_endpoint_is_int_in(&idesc->endpoint[0].desc) ||
    !usb_endpoint_is_int_out(&idesc->endpoint[1].desc)) {
    ret = -ENOMEM;
    goto out;
  }

  idesc = intf->ultsetting;

  -if (idesc->desc.bNumEndpoints < 2) {
    ret = -ENODEV;
    goto out;
  }

  ir->rc = rc;
  ir->dev = &intf->dev;
  ir->udev = udev;

  /* send touchscreen events through input subsystem if touchpad data */
  -if (ictx->display_type == IMON_DISPLAY_TYPE_VGA && len == 8 &&
    -buf[7] == 0x86) {
    +if (ictx->touch && len == 8 && buf[7] == 0x86) {
      imon_touch_event(ictx, buf);
      return;
    }

  @ @ -1962,12 +1961,17 @@
  break;
/* iMON VFD, MCE IR */
  case 0x46:
  case 0x7e:
  case 0x9e:
    dev_info(ictx->dev, "0xffdc iMON VFD, MCE IR");
    detected_display_type = IMON_DISPLAY_TYPE_VFD;
    allowed_protos = RC_PROTO_BIT_RC6_MCE;
    break;
/* iMON VFD, iMON or MCE IR */
+case 0x7e:
+dev_info(ictx->dev, "0xffdc iMON VFD, iMON or MCE IR");
+detelected_display_type = IMON_DISPLAY_TYPE_VFD;
+allowed_protos |= RC_PROTO_BIT_RC6_MCE;
+break;
/* iMON LCD, MCE IR */
case 0x9f:
    dev_info(ictx->dev, "0xffdc iMON LCD, MCE IR");
    --- linux-4.15.0.orig/drivers/media/rc/mce_kbd-decoder.c
+++ linux-4.15.0/drivers/media/rc/mce_kbd-decoder.c
@@ -130,6 +130,8 @@
        for (i = 0; i < MCIR2_MASK_KEYS_START; i++)
            input_report_key(mce_kbd->idev, kbd_keycodes[i], 0);
          +
          +input_sync(mce_kbd->idev);
      }

static enum mce_kbd_mode mce_kbd_mode(struct mce_kbd_dec *data)
@@ -319,11 +321,13 @@
        scancode = data->body & 0xffff;
        IR_dprintk(1, "keyboard data 0x%08x\n", data->body);
        -if (dev->timeout)
-          -delay = usecs_to_jiffies(dev->timeout / 1000);
        -else
-          -delay = msecs_to_jiffies(100);
-          -mod_timer(&data->rx_timeout, jiffies + delay);
+          +delay = nsecs_to_jiffies(dev->timeout) +
+              msecs_to_jiffies(100);
+          +mod_timer(&data->rx_timeout, jiffies + delay);
+          +} else {
+            +del_timer(&data->rx_timeout);
+          +}
/* Pass data to keyboard buffer parser */
    ir_mce_kbd_process_keyboard_data(data->idev, scancode);
    break;
--- linux-4.15.0.orig/drivers/media/rc/rc6-decoder.c
+++ linux-4.15.0/drivers/media/rc/rc6-decoder.c
@@ -40,6 +40,7 @@
#define RC6_6A_MCE_TOGGLE_MASK 0x8000 /* for the body bits */
#define RC6_6A_LCC_MASK 0xffff0000 /* RC6-6A-32 long customer code mask */
#define RC6_6A_MCE_CC0x800f0000 /* MCE customer code */
+#define RC6_6A_KATHREIN_CC0x80460000 /* Kathrein RCU-676 customer code */
#undef CHAR_BIT
#define CHAR_BIT 8 /* Normally in <limits.h> */
#endif
@@ -252,13 +253,17 @@
toggle = 0;
    break;
case 32:
if ((scancode & RC6_6A_LCC_MASK) == RC6_6A_MCE_CC) {
    switch (scancode & RC6_6A_LCC_MASK) {
    case RC6_6A_MCE_CC:
    case RC6_6A_KATHREIN_CC:
        protocol = RC_PROTO_RC6_MCE;
        toggle = !(scancode & RC6_6A_MCE_TOGGLE_MASK);
        scancode &= ~RC6_6A_MCE_TOGGLE_MASK;
        break;
    default:
        protocol = RC_PROTO_RC6_6A_32;
        toggle = 0;
        break;
    }
    break;
}

--- linux-4.15.0.orig/drivers/media/rc/ir-spi.c
+++ linux-4.15.0/drivers/media/rc/ir-spi.c
@@ -186,6 +186,7 @@
{
    .compatible = "ir-spi-led",
    .
+} MODULE_DEVICE_TABLE(of, ir_spi_of_match);

static struct spi_driver ir_spi_driver = {
    .probe = ir_spi_probe,
--- linux-4.15.0.orig/drivers/media/rc/ite-cir.c
+++ linux-4.15.0/drivers/media/rc/ite-cir.c
@@ -285,8 +285,14 @@
    /* read the interrupt flags */
    iflags = dev->params.get_irq_causes(dev);

+/* Check for RX overflow */
+if (iflags & ITE_IRQ_RX_FIFO_OVERRUN) {
+    dev_warn(&dev->rdev->dev, "receive overflow\n");
+    ir_raw_event_reset(dev->rdev);
+}
+
+/* check for the receive interrupt */
-If (iflags & (ITE_IRQ_RX_FIFO | ITE_IRQ_RX_FIFO_OVERRUN)) {
+if (iflags & ITE_IRQ_RX_FIFO) {
    /* read the FIFO bytes */
    rx_bytes =
        dev->params.get_rx_bytes(dev, rx_buf,
--- linux-4.15.0.orig/drivers/media/rc/mceusb.c
+++ linux-4.15.0/drivers/media/rc/mceusb.c
@@ -648,11 +648,18 @@
    data[0], data[1]);

---
break;
case MCE_RSP_EQIRCFS:
+if (!data[0] && !data[1]) {
+dev_dbg(dev, "%s: no carrier", inout);
+break;
+
+// prescaler should make sense
+if (data[0] > 8)
+break;

period = DIV_ROUND_CLOSEST((1U << data[0] * 2) *
    (data[1] + 1), 10);
if (!period)
break;
-carrier = (1000 * 1000) / period;
+carrier = USEC_PER_SEC / period;
dev_dbg(dev, "%s carrier of %u Hz (period %uus)",
inout, carrier, period);
break;
--- linux-4.15.0.orig/drivers/media/rc/mtk-cir.c
+++ linux-4.15.0/drivers/media/rc/mtk-cir.c
@@ -44,6 +44,11 @@
/* Fields containing pulse width data */
#define MTK_WIDTH_MASK	(GENMASK(7, 0))
+/* IR threshold */
+#define MTK_IRTHD	0x14
+#define MTK_DG_CNT_MASK	(GENMASK(12, 8))
+#define MTK_DG_CNT(x) ((x) << 8)
+
/* Bit to enable interrupt */
#define MTK_IRINT_EN	BIT(0)
@@ -411,6 +416,9 @@

/* Set de-glitch counter */
+mtk_w32_mask(ir, val, ir->data->fields[MTK_HW_PERIOD].mask,
+ir->data->fields[MTK_HW_PERIOD].reg);

/* Enable IR and PWM */
val = mtk_r32(ir, MTK_CONFIG_HIGH_REG);
val |= MTK_OK_COUNT(ir->data->ok_count) | MTK_PWM_EN | MTK_IR_EN;
--- linux-4.15.0.orig/drivers/media/rc/rc-loopback.c
+++ linux-4.15.0/drivers/media/rc/rc-loopback.c
@@ -52,7 +52,7 @@

if ((mask & (RXMASK_REGULAR | RXMASK_LEARNING)) != mask) {
    dprintf("invalid tx mask: %u\n", mask);
dprintf("setting tx mask: \%u\n", mask);
--- linux-4.15.0.orig/drivers/media/rc/rc-main.c
+++ linux-4.15.0/drivers/media/rc/rc-main.c
@@ -1855,11 +1855,11 @@
 if (!dev)
 return;

-del_timer_sync(&dev->timer_keyup);
-
+del_timer_sync(&dev->timer_keyup);
+
+rc_free_rx_device(dev);

device_del(&dev->dev);
--- linux-4.15.0.orig/drivers/media/rc/serial_ir.c
+++ linux-4.15.0/drivers/media/rc/serial_ir.c
@@ -773,8 +773,6 @@
 static int __init serial_ir_init_module(void)
 {
 
-switch (type) {
-case IR_HOMEBREW:
-case IR_IRDEO:
-@@ -802,12 +800,7 @@
- if (sense != -1)
- sense = !!sense;

-static int __init serial_ir_init(void)
-static void __exit serial_ir_exit_module(void)
@@ -132,6 +132,8 @@
} else if (status & REG_RXINT_RPEI_EN) {
   ir_raw_event_set_idle(ir->rc, true);
   ir_raw_event_handle(ir->rc);
+} else {
+   ir_raw_event_handle(ir->rc);
}

spin_unlock(&ir->ir_lock);
--- linux-4.15.0.orig/drivers/media/tuners/m88rs6000t.c
+++ linux-4.15.0/drivers/media/tuners/m88rs6000t.c
@@ -534,7 +534,7 @@
PGA2_cri = PGA2_GC >> 2;
PGA2_crf = PGA2_GC & 0x03;

-    for (i = 0; i <= RF_GC; i++)
+    for (i = 0; i <= RF_GC && i < ARRAY_SIZE(RFGS); i++)
      RFG += RFGS[i];

      if (RF_GC == 0)
@@ -546,12 +546,12 @@
        RFG += 100;

-    for (i = 0; i <= IF_GC; i++)
+    for (i = 0; i <= IF_GC && i < ARRAY_SIZE(IFGS); i++)
      IFG += IFGS[i];

    TIAG = TIA_GC * TIA_GS;

-    for (i = 0; i <= BB_GC; i++)
+    for (i = 0; i <= BB_GC && i < ARRAY_SIZE(BBGS); i++)
      BBG += BBGS[i];

    PGA2G = PGA2_cri * PGA2_cri_GS + PGA2_crf * PGA2_crf_GS;
--- linux-4.15.0.orig/drivers/media/tuners/qm1d1c0042.c
+++ linux-4.15.0/drivers/media/tuners/qm1d1c0042.c
@@ -352,8 +352,10 @@
      if (val == reg_initval[reg_index][0x00])
          break;
    }
-    if (reg_index >= QM1D1C0042_NUM_REG_ROWS)
+    if (reg_index >= QM1D1C0042_NUM_REG_ROWS) {
+        ret = -EINVAL;
+        goto failed;
+    }
    memcpy(state->regs, reg_initval[reg_index], QM1D1C0042_NUM_REGS);
    usleep_range(2000, 3000);
--- linux-4.15.0.orig/drivers/media/tuners/r820t.c
+++ linux-4.15.0/drivers/media/tuners/r820t.c
@@ -396,9 +396,11 @@
     return 0;
 }

static int r820t_write_reg(struct r820t_priv *priv, u8 reg, u8 val)
+static inline int r820t_write_reg(struct r820t_priv *priv, u8 reg, u8 val)
{
-    return r820t_write(priv, reg, &val, 1);
+    u8 tmp = val; /* work around GCC PR81715 with asan-stack=1 */
+    return r820t_write(priv, reg, &tmp, 1);
}

static int r820t_read_cache_reg(struct r820t_priv *priv, int reg)
@@ -411,17 +413,18 @@
     return -EINVAL;
 }

-static int r820t_write_reg_mask(struct r820t_priv *priv, u8 reg, u8 val,
+static inline int r820t_write_reg_mask(struct r820t_priv *priv, u8 reg, u8 val,
     u8 bit_mask)
{
+    tmp = val;
     int rc = r820t_read_cache_reg(priv, reg);
     if (rc < 0)
        return rc;
-    val = (rc & ~bit_mask) | (val & bit_mask);
+    tmp = (rc & ~bit_mask) | (tmp & bit_mask);

-    return r820t_write(priv, reg, &val, 1);
+    return r820t_write(priv, reg, &tmp, 1);
}

static int r820t_read(struct r820t_priv *priv, u8 reg, u8 *val, int len)
--- linux-4.15.0.orig/drivers/media/tuners/si2157.c
+++ linux-4.15.0/drivers/media/tuners/si2157.c
@@ -84,24 +84,23 @@
     struct si2157_cmd cmd;
     const struct firmware *fw;
     const char *fw_name;
-    unsigned int uitmp, chip_id;
+    unsigned int chip_id, xtal_trim;

dev_dbg(&client->dev, "\n");

/* Returned IF frequency is garbage when firmware is not running */
-memcpy(cmd.args, "\x15\x00\x06\x07", 4);

/* Try to get Xtal trim property, to verify tuner still running */
+memcpy(cmd.args, "\x15\x00\x04\x02", 4);

cmd.wlen = 4;
cmdrlen = 4;
ret = si2157_cmd_execute(client, &cmd);
-if (ret)
-goto err;

-dev_dbg(&client->dev, "if_frequency kHz=%u\n", uitmp);
+xtal_trim = cmd.args[2] | (cmd.args[3] << 8);

-if (uitmp == dev->if_frequency / 1000)
+if (ret == 0 && xtal_trim < 16)
goto warm;

+dev->if_frequency = 0; /* we no longer know current tuner state */
+
+/* power up */
+if (dev->chiptype == SI2157_CHIPTYPE_SI2146) {
-memcpy(cmd.args, "\xc0\x05\x01\x00\x0b\x00\x01", 9);
--- linux-4.15.0.orig/drivers/media/tuners/tuner-simple.c
+++ linux-4.15.0/drivers/media/tuners/tuner-simple.c
@@ -499,7 +499,7 @@
case TUNER_TENA_9533_DI:
case TUNER_YMEC_TVF_5533MF:
tuner_dbg("This tuner doesn't have FM. Most cards have a TEA5767 for FM\n");
-return 0;
+return -EINVAL;
case TUNER_PHILIPS_FM1216ME_MK3:
case TUNER_PHILIPS_FM1236_MK3:
case TUNER_PHILIPS_FMD1216ME_MK3:
@@ @ -700,7 +700,8 @@
+ TUNER_RATIO_SELECT_50; /* 50 kHz step */

/* Bandswitch byte */
-simple_radio_bandswitch(fe, &buffer[0]);
+if (simple_radio_bandswitch(fe, &buffer[0]))
+return 0;

/* Convert from 1/16 kHz V4L steps to 1/20 MHz (=50 kHz) PLL steps
 freq * (1 MHz / 16000 V4L steps) * (20 PLL steps / 1 MHz) =
--- linux-4.15.0.orig/drivers/media/usb/au0828/au0828-core.c
+++ linux-4.15.0/drivers/media/usb/au0828/au0828-core.c
/@ -623,31 +623,30 @@
 /* Setup */
 au0828_card_setup(dev);

 /*
+ * Store the pointer to the au0828_dev so it can be accessed in
+ * au0828_usb_disconnect
+ */
+usb_set_intfdata(interface, dev);
+ /* Analog TV */
+ retval = au0828_analog_register(dev, interface);
+ if (retval) {
+ -pr_err("%s() au0282_dev_register failed to register on V4L2
+ pr_err("%s() au0828_analog_register failed to register on V4L2"
+ __func__);
+ mutex_unlock(&dev->lock);
+ kfree(dev);
+ goto done;
+ }
+ /* Digital TV */
+ retval = au0828_dvb_register(dev);
+ if (retval)
+ -pr_err("%s() au0282_dev_register failed
+ pr_err("%s() au0828_dvb_register failed"
+ __func__);
+ /* Remote controller */
+ au0828_rc_register(dev);

 /*
- * Store the pointer to the au0828_dev so it can be accessed in
- * au0828_usb_disconnect
- */
-usb_set_intfdata(interface, dev);
- pr_info("Registered device AU0828 [%s]\n",
  dev->board.name == NULL ? "Unset" : dev->board.name);

 --- linux-4.15.0.orig/drivers/media/usb/au0828/au0828-video.c
 +++ linux-4.15.0/drivers/media/usb/au0828/au0828-video.c
 @@ -758,6 +758,9 @@
 dprintk(1, "au0828_analog_stream_enable called\n")
 +if (test_bit(DEV_DISCONNECTED, &d->dev_state))
 +return -ENODEV;
+ iface = usb_ifnum_to_if(d->usbdev, 0);
if (iface & iface->cur_altsetting->desc.bAlternateSetting != 5) {
    dprintk(1, "Changing intf#0 to alt 5\n");
@@ -839,9 +842,9 @@
    return rc;
}

+v4l2_device_call_all(&dev->v4l2_dev, 0, video, s_stream, 1);
+
if (vq->type == V4L2_BUF_TYPE_VIDEO_CAPTURE) {
    v4l2_device_call_all(&dev->v4l2_dev, 0, video,
    -s_stream, 1);
+    dev->vid_timeout_running = 1;
    mod_timer(&dev->vid_timeout, jiffies + (HZ / 10));
} else if (vq->type == V4L2_BUF_TYPE_VBI_CAPTURE) {
    @ @ -861,10 +864,11 @@

dprintk(1, "au0828_stop_streaming called %d\n", dev->streaming_users);

- if (dev->streaming_users-- == 1)
+ if (dev->streaming_users-- == 1) {
    au0828_uninit_isoc(dev);
+v4l2_device_call_all(&dev->v4l2_dev, 0, video, s_stream, 0);
+}

-v4l2_device_call_all(&dev->v4l2dev, 0, video, s_stream, 0);
+dev->vid_timeout_running = 0;
+del_timer_sync(&dev->vid_timeout);

@@ -893,8 +897,10 @@
    dprintk(1, "au0828_stop_vbi_streaming called %d\n", dev->streaming_users);

- if (dev->streaming_users-- == 1)
+ if (dev->streaming_users-- == 1) {
    au0828_uninit_isoc(dev);
+v4l2_device_call_all(&dev->v4l2_dev, 0, video, s_stream, 0);
+}

spin_lock_irqsave(&dev->slock, flags);

--- linux-4.15.0.orig/drivers/media/usb/b2c2/flexcop-usb.c
+++ linux-4.15.0/drivers/media/usb/b2c2/flexcop-usb.c
@@ -294,7 +294,7 @@
 mutex_unlock(&fc_usb->data_mutex);
static int flexcop_usb_init(struct flexcop_usb *fc_usb)
{
    /* use the alternate setting with the largest buffer */
    -usb_set_interface(fc_usb->udev,0,1);
    +int ret = usb_set_interface(fc_usb->udev, 0, 1);
    +
    +if (ret) {
        +err("set interface failed.");
        +return ret;
        +}
    +
    +if (fc_usb->uintf->cur_altsetting->desc.bNumEndpoints < 1)
    +return -ENODEV;
    +
    switch (fc_usb->udev->speed) {
    case USB_SPEED_LOW:
        err("cannot handle USB speed because it is too slow.");
        --- linux-4.15.0.orig/drivers/media/usb/cpia2/cpia2.h
        +++ linux-4.15.0/drivers/media/usb/cpia2/cpia2.h
        @@ -438,6 +438,7 @@
        int cpia2_do_command(struct camera_data *cam,
                unsigned int command,
                unsigned char direction, unsigned char param);
        +void cpia2_deinit_camera_struct(struct camera_data *cam, struct usb_interface *intf);
        struct camera_data *cpia2_init_camera_struct(struct usb_interface *intf);
        int cpia2_init_camera(struct camera_data *cam);
        int cpia2_allocate_buffers(struct camera_data *cam);
        --- linux-4.15.0.orig/drivers/media/usb/cpia2/cpia2_core.c
        +++ linux-4.15.0/drivers/media/usb/cpia2/cpia2_core.c
        @@ -2176,6 +2176,18 @@
        *
        * cpia2_init_camera_struct
        *
        + * Deinitialize camera struct
        +*******************************************************************************/
        +void cpia2_deinit_camera_struct(struct camera_data *cam, struct usb_interface *intf)
        +{
        +v4l2_device_unregister(&cam->v4l2_dev);
        +kfree(cam);
        +}
        +
        +*******************************************************************************/
+ *
+ * cpi2_init_camera_struct
+ *
* Initializes camera struct, does not call reset to fill in defaults.

******************************************************************************/

struct camera_data *cpi2_init_camera_struct(struct usb_interface *intf)
--- linux-4.15.0.orig/drivers/media/usb/cpia2/cpia2_usb.c
+++ linux-4.15.0/drivers/media/usb/cpia2/cpia2_usb.c
@@ -684,6 +684,10 @@
    for (j = 0; j < i; j++) {
        usb_free_urb(cam->sbuf[j].urb);
    }
+			for (j = 0; j < NUM_SBUF; j++) {
+				kfree(cam->sbuf[j].data);
+				cam->sbuf[j].data = NULL;
+			}
    }

return -ENOMEM;

@@ -848,15 +852,13 @@
    if (ret < 0) {
        ERR("%s: usb_set_interface error (ret = %d)\n", __func__, ret);
        kfree(cam);
-			return ret;
+			goto alt_err;
    }

    if((ret = cpi2_init_camera(cam)) < 0) {
        ERR("%s: failed to initialize cpia2 camera (ret = %d)\n", __func__, ret);
-			kfree(cam);
-			return ret;
+			goto alt_err;

    LOG(" CPiA Version: %d.%02d (%d.%d)\n",
    cam->params.version.firmware_revision_hi,
@@ -876,11 +878,14 @@
    ret = cpi2_register_camera(cam);
    if (ret < 0) {
        ERR("%s: Failed to register cpia2 camera (ret = %d)\n", __func__, ret);
-			kfree(cam);
-			return ret;
+			goto alt_err;
    }

    return 0;
+
+alt_err:
+cpia2_deinit_camera_struct(cam, intf);
+return ret;
}

/****************************************************************************
@@ -901,7 +906,6 @@
cpai2_unregister_camera(cam);
v4l2_device_disconnect(&cam->v4l2_dev);
mutex_unlock(&cam->v4l2_lock);
-v4l2_device_put(&cam->v4l2_dev);
if(cam->buffers) {
    DBG("Wakeup waiting processes\n");
@@ -913,6 +917,8 @@
    DBG("Releasing interface\n");
    usb_driver_release_interface(&cpia2_driver, intf);

+v4l2_device_put(&cam->v4l2_dev);
+LOG("CPiA2 camera disconnected.\n");
}

--- linux-4.15.0.orig/drivers/media/usb/cpia2/cpia2_v4l.c
+++ linux-4.15.0/drivers/media/usb/cpia2/cpia2_v4l.c
@@ -808,7 +808,7 @@
    struct camera_data *cam = video_drvdata(file);

    if(buf->type != V4L2_BUF_TYPE_VIDEO_CAPTURE ||
-       buf->index > cam->num_frames)
+       buf->index >= cam->num_frames)
        return -EINVAL;
    buf->m.offset = cam->buffers[buf->index].data - cam->frame_buffer;
@@ -859,7 +859,7 @@
        return -EINVAL;
    DBG("QBUF #%d\n", buf->index);
    LOG("%s v%s\n", ABOUT, CPIA_VERSION);
    check_parameters();
-    cpia2_usb_init();
- return 0;
+ return cpia2_usb_init();
}

--- linux-4.15.0.orig/drivers/media/usb/cx231xx/cx231xx-cards.c
+++ linux-4.15.0/drivers/media/usb/cx231xx/cx231xx-cards.c
@@ -919,6 +919,9 @@
         .driver_info = CX231XX_BOARD_CNXT_RDE_250},
         {USB_DEVICE(0x0572, 0x58A0),
         .driver_info = CX231XX_BOARD_CNXT_RDU_250},
+/* AverMedia DVD EZMaker 7 */
+{USB_DEVICE(0x07ca, 0xc039),
+ .driver_info = CX231XX_BOARD_CNXT_VIDEO_GRABBER},
+{USB_DEVICE(0x2040, 0xb110),
+ .driver_info = CX231XX_BOARD_HAUPPAUGE_USB2_FM_PAL},
+{USB_DEVICE(0x2040, 0xb111),
--- linux-4.15.0.orig/drivers/media/usb/cx231xx/cx231xx-video.c
+++ linux-4.15.0/drivers/media/usb/cx231xx/cx231xx-video.c
@@ -1389,7 +1389,7 @@
         reg->val = value[0] | value[1] << 8 |
         reg->size = 4;
         break;
     case 1:/* AFE - read byte */
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb-v2/af9035.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb-v2/af9035.c
@@ -402,8 +402,10 @@
if (msg[0].addr == state->af9033_i2c_addr[1])
         reg |= 0x100000;
-       ret = af9035_wr_regs(d, reg, &msg[0].buf[3],
-                          msg[0].len - 3);
+       ret = (msg[0].len >= 3) ? af9035_wr_regs(d, reg,
+          &msg[0].buf[3],
+          msg[0].len - 3)
+          : -EOPNOTSUPP;
} else {
/* I2C write */
u8 buf[MAX_XFER_SIZE];
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb-v2/lmedm04.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb-v2/lmedm04.c
@@ -436,7 +436,7 @@
ep = usb_pipe_endpoint(d->udev, lme_int->lme_urb->pipe);

if (usb_endpoint_type(&ep->desc) == USB_ENDPOINT_XFER_BULK)
- lme_int->lme_urb->pipe = usb_rcvbulkpipe(d->udev, 0xa),
+ lme_int->lme_urb->pipe = usb_rcvbulkpipe(d->udev, 0xa);

lme_int->lme_urb->transfer_flags |= URB_NO_TRANSFER_DMA_MAP;

@@ -494,18 +494,23 @@
static int lme2510_return_status(struct dvb_usb_device *d)
{
    int ret = 0;
    +int ret;
    u8 *data;

    - data = kzalloc(10, GFP_KERNEL);
    + data = kzalloc(6, GFP_KERNEL);
    if (!data)
        return -ENOMEM;
    - ret |= usb_control_msg(d->udev, usb_rcvctrlpipe(d->udev, 0),
-    - 0x06, 0x80, 0x0302, 0x00, data, 0x0006, 200);
-    - info("Firmware Status: %x (%x)", ret , data[2]);
-    + ret = usb_control_msg(d->udev, usb_rcvctrlpipe(d->udev, 0),
-    +      0x06, 0x80, 0x0302, 0x00,   
-    +      data, 0x6, 200);
-    + if (ret != 6)
-    + ret = -EINVAL;
-    + else
-    + ret = data[2];
-    + info("Firmware Status: %6ph", data);
-    
-    - ret = (ret < 0) ? -ENODEV : data[2];
-    + kfree(data);
    return ret;
}
@@ -1071,8 +1076,18 @@
if (adap->fe[0]) {
        info("FE Found M88RS2000");
        -dvb_attach(ts2020_attach, adap->fe[0], &ts2020_config,
-        -&d->i2c_adap);
-    st->i2c_tuner_gate_w = 5;
   st->i2c_tuner_gate_r = 5;
   st->i2c_tuner_addr = 0x60;
@@ -1138,17 +1141,18 @@
    ret = st->tuner_config;
    break;
case TUNER_RS2000:
  ret = st->tuner_config;
+ ret = st->tuner_config;
+ if (dvb_attach(ts2020_attach, adap->fe[0],
+     &ts2020_config, &d->i2c_adap))
+ ret = st->tuner_config;
  break;
  default:
  break;
}

- if (ret)
- if (ret) {
  info("TUN Found %s tuner", tun_msg[ret]);
- else {
- info("TUN No tuner found --- resetting device");
- lme_coldreset(d);
+ } else {
+ info("TUN No tuner found");
  return -ENODEV;
}

@@ -1189,6 +1193,7 @@
static int lme2510_identify_state(struct dvb_usb_device *d, const char **name)
{
  struct lme2510_state *st = d->priv;
  int status;

- if (lme2510_return_status(d) == 0x44) {
- status = lme2510_return_status(d);
- *name = lme_firmware_switch(d, 0);
- return COLD;
- }
+ if (status != 0x47)
+ return -EINVAL;
+ return WARM;
}

static int lme2510_get_stream_config(struct dvb_frontend *fe, u8 *ts_type,
```c
/* read */
requesttype = (USB_TYPE_VENDOR | USB_DIR_IN);
+pipe = usb_rcvctrlpipe(d->udev, 0);
+ */
+ * Zero-length transfers must use usb_sndctrlpipe() and
+ * rtl28xxu_identify_state() uses a zero-length i2c read
+ * command to determine the chip type.
+ */
+if (req->size)
+pipe = usb_rcvctrlpipe(d->udev, 0);
+else
+pipe = usb_sndctrlpipe(d->udev, 0);
+
ret = usb_control_msg(d->udev, pipe, 0, requesttype, req->value,
```

---

```c
u16 checksum;
-int act_len, i, ret;
+int act_len = 0, i, ret;
+
memset(buf, 0, size);
buf[0] = (u8) (FW_BULKOUT_SIZE & 0xff);
+ */
+else if (reply == 0x02)
+*cold = 0;
+else
+ return -EIO;
+deb_info("Identify state cold = %d\n", *cold);
+ret = -EIO;
+if (!ret)
+deb_info("Identify state cold = %d\n", *cold);
+
err:
kfree(buf);
```
if (ret < 0) {
+if (adap->fe_adap[0].fe)
+adap->fe_adap[0].fe->ops.release(adap->fe_adap[0].fe);

deb_rc("cinergyt2_power_ctrl() Failed to retrieve sleep state info\n");
}
mutex_unlock(&d->data_mutex);
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/cxusb.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/cxusb.c
@@ -455,7 +455,8 @@
{
+u8 ircode[4];
-      cxusb_ctrl_msg(d, CMD_GET_IR_CODE, NULL, 0, ircode, 4);
+      if (cxusb_ctrl_msg(d, CMD_GET_IR_CODE, NULL, 0, ircode, 4) < 0)
+        return 0;

if (ircode[2] || ircode[3])
  rc_keydown(d->rc_dev, RC_PROTO_NEC,
@@ -677,6 +678,8 @@
    case XC2028_RESET_CLK:
      deb_info("%s: XC2028_RESET_CLK %d\n", __func__, arg);
      break;
+    case XC2028_I2C_FLUSH:
+      break;
    default:
      deb_info("%s: unknown command %d, arg %d\n", __func__,
        command, arg);
@@ -1736,7 +1739,7 @@
    .size_of_priv     = sizeof(struct cxusb_state),
    .num_adapters = 2,
    .num_adapters = 1,
+    .adapter = {
+      .num_frontends = 1,
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/dib0700_core.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/dib0700_core.c
@@ -821,7 +821,7 @@
/* Starting in firmware 1.20, the RC info is provided on a bulk pipe */

    -if (intf->altsetting[0].desc.bNumEndpoints < rc_ep + 1)
+    if (intf->cur_altsetting->desc.bNumEndpoints < rc_ep + 1)
      return -ENODEV;

    purb = usb_alloc_urb(0, GFP_KERNEL);
@@ -841,7 +841,7 @@
Some devices like the Hauppauge NovaTD model 52009 use an interrupt
while others use a bulk one.

```c
-e = &intf->altsetting[0].endpoint[rc_ep].desc;
+e = &intf->cur_altsetting->endpoint[rc_ep].desc;
if (usb_endpoint_dir_in(e)) {
    if (usb_endpoint_xfer_bulk(e)) {
        pipe = usb_rcvbulkpipe(d->udev, rc_ep);
    }
    else {
        pipe = usb_rcvintpipe(d->udev, rc_ep);
    }
}
```

```c
state->dib7000p_ops.set_gpio(adap->fe_adap[0].fe, 8, 0, 1);
break;
```

```c
case XC2028_RESET_CLK:
case XC2028_I2C_FLUSH:
    break;
default:
```
```c
err("%s: unknown command %d, arg %d\n", __func__,
@@ -2437,9 +2438,13 @@
    8, 0x0486,
    if (!IS_ENABLED(CONFIG_DVB_DIB9000))
    +return -ENODEV;
```

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```
if (i2c_transfer(&adap->dev->i2c_adap, msg, 2) != 2) {
  err("tuner i2c write failed.");
  ret = -EBUSY;
  return -EBUSY;
}

if (adap->fe_adap[0].fe->ops.i2c_gate_ctrl)

static int digitv_rc_query(struct dvb_usb_device *d, u32 *event, int *state)
{
  int i;
  int ret, i;
  u8 key[5];
  u8 b[4] = { 0 };

  *event = 0;
  *state = REMOTE_NO_KEY_PRESSED;

  -digitv_ctrl_msg(d, USB_READ_REMOTE, 0, NULL, 0, &key[1], 4);
  +ret = digitv_ctrl_msg(d, USB_READ_REMOTE, 0, NULL, 0, &key[1], 4);
  +if (ret)
    +return ret;

  /* Tell the device we've read the remote. Not sure how necessary
  this is, but the Nebula SDK does it. */
  -digitv_ctrl_msg(d, USB_WRITE_REMOTE, 0, b, 4, NULL, 0);
  +ret = digitv_ctrl_msg(d, USB_WRITE_REMOTE, 0, b, 4, NULL, 0);
  +if (ret)
    +return ret;

  /* if something is inside the buffer, simulate key press */
  if (key[1] != 0)
    -digitv_ctrl_msg(d, USB_READ_REMOTE, 0, NULL, 0, &key[1], 4);
    +ret = digitv_ctrl_msg(d, USB_READ_REMOTE, 0, NULL, 0, &key[1], 4);
    +if (ret)
      +return ret;

    /* if something is inside the buffer, simulate key press */
    if (key[1] != 0)
      +digitv_ctrl_msg(d, USB_WRITE_REMOTE, 0, b, 4, NULL, 0);
      +ret = digitv_ctrl_msg(d, USB_WRITE_REMOTE, 0, b, 4, NULL, 0);
      +if (ret)
        +return ret;

    struct dtv5100_state *st = d->priv;
    +unsigned int pipe;
    u8 request;
    u8 type;
    u16 value;
switch (wlen) { 
  case 1: /* write { reg }, read { value } */
    pipe = usb_rcvctrlpipe(d->udev, 0);
    request = (addr == DTV5100_DEMOD_ADDR ? DTV5100_DEMOD_READ :
               DTV5100_TUNER_READ);
    type = USB_TYPE_VENDOR | USB_DIR_IN;
    break;
  case 2: /* write { reg, value } */
    pipe = usb_sndctrlpipe(d->udev, 0);
    request = (addr == DTV5100_DEMOD_ADDR ? DTV5100_DEMOD_WRITE :
               DTV5100_TUNER_WRITE);
    type = USB_TYPE_VENDOR | USB_DIR_OUT;
    break;
}
memcpy(st->data, rbuf, rlen);
msleep(1); /* avoid I2C errors */
return usb_control_msg(d->udev, pipe, request,
                     type, value, index, st->data, rlen,
                     DTV5100_USB_TIMEOUT);
}
ret = dvb_usb_adapter_dvb_init(adap, adapter_nrs);
+if (ret)
+goto dvb_init_err;
+
+ret = dvb_usb_adapter_frontend_init(adap);
+if (ret)
+goto frontend_init_err;

/* use exclusive FE lock if there is multiple shared FEs */
if (adap->fe_adap[1].fe)
@@ -106,6 +112,12 @@
}

return 0;
+
+frontend_init_err:
+dvb_usb_adapter_dvb_exit(adap);
+dvb_init_err:
+dvb_usb_adapter_stream_exit(adap);
+return ret;
}

static int dvb_usb_adapter_exit(struct dvb_usb_device *d)
@@ -287,12 +299,15 @@
void dvb_usb_device_exit(struct usb_interface *intf)
{
 struct dvb_usb_device *d = usb_get_intfdata(intf);
-const char *name = "generic DVB-USB module";
+const char *default_name = "generic DVB-USB module";
+char name[40];

 usb_set_intfdta(intf, NULL);
 if (d != NULL && d->desc != NULL) {
- name = d->desc->name;
+strcpy(name, d->desc->name, sizeof(name));
 dvb_usb_exit(d);
+} else {
+ strcpy(name, default_name, sizeof(name));
 } else {
 info("%s successfully deinitialized and disconnected.", name);

--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/dvb-usb-urb.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/dvb-usb-urb.c
 @@ -12,7 +12,7 @@
 int dvb_usb_generic_rw(struct dvb_usb_device *d, u8 *wbuf, u16 wlen, u8 *rbuf,
 u16 rlen, int delay_ms)
 {
-actlen,ret = -ENOMEM;

+int actlen = 0, ret = -ENOMEM;

if (!d || wbuf == NULL || wlen == 0)
  return -EINVAL;
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/dvb-usb.h
+++ linux-4.15.0/drivers/media/usb/dvb-usb/dvb-usb.h
@@ -475,7 +475,7 @@
dvb_usb_generic_write(struct dvb_usb_device *, u8 *, u16);
/* commonly used remote control parsing */
-extern int dvb_usb_nec_rc_key_to_event(struct dvb_usb_device *, u8[], u32 *, int *);
+-extern int dvb_usb_nec_rc_key_to_event(struct dvb_usb_device *, u8[5], u32 *, int *);

/* commonly used firmware download types and function */
struct hexline {
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/dw2102.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/dw2102.c
@@ -2103,14 +2103,12 @@
};

-static struct dvb_usb_device_properties *p1100;
static const struct dvb_usb_device_description d1100 = {
  "Prof 1100 USB ",
  {&dw2102_table[PROF_1100], NULL},
  {NULL},
};

-static struct dvb_usb_device_properties *s660;
static const struct dvb_usb_device_description d660 = {
  "TeVii S660 USB ",
  {&dw2102_table[TEVII_S660], NULL},
  @ @ -2103,14 +2103,12 @@
  {NULL},
};

-static struct dvb_usb_device_properties *p7500;
static const struct dvb_usb_device_description d7500 = {
  "Prof 7500 USB DVB-S2", 
  {&dw2102_table[PROF_7500], NULL},
  {NULL},
};

-static struct dvb_usb_device_properties *s421;
static const struct dvb_usb_device_description d421 = {
  "TeVii S421 PCI", 
  {&dw2102_table[TEVII_S421], NULL},
  @ @ -2336,6 +2332,11 @@
const struct usb_device_id *id)
{
    int retval = -ENOMEM;
    +struct dvb_usb_device_properties *p1100;
    +struct dvb_usb_device_properties *s660;
    +struct dvb_usb_device_properties *p7500;
    +struct dvb_usb_device_properties *s421;
    +
    p1100 = kmemdup(&s6x0_properties,
        sizeof(struct dvb_usb_device_properties), GFP_KERNEL);
    if (!p1100)
       @@ -2404,8 +2405,16 @@
            0 == dvb_usb_device_init(intf, &t220_properties,
                THIS_MODULE, NULL, adapter_nr) ||
            0 == dvb_usb_device_init(intf, &tt_s2_4600_properties,
                -THIS_MODULE, NULL, adapter_nr))
        +THIS_MODULE, NULL, adapter_nr)) {
        +
        +/* clean up copied properties */
        +kfree(s421);
        +kfree(p7500);
        +kfree(s660);
        +kfree(p1100);
        +
        return 0;
        +}
    
    retval = -ENODEV;
    kfree(s421);
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/gp8psk.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/gp8psk.c
@@ -185,7 +185,7 @@
 static int gp8psk_power_ctrl(struct dvb_usb_device *d, int onoff)
 {
     -u8 status, buf;
     +u8 status = 0, buf;
     int gp_product_id = le16_to_cpu(d->udev->descriptor.idProduct);

     if (onoff) {
         --- linux-4.15.0.orig/drivers/media/usb/dvb-usb/nova-t-usb2.c
         +++ linux-4.15.0/drivers/media/usb/dvb-usb/nova-t-usb2.c
@@ -133,7 +133,7 @@
         static int nova_t_read_mac_address (struct dvb_usb_device *d, u8 mac[6])
         {
             int i;
             +int i, ret;
u8 b;

mac[0] = 0x00;
@@ -142,7 +142,9 @@
     /* this is a complete guess, but works for my box */
 for (i = 136; i < 139; i++) {
     -dibusb_read_eeprom_byte(d, i, &b);
     +ret = dibusb_read_eeprom_byte(d, i, &b);
     +if (ret)
     +return ret;
     mac[5 - (i - 136)] = b;
 }
 --- linux-4.15.0.orig/drivers/media/usb/dvb-usb/technisat-usb2.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/technisat-usb2.c
@@ -607,10 +607,9 @@
     static int technisat_usb2_get_ir(struct dvb_usb_device *d)
     {
         struct technisat_usb2_state *state = d->priv;
     -u8 *buf = state->buf;
     -u8 *b;
     -int ret;
         struct ir_raw_event ev;
     +u8 *buf = state->buf;
     +int i, ret;

     buf[0] = GET_IR_DATA_VENDOR_REQUEST;
     buf[1] = 0x08;
@@ -646,26 +645,25 @@
         return 0; /* no key pressed */
     /* decoding */
     -b = buf+1;
     +#if 0
     deb_rc("RC: %d ", ret);
     -debug_dump(b, ret, deb_rc);
     +debug_dump(buf + 1, ret, deb_rc);
     +#endif
     ev.pulse = 0;
     -while (1) {  
     -ev.pulse = !ev.pulse;
     -ev.duration = (*b * FIRMWARE_CLOCK_DIVISOR * FIRMWARE_CLOCK_TICK) / 1000;
     -ir_raw_event_store(d->rc_dev, &ev);
     -
     -b++;
-if (*b == 0xff) {
+for (i = 1; i < ARRAY_SIZE(state->buf); i++) {
+if (buf[i] == 0xff) {
  ev.pulse = 0;
  ev.duration = 888888*2;
  ir_raw_event_store(d->rc_dev, &ev);
  break;
}
+  ev.pulse = !ev.pulse;
+  ev.duration = (buf[i] * FIRMWARE_CLOCK_DIVISOR * 
+                  FIRMWARE_CLOCK_TICK) / 1000;
+  ir_raw_event_store(d->rc_dev, &ev);

ir_raw_event_handle(d->rc_dev);
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/vp702x.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/vp702x.c
@@ -294,16 +294,22 @@
static int vp702x_read_mac_addr(struct dvb_usb_device *d,u8 mac[6])
{
  u8 i, *buf;
  int ret;
struct vp702x_device_state *st = d->priv;

  mutex_lock(&st->buf_mutex);
  buf = st->buf;
-  for (i = 6; i < 12; i++)
-    vp702x_usb_in_op(d, READ_EEPROM_REQ, i, 1, &buf[i - 6], 1);
+  for (i = 6; i < 12; i++) {
+    ret = vp702x_usb_in_op(d, READ_EEPROM_REQ, i, 1,
+                           &buf[i - 6], 1);
+    if (ret < 0)
+      goto err;
+  }
  memcpy(mac, buf, 6);
+err:
  mutex_unlock(&st->buf_mutex);
  return ret;
}

static int vp702x_frontend_attach(struct dvb_usb_adapter *adap)
--- linux-4.15.0.orig/drivers/media/usb/dvb-usb/vp7045.c
+++ linux-4.15.0/drivers/media/usb/dvb-usb/vp7045.c
@@ -99,10 +99,14 @@
static int vp7045_rc_query(struct dvb_usb_device *d)
{
    int ret;
    u8 key;
    -vp7045_usb_op(d,RC_VAL_READ,NULL,0,&key,1,20);

    -deb_rc("remote query key: %x %d\n",key,key);
    +ret = vp7045_usb_op(d, RC_VAL_READ, NULL, 0, &key, 1, 20);
    +if (ret)
    +return ret;
    +deb_rc("remote query key: %x\n", key);

    if (key != 0x44) {
        /*
@@ -118,15 +122,18 @@
        */
        @@ -118,15 +122,18 @@

        static int vp7045_read_eeprom(struct dvb_usb_device *d,u8 *buf, int len, int offset)
        {
            int i = 0;
            u8 v,br[2];
            +int i, ret;
            +u8 v, br[2];
            for (i=0; i < len; i++) {
                v = offset + i;
                -vp7045_usb_op(d,GET_EE_VALUE,&v,1,br,2,5);
                +ret = vp7045_usb_op(d, GET_EE_VALUE, &v, 1, br, 2, 5);
                +if (ret)
                +return ret;
                +deb_info("VP7045 EEPROM read (offs: %d, len: %d) : ", offset, i);
                debug_dump(buf, i, deb_info);
                return 0;
            }

            --- linux-4.15.0.orig/drivers/media/usb/em28xx/em28xx-cards.c
            +++ linux-4.15.0/drivers/media/usb/em28xx/em28xx-cards.c
            @@ -508,8 +508,10 @@
                
                /*
- * 2040:0265 Hauppauge WinTV-dualHD DVB
- * 2040:026d Hauppauge WinTV-dualHD ATSC/QAM
+ * 2040:0265 Hauppauge WinTV-dualHD DVB Isoc
+ */
* * 2040:8265 Hauppauge WinTV-dualHD DVB Bulk
* * 2040:026d Hauppauge WinTV-dualHD ATSC/QAM Isoc
* * 2040:826d Hauppauge WinTV-dualHD ATSC/QAM Bulk
* reg 0x80/0x84:
* GPIO_0: Yellow LED tuner 1, 0=on, 1=off
* GPIO_1: Green LED tuner 1, 0=on, 1=off
@@ -2110,13 +2112,13 @@
    .input           = { {
        .type     = EM28XX_VMUX_COMPOSITE,
        .vmux     = TVP5150_COMPOSITE1,
-    			.amux     = EM28XX_AUDIO_SRC_LINE,
+    			.amux     = EM28XX_AMUX_LINE_IN,
        .gpio     = terratec_av350_unmute_gpio,
    }, {
        .type     = EM28XX_VMUX_SVIDEO,
-    			.amux     = EM28XX_AUDIO_SRC_LINE,
+    			.amux     = EM28XX_AMUX_LINE_IN,
        .gpio     = terratec_av350_unmute_gpio,
    } },
@@ -2392,7 +2394,8 @@
    .has_dvb       = 1,
},
/*
- * 2040:0265 Hauppauge WinTV-dualHD (DVB version).
+ * 2040:0265 Hauppauge WinTV-dualHD (DVB version) Isoc.
+ * 2040:8265 Hauppauge WinTV-dualHD (DVB version) Bulk.
* Empia EM28274, 2x Silicon Labs Si2168, 2x Silicon Labs Si2157
*/
[EM28174_BOARD_HAUPPAUGE_WINTV_DUALHD_DVB] = {
    @@ -2407,7 +2410,8 @@
        .leds          = hauppauge_dualhd_leds,
    },
/*
- * 2040:026d Hauppauge WinTV-dualHD (model 01595 - ATSC/QAM).
+ * 2040:026d Hauppauge WinTV-dualHD (model 01595 - ATSC/QAM) Isoc.
+ * 2040:826d Hauppauge WinTV-dualHD (model 01595 - ATSC/QAM) Bulk.
* Empia EM28274, 2x LG LGDT3306A, 2x Silicon Labs Si2157
*/
[EM28174_BOARD_HAUPPAUGE_WINTV_DUALHD_01595] = {
    @@ -2548,8 +2552,12 @@
        .driver_info = EM2883_BOARD_HAUPPAUGE_WINTV_HVR_850 ],
    { USB_DEVICE(0x2040, 0x265),
        .driver_info = EM28174_BOARD_HAUPPAUGE_WINTV_DUALHD_DVB ],
+    { USB_DEVICE(0x2040, 0x8265),
+        .driver_info = EM28174_BOARD_HAUPPAUGE_WINTV_DUALHD_DVB ],
{ USBDEVICE(0x2040, 0x026d),
 .driver_info = EM28174_BOARD_HAUPPAUGE_WINTV_DUALHD_01595 },
+{ USBDEVICE(0x2040, 0x826d),
 .driver_info = EM28174_BOARD_HAUPPAUGE_WINTV_DUALHD_01595 },
{ USBDEVICE(0x0438, 0xb002),
 .driver_info = EM2880_BOARD_AMD_ATI_TV_WONDER_HD_600 },
{ USBDEVICE(0x2001, 0xf112),
@@ -2610,7 +2618,11 @@
 .driver_info = EM28178_BOARD_PCTV_461E },
{ USBDEVICE(0x2013, 0x025f),
 .driver_info = EM28178_BOARD_PCTV_292E },
-{ USBDEVICE(0x2040, 0x0264), /* Hauppauge WinTV-soloHD */
+{ USBDEVICE(0x2040, 0x0264), /* Hauppauge WinTV-soloHD Isoc */
 .driver_info = EM28178_BOARD_PCTV_292E },
+{ USBDEVICE(0x2040, 0x8264), /* Hauppauge OEM Generic WinTV-soloHD Bulk */
 .driver_info = EM28178_BOARD_PCTV_292E },
+{ USBDEVICE(0x2040, 0x8268), /* Hauppauge Retail WinTV-soloHD Bulk */
 .driver_info = EM28178_BOARD_PCTV_292E },
{ USBDEVICE(0x0413, 0x6f07),
 .driver_info = EM2861_BOARD_LEADTEK_VC100 },
--- linux-4.15.0.orig/drivers/media/usb/em28xx/em28xx-dvb.c
+++ linux-4.15.0/drivers/media/usb/em28xx/em28xx-dvb.c
@@ -2056,6 +2056,7 @@
   return result;
 out_free:
+em28xx_uninit_usb_xfer(dev, EM28XX_DIGITAL_MODE);
 kfree(dvb);
 dev->dvb = NULL;
 goto ret;
 @@ -2105,6 +2106,8 @@
 }
 }

+em28xx_unregister_dvb(dvb);
+/* remove I2C SEC */
.client = dvb->i2c_client_sec;
 if (client) {
   @@ -2126,7 +2129,6 @@
   i2c_unregister_device(client);
 }

-em28xx_unregister_dvb(dvb);
 kfree(dvb);
 dev->dvb = NULL;
 kref_put(&dev->ref, em28xx_free_device);
--- linux-4.15.0.orig/drivers/media/usb/em28xx/em28xx-input.c
dev->board.has_ir_i2c = 0;
dev_warn(&dev->intf->dev,
"No i2c IR remote control device found.\n");
return -ENODEV;
+err = -ENODEV;
+goto ref_put;
}
}

ir = kzalloc(sizeof(*ir), GFP_KERNEL);
if (!ir)
-return -ENOMEM;
+goto ref_put;
rc = rc_allocate_device(RC_DRIVER_SCANCODE);
if (!rc)
goto error;

em28xx_videodbg("%s\n", __func__);
+dev->v4l2->field_count = 0;
+/
*/ Make sure streaming is not already in progress for this type
 of filehandle (e.g. video, vbi) */
rc = res_get(dev, vq->type);
-@ -1445,9 +1447,9 @@
fmt = format_by_fourcc(f->fmt.pix.pixelformat);
if (!fmt) {
-em28xx_videodbg("Fourcc format (%08x) invalid.\n",
-f->fmt.pix.pixelformat);
-return -EINVAL;
+f->fmt.pix.pixelformat);
+fmt = &format[0];
if (dev->board.is_em2800) {

--- linux-4.15.0.orig/drivers/media/usb/em28xx/em28xx.h
+++ linux-4.15.0/drivers/media/usb/em28xx/em28xx.h
@@ -191,7 +191,7 @@
     * USB 2.0 spec says bulk packet size is always 512 bytes
 */
#define EM28XX_BULK_PACKET_MULTIPLIER 384
-#define EM28XX_DVB_BULK_PACKET_MULTIPLIER 384
+#define EM28XX_DVB_BULK_PACKET_MULTIPLIER 94

#define EM28XX_INTERLACED_DEFAULT 1

--- linux-4.15.0.orig/drivers/media/usb/go7007/go7007-driver.c
+++ linux-4.15.0/drivers/media/usb/go7007/go7007-driver.c
@@ -698,49 +698,23 @@

struct device *dev)
{
    struct go7007 *go;
    -int i;

    go = kzalloc(sizeof(struct go7007), GFP_KERNEL);
    if (go == NULL)
        return NULL;
    go->dev = dev;
    go->board_info = board;
    -go->board_id = 0;
    -go->tuner_type = -1;
    -go->channel_number = 0;
    -go->name[0] = 0;
    mutex_init(&go->hw_lock);
    init_waitqueue_head(&go->frame_waitq);
    spin_lock_init(&go->spinlock);
    go->status = STATUS_INIT;
    -memset(&go->i2c_adapter, 0, sizeof(go->i2c_adapter));
    -go->i2c_adapter_online = 0;
    -go->interrupt_available = 0;
    init_waitqueue_head(&go->interrupt_waitq);
    -go->input = 0;
    go7007_update_board(go);
    -go->encoder_h_halve = 0;
    -go->encoder_v_halve = 0;
    -go->encoder_subsample = 0;
    go->format = V4L2_PIX_FMT_MJPEG;
    go->bitrate = 1500000;
go->fps_scale = 1;
-go->pali = 0;
go->aspect_ratio = GO7007_RATIO_1_1;
-go->gop_size = 0;
-go->ipb = 0;
go->closed_gop = 0;
go->repeat_seqhead = 0;
go->seq_header_enable = 0;
go->gop_header_enable = 0;
go->dvd_mode = 0;
go->interlace_coding = 0;
for (i = 0; i < 4; ++i)
go->modet[i].enable = 0;
for (i = 0; i < 1624; ++i)
go->modet_map[i] = 0;
go->audio_deliver = NULL;
go->audio_enabled = 0;
return go;
}
--- linux-4.15.0.orig/drivers/media/usb/go7007/go7007-fw.c
+++ linux-4.15.0/drivers/media/usb/go7007/go7007-fw.c
@@ -1499,8 +1499,8 @@
 return cnt;
 }

-static int do_special(struct go7007 *go, u16 type, __le16 *code, int space,
-+static noinline_for_stack int do_special(struct go7007 *go, u16 type,
+ **le16 *code, int space, int *framelen)
+ {
switch (type) {
 case SPECIAL_FRM_HEAD:
 --- linux-4.15.0.orig/drivers/media/usb/go7007/go7007-usb.c
 +++ linux-4.15.0/drivers/media/usb/go7007/go7007-usb.c
 @@ -1052,6 +1052,7 @@
 struct go7007_usb *usb;
 const struct go7007_usb_board *board;
 struct usb_device *usbdev = interface_to_usbdev(intf);
+struct usb_host_endpoint *ep;
 unsigned num_i2c_devs;
 char *name;
 int video_pipe, i, v_urb_len;
 @@ -1147,7 +1148,7 @@
 if (usb->intr_urb->transfer_buffer == NULL)
goto allocfail;
-if (go->board_id == GO7007_BOARDIDSENSORAY_2250)
+ep = usb->usbdev->ep_in[4];
+if (usb_endpoint_type(&ep->desc) == USB_ENDPOINT_XFER_BULK)
usb_fill_bulk_urb(usb->intr_urb, usb->usbdev, 
usb_rcvbulkpipe(usb->usbdev, 4), 
usb->intr_urb->transfer_buffer, 2*sizeof(u16), 
--- linux-4.15.0.orig/drivers/media/usb/go7007/snd-go7007.c
+++ linux-4.15.0/drivers/media/usb/go7007/snd-go7007.c
@@ -243,22 +243,18 @@
gosnd->capturing = 0;
ret = snd_card_new(go->dev, index[dev], id[dev], THIS_MODULE, 0, 
    &gosnd->card);
-if (ret < 0) {
-    kfree(gosnd);
-    return ret;
-}
+if (ret < 0)
+    goto free_snd;
+ret = snd_device_new(gosnd->card, SNDRV_DEV_LOWLEVEL, go, 
    &go7007_snd_device_ops);
-if (ret < 0) {
-    kfree(gosnd);
-    return ret;
-}
+if (ret < 0)
+    goto free_card;
+ret = snd_pcm_new(gosnd->card, "go7007", 0, 0, 1, &gosnd->pcm);
-if (ret < 0) {
-    snd_card_free(gosnd->card);
-    kfree(gosnd);
-    return ret;
-}
+if (ret < 0)
+    goto free_card;
+strlcpy(gosnd->card->driver, "go7007", sizeof(gosnd->card->driver));
strlcpy(gosnd->card->shortname, go->name, sizeof(gosnd->card->shortname),
@@ -269,11 +265,8 @@
    &go7007_snd_capture_ops);
ret = snd_card_register(gosnd->card);
-if (ret < 0) {
-    snd_card_free(gosnd->card);
-    kfree(gosnd);
-    return ret;
-}
+    }ggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggggg...
+if (ret < 0)
+goto free_card;

gosnd->substream = NULL;
go->snd_context = gosnd;
@@ -281,6 +274,12 @@
++dev;

return 0;
+
+free_card:
+snd_card_free(gosnd->card);
+free_snd:
+kfree(gosnd);
+return ret;
}
EXPORT_SYMBOL(go7007_snd_init);

--- linux-4.15.0.orig/drivers/media/usb/gspca/gspca.c
+++ linux-4.15.0/drivers/media/usb/gspca/gspca.c
@@ -2037,7 +2037,7 @@
pr_err("couldn't kzalloc gspca struct\n");
return -ENOMEM;
}
gspca_dev->usb_buf = kmalloc(USB_BUF_SZ, GFP_KERNEL);
gspca_dev->usb_buf = kzalloc(USB_BUF_SZ, GFP_KERNEL);
if (!gspca_dev->usb_buf) {
pr_err("out of memory\n");
ret = -ENOMEM;
@@ -2139,6 +2139,9 @@
input_unregister_device(gspca_dev->input_dev);
#else
v4l2_ctrl_handler_free(gspca_dev->vdev.ctrl_handler);
+v4l2_device_unregister(&gspca_dev->v4l2_dev);
+if (sd_desc->probe_error)
+sd_desc->probe_error(gspca_dev);
kfree(gspca_dev->usb_buf);
kfree(gspca_dev);
return ret;
--- linux-4.15.0.orig/drivers/media/usb/gspca/gspca.h
+++ linux-4.15.0/drivers/media/usb/gspca/gspca.h
@@ -102,6 +102,7 @@
cam_op start;		/* called on stream on after URBs creation */
cam_pkt_op pkt_scan;

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/* optional operations */
--- linux-4.15.0.orig/drivers/media/usb/gspca/konica.c
+++ linux-4.15.0/drivers/media/usb/gspca/konica.c
@@ -123,6 +123,11 @@
if (ret < 0) {
    pr_err("reg_r err %d\n", ret);
    gspca_dev->usb_err = ret;
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, 2);
}
}

--- linux-4.15.0.orig/drivers/media/usb/gspca/m5602/m5602_po1030.c
+++ linux-4.15.0/drivers/media/usb/gspca/m5602/m5602_po1030.c
@@ -159,6 +159,7 @@
int po1030_probe(struct sd *sd)
{
    u8 dev_id_h = 0, i;
    +int err;
    struct gspca_dev *gspca_dev = (struct gspca_dev *)sd;

    if (force_sensor) {
@@ -177,10 +178,13 @@
        for (i = 0; i < ARRAY_SIZE(preinit_po1030); i++) {
            u8 data = preinit_po1030[i][2];
            if (preinit_po1030[i][0] == SENSOR) {
@@ -266,15 +269,17 @@
                else {
                    m5602_write_bridge(sd, preinit_po1030[i][1], data);
                    +err = m5602_write_bridge(sd, preinit_po1030[i][1],
                    +    data);
                    +if (err < 0)
                    +return err;
                }
            }
        }

        if (m5602_read_sensor(sd, PO1030_DEVID_H, &dev_id_h, 1))
--- linux-4.15.0.orig/drivers/media/usb/gspca/nw80x.c
+++ linux-4.15.0/drivers/media/usb/gspca/nw80x.c
@@ -1580,6 +1580,11 @@
        if (ret < 0) {
            pr_err("reg_r err %d\n", ret);
            gspca_dev->usb_err = ret;
            
            if (m5602_read_sensor(sd, PO1030_DEVID_H, &dev_id_h, 1))
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
+return;
+
+if (len == 1)
+return;
+
+PERR("reg_r %02x failed %d\n", index, ret);
sd->gspca_dev.usb_err = ret;
+/*
+ * Make sure the result is zeroed to avoid uninitialized
+ * values.
+ */
+gspca_dev->usb_buf[0] = 0;
+
+PERR("reg_r8 %02x failed %d\n", index, ret);
sd->gspca_dev.usb_err = ret;
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, 8);
+
+return ret;
+
+if (alt->desc.bNumEndpoints < 1) {
+sd->gspca_dev.usb_err = -ENOODEV;
+return;
+}
+
+packet_size = le16_to_cpu(alt->endpoint[0].desc.wMaxPacketSize);
+reg_w(sd, R51x_FIFO_PSIZE, packet_size >> 5);
+
+return.
if (alt->desc.bNumEndpoints < 1) {
    sd->gspca_dev.usb_err = -ENODEV;
    return;
}

packet_size = le16_to_cpu(alt->endpoint[0].desc.wMaxPacketSize);
ov518_reg_w32(sd, R51x_FIFO_PSIZE, packet_size & ~7, 2);

--- linux-4.15.0.orig/drivers/media/usb/gspca/ov534.c
+++ linux-4.15.0/drivers/media/usb/gspca/ov534.c
@@ -641,6 +641,11 @@
    if (ret < 0) {
        pr_err("read failed %d\n", ret);
        gspca_dev->usb_err = ret;
    /*
     *
     * Make sure the result is zeroed to avoid uninitialized
     * values.
     */
    +gspca_dev->usb_buf[0] = 0;
    }
    return gspca_dev->usb_buf[0];
}

--- linux-4.15.0.orig/drivers/media/usb/gspca/ov534_9.c
+++ linux-4.15.0/drivers/media/usb/gspca/ov534_9.c
@@ -1153,6 +1153,7 @@
    if (ret < 0) {
        pr_err("reg_r err %d\n", ret);
        gspca_dev->usb_err = ret;
    +return 0;
    }
    return gspca_dev->usb_buf[0];
}

--- linux-4.15.0.orig/drivers/media/usb/gspca/se401.c
+++ linux-4.15.0/drivers/media/usb/gspca/se401.c
@@ -111,6 +111,11 @@
    pr_err("read req failed req %#04x error %d\n",
            req, err);
    gspca_dev->usb_err = err;
    /*
     *
     * Make sure the buffer is zeroed to avoid uninitialized
     * values.
     */
    +memset(gspca_dev->usb_buf, 0, READ_REQ_SIZE);
    }
}
--- linux-4.15.0.orig/drivers/media/usb/gspca/sn9c20x.c
+++ linux-4.15.0/drivers/media/usb/gspca/sn9c20x.c
@@ -133,6 +133,13 @@
      {
      .ident = "MSI MS-1039",
      .matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "MICRO-STAR INTL CO.,LTD."),
+DMI_MATCH(DMI_PRODUCT_NAME, "MS-1039"),
+}
+},
+{
.ident = "MSI MS-1632",
.matches = {
 DMI_MATCH(DMI_BOARD_VENDOR, "MSI"),
@@ -918,6 +925,11 @@
if (unlikely(result < 0 || result != length)) {
 pr_err("Read register %02x failed %d\n", reg, result);
gspca_dev->usb_err = result;
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
} }

--- linux-4.15.0.orig/drivers/media/usb/gspca/sonixb.c
+++ linux-4.15.0/drivers/media/usb/gspca/sonixb.c
@@ -462,6 +462,11 @@
dev_err(gspca_dev->v4l2_dev.dev,
 "Error reading register %02x: %d\n", value, res);
gspca_dev->usb_err = res;
+/*
+ * Make sure the result is zeroed to avoid uninitialized
+ * values.
+ */
+gspca_dev->usb_buf[0] = 0;
} }

--- linux-4.15.0.orig/drivers/media/usb/gspca/sonixj.c
+++ linux-4.15.0/drivers/media/usb/gspca/sonixj.c
@@ -1170,6 +1170,11 @@
if (ret < 0) {
 pr_err("reg_r err %d\n", ret);
gspca_dev->usb_err = ret;

+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
+
--- linux-4.15.0.orig/drivers/media/usb/gspca1528.c
+++ linux-4.15.0/drivers/media/usb/gspca1528.c
@@ -80,6 +80,11 @@
if (ret < 0) {
  pr_err("reg_r err %d\n", ret);
  gspca_dev->usb_err = ret;
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
+
--- linux-4.15.0.orig/drivers/media/usb/gspca/sq905.c
+++ linux-4.15.0/drivers/media/usb/gspca/sq905.c
@@ -125,7 +125,7 @@
        ret = usb_control_msg(gspca_dev->dev,        
                        usb_sndctrlpipe(gspca_dev->dev, 0),  
                        USB_REQ_SYNCH_FRAME,                /* request */
--- linux-4.15.0.orig/drivers/media/usb/gspca/sq930x.c
+++ linux-4.15.0/drivers/media/usb/gspca/sq930x.c
@@ -434,6 +434,11 @@
        if (ret < 0) {
          pr_err("reg_r %04x failed %d\n", value, ret);
          gspca_dev->usb_err = ret;
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
+
        sq905_read_data(struct gspca_dev *gspca_dev, u8 *data, int size, int need_lock)  
          int ret;
          -int act_len;
+int act_len = 0;

          gspca_dev->usb_buf[0] = \'0\';
          if (need_lock)
            sq905_read_data(struct gspca_dev *gspca_dev, u8 *data, int size, int need_lock)  
              int ret;
            -int act_len;
+int act_len = 0;
/*
 * Make sure the buffer is zeroed to avoid uninitialized
 * values.
 */
memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
}
}

--- linux-4.15.0.orig/drivers/media/usb/gspca/stv06xx/stv06xx.c
+++ linux-4.15.0/drivers/media/usb/gspca/stv06xx/stv06xx.c
@@ -289,6 +289,9 @@
return -EIO;
}

+if (alt->desc.bNumEndpoints < 1)
+return -ENODEV;
+packet_size = le16_to_cpu(alt->endpoint[0].desc.wMaxPacketSize);
err = stv06xx_write_bridge(sd, STV_ISO_SIZE_L, packet_size);
if (err < 0)
@@ -313,11 +316,21 @@
static int stv06xx_isoc_init(struct gspca_dev *gspca_dev)
{
+struct usb_interface_cache *intfc;
struct usb_host_interface *alt;
struct sd *sd = (struct sd *) gspca_dev;
+intfc = gspca_dev->dev->actconfig->intf_cache[0];
+if (intfc->num_altsetting < 2)
+return -ENOODEV;
+alt = &intfc->altsetting[1];
+if (alt->desc.bNumEndpoints < 1)
+return -ENOODEV;
+/* Start isoc bandwidth "negotiation" at max isoc bandwidth */
-alt = &gspca_dev->dev->actconfig->intf_cache[0]->altsetting[1];
alt->endpoint[0].desc.wMaxPacketSize =
  cpu_to_le16(sd->sensor->max_packet_size[gspca_dev->curr_mode]);
@@ -330,6 +343,10 @@
struct usb_host_interface *alt;
struct sd *sd = (struct sd *) gspca_dev;
+/*

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+ * Existence of altsetting and endpoint was verified in
+ * stv06xx_isoc_init()
+ */
alt = &gspca_dev->dev->actconfig->intf_cache[0]->altsetting[1];
packet_size = le16_to_cpu(alt->endpoint[0].desc.wMaxPacketSize);
min_packet_size = sd->sensor->min_packet_size[gspca_dev->curr_mode];
static int stv06xx_config(struct gspca_dev *gspca_dev,
const struct usb_device_id *id);

+static void stv06xx_probe_error(struct gspca_dev *gspca_dev)
+{                  +
+struct sd *sd = (struct sd *)gspca_dev;
+
+kfree(sd->sensor_priv);
+sd->sensor_priv = NULL;
+
+ /* sub-driver description */
static const struct sd_desc sd_desc = {
   .name = MODULE_NAME,
   .config = stv06xx_config,
   .init = stv06xx_init,
   .init_controls = stv06xx_init_controls,
   .probe_error = stv06xx_probe_error,
   .start = stv06xx_start,
   .stopN = stv06xx_stopN,
   .pkt_scan = stv06xx_pkt_scan,
--- linux-4.15.0.orig/drivers/media/usb/gspca/stv06xx/stv06xx_pb0100.c
+++ linux-4.15.0/drivers/media/usb/gspca/stv06xx/stv06xx_pb0100.c
@@ -194,6 +194,10 @@
alt = usb_altnum_to_altsetting(intf, sd->gspca_dev.alt);
if (!alt)
   return -ENODEV;
+
+if (alt->desc.bNumEndpoints < 1)
+return -ENODEV;
+
+ packet_size = le16_to_cpu(alt->endpoint[0].desc.wMaxPacketSize);

/ * If we don’t have enough bandwidth use a lower framerate */
--- linux-4.15.0.orig/drivers/media/usb/gspca/sunplus.c
+++ linux-4.15.0/drivers/media/usb/gspca/sunplus.c
@@ -194,6 +194,10 @@
PERR("reg_r: buffer overflow\n");
return;
}
+if (len == 0) {
PERR("reg_r: zero-length read\n");
+return;
+
if (gspca_dev->usb_err < 0)
return;

ret = usb_control_msg(gspca_dev->dev,
@@ -259,11 +263,16 @@
USB_DIR_IN | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
0,/* value */
index,
-len ? gspca_dev->usb_buf : NULL, len,
-gspca_dev->usb_buf, len,
500);
if (ret < 0) {
    pr_err("reg_r err %d\n", ret);
gspca_dev->usb_err = ret;
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
}
}

--- linux-4.15.0.orig/drivers/media/usb/gspca/w996Xcf.c
--- linux-4.15.0.orig/drivers/media/usb/gspca/vc032x.c
+++ linux-4.15.0/drivers/media/usb/gspca/vc032x.c
@@ -2915,6 +2915,11 @@
if (ret < 0) {
    pr_err("reg_r err %d\n", ret);
gspca_dev->usb_err = ret;
+/*
+ * Make sure the buffer is zeroed to avoid uninitialized
+ * values.
+ */
+memset(gspca_dev->usb_buf, 0, USB_BUF_SZ);
}
}

static void reg_r(struct gspca_dev *gspca_dev,
--- linux-4.15.0.orig/drivers/media/usb/gspca/vc032x.c
pr_err("Read SB reg [01] failed\n");
sd->gspca_dev.usb_err = ret;

/* Make sure the buffer is zeroed to avoid uninitialized
 * values.
 */
memset(sd->gspca_dev.usb_buf, 0, 2);

udelay(W9968CF_I2C_BUS_DELAY);

if (alt->desc.bNumEndpoints < 1)
+return -ENODEV;
+
return le16_to_cpu(alt->endpoint[0].desc.wMaxPacketSize);

intfc = gspca_dev->dev->actconfig->intf_cache[0];
+struct usb_interface_cache *intfc;
+struct usb_host_interface *alt;
+int max_packet_size;
+
break;
+
+if (intfc->num_altsetting < 2)
+return -ENODEV;
+
+alt = &intfc->altsetting[1];
+
/* Start isoc bandwidth "negotiation" at max isoc bandwidth */
alt = &gspca_dev->dev->actconfig->intf_cache[0]->altsetting[1];
alt->endpoint[0].desc.wMaxPacketSize = cpu_to_le16(max_packet_size);
return 0;
@@ -2673,6 +2686,9 @@
break;
}

+/*
+ * Existence of altsetting and endpoint was verified in sd_isoc_init()
+ */
alt = &gspca_dev->dev->actconfig->intf_cache[0]->altsetting[1];
packet_size = le16_to_cpu(alt->endpoint[0].desc.wMaxPacketSize);
if (packet_size <= min_packet_size)
--- linux-4.15.0.orig/drivers/media/usb/hdpvr/hdpvr-core.c
+++ linux-4.15.0/drivers/media/usb/hdpvr/hdpvr-core.c
@@ -141,6 +141,7 @@
dev->fw_ver = dev->usbc_buf[1];

+dev->usbc_buf[46] = '0';
v4l2_info(&dev->v4l2_dev, "firmware version 0x%x dated %s\n", dev->fw_ver, &dev->usbc_buf[2]);

@@ -275,6 +276,7 @@
    #endif
size_t buffer_size;
int i;
+int dev_num;
int retval = -ENOMEM;

    /* allocate memory for our device state and initialize it */
    @@ -292,7 +294,7 @@
        /* register v4l2_device early so it can be used for printks */
        if (v4l2_device_register(&interface->dev, &dev->v4l2_dev)) {
            dev_err(&interface->dev, "v4l2_device_register failed\n");
    -goto error;
    +goto error_free_dev;
    }

    mutex_init(&dev->io_mutex);
    @@ -301,7 +303,7 @@
        dev->usbc_buf = kmalloc(64, GFP_KERNEL);
        if (!dev->usbc_buf) {
            v4l2_err(&dev->v4l2_dev, "Out of memory\n");
    -goto error;
    +goto error_v4l2_unregister;
    }
init_waitqueue_head(&dev->wait_buffer);
@@ -339,13 +341,13 @@
}
if (!dev->bulk_in_endpointAddr) {
    v4l2_err(&dev->v4l2_dev, "Could not find bulk-in endpoint\n");
    -goto error;
    +goto error_put_usb;
}
/* init the device */
if (hdpvr_device_init(dev)) {
    v4l2_err(&dev->v4l2_dev, "device init failed\n");
    -goto error;
    +goto error_put_usb;
}
mutex_lock(&dev->io_mutex);
@@ -353,7 +355,7 @@
mutex_unlock(&dev->io_mutex);
    v4l2_err(&dev->v4l2_dev, "allocating transfer buffers failed\n");
    -goto error;
    +goto error_put_usb;
}
mutex_unlock(&dev->io_mutex);
@@ -361,7 +363,7 @@
    retval = hdpvr_register_i2c_adapter(dev);
if (retval < 0) {
    v4l2_err(&dev->v4l2_dev, "i2c adapter register failed\n");
    -goto error;
    +goto error_free_buffers;
}
client = hdpvr_register_ir_rx_i2c(dev);
@@ -379,8 +381,17 @@
#else
    dev_num = atomic_inc_return(&dev_nr);
    +if (dev_num >= HDPVR_MAX) {
        v4l2_err(&dev->v4l2_dev, "max device number reached, device register failed\n");
        +atomic_dec(&dev_nr);
        +retval = -ENODEV;
        +goto reg_fail;
    +}
+ retval = hdpvr_register_videodev(dev, &interface->dev,
  - video_nr[atomic_inc_return(&dev_nr)]);
+ video_nr[dev_num]);
if (retval < 0) {
  v4l2_err(&dev->v4l2_dev, "registering videodev failed\n");
goto reg_fail;
  @ @ -394,13 +405,17 @@
reg_fail:
#if IS_ENABLED(CONFIG_I2C)
i2c_del_adapter(&dev->i2c_adapter);
+error_free_buffers:
#endif
+hdpvr_free_buffers(dev);
+error_put_usb:
+usb_put_dev(dev->udev);
+kfree(dev->usbc_buf);
+error_v4l2_unregister:
+v4l2_device_unregister(&dev->v4l2_dev);
+error_free_dev:
+kfree(dev);
error:
  -if (dev) {
  -flush_work(&dev->worker);
  -/" this frees allocated memory */
  -hdpvr_delete(dev);
  -}
  return retval;
}

--- linux-4.15.0.orig/drivers/media/usb/hdpvr/hdpvr-video.c
+++ linux-4.15.0/drivers/media/usb/hdpvr/hdpvr-video.c
@@ -439,7 +439,7 @@
 /* wait for the first buffer */
 if (!file->f_flags & O_NONBLOCK)) {
 if (wait_event_interruptible(dev->wait_data,
-    hdpvr_get_next_buffer(dev)))
+    !list_empty_careful(&dev->rec_buff_list))
   return -ERESTARTSYS;
 }

@@ -465,10 +465,17 @@ goto err;
 goto if (!err) {
- v4l2_dbg(MSG_INFO, hdpvr_debug, &dev->v4l2_dev,
- "timeout: restart streaming\n");
+ error_free_dev:
+v4l2_dev(

mutex_lock(&dev->io_mutex);
hdpvr_stop_streaming(dev);
mutex_unlock(&dev->io_mutex);

/*
 * The FW needs about 4 seconds after streaming
 * stopped before it is ready to restart
 * streaming.
 */
msleep(4000);
err = hdpvr_start_streaming(dev);
if (err) {
ret = err;
}

struct hdpvr_device *dev = video_get_drvdata(vdev);

hdpvr_delete(dev);
mutex_lock(&dev->io_mutex);
flush_work(&dev->worker);
mutex_unlock(&dev->io_mutex);
v4l2_device_unregister(&dev->v4l2_dev);
v4l2_ctrl_handler_free(&dev->hdl);

unsigned int vers;
struct completion cmd_done;
struct work_struct work;

struct pulse8 *pulse8 =

container_of(work, struct pulse8, work);
+u8 result = pulse8->work_result;

-switch (pulse8->data[0] & 0x3f) {
+switch (pulse8->data[0] & 0x3f) {
    +case MSGCODE_FRAME_DATA:
    cec_received_msg(pulse8->adap, &pulse8->rx_msg);
    break;
    @@ -177,12 +180,12 @@
    pulse8->escape = false;
    } else if (data == MSGEND) {
    struct cec_msg *msg = &pulse8->rx_msg;
    +u8 msgcode = pulse8->buf[0];

    if (debug)
    dev_info(pulse8->dev, "received: %*ph\n",
            pulse8->idx, pulse8->buf);
    -pulse8->data[0] = pulse8->buf[0];
    -switch (pulse8->buf[0] & 0x3f) {
    +switch (msgcode & 0x3f) {
      case MSGCODE_FRAME_START:
      msg->len = 1;
      msg->msg[0] = pulse8->buf[1];
    @@ -191,14 +194,20 @@
      if (msg->len == CEC_MAX_MSG_SIZE)
      break;
      msg->msg[msg->len++] = pulse8->buf[1];
      -if (pulse8->buf[0] & MSGCODE_FRAME_EOM)
      +if (msgcode & MSGCODE_FRAME_EOM) {
            +WARN_ON(pulse8->work_result);
            +pulse8->work_result = msgcode;
            +schedule_work(&pulse8->work);
            +break;
        +}
    break;
    case MSGCODE_TRANSMIT_SUCCEEDED:
    case MSGCODE_TRANSMIT_FAILED_LINE:
    case MSGCODE_TRANSMIT_FAILED_ACK:
    case MSGCODE_TRANSMIT_FAILED_TIMEOUT_DATA:
    case MSGCODE_TRANSMIT_FAILED_TIMEOUT_LINE:
      +WARN_ON(pulse8->work_result);
      +pulse8->work_result = msgcode;
      schedule_work(&pulse8->work);
      break;
    case MSGCODE_HIGH_ERROR:
      @@ -585,7 +594,7 @@
      else
pulse8->config_pending = true;
mutex_unlock(&pulse8->config_lock);
-return err;
+return log_addr == CEC_LOG_ADDR_INVALID ? 0 : err;
}

static int pulse8_cec_adap_transmit(struct cec_adapter *adap, u8 attempts,
--- linux-4.15.0.orig/drivers/media/usb/pvrusb2/pvrusb2-hdw.c
+++ linux-4.15.0/drivers/media/usb/pvrusb2/pvrusb2-hdw.c
@@ -666,6 +666,8 @@
static int ctrl_check_input(struct pvr2_ctrl *cptr,int v)
{
+if (v < 0 || v > PVR2_CVAL_INPUT_MAX)
+return 0;
return ((1 << v) & cptr->hdw->input_allowed_mask) != 0;
}

@@ -1678,7 +1680,7 @@
if (!hdw->flag_decoder_missed) {
    pvr2_trace(PVR2_TRACE_ERROR_LEGS,
        "WARNING: No decoder present");
+    "***WARNING*** No decoder present");
    hdw->flag_decoder_missed = !0;
    trace_stbit("flag_decoder_missed",
        hdw->flag_decoder_missed);
@@ -2363,7 +2365,7 @@
if (hdw->flag_decoder_missed) {
    pvr2_trace(PVR2_TRACE_ERROR_LEGS,
        "WARNING: No decoder present");
+    "***WARNING*** No decoder present");
    hdw->flag_decoder_missed = !0;
    trace_stbit("flag_decoder_missed",
        hdw->flag_decoder_missed);
@@ -2665,9 +2667,8 @@
    pvr2_stream_destroy(hdw->vid_stream);
    hdw->vid_stream = NULL;
}
-pvr2_i2c_core_done(hdw);
-v4l2_device_unregister(&hdw->v4l2_dev);
-pvr2_hdw_remove_usb_stuff(hdw);
+}pvr2_hdw_disconnect(hdw);
    mutex_lock(&pvr2_unit_mtx);
do {
    if (hdw->unit_number >= 0) &&
@@ -2694,6 +2695,7 @@

```c
{
  pvr2_trace(PVR2_TRACE_INIT,"pvr2_hdw_disconnect(hdw=%p)",hdw);
  LOCK_TAKE(hdw->big_lock);
  +pvr2_i2c_core_done(hdw);
  LOCK_TAKE(hdw->ctl_lock);
  pvr2_hdw_remove_usb_stuff(hdw);
  LOCK_GIVE(hdw->ctl_lock);
  @@ -3648,6 +3650,12 @@
        hdw);
        hdw->ctl_write_urb->actual_length = 0;
        hdw->ctl_write_pend_flag = !0;
        +if (usb_urb_ep_type_check(hdw->ctl_write_urb)) {
        +pvr2_trace(
        +PVR2_TRACE_ERROR_LEGS,
        +"Invalid write control endpoint");
        +return -EINVAL;
        +}
    status = usb_submit_urb(hdw->ctl_write_urb,GFP_KERNEL);
    if (status < 0) {
      pvr2_trace(PVR2_TRACE_ERROR_LEGS,
                   @@ -3672,6 +3680,12 @@
                   hdw);
      hdw->ctl_read_urb->actual_length = 0;
      hdw->ctl_read_pend_flag = !0;
      +if (usb_urb_ep_type_check(hdw->ctl_read_urb)) {
      +pvr2_trace(
      +PVR2_TRACE_ERROR_LEGS,
      +"Invalid read control endpoint");
      +return -EINVAL;
      +}
    status = usb_submit_urb(hdw->ctl_read_urb,GFP_KERNEL);
    if (status < 0) {
      pvr2_trace(PVR2_TRACE_ERROR_LEGS,
                  --- linux-4.15.0.orig/drivers/media/usb/pvrusb2/pvrusb2-hdw.h
                  +++ linux-4.15.0/drivers/media/usb/pvrusb2/pvrusb2-hdw.h
                  @@ -50,6 +50,7 @@
                  #define PVR2_CVAL_INPUT_COMPOSITE 2
                  #define PVR2_CVAL_INPUT_SVIDEO 3
                  #define PVR2_CVAL_INPUT_RADIO 4
                  +#define PVR2_CVAL_INPUT_MAX PVR2_CVAL_INPUT_RADIO

                  enum pvr2_config {
                  pvr2_config_empty,    /* No configuration */
                  --- linux-4.15.0.orig/drivers/media/usb/pvrusb2/pvrusb2-i2c-core.c
                  +++ linux-4.15.0/drivers/media/usb/pvrusb2/pvrusb2-i2c-core.c
                  @@ -343,11 +343,11 @@
                  if ((ret != 0) || (*rdata == 0x04) || (*rdata == 0x0a)) {
```
pvr2_trace(PVR2_TRACE_ERROR_LEGS,
    "WARNING: Detected a wedged cx25840 chip; the device will not work.");
pvr2_trace(PVR2_TRACE_ERROR_LEGS,
    "WARNING: Try power cycling the pvrusb2 device.");
pvr2_trace(PVR2_TRACE_ERROR_LEGS,
    "WARNING: Disabling further access to the device to prevent other foul-ups.");
    // This blocks all further communication with the part.

hdw->i2c_func[0x44] = NULL;
pvr2_hdw_render_useless(hdw);
--- linux-4.15.0.orig/drivers/media/usb/pvrusb2/pvrusb2-std.c
+++ linux-4.15.0/drivers/media/usb/pvrusb2/pvrusb2-std.c
@@ -353,7 +353,7 @@
    bcnt = pvr2_std_id_to_str(buf,sizeof(buf),fmsk);
pvr2_trace(PVR2_TRACE_ERROR_LEGS,
    "WARNING: Failed to classify the following standard(s): %.*s",
    "***WARNING*** Failed to classify the following standard(s): %.*s",
    bcnt,buf);
}

--- linux-4.15.0.orig/drivers/media/usb/pvrusb2/pvrusb2-v4l2.c
+++ linux-4.15.0/drivers/media/usb/pvrusb2/pvrusb2-v4l2.c
@@ -915,8 +915,12 @@
pvr2_v4l2_dev_disassociate_parent(vp->dev_video);
pvr2_v4l2_dev_disassociate_parent(vp->dev_radio);
if (!list_empty(&vp->dev_video->devbase.fh_list) ||
    !list_empty(&vp->dev_radio->devbase.fh_list)) {
    pvr2_trace(PVR2_TRACE_STRUCT,
        "pvr2_v4l2 internal_check exit-empty id=%p", vp);
    return;
    }
pvr2_v4l2_destroy_no_lock(vp);
}

@@ -990,7 +994,8 @@
    kfree(fhp);
    if (vp->channel.mc_head->disconnect_flag &&
        list_empty(&vp->dev_video->devbase.fh_list) &&
            list_empty(&vp->dev_radio->devbase.fh_list)) {
            !vp->dev_radio ||
            list_empty(&vp->dev_radio->devbase.fh_list)) {
        pvr2_v4l2_destroy_no_lock(vp);
    }
return 0;
--- linux-4.15.0.orig/drivers/media/usb/siano/smsusb.c
+++ linux-4.15.0/drivers/media/usb/siano/smsusb.c
@@ -402,6 +402,7 @@
 struct smsusb_device_t *dev;
 void *mdev;
 int i, rc;
+int align = 0;

 /* create device object */
 dev = kzalloc(sizeof(struct smsusb_device_t), GFP_KERNEL);
@@ -413,6 +414,24 @@
 dev->udev = interface_to_usbdev(intf);
 dev->state = SMSUSB_DISCONNECTED;

+for (i = 0; i < intf->cur_altsetting->desc.bNumEndpoints; i++) {
+struct usb_endpoint_descriptor *desc =
+&intf->cur_altsetting->endpoint[i].desc;
+  +if (desc->bEndpointAddress & USB_DIR_IN) {
+    dev->in_ep = desc->bEndpointAddress;
+    align = usb_endpoint_maxp(desc) - sizeof(struct sms_msg_hdr);
+  } else {
+    dev->out_ep = desc->bEndpointAddress;
+  }
+}
+  +pr_debug("in_ep = %02x, out_ep = %02x\n", dev->in_ep, dev->out_ep);
+if (!dev->in_ep || !dev->out_ep || align < 0) { /* Missing endpoints? */
+  smsusb_term_device(intf);
+  return -ENODEV;
+}
+  +params.device_type = sms_get_board(board_id)->type;
+
+  switch (params.device_type) {
+    @ @ -427,24 +446,12 @ @
+    /* fall-thru */
+    default:
+      dev->buffer_size = USB2_BUFFER_SIZE;
+      -dev->response_alignment =
-        le16_to_cpu(dev->udev->ep_in[1].desc.wMaxPacketSize) -
-        sizeof(struct sms_msg_hdr);
+      +dev->response_alignment = align;
+    params.flags |= SMS_DEVICE_FAMILY2;
+    break;
+  }
for (i = 0; i < intf->cur_altsetting->b NumEndpoints; i++) {
  if (intf->cur_altsetting->epoend[i].bEndpointAddress & USB_DIR_IN)
    dev->in_ep = intf->cur_altsetting->endpoint[i].bEndpointAddress;
  else
    dev->out_ep = intf->cur_altsetting->endpoint[i].bEndpointAddress;
}

pr_debug("in_ep = %02x, out_ep = %02x\n",
    dev->in_ep, dev->out_ep);

params.device = &dev->udev->dev;
params.buffer_size = dev->buffer_size;
params.num_buffers = MAX_BUFFERS;
--- linux-4.15.0.orig/drivers/media/usb/stkwebcam/stk-webcam.c
+++ linux-4.15.0/drivers/media/usb/stkwebcam/stk-webcam.c
@@ -164,7 +164,11 @@
    *value = *buf;
    kfree(buf);
    return ret;
+    if (ret < 0)
+      return ret;
+    else
+      return 0;
}

static int stk_start_stream(struct stk_camera *dev)
@@ -640,8 +644,7 @@
    dev->owner = NULL;
 }

-if (is_present(dev))
-usb_autopm_put_interface(dev->interface);
+usb_autopm_put_interface(dev->interface);
 mutex_unlock(&dev->lock);
 return v4l2_fh_release(fp);
 }  
@@ -1352,7 +1355,7 @@
    if (!dev->isoc_ep) {
      pr_err("Could not find isoc-in endpoint\n");
      err = -ENODEV;
      goto error;
    }
    dev->vsettings.palette = V4L2_PIX_FMT_RGB565;
    dev->vsettings.mode = MODE_VGA;
err = stk_register_video_device(dev);
if (err)
    -goto error;
+goto error_put;

return 0;

+error_put:
+usb_put_intf(interface);
error:
v4l2_ctrl_handler_free(hdl);
v4l2_device_unregister(&dev->v4l2_dev);
--- linux-4.15.0.orig/drivers/media/usb/tm6000/tm6000-dvb.c
+++ linux-4.15.0/drivers/media/usb/tm6000/tm6000-dvb.c
@@ -105,6 +105,7 @@
printk(KERN_ERR "tm6000:  error %s
", __func__);
kfree(urb->transfer_buffer);
usb_free_urb(urb);
+dev->dvb->bulk_urb = NULL;
}
}
}
@@ -135,6 +136,7 @@
dvb->bulk_urb->transfer_buffer = kzalloc(size, GFP_KERNEL);
if (!dvb->bulk_urb->transfer_buffer) {
    usb_free_urb(dvb->bulk_urb);
+dvb->bulk_urb = NULL;
    return -ENOMEM;
}
@@ -147,6 +149,10 @@
if (ret < 0) {
printk(KERN_ERR "tm6000: error %i in %s during pipe reset\n", 
ret, __func__);
+    kfree(dvb->bulk_urb->transfer_buffer);
+    usb_free_urb(dvb->bulk_urb);
+dvb->bulk_urb = NULL;
    return ret;
} else
printk(KERN_ERR "tm6000: pipe resetted\n");
@@ -161,6 +167,7 @@
kfree(dvb->bulk_urb->transfer_buffer);
    usb_free_urb(dvb->bulk_urb);
+dvb->bulk_urb = NULL;
return ret;
}

@@ -266,6 +273,11 @@

ret = dvb_register_adapter(&dvb->adapter, "Trident TVMaster 6000 DVB-T",
THIS_MODULE, &dev->udev->dev, adapter_nr);
+if (ret < 0) {
+pr_err("tm6000: couldn't register the adapter!\n");
+goto err;
+
+dvb->adapter.priv = dev;
+
if (dvb->frontend) {
--- linux-4.15.0.orig/drivers/media/usb/tm6000/tm6000-video.c
+++ linux-4.15.0/drivers/media/usb/tm6000/tm6000-video.c
@@ -473,11 +473,12 @@
if (dev->urb_buffer)
return 0;

-dev->urb_buffer = kmalloc(sizeof(void *)*num_bufs, GFP_KERNEL);
+dev->urb_buffer = kmalloc(sizeof(*dev->urb_buffer)*num_bufs,
+GFP_KERNEL);
if (!dev->urb_buffer)
return -ENOMEM;
-dev->urb_dma = kmalloc(sizeof(dma_addr_t *)*num_bufs, GFP_KERNEL);
+dev->urb_dma = kmalloc(sizeof(*dev->urb_dma)*num_bufs, GFP_KERNEL);
if (!dev->urb_dma)
return -ENOMEM;

--- linux-4.15.0.orig/drivers/media/usb/ttusb-dec/ttusb_dec.c
+++ linux-4.15.0/drivers/media/usb/ttusb-dec/ttusb_dec.c
@@ -330,7 +330,7 @@
dprintf("%s\n", __func__);

-b = kmalloc(COMMAND_PACKET_SIZE + 4, GFP_KERNEL);
+b = kzalloc(COMMAND_PACKET_SIZE + 4, GFP_KERNEL);
if (!b)
return -ENOMEM;

--- linux-4.15.0.orig/drivers/media/usb/usbtv/usbtv-audio.c
+++ linux-4.15.0/drivers/media/usb/usbtv/usbtv-audio.c
@@ -398,7 +398,7 @@
cancel_work_sync(&usbtv->snd_trigger);
if (usbtv->snd && usbtv->udev) {
    snd_card_free(usbtv->snd);
    snd_card_free_when_closed(usbtv->snd);
    usbtv->snd = NULL;
}

--- linux-4.15.0.orig/drivers/media/usb/usbtv/usbtv-core.c
+++ linux-4.15.0/drivers/media/usb/usbtv/usbtv-core.c
@@ -56,7 +56,7 @@
 ret = usb_control_msg(usbtv->udev, pipe, USBTV_REQUEST_REG,
    USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
    -value, index, NULL, 0, 0);
+    value, index, NULL, 0, USB_CTRL_GET_TIMEOUT);
 if (ret < 0)
    return ret;
 }
@@ -112,6 +112,9 @@
 return 0;

usbtv_audio_fail:
+/* we must not free at this point */
+v4l2_device_get(&usbtv->v4l2_dev);
+/* this will undo the v4l2_device_get() */
 usbtv_video_free(usbtv);

usbtv_video_fail:
--- linux-4.15.0.orig/drivers/media/usb/usbtv/usbtv-video.c
+++ linux-4.15.0/drivers/media/usb/usbtv/usbtv-video.c
@@ -720,7 +720,8 @@
 ret = usb_control_msg(usbtv->udev, usb_rcvctrlpipe(usbtv->udev, 0), USBTV_CONTROL_REG,
    USB_DIR_IN | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
    -0, USBTV_BASE + 0x0244, (void *)data, 3, 0);
+    0, USBTV_BASE + 0x0244, (void *)data, 3,
+    USB_CTRL_GET_TIMEOUT);
 if (ret < 0)
    goto error;
 }
@@ -771,7 +772,7 @@
 error:
 if (ret < 0)
if (mutex_lock_interruptible(&usbvision->v4l2_lock))
    return -ERESTARTSYS;

    if (usbvision->remove_pending) {
        err_code = -ENODEV;
        goto unlock;
    }
    if (usbvision->user) {
        err_code = -EBUSY;
    } else {
        static int usbvision_v4l2_close(struct file *file)
        {
            struct usb_usbvision *usbvision = video_drvdata(file);
            int r;

            PDEBUG(DBG_IO, "close");

        }@ -405,9 +410,10 @@
        usbvision_scratch_free(usbvision);

        usbvision->user--;
        r = usbvision->remove_pending;
        mutex_unlock(&usbvision->v4l2_lock);

        -if (usbvision->remove_pending) {
            -if (r) {
                printk(KERN_INFO "%s: Final disconnect\n", __func__);  
                usbvision_release(usbvision);
                return 0;
                @@ -1091,6 +1097,11 @@

            if (mutex_lock_interruptible(&usbvision->v4l2_lock))
                return -ERESTARTSYS;
            +
            +if (usbvision->remove_pending) {
                +err_code = -ENODEV;
                +goto out;
                +}
                err_code = v4l2_fh_open(file);
                if (err_code)
                    goto out;
                @@ -1123,6 +1134,7 @@

                static int usbvision_radio_close(struct file *file)
                {
struct usb_usbvision *usbvision = video_drvdata(file);
+int r;

PDEBUG(DBG_IO, "");

@ @ -1135,9 +1147,10 @@
usbvision_audio_off(usbvision);
usbvision->radio = 0;
usbvision->user--;
+r = usbvision->remove_pending;
mutex_unlock(&usbvision->v4l2_lock);

-if (usbvision->remove_pending) {
+if (r) {
printk(KERN_INFO "%s: Final disconnect\n", __func__);  
v4l2_fh_release(file);
usbvision_release(usbvision);
@@ -1562,6 +1575,7 @@
static void usbvision_disconnect(struct usb_interface *intf)
{
  struct usb_usbvision *usbvision = to_usbvision(usb_get_intfdata(intf));
+int u;

PDEBUG(DBG_PROBE, "");

@@ -1578,13 +1592,14 @@
  v4l2_device_disconnect(&usbvision->v4l2_dev);
  usbvision_i2c_unregister(usbvision);
  usbvision->remove_pending = 1;/* Now all ISO data will be ignored */
+u = usbvision->user;
  usb_put_dev(usbvision->dev);
  usbvision->dev = NULL;/* USB device is no more */

mutex_unlock(&usbvision->v4l2_lock);

-if (usbvision->user) {
+if (u) {
printk(KERN_INFO "%s: In use, disconnect pending\n", __func__);  
  wake_up_interruptible(&usbvision->wait_frame);
--- linux-4.15.0.orig/drivers/media/usb/uvc/uvc_ctrl.c
+++ linux-4.15.0/drivers/media/usb/uvc/uvc_ctrl.c
@@ -777,12 +777,16 @@
  offset &= 7;
  mask = ((1LL << bits) - 1) << offset;
  offset &= 7;
+for (; bits > 0; data++) {
+while (1) {
    __u8 byte = *data & mask;
    value |= offset > 0 ? (byte >> offset) : (byte << (-offset));
    bits -= 8 - (offset > 0 ? offset : 0);
    +if (bits <= 0)
    +break;
    +
    offset -= 8;
    mask = (1 << bits) - 1;
    +data++;
}

/* Sign-extend the value if needed. */
@@ -1203,7 +1207,7 @@

    __uvc_query_v4l2_ctrl(chain, ctrl, mapping, &v4l2_ctrl);

    -memset(ev->reserved, 0, sizeof(ev->reserved));
    +memset(ev, 0, sizeof(*ev));
    ev->type = V4L2_EVENT_CTRL;
    ev->id = v4l2_ctrl.id;
    ev->u.ctrl.value = value;
@@ -1722,30 +1726,35 @@
    {
        struct uvc_entity *entity;
        struct uvc_control *ctrl;
        -unsigned int i, found = 0;
        +unsigned int i;
        +bool found;
        __u32 reqflags;
        __u16 size;
        __u8 *data = NULL;
        int ret;

        /* Find the extension unit. */
+founded = false;
        list_for_each_entry(entity, &chain->entities, chain) {
            if (UVC_ENTITY_TYPE(entity) == UVC_VC_EXTENSION_UNIT &&
                - entity->id == xqry->unit)
                + entity->id == xqry->unit) {
                +found = true;
                break;
                +}
        }

    -if (entity->id != xqry->unit) {
        +if (!found) {
            uvc_trace(UVC_TRACE_CONTROL, "Extension unit %u not found.\n",
                        entity->id, xqry->unit);
            break;
        }

    }
/* Find the control and perform delayed initialization if needed. */
+found = false;
for (i = 0; i < entity->ncontrols; ++i) {
ctrl = &entity->controls[i];
if (ctrl->index == xqry->selector - 1) {
-    found = 1;
+    found = true;
break;
}
}
--- linux-4.15.0.orig/drivers/media/usb/uvc/uvc_driver.c
+++ linux-4.15.0/drivers/media/usb/uvc/uvc_driver.c
@@ -203,6 +203,11 @@
    .guid = UVC_GUID_FORMAT_INZI,
    .fcc = V4L2_PIX_FMT_INZI,
 },
+{  
+    .name = "HEVC",
+    .guid = UVC_GUID_FORMAT_HEVC,
+    .fcc = V4L2_PIX_FMT_HEVC,
+  },
};
/* ------------------------------------------------------------------------
@@ -380,6 +385,39 @@
*/
/* ------------------------------------------------------------------------
+ * Streaming Object Management
+ */
+
+static void uvc_stream_delete(struct uvc_streaming *stream)
+{
+mutex_destroy(&stream->mutex);
+
+usb_put_intf(stream->intf);
+
+kfree(stream->format);
+kfree(stream->header.bmaControls);
+kfree(stream);
+
+static struct uvc_streaming *uvc_stream_new(struct uvc_device *dev,
+    struct usb_interface *intf)
{ +struct uvc_streaming *stream; + +stream = kzalloc(sizeof(*stream), GFP_KERNEL); +if (stream == NULL) +return NULL; + +mutex_init(&stream->mutex); + +stream->dev = dev; +stream->intf = usb_get_intf(intf); +stream->intfnum = intf->cur_altsetting->desc.bInterfaceNumber; + +return stream; +} + +/* ------------------------------------------------------------------------ + * Descriptors parsing + */ + +return -EINVAL; +

streaming = kzalloc(sizeof *streaming, GFP_KERNEL); +streaming = uvc_stream_new(dev, intf); +if (streaming == NULL) { +usb_driver_release_interface(&uvc_driver.driver, intf); +return -ENOMEM; +} + +mutex_init(&streaming->mutex); +streaming->dev = dev; +streaming->intf = usb_get_intf(intf); +streaming->intfnum = intf->cur_altsetting->desc.bInterfaceNumber; + +/* The Pico iMage webcam has its class-specific interface descriptors + * after the endpoint descriptors. + */ +error: +usb_driver_release_interface(&uvc_driver.driver, intf); +-usb_put_intf(intf); +-kfree(streaming->format); +-kfree(streaming->header.bmaControls); +-kfree(streaming);
unsigned int size;
unsigned int i;

-extra_size = ALIGN(extra_size, sizeof(*entity->pads));
-num_inputs = (type & UVC_TERM_OUTPUT) ? num_pads : num_pads - 1;
+extra_size = roundup(extra_size, sizeof(*entity->pads));
+if (num_pads)
+num_inputs = type & UVC_TERM_OUTPUT ? num_pads : num_pads - 1;
+else
++num_inputs = 0;
size = sizeof(*entity) + extra_size + sizeof(*entity->pads) * num_pads
+num_inputs;
entity = kzalloc(size, GFP_KERNEL);
@@ -920,7 +953,7 @@
for (i = 0; i < num_inputs; ++i)
entity->pads[i].flags = MEDIA_PAD_FL_SINK;
-if (!UVC_ENTITY_IS_OTERM(entity))
+if (!UVC_ENTITY_IS_OTERM(entity) && num_pads)
entity->pads[num_pads-1].flags = MEDIA_PAD_FL_SOURCE;

entity->bNrInPins = num_inputs;
@@ -1054,11 +1087,19 @@
return -EINVAL;

-/*/ Make sure the terminal type MSB is not null, otherwise it
- * could be confused with a unit.
+/*
+ * Reject invalid terminal types that would cause issues:
+ *
+ * - The high byte must be non-zero, otherwise it would be
+ *   confused with a unit.
+ *
+ * - Bit 15 must be 0, as we use it internally as a terminal
+ *   direction flag.
+ *
+ * - Other unknown types are accepted.
+*/

type = get_unaligned_le16(&buffer[4]);
-if (((type & 0xff00) == 0) {
+if (((type & 0x7f00) == 0 || (type & 0x8000) != 0) {
    uvc_trace(UVC_TRACE_DESCR, "device %d videocontrol ")
"interface %d INPUT_TERMINAL %d has invalid type 0x%04x, skipping\n", udev->devnum,
@@ -1438,6 +1479,11 @@
break;
if (forward == prev)
continue;
+if (forward->chain.next || forward->chain.prev) {
+uvc_trace(UVC_TRACE_DESCR, "Found reference to "
+"entity %d already in chain\n", forward->id);
+return -EINVAL;
+
} 

switch (UVC_ENTITY_TYPE(forward)) {
  case UVC_VC_EXTENSION_UNIT:
@@ -1519,6 +1565,13 @@
return -1;
}
+if (term->chain.next || term->chain.prev) {
+uvc_trace(UVC_TRACE_DESCR, "Found reference to "
+"entity %d already in chain\n", term->id);
+return -EINVAL;
+
+if (uvc_trace_param & UVC_TRACE_PROBE)
printk(KERN_CONT " %d", term->id);

@@ -1799,7 +1852,7 @@
* is released.
*
* As this function is called after or during disconnect(), all URBs have
- * already been canceled by the USB core. There is no need to kill the
+ * already been cancelled by the USB core. There is no need to kill the
* interrupt URB manually.
*/
static void uvc_delete(struct kref *kref)
@@ -1813,11 +1866,7 @@
usb_put_intf(dev->intf);
usb_put_dev(dev->udev);

-if (dev->vdev.dev)
-v4l2_device_unregister(&dev->vdev);
ifdef CONFIG_MEDIA_CONTROLLER
-if (media_devnode_is_registered(dev->mdev.devnode))
-media_device_unregister(&dev->mdev);
media_device_cleanup(&dev->mdev);
#endif
streaming = list_entry(p, struct uvc_streaming, list);
usb_driver_release_interface(&uvc_driver.driver,
streaming->inf);
-usb_put_intf(streaming->inf);
-kfree(streaming->format);
-kfree(streaming->header.bmaControls);
-kfree(streaming);
+uvc_stream_delete(streaming);
}

kfree(dev);
@@ -1865,13 +1911,6 @@
{
 struct uvc_streaming *stream;

-/* Unregistering all video devices might result in uvc_delete() being
- * called from inside the loop if there's no open file handle. To avoid
- * that, increment the refcount before iterating over the streams and
- * decrement it when done.
- */
-kref_get(&dev->ref);
-
list_for_each_entry(stream, &dev->streams, list) {
if (!video_is_registered(&stream->vdev))
continue;
@@ -1881,7 +1920,14 @@
uvc_debugfs_cleanup_stream(stream);
}
-kref_put(&dev->ref, uvc_delete);
+uvc_status_unregister(dev);
+
+if (dev->vdev.dev)
+v4l2_device_unregister(&dev->vdev);
+#ifdef CONFIG_MEDIA_CONTROLLER
+if (media_devnode_is_registered(dev->mdev.devnode))
+media_device_unregister(&dev->mdev);
+#endif
}

static int uvc_register_video(struct uvc_device *dev,
@@ -2060,6 +2106,20 @@
sizeof(dev->name) - len);
}

+/* Initialize the media device. */
ifdef CONFIG_MEDIA_CONTROLLER
+dev->mdev.dev = &intf->dev;
+strcpy(dev->mdev.model, dev->name, sizeof(dev->mdev.model));
+if (udev->serial)
+strcpy(dev->mdev.serial, udev->serial,
+sizeof(dev->mdev.serial));
+usb_make_path(udev, dev->mdev.bus_info, sizeof(dev->mdev.bus_info));
+dev->mdev.hw_revision = le16_to_cpu(udev->descriptor.bcdDevice);
+media_device_init(&dev->mdev);
+
+dev->vdev.mdev = &dev->mdev;
+endif
+
/* Parse the Video Class control descriptor. */
if (uvc_parse_control(dev) < 0) {
  uvc_trace(UVC_TRACE_PROBE, "Unable to parse UVC 
@@ -2080,19 +2140,7 @@
"linux-uvc-devel mailing list.
} }

-/* Initialize the media device and register the V4L2 device. */
-ifdef CONFIG_MEDIA_CONTROLLER
-dev->mdev.dev = &intf->dev;
-strcpy(dev->mdev.model, dev->name, sizeof(dev->mdev.model));
-if (udev->serial)
-strcpy(dev->mdev.serial, udev->serial,
-sizeof(dev->mdev.serial));
-strcpy(dev->mdev.bus_info, udev->devpath);
-dev->mdev.hw_revision = le16_to_cpu(udev->descriptor.bcdDevice);
-media_device_init(&dev->mdev);
-
-dev->vdev.mdev = &dev->mdev;
-endif
+
/* Register the V4L2 device. */
if (v4l2_device_register(&intf->dev, &dev->vdev) < 0)
goto error;

@@ -2129,6 +2177,7 @@
gerun error;

error:
uvc_unregister_video(dev);
+kref_put(&dev->ref, uvc_delete);
return -ENODEV;
} }

@@ -2146,6 +2195,7 @@
return;
uvc_unregister_video(dev);
+kref_put(&dev->ref, uvc_delete);
}

static int uvc_suspend(struct usb_interface *intf, pm_message_t message)
--- linux-4.15.0.orig/drivers/media/usb/uvc/uvc_entity.c
+++ linux-4.15.0/drivers/media/usb/uvc/uvc_entity.c
@@ -78,10 +78,45 @@
    int ret;

    if (UVC_ENTITY_TYPE(entity) != UVC_TT_STREAMING) {
+    u32 function;
+    
+    v4l2_subdev_init(&entity->subdev, &uvc_subdev_ops);
    strlcpy(entity->subdev.name, entity->name,
            sizeof(entity->subdev.name));

+    switch (UVC_ENTITY_TYPE(entity)) {
+    case UVC_VC_SELECTOR_UNIT:
+        function = MEDIA_ENT_F_VID_MUX;
+        break;
+    case UVC_VC_PROCESSING_UNIT:
+        case UVC_VC_EXTENSION_UNIT:
+            /* For lack of a better option. */
+        function = MEDIA_ENT_F_PROC_VIDEO_PIXEL_FORMATTER;
+        break;
+    case UVC_COMPOSITE_CONNECTOR:
+    case UVC_COMPONENT_CONNECTOR:
+        function = MEDIA_ENT_F_CONN_COMPOSITE;
+        break;
+    case UVC_SVIDEO_CONNECTOR:
+        function = MEDIA_ENT_F_CONN_SVIDEO;
+        break;
+    case UVC_ITT_CAMERA:
+        function = MEDIA_ENT_F_CAM_SENSOR;
+        break;
+    case UVC_TT_VENDOR_SPECIFIC:
+    case UVC_ITT_VENDOR_SPECIFIC:
+    case UVC_ITT_MEDIA_TRANSPORT_INPUT:
+    case UVC_OTT_VENDOR_SPECIFIC:
+    case UVC_OTT_DISPLAY:
+    case UVC_OTT_MEDIA_TRANSPORT_OUTPUT:
+    case UVC_EXTERNAL_VENDOR_SPECIFIC:
+        default:
+        function = MEDIA_ENT_F_V4L2_SUBDEV_UNKNOWN;
+        break;
+    }
+    

entity->subdev.entity.function = function;

ret = media_entity_pads_init(&entity->subdev.entity,
    entity->num_pads, entity->pads);

--- linux-4.15.0.orig/drivers/media/usb/uvc/uvc_status.c
+++ linux-4.15.0/drivers/media/usb/uvc/uvc_status.c
@@ -54,7 +54,7 @@
     return ret;
 }

static void uvc_input_cleanup(struct uvc_device *dev)
+static void uvc_input_unregister(struct uvc_device *dev)
{
    if (dev->input)
        input_unregister_device(dev->input);
@@ -71,7 +71,7 @@

#endif /* CONFIG_USB_VIDEO_CLASS_INPUT_EVDEV */

@@ -198,12 +198,41 @@
    return 0;
 }

void uvc_status_cleanup(struct uvc_device *dev)
+void uvc_status_unregister(struct uvc_device *dev)
{
    usb_kill_urb(dev->int_urb);
+    uvc_input_unregister(dev);
+}
+
+void uvc_status_cleanup(struct uvc_device *dev)
+{
    usb_free_urb(dev->int_urb);
    kfree(dev->status);
    -uvc_input_cleanup(dev);
}

int uvc_status_start(struct uvc_device *dev, gfp_t flags)
--- linux-4.15.0.orig/drivers/media/usb/uvc/uvc_v4l2.c
+++ linux-4.15.0/drivers/media/usb/uvc/uvc_v4l2.c
@@ -252,11 +252,41 @@
    if (ret < 0)
goto done;

+/* After the probe, update fmt with the values returned from
+ * negotiation with the device. Some devices return invalid bFormatIndex
+ * and bFrameIndex values, in which case we can only assume they have
+ * accepted the requested format as-is.
+ */
+for (i = 0; i < stream->nformats; ++i) {
+if (probe->bFormatIndex == stream->format[i].index) {
+format = &stream->format[i];
+break;
+}
+
+if (i == stream->nformats)
+uvc_trace(UVC_TRACE_FORMAT,
+  "Unknown bFormatIndex %u, using default\n",
+  probe->bFormatIndex);
+
+for (i = 0; i < format->nframes; ++i) {
+if (probe->bFrameIndex == format->frame[i].bFrameIndex) {
+frame = &format->frame[i];
+break;
+}
+
+if (i == format->nframes)
+uvc_trace(UVC_TRACE_FORMAT,
+  "Unknown bFrameIndex %u, using default\n",
+  probe->bFrameIndex);
+
+fmt->fmt.pix.width = frame->wWidth;
fmt->fmt.pix.height = frame->wHeight;
fmt->fmt.pix.field = V4L2_FIELD_NONE;
fmt->fmt.pix.bytesperline = uvc_v4l2_get_bytesperline(format, frame);
fmt->fmt.pix.sizeimage = probe->dwMaxVideoFrameSize;
+fmt->fmt.pix.pixelformat = format->fcc;
fmt->fmt.pix.colorspace = format->colorspace;
fmt->fmt.pix.priv = 0;

@@ -846,8 +876,8 @@
{
  struct uvc_fh *handle = fh;
  struct uvc_video_chain *chain = handle->chain;
+u8 *buf;
  int ret;
-u8 i;
if (chain->selector == NULL ||
    (chain->dev->quirks & UVC_QUIRK_IGNORE_SELECTOR_UNIT)) {
    return 0;
}

buf = kmalloc(1, GFP_KERNEL);
+if (!buf)
+return -ENOMEM;
+
ret = uvc_query_ctrl(chain->dev, UVC_GET_CUR, chain->selector->id,
    chain->dev->intfnum,  UVC_SU_INPUT_SELECT_CONTROL,
-     &i, 1);
-if (ret < 0)
-    return ret;
+    buf, 1);
+if (!ret)
+*input = *buf - 1;

-*input = i - 1;
-return 0;
+kfree(buf);
+
+return ret;
}

static int uvc_ioctl_s_input(struct file *file, void *fh, unsigned int input)
{
    struct uvc_fh *handle = fh;
    struct uvc_video_chain *chain = handle->chain;
+u8 *buf;
    int ret;
-     u32 i;

    ret = uvc_acquire_privileges(handle);
    if (ret < 0)
        return -EINVAL;
    i = input + 1;
    if (input >= chain->selector->bNrInPins)
        return -EINVAL;
    -return uvc_query_ctrl(chain->dev, UVC_SET_CUR, chain->selector->id,
    -     chain->dev->intfnum, UVC_SU_INPUT_SELECT_CONTROL,
    -     &i, 1);
+buf = kmalloc(1, GFP_KERNEL);
+if (!buf)
+return -ENOMEM;
+}
buf = input + 1;
ret = uvc_query_ctrl(chain->dev, UVC_SET_CUR, chain->selector->id,
            chain->dev->intfnum, UVC_SU_INPUT_SELECT_CONTROL,
            buf, 1);
kfree(buf);
return ret;
}

static int uvc_ioctl_queryctrl(struct file *file, void *fh,
--- linux-4.15.0.orig/drivers/media/usb/uvc/uvc_video.c
+++ linux-4.15.0/drivers/media/usb/uvc/uvc_video.c
@@ -89,10 +89,37 @@
static void uvc_fixup_video_ctrl(struct uvc_streaming *stream,
struct uvc_streaming_control *ctrl)
{
+static const struct usb_device_id elgato_cam_link_4k = {
+    USB_DEVICE(0x0fd9, 0x0066)
+};
struct uvc_format *format = NULL;
struct uvc_frame *frame = NULL;
unsigned int i;

+/*
+ * The response of the Elgato Cam Link 4K is incorrect: The second byte
+ * contains bFormatIndex (instead of being the second byte of bmHint).
+ * The first byte is always zero. The third byte is always 1.
+ *
+ * The UVC 1.5 class specification defines the first five bits in the
+ * bmHint bitfield. The remaining bits are reserved and should be zero.
+ * Therefore a valid bmHint will be less than 32.
+ *
+ * Latest Elgato Cam Link 4K firmware as of 2021-03-23 needs this fix.
+ * MCU: 20.02.19, FPGA: 67
+ */
+if (usb_match_one_id(stream->dev->intf, &elgato_cam_link_4k) &&
+    ctrl->bmHint > 255) {
+    u8 corrected_format_index = ctrl->bmHint >> 8;
+    uvc_trace(UVC_TRACE_VIDEO,
+        "Correct USB video probe response from {bmHint: 0x%04x, bFormatIndex: %u} to {bmHint: 0x%04x,
+            bFormatIndex: %u}n",
+        ctrl->bmHint, ctrl->bFormatIndex,
+        1, corrected_format_index);
+    ctrl->bmHint = 1;
+    ctrl->bFormatIndex = corrected_format_index;
+}
for (i = 0; i < stream->nformats; ++i) {
    if (stream->format[i].index == ctrl->bFormatIndex) {
        format = &stream->format[i];
        @ @ -171,6 +198,8 @@
        int ret;

        size = stream->dev->uvc_version >= 0x0110 ? 34 : 26;
        +if (stream->dev->uvc_version >= 0x0150)
        +size = 48;
        if ((stream->dev->quirks & UVC_QUIRK_PROBE_DEF) &&
            query == UVC_GET_DEF)
            return -EIO;
        @@ -259,6 +288,8 @@
        int ret;

        size = stream->dev->uvc_version >= 0x0110 ? 34 : 26;
        +if (stream->dev->uvc_version >= 0x0150)
        +size = 48;
        data = kzalloc(size, GFP_KERNEL);
        if (data == NULL)
            return -ENOMEM;
        @@ -626,6 +657,14 @@
        if (!clock->samples)
            return;
        /* We will get called from __vb2_queue_cancel() if there are buffers
         * done but not dequeued by the user, but the sample array has already
         * been released at that time. Just bail out in that case.
         * */
        +if (!clock->samples)
            +return;
        +spin_lock_irqsave(&clock->lock, flags);

        if (clock->count < clock->size)
            @ @ -1077,6 +1116,7 @@
        /* Complete the current frame if the buffer size was exceeded. */
        if (len > maxlen) {
            uvc_trace(UVC_TRACE_FRAME, "Frame complete (overflow).\n");
            +buf->error = 1;
            buf->state = UVC_BUF_STATE_READY;
        }
    }
}
#define UVC_GUID_FORMAT_HEVC
{ 'H', 'E', 'V', 'C', 0x00, 0x00, 0x10, 0x00,
 + 0x80, 0x00, 0x00, 0xaaa, 0x00, 0x38, 0x9b, 0x71}

/* Driver specific constants. */
@@ -713,6 +716,7 @@
extern int uvc_status_init(struct uvc_device *dev);
+extern void uvc_status_unregister(struct uvc_device *dev);
extern void uvc_status_cleanup(struct uvc_device *dev);
extern int uvc_status_start(struct uvc_device *dev, gfp_t flags);
extern void uvc_status_stop(struct uvc_device *dev);
--- linux-4.15.0.orig/drivers/media/usb/zr364xx/zr364xx.c
+++ linux-4.15.0/drivers/media/usb/zr364xx/zr364xx.c
@@ -704,7 +704,8 @@
 struct zr364xx_camera *cam = video_drvdata(file);
    char *card = NULL;
    char *bus_info = NULL;
-strlcpy(cap->driver, DRIVER_DESC, sizeof(cap->driver));
+if (cam->udev->product)
+    strlcpy(cap->card, cam->udev->product, sizeof(cap->card));
    strlcpy(cap->bus_info, dev_name(&cam->udev->dev),
            sizeof(cap->bus_info));
    cap->device_caps = V4L2_CAP_VIDEO_CAPTURE |
        V4L2_CAP_VIDEO_CAPTURE Rencontres |
    DBG("submitting URB %p\n", pipe_info->stream_urb);
    retval = usb_submit_urb(pipe_info->stream_urb, GFP_KERNEL);
    if (retval) {
        usb_free_urb(pipe_info->stream_urb);
        printk(KERN_ERR KBUILD_MODNAME ": start read pipe failed\n");
        return retval;
    }
--- linux-4.15.0.orig/drivers/media/v4l2-core/v4l2-compat-ioctl32.c
+++ linux-4.15.0/drivers/media/v4l2-core/v4l2-compat-ioctl32.c
@@ -18,8 +18,18 @@
 #include <linux/videodev2.h>
 #include <linux/v4l2-subdev.h>
 #include <media/v4l2-dev.h>
+  #include <media/v4l2-fh.h>
+  #include <media/v4l2-ctrls.h>
+  #include <media/v4l2-ioctl.h>
+  #define assign_in_user(to, from)
+(\n+typeof(*from) __assign_tmp;\n+\n+get_user(__assign_tmp, from) || put_user(__assign_tmp, to);\n+})
+
static long native_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
{
    long ret = -ENOIOCTLCMD;
    @@ -46,135 +56,77 @@
        __u8                    global_alpha;
    }

    -static int get_v4l2_window32(struct v4l2_window *kp, struct v4l2_window32 __user *up)
    -{
    -if (!access_ok(VERIFY_READ, up, sizeof(struct v4l2_window32)) ||
    -copy_from_user(&kp->w, &up->w, sizeof(up->w)) ||
    -get_user(kp->field, &up->field) ||
    -get_user(kp->chromakey, &up->chromakey) ||
    -get_user(kp->clipcount, &up->clipcount) ||
    -get_user(kp->global_alpha, &up->global_alpha))
    -return -EFAULT;
    -if (kp->clipcount > 2048)
    -return -EINVAL;
    -if (kp->clipcount) {
        struct v4l2_clip32 __user *uclips;
        struct v4l2_clip __user *kclips;
        int n = kp->clipcount;
        compat_caddr_t p;
        -
        -if (get_user(p, &up->clips))
        -return -EFAULT;
        -uclips = compat_ptr(p);
        -kclips = compat_alloc_user_space(n * sizeof(struct v4l2_clip));
        -kp->clips = kclips;
        -while (--n >= 0) {
            -if (copy_in_user(&kclips->c, &uclips->c, sizeof(uclips->c)))
            -return -EFAULT;
            -if (put_user(n ? kclips + 1 : NULL, &kclips->next))
            -return -EFAULT;
            -uclips += 1;
            -kclips += 1;
        -}
        -} else
        -kp->clips = NULL;
        -return 0;
    -}
    -}
static int put_v4l2_window32(struct v4l2_window *kp, struct v4l2_window32 __user *up)
{
    -if (copy_to_user(&up->w, &kp->w, sizeof(kp->w)) ||
        put_user(kp->field, &up->field) ||
        put_user(kp->chromakey, &up->chromakey) ||
        put_user(kp->clipcount, &up->clipcount) ||
        put_user(kp->global_alpha, &up->global_alpha))
        return -EFAULT;
    return 0;
}

static inline int get_v4l2_pix_format(struct v4l2_pix_format *kp, struct v4l2_pix_format __user *up)
{
    -if (copy_from_user(kp, up, sizeof(struct v4l2_pix_format)))
        return -EFAULT;
    return 0;
}

static inline int get_v4l2_pix_format_mplane(struct v4l2_pix_format_mplane *kp, struct v4l2_pix_format_mplane __user *up)
{
    -if (copy_from_user(kp, up, sizeof(struct v4l2_pix_format_mplane)))
        return -EFAULT;
    return 0;
}

static inline int put_v4l2_pix_format_mplane(struct v4l2_pix_format_mplane *kp, struct v4l2_pix_format_mplane __user *up)
{
    -if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
        copy_in_user(&kp->w, &up->w, sizeof(up->w)) ||
        assign_in_user(&kp->field, &up->field) ||
        assign_in_user(&kp->chromakey, &up->chromakey))
        return -EFAULT;
    return 0;
}

+struct v4l2_clip32 __user *uclips;
+struct v4l2_clip __user *kclips;
+compat_caddr_t p;
+u32 clipcount;

+static inline int get_v4l2_pix_format_mplane(struct v4l2_pix_format_mplane *kp, struct v4l2_pix_format_mplane __user *up)
{  
    -if (copy_to_user(up, kp, sizeof(struct v4l2_pix_format_mplane)))
        return -EFAULT;
    return 0;
}

+struct v4l2_clip32 __user *uclips;
+struct v4l2_clip __user *kclips;
+compat_caddr_t p;
+u32 clipcount;
+    assign_in_user(&kp->global_alpha, &up->global_alpha) ||
+    get_user(clipcount, &up->clipcount) ||
+    put_user(clipcount, &kp->clipcount))
return -EFAULT;
-return 0;
-
+if (clipcount > 2048)
+return -EINVAL;
+if (!clipcount)
+return put_user(NULL, &kp->clips);

-static inline int get_v4l2_vbi_format(struct v4l2_vbi_format *kp, struct v4l2_vbi_format __user *up)
-{
    -if (copy_from_user(kp, up, sizeof(struct v4l2_vbi_format)))
    +if (get_user(p, &up->clips))
     return -EFAULT;
     -return 0;
     -}
     -
     -static inline int put_v4l2_vbi_format(struct v4l2_vbi_format *kp, struct v4l2_vbi_format __user *up)
     -{
     -if (copy_to_user(up, kp, sizeof(struct v4l2_vbi_format)))
     +uclips = compat_ptr(p);
     +if (aux_space < clipcount * sizeof(*kclips))
      return -EFAULT;
     -return 0;
     -}
     -
     -static inline int get_v4l2_sliced_vbi_format(struct v4l2_sliced_vbi_format *kp, struct v4l2_sliced_vbi_format __user *up)
     -{
     -if (copy_from_user(kp, up, sizeof(struct v4l2_sliced_vbi_format)))
     +kclips = aux_buf;
     +if (put_user(kclips, &kp->clips))
      return -EFAULT;
     -return 0;
     -}
     -
     -static inline int put_v4l2_sliced_vbi_format(struct v4l2_sliced_vbi_format *kp, struct v4l2_sliced_vbi_format __user *up)
     -{
     -if (copy_to_user(up, kp, sizeof(struct v4l2_sliced_vbi_format)))
     -return -EFAULT;
     +while (clipcount--) {
     +if (copy_in_user(&kclips->c, &uclips->c, sizeof(uclips->c)))
      +return -EFAULT;
     +if (put_user(clipcount ? kclips + 1 : NULL, &kclips->next))
      +return -EFAULT;

+uclips++;
+kclips++;
+
} return 0;

-static inline int get_v4l2_sdr_format(struct v4l2_sdr_format *kp, struct v4l2_sdr_format __user *up)
+static int put_v4l2_window32(struct v4l2_window __user *kp,
+    struct v4l2_window32 __user *up)
{
-    if (copy_from_user(kp, up, sizeof(struct v4l2_sdr_format)))
-        return -EFAULT;
-    return 0;
-}
+    struct v4l2_clip __user *kclips;
+    struct v4l2_clip32 __user *uclips;
+    compat_caddr_t p;
+    u32 clipcount;

-static inline int put_v4l2_sdr_format(struct v4l2_sdr_format *kp, struct v4l2_sdr_format __user *up)
-{
-    if (copy_to_user(up, kp, sizeof(struct v4l2_sdr_format)))
+    if (copy_in_user(&up->w, &kp->w, sizeof(kp->w)) ||
+        assign_in_user(&up->field, &kp->field) ||
+        assign_in_user(&up->chromakey, &kp->chromakey) ||
+        assign_in_user(&up->global_alpha, &kp->global_alpha) ||
+        get_user(clipcount, &kp->clipcount) ||
+        put_user(clipcount, &up->clipcount))
return -EFAULT;
-    return 0;
-}
+    if (!clipcount)
+        return 0;
+}
+return 0;

-static inline int get_v4l2_meta_format(struct v4l2_meta_format *kp, struct v4l2_meta_format __user *up)
-{
-    if (copy_from_user(kp, up, sizeof(struct v4l2_meta_format)))
+    if (get_user(kclips, &kp->clips))
return -EFAULT;
-    return 0;
-}
-
-static inline int put_v4l2_meta_format(struct v4l2_meta_format *kp, struct v4l2_meta_format __user *up)
-{
-    if (copy_to_user(up, kp, sizeof(struct v4l2_meta_format)))
+    if (get_user(p, &up->clips))
return -EFAULT;
+    uclips = compat_ptr(p);
+while (clipcount--) {
+if (copy_in_user(&uclips->c, &kclips->c, sizeof(uclips->c)))
+return -EFAULT;
+uclips++;
+kclips++;
+
+} return 0;
}

@@ -209,101 +161,164 @@
__u32			reserved[8];
};

-static int __get_v4l2_format32(struct v4l2_format *kp, struct v4l2_format32 __user *up)
+static int __bufsize_v4l2_format(struct v4l2_format32 __user *up, u32 *size)
{
- if (get_user(kp->type, &up->type))
+ u32 type;
+ if (get_user(type, &up->type))
+ return -EFAULT;

- switch (kp->type) {
+ switch (type) {
+ case V4L2_BUF_TYPE_VIDEO_OVERLAY:
+case V4L2_BUF_TYPE_VIDEO_OUTPUT_OVERLAY: {
+ u32 clipcount;
+ if (get_user(clipcount, &up->fmt.win.clipcount))
+ return -EFAULT;
+ if (clipcount > 2048)
+ return -EINVAL;
+ *size = clipcount * sizeof(struct v4l2_clip);
+ return 0;
+ }
+ default:
+ *size = 0;
+ return 0;
+ }
+ }
+ }
+ +static int bufsize_v4l2_format(struct v4l2_format32 __user *up, u32 *size)
+ {
+ if (!access_ok(VERIFY_READ, up, sizeof(*up)))
+ return -EFAULT;
+ return __bufsize_v4l2_format(up, size);
+ }
+ 
+
+static int __get_v4l2_format32(struct v4l2_format __user *kp,
+      struct v4l2_format32 __user *up,
+      void __user *aux_buf, u32 aux_space)
+{
+    u32 type;
+
+    if (get_user(type, &up->type) || put_user(type, &kp->type))
+        return -EFAULT;
+
+    switch (type) {
+    case V4L2_BUF_TYPE_VIDEO_CAPTURE:
+        return get_v4l2_pix_format(&kp->fmt.pix, &up->fmt.pix);
+        return copy_in_user(&kp->fmt.pix, &up->fmt.pix,
+            sizeof(kp->fmt.pix)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE:
+        return get_v4l2_pix_format_mplane(&kp->fmt.pix_mp,
+            &up->fmt.pix_mp);
+        return copy_in_user(&kp->fmt.pix_mp, &up->fmt.pix_mp,
+            sizeof(kp->fmt.pix_mp)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_VIDEO_OVERLAY:
+        return get_v4l2_window32(&kp->fmt.win, &up->fmt.win);
+        return get_v4l2_window32(&kp->fmt.win, &up->fmt.win,
+            aux_buf, aux_space);
+    case V4L2_BUF_TYPE_VBI_CAPTURE:
+        return get_v4l2_vbi_format(&kp->fmt.vbi, &up->fmt.vbi);
+        return copy_in_user(&kp->fmt.vbi, &up->fmt.vbi,
+            sizeof(kp->fmt.vbi)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_SDR_CAPTURE:
+        return get_v4l2_sdr_format(&kp->fmt.sdr, &up->fmt.sdr);
+        return copy_in_user(&kp->fmt.sdr, &up->fmt.sdr,
+            sizeof(kp->fmt.sdr)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_SLICED_VBI_CAPTURE:
+        return get_v4l2_sliced_vbi_format(&kp->fmt.sliced, &up->fmt.sliced);
+        return copy_in_user(&kp->fmt.sliced, &up->fmt.sliced,
+            sizeof(kp->fmt.sliced)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_SDR_OUTPUT:
+        return get_v4l2_sdr_format(&kp->fmt.sdr, &up->fmt.sdr);
+        return copy_in_user(&kp->fmt.sdr, &up->fmt.sdr,
+            sizeof(kp->fmt.sdr)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_SLICED_VBI_OUTPUT:
+        return get_v4l2_sliced_vbi_format(&kp->fmt.sliced, &up->fmt.sliced);
+        return copy_in_user(&kp->fmt.sliced, &up->fmt.sliced,
+            sizeof(kp->fmt.sliced)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_VBI_OUTPUT:
+        return get_v4l2_vbi_format(&kp->fmt.vbi, &up->fmt.vbi);
+        return copy_in_user(&kp->fmt.vbi, &up->fmt.vbi,
+            sizeof(kp->fmt.vbi)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_VIDEO_OUTPUT:
+        return get_v4l2_pix_format(&kp->fmt.pix, &up->fmt.pix);
+        return copy_in_user(&kp->fmt.pix, &up->fmt.pix,
+            sizeof(kp->fmt.pix)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_VIDEO_OUTPUT_MPLANE:
+        return get_v4l2_pix_format_mplane(&kp->fmt.pix_mp,
+            &up->fmt.pix_mp);
+        return copy_in_user(&kp->fmt.pix_mp, &up->fmt.pix_mp,
+            sizeof(kp->fmt.pix_mp)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_VIDEO_OVERLAY:
+        return get_v4l2_window32(&kp->fmt.win, &up->fmt.win);
+        return get_v4l2_window32(&kp->fmt.win, &up->fmt.win,
+            aux_buf, aux_space);
+    case V4L2_BUF_TYPE_VBI_OUTPUT:
+        return get_v4l2_vbi_format(&kp->fmt.vbi, &up->fmt.vbi);
+        return copy_in_user(&kp->fmt.vbi, &up->fmt.vbi,
+            sizeof(kp->fmt.vbi)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_SDR_OUTPUT:
+        return get_v4l2_sdr_format(&kp->fmt.sdr, &up->fmt.sdr);
+        return copy_in_user(&kp->fmt.sdr, &up->fmt.sdr,
+            sizeof(kp->fmt.sdr)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_SLICED_VBI_OUTPUT:
+        return get_v4l2_sliced_vbi_format(&kp->fmt.sliced, &up->fmt.sliced);
+        return copy_in_user(&kp->fmt.sliced, &up->fmt.sliced,
+            sizeof(kp->fmt.sliced)) ? -EFAULT : 0;
+    case V4L2_BUF_TYPE_META_CAPTURE:
+        return get_v4l2_meta_format(&kp->fmt.meta, &up->fmt.meta);
+        return copy_in_user(&kp->fmt.meta, &up->fmt.meta,
+            sizeof(kp->fmt.meta)) ? -EFAULT : 0;
+    default:
+        pr_info("compat_ioctl32: unexpected VIDIOC_FMT type %d\n",
+            -kp->type);
return -EINVAL;
}

static int get_v4l2_format32(struct v4l2_format *kp, struct v4l2_format32 __user *up)
+
static int get_v4l2_format32(struct v4l2_format __user *kp,
+    struct v4l2_format32 __user *up,
+    void __user *aux_buf, u32 aux_space)
+
+if (!access_ok(VERIFY_READ, up, sizeof(*up)))
+    return -EFAULT;
+return __get_v4l2_format32(kp, up, aux_buf, aux_space);
+
+static int bufsize_v4l2_create(struct v4l2_create_buffers32 __user *up,
+    u32 *size)
+
+    {.getSize_v4l2_create(&up->format, size);
+
+static int __put_v4l2_format32(struct v4l2_format __user *kp, struct v4l2_format32 __user *up)
+
+static int __put_v4l2_format32(struct v4l2_format __user *kp,
+    struct v4l2_format32 __user *up)
+
+    {put_user(kp->type, &up->type)
+    u32 type;
+    +if (get_user(type, &kp->type)
return -EFAULT;

switch (kp->type) {
+switch (type) {
  case V4L2_BUF_TYPE_VIDEO_CAPTURE:
  case V4L2_BUF_TYPE_VIDEO_OUTPUT:
    return put_v4l2_pix_format(&kp->fmt.pix, &up->fmt.pix);
  +return copy_in_user(&up->fmt.pix, &kp->fmt.pix,
    +sizeof(kp->fmt.pix)) ? -EFAULT : 0;
  case V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE:
  case V4L2_BUF_TYPE_VIDEO_OUTPUT_MPLANE:
    return put_v4l2_pix_format_mplane(&kp->fmt.pix_mp,
    -&up->fmt.pix_mp);
  +return copy_in_user(&up->fmt.pix_mp, &kp->fmt.pix_mp,
    +sizeof(kp->fmt.pix_mp)) ? -EFAULT : 0;
  case V4L2_BUF_TYPE_VIDEO_OVERLAY:
  case V4L2_BUF_TYPE_VIDEO_OUTPUT_OVERLAY:
    return put_v4l2_window32(&kp->fmt.win, &up->fmt.win);
  case V4L2_BUF_TYPE_VBI_CAPTURE:
  case V4L2_BUF_TYPE_VBI_OUTPUT:
    return put_v4l2_vbi_format(&kp->fmt.vbi, &up->fmt.vbi);
  +return copy_in_user(&up->fmt.vbi, &kp->fmt.vbi,
    +sizeof(kp->fmt.vbi)) ? -EFAULT : 0;
  case V4L2_BUF_TYPE_SLICED_VBI_CAPTURE:
  case V4L2_BUF_TYPE_SLICED_VBI_OUTPUT:
    return put_v4l2_sliced_vbi_format(&kp->fmt.sliced, &up->fmt.sliced);
  +return copy_in_user(&up->fmt.sliced, &kp->fmt.sliced,
    +sizeof(kp->fmt.sliced)) ? -EFAULT : 0;
  case V4L2_BUF_TYPE_SDR_CAPTURE:
  case V4L2_BUF_TYPE_SDR_OUTPUT:
    return put_v4l2_sdr_format(&kp->fmt.sdr, &up->fmt.sdr);
  +return copy_in_user(&up->fmt.sdr, &kp->fmt.sdr,
    +sizeof(kp->fmt.sdr)) ? -EFAULT : 0;
  case V4L2_BUF_TYPE_META_CAPTURE:
    return put_v4l2_meta_format(&kp->fmt.meta, &up->fmt.meta);
  +return copy_in_user(&up->fmt.meta, &kp->fmt.meta,
    +sizeof(kp->fmt.meta)) ? -EFAULT : 0;
  default:
    -pr_info("compat_ioctl32: unexpected VIDIOC_FMT type %d\n",
      -kp->type);
    return -EINVAL;
  }
}

static int put_v4l2_format32(struct v4l2_format __user *kp, struct v4l2_format32 __user *up) {
-if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_format32)))
+if (!access_ok(VERIFY_WRITE, up, sizeof(*up)))
    return -EFAULT;
    return __put_v4l2_format32(kp, up);
}

-static int put_v4l2_create32(struct v4l2_create_buffers *kp, struct v4l2_create_buffers32 __user *up)
+static int put_v4l2_create32(struct v4l2_create_buffers __user *kp,
   +struct v4l2_create_buffers32 __user *up)
{
    if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_create_buffers32)) ||
        copy_to_user(up, kp, offsetof(struct v4l2_create_buffers32, format)) ||
        copy_to_user(up->reserved, kp->reserved, sizeof(kp->reserved)))
+if (!access_ok(VERIFY_WRITE, up, sizeof(*up)) ||
    copy_in_user(up, kp, offsetof(struct v4l2_create_buffers32, format)) ||
    copy_in_user(up->reserved, kp->reserved, sizeof(kp->reserved)))
    return -EFAULT;
    return __put_v4l2_format32(&kp->format, &up->format);
}  
@@ -317,25 +332,28 @@
__u32		reserved[4];
    }

-static int get_v4l2_standard32(struct v4l2_standard *kp, struct v4l2_standard32 __user *up)
+static int get_v4l2_standard32(struct v4l2_standard __user *kp,
   +struct v4l2_standard32 __user *up)
{
/* other fields are not set by the user, nor used by the driver */
-    if (!access_ok(VERIFY_READ, up, sizeof(struct v4l2_standard32)) ||
-        get_user(kp->index, &up->index))
+    if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
        assign_in_user(&kp->index, &up->index))
    return -EFAULT;
    return 0;
}

-static int put_v4l2_standard32(struct v4l2_standard *kp, struct v4l2_standard32 __user *up)
+static int put_v4l2_standard32(struct v4l2_standard __user *kp,
   +struct v4l2_standard32 __user *up)
{
    if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_standard32)) ||
        put_user(kp->index, &up->index) ||
        put_user(kp->id, &up->id) ||
        copy_to_user(up->name, kp->name, 24) ||
        copy_to_user(up->frameperiod, kp->frameperiod, sizeof(kp->frameperiod)) ||
        put_user(kp->framelines, up->framelines) ||
        copy_to_user(up->reserved, kp->reserved, 4 * sizeof(__u32)))

-return -EFAULT;
+if (!access_ok VERIFY_WRITE, up, sizeof(*up)) ||
+ assign_in_user(&up->index, &kp->index) ||
+ assign_in_user(&up->id, &kp->id) ||
+ copy_in_user(up->name, kp->name, sizeof(up->name)) ||
+ copy_in_user(&up->frameperiod, &kp->frameperiod, + sizeof(up->frameperiod)) ||
+ assign_in_user(&up->framelines, &kp->framelines) ||
+ copy_in_user(up->reserved, kp->reserved, sizeof(up->reserved)))
+return -EFAULT;
return 0;
}

__u32 reserved;
};

-static int get_v4l2_plane32(struct v4l2_plane __user *up, struct v4l2_plane32 __user *up32,
-void __user *up_pln;
-compat_long_t p;
+compat_ulong_t p;

if (copy_in_user(up, up32, 2 * sizeof(__u32)) ||
+copy_in_user(&up->data_offset, &up32->data_offset, + sizeof(up->data_offset)))
+copy_in_user(&up->m.mem_offset, &up32->m.mem_offset, + sizeof(up->m.mem_offset))
+return -EFAULT;

-if (memory == V4L2_MEMORY_USERPTR) {
-if (get_user(p, &up32->m.userptr))
-return -EFAULT;
-up_pln = compat_ptr(p);
-if (put_user((unsigned long)up_pln, &up->m.userptr))
+switch (memory) {
+case V4L2_MEMORY_MMAP:
+case V4L2_MEMORY_OVERLAY:
+if (copy_in_user(&up->m.mem_offset, &up32->m.mem_offset, + sizeof(up32->m.mem_offset)))
+return -EFAULT;
-} else if (memory == V4L2_MEMORY_DMABUF) {
-if (copy_in_user(&up->m.fd, &up32->m.fd, sizeof(int)))
+break;
case V4L2_MEMORY_USERPTR:
+ if (get_user(p, &up32->m.userptr) ||
    + put_user((unsigned long)compat_ptr(p), &up->m.userptr))
    return -EFAULT;
-} else {
-    if (copy_in_user(&up->m.mem_offset, &up32->m.mem_offset,
-        -sizeof(__u32)))
-        +break;
+    case V4L2_MEMORY_DMABUF:
+        if (copy_in_user(&up->m.fd, &up32->m.fd, sizeof(up32->m.fd)))
+            return -EFAULT;
+            +break;
+        }

    return 0;
}
-
-static int put_v4l2_plane32(struct v4l2_plane __user *up, struct v4l2_plane32 __user *up32,
-    -enum v4l2_memory memory)
+static int put_v4l2_plane32(struct v4l2_plane __user *up,
+    +struct v4l2_plane32 __user *up32,
+    +enum v4l2_memory memory)
{
+    unsigned long p;
+
    if (copy_in_user(up32, up, 2 * sizeof(__u32))) ||
        -copy_in_user(&up32->data_offset, &up->data_offset,
-            -sizeof(__u32)))
+            +copy_in_user(&up32->data_offset, &up->data_offset,
+                +sizeof(up->data_offset)))
        return -EFAULT;
-
-    /* For MMAP, driver might've set up the offset, so copy it back.
-     - USERPTR stays the same (was userspace-provided), so no copying. */
-     -if (memory == V4L2_MEMORY_MMAP)
+    switch (memory) {
+        case V4L2_MEMORY_MMAP:
+            return -EFAULT;
+            +break;
+        case V4L2_MEMORY_OVERLAY:
+        if (copy_in_user(&up32->m.mem_offset, &up->m.mem_offset,
+            -sizeof(__u32)))
+            +sizeof(up->m.mem_offset)))
+            return -EFAULT;
+            +break;
+        case V4L2_MEMORY_USERPTR:
+        + if (get_user(p, &up->m.userptr) ||
+            + put_user((compat_ulong_t)ptr_to_compat((__force void *)p),
+                +&up32->m.userptr))
+            return -EFAULT;
/* For DMABUF, driver might've set up the fd, so copy it back. */
-if (memory == V4L2_MEMORY_DMABUF)
-if (copy_in_user(&up32->m.fd, &up->m.fd,
-sizeof(int)))
+break;
+case V4L2_MEMORY_DMABUF:
+if (copy_in_user(&up32->m.fd, &up->m.fd, sizeof(up->m.fd)))
+return -EFAULT;
+break;
+
{return 0;}
}

-static int get_v4l2_buffer32(struct v4l2_buffer *kp, struct v4l2_buffer32 __user *up)
+static int bufsize_v4l2_buffer(struct v4l2_buffer32 __user *up, u32 *size)
{
 +u32 type;
 +u32 length;
 +
 +if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
 + get_user(type, &up->type) ||
 + get_user(length, &up->length))
+return -EFAULT;
 +
 +if (V4L2_TYPE_IS_MULTIPLANAR(type)) {
 +if (length > VIDEO_MAX_PLANES)
 +return -EINVAL;
 +/*
 + * We don't really care if userspace decides to kill itself
 + * by passing a very big length value
 + */
 +*size = length * sizeof(struct v4l2_plane);
 +} else {
 +*size = 0;
 +}
 +return 0;
 +}
 +
+static int get_v4l2_buffer32(struct v4l2_buffer __user *kp,
 + struct v4l2_buffer32 __user *up,
 + void __user *aux_buf, u32 aux_space)
+{
 +u32 type;
 +u32 length;
 +enum v4l2_memory memory;
 struct v4l2_plane32 __user *uplane32;
struct v4l2_plane __user *uplane;
compat_caddr_t p;
int ret;

- if (!access_ok(VERIFY_READ, up, sizeof(struct v4l2_buffer32)) ||
  - get_user(kp->index, &up->index) ||
  - get_user(kp->type, &up->type) ||
  - get_user(kp->flags, &up->flags) ||
  - get_user(kp->memory, &up->memory) ||
  - get_user(kp->length, &up->length))
    return -EFAULT;
-
- if (V4L2_TYPE_IS_OUTPUT(kp->type))
  - if (get_user(kp->bytesused, &up->bytesused) ||
    - get_user(kp->field, &up->field) ||
    - get_user(kp->timestamp.tv_sec, &up->timestamp.tv_sec) ||
    - get_user(kp->timestamp.tv_usec, &up->timestamp.tv_usec))
      return -EFAULT;
-
- if (V4L2_TYPE_IS_MULTIPLANAR(kp->type)) {
  - unsigned int num_planes;
  -
  - if (kp->length == 0) {
    kp->m.planes = NULL;
    /* num_planes == 0 is legal, e.g. when userspace doesn't
     * need planes array on DQBUF*/
    return 0;
  } else if (kp->length > VIDEO_MAX_PLANES) {
    return -EINVAL;
  } else if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
    + assign_in_user(&kp->index, &up->index) ||
    + get_user(type, &up->type) ||
    + put_user(type, &kp->type) ||
    + assign_in_user(&kp->flags, &up->flags) ||
    + get_user(memory, &up->memory) ||
    + put_user(memory, &kp->memory) ||
    + get_user(length, &up->length) ||
    + put_user(length, &kp->length))
    return -EFAULT;
+
+ if (V4L2_TYPE_IS_OUTPUT(type))
  + if (assign_in_user(&kp->bytesused, &up->bytesused) ||
    + assign_in_user(&kp->field, &up->field) ||
    + assign_in_user(&kp->timestamp.tv_sec, &up->timestamp.tv_sec) ||
    + assign_in_user(&kp->timestamp.tv_usec, &up->timestamp.tv_usec))

return -EFAULT;
+
+if (V4L2_TYPE_IS_MULTIPLANAR(type)) {
+u32 num_planes = length;
+
+if (num_planes == 0) {
+/*
+ * num_planes == 0 is legal, e.g. when userspace doesn't
+ * need planes array on DQBUF
+ */
+return put_user(NULL, &kp->m.planes);
+}
+if (num_planes > VIDEO_MAX_PLANES)
+return -EINVAL;
+
if (get_user(p, &up->m.planes))
return -EFAULT;
+
uplane32 = compat_ptr(p);
if (!access_ok(VERIFY_READ, uplane32,
-kp->length * sizeof(struct v4l2_plane32)))
+ num_planes * sizeof(*uplane32))
return -EFAULT;
-/* We don't really care if userspace decides to kill itself
- * by passing a very big num_planes value */
-uplane = compat_alloc_user_space(kp->length *
- sizeof(struct v4l2_plane));
-kp->m.planes = (__force struct v4l2_plane *)uplane;
+/*
+ * We don't really care if userspace decides to kill itself
+ * by passing a very big num_planes value
+ */
+if (aux_space < num_planes * sizeof(*uplane))
+return -EFAULT;
+
+ uplane = aux_buf;
+if (put_user((__force struct v4l2_plane *)uplane,
+ &kp->m.planes))
+return -EFAULT;
-
-for (num_planes = 0; num_planes < kp->length; num_planes++) {
-ret = get_v4l2_plane32(uplane, uplane32, kp->memory);
+while (num_planes--) {
+ret = get_v4l2_plane32(uplane, uplane32, memory);
+if (ret)
+return ret;
+}
++uplane32;
+uplane++;
+uplane32++;
}
} else {
- switch (kp->memory) {
+ switch (memory) {
 case V4L2_MEMORY_MMAP:
- if (get_user(kp->m.offset, &up->m.offset))
+ case V4L2_MEMORY_OVERLAY:
+ if (assign_in_user(&kp->m.offset, &up->m.offset))
 return -EFAULT;
 break;
-case V4L2_MEMORY_USERPTR:
- {
- compat_long_t tmp;
- 
- if (get_user(tmp, &up->m.userptr))
- return -EFAULT;
+ case V4L2_MEMORY_USERPTR: {
+ compat_ulong_t userptr;

-kp->m.userptr = (unsigned long)compat_ptr(tmp);
- }
- break;
- case V4L2_MEMORY_OVERLAY:
- if (get_user(kp->m.offset, &up->m.offset))
+ if (get_user(userptr, &up->m.userptr)) ||
+ put_user((unsigned long)compat_ptr(userptr),
+ &kp->m.userptr))
 return -EFAULT;
 break;
+ }
 case V4L2_MEMORY_DMABUF:
- if (get_user(kp->m.fd, &up->m.fd))
+ if (assign_in_user(&kp->m.fd, &up->m.fd))
 return -EFAULT;
 break;
}
@@ -512,65 +580,70 @@
 return 0;
}

-static int put_v4l2_buffer32(struct v4l2_buffer *kp, struct v4l2_buffer32 __user *up)
+static int put_v4l2_buffer32(struct v4l2_buffer __user *kp,
+    struct v4l2_buffer32 __user *up)
{ }
+u32 type:
+u32 length;
+enum v4l2_memory memory;
struct v4l2_plane32 __user *uplane32;
struct v4l2_plane __user *uplane;
compat_caddr_t p;
-int num_planes;
int ret;

-if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_buffer32))) ||
-put_user(kp->index, &up->index) ||
-put_user(kp->type, &up->type) ||
-put_user(kp->flags, &up->flags) ||
-put_user(kp->memory, &up->memory))
-return -EFAULT;
-
-if (put_user(kp->bytesused, &up->bytesused)) ||
-put_user(kp->field, &up->field) ||
-put_user(kp->timestamp.tv_usec, &up->timestamp.tv_usec) ||
-copy_to_user(&up->timecode, &kp->timecode, sizeof(struct v4l2_timecode)) ||
-put_user(kp->sequence, &up->sequence) ||
-put_user(kp->reserved2, &up->reserved2) ||
-put_user(kp->reserved, &up->reserved) ||
-put_user(kp->length, &up->length))
-return -EFAULT;
+if (!access_ok(VERIFY_WRITE, up, sizeof(*up)) ||
+assign_in_user(&up->index, &kp->index) ||
+get_user(type, &kp->type) ||
+put_user(type, &up->type) ||
+assign_in_user(&up->flags, &kp->flags) ||
+get_user(memory, &kp->memory) ||
+put_user(memory, &up->memory))
+return -EFAULT;
+
+if (assign_in_user(&up->bytesused, &kp->bytesused) ||
+assign_in_user(&up->field, &kp->field) ||
+assign_in_user(&up->timestamp.tv_usec, &kp->timestamp.tv_usec) ||
+assign_in_user(&up->timestamp.tv_usec, &kp->timestamp.tv_usec) ||
+copy_in_user(&up->timecode, &kp->timecode, sizeof(kp->timecode)) ||
+assign_in_user(&up->sequence, &kp->sequence) ||
+assign_in_user(&up->reserved2, &kp->reserved2) ||
+assign_in_user(&up->reserved, &kp->reserved) ||
+get_user(length, &kp->length) ||
+put_user(length, &up->length))
+return -EFAULT;
+
+if (V4L2_TYPE_IS_MULTIPLANAR(type)) {
+u32 num_planes = length;
if (V4L2_TYPE_IS_MULTIPLANAR(kp->type)) {
    num_planes = kp->length;
    if (num_planes == 0)
        return 0;

    uplane = ((__force struct v4l2_plane __user *)kp->m.planes);
    if (get_user(uplane, ((__force struct v4l2_plane __user **)&kp->m.planes))
        return -EFAULT;
    if (get_user(p, &up->m.planes))
        return -EFAULT;
    uplane32 = compat_ptr(p);

    while (--num_planes >= 0) {
        ret = put_v4l2_plane32(uplane, uplane32, kp->memory);
        if (ret)
            return ret;
        ++uplane;
        ++uplane32;
    } else {
        switch (kp->memory) {
            case V4L2_MEMORY_MMAP:
                if (put_user(kp->m.offset, &up->m.offset))
                    return -EFAULT;
                break;
            case V4L2_MEMORY_OVERLAY:
                if (assign_in_user(&up->m.offset, &kp->m.offset))
                    return -EFAULT;
                break;
            case V4L2_MEMORY_USERPTR:
                if (put_user(kp->m.userptr, &up->m.userptr))
                    return -EFAULT;
                break;
            case V4L2_MEMORY_OVERLAY:
                if (assign_in_user(&up->m.userptr, &kp->m.userptr))
                    return -EFAULT;
                break;
            case V4L2_MEMORY_DMABUF:
                if (put_user(kp->m.fd, &up->m.fd))
                    return -EFAULT;
                break;
        }
    }
} else {
    switch (memory) {
        case V4L2_MEMORY_MMAP:
            if (put_user(kp->m.offset, &up->m.offset))
                return -EFAULT;
            break;
        case V4L2_MEMORY_OVERLAY:
            if (assign_in_user(&up->m.offset, &kp->m.offset))
                return -EFAULT;
            break;
        case V4L2_MEMORY_USERPTR:
            if (put_user(kp->m.userptr, &up->m.userptr))
                return -EFAULT;
            break;
        case V4L2_MEMORY_DMABUF:
            if (put_user(kp->m.fd, &up->m.fd))
                return -EFAULT;
            break;
    }
}
static int get_v4l2_framebuffer32(struct v4l2_framebuffer *kp, struct v4l2_framebuffer32 __user *up) {
    u32 tmp;
    compat_caddr_t tmp;

    if (!access_ok(VERIFY_READ, up, sizeof(struct v4l2_framebuffer32)) ||
        get_user(tmp, &up->base) ||
        get_user(kp->capability, &up->capability) ||
        get_user(kp->flags, &up->flags) ||
        copy_from_user(&kp->fmt, &up->fmt, sizeof(up->fmt)))
        return -EFAULT;
    kp->base = (__force void *)compat_ptr(tmp);

    if (!access_ok(VERIFY_WRITE, up, sizeof(*up)) ||
        get_user(tmp, &up->base) ||
        put_user(__force void *)compat_ptr(tmp), &kp->base) ||
        assign_in_user(&kp->capability, &up->capability) ||
        assign_in_user(&kp->flags, &up->flags) ||
        copy_in_user(&kp->fmt, &up->fmt, sizeof(kp->fmt)))
        return -EFAULT;
    return 0;
}

static int put_v4l2_framebuffer32(struct v4l2_framebuffer *kp, struct v4l2_framebuffer32 __user *up) {
    u32 tmp = (u32)((unsigned long)kp->base);

    if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_framebuffer32)) ||
        put_user(tmp, &up->base) ||
        put_user(kp->capability, &up->capability) ||
        put_user(kp->flags, &up->flags) ||
        copy_to_user(&up->fmt, &kp->fmt, sizeof(up->fmt)))
        return -EFAULT;
    void *base;

    if (!access_ok(VERIFY_WRITE, up, sizeof(*up)) ||
        get_user(base, &kp->base) ||
        put_user(ptr_to_compat(base), &up->base) ||
        assign_in_user(&up->capability, &kp->capability) ||
        assign_in_user(&up->flags, &kp->flags) ||
        copy_in_user(&up->fmt, &kp->fmt, sizeof(kp->fmt)))
        return -EFAULT;
    return 0;
}
__u32     reserved[3];
};

/* The 64-bit v4l2_input struct has extra padding at the end of the struct.
   Otherwise it is identical to the 32-bit version. */
static inline int get_v4l2_input32(struct v4l2_input *kp, struct v4l2_input32 __user *up)
{  
    if (copy_from_user(kp, up, sizeof(struct v4l2_input32)))
        return -EFAULT;
    return 0;
}

/* The 64-bit v4l2_input struct has extra padding at the end of the struct.
   Otherwise it is identical to the 32-bit version. */
static inline int put_v4l2_input32(struct v4l2_input *kp, struct v4l2_input32 __user *up)
{  
    if (copy_to_user(up, kp, sizeof(struct v4l2_input32)))
        return -EFAULT;
    return 0;
}

/* The following function really belong in v4l2-common, but that causes
   a circular dependency between modules. We need to think about this, but
   for now this will do. */

/* Return non-zero if this control is a pointer type. Currently only
   type STRING is a pointer type. */
static inline int ctrl_is_pointer(u32 id)
{  
    switch (id) {
    case V4L2_CID_RDS_TX_PS_NAME:
    case V4L2_CID_RDS_TX_RADIO_TEXT:
        return 1;
    default:
        return 0;
static inline bool ctrl_is_pointer(struct file *file, u32 id) 
{
    struct video_device *vdev = video_devdata(file);
    struct v4l2_fh *fh = NULL;
    struct v4l2_ctrl_handler *hdl = NULL;
    struct v4l2_query_ext_ctrl qec = { id };
    const struct v4l2_ioctl_ops *ops = vdev->ioctl_ops;

    if (test_bit(V4L2_FL_USES_V4L2_FH, &vdev->flags))
        fh = file->private_data;
    +if (fh && fh->ctrl_handler)
        hdl = fh->ctrl_handler;
    else if (vdev->ctrl_handler)
        hdl = vdev->ctrl_handler;
    +if (hdl) {
        struct v4l2_ctrl *ctrl = v4l2_ctrl_find(hdl, id);
        +return ctrl && ctrl->is_ptr;
    }
    +if (!ops || !ops->vidioc_query_ext_ctrl)
        return false;
    +return !ops->vidioc_query_ext_ctrl(file, fh, &qec) &&
        (qec.flags & V4L2_CTRL_FLAG_HAS_PAYLOAD);
}

static int bufsize_v4l2_ext_controls(struct v4l2_ext_controls32 __user *up,
                                    u32 *size)
{
    u32 count;

    if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
        get_user(count, &up->count))
        return -EFAULT;
    if (count > V4L2_CID_MAX_CTRLS)
        return -EINVAL;
    *size = count * sizeof(struct v4l2_ext_control);
    return 0;
}

static int get_v4l2_ext Controls32(struct file *file,
                                    struct v4l2_ext Controls __user *kp,
                                    struct v4l2_ext Controls32 __user *up,
                                    + u32 *size)
{
    +count;
    +if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
        get_user(count, &up->count))
        return -EFAULT;
    +if (count > V4L2_CID_MAX_CTRLS)
        return -EINVAL;
    +*size = count * sizeof(struct v4l2_ext_control);
    +return 0;
    +}
    +

static int get_v4l2_ext Controls32(struct file *file,
                                    struct v4l2_ext Controls __user *kp,
                                    struct v4l2_ext Controls32 __user *up,
void __user *aux_buf, u32 aux_space)
{
    struct v4l2_ext_control32 __user *ucontrols;
    struct v4l2_ext_control __user *kcontrols;
    unsigned int n;
+    u32 count;
+    u32 n;
    compat_caddr_t p;

    if (!access_ok(VERIFY_READ, up, sizeof(struct v4l2_ext_controls32)) ||
        get_user(kp->which, &up->which) ||
        get_user(kp->count, &up->count) ||
        get_user(kp->error_idx, &up->error_idx) ||
        copy_from_user(kp->reserved, up->reserved,
            sizeof(kp->reserved)))
    -    return -EFAULT;
    -    if (kp->count == 0) {
    -        kp->controls = NULL;
    -        return 0;
    -    } else if (kp->count > V4L2_CID_MAX_CTRLS) {
    +        if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
    +            assign_in_user(&kp->which, &up->which) ||
    +            get_user(count, &up->count) ||
    +            put_user(count, &kp->count) ||
    +            assign_in_user(&kp->error_idx, &up->error_idx) ||
    +            copy_in_user(kp->reserved, up->reserved, sizeof(kp->reserved)))
    +            return -EFAULT;
    +            if (count == 0)
    +                return put_user(NULL, &kp->controls);
    +            if (count > V4L2_CID_MAX_CTRLS)
    +                return -EINVAL;
    -    }
    if (get_user(p, &up->controls))
    return -EFAULT;
    ucontrols = compat_ptr(p);
    if (!access_ok(VERIFY_READ, ucontrols,
        -kp->count * sizeof(struct v4l2_ext_control32)))
    +    if (!access_ok(VERIFY_READ, ucontrols, count * sizeof(*ucontrols)))
    +        return -EFAULT;
    +        if (aux_space < count * sizeof(*kcontrols))
    +            return -EFAULT;
    +        kcontrols = aux_buf;
    +        if (put_user((__force struct v4l2_ext_control *)kcontrols,
    +            &kp->controls))
    return -EFAULT;
    -    kcontrols = compat_alloc_user_space(kp->count *
    -        sizeof(struct v4l2_ext_control));
-kp->controls = (__force struct v4l2_ext_control __user *)kcontrols;
-for (n = 0; n < kp->count; n++) {
  +for (n = 0; n < count; n++) {
    u32 id;

    if (copy_in_user(kcontrols, ucontrols, sizeof(*ucontrols)))
      return -EFAULT;
  +if (get_user(id, &kcontrols->id))
    return -EFAULT;
    -if (ctrl_is_pointer(id)) {
    +if (ctrl_is_pointer(file, id)) {
      void __user *s;

      if (get_user(p, &ucontrols->string))
        return 0;
    }

    -static int put_v4l2_ext_controls32(struct v4l2_ext_controls *kp, struct v4l2_ext_controls32 __user *up)
    +static int put_v4l2_ext_controls32(struct file *file,
          struct v4l2_ext_controls __user *kp,
          struct v4l2_ext_controls32 __user *up)
    {
      struct v4l2_ext_control32 __user *ucontrols;
      -struct v4l2_ext_control __user *kcontrols =
      -(__force struct v4l2_ext_control __user *)kp->controls;
      -int n = kp->count;
      +struct v4l2_ext_control32 __user *kcontrols =
      +u32 count;
      +u32 n;
      compat_caddr_t p;

    -if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_ext_controls32))) ||
      -put_user(kp->which, &up->which) ||
      -put_user(kp->count, &up->count) ||
      -put_user(kp->error_idx, &up->error_idx) ||
      -copy_to_user(up->reserved, kp->reserved, sizeof(up->reserved)))
      return -EFAULT;
    -if (!kp->count)
      return 0;
    +if (!access_ok(VERIFY_WRITE, up, sizeof(*up))) ||
      +assign_in_user(&up->which, &kp->which) ||
      +get_user(count, &kp->count) ||
      +put_user(count, &up->count) ||
      +assign_in_user(&up->error_idx, &kp->error_idx) ||

+    copy_in_user(up->reserved, kp->reserved, sizeof(up->reserved)) ||
+    get_user(kcontrols, &kp->controls))
+return -EFAULT;
+
+if (!count || count > (U32_MAX/sizeof(*ucontrols)))
+return 0;
+if (get_user(p, &up->controls))
+return -EFAULT;
+ucontrols = compat_ptr(p);
+if (!access_ok(VERIFY_WRITE, ucontrols,
+    n * sizeof(struct v4l2_ext_control32)))
+if (!access_ok(VERIFY_WRITE, ucontrols, count * sizeof(*ucontrols)))
+return -EFAULT;
+
+for (n = 0; n < count; n++) {
+    unsigned int size = sizeof(*ucontrols);
+    if (ctrl_is_pointer(file, id))
+    size -= sizeof(ucontrols->value64);
+    if (copy_in_user(ucontrols, kcontrols, size))
+    return -EFAULT;
+
+    ucontrols++;
+    kcontrols++;
+}

-while (--n >= 0) {
-unsigned size = sizeof(*ucontrols);
+for (n = 0; n < count; n++) {
+    unsigned size = sizeof(*ucontrols);
+    if (ctrl_is_pointer(id))
+    + * Do not modify the pointer when copying a pointer control.
+    + * The contents of the pointer was changed, not the pointer
+    + * itself. */
+    if (ctrl_is_pointer(id))
+    + * Do not modify the pointer when copying a pointer control.
+    + * The contents of the pointer was changed, not the pointer
+    + * itself. */
+    + * if (ctrl_is_pointer(file, id))
+    size -= sizeof(ucontrols->value64);
+    if (copy_in_user(ucontrols, kcontrols, size))
+    return -EFAULT;
+    ucontrols++;
+    kcontrols++;
+}
@@ -793,18 +920,19 @@
@@ -793,18 +920,19 @@
__u32				reserved[8];
static int put_v4l2_event32(struct v4l2_event *kp, struct v4l2_event32 __user *up) {
    if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_event32)) ||
        put_user(kp->type, &up->type) ||
        copy_to_user(&up->u, &kp->u, sizeof(kp->u)) ||
        put_user(kp->pending, &up->pending) ||
        put_user(kp->sequence, &up->sequence) ||
        put_user(kp->timestamp.tv_sec, &up->timestamp.tv_sec) ||
        put_user(kp->timestamp.tv_nsec, &up->timestamp.tv_nsec) ||
        put_user(kp->id, &up->id) ||
        copy_to_user(up->reserved, kp->reserved, 8 * sizeof(__u32)))
        return -EFAULT;
    return 0;
}

static int get_v4l2_edid32(struct v4l2_edid *kp, struct v4l2_edid32 __user *up) {
    u32 tmp;
    if (!access_ok(VERIFY_READ, up, sizeof(*up)) ||
        assign_in_user(&up->type, &kp->type) ||
        copy_in_user(&up->u, &kp->u, sizeof(kp->u)) ||
        assign_in_user(&up->pending, &kp->pending) ||
        assign_in_user(&up->sequence, &kp->sequence) ||
        assign_in_user(&up->timestamp.tv_sec, &kp->timestamp.tv_sec) ||
        assign_in_user(&up->timestamp.tv_nsec, &kp->timestamp.tv_nsec) ||
        assign_in_user(&up->id, &kp->id) ||
        copy_in_user(up->reserved, kp->reserved, sizeof(up->reserved)))
        return -EFAULT;
    return 0;
}

-static int put_v4l2_event32(struct v4l2_event *kp, struct v4l2_event32 __user *up) 
+static int put_v4l2_event32(struct v4l2_event __user *kp, 
+    struct v4l2_event32 __user *up) 
{
    -static int get_v4l2_edid32(struct v4l2_edid *kp, struct v4l2_edid32 __user *up) 
+static int get_v4l2_edid32(struct v4l2_edid __user *kp, 
+    struct v4l2_edid32 __user *up) 
{
    -u32 tmp;
    +compat_uptr_t tmp;

    -if (!access_ok(VERIFY_READ, up, sizeof(struct v4l2_edid32)) ||
        get_user(kp->pad, &up->pad) ||
        get_user(kp->start_block, &up->start_block) ||
        get_user(kp->blocks, &up->blocks) ||
        get_user(tmp, &up->edid) ||
        copy_from_user(kp->reserved, up->reserved, sizeof(kp->reserved)))
        -return -EFAULT;
        -kp->edid = (__force u8 *)compat_ptr(tmp);
        +kp->edid = (__force _compat_uptr_t *)compat_ptr(tmp);
+if (!access_ok(VIEW_READ, up, sizeof(*up)) ||
    assign__in_user(&kp->pad, &up->pad) ||
    assign__in_user(&kp->start_block, &up->start_block) ||
    assign__in_user(&kp->blocks, &up->blocks) ||
    get_user(tmp, &up->edid) ||
    put_user(compat_ptr(tmp), &kp->edid) ||
    copy_in_user(kp->reserved, up->reserved, sizeof(kp->reserved)))
+return -EFAULT;
return 0;
}

static int put_v4l2_edid32(struct v4l2_edid *kp, struct v4l2_edid32 __user *up) {
    u32 tmp = (u32)((unsigned long)kp->edid);
    void *edid;

    -if (!access_ok(VERIFY_WRITE, up, sizeof(struct v4l2_edid32)) ||
        put_user(kp->pad, &up->pad) ||
        put_user(kp->start_block, &up->start_block) ||
        put_user(kp->blocks, &up->blocks) ||
        put_user(tmp, &up->edid) ||
        copy_to_user(up->reserved, kp->reserved, sizeof(up->reserved)))
        return -EFAULT;
    if (!access_ok(VERIFY_WRITE, up, sizeof(*up)) ||
        assign_in_user(&up->pad, &kp->pad) ||
        assign_in_user(&up->start_block, &kp->start_block) ||
        assign_in_user(&up->blocks, &kp->blocks) ||
        get_user(edid, &kp->edid) ||
        put_user(ptr_to_compat(edid), &up->edid) ||
        copy_in_user(up->reserved, kp->reserved, sizeof(up->reserved)))
+return -EFAULT;
+return -EFAULT;
return 0;
}

#define VIDIOC_G_OUTPUT32_IOR ('V', 46, s32)
#define VIDIOC_S_OUTPUT32_IOWR('V', 47, s32)

+static int alloc_userspace(unsigned int size, u32 aux_space,
    void __user **up_native) {
    *up_native = compat_alloc_user_space(size + aux_space);
    if (!*up_native)
        return -ENOMEM;
    if (clear_user(*up_native, size))
        return -EFAULT;
+return 0;
+
static long do_video_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
{
    -union {
        -struct v4l2_format v2f;
        -struct v4l2_buffer v2b;
        -struct v4l2_framebuffer v2fb;
        -struct v4l2_input v2i;
        -struct v4l2_standard v2s;
        -struct v4l2_ext_controls v2ecs;
        -struct v4l2_event v2ev;
        -struct v4l2_create_buffers v2crt;
        -struct v4l2_edid v2edid;
        -unsigned long vx;
        -int vi;
    } karg;
    void __user *up = compat_ptr(arg);
    void __user *up_native = NULL;
    void __user *aux_buf;
    u32 aux_space;
    int compatible_arg = 1;
    long err = 0;

    @ @ -927.30 +1059.52 @@
    case VIDIOC_STREAMOFF:
    case VIDIOC_S_INPUT:
    case VIDIOC_S_OUTPUT:
        -err = get_user(karg.vi, (s32 __user *)up);
        +err = alloc_userspace(sizeof(unsigned int), 0, &up_native);
        +if (!err && assign_in_user((unsigned int __user *)up_native,
            + (compat_uint_t __user *)up))
        +err = -EFAULT;
        compatible_arg = 0;
    break;

    case VIDIOC_G_INPUT:
    case VIDIOC_G_OUTPUT:
        +err = alloc_userspace(sizeof(unsigned int), 0, &up_native);
        compatible_arg = 0;
    break;

    case VIDIOC_G_EDID:
    case VIDIOC_S_EDID:
        -err = get_v4l2_edid32(&karg.v2edid, up);
        +err = alloc_userspace(sizeof(struct v4l2_edid), 0, &up_native);
        +if (!err)
+err = get_v4l2_edid32(up_native, up);
compatible_arg = 0;
break;

case VIDIOC_G_FMT:
case VIDIOC_S_FMT:
case VIDIOC_TRY_FMT:
  -err = get_v4l2_format32(&karg.v2f, up);
  +err = bufsize_v4l2_format(up, &aux_space);
  +if (!err)
  +err = alloc_userspace(sizeof(struct v4l2_format),
  +    aux_space, &up_native);
  +if (!err) {
  +aux_buf = up_native + sizeof(struct v4l2_format);
  +err = get_v4l2_format32(up_native, up,
  +aux_buf, aux_space);
  +}
compatible_arg = 0;
break;

case VIDIOC_CREATE_BUFS:
  -err = get_v4l2_create32(&karg.v2crt, up);
  +err = bufsize_v4l2_create(up, &aux_space);
  +if (!err)
  +err = alloc_userspace(sizeof(struct v4l2_create_buffers),
  +    aux_space, &up_native);
  +if (!err) {
  +aux_buf = up_native + sizeof(struct v4l2_create_buffers);
  +err = get_v4l2_create32(up_native, up,
  +aux_buf, aux_space);
  +}
compatible_arg = 0;
break;

@@ -958,36 +1112,63 @@
case VIDIOC_QUERYBUF:
case VIDIOC_QBUF:
case VIDIOC_DQBUF:
  -err = get_v4l2_buffer32(&karg.v2b, up);
  +err = bufsize_v4l2_buffer(up, &aux_space);
  +if (!err)
  +err = alloc_userspace(sizeof(struct v4l2_buffer),
  +aux_space, &up_native);
  +if (!err) {
  +aux_buf = up_native + sizeof(struct v4l2_buffer);
  +err = get_v4l2_buffer32(up_native, up,
  +aux_buf, aux_space);
  +}
compatible_arg = 0;
break;

case VIDIOC_S_FBUF:
-err = get_v4l2_framebuffer32(&karg.v2fb, up);
+err = alloc_userspace(sizeof(struct v4l2_framebuffer), 0,
+    &up_native);
+if (!err)
+err = get_v4l2_framebuffer32(up_native, up);
compatible_arg = 0;
break;

case VIDIOC_G_FBUF:
+err = alloc_userspace(sizeof(struct v4l2_framebuffer), 0,
+    &up_native);
compatible_arg = 0;
break;

case VIDIOC_ENUMSTD:
-err = get_v4l2_standard32(&karg.v2s, up);
+err = alloc_userspace(sizeof(struct v4l2_standard), 0,
+    &up_native);
+if (!err)
+err = get_v4l2_standard32(up_native, up);
compatible_arg = 0;
break;

case VIDIOC_ENUMINPUT:
-err = get_v4l2_input32(&karg.v2i, up);
+err = alloc_userspace(sizeof(struct v4l2_input), 0, &up_native);
+if (!err)
+err = get_v4l2_input32(up_native, up);
compatible_arg = 0;
break;

case VIDIOC_G_EXT_CTRLS:
case VIDIOC_S_EXT_CTRLS:
case VIDIOC_TRY_EXT_CTRLS:
-err = get_v4l2_ext_controls32(&karg.v2ecs, up);
+err = bufsize_v4l2_ext_controls(up, &aux_space);
+if (!err)
+err = alloc_userspace(sizeof(struct v4l2_ext_controls),
+    aux_space, &up_native);
+if (!err) {
+aux_buf = up_native + sizeof(struct v4l2_ext_controls);
+err = get_v4l2_ext_controls32(file, up_native, up,
+    aux_buf, aux_space);
+}
compatible_arg = 0;
break;
case VIDIOC_DQEVENT:
+err = alloc_userspace(sizeof(struct v4l2_event), 0, &up_native);
compatible_arg = 0;
break;
} @@ -996,26 +1177,26 @@

if (compatible_arg)
err = native_ioctl(file, cmd, (unsigned long)up);
-else {
-mm_segment_t old_fs = get_fs();
+else
+err = native_ioctl(file, cmd, (unsigned long)up_native);

-set_fs(KERNEL_DS);
-err = native_ioctl(file, cmd, (unsigned long)&karg);
-set_fs(old_fs);
-}
+if (err == -ENOTTY)
+return err;

-/* Special case: even after an error we need to put the
- results back for these ioctls since the error_idx will
- contain information on which control failed. */
+/*
+ * Special case: even after an error we need to put the
+ * results back for these ioctls since the error_idx will
+ * contain information on which control failed.
+ */
switch (cmd) {
 case VIDIOC_G_EXT_CTRLS:
 case VIDIOC_S_EXT_CTRLS:
 case VIDIOC_TRY_EXT_CTRLS:
-if (put_v4l2_ext_controls32(&karg.v2ecs, up))
+if (put_v4l2_ext Controls32(file, up_native, up))
 err = -EFAULT;
 break;
 case VIDIOC_S_EDID:
-if (put_v4l2_edid32(&karg.v2edid, up))
+if (put_v4l2_edid32(up_native, up))
 err = -EFAULT;
 break;
} @@ -1027,43 +1208,46 @@
 case VIDIOC_S_OUTPUT:
 case VIDIOC_G_INPUT:

case VIDIOC_G_OUTPUT:
  -err = put_user(((s32)karg.vi), (s32 __user *)up);
  +if (assign_in_user((compat_uint_t __user *)up,
    +  ((unsigned int __user *)up_native)))
  +err = -EFAULT;
break;

case VIDIOC_G_FBUF:
  -err = put_v4l2_framebuffer32(&karg.v2fb, up);
  +err = put_v4l2_framebuffer32(up_native, up);
break;

case VIDIOC_DQEVENT:
  -err = put_v4l2_event32(&karg.v2ev, up);
  +err = put_v4l2_event32(up_native, up);
break;

case VIDIOC_G_EDID:
  -err = put_v4l2_edid32(&karg.v2edid, up);
  +err = put_v4l2_edid32(up_native, up);
break;

case VIDIOC_G_FMT:
  case VIDIOC_S_FMT:
  case VIDIOC_TRY_FMT:
  -err = put_v4l2_format32(&karg.v2f, up);
  +err = put_v4l2_format32(up_native, up);
break;

case VIDIOC_CREATE_BUFS:
  -err = put_v4l2_create32(&karg.v2crt, up);
  +err = put_v4l2_create32(up_native, up);
break;

+case VIDIOC_PREPARE_BUF:

case VIDIOC_QUERYBUF:
  case VIDIOC_QBUF:
  case VIDIOC_DQBUF:
  -err = put_v4l2_buffer32(&karg.v2b, up);
  +err = put_v4l2_buffer32(up_native, up);
break;

case VIDIOC_ENUMSTD:
  -err = put_v4l2_standard32(&karg.v2s, up);
  +err = put_v4l2_standard32(up_native, up);
break;

case VIDIOC_ENUMINPUT:
err = put_v4l2_input32(&karg.v2i, up);
+err = put_v4l2_input32(up_native, up);
break;
}
return err;
--- linux-4.15.0.orig/drivers/media/v4l2-core/v4l2-ctrls.c
+++ linux-4.15.0/drivers/media/v4l2-core/v4l2-ctrls.c
@@ -1014,6 +1014,7 @@
case V4L2_CID_FLASH_STROBE_STOP:
case V4L2_CID_AUTO_FOCUS_START:
case V4L2_CID_AUTO_FOCUS_STOP:
+case V4L2_CID_DO_WHITE_BALANCE:
    *type = V4L2_CTRL_TYPE_BUTTON;
    *flags |= V4L2_CTRL_FLAG_WRITE_ONLY |
    V4L2_CTRL_FLAG_EXECUTE_ON_WRITE;
@@ -1239,7 +1240,7 @@
 static void fill_event(struct v4l2_event *ev, struct v4l2_ctrl *ctrl, u32 changes)
 {
     -memset(ev->reserved, 0, sizeof(ev->reserved));
     +memset(ev, 0, sizeof(*ev));
     ev->type = V4L2_EVENT_CTRL;
     ev->id = ctrl->id;
     ev->u.ctrl.changes = changes;
     @@ -2109,16 +2110,7 @@
 v4l2_ctrl_fill(cfg->id, &name, &type, &min, &max, &step, &def, &flags);
     -is_menu = (cfg->type == V4L2_CTRL_TYPE_MENU ||
     -   cfg->type == V4L2_CTRL_TYPE_INTEGER_MENU);
     +is_menu = (type == V4L2_CTRL_TYPE_MENU ||
     +   type == V4L2_CTRL_TYPE_INTEGER_MENU);
     if (is_menu)
         WARN_ON(step);
     else
         WARN_ON(cfg->menu_skip_mask);
-    if (cfg->type == V4L2_CTRL_TYPE_MENU &&& qmenu == NULL) 
+    if (type == V4L2_CTRL_TYPE_MENU &&& !qmenu) {
         qmenu = v4l2_ctrl_get_menu(cfg->id);
-    else if (cfg->type == V4L2_CTRL_TYPE_INTEGER_MENU &&
-             qmenu_int == NULL) { 
-        handler_set_err(hdl, -EINVAL);
-        return NULL;
+    } else if (type == V4L2_CTRL_TYPE_INTEGER_MENU &&&
+             !qmenu_int) {
+        handler_set_err(hdl, -EINVAL);
+        return NULL;
     }
--- linux-4.15.0.orig/drivers/media/v4l2-core/v4l2-dv-timings.c
+++ linux-4.15.0/drivers/media/v4l2-core/v4l2-dv-timings.c
@@ -207,7 +207,7 @@
if (v4l2_valid_dv_timings(t, cap, fnc, fnc_handle))
return false;

-for (i = 0; i < v4l2_dv_timings_presets[i].bt.width; i++) {
+for (i = 0; v4l2_dv_timings_presets[i].bt.width; i++) {
if (v4l2_valid_dv_timings(v4l2_dv_timings_presets + i, cap, fnc, fnc_handle) &&
  v4l2_match_dv_timings(t, v4l2_dv_timings_presets + i, @ @ -229,7 +229,7 @@
} 
unsigned int i;

-for (i = 0; i < v4l2_dv_timings_presets[i].bt.width; i++) {
+for (i = 0; v4l2_dv_timings_presets[i].bt.width; i++) {
const struct v4l2_bt_timings *bt =
  &v4l2_dv_timings_presets[i].bt;

--- linux-4.15.0.orig/drivers/media/v4l2-core/v4l2-event.c
+++ linux-4.15.0/drivers/media/v4l2-core/v4l2-event.c
@@ -115,14 +115,6 @@
if (sev == NULL)
return;

-/*
- * If the event has been added to the fh->subscribed list, but its
- * add op has not completed yet elems will be 0, treat this as
- * not being subscribed.
- */
-if (!sev->elems)
-return;
-
-/* Increase event sequence number on fh. */
-fh->sequence++;

@@ -201,6 +193,22 @@
} 
EXPORT_SYMBOL_GPL(v4l2_event_pending);

+static void __v4l2_event_unsubscribe(struct v4l2_subscribed_event *sev)
+{
+struct v4l2_fh *fh = sev->fh;
+unsigned int i;
+lockdep_assert_held(&fh->subscribe_lock);
+assert_spin_locked(&fh->vdev->fh_lock);
+/* Remove any pending events for this subscription */
+for (i = 0; i < sev->in_use; i++) {
list_del(&sev->events[sev_pos(sev, i)].list);
+fh->navailable--;
+
+list_del(&sev->list);
+
int v4l2_event_subscribe(struct v4l2_fh *fh,
   const struct v4l2_event_subscription *sub, unsigned elems,
   const struct v4l2_subscribed_event_ops *ops)
@@ -208,6 +216,7 @@
   struct v4l2_subscribed_event *sev, *found_ev;
   unsigned long flags;
   unsigned i;
   +int ret = 0;

   if (sub->type == V4L2_EVENT_ALL)
      return -EINVAL;
@@ -226,6 +235,9 @@
    sev->flags = sub->flags;
    sev->fh = fh;
    sev->ops = ops;
+    sev->elems = elems;
    +
+    mutex_lock(&fh->subscribe_lock);

    spin_lock_irqsave(&fh->vdev->fh_lock, flags);
    found_ev = v4l2_event_subscribed(fh, sub->type, sub->id);
@@ -234,23 +246,21 @@
    spin_unlock_irqrestore(&fh->vdev->fh_lock, flags);

    if (found_ev) {
+    /* Already listening */
       kvfree(sev);
   -return 0; /* Already listening */
   -}
   -
   -if (sev->ops && sev->ops->add) {
       -int ret = sev->ops->add(sev, elems);
   +} else if (sev->ops && sev->ops->add) {
       +ret = sev->ops->add(sev, elems);
       if (ret) {
           -sev->ops = NULL;
           -v4l2_event_unsubscribe(fh, sub);
           -return ret;
+spin_lock_irqsave(&fh->vdev->fh_lock, flags);
+    __v4l2_event_unsubscribe(sev);
+spin_unlock_irqrestore(&fh->vdev->fh_lock, flags);
       +kvfree(sev);
   }
-/* Mark as ready for use */
-sev->elems = elems;
+mutex_unlock(&fh->subscribe_lock);

-return 0;
+return ret;
}
EXPORT_SYMBOL_GPL(v4l2_event_subscribe);

@@ -282,30 +292,27 @@
{
 struct v4l2_subscribed_event *sev;
 unsigned long flags;
-int i;

 if (sub->type == V4L2_EVENT_ALL) {
 v4l2_event_unsubscribe_all(fh);
 return 0;
 }

+mutex_lock(&fh->subscribe_lock);
 +
 spin_lock_irqsave(&fh->vdev->fh_lock, flags);

 sev = v4l2_event_subscribed(fh, sub->type, sub->id);
 -if (sev != NULL) {
 -/* Remove any pending events for this subscription */
 -for (i = 0; i < sev->in_use; i++) {
 -list_del(&sev->events[sev_pos(sev, i)].list);
 -fh->navailable--; 
 -}
 -list_del(&sev->list);
 -}
 +if (sev != NULL)
 +__v4l2_event_unsubscribe(sev);

 spin_unlock_irqrestore(&fh->vdev->fh_lock, flags);

 if (sev && sev->ops && sev->ops->del)
 sev->ops->del(sev);

+mutex_unlock(&fh->subscribe_lock);
 +
 kvfree(sev);
return 0;
--- linux-4.15.0.orig/drivers/media/v4l2-core/v4l2-fh.c
+++ linux-4.15.0/drivers/media/v4l2-core/v4l2-fh.c
@@ -45,6 +45,7 @@
 INIT_LIST_HEAD(&fh->available);
 INIT_LIST_HEAD(&fh->subscribed);
 fh->sequence = -1;
+mutex_init(&fh->subscribe_lock);
 }
 EXPORT_SYMBOL_GPL(v4l2_fh_init);

@@ -90,6 +91,7 @@
 return;
 v4l_disable_media_source(fh->vdev);
 v4l2_event_unsubscribe_all(fh);
+mutex_destroy(&fh->subscribe_lock);
 fh->vdev = NULL;
 }
 EXPORT_SYMBOL_GPL(v4l2_fh_exit);

@@ -102,6 +104,7 @@
 v4l2_fh_del(fh);
 v4l2_fh_exit(fh);
 kfree(fh);
+filp->private_data = NULL;
 }
 return 0;
 }

--- linux-4.15.0.orig/drivers/media/v4l2-core/v4l2-ioctl.c
+++ linux-4.15.0/drivers/media/v4l2-core/v4l2-ioctl.c
@@ -249,6 +249,7 @@
 const struct v4l2_window *win;
 const struct v4l2_sdr_format *sdr;
 const struct v4l2_meta_format *meta;
+u32 planes;
 unsigned i;

 pr_cont("type=%s", prt_names(p->type, v4l2_type_names));
@@ -279,7 +280,8 @@
 prt_names(mp->field, v4l2_field_names),
 mp->colorspace, mp->num_planes, mp->flags,
 mp->ycbcr_enc, mp->quantization, mp->xfer_func);
-"for (i = 0; i < mp->num_planes; i++)
+"for (i = 0; i < planes; i++)
+planes = min_t(u32, mp->num_planes, VIDEO_MAX_PLANES);
+"for (i = 0; i < planes; i++)
 printk(KERN_DEBUG "plane %u: bytesperline=%u sizeimage=%u\n", i,
 mp->plane_fmt[i].bytesperline,
 mp->plane_fmt[i].sizeimage);
@@ -1311,52 +1313,50 @@
struct file *file, void *fh, void *arg)
{
struct v4l2_fmtdesc *p = arg;
-struct video_device *vfd = video_devdata(file);
-bool is_vid = vfd->vfl_type == VFL_TYPE_GRABBER;
-bool is_sdr = vfd->vfl_type == VFL_TYPE_SDR;
-bool is_tch = vfd->vfl_type == VFL_TYPE_TOUCH;
-bool is_rx = vfd->vfl_dir != VFL_DIR_TX;
-bool is_tx = vfd->vfl_dir != VFL_DIR_RX;
-int ret = -EINVAL;
+int ret = check_fmt(file, p->type);
+
+if (ret)
+return ret;
+ret = -EINVAL;

switch (p->type) {
case V4L2_BUF_TYPE_VIDEO_CAPTURE:
+if (unlikely(!is_rx || (!is_vid && !is_tch) || !ops->vidioc_enum_fmt_vid_cap))
break;
ret = ops->vidioc_enum_fmt_vid_cap(file, fh, arg);
break;

case V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE:
+if (unlikely(!is_rx || !is_vid || !ops->vidioc_enum_fmt_vid_cap_mplane))
break;
ret = ops->vidioc_enum_fmt_vid_cap_mplane(file, fh, arg);
break;

case V4L2_BUF_TYPE_VIDEO_OVERLAY:
+if (unlikely(!is_rx || !is_vid || !ops->vidioc_enum_fmt_vid_overlay))
break;
ret = ops->vidioc_enum_fmt_vid_overlay(file, fh, arg);
break;

case V4L2_BUF_TYPE_VIDEO_OUTPUT:
+if (unlikely(!is_tx || !is_vid || !ops->vidioc_enum_fmt_vid_out))
break;
ret = ops->vidioc_enum_fmt_vid_out(file, fh, arg);
break;

case V4L2_BUF_TYPE_VIDEO_OUTPUT_MPLANE:
+if (unlikely(!is_tx || !is_vid || !ops->vidioc_enum_fmt_vid_out_mplane))
break;
ret = ops->vidioc_enum_fmt_vid_out_mplane(file, fh, arg);
break;

case V4L2_BUF_TYPE_SDR_CAPTURE:
if (unlikely(!is_rx || !is_sdr || !ops->vidioc_enum_fmt_sdr_cap))
    break;
ret = ops->vidioc_enum_fmt_sdr_cap(file, fh, arg);
break;
case V4L2_BUF_TYPE_SDR_OUTPUT:
    if (unlikely(!is_tx || !is_sdr || !ops->vidioc_enum_fmt_sdr_out))
        break;
    ret = ops->vidioc_enum_fmt_sdr_out(file, fh, arg);
    break;
case V4L2_BUF_TYPE_META_CAPTURE:
    if (unlikely(!is_rx || !is_vid || !ops->vidioc_enum_fmt_meta_cap))
        break;
    ret = ops->vidioc_enum_fmt_meta_cap(file, fh, arg);
    break;
@@ -1366,17 +1366,30 @@
    return ret;
}

+static void v4l_pix_format_touch(struct v4l2_pix_format *p)
+{
+    /*
+     * The v4l2_pix_format structure contains fields that make no sense for
+     * touch. Set them to default values in this case.
+     */
+    +p->field = V4L2_FIELD_NONE;
+    +p->colorspace = V4L2_COLORSPACE_RAW;
+    +p->flags = 0;
+    +p->ycbcr_enc = 0;
+    +p->quantization = 0;
+    +p->xfer_func = 0;
+    +}
+static int v4l_g_fmt(const struct v4l2_ioctl_ops *ops,
struct file *file, void *fh, void *arg)
{
    struct v4l2_format *p = arg;
    struct video_device *vfd = video_devdata(file);
    -bool is_vid = vfd->vfl_type == VFL_TYPE_GRABBER;
    -bool is_sdr = vfd->vfl_type == VFL_TYPE_SDR;
    -bool is_tch = vfd->vfl_type == VFL_TYPE_TOUCH;
    -bool is_rx = vfd->vfl_dir != VFL_DIR_TX;
    -bool is_tx = vfd->vfl_dir != VFL_DIR_RX;
    -int ret;
    +int ret = check_fmt(file, p->type);
switch (p->type) {
    case V4L2_BUF_TYPE_VIDEO_CAPTURE:
        if (unlikely(!is_rx || !is_vid || !ops->vidioc_g_fmt_vid_cap))
            break;
        p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
        ret = ops->vidioc_g_fmt_vid_cap(file, fh, arg);
        if (vfd->vfl_type == VFL_TYPE_TOUCH)
            v4l_pix_format_touch(&p->fmt.pix);
        return ret;
    case V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE:
        if (unlikely(!is_rx || !is_vid || !ops->vidioc_g_fmt_vid_cap_mplane))
            break;
        return ops->vidioc_g_fmt_vid_cap_mplane(file, fh, arg);
    case V4L2_BUF_TYPE_VIDEO_OVERLAY:
        if (unlikely(!is_rx || !is_vid || !ops->vidioc_g_fmt_vid_overlay))
            break;
        return ops->vidioc_g_fmt_vid_overlay(file, fh, arg);
    case V4L2_BUF_TYPE_VBI_CAPTURE:
        if (unlikely(!is_rx || is_vid || !ops->vidioc_g_fmt_vbi_cap))
            break;
        return ops->vidioc_g_fmt_vbi_cap(file, fh, arg);
    case V4L2_BUF_TYPE_SLICED_VBI_CAPTURE:
        if (unlikely(!is_rx || is_vid || !ops->vidioc_g_fmt_sliced_vbi_cap))
            break;
        return ops->vidioc_g_fmt_sliced_vbi_cap(file, fh, arg);
    case V4L2_BUF_TYPE_VIDEO_OUTPUT:
        if (unlikely(!is_tx || !is_vid || !ops->vidioc_g_fmt_vid_out))
            break;
        p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
        ret = ops->vidioc_g_fmt_vid_out(file, fh, arg);
        if (unlikely(!is_rx || !is_vid || !ops->vidioc_g_fmt_vid_out_mplane))
            break;
    case V4L2_BUF_TYPE_VIDEO_OUTPUT_MPLANE:
        if (unlikely(!is_tx || !is_vid || !ops->vidioc_g_fmt_vid_out_mplane))
            break;
}

/*
  * fmt can't be cleared for these overlay types due to the 'clips'
  */
@@ -1404,31 +1417,25 @@
    switch (p->type) {
    case V4L2_BUF_TYPE_VIDEO_CAPTURE:
        if (unlikely(!is_rx || (!is_vid && !is_tch) || !ops->vidioc_g_fmt_vid_cap))
            +if (unlikely(!ops->vidioc_g_fmt_vid_cap))
                break;
        p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
        ret = ops->vidioc_g_fmt_vid_cap(file, fh, arg);
        /* just in case the driver zeroed it again */
        p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
        +if (vfd->vfl_type == VFL_TYPE_TOUCH)
            +v4l_pix_format_touch(&p->fmt.pix);
        return ret;
    case V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE:
        if (unlikely(!is_rx || !is_vid || !ops->vidioc_g_fmt_vid_cap_mplane))
            break;
        return ops->vidioc_g_fmt_vid_cap_mplane(file, fh, arg);
    case V4L2_BUF_TYPE_VIDEO_OVERLAY:
        if (unlikely(!is_rx || !is_vid || !ops->vidioc_g_fmt_vid_overlay))
            break;
        return ops->vidioc_g_fmt_vid_overlay(file, fh, arg);
    case V4L2_BUF_TYPE_VBI_CAPTURE:
        if (unlikely(!is_rx || is_vid || !ops->vidioc_g_fmt_vbi_cap))
            break;
        return ops->vidioc_g_fmt_vbi_cap(file, fh, arg);
    case V4L2_BUF_TYPE_SLICED_VBI_CAPTURE:
        if (unlikely(!is_rx || is_vid || !ops->vidioc_g_fmt_sliced_vbi_cap))
            break;
        return ops->vidioc_g_fmt_sliced_vbi_cap(file, fh, arg);
    case V4L2_BUF_TYPE_VIDEO_OUTPUT:
        if (unlikely(!is_tx || !is_vid || !ops->vidioc_g_fmt_vid_out))
            break;
        p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
        ret = ops->vidioc_g_fmt_vid_out(file, fh, arg);
        @ @ -1436,63 +1443,32 @ @
    case V4L2_BUF_TYPE_VIDEO_OUTPUT_MPLANE:
        if (unlikely(!is_tx || !is_vid || !ops->vidioc_g_fmt_vid_out_mplane))
            break;
return ops->v4l2_ioctl_ops->vidioc_g_fmt_vid_out_mplane(file, fh, arg);
case V4L2_BUF_TYPE_VIDEO_OUTPUT_OVERLAY:
    if (unlikely(is_tx || !is_vid || !ops->v4l2_ioctl_ops->vidioc_g_fmt_vid_out_overlay))
        break;
    return ops->v4l2_ioctl_ops->vidioc_g_fmt_vid_out_overlay(file, fh, arg);
case V4L2_BUF_TYPE_VBI_OUTPUT:
    if (unlikely(!is_tx || is_vid || !ops->v4l2_ioctl_ops->vidioc_g_fmt_vbi_out))
        break;
    return ops->v4l2_ioctl_ops->vidioc_g_fmt_vbi_out(file, fh, arg);
case V4L2_BUF_TYPE_SLIJCED_VBI_OUTPUT:
    if (unlikely(!is_tx || is_vid || !ops->v4l2_ioctl_ops->vidioc_g_fmt_sliced_vbi_out))
        break;
    return ops->v4l2_ioctl_ops->vidioc_g_fmt_sliced_vbi_out(file, fh, arg);
case V4L2_BUF_TYPE_SDR_CAPTURE:
    if (unlikely(!is_rx || !is_sdr || !ops->v4l2_ioctl_ops->vidioc_g_fmt_sdr_cap))
        break;
    return ops->v4l2_ioctl_ops->vidioc_g_fmt_sdr_cap(file, fh, arg);
case V4L2_BUF_TYPE_SDR_OUTPUT:
    if (unlikely(!is_tx || !is_sdr || !ops->v4l2_ioctl_ops->vidioc_g_fmt_sdr_out))
        break;
    return ops->v4l2_ioctl_ops->vidioc_g_fmt_sdr_out(file, fh, arg);
case V4L2_BUF_TYPE_META_CAPTURE:
    if (unlikely(!is_rx || !is_vid || !ops->v4l2_ioctl_ops->vidioc_g_fmt_meta_cap))
        break;
    return ops->v4l2_ioctl_ops->vidioc_g_fmt_meta_cap(file, fh, arg);
}
return -EINVAL;

- static void v4l_pix_format_touch(struct v4l2_pix_format *p)
  -{
    
    -/*
    -* The v4l2_pix_format structure contains fields that make no sense for
    -* touch. Set them to default values in this case.
    -*/
    
    -p->field = V4L2_FIELD_NONE;
    -p->colorspace = V4L2_COLORSPACE_RAW;
    -p->flags = 0;
    -p->ycbcr_enc = 0;
    -p->quantization = 0;
    -p->xfer_func = 0;
    -}

- static int v4l_s_fmt(const struct v4l2_ioctl_ops *ops,
                       struct file *file, void *fh, void *arg)
  {
    struct v4l2_format *p = arg;
struct video_device *vfd = video_devdata(file);
bool is_vid = vfd->vfl_type == VFL_TYPE_GRABBER;
bool is_sdr = vfd->vfl_type == VFL_TYPE_SDR;
bool is_tch = vfd->vfl_type == VFL_TYPE_TOUCH;
bool is_rx = vfd->vfl_dir != VFL_DIR_TX;
bool is_tx = vfd->vfl_dir != VFL_DIR_RX;
int ret;
  int ret = check_fmt(file, p->type);
+
+if (ret)
+return ret;

ret = v4l_enable_media_source(vfd);
if (ret)
@@ -1501,37 +1477,37 @@

switch (p->type) {
case V4L2_BUF_TYPE_VIDEO_CAPTURE:
  -if (unlikely(!is_rx || (!is_vid && !is_tch) || !ops->vidioc_s_fmt_vid_cap))
  +if (unlikely(!ops->vidioc_s_fmt_vid_cap))
    break;
  CLEAR_AFTER_FIELD(p, fmt.pix);
  ret = ops->vidioc_s_fmt_vid_cap(file, fh, arg);
  /* just in case the driver zeroed it again */
  p->fmt.pix.priv = V4L2_PIX_FMT_PRV_MAGIC;
  -if (is_tch)
  +if (vfd->vfl_type == VFL_TYPE_TOUCH)
    v4l_pix_format_touch(&p->fmt.pix);
  ret = ops->vidioc_s_fmt_vid_cap(file, fh, arg);
  return ret;

case V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE:
  -if (unlikely(!is_rx || !is_vid || !ops->vidioc_s_fmt_vid_cap_mplane))
  +if (unlikely(!ops->vidioc_s_fmt_vid_cap_mplane))
    break;
  CLEAR_AFTER_FIELD(p, fmt.pix_mp.xfer_func);
  return ops->vidioc_s_fmt_vid_cap_mplane(file, fh, arg);

case V4L2_BUF_TYPE_VIDEO_OVERLAY:
  -if (unlikely(!is_rx || !is_vid || !ops->vidioc_s_fmt_vid_overlay))
  +if (unlikely(!ops->vidioc_s_fmt_vid_overlay))
    break;
  CLEAR_AFTER_FIELD(p, fmt.win);
  return ops->vidioc_s_fmt_vid_overlay(file, fh, arg);

case V4L2_BUF_TYPE_VBI_CAPTURE:
  -if (unlikely(!is_rx || is_vid || !ops->vidioc_s_fmt_vbi_cap))
  +if (unlikely(!ops->vidioc_s_fmt_vbi_cap))
    break;
  -CLEAR_AFTER_FIELD(p, fmt.vbi);
  +CLEAR_AFTER_FIELD(p, fmt.vbi.flags);
  return ops->vidioc_s_fmt_vbi_cap(file, fh, arg);
case V4L2_BUF_TYPE_SLICED_VBI_CAPTURE:
- if (unlikely(!is_rx || is_vid || !ops->vidioc_s_fmt_sliced_vbi_cap))
+ if (unlikely(!ops->vidioc_s_fmt_sliced_vbi_cap))
    break;
-CLEAR_AFTER_FIELD(p, fmt.sliced);
+CLEAR_AFTER_FIELD(p, fmt.sliced.io_size);
    return ops->vidioc_s_fmt_sliced_vbi_cap(file, fh, arg);

    case V4L2_BUF_TYPE_VIDEO_OUTPUT:
- if (unlikely(!is_tx || !is_vid || !ops->vidioc_s_fmt_vid_out))
+ if (unlikely(!ops->vidioc_s_fmt_vid_out))
    break;
    CLEAR_AFTER_FIELD(p, fmt.pix);
    ret = ops->vidioc_s_fmt_vid_out(file, fh, arg);
    @@ -1539,37 +1515,37 @@
    p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
    return ret;
    case V4L2_BUF_TYPE_VIDEO_OUTPUT_MPLANE:
- if (unlikely(!is_tx || !is_vid || !ops->vidioc_s_fmt_vid_out_mplane))
+ if (unlikely(!ops->vidioc_s_fmt_vid_out_mplane))
    break;
    CLEAR_AFTER_FIELD(p, fmt.pix_mp.xfer_func);
    return ops->vidioc_s_fmt_vid_out_mplane(file, fh, arg);
    case V4L2_BUF_TYPE_VIDEO_OUTPUT_OVERLAY:
- if (unlikely(!is_tx || !is_vid || !ops->vidioc_s_fmt_vid_out_overlay))
+ if (unlikely(!ops->vidioc_s_fmt_vid_out_overlay))
    break;
    CLEAR_AFTER_FIELD(p, fmt.win);
    return ops->vidioc_s_fmt_vid_out_overlay(file, fh, arg);
    case V4L2_BUF_TYPE_VBI_OUTPUT:
- if (unlikely(!is_tx || is_vid || !ops->vidioc_s_fmt_vbi_out))
+ if (unlikely(!ops->vidioc_s_fmt_vbi_out))
    break;
- CLEAR_AFTER_FIELD(p, fmt.vbi);
+ CLEAR_AFTER_FIELD(p, fmt.vbi.flags);
    return ops->vidioc_s_fmt_vbi_out(file, fh, arg);
    case V4L2_BUF_TYPE_SLICED_VBI_OUTPUT:
- if (unlikely(!is_tx || is_vid || !ops->vidioc_s_fmt_sliced_vbi_out))
+ if (unlikely(!ops->vidioc_s_fmt_sliced_vbi_out))
    break;
- CLEAR_AFTER_FIELD(p, fmt.sliced);
+ CLEAR_AFTER_FIELD(p, fmt.sliced.io_size);
    return ops->vidioc_s_fmt_sliced_vbi_out(file, fh, arg);
    case V4L2_BUF_TYPE_SDR_CAPTURE:
- if (unlikely(!is_rx || !is_sdr || !ops->vidioc_s_fmt_sdr_cap))
+ if (unlikely(!ops->vidioc_s_fmt_sdr_cap))
    break;
    CLEAR_AFTER_FIELD(p, fmt.sdr);
    +CLEAR_AFTER_FIELD(p, fmt.sdr.buffersize);
return ops->vidioc_s_fmt_sdr_cap(file, fh, arg);
case V4L2_BUF_TYPE_SDR_OUTPUT:
    -if (unlikely((is_tx || !is_sdr || !ops->vidioc_s_fmt_sdr_out))
    +if (unlikely(!ops->vidioc_s_fmt_sdr_out))
        break;
-CLEAR_AFTER_FIELD(p, fmt.sdr);
+CLEAR_AFTER_FIELD(p, fmt.sdr.buffersize);
return ops->vidioc_s_fmt_sdr_out(file, fh, arg);
case V4L2_BUF_TYPE_META_CAPTURE:
    -if (unlikely(!is_rx || !is_vid || !ops->vidioc_s_fmt_meta_cap))
    +if (unlikely(!ops->vidioc_s_fmt_meta_cap))
        break;
CLEAR_AFTER_FIELD(p, fmt.meta);
return ops->vidioc_s_fmt_meta_cap(file, fh, arg);
@@ -1581,19 +1557,16 @@
    struct file *file, void *fh, void *arg)
{
    struct v4l2_format *p = arg;
    -struct video_device *vfd = video_devdata(file);
    -bool is_vid = vfd->vfl_type == VFL_TYPE_GRABBER;
    -bool is_sdr = vfd->vfl_type == VFL_TYPE_SDR;
    -bool is_tch = vfd->vfl_type == VFL_TYPE_TOUCH;
    -bool is_rx = vfd->vfl_dir != VFL_DIR_TX;
    -bool is_tx = vfd->vfl_dir != VFL_DIR_RX;
    -int ret;
    +int ret = check_fmt(file, p->type);
    +
    +if (ret)
        +return ret;
    v4l_sanitize_format(p);

    switch (p->type) {
    case V4L2_BUF_TYPE_VIDEO_CAPTURE:
        -if (unlikely(!is_rx || (!is_vid && !is_tch) || !ops->vidioc_try_fmt_vid_cap))
        +if (unlikely(!ops->vidioc_try_fmt_vid_cap))
            break;
    CLEAR_AFTER_FIELD(p, fmt.pix);
    ret = ops->vidioc_try_fmt_vid_cap(file, fh, arg);
    @@ -1601,27 +1574,27 @@
    p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
    return ret;
case V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE:
    -if (unlikely(!is_rx || !is_vid || !ops->vidioc_try_fmt_vid_cap_mplane))
    +if (unlikely(!ops->vidioc_try_fmt_vid_cap_mplane))
        break;
    CLEAR_AFTER_FIELD(p, fmt.pix_mp.xfer_func);
    return ops->vidioc_try_fmt_vid_cap_mplane(file, fh, arg);
case V4L2_BUF_TYPE_VIDEO_OVERLAY:
    -if (unlikely(!is_rx || !is_vid || !ops->vidioc_try_fmt_vid_overlay))
+if (unlikely(!ops->vidioc_try_fmt_vid_overlay))
    break;

CLEAR_AFTER_FIELD(p, fmt.win);
return ops->vidioc_try_fmt_vid_overlay(file, fh, arg);

case V4L2_BUF_TYPE_VBI_CAPTURE:
    -if (unlikely(!is_rx || is_vid || !ops->vidioc_try_fmt_vbi_cap))
+if (unlikely(!ops->vidioc_try_fmt_vbi_cap))
    break;

-CLEAR_AFTER_FIELD(p, fmt.vbi);
+CLEAR_AFTER_FIELD(p, fmt.vbi.flags);
return ops->vidioc_try_fmt_vbi_cap(file, fh, arg);

case V4L2_BUF_TYPE_SLICED_VBI_CAPTURE:
    -if (unlikely(!is_rx || is_vid || !ops->vidioc_try_fmt_sliced_vbi_cap))
+if (unlikely(ops->vidioc_try_fmt_sliced_vbi_cap))
    break;

-CLEAR_AFTER_FIELD(p, fmt.sliced);
+CLEAR_AFTER_FIELD(p, fmt.sliced.io_size);
return ops->vidioc_try_fmt_sliced_vbi_cap(file, fh, arg);

case V4L2_BUF_TYPE_VIDEO_OUTPUT:
    -if (unlikely(!is_tx || !is_vid || !ops->vidioc_try_fmt_vid_out))
+if (unlikely(!ops->vidioc_try_fmt_vid_out))
    break;

CLEAR_AFTER_FIELD(p, fmt.pix);
ret = ops->vidioc_try_fmt_vid_out(file, fh, arg);
@@ -1629,37 +1602,37 @@
p->fmt.pix.priv = V4L2_PIX_FMT_PRIV_MAGIC;
return ret;

case V4L2_BUF_TYPE_VIDEO_OUTPUT_MPLANE:
    -if (unlikely(!is_tx || !is_vid || !ops->vidioc_try_fmt_vid_out_mplane))
+if (unlikely(ops->vidioc_try_fmt_vid_out_mplane))
    break;

CLEAR_AFTER_FIELD(p, fmt.pix_mp.xfer_func);
return ops->vidioc_try_fmt_vid_out_mplane(file, fh, arg);

case V4L2_BUF_TYPE_VIDEO_OUTPUT_OVERLAY:
    -if (unlikely(!is_tx || !is_vid || !ops->vidioc_try_fmt_vid_out_overlay))
+if (unlikely(ops->vidioc_try_fmt_vid_out_overlay))
    break;

CLEAR_AFTER_FIELD(p, fmt.win);
return ops->vidioc_try_fmt_vid_out_overlay(file, fh, arg);

case V4L2_BUF_TYPE_VBI_OUTPUT:
    -if (unlikely(!is_tx || !is_vid || !ops->vidioc_try_fmt_vbi_out))
+if (unlikely(!ops->vidioc_try_fmt_vbi_out))
    break;

-CLEAR_AFTER_FIELD(p, fmt.vbi);
+CLEAR_AFTER_FIELD(p, fmt.vbi.flags);
return ops->vidioc_try_fmt_vbi_out(file, fh, arg);
case V4L2_BUF_TYPE_SLICED_VBI_OUTPUT:
- if (unlikely(!is_tx || is_vid || !ops->vidioc_try_fmt_sliced_vbi_out))
+ if (unlikely(!ops->vidioc_try_fmt_sliced_vbi_out))
  break;
- CLEAR_AFTER_FIELD(p, fmt.sliced);
+ CLEAR_AFTER_FIELD(p, fmt.sliced.io_size);
return ops->vidioc_try_fmt_sliced_vbi_out(file, fh, arg);
case V4L2_BUF_TYPE_SDR_CAPTURE:
- if (unlikely(!is_rx || !is_sdr || !ops->vidioc_try_fmt_sdr_cap))
+ if (unlikely(!ops->vidioc_try_fmt_sdr_cap))
  break;
- CLEAR_AFTER_FIELD(p, fmt.sdr);
+ CLEAR_AFTER_FIELD(p, fmt.sdr.buffersize);
return ops->vidioc_try_fmt_sdr_cap(file, fh, arg);
case V4L2_BUF_TYPE_SDR_OUTPUT:
- if (unlikely(!is_tx || !is_sdr || !ops->vidioc_try_fmt_sdr_out))
+ if (unlikely(!ops->vidioc_try_fmt_sdr_out))
  break;
- CLEAR_AFTER_FIELD(p, fmt.sdr);
+ CLEAR_AFTER_FIELD(p, fmt.sdr.buffersize);
return ops->vidioc_try_fmt_sdr_out(file, fh, arg);
case V4L2_BUF_TYPE_META_CAPTURE:
- if (unlikely(!is_rx || !is_vid || !ops->vidioc_try_fmt_meta_cap))
+ if (unlikely(!ops->vidioc_try_fmt_meta_cap))
  break;
CLEAR_AFTER_FIELD(p, fmt.meta);
return ops->vidioc_try_fmt_meta_cap(file, fh, arg);
@ @ -1978.7 +1951.22 @ @
struct v4l2_streamparm *p = arg;
int ret = check_fmt(file, p->type);

- return ret ? ops->vidioc_s_parm(file, fh, p);
+ if (ret)
  + return ret;
+ /* Note: extendedmode is never used in drivers */
+ if (V4L2_TYPE_IS_OUTPUT(p->type)) {
+   memset(p->parm.output.reserved, 0,
+     + sizeof(p->parm.output.reserved));
+   p->parm.output.extendedmode = 0;
+   p->parm.output.outputmode &= V4L2_MODE_HIGHQUALITY;
+ } else {
+   memset(p->parm.capture.reserved, 0,
+     + sizeof(p->parm.capture.reserved));
+   p->parm.capture.extendedmode = 0;
+   p->parm.capture.capturemode &= V4L2_MODE_HIGHQUALITY;
+ }
+ return ops->vidioc_s_parm(file, fh, p);
static int v4l_queryctrl(const struct v4l2_ioctl_ops *ops,
@@ -2851,7 +2839,7 @@
    v4l2_kioctl func)
{
    char sbuf[128];
-void    *mbuf = NULL;
+void    *mbuf = NULL, *array_buf = NULL;
void*parg = (void *)arg;
long err  = -EINVAL;
bool has_array_args;
@@ -2909,26 +2897,23 @@
    has_array_args = err;

    if (has_array_args) {
-/*
- * When adding new types of array args, make sure that the
- * parent argument to ioctl (which contains the pointer to the
- * array) fits into sbuf (so that mbuf will still remain
- * unused up to here).
- */
-*/
-    mbuf = kvmalloc(array_size, GFP_KERNEL);
+    array_buf = kvmalloc(array_size, GFP_KERNEL);
    err = -ENOMEM;
    if (NULL == mbuf)
+    if (array_buf == NULL)
        goto out_array_args;
    err = -EFAULT;
    if (copy_from_user(mbuf, user_ptr, array_size))
+    if (copy_from_user(array_buf, user_ptr, array_size))
        goto out_array_args;
    *kernel_ptr = mbuf;
+    *kernel_ptr = array_buf;
    }

    /* Handles IOCTL */
    err = func(file, cmd, parg);
    if (err == -ENOIOCTLCMD)
+    if (err == -ENOTTY || err == -ENOIOCTLCMD) {
        err = -ENOTTY;
+        goto out;
+    }
    if (err == 0) {
        if (cmd == VIDIOC_DQBUF)
            trace_v4l2_dqbuf(video_devdata(file)->minor, parg);
@@ -2938,7 +2923,7 @@
if (has_array_args) {
    *kernel_ptr = (void __force *)user_ptr;
    if (copy_to_user(user_ptr, mbuf, array_size))
        if (copy_to_user(user_ptr, array_buf, array_size))
            err = -EFAULT;
        goto out_array_args;
    @ @ -2960,6 +2945,7 @@
}

out:
+kvfree(array_buf);
    kvfree(mbuf);
    return err;
}

--- linux-4.15.0.orig/drivers/media/v4l2-core/videobuf-dma-sg.c
+++ linux-4.15.0/drivers/media/v4l2-core/videobuf-dma-sg.c
@@ -352,8 +352,11 @@
    for (i = 0; i < dma->nr_pages; i++) {
        if (dma->direction == DMA_FROM_DEVICE)
            set_page_dirty_lock(dma->pages[i]);
        put_page(dma->pages[i]);
    }
    kfree(dma->pages);
    dma->pages = NULL;
}

--- linux-4.15.0.orig/drivers/media/v4l2-core/videobuf2-core.c
+++ linux-4.15.0/drivers/media/v4l2-core/videobuf2-core.c
@@ -205,6 +205,10 @@
    for (plane = 0; plane < vb->num_planes; ++plane) {
        unsigned long size = PAGE_ALIGN(vb->planes[plane].length);
        /* Did it wrap around? */
+        if (size < vb->planes[plane].length)
+            goto free;
+        mem_priv = call_ptr_memop(vb, alloc,
+                                  q->alloc_devs[plane] ? : q->dev,
+                                  q->dma_attr, size, q->dma_dir, q->gfp_flags);
+        @ @ -332,6 +336,10 @@
+    struct vb2_buffer *vb;
+    int ret;
+    BUG_ON(dma->sglen);

    if (dma->pages) {
        -for (i = 0; i < dma->nr_pages; i++)
+        for (i = 0; i < dma->nr_pages; i++) {
+            if (dma->direction == DMA_FROM_DEVICE)
+                set_page_dirty_lock(dma->pages[i]);
+            put_page(dma->pages[i]);
+        }
        kfree(dma->pages);
        dma->pages = NULL;
    }

/* Ensure that q->num_buffers+num_buffers is below VB2_MAX_FRAME */
+num_buffers = min_t(unsigned int, num_buffers,
+    VB2_MAX_FRAME - q->num_buffers);
+
+for (buffer = 0; buffer < num_buffers; ++buffer) {
    /* Allocate videobuf buffer structures */
    for (plane = 0; plane < vb->num_planes; ++plane)
        /* sync buffers */
        -for (plane = 0; plane < vb->num_planes; ++plane)
        -call_void_memop(vb, finish, vb->planes[plane].mem_priv);
        +if (state != VB2_BUF_STATE_QUEUED &&
        +    state != VB2_BUF_STATE_REQUEUEING) {
        +    /* sync buffers */
        +    +for (plane = 0; plane < vb->num_planes; ++plane)
        +    +call_void_memop(vb, finish, vb->planes[plane].mem_priv);
spin_lock_irqsave(&q->done_lock, flags);
if (state == VB2_BUF_STATE_QUEUED)
int vb2_core_qbuf(struct vb2_queue *q, unsigned int index, void *pb)
{
struct vb2_buffer *vb;
+enum vb2_buffer_state orig_state;
int ret;

+if (q->error) {
+dprintfk(1, "fatal error occurred on queue\n");
+return -EIO;
+
+vb = q->bufs[index];

switch (vb->state) {
@@ -1364,8 +1387,14 @@
    switch (vb->state) {
    /*
     * Add to the queued buffers list, a buffer will stay on it until
     * dequeued in dqbuf.
     */
    +orig_state = vb->state;
    list_add_tail(&vb->queued_entry, &q->queued_list);
    q->queued_count++;
    q->waiting_for_buffers = false;
    @@ -1388,6 +1417,7 @@
    if (q->streaming && !q->start_streaming_called &&
        q->queued_count >= q->min_buffers_needed) {
        ret = vb2_start_streaming(q);
        -if (ret)
        +if (ret) {
            +/*
            + * Since vb2_core_qbuf will return with an error,
            + * we should return it to state DEQUEUED since
            + * the error indicates that the buffer wasn't queued.
            + */
            +list_del(&vb->queued_entry);
            +q->queued_count--;
            +vb->state = orig_state;
            return ret;
            +}

    }

dprintfk(2, "qbuf of buffer %d succeeded\n", vb->index);
@@ -1447,6 +1486,11 @@
    for (;;) {
int ret;

+if (q->waiting_in_dqbuf) {
+dprintf(1, "another dup()ped fd is waiting for a buffer\n");
+return -EBUSY;
+}
+
+if (!q->streaming) {
+dprintf(1, "streaming off, will not wait for buffers\n");
return -EINVAL;
@@ -1474,6 +1518,7 @@
return -EAGAIN;
}
+
q->waiting_in_dqbuf = 1;
/*
 * We are streaming and blocking, wait for another buffer to
 * become ready or for streamoff. Driver's lock is released to
@@ -1494,6 +1539,7 @@
 * the locks or return an error if one occurred.
 */
call_void_qop(q, wait_finish, q);
q->waiting_in_dqbuf = 0;
if (ret) {
+dprintf(1, "sleep was interrupted\n");
return ret;
@@ -1685,6 +1731,15 @@
for (i = 0; i < q->num_buffers; ++i) {
struct vb2_buffer *vb = q->bufs[i];

+if (vb->state == VB2_BUF_STATE_PREPARED ||
+    vb->state == VB2_BUF_STATE_QUEUED) {
+    unsigned int plane;
+    +for (plane = 0; plane < vb->num_planes; ++plane)
+call_void_memop(vb, finish,
+    +vb->planes[plane].mem_priv);
+}
+
+if (vb->state != VB2_BUF_STATE_DEQUEUED) {
vb->state = VB2_BUF_STATE_PREPARED;
call_void_vb_qop(vb, buf_finish, vb);
@@ -1727,10 +1782,8 @@
if (ret)
    return ret;
ret = vb2_start_streaming(q);
-    if (ret) {
-        __vb2_queue_cancel(q);


if (ret)
return ret;
-
}
+
q->streaming = 1;
@@ -1904,9 +1957,13 @@
return -EINVAL;
}
@
+
mutex_lock(&q->mmap_lock);
+
if (vb2_fileio_is_active(q)) {
    dprintk(1, "mmap: file io in progress\n");
    -return -EBUSY;
    +ret = -EBUSY;
    +goto unlock;
}
+
/*
@@ -1914,7 +1971,7 @@
*/
ret = __find_plane_by_offset(q, off, &buffer, &plane);
if (ret)
    -return ret;
    +goto unlock;
+
vb = q->bufs[buffer];

@@ -1927,11 +1984,13 @@
if (length < (vma->vm_end - vma->vm_start)) {
    dprintk(1, "MMAP invalid, as it would overflow buffer length\n");
    -return -EINVAL;
    +ret = -EINVAL;
    +goto unlock;
}
-
+mutex_lock(&q->mmap_lock);
ret = call_memop(vb, mmap, vb->planes[plane].mem_priv, vma);
+
+unlock:
mutex_unlock(&q->mmap_lock);
if (ret)
    ret = -EINVAL;
@@ -2324,6 +2383,12 @@
if (!data)
+if (q->waiting_in_dqbuf) { +dprintf(3, "another dup()ped fd is %s\n", +read ? "reading" : "writing"); +return -EBUSY; +} + */

/* Initialize emulator on first call. */

--- linux-4.15.0.orig/drivers/media/v4l2-core/videobuf2-dma-sg.c
+++ linux-4.15.0/drivers/media/v4l2-core/videobuf2-dma-sg.c
@@ -59,7 +59,7 @@
gfp_t gfp_flags)
{
    unsigned int last_page = 0;
    int size = buf->size;
    unsigned long size = buf->size;

    while (size > 0) {
        struct page *pages;
--- linux-4.15.0.orig/drivers/media/v4l2-core/videobuf2-v4l2.c
+++ linux-4.15.0/drivers/media/v4l2-core/videobuf2-v4l2.c
@@ -145,7 +145,6 @@
            return;
            check_once = true;
-- linux-4.15.0.orig/drivers/media/v4l2-core/videobuf2-vmalloc.c
+++ linux-4.15.0/drivers/media/v4l2-core/videobuf2-vmalloc.c
@@ -106,7 +106,7 @@
         buf->vaddr = (void *)
-         ioremap_nocache(nums[0] << PAGE_SHIFT, size);
+         ioremap_nocache(__pfn_to_phys(nums[0]), size + offset);
     } else {
         buf->vaddr = vm_map_ram(frame_vector_pages(vec), n_pages, -1,
         PAGE_KERNEL);
--- linux-4.15.0.orig/drivers/memory/atmel-ebi.c
+++ linux-4.15.0/drivers/memory/atmel-ebi.c
@@ -579,8 +579,10 @@
         child);
ret = atmel_ebi_dev_disable(ebi, child);
-if (ret)
+if (ret) {
+    of_node_put(child);
+    return ret;
+}
}
}

--- linux-4.15.0.orig/drivers/memory/emif.c
+++ linux-4.15.0/drivers/memory/emif.c
@@ -165,35 +165,12 @@
static int __init_or_module emif_debugfs_init(struct emif_data *emif)
{
-    struct dentry *dentry;
-    int ret;
-    
-    dentry = debugfs_create_dir(dev_name(emif->dev), NULL);
-    if (!dentry) {
-        ret = -ENOMEM;
-        goto err0;
-    }
-    emif->debugfs_root = dentry;
-    
-    dentry = debugfs_create_file("regcache_dump", S_IRUGO,
-                             emif->debugfs_root, emif, &emif_regdump_fops);
-    if (!dentry) {
-        ret = -ENOMEM;
-        goto err1;
-    }
-    
-    dentry = debugfs_create_file("mr4", S_IRUGO,
-                             emif->debugfs_root, emif, &emif_mr4_fops);
-    if (!dentry) {
-        ret = -ENOMEM;
-        goto err1;
-    }
-    
+    emif->debugfs_root = debugfs_create_dir(dev_name(emif->dev), NULL);
+    debugfs_create_file("regcache_dump", S_IRUGO, emif->debugfs_root, emif,
+                        &emif_regdump_fops);
+    debugfs_create_file("mr4", S_IRUGO, emif->debugfs_root, emif,
+                        &emif_mr4_fops);
+    return 0;
+err1:
+    debugfs_remove_recursive(emif->debugfs_root);
err0:
static void __exit emif_debugfs_exit(struct emif_data *emif)
{
    return ret;
}

static void __exit emif_debugfs_entry(struct emif_data *emif)
{
    return ret;
}

irq = platform_get_irq(pdev, 0);
-if (!irq) {
-dev_err(&pdev->dev, "%s: no irq\n", __func__);
-return -ENXIO;
-
+if (irq < 0)
+return irq;

ret = devm_request_irq(&pdev->dev, irq, ccf_irq, 0, pdev->name, ccf);
if (ret) {
    --- linux-4.15.0.orig/drivers/memory/fsl_ifc.c
    +++ linux-4.15.0/drivers/memory/fsl_ifc.c
    @@ -109,7 +109,6 @@
    iounmap(ctrl->regs);

    dev_set_drvdata(&dev->dev, NULL);
    -kfree(ctrl);

    return 0;

}@

dev_info(&dev->dev, "Freescale Integrated Flash Controller\n");

-fsl_ifc_ctrl_dev = kzalloc(sizeof(*fsl_ifc_ctrl_dev), GFP_KERNEL);
+if (!fsl_ifc_ctrl_dev)
+    return -ENOMEM;

-fsl_ifc_ctrl_dev->gregs = of_iomap(dev->dev.of_node, 0);
+if (fsl_ifc_ctrl_dev->regs) {
+    dev_err(&dev->dev, "failed to get memory region\n");
+    -ret = -ENODEV;
+    goto err;
+    +return -ENODEV;
+}
if (of_property_read_bool(dev->of_node, "little-endian")) {
    free_irq(fsl_ifc_ctrl_dev->irq, fsl_ifc_ctrl_dev);
    irq_dispose_mapping(fsl_ifc_ctrl_dev->irq);
    err:
    +iounmap(fsl_ifc_ctrl_dev->regs);
    return ret;
}

--- linux-4.15.0.orig/drivers/memory/omap-gpmc.c
+++ linux-4.15.0/drivers/memory/omap-gpmc.c
@@ -21,6 +21,7 @@
#include <linux/spinlock.h>
#include <linux/io.h>
#include <linux/gpio/driver.h>
+ #include <linux/gpio/consumer.h> /* GPIO descriptor enum */
#include <linux/interrupt.h>
#include <linux/irqdomain.h>
#include <linux/platform_device.h>
@@ -951,7 +952,7 @@
int ret;
   u32 old_base, size;

-if (cs > gpmc_cs_num) {
+if (cs >= gpmc_cs_num) {
   pr_err("%s: requested chip-select is disabled\n", __func__);
   return -ENODEV;
 }
@@ -986,7 +987,7 @@
struct resource *res = &gpmc->mem;
int r = -1;

-if (cs > gpmc_cs_num) {
+if (cs >= gpmc_cs_num) {
   pr_err("%s: requested chip-select is disabled\n", __func__);
   return -ENODEV;
 }
@@ -1028,8 +1029,8 @@
void gpmc_cs_free(int cs)
{
   -struct gpmc_cs_data *gpmc = &gpmc_cs[cs];
   -struct resource *res = &gpmc->mem;
   +struct gpmc_cs_data *gpmc;
   +struct resource *res;
   spin_lock(&gpmc_mem_lock);
   if (cs >= gpmc_cs_num || cs < 0 || !gpmc_cs_reserved(cs)) {

spin_unlock(&gpmc_mem_lock);
return;
}
+gpmc = &gpmc_cs[cs];
+res = &gpmc->mem;
+
gpmc_cs_disable_mem(cs);
if (res->flags)
release_resource(res);

void gpmc_read_settings_dt(struct device_node *np, struct gpmc_settings *p)
{
+memset(p, 0, sizeof(*p));
+
static int gpmc_probe_dt(struct platform_device *pdev)
{
return 0;

#define MC_INTSTATUS 0x000
#define MC_INT_DECERR_MTS (1 << 16)
#define MC_INT_SECERR_SEC (1 << 13)
#define MC_INT_DECERR_VPR (1 << 12)
#define MC_INT_INVALID_APB_ASID_UPDATE (1 << 11)
#define MC_INT_INVALID_SMMU_PAGE (1 << 10)
#define MC_INT_ARBITRATION_EMEM (1 << 9)
#define MC_INT_SECURITY_VIOLATION (1 << 8)
#define MC_INT_DECERR_EMEM (1 << 6)

#define MC_INTMASK 0x004

/* compute the number of MC clock cycles per tick */
tick = mc->tick * clk_get_rate(mc->clk);
+tick = (unsigned long long)mc->tick * clk_get_rate(mc->clk);
do_div(tick, NSEC_PER_SEC);

value = readl(mc->regs + MC_EMEM_ARB_CFG);

#define MC_INTSECURITY_VIOLATION (1 << 8)
#define MC_INT_DECERR_EMEM (1 << 6)
static irqreturn_t tegra_mc_irq(int irq, void *data)
{
    struct tegra_mc *mc = data;
    unsigned long status, mask;
    unsigned long status;
    unsigned int bit;

    /* mask all interrupts to avoid flooding */
    status = mc_readl(mc, MC_INTSTATUS);
    mask = mc_readl(mc, MC_INTMASK);
    status = mc_readl(mc, MC_INTSTATUS) & mc->soc->intmask;
    if (!status)
        return IRQ_NONE;

    for_each_set_bit(bit, &status, 32) {  
        const char *error = status_names[bit] ?: "unknown";
        const struct of_device_id *match;
        const struct resource *res;
        struct tegra_mc *mc;
        u32 value;
        int err;

        match = of_match_node(tegra_mc_of_match, pdev->dev.of_node);
        const struct tegra_mc *mc = data;
        int err;

        match = of_match_node(tegra_mc_of_match, pdev->dev.of_node);
       .value = MC_INT_DECERR_MTS | MC_INT_SECERR_SEC | MC_INT_DECERR_VPR | 
        -MC_INT_INVALID_APB_ASID_UPDATE | MC_INT_INVALID_SMMU_PAGE | 
        -MC_INT_SECURITY_VIOLATION | MC_INT_DECERR_EMEM;

        mc_writel(mc, value, MC_INTMASK);
        return 0;
    }

    -- linux-4.15.0.orig/drivers/memory/tegra/mc.h
    +++ linux-4.15.0/drivers/memory/tegra/mc.h
    @ -346.7 +339.6 @@
    @ @ -414,11 +406,7 @@

    WARN(!mc->soc->client_id_mask, "Missing client ID mask for this SoC\n");

    -value = MC_INT_DECERR_MTS | MC_INT_SECERR_SEC | MC_INT_DECERR_VPR | 
    -MC_INT_INVALID_APB_ASID_UPDATE | MC_INT_INVALID_SMMU_PAGE | 
    -MC_INT_SECURITY_VIOLATION | MC_INT_DECERR_EMEM;

    -mc_writel(mc, value, MC_INTMASK);
    +mc_writel(mc, mc->soc->intmask, MC_INTMASK);

    return 0;
}
--- linux-4.15.0.orig/drivers/memory/tegra/mc.h
+++ linux-4.15.0/drivers/memory/tegra/mc.h
@@ -14,6 +14,15 @@
    #include <soc/tegra/mc.h>

    +#define MC_INT_DECERR_MTS (1 << 16)
    +#define MC_INT_SECERR_SEC (1 << 13)
    +#define MC_INT_DECERR_VPR (1 << 12)
    +#define MC_INT_INVALID_APB_ASID_UPDATE (1 << 11)
    +#define MC_INT_INVALID_SMMU_PAGE (1 << 10)
+define MC_INT_ARBITRATION_EMEM (1 << 9)
+define MC_INT_SECURITY_VIOLATION (1 << 8)
+define MC_INT_DECERR_EMEM (1 << 6)
+
static inline u32 mc_readl(struct tegra_mc *mc, unsigned long offset)
{
    return readl(mc->regs + offset);
}
--- linux-4.15.0.orig/drivers/memory/tegra/tegra114.c
+++ linux-4.15.0/drivers/memory/tegra/tegra114.c
@@ -930,4 +930,6 @@
    .atom_size = 32,
    .client_id_mask = 0x7f,
    .smmu = &tegra114_smmu_soc,
+  .intmask = MC_INT_INVALID_SMMU_PAGE | MC_INT_SECURITY_VIOLATION |
+    MC_INT_DECERR_EMEM,
    ;
--- linux-4.15.0.orig/drivers/memory/tegra/tegra124.c
+++ linux-4.15.0/drivers/memory/tegra/tegra124.c
@@ -1020,6 +1020,9 @@
    .smmu = &tegra124_smmu_soc,
    .emem_regs = tegra124_mc_emem_regs,
    .num_emem_regs = ARRAY_SIZE(tegra124_mc_emem_regs),
+  .intmask = MC_INT_DECERR_MTS | MC_INT_SECERR_SEC | MC_INT_DECERR_VPR |
+    MC_INT_INVALID_APB_ASID_UPDATE | MC_INT_INVALID_SMMU_PAGE |
+    MC_INT_SECURITY_VIOLATION | MC_INT_DECERR_EMEM,
    ;
@endif /* CONFIG_ARCH_TEGRA_124_SOC */
@@ -1042,5 +1045,8 @@
    .atom_size = 32,
    .client_id_mask = 0x7f,
    .smmu = &tegra132_smmu_soc,
+  .intmask = MC_INT_DECERR_MTS | MC_INT_SECERR_SEC | MC_INT_DECERR_VPR |
+    MC_INT_INVALID_APB_ASID_UPDATE | MC_INT_INVALID_SMMU_PAGE |
+    MC_INT_SECURITY_VIOLATION | MC_INT_DECERR_EMEM,
    ;
@endif /* CONFIG_ARCH_TEGRA_132_SOC */
--- linux-4.15.0.orig/drivers/memory/tegra/tegra210.c
+++ linux-4.15.0/drivers/memory/tegra/tegra210.c
@@ -1077,4 +1077,7 @@
    .atom_size = 64,
    .client_id_mask = 0xff,
    .smmu = &tegra210_smmu_soc,
+  .intmask = MC_INT_DECERR_MTS | MC_INT_SECERR_SEC | MC_INT_DECERR_VPR |
+    MC_INT_INVALID_APB_ASID_UPDATE | MC_INT_INVALID_SMMU_PAGE |
+    MC_INT_SECURITY_VIOLATION | MC_INT_DECERR_EMEM,
    ;
@endif /* CONFIG_ARCH_TEGRA_210_SOC */
--- linux-4.15.0.orig/drivers/memory/tegra/tegra30.c
+++ linux-4.15.0/drivers/memory/tegra/tegra30.c
@@ -952,4 +952,6 @@
        .atom_size = 16,
        .client_id_mask = 0x7f,
        .smmu = &tegra30_smmu_soc,
+       .intmask = MC_INT_INVALID_SMMU_PAGE | MC_INT_SECURITY_VIOLATION |
+           MC_INT_DECERR_EMEM,
    ];
--- linux-4.15.0.orig/drivers/memory/ti-aemif.c
+++ linux-4.15.0/drivers/memory/ti-aemif.c
@@ -380,8 +380,10 @@
  */
 for_each_available_child_of_node(np, child_np) { 
    ret = of_aemif_parse_abus_config(pdev, child_np);
-   if (ret < 0)
+   if (ret < 0) {
+      of_node_put(child_np);
    goto error;
+  }
  }

 for (i = 0; i < aemif->num_cs; i++) { 
    /*
-   for_each_available_child_of_node(np, child_np) {
+   for_each_available_child_of_node(np, child_np) {
      ret = of_platform_populate(child_np, NULL, dev_lookup, dev);
-     if (ret < 0)
+     if (ret < 0) {
+        of_node_put(child_np);
       goto error;
+      }
   }

 return 0;
--- linux-4.15.0.orig/drivers/memstick/core/memstick.c
+++ linux-4.15.0/drivers/memstick/core/memstick.c
@@ -18,6 +18,7 @@
 struct memstick_dev *card;
 dev_dbg(&host->dev, "memstick_check started\n");

 #define DRIVER_NAME "memstick"
@@ -436,6 +437,7 @@
 struct memstick_dev *card;

 dev_dbg(&host->dev, "memstick_check started\n");
pm_runtime_get_noresume(host->dev.parent);
mutex_lock(&host->lock);
if (!host->card) {
  if (memstick_power_on(host)) {
    host->card = card;
    if (device_register(&card->dev)) {
      put_device(&card->dev);
      kfree(host->card);
      host->card = NULL;
    }
  } else {
    host->set_param(host, MEMSTICK_POWER, MEMSTICK_POWER_OFF);
  }
  pm_runtime_put(host->dev.parent);
  dev_dbg(&host->dev, "memstick_check finished\n");
}
rc = bus_register(&memstick_bus_type);
if (!rc)
  rc = class_register(&memstick_host_class);
if (rc)
  goto error_destroy_workqueue;
if (!rc)
  return 0;
rc = class_register(&memstick_host_class);
if (!rc)
  goto error_bus_unregister;
+rc = bus_unregister(&memstick_bus_type);
+error_bus_unregister:
  destroy_workqueue(workqueue);
rc = bus_unregister(&memstick_bus_type);
+error_destroy_workqueue:
  destroy_workqueue(workqueue);
return rc;
--- linux-4.15.0.orig/drivers/memstick/host/Kconfig
+++ linux-4.15.0/drivers/memstick/host/Kconfig
@@ -45,7 +45,7 @@
 config MEMSTICK_REALTEK_PCI
tristate "Realtek PCI-E Memstick Card Interface Driver"
-depends on MFD_RTSX_PCI
+depends on MISC_RTSX_PCI
help
  Say Y here to include driver code to support Memstick card interface
  of Realtek PCI-E card reader
@@ -55,7 +55,7 @@
config MEMSTICK_REALTEK_USB
tristate "Realtek USB Memstick Card Interface Driver"
-depends on MFD_RTSX_USB
+depends on MISC_RTSX_USB
help
  Say Y here to include driver code to support Memstick card interface
  of Realtek RTS5129/39 series USB card reader
--- linux-4.15.0.orig/drivers/memstick/host/jmb38x_ms.c
+++ linux-4.15.0/drivers/memstick/host/jmb38x_ms.c
@@ -949,7 +949,7 @@
  if (!cnt) {
    rc = -ENODEV;
    pci_dev_busy = 1;
@@ -762,8 +762,10 @@
  dev->mmio = pci_ioremap_bar(pdev, 0);
  if (!dev->mmio)
        error = -ENOMEM;
@@ -789,12 +791,14 @@
  r592_stop_dma(dev, 0);
  if (request_irq(dev->irq, &r592_irq, IRQF_SHARED,
            DRV_NAME, dev))
+if (error)
goto error6;

r592_update_card_detect(dev);
-if (memstick_add_host(host))
+error = memstick_add_host(host);
+if (error)
goto error7;

message("driver successfully loaded");
--- linux-4.15.0.orig/drivers/memstick/host/rtsx_pci_ms.c
+++ linux-4.15.0/drivers/memstick/host/rtsx_pci_ms.c
@@ -24,7 +24,7 @@
#include <linux/delay.h>
#include <linux/platform_device.h>
#include <linux/memstick.h>
-#include <linux/mfd/rtsx_pci.h>
+#include <linux/rtsx_pci.h>
+#include <asm/unaligned.h>

struct realtek_pci_ms {
--- linux-4.15.0.orig/drivers/memstick/host/rtsx_usb_ms.c
+++ linux-4.15.0/drivers/memstick/host/rtsx_usb_ms.c
@@ -25,7 +25,7 @@
#include <linux/workqueue.h>
#include <linux/memstick.h>
#include <linux/kthread.h>
-#include <linux/mfd/rtsx_usb.h>
+#include <linux/rtsx_usb.h>
+#include <linux/pm_runtime.h>
#include <linux/mutex.h>
#include <linux/sched.h>
@@ -40,15 +40,14 @@
struct mutex																																																																																																																																																																																																																																																																																																																										
static inline struct device *ms_dev(struct rtsx_usb_ms *host) 
@@ -545,7 +544,7 @@
    host->req->error);
 }
 } while (!rc);
-pm_runtime_put(ms_dev(host));
+pm_runtime_put_sync(ms_dev(host));
 }
 }
@@ -585,14 +584,14 @@
 break;

 if (value == MEMSTICK_POWER_ON) {
-    pm_runtime_get_sync(ms_dev(host));
+    pm_runtime_get_noresume(ms_dev(host));
    err = ms_power_on(host);
+    if (err)
+        pm_runtime_put_noidle(ms_dev(host));
 } else if (value == MEMSTICK_POWER_OFF) {
    err = ms_power_off(host);
-    if (host->msh->card)
+    if (!err)
-        pm_runtime_put_noidle(ms_dev(host));
-    else
-        pm_runtime_put(ms_dev(host));
 } else
    err = -EINVAL;
 if (!err)
@@ -638,12 +637,16 @@
 }
 out:
 mutex_unlock(&ucr->dev_mutex);
-pm_runtime_put(ms_dev(host));
+pm_runtime_put_sync(ms_dev(host));

 /* power-on delay */
-if (param == MEMSTICK_POWER && value == MEMSTICK_POWER_ON)
+if (param == MEMSTICK_POWER && value == MEMSTICK_POWER_ON) {
    usleep_range(10000, 12000);
+    if (!host->eject)
+        schedule_delayed_work(&host->poll_card, 100);
+} 
+dev_dbg(ms_dev(host), "%s: return = %d\n", __func__, err);
 return err;
structure rtsx_usb_ms *host = dev_get_drvdata(dev);
structure memstick_host *msh = host->msh;

-dev_dbg(ms_dev(host), "--> %s\n", __func__);
+/* Since we use rtsx_usb's resume callback to runtime resume its
+ * children to implement remote wakeup signaling, this causes
+ * rtsx_usb_ms' runtime resume callback runs after its suspend
+ * callback:
+ * - rtsx_usb_ms_suspend()
+ * - rtsx_usb_resume()
+ * - rtsx_usb_ms_runtime_resume()
+ * - memstick_detect_change()
+ *
+ * rtsx_usb_suspend()
+ *
+ * To avoid this, skip runtime resume/suspend if system suspend is
+ * underway.
+ */

+host->system_suspending = true;
memstick_suspend_host(msh);
+
return 0;
}

@end -665.58 +683.85 @@
structure rtsx_usb_ms *host = dev_get_drvdata(dev);
structure memstick_host *msh = host->msh;

-dev_dbg(ms_dev(host), "--> %s\n", __func__);
-
memstick_resume_host(msh);
+host->system_suspending = false;
+
return 0;
}
#endif /* CONFIG_PM_SLEEP */

-/*
- * Thread function of ms card slot detection. The thread starts right after
- * successful host addition. It stops while the driver removal function sets
- * host->eject true.
- */
-*/
-static int rtsx_usb_detect_ms_card(void *__host)
+ifdef CONFIG_PM
+static int rtsx_usb_ms_runtime_suspend(struct device *dev)
struct rtsx_usb_ms *host = dev_get_drvdata(dev);

if (host->system_suspending)
    return 0;

if (host->msh->card || host->power_mode != MEMSTICK_POWER_OFF)
    return -EAGAIN;

return 0;
}

static int rtsx_usb_ms_runtime_resume(struct device *dev)
{
    struct rtsx_usb_ms *host = dev_get_drvdata(dev);

    if (host->system_suspending)
        return 0;

    memstick_detect_change(host->msh);

    return 0;
}

static const struct dev_pm_ops rtsx_usb_ms_pm_ops = {
    .set_system_sleep = rtsx_usb_ms_suspend,
    .set_runtime_pm = rtsx_usb_ms_runtime_suspend,
    .runtime_resume = NULL,
    .runtime_disable = NULL
};

static void rtsx_usb_ms_poll_card(struct work_struct *work)
{
    struct rtsx_usb_ms *host = (struct rtsx_usb_ms *)__host;
    struct rtsx_usb_ms *host = container_of(work, struct rtsx_usb_ms, poll_card.work);
    struct rtsx_ucr *ucr = host->ucr;
    u8 val = 0;

    for (;;) {
        pm_runtime_get_sync(ms_dev(host));
        mutex_lock(&ucr->dev_mutex);
        err = rtsx_usb_read_register(ucr, CARD_INT_PEND, &val);
    }
}

#if CONFIG_PM
+static int rtsx_usb_ms_runtime_resume(struct device *dev)
+{
+    struct rtsx_usb_ms *host = dev_get_drvdata(dev);
+
+    if (host->system_suspending)
+        return 0;
+
+    memstick_detect_change(host->msh);
+
+    return 0;
+}
+#endif /* CONFIG_PM */

+static const struct dev_pm_ops rtsx_usb_ms_pm_ops = {
+    SET_SYSTEM_SLEEP_PM_OPS(rtsx_usb_ms_suspend, rtsx_usb_ms_resume)
+    SET_RUNTIME_PM_OPS(rtsx_usb_ms_runtime_suspend, rtsx_usb_ms_runtime_resume, NULL)
+};
+
+static void rtsx_usb_ms_poll_card(struct work_struct *work)
{ ...
    pm_runtime_get_sync(ms_dev(host));
    mutex_lock(&ucr->dev_mutex);

    /* Check pending MS card changes */
    -err = rtsx_usb_read_register(ucr, CARD_INT_PEND, &val);

-if (err) {
  mutex_unlock(&ucr->dev_mutex);
  goto poll_again;
-
  +if (host->eject || host->power_mode != MEMSTICK_POWER_ON)
  +return;
/
/* Clear the pending */
-rtsx_usb_write_register(ucr, CARD_INT_PEND,
  -XD_INT | MS_INT | SD_INT,
  -XD_INT | MS_INT | SD_INT);
  +pm_runtime_get_sync(ms_dev(host));
  +mutex_lock(&ucr->dev_mutex);

  +/* Check pending MS card changes */
  +err = rtsx_usb_read_register(ucr, CARD_INT_PEND, &val);
  +if (err) {
    mutex_unlock(&ucr->dev_mutex);
    +goto poll_again;
  +}

  -if (val & MS_INT) {
    -dev_dbg(ms_dev(host), "MS slot change detected\n");
    -memstick_detect_change(host->msh);
    -
    +/* Clear the pending */
    +rtsx_usb_write_register(ucr, CARD_INT_PEND,
      +XD_INT | MS_INT | SD_INT,
      +XD_INT | MS_INT | SD_INT);

    -poll_again:
    -pm_runtime_put(ms_dev(host));
    -if (host->eject)
      -break;
    +mutex_unlock(&ucr->dev_mutex);

    -schedule_timeout_idle(HZ);
    +if (val & MS_INT) {
      +dev_dbg(ms_dev(host), "MS slot change detected\n");
      +memstick_detect_change(host->msh);
    +}

    -complete(&host->detect_ms_exit);
    -return 0;
    +poll_again:
    +pm_runtime_put_sync(ms_dev(host));
    +
    +if (!host->eject && host->power_mode == MEMSTICK_POWER_ON)
schedule_delayed_work(&host->poll_card, 100);

mutex_init(&host->host_mutex);
INIT_WORK(&host->handle_req, rtsx_usb_ms_handle_req);

-init_completion(&host->detect_ms_exit);
-host->detect_ms = kthread_create(rtsx_usb_detect_ms_card, host,
-"rtsx_usb_ms_%d", pdev->id);
-if (IS_ERR(host->detect_ms)) {
-dev_dbg(&(pdev->dev),
-"Unable to create polling thread.\n");
-err = PTR_ERR(host->detect_ms);
-goto err_out;
-
+INIT_DELAYED_WORK(&host->poll_card, rtsx_usb_ms_poll_card);

err = memstick_add_host(msh);
if (err)
goto err_out;

-wake_up_process(host->detect_ms);
+pm_runtime_put(ms_dev(host));
+
+return 0;
err_out:
memstick_free_host(msh);
+pm_runtime_disable(ms_dev(host));
+pm_runtime_put_noidle(ms_dev(host));
return err;
}

static int rtsx_usb_ms_drv_remove(struct platform_device *pdev)
{
struct rtsx_usb_ms *host = platform_get_drvdata(pdev);
-struct memstick_host *msh;
+struct memstick_host *msh = host->msh;

int err;

-msh = host->msh;
host->eject = true;
cancel_work_sync(&host->handle_req);

mutex_lock(&host->host_mutex);
if (host->req) {
-dev_dbg(&(pdev->dev),
+dev_dbg(ms_dev(host),
"%s: Controller removed during transfer\n", 
      dev_name(&msh->dev));
host->req->error = -ENOMEDIUM;
@@ -797,7 +839,6 @@
}
mutex_unlock(&host->host_mutex);

-wait_for_completion(&host->detect_ms_exit);
memstick_remove_host(msh);
memstick_free_host(msh);

@@ -807,18 +848,15 @@
if (pm_runtime_active(ms_dev(host)))
    pm_runtime_put(ms_dev(host));

-pm_runtime_disable(&pdev->dev);
+pm_runtime_disable(ms_dev(host));
platform_set_drvdata(pdev, NULL);

-dev_dbg(&(pdev->dev),
+dev_dbg(ms_dev(host),
"": Realtek USB Memstick controller has been removed\n");

return 0;
}

-static SIMPLE_DEV_PM_OPS(rtsx_usb_ms_pm_ops,
-rttsx_usb_ms_suspend, rtsx_usb_ms_resume);
-
static struct platform_device_id rtsx_usb_ms_ids[] = {
    
{name = "rtsx_usb_ms",
--- linux-4.15.0.orig/drivers/message/fusion/mptctl.c
+++ linux-4.15.0/drivers/message/fusion/mptctl.c
@@ -100,19 +100,19 @@
      * Function prototypes. Called from OS entry point mptctl_ioctl.
      * arg contents specific to function.
 */
-static int mptctl_fw_download(unsigned long arg);
-static int mptctl_getiocinfo(unsigned long arg, unsigned int cmd);
-static int mptctl_gettargetinfo(unsigned long arg);
-static int mptctl_readtest(unsigned long arg);
-static int mptctl_mpt_command(unsigned long arg);
-static int mptctl_eventquery(unsigned long arg);
-static int mptctl_eventenable(unsigned long arg);
-static int mptctl_eventreport(unsigned long arg);
-static int mptctl_replace_fw(unsigned long arg);
-
-static int mptctl_do_reset(unsigned long arg);
-static int mptctl_hp_hostinfo(unsigned long arg, unsigned int cmd);
-static int mptctl_hp_targetinfo(unsigned long arg);
+static int mptctl_fw_download(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_getiocinfo(MPT_ADAPTER *iocp, unsigned long arg, unsigned int cmd);
+static int mptctl_gettargetinfo(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_readtest(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_mpt_command(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_eventquery(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_eventenable(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_eventreport(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_replace_fw(MPT_ADAPTER *iocp, unsigned long arg);
+
+static int mptctl_do_reset(MPT_ADAPTER *iocp, unsigned long arg);
+static int mptctl_hp_hostinfo(MPT_ADAPTER *iocp, unsigned long arg, unsigned int cmd);
+static int mptctl_hp_targetinfo(MPT_ADAPTER *iocp, unsigned long arg);

static int mptctl_probe(struct pci_dev *, const struct pci_device_id *);
static void mptctl_remove(struct pci_dev *);
@@ -123,8 +123,8 @@
/*
 * Private function calls.
 */
-static int mptctl_do_mpt_command(struct mpt_ioctl_command karg, void __user *mfPtr);
-static int mptctl_do_fw_download(int ioc, char __user *ufwbuf, size_t fwlen);
+static int mptctl_do_mpt_command(MPT_ADAPTER *iocp, struct mpt_ioctl_command karg, void __user *
+mfPtr);
+static int mptctl_do_fw_download(MPT_ADAPTER *iocp, char __user *ufwbuf, size_t fwlen);
static MptSge_t *kbuf_alloc_2_sgl(int bytes, u32 dir, int sge_offset, int *frags,
struct buflist **blp, dma_addr_t *sglbuf_dma, MPT_ADAPTER *ioc);
static void kfree_sgl(MptSge_t *sgl, dma_addr_t sgl_dma,
@@ -656,19 +656,19 @@
* by TM and FW reloads.
 */
if ((cmd & ~IOCSIZE_MASK) == (MPTIOCINFO & ~IOCSIZE_MASK)) {
-return mptctl_getiocinfo(arg, _IOC_SIZE(cmd));
+return mptctl_getiocinfo(iocp, arg, _IOC_SIZE(cmd));
} else if (cmd == MPTTARGETINFO) {
- return mptctl_gettargetinfo(arg);
+ return mptctl_gettargetinfo(iocp, arg);
} else if (cmd == MPTTEST) {
- return mptctl_readtest(arg);
+ return mptctl_readtest(iocp, arg);
} else if (cmd == MPTEVENTQUERY) {
- return mptctl_eventquery(arg);
+ return mptctl_eventquery(iocp, arg);
} else if (cmd == MPTEVENTENABLE) {
- return mptctl_eventenable(arg);
+ return mptctl_eventenable(iocp, arg);
} else if (cmd == MPTEVENTREPORT) {
- return mptctl_eventreport(arg);
+ return mptctl_eventreport(iocp, arg);
} else if (cmd == MPTFWREPLACE) {
- return mptctl_replace_fw(arg);
+ return mptctl_replace_fw(iocp, arg);
}
/* All of these commands require an interrupt or
@@ -678,15 +678,15 @@
return ret;

if (cmd == MPTFWDOWNLOAD)
- ret = mptctl_fw_download(arg);
+ ret = mptctl_fw_download(iocp, arg);
else if (cmd == MPTCOMMAND)
- ret = mptctl_mpt_command(arg);
+ ret = mptctl_mpt_command(iocp, arg);
else if (cmd == MPTHARDRESET)
- ret = mptctl_do_reset(arg);
+ ret = mptctl_do_reset(iocp, arg);
else if ((cmd & ~IOCSIZE_MASK) == (HP_GETHOSTINFO & ~IOCSIZE_MASK))
- ret = mptctl_hp_hostinfo(arg, _IOC_SIZE(cmd));
+ ret = mptctl_hp_hostinfo(iocp, arg, _IOC_SIZE(cmd));
else if (cmd == HP_GETTARGETINFO)
- ret = mptctl_hp_targetinfo(arg);
+ ret = mptctl_hp_targetinfo(iocp, arg);
else
 ret = -EINVAL;
@@ -705,11 +705,10 @@
return ret;
}

- static int mptctl_do_reset(unsigned long arg)
+ static int mptctl_do_reset(MPT_ADAPTER *iocp, unsigned long arg)


struct mpt_ioctl_diag_reset __user *urinfo = (void __user *) arg;
struct mpt_ioctl_diag_reset krinfo;
-MPT_ADAPTER*iocp;

if (copy_from_user(&krinfo, urinfo, sizeof(struct mpt_ioctl_diag_reset))) {
    printk(KERN_ERR MYNAM "%s@%d::mptctl_do_reset - ",
           __FILE__, __LINE__);
    return -EFAULT;
}

if (mpt_verify_adapter(krinfo.hdr.iocnum, &iocp) < 0) {
    printk(KERN_DEBUG MYNAM "%s@%d::mptctl_do_reset - ioc%d not found!
",
           __FILE__, __LINE__, krinfo.hdr.iocnum);
    return -ENODEV; /* (-6) No such device or address */
}

dctlprintk(iocp, printk(MYIOC_s_DEBUG_FMT "mptctl_do_reset called.
",
            iocp->name));

return mptctl_do_reset(iocp, kfwdl.bufp, kfwdl.fwlen);
}

/*=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=*/
*/
static int
-mptctl_fw_download(unsigned long arg)
+ mptctl_fw_download(MPT_ADAPTER *iocp, unsigned long arg)
{
    struct mpt_fw_xfer __user *ufwdl = (void __user *) arg;
    struct mpt_fw_xfer kfwdl;
    return -EFAULT;
}

return mptctl_do_fw_download(kfwdl.iocnum, kfwdl.bufp, kfwdl.fwlen);
+ return mptctl_do_fw_download(iocp, kfwdl.bufp, kfwdl.fwlen);
}

/*=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=*/
*/
static int
-mptctl_do_fw_download(int ioc, char __user *ufwbuf, size_t fwlen)
+ mptctl_do_fw_download(MPT_ADAPTER *iocp, char __user *ufwbuf, size_t fwlen)
{
    FWDownload_t*dlmsg;
    MPT_FRAME_HDR*mf;
    -MPT_ADAPTER*iocp;
    FWDownloadTCSGE_t*ptsge;

MptSge_t*sgl, *sgIn;
char*sgOut;
@@ -808,17 +800,10 @@
pFWDownloadReply_t ReplyMsg = NULL;
unsigned long timeleft;

- if (mpt_verify_adapter(ioc, &iocp) < 0) {
- printk(KERN_DEBUG MYNAM "ioctl_fwdl - ioc%d not found\n",
- ioc);
- return -ENODEV; /* (-6) No such device or address */
- } else {
- /* Valid device. Get a message frame and construct the FW download message.
- */
- if ((mf = mpt_get_msg_frame(mptctl_id, iocp)) == NULL)
- return -EAGAIN;
- }
+ /* Valid device. Get a message frame and construct the FW download message.
+ */
+ if ((mf = mpt_get_msg_frame(mptctl_id, iocp)) == NULL)
+ return -EAGAIN;

dctlprintk(iocp, printk(MYIOC_s_DEBUG_FMT
- "mptctl_do_fwdl called. mptctl_id = %xh, iocp->name, mptctl_id));
- @ @ -826,8 +811,6 @@
- iocp->name, ufwbuf));
dctlprintk(iocp, printk(MYIOC_s_DEBUG_FMT "DbG: kfwdl.fwlen = %d\n",
- iocp->name, (int)fwlen));
- dctlprintk(iocp, printk(MYIOC_s_DEBUG_FMT "DbG: kfwdl.ioe = %04x\n",
- iocp->name, ioc));

dlmsg = (FWDownload_t*) mf;
ptsge = (FWDownloadTCSGE_t *) &dlmsg->SGL;
@@ -1238,13 +1221,11 @@
*-ENODEV if no such device/adapter
 */
 static int
 - mptctl_getiocinfo (unsigned long arg, unsigned int data_size)
 + mptctl_getiocinfo (MPT_ADAPTER *ioc, unsigned long arg, unsigned int data_size)
 { 
 struct mpt_ioctl_iocinfo __user *uarg = (void __user *) arg;
 struct mpt_ioctl_iocinfo *karg;
- MPT_ADAPTER*ioc;
- struct pci_dev*pdev;
- intiocnum;
- unsigned intport;
- intcim_rev;
 struct scsi_device *sdev;
@@ -1272,14 +1253,6 @@
return PTR_ERR(karg);
}

@if (((iocnum = mpt_verify_adapter(karg->hdr.iocnum, &ioc)) < 0) ||
- (ioc == NULL)) {
- printk(KERN_DEBUG MYNAM "%s::mptctl_getiocinfo() @%d - ioc%d not found!
",
- __FILE__, __LINE__, iocnum);
-kfree(karg);
-return -ENODEV;
-}
-
/* Verify the data transfer size is correct. */
if (karg->hdr.maxDataSize != data_size) {
printk(MYIOC_s_ERR_FMT "%s@%d::mptctl_getiocinfo - 
@@ -1385,15 +1358,13 @@
* -ENODEV  if no such device/adapter
*/
static int
-mptctl_gettargetinfo (unsigned long arg)
+mptctl_gettargetinfo (MPT_ADAPTER *ioc, unsigned long arg)
{
struct mpt_ioctl_targetinfo __user *uarg = (void __user *) arg;
struct mpt_ioctl_targetinfo karg;
-MPT_ADAPTER	*ioc;
VirtDevice	*vdevice;
char		*pmem;
int		*pdata;
	
-intiocnum;
intnumDevices = 0;
intln;
intmaxWordsLeft;
@@ -1408,13 +1379,6 @@
return -EFAULT;
}

@if (((iocnum = mpt_verify_adapter(karg,hdr.iocnum, &ioc)) < 0) ||
- (ioc == NULL)) {
- printk(KERN_DEBUG MYNAM "%s::mptctl_gettargetinfo() @%d - ioc%d not found!
",
- __FILE__, __LINE__, iocnum);
- return -ENODEV;
-}
-
dctlprintk(ioc, printk(MYIOC_s_DEBUG_FMT "mptctl_gettargetinfo called.\n",
- ioc->name));
/* Get the port number and set the maximum number of bytes
@@ -1510,12 +1474,10 @@
* -ENODEV  if no such device/adapter
static int
-mptctl_readtest (unsigned long arg)
+ mptctl_readtest (MPT_ADAPTER *ioc, unsigned long arg)
{
    struct mpt_ioctl_test __user *uarg = (void __user *) arg;
    struct mpt_ioctl_test karg;
    -MPT_ADAPTER *ioc;
    -int iocnum;

    if (copy_from_user(&karg, uarg, sizeof(struct mpt_ioctl_test))) {
        printk(KERN_ERR MYNAM "%s@%d::mptctl_readtest -
@@ -1524,13 +1486,6 @@
return -EFAULT;
    }
    -if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0) ||
        (ioc == NULL)) {
        printk(KERN_DEBUG MYNAM "%s::mptctl_readtest() @%d - ioc%d not found!
@@ -1571,12 +1526,10 @@
        /* ENODEV if no such device/adapter
        */
    }

    dctlprintk(ioc, printk(MYIOC_s_DEBUG_FMT "mptctl_readtest called.
        ioc->name));
/* Fill in the data and return the structure to the calling
@@ -1585,13 +1538,6 @@
    /*-ENODEV if no such device/adapter
    */
}

static int
-mptctl_eventquery (unsigned long arg)
+ mptctl_eventquery (MPT_ADAPTER *ioc, unsigned long arg)
{
    struct mpt_ioctl_eventquery __user *uarg = (void __user *) arg;
    struct mpt_ioctl_eventquery karg;
    -MPT_ADAPTER *ioc;
    -int iocnum;

    if (copy_from_user(&karg, uarg, sizeof(struct mpt_ioctl_eventquery))) {
        printk(KERN_ERR MYNAM "%s@%d::mptctl_eventquery -
@@ -1585,13 +1538,6 @@
return -EFAULT;
    }
    -if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0) ||
        (ioc == NULL)) {
        printk(KERN_DEBUG MYNAM "%s::mptctl_eventquery() @%d - ioc%d not found!
@@ -1585,13 +1538,6 @@
        /*-ENODEV if no such device/adapter
        */
    }

    /* Fill in the data and return the structure to the calling
    */

    /* ENODEV if no such device/adapter
    */
}
-return -ENODEV;
-
-
dctlprintk(ioc, printk(MYIOC_s_DEBUG_FMT "mptctl_eventquery called.
, 
ioc->name));
karg.eventEntries = MPTCTL_EVENT_LOG_SIZE;
@@ -1610,12 +1556,10 @@

/*=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=*/
static int
-mptctl_eventenable (unsigned long arg)
+ mptctl_eventenable (MPT_ADAPTER *ioc, unsigned long arg)
{
    struct mpt_ioctl_eventenable __user *uarg = (void __user *) arg;
    struct mpt_ioctl_eventenable karg;
    -MPT_ADAPTER *ioc;
    -int iocnum;

    if (copy_from_user(&karg, uarg, sizeof(struct mpt_ioctl_eventenable))) {
        printk(KERN_ERR MYNAM "%s@%d::mptctl_eventenable - 
@@ -1624,13 +1568,6 @@

        return -EFAULT;
    }
    
    if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0) 
        - (ioc == NULL)) {
        printk(KERN_DEBUG MYNAM "%s::mptctl_eventenable() @%d - ioc%d not found!
, 
        -__FILE__, __LINE__, iocnum);
        -return -ENODEV;
    }
    -
    -
    dctlprintk(ioc, printk(MYIOC_s_DEBUG_FMT "mptctl_eventenable called.
, 
ioc->name));
    if (ioc->events == NULL) {
      @@ -1658,12 +1595,10 @@

        /*=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=*/
        static int
        -mptctl_eventreport (unsigned long arg)
        + mptctl_eventreport (MPT_ADAPTER *ioc, unsigned long arg)
        {
        struct mpt_ioctl_eventreport __user *uarg = (void __user *) arg;
        struct mpt_ioctl_eventreport karg;
        -MPT_ADAPTER *ioc;
        -int iocnum;
        int numBytes, maxEvents, max;

        if (copy_from_user(&karg, uarg, sizeof(struct mpt_ioctl_eventreport))) {
return -EFAULT;
}

if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0)) {
    printk(KERN_DEBUG MYNAM "mptctl_eventreport() @%d - ioc%d not found\n",
            __FILE__, __LINE__, iocnum);
    return -ENODEV;
}
dctlprintk(ioc, printk(MYIOC_s_DEBUG_FMT "mptctl_eventreport called.\n",
                    ioc->name));

/\*=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=*/
static int
-mptctl_replace_fw (unsigned long arg)
+mptctl_replace_fw (MPT_ADAPTER *ioc, unsigned long arg)
{
struct mpt_ioctl_replace_fw __user *uarg = (void __user *) arg;
struct mpt_ioctl_replace_fw karg;
-MPT_ADAPTER *ioc;
-int iocnum;
int newFwSize;

if (copy_from_user(&karg, uarg, sizeof(struct mpt_ioctl_replace_fw))) {
    return -EFAULT;
}

if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0)) {
    printk(KERN_DEBUG MYNAM "mptctl_replace_fw() @%d - ioc%d not found\n",
            __FILE__, __LINE__, iocnum);
    return -ENODEV;
}
dctlprintk(ioc, printk(MYIOC_s_DEBUG_FMT "mptctl_replace_fw called.\n",
                    ioc->name));

/* If caching FW, Free the old FW image
@ @ -1780,12 +1700,10 @@
*.ENOMEM if memory allocation error
*/
static int
-mptctl_mpt_command (unsigned long arg)
+mptctl_mpt_command (MPT_ADAPTER *ioc, unsigned long arg)
{
struct mpt_ioctl_command __user *uarg = (void __user *) arg;
struct mpt_ioctl_command karg;
-MPT_ADAPTER*ioc;
-intiocnum;
intrc;

@@ -1796,14 +1714,7 @@
return -EFAULT;
}
-if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0) ||
- (ioc == NULL)) {
-printk(KERN_DEBUG MYNAM "%s::mptctl_mpt_command() @%d - ioc%d not found!\n",
-__FILE__, __LINE__, iocnum);
-return -ENODEV;
-}
-rc = mptctl_do_mpt_command (karg, &uarg->MF);
+rc = mptctl_do_mpt_command (ioc, karg, &uarg->MF);
return rc;
}
@@ -1821,9 +1732,8 @@
*-EPERM if SCSI I/O and target is untagged
*/
static int
-mptctl_do_mpt_command (struct mpt_ioctl_command karg, void __user *mfPtr)
+mptctl_do_mpt_command (MPT_ADAPTER *ioc, struct mpt_ioctl_command karg, void __user *mfPtr)
{
-MPT_ADAPTER*ioc;
MPT_FRAME_HDR*mf = NULL;
MPIHeader_t*hdr;
char*psge;
@@ -1832,7 +1742,7 @@
dma_addr_tdma_addr_in;
dma_addr_tdma_addr_out;
intsgSize = 0;/* Num SG elements */
-intiocnum, flagsLength;
+intflagsLength;
intsz, rc = 0;
intmsgContext;
u16req_idx;
@@ -1847,13 +1757,6 @@
bufIn.kptr = bufOut.kptr = NULL;
bufIn.len = bufOut.len = 0;
-if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0) ||

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- (ioc == NULL)) {
-printk(KERN_DEBUG MYNAM "%s::mptctl_do_mpt_command() @%d - ioc%d not found!
",
-__FILE__, __LINE__, iocnum);
-return -ENODEV;
}

spin_lock_irqsave(&ioc->taskmgmt_lock, flags);
if (ioc->ioc_reset_in_progress) {
spin_unlock_irqrestore(&ioc->taskmgmt_lock, flags);
@@ -2418,17 +2321,15 @@
  *ENOMEM if memory allocation error
  */
 static int
-mptctl_hp_hostinfo(unsigned long arg, unsigned int data_size)
+MPT_ADAPTER *ioc, unsigned long arg, unsigned int data_size)
{
  hp_host_info_t __user *uarg = (void __user *) arg;
  -MPT_ADAPTER*ioc;
  struct pci_dev*pdev;
  char *pbuf=NULL;
  dma_addr_t buf_dma;
  hp_host_info_t karg;
  CONFIGPARMScfg;
  ConfigPageHeader_thdr;
  -intiocnum;
  intr, cim_rev;
  ToolboxIstwiReadWriteRequest_t*IstwiRWRequest;
  MPT_FRAME_HDR*mf = NULL;
  @@ -2452,12 +2353,6 @@
    return -EFAULT;
 }

-if (((iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0) ||
 - (ioc == NULL)) {
-printk(KERN_DEBUG MYNAM "%s::mptctl_hp_hostinfo() @%d - ioc%d not found!
",
-__FILE__, __LINE__, iocnum);
-return -ENODEV;
-}
 dctprintk(ioc, printk(MYIOC_s_DEBUG_FMT ": mptctl_hp_hostinfo called.
",
    ioc->name));

@@ -2670,15 +2565,13 @@
  *ENOMEM if memory allocation error
  */
 static int
-mptctl_hp_targetinfo(unsigned long arg)
+MPT_ADAPTER *ioc, unsigned long arg)
{

hp_target_info_t __user *uarg = (void __user *) arg;  
SCSIDevicePage0_t *pg0_alloc;  
SCSIDevicePage3_t *pg3_alloc;  
-MPT_ADAPTER*ioc;  
MPT_SCSI_HOST *hd = NULL;  
hp_target_info_t karg;  
-intiocnum;  
int data_sz;  
dma_addr_t page_dma;  
CONFIGPARMS cfg;  
@@ -2692,12 +2585,8 @@
return -EFAULT;  
-(iocnum = mpt_verify_adapter(karg.hdr.iocnum, &ioc)) < 0) ||  
-(ioc == NULL)) {  
-printk(KERN_DEBUG MYNAM "%s::mptctl_hp_targetinfo() @%d - ioc%d not found!\n",  
-__FILE__, __LINE__, iocnum);  
-return -ENODEV;  
-}  
+if (karg.hdr.id >= MPT_MAX_FC_DEVICES)  
+return -EINVAL;  
dctlprintk(ioc, printk(MYIOC_s_DEBUG_FMT "mptctl_hp_targetinfo called.\n",  
ioc->name));

@@ -2863,7 +2752,7 @@
kfw.fwlen = kfw32.fwlen;  
kfw.bufp = compat_ptr(kfw32.bufp);  
-ret = mptctl_do_fw_download(kfw.iocnum, kfw.bufp, kfw.fwlen);  
+ret = mptctl_do_fw_download(iocp, kfw.bufp, kfw.fwlen);  
mutex_unlock(&iocp->ioctl_cmds.mutex);  
@@ -2917,7 +2806,7 @@
/* Pass new structure to do_mpt_command  
*/  
-ret = mptctl_do_mpt_command (karg, &uarg->MF);  
+ret = mptctl_do_mpt_command (iocp, karg, &uarg->MF);  
mutex_unlock(&iocp->ioctl_cmds.mutex);  

--- linux-4.15.0.orig/drivers/message/fusion/mptsas.c  
+++ linux-4.15.0/drivers/message/fusion/mptsas.c  
@@ -1995,6 +1995,7 @@
.cmd_per_lun	= 7,  
.use_clustering= ENABLE_CLUSTERING,
.host_attr= mptscsih_host_attr,
+ .no_write_same= 1,
};

static int mptsas_get_linkerrors(struct sas_phy *phy)
--- linux-4.15.0.orig/drivers/message/fusion/mptscsih.c
+++ linux-4.15.0/drivers/message/fusion/mptscsih.c
@@ -118,8 +118,6 @@
 int mptscsih_resume(struct pci_dev *pdev);
 #endif

-#define SNS_LEN(scp)SCSI_SENSE_BUFFERSIZE
-
/*=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=*
/*
@@ -1176,8 +1174,10 @@
 MPT_SCSI_HOST*hd;
 int sz1;

-if((hd = shost_priv(host)) == NULL)
-return;
+if (host == NULL)
+hd = NULL;
+else
+hd = shost_priv(host);

 mptscsih_shutdown(pdev);

 @@ -1193,14 +1193,15 @@
 "Free'd ScsiLookup (%d) memory\n",
 ioc->name, sz1));

-kfree(hd->info_kbuf);
+if (hd)
+kfree(hd->info_kbuf);

 /* NULL the Scsi_Host pointer
 */
 ioc->sh = NULL;

-scsi_host_put(host);
-
+if (host)
+scsi_host_put(host);
 mpt_detach(pdev);

}
Copy the sense received into the scsi command block. */
req_index = le16_to_cpu(mf->u.frame.hwhdr.msgctxu.fld.req_idx);
sense_data = ((u8 *)ioc->sense_buf_pool + (req_index * MPT_SENSE_BUFFER_ALLOC));
-memcpy(sc->sense_buffer, sense_data, SNS_LEN(sc));
+memcpy(sc->sense_buffer, sense_data, MPT_SENSE_BUFFER_ALLOC);

/* Log SMART data (asc = 0x5D, non-IM case only) if required. */
--- linux-4.15.0.orig/drivers/mfd/88pm860x-i2c.c
+++ linux-4.15.0/drivers/mfd/88pm860x-i2c.c
@@ -146,14 +146,14 @@
unsigned char zero;
int ret;
-i2c_lock_adapter(i2c->adapter);
+i2c_lock_bus(i2c->adapter, I2C_LOCK_SEGMENT);
read_device(i2c, 0xFA, 0, &zero);
read_device(i2c, 0xFB, 0, &zero);
read_device(i2c, 0xFF, 0, &zero);
ret = write_device(i2c, reg, 1, &data);
read_device(i2c, 0xFE, 0, &zero);
read_device(i2c, 0xFC, 0, &zero);
-i2c_unlock_adapter(i2c->adapter);
+i2c_unlock_bus(i2c->adapter, I2C_LOCK_SEGMENT);
return ret;
}
EXPORT_SYMBOL(pm860x_page_reg_write);
@@ -164,14 +164,14 @@
unsigned char zero = 0;
int ret;
-i2c_lock_adapter(i2c->adapter);
+i2c_lock_bus(i2c->adapter, I2C_LOCK_SEGMENT);
read_device(i2c, 0xFA, 0, &zero);
read_device(i2c, 0xFB, 0, &zero);
read_device(i2c, 0xFF, 0, &zero);
ret = read_device(i2c, reg, count, buf);
read_device(i2c, 0xFE, 0, &zero);
read_device(i2c, 0xFC, 0, &zero);
-i2c_unlock_adapter(i2c->adapter);
+i2c_unlock_bus(i2c->adapter, I2C_LOCK_SEGMENT);
return ret;
}
EXPORT_SYMBOL(pm860x_page_bulk_read);
--- linux-4.15.0.orig/drivers/mfd/Kconfig
+++ linux-4.15.0/drivers/mfd/Kconfig
@@ -469,10 +469,10 @@

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bool "Support for Crystal Cove PMIC"
depends on ACPI && HAS_IOMEM && I2C=y && GPIOLIB && COMMON_CLK
depends on X86 || COMPILE_TEST
+depends on I2C_DESIGNWARE_PLATFORM=y
select MFD_CORE
select REGMAP_I2C
select REGMAP_IRQ
-select I2C_DESIGNWARE_PLATFORM
help
Select this option to enable support for Crystal Cove PMIC
on some Intel SoC systems. The PMIC provides ADC, GPIO,
@@ -498,10 +498,10 @@
bool "Support for Intel Cherry Trail Whiskey Cove PMIC"
depends on ACPI && HAS_IOMEM && I2C=y && COMMON_CLK
depends on X86 || COMPILE_TEST
+depends on I2C_DESIGNWARE_PLATFORM=y
select MFD_CORE
select REGMAP_I2C
select REGMAP_IRQ
-select I2C_DESIGNWARE_PLATFORM
help
Select this option to enable support for the Intel Cherry Trail
Whiskey Cove PMIC found on some Intel Cherry Trail systems.
@@ -929,17 +929,6 @@
southbridge which provides access to GPIOs and Watchdog using the
southbridge PCI device configuration space.

-config MFD_RTSX_PCI
-tristate "Realtek PCI-E card reader"
-depends on PCI
-select MFD_CORE
-help
-  This supports for Realtek PCI-Express card reader including rts5209,
-  rts5227, rts522A, rts5229, rts5249, rts524A, rts525A, rtl8411, etc.
-  Realtek card reader supports access to many types of memory cards,
-  such as Memory Stick, Memory Stick Pro, Secure Digital and
-  MultiMediaCard.
-  config MFD_RT5033
tristate "Richtek RT5033 Power Management IC"
depends on I2C
@@ -953,16 +942,6 @@
sub-devices like charger, fuel gauge, flash LED, current source,
LDO and Buck.

-config MFD_RTSX_USB
-tristate "Realtek USB card reader"
-depends on USB
select MFD_CORE
-select MFD_CORE
-help
- Select this option to get support for Realtek USB 2.0 card readers
- including RTS5129, RTS5139, RTS5179 and RTS5170.
- Realtek card reader supports access to many types of memory cards,
- such as Memory Stick Pro, Secure Digital and MultiMediaCard.
-config MFD_RC5T583
bool "Ricoh RC5T583 Power Management system device"
depends on I2C=y
@@ -1384,9 +1363,9 @@
config MFD_TPS68470
bool "TI TPS68470 Power Management / LED chips"
depends on ACPI && I2C=y
+depends on I2C_DESIGNWARE_PLATFORM=y
select MFD_CORE
select REGMAP_I2C
-select I2C_DESIGNWARE_PLATFORM
help
  If you say yes here you get support for the TPS68470 series of
  Power Management / LED chips.
--- linux-4.15.0.orig/drivers/mfd/Makefile
+++ linux-4.15.0/drivers/mfd/Makefile
@@ -19,10 +19,6 @@
obj-$(CONFIG_MFD_CROS_EC_SPI) += cros_ec_spi.o
obj-$(CONFIG_MFD_EXYNOS_LPASS) += exynos-lpass.o
obj-$(CONFIG_MFD_RTSX_PCI) += rtsx_pci.o
-obj-$(CONFIG_MFD_RTSX_USB) += rtsx_usb.o
-
obj-$(CONFIG_HTC_PASIC3) += htc-pasic3.o
obj-$(CONFIG_HTC_I2CPLD) += htc-i2cpld.o
--- linux-4.15.0.orig/drivers/mfd/ab8500-core.c
+++ linux-4.15.0/drivers/mfd/ab8500-core.c
@@ -261,7 +261,7 @@
mutex_unlock(&ab8500->lock);
dev_vdbg(ab8500->dev, "rd: addr %#x => data %#x\n", addr, ret);
-    return ret;
+    return (ret < 0) ? ret : 0;
}

static int ab8500_get_register(struct device *dev, u8 bank,  
@@ -493,7 +493,7 @@
mutex_unlock(&ab8500->lock);
dev_vdbg(ab8500->dev, "rd: addr %#x => data %#x\n", addr, ret);
-    return ret;
+    return (ret < 0) ? ret : 0;
}

static int ab8500_get_register(struct device *dev, u8 bank,  
@@ -493,7 +493,7 @@
mutex_unlock(&ab8500->lock);
dev_vdbg(ab8500->dev, "rd: addr %#x => data %#x\n", addr, ret);
-    return ret;
+    return (ret < 0) ? ret : 0;
}

static int ab8500_get_register(struct device *dev, u8 bank,  
@@ -493,7 +493,7 @@
mutex_unlock(&ab8500->lock);
dev_vdbg(ab8500->dev, "rd: addr %#x => data %#x\n", addr, ret);
-    return ret;
+    return (ret < 0) ? ret : 0;
}
-handle_nested_irq(irq_create_mapping(ab8500->domain, line));
+handle_nested_irq(irq_find_mapping(ab8500->domain, line));
}

return 0;
--- linux-4.15.0.orig/drivers/mfd/arizona-core.c
+++ linux-4.15.0/drivers/mfd/arizona-core.c
@@ -52,8 +52,10 @@
if (ret != 0)
goto err_ref;
ret = clk_prepare_enable(arizona->mclk[ARIZONA_MCLK1]);
-    -if (ret != 0)
-    -goto err_pm;
-    +if (ret != 0) {
+    +    pm_runtime_put_sync(arizona->dev);
+    +    goto err_ref;
+    +}
break;
case ARIZONA_32KZ_MCLK2:
    ret = clk_prepare_enable(arizona->mclk[ARIZONA_MCLK2]);
    @@ -67,8 +69,6 @@
        ARIZONA_CLK_32K_ENA);
    }

-err_pm:
-    pm_runtime_put_sync(arizona->dev);
err_ref:
    if (ret != 0)
    arizona->clk32k_ref--;
    @@ -966,7 +966,7 @@
    unsigned int reg, val;
    int (*apply_patch)(struct arizona *) = NULL;
    const struct mfd_cell *subdevs = NULL;
    -int n_subdevs, ret, i;
    +int n_subdevs = 0, ret, i;

    dev_set_drvdata(arizona->dev, arizona);
    mutex_init(&arizona->clk_lock);
    @@ -1398,6 +1398,15 @@
    arizona_irq_exit(arizona);
    err_pm:
    pm_runtime_disable(arizona->dev);
+    switch (arizona->pdata.clk32k_src) {
+    +case ARIZONA_32KZ_MCLK1:
+    +    arizona_clk32k_disable(arizona);
+    +case ARIZONA_32KZ_MCLK2:
+    +    arizona_clk32k_disable(arizona);
err_reset:
    arizona_enable_reset(arizona);

regulator_disable(arizona->dcvdd);
@@ -1420,6 +1429,15 @@
regulator_disable(arizona->dcvdd);
regulator_put(arizona->dcvdd);  

+switch (arizona->pdata.clk32k_src) {
+    case ARIZONA_32KZ_MCLK1:
+    case ARIZONA_32KZ_MCLK2:
+    arizona_clk32k_disable(arizona);
+    break;
+    default:
+    break;
+}  
+
mfd_remove_devices(arizona->dev);

arizona_free_irq(arizona, ARIZONA_IRQ_UNDERCLOCKED, arizona);
arizona_free_irq(arizona, ARIZONA_IRQ_OVERCLOCKED, arizona);
--- linux-4.15.0.orig/drivers/mfd/axp20x.c
+++ linux-4.15.0/drivers/mfd/axp20x.c
@@ -127,11 +127,12 @@
static const struct regmap_range axp288_volatile_ranges[] = {
    regmap_reg_range(AXP20X_PWR_INPUT_STATUS, AXP288_POWER_REASON),
+    regmap_reg_range(AXP22X_PWR_OUT_CTRL1, AXP22X_ALDO3_V_OUT),
    regmap_reg_range(AXP288_BC_GLOBAL, AXP288_BC_GLOBAL),
-    regmap_reg_range(AXP288_BC_DET_STAT, AXP288_BC_DET_STAT),
+    regmap_reg_range(AXP288_BC_DET_STAT, AXP20X_VBUS_IPSOUT_MGMT),
    regmap_reg_range(AXP20X_IRQ1_EN, AXP20X_IPSOUT_V_HIGH_L),
    regmap_reg_range(AXP20X_IRQ1_EN, AXP20X_IPSOUT_V_HIGH_L),
    regmap_reg_range(AXP20X_TIMER_CTRL, AXP20X_TIMER_CTRL),
-    regmap_reg_range(AXP22X_GPIO_STATE, AXP22X_GPIO_STATE),
+    regmap_reg_range(AXP20X_GPIO1_CTRL, AXP22X_GPIO_STATE),
    regmap_reg_range(AXP288_RT_BATT_V_H, AXP288_RT_BATT_V_L),
    regmap_reg_range(AXP20X_FG_RES, AXP288_FG_CC_CAP_REG),
};
--- linux-4.15.0.orig/drivers/mfd/bd9571mwv.c
+++ linux-4.15.0/drivers/mfd/bd9571mwv.c
@@ -57,6 +57,7 @@
static const struct regmap_range bd9571mwv_volatile_yes_ranges[] = {
    regmap_reg_range(BD9571MWV_DVFS_MONIVDAC, BD9571MWV_DVFS_MONIVDAC),
};

static const struct regmap_range bd9571mwv_volatile_yes_ranges[] = {
+    regmap_reg_range(BD9571MWV_DVFS_MONIVDAC, BD9571MWV_DVFS_MONIVDAC),
    regmap_reg_range(BD9571MWV_GPIO_IN, BD9571MWV_GPIO_IN),
regmap_reg_range(BD9571MWV_GPIO_INT, BD9571MWV_GPIO_INT),
regmap_reg_range(BD9571MWV_INT_INTREQ, BD9571MWV_INT_INTREQ),
@@ -182,9 +183,9 @@
    return ret;
 }

-ret = mfd_add_devices(bd->dev, PLATFORM_DEVID_AUTO, bd9571mwv_cells,
- ARRAY_SIZE(bd9571mwv_cells), NULL, 0,
- regmap_irq_get_domain(bd->irq_data));
+ret = devm_mfd_add_devices(bd->dev, PLATFORM_DEVID_AUTO,
+ bd9571mwv_cells, ARRAY_SIZE(bd9571mwv_cells),
+ NULL, 0, regmap_irq_get_domain(bd->irq_data));
if (ret) {
    regmap_del_irq_chip(bd->irq, bd->irq_data);
    return ret;
--- linux-4.15.0.orig/drivers/mfd/cros_ec.c
+++ linux-4.15.0/drivers/mfd/cros_ec.c
 @@ -112,7 +112,11 @@
 mutex_init(&ec_dev->lock);

-cros_ec_query_all(ec_dev);
+err = cros_ec_query_all(ec_dev);
+if (err) {
+    dev_err(dev, "Cannot identify the EC: error %d\n", err);
+    return err;
+}

if (ec_dev->irq) {
    err = request_threaded_irq(ec_dev->irq, NULL, ec_irq_thread,
--- linux-4.15.0.orig/drivers/mfd/da9052-i2c.c
+++ linux-4.15.0/drivers/mfd/da9052-i2c.c
 @@ -118,6 +118,7 @@
         DA9053_BC},
     []);
     +MODULE_DEVICE_TABLE(i2c, da9052_i2c_id);

 #ifdef CONFIG_OF
 static const struct of_device_id dialog_dt_ids[] = {
--- linux-4.15.0.orig/drivers/mfd/da9062-core.c
+++ linux-4.15.0/drivers/mfd/da9062-core.c
 @@ -257,7 +257,7 @@
         DA9062_WATCHDOG",
         ARRAY_SIZE(da9062_wdt_resources),
         da9062_wdt_resources,
         "dlg,da9062-wdt",
         "dlg,da9062-watchdog",}
.name = "da9062-thermal",
--- linux-4.15.0.orig/drivers/mfd/db8500-prcmu.c
+++ linux-4.15.0/drivers/mfd/db8500-prcmu.c
@@ -2584,7 +2584,7 @@
 .irq_unmask = prcmu_irq_unmask,
 }

-static __init char *fw_project_name(u32 project)
+static char *fw_project_name(u32 project)
{
    switch (project) {
        case PRCMU_FW_PROJECT_U8500:
@@ -2732,7 +2732,7 @@
 INIT_WORK(&mb0_transfer.mask_work, prcmu_mask_work);
    }

-static void __init init_prcm_registers(void)
+static void init_prcm_registers(void)
{
    u32 val;

--- linux-4.15.0.orig/drivers/mfd/dln2.c
+++ linux-4.15.0/drivers/mfd/dln2.c
@@ -93,6 +93,11 @@
 spinlock_t lock;
 }

+enum dln2_endpoint {
+    DLN2_EP_OUT = 0,
+    DLN2_EP_IN = 1,
+};
+
+struct dln2_dev {
+    struct usb_device *usb_dev;
+    struct usb_interface *interface;
@@ -289,7 +294,11 @@
 len = urb->actual_length - sizeof(struct dln2_header);

 if (handle == DLN2_HANDLE_EVENT) {
+    unsigned long flags;
+    
+    spin_lock_irqsave(&dln2->event_cb_lock, flags);
    dln2_run_event_callbacks(dln2, id, echo, data, len);
+    spin_unlock_irqrestore(&dln2->event_cb_lock, flags);
 } else {
 /* URB will be re-submitted in _dln2_transfer (free_rx_slot) */
if (dln2_transfer_complete(dln2, urb, handle, echo))
@@ -729,6 +738,8 @@
    struct usb_device_id *usb_id)
{
    struct usb_host_interface *hostif = interface->cur_altsetting;
+    struct usb_endpoint_descriptor *epin;
+    struct usb_endpoint_descriptor *epout;
    struct device *dev = &interface->dev;
    struct dln2_dev *dln2;
    int ret;
@@ -738,12 +749,19 @@
        hostif->desc.bNumEndpoints < 2)
    return -ENOMEM;
+		epout = &hostif->endpoint[DLN2_EP_OUT].desc;
+	    if (!usb_endpoint_is_bulk_out(epout))
+        return -ENODEV;
+	    epin = &hostif->endpoint[DLN2_EP_IN].desc;
+	    if (!usb_endpoint_is_bulk_in(epin))
+        return -ENODEV;
+
    dln2 = kzalloc(sizeof(*dln2), GFP_KERNEL);
    if (!dln2)
        return -ENOMEM;
-	    dln2->ep_out = hostif->endpoint[0].desc.bEndpointAddress;
-	    dln2->ep_in = hostif->endpoint[1].desc.bEndpointAddress;
+    dln2->ep_out = epout->bEndpointAddress;
+    dln2->ep_in = epin->bEndpointAddress;
    dln2->usb_dev = usb_get_dev(interface_to_usbdev(interface));
    dln2->interface = interface;
    usb_set_intfdata(interface, dln2);
--- linux-4.15.0.orig/drivers/mfd/hi655x-pmic.c
+++ linux-4.15.0/drivers/mfd/hi655x-pmic.c
@@ -49,7 +49,7 @@
        .reg_bits = 32,
        .reg_stride = HI655X_STRIDE,
        .val_bits = 8,
-       .max_register = HI655X_BUS_ADDR(0xFFF),
+       .max_register = HI655X_BUS_ADDR(0x400) - HI655X_STRIDE,
     };

 static struct resource pwrkey_resources[] = {
@@ -112,6 +112,8 @@
    pmic->regmap = devm_regmap_init_mmio_clk(dev, NULL, base,
        &hi655x_regmap_config);
+    if (IS_ERR(pmic->regmap))
+return PTR_ERR(pmic->regmap);

regmap_read(pmic->regmap, HI655X_BUS_ADDR(HI655X_VER_REG), &pmic->ver);
if ((pmic->ver < PMU_VER_START) || (pmic->ver > PMU_VER_END)) {
--- linux-4.15.0.orig/drivers/mfd/intel-lpss-pci.c
+++ linux-4.15.0/drivers/mfd/intel-lpss-pci.c
@@ -39,6 +39,8 @@
info->mem = &pdev->resource[0];
info->irq = pdev->irq;
+pdev->d3cold_delay = 0;
+
/* Probably it is enough to set this for iDMA capable devices only */
pci_set_master(pdev);
pci_try_set_mwi(pdev);
@@ -124,7 +126,37 @@
   .properties = apl_i2c_properties,
};

+static struct property_entry glk_i2c_properties[] = {
+PROPERTY_ENTRY_U32("i2c-sda-hold-time-ns", 313),
+PROPERTY_ENTRY_U32("i2c-sda-falling-time-ns", 171),
+PROPERTY_ENTRY_U32("i2c-scl-falling-time-ns", 290),
+{ },
+};
+
+static const struct intel_lpss_platform_info glk_i2c_info = {
+.clk_rate = 133000000,
+.properties = glk_i2c_properties,
+};
+
+static const struct intel_lpss_platform_info cnl_i2c_info = {
+.clk_rate = 216000000,
+.properties = spt_i2c_properties,
+};
+
static const struct pci_device_id intel_lpss_pci_ids[] = {
/* CML */
+{ PCI_VDEVICE(INTEL, 0x02a8), (kernel_ulong_t)&spt_uart_info },
+{ PCI_VDEVICE(INTEL, 0x02a9), (kernel_ulong_t)&spt_uart_info },
+{ PCI_VDEVICE(INTEL, 0x02aa), (kernel_ulong_t)&spt_info },
+{ PCI_VDEVICE(INTEL, 0x02ab), (kernel_ulong_t)&spt_info },
+{ PCI_VDEVICE(INTEL, 0x02c5), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0x02c6), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0x02c7), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0x02e8), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0x02e9), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0x02ea), (kernel_ulong_t)&cnl_i2c_info },
{ PCI_VDEVICE(INTEL, 0x02eb), (kernel_ulong_t)&cnl_i2c_info },
{ PCI_VDEVICE(INTEL, 0x02fb), (kernel_ulong_t)&spt_info },
/* BXT A-Step */
{ PCI_VDEVICE(INTEL, 0x0aac), (kernel_ulong_t)&bxt_i2c_info },
{ PCI_VDEVICE(INTEL, 0x0aae), (kernel_ulong_t)&bxt_i2c_info },
{ PCI_VDEVICE(INTEL, 0x1ac4), (kernel_ulong_t)&bxt_info },
{ PCI_VDEVICE(INTEL, 0x1ac6), (kernel_ulong_t)&bxt_info },
{ PCI_VDEVICE(INTEL, 0x1aee), (kernel_ulong_t)&bxt_uart_info },
/* EBG */
{ PCI_VDEVICE(INTEL, 0x1bad), (kernel_ulong_t)&bxt_uart_info },
{ PCI_VDEVICE(INTEL, 0x1bae), (kernel_ulong_t)&bxt_uart_info },
/* GLK */
{ PCI_VDEVICE(INTEL, 0x31ac), (kernel_ulong_t)&glk_i2c_info },
{ PCI_VDEVICE(INTEL, 0x31ae), (kernel_ulong_t)&glk_i2c_info },
{ PCI_VDEVICE(INTEL, 0x31b0), (kernel_ulong_t)&glk_i2c_info },
{ PCI_VDEVICE(INTEL, 0x31b2), (kernel_ulong_t)&glk_i2c_info },
{ PCI_VDEVICE(INTEL, 0x31b4), (kernel_ulong_t)&glk_i2c_info },
{ PCI_VDEVICE(INTEL, 0x31b6), (kernel_ulong_t)&glk_i2c_info },
{ PCI_VDEVICE(INTEL, 0x31b8), (kernel_ulong_t)&glk_i2c_info },
{ PCI_VDEVICE(INTEL, 0x31bc), (kernel_ulong_t)&bxt_uart_info },
{ PCI_VDEVICE(INTEL, 0x31be), (kernel_ulong_t)&bxt_uart_info },
{ PCI_VDEVICE(INTEL, 0x9daa), (kernel_ulong_t)&spt_info },
{ PCI_VDEVICE(INTEL, 0x9dab), (kernel_ulong_t)&spt_info },
{ PCI_VDEVICE(INTEL, 0x9dfb), (kernel_ulong_t)&spt_info },
{ PCI_VDEVICE(INTEL, 0x9dc5), (kernel_ulong_t)&spt_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9dc6), (kernel_ulong_t)&spt_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9dc5), (kernel_ulong_t)&cnl_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9dc6), (kernel_ulong_t)&cnl_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9dc7), (kernel_ulong_t)&spt_uart_info },
{ PCI_VDEVICE(INTEL, 0x9de8), (kernel_ulong_t)&spt_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9de9), (kernel_ulong_t)&spt_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9dea), (kernel_ulong_t)&spt_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9de8), (kernel_ulong_t)&cnl_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9de9), (kernel_ulong_t)&cnl_i2c_info },
{ PCI_VDEVICE(INTEL, 0x9dea), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0x9deb), (kernel_ulong_t)&cnl_i2c_info },
/* SPT-H */
+{ PCI_VDEVICE(INTEL, 0xa127), (kernel_ulong_t)&spt_uart_info },
+{ PCI_VDEVICE(INTEL, 0xa128), (kernel_ulong_t)&spt_uart_info },
@@ -240,10 +275,10 @@
+{ PCI_VDEVICE(INTEL, 0xa32b), (kernel_ulong_t)&spt_info },
+{ PCI_VDEVICE(INTEL, 0xa37b), (kernel_ulong_t)&spt_info },
+{ PCI_VDEVICE(INTEL, 0xa347), (kernel_ulong_t)&spt_uart_info },
-{ PCI_VDEVICE(INTEL, 0xa368), (kernel_ulong_t)&spt_i2c_info },
-{ PCI_VDEVICE(INTEL, 0xa369), (kernel_ulong_t)&spt_i2c_info },
-{ PCI_VDEVICE(INTEL, 0xa36a), (kernel_ulong_t)&spt_i2c_info },
-{ PCI_VDEVICE(INTEL, 0xa36b), (kernel_ulong_t)&spt_i2c_info },
+{ PCI_VDEVICE(INTEL, 0xa368), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0xa369), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0xa36a), (kernel_ulong_t)&cnl_i2c_info },
+{ PCI_VDEVICE(INTEL, 0xa36b), (kernel_ulong_t)&cnl_i2c_info },
+{ } }

MODULE_DEVICE_TABLE(pci, intel_lpss_pci_ids);
--- linux-4.15.0.orig/drivers/mfd/intel-lpss.c
+++ linux-4.15.0/drivers/mfd/intel-lpss.c
@@ -17,6 +17,7 @@
#include <linux/clkdev.h>
#include <linux/clk-provider.h>
#include <linux/debugfs.h>
+#include <linux/dmi.h>
#include <linux/idr.h>
#include <linux/ioport.h>
#include <linux/kernel.h>
@@ -130,6 +131,17 @@
static DEFINE_IDA(intel_lpss_devid_ida);
static struct dentry *intel_lpss_debugfs;

+static const struct dmi_system_id mtrr_large_wc_region[] = {
+{  
+ .ident = "Dell Computer Corporation",  
+ .matches = {  
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),  
+ DMI_MATCH(DMI_PRODUCT_NAME, "XPS 13 7390 2-in-1"),  
+ },  
+ },  
+{ }  
+};
+
+static int intel_lpss_request_dma_module(const char *name)
+{  
+ static bool intel_lpss_dma_requested;
+@@ -273,13 +285,16 @@
u32 value = LPSS_PRIV_SSP_REG_DIS_DMA_FIN;

+/* Set the device in reset state */
writel(0, lpss->priv + LPSS_PRIV_RESETS);
+ intel_lpss_deassert_reset(lpss);

+intel_lpss_set_remap_addr(lpss);
+
if (!intel_lpss_has_idma(lpss))
return;

-intel_lpss_set_remap_addr(lpss);
-
/ * Make sure that SPI multiblock DMA transfers are re-enabled */
if (lpss->type == LPSS_DEV_SPI)
writel(value, lpss->priv + LPSS_PRIV_SSP_REG);
@@ -394,8 +409,12 @@
if (!lpss)
return -ENOMEM;

@ @ -538,6 +557,7 @@

static void __exit intel_lpss_exit(void)
{
+ida_destroy(&intel_lpss_devid_ida);
debugfs_remove(intel_lpss_debugfs);
}
module_exit(intel_lpss_exit);
--- linux-4.15.0.orig/drivers/mfd/intel_soc_pmic_bxtwc.c
+++ linux-4.15.0/drivers/mfd/intel_soc_pmic_bxtwc.c
@@ -31,8 +31,8 @@
/* Interrupt Status Registers */
#define BXTWC_IRQLVL1	0x4E02
#define BXTWC_PWRBTNIRQ	0x4E03

/#define BXTWC_IRQLVL1.10x4E02
-#define BXTWC_PWRBTNIRQ0x4E03
+\#define BXTWC_PWRBTNIRQ		0x4E03
+\#define BXTWC_THRM0IRQ	0x4E04
+\#define BXTWC_THRM1IRQ	0x4E05
+\#define BXTWC_THRM2IRQ	0x4E06
@@ -47,10 +47,9 @@
/* Interrupt MASK Registers */
+\#define BXTWC_MIRQLVL1	0x4E0E
+\#define BXTWC_MTHRM0IRQ	0x4E12
+\#define BXTWC_MTHRM1IRQ	0x4E13
+\#define BXTWC_MTHRM2IRQ	0x4E14
@@ -66,9 +65,7 @@
/* Whiskey Cove PMIC share same ACPI ID between different platforms */
+\#define BROXTON_PMIC_WC_HRV4

/* Manage in two IRQ chips since mask registers are not consecutive */
enum bxtwc_irqs {
    /* Level 1 */
    BXTWC_PWRBTN_LVL1_IRQ = 0,
    BXTWC_TMU_LVL1_IRQ,
    BXTWC_THRM_LVL1_IRQ,
@@ -77,9 +74,11 @@
    BXTWC_CHGR_LVL1_IRQ,
    BXTWC_GPIO_LVL1_IRQ,
    BXTWC_CRIT_LVL1_IRQ,
+};

/* Level 2 */
-BXTWC_PWRBTN_IRQ,
+enum bxtwc_irqs_pwrbtn {
+    BXTWC_PWRBTN_IRQ = 0,
+    BXTWC_UIBTN_IRQ,
    
    enum bxtwc_irqs_bcu {
    @@ -113,7 +112,10 @@
        REGMAP_IRQ_REG(BXTWC_CHGR_LVL1_IRQ, 0, BIT(5)),
        REGMAP_IRQ_REG(BXTWC_GPIO_LVL1_IRQ, 0, BIT(6)),
        REGMAP_IRQ_REG(BXTWC_CRIT_LVL1_IRQ, 0, BIT(7)),
@@ -126,9 +124,11 @@
        BXTWC_PWRBTN_IRQ, 1, 0x03),
    +};
+}
+static const struct regmap_irq bxtwc_regmap_irqs_pwrbtn[] = {
+  REGMAP_IRQ_REG(BXTWC_PWRBTN_IRQ, 0, 0x01),
};

static const struct regmap_irq bxtwc_regmap_irqs_bcu[] = {
  @ @ -125,7 +127,7 @ @
};

static const struct regmap_irq bxtwc_regmap_irqs_chgr[] = {
  -REGMAP_IRQ_REG(BXTWC_USBC_IRQ, 0, BIT(5)),
  +REGMAP_IRQ_REG(BXTWC_USBC_IRQ, 0, 0x20),
  REGMAP_IRQ_REG(BXTWC_CHGR0_IRQ, 0, 0x1f),
  REGMAP_IRQ_REG(BXTWC_CHGR1_IRQ, 1, 0x1f),
};
@@ -144,7 +146,16 @@
   .num_irqs = ARRAY_SIZE(bxtwc_regmap_irqs),
   .num_regs = 2,
   +num_regs = 1,
   +};
+static struct regmap_irq_chip bxtwc_regmap_irq_chip_pwrbtn = {
+  .name = "bxtwc_irq_chip_pwrbtn",
+  .status_base = BXTWC_PWRBTNIRQ,
+  .mask_base = BXTWC_MIRQLVL1,
+  .irqs = bxtwc_regmap_irqs,
+  .num_irqs = ARRAY_SIZE(bxtwc_regmap_irqs),
+  +num_regs = 1,
+  +};
+
+static struct regmap_irq_chip bxtwc_regmap_irq_chip_tmu = {
@@ -472,6 +483,16 @@
   return ret;
 }

+ret = bxtwc_add_chained_irq_chip(pmic, pmic->irq_chip_data,
+  BXTWC_PWRBTN_LVL1_IRQ,
+  IRQF_ONESHOT,
+  &bxtwc_regmap_irq_chip_pwrbtn,
+  &pmic->irq_chip_data_pwrbtn);
+if (ret) {
+  dev_err(&pdev->dev, "Failed to add PWRBTN IRQ chip\n");
+  return ret;
+}
+
+ret = bxtwc_add_chained_irq_chip(pmic, pmic->irq_chip_data,
  BXTWC_TMU_LVL1_IRQ,
 IRQF_ONESHOT,
--- linux-4.15.0.orig/drivers/mfd/max8997.c
+++ linux-4.15.0/drivers/mfd/max8997.c
@@ -155,12 +155,6 @@
pd->ono = irq_of_parse_and_map(dev->of_node, 1);

-/*
- * ToDo: the 'wakeup' member in the platform data is more of a linux
- * specific information. Hence, there is no binding for that yet and
- * not parsed here.
- */
- return pd;

return pd;

@@ -248,7 +242,7 @@
*/
/* MAX8997 has a power button input. */
-device_init_wakeup(max8997->dev, pdata->wakeup);
+device_init_wakeup(max8997->dev, true);

return ret;

--- linux-4.15.0.orig/drivers/mfd/mc13xxx-core.c
+++ linux-4.15.0/drivers/mfd/mc13xxx-core.c
@@ -274,9 +274,12 @@
mc13xxx->adcflags |= MC13XXX_ADC_WORKING;

-mc13xxx_reg_read(mc13xxx, MC13XXX_ADC0, &old_adc0);
+ret = mc13xxx_reg_read(mc13xxx, MC13XXX_ADC0, &old_adc0);
+if (ret)
+    goto out;
adc0 = MC13XXX_ADC0_ADINC1 | MC13XXX_ADC0_ADINC2 | MC13XXX_ADC0_CHRGRAWDIV;
adc1 = MC13XXX_ADC1_ADEN | MC13XXX_ADC1_ADTRIGIGN | MC13XXX_ADC1_ASC;

if (channel > 7)
--- linux-4.15.0.orig/drivers/mfd/menelaus.c
+++ linux-4.15.0/drivers/mfd/menelaus.c
@@ -1094,6 +1094,7 @@
static inline void menelaus_rtc_init(struct menelaus_chip *m)
{
    intalarm = (m->client->irq > 0);
if (!(menelaus_read_reg(MENELAUS_OSC_CTRL) & 0x80)) {
    return;
}

m->rtc = devm_rtc_allocate_device(&m->client->dev);
if (IS_ERR(m->rtc))
    return;

m->rtc->ops = &menelaus_rtc_ops;
/* support RTC alarm; it can issue wakeups */
if (alarm) {
    if (menelaus_add_irq_work(MENELAUS_RTCALM_IRQ,
            &m->client->dev, 0);
        --linux-4.15.0.orig/drivers/mfd/mfd-core.c
        +++ linux-4.15.0/drivers/mfd/mfd-core.c
        @ @ -32,6 +32,11 @@
        const struct mfd_cell *cell = mfd_get_cell(pdev);
    int err = 0;

    if (!cell->enable) {
        dev_dbg(&pdev->dev, "No .enable() call-back registered\n");
        return 0;
    }

    /* only call enable hook if the cell wasn't previously enabled */
    if (atomic_inc_return(cell->usage_count) == 1)
        err = cell->enable(pdev);
            @ @ -49,6 +54,11 @@
        const struct mfd_cell *cell = mfd_get_cell(pdev);
        int err = 0;
+if (!cell->disable) {
+dev_dbg(&pdev->dev, "No .disable() call-back registered\n");
+return 0;
+}
+
/* only disable if no other clients are using it */
if (atomic_dec_return(cell->usage_count) == 0)
err = cell->disable(pdev);
@@ -179,6 +189,7 @@
  for_each_child_of_node(parent->of_node, np) {
    if (of_device_is_compatible(np, cell->of_compatible)) {
      pdev->dev.of_node = np;
+      pdev->dev.fwnode = &np->fwnode;
      break;
    }
  }
--- linux-4.15.0.orig/drivers/mfd/mt6397-core.c
+++ linux-4.15.0/drivers/mfd/mt6397-core.c
@@ -309,8 +309,7 @@
default:
  dev_err(&pdev->dev, "unsupported chip: \%d\n", id);
  ret = -ENODEV;
  -break;
+  return -ENODEV;
}

if (ret) {
--- linux-4.15.0.orig/drivers/mfd/omap-usb-host.c
+++ linux-4.15.0/drivers/mfd/omap-usb-host.c
@@ -548,8 +548,8 @@
}
static const struct of_device_id usbhs_child_match_table[] = {
  -{ .compatible = "ti,omap-ehci", },
  -{ .compatible = "ti,omap-ohci", },
  +{ .compatible = "ti,ehci-omap", },
  +{ .compatible = "ti,ohci-omap3", },
  }
};
@@ -875,6 +875,7 @@
  .pm= &usbhsomap_dev_pm_ops,
  .of_match_table = usbhs_omap_dt_ids,
  },
+  .probe= usbhs_omap_probe,
+  .remove= usbhs_omap_remove,
  };
MODULE_LICENSE("GPL v2");
MODULE_DESCRIPTION("usb host common core driver for omap EHCI and OHCI");

/**
 * @init omap_usbhs_drvinit(void)
 */
static int __init omap_usbhs_drvinit(void)
{
    return platform_driver_register(&usbhs_omap_driver);
}

/*
 * @exit omap_usbhs_drvexit(void)
 */
static void __exit omap_usbhs_drvexit(void)
{
    platform_driver_unregister(&usbhs_omap_driver);
}

--- linux-4.15.0.orig/drivers/mfd/palmas.c
+++ linux-4.15.0/drivers/mfd/palmas.c
@@ -430,6 +430,7 @@
 {unsigned int addr;
 int ret, slave;
 +u8 powerhold_mask;
 struct device_node *np = palmas_dev->dev->of_node;

 if ((of_property_read_bool(np, "ti,palmas-override-powerhold"))
 @@ -437,8 +438,15 @@
 PALMAS_PRIMARY_SECONDARY_PAD2);
 slave = PALMAS_BASE_TO_SLAVE(PALMAS_PU_PD_OD_BASE);

 +if (of_device_is_compatible(np, "ti,tps65917"))
 +powerhold_mask =
 +TPS65917_PRIMARY_SECONDARY_PAD2_GPIO_5_MASK;
 +else
 +powerhold_mask =
 +PALMAS_PRIMARY_SECONDARY_PAD2_GPIO_7_MASK;
 +ret = regmap_update_bits(palmas_dev->regmap[slave], addr,
 -PALMAS_PRIMARY_SECONDARY_PAD2_GPIO_7_MASK, 0);
 +powerhold_mask, 0);
 if (ret)
 dev_err(palmas_dev->dev,
"Unable to write PRIMARY_SECONDARY_PAD2 %d
",
--- linux-4.15.0.orig/drivers/mfd/qcom_rpm.c
+++ linux-4.15.0/drivers/mfd/qcom_rpm.c
@@ -638,6 +638,10 @@
     return -EFAULT;
 }

+writel(fw_version[0], RPM_CTRL_REG(rpm, 0));
+writel(fw_version[1], RPM_CTRL_REG(rpm, 1));
+writel(fw_version[2], RPM_CTRL_REG(rpm, 2));
+
+dev_info(&pdev->dev, "RPM firmware %u.%u.%u\n", fw_version[0],
          fw_version[1],
          fw_version[2]);
--- linux-4.15.0.orig/drivers/mfd/rn5t618.c
+++ linux-4.15.0/drivers/mfd/rn5t618.c
@@ -32,6 +32,7 @@
     case RN5T618_WATCHDOGCNT:
     case RN5T618_DCIRQ:
     case RN5T618_ILIMDATAH ... RN5T618_AIN0DATAL:
+    case RN5T618_ADCCNT3:
     case RN5T618_IR_ADC1 ... RN5T618_IR_ADC3:
     case RN5T618_IR_GPR:
     case RN5T618_IR_GPF:
--- linux-4.15.0.orig/drivers/mfd/sm501.c
+++ linux-4.15.0/drivers/mfd/sm501.c
@@ -715,6 +715,7 @@
         smdev->pdev.name = name;
         smdev->pdev.id = sm->pdev_id;
         smdev->pdev.dev.parent = sm->dev;
+        smdev->pdev.dev.coherent_dma_mask = 0xffffffff;

        if (res_count) {
            smdev->pdev.resource = (struct resource *)(smdev+1);
@@ -1144,6 +1145,9 @@
         lookup = devm_kzalloc(&pdev->dev,
             sizeof(*lookup) + 3 * sizeof(struct gpiod_lookup),
             GFP_KERNEL);
+        if (!lookup)
+            return -ENOMEM;
+        lookup->dev_id = "i2c-gpio";
     }
     if (iic->pin_sda < 32)
         lookup->table[0].chip_label = "SM501-LOW";
@@ -1429,8 +1433,14 @@
             goto err_claim;
         }

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-return sm501_init_dev(sm);
+ret = sm501_init_dev(sm);
+if (ret)
+goto err_unmap;
+
+return 0;
+
+err_unmap:
+iounmap(sm->regs);
+err_claim:
+release_resource(sm->regs_claim);
+kfree(sm->regs_claim);
--- linux-4.15.0.orig/drivers/mfd/sprd-sc27xx-spi.c
+++ linux-4.15.0/drivers/mfd/sprd-sc27xx-spi.c
@@ -208,7 +208,7 @@
 }
 ret = devm_regmap_add_irq_chip(&spi->dev, ddata->regmap, ddata->irq,
 - IRQF_ONESHOT | IRQF_NO_SUSPEND, 0,
+ IRQF_ONESHOT, 0,
       &ddata->irq_chip, &ddata->irq_data);
 if (ret) {
 dev_err(&spi->dev, "Failed to add PMIC irq chip \%d\n", ret);
@@ -224,9 +224,34 @@
 return ret;
 }

+device_init_wakeup(&spi->dev, true);
 return 0;
 }

+&ifdef CONFIG_PM_SLEEP
+static int sprd_pmic_suspend(struct device *dev)
+{
+struct sprd_pmic *ddata = dev_get_drvdata(dev);
+    +if (device_may_wakeup(dev))
+enable_irq_wake(ddata->irq);
+    +return 0;
+}
+
+static int sprd_pmic_resume(struct device *dev)
+{
+struct sprd_pmic *ddata = dev_get_drvdata(dev);
+    +if (device_may_wakeup(dev))
+disable_irq_wake(ddata->irq);
static void stm32_timers_get_arr_size(struct stm32_timers *ddata) {
  +u32 arr;

  /* Backup ARR to restore it after getting the maximum value */
  +regmap_read(ddata->regmap, TIM_ARR, &arr);

  /*
   * Only the available bits will be written so when readback
   * we get the maximum value of auto reload register
   */
  regmap_write(ddata->regmap, TIM_ARR, ~0L);
  regmap_read(ddata->regmap, TIM_ARR, &ddata->max_arr);
  -regmap_write(ddata->regmap, TIM_ARR, 0x0);
  +regmap_write(ddata->regmap, TIM_ARR, arr);
}

static int stm32_timers_probe(struct platform_device *pdev) {
  --- linux-4.15.0.orig/drivers/mfd/stmpe-i2c.c
  +++ linux-4.15.0/drivers/mfd/stmpe-i2c.c
  @ @ -109,7 +109,7 @@
  } {
    "stmpe2403", STMPE2403 },
  } }
};

-MODULE_DEVICE_TABLE(i2c, stmpe_id);
+MODULE_DEVICE_TABLE(i2c, stmpe_i2c_id);
static struct i2c_driver stmpe_i2c_driver = {
    .driver = {
        --- linux-4.15.0.orig/drivers/mfd/stmpe.c
        +++ linux-4.15.0/drivers/mfd/stmpe.c
        @@ -1035,7 +1035,7 @@
            if (variant->id_val == STMPE801_ID ||
                variant->id_val == STMPE1600_ID) {
                int base = irq_create_mapping(stmpe->domain, 0);
            +int base = irq_find_mapping(stmpe->domain, 0);

            handle_nested_irq(base);
            return IRQ_HANDLED;
            @@ -1063,7 +1063,7 @@
                while (status) {
                    int bit = __ffs(status);
                    int line = bank * 8 + bit;
                -int nestedirq = irq_create_mapping(stmpe->domain, line);
                +int nestedirq = irq_find_mapping(stmpe->domain, line);

                handle_nested_irq(nestedirq);
                status &= ~(1 << bit);
        --- linux-4.15.0.orig/drivers/mfd/tc3589x.c
        +++ linux-4.15.0/drivers/mfd/tc3589x.c
        @@ -187,7 +187,7 @@
                while (status) {
                    int bit = __ffs(status);
                -int virq = irq_create_mapping(tc3589x->domain, bit);
                +int virq = irq_find_mapping(tc3589x->domain, bit);

                handle_nested_irq(virq);
                status &= ~(1 << bit);
        --- linux-4.15.0.orig/drivers/mfd/ti_am335x_tscadc.c
        +++ linux-4.15.0/drivers/mfd/ti_am335x_tscadc.c
        @@ -210,14 +210,13 @@
 * The TSC_ADC_SS controller design assumes the OCP clock is
 * at least 6x faster than the ADC clock.
 */
 -clk = clk_get(&pdev->dev, "adc_tsc_fck");
 +clk = devm_clk_get(&pdev->dev, "adc_tsc_fck");
 if (IS_ERR(clk)) {
     dev_err(&pdev->dev, "failed to get TSC fck\n");
     err = PTR_ERR(clk);
     goto err_disable_clk;
 }
 clock_rate = clk_get_rate(clk);
-clk_put(clk);
tscadc->clk_div = clock_rate / ADC_CLK;

/* TSCADC_CLKDIV needs to be configured to the value minus 1 */
@@ -266,8 +265,9 @@
cell->pdata_size = sizeof(tscadc);
}

-err = mfd_add_devices(&pdev->dev, pdev->id, tscadc->cells,
-tscadc->used_cells, NULL, 0, NULL);
+err = mfd_add_devices(&pdev->dev, PLATFORM_DEVID_AUTO,
+  tscadc->cells, tscadc->used_cells, NULL,
+  0, NULL);
if (err < 0)
goto err_disable_clk;

@@ -296,11 +296,24 @@
return 0;
}

+static int __maybe_unused ti_tscadc_can_wakeup(struct device *dev, void *data)
+{
+  return device_may_wakeup(dev);
+}
+
static int __maybe_unused tscadc_suspend(struct device *dev)
{
  struct ti_tscadc_dev *tscadc = dev_get_drvdata(dev);
  regmap_write(tscadc->regmap, REG_SE, 0x00);
  if (device_for_each_child(dev, NULL, ti_tscadc_can_wakeup)) {
    u32 ctrl;
    +regmap_read(tscadc->regmap, REG_CTRL, &ctrl);
    +ctrl &= ~(CNTRLREG_POWERDOWN);
    +ctrl |= CNTRLREG_TSCSSENB;
    +regmap_write(tscadc->regmap, REG_CTRL, ctrl);
  }
  pm_runtime_put_sync(dev);
  return 0;
--- linux-4.15.0.orig/drivers/mfd/tps65218.c
+++ linux-4.15.0/drivers/mfd/tps65218.c
@@ -235,9 +235,9 @@
mutex_init(&tps->tps_lock);

-ret = regmap_add_irq_chip(tps->regmap, tps->irq,
```c
ret = devm_regmap_add_irq_chip(&client->dev, tps->regmap, tps->irq,
       IRQF_ONESHOT, 0, &tps65218_irq_chip,
       &tps->irq_data);
if (ret < 0)
    return ret;

ARRAY_SIZE(tps65218_cells), NULL, 0,
    regmap_irq_get_domain(tps->irq_data));

-if (ret < 0)
    goto err_irq;
-
    return 0;
-
    err_irq:
    regmap_del_irq_chip(tps->irq, tps->irq_data);
    return ret;
}

static int tps65218_remove(struct i2c_client *client)
-
-{ struct tps65218 *tps = i2c_get_clientdata(client);
    -
    regmap_del_irq_chip(tps->irq, tps->irq_data);
    -
    return 0;
}
-
static const struct i2c_device_id tps65218_id_table[] = {
    /*tps65218", TPS65218 },
    [...] ,of_match_table = of_tps65218_match_table, 
    .probe= tps65218_probe,
    .remove= tps65218_remove,
    .id_table = tps65218_id_table,
};
```

--- linux-4.15.0.orig/drivers/mfd/tps6586x.c

+++ linux-4.15.0/drivers/mfd/tps6586x.c

@@ -285,7 +268,6 @@
    .of_match_table = of_tps65218_match_table, 
    .probe= tps65218_probe,
    .remove= tps65218_remove,
    .id_table = tps65218_id_table,
};

return 0;
```
+static int __maybe_unused tps6586x_i2c_suspend(struct device *dev)  
+
+struct tps6586x *tps6586x = dev_get_drvdata(dev);  
+
+if (tps6586x->client->irq)  
+disable_irq(tps6586x->client->irq);  
+
+return 0;  
+
+
+static int __maybe_unused tps6586x_i2c_resume(struct device *dev)  
+
+struct tps6586x *tps6586x = dev_get_drvdata(dev);  
+
+if (tps6586x->client->irq)  
+enable_irq(tps6586x->client->irq);  
+
+return 0;  
+
+
+static SIMPLE_DEV_PM_OPS(tps6586x_pm_ops, tps6586x_i2c_suspend,  
+tps6586x_i2c_resume);  
+
+static const struct i2c_device_id tps6586x_id_table[] = {  
+  "tps6586x", 0 },  
+};  
+
+MODULE_DEVICE_TABLE(of, tps65912_spi_of_match_table);  
+
+static int tps65912_spi_probe(struct spi_device *spi)  
+{  
+  --- linux-4.15.0.org/drivers/mfd/tps65912-spi.c  
+  +++ linux-4.15.0/drivers/mfd/tps65912-spi.c  
+  @@ -27,6 +27,7 @@  
+  
+  };  
+  +MODULE_DEVICE_TABLE(of, tps65912_spi_of_match_table);  
+
+static int tps65912_spi_probe(struct spi_device *spi)  
+{  
+  --- linux-4.15.0.org/drivers/mfd/twl-core.c  
+  +++ linux-4.15.0/drivers/mfd/twl-core.c  
+  @@ -979,7 +979,7 @@
* letting it generate the right frequencies for USB, MADC, and
* other purposes.
*/

static inline int __init protect_pm_master(void)
{int e = 0;

@@ -988,7 +988,7 @@
    return e;
 }

static inline int __init unprotect_pm_master(void)
{int e = 0;

@@ -1177,7 +1177,7 @@
    twl_priv->ready = true;

    /* setup clock framework */
    -clocks_init(&pdev->dev, pdata ? pdata->clock : NULL);
    +clocks_init(&client->dev, pdata ? pdata->clock : NULL);

    /* read TWL IDCODE Register */
    if (twl_class_is_4030()) {
        @@ -1244,6 +1244,28 @@
            return status;
        }

    +static int __maybe_unused twl_suspend(struct device *dev)
    +{
        +struct i2c_client *client = to_i2c_client(dev);
        +
        +if (client->irq)
        +disable_irq(client->irq);
        +
        +return 0;
        +}
        +
        +static int __maybe_unused twl_resume(struct device *dev)
        +{
            +struct i2c_client *client = to_i2c_client(dev);
                +
                +if (client->irq)
                +enable_irq(client->irq);
                +
                +return 0;
                +}
static const struct i2c_device_id twl_ids[] = {
    { "twl4030", TWL4030_VAUX2 }, /* "Triton 2" */
    { "twl5030", 0 }, /* T2 updated */
    @ @ -1261,6 +1283,7 @ @
/* One Client Driver, 4 Clients */
static struct i2c_driver twl_driver = {
    .driver.name = DRIVER_NAME,
    .driver.pm = &twl_dev_pm_ops,
    .id_table = twl_ids,
    .probe = twl_probe,
    .remove = twl_remove,
    --- linux-4.15.0.orig/drivers/mfd/twl6040.c
    +++ linux-4.15.0/drivers/mfd/twl6040.c
    @ @ -322,8 +322,19 @ @
}

/* Register access can produce errors after power-up unless we */
/* wait at least 8ms based on measurements on duovero. */
/* */
+usleep_range(10000, 12000);
+
/* Sync with the HW */
-regcache_sync(twl6040->regmap);
+ret = regcache_sync(twl6040->regmap);
+if (ret) {
    +dev_err(twl6040->dev, "Failed to sync with the HW: %i
",
        +ret);
    +goto out;
    +}

/* Default PLL configuration after power up */
twl6040->pll = TWL6040_SYSCLK_SEL_LPPLL;
--- linux-4.15.0.orig/drivers/mfd/wm5110-tables.c
+++ linux-4.15.0/drivers/mfd/wm5110-tables.c
@@ -1618,6 +1618,7 @@
    { 0x00000EE3, 0x4000 },    /* R3811  - ASRC_RATE2 */
    { 0x00000EE2, 0x0000 },    /* R3810  - ASRC_RATE1 */
    +{ 0x00000EE3, 0x4000 },    /* R3811  - ASRC_RATE2 */
    { 0x00000EEF0, 0x0000 },   /* R3824  - ISRC 1 CTRL 1 */
    { 0x00000EEF1, 0x0000 },   /* R3825  - ISRC 1 CTRL 2 */
    { 0x00000EEF2, 0x0000 },   /* R3826  - ISRC 1 CTRL 3 */
case ARIZONA_ASRC_ENABLE:
case ARIZONA_ASRC_STATUS:
case ARIZONA_ASRC_RATE1:
+case ARIZONA_ASRC_RATE2:
case ARIZONA_ISRC_1_CTRL_1:
case ARIZONA_ISRC_1_CTRL_2:
case ARIZONA_ISRC_1_CTRL_3:
--- linux-4.15.0.orig/drivers/mfd/wm831x-auxadc.c
+++ linux-4.15.0/drivers/mfd/wm831x-auxadc.c
@@ -98,11 +98,10 @@
        wait_for_completion_timeout(&req->done, msecs_to_jiffies(500));

        mutex_lock(&wm831x->auxadc_lock);
-        list_del(&req->list);

        ret = req->val;

        out:
+        list_del(&req->list);
        mutex_unlock(&wm831x->auxadc_lock);

        kfree(req);
--- linux-4.15.0.orig/drivers/mfd/wm8994-core.c
+++ linux-4.15.0/drivers/mfd/wm8994-core.c
@@ -696,3 +696,4 @@
 MODULE_DESCRIPTION("Core support for the WM8994 audio CODEC");
 MODULE_LICENSE("GPL");
 MODULE_AUTHOR("Mark Brown <broonie@opensource.wolfsonmicro.com>");
+MODULE_SOFTDEP("pre: wm8994_regulator");
--- linux-4.15.0.orig/drivers/mfd/wm8994-irq.c
+++ linux-4.15.0/drivers/mfd/wm8994-irq.c
@@ -159,7 +159,7 @@
        return IRQ_HANDLED;
    }
--- linux-4.15.0.orig/drivers/misc/Kconfig
+++ linux-4.15.0/drivers/misc/Kconfig
@@ -496,6 +496,10 @@
        Enable this configuration option to enable the host side test driver
        for PCI Endpoint.

        +config MISC_RTSX
+tristate
+default MISC_RTSX_PCI || MISC_RTSX_USB
+
source "drivers/misc/c2port/Kconfig"
source "drivers/misc/eeprom/Kconfig"
source "drivers/misc/cb710/Kconfig"
@@ -508,4 +512,6 @@
source "drivers/misc/genwqe/Kconfig"
source "drivers/misc/echo/Kconfig"
source "drivers/misc/cxl/Kconfig"
+source "drivers/misc/ocxl/Kconfig"
+source "drivers/misc/cardreader/Kconfig"
endmenu
--- linux-4.15.0.orig/drivers/misc/Makefile
+++ linux-4.15.0/drivers/misc/Makefile
@@ -55,6 +55,8 @@
obj-$(CONFIG_ASPEED_LPC_CTRL)+= aspeed-lpc-ctrl.o
obj-$(CONFIG_ASPEED_LPC_SNOOP)+= aspeed-lpc-snoop.o
obj-$(CONFIG_PCI_ENDPOINT_TEST)+= pci_endpoint_test.o
+obj-$(CONFIG_OCXL)+= ocxl/
+obj-$(CONFIG_MISC_RTSX)+= cardreader/

lkdtm-$(CONFIG_LKDTM)+= lkdtm_core.o
lkdtm-$(CONFIG_LKDTM)+= lkdtm_bugs.o
@@ -68,8 +70,7 @@
OBJCOPYFLAGS :=
OBJCOPYFLAGS_lkdtm_rodata_objcopy.o := 
---set-section-flags .text=alloc,readonly 
---rename-section .text=.rodata 
+--rename-section .text=.rodata,alloc,readonly,load
targets += lkdtm_rodata.o lkdtm_rodata_objcopy.o
$(obj)/lkdtm_rodata_objcopy.o: $(obj)/lkdtm_rodata.o FORCE
$(call if_changed,objcopy)
--- linux-4.15.0.orig/drivers/misc/altera-stapl/altera.c
+++ linux-4.15.0/drivers/misc/altera-stapl/altera.c
@@ -2126,8 +2126,7 @@

-static int altera_get_note(u8 *p, s32 program_size,
-    s32 *offset, char *key, char *value, int length)
+static int altera_get_note(u8 *p, s32 program_size, s32 *offset,
+    char *key, char *value, int keylen, int vallen)
 */
 * Gets key and value of NOTE fields in the JBC file.
 * Can be called in two modes: if offset pointer is NULL,
key_ptr = &p[note_strings +
get_unaligned_be32(
&p[note_table + (8 * i)]);
-if ((strncasecmp(key, key_ptr, strlen(key_ptr)) == 0) &&
-(key != NULL)) {
+if (key && !strncasecmp(key, key_ptr, strlen(key_ptr))) {
    status = 0;

value_ptr = &p[note_strings +
@@ -2185,7 +2184,7 @@
    &p[note_table + (8 * i) + 4]);

if (value != NULL)
-strlcpy(value, value_ptr, length);
+strlcpy(value, value_ptr, vallen);

} } {
@@ -2204,13 +2203,13 @@
    strlcpy(key, &p[note_strings +
        get_unaligned_be32(
            &p[note_table + (8 * i)]],
-        -length); +keylen);
+        +length); +vallen);

*offset = i + 1;
}
@@ -2464,7 +2463,7 @@
    __func__, (format_version == 2) ? "Jam STAPL" :
        "pre-standardized Jam 1.1");
    while (altera_get_note((u8 *)fw->data, fw->size,
-            -&offset, key, value, 256) == 0)
+            +&offset, key, value, 32, 256) == 0)
        printk(KERN_INFO "%s: NOTE "%s" = "%s"
            __func__, key, value);
    }
--- linux-4.15.0.orig/drivers/misc/aspeed-lpc-ctrl.c
+++ linux-4.15.0/drivers/misc/aspeed-lpc-ctrl.c
@@ -44,7 -44,7 
    unsigned long vsize = vma->vm_end - vma->vm_start;
    pgprot_t prot = vma->vm_page_prot;
if (vma->vm_pgoff + vma_pages(vma) > lpc_ctrl->mem_size >> PAGE_SHIFT)
return -EINVAL;

/* ast2400/2500 AHB accesses are not cache coherent */
--- linux-4.15.0.orig/drivers/misc/atmel-ssc.c
+++ linux-4.15.0/drivers/misc/atmel-ssc.c
@@ -13,7 +13,7 @@
#include <linux/clk.h>
#include <linux/err.h>
#include <linux/io.h>
-#include <linux/spinlock.h>
+#include <linux/mutex.h>
#include <linux/atmel-ssc.h>
#include <linux/slab.h>
#include <linux/module.h>
@ @ -23,7 +23,7 @@
#include "./../sound/soc/atmel/atmel_ssc_dai.h"

/* Serialize access to ssc_list and user count */
static DEFINE_SPINLOCK(user_lock);
+static DEFINE_MUTEX(user_lock);
static LIST_HEAD(ssc_list);

struct ssc_device *ssc_request(unsigned int ssc_num)
@@ @ -31,7 +31,7 @@
in ssc_valid = 0;
struct ssc_device *ssc;

-spin_lock(&user_lock);
+mutex_lock(&user_lock);
list_for_each_entry(ssc, &ssc_list, list) {
if (ssc->pdev->dev.of_node) {
if (of_alias_get_id(ssc->pdev->dev.of_node, "ssc")
@ @ -47,18 +47,18 @@
}

if (!ssc_valid) {
-spin_unlock(&user_lock);
+mutex_unlock(&user_lock);
pr_err("ssc: ssc%d platform device is missing\n", ssc_num);
return ERR_PTR(-ENODEV);
}

if (ssc->user) {
-spin_unlock(&user_lock);
+mutex_unlock(&user_lock);

dev_dbg(&ssc->pdev->dev, "module busy\n");
return ERR_PTR(-EBUSY);
}
ssc->user++;
-spin_unlock(&user_lock);
+mutex_unlock(&user_lock);

clk_prepare(ssc->clk);

@@ -70,14 +70,14 @@
{
 bool disable_clk = true;

 -spin_lock(&user_lock);
 +mutex_lock(&user_lock);
 if (ssc->user)
 ssc->user--;
 else {
 disable_clk = false;
 dev_dbg(&ssc->pdev->dev, "device already free\n");
 }
 -spin_unlock(&user_lock);
 +mutex_unlock(&user_lock);

 if (disable_clk)
 clk_unprepare(ssc->clk);
 @@ -132,7 +132,7 @@
 MODULE_DEVICE_TABLE(of, atmel_ssc_dt_ids);
 #endif

 -static inline const struct atmel_ssc_platform_data * __init
 +static inline const struct atmel_ssc_platform_data *
 atmel_ssc_get_driver_data(struct platform_device *pdev)
 {
 if (pdev->dev.of_node) {
 @@ -240,9 +240,9 @@
 return -ENXIO;
 }

 -spin_lock(&user_lock);
 +mutex_lock(&user_lock);
 list_add_tail(&ssc->list, &ssc_list);
 -spin_unlock(&user_lock);
 +mutex_unlock(&user_lock);

 platform_set_drvdata(pdev, ssc);

 @@ -261,9 +261,9 @@
ssc_sound_dai_remove(ssc);

-spin_lock(&user_lock);
+mutex_lock(&user_lock);
list_del(&ssc->list);
-spin_unlock(&user_lock);
+mutex_unlock(&user_lock);
return 0;
}
--- linux-4.15.0.orig/drivers/misc/cardreader/Kconfig
+++ linux-4.15.0/drivers/misc/cardreader/Kconfig
@@ -0,0 +1,20 @@
+config MISC_RTSX_PCI
+tristate "Realtek PCI-E card reader"
+depends on PCI
+select MFD_CORE
+help
+ This supports for Realtek PCI-Express card reader including rts5209,
+ rts5227, rts522A, rts5229, rts5249, rts524A, rts525A, rtl8411, rts5260.
+ Realtek card readers support access to many types of memory cards,
+ such as Memory Stick, Memory Stick Pro, Secure Digital and
+ MultiMediaCard.
+
+config MISC_RTSX_USB
+tristate "Realtek USB card reader"
+depends on USB
+select MFD_CORE
+help
+ Select this option to get support for Realtek USB 2.0 card readers
+ including RTS5129, RTS5139, RTS5179 and RTS5170.
+ Realtek card reader supports access to many types of memory cards,
+ such as Memory Stick Pro, Secure Digital and MultiMediaCard.
--- linux-4.15.0.orig/drivers/misc/cardreader/Makefile
+++ linux-4.15.0/drivers/misc/cardreader/Makefile
@@ -0,0 +1,4 @@
+rtsx_pci-objs := rtsx_pcr.o rts5209.o rts5229.o rtl8411.o rts5249.o rts5260.o
+
+obj-$(CONFIG_MISC_RTSX_PCI)+= rtsx_pci.o
+obj-$(CONFIG_MISC_RTSX_USB)+= rtsx_usb.o
--- linux-4.15.0.orig/drivers/misc/cardreader/rtl8411.c
+++ linux-4.15.0/drivers/misc/cardreader/rtl8411.c
@@ -0,0 +1,508 @@
+/* Driver for Realtek PCI-Express card reader
+ *
+ * Copyright(c) 2009-2013 Realtek Semiconductor Corp. All rights reserved.
+ */
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#include <linux/module.h>
#include <linux/bitops.h>
#include <linux/delay.h>
#include <linux/rtsx_pci.h>
#include "rtsx_pcr.h"

static u8 rtl8411_get_ic_version(struct rtsx_pcr *pcr)
{
    u8 val;
    rtsx_pci_read_register(pcr, SYS_VER, &val);
    return val & 0x0F;
}

static int rtl8411b_is_qfn48(struct rtsx_pcr *pcr)
{
    u8 val = 0;
    rtsx_pci_read_register(pcr, RTL8411B_PACKAGE_MODE, &val);
    if (val & 0x2)
        return 1;
    else
        return 0;
}

static void rtl8411_fetch_vendor_settings(struct rtsx_pcr *pcr)
{
    u32 reg1 = 0;
}
u8 reg3 = 0;
+rttsx_pci_read_config_dword(pcr, PCR_SETTING_REG1, &reg1);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG1, reg1);
+
+if (!rtsx_vendor_setting_valid(reg1))
+return;
+
+pcr->aspm_en = rtsx_reg_to_aspm(reg1);
+pcr->sd30_drive_sel_1v8 =
+map_sd_drive(rtsx_reg_to_sd30_drive_sel_1v8(reg1));
+pcr->card_drive_sel &= 0x3F;
+pcr->card_drive_sel |= rtsx_reg_to_card_drive_sel(reg1);
+
+rttsx_pci_read_config_byte(pcr, PCR_SETTING_REG3, &reg3);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG3, reg3);
+pcr->sd30_drive_sel_3v3 = rtl8411_reg_to_sd30_drive_sel_3v3(reg3);
+
+static void rtl8411b_fetch_vendor_settings(struct rtsx_pcr *pcr)
+{
+u32 reg = 0;
+
+rttsx_pci_read_config_dword(pcr, PCR_SETTING_REG1, &reg);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG1, reg);
+
+if (!rtsx_vendor_setting_valid(reg))
+return;
+
+pcr->aspm_en = rtsx_reg_to_aspm(reg);
+pcr->sd30_drive_sel_1v8 =
+map_sd_drive(rtsx_reg_to_sd30_drive_sel_1v8(reg));
+pcr->sd30_drive_sel_3v3 =
+map_sd_drive(rtl8411b_reg_to_sd30_drive_sel_3v3(reg));
+
+static int rtl8411_extra_init_hw(struct rtsx_pcr *pcr)
+{
+rttsx_pci_init_cmd(pcr);
+
+rttsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_DRIVE_SEL,
+0xFF, pcr->sd30_drive_sel_3v3);
+rttsx_pci_add_cmd(pcr, WRITE_REG_CMD, CD_PAD_CTL,
+CD_DISABLE_MASK | CD_AUTO_DISABLE, CD_ENABLE);
+
+return rtsx_pci_send_cmd(pcr, 100);
+
+
+
+
+static int rtx8411b_extra_init_hw(struct rtsx_pcr *pcr)
+{
+rtsx_pci_init_cmd(pcr);
+
+if (rtl8411b_is_qfn48(pcr))
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD,
+CARD_PULL_CTL3, 0xFF, 0xF5);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_DRIVE_SEL,
+0xFF, pcr->sd30_drive_sel_3v3);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CD_PAD_CTL,
+CD_DISABLE_MASK | CD_AUTO_DISABLE, CD_ENABLE);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, FUNC_FORCE_CTL,
+0x06, 0x00);
+
+return rtsx_pci_send_cmd(pcr, 100);
+
+
+
+
+static int rtx8411_turn_on_led(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, CARD_GPIO, 0x01, 0x00);
+
+
+static int rtx8411_turn_off_led(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, CARD_GPIO, 0x01, 0x01);
+
+
+static int rtx8411_enable_auto_blink(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, CARD_AUTO_BLINK, 0xFF, 0x0D);
+
+
+static int rtx8411_disable_auto_blink(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, CARD_AUTO_BLINK, 0x08, 0x00);
+
+
+static int rtx8411_card_power_on(struct rtsx_pcr *pcr, int card)
+{
+int err;
+
+rtsx_pci_init_cmd(pcr);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL,
+BPP_POWER_MASK, BPP_POWER_5_PERCENT_ON);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LDO_CTL,
+BPP_LDO_POWB, BPP_LDO_SUSPEND);
+err = rtsx_pci_send_cmd(pcr, 100);
+if (err < 0)
+return err;
+
+/* To avoid too large in-rush current */
+udelay(150);
+
+err = rtsx_pci_write_register(pcr, CARD_PWR_CTL,
+BPP_POWER_MASK, BPP_POWER_10_PERCENT_ON);
+if (err < 0)
+return err;
+
+udelay(150);
+
+err = rtsx_pci_write_register(pcr, CARD_PWR_CTL,
+BPP_POWER_MASK, BPP_POWER_15_PERCENT_ON);
+if (err < 0)
+return err;
+
+udelay(150);
+
+err = rtsx_pci_write_register(pcr, LDO_CTL,
+BPP_LDO_POWB, BPP_LDO_ON);
+
+static int rtl8411_card_power_off(struct rtsx_pcr *pcr, int card)
+{
+int err;
+
+err = rtsx_pci_write_register(pcr, CARD_PWR_CTL,
+BPP_POWER_MASK, BPP_POWER_OFF);
+if (err < 0)
+return err;
+
+return rtsx_pci_write_register(pcr, LDO_CTL, BPP_LDO_POWB, BPP_LDO_ON);
+
+}
+
+static int rtl8411_do_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage,
+int bpp_tuned18_shift, int bpp_asic_1v8)
+{
+u8 mask, val;
+int err;
+
+mask = (BPP_REG_TUNED18 << bpp_tuned18_shift) | BPP_PAD_MASK;
+if (voltage == OUTPUT_3V3) {
+err = rtsx_pci_write_register(pcr,
+SD30_DRIVE_SEL, 0x07, pcr->sd30_drive_sel_3v3);
+if (err < 0)
+return err;
+val = (BPP_ASIC_3V3 << bpp_tuned18_shift) | BPP_PAD_3V3;
+} else if (voltage == OUTPUT_1V8) {
+err = rtsx_pci_write_register(pcr,
+SD30_DRIVE_SEL, 0x07, pcr->sd30_drive_sel_1v8);
+if (err < 0)
+return err;
+val = (bpp_asic_1v8 << bpp_tuned18_shift) | BPP_PAD_1V8;
+} else {
+return -EINVAL;
+}
+
+return rtsx_pci_write_register(pcr, LDO_CTL, mask, val);
+}
+
+static int rtl8411_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
+{
+return rtl8411_do_switch_output_voltage(pcr, voltage,
+BPP_TUNED18_SHIFT_8411, BPP_ASIC_1V8);
+}
+
+static int rtl8402_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
+{
+return rtl8411_do_switch_output_voltage(pcr, voltage,
+BPP_TUNED18_SHIFT_8402, BPP_ASIC_2V0);
+}
+
+static unsigned int rtl8411_cd_deglitch(struct rtsx_pcr *pcr)
+{
+unsigned int card_exist;
+
card_exist = rtsx_pci_readl(pcr, RTSX_BIPR);
+card_exist &= CARD_EXIST;
+if (!card_exist) {
+/* Enable card CD */
+rtsx_pci_write_register(pcr, CD_PAD_CTL,
+CD_DISABLE_MASK, CD_ENABLE);
+/* Enable card interrupt */
+rtsx_pci_write_register(pcr, EFUSE_CONTENT, 0xe0, 0x00);
+return 0;
if (hweight32(card_exist) > 1) {
    rtsx_pci_write_register(pcr, CARD_PWR_CTL,
        BPP_POWER_MASK, BPP_POWER_5_PERCENT_ON);
    msleep(100);
    if (hweight32(card_exist) > 1) {
        rtsx_pci_write_register(pcr, CARD_PWR_CTL,
            BPP_POWER_MASK, BPP_POWER_5_PERCENT_ON);
        msleep(100);
        card_exist = rtsx_pci_readl(pcr, RTSX_BIPR);
        if (card_exist & MS_EXIST)
            card_exist = MS_EXIST;
        else if (card_exist & SD_EXIST)
            card_exist = SD_EXIST;
        else
            card_exist = 0;
        rtsx_pci_write_register(pcr, CARD_PWR_CTL,
            BPP_POWER_MASK, BPP_POWER_OFF);
        pcr_dbg(pcr, "After CD deglitch, card_exist = 0x%x\n", card_exist);
    }
    if (card_exist & MS_EXIST) {
        /* Disable SD interrupt */
        rtsx_pci_write_register(pcr, EFUSE_CONTENT, 0xe0, 0x40);
        rtsx_pci_write_register(pcr, CD_PAD_CTL,
            CD_DISABLE_MASK, MS_CD_EN_ONLY);
    } else if (card_exist & SD_EXIST) {
        /* Disable MS interrupt */
        rtsx_pci_write_register(pcr, EFUSE_CONTENT, 0xe0, 0x80);
        rtsx_pci_write_register(pcr, CD_PAD_CTL,
            CD_DISABLE_MASK, SD_CD_EN_ONLY);
    }
    return card_exist;
} else
    return card_exist;
+
+static int rtl8411_conv_clk_and_div_n(int input, int dir)
+{
    +int output;
    +
    +if (dir == CLK_TO_DIV_N)
        +output = input * 4 / 5 - 2;
    +else
        +output = (input + 2) * 5 / 4;
    +
    +return output;
+}
static const struct pcr_ops rtl8411_pcr_ops = {
.fetch_vendor_settings = rtl8411_fetch_vendor_settings,
.extra_init_hw = rtl8411_extra_init_hw,
.optimize_phy = NULL,
.turn_on_led = rtl8411_turn_on_led,
.turn_off_led = rtl8411_turn_off_led,
.enable_auto_blink = rtl8411_enable_auto_blink,
.disable_auto_blink = rtl8411_disable_auto_blink,
.card_power_on = rtl8411_card_power_on,
.card_power_off = rtl8411_card_power_off,
.switch_output_voltage = rtl8411_switch_output_voltage,
.cd_deglitch = rtl8411_cd_deglitch,
.conv_clk_and_div_n = rtl8411_conv_clk_and_div_n,
.force_power_down = rtl8411_force_power_down,
};

static const struct pcr_ops rtl8402_pcr_ops = {
.fetch_vendor_settings = rtl8411_fetch_vendor_settings,
.extra_init_hw = rtl8411_extra_init_hw,
.optimize_phy = NULL,
.turn_on_led = rtl8411_turn_on_led,
.turn_off_led = rtl8411_turn_off_led,
.enable_auto_blink = rtl8411_enable_auto_blink,
.disable_auto_blink = rtl8411_disable_auto_blink,
.card_power_on = rtl8411_card_power_on,
.card_power_off = rtl8411_card_power_off,
.switch_output_voltage = rtl8402_switch_output_voltage,
.cd_deglitch = rtl8411_cd_deglitch,
.conv_clk_and_div_n = rtl8411_conv_clk_and_div_n,
.force_power_down = rtl8411_force_power_down,
};

static const struct pcr_ops rtl8411b_pcr_ops = {
.fetch_vendor_settings = rtl8411b_fetch_vendor_settings,
.extra_init_hw = rtl8411b_extra_init_hw,
.optimize_phy = NULL,
.turn_on_led = rtl8411_turn_on_led,
.turn_off_led = rtl8411_turn_off_led,
.enable_auto_blink = rtl8411_enable_auto_blink,
.disable_auto_blink = rtl8411_disable_auto_blink,
.card_power_on = rtl8411_card_power_on,
.card_power_off = rtl8411_card_power_off,
.switch_output_voltage = rtl8411_switch_output_voltage,
.cd_deglitch = rtl8411_cd_deglitch,
.conv_clk_and_div_n = rtl8411_conv_clk_and_div_n,
.force_power_down = rtl8411_force_power_down,
};
+/* SD Pull Control Enable:
+ * SD_DAT[3:0] ==> pull up
+ * SD_CD     ==> pull up
+ * SD_WP     ==> pull up
+ * SD_CMD    ==> pull up
+ * SD_CLK    ==> pull down
+ */
+static const u32 rtl8411_sd_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL1, 0xAA),
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xA9),
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x09),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x09),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04),
+0,
+};
+
+/* SD Pull Control Disable:
+ * SD_DAT[3:0] ==> pull down
+ * SD_CD     ==> pull up
+ * SD_WP     ==> pull down
+ * SD_CMD    ==> pull down
+ * SD_CLK    ==> pull down
+ */
+static const u32 rtl8411_sd_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL1, 0x65),
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0x95),
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x09),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x05),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04),
+0,
+};
+
+/* MS Pull Control Enable:
+ * MS CD      ==> pull up
+ * others     ==> pull down
+ */
+static const u32 rtl8411_ms_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL1, 0x65),
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0x95),
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x05),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x05),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04),
+0,
+};
+/* MS Pull Control Disable:
+ *     MS CD       ==> pull up
+ *     others      ==> pull down
+ */
+static const u32 rtl8411_ms_pull_ctl_disable_tbl[] = {
+    RTSX_REG_PAIR(CARD_PULL_CTL1, 0x65),
+    RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+    RTSX_REG_PAIR(CARD_PULL_CTL3, 0x95),
+    RTSX_REG_PAIR(CARD_PULL_CTL4, 0x09),
+    RTSX_REG_PAIR(CARD_PULL_CTL5, 0x05),
+    RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04),
+    0,
+};
+
+static const u32 rtl8411b_qfn64_sd_pull_ctl_enable_tbl[] = {
+    RTSX_REG_PAIR(CARD_PULL_CTL1, 0xAA),
+    RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+    RTSX_REG_PAIR(CARD_PULL_CTL3, 0x09 | 0xD0),
+    RTSX_REG_PAIR(CARD_PULL_CTL4, 0x09 | 0x50),
+    RTSX_REG_PAIR(CARD_PULL_CTL5, 0x05 | 0x50),
+    RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04 | 0x11),
+    0,
+};
+
+static const u32 rtl8411b_qfn48_sd_pull_ctl_enable_tbl[] = {
+    RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+    RTSX_REG_PAIR(CARD_PULL_CTL3, 0x69 | 0x90),
+    RTSX_REG_PAIR(CARD_PULL_CTL6, 0x08 | 0x11),
+    0,
+};
+
+static const u32 rtl8411b_qfn64_sd_pull_ctl_disable_tbl[] = {
+    RTSX_REG_PAIR(CARD_PULL_CTL1, 0x65),
+    RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+    RTSX_REG_PAIR(CARD_PULL_CTL3, 0x05 | 0xD0),
+    RTSX_REG_PAIR(CARD_PULL_CTL4, 0x09 | 0x50),
+    RTSX_REG_PAIR(CARD_PULL_CTL5, 0x05 | 0x50),
+    RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04 | 0x11),
+    0,
+};
+
+static const u32 rtl8411b_qfn48_sd_pull_ctl_disable_tbl[] = {
+    RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+    RTSX_REG_PAIR(CARD_PULL_CTL3, 0x65 | 0x90),
+    RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04 | 0x11),
+    0,
+};
static const u32 rtl8411b_qfn64_ms_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL1, 0x65),
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0x05 | 0xD0),
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x05 | 0x50),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x05 | 0x50),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04 | 0x11),
+0,
+};
+
static const u32 rtl8411b_qfn48_ms_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0x65 | 0x90),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04 | 0x11),
+0,
+};
+
static const u32 rtl8411b_qfn64_ms_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL1, 0x65),
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0x05 | 0xD0),
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x09 | 0x50),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x05 | 0x50),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04 | 0x11),
+0,
+};
+
static const u32 rtl8411b_qfn48_ms_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0x65 | 0x90),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x04 | 0x11),
+0,
+};
+
static void rtl8411_init_common_params(struct rtsx_pcr *pcr) {
+pcr->extra_caps = EXTRA_CAPS_SD_SDR50 | EXTRA_CAPS_SD_SDR104;
+pcr->num_slots = 2;
+pcr->flags = 0;
+pcr->card_drive_sel = RTL8411_CARD_DRIVE_DEFAULT;
+pcr->sd30_drive_sel_1v8 = DRIVER_TYPE_B;
+pcr->sd30_drive_sel_3v3 = DRIVER_TYPE_D;
+pcr->aspm_en = ASPM_L1_EN;
+pcr->tx_initial_phase = SET_CLOCK_PHASE(23, 7, 14);
+pcr->rx_initial_phase = SET_CLOCK_PHASE(4, 3, 10);
+pcr->ic_version = rtl8411_get_ic_version(pcr);
+}
+ void rtl8411_init_params(struct rtsx_pcr *pcr)
+ {
+ rtl8411_init_common_params(pcr);
+ pcr->ops = &rtl8411_pcr_ops;
+ set_pull_ctrl_tables(pcr, rtl8411);
+ }
+
+ void rtl8411b_init_params(struct rtsx_pcr *pcr)
+ {
+ rtl8411_init_common_params(pcr);
+ pcr->ops = &rtl8411b_pcr_ops;
+ if (rtl8411b_is_qfn48(pcr))
+ set_pull_ctrl_tables(pcr, rtl8411b_qfn48);
+ else
+ set_pull_ctrl_tables(pcr, rtl8411b_qfn64);
+ }
+
+ void rtl8402_init_params(struct rtsx_pcr *pcr)
+ {
+ rtl8411_init_common_params(pcr);
+ pcr->ops = &rtl8402_pcr_ops;
+ set_pull_ctrl_tables(pcr, rtl8411);
+ }

--- linux-4.15.0.orig/drivers/misc/cardreader/rts5209.c
+++ linux-4.15.0/drivers/misc/cardreader/rts5209.c
@@ -0,0 +1,277 @@
+ /* Driver for Realtek PCI-Express card reader
+  *
+  + * Copyright(c) 2009-2013 Realtek Semiconductor Corp. All rights reserved.
+  + *
+  + * This program is free software; you can redistribute it and/or modify it
+  + * under the terms of the GNU General Public License as published by the
+  + * Free Software Foundation; either version 2, or (at your option) any
+  + * later version.
+  + *
+  + * This program is distributed in the hope that it will be useful, but
+  + * WITHOUT ANY WARRANTY; without even the implied warranty of
+  + * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
+  + * General Public License for more details.
+  + *
+  + * You should have received a copy of the GNU General Public License along
+  + * with this program; if not, see <http://www.gnu.org/licenses/>.
+  + *
+  + * Author:
+  + * Wei WANG <wei_wang@realsil.com.cn>
+  + */

+ */
#include <linux/module.h>
#include <linux/delay.h>
#include <linux/rtsx_pci.h>

#include "rtsx_pcr.h"

static u8 rts5209_get_ic_version(struct rtsx_pcr *pcr)
{
    u8 val;

    val = rtsx_pci_readb(pcr, 0x1C);
    return val & 0x0F;
}

static void rts5209_fetch_vendor_settings(struct rtsx_pcr *pcr)
{
    u32 reg;

    rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG1, &reg);
    pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG1, reg);
    if (rts5209_vendor_setting1_valid(reg)) {
        if (rts5209_reg_check_ms_pmos(reg))
            pcr->flags |= PCR_MS_PMOS;
        pcr->aspm_en = rts5209_reg_to_aspm(reg);
    }

    rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG2, &reg);
    pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG2, reg);
    if (rts5209_vendor_setting2_valid(reg)) {
        pcr->sd30_drive_sel_1v8 = rts5209_reg_to_sd30_drive_sel_1v8(reg);
        pcr->sd30_drive_sel_3v3 = rts5209_reg_to_sd30_drive_sel_3v3(reg);
        pcr->card_drive_sel = rts5209_reg_to_card_drive_sel(reg);
    }
}

static void rts5209_force_power_down(struct rtsx_pcr *pcr, u8 pm_state)
{
    rtsx_pci_write_register(pcr, FPDCTL, 0x07, 0x07);
}

static int rts5209_extra_init_hw(struct rtsx_pcr *pcr)
{
    rtsx_pci_init_cmd(pcr);
}
/* Turn off LED */
+tsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_GPIO, 0xFF, 0x03);

/* Reset ASPM state to default value */
+tsx_pci_add_cmd(pcr, WRITE_REG_CMD, ASPM_FORCE_CTL, 0x3F, 0);

/* Force CLKREQ# PIN to drive 0 to request clock */
+tsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG, 0x08, 0x08);

/* Configure GPIO as output */
+tsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_GPIO_DIR, 0xFF, 0x03);

/* Configure driving */
+tsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_DRIVE_SEL, 0xFF, pcr->sd30_drive_sel_3v3);
+
+return rtsx_pci_send_cmd(pcr, 100);
+
+
+static int rts5209_optimize_phy(struct rtsx_pcr *pcr)
+{
+    return rtsx_pci_write_phy_register(pcr, 0x00, 0xB966);
+}
+
+static int rts5209_turn_on_led(struct rtsx_pcr *pcr)
+{
+    return rtsx_pci_write_register(pcr, CARD_GPIO, 0x01, 0x00);
+}
+
+static int rts5209_turn_off_led(struct rtsx_pcr *pcr)
+{
+    return rtsx_pci_write_register(pcr, CARD_GPIO, 0x01, 0x01);
+}
+
+static int rts5209_enable_auto_blink(struct rtsx_pcr *pcr)
+{
+    return rtsx_pci_write_register(pcr, CARD_AUTO_BLINK, 0xFF, 0x0D);
+}
+
+static int rts5209_disable_auto_blink(struct rtsx_pcr *pcr)
+{
+    return rtsx_pci_write_register(pcr, CARD_AUTO_BLINK, 0x08, 0x00);
+}
+
+static int rts5209_card_power_on(struct rtsx_pcr *pcr, int card)
+{
+    int err;
+    u8 pwr_mask, partial_pwr_on, pwr_on;
+    
+    pwr_mask = SD_POWER_MASK;
+    partial_pwr_on = SD_PARTIAL_POWER_ON;
+    pwr_on = SD_POWER_ON;
+if ((pcr->flags & PCR_MS_PMOS) && (card == RTSX_MS_CARD)) {
  +pwr_mask = MS_POWER_MASK;
  +partial_pwr_on = MS_PARTIAL_POWER_ON;
  +pwr_on = MS_POWER_ON;
  +}
  +
  +rtsx_pci_init_cmd(pcr);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL,
  +pwr_mask, partial_pwr_on);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL,
  +LDO3318_PWR_MASK, 0x04);
  +err = rtsx_pci_send_cmd(pcr, 100);
  +if (err < 0)
  +return err;
  +
  +/* To avoid too large in-rush current */
  +udelay(150);
  +
  +rtsx_pci_init_cmd(pcr);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL, pwr_mask, pwr_on);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL,
  +LDO3318_PWR_MASK, 0x00);
  +return rtsx_pci_send_cmd(pcr, 100);
  +}
  +
static int rts5209_card_power_off(struct rtsx_pcr *pcr, int card)
{
+u8 pwr_mask, pwr_off;
+
  +pwr_mask = SD_POWER_MASK;
  +pwr_off = SD_POWER_OFF;
  +
  +if ((pcr->flags & PCR_MS_PMOS) && (card == RTSX_MS_CARD)) {
  +pwr_mask = MS_POWER_MASK;
  +pwr_off = MS_POWER_OFF;
  +}
  +
  +rtsx_pci_init_cmd(pcr);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL, pwr_mask, pwr_on);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL,
  +LDO3318_PWR_MASK, 0x00);
  +return rtsx_pci_send_cmd(pcr, 100);
  +}
  +
static int rts5209_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
{
int err;
+
if (voltage == OUTPUT_3V3) {
    err = rtsx_pci_write_register(pcr, SD30_DRIVE_SEL, 0x07, pcr->sd30_drive_sel_3v3);
    if (err < 0)
        return err;
    err = rtsx_pci_write_phy_register(pcr, 0x08, 0x4FC0 | 0x24);
    if (err < 0)
        return err;
} else if (voltage == OUTPUT_1V8) {
    err = rtsx_pci_write_register(pcr, SD30_DRIVE_SEL, 0x07, pcr->sd30_drive_sel_1v8);
    if (err < 0)
        return err;
    err = rtsx_pci_write_phy_register(pcr, 0x08, 0x4C40 | 0x24);
    if (err < 0)
        return err;
} else {
    return -EINVAL;
}
+
return 0;
+
static const struct pcr_ops rts5209_pcr_ops = {
    .fetch_vendor_settings = rts5209_fetch_vendor_settings,
    .extra_init_hw = rts5209_extra_init_hw,
    .optimize_phy = rts5209_optimize_phy,
    .turn_on_led = rts5209_turn_on_led,
    .turn_off_led = rts5209_turn_off_led,
    .enable_auto_blink = rts5209_enable_auto_blink,
    .disable_auto_blink = rts5209_disable_auto_blink,
    .card_power_on = rts5209_card_power_on,
    .card_power_off = rts5209_card_power_off,
    .switch_output_voltage = rts5209_switch_output_voltage,
    .cd_deglitch = NULL,
    .conv_clk_and_div_n = NULL,
    .force_power_down = rts5209_force_power_down,
};
+
/* SD Pull Control Enable:
   *     SD_DAT[3:0] ==> pull up
   *     SD_CD       ==> pull up
   *     SD_WP       ==> pull up
   *     SD_CMD      ==> pull up
   *     SD_CLK      ==> pull down
   */
+static const u32 rts5209_sd_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL1, 0xAA),
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xE9),
+0,
+};
+
+/* SD Pull Control Disable:
+ * SD_DAT[3:0] ==> pull down
+ * SD_CD       ==> pull up
+ * SD_WP       ==> pull down
+ * SD_CMD      ==> pull down
+ * SD_CLK      ==> pull down
+ */
+static const u32 rts5209_sd_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL1, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xD5),
+0,
+};
+
+/* MS Pull Control Enable:
+ * MS CD       ==> pull up
+ * others      ==> pull down
+ */
+static const u32 rts5209_ms_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+/* MS Pull Control Disable:
+ * MS CD       ==> pull up
+ * others      ==> pull down
+ */
+static const u32 rts5209_ms_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+void rts5209_init_params(struct rtsx_pcr *pcr)
+{
+pcr->extra_caps = EXTRA_CAPS_SD_SDR50 |
+EXTRA_CAPS_SD_SDR104 | EXTRA_CAPS_MMC_8BIT;
+pcr->num_slots = 2;
+
+pcr->ops = &rts5209_pcr_ops;
+
+pcr->flags = 0;
+pcr->card_drive_sel = RTS5209_CARD_DRIVE_DEFAULT;
+pcr->sd30_drive_sel_1v8 = DRIVER_TYPE_B;
+pcr->sd30_drive_sel_3v3 = DRIVER_TYPE_D;
+pcr->aspm_en = ASPM_L1_EN;
+pcr->tx_initial_phase = SET_CLOCK_PHASE(27, 27, 16);
+pcr->rx_initial_phase = SET_CLOCK_PHASE(24, 6, 5);
+
+pcr->ic_version = rts5209_get_ic_version(pcr);
+pcr->sd_pull_ctl_enable_tbl = rts5209_sd_pull_ctl_enable_tbl;
+pcr->sd_pull_ctl_disable_tbl = rts5209_sd_pull_ctl_disable_tbl;
+pcr->ms_pull_ctl_enable_tbl = rts5209_ms_pull_ctl_enable_tbl;
+pcr->ms_pull_ctl_disable_tbl = rts5209_ms_pull_ctl_disable_tbl;
+
*/
/* Driver for Realtek PCI-Express card reader
+ *
+ * Copyright(c) 2009-2013 Realtek Semiconductor Corp. All rights reserved.
+ *
+ * This program is free software; you can redistribute it and/or modify it
+ * under the terms of the GNU General Public License as published by the
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+ * later version.
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+ *
+ * Author:
+ * Wei WANG <wei_wang@realsil.com.cn>
+ * Roger Tseng <rogerable@realtek.com>
+ */
+
+#include <linux/module.h>
+#include <linux/delay.h>
+#include <linux/rtsx_pci.h>
+
+#include "rtsx_pcr.h"
+
+static u8 rts5227_get_ic_version(struct rtsx_pcr *pcr)
+{ 
+u8 val;
+
+rtsx_pci_read_register(pcr, DUMMY_REG_RESET_0, &val);
+return val & 0x0F;
+}
+
+static void rts5227_fill_driving(struct rtsx_pcr *pcr, u8 voltage)
+{ 
+u8 driving_3v3[4][3] = {
+{0x13, 0x13, 0x13},
+{0x96, 0x96, 0x96},
+{0x7F, 0x7F, 0x7F},
+{0x96, 0x96, 0x96},
+};
+u8 driving_1v8[4][3] = {
+{0x99, 0x99, 0x99},
+{0xAA, 0xAA, 0xAA},
+{0xFE, 0xFE, 0xFE},
+{0xB3, 0xB3, 0xB3},
+};
+u8 (*driving)[3], drive_sel;
+
+if (voltage == OUTPUT_3V3) {
+driving = driving_3v3;
+drive_sel = pcr->sd30_drive_sel_3v3;
+} else {
+driving = driving_1v8;
+drive_sel = pcr->sd30_drive_sel_1v8;
+}
+
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_CLK_DRIVE_SEL,
+0xFF, driving[drive_sel][0]);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_CMD_DRIVE_SEL,
+0xFF, driving[drive_sel][1]);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_DAT_DRIVE_SEL,
+0xFF, driving[drive_sel][2]);
+}
+
+static void rts5227_fetch_vendor_settings(struct rtsx_pcr *pcr)
+{ 
+u32 reg;
+
+rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG1, &reg);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG1, reg);
+
+if (!rtsx_vendor_setting_valid(reg))
+return;
+ pcr->aspm_en = rtsx_reg_to_aspm(reg);
+ pcr->sd30_drive_sel_1v8 = rtsx_reg_to_sd30_drive_sel_1v8(reg);
+ pcr->card_drive_sel &= 0x3F;
+ pcr->card_drive_sel |= rtsx_reg_to_card_drive_sel(reg);
+
+ rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG2, &reg);
+ pcr_dbg(pcr, "Cfg 0x%x: 0x%x
", PCR_SETTING_REG2, reg);
+ pcr->sd30_drive_sel_3v3 = rtsx_reg_to_sd30_drive_sel_3v3(reg);
+ if (rtsx_reg_check_reverse_socket(reg))
+ pcr->flags |= PCR_REVERSE_SOCKET;
+}
+
+static void rts5227_force_power_down(struct rtsx_pcr *pcr, u8 pm_state)
+{
+ /* Set relink_time to 0 */
+ rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 1, 0xFF, 0);
+ rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 2, 0xFF, 0);
+ rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 3, 0x01, 0);
+
+ if (pm_state == HOST_ENTER_S3)
+ rtsx_pci_write_register(pcr, pcr->reg_pm_ctrl3, 0x10, 0x10);
+}
+
+static int rts5227_extra_init_hw(struct rtsx_pcr *pcr)
+{
+ u16 cap;
+
+ rtsx_pci_init_cmd(pcr);
+
+ /* Configure GPIO as output */
+ rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, GPIO_CTL, 0x02, 0x02);
+ /* Reset ASPM state to default value */
+ rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, ASPM_FORCE_CTL, 0x3F, 0);
+ /* Switch LDO3318 source from DV33 to card_3v3 */
+ rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LDO_PWR_SEL, 0x03, 0x00);
+ rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LDO_PWR_SEL, 0x03, 0x01);
+ /* LED shine disabled, set initial shine cycle period */
+ rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, OLT_LED_CTL, 0x0F, 0x02);
+ /* Configure LTR */
+ pci_exصولCapability_read_word(pcr->pci, PCI_EXP_DEVCTL2, &cap);
+ if (cap & PCI_EXP_DEVCTL2_LTR_EN)
+ rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LTR_CTL, 0xFF, 0xA3);
+ /* Configure OBFF */
+ rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, OBFF_CFG, 0x03, 0x03);
+ /* Configure driving */
+rts5227_fill_driving(pcr, OUTPUT_3V3);
/* # Configure force_clock_req */
+if (pcr->flags & PCR_REVERSE_SOCKET)
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG, 0xB8, 0xB8);
+else
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG, 0xB8, 0x88);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, pcr->reg_pm_ctrl3, 0x10, 0x00);
+
+return rtsx_pci_send_cmd(pcr, 100);
+
+}
+
+static int rts5227_optimize_phy(struct rtsx_pcr *pcr)
+
+{ err;
+ +err = rtsx_pci_write_register(pcr, PM_CTRL3, D3_DELINK_MODE_EN, 0x00);
+if (err < 0)
+return err;
+
+/* Optimize RX sensitivity */
+return rtsx_pci_write_phy_register(pcr, 0x00, 0xBA42);
+}
+
+static int rts5227_turn_on_led(struct rtsx_pcr *pcr)
+
+{ return rtsx_pci_write_register(pcr, GPIO_CTL, 0x02, 0x02);
+
+}
+
+static int rts5227_turn_off_led(struct rtsx_pcr *pcr)
+
+{ return rtsx_pci_write_register(pcr, GPIO_CTL, 0x02, 0x00);
+
+}
+
+static int rts5227_enable_auto_blink(struct rtsx_pcr *pcr)
+
+{ return rtsx_pci_write_register(pcr, OLT_LED_CTL, 0x08, 0x08);
+
+}
+
+static int rts5227_disable_auto_blink(struct rtsx_pcr *pcr)
+
+{ return rtsx_pci_write_register(pcr, OLT_LED_CTL, 0x08, 0x00);
+
+}
+
+static int rts5227_card_power_on(struct rtsx_pcr *pcr, int card)
+
+{ err;
+
+if (pcr->option_ocp_en)
+rtsx_pci_enable_ocp(pdev);
+
+rtsx_pci_init_cmd(pdev);
+rtsx_pci_add_cmd(pdev, WRITE_REG_CMD, CARD_PWR_CTL,
+SD_POWER_MASK, SD_PARTIAL_POWER_ON);
+
+rtsx_pci_add_cmd(pdev, WRITE_REG_CMD, PWR_GATE_CTRL,
+LDO3318_PWR_MASK, 0x02);
+
+err = rtsx_pci_send_cmd(pdev, 100);
+if (err < 0)
+return err;
+
+/* To avoid too large in-rush current */
+msleep(20);
+rtsx_pci_init_cmd(pdev);
+rtsx_pci_add_cmd(pdev, WRITE_REG_CMD, CARD_PWR_CTL,
+SD_POWER_MASK, SD_POWER_ON);
+
+rtsx_pci_add_cmd(pdev, WRITE_REG_CMD, PWR_GATE_CTRL,
+LDO3318_PWR_MASK, 0x06);
+
+rtsx_pci_add_cmd(pdev, WRITE_REG_CMD, CARD_OE,
+SD_OUTPUT_EN, SD_OUTPUT_EN);
+rtsx_pci_add_cmd(pdev, WRITE_REG_CMD, CARD_OE,
+MS_OUTPUT_EN, MS_OUTPUT_EN);
+return rtsx_pci_send_cmd(pdev, 100);
+
+
+static int rtsx5227_card_power_off(struct rtsx_pcr *pdev, int card)
+{
+if (pdev->option.ocp_en)
+rtsx_pci_disable_ocp(pdev);
+
+rtsx_pci_write_register(pdev, CARD_PWR_CTL, SD_POWER_MASK |
+PMOS_STRG_MASK, SD_POWER_OFF | PMOS_STRG_400mA);
+rtsx_pci_write_register(pdev, PWR_GATE_CTRL, LDO3318_PWR_MASK, 0x00);
+
+return 0;
+}
+
+static int rtsx5227_switch_output_voltage(struct rtsx_pcr *pdev, u8 voltage)
+{
+int err;
+
+if (voltage == OUTPUT_3V3) {
+err = rtsx_pci_write_phy_register(pdev, 0x08, 0x4FC0 | 0x24);
+if (err < 0)
+return err;
+} else if (voltage == OUTPUT_1V8) {
+err = rtsx_pci_write_phy_register(pcr, 0x11, 0x3C02);
+if (err < 0)
+return err;
+err = rtsx_pci_write_phy_register(pcr, 0x08, 0x4C80 | 0x24);
+if (err < 0)
+return err;
+} else {
+return -EINVAL;
+}
+
+/* set pad drive */
+rtsx_pci_init_cmd(pcr);
+rts5227_fill_driving(pcr, voltage);
+return rtsx_pci_send_cmd(pcr, 100);
+}
+
+static const struct pcr_ops rts5227_pcr_ops = {
+.fetch_vendor_settings = rts5227_fetch_vendor_settings,
+.extra_init_hw = rts5227_extra_init_hw,
+.optimize_phy = rts5227_optimize_phy,
+.turn_on_led = rts5227_turn_on_led,
+.turn_off_led = rts5227_turn_off_led,
+.enable_auto_blink = rts5227_enable_auto_blink,
+.disable_auto_blink = rts5227_disable_auto_blink,
+.card_power_on = rts5227_card_power_on,
+.card_power_off = rts5227_card_power_off,
+.switch_output_voltage = rts5227_switch_output_voltage,
+.cd_deglitch = NULL,
+.conv_clk_and_div_n = NULL,
+.force_power_down = rts5227_force_power_down,
+};
+
+/* SD Pull Control Enable:
+ *     SD_DAT[3:0] ==> pull up
+ *     SD_CD     ==> pull up
+ *     SD_WP     ==> pull up
+ *     SD_CMD    ==> pull up
+ *     SD_CLK    ==> pull down
+ */
+static const u32 rts5227_sd_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xE9),
+0,
+};
+
+/* SD Pull Control Disable:
Open Source Used In 5GaaS Edge AC-4

+ *  SD_DAT[3:0] ==> pull down
+ *  SD_CD    ==> pull up
+ *  SD_WP    ==> pull down
+ *  SD_CMD   ==> pull down
+ *  SD_CLK   ==> pull down
+ */
+static const u32 rts5227_sd_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xD5),
+0,
+};
+
+/* MS Pull Control Enable:
+ *     MS CD       ==> pull up
+ *     others      ==> pull down
+ */
+static const u32 rts5227_ms_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+/* MS Pull Control Disable:
+ *     MS CD       ==> pull up
+ *     others      ==> pull down
+ */
+static const u32 rts5227_ms_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+void rts5227_init_params(struct rtsx_pcr *pcr)
+{
+pcr->extra_caps = EXTRA_CAPS_SD_SDR50 | EXTRA_CAPS_SD_SDR104;
+pcr->num_slots = 2;
+pcr->ops = &rts5227_pcr_ops;
+
+pcr->flags = 0;
+pcr->card_drive_sel = RTSX_CARD_DRIVE_DEFAULT;
+pcr->sd30_drive_sel_1v8 = CFG_DRIVER_TYPE_B;
+pcr->sd30_drive_sel_3v3 = CFG_DRIVER_TYPE_B;
+pcr->aspm_en = ASPM_L1_EN;
+pcr->tx_initial_phase = SET_CLOCK_PHASE(27, 27, 15);
+pcr->rx_initial_phase = SET_CLOCK_PHASE(30, 7, 7);
+
+pcr->ic_version = rts5227_get_ic_version(pcr);
+pcr->sd_pull_ctl_enable_tbl = rts5227_sd_pull_ctl_enable_tbl;
+pcr->sd_pull_ctl_disable_tbl = rts5227_sd_pull_ctl_disable_tbl;
+pcr->ms_pull_ctl_enable_tbl = rts5227_ms_pull_ctl_enable_tbl;
+pcr->ms_pull_ctl_disable_tbl = rts5227_ms_pull_ctl_disable_tbl;
+
+pcr->reg_pm_ctrl3 = PM_CTRL3;
+
+static int rts522a_optimize_phy(struct rtsx_pcr *pcr)
+{
+    int err;
+
+    err = rtsx_pci_write_register(pcr, RTS522A_PM_CTRL3, D3_DELINK_MODE_EN, 0x00);
+    if (err < 0)
+        return err;
+
+    if (is_version(pcr, 0x522A, IC_VER_A)) {
+        err = rtsx_pci_write_phy_register(pcr, PHY_RCR2, PHY_RCR2_INIT_27S);
+        if (err)
+            return err;
+
+        rtsx_pci_write_phy_register(pcr, PHY_RCR1, PHY_RCR1_INIT_27S);
+        rtsx_pci_write_phy_register(pcr, PHY_FLD0, PHY_FLD0_INIT_27S);
+        rtsx_pci_write_phy_register(pcr, PHY_FLD3, PHY_FLD3_INIT_27S);
+        rtsx_pci_write_phy_register(pcr, PHY_FLD4, PHY_FLD4_INIT_27S);
+    }
+
+    return 0;
+}
+
+static int rts522a_extra_init_hw(struct rtsx_pcr *pcr)
+{
+    rtsx27_extra_init_hw(pcr);
+
+    /* Power down OCP for power consumption */
+    if (!pcr->card_exist)
+        rtsx_pci_write_register(pcr, FPDCTL, OC_POWER_DOWN, OC_POWER_DOWN);
+
+    rtsx_pci_write_register(pcr, FUNC_FORCE_CTL, FUNC_FORCE_UPME_XMT_DBG, FUNC_FORCE_UPME_XMT_DBG);
+    rtsx_pci_write_register(pcr, PCLK_CTL, 0x04, 0x04);
+    rtsx_pci_write_register(pcr, PM_EVENT_DEBUG, PME_DEBUG_0, PME_DEBUG_0);
+    rtsx_pci_write_register(pcr, PM_CLK_FORCE_CTL, 0xFF, 0x11);
+
+    return 0;
+}
static int rts522a_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage) {
    int err;

    if (voltage == OUTPUT_3V3) {
        err = rtsx_pci_write_phy_register(pcr, 0x08, 0x57E4);
        if (err < 0)
            return err;
    } else if (voltage == OUTPUT_1V8) {
        err = rtsx_pci_write_phy_register(pcr, 0x11, 0x3C02);
        if (err < 0)
            return err;
        err = rtsx_pci_write_phy_register(pcr, 0x08, 0x54A4);
        if (err < 0)
            return err;
    } else {
        return -EINVAL;
    }

    /* set pad drive */
    rtsx_pci_init_cmd(pcr);
    rts5227_fill_driving(pcr, voltage);
    return rtsx_pci_send_cmd(pcr, 100);
}

/* rts522a operations mainly derived from rts5227, except phy/hw init setting. */

static const struct pcr_ops rts522a_pcr_ops = {
    .fetch_vendor_settings = rts5227_fetch_vendor_settings,
    .extra_init_hw = rts522a_extra_init_hw,
    .optimize_phy = rts522a_optimize_phy,
    .turn_on_led = rts5227_turn_on_led,
    .turn_off_led = rts5227_turn_off_led,
    .enable_auto_blink = rts5227_enable_auto_blink,
    .disable_auto_blink = rts5227_disable_auto_blink,
    .card_power_on = rts5227_card_power_on,
    .card_power_off = rts5227_card_power_off,
    .switch_output_voltage = rts522a_switch_output_voltage,
    .cd_deglitch = NULL,
    .conv_clk_and_div_n = NULL,
    .force_power_down = rts5227_force_power_down,
};

void rts522a_init_params(struct rtsx_pcr *pcr) {
    rts5227_init_params(pcr);
+pcr->ops = &rts522a_pcr_ops;
+pcr->tx_initial_phase = SET_CLOCK_PHASE(20, 20, 11);
+pcr->reg_pm_ctrl3 = RTS522A_PM_CTRL3;
+
+pcr->option.ocp_en = 1;
+if (pcr->option.ocp_en)
+pcr->hw_param.interrupt_en |= SD_OC_INT_EN;
+pcr->hw_param.ocp_glitch = SD_OCP_GLITCH_10M;
+pcr->option.sd_800mA_ocp_thd = RTS522A_OCP_THD_800;
+
+}

--- linux-4.15.0.orig/drivers/misc/cardreader/rts5229.c
+++ linux-4.15.0/drivers/misc/cardreader/rts5229.c
@@ -0,0 +1,273 @@
+/* Driver for Realtek PCI-Express card reader */
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+* Wei WANG <wei_wang@realsil.com.cn>
+*/
+#
+/#include <linux/module.h>
+/#include <linux/delay.h>
+/#include <linux/rtsx_pci.h>
+
+/#include "rtsx_pcr.h"
+
+static u8 rts5229_get_ic_version(struct rtsx_pcr *pcr)
+{
+u8 val;
+
+rtsx_pci_read_register(pcr, DUMMY_REG_RESET, &val);
+return val & 0x0F;
+}
+static void rts5229_fetch_vendor_settings(struct rtsx_pcr *pcr)
+
+u32 reg;
+
+rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG1, &reg);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG1, reg);
+
+if (!rtsx_vendor_setting_valid(reg))
+return;
+
+pcr->aspm_en = rtsx_reg_to_aspm(reg);
+pcr->sd30_drive_sel_1v8 =
+map_sd_drive(rtsx_reg_to_sd30_drive_sel_1v8(reg));
+pcr->card_drive_sel &= 0x3F;
+pcr->card_drive_sel |= rtsx_reg_to_card_drive_sel(reg);
+
+rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG2, &reg);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG2, reg);
+pcr->sd30_drive_sel_3v3 =
+map_sd_drive(rtsx_reg_to_sd30_drive_sel_3v3(reg));
+
+static void rts5229_force_power_down(struct rtsx_pcr *pcr, u8 pm_state)
+
+rtsx_pci_write_register(pcr, FPDCTL, 0x03, 0x03);
+
+static int rts5229_extra_init_hw(struct rtsx_pcr *pcr)
+
+rtsx_pci_init_cmd(pcr);
+
+/* Configure GPIO as output */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, GPIO_CTL, 0x02, 0x02);
+/* Reset ASPM state to default value */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, ASPM_FORCE_CTL, 0x3F, 0);
+/* Force CLKREQ# PIN to drive 0 to request clock */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG, 0x08, 0x08);
+/* Switch LDO3318 source from DV33 to card_3v3 */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LDO_PWR_SEL, 0x03, 0x00);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LDO_PWR_SEL, 0x03, 0x01);
+/* LED shine disabled, set initial shine cycle period */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, OLT_LED_CTL, 0x0F, 0x02);
+/* Configure driving */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_DRIVE_SEL,
+0xFF, pcr->sd30_drive_sel_3v3);
+
+return rtsx_pci_send_cmd(pcr, 100);
static int rts5229_optimize_phy(struct rtsx_pcr *pcr) {
	/* Optimize RX sensitivity */
	return rtsx_pci_write_phy_register(pcr, 0x00, 0xBA42);
}

static int rts5229_turn_on_led(struct rtsx_pcr *pcr) {
	return rtsx_pci_write_register(pcr, GPIO_CTL, 0x02, 0x02);
}

static int rts5229_turn_off_led(struct rtsx_pcr *pcr) {
	return rtsx_pci_write_register(pcr, GPIO_CTL, 0x02, 0x00);
}

static int rts5229_enable_auto_blink(struct rtsx_pcr *pcr) {
	return rtsx_pci_write_register(pcr, OLT_LED_CTL, 0x08, 0x08);
}

static int rts5229_disable_auto_blink(struct rtsx_pcr *pcr) {
	return rtsx_pci_write_register(pcr, OLT_LED_CTL, 0x08, 0x00);
}

static int rts5229_card_power_on(struct rtsx_pcr *pcr, int card) {
	int err;
	rtsx_pci_init_cmd(pcr);
	rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL, SD_POWER_MASK, SD_PARTIAL_POWER_ON);
	rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL, LDO3318_PWR_MASK, 0x02);
	err = rtsx_pci_send_cmd(pcr, 100);
	if (err < 0)
		return err;
	/* To avoid too large in-rush current */
	no delay(150);

*rtsx_pci_init_cmd(pcr);
*rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL, SD_POWER_MASK, SD_POWER_ON);
*rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL, LDO3318_PWR_MASK, 0x02);
*err = rtsx_pci_send_cmd(pcr, 100);
*if (err < 0)
*return err;
*/
LDO3318_PWR_MASK, 0x06);
+return rtsx_pci_send_cmd(pcr, 100);
+
+static int rtsx_card_power_off(struct rtsx_pcr *pcr, int card)
  +{
    rtsx_pci_init_cmd(pcr);
    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL,
      SD_POWER_MASK | PMOS_STRG_MASK,
      SD_POWER_OFF | PMOS_STRG_400mA);
    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL,
      LDO3318_PWR_MASK, 0x00);
    return rtsx_pci_send_cmd(pcr, 100);
  } +
+
+static int rtsx_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
  +{
    int err;
    +
      if (voltage == OUTPUT_3V3) {
        err = rtsx_pci_write_register(pcr,
          SD30_DRIVE_SEL, 0x07, pcr->sd30_drive_sel_3v3);
        if (err < 0)
          return err;
        err = rtsx_pci_write_phy_register(pcr, 0x08, 0x4FC0 | 0x24);
        if (err < 0)
          return err;
      } else if (voltage == OUTPUT_1V8) {
        err = rtsx_pci_write_register(pcr,
          SD30_DRIVE_SEL, 0x07, pcr->sd30_drive_sel_1v8);
        if (err < 0)
          return err;
        err = rtsx_pci_write_phy_register(pcr, 0x08, 0x4C40 | 0x24);
        if (err < 0)
          return err;
      } else {
        return -EINVAL;
      }
    +} return 0;
  +
+
+static const struct pcr_ops rtsx_pcr_ops = {
  .fetch_vendor_settings = rtsx_fetch_vendor_settings,
  .extra_init_hw = rtsx_extra_init_hw,
  .optimize_phy = rtsx_optimize_phy,
  .turn_on_led = rtsx_turn_on_led,
  .turn_off_led = rtsx_turn_off_led,
+.enable_auto_blink = rts5229_enable_auto_blink,
+.disable_auto_blink = rts5229_disable_auto_blink,
+.card_power_on = rts5229_card_power_on,
+.card_power_off = rts5229_card_power_off,
+.switch_output_voltage = rts5229_switch_output_voltage,
+.cd_deglitch = NULL,
+.conv_clk_and_div_n = NULL,
+.force_power_down = rts5229_force_power_down,
+};
+
+/* SD Pull Control Enable:
+ *   SD_DAT[3:0] ==> pull up
+ *   SD_CD     ==> pull up
+ *   SD_WP     ==> pull up
+ *   SD_CMD    ==> pull up
+ *   SD_CLK    ==> pull down
+ */
+static const u32 rts5229_sd_pull_ctl_enable_tbl1[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xE9),
+0,
+};
+
+/* For RTS5229 version C */
+static const u32 rts5229_sd_pull_ctl_enable_tbl2[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xD9),
+0,
+};
+
+/* SD Pull Control Disable:
+ *   SD_DAT[3:0] ==> pull down
+ *   SD_CD     ==> pull up
+ *   SD_WP     ==> pull down
+ *   SD_CMD    ==> pull down
+ *   SD_CLK    ==> pull down
+ */
+static const u32 rts5229_sd_pull_ctl_disable_tbl1[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xD5),
+0,
+};
+
+/* For RTS5229 version C */
+static const u32 rts5229_sd_pull_ctl_disable_tbl2[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL3, 0xE5),
+0,
+*/ MS Pull Control Enable:
+ * MS CD   ==> pull up
+ * others == pull down
+ */
+static const u32 rts5229_ms_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+*/ MS Pull Control Disable:
+ * MS CD   ==> pull up
+ * others == pull down
+ */
+static const u32 rts5229_ms_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+void rts5229_init_params(struct rtsx_pcr *pcr)
+{
+pcr->extra_caps = EXTRA_CAPS_SD_SDR50 | EXTRA_CAPS_SD_SDR104;
+pcr->num_slots = 2;
+pcr->ops = &rts5229_pcr_ops;
+
+pcr->flags = 0;
+pcr->card_drive_sel = RTSX_CARD_DRIVE_DEFAULT;
+pcr->sd30_drive_sel_1v8 = DRIVER_TYPE_B;
+pcr->sd30_drive_sel_3v3 = DRIVER_TYPE_D;
+pcr->aspm_en = ASPM_L1_EN;
+pcr->tx_initial_phase = SET_CLOCK_PHASE(27, 27, 15);
+pcr->rx_initial_phase = SET_CLOCK_PHASE(30, 6, 6);
+
+pcr->ic_version = rts5229_get_ic_version(pcr);
+if (pcr->ic_version == IC_VER_C) {
+pcr->sd_pull_ctl_enable_tbl = rts5229_sd_pull_ctl_enable_tbl2;
+pcr->sd_pull_ctl_disable_tbl = rts5229_sd_pull_ctl_disable_tbl2;
+} else {
+pcr->sd_pull_ctl_enable_tbl = rts5229_sd_pull_ctl_enable_tbl1;
+pcr->sd_pull_ctl_disable_tbl = rts5229_sd_pull_ctl_disable_tbl1;
+
+pcr->ms_pull_ctl_enable_tbl = rts5229_ms_pull_ctl_enable_tbl;
+pcr->ms_pull_ctl_disable_tbl = rts5229_ms_pull_ctl_disable_tbl;
+}
--- linux-4.15.0.orig/drivers/misc/cardreader/rts5249.c
# Driver for Realtek PCI-Express card reader

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* Author:
  Wei WANG <wei_wang@realsil.com.cn>

#include <linux/module.h>
#include <linux/delay.h>
#include <linux/rtsx_pci.h>
#include "rtsx_pcr.h"

static u8 rts5249_get_ic_version(struct rtsx_pcr *pcr)
{
  u8 val;

  rtsx_pci_read_register(pcr, DUMMY_REG_RESET_0, &val);
  return val & 0x0F;
}

static void rts5249_fill_driving(struct rtsx_pcr *pcr, u8 voltage)
{
  u8 driving_3v3[4][3] = {
    {0x11, 0x11, 0x18},
    {0x55, 0x55, 0x5C},
    {0xFF, 0xFF, 0xFF},
    {0x96, 0x96, 0x96},
  };

  u8 driving_1v8[4][3] = {
    {0xC4, 0xC4, 0xC4},
    {0x3C, 0x3C, 0x3C},
  };

  +static u8 rts5249_get_ic_version(struct rtsx_pcr *pcr)
  +{
    +u8 val;
    +
    +rtsx_pci_read_register(pcr, DUMMY_REG_RESET_0, &val);
    +return val & 0x0F;
    +}
    +
    +static void rts5249_fill_driving(struct rtsx_pcr *pcr, u8 voltage)
    +{
      +u8 driving_3v3[4][3] = {
        +{0x11, 0x11, 0x18},
        +{0x55, 0x55, 0x5C},
        +{0xFF, 0xFF, 0xFF},
        +{0x96, 0x96, 0x96},
      };
      +u8 driving_1v8[4][3] = {
        +{0xC4, 0xC4, 0xC4},
        +{0x3C, 0x3C, 0x3C},
      };

+{0xFE, 0xFE, 0xFE},
+{0xB3, 0xB3, 0xB3},
+
+u8 (*driving)[3], drive_sel;
+
+if (voltage == OUTPUT_3V3) {
+    driving = driving_3v3;
+    drive_sel = pcr->sd30_drive_sel_3v3;
+} else {
+    driving = driving_1v8;
+    drive_sel = pcr->sd30_drive_sel_1v8;
+}
+
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_CLK_DRIVE_SEL,
+    0xFF, driving[drive_sel][0]);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_CMD_DRIVE_SEL,
+    0xFF, driving[drive_sel][1]);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD30_DAT_DRIVE_SEL,
+    0xFF, driving[drive_sel][2]);
+
+static void rtsx_base_fetch_vendor_settings(struct rtsx_pcr *pcr)
+{
+    u32 reg;
+
+    rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG1, &reg);
+    pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG1, reg);
+    if (!rtsx_vendor_setting_valid(reg)) {
+        pcr_dbg(pcr, "skip fetch vendor setting\n");
+        return;
+    }
+    pcr->aspm_en = rtsx_reg_to_aspm(reg);
+    pcr->sd30_drive_sel_1v8 = rtsx_reg_to_sd30_drive_sel_1v8(reg);
+    pcr->card_drive_sel &= 0x3F;
+    pcr->card_drive_sel |= rtsx_reg_to_card_drive_sel(reg);
+
+    rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG2, &reg);
+    pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG2, reg);
+    pcr->sd30_drive_sel_3v3 = rtsx_reg_to_sd30_drive_sel_3v3(reg);
+    if (rtsx_reg_check_reverse_socket(reg))
+        pcr->flags |= PCR_REVERSE_SOCKET;
+}
+
+static void rtsx_base_force_power_down(struct rtsx_pcr *pcr, u8 pm_state)
+{
+    /* Set relink_time to 0 */
+rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 1, 0xFF, 0);
+rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 2, 0xFF, 0);
+rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 3, 0x01, 0);
+
+if (pm_state == HOST_ENTER_S3)
+rtsx_pci_write_register(pcr, pcr->reg_pm_ctrl3,
+D3_DELINK_MODE_EN, D3_DELINK_MODE_EN);
+
+rtsx_pci_write_register(pcr, FPDCTL, 0x03, 0x03);
+
+
+static void rts249_init_from_cfg(struct rtsx_pcr *pcr)
+{
+struct rtsx_cr_option *option = &(pcr->option);
+u32 lval;
+
+if (CHK_PCI_PID(pcr, PID_524A))
+rtsx_pci_read_config_dword(pcr,
+PCR_ASMP_SETTING_REG1, &lval);
+else
+rtsx_pci_read_config_dword(pcr,
+PCR_ASMP_SETTING_REG2, &lval);
+
+if (lval & ASPM_L1_1_EN_MASK)
+rtsx_set_dev_flag(pcr, ASPM_L1_1_EN);
+
+if (lval & ASPM_L1_2_EN_MASK)
+rtsx_set_dev_flag(pcr, ASPM_L1_2_EN);
+
+if (lval & PM_L1_1_EN_MASK)
+rtsx_set_dev_flag(pcr, PM_L1_1_EN);
+
+if (lval & PM_L1_2_EN_MASK)
+rtsx_set_dev_flag(pcr, PM_L1_2_EN);
+
+if (option->ltr_en) {
+u16 val;
+
pcie_capability_read_word(pcr->pci, PCI_EXP_DEVCTL2, &val);
+if (val & PCI_EXP_DEVCTL2_LTR_EN) {
+option->ltr_enabled = true;
+option->ltr_active = true;
+rtsx_set_ltr_latency(pcr, option->ltr_active_latency);
+} else {
+option->ltr_enabled = false;
+}
+}
+}
+static int rts5249_init_from_hw(struct rtsx_pcr *pcr)
+{
+    struct rtsx_cr_option *option = &(pcr->option);
+
+    if (rtsx_check_dev_flag(pcr, ASPM_L1_1_EN | ASPM_L1_2_EN
+        | PM_L1_1_EN | PM_L1_2_EN))
+        option->force_clkreq_0 = false;
+    else
+        option->force_clkreq_0 = true;
+
+    return 0;
+}
+
+static int rts5249_extra_init_hw(struct rtsx_pcr *pcr)
+{
+    struct rtsx_cr_option *option = &(pcr->option);
+
+    rts5249_init_from_cfg(pcr);
+    rts5249_init_from_hw(pcr);
+
+    rtsx_pci_init_cmd(pcr);
+
+    /* Rest L1SUB Config */
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, L1SUB_CONFIG3, 0xFF, 0x00);
+    /* Configure GPIO as output */
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, GPIO_CTL, 0x02, 0x02);
+    /* Reset ASPM state to default value */
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, ASPM_FORCE_CTL, 0x3F, 0);
+    /* Switch LDO3318 source from DV33 to card_3v3 */
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LDO_PWR_SEL, 0x03, 0x00);
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, LDO_PWR_SEL, 0x03, 0x01);
+    /* LED shine disabled, set initial shine cycle period */
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, OLT_LED_CTL, 0x0F, 0x02);
+    /* Configure driving */
+    rts5249_fill_driving(pcr, OUTPUT_3V3);
+    if (pcr->flags & PCR_REVERSE_SOCKET)
+        rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG, 0xB0, 0xB0);
+    else
+        rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG, 0xB0, 0x80);
+
+    /* If u_force_clkreq_0 is enabled, CLKREQ# PIN will be forced
+       to drive low, and we forcibly request clock. */
+    if (option->force_clkreq_0)
+        rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG,
+                        FORCE_CLKREQ_DELINK_MASK, FORCE_CLKREQ_LOW);
+else
+  rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PETXCFG,
+  FORCE_CLKREQ_DELINK_MASK, FORCE_CLKREQ_HIGH);
+
+  return rtsx_pci_send_cmd(pcr, CMD_TIMEOUT_DEF);
+
+}
+
+static int rts5249_optimize_phy(struct rtsx_pcr *pcr)
+{
+  int err;
+
+  err = rtsx_pci_write_register(pcr, PM_CTRL3, D3_DELINK_MODE_EN, 0x00);
+  if (err < 0)
+    return err;
+
+  err = rtsx_pci_write_phy_register(pcr, PHY_REV,
+  PHY_REV_RESV | PHY_REV_RXIDLE_LATCHED |
+  PHY_REV_P1_EN | PHY_REV_RXIDLE_EN |
+  PHY_REV_CLKREQ_TX_EN | PHY_REV_RX_PWST |
+  PHY_REV_CLKREQ_DT_1_0 | PHY_REV_STOP_CLKRD |
+  PHY_REV_STOP_CLKWR);
+  if (err < 0)
+    return err;
+
+  msleep(1);
+
+  err = rtsx_pci_write_phy_register(pcr, PHY_BPCR,
+  PHY_BPCR_IBRXSEL | PHY_BPCR_IBTXSEL |
+  PHY_BPCR_IB_FILTER | PHY_BPCR_CMIRROR_EN);
+  if (err < 0)
+    return err;
+
+  err = rtsx_pci_write_phy_register(pcr, PHY_PCR,
+  PHY_PCR_FORCE_CODE | PHY_PCR_OOBS_CALI_50 |
+  PHY_PCR_OOBS_VCM_08 | PHY_PCR_OOBS_SEN_90 |
+  PHY_PCR_RSSI_EN | PHY_PCR_RX10K);
+  if (err < 0)
+    return err;
+
+  err = rtsx_pci_write_phy_register(pcr, PHY_RCR2,
+  PHY_RCR2_EMPHASSE_EN | PHY_RCR2_NADJR |
+  PHY_RCR2_CDR_SR_2 | PHY_RCR2_FREQSEL_12 |
+  PHY_RCR2_CDR_SC_12P | PHY_RCR2_CALIB_LATE);
+  if (err < 0)
+    return err;
+
+  err = rtsx_pci_write_phy_register(pcr, PHY_FLD4,
+  PHY_FLD4_FLDEN_SEL | PHY_FLD4_REQ_REF |
+PHY_FLD4_RXAMP_OFF | PHY_FLD4_REQ_ADDA |
+PHY_FLD4_BER_COUNT | PHY_FLD4_BER_TIMER |
+PHY_FLD4_BER_CHK_EN);
+if (err < 0)
+return err;
+err = rtsx_pci_write_phy_register(pcr, PHY_RDR,
+PHY_RDR_RXDSEL_1_9 | PHY_SSC_AUTO_PWD);
+if (err < 0)
+return err;
+err = rtsx_pci_write_phy_register(pcr, PHY_RCR1,
+PHY_RCR1_ADPTIME_4 | PHY_RCR1_VCO_COARSE);
+if (err < 0)
+return err;
+err = rtsx_pci_write_phy_register(pcr, PHY_FLD3,
+PHY_FLD3_TIMER_4 | PHY_FLD3_TIMER_6 |
+PHY_FLD3_RXDELINK);
+if (err < 0)
+return err;
+
+return rtsx_pci_write_phy_register(pcr, PHY_TUNE,
+PHY_TUNE_TUNEREF_1_0 | PHY_TUNE_VBGSEL_1252 |
+PHY_TUNE_SDBUS_33 | PHY_TUNE_TUNED18 |
+PHY_TUNE_TUNED12 | PHY_TUNE_TUNEA12);
+
+static int rtsx_base_turn_on_led(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, GPIO_CTL, 0x02, 0x02);
+}
+
+static int rtsx_base_turn_off_led(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, GPIO_CTL, 0x02, 0x00);
+}
+
+static int rtsx_base_enable_auto_blink(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, OLT_LED_CTL, 0x08, 0x08);
+}
+
+static int rtsx_base_disable_auto_blink(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, OLT_LED_CTL, 0x08, 0x00);
+}
+
+#define RTX_SDRiphy
+
+static int rtsx_base_card_power_on(struct rtsx_pcr *pcr, int card)
+{
+int err;
struct rtsx_cr_option *option = &pcr->option;
+
if (option->ocp_en)

+rtsx_pci_enable_ocp(pcr);
+
+rtsx_pci_init_cmd(pcr);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL,
+SD_POWER_MASK, SD_VCC_PARTIAL_POWER_ON);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL,
+LDO3318_PWR_MASK, 0x02);
+err = rtsx_pci_send_cmd(pcr, 100);
+if (err < 0)
+return err;
+
+msleep(5);
+
+rtsx_pci_init_cmd(pcr);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_PWR_CTL,
+SD_POWER_MASK, SD_VCC_POWER_ON);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PWR_GATE_CTRL,
+LDO3318_PWR_MASK, 0x06);
+return rtsx_pci_send_cmd(pcr, 100);
+
+static int rtsx_base_card_power_off(struct rtsx_pcr *pcr, int card)
+
+{
+struct rtsx_cr_option *option = &pcr->option;
+
+if (option->ocp_en)
+rtsx_pci_disable_ocp(pcr);
+
+rtsx_pci_write_register(pcr, CARD_PWR_CTL, SD_POWER_MASK, SD_POWER_OFF);
+rtsx_pci_write_register(pcr, PWR_GATE_CTRL, LDO3318_PWR_MASK, 0x00);
+return 0;
+}
+
+static int rtsx_base_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
+
+{
+int err;
+u16 append;
+
+switch (voltage) {
+case OUTPUT_3V3:
+err = rtsx_pci_update_phy(pcr, PHY_TUNE, PHY_TUNE_VOLTAGE_MASK,
+PHY_TUNE_VOLTAGE_3V3);
+if (err < 0)
+return err;
break;
+case OUTPUT_1V8:
  +append = PHY_TUNE_D18_1V8;
  +if (CHK_PCI_PID(pcr, 0x5249)) {
    +err = rtsx_pci_update_phy(pcr, PHY_BACR,
    +PHY_BACR_BASIC_MASK, 0);
    +if (err < 0)
      +return err;
    +append = PHY_TUNE_D18_1V7;
    +}
    +
    +err = rtsx_pci_update_phy(pcr, PHY_TUNE, PHY_TUNE_VOLTAGE_MASK,
    +append);
    +if (err < 0)
      +return err;
    +break;
  +default:
  +pcr_dbg(pcr, "unknown output voltage %d\n", voltage);
  +return -EINVAL;
  +}
  +
  +/* set pad drive */
  +rtsx_pci_init_cmd(pcr);
  +rts5249_fill_driving(pcr, voltage);
  +return rtsx_pci_send_cmd(pcr, 100);
  +}
  +
+static void rts5249_set_aspm(struct rtsx_pcr *pcr, bool enable)
+
+{    ...
+struct rtsx_cr_option *option = &pcr->option;
+u8 val = 0;
+
+  +if (pcr->aspm_enabled == enable)
+    +return;
+    +
+  +if (option->dev_aspm_mode == DEV_ASPM_DYNAMIC) {
+    +if (enable)
+      +val = pcr->aspm_en;
+      +rtsx_pci_update_cfg_byte(pcr,
+      +pcr->pcie_cap + PCI_EXP_LNKCTL,
+      +ASPM_MASK_NEG, val);
+    } else if (option->dev_aspm_mode == DEV_ASPM_BACKDOOR) {
+      +u8 mask = FORCE_ASPM_VAL_MASK | FORCE_ASPM_CTL0;
+      +if (!enable)
+        +val = FORCE_ASPM_CTL0;
+        +rtsx_pci_write_register(pcr, ASPM_FORCE_CTL, mask, val);
+    }
+ pcr->aspm_enabled = enable;
+
+static const struct pcr_ops rts5249_pcr_ops = {
+    .fetch_vendor_settings = rtsx_base_fetch_vendor_settings,
+    .extra_init_hw = rts5249_extra_init_hw,
+    .optimize_phy = rts5249_optimize_phy,
+    .turn_on_led = rtsx_base_turn_on_led,
+    .turn_off_led = rtsx_base_turn_off_led,
+    .enable_auto_blink = rtsx_base_enable_auto_blink,
+    .disable_auto_blink = rtsx_base_disable_auto_blink,
+    .card_power_on = rtsx_base_card_power_on,
+    .card_power_off = rtsx_base_card_power_off,
+    .switch_output_voltage = rtsx_base_switch_output_voltage,
+    .set_aspm = rts5249_set_aspm,
+};
+
+/* SD Pull Control Enable:
+ *     SD_DAT[3:0] ==> pull up
+ *     SD_CD       ==> pull up
+ *     SD_WP       ==> pull up
+ */
+static const u32 rts5249_sd_pull_ctl_enable_tbl[] = {
+    RTSX_REG_PAIR(CARD_PULL_CTL1, 0x66),
+    RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
+    RTSX_REG_PAIR(CARD_PULL_CTL3, 0xE9),
+    RTSX_REG_PAIR(CARD_PULL_CTL4, 0xAA),
+    0,
+};
+
+/* SD Pull Control Disable:
+ *     SD_DAT[3:0] ==> pull down
+ *     SD_CD       ==> pull up
+ */
+static const u32 rts5249_sd_pull_ctl_disable_tbl[] = {
+    RTSX_REG_PAIR(CARD_PULL_CTL1, 0x66),
+    RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
+    RTSX_REG_PAIR(CARD_PULL_CTL3, 0xD5),
+    RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
+    0,
+};

---

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+/# MS Pull Control Enable:
+  */  MS CD   ==> pull up
+  */  others  ==> pull down
+  */
+static const u32 rts5249_ms_pull_ctl_enable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+/# MS Pull Control Disable:
+  */  MS CD   ==> pull up
+  */  others  ==> pull down
+  */
+static const u32 rts5249_ms_pull_ctl_disable_tbl[] = {
+RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
+RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
+0,
+};
+
+void rts5249_init_params(struct rtsx_pcr *pcr)
+{
+struct rtsx_cr_option *option = &(pcr->option);
+
+pcr->extra_caps = EXTRA_CAPS_SD_SDR50 | EXTRA_CAPS_SD_SDR104;
+pcr->num_slots = 2;
+pcr->ops = &rts5249_pcr_ops;
+
+pcr->flags = 0;
+pcr->card_drive_sel = RTSX_CARD_DRIVE_DEFAULT;
+pcr->sd30_drive_sel_1v8 = CFG_DRIVER_TYPE_B;
+pcr->sd30_drive_sel_3v3 = CFG_DRIVER_TYPE_B;
+pcr->aspm_en = ASPM_L1_EN;
+pcr->tx_initial_phase = SET_CLOCK_PHASE(1, 29, 16);
+pcr->rx_initial_phase = SET_CLOCK_PHASE(24, 6, 5);
+
+pcr->ic_version = rts5249_get_ic_version(pcr);
+pcr->sd_pull_ctl_enable_tbl = rts5249_sd_pull_ctl_enable_tbl;
+pcr->sd_pull_ctl_disable_tbl = rts5249_sd_pull_ctl_disable_tbl;
+pcr->ms_pull_ctl_enable_tbl = rts5249_ms_pull_ctl_enable_tbl;
+pcr->ms_pull_ctl_disable_tbl = rts5249_ms_pull_ctl_disable_tbl;
+
+pcr->reg_pm_ctrl3 = PM_CTRL3;
+
+option->dev_flags = (LTR_L1SS_PWR_GATE_CHECK_CARD_EN
```c
+| LTR.L1SS_PWR_GATE_EN;
+option->ltr_en = true;
+
+/* Init latency of active, idle, L1OFF to 60us, 300us, 3ms */
+option->ltr_active_latency = LTR_ACTIVE_LATENCY_DEF;
+option->ltr_idle_latency = LTR_IDLE_LATENCY_DEF;
+option->ltr_l1off_latency = LTR_L1OFF_LATENCY_DEF;
+option->dev_aspm_mode = DEV_ASPM_DYNAMIC;
+option->l1_snooze_delay = L1_SNOOZE_DELAY_DEF;
+option->ltr_l1off_sspwrgate = LTR_L1OFF_SSPWRGATE_5249_DEF;
+option->ltr_l1off_snooze_sspwrgate = LTR_L1OFF_SNOOZE_SSPWRGATE_5249_DEF;
+
+
+static int rts524a_write_phy(struct rtsx_pcr *pcr, u8 addr, u16 val)
+{
+    addr = addr & 0x80 ? (addr & 0x7F) | 0x40 : addr;
+    return __rtsx_pci_write_phy_register(pcr, addr, val);
+}
+
+static int rts524a_read_phy(struct rtsx_pcr *pcr, u8 addr, u16 *val)
+{
+    addr = addr & 0x80 ? (addr & 0x7F) | 0x40 : addr;
+    return __rtsx_pci_read_phy_register(pcr, addr, val);
+}
+
+static int rts524a_optimize_phy(struct rtsx_pcr *pcr)
+{
+    int err;
+    err = rtsx_pci_write_register(pcr, RTS524A_PM_CTRL3,
+        D3_DELINK_MODE_EN, 0x00);
+    if (err < 0)
+        return err;
+    rtsx_pci_write_phy_register(pcr, PHY_PCR,
+        PHY_PCR_FORCE_CODE | PHY_PCR_OOBS_CALI_50 |
+        PHY_PCR_OOBS_VCM_08 | PHY_PCR_OOBS_SEN_90 | PHY_PCR_RSSI_EN);
+    rtsx_pci_write_phy_register(pcr, PHY_SSCCR3,
+        PHY_SSCCR3_STEP_IN | PHY_SSCCR3_CHECK_DELAY);
+    if (is_version(pcr, 0x524A, IC_VER_A)) {
+        rtsx_pci_write_phy_register(pcr, PHY_SSCCR3,
+            PHY_SSCCR3_STEP_IN | PHY_SSCCR3_CHECK_DELAY);
+        rtsx_pci_write_phy_register(pcr, PHY_SSCCR2,
+            PHY_SSCCR2_PLL_NCODE | PHY_SSCCR2_TIME0 |
```

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+PHY_SSCCR2_TIME2_WIDTH);
+rtsx_pci_write_phy_register(pcr, PHY_ANA1A,
+PHY_ANA1A_TXR_LOOPBACK | PHY_ANA1A_RXT_BIST |
+PHY_ANA1A_TXR_BIST | PHY_ANA1A_REV);
+rtsx_pci_write_phy_register(pcr, PHY_ANA1D,
+PHY_ANA1D_DEBUG_ADDR);
+rtsx_pci_write_phy_register(pcr, PHY_DIG1E,
+PHY_DIG1E_REV | PHY_DIG1E_D0_X_D1 |
+PHY_DIG1E_RX_ON_HOST | PHY_DIG1E_RCLK_REF_HOST |
+PHY_DIG1E_RCLK_TX_EN_KEEP |
+PHY_DIG1E_RCLK_TX_TERM_KEEP |
+PHY_DIG1E_RCLK_RX_EIDLE_ON | PHY_DIG1E_TX_TERM_KEEP |
+PHY_DIG1E_RX_TERM_KEEP | PHY_DIG1E_TX_EN_KEEP |
+PHY_DIG1E_RX_EN_KEEP);
}
+
+rtsx_pci_write_phy_register(pcr, PHY_ANA08,
+PHY_ANA08_RX_EQ_DCGAIN | PHY_ANA08_SEL_RX_EN |
+PHY_ANA08_RX_EQ_VAL | PHY_ANA08_SCP | PHY_ANA08_SEL_IPI);
+
+return 0;
+
+
+static int rts24a_extra_init_hw(struct rtsx_pcr *pcr)
+{  
+  
+  +static int rts524a_extra_init_hw(struct rtsx_pcr *pcr)
+  +
+  +rtsx_pci_write_register(pcr, FUNC_FORCE_CTL,
+  +FORCE_ASPM_L1_EN, FORCE_ASPM_L1_EN);
+  +rtsx_pci_write_register(pcr, PM_EVENT_DEBUG, PME_DEBUG_0, PME_DEBUG_0);
+  +rtsx_pci_write_register(pcr, LDO_VCC_CFG1, LDO_VCC_LMT_EN,
+  +LDO_VCC_LMT_EN);
+  +rtsx_pci_write_register(pcr, LDO_VCC_CFG1, LDO_VCC_REF_TUNE_MASK, LDO_VCC_REF_1V2);
+  +rtsx_pci_write_register(pcr, LDO_VIO_CFG, LDO_VIO_SR_MASK, LDO_VIO_SR_DF);
+  +rtsx_pci_write_register(pcr, LDO_VIO_CFG, LDO_VIO_REF_TUNE_MASK, LDO_VIO_REF_1V2);
+  +rtsx_pci_write_register(pcr, LDO_VIO_CFG, LDO_VIO_SR_MASK, LDO_VIO_SR_DF);
+  +rtsx_pci_write_register(pcr, LDO_VIO_CFG, LDO_VIO_REF_TUNE_MASK, LDO_VIO_REF_1V2);
+  +rtsx_pci_write_register(pcr, SD40_LDO_CTL1, SD40_VIO_TUNE_MASK, SD40_VIO_TUNE_1V7);
+  +}
static void rts5250_set_l1off_cfg_sub_d0(struct rtsx_pcr *pcr, int active)
{
    struct rtsx_cr_option *option = &(pcr->option);
    u32 interrupt = rtsx_pci_readl(pcr, RTSX_BIPR);
    int card_exist = (interrupt & SD_EXIST) | (interrupt & MS_EXIST);
    int aspm_L1_1, aspm_L1_2;
    u8 val = 0;
    aspm_L1_1 = rtsx_check_dev_flag(pcr, ASPM_L1_1_EN);
    aspm_L1_2 = rtsx_check_dev_flag(pcr, ASPM_L1_2_EN);
    if (active) {
        /* Run, latency: 60us */
        if (aspm_L1_1)
            val = option->ltr_l1off_snooze_sspwrage;
    } else {
        /* L1off, latency: 300us */
        if (aspm_L1_2)
            val = option->ltr_l1off_sspwrage;
    }
    if (aspm_L1_1 || aspm_L1_2) {
        if (rtsx_check_dev_flag(pcr, LTR_L1SS_PWR_GATE_CHECK_CARD_EN)) {
            if (card_exist)
                val &= ~L1OFF_MBIAS2_EN_5250;
            else
                val |= L1OFF_MBIAS2_EN_5250;
        }
        rtsx_set_l1off_sub(pcr, val);
    }
}

static const struct pcr_ops rts524a_pcr_ops = {
    .write_phy = rts524a_write_phy,
    .read_phy = rts524a_read_phy,
    .fetch_vendor_settings = rtsx_base_fetch_vendor_settings,
    .extra_init_hw = rts524a_extra_init_hw,
    .optimize_phy = rts524a_optimize_phy,
    .turn_on_led = rtsx_base_turn_on_led,
    .turn_off_led = rtsx_base_turn_off_led,
    .enable_auto_blink = rtsx_base_enable_auto_blink,
    .disable_auto_blink = rtsx_base_disable_auto_blink,
    .card_power_on = rtsx_base_card_power_on,
+.card_power_off = rtsx_base_card_power_off,
+.switch_output_voltage = rtsx_base_switch_output_voltage,
+.force_power_down = rtsx_base_force_power_down,
+.set_11off_cfg_sub_d0 = rts5250_set_11off_cfg_sub_d0,
+.set_aspm = rts5249_set_aspm,
+};
+
+void rts524a_init_params(struct rtsx_pcr *pcr)
+{
+  rts5249_init_params(pcr);
+  pcr->tx_initial_phase = SET_CLOCK_PHASE(27, 29, 11);
+  pcr->option.ltr_11off_sspwrgate = LTR_L1OFF_SSPWRGATE_5250_DEF;
+  pcr->option.ltr_11off_snooze_sspwrgate =
+    LTR_L1OFF_SNOOZE_SSPWRGATE_5250_DEF;
+  pcr->reg_pm_ctrl3 = RTS524A_PM_CTRL3;
+  pcr->ops = &rts524a_pcr_ops;
+  ++
+  if (pcr->option.ocp_en)
+    pcr->hw_param.interrupt_en |= SD_OC_INT_EN;
+  pcr->hw_param.ocp_glitch = SD_OCP_GLITCH_10M;
+  pcr->option.sd_800mA_ocp_thd = RTS524A_OCP_THD_800;
+  ++
+  ++
+
+static int rts525a_card_power_on(struct rtsx_pcr *pcr, int card)
+{
+  rtsx_pci_write_register(pcr, LDO_VCC_CFG1,
+    LDO_VCC_TUNE_MASK, LDO_VCC_3V3);
+  return rtsx_base_card_power_on(pcr, card);
+  ++
+}
+
+static int rts525a_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
+{
+  switch (voltage) {
+    case OUTPUT_3V3:
+      rtsx_pci_write_register(pcr, LDO_CONFIG2,
+        LDO_D3318_MASK, LDO_D3318_33V);
+      rtsx_pci_write_register(pcr, SD_PAD_CTL, SD_IO_USING_1V8, 0);
+      break;
+    case OUTPUT_1V8:
+      rtsx_pci_write_register(pcr, LDO_CONFIG2,
+        LDO_D3318_MASK, LDO_D3318_18V);
+      rtsx_pci_write_register(pcr, SD_PAD_CTL, SD_IO_USING_1V8,
+        SD_IO_USING_1V8);
+      break;
+    default:
+return -EINVAL;
+
+rtsx_pci_init_cmd(pcr);
+rt5249_fill_driving(pcr, voltage);
+return rtvx_pci_send_cmd(pcr, 100);
+
+static int rts525a_optimize_phy(struct rtvx_pcr *pcr)
+
+
+static int rts525a_optimize_phy(struct rtvx_pcr *pcr)
+
+
+static int rts525a_optimize_phy(struct rtvx_pcr *pcr)
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+ */
+
+ #include <linux/module.h>
+ #include <linux/delay.h>
+ #include <linux/rtsx_pci.h>
+
+ #include "rts5260.h"
+ #include "rtsx_pcr.h"
+
+ static u8 rts5260_get_ic_version(struct rtsx_pcr *pcr)
+ {
+  u8 val;
+
+  rtsx_pci_read_register(pcr, DUMMY_REG_RESET_0, &val);
+  return val & IC_VERSION_MASK;
+ }
+
+ static void rts5260_fill_driving(struct rtsx_pcr *pcr, u8 voltage)
+ {
+  u8 driving_3v3[6][3] = {
+    {0x94, 0x94, 0x94},
+    {0x11, 0x11, 0x18},
+    {0x55, 0x55, 0x5C},
+    {0x94, 0x94, 0x94},
+    {0x94, 0x94, 0x94},
+    {0xFF, 0xFF, 0xFF},
+  };
+  u8 driving_1v8[6][3] = {
+{0x9A, 0x89, 0x89},
+{0xC4, 0xC4, 0xC4},
+{0x3C, 0x3C, 0x3C},
+{0x9B, 0x99, 0x99},
+{0x9A, 0x89, 0x89},
+{0xFE, 0xFE, 0xFE},
+};
+u8 (*driving)[3], drive_sel;
+
+if (voltage == OUTPUT_3V3) {
+driving = driving_3v3;
+drive_sel = pcr->sd30_drive_sel_3v3;
+} else {
+driving = driving_1v8;
+drive_sel = pcr->sd30_drive_sel_1v8;
+}
+
+rtsx_pci_write_register(pcr, SD30_CLK_DRIVE_SEL,
+ 0xFF, driving[drive_sel][0]);
+
+rtsx_pci_write_register(pcr, SD30_CMD_DRIVE_SEL,
+ 0xFF, driving[drive_sel][1]);
+
+rtsx_pci_write_register(pcr, SD30_CMD_DRIVE_SEL,
+ 0xFF, driving[drive_sel][2]);
+
+
+static void rtsx_base_fetch_vendor_settings(struct rtsx_pcr *pcr)
+{
+u32 reg;
+
+rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG1, &reg);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x
", PCR_SETTING_REG1, reg);
+
+if (!rtsx_vendor_setting_valid(reg)) {
+pcr_dbg(pcr, "skip fetch vendor setting\n");
+return;
+}
+
+pcr->aspm_en = rtsx_reg_to_aspm(reg);
+pcr->sd30_drive_sel_1v8 = rtsx_reg_to_sd30_drive_sel_1v8(reg);
+pcr->card_drive_sel &= 0x3F;
+pcr->card Drive sel |= rtsx_reg_to_card_drive_sel(reg);
+
+rtsx_pci_read_config_dword(pcr, PCR_SETTING_REG2, &reg);
+pcr_dbg(pcr, "Cfg 0x%x: 0x%x\n", PCR_SETTING_REG2, reg);
+pcr->sd30_drive_sel_3v3 = rtsx_reg_to_sd30_drive sel_3v3(reg);
+if (rtsx_reg_check_reverse_socket(reg))
+pcr->flags |= PCR_REVERSE_SOCKET;
+
+static void rtsx_base_force_power_down(struct rtsx_pcr *pcr, u8 pm_state)
+{
+/* Set relink_time to 0 */
+rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 1, MASK_8_BIT_DEF, 0);
+rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 2, MASK_8_BIT_DEF, 0);
+rtsx_pci_write_register(pcr, AUTOLOAD_CFG_BASE + 3,
+RELINK_TIME_MASK, 0);
+
+if (pm_state == HOST_ENTER_S3)
+rtsx_pci_write_register(pcr, pcr->reg_pm_ctrl3,
+D3_DELINK_MODE_EN, D3_DELINK_MODE_EN);
+
+rtsx_pci_write_register(pcr, FPDCTL, ALL_POWER_DOWN, ALL_POWER_DOWN);
+}
+
+static int rtsx_base_enable_auto_blink(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, OLT_LED_CTL,
+LED_SHINE_MASK, LED_SHINE_EN);
+}
+
+static int rtsx_base_disable_auto_blink(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, OLT_LED_CTL,
+LED_SHINE_MASK, LED_SHINE_DISABLE);
+}
+
+static int rts5260_turn_on_led(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, RTS5260_REG_GPIO_CTL0,
+RTS5260_REG_GPIO_MASK, RTS5260_REG_GPIO_ON);
+}
+
+static int rts5260_turn_off_led(struct rtsx_pcr *pcr)
+{
+return rtsx_pci_write_register(pcr, RTS5260_REG_GPIO_CTL0,
+RTS5260_REG_GPIO_MASK, RTS5260_REG_GPIO_OFF);
+}
+
+/* SD Pull Control Enable:
+ *     SD_DAT[3:0] ==> pull up
+ *     SD_CD      ==> pull up
+ *     SD_WP      ==> pull up
+ *     SD_CMD     ==> pull up
+ *     SD_CLK     ==> pull down
static const u32 rts5260_sd_pull_ctl_enable_tbl[] = {
  RTSX_REG_PAIR(CARD_PULL_CTL1, 0x66),
  RTSX_REG_PAIR(CARD_PULL_CTL2, 0xAA),
  RTSX_REG_PAIR(CARD_PULL_CTL3, 0xE9),
  RTSX_REG_PAIR(CARD_PULL_CTL4, 0xAA),
  0,
};

/* SD Pull Control Disable:
 *     SD_DAT[3:0] ==> pull down
 *     SD_CD       ==> pull up
 *     SD_WP       ==> pull down
 *     SD_CMD      ==> pull down
 *     SD_CLK      ==> pull down
 */
static const u32 rts5260_sd_pull_ctl_disable_tbl[] = {
  RTSX_REG_PAIR(CARD_PULL_CTL1, 0x66),
  RTSX_REG_PAIR(CARD_PULL_CTL2, 0x55),
  RTSX_REG_PAIR(CARD_PULL_CTL3, 0xD5),
  RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
  0,
};

/* MS Pull Control Enable:
 *     MS CD       ==> pull up
 *     others      ==> pull down
 */
static const u32 rts5260_ms_pull_ctl_enable_tbl[] = {
  RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
  RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
  RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
  0,
};

/* MS Pull Control Disable:
 *     MS CD       ==> pull up
 *     others      ==> pull down
 */
static const u32 rts5260_ms_pull_ctl_disable_tbl[] = {
  RTSX_REG_PAIR(CARD_PULL_CTL4, 0x55),
  RTSX_REG_PAIR(CARD_PULL_CTL5, 0x55),
  RTSX_REG_PAIR(CARD_PULL_CTL6, 0x15),
  0,
};

static int sd_set_sample_push_timing_sd30(struct rtsx_pcr *pcr)
+rtsx_pci_write_register(pcr, SD_CFG1, SD_MODE_SELECT_MASK
+ | SD_ASYNC_FIFO_NOT_RST, SD_30_MODE | SD_ASYNC_FIFO_NOT_RST);
+rtsx_pci_write_register(pcr, CLK_CTL, CLK_LOW_FREQ, CLK_LOW_FREQ);
+rtsx_pci_write_register(pcr, CARD_CLK_SOURCE, 0xFF,
+CRC_VAR_CLK0 | SD30_FIX_CLK | SAMPLE_VAR_CLK1);
+rtsx_pci_write_register(pcr, CLK_CTL, CLK_LOW_FREQ, 0);
+
+return 0;
+
+static int rts5260_card_power_on(struct rtsx_pcr *pcr, int card)
+
+{ +
+int err = 0;
+struct rtsx_cr_option *option = &pcr->option;
+ +
+if (option->ocp_en)
+rtsx_pci_enable_ocp(pcr);
+
+
+rtsx_pci_write_register(pcr, LDO_CONFIG2, DV331812_VDD1, DV331812_VDD1);
+rtsx_pci_write_register(pcr, LDO_VCC_CFG0,
+ RTS5260_DVCC_TUNE_MASK, RTS5260_DVCC_33);
+
+rtsx_pci_write_register(pcr, LDO_VCC_CFG1, LDO_POW_SDVDD1_MASK,
+LDO_POW_SDVDD1_ON);
+
+rtsx_pci_write_register(pcr, LDO_CONFIG2,
+ DV331812_POWERON, DV331812_POWERON);
+msleep(20);
+
+if (pcr->extra_caps & EXTRA_CAPS_SD_SDR50 ||
+ pcr->extra_caps & EXTRA_CAPS_SD_SDR104)
+sd_set_sample_push_timing_sd30(pcr);
+
+/* Initialize SD_CFG1 register */
+rtsx_pci_write_register(pcr, SD_CFG1, 0xFF,
+SD_CLK_DIVIDE_128 | SD_20_MODE);
+
+rtsx_pci_write_register(pcr, SD_SAMPLE_POINT_CTL,
+0xFF, SD20_RX_POS_EDGE);
+rtsx_pci_write_register(pcr, SD_PUSH_POINT_CTL, 0xFF, 0);
+rtsx_pci_write_register(pcr, CARD_STOP, SD_STOP | SD_CLR_ERR,
+SD_STOP | SD_CLR_ERR);
+
+/* Reset SD_CFG3 register */
+rtsx_pci_write_register(pcr, SD_CFG3, SD30_CLK_END_EN, 0);
+rtsx_pci_write_register(pcr, REG_SD_STOP_SDCLK_CFG,
+SD30_CLK_STOP_CFG_EN | SD30_CLK_STOP_CFG1 |
+SD30_CLK_STOP_CFG0, 0);
+
+rtsx_pci_write_register(pcr, REG_PRE_RW_MODE, EN_INFINITE_MODE, 0);
+
+return err;
+
+
+static int rts5260_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
+
+
+switch (voltage) {
+case OUTPUT_3V3:
+  +rtsx_pci_write_register(pcr, LDO_CONFIG2,
+    +DV331812_VDD1, DV331812_VDD1);
+  +rtsx_pci_write_register(pcr, LDO_DV18_CFG,
+    +DV331812_MASK, DV331812_33);
+  +rtsx_pci_write_register(pcr, SD_PAD_CTL, SD_IO_USING_1V8, 0);
+    +break;
+  case OUTPUT_1V8:
+    +rtsx_pci_write_register(pcr, LDO_CONFIG2,
+      +DV331812_VDD1, DV331812_VDD1);
+    +rtsx_pci_write_register(pcr, LDO_DV18_CFG,
+      +DV331812_MASK, DV331812_17);
+    +rtsx_pci_write_register(pcr, SD_PAD_CTL, SD_IO_USING_1V8,
+      +SD_IO_USING_1V8);
+    +break;
+    +default:
+    +return -EINVAL;
+  +}
+  /* set pad drive */
+  +rtsx5260_fill_driving(pcr, voltage);
+  +
+  +return 0;
+  +}
+
+static void rts5260_stop_cmd(struct rtsx_pcr *pcr)
+
+
+{ rttx_pci_writel(pcr, RTSX_HCBCTRLR, STOP_CMD);
+  rttx_pci_writel(pcr, RTSX_HDBCTRLR, STOP_DMA);
+  rttx_pci_write_register(pcr, RTS5260_DMA_RST_CTL_0,
+    +RTS5260_DMA_RST | RTS5260_ADMA3_RST,
+    +RTS5260_DMA_RST | RTS5260_ADMA3_RST);
+  rttx_pci_write_register(pcr, RBCTL, RB_FLUSH, RB_FLUSH);
+  +}
+  +static void rts5260_card_before_power_off(struct rtsx_pcr *pcr)
+  +{
+    +rttx5260_stop_cmd(pcr);
+  +}
+rts5260_switch_output_voltage(pcr, OUTPUT_3V3);
+
+
+static int rts5260_card_power_off(struct rtsx_pcr *pcr, int card)
+{
+  int err = 0;
+
+  rts5260_card_before_power_off(pcr);
+  err = rtsx_pci_write_register(pcr, LDO_VCC_CFG1,
+    LDO_POW_SDVDD1_MASK, LDO_POW_SDVDD1_OFF);
+  err = rtsx_pci_write_register(pcr, LDO_CONFIG2,
+    DV331812_POWERON, DV331812_POWEROFF);
+  if (pcr->option.ocp_en)
+    rtsx_pci_disable_ocp(pcr);
+  +
+  return err;
+}
+
+
+static void rts5260_init_ocp(struct rtsx_pcr *pcr)
+{
+  struct rtsx_cr_option *option = &pcr->option;
+
+  if (option->ocp_en) {
+    u8 mask, val;
+    +
+    rtsx_pci_write_register(pcr, RTS5260_DVCC_CTRL,
+      RTS5260_DVCC_OCP_THD_MASK,
+      option->sd_800mA_ocp_thd);
+    +
+    rtsx_pci_write_register(pcr, RTS5260_DV331812_CFG,
+      RTS5260_DV331812_OCP_THD_MASK,
+      RTS5260_DV331812_OCP_THD_270);
+    +
+    mask = SD_OCP_GLITCH_MASK;
+    val = pcr->hw_param.ocp_glitch;
+    rtsx_pci_write_register(pcr, REG_OCPGLITCH, mask, val);
+    rtsx_pci_write_register(pcr, RTS5260_DVCC_CTRL,
+      RTS5260_DVCC_OCP_EN |
+      RTS5260_DVCC_OCP_CL_EN,
+      RTS5260_DVCC_OCP_CL_EN |
+      RTS5260_DVCC_OCP_CL_EN);
+    +
+    rtsx_pci_enable_ocp(pcr);
+  } else {
+    rtsx_pci_write_register(pcr, RTS5260_DVCC_CTRL,
+      RTS5260_DVCC_OCP_EN |
+ RTS5260_DVCC_OCP_CL_EN, 0);
+
+
+ static void rts5260_enable_ocp(struct rtsx_pcr *pcr)
+ {
+     u8 val = 0;
+     + val = SD_OCP_INT_EN | SD_DETECT_EN;
+     rtsx_pci_write_register(pcr, REG_OCPCTL, 0xFF, val);
+     +
+ }
+
+ static void rts5260_disable_ocp(struct rtsx_pcr *pcr)
+ {
+     u8 mask = 0;
+     + mask = SD_OCP_INT_EN | SD_DETECT_EN;
+     rtsx_pci_write_register(pcr, REG_OCPCTL, mask, 0);
+     +
+ }
+
+ static int rts5260_get_ocpstat(struct rtsx_pcr *pcr, u8 *val)
+ {
+     return rtsx_pci_read_register(pcr, REG_OCPSTAT, val);
+     +
+ }
+
+ static int rts5260_get_ocpstat2(struct rtsx_pcr *pcr, u8 *val)
+ {
+     return rtsx_pci_read_register(pcr, REG_DV3318_OCPSTAT, val);
+     +
+ }
+
+ static void rts5260_clear_ocpstat(struct rtsx_pcr *pcr)
+ {
+     u8 mask = 0;
+     u8 val = 0;
+     +
+     mask = SD_OCP_INT_CLR | SD_OC_CLR;
+     val = SD_OCP_INT_CLR | SD_OC_CLR;
+     rtsx_pci_write_register(pcr, REG_OCPCTL, mask, val);
+     +
+     rtsx_pci_write_register(pcr, REG_OCPCTL, mask, val);
+     +
+     rtsx_pci_write_register(pcr, REG_DV3318_OCPCTL, mask, val);
+     +
+     rtsx_pci_write_register(pcr, REG_DV3318_OCPCTL, mask, val);
+     +
+     rtsx_pci_write_register(pcr, REG_DV3318_OCPCTL, mask, 0);
+     +
+     rtsx_pci_write_register(pcr, REG_DV3318_OCPCTL, mask, 0);
+DV3318_OCP_INT_CLR | DV3318_OCP_CLR, 0);
+
+static void rts5260_process_ocp(struct rtsx_pcr *pcr)
+{
+    if (!pcr->option.ocp_en)
+        return;
+
+    rtsx_pci_get_ocpstat(pcr, &pcr->ocp_stat);
+    rts5260_get_ocpstat2(pcr, &pcr->ocp_stat2);
+
+    if ((pcr->ocp_stat & (SD_OC_NOW | SD_OC_EVER)) ||
+        (pcr->ocp_stat2 & (DV3318_OCP_NOW | DV3318_OCP_EVER))) {
+        rtsx_pci_card_power_off(pcr, RTSX_SD_CARD);
+        rtsx_pci_write_register(pcr, CARD_OE, SD_OUTPUT_EN, 0);
+        rtsx_pci_clear_ocpstat(pcr);
+        pcr->ocp_stat = 0;
+        pcr->ocp_stat2 = 0;
+    }
+
+    /*
+     * static int rts5260_init_hw(struct rtsx_pcr *pcr)
+     */
+    +int err;
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    /*
+     */
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    # Rest L1SUB Config */
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, L1SUB_CONFIG3, 0xFF, 0x00);
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PM_CLK_FORCE_CTL,
+        CLK_PM_EN, CLK_PM_EN);
+    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, OBFF_CFG,
err = rtsx_pci_send_cmd(pcr, CMD_TIMEOUT_DEF);
if (err < 0)
    return err;

rtsx_pci_init_ocp(pcr);

return 0;

static void rts5260_pwr_saving_setting(struct rtsx_pcr *pcr)
{
int lss_l1_1, lss_l1_2;

lss_l1_1 = rtsx_check_dev_flag(pcr, ASPM_L1_1_EN)
    | rtsx_check_dev_flag(pcr, PM_L1_1_EN);

lss_l1_2 = rtsx_check_dev_flag(pcr, ASPM_L1_2_EN)
    | rtsx_check_dev_flag(pcr, PM_L1_2_EN);

rtsx_pci_write_register(pcr, ASPM_FORCE_CTL, 0xFF, 0);
if (lss_l1_2) {
    pcr_dbg(pcr, "Set parameters for L1.2.");
    rtsx_pci_write_register(pcr, PWR_GLOBAL_CTRL,
        0xFF, PCIE_L1_2_EN);
    rtsx_pci_write_register(pcr, RTS5260_DVCC_CTRL,
        RTS5260_DVCC_OCP_EN |
        RTS5260_DVCC_OCP_CL_EN,
        RTS5260_DVCC_OCP_EL_EN,
        RTS5260_DVCC_OCP_CL_EL_EN);
    
    rtsx_pci_write_register(pcr, PWR_FE_CTL,
        0xFF, PCIE_L1_2_PD_FE_EN);
} else if (lss_l1_1) {
    pcr_dbg(pcr, "Set parameters for L1.1.");
    rtsx_pci_write_register(pcr, PWR_GLOBAL_CTRL,
        0xFF, PCIE_L1_1_EN);
    rtsx_pci_write_register(pcr, PWR_FE_CTL,
        0xFF, PCIE_L1_1_PD_FE_EN);
} else {
    pcr_dbg(pcr, "Set parameters for L1.");
    rtsx_pci_write_register(pcr, PWR_GLOBAL_CTRL,
        0xFF, PCIE_L1_0_EN);
    rtsx_pci_write_register(pcr, PWR_FE_CTL,
        0xFF, PCIE_L1_0_PD_FE_EN);
}

rtsx_pci_write_register(pcr, CFG_L1_0_PCIE_DPHY_RET_VALUE,
+0xFF, CFG_L1_0_RET_VALUE_DEFAULT);
+rttx_pci_write_register(pcr, CFG_L1_0_PCIE_MAC_RET_VALUE,
+0xFF, CFG_L1_0_RET_VALUE_DEFAULT);
+rttx_pci_write_register(pcr, CFG_L1_0_CRC_SD30_RET_VALUE,
+0xFF, CFG_L1_0_RET_VALUE_DEFAULT);
+rttx_pci_write_register(pcr, CFG_L1_0_CRC_SD40_RET_VALUE,
+0xFF, CFG_L1_0_RET_VALUE_DEFAULT);
+rttx_pci_write_register(pcr, CFG_L1_0_SYS_RET_VALUE,
+0xFF, CFG_L1_0_RET_VALUE_DEFAULT);
+/*Option cut APHY*/
+rttx_pci_write_register(pcr, CFG_PCIE_APHY_OFF_0,
+0xFF, CFG_PCIE_APHY_OFF_0_DEFAULT);
+rttx_pci_write_register(pcr, CFG_PCIE_APHY_OFF_1,
+0xFF, CFG_PCIE_APHY_OFF_1_DEFAULT);
+rttx_pci_write_register(pcr, CFG_PCIE_APHY_OFF_2,
+0xFF, CFG_PCIE_APHY_OFF_2_DEFAULT);
+rttx_pci_write_register(pcr, CFG_PCIE_APHY_OFF_3,
+0xFF, CFG_PCIE_APHY_OFF_3_DEFAULT);
+/*CDR DEC*/
+rttx_pci_write_register(pcr, PWC_CDR, 0xFF, PWC_CDR_DEFAULT);
+/*PWMPFM*/
+rttx_pci_write_register(pcr, CFG_LP_FPWM_VALUE,
+0xFF, CFG_LP_FPWM_VALUE_DEFAULT);
+/*No Power Saving WA*/
+rttx_pci_write_register(pcr, CFG_L1_0_CRC_MISC_RET_VALUE,
+0xFF, CFG_L1_0_CRC_MISC_RET_VALUE_DEFAULT);
+
+
+static void rts5260_init_from_cfg(struct rtsx_pcr *pcr)
{+
+    struct rtsx_cr_option *option = &pcr->option;
+    u32 lval;
+
+    rttx_pci_read_config_dword(pcr, PCR_ASPM_SETTING_5260, &lval);
+
+    if (lval & ASPM_L1_1_EN_MASK)
+        rttx_set_dev_flag(pcr, ASPM_L1_1_EN);
+
+    if (lval & ASPM_L1_2_EN_MASK)
+        rttx_set_dev_flag(pcr, ASPM_L1_2_EN);
+
+    if (lval & PM_L1_1_EN_MASK)
+        rttx_set_dev_flag(pcr, PM_L1_1_EN);
+
+    if (lval & PM_L1_2_EN_MASK)
+        rttx_set_dev_flag(pcr, PM_L1_2_EN);
+
+    rts5260_pwr_saving_setting(pcr);
+ if (option->ltr_en) {
+ u16 val;
+ + pcie_capability_read_word(pcr->pci, PCI_EXP_DEVCTL2, &val);
+ if (val & PCI_EXP_DEVCTL2_LTR_EN) {
+ option->ltr_enabled = true;
+ option->ltr_active = true;
+ rtsx_set_ltr_latency(pcr, option->ltr_active_latency);
+ } else {
+ option->ltr_enabled = false;
+ }
+ }
+
+ if (rtsx_check_dev_flag(pcr, ASPM_L1_1_EN | ASPM_L1_2_EN
+ PM_L1_1_EN | PM_L1_2_EN))
+ option->force_clkreq_0 = false;
+ else
+ option->force_clkreq_0 = true;
+ }
+
+static int rts5260_extra_init_hw(struct rtsx_pcr *pcr)
+{
+ struct rtsx_cr_option *option = &pcr->option;
+ +/* Set mcu_cnt to 7 to ensure data can be sampled properly */
+ rtsx_pci_write_register(pcr, 0xFC03, 0x7F, 0x07);
+ rtsx_pci_write_register(pcr, SSC_DIV_N_0, 0xFF, 0x5D);
+ rts5260_init_from_cfg(pcr);
+ + /* force no MDIO*/
+ rtsx_pci_write_register(pcr, RTS5260_AUTOLOAD_CFG4,
+ 0xFF, RTS5260_MIMO_DISABLE);
+ /*Modify SDVCC Tune Default Parameters!*/
+ rtsx_pci_write_register(pcr, LDO_VCC_CFG0,
+ RTS5260_DVCC_TUNE_MASK, RTS5260_DVCC_33);
+ + rtsx_pci_write_register(pcr, PCLK_CTL, PCLK_MODE_SEL, PCLK_MODE_SEL);
+ + rts5260_init_hw(pcr);
+ + /*
+ * If u_force_clkreq_0 is enabled, CLKREQ# PIN will be forced
+ * to drive low, and we forcibly request clock.
+ */
+ if (option->force_clkreq_0)
+ rtsx_pci_write_register(pcr, PETXCFG,
+ FORCE_CLKREQ_DELINK_MASK, FORCE_CLKREQ_LOW);
+else
+rtsx_pci_write_register(pcr, PETXCFG,
+ FORCE_CLKREQ_DELINK_MASK, FORCE_CLKREQ_HIGH);
+
+return 0;
+
+static void rts5260_set_aspm(struct rtsx_pcr *pcr, bool enable)
+{
+struct rtsx_cr_option *option = &pcr->option;
+u8 val = 0;
+
+if (pcr->aspm_enabled == enable)
+return;
+
+if (option->dev_aspm_mode == DEV_ASPM_DYNAMIC) {
+if (enable)
+val = pcr->aspm_en;
+rtsx_pci_update_cfg_byte(pcr, pcr->pcie_cap + PCI_EXP_LNKCTL,
+ ASPM_MASK_NEG, val);
+} else if (option->dev_aspm_mode == DEV_ASPM_BACKDOOR) {
+u8 mask = FORCE_ASPM_VAL_MASK | FORCE_ASPM_CTL0;
+
+if (!enable)
+val = FORCE_ASPM_CTL0;
+rtsx_pci_write_register(pcr, ASPM_FORCE_CTL, mask, val);
+
+pcr->aspm_enabled = enable;
+}
+
+static void rts5260_set_l1off_cfg_sub_d0(struct rtsx_pcr *pcr, int active)
+{
+struct rtsx_cr_option *option = &pcr->option;
+u32 interrupt = rtsx_pci_readl(pcr, RTSX_BIPR);
+int card_exist = (interrupt & SD_EXIST) | (interrupt & MS_EXIST);
+int aspm_L1_1, aspm_L1_2;
+u8 val = 0;
+
+aspm_L1_1 = rtsx_check_dev_flag(pcr, ASPM_L1_1_EN);
+aspm_L1_2 = rtsx_check_dev_flag(pcr, ASPM_L1_2_EN);
+
+if (active) {
+/* run, latency: 60us */
+if (aspm_L1_1)
+val = option->ltr_l1off_snooze_sspwrage;
+} else {
/* l1off, latency: 300us */
+if (aspm_L1_2)
+val = option->ltr_l1off_sspwrngate;
+
+if (aspm_L1_1 || aspm_L1_2) {
+if (rtsx_check_dev_flag(pcr,
+LTR_L1SS_PWR_GATE_CHECK_CARD_EN)) {
+if (card.exist)
+val &= ~L1OFF_MBIAS2_EN_5250;
+else
+val |= L1OFF_MBIAS2_EN_5250;
+}
+}
+}
+}
+}
+}
+rtsx_set_l1off_sub(pcr, val);
+
+static const struct pcr_ops rts5260_pcr_ops = {
+.fetch_vendor_settings = rtsx_base_fetch_vendor_settings,
+.turn_on_led = rtsx5260_turn_on_led,
+.turn_off_led = rtsx5260_turn_off_led,
+.extra_init_hw = rtsx5260_extra_init_hw,
+.enable_auto_blink = rtsx_base_enable_auto_blink,
+.disable_auto_blink = rtsx_base_disable_auto_blink,
+.card_power_on = rtsx5260_card_power_on,
+.card_power_off = rtsx5260_card_power_off,
+.switch_output_voltage = rtsx5260_switch_output_voltage,
+.force_power_down = rtsx_base_force_power_down,
+.stop_cmd = rtsx5260_stop_cmd,
+.set_aspm = rtsx5260_set_aspm,
+.set_l1off_cfg_sub_d0 = rtsx5260_set_l1off_cfg_sub_d0,
+.enable_ocp = rtsx5260_enable_ocp,
+.disable_ocp = rtsx5260_disable_ocp,
+.init_ocp = rtsx5260_init_ocp,
+.process_ocp = rtsx5260_process_ocp,
+.get_ocpstat = rtsx5260_get_ocpstat,
+.clear_ocpstat = rtsx5260_clear_ocpstat,
+};
+
+void rtsx5260_init_params(struct rtsx_pcr *pcr)
+{
+struct rtsx_cr_option *option = &pcr->option;
+struct rtsx_hw_param *hw_param = &pcr->hw_param;
+
+pcr->extra_caps = EXTRA_CAPS_SD_SDR50 | EXTRA_CAPS_SD_SDR104;
+pcr->num_slots = 2;
+
+pcr->flags = 0;
+pcr->card_drive_sel = RTSX_CARD_DRIVE_DEFAULT;
+pcr->sd30_drive_sel_1v8 = CFG_DRIVER_TYPE_B;
+pcr->sd30_drive_sel_3v3 = CFG_DRIVER_TYPE_B;
+pcr->aspm_en = ASPM_L1_EN;
+pcr->tx_initial_phase = SET_CLOCK_PHASE(27, 29, 11);
+pcr->rx_initial_phase = SET_CLOCK_PHASE(24, 6, 5);
+
+pcr->ic_version = rts5260_get_ic_version(pcr);
+pcr->sd_pull_ctl_enable_tbl = rts5260_sd_pull_ctl_enable_tbl;
+pcr->sd_pull_ctl_disable_tbl = rts5260_sd_pull_ctl_disable_tbl;
+pcr->ms_pull_ctl_enable_tbl = rts5260_ms_pull_ctl_enable_tbl;
+pcr->ms_pull_ctl_disable_tbl = rts5260_ms_pull_ctl_disable_tbl;
+
+pcr->reg_pm_ctrl3 = RTS524A_PM_CTRL3;
+
+pcr->ops = &rts5260_pcr_ops;
+
+option->dev_flags = (LTR_L1SS_PWR_GATE_CHECK_CARD_EN
+| LTR_L1SS_PWR_GATE_EN);
+option->ltr_en = true;
+
+/* init latency of active, idle, L1OFF to 60us, 300us, 3ms */
+option->ltr_active_latency = LTR_ACTIVE_LATENCY_DEF;
+option->ltr_idle_latency = LTR_IDLE_LATENCY_DEF;
+option->ltr_l1off_latency = LTR_L1OFF_LATENCY_DEF;
+option->dev_aspm_mode = DEV_ASPM_DYNAMIC;
+option->l1_snooze_delay = L1_SNOOZE_DELAY_DEF;
+option->ltr_l1off_sspwrigrate = LTR_L1OFF_SSPWRCATE_5250_DEF;
+option->ltr_l1off_snooze_sspwrigrate =
+LTR_L1OFF_SNOOZE_SSPWRCATE_5250_DEF;
+
+option->ocp_en = 1;
+if (option->ocp_en)
+hw_param->interrupt_en |= SD_OCP_INT_EN;
+hw_param->ocp_glitch = SD_OCP_GLITCH_100U | SDVIO_OCP_GLITCH_800U;
+option->sd_400mA_ocp_thd = RTS5260_DVCC_OCP_THD_550;
+option->sd_800mA_ocp_thd = RTS5260_DVCC_OCP_THD_970;
+
--- linux-4.15.0.orig/drivers/misc/cardreader/rts5260.h
+++ linux-4.15.0/drivers/misc/cardreader/rts5260.h
@@ -0,0 +1,45 @@
+#ifndef __RTS5260_H__
+#define __RTS5260_H__
+#define __RTS5260_H__
+
+#define RTS5260_DVCC_CTRL0xFF73
+#define RTS5260_DVCC_OCP_EN(0x01 << 7)
+#define RTS5260_DVCC_OCP_THD_MASK(0x07 << 4)
+#define RTS5260_DVCC_POWERON(0x01 << 3)
+ * later version.
+ *
+ * This program is distributed in the hope that it will be useful, but
+ * WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
+ * General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License along
+ * with this program; if not, see <http://www.gnu.org/licenses/>.
+ *
+ * Author:
+ *   Wei WANG <wei_wang@realsil.com.cn>
+ */
+
+#include <linux/pci.h>
+#include <linux/module.h>
+#include <linux/slab.h>
+#include <linux/dma-mapping.h>
+#include <linux/highmem.h>
+#include <linux/interrupt.h>
+#include <linux/delay.h>
+#include <linux/idr.h>
+#include <linux/platform_device.h>
+#include <linux/mfd/core.h>
+#include <linux/rtsx_pci.h>
+#include <linux/mmc/card.h>
+#include <asm/unaligned.h>
+
+#include "rtsx_pcr.h"
+
+static bool msi_en = true;
+module_param(msi_en, bool, S_IRUGO | S_IWUSR);
+MODULE_PARM_DESC(msi_en, "Enable MSI");
+
+static DEFINE_IDR(rtsx_pci_idr);
+static DEFINE_SPINLOCK(rtsx_pci_lock);
+
+static struct mfd_cell rtsx_pcr_cells[] = {
+  [RTSX_SD_CARD] = {
+    .name = DRV_NAME_RTSX_PCI_SDMMC,
+  },
+  [RTSX_MS_CARD] = {
+    .name = DRV_NAME_RTSX_PCI_MS,
+  },
+};
+
+static const struct pci_device_id rtsx_pci_ids[] = {
+  { PCI_DEVICE(0x10EC, 0x5209), PCI_CLASS_OTHERS << 16, 0xFF0000 },
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+
	{ PCI_DEVICE(0x10EC, 0x5229), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x5289), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x5227), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x522A), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x5249), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x5287), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x5286), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x524A), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x525A), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ PCI_DEVICE(0x10EC, 0x5260), PCI_CLASS_OTHERS << 16, 0xFF0000 },
+
	{ 0, }
+};
+
+MODULE_DEVICE_TABLE(pci, rtsx_pci_ids);
+
+static inline void rtsx_pci_enable_aspm(struct rtsx_pcr *pcr)
+{
+rtsx_pci_update_cfg_byte(pcr, pcr->pcie_cap + PCI_EXP_LNKCTL,
+0xFC, pcr->aspm_en);
+}
+
+static inline void rtsx_pci_disable_aspm(struct rtsx_pcr *pcr)
+{
+rtsx_pci_update_cfg_byte(pcr, pcr->pcie_cap + PCI_EXP_LNKCTL,
+0xFC, 0);
+}
+
+int rtsx_comm_set_ltr_latency(struct rtsx_pcr *pcr, u32 latency)
+{
+rtsx_pci_write_register(pcr, MSGTXDATA0,
+MASK_8_BIT_DEF, (u8) (latency & 0xFF));
+rtsx_pci_write_register(pcr, MSGTXDATA1,
+MASK_8_BIT_DEF, (u8)((latency >> 8) & 0xFF));
+rtsx_pci_write_register(pcr, MSGTXDATA2,
+MASK_8_BIT_DEF, (u8)((latency >> 16) & 0xFF));
+rtsx_pci_write_register(pcr, MSGTXDATA3,
+MASK_8_BIT_DEF, (u8)((latency >> 24) & 0xFF));
+rtsx_pci_write_register(pcr, LTR_CTL, LTR_LATENCY_MODE_MASK | LTR_LATENCY_MODE_MASK, LTR_TX_EN_MASK | LTR_TX_EN_1 | LTR_LATENCY_MODE_SW);
+
+return 0;
+}
+
+int rtsx_set_ltr_latency(struct rtsx_pcr *pcr, u32 latency)
+{
+if (pcr->ops->set_ltr_latency)
+return pcr->ops->set_ltr_latency(pcr, latency);
+else
return rtsx_comm_set_ltr_latency(pcr, latency);
+
+static void rtsx_comm_set_aspm(struct rtsx_pcr *pcr, bool enable)
+{
+struct rtsx_cr_option *option = &pcr->option;
+
+if (pcr->aspm_enabled == enable)
+return;
+
+if (option->dev_aspm_mode == DEV_ASPM_DYNAMIC) {
+if (enable)
+rtsx_pci_enable_aspm(pcr);
+else
+rtsx_pci_disable_aspm(pcr);
+} else if (option->dev_aspm_mode == DEV_ASPM_BACKDOOR) {
+u8 mask = FORCE_ASPM_VAL_MASK;
+u8 val = 0;
+
+if (enable)
+val = pcr->aspm_en;
+rtsx_pci_write_register(pcr, ASPM_FORCE_CTL, mask, val);
+}
+
+pcr->aspm_enabled = enable;
+}
+
+static void rtsx_disable_aspm(struct rtsx_pcr *pcr)
+{
+if (pcr->ops->set_aspm)
+pcr->ops->set_aspm(pcr, false);
+else
+rtsx_comm_set_aspm(pcr, false);
+}
+
+int rtsx_set_l1off_sub(struct rtsx_pcr *pcr, u8 val)
+{
+rtsx_pci_write_register(pcr, L1SUB_CONFIG3, 0xFF, val);
+
+return 0;
+}
+
+void rtsx_set_l1off_sub_cfg_d0(struct rtsx_pcr *pcr, int active)
+{
+if (pcr->ops->set_l1off_cfg_sub_d0)
+pcr->ops->set_l1off_cfg_sub_d0(pcr, active);
+}
static void rtsx_comm_pm_full_on(struct rtsx_pcr *pcr)
{
    struct rtsx_cr_option *option = &pcr->option;
    rtsx_disable_aspm(pcr);

    /* Fixes DMA transfer timeout issue after disabling ASPM on RTS5260 */
    msleep(1);
    if (option->ltr_enabled)
        rtsx_set_ltr_latency(pcr, option->ltr_active_latency);
    if (rtsx_check_dev_flag(pcr, LTR_L1SS_PWR_GATE_EN))
        rtsx_set_l1off_sub_cfg_d0(pcr, 1);

    void rtsx_pm_full_on(struct rtsx_pcr *pcr)
    {
        if (pcr->ops->full_on)
            pcr->ops->full_on(pcr);
        else
            rtsx_comm_pm_full_on(pcr);
    }

    void rtsx_pci_start_run(struct rtsx_pcr *pcr)
    {
        /* If pci device removed, don't queue idle work any more */
        if (pcr->remove_pci)
            return;

        if (pcr->state != PDEV_STAT_RUN) {
            pcr->state = PDEV_STAT_RUN;
            if (pcr->ops->enable_auto_blink)
                pcr->ops->enable_auto_blink(pcr);
            rtsx_pm_full_on(pcr);
        }

        mod_delayed_work(system_wq, &pcr->idle_work, msecs_to_jiffies(200));
    }

    int rtsx_pci_write_register(struct rtsx_pcr *pcr, u16 addr, u8 mask, u8 data)
    {
        int i;
        u32 val = HAIMR_WRITE_START;
        val |= (u32)(addr & 0x3FFF) << 16;
        val |= (u32)mask << 8;
+val |= (u32)data;
+
+rtsx_pci_writel(pcr, RTSX_HAIMR, val);
+
+for (i = 0; i < MAX_RW_REG_CNT; i++) {
+val = rtsx_pci_readl(pcr, RTSX_HAIMR);
+if ((val & HAIMR_TRANS_END) == 0) {
+if (data != (u8)val)
+return -EIO;
+}
+}
+
+return -ETIMEDOUT;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_write_register);
+
+int rtsx_pci_read_register(struct rtsx_pcr *pcr, u16 addr, u8 *data)
+{
+u32 val = HAIMR_READ_START;
+int i;
+
+val |= (u32)(addr & 0x3FFF) << 16;
+rtsx_pci_writel(pcr, RTSX_HAIMR, val);
+
+for (i = 0; i < MAX_RW_REG_CNT; i++) {
+val = rtsx_pci_readl(pcr, RTSX_HAIMR);
+if ((val & HAIMR_TRANS_END) == 0)
+break;
+}
+
+if (i >= MAX_RW_REG_CNT)
+return -ETIMEDOUT;
+
+if (data)
+*data = (u8)(val & 0xFF);
+
+return 0;
+}
+
+EXPORT_SYMBOL_GPL(rtsx_pci_read_register);
+
+int __rtsx_pci_write_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 val)
+{
+int err, i, finished = 0;
+u8 tmp;
+
+rtsx_pci_init_cmd(pcr);
+}
int rtsx_pci_write_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 val)
{
    if (pcr->ops->write_phy)
        return pcr->ops->write_phy(pcr, addr, val);
    return __rtsx_pci_write_phy_register(pcr, addr, val);
}
EXPORT_SYMBOL_GPL(rtsx_pci_write_phy_register);

int __rtsx_pci_read_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 *val)
{
    int err, i, finished = 0;
    u16 data;
    u8 *ptr, tmp;

    rtsx_pci_init_cmd(pcr);
    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PHYADDR, 0xFF, addr);
    rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PHYRWCTL, 0xFF, 0x80);
    err = rtsx_pci_send_cmd(pcr, 100);
    if (err < 0)
        return err;
    for (i = 0; i < 100000; i++) {
        err = rtsx_pci_read_register(pcr, PHYRWCTL, &tmp);
        if (err < 0)
            return err;
        if (!(tmp & 0x80)) {
            finished = 1;
            break;
        }
    }
    if (!finished)
        return -ETIMEDOUT;
    return 0;
}
- return err;
+ 
+ for (i = 0; i < 100000; i++) {
+ err = rtsx_pci_read_register(pcr, PHYRWCTL, &tmp);
+ if (err < 0)
+ return err;
+ }
+ if (!(tmp & 0x80)) {
+ finished = 1;
+ break;
+ }
+ }
+ }
+ }
+ if (!finished)
+ return -ETIMEDOUT;
+ 
+ rtsx_pci_init_cmd(pcr);
+ 
+ rtsx_pci_add_cmd(pcr, READ_REG_CMD, PHYDATA0, 0, 0);
+ rtsx_pci_add_cmd(pcr, READ_REG_CMD, PHYDATA1, 0, 0);
+ 
+ err = rtsx_pci_send_cmd(pcr, 100);
+ if (err < 0)
+ return err;
+ 
+ ptr = rtsx_pci_get_cmd_data(pcr);
+ data = ((u16)ptr[1] << 8) | ptr[0];
+ 
+ if (val)
+ *val = data;
+ 
+ return 0;
+ }
+ 
+ int rtsx_pci_read_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 *val)
+ {
+ if (pcr->ops->read_phy)
+ return pcr->ops->read_phy(pcr, addr, val);
+ 
+ return __rtsx_pci_read_phy_register(pcr, addr, val);
+ }
+ EXPORT_SYMBOL_GPL(rtsx_pci_read_phy_register);
+ 
+ void rtsx_pci_stop_cmd(struct rtsx_pcr *pcr)
+ {
+ if (pcr->ops->stop_cmd)
+ return pcr->ops->stop_cmd(pcr);
+ 
+ Open Source Used In 5GaaS Edge AC-4 23433
+rtsx_pci_writel(pcr, RTSX_HCBCTRLR, STOP_CMD);
+rtsx_pci_writel(pcr, RTSX_HDBCTRLR, STOP_DMA);
+
+rtsx_pci_write_register(pcr, DMACTL, 0x80, 0x80);
+rtsx_pci_write_register(pcr, RBCTL, 0x80, 0x80);
+
+EXPORT_SYMBOL_GPL(rtsx_pci_stop_cmd);
+
+void rtsx_pci_add_cmd(struct rtsx_pcr *pcr,
+u8 cmd_type, u16 reg_addr, u8 mask, u8 data)
+{
+unsigned long flags;
+u32 val = 0;
+u32 *ptr = (u32 *)(pcr->host_cmds_ptr);
+
+val |= (u32)(cmd_type & 0x03) << 30;
+val |= (u32)(reg_addr & 0x3FFF) << 16;
+val |= (u32)mask << 8;
+val |= (u32)data;
+
+spin_lock_irqsave(&pcr->lock, flags);
.ptr += pcr->ci;
+if (pcr->ci < (HOST_CMDS_BUF_LEN / 4)) {
+put_unaligned_le32(val, ptr);
+ptr++;
+pcr->ci++;
+}
+spin_unlock_irqrestore(&pcr->lock, flags);
+}
+EXPORT_SYMBOL_GPL(rtsx_pci_add_cmd);
+
+void rtsx_pci_send_cmd_no_wait(struct rtsx_pcr *pcr)
+{
+u32 val = 1 << 31;
+
+rtsx_pci_writel(pcr, RTSX_HCBAR, pcr->host_cmds_addr);
+
+val |= (u32)(pcr->ci * 4) & 0x00FFFFFF;
+/* Hardware Auto Response */
+val |= 0x40000000;
+rtsx_pci_writel(pcr, RTSX_HCBCTRLR, val);
+}
+EXPORT_SYMBOL_GPL(rtsx_pci_send_cmd_no_wait);
+
+int rtsx_pci_send_cmd(struct rtsx_pcr *pcr, int timeout)
+{
+struct completion trans_done;
+u32 val = 1 << 31;
+long timeleft;
+unsigned long flags;
+int err = 0;
+
+spin_lock_irqsave(&pcr->lock, flags);
+
+/* set up data structures for the wakeup system */
+pcr->done = &trans_done;
+pcr->trans_result = TRANS_NOT_READY;
+init_completion(&trans_done);
+
+rtsx_pci_writel(pcr, RTSX_HCBAR, pcr->host_cmds_addr);
+
+val |= (u32)(pcr-ci * 4) & 0x00FFFFFF;
+/* Hardware Auto Response */
+val |= 0x40000000;
+rtsx_pci_writel(pcr, RTSX_HCBCTRL, val);
+
+spin_unlock_irqrestore(&pcr->lock, flags);
+
+/* Wait for TRANS_OK_INT */
+timeleft = wait_for_completion_interruptible_timeout(
+&trans_done, msecs_to_jiffies(timeout));
+if (timeleft <= 0) {
+pcre_dbg(pcr, "Timeout (%s %d)\n", __func__, __LINE__);
+err = -ETIMEDOUT;
+goto finish_send_cmd;
+}
+
+spin_lock_irqsave(&pcr->lock, flags);
+
+if (pcr->trans_result == TRANS_RESULT_FAIL)
+err = -EINVAL;
+else if (pcr->trans_result == TRANS_RESULT_OK)
+err = 0;
+else if (pcr->trans_result == TRANS_NO_DEVICE)
+err = -ENODEV;
+spin_unlock_irqrestore(&pcr->lock, flags);
+
++finish_send_cmd:
+spin_lock_irqsave(&pcr->lock, flags);
+pcr->done = NULL;
+spin_unlock_irqrestore(&pcr->lock, flags);
+
+if ((err < 0) && (err != -ENODEV))
+rtsx_pci_stop_cmd(pcr);
+
+if (pcr->finish_me)
+complete(pcr->finish_me);
+return err;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_send_cmd);
+
+static void rtsx_pci_add_sg_tbl(struct rtsx_pcr *pcr,
+    dma_addr_t addr, unsigned int len, int end)
+{
+    u64 *ptr = (u64 *)(pcr->host_sg_tbl_ptr) + pcr->sgi;
+    u64 val;
+    u8 option = SG_VALID | SG_TRANS_DATA;
+    pcr_dbg(pcr, "DMA addr: 0x%x, Len: 0x%x\n", (unsigned int)addr, len);
+    if (end)
+        option |= SG_END;
+    val = ((u64)addr << 32) | ((u64)len << 12) | option;
+    put_unaligned_le64(val, ptr);
+    pcr->sgi++;
+}
+
+int rtsx_pci_transfer_data(struct rtsx_pcr *pcr, struct scatterlist *sglist,
+    int num_sg, bool read, int timeout)
+{
+    int err = 0, count;
+    pcr_dbg(pcr, "-->
+    count = rtsx_pci_dma_map_sg(pcr, sglist, num_sg, read);
+    if (count < 1)
+        return -EINVAL;
+    pcr_dbg(pcr, "DMA mapping count: %d\n", count);
+    err = rtsx_pci_dma_transfer(pcr, sglist, count, read, timeout);
+    rtsx_pci_dma_unmap_sg(pcr, sglist, num_sg, read);
+    return err;
+}
+EXPORT_SYMBOL_GPL(rtsx_pci_transfer_data);
+
+int rtsx_pci_dma_map_sg(struct rtsx_pcr *pcr, struct scatterlist *sglist,
+    int num_sg, bool read)
+{
+    enum dma_data_direction dir = read ? DMA_FROM_DEVICE : DMA_TO_DEVICE;
+    if (pcr->remove_pci)
+        return -EINVAL;
+    pcr_dbg(pcr, "DMA addr: 0x%x, Len: 0x%x\n", (unsigned int)addr, len);
+    if (end)
+        option |= SG_END;
+    val = ((u64)addr << 32) | ((u64)len << 12) | option;
+    put_unaligned_le64(val, ptr);
+    pcr->sgi++;
+}
+
+int rtsx_pci_transfer_data(struct rtsx_pcr *pcr, struct scatterlist *sglist,
+    int num_sg, bool read, int timeout)
+{
+    int err = 0, count;
+    pcr_dbg(pcr, "-->
+    count = rtsx_pci_dma_map_sg(pcr, sglist, num_sg, read);
+    if (count < 1)
+        return -EINVAL;
+    pcr_dbg(pcr, "DMA mapping count: %d\n", count);
+    err = rtsx_pci_dma_transfer(pcr, sglist, count, read, timeout);
+    rtsx_pci_dma_unmap_sg(pcr, sglist, num_sg, read);
+    return err;
+}
+EXPORT_SYMBOL_GPL(rtsx_pci_transfer_data);
+
+int rtsx_pci_dma_map_sg(struct rtsx_pcr *pcr, struct scatterlist *sglist,
+    int num_sg, bool read)
+{
+    enum dma_data_direction dir = read ? DMA_FROM_DEVICE : DMA_TO_DEVICE;
+    if (pcr->remove_pci)
+        return -EINVAL;
+if ((sglist == NULL) || (num_sg <= 0))
+   return -EINVAL;
+
+return dma_map_sg(&(pcr->pci->dev), sglist, num_sg, dir);
+
+ EXPORT_SYMBOL_GPL(rtsx_pci_dma_map_sg);
+
+void rtsx_pci_dma_unmap_sg(struct rtsx_pcr *pcr, struct scatterlist *sglist,
+int num_sg, bool read)
+
+   enum dma_data_direction dir = read ? DMA_FROM_DEVICE : DMA_TO_DEVICE;
+
+   dma_unmap_sg(&(pcr->pci->dev), sglist, num_sg, dir);
+
+ EXPORT_SYMBOL_GPL(rtsx_pci_dma_unmap_sg);
+
+int rtsx_pci_dma_transfer(struct rtsx_pcr *pcr, struct scatterlist *sglist,
+int count, bool read, int timeout)
+
+   struct completion trans_done;
+   struct scatterlist *sg;
+   dma_addr_t addr;
+   long timeleft;
+   unsigned long flags;
+   unsigned int len;
+   int i, err = 0;
+   u32 val;
+   u8 dir = read ? DEVICE_TO_HOST : HOST_TO_DEVICE;
+
+   if (pcr->remove_pci)
+      return -ENODEV;
+
+   if ((sglist == NULL) || (count < 1))
+      return -EINVAL;
+
+   val = ((u32)(dir & 0x01) << 29) | TRIG_DMA | ADMA_MODE;
+   pcr->sgi = 0;
+   for_each_sg(sglist, sg, count, i) {
+       addr = sg_dma_address(sg);
+       len = sg_dma_len(sg);
+       rtsx_pci_add_sg_tbl(pcr, addr, len, i == count - 1);
+   }
+
+   spin_lock_irqsave(&pcr->lock, flags);
+
+   pcr->done = &trans_done;
+   pcr->trans_result = TRANS_NOT_READY;
init_completion(&trans_done);
+rtsx_pci_writel(pcr, RTSX_HDBAR, pcr->host_sg_tbl_addr);
+rtsx_pci_writel(pcr, RTSX_HDBCTRL, val);
+
+spin_unlock_irqrestore(&pcr->lock, flags);
+
+timeleft = wait_for_completion_interruptible_timeout(  
+&trans_done, msecs_to_jiffies(timeout));
+if (timeleft <= 0) {
    pcr_dbg(pcr, "Timeout (%s %d)\n", __func__, __LINE__);
    err = -ETIMEDOUT;
    goto out;
}
+
+spin_lock_irqsave(&pcr->lock, flags);
+if (pcr->trans_result == TRANS_RESULT_FAIL) {
    err = -EILSEQ;
    if (pcr->dma_error_count < RTS_MAX_TIMES_FREQ_REDUCTION)
        pcr->dma_error_count++;
}
+
+else if (pcr->trans_result == TRANS_NO_DEVICE)
    err = -ENODEV;
+spin_unlock_irqrestore(&pcr->lock, flags);
+
+out:
+spin_lock_irqsave(&pcr->lock, flags);
+pcr->done = NULL;
+spin_unlock_irqrestore(&pcr->lock, flags);
+
+if ((err < 0) && (err != -ENODEV))
    rtsx_pci_stop_cmd(pcr);
+
+if (pcr->finish_me)
    complete(pcr->finish_me);
+
+return err;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_dma_transfer);
+
+int rtsx_pci_read_ppbuf(struct rtsx_pcr *pcr, u8 *buf, int buf_len)
+{
    int err;
    int i, j;
    +u16 reg;
    +u8 *ptr;
    +
    +if (buf_len > 512)
buf_len = 512;
+
ptr = buf;
+reg = PPBUF_BASE2;
+for (i = 0; i < buf_len / 256; i++) {
+rtsx_pci_init_cmd(pcr);
+
+for (j = 0; j < 256; j++)
+rtsx_pci_add_cmd(pcr, READ_REG_CMD, reg++, 0, 0);
+
+err = rtsx_pci_send_cmd(pcr, 250);
+if (err < 0)
+return err;
+
+memcpy(ptr, rtsx_pci_get_cmd_data(pcr), 256);
+ptr += 256;
+}
+
+if (buf_len % 256) {
+rtsx_pci_init_cmd(pcr);
+
+for (j = 0; j < buf_len % 256; j++)
+rtsx_pci_add_cmd(pcr, READ_REG_CMD, reg++, 0, 0);
+
+err = rtsx_pci_send_cmd(pcr, 250);
+if (err < 0)
+return err;
+}
+
+memcpy(ptr, rtsx_pci_get_cmd_data(pcr), buf_len % 256);
+
+return 0;
+}
+EXPORT_SYMBOL_GPL(rtsx_pci_read_ppbuf);
+
+int rtsx_pci_write_ppbuf(struct rtsx_pcr *pcr, u8 *buf, int buf_len)
+{
+int err;
+int i, j;
+u16 reg;
+u8 *ptr;
+
+if (buf_len > 512)
+buf_len = 512;
+
+ptr = buf;
+reg = PPBUF_BASE2;
+for (i = 0; i < buf_len / 256; i++) {
+}
rtsx_pci_init_cmd(pcr);
+
+for (j = 0; j < 256; j++) {
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD,
+reg++, 0xFF, *ptr);
+ptr++;
+}
+
+err = rtsx_pci_send_cmd(pcr, 250);
+if (err < 0)
+return err;
+
+if (buf_len % 256) {
+rtsx_pci_init_cmd(pcr);
+
+for (j = 0; j < buf_len % 256; j++) {
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD,
+reg++, 0xFF, *ptr);
+ptr++;
+}
+
+err = rtsx_pci_send_cmd(pcr, 250);
+if (err < 0)
+return err;
+
+return 0;
+
+}
+EXPORT_SYMBOL_GPL(rtsx_pci_write_ppbuf);
+
+static int rtsx_pci_set_pull_ctl(struct rtsx_pcr *pcr, const u32 *tbl)
+{
+rtsx_pci_init_cmd(pcr);
+
+while (*tbl & 0xFFFF0000) {
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD,
+(u16)(*tbl >> 16), 0xFF, (u8)(*tbl));
+tbl++;
+}
+
+return rtsx_pci_send_cmd(pcr, 100);
+}
+
+int rtsx_pci_card_pull_ctl_enable(struct rtsx_pcr *pcr, int card)
+{
+const u32 *tbl;
+if (card == RTSX_SD_CARD)
  +tbl = pcr->sd_pull_ctl_enable_tbl;
+else if (card == RTSX_MS_CARD)
  +tbl = pcr->ms_pull_ctl_enable_tbl;
+else
  +return -EINVAL;
+
+return rtsx_pci_set_pull_ctl(pcr, tbl);
+
+EXPORT_SYMBOL_GPL(rtsx_pci_card_pull_ctl_enable);
+
+int rtsx_pci_card_pull_ctl_disable(struct rtsx_pcr *pcr, int card)
+{
  +const u32 *tbl;
  +
  +if (card == RTSX_SD_CARD)
    +tbl = pcr->sd_pull_ctl_disable_tbl;
  +else if (card == RTSX_MS_CARD)
    +tbl = pcr->ms_pull_ctl_disable_tbl;
  +else
    +return -EINVAL;
    +
    +
    +return rtsx_pci_set_pull_ctl(pcr, tbl);
    +
    +
    +EXPORT_SYMBOL_GPL(rtsx_pci_card_pull_ctl_disable);
    +
+static void rtsx_pci_enable_bus_int(struct rtsx_pcr *pcr)
+{
  +struct rtsx_hw_param *hw_param = &pcr->hw_param;
  +
  +pcr->bier = TRANS_OK_INT_EN | TRANS_FAIL_INT_EN | SD_INT_EN
  +| hw_param->interrupt_en;
  +
  +if (pcr->num_slots > 1)
    +pcr->bier |= MS_INT_EN;
  +
  +"*/ Enable Bus Interrupt */
  +rtsx_pci_writel(pcr, RTSX_BIER, pcr->bier);
  +
  +pcr_dbg(pcr, "RTSX_BIER: 0x%08x\n", pcr->bier);
  +
+}
+
+static inline u8 double_ssc_depth(u8 depth)
+{
  +return ((depth > 1) ? (depth - 1) : depth);
  +}
+static u8 revise_ssc_depth(u8 ssc_depth, u8 div)
+{
  +if (div > CLK_DIV_1) {
    +if (ssc_depth > (div - 1))
      +ssc_depth -= (div - 1);
  +else
    +ssc_depth = SSC_DEPTH_4M;
  +}
  +return ssc_depth;
+}

+int rtsx_pci_switch_clock(struct rtsx_pcr *pcr, unsigned int card_clock,
+u8 ssc_depth, bool initial_mode, bool double_clk, bool vpclk)
+{
  +int err, clk;
  +u8 n, clk_divider, mcu_cnt, div;
  +static const u8 depth[] = {
    +[RTSX_SSC_DEPTH_4M] = SSC_DEPTH_4M,
    +[RTSX_SSC_DEPTH_2M] = SSC_DEPTH_2M,
    +[RTSX_SSC_DEPTH_1M] = SSC_DEPTH_1M,
    +[RTSX_SSC_DEPTH_500K] = SSC_DEPTH_500K,
    +[RTSX_SSC_DEPTH_250K] = SSC_DEPTH_250K,
  +};
  +
  +if (initial_mode) {
    /* We use 250k(around) here, in initial stage */
    +clk_divider = SD_CLK_DIVIDE_128;
    +card_clock = 30000000;
  +} else {
    +clk_divider = SD_CLK_DIVIDE_0;
  +}
  +err = rtsx_pci_write_register(pcr, SD_CFG1,
    +SD_CLK_DIVIDE_MASK, clk_divider);
  +if (err < 0)
    +return err;
  +
  +/* Reduce card clock by 20MHz each time a DMA transfer error occurs */
  +if (card_clock == UHS_SDR104_MAX_DTR &&
    +pcr->dma_error_count &&
    +PCI_PID(pcr) == RTS5227_DEVICE_ID)
    +card_clock = UHS_SDR104_MAX_DTR -
      +(pcr->dma_error_count * 20000000);
  +
  +card_clock /= 1000000;
  +pcr_dbg(pcr, "Switch card clock to %dMHz\n", card_clock);
  +
  +clk = card_clock;
+if (!initial_mode && double_clk)
+clk = card_clock * 2;
+pcr_dbg(pcr, "Internal SSC clock: %dMHz (cur_clock = %d)\n",
+clk, pcr->cur_clock);
+
+if (clk == pcr->cur_clock)
+return 0;
+
+if (pcr->ops->conv_clk_and_div_n)
+n = (u8)pcr->ops->conv_clk_and_div_n(clk, CLK_TO_DIV_N);
+else
+n = (u8)(clk - 2);
+if ((clk <= 2) || (n > MAX_DIV_N_PCR))
+return -EINVAL;
+
+mcu_cnt = (u8)(125/clk + 3);
+if (mcu_cnt > 15)
+mcu_cnt = 15;
+
+/* Make sure that the SSC clock div_n is not less than MIN_DIV_N_PCR */
+div = CLK_DIV_1;
+while ((n < MIN_DIV_N_PCR) && (div < CLK_DIV_8)) {
+if (pcr->ops->conv_clk_and_div_n) {
+int dbl_clk = pcr->ops->conv_clk_and_div_n(n,
+DIV_N_TO_CLK) * 2;
+n = (u8)pcr->ops->conv_clk_and_div_n(dbl_clk,
+CLK_TO_DIV_N);
+} else {
+n = (n + 2) * 2 - 2;
+}
+div++;
+}
+pcr_dbg(pcr, "n = %d, div = %d\n", n, div);
+
+ssc_depth = depth[ssc_depth];
+if (double_clk)
+ssc_depth = double_ssc_depth(ssc_depth);
+
+ssc_depth = revise_ssc_depth(ssc_depth, div);
+pcr_dbg(pcr, "ssc_depth = %d\n", ssc_depth);
+
+rtsx_pci_init_cmd(pcr);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CLK_CTL,
+CLK_LOW_FREQ, CLK_LOW_FREQ);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CLK_DIV,
+0xFF, (div << 4) | mcu_cnt);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SSC_CTL1, SSC_RSTB, 0);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SSC_CTL2,
+SSC_DEPTH_MASK, ssc_depth);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SSC_DIV_N_0, 0xFF, n);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SSC_CTL1, SSC_RSTB, SSC_RSTB);
+if (vpcclk) {
    +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD_VPCLK0_CTL,
    +PHASE_NOT_RESET, 0);
    +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SD_VPCLK0_CTL,
    +PHASE_NOT_RESET, PHASE_NOT_RESET);
    +}
+
+err = rtsx_pci_send_cmd(pcr, 2000);
+if (err < 0)
+return err;
+
+/* Wait SSC clock stable */
+udelay(SSC_CLOCK_STABLE_WAIT);
+err = rtsx_pci_write_register(pcr, CLK_CTL, CLK_LOW_FREQ, 0);
+if (err < 0)
+return err;
+
+pcr->cur_clock = clk;
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_switch_clock);
+
+int rtsx_pci_card_power_on(struct rtsx_pcr *pcr, int card)
+
+if (pcr->ops->card_power_on)
+    return pcr->ops->card_power_on(pcr, card);
+
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_card_power_on);
+
+int rtsx_pci_card_power_off(struct rtsx_pcr *pcr, int card)
+
+if (pcr->ops->card_power_off)
+    return pcr->ops->card_power_off(pcr, card);
+
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_card_power_off);
+
+int rtsx_pci_card_exclusive_check(struct rtsx_pcr *pcr, int card)
+
+static const unsigned int cd_mask[] = {
+    [RTSX_SD_CARD] = SD_EXIST,
+    [RTSX_MS_CARD] = MS_EXIST,
+};
+
+if (!(pcr->flags & PCR_MS_PMOS)) {
+                      /* When using single PMOS, accessing card is not permitted
+                      * if the existing card is not the designated one.
+                      */
+if (pcr->card_exist & (~cd_mask[card]))
+return -EIO;
+
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_card_exclusive_check);
+
+int rtsx_pci_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage)
+{
+if (pcr->ops->switch_output_voltage)
+return pcr->ops->switch_output_voltage(pcr, voltage);
+
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_switch_output_voltage);
+
+unsigned int rtsx_pci_card_exist(struct rtsx_pcr *pcr)
+{
+unsigned int val;
+
+val = rtsx_pci_readl(pcr, RTSX_BIPR);
+if (pcr->ops->cd_deglitch)
+val = pcr->ops->cd_deglitch(pcr);
+
+return val;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_card_exist);
+
+void rtsx_pci_complete_unfinished_transfer(struct rtsx_pcr *pcr)
+{
+struct completion finish;
+
+pcr->finish_me = &finish;
+init_completion(&finish);
+
+if (pcr->done)
+complete(pcr->done);
+
+if (!pcr->remove_pci)
+rtsx_pci_stop_cmd(pcr);
+
+}
wait_for_completion_interruptible_timeout(&finish, msecs_to_jiffies(2));
+pcr->finish_me = NULL;
+
+EXPORT_SYMBOL_GPL(rtsx_pci_complete_unfinished_transfer);
+
+static void rtsx_pci_card_detect(struct work_struct *work)
+{
+struct delayed_work *dwork;
+struct rtsx_pcr *pcr;
+unsigned long flags;
+unsigned int card_detect = 0, card_inserted, card_removed;
+u32 irq_status;
+
+dwork = to_delayed_work(work);
+pcr = container_of(dwork, struct rtsx_pcr, carddet_work);
+
+pcr_dbg(pcr, "--> %s\n", __func__);
+
+mutex_lock(&pcr->pcr_mutex);
+spin_lock_irqsave(&pcr->lock, flags);
+
+irq_status = rtsx_pci_readl(pcr, RTSX_BIPR);
+pcr_dbg(pcr, "irq_status: 0x%08x\n", irq_status);
+
+irq_status &= CARD_EXIST;
+card_inserted = pcr->card_inserted & irq_status;
+card_removed = pcr->card_removed;
+pcr->card_inserted = 0;
+pcr->card_removed = 0;
+
+spin_unlock_irqrestore(&pcr->lock, flags);
+
+if (card_inserted || card_removed) {
+pcr_dbg(pcr, "card_inserted: 0x%x, card_removed: 0x%x\n", card_inserted, card_removed);
+
+if (pcr->ops->cd_deglitch)
+card_inserted = pcr->ops->cd_deglitch(pcr);
+
+card_detect = card_inserted | card_removed;
+
+pcr->card_exist |= card_inserted;
+pcr->card_exist &= ~card_removed;
+}
+
+mutex_unlock(&pcr->pcr_mutex);
+if ((card_detect & SD_EXIST) && pcr->slots[RTSX_SD_CARD].card_event)
+ pcr->slots[RTSX_SD_CARD].card_event(
+ pcr->slots[RTSX_SD_CARD].p_dev);
+if ((card_detect & MS_EXIST) && pcr->slots[RTSX_MS_CARD].card_event)
+ pcr->slots[RTSX_MS_CARD].card_event(
+ pcr->slots[RTSX_MS_CARD].p_dev);
+
+void rtsx_pci_process_ocp(struct rtsx_pcr *pcr)
+{
+  if (pcr->ops->process_ocp) {
+    pcr->ops->process_ocp(pcr);
+  } else {
+    if (!pcr->option.ocp_en)
+      return;
+  }
+  
+  rtsx_pci_get_ocpstat(pcr, &pcr->ocp_stat);
+  if (pcr->ocp_stat & (SD_OC_NOW | SD_OC_EVER)) {
+    rtsx_pci_card_power_off(pcr, RTSX_SD_CARD);
+    rtsx_pci_write_register(pcr, CARD_OE, SD_OUTPUT_EN, 0);
+    rtsx_pci_clear_ocpstat(pcr);
+    pcr->ocp_stat = 0;
+  }
+
+int rtsx_pci_process_ocp_interrupt(struct rtsx_pcr *pcr)
+{
+  if (pcr->option.ocp_en)
+    rtsx_pci_process_ocp(pcr);
+  return 0;
+}
+
+static irqreturn_t rtsx_pci_isr(int irq, void *dev_id)
+{
+  struct rtsx_pcr *pcr = dev_id;
+  u32 int_reg;
+  
+  if (!pcr)
+    return IRQ_NONE;
+  spin_lock(&pcr->lock);
+  int_reg = rtsx_pci_readl(pcr, RTSX_BIPR);
+  /* Clear interrupt flag */
+  rtsx_pci_writel(pcr, RTSX_BIPR, int_reg);
+  if ((int_reg & pcr->bier) == 0) {
+    spin_unlock(&pcr->lock);
return IRQ_NONE;
+
if (int_reg == 0xFFFFFFFF) {
+spin_unlock(&pcr->lock);
+return IRQ_HANDLED;
+
+int_reg &= (pcr->bier | 0x7FFFFFF);
+
+if (int_reg & SD_OC_INT)
+rttx_pci_process_ocp_interrupt(pcr);
+
+if (int_reg & SD_INT) {
+if (int_reg & SD_EXIST) {
+pcr->card_inserted |= SD_EXIST;
+} else {
+pcr->card_removed |= SD_EXIST;
+pcr->card_inserted &= ~SD_EXIST;
+}
+pcr->dma_error_count = 0;
+}
+
+if (int_reg & MS_INT) {
+if (int_reg & MS_EXIST) {
+pcr->card_inserted |= MS_EXIST;
+} else {
+pcr->card_removed |= MS_EXIST;
+pcr->card_inserted &= ~MS_EXIST;
+}
+}
+
+if (int_reg & (NEED_COMPLETE_INT | DELINK_INT)) {
+if (int_reg & (TRANS_FAIL_INT | DELINK_INT)) {
+pcr->trans_result = TRANS_RESULT_FAIL;
+if (pcr->done)
+complete(pcr->done);
+} else if (int_reg & TRANS_OK_INT) {
+pcr->trans_result = TRANS_RESULT_OK;
+if (pcr->done)
+complete(pcr->done);
+}
+
+if (!((pcr->card_inserted || pcr->card_removed) && !(int_reg & SD_OC_INT))
schedule_delayed_work(&pcr->carddet_work,
msecs_to_jiffies(200));
+
+spin_unlock(&pcr->lock);
+return IRQ_HANDLED;
+
+static int rtsx_pci_acquire_irq(struct rtsx_pcr *pcr)
+
+{ pcr_dbg(pcr, "%s: pcr->msi_en = %d, pci->irq = %d\n", __func__, pcr->msi_en, pcr->pci->irq);
+    +
+    +static void rtsx_enable_aspm(struct rtsx_pcr *pcr)
+
+    { pcr_dbg(pcr, "%s: pcr->msi_en = %d, pci->irq = %d\n", __func__, pcr->msi_en, pcr->pci->irq);
+    }
+}
 +
+pci_intx(pcr->pci, pcr->msi_en);
+
+return 0;
+
+static void rtsx_comm_pm_power_saving(struct rtsx_pcr *pcr)
+
+{ struct rtsx_cr_option *option = &pcr->option;
+    if (option->ltr_enabled) {
+        u32 latency = option->ltr_l1off_latency;
+        +
+    }
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    +
+    
+    +
+    +
+    +
+    +
+    +
+}
+void rtsx_pm_power_saving(struct rtsx_pcr *pcr)
+{
+    if (pcr->ops->power_saving)
+        pcr->ops->power_saving(pcr);
+    else
+        rtsx_comm_pm_power_saving(pcr);
+
+static void rtsx_pci_idle_work(struct work_struct *work)
+{
+    struct delayed_work *dwork = to_delayed_work(work);
+    struct rtsx_pcr *pcr = container_of(dwork, struct rtsx_pcr, idle_work);
+    pcr_dbg(pcr, "---> %s\n", __func__);
+    mutex_lock(&pcr->pcr_mutex);
+    pcr->state = PDEV_STAT_IDLE;
+    if (pcr->ops->disable_auto_blink)
+        pcr->ops->disable_auto_blink(pcr);
+    if (pcr->ops->turn_off_led)
+        pcr->ops->turn_off_led(pcr);
+    rtsx_pm_power_saving(pcr);
+    mutex_unlock(&pcr->pcr_mutex);
+
+    #ifdef CONFIG_PM
+    static void rtsx_pci_power_off(struct rtsx_pcr *pcr, u8 pm_state)
+    {
+        if (pcr->ops->turn_off_led)
+            pcr->ops->turn_off_led(pcr);
+        rtsx_pci_writel(pcr, RTSX_BIER, 0);
+        pcr->bier = 0;
+        rtsx_pci_write_register(pcr, PETXCFG, 0x08, 0x08);
+        rtsx_pci_write_register(pcr, HOST_SLEEP_STATE, 0x03, pm_state);
+        if (pcr->ops->force_power_down)
+            pcr->ops->force_power_down(pcr, pm_state);
+    }
+    #endif
+    
+    #endif
+void rtsx_pci_enable_ocp(struct rtsx_pcr *pcr)
+{
+u8 val = SD_OCP_INT_EN | SD_DETECT_EN;
+
+if (pcr->ops->enable_ocp) {
+pcr->ops->enable_ocp(pcr);
+} else {
+rtsx_pci_write_register(pcr, FPDCTL, OC_POWER_DOWN, 0);
+rtsx_pci_write_register(pcr, REG_OCPCTL, 0xFF, val);
+
+
+
+void rtsx_pci_disable_ocp(struct rtsx_pcr *pcr)
+{
+u8 mask = SD_OCP_INT_EN | SD_DETECT_EN;
+
+if (pcr->ops->disable_ocp) {
+pcr->ops->disable_ocp(pcr);
+} else {
+rtsx_pci_write_register(pcr, REG_OCPCTL, mask, 0);
+rtsx_pci_write_register(pcr, FPDCTL, OC_POWER_DOWN,
+OC_POWER_DOWN);
+
+
+
+void rtsx_pci_init_ocp(struct rtsx_pcr *pcr)
+{
+if (pcr->ops->init_ocp) {
+pcr->ops->init_ocp(pcr);
+} else {
+struct rtsx_cr_option *option = &(pcr->option);
+
+if (option->ocp_en) {
+u8 val = option->sd_800mA_ocp_thd;
+
+rtsx_pci_write_register(pcr, FPDCTL, OC_POWER_DOWN, 0);
+rtsx_pci_write_register(pcr, REG_OCPPARA1,
+SD_OCP_TIME_MASK, SD_OCP_TIME_800);
+rtsx_pci_write_register(pcr, REG_OCPPARA2,
+SD_OCP_THD_MASK, val);
+rtsx_pci_write_register(pcr, REG_OCPGLITCH,
+SD_OCP_GLITCH_MASK, pcr->hw_param.ocp_glitch);
+rtsx_pci_enable_ocp(pcr);
+} else {
+/* OC power down */
+rtsx_pci_write_register(pcr, FPDCTL, OC_POWER_DOWN,
+OC_POWER_DOWN);
int rtsx_pci_get_ocpstat(struct rtsx_pcr *pcr, u8 *val)
{
  if (pcr->ops->get_ocpstat)
    return pcr->ops->get_ocpstat(pcr, val);
  else
    return rtsx_pci_read_register(pcr, REG_OCPSTAT, val);
}

void rtsx_pci_clear_ocpstat(struct rtsx_pcr *pcr)
{
  if (pcr->ops->clear_ocpstat) {
    pcr->ops->clear_ocpstat(pcr);
  } else {
    u8 mask = SD_OCP_INT_CLR | SD_OC_CLR;
    u8 val = SD_OCP_INT_CLR | SD_OC_CLR;
    rtsx_pci_write_register(pcr, REG_OCPCTL, mask, val);
    udelay(100);
    rtsx_pci_write_register(pcr, REG_OCPCTL, mask, 0);
  }
}

int rtsx_sd_power_off_card3v3(struct rtsx_pcr *pcr)
{
  rtsx_pci_write_register(pcr, CARD_CLK_EN, SD_CLK_EN | MS_CLK_EN | SD40_CLK_EN, 0);
  rtsx_pci_write_register(pcr, CARD_OE, SD_OUTPUT_EN, 0);
  rtsx_pci_card_power_off(pcr, RTSX_SD_CARD);
  msleep(50);
  rtsx_pci_card_pull_ctl_disable(pcr, RTSX_SD_CARD);
  return 0;
}

int rtsx_ms_power_off_card3v3(struct rtsx_pcr *pcr)
{
  rtsx_pci_write_register(pcr, CARD_CLK_EN, SD_CLK_EN | MS_CLK_EN | SD40_CLK_EN, 0);
  rtsx_pci_card_power_off(pcr, RTSX_SD_CARD);
  rtsx_pci_card_pull_ctl_disable(pcr, RTSX_SD_CARD);
  rtsx_pci_write_register(pcr, CARD_OE, MS_OUTPUT_EN, 0);
}
+rtsx_pci_card_power_off(pcr, RTSX_MS_CARD);
+
+return 0;
+
+}
+
+static int rtsx_pci_init_hw(struct rtsx *pcr)
+
+
+pcr->pcie_cap = pci_find_capability(pcr->pci, PCI_CAP_ID_EXP);
+rtsx_pci_writel(pcr, RTSX_HCBAR, pcr->host_cmds_addr);
+
+rtsx_pci_enable_bus_int(pcr);
+
+/* Power on SSC */
+err = rtsx_pci_write_register(pcr, FPDCTL, SSC_POWER_DOWN, 0);
+if (err < 0)
+return err;
+
+/* Wait SSC power stable */
+udelay(200);
+
+rtsx_pci_disable_aspm(pcr);
+if (pcr->ops->optimize_phy) {
+err = pcr->ops->optimize_phy(pcr);
+if (err < 0)
+return err;
+
+
+rtsx_pci_init_cmd(pcr);
+
+/* Set mcu_cnt to 7 to ensure data can be sampled properly */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CLK_DIV, 0x07, 0x07);
+
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, HOST_SLEEP_STATE, 0x03, 0x00);
+
+/* Disable card clock */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_CLK_EN, 0x1E, 0);
+
+/* Reset delink mode */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CHANGE_LINK_STATE, 0x0A, 0);
+
+/* Card driving select */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CARD_DRIVE_SEL,
+0xFF, pcr->card_drive_sel);
+
+/* Enable SSC Clock */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SSC_CTL1,
+0xFF, SSC_8X_EN | SSC_SEL_4M);
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, SSC_CTL2, 0xFF, 0x12);
+
+/* Disable cd_pwr_save */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, CHANGE_LINK_STATE, 0x16, 0x10);
+/* Clear Link Ready Interrupt */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, IRQSTAT0,
+LINK_RDY_INT, LINK_RDY_INT);
+/* Enlarge the estimation window of PERST# glitch
+ * to reduce the chance of invalid card interrupt
+ */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, PERST_GLITCH_WIDTH, 0xFF, 0x80);
+/* Update RC oscillator to 400k
+ * bit[0] F_HIGH: for RC oscillator, Rst_value is 1'b1
+ * 1: 2M  0: 400k
+ */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, RCCTL, 0x01, 0x00);
+/* Set interrupt write clear
+ * bit 1: U_elbi_if_rd_clr_en
+ * 1: Enable ELBI interrupt[31:22] & [7:0] flag read clear
+ * 0: ELBI interrupt flag[31:22] & [7:0] only can be write clear
+ */
+rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, NFTS_TX_CTRL, 0x02, 0);
+
+err = rtsx_pci_send_cmd(pcr, 100);
+if (err < 0)
+return err;
+
+switch (PCI_PID(pcr)) {
+case PID_5250:
+case PID_524A:
+case PID_525A:
+case PID_5260:
+rtsx_pci_write_register(pcr, PM_CLK_FORCE_CTL, 1, 1);
+break;
+default:
+break;
+}
+
+/*init ocp*/
+rtsx_pci_init_ocp(pcr);
+
+/* Enable clk_request_n to enable clock power management */
+rtsx_pci_write_config_byte(pcr, pcie_cap + PCI_EXP_LNKCTL + 1, 1);
+/* Enter L1 when host tx idle */
+rtsx_pci_write_config_byte(pcr, 0x70F, 0x5B);
+
+if (pcr->ops->extra_init_hw) {
+err = pcr->ops->extra_init_hw(pcr);
+if (err < 0)
+return err;
+}
+
/* No CD interrupt if probing driver with card inserted.
 * So we need to initialize pcr->card_exist here.
 */

if (pcr->ops->cd_deglitch)
  pcr->card_exist = pcr->ops->cd_deglitch(pcr);
else
  pcr->card_exist = rtsx_pci_readl(pcr, RTSX_BIPR) & CARD_EXIST;
+
+return 0;
+
+
+static int rtsx_pci_init_chip(struct rtsx_pcr *pcr)
+
+
+{ int err;
+  +spin_lock_init(&pcr->lock);
+  +mutex_init(&pcr->pcr_mutex);
+  +
+  +switch (PCI_PID(pcr)) {  
+  +default:
+  +case 0x5209:
+  +rts5209_init_params(pcr);
+  +break;
+  +
+  +case 0x5229:
+  +rts5229_init_params(pcr);
+  +break;
+  +
+  +case 0x5289:
+  +rtl8411_init_params(pcr);
+  +break;
+  +
+  +case 0x5227:
+  +rts5227_init_params(pcr);
+  +break;
+  +
+  +case 0x5249:
+  +rts5249_init_params(pcr);
+  +break;
+  +
+  +case 0x524A:
+  +rts524a_init_params(pcr);
+  +break;
+  +
#Open Source Used In 5GaaS Edge AC-4  23455
case 0x525A:
    rts525a_init_params(pcr);
    break;
  +
  case 0x5287:
    rtl8411b_init_params(pcr);
    break;
  +
  case 0x5286:
    rtl8402_init_params(pcr);
    break;
  case 0x5260:
    rts5260_init_params(pcr);
    break;
  +}
  +
  pcr_dbg(pcr, "PID: 0x%04x, IC version: 0x%02x
",
    PCI_PID(pcr), pcr->ic_version);
  +
  pcr->slots = kcalloc(pcr->num_slots, sizeof(struct rtsx_slot),
    GFP_KERNEL);
  +if (!pcr->slots)
    +return -ENOMEM;
  +if (pcr->ops->fetch_vendor_settings)
    +pcr->ops->fetch_vendor_settings(pcr);
  +
  pcr_dbg(pcr, "pcr->aspm_en = 0x%x
",
    pcr->aspm_en);
  pcr_dbg(pcr, "pcr->sd30_drive_sel_1v8 = 0x%x
",
    pcr->sd30_drive_sel_1v8);
  pcr_dbg(pcr, "pcr->sd30_drive_sel_3v3 = 0x%x
",
    pcr->sd30_drive_sel_3v3);
  pcr_dbg(pcr, "pcr->card_drive_sel = 0x%x
",
    pcr->card_drive_sel);
  pcr_dbg(pcr, "pcr->flags = 0x%x
",
    pcr->flags);
  +
  pcr->state = PDEV_STAT_IDLE;
  +err = rtsx_pci_init_hw(pcr);
  +if (err < 0) {
    +kfree(pcr->slots);
    +return err;
  +}
  +return 0;
  +
static int rtsx_pci_probe(struct pci_dev *pcidev,
    const struct pci_device_id *id)
{
+struct rtsx_pcr *pcr;
+struct pcr_handle *handle;
+u32 base, len;
+int ret, i, bar = 0;
+
+dev_dbg(&(pcidev->dev),
+": Realtek PCI-E Card Reader found at %s [%04x:%04x] (rev %x)n",
+pci_name(pcidev), (int)pcidev->vendor, (int)pcidev->device,
+(int)pcidev->revision);
+
+ret = pci_set_dma_mask(pcidev, DMA_BIT_MASK(32));
+if (ret < 0)
+return ret;
+
+ret = pci_enable_device(pcidev);
+if (ret)
+return ret;
+
+ret = pci_request_regions(pcidev, DRV_NAME_RTSX_PCI);
+if (ret)
+goto disable;
+
+pcr = kzalloc(sizeof(*pcr), GFP_KERNEL);
+if (!pcr) {
+ret = -ENOMEM;
+goto release_pci;
+}
+
+handle = kzalloc(sizeof(*handle), GFP_KERNEL);
+if (!handle) {
+ret = -ENOMEM;
+goto free_pcr;
+}
+
+idr_preload(GFP_KERNEL);
+spin_lock(&rtsx_pci_lock);
+ret = idr_alloc(&rtsx_pci_idr, pcr, 0, 0, GFP_NOWAIT);
+if (ret >= 0)
+pcr->id = ret;
+spin_unlock(&rtsx_pci_lock);
+idr_preload_end();
+if (ret < 0)
+goto free_handle;
+
+pcr->pci = pcidev;
+dev_set_drvdata(&pcidev->dev, handle);
+if (CHK_PCI_PID(pcr, 0x525A))
+bar = 1;
+len = pci_resource_len(pcidev, bar);
+base = pci_resource_start(pcidev, bar);
+pcr->remap_addr = ioremap_nocache(base, len);
+if (!pcr->remap_addr) {
    +ret = -ENOMEM;
    +goto free_handle;
    +}
+
+pcr->rtsx_resv_buf = dma_alloc_coherent(&(pcidev->dev),
+RTSX_RESV_BUF_LEN, &(pcr->rtsx_resv_buf_addr),
+GFP_KERNEL);
+if (pcr->rtsx_resv_buf == NULL) {
    +ret = -ENXIO;
    +goto unmap;
    +}

tcr->host_cmds_ptr = pcr->rtsx_resv_buf;
+pcr->host_cmds_addr = pcr->rtsx_resv_buf_addr;
+pcr->host_sg_tbl_ptr = pcr->rtsx_resv_buf + HOST_CMDS_BUF_LEN;
+pcr->host_sg_tbl_addr = pcr->rtsx_resv_buf_addr + HOST_CMDS_BUF_LEN;
+
+pcr->card_inserted = 0;
+pcr->card_removed = 0;
+INIT_DELAYED_WORK(&pcr->carddet_work, rtsx_pci_card_detect);
+INIT_DELAYED_WORK(&pcr->idle_work, rtsx_pci_idle_work);
+
+pcr->msi_en = msi_en;
+if (pcr->msi_en) {
    +ret = pci_enable_msi(pcidev);
    +if (ret)
        +pcr->msi_en = false;
    +}
+
+ret = rtsx_pci_acquire_irq(pcr);
+if (ret < 0)
    +goto disable_msi;
+
+pcr->msi_en = msi_en;
+pci_set_master(pcidev);
+synchronize_irq(pcr->irq);
+
+ret = rtsx_pci_init_chip(pcr);
+if (ret < 0)
    +goto disable_irq;
+
+for (i = 0; i < ARRAY_SIZE(rtsx_pcr_cells); i++) {
    +rtsx_pcr_cells[i].platform_data = handle;
+tsx_pcr_cells[i].pdata_size = sizeof(*handle);
+
+ret = mfd_add_devices(&pcidev->dev, pcr->id, rtsx_pcr_cells,
+ARRAY_SIZE(rtsx_pcr_cells), NULL, 0, NULL);
+if (ret < 0)
+goto free_slots;
+
+schedule_delayed_work(&pcr->idle_work, msecs_to_jiffies(200));
+
+return 0;
+
+free_slots:
+kfree(pcr->slots);
+disable_irq:
+free_irq(pcr->irq, (void *)pcr);
+disable_msi:
+if (pcr->msi_en)
+pci_disable_msi(pcr->pci);
+dma_free_coherent(&(pcr->pci->dev), RTSX_RESV_BUF_LEN,
+pcr->rtsx_resv_buf, pcr->rtsx_resv_buf_addr);
+unmap:
+iounmap(pcr->remap_addr);
+free_handle:
+kfree(handle);
+free_pcr:
+kfree(pcr);
+release_pci:
+pci_release_regions(pcidev);
+disable:
+pci_disable_device(pcidev);
+
+return ret;
+
+static void rtsx_pci_remove(struct pci_dev *pcidev)
+{
+struct pcr_handle *handle = pci_get_drvdata(pcidev);
+struct rtsx_percr *pcr = handle->pcr;
+
+pcr->remove_pci = true;
+
+/* Disable interrupts at the pcr level */
+spin_lock_irq(&pcr->lock);
+rtsx_pci_writel(pcr, RTSX_BIER, 0);
+pcr->bier = 0;
+spin_unlock_irq(&pcr->lock);
+
+cancel_delayed_work_sync(&pcr->carddet_work);
+cancel_delayed_work_sync(&pcr->idle_work);
+maid_remove_devices(&pcidev->dev);
+dma_free_coherent(&pcr->pci->dev, RONX_RESV_BUF_LEN,
+pcr->rtsx_resv_buf, pcr->rtsx_resv_buf_addr);
+free_irq(pcr->irq, (void *)pcr);
+if (pcr->msi_en)
+pci_disable_msi(pcr->pci);
+iounmap(pcr->remap_addr);
+
+pci_release_regions(pcidev);
+pci_disable_device(pcidev);
+
+spin_lock(&rtsx_pci_lock);
+idr_remove(&rtsx_pci_idr, pcr->id);
+spin_unlock(&rtsx_pci_lock);
+
+kfree(pcr->slots);
+kfree(pcr);
+kfree(handle);
+
+dev_dbg(&pcidev->dev),
+: Realtek PCI-E Card Reader at %s [%04x:%04x] has been removed
+
+pci_name(pcidev), (int)pcidev->vendor, (int)pcidev->device);
+}
+
+#ifdef CONFIG_PM
+
+static int rtsx_pci_suspend(struct pci_dev *pcidev, pm_message_t state)
+{
+struct pcr_handle *handle;
+struct rtsx_pcr *pcr;
+
+dev_dbg(&pcidev->dev), "--> %s\n", __func__);
+
+handle = pci_get_drvdata(pcidev);
+pcr = handle->pcr;
+
+cancel_delayed_work(&pcr->carddet_work);
+cancel_delayed_work(&pcr->idle_work);
+
+mutex_lock(&pcr->pcr_mutex);
+
+rtsx_pci_power_off(pcr, HOST_ENTER_S3);
+
+pci_save_state(pcidev);
+pci_enable_wake(pcidev, pci_choose_state(pcidev, state), 0);
+pci_disable_device(pcidev);
+pci_set_power_state(pcidev, pci_choose_state(pcidev, state));
+mutex_unlock(&pcr->pcr_mutex);
+return 0;
+
+static int rtsx_pci_resume(struct pci_dev *pcidev)
+{
+struct pcr_handle *handle;
+struct rtsx_pcr *pcr;
+int ret = 0;
+
+dev_dbg(&(pcidev->dev), "--> %s\n", __func__);
+
+handle = pci_get_drvdata(pcidev);
+pcr = handle->pcr;
+
+mutex_lock(&pcr->pcr_mutex);
+
+pci_set_power_state(pcidev, PCI_D0);
+pci_restore_state(pcidev);
+ret = pci_enable_device(pcidev);
+if (ret)
+goto out;
+
+pci_set_master(pcidev);
+
+ret = rtsx_pci_write_register(pcr, HOST_SLEEP_STATE, 0x03, 0x00);
+if (ret)
+goto out;
+
+ret = rtsx_pci_init_hw(pcr);
+if (ret)
+goto out;
+
+schedule_delayed_work(&pcr->idle_work, msecs_to_jiffies(200));
+
+out:
+
+mutex_unlock(&pcr->pcr_mutex);
+return ret;
+
+}
+
+static void rtsx_pci_shutdown(struct pci_dev *pcidev)
+{
+struct pcr_handle *handle;
+struct rtsx_pcr *pcr;
+
+dev_dbg(&(pcidev->dev), "--> %s\n", __func__);
+handle = pci_get_drvdata(pcidev);
+pcr = handle->pcr;
+rtsx_pci_power_off(pcr, HOST_ENTER_S1);
+
+pci_disable_device(pcidev);
+free_irq(pcr->irq, (void *)pcr);
+if (pcr->msi_en)
+pci_disable_msi(pcr->pci);
+}
+
+#else /* CONFIG_PM */
+
+#define rtsx_pci_suspend NULL
+#define rtsx_pci_resume NULL
+#define rtsx_pci_shutdown NULL
+
+#endif /* CONFIG_PM */
+
+static struct pci_driver rtsx_pci_driver = {
+.name = DRV_NAME_RTSX_PCI,
+.id_table = rtsx_pci_ids,
+.probe = rtsx_pci_probe,
+.remove = rtsx_pci_remove,
+.suspend = rtsx_pci_suspend,
+.resume = rtsx_pci_resume,
+.shutdown = rtsx_pci_shutdown,
+};
+module_pci_driver(rtsx_pci_driver);
+
+MODULE_LICENSE("GPL");
+MODULE_AUTHOR("Wei WANG <wei_wang@realsil.com.cn>");
+MODULE_DESCRIPTION("Realtek PCI-Express card Reader Driver");
--- linux-4.15.0.orig/drivers/misc/cardreader/rtsx_pcr.h
+++ linux-4.15.0/drivers/misc/cardreader/rtsx_pcr.h
@@ -0,0 +1,118 @@
+/* Driver for Realtek PCI-Express card reader
+ * 
+ * Copyright(c) 2009-2013 Realtek Semiconductor Corp. All rights reserved.
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+ *
+ * Author:
+ * Wei WANG <wei_wang@realsil.com.cn>
+ */
+
+#ifndef __RTSX_PCR_H
+#define __RTSX_PCR_H
+
+#include <linux/rtsx_pci.h>
+
+#define MIN_DIV_N_PCR		80
+#define MAX_DIV_N_PCR		208
+
+#define RTS522A_PM_CTRL3		0xFF7E
+
+#define RTS524A_PME_FORCE_CTL0xFF78
+#define RTS524A_PM_CTRL3		0xFF7E
+
+#define LTR_ACTIVE_LATENCY_DEF		0x883C
+#define LTR_IDLE_LATENCY_DEF	0x892C
+#define LTR_L1OFF_LATENCY_DEF	0x9003
+#define L1_SNOOZE_DELAY_DEF	1
+#define LTR_L1OFF_SSPWRGATE_5249_DEF	0xAF
+#define LTR_L1OFF_SSPWRGATE_5250_DEF	0xFF
+#define LTR_L1OFF_SNOOZE_SSPWRGATE_5249_DEF	0xAC
+#define LTR_L1OFF_SNOOZE_SSPWRGATE_5250_DEF	0xF8
+#define CMD_TIMEOUT_DEF		100
+#define ASPM_MASK_NEG		0xFC
+#define MASK_8_BIT_DEF		0xFF
+
+#define SSC_CLOCK_STABLE_WAIT	130
+
+#define RTS524A_OCP_THD_8000x4
+#define RTS525A_OCP_THD_8000x5
+#define RTS522A_OCP_THD_8000x6
+
+int __rtsx_pci_write_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 val);
+int __rtsx_pci_read_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 *val);
+
+void rts5209_init_params(struct rtsx_pcr *pcr);
+void rts5229_init_params(struct rtsx_pcr *pcr);
+void rtl8411_init_params(struct rtsx_pcr *pcr);
+void rtl8402_init_params(struct rtsx_pcr *pcr);
+void rts5227_init_params(struct rtsx_pcr *pcr);
+void rts522a_init_params(struct rtsx_pcr *pcr);
+void rts5249_init_params(struct rtsx_pcr *pcr);
+void rts524a_init_params(struct rtsx_pcr *pcr);
+void rts525a_init_params(struct rtsx_pcr *pcr);
+void rtl8411b_init_params(struct rtsx_pcr *pcr);
+void rts5260_init_params(struct rtsx_pcr *pcr);
+
+static inline u8 map_sd_drive(int idx)
+{
+  u8 sd_drive[4] = {
+    0x01, /* Type D */
+    0x02, /* Type C */
+    0x05, /* Type A */
+    0x03, /* Type B */
+  };
+  return sd_drive[idx];
+}
+
+#define rtsx_vendor_setting_valid(reg) (!((reg) & 0x1000000))
+#define rts5209_vendor_setting1_valid(reg) (!((reg) & 0x80))
+#define rts5209_vendor_setting2_valid(reg) ((reg) & 0x80)
+
+#define rtsx_reg_to_aspm(reg) (((reg) >> 28) & 0x03)
+#define rtsx_reg_to_sd30_drive_sel_1v8(reg) (((reg) >> 26) & 0x03)
+#define rtsx_reg_to_sd30_drive_sel_3v3(reg) (((reg) >> 5) & 0x03)
+#define rtsx_reg_to_card_drive_sel(reg) (((reg) >> 25) & 0x01) << 6)
+#define rtsx_reg_check_reverse_socket(reg) ((reg) & 0x4000)
+#define rts5209_reg_to_aspm(reg) (((reg) >> 5) & 0x03)
+#define rts5209_reg_check_ms_pmos(reg) (!((reg) & 0x08))
+#define rts5209_reg_to_sd30_drive_sel_1v8(reg) (((reg) >> 3) & 0x07)
+#define rts5209_reg_to_sd30_drive_sel_3v3(reg) ((reg) & 0x07)
+#define rts5209_reg_to_card_drive_sel(reg) ((reg) >> 8)
+#define rtl8411_reg_to_sd30_drive_sel_3v3(reg) (((reg) >> 5) & 0x07)
+#define rtl8411b_reg_to_sd30_drive_sel_3v3(reg) (((reg) & 0x03)
+
+#define set_pull_ctrl_tables(pcr, __device)
+{ do {
+  pcr->sd_pull_ctl_enable_tbl = __device##_sd_pull_ctl_enable_tbl; \
+  pcr->sd_pull_ctl_disable_tbl = __device##_sd_pull_ctl_disable_tbl; \
+  pcr->ms_pull_ctl_enable_tbl = __device##_ms_pull_ctl_enable_tbl; \
+  pcr->ms_pull_ctl_disable_tbl = __device##_ms_pull_ctl_disable_tbl; \
+} while (0)
+
+/* generic operations */
+int rtsx_gops_pm_reset(struct rtsx_pcr *pcr);
+int rtsx_set_ltr_latency(struct rtsx_pcr *pcr, u32 latency);
+int rtsx_set_l1off_sub(struct rtsx_pcr *pcr, u8 val);
+void rtsx_pci_init_ocp(struct rtsx_pcr *pcr);
+void rtsx_pci_enable_ocp(struct rtsx_pcr *pcr);
+int rtsx_pci_disable_ocp(struct rtsx_pcr *pcr);
+int rtsx_pci_get_ocpstat(struct rtsx_pcr *pcr, u8 *val);
+void rtsx_pci_clear_ocpstat(struct rtsx_pcr *pcr);
+int rtsx_sd_power_off_card3v3(struct rtsx_pcr *pcr);
+int rtsx_ms_power_off_card3v3(struct rtsx_pcr *pcr);
+
+#endif
--- linux-4.15.0.orig/drivers/misc/cardreader/rtsx_usb.c
+++ linux-4.15.0/drivers/misc/cardreader/rtsx_usb.c
@@ -0,0 +1,799 @@
+/* Driver for Realtek USB card reader
+ *
+ * Copyright(c) 2009-2013 Realtek Semiconductor Corp. All rights reserved.
+ *
+ * This program is free software; you can redistribute it and/or modify it
+ * under the terms of the GNU General Public License version 2
+ * as published by the Free Software Foundation.
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+ * This program is distributed in the hope that it will be useful, but
+ * WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
+ * General Public License for more details.
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+ * You should have received a copy of the GNU General Public License along
+ * with this program; if not, see <http://www.gnu.org/licenses/>.
+ *
+ * Author:
+ *   Roger Tseng <rogerable@realtek.com>
+ */
+#include <linux/module.h>
+#include <linux/slab.h>
+#include <linux/mutex.h>
+#include <linux/usb.h>
+#include <linux/platform_device.h>
+#include <linux/mfd/core.h>
+#include <linux/rtlx_usb.h>
+
+static int polling_pipe = 1;
+module_param(polling_pipe, int, S_IRUGO | S_IWUSR);
+MODULE_PARM_DESC(polling_pipe, "polling pipe (0: ctl, 1: bulk)");
+
+static const struct mfd_cell rtsx_usb_cells[] = {
+[RTSX_USB_SD_CARD] = {
+.name = "rtsx_usb_sdmme",
+.pdata_size = 0,
+},
+[RTSX_USB_MS_CARD] = {
+    .name = "rtsx_usb_ms",
+    .pdma_size = 0,
+};
+
+static void rtsx_usb_sg_timed_out(struct timer_list *t)
+{
+    struct rtsx_ucr *ucr = from_timer(ucr, t, sg_timer);
+    dev_dbg(&ucr->pusb_intf->dev, "%s: sg transfer timed out", __func__);
+    usb_sg_cancel(&ucr->current_sg);
+}
+
+static int rtsx_usb_bulk_transfer_sglist(struct rtsx_ucr *ucr,
+    unsigned int pipe, struct scatterlist *sg, int num_sg,
+    unsigned int length, unsigned int *act_len, int timeout)
+{
+    int ret;
+    dev_dbg(&ucr->pusb_intf->dev, "%s: xfer %u bytes, %d entries\n", __func__, length, num_sg);
+    ret = usb_sg_init(&ucr->current_sg, ucr->pusb_dev, pipe, 0,
+        sg, num_sg, length, GFP_NOIO);
+    if (ret)
+        return ret;
+    ucr->sg_timer.expires = jiffies + msecs_to_jiffies(timeout);
+    add_timer(&ucr->sg_timer);
+    usb_sg_wait(&ucr->current_sg);
+    if (!del_timer_sync(&ucr->sg_timer))
+        ret = -ETIMEDOUT;
+    else
+        ret = ucr->current_sg.status;
+    if (act_len)
+        *act_len = ucr->current_sg.bytes;
+    return ret;
+}
+
+int rtsx_usb_transfer_data(struct rtsx_ucr *ucr, unsigned int pipe,
+    void *buf, unsigned int len, int num_sg,
+    unsigned int *act_len, int timeout)
+{
+    if (timeout < 600)
+        timeout = 600;
+ if (num_sg)
+ return rtsx_usb_bulk_transfer_sglist(ucr, pipe,  
+ (struct scatterlist *)buf, num_sg, len, act_len,  
+ timeout);
+ else
+ return usb_bulk_msg(ucr->pusb_dev, pipe, buf, len, act_len,  
+ timeout);
+ }
+ EXPORT_SYMBOL_GPL(rtsx_usb_transfer_data);
+
+static inline void rtsx_usb_seq_cmd_hdr(struct rtsx_ucr *ucr,  
+ u16 addr, u16 len, u8 seq_type)
+ {
+ rtsx_usb_cmd_hdr_tag(ucr);
+  
+ ucr->cmd_buf[PACKET_TYPE] = seq_type;
+ ucr->cmd_buf[5] = (u8)(len >> 8);
+ ucr->cmd_buf[6] = (u8)len;
+ ucr->cmd_buf[8] = (u8)(addr >> 8);
+ ucr->cmd_buf[9] = (u8)addr;
+  
+ if (seq_type == SEQ_WRITE)
+ ucr->cmd_buf[STAGE_FLAG] = 0;
+ else
+ ucr->cmd_buf[STAGE_FLAG] = STAGE_R;
+ }
+
+static int rtsx_usb_seq_write_register(struct rtsx_ucr *ucr,  
+ u16 addr, u16 len, u8 *data)
+ {
+ u16 cmd_len = ALIGN(SEQ_WRITE_DATA_OFFSET + len, 4);
+  
+ if (!data)
+ return -EINVAL;
+ if (cmd_len > IOBUF_SIZE)
+ return -EINVAL;
+ rtsx_usb_seq_cmd_hdr(ucr, addr, len, SEQ_WRITE);
+ memcpy(ucr->cmd_buf + SEQ_WRITE_DATA_OFFSET, data, len);
+ return rtsx_usb_transfer_data(ucr,  
+ usb_sndbulkpipe(ucr->pusb_dev, EP_BULK_OUT),  
+ ucr->cmd_buf, cmd_len, 0, NULL, 100);
+ }
+
+static int rtsx_usb_seq_read_register(struct rtsx_ucr *ucr,
+u16 addr, u16 len, u8 *data)
+
+int i, ret;
+u16 rsp_len = round_down(len, 4);
+u16 res_len = len - rsp_len;
+
+if (!data)
+return -EINVAL;
+
+/* 4-byte aligned part */
+if (rsp_len) {
+rtsx_usb_seq_cmd_hdr(ucr, addr, len, SEQ_READ);
+ret = rtsx_usb_transfer_data(ucr,
+usb_sndbulkpipe(ucr->pusb_dev, EP_BULK_OUT),
+ucr->cmd_buf, 12, 0, NULL, 100);
+if (ret)
+return ret;
+
+ret = rtsx_usb_transfer_data(ucr,
+usb_rcvbulkpipe(ucr->pusb_dev, EP_BULK_IN),
+data, rsp_len, 0, NULL, 100);
+if (ret)
+return ret;
+
+} 
+
+/* unaligned part */
+for (i = 0; i < res_len; i++) {
+ret = rtsx_usb_read_register(ucr, addr + rsp_len + i,
+data + rsp_len + i);
+if (ret)
+return ret;
+
+} 
+
+return 0;
+
+}
+
+
+int rtsx_usb_read_ppbuf(struct rtsx_ucr *ucr, u8 *buf, int buf_len)
+
+{ 
+return rtsx_usb_seq_read_register(ucr, PPBUF_BASE2, (u16)buf_len, buf);
+
+} 
+EXPORT_SYMBOL_GPL(rtsx_usb_read_ppbuf);
+
+
+int rtsx_usb_write_ppbuf(struct rtsx_ucr *ucr, u8 *buf, int buf_len)
+
+{ 
+return rtsx_usb_seq_write_register(ucr, PPBUF_BASE2, (u16)buf_len, buf);
+
+} 
+EXPORT_SYMBOL_GPL(rtsx_usb_write_ppbuf);
+
+int rtsx_usb_ep0_write_register(struct rtsx_ucr *ucr, u16 addr, 
+u8 mask, u8 data)
+
+{
+u16 value, index;
+
+addr |= EP0_WRITE_REG_CMD << EP0_OP_SHIFT;
+value = swab16(addr);
+index = mask | data << 8;
+
+return usb_control_msg(ucr->pusb_dev, 
+usb_sndctrlpipe(ucr->pusb_dev, 0), RTSX_USB_REQ_REG_OP, 
+USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_DEVICE, 
+value, index, NULL, 0, 100);
+}
+EXPORT_SYMBOL_GPL(rtsx_usb_ep0_write_register);
+
+int rtsx_usb_ep0_read_register(struct rtsx_ucr *ucr, u16 addr, u8 *data)
+
+{
+u16 value;
+u8 *buf;
+int ret;
+
+if (!data)
+return -EINVAL;
+
+buf = kzalloc(sizeof(u8), GFP_KERNEL);
+if (!buf)
+return -ENOMEM;
+
+addr |= EP0_READ_REG_CMD << EP0_OP_SHIFT;
+value = swab16(addr);
+
+ret = usb_control_msg(ucr->pusb_dev, 
+usb_rcvctrlpipe(ucr->pusb_dev, 0), RTSX_USB_REQ_REG_OP, 
+USB_DIR_IN | USB_TYPE_VENDOR | USB_RECIP_DEVICE, 
+value, 0, buf, 1, 100);
+*data = *buf;
+
+kfree(buf);
+return ret;
+}
+EXPORT_SYMBOL_GPL(rtsx_usb_ep0_read_register);
+
+void rtsx_usb_add_cmd(struct rtsx_ucr *ucr, u8 cmd_type, u16 reg_addr, 
+u8 mask, u8 data)
+
+{
+int i;
+if (ucr->cmd_idx < (IOBUF_SIZE - CMD_OFFSET) / 4) {
+i = CMD_OFFSET + ucr->cmd_idx * 4;
+
+ucr->cmd_buf[i++] = ((cmd_type & 0x03) << 6) |
+(u8)((reg_addr >> 8) & 0x3F);
+ucr->cmd_buf[i++] = (u8)reg_addr;
+ucr->cmd_buf[i++] = mask;
+ucr->cmd_buf[i++] = data;
+
+ucr->cmd_idx++;
+
+} 
+}
+
+EXPORT_SYMBOL_GPL(rtsx_usb_add_cmd);
+
+int rtsx_usb_send_cmd(struct rtsx_ucr *ucr, u8 flag, int timeout)
+{
+    int ret;
+
+    ucr->cmd_buf[CNT_H] = (u8)(ucr->cmd_idx >> 8);
+    ucr->cmd_buf[CNT_L] = (u8)(ucr->cmd_idx);
+    ucr->cmd_buf[STAGE_FLAG] = flag;
+
+    ret = rtsx_usb_transfer_data(ucr,
+    usb_sndbulkpipe(ucr->pusb_dev, EP_BULK_OUT),
+    ucr->cmd_buf, ucr->cmd_idx * 4 + CMD_OFFSET,
+    0, NULL, timeout);
+    if (ret) {
+        rtsx_usb_clear_fsm_err(ucr);
+        return ret;
+    }
+
+    return 0;
+}
+
+EXPORT_SYMBOL_GPL(rtsx_usb_send_cmd);
+
+int rtsx_usb_get_rsp(struct rtsx_ucr *ucr, int rsp_len, int timeout)
+{
+    if (rsp_len <= 0)
+        return -EINVAL;
+
+    rsp_len = ALIGN(rsp_len, 4);
+
+    return rtsx_usb_transfer_data(ucr,
+    usb_rcvbulkpipe(ucr->pusb_dev, EP_BULK_IN),
+    ucr->rsp_buf, rsp_len, 0, NULL, timeout);
+}
+
+EXPORT_SYMBOL_GPL(rtsx_usb_get_rsp);
+static int rtsx_usb_get_status_withBulk(struct rtsx_ucr *ucr, u16 *status)
+{
+    int ret;
+
+    rtsx_usb_init_cmd(ucr);
+    rtsx_usb_add_cmd(ucr, READ_REG_CMD, CARD_EXIST, 0x00, 0x00);
+    rtsx_usb_add_cmd(ucr, READ_REG_CMD, OCPSTAT, 0x00, 0x00);
+    ret = rtsx_usb_send_cmd(ucr, MODE_CR, 100);
+    if (ret)
+        return ret;
+
+    ret = rtsx_usb_get_rsp(ucr, 2, 100);
+    if (ret)
+        return ret;
+
+    *status = ((ucr->rsp_buf[0] >> 2) & 0x0f) |
+               ((ucr->rsp_buf[1] & 0x03) << 4);
+    return 0;
+
+}
+
+int rtsx_usb_get_card_status(struct rtsx_ucr *ucr, u16 *status)
+{
+    int ret;
+    u16 *buf;
+
+    if (!status)
+        return -EINVAL;
+
+    if (polling_pipe == 0) {
+        buf = kzalloc(sizeof(u16), GFP_KERNEL);
+        if (!buf)
+            return -ENOMEM;
+        ret = usb_control_msg(ucr->pusb_dev,
+                              usb_rcvctrlpipe(ucr->pusb_dev, 0),
+                              RTSX_USB_REQ_POLL,
+                              USB_DIR_IN | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
+                              0, 0, buf, 2, 100);
+        *status = *buf;
+        kfree(buf);
+    } else {
+        ret = rtsx_usb_get_status_withBulk(ucr, status);
+    }
+
+    /* usb_control_msg may return positive when success */
+    if (ret < 0)
+return ret;
+
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_usb_get_card_status);
+
+static int rtsx_usb_write_phy_register(struct rtsx_ucr *ucr, u8 addr, u8 val)
+{
+    dev_dbg(&ucr->pusb_intf->dev, "Write 0x%x to phy register 0x%x\n",
+            val, addr);
+
+    return rtsx_usb_init_cmd(ucr);
+
+    rtsx_usb_write_phy_register(ucr, WRITE_REG_CMD, HS_VSTAIN, 0xFF, val);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, HS_VCONTROL, 0xFF, addr & 0x0F);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, HS_VLOADM, 0xFF, 0x00);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, HS_VLOADM, 0xFF, 0x00);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, HS_VLOADM, 0xFF, 0x01);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, HS_VLOADM, 0xFF, 0x00);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, HS_VLOADM, 0xFF, 0x00);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, HS_VLOADM, 0xFF, 0x01);
+    rtsx_usb_send_cmd(ucr, MODE_C, 100);
+
+}
+
+int rtsx_usb_write_register(struct rtsx_ucr *ucr, u16 addr, u8 mask, u8 data)
+{
+    rtsx_usb_init_cmd(ucr);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, addr, mask, data);
+    rtsx_usb_send_cmd(ucr, MODE_C, 100);
+}
+
+EXPORT_SYMBOL_GPL(rtsx_usb_write_register);
+
+int rtsx_usb_read_register(struct rtsx_ucr *ucr, u16 addr, u8 *data)
+{
+    int ret;
+
+    if (data != NULL)
+        *data = 0;
+
+    rtsx_usb_init_cmd(ucr);
+    rtsx_usb_add_cmd(ucr, READ_REG_CMD, addr, 0, 0);
+    ret = rtsx_usb_send_cmd(ucr, MODE_CR, 100);
+    if (ret)
+        return ret;
+    return ret;
+ret = rtsx_usb_get_rsp(ucr, 1, 100);
+if (ret)
+return ret;
+
+if (data != NULL)
+*data = ucr->rsp_buf[0];
+
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_usb_read_register);
+
+static inline u8 double_ssc_depth(u8 depth)
+{
+return (depth > 1) ? (depth - 1) : depth;
+}
+
+static u8 revise_ssc_depth(u8 ssc_depth, u8 div)
+{
+if (div > CLK_DIV_1) {
+if (ssc_depth > div - 1)
+ssc_depth -= (div - 1);
+else
+ssc_depth = SSC_DEPTH_2M;
+}
+
+return ssc_depth;
+}
+
+int rtsx_usb_switch_clock(struct rtsx_ucr *ucr, unsigned int card_clock,
+u8 ssc_depth, bool initial_mode, bool double_clk, bool vpclk)
+{
+int ret;
+u8 n, clk_divider, mcu_cnt, div;
+
+if (!card_clock) {
+ucr->cur_clk = 0;
+return 0;
+}
+
+if (initial_mode) {
+/* We use 250k(around) here, in initial stage */
+clk_divider = SD_CLK_DIVIDE_128;
+card_clock = 30000000;
+} else {
+clk_divider = SD_CLK_DIVIDE_0;
+}
+
+ret = rtsx_usb_write_register(ucr, SD_CFG1,
+SD_CLK_DIVIDE_MASK, clk_divider);
+if (ret < 0)
+return ret;
+
+card_clock /= 1000000;
+dev_dbg(&ucr->pusb_intf->dev,
+"Switch card clock to %dMHz\n", card_clock);
+
+if (!initial_mode && double_clk)
+card_clock *= 2;
+dev_dbg(&ucr->pusb_intf->dev,
+"Internal SSC clock: %dMHz (cur_clk = %d)\n",
+card_clock, ucr->cur_clk);
+
+if (card_clock == ucr->cur_clk)
+return 0;
+
+/* Converting clock value into internal settings: n and div */
+n = card_clock - 2;
+if (((card_clock <= 2) || (n > MAX_DIV_N))
+return -EINVAL;
+
+mcu_cnt = 60/card_clock + 3;
+if (mcu_cnt > 15)
+mcu_cnt = 15;
+
+/* Make sure that the SSC clock div_n is not less than MIN_DIV_N */
+
+div = CLK_DIV_1;
+while (n < MIN_DIV_N && div < CLK_DIV_4) {
+n = (n + 2) * 2 - 2;
+div++;
+}
+dev_dbg(&ucr->pusb_intf->dev, "n = \%d, div = \%d\n", n, div);
+
+if (double_clk)
+ssc_depth = double_ssc_depth(ssc_depth);
+
+ssc_depth = revise_ssc_depth(ssc_depth, div);
+dev_dbg(&ucr->pusb_intf->dev, "ssc_depth = \%d\n", ssc_depth);
+
+rtsx_usb_init_cmd(ucr);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CLK_DIV, CLK_CHANGE, CLK_CHANGE);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CLK_DIV,
+0x3F, (div << 4) | mcu_cnt);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, SSC_CTL1, SSC_CTL2,
+SSC_DEPTH_MASK, ssc_depth);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, SSC_DIV_N_0, 0xFF, n);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, SSC_CTL1, SSC_RSTB, SSC_RSTB);
+if (vpclk) {
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, SD_VPCLK0_CTL, +PHASE_NOT_RESET, 0);
+    rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, SD_VPCLK0_CTL, +PHASE_NOT_RESET, PHASE_NOT_RESET);
+}
+
+ret = rtsx_usb_send_cmd(ucr, MODE_C, 2000);
+if (ret < 0)
+    return ret;
+
+ret = rtsx_usb_write_register(ucr, SSC_CTL1, 0xff, +SSC_RSTB | SSC_8X_EN | SSC_SEL_4M);
+if (ret < 0)
+    return ret;
+
+/* Wait SSC clock stable */
+usleep_range(100, 1000);
+
+ret = rtsx_usb_write_register(ucr, CLK_DIV, CLK_CHANGE, 0);
+if (ret < 0)
+    return ret;
+
+ucr->cur_clk = card_clock;
+
+return 0;
+
+EXPORT_SYMBOL_GPL(rtsx_usb_switch_clock);
+
+int rtsx_usb_card_exclusive_check(struct rtsx_ucr *ucr, int card)
+{
+    int ret;
+    u16 val;
+    u16 cd_mask[] = {
+[RTSX_USB_SD_CARD] = (CD_MASK & ~SD_CD),
+[RTSX_USB_MS_CARD] = (CD_MASK & ~MS_CD)
+};
+
+ret = rtsx_usb_get_card_status(ucr, &val);
+/*
+ * If get status fails, return 0 (ok) for the exclusive check
+ * and let the flow fail at somewhere else.
+ */
+if (ret)
+    return 0;
++
+if (val & cd_mask[card])
+return -EIO;
+
+return 0;
+}
+EXPORT_SYMBOL_GPL(rtsx_usb_card_exclusive_check);
+
+static int rtsx_usb_reset_chip(struct rtsx_ucr *ucr)
+{
+int ret;
+u8 val;
+
+rtsx_usb_init_cmd(ucr);
+
+if (CHECK_PKG(ucr, LQFP48)) {
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CARD_PWR_CTL, +LDO3318_PWR_MASK, LDO_SUSPEND);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CARD_PWR_CTL, +FORCE_LDO_POWERB, FORCE_LDO_POWERB);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CARD_PULL_CTL1, +0x30, 0x10);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CARD_PULL_CTL5, +0x03, 0x01);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CARD_PULL_CTL6, +0x0C, 0x04);
+}
+
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, SYS_DUMMY0, NYET_MSAK, NYET_EN);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CD_DEGLITCH_WIDTH, 0xFF, 0x08);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, +CD_DEGLITCH_EN, XD_CD_DEGLITCH_EN, 0x0);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, SD30_DRIVE_SEL, +SD30_DRIVE_MASK, DRIVER_TYPE_D);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, +CARD_DRIVE_SEL, SD20_DRIVE_MASK, 0x0);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, +LDO_POWER_CFG, 0xE0, 0x0);
+
+if (ucr->is_rts5179)
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, +CARD_PULL_CTL5, 0x03, 0x01);
+
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CARD_DMA1_CTL, +EXTEND_DMA1_ASYNC_SIGNAL, EXTEND_DMA1_ASYNC_SIGNAL);
+rtsx_usb_add_cmd(ucr, WRITE_REG_CMD, CARD_INT_PEND, +XD_INT | MS_INT | SD_INT, +XD_INT | MS_INT | SD_INT);
+
+ret = rtsx_usb_send_cmd(ucr, MODE_C, 100);
+if (ret)
+return ret;
+
+/* config non-crystal mode */
+rtsx_usb_read_register(ucr, CFG_MODE, &val);
+if ( ((val & XTAL_FREE) || ((val & CLK_MODE_MASK) == CLK_MODE_NON_XTAL)) )
+ret = rtsx_usb_write_phy_register(ucr, 0xC2, 0x7C);
+if (ret)
+return ret;
+
+return 0;
+
+}
+
+static int rtsx_usb_init_chip(struct rtsx_ucr *ucr)
+{
+int ret;
+u8 val;
+
+rtsx_usb_clear_fsm_err(ucr);
+
+/* power on SSC */
+ret = rtsx_usb_write_register(ucr,
+FPDCTL, SSC_POWER_MASK, SSC_POWER_ON);
+if (ret)
+return ret;
+
+usleep_range(100, 1000);
+ret = rtsx_usb_write_register(ucr, CLK_DIV, CLK_CHANGE, 0x00);
+if (ret)
+return ret;
+
+/* determine IC version */
+ret = rtsx_usb_read_register(ucr, HW_VERSION, &val);
+if (ret)
+return ret;
+
+ucr->ic_version = val & HW_VER_MASK;
+
+/* determine package */
+ret = rtsx_usb_read_register(ucr, CARD_SHARE_MODE, &val);
+if (ret)
+return ret;
+
+if (val & CARD_SHARE_LQFP_SEL) {
+ucr->package = LQFP48;
+dev_dbg(&ucr->pusb_intf->dev, "Package: LQFP48\n");
+} else {
+ucr->package = QFN24;
+dev_dbg(&ucr->pusb_intf->dev, "Package: QFN24\n");
+
+/
+/* determine IC variations */
+rtsx_usb_read_register(ucr, CFG_MODE_1, &val);
+if (val & RTS5179) {
+ucr->is_rts5179 = true;
+dev_dbg(&ucr->pusb_intf->dev, "Device is rts5179\n");
+} else {
+ucr->is_rts5179 = false;
+}
+
+return rttx_usb_reset_chip(ucr);
+
+static int rttx_usb_probe(struct usb_interface *intf,
+const struct usb_device_id *id)
+{
+struct usb_device *usb_dev = interface_to_usbdev(intf);
+struct rttx_ucr *ucr;
+int ret;
+
+dev_dbg(intf->dev,": Realtek USB Card Reader found at bus %03d address %03d\n",
+usb_dev->bus->busnum, usb_dev->devnum);
+
+ucr = devm_kzalloc(intf->dev, sizeof(*ucr), GFP_KERNEL);
+if (!ucr)
+return -ENOMEM;
+
+ucr->pusb_dev = usb_dev;
+
+ucr->iobuf = usb_alloc_coherent(ucr->pusb_dev, IOBUF_SIZE,
+GFP_KERNEL, &ucr->iobuf_dma);
+if (!ucr->iobuf)
+return -ENOMEM;
+
+usb_set_intfdata(intf, ucr);
+
+ucr->push_dev = usb_dev;
+
+ucr->iobuf = usb_alloc_coherent(ucr->push_dev, IOBUF_SIZE,
+GFP_KERNEL, &ucr->iobuf_dma);
+if (!ucr->iobuf)
+return -ENOMEM;
+
+mutex_init(&ucr->dev_mutex);
+
+ucr->pusb_intf = intf;
+}
/* initialize */
ret = rtsx_usb_init_chip(ucr);
if (ret)
    goto out_init_fail;

/* initialize USB SG transfer timer */
timer_setup(&ucr->sg_timer, rtsx_usb_sg_timed_out, 0);
ret = mfd_add_hotplug_devices(&intf->dev, rtsx_usb_cells,
    ARRAY_SIZE(rtsx_usb_cells));
if (ret)
    goto out_init_fail;

#ifdef CONFIG_PM
intf->needs_remote_wakeup = 1;
usb_enable_autosuspend(usb_dev);
#endif

return 0;

out_init_fail:
usb_free_coherent(ucr->pusb_dev, IOBUF_SIZE, ucr->iobuf,
    ucr->iobuf_dma);
return ret;

static void rtsx_usb_disconnect(struct usb_interface *intf)
{
    struct rtsx_ucr *ucr = (struct rtsx_ucr *)usb_get_intfdata(intf);

debug(&intf->dev, "%s called\n", __func__);
    mfd_remove_devices(&intf->dev);
    usb_set_intfdata(ucr->pusb_intf, NULL);
    usb_free_coherent(ucr->pusb_dev, IOBUF_SIZE, ucr->iobuf,
        ucr->iobuf_dma);
}

#ifdef CONFIG_PM
static int rtsx_usb_suspend(struct usb_interface *intf, pm_message_t message)
{
    struct rtsx_ucr *ucr =
        (struct rtsx_ucr *)usb_get_intfdata(intf);
    u16 val = 0;

debug(&intf->dev, "%s called with pm message 0x%04x\n", __func__, message.event);
+ if (PMSG_IS_AUTO(message)) {
+ if (mutex_trylock(&ucr->dev_mutex)) {
+ rtsx_usb_get_card_status(ucr, &val);
+ mutex_unlock(&ucr->dev_mutex);
+ /* Defer the autosuspend if card exists */
+ if (val & (SD_CD | MS_CD))
+ return -EAGAIN;
+ } else {
+ /* There is an ongoing operation*/
+ return -EAGAIN;
+ }
+ }
+ return 0;
+ }
+
+static int rtsx_usb_resume_child(struct device *dev, void *data)
+{
+ pm_request_resume(dev);
+ return 0;
+ }
+
+static int rtsx_usb_resume(struct usb_interface *intf)
+{
+ device_for_each_child(&intf->dev, NULL, rtsx_usb_resume_child);
+ return 0;
+ }
+
+static int rtsx_usb_reset_resume(struct usb_interface *intf)
+{
+ struct rtsx_ucr *ucr =
+ (struct rtsx_ucr *)usb_get_intfdata(intf);
+ rtsx_usb_reset_chip(ucr);
+ device_for_each_child(&intf->dev, NULL, rtsx_usb_resume_child);
+ return 0;
+ }
+
+#else /* CONFIG_PM */
+ #define rtsx_usb_suspend NULL
+ #define rtsx_usb_resume NULL
+ #define rtsx_usb_reset_resume NULL
+ #endif /* CONFIG_PM */
+
+static int rtsx_usb_pre_reset(struct usb_interface *intf) {
+  struct rtsx_ucr *ucr = (struct rtsx_ucr *)usb_get_intfdata(intf);
+  mutex_lock(&ucr->dev_mutex);
+  return 0;
+}
+
+static int rtsx_usb_post_reset(struct usb_interface *intf) {
+  struct rtsx_ucr *ucr = (struct rtsx_ucr *)usb_get_intfdata(intf);
+  mutex_unlock(&ucr->dev_mutex);
+  return 0;
+}
+
+static struct usb_device_id rtsx_usb_usb_ids[] = {
+  { USB_DEVICE(0x0BDA, 0x0129) },
+  { USB_DEVICE(0x0BDA, 0x0139) },
+  { USB_DEVICE(0x0BDA, 0x0140) },
+  {};
+} MODULE_DEVICE_TABLE(usb, rtsx_usb_usb_ids);
+
+static struct usb_driver rtsx_usb_driver = {
+  .name			= "rtsx_usb",
+  .probe			= rtsx_usb_probe,
+  .disconnect		= rtsx_usb_disconnect,
+  .suspend			= rtsx_usb_suspend,
+  .resume			= rtsx_usb_resume,
+  .reset_resume		= rtsx_usb_reset_resume,
+  .pre_reset		= rtsx_usb_pre_reset,
+  .post_reset		= rtsx_usb_post_reset,
+  .id_table		= rtsx_usb_usb_ids,
+  .supports_autosuspend= 1,
+  .soft_unbind= 1,
+};
+
+module_usb_driver(rtsx_usb_driver);
+
+MODULE_LICENSE("GPL v2");
+MODULE_AUTHOR("Roger Tseng <rogerable@realtek.com>");
+MODULE_DESCRIPTION("Realtek USB Card Reader Driver");
--- linux-4.15.0.orig/drivers/misc/cb710/sgbuf2.c
+++ linux-4.15.0/drivers/misc/cb710/sgbuf2.c
@@ -50,7 +50,7 @@
#ifdef CONFIG_HAVE_EFFICIENT_UNALIGNED_ACCESS

return false;
#else
-return ((ptr - NULL) & 3) != 0;
+return ((uintptr_t)ptr & 3) != 0;
#endif
}

--- linux-4.15.0.orig/drivers/misc/cxl/api.c
+++ linux-4.15.0/drivers/misc/cxl/api.c
@@ -103,15 +103,15 @@
d_instantiate(path.dentry, inode);
file = alloc_file(&path, OPEN_FMODE(flags), fops);
-if (IS_ERR(file))
-goto err_dput;
+if (IS_ERR(file)) {
+    path_put(&path);
+    goto err_fs;
+}
file->f_flags = flags & (O_ACCMODE | O_NONBLOCK);
file->private_data = priv;

return file;
-
-err_dput:
-    path_put(&path);
-err_inode:
-    iput(inode);
-err_fs:
--- linux-4.15.0.orig/drivers/misc/cxl/context.c
+++ linux-4.15.0/drivers/misc/cxl/context.c
@@ -45,6 +45,8 @@
ctx->pid = NULL; /* Set in start work ioctl */
mutex_init(&ctx->mapping_lock);
ctx->mapping = NULL;
+ctx->tidr = 0;
+ctx->assign_tidr = false;
if (cxl_is_power8()) {
    spin_lock_init(&ctx->sste_lock);
--- linux-4.15.0.orig/drivers/misc/cxl/cxl.h
+++ linux-4.15.0/drivers/misc/cxl/cxl.h
@@ -369,6 +369,9 @@
#define CXL_PSL_TFC_An_AE (1ull << (63-30)) /* Restart PSL with address error */
#define CXL_PSL_TFC_An_R  (1ull << (63-31)) /* Restart PSL transaction */
+ ****** CXL_PSL_DEBUG *****************************************************/
#define CXL_PSL_DEBUG_CDC  (1ull << (63-27)) /* Coherent Data cache support */
#define CXL_XSL9_IERAT_MLPID    (1ull << (63-0))  /* Match LPID */
#define CXL_XSL9_IERAT_MPID     (1ull << (63-1))  /* Match PID */

@@ -630,6 +633,9 @@
 struct list_head extra_irq_contexts;

 struct mm_struct *mm;
 +
 +u16 tidr;
 +bool assign_tidr;
);

 struct cxl_irq_info;
 @@ -666,6 +672,7 @@
    unsigned int err_virq;
    u64 ps_off;
    +bool no_data_cache; /* set if no data cache on the card */
    const struct cxl_service_layer_ops *sl_ops;
);

 @@ -710,6 +717,7 @@
      bool perst_select_user;
      bool perst_same_image;
      bool psli_timebase_synced;
      +bool tunneled_ops_supported;

 /*
  * number of contexts mapped on to this card. Possible values are:
 @@ -1062,7 +1070,7 @@
    int cxl_calc_capp_routing(struct pci_dev *dev, u64 *chipid,
    u32 *phb_index, u64 *capp_unit_id);
    int cxl_slot_is_switched(struct pci_dev *dev);
    -int cxl_get_xsl9_dsnctl(u64 capp_unit_id, u64 *reg);
    +int cxl_get_xsl9_dsnctl(struct pci_dev *dev, u64 capp_unit_id, u64 *reg);
    u64 cxl_calculate_sr(bool master, bool kernel, bool real_mode, bool p9);

    void cxl_native_irq_dump_regs_psli9(struct cxl_context *ctx);
 --- linux-4.15.0.orig/drivers/misc/cxl/cxllib.c
 +++ linux-4.15.0/drivers/misc/cxl/cxllib.c
 @@ -99,7 +99,7 @@
 if (rc)
 return rc;

 -rc = cxl_get_xsl9_dsnctl(capp_unit_id, &cfg->dsnctl);
 +rc = cxl_get_xsl9_dsnctl(dev, capp_unit_id, &cfg->dsnctl);
 if (rc)
return rc;
if (cpu_has_feature(CPU_FTR_POWER9_DD1)) {
@@ -199,57 +199,83 @@
*/
attr->pid = mm->context.id;
mmapput(mm);
+attr->tid = task->thread.tidr;
} else {
attr->pid = 0;
+attr->tid = 0;
}
-attrib->tid = 0;
return 0;
}
EXPORT_SYMBOL_GPL(cxllib_get_PE_attributes);

-int cxllib_handle_fault(struct mm_struct *mm, u64 addr, u64 size, u64 flags)
+static int get_vma_info(struct mm_struct *mm, u64 addr,
+u64 *vma_start, u64 *vma_end,
+unsigned long *page_size)
{
-int rc;
-u64 dar;
struct vm_area_struct *vma = NULL;
-unsigned long page_size;
-
-if (mm == NULL)
-return -EFAULT;
+int rc = 0;
+int rc = 0;

down_read(&mm->mmap_sem);

vma = find_vma(mm, addr);
if (!vma) {
-pr_err("Can't find vma for addr %"i64x", addr);
rc = -EFAULT;
goto out;
}
-/* get the size of the pages allocated */
-page_size = vma_kernel_pagesize(vma);
+*page_size = vma_kernel_pagesize(vma);
+*vma_start = vma->vm_start;
+*vma_end = vma->vm_end;
+out:
+up_read(&mm->mmap_sem);
+return rc;
+}
+int cxllib_handle_fault(struct mm_struct *mm, u64 addr, u64 size, u64 flags)
+{
+int rc;
+u64 dar, vma_start, vma_end;
+unsigned long page_size;
+
+if (mm == NULL)
+return -EFAULT;
+
+/*
+ * The buffer we have to process can extend over several pages
+ * and may also cover several VMAs.
+ * We iterate over all the pages. The page size could vary
+ * between VMAs.
+ */
+rc = get_vma_info(mm, addr, &vma_start, &vma_end, &page_size);
+if (rc)
+return rc;
+
-/*
- * get the size of the pages allocated */
-/*
- * page_size = vma_kernel_pagesize(vma);
+-for (dar = (addr & ~(page_size - 1)); dar < (addr + size); dar += page_size) {
+for (dar = (addr & ~(page_size - 1)); dar < (addr + size);
+     dar += page_size) {
+if (dar < vma_start || dar >= vma_end) {
+    /* We don't hold the mm->mmap_sem semaphore
+    * while iterating, since the semaphore is
+    * required by one of the lower-level page
+    * fault processing functions and it could
+    * create a deadlock.
+    */
+    +/*
+    * It means the VMAs can be altered between 2
+    * loop iterations and we could theoretically
+    * miss a page (however unlikely). But that's
+    * not really a problem, as the driver will
+    * retry access, get another page fault on the
+    * missing page and call us again.
+    */
+    rc = get_vma_info(mm, dar, &vma_start, &vma_end,
+    &page_size);
if (rc)
    return rc;
}

rc = cxl_handle_mm_fault(mm, flags, dar);
-if (rc) {
-pr_err("cxl_handle_mm_fault failed %d", rc);
-rc = -EFAULT;
-goto out;
-}
+if (rc)
    return -EFAULT;
}
-rc = 0;
-out:
-up_read(&mm->mmap_sem);
-return rc;
+return 0;
}
EXPORT_SYMBOL_GPL(cxllib_handle_fault);
--- linux-4.15.0.orig/drivers/misc/cxl/file.c
+++ linux-4.15.0/drivers/misc/cxl/file.c
@@ -173,7 +173,7 @@
 * flags are set it's invalid
 */
 if (work.reserved1 || work.reserved2 || work.reserved3 ||
-    work.reserved4 || work.reserved5 || work.reserved6 ||
+    work.reserved4 || work.reserved5 ||
        (work.flags & ~CXL_START_WORK_ALL)) {
    rc = -EINVAL;
    goto out;
@@ -186,12 +186,16 @@
 rc = -EINVAL;
 goto out;
 }
+if ((rc = afu_register_irqs(ctx, work.num_interrupts)))
    goto out;
    rc = -EINVAL;
    goto out;
 } +
 if ((rc = afu_register_irqs(ctx, work.num_interrupts)))
 goto out;

if (work.flags & CXL_START_WORK_AMR)
    amr = work.amr & mfspr(SPRN_UAMOR);

+if (work.flags & CXL_START_WORK_TID)
    ctx->assign_tidr = true;
+ctx->mmio_err_ff = !(work.flags & CXL_START_WORK_ERR_FF);
/*
goto out;
}

-ctx->status = STARTED;
rc = 0;
+if (work.flags & CXL_START_WORK_TID) {
+work.tid = ctx->tidr;
+if (copy_to_user(uwork, &work, sizeof(work)))
+rc = -EFAULT;
+
+ctx->status = STARTED;
+
out:
mutex_unlock(&ctx->status_mutex);
return rc;
--- linux-4.15.0.orig/drivers/misc/cxl/guest.c
+++ linux-4.15.0/drivers/misc/cxl/guest.c
@@ -267,6 +267,7 @@

int i, rc;

pr_devel("Adapter reset request\n");
+spin_lock(&adapter->afu_list_lock);
for (i = 0; i < adapter->slices; i++) {
if ((afu = adapter->afu[i])) {
pci_error_handlers(afu, CXL_ERROR_DETECTED_EVENT,
@@ -283,6 +284,7 @@
pici_error_handlers(afu, CXL_RESUME_EVENT, 0);
} }
} }
+spin_unlock(&adapter->afu_list_lock);
return rc;
}

@@ -1026,8 +1028,6 @@

void cxl_guest_remove_afu(struct cxl_afu *afu)
{
-pr_devel("in %s - AFU(%d)\n", __func__, afu->slice);
- if (!afu) return;

--- linux-4.15.0.orig/drivers/misc/cxl/main.c
+++ linux-4.15.0/drivers/misc/cxl/main.c
@@ -287,7 +287,7 @@

int rc;


rc = atomic_inc_unless_negative(&adapter->contexts_num);
- return rc >= 0 ? 0 : -EBUSY;
+ return rc ? 0 : -EBUSY;
}

void cxl_adapter_context_put(struct cxl *adapter)
--- linux-4.15.0.orig/drivers/misc/cxl/native.c
+++ linux-4.15.0/drivers/misc/cxl/native.c
@@ -16,6 +16,7 @@
#include <linux/uaccess.h>
#include <linux/delay.h>
#include <asm/synch.h>
+ #include <asm/switch_to.h>
#include <misc/cxl-base.h>

#include "cxl.h"
@@ -352,8 +353,17 @@
 u64 reg;
 unsigned long timeout = jiffies + (HZ * CXL_TIMEOUT);

-pr_devel("Flushing data cache\n");
+/*
+ * Do a datacache flush only if datacache is available.
+ * In case of PSL9D datacache absent hence flush operation.
+ * would timeout.
+ */
+if (adapter->native->no_data_cache) {
+pr_devel("No PSL data cache. Ignoring cache flush req.\n");
+ return 0;
+}

+pr_devel("Flushing data cache\n");
 reg = cxl_p1_read(adapter, CXL_PSL_Control);
 reg |= CXL_PSL_Control_Fr;
 cxl_p1_write(adapter, CXL_PSL_Control, reg);
@@ -655,6 +665,7 @@
 static int process_element_entry_psl9(struct cxl_context *ctx, u64 wed, u64 amr)
 { u32 pid;
+ int rc;

cxl_assign_psn_space(ctx);

@@ -673,7 +684,16 @@
 pid = ctx->mm->context.id;
}
ctx->elem->common.tid = 0;
+
+/* Assign a unique TIDR (thread id) for the current thread */
+if (!(ctx->tidr) && (ctx->assign_tidr)) {
+    rc = set_thread_tidr(current);
+    if (rc)
+        return -ENODEV;
+    ctx->tidr = current->thread.tidr;
+    pr_devel("%s: current tidr: %d
", __func__, ctx->tidr);
+}
+
+ctx->elem->common.tid = cpu_to_be32(ctx->tidr);
ctx->elem->common.pid = cpu_to_be32(pid);
ctx->elem->sr = cpu_to_be64(calculate_sr(ctx));

--- linux-4.15.0.orig/drivers/misc/cxl/pci.c
+++ linux-4.15.0/drivers/misc/cxl/pci.c
@@ -125,8 +125,6 @@
{ PCI_DEVICE(PCI_VENDOR_ID_IBM, 0x0628), },
-{ PCI_DEVICE_CLASS(0x120000, ~0), },
-{ }
-MODULE_DEVICE_TABLE(pci, cxl_pci_tbl);
@@ -401,29 +399,67 @@
int cxl_get_xsl9_dsnctl(u64 capp_unit_id, u64 *reg)
+
+static DEFINE_MUTEX(indications_mutex);
+
+static int get_phb_indications(struct pci_dev *dev, u64 *capiind, u64 *asnind,
+    u64 *nbwind)
+ {
+    static u64 nbw, asn, capi = 0;
+    struct device_node *np;
+    const __be32 *prop;
mutex_lock(&indications_mutex);
if (!capi) {
    if (!(np = pnv_pci_get_phb_node(dev))) {
        mutex_unlock(&indications_mutex);
        return -ENODEV;
    }
    prop = of_get_property(np, "ibm.phb-indications", NULL);
    if (!prop) {
        nbw = 0x0300UL; /* legacy values */
        asn = 0x0400UL;
        capi = 0x0200UL;
    } else {
        nbw = (u64)be32_to_cpu(prop[2]);
        asn = (u64)be32_to_cpu(prop[1]);
        capi = (u64)be32_to_cpu(prop[0]);
    }
    of_node_put(np);
}
*capiind = capi;
*asnind = asn;
*nbwind = nbw;
mutex_unlock(&indications_mutex);
return 0;
}

int cxl_get_xsl9_dsnctl(struct pci_dev *dev, u64 capp_unit_id, u64 *reg) {
    u64 capiind, asnind, nbwind;

    /*
     * CAPI Identifier bits [0:7]
     * bit 61:60 MSI bits --> 0
     * bit 59 TVT selector --> 0
     *
    */
    if (get_phb_indications(dev, &capiind, &asnind, &nbwind))
        return -ENODEV;

    /*
     * Tell XSL where to route data to.
     * The field chipid should match the PHB CAPI_CMPM register
     *
     */
    -xsl_dsnctl = ((u64)0x2 << (63-7)); /* Bit 57 */
    +xsl_dsnctl = (capiind << (63-15)); /* Bit 57 */
    xsl_dsnctl |= (capp_unit_id << (63-15));


/* nMMU_ID Defaults to: b000001001 */
@@ -437,14 +473,14 @@
* nbwind=0x03, bits [57:58], must include capi indicator.
* Not supported on P9 DD1.
*/
xsl_dsnctl |= ((u64)0x03 << (63-47));
xsl_dsnctl |= (nbwind << (63-55));

/*
* Upper 16b address bits of ASB_Notify messages sent to the
* system. Need to match the PHBs ASN Compare/Mask Register.
* Not supported on P9 DD1.
*/
xsl_dsnctl |= ((u64)0x04 << (63-55));
xsl_dsnctl |= asnind;
}

/*
*reg = xsl_dsnctl;
@@ -458,13 +494,14 @@
 u64 chipid;
 u32 phb_index;
 u64 capp_unit_id;
+u64 psl_debug;
 int rc;

 rc = cxl_calc_capp_routing(dev, &chipid, &phb_index, &capp_unit_id);
 if (rc)
 return rc;

 -rc = cxl_get_xsl9_dsnctl(capp_unit_id, &xsl_dsnctl);
 +rc = cxl_get_xsl9_dsnctl(dev, capp_unit_id, &xsl_dsnctl);
 if (rc)
 return rc;

 @@ -477,9 +514,9 @@
cxl_pl_write(adapter, CXL_PSL9_FIR_CNTL, ps1_fircntl);

 /* Setup the PSL to transmit packets on the PCIe before the
 - * CAPP is enabled
 + * CAPP is enabled. Make sure that CAPP virtual machines are disabled
 */
cxl_pl_write(adapter, CXL_PSL9_DSNDCTL, 0x0001001000002A10ULL);
cxl_pl_write(adapter, CXL_PSL9_DSNDCTL, 0x0001001000012A10ULL);

 /*
 * A response to an ASB_Notify request is returned by the
 @@ -505,8 +542,22 @@
 if (cxl_is_power9_dd1()) {

 /*
/* Disabling deadlock counter CAR */
cxl_p1_write(adapter, CXL_PSL9_GP_CT, 0x0020000000000001ULL);
-} else
-cxl_p1_write(adapter, CXL_PSL9_DEBUG, 0x4000000000000000ULL);
+/* Enable NORST */
+cxl_p1_write(adapter, CXL_PSL9_DEBUG, 0x8000000000000000ULL);
+} else {
+/* Enable NORST and DD2 features */
+cxl_p1_write(adapter, CXL_PSL9_DEBUG, 0xC000000000000000ULL);
+
+
+/*
+ * Check if PSL has data-cache. We need to flush adapter datacache
+ * when as its about to be removed.
+ */
+psl_debug = cxl_p1_read(adapter, CXL_PSL9_DEBUG);
+if (psl_debug & CXL_PSL_DEBUG_CDC) {
+dev_dbg(&dev->dev, "No data-cache present\n");
+adapter->native->no_data_cache = true;
+}

return 0;
}
@ @ -570,12 +621,6 @@
/*/ For the PSL this is a multiple for 0 < n <= 7: */
#define PSL_2048_250MHZ_CYCLES 1

-static void write_timebase_ctrl_psl9(struct cxl *adapter)
-{,
-cxl_p1_write(adapter, CXL_PSL9_TB_CTLSTAT,
- TBSYNC_CNT(2 * PSL_2048_250MHZ_CYCLES));
-}
-
-static void write_timebase_ctrl_psl8(struct cxl *adapter)
{

static void cxl_setup_psl_timebase(struct cxl *adapter, struct pci_dev *dev)
{
-u64 psl_tb;
-int delta;
-unsigned int retry = 0;
struct device_node *np;

adapter->psl_timebase_synced = false;
@ @ -637,26 +679,13 @@
* Setup PSL Timebase Control and Status register
* with the recommended Timebase Sync Count value
*/
-adapter->native->sl_ops->write_timebase_ctrl(adapter);
+if (adapter->native->sl_ops->write_timebase_ctrl)
+adapter->native->sl_ops->write_timebase_ctrl(adapter);

/* Enable PSL Timebase */
cxl_pl_write(adapter, CXL_PSL_Control, 0x0000000000000000);
cxl_pl_write(adapter, CXL_PSL_Control, CXL_PSL_Control_tb);

-/* Wait until CORE TB and PSL TB difference <= 16usecs */
-dof (retry+++ > 5) {
        -dev_info(&dev->dev, "PSL timebase can't synchronize\n");
        -return;
    -}
    -psl_tb = adapter->native->sl_ops->timebase_read(adapter);
    -delta = mftb() - psl_tb;
    -if (delta < 0)
        -delta = -delta;
    -} while (tb_to_ns(delta) > 16000);
    -
    -adapter->psl_timebase_synced = true;
    -return;
}

@@ -1451,10 +1480,8 @@

    */
    * The adapter is about to be reset, so ignore errors.
    - * Not supported on P9 DD1
    */
-    -if (cxl_is_power8()) || (!(cxl_is_power9_dd1()))
+    -cxl_data_cache_flush(adapter);
+    +cxl_data_cache_flush(adapter);

    /* pcie_warm_reset requests a fundamental pci reset which includes a
    * PERST assert/deassert. PERST triggers a loading of the image
    @ @ -1715.6 +1742.15 @@
    */
    * Required for devices using CAPP DMA mode, harmless for others */
    pci_set_master(dev);

    +adapter->tunneled_ops_supported = false;
    +
    +if (cxl_is_power9()) {
        +if (pnv_pci_set_tunnel_bar(dev, 0x00020000E0000000ull, 1))
        +dev_info(&dev->dev, "Tunneled operations unsupported\n");
else
+adapter->tunneled_ops_supported = true;
+
+if ((rc = pnv_phb_to_cxl_mode(dev, adapter->native->sl_ops->capi_mode)))
goto err;

@@ -1741,6 +1777,9 @@
{
 struct pci_dev *pdev = to_pci_dev(adapter->dev.parent);

+if (cxl_is_power9())
+pnv_pci_set_tunnel_bar(pdev, 0x00020000E0000000ull, 0);
+  cxl_native_release_psl_err_irq(adapter);
  cxl_unmap_adapter_regs(adapter);

@@ -1803,7 +1842,6 @@
   .psl_irq_dump_registers = cxl_native_irq_dump_regs_psl9,
   .err_irq_dump_registers = cxl_native_err_irq_dump_regs_psl9,
   .debugfs_stop_trace = cxl_stop_trace_psl9,
-  .write_timebase_ctrl = write_timebase_ctrl_psl9,
   .timebase_read = timebase_read_psl9,
   .capi_mode = OPAL_PHB_CAPI_MODE_CAPI,
   .needs_reset_before_disable = true,
@@ -1938,10 +1976,8 @@
/*
 * Flush adapter datacache as its about to be removed.
- * Not supported on P9 DD1.
 */
-  -if ((cxl_is_power8()) || (!(cxl_is_power9_dd1())))
-    cxl_data_cache_flush(adapter);
+  cxl_deconfigure_adapter(adapter);

@@ -2083,7 +2119,7 @@
 /* There should only be one entry, but go through the list
 * anyway
 */
-  -if (afu->phb == NULL)
+  +if (afu == NULL || afu->phb == NULL)
    return result;

  list_for_each_entry(afu_dev, &afu->phb->bus->devices, bus_list) {
@@ -2110,7 +2146,8 @@

struct cxl *adapter = pci_get_drvdata(pdev);
struct cxl_afu *afu;
-pci_ers_result_t result = PCI_ERS_RESULT_NEED_RESET, afu_result;
+pci_ers_result_t result = PCI_ERS_RESULT_NEED_RESET;
+pci_ers_result_t afu_result = PCI_ERS_RESULT_NEED_RESET;
int i;

/* At this point, we could still have an interrupt pending.
@@ -2121,6 +2158,7 @@

/* If we're permanently dead, give up. */
if (state == pci_channel_io_perm_failure) {
+spin_lock(&adapter->afu_list_lock);
for (i = 0; i < adapter->slices; i++) {
  afu = adapter->afu[i];
/*
@@ -2129,6 +2167,7 @@
  */
cxl_vphb_error_detected(afu, state);
} 
+spin_unlock(&adapter->afu_list_lock);
return PCI_ERS_RESULT_DISCONNECT;
}

@@ -2210,11 +2249,17 @@
*     * In slot_reset, free the old resources and allocate new ones.
*     * In resume, clear the flag to allow things to start.
* />
+/* Make sure no one else changes the afu list */
+spin_lock(&adapter->afu_list_lock);
+for (i = 0; i < adapter->slices; i++) {
  afu = adapter->afu[i];

  -afu_result = cxl_vphb_error_detected(afu, state);
  +if (afu == NULL)
  +continue;

  +afu_result = cxl_vphb_error_detected(afu, state);
  cxl_context_detach_all(afu);
  cxl_ops->afu_deactivate_mode(afu, afu->current_mode);
  pci_deconfigure_afu(afu);
@@ -2226,6 +2271,7 @@
  (result == PCI_ERS_RESULT_NEED_RESET))
  result = PCI_ERS_RESULT_NONE;
}
+spin_unlock(&adapter->afu_list_lock);
/* should take the context lock here */
if (cxl_adapter_context_lock(adapter) != 0)
@@ -2258,14 +2304,18 @@
/*
cxl_adapter_context_unlock(adapter);

+spin_lock(&adapter->afu_list_lock);
for (i = 0; i < adapter->slices; i++) {
afu = adapter->afu[i];

+if (afu == NULL)
+continue;
+
if (pci_configure_afu(afu, adapter, pdev))
-goto err;
+goto err_unlock;

if (cxl_afu_select_best_mode(afu))
-goto err;
+goto err_unlock;

if (afu->phb == NULL)
continue;
@@ -2277,16 +2327,16 @@
ctx = cxl_get_context(afu_dev);

if (ctx && cxl_release_context(ctx))
-goto err;
+goto err_unlock;

cxt = cxl_dev_context_init(afu_dev);
if (IS_ERR(ctx))
-goto err;
+goto err_unlock;

afu_dev->dev.archdata.cxl_ctx = ctx;

if (cxl_ops->afu_check_and_enable(afu))
-goto err;
+goto err_unlock;

afu_dev->error_state = pci_channel_io_normal;
@@ -2307,8 +2357,13 @@
result = PCI_ERS_RESULT_DISCONNECT;
}
}
+spin_unlock(&adapter->afu_list_lock);
return result;

+err_unlock:
+spin_unlock(&adapter->afu_list_lock);
+
err:
/* All the bits that happen in both error_detected and cxl_remove
 * should be idempotent, so we don't need to worry about leaving a mix
 @@ -2329,10 +2384,11 @@
 * This is not the place to be checking if everything came back up
 * properly, because there's no return value: do that in slot_reset.
 */
+spin_lock(&adapter->afu_list_lock);
for (i = 0; i < adapter->slices; i++) {
afu = adapter->afu[i];

-if (afu->phb == NULL)
+if (afu == NULL || afu->phb == NULL)
continue;

list_for_each_entry(afu_dev, &afu->phb->bus->devices, bus_list) {
@@ -2341,6 +2397,7 @@
afu_dev->driver->err_handler->resume(afu_dev);
}
}
+spin_unlock(&adapter->afu_list_lock);
}

static const struct pci_error_handlers cxl_err_handler = {
--- linux-4.15.0.orig/drivers/misc/cxl/sysfs.c
+++ linux-4.15.0/drivers/misc/cxl/sysfs.c
@@ -62,10 +62,31 @@
char *buf)
 {
 struct cxl *adapter = to_cxl_adapter(device);
+u64 psl_tb, delta;

+/* Recompute the status only in native mode */
+if (cpu_has_feature(CPU_FTR_HVMODE)) {
+psl_tb = adapter->native->sl_ops->timebase_read(adapter);
+delta = abs(mftb() - psl_tb);
+ /* CORE TB and PSL TB difference <= 16usecs ? */
+adapter->psl_timebase_synced = (tb_to_ns(delta) < 16000) ? true : false;
+pr_devel("PSL timebase %s - delta: 0x%016llx\n",
+ (tb_to_ns(delta) < 16000) ? "synchronized" :
+ "not synchronized", tb_to_ns(delta));
+
return scnprintf(buf, PAGE_SIZE, "\%d\n", adapter->psl_timebase_synced);
}

+static ssize_t tunneled_ops_supported_show(struct device *device,
+struct device_attribute *attr,
+char *buf)
+{
+struct cxl *adapter = to_cxl_adapter(device);
+
+return scnprintf(buf, PAGE_SIZE, "\%d\n", adapter->tunneled_ops_supported);
+
+
static ssize_t reset_adapter_store(struct device *device,
    struct device_attribute *attr,
    const char *buf, size_t count)
@@ -171,6 +192,7 @@
__ATTR_RO(base_image),
__ATTR_RO(image_loaded),
__ATTR_RO(psl_timebase_synced),
+__ATTR_RO(tunneled_ops_supported),
__ATTR_RW(load_image_on_perst),
__ATTR_RW(perst_reloads_same_image),
__ATTR(reset, S_IWUSR, NULL, reset_adapter_store),
@@ -331,12 +353,20 @@
struct cxl_afu *afu = to_cxl_afu(device);
enum prefault_modes mode = -1;

    -if (!strncmp(buf, "work_element_descriptor", 23))
-    mode = CXL_PREFAULT_WED;
    -if (!strncmp(buf, "all", 3))
-    mode = CXL_PREFAULT_ALL;
    -if (!strncmp(buf, "none", 4))
        if (!radix_enabled()) {
            /* only allowed when not in radix mode */
            +mode = CXL_PREFAULT_WED;
            +mode = CXL_PREFAULT_WED;
            +mode = CXL_PREFAULT_ALL;
            +}
else {
+dev_err(device, "Cannot prefault with radix enabled\n");
+}
+}
if (mode == -1)
    return -EINVAL;
@@ -598,7 +628,7 @@
    rc = kobject_init_and_add(&cr->kobj, &afu_config_record_type,
                        &afu->dev.kobj, "cr%i", cr->cr);
if (rc)
    -goto err;
    +goto err1;
rc = sysfs_create_bin_file(&cr->kobj, &cr->config_attr);
if (rc)
    --- linux-4.15.0.orig/drivers/misc/echo/echo.c
    +linux-4.15.0/drivers/misc/echo/echo.c
@@ -454,7 +454,7 @@
      /*
        ec->factor = 0;
        ec->shift = 0;
-       if ((ec->nonupdate_dwell == 0)) {
+       if (!ec->nonupdate_dwell) {
            int p, logp, shift;
            /* Determine:
               ones like at24c64, 24lc02 or fm24c04:
               24c00, 24c01, 24c02, spd (readonly 24c02), 24c04, 24c08,
-              24c16, 24c32, 24c64, 24c128, 24c256, 24c512, 24c1024
+              24c16, 24c32, 24c64, 24c128, 24c256, 24c512, 24c1024, 24c2048
            Unless you like data loss puzzles, always be sure that any chip
            you configure as a 24c32 (32 kbit) or larger is NOT really a
-           @ @ -23,7 +23,10 @ @
+           @ @ -3,6 +3,7 @ @

            If you use this with an SMBus adapter instead of an I2C adapter,
            full functionality is not available. Only smaller devices are
            - supported (24c16 and below, max 4 kByte).
            + supported via block reads (24c16 and below, max 4 kByte).
            + Larger devices that use 16-bit addresses will only work with
            + individual byte reads, which is very slow in general and is unsafe
            + in multi-master SMBus topologies.

            This driver can also be built as a module. If so, the module
            will be called at24.
        */
        --- linux-4.15.0.orig/drivers/misc/eeeprom/Kconfig
        +linux-4.15.0/drivers/misc/eeeprom/Kconfig
        @@ -12,7 +12,7 @@
            ones like at24c64, 24lc02 or fm24c04:
            24c00, 24c01, 24c02, spd (readonly 24c02), 24c04, 24c08,
            - 24c16, 24c32, 24c64, 24c128, 24c256, 24c512, 24c1024
            + 24c16, 24c32, 24c64, 24c128, 24c256, 24c512, 24c1024, 24c2048
            If you use this with an SMBus adapter instead of an I2C adapter,
            full functionality is not available. Only smaller devices are
            - supported (24c16 and below, max 4 kByte).
            + supported via block reads (24c16 and below, max 4 kByte).
            + Larger devices that use 16-bit addresses will only work with
            + individual byte reads, which is very slow in general and is unsafe
            + in multi-master SMBus topologies.

            This driver can also be built as a module. If so, the module
            will be called at24.
        */
        --- linux-4.15.0.orig/drivers/misc/eeeprom/at24.c
        +linux-4.15.0/drivers/misc/eeeprom/at24.c
        @@ -3,6 +3,7 @@
* Copyright (C) 2005-2007 David Brownell
* Copyright (C) 2008 Wolfram Sang, Pengutronix
* Copyright (C) 2015 Extreme Engineering Solutions, Inc.
*
* This program is free software; you can redistribute it and/or modify
* it under the terms of the GNU General Public License as published by
@c -52.7 +53.7 @c
* Other than binding model, current differences from "eeprom" driver are
* that this one handles write access and isn't restricted to 24c02 devices.
* It also handles larger devices (32 kbit and up) with two-byte addresses,
- * which won't work on pure SMBus systems.
+ * which don't work without risks on pure SMBus systems.
* /

struct at24_data {
    c @c -115.22 +116.6 c @c
    ((1 << AT24_SIZE_FLAGS | (_flags)) \n    \c c << AT24_SIZE_BYTELEN | ilog2(_len))
    \c /
- * Both reads and writes fail if the previous write didn't complete yet. This
- * macro loops a few times waiting at least long enough for one entire page
- * write to work while making sure that at least one iteration is run before
- * checking the break condition.
- *
- * It takes two parameters: a variable in which the future timeout in jiffies
- * will be stored and a temporary variable holding the time of the last
- * iteration of processing the request. Both should be unsigned integers
- * holding at least 32 bits.
- */
-#define loop_until_timeout(tout, op_time)\n\c -for (tout = jiffies + msecs_to_jiffies(write_timeout), op_time = 0; \n- \c - op_time ? time_before(op_time, tout) : true; \n- \c - usleep_range(1000, 1500), op_time = jiffies)
-
static const struct i2c_device_id at24_ids[] = {
    \c c /* needs 8 addresses as A0-A2 are ignored */\c
    \c c ["24c00",AT24_DEVICE_MAGIC(128 / 8,AT24_FLAG_TAKE8ADDR) ],\c
    \c c @c -172.6 +157.7 c @c
    \c c ["24c256",AT24_DEVICE_MAGIC(262144 / 8,AT24_FLAG_ADDR16) ],\c
    \c c ["24c512",AT24_DEVICE_MAGIC(524288 / 8,AT24_FLAG_ADDR16) ],\c
    \c c ["24c1024",AT24_DEVICE_MAGIC(1048576 / 8,AT24_FLAG_ADDR16) ],\c
    \c c [+["24c2048",AT24_DEVICE_MAGIC(2097152 / 8,AT24_FLAG_ADDR16) ],\c
    \c c ["at24", 0 ],\c
    \c c /* END OF LIST */\c
    \c c ];\c
    \c c @c -261.6 +247.88 c @c
* one "eeprom" file not four, but larger reads would fail when
  * they crossed certain pages.
*/
+
+*/
+ * Write a byte to an AT24 device using SMBus cycles.
+ */
+static inline s32 at24_smbus_write_byte_data(struct at24_data *at24,
+struct i2c_client *client, u16 offset, u8 value)
+{
+  if (!(at24->chip.flags & AT24_FLAG_ADDR16))
+    return i2c_smbus_write_byte_data(client, offset, value);
+
+  /* Emulate I2C multi-byte write by using SMBus "write word"
+  * cycle. We split up the 16-bit offset among the "command"
+  * byte and the first data byte.
+  */
+  return i2c_smbus_write_word_data(client, offset >> 8,
+    (value << 8) | (offset & 0xff));
+
+}  
+/*
+ * Write block data to an AT24 device using SMBus cycles.
+ */
+static inline s32 at24_smbus_write_i2c_block_data(struct at24_data *at24,
+const struct i2c_client *client, u16 off, u8 len, const u8 *vals)
+{
+s32 res;
+
+  if (!(at24->chip.flags & AT24_FLAG_ADDR16))
+    return i2c_smbus_write_i2c_block_data(client, off, len, vals);
+
+  /* Insert extra address byte into data stream */
+  at24->writebuf[0] = off & 0xff;
+  memcpy(&at24->writebuf[1], vals, len);
+  
+  res = i2c_smbus_write_i2c_block_data(client, off >> 8, len + 1,
+    at24->writebuf);
+  
+  return res;
+}
+
+/*
+ * Read block data from an AT24 device using SMBus cycles.
+ */
+static inline s32 at24_smbus_read_block_data(struct at24_data *at24,
+const struct i2c_client *client, u16 off, u8 len, u8 *vals)
{ int count;
  s32 res;
+
  if (!(at24->chip.flags & AT24_FLAG_ADDR16))
    return i2c_smbus_read_i2c_block_data_or_emulated(client, off,
    len, vals);
+
  /*
   * Emulate I2C multi-byte read by using SMBus "write byte" and
   * "receive byte". This is slightly unsafe since there is an
   * additional STOP involved, which exposes the SMBus and (this
   * device!) to takeover by another bus master. However, it's the
   * only way to work on SMBus-only controllers when talking to
   * EEPROMs with multi-byte addresses.
   */
  
  /* Address "dummy" write */
  res = i2c_smbus_write_byte_data(client, off >> 8, off & 0xff);
  if (res < 0)
    return res;
+
  count = 0;
  do {
    /* Current Address Read */
    res = i2c_smbus_read_byte(client);
    if (res < 0)
      break;
+
    *(vals++) = res;
    count++;
    len--;
  } while (len > 0);
  return count;
+
  static struct i2c_client *at24_translate_offset(struct at24_data *at24,
  unsigned int *offset)
  {
    @@ -293,17 +361,24 @@
      if (count > I2C_SMBUS_BLOCK_MAX)
        count = I2C_SMBUS_BLOCK_MAX;
       
       -loop_until_timeout(timeout, read_time) {
       -status = i2c_smbus_read_i2c_block_data_or_emulated(client,
        - offset,
        - count, buf);
timeout = jiffies + jiffies(write_timeout);
do {
  /*
   * The timestamp shall be taken before the actual operation
   * to avoid a premature timeout in case of high CPU load.
   */
  +read_time = jiffies;

  status = at24_smbus_read_block_data(at24, count, buf);
  dev_dbg(&client->dev, "read %zu@%d --> %d (%ld)\n",
          count, offset, status, jiffies);

  if (status == count)
    return count;
-}
+
  usleep_range(1000, 1500);
+} while (time_before(read_time, timeout));

return -ETIMEDOUT;
}

msg[1].buf = buf;
msg[1].len = count;

-loop_until_timeout(timeout, read_time) {
  +timeout = jiffies + jiffies(write_timeout);
  do {
    /*
     * The timestamp shall be taken before the actual operation
     * to avoid a premature timeout in case of high CPU load.
     */
    +read_time = jiffies;
    +status = i2c_transfer(client->adapter, msg, 2);
    if (status == 2)
      status = count;
  -}
  +usleep_range(1000, 1500);
  +} while (time_before(read_time, timeout));

return -ETIMEDOUT;
msg[1].buf = buf;
msg[1].len = count;

-loop_until_timeout(timeout, read_time) {
+timeout = jiffies + msecs_to_jiffies(write_timeout);
+do {
+/*
+ * The timestamp shall be taken before the actual operation
+ * to avoid a premature timeout in case of high CPU load.
+ */
+read_time = jiffies;
+
status = i2c_transfer(client->adapter, msg, 2);
if (status == 2)
return count;
-}
+
+usleep_range(1000, 1500);
+} while (time_before(read_time, timeout));

return -ETIMEDOUT;
}
@@ -433,11 +526,20 @@
msg[1].buf = buf;
msg[1].len = count;

-loop_until_timeout(timeout, read_time) {
+timeout = jiffies + msecs_to_jiffies(write_timeout);
+do {
+/*
+ * The timestamp shall be taken before the actual operation
+ * to avoid a premature timeout in case of high CPU load.
+ */
+read_time = jiffies;
+
status = i2c_transfer(client->adapter, msg, 2);
if (status == 2)
return count;
-}
+
+usleep_range(1000, 1500);
+} while (time_before(read_time, timeout));

return -ETIMEDOUT;
}
@@ -479,9 +581,16 @@
client = at24_translate_offset(at24, &offset);
count = at24_adjust_write_count(at24, offset, count);

-loop_until_timeout(timeout, write_time) {
-status = i2c_smbus_write_i2c_block_data(client,
-offset, count, buf);
+timeout = jiffies + msecs_to_jiffies(write_timeout);
+do {
+*/
+ * The timestamp shall be taken before the actual operation
+ * to avoid a premature timeout in case of high CPU load.
+ */
+write_time = jiffies;
+
+status = at24_smbus_write_i2c_block_data(at24,
+client, offset, count, buf);
if (status == 0)
status = count;

@@ -490,7 +599,9 @@
if (status == count)
return count;
-
+
+usleep_range(1000, 1500);
+} while (time_before(write_time, timeout));

return -ETIMEDOUT;
}
@@ -505,8 +616,16 @@
client = at24_translate_offset(at24, &offset);

-loop_until_timeout(timeout, write_time) {
-status = i2c_smbus_write_byte_data(client, offset, buf[0]);
+timeout = jiffies + msecs_to_jiffies(write_timeout);
+do {
+*/
+ * The timestamp shall be taken before the actual operation
+ * to avoid a premature timeout in case of high CPU load.
+ */
+write_time = jiffies;
+
+status = at24_smbus_write_byte_data(at24, client, offset,
+    buf[0]);
if (status == 0)
status = count;

```
if (status == count)
return count;
-
+
+usleep_range(1000, 1500);
+} while (time_before(write_time, timeout));

return -ETIMEDOUT;
}
@@ -544,7 +665,14 @@
memcpy(&msg.buf[i], buf, count);
msg.len = i + count;

@-loop_until_timeout(timeout, write_time) {
+timeout = jiffies + msecs_to_jiffies(write_timeout);
+do {
+/*
+ * The timestamp shall be taken before the actual operation
+ * to avoid a premature timeout in case of high CPU load.
+ */
+write_time = jiffies;
+
status = i2c_transfer(client->adapter, &msg, 1);
if (status == 1)
status = count;
@@ -554,7 +682,9 @@
if (status == count)
return count;
-
+
+usleep_range(1000, 1500);
+} while (time_before(write_time, timeout));

return -ETIMEDOUT;
}
@@ -663,6 +793,23 @@
if (!err)
chip->byte_len = val;

+err = device_property_read_u32(dev, "address-width", &val);
+if (!err)
+switch (val) {
+case 8:
+if (chip->flags & AT24_FLAG_ADDR16)
dev_warn(dev, "Override address width to be 8, while default is 16\n");
+chip->flags &= ~AT24_FLAG_ADDR16;
+break;
+case 16:
+chip->flags |= AT24_FLAG_ADDR16;
+break;
+default:
+dev_warn(dev, "Bad \"address-width\" property: %u\n",
+ val);
+
+
+err = device_property_read_u32(dev, "pagesize", &val);
+if (!err) {
+chip->page_size = val;
+}
+
+err = device_property_read_u32(dev, "pagesize", &val);
+if (!err) {
+chip->page_size = val;
+
+if (I2C_FUNC_I2C) {
+if ((chip.flags & AT24_FLAG_ADDR16) &&
+ i2c_check_functionality(client->adapter,
+I2C_FUNC_SMBUS_READ_BYTE)
+I2C_FUNC_SMBUS_WRITE_BYTE_DATA)
+/*
+ * We need SMBUS_WRITE_BYTE_DATA and SMBUS_READ_BYTE to
+ * implement byte reads for 16-bit address devices.
+ * This will be slow, but better than nothing (e.g.
+ * read @ 3.6 KiB/s). It is also unsafe in a multi-
+ * master topology.
+ */
+use_smbus = I2C_SMBUS_BYTE_DATA;
+} else if (i2c_check_functionality(client->adapter,
+I2C_FUNC_SMBUS_I2C_BLOCK)) {
+use_smbus = I2C_SMBUS_I2C_BLOCK_DATA;
+} else if (i2c_check_functionality(client->adapter,
+I2C_FUNC_SMBUS_WRITE_WORD_DATA)) {
+/*
+ * We need SMBUS_WRITE_WORD_DATA to implement
+ * byte writes for 16-bit address devices.
+ */
+use_smbus_write = I2C_SMBUS_BYTE_DATA;
+chip.page_size = 1;
+} else if (!(chip.flags & AT24_FLAG_ADDR16) &&
+    i2c_check_functionality(client->adapter,
I2C_FUNC_SMBUS_READ_WORD_DATA)) {
    use_smbus = I2C_SMBUS_WORD_DATA;
} else if (i2c_check_functionality(client->adapter,
@@ -771,6 +937,9 @@)
}
}

+if (strcmp(client->name, "24c256") == 0)
+chip.page_size = 64;
+
+if (chip.flags & AT24_FLAG_TAKE8ADDR)
num_addresses = 8;
else
@@ -816,12 +985,15 @@)
    if (writable) {
        if (!use_smbus || use_smbus_write) {

-unsigned write_max = chip.page_size;
+unsigned int write_max = chip.page_size;
+unsigned int smbus_max = (chip.flags & AT24_FLAG_ADDR16) ?
+    I2C_SMBUS_BLOCK_MAX - 1 :
+    I2C_SMBUS_BLOCK_MAX;

        if (write_max > io_limit)
            write_max = io_limit;
-    if (use_smbus && write_max > I2C_SMBUS_BLOCK_MAX)
-        write_max = I2C_SMBUS_BLOCK_MAX;
+    if (use_smbus && write_max > smbus_max)
+        write_max = smbus_max;

        at24->write_max = write_max;

-/* buffer (data + address at the beginning) */
-@@ -869,7 +1041,7 @@
-    at24->nvmem_config.name = dev_name(&client->dev);
-    at24->nvmem_config.dev = &client->dev;
-    at24->nvmem_config.read_only = !writable;
+    at24->nvmem_config.root_only = !(chip.flags & AT24_FLAG_IRUGO);
    at24->nvmem_config.owner = THIS_MODULE;
    at24->nvmem_config.compat = true;
    at24->nvmem_config.base_dev = &client->dev;
--- linux-4.15.0.org/drivers/misc/eeprom/at25.c
+++ linux-4.15.0/drivers/misc/eeprom/at25.c
@@ -355,7 +355,7 @@
    at25->nvmem_config.reg_read = at25_ee_read;
    at25->nvmem_config.reg_write = at25_ee_write;
at25->nvmem_config.priv = at25;
-at25->nvmem_config.stride = 4;
+at25->nvmem_config.stride = 1;
at25->nvmem_config.word_size = 1;
at25->nvmem_config.size = chip.byte_len;

--- linux-4.15.0.orig/drivers/misc/eeprom/eeprom_93xx46.c
+++ linux-4.15.0/drivers/misc/eeprom/eeprom_93xx46.c
@@ -38,6 +38,10 @@
 EEPROM_93XX46_QUIRK_INSTRUCTION_LENGTH,
 }

+static const struct eeprom_93xx46_devtype_data microchip_93lc46b_data = {
   .quirks = EEPROM_93XX46_QUIRK_EXTRA_READ_CYCLE,
   +};
+
 struct eeprom_93xx46_dev {
 struct spi_device *spi;
 struct eeprom_93xx46_platform_data *pdata;
@@ -58,6 +62,11 @@
 return edev->pdata->quirks & EEPROM_93XX46_QUIRK_INSTRUCTION_LENGTH;
 }

+static inline bool has_quirk_extra_read_cycle(struct eeprom_93xx46_dev *edev)
+{
+    return edev->pdata->quirks & EEPROM_93XX46_QUIRK_EXTRA_READ_CYCLE;
+}
+
 static int eeprom_93xx46_read(void *priv, unsigned int off,
    void *val, size_t count)
 {
@@ -99,6 +108,11 @@
    dev_dbg(&edev->spi->dev, "read cmd 0x%x, %d Hz\n",
    cmd_addr, edev->spi->max_speed_hz);
+	    if (has_quirk_extra_read_cycle(edev)) {
+        cmd_addr <<= 1;
+        bits += 1;
+    }
+}
+
    spi_message_init(&m);

 t[0].tx_buf = (char *)&cmd_addr;
@@ -366,6 +380,7 @@
 static const struct of_device_id eeprom_93xx46_of_table[] = {
 { .compatible = "eeprom-93xx46", },
 { .compatible = "atmel,at93c46d", .data = &atmel_at93c46d_data, },
+{ .compatible = "microchip,93lc46b", .data = &microchip_93lc46b_data, },
};
{};
MODULEDEVICE_TABLE(of, eeprom_93xx46_of_table);
@@ -523,3 +538,4 @@
MODULEDESCRIPTION("Driver for 93xx46 EEPROMs");
MODULEAUTHOR("Anatolij Gustschin <agust@denx.de>");
MODULEALIAS("spi:93xx46");
+MODULEALIAS("spi:eeprom-93xx46");
--- linux-4.15.0.orig/drivers/misc/eeprom/idt_89hpesx.c
+++ linux-4.15.0/drivers/misc/eeprom/idt_89hpesx.c
@@ -1165,6 +1165,7 @@
 else /* if (!fwnode_property_read_bool(node, "read-only")) */
 pdev->eero = false;
+
+fwnode_handle_put(fwnode);
dev_info(dev, "EEPROM of %d bytes found by 0x%x",
pdev->eesize, pdev->eeaddr);
}
--- linux-4.15.0.orig/drivers/misc/enclosure.c
+++ linux-4.15.0/drivers/misc/enclosure.c
@@ -419,10 +419,9 @@
cdev = &edev->component[i];
if (cdev->dev == dev) {
enclosure_remove_links(cdev);
-device_del(&cdev->cdev);
+return 0;
}
}
return -ENODEV;
--- linux-4.15.0.orig/drivers/misc/genwqe/card_base.h
+++ linux-4.15.0/drivers/misc/genwqe/card_base.h
@@ -408,7 +408,7 @@
 struct file *filp;

 struct fasync_struct *async_queue;
-struct task_struct *owner;
+struct pid *opener;
 struct list_head list;/* entry in list of open files */

 spinlock_t map_lock;/* lock for dma_mappings */
--- linux-4.15.0.orig/drivers/misc/genwqe/card_dev.c
+++ linux-4.15.0/drivers/misc/genwqe/card_dev.c
@@ -52,7 +52,7 @@
 {
 unsigned long flags;
-cfile->owner = current;
+cfile->opener = get_pid(task_tgid(current));
spin_lock_irqsave(&cd->file_lock, flags);
list_add(&cfile->list, &cd->file_list);
spin_unlock_irqrestore(&cd->file_lock, flags);
@@ -65,6 +65,7 @@
spin_lock_irqsave(&cd->file_lock, flags);
list_del(&cfile->list);
spin_unlock_irqrestore(&cd->file_lock, flags);
+put_pid(cfile->opener);
return 0;
}
@@ -275,7 +276,7 @@
return files;
}

-static int genwqe_force_sig(struct genwqe_dev *cd, int sig)
+static int genwqe_terminate(struct genwqe_dev *cd)
{
unsigned int files = 0;
unsigned long flags;
@@ -283,7 +284,7 @@
spin_lock_irqsave(&cd->file_lock, flags);
list_for_each_entry(cfile, &cd->file_list, list) {
-\t\tforce_sig(sig, cfile->owner);
+\t\tkill_pid(cfile->opener, SIGKILL, 1);
files++;
}
spin_unlock_irqrestore(&cd->file_lock, flags);
@@ -781,6 +782,8 @@
if ((m->addr == 0x0) || (m->size == 0))
return -EINVAL;
+if (m->size > ULONG_MAX - PAGE_SIZE - (m->addr & ~PAGE_MASK))
+return -EINVAL;

map_addr = (m->addr & PAGE_MASK);
map_size = round_up(m->size + (m->addr & ~PAGE_MASK), PAGE_SIZE);
@@ -1360,7 +1363,7 @@
dev_warn(&pci_dev->dev,
"[%s] send SIGKILL and wait ...
",
+rc = genwqe_force_sig(cd, SIGKILL); /* force terminate */
+rc = genwqe_terminate(cd);
if (rc) {
/* Give kill_timeout more seconds to end processes */
for (i = 0; (i < genwqe_kill_timeout) &&
--- linux-4.15.0.orig/drivers/misc/genwqe/card_util.c
+++ linux-4.15.0/drivers/misc/genwqe/card_util.c
@@ -217,7 +217,7 @@
 void *__genwqe_alloc_consistent(struct genwqe_dev *cd, size_t size,
    dma_addr_t *dma_handle)
 {
-     if (get_order(size) > MAX_ORDER)
+     if (get_order(size) >= MAX_ORDER)
         return NULL;

     return dma_zalloc_coherent(&cd->pci_dev->dev, size, dma_handle,
@@ -298,7 +298,7 @@
 int genwqe_alloc_sync_sgl(struct genwqe_dev *cd, struct genwqe_sgl *sgl,
  void __user *user_addr, size_t user_size, int write)
 {
-     int rc;
+     int ret = -ENOMEM;
     struct pci_dev *pci_dev = cd->pci_dev;

     sgl->fpage_offs = offset_in_page((unsigned long)user_addr);
@@ -318,7 +318,7 @@
 if (get_order(sgl->sgl_size) > MAX_ORDER) {
     dev_err(&pci_dev->dev,
         "[%s] err: too much memory requested!\n", __func__);}
-      return -ENOMEM;
+      return ret;
 }

 /* Only use buffering on incomplete pages */
@@ -339,7 +339,7 @@
 if (copy_from_user(sgl->fpage + sgl->fpage_offs,
                 user_addr, sgl->fpage_size)) {
-     rc = -EFAULT;
+     ret = -EFAULT;
      goto err_out;
 }
@@ -352,7 +352,7 @@
*/ Sync with user memory */
if (copy_from_user(sgl->lpage, user_addr + user_size -
    sgl->lpage_size, sgl->lpage_size)) {
    -rc = -EFAULT;
+    ret = -EFAULT;
    goto err_out2;
}
}
@@ -374,7 +374,8 @@
sgl->sgl = NULL;
sgl->sgl_dma_addr = 0;
sgl->sgl_size = 0;
-    return -ENOMEM;
+    return ret;
}

int genwqe_setup_sgl(struct genwqe_dev *cd, struct genwqe_sgl *sgl,
@@ -593,6 +594,10 @@
/* determine space needed for page_list. */
data = (unsigned long)uaddr;
offs = offset_in_page(data);
+if (size > ULONG_MAX - PAGE_SIZE - offs) {
+    m->size = 0; /* mark unused and not added */
+    return -EINVAL;
+}
m->nr_pages = DIV_ROUND_UP(offs + size, PAGE_SIZE);

m->page_list = kcalloc(m->nr_pages,
--- linux-4.15.0.orig/drivers/misc/hmc6352.c
+++ linux-4.15.0/drivers/misc/hmc6352.c
@@ -27,6 +27,7 @@
#include <linux/err.h>
#include <linux/delay.h>
#include <linux/sysfs.h>
+include <linux/nospec.h>
static DEFINE_MUTEX(compass_mutex);

@@ -50,6 +51,7 @@
return ret;
if (val >= strlen(map))
    return -EINVAL;
+val = array_index_nospec(val, strlen(map));
mutex_lock(&compass_mutex);
ret = compass_command(c, map[val]);
mutex_unlock(&compass_mutex);
--- linux-4.15.0.orig/drivers/misc/ibmasm/ibmasmfs.c
+++ linux-4.15.0/drivers/misc/ibmasm/ibmasmfs.c
@@ -507,35 +507,14 @@
static ssize_t remote_settings_file_read(struct file *file, char __user *buf, size_t count, loff_t *offset)
{
    void __iomem *address = (void __iomem *)file->private_data;
    unsigned char *page;
    int retval;
    int len = 0;
    unsigned int value;

    if (*offset < 0)
        return -EINVAL;
    if (count == 0 || count > 1024)
        return 0;
    if (*offset != 0)
        return 0;

    page = (unsigned char *)__get_free_page(GFP_KERNEL);
    if (!page)
        return -ENOMEM;
+	char lbuf[20];
    value = readl(address);
    len = sprintf(page, "%d\n", value);
-	if (copy_to_user(buf, page, len)) {
-        retval = -EFAULT;
-        goto exit;
-    }
-    *offset += len;
-    retval = len;
-
exit:
    free_page((unsigned long)page);
    return retval;
+	len = snprintf(lbuf, sizeof(lbuf), "%d\n", value);
    return simple_read_from_buffer(buf, count, offset, lbuf, len);
}

static ssize_t remote_settings_file_write(struct file *file, const char __user *ubuff, size_t count, loff_t *offset)
--- linux-4.15.0.orig/drivers/misc/ibmasm/module.c
+++ linux-4.15.0/drivers/misc/ibmasm/module.c
@@ -125,7 +125,7 @@
    result = ibmasm_init_remote_input_dev(sp);
    if (result) {
        dev_err(sp->dev, "Failed to initialize remote queue\n");
    }
result = ibmasm_send_driver_vpd(sp);
@@ -145,8 +145,9 @@
return 0;

error_send_message:
-disable_sp_interruptions(sp->base_address);
ibmasm_free_remote_input_dev(sp);
+error_init_remote:
+disable_sp_interruptions(sp->base_address);
free_irq(sp->irq, (void *)sp);
error_request_irq:
iounmap(sp->base_address);
--- linux-4.15.0.orig/drivers/misc/kgdbts.c
+++ linux-4.15.0/drivers/misc/kgdbts.c
@@ -107,19 +107,20 @@
#include <asm/sections.h>

#define v1printk(a...) do { \
-if (verbose) \ 
-printk(KERN_INFO a); \
-} while (0)
#define v2printk(a...) do { \
-if (verbose > 1) \ 
-printk(KERN_INFO a); \ 
-touch_nmi_watchdog();\ 
-} while (0)
#define eprintk(a...) do { \
-printk(KERN_ERR a); \ 
-WARN_ON(1); \ 
-} while (0)
+#define v1printk(a...) do { \
+if (verbose)\ 
+printk(KERN_INFO a);\ 
+} while (0)
+#define v2printk(a...) do { \
+if (verbose > 1) {\ 
+printk(KERN_INFO a);\ 
+}\ 
+touch_nmi_watchdog();\ 
+} while (0)
+#define eprintk(a...) do { \
+printk(KERN_ERR a);\ 
+WARN_ON(1);\ 
+}
while (0)
#define MAX_CONFIG_LEN		40
static struct kgdb_io kgdbts_io_ops;
int nmi_sleep = 0;
int i;

+verbose = 0;
+if (strstr(config, "V1"))
+verbose = 1;
+if (strstr(config, "V2"))
+verbose = 2;
+
ptr = strchr(config, 'F');
if (ptr)
fork_test = simple_strtol(ptr + 1, NULL, 10);
return -ENOSPC;
}
strcpy(config, opt);
-
-verbose = 0;
-if (strstr(config, "V1"))
-verbose = 1;
-if (strstr(config, "V2"))
-verbose = 2;
-
return 0;
}

if (!strlen(config) || isspace(config[0]))
goto noconfig;
-err = kgdbts_option_setup(config);
-if (err)
-goto noconfig;

final_ack = 0;
run_plant_and_detach_test(1);
static int param_set_kgdbts_var(const char *kmessage, const struct kernel_param *kp)
{
-int len = strlen(kmessage);
-size_t len = strlen(kmessage);
if (len >= MAX_CONFIG_LEN) {
    printk(KERN_ERR "kgdbts: config string too long\n");
    @@ -1155,7 +1152,7 @@
}

strncpy(config, kmessage);
/*@ Chop out \n char as a result of echo */
@if (config[len - 1] == '\n')
+if (len & config[len - 1] == '\n')
config[len - 1] = '\0';

/*@ Go and configure with the new params. */
--- linux-4.15.0.orig/drivers/misc/lis3lv02d/lis3lv02d.c
+++ linux-4.15.0/drivers/misc/lis3lv02d/lis3lv02d.c
@@ -221,7 +221,7 @@
static int lis3_3dlh_rates[4] = {50, 100, 400, 1000};

/*@ ODR is Output Data Rate */
-static int lis3lv02d_get_odr(struct lis3lv02d *lis3)
+static int lis3lv02d_get_odr_index(struct lis3lv02d *lis3)
{ 
    u8 ctrl;
    int shift;
    @@ -229,15 +229,23 @@
    -return lis3->odrs[(ctrl >> shift)];
    +return (ctrl >> shift);
    }

static int lis3lv02d_get_pwron_wait(struct lis3lv02d *lis3)
{ 
    -int div = lis3lv02d_get_odr(lis3);
    +int odr_idx = lis3lv02d_get_odr_index(lis3);
    +int div = lis3->odrs[odr_idx];

    -if (WARN_ONCE(div == 0, "device returned spurious data"))
    +if (div == 0) {
        +if (odr_idx == 0) {
            /* Power-down mode, not sampling no need to sleep */
            +return 0;
            +
            +dev_err(&lis3->pdev->dev, "Error unknown odrs-index: %d\n", odr_idx);
            return -ENXIO;
            +}
        +}
    }

    /* LIS3 power on delay is quite long */
msleep(lis3->pwron_delay / div);
@@ -820,9 +828,12 @@
struct device_attribute *attr, char *buf)
{
    struct lis3lv02d *lis3 = dev_get_drvdata(dev);
+    int odr_idx;

    lis3lv02d_sysfs_poweron(lis3);
    return sprintf(buf, "%d\n", lis3lv02d_get_odr(lis3));
+
+    odr_idx = lis3lv02d_get_odr_index(lis3);
+    return sprintf(buf, "%d\n", lis3->odrs[odr_idx]);
}

static ssize_t lis3lv02d_rate_set(struct device *dev,
--- linux-4.15.0.orig/drivers/misc/lis3lv02d/lis3lv02d.h
+++ linux-4.15.0/drivers/misc/lis3lv02d/lis3lv02d.h
@@ -284,6 +284,7 @@
    u8                      *reg_cache;
    +bool init_required;
    u8                      odr_mask; /* ODR bit mask */
    u8 whoami; /* indicates measurement precision */
    s16 (*read_data) (struct lis3lv02d *lis3, int reg);
--- linux-4.15.0.orig/drivers/misc/lkdtm.h
+++ linux-4.15.0/drivers/misc/lkdtm.h
@@ -45,7 +45,9 @@
    void lkdtm_EXEC_VMALLOC(void);
    void lkdtm_EXEC_RODATA(void);
    void lkdtm_EXEC_USERSPACE(void);
+    void lkdtm_EXEC_NULL(void);
    void lkdtm_ACCESS_USERSPACE(void);
+    void lkdtm_ACCESS_NULL(void);

    /* lkdtm_refcount.c */
    void lkdtm_REFCOUNT_INC_OVERFLOW(void);
--- linux-4.15.0.orig/drivers/misc/lkdtm_core.c
+++ linux-4.15.0/drivers/misc/lkdtm_core.c
@@ -152,7 +152,9 @@
CRASHTYPE(EXEC_VMALLOC),
CRASHTYPE(EXEC_RODATA),
CRASHTYPE(EXEC_USERSPACE),
+    CRASHTYPE(EXEC_NULL),
CRASHTYPE(ACCESS_USERSPACE),
+    CRASHTYPE(ACCESS_NULL),
CRASHTYPE(WRITE_RO),
CRASHTYPE(WRITE_RO_AFTER_INIT),
CRASTYPE(WRITE_KERN).
--- linux-4.15.0.orig/drivers/misc/lkdtm_perms.c
+++ linux-4.15.0/drivers/misc/lkdtm_perms.c
@@ -47,7 +47,7 @@
    }
  void (*func)(void) = dst;

-pr_info("attempting ok execution at %p\n", do_nothing);
+pr_info("attempting ok execution at %px\n", do_nothing);
  do_nothing();

  if (write == CODE_WRITE) {
  @@ -55,7 +55,7 @@
    flush_icache_range((unsigned long)dst,
      (unsigned long)dst + EXEC_SIZE);
  }
-pr_info("attempting bad execution at %p\n", func);
+pr_info("attempting bad execution at %px\n", func);
  func();
  }

@@ -66,14 +66,14 @@
/* Intentionally crossing kernel/user memory boundary. */
  void (*func)(void) = dst;

-pr_info("attempting ok execution at %p\n", do_nothing);
+pr_info("attempting ok execution at %px\n", do_nothing);
  do_nothing();

  copied = access_process_vm(current, (unsigned long)dst, do_nothing,
    EXEC_SIZE, FOLL_WRITE);
  if (copied < EXEC_SIZE)
    return;
-pr_info("attempting bad execution at %p\n", func);
+pr_info("attempting bad execution at %px\n", func);
  func();
  }

@@ -82,7 +82,7 @@
/* Explicitly cast away "const" for the test. */
  unsigned long *ptr = (unsigned long *)&rodata;

-pr_info("attempting bad rodata write at %p\n", ptr);
+pr_info("attempting bad rodata write at %px\n", ptr);
  *ptr ^= 0xabcd1234;
  }

@@ -100,7 +100,7 @@

return;
}

-pr_info("attempting bad ro_after_init write at %p\n", ptr);
+pr_info("attempting bad ro_after_init write at %p\n", ptr);
*ptr ^= 0xabcd1234;
}

@ @ -112,7 +112,7 @@
size = (unsigned long)do_overwritten - (unsigned long)do_nothing;
ptr = (unsigned char *)do_overwritten;

-pr_info("attempting bad %zu byte write at %p\n", size, ptr);
+pr_info("attempting bad %zu byte write at %p\n", size, ptr);
memcpy(ptr, (unsigned char *)do_nothing, size);
flush_icache_range((unsigned long)ptr, (unsigned long)(ptr + size));

@ @ -164,6 +164,11 @@
vm_munmap(user_addr, PAGE_SIZE);
}

+void lkdtm_EXEC_NULL(void)
+{
+execute_location(NULL, CODE_AS_IS);
+
+
void lkdtm_ACCESS_USERSPACE(void)
{
unsigned long user_addr, tmp = 0;
@@ -185,16 +190,29 @@
ptr = (unsigned long *)user_addr;

-pr_info("attempting bad read at %p\n", ptr);
+pr_info("attempting bad read at %p\n", ptr);
tmp = *ptr;
tmp += 0xc0dec0de;

-pr_info("attempting bad write at %p\n", ptr);
+pr_info("attempting bad write at %p\n", ptr);
*ptr = tmp;

vm_munmap(user_addr, PAGE_SIZE);
}

+void lkdtm_ACCESS_NULL(void)
+{
+unsigned long tmp;
unsigned long *ptr = (unsigned long *)NULL;

pr_info("attempting bad read at %p\n", ptr);

tmp = *ptr;
tmp += 0xc0dec0de;

pr_info("attempting bad write at %p\n", ptr);

*ptr = tmp;

}

void __init lkdtm_perms_init(void)
{

/* Make sure we can write to __ro_after_init values during __init */
--- linux-4.15.0.orig/drivers/misc/mei/bus-fixup.c
+++ linux-4.15.0/drivers/misc/mei/bus-fixup.c
@@ -267,7 +267,7 @@
ret = 0;
bytes_recv = __mei_cl_recv(cl, (u8 *)reply, if_version_length, 0);
-if (bytes_recv < if_version_length) {
+if (bytes_recv < 0 || bytes_recv < if_version_length) {
    dev_err(bus->dev, "Could not read IF version\n");
    ret = -EIO;
    goto err;
--- linux-4.15.0.orig/drivers/misc/mei/bus.c
+++ linux-4.15.0/drivers/misc/mei/bus.c
@@ -465,17 +465,15 @@
    mutex_lock(&bus->device_lock);
    if (cl->state == MEI_FILE_UNINITIALIZED) {
        mutex_lock(&bus->device_lock);
--- linux-4.15.0.orig/drivers/misc/mei/bus.c
+++ linux-4.15.0/drivers/misc/mei/bus.c
@@ -724,9 +722,8 @@
    mei_cldev_unregister_callbacks(cldev);

    mutex_lock(&bus->device_lock);
    if (cl->state == MEI_FILE_UNINITIALIZED) {
        mutex_lock(&bus->device_lock);
        ret = mei_cl_link(cl);
--- linux-4.15.0.orig/drivers/misc/mei/bus.c
+++ linux-4.15.0/drivers/misc/mei/bus.c
@@ -465,17 +465,15 @@
        if (ret)
            return ret;
    }

    mutex_unlock(&bus->device_lock);
    if (ret)
        goto out;
/* update pointers */
    cl->cldev = cldev;
    }

    mutex_lock(&bus->device_lock);
    if (mei_cl_is_connected(cl)) {
        ret = 0;
        goto out;
@@ -724,9 +722,8 @@
    mei_cldev_unregister_callbacks(cldev);
module_put(THE_MODULE);
-dev->driver = NULL;
-return ret;

+return ret;
}

static ssize_t name_show(struct device *dev, struct device_attribute *a,
@@ -841,25 +838,27 @@
mei_me_cl_put(cldev->me_cl);
mei_dev_bus_put(cldev->bus);
+mei_cl_unlink(cldev->cl);
kfree(cldev->cl);
kfree(cldev);
}

static const struct device_type mei_cl_device_type = {
- .release = mei_cl_bus_dev_release,
+ .release = mei_cl_bus_dev_release,
};

/**
 * mei_cl_bus_set_name - set device name for me client device
+ * <controller>-<client device>
+ * Example: 0000:00:16.0-55213584-9a29-4916-badf-0fb7ed682aeb
 * *
+ * @cldev: me client device
+ */

static inline void mei_cl_bus_set_name(struct mei_cl_device *cldev)
{
+dev_set_name(&cldev->dev, "mei:%s:%pUl:%02X",
-cldev->name,
- mei_me_cl_uuid(cldev->me_cl),
- mei_me_cl_ver(cldev->me_cl));
+dev_set_name(cldev->dev, "%s-%pUl",
+ dev_name(cldev->bus->dev),
+ mei_me_cl_uuid(cldev->me_cl));
}

/**
 --- linux-4.15.0.orig/drivers/misc/mei/client.c
+++ linux-4.15.0/drivers/misc/mei/client.c
@@ -276,6 +276,7 @@
down_write(&dev->me_clients_rwlock);
  me_cl = __mei_me_cl_by_uuid(dev, uuid);
  __mei_me_cl_del(dev, me_cl);
+mei_me_cl_put(me_cl);
up_write(&dev->me_clients_rwsem);
}

@@ -297,6 +298,7 @@
down_write(&dev->me_clients_rwsem);
me_cl = __mei_me_cl_by_uuid_id(dev, uuid, id);
__mei_me_cl_del(dev, me_cl);
+mei_me_cl_put(me_cl);
up_write(&dev->me_clients_rwsem);
}

--- linux-4.15.0.orig/drivers/misc/mei/client.h
+++ linux-4.15.0/drivers/misc/mei/client.h
@@ -138,11 +138,11 @@
 *
-* Return: mtu
+ * Return: mtu or 0 if client is not connected
 */
static inline size_t mei_cl_mtu(const struct mei_cl *cl)
{
-return cl->me_cl->props.max_msg_length;
+return cl->me_cl ? cl->me_cl->props.max_msg_length : 0;
}

/**
--- linux-4.15.0.orig/drivers/misc/mei/hbm.c
+++ linux-4.15.0/drivers/misc/mei/hbm.c
@@ -1140,15 +1140,18 @@
 props_res = (struct hbm_props_response *)mei_msg;

-if (props_res->status) {
+if (props_res->status == MEI_HBMS_CLIENT_NOT_FOUND) {
+dev_dbg(dev->dev, "hbm: properties response: %d CLIENT_NOT_FOUND\n",
+props_res->me_addr);
+} else if (props_res->status) {
+dev_err(dev->dev, "hbm: properties response: wrong status = %d %s\n",
+props_res->status,
+mei_hbm_status_str(props_res->status));
+return -EPROTO;
+} else {
+mei_hbm_me_cl_add(dev, props_res);
+}

-mei_hbm_me_cl_add(dev, props_res);
/* request property for the next client */
if (mei_hbm_prop_req(dev, props_res->me_addr + 1))
    return -EIO;
--- linux-4.15.0.orig/drivers/misc/mei/hw-me-regs.h
+++ linux-4.15.0/drivers/misc/mei/hw-me-regs.h
@@ -127,11 +127,20 @@
#define MEI_DEV_ID_BXT_M      0x1A9A /* Broxton M */
#define MEI_DEV_ID_APL_I      0x5A9A /* Apollo Lake I */
+
+#define MEI_DEV_ID_DNV_IE     0x19E5 /* Denverton IE */
+
#define MEI_DEV_ID_GLK        0x319A /* Gemini Lake */
#define MEI_DEV_ID_KBP        0x0A2BA /* Kaby Point */
#define MEI_DEV_ID_KBP_2      0x0A2BB /* Kaby Point 2 */
+
+#define MEI_DEV_ID_CNP_LP     0x9DE0 /* Cannon Point LP */
+#define MEI_DEV_ID_CNP_LP_4   0x9DE4 /* Cannon Point LP 4 (iTouch) */
+#define MEI_DEV_ID_CNP_H      0xA360 /* Cannon Point H */
+#define MEI_DEV_ID_CNP_H_4    0xA364 /* Cannon Point H 4 (iTouch) */
+
+#define MEI_DEV_ID_CDF        0x18D3 /* Cedar Fork */
+
/*
 * MEI HW Section
 */
--- linux-4.15.0.orig/drivers/misc/mei/interrupt.c
+++ linux-4.15.0/drivers/misc/mei/interrupt.c
@@ -220,6 +220,9 @@
    return ret;
 }
+
+pm_runtime_mark_last_busy(dev->dev);
+pm_request_autosuspend(dev->dev);
+
 list_move_tail(&cb->list, &cl->rd_pending);

 return 0;
@@ -310,8 +313,11 @@
 if (&cl->link == &dev->file_list) {
 /* A message for not connected fixed address clients
  * should be silently discarded
  * On power down client may be force cleaned,
  * silently discard such messages
 */
-    if (hdr_is_fixed(mei_hdr)) {
+if (hdr_is_fixed(mei_hdr))
}
dev->dev_state == MEI_DEV_POWER_DOWN) {
  mei_irq_discard_msg(dev, mei_hdr);
  ret = 0;
  goto reset_slots;
}
--- linux-4.15.0.orig/drivers/misc/mei/main.c
+++ linux-4.15.0/drivers/misc/mei/main.c
@@ -291,7 +291,6 @@
  goto out;
}
-*offset = 0;
+*offset = 0;
 cb = mei_cl_alloc_cb(cl, length, MEI_FOP_WRITE, file);
 if (!cb) {
   rets = -ENOMEM;
   @@ -507,7 +506,6 @@
   break;

 default:
-dev_err(dev->dev, ": unsupported ioctl %d\n", cmd);  
 rets = -ENOIOCTLCMD;
 }
--- linux-4.15.0.orig/drivers/misc/mei/pci-me.c
+++ linux-4.15.0/drivers/misc/mei/pci-me.c
@@ -41,6 +41,9 @@
 #include "hw-me-regs.h"
 #include "hw-me.h"
+
+static bool disable_msi;
+module_param(disable_msi, bool, 0);
+
+ /* mei_pci_tbl - PCI Device ID Table */
+ static const struct pci_device_id mei_me_pci_tbl[] = {
+ {MEI_PCI_DEVICE(MEI_DEV_ID_82946GZ, MEI_ME_ICH_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_BXT_M, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_APL_I, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_DNV_IE, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_GLK, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_KBP, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_KBP_2, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_CNP_LP, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_CNP_LP_4, MEI_ME_PCH8_CFG)},
+ {MEI_PCI_DEVICE(MEI_DEV_ID_CNP_H, MEI_ME_PCH8_CFG)},
+{MEI_PCI_DEVICE(MEI_DEV_ID_CNP_H_4, MEI_ME_PCH8_CFG)},
+{MEI_PCI_DEVICE(MEI_DEV_ID_CDF, MEI_ME_PCH8_CFG)},
+ /* required last entry */
+ {0, };
+ @ @ -191,7 +203,8 @ @
+ hw = to_me_hw(dev);
+ hw->mem_addr = pcim_iomap_table(pdev)[0];
-
-pci_enable_msi(pdev);
+if (!disable_msi)
+p pci_enable_msi(pdev);

/* request and enable interrupt */
irqflags = pci_dev_msi_enabled(pdev) ? IRQF_ONESHOT : IRQF_SHARED;
@ @ -238,8 +251,11 @@
 */
mei_me_set_pm_domain(dev);

-if (mei_pg_is_enabled(dev))
+if (mei_pg_is_enabled(dev)) {
+ pm_runtime_put_noidle(&pdev->dev);
+ if (hw->d0i3_supported)
+ pm_runtime_allow(&pdev->dev);
+
+}

dev_dbg(&pdev->dev, "initialization successful.n");

--- linux-4.15.0.orig/drivers/misc/mic/card/mic_x100.c
+++ linux-4.15.0/drivers/misc/mic/card/mic_x100.c
@@ -249,6 +249,9 @@
 mdrv->dev = &pdev->dev;
 snprintf(mdrv->name, sizeof(mic_driver_name), mic_driver_name);
+
+ /* FIXME: use dma_set_mask_and_coherent() and check result */
+ dma_coerce_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(64));
+ mdev->mmio.pa = MIC_X100_MMIO_BASE;
+ mdev->mmio.len = MIC_X100_MMIO_LEN;
+ mdev->mmio.va = devm_ioremap(pdev, MIC_X100_MMIO_BASE,
+ @ @ -294,18 +297,6 @@
+ mic_remove(pdev);
+ }
-
-static u64 mic_dma_mask = DMA_BIT_MASK(64);
static struct platform_device mic_platform_dev = {
    .name = mic_driver_name,
    .id = 0,
    .num_resources = 0,
    .dev = {
        .dma_mask = &mic_dma_mask,
        .coherent_dma_mask = DMA_BIT_MASK(64),
    },
};

static struct platform_driver __refdata mic_platform_driver = {
    .probe = mic_probe,
    .remove = mic_remove,
    @@ -315,6 +306,8 @@
};

static struct platform_device *mic_platform_dev;

static int __init mic_init(void)
{
    int ret;
    @@ -328,9 +321,12 @@
            request_module("mic_x100_dma");
            mic_init_card_debugfs();
            ret = platform_device_register(&mic_platform_dev);
            +
            +mic_platform_dev = platform_device_register_simple(mic_driver_name,
            +  0, NULL, 0);
            +ret = PTR_ERR_OR_ZERO(mic_platform_dev);
            +if (ret) {
                -pr_err("platform_device_register ret %d\n", ret);
                +pr_err("platform_device_register_full ret %d\n", ret);
                goto cleanup_debugfs;
            }
            ret = platform_driver_register(&mic_platform_driver);
            @@ -341,7 +337,7 @@
            return ret;

            device_unregister:
            -platform_device_unregister(&mic_platform_dev);
            +platform_device_unregister(mic_platform_dev);
            cleanup_debugfs:
            mic_exit_card_debugfs();
            done:
            @@ -351,7 +347,7 @@
            static void __exit mic_exit(void)
{platform_driver_unregister(&mic_platform_driver);
platform_device_unregister(&mic_platform_dev);
+platform_device_unregister(mic_platform_dev);
mic_exit_card_debugfs();}

--- linux-4.15.0.orig/drivers/misc/mic/scif/scif_api.c
+++ linux-4.15.0/drivers/misc/mic/scif/scif_api.c
@@ -370,11 +370,10 @@
goto scif_bind_exit;
} else {
-pn = scif_get_new_port();
-if (!pn) {
-\tret = -ENOSPC;
+\tret = scif_get_new_port();
+\tif (ret < 0)
goto scif_bind_exit;
-\}
+\tpn = ret;
}

ep->state = SCIFEP_BOUND;
@@ -648,13 +647,12 @@
err = -EISCONN;
break;

err = scif_get_new_port();
-if (!ep->port.node) {
-\tret = -ENOSPC;
+\tret = scif_get_new_port();
+\tif (ret < 0)
goto scif_bind_exit;
-\}
+\tep->port.port = err;
+\tep->port.node = scif_info.nodeid;
+\tep->conn_async_state = ASYNC_CONN_IDLE;
/* Fall through */
case SCIFEP_BOUND:
/*
--- linux-4.15.0.orig/drivers/misc/mic/scif/scif_fence.c
+++ linux-4.15.0/drivers/misc/mic/scif/scif_fence.c
@@ -272,7 +272,7 @@

/*
if (!x100)
dma_pool_free(ep->remote_dev->signal_pool, status,
    status->src_dma_addr);
+    src - offsetof(struct scif_status, val));
alloc_fail:
return err;
}
--- linux-4.15.0.orig/drivers/misc/mic/scif/scif_rma.c
+++ linux-4.15.0/drivers/misc/mic/scif/scif_rma.c
@@ -416,7 +416,7 @@
if (err)
goto error_window;
err = scif_map_page(&window->num_pages_lookup.lookup[j],
    vmalloc_dma_phys ?
+    vmalloc_num_pages ?
        vmalloc_to_page(&window->num_pages[i]),
    virt_to_page(&window->num_pages[i]),
    remote_dev);
@@ -1403,6 +1403,8 @@
    NULL);
    up_write(&mm->mmap_sem);
    if (nr_pages != pinned_pages->nr_pages) {
        if (pinned_pages->nr_pages < nr_pages) {[...]
    if (try_upgrade) {
    if (ulimit)
        __scif_dec_pinned_vm_lock(mm,
@@ -1423,7 +1425,6 @@
        if (pinned_pages->nr_pages < nr_pages) {
            err = -EFAULT;
            -pinned_pages->nr_pages = nr_pages;
            goto dec_pinned;
        }
@@ -1436,7 +1437,6 @@
            __scif_dec_pinned_vm_lock(mm, nr_pages, 0);
            /* Something went wrong! Rollback */
            error_unmap:
            -pinned_pages->nr_pages = nr_pages;
            scif_destroy_pinned_pages(pinned_pages);
            *pages = NULL;
            dev_dbg(scif_info.mdev.this_device,
--- linux-4.15.0.orig/drivers/misc/mic/vop/vop_main.c
+++ linux-4.15.0/drivers/misc/mic/vop/vop_main.c
@@ -301,7 +301,7 @@
            /* First assign the vring's allocated in host memory */
            vqconfig = _vop_vq_config(vdev->desc) + index;
memcpy_fromio(&config, vqconfig, sizeof(config));
-vr_size = vring_size(le16_to_cpu(config.num), MIC_VIRTIO_RING_ALIGN);
+vr_size = round_up(vring_size(le16_to_cpu(config.num), MIC_VIRTIO_RING_ALIGN), 4);
vr_size = PAGE_ALIGN(vr_size + sizeof(struct _mic_vring_info));
va = vpdev->hw_ops->ioremap(vpdev, le64_to_cpu(config.address), 
vpr_size);
--- linux-4.15.0.orig/drivers/misc/mic/vop/vop_vringh.c
+++ linux-4.15.0/drivers/misc/mic/vop/vop_vringh.c
@@ -308,7 +308,7 @@
    num = le16_to_cpu(vqconfig[i].num);
    mutex_init(&vvr->vr_mutex);
    -vr_size = PAGE_ALIGN(vring_size(num, MIC_VIRTIO_RING_ALIGN) +
    +vr_size = PAGE_ALIGN(round_up(vring_size(num, MIC_VIRTIO_RING_ALIGN), 4) +
    sizeof(struct _mic_vring_info));
    vr->va = (void *)
    __get_free_pages(GFP_KERNEL | __GFP_ZERO,
@@ -320,7 +320,7 @@
 goto err;
 }
 vr->len = vr_size;
@@ -611,6 +611,7 @@
 size_t partlen;
 bool dma = VOP_USE_DMA;
 int err = 0;
+size_t offset = 0;

 if (daddr & (dma_alignment - 1)) {
    vdev->tx_dst_unaligned += len;
@@ -659,13 +660,20 @@
 * We are copying to IO below and should ideally use something
 * like copy_from_user_toio(..) if it existed.
 */
-if (copy_from_user((void __force *)dbuf, ubuf, len)) {
-err = -EFAULT;
-err = dev_err(vop_dev(vdev), "%s %d err %d\n",
-__func__, __LINE__, err);
-goto err;
+while (len) {
+partlen = min_t(size_t, len, VOP_INT_DMA_BUF_SIZE);
+if (copy_from_user(vvr->buf, ubuf + offset, partlen)) {
+err = -EFAULT;

---
+dev_err(vop_dev(vdev), "%s %d err %d
",
+__func__, __LINE__, err);
+goto err;
+}
+memcpy_toio(dbuf + offset, vvr->buf, partlen);
+offset += partlen;
+vdev->out_bytes += partlen;
+len -= partlen;
}
-vdev->out_bytes += len;
err = 0;
err:
vpdev->hw_ops->iounmap(vpdev, dbuf);
--- linux-4.15.0.orig/drivers/misc/ocxl/Kconfig
+++ linux-4.15.0/drivers/misc/ocxl/Kconfig
@@ -0,0 +1,31 @@
+# Open Coherent Accelerator (OCXL) compatible devices
+#
+
+config OCXL_BASE
+bool
+default n
+select PPC_COPRO_BASE
+
+config OCXL
+tristate "OpenCAPI coherent accelerator support"
+depends on PPC_POWERNV && PCI && EEH
+select OCXL_BASE
+default m
+help
+ Select this option to enable the ocxl driver for Open
+ Coherent Accelerator Processor Interface (OpenCAPI) devices.
+
+ OpenCAPI allows FPGA and ASIC accelerators to be coherently
+ attached to a CPU over an OpenCAPI link.
+
+ The ocxl driver enables userspace programs to access these
+ accelerators through devices in /dev/ocxl/.
+
+ For more information, see http://opencapi.org.
+
+ This is not to be confused with the support for IBM CAPI
+ accelerators (CONFIG_CXL), which are PCI-based instead of a
+ dedicated OpenCAPI link, and don't follow the same protocol.
+
+ If unsure, say N.
--- linux-4.15.0.orig/drivers/misc/ocxl/Makefile
+++ linux-4.15.0/drivers/misc/ocxl/Makefile
@@ -0,0 +1,11 @@
+# SPDX-License-Identifier: GPL-2.0+
+ccflags-$\{CONFIG_PPC_WERROR\}$ += -Werror
+
+ocxl-y += main.o pci.o config.o file.o pasid.o
+ocxl-y += link.o context.o afu_irq.o sysfs.o trace.o
+obj-$\{CONFIG_OCXL\}$ += ocxl.o
+
+## For tracepoints to include our trace.h from tracepoint infrastructure:
+CFLAGS_trace.o := -I$\{src\}$
+
+## ccflags-y += -DDEBUG
--- linux-4.15.0.orig/drivers/misc/ocxl/afu_irq.c
+++ linux-4.15.0/drivers/misc/ocxl/afu_irq.c
@@ -0,0 +1,202 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+##include <linux/interrupt.h>
+##include <linux/eventfd.h>
+##include <asm/pnv-ocxl.h>
+##include "ocxl_internal.h"
+##include "trace.h"
+
+##struct afu_irq {
+##int id;
+##int hw_irq;
+##unsigned int virq;
+##char *name;
+##u64 trigger_page;
+##struct eventfd_ctx *ev_ctx;
+};
+
+static int irq_offset_to_id(struct ocxl_context *ctx, u64 offset)
+{
+    return (offset - ctx->afu->irq_base_offset) >> PAGE_SHIFT;
+}
+
+static u64 irq_id_to_offset(struct ocxl_context *ctx, int id)
+{
+    return ctx->afu->irq_base_offset + (id << PAGE_SHIFT);
+}
+
+static irqreturn_t afu_irq_handler(int virq, void *data)
+{
+    struct afu_irq *irq = (struct afu_irq *)data;
+    trace_ocxl_afu_irq_receive(virq);

---
+if (irq->ev_ctx)
+eventfd_signal(irq->ev_ctx, 1);
+return IRQ_HANDLED;
+
+static int setup_afu_irq(struct ocxl_context *ctx, struct afu_irq *irq)
+{
+int rc;
+
+irq->virq = irq_create_mapping(NULL, irq->hw_irq);
+if (!irq->virq) {
+pr_err("irq_create_mapping failed\n");
+return -ENOMEM;
+}
+
+pr_debug("hw_irq %d mapped to virq %u\n", irq->hw_irq, irq->virq);
+
+irq->name = kasprintf(GFP_KERNEL, "ocxl-afu-%u", irq->virq);
+if (!irq->name) {
+irq_dispose_mapping(irq->virq);
+return -ENOMEM;
+}
+
+rc = request_irq(irq->virq, afu_irq_handler, 0, irq->name, irq);
+if (rc) {
+kfree(irq->name);
+irq->name = NULL;
+irq_dispose_mapping(irq->virq);
+pr_err("request_irq failed: %d\n", rc);
+return rc;
+}
+
+return 0;
+
+static void release_afu_irq(struct afu_irq *irq)
+{
+kfree_irq(irq->virq, irq);
+irq_dispose_mapping(irq->virq);
+kfree(irq->name);
+}
+
+int ocxl_afu_irq_alloc(struct ocxl_context *ctx, u64 *irq_offset)
+{
+struct afu_irq *irq;
+int rc;
+
+irq = kzalloc(sizeof(struct afu_irq), GFP_KERNEL);
+if (!irq)
+return -ENOMEM;
/*
 * We limit the number of afu irqs per context and per link to
 * avoid a single process or user depleting the pool of IPIs
 */
+
+mutex_lock(&ctx->irq_lock);
+
+irq->id = idr_alloc(&ctx->irq_idr, irq, 0, MAX_IRQ_PER_CONTEXT,
+GFP_KERNEL);
+if (irq->id < 0) {
+  rc = -ENOOSPC;
+  goto err_unlock;
+}
+
+rc = ocxl_link_irq_alloc(ctx->afu->fn->link, &irq->hw_irq,
+&irq->trigger_page);
+if (rc)
+  goto err_idr;
+
+rc = setup_afu_irq(ctx, irq);
+if (rc)
+  goto err_alloc;
+
+*irq_offset = irq_id_to_offset(ctx, irq->id);
+
+trace_ocxl_afu_irq_alloc(ctx->pasid, irq->id, irq->virq, irq->hw_irq,
+ *irq_offset);
+mutex_unlock(&ctx->irq_lock);
+return 0;
+
+err_alloc:
+ocxl_link_free_irq(ctx->afu->fn->link, irq->hw_irq);
+err_idr:
+idr_remove(&ctx->irq_idr, irq->id);
+err_unlock:
+mutex_unlock(&ctx->irq_lock);
+kfree(irq);
+return rc;
+
+static void afu_irq_free(struct afu_irq *irq, struct ocxl_context *ctx)
+{
+trace_ocxl_afu_irq_free(ctx->pasid, irq->id);
+if (ctx->mapping)
+  unmap_mapping_range(ctx->mapping,
+  irq_id_to_offset(ctx, irq->id),
+  1 << PAGE_SHIFT, 1);
release_afu_irq(irq);
+ if (irq->ev_ctx)
+ eventfd_ctx_put(irq->ev_ctx);
+ ocxl_link_free_irq(ctx->afu->fn->link, irq->hw_irq);
+ kfree(irq);
+ }
+
+ int ocxl_afu_irq_free( struct ocxl_context *ctx, u64 irq_offset)
+ {
+ struct afu_irq *irq;
+ int id = irq_offset_to_id(ctx, irq_offset);
+ + mutex_lock(&ctx->irq_lock);
+ + irq = idr_find(&ctx->irq_idr, id);
+ + if (!irq) {
+ + mutex_unlock(&ctx->irq_lock);
+ + return -EINVAL;
+ + }
+ + idr_remove(&ctx->irq_idr, irq->id);
+ + afu_irq_free(irq, ctx);
+ + mutex_unlock(&ctx->irq_lock);
+ + return 0;
+ + }
+
+ void ocxl_afu_irq_free_all(struct ocxl_context *ctx)
+ {
+ struct afu_irq *irq;
+ int id;
+ + mutex_lock(&ctx->irq_lock);
+ + idr_for_each_entry(&ctx->irq_idr, irq, id)
+ + afu_irq_free(irq, ctx);
+ + mutex_unlock(&ctx->irq_lock);
+ + }
+
+ int ocxl_afu_irq_set_fd(struct ocxl_context *ctx, u64 irq_offset, int eventfd)
+ {
+ struct afu_irq *irq;
+ struct eventfd_ctx *ev_ctx;
+ int rc = 0, id = irq_offset_to_id(ctx, irq_offset);
+ + mutex_lock(&ctx->irq_lock);
+ + irq = idr_find(&ctx->irq_idr, id);
+ + if (!irq) {
+ + rc = -EINVAL;
+ + goto unlock;
+ + }
+ev_ctx = eventfd_ctx_fget(eventfd);
+if (IS_ERR(ev_ctx)) {
+rc = -EINVAL;
+goto unlock;
+}
+
+irq->ev_ctx = ev_ctx;
+unlock:
+mutex_unlock(&ctx->irq_lock);
+return rc;
+
+u64 oclx_afu_irq_get_addr(struct oclx_context *ctx, u64 irq_offset)
+{
+struct afu_irq *irq;
+int id = irq_offset_to_id(ctx, irq_offset);
+u64 addr = 0;
+
+mutex_lock(&ctx->irq_lock);
+irq = idr_find(&ctx->irq_idr, id);
+if (irq)
+addr = irq->trigger_page;
+mutex_unlock(&ctx->irq_lock);
+return addr;
+
--- linux-4.15.0.orig/drivers/misc/ocxl/config.c
+++ linux-4.15.0/drivers/misc/ocxl/config.c
@@ -0,0 +1,725 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+#include <linux/pci.h>
+#include <asm/pnv-ocxl.h>
+#include <misc/ocxl-config.h>
+
+#define EXTRACT_BIT(val, bit) (!!(val & BIT(bit)))
+#define EXTRACT_BITS(val, s, e) (((val & GENMASK(e, s)) >> s)
+
+#define OCXL_DVSEC_AFU_IDX_MASK GENMASK(5, 0)
+#define OCXL_DVSEC_ACTAG_MASK GENMASK(11, 0)
+#define OCXL_DVSEC_PASID_MASK GENMASK(19, 0)
+#define OCXL_DVSEC_PASID_LOG_MASK GENMASK(4, 0)
+
+#define OCXL_DVSEC_TEMPL_VERSION 0x0
+#define OCXL_DVSEC_TEMPL_NAME 0x4
+#define OCXL_DVSEC_TEMPL_AFU_VERSION 0x1C
+#define OCXL_DVSEC_TEMPL_MMIO_GLOBAL 0x20
```c
#define OCXL_DVSEC_TEMPL_MMIO_GLOBAL_SZ 0x28
#define OCXL_DVSEC_TEMPL_MMIO_PP 0x30
#define OCXL_DVSEC_TEMPL_MMIO_PP_SZ 0x38
#define OCXL_DVSEC_TEMPL_MEM_SZ 0x3C
#define OCXL_DVSEC_TEMPL_WWID 0x40
+
#define OCXL_MAX_AFU_PER_FUNCTION 64
#define OCXL_TEMPL_LEN 0x58
#define OCXL_TEMPL_NAME_LEN 24
#define OCXL_CFG_TIMEOUT 3
+
static int find_dvsec(struct pci_dev *dev, int dvsec_id)
{
    int vsec = 0;
    u16 vendor, id;
    +
    while ((vsec = pci_find_next_ext_capability(dev, vsec,
        + OCXL_EXT_CAP_ID_DVSEC))) {
        pci_read_config_word(dev, vsec + OCXL_DVSEC_VENDOR_OFFSET,
            +&vendor);
        pci_read_config_word(dev, vsec + OCXL_DVSEC_ID_OFFSET, &id);
        if (vendor == PCI_VENDOR_ID_IBM && id == dvsec_id)
            return vsec;
    }
    return 0;
}
+
static int find_dvsec_afu_ctrl(struct pci_dev *dev, u8 afu_idx)
{
    int vsec = 0;
    u16 vendor, id;
    u8 idx;
    +
    while ((vsec = pci_find_next_ext_capability(dev, vsec,
        + OCXL_EXT_CAP_ID_DVSEC))) {
        pci_read_config_word(dev, vsec + OCXL_DVSEC_VENDOR_OFFSET,
            +&vendor);
        pci_read_config_word(dev, vsec + OCXL_DVSEC_ID_OFFSET, &id);
        if (vendor == PCI_VENDOR_ID_IBM && id == dvsec_id)
        {
            pci_read_config_byte(dev,
                vsec + OCXL_DVSEC_AFU_CTRL_AFU_IDX, &idx);
            if (idx == afu_idx)
                return vsec;
        }
    }
    return 0;
}
```
return 0;
+
static int read_pasid(struct pci_dev *dev, struct ocxl_fn_config *fn)
+
+u16 val;
+int pos;
+
+pos = pci_find_ext_capability(dev, PCI_EXT_CAP_ID_PASID);
+if (!pos) {
+  /*
+   * PASID capability is not mandatory, but there
+   * shouldn’t be any AFU
+   */
+  +dev_dbg(&dev->dev, "Function doesn’t require any PASID\n”);
+  +fn->max_pasid_log = -1;
+  +goto out;
+  +}
+pci_read_config_word(dev, pos + PCI_PASID_CAP, &val);
+fn->max_pasid_log = EXTRACT_BITS(val, 8, 12);
+
+out:
+  dev_dbg(&dev->dev, "PASID capability:
”);
+  dev_dbg(&dev->dev, "  Max PASID log = %d
", fn->max_pasid_log);
+  return 0;
+}
+
static int read_dvsec_tl(struct pci_dev *dev, struct ocxl_fn_config *fn)
+
+pos = find_dvsec(dev, OCXL_DVSEC_TL_ID);
+if (!pos && PCI_FUNC(dev->devfn) == 0) {
+  +dev_dbg(&dev->dev, "Can’t find TL DVSEC\n”);
+  +return -ENOMEM;
+  +}
+  fn->dvsec_tl_pos = pos;
+
static int read_dvsec_function(struct pci_dev *dev, struct ocxl_fn_config *fn)
+
+int pos, afu_present;
+
+pos = find_dvsec(dev, OCXL_DVSEC_FUNCTION_ID);
+if (pos && PCI_FUNC(dev->devfn) != 0) {
+  +dev_err(&dev->dev, "TL DVSEC is only allowed on function 0\n”);
+  +return -ENOMEM;
+  +}
+  fn->dvsec_fn_pos = pos;
+  return 0;
+}
+pos = find_dvsec(dev, OCXL_DVSEC_FUNC_ID);
+if (pos) {
+dev_err(&dev->dev, "Can't find function DVSEC\n");
+return -ENODEV;
+
+fn->dvsec_function_pos = pos;
+
+pci_read_config_dword(dev, pos + OCXL_DVSEC_FUNC_OFF_INDEX, &val);
+afu_present = EXTRACT_BIT(val, 31);
+if (!afu_present) {
+  fn->max_afu_index = -1;
+  dev_dbg(&dev->dev, "Function doesn't define any AFU\n");
+  goto out;
+}
+fn->max_afu_index = EXTRACT_BITS(val, 24, 29);
+
+out:
+  dev_dbg(&dev->dev, "Function DVSEC:
");
+  dev_dbg(&dev->dev, "  Max AFU index = %d\n", fn->max_afu_index);
+  return 0;
+
+static int read_dvsec_afu_info(struct pci_dev *dev, struct ocxl_fn_config *fn)
+{
+  int pos;
+
+  if (fn->max_afu_index < 0) {
+    fn->dvsec_afu_info_pos = -1;
+    return 0;
+  }
+
+  pos = find_dvsec(dev, OCXL_DVSEC_AFU_INFO_ID);
+  if (pos) {
+    dev_err(&dev->dev, "Can't find AFU information DVSEC\n");
+    return -ENODEV;
+  }
+  fn->dvsec_afu_info_pos = pos;
+  return 0;
+}
+
+static int read_dvsec_vendor(struct pci_dev *dev)
+{
+  int pos;
+  u32 cfg, tlx, dlx;
+
+  /*
+   * vendor specific DVSEC is optional
+   *
+ * It's currently only used on function 0 to specify the
+ * version of some logic blocks. Some older images may not
+ * even have it so we ignore any errors
+ */
+if (PCI_FUNC(dev->devfn) != 0)
+return 0;
+
+pos = find_dvsec(dev, OCXL_DVSEC_VENDOR_ID);
+if (!pos)
+return 0;
+
+pci_read_config_dword(dev, pos + OCXL_DVSEC_VENDOR_CFG_VERS, &cfg);
+pci_read_config_dword(dev, pos + OCXL_DVSEC_VENDOR_TLX_VERS, &tlx);
+pci_read_config_dword(dev, pos + OCXL_DVSEC_VENDOR_DLX_VERS, &dlx);
+
+dev_dbg(&dev->dev, "Vendor specific DVSEC:
" +dev_dbg(&dev->dev, "  CFG version = 0x%x
", cfg);
+dev_dbg(&dev->dev, "  TLX version = 0x%x
", tlx);
+dev_dbg(&dev->dev, "  DLX version = 0x%x
", dlx);
+return 0;
+
+static int validate_function(struct pci_dev *dev, struct ocxl_fn_config *fn)
+
+if (fn->max_pasid_log == -1 && fn->max_afu_index >= 0) {
+dev_err(&dev->dev,
+"AFUs are defined but no PASIDs are requested
" +return -EINVAL;
+} +
+
+if (fn->max_afu_index > OCXL_MAX_AFU_PER_FUNCTION) {
+dev_err(&dev->dev,
+"Max AFU index out of architectural limit (%d vs %d)
", +fn->max_afu_index, OCXL_MAX_AFU_PER_FUNCTION);
+return -EINVAL;
+} +
+return 0;
+
int ocxl_config_read_function(struct pci_dev *dev, struct ocxl_fn_config *fn)
+
+int rc;
+
+rc = read_pasid(dev, fn);
+if (rc) {
+dev_err(&dev->dev, "Invalid PASID configuration: %d
", rc);
+return -ENODEV;
}
+{  
+    +rc = read_dvsec_tl(dev, fn);  
+    +if (rc) {  
+        +dev_err(&(dev->dev),  
+            +"Invalid Transaction Layer DVSEC configuration: %d\n",  
+            +rc);  
+        +return -ENODEV;  
+    }  
+    +rc = read_dvsec_function(dev, fn);  
+    +if (rc) {  
+        +dev_err(&(dev->dev),  
+            +"Invalid Function DVSEC configuration: %d\n", rc);  
+        +return -ENODEV;  
+    }  
+    +rc = read_dvsec_afu_info(dev, fn);  
+    +if (rc) {  
+        +dev_err(&(dev->dev), "Invalid AFU configuration: %d\n", rc);  
+        +return -ENODEV;  
+    }  
+    +rc = read_dvsec_vendor(dev);  
+    +if (rc) {  
+        +dev_err(&(dev->dev), "Invalid vendor specific DVSEC configuration: %d\n", rc);  
+        +return -ENODEV;  
+    }  
+    +rc = validate_function(dev, fn);  
+    +return rc;  
+}  
+EXPORT_SYMBOL_GPL(ocxl_config_read_function);  
+  
+static int read_afu_info(struct pci_dev *dev, struct ocxl_fn_config *fn,  
+        int offset, u32 *data)  
+{  
+    u32 val;  
+    unsigned long timeout = jiffies + (HZ * OCXL_CFG_TIMEOUT);  
+    int pos = fn->dvsec_afu_info_pos;  
+    +/* Protect 'data valid' bit */  
+    +if (EXTRACT_BIT(offset, 31)) {  
+        +dev_err(&(dev->dev), "Invalid offset in AFU info DVSEC\n");  
+        +return -EINVAL;  
+    }  
+}
+pci_write_config_dword(dev, pos + OCXL_DVSEC_AFU_INFO_OFF, offset);
+pci_read_config_dword(dev, pos + OCXL_DVSEC_AFU_INFO_OFF, &val);
+while (!EXTRACT_BIT(val, 31)) {
  +if (time_after_eq(jiffies, timeout)) {
    +dev_err(&dev->dev, 
            +"Timeout while reading AFU info DVSEC (offset=%d)\n",
            +offset);
    +return -EBUSY;
  +}
  +cpu_relax();
  +pci_read_config_dword(dev, pos + OCXL_DVSEC_AFU_INFO_OFF, &val);
+
  +pci_read_config_dword(dev, pos + OCXL_DVSEC_AFU_INFO_DATA, data);
  +return 0;
+
  +int ocxl_config_check_afu_index(struct pci_dev *dev, 
    +struct ocxl_fn_config *fn, int afu_idx)
  +{
    +u32 val;
    +int rc, templ_major, templ_minor, len;
    +
    +pci_write_config_byte(dev, 
      +fn->dvsec_afu_info_pos + OCXL_DVSEC_AFU_INFO_AFU_IDX, 
      +afu_idx);
    +rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_VERSION, &val);
    +if (rc)
      +return rc;
    +
    /* AFU index map can have holes */
    +if (!val)
      +return 0;
    +
    +templ_major = EXTRACT_BITS(val, 8, 15);
    +templ_minor = EXTRACT_BITS(val, 0, 7);
    +dev_dbg(&dev->dev, "AFU descriptor template version %d.%d\n", 
      +templ_major, templ_minor);
    +
    +len = EXTRACT_BITS(val, 16, 31);
    +if (len != OCXL_TEMPL_LEN) {
      +dev_warn(&dev->dev, 
                +"Unexpected template length in AFU information (%#x)\n", 
                +len);
      +}
    +return 1;
  +}
  +EXPORT_SYMBOL_GPL(ocxl_config_check_afu_index);
static int read_afu_name(struct pci_dev *dev, struct ocxl_fn_config *fn, struct ocxl_afu_config *afu) {
    int i, rc;
    u32 val, *ptr;
    
    BUILD_BUG_ON(OCXL_AFU_NAME_SZ < OCXL_TEMPL_NAME_LEN);
    for (i = 0; i < OCXL_TEMPL_NAME_LEN; i += 4) {
        rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_NAME + i, &val);
        if (rc)
            return rc;
        ptr = (u32 *) &afu->name[i];
        *ptr = le32_to_cpu((__force __le32) val);
    }
    afu->name[OCXL_AFU_NAME_SZ - 1] = '\0'; /* play safe */
    return 0;
}

static int read_afu_mmio(struct pci_dev *dev, struct ocxl_fn_config *fn, struct ocxl_afu_config *afu) {
    int rc;
    u32 val;
    
    /*
    * Global MMIO
    */
    rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_MMIO_GLOBAL, &val);
    if (rc)
        return rc;
    afu->global_mmio_bar = EXTRACT_BITS(val, 0, 2);
    afu->global_mmio_offset = EXTRACT_BITS(val, 16, 31) << 16;
    
    rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_MMIO_GLOBAL_SZ, &val);
    if (rc)
        return rc;
    afu->global_mmio_size = val;
    
    /*
    * Per-process MMIO
    */
    rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_MMIO_PP, &val);
if (rc)
+ return rc;
+ afu->pp_mmio_bar = EXTRACT_BITS(val, 0, 2);
+ afu->pp_mmio_offset = EXTRACT_BITS(val, 16, 31) << 16;
+ 
+ rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_MMIO_PP + 4, &val);
+ if (rc)
+ return rc;
+ afu->pp_mmio_offset += (u64) val << 32;
+
+ rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_MMIO_PP_SZ, &val);
+ if (rc)
+ return rc;
+ afu->pp_mmio_stride = val;
+
+ return 0;
+
+ static int read_afu_control(struct pci_dev *dev, struct ocxl_afu_config *afu)
+ {
+ int pos;
+ u8 val8;
+ u16 val16;
+ 
+ pos = find_dvsec_afu_ctrl(dev, afu->idx);
+ if (!pos) {
+ dev_err(&dev->dev, "Can't find AFU control DVSEC for AFU %d\n",
+ afu->idx);
+ return -ENODEV;
+ }
+ afu->dvsec_afu_control_pos = pos;
+ 
+ pci_read_config_byte(dev, pos + OCXL_DVSEC_AFU_CTRL_PASID_SUP, &val8);
+ afu->pasid_supported_log = EXTRACT_BITS(val8, 0, 4);
+ 
+ pci_read_config_word(dev, pos + OCXL_DVSEC_AFU_CTRL_ACTAG_SUP, &val16);
+ afu->actag_supported = EXTRACT_BITS(val16, 0, 11);
+ return 0;
+ }
+
+ static bool char_allowed(int c)
+ { /*
+ * Permitted Characters : Alphanumeric, hyphen, underscore, comma
+ */
+ if ((c >= 0x30 && c <= 0x39) /* digits */ ||
+ (c >= 0x41 && c <= 0x5A) /* upper case */ ||
+ (c >= 0x61 && c <= 0x7A) /* lower case */ ||
```c
+c == 0 /* NULL */ ||
+c == 0x2D /* - */ ||
+c == 0x5F /* _ */ ||
+c == 0x2C /* , */)
+return true;
+return false;
+
+static int validate_afu(struct pci_dev *dev, struct ocxl_afu_config *afu)
+{
+int i;
+
+if (!afu->name[0]) {
+dev_err(&dev->dev, "Empty AFU name\n");
+return -EINVAL;
+}
+for (i = 0; i < OCXL_TEMPL_NAME_LEN; i++) {
+if (!char_allowed(afu->name[i])) {
+dev_err(&dev->dev,
+"Invalid character in AFU name\n");
+return -EINVAL;
+}
+}
+
+if (afu->global_mmio_bar != 0 &&
+afu->global_mmio_bar != 2 &&
+afu->global_mmio_bar != 4) {
+dev_err(&dev->dev,
+"Invalid global MMIO bar number\n");
+return -EINVAL;
+}
+
+if (afu->pp_mmio_bar != 0 &&
+afu->pp_mmio_bar != 2 &&
+afu->pp_mmio_bar != 4) {
+dev_err(&dev->dev,
+"Invalid per-process MMIO bar number\n");
+return -EINVAL;
+}
+
+return 0;
+
+int ocxl_config_read_afu(struct pci_dev *dev, struct ocxl_fn_config *fn,
+struct ocxl_afu_config *afu, u8 afu_idx)
+{
+int rc;
+u32 val32;
+
+/* First, we need to write the AFU idx for the AFU we want to
+ access. */
```
```c
+a*/
+WARN_ON((afu_idx & OCXL_DVSEC_AFU_IDX_MASK) != afu_idx);
+afu->idx = afu_idx;
+pci_write_config_byte(dev, fn->dvsec_afu_info_pos + OCXL_DVSEC_AFU_INFO_AFU_IDX, afu->idx);
+
+rc = read_afu_name(dev, fn, afu);
+if (rc)
+return rc;
+
+rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_AFU_VERSION, &val32);
+if (rc)
+return rc;

+afu->version_major = EXTRACT_BITS(val32, 24, 31);
+afu->version_minor = EXTRACT_BITS(val32, 16, 23);
+afu->afuc_type = EXTRACT_BITS(val32, 14, 15);
+afu->afum_type = EXTRACT_BITS(val32, 12, 13);
+afu->profile = EXTRACT_BITS(val32, 0, 7);
+
+rc = read_afu_mmio(dev, fn, afu);
+if (rc)
+return rc;
+
+rc = read_afu_info(dev, fn, OCXL_DVSEC_TEMPL_MEM_SZ, &val32);
+if (rc)
+return rc;

+afu->log_mem_size = EXTRACT_BITS(val32, 0, 7);
+
+rc = read_afu_control(dev, afu);
+if (rc)
+return rc;
+
+dev_dbg(&dev->dev, "AFU configuration:\n");
+dev_dbg(&dev->dev, " name = %s\n", afu->name);
+dev_dbg(&dev->dev, " version = %d.%d\n", afu->version_major, afu->version_minor);
+dev_dbg(&dev->dev, " global mmio bar = %hhu\n", afu->global_mmio_bar);
+dev_dbg(&dev->dev, " global mmio offset = %#llx\n", afu->global_mmio_offset);
+dev_dbg(&dev->dev, " global mmio size = %#x\n", afu->global_mmio_size);
+dev_dbg(&dev->dev, " pp mmio bar = %hhu\n", afu->pp_mmio_bar);
+dev_dbg(&dev->dev, " pp mmio offset = %#llx\n", afu->pp_mmio_offset);
+dev_dbg(&dev->dev, " pp mmio stride = %#x\n", afu->pp_mmio_stride);
+dev_dbg(&dev->dev, " mem size (log) = %hhu\n", afu->log_mem_size);
+dev_dbg(&dev->dev, " pasid supported (log) = %u\n", afu->pasid_supported_log);
+dev_dbg(&dev->dev, " actag supported = %u\n", afu->actag_supported_log);``
+afu->actag_supported);
+
+rc = validate_afu(dev, afu);
+return rc;
+}
+EXPORT_SYMBOL_GPL(ocxl_config_read_afu);
+
+int ocxl_config_get_actag_info(struct pci_dev *dev, u16 *base, u16 *enabled,
+u16 *supported)
+{
+int rc;
+
+/*
+ * This is really a simple wrapper for the kernel API, to
+ * avoid an external driver using ocxl as a library to call
+ * platform-dependent code
+ */
+rc = pnv_ocxl_get_actag(dev, base, enabled, supported);
+if (rc) {
+dev_err(&dev->dev, "Can't get actag for device: %d\n", rc);
+return rc;
+}
+return 0;
+}
+EXPORT_SYMBOL_GPL(ocxl_config_get_actag_info);
+
+void ocxl_config_set_afu_actag(struct pci_dev *dev, int pos, int actag_base,
+int actag_count)
+{
+u16 val;
+
+val = actag_count & OCXL_DVSEC_ACTAG_MASK;
+pci_write_config_byte(dev, pos + OCXL_DVSEC_AFU_CTRL_ACTAG_EN, val);
+
+val = actag_base & OCXL_DVSEC_ACTAG_MASK;
+pci_write_config_dword(dev, pos + OCXL_DVSEC_AFU_CTRL_ACTAG_BASE, val);
+}
+EXPORT_SYMBOL_GPL(ocxl_config_set_afu_actag);
+
+int ocxl_config_get_pasid_info(struct pci_dev *dev, int *count)
+{
+return pnv_ocxl_get_pasid_count(dev, count);
+}
+EXPORT_SYMBOL_GPL(ocxl_config_get_pasid_info);
+
+void ocxl_config_set_afu_pasid(struct pci_dev *dev, int pos, int pasid_base,
+u32 pasid_count_log)
+{


+u8 val8;
+u32 val32;
+
+val8 = pasid_count_log & OCXL_DVSEC_PASID_LOG_MASK;
+pci_write_config_byte(dev, pos + OCXL_DVSEC_AFU_CTRL_PASID_EN, val8);
+
+pci_read_config_dword(dev, pos + OCXL_DVSEC_AFU_CTRL_PASID_BASE, &val32);
+val32 &= ~OCXL_DVSEC_PASID_MASK;
+val32 |= pasid_base & OCXL_DVSEC_PASID_MASK;
+pci_write_config_dword(dev, pos + OCXL_DVSEC_AFU_CTRL_PASID_BASE, val32);
+
+EXPORT_SYMBOL_GPL(ocxl_config_set_afu_pasid);
+
+void ocxl_config_set_afu_state(struct pci_dev *dev, int pos, int enable)
+{
+u8 val;
+
+pci_read_config_byte(dev, pos + OCXL_DVSEC_AFU_CTRL_ENABLE, &val);
+if (enable)
+val |= 1;
+else
+val &= 0xFE;
+pci_write_config_byte(dev, pos + OCXL_DVSEC_AFU_CTRL_ENABLE, val);
+
+EXPORT_SYMBOL_GPL(ocxl_config_set_afu_state);
+
+int ocxl_config_set_TL(struct pci_dev *dev, int tl_dvsec)
+{
+u32 val;
+__be32 *be32ptr;
+u8 timers;
+int i, rc;
+long recv_cap;
+char *recv_rate;
+
+/*
+ * Skip on function != 0, as the TL can only be defined on 0
+ */
+if (PCI_FUNC(dev->devfn) != 0)
+return 0;
+
+recv_rate = kzalloc(PNV_OCXL_TL_RATE_BUF_SIZE, GFP_KERNEL);
+if (!recv_rate)
+return -ENOMEM;
+/*
+ * The spec defines 64 templates for messages in the
Transaction Layer (TL).

The host and device each support a subset, so we need to configure the transmitters on each side to send only templates the receiver understands, at a rate the receiver can process. Per the spec, template 0 must be supported by everybody. That's the template which has been used by the host and device so far.

The sending rate limit must be set before the template is enabled.

Device -> host

Device -> host

```c
rc = pnv_ocxl_get_tl_cap(dev, &recv_cap, recv_rate,
+PNV_OCXL_TL_RATE_BUF_SIZE);
if (rc)
    goto out;

for (i = 0; i < PNV_OCXL_TL_RATE_BUF_SIZE; i += 4) {
    be32ptr = (__be32 *) &recv_rate[i];
    pci_write_config_dword(dev,
        tl_dvsec + OCXL_DVSEC_TL_SEND_RATE + i,
        *be32ptr = cpu_to_be32(val));
}
pci_write_config_dword(dev, tl_dvsec + OCXL_DVSEC_TL_SEND_CAP, val);
pci_write_config_dword(dev, tl_dvsec + OCXL_DVSEC_TL_SEND_CAP + 4, val);
```

Host -> device

```c
for (i = 0; i < PNV_OCXL_TL_RATE_BUF_SIZE; i += 4) {
    pci_read_config_dword(dev,
        tl_dvsec + OCXL_DVSEC_TL_RECV_RATE + i,
        &val);
    *be32ptr = cpu_to_be32(val);
}
pci_read_config_dword(dev, tl_dvsec + OCXL_DVSEC_TL_RECV_CAP, &val);
recv_cap = (long) val << 32;
pci_read_config_dword(dev, tl_dvsec + OCXL_DVSEC_TL_RECV_CAP + 4, &val);
recv_cap |= val;
rc = pnv_ocxl_set_tl_conf(dev, recv_cap, __pa(recv_rate),
if (rc)
    goto out;
*/
* Opencapi commands needing to be retried are classified per
* the TL in 2 groups: short and long commands.
* The short back off timer it not used for now. It will be
* for opencapi 4.0.
* The long back off timer is typically used when an AFU hits
* a page fault but the NPU is already processing one. So the
* AFU needs to wait before it can resubmit. Having a value
* too low doesn't break anything, but can generate extra
* traffic on the link.
* We set it to 1.6 us for now. It's shorter than, but in the
* same order of magnitude as the time spent to process a page
* fault.
*/
timers = 0x2 << 4; /* long timer = 1.6 us */
pci_write_config_byte(dev, tl_dvsec + OCXL_DVSEC_TL_BACKOFF_TIMERS,
timers);
rc = 0;
out:
kfree(recv_rate);
return rc;
} EXPORT_SYMBOL_GPL(ocxl_config_set_TL);

int ocxl_config_terminate_pasid(struct pci_dev *dev, int afu_control, int pasid)
{
    u32 val;
    unsigned long timeout;
    pci_read_config_dword(dev, afu_control + OCXL_DVSEC_AFU_CTRL_TERM_PASID,
    &val);
    if (EXTRACT_BIT(val, 20)) {
        dev_err(&dev->dev,
            "Can't terminate PASID %#x, previous termination didn't complete\n",
            pasid);
        return -EBUSY;
    }
    val &= ~OCXL_DVSEC_PASID_MASK;
    val |= pasid & OCXL_DVSEC_PASID_MASK;
    val |= BIT(20);
+pci_write_config_dword(dev, afu_control + OCXL_DVSEC_AFU_CTRL_TERM_PASID, &val);
+
+timeout = jiffies + (HZ * OCXL_CFG_TIMEOUT);
+pci_read_config_dword(dev, afu_control + OCXL_DVSEC_AFU_CTRL_TERM_PASID, &val);
+while (EXTRACT_BIT(val, 20)) {
+if (time_after_eq(jiffies, timeout)) {
+dev_err(&dev->dev, "Timeout while waiting for AFU to terminate PASID %#x\n", pasid);
+return -EBUSY;
+
+cpu_relax();
+pci_read_config_dword(dev, afu_control + OCXL_DVSEC_AFU_CTRL_TERM_PASID, &val);
+}
+return 0;
+
+EXPORT_SYMBOL_GPL(ocxl_config_terminate_pasid);
+
+void ocxl_config_set_actag(struct pci_dev *dev, int func_dvsec, u32 tag_first, u32 tag_count)
+
+
+val = (tag_first & OCXL_DVSEC_ACTAG_MASK) << 16;
+val |= tag_count & OCXL_DVSEC_ACTAG_MASK;
+pci_write_config_dword(dev, func_dvsec + OCXL_DVSEC_FUNC_OFF_ACTAG, &val);
+
+EXPORT_SYMBOL_GPL(ocxl_config_set_actag);

--- linux-4.15.0.orig/drivers/misc/ocxl/context.c
+++ linux-4.15.0/drivers/misc/ocxl/context.c
@@ -0,0 +1,282 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+/#include <linux/sched/mm.h>
+/#include "trace.h"
+/#include "ocxl_internal.h"
+
+struct ocxl_context *ocxl_context_alloc(void)
+
+{+
+return kzalloc(sizeof(struct ocxl_context), GFP_KERNEL);
+
+}
+int ocxl_context_init(struct ocxl_context *ctx, struct ocxl_afu *afu,
+struct address_space *mapping)
+{
+    int pasid;
+
+    ctx->afu = afu;
+    mutex_lock(&afu->contexts_lock);
+    pasid = idr_alloc(&afu->contexts_idr, ctx, afu->pasid_base,
+        afu->pasid_base + afu->pasid_max, GFP_KERNEL);
+    if (pasid < 0) {
+        mutex_unlock(&afu->contexts_lock);
+        return pasid;
+    }
+    afu->pasid_count++;
+    mutex_unlock(&afu->contexts_lock);
+
+    ctx->pasid = pasid;
+    ctx->status = OPENED;
+    mutex_init(&ctx->status_mutex);
+    ctx->mapping = mapping;
+    mutex_init(&ctx->mapping_lock);
+    init_waitqueue_head(&ctx->events_wq);
+    mutex_init(&ctx->xsl_error_lock);
+    mutex_init(&ctx->irq_lock);
+    idr_init(&ctx->irq_idr);
+    ctx->tidr = 0;
+
+    /*
+     * Keep a reference on the AFU to make sure it's valid for the
+     * duration of the life of the context
+     */
+    ocxl_afu_get(afu);
+    return 0;
+
+/*
+ * Callback for when a translation fault triggers an error
+ * data:a pointer to the context which triggered the fault
+ * addr:the address that triggered the error
+ * dsisr:the value of the PPC64 dsisr register
+ */
+static void xsl_fault_error(void *data, u64 addr, u64 dsisr)
+{
+    struct ocxl_context *ctx = (struct ocxl_context *) data;
+
+    mutex_lock(&ctx->xsl_error_lock);
+    ctx->xsl_error.addr = addr;
+    ctx->xsl_error.dsisr = dsisr;
+ctx->xsl_error.count++;
+mutex_unlock(&ctx->xsl_error_lock);
+
+wake_up_all(&ctx->events_wq);
+}
+
+int ocxl_context_attach(struct ocxl_context *ctx, u64 amr)
+{
+int rc;
+
+// Locks both status & tidr
+mutex_lock(&ctx->status_mutex);
+if (ctx->status != OPENED) {
+rc = -EIO;
+goto out;
+}
+
+rc = ocxl_link_add_pe(ctx->afu->fn->link, ctx->pasid,
+current->mm->context.id, ctx->tidr, amr, current->mm,
+xsl_fault_error, ctx);
+if (rc)
+goto out;
+
+ctx->status = ATTACHED;
+out:
+mutex_unlock(&ctx->status_mutex);
+return rc;
+}
+
+static int map_afu_irq(struct vm_area_struct *vma, unsigned long address,
+u64 offset, struct ocxl_context *ctx)
+{
+u64 trigger_addr;
+
+trigger_addr = ocxl_afu_irq_get_addr(ctx, offset);
+if (!trigger_addr)
+return VM_FAULT_SIGBUS;
+
+vm_insert_pfn(vma, address, trigger_addr >> PAGE_SHIFT);
+return VM_FAULT_NOPAGE;
+}
+
+static int map_pp_mmio(struct vm_area_struct *vma, unsigned long address,
+u64 offset, struct ocxl_context *ctx)
+{
+u64 pp_mmio_addr;
+
+pp_mmio_addr = ocxl_pp_mmio_get_addr(ctx, offset);
+if (!pp_mmio_addr)
+return VM_FAULT_SIGBUS;
+
+vm_insert_pfn(vma, address, pp_mmio_addr >> PAGE_SHIFT);
+return VM_FAULT_NOPAGE;
+}
if (offset >= ctx->afu->config.pp_mmio_stride)
+return VM_FAULT_SIGBUS;
+
+mutex_lock(&ctx->status_mutex);
+if (ctx->status != ATTACHED) {
+mutex_unlock(&ctx->status_mutex);
+pr_debug("%s: Context not attached, failing mmio mmap\n", __func__);
+return VM_FAULT_SIGBUS;
+}
+
+pasid_off = ctx->pasid - ctx->afu->pasid_base;
+pp_mmio_addr = ctx->afu->pp_mmio_start +
+pasid_off * ctx->afu->config.pp_mmio_stride +
+offset;
+
+vm_insert_pfn(vma, address, pp_mmio_addr >> PAGE_SHIFT);
+mutex_unlock(&ctx->status_mutex);
+return VM_FAULT_NOPAGE;
+
static int ocxl_mmap_fault(struct vm_fault *vmf)
{]
+struct vm_area_struct *vma = vmf->vma;
+struct ocxl_context *ctx = vma->vm_file->private_data;
+u64 offset;
+int rc;
+
+offset = vmf->pgooff << PAGE_SHIFT;
+pr_debug("%s: pasid %d address 0x%lx offset 0x%llx\n", __func__,
+ctx->pasid, vmf->address, offset);
+
+if (offset < ctx->afu->irq_base_offset)
+rc = map_pp_mmio(vma, vmf->address, offset, ctx);
+else
+rc = map_afu_irq(vma, vmf->address, offset, ctx);
+return rc;
+
+static const struct vm_operations_struct ocxl_vmops = {
+.fault = ocxl_mmap_fault,
+};
+
+static int check_mmap_afu_irq(struct ocxl_context *ctx,
+struct vm_area_struct *vma)
+{]
+/* only one page */
+if (vma_pages(vma) != 1)
+return -EINVAL;
+
+ /* check offset validity */
+if ((ocxl_afu_irq_get_addr(ctx, vma->vm_pgoff << PAGE_SHIFT))
+return -EINVAL;
+
+ /* trigger page should only be accessible in write mode. */
+ /* It's a bit theoretical, as a page mmaped with only */
+ /* PROT_WRITE is currently readable, but it doesn't hurt. */
+if ((vma->vm_flags & VM_READ) || (vma->vm_flags & VM_EXEC) ||
+!(vma->vm_flags & VM_WRITE))
+return -EINVAL;
+vma->vm_flags &= ~(VM_MAYREAD | VM_MAYEXEC);
+return 0;
+
+static int check_mmap_mmio(struct ocxl_context *ctx,
+struct vm_area_struct *vma)
+{
+if ((vma_pages(vma) + vma->vm_pgoff) >
+(ctx->afu->config.pp_mmio_stride >> PAGE_SHIFT))
+return -EINVAL;
+return 0;
+
+int ocxl_context_mmap(struct ocxl_context *ctx, struct vm_area_struct *vma)
+{
+int rc;
+
+if ((vma->vm_pgoff << PAGE_SHIFT) < ctx->afu->irq_base_offset)
+rc = check_mmap_mmio(ctx, vma);
+else
+rc = check_mmap_afu_irq(ctx, vma);
+if (rc)
+return rc;
+
+vma->vm_flags |= VM_IO | VM_PFNMAP;
+vma->vm_page_prot = pgprot_noncached(vma->vm_page_prot);
+vma->vm_ops = &ocxl_vmops;
+return 0;
+)
+
+int ocxl_context_detach(struct ocxl_context *ctx)
+{
+struct pci_dev *dev;
+int afu_control_pos;
+enum o-xl_context_status status;
+int rc;
+
+mutex_lock(&ctx->status_mutex);
+status = ctx->status;
+ctx->status = CLOSED;
+mutex_unlock(&ctx->status_mutex);
+if (status != ATTACHED)
+return 0;
+
+dev = to_pci_dev(ctx->afu->fn->dev.parent);
+afu_control_pos = ctx->afu->config.dvsec_afu_control_pos;
+
+mutex_lock(&ctx->afu->afu_control_lock);
+rc = ocxl_config_terminate_pasid(dev, afu_control_pos, ctx->pasid);
+mutex_unlock(&ctx->afu->afu_control_lock);
+trace_ocxl_terminate_pasid(ctx->pasid, rc);
+if (rc) {
+/*
+ * If we timeout waiting for the AFU to terminate the
+ * pasid, then it's dangerous to clean up the Process
+ * Element entry in the SPA, as it may be referenced
+ * in the future by the AFU. In which case, we would
+ * checkstop because of an invalid PE access (FIR
+ * register 2, bit 42). So leave the PE defined. Caller shouldn't free the context so that
+ * PASID remains allocated.
+ *
+ * A link reset will be required to cleanup the AFU
+ * and the SPA.
+ */
+if (rc == -EBUSY)
+return rc;
+}
+rc = ocxl_link_remove_pe(ctx->afu->fn->link, ctx->pasid);
+if (rc) {
+dev_warn(&ctx->afu->dev,
+"Couldn't remove PE entry cleanly: %d\n", rc);
+}
+return 0;
+}
+
+void ocxl_context_detach_all(struct ocxl_afu *afu)
+{
+struct ocxl_context *ctx;
+int tmp;
+
mutex_lock(&afu->contexts_lock);
+idr_for_each_entry(&afu->contexts_idr, ctx, tmp) {
+ocxl_context_detach(ctx);
+/
+ * We are force detaching - remove any active mmio
+ * mappings so userspace cannot interfere with the
+ * card if it comes back. Easiest way to exercise
+ * this is to unbind and rebind the driver via sysfs
+ * while it is in use.
+ */
+mutex_lock(&ctx->mapping_lock);
+if (ctx->mapping)
+unmap_mapping_range(ctx->mapping, 0, 0, 1);
+mutex_unlock(&ctx->mapping_lock);
+
+mutex_unlock(&afu->contexts_lock);
+
+void ocxl_context_free(struct ocxl_context *ctx)
+{
+mutex_lock(&ctx->afu->contexts_lock);
+ctx->afu->pasid_count--;
+idr_remove(&ctx->afu->contexts_idr, ctx->pasid);
+mutex_unlock(&ctx->afu->contexts_lock);
+
+ocxl_afu_irq_free_all(ctx);
+idr_destroy(&ctx->irq_idr);
+/* reference to the AFU taken in ocxl_context_init */
+ocxl_afu_put(ctx->afu);
+kfree(ctx);
+
--- linux-4.15.0.orig/drivers/misc/ocxl/file.c
+++ linux-4.15.0/drivers/misc/ocxl/file.c
@@ -0,0 +1,541 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+#include <linux/fs.h>
+#include <linux/poll.h>
+#include <linux/sched/signal.h>
+#include <linux/uaccess.h>
+#include <uapi/misc/ocxl.h>
+#include <asm/reg.h>
+#include <asm/switch_to.h>
+#include "ocxl_internal.h"
+
+/
+#define OCXL_NUM_MINORS 256 /* Total to reserve */
+static dev_t oclxl_dev;
+static struct class *oclxl_class;
+static struct mutex minors_idr_lock;
+static struct idr minors_idr;
+
+static struct ocxl_afu *find_and_get_afu(dev_t devno)
+{
+struct ocxl_afu *afu;
+int afu_minor;
+
+afu_minor = MINOR(devno);
+/
+ /* We don't declare an RCU critical section here, as our AFU
+ is protected by a reference counter on the device. By the time the
+ minor number of a device is removed from the idr, the ref count of
+ the device is already at 0, so no user API will access that AFU and
+ this function can't return it.
+ */
+afu = idr_find(&minors_idr, afu_minor);
+if (afu)
+ocxl_afu_get(afu);
+return afu;
+}
+
+static int allocate_afu_minor(struct ocxl_afu *afu)
+{
+int minor;
+
+mutex_lock(&minors_idr_lock);
+minor = idr_alloc(&minors_idr, afu, 0, OCXL_NUM_MINORS, GFP_KERNEL);
+mutex_unlock(&minors_idr_lock);
+return minor;
+}
+
+static void free_afu_minor(struct ocxl_afu *afu)
+{
+mutex_lock(&minors_idr_lock);
+idr_remove(&minors_idr, MINOR(afu->dev.devt));
+mutex_unlock(&minors_idr_lock);
+}
+
+static int afu_open(struct inode *inode, struct file *file)
+{
+struct ocxl_afu *afu;
+struct ocxl_context *ctx;
+int rc;
+
+pr_debug("%s for device %x\n", __func__, inode->i_rdev);
+afu = find_and_get_afu(inode->i_rdev);
+if (!afu)
+return -ENODEV;
+
+ctx = ocxl_context_alloc();
+if (!ctx) {
+rc = -ENOMEM;
+goto put_afu;
+}
+
+rc = ocxl_context_init(ctx, afu, inode->i_mapping);
+if (rc)
+goto put_afu;
+file->private_data = ctx;
+ocxl_afu_put(afu);
+return 0;
+
+put_afu:
+ocxl_afu_put(afu);
+return rc;
+}
+
+static long afu_ioctl_attach(struct ocxl_context *ctx,
+struct ocxl_ioctl_attach __user *uarg)
+{
+struct ocxl_ioctl_attach arg;
+u64 amr = 0;
+int rc;
+
+pr_debug("%s for context %d
", __func__, ctx->pasid);
+
+if (copy_from_user(&arg, uarg, sizeof(arg)))
+return -EFAULT;
+
+/* Make sure reserved fields are not set for forward compatibility */
+if (arg.reserved1 || arg.reserved2 || arg.reserved3)
+return -EINVAL;
+
amr = arg.amr & mfspr(SPRN_UAMOR);
+rc = ocxl_context_attach(ctx, amr);
+return rc;
+}
+
+static long afu_ioctl_get_metadata(struct ocxl_context *ctx,
+struct ocxl_ioctl_metadata __user *uarg)
+{
+struct ocxl_ioctl_metadata arg;
+ memset(&arg, 0, sizeof(arg));
+ 
+ arg.version = 0;
+ 
+ arg.afu_version_major = ctx->afu->config.version_major;
+ arg.afu_version_minor = ctx->afu->config.version_minor;
+ arg.pasid = ctx->pasid;
+ arg.pp_mmio_size = ctx->afu->config.pp_mmio_stride;
+ arg.global_mmio_size = ctx->afu->config.global_mmio_size;
+ 
+ if (copy_to_user(uarg, &arg, sizeof(arg)))
+ return -EFAULT;
+ 
+ return 0;
+
+
+#ifdef CONFIG_PPC64
+ static long afu_ioctl_enable_p9_wait(struct ocxl_context *ctx,
+ struct ocxl_ioctl_p9_wait __user *uarg)
+ {
+ struct ocxl_ioctl_p9_wait arg;
+ 
+ memset(&arg, 0, sizeof(arg));
+ 
+ if (cpu_has_feature(CPU_FTR_P9_TIDR)) {
+ enum ocxl_context_status status;
+ 
+ // Locks both status & tidr
+ mutex_lock(&ctx->status_mutex);
+ if (!ctx->tidr) {
+ if (set_thread_tidr(current)) {
+ mutex_unlock(&ctx->status_mutex);
+ return -ENOENT;
+ }
+ 
+ ctx->tidr = current->thread.tidr;
+ }
+ 
+ status = ctx->status;
+ mutex_unlock(&ctx->status_mutex);
+ 
+ if (status == ATTACHED) {
+ int rc;
+ struct link *link = ctx->afu->fn->link;
+ 
+ rc = ocxl_link_update_pe(link, ctx->pasid, ctx->tidr);
+ if (rc)
+return rc;
+
+arg.thread_id = ctx->tidr;
+} else
+return -ENOENT;
+
+if (copy_to_user(uarg, &arg, sizeof(arg)))
+return -EFAULT;
+
+return 0;
+
+}
+
+static long afu_ioctl_get_features(struct ocxl_context *ctx,
+struct ocxl_ioctl_features __user *uarg)
+{
+struct ocxl_ioctl_features arg;
+
+memset(&arg, 0, sizeof(arg));
+
+#ifdef CONFIG_PPC64
+if (cpu_has_feature(CPU_FTR_P9_TIDR))
+arg.flags[0] |= OCXL_IOCTL_FEATURES_FLAGS0_P9_WAIT;
+#endif
+
+if (copy_to_user(uarg, &arg, sizeof(arg)))
+return -EFAULT;
+
+return 0;
+
+#define CMD_STR(x) (x == OCXL_IOCTL_ATTACH ? "ATTACH" : \
+x == OCXL_IOCTL_IRQ_ALLOC ? "IRQ_ALLOC" : \
+x == OCXL_IOCTL_IRQ_FREE ? "IRQ_FREE" : \
+x == OCXL_IOCTL_IRQ_SET_FD ? "IRQ_SET_FD" : \
+x == OCXL_IOCTL_GET_METADATA ? "GET_METADATA" : \
+x == OCXL_IOCTL_ENABLE_P9_WAIT ? "ENABLE_P9_WAIT" : \
+x == OCXL_IOCTL_GET_FEATURES ? "GET_FEATURES" : \
+"UNKNOWN")
+
+static long afu_ioctl(struct file *file, unsigned int cmd,
+unsigned long args)
+{
+struct ocxl_context *ctx = file->private_data;
+struct ocxl_ioctl_irq_fd irq_fd;
+u64 irq_offset;

---

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long rc;
+pr_debug("%s for context %d, command %s\n", __func__, ctx->pasid,
+CMD_STR(cmd));
+
+if (ctx->status == CLOSED)
+return -EIO;
+
+switch (cmd) {
+case OCXL_IOCTL_ATTACH:
+rc = afu_ioctl_attach(ctx, (struct ocxl_ioctl_attach __user *) args);
+break;
+
+case OCXL_IOCTL_IRQ_ALLOC:
+rc = ocxl_afu_irq_alloc(ctx, &irq_offset);
+if (!rc) {
+rc = copy_to_user((u64 __user *) args, &irq_offset,
+sizeof(irq_offset));
+if (rc) {
+ocxl_afu_irq_free(ctx, irq_offset);
+return -EFAULT;
+}
+}
+break;
+
+case OCXL_IOCTL_IRQ_FREE:
+rc = copy_from_user(&irq_offset, (u64 __user *) args,
+sizeof(irq_offset));
+if (rc)
+return -EFAULT;
+rc = ocxl_afu_irq_free(ctx, irq_offset);
+break;
+
+case OCXL_IOCTL_IRQ_SET_FD:
+rc = copy_from_user(&irq_fd, (u64 __user *) args,
+sizeof(irq_fd));
+if (rc)
+return -EFAULT;
+rc = ocxl_afu_irq_set_fd(ctx, irq_fd.irq_offset,
+irq_fd.eventfd);
+break;
+
+case OCXL_IOCTL_GET_METADATA:
+rc = afu_ioctl_get_metadata(ctx,
+struct ocxl_ioctl_metadata __user *) args);
break;
+
+#ifdef CONFIG_PPC64
+case OCXL_IOCTL_ENABLE_P9_WAIT:
+rc = afu_ioctl_enable_p9_wait(ctx,
+(struct ocxl_ioctl_p9_wait __user *) args);
+break;
+#endif
+
+case OCXL_IOCTL_GET_FEATURES:
+rc = afu_ioctl_get_features(ctx,
+(struct ocxl_ioctl_features __user *) args);
+break;
+
+default:
+rc = -EINVAL;
+
+return rc;
+
+static long afu_compat_ioctl(struct file *file, unsigned int cmd,
+unsigned long args)
+{
+return afu_ioctl(file, cmd, args);
+}
+
+static int afu_mmap(struct file *file, struct vm_area_struct *vma)
+{
+struct ocxl_context *ctx = file->private_data;
+
+pr_debug("%s for context %d\n", __func__, ctx->pasid);
+
+return ocxl_context_mmap(ctx, vma);
+}
+
+static bool has_xsl_error(struct ocxl_context *ctx)
+{
+bool ret;
+
+mutex_lock(&ctx->xsl_error_lock);
+ret = !!ctx->xsl_error.addr;
+mutex_unlock(&ctx->xsl_error_lock);
+
+return ret;
+}
+
+ /* Are there any events pending on the AFU
+ * ctx: The AFU context
+ * Returns: true if there are events pending
+ */
+static bool afu_events_pending(struct ocxl_context *ctx)
+{
+if (has_xsl_error(ctx))
+return true;
+return false;
+}
+
+static unsigned int afu_poll(struct file *file, struct poll_table_struct *wait)
+{
+struct ocxl_context *ctx = file->private_data;
+unsigned int mask = 0;
+bool closed;
+
+pr_debug("%s for context %d\n", __func__, ctx->pasid);
+
poll_wait(file, &ctx->events_wq, wait);
+
+mutex_lock(&ctx->status_mutex);
+closed = (ctx->status == CLOSED);
+mutex_unlock(&ctx->status_mutex);
+
+if (afu_events_pending(ctx))
+mask = POLLIN | POLLRDNORM;
+else if (closed)
+mask = POLLERR;
+
+return mask;
+}
+
+/*
+ * Populate the supplied buffer with a single XSL error
+ * ctx:
The AFU context to report the error from
+ * header: the event header to populate
+ * buf: The buffer to write the body into (should be at least
+ *  AFU_EVENT_BODY_XSL_ERROR_SIZE)
+ * Return: the amount of buffer that was populated
+ */
+static ssize_t append_xsl_error(struct ocxl_context *ctx,
+struct ocxl_kernel_event_header *header,
+char __user *buf)
+{
+struct ocxl_kernel_event_xsl_fault_error body;
+
+memset(&body, 0, sizeof(body));
+
+mutex_lock(&ctx->xsl_error_lock);
if (!ctx->xsl_error.addr) {
    mutex_unlock(&ctx->xsl_error_lock);
    return 0;
}

body.addr = ctx->xsl_error.addr;
body.dsisr = ctx->xsl_error.dsisr;
body.count = ctx->xsl_error.count;

ctx->xsl_error.addr = 0;
ctx->xsl_error.dsisr = 0;
ctx->xsl_error.count = 0;

mutex_unlock(&ctx->xsl_error_lock);

header->type = OCXL_AFU_EVENT_XSL_FAULT_ERROR;

if (copy_to_user(buf, &body, sizeof(body)))
    return -EFAULT;

return sizeof(body);
}

#define AFU_EVENT_BODY_MAX_SIZE sizeof(struct ocxl_kernel_event_xsl_fault_error)

/*
 * Reports events on the AFU
 * Format:
 * 	Header (struct ocxl_kernel_event_header)
 * 	Body (struct ocxl_kernel_event_*)
 * 	Header...
 */
static ssize_t afu_read(struct file *file, char __user *buf, size_t count,
                         loff_t *off)
{
    struct ocxl_context *ctx = file->private_data;
    struct ocxl_kernel_event_header header;
    ssize_t rc;
    ssize_t used = 0;
    DEFINE_WAIT(event_wait);

    memset(&header, 0, sizeof(header));

    /* Require offset to be 0 */
    if (*off != 0)
        return -EINVAL;

    if (count < (sizeof(struct ocxl_kernel_event_header) +


+AFU_EVENT_BODY_MAX_SIZE))
+return -EINVAL;
+
+for (;;) {
+prepare_to_wait(&ctx->events_wq, &event_wait, 
+TASK_INTERRUPTIBLE);
+
+if (afu_events_pending(ctx))
+break;
+
+if (ctx->status == CLOSED)
+break;
+
+if (file->f_flags & O_NONBLOCK) {
+finish_wait(&ctx->events_wq, &event_wait);
+return -EAGAIN;
+}
+
+if (signal_pending(current)) {
+finish_wait(&ctx->events_wq, &event_wait);
+return -ERESTARTSYS;
+}
+
+schedule();
+}
+
+finish_wait(&ctx->events_wq, &event_wait);
+
+if (has_xsl_error(ctx)) {
+used = append_xsl_error(ctx, &header, buf + sizeof(header));
+if (used < 0)
+return used;
+}
+
+if (!afu_events_pending(ctx))
+header.flags |= OCXL_KERNEL_EVENT_FLAG_LAST;
+
+if (copy_to_user(buf, &header, sizeof(header)))
+return -EFAULT;
+
+used += sizeof(header);
+rc = used;
+return rc;
+}
+
+static int afu_release(struct inode *inode, struct file *file)
struct ocxl_context *ctx = file->private_data;
int rc;

pr_debug("%s for device %x\n", __func__, inode->i_rdev);
rc = ocxl_context_detach(ctx);
mutex_lock(&ctx->mapping_lock);
ctx->mapping = NULL;
mutex_unlock(&ctx->mapping_lock);
wake_up_all(&ctx->events_wq);
if (rc != -EBUSY)
ocxl_context_free(ctx);
return 0;
}

static const struct file_operations ocxl_afu_fops = {
.owner		= THIS_MODULE,
.open           = afu_open,
.unlocked_ioctl = afu_ioctl,
.compat_ioctl   = afu_compat_ioctl,
.mmap           = afu_mmap,
.poll           = afu_poll,
.read           = afu_read,
.release        = afu_release,
};

int ocxl_create_cdev(struct ocxl_afu *afu)
{
int rc;

cdev_init(&afu->cdev, &ocxl_afu_fops);
rc = cdev_add(&afu->cdev, afu->dev.devt, 1);
if (rc) {
dev_err(&afu->dev, "Unable to add afu char device: \%d\n", rc);
return rc;
}
return 0;
}

void ocxl_destroy_cdev(struct ocxl_afu *afu)
{
cdev_del(&afu->cdev);
}

int ocxl_register_afu(struct ocxl_afu *afu)
{
int minor;

minor = allocate_afu_minor(afu);
+if (minor < 0)
+    return minor;
+afu->dev.devt = MKDEV(MAJOR(ocxl_dev), minor);
+afu->dev.class = ocxl_class;
+return device_register(&afu->dev);
+
+void ocxl_unregister_afu(struct ocxl_afu *afu)
+{
+    free_afu_minor(afu);
+}
+
+static char *ocxl_devnode(struct device *dev, umode_t *mode)
+{
+    return kasprintf(GFP_KERNEL, "ocxl/%s", dev_name(dev));
+}
+
+int ocxl_file_init(void)
+{
+    int rc;
+    mutex_init(&minors_idr_lock);
+    idr_init(&minors_idr);
+    rc = alloc_chrdev_region(&ocxl_dev, 0, OCXL_NUM_MINORS, "ocxl");
+    if (rc) {
+        pr_err("Unable to allocate ocxl major number: %d\n", rc);
+        return rc;
+    }
+    ocxl_class = class_create(THIS_MODULE, "ocxl");
+    if (!is_ERR(ocxl_class)) {
+        pr_err("Unable to create ocxl class\n");
+        unregister_chrdev_region(ocxl_dev, OCXL_NUM_MINORS);
+        return PTR_ERR(ocxl_class);
+    }
+    ocxl_class->devnode = ocxl_devnode;
+    return 0;
+}
+
+void ocxl_file_exit(void)
+{
+    class_destroy(ocxl_class);
+    unregister_chrdev_region(ocxl_dev, OCXL_NUM_MINORS);
+    idr_destroy(&minors_idr);
+}

--- linux-4.15.0.orig/drivers/misc/ocxl/link.c
+++ linux-4.15.0/drivers/misc/ocxl/link.c
@ @ -0.0 +1,689 @ @
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+/#include <linux/sched/mm.h>
+/#include <linux/mutex.h>
+/#include <linux/mmu_context.h>
+/#include <asm/copro.h>
+/#include <asm/pnv-ocxl.h>
+/#include <misc/ocxl.h>
+/#include "ocxl_internal.h"
+/#include "trace.h"
+
+#define SPA_PASID_BITS	15
+#define SPA_PASID_MAX	((1 << SPA_PASID_BITS) - 1)
+#define SPA_PE_MASK	SPA_PASID_MAX
+#define SPA_SPA_SIZE_LOG	22 /* Each SPA is 4 Mb */
+
+#define SPA_CFG_SF	(1ull << (63-0))
+#define SPA_CFG_TA	(1ull << (63-1))
+#define SPA_CFG_HV	(1ull << (63-3))
+#define SPA_CFG_UV	(1ull << (63-4))
+#define SPA_CFG_XLAT_hpt(0ull << (63-6)) /* Hashed page table (HPT) mode */
+#define SPA_CFG_XLAT_roh(2ull << (63-6)) /* Radix on HPT mode */
+#define SPA_CFG_XLATror(3ull << (63-6)) /* Radix on Radix mode */
+#define SPA_CFG_PR	(1ull << (63-49))
+#define SPA_CFG_TC	(1ull << (63-54))
+#define SPA_CFG_DR	(1ull << (63-59))
+
+#define SPA_XSL_TF	(1ull << (63-3)) /* Translation fault */
+#define SPA_XSL_S	(1ull << (63-38)) /* Store operation */
+
+#define SPA_PE_VALID	0x80000000
+
+
+struct pe_data {
+  struct mm_struct *mm;
+  /* callback to trigger when a translation fault occurs */
+  void (*xsl_err_cb)(void *data, u64 addr, u64 dsisr);
+  /* opaque pointer to be passed to the above callback */
+  void *xsl_err_data;
+  struct rcu_head rcu;
+};
+
+struct spa {
+  struct ocxl_process_element *spa_mem;
+  int spa_order;
+}
+struct mutex spa_lock;
+struct radix_tree_root pe_tree; /* Maps PE handles to pe_data */
+char *irq_name;
+int virq;
+void __iomem *reg_dsisr;
+void __iomem *reg_dar;
+void __iomem *reg_tfc;
+void __iomem *reg_pe_handle;
+/
+ * The following field are used by the memory fault
+ * interrupt handler. We can only have one interrupt at a
+ * time. The NPU won't raise another interrupt until the
+ * previous one has been ack'd by writing to the TFC register
+ */
+struct xsl_fault {
+struct work_struct fault_work;
+u64 pe;
+u64 dsisr;
+u64 dar;
+struct pe_data pe_data;
+} xsl_fault;
+};
+
+/*
+ * A opencapi link can be used by several PCI functions. We have
+ * one link per device slot.
+ *
+ * A linked list of opencapi links should suffice, as there's a
+ * limited number of opencapi slots on a system and lookup is only
+ * done when the device is probed
+ */
+struct link {
+struct list_head list;
+struct kref ref;
+int domain;
+int bus;
+int dev;
+atomic_t irq_available;
+struct spa *spa;
+void *platform_data;
+};
+static struct list_head links_list = LIST_HEAD_INIT(links_list);
+static DEFINE_MUTEX(links_list_lock);
+
+enum xsl_response {
+CONTINUE,
+ADDRESS_ERROR,
+RESTART,
+static void read_irq(struct spa *spa, u64 *dsisr, u64 *dar, u64 *pe)
+{
+u64 reg;
+
+*dsisr = in_be64(spa->reg_dsisr);
+*dar = in_be64(spa->reg_dar);
+reg = in_be64(spa->reg_pe_handle);
+*pe = reg & SPA_PE_MASK;
+} 
+
+static void ack_irq(struct spa *spa, enum xsl_response r)
+{
+u64 reg = 0;
+
+/* continue is not supported */
+if (r == RESTART)
+reg = PPC_BIT(31);
+else if (r == ADDRESS_ERROR)
+reg = PPC_BIT(30);
+else
+WARN(1, "Invalid irq response %d\n", r);
+ 
+if (reg) {
+trace_ocxl_fault_ack(spa->spa_mem, spa->xsl_fault.pe,
+spa->xsl_fault.dsisr, spa->xsl_fault.dar, reg);
+out_be64(spa->reg_tfc, reg);
+} 
+
+
+static void xsl_fault_handler_bh(struct work_struct *fault_work)
+{
+unsigned int flt = 0;
+unsigned long access, flags, inv_flags = 0;
+enum xsl_response r;
+struct xsl_fault *fault = container_of(fault_work, struct xsl_fault,
+fault_work);
+struct spa *spa = container_of(fault, struct spa, xsl_fault);
+
+int rc;
+
+/*
+ * We must release a reference on mm_users whenever exiting this
+ * function (taken in the memory fault interrupt handler)
+ */
+rc = copro_handle_mm_fault(fault->pe_data.mm, fault->dar, fault->dsisr,
+&if (rc) {
+pr_debug("copro_handle_mm fault failed: %d\n", rc);
+if (fault->pe_data.xsl_err_cb) {
+fault->pe_data.xsl_err_cb(
+fault->pe_data.xsl_err_data,
+fault->dar, fault->dsisr);
+}
+r = ADDRESS_ERROR;
+goto ack;
+}
+
+if (!radix_enabled()) {
+/*
+ * update_mmu_cache() will not have loaded the hash
+ * since current->trap is not a 0x400 or 0x300, so
+ * just call hash_page_mm() here.
+ */
+access = _PAGE_PRESENT | _PAGE_READ;
+if (fault->dsisr & SPA_XSL_S)
+access |= _PAGE_WRITE;
+
+if (REGION_ID(fault->dar) != USER_REGION_ID)
+access |= _PAGE_PRIVILEGED;
+
+local_irq_save(flags);
+hash_page_mm(fault->pe_data.mm, fault->dar, access, 0x300,
+inv_flags);
+local_irq_restore(flags);
+}
+r = RESTART;
+ack:
+mmput(fault->pe_data.mm);
+ack_irq(spa, r);
+}
+
+static irqreturn_t xsl_fault_handler(int irq, void *data)
+
+struct link *link = (struct link *) data;
+struct spa *spa = link->spa;
+u64 dsisr, dar, pe_handle;
+struct pe_data *pe_data;
+struct ocxl_process_element *pe;
+int lpid, pid, tid;
+bool schedule = false;
+
+read_irq(spa, &dsisr, &dar, &pe_handle);
+trace_ocxl_fault(spa->spa_mem, pe_handle, dsisr, dar, -1);
+WARN_ON(pe_handle > SPA_PE_MASK);
+pe = spa->spa_mem + pe_handle;
+lpid = be32_to_cpu(pe->lpid);
+pid = be32_to_cpu(pe->pid);
+tid = be32_to_cpu(pe->tid);
+/* We could be reading all null values here if the PE is being
+ removed while an interrupt kicks in. It's not supposed to
+ happen if the driver notified the AFU to terminate the
+ PASID, and the AFU waited for pending operations before
+ acknowledging. But even if it happens, we won't find a
+ memory context below and fail silently, so it should be ok.
+ */
+if (!(dsisr & SPA_XSL_TF)) {
+WARN(1, "Invalid xsl interrupt fault register %#llx\n", dsisr);
+ack_irq(spa, ADDRESS_ERROR);
+returnIRQ_HANDLED;
+}
+
+rcu_read_lock();
+pe_data = radix_tree_lookup(&spa->pe_tree, pe_handle);
+if (!pe_data) {
+/*
+ * Could only happen if the driver didn't notify the
+ * AFU about PASID termination before removing the PE,
+ * or the AFU didn't wait for all memory access to
+ * have completed.
+ * Either way, we fail early, but we shouldn't log an
+ * error message, as it is a valid (if unexpected)
+ * scenario
+ */
+rcu_read_unlock();
+pr_debug("Unknown mm context for xsl interrupt\n");
+ack_irq(spa, ADDRESS_ERROR);
+return IRQ_HANDLED;
+}
+WARN_ON(pe_data->mm->context.id != pid);
+
+if (mmget_not_zero(pe_data->mm)) {
+spa->xsl_fault.pe = pe_handle;
+spa->xsl_fault.dar = dar;
+spa->xsl_fault.dsisr = dsisr;
+spa->xsl_fault.pe_data = *pe_data;
+schedule = true;
+/* mm_users count released by bottom half */
+}
+rcu_read_unlock();
if (schedule)
+schedule_work(&spa->xsl_fault.fault_work);
+else
+ack_irq(spa, ADDRESS_ERROR);
+return IRQ_HANDLED;
+
+static void unmap_irq_registers(struct spa *spa)
+
+{+nv_ocxl_unmap_xsl_regs(spa->reg_dsisr, spa->reg_dar, spa->reg_tfc,+spa->reg_pe_handle);+
+}
+
+static int map_irq_registers(struct pci_dev *dev, struct spa *spa)
+
+{+return nv_ocxl_map_xsl_regs(dev, &spa->reg_dsisr, &spa->reg_dar,+&spa->reg_tfc, &spa->reg_pe_handle);+
+}
+
+static int setup_xsl_irq(struct pci_dev *dev, struct link *link)
+
+{+struct spa *spa = link->spa;+
+int rc;+
+int hwirq;+
+rc = nv_ocxl_get_xsl_irq(dev, &hwirq);+
+if (rc)
+return rc;+
+rc = map_irq_registers(dev, spa);+
+if (rc)
+return rc;+
+spa->irq_name = kasprintf(GFP_KERNEL, "ocxl-xsl-%x-%x-%x",+
+link->domain, link->bus, link->dev);+
+if (!spa->irq_name) {
+unmap_irq_registers(spa);+
dev_err(&dev->dev, "Can't allocate name for xsl interrupt\n");+
return -ENOMEM;+
}+
*/+
* At some point, we'll need to look into allowing a higher+
* number of interrupts. Could we have an IRQ domain per link?+
*/+
+spa->virq = irq_create_mapping(NULL, hwirq);+
+if (!spa->virq) {
+kfree(spa->irq_name);
+unmap_irq_registers(spa);
dev_err(&dev->dev,
"irq_create_mapping failed for translation interrupt\n"); return -EINVAL;
+
+dev_dbg(&dev->dev, "hwirq %d mapped to virq %d\n", hwirq, spa->virq);
+
+rc = request_irq(spa->virq, xsl_fault_handler, 0, spa->irq_name,
+link);
+if (rc) {
+irq_dispose_mapping(spa->virq);
+kfree(spa->irq_name);
+unmap_irq_registers(spa);
+dev_err(&dev->dev,
+"request_irq failed for translation interrupt: %d\n",
+rc);
+return -EINVAL;
+}
+return 0;
+
+static void release_xsl_irq(struct link *link)
+{
+struct spa *spa = link->spa;
+
+if (spa->virq) {
+free_irq(spa->virq, link);
+irq_dispose_mapping(spa->virq);
+}
+kfree(spa->irq_name);
+unmap_irq_registers(spa);
+
+static int alloc_spa(struct pci_dev *dev, struct link *link)
+{
+struct spa *spa;
+
+spa = kzalloc(sizeof(struct spa), GFP_KERNEL);
+if (!spa)
+return -ENOMEM;
+mutex_init(&spa->spa_lock);
+INIT_RADDX_TREE(&spa->pe_tree, GFP_KERNEL);
+INIT_WORK(&spa->xsl_fault.fault_work, xsl_fault_handler_bh);
+
+spa->spa_order = SPA_SPA_SIZE_LOG - PAGE_SHIFT;
+spa->spa_mem = (struct ocxl_process_element *)
+__get_free_pages(GFP_KERNEL | __GFP_ZERO, spa->spa_order);
+if (!spa->spa_mem) {
+    dev_err(&dev->dev, "Can't allocate Shared Process Area\n");
+kfree(spa);
+    return -ENOMEM;
+}
+pr_debug("Allocated SPA for %x:%x:%x at %p\n", link->domain, link->bus,
+        dev, spa->spa_mem);
+
+    link->spa = spa;
+    return 0;
+
+static void free_spa(struct link *link)
+{
+    struct spa *spa = link->spa;
+
+    pr_debug("Freeing SPA for %x:%x:%x\n", link->domain, link->bus,
+        dev);
+
+    if (spa && spa->spa_mem) {
+        free_pages((unsigned long) spa->spa_mem, spa->spa_order);
+kfree(spa);
+        link->spa = NULL;
+    }
+
+}  
+
+static int alloc_link(struct pci_dev *dev, int PE_mask, struct link **out_link)
+{
+    struct link *link;
+    int rc;
+
+    link = kzalloc(sizeof(struct link), GFP_KERNEL);
+
+    if (!link)
+        return -ENOMEM;
+
+    kref_init(&link->ref);
+    link->domain = pci_domain_nr(dev->bus);
+    link->bus = dev->bus->number;
+    link->dev = PCI_SLOT(dev->devfn);
+    atomic_set(&link->irq_available, MAX_IRQ_PER_LINK);
+
+    rc = alloc_spa(dev, link);
+
+    if (rc)
+        goto err_free;
+
+    rc = setup_xsl_irq(dev, link);
+
+    if (rc)
+        goto err_spa;
# Open Source Used In 5GaaS Edge AC-4

```c
/* platform specific hook */
rc = pnv_ocxl_spa_setup(dev, link->spa->spa_mem, PE_mask, &link->platform_data);
if (rc)
    goto err_xsl_irq;
*out_link = link;
return 0;

err_xsl_irq:
release_xsl_irq(link);
err_spa:
free_spa(link);
err_free:
kfree(link);
return rc;
}

static void free_link(struct link *link)
{
    release_xsl_irq(link);
    free_spa(link);
kfree(link);
}

int ocxl_link_setup(struct pci_dev *dev, int PE_mask, void **link_handle)
{
    int rc = 0;
    struct link *link;

    mutex_lock(&links_list_lock);
    list_for_each_entry(link, &links_list, list) {
        /* The functions of a device all share the same link */
        if (link->domain == pci_domain_nr(dev->bus) &&
            link->bus == dev->bus->number &&
            link->dev == PCI_SLOT(dev->devfn)) {
            kref_get(&link->ref);
            *link_handle = link;
            goto unlock;
        }
    }
    rc = alloc_link(dev, PE_mask, &link);
    if (rc)
        goto unlock;
    list_add(&link->list, &links_list);
    *link_handle = link;
}
```

---

Open Source Used In 5GaaS Edge AC-4  23577
unlock:
mutex_unlock(&links_list_lock);
return rc;
+
EXPORT_SYMBOL_GPL(ocxl_link_setup);
+
static void release_xsl(struct kref *ref)
+
struct link *link = container_of(ref, struct link, ref);
+
list_del(&link->list);
/* call platform code before releasing data */
+pnv_ocxl_spa_release(link->platform_data);
+free_link(link);
+
void ocxl_link_release(struct pci_dev *dev, void *link_handle)
+
struct link *link = (struct link *) link_handle;
+
mutex_lock(&links_list_lock);
+kref_put(&link->ref, release_xsl);
+mutex_unlock(&links_list_lock);
+
EXPORT_SYMBOL_GPL(ocxl_link_release);
+
static u64 calculate_cfg_state(bool kernel)
+
u64 state;
+
= SPA_CFG_DR;
+if (mfspr(SPRN_LPCR) & LPCR_TC)
+state |= SPA_CFG_TC;
+if (radix_enabled())
+state |= SPA_CFG_XLAT_ror;
+else
+state |= SPA_CFG_XLAT_hpt;
+state |= SPA_CFG_HV;
+if (kernel) {
+if (mfmsr() & MSR_SF)
+state |= SPA_CFG_SF;
+} else {
+state |= SPA_CFG_PR;
+if (!test_tsk_thread_flag(current, TIF_32BIT))
+state |= SPA_CFG_SF;
+}
+return state;
+}
+int ocxl_link_add_pe(void *link_handle, int pasid, u32 pidr, u32 tidr,
+u64 amr, struct mm_struct *mm,
+void (*xsl_err_cb)(void *data, u64 addr, u64 dsisr),
+void *xsl_err_data)
+
+{ struct link *link = (struct link *) link_handle;
+struct spa *spa = link->spa;
+struct ocxl_process_element *pe;
+int pe_handle, rc = 0;
+struct pe_data *pe_data;
+
+BUILD_BUG_ON(sizeof(struct ocxl_process_element) != 128);
+if (pasid > SPA_PASID_MAX)
+return -EINVAL;
+
+mutex_lock(&spa->spa_lock);
+pe_handle = pasid & SPA_PE_MASK;
+pe = spa->spa_mem + pe_handle;
+
+if (pe->software_state) {
+rc = -EBUSY;
+goto unlock;
+}
+
+pe_data = kmalloc(sizeof(*pe_data), GFP_KERNEL);
+if (!pe_data) {
+rc = -ENOMEM;
+goto unlock;
+}
+
+pe_data->mm = mm;
+pe_data->xsl_err_cb = xsl_err_cb;
+pe_data->xsl_err_data = xsl_err_data;
+
+memset(pe, 0, sizeof(struct ocxl_process_element));
+pe->config_state = cpu_to_be64(calculate_cfg_state(pidr == 0));
+pe->lpid = cpu_to_be32(mfspr(SPRN_LPID));
+pe->pid = cpu_to_be32(pidr);
+pe->tid = cpu_to_be32(tidr);
+pe->amr = cpu_to_be64(amr);
+pe->software_state = cpu_to_be32(SPA_PE_VALID);
+
+mm_context_add_copro(mm);
+/*
+ * Barrier is to make sure PE is visible in the SPA before it
+ * is used by the device. It also helps with the global TLBI
+ * invalidation
+ *\n+ mb();
+ radix_tree_insert(&spa->pe_tree, pe_handle, pe_data);
+ *
+ */
+ * The mm must stay valid for as long as the device uses it. We
+ * lower the count when the context is removed from the SPA.
+ *
+ * We grab mm_count (and not mm_users), as we don’t want to
+ * end up in a circular dependency if a process mmaps its
+ * mmio, therefore incrementing the file ref count when
+ * calling mmap(), and forgets to unmap before exiting. In
+ * that scenario, when the kernel handles the death of the
+ * process, the file is not cleaned because unmap was not
+ * called, and the mm wouldn’t be freed because we would still
+ * have a reference on mm_users. Incrementing mm_count solves
+ * the problem.
+ */
+ mmgrab(mm);
+ trace_ocxl_context_add(current->pid, spa->spa_mem, pasid, pidr, tidr);
+ unlock:
+ mutex_unlock(&spa->spa_lock);
+ return rc;
+
+EXPORT_SYMBOL_GPL(ocxl_link_add_pe);
+
+int ocxl_link_update_pe(void *link_handle, int pasid, __u16 tid)
+{
+ struct link *link = (struct link *) link_handle;
+ struct spa *spa = link->spa;
+ struct oclx_process_element *pe;
+ int pe_handle, rc;
+ +
+ if (pasid > SPA_PASID_MAX)
+ return -EINVAL;
+ +
+ pe_handle = pasid & SPA_PE_MASK;
+ pe = spa->spa_mem + pe_handle;
+ +
+ mutex_lock(&spa->spa_lock);
+ +
+ pe->tid = cpu_to_be32(tid);
+ +
+ */
+ * The barrier makes sure the PE is updated
+ * before we clear the NPU context cache below, so that the
+ * old PE cannot be reloaded erroneously.
+ */
/* hook to platform code
   * On powerpc, the entry needs to be cleared from the context
   * cache of the NPU.
   */
rc = pnv_ocxl_spa_remove_pe_from_cache(link->platform_data, pe_handle);
WARN_ON(rc);

mutex_unlock(&spa->spa_lock);
return rc;
}

int ocxl_link_remove_pe(void *link_handle, int pasid)
{
    struct link *link = (struct link *) link_handle;
    struct spa *spa = link->spa;
    struct ocxl_process_element *pe;
    struct pe_data *pe_data;
    int pe_handle, rc;

    if (pasid > SPA_PASID_MAX)
        return -EINVAL;

    /* About synchronization with our memory fault handler:
       * Before removing the PE, the driver is supposed to have
       * notified the AFU, which should have cleaned up and make
       * sure the PASID is no longer in use, including pending
       * interrupts. However, there's no way to be sure...
       * We clear the PE and remove the context from our radix
       * tree. From that point on, any new interrupt for that
       * context will fail silently, which is ok. As mentioned
       * above, that's not expected, but it could happen if the
       * driver or AFU didn't do the right thing.
       * There could still be a bottom half running, but we don't
       * need to wait/flush, as it is managing a reference count on
       * the mm it reads from the radix tree.
       */
    pe_handle = pasid & SPA_PE_MASK;
    pe = spa->spa_mem + pe_handle;
    mutex_lock(&spa->spa_lock);

    /*
if (!(be32_to_cpu(pe->software_state) & SPA_PE_VALID)) {
    rc = -EINVAL;
    goto unlock;
}

trace_ocxl_context_remove(current->pid, spa->spa_mem, pasid,
    be32_to_cpu(pe->pid), be32_to_cpu(pe->tid));

memset(pe, 0, sizeof(struct ocxl_process_element));

/*
 * The barrier makes sure the PE is removed from the SPA
 * before we clear the NPU context cache below, so that the
 * old PE cannot be reloaded erroneously.
 */
mb();

/*
 * hook to platform code
 * On powerpc, the entry needs to be cleared from the context
 * cache of the NPU.
 */
rc = pnv_ocxl_spa_remove_pe_from_cache(link->platform_data, pe_handle);
WARN_ON(rc);

pe_data = radix_tree_delete(&spa->pe_tree, pe_handle);
if (!pe_data) {
    WARN(1, "Couldn't find pe data when removing PE\n");
} else {
    mm_context_remove_copro(pe_data->mm);
    mmdrop(pe_data->mm);
    kfree_rcu(pe_data, rcu);
}
unlock:
mutex_unlock(&spa->spa_lock);
return rc;
}
EXPORT_SYMBOL_GPL(ocxl_link_remove_pe);

int ocxl_link_irq_alloc(void *link_handle, int *hw_irq, u64 *trigger_addr)
{
    struct link *link = (struct link *) link_handle;
    int rc, irq;
    u64 addr;

    if (atomic_dec_if_positive(&link->irq_available) < 0)
        return -ENOSPC;

    rc = pnv_ocxl_alloc_xive_irq(&irq, &addr);
    if (rc)
        return rc;

    *link = (struct link *) link_handle;
    *hw_irq = irq;
    *trigger_addr = addr;

    if (atomic_dec_if_positive(&link->irq_available) < 0)
        return -ENOSPC;

    rc = pnv_ocxl_alloc_xive_irq(&hw_irq, &addr);
if (rc) {
    atomic_inc(&link->irq_available);
    return rc;
}

*hw_irq = irq;
*trigger_addr = addr;
return 0;
}

EXPORT_SYMBOL_GPL(ocxl_link_irq_alloc);

void ocxl_link_free_irq(void *link_handle, int hw_irq)
{
    struct link *link = (struct link *) link_handle;
    pnv_ocxl_free_xive_irq(hw_irq);
    atomic_inc(&link->irq_available);
}

EXPORT_SYMBOL_GPL(ocxl_link_free_irq);

//#include <linux/module.h>
//#include <linux/pci.h>
#include "ocxl_internal.h"

static int __init init_ocxl(void)
{
    int rc = 0;

    rc = ocxl_file_init();
    if (rc)
        return rc;

    rc = pci_register_driver(&ocxl_pci_driver);
    if (rc) {
        ocxl_file_exit();
        return rc;
    }

    return 0;
}

static void exit_ocxl(void)
{
    pci_unregister_driver(&ocxl_pci_driver);
    ocxl_file_exit();
+module_init(init_ocxl);
+module_exit(exit_ocxl);
+
+MODULE_DESCRIPTION("Open Coherent Accelerator");
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/misc/ocxl/ocxl_internal.h
+++ linux-4.15.0/drivers/misc/ocxl/ocxl_internal.h
@@ -0,0 +1,132 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+#ifndef _OCXL_INTERNAL_H_
+#define _OCXL_INTERNAL_H_
+
+#include <linux/pci.h>
+#include <linux/cdev.h>
+#include <linux/list.h>
+#include <misc/ocxl.h>
+
+#define MAX_IRQ_PER_LINK 2000
+#define MAX_IRQ_PER_CONTEXT MAX_IRQ_PER_LINK
+
+#define to_ocxl_function(d) container_of(d, struct ocxl_fn, dev)
+#define to_ocxl_afu(d) container_of(d, struct ocxl_afu, dev)
+
+extern struct pci_driver ocxl_pci_driver;
+
+
+struct ocxl_fn {
+struct device dev;
+int bar_used[3];
+struct ocxl_fn_config config;
+struct list_head afu_list;
+int pasid_base;
+int actag_base;
+int actag_enabled;
+int actag_supported;
+struct list_head pasid_list;
+struct list_head actag_list;
+void *link;
+};
+
+struct ocxl_afu {
+struct ocxl_fn *fn;
+struct list_head list;
+struct device dev;
+struct cdev cdev;
struct ocxl_afu_config {
    int pasid_base;
    int pasid_count; /* opened contexts */
    int pasid_max; /* maximum number of contexts */
    int actag_base;
    int actag_enabled;
    struct mutex contexts_lock;
    struct idr contexts_idr;
    struct mutex afu_control_lock;
    u64 global_mmio_start;
    u64 irq_base_offset;
    void __iomem *global_mmio_ptr;
    u64 pp_mmio_start;
    struct bin_attribute attr_global_mmio;
};

enum ocxl_context_status {
    CLOSED,
    OPENED,
    ATTACHED,
};

// Contains metadata about a translation fault
struct ocxl_xsl_error {
    u64 addr; // The address that triggered the fault
    u64 dsisr; // the value of the dsisr register
    u64 count; // The number of times this fault has been triggered
};

struct ocxl_context {
    struct ocxl_afu *afu;
    int pasid;
    struct mutex status_mutex;
    enum ocxl_context_status status;
    struct address_space *mapping;
    struct mutex mapping_lock;
    wait_queue_head_t events_wq;
    struct mutex xsl_error_lock;
    struct ocxl_xsl_error xsl_error;
    struct mutex irq_lock;
    struct idr irq_idr;
    u16 tidr; // Thread ID used for P9 wait implementation
};

struct ocxl_process_element {
    __be64 config_state;
    __be32 reserved1[11];
    __be32 lpid;
}
__be32 tid;
__be32 pid;
__be32 reserved2[10];
__be64 amr;
__be32 reserved3[3];
__be32 software_state;
}{


extern struct ocxl_afu *ocxl_afu_get(struct ocxl_afu *afu);
extern void ocxl_afu_put(struct ocxl_afu *afu);

extern int ocxl_create_cdev(struct ocxl_afu *afu);
extern void ocxl_destroy_cdev(struct ocxl_afu *afu);
extern int ocxl_register_afu(struct ocxl_afu *afu);
extern void ocxl_unregister_afu(struct ocxl_afu *afu);

extern int ocxl_file_init(void);
extern void ocxl_file_exit(void);

extern int ocxl_pasid_afu_alloc(struct ocxl_fn *fn, u32 size);
extern void ocxl_pasid_afu_free(struct ocxl_fn *fn, u32 start, u32 size);
extern int ocxl_actag_afu_alloc(struct ocxl_fn *fn, u32 size);
extern void ocxl_actag_afu_free(struct ocxl_fn *fn, u32 start, u32 size);

extern struct ocxl_context *ocxl_context_alloc(void);
extern int ocxl_context_init(struct ocxl_context *ctx, struct ocxl_afu *afu,
struct address_space *mapping);
extern int ocxl_context_attach(struct ocxl_context *ctx, u64 amr);
extern int ocxl_context_mmap(struct ocxl_context *ctx,
struct vm_area_struct *vma);
extern int ocxl_context_detach(struct ocxl_context *ctx);
extern void ocxl_contextDetach_all(struct ocxl_afu *afu);
extern void ocxl_context_free(struct ocxl_context *ctx);

extern int ocxl_sysfs_add_afu(struct ocxl_afu *afu);
extern void ocxl_sysfs_remove_afu(struct ocxl_afu *afu);

extern int ocxl_afu_irq_alloc(struct ocxl_context *ctx, u64 *irq_offset);
extern int ocxl_afu_irq_free(struct ocxl_context *ctx, u64 irq_offset);
extern void ocxl_afu_irq_free_all(struct ocxl_context *ctx);
extern int ocxl_afu_irq_set_fd(struct ocxl_context *ctx, u64 irq_offset,
int eventfd);
extern u64 ocxl_afu_irq_get_addr(struct ocxl_context *ctx, u64 irq_offset);

#endif /* _OCXL_INTERNAL_H_ */
--- linux-4.15.0.orig/drivers/misc/ocxl/pasid.c
+++ linux-4.15.0/drivers/misc/ocxl/pasid.c
@@ -0,0 +1,107 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+#include "ocxl_internal.h"
+
+
+struct id_range {
+struct list_head list;
+u32 start;
+u32 end;
+};
+
+#ifdef DEBUG
+static void dump_list(struct list_head *head, char *type_str)
+{
+struct id_range *cur;
+
+pr_debug("%s ranges allocated:\n", type_str);
+list_for_each_entry(cur, head, list) {
+pr_debug("Range %d->%d\n", cur->start, cur->end);
+}
+}
+#endif
+
+static int range_alloc(struct list_head *head, u32 size, int max_id,
+char *type_str)
+{
+struct list_head *pos;
+struct id_range *cur, *new;
+int rc, last_end;
+
+new = kmalloc(sizeof(struct id_range), GFP_KERNEL);
+if (!new)
+return -ENOMEM;
+
pos = head;
+last_end = -1;
+list_for_each_entry(cur, head, list) {
+if ((cur->start - last_end) > size)
+break;
+last_end = cur->end;
+pos = &cur->list;
+}
+
+new->start = last_end + 1;
+new->end = new->start + size - 1;
+
+if (new->end > max_id) {
kfree(new);
rc = -ENOSPC;
} else {
list_add(&new->list, pos);
rc = new->start;
}

#ifdef DEBUG
dump_list(head, type_str);
#endif
return rc;
}

static void range_free(struct list_head *head, u32 start, u32 size,
char *type_str)
{
bool found = false;
struct id_range *cur, *tmp;

list_for_each_entry_safe(cur, tmp, head, list) {
if (cur->start == start && cur->end == (start + size - 1)) {
found = true;
list_del(&cur->list);
kfree(cur);
break;
}
}
WARN_ON(!found);
#ifdef DEBUG
dump_list(head, type_str);
#endif
}

int ocxl_pasid_afu_alloc(struct ocxl_fn *fn, u32 size)
{
int max_pasid;

if (fn->config.max_pasid_log < 0)
return -ENOSPC;
max_pasid = 1 << fn->config.max_pasid_log;
return range_alloc(&fn->pasid_list, size, max_pasid, "afu pasid");
}

void ocxl_pasid_afu_free(struct ocxl_fn *fn, u32 start, u32 size)
{
return range_free(&fn->pasid_list, start, size, "afu pasid");
}
```c
#include <linux/module.h>
#include <linux/pci.h>
#include <linux/idr.h>
#include <asm/pnv-ocxl.h>
#include "ocxl_internal.h"

/*
 * Any opencapi device which wants to use this 'generic' driver should
 * use the 0x062B device ID. Vendors should define the subsystem
 * vendor/device ID to help differentiate devices.
 */
static const struct pci_device_id ocxl_pci_tbl[] = {
	{ PCI_DEVICE(PCI_VENDOR_ID_IBM, 0x062B), },

MODULE_DEVICE_TABLE(pci, ocxl_pci_tbl);

static struct ocxl_fn *ocxl_fn_get(struct ocxl_fn *fn)
{
	return (get_device(&fn->dev) == NULL) ? NULL : fn;
}

static void ocxl_fn_put(struct ocxl_fn *fn)
{
	put_device(&fn->dev);
}

struct ocxl_afu *ocxl_afu_get(struct ocxl_afu *afu)
{
	return (get_device(&afu->dev) == NULL) ? NULL : afu;
}
```
+}\n+\n+void ocxl_afu_put(struct ocxl_afu *afu)\n+{\n+put_device(&afu->dev);\n+}\n+
+static struct ocxl_afu *alloc_afu(struct ocxl_fn *fn)\n+{\n+struct ocxl_afu *afu;\n+\n+afu = kzalloc(sizeof(struct ocxl_afu), GFP_KERNEL);\n+if (!afu)\n+return NULL;\n+\n+mutex_init(&afu->contexts_lock);\n+mutex_init(&afu->afu_control_lock);\n+idr_init(&afu->contexts_idr);\n+afu->fn = fn;\n+ocxl_fn_get(fn);\n+return afu;\n+}\n+
+static void free_afu(struct ocxl_afu *afu)\n+{\n+idr_destroy(&afu->contexts_idr);\n+ocxl_fn_put(afu->fn);\n+kfree(afu);\n+}\n+
+static void free_afu_dev(struct device *dev)\n+{\n+struct ocxl_afu *afu = to_ocxl_afu(dev);\n+\n+ocxl_unregister_afu(afu);\n+free_afu(afu);\n+}\n+
+static int set_afu_device(struct ocxl_afu *afu, const char *location)\n+{\n+struct ocxl_fn *fn = afu->fn;\n+int rc;\n+\n+afu->dev.parent = &fn->dev;\n+afu->dev.release = free_afu_dev;\n+rc = dev_set_name(&afu->dev, "%s.%s.%hhu", afu->config.name, location,\n+afu->config.idx);\n+return rc;
static int assign_afu_actag(struct ocxl_afu *afu, struct pci_dev *dev)
{
    struct ocxl_fn *fn = afu->fn;
    int actag_count, actag_offset;
+
    /*
    * if there were not enough actags for the function, each afu
    * reduces its count as well
    */
    actag_count = afu->config.actag_supported *
        fn->actag_enabled / fn->actag_supported;
    actag_offset = ocxl_actag_afu_alloc(fn, actag_count);
    if (actag_offset < 0) {
        dev_err(&afu->dev, "Can't allocate %d actags for AFU: %d
", 
            actag_count, actag_offset);
        return actag_offset;
    }
    afu->actag_base = fn->actag_base + actag_offset;
    afu->actag_enabled = actag_count;
+
    ocxl_config_set_afu_actag(dev, afu->config.dvsec_afu_control_pos,
        afu->actag_base, afu->actag_enabled);
    dev_dbg(&afu->dev, "actag base=%d enabled=%d
", 
        afu->actag_base, afu->actag_enabled);
    return 0;
}

static void reclaim_afu_actag(struct ocxl_afu *afu)
{
    struct ocxl_fn *fn = afu->fn;
    int start_offset, size;
+
    start_offset = afu->actag_base - fn->actag_base;
    size = afu->actag_enabled;
    ocxl_actag_afu_free(afu->fn, start_offset, size);
+
}

static int assign_afu_pasid(struct ocxl_afu *afu, struct pci_dev *dev)
{
    struct ocxl_fn *fn = afu->fn;
    int pasid_count, pasid_offset;
+
    /*
    * We only support the case where the function configuration
    * requested enough PASIDs to cover all AFUs.
    */
pasid_count = 1 << afu->config.pasid_supported_log;
pasid_offset = ocxl_pasid_afu_alloc(fn, pasid_count);
if (pasid_offset < 0) {
    dev_err(&afu->dev, "Can't allocate %d PASIDs for AFU: %d\n",
pasid_count, pasid_offset);
    return pasid_offset;
}
afu->pasid_base = fn->pasid_base + pasid_offset;
afu->pasid_count = 0;
afu->pasid_max = pasid_count;

ocxl_config_set_afu_pasid(dev, afu->config.dvsec_afu_control_pos,
    afu->pasid_base,
    afu->config.pasid_supported_log);
dev_dbg(&afu->dev, "PASID base=%d, enabled=%d\n",
    afu->pasid_base, pasid_count);
return 0;
}

static void reclaim_afu_pasid(struct ocxl_afu *afu)
{
    struct ocxl_fn *fn = afu->fn;
    int start_offset, size;

    start_offset = afu->pasid_base - fn->pasid_base;
    size = 1 << afu->config.pasid_supported_log;
    ocxl_pasid_afu_free(afu->fn, start_offset, size);
}

static int reserve_fn_bar(struct ocxl_fn *fn, int bar)
{
    struct pci_dev *dev = to_pci_dev(fn->dev.parent);
    int rc, idx;

    if (bar != 0 && bar != 2 && bar != 4)
        return -EINVAL;
    idx = bar >> 1;
    if (fn->bar_used[idx]++ == 0) {
        rc = pci_request_region(dev, bar, "ocxl");
        if (rc)
            return rc;
    }
    return 0;
}

static void release_fn_bar(struct ocxl_fn *fn, int bar)
{
+struct pci_dev *dev = to_pci_dev(fn->dev.parent);
+int idx;
+  
+if (bar != 0 && bar != 2 && bar != 4)
+  return;
+  
+idx = bar >> 1;
+if (--fn->bar_used[idx] == 0)
+pci_release_region(dev, bar);
+WARN_ON(fn->bar_used[idx] < 0);
+
+static int map_mmio_areas(struct ocxl_afu *afu, struct pci_dev *dev)
+{
+  int rc;
+
+  rc = reserve_fn_bar(afu->fn, afu->config.global_mmio_bar);
+  if (rc)
+    return rc;
+
+  rc = reserve_fn_bar(afu->fn, afu->config.pp_mmio_bar);
+  if (rc)
+    release_fn_bar(afu->fn, afu->config.global_mmio_bar);
+    return rc;
+
+  afu->global_mmio_start =
+  pci_resource_start(dev, afu->config.global_mmio_bar) +
+  afu->config.global_mmio_offset;
+  afu->pp_mmio_start =
+  pci_resource_start(dev, afu->config.pp_mmio_bar) +
+  afu->config.pp_mmio_offset;
+  afu->global_mmio_ptr = ioremap(afu->global_mmio_start,
+  afu->config.global_mmio_size);
+  if (!afu->global_mmio_ptr) {
+    release_fn_bar(afu->fn, afu->config.pp_mmio_bar);
+    release_fn_bar(afu->fn, afu->config.global_mmio_bar);
+    dev_err(&dev->dev, "Error mapping global mmio area\n");
+    return -ENOMEM;
+  }
+
+  /* Leave an empty page between the per-process mmio area and
+     the AFU interrupt mappings
+     */
+  afu->irq_base_offset = afu->config.pp_mmiostride + PAGE_SIZE;
+  return 0;
+static void unmap_mmio_areas(struct ocxl_afu *afu)
+{
+    if (afu->global_mmio_ptr) {
+        iounmap(afu->global_mmio_ptr);
+        afu->global_mmio_ptr = NULL;
+    }
    afu->global_mmio_start = 0;
    afu->pp_mmio_start = 0;
    release_fn_bar(afu->fn, afu->config.pp_mmio_bar);
    release_fn_bar(afu->fn, afu->config.global_mmio_bar);
+}
+
+static int configure_afu(struct ocxl_afu *afu, u8 afu_idx, struct pci_dev *dev)
+{
+    int rc;
+    rc = ocxl_config_read_afu(dev, &afu->fn->config, &afu->config, afu_idx);
+    if (rc)
+        return rc;
+    rc = set_afu_device(afu, dev_name(&dev->dev));
+    if (rc)
+        return rc;
+    rc = assign_afu_actag(afu, dev);
+    if (rc)
+        return rc;
+    rc = assign_afu_pasid(afu, dev);
+    if (rc) {
+        reclaim_afu_actag(afu);
+        return rc;
+    }
+    rc = map_mmio_areas(afu, dev);
+    if (rc) {
+        reclaim_afu_pasid(afu);
+        reclaim_afu_actag(afu);
+        return rc;
+    }
+    return 0;
+}
+
+static void deconfigure_afu(struct ocxl_afu *afu)
+{
+    unmap_mmio_areas(afu);
+reclaim_afu_pasid(afu);
+reclaim_afu_actag(afu);
+
+static int activate_afu(struct pci_dev *dev, struct ocxl_afu *afu)
+{
+int rc;
+
+ocxl_config_set_afu_state(dev, afu->config.dvsec_afu_control_pos, 1);
+/*
+ * Char device creation is the last step, as processes can
+ * call our driver immediately, so all our inits must be finished.
+ */
+rc = ocxl_create_cdev(afu);
+if (rc)
+return rc;
+return 0;
+
+
+static void deactivate_afu(struct ocxl_afu *afu)
+{
+struct pci_dev *dev = to_pci_dev(afu->fn->dev.parent);
+
+ocxl_destroy_cdev(afu);
+ocxl_config_set_afu_state(dev, afu->config.dvsec_afu_control_pos, 0);
+}
+
+static int init_afu(struct pci_dev *dev, struct ocxl_fn *fn, u8 afu_idx)
+{
+int rc;
+struct ocxl_afu *afu;
+
+afu = alloc_afu(fn);
+if (!afu)
+return -ENOMEM;
+
+rc = configure_afu(afu, afu_idx, dev);
+if (rc) {
+free_afu(afu);
+return rc;
+}
+
+rc = ocxl_register_afu(afu);
+if (rc)
+goto err;
+
+rc = ocxl_sysfs_add_afu(afu);
+if (rc)
goto err;
+
rc = activate_afu(dev, afu);
+if (rc)
+goto err_sys;
+
list_add_tail(&afu->list, &fn->afu_list);
+return 0;
+
err_sys:
+ocxl_sysfs_remove_afu(afu);
+err:
+deconfigure_afu(afu);
+device_unregister(&afu->dev);
+return rc;
+
static void remove_afu(struct ocxl_afu *afu)
+
list_del(&afu->list);
+ocxl_context_detach_all(afu);
+deactivate_afu(afu);
+ocxl_sysfs_remove_afu(afu);
+deconfigure_afu(afu);
+device_unregister(&afu->dev);
+
static struct ocxl_fn *alloc_function(struct pci_dev *dev)
+
struct ocxl_fn *fn;
+
fn = kzalloc(sizeof(struct ocxl_fn), GFP_KERNEL);
+if (!fn)
+return NULL;
+
+INIT_LIST_HEAD(&fn->afu_list);
+INIT_LIST_HEAD(&fn->pasid_list);
+INIT_LIST_HEAD(&fn->actag_list);
+return fn;
+
static void free_function(struct ocxl_fn *fn)
+
WARN_ON(!list_empty(&fn->afu_list));
+WARN_ON(!list_empty(&fn->pasid_list));
+kfree(fn);
+
+
static void free_function_dev(struct device *dev)
{
    struct ocxl_fn *fn = to_ocxl_function(dev);
    free_function(fn);
}

static int set_function_device(struct ocxl_fn *fn, struct pci_dev *dev)
{
    int rc;
    fn->dev.parent = &dev->dev;
    fn->dev.release = free_function_dev;
    rc = dev_set_name(&fn->dev, "ocxlfn.%s", dev_name(&dev->dev));
    if (rc)
        return rc;
    pci_set_drvdata(dev, fn);
    return 0;
}

static int assign_function_actag(struct ocxl_fn *fn)
{
    struct pci_dev *dev = to_pci_dev(fn->dev.parent);
    u16 base, enabled, supported;
    int rc;
    rc = ocxl_config_get_actag_info(dev, &base, &enabled, &supported);
    if (rc)
        return rc;
    fn->actag_base = base;
    fn->actag_enabled = enabled;
    fn->actag_supported = supported;

    ocxl_config_set_actag(dev, fn->config.dvsec_function_pos,
                          fn->actag_base, fn->actag_enabled);
    dev_dbg(&fn->dev, "actag range starting at %d, enabled %d\n",
            fn->actag_base, fn->actag_enabled);
    return 0;
}

static int set_function_pasid(struct ocxl_fn *fn)
{
    struct pci_dev *dev = to_pci_dev(fn->dev.parent);
    int rc, desired_count, max_count;

    /* A function may not require any PASID */
    if (fn->config.max_pasid_log < 0)
return 0;
+
+rc = ocxl_config_get_pasid_info(dev, &max_count);
+if (rc)
+return rc;
+
+desired_count = 1 << fn->config.max_pasid_log;
+
+if (desired_count > max_count) {
+dev_err(&fn->dev,
"Function requires more PASIDs than is available (%d vs. %d)\n",
+desired_count, max_count);
+return -ENOSPC;
+}
+
+fn->pasid_base = 0;
+return 0;
+
+static int configure_function(struct ocxl_fn *fn, struct pci_dev *dev)
+{  
+int rc;
+
+rc = pci_enable_device(dev);
+if (rc) {
+dev_err(&dev->dev, "pci_enable_device failed: %d\n", rc);
+return rc;
+}
+
+/*
+ * Once it has been confirmed to work on our hardware, we
+ * should reset the function, to force the adapter to restart
+ * from scratch.
+ * A function reset would also reset all its AFUs.
+ *
+ * Some hints for implementation:
+ *
+ * - there's not status bit to know when the reset is done. We
+ * should try reading the config space to know when it's
+ * done.
+ * - probably something like:
+ *Reset
+ *wait 100ms
+ *issue config read
+ *allow device up to 1 sec to return success on config
+ *read before declaring it broken
+ *
+ * Some shared logic on the card (CFG, TLX) won't be reset, so
+ * there's no guarantee that it will be enough.
+ */
+rc = oclx_config_read_function(dev, &fn->config);
+if (rc)
+return rc;
+
+rc = set_function_device(fn, dev);
+if (rc)
+return rc;
+
+rc = assign_function_actag(fn);
+if (rc)
+return rc;
+
+rc = set_function_pasid(fn);
+if (rc)
+return rc;
+
+rc = oclx_link_setup(dev, 0, &fn->link);
+if (rc)
+return rc;
+
+rc = oclx_config_set_TL(dev, fn->config.dvsec_tl_pos);
+if (rc) {
+oclx_link_release(dev, fn->link);
+return rc;
+}
+return 0;
+
+static void deconfigure_function(struct ocx1_fn *fn)
+{
+struct pci_dev *dev = to_pci_dev(fn->dev.parent);
+
+oclx_link_release(dev, fn->link);
+pci_disable_device(dev);
+}
+
+static struct ocx1_fn *init_function(struct pci_dev *dev)
+{
+struct ocx1_fn *fn;
+int rc;
+
+fn = alloc_function(dev);
+if (!fn)
+return ERR_PTR(-ENOMEM);
+
+rc = configure_function(fn, dev);
if (rc) {
    free_function(fn);
    return ERR_PTR(rc);
}

rc = device_register(&fn->dev);
if (rc) {
    deconfigure_function(fn);
    put_device(&fn->dev);
    return ERR_PTR(rc);
}
return fn;
}

static void remove_function(struct ocxl_fn *fn)
{
    deconfigure_function(fn);
    device_unregister(&fn->dev);
}

static int ocxl_probe(struct pci_dev *dev, const struct pci_device_id *id)
{
    int rc, afu_count = 0;
    u8 afu;
    struct ocxl_fn *fn;

    if (!radix_enabled()) {
        dev_err(&dev->dev, "Unsupported memory model (hash)\n");
        return -ENODEV;
    }

    fn = init_function(dev);
    if (IS_ERR(fn)) {
        dev_err(&dev->dev, "function init failed: %li\n",
                PTR_ERR(fn));
        return PTR_ERR(fn);
    }

    for (afu = 0; afu <= fn->config.max_afu_index; afu++) {
        rc = ocxl_config_check_afu_index(dev, &fn->config, afu);
        if (rc > 0) {
            rc = init_afu(dev, fn, afu);
            if (rc) {
                dev_err(&dev->dev, "Can't initialize AFU index \d\n", afu);
                continue;
            }
            afu_count++;
        }
    }
    return 0;
}
+}  
+}  
-dev_info(&dev->dev, "%d AFU(s) configured\n", afu_count);  
+return 0;  
+}  
+}  
+static void ocxl_remove(struct pci_dev *dev)  
+{  
+struct ocxl_afu *afu, *tmp;  
+struct ocxl_fn *fn = pci_get_drvdata(dev);  
+  
+list_for_each_entry_safe(afu, tmp, &fn->afu_list, list) {  
+remove_afu(afu);  
+}  
+remove_function(fn);  
+}  
+}  
+struct pci_driver ocxl_pci_driver = {  
+.name = "ocxl",  
+.id_table = ocxl_pci_tbl,  
+.probe = ocxl_probe,  
+.remove = ocxl_remove,  
+.shutdown = ocxl_remove,  
+};  
--- linux-4.15.0.orig/drivers/misc/ocxl/sysfs.c  
+++ linux-4.15.0/drivers/misc/ocxl/sysfs.c  
@@ -0,0 +1,142 @@  
+// SPDX-License-Identifier: GPL-2.0+  
+// Copyright 2017 IBM Corp.  
+#include <linux/sysfs.h>  
+#include "ocxl_internal.h"  
+  
+static ssize_t global_mmio_size_show(struct device *device,  
+struct device_attribute *attr,  
+char *buf)  
+{  
+struct ocxl_afu *afu = to_ocxl_afu(device);  
+  
+return scnprintf(buf, PAGE_SIZE, "%d\n",  
+afu->config.global_mmio_size);  
+}  
+  
+static ssize_t pp_mmio_size_show(struct device *device,  
+struct device_attribute *attr,  
+char *buf)  
+{  
+struct ocxl_afu *afu = to_ocxl_afu(device);  
+  
+}
+return scnprintf(buf, PAGE_SIZE, "\%d\n",
+afu->config.pp_mmio_stride);
+
+static ssize_t afu_version_show(struct device *device,
+struct device_attribute *attr,
+char *buf)
+{
+struct oclx_afu *afu = to_ocxl_afu(device);
+
+return scnprintf(buf, PAGE_SIZE, "\%hhu:\%hhu\n",
+afu->config.version_major,
+afu->config.version_minor);
+}
+
+static ssize_t contexts_show(struct device *device,
+struct device_attribute *attr,
+char *buf)
+{
+struct oclx_afu *afu = to_ocxl_afu(device);
+
+return scnprintf(buf, PAGE_SIZE, "\%d/\%d\n",
+afu->pasid_count, afu->pasid_max);
+}
+
+static struct device_attribute afu_attrs[] = {
+__ATTR_RO(global_mmio_size),
+__ATTR_RO(pp_mmio_size),
+__ATTR_RO(afu_version),
+__ATTR_RO(contexts),
+};
+
+static ssize_t global_mmio_read(struct file *filp, struct kobject *kobj,
+struct bin_attribute *bin_attr, char *buf,
+loff_t off, size_t count)
+{
+struct oclx_afu *afu = to_ocxl_afu(kobj_to_dev(kobj));
+
+if (count == 0 || off < 0 ||
+off > afu->config.global_mmio_size)
+return 0;
+memcpy_fromio(buf, afu->global_mmio_ptr + off, count);
+return count;
+}
+
+static int global_mmio_fault(struct vm_fault *vmf)
+{
+struct vm_area_struct *vma = vmf->vma;
+}
+ struct ocxl_afu *afu = vma->vm_private_data;
+ unsigned long offset;
+ 
+ if (vmf->pgoff >= (afu->config.global_mmio_size >> PAGE_SHIFT))
+ return VM_FAULT_SIGBUS;
+
+ offset = vmf->pgoff;
+ offset += (afu->global_mmio_start >> PAGE_SHIFT);
+ vm_insert_pfn(vma, vmf->address, offset);
+ return VM_FAULT_NOPAGE;
+
+ static const struct vm_operations_struct global_mmio_vmops = {
+ .fault = global_mmio_fault,
+ };
+
+ static int global_mmio_mmap(struct file *filp, struct kobject *kobj,
+ struct bin_attribute *bin_attr,
+ struct vm_area_struct *vma)
+ {
+ struct ocxl_afu *afu = to_ocxl_afu(kobj_to_dev(kobj));
+ 
+ if ((vma_pages(vma) + vma->vm_pgoff) >
+ (afu->config.global_mmio_size >> PAGE_SHIFT))
+ return -EINVAL;
+
+ vma->vm_flags |= VM_IO | VM_PFNMAP;
+ vma->vm_page_prot = pgprot_noncached(vma->vm_page_prot);
+ vma->vm_ops = &global_mmio_vmops;
+ vma->vm_private_data = afu;
+ return 0;
+ }
+
+ int ocxl_sysfs_add_afu(struct ocxl_afu *afu)
+ {
+ int i, rc;
+ 
+ for (i = 0; i < ARRAY_SIZE(afu->attrs); i++) {
+ rc = device_create_file(&afu->dev, &afu->attrs[i]);
+ if (rc)
+ goto err;
+ }
+ 
+ sysfs_attr_init(&afu->attr_global_mmio.attr);
+ afu->attr_global_mmio.attr.name = "global_mmio_area";
+ afu->attr_global_mmio.attr.mode = 0600;
+ afu->attr_global_mmio.size = afu->config.global_mmio_size;
+ afu->attr_global_mmio.read = global_mmio_read;
+afu->attr_global_mmio.mmap = global_mmio_mmap;
+rc = device_create_bin_file(&afu->dev, &afu->attr_global_mmio);
+if (rc) {
+dev_err(&afu->dev,
+"Unable to create global mmio attr for afu: %d\n",
+rc);
+goto err;
+}
+
+return 0;
+
+err:
+for (i--; i >= 0; i--)
+device_remove_file(&afu->dev, &afu_attrs[i]);
+return rc;
+
+}
+
+void ocxl_sysfs_remove_afu(struct ocxl_afu *afu)
+{
+int i;
+
+for (i = 0; i < ARRAY_SIZE(afu_attrs); i++)
+device_remove_file(&afu->dev, &afu_attrs[i]);
+device_remove_bin_file(&afu->dev, &afu->attr_global_mmio);
+}
--- linux-4.15.0.orig/drivers/misc/ocxl/trace.c
+++ linux-4.15.0/drivers/misc/ocxl/trace.c
@@ -0,0 +1,6 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+#ifndef __CHECKER__
+#define CREATE_TRACE_POINTS
+#include "trace.h"
+#endif
--- linux-4.15.0.orig/drivers/misc/ocxl/trace.h
+++ linux-4.15.0/drivers/misc/ocxl/trace.h
@@ -0,0 +1,182 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
+#undef TRACE_SYSTEM
+#define TRACE_SYSTEM ocxl
+
+/
+ifdef (_TRACE_OCXL_H || defined(TRACE_HEADER_MULTI_READ)
+#define _TRACE_OCXL_H
+
+#include <linux/tracepoint.h>
+
+DECLARE_EVENT_CLASS(ocxl_context,
+TP_PROTO(pid_t pid, void *spa, int pasid, u32 pidr, u32 tidr),
+TP_ARGS(pid, spa, pasid, pidr, tidr),
+
+TP_STRUCT__entry(
+__field(pid_t, pid)
+__field(void*, spa)
+__field(int, pasid)
+__field(u32, pidr)
+__field(u32, tidr)
+),
+
+TP_fast_assign(
+__entry->pid = pid;
+__entry->spa = spa;
+__entry->pasid = pasid;
+__entry->pidr = pidr;
+__entry->tidr = tidr;
+),
+
+TP_printk("linux pid=%d spa=0x%p pasid=0x%lx pidr=0x%x tidr=0x%lx",
+__entry->pid,
+__entry->spa,
+__entry->pasid,
+__entry->pidr,
+__entry->tidr
+)
+);
+
+DEFINE_EVENT(ocxl_context, ocxl_context_add,
+TP_PROTO(pid_t pid, void *spa, int pasid, u32 pidr, u32 tidr),
+TP_ARGS(pid, spa, pasid, pidr, tidr)
+);
+
+DEFINE_EVENT(ocxl_context, ocxl_context_remove,
+TP_PROTO(pid_t pid, void *spa, int pasid, u32 pidr, u32 tidr),
+TP_ARGS(pid, spa, pasid, pidr, tidr)
+);
+
+TRACE_EVENT(ocxl_terminate_pasid,
+TP_PROTO(int pasid, int rc),
+TP_ARGS(pasid, rc),
+
+TP_STRUCT__entry(
+__field(int, pasid)
+__field(int, rc)
+),
+
+TP_fast_assign(}

---
+__entry->pasid = pasid;
+__entry->rc = rc;
+),
+
+TP_printk("pasid=0x%x rc=%d",
+__entry->pasid,
+__entry->rc
+)
+);
+
+DECLARE_EVENT_CLASS(ocxl_fault_handler,
+TP_PROTO(void *spa, u64 pe, u64 dsisr, u64 dar, u64 tfc),
+TP_ARGS(spa, pe, dsisr, dar, tfc),
+
+TP_STRUCT__entry(
+__field(void *, spa)
+__field(u64, pe)
+__field(u64, dsisr)
+__field(u64, dar)
+__field(u64, tfc)
+),
+
+TP_fast_assign(
+__entry->spa = spa;
+__entry->pe = pe;
+__entry->dsisr = dsisr;
+__entry->dar = dar;
+__entry->tfc = tfc;
+),
+
+TP_printk("spa=%p pe=0x%llx dsisr=0x%llx dar=0x%llx tfc=0x%llx",
+__entry->spa,
+__entry->pe,
+__entry->dsisr,
+__entry->dar,
+__entry->tfc
+)
+);
+
+DEFINE_EVENT(ocxl_fault_handler, ocxl_fault,
+TP_PROTO(void *spa, u64 pe, u64 dsisr, u64 dar, u64 tfc),
+TP_ARGS(spa, pe, dsisr, dar, tfc)
+);
+
+DEFINE_EVENT(ocxl_fault_handler, ocxl_fault_ack,
+TP_PROTO(void *spa, u64 pe, u64 dsisr, u64 dar, u64 tfc),
+TP_ARGS(spa, pe, dsisr, dar, tfc)
+);
+TRACE_EVENT(ocxl_afu_irq_alloc,  
+TPPROTO(int pasid, int irq_id, unsigned int virq, int hw_irq,  
+u64 irq_offset),  
+TPARGS(pasid, irq_id, virq, hw_irq, irq_offset),  
+  
+TP_STRUCT__entry(  
+  __field(int, pasid)  
+  __field(int,irq_id)  
+  __field(unsigned int, virq)  
+  __field(int,hw_irq)  
+  __field(u64, irq_offset)  
+),  
+  
+TP_fast_assign(  
+  __entry->pasid = pasid;  
+  __entry->irq_id = irq_id;  
+  __entry->virq = virq;  
+  __entry->hw_irq = hw_irq;  
+  __entry->irq_offset = irq_offset;  
+),  
+  
+TP_printk("pasid=0x%x irq_id=%d virq=%u hw_irq=%d irq_offset=0x%llx",  
+  __entry->pasid,  
+  __entry->irq_id,  
+  __entry->virq,  
+  __entry->hw_irq,  
+  __entry->irq_offset  
+);  
+);  
+  
+TRACE_EVENT(ocxl_afu_irq_free,  
+TPPROTO(int pasid, int irq_id),  
+TPARGS(pasid, irq_id),  
+  
+TP_STRUCT__entry(  
+  __field(int, pasid)  
+  __field(int, irq_id)  
+),  
+  
+TP_fast_assign(  
+  __entry->pasid = pasid;  
+  __entry->irq_id = irq_id;  
+),  
+  
+TP_printk("pasid=0x%x irq_id=%d",  
+  __entry->pasid,  
+  __entry->irq_id
+TRACE_EVENT(ocxl_afu_irq_receive,
+TPPROTO(int virq),
+TP_ARGS(virq),
+
+TP_STRUCT__entry(
+__field(int, virq)
+),
+
+TP_fast_assign(
+__entry->virq = virq;
+),
+
+TP_printk("virq=%d",
+__entry->virq
+)
+);
+
+#endif /* _TRACE_OCXL_H */
+
+/* This part must be outside protection */
+#undef TRACE_INCLUDE_PATH
+#define TRACE_INCLUDE_PATH .
+#define TRACE_INCLUDE_FILE trace
+<include <trace/define_trace.h>
--- linux-4.15.0.orig/drivers/misc/pch_phub.c
+++ linux-4.15.0/drivers/misc/pch_phub.c
@@ -64,7 +64,6 @@
#define CLKCFG_UARTCLKSEL			(1 << 18)
/* Macros for ML7213 */
-#define PCI_VENDOR_ID_ROHM			0x10db
#define PCI_DEVICE_ID_ROHM_ML7213_PHUB		0x801A
--- linux-4.15.0.orig/drivers/misc/pci_endpoint_test.c
+++ linux-4.15.0/drivers/misc/pci_endpoint_test.c
@@ -68,6 +68,11 @@
#define PCI_ENDPOINT_TEST_CHECKSUM	0x20
+#define PCI_DEVICE_ID_TI_AM654			0xb00c
+
+#define is_am654_pci_dev(pdev)		\n+((pdev)->device == PCI_DEVICE_ID_TI_AM654)
+"
static DEFINE_IDA(pci_endpoint_test_ida);

#define to_endpoint_test(priv) container_of((priv), struct pci_endpoint_test, \
@@ -423,6 +428,7 @@
int ret = -EINVAL;
enum pci_barno bar;
struct pci_endpoint_test *test = to_endpoint_test(file->private_data);
+struct pci_dev *pdev = test->pdev;

mutex_lock(&test->mutex);
switch (cmd) {
@@ -430,6 +436,8 @@
bar = arg;
if (bar < 0 || bar > 5)
goto ret;
+if (is_am654_pci_dev(pdev) && bar == BAR_0)
+goto ret;
ret = pci_endpoint_test_bar(test, bar);
break;
case PCITEST_LEGACY_IRQ:
@@ -466,7 +474,7 @@
int err;
int irq = 0;
int id;
- char name[20];
+ char name[24];
enum pci_barno bar;
void __iomem *base;
struct device *dev = &pdev->dev;
@@ -489,6 +497,7 @@
data = (struct pci_endpoint_test_data *)ent->driver_data;
if (data) {
test_reg_bar = data->test_reg_bar;
+test->test_reg_bar = test_reg_bar;
test->alignment = data->alignment;
no_msi = data->no_msi;
}
@@ -629,9 +638,19 @@
pci_disable_device(pdev);
}

+static const struct pci_endpoint_test_data am654_data = {
+.test_reg_bar = BAR_2,
+.alignment = SZ_64K,
+.irq_type = IRQ_TYPE_MSI,
+};
+
static const struct pci_device_id pci_endpoint_test_tbl[] = {

{ PCI_DEVICE(PCI_VENDOR_ID_TI, PCI_DEVICE_ID_TI_DRA74x) },
{ PCI_DEVICE(PCI_VENDOR_ID_TI, PCI_DEVICE_ID_TI_DRA72x) },
+{ PCI_DEVICE(PCI_VENDOR_ID_FREESCALE, 0x81c0) },
+{ PCI_DEVICE(PCI_VENDOR_ID_TI, PCI_DEVICE_ID_TI_AM654),
  .driver_data = (kernel_ulong_t)&am654_data
+}.
{ }
};
MODULE_DEVICE_TABLE(pci, pci_endpoint_test_tbl);
--- linux-4.15.0.orig/drivers/misc/sgi-gru/grukdump.c
+++ linux-4.15.0/drivers/misc/sgi-gru/grukdump.c
@@ -27,6 +27,9 @@
#include <linux/delay.h>
#include <linux/bitops.h>
#include <asm/uv/uv_hub.h>
+
+#include <linux/nospec.h>
+
#include "gru.h"
#include "grutables.h"
#include "gruhandles.h"
@@ -196,6 +199,7 @@
/* Currently, only dump by gid is implemented */
if (req.gid >= gru_max_gids)
  return -EINVAL;
+req.gid = array_index_nospec(req.gid, gru_max_gids);

gru = GID_TO_GRU(req.gid);
ubuf = req.buf;
--- linux-4.15.0.orig/drivers/misc/sgi-xp/xpc_partition.c
+++ linux-4.15.0/drivers/misc/sgi-xp/xpc_partition.c
@@ -70,7 +70,7 @@
unsigned long rp_pa = nasid; /* seed with nasid */
size_t len = 0;
size_t buf_len = 0;
-void *buf = buf;
+void *buf = NULL;
void *buf_base = NULL;
enum xp_retval (*get_partition_rsvd_page_pa)
(void *, u64 *, unsigned long *, size_t *) =
--- linux-4.15.0.orig/drivers/misc/sram.c
+++ linux-4.15.0/drivers/misc/sram.c
@@ @ -391,29 +391,37 @@
if (IS_ERR(sram->pool))
  return PTR_ERR(sram->pool);
  ret = sram_reserve_regions(sram, res);
-if (ret)
sram-&gt;clk = devm_clk_get(sram-&gt;dev, NULL);
if (IS_ERR(sram-&gt;clk))
sram-&gt;clk = NULL;
else
clk_prepare_enable(sram-&gt;clk);

+ret = sram_reserve_regions(sram, res);
+if (ret)
+goto err_disable_clk;
+
platform_set_drvdata(pdev, sram);

init_func = of_device_get_match_data(&pdev-&gt;dev);
if (init_func) {
  ret = init_func();
  if (ret)
    return ret;
+    goto err_free_partitions;
}

dev_dbg(sram-&gt;dev, "SRAM pool: %zu KiB @ 0x%p\n",
gen_pool_size(sram-&gt;pool) / 1024, sram-&gt;virt_base);

return 0;
+
+err_free_partitions:
+sram_free_partitions(sram);
+err_disable_clk:
+if (sram-&gt;clk)
+clk_disable_unprepare(sram-&gt;clk);
+
+return ret;
}

static int sram_remove(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/misc/ti-st/st_kim.c
+++ linux-4.15.0/drivers/misc/ti-st/st_kim.c
@@ -756,14 +756,14 @@
err = gpio_request(kim_gdata-&gt;nshutdown, "kim");
if (unlikely(err)) {
  pr_err(" gpio %d request failed ", kim_gdata-&gt;nshutdown);
  -return err;
+ goto err_sysfs_group;
}
err = gpio_direction_output(kim_gdata->nshutdown, 0);
if (unlikely(err)) {
    pr_err(" unable to configure gpio %d", kim_gdata->nshutdown);
    return err;
    goto err_sysfs_group;
}
/* get reference of pdev for request_firmware */
--- linux-4.15.0.orig/drivers/misc/tsl2550.c
+++ linux-4.15.0/drivers/misc/tsl2550.c
@@ -177,7 +177,7 @@
    lux = 0;
    return -EAGAIN;
    return 0;
/* LUX range check */
return lux > TSL2550_MAX_LUX ? TSL2550_MAX_LUX : lux;
--- linux-4.15.0.orig/drivers/misc/vexpress-syscfg.c
+++ linux-4.15.0/drivers/misc/vexpress-syscfg.c
@@ -61,7 +61,7 @@
        long timeout;
        -if (WARN_ON(index > func->num_templates))
           +if (WARN_ON(index >= func->num_templates))
            return -EINVAL;
        command = readl(syscfg->base + SYS_CFGCTRL);
--- linux-4.15.0.orig/drivers/misc/vmw_balloon.c
+++ linux-4.15.0/drivers/misc/vmw_balloon.c
@@ -45,6 +45,7 @@

#include <linux/seq_file.h>
#include <linux/vmw_vmci_defs.h>
#include <linux/vmw_vmci_api.h>
+include <linux/io.h>
+include <asm/hypervisor.h>

MODULE_AUTHOR("VMware, Inc.");
@@ -341,7 +342,13 @@
    success = false;
}
+ if (b->capabilities & VMW_BALLOON_BATCHED_2M_CMDS)
+ /*
+  * 2MB pages are only supported with batching. If batching is for some
+  * reason disabled, do not use 2MB pages, since otherwise the legacy
+ * mechanism is used with 2MB pages, causing a failure.
+ */
+ if ((b->capabilities & VMW_BALLOON_BATCHED_2M_CMDS) &&
+     (b->capabilities & VMW_BALLOON_BATCHED_CMDS))
   b->supported_page_sizes = 2;
else
   b->supported_page_sizes = 1;
@@ -450,7 +457,7 @@
pfn32 = (u32)pfn;
if (pfn32 != pfn)
   return -1;
+return -EINVAL;

STATS_INC(b->stats.lock[false]);
@@ -460,14 +467,14 @@
pr_debug("%s - ppn %lx, hv returns %ld\n", __func__, pfn, status);
STATS_INC(b->stats.lock_fail[false]);
    return 1;
+return -EIO;
}

static int vmballoon_send_batched_lock(struct vmballoon *b,
unsigned int num_pages, bool is_2m_pages, unsigned int *target)
{
    unsigned long status;
    unsigned long pfn = page_to_pfn(b->page);
+unsigned long pfn = PHYS_PFN(virt_to_phys(b->batch_page));

    STATS_INC(b->stats.lock[is_2m_pages]);
@@ -515,7 +522,7 @@
unsigned int num_pages, bool is_2m_pages, unsigned int *target)
{
    unsigned long status;
    unsigned long pfn = page_to_pfn(b->page);
+unsigned long pfn = PHYS_PFN(virt_to_phys(b->batch_page));

    STATS_INC(b->stats.unlock[is_2m_pages]);
@@ -576,15 +583,9 @@

    -if (b->batch_page) {
       -vunmap(b->batch_page);
b->batch_page = NULL;
-
-if (b->page) {
-__free_page(b->page);
-b->page = NULL;
-}
+ /* Clearing the batch_page unconditionally has no adverse effect */
+ free_page((unsigned long)b->batch_page);
+b->batch_page = NULL;
}

/*
@@ -603,11 +604,12 @@*/
locked = vmballoon_send_lock_page(b, page_to_pfn(page), &hv_status, target);
-if (locked > 0) {
+if (locked) {
STATS_INC(b->stats.refused_alloc[false]);

-if (hv_status == VMW_BALLOON_ERROR_RESET ||
-hv_status == VMW_BALLOON_ERROR_PPN_NOTNEEDED) {
+if (locked == -EIO &&
 + (hv_status == VMW_BALLOON_ERROR_RESET ||
 + hv_status == VMW_BALLOON_ERROR_PPN_NOTNEEDED)) {
  vmballoon_free_page(page, false);
  return -EIO;
 }
@@ -623,7 +625,7 @@
 } else {
  vmballoon_free_page(page, false);
  }
-} return -EIO;
+return locked;
}

/* track allocated page */
@@ -991,16 +993,13 @@
static bool vmballoon_init_batching(struct vmballoon *b)
{
-b->page = alloc_page(VMW_PAGE_ALLOC_NOSLEEP);
-if (!b->page)
-return false;
+struct page *page;

-b->batch_page = vmap(&b->page, 1, VM_MAP, PAGE_KERNEL);

-if (!b->batch_page) {
-__free_page(b->page);
+page = alloc_page(GFP_KERNEL | __GFP_ZERO);
+if (!page)
  return false;
-}

+b->batch_page = page_address(page);
return true;
}

@@ -1038,29 +1037,30 @@*/
static int vmballoon_vmci_init(struct vmballoon *b)
{
-int error = 0;
+unsigned long error, dummy;

-if ((b->capabilities & VMW_BALLOON_SIGNALLED_WAKEUP_CMD) != 0) {
-error = vmci_doorbell_create(&b->vmci_doorbell,
-       VMCI_FLAG_DELAYED_CB,
-       VMCI_PRIVILEGE_FLAG_RESTRICTED,
-       vmballoon_doorbell, b);
-        
-        -if (error == VMCI_SUCCESS) {
-            VMWARE_BALLOON_CMD(VMCI_DOORBELL_SET, b->vmci_doorbell.context,
-                b->vmci_doorbell.resource, error);
-            STATS_INC(b->stats.doorbell_set);
-        }
-        
-        +if ((b->capabilities & VMW_BALLOON_SIGNALLED_WAKEUP_CMD) == 0)
-            return 0;
-        
-        +if (error != VMCI_SUCCESS) {
-            VMWARE_BALLOON_CMD(VMCI_DOORBELL_SET, b->vmci_doorbell.context,
-                b->vmci_doorbell.resource, error);
-            STATS_INC(b->stats.doorbell_set);
-        }
-        
-        +if ((b->capabilities & VMW_BALLOON_SIGNALLED_WAKEUP_CMD) == 0)
-            return 0;
-        
-        +if (error != 0) {
-            vmballoon_vmci_cleanup(b);
-            +error = vmci_doorbell_create(&b->vmci_doorbell, VMCI_FLAG_DELAYED_CB,
-                VMCI_PRIVILEGE_FLAG_RESTRICTED,
-                vmballoon_doorbell, b);
-            
-            +VMCI_FLAG_DELAYED_CB,
-                VMCI_PRIVILEGE_FLAG_RESTRICTED,
-                vmballoon_doorbell, b);
-
-        -return -EIO;
-    }
+error = VMWARE_BALLOON_CMD(VMCI_DOORBELL_SET, b->vmci_doorbell.context,
+        b->vmci_doorbell.resource, dummy);
+    
-    
-    }
+STATS_INC(b->stats.doorbell_set);
+
+if (error != VMW_BALLOON_SUCCESS)
+goto fail;

return 0;
+fail:
+vmballoon_vmci_cleanup(b);
+return -EIO;
}

/*@ -1298,7 +1298,14 @@*/

return 0;
}
-module_init(vmballoon_init);
+
+/*!*
+ * Using late_initcall() instead of module_init() allows the balloon to use the
+ * VMCI doorbell even when the balloon is built into the kernel. Otherwise the
+ * VMCI is probed only after the balloon is initialized. If the balloon is used
+ * as a module, late_initcall() is equivalent to module_init().
+ */
+late_initcall(vmballoon_init);

static void __exit vmballoon_exit(void)
{

#include "vmci_driver.h"
#include "vmci_event.h"

/*@ Use a wide upper bound for the maximum contexts. */
+#define VMCI_MAX_CONTEXTS 2000
+
+/*!*
+ * List of current VMCI contexts. Contexts can be added by
+ * vmci_ctx_create() and removed via vmci_ctx_destroy().
+ */
+init_waitqueue_head(&context->host_context.wait_queue);

-context->queue_pair_array = vmci_handle_arr_create(0);
+context->queue_pair_array =
+vmci_handle_arr_create(0, VMCI_MAX_GUEST_QP_COUNT);
if (!context->queue_pair_array) {

```c
error = -ENOMEM;
goto err_free_ctx;
}

- context->doorbell_array = vmci_handle_arr_create(0);
+ context->doorbell_array =
+ vmci_handle_arr_create(0, VMCI_MAX_GUEST_DOORBELL_COUNT);
if (!context->doorbell_array) {
error = -ENOMEM;
goto err_free_qp_array;
}

- context->pending_doorbell_array = vmci_handle_arr_create(0);
+ context->pending_doorbell_array =
+ vmci_handle_arr_create(0, VMCI_MAX_GUEST_DOORBELL_COUNT);
if (!context->pending_doorbell_array) {
error = -ENOMEM;
goto err_free_db_array;
@@ -212,7 +218,7 @@
* We create an array to hold the subscribers we find when
* scanning through all contexts.
*/
- subscriber_array = vmci_handle_arr_create(0);
+ subscriber_array = vmci_handle_arr_create(0, VMCI_MAX_CONTEXTS);
if (subscriber_array == NULL)
return VMCI_ERROR_NO_MEM;

@@ -631,20 +637,26 @@

spin_lock(&context->lock);

- list_for_each_entry(n, &context->notifier_list, node) {
- if (vmci_handle_is_equal(n->handle, notifier->handle)) {
- exists = true;
- break;
- } +if (context->n_notifiers < VMCI_MAX_CONTEXTS) {
+ list_for_each_entry(n, &context->notifier_list, node) {
+ if (vmci_handle_is_equal(n->handle, notifier->handle)) {
+ exists = true;
+ break;
+ }
+ }
+ }
+ }
-}

- if (exists) {
- kfree(notifier);
- result = VMCI_ERROR_ALREADY_EXISTS;
+ if (exists) {
```
kfree(notifier);
+result = VMCI_ERROR_ALREADY_EXISTS;
+} else {
+klist_add_tail_rcu(&notifier->node, &context->notifier_list);
+context->n_notifiers++;
+result = VMCI_SUCCESS;
+
+
+} else {
-list_add_tail_rcu(&notifier->node, &context->notifier_list);
-context->n_notifiers++;
-result = VMCI_SUCCESS;
+kfree(notifier);
+result = VMCI_ERROR_NO_MEM;
}

spin_unlock(&context->lock);
@@ -729,8 +741,7 @@
@ @ -729,8 +741,7 @@

u32 *buf_size, void **pbuf)
}{
    struct dbell_cpt_state *dbells;
-size_t n_doorbells;
-int i;
+u32 i, n_doorbells;

    n_doorbells = vmci_handle_arr_get_size(context->doorbell_array);
    if (n_doorbells > 0) {
@@ -740,7 +751,7 @@
return VMCI_ERROR_MORE_DATA;
    }

-dbells = kmalloc(data_size, GFP_ATOMIC);
+dbells = kzalloc(data_size, GFP_ATOMIC);
    if (!dbells)
return VMCI_ERROR_NO_MEM;
@@ -868,7 +879,8 @@
    spin_lock(&context->lock);

    *db_handle_array = context->pending_doorbell_array;
-context->pending_doorbell_array = vmci_handle_arr_create(0);
+context->pending_doorbell_array =
+vmci_handle_arr_create(0, VMCI_MAX_GUEST_DOORBELL_COUNT);
    if (!context->pending_doorbell_array) {
        context->pending_doorbell_array = *db_handle_array;
+db_handle_array = NULL;
@@ -950,12 +962,11 @@
return VMCI_ERROR_NOT_FOUND;
spin_lock(&context->lock);
-if (!vmci_handle_arr_has_entry(context->doorbell_array, handle)) {
-vmci_handle_arr_append_entry(&context->doorbell_array, handle);
-result = VMCI_SUCCESS;
-} else {
+if (!vmci_handle_arr_has_entry(context->doorbell_array, handle))
+result = vmci_handle_arr_append_entry(&context->doorbell_array,
+  handle);
+else
result = VMCI_ERROR_DUPLICATE_ENTRY;
-}

spin_unlock(&context->lock);
vmci_ctx_put(context);
@@ -1091,15 +1102,16 @@
if (!vmci_handle_arr_has_entry(
    dst_context->pending_doorbell_array,
    handle)) {
-vmci_handle_arr_append_entry(
+result = vmci_handle_arr_append_entry(
    &dst_context->pending_doorbell_array,
    handle);
-
-ctx_signal_notify(dst_context);
-wake_up(&dst_context->host_context.wait_queue);
-
+if (result == VMCI_SUCCESS) {
+  ctx_signal_notify(dst_context);
+  wake_up(&dst_context->host_context.wait_queue);
+}
+} else {
+result = VMCI_SUCCESS;
}
-result = VMCI_SUCCESS;
}
spin_unlock(&dst_context->lock);
} @@ -1126,13 +1138,11 @@
if (context == NULL || vmci_handle_is_invalid(handle))
return VMCI_ERROR_INVALID_ARGS;

-if (!vmci_handle_arr_has_entry(context->queue_pair_array, handle)) {
-vmci_handle_arr_append_entry(&context->queue_pair_array,
-  handle);
-result = VMCI_SUCCESS;
-} else {
+if (!vmci_handle_arr_has_entry(context->queue_pair_array, handle))

result = vmci_handle_arr_append_entry(
    &context->queue_pair_array, handle);
else
result = VMCI_ERROR_DUPLICATE_ENTRY;
}

return result;
}
--- linux-4.15.0.orig/drivers/misc/vmw_vmci/vmci_doorbell.c
+++ linux-4.15.0/drivers/misc/vmw_vmci/vmci_doorbell.c
@@ -318,7 +318,8 @@
    entry = container_of(resource, struct dbell_entry, resource);
    if (entry->run_delayed) {
        schedule_work(&entry->work);
    } else {
        entry->notify_cb(entry->client_data);
        vmci_resource_put(resource);
    } @ @ -318,7 +318,8 @@
bool vmci_dbell_register_notification_bitmap(u32 bitmap_ppn)
{
    int result;
-struct vmci_notify_bm_set_msg bitmap_set_msg = { };
+struct vmci_notify_bm_set_msg bitmap_set_msg = { }; 
    bitmap_set_msg.hdr.dst = vmci_make_handle(VMCI_HYPERVISOR_CONTEXT_ID,
        VMCI_SET_NOTIFY_BITMAP);
    @ @ -366,7 +367,8 @@
            atomic_read(&dbell->active) == 1) {
        if (dbell->run_delayed) {
            vmci_resource_get(&dbell->resource);
        } else {
            dbell->notify_cb(dbell->client_data);
        } @ @ -113,5 +113,5 @@
M

MODULE_AUTHOR("VMware, Inc.");
MODULE_DESCRIPTION("VMware Virtual Machine Communication Interface.");
-MODULE_VERSION("1.1.5.0-k");
+MODULE_VERSION("1.1.6.0-k");
MODULE_LICENSE("GPL v2");
-check_msg = kmalloc(msg_size, GFP_KERNEL);
+check_msg = kzalloc(msg_size, GFP_KERNEL);
if (!check_msg) {
    dev_err(&pdev->dev, "%s: Insufficient memory\n", __func__); return -ENOMEM;
--- linux-4.15.0.orig/drivers/misc/vmw_vmci/vmci_handle_array.c
+++ linux-4.15.0/drivers/misc/vmw_vmci/vmci_handle_array.c
@@ -16,24 +16,29 @@
#include <linux/slab.h>
#include "vmci_handle_array.h"

-struct vmci_handle_arr *vmci_handle_arr_create(size_t capacity)
+struct vmci_handle_arr *vmci_handle_arr_create(u32 capacity, u32 max_capacity)
{
    struct vmci_handle_arr *array;
    if (max_capacity == 0 || capacity > max_capacity)
        return NULL;
    if (capacity == 0)
        capacity = VMCI_HANDLE_ARRAY_DEFAULT_CAPACITY;
-    capacity = VMCI_HANDLE_ARRAY_DEFAULT_SIZE;
+    capacity = min((u32)VMCI_HANDLE_ARRAY_DEFAULT_CAPACITY,
        max_capacity);

    array = kmalloc(handle_arr_calc_size(capacity), GFP_ATOMIC);
    if (!array)
        return NULL;

    array->capacity = capacity;
+    array->max_capacity = max_capacity;
    array->size = 0;

    return array;
@@ -44,27 +49,34 @@
kfree(array);
}

-void vmci_handle_arr_append_entry(struct vmci_handle_arr **array_ptr,  
  struct vmci_handle handle)
+int vmci_handle_arr_append_entry(struct vmci_handle_arr **array_ptr,  
  struct vmci_handle handle)
{
  struct vmci_handle_arr *array = *array_ptr;

  if (unlikely(array->size >= array->capacity)) {
    /* reallocate. */
    struct vmci_handle_arr *new_array;
    -size_t new_capacity = array->capacity * VMCI_ARR_CAP_MULT;
    -size_t new_size = handle_arr_calc_size(new_capacity);
    +u32 capacity_bump = min(array->max_capacity - array->capacity,  
                              array->capacity);
    +size_t new_size = handle_arr_calc_size(array->capacity +  
                                           capacity_bump);
    +
    +if (array->size >= array->max_capacity)
      +return VMCI_ERROR_NO_MEM;
    new_array = krealloc(array, new_size, GFP_ATOMIC);
    if (!new_array)
      +return VMCI_ERROR_NO_MEM;
    new_array->capacity = new_capacity;
    +new_array->capacity += capacity_bump;
    *array_ptr = array = new_array;
  }

  array->entries[array->size] = handle;
  array->size++;
  +
  +return VMCI_SUCCESS;
}

/*@ -74,7 +86,7 @*/
struct vmci_handle entry_handle)
{
  struct vmci_handle handle = VMCI_INVALID.Handle;
  -size_t i;
  +u32 i;

  for (i = 0; i < array->size; i++) {
    /*
if (vmci_handle_is_equal(array->entries[i], entry_handle)) {
@@ -109,7 +121,7 @@
 * Handle at given index, VMCI_INVALID_HANDLE if invalid index.
 */

 struct vmci_handle
@@ -109,7 +121,7 @@
 struct vmci_handle_arr_get_entry(const struct vmci_handle_arr *array, size_t index)
 +vmci_handle_arr_get_entry(const struct vmci_handle_arr *array, u32 index)
 {
 if (unlikely(index >= array->size))
 return VMCI_INVALID_HANDLE;
@@ -120,7 +132,7 @@
 bool vmci_handle_arr_has_entry(const struct vmci_handle_arr *array,
 - struct vmci_handle entry_handle)
+
 {
 -size_t i;
 +u32 i;

 for (i = 0; i < array->size; i++)
 if (vmci_handle_is_equal(array->entries[i], entry_handle))
 --- linux-4.15.0.orig/drivers/misc/vmw_vmci/vmci_handle_array.h
+++ linux-4.15.0/drivers/misc/vmw_vmci/vmci_handle_array.h
@@ -17,32 +17,41 @@
 #define _VMCI_HANDLE_ARRAY_H_

 #include <linux/vmw_vmci_defs.h>
+#include <linux/limits.h>
+#include <linux/types.h>

-#define VMCI_HANDLE_ARRAY_DEFAULT_SIZE 4
-#define VMCI_ARR_CAP_MULT 2/* Array capacity multiplier */
-struct vmci_handle_arr {
- size_t capacity;
- size_t size;
- +u32 capacity;
- +u32 max_capacity;
- +u32 size;
- +u32 pad;
 struct vmci_handle entries[];
}:

-struct vmci_handle_arr *vmci_handle_arr_create(size_t capacity);
+#define VMCI_HANDLE_ARRAY_HEADER_SIZE
+offsetof(struct vmci_handle_arr, entries)
+/* Select a default capacity that results in a 64 byte sized array */
+#define VMCI_HANDLE_ARRAY_DEFAULT_CAPACITY
+/* Make sure that the max array size can be expressed by a u32 */
+
+((U32_MAX - VMCI_HANDLE_ARRAY_HEADER_SIZE - 1) ∧
+sizeof(struct vmci_handle))
+
+struct vmci_handle_arr *vmci_handle_arr_create(u32 capacity, u32 max_capacity);
void vmci_handle_arr_destroy(struct vmci_handle_arr *array);

-void vmci_handle_arr_append_entry(struct vmci_handle_arr **array_ptr,
- struct vmci_handle handle);

+int vmci_handle_arr_append_entry(struct vmci_handle_arr **array_ptr,
+ struct vmci_handle handle);

struct vmci_handle vmci_handle_arr_remove_entry(struct vmci_handle_arr *array,
struct vmci_handle entry_handle);
struct vmci_handle vmci_handle_arr_remove_tail(struct vmci_handle_arr *array);
struct vmci_handle

-vmci_handle_arr_get_entry(const struct vmci_handle_arr *array, size_t index);
+
+vmci_handle_arr_get_entry(const struct vmci_handle_arr *array, u32 index);

bool vmci_handle_arr_has_entry(const struct vmci_handle_arr *array,
struct vmci_handle entry_handle);

struct vmci_handle *vmci_handle_arr_get_handles(struct vmci_handle_arr *array);

-static inline size_t vmci_handle_arr_get_size(
+static inline u32 vmci_handle_arr_get_size(
const struct vmci_handle_arr *array)
{
 return array->size;

--- linux-4.15.0.orig/drivers/misc/vmw_vmci/vmci_queue_pair.c
+++ linux-4.15.0/drivers/misc/vmw_vmci/vmci_queue_pair.c
@@ -639,6 +639,9 @@
 queue_page_size = num_pages * sizeof(*queue->kernel_if->u.h.page);

+if (queue_size + queue_page_size > KMALLOC_MAX_SIZE)
+return NULL;
+
 queue = kzalloc(queue_size + queue_page_size, GFP_KERNEL);
 if (queue) {
 queue->q_header = NULL;
@@ -732,7 +735,7 @@
 for (i = 0; i < num_pages; i++) {
 if (dirty)
 -set_page_dirty(pages[i]);
+set_page_dirty_lock(pages[i]);

 put_page(pages[i]);
 pages[i] = NULL;
@@ -755,11 +758,12 @@
 retval = get_user_pages_fast((uintptr_t) produce_uva,

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produce_q->kernel_if->num_pages, 1,
produce_q->kernel_if->u.h.header_page);
- if (retval < produce_q->kernel_if->num_pages) {
+ if (retval < (int)produce_q->kernel_if->num_pages) {
    pr_debug("get_user_pages_fast(produce) failed (retval=%d)",
    retval);
    qp_release_pages(produce_q->kernel_if->u.h.header_page,
    - retval, false);
+    if (retval > 0)
+        qp_release_pages(produce_q->kernel_if->u.h.header_page,
+            retval, false);
    err = VMCI_ERROR_NO_MEM;
    goto out;
}
@@ -767,11 +771,12 @@
retval = get_user_pages_fast((uintptr_t) consume_uva,
    consume_q->kernel_if->num_pages, 1,
    consume_q->kernel_if->u.h.header_page);
- if (retval < consume_q->kernel_if->num_pages) {
+ if (retval < (int)consume_q->kernel_if->num_pages) {
    pr_debug("get_user_pages_fast(consume) failed (retval=%d)",
    retval);
    qp_release_pages(consume_q->kernel_if->u.h.header_page,
    - retval, false);
+    if (retval > 0)
+        qp_release_pages(consume_q->kernel_if->u.h.header_page,
+            retval, false);
    qp_release_pages(produce_q->kernel_if->u.h.header_page,
    produce_q->kernel_if->num_pages, false);
    err = VMCI_ERROR_NO_MEM;
@@ -2333,7 +2338,8 @@
 is_local = entry->qp.flags & VMCI_QPFLAG_LOCAL;
 result = VMCI_SUCCESS;
- if (context_id != VMCI_HOST_CONTEXT_ID) {
+ if (context_id != VMCI_HOST_CONTEXT_ID &&
+     !QPbrokerSTATE_HAS_MEM(entry)) {
    struct vmci_qp_page_store page_store;
    page_store.pages = guest_mem;
@@ -2443,7 +2449,8 @@
 is_local = entry->qp.flags & VMCI_QPFLAG_LOCAL;
- if (context_id != VMCI_HOST_CONTEXT_ID) {
+ if (context_id != VMCI_HOST_CONTEXT_ID &&
+     QPbrokerSTATE_HAS_MEM(entry)) {
    qp_acquire_queue_mutex(entry->produce_q);
result = qp_save_headers(entry);
if (result < VMCI_SUCCESS)
    --- linux-4.15.0.orig/drivers/misc/vmw_vmci/vmci_resource.c
+++ linux-4.15.0/drivers/misc/vmw_vmci/vmci_resource.c
@@ -57,7 +57,8 @@
    if (r->type == type &&
         rid == handle.resource &&
    - (cid == handle.context || cid == VMCI_INVALID_ID)) {
    + (cid == handle.context || cid == VMCI_INVALID_ID ||
       handle.context == VMCI_INVALID_ID)) {
        resource = r;
        break;
    }
--- linux-4.15.0.orig/drivers/mmc/core/block.c
+++ linux-4.15.0/drivers/mmc/core/block.c
@@ -66,6 +66,7 @@
#define MMC_BLK_TIMEOUT_MS (10 * 60 * 1000)        /* 10 minute timeout */
#define MMC_SANITIZE_REQ_TIMEOUT 240000
+#define MMC_EXTRACT_INDEX_FROM_ARG(x) ((x & 0x00FF0000) >> 16)
#define MMC_EXTRACT_VALUE_FROM_ARG(x) ((x & 0x0000FF00) >> 8)
#define mmc_req_rel_wr(req)((req->cmd_flags & REQ_FUA) &&
    (rq_data_dir(req) == WRITE))
@@ -471,7 +472,7 @@
static int __mmc_blk_ioctl_cmd(struct mmc_card *card, struct mmc_blk_data *md,
    -struct mmc_command cmd = {};    
    +struct mmc_command cmd = {}, sbc = {};
    struct mmc_data data = {};
    struct mmc_request mrq = {};
    struct scatterlist sg;
    @ @ -549,10 +550,15 @@
}
if (idata->rpmb) {
    -err = mmc_set_blockcount(card, data.blocks,
    -idata->ic.write_flag & (1 << 31));
    -if (err)
    -return err;
    +sbc.opcode = MMC_SET_BLOCK_COUNT;
    +# We don't do any blockcount validation because the max size
    +# may be increased by a future standard. We just copy the
    +# ’Reliable Write’ bit here.
    +#
    +sbc.arg = data.blocks | (idata->ic.write_flag & BIT(31));
+sbc.flags = MMC_RSP_R1 | MMC_CMD_AC;
+mrq.sbc = &sbc;
}

if ((MMC_EXTRACT_INDEX_FROM_ARG(cmd.arg) == EXT_CSD_SANITIZE_START) &&
    @@ -580,6 +586,36 @@
}

/*
 * Make sure the cache of the PARTITION_CONFIG register and
 * PARTITION_ACCESS bits is updated in case the ioctl ext_csd write
 * changed it successfully.
 */
+if ((MMC_EXTRACT_INDEX_FROM_ARG(cmd.arg) == EXT_CSD_PART_CONFIG) &&
    (cmd.opcode == MMC_SWITCH)) {
+    struct mmc_blk_data *main_md = dev_get_drvdata(&card->dev);
+    u8 value = MMC_EXTRACT_VALUE_FROM_ARG(cmd.arg);
+    /*
    +    * Update cache so the next mmc_blk_part_switch call operates
    +    * on up-to-date data.
    +    */
+    card->ext_csd.part_config = value;
+    main_md->part_curr = value & EXT_CSD_PART_CONFIG_ACC_MASK;
+}
+
+/*
 * Make sure to update CACHE_CTRL in case it was changed. The cache
 * will get turned back on if the card is re-initialized, e.g.
 * suspend/resume or hw reset in recovery.
 */
+if ((MMC_EXTRACT_INDEX_FROM_ARG(cmd.arg) == EXT_CSD_CACHE_CTRL) &&
    (cmd.opcode == MMC_SWITCH)) {
+    u8 value = MMC_EXTRACT_VALUE_FROM_ARG(cmd.arg) & 1;
+    /*
    +    * According to the SD specs, some commands require a delay after
    +    * issuing the command.
    */
    @@ -1646,6 +1682,16 @@
    if (brq->data.blocks > 1) {
    /*
    +    * Some SD cards in SPI mode return a CRC error or even lock up
    +    * completely when trying to read the last block using a
+ * multiblock read command.
+ */
+if (mmc_host_is_spi(card->host) && (rq_data_dir(req) == READ) &&
+   (blk_rq_pos(req) + blk_rq_sectors(req) ==
+    get_capacity(md->disk))
+brq->data.blocks--;
+
+/*
* After a read error, we redo the request one sector
* at a time in order to accurately determine which
* sectors can be read successfully.
@@ -2182,12 +2228,6 @@
    snprintf(md->disk->disk_name, sizeof(md->disk->disk_name),
        "mmcblk%u%s", card->host->index, subname ? subname : "");

-if (mmc_card_mmc(card))
-bblk_queue_logical_block_size(md->queue.queue,
-   card->ext_csd.data_sector_size);
-else
-bblk_queue_logical_block_size(md->queue.queue, 512);
-
-set_capacity(md->disk, size);

if (mmc_host_cmd23(card->host)) {
 @@ -2297,7 +2337,7 @@
    break;
 }

-return 0;
+return ret;
 }

#endif CONFIG_COMPAT
@@ -2325,8 +2365,8 @@
    struct mmc_rpmb_data *rpmb = container_of(inode->i_cdev,
        struct mmc_rpmb_data, chrdev);

-put_device(&rpmb->dev);
 mmc_blk_put(rpmb->md);
+put_device(&rpmb->dev);

 return 0;
 }
@@ -2623,6 +2663,7 @@

 if (n != EXT_CSD_STR_LEN) {
    err = -EINVAL;
+kfree(ext_csd);

goto out_free;
}

@@ -2895,6 +2936,7 @@
mmc_unregister_driver(&mmc_driver);
unregister_blkdev(MMC_BLOCK_MAJOR, "mmc");
unregister_chrdev_region(mmc_rpmb_devt, MAX_DEVICES);
+bus_unregister(&mmc_rpmb_bus_type);
}

module_init(mmc_blk_init);
--- linux-4.15.0.orig/drivers/mmc/core/bus.c
+++ linux-4.15.0/drivers/mmc/core/bus.c
@@ -378,11 +378,6 @@
mmc_remove_card_debugfs(card);
#endif

-if (host->cqe_enabled) {
-host->cqe_ops->cqe_disable(host);
-host->cqe_enabled = false;
-}
-
if (mmc_card_present(card)) {
-if (mmc_host_is_spi(card->host)) {
pr_info("%s: SPI card removed\n",  
@@ -395,6 +390,10 @@
of_node_put(card->dev.of_node);
}

+if (host->cqe_enabled) {
+host->cqe_ops->cqe_disable(host);
+host->cqe_enabled = false;
+}
+
+put_device(&card->dev);
} 
-
--- linux-4.15.0.orig/drivers/mmc/core/card.h
+++ linux-4.15.0/drivers/mmc/core/card.h
@@ -82,6 +82,7 @@
#define CID_MANFID_APACER 0x27
#define CID_MANFID_KINGSTON 0x70
#define CID_MANFID_HYNIX 0x90
+#define CID_MANFID_NUMONYX 0xFE
#define END_FIXUP { NULL }

--- linux-4.15.0.orig/drivers/mmc/core/core.c
if (!data)
return;

@if (cmd->error || data->error ||
!should_fail(&host->fail_mmc_request, data->blksz * data->blocks))
return;

int err = cmd->error;

/* Flag re-tuning needed on CRC errors */
@if ((cmd->opcode != MMC_SEND_TUNING_BLOCK && cmd->opcode != MMC_SEND_TUNING_BLOCK_HS200) &&
+ (cmd->opcode != MMC_SEND_TUNING_BLOCK &&
+ !host->retune_crc_disable &&
+ (err == -EILSEQ || (mrq->data && mrq->data->error == -EILSEQ) ||
+ (mrq->stop && mrq->stop->error == -EILSEQ)))
@@ -1088,7 +1089,10 @@
spin_unlock_irqrestore(&host->lock, flags);
wake_up(&host->wq);
pm_runtime_mark_last_busy(mmc_dev(host));
-pm_runtime_put_autosuspend(mmc_dev(host));
+if (host->caps & MMC_CAP_SYNC_RUNTIME_PM)
+pm_runtime_put_sync_suspend(mmc_dev(host));
+else
+pm_runtime_put_autosuspend(mmc_dev(host));
}
EXPORT_SYMBOL(mmc_release_host);
@@ -1180,11 +1184,14 @@
err = host->ops->execute_tuning(host, opcode);

-@ @ -1180,11 +1184,14 @@

@if (err)
+if (err) {
pr_err("%s: tuning execution failed: %d\n",
mmc_hostname(host), err);
-else
+} else {
+host->retune_now = 0;
+host->need_retune = 0;
mmc_retune_enable(host);
+}
return err;
}
@@ -1726,7 +1733,7 @@
err = mmc_wait_for_cmd(host, &cmd, 0);
if (err)
    return err;
+goto power_cycle;

if (!mmc_host_is_spi(host) && (cmd.resp[0] & R1_ERROR))
    return -EIO;
@@ -2237,8 +2244,11 @@
    * the erase operation does not exceed the max_busy_timeout, we should
    * use R1B response. Or we need to prevent the host from doing hw busy
    * detection, which is done by converting to a R1 response instead.
    + * Note, some hosts requires R1B, which also means they are on their own
    + * when it comes to deal with the busy timeout.
    */
-    if (card->host->max_busy_timeout &&
+    if (!(card->host->caps & MMC_CAP_NEED_RSP_BUSY) &&
        card->host->max_busy_timeout &&
        busy_timeout > card->host->max_busy_timeout) {
        cmd.flags = MMC_RSP_SPI_R1 | MMC_RSP_R1 | MMC_CMD_AC;
    } else {
        max_discard = mmc_do_calc_max_discard(card, MMC_ERASE_ARG);
        if (mmc_can_trim(card)) {
            max_trim = mmc_do_calc_max_discard(card, MMC_TRIM_ARG);
-            if (max_trim < max_discard)
+            if (max_trim < max_discard || max_discard == 0)
                max_discard = max_trim;
        } else if (max_discard < card->erase_size) {
            max_discard = 0;
@@ -2959,6 +2969,14 @@
        if (!err)
            break;

        +if (!mmc_card_is_removable(host)) {
            +dev_warn(mmc_dev(host),
-            +"pre_suspend failed for non-removable host: ",
-            +"%d\n", err);
-            +/* Avoid removing non-removable hosts */
+            +break;
+        }
+        
+    /* Calling bus_ops->remove() with a claimed host can deadlock */
+    host->bus_ops->remove(host);

mcc_claim_host(host);

--- linux-4.15.0.orig/drivers/mmc/core/host.c
+++ linux-4.15.0/drivers/mmc/core/host.c
@@ -380,8 +380,6 @@
 if (mcc_gpio_alloc(host)) {
     put_device(&host->class_dev);
     -ida_simple_remove(&mmc_host_ida, host->index);
-    kfree(host);
     return NULL;
 }
EXT_CSD_PART_CONFIG_ACC_GP0 + idx,
"gp%d", idx, false,
    @@ -364,7 +364,7 @@
static int mmc_decode_ext_csd(struct mmc_card *card, u8 *ext_csd)
{
    int err = 0, idx;
    unsigned int part_size;
    +u64 part_size;
    struct device_node *np;
    bool broken_hpi = false;

    @@ -426,10 +426,6 @@
/* EXT_CSD value is in units of 10ms, but we store in ms */
    card->ext_csd.part_time = 10 * ext_csd[EXT_CSD_PART_SWITCH_TIME];
-/* Some eMMC set the value too low so set a minimum */
-    -if (card->ext_csd.part_time &
-        -    card->ext_csd.part_time < MMC_MIN_PART_SWITCH_TIME)
-        -card->ext_csd.part_time = MMC_MIN_PART_SWITCH_TIME;
/* Sleep / awake timeout in 100ns units */
    if (sa_shift > 0 && sa_shift <= 0x17)
        @@ -526,8 +522,7 @@
            card->cid.year += 16;
/* check whether the eMMC card supports BKOPS */
    -if (!mmc_card_broken_hpi(card) &
        -    ext_csd[EXT_CSD_BKOPS_SUPPORT] & 0x1) {
        +if (ext_csd[EXT_CSD_BKOPS_SUPPORT] & 0x1) {
            card->ext_csd.bkops = 1;
            card->ext_csd.man_bkops_en =
                (ext_csd[EXT_CSD_BKOPS_EN] &
                @@ -620,6 +615,17 @@
                    card->ext_csd.data_sector_size = 512;
    }
    */
    +/* GENERIC_CMD6_TIME is to be used "unless a specific timeout is defined
    + when accessing a specific field", so use it here if there is no
    + PARTITION_SWITCH_TIME.
    + */
    +if (!card->ext_csd.part_time)
        +card->ext_csd.part_time = card->ext_csd.generic_cmd6_time;
    +/* Some eMMC set the value too low so set a minimum */
    +if (card->ext_csd.part_time < MMC_MIN_PART_SWITCH_TIME)
        +card->ext_csd.part_time = MMC_MIN_PART_SWITCH_TIME;
    +/* eMMC v5 or later */

if (card->ext_csd.rev >= 7) {
    memcpy(card->ext_csd.fwrev, &ext_csd[EXT_CSD_FIRMWARE_VERSION], @ @ -1762,20 +1768,26 @ @
    if (err) {
        pr_warn("%s: Enabling HPI failed\n",
        mmc_hostname(card->host));
        +card->ext_csd.hpi_en = 0;
        err = 0;
        } else
        +} else {
        card->ext_csd.hpi_en = 1;
        +
    }
}

/*
 - * If cache size is higher than 0, this indicates
 - * the existence of cache and it can be turned on.
 + * If cache size is higher than 0, this indicates the existence of cache
 + * and it can be turned on. Note that some eMMCs from Micron has been
 + * reported to need ~800 ms timeout, while enabling the cache after
 + * sudden power failure tests. Let's extend the timeout to a minimum of
 + * DEFAULT_CACHE_EN_TIMEOUT_MS and do it for all cards.
 */
-if (!mmc_card_broken_hpi(card) &&
-    card->ext_csd.cache_size > 0) {
+if (card->ext_csd.cache_size > 0) {
+    unsigned int timeout_ms = MIN_CACHE_EN_TIMEOUT_MS;
+    +timeout_ms = max(card->ext_csd.generic_cmd6_time, timeout_ms);
    err = mmc_switch(card, EXT_CSD_CMD_SET_NORMAL,
    -EXT_CSD_CACHE_CTRL, 1,
    -card->ext_csd.generic_cmd6_time);
    +EXT_CSD_CACHE_CTRL, 1, timeout_ms);
    if (err && err != -EBADMSG)
        goto free_card;
@@ -1867,9 +1879,12 @@
 * If the max_busy_timeout of the host is specified, validate it against
 * the sleep cmd timeout. A failure means we need to prevent the host
 * from doing hw busy detection, which is done by converting to a R1
-* response instead of a R1B.
+* response instead of a R1B. Note, some hosts requires R1B, which also
+* means they are on their own when it comes to deal with the busy
+* timeout.
 */
-if (host->max_busy_timeout && (timeout_ms > host->max_busy_timeout)) {
+if (!(host->caps & MMC_CAP_NEED_RSP_BUSY) && host->max_busy_timeout &&
+    (timeout_ms > host->max_busy_timeout)) {
cmd.flags = MMC_RSP_R1 | MMC_CMD_AC;
} else {
  cmd.flags = MMC_RSP_R1B | MMC_CMD_AC;
--- linux-4.15.0.orig/drivers/mmc/core/mmc_ops.c
+++ linux-4.15.0/drivers/mmc/core/mmc_ops.c
@@ -536,10 +536,12 @@
 /* If the cmd timeout and the max_busy_timeout of the host are both
 * specified, let's validate them. A failure means we need to prevent
 * the host from doing hw busy detection, which is done by converting
- * to a R1 response instead of a R1B.
+ * to a R1 response instead of a R1B. Note, some hosts requires R1B,
+ * which also means they are on their own when it comes to deal with the
+ * busy timeout.
+ */
-    -if (timeout_ms && host->max_busy_timeout &&
-      (timeout_ms > host->max_busy_timeout))
+    if (!(host->caps & MMC_CAP_NEED_RSP_BUSY) && timeout_ms &&
+      host->max_busy_timeout && (timeout_ms > host->max_busy_timeout))
  use_r1b_resp = false;

  cmd.opcode = MMC_SWITCH;
--- linux-4.15.0.orig/drivers/mmc/core/mmc_test.c
+++ linux-4.15.0/drivers/mmc/core/mmc_test.c
@@ -2328,10 +2328,17 @@
   err = mmc_hw_reset(host);
   -if (!err)
   +if (!err) {
+     /*
+      * Reset will re-enable the card's command queue, but tests
+      * expect it to be disabled.
+      */
+     if (card->ext_csd.cmdq_en)
+       mmc_cmdq_disable(card);
+     return RESULT_OK;
+   -else if (err == -EOPNOTSUPP)
      +} else if (err == -EOPNOTSUPP) {
       return RESULT_UNSUP_HOST;
+    }

    return RESULT_FAIL;
  }
--- linux-4.15.0.orig/drivers/mmc/core/pwrseq_emmc.c
+++ linux-4.15.0/drivers/mmc/core/pwrseq_emmc.c
@@ @ -.30,19 +30,14 @@

#define to_pwrseq_emmc(p) container_of(p, struct mmc_pwrseq_emmc, pwrseq)
static void __mmc_pwrseq_emmc_reset(struct mmc_pwrseq_emmc *pwrseq)
{
    gpiod_set_value(pwrseq->reset_gpio, 1);
    udelay(1);
    gpiod_set_value(pwrseq->reset_gpio, 0);
    udelay(200);
}

static void mmc_pwrseq_emmc_reset(struct mmc_host *host)
{
    struct mmc_pwrseq_emmc *pwrseq = to_pwrseq_emmc(host->pwrseq);
    gpiod_set_value_cansleep(pwrseq->reset_gpio, 1);
    udelay(1);
    gpiod_set_value_cansleep(pwrseq->reset_gpio, 0);
    udelay(200);
}

static int mmc_pwrseq_emmc_reset_nb(struct notifier_block *this, struct mmc_pwrseq_emmc *pwrseq);

if (IS_ERR(pwrseq->reset_gpio))
    return PTR_ERR(pwrseq->reset_gpio);

    /*
    * register reset handler to ensure emmc reset also from
    * emergency_reboot(), priority 255 is the highest priority
    * so it will be executed before any system reboot handler.
    * */
    pwrseq->reset_nb.notifier_call = mmc_pwrseq_emmc_reset_nb;
    pwrseq->reset_nb.priority = 255;
    register_restart_handler(&pwrseq->reset_nb);
    if (!gpiod_cansleep(pwrseq->reset_gpio))
+ * register reset handler to ensure emmc reset also from
+ * emergency_reboot(), priority 255 is the highest priority
+ * so it will be executed before any system reboot handler.
+ */
+pwrseq->reset_nb.notifier_call = mmc_pwrseq_emmc_reset_nb;
pwrseq->reset_nb.priority = 255;
+register_restart_handler(&pwrseq->reset_nb);
+} else {
+dev_notice(dev, "EMMC reset pin tied to a sleepy GPIO driver; reset on emergency-reboot disabled\n");
+
}
pwrseq->pwrseq.ops = &mmc_pwrseq_emmc_ops;
pwrseq->pwrseq.dev = dev;
--- linux-4.15.0.orig/drivers/mmc/core/pwrseq_simple.c
+++ linux-4.15.0/drivers/mmc/core/pwrseq_simple.c
@@ -40,14 +40,18 @@
 struct gpio_descs *reset_gpios = pwrseq->reset_gpios;

 if (!IS_ERR(reset_gpios)) {
- int i;
- int values[reset_gpios->ndescs];
+ int i, *values;
+ int nvalues = reset_gpios->ndescs;

 -for (i = 0; i < reset_gpios->ndescs; i++)
 +values = kmalloc_array(nvalues, sizeof(int), GFP_KERNEL);
 +if (!values)
 + return;
 +
 +for (i = 0; i < nvalues; i++)
 values[i] = value;

 -gpiod_set_array_value_cansleep(
 -reset_gpios->ndescs, reset_gpios->desc, values);
 +gpiod_set_array_value_cansleep(nvalues, reset_gpios->desc, values);
 +kfree(values);
 }
}

--- linux-4.15.0.orig/drivers/mmc/core/queue.c
+++ linux-4.15.0/drivers/mmc/core/queue.c
 @@ -143,7 +143,7 @@
 q->limits.discard_granularity = card->pref_erase << 9;
 /* granularity must not be greater than max. discard */
 if (card->pref_erase > max_discard)
- q->limits.discard_granularity = 0;
+ q->limits.discard_granularity = SECTOR_SIZE;
 if (mmc_can_secure_erase_trim(card))


queue_flag_set_unlocked(QUEUE_FLAG_SECERASE, q):
}@@ -181,6 +181,7 @@
{
    struct mmc_host *host = card->host;
u64 limit = BLK_BOUNCE_HIGH;
+    unsigned block_size = 512;

    if (mmc_dev(host)->dma_mask && *mmc_dev(host)->dma_mask)
        limit = (u64)dma_max_pfn(mmc_dev(host)) << PAGE_SHIFT;
@@ -194,7 +195,15 @@
            blk_queue_max_hw_sectors(mq->queue,
                min(host->max_blk_count, host->max_req_size / 512));
            blk_queue_max_segments(mq->queue, host->max_segs);
+        blk_queue_max_segment_size(mq->queue, host->max_seg_size);
+        if (mmc_card_mmc(card) && card->ext_csd.data_sector_size) {
+            block_size = card->ext_csd.data_sector_size;
+            WARN_ON(block_size != 512 && block_size != 4096);
+        }
+        blk_queue_logical_block_size(mq->queue, block_size);
+        blk_queue_max_segment_size(mq->queue,
+            round_down(host->max_seg_size, block_size));

    /* Initialize thread_sem even if it is not used */
    sema_init(&mq->thread_sem, 1);
--- linux-4.15.0.orig/drivers/mmc/core/quirks.h
+++ linux-4.15.0/drivers/mmc/core/quirks.h
@@ -109,11 +109,24 @@
*/
MMC_FIXUP_EXT_CSD_REV(CID_NAME_ANY, CID_MANFID_HYNIX,
    0x014a, add_quirk, MMC_QUIRK_BROKEN_HPI, 5),
+/*
+ * Certain Micron (Numonyx) eMMC 4.5 cards might get broken when HPI
+ * feature is used so disable the HPI feature for such buggy cards.
+ */
+MMC_FIXUP_EXT_CSD_REV(CID_NAME_ANY, CID_MANFID_NUMONYX,
+    0x014e, add_quirk, MMC_QUIRK_BROKEN_HPI, 6),
END_FIXUP
};

+static const struct mmc_fixup sdio_fixup_methods[] = {
+    SDIO_FIXUP(SDIO_VENDOR_ID_TI_WL1251, SDIO_DEVICE_ID_TI WL1251,
+        add_quirk, MMC_QUIRK_NONSTD_FUNC_IF),
+    ...
+SDIO_FIXUP(SDIO_VENDOR_ID_TI_WL1251, SDIO_DEVICE_ID_TI_WL1251,
+    add_quirk, MMC_QUIRK_DISABLE_CD),
+
+SDIO_FIXUP(SDIO_VENDOR_ID_TI, SDIO_DEVICE_ID_TI_WL1271,
    add_quirk, MMC_QUIRK_NONSTD_FUNC_IF),

--- linux-4.15.0.orig/drivers/mmc/core/sd.c
+++ linux-4.15.0/drivers/mmc/core/sd.c
@@ -138,6 +138,9 @@
csd->erase_size = UNSTUFF_BITS(resp, 39, 7) + 1;
csd->erase_size <<= csd->write_blkbits - 9;
}
+
+if (UNSTUFF_BITS(resp, 13, 1))
+    mmc_card_set_readonly(card);
break;

case 1:
/*
@@ -172,6 +175,9 @@
csd->write_blkbits = 9;
csd->write_partial = 0;
csd->erase_size = 1;
+
+if (UNSTUFF_BITS(resp, 13, 1))
+    mmc_card_set_readonly(card);
break;

default:
pr_err("%s: unrecognised CSD structure version %d\n",
@@ -216,6 +222,14 @@

if (scr->sda_spec3)
    scr->cmds = UNSTUFF_BITS(resp, 32, 2);
+
+/* SD Spec says: any SD Card shall set at least bits 0 and 2 */
+if (!((scr->bus_widths & SD_SCR_BUS_WIDTH_1) ||
+     !((scr->bus_widths & SD_SCR_BUS_WIDTH_4)) {  
+pr_err("%s: invalid bus width\n", mmc_hostname(card->host));
+return -EINVAL;
+
+}
+return 0;
}

@@ -773,11 +787,13 @@
return err;

/*
- * In case CCS and S18A in the response is set, start Signal Voltage

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- * Switch procedure. SPI mode doesn't support CMD11.
+ * In case the S18A bit is set in the response, let's start the signal
+ * voltage switch procedure. SPI mode doesn't support CMD11.
+ * Note that, according to the spec, the S18A bit is not valid unless
+ * the CCS bit is set as well. We deliberately deviate from the spec in
+ * regards to this, which allows UHS-I to be supported for SDSC cards.
+ */
+ if (!mmc_host_is_spi(host) && rocr && (*rocr & 0x01000000)) {
+ ocr &= ~0x7FFF;
+ rocr = mmc_select_voltage(host, ocr);
+ /*
+ /* Some SD cards claims an out of spec VDD voltage range. Let's treat
+ /* these bits as being in-valid and especially also bit7.
+ + */
+ return err;
+ }
+ /*
--- linux-4.15.0.orig/drivers/mmc/core/sdio.c
+++ linux-4.15.0/drivers/mmc/core/sdio.c
@@ -717,9 +717,8 @@
/* Retry init sequence, but without R4_18V_PRESENT. */
  retries = 0;
  goto try_again;
-} else {
-  goto remove;
-}
+  return err;
+ }
+ /*
@@ -907,6 +906,10 @@

 static int mmc_sdio_suspend(struct mmc_host *host)
 {
+/* Prevent processing of SDIO IRQs in suspended state. */
+mmc_card_set_suspended(host->card);
+cancelDelayed_work_sync(&host->sdio_irq_work);
+ mmc_claim_host(host);
if (mmc_card_keep_power(host) && mmc_card_wake_sdio_irq(host))
@@ -962,13 +965,20 @@
err = sdio_enable_4bit_bus(host->card);
}

-if (!err && host->sdio_irqs) {
+if (!err)
+goto out;
+
+/* Allow SDIO IRQs to be processed again. */
+-/* Allow SDIO IRQs to be processed again. */
+-mmc_card_clr_suspended(host->card);
+
+-if (host->sdio_irqs) {
+if (!(host->caps2 & MMC_CAP2_SDIO_IRQ_NOTHREAD))
+wake_up_process(host->sdio_irq_thread);
+else if (host->caps & MMC_CAP_SDIO_IRQ)
+host->ops->enable_sdio_irq(host, 1);
+}
+
+out:
++out:
mmc_release_host(host);

host->pm_flags &= ~MMC_PM_KEEP_POWER;
--- linux-4.15.0.orig/drivers/mmc/core/sdio_cis.c
+++ linux-4.15.0/drivers/mmc/core/sdio_cis.c
@@ -24,12 +24,17 @@
#include "sdio_cis.h"
#include "sdio_ops.h"
+
+#define SDIO_READ_CIS_TIMEOUT_MS  (10 * 1000) /* 10s */
+
+static int cistpl_vers_1(struct mmc_card *card, struct sdio_func *func,
+const unsigned char *buf, unsigned size)
+
+
+{ unsigned i, nr_strings;
+char **buffer, *string;
+
+if (size < 2)
+return 0;
+
+/* Find all null-terminated (including zero length) strings in
+the TPLLV1_INFO field. Trailing garbage is ignored. */
+buf += 2;
@@ -267,6 +272,8 @@
do {
+unsigned char tpl_code, tpl_link;

unsigned long timeout = jiffies +
			msecs_to_jiffies(SDIO_READ_CIS_TIMEOUT_MS);

ret = mmc_io_rw_direct(card, 0, 0, ptr++, 0, &tpl_code);
if (ret)
@@ -319,6 +326,8 @@
 prev = &this->next;

if (ret == -ENOENT) {
@@ -725,3 +726,7 @@
 #include "sdio_ops.h"
 #include "core.h"
 #include "card.h"
+    #include "host.h"

 /* warn about unknown tuples */
 pr_warn_ratelimited("%s: queuing unknown" 
 --- linux-4.15.0.orig/drivers/mmc/core/sdio_io.c 
+++ linux-4.15.0/drivers/mmc/core/sdio_io.c 
@@ -18,6 +18,7 @@
" CIS tuple 0x%02x (%u bytes)\n",

/** 
 * sdio_claim_host - exclusively claim a bus for a certain SDIO function
@@ -725,3 +726,79 @@
 return 0;
 }
 EXPORT_SYMBOL_GPL(sdio_set_host_pm_flags);
+
+/**
+ * sdio_retune_crc_disable - temporarily disable retuning on CRC errors
+ * @func: SDIO function attached to host
+ *
+ * If the SDIO card is known to be in a state where it might produce
+ * CRC errors on the bus in response to commands (like if we know it is
+ * transitioning between power states), an SDIO function driver can
+ * call this function to temporarily disable the SD/MMC core behavior of
+ * triggering an automatic retuning.
+ *
+ * This function should be called while the host is claimed and the host
+ * should remain claimed until sdio_retune_crc_enable() is called.
+ * Specifically, the expected sequence of calls is:
+ * - sdio_claim_host()
+ * - sdio_retune_crc_disable()
+ * - some number of calls like sdio_writeb() and sdio_readb()
+ * - sdio_retune_crc_enable()
+ * - sdio_release_host()
+ */
+void sdio_retune_crc_disable(struct sdio_func *func)
+{
+func->card->host->retune_crc_disable = true;
+}
+EXPORT_SYMBOL_GPL(sdio_retune_crc_disable);
+
+/**
+ * sdio_retune_crc_enable - re-enable retuning on CRC errors
+ * @func: SDIO function attached to host
+ *
+ * This is the complement to sdio_retune_crc_disable().
+ */
+void sdio_retune_crc_enable(struct sdio_func *func)
+{
+func->card->host->retune_crc_disable = false;
+}
+EXPORT_SYMBOL_GPL(sdio_retune_crc_enable);
+
+/**
+ * sdio_retune_hold_now - start deferring retuning requests till release
+ * @func: SDIO function attached to host
+ *
+ * This function can be called if it's currently a bad time to do
+ * a retune of the SDIO card. Retuning requests made during this time
+ * will be held and we'll actually do the retune sometime after the
+ * release.
+ *
+ * This function could be useful if an SDIO card is in a power state
+ * where it can respond to a small subset of commands that doesn't
+ * include the retuning command. Care should be taken when using
+ * this function since (presumably) the retuning request we might be
+ * deferring was made for a good reason.
+ *
+ * This function should be called while the host is claimed.
+ */
+void sdio_retune_hold_now(struct sdio_func *func)
+{
+mmc_retune_hold_now(func->card->host);
+}
+EXPORT_SYMBOL_GPL(sdio_retune_hold_now);
+
+/**
+ * sdio_retune_release - signal that it's OK to retune now
+ * @func: SDIO function attached to host
+ *
+ * This is the complement to sdio_retune_hold_now(). Calling this
+ * function won't make a retune happen right away but will allow
+ * them to be scheduled normally.
This function should be called while the host is claimed.

```
void sdio_retune_release(struct sdio_func *func)
{
  mmc_retune_release(func->card->host);
}
```

```
EXPORT_SYMBOL_GPL(sdio_retune_release);
```

```
--- linux-4.15.0.orig/drivers/mmc/core/sdio_irq.c
+++ linux-4.15.0/drivers/mmc/core/sdio_irq.c
@@ -35,16 +35,24 @@
{
 struct mmc_card *card = host->card;
 int i, ret, count;
+  bool sdio_irq_pending = host->sdio_irq_pending;
 unsigned char pending;
 struct sdio_func *func;

+/* Don't process SDIO IRQs if the card is suspended. */
+if (mmc_card_suspended(card))
+  return 0;
+
+/* Clear the flag to indicate that we have processed the IRQ. */
+host->sdio_irq_pending = false;
+
+/* Optimization, if there is only 1 function interrupt registered
+* and we know an IRQ was signaled then call irq handler directly.
+* Otherwise do the full probe.
+*/
+func = card->sdio_single_irq;
-if (func && host->sdio_irq_pending) {
+if (func && sdio_irq_pending) {
    func->irq_handler(func);
    return 1;
}@
@@ -96,7 +104,6 @@
{
  mmc_claim_host(host);
  if (host->sdio_irqs) {
-    host->sdio_irq_pending = true;
+    host->sdio_irq_pending = true;
    process_sdio_pending_irqs(host);
    if (host->ops->ack_sdio_irq)
      host->ops->ack_sdio_irq(host);
@@ -115,6 +122,7 @@

 void sdio_signal_irq(struct mmc_host *host)
 {
```
host->sdio_irq_pending = true;
queue_delayed_work(system_wq, &host->sdio_irq_work, 0);
}
EXPORT_SYMBOL_GPL(sdio_signal_irq);
@@ -160,7 +168,6 @@
if (ret)
break;
host->sdio_irq_pending = false;
mmc_release_host(host);

/*
--- linux-4.15.0.orig/drivers/mmc/host/Kconfig
+++ linux-4.15.0/drivers/mmc/host/Kconfig
@@ -838,14 +838,14 @@
config MMC_REALTEK_PCI
tristate "Realtek PCI-E SD/MMC Card Interface Driver"
-depends on MFD_RTSX_PCI
+-depends on MISC_RTSX_PCI
help
 Say Y here to include driver code to support SD/MMC card interface
 of Realtek PCI-E card reader

-config MMC_REALTEK_USB
tristate "Realtek USB SD/MMC Card Interface Driver"
-depends on MFD_RTSX_USB
+-depends on MISC_RTSX_USB
help
 Say Y here to include driver code to support SD/MMC card interface
 of Realtek RTS5129/39 series card reader
--- linux-4.15.0.orig/drivers/mmc/host/atmel-mci.c
+++ linux-4.15.0/drivers/mmc/host/atmel-mci.c
@@ -1954,13 +1954,14 @@
}
}
atmci_request_end(host, host->mrq);
-state = STATE_IDLE;
+goto unlock; /* atmci_request_end() sets host->state */
break;
}
} while (state != prev_state);

host->state = state;

+unlock:
spin_unlock(&host->lock);
}
if (host->dma_chan)
    dmaengine_terminate_sync(host->dma_chan);
+host->dma_chan = NULL;
    bcm2835_reset_internal(host);
}

if (!(sdhsts & SDHSTS_CRC7_ERROR) ||
    (host->cmd->opcode != MMC_SEND_OP_COND)) {
    u32 edm, fsm;
+
if (sdhsts & SDHSTS_CMD_TIME_OUT) {
    host->cmd->error = -ETIMEDOUT;
} else {
    bcm2835_dumpregs(host);
    host->cmd->error = -EINVAL;
}
+edm = readl(host->ioaddr + SDEDM);
+fsm = edm & SDEDM_FSM_MASK;
+if (fsm == SDEDM_FSM_READWAIT ||
    fsm == SDEDM_FSM_WRITESTART1)
+/* Kick the FSM out of its wait */
+writel(edm | SDEDM_FORCE_DATA_MODE,
        host->ioaddr + SDEDM);
    bcm2835_finish_request(host);
return;
}

dev_err(dev, "timeout waiting for hardware interrupt.
" bcm2835_dumpregs(host);

+bcm2835_reset(host->mmc);
+
if (host->data) {
    host->data->error = -ETIMEDOUT;
    bcm2835_finish_data(host);
    char pio_limit_string[20];
    int ret;

    -mmc->f_max = host->max_clk;
if (!mmc->f_max || mmc->f_max > host->max_clk)
    mmc->f_max = host->max_clk;
mmc->f_min = host->max_clk / SDCDIV_MAX_CDIV;

mmc->max_busy_timeout = ~0 / (mmc->f_max / 1000);
@@ -1426,6 +1439,8 @@
err:
    dev_dbg(dev, "%s -> err %d\n", __func__, ret);
    if (host->dma_chan_rxtx)
@@ -1046,7 +1047,8 @@
    mmc->max_segs = 1;
    /* DMA size field can address up to 8 MB */
    -mmc->max_seg_size = 8 * 1024 * 1024;
@@ -165,9 +165,15 @@
    mmc_davinci_reset_ctrl(host, 1);
@endf

-static void __init init_mmcsd_host(struct mmc_davinci_host *host)
+static void init_mmcsd_host(struct mmc_davinci_host *host)
{

--- linux-4.15.0.orig/drivers/mmc/host/davinci_mmc.c
+++ linux-4.15.0/drivers/mmc/host/davinci_mmc.c
@@ -1118,7 +1118,7 @@
static int dw_mci_exynos_runtime_resume(struct device *dev)
{
    struct dw_mci *host = dev_get_drvdata(dev);
    int ret;
    +ret = dw_mci_runtime_resume(dev);
    if (ret)
        return ret;
    dw_mci_exynos_config_smu(host);
    return ret;
}

/**
 @@ -487,6 +493,7 @@
 static const struct dw_mci_drv_data exynos_drv_data = {
 .caps = exynos_dwmme_caps,
+.num_caps = ARRAY_SIZE(exynos_dwmme_caps),
 .init = dw_mci_exynos_priv_init,
 .set_ios = dw_mci_exynos_set_ios,
 .parse_dt = dw_mci_exynos_parse_dt,
--- linux-4.15.0.orig/drivers/mmc/host/dw_mmc-k3.c
+++ linux-4.15.0/drivers/mmc/host/dw_mmc-k3.c
@@ -135,6 +135,9 @@
 if (priv->ctrl_id < 0)
     priv->ctrl_id = 0;
+if (priv->ctrl_id >= TIMING_MODE)
+    return -EINVAL;
+    host->priv = priv;
    return 0;

static const struct dw_mci_drv_data hi6220_data = {
    .caps = dw_mci_hi6220_caps,
+.num_caps = ARRAY_SIZE(dw_mci_hi6220_caps),
 .switch_voltage = dw_mci_hi6220_switch_voltage,
 .set_ios = dw_mci_hi6220_set_ios,
 .parse_dt = dw_mci_hi6220_parse_dt,
--- linux-4.15.0.orig/drivers/mmc/host/dw_mmc-rockchip.c
+++ linux-4.15.0/drivers/mmc/host/dw_mmc-rockchip.c
@@ -282,11 +282,11 @@
priv->drv_clk = devm_clk_get(host->dev, "ciu-drive");
if (IS_ERR(priv->drv_clk))
-dev_dbg(host->dev, "ciu_drv not available\n");
+dev_dbg(host->dev, "ciu-drive not available\n");

priv->sample_clk = devm_clk_get(host->dev, "ciu-sample");
if (IS_ERR(priv->sample_clk))
-dev_dbg(host->dev, "ciu_sample not available\n");
+dev_dbg(host->dev, "ciu-sample not available\n");

host->priv = priv;

--- linux-4.15.0.orig/drivers/mmc/host/dw_mmc-zx.c
+++ linux-4.15.0/drivers/mmc/host/dw_mmc-zx.c
@@ -195,6 +195,7 @@
static const struct dw_mci_drv_data zx_drv_data = {
 .caps		= zx_dwmmc_caps,
 +.num_caps	= ARRAY_SIZE(zx_dwmmc_caps),
 .set_ios	= dw_mci_zx3288_set_ios,
@@ -319,6 +319,7 @@
static const struct dw_mci_drv_data rk3288_drv_data = {
 .caps		= dw_mci_rk3288_dwmmc_caps,
 +.num_caps	= ARRAY_SIZE(dw_mci_rk3288_dwmmc_caps),
 .set_ios	= dw_mci_rk3288_set_ios,
@@ -172,6 +174,8 @@
struct dw_mci *host = s->private;

+pm_runtime_get_sync(host->dev);
+ seq_printf(s, "STATUS:\t0x%08x\n", mci_readl(host, STATUS));
 seq_printf(s, "RINTSTS:\t0x%08x\n", mci_readl(host, RINTSTS));
 seq_printf(s, "CMD:\t0x%08x\n", mci_readl(host, CMD));
@@ -172,6 +174,8 @@
 seq_printf(s, "INTMASK:\t0x%08x\n", mci_readl(host, INTMASK));
 seq_printf(s, "CLKENA:\t0x%08x\n", mci_readl(host, CLKENA));

+pm_runtime_put_autosuspend(host->dev);
+ return 0;
cto_div = (mci_readl(host, CLKDIV) & 0xff) * 2;
if (cto_div == 0)
    cto_div = 1;
-cto_ms = DIV_ROUND_UP(MSEC_PER_SEC * cto_clks * cto_div, host->bus_hz);
+cto_ms = DIV_ROUND_UP_ULL((u64)MSEC_PER_SEC * cto_clks * cto_div,
+    host->bus_hz);
/* add a bit spare time */
cto_ms += 10;

/* Initialize reserved and buffer size fields to "0" */
+p->des0 = 0;
p->des1 = 0;
p->des2 = 0;
p->des3 = 0;

/* Set external dma config: burst size, burst width */
+memset(&cfg, 0, sizeof(cfg));
    cfg.dst_addr = host->phy_regs + fifo_offset;
    cfg.src_addr = cfg.dst_addr;
    cfg.dst_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
    * It's used when HS400 mode is enabled.
*/
if (data->flags & MMC_DATA_WRITE &&
    !(host->timing != MMC_TIMING_MMC_HS400))
    return;
if (data->flags & MMC_DATA_WRITE)
    enable = SDMMC_CARD_WR_THR_EN;
enable = SDMMC_CARD_RD_THR_EN;

if (host->timing != MMC_TIMING_MMC_HS200 &&
    host->timing != MMC_TIMING_UHS_SDR104)
+    host->timing != MMC_TIMING_UHS_SDR104 &&
+    host->timing != MMC_TIMING_MMC_HS400)
goto disable;

blksz_depth = blksz / (1 << host->data_shift);
@@ -1246,6 +1256,8 @@
if (host->state == STATE_WAITING_CMD11_DONE)
    sdmmc_cmd_bits |= SDMMC_CMD_VOLT_SWITCH;
    slot->mmc->actual_clock = 0;
+    if (!clock) {
+        mci_writel(host, CLKENA, 0);
        mci_send_cmd(slot, sdmmc_cmd_bits, 0);
@@ -1304,6 +1316,8 @@
    /* keep the last clock value that was requested from core */
    slot->__clk_old = clock;
+    slot->mmc->actual_clock = div ? ((host->bus_hz / div) >> 1) :
+        host->bus_hz;
}

host->current_speed = clock;
@@ -1795,8 +1809,8 @@
if (host->use_dma == TRANS_MODE_IDMAC)
    /* It is also recommended that we reset and reprogram idmac */
    -dw_mci_idmac_reset(host);
    /* It is also required that we reinit idmac */
+    dw_mci_idmac_init(host);

    ret = true;

@@ -1944,8 +1958,9 @@
    drto_div = (mci_readl(host, CLKDIV) & 0xff) * 2;
    if (drto_div == 0)
        drto_div = 1;
-    drto_ms = DIV_ROUND_UP(MSEC_PER_SEC * drto_clks * drto_div,
-        -    host->bus_hz);
+    +    drto_ms = DIV_ROUND_UP_ULL((u64)MSEC_PER_SEC * drto_clks * drto_div,
+        +    host->bus_hz);
/* add a bit spare time */
drto_ms += 10;
@@ -2049,14 +2064,13 @@
    * delayed. Allowing the transfer to take place
    * avoids races and keeps things simple.
/*
-if ((err != -ETIMEDOUT) &&
   (cmd->opcode == MMC_SEND_TUNING_BLOCK)) {
+if (err != -ETIMEDOUT) {
    state = STATE_SENDING_DATA;
    continue;
}

-dw_mci_stop_dma(host);
+dw_mci_stop_dma(host);
state = STATE_SENDING_STOP;
break;
}
@@ -2080,10 +2094,10 @@
/*
  if (test_and_clear_bit(EVENT_DATA_ERROR,
       &host->pending_events)) {
-dw_mci_stop_dma(host);
  if (!(host->data_status & (SDMMC_INT_DRTO |
       SDMMC_INT_EBE)))
+dw_mci_stop_dma(host);
    send_stop_abort(host, data);
    state = STATE_DATA_ERROR;
    break;
  }
@@ -2116,10 +2130,10 @@
/*
  if (test_and_clear_bit(EVENT_DATA_ERROR,
       &host->pending_events)) {
-dw_mci_stop_dma(host);
  if (!(host->data_status & (SDMMC_INT_DRTO |
       SDMMC_INT_EBE)))
+dw_mci_stop_dma(host);
    send_stop_abort(host, data);
    state = STATE_DATA_ERROR;
    break;
  }
@@ -2778,12 +2792,57 @@
return IRQ_HANDLED;
}
+static int dw_mci_init_slot_caps(struct dw_mci_slot *slot)
{  
+struct dw_mci *host = slot->host;
+const struct dw_mci_drv_data *drv_data = host->drv_data;
+struct mmc_host *mmc = slot->mmc;
+int ctrl_id;
+
+if (host->pdata->caps)
+mmc->caps = host->pdata->caps;
+
+/*
+ * Support MMC_CAP_ERASE by default.
+ * It needs to use trim/discard/erase commands.
+ */
+mmc->caps |= MMC_CAP_ERASE;
+
+if (host->pdata->pm_caps)
+mmc->pm_caps = host->pdata->pm_caps;
+
+if (host->dev->of_node) {
+ctrl_id = of_alias_get_id(host->dev->of_node, "mshc");
+if (ctrl_id < 0)
+ctrl_id = 0;
+} else {
+ctrl_id = to_platform_device(host->dev)->id;
+}
+
+if (drv_data && drv_data->caps) {
+if (ctrl_id >= drv_data->num_caps) {
+dev_err(host->dev, "invalid controller id %d\n",
+ctrl_id);
+return -EINVAL;
+}
+mmc->caps |= drv_data->caps[ctrl_id];
+
+if (host->pdata->caps2)
+mmc->caps2 = host->pdata->caps2;
+
+/* Process SDIO IRQs through the sdio_irq_work. */
+if (mmc->caps & MMC_CAP_SDIO_IRQ)
+mmc->caps2 |= MMC_CAP2_SDIO_IRQ_NOTHREAD;
+
+return 0;
+}
+
+static int dw_mci_init_slot(struct dw_mci *host)
{
struct mmc_host *mmc;
struct dw_mci_slot *slot;
const struct dw_mci_drv_data *drv_data = host->drv_data;
int ctrl_id, ret;
+int ret;
u32 freq[2];

mmc = mmc_alloc_host(sizeof(struct dw_mci_slot), host->dev);
if (!mmc->ocr_avail)
mmc->ocr_avail = MMC_VDD_32_33 | MMC_VDD_33_34;

@if (host->pdata->caps)
mmc->caps = host->pdata->caps;
@
*/
- * Support MMC_CAP_ERASE by default.
- * It needs to use trim/discard/erase commands.
- */
- mmc->caps |= MMC_CAP_ERASE;
-
@if (host->pdata->pm_caps)
mmc->pm_caps = host->pdata->pm_caps;
-
@if (host->dev->of_node) {
-ctrl_id = of_alias_get_id(host->dev->of_node, "mshc");
-if (ctrl_id < 0)
-ctrl_id = 0;
-} else {
-ctrl_id = to_platform_device(host->dev)->id;
-}
-if (drv_data & drv_data->caps)
mmc->caps |= drv_data->caps[ctrl_id];
-
@if (host->pdata->caps2)
mmc->caps2 = host->pdata->caps2;
-
ret = mmc_of_parse(mmc);
if (ret)
goto err_host_allocated;

-/* Process SDIO IRqs through the sdio_irq_work. */
-if (mmc->caps & MMC_CAP_SDIO_IRQ)
-mmcc->caps2 |= MMC_CAP2_SDIO_IRQ_NOTHREAD;
+ret = dw_mci_init_slot_caps(slot);
+if (ret)
+goto err_host_allocated;
/* Useful defaults if platform data is unset. */
if (host->use_dma == TRANS_MODE_IDMAC) {
  @@ -3489,6 +3523,10 @@
      /* Force setup bus to guarantee available clock output */
    dw_mci_setup_bus(host->slot, true);

    +/* Re-enable SDIO interrupts. */
    +if (sdio_irq_claimed(host->slot->mmc))
    +  __dw_mci_enable_sdio_irq(host->slot, 1);
    +
    /* Now that slots are all setup, we can enable card detect */
    dw_mci_enable_cd(host);

--- linux-4.15.0.orig/drivers/mmc/host/dw_mmc.h
+++ linux-4.15.0/drivers/mmc/host/dw_mmc.h
@@ -543,6 +543,7 @@
/**
 * dw_mci driver data - dw-mshc implementation specific driver data.
 * @caps: mmc subsystem specified capabilities of the controller(s).
@@ -554,6 +555,7 @@
 */
struct dw_mci_drv_data {
  unsigned long *caps;
+  u32 num_caps;
  int (*init)(struct dw_mci *host);
  void (*set_ios)(struct dw_mci *host, struct mmc_ios *ios);
  int (*parse_dt)(struct dw_mci *host);
--- linux-4.15.0.orig/drivers/mmc/host/jz4740_mmc.c
+++ linux-4.15.0/drivers/mmc/host/jz4740_mmc.c
@@ -937,17 +937,17 @@
    if (!pdata->read_only_active_low)
      mmc->caps2 |= MMC_CAP2_RO_ACTIVE_HIGH;

    host->irq_mask &= ~irq;
    else
      spin_unlock_irqrestore(&host->lock, flags);

    writew(host->irq_mask, host->base + JZ_REG_MMC_IMASK);
+    spin_unlock_irqrestore(&host->lock, flags);
  }

static void jz4740_mmc_clock_enable(struct jz4740_mmc_host *host, 
  @@ -937,17 +937,17 @@
    if (!pdata->read_only_active_low)
      mmc->caps2 |= MMC_CAP2_RO_ACTIVE_HIGH;
-if (gpio_is_valid(pdata->gpio_card_detect)) {
  ret = mmc_gpio_request_cd(mmc, pdata->gpio_card_detect, 0);
  if (ret)
    return ret;
}

/*
 * Get optional card detect and write protect GPIOs,
 * only back out on probe deferral.
 */
+ret = mmc_gpiod_request_cd(mmc, "cd", 0, false, 0, NULL);
+if (ret == -EPROBE_DEFER)
+return ret;

@if (gpio_is_valid(pdata->gpio_read_only)) {
  ret = mmc_gpio_request_ro(mmc, pdata->gpio_read_only);
  if (ret)
    return ret;
}

+ret = mmc_gpiod_request_ro(mmc, "wp", 0, false, 0, NULL);
+if (ret == -EPROBE_DEFER)
+return ret;

return jz4740_mmc_request_gpio(&pdev->dev, pdata->gpio_power, 
"MMC read only", true, pdata->power_active_low);
--- linux-4.15.0.orig/drivers/mmc/host/meson-gx-mmc.c
+++ linux-4.15.0/drivers/mmc/host/meson-gx-mmc.c
@@ -21,6 +21,7 @@
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/init.h>
+#include <linux/delay.h>
#include <linux/device.h>
#include <linux/of_device.h>
#include <linux/platform_device.h>
@@ -74,9 +75,11 @@
#define   CFG_CLK_ALWAYS_ON BIT(18)
#define   CFG_CHK_DS BIT(20)
#define   CFG_AUTO_CLK BIT(23)
+#define   CFG_ERR_ABORT BIT(27)
#define SD_EMMC_STATUS 0x48
#define   STATUS_BUSY BIT(31)
+#define   STATUS_DESC_BUSY BIT(30)
#define   STATUS_DATI GENMASK(23, 16)
#define SD_EMMC_IRQ_EN 0x4c
@@ -151,6 +154,8 @@
 struct sd_emmc_desc *descs;
dma_addr_t desc_dma_addr;

+int irq;
+
bool vqmmc_enabled;
};

static int meson_mmc_execute_tuning(struct mmc_host *mmc, u32 opcode)
{
struct meson_host *host = mmc_priv(mmc);
-int ret;
-
-/*
- * If this is the initial tuning, try to get a sane Rx starting
- * phase before doing the actual tuning.
- */
-if (!mmc->doing_retune) {
-rett = meson_mmc_clk_phase_tuning(mmc, opcode, host->rx_clk);
-
-if (ret)
-return ret;
-
-
-rett = meson_mmc_clk_phase_tuning(mmc, opcode, host->tx_clk);
-if (ret)
-return ret;

return meson_mmc_clk_phase_tuning(mmc, opcode, host->rx_clk);
}

if (!IS_ERR(mmc->supply.vmmc))
mmc_regulator_set_ocr(mmc, mmc->supply.vmmc, ios->vdd);

-/* Reset phases */
+/* Reset rx phase */
clk_set_phase(host->rx_clk, 0);
-clk_set_phase(host->tx_clk, 270);

break;

cmd_cfg |= FIELD_PREP(CMD_CFG_CMD_INDEX_MASK, cmd->opcode);  
cmd_cfg |= CMD_CFG_OWNER; /* owned by CPU */
+cmd_cfg |= CMD_CFG_ERROR; /* stop in case of error */

meson_mmc_set_response_bits(cmd, &cmd_cfg);
u32 irq_en, status, raw_status;
irqreturn_t ret = IRQ_NONE;

irq_en = readl(host->regs + SD_EMMC_IRQ_EN);
raw_status = readl(host->regs + SD_EMMC_STATUS);
status = raw_status & irq_en;

if (!status) {
    dev_dbg(host->dev, "Unexpected IRQ! irq_en 0x%08x - status 0x%08x\n",
        irq_en, raw_status);
    return IRQ_NONE;
}

if (WARN_ON(!host) || WARN_ON(!host->cmd))
    return IRQ_NONE;

cmd = host->cmd;
data = cmd->data;
-irq_en = readl(host->regs + SD_EMMC_IRQ_EN);
-raw_status = readl(host->regs + SD_EMMC_STATUS);
-status = raw_status & irq_en;
-
cmd->error = 0;
if (status & IRQ_CRC_ERR) {
    dev_dbg(host->dev, "CRC Error - status 0x%08x\n", status);
    cmd->error = -EILSEQ;
    -ret = IRQ_HANDLED;
    +ret = IRQ_WAKE_THREAD;
    goto out;
}

if (status & IRQ_TIMEOUTS) {
    dev_dbg(host->dev, "Timeout - status 0x%08x\n", status);
    cmd->error = -ETIMEDOUT;
    -ret = IRQ_HANDLED;
    +ret = IRQ_WAKE_THREAD;
    goto out;
}

/* ack all enabled interrupts */
writel(irq_en, host->regs + SD_EMMC_STATUS);
+if (cmd->error) {
+  /* Stop desc in case of errors */
+  u32 start = readl(host->regs + SD_EMMC_START);
+  +start &= ~START_DESC_BUSY;
+  writel(start, host->regs + SD_EMMC_START);
+}
+
+if (ret == IRQ_HANDLED)
+  meson_mmc_request_done(host->mmc, cmd->mrq);
-else if (ret == IRQ_NONE)
-  dev_warn(host->dev,
-    "Unexpected IRQ! status=0x%08x, irq_en=0x%08x\n",
-    raw_status, irq_en);

spin_unlock(&host->lock);
return ret;
}

+static int meson_mmc_wait_desc_stop(struct meson_host *host)
+{
+  int loop;
+  u32 status;
+  +
+  */
+  /* It may sometimes take a while for it to actually halt. Here, we
+     * are giving it 5ms to comply
+     * +
+     * + If we don't confirm the descriptor is stopped, it might raise new
+     * + IRQs after we have called mmc_request_done() which is bad.
+     */
+  for (loop = 50; loop; loop--) {
+    status = readl(host->regs + SD_EMMC_STATUS);
+    if (status & (STATUS_BUSY | STATUS_DESC_BUSY))
+      udelay(100);
+    else
+      break;
+  }
+
+  if (status & (STATUS_BUSY | STATUS_DESC_BUSY)) {
+    dev_err(host->dev, "Timed out waiting for host to stop\n");
+    return -ETIMEDOUT;
+  }
+
+  return 0;
+
static irqreturn_t meson_mmc_irq_thread(int irq, void *dev_id)
{  
struct meson_host *host = dev_id;
@@ -1084,6 +1112,13 @@  
if (WARN_ON(!cmd))  
return IRQ_NONE;
+
+if (cmd->error) {  
+meson_mmc_wait_desc_stop(host);  
+meson_mmc_request_done(host->mmc, cmd->mrq);  
+  
+return IRQ_HANDLED;
+}  
+  
data = cmd->data;
if (meson_mmc_bounce_buf_read(data)) {
  xfer_bytes = data->blkz * data->blocks;
@@ -1124,6 +1159,9 @@  
cfg |= FIELD_PREP(CFG_RC_CC_MASK, ilog2(SD_EMMC_CFG_CMD_GAP));  
cfg |= FIELD_PREP(CFG_BLK_LEN_MASK, ilog2(SD_EMMC_CFG_BLK_SIZE));

+/* abort chain on R/W errors */  
+cfg |= CFG_ERR_ABORT;  
+  
write1(cfg, host->regs + SD_EMMC_CFG);
}  

@@ -1175,7 +1213,7 @@  
struct resource *res;
struct meson_host *host;
struct mmc_host *mmc;
-int ret, irq;
+int ret;

mmc = mmc_alloc_host(sizeof(struct meson_host), &pdev->dev);
if (!mmc)
@@ -1207,8 +1245,8 @@
goto free_host;
}  

-irq = platform_get_irq(pdev, 0);  
-if (!irq) {  
+host->irq = platform_get_irq(pdev, 0);  
+if (!host->irq) {  
  dev_err(&pdev->dev, "failed to get interrupt resource.\n");  
  ret = -EINVAL;
  goto free_host;
@@ -1262,9 +1300,9 @@  
writel(IRQ_CRC_ERR | IRQ_TIMEOUTS | IRQ_END_OF_CHAIN,
host->regs + SD_EMMC_IRQ_EN);

-ret = devm_request_threaded_irq(&pdev->dev, irq, meson_mmc_irq,
-meson_mmc_irq_thread, IRQF_SHARED,
-NULL, host);
+ret = request_threaded_irq(host->irq, meson_mmc_irq,
  +meson_mmc_irq_thread, IRQF_SHARED,
  +dev_name(&pdev->dev), host);
if (ret)
goto err_init_clk;

@@ -1282,7 +1320,7 @@
if (host->bounce_buf == NULL) {
  dev_err(host->dev, "Unable to map allocate DMA bounce buffer.\n");
  ret = -ENOMEM;
  -goto err_init_clk;
  +goto err_free_irq;
  } }

host->descs = dma_alloc_coherent(host->dev, SD_EMMC_DESC_BUF_LEN,
@@ -1301,6 +1339,8 @@
err_bounce_buf:
  dma_free_coherent(host->dev, host->bounce_buf_size,
  host->bounce_buf, host->bounce_dma_addr);
+err_free_irq:
+free_irq(host->irq, host);
err_init_clk:
  clk_disable_unprepare(host->mmc_clk);
err_core_clk:
@@ -1318,6 +1358,7 @@
    /* disable interrupts */
    writel(0, host->regs + SD_EMMC_IRQ_EN);
    free_irq(host->irq, host);

dma_free_coherent(host->dev, SD_EMMC_DESC_BUF_LEN,
  host->descs, host->descs_dma_addr);
--- linux-4.15.0.orig/drivers/mmc/host/meson-mx-sdio.c
+++ linux-4.15.0/drivers/mmc/host/meson-mx-sdio.c
@@ -76,7 +76,7 @@
#define MESON_MX_SDIO_IRQC_IFCONFIG_MASKGENMASK(7, 6)
#define MESON_MX_SDIO_IRQC_FORCE_DATA_CLKBIT(8)
#define MESON_MX_SDIO_IRQC_FORCE_DATA_CMDBIT(9)
-#define MESON_MX_SDIO_IRQC_FORCE_DATA_DAT_MASKGENMASK(10, 13)
+#define MESON_MX_SDIO_IRQC_FORCE_DATA_DAT_MASKGENMASK(13, 10)
+#define MESON_MX_SDIO_IRQC_SOFT_RESETBIT(15)
#define MESON_MX_SDIO_IRQC_FORCE_HALTBIT(30)
#define MESON_MX_SDIO_IRQC_HALT_HOLEBIT(31)
mrq = host->mrq;

+if (host->cmd->error)
+meson_mx_mmc_soft_reset(host);
+host->mrq = NULL;
+host->cmd = NULL;

meson_mx_mmc_start_cmd(mmc, mrq->cmd);
}

-static int meson_mx_mmc_card_busy(struct mmc_host *mmc)
-{
-struct meson_mx_mmc_host *host = mmc_priv(mmc);
-u32 irqc = readl(host->base + MESON_MX_SDIO_IRQC);
-
-return !!((irqc & MESON_MX_SDIO_IRQC_FORCE_DATA_DAT_MASK);
-}

static void meson_mx_mmc_read_response(struct mmc_host *mmc,
struct mmc_command *cmd)
{
@@ -509,7 +504,6 @@
static struct mmc_host_ops meson_mx_mmc_ops = {
 .request= meson_mx_mmc_request,
 .set_ios= meson_mx_mmc_set_ios,
-.card_busy= meson_mx_mmc_card_busy,
- .get_cd= mmc_gpio_get_cd,
- .get_ro= mmc_gpio_get_ro,
};
@@ -517,19 +511,23 @@
static struct platform_device *meson_mx_mmc_slot_pdev(struct device *parent)
{
 struct device_node *slot_node;
+struct platform_device *pdev;

/*
 * TODO: the MMC core framework currently does not support
 * controllers with multiple slots properly. So we only register
 * the first slot for now
 */
-slot_node = of_find_compatible_node(parent->of_node, NULL, "mmc-slot");
+slot_node = of_get_compatible_node(parent->of_node, NULL, "mmc-slot");
 if (!slot_node) {
 dev_warn(parent, "no 'mmc-slot' sub-node found\n");

return ERR_PTR(-ENOENT);
}
-
+-return of_platform_device_create(slot_node, NULL, parent);
+tpdev = of_platform_device_create(slot_node, NULL, parent);
+of_node_put(slot_node);
+
+-return pdev;
+
static int meson_mx_mmc_add_host(struct meson_mx_mmc_host *host)
@@ -569,7 +567,7 @@
    mmc->f_max = clk_round_rate(host->cfg_div_clk,
        clk_get_rate(host->parent_clk));

-mmci->caps |= MMC_CAP_ERASE | MMC_CAP_CMD23;
+mmci->caps |= MMC_CAP_ERASE | MMC_CAP_CMD23 | MMC_CAP_WAIT WHILE_BUSY;
    mmci->ops = &meson_mx_mmc_ops;

    ret = mmci_of_parse(mmci);
@@ -592,6 +590,9 @@
    init.name = devm_kasprintf(host->controller_dev, GFP_KERNEL,
                     "%s#fixed_factor",
                     dev_name(host->controller_dev));
+    if (!init.name)
+        return -ENOMEM;
+
    init.ops = &clk_fixed_factor_ops;
+    init.flags = 0;
    init.parent_names = &clk_fixed_factor_parent;
@@ -608,6 +609,9 @@
    init.name = devm_kasprintf(host->controller_dev, GFP_KERNEL,
                     "%s#div", dev_name(host->controller_dev));
+    if (!init.name)
+        return -ENOMEM;
+
    init.ops = &clk_divider_ops;
+    init.flags = CLK_SET_RATE_PARENT;
    init.parent_names = &clk_div_parent;
--- linux-4.15.0.orig/drivers/mmc/host/mmc_spi.c
+++ linux-4.15.0/drivers/mmc/host/mmc_spi.c
@@ -819,6 +819,10 @@
}

status = spi_sync_locked(spi, &host->m);
+if (status < 0) {
+    dev_dbg(&spi->dev, "read error %d\n", status);
if (host->dma_dev) {
dma_sync_single_for_cpu(host->dma_dev,
\ @@ -1150,17 +1154,22 @@
* SPI protocol. Another is that when chip select is released while
* the card returns BUSY status, the clock must issue several cycles
* with chip select high before the card will stop driving its output.
+ *
+ * SPI_CS_HIGH means "asserted" here. In some cases like when using
+ * GPIOs for chip select, SPI_CS_HIGH is set but this will be logically
+ * inverted by gpiolib, so if we want to ascertain to drive it high
+ * we should toggle the default with an XOR as we do here.
+ */
- host->spi->mode |= SPI_CS_HIGH;
+ host->spi->mode ^= SPI_CS_HIGH;
if (spi_setup(host->spi) != 0) {
    /* Just warn; most cards work without it. */
    dev_warn(&host->spi->dev,
    "can't change chip-select polarity\n");
- host->spi->mode &= ~SPI_CS_HIGH;
+ host->spi->mode ^= SPI_CS_HIGH;
    } else {
    mmc_spi_readbytes(host, 18);

    - host->spi->mode &= ~SPI_CS_HIGH;
+ host->spi->mode ^= SPI_CS_HIGH;
    if (spi_setup(host->spi) != 0) {
        /* Wot, we can't get the same setup we had before? */
        dev_err(&host->spi->dev,
        \ @@ -1447,6 +1456,7 @@
        mmc->caps &= ~MMC_CAP_NEEDS_POLL;
        mmc_gpiod_request_cd_irq(mmc);
    }
    +mmc_detect_change(mmc, 0);
}

if (host->pdata && host->pdata->flags & MMC_SPI_USE_RO_GPIO) {
    has_ro = true;
    --- linux-4.15.0.orig/drivers/mmc/host/mmci.c
    +++ linux-4.15.0/drivers/mmc/host/mmci.c
    @@ -1320,9 +1320,10 @@
    }

    /*
    - * Don't poll for busy completion in IRQ context.
    + * Busy detection has been handled by mmci_cmd_irq() above.
    + * Clear the status bit to prevent polling in IRQ context.
    */
}
/*
- if (host->variant->busy_detect && host->busy_status)
+ if (host->variant->busy_detect_flag)
    status &= ~host->variant->busy_detect_flag;

    ret = 1;
    --- linux-4.15.0.orig/drivers/mmc/host/moxart-mmc.c
    +++ linux-4.15.0/drivers/mmc/host/moxart-mmc.c
    @@ -631,6 +631,7 @@
        host->have_dma = true;

        memset(&cfg, 0, sizeof(cfg));
        cfg.src_addr_width = DMA_SLAVE_BUSWIDTH_4getBytes;
        cfg.dst_addr_width = DMA_SLAVE_BUSWIDTH_4BYTES;

    --- linux-4.15.0.orig/drivers/mmc/host/mtk-sd.c
    +++ linux-4.15.0/drivers/mmc/host/mtk-sd.c
    @@ -223,6 +223,7 @@
        #define MSDC_PATCH_BIT_SPCUSH (0x1 << 29) /* RW */
        #define MSDC_PATCH_BIT_DECRCTMO (0x1 << 30) /* RW */

        +#define MSDC_PATCH_BIT1_CMDTA (0x7 << 3)    /* RW */
        #define MSDC_PATCH_BIT1_STOP_DLY (0xf << 8)    /* RW */

        #define MSDC_PATCH_BIT2_CFGRESP (0x1 << 15)   /* RW */
    @@ -379,7 +380,6 @@
            src_clk_cg; /* msdc source clock control gate */
            u32 mclk; /* mmc subsystem clock frequency */
            u32 src_clk_freq; /* source clock frequency */
            -u32 sclk; /* SD/MS bus clock frequency */
            unsigned char timing;
            bool vqmmc_enabled;
            u32 latch_ck;
        @@ -599,10 +599,10 @@

            host->timeout_ns = ns;
            host->timeout_clks = clks;
            -if (host->sclk == 0) {
            +#if (host->mmc->actual_clock == 0) {
                timeout = 0;
            } else {
                -clk_ns = 1000000000UL / host->sclk;
                +clk_ns = 1000000000UL / host->mmc->actual_clock;
                timeout = (ns + clk_ns - 1) / clk_ns + clks;
                /* in 1048576 sclk cycle unit */
                timeout = (timeout + (0x1 << 20) - 1) >> 20;
        @@ -647,6 +647,7 @@
if (!hz) {
    dev_dbg(host->dev, "set mclk to 0\n");
    host->mclk = 0;
    +host->mmc->actual_clock = 0;
    sdr_clr_bits(host->base + MSDC_CFG, MSDC_CFG_CKPDN);
    return;
}
@@ -725,7 +726,7 @@
while (!(readl(host->base + MSDC_CFG) & MSDC_CFG_CKSTB))
    cpu_relax();
    sdr_set_bits(host->base + MSDC_CFG, MSDC_CFG_CKPDN);
    -host->sclk = sclk;
    +host->mmc->actual_clock = sclk;
    host->mclk = hz;
    host->timing = timing;
    /* need because clk changed. */
@@ -736,7 +737,7 @@
        if (host->sclk <= 52000000) {
            +if (host->mmc->actual_clock <= 52000000) {
                writel(host->def_tune_para.iocon, host->base + MSDC_IOCON);
                writel(host->def_tune_para.pad_tune, host->base + tune_reg);
            } else {
                @@ -748,10 +749,11 @@
                if (timing == MMC_TIMING_MMC_HS400 &&
                    host->dev_comp->hs400_tune)
                    -sdr_set_field(host->base + PAD_CMD_TUNE,
                    +sdr_set_field(host->base + tune_reg,
                        MSDC_PAD_TUNE_CMDRDLAY,
                        host->hs400_cmd_int_delay);
                    -dev_dbg(host->dev, "sclk: %d, timing: %d\n", host->sclk, timing);
                    +dev_dbg(host->dev, "sclk: %d, timing: %d\n", host->mmc->actual_clock,
                    +timing);
                }

                static inline u32 msdc_cmd_find_resp(struct msdc_host *host,
                    @@ -890,13 +892,13 @@
                static void msdc_request_done(struct msdc_host *host, struct mmc_request *mrq)
                    {
                        unsigned long flags;
                        -bool ret;
                        
                        -ret = cancel_delayed_work(&host->req_timeout);
                        -if (!ret) {
                        -/* delay work already running */
                    
    Open Source Used In 5GaaS Edge AC-4  23666
+ /* No need check the return value of cancel_delayed_work, as only ONE + * path will go here! + */
+ cancel_delayed_work(&host->req_timeout);
+ spin_lock_irqsave(&host->lock, flags);
+ host->mrq = NULL;
+ spin_unlock_irqrestore(&host->lock, flags);
bool done = false;
bool sbc_error;
unsigned long flags;
-u32 *rsp = cmd->resp;
+u32 *rsp;

if (mrq->sbc && cmd == mrq->cmd &&
    (events & (MSDC_INT_ACMRDY | MSDC_INT_ACMDCRCERR
@@ -935,6 +937,7 @@
      if (done)
        return true;
+rsp = cmd->resp;

sdr_clr_bits(host->base + MSDC_INTEN, cmd_ints_mask);
@@ -1019,6 +1022,7 @@
      WARN_ON(host->cmd);
      host->cmd = cmd;

+mod_delayed_work(system_wq, &host->req_timeout, DAT_TIMEOUT);
    if (!msdc_cmd_is_ready(host, mrq, cmd))
      return;
@@ -1030,7 +1034,6 @@
      cmd->error = 0;
      rawcmd = msdc_cmd_prepare_raw_cmd(host, mrq, cmd);
      -mod_delayed_work(system_wq, &host->req_timeout, DAT_TIMEOUT);

sdr_set_bits(host->base + MSDC_INTEN, cmd_ints_mask);
write(cmd->arg, host->base + SDC_ARG);
@@ -1116,7 +1119,7 @@
    static bool msdc_data_xfer_done(struct msdc_host *host, u32 events,
    struct mmc_request *mrq, struct mmc_data *data)
    {
-struct mmc_command *stop = data->stop;
+struct mmc_command *stop;
unsigned long flags;
bool done;
unsigned int check_data = events &
@@ -1132,6 +1135,7 @@
if (done)
    return true;
+stop = data->stop;
if (check_data || (stop && stop->error)) {
    dev_dbg(host->dev, "DMA status: 0x%8Xn",
@@ -1620,6 +1624,7 @@
/* select EMMC50 PAD CMD tune */
sdr_set_bits(host->base + PAD_CMD_TUNE, BIT(0));
+sdr_set_field(host->base + MSDC_PATCH_BIT1, MSDC_PATCH_BIT1_CMDTA, 2);

    if (mmc->ios.timing == MMC_TIMING_MMC_HS200 ||
        mmc->ios.timing == MMC_TIMING_UHS_SDR104)
--- linux-4.15.0.orig/drivers/mmc/host/mxs-mmc.c
+++ linux-4.15.0/drivers/mmc/host/mxs-mmc.c
@@ -659,7 +659,7 @@
    ret = mmc_of_parse(mmc);
    if (ret)
        -goto out_clk_disable;
+++ linux-4.15.0/drivers/mmc/host/mxs-mmc.c
@@ -919,7 +920,7 @@
        OMAP_MMC_WRITE(host, CTO, 0xff);
--- linux-4.15.0.orig/drivers/mmc/host/omap.c
+++ linux-4.15.0/drivers/mmc/host/omap.c
@@ -104,6 +104,7 @@
 unsigned int		vdd;
 u16			saved_con;
 u16			bus_mode;
+tu16			power_mode;
 unsigned int		fclk_freq;
 struct tasklet_struct	cover_tasklet;
@@ -919,7 +920,7 @@
        OMAP_MMC_WRITE(host, CTO, 0xfd);
static inline void set_data_timeout(struct mmc_omap_host *host, struct mmc_request *req)
{
    struct mmc_omap_slot *slot = mmc_priv(mmc);
    struct mmc_omap_host *host = slot->host;
    int i, dsor;
    int clk_enabled, init_stream;
    slot->vdd = ios->vdd;
    clk_enabled = 0;
    init_stream = 0;
    switch (ios->power_mode) {
    case MMC_POWER_OFF:
        mmc_omap_set_power(slot, 0, ios->vdd);
        case MMC_POWER_UP:
            /* Cannot touch dsor yet, just power up MMC */
            mmc_omap_set_power(slot, 1, ios->vdd);
            slot->power_mode = ios->power_mode;
            goto exit;
            break;
    case MMC_POWER_ON:
        MMC_CLK_ENABLE(host, 1);
        clk_enabled = 1;
        dsor |= 1 << 11;
        if (slot->power_mode != MMC_POWER_ON)
            init_stream = 1;
        break;
    }
    slot->power_mode = ios->power_mode;
    if (slot->bus_mode != ios->bus_mode) {
        if (slot->pdata->set_bus_mode != NULL)
            for (i = 0; i < 2; i++)
                OMAP_MMC_WRITE(host, CON, dsor);
            slot->saved_con = dsor;
            if (ios->power_mode != MMC_POWER_ON) {
                init_stream = 1;
                /* worst case at 400kHz, 80 cycles makes 200 microsecs */
                int usecs = 250;
            }
            else {
                /* worst case at 400kHz, 80 cycles makes 200 microsecs */
                int usecs = 250;
            }
}
slot->host = host;
slot->mmc = mmc;
slot->id = id;
+slot->power_mode = MMC_POWER_UNDEFINED;
slot->pdata = &host->pdata->slots[id];

host->slots[id] = slot;
--- linux-4.15.0.orig/drivers/mmc/host/omap_hsmmc.c
+++ linux-4.15.0/drivers/mmc/host/omap_hsmmc.c
@@ -1661,6 +1661,36 @@
 if (mmc_pdata(host)->init_card)
  mmc_pdata(host)->init_card(card);
+else if (card->type == MMC_TYPE_SDIO ||
+         card->type == MMC_TYPE_SD_COMBO) {
+  struct device_node *np = mmc_dev(mmc)->of_node;
+  
+  /* REVISIT: should be moved to sdio core and made more
general e.g. by expanding the DT bindings of child nodes
+ * to provide a mechanism to provide this information:
+ * Documentation/devicetree/bindings/mmc/mmc-card.txt
+ */
+  +np = of_get_compatible_child(np, "ti,wl1251");
+  +if (np) {
+    /*
+     * We have TI wl1251 attached to MMC3. Pass this
+     * information to the SDIO core because it can't be
+     * probed by normal methods.
+     */
+    +dev_info(host->dev, "found wl1251\n");
++card->quirks |= MMC_QUIRK_NONSTD_SDIO;
++card->cccr.wide_bus = 1;
++card->cis.vendor = 0x104c;
++card->cis.device = 0x9066;
++card->cis.blksize = 512;
++card->cis.max_dtr = 24000000;
++card->ocr = 0x80;
++of_node_put(np);
+  +}
+  +}
+
+static void omap_hsmmc_enable_sdio_irq(struct mmc_host *mmc, int enable)
@@ -2066,7 +2096,6 @@
 mmc->max_blk_size = 512;     /* Block Length at max can be 1024 */
mmc->max_blk_count = 0xFFFF; /* No. of Blocks is 16 bits */
mmc->max_req_size = mmc->max_blk_size * mmc->max_blk_count;
-mmmc->max_seg_size = mmc->max_req_size;

mmc->caps |= MMC_CAP_MMC_HIGH_SPEED | MMC_CAP_SD_HIGH_SPEED |
MMC_CAP_WAIT_WHILE_BUSY | MMC_CAP_ERASE | MMC_CAP_CMD23;
@@ -2096,6 +2125,17 @@
goto err_irq;
}

+/*
+ * Limit the maximum segment size to the lower of the request size
+ * and the DMA engine device segment size limits. In reality, with
+ * 32-bit transfers, the DMA engine can do longer segments than this
+ * but there is no way to represent that in the DMA model - if we
+ * increase this figure here, we get warnings from the DMA API debug.
+ */
+mmc->max_seg_size = min3(mmc->max_req_size,
+dma_get_max_seg_size(host->rx_chan->device->dev),
+dma_get_max_seg_size(host->tx_chan->device->dev));
+
/* Request IRQ for MMC operations */
ret = devm_request_irq(&pdev->dev, host->irq, omap_hsmmc_irq, 0,
mmc_hostname(mmc), host);
@@ -2177,6 +2217,7 @@
dma_release_channel(host->rx_chan);

+dev_pm_clear_wake_irq(host->dev);
pm_runtime_dont_use_autosuspend(host->dev);
pm_runtime_put_sync(host->dev);
--- linux-4.15.0.orig/drivers/mmc/host/pxamci.c
+++ linux-4.15.0/drivers/mmc/host/pxamci.c
@@ -181,7 +181,7 @@
static void pxamci_setup_data(struct pxamci_host *host, struct mmc_data *data)
 {
 struct dma_async_tx_descriptor *tx;
-enum dma_data_direction direction;
+enum dma_transfer_direction direction;
 struct dma_slave_config config;
 struct dma_chan *chan;
 unsigned int nob = data->blocks;
--- linux-4.15.0.orig/drivers/mmc/host/renesas_sdhi_core.c
+++ linux-4.15.0/drivers/mmc/host/renesas_sdhi_core.c
@@ -479,6 +479,7 @@
struct renesas_sdhi *priv;
struct resource *res;
int irq, ret, i;
+u16 ver;

of_data = of_device_get_match_data(&pdev->dev);

@@ -555,6 +556,13 @@
 host->card_busy= renesas_sdhi_card_busy;
 host->start_signal_voltage_switch =
 renesas_sdhi_start_signal_voltage_switch;
+
+/* SDR and HS200/400 registers requires HW reset */
+if (of_data & of_data->scc_offset) {
+priv->scc_ctl = host->ctl + of_data->scc_offset;
+host->mmc->caps |= MMC_CAP_HW_RESET;
+host->hw_reset = renesas_sdhi_hw_reset;
+}
}
/* Orginally registers were 16 bit apart, could be 32 or 64 nowadays */
@@ -587,12 +595,17 @@
/* All SDHI have SDIO status bits which must be 1 */
mmc_data->flags |= TMIO_MMC_SDIO_STATUS_SETBITS;

+ver = sd_ctrl_read16(host, CTL_VERSION);
+/* GEN2_SDR104 is first known SDHI to use 32bit block count */
+if (ver < SDHI_VER_GEN2_SDR104 && mmc_data->max_blk_count > U16_MAX)
+mmc_data->max_blk_count = U16_MAX;
+
+ret = tmio_mmc_host_probe(host, mmc_data, dma_ops);
if (ret < 0)
goto efree;
/* One Gen2 SDHI incarnation does NOT have a CBSY bit */
@if (sd_ctrl_read16(host, CTL_VERSION) == SDHI_VER_GEN2_SDR50)
+if (ver == SDHI_VER_GEN2_SDR50)
mmc_data->flags &= ~TMIO_MMC_HAVE_CBSY;
/* Enable tuning iff we have an SCC and a supported mode */
@@ -602,8 +615,6 @@
const struct renesas_sdhi_scc *taps = of_data->taps;
bool hit = false;
-host->mmc->caps |= MMC_CAP_HW_RESET;
-
for (i = 0; i < of_data->taps_num; i++) {
if (taps[i].clk_rate == 0 ||
  taps[i].clk_rate == host->mmc->f_max) {
@@ -616,12 +627,10 @@
if (!hit)
    dev_warn(&host->pdev->dev, "Unknown clock rate for SDR104\n");

    -priv->scc_ctl = host->ctl + of_data->scc_offset;
    host->init_tuning = renesas_sdhi_init_tuning;
    host->prepare_tuning = renesas_sdhi_prepare_tuning;
    host->select_tuning = renesas_sdhi_select_tuning;
    host->check_scc_error = renesas_sdhi_check_scc_error;
    -host->hw_reset = renesas_sdhi_hw_reset;

i = 0;
#endif -664,6 +673,7 @@
struct tmio_mmc_host *host = mmc_priv(mmc);

    tmio_mmc_host_remove(host);
    +tmio_mmc_host_free(host);

return 0;
}
--- linux-4.15.0.orig/drivers/mmc/host/renesas_sdhi_internal_dmac.c
+++ linux-4.15.0/drivers/mmc/host/renesas_sdhi_internal_dmac.c
@@ -44,14 +44,16 @@
    /* DM_CM_RST */
    #define RST_DTRANRST1BIT(9)
    #define RST_DTRANRST0BIT(8)
-    #define RST_RESERVED_BITS GENMASK_ULL(32, 0)
+    #define RST_RESERVED_BITS GENMASK_ULL(31, 0)
    /* DM_CM_INFO1 and DM_CM_INFO1_MASK */
    #define INFO1_CLEAR 0
    +#define INFO1_MASK_CLEAR GENMASK_ULL(31, 0)
    #define INFO1_DTRANEND1BIT(17)
    #define INFO1_DTRANEND0BIT(16)

    /* DM_CM_INFO2 and DM_CM_INFO2_MASK */
-    +#define INFO2_MASK_CLEAR GENMASK_ULL(31, 0)
    #define INFO2_DTRANERR1BIT(17)
    #define INFO2_DTRANERR0BIT(16)

    @@ -146,8 +148,8 @@
    /* This DMAC cannot handle if sg_len is not 1 */
    WARN_ON(host->sg_len > 1);

    -/* This DMAC cannot handle if buffer is not 8-bytes alignment */
    -if (!IS_ALIGNED(sg->offset, 8))
    +#/* This DMAC cannot handle if buffer is not 128-bytes alignment */
    +if (!IS_ALIGNED(sg->offset, 128))
goto force_pio;

if (data->flags & MMC_DATA_READ) {
    DTRAN_CTRL_DM_START);
}

-static void renesas_sdhi_internal_dmac_complete_tasklet_fn(unsigned long arg)
+static bool renesas_sdhi_internal_dmac_complete(struct tmio_mmc_host *host)
{
    struct tmio_mmc_host *host = (struct tmio_mmc_host *)arg;
    enum dma_data_direction dir;

    -spin_lock_irq(&host->lock);
    -
    if (!host->data)
        goto out;
    +return false;
    +return true;
    
    if (host->data->flags & MMC_DATA_READ)
        dir = DMA_FROM_DEVICE;
    @ @ -211,6 +210,17 @ @
    renesas_sdhi_internal_dmac_enable_dma(host, false);
    dma_unmap_sg(&host->pdev->dev, host->sg_ptr, host->sg_len, dir);

    +return true;
    +}
    +
    +static void renesas_sdhi_internal_dmac_complete_tasklet_fn(unsigned long arg)
    +{
    +struct tmio_mmc_host *host = (struct tmio_mmc_host *)arg;
    +
    +spin_lock_irq(&host->lock);
    +if (!renesas_sdhi_internal_dmac_complete(host))
        goto out;
    +
    tmio_mmc_do_data_irq(host);
    out:
    spin_unlock_irq(&host->lock);
    @ @ -220,6 +230,12 @ @
    renesas_sdhi_internal_dmac_request_dma(struct tmio_mmc_host *host,
               struct tmio_mmc_data *pdata)
    {
    +/* Disable DMAC interrupts, we don't use them */
    +renesas_sdhi_internal_dmac_dm_write(host, DM_CM_INFO1_MASK,
               INFO1_MASK_CLEAR);
    +renesas_sdhi_internal_dmac_dm_write(host, DM_CM_INFO2_MASK,
               INFO2_MASK_CLEAR);
Each value is set to non-zero to assume "enabling" each DMA

host->chan_rx = host->chan_tx = (%void *0xdeadbeaf;

static int renesas_sdhi_internal_dmac_probe(struct platform_device *pdev)
{
    struct device *dev = &pdev->dev;
    if (!soc_device_match(gen3_soc_whitelist))
        return -ENODEV;
    dev->dma_parms = devm_kzalloc(dev, sizeof(*dev->dma_parms), GFP_KERNEL);
    if (!dev->dma_parms)
        return -ENOMEM;
    dma_set_max_seg_size(dev, 0xffffffff);
    return renesas_sdhi_probe(pdev, &renesas_sdhi_internal_dmac_dma_ops);
}

/* Definitions for sampling clocks */

struct realtek_pci_sdmmc {
    .max_blk_count = 0xffffffff,
};

#include <linux/mmc/sd.h>
#include <linux/mmc/sdio.h>
#include <linux/mmc/card.h>
#include <linux/mfd/rttx_pci.h>
#include <linux/rttx_pci.h>
#include <asm/unaligned.h>
+static inline void sd_enable_initial_mode(struct realtek_pci_sdmmc *host) 
+{
+    rtsx_pci_write_register(host->pcr, SD_CFG1, 
+    SD_CLK_DIVIDE_MASK, SD_CLK_DIVIDE_128);
+}
+
+static inline void sd_disable_initial_mode(struct realtek_pci_sdmmc *host) 
+{
+    rtsx_pci_write_register(host->pcr, SD_CFG1, 
+    SD_CLK_DIVIDE_MASK, SD_CLK_DIVIDE_0);
+}
+
+static int sd_rw_multi(struct realtek_pci_sdmmc *host, struct mmc_request *mrq) 
+{
    struct mmc_data *data = mrq->data;
    int err;

    if (host->sg_count < 0) {
        data->error = host->sg_count;
        return data->error;
    }

    if (data->flags & MMC_DATA_READ) 
        return sd_write_long_data(host, mrq);
+if (data->flags & MMC_DATA_READ) {
+    if (host->initial_mode)
+        sd_disable_initial_mode(host);

    return sd_write_long_data(host, mrq);
    }
+    return err;
+}
+
+static inline void sd_enable_initial_mode(struct realtek_pci_sdmmc *host) 
+{
+    rtsx_pci_write_register(host->pcr, SD_CFG1, 
+    SD_CLK_DIVIDE_MASK, SD_CLK_DIVIDE_128);
+}
+
+static inline void sd_disable_initial_mode(struct realtek_pci_sdmmc *host) 
+{
+    rtsx_pci_write_register(host->pcr, SD_CFG1, 
+    SD_CLK_DIVIDE_MASK, SD_CLK_DIVIDE_0);
+}
+
+static inline void sd_enable_initial_mode(struct realtek_pci_sdmmc *host) 
+{
+    rtsx_pci_write_register(host->pcr, SD_CFG1, 
+    SD_CLK_DIVIDE_MASK, SD_CLK_DIVIDE_128);
+}
+
+static inline void sd_disable_initial_mode(struct realtek_pci_sdmmc *host) 
+{
+    rtsx_pci_write_register(host->pcr, SD_CFG1, 
+    SD_CLK_DIVIDE_MASK, SD_CLK_DIVIDE_0);
+    return err;
+}
+
+return sd_write_long_data(host, mrq);
}

static void sd_normal_rw(struct realtek_pci_sdmmc *host,
@@ -618,19 +628,22 @@
    u8 sample_point, bool rx)
{
    struct rtsx_pcr *pcr = host->pcr;
-
+    u16 SD_VP_CTL = 0;
    dev_dbg(sdmmc_dev(host), "%s(%s): sample_point = %d\n",
    __func__, rx ? "RX" : "TX", sample_point);
	rtsx_pci_write_register(pcr, CLK_CTL, CHANGE_CLK, CHANGE_CLK);
    -if (rx)
    +if (rx) {
    +    SD_VP_CTRL = SD_VPRX_CTL;
        rtsx_pci_write_register(pcr, SD_VPRX_CTL,
            PHASE_SELECT_MASK, sample_point);
    -else
        +} else {
            +    SD_VP_CTRL = SD_VPTX_CTL;
        rtsx_pci_write_register(pcr, SD_VPTX_CTL,
            PHASE_SELECT_MASK, sample_point);
    -rttx_pci_write_register(pcr, SD_VPCLK0_CTL, PHASE_NOT_RESET, 0);
    -rttx_pci_write_register(pcr, SD_VPCLK0_CTL, PHASE_NOT_RESET,
    +}
        +rttx_pci_write_register(pcr, SD_VP_CTRL, PHASE_NOT_RESET, 0);
    +rttx_pci_write_register(pcr, SD_VP_CTRL, PHASE_NOT_RESET,
            PHASE_NOT_RESET);
    rtsx_pci_write_register(pcr, CLK_CTL, CHANGE_CLK, 0);
    rtsx_pci_write_register(pcr, SD_CFG1, SD_ASYNC_FIFO_NOT_RST, 0);

--- linux-4.15.0.orig/drivers/mmc/host/rtsx_usb_sdmmc.c
+++ linux-4.15.0/drivers/mmc/host/rtsx_usb_sdmmc.c
@@ -26,12 +26,12 @@
     #include <linux/mmc/host.h>
     #include <linux/mmc/mmc.h>
     #include <linux/mmc/sdio.h>
-    #include <linux/mmc/card.h>
     #include <linux/scatterlist.h>
     +#include <linux/pm.h>
     #include <linux/pm_runtime.h>

     -#include <linux/mfd/rtsx_usb.h>
     +#include <linux/rtsx_usb.h>
     #include <asm/unaligned.h>
```c
#if defined(CONFIG_LEDS_CLASS) || (defined(CONFIG_LEDS_CLASS_MODULE) &&
    @ @ -839,17 +839,6 @ @
goto finish_detect_card;
}

/*
- * Reject SDIO CMDs to speed up card identification
- * since unsupported
- */
-if (cmd->opcode == SD_IO_SEND_OP_COND ||
-   cmd->opcode == SD_IO_RW_DIRECT ||
-   cmd->opcode == SD_IO_RW_EXTENDED) {
-   cmd->error = -EINVAL;
-goto finish;
-
-mutex_lock(&ucr->dev_mutex);

mutex_lock(&host->host_mutex);
@@ -1054,9 +1043,9 @@
if (power_mode == MMC_POWER_OFF) {
    err = sd_power_off(host);
    -pm_runtime_put(sdmmc_dev(host));
    +pm_runtime_put_noidle(sdmmc_dev(host));
} else {
    -pm_runtime_get_sync(sdmmc_dev(host));
    +pm_runtime_get_noresume(sdmmc_dev(host));
    err = sd_power_on(host);
}
@@ -1309,16 +1298,20 @@
    container_of(work, struct rtsx_usb_sdmmc, led_work);
    struct rtsx_ucr *ucr = host->ucr;
    
    -pm_runtime_get_sync(sdmmc_dev(host));
    +pm_runtime_get_noresume(sdmmc_dev(host));
    mutex_lock(&ucr->dev_mutex);

    +if (host->power_mode == MMC_POWER_OFF)
    +goto out;
+    
    if (host->led.brightness == LED_OFF)
        rtsx_usb_turn_off_led(ucr);
    else
        rtsx_usb_turn_on_led(ucr);

    +out:
```
mutex_unlock(&ucr->dev_mutex);
-pm_runtime_put(sdmmc_dev(host));
+pm_runtime_put_sync_suspend(sdmmc_dev(host));
}
#endif

@@ -1332,8 +1325,9 @@
mmc->caps = MMC_CAP_4_BIT_DATA | MMC_CAP_SD_HIGHSPEED |
MMC_CAP_MMC_HIGHSPEED | MMC_CAP_BUS_WIDTH_TEST |
MMC_CAP_UHS_SDR12 | MMC_CAP_UHS_SDR25 | MMC_CAP_UHS_SDR50 |
-MMC_CAP_NEEDS_POLL;
-mmc->caps2 = MMC_CAP2_NO_PRESCAN_POWERUP | MMC_CAP2_FULL_PWR_CYCLE;
+MMC_CAP_ERASE | MMC_CAP_SYNC_RUNTIME_PM;
+mmc->caps2 = MMC_CAP2_NO_PRESCAN_POWERUP | MMC_CAP2_FULL_PWR_CYCLE |
+MMC_CAP2_NO_SDIO;

mmc->max_current_330 = 400;
mmc->max_current_180 = 800;
@@ -1374,8 +1368,6 @@
mutex_init(&host->host_mutex);
rtsx_usb_init_host(host);
-pm_runtime_use_autosuspend(&pdev->dev);
-pm_runtime_set_autosuspend_delay(&pdev->dev, 50);
pm_runtime_enable(&pdev->dev);
#endif RTSX_USB_USE_LEDS_CLASS
@@ -1430,7 +1422,6 @@
mmc_free_host(mmc);
pm_runtime_disable(&pdev->dev);
-pm_runtime_dont_use_autosuspend(&pdev->dev);
platform_set_drvdata(pdev, NULL);

dev_dbg(&pdev->dev),
@@ -1439,6 +1430,31 @@
return 0;
}

+#ifdef CONFIG_PM
+static int rtsx_usb_sdmmc_runtime_suspend(struct device *dev)
+{
+struct rtsx_usb_sdmmc *host = dev_get_drvdata(dev);
+host->mmc->caps &= ~MMC_CAP_NEEDS_POLL;
+return 0;
+}
+
```c
+static int rtsx_usb_sdmmc_runtime_resume(struct device *dev)
+{
+    struct rtsx_usb_sdmmc *host = dev_get_drvdata(dev);
+
+    host->mmc->caps |= MMC_CAP_NEEDS_POLL;
+    if (sdmmc_get_cd(host->mmc) == 1)
+        mmc_detect_change(host->mmc, 0);
+    return 0;
+}
+
+static const struct dev_pm_ops rtsx_usb_sdmmc_dev_pm_ops = {
+    .set_runtime_pm = rtsx_usb_sdmmc_runtime_suspend,
+    .runtime_resume = rtsx_usb_sdmmc_runtime_resume,
+    .runtime_disable = NULL
+};
+
+static const struct platform_device_id rtsx_usb_sdmmc_ids[] = {
+    {.name = "rtsx_usb_sdmmc",
+     .id_table = rtsx_usb_sdmmc_ids,
+     .driver = {
+         .name = "rtsx_usb_sdmmc",
+         .pm = &rtsx_usb_sdmmc_dev_pm_ops,
+     },
+    },
+};
+module_platform_driver(rtsx_usb_sdmmc_driver);

--- linux-4.15.0.orig/drivers/mmc/host/sdhci-acpi.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-acpi.c
@@ -76,6 +76,7 @@
     int (*probe_slot)(struct platform_device *, const char *, const char *);
     int (*remove_slot)(struct platform_device *);
     int (*free_slot)(struct platform_device *pdev);
+};
+
+struct sdhci_acpi_host {
+    .name = "sdhci_acpi",
+    .id_table = sdhci_acpi_ids,
+    .driver = {
+        .name = "sdhci_acpi",
+        .pm = &sdhci_acpi_pm_ops,
+    },
+};
+module_platform_driver(sdhci_acpi_driver);

size_t_tpriv_size;
int (*probe_slot)(struct platform_device *, const char *, const char *);
int (*remove_slot)(struct platform_device *);
+int (*free_slot)(struct platform_device *pdev);
};

struct sdhci_acpi_host {
    .name = "sdhci_acpi",
    .id_table = sdhci_acpi_ids,
    .driver = {
        .name = "sdhci_acpi",
        .pm = &sdhci_acpi_pm_ops,
    },
};
+module_platform_driver(sdhci_acpi_driver);

-- linux-4.15.0.orig/drivers/mmc/host/sdhci-acpi.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-acpi.c
@@ -1454,6 +1470,7 @@
@@ -1454,6 +1470,7 @@
@@ -1454,6 +1470,7 @@
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@@ -1454,6 +1470,7 @@
@@ -1454,6 +1470,7 @@
@@ -1454,6 +1470,7 @@
```

err_free:
+if (c->slot && c->slot->free_slot)
+c->slot->free_slot(pdev);
+
sdhci_free_host(c->host);
return err;
}
@@ -647,6 +651,10 @@
dead = (sdhci_readl(c->host, SDHCI_INT_STATUS) == ~0);
sdhci_remove_host(c->host, dead);
+
+if (c->slot && c->slot->free_slot)
+c->slot->free_slot(pdev);
+
sdhci_free_host(c->host);

return 0;
--- linux-4.15.0.orig/drivers/mmc/host/sdhci-brcmstb.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-brcmstb.c
@@ -55,7 +55,9 @@
}
sdhci_get_of_property(pdev);
-mmc_of_parse(host->mmc);
+res = mmc_of_parse(host->mmc);
+if (res)
+goto err;

/*
 * Supply the existing CAPS, but clear the UHS modes. This
--- linux-4.15.0.orig/drivers/mmc/host/sdhci-esdhc-imx.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-esdhc-imx.c
@@ -79,7 +79,7 @@
#define ESDHC_TUNING_START_TAP_DEFAULT	0x1
/* NOTE: the minimum valid tuning start tap for mx6sl is 1 */
#define ESDHC_TUNING_STEP_MASK	0x00070000
#define ESDHC_TUNING_STEP_SHIFT	16
@@ -305,6 +305,15 @@
if (imx_data->socdata->flags & ESDHC_FLAG_HS400)
val |= SDHCI_SUPPORT_HS400;
+*/
/*
 * Do not advertise faster UHS modes if there are no pinctrl states for 100MHz/200MHz.
 */

if (IS_ERR_OR_NULL(imx_data->pins_100mhz) ||
    IS_ERR_OR_NULL(imx_data->pins_200mhz))
  val &= ~(SDHCI_SUPPORT_SDR50 | SDHCI_SUPPORT_DDR50 |
            SDHCI_SUPPORT_SDR104 | SDHCI_SUPPORT_HS400);
}

val = readl(host->ioaddr + ESDHC_MIX_CTRL);
else if (imx_data->socdata->flags & ESDHC_FLAG_STD_TUNING)
  /* the std tuning bits is in ACMD12_ERR for imx6sl */
  val = readl(host->ioaddr + SDHCI_ACMD12_ERR);
  +val = readl(host->ioaddr + SDHCI_AUTO_CMD_STATUS);
}

if (val & ESDHC_MIX_CTRL_EXE_TUNE)
  val = readl(host->ioaddr + SDHCI_ACMD12_ERR);
else if (imx_data->socdata->flags & ESDHC_FLAG_STD_TUNING) {
  u32 v = readl(host->ioaddr + SDHCI_ACMD12_ERR);
  u32 m = readl(host->ioaddr + ESDHC_MIX_CTRL);
  if (val & SDHCI_CTRL_TUNED_CLK) {
    v |= ESDHC_MIX_CTRL_SMPCLK_SEL;
    v &= ~ESDHC_MIX_CTRL_EXE_TUNE;
  }
  -writel(v, host->ioaddr + SDHCI_ACMD12_ERR);
  +writel(v, host->ioaddr + SDHCI_AUTO_CMD_STATUS);
  -writel(m, host->ioaddr + ESDHC_MIX_CTRL);
  +writel(m, host->ioaddr + SDHCI_MIX_CTRL);
}
return;

writel(0, host->ioaddr + ESDHC_TUNE_CTRL_STATUS);
else if (imx_data->socdata->flags & ESDHC_FLAG_STD_TUNING) {
  -ctrl = readl(host->ioaddr + SDHCI_ACMD12_ERR);
  +ctrl = readl(host->ioaddr + SDHCI_AUTO_CMD_STATUS);
  ctrl &= ~ESDHC_MIX_CTRL_SMPCLK_SEL;
  -writel(ctrl, host->ioaddr + SDHCI_ACMD12_ERR);
  +writel(ctrl, host->ioaddr + SDHCI_AUTO_CMD_STATUS);
}
case MMC_TIMING_UHS_SDR25:
case MMC_TIMING_UHS_SDR50:
case MMC_TIMING_UHS_SDR104:
+case MMC_TIMING_MMC_HS:
case MMC_TIMING_MMC_HS200:
    writel(m, host->ioaddr + ESDHC_MIX_CTRL);
break;
@@ -1068,11 +1078,12 @@
    writel(readl(host->ioaddr + SDHCI_HOST_CONTROL) |
       ESDHC_BURST_LEN_EN_INCR,
       host->ioaddr + SDHCI_HOST_CONTROL);
+ /*
+ -* erratum ESDHC_FLAG_ERR004536 fix for MX6Q TO1.2 and MX6DL
+ -* TO1.1, it's harmless for MX6SL
+ */
    -writel(readl(host->ioaddr + 0x6c) | BIT(7),
    + * erratum ESDHC_FLAG_ERR004536 fix for MX6Q TO1.2 and MX6DL
    + * TO1.1, it's harmless for MX6SL
    + */
    +writel(readl(host->ioaddr + 0x6c) & ~BIT(7),
    host->ioaddr + 0x6c);
    /* disable DLL_CTRL delay line settings */
    @ @ -1135,18 +1146,6 @@
    ESDHC_PINCTRL_STATE_100MHZ);
    imx_data->pins_200mhz = pinctrl_lookup_state(imx_data->pinctrl,
       ESDHC_PINCTRL_STATE_200MHZ);
    -if (IS_ERR(imx_data->pins_100mhz) ||
    -IS_ERR(imx_data->pins_200mhz)) {
    -dev_warn(mmc_dev(host->mmc),
    -"could not get ultra high speed state, work on normal mode\n");
    -/*
    - * fall back to not supporting uhs by specifying no
    - * 1.8v quirk
    - */
    -host->quirks2 |= SDHCI_QUIRK2_NO_1_8_V;
    -}
    -} else {
    -host->quirks2 |= SDHCI_QUIRK2_NO_1_8_V;
    }
    /* call to generic mmc_of_parse to support additional capabilities */
    @ @ -1304,7 +1303,7 @@
/* clear tuning bits in case ROM has set it already */
write(0x0, host->ioaddr + ESDHC_MIX_CTRL);
-writel(0x0, host->ioaddr + SDHCI_ACM12_ERR);
+writel(0x0, host->ioaddr + SDHCI_AUTO_CMD_STATUS);
write(0x0, host->ioaddr + ESDHC_TUNE_CTRL_STATUS);

@@ -1355,9 +1354,10 @@
        struct sdhci_host *host = platform_get_drvdata(pdev);
        struct sdhci_pltfm_host *pltfm_host = sdhci_priv(host);
        struct pltfm_imx_data *imx_data = sdhci_pltfm_priv(pltfm_host);
-    int dead = (readl(host->ioaddr + SDHCI_INT_STATUS) == 0xffffffff);
+    int dead;
    pm_runtime_get_sync(&pdev->dev);
    +dead = (readl(host->ioaddr + SDHCI_INT_STATUS) == 0xffffffff);
    pm_runtime_disable(&pdev->dev);
    pm_runtime_put_noidle(&pdev->dev);

--- linux-4.15.0.orig/drivers/mmc/host/sdhci-iproc.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-iproc.c
@@ -33,6 +33,8 @@
        const struct sdhci_iproc_data *data;
        u32 shadow_cmd;
        u32 shadow_blk;
+    bool is_cmd_shadowed;
+    bool is_blk_shadowed;
    
#define REG_OFFSET_IN_BITS(reg) ((reg) << 3 & 0x18)
@@ -48,8 +50,22 @@
static u16 sdhci_iproc_readw(struct sdhci_host *host, int reg)
{
    -u32 val = sdhci_iproc_readl(host, (reg & ~3));
    -u16 word = val >> REG_OFFSET_IN_BITS(reg) & 0xffff;
+    struct sdhci_pltfm_host *pltfm_host = sdhci_priv(host);
+    struct sdhci_iproc_host *iproc_host = sdhci_pltfm_priv(pltfm_host);
+    u32 val;
+    u16 word;
+    
+    if ((reg == SDHCI_TRANSFER_MODE) && iproc_host->is_cmd_shadowed) {
+        /* Get the saved transfer mode */
+        val = iproc_host->shadow_cmd;
+    } else if ((reg == SDHCI_BLOCK_SIZE || reg == SDHCI_BLOCK_COUNT) &&
+        iproc_host->is_blk_shadowed) {
+        /* Get the saved block info */
+        val = iproc_host->shadow_blk;


+} else {
+val = sdhci_iproc_readl(host, (reg & ~3));
+}
+word = val >> REG_OFFSET_IN_BITS(reg) & 0xffff;
return word;
}

@@ -105,13 +121,15 @@
if (reg == SDHCI_COMMAND) {
   /* Write the block now as we are issuing a command */
   -if (iproc_host->shadow_blk != 0) {
   +if (iproc_host->is_blk_shadowed) {
   sdhci_iproc_writel(host, iproc_host->shadow_blk,
   SDHCI_BLOCK_SIZE);
   -iproc_host->shadow_blk = 0;
   +iproc_host->is_blk_shadowed = false;
   }
   oldval = iproc_host->shadow_cmd;
   -} else if (reg == SDHCI_BLOCK_SIZE || reg == SDHCI_BLOCK_COUNT) {
   +iproc_host->is_cmd_shadowed = false;
   +} else if ((reg == SDHCI_BLOCK_SIZE || reg == SDHCI_BLOCK_COUNT) &&
   + iproc_host->is_blk_shadowed) {
   /* Block size and count are stored in shadow reg */
   oldval = iproc_host->shadow_blk;
   } else {
@@ -123,9 +141,11 @@
if (reg == SDHCITRANSFER_MODE) {
   /* Save the transfer mode until the command is issued */
   iproc_host->shadow_cmd = newval;
   +iproc_host->is_cmd_shadowed = true;
   } else if (reg == SDHCI_BLOCK_SIZE || reg == SDHCI_BLOCK_COUNT) {
   /* Save the block info until the command is issued */
   iproc_host->shadow_blk = newval;
   +iproc_host->is_blk_shadowed = true;
   } else {
   /* Command or other regular 32-bit write */
   sdhci_iproc_writel(host, newval, reg & ~3);
@@ -165,8 +185,9 @@
};

static const struct sdhci_pltfm_data sdhci_iproc_cygnus_pltfm_data = {
   .quirks = SDHCI_QUIRK_DATA_TIMEOUT_USES_SDCLK,
   -.quirks2 = SDHCI_QUIRK2_ACMD23_BROKEN,
   +.quirks = SDHCI_QUIRK_DATA_TIMEOUT_USES_SDCLK |
   + SDHCI_QUIRK_NO_HISPD_BIT,
   +.quirks2 = SDHCI_QUIRK2_ACMD23_BROKEN | SDHCI_QUIRK2_HOST_OFF_CARD_ON,
   .ops = &sdhci_iproc_32only_ops,
static const struct sdhci_pltfm_data sdhci_iproc_pltfm_data = {
    .quirks = SDHCI_QUIRK_DATA_TIMEOUT_USES_SDCLK |
    SDHCI_QUIRK_MULTIBLOCK_READ_ACMD12,
    .quirks2 = SDHCI_QUIRK2_ACMD23_BROKEN,
    .ops = &sdhci_iproc_ops,
};
@@ -206,7 +228,6 @@
    .caps1 = SDHCI DRIVER_TYPE_C |
    SDHCI DRIVER_TYPE_D |
    SDHCI SUPPORT_DDR50,
-    .mmc_caps = MMC_CAP_1_8V_DDR,
};

static const struct sdhci_pltfm_data sdhci_bcm2835_pltfm_data = {
    @@ -259,7 +280,10 @@
    mmc_of_parse(host->mmc);
    +ret = mmc_of_parse(host->mmc);
    +if (ret)
    +goto err;
    +
    sdhci_get_of_property(pdev);

    host->mmc->caps |= iproc_host->data->mmc_caps;
--- linux-4.15.0.orig/drivers/mmc/host/sdhci-msm.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-msm.c
@@ -144,6 +144,8 @@
    bool calibration_done;
    u8 saved_tuning_phase;
    bool use_cdcp533;
+    bool use_cdr;
+    u32 transfer_mode;
    u32 curr_pwr_state;
    u32 curr_io_level;
    wait_queue_head_t pwr_irq_wait;
    @@ -422,9 +424,12 @@
    struct sdhci_pltfm_host *pltfm_host = sdhci_priv(host);
    struct sdhci_msm_host *msm_host = sdhci_pltfm_priv(pltfm_host);
    int wait_cnt = 50;
    +unsigned long flags;
unsigned long flags, xo_clk = 0;

if (msm_host->use_14lpp_dll_reset && !IS_ERR_OR_NULL(msm_host->xo_clk))
xo_clk = clk_get_rate(msm_host->xo_clk);

spin_lock_irqsave(&host->lock, flags);

/*
@@ -463,10 +468,10 @@
config &= CORE_FLL_CYCLE_CNT;
if (config)
mclk_freq = DIV_ROUND_CLOSEST_ULL((host->clock * 8),
-clk_get_rate(msm_host->xo_clk));
+xo_clk);
else
mclk_freq = DIV_ROUND_CLOSEST_ULL((host->clock * 4),
-clk_get_rate(msm_host->xo_clk));
+xo_clk);

config = readl_relaxed(host->ioaddr + CORE_DLL_CONFIG_2);
config &= ~(0xFF << 10);
@@ -826,10 +831,27 @@
return ret;
}

static void sdhci_msm_set_cdr(struct sdhci_host *host, bool enable)
{
+u32 config, oldconfig = readl_relaxed(host->ioaddr + CORE_DLL_CONFIG);
+
+config = oldconfig;
+if (enable) {
+config |= CORE_CDR_EN;
+config &= ~CORE_CDR_EXT_EN;
+} else {
+config &= ~CORE_CDR_EN;
+config |= CORE_CDR_EXT_EN;
+
+if (config != oldconfig)
+writel_relaxed(config, host->ioaddr + CORE_DLL_CONFIG);
+}
+
static int sdhci_msm_execute_tuning(struct mmc_host *mmc, u32 opcode)
{
 struct sdhci_host *host = mmc_priv(mmc);
-int tuning_seq_cnt = 3;
+int tuning_seq_cnt = 10;
u8 phase, tuned_phases[16], tuned_phase_cnt = 0;
int rc;
struct mmc_ios ios = host->mmc->ios;
if (host->clock <= CORE_FREQ_100MHZ)
    !(ios.timing == MMC_TIMING_MMC_HS400 ||
    ios.timing == MMC_TIMING_MMC_HS200 ||
    ios.timing == MMC_TIMING_UHS_SDR104)) {
    msm_host->use_cdr = false;
    sdhci_msm_set_cdr(host, false);
    return 0;
}
/* Clock-Data-Recovery used to dynamically adjust RX sampling point */
+msm_host->use_cdr = true;
+
/* Clear tuning_done flag before tuning to ensure proper
 * HS400 settings.
 * */
+msm_host->tuning_done = 0;
/*
 * For HS400 tuning in HS200 timing requires:
 */
while (++phase < ARRAY_SIZE(tuned_phases));

if (tuned_phase_cnt) {
+if (tuned_phase_cnt == ARRAY_SIZE(tuned_phases)) {
+/*
 * All phases valid is _almost_ as bad as no phases
 * valid. Probably all phases are not really reliable
 * but we didn't detect where the unreliable place is.
 * That means we'll essentially be guessing and hoping
 * we get a good phase. Better to try a few times.
 * */
+dev_dbg(mmc_dev(mmc), "%s: All phases valid; try again\n",
+mmc_hostname(mmc));
+if (!--tuning_seq_cnt) {
+tuned_phase_cnt = 0;
+goto retry;
+}
+}
+rc = msm_find_most_appropriate_phase(host, tuned_phases,
    tuned_phase_cnt);
if (rc < 0)
case SDHCI_POWER_CONTROL:
  req_type = !val ? REQ_BUS_OFF : REQ_BUS_ON;
  break;
+ case SDHCI_TRANSFER_MODE:
+   msm_host->transfer_mode = val;
+   break;
+ case SDHCI_COMMAND:
+   if (!msm_host->use_cdr)
+     break;
+   if (((msm_host->transfer_mode & SDHCI_TRNS_READ) &&
+        SDHCI_GET_CMD(val) != MMC_SEND_TUNING_BLOCK_HS200 &&
+        SDHCI_GET_CMD(val) != MMC_SEND_TUNING_BLOCK)
+       + sdhci_msm_set_cdr(host, true);
+   else
+     sdhci_msm_set_cdr(host, false);
+   break;
}

if (req_type) {
@@ -1335,7 +1398,9 @@
@@ -1319,4 +1382,4 @@
  .quirks = SDHCI_QUIRK_BROKEN_CARD_DETECTION |
          SDHCI_QUIRK_NO_CARD_NO_RESET |
          SDHCI_QUIRK_SINGLE_POWER_WRITE |
+        SDHCI_QUIRK_CAP_CLOCK_BASE_BROKEN |
+        SDHCI_QUIRK_MULTIBLOCK_READ_ACMD12,
+        .quirks2 = SDHCI_QUIRK2_PRESET_VALUE_BROKEN,
  .ops = &sdhci_msm_ops,
};
@@ -1519,6 +1584,8 @@
goto clk_disable;
}

+msm_host->mmc->caps |= MMC_CAP_WAIT_WHILE_BUSY | MMC_CAP_NEED_RSP_BUSY;
+ pm_runtime_get_noresume(&pdev->dev);
+ pm_runtime_set_active(&pdev->dev);
+ pm_runtime_enable(&pdev->dev);
--- linux-4.15.0.orig/drivers/mmc/host/sdhci-of-arasan.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-of-arasan.c
@@ -179,7 +179,12 @@
 /* through low speeds without power cycling. */
 sdkhci_set_clock(host, host->max_clk);
-phy_power_on(sdhci_arasan->phy);
+if (phy_power_on(sdhci_arasan->phy)) {

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pr_err("%s: Cannot power on phy.
", mmc_hostname(host->mmc));
+return;
+
+sdhci_arasan->is_phy_on = true;

/*
 @@ -205,7 +210,12 @@
 sdhci_set_clock(host, clock);

 if (ctrl_phy) {
-phy_power_on(sdhci_arasan->phy);
+if (phy_power_on(sdhci_arasan->phy)) {
+pr_err("%s: Cannot power on phy.
", mmc_hostname(host->mmc));
+return;
+}
+
+sdhci_arasan->is_phy_on = true;
 }
}
@@ -305,7 +315,9 @@
ret = phy_power_off(sdhci_arasan->phy);
if (ret) {
 dev_err(dev, "Cannot power off phy.
");
-sdhci_resume_host(host);
+if (sdhci_resume_host(host))
+dev_err(dev, "Cannot resume host.
");
 +
 return ret;
 }
sdhci_arasan->is_phy_on = false;
@@ -638,7 +650,8 @@
ret = mmc_of_parse(host->mmc);
if (ret) {
-dev_err(&pdev->dev, "parsing dt failed (%d)\n", ret);
+if (ret != -EPROBE_DEFER)
+dev_err(&pdev->dev, "parsing dt failed (%d)\n", ret);
 goto unreg_clk;
 }

--- linux-4.15.0.orig/drivers/mmc/host/sdhci-of-at91.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-of-at91.c
@@ -126,7 +126,8 @@
{
 sdhci_reset(host, mask);
if (host->mmc->caps & MMC_CAP_NONREMOVABLE)
  || mmc_gpio_get_cd(host->mmc) >= 0)
sdhci_at91_set_force_card_detect(host);
}

priv->mainck = devm_clk_get(&pdev->dev, "baseclk");
if (IS_ERR(priv->mainck)) {
  dev_err(&pdev->dev, "failed to get baseclk\n");
  -return PTR_ERR(priv->mainck);
  +ret = PTR_ERR(priv->mainck);
  +goto sdhci_pltfm_free;
}

priv->hclock = devm_clk_get(&pdev->dev, "hclock");
if (IS_ERR(priv->hclock)) {
  dev_err(&pdev->dev, "failed to get hclock\n");
  -return PTR_ERR(priv->hclock);
  +ret = PTR_ERR(priv->hclock);
  +goto sdhci_pltfm_free;
}

priv->gck = devm_clk_get(&pdev->dev, "multclk");
if (IS_ERR(priv->gck)) {
  dev_err(&pdev->dev, "failed to get multclk\n");
  -return PTR_ERR(priv->gck);
  +ret = PTR_ERR(priv->gck);
  +goto sdhci_pltfm_free;
}

ret = sdhci_at91_set_clks_presets(&pdev->dev);

/* HS200 is broken at this moment */
+host->quirks2 |= SDHCI_QUIRK2_BROKEN_HS200;
+
ret = sdhci_add_host(host);
if (ret)
  goto pm_runtime_disable;

/* detection procedure using the SDMCC_CD signal is bypassed.
* This bit is reset when a software reset for all command is performed
* so we need to implement our own reset function to set back this bit.
+ */
 WA: SAMA5D2 doesn't drive CMD if using CD GPIO line.
*/

if (host->mmc->caps & MMC_CAP_NONREMOVABLE)
+    || mmc_gpio_get_cd(host->mmc) >= 0)
sdhci_at91_set_force_card_detect(host);

pm_runtime_put_autosuspend(&pdev->dev);
--- linux-4.15.0.orig/drivers/mmc/host/sdhci-of-esdhc.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-of-esdhc.c
@@ -22,6 +22,7 @@
#include <linux/sys_soc.h>
#include <linux/clk.h>
#include <linux/ktime.h>
+#include <linux/dma-mapping.h>
#include <linux/mmc/host.h>
#include "sdhci-pltfm.h"
#include "sdhci-esdhc.h"
@@ -427,9 +428,19 @@
static int esdhc_of_enable_dma(struct sdhci_host *host)
{
   u32 value;
+  struct device *dev = mmc_dev(host->mmc);
   +
+  if (of_device_is_compatible(dev->of_node, "fsl,ls1043a-esdhc") ||
+     of_device_is_compatible(dev->of_node, "fsl,ls1046a-esdhc"))
+    dma_set_mask_and_coherent(dev, DMA_BIT_MASK(40));

   value = sdhci_readl(host, ESDHC_DMA_SYSCTL);
   -value |= ESDHC_DMA_SNOOP;
   +
   +if (of_dma_is_coherent(dev->of_node))
   +value |= ESDHC_DMA_SNOOP;
   +else
   +value &=-ESDHC_DMA_SNOOP;
   +
   sdhci_writel(host, value, ESDHC_DMA_SYSCTL);
   return 0;
}
@@ -475,8 +486,12 @@
   /* Wait max 20 ms */
   timeout = ktime_add_ms(ktime_get(), 20);
   val = ESDHC_CLOCK_STABLE;
-while (!(sdhci_readl(host, ESDHC_PRSSTAT) & val)) {
-    if (ktime_after(ktime_get(), timeout)) {
-+     while (1) {
-+    bool timedout = ktime_after(ktime_get(), timeout);
if (sdhci_readl(host, ESDHC_PRSSTAT) & val)
+break;
+if (timedout) {
  pr_err("%s: Internal clock never stabilised.\n",
mmc_hostname(host->mmc));
  break;
@@ -552,8 +567,12 @@
/* Wait max 20 ms */
timeout = ktime_add_ms(ktime_get(), 20);
-while (!(sdhci_readl(host, ESDHC_PRSSTAT) & ESDHC_CLOCK_STABLE)) {
-  if (ktime_after(ktime_get(), timeout)) {
+while (1) {
+  bool timedout = ktime_after(ktime_get(), timeout);
+  +if (sdhci_readl(host, ESDHC_PRSSTAT) & ESDHC_CLOCK_STABLE)
  +break;
+  +if (timedout) {
+    pr_err("%s: Internal clock never stabilised.\n",
mmc_hostname(host->mmc));
+    return;
@@ -589,10 +608,18 @@
static void esdhc_reset(struct sdhci_host *host, u8 mask)
{
  +u32 val;
  +
sdhci_reset(host, mask);

  sdhci_writel(host, host->ier, SDHCI_INT_ENABLE);
  sdhci_writel(host, host->ier, SDHCI_SIGNAL_ENABLE);
  +
  +if (mask & SDHCI_RESET_ALL) {
  +val = sdhci_readl(host, ESDHC_TBCTL);
  +val &= ~ESDHC_TB_EN;
  +sdhci_writel(host, val, ESDHC_TBCTL);
  +}
}

/* The SCFG, Supplemental Configuration Unit, provides SoC specific
@@ -858,6 +885,11 @@
if (esdhc->vendor_ver > VENDOR_V_22)
  host->quirks &= ~SDHCI_QUIRK_NO_BUSY_IRQ;

  +if (of_find_compatible_node(NULL, NULL, "fsl,p2020-esdhc")) {
  +host->quirks |= SDHCI_QUIRK_RESET_AFTER_REQUEST;
  +host->quirks |= SDHCI_QUIRK_BROKEN_TIMEOUT_VAL;
  +}
if (of_device_is_compatible(np, "fsl,p5040-esdhc") ||
    of_device_is_compatible(np, "fsl,p5020-esdhc") ||
    of_device_is_compatible(np, "fsl,p4080-esdhc") ||
--- linux-4.15.0.orig/drivers/mmc/host/sdhci-omap.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-omap.c
@@ -184,8 +184,12 @@
        /* wait 1ms */
timeout = ktime_add_ms(ktime_get(), SDHCI_OMAP_TIMEOUT);
        -while (!(sdhci_omap_readl(omap_host, SDHCI_OMAP_HCTL) & HCTL_SDBP)) {
        -    if (WARN_ON(ktime_after(ktime_get(), timeout)))
        +while (1) {
        +    bool timedout = ktime_after(ktime_get(), timeout);
        +
        +    if (sdhci_omap_readl(omap_host, SDHCI_OMAP_HCTL) & HCTL_SDBP)
        +        break;
        +    if (WARN_ON(timedout))
        return;
        usleep_range(5, 10);
        }
        @@ -389,8 +393,12 @@
        /* wait 1ms */
timeout = ktime_add_ms(ktime_get(), SDHCI_OMAP_TIMEOUT);
        -while (!(sdhci_omap_readl(omap_host, SDHCI_OMAP_STAT) & INT_CC_EN)) {
        -    if (WARN_ON(ktime_after(ktime_get(), timeout)))
        +while (1) {
        +    bool timedout = ktime_after(ktime_get(), timeout);
        +
        +    if (sdhci_omap_readl(omap_host, SDHCI_OMAP_STAT) & INT_CC_EN)
        +        break;
        +    if (WARN_ON(timedout))
        return;
        usleep_range(5, 10);
        }
        --- linux-4.15.0.orig/drivers/mmc/host/sdhci-pci-core.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-pci-core.c
@@ -489,6 +490,9 @@
    u32 dsm_fns;
    intdrv_strength;
    bool d3_retune;
    +bool needs_pwr_off;
    
    static const guid_t intel_dsm_guid =
    @@ -489,6 +490,9 @@
    struct sdhci_pci_slot *slot = sdhci_priv(host);
struct intel_host *intel_host = sdhci_pci_priv(slot);

+if (!mmc_driver_type_mask(intel_host->drv_strength) & card_drv))
+return 0;
+
return intel_host->drv_strength;
}

static void sdhci_intel_set_power(struct sdhci_host *host, unsigned char mode,
       unsigned short vdd)
{
  struct sdhci_pci_slot *slot = sdhci_priv(host);
  struct intel_host *intel_host = sdhci_pci_priv(slot);
  int cntr;
  u8 reg;

  /*
   * Bus power may control card power, but a full reset still may not
   * reset the power, whereas a direct write to SDHCI_POWER_CONTROL can.
   * That might be needed to initialize correctly, if the card was left
   * powered on previously.
   */
  +*/
  + if (intel_host->needs_pwr_off) {
    +intel_host->needs_pwr_off = false;
    +if (mode != MMC_POWER_OFF) {
      +sdhci_writeb(host, 0, SDHCI_POWER_CONTROL);
      +usleep_range(10000, 12500);
    +}
    +}
  +
  sdhci_set_power(host, mode, vdd);

  if (mode == MMC_POWER_OFF)
    slot->chip->rpm_retune = intel_host->d3_retune;
}

-static int byt_emmc_probe_slot(struct sdhci_pci_slot *slot)
+static int intel_execute_tuning(struct mmc_host *mmc, u32 opcode)
{
  +int err = sdhci_execute_tuning(mmc, opcode);
  +struct sdhci_host *host = mmc_priv(mmc);
  +
  +if (err)
  +return err;
  +
+*/
Tuning can leave the IP in an active state (Buffer Read Enable bit set) which prevents the entry to low power states (i.e. S0i3). Data reset will clear it.

```
sdhci_reset(host, SDHCI_RESET_DATA);
```

```
return 0;
```

```
static void byt_probe_slot(struct sdhci_pci_slot *slot)
{
    struct mmc_host_ops *ops = &slot->host->mmc_host_ops;
    byt_read_dsm(slot);
    ops->execute_tuning = intel_execute_tuning;
}
```

```
static int byt_emmc_probe_slot(struct sdhci_pci_slot *slot)
{
    byt_probe_slot(slot);
    slot->host->mmc->caps |= MMC_CAP_8_BIT_DATA | MMC_CAP_NONREMOVABLE |
    MMC_CAP_HW_RESET | MMC_CAP_1_8V_DDR |
    @ @ -650,7 +697,7 @ @
    int err;
    @ -byt_read_dsm(slot);
    +byt_probe_slot(slot);
    err = ni_set_max_freq(slot);
    if (err)
    @ @ -663,15 +710,23 @ @
    static int byt_sdio_probe_slot(struct sdhci_pci_slot *slot)
    {
    -byt_read_dsm(slot);
    +byt_probe_slot(slot);
    slot->host->mmc->caps |= MMC_CAP_POWER_OFF_CARD | MMC_CAP_NONREMOVABLE |
    MMC_CAP_WAIT_WHILE_BUSY;
    return 0;
    }
```

```
static void byt_needs_pwr_off(struct sdhci_pci_slot *slot)
{
    struct intel_host *intel_host = sdhci_pci_priv(slot);
    u8 reg = sdhci_readb(slot->host, SDHCI_POWER_CONTROL);
```
+int host->needs_pwr_off = reg & SDHCI_POWER_ON;
+
+static int byt_sd_probe_slot(struct sdhci_pci_slot *slot)
{
  -byt_read_dsm(slot);
  +byt_probe_slot(slot);
  slot->host->mmc->caps |= MMC_CAP_WAIT_WHILE_BUSY |
  MMC_CAP_AGGRESSIVE_PM | MMC_CAP_CD_WAKE;
  slot->cd_idx = 0;
  @ @ -682.6 +737.8 @@ 
  slot->chip->pdev->device == PCI_DEVICE_ID_INTEL_GLK_SD)
  slot->host->mmc_host_ops.get_cd = bxt_get_cd;

+byt_needs_pwr_off(slot);
+
  return 0;
}
 @@ -778,6 +835,8 @@
  slot->host->quirks2 |= SDHCI QUIRK2_NO_1_8_V;
  break;
  case INTEL_MRFLD_SON:
  */ Advertise 2.0v for compatibility with the SDIO card's OCR */
  +slot->host->ocr_mask = MMC_VDD_20_21 | MMC_VDD_165_195;
  slot->host->mmc->caps |= MMC_CAP_NONREMOVABLE |
  MMC_CAP_POWER_OFF_CARD;
  break;
  @ @ -1153.7 +1212.7 @@
  pci_write_config_dword(pdev, AMD_SD_MISC_CONTROL, val);
}

-static int amd_execute_tuning(struct sdhci_host *host, u32 opcode)
+static int amd_execute_tuning_hs200(struct sdhci_host *host, u32 opcode)
{
  struct sdhci_pci_slot *slot = sdhci_priv(host);
  struct pci_dev *pdev = slot->chip->pdev;
  @ @ -1192.6 +1251.27 @@
  return 0;
}

+static int amd_execute_tuning(struct mmc_host *mmc, u32 opcode)
+
  +struct sdhci_host *host = mmc_priv(mmc);
  +
  +/* AMD requires custom HS200 tuning */
  +if (host->timing == MMC_TIMING_MMC_HS200)
return amd_execute_tuning_hs200(host, opcode);
+
+/* Otherwise perform standard SDHCI tuning */
+return sdhci_execute_tuning(mmc, opcode);
+
+static int amd_probe_slot(struct sdhci_pci_slot *slot)
+{
+struct mmc_host_ops *ops = &slot->host->mmc_host_ops;
+
+ops->execute_tuning = amd_execute_tuning;
+
+return 0;
+}
+
+static int amd_probe(struct sdhci_pci_chip *chip)
+
+.set_bus_width		= sdhci_set_bus_width,
+.reset			= sdhci_reset,
+.set_uhs_signaling	= sdhci_set_uhs_signaling,
-.platform_execute_tuning= amd_execute_tuning,
};

static const struct sdhci_pci_fixes sdhci_amd = {
.probe= amd_probe,
.ops= &amd_sdhci_pci_ops,
+probe_slot= amd_probe_slot,
};

static const struct pci_device_id pci_ids[] = {
@@ -1296,6 +1376,10 @@
    SDHCI_PCI_DEVICE(INTEL, CNP_EMMC, intel_glk_emmc),
    SDHCI_PCI_DEVICE(INTEL, CNP_SD, intel_byt_sd),
    SDHCI_PCI_DEVICE(INTEL, CNPH_SD, intel_byt_sd),
-    SDHCI_PCI_DEVICE(INTEL, ICP_EMMC, intel_glk_emmc),
-    SDHCI_PCI_DEVICE(INTEL, ICP_SD, intel_byt_sd),
-    SDHCI_PCI_DEVICE(INTEL, CML_EMMC, intel_glk_emmc),
-    SDHCI_PCI_DEVICE(INTEL, CML_SD, intel_byt_sd),
    SDHCI_PCI_DEVICE(O2, 8120, o2),
    SDHCI_PCI_DEVICE(O2, 8220, o2),
    SDHCI_PCI_DEVICE(O2, 8221, o2),
@@ -1548,8 +1632,13 @@
    host->mmc->caps2 |= MMC_CAP2_NO_PRESCAN_POWERUP;

    if (slot->cd_idx >= 0) {
-    ret = mmc_gpiod_request_cd(host->mmc, NULL, slot->cd_idx,

+ret = mmc_gpiod_request_cd(host->mmc, "cd", slot->cd_idx, 
    slot->cd_override_level, 0, NULL);
+ret = mmc_gpiod_request_cd(host->mmc, NULL, 
    slot->cd_idx, 
    slot->cd_override_level, 
    0, NULL);
if (ret == -EPROBE_DEFER)
goto remove;

--- linux-4.15.0.orig/drivers/mmc/host/sdhci-pci-o2micro.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-pci-o2micro.c
@@ -183,10 +183,20 @@
{
    struct sdhci_pci_chip *chip;
    struct sdhci_host *host;
    -u32 reg;
    +u32 reg, caps;

    chip = slot->chip;
    host = slot->host;
+
    +caps = sdhci_readl(host, SDHCI_CAPABILITIES);
    +
    +/*
    + * mmc_select_bus_width() will test the bus to determine the actual bus
    + * width.
    + */
    +if (caps & SDHCI_CAN_DO_8BIT)
    +host->mmc->caps |= MMC_CAP_8_BIT_DATA;
    +
    switch (chip->pdev->device) {
        case PCI_DEVICE_ID_O2_SDS0:
        case PCI_DEVICE_ID_O2_SEABIRD0:
            @@ -367,6 +377,9 @@
            pci_write_config_byte(chip->pdev, O2_SD_LOCK_WP, scratch);
            break;
        case PCI_DEVICE_ID_O2_SEABIRD0:
            +if (chip->pdev->revision == 0x01)
            +chip->quirks |= SDHCI QUIRK_DELAY_AFTER_POWER;
            +/* fall through */
            case PCI_DEVICE_ID_O2_SEABIRD1:
                /* UnLock WP */
                ret = pci_read_config_byte(chip->pdev,
                --- linux-4.15.0.orig/drivers/mmc/host/sdhci-pci.h
                +++ linux-4.15.0/drivers/mmc/host/sdhci-pci.h
                @@ -48,6 +48,10 @@
                #define PCI_DEVICE_ID_INTEL_CNP_EMMC0x9dc4
```c
#define PCI_DEVICE_ID_INTEL_CNP_SD	0x9df5
#define PCI_DEVICE_ID_INTEL_CNPH_SD	0xa375
+#define PCI_DEVICE_ID_INTEL_ICP_EMMC	0x34c4
+#define PCI_DEVICE_ID_INTEL_ICP_SD	0x34f8
+#define PCI_DEVICE_ID_INTEL_CML_EMMC	0x02c4
+#define PCI_DEVICE_ID_INTEL_CML_SD	0x02f5
#define PCI_DEVICE_ID_SYSKONNECT_8000x8000
#define PCI_DEVICE_ID_VIA_95D0		0x95d0

--- linux-4.15.0.orig/drivers/mmc/host/sdhci-tegra.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-tegra.c
@@ -177,7 +177,7 @@
     misc_ctrl |= SDHCI_MISC_CTRL_ENABLE_DDR50;
 if (soc_data->nvquirks & NVQUIRK_ENABLE_SDR104)
     misc_ctrl |= SDHCI_MISC_CTRL_ENABLE_SDR104;
-    if (soc_data->nvquirks & SDHCI_MISC_CTRL_ENABLE_SDR50)
+    if (soc_data->nvquirks & NVQUIRK_ENABLE_SDR50)
    clk_ctrl |= SDHCI_CLOCK_CTRL_SDR50_TUNING_OVERRIDE;
 }

@@ -334,7 +334,8 @@
     .quirks2 = SDHCI_QUIRK2_PRESET_VALUE_BROKEN | 
     .quirks2 = SDHCI_QUIRK2_PRESET_VALUE_BROKEN |
 +     SDHCI_QUIRK2_BROKEN_HS200,
 .ops  = &tegra_sdhci_ops,
     ];

@@ -481,6 +482,9 @@
 if (tegra_host->soc_data->nvquirks & NVQUIRK_ENABLE_DDR50)
     host->mmc->caps |= MMC_CAP_1_8V_DDR;

+/* R1B responses is required to properly manage HW busy detection. */
+host->mmc->caps |= MMC_CAP_NEED_RSP_BUSY;
 +
 tegra_host->power_gpio = devm_gpiod_get_optional(&pdev->dev, "power",
     GPIOD_OUT_HIGH);
 if(IS_ERR(tegra_host->power_gpio)) {
--- linux-4.15.0.orig/drivers/mmc/host/sdhci-xenon-phy.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-xenon-phy.c
@@ -357,9 +357,13 @@
   /* Wait max 32 ms */
 timeout = ktime_add_ms(ktime_get(), 32);
-while (!sdhci_readw(host, XENON_SLOT_EXT_PRESENT_STATE) &
-       XENON_DLL_LOCK_STATE)) {
```
-if (ktime_after(ktime_get(), timeout)) {
+while (1) {
+bool timedout = ktime_after(ktime_get(), timeout);
+
+if (sdhci_readw(host, XENON_SLOT_EXT_PRESENT_STATE) &
+ XENON_DLL_LOCK_STATE)
+break;
+if (timedout) {
dev_err(mmc_dev(host->mmc), "Wait for DLL Lock time-out\n");
return -ETIMEDOUT;
}

--- linux-4.15.0.orig/drivers/mmc/host/sdhci-xenon.c
+++ linux-4.15.0/drivers/mmc/host/sdhci-xenon.c
@@ -34,9 +34,13 @@
sdhci_writel(host, reg, SDHCI_CLOCK_CONTROL);
/* Wait max 20 ms */
timeout = ktime_add_ms(ktime_get(), 20);
-while (!((reg = sdhci_readw(host, SDHCI_CLOCK_CONTROL))
-&& SDHCI_CLOCK_INT_STABLE)) {
-if (ktime_after(ktime_get(), timeout)) {
+-while (1) {
+bool timedout = ktime_after(ktime_get(), timeout);
+
+/reg = sdhci_readw(host, SDHCI_CLOCK_CONTROL);
+if (reg & SDHCI_CLOCK_INT_STABLE)
+break;
+if (timedout) {
dev_err(mmc_dev(host->mmc), "Internal clock never stabilised.\n");
return -ETIMEDOUT;
}
@@ -166,7 +170,12 @@
/* Disable tuning request and auto-retuning again */
xenon_retune_setup(host);

+xenon_set_acg(host, true);
+/
+ * The ACG should be turned off at the early init time, in order
+ * to solve a possible issues with the 1.8V regulator stabilization.
+ * The feature is enabled in later stage.
+ */
+xenon_set_acg(host, false);

xmmc_regulator_set_ocr(mmc, mmc->supply.vmmc, vdd);
}
+static void xenon_voltage_switch(struct sdhci_host *host)
+{
+  /* Wait for 5ms after set 1.8V signal enable bit */
+  usleep_range(5000, 5500);
+  
+  /* For some reason the controller's Host Control2 register reports
+   * the bit representing 1.8V signaling as 0 when read after it was
+   * written as 1. Subsequent read reports 1.
+   * Since this may cause some issues, do an empty read of the Host
+   * Control2 register here to circumvent this.
+   */
+  sdhci_readw(host, SDHCI_HOST_CONTROL2);
+}
+
+static const struct sdhci_ops sdhci_xenon_ops = {
+  .voltage_switch = xenon_voltage_switch,
+  .set_clock = sdhci_set_clock,
+  .set_power = xenon_set_power,
+  .set_bus_width = sdhci_set_bus_width,
+};

#include <linux/dma-mapping.h>
#include <linux/slab.h>
#include <linux/scatterlist.h>
#include <linux/sizes.h>
#include <linux/swiotlb.h>
#include <linux/regulator/consumer.h>
#include <linux/pm_runtime.h>

if ((host->quirks & SDHCI_QUIRK_BROKEN_CARD_DETECTION) ||
    !mmc_card_is_removable(host->mmc))
-    !mmc_card_is_removable(host->mmc) || mmc_can_gpio_cd(host->mmc))
return;

if (enable) {
    timeout = ktime_add_ms(ktime_get(), 100);

    /* hw clears the bit when it's done */
    -while (sdhci_readb(host, SDHCI_SOFTWARE_RESET) & mask) {
    -if (ktime_after(ktime_get(), timeout)) {
        +while (1) {
            +bool timedout = ktime_after(ktime_get(), timeout);
            +
            +if (!sdhci_readb(host, SDHCI_SOFTWARE_RESET) & mask))
                +break;
        +if (timedout) {
            pr_err("%s: Reset 0x%x never completed.
",
                mmc_hostname(host->mmc), (int)mask);
            sdhci_dumpregs(host);
        }
    }
    } else {

-} else {

*/
*/

-while (sdhci_readb(host, SDHCI_SOFTWARE_RESET) & mask) {
    -if (ktime_after(ktime_get(), timeout)) {
        +while (1) {
            +bool timedout = ktime_after(ktime_get(), timeout);
            +
            +if (!sdhci_readb(host, SDHCI_SOFTWARE_RESET) & mask))
                +break;
        +if (timedout) {
            pr_err("%s: Reset 0x%x never completed.
",
                mmc_hostname(host->mmc), (int)mask);
            sdhci_dumpregs(host);
        }
    }
    } else {

*/
*/

-while (sdhci_readb(host, SDHCI_SOFTWARE_RESET) & mask) {
    -if (ktime_after(ktime_get(), timeout)) {
        +while (1) {
            +bool timedout = ktime_after(ktime_get(), timeout);
            +
            +if (!sdhci_readb(host, SDHCI_SOFTWARE_RESET) & mask))
                +break;
        +if (timedout) {
            pr_err("%s: Reset 0x%x never completed.
",
                mmc_hostname(host->mmc), (int)mask);
            sdhci_dumpregs(host);
        }
    }
    } else {

*/
*/
/* Just access the data directly from memory */
+sg_count = dma_map_sg(mmc_dev(host->mmc),
+    data->sg, data->sg_len,
+    mmc_get_dma_dir(data));
+
if (sg_count == 0)
    return -ENOSPC;
@@ -673,6 +705,14 @@
}
}
+
+static u32 sdhci_sdma_address(struct sdhci_host *host)
+{
+    if (host->bounce_buffer)
+        return host->bounce_addr;
+    else
+        return sg_dma_address(host->data->sg);
+}
+
+static u8 sdhci_calc_timeout(struct sdhci_host *host, struct mmc_command *cmd)
{  
    u8 count;
    @@ -750,6 +790,11 @@
        else
            host->ier = (host->ier & ~dma_irqs) | pio_irqs;
+
+    if (host->flags & (SDHCI_AUTO_CMD23 | SDHCI_AUTO_CMD12))
+        host->ier |= SDHCI_INT_AUTO_CMD_ERR;
+    else
+        host->ier &= ~SDHCI_INT_AUTO_CMD_ERR;
+    sdhci_writel(host, host->ier, SDHCI_INT_ENABLE);
+    sdhci_writel(host, host->ier, SDHCI_SIGNAL_ENABLE);
}
 @@ -858,8 +903,8 @@
 SDHCI_ADMA_ADDRESS_HI);
 } else {
    WARN_ON(sg_cnt != 1);
-    sdhci_writel(host, sg_dma_address(data->sg),
-        SDHCI_DMA_ADDRESS);
+    sdhci_writel(host, sdhci_sdma_address(host),
+        SDHCI_DMA_ADDRESS);
 }

@@ -962,8 +1007,7 @@
 return !(host->flags & SDHCI_DEVICE_DEAD) &&
((mrq->cmd && mrq->cmd->error) ||
(mrq->sbc && mrq->sbc->error) ||
 !(mrq->data->stop && mrq->data->stop->error))) ||
(mrq->data && mrq->data->stop && mrq->data->stop->error)) ||
(host->quirks & SDHCI_QUIRK_RESET_AFTER_REQUEST));

if (host->data = NULL;
host->data_cmd = NULL;

+/*
 * The controller needs a reset of internal state machines upon error
 * conditions.
 */
+if (data->error) {
+if (host->cmd || host->cmd == data_cmd)
+sdhci_do_reset(host, SDHCI_RESET_CMD);
+sdhci_do_reset(host, SDHCI_RESET_DATA);
+
+sdhci_adma_table_post(host, data);
@
if (data->stop &&
 (data->error ||
 !data->mrq->sbc)) {
-
-/*
 * The controller needs a reset of internal state machines
 * upon error conditions.
 */
-if (data->error) {
-if (!host->cmd || host->cmd == data_cmd)
-sdhci_do_reset(host, SDHCI_RESET_CMD);
-sdhci_do_reset(host, SDHCI_RESET_DATA);
-}
-
-/*
 * ‘cap_cmd_during_tfr’ request must not use the command line
 * after mmc_command_done() has been called. It is upper layer’s
 */

switch (host->timing) {
+case MMC_TIMING_MMC_HS:

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+case MMC_TIMING_SD_HS:
+preset = sdhci_readw(host, SDHCI_PRESET_FOR_HIGH_SPEED);
+break;
+case MMC_TIMING_UHS_SDR12:
+preset = sdhci_readw(host, SDHCI_PRESET_FOR_SDR12);
+break;
@@ -1381,9 +1428,13 @@
 /* Wait max 20 ms */
timeout = ktime_add_ms(ktime_get(), 20);
-while (!((clk = sdhci_readw(host, SDHCI_CLOCK_CONTROL)) & SDHCI_CLOCK_INT_STABLE)) {
-    if (ktime_after(ktime_get(), timeout)) {
+    while (1) {
+        bool timedout = ktime_after(ktime_get(), timeout);
+        clk = sdhci_readw(host, SDHCI_CLOCK_CONTROL);
+        if (clk & SDHCI_CLOCK_INT_STABLE)
+            break;
+        if (timedout) {
pr_err("%s: Internal clock never stabilised\n",
    mmc_hostname(host->mmc));
sdhci_dumpregs(host);
@@ -1434,6 +1485,13 @@
if (mode != MMC_POWER_OFF) {
    switch (1 << vdd) {
        case MMC_VDD_165_195:
+/*
+ * Without a regulator, SDHCI does not support 2.0v
+ * so we only get here if the driver deliberately
+ * added the 2.0v range to ocr_avail. Map it to 1.8v
+ * for the purpose of turning on the power.
+ */
+case MMC_VDD_20_21:
    pwr = SDHCI_POWER_180;
    break;
+case MMC_VDD_29_30:
@@ -2108,8 +2166,8 @@
sdhci_send_tuning(host, opcode);
if (!host->tuning_done) {
    -pr_info("%s: Tuning timeout, falling back to fixed sampling clock\n",
    -mmc_hostname(host->mmc));
+pr_debug("%s: Tuning timeout, falling back to fixed sampling clock\n",
+   mmc_hostname(host->mmc));
sdhci_abort_tuning(host, opcode);
return;
}
mrq->data->host_cookie = COOKIE_UNMAPPED;

- if (host->flags & SDHCI_REQ_USE_DMA)
  + /* No pre-mapping in the pre hook if we're using the bounce buffer,
  + * for that we would need two bounce buffers since one buffer is
  + * in flight when this is getting called.
  + */
  + if (host->flags & SDHCI_REQ_USE_DMA && !host->bounce_buffer)
    sdhci_pre_dma_transfer(host, mrq->data, COOKIE_PRE_MAPPED);
  }

@@ -2352,8 +2415,45 @@

struct mmc_data *data = mrq->data;

  if (data && data->host_cookie == COOKIE_MAPPED) {
-    dma_unmap_sg(mmc_dev(host->mmc), data->sg, data->sg_len,
-      mmc_get_dma_dir(data));
+    if (host->bounce_buffer) {
+      /* On reads, copy the bounced data into the
+       * sglist
+       */
+      if (mmc_get_dma_dir(data) == DMA_FROM_DEVICE) {
+        unsigned int length = data->bytes_xfered;
+        /* Cap it down and continue */
        +        if (length > host->bounce_buffer_size) {
+          pr_err("%s: bounce buffer is %u bytes but DMA claims to have transferred %u bytes\n",
+            mmc_hostname(host->mmc),
+            host->bounce_buffer_size,
+            data->bytes_xfered);
+        /* Cap it down and continue */
        +        length = host->bounce_buffer_size;
+      }
+      +        dma_sync_single_for_cpu(
+          host->mmc->parent,
+          host->bounce_addr,
+          host->bounce_buffer_size,
+          DMA_FROM_DEVICE);
+        +        sg_copy_from_buffer(data->sg,
+          data->sg_len,
+          host->bounce_buffer,
+          length);
+      } else {
+        /* No copying, just switch ownership */
+        dma_sync_single_for_cpu(

+host->mmc->parent,
+host->bounce_addr,
+host->bounce_buffer_size,
+mmc_get_dma_dir(data));
+
+} else {
+/* Unmap the raw data */
+dma_unmap_sg(mmc_dev(host->mmc), data->sg,
+   data->sg_len,
+   mmc_get_dma_dir(data));
+}

data->host_cookie = COOKIE_UNMAPPED;
}
}

/*
**********

-static void sdhci_cmd_irq(struct sdhci_host *host, u32 intmask)
+static void sdhci_cmd_irq(struct sdhci_host *host, u32 intmask, u32 *intmask_p)
{
+/* Handle auto-CMD12 error */
+if (intmask & SDHCI_INT_AUTO_CMD_ERR && host->data_cmd) {
+    struct mmc_request *mrq = host->data_cmd->mrq;
+    u16 auto_cmd_status = sdhci_readw(host, SDHCI_AUTO_CMD_STATUS);
+    int data_err_bit = (auto_cmd_status & SDHCI_AUTO_CMD_TIMEOUT) ?
+        SDHCI_INT_DATA_TIMEOUT :
+        SDHCI_INT_DATA_CRC;
+
+    /* Treat auto-CMD12 error the same as data error */
+    if (!mrq->sbc && (host->flags & SDHCI_AUTO_CMD12)) {
+        *intmask_p |= data_err_bit;
+        return;
+    }
+}
+
+if (!host->cmd) {
+    /* SDHCI recovers from errors by resetting the cmd and data
+     *  @ @ -2490,20 +2605,12 @ @
+     * else
+     * host->cmd->error = -EILSEQ;
+     */
+    /* If this command initiates a data phase and a response
+    * CRC error is signalled, the card can start transferring
+    * data - the card may have received the command without
+    * error. We must not terminate the mmc_request early.
+    */
/*
 * If the card did not receive the command or returned an error which prevented it sending data, the data phase will time out.
 */

+/* Treat data command CRC error the same as data CRC error */
if (host->cmd->data &&
    (intmask & (SDHCI_INT_CRC | SDHCI_INT_TIMEOUT)) ==
    SDHCI_INT_CRC) {
    host->cmd = NULL;
    /*intmask_p |= SDHCI_INT_DATA_CRC;
    return;
    */
    @ @ -2511,6 +2618,21 @ @
    return;
}

+/* Handle auto-CMD23 error */
+if (intmask & SDHCI_INT_AUTO_CMD_ERR) {
    struct mmc_request *mrq = host->cmd->mrq;
    u16 auto_cmd_status = sdhci_readw(host, SDHCI_AUTO_CMD_STATUS);
    int err = (auto_cmd_status & SDHCI_AUTO_CMD_TIMEOUT) ?
        -ETIMEDOUT :
        -EILSEQ;
    +
    +if (mrq->sbc && (host->flags & SDHCI_AUTO_CMD23)) {
        +mrq->sbc->error = err;
        +sdhci_finish_mrq(host, mrq);
        +return;
        +}
    +}
    +}
    +
    if (intmask & SDHCI_INT_RESPONSE)
    sdhci_finish_command(host);
    }
@ @ -2518,6 +2640,7 @ @
static void sdhci_adma_show_error(struct sdhci_host *host)
{
    void *desc = host->adma_table;
    +dma_addr_t dma = host->adma_addr;

    sdhci_dumpregs(host);

    @ @ -2525,18 +2648,21 @ @
    struct sdhci_adma2_64_desc *dma_desc = desc;

    if (host->flags & SDHCI_USE_64_BIT_DMA)
-DBG("%p: DMA 0x%08x%08x, LEN 0x%04x, Attr=0x%02x\n",  
- desc, le32_to_cpu(dma_desc->addr_hi),  
+SDHCI_DUMP("%08llx: DMA 0x%08x%08x, LEN 0x%04x, Attr=0x%02x
" 
+ (unsigned long long)dma,  
+ le32_to_cpu(dma_desc->addr_hi),  
+ le32_to_cpu(dma_desc->addr_lo),  
+ le16_to_cpu(dma_desc->len),  
+ le16_to_cpu(dma_desc->cmd));  
else  
-DBG("%p: DMA 0x%08x, LEN 0x%04x, Attr=0x%02x\n",  
- desc, le32_to_cpu(dma_desc->addr_lo),  
+SDHCI_DUMP("%08llx: DMA 0x%08x, LEN 0x%04x, Attr=0x%02x
",  
+ (unsigned long long)dma,  
+ le32_to_cpu(dma_desc->addr_lo),  
+ le16_to_cpu(dma_desc->len),  
+ le16_to_cpu(dma_desc->cmd));

desc += host->desc_sz;  
+dma += host->desc_sz;

if (dma_desc->cmd & cpu_to_le16(ADMA2_END))  
break;  
@@ -2612,7 +2738,8 @@  
!= MMC_BUS_TEST_R)  
host->data->error = -EILSEQ;  
else if (intmask & SDHCI_INT_ADMA_ERROR) {  
-pr_err("%s: ADMA error\n", mmc_hostname(host->mmc));  
+pr_err("%s: ADMA error: 0x%08x\n", mmc_hostname(host->mmc),  
+ intmask);  
-sdhci_adma_show_error(host);  
-host->data->error = -EIO;  
if (host->ops->adma_workaround)  
@@ -2636,7 +2763,8 @@  
*/  
if (intmask & SDHCI_INT_DMA_END) {  
u32 dmastart, dmanow;  
-dmastart = sg_dma_address(host->data->sg);  
+  
+dmastart = sdhci_sdma_address(host);  
dmanow = dmastart + host->data->bytes_xfered;  
/*  
* Force update to the next DMA block boundary.  
@@ -2730,7 +2858,7 @@  
}  
if (intmask & SDHCI_INT_CMD_MASK)  
-sdhci_cmd_irq(host, intmask & SDHCI_INT_CMD_MASK);  
+sdhci_cmd_irq(host, intmask & SDHCI_INT_CMD_MASK, &intmask);
if (intmask & SDHCI_INT_DATA_MASK)
sdhci_data_irq(host, intmask & SDHCI_INT_DATA_MASK);
@@ -3217,6 +3345,68 @@
}       
EXPORT_SYMBOL_GPL(__sdhci_read_caps);

+static int sdhci_allocate_bounce_buffer(struct sdhci_host *host)
+{
+struct mmc_host *mmc = host->mmc;
+unsigned int max_blocks;
+unsigned int bounce_size;
+int ret;
+
+/*
+ * Cap the bounce buffer at 64KB. Using a bigger bounce buffer
+ * has diminishing returns, this is probably because SD/MMC
+ * cards are usually optimized to handle this size of requests.
+ */
+bounce_size = SZ_64K;
+/*
+ * Adjust downwards to maximum request size if this is less
+ * than our segment size, else hammer down the maximum
+ * request size to the maximum buffer size.
+ */
+if (mmc->max_req_size < bounce_size)
+bounce_size = mmc->max_req_size;
+max_blocks = bounce_size / 512;
+
+/*
+ * When we just support one segment, we can get significant
+ * speedups by the help of a bounce buffer to group scattered
+ * reads/writes together.
+ */
+host->bounce_buffer = devm_kmalloc(mmc->parent,
+    bounce_size,
+    GFP_KERNEL);
+if (!host->bounce_buffer) {
+pr_err("%s: failed to allocate %u bytes for bounce buffer, falling back to single segments\n",
+    mmc_hostname(mmc),
+    bounce_size);
+/*
+ * Exiting with zero here makes sure we proceed with
+ * mmc->max_segs == 1.
+ */
+return 0;
+}
+host->bounce_addr = dma_map_single(mmc->parent,
+    host->bounce_buffer,
+    bounce_size,
+    DMA_BIDIRECTIONAL);
+ret = dma_mapping_error(mmc->parent, host->bounce_addr);
+if (ret)
+    /* Again fall back to maxSegments == 1 */
+    return 0;
+host->bounce_buffer_size = bounce_size;
+
+    /* Lie about this since we're bouncing */
+    mmc->max_segs = max_blocks;
+    mmc->max_seg_size = bounce_size;
+    mmc->max_req_size = bounce_size;
+
+    pr_info("%s bounce up to %u segments into one, max segment size %u bytes\n", 
            mmc_hostname(mmc), max_blocks, bounce_size);
+    +return 0;
+}
+
int sdhci_setup_host(struct sdhci_host *host)
{
    struct mmc_host *mmc;
    @@ -3258,6 +3448,9 @@
        mmc_hostname(mmc), host->version);
    }
    +if (host->quirks & SDHCI_QUIRK_BROKEN_CQE)
    +    mmc->caps2 &= ~MMC_CAP2_CQE;
    +
    if (host->quirks & SDHCI_QUIRK_FORCE_DMA)
        host->flags |= SDHCI_USE_SDMA;
    else if (!(host->caps & SDHCI_CAN_DO_SDMA))
    @@ -3406,11 +3599,13 @@
        if (host->ops->get_min_clock)
            mmc->f_min = host->ops->get_min_clock(host);
    else if (host->version >= SDHCI_SPEC_300) {
        -if (host->clk_mul) {
        -    mmc->f_min = (host->max_clk * host->clk_mul) / 1024;
        -    if (host->clk_mul)
        max_clk = host->max_clk * host->clk_mul;
        -} else
        -    mmc->f_min = host->max_clk / SDHCI_MAX_DIV_SPEC_300;
        +/*
        +    * Divided Clock Mode minimum clock rate is always less than
        +    * Programmable Clock Mode minimum clock rate.
        + */
+mmc->f_min = host->max_clk / SDHCI_MAX_DIV_SPEC_300;
} else
mmc->f_min = host->max_clk / SDHCI_MAX_DIV_SPEC_200;

@@ -3483,14 +3678,21 @@
mmc_gpio_get_cd(host->mmc) < 0)
mmc->caps |= MMC_CAP_NEEDS_POLL;

-/* If vqmmc regulator and no 1.8V signalling, then there's no UHS */
+/* If vqmmc regulator and no 1.8V signalling, then there's no UHS */
if (!IS_ERR(mmc->supply.vqmmc)) {
    ret = regulator_enable(mmc->supply.vqmmc);
+    /* If vqmmc provides no 1.8V signalling, then there's no UHS */
    if (!regulator_is_supported_voltage(mmc->supply.vqmmc, 1700000,
+        1950000))
        host->caps1 &= ~(SDHCI_SUPPORT_SDR104 |
            SDHCI_SUPPORT_SDR50 |
            SDHCI_SUPPORT_DDR50);
    +    /* In eMMC case vqmmc might be a fixed 1.8V regulator */
    +if (!regulator_is_supported_voltage(mmc->supply.vqmmc, 2700000,
    +    3600000))
    +host->flags &= ~SDHCI_SIGNALING_330;
    +
    if (ret) {
        pr_warn("%s: Failed to enable vqmmc regulator: %d\n",
            mmc_hostname(mmc), ret);
        @@ -3519,6 +3721,16 @@
        if (host->quirks2 & SDHCI_QUIRK2_NO_1_8_V) {
            host->caps1 &= ~(SDHCI_SUPPORT_SDR104 | SDHCI_SUPPORT_SDR50 |
            SDHCI_SUPPORT_DDR50);
            +    /* The SDHCI controller in a SoC might support HS200/HS400
            + but if the board is modeled such that the IO lines are not
            + connected to 1.8v then HS200/HS400 cannot be supported.
            + Disable HS200/HS400 if the board does not have 1.8v connected
            + to the IO lines. (Applicable for other modes in 1.8v)
            +*/
                +mmc->caps2 &= ~(MMC_CAP2_HSX00_1_8V | MMC_CAP2_HS400_ES);
                +mmc->caps &= ~(MMC_CAP_1_8V_DDR | MMC_CAP_UHS);
        }
/
/* Any UHS-I mode in caps implies SDR12 and SDR25 support. */
@@ -3713,6 +3925,13 @@
    mmc->max_blk_count = (host->quirks & SDHCI_QUIRK_NO_MULTIBLOCK) ? 1 : 65535;
+if (mmc->max_segs == 1) {
+  /* This may alter mmc->*_blk_* parameters */
+  ret = sdhci_allocate_bounce_buffer(host);
+  if (ret)
+    return ret;
+}
+
+return 0;

unreg:
--- linux-4.15.0.orig/drivers/mmc/host/sdhci.h
+++ linux-4.15.0/drivers/mmc/host/sdhci.h
@@ -144,14 +144,15 @@
#define  SDHCI_INT_DATA_CRC	0x00200000
#define  SDHCI_INT_DATA_END_BIT	0x00400000
#define  SDHCI_INT_BUS_POWER	0x00800000
-#define  SDHCI_INT_ACMD12ERR	0x01000000
+#define  SDHCI_INT_AUTO_CMD_ERR	0x01000000
#define  SDHCI_INT_ADMA_ERROR	0x02000000
+-#define  SDHCI_INT_NORMAL_MASK	0x00007FFF
+  #define  SDHCI_INT_ERROR_MASK	0xFFFF8000
+  #define  SDHCI_INT_CMD_MASK	(SDHCI_INT_RESPONSE | SDHCI_INT_TIMEOUT |
+    SDHCI_INT_CRC | SDHCI_INT_END_BIT | SDHCI_INT_INDEX)
+  #define  SDHCI_INT_DATA_MASK	(SDHCI_INT_DATA_END | SDHCI_INT_DMA_END |
+    SDHCI_INT_DATA_AVAIL | SDHCI_INT_SPACE_AVAIL | SDHCI_INT_DATA_TIMEOUT | SDHCI_INT_DATA_CRC |
+    SDHCI_INT_NORMAL_MASK | SDHCI_INT_ERROR_MASK | SDHCI_INT_CMD_MASK | SDHCI_INT_DATA_MASK)
+  #define SDHCI_CQE_INT_MASK (SDHCI_CQE_INT_ERR_MASK | SDHCI_CQE_INT_CQE)

-#define SDHCI_ACMD12_ERR	0x3C
+#define SDHCI_AUTO_CMD_STATUS	0x3C
+#define  SDHCI_AUTO_CMD_TIMEOUT	0x00000002
+#define  SDHCI_AUTO_CMD_CRC	0x00000004
+#define  SDHCI_AUTO_CMD_END_BIT	0x00000008
+#define  SDHCI_AUTO_CMD_INDEX	0x00000010

#define SDHCI_HOST_CONTROL2	0x3E
#define  SDHCI_CTRL_UHS_MASK	0x0007
@@ -247,6 +252,7 @@
/* 60-FB reserved */

+#define SDHCI_PRESET_FOR_HIGH_SPEED	0x64
```c
#define SDHCI_PRESET_FOR_SDR12 0x66
#define SDHCI_PRESET_FOR_SDR25 0x68
#define SDHCI_PRESET_FOR_SDR50 0x6A

#define SDHCI_QUIRK_BROKEN_CARD_DETECTION(1<<15)
/* Controller reports inverted write-protect state */
#define SDHCI_QUIRK_INVERTED_WRITE_PROTECT(1<<16)
/* Controller has unusable command queue engine */
#define SDHCI_QUIRK_BROKEN_CQE(1<<17)
/* Controller does not like fast PIO transfers */
#define SDHCI_QUIRKPIO_NEEDS_DELAY(1<<18)
/* Controller has to be forced to use block size of 2048 bytes */

int irq;/* Device IRQ */
void __iomem *ioaddr;/* Mapped address */
+char *bounce_buffer;/* For packing SDMA reads/writes */
+dma_addr_t bounce_addr;
+unsigned int bounce_buffer_size;

const struct sdhci_ops *ops;/* Low level hw interface */
```

--- linux-4.15.0.orig/drivers/mmc/host/sunxi-mmc.c
+++ linux-4.15.0/drivers/mmc/host/sunxi-mmc.c
@@ -1343,6 +1343,21 @@
     if (ret)
     goto error_free_dma;

+/*
+ * If we don't support delay chains in the SoC, we can't use any
+ * of the higher speed modes. Mask them out in case the device
+ * tree specifies the properties for them, which gets added to
+ * the caps by mmc_of_parse() above.
+ */
+if (!(host->cfg->clk_delays || host->use_new_timings)) {
+    mmc->caps &= ~(MMC_CAP_3_3V_DDR | MMC_CAP_1_8V_DDR |
+        MMC_CAP_1_2V_DDR | MMC_CAP_UHS);
+    mmc->caps2 &= ~MMC_CAP2_HS200;
+    +}
+    +
+    +/* TODO: This driver doesn't support HS400 mode yet */
+    +mmc->caps2 &= ~MMC_CAP2_HS400;
+    +
+    +ret = mmc_add_host(mmc);
+    +if (ret)
+    +goto error_free_dma;
```

--- linux-4.15.0.orig/drivers/mmc/host/tmio_mmc.h
+++ linux-4.15.0/drivers/mmc/host/tmio_mmc.h
writew(val >> 16, host->ctl + ((addr + 2) << host->bus_shift));

+static inline void sd_ctrl_write32(struct tmio_mmc_host *host, int addr, u32 val)
+{
+iowrite32(val, host->ctl + (addr << host->bus_shift));
+}
+
static inline void sd_ctrl_write32_rep(struct tmio_mmc_host *host, int addr,
    const u32 *buf, int count)
{
    --- linux-4.15.0.orig/drivers/mmc/host/tmio_mmc_core.c
    +++ linux-4.15.0/drivers/mmc/host/tmio_mmc_core.c
    @ @ -46,6 +46,7 @@
    #include <linux/regulator/consumer.h>
    #include <linux/mmc/sdio.h>
    #include <linux/scatterlist.h>
    +#include <linux/sizes.h>
    #include <linux/spinlock.h>
    #include <linux/swiotlb.h>
    #include <linux/workqueue.h>
    @@ -688,7 +689,7 @@
    return false;
}

-static void __tmio_mmc_sdio_irq(struct tmio_mmc_host *host)
+static bool __tmio_mmc_sdio_irq(struct tmio_mmc_host *host)
{
    struct mmc_host *mmc = host->mmc;
    struct tmio_mmc_data *pdata = host->pdata;
    @@ -696,7 +697,7 @@
    unsigned int sdio_status;
    if (!(pdata->flags & TMIO_MMC_SDIO_IRQ))
        return;
    return false;
    status = sd_ctrl_read16(host, CTL_SDIOS_STATUS);
    ireg = status & TMIO_SDIOS_MASK_ALL & ~host->sdio_irq_mask;
    @@ -709,6 +710,8 @@
    if (mmc->caps & MMC_CAP_SDIO_IRQ && ireg & TMIO_SDIOS_STAT_IOIRQ)
        mmc_signal_sdio_irq(mmc);
+    return ireg;
}
irqreturn_t tmio_mmc_irq(int irq, void *devid)
@@ -727,9 +730,10 @@
    if (__tmio_mmc_sdcard_irq(host, ireg, status))
    return IRQ_HANDLED;

-__tmio_mmc_sdio_irq(host);
+if (__tmio_mmc_sdio_irq(host))
+return IRQ_HANDLED;

-return IRQ_HANDLED;
+return IRQ_NONE;
}
EXPORT_SYMBOL_GPL(tmio_mmc_irq);

/* Set transfer length / blocksize */
sd_ctrl_write16(host, CTL_SD_XFER_LEN, data->blksz);
-sd_ctrl_write16(host, CTL_XFER_BLK_COUNT, data->blocks);
+if (host->mmc->max_blk_count >= SZ_64K)
+ sd_ctrl_write32(host, CTL_XFER_BLK_COUNT, data->blocks);
+else
+ sd_ctrl_write16(host, CTL_XFER_BLK_COUNT, data->blocks);

tmio_mmc_start_dma(host, data);

/* SCC error means retune, but executed command was still successful */
+if (host->check_scc_error && host->check_scc_error(host))
+mmc_retune_needed(host->mmc);

/* If SET_BLOCK_COUNT, continue with main command */
-if (host->mrq) {
+if (host->mrq && !mrq->cmd->error) {
  tmio_process_mrq(host, mrq);
  return;
}
@@ -1212,7 +1220,7 @@
 _host->start_signal_voltage_switch;
 mmc->ops = &tmio_mmc_ops;

-mmc->caps |= MMC_CAP_4_BIT_DATA | pdata->capabilities;
+mmc->caps |= MMC_CAP_ERASE | MMC_CAP_4_BIT_DATA | pdata->capabilities;
mmc->caps2 |= pdata->capabilities2;
mmc->max_segs = pdata->max_segs ? 32;
mmc->max_blk_size = 512;
--- linux-4.15.0.orig/drivers/mmc/host/usdhi6rol0.c
+++ linux-4.15.0/drivers/mmc/host/usdhi6rol0.c
@@ -1809,6 +1809,7 @@
version = usdhi6_read(host, USDHI6_VERSION);
if ((version & 0xfff) != 0xa0d) {
+ret = -EPERM;
    dev_err(dev, "Version not recognized \%x\n", version);
    goto e_clk_off;
}  @@ -1866,10 +1867,12 @@
    ret = mmc_add_host(mmc);
    if (ret < 0)
      -goto e_clk_off;
+goto e_release_dma;
      return 0;
+e_release_dma:
    +usdhi6_dma_release(host);
    +e_clk_off:
    clk_disable_unprepare(host->clk);
    e_free_mmc:
--- linux-4.15.0.orig/drivers/mmc/host/via-sdmmc.c
+++ linux-4.15.0/drivers/mmc/host/via-sdmmc.c
@@ -323,6 +323,8 @@
/* some devices need a very long delay for power to stabilize */
#define VIA_CRDR_QUIRK_300MS_PWRDELAY 0x0001
+#define VIA_CMD_TIMEOUT_MS 1000
+static const struct pci_device_id via_ids[] = {
    {PCI_VENDOR_ID_VIA, PCI_DEVICE_ID_VIA_9530,
     PCI_ANY_ID, PCI_ANY_ID, 0, 0, 0,},
    @@ -555,14 +557,17 @@
   
    +static const struct pci_device_id via_ids[] = {
    
    void __iomem *addrbase;
    struct mmc_data *data;
    +unsigned int timeout_ms;
    u32 cmdctrl = 0;

    WARN_ON(host->cmd);

    data = cmd->data;
-mod_timer(&host->timer, jiffies + HZ);
host->cmd = cmd;

+timeout_ms = cmd->busy_timeout ? cmd->busy_timeout : VIA_CMD_TIMEOUT_MS;
+mod_timer(&host->timer, jiffies + msecs_to_jiffies(timeout_ms));
+
/*Command index*/
cmdctrl = cmd->opcode << 8;

@@ -860,6 +865,9 @@
{
BUG_ON(intmask == 0);

+if (!host->data)
+return;
+
if (intmask & VIA_CRDR_SDSTS_DT)
host->data->error = -ETIMEDOUT;
else if (intmask & (VIA_CRDR_SDSTS_RC | VIA_CRDR_SDSTS_WC))
@@ -1268,11 +1276,14 @@
static int via_sd_suspend(struct pci_dev *pcidev, pm_message_t state)
{
struct via_crdr_mmc_host *host;
unsigned long flags;

host = pci_get_drvdata(pcidev);

+spin_lock_irqsave(&host->lock, flags);
via_save_pcictrlreg(host);
via_save_sdcreg(host);
+spin_unlock_irqrestore(&host->lock, flags);

pci_save_state(pcidev);
pci_enable_wake(pcidev, pci_choose_state(pcidev, state), 0);
--- linux-4.15.0.orig/drivers/mmc/host/vub300.c
+++ linux-4.15.0/drivers/mmc/host/vub300.c
@@ -2289,7 +2289,7 @@
if (retval < 0)
goto error5;
retval =
-usb_control_msg(vub300->udev, usb_rcvctrlpipe(vub300->udev, 0),
+usb_control_msg(vub300->udev, usb_sndctrlpipe(vub300->udev, 0),
SET_ROM_WAIT_STATES,
USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_DEVICE,
firmware_rom_wait_states, 0x0000, NULL, 0, HZ);
--- linux-4.15.0.orig/drivers/mtd/chips/cfi_cmdset_0001.c
+++ linux-4.15.0/drivers/mtd/chips/cfi_cmdset_0001.c
@@ -45,6 +45,7 @@
#define I82802AB      0x00ad
#define I82802AC      0x00ac
#define PF38F4476     0x881c
+#define M28F00AP30   0x8963
/* STMicroelectronics chips */
#define M50LPW080     0x002F
#define M50FLW080A    0x0080
@@ -375,6 +376,17 @@
extp->MinorVersion = '1';
}

+static int cfi_is_micron_28F00AP30(struct cfi_private *cfi, struct flchip *chip)
+{
+  /*
+   + Micron(was Numonyx) 1Gbit bottom boot are buggy w.r.t
+   + Erase Suspend for their small Erase Blocks(0x8000)
+   + */
+   +if (cfi->mfr == CFI_MFR_INTEL && cfi->id == M28F00AP30)
+     +return 1;
+   +return 0;
+}
+
+static inline struct cfi_pri_intelext *
read_pri_intelext(struct map_info *map, __u16 adr)
{
  @@ -831,21 +843,30 @@
  (mode == FL_WRITING && (cfip->SuspendCmdSupport & 1)))
goto sleep;

+/* Do not allow suspend iff read/write to EB address */
+if (((adr & chip->in_progress_block_mask) ==
+   chip->in_progress_block_addr)
+  goto sleep;
+
+ /* do not suspend small EBs, buggy Micron Chips */
+if (cfi_is_micron_28F00AP30(cfi, chip) &&
+  (chip->in_progress_block_mask == ~(0x8000-1)))
goto sleep;

/* Erase suspend */
-map_write(map, CMD(0xB0), adr);
+map_write(map, CMD(0xB0), chip->in_progress_block_addr);

/* If the flash has finished erasing, then 'erase suspend'
  * appears to make some (28F320) flash devices switch to
  * 'read' mode. Make sure that we switch to 'read status'
  * mode so we get the right data. --rmk
  */
-map_write(map, CMD(0x70), adr);
+map_write(map, CMD(0x70), chip->in_progress_block_addr);
chip->oldstate = FL_ERASING;
chip->state = FL_ERASE_SUSPENDING;
chip->erase_suspended = 1;
for (;;) {
-status = map_read(map, adr);
+status = map_read(map, chip->in_progress_block_addr);
if (map_word_andequal(map, status, status_OK, status_OK))
    break;

@@ -1041,8 +1062,8 @@
    sending the 0x70 (Read Status) command to an erasing
    chip and expecting it to be ignored, that's what we
do. */
-map_write(map, CMD(0xd0), adr);
-map_write(map, CMD(0x70), adr);
+map_write(map, CMD(0xd0), chip->in_progress_block_addr);
+map_write(map, CMD(0x70), chip->in_progress_block_addr);
chip->oldstate = FL_READY;
chip->state = FL_ERASING;
break;
@@ -1933,6 +1954,8 @@
map_write(map, CMD(0xD0), adr);
chip->state = FL_ERASING;
chip->erase_suspended = 0;
+chip->in_progress_block_addr = adr;
+chip->in_progress_block_mask = ~(len - 1);

ret = INVAL_CACHE_AND_WAIT(map, chip, adr, 
adr, len,
--- linux-4.15.0.orig/drivers/mtd/chips/cfi_cmdset_0002.c
+++ linux-4.15.0/drivers/mtd/chips/cfi_cmdset_0002.c
@@ -42,7 +42,7 @@
#define AMD_BOOTLOC_BUG
#define FORCE_WORD_WRITE 0

-#define MAX_WORD_RETRIES 3
+#define MAX_RETries 3

#define SST49LF004B    0x0060
#define SST49LF040B    0x0050
@@ -726,7 +726,6 @@
kfree(mtd->eraseregions);
kfree(mtd);
kfree(cfi->cmdset_priv);
-kfree(cfi->cfiq);
return NULL;

/* We could check to see if we're trying to access the sector
 * that is currently being erased. However, no user will try
 * anything like that so we just wait for the timeout. */

/* Do not allow suspend iff read/write to EB address */
if ((adr & chip->in_progress_block_mask) ==
    chip->in_progress_block_addr)
goto sleep;

/* Erase suspend */
/* It's harmless to issue the Erase-Suspend and Erase-Resume
*/

- if (time_after(jiffies, timeo) && !chip_ready(map, adr)) {
+ /* We check "time_after" and "!chip_good" before checking
+    "chip_good" to avoid the failure due to scheduling.
+ */
+ if (time_after(jiffies, timeo) && !chip_good(map, adr, datum)) {
    xip_enable(map, chip, adr);
    printk(KERN_WARNING "MTD %s(): software timeout\n", __func__);  
    xip_disable(map, chip, adr);
    +ret = -EIO;
    break;
}

- if (!chip_good(map, adr))
+ if (ret) {
    /* reset on all failures. */
    map_write(map, CMD(0xF0), chip->start);
    /* FIXME - should have reset delay before continuing */
-if (++retry_cnt <= MAX_WORD_RETRIES)
+if (++retry_cnt <= MAX_RETRIES) {
  ret = 0;
goto retry;
-
-ret = -EIO;
+
}
}
xip_enable(map, chip, adr);

op_done:
@@ -1876,10 +1882,14 @@
  continue;
 }

-if (time_after(jiffies, timeo) && !chip_ready(map, adr))
+/*
+ * We check "time_after" and "!chip_good" before checking "chip_good" to avoid
+ * the failure due to scheduling.
+ */
+if (time_after(jiffies, timeo) && !chip_good(map, adr, datum))
  break;

- if (chip_ready(map, adr)) {
+ if (chip_good(map, adr, datum)) {
    xip_enable(map, chip, adr);
    goto op_done;
  }
@@ -2105,7 +2115,7 @@
  map_write(map, CMD(0xF0), chip->start);
  /* FIXME - should have reset delay before continuing */

- if (++retry_cnt <= MAX_WORD_RETRIES)
+ if (++retry_cnt <= MAX_RETRIES)
  goto retry;

 ret = -EIO;
@@ -2240,6 +2250,7 @@
  unsigned long int adr;
 DECLARE_WAITQUEUE(wait, current);
 int ret = 0;
+int retry_cnt = 0;

 adr = cfi->addr_unlock1;
@@ -2257,6 +2268,7 @@
 ENABLE_VPP(map);
 xip_disable(map, chip, adr);
+ retry:
cfi_send_gen_cmd(0xAA, cfi->addr_unlock1, chip->start, map, cfi, cfi->device_type, NULL);
cfi_send_gen_cmd(0x55, cfi->addr_unlock2, chip->start, map, cfi, cfi->device_type, NULL);
cfi_send_gen_cmd(0x80, cfi->addr_unlock1, chip->start, map, cfi, cfi->device_type, NULL);
@@ -2267,6 +2279,7 @@
chip->state = FL_ERASING;
chip->erase_suspended = 0;
chip->in_progress_block_addr = adr;
+chip->in_progress_block_mask = ~(map->size - 1);

INVALIDATE_CACHE_UDELAY(map, chip, 
adr, map->size,
@@ -2292,12 +2305,13 @@
chip->erase_suspended = 0;
}

-if (chip_ready(map, adr))
+if (chip_good(map, adr, map_word_ff(map)))
break;

if (time_after(jiffies, timeo)) {
printk(KERN_WARNING "MTD %s(): software timeout\n",
__func__); 
+ret = -EIO;
break;
}

@@ -2305,12 +2319,15 @@
UDELAY(map, chip, adr, 1000000/Hz);
}
/* Did we succeed? */
-if (!chip_good(map, adr, map_word_ff(map))) {
+if (ret) {
+/* reset on all failures. */
+map_write( map, CMD(0xF0), chip->start );

/* FIXME - should have reset delay before continuing */

-ret = -EIO;
+if (++retry_cnt <= MAX_RETRIES) {
+ret = 0;
+goto retry;
+}
}

chip->state = FL_READY;
@@ -2329,6 +2346,7 @@
unsigned long timeo = jiffies + Hz;
DECLARE_WAITQUEUE(wait, current);
int ret = 0;
+int retry_cnt = 0;

adr += chip->start;

@@ -2346,6 +2364,7 @@
 ENABLE_VPP(map);
 xip_disable(map, chip, adr);

 + retry:
 cfi_send_gen_cmd(0xAA, cfi->addr_unlock1, chip->start, map, cfi, cfi->device_type, NULL);
 cfi_send_gen_cmd(0x55, cfi->addr_unlock2, chip->start, map, cfi, cfi->device_type, NULL);
 cfi_send_gen_cmd(0x80, cfi->addr_unlock1, chip->start, map, cfi, cfi->device_type, NULL);
@@ -2356,6 +2375,7 @@
 chip->state = FL_ERASING;
 chip->erase_suspended = 0;
 chip->in_progress_block_addr = adr;
+chip->in_progress_block_mask = ~(len - 1);

INVALIDATE_CACHE_UDELAY(map, chip, adr, len,
@@ -2381,7 +2401,7 @@
 chip->erase_suspended = 0;
 }

-if (chip_ready(map, adr)) {
 +if (chip_good(map, adr, map_word_ff(map))) {
 xip_enable(map, chip, adr);
 break;
 }
@@ -2390,6 +2410,7 @@
 xip_enable(map, chip, adr);
 printk(KERN_WARNING "MTD %s(): software timeout\n", __func__); 
+ret = -EIO;
 break;
 }

@@ -2397,12 +2418,15 @@
 UDELAY(map, chip, adr, 1000000/Hz);
 }
/* Did we succeed? */
-if (!chip_good(map, adr, map_word_ff(map))) { 
+if (ret) {
 /* reset on all failures. */
 map_write( map, CMD(0xF0), chip->start );
 /* FIXME - should have reset delay before continuing */
-ret = -EIO;
+if (++retry_cnt <= MAX_RETRIES) {
+ret = 0;
+goto retry;
+}
}

chip->state = FL_READY;
@@ -2532,7 +2556,7 @@

struct ppb_lock {
 struct flchip *chip;
 -loff_t offset;
 +unsigned long adr;
 int locked;
};
@@ -2550,8 +2574,9 @@
 unsigned long timeo;
 int ret;

+adr += chip->start;
 mutex_lock(&chip->mutex);
-ret = get_chip(map, chip, adr + chip->start, FL_LOCKING);
+ret = get_chip(map, chip, adr, FL_LOCKING);
 if (ret) {
 mutex_unlock(&chip->mutex);
 return ret;
@@ -2569,8 +2594,8 @@

 if (thunk == DO_XXLOCK_ONEBLOCK_LOCK) {
 chip->state = FL_LOCKING;
-map_write(map, CMD(0xA0), chip->start + adr);
-map_write(map, CMD(0x00), chip->start + adr);
+map_write(map, CMD(0xA0), adr);
+map_write(map, CMD(0x00), adr);
 } else if (thunk == DO_XXLOCK_ONEBLOCK_UNLOCK) {
 /*
 * Unlocking of one specific sector is not supported, so we
@@ -2608,7 +2633,7 @@
-map_write(map, CMD(0x00), chip->start);

 chip->state = FL_READY;
-put_chip(map, chip, adr + chip->start);
+put_chip(map, chip, adr);
 mutex_unlock(&chip->mutex);

 return ret;
sectors shall be unlocked, so lets keep their locking status at "unlocked" (locked=0) for the final re-locking.

- if ((adr < ofs) || (adr >= (ofs + len))) {
  + if (offset >= (ofs + len))
    + break;
  + adr = 0;
  + chipnum++;

  for (i = 0; i < sectors; i++) {
    if (sect[i].locked)
      - do_ppb_xxlock(map, sect[i].chip, sect[i].offset, 0,
      + do_ppb_xxlock(map, sect[i].chip, sect[i].adr, 0,
        DO_XXLOCK_ONEBLOCK_LOCK);
  }

--- linux-4.15.0.orig/drivers/mtd/chips/jedec_probe.c
+++ linux-4.15.0/drivers/mtd/chips/jedec_probe.c
@@ -1889,6 +1889,8 @@
do {
  uint32_t ofs = cfi_build_cmd_addr(0 + (bank << 8), map, cfi);
  mask = (1 << (cfi->device_type * 8)) - 1;
  + if (ofs >= map->size)
    + return 0;
  result = map_read(map, base + ofs);
  bank++;
} while ((result.x[0] & mask) == CFI_MFR_CONTINUATION);
+char *p, *mtd_id, *semicol, *open_parenth;
+
+/*
+ * Replace the first ';' by a NULL char so strchr can work
+ * properly.
+ */
+semicol = strchr(s, ';');
+if (semicol)
+*semicol = '\0';
+
+/*
+ * make sure that part-names with ":" will not be handled as
+ * part of the mtd-id with an "":"
+ */
+open_parenth = strchr(s, '(');
+if (open_parenth)
+*open_parenth = '\0';

mtd_id = s;

-/* fetch <mtd-id> */
-p = strchr(s, ':');
+/*
+ * fetch <mtd-id>. We use strchr to ignore all ":" that could
+ * be present in the MTD name, only the last one is interpreted
+ * as an <mtd-id>/<part-definition> separator.
+ */
+p = strchr(s, ':');
+
+/* Restore the '(' now. */
+if (open_parenth)
+*open_parenth = '(';
+
+/* Restore the ';' now. */
+if (semicol)
+*semicol = ';';
+
if (!p) {
    pr_err("no mtd-id
    return -EINVAL;

--- linux-4.15.0.orig/drivers/mtd/devices/Kconfig
+++ linux-4.15.0/drivers/mtd/devices/Kconfig
@@ -206,7 +206,7 @@
 config MTD_DOCG3
 tristate "M-Systems Disk-On-Chip G3"
 select BCH
-choose BCH_CONST_PARAMS
+choose BCH_CONST_PARAMS if !MTD_NAND_BCH

select BITREVERSE
---help---
This provides an MTD device driver for the M-Systems DiskOnChip
--- linux-4.15.0.orig/drivers/mtd/devices/mchp23k256.c
+++ linux-4.15.0/drivers/mtd/devices/mchp23k256.c
@@ -68,14 +68,17 @@
 struct spi_transfer transfer[2] = { };
 struct spi_message message;
 unsigned char command[MAX_CMD_SIZE];
+int cmd_len;

 spi_message_init(&message);

 +cmd_len = mchp23k256_cmdsz(flash);
 +
 command[0] = MCHP23K256_CMD_WRITE;
 mchp23k256_addr2cmd(flash, to, command);

 transfer[0].tx_buf = command;
 transfer[0].len = mchp23k256_cmdsz(flash);
+transfer[0].len = cmd_len;
 spi_message_add_tail(&transfer[0], &message);

 transfer[1].tx_buf = buf;
 @@ -86,8 +89,8 @@
 spi_sync(flash->spi, &message);

 -if (retlen && message.actual_length > sizeof(command))
-*retlen += message.actual_length - sizeof(command);
 +if (retlen && message.actual_length > cmd_len)
+*retlen += message.actual_length - cmd_len;

 mutex_unlock(&flash->lock);
 return 0;
@@ -100,15 +103,18 @@
 struct spi_transfer transfer[2] = { };
 struct spi_message message;
 unsigned char command[MAX_CMD_SIZE];
+int cmd_len;

 spi_message_init(&message);

 +cmd_len = mchp23k256_cmdsz(flash);
 +
 memset(&transfer, 0, sizeof(transfer));
 command[0] = MCHP23K256_CMD_READ;
 mchp23k256_addr2cmd(flash, from, command);
transfer[0].tx_buf = command;
- transfer[0].len = mchp23k256_cmdsflash(flash);
+ transfer[0].len = cmd_len;
spi_message_add_tail(&transfer[0], &message);

transfer[1].rx_buf = buf;
@@ -119,8 +125,8 @@
spi_sync(flash->spi, &message);
-	if (retlen && message.actual_length > sizeof(command))
+ if (retlen && message.actual_length > cmd_len)
    *retlen += message.actual_length - cmd_len;
mutex_unlock(&flash->lock);
return 0;
--- linux-4.15.0.orig/drivers/mtd/devices/mtd_dataflash.c
+++ linux-4.15.0/drivers/mtd/devices/mtd_dataflash.c
@@ -737,8 +737,8 @@
    { "AT45DB641E", 0x1f28000100ULL, 32768, 264, 9, SUP_EXTID | SUP_POW2PS | IS_POW2PS},
    { "at45db641e", 0x1f28000100, 32768, 256, 8, SUP_EXTID | SUP_POW2PS | IS_POW2PS},
};

static struct flash_info *jedec_lookup(struct spi_device *spi,
--- linux-4.15.0.orig/drivers/mtd/devices/phram.c
+++ linux-4.15.0/drivers/mtd/devices/phram.c
@@ -247,22 +247,25 @@
       ret = parse_num64(&len, token[2]);
       if (ret) {
           -kfree(name);
+           parse_err("illegal device length\n");
+           goto error;
          }

       ret = parse_num64(&start, token[1]);
       if (ret) {
           -kfree(name);
+           parse_err("illegal start address\n");
+           goto error;
          }
ret = register_device(name, start, len);
#if (ret)
    pr_info("%s device: %#llx at %#llx\n", name, len, start);
#else
    kfree(name);
#endif
if (ret)
    goto error;

pr_info("%s device: %#llx at %#llx\n", name, len, start);
return 0;
+
+error:
    kfree(name);
return ret;
}

--- linux-4.15.0.orig/drivers/mtd/devices/spear_smic
+++ linux-4.15.0/drivers/mtd/devices/spear_smi.c
@@ -595,6 +595,26 @@
return 0;
}

+/*
 + * The purpose of this function is to ensure a memcpy_toio() with byte writes
 + * only. Its structure is inspired from the ARM implementation of _memcpy_toio()
 + * which also does single byte writes but cannot be used here as this is just an
 + * implementation detail and not part of the API. Not mentioning the comment
 + * stating that _memcpy_toio() should be optimized.
 + */
 +static void spear_smi_memcpy_toio_b(volatile void __iomem *dest,
 + const void *src, size_t len)
 +{
 +    const unsigned char *from = src;
 +
 +    while (len) {
 +        len--;
 +        writeb(*from, dest);
 +        from++;
 +        dest++;
 +    }
 +}
 +
 +static inline int spear_smi_cpy_toio(struct spear_smic *dev, u32 bank,
 void __iomem *dest, const void *src, size_t len)
 {
 @@ -617,7 +637,23 @@
 ctrlreg1 = readl(dev->io_base + SMI_CR1);
writel((ctrlreg1 | WB_MODE) & ~SW_MODE, dev->io_base + SMI_CR1);
-
-memcpy_toio(dest, src, len);
+ /*
+ * In Write Burst mode (WB_MODE), the specs states that writes must be:
+ *  - incremental
+ *  - of the same size
+ * The ARM implementation of memcpy_toio() will optimize the number of
+ *  I/O by using as much 4-byte writes as possible, surrounded by
+ *  2-byte/1-byte access if:
+ *  - the destination is not 4-byte aligned
+ *  - the length is not a multiple of 4-byte.
+ * Avoid this alternance of write access size by using our own 'byte
+ *  access' helper if at least one of the two conditions above is true.
+ */
+ if (IS_ALIGNED(len, sizeof(u32)) &&
+    IS_ALIGNED((uintptr_t)dest, sizeof(u32)))
+    memcpy_toio(dest, src, len);
+ else
+ spear_smi_memcpy_toio_b(dest, src, len);
+
+writel(ctrlreg1, dev->io_base + SMI_CR1);

--- linux-4.15.0.orig/drivers/mtd/lpddr/lpddr2_nvm.c
+++ linux-4.15.0/drivers/mtd/lpddr/lpddr2_nvm.c
@@ -408,6 +408,17 @@
 return lpddr2_nvm_do_block_op(mtd, start_add, len, LPDDR2_NVM_LOCK);
 }

+static const struct mtd_info lpddr2_nvm_mtd_info = {
+    .type=MTD_RAM,
+    .writesize=1,
+    .flags=(MTD_CAP_NVRAM | MTD_POWERUP_LOCK),
+    ._read=lpddr2_nvm_read,
+    ._write=lpddr2_nvm_write,
+    ._erase=lpddr2_nvm_erase,
+    ._unlock=lpddr2_nvm_unlock,
+    ._lock=lpddr2_nvm_lock,
+};
+
+/*
+ * lpddr2_nvm driver probe method
+ */
@@ -448,6 +459,7 @@
 .pfow_base= OW_BASE_ADDRESS,
 .fldrv_priv= pcm_data,
 };

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if (IS_ERR(map->virt))
return PTR_ERR(map->virt);

@@ -459,22 +471,13 @@
return PTR_ERR(pcm_data->ctl_regs);

/* Populate mtd_info data structure */
-*mtd = (struct mtd_info) {
- .dev = { .parent = &pdev->dev },
- .name = pdev->dev.init_name,
- .type = MTD_RAM,
- .priv = map,
- .size = resource_size(add_range),
- .erasesize = ERASE_BLOCKSIZE * pcm_data->bus_width,
- .writesize = 1,
- .writebufsize = WRITE_BUFFSIZE * pcm_data->bus_width,
- .flags = (MTD_CAP_NVRAM | MTD_POWERUP_LOCK),
- .read = lpddr2_nvm_read,
- .write = lpddr2_nvm_write,
- .erase = lpddr2_nvm_erase,
- .unlock = lpddr2_nvm_unlock,
- .lock = lpddr2_nvm_lock,
-};
+*mtd = lpddr2_nvm_mtd_info;
+mtd->dev.parent = &pdev->dev;
+mtd->name = pdev->dev.init_name;
+mtd->priv = map;
+mtd->size = resource_size(add_range);
+mtd->erasesize = ERASE_BLOCKSIZE * pcm_data->bus_width;
+mtd->writebufsize = WRITE_BUFFSIZE * pcm_data->bus_width;

/* Verify the presence of the device looking for PFOW string */
if (!lpddr2_nvm_pfow_present(map)) {
--- linux-4.15.0.orig/drivers/mtd/lpddr/lpddr_cmds.c
+++ linux-4.15.0/drivers/mtd/lpddr/lpddr_cmds.c
@@ -81,7 +81,6 @@
shared = kmalloc(sizeof(struct flchip_shared) * lpddr->numchips,
GFP_KERNEL);
if (!shared) {
- kfree(lpddr);
 kfree(mtd);
 return NULL;
 }
--- linux-4.15.0.orig/drivers/mtd/maps/physmap_of_core.c
+++ linux-4.15.0/drivers/mtd/maps/physmap_of_core.c
@@ -81,7 +81,6 @@
struct of_flash_list {
 struct mtd_info *mtd;


struct map_info map;
-struct resource *res;
};

struct of_flash {
@@ -55,18 +54,10 @@
mtd_concat_destroy(info->cmtd);
}

-#for (i = 0; i < info->list_size; i++) {
+for (i = 0; i < info->list_size; i++)
if (info->list[i].mtd)
    map_destroy(info->list[i].mtd);

-if (info->list[i].map.virt)
    iounmap(info->list[i].map.virt);
-
-if (info->list[i].res) {
-    release_resource(info->list[i].res);
-    kfree(info->list[i].res);
-}
-}
return 0;
}

@@ -214,10 +205,11 @@
err = -EBUSY;
res_size = resource_size(&res);
-info->list[i].res = request_mem_region(res.start, res_size,
-dev_name(&dev->dev));
-if (!info->list[i].res)
+info->list[i].map.virt = devm_ioremap_resource(&dev->dev, &res);
+if (IS_ERR(info->list[i].map.virt)) {
+    err = PTR_ERR(info->list[i].map.virt);
    goto err_out;
+}

err = -ENXIO;
width = of_get_property(dp, "bank-width", NULL);
@@ -240,15 +232,6 @@
if (err)
    goto err_out;

-err = -ENOMEM;
-info->list[i].map.virt = ioremap(info->list[i].map.phys,
- info->list[i].map.size);
-if (!info->list[i].map.virt) {


-dev_err(&dev->dev, "Failed to ioremap() flash"
-" region\n");
-goto err_out;
-
-simple_map_init(&info->list[i].map);

/*
--- linux-4.15.0.orig/drivers/mtd/maps/solutionengine.c
+++ linux-4.15.0/drivers/mtd/maps/solutionengine.c
@@ -59,9 +59,9 @@
return -ENXIO;
}
}
-printk(KERN_NOTICE "Solution Engine: Flash at 0x%08lx, EPROM at 0x%08lx\n",
- soleng_flash_map.phys & 0x1fffffff,
- soleng_eprom_map.phys & 0x1fffffff);
+printk(KERN_NOTICE "Solution Engine: Flash at 0x%pap, EPROM at 0x%pap\n",
+ &soleng_flash_map.phys,
+ &soleng_eprom_map.phys);
flash_mtd->owner = THIS_MODULE;

eprom_mtd = do_map_probe("map_rom", &soleng_eprom_map);
--- linux-4.15.0.orig/drivers/mtd/mtdchar.c
+++ linux-4.15.0/drivers/mtd/mtdchar.c
@@ -160,8 +160,12 @@
pr_debug("MTD_read\n");

-if (*ppos + count > mtd->size)
-count = mtd->size - *ppos;
+if (*ppos + count > mtd->size) {
+if (*ppos < mtd->size)
+count = mtd->size - *ppos;
+else
+count = 0;
+
if (!count)
return 0;
@@ -246,7 +250,7 @@
pr_debug("MTD_write\n");

-if (*ppos == mtd->size)
+if (*ppos >= mtd->size)
return -ENOSPC;
if (*ppos + count > mtd->size)
    @ @ -368.9 +372.6 @@
uint32_t retlen;
int ret = 0;

if (!(file->f_mode & FMODE_WRITE))
    @ @ -368.9 +372.6 @@
@return -EPERM;
-
if (length > 4096)
    @ @ -479.7 +480.7 @@
return -EINVAL;

for (i = 0; i < MTD_MAX_ECCPOS_ENTRIES;) { 
    u32 eccpos;

    ret = mtd_ooblayout_ecc(mtd, section, &oobregion);
    @ @ -526.7 +527.7 @@
    if (ret < 0) {
        if (ret != -ERANGE)
            return ret;
    }

    ret = mtd_ooblayout_ecc(mtd, section++, &oobregion);
    @ @ -526.7 +527.7 @@
    for (i = 0; i < ARRAY_SIZE(to->eccpos);) { 
        u32 eccpos;

        ret = mtd_ooblayout_ecc(mtd, section, &oobregion);
        @ @ -526.7 +527.7 @@
        if (ret < 0) {
            if (ret != -ERANGE)
                return ret;
        }

        ret = mtd_ooblayout_ecc(mtd, section++, &oobregion);
        @ @ -655.6 +656.48 @@

    pr_debug("MTD_ioctl\n");

    /*
     * Check the file mode to require "dangerous" commands to have write
     * permissions.
     */
    +*switch (cmd) {
        +*/ "safe" commands */
        +case MEMGETREGIONCOUNT:
        +case MEMGETREGIONINFO:
        +case MEMGETINFO:
        +case MEMREADOOB:
        +case MEMREADOOB64:
        +case MEMISLOCKED:
        +case MEMGETOOBSEL:
        +case MEMGETBADBLOCK:
        +case OTPSELECT:
case OTPGETREGIONCOUNT:
+case OTPGETREGIONINFO:
+case ECCGETLAYOUT:
+case ECCGETSTATS:
+case MTDFILEMODE:
+case BLKPG:
+case BLKRRPART:
+break;
+
+ /* "dangerous" commands */
+case MEMERASE:
+case MEMERASE64:
+case MEMMEMLOCK:
+case MEMMEMUNLOCK:
+case MEMMEMSETBADBLOCK:
+case MEMMEMWRITEO06B:
+case MEMMEMWRITEO06B64:
+case MEMMEMWRITE:
+case OTPLOCK:
+if (!(file->f_mode & FMODE_WRITE))
+return -EPERM;
+break;
+
+default:
+return -ENOTTY;
+
switch (cmd) {
+case MEMGETREGIONCOUNT:
+if (copy_to_user(argp, &(mtd->numerasederegions), sizeof(int)))
+@ @ -702,9 +745,6 @ @
+
} 
+
chang (cmd) { 
+ case MEMGETREGIONCOUNT:
+ if (copy_to_user(argp, &(mtd->numerasederegions), sizeof(int)))
+ @ @ -702,9 +745,6 @ @
+ {
+ struct erase_info *erase;
+
- if(!(file->f_mode & FMODE_WRITE))
- return -EPERM;
- 
- erase=kzalloc(sizeof(struct erase_info),GFP_KERNEL);
+ if (!erase)
+ ret = -ENOMEM;
+ @ @ -1025,9 +1065,6 @ @
+ ret = 0;
+ break;
+ }
+ 
- default:
- ret = -ENOTTY;
+ }
return ret;
@@ -1071,6 +1108,11 @@
    struct mtd_oob_buf32 buf32 __user *buf_user = argp;

    +if (!(file->f_mode & FMODE_WRITE)) {
    +ret = -EPERM;
    +break;
    +}
    +
    +if (copy_from_user(&buf, argp, sizeof(buf)))
    ret = -EFAULT;
    else
--- linux-4.15.0.orig/drivers/mtd/mtdcore.h
+++ linux-4.15.0/drivers/mtd/mtdcore.h
@@ -7,7 +7,7 @@
 extern struct mutex mtd_table_mutex;

 struct mtd_info *__mtd_next_device(int i);
-int add_mtd_device(struct mtd_info *mtd);
+int __must_check add_mtd_device(struct mtd_info *mtd);
 int del_mtd_device(struct mtd_info *mtd);
 int add_mtd_partitions(struct mtd_info *, const struct mtd_partition *, int);
 int del_mtd_partitions(struct mtd_info *);
--- linux-4.15.0.orig/drivers/mtd/mtdoops.c
+++ linux-4.15.0/drivers/mtd/mtdoops.c
@@ -313,12 +313,13 @@
     kmsg_dump_get_buffer(dumper, true, cxt->oops_buf + MTDOOPS_HEADER_SIZE,
                         record_size - MTDOOPS_HEADER_SIZE, NULL);

-/* Panics must be written immediately */
-if (reason != KMSG_DUMP_OOPS)
+/* Panics must be written immediately */
+mtdoops_write(cxt, 1);
+}

-/* For other cases, schedule work to write it "nicely" */
-schedule_work(&cxt->work_write);
+} else {
+/* For other cases, schedule work to write it "nicely" */
+schedule_work(&cxt->work_write);
+}

static void mtdoops_notify_add(struct mtd_info *mtd)
--- linux-4.15.0.orig/drivers/mtd/mtdpart.c
+++ linux-4.15.0/drivers/mtd/mtdpart.c
let's register it anyway to preserve ordering */
slave->offset = 0;
slave->mtd.size = 0;
+
+ /* Initialize ->erasesize to make add_mtd_device() happy. */
+slave->mtd.erasesize = parent->erasesize;
+
+ printk(KERN_ERR "mtd: partition \"%s\" is out of reach -- disabled\n",
part->name);
goto out_register;
@@ -670,10 +674,21 @@
list_add(&new->list, &mtd_partitions);
mutex_unlock(&mtd_partitions_mutex);
-
- add_mtd_device(&new->mtd);
+ret = add_mtd_device(&new->mtd);
+if (ret)
+goto err_remove_part;
+
mtd_add_partition_attrs(new);
+
+return 0;
+
+err_remove_part:
+mutex_lock(&mtd_partitions_mutex);
+list_del(&new->list);
+mutex_unlock(&mtd_partitions_mutex);
+
+free_partition(new);
+
+ return ret;
+
EXPORT_SYMBOL_GPL(mtd_add_partition);
@@ -764,22 +779,31 @@

struct mtd_part *slave;
uint64_t cur_offset = 0;
-int i;
+int i, ret;

printk(KERN_NOTICE "Creating %d MTD partitions on \"%s\":\n", nbparts, master->name);

for (i = 0; i < nbparts; i++) {
slave = allocate_partition(master, parts + i, i, cur_offset);
if (IS_ERR(slave)) {
-del_mtd_partitions(master);
-return PTR_ERR(slave);
}
+ret = PTR_ERR(slave);
+goto err_del_partitions;
}

mutex_lock(&mtd_partitions_mutex);
list_add(&slave->list, &mtd_partitions);
mutex_unlock(&mtd_partitions_mutex);

+ret = add_mtd_device(&slave->mtd);
+if (ret) {
+mutex_lock(&mtd_partitions_mutex);
+list_del(&slave->list);
+mutex_unlock(&mtd_partitions_mutex);
+
+free_partition(slave);
+goto err_del_partitions;
+}
+
mtd_add_partition_attrs(slave);
if (parts[i].types)
mtd_parse_part(slave, parts[i].types);
@@ -788,6 +812,11 @@
} return 0;
+
+err_del_partitions:
+del_mtd_partitions(master);
+
+return ret;
}

--- linux-4.15.0.orig/drivers/mtd/mtdsuper.c
+++ linux-4.15.0/drivers/mtd/mtdsuper.c
@@ -129,6 +129,7 @@
#ifdef CONFIG_BLOCK
struct block_device *bdev;
int ret, major;
+int perm;
#endif
int mtdnr;

@@ -180,7 +181,10 @@
/* try the old way - the hack where we allowed users to mount
 */
/* /dev/mtdblock$(n) but didn't actually _use_ the blockdev
 */
bdev = lookup_bdev(dev_name);
+perm = MAY_READ;
+if (!(flags & MS_RDONLY))
+perm |= MAY_WRITE;
+bdev = lookup_bdev(dev_name, perm);
if (IS_ERR(bdev)) {
  ret = PTR_ERR(bdev);
  pr_debug("MTDSB: lookup_bdev() returned %d\n", ret);
--- linux-4.15.0.orig/drivers/mtd/nand/ams-delta.c
+++ linux-4.15.0/drivers/mtd/nand/ams-delta.c
@@ -263,7 +263,7 @@
  "MTDSB: lookup_bdev() returned %d\n"
  ret;
--- linux-4.15.0.orig/drivers/mtd/nand/atmel/nand-controller.c
+++ linux-4.15.0/drivers/mtd/nand/atmel/nand-controller.c
@@ -129,6 +129,11 @@
#define DEFAULT_TIMEOUT_MS1000
#define MIN_DMA_LEN128

+static bool atmel_nand_avoid_dma __read_mostly;
+
+MODULE_PARM_DESC(avoiddma, "Avoid using DMA");
+module_param_named(avoiddma, atmel_nand_avoid_dma, bool, 0400);
+
+enum atmel_nand_rb_type {
  ATMEL_NAND_NO_RB,
  ATMEL_NAND_NATIVE_RB,
  @ @ -822,10 +827,12 @@
  NULL, 0,
  chip->ecc.strength);

-if (ret >= 0)
+if (ret >= 0) {
  +mtd->ecc_stats.corrected += ret;
  max_bitflips = max(ret, max_bitflips);
-else
+} else {
  mtd->ecc_stats.failed++;
+}

databuf += chip->ecc.size;
eccbuf += chip->ecc.bytes;
@@ -1882,7 +1889,7 @@
     ret = of_property_read_u32(np, "#size-cells", &val);
     if (ret) {
         dev_err(dev, "missing #address-cells property\n");
-    +dev_err(dev, "missing #size-cells property\n");
         return ret;
     }

@@ -1974,7 +1981,7 @@
     return ret;
 }

-if (nc->caps->has_dma) {
+if (nc->caps->has_dma && !atmel_nand_avoid_dma) {
     dma_cap_mask_t mask;

     dma_cap_zero(mask);
 @@ -2071,8 +2078,11 @@
     int ret;

     nand_np = dev->of_node;
-    nfc_np = of_find_compatible_node(dev->of_node, NULL,
-         "atmel,sama5d3-nfc");
+    nfc_np = of_get_compatible_child(dev->of_node, "atmel,sama5d3-nfc");
+    if (!nfc_np) {
+        dev_err(dev, "Could not find device node for sama5d3-nfc\n");
+        return -ENODEV;
+    }

     nc->clk = of_clk_get(nfc_np, 0);
     if (IS_ERR(nc->clk)) {
@@ -2482,15 +2492,19 @@
         } else {
             u32 ale_offs = 21;

-/*
- * If we are parsing legacy DT props and the DT contains a
- * valid NFC node, forward the request to the sama5 logic.
- */
-if (of_find_compatible_node(pdev->dev.of_node, NULL,
-    "atmel,sama5d3-nfc")
+    nfc_node = of_get_compatible_child(pdev->dev.of_node,
+        "atmel,sama5d3-nfc");
+    if (nfc_node) {
+        "atmel,sama5d3-nfc")
+    if (nfc_node) {
+        "atmel,sama5d3-nfc")
+    if (nfc_node) {

caps = &atmel_sama5_nand_caps;
+of_node_put(nfc_node);
+

/**
 * Even if the compatible says we are dealing with an
--- linux-4.15.0.orig/drivers/mtd/nand/atmel/pmecc.c
+++ linux-4.15.0/drivers/mtd/nand/atmel/pmecc.c
@@ -426,7 +426,7 @@
 static int get_sectorsize(struct atmel_pmecc_user *user)
 {  
- return user->cache.cfg & PMECC_LOOKUP_TABLE_SIZE_1024 ? 1024 : 512;
 + return user->cache.cfg & PMECC_CFG_SECTOR1024 ? 1024 : 512;
 }

 static void atmel_pmecc_gen_syndrome(struct atmel_pmecc_user *user, int sector)
 @@ -876,23 +876,32 @@
 {  
 struct platform_device *pdev;
 struct atmel_pmecc *pmecc, **ptr;
 +int ret;

 pdev = of_find_device_by_node(np);
 -if (!pdev || !platform_get_drvdata(pdev))
 +if (!pdev)
 return ERR_PTR(-EPROBE_DEFER);
 +pmecc = platform_get_drvdata(pdev);
 +if (!pmecc) {
 + ret = -EPROBE_DEFER;
 +goto err_put_device;
 +}
 
 ptr = devres_alloc(devm_atmel_pmecc_put, sizeof(*ptr), GFP_KERNEL);
 -if (!ptr)
 -return ERR_PTR(-ENOMEM);
 -get_device(&pdev->dev);
 -pmecc = platform_get_drvdata(pdev);
 -if (!ptr) {
 - ret = -ENOMEM;
 -goto err_put_device;
 -}
 +*ptr = pmecc;

 devres_add(userdev, ptr);
static const int atmel_pmecc_strengths[] = { 2, 4, 8, 12, 24, 32 };

--- linux-4.15.0.orig/drivers/mtd/nand/au1550nd.c
+++ linux-4.15.0/drivers/mtd/nand/au1550nd.c
@@ -495,7 +495,7 @@
 struct au1550nd_ctx *ctx = platform_get_drvdata(pdev);
 struct resource *r = platform_get_resource(pdev, IORESOURCE_MEM, 0);

-nand_release(nand_to_mtd(&ctx->chip));
+nand_release(&ctx->chip);
 iounmap(ctx->base);
 release_mem_region(r->start, 0x1000);
 kfree(ctx);
--- linux-4.15.0.orig/drivers/mtd/nand/bcm47xxnflash/main.c
+++ linux-4.15.0/drivers/mtd/nand/bcm47xxnflash/main.c
@@ -65,7 +65,7 @@
 {
 struct bcm47xxnflash *nflash = platform_get_drvdata(pdev);

-nand_release(nand_to_mtd(&nflash->nand_chip));
+nand_release(&nflash->nand_chip);
 return 0;
 }
--- linux-4.15.0.orig/drivers/mtd/nand/bf5xx_nand.c
+++ linux-4.15.0/drivers/mtd/nand/bf5xx_nand.c
@@ -688,7 +688,7 @@
 * and their partitions, then go through freeing the
 * resources used
 */
-nand_release(nand_to_mtd(&info->chip));
+nand_release(&info->chip);
 peripheral_free_list(bfin_nfc_pin_req);
 bf5xx_nand_dma_remove(info);
--- linux-4.15.0.orig/drivers/mtd/nand/brcmnand/brcmnand.c
+++ linux-4.15.0/drivers/mtd/nand/brcmnand/brcmnand.c
@@ -491,8 +491,9 @@

 ctrl->cs_offsets = brcmnand_cs_offsets;

-/* v5.0 and earlier has a different CS0 offset layout */
-if (ctrl->nand_version <= 0x0500)
+/* v3.3-5.0 have a different CS0 offset layout */
+if (ctrl->nand_version >= 0x0303 &&
+    ctrl->nand_version <= 0x0500)
ctrl->cs0_offsets = brcmnand_cs_offsets_cs0;
}

@@ -911,11 +912,14 @@
if (!section) {
/*
 * Small-page NAND use byte 6 for BBI while large-page
 - * NAND use byte 0.
 + * NAND use bytes 0 and 1.
 */
-if (cfg->page_size > 512)
-oobregion->offset++;
-oobregion->length--;
+if (cfg->page_size > 512) {
+oobregion->offset += 2;
+oobregion->length -= 2;
+} else {
+oobregion->length--;
+}
}
}

@@ -2193,16 +2197,9 @@
if (ctrl->nand_version >= 0x0702)
tmp |= ACC_CONTROL_RD_ERASED;
tmp &= ~ACC_CONTROL_FAST_PGM_RDIN;
-if (ctrl->features & BRCMNAND_HAS_PREFETCH) {
+/*
 - * FIXME: Flash DMA + prefetch may see spurious erased-page ECC
 - * errors
 - */
 -if (has.flash_dma(ctrl))
 -tmp &= ~ACC_CONTROL_PREFETCH;
 -else
 -tmp |= ACC_CONTROL_PREFETCH;
 -}
+if (ctrl->features & BRCMNAND_HAS_PREFETCH)
+tmp &= ~ACC_CONTROL_PREFETCH;
+nand_writereg(ctrl, offs, tmp);

return 0;
@@ -2290,6 +2287,12 @@
if (ret)
ret = nand_scan_tail(mtd);
if (ret)
  return ret;

/* If OOB is written with ECC enabled it will cause ECC errors */
+if (is_hamming_ecc(host->ctrl, &host->hwcfg)) {
+  chip->ecc.write_oob = brcmnand_write_oob_raw;
+  chip->ecc.read_oob = brcmnand_read_oob_raw;
+}
+
  ret = nand_scan_tail(mtd);
if (ret)
  return ret;
@@ -2601,7 +2604,7 @@
struct brcmnand_host *host;

list_for_each_entry(host, &ctrl->host_list, node)
-  nand_release(nand_to_mtd(&host->chip));
+  nand_release(&host->chip);

clk_disable_unprepare(ctrl->clk);

--- linux-4.15.0.orig/drivers/mtd/nand/cafe_nand.c
+++ linux-4.15.0/drivers/mtd/nand/cafe_nand.c
@@ -702,7 +702,7 @@
"CAFE NAND", mtd);
if (err) {
  dev_warn(&pdev->dev, "Could not register IRQ %d\n", pdev->irq);
-    goto out_ior;
+    goto out_free_rs;
  }

/* Disable master reset, enable NAND clock */
@@ -809,6 +809,8 @@
/* Disable NAND IRQ in global IRQ mask register */
cafe_writel(cafe, ~1 & cafe_readl(cafe, GLOBAL_IRQ_MASK), GLOBAL_IRQ_MASK);
free_irq(pdev->irq, mtd);
+  out_free_rs:
+    free_rs(cafe->rs);
out_iore:
    free_ms(pdev, cafe->mmio);
out_free_mtd:
@@ -826,7 +828,7 @@
/* Disable NAND IRQ in global IRQ mask register */
cafe_writel(cafe, ~1 & cafe_readl(cafe, GLOBAL_IRQ_MASK), GLOBAL_IRQ_MASK);
free_irq(pdev->irq, mtd);
-  nand_release(mtd);
+  nand_release(chip);
free_rs(cafe->rs);
cpci_iounmap(pdev, cafe->mmio);
dma_free_coherent(&cafe->pdev->dev,
--- linux-4.15.0.orig/drivers/mtd/nand/cmx270_nand.c
+++ linux-4.15.0/drivers/mtd/nand/cmx270_nand.c
@@ -230,7 +230,7 @@
 static void __exit cmx270_cleanup(void)
 {
 /* Release resources, unregister device */
-tnand_release(cmx270_nand_mtd);
-tnand_release(mtd_to_nand(cmx270_nand_mtd));
+tnand_release(mtd_to_nand(cmx270_nand_mtd));

gpio_free(GPIO_NAND_RB);
gpio_free(GPIO_NAND_CS);
--- linux-4.15.0.orig/drivers/mtd/nand/cs553x_nand.c
+++ linux-4.15.0/drivers/mtd/nand/cs553x_nand.c
@@ -338,7 +338,7 @@
 mmio_base = this->IO_ADDR_R;

 /* Release resources, unregister device */
-tnand_release(mtd);
+tnand_release(this);
 kfree(mtd->name);
 cs553x_mtd[i] = NULL;

--- linux-4.15.0.orig/drivers/mtd/nand/davinci_nand.c
+++ linux-4.15.0/drivers/mtd/nand/davinci_nand.c
@@ -854,7 +854,7 @@
 spin_unlock_irq(&davinci_nand_lock);

-tnand_release(nand_to_mtd(&info->chip));
+nand_release(&info->chip);

 clk_disable_unprepare(info->clk);

--- linux-4.15.0.orig/drivers/mtd/nand/denali.c
+++ linux-4.15.0/drivers/mtd/nand/denali.c
@@ -28,6 +28,7 @@
 MODULE_LICENSE("GPL");

#define DENALI_NAND_NAME  "denali-nand"
+#define DENALI_DEFAULT_OOB_SKIP_BYTES8

/* for Indexed Addressing */
#define DENALI_INDEXED_CTRL0x00
@@ -608,6 +609,12 @@
}

iowrite32(DMA_ENABLE__FLAG, denali->reg + DMA_ENABLE);
/*
 * The ->setup_dma() hook kicks DMA by using the data/command
 * interface, which belongs to a different AXI port from the
 * register interface.  Read back the register to avoid a race.
 */
+ioread32(denali->reg + DMA_ENABLE);

denali_reset_irq(denali);
denali->setup_dma(denali, dma_addr, page, write);
@@ -1105,12 +1112,17 @@
denali->revision = swab16(ioread32(denali->reg + REVISION));
/
- * tell driver how many bit controller will skip before
- * writing ECC code in OOB, this register may be already
- * set by firmware. So we read this value out.
- * if this value is 0, just let it be.
+ * Set how many bytes should be skipped before writing data in OOB.
+ * If a non-zero value has already been set (by firmware or something),
+ * just use it. Otherwise, set the driver default.
 */
+denali->oob_skip_bytes = ioread32(denali->reg + SPARE_AREA_SKIP_BYTES);
+ioread32(denali->reg + SPARE_AREA_SKIP_BYTES);  
+iowrite32(denali->oob_skip_bytes,
+ denali->reg + SPARE_AREA_SKIP_BYTES);
+}
+
+denali_detect_max_banks(denali);
iowrite32(0x0F, denali->reg + RB_PIN_ENABLED);
iowrite32(CHIP_EN_DONT_CARE__FLAG, denali->reg + CHIP_ENABLE_DONT_CARE);
@@ -1405,9 +1417,7 @@
void denali_remove(struct denali_nand_info *denali)
{
-struct mtd_info *mtd = nand_to_mtd(&denali->nand);
-  
-  nand_release(mtd);
+  nand_release(&denali->nand);
  kfree(denali->buf);
  denali_disable_irq(denali);
}
-denali->clk_x_rate = clk_get_rate(dt->clk);

+/*
+ * Hardcode the clock rate for the backward compatibility.
+ * This works for both SOCFPGA and UniPhier.
+ */
+denali->clk_x_rate = 200000000;

ret = denali_init(denali);
if (ret)
    -- linux-4.15.0.orig/drivers/mtd/nand/denali_pci.c
    +++ linux-4.15.0/drivers/mtd/nand/denali_pci.c
    @ @ -125,3 +125,7 @@
    .remove = denali_pci_remove,
};
module_pci_driver(denali_pci_driver);
+
+MODULE_DESCRIPTION("PCI driver for Denali NAND controller");
+MODULE_AUTHOR("Intel Corporation and its suppliers");
+MODULE_LICENSE("GPL v2");
    -- linux-4.15.0.orig/drivers/mtd/nand/diskonchip.c
    +++ linux-4.15.0/drivers/mtd/nand/diskonchip.c
    @ @ -1604,13 +1604,10 @@
    numchips = doc2001_init(mtd);

if ((ret = nand_scan(mtd, numchips)) ||(ret = doc->late_init(mtd))) {
    /* DBB note: i believe nand_release is necessary here, as
    DBB note: i believe nand_cleanup is necessary here, as
    buffers may have been allocated in nand_base. Check with
    Thomas. FIX ME! */
    /* nand_release will call mtd_device_unregister, but we
    - haven't yet added it. This is handled without incident by
    - mtd_device_unregister, as far as I can tell. */
    -nand_release(mtd);
    +nand_cleanup(nand);
    kfree(nand);
    goto fail;
}    @ @ -1643,7 +1640,7 @@
    doc = nand_get_controller_data(nand);

nextmtd = doc->nextdoc;
    -nand_release(mtd);
    +nand_release(nand);
    iounmap(doc->virtadr);
    release_mem_region(doc->physadr, DOC_IOREMAP_LEN);
    kfree(nand);
    -- linux-4.15.0.orig/drivers/mtd/nand/docg4.c
    +++ linux-4.15.0/drivers/mtd/nand/docg4.c
 fail:
- nand_release(mtd); /* deletes partitions and mtd devices */
+ nand_release(nand); /* deletes partitions and mtd devices */
 free_bch(doc->bch);
 kfree(nand);

 static int __exit cleanup_docg4(struct platform_device *pdev)
 { }
 struct docg4_priv *doc = platform_get_drvdata(pdev);
- nand_release(doc->mtd);
+ nand_release(mtd_to_nand(doc->mtd));
 free_bch(doc->bch);
 kfree(mtd_to_nand(doc->mtd));
 iounmap(doc->virtadr);
 --- linux-4.15.0.orig/drivers/mtd/nand/fsl_elbc_nand.c
 +++ linux-4.15.0/drivers/mtd/nand/fsl_elbc_nand.c
 @@ -813,7 +813,7 @@
 struct fsl_elbc_fcm_ctrl *elbc_fcm_ctrl = priv->ctrl->nand;
 struct mtd_info *mtd = nand_to_mtd(&priv->chip);

- nand_release(mtd);
+ nand_release(&priv->chip);

 kfree(mtd->name);

 #define ERR_BYTE 0xFF /* Value returned for read
 bytes when read failed*/
 @ @ -173,14 +174,9 @@

 /* returns nonzero if entire page is blank */
 static int check_read_ecc(struct mtd_info *mtd, struct fsl_ifc_ctrl *ctrl,
 - u32 *eccstat, unsigned int bufnum)
+ u32 eccstat, unsigned int bufnum)
 { }
- u32 reg = eccstat[bufnum / 4];
- int errors;


-errors = (reg >> ((3 - bufnum % 4) * 8)) & 15;
-
-return errors;
+return (eccstat >> ((3 - bufnum % 4) * 8)) & 15;
}

*/
@ @ .193.7 +189.7 @@
struct fsl_ifc_ctrl *ctrl = priv->ctrl;
struct fsl_ifc_nand_ctrl *nctrl = ifc_nand_ctrl;
struct fsl_ifc_runtime __iomem *ifc = ctrl->rregs;
-u32 eccstat[4];
+u32 eccstat;
int i;

/* set the chip select for NAND Transaction */
@ @ .228,19 +224,17 @@
if (nctrl->eccread) {
  int errors;
  int buflen = nctrl->page & priv->bufnum_mask;
  -int sector = buflen * chip->ecc.steps;
  -int sector_end = sector + chip->ecc.steps - 1;
  +int sector_start = buflen * chip->ecc.steps;
  +int sector_end = sector_start + chip->ecc.steps - 1;
  __be32 *eccstat_regs;

  -if (ctrl->version >= FSL_IFC_VERSION_2_0_0)
  -eccstat_regs = ifc->ifc_nand.v2_nand_eccstat;
  -else
  -eccstat_regs = ifc->ifc_nand.v1_nand_eccstat;
  +eccstat_regs = ifc->ifc_nand.nand_eccstat;
  +eccstat = ifc_in32(&eccstat_regs[sector_start / 4]);

  -for (i = sector / 4; i <= sector_end / 4; i++)
  -eccstat[i] = ifc_in32(&eccstat_regs[i]);
  +for (i = sector_start; i <= sector_end; i++) {
  +if (i != sector_start && !(i % 4))
  +eccstat = ifc_in32(&eccstat_regs[i / 4]);

  -for (i = sector; i <= sector_end; i++) {
  errors = check_read_ecc(mtd, ctrl, eccstat, i);

  if (errors == 15) {
    @ @ .349.9 +343,16 @@

    case NAND_CMD_READID:
    case NAND_CMD_PARAM: {
/*
  * For READID, read 8 bytes that are currently used.
  * For PARAM, read all 3 copies of 256-bytes pages.
  */

int len = 8;
int timing = IFC_FIR_OP_RB;
if (command == NAND_CMD_PARAM)
  timing = IFC_FIR_OP_RBCD;
+len = 256 * 3;
+

ifc_out32((IFC_FIR_OP_CW0 << IFC_NAND_FIR0_OP0_SHIFT) |
      (IFC_FIR_OP_UA  << IFC_NAND_FIR0_OP1_SHIFT))
@@ -361,12 +362,8 @@
&ifc->ifc_nand.nand_fcr0);
ifc_out32(column, &ifc->ifc_nand.row3);

-/*
- * although currently it's 8 bytes for READID, we always read
- * the maximum 256 bytes(for PARAM)
- */
-@ifc_out32(256, &ifc->ifc_nand.nand_fbr);
-ifc_nand_ctrl->read_bytes = 256;
+ifc_out32(len, &ifc->ifc_nand.nand_fbr);
+ifc_nand_ctrl->read_bytes = len;

set_addr(mtd, 0, 0, 0);
fsl_ifc_run_command(mtd);
@@ -626,6 +623,7 @@
struct fsl_ifc_ctrl *ctrl = priv->ctrl;
struct fsl_ifc_runtime __iomem *ifc = ctrl->rregs;
u32 nand_fsr;
+int status;

/* Use READ_STATUS command, but wait for the device to be ready */
ifc_out32((IFC_FIR_OP_CW0 << IFC_NAND_FIR0_OP0_SHIFT))
@@ -640,12 +638,12 @@
fsl_ifc_run_command(mtd);
nand_fsr = ifc_in32(&ifc->ifc_nand.nand_fsr);
-
+status = nand_fsr >> 24;
/*
 * The chip always seems to report that it is
 * write-protected, even when it is not.
 */
-return nand_fsr | NAND_STATUS_WP;

return status | NAND_STATUS_WP;
}
/*
@@ -760,7 +758,7 @@
return 0;
}

-static void fsl_ifc_sram_init(struct fsl_ifc_mtd *priv)
+static int fsl_ifc_sram_init(struct fsl_ifc_mtd *priv)
{
 struct fsl_ifc_ctrl *ctrl = priv->ctrl;
 struct fsl_ifc_runtime __iomem *ifc_runtime = ctrl->rregs;
 @@ -768,6 +766,27 @@
 uint32_t csor = 0, csor_8k = 0, csor_ext = 0;
 uint32_t cs = priv->bank;

+if (ctrl->version < FSL_IFC_VERSION_1_1_0)
+return 0;
+
+if (ctrl->version > FSL_IFC_VERSION_1_1_0) {
+u32 ncfgr, status;
+int ret;
+*
+/* Trigger auto initialization */
+ncfgr = ifc_in32(&ifc_runtime->ifc_nand.ncfgr);
+ifc_out32(ncfgr | IFC_NAND_NCFGR_SRAM_INIT_EN, &ifc_runtime->ifc_nand.ncfgr);
+
+/* Wait until done */
+ret = readx_poll_timeout(ifc_in32, &ifc_runtime->ifc_nand.ncfgr,
+status, !(status & IFC_NAND_NCFGR_SRAM_INIT_EN),
+10, IFC_TIMEOUT_MSECS * 1000);
+if (ret)
+dev_err(priv->dev, "Failed to initialize SRAM!\n");
+
+return ret;
+
+/* Save CSOR and CSOR_ext */
+csor = ifc_in32(&ifc_global->csor_cs[cs].csor);
+csor_ext = ifc_in32(&ifc_global->csor_cs[cs].csor_ext);
@@ -804,12 +823,16 @@
+wait_event_timeout(ctrl->nand_wait, ctrl->nand_stat,
+msecs_to_jiffies(IFC_TIMEOUT_MSECS));

-if (ctrl->nand_stat != IFC_NAND_EVTER_STAT_OPC)
+if (ctrl->nand_stat != IFC_NAND_EVTER_STAT_OPC) {
 printk(KERN_ERR "fsl-ifc: Failed to Initialise SRAM\n");
return -ETIMEDOUT;
+
/* Restore CSOR and CSOR_ext */
ifc_out32(csor, &ifc_global->csor_cs[cs].csor);
ifc_out32(csor_ext, &ifc_global->csor_cs[cs].csor_ext);
+
+return 0;
}

static int fsl_ifc_chip_init(struct fsl_ifc_mtd *priv)
@@ -820,6 +843,7 @@
struct nand_chip *chip = &priv->chip;
struct mtd_info *mtd = nand_to_mtd(&priv->chip);
int csor;
+int ret;

/* Fill in fsl_ifc_mtd structure */

mtd->dev.parent = priv->dev;
@@ -913,8 +937,16 @@
chip->ecc.algo = NAND_ECC_HAMMING;
}

@if (ctrl->version >= FSL_IFC_VERSION_1_1_0)
-fsl_ifc_sram_init(priv);
+ret = fsl_ifc_sram_init(priv);
+if (ret)
+return ret;
+
+/*
+ * As IFC version 2.0.0 has 16KB of internal SRAM as compared to older
+ * versions which had 8KB. Hence bufnum mask needs to be updated.
+ */
+if (ctrl->version >= FSL_IFC_VERSION_2_0_0)
+priv->bufnum_mask = (priv->bufnum_mask * 2) + 1;

return 0;
}
@@ -923,7 +955,7 @@
{
struct mtd_info *mtd = nand_to_mtd(&priv->chip);

-nand_release(mtd);
+nand_release(&priv->chip);

kfree(mtd->name);

--- linux-4.15.0.orig/drivers/mtd/nand/fsl_upm.c
+++ linux-4.15.0/drivers/mtd/nand/fsl_upm.c
@@ -326,7 +326,7 @@
    struct mtd_info *mtd = nand_to_mtd(&fun->chip);
    int i;

-nand_release(mtd);
+  nand_release(&fun->chip);
    kfree(mtd->name);

    for (i = 0; i < fun->mchip_count; i++) {
--- linux-4.15.0.orig/drivers/mtd/nand/fsmc_nand.c
+++ linux-4.15.0/drivers/mtd/nand/fsmc_nand.c
@@ -982,11 +982,13 @@
    host->read_dma_chan = dma_request_channel(mask, filter, NULL);
    if (!host->read_dma_chan) {
        dev_err(&pdev->dev, "Unable to get read dma channel\n");
+    ret = -ENODEV;
        goto err_req_read_chnl;
    }
    host->write_dma_chan = dma_request_channel(mask, filter, NULL);
    if (!host->write_dma_chan) {
        dev_err(&pdev->dev, "Unable to get write dma channel\n");
+    ret = -ENODEV;
        goto err_req_write_chnl;
    }
    nand->read_buf = fsmc_read_buf_dma;
    @ @ -1118,7 +1120,7 @@
    struct fsmc_nand_data *host = platform_get_drvdata(pdev);

    if (host) {
-nand_release(nand_to_mtd(&host->nand));
+  nand_release(&host->nand);

    if (host->mode == USE_DMA_ACCESS) {
        dma_release_channel(host->write_dma_chan);
--- linux-4.15.0.orig/drivers/mtd/nand/gpio.c
+++ linux-4.15.0/drivers/mtd/nand/gpio.c
@@ -196,7 +196,7 @@
    struct gpiomtd *gpiomtd = platform_get_drvdata(pdev);

    if (host) {
-nand_release(nand_to_mtd(&gpiomtd->nand_chip));
+  nand_release(&gpiomtd->nand_chip);

    /* Enable write protection and disable the chip */
    if (gpiomtd->nwp && !IS_ERR(gpiomtd->nwp))
--- linux-4.15.0.orig/drivers/mtd/nand/gpmi-nand/gpmi-lib.c
+++ linux-4.15.0/drivers/mtd/nand/gpmi-nand/gpmi-lib.c

/*
* Reset BCH here, too. We got failures otherwise :( 
* - See later BCH reset for explanation of MX23 handling 
* + See later BCH reset for explanation of MX23 and MX28 handling 
*/
- ret = gpmi_reset_block(r->bch_regs, GPMI_IS_MX23(this));
+ ret = gpmi_reset_block(r->bch_regs, 
+    GPMI_IS_MX23(this) || GPMI_IS_MX28(this));
if (ret)
  goto err_out;

*/
* Due to erratum #2847 of the MX23, the BCH cannot be soft reset on this 
* chip, otherwise it will lock up. So we skip resetting BCH on the MX23. 
* On the other hand, the MX28 needs the reset, because one case has been 
* seen where the BCH produced ECC errors constantly after 10000 
* consecutive reboots. The latter case has not been seen on the MX23 
* yet, still we don't know if it could happen there as well. 
* chip, otherwise it will lock up. So we skip resetting BCH on the MX23 
* and MX28. 
*/
- ret = gpmi_reset_block(r->bch_regs, GPMI_IS_MX23(this));
+ ret = gpmi_reset_block(r->bch_regs, 
+    GPMI_IS_MX23(this) || GPMI_IS_MX28(this));
if (ret)
  goto err_out;

--- linux-4.15.0.orig/drivers/mtd/nand/gpmi-nand/gpmi-nand.c
+++ linux-4.15.0/drivers/mtd/nand/gpmi-nand/gpmi-nand.c
@@ -2022,7 +2022,7 @@
   this->bch_geometry.auxiliary_size = 128;
   ret = gpmi_alloc_dma_buffer(this);
   if (ret)
-  goto err_out;
+  return ret;

   ret = nand_scan_ident(mtd, GPMI_IS_MX6(this) ? 2 : 1, NULL);
   if (ret)
- @ @ -2135,7 +2135,7 @@
+ 
+ struct gpmi_nand_data *this = platform_get_drvdata(pdev);

   - nand_release(nand_to_mtd(&this->nand));
   + nand_release(&this->nand);

@@ -168,9 +168,10 @@

*/

/*
* Due to erratum #2847 of the MX23, the BCH cannot be soft reset on this 
* chip, otherwise it will lock up. So we skip resetting BCH on the MX23. 
* On the other hand, the MX28 needs the reset, because one case has been 
* seen where the BCH produced ECC errors constantly after 10000 
* consecutive reboots. The latter case has not been seen on the MX23 
* yet, still we don't know if it could happen there as well. 
* chip, otherwise it will lock up. So we skip resetting BCH on the MX23 
* and MX28. 
*/
- ret = gpmi_reset_block(r->bch_regs, GPMI_IS_MX23(this));
+ ret = gpmi_reset_block(r->bch_regs, 
+    GPMI_IS_MX23(this) || GPMI_IS_MX28(this));
if (ret)
  goto err_out;

@@ -275,13 +276,11 @@

*/

--- linux-4.15.0.orig/drivers/mtd/nand/gpmi-nand/gpmi-nand.c
+++ linux-4.15.0/drivers/mtd/nand/gpmi-nand/gpmi-nand.c
@@ -2022,7 +2022,7 @@
   this->bch_geometry.auxiliary_size = 128;
   ret = gpmi_alloc_dma_buffer(this);
   if (ret)
-  goto err_out;
+  return ret;

   ret = nand_scan_ident(mtd, GPMI_IS_MX6(this) ? 2 : 1, NULL);
   if (ret)
- @ @ -2135,7 +2135,7 @@
gpmai_free_dma_bufter(this);
release_resources(this);
return 0;
--- linux-4.15.0.orig/drivers/mtd/nand/hisi504_nand.c
+++ linux-4.15.0/drivers/mtd/nand/hisi504_nand.c
@@ -822,7 +822,7 @@
return 0;
err_mtd:
-nand_release(mtd);
+nand_release(chip);
err_res:
return ret;
}
@@ -830,9 +830,8 @@
static int hisi_nfc_remove(struct platform_device *pdev)
{
 struct hinfc_host *host = platform_get_drvdata(pdev);
-struct mtd_info *mtd = nand_to_mtd(&host->chip);
+struct mtd_info *mtd = nand_to_mtd(&host->chip);

-nand_release(mtd);
+nand_release(&host->chip);

return 0;
}
--- linux-4.15.0.orig/drivers/mtd/nand/jz4740_nand.c
+++ linux-4.15.0/drivers/mtd/nand/jz4740_nand.c
@@ -480,7 +480,7 @@
return 0;
err_nand_release:
-nand_release(mtd);
+nand_release(chip);
err_unclaim_banks:
while (chipnr--) {
    unsigned char bank = nand->banks[chipnr];
-    @ @ -500,7 +500,7 @ @
+    @ @ -500,7 +500,7 @ @
    struct jz_nand *nand = platform_get_drvdata(pdev);
    size_t i;

    -nand_release(nand_to_mtd(&nand->chip));
+ nand_release(&nand->chip);

    /* Deassert and disable all chips */
    writel(0, nand->base + JZ_REG_NAND_CTRL);
ret = mtd_device_register(mtd, NULL, 0);
if (ret) {
    -nand_release(mtd);
    +nand_release(chip);
    return ret;
}

@@ -308,7 +308,7 @@
while (!list_empty(&nfc->chips)) {
    chip = list_first_entry(&nfc->chips, struct jz4780_nand_chip, chip_list);
    -nand_release(nand_to_mtd(&chip->chip));
    +nand_release(&chip->chip);
    list_del(&chip->chip_list);
}
--- linux-4.15.0.orig/drivers/mtd/nand/lpc32xx_mlc.c
+++ linux-4.15.0/drivers/mtd/nand/lpc32xx_mlc.c
@@ -805,7 +805,7 @@
if (!res)
    return res;

-struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);
+-struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);

err_exit4:
    free_irq(host->irq, host);
@@ -829,9 +829,8 @@
static int lpc32xx_nand_remove(struct platform_device *pdev)
{
    struct lpc32xx_nand_host *host = platform_get_drvdata(pdev);
    -struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);
    +struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);

    -nand_release(mtd);
    +nand_release(&host->nand_chip);
    free_irq(host->irq, host);
    if (use_dma)
        dma_release_channel(host->dma_chan);
--- linux-4.15.0.orig/drivers/mtd/nand/lpc32xx_slc.c
+++ linux-4.15.0/drivers/mtd/nand/lpc32xx_slc.c
@@ -935,7 +935,7 @@
if (!res)
    return res;

-struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);
+-struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);
    free_irq(host->irq, host);
    if (use_dma)
        dma_release_channel(host->dma_chan);
err_exit3:
dma_release_channel(host->dma_chan);
@@ -954,9 +954,8 @@
{
    uint32_t tmp;
    struct lpc32xx_nand_host *host = platform_get_drvdata(pdev);
-    struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);
-    nand_release(mtd);
-    nand_release(&host->nand_chip);
    dma_release_channel(host->dma_chan);

    /* Force CE high */
    --- linux-4.15.0.orig/drivers/mtd/mpc5121_nfc.c
+++ linux-4.15.0/drivers/mtd/mpc5121_nfc.c
@@ -829,7 +829,7 @@
struct device *dev = &op->dev;
struct mtd_info *mtd = dev_get_drvdata(dev);
-    nand_release(mtd);
+    nand_release(mtd_to_nand(mtd));
    mpc5121_nfc_free(dev, mtd);

    return 0;
    --- linux-4.15.0.orig/drivers/mtd/mtk_nand.c
+++ linux-4.15.0/drivers/mtd/mtk_nand.c
@@ -504,7 +504,8 @@
{
    struct mtk_nfc *nfc = nand_get_controller_data(mtd_to_nand(mtd));
    const struct nand_sdr_timings *timings;
-    u32 rate, tpoecs, tprecs, tc2r, tw2r, twh, twst, trlt;
+    u32 rate, tpoecs, tprecs, tc2r, tw2r, twh, twst, trlt = 0, thold = 0;
+    thold = (twh + 1) * 1000000 / rate;
    +u32 thold;

    timings = nand_get_sdr_timings(conf);
    if (IS_ERR(timings))
@@ -540,11 +541,28 @@
twh = DIV_ROUND_UP(twh * rate, 1000000) - 1;
twh &= 0xf;

    -twst = timings->tWP_min / 1000;
    +/* Calculate real WE#/RE# hold time in nanosecond */
+    thold = (twh + 1) * 1000000 / rate;
+    +/* nanosecond to picosecond */
+    thold *= 1000;
+    +/*
+     + * WE# low level time should be expaned to meet WE# pulse time
+ * and WE# cycle time at the same time.
+ */
+if (thold < timings->tWC_min)
+twst = timings->tWC_min - thold;
+twst = max(timings->tWP_min, twst) / 1000;
+twst = DIV_ROUND_UP(twst * rate, 1000000) - 1;
+twst &= 0xf;
-	trlt = max(timings->tREA_max, timings->tRP_min) / 1000;
+/*
+ * RE# low level time should be expaned to meet RE# pulse time,
+ * RE# access time and RE# cycle time at the same time.
+ */
+if (thold < timings->tRC_min)
+trlt = timings->tRC_min - thold;
+trlt = max3(trlt, timings->tREA_max, timings->tRP_min) / 1000;
+trlt = DIV_ROUND_UP(trlt * rate, 1000000) - 1;
+trlt &= 0xf;
@@ -846,19 +864,21 @@
return ret & NAND_STATUS_FAIL ? -EIO : 0;
}

-static int mtk_nfc_update_ecc_stats(struct mtd_info *mtd, u8 *buf, u32 sectors)
+static int mtk_nfc_update_ecc_stats(struct mtd_info *mtd, u8 *buf, u32 start,
+                                    u32 sectors)
+
+struct nand_chip *chip = mtd_to_nand(mtd);
+struct mtk_nfc *nfc = nand_get_controller_data(chip);
+struct mtk_nfc_nand_chip *mtk_nand = to_mtk_nand(chip);
+struct mtk_ecc_stats stats;
+
+u32 reg_size = mtk_nand->fdm.reg_size;
+int rc, i;

rc = nfi_readl(nfc, NFI_STA) & STA_EMP_PAGE;
if (rc) {
    memset(buf, 0xff, sectors * chip->ecc.size);
    for (i = 0; i < sectors; i++)
        -memset(oob_ptr(chip, i), 0xff, mtk_nand->fdm.reg_size);
        +memset(oob_ptr(chip, start + i), 0xff, reg_size);
    return 0;
}
@@ -878,7 +898,7 @@
    u32 spare = mtk_nand->spare_per_sector;
    u32 column, sectors, start, end, reg;
    dma_addr_t addr;
-    int bitflips;
+    int bitflips;
int bitflips = 0;
size_t len;
u8 *buf;
int rc;
if (rc < 0) {
    dev_err(nfc->dev, "subpage done timeout\n");
    bitflips = -EIO;
} else {
    bitflips = 0;
    if (!raw) {
        rc = mtk_ecc_wait_done(nfc->ecc, ECC_DECODE);
        bitflips = rc < 0 ? -ETIMEDOUT :
            mtk_nfc_update_ecc_stats(mtd, buf, sectors);
        mtk_nfc_read_fdm(chip, start, sectors);
    } else if (!raw) {
        rc = mtk_ecc_wait_done(nfc->ecc, ECC_DECODE);
        bitflips = rc < 0 ? -ETIMEDOUT :
            mtk_nfc_update_ecc_stats(mtd, buf, start, sectors);
        mtk_nfc_read_fdm(chip, start, sectors);
    }
}
dma_unmap_single(nfc->dev, addr, len, DMA_FROM_DEVICE);
if (ret) {
    dev_err(dev, "mtd parse partition error\n");
    nand_release(mtd);
    return ret;
}
while (!list_empty(&nfc->chips)) {
    chip = list_first_entry(&nfc->chips, struct mtk_nfc_nand_chip, node);
    nand_release(nand_to_mtd(&chip->nand));
    +nand_release(&chip->nand);
    list_del(&chip->node);
}

--- linux-4.15.0.orig/drivers/mtd/nand/mxc_nand.c
+++ linux-4.15.0/drivers/mtd/nand/mxc_nand.c
@ -48,7 +48,7 @
#define NFC_V1_V2_CONFIG		(host->regs + 0x0a)
#define NFC_V1_V2_ECC_STATUS_RESULT	(host->regs + 0x0c)
#define NFC_V1_V2_RSLTMAIN_AREA	(host->regs + 0x0e)
#define NFC_V1_V2_RSLTSPARE_AREA (host->regs + 0x10)
+#define NFC_V21_RSLTSPARE_AREA 		(host->regs + 0x10)
#define NFC_V1_V2_WRPROT (host->regs + 0x12)
#define NFC_V1_UNLOCKSTART_BLKADDR (host->regs + 0x14)
#define NFC_V1_UNLOCKEND_BLKADDR (host->regs + 0x16)
@@ -1118,6 +1118,9 @@
 writew(config1, NFC_V1_V2_CONFIG1);
 /* preset operation */

+/* spare area size in 16-bit half-words */
+writew(mtd->oobsize / 2, NFC_V21_RSLTSPARE_AREA);
+
 /* Unlock the internal RAM Buffer */
 writew(0x2, NFC_V1_V2_CONFIG);

 @@ -1830,7 +1833,7 @@
 {                      
 struct mxc_nand_host *host = platform_get_drvdata(pdev);

 -nand_release(nand_to_mtd(&host->nand));
 +nand_release(&host->nand);
 if (host->clk_act)
 clk_disable_unprepare(host->clk);

 --- linux-4.15.0.orig/drivers/mtd/nand/nand_base.c
 +++ linux-4.15.0/drivers/mtd/nand/nand_base.c
 @@ -440,7 +440,7 @@
 for (; page < page_end; page++) {
 res = chip->ecc.read_oob(mtd, chip, page);
 -if (res)
 +if (res < 0)
 return res;

 bad = chip->oob.poi[chip->badblockpos];
 @@ -710,7 +710,8 @@
 chip->cmd_ctrl(mtd, readcmd, ctrl);
 ctrl &= ~NAND_CTRL_CHANGE;
 }                                      
 -chip->cmd_ctrl(mtd, command, ctrl);
 +if (command != NAND_CMD_NONE)
 +chip->cmd_ctrl(mtd, command, ctrl);

 /* Address cycle, when necessary */
 ctrl = NAND_CTRL_ALE | NAND_CTRL_CHANGE;
 @@ -738,6 +739,7 @@
 */
 switch (command) {

+case NAND_CMD_NONE:
case NAND_CMD_PAGEPROG:
case NAND_CMD_ERASE1:
case NAND_CMD_ERASE2:
  @ @ -831,7 +833,9 @ @
}

/* Command latch cycle */
-chip->cmd_ctrl(mtd, command, NAND_NCE | NAND_CLE | NAND_CTRL_CHANGE);
+if (command != NAND_CMD_NONE)
  +chip->cmd_ctrl(mtd, command,
    +NAND_NCE | NAND_CLE | NAND_CTRL_CHANGE);

if (column != -1 || page_addr != -1) {
  int ctrl = NAND_CTRL_CHANGE | NAND_NCE | NAND_ALE;
  @ @ -866,6 +870,7 @ @
  */
  switch (command) {

+case NAND_CMD_NONE:
case NAND_CMD_CACHEDPROG:
case NAND_CMD_PAGEPROG:
case NAND_CMD_ERASE1:
  @ @ -2199,6 +2204,7 @ @
static int nand_do_read_oob(struct mtd_info *mtd, loff_t from,
    struct mtd_oob_ops *ops)
{
  +unsigned int max_bitflips = 0;
  int page, realpage, chipnr;
  struct nand_chip *chip = mtd_to_nand(mtd);
  struct mtd_ecc_stats stats;
  @ @ -2256,6 +2262,8 @ @
  nand_wait_ready(mtd);
  }

+max_bitflips = max_t(unsigned int, max_bitflips, ret);
+
  readlen -= len;
  if (!readlen)
    break;
  @ @ -2281,7 +2289,7 @ @
  if (mtd->ecc_stats.failed - stats.failed)
    return -EBADMSG;

  +return mtd->ecc_stats.corrected - stats.corrected ? -EUCLEAN : 0;
  +return max_bitflips;
  }
/**
 * nand_release - [NAND Interface] Unregister the MTD device and free resources
 * held by the NAND device
 * @mtd: MTD device structure
 * @chip: NAND chip object
 */

-void nand_release(struct mtd_info *mtd)
+void nand_release(struct nand_chip *chip)
{
- mtd_device_unregister(mtd);
  nand_cleanup(mtd_to_nand(mtd));
+ mtd_device_unregister(nand_to_mtd(chip));
+ nand_cleanup(chip);
}

EXPORT_SYMBOL_GPL(nand_release);

--- linux-4.15.0.orig/drivers/mtd/nand/nandsim.c
+++ linux-4.15.0/drivers/mtd/nand/nandsim.c
@@ -2356,7 +2356,7 @@

 err_exit:
  free_nandsim(nand);
- nand_release(nsmtd);
+ nand_release(chip);
  for (i = 0;i < ARRAY_SIZE(nand->partitions); ++i)
    kfree(nand->partitions[i].name);

 error:
@@ -2378,7 +2378,7 @@

 int i;

 free_nandsim(ns); /* Free nandsim private resources */
- nand_release(nsmtd); /* Unregister driver */
+ nand_release(chip); /* Unregister driver */
  for (i = 0;i < ARRAY_SIZE(ns->partitions); ++i)
    kfree(ns->partitions[i].name);
  kfree(mtd_to_nand(nsmtd)); /* Free other structures */
--- linux-4.15.0.orig/drivers/mtd/nand/ndfc.c
+++ linux-4.15.0/drivers/mtd/nand/ndfc.c
@@ -258,7 +258,7 @@

 struct ndfc_controller *ndfc = dev_get_drvdata(&ofdev->dev);
 struct mtd_info *mtd = nand_to_mtd(&ndfc->chip);
- nand_release(mtd); /* Unregister driver */
+ nand_release(&ndfc->chip); /* Unregister driver */
  for (i = 0;i < ARRAY_SIZE(ns->partitions); ++i)
    kfree(mtd_to_nand(nsmtd)); /* Free other structures */
--- linux-4.15.0.orig/drivers/mtd/nand/ndfc.c
+++ linux-4.15.0/drivers/mtd/nand/ndfc.c
@@ -258,7 +258,7 @@

 struct ndfc_controller *ndfc = dev_get_drvdata(&ofdev->dev);
 struct mtd_info *mtd = nand_to_mtd(&ndfc->chip);
- nand_release(mtd);
+ nand_release(&ndfc->chip);
  kfree(mtd->name);
return 0;
--- linux-4.15.0.orig/drivers/mtd/nand/nuc900_nand.c
+++ linux-4.15.0/drivers/mtd/nand/nuc900_nand.c
@@ -284,7 +284,7 @@
{
struct nuc900_nand *nuc900_nand = platform_get_drvdata(pdev);

-nand_release(nand_to_mtd(&nuc900_nand->chip));
+nand_release(&nuc900_nand->chip);
clk_disable(nuc900_nand->clk);

return 0;
--- linux-4.15.0.orig/drivers/mtd/nand/omap2.c
+++ linux-4.15.0/drivers/mtd/nand/omap2.c
@@ -2284,7 +2284,7 @@
}
if (info->dma)
dma_release_channel(info->dma);
-nand_release(mtd);
+nand_release(nand_chip);
return 0;
}

--- linux-4.15.0.orig/drivers/mtd/nand/omap_elm.c
+++ linux-4.15.0/drivers/mtd/nand/omap_elm.c
@@ -421,6 +421,7 @@
pm_runtime_enable(&pdev->dev);
if (pm_runtime_get_sync(&pdev->dev) < 0) {
ret = -EINVAL;
+pm_runtime_put_sync(&pdev->dev);
pm_runtime_disable(&pdev->dev);
dev_err(pdev->dev, "can't enable clock\n");
return ret;
--- linux-4.15.0.orig/drivers/mtd/nand/orion_nand.c
+++ linux-4.15.0/drivers/mtd/nand/orion_nand.c
@@ -186,7 +186,7 @@
mtd->name = "orion_nand";
ret = mtd_device_register(mtd, board->parts, board->nr_parts);
if (ret) {
-nand_release(mtd);
+nand_cleanup(nc);
goto no_dev;
}

@@ -201,9 +201,8 @@
{
struct orion_nand_info *info = platform_get_drvdata(pdev);


struct nand_chip *chip = &info->chip;
-nstruct mtd_info *mtd = nand_to_mtd(chip);

-nand_release(mtd);
+nand_release(chip);

clk_disable_unprepare(info->clk);

--- linux-4.15.0.orig/drivers/mtd/nand/oxnas_nand.c
+++ linux-4.15.0/drivers/mtd/nand/oxnas_nand.c
@@ -36,6 +36,7 @@
void __iomem *io_base;
 struct clk *clk;
 struct nand_chip *chips[OXNAS_NAND_MAX_CHIPS];
 +unsigned int nchips;
};

static uint8_t oxnas_nand_read_byte(struct mtd_info *mtd) @ @ -86.9 +87.9 @ @
struct nand_chip *chip;
struct mtd_info *mtd;
struct resource *res;
-int nchips = 0;
+int i;
 int count = 0;
 int err = 0;
/* Allocate memory for the device structure (and zero it) */
err = mtd_device_register(mtd, NULL, 0);
+if (!chip) {
+ err = -ENOMEM;
+ goto err_clk_unprepare;
+ goto err_release_child;
+}

chip->controller = &oxnas->base;
@@ -144,10 +144,10 @@
/* Scan to find existence of the device */
 err = nand_scan(mtd, 1);
 if (err)
 - goto err_clk_unprepare;
+ goto err_release_child;

 err = mtd_device_register(mtd, NULL, 0);
-if (err) {
- nand_release(mtd);
-goto err_clk_unprepare;
-}
+if (err)
+goto err_cleanup_nand;
-
oxnas->chips[nchips] = chip;
+  ++nchips;
+oxnas->chips[oxnas->nchips] = chip;
++oxnas->nchips;
}

/* Exit if no chips found */
-if (!nchips) {
+if (!oxnas->nchips) {
  err = -ENODEV;
  goto err_clk_unprepare;
}
@@ -166,6 +165,17 @@

return 0;

+err_cleanup_nand:
+nand_cleanup(chip);
+err_release_child:
+of_node_put(nand_np);
+
+for (i = 0; i < oxnas->nchips; i++) {
+chip = oxnas->chips[i];
+WARN_ON(mtd_device_unregister(nand_to_mtd(chip)));
+nand_cleanup(chip);
+
+err_clk_unprepare:
clk_disable_unprepare(oxnas->clk);
return err;
@@ -174,9 +184,13 @@
static int oxnas_nand_remove(struct platform_device *pdev)
{
 struct oxnas_nand_ctrl *oxnas = platform_get_drvdata(pdev);
+struct nand_chip *chip;
+int i;

-if (oxnas->chips[0])
-nand_release(nand_to_mtd(oxnas->chips[0]));
+for (i = 0; i < oxnas->nchips; i++) {
+chip = oxnas->chips[i];
+nand_release(chip);
+}
clk_disable_unprepare(oxnas->clk);

--- linux-4.15.0.orig/drivers/mtd/nand/pasemi_nand.c
+++ linux-4.15.0/drivers/mtd/nand/pasemi_nand.c
@@ -163,7 +163,7 @@
if (mtd_device_register(pasemi_nand_mtd, NULL, 0)) {
    dev_err(dev, "Unable to register MTD device\n");
    err = -ENODEV;
-goto out_lpc;
+goto out_cleanup_nand;
}

dev_info(dev, "PA Semi NAND flash at %pR, control at I/O %x\n", &res,
@@ -171,6 +171,8 @@
return 0;

+ out_cleanup_nand:
+ nand_cleanup(chip);
    out_lpc:
    release_region(lpcctl, 4);
    out_iors:
-    nand_release(pasemi_nand_mtd);
+    nand_release(chip);

release_region(lpcctl, 4);

--- linux-4.15.0.orig/drivers/mtd/nand/plat_nand.c
+++ linux-4.15.0/drivers/mtd/nand/plat_nand.c
@@ -99,7 +99,7 @@
    if (!err)
        return err;
@
-    nand_release(mtd);
+    nand_release(&data->chip);
    out:
    if (pdata->ctrl.remove)
        pdata->ctrl.remove(pdev);
@@ -114,7 +114,7 @@
        struct plat_nand_data *data = platform_get_drvdata(pdev);
        struct platform_nand_data *pdata = dev_get_platdata(&pdev->dev);

    -nand_release(mtd);
+nand_release(&data->chip);
    out:
    if (pdata->ctrl.remove)
        pdata->ctrl.remove(pdev);
@@ -141,7 +141,7 @@
        struct platform_nand_data *pdata = dev_get_platdata(&pdev->dev);

    -nand_release(nand_to_mtd(&data->chip));
nand_release(&data->chip);
if (pdata->ctrl.remove)
pdata->ctrl.remove(pdev);

clock_disable_unprepare(info->clk);

for (cs = 0; cs < pdata->num_cs; cs++)
  nand_release(nand_to_mtd(info->host[cs]->chip));
return 0;

#define NAND_VERSION_MINOR_SHIFT16

/* NAND OP_CMDS */
#define PAGE_READ0x2
#define PAGE_READ_WITH_ECC0x3
#define PAGE_READ_WITH_ECC_SPARE0x4
#define PROGRAM_PAGE0x6
#define PROGRAM_WITH_ECC0x7
#define PROGRAM_PAGE_SPARE0x9
#define BLOCK_ERASE0xa
#define FETCH_ID0xb
#define RESETDEVICE0xd

/* Default Value for NAND_DEV_CMD_VLD */
#define NAND_DEV_CMD_VLD_VAL
READ_START_VLD | WRITE_START_VLD | 

#define QPIC_PER_CW_CMD_SGL32
#define QPIC_PER_CW_DATA_SGL8

#define QPIC_NAND_COMPLETION_TIMEOUT msecs_to_jiffies(2000)

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/* Flags used in DMA descriptor preparation helper functions
   * (i.e. read_reg_dma/write_reg_dma/read_data_dma/write_data_dma)
   * @tx_sgl_start - start index in data sgl for tx.
   * @rx_sgl_pos - current index in data sgl for rx.
   * @rx_sgl_start - start index in data sgl for rx.
   + * @wait_second_completion - wait for second DMA desc completion before making
   + * the NAND transfer completion.
   + * @txn_done - completion for NAND transfer.
   + * @last_data_desc - last DMA desc in data channel (tx/rx).
   + * @last_cmd_desc - last DMA desc in command channel.
   */

struct bam_transaction {
    struct bam_cmd_element *bam_ce;
    u32 tx_sgl_start;
    u32 rx_sgl_pos;
    u32 rx_sgl_start;
    bool wait_second_completion;
    struct completion txn_done;
    struct dma_async_rx_descriptor *last_data_desc;
    struct dma_async_rx_descriptor *last_cmd_desc;
};

/*
   * among different NAND controllers.
   * @ecc_modes - ecc mode for NAND
   * @is_bam - whether NAND controller is using BAM
   + * @is_qpic - whether NAND CTRL is part of qpic IP
   * @dev_cmd_reg_start - NAND_DEV_CMD_* registers starting offset
   */

struct qcom_nandc_props {
    u32 ecc_modes;
    bool is_bam;
    +bool is_qpic;
    u32 dev_cmd_reg_start;
};

bam_txn->data_sgl = bam_txn_buf;

+init_completion(&bam_txn->txn_done);
+
return bam_txn;
}
bam_txn->tx_sgl_start = 0;
bam_txn->rx_sgl_pos = 0;
bam_txn->rx_sgl_start = 0;
+bam_txn->last_data_desc = NULL;
+bam_txn->wait_second_completion = false;

sg_init_table(bam_txn->cmd_sgl, nandc->max_cwperpage * 
    QPIC_PER_CW_CMD_SGL);
sg_init_table(bam_txn->data_sgl, nandc->max_cwperpage * 
    QPIC_PER_CW_DATA_SGL);
+
+reinit_completion(&bam_txn->txn_done);
+
+/* Callback for DMA descriptor completion */
+static void qpic_bam_dma_done(void *data)
+{
+struct bam_transaction *bam_txn = data;
+
+/*
+ * In case of data transfer with NAND, 2 callbacks will be generated.
+ * One for command channel and another one for data channel.
+ * If current transaction has data descriptors
+ * (i.e. wait_second_completion is true), then set this to false
+ * and wait for second DMA descriptor completion.
+ */
+if (bam_txn->wait_second_completion)
+bam_txn->wait_second_completion = false;
+else
+complete(&bam_txn->txn_done);
}

static inline struct qcom_nand_host *to_qcom_nand_host(struct nand_chip *chip)
@@ -656,11 +693,11 @@
if (read) {
    if (host->use_ecc)
        -cmd = PAGE_READ_WITH_ECC | PAGE_ACC | LAST_PAGE;
-    cmd = OP_PAGE_READ_WITH_ECC | PAGE_ACC | LAST_PAGE;
+    cmd = OP_PAGE_READ | PAGE_ACC | LAST_PAGE;
} else {
    -cmd = PROGRAM_PAGE | PAGE_ACC | LAST_PAGE;
+cmd = OP_PROGRAM_PAGE | PAGE_ACC | LAST_PAGE;
}
if (host->use_ecc) {
    desc->dma_desc = dma_desc;

    +/- update last data/command descriptor */
+if (chan == nandc->cmd_chan)
+    bam_txn->last_cmd_desc = dma_desc;
+else
+    bam_txn->last_data_desc = dma_desc;
+
    list_add_tail(&desc->node, &nandc->desc_list);

    return 0;
}

/* in use, we configure the controller to perform a raw read of 512
 * bytes to read onfi params */

-nandc_set_reg(nandc, NAND_FLASH_CMD, PAGE_READ | PAGE_ACC | LAST_PAGE);
+nandc_set_reg(nandc, NAND_FLASH_CMD, OP_PAGE_READ | PAGE_ACC | LAST_PAGE);

nandc_set_reg(nandc, NAND_ADDR0, 0);
nandc_set_reg(nandc, NAND_ADDR1, 0);
nandc_set_reg(nandc, NAND_DEV0_CFG0, 0 << CW_PER_PAGE
@@ -1175,7 +1218,7 @@
    struct qcom_nand_controller *nandc = get_qcom_nand_controller(chip);

    nandc_set_reg(nandc, NAND_FLASH_CMD,
-       BLOCK_ERASE | PAGE_ACC | LAST_PAGE);
+       OP_BLOCK_ERASE | PAGE_ACC | LAST_PAGE);
    nandc_set_reg(nandc, NAND_ADDR0, page_addr);
    nandc_set_reg(nandc, NAND_ADDR1, 0);
    nandc_set_reg(nandc, NAND_DEV0_CFG0, 0 << CW_PER_PAGE
@@ -1206,7 +1249,7 @@
    if (column == -1)
        return 0;

    nandc_set_reg(nandc, NAND_FLASH_CMD, RESET_DEVICE);
+nandc_set_reg(nandc, NAND_FLASH_CMD, OP_RESET_DEVICE);
nandc_set_reg(nandc, NAND_EXEC_CMD, 1);

write_reg_dma(nandc, NAND_FLASH_CMD, 1, NAND_BAM_NEXT_SGL);
@@ -1272,10 +1315,20 @@
cookie = dmaengine_submit(desc->dma_desc);

if (nandc->props->is_bam) {
+bam_txn->last_cmd_desc->callback = qpic_bam_dma_done;
+bam_txn->last_cmd_desc->callback_param = bam_txn;
+if (bam_txn->last_data_desc) {
+bam_txn->last_data_desc->callback = qpic_bam_dma_done;
+bam_txn->last_data_desc->callback_param = bam_txn;
+bam_txn->wait_second_completion = true;
+}
+dma_async_issue_pending(nandc->tx_chan);
+dma_async_issue_pending(nandc->rx_chan);
+dma_async_issue_pending(nandc->cmd_chan);

-if (dma_sync_wait(nandc->cmd_chan, cookie) != DMA_COMPLETE)
+if (!wait_for_completion_timeout(&bam_txn->txn_done,
+    QPIC_NAND_COMPLETION_TIMEOUT))
return -ETIMEDOUT;
} else {
    if (dma_sync_wait(nandc->chan, cookie) != DMA_COMPLETE)
@@ -2600,7 +2653,8 @@
    u32 nand_ctrl;

    /* kill onenand */
    -nandc_write(nandc, SFLASHC_BURST_CFG, 0);
    +if (!nandc->props->is_qpic)
    +nandc_write(nandc, SFLASHC_BURST_CFG, 0);
    nandc_write(nandc, dev_cmd_reg_addr(nandc, NAND_DEV_CMD_VLD),
    NAND_DEV_CMD_VLD_VAL);
@@ -2698,7 +2755,7 @@

    nand_set_flash_node(chip, dn);
    mtd->name = devm_kasprintf(dev, GFP_KERNEL, "qcom_nand.%d", host->cs);
    +if (!mtd->name)
    +return -ENOMEM;
    mtd->owner = THIS_MODULE;
    mtd->dev.parent = dev;

@@ -2698,7 +2755,7 @@
 struct device *dev = nandc->dev;
 struct device_node *dn = dev->of_node, *child;


struct qcom_nand_host *host, *tmp;
-int ret;
+int ret = -ENODEV;

for_each_available_child_of_node(dn, child) {
    host = devm_kzalloc(dev, sizeof(*host), GFP_KERNEL);
@@ -2737,10 +2794,7 @@
    }
}

-if (list_empty(&nandc->host_list))
    return -ENODEV;
-
-return 0;
+return ret;
}

/* parse custom DT properties here */
@@ -2850,7 +2904,7 @@
struct qcom_nand_host *host;

list_for_each_entry(host, &nandc->host_list, node)
    -nand_release(nand_to_mtd(&host->chip));
    +nand_release(&host->chip);

qcom_nandc_unalloc(nandc);
@@ -2869,12 +2923,14 @@
static const struct qcom_nandc_props ipq4019_nandc_props = {
    .ecc_modes = (ECC_BCH_4BIT | ECC_BCH_8BIT),
    .is_bam = true,
    +.is_qpic = true,
    .dev_cmd_reg_start = 0x0,
};

static const struct qcom_nandc_props ipq8074_nandc_props = {
    .ecc_modes = (ECC_BCH_4BIT | ECC_BCH_8BIT),
    .is_bam = true,
    +.is_qpic = true,
    .dev_cmd_reg_start = 0x7000,
};

--- linux-4.15.0.orig/drivers/mtd/nand/r852.c
+++ linux-4.15.0/drivers/mtd/nand/r852.c
@@ -656,7 +656,7 @@
    dev->card_registred = 1;
    return 0;
error3:
nand_release(mtd);
+nand_release(dev->chip);
error1:
    /* Force card redetect */
    dev->card_detected = 0;
@@ -675,7 +675,7 @@
    return;
    
    device_remove_file(&mtd->dev, &dev_attr_media_type);
-    nand_release(mtd);
+    nand_release(dev->chip);
    r852_engine_disable(dev);
    dev->card_registered = 0;
}
--- linux-4.15.0.orig/drivers/mtd/nand/s3c2410.c
+++ linux-4.15.0/drivers/mtd/nand/s3c2410.c
@@ -784,7 +784,7 @@
    for (mtdno = 0; mtdno < info->mtd_count; mtdno++, ptr++) {
        pr_debug("releasing mtd %d (%p)\n", mtdno, ptr);
-        nand_release(nand_to_mtd(&ptr->chip));
+        nand_release(&ptr->chip);
    }
    }

--- linux-4.15.0.orig/drivers/mtd/nand/sh_flctl.c
+++ linux-4.15.0/drivers/mtd/nand/sh_flctl.c
@@ -480,7 +480,7 @@
    /* initiate DMA transfer */
    if (flctl->chan_fifo0_rx && rlen >= 32 &&
-        flctl_dma_fifo0_transfer(flctl, buf, rlen, DMA_DEV_TO_MEM) > 0)
+        flctl_dma_fifo0_transfer(flctl, buf, rlen, DMA_FROM_DEVICE) > 0)
        goto convert;/* DMA success */

    /* do polling transfer */
    @ @ -539,7 +539,7 @@

    /* initiate DMA transfer */
    if (flctl->chan_fifo0_tx && rlen >= 32 &&
-        flctl_dma_fifo0_transfer(flctl, buf, rlen, DMA_MEM_TO_DEV) > 0)
+        flctl_dma_fifo0_transfer(flctl, buf, rlen, DMA_TO_DEVICE) > 0)
        return;/* DMA success */

    /* do polling transfer */
    @ @ -1228,7 +1228,7 @@
struct sh_flctl *flctl = platform_get_drvdata(pdev);
flctl_release_dma(flctl);
-nand_release(nand_to_mtd(&flctl->chip));
+nand_release(&flctl->chip);

pm_runtime_disable(&pdev->dev);

return 0;

--- linux-4.15.0.orig/drivers/mtd/nand/sharpsl.c
+++ linux-4.15.0/drivers/mtd/nand/sharpsl.c
@@ -192,7 +192,7 @@
return 0;

err_add:
- nand_release(mtd);
+ nand_cleanup(this);

err_scan:

iounmap(sharpsl->io);
@@ -210,7 +210,7 @@
struct sharpsl_nand *sharpsl = platform_get_drvdata(pdev);

/* Release resources, unregister device */
- nand_release(nand_to_mtd(&sharpsl->chip));
+ nand_release(&sharpsl->chip);

iounmap(sharpsl->io);

--- linux-4.15.0.orig/drivers/mtd/nand/socrates_nand.c
+++ linux-4.15.0/drivers/mtd/nand/socrates_nand.c
@@ -195,7 +195,7 @@
          if (!res)
           res = res;

iounmap(host->io_base);
@@ -208,9 +208,8 @@
static int socrates_nand_remove(struct platform_device *ofdev)
 {
 struct socrates_nand_host *host = dev_get_drvdata(&ofdev->dev);
- struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);
+ struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);

            return res;

            -nand_release(mtd);
+ nand_cleanup(nand_chip);

            out:
            iounmap(host->io_base);
            @@ -208,9 +208,8 @@
static int socrates_nand_remove(struct platform_device *ofdev)
 {         
 struct socrates_nand_host *host = dev_get_drvdata(&ofdev->dev);
- struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);
+ struct mtd_info *mtd = nand_to_mtd(&host->nand_chip);

            -nand_release(mtd);
+ nand_release(&host->nand_chip);

            iounmap(host->io_base);
sunxi_nfc_randomizer_enable(mtd);

writel((NAND_CMD_RNDIN << 8) | NAND_CMD_PAGEPROG,
	       nfc->regs + NFC_REG_RCMD_SET);
+     nfc->regs + NFC_REG_WCMD_SET);

dma_async_issue_pending(nfc->dmac);

/* Add ECC info retrieval from DT */
for (i = 0; i < ARRAY_SIZE(strengths); i++) {
    if (ecc->strength <= strengths[i]) {
+        /*
+         * Update ecc->strength value with the actual strength
+         * that will be used by the ECC engine.
+         */
+        ecc->strength = strengths[i];
        break;
        +}
    }

if (i >= ARRAY_SIZE(strengths)) {
    ret = mtd_device_register(mtd, NULL, 0);
    if (ret) {
        dev_err(dev, "failed to register mtd device: %d\n", ret);
        nand_release(mtd);
        nand_cleanup(nand);
        return ret;
    }

    while (!list_empty(&nfc->chips)) {
        chip = list_first_entry(&nfc->chips, struct sunxi_nand_chip, node);
+            nand_release(&chip->nand);
            sunxi_nand_ecc_cleanup(&chip->nand.ecc);
            list_del(&chip->node);
    }
}
for (cs = 0; cs < MAX_CS; ++cs) {
    if (nfc->chips[cs]){
        -nand_release(nand_to_mtd(&nfc->chips[cs]->nand_chip));
        +nand_release(&nfc->chips[cs]->nand_chip);
    }

    return 0;
}

writel_relaxed(MODE_RAW, nfc->pbus_base + PBUS_PAD_MODE);

-clk = clk_get(&pdev->dev, NULL);
+clk = devm_clk_get(&pdev->dev, NULL);
if (IS_ERR(clk))
    return PTR_ERR(clk);

--- linux-4.15.0.orig/drivers/mtd/nand/tmio_nand.c
+++ linux-4.15.0/drivers/mtd/nand/tmio_nand.c
@@ -448,7 +448,7 @@
   if (!retval)
       return retval;

-clk = devm_clk_get(&pdev->dev, NULL);
+clk = clk_get(&pdev->dev, NULL);
if (IS_ERR(clk))
    return PTR_ERR(clk);

err_irq:
    tmio_hw_stop(dev, tmio);
@@ -459,7 +459,7 @@
{
    struct tmio_nand *tmio = platform_get_drvdata(dev);

    -nand_release(nand_to_mtd(chip));
    +nand_cleanup(nand_chip);
    tmio_hw_stop(dev, tmio);
    return 0;
}
if (mtd->oobsize > 64)
  mtd->oobsize = 64;

/*
 * mtd->ecclayout is not specified here because we're using the
 * default large page ECC layout defined in NAND core.
 */

/* Use default large page ECC layout defined in NAND core */
mtd_set_ooblayout(mtd, &nand_ooblayout_lp_ops);
if (chip->ecc.strength == 32) {
  nfc->ecc_mode = ECC_60_BYTE;
  chip->ecc.bytes = 60;
  mtd = platform_get_drvdata(pdev);
  struct mtd_info *mtd = platform_get_drvdata(pdev);
  struct xway_nand_data *data = platform_get_drvdata(pdev);
  struct vf610_nfc *nfc = mtd_to_nfc(mtd);
  struct vf610_nfc
  nand_release(mtd);
  +nand_release(mtd_to_nand(mtd));
  clk_disable_unprepare(nfc->clk);
  return 0;
}
--- linux-4.15.0.orig/drivers/mtd/onenand/onenand_base.c
+++ linux-4.15.0/drivers/mtd/onenand/onenand_base.c
@@ -1253,44 +1253,44 @@

Err = mtd_device_register(mtd, NULL, 0);
if (err)
  -nand_release(mtd);
  +nand_cleanup(&data->chip);

return err;
}
stats = mtd->ecc_stats;

- /* Read-while-load method */
+ /* Read-while-load method */

- /* Do first load to bufferRAM */
- if (read < len) {
- if (!onenand_check_bufferram(mtd, from)) {
+ /* Do first load to bufferRAM */
+ if (read < len) {
+ if (!onenand_check_bufferram(mtd, from)) {
  this->command(mtd, ONENAND_CMD_READ, from, writesize);
  ret = this->wait(mtd, FL_READING);
  onenand_update_bufferram(mtd, from, !ret);
  +ret = this->wait(mtd, FL_READING);
+onenand_update_bufferram(mtd, from, !ret);
  if (mtd_is_eccerr(ret))
    ret = 0;
  - }
  - }
  +}
  +}

thislen = min_t(int, writesize, len - read);
column = from & (writesize - 1);
if (column + thislen > writesize)
  thislen = writesize - column;

- while (!ret) {
- /* If there is more to load then start next load */
- from += thislen;
- if (read + thislen < len) {
+while (!ret) {
+ /* If there is more to load then start next load */
+from += thislen;
+if (read + thislen < len) {
  this->command(mtd, ONENAND_CMD_READ, from, writesize);
  - /* Chip boundary handling in DDP
  - * Now we issued chip 1 read and pointed chip 1
  */
+ /* Chip boundary handling in DDP
+ * Now we issued chip 1 read and pointed chip 1
+ * bufferram so we have to point chip 0 bufferram.
  - */
- if (ONENAND_IS_DDP(this) &&
- unlikely(from == (this->chipsize >> 1))) {
- this->write_word(ONENAND_DDP_CHIP0, this->base + ONENAND_REG_START_ADDRESS2);
boundary = 1;
} else
boundary = 0;
- ONENAND_SET_PREV_BUFFERRAM(this);
-
- /* While load is going, read from last bufferRAM */
- this->read_bufferram(mtd, ONENAND_DATARAM, buf, column, thislen);
+ */
+if (ONENAND_IS_DDP(this) &&
  unlikely(from == (this->chipsize >> 1))) {
+this->write_word(ONENAND_DDP_CHIP0, this->base + ONENAND_REG_START_ADDRESS);
+boundary = 1;
+} else
+boundary = 0;
+ONENAND_SET_PREV_BUFFERRAM(this);
+
+) /* While load is going, read from last bufferRAM */
+this->read_bufferram(mtd, ONENAND_DATARAM, buf, column, thislen);

/* Read oob area if needed */
if (oobbuf) {
 @@ -1306,24 +1306,24 @@
oobcolumn = 0;
}

/* See if we are done */
read += thislen;
if (read == len)
brake;
/* Set up for next read from bufferRAM */
- if (unlikely(boundary))
- this->write_word(ONENAND_DDP_CHIP1, this->base + ONENAND_REG_START_ADDRESS);
- ONENAND_SET_NEXT_BUFFERRAM(this);
- buf += thislen;
+/* See if we are done */
+read += thislen;
+if (read == len)
+bbreak;
+/* Set up for next read from bufferRAM */
+if (unlikely(boundary))
+this->write_word(ONENAND_DDP_CHIP1, this->base + ONENAND_REG_START_ADDRESS);
+ONENAND_SET_NEXT_BUFFERRAM(this);
+buf += thislen;
thislen = min_t(int, writesize, len - read);
- column = 0;
- cond_resched();
- /* Now wait for load */
- ret = this->wait(mtd, FL_READING);
- onenand_update_bufferram(mtd, from, !ret);
+column = 0;
+cond_resched();
+/* Now wait for load */
+ret = this->wait(mtd, FL_READING);
+onenand_update_bufferram(mtd, from, !ret);
if (mtd_is_eccerr(ret))
ret = 0;
- }
+
+}

/*
 * Return success, if no ECC failures, else -EBADMSG
--- linux-4.15.0.orig/drivers/mtd/parsers/sharpslpart.c
+++ linux-4.15.0/drivers/mtd/parsers/sharpslpart.c
@@ -165,10 +165,10 @@
static int sharpsl_nand_init_ftl(struct mtd_info *mtd, struct sharpsl_ftl *ftl)
{
-unsigned int block_num, log_num, phymax;
+unsigned int block_num, phymax;
+int i, ret, log_num;
loff_t block_adr;
u8 *oob;
<int i, ret;

oob = kzalloc(mtd->oobsize, GFP_KERNEL);
if (!oob)
--- linux-4.15.0.orig/drivers/mtd/spi-nor/Kconfig
+++ linux-4.15.0/drivers/mtd/spi-nor/Kconfig
@@ -41,7 +41,7 @@
config SPI_ATMEL_QUADSPI
tristate "Atmel Quad SPI Controller"
-depends on ARCH_AT91 || (ARM && COMPILE_TEST)
+depends on ARCH_AT91 || (ARM && COMPILE_TEST && !ARCH_EBSA110)
depends on OF && HAS_IOMEM
help
  This enables support for the Quad SPI controller in master mode.
--- linux-4.15.0.orig/drivers/mtd/spi-nor/cadence-quadspi.c
+++ linux-4.15.0/drivers/mtd/spi-nor/cadence-quadspi.c
@@ -467,7 +467,7 @@
/* Setup dummy clock cycles */
dummy_clk = nor->read_dummy;
if (dummy_clk > CQSPI_DUMMY_CLKS_MAX)
-dummy_clk = CQSPI_DUMMY_CLKS_MAX;
+-dummy_clk = CQSPI_DUMMY_CLKS_MAX;
+return -EOPNOTSUPP;
if (dummy_clk / 8) {
    reg |= (1 << CQSPI_REG_RD_INSTR_MODE_EN_LSB);
    reg_base = cqspi->iobase;
    ahb_base = cqspi->ahb_base;
    remaining = n_rx;
    mod_bytes = n_rx % 4;
    bytes_to_read = 0;
    rxbuf_end = rxbuf + n_rx;
    int ret = 0;

    writel(remaining, reg_base + CQSPI_REG_INDIRECTRDBYTES);
}

while (bytes_to_read != 0) {
    word_remain = round_down(remaining, 4);
    bytes_to_read *= cqspi->fifo_width;
    bytes_to_read = bytes_to_read > remaining ? remaining : bytes_to_read;
    ioread32_rep(ahb_base, rxbuf,
    DIV_ROUND_UP(bytes_to_read, 4));
    bytes_to_read = round_down(bytes_to_read, 4);
    /* Read 4 byte word chunks then single bytes */
    if (bytes_to_read) {
        ioread32_rep(ahb_base, rxbuf,
        (bytes_to_read / 4));
    } else if (!word_remain && mod_bytes) {
        temp = ioread32(ahb_base);
        bytes_to_read = mod_bytes;
        memcpy(rxbuf, &temp, min((unsigned int)
        (rxbuf_end - rxbuf),
        bytes_to_read));
    }
    bytes_to_read = cqspi_get_rd_sram_level(cqspi);

    ndelay(cqspi->wr_delay);

    while (remaining > 0) {
        write_words, mod_bytes;
        write_bytes = remaining > page_size ? page_size : remaining;
        iowrite32_rep(cqspi->ahb_base, txbuf,
        DIV_ROUND_UP(write_bytes, 4));
+write_words = write_bytes / 4;
+mod_bytes = write_bytes % 4;
+ /* Write 4 bytes at a time then single bytes. */
+if (write_words) {
+iowrite32_rep(cqspi->ahb_base, txbuf, write_words);
+txbuf += (write_words * 4);
+}
+if (mod_bytes) {
+unsigned int temp = 0xFFFFFFFF;
+
+memcpy(&temp, txbuf, mod_bytes);
+iowrite32(temp, cqspi->ahb_base);
+txbuf += mod_bytes;
+}

ret = wait_for_completion_timeout(&cqspi->transfer_complete,
    msecs_to_jiffies
@@ -638,7 +667,6 @@
goto failwr;
}

-txbuf += write_bytes;
remaining -= write_bytes;

if (remaining > 0)
--- linux-4.15.0.orig/drivers/mtd/spi-nor/fsl-quadspi.c
+++ linux-4.15.0/drivers/mtd/spi-nor/fsl-quadspi.c
@@ -468,6 +468,7 @@
{
    switch (cmd) {
    case SPINOR_OP_READ_1_1_4:
+    case SPINOR_OP_READ_1_1_4_4B:
        return SEQID_READ;
    case SPINOR_OP_WREN:
        return SEQID_WREN;
@@ -533,6 +534,9 @@
        /* trigger the LUT now */
        seqid = fsl_qspi_get_seqid(q, cmd);
+        if (seqid < 0)
+            return seqid;
+        qspi_writel(q, (seqid << QUADSPI_IPCR_SEQID_SHIFT) | len,
        base + QUADSPI_IPCR);
@@ -661,7 +665,7 @@
    * causes the controller to clear the buffer, and use the sequence pointed
    * by the QUADSPI_BFGENCR[SEQID] to initiate a read from the flash.
-static void fsl_qspi_init_abh_read(struct fsl_qspi *q)
+static int fsl_qspi_init_ahb_read(struct fsl_qspi *q)
{
  void __iomem *base = q->iobase;
  int seqid;
  @@ -686,8 +690,13 @@
 /* Set the default lut sequence for AHB Read. */
  seqid = fsl_qspi_get_seqid(q, q->nor[0].read_opcode);
  +if (seqid < 0)
  +return seqid;
  +
  qspi_writel(q, seqid << QUADSPI_BFGENCR_SEQID_SHIFT,
  q->iobase + QUADSPI_BFGENCR);
  +
  +return 0;
}

/* This function was used to prepare and enable QSPI clock */
@@ -795,9 +804,7 @@
 fsl_qspi_init_lut(q);

 /* Init for AHB read */
-fsl_qspi_init_abh_read(q);
-
-fsl_qspi_init_abh_read(q);
+return fsl_qspi_init_ahb_read(q);
}

static const struct of_device_id fsl_qspi_dt_ids[] = {
--- linux-4.15.0.orig/drivers/mtd/spi-nor/hisi-sfc.c
+++ linux-4.15.0/drivers/mtd/spi-nor/hisi-sfc.c
@@ -408,8 +408,10 @@
    for_each_available_child_of_node(dev->of_node, np) {
      ret = hisi_spi_nor_register(np, host);
      -if (ret)
      -
      +of_node_put(np);
      goto fail;
      +}

      if (host->num_chip == HIFMC_MAX_CHIP_NUM) {
--- linux-4.15.0.orig/drivers/mtd/spi-nor/intel-spi-pci.c
+++ linux-4.15.0/drivers/mtd/spi-nor/intel-spi-pci.c
@@ -65,6 +65,7 @@
      dev_warn(dev, "Flash device number exceeds the maximum chipselect number\n");
--- linux-4.15.0.orig/drivers/mtd/spi-nor/intel-spi-pci.c
+++ linux-4.15.0/drivers/mtd/spi-nor/intel-spi-pci.c
@@ -65,6 +65,7 @@
static const struct pci_device_id intel_spi_pci_ids[] = {
    { PCI_VDEVICE(INTEL, 0x18e0), (unsigned long)&bxt_info },
    { PCI_VDEVICE(INTEL, 0x19e0), (unsigned long)&bxt_info },
    { PCI_VDEVICE(INTEL, 0x34a4), (unsigned long)&bxt_info },
    { PCI_VDEVICE(INTEL, 0xa1a4), (unsigned long)&bxt_info },
    { PCI_VDEVICE(INTEL, 0xa224), (unsigned long)&bxt_info },
};
--- linux-4.15.0.orig/drivers/mtd/spi-nor/intel-spi.c
+++ linux-4.15.0/drivers/mtd/spi-nor/intel-spi.c
@@ -136,9 +136,9 @@
 * @swseq_reg: Use SW sequencer in register reads/writes
 * @swseq_erase: Use SW sequencer in erase operation
 * @erase_64k: 64k erase supported
+ * @atomic_preopcode: Holds preopcode when atomic sequence is requested
 * @opcodes: Opcodes which are supported. This are programmed by BIOS
 *     before it locks down the controller.
-* @preopcodes: Preopcodes which are supported.
 */

 struct intel_spi {
 struct device *dev;
@@ -154,8 +154,8 @@
     bool swseq_reg;
     bool swseq_erase;
     bool erase_64k;
+    u8 atomic_preopcode;
     u8 opcodes[8];
-    u8 preopcodes[2];
 };

 static bool writeable;
@@ -400,10 +400,6 @@
     ispi->opcodes[i] = opmenu0 >> i * 8;
     ispi->opcodes[i + 4] = opmenu1 >> i * 8;
 }
-  -
-val = readl(ispi->sregs + PREOP_OTYPE);
-  -ispi->preopcodes[0] = val;
-  -ispi->preopcodes[1] = val >> 8;
 }
 }

 @@ -480,7 +476,7 @@
     int optype)
         
     u32 val = 0, status;
-    u16 preop;
+    u8 atomic_preopcode;
     int ret;

ret = intel_spi_opcode_index(ispi, opcode, optype);
@@ -490,17 +486,42 @@
if (len > INTEL_SPI_FIFO_SZ)
    return -EINVAL;

+/*
+ * Always clear it after each SW sequencer operation regardless
+ * of whether it is successful or not.
+ */
atomic_preopcode = ispi->atomic_preopcode;
ispi->atomic_preopcode = 0;
+
/* Only mark 'Data Cycle' bit when there is data to be transferred */
if (len > 0)
    val = ((len - 1) << SSFSTS_CTL_DBC_SHIFT) | SSFSTS_CTL_DS;
    val |= ret << SSFSTS_CTL_COP_SHIFT;
    val |= SSFSTS_CTL_FCERR | SSFSTS_CTL_FDONE;
    val |= SSFSTS_CTL_SCGO;
-preop = readw(ispi->sregs + PREOP_OPTYPE);
-if (preop) {
+    u16 preop;
+    switch (optype) {
+        case OPTYPE_WRITE_NO_ADDR:
+        case OPTYPE_WRITE_WITH_ADDR:
+            /* Pick matching preopcode for the atomic sequence */
+            preop = readw(ispi->sregs + PREOP_OPTYPE);
+            if ((preop & 0xff) == atomic_preopcode)
+                ; /* Do nothing */
+            else if ((preop >> 8) == atomic_preopcode)
+                val |= SSFSTS_CTL_SPOP;
+            else
+                return -EINVAL;
+            /* Enable atomic sequence */
+            val |= SSFSTS_CTL_ACS;
+            break;
+        default:
+            return -EINVAL;
+        }
+    }
-free;
-val |= SSFSTS_CTL_SPOC;
-if (preop >> 8)
-val |= SSFSTS_CTL_SPO;
+return -EINVAL;
+
+ Enable atomic sequence */
+val |= SSFSTS_CTL_ACS;
+break;
+
+default:
+return -EINVAL;
+
}
writel(val, ispi->sregs + SSFSTS_CTL);

/*@ -544,13 +565,31 @@*/

/*
 * This is handled with atomic operation and preop code in Intel
 * controller so skip it here now. If the controller is not locked,
 * program the opcode to the PREOP register for later use.
 * controller so we only verify that it is available. If the
 * controller is not locked, program the opcode to the PREOP
 * register for later use.
 */
if (opcode == SPINOR_OP_WREN) {
    if (!ispi->locked)
        u16 preop;
        if (!ispi->swseq_reg)
            return 0;
    preop = readw(ispi->sregs + PREOP_OPTYPE);
    if ((preop & 0xff) != opcode && (preop >> 8) != opcode) {
        if (ispi->locked)
            return -EINVAL;
    }
    /*
    * This enables atomic sequence on next SW sycle. Will
    * be cleared after next operation.
    */
    ispi->atomic_preopcode = opcode;
    return 0;
}

u32 val, status;
ssize_t ret;

 /*
 * Atomic sequence is not expected with HW sequencer reads. Make
 * sure it is cleared regardless.
 */
+if (WARN_ON_ONCE(ispi->atomic_preopcode))
    ispi->atomic_preopcode = 0;
+ /*
switch (nor->read_opcode) {
    case SPINOR_OP_READ:
    case SPINOR_OP_READ_FAST:
        while (len > 0) {
            block_size = min_t(size_t, len, INTEL_SPI_FIFO_SZ);

            /* Read cannot cross 4K boundary */
            block_size = min_t(loff_t, from + block_size,
                round_up(from + 1, SZ_4K)) - from;
            writel(from, ispi->base + FADDR);

            val = readl(ispi->base + HSFSTS_CTL);
            u32 val, status;
            ssize_t ret;

            /* Not needed with HW sequencer write, make sure it is cleared */
            ispi->atomic_preopcode = 0;
            +
            while (len > 0) {
                block_size = min_t(size_t, len, INTEL_SPI_FIFO_SZ);

                /* Write cannot cross 4K boundary */
                block_size = min_t(loff_t, to + block_size,
                    round_up(to + 1, SZ_4K)) - to;
                +
                writel(to, ispi->base + FADDR);

                val = readl(ispi->base + HSFSTS_CTL);
                return 0;
            }
        }
        /* Not needed with HW sequencer erase, make sure it is cleared */
        ispi->atomic_preopcode = 0;
        +
        while (len > 0) {
            writel(offs, ispi->base + FADDR);
        }
    }

    /* ISSI */
    { "is25cd512", INFO(0x7f9d20, 0, 32 * 1024, 2, SECT_4K) },
    +{ "is25wp032", INFO(0x9d7016, 0, 64 * 1024, 64,}
/* Macronix */
{ "mx25l512e", INFO(0xc22010, 0, 64 * 1024, 1, SECT_4K) },

size_t *retlen, u_char *buf)
{
    struct spi_nor *nor = mtd_to_spi_nor(mtd);
    -int ret;
    +ssize_t ret;

dev_dbg(nor->dev, "from 0x%08x, len %zd\n", (u32)from, len);

static int write_sr_cr(struct spi_nor *nor, u8 *sr_cr)
{
    -int ret;
    +ssize_t ret;

write_enable(nor);

    @ @ -396,7 +2402,7 @@
    memset(params, 0, sizeof(*params));

    /* Set SPI NOR sizes. */
    -params->size = info->sector_size * info->n_sectors;
    +params->size = (u64)info->sector_size * info->n_sectors;
    params->page_size = info->page_size;

    /* (Fast) Read settings. */
    --- linux-4.15.0.orig/drivers/mtd/tests/oobtest.c
    +++ linux-4.15.0/drivers/mtd/tests/oobtest.c
    @ @ -193,6 +193,9 @@
    ops.datbuf    = NULL;
    ops.oobbuf    = readbuf;
    err = mtd_read_oob(mtd, addr, &ops);
    +if (mtd_is_bitflip(err))
    +err = 0;
    +if (err || ops.oobretlen != use_len) {
        pr_err("error: readoob failed at %#llx\n",
            (long long)addr);
        @ @ -227,6 +230,9 @@
ops.datbuf = NULL;
ops.oobbuf = readbuf;
err = mtd_read_oob(mtd, addr, &ops);
+if (mtd_is_bitflip(err))
+err = 0;
+
if (err || ops.oobretlen != mtd->oobavail) {
pr_err("error: readoob failed at %#llx\n",
(long long)addr);
@@ -286,6 +292,9 @@
/* read entire block’s OOB at one go */
err = mtd_read_oob(mtd, addr, &ops);
+if (mtd_is_bitflip(err))
+err = 0;
+
if (err || ops.oobretlen != len) {
pr_err("error: readoob failed at %#llx\n",
    (long long)addr);
@@ -527,6 +536,9 @@
pr_info("attempting to start read past end of OOB\n");
pr_info("an error is expected...\n");
err = mtd_read_oob(mtd, addr0, &ops);
+if (mtd_is_bitflip(err))
+err = 0;
+
if (err) {
pr_info("error occurred as expected\n");
err = 0;
@@ -571,6 +583,9 @@
pr_info("attempting to read past end of device\n");
pr_info("an error is expected...\n");
err = mtd_read_oob(mtd, mtd->size - mtd->writesize, &ops);
+if (mtd_is_bitflip(err))
+err = 0;
+
if (err) {
pr_info("error occurred as expected\n");
err = 0;
@@ -615,6 +630,9 @@
pr_info("attempting to read past end of device\n");
pr_info("an error is expected...\n");
err = mtd_read_oob(mtd, mtd->size - mtd->writesize, &ops);
+if (mtd_is_bitflip(err))
+err = 0;
+
if (err) {
pr_info("error occurred as expected\n");
err = 0;
@@ -684,6 +702,9 @@
  ops.datbuf    = NULL;
  ops.oobbuf    = readbuf;
  err = mtd_read_oob(mtd, addr, &ops);
+if (mtd_is_bitflip(err))
+  err = 0;
+
if (err)
go to out;
if (memcmpshow(addr, readbuf, writebuf,
--- linux-4.15.0.orig/drivers/mtd/ubi/block.c
+++ linux-4.15.0/drivers/mtd/ubi/block.c
@@ -99,6 +99,8 @@
/* Linked list of all ubiblock instances */
static LIST_HEAD(ubiblock_devices);
+static DEFINE_IDR(ubiblock_minor_idr);
+/* Protects ubiblock_devices and ubiblock_minor_idr */
static DEFINE_MUTEX(devices_mutex);
static int ubiblock_major;

@@ -242,7 +244,7 @@
*/
    if (mode & FMODE_WRITE) {
-      ret = -EPERM;
+      ret = -EROFS;
        goto out_unlock;
    }

@@ -351,8 +353,6 @@
    .init_request	= ubiblock_init_request,
};

-static DEFINE_IDR(ubiblock_minor_idr);
-
int ubiblock_create(struct ubi_volume_info *vi)
{
  struct ubiblock *dev;
@@ -351,8 +353,6 @@
    .init_request	= ubiblock_init_request,
};

-static DEFINE_IDR(ubiblock_minor_idr);
-
int ubiblock_create(struct ubi_volume_info *vi)
{
  struct ubiblock *dev;
@@ -351,8 +353,6 @@
    .init_request	= ubiblock_init_request,
};

-static DEFINE_IDR(ubiblock_minor_idr);
-
int ubiblock_create(struct ubi_volume_info *vi)
{
  struct ubiblock *dev;
  @ @ -365,14 +365,15 @@
    /* Check that the volume isn't already handled */
    mutex_lock(&devices_mutex);
    if (find_dev_nolock(vi->ubi_num, vi->vol_id)) {
      -mutex_unlock(&devices_mutex);
      -return -EEXIST;
      +ret = -EEXIST;
      +goto out_unlock;
    }
mutex_unlock(&devices_mutex);

dev = kzalloc(sizeof(struct ubiblock), GFP_KERNEL);
-if (!dev)
-return -ENOMEM;
+if (!dev) {
+ret = -ENOMEM;
+goto out_unlock;
+
mutex_init(&dev->dev_mutex);

goto out_free_queue;
}

mutex_lock(&devices_mutex);
list_add_tail(&dev->list, &ubiblock_devices);
mutex_unlock(&devices_mutex);

/*@ -437,14 +438,13 @@*/
goto out_free_queue;
}

mutex_lock(&devices_mutex);
list_add_tail(&dev->list, &ubiblock_devices);
mutex_unlock(&devices_mutex);

/*@ -457,6 +457,8 @@*/
put_disk(dev->gd);
out_free_dev:
free(dev);
+mutex_unlock:
+mutex_unlock(&devices_mutex);

return ret;
}
/*@ -478,30 +480,36 @@*/
int ubiblock_remove(struct ubi_volume_info *vi)
{
 struct ubiblock *dev;
 +int ret;

mutex_lock(&devices_mutex);
dev = find_dev_nolock(vi->ubi_num, vi->vol_id);
if (!dev) {
+mutex_unlock(&devices_mutex);


-return -ENODEV;
+ret = -ENODEV;
+goto out_unlock;
}

/* Found a device, let's lock it so we can check if it's busy */
mutex_lock(&dev->dev_mutex);
if (dev->refcnt > 0) {
-mutex_unlock(&dev->dev_mutex);
-mutex_unlock(&devices_mutex);
-return -EBUSY;
+ret = -EBUSY;
+goto out_unlock_dev;
}

/* Remove from device list */
list_del(&dev->list);
-mutex_unlock(&devices_mutex);
-
ubiblock_cleanup(dev);
-mutex_unlock(&dev->dev_mutex);
+mutex_unlock(&devices_mutex);
+
kfree(dev);
return 0;
+
+out_unlock_dev:
+mutex_unlock(&dev->dev_mutex);
+out_unlock:
+mutex_unlock(&devices_mutex);
+return ret;
}

static int ubiblock_resize(struct ubi_volume_info *vi)
@@ -630,6 +638,7 @@
 struct ubiblock *next;
 struct ubiblock *dev;

+mutex_lock(&devices_mutex);
list_for_each_entry_safe(dev, next, &ubiblock_devices, list) {
/* The module is being forcefully removed */
WARN_ON(dev->desc);
@@ -638,6 +647,7 @@
 ubiblock_cleanup(dev);
 kfree(dev);
 }
+mutex_unlock(&devices_mutex);
}
```c
int __init ubiblock_init(void)
--- linux-4.15.0.orig/drivers/mtd/ubi/build.c
+++ linux-4.15.0/drivers/mtd/ubi/build.c
@@ -526,6 +526,7 @@
     for (i = ubi->vtbl_slots;
         i < ubi->vtbl_slots + UBI_INT_VOL_COUNT; i++) {
     ubi_eba_replace_table(ubi->volumes[i], NULL);
+    ubi_fastmap_destroy_checkmap(ubi->volumes[i]);
     kfree(ubi->volumes[i]);
 }
@@ -845,6 +846,17 @@
 return -EINVAL;
 }

+/*
+ * Both UBI and UBIFS have been designed for SLC NAND and NOR flashes.
+ * MLC NAND is different and needs special care, otherwise UBI or UBIFS
+ * will die soon and you will lose all your data.
+ */
+if (mtd->type == MTD_MLCNANDFLASH) {
+    pr_err("ubi: refuse attaching mtd%d - MLC NAND is not supported
+    mtd->index);
+    return -EINVAL;
+}
+if (ubi_num == UBI_DEV_NUM_AUTO) {
+    /* Search for an empty slot in the @ubi_devices array */
+    for (ubi_num = 0; ubi_num < UBI_MAX_DEVICES; ubi_num++)
+        @ @ -1071,16 +1083,19 @ @
        if (ubi->bgt_thread)
            kthread_stop(ubi->bgt_thread);
+    if (ubi_num == UBI_DEV_NUM_AUTO) {
+        /* Search for an empty slot in the @ubi_devices array */
+        for (ubi_num = 0; ubi_num < UBI_MAX_DEVICES; ubi_num++)
+            @ @ -1071,16 +1083,19 @ @
+            if (ubi->bgt_thread)
+                kthread_stop(ubi->bgt_thread);
+    }
+    if (config.mtd_ubi_fastmap)
+        cancel_work_sync(&ubi->fm_work);
+    ubi_debugfs_exit_dev(ubi);
+    uif_close(ubi);
+    ubi_wl_close(ubi);
+    ubi_free_internal_volumes(ubi);
+    vfree(ubi->vtbl);
+    -put_mtd_device(ubi->mtd);
+    vfree(ubi->peb_buf);
+    vfree(ubi->fm_buf);
+    ubi_msg(ubi, "mtd%d is detached", ubi->mtd->index);
+    -put_mtd_device(ubi->mtd);
```

put_device(&ubi->dev);
return 0;
}
--- linux-4.15.0.orig/drivers/mtd/ubi/debug.c
+++ linux-4.15.0/drivers/mtd/ubi/debug.c
@@ -405,9 +405,6 @@
{
struct ubi_device *ubi = s->private;

-if (*pos == 0)
-return SEQ_START_TOKEN;
-
if (*pos < ubi->peb_count)
return pos;

@@ -421,8 +418,6 @@
{
struct ubi_device *ubi = s->private;

-if (v == SEQ_START_TOKEN)
-return pos;
-(*pos)++;

if (*pos < ubi->peb_count)
@@ -444,11 +439,8 @@
int err;

int err = ubi_io_is_bad(ubi, *block_number);
if (err)
--- linux-4.15.0.orig/drivers/mtd/ubi/eba.c
+++ linux-4.15.0/drivers/mtd/ubi/eba.c
@@ -490,6 +490,86 @@
return err;
}
#endif CONFIG_MTD_UBI_FASTMAP
+/**
+ * check_mapping - check and fixup a mapping
+ * @ubi: UBI device description object

static int check_mapping(struct ubi_device *ubi, struct ubi_volume *vol, int lnum, int *pnum) {
    int err;
    struct ubi_vid_io_buf *vidb;

    if (!ubi->fast_attach) return 0;
    if (!vol->checkmap || test_bit(lnum, vol->checkmap)) return 0;
    vidb = ubi_alloc_vid_buf(ubi, GFP_NOFS);
    if (!vidb) return -ENOMEM;

    err = ubi_io_read_vid_hdr(ubi, *pnum, vidb, 0);
    if (err > 0 && err != UBI_IO_BITFLIPS) {
        int torture = 0;
        switch (err) {
            case UBI_IO_FF:
            case UBI_IO_FF_BITFLIPS:
            case UBI_IO_BAD_HDR:
            case UBI_IO_BAD_HDR_EBADMSG:
                break;
            default:
                ubi_assert(0);
        }
        if (err == UBI_IO_BAD_HDR_EBADMSG || err == UBI_IO_FF_BITFLIPS) torture = 1;
        switch (err) {
            case UBI_IO_FF:
            case UBI_IO_FF_BITFLIPS:
            case UBI_IO_BAD_HDR:
            case UBI_IO_BAD_HDR_EBADMSG:
                break;
            default:
                ubi_assert(0);
        }
        if (err == UBI_IO_BAD_HDR_EBADMSG || err == UBI_IO_FF_BITFLIPS)
            torture = 1;
        down_read(&ubi->fm_eba_sem);
    }
+vol->eba_tbl->entries[lnum].pnum = UBI_LEB_UNMAPPED;
+up_read(&ubi->fm_eba_sem);
+ubi_wl_put_peb(ubi, vol->vol_id, lnum, *pnum, torture);
+
+*pnum = UBI_LEB_UNMAPPED;
+} else if (err < 0) {
+ubi_err(ubi, "unable to read VID header back from PEB %i: %i",
+*pnum, err);
+
+goto out_free;
+}
+
+set_bit(lnum, vol->checkmap);
+err = 0;
+
+out_free:
+ubi_free_vid_buf(vidb);
+
+return err;
+
#else
+static int check_mapping(struct ubi_device *ubi, struct ubi_volume *vol, int lnum,
+  int *pnum)
+{
+return 0;
+}
+#endif

/**
 * ubi_eba_read_leb - read data.
 * @ubi: UBI device description object
 * @@ -522,7 +602,13 @@
 return err;

 pnum = vol->eba_tbl->entries[lnum].pnum;
 -if (pnum < 0) {
 +if (pnum >= 0) {
 +err = check_mapping(ubi, vol, lnum, &pnum);
 +if (err < 0)
 +goto out_unlock;
 +}
 +
 +if (pnum == UBI_LEB_UNMAPPED) {
 */
 *
 * The logical eraseblock is not mapped, fill the whole buffer
 * with 0xFF bytes. The exception is static volumes for which
 * @@ -931,6 +1017,12 @@
pnum = vol->eba_tbl->entries[lnum].pnum;
if (pnum >= 0) {
    err = check_mapping(ubi, vol, lnum, &pnum);
    if (err < 0)
        goto out;
}

if (pnum >= 0) {
    dbg_eba("write %d bytes at offset %d of LEB %d:%d, PEB %d",
            len, offset, vol_id, lnum, pnum);

--- linux-4.15.0.orig/drivers/mtd/ubi/fastmap-wl.c
+++ linux-4.15.0/drivers/mtd/ubi/fastmap-wl.c
@@ -362,7 +362,6 @@
{
    int i;

    -flush_work(&ubi->fm_work);
    return_unused_pool_pebs(ubi, &ubi->fm_pool);
    return_unused_pool_pebs(ubi, &ubi->fm_wl_pool);

--- linux-4.15.0.orig/drivers/mtd/ubi/fastmap.c
+++ linux-4.15.0/drivers/mtd/ubi/fastmap.c
@@ -73,7 +73,7 @@
    return 0;
    for (pnum = 0; pnum < ubi->peb_count; pnum++) {
        -if (test_bit(pnum, seen) && ubi->lookuptbl[pnum]) {
        +if (!test_bit(pnum, seen) && ubi->lookuptbl[pnum]) {
            ubi_err(ubi, "self-check failed for PEB %d, fastmap didn't see it", pnum);
            ret = -EINVAL;
        }
@@ -1101,6 +1101,26 @@
        goto out;
    }

+-int ubi_fastmap_init_checkmap(struct ubi_volume *vol, int leb_count)
+-{
+    struct ubi_device *ubi = vol->ubi;
+    +if (!ubi->fast_attach)
+        return 0;
+    +vol->checkmap = kcalloc(BITS_TO_LONGS(leb_count), sizeof(unsigned long),
+                            GFP_KERNEL);
+    +if (!vol->checkmap)
+        return -ENOMEM;
+    +}
+return 0;
+
+void ubi_fastmap_destroy_checkmap(struct ubi_volume *vol)
+{
+kfree(vol->checkmap);
+
+/**
 * ubi_write_fastmap - writes a fastmap.
 * @ubi: UBI device object
 *
 struct rb_node *tmp_rb;
 int ret, i, j, free_peb_count, used_peb_count, vol_count;
 int scrub_peb_count, erase_peb_count;
 unsigned long *seen_pebs = NULL;
 unsigned long *seen_pebs;

 fm_raw = ubi->fm_buf;
 memset(ubi->fm_buf, 0, ubi->fm_size);

dvbuf = new_fm_vbuf(ubi, UBI_FM_DATA_VOLUME_ID);
 if (!dvbuf) {
 ret = -ENOMEM;
 -goto out_kfree;
 +goto out_free_avbuf;
 }

 avhdr = ubi_get_vid_hdr(avbuf);

 seen_pebs = init_seen(ubi);
 if (IS_ERR(seen_pebs)) {
 ret = PTR_ERR(seen_pebs);
 -goto out_kfree;
 +goto out_free_dvbuf;
 }

 spin_lock(&ubi->volumes_lock);

 ret = ubi_io_write_vid_hdr(ubi, new_fm->e[0]->pnum, avbuf);
 if (ret) {
 ubi_err(ubi, "unable to write vid_hdr to fastmap SB!");
 -goto out_kfree;
 +goto out_free_seen;
 }

 for (i = 0; i < new_fm->used_blocks; i++) {


if (ret) {
    ubi_err(ubi, "unable to write vid_hdr to PEB %i!",
    new_fm->e[i]->pnum);
    goto out_kfree;
    +goto out_free_seen;
} }

@@ -1350,7 +1370,7 @@
if (ret) {
    ubi_err(ubi, "unable to write fastmap to PEB %i!",
    new_fm->e[i]->pnum);
-    goto out_kfree;
+    goto out_free_seen;
} }

@@ -1360,10 +1380,13 @@
ret = self_check_seen(ubi, seen_pebs);
    dbg_bld("fastmap written!");

-out_kfree:
    -ubi_free_vid_buf(avbuf);
    -ubi_free_vid_buf(dvbuf);
+out_free_seen:
    free_seen(seen_pebs);
+out_free_dvbuf:
+    +ubi_free_vid_buf(dvbuf);
+out_free_avbuf:
+    +ubi_free_vid_buf(avbuf);
+    out:
    return ret;
} }
--- linux-4.15.0.orig/drivers/mtd/ubi/kapi.c
+++ linux-4.15.0/drivers/mtd/ubi/kapi.c
@@ -227,9 +227,9 @@
out_free:
    kfree(desc);
    out_put_ubi;
    -ubi_put_device(ubi);
-    ubi_err(ubi, "cannot open device %d, volume %d, error %d",
-    ubi_num, vol_id, err);
+    +ubi_put_device(ubi);
+    return ERR_PTR(err);
} }
EXPORT_SYMBOL_GPL(ubi_open_volume);
--- linux-4.15.0.orig/drivers/mtd/ubi/ubi.h
+++ linux-4.15.0/drivers/mtd/ubi/ubi.h
@@ -334,6 +334,9 @@
  *
  * @changing_leb: %1 if the atomic LEB change ioctl command is in progress
  * @direct_writes: %1 if direct writes are enabled for this volume
  *
  + * @checkmap: bitmap to remember which PEB->LEB mappings got checked,
  + * protected by UBI LEIB lock tree.
  + *
  * The @corrupted field indicates that the volume's contents is corrupted.
  * Since UBI protects only static volumes, this field is not relevant to
  * dynamic volumes - it is user's responsibility to assure their data
@@ -377,6 +380,10 @@
  unsigned int updating:1;
  unsigned int changing_leb:1;
  unsigned int direct_writes:1;
  +
  +#ifdef CONFIG_MTD_UBI_FASTMAP
  +unsigned long *checkmap;
  +#endif
  */

/**
@@ -965,8 +972,12 @@
  int ubi_update_fastmap(struct ubi_device *ubi);
  int ubi_scan_fastmap(struct ubi_device *ubi, struct ubi_attach_info *ai,
       struct ubi_attach_info *scan_ai);
  +int ubi_fastmap_init_checkmap(struct ubi_volume *vol, int leb_count);
  +void ubi_fastmap_destroy_checkmap(struct ubi_volume *vol);
  +#else
  static inline int ubi_update_fastmap(struct ubi_device *ubi) { return 0; }
  +#static inline int ubi_fastmap_init_checkmap(struct ubi_volume *vol, int leb_count) { return 0; }
  +#static inline void ubi_fastmap_destroy_checkmap(struct ubi_volume *vol) {} 
  +#endif
 */

/* block.c */
--- linux-4.15.0.orig/drivers/mtd/ubi/vmt.c
+++ linux-4.15.0/drivers/mtd/ubi/vmt.c
@@ -139,6 +139,7 @@
  struct ubi_volume *vol = container_of(dev, struct ubi_volume, dev);

  ubi_eba_replace_table(vol, NULL);
  +ubi_fastmap_destroy_checkmap(vol);
  kfree(vol);
 }
/* Make volume "available" before it becomes accessible via sysfs */
spin_lock(&ubi->volumes_lock);
ubi->volumes[vol_id] = vol;
ubi->vol_count += 1;
spin_unlock(&ubi->volumes_lock);

/* Register character device for the volume */
cdev_init(&vol->cdev, &ubi_vol_cdev_operations);
vol->cdev.owner = THIS_MODULE;
if (err)
goto out_sysfs;

spin_lock(&ubi->volumes_lock);
ubi->volumes[vol_id] = vol;
ubi->vol_count += 1;
spin_unlock(&ubi->volumes_lock);

ubi_volume_notify(ubi, vol, UBI_VOLUME_ADDED);
self_check_volumes(ubi);
return err;
@@ -298,11 +305,6 @@
if (err)
goto out_sysfs;

spin_lock(&ubi->volumes_lock);
ubi->volumes[vol_id] = NULL;
ubi->vol_count -= 1;
spin_unlock(&ubi->volumes_lock);

ubi_eba_destroy_table(eba_tbl);
out_acc:
spin_lock(&ubi->volumes_lock);

--- linux-4.15.0.orig/drivers/mtd/ubi/vtbl.c
+++ linux-4.15.0/drivers/mtd/ubi/vtbl.c
@@ -534,7 +534,7 @@
 const struct ubi_attach_info *ai,
 const struct ubi_vtbl_record *vtbl)
 {
- int i, reserved_pebs = 0;
+ int i, err, reserved_pebs = 0;
 struct ubi_ainf_volume *av;
 struct ubi_volume *vol;

 @@ -579,6 +579,16 @@
 reserved_pebs += vol->reserved_pebs;

 /*
* We use ubi->peb_count and not vol->reserved_pebs because we want to keep the code simple. Otherwise we'd have to resize/check the bitmap upon volume resize too. Allocating a few bytes more does not hurt.

```c
+ err = ubi_fastmap_init_checkmap(vol, ubi->peb_count);
+ if (err)
+ return err;
+ /*
+ * In case of dynamic volume UBI knows nothing about how many data is stored there. So assume the whole volume is used.
+ */
@@ -645,6 +655,9 @@
    reserved_pebs += vol->reserved_pebs;
    ubi->vol_count += 1;
    vol->ubi = ubi;
+ err = ubi_fastmap_init_checkmap(vol, UBI_LAYOUT_VOLUME_EBS);
+ if (err)
+ return err;
```

if (reserved_pebs > ubi->avail_pebs) {
    ubi_errno(ubi, "not enough PEBs, required %d, available %d",
    @ @ -849,6 +862,7 @@
    out_free:
    vfree(ubi->vtbl);
    for (i = 0; i < ubi->vtbl_slots + UBI_INT_VOL_COUNT; i++) {
        ubi_fastmap_destroy_checkmap(ubi->volumes[i]);
        kfree(ubi->volumes[i]);
        ubi->volumes[i] = NULL;
    }
--- linux-4.15.0.orig/drivers/mtd/ubi/wl.c
+++ linux-4.15.0/drivers/mtd/ubi/wl.c
@@ -1478,6 +1478,19 @@
!ubi->thread_enabled || ubi_dbg_is_bgt_disabled(ubi)) {
    set_current_state(TASK_INTERRUPTIBLE);
    spin_unlock(&ubi->wl_lock);
+ /*
+ * Check kthread_should_stop() after we set the task state to guarantee that we either see the stop bit and exit or the task state is reset to runnable such that it's not scheduled out indefinitely and detects the stop bit at kthread_should_stop().
+ */
+ if (kthread_should_stop()) {
+     set_current_state(TASK_RUNNING);
+     break;
```
schedule();
continue;
}
@@ -1505,6 +1518,7 @@
}
}

dbg_wl("background thread \"%s\" is killed", ubi->bgt_name);
+ubi->thread_enabled = 0;
return 0;
}

@@ -1514,9 +1528,6 @@
*/
static void shutdown_work(struct ubi_device *ubi)
{
-#ifdef CONFIG_MTD_UBI_FASTMAP
-flush_work(&ubi->fm_work);
-#endif
while (!list_empty(&ubi->works)) {
struct ubi_work *wrk;

@@ -1529,6 +1540,46 @@
/**
 * erase_aeb - erase a PEB given in UBI attach info PEB
 * @ubi: UBI device description object
 * @aeb: UBI attach info PEB
 * @sync: If true, erase synchronously. Otherwise schedule for erasure
 * @*/
+static int erase_aeb(struct ubi_device *ubi, struct ubi_ainf_peb *aeb, bool sync)
+{
+struct ubi_wl_entry *e;
+int err;
+
+e = kmem_cache_alloc(ubi_wl_entry_slab, GFP_KERNEL);
+if (!e)
+return -ENOMEM;
+
+e->pnum = aeb->pnum;
+e->ec = aeb->ec;
+ubi->lookuptbl[e->pnum] = e;
+
+if (sync) {
+err = sync_erase(ubi, e, false);
+if (err)
goto out_free;
+
+wl_tree_add(e, &ubi->free);
+ubi->free_count++;
+} else {
+err = schedule_erase(ubi, e, aeb->vol_id, aeb->lnum, 0, false);
+if (err)
+goto out_free;
+
+return 0;
+
+out_free:
+wl_entry_destroy(ubi, e);
+
+return err;
+
*/
**
* ubi_wl_init - initialize the WL sub-system using attaching information.
* @ubi: UBI device description object
* @ai: attaching information
@@ -1566,18 +1617,10 @@
list_for_each_entry_safe(aeb, tmp, &ai->erase, u.list) {
    cond_resched();

    e = kmem_cache_alloc(ubi_wl_entry_slab, GFP_KERNEL);
    -if (!e)
     +err = erase_aeb(ubi, aeb, false);
    +if (err)
          goto out_free;

    -e->pnum = aeb->pnum;
    -e->ec = aeb->ec;
    -ubi->lookuptbl[e->pnum] = e;
    -if (schedule_erase(ubi, e, aeb->vol_id, aeb->lnum, 0, false)) {
    -wl_entry_destroy(ubi, e);
    -goto out_free;
    -}

    found_pebs++;
    }

@@ -1585,8 +1628,10 @@
    cond_resched();

    e = kmem_cache_alloc(ubi_wl_entry_slab, GFP_KERNEL);
    -if (!e)
if (!e) {
    err = -ENOMEM;
    goto out_free;
}

e->pnum = aeb->pnum;
e->ec = aeb->ec;
@@ -1605,8 +1650,10 @@
    cond_resched();

e = kmem_cache_alloc(ubi_wl_entry_slab, GFP_KERNEL);
    if (!e)
+    if (!e) {
+        err = -ENOMEM;
            goto out_free;
+    }

e->pnum = aeb->pnum;
e->ec = aeb->ec;
@@ -1635,6 +1682,8 @@
    ubi_assert(!ubi->lookuptbl[e->pnum] == false;
+*/
/*
 * Usually old Fastmap PEBs are scheduled for erasure
 * and we don’t have to care about them but if we face
@@ -1644,18 +1693,21 @@
    if (ubi->lookuptbl[aeb->pnum])
        continue;
-
e = kmem_cache_alloc(ubi_wl_entry_slab, GFP_KERNEL);
-    if (!e)
-        goto out_free;
+/*
+ * The fastmap update code might not find a free PEB for
+ * writing the fastmap anchor to and then reuses the
+ * current fastmap anchor PEB. When this PEB gets erased
+ * and a power cut happens before it is written again we
+ * must make sure that the fastmap attach code doesn’t
+ * find any outdated fastmap anchors, hence we erase the
+ * outdated fastmap anchor PEBs synchronously here.
+ */
+    if (aeb->vol_id == UBI_FM_SB_VOLUME_ID)
+        sync = true;

-e->pnum = aeb->pnum;
-e->ec = aeb->ec;
-ubi_assert(!ubi->lookuptbl[e->pnum]);
-ubi->lookuptbl[e->pnum] = e;
-if (schedule_erase(ubi, e, aeb->vol_id, aeb->lnum, 0, false)) {
-  wl_entry_destroy(ubi, e);
+err = erase_aeb(ubi, aeb, sync);
+if (err)
+  goto out_free;
-
}

found_pebs++;
--- linux-4.15.0.orig/drivers/net/Kconfig
+++ linux-4.15.0/drivers/net/Kconfig
@@ -149,7 +149,6 @@
config IPVLAN
  tristate "IP-VLAN support"
  depends on INET
-    depends on IPV6
-    depends on NETFILTER
-    depends on NET_L3_MASTER_DEV
---help---
@@ -197,8 +196,8 @@
config GENEVE
  tristate "Generic Network Virtualization Encapsulation"
  -  depends on INET && NET_UDP_TUNNEL
  -  select NET_IP_TUNNEL
  +  depends on INET
  +  select NET_UDP_TUNNEL
     select GRO.Cells
---help---
  This allows one to create geneve virtual interfaces that provide
@@ -212,8 +211,8 @@
config GTP
 tristate "GPRS Tunneling Protocol datapath (GTP-U)"
-depends on INET && NET_UDP_TUNNEL
-select NET_IP_TUNNEL
+depends on INET
+select NET_UDP_TUNNEL
  ---help---
  This allows one to create gtp virtual interfaces that provide
  the GPRS Tunneling Protocol datapath (GTP-U). This tunneling protocol
--- linux-4.15.0.orig/drivers/net/Makefile
+++ linux-4.15.0/drivers/net/Makefile
@@ -41,7 +41,7 @@
obj-$(CONFIG_CAIF) += caif/
obj-$(CONFIG_CAN) += can/
obj-$(CONFIG_ETRAX_ETHERNET) += cris/
-obj-$(CONFIG_NET_DSA) += dsa/
+obj-y += dsa/
obj-$(CONFIG_ETHERNET) += ethernet/
obj-$(CONFIG_FDDI) += fddi/
obj-$(CONFIG_HIPPI) += hippi/
--- linux-4.15.0.orig/drivers/net/appletalk/cops.c
+++ linux-4.15.0/drivers/net/appletalk/cops.c
@@ -325,6 +325,8 @@
 break;
 }
+	dev->base_addr = ioaddr;
+
/* Reserve any actual interrupt. */
if (dev->irq) {
    retval = request_irq(dev->irq, cops_interrupt, 0, dev->name, dev);
@@ -332,8 +334,6 @@
go to err_out;
 }
-dev->base_addr = ioaddr;
-
lp = netdev_priv(dev);
spin_lock_init(&lp->lock);
--- linux-4.15.0.orig/drivers/net/ipddp.c
+++ linux-4.15.0/drivers/net/ipddp.c
@@ -283,8 +283,12 @@
case SIOCFINDIPDDPRT:
    spin_lock_bh(&ipddp_route_lock);
    rp = __ipddp_find_route(&rcp);
-    if (rp)
-        memcpy(&rcp2, rp, sizeof(rcp2));
+    if (rp) {
+        memset(&rcp2, 0, sizeof(rcp2));
+        rcp2.ip    = rp->ip;
+        rcp2.at    = rp->at;
+        rcp2.flags = rp->flags;
+    }
    spin_unlock_bh(&ipddp_route_lock);

if (rp) {
--- linux-4.15.0.orig/drivers/net/arcnet/arcnet.c
+++ linux-4.15.0/drivers/net/arcnet/arcnet.c
@@ -1063,31 +1063,34 @@
 static void arcnet_rx(struct net_device *dev, int bufnum)
struct arcnet_local *lp = netdev_priv(dev);
-struct archdr pkt;
+union {
+    struct archdr pkt;
+    char buf[512];
+} rxdata;
struct arc_rfc1201 *soft;
int length, ofs;

-soft = &pkt.soft.rfc1201;
+soft = &rxdata.pkt.soft.rfc1201;

-lp->hw.copy_from_card(dev, bufnum, 0, &pkt, ARC_HDR_SIZE);
-if (pkt.hard.offset[0]) {
-    ofs = pkt.hard.offset[0];
+lp->hw.copy_from_card(dev, bufnum, 0, &rxdata.pkt, ARC_HDR_SIZE);
+if (rxdata.pkt.hard.offset[0]) {
+    ofs = rxdata.pkt.hard.offset[0];
    length = 256 - ofs;
} else {
-    ofs = pkt.hard.offset[1];
+    ofs = rxdata.pkt.hard.offset[1];
+length = 512 - ofs;
    }

/* get the full header, if possible */
-if (sizeof(pkt.soft) <= length) {
-    lp->hw.copy_from_card(dev, bufnum, ofs, soft, sizeof(pkt.soft));
+if (sizeof(rxdata.pkt.soft) <= length) {
+    lp->hw.copy_from_card(dev, bufnum, ofs, soft, sizeof(rxdata.pkt.soft));
    } else {
-        memset(&pkt.soft, 0, sizeof(pkt.soft));
+        memset(&rxdata.pkt.soft, 0, sizeof(rxdata.pkt.soft));
        lp->hw.copy_from_card(dev, bufnum, ofs, soft, length);
    }

arc_printk(D_DURING, dev, "Buffer #\d: received packet from %02Xh to %02Xh (%d+4 bytes)\n",
-    bufnum, pkt.hard.source, pkt.hard.dest, length);
+    bufnum, rxdata.pkt.hard.source, rxdata.pkt.hard.dest, length);

dev->stats.rx_packets++;
dev->stats.rx_bytes += length + ARC_HDR_SIZE;
@@ -1096,13 +1099,13 @@
if (arc_proto_map[soft->proto]->is_ip) {
    if (BUGLVL(D_PROTO)) {
        struct ArcProto
-        *oldp = arc_proto_map[lp->default_proto[pkt.hard.source]],
+        *oldp = arc_proto_map[lp->default_proto[pkt.hard.source]],
oldp = arc_proto_map[lp->default_proto[rxdata.pkt.hard.source]],
newp = arc_proto_map[soft->proto];

if (oldp != newp) {
    arc_printk(D_PROMO, dev,
       "got protocol %02Xh; encap for host %02Xh is now '%c' (was '%c')\n",
       - soft->proto, pkt.hard.source,
       + soft->proto, rxdata.pkt.hard.source,
       newp->suffix, oldp->suffix);
}
}
@@ -1111,10 +1114,10 @@
lp->default_proto[0] = soft->proto;
/* in striking contrast, the following isn't a hack. */
-lp->default_proto[pkt.hard.source] = soft->proto;
+lp->default_proto[rxd_data.pkt.hard.source] = soft->proto;
}
/* call the protocol-specific receiver. */
-arc_proto_map[soft->proto]->rx(dev, bufnum, &pkt, length);
+arc_proto_map[soft->proto]->rx(dev, bufnum, &rxdata.pkt, length);
}

static void null_rx(struct net_device *dev, int bufnum,
--- linux-4.15.0.orig/drivers/net/bonding/bond_3ad.c
+++ linux-4.15.0/drivers/net/bonding/bond_3ad.c
@@ -2086,6 +2086,9 @@
aggregator->aggregator_identifier);
/* Tell the partner that this port is not suitable for aggregation */
+port->actor_oper_port_state &= ~AD_STATE_SYNCHRONIZATION;
+port->actor_oper_port_state &= ~AD_STATE_COLLECTING;
+port->actor_oper_port_state &= ~AD_STATE_DISTRIBUTING;
+port->actor_oper_port_state &= ~AD_STATE_AGGREGATION;
__update_lacpdu_from_port(port);
ad_lacpdu_send(port);
--- linux-4.15.0.orig/drivers/net/bonding/bond_alb.c
+++ linux-4.15.0/drivers/net/bonding/bond_alb.c
@@ -71,11 +71,6 @@
};
#pragma pack()

-static inline struct arp_pkt *arp_pkt(const struct sk_buff *skb)
-{
-    return (struct arp_pkt *)skb_network_header(skb);
-}

/* Forward declaration */
static void alb_send_learning_packets(struct slave *slave, u8 mac_addr[],
    bool strict_match);
@@ -450,7 +445,7 @@
{
  int i;

-  if (!client_info->slave)
+  if (!client_info->slave || !is_valid_ether_addr(client_info->mac_dst))
    return;

  for (i = 0; i < RLB_ARP_BURST_SIZE; i++) {
@@ -574,10 +569,11 @@
    spin_unlock(&bond->mode_lock);
  }

-  static struct slave *rlb_choose_channel(struct sk_buff *skb, struct bonding *bond)
+  static struct slave *rlb_choose_channel(struct sk_buff *skb,
+                                             struct bonding *bond,
+                                             const struct arp_pkt *arp)
  {
    struct alb_bond_info *bond_info = &(BOND_ALB_INFO(bond));
-    struct arp_pkt *arp = arp_pkt(skb);
+    struct slave *assigned_slave, *curr_active_slave;
+    struct rlb_client_info *client_info;
    u32 hash_index = 0;
@@ -674,8 +670,12 @@
  */
  static struct slave *rlb_arp_xmit(struct sk_buff *skb, struct bonding *bond)
  {
    -struct arp_pkt *arp = arp_pkt(skb);
+    struct slave *tx_slave = NULL;
+    if (!pskb_network_may_pull(skb, sizeof(*arp)))
+      return NULL;
+    arp = (struct arp_pkt *)skb_network_header(skb);

    /* Don't modify or load balance ARPs that do not originate locally
     * (e.g., arrive via a bridge).
@@ -685,7 +685,7 @@
      if (arp->op_code == htons(ARPOP_REPLY)) {
      /* the arp must be sent on the selected rx channel */
-      tx_slave = rlb_choose_channel(skb, bond);
+      tx_slave = rlb_choose_channel(skb, bond, arp);
      if (tx_slave)
        bond_hw_addr_copy(arp->mac_src, tx_slave->dev->addr, tx_slave->dev->addr_len);
* When the arp reply is received the entry will be updated
* with the correct unicast address of the client.
*/
-rlb_choose_channel(skb, bond);
+rlb_choose_channel(skb, bond, arp);

/* The ARP reply packets must be delayed so that
* they can cancel out the influence of the ARP request.
 skb->priority = TC_PRIO_CONTROL;
 skb->dev = slave->dev;

+netdev_dbg(slave->bond->dev,
+    "Send learning packet: dev %s mac %pM vlan %d
",
+    slave->dev->name, mac_addr, vid);
+
+if (vid)
   __vlan_hwaccel_put_tag(skb, vlan_proto, vid);

u8 *mac_addr = data->mac_addr;
struct bond_vlan_tag *tags;

-if (is_vlan_dev(upper) && vlan_get_encap_level(upper) == 0) {
  -if (strict_match &&
    - ether_addr_equal_64bits(mac_addr,
      - upper->dev_addr)) {
    +if (is_vlan_dev(upper) &&
    + bond->nest_level == vlan_get_encap_level(upper) - 1) {
    +if (upper->addr_assign_type == NET_ADDR_STOLEN) {
      alb_send_lp_vid(slave, mac_addr,
      vlan_dev_vlan_proto(upper),
      vlan_dev_vlan_id(upper));
    -} else if (!strict_match) {
    +} else {
      alb_send_lp_vid(slave, upper->dev_addr,
      vlan_dev_vlan_proto(upper),
      vlan_dev_vlan_id(upper));
  @ @ -1400.26 +1403.31 @ @
  bool do_tx_balance = true;
  u32 hash_index = 0;
  const u8 *hash_start = NULL;
  -struct ipv6hdr *ip6hdr;

  skb_reset_mac_header(skb);
  eth_data = eth_hdr(skb);
switch (ntohs(skb->protocol)) {
    case ETH_P_IP: {
        const struct iphdr *iph = ip_hdr(skb);
        +const struct iphdr *iph;

        if (ether_addr_equal_64bits(eth_data->h_dest, mac_bcast) ||
            (iph->daddr == ip_bcast) ||
            (iph->protocol == IPPROTO_IGMP)) {
            if (!pskb_network_may_pull(skb, sizeof(*iph))) {
                do_tx_balance = false;
                break;
            }
            if (iph->daddr == ip_bcast || iph->protocol == IPPROTO_IGMP) {
                do_tx_balance = false;
                break;
            }
        }
        hash_start = (char *)&(iph->daddr);
        hash_size = sizeof(iph->daddr);
    }
    break;
    case ETH_P_IPV6: {
        const struct ipv6hdr *ip6hdr;
        /* IPv6 doesn't really use broadcast mac address, but leave
         * that here just in case.
         */
        @@ -1436,7 +1444,11 @@
        break;
    }
    break;
    case ETH_P_IPV6: {
        const struct ipv6hdr *ip6hdr;
        +/* IPv6 doesn't really use broadcast mac address, but leave
        * that here just in case.
        */
        @@ -1446,17 +1458,26 @@
        break;
    }
    @@ -1446,17 +1458,26 @@
    break;
}

   .fromCharCode(*)(&(ipv6_hdr(skb)->daddr));
    hash_size = sizeof(ipv6_hdr(skb)->daddr);
}

    /* Additionally, DAD probes should not be tx-balanced as that
    * will lead to false positives for duplicate addresses and
    * prevent address configuration from working.
    */
    @@ -1446,17 +1458,26 @@
    break;
}

    -hash_start = (char *)&(ipv6_hdr(skb)->daddr);
    -hash_size = sizeof(ipv6_hdr(skb)->daddr);
hash_start = (char *)&ip6hdr->daddr;
hash_size = sizeof(ip6hdr->daddr);
break;

-case ETH_P_IPX:
-if (ipx_hdr(skb)->ipx_checksum != IPX_NO_CHECKSUM) {
+
+case ETH_P_IPX: {
+const struct ipxhdr *ipxhdr;
+
+if (pskb_network_may_pull(skb, sizeof(*ipxhdr))) {
+do_tx_balance = false;
+break;
+
+ipxhdr = (struct ipxhdr *)skb_network_header(skb);
+
+if (ipxhdr->ipx_checksum != IPX_NO_CHECKSUM) {
/* something is wrong with this packet */
do_tx_balance = false;
break;
}

-if (ipx_hdr(skb)->ipx_type != IPX_TYPE_NCP) {
+if (ipxhdr->ipx_type != IPX_TYPE_NCP) {
/* The only protocol worth balancing in
 * this family since it has an "ARP" like
 * mechanism
@@ -1465,9 +1486,11 @@
break;
}

+eth_data = eth_hdr(skb);
hash_start = (char *)eth_data->h_dest;
hash_size = ETH_ALEN;
break;
+
} case ETH_P_ARP:
do_tx_balance = false;
if (bond_info->rlb_enabled)
--- linux-4.15.0.orig/drivers/net/bonding/bond_main.c
+++ linux-4.15.0/drivers/net/bonding/bond_main.c
@@ -210,6 +210,7 @@
static void bond_slave_arr_handler(struct work_struct *work);
static bool bond_time_in_interval(struct bonding *bond, unsigned long last_act,
-int mod);
+static void bond_netdev_notify_work(struct work_struct *work);

/*----------------------------- General routines -----------------------------*/
```c
#define BOND_ENC_FEATURES (NETIF_F_HW_CSUM | NETIF_F_SG | 
                         NETIF_F_RXCSUM | NETIF_F_ALL_TSO)

#define BOND_MPLS_FEATURES (NETIF_F_HW_CSUM | NETIF_F_SG | 
                           NETIF_F_ALL_TSO)

static void bond_compute_features(struct bonding *bond) {
    unsigned int dst_release_flag = IFF_XMIT_DST_RELEASE | 
                                     IFF_XMIT_DST_RELEASE_PERM;
    netdev_features_t vlan_features = BOND_VLAN_FEATURES;
    netdev_features_t enc_features = BOND_ENC_FEATURES;
    +netdev_features_t mpls_features = BOND_MPLS_FEATURES;
    struct net_device *bond_dev = bond->dev;
    struct list_head *iter;
    struct slave *slave;

    if (!bond_has_slaves(bond))
        goto done;
    vlan_features &= NETIF_F_ALL_FOR_ALL;
    +mpls_features &= NETIF_F_ALL_FOR_ALL;

    bond_for_each_slave(bond, slave, iter) {
        vlan_features = netdev_increment_features(vlan_features,
                                             slave->dev->hard_header_len > max_hard_header_len)
        enc_features = netdev_increment_features(enc_features,
                                             BOND_ENC_FEATURES);
        +mpls_features = netdev_increment_features(mpls_features,
                                             BOND_MPLS_FEATURES);
        +dst_release_flag &= slave->dev->priv_flags;
        if (slave->dev->hard_header_len > max_hard_header_len)
            max_hard_header_len = slave->dev->hard_header_len;
    }

done:
    bond_dev->vlan_features = vlan_features;
    bond_dev->hw_enc_features = enc_features | NETIF_F_GSO_ENCAP_ALL;
    bond_dev->hw_enc_features = enc_features | NETIF_F_GSO_ENCAP_ALL |
    +NETIF_F_HW_VLAN_CTAG_TX |
    +NETIF_F_HW_VLAN_STAG_TX |
    +bond_dev->mpls_features = mpls_features;
    bond_dev->gso_max_segs = gso_max_segs;
    netif_set_gso_max_size(bond_dev, gso_max_size);
}
```
bond_dev->type = slave_dev->type;
bond_dev->hard_header_len = slave_dev->hard_header_len;
bond_dev->needed_headroom = slave_dev->needed_headroom;
bond_dev->addr_len = slave_dev->addr_len;

memcpy(bond_dev->broadcast, slave_dev->broadcast,

/* don't change skb->dev for link-local packets */
@if (is_link_local_ether_addr(eth_hdr(skb)->h_dest))
-return RX_HANDLER_PASS;
-@)
@if (bond_should_deliver_exact_match(skb, slave, bond))
+ /*
+ * For packets determined by bond_should_deliver_exact_match() call to
+ * be suppressed we want to make an exception for link-local packets.
+ * This is necessary for e.g. LLDP daemons to be able to monitor
+ * inactive slave links without being forced to bind to them
+ * explicitly.
+ *
+ * At the same time, packets that are passed to the bonding master
+ * (including link-local ones) can have their originating interface
+ * determined via PACKET_ORIGDEV socket option.
+ */
+if (bond_should_deliver_exact_match(skb, slave, bond)) {
+if (is_link_local_ether_addr(eth_hdr(skb)->h_dest))
+return RX_HANDLER_PASS;
+return RX_HANDLER_EXACT;
+
skb->dev = bond->dev;

slave->dev->flags &= ~IFF_SLAVE;

-static struct slave *bond_alloc_slave(struct bonding *bond)
+static void slave_kobj_release(struct kobject *kobj)
+{
+struct slave *slave = to_slave(kobj);
+struct bonding *bond = bond_get_bond_by_slave(slave);
+cancel_delayed_work_sync(&slave->notify_work);
+if (BOND_MODE(bond) == BOND_MODE_8023AD)
+kfree(SLAVE_AD_INFO(slave));
+
+kfree(slave);
+
+static struct kobj_type slave_ktype = {
+.release = slave_kobj_release,
+#ifdef CONFIG_SYSFS
+.sysfs_ops = &slave_sysfs_ops,
+#endif
+};
+
+static int bond_kobj_init(struct slave *slave)
+{
+int err;
+
+err = kobject_init_and_add(&slave->kobj, &slave_ktype,
+  &(slave->dev->dev.kobj), "bonding_slave");
+if (err)
+kobject_put(&slave->kobj);
+
+return err;
+}
+
+static struct slave *bond_alloc_slave(struct bonding *bond,
+  struct net_device *slave_dev)
+
  {
  struct slave *slave = NULL;

  if (!slave)
  return NULL;

  slave->bond = bond;
  slave->dev = slave_dev;
  INIT_DELAYED_WORK(&slave->notify_work, bond_netdev_notify_work);
+
+if (bond_kobj_init(slave))
+return NULL;
+
+if (BOND_MODE(bond) == BOND_MODE_8023AD) {
SLAVE_AD_INFO(slave) = kzalloc(sizeof(struct ad_slave_info),
  GFP_KERNEL);
if (!SLAVE_AD_INFO(slave)) {
-  kfree(slave);
+  kobject_put(&slave->kobj);
return NULL;
  }


static void bond_free_slave(struct slave *slave)
{
    struct bonding *bond = bond_get_bond_by_slave(slave);

    if (BOND_MODE(bond) == BOND_MODE_8023AD)
        kfree(SLAVE_AD_INFO(slave));
    kfree(slave);
    return slave;
}

static void bond_fill_ifbond(struct bonding *bond, struct ifbond *info)
{
    info->link_failure_count = slave->link_failure_count;
}

static void bond_netdev_notify(struct net_device *dev, struct netdev_bonding_info *info)
{
    rtnl_lock();
    netdev_bonding_info_change(dev, info);
    rtnl_unlock();
}

static void bond_netdev_notify_work(struct work_struct *_work)
{
    struct slave *slave = container_of(_work, struct slave, notify_work.work);
    if (rtnl_trylock()) {
        struct netdev_bonding_info binfo;
        bond_netdev_notify(slave->dev, &binfo.slave);
        bond_fill_ifbond(slave->bond, &binfo.master);
        netdev_bonding_info_change(slave->dev, &binfo);
        rtnl_unlock();
    } else {
        queue_delayed_work(slave->bond->wq, &slave->notify_work, 1);
    }
}
void bond_queue_slave_event(struct slave *slave)
{
-struct bonding *bond = slave->bond;
-struct netdev_notify_work *nnw = kzalloc(sizeof(*nnw), GFP_ATOMIC);
-
-if (!nnw)
-return;
-
-dev_hold(slave->dev);
-nnw->dev = slave->dev;
-bond_fill_ifslave(slave, &nnw->bonding_info.slave);
-bond_fill_ifbond(bond, &nnw->bonding_info.master);
-INIT_DELAYED_WORK(&nnw->work, bond_netdev_notify_work);
-
-queue_delayed_work(slave->bond->wq, &nnw->work, 0);
+queue_delayed_work(slave->bond->wq, &slave->notify_work, 0);
}

void bond_lower_state_changed(struct slave *slave)
@ @ -1463,14 +1506,12 @@
    bond->dev->addr_assign_type == NET_ADDR_RANDOM)
-bond_set_dev_addr(bond->dev, slave_dev);
+
-new_slave = bond_alloc_slave(bond);
+new_slave = bond_alloc_slave(bond, slave_dev);
      if (!new_slave) {
          res = -ENOMEM;
          goto err_undo_flags;
      }
-
-new_slave->bond = bond;
-subclassSlave = new_slave;

/* Set the new_slave's queue_id to be zero. Queue ID mapping
   * is set via sysfs or module option if desired.
   */
@@ -1528,44 +1569,11 @@
-goto err_close;

/* If the mode uses primary, then the following is handled by
   * bond_change_active_slave().
   */
@@ -1528,44 +1569,11 @@
      if (!bond_uses_primary(bond)) {
          /* set promiscuity level to new slave */
          -res = dev_set_promiscuity(slave_dev, 1);
          +res = dev_set_promiscuity(new_slave, 1);
          goto err_close;
-if (res)
  -goto err_close;
-}
-
-/* set allmulti level to new slave */
-if (bond_dev->flags & IFF_ALLMULTI) {
  -res = dev_set_allmulti(slave_dev, 1);
  -if (res)
    -goto err_close;
  -}
-
-netif_addr_lock_bh(bond_dev);
-
-dev_mc_sync_multiple(slave_dev, bond_dev);
-dev_uc_sync_multiple(slave_dev, bond_dev);
-
-netif_addr_unlock_bh(bond_dev);
-}
-
-if (BOND_MODE(bond) == BOND_MODE_8023AD) {
  -u8 lacpdu_multicast[ETH_ALEN] = MULTICAST_LACPDU_ADDR;
  -
  -dev_mc_add(slave_dev, lacpdu_multicast);
  -}
-
-res = vlan_vids_add_by_dev(slave_dev, bond_dev);
-if (res) {
  -netdev_err(bond_dev, "Couldn't add bond vlan ids to %s\n",
    -slave_dev->name);
  -goto err_close;
  +goto err_hwaddr_unsync;
  -}

prev_slave = bond_last_slave(bond);
@@ -1693,8 +1701,7 @@
} /* switch(bond_mode) */

#ifdef CONFIG_NET POLL_CONTROLLER
-slide_dev->npinfo = bond->dev->npinfo;
-if (slave_dev->npinfo) {
  +if (bond->dev->npinfo) {
    if (slave_enable_netpoll(new_slave)) {
      netdev_info(bond_dev, "master_dev is using netpoll, but new slave device does not support netpoll\n"));
      res = -EBUSY;
    @@ -1693,6 +1701,7 @@
      goto err_upper_unlink;
    }

#ifdef CONFIG_NET POLL_CONTROLLER
-slide_dev->npinfo = bond->dev->npinfo;
-if (slave_dev->npinfo) {
  +if (bond->dev->npinfo) {
    if (slave_enable_netpoll(new_slave)) {
      netdev_info(bond_dev, "master_dev is using netpoll, but new slave device does not support netpoll\n"));
      res = -EBUSY;
    @@ -1693,6 +1701,7 @@
      goto err_upper_unlink;
    }


bond->nest_level = dev_get_nest_level(bond_dev) + 1;
+
/*! If the mode uses primary, then the following is handled by */
+ * bond_change_active_slave().
+ */
+if (!bond_uses_primary(bond)) {
+/*! set promiscuity level to new slave */
+if (bond_dev->flags & IFF_PROMISC) {
+res = dev_set_promiscuity(slave_dev, 1);
+if (res)
+goto err_sysfs_del;
+
+/*! set allmulti level to new slave */
+if (bond_dev->flags & IFF_ALLMULTI) {
+res = dev_set_allmulti(slave_dev, 1);
+if (res) {
+if (bond_dev->flags & IFF_PROMISC)
+dev_set_promiscuity(slave_dev, -1);
+goto err_sysfs_del;
+
+netif_addr_lock_bh(bond_dev);
+dev_mc_sync_multiple(slave_dev, bond_dev);
+dev_uc_sync_multiple(slave_dev, bond_dev);
+netif_addr_unlock_bh(bond_dev);
+
+if (BOND_MODE(bond) == BOND_MODE_8023AD) {
+/*! add lacpdu mc addr to mc list */
+u8 lacpdu_multicast[ETH_ALEN] = MULTICAST_LACPDU_ADDR;
+
+dev_mc_add(slave_dev, lacpdu_multicast);
+
++bond->slave_cnt;
+bond_compute_features(bond);
+bond_set_carrier(bond);
@@ -1738,6 +1781,7 @@
if (bond_mode_uses_xmit_hash(bond))
bond_update_slave_arr(bond, NULL);
+
+netdev_info(bond_dev, "Enslaving %s as %s interface with %s link\n", 
slave_dev->name, 
bond_is_active_slave(new_slave) ? "an active" : "a backup",
return 0;

/* Undo stages on error */
+err_sysfs_del:
+bond_sysfs_slave_del(new_slave);
+
err_upper_unlink:
bond_upper_dev_unlink(bond, new_slave);

@ @ -1755,9 +1802,6 @@
netdev_rx_handler_unregister(slave_dev);

err_detach:
-if (!bond_uses_primary(bond))
+bond_hw_addr_flush(bond_dev, slave_dev);
-
+vlan_vids_del_by_dev(slave_dev, bond_dev);
if (rcu_access_pointer(bond->primary_slave) == new_slave)
RCU_INIT_POINTER(bond->primary_slave, NULL);
@ @ -1771,8 +1815,13 @@
synchronize_rcu();
slave_disable_netpoll(new_slave);

+err_hwaddr_unsync:
+if (!bond_uses_primary(bond))
+bond_hw_addr_flush(bond_dev, slave_dev);
+
err_close:
-slave_dev->priv_flags &= ~IFF_BONDING;
+if (!netif_is_bond_master(slave_dev))
+slave_dev->priv_flags &= ~IFF_BONDING;
dev_close(slave_dev);

err_restore_mac:
@ @ -1793,7 +1842,7 @@
dev_set_mtu(slave_dev, new_slave->original_mtu);

err_free:
-bond_free_slave(new_slave);
+kobject_put(&new_slave->kobj);

err_undo_flags:
/* Enslave of first slave has failed and we need to fix master's mac */
@ @ -1916,6 +1965,9 @@
if (!bond_has_slaves(bond)) {
bond_set_carrier(bond);
eth_hw_addr_random(bond_dev);
+bond->nest_level = SINGLE_DEPTH_NESTING;
+} else {
+bond->nest_level = dev_get_nest_level(bond_dev) + 1;
}

unblock_netpoll_tx();
@@ -1975,9 +2027,10 @@
else
dev_set_mtu(slave_dev, slave->original_mtu);

-slave_dev->priv_flags &= ~IFF_BONDING;
+if (!netif_is_bond_master(slave_dev))
+slave_dev->priv_flags &= ~IFF_BONDING;

-bond_free_slave(slave);
+kobject_put(&slave->kobj);

return 0;
}
@@ -1998,7 +2051,8 @@
int ret;

ret = __bond_release_one(bond_dev, slave_dev, false, true);
-if (ret == 0 && !bond_has_slaves(bond)) {
+if (ret == 0 && !bond_has_slaves(bond) &&
 + bond_dev->reg_state != NETREG_UNREGISTERING) {
bond_dev->priv_flags |= IFF_DISABLE_NETPOLL;
netdev_info(bond_dev, "Destroying bond %s\n",
   bond_dev->name);
@@ -2045,8 +2099,7 @@
ignore_updelay = !rcu_dereference(bond->curr_active_slave);

bond_for_each_slave_rcu(bond, slave, iter) {
-slave->new_link = BOND_LINK_NOCHANGE;
-slave->link_new_state = slave->link;
+bond_propose_link_state(slave, BOND_LINK_NOCHANGE);

link_state = bond_check_dev_link(bond, slave->dev, 0);
@@ -2082,7 +2135,7 @@
}

if (slave->delay <= 0) {
-slave->new_link = BOND_LINK_DOWN;
+bond_propose_link_state(slave, BOND_LINK_DOWN);
commit++;
continue;
}
slave->delay = 0;

if (slave->delay <= 0) {
    -slave->new_link = BOND_LINK_UP;
    +bond_propose_link_state(slave, BOND_LINK_UP);
    commit++;
    ignore_updelay = false;
    continue;
}

struct slave *slave, *primary;

bond_for_each_slave(bond, slave, iter) {
    -switch (slave->new_link) {
    +switch (slave->link_new_state) {
        case BOND_LINK_NOCHANGE:
            /* For 802.3ad mode, check current slave speed and
             * duplex again in case its port was disabled after
             * invalid speed/duplex reporting but recovered before
             * link monitoring could make a decision on the actual
             * link status
             * */
            +if (BOND_MODE(bond) == BOND_MODE_8023AD &&
                slave->link == BOND_LINK_UP)
                +bond_3ad_adapter_speed_duplex_changed(slave);
            continue;
        case BOND_LINK_UP:
            ...
bond_for_each_slave_rcu(bond, slave, iter) {
    unsigned long trans_start = dev_trans_start(slave->dev);

    -slave->new_link = BOND_LINK_NOCHANGE;
    +bond_propose_link_state(slave, BOND_LINK_NOCHANGE);

    if (slave->link != BOND_LINK_UP) {
        if (bond_time_in_interval(bond, trans_start, 1) && 
            bond_time_in_interval(bond, slave->last_rx, 1)) {
            -slave->new_link = BOND_LINK_UP;
            +bond_propose_link_state(slave, BOND_LINK_UP);
            slave_state_changed = 1;
        }

        /* primary_slave has no meaning in round-robin
         @ @ -2659,7 +2718,7 @@
         if (!bond_time_in_interval(bond, trans_start, 2) || 
             !bond_time_in_interval(bond, slave->last_rx, 2)) {
            -slave->new_link = BOND_LINK_DOWN;
            +bond_propose_link_state(slave, BOND_LINK_DOWN);
            slave_state_changed = 1;
        }

        if (slave->link_failure_count < UINT_MAX)
            goto re_arm;

    bond_for_each_slave(bond, slave, iter) {
        -if (slave->new_link != BOND_LINK_NOCHANGE)
        -slave->link = slave->new_link;
        +if (slave->link_new_state != BOND_LINK_NOCHANGE)
        +slave->link = slave->link_new_state;
    }

    if (slave_state_changed) {
        @@ -2715,9 +2774,9 @@
    }

    /* Called to inspect slaves for active-backup mode ARP monitor link state
    - * changes. Sets new_link in slaves to specify what action should take
    - * place for the slave. Returns 0 if no changes are found, >0 if changes
    - * to link states must be committed.
    + * changes. Sets proposed link state in slaves to specify what action
    + * should take place for the slave. Returns 0 if no changes are found, >0
    + * if changes to link states must be committed.
    */
* Called with rcu_read_lock held.
*/
@@ -2729,12 +2788,15 @@
    int commit = 0;

    bond_for_each_slave_rcu(bond, slave, iter) {
-       slave->new_link = BOND_LINK_NOCHANGE;
+       bond_propose_link_state(slave, BOND_LINK_NOCHANGE);
        last_rx = slave_last_rx(bond, slave);

        if (slave->link != BOND_LINK_UP) {
-            slave->new_link = BOND_LINK_UP;
+            bond_propose_link_state(slave, BOND_LINK_UP);
+            commit++; ???
+        } else if (slave->link == BOND_LINK_BACK) {
+            bond_propose_link_state(slave, BOND_LINK_FAIL);
+            commit++; ???
        }
        continue;
    }

    if (!bond_is_active_slave(slave) &&
        !rcu_access_pointer(bond->current_arp_slave) &&
        !bond_time_in_interval(bond, last_rx, 3)) {
-        slave->new_link = BOND_LINK_DOWN;
+        bond_propose_link_state(slave, BOND_LINK_DOWN);
        commit++; ???
    }

    if (bond_is_active_slave(slave) &&
        (!bond_time_in_interval(bond, trans_start, 2) ||
+         !bond_time_in_interval(bond, last_rx, 2))) {
-        slave->new_link = BOND_LINK_DOWN;
+        bond_propose_link_state(slave, BOND_LINK_DOWN);
        commit++; ???
    }

    struct slave *slave;

    bond_for_each_slave(bond, slave, iter) {
-        switch (slave->new_link) {
+        switch (slave->link_new_state) {
            case BOND_LINK_NOCHANGE:
                continue;

-            case BOND_LINK_UP:
+            case BOND_LINK_NOCHANGE:
+                continue;

            case BOND_LINK_DOWN:

            default:
                break;

            }

        }
    }

---
continue;

+case BOND_LINK_FAIL:
+bond_set_slave_link_state(slave, BOND_LINK_FAIL,
  + BOND_SLAVE_NOTIFY_NOW);
+bond_set_slave_inactive_flags(slave,
  + BOND_SLAVE_NOTIFY_NOW);
+
+/* A slave has just been enslaved and has become
+ * the current active slave.
+ */
+if (rtnl_dereference(bond->curr_active_slave))
  +RCU_INIT_POINTER(bond->current_arp_slave, NULL);
+continue;
+
default:
netdev_err(bond->dev, "impossible: new_link %d on slave %s\n",
  - slave->new_link, slave->dev->name);
  + slave->link_new_state, slave->dev->name);
continue;
}

@@ -2895,8 +2970,6 @@
return should_notify_rtnl;
}

-bond_set_slave_inactive_flags(curr_arp_slave, BOND_SLAVE_NOTIFY_LATER);
-
bond_for_each_slave_rcu(bond, slave, iter) {
if (!found && !before && bond_slave_is_up(slave))
  before = slave;
@@ -3080,13 +3153,18 @@
case NETDEV_CHANGE:
/* For 802.3ad mode only:
   * Getting invalid Speed/Duplex values here will put slave
   * in weird state. So mark it as link-down for the time
   * being and let link-monitoring (miimon) set it right when
   * correct speeds/duplex are available.
   * in weird state. Mark it as link-fail if the link was
   * previously up or link-down if it hasn't yet come up, and
   * let link-monitoring (miimon) set it right when correct
   * speeds/duplex are available.
   */
if (bond_update_speed_duplex(slave) &&
  - BOND_MODE(bond) == BOND_MODE_8023AD)
  -slave->link = BOND_LINK_DOWN;
  + BOND_MODE(bond) == BOND_MODE_8023AD) {
if (slave->last_link_up)
+slave->link = BOND_LINK_FAIL;
+else
+slave->link = BOND_LINK_DOWN;
+
if (BOND_MODE(bond) == BOND_MODE_8023AD)
bond_3ad_adapter_speed_duplex_changed(slave);
@@ -3171,8 +3249,12 @@
return NOTIFY_DONE;

if (event_dev->flags & IFF_MASTER) {
+int ret;
+netdev_dbg(event_dev, "IFF_MASTER\n");
-return bond_master_netdev_event(event, event_dev);
+ret = bond_master_netdev_event(event, event_dev);
+if (ret != NOTIFY_DONE)
+return ret;
+
if (event_dev->flags & IFF_SLAVE) {
@@ -3387,6 +3469,13 @@
}
}

+static int bond_get_nest_level(struct net_device *bond_dev)
+
+struct bonding *bond = netdev_priv(bond_dev);
+
+return bond->nest_level;
+
+static void bond_get_stats(struct net_device *bond_dev,
+struct rtnl_link_stats64 *stats)
{
@@ -3395,7 +3484,7 @@
struct list_head *iter;
struct slave *slave;

+spin_lock(&bond->stats_lock);
+spin_lock_nested(&bond->stats_lock, bond_get_nest_level(bond_dev));
memcpy(stats, &bond->bond_stats, sizeof(*stats));
rcu_read_lock();
@@ -3808,8 +3897,8 @@
static int bond_xmit_roundrobin(struct sk_buff *skb, struct net_device *bond_dev)
{
struct bonding *bond = netdev_priv(bond_dev);
-struct iphdr *iph = ip_hdr(skb);
struct slave *slave;
+int slave_cnt;
u32 slave_id;

/* Start with the curr_active_slave that joined the bond as the
@@ -3818,23 +3907,32 @@
* send the join/membership reports. The curr_active_slave found
* will send all of this type of traffic.
*/
-if (iph->protocol == IPPROTO_IGMP && skb->protocol == htons(ETH_P_IP)) {
-slave = rcu_dereference(bond->curr_active_slave);
-if (slave)
+bond_dev_queue_xmit(bond, skb, slave->dev);
-else
+bond_xmit_slave_id(bond, skb, 0);
-} else {
-int slave_cnt = READ_ONCE(bond->slave_cnt);
+if (skb->protocol == htons(ETH_P_IP)) {
+noff = skb_network_offset(skb);
+struct iphdr *iph;

-if (likely(slave_cnt)) {
-slave_id = bond_rr_gen_slave_id(bond);
-bond_xmit_slave_id(bond, skb, slave_id % slave_cnt);
-} else {
-bond_tx_drop(bond_dev, skb);
+if (unlikely(!pskb_may_pull(skb, noff + sizeof(*iph))))
+goto non_igmp;
+iph = ip_hdr(skb);
+if (iph->protocol == IPPROTO_IGMP) {
+slave = rcu_dereference(bond->curr_active_slave);
+if (slave)
+bond_dev_queue_xmit(bond, skb, slave->dev);
+else
+bond_xmit_slave_id(bond, skb, 0);
+return NETDEV_TX_OK;
} }

+non_igmp:
+slave_cnt = READ_ONCE(bond->slave_cnt);
+if (likely(slave_cnt)) {
+slave_id = bond_rr_gen_slave_id(bond);
+bond_xmit_slave_id(bond, skb, slave_id % slave_cnt);
+} else {
+bond_tx_drop(bond_dev, skb);
+
+}
return NETDEV_TX_OK;
+
@@ -3963,7 +4061,7 @@
* this to-be-skipped slave to send a packet out.
 */
 old_arr = rtnl_dereference(bond->slave_arr);
@@ -4129,13 +4227,23 @@

+static u32 bond_mode_bcast_speed(struct slave *slave, u32 speed)
+{
+  if (speed == 0 || speed == SPEED_UNKNOWN)
+    speed = slave->speed;
+  else
+    speed = min(speed, slave->speed);
+  
+  +return speed;
+
  +}
+
+static int bond_ethtool_get_link_ksettings(struct net_device *bond_dev,
+struct ethtool_link_ksettings *cmd)
{struct bonding *bond = netdev_priv(bond_dev);
-unsigned long speed = 0;
-struct list_head *iter;
-struct slave *slave;
+u32 speed = 0;

  cmd->base.duplex = DUPLEX_UNKNOWN;
  cmd->base.port = PORT_OTHER;
@@ -4147,8 +4255,13 @@
/*
 bond_for_each_slave(bond, slave, iter) {
  if (bond_slave_can_tx(slave)) {
-    if (slave->speed != SPEED_UNKNOWN)
-      speed += slave->speed;
+    if (slave->speed != SPEED_UNKNOWN) {
++    if (BOND_MODE(bond) == BOND_MODE_BROADCAST)
++      speed = bond_mode_bcast_speed(slave,
speed);
+else
+speed += slave->speed;
+
if (cmd->base.duplex == DUPLEX_UNKNOWN &&
    slave->duplex != DUPLEX_UNKNOWN)
    cmd->base.duplex = slave->duplex;
@@ -4190,6 +4303,7 @@
    .ndo_neigh_setup = bond_neigh_setup,
    .ndo_vlan_rx_add_vid = bond_vlan_rx_add_vid,
    .ndo_vlan_rx_kill_vid = bond_vlan_rx_kill_vid,
+    .ndo_get_lock_subclass = bond_get_nest_level,
    #ifdef CONFIG_NET_POLL_CONTROLLER
    .ndo_netpoll_setup = bond_netpoll_setup,
    .ndo_netpoll_cleanup = bond_netpoll_cleanup,
    @@ -4253,12 +4367,12 @@
    bond_dev->features |= NETIF_F_NETNS_LOCAL;
    bond_dev->hw_features = BOND_VLAN_FEATURES |
        -NETIF_F_HW_VLAN_CTAG_TX |
        NETIF_F_HW_VLAN_CTAG_RX |
        NETIF_F_HW_VLAN_CTAG_FILTER;
    bond_dev->hw_features |= NETIF_F_GSO_ENCAP_ALL;
    bond_dev->features |= bond_dev->hw_features;
    +bond_dev->features |= NETIF_F_HW_VLAN_CTAG_TX;
}
/* Destroy a bonding device.
@@ -4688,6 +4802,7 @@
if (!bond->wq)
    return -ENOMEM;
+    bond->nest_level = SINGLE_DEPTH_NESTING;
    netdev_lockdep_set_classes(bond_dev);
    list_add_tail(&bond->bond_list, &bn->dev_list);
    @@ -4744,15 +4859,19 @@
    bond_dev->rtnl_link_ops = &bond_link_ops;
    res = register_netdevice(bond_dev);
    +if (res < 0) {
    +free_netdev(bond_dev);
    +rtnl_unlock();
    +
    +return res;
    +}
netif_carrier_off(bond_dev);

bond_work_init_all(bond);

rtnl_unlock();
if (res < 0)
  -free_netdev(bond_dev);
  -return res;
+return 0;
}

static int __net_init bond_net_init(struct net *net)
--- linux-4.15.0.orig/drivers/net/bonding/bond_netlink.c
+++ linux-4.15.0/drivers/net/bonding/bond_netlink.c
@@ -451,11 +451,10 @@
 return err;

 err = register_netdevice(bond_dev);
 -netif_carrier_off(bond_dev);
 if (!err) {
 struct bonding *bond = netdev_priv(bond_dev);

 +netif_carrier_off(bond_dev);
 bond_work_init_all(bond);
 }

 @@ -638,8 +637,7 @@
 goto nla_put_failure;

 if (nla_put(skb, IFLA_BOND_AD_ACTOR_SYSTEM,
 - sizeof(bond->params.ad_actor_system),
 - &bond->params.ad_actor_system))
 + ETH_ALEN, &bond->params.ad_actor_system))
 goto nla_put_failure;
 }

 if (!bond_3ad_get_active_agg_info(bond, &info)) {
 --- linux-4.15.0.orig/drivers/net/bonding/bond_options.c
 +++ linux-4.15.0/drivers/net/bonding/bond_options.c
 @@ -743,15 +743,20 @@
 static int bond_option_mode_set(struct bonding *bond,
 const struct bond_opt_value *newval)
 {
 -if (!bond_mode_uses_arp(newval->value) && bond->params.arp_interval) {
 -netdev_dbg(bond->dev, "%s mode is incompatible with arp monitoring, start mii monitoring\n",
 - newval->string);
 -/* disable arp monitoring */
 -bond->params.arp_interval = 0;
}
/* set miimon to default value */
bond->params.miimon = BOND_DEFAULT_MIIMON;
netdev_dbg(bond->dev, "Setting MII monitoring interval to %d\n",
        bond->params.miimon);
+if (!bond_mode_uses_arp(newval->value)) {
+    if (bond->params.arp_interval) {
+        netdev_dbg(bond->dev, "%s mode is incompatible with arp monitoring, start mii monitoring\n",
+            newval->string);
+        /* disable arp monitoring */
+        bond->params.arp_interval = 0;
+    }
+    if (!bond->params.miimon) {
+        /* set miimon to default value */
+        bond->params.miimon = BOND_DEFAULT_MIIMON;
+        netdev_dbg(bond->dev, "Setting MII monitoring interval to %d\n",
+            bond->params.miimon);
+    }
+}

if (newval->value == BOND_MODE_ALB)
@@ -1093,13 +1098,6 @@
    }
    netdev_dbg(bond->dev, "Setting arp_validate to %s (%llu)\n",
            newval->string, newval->value);
-    if (bond->dev->flags & IFF_UP) {
-        if (!newval->value)
-            bond->recv_probe = NULL;
-        else if (bond->params.arp_interval)
-            bond->recv_probe = bond_arp_rcv;
-    }
    bond->params.arp_validate = newval->value;

return 0;
@@ -1142,6 +1140,7 @@
    slave->dev->name);
    rcu_assign_pointer(bond->primary_slave, slave);
    strcpy(bond->params.primary, slave->dev->name);
+    bond->force_primary = true;
    bond_select_active_slave(bond);
goto out;
}
--- linux-4.15.0.orig/drivers/net/bonding/bond_sysfs_slave.c
+++ linux-4.15.0/drivers/net/bonding/bond_sysfs_slave.c
@@ -55,7 +55,9 @@
static ssize_t perm_hwaddr_show(struct slave *slave, char *buf)
{ return sprintf(buf, "%pM
", slave->perm_hwaddr); }

static SLAVE_ATTR_RO(perm_hwaddr);

static ssize_t slave_show(struct kobject *kobj, struct attribute *attr, char *buf)
{
    return slave_attr->show(slave, buf);
}

static const struct sysfs_ops slave_sysfs_ops = {
    .show = slave_show,
};

static struct kobj_type slave_ktype = {
    #ifdef CONFIG_SYSFS
        .sysfs_ops = &slave_sysfs_ops,
    #endif
};

int bond_sysfs_slave_add(struct slave *slave)
{
    const struct slave_attribute **a;
    int err;

    -err = kobject_init_and_add(&slave->kobj, &slave_ktype,
    -    &slave->dev->dev.kobj, "bonding_slave");
    -if (err)
    -    return err;

    for (a = slave_attrs; *a; ++a) {
        err = sysfs_create_file(&slave->kobj, &(*a)->attr);
        if (err) {
            @ @ -171,6 +161,4 @ @
        }
    }

    for (a = slave_attrs; *a; ++a)
        sysfs_remove_file(&slave->kobj, &(*a)->attr);
- kobject_put(&slave->kobj);
}

--- linux-4.15.0.orig/drivers/net/caif/caif_hsi.c
+++ linux-4.15.0/drivers/net/caif/caif_hsi.c
@@ -1456,7 +1456,7 @
  rtnl_lock();
  list_for_each_safe(list_node, n, &cfhsi_list) {
    cfhsi = list_entry(list_node, struct cfhsi, list);
-   unregister_netdev(cfhsi->ndev);
+   unregister_netdevice(cfhsi->ndev);
  }
  rtnl_unlock();
}

--- linux-4.15.0.orig/drivers/net/caif/caif_serial.c
+++ linux-4.15.0/drivers/net/caif/caif_serial.c
@@ -279,7 +279,6 @
 {
   struct ser_device *ser;

-  BUG_ON(dev == NULL);
  ser = netdev_priv(dev);

  /* Send flow off once, on high water mark */
@@ -361,6 +360,7 @
  rtnl_lock();
  result = register_netdevice(dev);
  if (result) {
    tty_kref_put(tty);
-   rtnl_unlock();
    free_netdev(dev);
    return -ENODEV;
  }

--- linux-4.15.0.orig/drivers/net/can/c_can/c_can.c
+++ linux-4.15.0/drivers/net/can/c_can/c_can.c
@@ -52,6 +52,7 @

#define CONTROL_EX_PDR	BIT(8)
#define CONTROL_SWR	BIT(15)
#define CONTROL_TEST	BIT(7)
#define CONTROL_CCE	BIT(6)
#define CONTROL_DISABLE_AR	BIT(5)

#define BTR_TSEG2_SHIFT	12
#define BTR_TSEG2_MASK	(0x7 << BTR_TSEG2_SHIFT)

/* interrupt register */
#define INT_STS_PENDING	0x8000

/* control register */
#define CONTROL_SWRBIT(15)
#define CONTROL_TESTBIT(7)
#define CONTROL_CCEBIT(6)
#define CONTROL_DISABLE_ARBIT(5)
#define BTR_TSEG2_SHIFT12
#define BTR_TSEG2_MASK(0x7 << BTR_TSEG2_SHIFT)

/* interrupt register */
#define INT_STS_PENDING0x8000
/* brp extension register */
#define BRP_EXT_BRPE_MASK 0x0f
#define BRP_EXT_BRPE_SHIFT 0

static inline void c_can_pm_runtime_enable(const struct c_can_priv *priv)
{
    if (priv->device)
        pm_runtime_enable(priv->device);
}

static inline void c_can_pm_runtime_disable(const struct c_can_priv *priv)
{
    if (priv->device)
        pm_runtime_disable(priv->device);
}

static inline void c_can_pm_runtime_get_sync(const struct c_can_priv *priv)
{
    if (priv->device)
        IF_MCONT_RCV_EOB;
}

static int c_can_software_reset(struct net_device *dev)
{
    struct c_can_priv *priv = netdev_priv(dev);
    int retry = 0;

    if (priv->type != BOSCH_D_CAN)
        return 0;

    priv->write_reg(priv, C_CAN_CTRL_REG, CONTROL_SWR | CONTROL_INIT);
    while (priv->read_reg(priv, C_CAN_CTRL_REG) & CONTROL_SWR) {
        msleep(20);
        if (retry++ > 100) {
            netdev_err(dev, "CCTRL: software reset failed\n");
    return -EIO;
    }
    }
    return 0;
}
* Configure C_CAN chip:
* - enable/disable auto-retransmission
@@ -578,6 +590,11 @@
static int c_can_chip_config(struct net_device *dev)
{
    struct c_can_priv *priv = netdev_priv(dev);
    +int err;
    +
    +err = c_can_software_reset(dev);
    +if (err)
    +return err;

    /* enable automatic retransmission */
priv->write_reg(priv, C_CAN_CTRL_REG, CONTROL_ENABLE_AR);
@@ -1029,10 +1046,16 @@
u16 curr, last = priv->last_status;
    int work_done = 0;

    -priv->last_status = curr = priv->read_reg(priv, C_CAN_STS_REG);
    -/* Ack status on C_CAN. D_CAN is self clearing */
    -if (priv->type != BOSCH_D_CAN)
    -priv->write_reg(priv, C_CAN_STS_REG, LEC_UNUSED);
    +/* Only read the status register if a status interrupt was pending */
    +if (atomic_xchg(&priv->sie_pending, 0)) {
    +priv->last_status = curr = priv->read_reg(priv, C_CAN_STS_REG);
    +/* Ack status on C_CAN. D_CAN is self clearing */
    +if (priv->type != BOSCH_D_CAN)
    +priv->write_reg(priv, C_CAN_STS_REG, LEC_UNUSED);
    +} else {
    +/* no change detected ... */
    +curr = last;
    +}

    /* handle state changes */
if ((curr & STATUS_EWARN) && (!(curr & STATUS_EWARN))) {
    struct net_device *dev = (struct net_device *)dev_id;
    struct c_can_priv *priv = netdev_priv(dev);
    +int reg_int;

    -if (!priv->read_reg(priv, C_CAN_INT_REG))
    +reg_int = priv->read_reg(priv, C_CAN_INT_REG);
    +if (!reg_int)
    return IRQ_NONE;
    +/* save for later use */
    +if (reg_int & INT_STS_PENDING)
atomic_set(&priv->sie_pending, 1);

/* disable all interrupts and schedule the NAPI */
c_can_irq_control(priv, false);
napi_schedule(&priv->napi);

int register_c_can_dev(struct net_device *dev)
{
-struct c_can_priv *priv = netdev_priv(dev);
  int err;

  /* Deactivate pins to prevent DRA7 DCAN IP from being */
  /* pinctrl_pm_select_sleep_state(dev->dev.parent);
  
  c_can_pm_runtime_enable(priv);
  
  dev->flags |= IFF_ECHO; /* we support local echo */
  dev->netdev_ops = &c_can_netdev_ops;

  err = register_candev(dev);
  -if (err)
  -c_can_pm_runtime_disable(priv);
  -else
  +if (!err)
  devm_can_led_init(dev);
  -
  return err;
}
EXPORT_SYMBOL_GPL(register_c_can_dev);

void unregister_c_can_dev(struct net_device *dev)
{
-struct c_can_priv *priv = netdev_priv(dev);
  -
  unregister_candev(dev);
  -
  c_can_pm_runtime_disable(priv);
}
EXPORT_SYMBOL_GPL(unregister_c_can_dev);
atomic_t tx_active;
atomic_t sie_pending;
unsigned long tx_dir;
int last_status;

u16 (*read_reg) (const struct c_can_priv *priv, enum reg index);

--- linux-4.15.0.orig/drivers/net/can/c_can/c_can_pci.c
+++ linux-4.15.0/drivers/net/can/c_can/c_can_pci.c
@@ -239,12 +239,13 @@
{
    struct net_device *dev = pci_get_drvdata(pdev);

-    void __iomem *addr = priv->base;
+    void __iomem *addr = priv->base;

    unregister_c_can_dev(dev);

    free_c_can_dev(dev);

-pci_iounmap(pdev, priv->base);
+pci_iounmap(pdev, addr);
    pci_disable_msi(pdev);
    pci_clear_master(pdev);
    pci_release_regions(pdev);
--- linux-4.15.0.orig/drivers/net/can/c_can/c_can_platform.c
+++ linux-4.15.0/drivers/net/can/c_can/c_can_platform.c
@@ -29,6 +29,7 @@

     #include <linux/platform_device.h>
     +#include <linux/pm_runtime.h>
     #include <linux/clk.h>
     #include <linux/of.h>
     #include <linux/of_device.h>
@@ -385,6 +386,7 @@
           platform_set_drvdata(pdev, dev);
           SET_NETDEV_DEV(dev, &pdev->dev);

+     pm_runtime_enable(priv->device);
     ret = register_c_can_dev(dev);
     if (ret) {
         dev_err(&pdev->dev, "registering %s failed (err=%d)\n", 
@@ -397,6 +399,7 @@
             exit_free_device:
             +pm_runtime_disable(priv->device);
             free_c_can_dev(dev);
             exit:
             dev_err(&pdev->dev, "probe failed\n");
static int c_can_plat_remove(struct platform_device *pdev)
{
    struct net_device *dev = platform_get_drvdata(pdev);
    struct c_can_priv *priv = netdev_priv(dev);

    unregister_c_can_dev(dev);
    -
    +pm_runtime_disable(priv->device);
    free_c_can_dev(dev);

    return 0;
}

-static netdev_tx_t cc770_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static void cc770_tx(struct net_device *dev, int mo)
{
    struct cc770_priv *priv = netdev_priv(dev);
    -struct net_device_stats *stats = &dev->stats;
    -struct can_frame *cf = (struct can_frame *)skb->data;
    -unsigned int mo = obj2msgobj(CC770_OBJ_TX);
    +struct can_frame *cf = (struct can_frame *)priv->tx_skb->data;
    u8 dlc, rtr;
    u32 id;
    int i;

    -if (can_dropped_invalid_skb(dev, skb))
    -return NETDEV_TX_OK;
    -
    -if ((cc770_read_reg(priv,
        -msgobj[mo].ctrl1) & TXRQST_UNC) == TXRQST_SET) {
    -netdev_err(dev, "TX register is still occupied!\n");
    -return NETDEV_TX_BUSY;
    -}
    -
    -netif_stop_queue(dev);
    -
    dlc = cf->can_dlc;
    id = cf->can_id;
    -if (cf->can_id & CAN_RTR_FLAG)
    -rtr = 0;
    -else
    -rtr = MSGCFG_DIR;
    +rtr = cf->can_id & CAN_RTR_FLAG ? 0 : MSGCFG_DIR;
+cc770_write_reg(priv, msgobj[mo].ctrl0,
+MSGVAL_RES | TXIE_RES | RXIE_RES | INTPND_RES);
cc770_write_reg(priv, msgobj[mo].ctrl1,
RMTPNPD_RES | TXRQST_RES | CPUUPD_SET | NEWDAT_RES);
-cc770_write_reg(priv, msgobj[mo].ctrl0,
-MSGVAL_SET | TXIE_SET | RXIE_RES | INTPND_RES);
+
if (id & CAN_EFF_FLAG) {
    id &= CAN_EFF_MASK;
    cc770_write_reg(priv, msgobj[mo].config,
        @ @ -439.22 +425.30 @ @
    for (i = 0; i < dlc; i++)
        cc770_write_reg(priv, msgobj[mo].data[i], cf->data[i]);

-/* Store echo skb before starting the transfer */
-can_put_echo skb(skb, dev, 0);
-
-cc770_write_reg(priv, msgobj[mo].ctrl1,
-RMTPNPD_RES | TXRQST_SET | CPUUPD_RES | NEWDAT_UNC);
+RMTPNPD_UNC | TXRQST_SET | CPUUPD_RES | NEWDAT_UNC);
+cc770_write_reg(priv, msgobj[mo].ctrl0,
+MSGVAL_SET | TXIE_SET | RXIE_SET | INTPND_UNC);
+}
+
+static netdev_tx_t cc770_start_xmit(struct sk_buff *skb, struct net_device *dev)
+{
    +struct cc770_priv *priv = netdev_priv(dev);
    +unsigned int mo = obj2msgobj(CC770_OBJ_TX);

-stats->tx_bytes += dlc;
+if (can_dropped_invalid_skb(dev, skb))
+return NETDEV_TX_OK;

+netif_stop_queue(dev);

-/*
- * HM: We had some cases of repeated IRQs so make sure the
- * INT is acknowledged I know it's already further up, but
- * doing again fixed the issue
- */
-cc770_write_reg(priv, msgobj[mo].ctrl0,
-MSGVAL_UNC | TXIE_UNC | RXIE_UNC | INTPND_RES);
+if ((cc770_read_reg(priv,
    +msgobj[mo].ctrl1) & TXRQST_UNC) == TXRQST_SET) {
    +netdev_err(dev, "TX register is still occupied!\n");
    +return NETDEV_TX_BUSY;
+}
+priv->tx_skb = skb;
+cc770_tx(dev, mo);

return NETDEV_TX_OK;
}

struct cc770_priv *priv = netdev_priv(dev);
struct net_device_stats *stats = &dev->stats;
unsigned int mo = obj2msgobj(o);
+struct can_frame *cf;
+u8 ctrl1;
+
+ctrl1 = cc770_read_reg(priv, msgobj[mo].ctrl1);

-/* Nothing more to send, switch off interrupts */
+cc770_write_reg(priv, msgobj[mo].ctrl0,
    MSGVAL_RES | TXIE_RES | RXIE_RES | INTPND_RES);
-/*
- * We had some cases of repeated IRQ so make sure the
- * INT is acknowledged
-+cc770_write_reg(priv, msgobj[mo].ctrl1,
-+RMTPND_RES | TXRQST_RES | MSGLST_RES | NEWDAT_RES);
+
+if (unlikely(!priv->tx_skb)) {
+    netdev_err(dev, "missing tx skb in tx interrupt'\n");
+    return;
+}
+
+if (unlikely(ctrl1 & MSGLST_SET)) {
+    stats->rx_over_errors++;
+    stats->rx_errors++;
+}
+
+/* When the CC770 is sending an RTR message and it receives a regular
+ * message that matches the id of the RTR message, it will overwrite the
+ * outgoing message in the TX register. When this happens we must
+ * process the received message and try to transmit the outgoing skb
+ * again.
+ */
-cc770_write_reg(priv, msgobj[mo].ctrl0,
-MSGVAL_UNC | TXIE_UNC | RXIE_UNC | INTPND_RES);
+if (unlikely(ctrl1 & NEWDAT_SET)) {
+    cc770_rx(dev, mo, ctrl1);
+    cc770_tx(dev, mo);
+    return;
+}
+cf = (struct can_frame *)priv->tx_skb->data;
+stats->tx_bytes += cf->can_dlc;
stats->tx_packets++;
+
+can_put_echo_skb(priv->tx_skb, dev, 0);
+can_get_echo_skb(dev, 0);
+priv->tx_skb = NULL;
+
+netif_wake_queue(dev);
}

@@ -804,6 +825,7 @@
priv->can.do_set_bittiming = cc770_set_bittiming;
priv->can.do_set_mode = cc770_set_mode;
priv->can.ctrlmode_supported = CAN_CTRLMODE_3_SAMPLES;
+priv->tx_skb = NULL;
+
memcpy(priv->obj_flags, cc770_obj_flags, sizeof(cc770_obj_flags));

--- linux-4.15.0.orig/drivers/net/can/cc770/cc770.h
+++ linux-4.15.0/drivers/net/can/cc770/cc770.h
@@ -193,6 +193,8 @@
     u8 cpu_interface;/* CPU interface register */
     u8 clkout;/* Clock out register */
     u8 bus_config;/* Bus configuration register */
+
+    struct sk_buff *tx_skb;
    
};

struct net_device *alloc_cc770dev(int sizeof_priv);
--- linux-4.15.0.orig/drivers/net/can/dev.c
+++ linux-4.15.0/drivers/net/can/dev.c
@@ -476,6 +476,37 @@
}                                            
EXPORT_SYMBOL_GPL(can_put_echo_skb);

+struct sk_buff *__can_get_echo_skb(struct net_device *dev, unsigned int idx, u8 *len_ptr)
+{
+    struct can_priv *priv = netdev_priv(dev);
+    
+    if (idx >= priv->echo_skb_max) {
+        netdev_err(dev, "%s: BUG! Trying to access can_priv::echo_skb out of bounds (%u/%u)\n",
+            __func__, idx, priv->echo_skb_max);
+        __func__, idx, priv->echo_skb_max);
+        return NULL;
+    }
+    
+    if (priv->echo_skb[idx]) {
+        /* Using "struct canfd_frame::len" for the frame
+ * length is supported on both CAN and CANFD frames.
+ */
+struct sk_buff *skb = priv->echo_skb[idx];
+struct canfd_frame *cf = (struct canfd_frame *)skb->data;
+ /* get the real payload length for neidev statistics */
+if (cf->can_id & CAN_RTR_FLAG)
+ *len_ptr = 0;
+else
+ *len_ptr = cf->len;
+ priv->echo_skb[idx] = NULL;
+ return skb;
+
+return NULL;
+
+/*
+ * Get the skb from the stack and loop it back locally
+ * @@ -485,22 +516,20 @@
+ */
unsigned int can_get_echo_skb(struct net_device *dev, unsigned int idx)
{
  -struct can_priv *priv = netdev_priv(dev);
  -
  -BUG_ON(idx >= priv->echo_skb_max);
  -
  -if (priv->echo_skb[idx]) {
  -struct sk_buff *skb = priv->echo_skb[idx];
  -struct can_frame *cf = (struct can_frame *)skb->data;
  -u8 dlc = cf->can_dlc;
  +struct sk_buff *skb;
  +u8 len;

  -netif_rx(priv->echo_skb[idx]);
  -priv->echo_skb[idx] = NULL;
  +skb = __can_get_echo_skb(dev, idx, &len);
  +if (!skb)
  + return 0;

  -return dlc;
  -}
  +skb_get(skb);
  +if (netif_rx(skb) == NET_RX_SUCCESS)
  +dev_consume_skb_any(skb);
+else
+dev_kfree_skb_any(skb);
-
-0;
+return len;
 }
EXPORT_SYMBOL_GPL(can_get_echo_skb);
@@ -549,11 +578,11 @@
 }
 cf->can_id |= CAN_ERR_RESTARTED;
-
 -netif_rx(skb);
-
 -stats->rx_packets++;
 stats->rx_bytes += cf->can_dlc;
+
 +netif_rx(skb);
 +
 restart:
 netdev_dbg(dev, "restarted\n");
 priv->can_stats.restarts++;
@@ -604,7 +633,7 @@
 {
 struct can_priv *priv = netdev_priv(dev);
-
 -netdev_dbg(dev, "bus-off\n");
 +netdev_info(dev, "bus-off\n");
 netif_carrier_off(dev);
@@ -846,6 +875,7 @@
 = { .len = sizeof(struct can_bittiming) },
 [IFLA_CAN_DATA_BITTIMING_CONST]
 = { .len = sizeof(struct can_bittiming_const) },
+[IFLA_CAN_TERMINATION]= { .type = NLA_U16 },
 };

 static int can_validate(struct nlattr *tb[], struct nlattr *data[],
@@ -1072,7 +1102,7 @@
 {
 struct can_priv *priv = netdev_priv(dev);
 struct can_ctrlmode cm = {.flags = priv->ctrlmode};
-struct can_berr_counter bec;
+struct can_berr_counter bec = { };
 enum can_state state = priv->state;

 if (priv->do_get_state)
static struct rtnl_link_ops can_link_ops __read_mostly = {
    .kind = "can",
    .netns_refund = true,
    .maxtype = IFLA_CAN_MAX,
    .policy = can_policy,
    .setup = can_setup,
    @ @ -1196,6 +1227,8 @ @
return -EINVAL;
}
dev->rtnl_link_ops = &can_link_ops;
+netif_carrier_off(dev);
+
return register_netdev(dev);
}
EXPORT_SYMBOL_GPL(register_candev);
--- linux-4.15.0.orig/drivers/net/can/flexcan.c
+++ linux-4.15.0/drivers/net/can/flexcan.c
@@ -177,7 +177,7 @@
#define FLEXCAN_MB_CNT_LENGTH(x) (((x) & 0xf) << 16)
#define FLEXCAN_MB_CNT_TIMESTAMP(x) ((x) & 0xffff)
-#define FLEXCAN_TIMEOUT_US (50)
+#define FLEXCAN_TIMEOUT_US (250)
/* FLEXCAN hardware feature flags
 */
static int flexcan_chip_freeze(struct flexcan_priv *priv)
{
    struct flexcan_regs __iomem *regs = priv->regs;
-unsigned int timeout = 1000 * 1000 * 10 / priv->can.bittiming.bitrate;
+unsigned int timeout;
+u32 bitrate = priv->can.bittiming.bitrate;
    u32 reg;
+if (bitrate)
+timeout = 1000 * 1000 * 10 / bitrate;
+else
+timeout = FLEXCAN_TIMEOUT_US / 10;
+
reg = flexcan_read(&regs->mcr);
-reg |= FLEXCAN_MCR_HALT;
+reg |= FLEXCAN_MCR_FRZ | FLEXCAN_MCR_HALT;
    flexcan_write(reg, &regs->mcr);

    while (timeout-- && !(flexcan_read(&regs->mcr) & FLEXCAN_MCR_FRZ_ACK))
if (tx_errors)
    dev->stats.tx_errors++;

-can_rx_offload_irq_queue_err_skb(&priv->offload, skb);
+can_rx_offload_queue_tail(&priv->offload, skb);
}

static void flexcan_irq_state(struct net_device *dev, u32 reg_esr)
{
    if (unlikely(new_state == CAN_STATE_BUS_OFF))
        can_bus_off(dev);

-can_rx_offload_irq_queue_err_skb(&priv->offload, skb);
+can_rx_offload_queue_tail(&priv->offload, skb);
}

static inline struct flexcan_priv *rx_offload_to_priv(struct can_rx_offload *offload)
{
    reg_mecr = flexcan_read(&regs->mecr);
    reg_mecr &= ~FLEXCAN_MECR_ECRWRDIS;
    flexcan_write(reg_mecr, &regs->mecr);
    +reg_mecr |= FLEXCAN_MECR_ECCDIS;
    reg_mecr &= ~(FLEXCAN_MECR_NCEFAFRZ | FLEXCAN_MECR_HANCEI_MSK |
                   FLEXCAN_MECR_FANCEI_MSK);
    flexcan_write(reg_mecr, &regs->mecr);

    /* freeze + disable module */
    -flexcan_chip_freeze(priv);
    -flexcan_chip_disable(priv);
    +err = flexcan_chip_freeze(priv);
    +if (err && !disable_on_error)
+return err;
+err = flexcan_chip_disable(priv);
+if (err && !disable_on_error)
+  goto out_chip_unfreeze;

/* Disable all interrupts */
flexcan_write(0, &regs->imask2);
@@ -1075,6 +1087,23 @@
flexcan_transceiver_disable(priv);
priv->can.state = CAN_STATE_STOPPED;
+
+return 0;
+
+ out_chip_unfreeze:
+flexcan_chip_unfreeze(priv);
+
+return err;
+
+static inline int flexcan_chip_stop_disable_on_error(struct net_device *dev)
+{
+  __flexcan_chip_stop(dev, true);
+}
+
+static inline int flexcan_chip_stop(struct net_device *dev)
+{
+  __flexcan_chip_stop(dev, false);
}

static int flexcan_open(struct net_device *dev)
@@ -1128,7 +1157,7 @@
netif_stop_queue(dev);
can_rx_offload_disable(&priv->offload);
-flexcan_chip_stop(dev);
+flexcan_chip_stop_disable_on_error(dev);

free_irq(dev->irq, dev);
clk_disable_unprepare(priv->clk_per);
@@ -1194,10 +1223,14 @@
if (err)
goto out_chip_disable;

/-* set freeze, halt and activate FIFO, restrict register access */
+/* set freeze, halt */
+err = flexcan_chip_freeze(priv);
+if (err)
/* activate FIFO, restrict register access */
reg = flexcan_read(&regs->mcr);
-reg |= FLEXCAN_MCR_FRZ | FLEXCAN_MCR_HALT |
-FLEXCAN_MCR_FEN | FLEXCAN_MCR_SUPV;
+reg |= FLEXCAN_MCR_FEN | FLEXCAN_MCR_SUPV;
flexcan_write(reg, &regs->mcr);

/* Currently we only support newer versions of this core
--- linux-4.15.0.orig/drivers/net/can/ifi_canfd/ifi_canfd.c
+++ linux-4.15.0/drivers/net/can/ifi_canfd/ifi_canfd.c
@@ -30,6 +30,7 @@
#define IFI_CANFD_STCMD_ERROR_ACTIVE	BIT(2)
#define IFI_CANFD_STCMD_ERROR_PASSIVEBIT(3)
#define IFI_CANFD_STCMD_BUSOFFBIT(4)
+#define IFI_CANFD_STCMD_ERROR_WARNINGBIT(5)
#define IFI_CANFD_STCMD_BUSMONITORBIT(16)
#define IFI_CANFD_STCMD_LOOPBACKBIT(18)
#define IFI_CANFD_STCMD_DISABLE_CANFDBIT(24)
@@ -52,7 +53,10 @@
#define IFI_CANFD_TXSTCMD_OVERFLOW	BIT(13)

#define IFI_CANFD_INTERRUPT0xc
+#define IFI_CANFD_INTERRUPT_ERROR_BUSOFFBIT(0)
#define IFI_CANFD_INTERRUPT_ERROR_WARNINGBIT(1)
+#define IFI_CANFD_INTERRUPT_ERROR_STATE_CHGBIT(2)
+#define IFI_CANFD_INTERRUPT_ERROR_REC_TEC_INCBIT(3)
#define IFI_CANFD_INTERRUPT_ERROR_COUNTERBIT(10)
#define IFI_CANFD_INTERRUPT_TXFIFO_EMPTYBIT(16)
#define IFI_CANFD_INTERRUPT_TXFIFO_REMOVEBIT(22)
@@ -61,6 +65,10 @@
#define IFI_CANFD_INTERRUPT_SET_IRQ((u32)BIT(31))

#define IFI_CANFD_IRQMASK0x10
+#define IFI_CANFD_IRQMASK_ERROR_BUSOFFBIT(0)
+#define IFI_CANFD_IRQMASK_ERROR_WARNINGBIT(1)
+#define IFI_CANFD_IRQMASK_ERROR_STATE_CHGBIT(2)
+#define IFI_CANFD_IRQMASK_ERROR_REC_TEC_INCBIT(3)
#define IFI_CANFD_IRQMASK_SET_ERRBIT(7)
#define IFI_CANFD_IRQMASK_SET_TSBIT(15)
#define IFI_CANFD_IRQMASK_TXFIFO_EMPTYBIT(16)
@@ -136,6 +144,8 @@
#define IFI_CANFD_SYSCLOCK0x50

#define IFI_CANFD_VER0x54
+#define IFI_CANFD_VER_REV_MASK0xff
+#define IFI_CANFD_VER_REV_MIN_SUPPORTED0x15
#define IFI_CANFD_IP_ID				0x58
#define IFI_CANFD_IP_ID_VALUE			0xD073CAFD
@@ -220,7 +230,10 @@
if (enable) {
enirq = IFI_CANFD_IRQMASK_TXFIFO_EMPTY |
-IFI_CANFD_IRQMASK_RXFIFO_NEMPTY;
+IFI_CANFD_IRQMASK_RXFIFO_NEMPTY |
+IFI_CANFD_IRQMASK_ERROR_STATE_CHG |
+IFI_CANFD_IRQMASK_ERROR_WARNING |
+IFI_CANFD_IRQMASK_ERROR_BUSOFF;
if (priv->can.ctrlmode & CAN_CTRLMODE_BERR_REPORTING)
enirq |= IFI_CANFD_INTERRUPT_ERROR_COUNTER;
}  
@@ -361,12 +374,13 @@
return 1;
}

-static int ifi_canfd_handle_lec_err(struct net_device *ndev, const u32 errctr)
+static int ifi_canfd_handle_lec_err(struct net_device *ndev)
{
 struct ifi_canfd_priv *priv = netdev_priv(ndev);
 struct net_device_stats *stats = &ndev->stats;
 struct can_frame *cf;
 struct sk_buff *skb;
 +u32 errctr = readl(priv->base + IFI_CANFD_ERROR_CTR);
 const u32 errmask = IFI_CANFD_ERROR_CTR_OVERLOAD_FIRST |
 IFI_CANFD_ERROR_CTR_ACK_ERROR_FIRST |
 IFI_CANFD_ERROR_CTR_BIT0_ERROR_FIRST |
@@ -449,6 +463,11 @@
 switch (new_state) {
 case CAN_STATE_ERROR_ACTIVE:
+/* error active state */
 +priv->can.can_stats.error_warning++;
 +priv->can.state = CAN_STATE_ERROR_ACTIVE;
 +break;
+case CAN_STATE_ERROR_WARNING:
 /* error warning state */
 priv->can.can_stats.error_warning++;
 priv->can.state = CAN_STATE_ERROR_WARNING;
@@ -477,7 +496,7 @@
 ifi_canfd_get_berr_counter(ndev, &bec);

 switch (new_state) {
 -case CAN_STATE_ERROR_ACTIVE:
 +case CAN_STATE_ERROR_WARNING:
/* error warning state */
cf->can_id |= CAN_ERR_CRTL;
cf->data[1] = (bec.txerr > bec.rxerr) ?
return 1;
}

-static int ifi_canfd_handle_state_errors(struct net_device *ndev, u32 stcmd)
+static int ifi_canfd_handle_state_errors(struct net_device *ndev)
{
struct ifi_canfd_priv *priv = netdev_priv(ndev);
+u32 stcmd = readl(priv->base + IFI_CANFD_STCMD);
int work_done = 0;
-u32 isr;

-/*
- * The ErrWarn condition is a little special, since the bit is
- * located in the INTERRUPT register instead of STCMD register.
- */
-_-isr = readl(priv->base + IFI_CANFD_INTERRUPT);
-_-if ((isr & IFI_CANFD_INTERRUPT_ERROR_WARNING) &&
+if ((stcmd & IFI_CANFD_STCMD_ERROR_ACTIVE) &&
+    (priv->can.state != CAN_STATE_ERROR_ACTIVE)) {
+    netdev_dbg(ndev, "Error, entered active state\n");
+    work_done += ifi_canfd_handle_state_change(ndev,
+    CAN_STATE_ERROR_ACTIVE);
+}
+
+if ((stcmd & IFI_CANFD_STCMD_ERROR_WARNING) &&
+    (priv->can.state != CAN_STATE_ERROR_WARNING)) {
+    /* Clear the interrupt */
+    -writel(IFI_CANFD_INTERRUPT_ERROR_WARNING,
+    -    priv->base + IFI_CANFD_INTERRUPT);
+    netdev_dbg(ndev, "Error, entered warning state\n");
+    work_done += ifi_canfd_handle_state_change(ndev,
+    CAN_STATE_ERROR_WARNING);
@@ -552,18 +570,11 @@
{| struct net_device *ndev = napi->dev;
struct ifi_canfd_priv *priv = netdev_priv(ndev);
-const u32 stcmd_state_mask = IFI_CANFD_STCMD_ERROR_PASSIVE |
-    IFI_CANFD_STCMD_ERROR_PASSIVE |
-    IFI_CANFD_STCMD_BUSOFF;
-int work_done = 0;
-| -u32 stcmd = readl(priv->base + IFI_CANFD_STCMD);
-u32 rxstcmd = readl(priv->base + IFI_CANFD_RXSTCMD);
-u32 errctr = readl(priv->base + IFI_CANFD_ERROR_CTR);
+int work_done = 0;
/* Handle bus state changes */
-if ((stcmd & stcmd_state_mask) ||
-   ((stcmd & IFI_CANFD_STCMD_ERROR_ACTIVE) == 0))
-    work_done += ifi_canfd_handle_state_errors(ndev, stcmd);
+    work_done += ifi_canfd_handle_state_errors(ndev);

/* Handle lost messages on RX */
if (rxstcmd & IFI_CANFD_RXSTCMD_OVERFLOW)
@@ -571,7 +582,7 @@
/* Handle lec errors on the bus */
if (priv->can.ctrlmode & CAN_CTRLMODE_BERR_REPORTING)
-    work_done += ifi_canfd_handle_lec_err(ndev, errctr);
+    work_done += ifi_canfd_handle_lec_err(ndev);

/* Handle normal messages on RX */
if (!(rxstcmd & IFI_CANFD_RXSTCMD_EMPTY))
@@ -592,12 +603,13 @@
struct net_device_stats *stats = &ndev->stats;
const u32 rx_irq_mask = IFI_CANFD_INTERRUPT_RXFIFO_NEMPTY |
IFI_CANFD_INTERRUPT_RXFIFO_NEMPTY_PER |
IFI_CANFD_INTERRUPT_ERROR_COUNTER |
IFI_CANFD_INTERRUPT_ERROR_STATE_CHG |
IFI_CANFD_INTERRUPT_ERROR_WARNING |
-IFI_CANFD_INTERRUPT_ERROR_COUNTER;
+IFI_CANFD_INTERRUPT_ERROR_BUSOFF;
const u32 tx_irq_mask = IFI_CANFD_INTERRUPT_TXFIFO_EMPTY |
IFI_CANFD_INTERRUPT_TXFIFO_REMOVE;
-const u32 clr_irq_mask = ~((u32)(IFI_CANFD_INTERRUPT_SET_IRQ |
-    IFI_CANFD_INTERRUPT_ERROR_WARNING));
+const u32 clr_irq_mask = ~((u32)IFI_CANFD_INTERRUPT_SET_IRQ);
u32 isr;

isr = readl(priv->base + IFI_CANFD_INTERRUPT);
@@ -933,7 +945,7 @@
struct resource *res;
void __iomem *addr;
int irq, ret;
-u32 id;
+u32 id, rev;

res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
addr = devm_ioremap_resource(dev, res);
@@ -947,6 +959,13 @@
return -EINVAL;
}
rev = readl(addr + IFI_CANFD_VER) & IFI_CANFD_VER_REV_MASK;
if (rev < IFI_CANFD_VER_REV_MIN_SUPPORTED) {
    dev_err(dev, "This block is too old (rev %i), minimum supported is rev %i\n",
            rev, IFI_CANFD_VER_REV_MIN_SUPPORTED);
    return -EINVAL;
}

dev = alloc_candev(sizeof(*priv), 1);
if (!dev)
    return -ENOMEM;

#include <linux/platform_device.h>
#include <linux/iopoll.h>
#include <linux/can/dev.h>
#include <linux/pinctrl/consumer.h>

/* napi related */
define M_CAN_NAPI_WEIGHT 64

/* Rx FIFO 0/1 Configuration (RXF0C/RXF1C) */
define RXFC_FWM_SHIFT 24
#undef RXFC_FWM_MASK (0x7f < RXFC_FWM_SHIFT)
declare RXFC_FWM_MASK (0x7f << RXFC_FWM_SHIFT)
define RXFC_FS_SHIFT 16
declare RXFC_FS_SHIFT16
declare RXFC_FS_MASK (0x7f << RXFC_FS_SHIFT)

while ((rxfs & RXFS_FFL_MASK) && (quota > 0)) {
    if (rxfs & RXFS_RFL)
        netdev_warn(dev, "Rx FIFO 0 Message Lost\n");
    m_can_read_fifo(dev, rxfs);
    quota--;
}

unsigned int ecr;
switch (new_state) {
    case CAN_STATE_ERROR_ACTIVE:
    +case CAN_STATE_ERROR_WARNING:
    /* error warning state */
    priv->can.can_stats.error_warning++;
    priv->can.state = CAN_STATE_ERROR_WARNING;
switch (new_state) {
  case CAN_STATE_ERROR_ACTIVE:
  /* error active state */
  cf->can_id |= CAN_ERR_CRTL;
  cf->data[1] = (bec.txerr > bec.rxerr) ?
  goto end;

  case CAN_STATE_ERROR_WARNING:
  /* error warning state */
  cf->data[1] = (bec.txerr > bec.rxerr) ?
  goto end;

  /* Errata workaround for issue "Needless activation of MRAF irq"
  * During frame reception while the MCAN is in Error Passive state
  * and the Receive Error Counter has the value MCAN_ECR.REC = 127,
  * it may happen that MCAN_IR.MRAF is set although there was no
  * Message RAM access failure.
  * If MCAN_IR.MRAF is enabled, an interrupt to the Host CPU is generated
  * The Message RAM Access Failure interrupt routine needs to check
  * whether MCAN_ECR.RP = 1 and MCAN_ECR.REC = 127.
  * In this case, reset MCAN_IR.MRAF. No further action is required.
  */
  +if ((priv->version <= 31) && (irqstatus & IR_MRAF) &&
  +    (m_can_read(priv, M_CAN_ECR) & ECR_RP)) {
  +struct can_berr_counter bec;
  +
  +__m_can_get_berr_counter(dev, &bec);
  +
  +__m_can_get_berr_counter(dev, &bec);
  +if (bec.rxerr == 127) {
  +m_can_write(priv, M_CAN_IR, IR_MRAF);
  +irqstatus &= ~IR_MRAF;
  +}
  +}
  +}
  +
  psr = m_can_read(priv, M_CAN_PSR);
  if (irqstatus & IR_ERR_STATE)
  work_done += m_can_handle_state_errors(dev, psr);
  @@ -950,7 +969,7 @@
    .name = KBUILD_MODNAME,
    .tseg1_min = 2, /* Time segment 1 = prop_seg + phase_seg1 */
    .tseg1_max = 256,
    -.tseg2_min = 1, /* Time segment 2 = phase_seg2 */
    +.tseg2_min = 2, /* Time segment 2 = phase_seg2 */
    .tseg2_max = 128,
    .sjw_max = 128,
    .brp_min = 1,
    @@ -1072,7 +1091,8 @@
} else {
/* Version 3.1.x or 3.2.x */
-cccr &= ~(CCCR_TEST | CCCR_MON | CCCR_BRSE | CCCR_FDOE);
+cccr &= ~(CCCR_TEST | CCCR_MON | CCCR_BRSE | CCCR_FDOE |
+ CCCR_NISO);

/* Only 3.2.x has NISO Bit implemented */
if (priv->can.ctrlmode & CAN_CTRLMODE_FD_NON_ISO)
  @ @ -1635,8 +1655,6 @@
  priv->can.clock.freq = clk_get_rate(cclk);
  priv->mram_base = mram_addr;

-m_can_of_parse_mram(priv, mram_config_vals);
-
  platform_set_drvdata(pdev, dev);
  SET_NETDEV_DEV(dev, &pdev->dev);

  @ @ -1647,6 +1665,8 @@
goto failed_free_dev;
}

+m_can_of_parse_mram(priv, mram_config_vals);
+
  devm_can_led_init(dev);

dev_info(&pdev->dev, "%s device registered (irq=%d, version=%d)n",
  @ @ -1682,6 +1702,8 @@
m_can_clk_stop(priv);
}

+pinctrl_pm_select_sleep_state(dev);
+
  priv->can.state = CAN_STATE_SLEEPING;

return 0;
@ @ -1692,7 +1714,7 @@
struct net_device *ndev = dev_get_drvdata(dev);
struct m_can_priv *priv = netdev_priv(ndev);

-m_can_init_ram(priv);
+pinctrl_pm_select_default_state(dev);

priv->can.state = CAN_STATE_ERROR_ACTIVE;

@ @ -1703,6 +1725,7 @@
if (ret)
  return ret;
m_can_init_ram(priv);
m_can_start(ndev);
netif_device_attach(ndev);
netif_start_queue(ndev);
--- linux-4.15.0.orig/drivers/net/can/mscan/mpc5xxx_can.c
+++ linux-4.15.0/drivers/net/can/mscan/mpc5xxx_can.c
@@ -86,6 +86,11 @@
 return 0;
 }
cdm = of_iomap(np_cdm, 0);
+if (!cdm) {
+ of_node_put(np_cdm);
+dev_err(&ofdev->dev, "can't map clock node!\n");
+return 0;
+
}

if (in_8(&cdm->ipb_clk_sel) & 0x1)
 freq *= 2;
--- linux-4.15.0.orig/drivers/net/can/mscan/mscan.c
+++ linux-4.15.0/drivers/net/can/mscan/mscan.c
@@ -392,13 +392,12 @@
 struct net_device *dev = napi->dev;
 struct mscan_regs __iomem *regs = priv->reg_base;
 struct net_device_stats *stats = &dev->stats;
-int npackets = 0;
-int ret = 1;
+int work_done = 0;
 struct sk_buff *skb;
 struct can_frame *frame;
 u8 canrflg;

-while (npackets < quota) {
+while (work_done < quota) {
 canrflg = in_8(&regs->canrflg);
 if (!(!canrflg & (MSCAN_RXF | MSCAN_ERR_IF)))
 break;
@@ -419,18 +419,18 @@
 stats->rx_packets++;
 stats->rx_bytes += frame->can_dlc;
 -npackets++;
- +work_done++;
 netif_receive_skb(skb);
 }

 -if (!in_8(&regs->canrflg) & (MSCAN_RXF | MSCAN_ERR_IF)) {
- napi_complete(&priv->napi);
- clear_bit(F_RX_PROGRESS, &priv->flags);
-if (priv->can.state < CAN_STATE_BUS_OFF)
-out_8(&regs->canrier, priv->shadow_canrier);
-ret = 0;
+if (work_done < quota) {
+if (likely(napi_complete_done(&priv->napi, work_done))) {
+clear_bit(F_RX_PROGRESS, &priv->flags);
+if (priv->can.state < CAN_STATE_BUS_OFF)
+out_8(&regs->canrier, priv->shadow_canrier);
+}
}
-return ret;
+return work_done;
}

static irqreturn_t mscan_isr(int irq, void *dev_id)
--- linux-4.15.0.orig/drivers/net/can/peak_canfd/peak_canfd.c
+++ linux-4.15.0/drivers/net/can/peak_canfd/peak_canfd.c
@@ -240,6 +240,20 @@
return pucan_write_cmd(priv);
}

+static int pucan_netif_rx(struct sk_buff *skb, __le32 ts_low, __le32 ts_high)
+{
+struct skb_shared_hwtstamps *hwts = skb_hwtstamps(skb);
+u64 ts_us;
+ +
+ts_us = (u64)le32_to_cpu(ts_high) << 32;
+ts_us |= le32_to_cpu(ts_low);
+
+/* IP core timestamps are s. */
+hwts->hwtstamp = ns_to_ktime(ts_us * NSEC_PER_USEC);
+
+return netif_rx(skb);
+}
+
+/* handle the reception of one CAN frame */
static int pucan_handle_can_rx(struct peak_canfd_priv *priv,
    struct pucan_rx_msg *msg)
@@ -256,13 +270,11 @@
    cf_len = get_can_dlc(pucan_msg_get_dlc(msg));

    /* if this frame is an echo, */
-if ((rx_msg_flags & PUCAN_MSG_LOOPED_BACK) &&
-    !(rx_msg_flags & PUCAN_MSG_SELF_RECEIVE)) {
+if (rx_msg_flags & PUCAN_MSG_LOOPED_BACK) {
    unsigned long flags;
    spin_lock_irqsave(&priv->echo_lock, flags);
can_get_echo_skb(priv->ndev, msg->client);
-spin_unlock_irqrestore(&priv->echo_lock, flags);

/* count bytes of the echo instead of skb */
stats->tx_bytes += cf_len;
@@ -271,7 +283,14 @@
/* restart tx queue (a slot is free) */
netif_wake_queue(priv->ndev);

-return 0;
+spin_unlock_irqrestore(&priv->echo_lock, flags);
+
+/* if this frame is only an echo, stop here. Otherwise,
+ * continue to push this application self-received frame into
+ * its own rx queue.
+ */
+if (!(rx_msg_flags & PUCAN_MSG_SELF_RECEIVE))
+return 0;
 }

/* otherwise, it should be pushed into rx fifo */
@@ -307,7 +326,7 @@
stats->rx_bytes += cf->len;
stats->rx_packets++;

-netif_rx(skb);
+puca_netif_rx(skb, msg->ts_low, msg->ts_high);

return 0;
}
@@ -333,7 +352,6 @@
/* this STATUS is the CNF of the RX_BARRIER: Tx path can be setup */
if (pucan_status_is_rx_barrier(msg)) {
-unsigned long flags;

if (priv->enable_tx_path) {
    int err = priv->enable_tx_path(priv);
@@ -342,16 +360,8 @@
    return err;
 }

-/* restart network queue only if echo skb array is free */
-spun_lock_irqsave(&priv->echo_lock, flags);
-
-if (!priv->can.echo_skb[priv->echo_idx]) {
-    spin_unlock_irqrestore(&priv->echo_lock, flags);
-
- netif_wake_queue(ndev);
- } else {
- spin_unlock_irqrestore(&priv->echo_lock, flags);
- }
+ /* wake network queue up (echo_skb array is empty) */
+ netif_wake_queue(ndev);

return 0;
}
@@ -410,7 +420,7 @@
stats->rx_packets++;
stats->rx_bytes += cf->can_dlc;
- netif_rx(skb);
+ pucan_netif_rx(skb, msg->ts_low, msg->ts_high);

return 0;
}
@@ -726,11 +736,6 @@
* should_stop_tx_queue = !!(priv->can.echo_skb[priv->echo_idx]);

- spin_unlock_irqrestore(&priv->echo_lock, flags);
- /* write the skb on the interface */
- priv->write_tx_msg(priv, msg);
- /* stop network tx queue if not enough room to save one more msg too */
- if (priv->can.ctrlmode & CAN_CTRLMODE_FD)
+ should_stop_tx_queue |= (room_left <
@@ -742,6 +747,11 @@
if (should_stop_tx_queue)
  netif_stop_queue(ndev);

+ spin_unlock_irqrestore(&priv->echo_lock, flags);
+ /* write the skb on the interface */
+ priv->write_tx_msg(priv, msg);
+ return NETDEV_TX_OK;
}

--- linux-4.15.0.orig/drivers/net/can/peak_canfd/peak_pciefd_main.c
+++ linux-4.15.0/drivers/net/can/peak_canfd/peak_pciefd_main.c
@@ -58,6 +58,10 @@
#define PCIEFD_REG_SYS_VER1		0x0040	/* version reg #1 */
#define PCIEFD_REG_SYS_VER2		0x0044	/* version reg #2 */
```c
#define PCIEFD_FW_VERSION(x, y, z) (((u32)(x) << 24) |
    ((u32)(y) << 16) |
    ((u32)(z) << 8))

/* System Control Registers Bits */
#define PCIEFD_SYS_CTL_TS_RST 0x00000001 /* timestamp clock */
#define PCIEFD_SYS_CTL_CLK_EN 0x00000002 /* system clock */
prv->tx_pages_free++;
spin_unlock_irqrestore(&priv->tx_lock, flags);

/* wake producer up */
-netif_wake_queue(priv->ucan.ndev);
/* wake producer up (only if enough room in echo_skb array) */
+spin_lock_irqsave(&priv->ucan.echo_lock, flags);
+if (!priv->ucan.can.echo_skb[priv->ucan.echo_idx])
  +netif_wake_queue(priv->ucan.ndev);
+spin_unlock_irqrestore(&priv->ucan.echo_lock, flags);
}
/* re-enable Rx DMA transfer for this CAN */
"%ux CAN-FD PCAN-PCIe FPGA v%u.%u.%u:
    hw_ver_major, hw_ver_minor, hw_ver_sub);

#define CONFIG_ARCH_DMA_ADDR_T_64BIT
/* FW < v3.3.0 DMA logic doesn't handle correctly the mix of 32-bit and
   * 64-bit logical addresses: this workaround forces usage of 32-bit
   * DMA addresses only when such a fw is detected.
   */
+if (PCIEFD_FW_VERSION(hw_ver_major, hw_ver_minor, hw_ver_sub) <
    PCIEFD_FW_VERSION(3, 3, 0)) {
  +err = dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(32));
  +if (err)
    +dev_warn(&pdev->dev,
      "warning: can't set DMA mask %llxh (err %d)\n",
      DMA_BIT_MASK(32), err);
+}
/* stop system clock */
pciefd_sys_writereg(pciefd, PCIEFD_SYS_CTL_CLK_EN,
    PCIEFD_REG_SYS_CTL_CLR);
--- linux-4.15.0.orig/drivers/net/can/rcar/rcar_can.c
+++ linux-4.15.0/drivers/net/can/rcar/rcar_can.c
@@ -24,6 +24,9 @@
```

Open Source Used In 5GaaS Edge AC-4 23861
#define RCAR_CAN_DRV_NAME "rcar_can"

+#define RCAR_SUPPORTED_CLOCKS (BIT(CLKR_CLKP1) | BIT(CLKR_CLKP2) |
+ BIT(CLKR_CLKEXT))
+
/* Mailbox configuration:
 * mailbox 60 - 63 - Rx FIFO mailboxes
 * mailbox 56 - 59 - Tx FIFO mailboxes
@@ -789,7 +792,7 @@
goto fail_clk;
}

-if (clock_select >= ARRAY_SIZE(clock_names)) {
+if (!(BIT(clock_select) & RCAR_SUPPORTED_CLOCKS)) {
err = -EINVAL;
dev_err(&pdev->dev, "invalid CAN clock selected\n");
goto fail_clk;
@@ -854,10 +857,12 @@
struct rcar_can_priv *priv = netdev_priv(ndev);
u16 ctlr;

-if (netif_running(ndev)) {
- netif_stop_queue(ndev);
- netif_device_detach(ndev);
-}
+if (!netif_running(ndev))
+ return 0;
+
+netif_stop_queue(ndev);
+netif_device_detach(ndev);
+
ctlr = readw(&priv->regs->ctlr);
ctlr |= RCAR_CAN_CTLR_CANM_HALT;
writew(ctlr, &priv->regs->ctlr);
@@ -876,6 +881,9 @@
u16 ctlr;
 int err;

+if (!netif_running(ndev))
+return 0;
+
err = clk_enable(priv->clk);
if (err) {
 netdev_err(ndev, "clk_enable() failed, error %d\n", err);
@@ -889,10 +897,9 @@
writew(ctlr, &priv->regs->ctlr);
priv->can.state = CAN_STATE_ERROR_ACTIVE;
if (netif_running(ndev)) {
netif_device_attach(ndev);
netif_start_queue(ndev);
}

netif_device_attach(ndev);
netif_start_queue(ndev);

return 0;
}

--- linux-4.15.0.orig/drivers/net/can/rcar/rcar_canfd.c
+++ linux-4.15.0/drivers/net/can/rcar/rcar_canfd.c
@@ -1512,10 +1512,11 @@
/* All packets processed */
if (num_pkts < quota) {
  -napi_complete_done(napi, num_pkts);
+/* Enable Rx FIFO interrupts */
  -rcar_canfd_set_bit(priv->base, RCANFD_RFCC(ridx),
   + RCANFD_RFCC_RFIE);
   if (napi_complete_done(napi, num_pkts)) {
   + /* Enable Rx FIFO interrupts */
   +rcar_canfd_set_bit(priv->base, RCANFD_RFCC(ridx),
   + RCANFD_RFCC_RFIE);
   +}
}
return num_pkts;
}

--- linux-4.15.0.orig/drivers/net/can/rx-offload.c
+++ linux-4.15.0/drivers/net/can/rx-offload.c
@@ -116,37 +116,95 @@
return cb_b->timestamp - cb_a->timestamp;
}

-static struct sk_buff *can_rx_offload_offload_one(struct can_rx_offload *offload, unsigned int n)
+/**
+ * can_rx_offload_offload_one() - Read one CAN frame from HW
+ * @offload: pointer to rx_offload context
+ * @n: number of mailbox to read
+ *
+ * The task of this function is to read a CAN frame from mailbox @n
+ * from the device and return the mailbox's content as a struct
+ * sk_buff.
+ *
+ * If the struct can_rx_offload::skb_queue exceeds the maximal queue
+ * length (struct can_rx_offload::skb_queue_len_max) or no skb can be
+ * allocated, the mailbox contents is discarded by reading it into an
+ * overflow buffer. This way the mailbox is marked as free by the
+ * driver.
+ *
+ * Return: A pointer to skb containing the CAN frame on success.
+ *
+ * NULL if the mailbox @n is empty.
+ *
+ * ERR_PTR() in case of an error
+ */
+static struct sk_buff *
can_rx_offload_offload_one(struct can_rx_offload *offload, unsigned int n)
{
    struct sk_buff *skb = NULL;
    struct sk_buff *skb = NULL, *skb_error = NULL;
    struct can_rx_offload_cb *cb;
    struct can_frame *cf;
    int ret;

    /* If queue is full or skb not available, read to discard mailbox */
    if (likely(skb_queue_len(&offload->skb_queue) <=
            offload->skb_queue_len_max))
        if (likely(skb_queue_len(&offload->skb_queue) <
            offload->skb_queue_len_max)) {
            skb = alloc_can_skb(offload->dev, &cf);
            if (unlikely(!skb))
                skb_error = ERR_PTR(-ENOMEM);
                /* skb alloc failed */
            } else {
                skb_error = ERR_PTR(-ENOMEM);
                /* skb alloc failed */
            } +skb_error = ERR_PTR(-ENOBUFS);
                /* skb_queue is full */
            +}
            -if (!skb) {
                /* If queue is full or skb not available, drop by reading into
                    * overflow buffer.
                */
                +*
                +if (unlikely(skb_error)) {
                    struct can_frame cf_overflow;
                    u32 timestamp;

                    ret = offload->mailbox_read(offload, &cf_overflow,
                        &timestamp, n);
                    -if (ret)
                        -offload->dev->stats.rx_dropped++;

                    /* Mailbox was empty. */
                    +if (unlikely(!ret))
                        +return NULL;
                +return NULL;

            +/* Mailbox has been read and we're dropping it or...
+ * there was a problem reading the mailbox.
+ *
+ * Increment error counters in any case.
+ */
+offload->dev->stats.rx_dropped++;
+offload->dev->stats.rx_fifo_errors++;
+
+/* There was a problem reading the mailbox, propagate
+ * error value.
+ */
+if (unlikely(ret < 0))
+return ERR_PTR(ret);
+
+return skb_error;
}

cb = can_rx_offload_get_cb(skb);
ret = offload->mailbox_read(offload, cf, &cb->timestamp, n);
- if (!ret) {
+    /* Mailbox was empty. */
+    if (unlikely(!ret)) {
        kfree_skb(skb);
        return NULL;
    }
+
+    /* There was a problem reading the mailbox, propagate error value. */
+    if (unlikely(ret < 0)) {
        kfree_skb(skb);
        +offload->dev->stats.rx_dropped++;
        +offload->dev->stats.rx_fifo_errors++;
        +return ERR_PTR(ret);
    }
+
+    /* Mailbox was read. */
    return skb;
}

@@ -166,8 +224,8 @@ continue;
 skb = can_rx_offload_offload_one(offload, i);
- if (!skb)
- break;
+ if (IS_ERR_OR_NULL(skb))
+ continue;
__skb_queue_add_sort(&skb_queue, skb, can_rx_offload_compare);
}
@@ -197,7 +255,13 @@
struct sk_buff *skb;
int received = 0;

-while ((skb = can_rx_offload_offload_one(offload, 0))) {
+while (1) {
+skb = can_rx_offload_offload_one(offload, 0);
+if (IS_ERR(skb))
+continue;
+if (!skb)
+break;
+
skb_queue_tail(&offload->skb_queue, skb);
received++;
}
@@ -209,18 +273,69 @@
} EXPORT_SYMBOL_GPL(can_rx_offload_irq_offload_fifo);

-int can_rx_offload_irq_queue_err_skb(struct can_rx_offload *offload, struct sk_buff *skb)
+int can_rx_offload_queue_sorted(struct can_rx_offload *offload,
+struct sk_buff *skb, u32 timestamp)
+{
+struct can_rx_offload_cb *cb;
+unsigned long flags;
+
+if (skb_queue_len(&offload->skb_queue) >
+ offload->skb_queue_len_max) {
+dev_kfree_skb_any(skb);
+return -ENOBUFS;
+}
+
+cb = can_rx_offload_get_cb(skb);
+cb->timestamp = timestamp;
+
+spin_lock_irqsave(&offload->skb_queue.lock, flags);
+__skb_queue_add_sort(&offload->skb_queue, skb, can_rx_offload_compare);
+spin_unlock_irqrestore(&offload->skb_queue.lock, flags);
+
+can_rx_offload_schedule(offload);
+
+return 0;
+}
+EXPORT_SYMBOL_GPL(can_rx_offload_queue_sorted);
unsigned int can_rx_offload_get_echo_skb(struct can_rx_offload *offload, unsigned int idx, u32 timestamp)
+
    struct net_device *dev = offload->dev;
    struct net_device_stats *stats = &dev->stats;
    struct sk_buff *skb;
    u8 len;
    int err;

    skb = __can_get_echo_skb(dev, idx, &len);
    if (!skb)
        return 0;

    err = can_rx_offload_queue_sorted(offload, skb, timestamp);
    if (err) {
        stats->rx_errors++;
        stats->tx_fifo_errors++;
    }

    return len;
+}

EXPORT_SYMBOL_GPL(can_rx_offload_get_echo_skb);

int can_rx_offload_queue_tail(struct can_rx_offload *offload, struct sk_buff *skb)
{
    if (skb_queue_len(&offload->skb_queue) > offload->skb_queue_len_max)
        dev_kfree_skb_any(skb);
    return -ENOBUFS;
+
    skb_queue_tail(&offload->skb_queue, skb);
    can_rx_offload_schedule(offload);

    return 0;
}

EXPORT_SYMBOL_GPL(can_rx_offload_irq_queue_err_skb);
+EXPORT_SYMBOL_GPL(can_rx_offload_queue_tail);

static int can_rx_offload_init_queue(struct net_device *dev, struct can_rx_offload *offload, unsigned int weight)
{
    --- linux-4.15.0.orig/drivers/net/can/sja1000/peak_pci.c
    +++ linux-4.15.0/drivers/net/can/sja1000/peak_pci.c
    @@ -739,16 +739,15 @@
    struct net_device *prev_dev = chan->prev_dev;


dev_info(&pdev->dev, "removing device %s\n", dev->name);

/* do that only for first channel */
+if (!prev_dev && chan->pciec_card)
+peak_pciec_remove(chan->pciec_card);
unregister_sja1000dev(dev);
free_sja1000dev(dev);
dev = prev_dev;

-/* do that only for first channel */
-if (chan->pciec_card)
-peak_pciec_remove(chan->pciec_card);
+if (!dev)
break;
-
priv = netdev_priv(dev);
chan = priv->priv;
}
--- linux-4.15.0.orig/drivers/net/can/sja1000/peak_pcmcia.c
+++ linux-4.15.0/drivers/net/can/sja1000/peak_pcmcia.c
@@ -487,7 +487,7 @@
if (!netdev)
continue;

-strncpy(name, netdev->name, IFNAMSIZ);
+strlcpy(name, netdev->name, IFNAMSIZ);

unregister_sja1000dev(netdev);

--- linux-4.15.0.orig/drivers/net/can/slcan.c
+++ linux-4.15.0/drivers/net/can/slcan.c
@@ -147,7 +147,7 @@
     switch (*cmd) {
 case 'r':
     @ @ -186,8 +186,6 @ @
else
     return;

-*(u64 *) (&cf.data) = 0; /* clear payload */
+-
 /* RTR frames may have a dlc > 0 but they never have any data bytes */
if (!(cf.can_id & CAN_RTR_FLAG)) {
    for (i = 0; i < cf.can_dlc; i++) {
        @@ -343,9 +341,16 @@
    */
    static void slcan_write_wakeup(struct tty_struct *tty) {
        -struct slcan *sl = tty->disc_data;
        +struct slcan *sl;
        +
        +rcu_read_lock();
        +sl = rcu_dereference(tty->disc_data);
        +if (!sl)
        +goto out;

        schedule_work(&sl->tx_work);
        +out:
        +rcu_read_unlock();
    }

    /* Send a can_frame to a TTY queue. */
    @@ -613,6 +618,11 @@
        tty->disc_data = NULL;
        clear_bit(SLF_INUSE, &sl->flags);
        +slc_free_netdev(sl->dev);
        +/* do not call free_netdev before rtnl_unlock */
        +rtnl_unlock();
        +free_netdev(sl->dev);
        +return err;

    err_exit:
    rtnl_unlock();
    @@ -638,10 +648,11 @@
    return;

    spin_lock_bh(&sl->lock);
    -tty->disc_data = NULL;
    +rcu_assign_pointer(tty->disc_data, NULL);
    sl->tty = NULL;
    spin_unlock_bh(&sl->lock);

    +synchronize_rcu();
    flush_work(&sl->tx_work);

    /* Flush network side */
    --- linux-4.15.0.orig/drivers/net/can/softing/softing_main.c
    +++ linux-4.15.0/drivers/net/can/softing/softing_main.c
    @@ -393,8 +393,13 @@
/* check or determine and set bittime */
ret = open_candev(ndev);
-if (!ret)
-ret = softing_startstop(ndev, 1);
+if (ret)
+-return ret;
+
+ret = softing_startstop(ndev, 1);
+if (ret < 0)
+close_candev(ndev);
+
return ret;
}

--- linux-4.15.0.orig/drivers/net/can/spi/Kconfig
+++ linux-4.15.0/drivers/net/can/spi/Kconfig
@@ -8,9 +8,10 @@
Driver for the Holt HI311x SPI CAN controllers.
config CAN_MCP251X
-tristate "Microchip MCP251x SPI CAN controllers"
+tristate "Microchip MCP251x and MCP25625 SPI CAN controllers"
deeps on HAS_DMA
-  Driver for the Microchip MCP251x SPI CAN controllers.
+  Driver for the Microchip MCP251x and MCP25625 SPI CAN controllers.
+
endmenu
--- linux-4.15.0.orig/drivers/net/can/spi/hi311x.c
+++ linux-4.15.0/drivers/net/can/spi/hi311x.c
@@ -91,6 +91,7 @@
#define HI3110_STAT_ERRP BIT(3)
#define HI3110_STAT_ERRW BIT(4)
+#define HI3110_STAT_TXMTY BIT(7)
#define HI3110_BTR0_SJW_SHIFT 6
#define HI3110_BTR0_BRP_SHIFT 0
@@ -235,7 +236,7 @@
return ret;
}

-static u8 hi3110_cmd(struct spi_device *spi, u8 command)
+static int hi3110_cmd(struct spi_device *spi, u8 command)
{
 struct hi3110_priv *priv = spi_get_drvdata(spi);
struct hi3110_priv *priv = netdev_priv(net);
struct spi_device *spi = priv->spi;

+mutex_lock(&priv->hi3110_lock);
bec->txerr = hi3110_read(spi, HI3110_READ_TEC);
bec->rxerr = hi3110_read(spi, HI3110_READ_REC);
+mutex_unlock(&priv->hi3110_lock);

return 0;
}

-@ @ -735,10 +738,7 @@
}
}

-if (intf == 0)
-break;
-
-if (intf & HI3110_INT_TXCPLT) {
+if (priv->tx_len && statf & HI3110_STAT_TXMTY) {
    net->stats.tx_packets++;
    net->stats.tx_bytes += priv->tx_len - 1;
    can_led_event(net, CAN_LED_EVENT_TX);
    @ @ -748,6 +748,9 @@
}
 netif_wake_queue(net);
}
+
+if (intf == 0)
+break;
}
mutex_unlock(&priv->hi3110_lock);
return IRQ_HANDLED;

--- linux-4.15.0.orig/drivers/net/can/spi/mcp251x.c
+++ linux-4.15.0/drivers/net/can/spi/mcp251x.c
@@ -1,5 +1,5 @@
/*
- * CAN bus driver for Microchip 251x CAN Controller with SPI Interface
* CAN bus driver for Microchip 251x/25625 CAN Controller with SPI Interface
* MCP2510 support and bug fixes by Christian Pellegrin
* <chripell@evolware.org>
* static struct spi_board_info spi_board_info[] = {
  *
  * .modalias = "mcp2510",
  - */\ or "mcp2515" depending on your controller
  + */\ "mcp2515" or "mcp25625" depending on your controller
  * .platform_data = &mcp251x_info,
  * .irq = IRQ_EINT13,
  * .max_speed_hz = 2*1000*1000,
  @ @ -238,6 +238,7 @@
enum mcp251x_model {
  CAN_MCP251X_MCP2510 = 0x2510,
  CAN_MCP251X_MCP2515 = 0x2515,
  +CAN_MCP251X_MCP25625 = 0x25625,
};

struct mcp251x_priv {
  @ @ -280,7 +281,6 @@
}

MCP251X_IS(2510);
-MCP251X_IS(2515);

static void mcp251x_clean(struct net_device *net)
{
  @ @ -627,7 +627,7 @@
static int mcp251x_hw_reset(struct spi_device *spi)
{
  struct mcp251x_priv *priv = spi_get_drvdata(spi);
  -u8 reg;
  +unsigned long timeout;
  int ret;

  /* Wait for oscillator startup timer after power up */
  @ @ -640,11 +640,20 @@

  /* Wait for oscillator startup timer after reset */
  mdelay(MCP251X_OST_DELAY_MS);
  -
  -reg = mcp251x_read_reg(spi, CANSTAT);
  -if ((reg & CANCTRL_REQOP_MASK) != CANCTRL_REQOP_CONF)
  -return -ENODEV;

  /* Wait for reset to finish */
timeout = jiffies + HZ;
while (mcp251x_read_reg(spi, CANSTAT) & CANCTRL_REQOP_MASK) !=
    CANCTRL_REQOP_CONF) {
    usleep_range(MCP251X_OST_DELAY_MS * 1000,
    MCP251X_OST_DELAY_MS * 1000 * 2);
    if (time_after(jiffies, timeout)) {
        dev_err(&spi->dev,
            "MCP251x didn't enter in conf mode after reset\n");
        return -EBUSY;
    }
    return 0;
}

return regulator_disable(reg);
}

static void mcp251x_open_clean(struct net_device *net)
{
    struct mcp251x_priv *priv = netdev_priv(net);
    struct spi_device *spi = priv->spi;
    -free_irq(spi->irq, priv);
    -mcp251x_hw_sleep(spi);
    -mcp251x_power_enable(priv->transceiver, 0);
    -close_candev(net);
}

static int mcp251x_stop(struct net_device *net)
{
    struct mcp251x_priv *priv = netdev_priv(net);
    if (priv->after_suspend) {
        mcp251x_hw_reset(spi);
        mcp251x_setup(net, priv, spi);
        priv->force_quit = 0;
    } else if (priv->after_suspend & AFTER_SUSPEND_RESTART) {
        mcp251x_set_normal_mode(spi);
    } else if (priv->after_suspend & AFTER_SUSPEND_UP) {
        mcp251x_hw_sleep(spi);
    }
    priv->after_suspend = 0;
    priv->force_quit = 0;
}
if (priv->restart_tx) {
    // - -821.9 +819.8 @@
    /* receive buffer 0 */
    if (intf & CANINTF_RX0IF) {
        mcp251x_hw_rx(spi, 0);
    } /* Free one buffer ASAP
    * (The MCP2515 does this automatically.) */
    +/* Free one buffer ASAP */
    +/* (The MCP2515/25625 does this automatically.) */
    */
    if (mcp251x_is_2510(spi))
        mcp251x_write_bits(spi, CANINTF, CANINTF_RX0IF, 0x00);
    // - -832.7 +829.7 @@
    /* receive buffer 1 */
    if (intf & CANINTF_RX1IF) {
        mcp251x_hw_rx(spi, 1);
    } /* the MCP2515 does this automatically */
    +/* The MCP2515/25625 does this automatically. */
    if (mcp251x_is_2510(spi))
        clear_intf |= CANINTF_RX1IF;
}
// - -956.37 +953.43 @@
flags | IRQF_ONESHOT, DEVICE_NAME, priv);
if (ret) {
    dev_err(&spi->dev, "failed to acquire irq %d\n", spi->irq);
    -mcp251x_power_enable(priv->transceiver, 0);
    -close_candev(net);
    -goto open_unlock;
    +goto out_close;
}

priv->wq = alloc_workqueue("mcp251x_wq", WQ_FREEZABLE | WQ_MEM_RECLAIM, 0);
+if (!priv->wq) {
    +ret = -ENOMEM;
    +goto out_clean;
    +}
INIT_WORK(&priv->tx_work, mcp251x_tx_work_handler);
INIT_WORK(&priv->restart_work, mcp251x_restart_work_handler);

ret = mcp251x_hw_reset(spi);
-if (ret) {
    -mcp251x_open_clean(net);
    -goto open_unlock;
    -}
+if (ret)
    +goto out_free_wq;
ret = mcp251x_setup(net, priv, spi);
    if (ret) {
        mcp251x_open_clean(net);
        goto open_unlock;
    }
    if (ret)
        goto out_free_wq;
ret = mcp251x_set_normal_mode(spi);
    if (ret) {
        mcp251x_open_clean(net);
        goto open_unlock;
    }
    if (ret)
        goto out_free_wq;
can_led_event(net, CAN_LED_EVENT_OPEN);

netif_wake_queue(net);
+mutex_unlock(&priv->mcp_lock);
+
+return 0;

-open_unlock:
+out_free_wq:
+destroy_workqueue(priv->wq);
+out_clean:
+free_irq(spi->irq, priv);
+mcp251x_HW_sleep(spi);
+out_close:
+mcp251x_power_enable(priv->transceiver, 0);
+close_candev(net);
+mutex_unlock(&priv->mcp_lock);
return ret;
}

@ @  -1007.6 +1010.10 @ @
 .compatible = "microchip.mcp2515",
 .data = (void *)CAN_MCP251X_MCP2515,
 }.
+{
 +.compatible = "microchip.mcp25625",
 +.data = (void *)CAN_MCP251X_MCP25625,
 +},
 } |
}: 
MODULE_DEVICE_TABLE(of, mcp251x_of_match);
@ @  -1020.6 +1027.10 @ @
 .name = "mcp2515",
 .driver_data = (kernel_ulong_t)CAN_MCP251X_MCP2515,
{
+ {  
+.name= "mcp25625",
+.driver_data= (kernel_ulong_t)CAN_MCP251X_MCP25625,
+ },
}:
MODULE_DEVICE_TABLE(spi, mcp251x_id_table);
@ @ -1260,5 +1271,5 @@

MODULE_AUTHOR("Chris Elston <celston@katalix.com>, 
"Christian Pellegrin <chripell@evolware.org>");
-MODULE_DESCRIPTION("Microchip 251x CAN driver");
+MODULE_DESCRIPTION("Microchip 251x/25625 CAN driver");
MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/net/can/ti_hecc.c
+++ linux-4.15.0/drivers/net/can/ti_hecc.c
@@ -903,7 +903,8 @@
priv->base = devm_ioremap_resource(&pdev->dev, res);
if (IS_ERR(priv->base)) {
    dev_err(&pdev->dev, "hecc ioremap failed\n");
-return PTR_ERR(priv->base);
+err = PTR_ERR(priv->base);
+goto probe_exit_candev;
}
/* handle hecc-ram memory */
@@ -916,7 +917,8 @@
priv->hecc_ram = devm_ioremap_resource(&pdev->dev, res);
if (IS_ERR(priv->hecc_ram)) {
    dev_err(&pdev->dev, "hecc-ram ioremap failed\n");
-return PTR_ERR(priv->hecc_ram);
+err = PTR_ERR(priv->hecc_ram);
+goto probe_exit_candev;
}
/* handle mbx memory */
@@ -929,13 +931,14 @@
priv->mbx = devm_ioremap_resource(&pdev->dev, res);
if (IS_ERR(priv->mbx)) {
    dev_err(&pdev->dev, "mbx ioremap failed\n");
-return PTR_ERR(priv->mbx);
+err = PTR_ERR(priv->mbx);
+goto probe_exit_candev;
}
irq = platform_get_resource(pdev, IORESOURCE_IRQ, 0);
if (!irq) {

```
dev_err(&pdev->dev, "No irq resource\n");
-goto probe_exit;
+goto probe_exit_candev;
}

priv->ndev = ndev;
@@ -988,7 +991,7 @@
    clk_put(priv->clk);
    probe_exit_candev:
    free_candev(ndev);
    -probe_exit:
    +
    return err;
}

--- linux-4.15.0.orig/drivers/net/can/usb/ems_usb.c
+++ linux-4.15.0/drivers/net/can/usb/ems_usb.c
@@ -267,6 +267,8 @@
    unsigned int free_slots; /* remember number of available slots */

 struct ems_cpc_msg active_params; /* active controller parameters */
 +void *rxbuf[MAX_RX_URBS];
 +dma_addr_t rxbuf_dma[MAX_RX_URBS];
 ;

 static void ems_usb_read_interrupt_callback(struct urb *urb)
 @@ -599,6 +601,7 @@
    for (i = 0; i < MAX_RX_URBS; i++) {
        struct urb *urb = NULL;
        u8 *buf = NULL;
+       dma_addr_t buf_dma;

        /* create a URB, and a buffer for it */
        urb = usb_alloc_urb(0, GFP_KERNEL);
@@ -616,6 +619,8 @@

        buf = usb_alloc_coherent(dev->udev, RX_BUFFER_SIZE, GFP_KERNEL,
 -&urb->transfer_dma);
+&urb->transfer_dma);
+&buf_dma);
    if (!buf) {
        netdev_err(netdev, "No memory left for USB buffer\n");
        usb_free_urb(urb);
@@ -616,6 +619,8 @@
          break;
    }

    +urb->transfer_dma = buf_dma;


+ ush_fill_hulk_urb(urb, dev->udev, usb_rvbulkpipe(dev->udev, 2),
  buf, RX_BUFFER_SIZE,
  ems_usmd_read_bulk_callback, dev);
@@ -631,6 +636,9 @@
breae;
 }
+dev->rxbuf[i] = buf;
+dev->rxbuf_dma[i] = buf_dma;
+
 /* Drop reference, USB core will take care of freeing it */
 ush_free_urb(urb);
@@ -696,6 +704,10 @@
 usb_kill_anchored Urbs(&dev->rx_submitted);
+
+for (i = 0; i < MAX_RX_URBS; ++i)
+ush_free_coherent(dev->udev, RX_BUFFER_SIZE,
+  dev->rxbuf[i], dev->rxbuf_dma[i]);
+
  usb_kill_anchored Urbs(&dev->tx_submitted);
 atomic_set(&dev->active_tx Urbs, 0);
@@ -1065,13 +1077,15 @@
 if (dev) {
 unregister_netdev(dev->netdev);
-free_candev(dev->netdev);

 unlink_all_urbdev(dev);

 ush_free_urb(dev->intr_urb);

 kfree(dev->intr_in_buffer);
+kfree(dev->tx_msg_buffer);
+
+free_candev(dev->netdev);
 } 
 
 --- linux-4.15.0.orig/drivers/net/can/usb/esd_usb2.c
 +++ linux-4.15.0/drivers/net/can/usb/esd_usb2.c
 @@ -207,6 +207,8 @@
 int net_count;
 u32 version;
 int rxinitdone;

+void *rxbuf[MAX_RX_URBS];
+dma_addr_t rxbuf_dma[MAX_RX_URBS];
};

struct esd_usb2_net_priv {
    /*...
    @ @ -234,8 +236,8 @@
    if (id == ESD_EV_CAN_ERROR_EXT) {
    u8 state = msg->msg.rx.data[0];
    u8 ecc = msg->msg.rx.data[1];
    -u8 txerr = msg->msg.rx.data[2];
    -u8 rxerr = msg->msg.rx.data[3];
    +u8 rxerr = msg->msg.rx.data[2];
    +u8 txerr = msg->msg.rx.data[3];

    skb = alloc_can_err_skb(priv->netdev, &cf);
    if (skb == NULL) {
        @ @ -556,6 +558,7 @@
    for (i = 0; i < MAX_RX_URBS; i++) {
        struct urb *urb = NULL;
        u8 *buf = NULL;
        +dma_addr_t buf_dma;

        /* create a URB, and a buffer for it */
        urb = usb_alloc_urb(0, GFP_KERNEL);
        @ @ -565,7 +568,7 @@
    }

    buf = usb_alloc_coherent(dev->udev, RX_BUFFER_SIZE, GFP_KERNEL,
        - &urb->transfer_dma);
    + &buf_dma);
    if (!buf) {
        dev_warn(dev->udev->dev.parent,
            "No memory left for USB buffer\n");
        @ @ -573,6 +576,8 @@
        goto freeurb;
    }

    +urb->transfer_dma = buf_dma;
    +
    usb_fill_bulk_urb(urb, dev->udev,
        -usb_rcvbulkpipe(dev->udev, 1),
        +buf, RX_BUFFER_SIZE,
        @ @ -585,8 +590,12 @@
    usb_unanchor_urb(urb);
    usb_free_coherent(dev->udev, RX_BUFFER_SIZE, buf,
        -urb->transfer_dma);
    +goto freeurb;
}
dev->rxbuf[i] = buf;
+dev->rxbuf_dma[i] = buf_dma;
+
freeurb:
/* Drop reference, USB core will take care of freeing it */
usb_free_urb(urb);
@@ -674,6 +683,11 @@
int i, j;

usb_kill_anchored_urbs(&dev->rx_submitted);
+
+for (i = 0; i < MAX_RX_URBS; ++i)
+usb_free_coherent(dev->udev, RX_BUFFER_SIZE,
+dev->rxbuf[i], dev->rxbuf_dma[i]);
+
for (i = 0; i < dev->net_count; i++) {
priv = dev->nets[i];
if (priv) {
--- linux-4.15.0.orig/drivers/net/can/usb/gs_usb.c
+++ linux-4.15.0/drivers/net/can/usb/gs_usb.c
@@ -71,21 +71,27 @@
};

/* data types passed between host and device */
+
+/* The firmware on the original USB2CAN by Geschwister Schneider
+ * Technologie Entwicklungs- und Vertriebs UG exchanges all data
+ * between the host and the device in host byte order. This is done
+ * with the struct gs_host_config::byte_order member, which is sent
+ * first to indicate the desired byte order.
+ *
+ * The widely used open source firmware candleLight doesn't support
+ * this feature and exchanges the data in little endian byte order.
+ */
struct gs_host_config {
- u32 byte_order;
+__le32 byte_order;  
 } __packed;
-/* All data exchanged between host and device is exchanged in host byte order,
-* thanks to the struct gs_host_config byte_order member, which is sent first
-* to indicate the desired byte order.
- */

struct gs_device_config {
 u8 reserved1;
 u8 reserved2;
 u8 reserved3;
u8 icount;
-u32 sw_version;
-u32 hw_version;
+__le32 sw_version;
+__le32 hw_version;
} __packed;

#define GS_CAN_MODE_NORMAL       0
@@ -95,26 +101,26 @@
#define GS_CAN_MODE_ONE_SHOT     BIT(3)

struct gs_device_mode {
    -u32 mode;
    -u32 flags;
    +__le32 mode;
    +__le32 flags;
} __packed;

struct gs_device_state {
    -u32 state;
    -u32 rxerr;
    -u32 txerr;
    +__le32 state;
    +__le32 rxerr;
    +__le32 txerr;
} __packed;

struct gs_device_bittiming {
    -u32 prop_seg;
    -u32 phase_seg1;
    -u32 phase_seg2;
    -u32 sjw;
    -u32 brp;
    +__le32 prop_seg;
    +__le32 phase_seg1;
    +__le32 phase_seg2;
    +__le32 sjw;
    +__le32 brp;
} __packed;

struct gs_identify_mode {
    -u32 mode;
    +__le32 mode;
} __packed;

#define GS_CAN_FEATURE_LISTEN_ONLY BIT(0)
@@ -125,23 +131,23 @@
#define GS_CAN_FEATURE_IDENTIFY     BIT(5)
struct gs_device_bt_const {
    u32 feature;
    u32 fclk_can;
    u32 tseg1_min;
    u32 tseg1_max;
    u32 tseg2_min;
    u32 tseg2_max;
    u32 sjw_max;
    u32 brp_min;
    u32 brp_max;
    u32 brp_inc;
    __le32 feature;
    __le32 fclk_can;
    __le32 tseg1_min;
    __le32 tseg1_max;
    __le32 tseg2_min;
    __le32 tseg2_max;
    __le32 sjw_max;
    __le32 brp_min;
    __le32 brp_max;
    __le32 brp_inc;
} __packed;

#define GS_CAN_FLAG_OVERFLOW 1

struct gs_host_frame {
    u32 echo_id;
    u32 can_id;
    __le32 can_id;
    u8 can_dlc;
    u8 channel;

    if (!skb)
        return;

    cf->can_id = hf->can_id;
    cf->can_dlc = get_can_dlc(hf->can_dlc);
    memcpy(cf->data, hf->data, 8);

    /* ERROR frames tell us information about the controller */
    if (hf->can_id & CAN_ERR_FLAG)
        gs_update_state(dev, cf);
netdev->stats.rx_packets++;  
@@ -426,11 +432,11 @@
if (!dbt)  
    return -ENOMEM;

-dbt->prop_seg = bt->prop_seg;
-dbt->phase_seg1 = bt->phase_seg1;
-dbt->phase_seg2 = bt->phase_seg2;
-dbt->sjw = bt->sjw;
-dbt->brp = bt->brp;
+dbt->prop_seg = cpu_to_le32(bt->prop_seg);
+dbt->phase_seg1 = cpu_to_le32(bt->phase_seg1);
+dbt->phase_seg2 = cpu_to_le32(bt->phase_seg2);
+dbt->sjw = cpu_to_le32(bt->sjw);
+dbt->brp = cpu_to_le32(bt->brp);

    /* request bit timings */
    rc = usb_control_msg(interface_to_usbdev(intf),
@@ -511,7 +517,7 @@
    cf = (struct can_frame *)skb->data;

-hf->can_id = cf->can_id;
+hf->can_id = cpu_to_le32(cf->can_id);
    hf->can_dlc = cf->can_dlc;
    memcpy(hf->data, cf->data, cf->can_dlc);

@@ -581,6 +587,7 @@
    int rc, i;
    struct gs_device_mode *dm;
    u32 ctrlmode;
+u32 flags = 0;

    rc = open_candev(netdev);
    if (rc)
@@ -631,6 +638,7 @@
        rc);

        usb_unanchor_urb(urb);
    +usb_free_urb(urb);
        break;
    }

@@ -647,24 +655,24 @@
        /* flags */
        ctrlmode = dev->can.ctrlmode;
        -dm->flags = 0;
        +dm->flags = 0;

        /* flags */
        ctrlmode = dev->can.ctrlmode;
        -dm->flags = 0;
        +dm->flags = 0;

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if (ctrlmode & CAN_CTRLMODE_LOOPBACK)
  - dm->flags |= GS_CAN_MODE_LOOP_BACK;
  + flags |= GS_CAN_MODE_LOOP_BACK;
else if (ctrlmode & CAN_CTRLMODE_LISTENONLY)
  - dm->flags |= GS_CAN_MODE_LISTEN_ONLY;
  + flags |= GS_CAN_MODE_LISTEN_ONLY;
/* Controller is not allowed to retry TX */
* this mode is unavailable on atmels uc3c hardware */
if (ctrlmode & CAN_CTRLMODE_ONE_SHOT)
  - dm->flags |= GS_CAN_MODE_ONE_SHOT;
  + flags |= GS_CAN_MODE_ONE_SHOT;
if (ctrlmode & CAN_CTRLMODE_3_SAMPLES)
  - dm->flags |= GS_CAN_MODE_TRIPLE_SAMPLE;
  + flags |= GS_CAN_MODE_TRIPLE_SAMPLE;
/* finally start device */
  - dm->mode = GS_CAN_MODE_START;
  + dm->mode = cpu_to_le32(GS_CAN_MODE_START);
  + dm->flags = cpu_to_le32(flags);
rc = usb_control_msg(interface_to_usbdev(dev->iface),
  usb_sndctrlpipe(interface_to_usbdev(dev->iface), 0),
  GS_USB_BREQ_MODE,
@@ -744,9 +752,9 @@
 return -ENOMEM;
if (do_identify)
  - imode->mode = GS_CAN_IDENTIFY_ON;
  + imode->mode = cpu_to_le32(GS_CAN_IDENTIFY_ON);
  else
  - imode->mode = GS_CAN_IDENTIFY_OFF;
  + imode->mode = cpu_to_le32(GS_CAN_IDENTIFY_OFF);
rc = usb_control_msg(interface_to_usbdev(dev->iface),
  usb_sndctrlpipe(interface_to_usbdev(dev->iface),
@@ -797,6 +805,7 @@
 struct net_device *netdev;
 int rc;
 struct gs_device_bt_const *bt_const;
+u32 feature;

 bt_const = kmalloc(sizeof(*bt_const), GFP_KERNEL);
 if (!bt_const)
@@ -837,14 +846,14 @@
/* dev setup */
strcpy(dev->bt_const.name, "gs_usb");
-dev->bt_const.tseg1_min = bt_const->tseg1_min;
-dev->bt_const.tseg1_max = bt_const->tseg1_max;
-dev->bt_const.tseg2_min = bt_const->tseg2_min;
-dev->bt_const.tseg2_max = bt_const->tseg2_max;
-dev->bt_const.sjw_max = bt_const->sjw_max;
-dev->bt_const.brp_min = bt_const->brp_min;
-dev->bt_const.brp_max = bt_const->brp_max;
-dev->bt_const.brp_inc = bt_const->brp_inc;
+dev->bt_const.tseg1_min = le32_to_cpu(bt_const->tseg1_min);
+dev->bt_const.tseg1_max = le32_to_cpu(bt_const->tseg1_max);
+dev->bt_const.tseg2_min = le32_to_cpu(bt_const->tseg2_min);
+dev->bt_const.tseg2_max = le32_to_cpu(bt_const->tseg2_max);
+dev->bt_const.sjw_max = le32_to_cpu(bt_const->sjw_max);
+dev->bt_const.brp_min = le32_to_cpu(bt_const->brp_min);
+dev->bt_const.brp_max = le32_to_cpu(bt_const->brp_max);
+dev->bt_const.brp_inc = le32_to_cpu(bt_const->brp_inc);

dev->udev = interface_to_usbdev(intf);
dev->iface = intf;
@@ -861,28 +870,29 @@
/* can settup */
dev->can.state = CAN_STATE_STOPPED;
-dev->can.clock.freq = bt_const->fclk_can;
+dev->can.clock.freq = le32_to_cpu(bt_const->fclk_can);
dev->can.bittiming_const = &dev->bt_const;
dev->can.do_set_bittiming = gs_usb_set_bittiming;

dev->can.ctrlmode_supported = 0;

-if (bt_const->feature & GS_CAN_FEATURE_LISTEN_ONLY)
+feature = le32_to_cpu(bt_const->feature);
+if (feature & GS_CAN_FEATURE_LISTEN_ONLY)
  dev->can.ctrlmode_supported |= CAN_CTRLMODE_LISTENONLY;

-if (bt_const->feature & GS_CAN_FEATURE_LOOP_BACK)
+if (feature & GS_CAN_FEATURE_LOOP_BACK)
  dev->can.ctrlmode_supported |= CAN_CTRLMODE_LOOPBACK;

-if (bt_const->feature & GS_CAN_FEATURE_TRIPLE_SAMPLE)
+if (feature & GS_CAN_FEATURE_TRIPLE_SAMPLE)
  dev->can.ctrlmode_supported |= CAN_CTRLMODE_3_SAMPLES;

-if (bt_const->feature & GS_CAN_FEATURE_ONE_SHOT)
+if (feature & GS_CAN_FEATURE_ONE_SHOT)
  dev->can.ctrlmode_supported |= CAN_CTRLMODE_ONE_SHOT;
SET_NETDEV_DEV(netdev, &intf->dev);

-if (dconf->sw_version > 1)
-if (bt_const->feature & GS_CAN_FEATURE_IDENTIFY)
+if (le32_to_cpu(dconf->sw_version) > 1)
+if (feature & GS_CAN_FEATURE_IDENTIFY)
netdev->ethtool_ops = &gs_usb_ethtool_ops;

kfree(bt_const);
@@ -917,7 +927,7 @@
if (!hconf)
return -ENOMEM;

-hconf->byte_order = 0x0000beef;
+hsconf->byte_order = cpu_to_le32(0x0000beef);

/* send host config */
rc = usb_control_msg(interface_to_usbdev(intf),
@@ -925,7 +935,7 @@
    GS_USB_BREQ_HOST_FORMAT,
    USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_INTERFACE,
    1,
-    intf->altsetting[0].desc.bInterfaceNumber,
+    intf->cur_altsetting->desc.bInterfaceNumber,
    hconf,
    sizeof(*hconf),
    1000);
@@ -948,7 +958,7 @@
    GS_USB_BREQ_DEVICE_CONFIG,
    USB_DIR_IN | USB_TYPE_VENDOR | USB_RECIP_INTERFACE,
    1,
-    intf->altsetting[0].desc.bInterfaceNumber,
+    intf->cur_altsetting->desc.bInterfaceNumber,
    dconf,
    sizeof(*dconf),
    1000);
--- linux-4.15.0.orig/drivers/net/can/usb/kvaser_usb.c
+++ linux-4.15.0/drivers/net/can/usb/kvaser_usb.c
@@ -791,7 +791,7 @@
if (!urb)
return -ENOMEM;

-buf = kmalloc(sizeof(struct kvaser_msg), GFP_ATOMIC);
+buzf = kzalloc(sizeof(struct kvaser_msg), GFP_ATOMIC);
if (!buf) {
    usb_free_urb(urb);
return -ENOMEM;
skb = alloc_can_skb(priv->netdev, &cf);
if (!skb) {
  -stats->tx_dropped++;
  +stats->rx_dropped++;
  return;
}

msg = kmalloc(sizeof(*msg), GFP_KERNEL);
if (!msg)
  return -ENOMEM;

/* CAN frame */
if (!ctx)
  return NETDEV_TX_BUSY;

if (cf->can_id & CAN_EFF_FLAG) {
  /* SIDH    | SIDL                 | EIDH   | EIDL
   * 28 - 21 | 20 19 18 x x x 17 16 | 15 - 8 | 7 - 0
   */
  * -368,8 +368,8 @@
if (cf->can_id & CAN_RTR_FLAG)
    usb_msg.dlc |= MCBA_DLC_RTR_MASK;
+
+    can_put_echo_skb(skb, priv->netdev, ctx->ndx);
    +
    err = mcba_usb_xmit(priv, (struct mcba_usb_msg *)&usb_msg, ctx);
    if (err)
        goto xmit_failed;
    @@ -644,6 +646,7 @@
        for (i = 0; i < MCBA_MAX_RX_URBS; i++) {
            struct urb *urb = NULL;
            u8 *buf;
            +    dma_addr_t buf_dma;

            /* create a URB, and a buffer for it */
            urb = usb_alloc_urb(0, GFP_KERNEL);
            @@ -653,7 +656,7 @@
                }
                buf = usb_alloc_coherent(priv->udev, MCBA_USB_RX_BUFF_SIZE,
                    - GFP_KERNEL, &urb->transfer_dma);
                    + GFP_KERNEL, &buf_dma);
                if (!buf) {
                    netdev_err(netdev, "No memory left for USB buffer\n");
                    usb_free_urb(urb);
                    @@ -661,6 +664,8 @@
                    break;
                    }

                +urb->transfer_dma = buf_dma;
                +
                usb_fill_bulk_urb(urb, priv->udev,
                    - usb_rcvbulkpipe(priv->udev, MCBA_USB_EP_IN),
                    - buf, MCBA_USB_RX_BUFF_SIZE,
                    @@ -672,11 +677,14 @@
                    if (err) {
                        usb_unanchor_urb(urb);
                        usb_free_coherent(priv->udev, MCBA_USB_RX_BUFF_SIZE,
                            - buf, urb->transfer_dma);
                            + buf, buf_dma);
                            usb_free_urb(urb);
                            break;
                            }

                +rxbuf[i] = buf;
                +rxbuf_dma[i] = buf_dma;
                +
                /* Drop reference, USB core will take care of freeing it */
usb_free_urb(urb);
}
@@ -719,7 +727,14 @@
static void mcba_urb_unlink(struct mcba_priv *priv)
{
+int i;
+
usb_kill_anchored_urbs(&priv->rx_submitted);
+
+for (i = 0; i < MCBA_MAX_RX_URBS; ++i)
+usb_free_coherent(priv->udev, MCBA_USB_RX_BUFF_SIZE,
+ priv->rxbuff[i], priv->rxbuf_dma[i]);
+
usb_kill_anchored_urbs(&priv->tx_submitted);
}
@@ -887,9 +902,8 @@
netdev_info(priv->netdev, "device disconnected\n");

unregister_candev(priv->netdev);
-free_candev(priv->netdev);
-
mcba_urb_unlink(priv);
+free_candev(priv->netdev);
}

static struct usb_driver mcba_usb_driver = {
--- linux-4.15.0.orig/drivers/net/can/usb/peak_usb/pcan_usb.c
+++ linux-4.15.0/drivers/net/can/usb/peak_usb/pcan_usb.c
@@ -108,7 +108,7 @@
 u8 *end;
 u8 rec_cnt;
 u8 rec_idx;
-u8 rec_data_idx;
+u8 rec_ts_idx;
 struct net_device *netdev;
 struct pcan_usb *pdev;
};
@@ -444,8 +444,8 @@
 if ((n & PCAN_USB_ERROR_BUS_LIGHT) == 0) {
 /* no error (back to active state) */
 -mc->pdev->dev.can.state = CAN_STATE_ERROR_ACTIVE;
 -return 0;
+new_state = CAN_STATE_ERROR_ACTIVE;
+break;
 }
break;

@@ -468,9 +468,9 @@
      mc->pdev->dev.can.state = CAN_STATE_ERROR_ACTIVE;
      return 0;
+/* no error (back to warning state) */
+new_state = CAN_STATE_ERROR_WARNING;
+break;
  }
break;

@@ -509,6 +509,11 @@
mc->pdev->dev.can_stats.error_warning++;
break;

+case CAN_STATE_ERROR_ACTIVE:
+cf->can_id |= CAN_ERR_CRTL;
+cf->data[1] = CAN_ERR_CRTL_ACTIVE;
+break;
+
+/* CAN_STATE_MAX (trick to handle other errors) */
cf->can_id |= CAN_ERR_CRTL;
@@ -555,10 +560,15 @@
mc->ptr += PCAN_USB_CMD_ARGS;

if (status_len & PCAN_USB_STATUSLEN_TIMESTAMP) {
-  int err = pcan_usb_decode_ts(mc, !mc->rec_idx);
+  int err = pcan_usb_decode_ts(mc, !mc->rec_ts_idx);
if (err)
  return err;
+
+  /* Next packet in the buffer will have a timestamp on a single
+     * byte
+     */
+  mc->rec_ts_idx++;
  }

switch (f) {
@@ -641,10 +651,13 @@
cf->can_dlc = get_can_dlc(rec_len);
/* first data packet timestamp is a word */
if (pcan_usb_decode_ts(mc, !mc->rec_data_idx))
/* Only first packet timestamp is a word */
+if (pcan_usb_decode_ts(mc, !mc->rec_ts_idx))
go to decode failed;

+/* Next packet in the buffer will have a timestamp on a single byte */
+mc->rec_ts_idx++;
+
/* read data */
memset(cf->data, 0x0, sizeof(cf->data));
if (status_len & PCAN_USB_STATUSLEN_RTR) {
    mc.rec_data_idx++;
}

--- linux-4.15.0.orig/drivers/net/can/usb/peak_usb/pcan_usb_core.c
+++ linux-4.15.0/drivers/net/can/usb/peak_usb/pcan_usb_core.c
@@ -154,14 +154,55 @@
    /* protect from getting timeval before setting now */
    if (time_ref->tv_host.tv_sec > 0) {
        u64 delta_us;
        +s64 delta_ts = 0;

        -delta_us = ts - time_ref->ts_dev_2;
        -delta_us &= (1 << time_ref->adapter->ts_used_bits) - 1;
        +/* General case: dev_ts_1 < dev_ts_2 < ts, with:
            + * - dev_ts_1 = previous sync timestamp
            + * - dev_ts_2 = last sync timestamp
            + * - ts = event timestamp
            + * - ts_period = known sync period (theoretical)
            + * - dev_ts2 - dev_ts1
            + */
            +but*:
            +
            + * - time counters wrap (see adapter->ts_used_bits)
            + * - sometimes, dev_ts_1 < ts < dev_ts2
            + *
            + *"normal" case (sync time counters increase):
            + * must take into account case when ts wraps (tsw)
            + *
            + * < ts_period > < >
            + * | | |
/*
 * -------------------0-+-+-
 * ts_dev_1 | ts_dev_2 |
 * ts         tsw
 */

if (time_ref->ts_dev_1 < time_ref->ts_dev_2) {
    /* case when event time (tsw) wraps */
    if (ts < time_ref->ts_dev_1)
      delta_ts = BIT_ULL(time_ref->adapter->ts_used_bits);
    /* Otherwise, sync time counter (ts_dev_2) has wrapped:
     * handle case when event time (tsn) hasn't.
     * < ts_period > <          >
     *  |             |            |
     * 0-+--------+----+-------0-+--+-->
     *     ts_dev_1 |    ts_dev_2  |
     *              tsn            ts
 */
} else if (time_ref->ts_dev_1 < ts) {
    delta_ts = -BIT_ULL(time_ref->adapter->ts_used_bits);
}

/* add delay between last sync and event timestamps */
delta_ts += (signed int)(ts - time_ref->ts_dev_2);

-delta_us += time_ref->ts_total;
/* add time from beginning to last sync */
+delta_us += time_ref->ts_total;

-delta_us *= time_ref->adapter->us_per_ts_scale;
/* convert ticks number into microseconds */
+delta_us = delta_ts * time_ref->adapter->us_per_ts_scale;
delta_us >>= time_ref->adapter->us_per_ts_shift;

*tv = time_ref->tv_host_0;
/** @ @ -594.16 +635.16 @ @
 dev->state &= ~PCAN_USB_STATE_STARTED;
 netif_stop_queue(netdev);

+close_candev(netdev);
+
+dev->can.state = CAN_STATE_STOPPED;
+
/* unlink all pending urbs and free used memory */
peak_usb_unlink_all_urbs(dev);

if (dev->adapter->dev_stop)
  dev->adapter->dev_stop(dev);
- close_candev(netdev);
-
-dev->can.state = CAN_STATE_STOPPED;
-
/* can set bus off now */
if (dev->adapter->dev_set_bus) {
    int err = dev->adapter->dev_set_bus(dev, 0);
    @ @ -776,7 +817,7 @ @
    dev = netdev_priv(netdev);
}

/* allocate a buffer large enough to send commands */
-dev->cmd_buf = kmalloc(PCAN_USB_MAX_CMD_LEN, GFP_KERNEL);
+dev->cmd_buf = kzalloc(PCAN_USB_MAX_CMD_LEN, GFP_KERNEL);
if (!dev->cmd_buf) {
    err = -ENOMEM;
    goto lbl_free_candev;
    @ @ -841,7 +882,7 @ @
    if (dev->adapter->dev_set_bus) {
        err = dev->adapter->dev_set_bus(dev, 0);
        if (err)
            -goto lbl_unregister_candev;
            +goto adap_dev_free;
    }

/* get device number early */
@ @ -853,6 +894,10 @ @

return 0;

+adap_dev_free:
+if (dev->adapter->dev_free)
+dev->adapter->dev_free(dev);
+
lbl_unregister_candev:
unregister_candev(netdev);

@ @ -881,7 +926,7 @ @

dev_prev_siblings = dev->prev_siblings;
dev->state &= ~PCAN_USB_STATE_CONNECTED;
-strncpy(name, netdev->name, IFNAMSIZ);
+strlcpy(name, netdev->name, IFNAMSIZ);
+strlcpy(name, netdev->name, IFNAMSIZ);

unregister_netdev(netdev);

--- linux-4.15.0.orig/drivers/net/can/usb/peak_usb/pcan_usb_fd.c
+++ linux-4.15.0/drivers/net/can/usb/peak_usb/pcan_usb_fd.c
@@ -476,12 +476,18 @@
    struct pucan_msg *rx_msg)
 {
    struct pucan_rx_msg *rm = (struct pucan_rx_msg *)rx_msg;
-   struct peak_usb_device *dev = usb_if->dev[pucan_msg_get_channel(rm)];
-   struct net_device *netdev = dev->netdev;
+   struct peak_usb_device *dev;
+   struct net_device *netdev;
    struct canfd_frame *cfd;
    struct sk_buff *skb;
    const u16 rx_msg_flags = le16_to_cpu(rm->flags);
+
+    if (pucan_msg_get_channel(rm) >= ARRAY_SIZE(usb_if->dev))
+        return -ENOMEM;
+    dev = usb_if->dev[pucan_msg_get_channel(rm)];
    netdev = dev->netdev;

    if (rx_msg_flags & PUCAN_MSG_EXT_DATA_LEN) {
        /* CANFD frame case */
        skb = alloc_canfd_skb(netdev, &cfd);
        peak_usb_netif_rx(skb, &usb_if->time_ref,
            le32_to_cpu(rm->ts_low), le32_to_cpu(rm->ts_high));

        netdev->stats.rx_packets++;
        netdev->stats.rx_bytes += cfd->len;
+
+        peak_usb_netif_rx(skb, &usb_if->time_ref,
+            le32_to_cpu(rm->ts_low), le32_to_cpu(rm->ts_high));
+        return 0;
    }
 }
@@ -528,15 +534,21 @@
    struct pucan_msg *rx_msg)
 {
    struct pucan_status_msg *sm = (struct pucan_status_msg *)rx_msg;
-   struct peak_usb_device *dev = usb_if->dev[pucan_stmsg_get_channel(sm)];
-   struct pcan_usb_fd_device *pdev =
-      container_of(dev, struct pcan_usb_fd_device, dev);
+   struct pcan_usb_fd_device *pdev =
+      container_of(dev, struct pcan_usb_fd_device, dev);
    enum can_state new_state = CAN_STATE_ERROR_ACTIVE;
    enum can_state rx_state, tx_state;
    struct net_device *netdev = dev->netdev;

@@ -514,12 +520,12 @@
 else
     memcpy(cfd->data, rm->d, cfd->len);
-    peak_usb_netif_rx(skb, &usb_if->time_ref,
-        le32_to_cpu(rm->ts_low), le32_to_cpu(rm->ts_high));
-    netdev->stats.rx_packets++;
-    netdev->stats.rx_bytes += cfd->len;
+
+    peak_usb_netif_rx(skb, &usb_if->time_ref,
+        le32_to_cpu(rm->ts_low), le32_to_cpu(rm->ts_high));
+    return 0;
+struct peak_usb_device *dev;
+struct net_device *netdev;
struct can_frame *cf;
struct sk_buff *skb;

+if (pucan_stmsg_get_channel(sm) >= ARRAY_SIZE(usb_if->dev))
+return -ENOMEM;
+
+dev = usb_if->dev[pucan_stmsg_get_channel(sm)];
+pdev = container_of(dev, struct pcan_usb_fd_device, dev);
+netdev = dev->netdev;
+
/* nothing should be sent while in BUS_OFF state */
if (dev->can.state == CAN_STATE_BUS_OFF)
return 0;
@@ -548,11 +560,10 @@
 } else if (sm->channel_p_w_b & PUCAN_BUS_WARNING) {
 new_state = CAN_STATE_ERROR_WARNING;
 } else {
-/* no error bit (so, no error skb, back to active state) */
-dev->can.state = CAN_STATE_ERROR_ACTIVE;
+/* back to (or still in) ERROR_ACTIVE state */
+new_state = CAN_STATE_ERROR_ACTIVE;
 pdev->bec.txerr = 0;
 pdev->bec.rxerr = 0;
return 0;
 }

/* state hasn't changed */
@@ -575,12 +586,12 @@
 if (!skb)
 return -ENOMEM;
-peak_usb_netif_rx(skb, &usb_if->time_ref,
- le32_to_cpu(sm->ts_low), le32_to_cpu(sm->ts_high));
- netdev->stats.rx_packets++;;
 netdev->stats.rx_bytes += cf->can_dlc;
+
+peak_usb_netif_rx(skb, &usb_if->time_ref,
+ le32_to_cpu(sm->ts_low), le32_to_cpu(sm->ts_high));
+ return 0;
 }
@@ -589,9 +600,14 @@
 struct pucan_msg *rx_msg)
 {
struct pucan_error_msg *er = (struct pucan_error_msg *)rx_msg;
-struct peak_usb_device *dev = usb_if->dev[pucan_errnomsg_get_channel(er)];
-struct pcan_usb_fd_device *pdev =
-container_of(dev, struct pcan_usb_fd_device, dev);
+struct pcan_usb_fd_device *pdev;
+struct peak_usb_device *dev;
+
+if (pucan_errnomsg_get_channel(er) >= ARRAY_SIZE(usb_if->dev))
+return -EINVAL;
+
+dev = usb_if->dev[pucan_errnomsg_get_channel(er)];
+pdev = container_of(dev, struct pcan_usb_fd_device, dev);

/* keep a trace of tx and rx error counters for later use */
pdev->bec.txerr = er->tx_err_cnt;
@@ -605,11 +621,17 @@
   struct pucan_msg *rx_msg)
 {
     struct pcan_ufd_ovr_msg *ov = (struct pcan_ufd_ovr_msg *)rx_msg;
-struct peak_usb_device *dev = usb_if->dev[pufd_omsg_get_channel(ov)];
-struct net_device *netdev = dev->netdev;
+struct peak_usb_device *dev;
+struct net_device *netdev;
 struct can_frame *cf;
 struct sk_buff *skb;
+
+if (pufd_omsg_get_channel(ov) >= ARRAY_SIZE(usb_if->dev))
+return -EINVAL;
+
+dev = usb_if->dev[pufd_omsg_get_channel(ov)];
+netdev = dev->netdev;
+
/* allocate an skb to store the error frame */
 skb = alloc_can_err_skb(netdev, &cf);
 if (!skb)
@@ -727,6 +749,9 @@
   u16 tx_msg_size, tx_msg_flags;
   u8 can_dlc;
+
+if (cfd->len > CANFD_MAX_DLEN)
+return -EINVAL;
+
 tx_msg_size = ALIGN(sizeof(struct pucan_tx_msg) + cfd->len, 4);
 tx_msg->size = cpu_to_le16(tx_msg_size);
 tx_msg->type = cpu_to_le16(PUCAN_MSG_CAN_TX);
@@ -852,7 +877,7 @@
goto err_out;
/* allocate command buffer once for all for the interface */
-pdev->cmd_buffer_addr = kmalloc(PCAN_UFD_CMD_BUFFER_SIZE,
+pdev->cmd_buffer_addr = kzalloc(PCAN_UFD_CMD_BUFFER_SIZE,
GFP_KERNEL);
if (!pdev->cmd_buffer_addr)
  goto err_out_1;
--- linux-4.15.0.orig/drivers/net/can/usb/peak_usb/pcan_usb_pro.c
+++ linux-4.15.0/drivers/net/can/usb/peak_usb/pcan_usb_pro.c
@@ -500,7 +500,7 @@
 u8 *buffer;
 int err;

-buffer = kmalloc(PCAN_USBPRO_FCT_DRVLD_REQ_LEN, GFP_KERNEL);
+buffer = kzalloc(PCAN_USBPRO_FCT_DRVLD_REQ_LEN, GFP_KERNEL);
if (!buffer)
  return -ENOMEM;
--- linux-4.15.0.orig/drivers/net/can/usb/usb_8dev.c
+++ linux-4.15.0/drivers/net/can/usb/usb_8dev.c
@@ -148,7 +148,8 @@
 u8 *cmd_msg_buffer;
 }
+void *rxbuf[MAX_RX_URBS];
+dma_addr_t rxbuf_dma[MAX_RX_URBS];
};

/* tx frame */
@@ -744,6 +745,7 @@
 for (i = 0; i < MAX_RX_URBS; i++) {
 struct urb *urb = NULL;
 u8 *buf;
+dma_addr_t buf_dma;

 /* create a URB, and a buffer for it */
 urb = usb_alloc_urb(0, GFP_KERNEL);
@@ -753,7 +755,7 @@
 break;

usb_fill_bulk_urb(urb, priv->udev,
    usb_rcvbulkpipe(priv->udev,
        USB_8DEV_ENDP_DATA_RX),
    @@ -778,6 +782,9 @@
        break;
    }

    priv->rxbuf[i] = buf;
    priv->rxbuf_dma[i] = buf_dma;
+ /* Drop reference, USB core will take care of freeing it */
    usb_free_urb(urb);
}
@@ -847,6 +854,10 @@
    usb_kill_anchored_urbs(&priv->rx_submitted);

    for (i = 0; i < MAX_RX_URBS; ++i)
        usb_free_coherent(priv->udev, RX_BUFFER_SIZE,
            priv->rxbuf[i], priv->rxbuf_dma[i]);
+ usb_kill_anchored_urbs(&priv->tx_submitted);
    atomic_set(&priv->active_tx_urbs, 0);

    netdev_info(priv->netdev, "device disconnected\n");

    unregister_netdev(priv->netdev);
    -free_candev(priv->netdev);
- unlink_all_urbs(priv);
+free_candev(priv->netdev);

--- linux-4.15.0.orig/drivers/net/can/vxcan.c
+++ linux-4.15.0/drivers/net/can/vxcan.c
@@ -49,6 +49,7 @@
    struct net_device *peer;
    struct canfd_frame *cfd = (struct canfd_frame *)skb->data;
    struct net_device_stats *peerstats, *srcstats = &dev->stats;
+    u8 len;

    if (can_dropped_invalid_skb(dev, skb))
    }
return NETDEV_TX_OK;
@@ -71,12 +72,13 @@
skb->dev = peer;
skb->ip_summed = CHECKSUM_UNNECESSARY;

+len = cfd->len;
if (netif_rx_ni(skb) == NET_RX_SUCCESS) {
srcstats->tx_packets++;
-srcstats->tx_bytes += cfd->len;
+len = cfd->len;
peerstats = &peer->stats;
peerstats->rx_packets++;
-peerstats->rx_bytes += cfd->len;
+peerstats->rx_bytes += len;
}

out_unlock:
--- linux-4.15.0.orig/drivers/net/can/xilinx_can.c
+++ linux-4.15.0/drivers/net/can/xilinx_can.c
@@ -2,6 +2,7 @@
* *
* Copyright (C) 2012 - 2014 Xilinx, Inc.
* Copyright (C) 2009 PetaLogix. All rights reserved.
+ * Copyright (C) 2017 Sandvik Mining and Construction Oy
* *
* Description:
* This driver is developed for Axi CAN IP and for Zynq CANPS Controller.
@@ -25,8 +26,10 @@
#define XCAN_INTR_ALL (XCAN_IXR_TXOK_MASK | XCAN_IXR_BSOFF_MASK |
                     XCAN_IXR_WKUP_MASK | XCAN_IXR_SLP_MASK |
                     XCAN_IXR_RXNEMP_MASK | XCAN_IXR_ERROR_MASK |
                     XCAN_IXR_ARBLST_MASK | XCAN_IXR_RXOK_MASK)
+XCAN_IXR_RXOFLW_MASK | XCAN_IXR_ARBLST_MASK)
/* CAN register bit shift - XCAN_<REG>_<BIT>_SHIFT */
define XCAN_BTR_SJW_SHIFT 7  /* Synchronous jump width */
@@ -101,7 +104,7 @@
/**
* struct xcan_priv - This definition define CAN driver instance
* @can:CAN private data structure.
+ * @tx_lock:Lock for synchronizing TX interrupt handling
* @tx_head:Tx CAN packets ready to send on the queue
* @tx_tail:Tx CAN packets successfully sent on the queue
* @tx_max:Maximum number packets the driver can send
@@ -132,6 +136,7 @@*/
struct xcan_priv {
struct can_priv can;
+spinlock_t tx_lock;
unsigned int tx_head;
unsigned int tx_tail;
unsigned int tx_max;
@@ -159,6 +164,11 @@
.brp_inc = 1,
};

#define XCAN_CAP_WATERMARK 0x0001
+struct xcan_devtype_data {
+unsigned int caps;
+};
+
/**
* xcan_write_reg_le - Write a value to the device register little endian
* @priv:Driver private data structure
@@ -238,6 +248,10 @@
usleep_range(500, 10000);
}

+/* reset clears FIFOs */
+priv->tx_head = 0;
+priv->tx_tail = 0;
+
return 0;
}

@@ -386,12 +400,13 @@
*/
* Return: 0 on success and failure value on error
*/
-static int xcan_start_xmit(struct sk_buff *skb, struct net_device *ndev)
+static netdev_tx_t xcan_start_xmit(struct sk_buff *skb, struct net_device *ndev)
{
struct xcan_priv *priv = netdev_priv(ndev);
struct net_device_stats *stats = &ndev->stats;
struct can_frame *cf = (struct can_frame *)skb->data;

u32 id, dlc, data[2] = {0, 0};
unsigned long flags;

if (can_dropped_invalid_skb(ndev, skb))
return NETDEV_TX_OK;

unsigned long flags = spin_lock_irqsave(&priv->tx_lock, flags);
priv->tx_head++;

/* Write the Frame to Xilinx CAN TX FIFO */

/**
 * xcan_current_error_state - Get current error state from HW
 * @ndev:	Pointer to net_device structure
 * 
 * Checks the current CAN error state from the HW. Note that this
 * only checks for ERROR_PASSIVE and ERROR_WARNING.
 * 
 * Return:
 * ERROR_PASSIVE or ERROR_WARNING if either is active, ERROR_ACTIVE
 * otherwise.
 * */
static enum can_state xcan_current_error_state(struct net_device *ndev)
{

/* Clear TX-FIFO-empty interrupt for xcan_tx_interrupt() */
if (priv->tx_max > 1)
priv->write_reg(priv, XCAN_ICR_OFFSET, XCAN_IXR_TXFEMP_MASK);
/* Check if the TX buffer is full */
if ((priv->tx_head - priv->tx_tail) == priv->tx_max)
etif_stop_queue(ndev);

/* Write the Frame to Xilinx CAN TX FIFO */

/**
 * xcan_current_error_state - Get current error state from HW
 * @ndev:	Pointer to net_device structure
 * 
 * Checks the current CAN error state from the HW. Note that this
 * only checks for ERROR_PASSIVE and ERROR_WARNING.
 * 
 * Return:
 * ERROR_PASSIVE or ERROR_WARNING if either is active, ERROR_ACTIVE
 * otherwise.
 * */
static enum can_state xcan_current_error_state(struct net_device *ndev)
{
struct xcan_priv *priv = netdev_priv(ndev);

u32 status = priv->read_reg(priv, XCAN_SR_OFFSET);

if ((status & XCAN_SR_ESTAT_MASK) == XCAN_SR_ESTAT_MASK)
   return CAN_STATE_ERROR_PASSIVE;
else if (status & XCAN_SR_ERRWRN_MASK)
   return CAN_STATE_ERROR_WARNING;
else
   return CAN_STATE_ERROR_ACTIVE;

/**
 * xcan_set_error_state - Set new CAN error state
 * @ndev: Pointer to net_device structure
 * @new_state: The new CAN state to be set
 * @cf: Error frame to be populated or NULL
 *
 * Set new CAN error state for the device, updating statistics and
 * populating the error frame if given.
 */
static void xcan_set_error_state(struct net_device *ndev, enum can_state new_state, struct can_frame *cf)
{
    struct xcan_priv *priv = netdev_priv(ndev);

    u32 ecr = priv->read_reg(priv, XCAN_ECR_OFFSET);
    u32 txerr = ecr & XCAN_ECR_TEC_MASK;
    u32 rxerr = (ecr & XCAN_ECR_REC_MASK) >> XCAN_ESR_REC_SHIFT;

    priv->can.state = new_state;

    if (cf) {
        cf->can_id |= CAN_ERR_CRTL;
        cf->data[7] = rxerr;
    }

    switch (new_state) {
    case CAN_STATE_ERROR_PASSIVE:
        priv->can.can_stats.error_passive++;
        if (cf)
        break;
    case CAN_STATE_ERROR_WARNING:
        priv->can.can_stats.error_warning++;
        if (cf)
        break;
    }
+cf->data[1] |= (txerr > rxerr) :
+CAN_ERR_CRTL_TX_WARNING :
+CAN_ERR_CRTL_RX_WARNING;
+break;
+case CAN_STATE_ERROR_ACTIVE:
+if (cf)
+cf->data[1] |= CAN_ERR_CRTL_ACTIVE;
+break;
+default:
+/* non-ERROR states are handled elsewhere */
+WARN_ON(1);
+break;
+}
+
+/**
+ * xcan_update_error_state_after_rxtx - Update CAN error state after RX/TX
+ * @ndev: Pointer to net_device structure
+ * If the device is in a ERROR-WARNING or ERROR-PASSIVE state, check if
+ * the performed RX/TX has caused it to drop to a lesser state and set
+ * the interface state accordingly.
+ */
+static void xcan_update_error_state_after_rxtx(struct net_device *ndev)
+{
+struct xcan_priv *priv = netdev_priv(ndev);
+enum can_state old_state = priv->can.state;
+enum can_state new_state;
+
+/* changing error state due to successful frame RX/TX can only
+ * occur from these states
+ */
+if (old_state != CAN_STATE_ERROR_WARNING &&
+ old_state != CAN_STATE_ERROR_PASSIVE)
+return;
+
+new_state = xcan_current_error_state(ndev);
+
+if (new_state != old_state) {
+struct sk_buff *skb;
+struct can_frame *cf;
+
+skb = alloc_can_err_skb(ndev, &cf);
+
+xcan_set_error_state(ndev, new_state, skb ? cf : NULL);
+
+if (skb) {
+struct net_device_stats *stats = &ndev->stats;
+stats->rx_packets++;  
+stats->rx_bytes += cf->can_dlc;
+netif_rx(skb);  
+
+}  
+}
+
+/**
+ * xcan_err_interrupt - error frame Isr
+ * @ndev: net_device pointer
+ * @isr: interrupt status register value
+ */
+@ -544,16 +685,12 @@
+struct net_device_stats *stats = &ndev->stats;
+struct can_frame *cf;
+struct sk_buff *skb;
+u32 err_status, status, txerr = 0, rxerr = 0;
+u32 err_status;
+
+skb = alloc_can_err_skb(ndev, &cf);
+
+err_status = priv->read_reg(priv, XCAN_ESR_OFFSET);
+priv->write_reg(priv, XCAN_ESR_OFFSET, err_status);
+-txerr = priv->read_reg(priv, XCAN_ECR_OFFSET) & XCAN_ECR_TEC_MASK;
+-rxerr = ((priv->read_reg(priv, XCAN_ECR_OFFSET) &
+-XCAN_ECR_REC_MASK) >> XCAN_ESR_REC_SHIFT);
+-status = priv->read_reg(priv, XCAN_SR_OFFSET);
+
+if (isr & XCAN_IXR_BSOFF_MASK) {
+priv->can.state = CAN_STATE_BUS_OFF;
+@@ -563,28 +700,10 @@
+can_bus_off(ndev);
+if (skb)
+cf->can_id |= CAN_ERR_BUSOFF;
-} else if (((status & XCAN_SR_ESTAT_MASK) == XCAN_SR_ESTAT_MASK) {
-priv->can.state = CAN_STATE_ERROR_PASSIVE;
-priv->can.can_stats.error_passive++;
-if (skb) {
- cf->can_id |= CAN_ERR_CRTL;
- cf->data[1] = (rxerr > 127) ?
- CAN_ERR_CRTL_RX_PASSIVE :
- CAN_ERR_CRTL_TX_PASSIVE;
- cf->data[7] = rxerr;
- }
-} else if (status & XCAN_SR_ERRWRN_MASK) {
-priv->can.state = CAN_STATE_ERROR_WARNING;
-priv->can.can_stats.error_warning++;
if (skb) {
    cf->can_id |= CAN_ERR_CRTL;
    cf->data[1] |= (txerr > rxerr) ? CAN_ERR_CRTL_TX_WARNING : CAN_ERR_CRTL_RX_WARNING;
    cf->data[7] = rxerr;
}

} else {
    enum can_state new_state = xcan_current_error_state(ndev);

    xcan_set_error_state(ndev, new_state, skb ? cf : NULL);
}

/* Check for Arbitration lost interrupt */
@@ -600,7 +719,6 @@
if (isr & XCAN_IXR_RXOFLW_MASK) {
    stats->rx_over_errors++;
    stats->rx_errors++;
    priv->write_reg(priv, XCAN_SRR_OFFSET, XCAN_SRR_RESET_MASK);
    if (skb) {
        cf->can_id |= CAN_ERR_CRTL;
        cf->data[1] |= CAN_ERR_CRTL_RX_OVERFLOW;
    }
}

isr = priv->read_reg(priv, XCAN_ISR_OFFSET);
while ((isr & XCAN_IXR_RXNEMP_MASK) && (work_done < quota)) {
    -if (isr & XCAN_IXR_RXOK_MASK) {
        -priv->write_reg(priv, XCAN_ICR_OFFSET, XCAN_IXR_RXOK_MASK);
        -work_done += xcan_rx(ndev);
    } else {
        -priv->write_reg(priv, XCAN_ICR_OFFSET, XCAN_IXR_RXNEMP_MASK);
        -break;
    }
    +work_done += xcan_rx(ndev);
    priv->write_reg(priv, XCAN_ICR_OFFSET, XCAN_IXR_RXNEMP_MASK);
    isr = priv->read_reg(priv, XCAN_ISR_OFFSET);
}

    -if (work_done)
    +if (work_done) {
        can_led_event(ndev, CAN_LED_EVENT_RX);
        xcan_update_error_state_after_rxtx(ndev);
    }

    if (work_done < quota) {
napi_complete_done(napi, work_done);
ier = priv->read_reg(priv, XCAN_IER_OFFSET);
-ier |= (XCAN_IXR_RXOK_MASK | XCAN_IXR_RXNEMP_MASK);
+ier |= XCAN_IXR_RXNEMP_MASK;
priv->write_reg(priv, XCAN_IER_OFFSET, ier);
}
return work_done;
@@ -743,18 +855,71 @@
{
struct xcan_priv *priv = netdev_priv(ndev);
struct net_device_stats *stats = &ndev->stats;
+unsigned int frames_in_fifo;
+int frames_sent = 1; /* TXOK => at least 1 frame was sent */
+unsigned long flags;
+int retries = 0;
+
+/* Synchronize with xmit as we need to know the exact number
+ * of frames in the FIFO to stay in sync due to the TXFEMP
+ * handling.
+ * This also prevents a race between netif_wake_queue() and
+ * netif_stop_queue().
+ */
+spin_lock_irqsave(&priv->tx_lock, flags);
+
+frames_in_fifo = priv->tx_head - priv->tx_tail;
+
+if (WARN_ON_ONCE(frames_in_fifo == 0)) {
+/* clear TXOK anyway to avoid getting back here */
+priv->write_reg(priv, XCAN_ICR_OFFSET, XCAN_IXR_TXOK_MASK);
+spin_unlock_irqrestore(&priv->tx_lock, flags);
+return;
+}
+
+/* Check if 2 frames were sent (TXOK only means that at least 1
+ * frame was sent).
+ */
+if (frames_in_fifo > 1) {
+WARN_ON(frames_in_fifo > priv->tx_max);
+-while ((priv->tx_head - priv->tx_tail > 0) &&
+-(isr & XCAN_IXR_TXOK_MASK)) {
+/* Synchronize TXOK and isr so that after the loop:
+ * (1) isr variable is up-to-date at least up to TXOK clear
+ * time. This avoids us clearing a TXOK of a second frame
+ * but not noticing that the FIFO is now empty and thus
+ * marking only a single frame as sent.
+ * (2) No TXOK is left. Having one could mean leaving a
+ * stray TXOK as we might process the associated frame
via TXFEMP handling as we read TXFEMP *after* TXOK
clear to satisfy (1).

while ((isr & XCAN_IXR_TXOK_MASK) && !WARN_ON(++retries == 100)) {
  priv->write_reg(priv, XCAN_ICR_OFFSET, XCAN_IXR_TXOK_MASK);
  isr = priv->read_reg(priv, XCAN_ISR_OFFSET);
}

if (isr & XCAN_IXR_TXFEMP_MASK) {
  /* nothing in FIFO anymore */
  frames_sent = frames_in_fifo;
}

while (isr & XCAN_IXR_TXFEMP_MASK) {
  /* nothing in FIFO anymore */
  frames_sent = frames_in_fifo;
}

else {
  /* single frame in fifo, just clear TXOK */
  priv->write_reg(priv, XCAN_ICR_OFFSET, XCAN_IXR_TXOK_MASK);
}

while (frames_sent--) {
  can_get_echo_skb(ndev, priv->tx_tail %
  priv->tx_max);
  priv->tx_tail++;
  stats->tx_packets++;
  isr = priv->read_reg(priv, XCAN_ISR_OFFSET);
}

-xcan_tx_interrupt(ndev, isr); 
/* Check for the type of error interrupt and Processing it */
-if (isr & (XCAN_IXR_ERROR_MASK | XCAN_IXR_RXOFLW_MASK |
static void xcan_chip_stop(struct net_device *ndev)
{
    struct xcan_priv *priv = netdev_priv(ndev);
    u32 ier;

    /* Disable interrupts and leave the can in configuration mode */
    ier = priv->read_reg(priv, XCAN_IER_OFFSET);
    ier &= ~XCAN_INTR_ALL;
    priv->write_reg(priv, XCAN_IER_OFFSET, ier);
    priv->write_reg(priv, XCAN_SRR_OFFSET, XCAN_SRR_RESET_MASK);
    priv->can.state = CAN_STATE_STOPPED;
}

static int __maybe_unused xcan_suspend(struct device *dev)
{
    if (!device_may_wakeup(dev))
        return pm_runtime_force_suspend(dev);
    return 0;

    if (netif_running(ndev)) {
        netif_stop_queue(ndev);
        netif_device_detach(ndev);
        xcan_chip_stop(ndev);
    }
 struct net_device *ndev = dev_get_drvdata(dev);
+struct xcan_priv *priv = netdev_priv(ndev);

-priv->write_reg(priv, XCAN_MSR_OFFSET, XCAN_MSR_OFFSET, XCAN_MSR_SLEEP_MASK);
-priv->can.state = CAN_STATE_SLEEPING;
clk_disable_unprepare(priv->bus_clk);
clk_disable_unprepare(priv->can_clk);

@@ -1018,7 +1192,6 @@
struct net_device *ndev = dev_get_drvdata(dev);
struct xcan_priv *priv = netdev_priv(ndev);
int ret;
-u32 isr, status;

ret = clk_prepare_enable(priv->bus_clk);
if (ret) {
@@ -1032,27 +1205,6 @@
    return ret;
}

-priv->write_reg(priv, XCAN_SRR_OFFSET, XCAN_SRR_RESET_MASK);
-isl = priv->read_reg(priv, XCAN_ISR_OFFSET);
-status = priv->read_reg(priv, XCAN_SR_OFFSET);
-
-if (netif_running(ndev)) {
-    if (isl & XCAN_IXR_BSOFF_MASK) {
-        priv->can.state = CAN_STATE_BUS_OFF;
-        priv->write_reg(priv, XCAN_SRR_OFFSET,
-                        XCAN_SRR_RESET_MASK);
-    } else if ((status & XCAN_SR_ESTAT_MASK) ==
-                XCAN_SR_ESTAT_MASK) {
-        priv->can.state = CAN_STATE_ERROR_PASSIVE;
-    } else if (status & XCAN_SR_ERRWRN_MASK) {
-        priv->can.state = CAN_STATE_ERROR_WARNING;
-    } else {
-        priv->can.state = CAN_STATE_ERROR_ACTIVE;
-    }
-
netif_device_attach(ndev);
netif_start_queue(ndev);
-
return 0;
}

@@ -1061,6 +1213,18 @@
SET_RUNTIME_PM_OPS(xcan_runtime_suspend, xcan_runtime_resume, NULL)
};

+static const struct xcan_devtype_data xcan_zynq_data = {
+    .caps = XCAN_CAP_WATERMARK,
+};
+

+/* Match table for OF platform binding */
+static const struct of_device_id xcan_of_match[] = {
+    { .compatible = "xlnx,zynq-can-1.0", .data = &xcan_zynq_data },
+    { .compatible = "xlnx,axi-can-1.00.a", },
+    { /* end of list */ },
+};
+MODULE_DEVICE_TABLE(of, xcan_of_match);
+
+/**
+ * xcan_probe - Platform registration call
+ * @pdev: Handle to the platform device structure
+ * @res: /* IO mem resources */
+ * struct resource *res; /* IO mem resources */
+ * struct net_device *ndev;
+ * struct xcan_priv *priv;
+ * @of_id:
+ * struct of_device_id *of_id;
+ * int caps = 0;
+ * void __iomem *addr;
+ * @rx_max, tx_max;
+ * int ret, rx_max, tx_max, tx_fifo_depth;
+
+ /* Get the virtual base address for the device */
+ res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+ goto err;
+
+ ret = of_property_read_u32(pdev->dev.of_node, "tx-fifo-depth", &tx_max);
+ if (ret < 0)
+     goto err;
+
+ of_id = of_match_device(xcan_of_match, &pdev->dev);
+ if (of_id) {
+     const struct xcan_devtype_data *devtype_data = of_id->data;
+     if (devtype_data)
+         caps = devtype_data->caps;
+ }
+
+ /* There is no way to directly figure out how many frames have been
+  * sent when the TXOK interrupt is processed. If watermark programming
+  * is supported, we can have 2 frames in the FIFO and use TXFEMP
/* to determine if 1 or 2 frames have been sent.
 * Theoretically we should be able to use TXFWMEMP to determine up
 + * to 3 frames, but it seems that after putting a second frame in the
 + * FIFO, with watermark at 2 frames, it can happen that TXFWMEMP (less
 + * than 2 frames in FIFO) is set anyway with no TXOK (a frame was
 + * sent), which is not a sensible state - possibly TXFWMEMP is not
 + * completely synchronized with the rest of the bits?
 + */
+if (caps & XCAN_CAP_WATERMARK)
+tx_max = min(tx_fifo_depth, 2);
+else
+tx_max = 1;
+
/* Create a CAN device instance */
ndev = alloc_candev(sizeof(struct xcan_priv), tx_max);
if (!ndev)
@@ -1108,6 +1299,7 @@
 CAN_CTRLMODE_BERR_REPORTING;
 priv->reg_base = addr;
 priv->tx_max = tx_max;
+spin_lock_init(&priv->tx_lock);

 /* Get IRQ for the device */
 ndev->irq = platform_get_irq(pdev, 0);
@@ -1172,9 +1364,9 @@
 pm_runtime_put(&pdev->dev);

 -netdev_dbg(ndev, "reg_base=0x%p irq=%d clock=%d, tx fifo depth:%d\n",
+netdev_dbg(ndev, "reg_base=0x%p irq=%d clock=%d, tx fifo depth: actual %d, using %d\n",
 priv->reg_base, ndev->irq, priv->can.clock.freq,
 -priv->tx_max);
+tx_fifo_depth, priv->tx_max);

 return 0;
@@ -1208,14 +1400,6 @@
 return 0;
 }

-/* Match table for OF platform binding */
-static const struct of_device_id xcan_of_match[] = {
-    { .compatible = "xlnx,zynq-can-1.0", },
-    { .compatible = "xlnx,axi-can-1.00.a", },
-    /* end of list */
-};
-MODULE_DEVICE_TABLE(of, xcan_of_match);
-
static struct platform_driver xcan_driver = {
 .probe = xcan_probe,
 .remove= xcan_remove,
 --- linux-4.15.0.orig/drivers/net/dsa/Kconfig
 +++ linux-4.15.0/drivers/net/dsa/Kconfig
 @@ -55,6 +55,7 @@
 config NET_DSA_SMSC_LAN9303
 tristate
 select NET_DSA_TAG_LAN9303
+select REGMAP
 ---help---
 This enables support for the SMSC/Microchip LAN9303 3 port ethernet
 switch chips.
 --- linux-4.15.0.orig/drivers/net/dsa/Makefile
 +++ linux-4.15.0/drivers/net/dsa/Makefile
 @@ -1,7 +1,10 @@
 # SPDX-License-Identifier: GPL-2.0
 obj-$(CONFIG_NET_DSA_BCM_SF2)=+ bcm-sf2.o
 bcm-sf2-objs:= bcm_sf2.o bcm_sf2_cfp.o
-obj-$(CONFIG_NET_DSA_LOOP)=+ dsa_loop.o dsa_loop_bdinfo.o
+obj-$(CONFIG_NET_DSA_LOOP)=+ dsa_loop.o
+ifdef CONFIG_NET_DSA_LOOP
+obj-$(CONFIG_FIXED_PHY)=+ dsa_loop_bdinfo.o
+endif
 obj-$(CONFIG_NET_DSA_MT7530)=+ mt7530.o
 obj-$(CONFIG_NET_DSA_MV88E6060) += mv88e6060.o
 obj-$(CONFIG_NET_DSA_QCA8K)=+ qca8k.o
 --- linux-4.15.0.orig/drivers/net/dsa/b53/b53_common.c
 +++ linux-4.15.0/drivers/net/dsa/b53/b53_common.c
 @@ -343,7 +343,8 @@
 b53_write8(dev, B53_CTRL_PAGE, B53_SWITCH_CTRL, mgmt);
 }
-static void b53_enable_vlan(struct b53_device *dev, bool enable)
+static void b53_enable_vlan(struct b53_device *dev, bool enable,
+   bool enable_filtering)
 { u8 mgmt, vc0, vc1, vc4 = 0, vc5;

 @@ -368,8 +369,13 @@
 vc0 |= VC0_VLAN_EN | VC0_VID_CHK_EN | VC0_VID_HASH_VID;
 vc1 |= VC1_RX_MCST_UNTAG_EN | VC1_RX_MCST_FWD_EN;
 vc4 &=- VC4_ING_VID_CHECK_MASK;
-vc4 |= VC4_ING_VID_VIO_DROP << VC4_ING_VID_CHECK_S;
-vc5 |= VC5_DROP_VTABLE_MISS;
+if (enable_filtering) {
+ vc4 |= VC4_ING_VID_VIO_DROP << VC4_ING_VID_CHECK_S;
+ vc5 |= VC5_DROP_VTABLE_MISS;
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```c
+} else {
+vc4 |= VC4_ING_VID_VIO_FWD << VC4_ING_VID_CHECK_S;
+vc5 &= ~VC5_DROP_VTABLE_MISS;
+
}

if (is5325(dev))
vc0 &= ~VC0_RESERVED_1;
@@ -419,6 +425,9 @@
}

b53_write8(dev, B53_CTRL_PAGE, B53_SWITCH_MODE, mgmt);
+
+dev->vlan_enabled = enable;
+dev->vlan_filtering_enabled = enable_filtering;
}

static int b53_set_jumbo(struct b53_device *dev, bool enable, bool allow_10_100)
@@ -498,12 +507,27 @@
}

EXPORT_SYMBOL(b53_imp_vlan_setup);

+static void b53_port_set_learning(struct b53_device *dev, int port,
+  bool learning)
+{
+  u16 reg;
+  +
+  +b53_read16(dev, B53_CTRL_PAGE, B53_DIS_LEARNING, &reg);
+  +if (learning)
+    +reg &= ~BIT(port);
+  +else
+    +reg |= BIT(port);
+  +b53_write16(dev, B53_CTRL_PAGE, B53_DIS_LEARNING, reg);
+  +}
+  +
+  int b53_enable_port(struct dsa_switch *ds, int port, struct phy_device *phy)
+  {
+    struct b53_device *dev = ds->priv;
+    unsigned int cpu_port = ds->ports[port].cpu_dp->index;
+    u16 pvlan;
+
+    +b53_port_set_learning(dev, port, false);
+    +
+    /* Clear the Rx and Tx disable bits and set to no spanning tree */
+    b53_write8(dev, B53_CTRL_PAGE, B53_PORT_CTRL(port), 0);
+    @ @ -611,6 +635,7 @@
+    b53_write8(dev, B53_CTRL_PAGE, B53_PORT_CTRL(port), port_ctrl);
```

---

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b53_brcm_hdr_setup(dev->ds, port);
+b53_port_set_learning(dev, port, false);
}

static void b53_enable_mib(struct b53_device *dev)
@@ -622,25 +647,35 @@
b53_write8(dev, B53_MGMT_PAGE, B53_GLOBAL_CONFIG, gc);
}

+static u16 b53_default_pvid(struct b53_device *dev)
+{
+if (is5325(dev) || is5365(dev))
+return 1;
+else
+return 0;
+}
+
int b53_configure_vlan(struct dsa_switch *ds)
{
struct b53_device *dev = ds->priv;
struct b53_vlan vl = { 0 };
-int i;
+int i, def_vid;
+
+def_vid = b53_default_pvid(dev);

 /* clear all vlan entries */
 if (is5325(dev) || is5365(dev)) {
    -for (i = 1; i < dev->num_vlans; i++)
    +for (i = def_vid; i < dev->num_vlans; i++)
    b53_set_vlan_entry(dev, i, &vl);
 } else {
    b53_do_vlan_op(dev, VTA_CMD_CLEAR);
 }

-b53_enable_vlan(dev, false);
+b53_enable_vlan(dev, dev->vlan_enabled, dev->vlan_filtering_enabled);

b53_for_each_port(dev, i)
b3_write16(dev, B53_VLAN_PAGE,
-  B53_VLAN_PORT_DEF_TAG(i), 1);
+  B53_VLAN_PORT_DEF_TAG(i), def_vid);

if (!is5325(dev) && !is5365(dev))
b53_set_jumbo(dev, dev->enable_jumbo, false);
@@ -684,7 +719,8 @@
* still use this driver as a library and need to perform the reset
* earlier.
/*
- if (dev->chip_id == BCM58XX_DEVICE_ID) {
+ if (dev->chip_id == BCM58XX_DEVICE_ID ||
  + dev->chip_id == BCM583XX_DEVICE_ID) {
 b53_read8(dev, B53_CTRL_PAGE, B53_SOFTRESET, &reg);
  reg |= SW_RST | EN_SW_RST | EN_CH_RST;
b53_write8(dev, B53_CTRL_PAGE, B53_SOFTRESET, reg);
 @ @ -1024,6 +1060,46 @@

int b53_vlan_filtering(struct dsa_switch *ds, int port, bool vlan_filtering)
{
 + struct b53_device *dev = ds->priv;
 + struct net_device *bridge_dev;
 + unsigned int i;
 + u16 pvid, new_pvid;
 +
 + /* Handle the case were multiple bridges span the same switch device
 + * and one of them has a different setting than what is being requested
 + * which would be breaking filtering semantics for any of the other
 + * bridge devices.
 + */
 + b53_for_each_port(dev, i) { 
 + bridge_dev = dsa_to_port(ds, i)->bridge_dev;
 + if (bridge_dev &&
 + bridge_dev != dsa_to_port(ds, port)->bridge_dev &&
 + br_vlan_enabled(bridge_dev) != vlan_filtering) {
 + netdev_err(bridge_dev,
 + "VLAN filtering is global to the switch!\n");
 + return -EINVAL;
 + } 
 + }
 +
 + b53_read16(dev, B53_VLAN_PAGE, B53_VLAN_PORT_DEF_TAG(port), &pvid);
 + new_pvid = pvid;
 + if (dev->vlan_filtering_enabled && !vlan_filtering) {
 + /* Filtering is currently enabled, use the default PVID since
 + * the bridge does not expect tagging anymore
 + */
 + dev->ports[port].pvid = pvid;
 + new_pvid = b53_default_pvid(dev);
 + } else if (!dev->vlan_filtering_enabled && vlan_filtering) {
 + /* Filtering is currently disabled, restore the previous PVID */
 + new_pvid = dev->ports[port].pvid;
 + }
 +
 + if (pvid != new_pvid)
b53_write16(dev, B53_VLAN_PAGE, B53_VLAN_PORT_DEF_TAG(port),
 + new_pvid);
 */
+ b53_enable_vlan(dev, dev->vlan_enabled, vlan_filtering);
+ return 0;
}
EXPORT_SYMBOL(b53_vlan_filtering);
@@ -1037,10 +1113,10 @@
    if ((is5325(dev) || is5365(dev)) && vlan->vid_begin == 0)
        return -EOPNOTSUPP;

-    if (vlan->vid_end > dev->num_vlans)
+    if (vlan->vid_end >= dev->num_vlans)
        return -ERANGE;

-    b53_enable_vlan(dev, true);
+    b53_enable_vlan(dev, true, dev->vlan_filtering_enabled);

    return 0;
}
@@ -1061,8 +1137,11 @@
    b53_get_vlan_entry(dev, vid, vl);

+    if (vid == 0 && vid == b53_default_pvid(dev))
+    untagged = true;
+    vl->members |= BIT(port);
    -if (untagged)
    +if (untagged && !dsa_is_cpu_port(ds, port))
    vl->untag |= BIT(port);
    else
    vl->untag &= ~BIT(port);
@@ -1071,7 +1150,7 @@
    b53_fast_age_vlan(dev, vid);
    }

-    if (pvid) {
+    if (pvid && !dsa_is_cpu_port(ds, port)) {
    b53_write16(dev, B53_VLAN_PAGE, B53_VLAN_PORT_DEF_TAG(port),
        vlan->vid_end);
    b53_fast_age_vlan(dev, vid);
@@ -1097,14 +1176,10 @@
    vl->members &= ~BIT(port);

-    if (pvid == vid) {
+    if (is5325(dev) || is5365(dev))
        pvid = 1;
-else
-pvid = 0;
-
+if (pvid == vid)
+ pvid = b53_default_pvid(dev);

-if (untagged)
+if (untagged && !dsa_is_cpu_port(ds, port))
 vl->untag &=(~BIT(port));

b53_set_vlan_entry(dev, vid, vl);
 reg &= ~ARLTBL_RW;
 else
 reg &= ~ARLTBL_RW;
+if (dev->vlan_enabled)
+ reg &= ~ARLTBL_IVL_SVL_SELECT;
+else
+ reg &= ~ARLTBL_IVL_SVL_SELECT;
 b53_write8(dev, B53_ARLIO_PAGE, B53_ARLTBL_RW_CTRL, reg);

return b53_arl_op_wait(dev);
 u16 vid, struct b53_arl_entry *ent, u8 *idx,
 bool is_valid)
 {
+DECLARE_BITMAP(free_bins, B53_ARLTBL_MAX_BIN_ENTRIES);
 unsigned int i;
 int ret;

 if (ret)
 return ret;

+bitmap_zero(free_bins, dev->num_arl_entries);
+
 /* Read the bins */
 for (i = 0; i < dev->num_arl_entries; i++) {
 u64 mac_vid;
+ B53_ARLTBL_DATA_ENTRY(i), &fwd_entry);
 b53_arl_to_entry(ent, mac_vid, fwd_entry);

- if (!(fwd_entry & ARLTBL_VALID))
- if (!(fwd_entry & ARLTBL_VALID)) {
+set_bit(i, free_bins);
 continue;
+}
if ((mac_vid & ARLTBL_MAC_MASK) != mac)
    continue;
+  if (dev->vlan_enabled &&
+     ((mac_vid >> ARLTBL_VID_S) & ARLTBL_VID_MASK) != vid)
+    continue;
    *idx = i;
    return 0;
}

+if (bitmap_weight(free_bins, dev->num_arl_entries) == 0)
+return -ENOSPC;
+
+*idx = find_first_bit(free_bins, dev->num_arl_entries);
+
+ return -ENOENT;
}

@@ -1213,10 +1306,23 @@
if (op)
    return ret;

-/* We could not find a matching MAC, so reset to a new entry */
-if (ret) {
+switch (ret) {
+  case -ETIMEDOUT:
+    return ret;
+  case -ENOSPC:
+    dev_dbg(dev->dev, "{%pM,%.4d} no space left in ARL\n",
+            addr, vid);
+    return is_valid ? ret : 0;
+  case -ENOENT:
+    /* We could not find a matching MAC, so reset to a new entry */
+    dev_dbg(dev->dev, "{%pM,%.4d} not found, using idx: %d\n",
+                   addr, vid, idx);
+    fwd_entry = 0;
+    -idx = 1;
+    break;
+  default:
+    dev_dbg(dev->dev, "{%pM,%.4d} found, using idx: %d\n",
+            addr, vid, idx);
+    break;
+}

    memset(&ent, 0, sizeof(ent));
@@ -1383,6 +1489,8 @@
    b53_write16(dev, B53_PVLAN_PAGE, B53_PVLAN_PORT_MASK(port), pvlan);
    dev->ports[port].vlan_ctl_mask = pvlan;

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+b53_port_set_learning(dev, port, true);
+
+return 0;
}
EXPORT_SYMBOL(b53_br_join);
@@ -1415,10 +1523,7 @@
b53_write16(dev, B53_PVLAN_PAGE, B53_PVLAN_PORT_MASK(port), pvlan);
dev->ports[port].vlan_ctl_mask = pvlan;

-    if (is5325(dev) || is5365(dev))
-    -pvid = 1;
-else
-    -pvid = 0;
+    pvid = b53_default_pvid(dev);

/* Make this port join all VLANs without VLAN entries */
if (is58xx(dev)) {
    @@ -1433,6 +1538,7 @@
        vl->untag |= BIT(port) | BIT(cpu_port);
        b53_set_vlan_entry(dev, pvid, vl);
    }
+    b53_port_set_learning(dev, port, false);
}
EXPORT_SYMBOL(b53_br_leave);

@@ -1530,7 +1636,6 @@
 loc = B53_EG_MIR_CTL;

 b53_read16(dev, B53_MGMT_PAGE, loc, &reg);
-    -reg &= ~MIRROR_MASK;
-    reg |= BIT(port);
 b53_write16(dev, B53_MGMT_PAGE, loc, &reg);

@@ -1714,6 +1819,18 @@
 .duplex_reg = B53_DUPLEX_STAT_FE,
 },
 { +.chip_id = BCM5389_DEVICE_ID,
+    .dev_name = "BCM5389",
+    .vlans = 4096,
+    .enabled_ports = 0x1f,
+    .arl_entries = 4,
+    .cpu_port = B53_CPU_PORT,
+    .vta_regs = B53_VTA_REGS,
+    .duplex_reg = B53_DUPLEX_STAT_GE,
+    .jumbo_pm_reg = B53_JUMBO_PORT_MASK,
+    .jumbo_size_reg = B53_JUMBO_MAX_SIZE,
+}.
+
 .chip_id = BCM5395_DEVICE_ID,
 .dev_name = "BCM5395",
 .vlans = 4096,
@@ -1870,6 +1987,18 @@
 .jumbo_size_reg = B53_JUMBO_MAX_SIZE,
 },
{
+ .chip_id = BCM583XX_DEVICE_ID,
+ .dev_name = "BCM583xx/11360",
+ .vlans = 4096,
+ .enabled_ports = 0x103,
+ .arl_entries = 4,
+ .cpu_port = B53_CPU_PORT,
+ .vta_regs = B53_VTA_REGS,
+ .duplex_reg = B53_DUPLEX_STAT_GE,
+ .jumbo_pm_reg = B53_JUMBO_PORT_MASK,
+ .jumbo_size_reg = B53_JUMBO_MAX_SIZE,
 },
+{
 .chip_id = BCM7445_DEVICE_ID,
 .dev_name = "BCM7445",
 .vlans = 4096,
@@ -1952,9 +2081,8 @@
 dev->cpu_port = 5;
 }

 /* cpu port is always last */
-dev->num_ports = dev->cpu_port + 1;
 dev->enabled_ports |= BIT(dev->cpu_port);
+dev->num_ports = fls(dev->enabled_ports);

dev->ports = devm_kzalloc(dev->dev,
sizeof(struct b53_port) * dev->num_ports,
@@ -2036,6 +2164,7 @@
 else
 dev->chip_id = BCM5365_DEVICE_ID;
 break;
+case BCM5389_DEVICE_ID:
 case BCM5395_DEVICE_ID:
 case BCM5397_DEVICE_ID:
 case BCM5398_DEVICE_ID:
--- linux-4.15.0.orig/drivers/net/dsa/b53/b53_mdio.c
+++ linux-4.15.0/drivers/net/dsa/b53/b53_mdio.c
@@ -285,6 +285,7 @@
#define B53_BRCM_OUI_1	0x0143bc00
#define B53_BRCM_OUI_2	0x03625c00
#define B53_BRCM_OUI_3	0x00406000

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+\#define B53_BRCM_OUI_4 0x01410c00

static int b53_mdio_probe(struct mdio_device *mdiodev)
{
    if ((phy_id & 0xfffffc00) != B53_BRCM_OUI_1 &&
        (phy_id & 0xfffffc00) != B53_BRCM_OUI_2 &&
        (phy_id & 0xfffffc00) != B53_BRCM_OUI_3 &&
        (phy_id & 0xfffffc00) != B53_BRCM_OUI_4) {
        dev_err(&mdiodev->dev, "Unsupported device: 0x%08x\n", phy_id);
        return -ENODEV;
    }

    enum {
        BCM5325_DEVICE_ID = 0x25,
        BCM5365DEVICE_ID = 0x65,
        BCM5389_DEVICE_ID = 0x89,
        BCM5395_DEVICE_ID = 0x95,
        BCM5397_DEVICE_ID = 0x97,
        BCM5398_DEVICE_ID = 0x98,
        BCM53018_DEVICE_ID = 0x53018,
        BCM53019_DEVICE_ID = 0x53019,
        BCM58XX_DEVICE_ID = 0x5800,
        BCM583XX_DEVICE_ID = 0x58300,
        BCM7445_DEVICE_ID = 0x7445,
        BCM7278_DEVICE_ID = 0x7278,
    };

    struct b53_port {
        u16 vlan_ctl_mask;
        struct ethtool_eee eee eee;
        u16 pvid;
    };
unsigned int num_vlans;
struct b53_vlan *vlans;
bool vlan_enabled;
bool vlan_filtering_enabled;
unsigned int num_ports;
struct b53_port *ports;
}

static inline int is58xx(struct b53_device *dev)
{
    return dev->chip_id == BCM58XX_DEVICE_ID ||
    dev->chip_id == BCM583XXDEVICE_ID ||
    dev->chip_id == BCM7445_DEVICE_ID ||
    dev->chip_id == BCM7278_DEVICE_ID;
}

/*
 * Override Ports 0-7 State on devices with xMII interfaces (8 bit)
 */
#define B53_UC_FLOOD_MASK	0x32
#define B53_MC_FLOOD_MASK	0x34
#define B53_IPMC_FLOOD_MASK	0x36
#define B53_DIS_LEARNING	0x3c

/* MAC Address Index Register (48 bit) */
#define B53_ARLTBL_MAC_VID_ENTRY(n)	((0x10 * (n)) + 0x10)
#define ARLTBL_MAC_MASK	0xffffffffffffULL
#define ARLTBL_VID_S	48
#define ARLTBL_VID_MASK_25	0xff
#define ARLTBL_VALID_25	BIT(63)

/* ARL Table Data Entry N Registers (32 bit) */
```c
#define B53_ARLTBL_DATA_ENTRY(n) ((0x10 * (n)) + 0x08)
#define B53_ARLTBL_DATA_ENTRY(n) ((0x10 * (n)) + 0x18)
#define ARLTBL_DATA_PORT_ID_MASK 0x1ff
#define ARLTBL_TC(tc)((3 & tc) << 11)
#define ARLTBL_AGEBIT(14)
#define ARLTBL_STATIC BIT(15)
#define ARLTBL_VALID BIT(16)

/* Maximum number of bin entries in the ARL for all switches */
#define B53_ARLTBL_MAX_BIN_ENTRIES 4

/* ARL Search Control Register (8 bit) */
#define B53_ARL_SRCH_CTL 0x50
#define B53_ARL_SRCH_CTL_25 0x20

--- linux-4.15.0.orig/drivers/net/dsa/b53/b53_srab.c
+++ linux-4.15.0/drivers/net/dsa/b53/b53_srab.c
@@ -364,7 +364,7 @@
 {
   .compatible = "brcm,bcm53018-srab" ,
   .compatible = "brcm,bcm53019-srab" ,
-  
-  
-  ,
+  
+  
+  ,
   .compatible = "brcm,bcm11360-srab", .data = (void *)BCM58XX_DEVICE_ID ,
+  
+  
+  ,
   .compatible = "brcm,bcm11360-srab", .data = (void *)BCM583XX_DEVICE_ID ,
   .compatible = "brcm,bcm58522-srab", .data = (void *)BCM58XX_DEVICE_ID ,
   .compatible = "brcm,bcm58525-srab", .data = (void *)BCM58XXDEVICE_ID ,
   .compatible = "brcm,bcm58535-srab", .data = (void *)BCM58XXDEVICE_ID ,
@@ -372,7 +372,7 @@
   .compatible = "brcm,bcm58623-srab", .data = (void *)BCM58XXDEVICE_ID ,
   .compatible = "brcm,bcm58625-srab", .data = (void *)BCM58XXDEVICE_ID ,
   .compatible = "brcm,bcm88312-srab", .data = (void *)BCM58XXDEVICE_ID ,
-  
-  ,
+  
+  ,
   .compatible = "brcm,cygnus-srab", .data = (void *)BCM58XXDEVICE_ID ,
+  
+  
+  ,
   .compatible = "brcm,cygnus-srab", .data = (void *)BCM58XXDEVICE_ID ,
   /* sentinel */ ,

--- linux-4.15.0.orig/drivers/net/dsa/bcm_sf2.c
+++ linux-4.15.0/drivers/net/dsa/bcm_sf2.c
@@ -46,22 +46,11 @@
 unsigned int i;
 u32 reg, offset;

-if (priv->type == BCM7445_DEVICE_ID)
-offset = CORE_STS_OVERR_ID;
-else
-offset = CORE_STS_OVERR_ID2;
-
-/* Enable the port memories */
-reg = core_readl(priv, CORE_MEM_PSM_VDD_CTRL);
-reg &= ~P_TXQ_PSM_VDD(port);
```
core_writel(priv, reg, CORE_MEM_PSM_VDD_CTRL);

-/* Enable Broadcast, Multicast, Unicast forwarding to IMP port */
-reg = core_readl(priv, CORE_IMP_CTL);
-reg |= (RX_BCST_EN | RX_MCST_EN | RX_UCST_EN);
-reg &= ~(RX_DIS | TX_DIS);
-core_writel(priv, reg, CORE_IMP_CTL);
-
-/* Enable forwarding */
core_writel(priv, SW_FWDG_EN, CORE_SWMODE);

@@ -80,10 +69,28 @@

b53_brcm_hdr_setup(ds, port);

-/* Force link status for IMP port */
-reg = core_readl(priv, offset);
-reg |= (MII_SW_OR | LINK_STS);
-core_writel(priv, reg, offset);
+if (port == 8) {
+  if (priv->type == BCM7445_DEVICE_ID)
+    offset = CORE_STS_OVERRIDE_IMP;
+  else
+    offset = CORE_STS_OVERRIDE_IMP2;
+  +/* Force link status for IMP port */
+  reg = core_readl(priv, offset);
+  reg |= (MII_SW_OR | LINK_STS);
+  reg &= ~GMII_SPEED_UP_2G;
+  core_writel(priv, reg, offset);
+  +/* Enable Broadcast, Multicast, Unicast forwarding to IMP port */
+  reg = core_readl(priv, CORE_IMP_CTL);
+  reg |= (RX_BCST_EN | RX_MCST_EN | RX_UCST_EN);
+  reg &= ~(RX_DIS | TX_DIS);
+  core_writel(priv, reg, CORE_IMP_CTL);
+} else {
+  reg = core_readl(priv, CORE_G_PCTL_PORT(port));
+  reg &= ~(RX_DIS | TX_DIS);
+  core_writel(priv, reg, CORE_G_PCTL_PORT(port));
+}
}

static void bcm_sf2_gphy_enable_set(struct dsa_switch *ds, bool enable)
@@ -303,11 +310,10 @@

* send them to our master MDIO bus controller
*/
if (addr == BRCM_PSEUDO_PHY_ADDR && priv->indir_phy_mask & BIT(addr))
- bcm_sf2_sw_indir_rw(priv, 0, addr, regnum, val);
+return bcm_sf2_sw_indir_rw(priv, 0, addr, regnum, val);
else
- mdiobus_write_nested(priv->master_mii_bus, addr, regnum, val);
- return 0;
+ return mdiobus_write_nested(priv->master_mii_bus, addr,
+ regnum, val);
}

static irqreturn_t bcm_sf2_switch_0_isr(int irq, void *dev_id)
@@ -411,15 +417,19 @@
/* Find our integrated MDIO bus node */
dn = of_find_compatible_node(NULL, NULL, "brcm,unimac-mdio");
priv->master_mii_bus = of_mdio_find_bus(dn);
- if (!priv->master_mii_bus)
- return -EPROBE_DEFER;
+ if (!priv->master_mii_bus) {
+ of_node_put(dn);
+ return -EPROBE_DEFER;
+ }

get_device(&priv->master_mii_bus->dev);
priv->master_mii_dn = dn;

priv->slave_mii_bus = devm_mdiobus_alloc(ds->dev);
- if (!priv->slave_mii_bus)
- return -ENOMEM;
+ if (!priv->slave_mii_bus) {
+ of_node_put(dn);
+ return -ENOMEM;
+ }

priv->slave_mii_bus->priv = priv;
priv->slave_mii_bus->name = "sf2 slave mii";
@ @ -475,8 +485,10 @@
* in bits 15:8 and the patch level in bits 7:0 which is exactly what
* the REG_PHY_REVISION register layout is.
*/
-
- return priv->hw_params.gphy_rev;
+ if (priv->int_phy_mask & BIT(port))
+ return priv->hw_params.gphy_rev;
+ else
+ return 0;
}

static void bcm_sf2_sw_adjust_link(struct dsa_switch *ds, int port,
@@ -651,7 +663,7 @@
* port, the other ones have already been disabled during
static int bcm_sf2_sw_resume(struct dsa_switch *ds)
{
    struct bcm_sf2_priv *priv = bcm_sf2_to_priv(ds);
    unsigned int port;
    int ret;

    ret = bcm_sf2_sw_rst(priv);
    if (priv->hw_params.num_gphy == 1)
        bcm_sf2_gphy_enable_set(ds, true);

    return 0;
}

struct net_device *p = ds->ports[port].cpu_dp->master;
struct bcm_sf2_priv *priv = bcm_sf2_to_priv(ds);
struct ethtool_wolinfo pwol = { }
/* Get the parent device WoL settings */
-p->ethtool_ops->get_wol(p, &pwol);
+if (p->ethtool_ops->get_wol)
   +p->ethtool_ops->get_wol(p, &pwol);
/* Advertise the parent device supported settings */
wol->supported = pwol.supported;
struct net_device *p = ds->ports[port].cpu_dp->master;
struct bcm_sf2_priv *priv = bcm_sf2_to_priv(ds);
s8 cpu_port = ds->ports[port].cpu_dp->index;
-struct ethtool_wolinfo pwol;
+struct ethtool_wolinfo pwol = { };

-p->ethtool_ops->get_wol(p, &pwol);
+if (p->ethtool_ops->get_wol)
+p->ethtool_ops->get_wol(p, &pwol);
if (wol->wolopts & ~pwol.supported)
return -EINVAL;

@@ -966,6 +972,7 @@
const struct bcm_sf2_of_data *data;
struct b53_platform_data *pdata;
struct dsa_switch_ops *ops;
+struct device_node *ports;
struct bcm_sf2_priv *priv;
struct b53_device *dev;
struct dsa_switch *ds;
@@ -1029,7 +1036,13 @@
set_bit(0, priv->cfp.used);
set_bit(0, priv->cfp.unique);

-bcm_sf2_identify_ports(priv, dn->child);
+/* Balance of_node_put() done by of_find_node_by_name() */
+of_node_get(dn);
+ports = of_find_node_by_name(dn, "ports");
+if (ports) {
+bcm_sf2_identify_ports(priv, ports);
+of_node_put(ports);
+}

priv->irq0 = irq_of_parse_and_map(dn, 0);
priv->irq1 = irq_of_parse_and_map(dn, 1);
@@ -1051,12 +1064,16 @@
return ret;
}

+bcm_sf2_gphy_enable_set(priv->dev->ds, true);
+
ret = bcm_sf2_mdio_register(ds);
if (ret) {
pr_err("failed to register MDIO bus\n");
return ret;
}

+bcm_sf2_gphy_enable_set(priv->dev->ds, false);
+
ret = bcm_sf2_cfp_rst(priv);
if (ret) {
    pr_err("failed to reset CFPn");
    return -1125,10 +1142,10 @@
}
struct bcm_sf2_priv *priv = platform_get_drvdata(pdev);

-/* Disable all ports and interrupts */
priv->wol_ports_mask = 0;
-bcm_sf2_sw_suspend(priv->dev->ds);
dsa_unregister_switch(priv->dev->ds);
+/* Disable all ports and interrupts */
+bcm_sf2_sw_suspend(priv->dev->ds);
bcm_sf2_mdio_unregister(priv);

return 0;
--- linux-4.15.0.orig/drivers/net/dsa/bcm_sf2_cfp.c
+++ linux-4.15.0/drivers/net/dsa/bcm_sf2_cfp.c
@@ -354,10 +354,13 @@
    bcm_sf2_cfp_rule_size(priv));
 else
    rule_index = fs->location;
+if (rule_index > bcm_sf2_cfp_rule_size(priv))
+    return -ENOSPC;
+
    layout = &udf_tcpip4_layout;
+/* We only use one UDF slice for now */
    slice_num = bcm_sf2_get_slice_number(layout, 0);
@@ -562,19 +565,21 @@
    bcm_sf2_cfp_rule_size(priv));
    else
    rule_index = fs->location;

+if (rule_index > bcm_sf2_cfp_rule_size(priv))
+    return -ENOSPC;
+    layout = &udf_tcpip4_layout;
+    /* We only use one UDF slice for now */
+    slice_num = bcm_sf2_get_slice_number(layout, 0);
    /* first half because the HW search is by incrementing addresses. */
    if (fs->location == RX_CLS_LOC_ANY)
        -rule_index[0] = find_first_zero_bit(priv->cpf.used,
-            bcm_sf2_cfp_rule_size(priv));
+rule_index[1] = find_first_zero_bit(priv->cpf.used,
+            priv->num_cfp_rules);
    else
    -rule_index[0] = fs->location;
+rule_index[1] = fs->location;
+if (rule_index[1] > bcm_sf2_cfp_rule_size(priv))
+    return -ENOSPC;

    /* Flag it as used (cleared on error path) such that we can immediately
* obtain a second one to chain from.
*set_bit(rule_index[0], priv->cfp.used);
+set_bit(rule_index[1], priv->cfp.used);

-rule_index[1] = find_first_zero_bit(priv->cfp.used,
-    bcm_sf2_cfp_rule_size(priv));
-if (rule_index[1] > bcm_sf2_cfp_rule_size(priv)) {
+rule_index[0] = find_first_zero_bit(priv->cfp.used,
+    priv->num_cfp_rules);
+if (rule_index[0] > bcm_sf2_cfp_rule_size(priv)) {
    ret = -ENOSPC;
    goto out_err;
}
@@ -712,14 +717,14 @@
/* Flag the second half rule as being used now, return it as the
* location, and flag it as unique while dumping rules
*/
-    set_bit(rule_index[1], priv->cfp.used);
+    set_bit(rule_index[0], priv->cfp.used);
    set_bit(rule_index[1], priv->cfp.unique);
    fs->location = rule_index[1];

    return ret;

out_err:
-    clear_bit(rule_index[0], priv->cfp.used);
+    clear_bit(rule_index[1], priv->cfp.used);
    return ret;
}
@@ -736,13 +741,13 @@
return -EINVAL;

if (fs->location != RX_CLS_LOC_ANY &&
-    test_bit(fs->location, priv->cfp.used))
-    return -EBUSY;
-
-    if (fs->location != RX_CLS_LOC_ANY &&
+    if (fs->location != RX_CLS_LOC_ANY &&
        fs->location > bcm_sf2_cfp_rule_size(priv))
    return -EINVAL;

+if (fs->location != RX_CLS_LOC_ANY &&
+    test_bit(fs->location, priv->cfp.used))
+    return -EBUSY;
+    /* We do not support discarding packets, check that the
* destination port is enabled and that we are within the
* number of ports supported by the switch

int ret;
u32 reg;

/* Refuse deletion of unused rules, and the default reserved rule */
-if (!test_bit(loc, priv->cfp.used) || loc == 0)
-return -EINVAL;
-
/* Indicate which rule we want to read */
bcm_sf2_cfp_rule_addr_set(priv, loc);

u32 next_loc = 0;
int ret;

+if (loc > bcm_sf2_cfp_rule_size(priv))
+return -EINVAL;
+
+/* Refuse deleting unused rules, and those that are not unique since
+ * that could leave IPv6 rules with one of the chained rule in the
+ * table.
+ */
+if (!test_bit(loc, priv->cfp.unique) || loc == 0)
+return -EINVAL;
+
ret = bcm_sf2_cfp_rule_del_one(priv, port, loc, &next_loc);
if (ret)
return ret;

--- linux-4.15.0.orig/drivers/net/dsa/dsa_loop.c
+++ linux-4.15.0/drivers/net/dsa/dsa_loop.c
@@ -350,6 +350,7 @@
}
module_exit(dsa_loop_exit);

+MODULE_SOFTDEP("pre: dsa_loop_bdinfo");
MODULE_LICENSE("GPL");
MODULE_AUTHOR("Florian Fainelli");
MODULE_DESCRIPTION("DSA loopback driver");
--- linux-4.15.0.orig/drivers/net/dsa/lan9303-core.c
+++ linux-4.15.0/drivers/net/dsa/lan9303-core.c
@@ -576,12 +576,12 @@
return 0;
}

-typedef void alr_loop_cb_t(struct lan9303 *chip, u32 dat0, u32 dat1,
- int portmap, void *ctx);
+typedef int alr_loop_cb_t(struct lan9303 *chip, u32 dat0, u32 dat1,
+ int portmap, void *ctx);
-static void lan9303_alr_loop(struct lan9303 *chip, alr_loop_cb_t *cb, void *ctx)
+static int lan9303_alr_loop(struct lan9303 *chip, alr_loop_cb_t *cb, void *ctx)
{
-int i;
+int ret = 0, i;

lan9303_write_switch_reg(chip, LAN9303_SWE_ALR_CMD,
LAN9303_ALR_CMD_GET_FIRST);
@@ -600,12 +600,16 @@
LAN9303_ALR_DAT1_PORT_BITOFFS;
portmap = alrport_2_portmap[alrport];

-cb(chip, dat0, dat1, portmap, ctx);
+ret = cb(chip, dat0, dat1, portmap, ctx);
+if (ret)
+break;

lan9303_write_switch_reg(chip, LAN9303_SWE_ALR_CMD,
LAN9303_ALR_CMD_GET_NEXT);
lan9303_write_switch_reg(chip, LAN9303_SWE_ALR_CMD, 0);
}
+
+return ret;
}

static void alr_reg_to_mac(u32 dat0, u32 dat1, u8 mac[6])
@@ -623,18 +627,20 @@
};

/* Clear learned (non-static) entry on given port */
-static void alr_loop_cb_del_port_learned(struct lan9303 *chip, u32 dat0,
- u32 dat1, int portmap, void *ctx)
+static int alr_loop_cb_del_port_learned(struct lan9303 *chip, u32 dat0,
+u32 dat1, int portmap, void *ctx)
{
    struct del_port_learned_ctx *del_ctx = ctx;
    int port = del_ctx->port;
    if (((BIT(port) & portmap) == 0) || (dat1 & LAN9303_ALR_DAT1_STATIC))
-    return;
+    return 0;
    dat1 &= ~LAN9303_ALR_DAT1_VALID; /* delete entry */
    lan9303_alr_make_entry_raw(chip, dat0, dat1);
+    return 0;
struct port_fdb_dump_ctx {
    dsa_fdb_dump_cb_t *cb;
};

static void alr_loop_cb_fdb_port_dump(struct lan9303 *chip, u32 dat0,
    u32 dat1, int portmap, void *ctx)
{
    struct port_fdb_dump_ctx *dump_ctx = ctx;
    u8 mac[ETH_ALEN];
    bool is_static;

    if ((BIT(dump_ctx->port) & portmap) == 0)
        return 0;
    alr_reg_to_mac(dat0, dat1, mac);
    is_static = !(dat1 & LAN9303_ALR_DAT1_STATIC);
    dump_ctx->cb(mac, 0, is_static, dump_ctx->data);
}

/* Set a static ALR entry. Delete entry if port_map is zero */
static int lan9303_port_mdb_prepare(struct dsa_switch *ds, int port,
--- linux-4.15.0.orig/drivers/net/dsa/microchip/ksz_common.c
+++ linux-4.15.0/drivers/net/dsa/microchip/ksz_common.c
@@ -1105,11 +1105,6 @@
    is_static = !(dat1 & LAN9303_ALR_DAT1_STATIC);
    dump_ctx->cb(mac, 0, is_static, dump_ctx->data);
+return dump_ctx->cb(mac, 0, is_static, dump_ctx->data);
}
/* Set a static ALR entry. Delete entry if port_map is zero */
static int lan9303_port_mdb_prepare(struct dsa_switch *ds, int port,
    int i;
   -mutex_init(&dev->reg_mutex);
   -mutex_init(&dev->alu_mutex);
   -mutex_init(&dev->stats_mutex);
   -mutex_init(&dev->vlan_mutex);
}
dev->ops = &ksz_switch_ops;

for (i = 0; i < ARRAY_SIZE(ksz_switch_chips); i++) {
    if (dev->pdata)
        dev->chip_id = dev->pdata->chip_id;

    mutex_init(&dev->reg_mutex);
    mutex_init(&dev->stats_mutex);
    mutex_init(&dev->alu_mutex);
    mutex_init(&dev->vlan_mutex);

    if (ksz_switch_detect(dev))
        return -EINVAL;

--- linux-4.15.0.orig/drivers/net/dsa/mt7530.c
+++ linux-4.15.0/drivers/net/dsa/mt7530.c
@@ -54,6 +54,7 @@
    MIB_DESC(2, 0x48, "TxBytes"),
    MIB_DESC(1, 0x60, "RxDrop"),
    MIB_DESC(1, 0x64, "RxFiltering"),
+    MIB_DESC(1, 0x68, "RxUnicast"),
    MIB_DESC(1, 0x6c, "RxMulticast"),
    MIB_DESC(1, 0x70, "RxBroadcast"),
    MIB_DESC(1, 0x74, "RxAlignErr"),
@@ -549,7 +550,7 @@
    /* Setup the MAC by default for the cpu port */
    mt7530_write(priv, MT7530_PMCR_P(port), PMCR_CPUP_LINK);
    /* Disable auto learning on the cpu port */
-    mt7530_set(priv, MT7530_PSC_P(port), SA_DIS);
+    mt7530_rmw(priv, MT7530_MFC, UNM_FFP_MASK, UNM_FFP(BIT(port)));

    /* CPU port gets connected to all user ports of
* the switch
@ @ -997,8 +995,6 @@
/* Enable and reset MIB counters */
mt7530_mib_reset(ds);

-mt7530_clear(priv, MT7530_MFC, UNU_FFP_MASK);
-
for (i = 0; i < MT7530_NUM_PORTS; i++) {
/* Disable forwarding by default on all ports */
mt7530_rmw(priv, MT7530_PCR_P(i), PCR_MATRIX_MASK,
@@ -1123,6 +1119,7 @@
    {
    /* sentinel */ },
    });
+MODULE_DEVICE_TABLE(of, mt7530_of_match);

static struct mdio_driver mt7530_mdio_driver = {
    .probe = mt7530_probe,
--- linux-4.15.0.orig/drivers/net/dsa/mt7530.h
+++ linux-4.15.0/drivers/net/dsa/mt7530.h
@@ -33,6 +33,7 @@
#define MT7530_MFC			0x10
#define  BC_FFP(x)			(((x) & 0xff) << 24)
#define  UNM_FFP(x)			(((x) & 0xff) << 16)
+#define  UNM_FFP_MASK			UNM_FFP(~0)
#define  UNU_FFP(x)			(((x) & 0xff) << 8)
#define  UNU_FFP_MASK			UNU_FFP(~0)

--- linux-4.15.0.orig/drivers/net/dsa/mv88e6060.c
+++ linux-4.15.0/drivers/net/dsa/mv88e6060.c
@@ -116,8 +116,7 @@
/* Reset the switch. */
REG_WRITE(REG_GLOBAL, GLOBAL_ATU_CONTROL,
    GLOBAL_ATU_CONTROL_LEARNDIS);

/* Wait up to one second for reset to complete. */
timeout = jiffies + 1 * HZ;
@@ -142,13 +141,10 @@
*/
REG_WRITE(REG_GLOBAL, GLOBAL_CONTROL, GLOBAL_CONTROL_MAX_FRAME_1536);

/* Enable automatic address learning, set the address
- * database size to 1024 entries, and set the default aging
- * time to 5 minutes.
/+* Disable automatic address learning.
REG_WRITE(REG_GLOBAL, GLOBAL_ATU_CONTROL,
- GLOBAL_ATU_CONTROL_ATUSIZE_1024 |
- GLOBAL_ATU_CONTROL_AGE_5MIN);
+ GLOBAL_ATU_CONTROL_LEARNDIS);

return 0;
}
--- linux-4.15.0.orig/drivers/net/dsa/mv88e6xxx/chip.c
+++ linux-4.15.0/drivers/net/dsa/mv88e6xxx/chip.c
@@ -258,6 +258,7 @@
unsigned int sub_irq;
unsigned int n;
u16 reg;
+u16 ctl1;
int err;

mutex_lock(&chip->reg_lock);
@@ -267,13 +268,28 @@
if (err)
go to out;

- for (n = 0; n < chip->g1_irq.nirqs; ++n) {
- if (reg & (1 << n)) {
- sub_irq = irq_find_mapping(chip->g1_irq.domain, n);
- handle_nested_irq(sub_irq);
- ++nhandled;
- +do {
- + for (n = 0; n < chip->g1_irq.nirqs; ++n) {
- + if (reg & (1 << n)) {
- + sub_irq = irq_find_mapping(chip->g1_irq.domain,
- + n);
- + handle_nested_irq(sub_irq);
- + ++nhandled;
- + }
- -
- + mutex_lock(&chip->reg_lock);
- + err = mv88e6xxx_g1_read(chip, MV88E6XXX_G1_CTL1, &ctl1);
- + if (err)
- + goto unlock;
- + err = mv88e6xxx_g1_read(chip, MV88E6XXX_G1_STS, &reg);
- + unlock:
- + mutex_unlock(&chip->reg_lock);
- + if (err)
- + goto out;
- + ctl1 &= GENMASK(chip->g1_irq.nirqs, 0);
+} while (reg & ctl1);
+
out:
return (nhandled > 0 ? IRQ_HANDLED : IRQ_NONE);
}
@@ -385,10 +401,12 @@
if (err)
goto out_disable;

+mutex_unlock(&chip->reg_lock);
err = request_threaded_irq(chip->irq, NULL,
    mv88e6xxx_g1_irq_thread_fn,
    IRQF_ONESHOT | IRQF_TRIGGER_FALLING,
    dev_name(chip->dev), chip);
+mutex_lock(&chip->reg_lock);
if (err)
goto out_disable;

@@ -608,7 +626,7 @@
err = mv88e6xxx_port_read(chip, port, s->reg + 1, &reg);
if (err)
return UINT64_MAX;
-high = reg;
+low |= ((u32)reg) << 16;
}
break;

case STATS_TYPE_BANK1:
@@ -623,7 +641,7 @@
default:
return UINT64_MAX;
}
-value = (((u64)high) << 16) | low;
+value = (((u64)high) << 32) | low;
return value;
}

@@ -1072,7 +1090,11 @@
int err;

if (!vid)
-return -EINVAL;
+return -EOPNOTSUPP;

entry->vid = vid - 1;
entry->valid = false;
@@ -1245,7 +1263,11 @@
if (!entry.portvec)
entry.state = MV88E6XXX_G1_ATU_DATA_STATE_UNUSED;

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} else {
    entry.portvec |= BIT(port);
    if (state == MV88E6XXX_G1_ATU_DATA_STATE_UC_STATIC)
        entry.portvec = BIT(port);
    else
        entry.portvec |= BIT(port);
    entry.state = state;
}

return mv88e6xxx_g1_stats_clear(chip);
}

/* The mv88e6390 has some hidden registers used for debug and
 * development. The errata also makes use of them.
 */
static int mv88e6390_hidden_write(struct mv88e6xxx_chip *chip, int port,
   int reg, u16 val)
{
    u16 ctrl;
    int err;
    err = mv88e6xxx_port_write(chip, PORT_RESERVED_1A_DATA_PORT,
       PORT_RESERVED_1A, val);
    if (err)
      return err;
    ctrl = PORT_RESERVED_1A_BUSY | PORT_RESERVED_1A_WRITE |
       PORT_RESERVED_1A_BLOCK | port << PORT_RESERVED_1A_PORT_SHIFT |
       reg;
    return mv88e6xxx_port_write(chip, PORT_RESERVED_1A_CTRL_PORT,
       PORT_RESERVED_1A, ctrl);
}

static int mv88e6390_hidden_wait(struct mv88e6xxx_chip *chip)
{
    return mv88e6xxx_wait(chip, PORT_RESERVED_1A_CTRL_PORT,
       PORT_RESERVED_1A, PORT_RESERVED_1A_BUSY);
}

static int mv88e6390_hidden_read(struct mv88e6xxx_chip *chip, int port,
   int reg, u16 *val)
{
    u16 ctrl;
    int err;
+ ctrl = PORT_RESERVED_1A_BUSY | PORT_RESERVED_1A_READ |
+ PORT_RESERVED_1A_BLOCK | port << PORT_RESERVED_1A_PORT_SHIFT |
+ reg;
+
+ err = mv88e6xxx_port_write(chip, PORT_RESERVED_1A_CTRL_PORT, 
+ PORT_RESERVED_1A, ctrl);
+ if (err)
+ return err;
+
+ err = mv88e6390_hidden_wait(chip);
+ if (err)
+ return err;
+
+ return mv88e6xxx_port_read(chip, PORT_RESERVED_1A_DATA_PORT, 
+ PORT_RESERVED_1A, val);
+
+ /* Check if the errata has already been applied. */
+ static bool mv88e6390_setup_errata_applied(struct mv88e6xxx_chip *chip)
+ {
+ int port;
+ int err;
+ u16 val;
+ 
+ for (port = 0; port < mv88e6xxx_num_ports(chip); port++) {
+ err = mv88e6390_hidden_read(chip, port, 0, &val);
+ if (err) {
+ dev_err(chip->dev,
+ "Error reading hidden register: %d", err);
+ return false;
+ }
+ if (val != 0x01c0)
+ return false;
+ }
+ return true;
+
+ /* The 6390 copper ports have an errata which require poking magic 
+ * values into undocumented hidden registers and then performing a 
+ * software reset.
+ */
+ static int mv88e6390_setup_errata(struct mv88e6xxx_chip *chip)
+ {
+ int port;
+ int err;
+ 
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if (mv88e6390_setup_errata_applied(chip))
return 0;
+
+/* Set the ports into blocking mode */
+for (port = 0; port < mv88e6xxx_num_ports(chip); port++) {
+err = mv88e6xxx_port_set_state(chip, port, BR_STATE_DISABLED);
+if (err)
+return err;  
+
+/* Set the ports into blocking mode */
+for (port = 0; port < mv88e6xxx_num_ports(chip); port++) {
+err = mv88e6390_hidden_write(chip, port, 0, 0x01c0);
+if (err)
+return err;  
+
+return mv88e6xxx_software_reset(chip);
+
+
static int mv88e6xxx_setup(struct dsa_switch *ds)
{
struct mv88e6xxx_chip *chip = ds->priv;
@@ -2018,6 +2141,12 @@
mutex_lock(&chip->reg_lock);
+
+if (chip->info->ops->setup_errata) {
+err = chip->info->ops->setup_errata(chip);
+if (err)
+goto unlock;
+
+/* Setup Switch Port Registers */
+for (i = 0; i < mv88e6xxx_num_ports(chip); i++) {
+if (dsa_is_unused_port(ds, i))
@@ -2097,11 +2226,22 @@
mutex_unlock(&chip->reg_lock);
+
+/* Setup Switch Port Registers */
+for (i = 0; i < mv88e6xxx_num_ports(chip); i++) {
+if (dsa_is_unused_port(ds, i))

if (reg == MII_PHYSID2) {
-/* Some internal PHYS don't have a model number. Use
- * the mv88e6390 family model number instead.
-* */
-endif (!!(val & 0x3f0))
-val |= MV88E6XXX_PORT_SWITCH_ID_PROD_6390 >> 4;
+/* Some internal PHYs don't have a model number. */
+if (chip->info->family != MV88E6XXX_FAMILY_6165)
+/* Then there is the 6165 family. It gets is
+ * PHYs correct. But it can also have two
* SERDES interfaces in the PHY address
* space. And these don't have a model
* number. But they are not PHYs, so we don't
* want to give them something a PHY driver
* will recognise.
*
* Use the mv88e6390 family model number
* instead, for anything which really could be
* a PHY,
* */
+if (!(val & 0x3f0))
+val |= MV88E6XXX_PORT SWITCH ID PROD 6390 >> 4;
}

return err ? err : val;
@@ -2342,7 +2482,6 @@
 .port_set_frame_mode = mv88e6351_port_set_frame_mode,
 .port_set_egress_floods = mv88e6352_port_set_egress_floods,
 .port_set_ether_type = mv88e6351_port_set_ether_type,
-.port_set_jumbo_size = mv88e6165_port_set_jumbo_size,
 .port_egress_rate_limiting = mv88e6095_port_egress_rate_limiting,
 .port_pause_limit = mv88e6097_port_pause_limit,
 .port_disable_learn_limit = mv88e6xxx_port_disable_learn_limit,
@@ -2433,7 +2572,7 @@
 .port_set_link = mv88e6xxx_port_set_link,
 .port_set_duplex = mv88e6xxx_port_set_duplex,
 .port_set_rgmii_delay = mv88e6390_port_set_rgmii_delay,
-.port_set_speed = mv88e6390_port_set_speed,
+.port_set_speed = mv88e6341_port_set_speed,
 .port_tag_remap = mv88e6095_port_tag_remap,
 .port_set_frame_mode = mv88e6351_port_set_frame_mode,
 .port_set_egress_floods = mv88e6352_port_set_egress_floods,
@@ -2444,7 +2583,7 @@
 .port_disable_learn_limit = mv88e6xxx_port_disable_learn_limit,
 .port_disable_pri_overide = mv88e6xxx_port_disable_pri_overide,
 .stats_snapshot = mv88e6390_g1_stats_snapshot,
-.stats_set_histogram = mv88e6095_g1_stats_set_histogram,
+.stats_set_histogram = mv88e6390_g1_stats_set_histogram,
 .stats_get_sset_count = mv88e6320_stats_get_sset_count,
 .stats_get_strings = mv88e6320_stats_get_strings,
 .stats_get_stats = mv88e6390_stats_get_stats,
@@ -2476,7 +2615,7 @@
 .port_pause_limit = mv88e6097_port_pause_limit,
 .port_disable_learn_limit = mv88e6xxx_port_disable_learn_limit,
 .port_disable_pri_overide = mv88e6xxx_port_disable_pri_overide,
-.stats_snapshot = mv88e6320_g1_stats_snapshot,
+.stats_snapshot = mv88e6xxx_g1_stats_snapshot,
 .stats_set_histogram = mv88e6095_g1_stats_set_histogram,
.stats_get_sset_count = mv88e6095_stats_get_sset_count,
.stats_get_strings = mv88e6095_stats_get_strings,
@@ -2689,6 +2828,7 @@
 static const struct mv88e6xxx_ops mv88e6190_ops = {
 /* MV88E6XXX_FAMILY_6390 */
 +.setup_errata = mv88e6390_setup_errata,
 .irl_init_all = mv88e6390_g2_irl_init_all,
 .get_eeprom = mv88e6xxx_g2_get_eeprom8,
 .set_eeprom = mv88e6xxx_g2_set_eeprom8,
@@ -2724,6 +2864,7 @@
 static const struct mv88e6xxx_ops mv88e6190x_ops = {
 /* MV88E6XXX_FAMILY_6390 */
 +.setup_errata = mv88e6390_setup_errata,
 .irl_init_all = mv88e6390_g2_irl_init_all,
 .get_eeprom = mv88e6xxx_g2_get_eeprom8,
 .set_eeprom = mv88e6xxx_g2_set_eeprom8,
@@ -2759,6 +2900,7 @@
 static const struct mv88e6xxx_ops mv88e6191_ops = {
 /* MV88E6XXX_FAMILY_6390 */
 +.setup_errata = mv88e6390_setup_errata,
 .irl_init_all = mv88e6390_g2_irl_init_all,
 .get_eeprom = mv88e6xxx_g2_get_eeprom8,
 .set_eeprom = mv88e6xxx_g2_set_eeprom8,
@@ -2831,6 +2973,7 @@
 static const struct mv88e6xxx_ops mv88e6290_ops = {
 /* MV88E6XXX_FAMILY_6390 */
 +.setup_errata = mv88e6390_setup_errata,
 .irl_init_all = mv88e6390_g2_irl_init_all,
 .get_eeprom = mv88e6xxx_g2_get_eeprom8,
 .set_eeprom = mv88e6xxx_g2_set_eeprom8,
@@ -2942,7 +3085,7 @@
 .port_set_link = mv88e6xxx_port_set_link,
 .port_set_duplex = mv88e6xxx_port_set_duplex,
 .port_set_rgmii_delay = mv88e6390_port_set_rgmii_delay,
 -.port_set_speed = mv88e6390_port_set_speed,
 +.port_set_speed = mv88e6341_port_set_speed,
 .port_tag_remap = mv88e6095_port_tag_remap,
 .port_set_frame_mode = mv88e6351_port_set_frame_mode,
 .port_set_egress_floods = mv88e6352_port_set_egress_floods,
@@ -2953,7 +3096,7 @@
 .port_disable_learn_limit = mv88e6xxx_port_disable_learn_limit,
 .port_disable_pri_override = mv88e6xxx_port_disable_pri_override,
 .stats_snapshot = mv88e6390_g1_stats_snapshot,
 -.stats_set_histogram = mv88e6095_g1_stats_set_histogram,
.stats_set_histogram = mv88e6390_g1_stats_set_histogram,
.stats_get_sset_count = mv88e6320_stats_get_sset_count,
.stats_get_strings = mv88e6320_stats_get_strings,
.stats_get_stats = mv88e6390_stats_get_stats,
@@ -3074,6 +3217,7 @@
        static const struct mv88e6xxx_ops mv88e6390_ops = {
            /* MV88E6XXX_FAMILY_6390 */
            +.setup_errata = mv88e6390_setup_errata,
-irl_init_all = mv88e6390_g2_irl_init_all,
.get_eeprom = mv88e6xxx_g2_get_eeprom8,
.set_eeprom = mv88e6xxx_g2_set_eeprom8,
@@ -3112,6 +3256,7 @@
go to out_g1_irq;
    }
    }
    +if (chip->reset)
+    usleep_range(1000, 2000);

    err = mv88e6xxx_mdios_register(chip, np);
    if (err)
--- linux-4.15.0.orig/drivers/net/dsa/mv88e6xxx/chip.h
+++ linux-4.15.0/drivers/net/dsa/mv88e6xxx/chip.h
@@ -222,6 +222,11 @@
    +struct mv88e6xxx_ops {
        +/* Switch Setup Errata, called early in the switch setup to
           + allow any errata actions to be performed
           + */
        +int (*setup_errata)(struct mv88e6xxx_chip *chip);
        +
        /* Ingress Rate Limit unit (IRL) operations */
        int (*irl_init_all)(struct mv88e6xxx_chip *chip, int port);

--- linux-4.15.0.orig/drivers/net/dsa/mv88e6xxx/global1.c
+++ linux-4.15.0/drivers/net/dsa/mv88e6xxx/global1.c
@@ -313,6 +313,11 @@
{    u16 ptr = MV88E6390_G1_MONITOR_MGMT_CTL_PTR_CPU_DEST;
/* Use the default high priority for management frames sent to
 * the CPU.
 */

#define MV88E6390_G1_MONITOR_MGMT_CTL_PTR_CPU_DEST_MGMTPRI 0x00e0

if (err)
    return err;

/* Keep the histogram mode bits */
val &= MV88E6XXX_G1_STATS_OP_HIST_RX_TX;
val |= MV88E6XXX_G1_STATS_OP_BUSY | MV88E6XXX_G1_STATS_OP_FLUSH_ALL;

err = mv88e6xxx_g1_write(chip, MV88E6XXX_G1_STATS_OP, val);

/* Offset 0x1C: Global Control 2 */
--- linux-4.15.0.orig/drivers/net/dsa/mv88e6xxx/global1_vtu.c
+++ linux-4.15.0/drivers/net/dsa/mv88e6xxx/global1_vtu.c
@@ -124,11 +124,9 @@
 * Offset 0x08: VTU/STU Data Register 2
 * Offset 0x09: VTU/STU Data Register 3
 */
-
-static int mv88e6185_g1_vtu_data_read(struct mv88e6xxx_chip *chip,
-struct mv88e6xxx_vtu_entry *entry)
+static int mv88e6185_g1_vtu_stu_data_read(struct mv88e6xxx_chip *chip,
+     u16 *regs)
 {       
     u16 regs[3];
     int i;

    /* Read all 3 VTU/STU Data registers */
    @ @ -141,12 +139,45 @ @
    return err;
    }

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-/* Extract MemberTag and PortState data */
+return 0;
+
+static int mv88e6185_g1_vtu_data_read(struct mv88e6xxx_chip *chip,
+     struct mv88e6xxx_vtu_entry *entry)
+{
+    u16 regs[3];
+    int err;
+    int i;
+
+    err = mv88e6185_g1_vtu_stu_data_read(chip, regs);
+    if (err)
+        return err;
+
+    /* Extract MemberTag data */
+    for (i = 0; i < mv88e6xxx_num_ports(chip); ++i) {
+        unsigned int member_offset = (i % 4) * 4;
+        unsigned int state_offset = member_offset + 2;
+        entry->member[i] = (regs[i / 4] >> member_offset) & 0x3;
+    }
+    return 0;
+}
+
+static int mv88e6185_g1_stu_data_read(struct mv88e6xxx_chip *chip,
+     struct mv88e6xxx_vtu_entry *entry)
+{
+    u16 regs[3];
+    int err;
+    int i;
+
+    err = mv88e6185_g1_vtu_stu_data_read(chip, regs);
+    if (err)
+        return err;
+
+    /* Extract PortState data */
+    for (i = 0; i < mv88e6xxx_num_ports(chip); ++i) {
+        unsigned int state_offset = (i % 4) * 4 + 2;
+        entry->state[i] = (regs[i / 4] >> state_offset) & 0x3;
+    }
+
+    return err;
+
+    /* Extract MemberTag data */
+    for (i = 0; i < mv88e6xxx_num_ports(chip); ++i) {
+        unsigned int member_offset = (i % 4) * 4;
+        unsigned int state_offset = member_offset + 2;
+        entry->member[i] = (regs[i / 4] >> member_offset) & 0x3;
+    }
+    return 0;
+
+    return err;
+
+    return err;
```c
+err = mv88e6185_g1_stu_data_read(chip, entry);
+if (err)
+return err;
+
+/* VTU DBNum[3:0] are located in VTU Operation 3:0
+ * VTU DBNum[7:4] are located in VTU Operation 11:8 */
@@ -344,16 +379,20 @@ return err;
 if (entry->valid) {
-/* Fetch (and mask) VLAN PortState data from the STU */
-err = mv88e6xxx_g1_vtu_stu_get(chip, entry);
+err = mv88e6185_g1_vtu_data_read(chip, entry);
 if (err)
 return err;

 -err = mv88e6185_g1_vtu_data_read(chip, entry);
+err = mv88e6xxx_g1_vtu_fid_read(chip, entry);
 if (err)
 return err;

 -err = mv88e6xxx_g1_vtu_fid_read(chip, entry);
+/* Fetch VLAN PortState data from the STU */
+err = mv88e6xxx_g1_vtu_stu_get(chip, entry);
+if (err)
+return err;
+
+err = mv88e6185_g1_stu_data_read(chip, entry);
 if (err)
 return err;
 }
@@ -416,7 +455,7 @@
 * VTU DBNum[7:4] are located in VTU Operation 11:8 */
 op |= entry->fid & 0x000f;
 -op |= (entry->fid & 0x00f0) << 8;
+op |= (entry->fid & 0x00f0) << 4;
 }

 return mv88e6xxx_g1_vtu_op(chip, op);
--- linux-4.15.0.orig/drivers/net/dsa/mv88e6xxx/phy.c
+++ linux-4.15.0/drivers/net/dsa/mv88e6xxx/phy.c
@@ -110,6 +110,9 @@
 err = mv88e6xxx_phy_page_get(chip, phy, page);
 if (!err) {
 err = mv88e6xxx_phy_write(chip, phy, MV88E6XXX_PHY_PAGE, page);
+if (!err)
```
err = mv88e6xxx_phy_write(chip, phy, reg, val);
+
mv88e6xxx_phy_page_put(chip, phy);
}

err = mv88e6xxx_phy_write(chip, phy, reg, val);
+
mv88e6xxx_phy_page_put(chip, phy);
}

--- linux-4.15.0.orig/drivers/net/dsa/mv88e6xxx/port.c
+++ linux-4.15.0/drivers/net/dsa/mv88e6xxx/port.c
@@ -165,7 +165,7 @@
 /* normal duplex detection */
 break;
 default:
-  return -EINVAL;
+  return -EOPNOTSUPP;
 }

err = mv88e6xxx_port_write(chip, port, MV88E6XXX_PORT_MAC_CTL, reg);
@@ -203,8 +203,11 @@
 ctrl = MV88E6XXX_PORT_MAC_CTL_SPEED_1000;
 break;
 case 2500:
-  ctrl = MV88E6390_PORT_MAC_CTL_SPEED_10000 |
-  MV88E6390_PORT_MAC_CTL_ALTSPEED;
+  if (alt_bit)
+    ctrl = MV88E6390_PORT_MAC_CTL_SPEED_10000 |
+    MV88E6390_PORT_MAC_CTL_ALTSPEED;
+  else
+    ctrl = MV88E6390_PORT_MAC_CTL_SPEED_10000;
 break;
 case 10000:
  /* all bits set, fall through... */
@@ -266,6 +269,24 @@
 return mv88e6xxx_port_set_speed(chip, port, speed, false, false);
 }

+/* Support 10, 100, 200, 1000, 2500 Mbps (e.g. 88E6341) */
+int mv88e6341_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed) +{
+  if (speed == SPEED_MAX)
+    speed = port < 5 ? 1000 : 2500;
+  if (speed > 2500)
+    return -EOPNOTSUPP;
+  if (speed == 200 && port != 0)
+    return -EOPNOTSUPP;
+  if (speed == 2500 && port < 5)
+    return -EOPNOTSUPP;


int mv88e6352_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed)
{
    /* Support 10, 100, 200, 1000 Mbps (e.g. 88E6352 family) */
    return mv88e6xxx_port_set_speed(chip, port, speed, !port, true);
}

/* Offset 0x1a: Magic undocumented errata register */
#define PORT_RESERVED_1A	0x1a
#define PORT_RESERVED_1A_BUSY	BIT(15)
#define PORT_RESERVED_1A_WRITE	BIT(14)
#define PORT_RESERVED_1A_READ	0
#define PORT_RESERVED_1A_PORT_SHIFT	5
#define PORT_RESERVED_1A_BLOCK	(0xf << 10)
#define PORT_RESERVED_1A_CTRL_PORT	4
#define PORT_RESERVED_1A_DATA_PORT	5

int mv88e6xxx_port_read(struct mv88e6xxx_chip *chip, int port, int reg, u16 *val);
int mv88e6xxx_port_write(struct mv88e6xxx_chip *chip, int port, int reg, u16 *val);

int mv88e6065_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed);
int mv88e6185_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed);
int mv88e6341_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed);
int mv88e6352_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed);
int mv88e6390_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed);
int mv88e6390x_port_set_speed(struct mv88e6xxx_chip *chip, int port, int speed);

qca8k_write(priv, QCA8K_REG_PORT5_PAD_CTRL, QCA8K_PORT_PAD_RGMII_RX_DELAY_EN);
break;
+case PHY_INTERFACE_MODE_RGMII_ID:
/* RGMII_ID needs internal delay. This is enabled through
 * PORT5_PAD_CTRL for all ports, rather than individual port
 * registers
 */
+qca8k_write(priv, reg,
   QCA8K_PORT_PAD_RGMII_EN |
   QCA8K_PORT_PAD_RGMII_TX_DELAY(QCA8K_MAX_DELAY))}
static void qca8k_port_set_status(struct qca8k_priv *priv, int port, int enable)
{
    u32 mask = QCA8K_PORT_STATUS_TXMAC;
    /* Port 0 and 6 have no internal PHY */
    if ((port > 0) && (port < 6))
        { 
        struct qca8k_priv *priv = (struct qca8k_priv *)ds->priv;
        int ret, i, phy_mode = -1;
        +u32 mask;

        /* Make sure that port 0 is the cpu port */
        if (!dsa_is_cpu_port(ds, 0)) {
            @ @ -515,7 +528,10 @@
            if (ret < 0)
                return ret;

            /* Enable CPU Port */
            +/* Enable CPU Port, force it to maximum bandwidth and full-duplex */
            +mask = QCA8K_PORT_STATUS_SPEED_1000 | QCA8K_PORT_STATUS_TXFLOW |
            + QCA8K_PORT_STATUS_RXFLOW | QCA8K_PORT_STATUS_DUPLEX;
            +qca8k_write(priv, QCA8K_REG_PORT_STATUS(QCA8K_CPU_PORT), mask);
            qca8k_reg_set(priv, QCA8K_REG_GLOBAL_FW_CTRL0,
                           QCA8K_GLOBAL_FW_CTRL0_CPU_PORT_EN);
            qca8k_port_set_status(priv, QCA8K_CPU_PORT, 1);
            @ @ -547,7 +563,7 @@
            BIT(0) << QCA8K_GLOBAL_FW_CTRL1_UC_DP_S);

            /* Setup connection between CPU port & user ports */
            -for (i = 0; i < DSA_MAX_PORTS; i++) {
            +for (i = 0; i < QCA8K_NUM_PORTS; i++) {
                /* CPU port gets connected to all user ports of the switch */
                if (dsa_is_cpu_port(ds, i)) {
                    qca8k_rmw(priv, QCA8K_PORT_LOOKUP_CTRL(QCA8K_CPU_PORT),
                               @ @ -583,20 +599,45 @@
                    return 0;
                }
static int qca8k_phy_read(struct dsa_switch *ds, int phy, int regnum) {
    struct qca8k_priv *priv = (struct qca8k_priv *)ds->priv;
    u32 reg;
    return mdiobus_read(priv->bus, phy, regnum);
}

static void qca8k_adjust_link(struct dsa_switch *ds, int port, struct phy_device *phy) {
    struct qca8k_priv *priv = ds->priv;
    /* Force fixed-link setting for CPU port, skip others. */
    if (!phy_is_pseudo_fixed_link(phy))
        return;
    /* Set port speed */
    switch (phy->speed) {
        case 10:
            reg = QCA8K_PORT_STATUS_SPEED_10;
            break;
        case 100:
            reg = QCA8K_PORT_STATUS_SPEED_100;
            break;
        case 1000:
            reg = QCA8K_PORT_STATUS_SPEED_1000;
            break;
        default:
            dev_dbg(priv->dev, "port%d link speed %dMbps not supported
", port, phy->speed);
            return;
    }
}

static int qca8k_phy_write(struct dsa_switch *ds, int phy, int regnum, u16 val) {
    struct qca8k_priv *priv = (struct qca8k_priv *)ds->priv;
    /* Set duplex mode */
    if (phy->duplex == DUPLEX_FULL)
        reg |= QCA8K_PORT_STATUS_DUPLEX;
    /* Force flow control */
    if (dsa_is_cpu_port(ds, port))
        reg |= QCA8K_PORT_STATUS_RXFLOW | QCA8K_PORT_STATUS_TXFLOW;

    return mdiobus_write(priv->bus, phy, regnum, val);
}

/* Force link down before changing MAC options */
qca8k_port_set_status(priv, port, 0);
+qca8k_write(priv, QCA8K_REG_PORT_STATUS(port), reg);
+qca8k_port_set_status(priv, port, 1);
}

static void
@@ -831,9 +872,8 @@
static const struct dsa_switch_ops qca8k_switch_ops = {
    .get_tag_protocol = qca8k_get_tag_protocol,
    .setup = qca8k_setup,
    +.adjust_link = qca8k_adjust_link,
    .get_strings = qca8k_get_strings,
    -.phy_read = qca8k_phy_read,
    -.phy_write = qca8k_phy_write,
    .get_ethtool_stats = qca8k_get_ethtool_stats,
    .get_sset_count = qca8k_get_sset_count,
    .get_mac_eee = qca8k_get_mac_eee,
@@ -862,6 +902,7 @@
    return -ENOMEM;

    priv->bus = mdiodev->bus;
    +priv->dev = &mdiodev->dev;

    /* read the switches ID register */
    id = qca8k_read(priv, QCA8K_REG_MASK_CTRL);
@@ -870,7 +911,7 @@
    if (id != QCA8K_ID_QCA8337)
    return -ENODEV;

    -priv->ds = dsa_switch_alloc(&mdiodev->dev, DSA_MAX_PORTS);
    +priv->ds = dsa_switch_alloc(&mdiodev->dev, QCA8K_NUM_PORTS);
    if (!priv->ds)
    return -ENOMEM;

    @ @ -933,6 +974,7 @@
    qca8k_suspend, qca8k_resume);

    static const struct of_device_id qca8k_of_match[] = {
    +{ .compatible = "qca,qca8334" },
    { .compatible = "qca,qca8337" },
    { /* sentinel */ },
    };
#define QCA8K_PORT_PAD_RGMII_RX_DELAY_ENBIT(24)
#define QCA8K_PORT_PAD_SGMII_ENBIT(7)
#define QCA8K_REG_MODULE_EN 0x030
@@ -51,8 +52,10 @@
#define QCA8K_GOL_MAC_ADDR0 0x60
#define QCA8K_GOL_MAC_ADDR1 0x64
#define QCA8K_REG_PORT_STATUS(_i) (0x07c + (_i) * 4)
-#define QCA8K_PORT_STATUS_SPEED GENMASK(2, 0)
-#define QCA8K_PORT_STATUS_SPEED_S 0
+#define QCA8K_PORT_STATUS_SPEED GENMASK(1, 0)
+#define QCA8K_PORT_STATUS_SPEED_10 0
+#define QCA8K_PORT_STATUS_SPEED_100 0x1
+#define QCA8K_PORT_STATUS_SPEED_1000 0x2
#define QCA8K_PORT_STATUS_TXMAC BIT(2)
#define QCA8K_PORT_STATUS_RXMAC BIT(3)
@@ -165,6 +168,7 @@
struct ar8xxx_port_status port_sts[QCA8K_NUM_PORTS];
struct dsa_switch *ds;
struct mutex reg_mutex;
+struct device *dev;
};

struct qca8k_mib_desc {
--- linux-4.15.0.orig/drivers/net/ethernet/3com/3c59x.c
+++ linux-4.15.0/drivers/net/ethernet/3com/3c59x.c
@@ -1212,9 +1212,9 @@
 vp->mii.reg_num_mask = 0x1f;
 /* Makes sure rings are at least 16 byte aligned. */
- vp->rx_ring = pci_alloc_consistent(pdev, sizeof(struct boom_rx_desc) * RX_RING_SIZE
+ vp->rx_ring = dma_alloc_coherent(gendev, sizeof(struct boom_rx_desc) * RX_RING_SIZE
   + sizeof(struct boom_tx_desc) * TX_RING_SIZE,
   - &vp->rx_ring_dma);
   + &vp->rx_ring_dma, GFP_KERNEL);
 retval = -ENOMEM;
 if (!vp->rx_ring)
 goto free_device;
@@ -1476,11 +1476,10 @@
 return 0;

 free_ring:
- pci_free_consistent(pdev,
- sizeof(struct boom_rx_desc) * RX_RING_SIZE
- + sizeof(struct boom_tx_desc) * TX_RING_SIZE,
- vp->rx_ring,
- vp->rx_ring_dma);
+ dma_free_coherent(&pdev->dev,
+sizeof(struct boom_rx_desc) * RX_RING_SIZE +
+sizeof(struct boom_tx_desc) * TX_RING_SIZE,
+vp->rx_ring, vp->rx_ring_dma);
free_device:
free_netdev(dev);
pr_err(PFX "vortex_probe1 fails. Returns %d\n", retval);
@@ -1751,9 +1750,9 @@
break;/* Bad news! */

skb_reserve(skb, NET_IP_ALIGN); /* Align IP on 16 byte boundaries */
-dma = pci_map_single(VORTEX_PCI(vp), skb->data,
- PKT_BUF_SZ, PCI_DMA_FROMDEVICE);
-if (dma_mapping_error(&VORTEX_PCI(vp)->dev, dma))
+dma = dma_map_single(vp->gendev, skb->data,
 + PKT_BUF_SZ, DMA_FROM_DEVICE);
+if (dma_mapping_error(vp->gendev, dma))
break;
vp->rx_ring[i].addr = cpu_to_le32(dma);
}
@@ -2067,9 +2066,9 @@
if (vp->bus_master) {
 /* Set the bus-master controller to transfer the packet. */
 int len = (skb->len + 3) & ~3;
-vp->tx_skb_dma = pci_map_single(VORTEX_PCI(vp), skb->data, len,
- PCI_DMA_TODEVICE);
-if (dma_mapping_error(&VORTEX_PCI(vp)->dev, vp->tx_skb_dma)) {
+vp->tx_skb_dma = dma_map_single(vp->gendev, skb->data, len,
+ DMA_TO_DEVICE);
+if (dma_mapping_error(vp->gendev, vp->tx_skb_dma)) {
 dev_kfree_skb_any(skb);
 dev->stats.tx_dropped++;
 return NETDEV_TX_OK;
@@ -2168,9 +2167,9 @@
 vp->tx_ring[entry].status = cpu_to_le32(skb->len | TxIntrUploaded | AddTCPChksum | AddUDPChksum);

 if (!skb_shinfo(skb)->nr_frags) {
-dma_addr = pci_map_single(VORTEX_PCI(vp), skb->data, skb->len,
- PCI_DMA_TODEVICE);
-if (dma_mapping_error(&VORTEX_PCI(vp)->dev, dma_addr))
+dma_addr = dma_map_single(vp->gendev, skb->data, skb->len,
 + DMA_TO_DEVICE);
+if (dma_mapping_error(vp->gendev, dma_addr))
goto out_dma_err;

 vp->tx_ring[entry].frag[0].addr = cpu_to_le32(dma_addr);
@@ -2178,9 +2177,9 @@
 } else {
 int i;

---
-dma_addr = pci_map_single(VORTEX_PCI(vp), skb->data,
- skb_headlen(skb), PCI_DMA_TODEVICE);
-if (dma_mapping_error(&VORTEX_PCI(vp)->dev, dma_addr))
+dma_addr = dma_map_single(vp->gendev, skb->data,
+ skb_headlen(skb), DMA_TO_DEVICE);
+if (dma_mapping_error(vp->gendev, dma_addr))
goto out_dma_err;

vp->tx_ring[entry].frag[0].addr = cpu_to_le32(dma_addr);
@@ -2189,21 +2188,21 @@
for (i = 0; i < skb_shinfo(skb)->nr_frags; i++) {
    skb_frag_t *frag = &skb_shinfo(skb)->frags[i];

    -dma_addr = skb_frag_dma_map(&VORTEX_PCI(vp)->dev, frag,
    +dma_addr = skb_frag_dma_map(vp->gendev, frag,
           0,
           frag->size,
           DMA_TO_DEVICE);
    -if (dma_mapping_error(&VORTEX_PCI(vp)->dev, dma_addr)) {
    +if (dma_mapping_error(vp->gendev, dma_addr)) {
        for(i = i-1; i >= 0; i--)
            dma_unmap_page(&VORTEX_PCI(vp)->dev,
             dma_unmap_page(vp->gendev,
                le32_to_cpu(vp->tx_ring[entry].frag[i+1].addr),
                le32_to_cpu(vp->tx_ring[entry].frag[i+1].length),
                DMA_TO_DEVICE);
    -pci_unmap_single(VORTEX_PCI(vp),
    +dma_unmap_single(vp->gendev,
       le32_to_cpu(vp->tx_ring[entry].frag[0].addr),
       le32_to_cpu(vp->tx_ring[entry].frag[0].length),
       - PCI_DMA_TODEVICE);
    + DMA_TO_DEVICE);

goto out_dma_err;
}
@@ -2218,8 +2217,8 @@
}
}
}
#else
-dma_addr = pci_map_single(VORTEX_PCI(vp), skb->data, skb->len, PCI_DMA_TODEVICE);
-if (dma_mapping_error(&VORTEX_PCI(vp)->dev, dma_addr))
+dma_addr = dma_map_single(vp->gendev, skb->data, skb->len, DMA_TO_DEVICE);
+if (dma_mapping_error(vp->gendev, dma_addr))
goto out_dma_err;
vp->tx_ring[entry].addr = cpu_to_le32(dma_addr);
vp->tx_ring[entry].length = cpu_to_le32(skb->len | LAST_FRAG);
out:
return NETDEV_TX_OK;
out_dma_err:
-dev_err(&VORTEX_PCI(vp)->dev, "Error mapping dma buffer\n");
+dev_err(vp->gendev, "Error mapping dma buffer\n");
goto out;
}

@@ -2322,7 +2321,7 @@
if (status & DMADone) {
if (ioread16(ioaddr + Wn7_MasterStatus) & 0x1000) {
iowrite16(0x1000, ioaddr + Wn7_MasterStatus); /* Ack the event. */
 pci_unmap_single(VORTEX_PCI(vp), vp->tx_skb_dma, (vp->tx_skb->len + 3) & ~3, PCI_DMA_TODEVICE);
+dma_unmap_single(vp->gendev, vp->tx_skb_dma, (vp->tx_skb->len + 3) & ~3, DMA_TO_DEVICE);
 pkts_compl++;
 bytes_compl += vp->tx_skb->len;
 dev_kfree_skb_irq(vp->tx_skb); /* Release the transferred buffer */
 @} -2459,19+2458,19 @@
 struct sk_buff *skb = vp->tx_skbuff[entry];
 #if DO_ZEROCOPY
 int i;
-pci_unmap_single(VORTEX_PCI(vp),
+dma_unmap_single(vp->gendev,
 le32_to_cpu(vp->tx_ring[entry].frag[0].addr),
 le32_to_cpu(vp->tx_ring[entry].frag[0].length)&0xFFF,
-PCI_DMA_TODEVICE);
+DMA_TO_DEVICE);
 for (i=1; i<=skb_shinfo(skb)->nr_frags; i++)
-pci_unmap_page(VORTEX_PCI(vp),
+dma_unmap_page(vp->gendev,
 le32_to_cpu(vp->tx_ring[entry].frag[i].addr),
 le32_to_cpu(vp->tx_ring[entry].frag[i].length)&0xFFF,
-PCI_DMA_TODEVICE);
+DMA_TO_DEVICE);
#else
-pci_unmap_single(VORTEX_PCI(vp),
-le32_to_cpu(vp->tx_ring[entry].addr), skb->len, PCI_DMA_TODEVICE);
+dma_unmap_single(vp->gendev,
+le32_to_cpu(vp->tx_ring[entry].addr), skb->len, DMA_TO_DEVICE);
#endif
 pkts_compl++;
 bytes_compl += skb->len;
 @} -2561,14+2560,14 @@
 /* 'skb_put()' points to the start of sk_buff data area. */
 if (vp->bus_master &&
 ! (ioread16(ioaddr + Wn7_MasterStatus) & 0x8000)) {
- dma_addr_t dma = pci_map_single(VORTEX_PCI(vp), skb_put(skb, pkt_len),
  - pkt_len, PCI_DMA_FROMDEVICE);
+ dma_addr_t dma = dma_map_single(vp->gendev, skb_put(skb, pkt_len),
+   pkt_len, DMA_FROM_DEVICE);
iowrite32(dma, ioaddr + Wn7_MasterAddr);
iowrite16((skb->len + 3) & ~3, ioaddr + Wn7_MasterLen);
iowrite16(StartDMAUp, ioaddr + EL3_CMD);
while (ioread16(ioaddr + Wn7_MasterStatus) & 0x8000)
  ;
- pci_unmap_single(VORTEX_PCI(vp), dma, pkt_len, PCI_DMA_FROMDEVICE);
+ dma_unmap_single(vp->gendev, dma, pkt_len, DMA_FROM_DEVICE);
} else {
ioread32_rep(ioaddr + RX_FIFO,
    skb_put(skb, pkt_len),
@@ -2635,11 +2634,11 @@
if (pkt_len < rx_copybreak &&
  (skb = netdev_alloc_skb(dev, pkt_len + 2)) != NULL) {
    skb_reserve(skb, 2); /* Align IP on 16 byte boundaries */
- pci_dma_sync_single_for_cpu(VORTEX_PCI(vp), dma, PKT_BUF_SZ, PCI_DMA_FROMDEVICE);
+ dma_sync_single_for_cpu(vp->gendev, dma, PKT_BUF_SZ, DMA_FROM_DEVICE);
/* 'skb_put()' points to the start of sk_buff data area. */
    skb_put_data(skb, vp->rx_skbuff[entry]->data, pkt_len);
- pci_dma_sync_single_for_device(VORTEX_PCI(vp), dma, PKT_BUF_SZ, PCI_DMA_FROMDEVICE);
+ dma_sync_single_for_device(vp->gendev, dma, PKT_BUF_SZ, DMA_FROM_DEVICE);
    vp->rx_copy++;
} else {
/* Pre-allocate the replacement skb. If it or its
@@ -2651,9 +2650,9 @@
    goto clear_complete;
  }
  - newdma = pci_map_single(VORTEX_PCI(vp), newskb->data,
    -PKT_BUF_SZ, PCI_DMA_FROMDEVICE);
- if (dma_mapping_error(&VORTEX_PCI(vp)->dev, newdma)) {
+ if (dma_mapping_error(vp->gendev, newdma)) {
    newdma = dma_map_single(vp->gendev, newskb->data,
    +PKT_BUF_SZ, DMA_FROM_DEVICE);
    + if (dma_mapping_error(vp->gendev, newdma)) {
      dev->stats.rx_dropped++;
      consume_skb(newskb);
      goto clear_complete;
@@ -2664,7 +2663,7 @@
      vp->rx_skbuff[entry] = newskb;
      vp->rx_ring[entry].addr = cpu_to_le32(newdma);
      skb_put(skb, pkt_len);
-pci_unmap_single(VORTEX_PCI(vp), dma, PKT_BUF_SZ, PCI_DMA_FROMDEVICE);
+ dma_unmap_single(vp->gendev, dma, PKT_BUF_SZ, DMA_FROM_DEVICE);
    vp->rx_nocopy++;

skb->protocol = eth_type_trans(skb, dev);
@@ -2761,8 +2760,8 @@
if (vp->full_bus_master_rx) { /* Free Boomerang bus master Rx buffers. */
    for (i = 0; i < RX_RING_SIZE; i++)
    if (vp->rx_skbuff[i]) {
-        pci_unmap_single(VORTEX_PCI(vp), le32_to_cpu(vp->rx_ring[i].addr),
-            PKT_BUF_SZ, PCI_DMA_FROMDEVICE);
+        dma_unmap_single(vp->gendev, le32_to_cpu(vp->rx_ring[i].addr),
+            PKT_BUF_SZ, DMA_FROM_DEVICE);
        dev_kfree_skb(vp->rx_skbuff[i]);
        vp->rx_skbuff[i] = NULL;
    }
@@ -2775,12 +2774,12 @@
    int k;
    for (k=0; k<=skb_shinfo(skb)->nr_frags; k++)
        -pci_unmap_single(VORTEX_PCI(vp),
-            le32_to_cpu(vp->tx_ring[i].frag[k].addr),
-            le32_to_cpu(vp->tx_ring[i].frag[k].length)&0xFFF,
-            PCI_DMA_TODEVICE);
+        dma_unmap_single(vp->gendev,
+            le32_to_cpu(vp->tx_ring[i].frag[k].addr),
+            le32_to_cpu(vp->tx_ring[i].frag[k].length)&0xFFF,
+            DMA_TO_DEVICE);
    #else
        -pci_unmap_single(VORTEX_PCI(vp), le32_to_cpu(vp->tx_ring[i].addr), skb->len, PCI_DMA_TODEVICE);
        +dma_unmap_single(vp->gendev, le32_to_cpu(vp->tx_ring[i].addr), skb->len, DMA_TO_DEVICE);
    #endif
    dev_kfree_skb(skb);
    vp->tx_skbuff[i] = NULL;
@@ -3288,11 +3287,10 @@
    pci_iounmap(pdev, vp->ioaddr);

    -pci_free_consistent(pdev,
-        sizeof(struct boom_rx_desc) * RX_RING_SIZE
-        + sizeof(struct boom_tx_desc) * TX_RING_SIZE,
-        vp->rx_ring,
-        vp->rx_ring_dma);
+        dma_free_coherent(&pdev->dev,
+        sizeof(struct boom_rx_desc) * RX_RING_SIZE
+        + sizeof(struct boom_tx_desc) * TX_RING_SIZE,
+        vp->rx_ring, vp->rx_ring_dma);

    pci_release_regions(pdev);

--- linux-4.15.0.orig/drivers/net/ethernet/3com/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/3com/Kconfig
@@ -32,7 +32,7 @@
config 3C515
tristate "3c515 ISA \"Fast EtherLink\""
-depends on ISA && ISA_DMA_API
+depends on ISA && ISA_DMA_API && !PPC32
---help---
If you have a 3Com ISA EtherLink XL "Corkscrew" 3c515 Fast Ethernet
network card, say Y here.
--- linux-4.15.0.orig/drivers/net/ethernet/8390/mac8390.c
+++ linux-4.15.0/drivers/net/ethernet/8390/mac8390.c
@@ -156,8 +156,6 @@
#define memcpy_fromio(a, b, c)
    memcpy((a), (void *)(b), (c))
#define memcpy_toio(a, b, c)
-#define memcmp_withio(a, b, c)  
-                          memcmp((a), (void *)(b), (c))
-
/* Slow Sane (16-bit chunk memory read/write) Cabletron uses this */
static void slow_sane_get_8390_hdr(struct net_device *dev,  
    struct e8390_pkt_hdr *hdr, int ring_page);
@@ -237,19 +235,26 @@
static enum mac8390_access __init mac8390_testio(volatile unsigned long membase)
{
    unsigned long outdata = 0xA5A0B5B0;
    unsigned long indata = 0x00000000;
    +u32 outdata = 0xA5A0B5B0;
    +u32 indata = 0;
    +
    /* Try writing 32 bits */
    -memcpy_toio(membase, &outdata, 4);
    -/* Now compare them */
    -if (memcmp_withio(&outdata, membase, 4) == 0)
        +nubus_writel(outdata, membase);
        +/* Now read it back */
        +indata = nubus_readl(membase);
        +if (outdata == indata)
            return ACCESS_32;
    +
    +outdata = 0xC5C0D5D0;
    +indata = 0;
    +
    /* Write 16 bit output */
    word_memcpy_tocard(membase, &outdata, 4);
    /* Now read it back */
    word_memcpy_fromcard(&indata, membase, 4);
    if (outdata == indata)
        return ACCESS_16;
    +
return ACCESS_UNKNOWN;
}

--- linux-4.15.0.orig/drivers/net/ethernet/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/Kconfig
@@ -99,6 +99,7 @@
    tristate "Korina (IDT RC32434) Ethernet support"
    depends on MIKROTIK_RB532
+-select CRC32
---help---
If you have a Mikrotik RouterBoard 500 or IDT RC32434 based system say Y. Otherwise say N.
@@ -170,6 +171,7 @@
    source "drivers/net/ethernet/sfc/Kconfig"
    source "drivers/net/ethernet/sgi/Kconfig"
    source "drivers/net/ethernet/smsc/Kconfig"
+-source "drivers/net/ethernet/socionext/Kconfig"
    source "drivers/net/ethernet/stmicro/Kconfig"
    source "drivers/net/ethernet/sun/Kconfig"
    source "drivers/net/ethernet/tehuti/Kconfig"
--- linux-4.15.0.orig/drivers/net/ethernet/Makefile
+++ linux-4.15.0/drivers/net/ethernet/Makefile
@@ -82,6 +82,7 @@
    obj-$(CONFIG_SFC_FALCON) += sfc/falcon/
    obj-$(CONFIG_NET_VENDOR_SGI) += sgi/
    obj-$(CONFIG_NET_VENDOR_SMSC) += smsc/
+-obj-$(CONFIG_NET_VENDOR_SOCIONEXT) += socionext/
    obj-$(CONFIG_NET_VENDOR_STMICRO) += stmicro/
    obj-$(CONFIG_NET_VENDOR_SUN) += sun/
    obj-$(CONFIG_NET_VENDOR_TEHUTI) += tehuti/
--- linux-4.15.0.orig/drivers/net/ethernet/aeroflex/greth.c
+++ linux-4.15.0/drivers/net/ethernet/aeroflex/greth.c
@@ -1546,10 +1546,11 @@
    mdiobus_unregister(greth->mdio);

    unregister_netdev(ndev);
+-free_netdev(ndev);

    of_iounmap(&of_dev->resource[0], greth->regs, resource_size(&of_dev->resource[0]));

    +free_netdev(ndev);
    
    return 0;
}

--- linux-4.15.0.orig/drivers/net/ethernet/allwinner/sun4i-emac.c
+++ linux-4.15.0/drivers/net/ethernet/allwinner/sun4i-emac.c
static int emac_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct emac_board_info *db = netdev_priv(dev);
    unsigned long channel = db->tx_fifo_stat & 3;
    if (channel == 3)
        return 1;
    channel = (channel == 1 ? 1 : 0);

    db->clk = devm_clk_get(&pdev->dev, NULL);
    if (IS_ERR(db->clk)) {
        ret = PTR_ERR(db->clk);
        goto out_iounmap;
    }
    ret = clk_prepare_enable(db->clk);
    if (ret) {
        dev_err(&pdev->dev, "Error couldn't enable clock (%d)\n", ret);
        goto out_iounmap;
    }
    ret = sunxi_sram_claim(&pdev->dev);
    out_dispose_mapping:
    irq_dispose_mapping(ndev->irq);
    out_iounmap:
    iounmap(db->membase);
    out:
    unregister_netdev(ndev);
    sunxi_sram_release(&pdev->dev);
    clk_disable_unprepare(db->clk);
    +irq_dispose_mapping(ndev->irq);
    out_iounmap:
    iounmap(db->membase);
    out:
iounmap(db->membase);
free_netdev(nenv);

--- linux-4.15.0.orig/drivers/net/ethernet/altera/altera_msgdma.c
+++ linux-4.15.0/drivers/net/ethernet/altera/altera_msgdma.c
@@ -145,7 +145,8 @@
  & 0xffff;
if (inuse) { /* Tx FIFO is not empty */
  ready = priv->tx_prod - priv->tx_cons - inuse - 1;
+  ready = max_t(int,
+    priv->tx_prod - priv->tx_cons - inuse - 1, 0);
} else {
  /* Check for buffered last packet */
  status = csrrd32(priv->tx_dma_csr, msgdma_csroffs(status));
--- linux-4.15.0.orig/drivers/net/ethernet/altera/altera_tse_main.c
+++ linux-4.15.0/drivers/net/ethernet/altera/altera_tse_main.c
@@ -714,8 +714,10 @@
phydev = phy_connect(dev, phy_id_fmt, &altera_tse_adjust_link,
  priv->phy_iface);
-if (IS_ERR(phydev))
+if (IS_ERR(phydev)) {
  netdev_err(dev, "Could not attach to PHY\n");
+phydev = NULL;
  +}
} else {
  int ret;
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/amazon/Kconfig
@@ -17,7 +17,8 @@
config ENA_ETHERNET
  tristate "Elastic Network Adapter (ENA) support"
  -depends on (PCI_MSI && X86)
+depends on PCI_MSI && !CPU_BIG_ENDIAN
+select DIMLIB
---help---
  This driver supports Elastic Network Adapter (ENA)"

--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_admin_defs.h
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_admin_defs.h
@@ -1,146 +1,87 @@
/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
/*
- * Copyright 2015 - 2016 Amazon.com, Inc. or its affiliates.
- */
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*/

#ifndef _ENA_ADMIN_H_
#define _ENA_ADMIN_H_

-enum ena_admin_aq_opcode { 
-ENA_ADMIN_CREATE_SQ= 1, 
-ENA_ADMIN_DESTROY_SQ= 2, 
-ENA_ADMIN_CREATE_CQ= 3, 
-ENA_ADMIN_DESTROY_CQ= 4, 
-ENA_ADMIN_GET_FEATURE= 8, 
+#define ENA_ADMIN_RSS_KEY_PARTS 10 
-ENA_ADMIN_SET_FEATURE= 9, 
-ENA_ADMIN_GET_STATS= 11, 
+enum ena_admin_aq_opcode {
enum ena_admin_aq_completion_status {
  ENA_ADMIN_SUCCESS = 0,
  ENA_ADMIN_RESOURCE_ALLOCATION_FAILURE = 1,
  ENA_ADMIN_BAD_OPCODE = 2,
  ENA_ADMIN_UNSUPPORTED_OPCODE = 3,
  ENA_ADMIN_MALFORMED_REQUEST = 4,
  ENA_ADMIN_ILLEGAL_PARAMETER = 5,
  ENA_ADMIN_UNKNOWN_ERROR = 6,
  ENA_ADMIN_RESOURCE_BUSY = 7,
};

enum ena_admin_aq_feature_id {
  ENA_ADMIN_DEVICE_ATTRIBUTES = 1,
  ENA_ADMIN_MAX_QUEUES_NUM = 2,
  ENA_ADMIN_HW_HINTS = 3,
  ENA_ADMIN_RSS_HASH_FUNCTION = 10,
  ENA_ADMIN_STATELESS_OFFLOAD_CONFIG = 11,
  ENA_ADMIN_RSS_REDIRECTION_TABLE_CONFIG = 12,
  ENA_ADMIN_MTU = 14,
};
- ENA_ADMIN_RSS_HASH_INPUT = 18,
- ENA_ADMIN_INTERRUPT_MODERATION = 20,
- ENA_ADMIN_AENQ_CONFIG = 26,
- ENA_ADMIN_LINK_CONFIG = 27,
- ENA_ADMIN_HOST_ATTR_CONFIG = 28,
- ENA_ADMIN_FEATURES_OPCODE_NUM = 32,
+ ENA_ADMIN_DEVICE_ATTRIBUTES = 1,
+ ENA_ADMIN_MAX_QUEUES_NUM = 2,
+ ENA_ADMIN_HW_HINTS = 3,
+ ENA_ADMIN_LLQ = 4,
+ ENA_ADMIN_MAX_QUEUES_EXT = 7,
+ ENA_ADMIN_RSS_HASH_FUNCTION = 10,
+ ENA_ADMIN_STATELESS_OFFLOAD_CONFIG = 11,
+ ENA_ADMIN_RSS_INDIRECTION_TABLE_CONFIG = 12,
+ ENA_ADMIN_MTU = 14,
+ ENA_ADMIN_RSS_HASH_INPUT = 18,
+ ENA_ADMIN_INTERRUPT_MODERATION = 20,
+ ENA_ADMIN_AENQ_CONFIG = 26,
+ ENA_ADMIN_LINK_CONFIG = 27,
+ ENA_ADMIN_HOST_ATTR_CONFIG = 28,
+ ENA_ADMIN_FEATURES_OPCODE_NUM = 32,
};

enum ena_admin_placement_policy_type {
    /* descriptors and headers are in host memory */
- ENA_ADMIN_PLACEMENT_POLICY_HOST = 1,
- 
+ ENA_ADMIN_PLACEMENT_POLICY_HOST = 1,
    /* descriptors and headers are in device memory (a.k.a Low Latency * Queue) */
+ ENA_ADMIN_PLACEMENT_POLICY_DEV = 3,
+ ENA_ADMIN_PLACEMENT_POLICY_DEV = 3,
};

enum ena_admin_link_types {
- ENA_ADMIN_LINK_SPEED_1G = 0x1,
- 
- ENA_ADMIN_LINK_SPEED_2_HALF_G = 0x2,
- 
- ENA_ADMIN_LINK_SPEED_5G = 0x4,
-
-ENA_ADMIN_LINK_SPEED_10G = 0x8,
-ENA_ADMIN_LINK_SPEED_25G = 0x10,
-ENA_ADMIN_LINK_SPEED_40G = 0x20,
-ENA_ADMIN_LINK_SPEED_50G = 0x40,
-ENA_ADMIN_LINK_SPEED_100G = 0x80,
-ENA_ADMIN_LINK_SPEED_200G = 0x100,
-ENA_ADMIN_LINK_SPEED_400G = 0x200,
+ENA_ADMIN_LINK_SPEED_1G = 0x1,
+ENA_ADMIN_LINK_SPEED_2_HALF_G = 0x2,
+ENA_ADMIN_LINK_SPEED_5G = 0x4,
+ENA_ADMIN_LINK_SPEED_10G = 0x8,
+ENA_ADMIN_LINK_SPEED_25G = 0x10,
+ENA_ADMIN_LINK_SPEED_40G = 0x20,
+ENA_ADMIN_LINK_SPEED_50G = 0x40,
+ENA_ADMIN_LINK_SPEED_100G = 0x80,
+ENA_ADMIN_LINK_SPEED_200G = 0x100,
+ENA_ADMIN_LINK_SPEED_400G = 0x200,
};

enum ena_admin_completion_policy_type {
    /* completion queue entry for each sq descriptor */
    -ENA_ADMIN_COMPLETION_POLICY_DESC = 0,
    +ENA_ADMIN_COMPLETION_POLICY_DESC = 0,
    /* completion queue entry upon request in sq descriptor */
    -ENA_ADMIN_COMPLETION_POLICY_DESC_ON_DEMAND = 1,
    +ENA_ADMIN_COMPLETION_POLICY_DESC_ON_DEMAND = 1,
    /* current queue head pointer is updated in OS memory upon sq
    * descriptor request */
    -ENA_ADMIN_COMPLETION_POLICY_HEAD_ON_DEMAND = 2,
    +ENA_ADMIN_COMPLETION_POLICY_HEAD_ON_DEMAND = 2,
    /* current queue head pointer is updated in OS memory for each sq
    * descriptor */
    -ENA_ADMIN_COMPLETION_POLICY_HEAD = 3,
    +ENA_ADMIN_COMPLETION_POLICY_HEAD = 3,
};

/* basic stats return ena_admin_basic_stats while extanded stats return a
enum ena_admin_get_stats_type {
    ENA_ADMIN_GET_STATS_TYPE_BASIC = 0,
    ENA_ADMIN_GET_STATS_TYPE_EXTENDED = 1,
    ENA_ADMIN_GET_STATS_TYPE_ENI = 2,
};

enum ena_admin_get_stats_scope {
    ENA_ADMIN_SPECIFIC_QUEUE = 0,
    ENA_ADMIN_ETH_TRAFFIC = 1,
};

struct ena_admin_aq_common_desc {
    u16 extended_status;
    u16 sq_head_indx;
};

enum ena_admin_sq_direction {
    ENA_ADMIN_SQ_DIRECTION_TX = 1,
    ENA_ADMIN_SQ_DIRECTION_RX = 2,
};

struct ena_admin_acq_create_sq_resp_desc {
    u32 rx_drops_high;
};
+/* ENI Statistics Command. */
+struct ena_admin_eni_stats {
+    /* The number of packets shaped due to inbound aggregate BW
+    + allowance being exceeded
+    */
+    u64 bw_in_allowance_exceeded;
+    +/* The number of packets shaped due to outbound aggregate BW
+    + allowance being exceeded
+    */
+    u64 bw_out_allowance_exceeded;
+    +/* The number of packets shaped due to PPS allowance being exceeded */
+    u64 pps_allowance_exceeded;
+    +/* The number of packets shaped due to connection tracking
+    + allowance being exceeded and leading to failure in establishment
+    + of new connections
+    */
+    u64 conntrack_allowance_exceeded;
+    +/* The number of packets shaped due to linklocal packet rate
+    + allowance being exceeded
+    */
+    u64 linklocal_allowance_exceeded;
+};
+
+union {
+    u64 raw[7];
+    struct ena_admin_basic_stats basic_stats;
+    struct ena_admin_eni_stats eni_stats;
+} u;
+
+struct ena_admin_acq_get_stats_resp {
    struct ena_admin_acq_common_desc acq_common_desc;
};
+ /* device responds with the currently supported feature version. The  
+ * field is zero based  
+ */  
+ u8 feature_version;  
+  
+ u8 reserved8;  
};

struct ena_admin_device_attr_feature_desc {
  u32 max_mtu;
};

+ enum ena_admin_llq_header_location {  
  +/* header is in descriptor list */  
  + ENA_ADMIN_INLINE_HEADER = 1,  
  +/* header in a separate ring, implies 16B descriptor list entry */  
  + ENA_ADMIN_HEADER_RING = 2,  
  +};
  +
  + enum ena_admin_llq_ring_entry_size {  
  + ENA_ADMIN_LIST_ENTRY_SIZE_128B = 1,  
  + ENA_ADMIN_LIST_ENTRY_SIZE_192B = 2,  
  + ENA_ADMIN_LIST_ENTRY_SIZE_256B = 4,  
  +};
  +
  + enum ena_admin_llq_num_descs_before_header {  
  + ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_0 = 0,  
  + ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_1 = 1,  
  + ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_2 = 2,  
  + ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_4 = 4,  
  + ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_8 = 8,  
  +};
  +
  +/* packet descriptor list entry always starts with one or more descriptors,  
  + * followed by a header. The rest of the descriptors are located in the  
  + * beginning of the subsequent entry. Stride refers to how the rest of the  
  + * descriptors are placed. This field is relevant only for inline header  
  + * mode  
  + */  
  + enum ena_admin_llq_stride_ctrl {  
  + ENA_ADMIN_SINGLE_DESC_PER_ENTRY = 1,  
  + ENA_ADMIN_MULTIPLE_DESCS_PER_ENTRY = 2,  
  +};
  +
  + struct ena_admin_feature_llq_desc {  
  + u32 max_llq_num;  
  +
+u32 max_llq_depth;
+
+/* specify the header locations the device supports. bitfield of
+ * enum ena_admin_llq_header_location.
+ */
+u16 header_location_ctrl_supported;
+
+/* the header location the driver selected to use. */
+u16 header_location_ctrl_enabled;
+
+/* if inline header is specified - this is the size of descriptor
+ * list entry. If header in a separate ring is specified - this is
+ * the size of header ring entry. bitfield of enum
+ * ena_admin_llq_ring_entry_size. specify the entry sizes the device
+ * supports
+ */
+u16 entry_size_ctrl_supported;
+
+/* the entry size the driver selected to use. */
+u16 entry_size_ctrl_enabled;
+
+/* valid only if inline header is specified. First entry associated
+ * with the packet includes descriptors and header. Rest of the
+ * entries occupied by descriptors. This parameter defines the max
+ * number of descriptors preceeding the header in the first entry.
+ * The field is bitfield of enum
+ * ena_admin_llq_num_descs_before_header and specify the values the
+ * device supports
+ */
+u16 desc_num_before_header_supported;
+
+/* the desire field the driver selected to use */
+u16 desc_num_before_header_enabled;
+
+/* valid only if inline was chosen. bitfield of enum
+ * ena_admin_llq_stride_ctrl
+ */
+u16 descriptors_stride_ctrl_supported;
+
+/* the stride control the driver selected to use */
+u16 descriptors_stride_ctrl_enabled;
+
+/* Maximum size in bytes taken by llq entries in a single tx burst.
+ * Set to 0 when there is no such limit.
+ */
+u32 max_tx_burst_size;
+};
+struct ena_admin_queue_ext_feature_fields {
+u32 max_tx_sq_num;
+u32 max_tx_cq_num;
+u32 max_rx_sq_num;
+u32 max_rx_cq_num;
+u32 max_tx_sq_depth;
+u32 max_tx_cq_depth;
+u32 max_rx_sq_depth;
+u32 max_rx_cq_depth;
+u32 max_tx_header_size;
+/
+/* Maximum Descriptors number, including meta descriptor, allowed for
+ * a single Tx packet
+ */
+u16 max_per_packet_tx_descs;
+
+/* Maximum Descriptors number allowed for a single Rx packet */
+u16 max_per_packet_rx_descs;
+};
+
+struct ena_admin_queue_feature_desc {
-/* including LLQs */
u32 max_sq_num;

u32 max_sq_depth;
@@ -493,9 +584,9 @@

u32 max_cq_depth;

-u32 max_llq_num;
+u32 max_legacy_llq_num;

-u32 max_llq_depth;
+u32 max_legacy_llq_depth;

u32 max_header_size;

@@ -583,17 +674,16 @@
};
enum ena_admin_hash_functions {
    ENA_ADMIN_TOEPLITZ = 1,
    ENA_ADMIN_CRC32 = 2,
    +ENA_ADMIN_TOEPLITZ = 1,
    +ENA_ADMIN_CRC32 = 2,
};

struct ena_admin_feature_rss_flow_hash_control {
    u32 keys_num;
    +u32 key_parts;

    u32 reserved;

    -u32 key[10];
    +u32 key[ENA_ADMIN_RSS_KEY_PARTS];
};

struct ena_admin_feature_rss_flow_hash_function {
/* RSS flow hash protocols */
    enum ena_admin_flow_hash_proto {
        ENA_ADMIN_RSS_TCP4 = 0,
        -ENA_ADMIN_RSS_TCP4 = 0,
        -ENA_ADMIN_RSS_UDP4 = 1,
        -ENA_ADMIN_RSS_TCP6 = 2,
        -ENA_ADMIN_RSS_UDP6 = 3,
        -ENA_ADMIN_RSS_IP4 = 4,
        -ENA_ADMIN_RSS_IP6 = 5,
        -ENA_ADMIN_RSS_IP4_FRAG = 6,
        -ENA_ADMIN_RSS_NOT_IP = 7,
        +ENA_ADMIN_RSS_TCP4 = 0,
        +ENA_ADMIN_RSS_UDP4 = 1,
        +ENA_ADMIN_RSS_TCP6 = 2,
        +ENA_ADMIN_RSS_UDP6 = 3,
        +ENA_ADMIN_RSS_IP4 = 4,
        +ENA_ADMIN_RSS_IP6 = 5,
        +ENA_ADMIN_RSS_IP4_FRAG = 6,
        +ENA_ADMIN_RSS_NOT_IP = 7,
    };

    /* TCPv6 with extension header */
-ENA_ADMIN_RSS_TCP6_EX = 8,
-ENA_ADMIN_RSS_IP6_EX = 9,
-ENA_ADMIN_RSS_PROTO_NUM = 16,
-ENA_ADMIN_OS_LINUX = 1,
-ENA_ADMIN_OS_WIN = 2,
-ENA_ADMIN_OS_DPDK = 3,

/* IPv6 with extension header */
-ENA_ADMIN_RSS_TCP6_EX = 8,
-ENA_ADMIN_RSS_IP6_EX = 9,
-ENA_ADMIN_RSS_PROTO_NUM = 16,

/* RSS flow hash fields */
enum ena_admin_flow_hash_fields {
    /* Ethernet Dest Addr */
    -ENA_ADMIN_RSS_L2_DA = BIT(0),
    +ENA_ADMIN_RSS_L2_DA = BIT(0),
    /* Ethernet Src Addr */
    -ENA_ADMIN_RSS_L2_SA = BIT(1),
    +ENA_ADMIN_RSS_L2_SA = BIT(1),
    /* ipv4/6 Dest Addr */
    -ENA_ADMIN_RSS_L3_DA = BIT(2),
    +ENA_ADMIN_RSS_L3_DA = BIT(2),
    /* ipv4/6 Src Addr */
    -ENA_ADMIN_RSS_L3_SA = BIT(3),
    +ENA_ADMIN_RSS_L3_SA = BIT(3),
    /* tcp/udp Dest Port */
    -ENA_ADMIN_RSS_L4_DP = BIT(4),
    -ENA_ADMIN_RSS_L4_SP = BIT(5),
    +ENA_ADMIN_RSS_L4_SP = BIT(5),
}

struct ena_admin_proto_input {
    @ @ -693,15 +768,13 @ @
}

enum ena_admin_os_type {
    -ENA_ADMIN_OS_LINUX = 1,
    -ENA_ADMIN_OS_WIN = 2,
    -ENA_ADMIN_OS_DPDK = 3,
-ENA_ADMIN_OS_FREEBSD= 4,
-
-ENA_ADMIN_OS_IPXE= 5,
+ENA_ADMIN_OS_LINUX = 1,
+ENA_ADMIN_OS_WIN = 2,
+ENA_ADMIN_OS_DPDK = 3,
+ENA_ADMIN_OS_FREEBSD = 4,
+ENA_ADMIN_OS_IPXE = 5,
+ENA_ADMIN_OS_ESXI = 6,
+ENA_ADMIN_OS_GROUPS_NUM = 6,
};

struct ena_admin_host_info {
@@ -723,11 +796,33 @@
/* 7:0 : major
 * 15:8 : minor
 * 23:16 : sub_minor
+ * 31:24 : module_type
 */
  u32 driver_version;

/* features bitmap */
-u32 supported_network_features[4];
+u32 supported_network_features[2];
+
+/* ENA spec version of driver */
+u16 ena_spec_version;
+
+/* ENA device's Bus, Device and Function */
+ u2:0 : function
+ u7:3 : device
+ u15:8 : bus
+ */
+ u16 bdf;
+
+/* Number of CPUs */
+ u16 num_cpus;
+
+u16 reserved;
+
+/* 1 :0 : reserved */
+ u2 : interrupt_moderation
+ u31:3 : reserved
+ */
+ u32 driver_supported_features;
};
struct ena_admin_rss_ind_table_entry {
    u32 raw[11];
};

+struct ena_admin_queue_ext_feature_desc {
    /* version */
    u8 version;
    +
    u8 reserved1[3];
    +
    union {
        struct ena_admin_queue_ext_feature_fields max_queue_ext;
        +
        u32 raw[10];
        +
    };
    +
}
+
struct ena_admin_get_feat_resp {
    struct ena_admin_acq_common_desc acq_common_desc;
    +
    struct ena_admin_device_attr_feature_desc dev_attr;
    +
    struct ena_admin_feature_llq_desc llq;
    +
    struct ena_admin_queue_feature_desc max_queue;
    +
    struct ena_admin_queue_ext_feature_desc max_queue_ext;
    +
    struct ena_admin_feature_aenq_desc aenq;
    +
    struct ena_admin_get_feature_link_desc link;
    /* rss indirection table */
    struct ena_admin_feature_rss_ind_table ind_table;
    +
    /* LLQ configuration */
    +
    struct ena_admin_feature_llq_desc llq;
} u;

#ifdef configs
    u16 syndrom;
#endif
/* 0 : phase */
+/* 0 : phase
+ * 7:1 : reserved - MBZ
+ */

u8 flags;

u8 reserved1[3];
@@ -875,25 +992,18 @@

/* asynchronous event notification groups */
enum ena_admin_aenq_group {
- ENA_ADMIN_LINK_CHANGE = 0,
- ENA_ADMIN_FATAL_ERROR = 1,
- ENA_ADMIN_WARNING = 2,
- ENA_ADMIN_NOTIFICATION = 3,
- ENA_ADMIN_KEEP_ALIVE = 4,
- ENA_ADMIN_AENQ_GROUPS_NUM = 5,
+ ENA_ADMIN_LINK_CHANGE = 0,
+ ENA_ADMIN_FATAL_ERROR = 1,
+ ENA_ADMIN_WARNING = 2,
+ ENA_ADMIN_NOTIFICATION = 3,
+ ENA_ADMIN_KEEP_ALIVE = 4,
+ ENA_ADMIN_AENQ_GROUPS_NUM = 5,
};

enum ena_admin_aenq_notification_syndrom {
- ENA_ADMIN_SUSPEND = 0,
- ENA_ADMIN_RESUME = 1,
- ENA_ADMIN_UPDATE_HINTS = 2,
+ ENA_ADMIN_SUSPEND = 0,
+ ENA_ADMIN_RESUME = 1,
+ ENA_ADMIN_UPDATE_HINTS = 2,
};

struct ena_admin_aenq_entry {
@@ -928,27 +1038,27 @@

/* aq_common_desc */
#define ENA_ADMIN_AQ_COMMON_DESC_COMMAND_ID_MASK GENMASK(11, 0)
#define ENA_ADMIN_AQ_COMMON_DESC_PHASE_MASK BIT(0)
-#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_SHIFT 1
-#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_MASK BIT(1)
-#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_INDIRECT_SHIFT 2
-#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_INDIRECT_MASK BIT(2)
+#define ENA_ADMIN_AQ_COMMON_DESC_COMMAND_ID_MASK GENMASK(11, 0)
+#define ENA_ADMIN_AQ_COMMON_DESC_PHASE_MASK BIT(0)
+#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_SHIFT 1
+#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_MASK BIT(1)
+#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_INDIRECT_SHIFT 2
+#define ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_INDIRECT_MASK BIT(2)

/* sq */
-#define ENA_ADMIN_SQ_SQ_DIRECTION_SHIFT 5
-#define ENA_ADMIN_SQ_SQ_DIRECTION_MASK GENMASK(7, 5)
+#define ENA_ADMIN_SQ_SQ_DIRECTION_SHIFT                     5
+#define ENA_ADMIN_SQ_SQ_DIRECTION_MASK                      GENMASK(7, 5)

/* acq_common_desc */
-#define ENA_ADMIN_ACQ_COMMON_DESC_COMMAND_ID_MASK GENMASK(11, 0)
-#define ENA_ADMIN_ACQ_COMMON_DESC_PHASE_MASK BIT(0)
+#define ENA_ADMIN_ACQ_COMMON_DESC_COMMAND_ID_MASK           GENMASK(11, 0)
+#define ENA_ADMIN_ACQ_COMMON_DESC_PHASE_MASK                BIT(0)

/* aq_create_sq_cmd */
-#define ENA_ADMIN_AQ_CREATE_SQ_CMD_SQ_DIRECTION_SHIFT 5
-#define ENA_ADMIN_AQ_CREATE_SQ_CMD_SQ_DIRECTION_MASK GENMASK(7, 5)
-#define ENA_ADMIN_AQ_CREATE_SQ_CMD_PLACEMENT_POLICY_MASK GENMASK(3, 0)
-#define ENA_ADMIN_AQ_CREATE_SQ_CMD_COMPLETION_POLICY_SHIFT 4
-#define ENA_ADMIN_AQ_CREATE_SQ_CMD_COMPLETION_POLICY_MASK GENMASK(6, 4)
+#define ENA_ADMIN_AQ_CREATE_SQ_CMD_SQ_DIRECTION_SHIFT       5
+#define ENA_ADMIN_AQ_CREATE_SQ_CMD_SQ_DIRECTION_MASK        GENMASK(7, 5)
+#define ENA_ADMIN_AQ_CREATE_SQ_CMD_PLACEMENT_POLICY_MASK    GENMASK(3, 0)
+#define ENA_ADMIN_AQ_CREATE_SQ_CMD_COMPLETION_POLICY_SHIFT  4
+#define ENA_ADMIN_AQ_CREATE_SQ_CMD_COMPLETION_POLICY_MASK   GENMASK(6, 4)
#define ENA_ADMIN_AQ_CREATE_SQ_CMD_IS_PHYSICALLY_CONTIGUOUS_MASK BIT(0)

/* aq_create_cq_cmd */
@@ -957,12 +1067,12 @@
  #define ENA_ADMIN_AQ_CREATE_CQ_CMD_CQ_ENTRY_SIZE_WORDS_MASK GENMASK(4, 0)

/* get_set_feature_common_desc */
-#define ENA_ADMIN_GET_SET_FEATURE_COMMON_DESC_SELECT_MASK GENMASK(1, 0)
+#define ENA_ADMIN_GET_SET_FEATURE_COMMON_DESC_SELECT_MASK GENMASK(1, 0)

/* get_feature_link_desc */
-#define ENA_ADMIN_GET_FEATURE_LINK_DESC_AUTONEG_MASK BIT(0)
-#define ENA_ADMIN_GET_FEATURE_LINK_DESC_DUPLEX_SHIFT 1
-#define ENA_ADMIN_GET_FEATURE_LINK_DESC_DUPLEX_MASK BIT(1)

---
/* feature_offload_desc */
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_TX_L3_CSUM_IPV4_MASK BIT(0)
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_TX_L4_IPV6_CSUM_PART_MASK BIT(3)
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_TX_L4_IPV6_CSUM_FULL_SHIFT 4
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_TSO_IPV4_SHIFT 5
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_TSO_IPV6_MASK BIT(6)
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_TSO_ECN_SHIFT 7
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_RX_L3_CSUM_IPV4_MASK BIT(0)
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_RX_L4_IPV4_CSUM_SHIFT 1
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_RX_L4_IPV4_CSUM_MASK BIT(1)
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_RX_L4_IPV6_CSUM_SHIFT 2
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_RX_L4_IPV6_CSUM_MASK BIT(2)
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_RX_HASH_SHIFT 3
#define ENA_ADMIN_FEATURE_OFFLOAD_DESC_RX_HASH_MASK BIT(3)

/* feature_rss_flow_hash_function */
#define ENA_ADMIN_FEATURE_RSS_FLOW_HASH_FUNCTION_FUNCS_MASK GENMASK(7, 0)

/* feature_rss_flow_hash_input */
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_L3_SORT_SHIFT 1
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_L3_SORT_MASK BIT(1)
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_L4_SORT_SHIFT 2
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_L4_SORT_MASK BIT(2)
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_ENABLE_L3_SORT_SHIFT 1
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_ENABLE_L3_SORT_MASK BIT(1)
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_ENABLE_L4_SORT_SHIFT 2
#define ENA_ADMINFEATURE_RSS_FLOW_HASH_INPUT_ENABLE_L4_SORT_MASK BIT(2)
/* host_info */
#define ENA_ADMIN_HOST_INFO_MAJOR_MASK GENMASK(7, 0)
#define ENA_ADMIN_HOST_INFO_MINOR_SHIFT 8
#define ENA_ADMIN_HOST_INFO_MINOR_MASK GENMASK(15, 8)
#define ENA_ADMIN_HOST_INFO_SUB_MINOR_SHIFT 16
#define ENA_ADMIN_HOST_INFO_SUB_MINOR_MASK GENMASK(23, 16)
#define ENA_ADMIN_HOST_INFO_MODULE_TYPE_SHIFT 24
#define ENA_ADMIN_HOST_INFO_MODULE_TYPE_MASK GENMASK(31, 24)
#define ENA_ADMIN_HOST_INFO_FUNCTION_MASK GENMASK(2, 0)
#define ENA_ADMIN_HOST_INFO_DEVICE_SHIFT 3
#define ENA_ADMIN_HOST_INFO_DEVICE_MASK GENMASK(7, 3)
#define ENA_ADMIN_HOST_INFO_BUS_SHIFT 8
#define ENA_ADMIN_HOST_INFO_BUS_MASK GENMASK(15, 8)
#define ENA_ADMIN_HOST_INFO_INTERRUPT_MODERATION_SHIFT 2
#define ENA_ADMIN_HOST_INFO_INTERRUPT_MODERATION_MASK BIT(2)

/* aenq_common_desc */
#define ENA_ADMIN_AENQ_COMMON_DESC_PHASE_MASK BIT(0)

/* aenq_link_change_desc */
#define ENA_ADMIN_AENQ_LINK_CHANGE_DESC_LINK_STATUS_MASK BIT(0)

#include "ena_com.h"
#include "ena_common.h"
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#include "ena_com.h"
#define ENA_ASYNC_QUEUE_DEPTH 16
#define ENA_ADMIN_QUEUE_DEPTH 32

#define MIN_ENA_VER (((ENA_COMMON_SPEC_VERSION_MAJOR) <<		ENA_REGS_VERSION_MAJOR_VERSION_SHIFT)
| (ENA_COMMON_SPEC_VERSION_MINOR))

#define ENA_CTRL_MAJOR	0
#define ENA_CTRL_MINOR	0

#define ENA_MMIO_READ_TIMEOUT 0xFFFFFFFF
#define ENA_COM_BOUNCE_BUFFER_CNTRL_CNT	4
#define ENA_REGS_ADMIN_INTR_MASK 1
#define ENA_POLL_MS	5

struct ena_admin_acq_get_stats_resp get_resp;

static int ena_com_mem_addr_set(struct ena_com_dev *ena_dev,
struct ena_common_mem_addr *ena_addr,
dma_addr_t addr)
if (!sq->entries) {
    pr_err("memory allocation failed");
    return -ENOMEM;
}

if (!cq->entries) {
    pr_err("memory allocation failed");
    return -ENOMEM;
}

if (!aenq->entries) {
    pr_err("memory allocation failed");
    return -ENOMEM;
}

return 0;

-static inline void comp_ctxt_release(struct ena_com_admin_queue *queue,
    struct ena_comp_ctx *comp_ctx)
{
    comp_ctx->occupied = false;
}

-static void comp_ctxt_release(struct ena_com_admin_queue *queue,
    struct ena_comp_ctx *comp_ctx)
{
    comp_ctx->occupied = false;
}

static struct ena_comp_ctx *get_comp_ctxt(struct ena_com_admin_queue *queue,
    u16 command_id, bool capture)
{
    if (unlikely(!queue->comp_ctx)) {
        pr_err("Completion context is NULL");
        return NULL;
    }
    if (unlikely(command_id >= queue->q_depth)) {
        pr_err("command id is larger than the queue size. cmd_id: %u queue size %d", command_id, queue->q_depth);
tail_masked = admin_queue->sq.tail & queue_size_mask;

/* In case of queue FULL */
cnt = atomic_read(&admin_queue->outstanding_cmds);
if (cnt >= admin_queue->q_depth) {
    pr_debug("admin queue is full.");
    admin_queue->stats.out_of_space++;
    return comp_ctx;
}

queue->comp_ctx = devm_kzalloc(queue->q_dmadev, size, GFP_KERNEL);
if (unlikely(!queue->comp_ctx)) {
    pr_err("memory allocation failed");
    return -ENOMEM;
}

struc ena_admin_acq_entry *comp,
    size_t comp_size_in_bytes) {
    unsigned long flags = 0;
    struct ena_comp_ctx *comp_ctx;
    spin_lock_irqsave(&admin_queue->q_lock, flags);
    memset(&io_sq->desc_addr, 0x0, sizeof(io_sq->desc_addr));
    io_sq->dma_addr_bits = (u8)ena_dev->dma_addr_bits;
    io_sq->desc_entry_size =
        (io_sq->direction == ENA_COM_IO_QUEUE_DIRECTION_TX) ?
            sizeof(struct ena_eth_io_tx_desc) :
            sizeof(struct ena_eth_io_rx_desc);
    @ -354,21 +332,52 @@
        &io_sq->desc_addr.phys_addr,
        GFP_KERNEL);
}
  } else {
+  
+  +  if (!io_sq->desc_addr.virt_addr) {
+  +      pr_err("memory allocation failed\n");
+  +      return -ENOMEM;
+  +  }
+  +  }
+  +
+  +  if (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV) {
+  +    /* Allocate bounce buffers */
+  +    io_sq->bounce_buf_ctrl.buffer_size =
+  +        ena_dev->llq_info.desc_list_entry_size;
+  +    io_sq->bounce_buf_ctrl.buffers_num =
+  +        ENA_COM_BOUNCE_BUFFER_CNTRL_CNT;
+  +    io_sq->bounce_buf_ctrl.next_to_use = 0;
+  +    +
+  +    +    size = io_sq->bounce_buf_ctrl.buffer_size *
+  +    +        io_sq->bounce_buf_ctrl.buffers_num;
+  +    +
+  +    +    dev_node = dev_to_node(ena_dev->dmadev);
+  +    +    set_dev_node(ena_dev->dmadev, ctx->numa_node);
+  +    - io_sq->desc_addr.virt_addr =
+  +    - io_sq->bounce_buf_ctrl.base_buffer =
+  +        devm_kzalloc(ena_dev->dmadev, size, GFP_KERNEL);
+  +    - set_dev_node(ena_dev->dmadev, dev_node);
+  +    - if (!io_sq->desc_addr.virt_addr) {
+  +      - io_sq->desc_addr.virt_addr =
+  +      - if (!io_sq->bounce_buf_ctrl.base_buffer)
+  +      - io_sq->bounce_buf_ctrl.base_buffer =
+  +          devm_kzalloc(ena_dev->dmadev, size, GFP_KERNEL);
+  +      +
+  +      +    if (!io_sq->bounce_buf_ctrl.base_buffer) {
+  +      +      pr_err("bounce buffer memory allocation failed\n");
+  +      +      return -ENOMEM;
+  +      +    }
+  +    } else {
+  +      +
+  +      +  - pr_err("memory allocation failed");
+  +      +  - return -ENOMEM;
+  +      +
+  +      +  +  memcpy(&io_sq->llq_info, &ena_dev->llq_info,
+  +      +  +      sizeof(io_sq->llq_info));
+  +      +  +
+  +      +  +    /* Initiate the first bounce buffer */
+  +      +  +    io_sq->llq_buf_ctrl.curr_bounce_buf =
+  +      +  +    ena_com_get_next_bounce_buffer(&io_sq->bounce_buf_ctrl);
+  +      +  +    memset(io_sq->llq_buf_ctrl.curr_bounce_buf,
+  +      +  +    0x0, io_sq->llq_info.desc_list_entry_size);
+  +      +  +  

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io_sq->llq_buf_ctrl.descs_left_in_line =
+io_sq->llq_info.descs_num_before_header;
+
+if (io_sq->llq_info.max_entries_in_tx_burst > 0)
+io_sq->entries_in_tx_burst_left =
+io_sq->llq_info.max_entries_in_tx_burst;
}

io_sq->tail = 0;
@@ -409,7 +418,7 @@
}

if (!io_cq->cdesc_addr.virt_addr) {
- pr_err("memory allocation failed");
+ pr_err("memory allocation failed\n");
 return -ENOMEM;
}

@@ -458,12 +467,12 @@
cqe = &admin_queue->cq.entries[head_masked];

/* Go over all the completions */
-while ((cqe->acq_common_descriptor.flags &
- ENA_ADMIN_ACQ_COMMON_DESC_PHASE_MASK) == phase) {
+while ((READ_ONCE(cqe->acq_common_descriptor.flags) &
+ ENA_ADMIN_ACQ_COMMON_DESC_PHASE_MASK) == phase) {
 /* Do not read the rest of the completion entry before the
 * phase bit was validated
 */
- rmb();
+dma_rmb();
enacom_handle_single_admin_completion(admin_queue, cqe);

head_masked++;
@@ -510,7 +519,8 @@
static int ena_com_wait_and_process_admin_cq_polling(struct ena_comp_ctx *comp_ctx,
 struct ena_com_admin_queue *admin_queue)
{
-unsigned long flags, timeout;
+unsigned long flags = 0;
+unsigned long timeout;
 int ret;

 timeout = jiffies + usecs_to_jiffies(admin_queue->completion_timeout);
@@ -556,10 +566,163 @@
 return ret;
}
/**
 * Set the LLQ configurations of the firmware
 * The driver provides only the enabled feature values to the device,
 * which in turn, checks if they are supported.
 */

static int ena_com_set_llq(struct ena_com_dev *ena_dev)
{
	struct ena_com_admin_queue *admin_queue;
	struct ena_admin_set_feat_cmd cmd;
	struct ena_admin_set_featResp resp;
	struct ena_com_llq_info *llq_info = &ena_dev->llq_info;
	int ret;

	memset(&cmd, 0x0, sizeof(cmd));
	admin_queue = &ena_dev->admin_queue;

	cmd.aq_common_descriptor.opcode = ENA_ADMIN_SET_FEATURE;
	cmd.feat_common.feature_id = ENA_ADMIN_LLQ;

	cmd.u.llq.header_location_ctrl_enabled = llq_info->header_location_ctrl;
	cmd.u.llq.entry_size_ctrl_enabled = llq_info->desc_list_entry_size_ctrl;
	cmd.u.llq.desc_num_before_header_enabled = llq_info->descs_num_before_header;
	cmd.u.llq.descriptors_stride_ctrl_enabled = llq_info->desc_stride_ctrl;

	ret = ena_com_execute_admin_command(admin_queue,
					    (struct ena_admin_aq_entry *)&cmd,
					    sizeof(cmd),
					    (struct ena_admin_acq_entry *)&resp,
					    sizeof(resp));

	if (unlikely(ret))
		pr_err("Failed to set LLQ configurations: %d\n", ret);

	return ret;
}

static int ena_com_config_llq_info(struct ena_com_dev *ena_dev,
				   struct ena_admin_feature_llq_desc *llq_features,
				   struct ena_llq_configurations *llq_default_cfg)
{
	struct ena_com_llq_info *llq_info = &ena_dev->llq_info;

	u16 supported_feat;

	memset(llq_info, 0, sizeof(*llq_info));

	+supported_feat = llq_features->header_location_ctrl_supported;
+  if (likely(supported_feat & llq_default_cfg->llq_header_location)) {
+    llq_info->header_location_ctrl =
+    llq_default_cfg->llq_header_location;
+  } else {
+    pr_err("Invalid header location control, supported: 0x%"n",
+          supported_feat);
+    return -EINVAL;
+  }
+  
+  if (likely(llq_info->header_location_ctrl == ENA_ADMIN_INLINE_HEADER)) {
+    supported_feat = llq_features->descriptors_stride_ctrl_supported;
+    if (likely(supported_feat & llq_default_cfg->llq_stride_ctrl)) {
+      llq_info->desc_stride_ctrl = llq_default_cfg->llq_stride_ctrl;
+    } else {
+      if (supported_feat & ENA_ADMIN_MULTIPLE_DESCS_PER_ENTRY) {
+        llq_info->desc_stride_ctrl = ENA_ADMIN_MULTIPLE_DESCS_PER_ENTRY;
+      } else if (supported_feat & ENA_ADMIN_SINGLE_DESC_PER_ENTRY) {
+        llq_info->desc_stride_ctrl = ENA_ADMIN_SINGLE_DESC_PER_ENTRY;
+      } else {
+        pr_err("Invalid desc_stride_ctrl, supported: 0x%"n",
+          supported_feat);
+        return -EINVAL;
+      }
+      pr_err("Default llq stride ctrl is not supported, performing fallback, default: 0x% x, supported: 0x% x, used:
+          0x% x",
+          llq_default_cfg->llq_stride_ctrl, supported_feat,
+          llq_info->desc_stride_ctrl);
+    }
+  } else {
+    llq_info->desc_stride_ctrl = 0;
+  }
+  
+  supported_feat = llq_features->entry_size_ctrl_supported;
+  if (likely(supported_feat & llq_default_cfg->llq_ring_entry_size)) {
+    llq_info->desc_list_entry_size_ctrl = llq_default_cfg->llq_ring_entry_size;
+    llq_info->desc_list_entry_size = llq_default_cfg->llq_ring_entry_size_value;
+  } else {
+    if (supported_feat & ENA_ADMIN_LIST_ENTRY_SIZE_128B) {
+      llq_info->desc_list_entry_size_ctrl = ENA_ADMIN_LIST_ENTRY_SIZE_128B;
+      llq_info->desc_list_entry_size = 128;
+    } else if (supported_feat & ENA_ADMIN_LIST_ENTRY_SIZE_192B) {
+      llq_info->desc_list_entry_size_ctrl = ENA_ADMIN_LIST_ENTRY_SIZE_192B;
+      llq_info->desc_list_entry_size = 192;
+    } else if (supported_feat & ENA_ADMIN_LIST_ENTRY_SIZE_256B) {
+      llq_info->desc_list_entry_size_ctrl = ENA_ADMIN_LIST_ENTRY_SIZE_256B;
+      llq_info->desc_list_entry_size = 256;
+    } else {
+      llq_info->desc_list_entry_size_ctrl = 0;
+      llq_info->desc_list_entry_size = 0;
+    }
+  }
} else {
+pr_err("Invalid entry_size_ctrl, supported: 0x%x\n", 
+ supported_feat);
+return -EINVAL;
+
+pr_err("Default llq ring entry size is not supported, performing fallback, default: 0x%x, supported: 0x%x, used: 
+ llq_default_cfg->llq_ring_entry_size, supported_feat, 
+ llq_info->desc_list_entry_size);
+}
+if (unlikely(llq_info->desc_list_entry_size & 0x7)) {
+/* The desc list entry size should be whole multiply of 8 
+ * This requirement comes from __iowrite64_copy() 
+ */
+pr_err("illegal entry size %d\n", 
+ llq_info->desc_list_entry_size);
+return -EINVAL;
+
+if (llq_info->desc_stride_ctrl == ENA_ADMIN_MULTIPLE_DESCS_PER_ENTRY) 
+llq_info->descs_per_entry = llq_info->desc_list_entry_size / 
+sizeof(struct ena_eth_io_tx_desc);
+else 
+llq_info->descs_per_entry = 1;
+
supported_feat = llq_features->desc_num_before_header_supported;
+if (likely(supported_feat & llq_default_cfg->llq_num_decs_before_header)) {
+llq_info->descs_num_before_header = llq_default_cfg->llq_num_decs_before_header;
+} else {
+if (supported_feat & ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_2) {
+llq_info->descs_num_before_header = ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_2;
+} else if (supported_feat & ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_1) {
+llq_info->descs_num_before_header = ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_1;
+} else if (supported_feat & ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_4) {
+llq_info->descs_num_before_header = ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_4;
+} else if (supported_feat & ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_8) {
+llq_info->descs_num_before_header = ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_8;
+} else {
+pr_err("Invalid desc_num_before_header, supported: 0x%x\n", 
+ supported_feat);
+return -EINVAL;
+}
+
+pr_err("Default llq num desc before header is not supported, performing fallback, default: 0x%x, supported: 
+ llq_default_cfg->llq_num_decs_before_header, 
+ supported_feat, llq_info->descs_num_before_header);
+llq_info->max_entries_in_tx_burst = +(u16)(llq_features->max_tx_burst_size /llq_default_cfg->llq_ring_entry_size_value);
+rc = ena_com_set_llq(ena_dev);
+if (rc)
+pr_err("Cannot set LLQ configuration: %d\n", rc);
+return rc;
+
static int ena_com_wait_and_process_admin_cq_interrupts(struct ena_comp_ctx *comp_ctx,
struct ena_com_admin_queue *admin_queue)
{
  unsigned long flags = 0;
  int ret;

  wait_for_completion_timeout(&comp_ctx->wait_event,
  @ @ -577,16 +740,26 @ @
admin_queue->stats.no_completion++;
  spin_unlock_irqrestore(&admin_queue->q_lock, flags);

  -if (comp_ctx->status == ENA_CMD_COMPLETED)
  -pr_err("The ena device have completion but the driver didn't receive any MSI-X interrupt (cmd %d)\n",
   -    comp_ctx->cmd_opcode);
  -else
  -pr_err("The ena device doesn't send any completion for the admin cmd %d status %d\n",
  +if (comp_ctx->status == ENA_CMD_COMPLETED) {
  +pr_err("The ena device sent a completion but the driver didn't receive a MSI-X interrupt (cmd %d), autopolling
  +    mode is %s\n",
  +    comp_ctx->cmd_opcode,
  +    admin_queue->auto_polling ? "ON" : "OFF");
  +/ * Check if fallback to polling is enabled */
  +if (admin_queue->auto_polling)
  +admin_queue->polling = true;
  +} else {
  +pr_err("The ena device doesn't send a completion for the admin cmd %d status %d\n",
      comp_ctx->cmd_opcode, comp_ctx->status);
  -
  -admin_queue->running_state = false;
  -ret = -ETIME;
  -goto err;
  +} /* Check if shifted to polling mode.
  + * This will happen if there is a completion without an interrupt
  + * and autopolling mode is enabled. Continuing normal execution in such case
if (!admin_queue->polling) {
    admin_queue->running_state = false;
    ret = -ETIME;
    goto err;
}  
}

ret = ena_com_comp_status_to_errno(comp_ctx->comp_status);
volatile struct ena_admin_ena_mmio_req_read_less_resp *read_resp = 
    mmio_read->readResp;
unsigned long flags = 0;
u32 timeout = mmio_read->reg_read_to;

might_sleep();
mmio_read_reg |= mmio_read->seq_num & ENA_REGS_MMIO_REG_READ_REQ_ID_MASK;

/* make sure read_resp->req_id get updated before the hw can write
 - * there
 - */
-wmb();
-writel(mmio_read_reg, ena_dev->reg_bar + ENA_REGS_MMIO_REG_READ_OFF);

for (i = 0; i < timeout; i++) {
    if (read_resp->req_id == mmio_read->seq_num)
        break;
}

udelay(1);

if (read_resp->reg_off != offset) {
    pr_err("Read failure: wrong offset provided");
    pr_err("Read failure: wrong offset provided\n");
    ret = ENA_MMIO_READ_TIMEOUT;
} else {
    ret = read_resp->reg_val;
    if (io_sq->desc_addr.virt_addr) {
        size = io_sq->desc_entry_size * io_sq->q_depth;
-if (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST)
-dma_free_coherent(ena_dev->dmadev, size,
-  io_sq->desc_addr.virt_addr,
-  io_sq->desc_addr.phys_addr);
-else
-devm_kfree(ena_dev->dmadev, io_sq->desc_addr.virt_addr);
+dma_free_coherent(ena_dev->dmadev, size,
+  io_sq->desc_addr.virt_addr,
+  io_sq->desc_addr.phys_addr);

io_sq->desc_addr.virt_addr = NULL;
}
+
+if (io_sq->bounce_buf_ctrl.base_buffer) {
+  devm_kfree(ena_dev->dmadev, io_sq->bounce_buf_ctrl.base_buffer);
+  io_sq->bounce_buf_ctrl.base_buffer = NULL;
+}
}

static int wait_for_reset_state(struct ena_com_dev *ena_dev, u32 timeout,
@@ -786,7 +956,8 @@
struct ena_admin_get_feat_resp *get_resp,
enum ena_admin_aq_feature_id feature_id,
dma_addr_t control_buf_dma_addr,
-  u32 control_buff_size)
+  u32 control_buff_size,
+  u8 feature_ver)
{
  struct ena_com_admin_queue *admin_queue;
  struct ena_admin_get_feat_cmd get_cmd;
@@ -817,7 +988,7 @@
    get_cmd.control_buffer.length = control_buff_size;
    +get_cmd.feat_common.feature_version = feature_ver;
    get_cmd.feat_common.feature_id = feature_id;

    ret = ena_com_execute_admin_command(admin_queue,
    @@ -837,13 +1008,32 @@

static int ena_com_get_feature(struct ena_com_dev *ena_dev,
@@ -902,7 +1087,7 @@
    struct ena_admin_get_feat_res
static void ena_com_hash_key_fill_default_key(struct ena_com_dev *ena_dev) {
+static ena_admin_feature_rss_flow_hash_control *hash_key =
+(ena_dev->rss).hash_key;
+
+netdev_rss_key_fill(&hash_key->key, sizeof(hash_key->key));
+/* The key buffer is stored in the device in an array of
+ * uint32 elements.
+ */
+hash_key->key_parts = ENA_ADMIN_RSS_KEY_PARTS;
+
+int ena_com_get_current_hash_function(struct ena_com_dev *ena_dev) {
+return ena_dev->rss.hash_func;
+
static int ena_com_hash_key_allocate(struct ena_com_dev *ena_dev) {
int ret;

ret = ena_com_get_feature(ena_dev, &get_resp,
- ENA_ADMIN_RSS_REDIRECTION_TABLE_CONFIG);
+ ENA_ADMIN_RSS_INDIRECTION_TABLE_CONFIG, 0);
if (unlikely(ret))
return ret;

-devm_kzalloc(ena_dev->dmadev, size, GFP_KERNEL);
-if (!ena_dev->intr_moder_tbl)
-return -ENOMEM;
-
-ena_com_config_default_interrupt_moderation_table(ena_dev);
-
-return 0;
-}
-
static void ena_com_update_intr_delay_resolution(struct ena_com_dev *ena_dev,
    u16 intr_delay_resolution)
{
    struct ena_intr_moder_entry *intr_moder_tbl = ena_dev->intr_moder_tbl;
    unsigned int i;
    /* Initial value of intr_delay_resolution might be 0 */
    +u16 prev_intr_delay_resolution =
        +ena_dev->intr_delay_resolution ?
        +ena_dev->intr_delay_resolution :
        +ENA_DEFAULT_INTR_DELAY_RESOLUTION;
    if (!intr_delay_resolution) {
        pr_err("Illegal intr_delay_resolution provided. Going to use default 1 usec resolution\n");
        -intr_delay_resolution = 1;
        +ena_dev->intr_delay_resolution =
            +ENA_DEFAULT_INTR_DELAY_RESOLUTION;
    }
    -ena_dev->intr_delay_resolution = intr_delay_resolution;

    /* update Rx */
    -for (i = 0; i < ENA_INTR_MAX_NUM_OF_LEVELS; i++)
        -intr_moder_tbl[i].intr_moder_interval /= intr_delay_resolution;
        +ena_dev->intr_moder_rx_interval =
            +ena_dev->intr_moder_rx_interval *
            +prev_intr_delay_resolution /
            +intr_delay_resolution;

    /* update Tx */
    -ena_dev->intr_moder_tx_interval /= intr_delay_resolution;
        +ena_dev->intr_moder_tx_interval =
            +ena_dev->intr_moder_tx_interval *
            +prev_intr_delay_resolution /
            +intr_delay_resolution;
    +
    +ena_dev->intr_delay_resolution = intr_delay_resolution;
}

******************************************************************************/
@@ -1252,7 +1435,7 @@
void ena_com_wait_for_abort_completion(struct ena_com_dev *ena_dev)
{
    struct ena_com_admin_queue *admin_queue = &ena_dev->admin_queue;

```
unsigned long flags;
unsigned long flags = 0;

spin_lock_irqsave(&admin_queue->q_lock, flags);
while (atomic_read(&admin_queue->outstanding_cmds) != 0) {
    spin_lock_irqsave(&admin_queue->q_lock, flags);
    ena_dev->admin_queue.running_state = state;
    struct ena_admin_get_feat_resp get_resp;
    int ret;

    ret = ena_com_set_admin_running_state(ena_dev, state);
}

if ((get_resp.u.aenq.supported_groups & groups_flag) != groups_flag) {
    pr_warn("Trying to set unsupported aenq events. supported flag: 0x%x asked flag: 0x%x\n", get_resp.u.aenq.supported_groups, groups_flag);
    return -EOPNOTSUPP;
}

if (ver < MIN_ENA_VER) {
    pr_err("ENA version is lower than the minimal version the driver supports\n");
    return -1;
}

pr_info("ena controller version: %d.%d.%d implementation version %d\n",
    (ctrl_ver & ENA_REGS_CONTROLLER_VERSION_MAJOR_VERSION_MASK) >>
    ENA_REGS_CONTROLLER_VERSION_MAJOR_VERSION_SHIFT,
    ver & ENA_REGS_VERSION_MINOR_VERSION_MASK);

if (ver < MIN_ENA_VER) {
    pr_info("ENA version is lower than the minimal version the driver supports\n");
    return -1;
}

pr_info("ena controller version: %d.%d.%d implementation version %d\n",
    (ctrl_ver & ENA_REGS_CONTROLLER_VERSION_MAJOR_VERSION_MASK) >>
    ENA_REGS_CONTROLLER_VERSION_MAJOR_VERSION_SHIFT,
    ver & ENA_REGS_VERSION_MINOR_VERSION_MASK);

void ena_com_set_admin_auto_polling_mode(struct ena_com_dev *ena_dev,
+ bool polling)
+{
+ena_dev->admin_queue.auto_polling = polling;
+
+
int ena_com_mmio_reg_read_request_init(struct ena_com_dev *ena_dev)
{
struct ena_com_mmio_read *mmio_read = &ena_dev->mmio_read;
@@ -1483,7 +1667,7 @@
    sizeof(*mmio_read->read_resp),
    &mmio_read->read_resp_dma_addr, GFP_KERNEL);
if (unlikely(!mmio_read->read_resp))
-    return -ENOMEM;
+    goto err;
+    return -ENOMEM;
}

ena_com_mmio_reg_read_request_write_dev_addr(ena_dev);

@@ -1492,6 +1676,10 @@
    mmio_read->readless_supported = true;

return 0;
+ +err:
+ +goto err;
+ +return -ENOMEM;
}

void ena_com_set_mmio_read_mode(struct ena_com_dev *ena_dev, bool readless_supported)
@@ -1527,8 +1715,7 @@
}

int ena_com_admin_init(struct ena_com_dev *ena_dev,
    struct ena_aenq_handlers *aenq_handlers,
    bool init_spinlock)
+    struct ena_aenq_handlers *aenq_handlers)
{
struct ena_com_admin_queue *admin_queue = &ena_dev->admin_queue;
u32 aq_caps, acq_caps, dev_sts, addr_low, addr_high;
@@ -1554,8 +1741,7 @@
    atomic_set(&admin_queue->outstanding_cmds, 0);

    -if (init_spinlock)
    -spin_lock_init(&admin_queue->q_lock);
    +spin_lock_init(&admin_queue->q_lock);

    ret = ena_com_init_comp_ctxt(admin_queue);
    if (ret)
int ena_com_get_link_params(struct ena_com_dev *ena_dev, 
    struct ena_admin_get_feat_resp *resp) 
{
    return ena_com_get_feature(ena_dev, resp, ENA_ADMIN_LINK_CONFIG); 
    +return ena_com_get_feature(ena_dev, resp, ENA_ADMIN_LINK_CONFIG, 0);
}

int ena_com_get_dev_attr_feat(struct ena_com_dev *ena_dev,
@@ -1705,7 +1891,7 @@
int rc;

rc = ena_com_get_feature(ena_dev, &get_resp,  
    - ENA_ADMIN_DEVICE_ATTRIBUTES);  
    + ENA_ADMIN_DEVICE_ATTRIBUTES, 0);
    if (rc)
        return rc;

@@ -1713,17 +1899,34 @@  
        sizeof(get_resp.u.dev_attr));
    ena_dev->supported_features = get_resp.u.dev_attr.supported_features;

-rc = ena_com_get_feature(ena_dev, &get_resp,  
    - ENA_ADMIN_MAX_QUEUES_NUM);  
    -if (rc)
        -return rc;
    +if (ena_dev->supported_features & BIT(ENA_ADMIN_MAX_QUEUES_EXT)) {
        +rc = ena_com_get_feature(ena_dev, &get_resp, 
            + ENA_ADMIN_MAX_QUEUES_EXT, 
            + ENA_FEATURE_MAX_QUEUE_EXT_VER);
        +if (rc)
            +return rc;

-memcpy(&get_feat_ctx->max_queues, &get_resp.u.max_queue,  
    - sizeof(get_resp.u.max_queue));
-ena_dev->tx_max_header_size = get_resp.u.max_queue.max_header_size;
+if (get_resp.u.max_queue_ext.version != ENA_FEATURE_MAX_QUEUE_EXT_VER)
    +return -EINVAL;
    +
    +memcpy(&get_feat_ctx->max_queue_ext, &get_resp.u.max_queue_ext,  
        + sizeof(get_resp.u.max_queue_ext));
    +ena_dev->tx_max_header_size =
        +get_resp.u.max_queue_ext.max_queue_ext.max_tx_header_size;
} else {
    +rc = ena_com_get_feature(ena_dev, &get_resp, 
        + ENA_ADMIN_MAX_QUEUES_NUM, 0);
    +memcpy(&get_feat_ctx->max_queues, &get_resp.u.max_queue,  
        + sizeof(get_resp.u.max_queue));

ena_dev->tx_max_header_size =
+get_resp.u.max_queue.max_header_size;
+
+if (rc)
+return rc;
+
rc = ena_com_get_feature(ena_dev, &get_resp,
- ENA_ADMIN_AENQ_CONFIG);
+ ENA_ADMIN_AENQ_CONFIG, 0);
if (rc)
return rc;

rc = ena_com_get_feature(ena_dev, &get_resp,
- ENA_ADMIN_STATELESS_OFFLOAD_CONFIG);
+ ENA_ADMIN_STATELESS_OFFLOAD_CONFIG, 0);
if (rc)
return rc;

rc = ena_com_get_feature(ena_dev, &get_resp,
- ENA_ADMIN_HW_HINTS);
+rc = ena_com_get_feature(ena_dev, &get_resp, ENA_ADMIN_HW_HINTS, 0);
if (!rc)
memcpy(&get_feat_ctx->hw_hints, &get_resp.u.hw_hints,
@@ -1752,6 +1955,15 @@
else
return rc;

+rc = ena_com_get_feature(ena_dev, &get_resp, ENA_ADMIN_LLQ, 0);
+if (!rc)
+memcpy(&get_feat_ctx->llq, &get_resp.u.llq,
+ sizeof(get_resp.u.llq);
+else if (rc == -EOPNOTSUPP)
+memset(&get_feat_ctx->llq, 0x0, sizeof(get_feat_ctx->llq));
+else
+return rc;
+return 0;
+
@@ -1783,6 +1995,7 @@
struct ena_admin_aenq_entry *aenq_e;
struct ena_admin_aenq_common_desc *aenq_common;
struct ena_com_aenq *aenq = &dev->aenq;
+unsigned long long timestamp;
ena_aenq_handler handler_cb;
unsigned short masked_head, processed = 0;
unsigned char phase;
@@ -1793,12 +2006,18 @@
aenq_common = &aenq_e->aenq_common_desc;

/* Go over all the events */
-while (((aenq_common->flags & ENA_ADMIN_AENQ_COMMON_DESC_PHASE_MASK) ==
-       phase) { 
+while ((READ_ONCE(aenq_common->flags) &
+       ENA_ADMIN_AENQ_COMMON_DESC_PHASE_MASK) == phase) {
+*/
+* Make sure the phase bit (ownership) is as expected before
+* reading the rest of the descriptor.
+*/
+dma_rmb();
+
+timestamp =
+(unsigned long long)aenq_common->timestamp_low |
+(unsigned long long)aenq_common->timestamp_high << 32);
pr_debug("AENQ! Group[%x] Syndrom[%x] timestamp: [%llus]
,
  aenq_common->group, aenq_common->syndrom,
  (u64)aenq_common->timestamp_low +
  ((u64)aenq_common->timestamp_high << 32));
+ aenq_common->group, aenq_common->syndrom, timestamp);

/* Handle specific event*/
handler_cb = ena_com_get_specific_aenq_cb(dev,
@@ -1826,7 +2045,9 @@
/* write the aenq doorbell after all AENQ descriptors were read */
mb();
-writel((u32)aenq->head, dev->reg_bar + ENA_REGS_AENQ_HEAD_DB_OFF);
+writel_relaxed((u32)aenq->head,
+   dev->reg_bar + ENA_REGS_AENQ_HEAD_DB_OFF);
+mmiowb();
}

int ena_com_dev_reset(struct ena_com_dev *ena_dev,
@@ -1918,6 +2139,21 @@
return ret;
}

+int ena_com_get_eni_stats(struct ena_com_dev *ena_dev,
+ struct ena_admin_eni_stats *stats)
+{
+struct ena_com_stats_ctx ctx;
+int ret;
+
+memset(&ctx, 0x0, sizeof(ctx));
+ret = ena_get_dev_stats(ena_dev, &ctx, ENA_ADMIN_GET_STATS_TYPE_ENI);
+if (likely(ret == 0))
+memcpy(stats, &ctx.get_resp.u.eni_stats,
+sizeof(ctx.get_resp.u.eni_stats));
+
+return ret;
+
}
+
int ena_com_get_dev_basic_stats(struct ena_com_dev *ena_dev,
struct ena_admin_basic_stats *stats)
{
@@ -1927,8 +2163,8 @@
memset(&ctx, 0x0, sizeof(ctx));
ret = ena_get_dev_stats(ena_dev, &ctx, ENA_ADMIN_GET_STATS_TYPE_BASIC);
if (likely(ret == 0))
-memcpy(stats, &ctx.get_resp.basic_stats,
-sizeof(ctx.get_resp.basic_stats));
+memcpy(stats, &ctx.get_resp.u.basic_stats,
+sizeof(ctx.get_resp.u.basic_stats));

return ret;
}
@@ -1972,7 +2208,7 @@
struct ena_admin_get_feat_resp resp;

ret = ena_com_get_feature(ena_dev, &resp,
- ENA_ADMIN_STATELESS_OFFLOAD_CONFIG);
+ ENA_ADMIN_STATELESS_OFFLOAD_CONFIG, 0);
if (unlikely(ret)) {
pr_err("Failed to get offload capabilities %d\n", ret);
return ret;
@@ -2001,11 +2237,11 @@
/* Validate hash function is supported */
ret = ena_com_get_feature(ena_dev, &get_resp,
- ENA_ADMIN_RSS_HASH_FUNCTION);
+ ENA_ADMIN_RSS_HASH_FUNCTION, 0);
if (unlikely(ret)) {
pr_err("Func hash %d isn't supported by device, abort\n",}
rss->hash_func);
return -EOPNOTSUPP;

rc = ena_com_get_feature_ex(ena_dev, &get_resp,
        ENA_ADMIN_RSS_HASH_FUNCTION,
        rss->hash_key_dma_addr,
        - sizeof(*rss->hash_key));
+ sizeof(*rss->hash_key), 0);
if (unlikely(rc))
    return rc;

switch (func) {
    case ENA_ADMIN_TOEPLITZ:
        -if (key_len > sizeof(hash_key->key)) {
        -pr_err("key len (%hu) is bigger than the max supported (%zu)\n",
            key_len, sizeof(hash_key->key));
            -return -EINVAL;
        +if (key) {
        +if (key_len != sizeof(hash_key->key)) {
        +pr_err("key len (%hu) doesn't equal the supported size (%zu)\n",
            key_len, sizeof(hash_key->key));
        +return -EINVAL;
        +}
        +memcpy(hash_key->key, key, key_len);
        +rss->hash_init_val = init_val;
        +hash_key->keys_num = key_len >> 2;
                break;
        case ENA_ADMIN_CRC32:
        rss->hash_init_val = init_val;
        @ @ -2090,6 +2327,7 @@
        return -EINVAL;
    }
        -memcpy(hash_key->key, key, key_len);
        -rss->hash_init_val = init_val;
        -hash_key->keys_num = key_len >> 2;
        break;
    case ENA_ADMIN_CRC32:
        rss->hash_init_val = init_val;
        @ @ -2109,19 +2347,26 @@
        return -EINVAL;
    }
        +rss->hash_func = func;
    rc = ena_com_set_hash_function(ena_dev);

    /* Restore the old function */
    @ @ -2109,19 +2347,26 @@
    rss->hash_key;
    int rc;
if (unlikely(!func))
    return -EINVAL;
rc = ena_com_get_feature_ex(ena_dev, &get_resp,
    ENA_ADMIN_RSS_HASH_FUNCTION,
    rss->hash_key_dma_addr,
    - sizeof(*rss->hash_key));
+    sizeof(*rss->hash_key), 0);
if (unlikely(rc))
    return rc;
-rss->hash_func = get_resp.u.flow_hash_func.selected_func;
-    if (func)
-        *func = rss->hash_func;
+    rss->hash_func = ffs(get_resp.u.flow_hash_func.selected_func);
+    if (rss->hash_func)
+        rss->hash_func--;
+    *func = rss->hash_func;

    if (key)
    -    memcpy(key, hash_key->key, (size_t)(hash_key->keys_num) << 2);
+    memcpy(key, hash_key->key,
+           (size_t)(hash_key->key_parts) * sizeof(hash_key->key[0]));

    return 0;
}
@@ -2137,7 +2382,7 @@
rc = ena_com_get_feature_ex(ena_dev, &get_resp,
    ENA_ADMIN_RSS_HASH_INPUT,
    rss->hash_ctrl_dma_addr,
-    sizeof(*rss->hash_ctrl));
+    sizeof(*rss->hash_ctrl), 0);
if (unlikely(rc))
    return rc;
@@ -2316,9 +2561,9 @@

int ret;

if (!ena_com_check_supported_feature_id(
-    ena_dev, ENA_ADMIN_RSS_REDIRECTION_TABLE_CONFIG)) {
+    ena_dev, ENA_ADMIN_RSS_INDIRECTION_TABLE_CONFIG)) {
    pr_debug("Feature %d isn't supported\n",
-    ENA_ADMIN_RSS_REDIRECTION_TABLE_CONFIG);
+    ENA_ADMIN_RSS_INDIRECTION_TABLE_CONFIG);
    return -EOPNOTSUPP;
}
cmd.aq_common_descriptor.opcode = ENA_ADMIN_SET_FEATURE;
cmd.aq_common_descriptor.flags =
ENA_ADMIN_AQ_COMMON_DESC_CTRL_DATA_INDIRECT_MASK;
-cmd.feat_common.feature_id = ENA_ADMIN_RSS_REDIRECTION_TABLE_CONFIG;
+cmd.feat_common.feature_id = ENA_ADMIN_RSS_INDIRECTION_TABLE_CONFIG;
cmd.u.ind_table.size = rss->tbl_log_size;
cmd.u.ind_table.inline_index = 0xFFFFFFFF;

rc = ena_com_get_feature_ex(ena_dev, &get_resp,
- ENA_ADMIN_RSS_REDIRECTION_TABLE_CONFIG,
+ ENA_ADMIN_RSS_INDIRECTION_TABLE_CONFIG,
    rss->rss_ind_tbl_dma_addr,
- tbl_size);
+ tbl_size, 0);
if (unlikely(rc))
    return rc;

+ena_com_hash_key_fill_default_key(ena_dev);
+
rc = ena_com_hash_ctrl_init(ena_dev);
if (unlikely(rc))
    goto err_hash_ctrl;
@@ -2438,6 +2685,10 @@
if (unlikely(!host_attr->host_info))
    return -ENOMEM;
+host_attr->host_info->ena_spec_version = ((ENA_COMMON_SPEC_VERSION_MAJOR <<
+ ENA_REGS_VERSION_MAJOR_VERSION_SHIFT) |
+ (ENA_COMMON_SPEC_VERSION_MINOR));
+
return 0;
}

ENGLISHADMIN_INTERRUPT_MODERATION);
}

-int ena_com_update_nonadaptive_moderation_interval_tx(struct ena_com_dev *ena_dev,
- u32 tx_coalesce_usecs)
+static int ena_com_update_nonadaptive_moderation_interval(u32 coalesce_usecs,
+ u32 intr_delay_resolution,
+ u32 *intr_moder_interval)
{
-    if (!ena_dev->intr_delay_resolution) {
-        if (!intr_delay_resolution) {
-            pr_err("Illegal interrupt delay granularity value\n");
-            return -EFAULT;
-        }
-        ena_dev->intr_moder_tx_interval = tx_coalesce_usecs /
-        ena_dev->intr_delay_resolution;
-        *intr_moder_interval = coalesce_usecs / intr_delay_resolution;
-        return 0;
-    }
-
-    int ena_com_update_nonadaptive_moderation_interval_rx(struct ena_com_dev *ena_dev,
-        u32 rx_coalesce_usecs)
+int ena_com_update_nonadaptive_moderation_interval_tx(struct ena_com_dev *ena_dev,
+        u32 tx_coalesce_usecs)
{
-    if (!ena_dev->intr_delay_resolution) {
-        pr_err("Illegal interrupt delay granularity value\n");
-        return -EFAULT;
-    }
-    /* We use LOWEST entry of moderation table for storing
-    * nonadaptive interrupt coalescing values
-    */
-    ena_dev->intr_moder_tbl[ENA_INTR_MODER_LOWEST].intr_moder_interval =
-        rx_coalesce_usecs / ena_dev->intr_delay_resolution;
-    
-    return 0;
+    return ena_com_update_nonadaptive_moderation_interval(tx_coalesce_usecs,
+        ena_dev->intr_delay_resolution,
+        &ena_dev->intr_moder_tx_interval);
}
int ena_com_init_interrupt_moderation(struct ena_com_dev *ena_dev)
@@ -2583,7 +2826,7 @@
 int rc;

 rc = ena_com_get_feature(ena_dev, &get_resp,
 - ENA_ADMIN_INTERRUPT_MODERATION);
 + ENA_ADMIN_INTERRUPT_MODERATION, 0);

 if (rc) {
 if (rc == -EOPNOTSUPP) {
 @@ -2600,62 +2843,14 @@
 return rc;
 }

 -rc = ena_com_init_interrupt_moderation_table(ena_dev);
 -if (rc)
 -goto err;
 -
 /* if moderation is supported by device we set adaptive moderation */
 delay_resolution = get_resp.u.intr_moderation.intr_delay_resolution;
 ena_com_update_intr_delay_resolution(ena_dev, delay_resolution);
 -ena_com_enable_adaptive_moderation(ena_dev);
 -
 -return 0;
 -err:
 -ena_com_destroy_interrupt_moderation(ena_dev);
 -return rc;
 -}
 -
 -void ena_com_config_default_interrupt_moderation_table(struct ena_com_dev *ena_dev)
 -{
 -struct ena_intr_moder_entry *intr_moder_tbl = ena_dev->intr_moder_tbl;

 -if (!intr_moder_tbl)
 -return;
 +/* Disable adaptive moderation by default - can be enabled later */
 +ena_com_disable_adaptive_moderation(ena_dev);

 -intr_moder_tbl[ENA_INTR_MODER_LOWEST].intr_moder_interval =
 -ENA_INTR_LOWEST_USECS;
 -intr_moder_tbl[ENA_INTR_MODER_LOWEST].pkts_per_interval =
 -ENA_INTR_LOWEST_PKTS;
 -intr_moder_tbl[ENA_INTR_MODER_LOWEST].bytes_per_interval =
 -ENA_INTR_LOWEST_BYTES;
 -
- intr_moder_tbl[ENA_INTR_Moder_LOW].intr_moder_interval =
  -ENA_INTR_LOW_USECS;
- intr_moder_tbl[ENA_INTR_Moder_LOW].pkts_per_interval =
  -ENA_INTR_LOW_PKTS;
- intr_moder_tbl[ENA_INTR_Moder_LOW].bytes_per_interval =
  -ENA_INTR_LOW_BYTES;
-
- intr_moder_tbl[ENA_INTR_Moder_MID].intr_moder_interval =
  -ENA_INTR_MID_USECS;
- intr_moder_tbl[ENA_INTR_Moder_MID].pkts_per_interval =
  -ENA_INTR_MID_PKTS;
- intr_moder_tbl[ENA_INTR_Moder_MID].bytes_per_interval =
  -ENA_INTR_MID_BYTES;
-
- intr_moder_tbl[ENA_INTR_Moder_HIGH].intr_moder_interval =
  -ENA_INTR_HIGH_USECS;
- intr_moder_tbl[ENA_INTR_Moder_HIGH].pkts_per_interval =
  -ENA_INTR_HIGH_PKTS;
- intr_moder_tbl[ENA_INTR_Moder_HIGH].bytes_per_interval =
  -ENA_INTR_HIGH_BYTES;
-
- intr_moder_tbl[ENA_INTR_Moder_HIGHEST].intr_moder_interval =
  -ENA_INTR_HIGHEST_USECS;
- intr_moder_tbl[ENA_INTR_Moder_HIGHEST].pkts_per_interval =
  -ENA_INTR_HIGHEST_PKTS;
- intr_moder_tbl[ENA_INTR_Moder_HIGHEST].bytes_per_interval =
  -ENA_INTR_HIGHEST_BYTES;
+return 0;
}

unsigned int ena_com_get_nonadaptive_moderation_interval_rx(struct ena_com_dev *ena_dev)
@@ -2665,47 +2860,34 @@
unsigned int ena_com_get_nonadaptive_moderation_interval_rx(struct ena_com_dev *ena_dev)
{
  struct ena_intr_moder_entry *intr_moder_tbl = ena_dev->intr_moder_tbl;
  -
  -if (intr_moder_tbl)
  -return intr_moder_tbl[ENA_INTR_Moder_LOWEST].intr_moder_interval;
  -
  -return 0;
  +return ena_dev->intr_moder_rx_interval;
}

-void ena_com_init_intr_moderation_entry(struct ena_com_dev *ena_dev,
-enum ena_intr_moder_level level,
-struct ena_intr_moder_entry *entry)
+int ena_com_config_dev_mode(struct ena_com_dev *ena_dev,
+ struct ena_admin_feature_llq_desc *llq_features,
+ struct ena_llq_configurations *llq_default_cfg)
{
- struct ena_intr_moder_entry *intr_moder_tbl = ena_dev->intr_moder_tbl;
+ struct ena_com_llq_info *llq_info = &ena_dev->llq_info;
+ int rc;

- if (level >= ENA_INTR_MAX_NUM_OF_LEVELS)
- return;
+ if (!llq_features->max_llq_num) {
+ ena_dev->tx_mem_queue_type = ENA_ADMIN_PLACEMENT_POLICY_HOST;
+ return 0;
+ }

- intr_moder_tbl[level].intr_moder_interval = entry->intr_moder_interval;
- if (ena_dev->intr_delay_resolution)
- intr_moder_tbl[level].intr_moder_interval /=
- ena_dev->intr_delay_resolution;
- intr_moder_tbl[level].pkts_per_interval = entry->pkts_per_interval;
+ rc = ena_com_config_llq_info(ena_dev, llq_features, llq_default_cfg);
+ if (rc)
+ return rc;

- /* use hardcoded value until ethtool supports bytecount parameter */
- if (entry->bytes_per_interval != ENA_INTR_BYTE_COUNT_NOT_SUPPORTED)
- intr_moder_tbl[level].bytes_per_interval = entry->bytes_per_interval;
- }
+ ena_dev->tx_max_header_size = llq_info->desc_list_entry_size -
+ (llq_info->descs_num_before_header * sizeof(struct ena_eth_io_tx_desc));

+ void ena_com_get_intr_moderation_entry(struct ena_com_dev *ena_dev,
- enum ena_intr_moder_level level,
- struct ena_intr_moder_entry *entry)
- {
- struct ena_intr_moder_entry *intr_moder_tbl = ena_dev->intr_moder_tbl;
+ if (unlikely(ena_dev->tx_max_header_size == 0)) {
+ pr_err("the size of the LLQ entry is smaller than needed\n");
+ return -EINVAL;
+ }

- if (level >= ENA_INTR_MAX_NUM_OF_LEVELS)
- return;
+ ena_dev->tx_mem_queue_type = ENA_ADMIN_PLACEMENT_POLICY_DEV;

- entry->intr_moder_interval = intr_moder_tbl[level].intr_moder_interval;
- if (ena_dev->intr_delay_resolution)
- entry->intr_moder_interval *= ena_dev->intr_delay_resolution;
- entry->pkts_per_interval =

---

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-intr_moder_tbl[level].pkts_per_interval;
-entry->bytes_per_interval = intr_moder_tbl[level].bytes_per_interval;
+return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_com.h
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_com.h
@@ -1,33 +1,6 @@
+/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
*/
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*/

#ifndef ENA_COM
@@ -37,11 +10,14 @@
    #include <linux/delay.h>
    #include <linux/dma-mapping.h>
    #include <linux/gfp.h>
+    #include <linux/io.h>
+    #include <linux/prefetch.h>

    #ifndef ENA_COM
    @ @ -37,11 +10,14 @@
    #include <linux/delay.h>
    #include <linux/dma-mapping.h>
    #include <linux/gfp.h>
+    #include <linux/io.h>
+    #include <linux/prefetch.h>

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#include <linux/sched.h>
#include <linux/sizes.h>
#include <linux/spinlock.h>
#include <linux/types.h>
#include <linux/wait.h>
+include <linux/netdevice.h>
#include "ena_common_defs.h"
#include "ena_admin_defs.h"
@@ -70,48 +46,20 @@
/* ENA adaptive interrupt moderation settings */

#define ENA_INTR_LOWEST_USECS           (0)
#define ENA_INTR_LOWEST_PKTS            (3)
#define ENA_INTR_LOWEST_BYTES           (2 * 1524)
-
#define ENA_INTR_LOW_USECS              (32)
#define ENA_INTR_LOW_PKTS               (12)
#define ENA_INTR_LOW_BYTES              (16 * 1024)
-
#define ENA_INTR_MID_USECS              (80)
#define ENA_INTR_MID_PKTS               (48)
#define ENA_INTR_MID_BYTES              (64 * 1024)
-
#define ENA_INTR_HIGH_USECS             (128)
#define ENA_INTR_HIGH_PKTS              (96)
#define ENA_INTR_HIGH_BYTES             (128 * 1024)
-
#define ENA_INTR_HIGHEST_USECS          (192)
#define ENA_INTR_HIGHEST_PKTS           (128)
#define ENA_INTR_HIGHEST_BYTES          (192 * 1024)
-
#define ENA_INTR_INITIAL_TX_INTERVAL_USECS 196
#define ENA_INTR_INITIAL_RX_INTERVAL_USECS 4
#define ENA_INTR_DELAY_OLD_VALUE_WEIGHT 6
#define ENA_INTR_DELAY_NEW_VALUE_WEIGHT 4
#define ENA_INTR_MODER_LEVEL_STRIDE 2
#define ENA_INTR_BYTE_COUNT_NOT_SUPPORTED 0xFFFFFF
+define ENA_INTR_INITIAL_TX_INTERVAL_USECS 0
+define ENA_INTR_INITIAL_RX_INTERVAL_USECS 0
+define ENA_DEFAULT_INTR_DELAY_RESOLUTION 1
#define ENA_HW_HINTS_NO_TIMEOUT 0xFFFF

enum ena_intr_moder_level {
    ENA_INTR_MODER_LOWEST = 0,
    ENA_INTR_MODER_LOW,
-ENA_INTR_MODER_MID,  
-ENAINTR_MODER_HIGH,   
-ENA_INTR_MODER_HIGHEST,  
-ENA_INTR_MAX_NUM_OF_LEVELS,  
-};
+#define ENA_FEATURE_MAX_QUEUE_EXT_VER1

-struct ena_intr_moder_entry {
  -unsigned int intr_moder_interval;
  -unsigned int pkts_per_interval;
  -unsigned int bytes_per_interval;
  +struct ena_llq_configurations {
    +enum ena admin llq header location llq header location;
    +enum ena admin llq ring entry size llq ring entry size;
    +enum ena admin llq stride ctrl llq stride ctrl;
    +enum ena admin llq num desc before header llq num decs before header;
    +u16 llq ring entry size value;
  };

  enum queue_direction {
    @ @ -142,6 +90,16 @@
    u16 l4_hdr_len; /* In words */
  }

  +struct ena com llq info {
    +u16 header location ctrl;
    +u16 desc stride ctrl;
    +u16 desc list entry size ctrl;
    +u16 desc list entry size;
    +u16 desc num before header;
    +u16 desc per entry;
    +u16 max entries in tx burst;
    +
    +struct ena com io cq {
      struct ena com io desc addr cdesc addr;

    @@ -179,6 +137,20 @@

    } ______ cacheline aligned;

    +struct ena com io bounce buffer control {
      +u8 *base buffer;
      +u16 next to use;
      +u16 buffer size;
      +u16 buffers num; /* Must be a power of 2 */
      +
    +


/* This struct is to keep tracking the current location of the next llq entry */
+struct ena_com_llq_pkt_ctrl {
+    u8 *curr_bounce_buf;
+    u16 idx;
+    u16 descs_left_in_line;
+};
+
+struct ena_com_io_sq {
    struct ena_com_io_desc_addr desc_addr;

    @ @ -190,6 +162,9 @ @

    u32 msix_vector;
    struct ena_com_tx_meta cached_tx_meta;
    +struct ena_com_llq_info llq_info;
    +struct ena_com_llq_pkt_ctrl llq_buf_ctrl;
    +struct ena_com_io_bounce_buffer_control bounce_buf_ctrl;
    u16 q_depth;
    u16 qid;
    @ @ -197,10 +172,12 @ @
    u16 idx;
    u16 tail;
    u16 next_to_comp;
    +u16 llq_last_copy_tail;
    u32 tx_max_header_size;
    u8 phase;
    u8 desc_entry_size;
    u8 dma_addr_bits;
    +u16 entries_in_tx_burst_left;
} cacheline_aligned;

struct ena_com_admin_cq {
    @ @ -224,11 +201,11 @ @
};

struct ena_com_stats_admin {
    -u32 aborted_cmd;
    -u32 submitted_cmd;
    -u32 completed_cmd;
    -u32 out_of_space;
    -u32 no_completion;
    +u64 aborted_cmd;
    +u64 submitted_cmd;
    +u64 completed_cmd;
    +u64 out_of_space;
    +u64 no_completion;
};
struct ena_com_admin_queue {
    /* Indicate if the admin queue should poll for completion */
    bool polling;

    /* Define if fallback to polling mode should occur */
    bool auto_polling;
    u16 curr_cmd_id;

    /* Indicate that the ena was initialized and can */
    u16 intr_delay_resolution;

    struct ena_intr_moder_entry *intr_moder_tbl;
    u32 intr_moder_rx_interval;
    u32 intr_moder_tx_interval;

    struct ena_host_attribute host_attr;
    bool adaptive_coalescing;

    struct ena_intr_moder_entry *intr_moder_entry *intr_moder_tbl;
    +
    +struct ena_com_llq_info llq_info;
};

struct ena_com_dev_get_features_ctx {
    struct ena_admin_queue_feature_desc max_queues;
    struct ena_admin_queue_ext_feature_desc max_queue_ext;
    struct ena_admin_device_attr_feature_desc dev_attr;
    struct ena_admin_feature_aenq_desc aenq;
    struct ena_admin_feature_offload_desc offload;
    struct ena_admin_ena_hw_hints hw_hints;

    struct ena_com_llq_desc llq;
};

struct ena_com_create_io_ctx {
    /* ena_com_admin_init - Init the admin and the async queues */
    * @ena_dev: ENA communication layer struct
    * @aenq_handlers: Those handlers to be called upon event.
    * @init_spinlock: Indicate if this method should init the admin spinlock or
    * the spinlock was init before (for example, in a case of FLR).
    *
    * Initialize the admin submission and completion queues.
    * Initialize the asynchronous events notification queues.
int ena_com_admin_init(struct ena_com_dev *ena_dev,
+ struct ena_aenq_handlers *aenq_handlers,
- bool init_spinlock);
+ struct ena_aenq_handlers *aenq_handlers);

bool ena_com_get_ena_admin_polling_mode(struct ena_com_dev *ena_dev);

void ena_com_set_admin_auto_polling_mode(struct ena_com_dev *ena_dev,
+ bool polling);

int ena_com_get_dev_basic_stats(struct ena_com_dev *ena_dev,
struct ena_admin_basic_stats *stats);

int ena_com_get_eni_stats(struct ena_com_dev *ena_dev,
struct ena_admin_eni_stats *stats);

void ena_com_set_dev_mtu(struct ena_com_dev *ena_dev,
+ uint32 mtu);

void ena_com_rss_destroy(struct ena_com_dev *ena_dev);
加上 / * ena_com_get_current_hash_function - Get RSS hash function * @ena_dev: ENA communication layer struct 
+ * Return the current hash function. 
+ * @return: 0 or one of the ena_admin_hash_functions values. 
+ */ 
+ int ena_com_get_current_hash_function(struct ena_com_dev *ena_dev); 
+ 
+ /* ena_com_fill_hash_function - Fill RSS hash function 
+ * @ena_dev: ENA communication layer struct 
+ * @func: The hash function (Toeplitz or crc) 
+ * @ @ -858,11 +873,6 @@ 
+ */ 
+ int ena_com_init_interrupt_moderation(struct ena_com_dev *ena_dev); 
-/* ena_com_destroy_interrupt_moderation - Destroy interrupt moderation resources 
- * @ena_dev: ENA communication layer struct 
- */ 
-void ena_com_destroy_interrupt_moderation(struct ena_com_dev *ena_dev); 
- 
-/* ena_com_interrupt_moderation_supported - Return if interrupt moderation 
- * capability is supported by the device. 
- * @@ -870,12 +880,6 @@ 
-*/ 
+ bool ena_com_interrupt_moderation_supported(struct ena_com_dev *ena_dev); 
-/* ena_com_config_default_interrupt_moderation_table - Restore the interrupt 
- * moderation table back to the default parameters. 
- * @ena_dev: ENA communication layer struct 
- */ 
-void ena_com_config_default_interrupt_moderation_table(struct ena_com_dev *ena_dev); 
- 
-/* ena_com_update_nonadaptive_moderation_interval_tx - Update the 
- * non-adaptive interval in Tx direction. 
- * @ena_dev: ENA communication layer struct 
- @ @ -912,28 +916,15 @@ 
-*/ 
+ unsigned int ena_com_get_nonadaptive_moderation_interval_rx(struct ena_com_dev *ena_dev); 
-/* ena_com_init_intr_moderation_entry - Update a single entry in the interrupt 
- * moderation table. 
-+/* ena_com_config_dev_mode - Configure the placement policy of the device. 
- * @ena_dev: ENA communication layer struct 
- * @level: Interrupt moderation table level 
- * @entry: Entry value 
- * 
- * Update a single entry in the interrupt moderation table.
void ena_com_init_intr_moderation_entry(struct ena_com_dev *ena_dev,
        enum ena_intr_moder_level level,
        struct ena_intr_moder_entry *entry);

/* ena_com_get_intr_moderation_entry - Init ena_intr_moder_entry.
   * @ena_dev: ENA communication layer struct
   * @level: Interrupt moderation table level
   * @entry: Entry to fill.
   *
   * Initialize the entry according to the adaptive interrupt moderation table.
   *
   */
void ena_com_get_intr_moderation_entry(struct ena_com_dev *ena_dev,
        enum ena_intr_moder_level level,
        struct ena_intr_moder_entry *entry);

int ena_com_config_dev_mode(struct ena_com_dev *ena_dev,
        struct ena_admin_feature_llq_desc *llq_features,
        struct ena_llq_configurations *llq_default_config);

static inline bool ena_com_get_adaptive_moderation_enabled(struct ena_com_dev *ena_dev)
{
    ena_dev->adaptive_coalescing = false;
}

/* ena_com_calculate_interrupt_delay - Calculate new interrupt delay
   * @ena_dev: ENA communication layer struct
   * @pkts: Number of packets since the last update
   * @bytes: Number of bytes received since the last update.
   * @smoothed_interval: Returned interval
   * @moder_tbl_idx: Current table level as input update new level as return
   * value.
   *
   */
static inline void ena_com_calculate_interrupt_delay(struct ena_com_dev *ena_dev,
        unsigned int pkts,
        unsigned int bytes,
        unsigned int *smoothed_interval,
        unsigned int *moder_tbl_idx);
- unsigned int interval;
    - /* We apply adaptive moderation on Rx path only.
    - * Tx uses static interrupt moderation.
    - */
    - if (!pkts || !bytes)
    - /* Tx interrupt, or spurious interrupt,
    - * in both cases we just use same delay values
    - */
    - return;
    -
    - curr_moder_idx = (enum ena_intr_moder_level)(*moder_tbl_idx);
    - if (unlikely(curr_moder_idx >= ENA_INTR_MAX_NUM_OF_LEVELS)) {
    - pr_err("Wrong moderation index \%u\n", curr_moder_idx);
    - return;
    - }
    -
    - curr_moder_entry = &intr_moder_tbl[curr_moder_idx];
    - new_moder_idx = curr_moder_idx;
    -
    - if (curr_moder_idx == ENA_INTR_MODER_LOWEST) {
    - (enum ena_intr_moder_level)(curr_moder_idx + ENA_INTR_MODER_LEVELStride);
    - } else {
    - pred_moder_entry = &intr_moder_tbl[curr_moder_idx - ENA_INTR_MODER_LEVELStride];
    -
    - if ((pkts <= pred_moder_entry->pkts_per_interval) ||
    - (bytes <= pred_moder_entry->bytes_per_interval))
    - new_moder_idx =
    - (enum ena_intr_moder_level)(curr_moder_idx - ENA_INTR_MODER_LEVELStride);
    - else if ((pkts > curr_moder_entry->pkts_per_interval) ||
    - (bytes > curr_moder_entry->bytes_per_interval)) {
    - if (curr_moder_idx != ENA_INTR_MODER_HIGHEST)
    - new_moder_idx =
    - (enum ena_intr_moder_level)(curr_moder_idx + ENA_INTR_MODER_LEVELStride);
    - }
    -
    - new_moder_entry = &intr_moder_tbl[new_moder_idx];
    -
    - interval = new_moder_entry->intr_moder_interval;
    -*smoothed_interval = (interval * ENA_INTR_DELAY_NEW_VALUE_WEIGHT +
    -ENA_INTR_DELAY_OLD_VALUE_WEIGHT * (*smoothed_interval)) + 5) /
    -10;
    -
    -*moder_tbl_idx = new_moder_idx;
/* ena_com_update_intr_reg - Prepare interrupt register 
 * @intr_reg: interrupt register to update.
 * @rx_delay_interval: Rx interval in usecs
 *@@ -1044,4 +966,21 @@
 * intr_reg->intr_control |= ENA_ETH_IO_INTR_REG_INTR_UNMASK_MASK;
 */

+static inline u8 *ena_com_get_next_bounce_buffer(struct ena_com_io_bounce_buffer_control *bounce_buf_ctrl)
+{
+u16 size, buffers_num;
+u8 *buf;
+
+size = bounce_buf_ctrl->buffer_size;
+buffers_num = bounce_buf_ctrl->buffers_num;
+
+buf = bounce_buf_ctrl->base_buffer +
+((bounce_buf_ctrl->next_to_use++ & (buffers_num - 1)) * size);
+
prefetchw(bounce_buf_ctrl->base_buffer +
+((bounce_buf_ctrl->next_to_use & (buffers_num - 1)) * size);
+
+return buf;
+}

#endif /* !(ENA_COM) */
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_common_defs.h
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_common_defs.h
@@ -1,39 +1,12 @@
+/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
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+ */
#define _ENA_COMMON_H_
#endif

#define ENA_COMMON_SPEC_VERSION_MAJOR	0 /*  */
#define ENA_COMMON_SPEC_VERSION_MINOR	10 /*  */
+#define ENA_COMMON_SPEC_VERSION_MAJOR 2
+define ENA_COMMON_SPEC_VERSION_MINOR 0

/* ENA operates with 48-bit memory addresses. ena_mem_addr_t */
struct ena_common_mem_addr {
    --- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_eth_com.c
    +++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_eth_com.c
    @ @ -1,38 +1,11 @ @
    // SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB
    /*
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```
#include "ena_eth_com.h"

static inline struct ena_eth_io_rx_cdesc_base *ena_com_get_next_rx_cdesc(
    struct ena_com_io_cq *io_cq)
{
    struct ena_eth_io_rx_cdesc_base *cdesc;
    if (desc_phase != expected_phase)
        return NULL;
    return cdesc;
}

static inline void ena_com_cq_inc_head(struct ena_com_io_cq *io_cq)
{
    io_cq->head++;
    /* Make sure we read the rest of the descriptor after the phase bit
     * has been read
     */
    dma_rmb();
}

static inline void *get_sq_desc(struct ena_com_io_sq *io_sq)
{
    u16 tail_masked;
    u32 offset;
    if (desc_phase != expected_phase)
        return NULL;
    return cdesc;
}

static inline void *get_sq_desc_regular_queue(struct ena_com_io_sq *io_sq)
{
    u16 tail_masked;
    u32 offset;
    return NULL;
}
```

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*/

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return (void *)((uintptr_t)io_sq->desc_addr.virt_addr + offset);
}

-static inline void ena_com_copy_curr_sq_desc_to_dev(struct ena_com_io_sq *io_sq)
+static int ena_com_write_bounce_buffer_to_dev(struct ena_com_io_sq *io_sq,
+    u8 *bounce_buffer)
{
-    u16 tail_masked = io_sq->tail & (io_sq->q_depth - 1);
-    u32 offset = tail_masked * io_sq->desc_entry_size;
+    struct ena_com_llq_info *llq_info = &io_sq->llq_info;

-    /* In case this queue isn't a LLQ */
-    if (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST)
-        return;
+    u16 dst_tail_mask;
+    u32 dst_offset;

+    memcpy_toio(io_sq->desc_addr.pbuf_dev_addr + offset,
+        io_sq->desc_addr.virt_addr + offset,
+        io_sq->desc_entry_size);
+}
+    dst_tail_mask = io_sq->tail & (io_sq->q_depth - 1);
+    dst_offset = dst_tail_mask * llq_info->desc_list_entry_size;

+    if (is_llq_max_tx_burst_exists(io_sq)) {
+        if (unlikely(!io_sq->entries_in_tx_burst_left)) {
+            pr_err("Error: trying to send more packets than tx burst allows\n");
+            return -ENOSPC;
+        }
+        io_sq->entries_in_tx_burst_left--;
+        pr_debug("decreasing entries_in_tx_burst_left of queue \%d to \%d\n", 
+            io_sq->qid, io_sq->entries_in_tx_burst_left);
+    }
+    /* Make sure everything was written into the bounce buffer before 
+     * writing the bounce buffer to the device 
+     */
+    wmb();
+    /* The line is completed. Copy it to dev */
+    __iowrite64_copy(io_sq->desc_addr.pbuf_dev_addr + dst_offset,
+        bounce_buffer, (llq_info->desc_list_entry_size) / 8);

-static inline void ena_com_sq_update_tail(struct ena_com_io_sq *io_sq)
+static inline void ena_com_sq_update_tail(struct ena_com_io_sq *io_sq)
{
    io_sq->tail++;
/* Switch phase bit in case of wrap around */
if (unlikely((io_sq->tail & (io_sq->q_depth - 1)) == 0))
io_sq->phase ^= 1;
+ return 0;
}

static inline int ena_com_write_header(struct ena_com_io_sq *io_sq,
     u8 *head_src, u16 header_len)
+ static int ena_com_write_header_to_bounce(struct ena_com_io_sq *io_sq,
     u8 *header_src,
     u16 header_len)
+ {
+     struct ena_com_llq_pkt_ctrl *pkt_ctrl = &io_sq->llq_buf_ctrl;
+     struct ena_com_llq_info *llq_info = &io_sq->llq_info;
+     u8 *bounce_buffer = pkt_ctrl->curr_bounce_buf;
+     u16 header_offset;
+
+     if (unlikely(io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST))
+         return 0;
+     
+     header_offset =
+     llq_info->descs_num_before_header * io_sq->desc_entry_size;
+     
+     if (unlikely((header_offset + header_len) >
+                   llq_info->desc_list_entry_size)) {
+         pr_err("trying to write header larger than llq entry can accommodate\n");
+         return -EFAULT;
+     }
+     
+     if (!bounce_buffer) {
+         pr_err("bounce buffer is NULL\n");
+         return -EFAULT;
+     }
+     
+     memcpy(bounce_buffer + header_offset, header_src, header_len);
+     
+     return 0;
+ }
+
+ static void *get_sq_desc_llq(struct ena_com_io_sq *io_sq)
+ {
+     struct ena_com_llq_pkt_ctrl *pkt_ctrl = &io_sq->llq_buf_ctrl;
+     u8 *bounce_buffer;
+     void *sq_desc;
+     
+     bounce_buffer = pkt_ctrl->curr_bounce_buf;
+ }

+if (unlikely(!bounce_buffer)) {
+pr_err("bounce buffer is NULL\n");
+return NULL;
+}
+
+sq_desc = bounce_buffer + pkt_ctrl->idx * io_sq->desc_entry_size;
+pkt_ctrl->idx++;
+pkt_ctrl->descs_left_in_line--;
+
+return sq_desc;
+}
+
+static int ena_com_close_bounce_buffer(struct ena_com_io_sq *io_sq)
{
	u16 tail_masked = io_sq->tail & (io_sq->q_depth - 1);
	u8 __iomem *dev_head_addr =
		io_sq->header_addr + (tail_masked * io_sq->tx_max_header_size);
+struct ena_com_llq_pkt_ctrl *pkt_ctrl = &io_sq->llq_buf_ctrl;
+struct ena_com_llq_info *llq_info = &io_sq->llq_info;
+int rc;
+
-if (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST)
+if (unlikely(io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST))
	return 0;
+
-if (unlikely(!io_sq->header_addr)) {
-pr_err("Push buffer header ptr is NULL\n");
-return -EINVAL;
+/* bounce buffer was used, so write it and get a new one */
+if (pkt_ctrl->idx) {
+rc = ena_com_write_bounce_buffer_to_dev(io_sq,
+pkt_ctrl->curr_bounce_buf);
+if (unlikely(rc))
+return rc;
+
+pkt_ctrl->curr_bounce_buf =
+ena_com_get_next_bounce_buffer(&io_sq->bounce_buf_ctrl);
+memset(io_sq->llq_buf_ctrl.curr_bounce_buf,
+0x0, llq_info->desc_list_entry_size);
+}
+
+pkt_ctrl->idx = 0;
+pkt_ctrl->descs_left_in_line = llq_info->descs_num_before_header;
+return 0;
+}
+
+static void *get_sq_desc(struct ena_com_io_sq *io_sq)
+if (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
+return get_sq_desc_llq(io_sq);
+
+return get_sq_desc_regular_queue(io_sq);
+
+static int ena_com_sq_update_llq_tail(struct ena_com_io_sq *io_sq)
+{
+  struct ena_com_llq_pkt_ctrl *pkt_ctrl = &io_sq->llq_buf_ctrl;
+  struct ena_com_llq_info *llq_info = &io_sq->llq_info;
+  int rc;
+  
+  if (!pkt_ctrl->descs_left_in_line) {
+    rc = ena_com_write_bounce_buffer_to_dev(io_sq,
+      pkt_ctrl->curr_bounce_buf);
+    if (unlikely(rc))
+      return rc;
+    
+    pkt_ctrl->curr_bounce_buf =
+      ena_com_get_next_bounce_buffer(&io_sq->bounce_buf_ctrl);
+    memset(io_sq->llq_buf_ctrl.curr_bounce_buf,
+      0x0, llq_info->desc_list_entry_size);
+    
+    pkt_ctrl->idx = 0;
+    if (unlikely(llq_info->desc_stride_ctrl == ENA_ADMIN_SINGLE_DESC_PER_ENTRY))
+      pkt_ctrl->descs_left_in_line = 1;
+    else
+      pkt_ctrl->descs_left_in_line =
+        llq_info->desc_list_entry_size / io_sq->desc_entry_size;
+  }
+  
-  memcpy_toio(dev_head_addr, head_src, header_len);
+  return 0;
+}
+
+static int ena_com_sq_update_tail(struct ena_com_io_sq *io_sq)
+{
+  if (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
+    return ena_com_sq_update_llq_tail(io_sq);
+
+  io_sq->tail++;
+  
+  /* Switch phase bit in case of wrap around */
+  if (unlikely((io_sq->tail & (io_sq->q_depth - 1)) == 0))
+    io_sq->phase ^= 1;
+
+  return 0;
+}
static inline struct ena_eth_io_rx_cdesc_base *
ena_com_rx_cdesc_idx_to_ptr(struct ena_com_io_cq *io_cq, u16 idx)
{
    idx &= (io_cq->q_depth - 1);
    idx * (io_cq->cdesc_entry_size_in_bytes);
}

static inline u16 ena_com_cdesc_rx_pkt_get(struct ena_com_io_cq *io_cq,
                                          u16 *first_cdesc_idx)
{
    struct ena_eth_io_rx_cdesc_base *cdesc;
    u16 count;
    return count;
}

static inline bool ena_com_meta_desc_changed(struct ena_com_io_sq *io_sq,
                                            struct ena_com_tx_ctx *ena_tx_ctx)
{
    int rc;
    if (ena_tx_ctx->meta_valid) {
        rc = memcmp(&io_sq->cached_tx_meta, &ena_tx_ctx->ena_meta,
                    sizeof(struct ena_com_tx_meta));
        if (unlikely(rc != 0))
            return true;
    }
    return false;
}

static inline void ena_com_create_and_store_tx_meta_desc(struct ena_com_io_sq *io_sq,
                                                          struct ena_com_tx_ctx *ena_tx_ctx)
{
    struct ena_eth_io_tx_meta_desc *meta_desc = NULL;
    struct ena_com_tx_meta *ena_meta = &ena_tx_ctx->ena_meta;
    memcpyp(&io_sq->cached_tx_meta, ena_meta,
             sizeof(struct ena_com_tx_meta));
    ena_com_copy_curr_sq_desc_to_dev(io_sq);
- ena_com_sq_update_tail(io_sq);
+ return ena_com_sq_update_tail(io_sq);

- static inline void ena_com_rx_set_flags(struct ena_com_rx_ctx *ena_rx_ctx,
+ static void ena_com_rx_set_flags(struct ena_com_rx_ctx *ena_rx_ctx,
 struct ena_eth_io_rx_cdesc_base *cdesc)
{
  ena_rx_ctx->l3_proto = cdesc->status &
@@ -240,11 +316,14 @@
      (cdesc->status & ENA_ETH_IO_RX_CDESC_BASE_L4_PROTO_IDX_MASK) >>
 ENA_ETH_IO_RX_CDESC_BASE_L4_PROTO_IDX_SHIFT;
  ena_rx_ctx->l3_csum_err =
@@ -240,11 +316,14 @@
      (cdesc->status & ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_MASK) >>
 ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_SHIFT;
 +!!!((cdesc->status & ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_MASK) >>
@@ -240,11 +316,14 @@
      ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_SHIFT);
  ena_rx_ctx->l4_csum_err =
@@ -240,11 +316,14 @@
      (cdesc->status & ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_MASK) >>
 ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_SHIFT;
 +!!!((cdesc->status & ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_MASK) >>
@@ -240,11 +316,14 @@
      ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_SHIFT);
  ena_rx_ctx->l4_csum_checked =
@@ -240,11 +316,14 @@
      !!!((cdesc->status & ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_CHECKED_MASK) >>
 ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_CHECKED_SHIFT);
  ena_rx_ctx->hash = cdesc->hash;
@@ -273,18 +352,19 @@
{
  struct ena_eth_io_tx_desc *desc = NULL;
  struct ena_com_buf *ena_bufs = ena_tx_ctx->ena_bufs;
@@ -273,18 +352,19 @@
    void *push_header = ena_tx_ctx->push_header;
    void *buffer_to_push = ena_tx_ctx->push_header;
    u16 header_len = ena_tx_ctx->header_len;
@@ -273,18 +352,19 @@
    u16 num_bufs = ena_tx_ctx->num_bufs;
    -int total_desc, i, rc;
    +u16 start_tail = io_sq->tail;
@@ -273,18 +352,19 @@
    bool have_meta;
    u64 addr_hi;

    WARN(io_sq->direction != ENA_COM_IO_QUEUE_DIRECTION_TX, "wrong Q type");

    /* num_bufs +1 for potential meta desc */
    -if (ena_com_sq_empty_space(io_sq) < (num_bufs + 1)) {
    +if (unlikely(!ena_com_sq_have_enough_space(io_sq, num_bufs + 1))) {

+pr_debug("Not enough space in the tx queue\n");
return -ENOMEM;
}

return -EINVAL;
}

/* start with pushing the header (if needed) */
-rc = ena_com_write_header(io_sq, push_header, header_len);
+if (unlikely(io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV &&
     !buffer_to_push))
+return -EINVAL;
+
+rc = ena_com_write_header_to_bounce(io_sq, buffer_to_push, header_len);
if (unlikely(rc))
return rc;

have_meta = ena_tx_ctx->meta_valid && ena_com_meta_desc_changed(io_sq,
ena_tx_ctx);
-
-ena_com_create_and_store_tx_meta_desc(io_sq, ena_tx_ctx);
-if (have_meta)
-ena_com_create_and_store_tx_meta_desc(io_sq, ena_tx_ctx);
+if (have_meta) {
+rc = ena_com_create_and_store_tx_meta_desc(io_sq, ena_tx_ctx);
+if (unlikely(rc))
+return rc;
+
+
;/* If the caller doesn't want send packets */
+/* If the caller doesn't want to send packets */
if (unlikely(!num_bufs && !header_len)) {
-*nb_hw_desc = have_meta ? 0 : 1;
-return 0;
+rc = ena_com_close_bounce_buffer(io_sq);
+*nb_hw_desc = io_sq->tail - start_tail;
+return rc;
}

desc = get_sq_desc(io_sq);
+if (unlikely(!desc))
+return -EFAULT;
memset(desc, 0x0, sizeof(struct ena_eth_io_tx_desc));

/* Set first desc when we don't have meta descriptor */
@@ -355,10 +444,14 @@
for (i = 0; i < num_bufs; i++) {
/* The first desc share the same desc as the header */
if (likely(i != 0)) {

-ena_com_copy_curr_sq_desc_to_dev(io_sq);
-ena_com_sq_update_tail(io_sq);
+rc = ena_com_sq_update_tail(io_sq);
+if (unlikely(rc))
+return rc;

desc = get_sq_desc(io_sq);
+if (unlikely(!desc))
+return -EFAULT;
+
memset(desc, 0x0, sizeof(struct ena_eth_io_tx_desc));

desc->len_ctrl |= (io_sq->phase <<
@@ -381,15 +474,14 @@*/
desc->len_ctrl |= ENA_ETH_IO_TX_DESC_LAST_MASK;

-ena_com_copy_curr_sq_desc_to_dev(io_sq);
-
-ena_com_sq_update_tail(io_sq);
+rc = ena_com_sq_update_tail(io_sq);
+if (unlikely(rc))
+return rc;

-total_desc = max_t(u16, num_bufs, 1);
-total_desc += have_meta ? 1 : 0;
+rc = ena_com_close_bounce_buffer(io_sq);

-*nb_hw_desc = total_desc;
-return 0;
+*nb_hw_desc = io_sq->tail - start_tail;
+return rc;
}

int ena_com_rx_pkt(struct ena_com_io_cq *io_cq,
@@ -448,15 +540,18 @@
WARN(io_sq->direction != ENA_COM_IO_QUEUE_DIRECTION_RX, "wrong Q type");

-if (unlikely(ena_com_sq_empty_space(io_sq) == 0))
+if (unlikely(!ena_com_sq_have_enough_space(io_sq, 1)))
return -ENOSPC;

desc = get_sq_desc(io_sq);
+if (unlikely(!desc))
+return -EFAULT;
+
memset(desc, 0x0, sizeof(struct ena_eth_io_rx_desc));
desc->length = ena_buf->len;

desc->ctrl |= ENA_ETH_IO_RX_DESC_FIRST_MASK;
+desc->ctrl = ENA_ETH_IO_RX_DESC_FIRST_MASK;
desc->ctrl |= ENA_ETH_IO_RX_DESC_LAST_MASK;
desc->ctrl |= io_sq->phase & ENA_ETH_IO_RX_DESC_PHASE_MASK;
desc->ctrl |= ENA_ETH_IO_RX_DESC_COMP_REQ_MASK;
@@ -467,40 +562,16 @@
desc->buff_addr_hi = ((ena_buf->paddr & GENMASK_ULL(io_sq->dma_addr_bits - 1, 32)) >> 32);

-ena_com_sq_update_tail(io_sq);
-
-return 0;
+return ena_com_sq_update_tail(io_sq);
}

-int ena_com_tx_comp_req_id_get(struct ena_com_io_cq *io_cq, u16 *req_id)
+bool ena_com_cq_empty(struct ena_com_io_cq *io_cq)
{
-u8 expected_phase, cdesc_phase;
-struct ena_eth_io_tx_cdesc *cdesc;
-u16 masked_head;
-
-masked_head = io_cq->head & (io_cq->q_depth - 1);
-expected_phase = io_cq->phase;
-
-cdesc = (struct ena_eth_io_tx_cdesc *)
-((uintptr_t)io_cq->cdesc_addr.virt_addr +
-(masked_head * io_cq->cdesc_entry_size_in_bytes));
-
-/* When the current completion descriptor phase isn't the same as the
- * expected, it mean that the device still didn't update
- * this completion.
- */
-cdesc_phase = READ_ONCE(cdesc->flags) & ENA_ETH_IO_TX_CDESC_PHASE_MASK;
-if (cdesc_phase != expected_phase)
-return -EAGAIN;
-
-if (unlikely(cdesc->req_id >= io_cq->q_depth)) {
-pr_err("Invalid req id \%d\n", cdesc->req_id);
-return -EINVAL;
-}
-
-ena_com_cq_inc_head(io_cq);
-
-*req_id = READ_ONCE(cdesc->req_id);
struct ena_eth_io_rx_cdesc_base *cdesc;

return 0;
+cdesc = ena_com_get_next_rx_cdesc(io_cq);
+if (cdesc)
+return false;
+else
+return true;
+
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_eth_com.h
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_eth_com.h
@@ -1,33 +1,6 @@
+/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
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 */

ifndef ENA_ETH_COM_H_
@@ -67,6 +40,7 @@

@end -77,6 +50,7 @@
enum ena_eth_io_l4_proto_index l4_proto;
bool l3_csum_err;
bool l4_csum_err;
+u8 l4_csum_checked;
/* fragmented packet */
bool frag;
u32 hash;
@@ -86,7 +60,7 @@
    struct ena_com_buf *ena_buf,
    u16 req_id);

-int ena_com_tx_comp_req_id_get(struct ena_com_io_cq *io_cq, u16 *req_id);
+bool ena_com_sq_empty(struct ena_com_io_cq *io_cq);

static inline void ena_com_unmask_intr(struct ena_com_io_cq *io_cq,
    struct ena_eth_io_intr_reg *intr_reg)
@@ -94,7 +68,7 @@
    writel(intr_reg->intr_control, io_cq->unmask_reg);
}

-static inline int ena_com_sq_empty_space(struct ena_com_io_sq *io_sq)
+static inline int ena_com_sq_have_enough_space(struct ena_com_io_sq *io_sq,
    u16 required_buffers)
{
    u16 tail, next_to_comp, cnt;

    @@ -105,17 +79,87 @@
    return io_sq->q_depth - 1 - cnt;
 }

-static inline int ena_com_write_sq_doorbell(struct ena_com_io_sq *io_sq)
+/* Check if the submission queue has enough space to hold required_buffers */
+static inline bool ena_com_sq_have_enough_space(struct ena_com_io_sq *io_sq,
+    u16 required_buffers)
+{
+    +int temp;
+    +
+    +if (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST)
+    +return ena_com_free_desc(io_sq) >= required_buffers;
+    +
+    +/* This calculation doesn't need to be 100% accurate. So to reduce
+        + the calculation overhead just Subtract 2 lines from the free desc
+        + (one for the header line and one to compensate the divison
+        + down calculation.
+        */
+    +temp = required_buffers / io_sq->llq_info.descs_per_entry + 2;
+    +
+    +return ena_com_free_desc(io_sq) > temp;
+}
static inline bool ena_com_meta_desc_changed(struct ena_com_io_sq *io_sq, struct ena_com_tx_ctx *ena_tx_ctx) {
    u16 tail;
    if (!ena_tx_ctx->meta_valid)
        return false;
    tail = io_sq->tail;
    return !!memcmp(&io_sq->cached_tx_meta, &ena_tx_ctx->ena_meta, sizeof(struct ena_com_tx_meta));
}

static inline bool is_llq_max_tx_burst_exists(struct ena_com_io_sq *io_sq) {
    return (io_sq->mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV) &&
               io_sq->llq_info.max_entries_in_tx_burst > 0;
}

static inline bool ena_com_is_doorbell_needed(struct ena_com_io_sq *io_sq, struct ena_com_tx_ctx *ena_tx_ctx) {
    struct ena_com_llq_info *llq_info;
    int descs_after_first_entry;
    int num_entries_needed = 1;
    u16 num_descs;
    if (!is_llq_max_tx_burst_exists(io_sq))
        return false;
    llq_info = &io_sq->llq_info;
    num_descs = ena_tx_ctx->num_bufs;
    if (unlikely(ena_com_meta_desc_changed(io_sq, ena_tx_ctx)))
        ++num_descs;
    if (num_descs > llq_info->descs_num_before_header) {
        descs_after_first_entry = num_descs - llq_info->descs_num_before_header;
        num_entries_needed += DIV_ROUND_UP(descs_after_first_entry, llq_info->descs_per_entry);
    }
    pr_debug("queue: %d num_descs: %d num_entries_needed: %d\n", io_sq->qid, num_descs, num_entries_needed);
    return num_entries_needed > io_sq->entries_in_tx_burst_left;
}
+static inline int ena_com_write_sq_doorbell(struct ena_com_io_sq *io_sq)
+{
+u16 max_entries_in_tx_burst = io_sq->llq_info.max_entries_in_tx_burst;
+u16 tail = io_sq->tail;

pr_debug("write submission queue doorbell for queue: %d tail: %d\n",
io_sq->qid, tail);

writel(tail, io_sq->db_addr);

+if (is_llq_max_tx_burst_exists(io_sq)) {
+pr_debug("reset available entries in tx burst for queue %d to %d\n",
io_sq->qid, max_entries_in_tx_burst);
io_sq->entries_in_tx_burst_left = max_entries_in_tx_burst;
+}
+
return 0;
}

@@ -124,15 +168,17 @@
u16 unreported_comp, head;
bool need_update;

-head = io_cq->head;
-unreported_comp = head - io_cq->last_head_update;
-need_update = unreported_comp > (io_cq->q_depth / ENA_COMP_HEAD_THRESH);
-
-if (io_cq->cq_head_db_reg && need_update) {
-pr_debug("Write completion queue doorbell for queue %d: head: %d\n",
io_cq->qid, head);
-writel(head, io_cq->cq_head_db_reg);
io_cq->last_head_update = head;
+if (unlikely(io_cq->cq_head_db_reg)) {
+head = io_cq->head;
+unreported_comp = head - io_cq->last_head_update;
+need_update = unreported_comp > (io_cq->q_depth / ENA_COMP_HEAD_THRESH);
+
+if (unlikely(need_update)) {
+pr_debug("Write completion queue doorbell for queue %d: head: %d\n",
io_cq->qid, head);
+writel(head, io_cq->cq_head_db_reg);
io_cq->last_head_update = head;
+}
+
return 0;
@@ -157,4 +203,48 @@
io_sq->next_to_comp += elem;
}

+static inline void ena_com_cq_inc_head(struct ena_com_io_cq *io_cq)
+{
+io_cq->head++;
+
+/* Switch phase bit in case of wrap around */
+if (unlikely((io_cq->head & (io_cq->q_depth - 1)) == 0))
+io_cq->phase ^= 1;
+}
+
+static inline int ena_com_tx_comp_req_id_get(struct ena_com_io_cq *io_cq,
+ u16 *req_id)
+{
+u8 expected_phase, cdesc_phase;
+struct ena_eth_io_tx_cdesc *cdesc;
+u16 masked_head;
+
+masked_head = io_cq->head & (io_cq->q_depth - 1);
+expected_phase = io_cq->phase;
+
+cdesc = (struct ena_eth_io_tx_cdesc *)
+((uintptr_t)io_cq->cdesc_addr.virt_addr +
+(masked_head * io_cq->cdesc_entry_size_in_bytes));
+
+/* When the current completion descriptor phase isn't the same as the
+ * expected, it mean that the device still didn't update
+ * this completion.
+ */
+cdesc_phase = READ_ONCE(cdesc->flags) & ENA_ETH_IO_TX_CDESC_PHASE_MASK;
+if (cdesc_phase != expected_phase)
+return -EAGAIN;
+
+dma_rmb();
+
+*req_id = READ_ONCE(cdesc->req_id);
+if (unlikely(*req_id >= io_cq->q_depth)) {
+pr_err("Invalid req id %d\n", cdesc->req_id);
+return -EINVAL;
+}
+
tena_com_cq_inc_head(io_cq);
+
+return 0;
+}
+
+endif /* ENA_ETH_COM_H_ */
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_eth_io_defs.h
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_eth_io_defs.h
@@ -1,57 +1,23 @@
+/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
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 */
#endif _ENA_ETH_IO_H_
define _ENA_ETH_IO_H_

enum ena_eth_io_l3_proto_index {
  -ENA_ETH_IO_L3_PROTO_UNKNOWN= 0,
  -ENA_ETH_IO_L3_PROTO_IPV4= 8,
  -ENA_ETH_IO_L3_PROTO_IPV6= 11,
  -ENA_ETH_IO_L3_PROTO_FCOE= 21,
-ENA_ETH_IO_L3_PROTO_ROCE= 22,
+ENA_ETH_IO_L3_PROTO_UNKNOWN = 0,
+ENA_ETH_IO_L3_PROTO_IPV4 = 8,
+ENA_ETH_IO_L3_PROTO_IPV6 = 11,
+ENA_ETH_IO_L3_PROTO_FCOE = 21,
+ENA_ETH_IO_L3_PROTO_ROCE = 22,
}

enum ena_eth_io_l4_proto_index {
-ENA_ETH_IO_L4_PROTO_UNKNOWN = 0,
-
-ENA_ETH_IO_L4_PROTO_TCP = 12,
-
-ENA_ETH_IO_L4_PROTO_UDP = 13,
-
-ENA_ETH_IO_L4_PROTO_ROUTEABLE_ROCE = 23,
+ENA_ETH_IO_L4_PROTO_UNKNOWN = 0,
+ENA_ETH_IO_L4_PROTO_TCP = 12,
+ENA_ETH_IO_L4_PROTO_UDP = 13,
+ENA_ETH_IO_L4_PROTO_ROUTEABLE_ROCE = 23,
}

struct ena_eth_io_tx_desc {
@@ -242,9 +208,13 @@
* checksum error detected, or, the controller didn’t
* validate the checksum. This bit is valid only when
* l4_proto_idx indicates TCP/UDP packet, and,
- * ipv4_frag is not set
+ * ipv4_frag is not set. This bit is valid only when
+ * l4_csum_checked below is set.
* ipv4_frag - Indicates IPv4 fragmented packet
- * 23:16 : reserved16
+ * 16 : l4_csum_checked - L4 checksum was verified
+ * (could be OK or error), when cleared the status of
+ * checksum is unknown
+ * 23:17 : reserved17 - MBZ
* 24 : phase
* 25 : l3_csum2 - second checksum engine result
* 26 : first - Indicates first descriptor in
@@ -303,114 +273,116 @@
};

/* tx_desc */
#define ENA_ETH_IO_TX_DESC_LENGTH_MASK GENMASK(15, 0)
#define ENA_ETH_IO_TX_DESC_REQ_ID_HI_SHIFT 16
#define ENA_ETH_IO_TX_DESC_REQ_ID_HI_MASK GENMASK(21, 16)
#define ENA_ETH_IO_TX_DESC_META_DESC_SHIFT 23
#define ENA_ETH_IO_TX_DESC_META_DESC_MASK BIT(23)
-#define ENA_ETH_IO_TX_DESC_PHASE_SHIFT 24
-#define ENA_ETH_IO_TX_DESC_PHASE_MASK BIT(24)
-#define ENA_ETH_IO_TX_DESC_FIRST_SHIFT 26
-#define ENA_ETH_IO_TX_DESC_FIRST_MASK BIT(26)
-#define ENA_ETH_IO_TX_DESC_LAST_SHIFT 27
-#define ENA_ETH_IO_TX_DESC_LAST_MASK BIT(27)
-#define ENA_ETH_IO_TX_DESC_COMP_REQ_SHIFT 28
-#define ENA_ETH_IO_TX_DESC_COMP_REQ_MASK BIT(28)
-#define ENA_ETH_IO_TX_DESC_L3_PROTO_ID_IDX_MASK GENMASK(3, 0)
-#define ENA_ETH_IO_TX_DESC_DF_SHIFT 4
-#define ENA_ETH_IO_TX_DESC_DF_MASK BIT(4)
-#define ENA_ETH_IO_TX_DESC_TSO_EN_SHIFT 7
-#define ENA_ETH_IO_TX_DESC_TSO_EN_MASK BIT(7)
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_SHIFT 8
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_MASK GENMASK(12, 8)
-#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_SHIFT 13
-#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_MASK BIT(13)
-#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_SHIFT 14
-#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_MASK BIT(14)
-#define ENA_ETH_IO_TX_DESC_L3_PROTO_ID_IDX_MASK GENMASK(3, 0)
-#define ENA_ETH_IO_TX_DESC_DF_SHIFT 4
-#define ENA_ETH_IO_TX_DESC_DF_MASK BIT(4)
-#define ENA_ETH_IO_TX_DESC_TSO_EN_SHIFT 7
-#define ENA_ETH_IO_TX_DESC_TSO_EN_MASK BIT(7)
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_SHIFT 8
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_MASK GENMASK(12, 8)
-#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_SHIFT 13
-#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_MASK BIT(13)
-#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_SHIFT 14
-#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_MASK BIT(14)
-#define ENA_ETH_IO_TX_DESC_L3_PROTO_ID_IDX_MASK GENMASK(3, 0)
-#define ENA_ETH_IO_TX_DESC_DF_SHIFT 4
-#define ENA_ETH_IO_TX_DESC_DF_MASK BIT(4)
-#define ENA_ETH_IO_TX_DESC_TSO_EN_SHIFT 7
-#define ENA_ETH_IO_TX_DESC_TSO_EN_MASK BIT(7)
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_SHIFT 8
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_MASK GENMASK(12, 8)
-#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_SHIFT 13
-#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_MASK BIT(13)
-#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_SHIFT 14
-#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_MASK BIT(14)
-#define ENA_ETH_IO_TX_DESC_L3_PROTO_ID_IDX_MASK GENMASK(3, 0)
-#define ENA_ETH_IO_TX_DESC_DF_SHIFT 4
-#define ENA_ETH_IO_TX_DESC_DF_MASK BIT(4)
-#define ENA_ETH_IO_TX_DESC_TSO_EN_SHIFT 7
-#define ENA_ETH_IO_TX_DESC_TSO_EN_MASK BIT(7)
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_SHIFT 8
-#define ENA_ETH_IO_TX_DESC_L4_PROTO_ID_IDX_MASK GENMASK(12, 8)

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/* tx_desc */
#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_SHIFT 13
#define ENA_ETH_IO_TX_DESC_L3_CSUM_EN_MASK BIT(13)
#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_SHIFT 14
#define ENA_ETH_IO_TX_DESC_L4_CSUM_EN_MASK BIT(14)
#define ENA_ETH_IO_TX_DESC_ETHERNET_FCS_DIS_SHIFT 15
#define ENA_ETH_IO_TX_DESC_ETHERNET_FCS_DIS_MASK BIT(15)
#define ENA_ETH_IO_TX_DESC_REQ_ID_LO_SHIFT 22
#define ENA_ETH_IO_TX_DESC_REQ_ID_LO_MASK GENMASK(31, 22)
#define ENA_ETH_IO_TX_DESC_ADDR_HI_MASK GENMASK(15, 0)
#define ENA_ETH_IO_TX_DESC_HEADER_LENGTH_SHIFT 24
#define ENA_ETH_IO_TX_DESC_HEADER_LENGTH_MASK GENMASK(31, 24)

/* tx_meta_desc */
#define ENA_ETH_IO_TX_META_DESC_REQ_ID_LO_MASK GENMASK(9, 0)
#define ENA_ETH_IO_TX_META_DESC_EXT_VALID_SHIFT 14
#define ENA_ETH_IO_TX_META_DESC_EXT_VALID_MASK BIT(14)
#define ENA_ETH_IO_TX_META_DESC_MSS_HI_SHIFT 16
#define ENA_ETH_IO_TX_META_DESC_MSS_HI_MASK GENMASK(19, 16)
#define ENA_ETH_IO_TX_META_DESC_ETH_META_TYPE_SHIFT 20
#define ENA_ETH_IO_TX_META_DESC_ETH_META_TYPE_MASK BIT(20)
#define ENA_ETH_IO_TX_META_DESC_META_STORE_SHIFT 24
#define ENA_ETH_IO_TX_META_DESC_META_STORE_MASK BIT(24)
#define ENA_ETH_IO_TX_META_DESC_Meta_DESC_SHIFT 22
#define ENA_ETH_IO_TX_META_DESC_Meta_DESC_MASK BIT(22)
#define ENA_ETH_IO_TX_META_DESC_PHASE_SHIFT 26
#define ENA_ETH_IO_TX_META_DESC_PHASE_MASK BIT(26)
#define ENA_ETH_IO_TX_META_DESC_FIRST_SHIFT 27
#define ENA_ETH_IO_TX_META_DESC_FIRST_MASK BIT(27)
#define ENA_ETH_IO_TX_META_DESC_COMP_REQ_SHIFT 28
#define ENA_ETH_IO_TX_META_DESC_COMP_REQ_MASK BIT(28)
#define ENA_ETH_IO_TX_META_DESC_REQ_ID_HI_MASK GENMASK(5, 0)
#define ENA_ETH_IO_TX_META_DESC_L3_HDR_LEN_MASK GENMASK(7, 0)
#define ENA_ETH_IO_TX_META_DESC_L3_HDR_OFF_SHIFT 8
#define ENA_ETH_IO_TX_META_DESC_L3_HDR_OFF_MASK GENMASK(15, 8)
#define ENA_ETH_IO_TX_META_DESC_L4_HDR_LEN_IN_WORDS_SHIFT 16
#define ENA_ETH_IO_TX_META_DESC_L4_HDR_LEN_IN_WORDS_MASK GENMASK(21, 16)
#define ENA_ETH_IO_TX_META_DESC_MSS_LO_SHIFT 22
#define ENA_ETH_IO_TX_META_DESC_MSS_LO_MASK GENMASK(31, 22)
/* tx_cdesc */
+define ENA_ETH_IO_TX_CDESC_PHASE_MASK BIT(0)
+define ENA_ETH_IO_TX_CDESC_PHASE_MASK BIT(0)

/* rx_desc */
-define ENA_ETH_IO_RX_DESC_PHASE_MASK BIT(0)
-define ENA_ETH_IO_RX_DESC_FIRST_SHIFT 2
-define ENA_ETH_IO_RX_DESC_FIRST_MASK BIT(2)
-define ENA_ETH_IO_RX_DESC_LAST_SHIFT 3
-define ENA_ETH_IO_RX_DESC_LAST_MASK BIT(3)
-define ENA_ETH_IO_RX_DESC_COMP_REQ_SHIFT 4
-define ENA_ETH_IO_RX_DESC_COMP_REQ_MASK BIT(4)
+define ENA_ETH_IO_RX_DESC_PHASE_MASK BIT(0)
+define ENA_ETH_IO_RX_DESC_FIRST_SHIFT 2
+define ENA_ETH_IO_RX_DESC_FIRST_MASK BIT(2)
+define ENA_ETH_IO_RX_DESC_LAST_SHIFT 3
+define ENA_ETH_IO_RX_DESC_LAST_MASK BIT(3)
+define ENA_ETH_IO_RX_DESC_COMP_REQ_SHIFT 4
+define ENA_ETH_IO_RX_DESC_COMP_REQ_MASK BIT(4)

/* rx_cdesc_base */
-define ENA_ETH_IO_RX_CDESC_BASE_L3_PROTO_IDX_MASK GENMASK(4, 0)
-define ENA_ETH_IO_RX_CDESC_BASE_SRC_VLAN_CNT_SHIFT 5
-define ENA_ETH_IO_RX_CDESC_BASE_SRC_VLAN_CNT_MASK GENMASK(6, 5)
-define ENA_ETH_IO_RX_CDESC_BASE_L4_PROTO_IDX_SHIFT 8
-define ENA_ETH_IO_RX_CDESC_BASE_L4_PROTO_IDX_MASK GENMASK(12, 8)
#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_SHIFT 13
#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_MASK BIT(13)
#define ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_SHIFT 14
#define ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_MASK BIT(14)
#define ENA_ETH_IO_RX_CDESC_BASE_IPV4_FRAG_SHIFT 15
#define ENA_ETH_IO_RX_CDESC_BASE_IPV4_FRAG_MASK BIT(15)
#define ENA_ETH_IO_RX_CDESC_BASE_PHASE_SHIFT 24
#define ENA_ETH_IO_RX_CDESC_BASE_PHASE_MASK BIT(24)
#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM2_SHIFT 25
#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM2_MASK BIT(25)
#define ENA_ETH_IO_RX_CDESC_BASE_FIRST_SHIFT 26
#define ENA_ETH_IO_RX_CDESC_BASE_FIRST_MASK BIT(26)
#define ENA_ETH_IO_RX_CDESC_BASE_LAST_SHIFT 27
#define ENA_ETH_IO_RX_CDESC_BASE_LAST_MASK BIT(27)
#define ENA_ETH_IO_RX_CDESC_BASE_BUFFER_SHIFT 30
#define ENA_ETH_IO_RX_CDESC_BASE_BUFFER_MASK BIT(30)
+#define ENA_ETH_IO_RX_CDESC_BASE_L3_PROTO_IDX_MASK GENMASK(4, 0)
+#define ENA_ETH_IO_RX_CDESC_BASE_SRC_VLAN_CNT_SHIFT 5
+#define ENA_ETH_IO_RX_CDESC_BASE_SRC_VLAN_CNT_MASK GENMASK(6, 5)
+#define ENA_ETH_IO_RX_CDESC_BASE_L4_PROTO_IDX_SHIFT 8
+#define ENA_ETH_IO_RX_CDESC_BASE_L4_PROTO_IDX_MASK GENMASK(12, 8)
+#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_SHIFT 13
+#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM_ERR_MASK BIT(13)
+#define ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_SHIFT 14
+#define ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_ERR_MASK BIT(14)
+#define ENA_ETH_IO_RX_CDESC_BASE_IPV4_FRAG_SHIFT 15
+#define ENA_ETH_IO_RX_CDESC_BASE_IPV4_FRAG_MASK BIT(15)
+#define ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_CHECKED_SHIFT 16
+#define ENA_ETH_IO_RX_CDESC_BASE_L4_CSUM_CHECKED_MASK BIT(16)
+#define ENA_ETH_IO_RX_CDESC_BASE_PHASE_SHIFT 24
+#define ENA_ETH_IO_RX_CDESC_BASE_PHASE_MASK BIT(24)
+#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM2_SHIFT 25
+#define ENA_ETH_IO_RX_CDESC_BASE_L3_CSUM2_MASK BIT(25)
+#define ENA_ETH_IO_RX_CDESC_BASE_FIRST_SHIFT 26
+#define ENA_ETH_IO_RX_CDESC_BASE_FIRST_MASK BIT(26)
+#define ENA_ETH_IO_RX_CDESC_BASE_LAST_SHIFT 27
+#define ENA_ETH_IO_RX_CDESC_BASE_LAST_MASK BIT(27)
+#define ENA_ETH_IO_RX_CDESC_BASE_BUFFER_SHIFT 30
+#define ENA_ETH_IO_RX_CDESC_BASE_BUFFER_MASK BIT(30)

/* intr_reg */
-#define ENA_ETH_IO_INTR_REG_RX_INTR_DELAY_MASK GENMASK(14, 0)
-#define ENA_ETH_IO_INTR_REG_TX_INTR_DELAY_SHIFT 15
-#define ENA_ETH_IO_INTR_REG_TX_INTR_DELAY_MASK GENMASK(29, 15)
-#define ENA_ETH_IO_INTR_REG_INTR_UNMASK_SHIFT 30
-#define ENA_ETH_IO_INTR_REG_INTR_UNMASK_MASK BIT(30)
+#define ENA_ETH_IO_INTR_REG_RX_INTR_DELAY_MASK GENMASK(14, 0)
+#define ENA_ETH_IO_INTR_REG_TX_INTR_DELAY_SHIFT 15
/* numa_node_cfg_reg */
-#define ENA_ETH_IO_NUMA_NODE_CFG_REG_NUMA_MASK GENMASK(7, 0)
-#define ENA_ETH_IO_NUMA_NODE_CFG_REG_ENABLED_SHIFT 31
-#define ENA_ETH_IO_NUMA_NODE_CFG_REG_ENABLED_MASK BIT(31)
+#define ENA_ETH_IO_NUMA_NODE_CFG_REG_NUMA_MASK              GENMASK(7, 0)
+#define ENA_ETH_IO_NUMA_NODE_CFG_REG_ENABLED_SHIFT          31
+#define ENA_ETH_IO_NUMA_NODE_CFG_REG_ENABLED_MASK           BIT(31)

#endif /*_ENA_ETH_IO_H_ */
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_ethtool.c
@@ -1,33 +1,6 @@
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#include <linux/pci.h>

#define ENA_STAT_ENA_COM_ENTRY(stat) { 
   .name = #stat, 
   .stat_offset = offsetof(struct ena_com_stats_admin, stat),
   + .stat_offset = offsetof(struct ena_com_stats_admin, stat) / sizeof(u64),
}

#define ENA_STAT_ENTRY(stat, stat_type) { 
   .name = #stat, 
   .stat_offset = offsetof(struct ena_stats_##stat_type, stat),
   + .stat_offset = offsetof(struct ena_stats_##stat_type, stat) / sizeof(u64),
}

#define ENA_STAT_HW_ENTRY(stat, stat_type) { 
   .name = #stat, 
   .stat_offset = offsetof(struct ena_admin_##stat_type, stat) / sizeof(u64),
}

#define ENA_STAT_RX_ENTRY(stat) 
@@ -58,6 +36,9 @@
#define ENA_STAT_GLOBAL_ENTRY(stat) 
ENA_STAT_ENTRY(stat, dev)

#define ENA_STAT_ENI_ENTRY(stat) 
+ENA_STAT_HW_ENTRY(stat, eni_stats)
+
static const struct ena_stats ena_stats_global_strings[] = {
   ENA_STAT_GLOBAL_ENTRY(tx_timeout),
   ENA_STAT_GLOBAL_ENTRY(suspend),
   + @ @ -58,6 +36,9 @@
   ENA_STAT_GLOBAL_ENTRY(admin_q_pause),
};

+static const struct ena_stats ena_stats_eni_strings[] = {
+ENA_STAT_ENI_ENTRY(bw_in_allowance_exceeded),
+ENA_STAT_ENI_ENTRY(bw_out_allowance_exceeded),
+ENA_STAT_ENI_ENTRY(pps_allowance_exceeded),
+ENA_STAT_ENI_ENTRY(conntrack_allowance_exceeded),
+ENA_STAT_ENI_ENTRY(linklocal_allowance_exceeded),
+};
+
static const struct ena_stats ena_stats_tx_strings[] = {
   ENA_STAT_TX_ENTRY(cnt),
   ENA_STAT_TX_ENTRY(bytes),
}
ENA_STAT_TX_ENTRY(doorbells),
ENA_STAT_TX_ENTRY(prepare_ctx_err),
ENA_STAT_TX_ENTRY(bad_req_id),
+ENA_STAT_TX_ENTRY(llq_buffer_copy),
ENA_STAT_TX_ENTRY(missed_tx),
+ENA_STAT_TX_ENTRY(unmask_interrupt),
};

static const struct ena_stats ena_stats_rx_strings[] = {
ENA_STAT_RX_ENTRY(cnt),
ENA_STAT_RX_ENTRY(bytes),
+ENA_STAT_RX_ENTRY(rx_copybreak_pkt),
+ENA_STAT_RX_ENTRY(csum_good),
ENA_STAT_RX_ENTRY(refil_partial),
ENA_STAT_RX_ENTRY(bad_csum),
ENA_STAT_RX_ENTRY(page_alloc_fail),
ENA_STAT_RX_ENTRY(skb_alloc_fail),
ENA_STAT_RX_ENTRY(dma_mapping_err),
ENA_STAT_RX_ENTRY(bad_desc_num),
-ENA_STAT_RX_ENTRY(rx_copybreak_pkt),
ENA_STAT_RX_ENTRY(bad_req_id),
ENA_STAT_RX_ENTRY(empty_rx_ring),
+ENA_STAT_RX_ENTRY(csum_unchecked),
};

static const struct ena_stats ena_stats_ena_com_strings[] = {
ENA_STAT_ENA_COM_ENTRY(no_completion),
};

#define ENA_STATS_ARRAY_GLOBAL	ARRAY_SIZE(ena_stats_global_strings)
#define ENA_STATS_ARRAY_TX	ARRAY_SIZE(ena_stats_tx_strings)
#define ENA_STATS_ARRAY_RX	ARRAY_SIZE(ena_stats_rx_strings)
#define ENA_STATS_ARRAY_ENA_COM	ARRAY_SIZE(ena_stats_ena_com_strings)
#define ENA_STATS_ARRAY_ENI(adapter) 	
+(ARRAY_SIZE(ena_stats_eni_strings) * (adapter)->eni_stats_supported)

static void ena_safe_update_stat(u64 *src, u64 *dst,
struct u64_stats_sync *syncp)
@@ -130,15 +125,14 @@
u64 *ptr;
    int i, j;
for (i = 0; i < adapter->num_queues; i++) {
  for (i = 0; i < adapter->num_io_queues; i++) {
    /* Tx stats */
    ring = &adapter->tx_ring[i];

    for (j = 0; j < ENA_STATS_ARRAY_TX; j++) {
      ena_stats = &ena_stats_tx_strings[j];

      -ptr = (u64 *((uintptr_t)&ring->tx_stats +
                (uintptr_t)ena_stats->stat_offset);
      +ptr = (u64 *)&ring->tx_stats + ena_stats->stat_offset;

      ena_safe_update_stat(ptr, (*data)++, &ring->syncp);
    }
  }
}

for (j = 0; j < ENA_STATS_ARRAY_RX; j++) {
  ena_stats = &ena_stats_rx_strings[j];

  -ptr = (u64 *((uintptr_t)&ring->rx_stats +
            (uintptr_t)ena_stats->stat_offset);
  +ptr = (u64 *)&ring->rx_stats + ena_stats->stat_offset;

  ena_safe_update_stat(ptr, (*data)++, &ring->syncp);
}

static void ena_dev_admin_queue_stats(struct ena_adapter *adapter, u64 **data)
{
  const struct ena_stats *ena_stats;
  -u32 *ptr;
  +u64 *ptr;
  int i;

  for (i = 0; i < ENA_STATS_ARRAY_ENA_COM; i++) {
    ena_stats = &ena_stats_ena_com_strings[i];

    -ptr = (u32 *((uintptr_t)&adapter->ena_dev->admin_queue.stats +
                 (uintptr_t)ena_stats->stat_offset);
    +ptr = (u64 *)&adapter->ena_dev->admin_queue.stats +
           ena_stats->stat_offset;

    *(data)++ = *ptr;
  }
}

static void ena_get_ethtool_stats(struct net_device *netdev,
  - struct ethtool_stats *stats,
  - u64 *data)
static void ena_get_stats(struct ena_adapter *adapter, u64 *data, bool eni_stats_needed)
{
    struct ena_adapter *adapter = netdev_priv(netdev);
    const struct ena_stats *ena_stats;
    u64 *ptr;
    int i;
    for (i = 0; i < ENA_STATS_ARRAY_GLOBAL; i++) {
        ena_stats = &ena_stats_global_strings[i];
        ptr = (u64 *)((uintptr_t)&adapter->dev_stats + (uintptr_t)ena_stats->stat_offset);
        ena_safe_update_stat(ptr, data++, &adapter->syncp);
    }
    if (eni_stats_needed) {
        ena_update_hw_stats(adapter);
        for (i = 0; i < ENA_STATS_ARRAY_ENI(adapter); i++) {
            ena_stats = &ena_stats_eni_strings[i];
            ptr = (u64 *)&adapter->eni_stats + ena_stats->stat_offset;
            ena_safe_update_stat(ptr, data++, &adapter->syncp);
        }
    }
    ena_queue_stats(adapter, &data);
    ena_dev_admin_queue_stats(adapter, &data);
}

static void ena_get_ethtool_stats(struct net_device *netdev, struct ethtool_stats *stats, u64 *data)
{
    struct ena_adapter *adapter = netdev_priv(netdev);
    ena_get_stats(adapter, data, adapter->eni_stats_supported);
}

static int ena_get_sw_stats_count(struct ena_adapter *adapter)
{
    return adapter->num_io_queues * (ENA_STATS_ARRAY_TX + ENA_STATS_ARRAY_RX) + ENA_STATS_ARRAY_GLOBAL + ENA_STATS_ARRAY_ENA_COM;
}
static int ena_get_hw_stats_count(struct ena_adapter *adapter) {
    return ENA_STATS_ARRAY_ENI(adapter);
}

int ena_get_sset_count(struct net_device *netdev, int sset) {
    struct ena_adapter *adapter = netdev_priv(netdev);
    if (sset != ETH_SS_STATS)
        return -EOPNOTSUPP;
    return adapter->num_queues * (ENA_STATS_ARRAY_TX + ENA_STATS_ARRAY_RX)
        + ENA_STATS_ARRAY_GLOBAL + ENA_STATS_ARRAY_ENA_COM;
    return ena_get_sw_stats_count(adapter) + ena_get_hw_stats_count(adapter);
}

static void ena_queue_strings(struct ena_adapter *adapter, u8 **data) {
    for (i = 0; i < adapter->num_queues; i++) {
        for (j = 0; j < ENA_STATS_ARRAY_TX; j++) {
            ena_stats = &ena_stats_tx_strings[j];
            snprintf(*data, ETH_GSTRING_LEN, "queue_%u_tx_%s", i, ena_stats->name);
            (*data) += ETH_GSTRING_LEN;
        }
    }
    for (j = 0; j < ENA_STATS_ARRAY_RX; j++) {
        ena_stats = &ena_stats_rx_strings[j];
        snprintf(*data, ETH_GSTRING_LEN, "queue_%u_rx_%s", i, ena_stats->name);
        (*data) += ETH_GSTRING_LEN;
    }
}

static void ena_get_strings(struct ena_adapter *adapter, u8 *data) {
    for (i = 0; i < adapter->num_queues; i++) {
        for (j = 0; j < ENA_STATS_ARRAY_TX; j++) {
            ena_stats = &ena_stats_tx_strings[j];
            snprintf(*data, ETH_GSTRING_LEN, "queue_%u_tx_%s", i, ena_stats->name);
            (*data) += ETH_GSTRING_LEN;

        }
    }
    for (j = 0; j < ENA_STATS_ARRAY_RX; j++) {
        ena_stats = &ena_stats_rx_strings[j];
        snprintf(*data, ETH_GSTRING_LEN, "queue_%u_rx_%s", i, ena_stats->name);
        (*data) += ETH_GSTRING_LEN;
    }
}

static void ena_get_strings(struct net_device *netdev, u32 sset, u8 *data) {
    struct ena_adapter *adapter = netdev_priv(netdev);
    for (i = 0; i < adapter->num_queues; i++) {
        for (j = 0; j < ENA_STATS_ARRAY_TX; j++) {
            ena_stats = &ena_stats_tx_strings[j];
            snprintf(*data, ETH_GSTRING_LEN, "queue_%u_tx_%s", i, ena_stats->name);
            (*data) += ETH_GSTRING_LEN;
        }
    }
    for (j = 0; j < ENA_STATS_ARRAY_RX; j++) {
        ena_stats = &ena_stats_rx_strings[j];
        snprintf(*data, ETH_GSTRING_LEN, "queue_%u_rx_%s", i, ena_stats->name);
        (*data) += ETH_GSTRING_LEN;
    }
    return -EOPNOTSUPP;
}

-static void ena_get_strings(struct net_device *netdev, u32 sset, u8 *data) {
-    struct ena_adapter *adapter = netdev_priv(netdev);
-    const struct ena_stats *ena_stats;
-    int i, j;
-
-    for (i = 0; i < adapter->num_queues; i++) {
-        for (j = 0; j < ENA_STATS_ARRAY_TX; j++) {
-            ena_stats = &ena_stats_tx_strings[j];
-            snprintf(*data, ETH_GSTRING_LEN, "queue_%u_tx_%s", i, ena_stats->name);
-            (*data) += ETH_GSTRING_LEN;
-        }
-    }
-    for (j = 0; j < ENA_STATS_ARRAY_RX; j++) {
-        ena_stats = &ena_stats_rx_strings[j];
-        snprintf(*data, ETH_GSTRING_LEN, "queue_%u_rx_%s", i, ena_stats->name);
-        (*data) += ETH_GSTRING_LEN;
-    }
-}

-struct ena_adapter *adapter = netdev_priv(netdev);
-const struct ena_stats *ena_stats;
int i;

-if (sset != ETH_SS_STATS)
-return;

for (i = 0; i < ENA_STATS_ARRAY_GLOBAL; i++) {
    ena_stats = &ena_stats_global_strings[i];
    memcpy(data, ena_stats->name, ETH_GSTRING_LEN);
data += ETH_GSTRING_LEN;
}

+if (eni_stats_needed) {
+for (i = 0; i < ENA_STATS_ARRAY_ENI(adapter); i++) {
+  ena_stats = &ena_stats_eni_strings[i];
+  memcpy(data, ena_stats->name, ETH_GSTRING_LEN);
+  data += ETH_GSTRING_LEN;
+}
+}
+
+ena_queue_strings(adapter, &data);
enacom_dev_strings(&data);
}

+static void ena_get_ethtool_strings(struct net_device *netdev,
  u32 sset,
  u8 *data)
+
+{ /*struct ena_adapter *adapter = netdev_priv(netdev);*/
+  +if (sset != ETH_SS_STATS)
+  +return;
+  +ena_get_strings(adapter, data, adapter->eni_stats_supported);
+  +}
+
static int ena_get_link_ksettings(struct net_device *netdev,
  struct ethtool_link_ksettings *link_ksettings)
{
    struct ena_adapter *adapter = netdev_priv(net_dev);
    struct ena_com_dev *ena_dev = adapter->ena_dev;
    if (!ena_com_interrupt_moderation_supported(ena_dev)) {
        /* the devie doesn't support interrupt moderation */
        +if (!ena_com_interrupt_moderation_supported(ena_dev))
        +}
return -EOPNOTSUPP;
-
+
coalesce->tx_coalesce_usecs =
-ena_com_get_nonadaptive_moderation_interval_tx(ena_dev) /
+ena_com_get_nonadaptive_moderation_interval_tx(ena_dev) *
  ena_dev->intr_delay_resolution;
-if (!ena_com_get_adaptive_moderation_enabled(ena_dev)) {
  coalesce->rx_coalesce_usecs =
  -ena_com_get_nonadaptive_moderation_interval_rx(ena_dev)
-/ ena_dev->intr_delay_resolution;
  -} else {
  -ena_com_get_intr_moderation_entry(adapter->ena_dev, ENA_INTR_MODER_LOWEST, &intr_moder_entry);
  -coalesce->rx_coalesce_usecs_low = intr_moder_entry.intr_moder_interval;
  -coalesce->rx_max_coalesced_frames_low = intr_moder_entry.pkts_per_interval;
  -
  -ena_com_get_intr_moderation_entry(adapter->ena_dev, ENA_INTR_MODER_MID, &intr_moder_entry);
  -coalesce->rx_coalesce_usecs = intr_moder_entry.intr_moder_interval;
  -coalesce->rx_max_coalesced_frames = intr_moder_entry.pkts_per_interval;
  -
  -ena_com_get_intr_moderation_entry(adapter->ena_dev, ENA_INTR_MODER_HIGHEST, &intr_moder_entry);
  -coalesce->rx_coalesce_usecs_high = intr_moder_entry.intr_moder_interval;
  -coalesce->rx_max_coalesced_frames_high = intr_moder_entry.pkts_per_interval;
  -}
+
+coalesce->rx_coalesce_usecs =
+ena_com_get_nonadaptive_moderation_interval_rx(ena_dev)
+* ena_dev->intr_delay_resolution;
+
coalesce->use_adaptive_rx_coalesce =
ena_com_get_adaptive_moderation_enabled(ena_dev);

return 0;
}

-static void ena_update_tx_rings_intr_moderation(struct ena_adapter *adapter)
+static void ena_update_tx_rings_nonadaptive_intr_moderation(struct ena_adapter *adapter)
{
  unsigned int val;
  int i;

  val = ena_com_get_nonadaptive_moderation_interval_tx(adapter->ena_dev);

  -for (i = 0; i < adapter->num_queues; i++)
  +for (i = 0; i < adapter->num_io_queues; i++)
    adapter->tx_ring[i].smoothed_interval = val;
  }
static void ena_update_rx_rings_nonadaptive_intr_moderation(struct ena_adapter *adapter)
{
    unsigned int val;
    int i;
    
    val = ena_com_get_nonadaptive_moderation_interval_rx(adapter->ena_dev);
    
    for (i = 0; i < adapter->num_io_queues; i++)
        adapter->rx_ring[i].smoothed_interval = val;
}

static int ena_set_coalesce(struct net_device *net_dev,
    struct ethtool_coalesce *coalesce)
{
    struct ena_adapter *adapter = netdev_priv(net_dev);
    struct ena_com_dev *ena_dev = adapter->ena_dev;

    if (!ena_com_interrupt_moderation_supported(ena_dev))
        return -EOPNOTSUPP;

    if (!ena_com_interrupt_moderation_supported(ena_dev))
        return -EINVAL;

    rc = ena_com_update_nonadaptive_moderation_interval_tx(ena_dev,
        coalesce->tx_coalesce_usecs);
    if (rc)
        return rc;

    ena_update_tx_rings_nonadaptive_intr_moderation(adapter);
-if (ena_com_get_adaptive_moderation_enabled(ena_dev)) {
    -if (!coalesce->use_adaptive_rx_coalesce) {
        -rc = ena_com_update_nonadaptive_moderation_interval_rx(ena_dev,
            - coalesce->rx_coalesce_usecs);
        -return rc;
    }
    -} else { /* was in non-adaptive mode */
        -if (coalesce->use_adaptive_rx_coalesce) {
            -ena_com_enable_adaptive_moderation(ena_dev);
        }
        -else {
            -rc = ena_com_update_nonadaptive_moderation_interval_rx(ena_dev,
                - coalesce->rx_coalesce_usecs);
            -return rc;
        }
    }
    +if (rc)
    +return rc;
}

-intr_moder_entry.intr_moder_interval = coalesce->rx_coalesce_usecs_low;
-intr_moder_entry.pkts_per_interval = coalesce->rx_max_coalesced_frames_low;
-intr_moder_entry.bytes_per_interval = ENA_INTR_BYTE_COUNT_NOT_SUPPORTED;
-ena_com_init_intr_moderation_entry(adapter->ena_dev, ENA_INTR_MODER_LOWEST, &intr_moder_entry);
-
-intr_moder_entry.intr_moder_interval = coalesce->rx_coalesce_usecs;
-intr_moder_entry.pkts_per_interval = coalesce->rx_max_coalesced_frames;
-intr_moder_entry.bytes_per_interval = ENA_INTR_BYTE_COUNT_NOT_SUPPORTED;
-ena_com_init_intr_moderation_entry(adapter->ena_dev, ENA_INTR_MODER_MID, &intr_moder_entry);
-
-intr_moder_entry.intr_moder_interval = coalesce->rx_coalesce_usecs_high;
-intr_moder_entry.pkts_per_interval = coalesce->rx_max_coalesced_frames_high;
-intr_moder_entry.bytes_per_interval = ENA_INTR_BYTE_COUNT_NOT_SUPPORTED;
-ena_com_init_intr_moderation_entry(adapter->ena_dev, ENA_INTR_MODER_HIGHEST, &intr_moder_entry);
+ena_update_rx_rings_nonadaptive_intr_moderation(adapter);
+
+if ((coalesce->use_adaptive_rx_coalesce) &&
+    (!ena_com_get_adaptive_moderation_enabled(ena_dev)))
+ena_com_enable_adaptive_moderation(ena_dev);
+
+if ((!coalesce->use_adaptive_rx_coalesce) &&
+    (ena_com_get_adaptive_moderation_enabled(ena_dev)))
+ena_com_disable_adaptive_moderation(ena_dev);

return 0;
}
struct ena_adapter *adapter = netdev_priv(dev);

strlcpy(info->driver, DRV_MODULE_NAME, sizeof(info->driver));
strlcpy(info->version, DRV_MODULE_VERSION, sizeof(info->version));
strlcpy(info->bus_info, pci_name(adapter->pdev), sizeof(info->bus_info));
}

struct ena_adapter *adapter = netdev_priv(netdev);
-struct ena_ring *tx_ring = &adapter->tx_ring[0];
-struct ena_ring *rx_ring = &adapter->rx_ring[0];

-ring->rx_max_pending = rx_ring->ring_size;
-ring->tx_max_pending = tx_ring->ring_size;
-ring->rx_pending = rx_ring->ring_size;
-ring->tx_pending = tx_ring->ring_size;
+ring->tx_max_pending = adapter->max_tx_ring_size;
+ring->rx_max_pending = adapter->max_rx_ring_size;
+ring->tx_pending = adapter->tx_ring[0].ring_size;
+ring->rx_pending = adapter->rx_ring[0].ring_size;
+
+static int ena_set_ringparam(struct net_device *netdev, 
    struct ethtool_ringparam *ring)
+
+{ 
+    struct ena_adapter *adapter = netdev_priv(netdev);
+    u32 new_tx_size, new_rx_size;
+    +new_tx_size = ring->tx_pending < ENA_MIN_RING_SIZE ? 
+    +ENA_MIN_RING_SIZE : ring->tx_pending;
+    +new_tx_size = rounddown_pow_of_two(new_tx_size);
+    +
+    +new_rx_size = ring->rx_pending < ENA_MIN_RING_SIZE ? 
+    +ENA_MIN_RING_SIZE : ring->rx_pending;
+    +new_rx_size = rounddown_pow_of_two(new_rx_size);
+    +
+    +if (new_tx_size == adapter->requested_tx_ring_size &&
+        new_rx_size == adapter->requested_rx_ring_size)
+    +return 0;
+    +
+    +return ena_update_queue_sizes(adapter, new_tx_size, new_rx_size);
+
static u32 ena_flow_hash_to_flow_type(u16 hash_fields)
switch (info->cmd) {
    case ETHTOOL_GRXRINGS:
        /* info->data = adapter->num_queues; */
        info->data = adapter->num_io_queues;
        rc = 0;
        break;
    case ETHTOOL_GRXFH:
        return ENA_HASH_KEY_SIZE;
    }

+static int ena_indirection_table_get(struct ena_adapter *adapter, u32 *indir) {
+    struct ena_com_dev *ena_dev = adapter->ena_dev;
+    int i, rc;
+    
+    if (!indir)
+        return 0;
+    
+    rc = ena_com_indirect_table_get(ena_dev, indir);
+    if (rc)
+        return rc;
+    /* Our internal representation of the indices is: even indices
+    * for Tx and uneven indices for Rx. We need to convert the Rx
+    * indices to be consecutive
+    */
+    for (i = 0; i < ENA_RX_RSS_TABLE_SIZE; i++)
+        indir[i] = ENA_IO_RXQ_IDX_TO_COMBINED_IDX(indir[i]);
+    
+    return rc;
+}

static int ena_get_rxfh(struct net_device *netdev, u32 *indir, u8 *key, u8 *hfunc) {
    
    rc = ena_com_indirect_table_get(adapter->ena_dev, indir);
    +rc = ena_indirection_table_get(adapter, indir);
    if (rc)
        return rc;

    /* We call this function in order to check if the device
    * supports getting/setting the hash function. */
rc = ena_com_get_hash_function(adapter->ena_dev, &ena_func, key);
-if (rc)
+if (rc) {
+if (rc == -EOPNOTSUPP)
+rc = 0;
+
+return rc;
+}

switch (ena_func) {
 case ENA_ADMIN_TOEPLITZ:
 func = ETH_RSS_HASH_TOP;
 break;
 case ENA_ADMIN_CRC32:
  	-func = ETH_RSS_HASH_CRC32;
+  func = ETH_RSS_HASH_CRC32;
 break;
 default:
 netif_err(adapter, drv, netdev,
 @@ -695,8 +743,8 @@
 if (indir) {
 for (i = 0; i < ENA_RX_RSS_TABLE_SIZE; i++) {
 rc = ena_com_indirect_table_fill_entry(ena_dev,
-    ENA_IO_RXQ_IDX(indir[i]),
-    i);
+    i,
+    ENA_IO_RXQ_IDX(indir[i]));
 if (unlikely(rc)) {
 netif_err(adapter, drv, netdev,
 "Cannot fill indirect table (index is too large)\n");
@@ -713,10 +761,13 @@
 }

 switch (hfunc) {
+case ETH_RSS_HASH_NO_CHANGE:
+  func = ena_com_get_current_hash_function(ena_dev);
+  break;
 case ETH_RSS_HASH_TOP:
 func = ENA_ADMIN_TOEPLITZ;
 break;
- case ETH_RSS_HASH_XOR:
+ case ETH_RSS_HASH_CRC32:
  func = ENA_ADMIN_CRC32;
 break;
 default:
@@ -743,14 +794,20 @@
}
struct ena_adapter *adapter = netdev_priv(netdev);

-channels->max_rx = adapter->num_queues;
-channels->max_tx = adapter->num_queues;
-channels->max_other = 0;
-channels->max_combined = 0;
-channels->rx_count = adapter->num_queues;
-channels->tx_count = adapter->num_queues;
-channels->other_count = 0;
-channels->combined_count = 0;
+channels->max_combined = adapter->num_io_queues;
+channels->combined_count = adapter->num_io_queues;
+}
+
+static int ena_set_channels(struct net_device *netdev,
+    struct ethtool_channels *channels)
+{
+    struct ena_adapter *adapter = netdev_priv(netdev);
+    u32 count = channels->combined_count;
+    /* The check for max value is already done in ethtool */
+    if (count < ENA_MIN_NUM_IO_QUEUES)
+        return -EINVAL;
+    return ena_update_queue_count(adapter, count);
+}

static int ena_get_tunable(struct net_device *netdev,
    .get_coalesce = ena_get_coalesce,
    .set_coalesce = ena_set_coalesce,
    .get_ringparam = ena_get_ringparam,
    .set_ringparam = ena_set_ringparam,
    .get_sset_count = ena_get_sset_count,
    .get_strings = ena_get_strings,
    .get_ethtool_stats = ena_get_ethtool_stats,
    .get_rxnfc = ena_get_rxnfc,
    .set_rxnfc = ena_set_rxnfc,
    .get_rxfh = ena_get_rxfh,
    .set_rxfh = ena_set_rxfh,
    .get_channels = ena_get_channels,
    .set_channels = ena_set_channels,
    .get_tunable = ena_get_tunable,
    .set_tunable = ena_set_tunable,
    .get_ts_info = ethtool_op_get_ts_info,
};
void ena_set_ethtool_ops(struct net_device *netdev)
@@ -832,14 +892,14 @@
   int strings_num;
   int i, rc;

-strings_num = ena_get_sset_count(netdev, ETH_SS_STATS);
+strings_num = ena_get_sw_stats_count(adapter);
   if (strings_num <= 0) {
      netif_err(adapter, drv, netdev, "Can't get stats num\n");
      return;
   }

-strings_buf = devm_kzalloc(&adapter->pdev->dev, 
-   strings_num * ETH_GSTRING_LEN, 
+strings_buf = devm_kcalloc(&adapter->pdev->dev, 
  gregation_LEN, strings_num, 
   GFP_ATOMIC);
   if (!strings_buf) {
      netif_err(adapter, drv, netdev, 
@@ -847,18 +907,18 @@
      return;
   }

-data_buf = devm_kzalloc(&adapter->pdev->dev, 
-   data_buf = devm_kalloc(&adapter->pdev->dev, 
   strings_num * sizeof(u64), 
   GFP_ATOMIC);
   if (!data_buf) {
      netif_err(adapter, drv, netdev, 
-"failed to allocate data buf\n");
+"Failed to allocate data buf\n");
   devm_kfree(&adapter->pdev->dev, strings_buf);
   return;
   }

-ena_get_strings(netdev, ETH_SS_STATS, strings_buf);
-ena_get_ethtool_stats(netdev, NULL, data_buf);
+ena_get_strings(adapter, strings_buf, false);
+ena_get_stats(adapter, data_buf, false);

/* If there is a buffer, dump stats, otherwise print them to dmesg */
if (buf)
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_netdev.c
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_netdev.c
@@ -1,33 +1,6 @@
+// SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB
/*
* Copyright 2015-2020 Amazon.com, Inc. or its affiliates. All rights reserved.

*/

#define pr_fmt(fmt) KBUILD_MODNAME " : " fmt
@@ -50,12 +23,9 @@
#include "ena_netdev.h"
#include "ena_pci_id_tbl.h"
- static char version[] = DEVICE_NAME " v" DRV_MODULE_VERSION "\n";
- MODULE_AUTHOR("Amazon.com, Inc. or its affiliates");
- MODULE_DESCRIPTION(DEVICE_NAME);
- MODULE_LICENSE("GPL");
- MODULE_VERSION(DRV_MODULE_VERSION);

/* Time in jiffies before concluding the transmitter is hung. */
#define TX_TIMEOUT (5 * HZ)
static int ena_rss_init_default(struct ena_adapter *adapter);
static void check_for_admin_com_state(struct ena_adapter *adapter);
static void ena_destroy_device(struct ena_adapter *adapter);
static void ena_destroy_device(struct ena_adapter *adapter, bool graceful);
static int ena_restore_device(struct ena_adapter *adapter);

static void ena_tx_timeout(struct net_device *dev)
@@ -102,7 +72,7 @@
    }
    int i;

    -for (i = 0; i < adapter->num_queues; i++)
    +for (i = 0; i < adapter->num_io_queues; i++)
        adapter->rx_ring[i].mtu = mtu;
    }
@@ -130,10 +100,10 @@
    u32 i;
    int rc;

    -adapter->netdev->rx_cpu_rmap = alloc_irq_cpu_rmap(adapter->num_queues);
    +adapter->netdev->rx_cpu_rmap = alloc_irq_cpu_rmap(adapter->num_io_queues);
    if (!adapter->netdev->rx_cpu_rmap)
        return -ENOMEM;
    -for (i = 0; i < adapter->num_queues; i++) {
    +for (i = 0; i < adapter->num_io_queues; i++) {
        int irq_idx = ENA_IO_IRQ_IDX(i);

        rc = irq_cpu_rmap_add(adapter->netdev->rx_cpu_rmap,
@@ -159,8 +129,9 @@
            ring->ena_dev = adapter->ena_dev;
            ring->per_napi_packets = 0;
            -ring->per_napi_bytes = 0;
            +ring->first_interrupt = false;
            +ring->no_interrupt_event_cnt = 0;
            u64_stats_init(&ring->syncp);
    }
@@ -172,7 +143,7 @@
    ena_dev = adapter->ena_dev;

    -for (i = 0; i < adapter->num_queues; i++) {
    +for (i = 0; i < adapter->num_io_queues; i++) {
        txr = &adapter->tx_ring[i];
        rxr = &adapter->rx_ring[i];
ena_init_io_rings_common(adapter, rrx, i);

/* TX specific ring state */
-txr->ring_size = adapter->tx_ring_size;
+txr->ring_size = adapter->requested_tx_ring_size;
   txr->tx_max_header_size = ena_dev->tx_max_header_size;
   txr->tx_mem_queue_type = ena_dev->tx_mem_queue_type;
   txr->sgl_size = adapter->max_tx_sgl_size;
@ @ -181,7 +152,7 @@
   ena_com_get_nonadaptive_moderation_interval_tx(ena_dev);

/* RX specific ring state */
-rxr->ring_size = adapter->rx_ring_size;
+rxr->ring_size = adapter->requested_rx_ring_size;
   rxr->rx_copybreak = adapter->rx_copybreak;
   rxr->sgl_size = adapter->max_rx_sgl_size;
   rxr->smoothed_interval =
   ena_com_get_nonadaptive_moderation_interval_rx(ena_dev);
   rxr->empty_rx_queue = 0;
   +adapter->ena_napi[i].dim.mode = DIM_CQ_PERIOD_MODE_START_FROM_EQE;
   }
   }

@ @ -223,22 +195,28 @@
   if (!tx_ring->tx_buffer_info) {
      tx_ring->tx_buffer_info = vzalloc(size);
   if (!tx_ring->tx_buffer_info)
      -return -ENOMEM;
      +goto err_tx_buffer_info;
   }

size = sizeof(u16) * tx_ring->ring_size;
-tx_ring->free_tx_ids = vzalloc_node(size, node);
-if (!tx_ring->free_tx_ids) {
   -tx_ring->free_tx_ids = vzalloc(size);
   -if (!tx_ring->free_tx_ids) {
      -vfree(tx_ring->tx_buffer_info);
      -return -ENOMEM;
      -}
      +tx_ring->free_ids = vzalloc_node(size, node);
      +if (!tx_ring->free_ids) {
      +tx_ring->free_ids = vzalloc(size);
      +if (!tx_ring->free_ids)
      +goto err_tx_free_ids;
      +}
      +}
size = tx_ring->tx_max_header_size;
+tx_ring->push_buf_intermediate_buf = vzalloc_node(size, node);
+if (!tx_ring->push_buf_intermediate_buf) {
+tx_ring->push_buf_intermediate_buf = vzalloc(size);
+if (!tx_ring->push_buf_intermediate_buf)
+goto err_push_buf_intermediate_buf;
+
/* Req id ring for TX out of order completions */
for (i = 0; i < tx_ring->ring_size; i++)
+tx_ring->free_tx_ids[i] = i;
+tx_ring->free_ids[i] = i;
+
/*@ -247,6 +225,15 @@*/
/* Reset tx statistics */
memset(&tx_ring->tx_stats, 0x0, sizeof(tx_ring->tx_stats));
tx_ring->next_to_clean = 0;
tx_ring->cpu = ena_irq->cpu;
return 0;
+
+err_push_buf_intermediate_buf:
+vfree(tx_ring->free_ids);
+tx_ring->free_ids = NULL;
+err_tx_free_ids:
+vfree(tx_ring->tx_buffer_info);
+tx_ring->tx_buffer_info = NULL;
+err_tx_buffer_info:
+return -ENOMEM;
+
/*@ -262,8 +249,11 @@*/
vfree(tx_ring->tx_buffer_info);
tx_ring->tx_buffer_info = NULL;
-
vfree(tx_ring->free_tx_ids);
-tx_ring->free_tx_ids = NULL;
+err_free_ids:
+vfree(tx_ring->push_buf_intermediate_buf);
+tx_ring->push_buf_intermediate_buf = NULL;
+
/*@ -275,7 +265,7 @@*/

/* ena_free_tx_resources - Free I/O Tx Resources per Queue */

/*@ -254,7 +236,7 @@*/
int i, rc = 0;
for (i = 0; i < adapter->num_queues; i++) {
  for (i = 0; i < adapter->num_io_queues; i++) {
    rc = ena_setup_tx_resources(adapter, i);
    if (rc)
      goto err_setup_tx;
  }
}

int i;

for (i = 0; i < adapter->num_queues; i++)
  ena_free_tx_resources(adapter, i);

static inline int validate_rx_req_id(struct ena_ring *rx_ring, u16 req_id)
{
  if (likely(req_id < rx_ring->ring_size))
    return 0;
}

size = sizeof(u16) * rx_ring->ring_size;
rx_ring->free_rx_ids = vzalloc_node(size, node);
if (!rx_ring->free_rx_ids) {
  rx_ring->free_rx_ids = vzalloc(size);
  if (!rx_ring->free_rx_ids) {
    rx_ring->free_ids = vzalloc_node(size, node);
    if (!rx_ring->free_ids) {
      rx_ring->free_ids = vzalloc(size);
      if (!rx_ring->free_ids) {
        vfree(rx_ring->rx_buffer_info);
        rx_ring->rx_buffer_info = NULL;
        return -ENOMEM;
      }
    }
  }
}

/* Req id ring for receiving RX pkts out of order */
for (i = 0; i < rx_ring->ring_size; i++)
  rx_ring->free_rx_ids[i] = i;
rx_ring->free_ids[i] = i;

/* Reset rx statistics */
memset(&rx_ring->rx_stats, 0x0, sizeof(rx_ring->rx_stats));
vfree(rx_ring->rx_buffer_info);
rx_ring->rx_buffer_info = NULL;
- vfree(rx_ring->free_rx_ids);
- rx_ring->free_rx_ids = NULL;
+ vfree(rx_ring->free_ids);
+ rx_ring->free_ids = NULL;
}

/* ena_setup_all_rx_resources - allocate I/O Rx queues resources for all queues
@@ -408,7 +399,7 @@
{
    int i, rc = 0;

    for (i = 0; i < adapter->num_queues; i++) {
+for (i = 0; i < adapter->num_io_queues; i++) {
    rc = ena_setup_rx_resources(adapter, i);
    if (rc)
        goto err_setup_rx;
@@ -436,11 +427,11 @@
    }
    int i;

    for (i = 0; i < adapter->num_queues; i++)
+for (i = 0; i < adapter->num_io_queues; i++)
    ena_free_rx_resources(adapter, i);
}

- static inline int ena_alloc_rx_page(struct ena_ring *rx_ring,
+ static int ena_alloc_rx_page(struct ena_ring *rx_ring,
    struct ena_rx_buffer *rx_info, gfp_t gfp)
{
    struct ena_com_buf *ena_buf;
@@ -459,7 +450,7 @@
    return -ENOMEM;
}

- dma = dma_map_page(rx_ring->dev, page, 0, PAGE_SIZE,
+ dma = dma_map_page(rx_ring->dev, page, 0, ENA_PAGE_SIZE,
    DMA_FROM_DEVICE);
if (unlikely(dma_mapping_error(rx_ring->dev, dma))) {
    u64_stats_update_begin(&rx_ring->syncp);
@@ -476,7 +467,7 @@
    rx_info->page_offset = 0;
    ena_buf = &rx_info->ena_buf;
    ena_buf->paddr = dma;
- ena_buf->len = PAGE_SIZE;
+ ena_buf->len = ENA_PAGE_SIZE;

    return 0;
@@ -493,7 +484,7 @@
    return;
}

dma_unmap_page(rx_ring->dev, ena_buf->paddr, PAGE_SIZE,
+ dma_unmap_page(rx_ring->dev, ena_buf->paddr, ENA_PAGE_SIZE,
   DMA_FROM_DEVICE);

__free_page(page);
@@ -511,7 +502,7 @@
 for (i = 0; i < num; i++) {
    struct ena_rx_buffer *rx_info;

    req_id = rx_ring->free_rx_ids[next_to_use];
+    req_id = rx_ring->free_ids[next_to_use];
    rc = validate_rx_req_id(rx_ring, req_id);
    if (unlikely(rc < 0))
        break;
@@ -549,13 +540,9 @@
    ena_com_write_sq_doorbell(rx_ring->ena_com_io_sq);

    rx_ring->next_to_use = next_to_use;

@@ -578,14 +565,13 @@

    /* ena_com_write_sq_doorbell issues a wmb() */
+    if (likely(i))
    ena_com_write_sq_doorbell(rx_ring->ena_com_io_sq);
    }

    rx_ring->next_to_use = next_to_use;

@@ -581,14 +568,13 @@

    /* ena_refill_all_rx_bufs - allocate all queues Rx buffers
    * @adapter: board private structure
    * *
    * /
+    static void ena_refill_all_rx_bufs(struct ena_adapter *adapter)
    {
    struct ena_ring *rx_ring;
    int i, rc, bufs_num;

    -for (i = 0; i < adapter->num_queues; i++) {
    +for (i = 0; i < adapter->num_io_queues; i++) {

rx_ring = &adapter->rx_ring[i];
bufs_num = rx_ring->ring_size - 1;
rc = ena_refill_rx_bufs(rx_ring, bufs_num);
@@ -601,10 +587,40 @@
{
    int i;

    -for (i = 0; i < adapter->num_queues; i++)
    +for (i = 0; i < adapter->num_io_queues; i++)
en_meta_rx_bufs(adapter, i);
}

+static void ena_unmap_tx_skb(struct ena_ring *tx_ring,
+  struct ena_tx_buffer *tx_info)
+{
+    struct ena_com_buf *ena_buf;
+    u32 cnt;
+    int i;
+    +ena_buf = tx_info->bufs;
+    +cnt = tx_info->num_of_bufs;
+    +if (unlikely(!cnt))
+        +return;
+    +
+    +if (tx_info->map_linear_data) {
+        +dma_unmap_single(tx_ring->dev,
+            +dma_unmap_addr(ena_buf, paddr),
+            +dma_unmap_len(ena_buf, len),
+            +DMA_TO_DEVICE);
+        +ena_buf++;
+        +cnt--;
+    }
+    +
+    +/* unmap remaining mapped pages */
+    +for (i = 0; i < cnt; i++) {
+        +dma_unmap_page(tx_ring->dev, dma_unmap_addr(ena_buf, paddr),
+            +dma_unmap_len(ena_buf, len), DMA_TO_DEVICE);
+        +ena_buf++;
+    }
+    +}
+    +}
+    +
+    /* ena_free_tx_bufs - Free Tx Buffers per Queue
+ * @tx_ring: TX ring for which buffers be freed
+ */
+    @@ -615,9 +631,6 @@

    for (i = 0; i < tx_ring->ring_size; i++) {

struct ena_tx_buffer *tx_info = &tx_ring->tx_buffer_info[i];
-struct ena_com_buf *ena_buf;
-int nr_frags;
-int j;

if (!tx_info->skb)
  continue;
@@ -633,21 +646,7 @@
    tx_ring->qid, i);
}
-ena_buf = tx_info->bufs;
-dma_unmap_single(tx_ring->dev,
-    ena_buf->paddr,
-    ena_buf->len,
-    DMA_TO_DEVICE);
-
-/* unmap remaining mapped pages */
-nr_frags = tx_info->num_of_bufs - 1;
-for (j = 0; j < nr_frags; j++) {
-  ena_buf++;
-  dma_unmap_page(tx_ring->dev,
-    ena_buf->paddr,
-    ena_buf->len,
-    DMA_TO_DEVICE);
-}
+ena_unmap_tx_skb(tx_ring, tx_info);
-dev_kfree_skb_any(tx_info->skb);
}
@@ -660,7 +659,7 @@
 struct ena_ring *tx_ring;
 int i;

-for (i = 0; i < adapter->num_queues; i++) {
+for (i = 0; i < adapter->num_io_queues; i++) {
  tx_ring = &adapter->tx_ring[i];
  ena_free_tx_bufs(tx_ring);
}
@@ -671,7 +670,7 @@
 u16 ena_qid;
 int i;

-for (i = 0; i < adapter->num_queues; i++) {
+for (i = 0; i < adapter->num_io_queues; i++) {
  ena_qid = ENA_IO_TXQ_IDX(i); 
  ena_com_destroy_io_queue(adapter->ena_dev, ena_qid);
}
@@ -682,8 +681,9 @@
    u16 ena_qid;
    int i;

    -for (i = 0; i < adapter->num_queues; i++) {
    +for (i = 0; i < adapter->num_io_queues; i++) {
        ena_qid = ENA_IO_RXQ_IDX(i);
        +cancel_work_sync(&adapter->ena_napi[i].dim.work);
        ena_com_destroy_io_queue(adapter->ena_dev, ena_qid);
    }
    }
@@ -738,8 +738,6 @@
    while (tx_pkts < budget) {
        struct ena_tx_buffer *tx_info;
        struct sk_buff *skb;
        -struct ena_com_buf *ena_buf;
        -int i, nr_frags;

        rc = ena_com_tx_comp_req_id_get(tx_ring->ena_com_io_cq, &req_id);
@@ -759,24 +757,7 @@
    tx_info->skb = NULL;
    tx_info->last_jiffies = 0;

    -if (likely(tx_info->num_of_bufs != 0)) {
    -ena_buf = tx_info->bufs;
    -
    -dma_unmap_single(tx_ring->dev, -
    - dma_unmap_addr(ena_buf, paddr), -
    - dma_unmap_len(ena_buf, len), -
    - DMA_TO_DEVICE);
    -
    -/* unmap remaining mapped pages */
    -nr_frags = tx_info->num_of_bufs - 1;
    -for (i = 0; i < nr_frags; i++) {
    -ena_buf++;
    -dma_unmap_page(tx_ring->dev, -
    - dma_unmap_addr(ena_buf, paddr), -
    - dma_unmap_len(ena_buf, len), -
    - DMA_TO_DEVICE);
    -}
    -}
    +ena_unmap_tx_skb(tx_ring, tx_info);

    netif_dbg(tx_ring->adapter, tx_done, tx_ring->netdev, 
        "tx_poll: q %d skb %p completed\n", tx_ring->qid, 
@@ -787,7 +768,7 @@
        tx_pkts++;
total_done += tx_info->tx_descs;

- tx_ring->free_tx_ids[next_to_clean] = req_id;
+ tx_ring->free_ids[next_to_clean] = req_id;
next_to_clean = ENA_TX_RING_IDX_NEXT(next_to_clean,
    tx_ring->ring_size);
}
@@ -807,13 +788,15 @@
*/

smp_mb();

-above_thresh = ena_com_sq_empty_space(tx_ring->ena_com_io_sq) >
-ENA_TX_WAKEUP_THRESH;
+above_thresh = ena_com_sq_have_enough_space(tx_ring->ena_com_io_sq,
 + ENA_TX_WAKEUP_THRESH);
if (unlikely(netif_tx_queue_stopped(txq) &&& above_thresh)) {
    __netif_tx_lock(txq, smp_processor_id());
-above_thresh = ena_com_sq_empty_space(tx_ring->ena_com_io_sq) >
-ENA_TX_WAKEUP_THRESH;
-if (netif_tx_queue_stopped(txq) &&& above_thresh) {
+above_thresh =
+ena_com_sq_have_enough_space(tx_ring->ena_com_io_sq,
 + ENA_TX_WAKEUP_THRESH);
+if (netif_tx_queue_stopped(txq) &&& above_thresh &&
 + test_bit(ENA_FLAG_DEV_UP, &tx_ring->adapter->flags)) {
 netif_tx_wake_queue(txq);
 u64_stats_update_begin(&tx_ring->syncp);
 tx_ring->tx_stats.queue_wakeup++;
@@ -822,9 +805,6 @@
 __netif_tx_unlock(txq);
 }

-tx_ring->per_napi_bytes += tx_bytes;
-tx_ring->per_napi_packets += tx_pkts;
-
return tx_pkts;
}
@@ -900,7 +880,7 @@

skb_put(skb, len);
 skb->protocol = eth_type_trans(skb, rx_ring->netdev);
-rx_ring->free_rx_ids[*next_to_clean] = req_id;
+rx_ring->free_ids[*next_to_clean] = req_id;
*next_to_clean = ENA_RX_RING_IDX_ADD(*next_to_clean, desc,
    rx_ring->ring_size);
return skb;
@@ -913,10 +893,10 @@
do {
    dma_unmap_page(rx_ring->dev, 
        dma_unmap_addr(&rx_info->ena_buf, paddr), 
        - PAGE_SIZE, DMA_FROM_DEVICE); 
+ ENA_PAGE_SIZE, DMA_FROM_DEVICE); 
    skb_add_rx_frag(skb, skb_shinfo(skb)->nr_frags, rx_info->page, 
        -rx_info->page_offset, len, PAGE_SIZE); 
+rx_info->page_offset, len, ENA_PAGE_SIZE); 
    netif_dbg(rx_ring->adapter, rx_status, rx_ring->netdev, 
        "rx skb updated. len %d. data_len %d\n", 
@@ -924,7 +904,7 @@
        rx_info->page = NULL; 
    -rx_ring->free_rx_ids[*next_to_clean] = req_id; 
+rx_ring->free_ids[*next_to_clean] = req_id; 
*next_to_clean = 
    ENA_RX_RING_IDX_NEXT(*next_to_clean, 
        rx_ring->ring_size); 
@@ -945,7 +925,7 @@
    * @ena_rx_ctx: received packet context/metadata 
    * @skb: skb currently being received and modified 
*/ 
-static inline void ena_rx_checksum(struct ena_ring *rx_ring, 
+static void ena_rx_checksum(struct ena_ring *rx_ring, 
    struct ena_com_rx_ctx *ena_rx_ctx, 
    struct sk_buff *skb) 
{ 
@@ -988,8 +968,22 @@
    return; 
} 
-skb->ip_summed = CHECKSUM_UNNECESSARY; 
+if (likely(ena_rx_ctx->l4_csum_checked)) { 
+skb->ip_summed = CHECKSUM_UNNECESSARY; 
+u64_stats_update_begin(&rx_ring->syncp); 
+rx_ring->rx_stats.csum_good++; 
+u64_stats_update_end(&rx_ring->syncp); 
+} else { 
+u64_stats_update_begin(&rx_ring->syncp); 
+rx_ring->rx_stats.csumUnchecked++; 
+u64_stats_update_end(&rx_ring->syncp); 
+skb->ip_summed = CHECKSUM_NONE; 
+} 
+} else { 
+skb->ip_summed = CHECKSUM_NONE; 
}
static void ena_set_rx_hash(struct ena_ring *rx_ring, 
@@ -1066,7 +1060,7 @@
  /* exit if we failed to retrieve a buffer */
  if (unlikely(!skb)) {
    for (i = 0; i < ena_rx_ctx.descs; i++) {
-     trx_ring->free_tx_ids[next_to_clean] =
+     trx_ring->free_ids[next_to_clean] =
        rx_ring->ena_bufs[i].req_id;
      next_to_clean =
        ENA_RX_RING_IDX_NEXT(next_to_clean,
@@ -1094,7 +1088,6 @@
             while (likely(res_budget));

     work_done = budget - res_budget;
-    trx_ring->per_napi_bytes += total_len;
+    refill_required = ena_com_free_desc(rx_ring->ena_com_io_sq);
+    refill_threshold =
+      min_t(int, rx_ring->ring_size / ENA_RX_REFILL_THRESH_DIVIDER,
+            ENA_RX_REFILL_THRESH_PACKET);
    rx_ring->per_napi_packets += work_done;
    u64_stats_update_begin(&rx_ring->syncp);
    rx_ring->rx_stats.bytes += total_len;
@@ -1104,8 +1124,56 @@
    rx_ring->next_to_clean = next_to_clean;

    refill_required = ena_com_sq_empty_space(rx_ring->ena_com_io_sq);
-    refill_threshold = rx_ring->ring_size / ENA_RX_REFILL_THRESH_DIVIDER;
+    refill_required = ena_com_free_desc(rx_ring->ena_com_io_sq);
+    refill_threshold =
+      min_t(int, rx_ring->ring_size / ENA_RX_REFILL_THRESH_DIVIDER,
+            ENA_RX_REFILL_THRESH_PACKET);

  /* Optimization, try to batch new rx buffers */
  if (refill_required > refill_threshold) {
@@ -1229,38 +1124,56 @@
    return 0;
  }

-  inline void ena_adjust_intr_moderation(struct ena_ring *rx_ring,
-    struct ena_ring *tx_ring)
+  static void ena_dim_work(struct work_struct *w)
{
  /* We apply adaptive moderation on Rx path only.
    * Tx uses static interrupt moderation.
    */
-  ena_com_calculate_interrupt_delay(rx_ring->ena_dev,
+  ena_com_calculate_interrupt_delay(rx_ring->ena_dev,
- tx_ring->per_napi_packets = 0;
- tx_ring->per_napi_bytes = 0;
  /* Reset per napi packets/bytes */
  tx_ring->per_napi_packets = 0;
  tx_ring->per_napi_bytes = 0;
+ struct dim *dim = container_of(w, struct dim, work);
+ struct dim_cq_moder cur_moder =
  net_dim_get_rx_moderation(dim->mode, dim->profile_ix);
+ struct ena_napi *ena_napi = container_of(dim, struct ena_napi, dim);
+ 
+ ena_napi->rx_ring->smoothed_interval = cur_moder.usec;
+ dim->state = DIM_START_MEASURE;
+ }
+
+ static void ena_adjust_adaptive_rx_intr_moderation(struct ena_napi *ena_napi)
+ {
+     struct dim_sample dim_sample;
+     struct ena_ring *rx_ring = ena_napi->rx_ring;
+     
+     if (!rx_ring->per_napi_packets)
+         return;
+     
+     rx_ring->non_empty_napi_events++;
+     
+     dim_update_sample(rx_ring->non_empty_napi_events,
+         rx_ring->rx_stats.cnt,
+         rx_ring->rx_stats.bytes,
+         &dim_sample);
+     
+     net_dim(&ena_napi->dim, dim_sample);
+     
+     rx_ring->per_napi_packets = 0;
-    rx_ring->per_napi_bytes = 0;
+ }

- static inline void ena_unmask_interrupt(struct ena_ring *tx_ring,
+ static void ena_unmask_interrupt(struct ena_ring *tx_ring,
    struct ena_ring *rx_ring)
+ {
+     struct ena_eth_io_intr_reg intr_reg;
+     u32 rx_interval = ena_com_get_adaptive_moderation_enabled(rx_ring->ena_dev) ?
+         rx_ring->smoothed_interval :
+         ena_com_get_nonadaptive_moderation_interval_rx(rx_ring->ena_dev);

    /* Update intr register: rx intr delay,
* tx intr delay and interrupt unmask
*/
ena_com_update_intr_reg(&intr_reg,
-rx_ring->smoothed_interval,
+rx_interval,
 tx_ring->smoothed_interval,
 true);

+u64_stats_update_begin(&tx_ring->syncp);
+tx_ring->tx_stats.unmask_interrupt++;
+u64_stats_update_end(&tx_ring->syncp);
/* It is a shared MSI-X.
 * Tx and Rx CQ have pointer to it.
 * So we use one of them to reach the intr reg
@@ -1168,7 +1181,7 @@
 ena_com_unmask_intr(rx_ring->ena_com_io_cq, &intr_reg);
 }

-static inline void ena_update_ring_numa_node(struct ena_ring *tx_ring,
+static void ena_update_ring_numa_node(struct ena_ring *tx_ring,
 struct ena_ring *rx_ring)
{
 int cpu = get_cpu();
 @@ -1199,8 +1212,8 @@
 struct ena_napi *ena_napi = container_of(napi, struct ena_napi, napi);
 struct ena_ring *tx_ring, *rx_ring;

 -u32 tx_work_done;
-u32 rx_work_done;
+int tx_work_done;
+int rx_work_done = 0;
 int tx_budget;
 int napi_comp_call = 0;
 int ret;
@@ -1217,7 +1230,11 @@
 tx_work_done = ena_clean_tx_irq(tx_ring, tx_budget);
-rx_work_done = ena_clean_rx_irq(rx_ring, napi, budget);
+/* On netpoll the budget is zero and the handler should only clean the
+ * tx completions.
+ */
+if (likely(budget))
+rx_work_done = ena_clean_rx_irq(rx_ring, napi, budget);

 /* If the device is about to reset or down, avoid unmask
 * the interrupt and return 0 so NAPI won't reschedule
@@ -1234,9 +1251,11 @@
* from the interrupt context (vs from sk_busy_loop)
*/
if (napi_complete_done(napi, rx_work_done)) {
  /* Tx and Rx share the same interrupt vector */
  /* We apply adaptive moderation on Rx path only.
   * Tx uses static interrupt moderation.
   */
  if (ena_com_get_adaptive_moderation_enabled(rx_ring->ena_dev))
    ena_adjust_intr_moderation(rx_ring, tx_ring);
  ena_adjust_adaptive_rx_intr_moderation(ena_napi);

  ena_unmask_interrupt(tx_ring, rx_ring);
}
@@ -1277,6 +1296,9 @@
{@ -1296,9 @}
{struct ena_napi *ena_napi = data;
+	ena_napi->tx_ring->first_interrupt = true;
+	ena_napi->rx_ring->firstInterrupt = true;
+
  napi_schedule_irqoff(&ena_napi->napi);

  return IRQ_HANDLED;
@@ -1299,7 +1321,6 @@
{@ -1321,6 @}
/* Reserved the max msix vectors we might need */
msix_vecs = ENA_MAX_MSIX_VEC(num_queues);
-netif_dbg(adapter, probe, adapter->netdev,
            "trying to enable MSI-X, vectors %d\n", msix_vecs);
@@ -1316,7 +1337,7 @@
  netif_notice(adapter, probe, adapter->netdev,
            "enable only %d MSI-X (out of %d), reduce the number of queues\n", irq_cnt, msix_vecs);
  adapter->num_queues = irq_cnt - ENA_ADMIN_MSIX_VEC;
  adapter->num_io_queues = irq_cnt - ENA_ADMIN_MSIX_VEC;
}

if (ena_init_rx_cpu_rmap(adapter))
@@ -1354,7 +1375,7 @@
  netdev = adapter->netdev;
  -for (i = 0; i < adapter->num_queues; i++) {
  +for (i = 0; i < adapter->num_io_queues; i++) {
    irq_idx = ENA_IOIRQIDX(i);
    cpu = i % num_online_cpus();
@@ -1486,7 +1507,7 @@
\{
  int i;

- for (i = 0; i < adapter->num_queues; i++)
+ for (i = 0; i < adapter->num_io_queues; i++)
    netif_napi_del(&adapter->ena_napi[i].napi);
  }
@@ -1495,7 +1516,7 @@
struct ena_napi *napi;
  int i;

- for (i = 0; i < adapter->num_queues; i++) {
+ for (i = 0; i < adapter->num_io_queues; i++) {
    napi = &adapter->ena_napi[i];
    netif_napi_add(adapter->netdev,
@@ -1512,7 +1533,7 @@
\{
  int i;

- for (i = 0; i < adapter->num_queues; i++)
+ for (i = 0; i < adapter->num_io_queues; i++)
    napi_disable(&adapter->ena_napi[i].napi);
  }
@@ -1520,18 +1541,10 @@
\{
  int i;

- for (i = 0; i < adapter->num_queues; i++)
+ for (i = 0; i < adapter->num_io_queues; i++)
    napi_enable(&adapter->ena_napi[i].napi);
  }

- static void ena_restore_ethtool_params(struct ena_adapter *adapter)
- {
-    adapter->tx_usecs = 0;
-    adapter->rx_usecs = 0;
-    adapter->tx_frames = 1;
-    adapter->rx_frames = 1;
- }  
- 
- /* Configure the Rx forwarding */
static int ena_rss_configure(struct ena_adapter *adapter)
{
@@ -1574,8 +1587,6 @@
     if (rc)
     return rc;

-ena_init_napi(adapter);
-
ena_change_mtu(adapter->netdev, adapter->netdev->mtu);

ena_refill_all_rx_bufs(adapter);
@@ -1583,8 +1594,6 @@
 /* enable transmits */
 netif_tx_start_all_queues(adapter->netdev);

-ena_restore_ethtool_params(adapter);
-
ena_napi_enable_all(adapter);

return 0;
@@ -1592,7 +1601,7 @@

static int ena_create_io_tx_queue(struct ena_adapter *adapter, int qid)
{
    struct ena_com_create_io_ctx ctx = { 0 };
+    struct ena_com_create_io_ctx ctx;
    struct ena_com_dev *ena_dev;
    struct ena_ring *tx_ring;
    u32 msix_vector;
    @@ -1605,11 +1614,13 @@
        msix_vector = ENA_IO_IRQ_IDX(qid);
        ena_qid = ENA_IO_TXQ_IDX(qid);

        +memset(&ctx, 0x0, sizeof(ctx));
        +
        ctx.direction = ENA_COM_IO_QUEUE_DIRECTION_TX;
        ctx.qid = ena_qid;
        ctx.mem_queue_type = ena_dev->tx_mem_queue_type;
        ctx.msix_vector = msix_vector;
-        ctx.queue_size = adapter->tx_ring_size;
+        ctx.queue_size = tx_ring->ring_size;
        ctx.numa_node = cpu_to_node(tx_ring->cpu);

        rc = ena_com_create_io_queue(ena_dev, &ctx);
    @@ -1640,7 +1651,7 @@
    int rc, i;

        -for (i = 0; i < adapter->num_queues; i++) {
+for (i = 0; i < adapter->num_io_queues; i++) {

rc = ena_create_io_tx_queue(adapter, i);
if (rc)
goto create_err;
@@ -1658,7 +1669,7 @@
static int ena_create_io_rx_queue(struct ena_adapter *adapter, int qid)
 {
  struct ena_com_dev *ena_dev;
  struct ena_com_create_io_ctx ctx = { 0 };  
+ struct ena_com_create_io_ctx ctx;
  struct ena_ring *rx_ring;
  u32 msix_vector;
  u16 ena_qid;
@@ -1670,11 +1681,13 @@
  msix_vector = ENA_IO_IRQ_IDX(qid);
  ena_qid = ENA_IO_RXQ_IDX(qid);
  +memset(&ctx, 0x0, sizeof(ctx));
+  ctx.qid = ena_qid;
+  ctx.direction = ENA_COM_IO_QUEUE_DIRECTION_RX;
+  ctx.mem_queue_type = ENA_ADMIN_PLACEMENT_POLICY_HOST;
+  ctx.msix_vector = msix_vector;
  -ctx.queue_size = adapter->rx_ring_size;
+  ctx.queue_size = rx_ring->ring_size;
  ctx.numa_node = cpu_to_node(rx_ring->cpu);

  rc = ena_com_create_io_queue(ena_dev, &ctx);
@@ -1706,21 +1719,130 @@
  struct ena_com_dev *ena_dev = adapter->ena_dev;
  int rc, i;

  -for (i = 0; i < adapter->num_queues; i++) {
  +for (i = 0; i < adapter->num_io_queues; i++) {
    rc = ena_create_io_rx_queue(adapter, i);
    if (rc)
goto create_err;
    +INIT_WORK(&adapter->ena_napi[i].dim.work, ena_dim_work);
  }

  return 0;

create_err:
  -while (i--)
  +while (i--) {
    +cancel_work_sync(&adapter->ena_napi[i].dim.work);
    ena_com_destroy_io_queue(ena_dev, ENA_IO_RXQ_IDX(i));
  +}
return rc;
}

+static void set_io_rings_size(struct ena_adapter *adapter,
  +   int new_tx_size, int new_rx_size)
  +{
  +int i;
   +
  +for (i = 0; i < adapter->num_io_queues; i++) {
  +adapter->tx_ring[i].ring_size = new_tx_size;
  +adapter->rx_ring[i].ring_size = new_rx_size;
  +}
  +}

+/* This function allows queue allocation to backoff when the system is
  + low on memory. If there is not enough memory to allocate io queues
  + the driver will try to allocate smaller queues.
  + *
  + * The backoff algorithm is as follows:
  + * 1. Try to allocate TX and RX and if successful.
  + * 1.1. return success
  + *
  + * 2. Divide by 2 the size of the larger of RX and TX queues (or both if their size is the same).
  + *
  + * 3. If TX or RX is smaller than 256
  + * 3.1. return failure.
  + * 4. else
  + * 4.1. go back to 1.
  + */
+static int create_queues_with_size_backoff(struct ena_adapter *adapter)
  +{
  +int rc, cur_rx_ring_size, cur_tx_ring_size;
  +int new_rx_ring_size, new_tx_ring_size;
  +
  +/*! current queue sizes might be set to smaller than the requested
  + * ones due to past queue allocation failures.
  + */
  +set_io_rings_size(adapter, adapter->requested_tx_ring_size,
  + adapter->requested_rx_ring_size);
  +
  +while (1) {
  +rc = ena_setup_all_tx_resources(adapter);
  +if (rc)
  +goto err_setup_tx;
  +
  +rc = ena_create_all_io_tx_queues(adapter);
  +if (rc)
  +goto err_create_tx_queues;
+rc = ena_setup_all_rx_resources(adapter);
+if (rc)
+goto err_setup_rx;
+
+rc = ena_create_all_io_rx_queues(adapter);
+if (rc)
+goto err_create_rx_queues;
+
+return 0;
+
+err_create_rx_queues:
+ena_free_all_io_rx_resources(adapter);
+err_setup_rx:
+ena_destroy_all_tx_queues(adapter);
+err_create_tx_queues:
+ena_free_all_io_tx_resources(adapter);
+err_setup_tx:
+if (rc != -ENOMEM) {
+    netif_err(adapter, ifup, adapter->netdev,
+            "Queue creation failed with error code %d\n",
+            rc);
+    return rc;
+}
+
+cur_tx_ring_size = adapter->tx_ring[0].ring_size;
+cur_rx_ring_size = adapter->rx_ring[0].ring_size;
+
+netif_err(adapter, ifup, adapter->netdev,
+            "Not enough memory to create queues with sizes TX=%d, RX=%d\n",
+            cur_tx_ring_size, cur_rx_ring_size);
+
+new_tx_ring_size = cur_tx_ring_size;
+new_rx_ring_size = cur_rx_ring_size;
+
+/* Decrease the size of the larger queue, or
+   * decrease both if they are the same size.
+   */
+if (cur_rx_ring_size <= cur_tx_ring_size)
+    new_tx_ring_size = cur_tx_ring_size / 2;
+if (cur_rx_ring_size >= cur_tx_ring_size)
+    new_rx_ring_size = cur_rx_ring_size / 2;
+
+if (new_tx_ring_size < ENA_MIN_RING_SIZE ||
+    new_rx_ring_size < ENA_MIN_RING_SIZE) {
+    netif_err(adapter, ifup, adapter->netdev,
+            "Queue creation failed with the smallest possible queue size of %d for both queues. Not retrying with smaller
queues\n",
static int ena_up(struct ena_adapter *adapter)
{
    int rc, i;
    ena_setup_io_intr(adapter);

    /* napi poll functions should be initialized before running */
    /* request_irq(), to handle a rare condition where there is a pending */
    /* interrupt, causing the ISR to fire immediately while the poll */
    /* function wasn't set yet, causing a null dereference */
    ena_init_napi(adapter);
    rc = ena_request_io_irq(adapter);
    if (rc)
        goto err_req_irq;

    /* allocate transmit descriptors */
    rc = ena_setup_all_tx_resources(adapter);
    rc = create_queues_with_size_backoff(adapter);
    if (rc)
        goto err_setup_tx;

    /* allocate receive descriptors */
    rc = ena_setup_all_rx_resources(adapter);
    if (rc)
        goto err_setup_rx;

    /* Create TX queues */
    rc = ena_create_all_io_tx_queues(adapter);
    if (rc)
        goto err_create_tx_queues;

    return rc;
}
/* Create RX queues */
-rc = ena_create_all_io_rx_queues(adapter);
-if (rc)
-goto err_create_rx_queues;
+goto err_create_queues_with_backoff;

rc = ena_up_complete(adapter);
if (rc)
@@ -1767,29 +1880,27 @@
set_bit(ENA_FLAG_DEV_UP, &adapter->flags);

/* Enable completion queues interrupt */
-for (i = 0; i < adapter->num_queues; i++)
+for (i = 0; i < adapter->num_io_queues; i++)
  ena_unmask_interrupt(&adapter->tx_ring[i],
                       &adapter->rx_ring[i]);

/* schedule napi in case we had pending packets
 * from the last time we disable napi
 */
-for (i = 0; i < adapter->num_queues; i++)
+for (i = 0; i < adapter->num_io_queues; i++)
  napi_schedule(&adapter->ena_napi[i].napi);

return rc;

err_up:
-ena_destroy_all_rx_queues(adapter);
-err_create_rx_queues:
  ena_destroy_all_tx_queues(adapter);
-err_create_tx_queues:
  -ena_free_all_io_rx_resources(adapter);
  -err_setup_rx:
  ena_free_all_io_tx_resources(adapter);
  -err_setup_tx:
  +ena_destroy_all_rx_queues(adapter);
  +ena_free_all_io_rx_resources(adapter);
  +err_create_queues_with_backoff:
  ena_free_io_irq(adapter);
  err_req_irq:
  +ena_del_napi(adapter);

return rc;
}
@@ -1818,6 +1929,8 @@
rc = ena_com_dev_reset(adapter->ena_dev, adapter->reset_reason);
-if (rc)
  dev_err(&adapter->pdev->dev, "Device reset failed\n");
/* stop submitting admin commands on a device that was reset */
+ena_com_set_admin_running_state(adapter->ena_dev, false);
}

ena_destroy_all_io_queues(adapter);

/*@ -1849,13 +1962,13 @*/
int rc;

/* Notify the stack of the actual queue counts. */
-rc = netif_set_real_num_tx_queues(netdev, adapter->num_queues);
+rc = netif_set_real_num_tx_queues(netdev, adapter->num_io_queues);
if (rc) {
    netif_err(adapter, ifup, netdev, "Can't set num tx queues\n");
    return rc;
}

-rc = netif_set_real_num_rx_queues(netdev, adapter->num_queues);
+rc = netif_set_real_num_rx_queues(netdev, adapter->num_io_queues);
if (rc) {
    netif_err(adapter, ifup, netdev, "Can't set num rx queues\n");
    return rc;
}

/*@ -1884,6 +1997,9 @*/
netif_dbg(adapter, ifdown, netdev, "%s\n", __func__);

+if (!test_bit(ENA_FLAG_DEVICE_RUNNING, &adapter->flags))
+    return 0;
+
if (test_bit(ENA_FLAG_DEV_UP, &adapter->flags))
    ena_down(adapter);

/*@ -1894,13 +2010,43 @*/
    "Destroy failure, restarting device\n");
    ena_dump_stats_to_dmesg(adapter);
    /* rtnl lock already obtained in dev_ioctl() layer */
    -ena_destroy_device(adapter);
    +ena_destroy_device(adapter, false);
    ena_restore_device(adapter);
}

return 0;
}

+int ena_update_queue_sizes(struct ena_adapter *adapter,
+
+    u32 new_tx_size,
+    u32 new_rx_size)
+{
+    bool dev_was_up;


int ena_update_queue_count(struct ena_adapter *adapter, u32 new_channel_count) {
    struct ena_com_dev *ena_dev = adapter->ena_dev;
    bool dev_was_up;

    dev_was_up = test_bit(ENA_FLAG_DEV_UP, &adapter->flags);
    ena_close(adapter->netdev);
    adapter->num_io_queues = new_channel_count;
    /* We need to destroy the rss table so that the indirection
     * table will be reinitialized by ena_up()
     */
    ena_com_rss_destroy(ena_dev);
    ena_init_io_rings(adapter);
    return dev_was_up ? ena_open(adapter->netdev) : 0;
}

static void ena_tx_csum(struct ena_com_tx_ctx *ena_tx_ctx, struct sk_buff *skb) {
    u32 mss = skb_shinfo(skb)->gso_size;
    return rc;
}
/* Called with netif_tx_lock. */
static netdev_tx_t ena_start_xmit(struct sk_buff *skb, struct net_device *dev) {
    static int ena_tx_map_skb(struct ena_ring *tx_ring,
    + struct ena_tx_buffer *tx_info,
    + struct sk_buff *skb,
    + void **push_hdr,
    + u16 *header_len)
    {
    -struct ena_adapter *adapter = netdev_priv(dev);
    -struct ena_tx_buffer *tx_info;
    -struct ena_com_tx_ctx ena_tx_ctx;
    -struct ena_ring *tx_ring;
    -struct netdev_queue *txq;
    +struct ena_adapter *adapter = tx_ring->adapter;
    struct ena_com_buf *ena_buf;
    -void *push_hdr;
-u32 len, last_frag;
- u16 next_to_use;
- u16 req_id;
- u16 push_len;
- u16 header_len;

dma_addr_t dma;
-int qid, rc, nb_hw_desc;
-int i = -1;
+ u32 skb_head_len, frag_len, last_frag;
+ u16 push_len = 0;
+ u16 delta = 0;
+ int i = 0;

- netif_dbg(adapter, tx_queued, dev, "%s skb %p\n", __func__, skb);

/* Determine which tx ring we will be placed on */
-qid = skb_get_queue_mapping(skb);
-tx_ring = &adapter->tx_ring[qid];
-txq = netdev_get_tx_queue(dev, qid);
-
-rc = ena_check_and_linearize_skb(tx_ring, skb);
-if (unlikely(rc))
  goto error_drop_packet;
-
-skb_tx_timestamp(skb);
-len = skb_headlen(skb);
-
-next_to_use = tx_ring->next_to_use;
-req_id = tx_ring->free_tx_ids[next_to_use];
-tx_info = &tx_ring->tx_buffer_info[req_id];
-tx_info->num_of_bufs = 0;
-
-WARN(tx_info->skb, "SKB isn't NULL req_id %d\n", req_id);
-ena_buf = tx_info->bufs;
+ skb_head_len = skb_headlen(skb);
 tx_info->skb = skb;
+ ena_buf = tx_info->bufs;

if (tx_ring->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV) {
  /* prepared the push buffer */
  -push_len = min_t(u32, len, tx_ring->tx_max_header_size);
  -header_len = push_len;
  -push_hdr = skb->data;
  */ When the device is LLQ mode, the driver will copy
  + the header into the device memory space.
  + the ena_com layer assume the header is in a linear
  + memory space.
  + This assumption might be wrong since part of the header
  + can be in the fragmented buffers.
* Use skb_header_pointer to make sure the header is in a linear memory space.
+ */
+ +
+ *push_len = min_t(u32, skb->len, tx_ring->tx_max_header_size);
+ *push_hdr = skb_header_pointer(skb, 0, push_len,
+ tx_ring->push_buf_intermediate_buf);
+ *header_len = push_len;
+ if (unlikely(skb->data != *push_hdr)) {
+ u64_stats_update_begin(&tx_ring->syncp);
+ tx_ring->tx_stats.llq_buffer_copy++;
+ u64_stats_update_end(&tx_ring->syncp);
+ +
+ delta = push_len - skb_head_len;
+ +}
+ } else {
- push_len = 0;
- header_len = min_t(u32, len, tx_ring->tx_max_header_size);
- push_hdr = NULL;
- *push_hdr = NULL;
- *header_len = min_t(u32, skb_head_len,
+ tx_ring->tx_max_header_size);
}
-
-netif_dbg(adapter, tx_queued, dev,
+netif_dbg(adapter, tx_queued, adapter->netdev,
"skb: %p header_buf->vaddr: %p push_len: %d
", skb,
- push_hdr, push_len);
+ *push_hdr, push_len);

-if (len > push_len) {
+if (skb_head_len > push_len) {
+ dma = dma_map_single(tx_ring->dev, skb->data + push_len,
- len - push_len, DMA_TO_DEVICE);
- if (dma_mapping_error(tx_ring->dev, dma))
+ skb_head_len - push_len, DMA_TO_DEVICE);
+ if (unlikely(dma_mapping_error(tx_ring->dev, dma)))
goto error_report_dma_error;

ena_buf->paddr = dma;
-ena_buf->len = len - push_len;
+ena_buf->len = skb_head_len - push_len;

ena_buf++;
+tx_info->num_of_bufs++;
+tx_info->map_linear_data = 1;
+}
+ else {
+tx_info->map_linear_data = 0;
```c
for (i = 0; i < last_frag; i++) {
    const skb_frag_t *frag = skb_shinfo(skb)->frags[i];
    len = skb_frag_size(frag);
    dma = skb_frag_dma_map(tx_ring->dev, frag, 0, len,
        DMA_TO_DEVICE);
    if (dma_mapping_error(tx_ring->dev, dma))
        frag_len = skb_frag_size(frag);
    +if (unlikely(delta >= frag_len)) {
        +delta -= frag_len;
        +continue;
        +}
    +
    +dma = skb_frag_dma_map(tx_ring->dev, frag, delta,
        frag_len - delta, DMA_TO_DEVICE);
    +if (unlikely(dma_mapping_error(tx_ring->dev, dma)))
        goto error_report_dma_error;
    ena_buf->paddr = dma;
    -ena_buf->len = len;
    +ena_buf->len = frag_len - delta;
    ena_buf++;
    +tx_info->num_of_bufs++;
    +delta = 0;
}

-tx_info->num_of_bufs += last_frag;
+return 0;
+
+error_report_dma_error:
+u64_stats_update_begin(&tx_ring->syncp);
+tx_ring->tx_stats.dma_mapping_err++;
+u64_stats_update_end(&tx_ring->syncp);
+netdev_warn(adapter->netdev, "failed to map skb\n");
+
+tx_info->skb = NULL;
+
+tx_info->num_of_bufs += i;
+ena_unmap_tx_skb(tx_ring, tx_info);
+
+return -EINVAL;
+
```
+/* Called with netif_tx_lock. */
+static netdev_tx_t ena_start_xmit(struct sk_buff *skb, struct net_device *dev)
+{
+  struct ena_adapter *adapter = netdev_priv(dev);
+  struct ena_tx_buffer *tx_info;
+  struct ena_com_tx_ctx ena_tx_ctx;
+  struct ena_ring *tx_ring;
+  struct netdev_queue *txq;
+  void *push_hdr;
+  u16 next_to_use, req_id, header_len;
+  int qid, rc, nb_hw_desc;
+
+  netif_dbg(adapter, tx_queued, dev, "%s skb %p\n", __func__, skb);
+  /* Determine which tx ring we will be placed on */
+  qid = skb_get_queue_mapping(skb);
+  tx_ring = &adapter->tx_ring[qid];
+  txq = netdev_get_tx_queue(dev, qid);
+
+  rc = ena_check_and_linearize_skb(tx_ring, skb);
+  if (unlikely(rc))
+    goto error_drop_packet;
+  skb_tx_timestamp(skb);
+
+  next_to_use = tx_ring->next_to_use;
+  req_id = tx_ring->free_ids[next_to_use];
+  tx_info = &tx_ring->tx_buffer_info[req_id];
+  WARN(tx_info->skb, "SKB isn't NULL req_id %d\n", req_id);
+
+  rc = ena_tx_map_skb(tx_ring, tx_info, skb, &push_hdr, &header_len);
+  if (unlikely(rc))
+    goto error_drop_packet;
+
+  memset(&ena_tx_ctx, 0x0, sizeof(struct ena_com_tx_ctx));
+  ena_tx_ctx.ena_bufs = tx_info->bufs;
+  if (unlikely(ena_com_is_doorbell_needed(tx_ring->ena_com_io_sq, &ena_tx_ctx))) {
+    netif_dbg(adapter, tx_queued, dev,
+      "llq tx max burst size of queue %d achieved, writing doorbell to send burst\n",
+      qid);
+    ena_com_write_sq_doorbell(tx_ring->ena_com_io_sq);
+  }
+
  memset(&ena_tx_ctx, 0x0, sizeof(struct ena_com_tx_ctx));
  ena_tx_ctx.ena_bufs = tx_info->bufs;
  @@ -2077,18 +2277,33 @@
 /* set flags and meta data */
  ena_tx_csum(&ena_tx_ctx, skb);
+
  if (unlikely(ena_com_is_doorbell_needed(tx_ring->ena_com_io_sq, &ena_tx_ctx))) {
+    netif_dbg(adapter, tx_queued, dev,
+      "llq tx max burst size of queue %d achieved, writing doorbell to send burst\n",
+      qid);
+    ena_com_write_sq_doorbell(tx_ring->ena_com_io_sq);
+  }
+}
/* prepare the packet’s descriptors to dma engine */
rc = ena_com_prepare_tx(tx_ring->ena_com_io_sq, &ena_tx_ctx, &nb_hw_desc);

+/* ena_com_prepare_tx() can't fail due to overflow of tx queue,
  + * since the number of free descriptors in the queue is checked
  + * after sending the previous packet. In case there isn't enough
  + * space in the queue for the next packet, it is stopped
  + * until there is again enough available space in the queue.
  + * All other failure reasons of ena_com_prepare_tx() are fatal
  + * and therefore require a device reset.
  + */
if (unlikely(rc)) {
  netif_err(adapter, tx_queued, dev,
          "failed to prepare tx bufs\n");
  u64_stats_update_begin(&tx_ring->syncp);
  -tx_ring->tx_stats.queue_stop++;
  tx_ring->tx_stats.prepare_ctx_err++;
  u64_stats_update_end(&tx_ring->syncp);
  -netif_tx_stop_queue(txq);
  +adapter->reset_reason = ENA_REGS_RESET_DRIVER_INVALID_STATE;
  +set_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags);
  goto error_unmap_dma;
}
@@ -2106,18 +2321,12 @@
tx_ring->next_to_use = ENA_TX_RING_IDX_NEXT(next_to_use,
                              tx_ring->ring_size);

-wmb();
-/* stop the queue when no more space available, the packet can have up
  * to sgl_size + 2. one for the meta descriptor and one for header
  * (if the header is larger than tx_max_header_size).
- */
-if (unlikely(ena_com_sq_empty_space(tx_ring->ena_com_io_sq) <
  - (tx_ring->sgl_size + 2))) {
  +if (unlikely(!ena_com_sq_have_enough_space(tx_ring->ena_com_io_sq,
            + tx_ring->sgl_size + 2))) {
    netif_dbg(adapter, tx_queued, dev, "%s stop queue %d\n",
          __func__, qid);
@@ -2130,13 +2339,14 @@
* stop the queue but meanwhile clean_tx_irq updates
* next_to_completion and terminates.
* The queue will remain stopped forever.
- * To solve this issue this function perform rmb, check
- * the wakeup condition and wake up the queue if needed.
+ * To solve this issue add a mb() to make sure that
+ * netif_tx_stop_queue() write is visible before checking if
+ * there is additional space in the queue.
*/
-smp_rmb();
+smp_mb();

-#if (ena_com_sq_empty_space(tx_ring->ena_com_io_sq)
-> ENA_TX_WAKEUP_THRESH) {
+if (ena_com_sq_have_enough_space(tx_ring->ena_com_io_sq,
+ ENA_TX_WAKEUP_THRESH)) {
    netif_tx_wake_queue(txq);
    u64_stats_update_begin(&tx_ring->syncp);
    tx_ring->tx_stats.queue_wakeup++;
    @@ -2145,7 +2355,9 @@
}

if (netif_xmit_stopped(txq) || !skb->xmit_more) {
  /* trigger the dma engine */
+  /* trigger the dma engine. ena_com_write_sq_doorbell()
+   * has a mb
+   */
+  ena_com_write_sq_doorbell(tx_ring->ena_com_io_sq);
+  u64_stats_update_begin(&tx_ring->syncp);
+  tx_ring->tx_stats.doorbells++;
+  @@ -2154,58 +2366,15 @@

  return NETDEV_TX_OK;

-error_report_dma_error:
-  u64_stats_update_begin(&tx_ring->syncp);
-  tx_ring->tx_stats.dma_mapping_err++;
-  u64_stats_update_end(&tx_ring->syncp);
-  netdev_warn(adapter->netdev, "failed to map skb\n");
-  -
-  tx_info->skb = NULL;
-  -
-error_unmap_dma:
-  if (i >= 0) {
-    /* save value of frag that failed */
-    last_frag = i;
-    -
-    /* start back at beginning and unmap skb */
-    tx_info->skb = NULL;
-ena_buf = tx_info->bufs;
-dma_unmap_single(tx_ring->dev, dma_unmap_addr(ena_buf, paddr),
    - dma_unmap_len(ena_buf, len), DMA_TO_DEVICE);
-
    /* unmap remaining mapped pages */
-    for (i = 0; i < last_frag; i++) {
-        -ena_buf++;
-        -dma_unmap_page(tx_ring->dev, dma_unmap_addr(ena_buf, paddr),
-            - dma_unmap_len(ena_buf, len), DMA_TO_DEVICE);
-    }
-}
+ena_unmap_tx_skb(tx_ring, tx_info);
+tx_info->skb = NULL;

error_drop_packet:
-
-    dev_kfree_skb(skb);
return NETDEV_TX_OK;
}

-#ifdef CONFIG_NET_POLL_CONTROLLER
- static void ena_netpoll(struct net_device *netdev)
-{
-    -struct ena_adapter *adapter = netdev_priv(netdev);
-    -int i;
-    -
-    /* Dont schedule NAPI if the driver is in the middle of reset
-     * or netdev is down.
-     * */
-    -
-    -if (!test_bit(ENA_FLAG_DEV_UP, &adapter->flags) ||
-        -test_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags))
-        -return;
-    -
-    -for (i = 0; i < adapter->num_queues; i++)
-        -napi_schedule(&adapter->ena_napi[i].napi);
-    -}
-#endif /* CONFIG_NET_POLL_CONTROLLER */
-
static u16 ena_select_queue(struct net_device *dev, struct sk_buff *skb,
void *accel_priv, select_queue_fallback_t fallback)
{
@@ -2222,7 +2391,8 @@
    return qid;

-static void ena_config_host_info(struct ena_com_dev *ena_dev)
+static void ena_config_host_info(struct ena_com_dev *ena_dev,

+ struct pci_dev *pdev)
{
    struct ena_admin_host_info *host_info;
    int rc;
    @@ -2236,17 +2406,19 @@

    host_info = ena_dev->host_attr.host_info;
    +host_info->bdf = (pdev->bus->number << 8) | pdev->devfn;
    host_info->os_type = ENA_ADMIN_OS_LINUX;
    host_info->kernel_ver = LINUX_VERSION_CODE;
    -strncpy(host_info->kernel_ver_str, utsname()->version, sizeof(host_info->kernel_ver_str) - 1);
    +strlcpy(host_info->kernel_ver_str, utsname()->version, sizeof(host_info->kernel_ver_str) - 1);
    host_info->kernel_ver = LINUX_VERSION_CODE;
    host_info->os_dist = 0;
    htons(host_info->os_dist_str, utsname()->release, sizeof(host_info->os_dist_str) - 1);
    host_info->driver_version =
        -DRV_MODULE_VER_MAJOR)
        -DRV_MODULE_VER_MINOR << ENA_ADMIN_HOST_INFO_MINOR_SHIFT) |
        -DRV_MODULE_VER_SUBMINOR << ENA_ADMIN_HOST_INFO_SUB_MINOR_SHIFT);
    +host_info->driver_version = LINUX_VERSION_CODE;
    +host_info->num_cpus = num_online_cpus();
    +
    +host_info->driver_supported_features =
        +ENA_ADMIN_HOST_INFO_INTERRUPT_MADERATION_MASK;

    rc = ena_com_set_host_attributes(ena_dev);
    if (rc) {
        @@ -2301,6 +2473,19 @@
            ena_com_delete_debug_area(adapter->ena_dev);
        }

+int ena_update_hw_stats(struct ena_adapter *adapter)
+{
+    int rc = 0;
+    +rc = ena_com_get_eni_stats(adapter->ena_dev, &adapter->eni_stats);
+    +if (rc) {
+        dev_info_once(&adapter->pdev->dev, "Failed to get ENI stats\n");
+        +return rc;
+    }
+    +return 0;
+}
+}
+
+static void ena_get_stats64(struct net_device *netdev, struct rtnl_link_stats64 *stats)
if (!test_bit(ENA_FLAG_DEV_UP, &adapter->flags))
    return;

    for (i = 0; i < adapter->num_queues; i++) {
+for (i = 0; i < adapter->num_io_queues; i++) {
    u64 bytes, packets;

    tx_ring = &adapter->tx_ring[i];
    .ndo_change_mtu= ena_change_mtu,
    .ndo_set_mac_address= NULL,
    .ndo_validate_addr= eth_validate_addr,
    -#ifdef CONFIG_NET_POLL_CONTROLLER
    -.ndo_poll_controller= ena_netpoll,
    -#endif /* CONFIG_NET_POLL_CONTROLLER */
    };

    static int ena_device_validate_params(struct ena_adapter *adapter,
    return -EINVAL;
    }

    if ((get_feat_ctx->max_queues.max_cq_num < adapter->num_queues) ||
        (get_feat_ctx->max_queues.max_sq_num < adapter->num_queues)) {
        -netif_err(adapter, drv, netdev,
        - "Error, device doesn't support enough queues\n"");
        -return -EINVAL;
    -}
    -
    if (get_feat_ctx->dev_attr.max_mtu < netdev->mtu) {
        netif_err(adapter, drv, netdev,
        "Error, device max mtu is smaller than netdev MTU\n");
        goto err_mmio_read_less;
    }

    -rc = pci_set_dma_mask(pdev, DMA_BIT_MASK(dma_width));
     +rc = dma_set_mask_and_coherent(dev, DMA_BIT_MASK(dma_width));
    if (rc) {
        -dev_err(dev, "pci_set_dma_mask failed 0x%x\n", rc);
        -goto err_mmio_read_less;
    -}
    -
    -rc = pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(dma_width));
    -if (rc) {
        -dev_err(dev, "err_pci_set_consistent_dma_mask failed 0x%x\n",
-rc);
+dev_err(dev, "dma_set_mask_and_coherent failed %d\n", rc);
goto err_mmio_read_less;
}

/* ENA admin level init */
-rc = ena_com_admin_init(ena_dev, &aenq_handlers, true);
+rc = ena_com_admin_init(ena_dev, &aenq_handlers);
if (rc) {
  dev_err(dev,
  "Can not initialize ena admin queue with device\n");
  @ @ -2473,7 +2641,7 @@
  */
  ena_com_set_admin_polling_mode(ena_dev, true);
}
-ena_config_host_info(ena_dev);
+ena_config_host_info(ena_dev, pdev);

/* Get Device Attributes*/
rc = ena_com_get_dev_attr_feat(ena_dev, get_feat_ctx);
@@ -2543,28 +2711,29 @@
return rc;
}

-static void ena_destroy_device(struct ena_adapter *adapter)
+static void ena_destroy_device(struct ena_adapter *adapter, bool graceful)
{
  struct net_device *netdev = adapter->netdev;
  struct ena_com_dev *ena_dev = adapter->ena_dev;
  bool dev_up;
  
  +static void ena_destroy_device(struct ena_adapter *adapter, bool graceful)
  {\
    struct net_device *netdev = adapter->netdev;
    struct ena_com_dev *ena_dev = adapter->ena_dev;
  
  +if (!test_bit(ENA_FLAG_DEVICE_RUNNING, &adapter->flags))
  +return;
  +
  netif_carrier_off(netdev);

del_timer_sync(&adapter->timer_service);

  dev_up = test_bit(ENA_FLAG_DEV_UP, &adapter->flags);
  adapter->dev_up_before_reset = dev_up;

  -ena_com_set_admin_running_state(ena_dev, false);
  +if (!graceful)
  +ena_com_set_admin_running_state(ena_dev, false);

  if (test_bit(ENA_FLAG_DEV_UP, &adapter->flags))
  ena_down(adapter);
Before releasing the ENA resources, a device reset is required.
- * (to prevent the device from accessing them).
- * In case the reset flag is set and the device is up, ena_down()
- * already perform the reset, so it can be skipped.
+/* Stop the device from sending AENQ events (in case reset flag is set
+ * and device is up, ena_down() already reset the device.
+ */
if (!(test_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags) && dev_up))
    ena_com_dev_reset(adapter->ena_dev, adapter->reset_reason);
    adapter->reset_reason = ENA_REGS_RESET_NORMAL;
clear_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags);
clear_bit(ENA_FLAG_DEVICE_RUNNING, &adapter->flags);
}

static int ena_restore_device(struct ena_adapter *adapter)
{    goto err_device_destroy;
}

-clear_bit(ENA_FLAG_ONGOING_RESET, &adapter->flags);
-/* Make sure we don’t have a race with AENQ Links state handler */
-if (test_bit(ENA_FLAG_LINK_UP, &adapter->flags))
-    netif_carrier_on(adapter->netdev);
-
rc = ena_enable_msix_and_set_admin_interrupts(adapter,
    adapter->num_queues);
+    adapter->num_io_queues);
if (rc) {
    dev_err(&pdev->dev, "Enable MSI-X failed\n");
    goto err_device_destroy;
    @ @ -2628,6 +2793,12 @@
}

+set_bit(ENA_FLAG_DEVICE_RUNNING, &adapter->flags);
+
clear_bit(ENA_FLAG_ONGOING_RESET, &adapter->flags);
+if (test_bit(ENA_FLAG_LINK_UP, &adapter->flags))
+    netif_carrier_on(adapter->netdev);
+
    mod_timer(&adapter->timer_service, round_jiffies(jiffies + HZ));
    dev_err(&pdev->dev, "Device reset completed successfully\n");
    @ @ -2636,7 +2807,11 @@
    ena_free_mgmt_irq(adapter);
    ena_disable_msix(adapter);
err_device_destroy:
+ena_com_abort_admin_commands(ena_dev);
+ena_com_wait_for_abort_completion(ena_dev);
ena_com_admin_destroy(ena_dev);
+ena_com_dev_reset(ena_dev, ENA_REGS_RESET_DRIVER_INVALID_STATE);
+ena_com_mmio_reg_read_request_destroy(ena_dev);
err:
clear_bit(ENA_FLAG_DEVICE_RUNNING, &adapter->flags);
clear_bit(ENA_FLAGONGOING_RESET, &adapter->flags);
@@ -2650,21 +2825,43 @@
{
 struct ena_adapter *adapter =
 container_of(work, struct ena_adapter, reset_task);
-struct pci_dev *pdev = adapter->pdev;
-if (unlikely(!test_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags))) {
-dev_err(pdev->dev,
 -"device reset schedule while reset bit is off\n");
-return;
-}
 rtnl_lock();
-ena_destroy_device(adapter);
-ena_restore_device(adapter);
+
+if (likely(test_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags))) {
+ena_destroy_device(adapter, false);
+ena_restore_device(adapter);
+
+}
+}
-rtnl_unlock();
}

static int check_missing_comp_in_queue(struct ena_adapter *adapter,
- struct ena_ring *tx_ring)
+static int check_for_rx_interrupt_queue(struct ena_adapter *adapter,
+ struct ena_ring *rx_ring)
+{
+if (likely(rx_ring->first_interrupt))
+return 0;
+
+if (ena_com_cq_empty(rx_ring->ena_com_io_cq))
+return 0;
+
+rx_ring->no_interrupt_event_cnt++;
+
+if (rx_ring->no_interrupt_event_cnt == ENA_MAX_NO_INTERRUPT_ITERATIONS) {
+netif_err(adapter, rx_err, adapter->netdev,
+ "Potential MSIX issue on Rx side Queue = %d. Reset the device\n", 

+ tx_ring->qid);
+adapter->reset_reason = ENA_REGS_RESET_MISS_INTERRUPT;
+smp_mb__before_atomic();
+set_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags);
+return -EIO;
+
+return 0;
+
+static int check_missing_comp_in_tx_queue(struct ena_adapter *adapter,
+struct ena_ring *tx_ring)
+
{ struct ena_tx_buffer *tx_buf;
unsigned long last_jiffies;
@@ -2674,8 +2871,27 @@
for (i = 0; i < tx_ring->ring_size; i++) {
    tx_buf = &tx_ring->tx_buffer_info[i];
    last_jiffies = tx_buf->last_jiffies;
 -if (unlikely(last_jiffies &&
-     time_is_before_jiffies(last_jiffies + adapter->missing_tx_completion_to))) {
+    if (last_jiffies == 0)
+        /* no pending Tx at this location */
+        continue;
+    
+    if (unlikely((tx_ring->first_interrupt && time_is_before_jiffies(last_jiffies +
+        2 * adapter->missing_tx_completion_to))) {
+        /* If after graceful period interrupt is still not
+           received, we schedule a reset
+        */
+        netif_err(adapter, tx_err, adapter->netdev,
+               "Potential MSIX issue on Tx side Queue = %d. Reset the device\n",
+                     tx_ring->qid);
+        adapter->reset_reason = ENA_REGS_RESET_MISS_INTERRUPT;
+        smp_mb__before_atomic();
+        set_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags);
+        return -EIO;
+    }
+
+    if (unlikely(time_is_before_jiffies(last_jiffies +
+        adapter->missing_tx_completion_to))) {
        if (!tx_buf->print_once)
            netif_notice(adapter, tx_err, adapter->netdev,

                "Found a Tx that wasn't completed on time, qid %d, index %d.\n",
@@ -2698,15 +2914,16 @@
u64_stats_update_begin(&tx_ring->syncp);
-tx_ring->tx_stats.missed_tx = missed_tx;
+tx_ring->tx_stats.missed_tx += missed_tx;
u64_stats_update_end(&tx_ring->syncp);

return rc;
}

-static void check_for_missing_tx_completions(struct ena_adapter *adapter)
+static void check_for_missing_completions(struct ena_adapter *adapter)
{
    struct ena_ring *tx_ring;
    +struct ena_ring *rx_ring;
    int i, budget, rc;

    /* Make sure the driver doesn't turn the device in other process */
    @ @ -2723,10 +2940,15 @@

    budget = ENA_MONITORED_TX_QUEUES;

    -for (i = adapter->last_monitored_tx_qid; i < adapter->num_queues; i++) {
    +for (i = adapter->last_monitored_tx_qid; i < adapter->num_io_queues; i++) {
        tx_ring = &adapter->tx_ring[i];
        +rx_ring = &adapter->rx_ring[i];
        +
        +rc = check_missing_comp_in_tx_queue(adapter, tx_ring);
        +if (unlikely(rc))
        +return;

        -rc = check_missing_comp_in_queue(adapter, tx_ring);
        +rc = check_for_rx_interrupt_queue(adapter, rx_ring);
        if (unlikely(rc))
            return;

        @@ -2735,7 +2957,7 @@
        break;
    }

    -adapter->last_monitored_tx_qid = i % adapter->num_queues;
    +adapter->last_monitored_tx_qid = i % adapter->num_io_queues;
}

    /* trigger napi schedule after 2 consecutive detections */
    @ @ -2765,11 +2987,11 @@
    if (test_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags))
        return;

    -for (i = 0; i < adapter->num_queues; i++) {
    +for (i = 0; i < adapter->num_io_queues; i++) {
for (i = 0; i < adapter->num_io_queues; i++) {
    rx_ring = &adapter->rx_ring[i];

    refill_required =
        ena_com_sq_empty_space(rx_ring->ena_com_io_sq);
    ena_com_free_desc(rx_ring->ena_com_io_sq);
    if (unlikely(refill_required == (rx_ring->ring_size - 1))) {
        rx_ring->empty_rx_queue++;
    }
}

if (adapter->keep_alive_timeout == ENA_HW_HINTS_NO_TIMEOUT) return;

keep_alive_expired = round_jiffies(adapter->last_keep_alive_jiffies +
    adapter->keep_alive_timeout);
+ keep_alive_expired = adapter->last_keep_alive_jiffies +
    adapter->keep_alive_timeout;
if (unlikely(time_is_before_jiffies(keep_alive_expired))) {
    netif_err(adapter, drv, adapter->netdev,
        "Keep alive watchdog timeout.
    ");
}

check_for_admin_com_state(adapter);

check_for_missing_completions(adapter);
check_for_empty_rx_ring(adapter);

/* Reset the timer */
-mod_timer(&adapter->timer_service, jiffies + HZ);
+ mod_timer(&adapter->timer_service, round_jiffies(jiffies + HZ));
}

static int ena_calc_io_queue_num(struct pci_dev *pdev, struct ena_com_dev *ena_dev, struct ena_com_dev_get_features_ctx *get_feat_ctx)
{
    -int io_sq_num, io_queue_num;
    +int io_tx_sq_num, io_tx_cq_num, io_rx_num, io_queue_num;

    /* In case of LLQ use the llq number in the get feature cmd */
    -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV) {
    -io_sq_num = get_feat_ctx->max_queues.max_llq_num;
    -
    +io_sq_num = get_feat_ctx->max_queues.max_llq_num;
    +io_tx_sq_num = get_feat_ctx->max_queues.max_tx_sq_num;
    +io_rx_num = get_feat_ctx->max_queues.max_tx_cq_num;
    +io_queue_num = get_feat_ctx->max_queues.max_queue_num;
    +
    
    return;
-if (io_sq_num == 0) {
  dev_err(&pdev->dev,
  "Trying to use LLQ but llq_num is 0. Fall back into regular queues\n");
  -
  ena_dev->tx_mem_queue_type =
  ENA_ADMIN_PLACEMENT_POLICY_HOST;
  -io_sq_num = get_feat_ctx->max_queues.max_sq_num;
  -}
+if (ena_dev->supported_features & BIT(ENA_ADMIN_MAX_QUEUES_EXT)) {
  +struct ena_admin_queue_ext_feature_fields *max_queue_ext =
  +&get_feat_ctx->max_queue_ext.max_queue_ext;
  +io_rx_num = min_t(int, max_queue_ext->max_sq_num,
  +  max_queue_ext->max_rx_sq_num);
  +
  +io_tx_sq_num = max_queue_ext->max_tx_sq_num;
  +io_tx_cq_num = max_queue_ext->max_tx_cq_num;
  } else {
-    io_sq_num = get_feat_ctx->max_queues.max_sq_num;
+    struct ena_admin_queue_feature_desc *max_queues =
+    &get_feat_ctx->max_queues;
    +io_rx_num = min_t(int, io_tx_sq_num, io_tx_cq_num);
    }
}

/* In case of LLQ use the llq fields for the tx SQ/CQ */
+if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
+  io_tx_num = get_feat_ctx->llq.max_llq_num;
+
  io_queue_num = min_t(int, num_online_cpus(), ENA_MAX_NUM_IO_QUEUES);
-  io_queue_num = min_t(int, io_queue_num, io_sq_num);
-  io_queue_num = min_t(int, io_queue_num,
-    get_feat_ctx->max_cq_num);
-  io_queue_num = min_t(int, io_queue_num, io_rx_num);
-  io_queue_num = min_t(int, io_queue_num, pci_msix_vec_count(pdev) - 1);
  if (unlikely(!io_queue_num)) {
    @@ -2943,18 +3169,52 @@
    return io_queue_num;
  }

-static void ena_set_push_mode(struct pci_dev *pdev, struct ena_com_dev *ena_dev,
-    struct ena_com_dev_get_features_ctx *get_feat_ctx)
+static int ena_set_queues_placement_policy(struct pci_dev *pdev,
+    struct ena_admin_feature_llq_desc *llq,
  -
struct ena_llq_configurations *llq_default_configurations) {
  bool has_mem_bar;
  int rc;
  u32 llq_feature_mask;

  llq_feature_mask = 1 << ENA_ADMIN_LLQ;
  if (!(ena_dev->supported_features & llq_feature_mask)) {
    dev_err(&pdev->dev, "LLQ is not supported Fallback to host mode policy.\n");
    ena_dev->tx_mem_queue_type = ENA_ADMIN_PLACEMENT_POLICY_HOST;
    return 0;
  }

  has_mem_bar = pci_select_bars(pdev, IORESOURCE_MEM) & BIT(ENA_MEM_BAR);

  /* Enable push mode if device supports LLQ */
  if (has_mem_bar && (get_feat_ctx->max_queues.max_llq_num > 0))
    ena_dev->tx_mem_queue_type = ENA_ADMIN_PLACEMENT_POLICY_DEV;
  else
    rc = ena_com_config_dev_mode(ena_dev, llq, llq_default_configurations);
    if (unlikely(rc)) {
      dev_err(&pdev->dev, "Failed to configure the device mode. Fallback to host mode policy.\n");
      ena_dev->tx_mem_queue_type = ENA_ADMIN_PLACEMENT_POLICY_HOST;
      return 0;
    }

  /* Nothing to config, exit */
  if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST)
    return 0;

  if (!has_mem_bar) {
    dev_err(&pdev->dev, "ENA device does not expose LLQ bar. Fallback to host mode policy.\n");
    ena_dev->tx_mem_queue_type = ENA_ADMIN_PLACEMENT_POLICY_HOST;
    return 0;
  }

  ena_dev->mem_bar = devm_ioremap_wc(&pdev->dev,
  pci_resource_start(pdev, ENA_MEM_BAR),
  pci_resource_len(pdev, ENA_MEM_BAR));
  if (!ena_dev->mem_bar)
    return -EFAULT;
  return 0;
static void ena_set_dev_offloads(struct ena_com_dev_get_features_ctx *feat,
@@ -3034,7 +3294,7 @@
}
for (i = 0; i < ENA_RX_RSS_TABLE_SIZE; i++) {
    -val = ethtool_rxfh_indir_default(i, adapter->num_queues);
+val = ethtool_rxfh_indir_default(i, adapter->num_io_queues);
    rc = ena_com_indirect_table_fill_entry(ena_dev, i,
             ENA_IO_RXQ_IDX(val));
    if (unlikely(rc && (rc != -EOPNOTSUPP))) {
@@ -3067,48 +3327,84 @@
static void ena_release_bars(struct ena_com_dev *ena_dev, struct pci_dev *pdev)
{
    -int release_bars;
+int release_bars = pci_select_bars(pdev, IORESOURCE_MEM) & ENA_BAR_MASK;
    -if (ena_dev->mem_bar)
+    if (ena_dev->mem_bar)
        -devm_iounmap(&pdev->dev, ena_dev->mem_bar);
-    -if (ena_dev->reg_bar)
+    -if (ena_dev->reg_bar)
        -devm_iounmap(&pdev->dev, ena_dev->reg_bar);
-    -release_bars = pci_select_bars(pdev, IORESOURCE_MEM) & ENA_BAR_MASK;
+    -release_bars = pci_select_bars(pdev, IORESOURCE_MEM) & ENA_BAR_MASK;
        pci_release_selected_regions(pdev, release_bars);
    }
    -static int ena_calc_queue_size(struct pci_dev *pdev,
-    struct ena_com_dev *ena_dev,
-    u16 *max_tx_sgl_size,
-    u16 *max_rx_sgl_size,
-    struct ena_com_dev_get_features_ctx *get_feat_ctx)
-    {
-        u32 queue_size = ENA_DEFAULT_RING_SIZE;
-        -queue_size = min_t(u32, queue_size,
-                        -get_feat_ctx->max_queues.max_cq_depth);
-        -queue_size = min_t(u32, queue_size,
-                        -get_feat_ctx->max_queues.max_sq_depth);
-        -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
-            -queue_size = min_t(u32, queue_size,
-                           -get_feat_ctx->max_queues.max_llq_depth);
-            -queue_size = rounddown_pow_of_two(queue_size);
+static void set_default_llq_configurations(struct ena_llq_configurations *llq_config)
+{
+    static int ena_calc_queue_size(struct pci_dev *pdev,
+        struct ena_com_dev *ena_dev,
+        u16 *max_tx_sgl_size,
+        u16 *max_rx_sgl_size,
+        struct ena_com_dev_get_features_ctx *get_feat_ctx)
+    {
+        u32 queue_size = ENA_DEFAULT_RING_SIZE;
+        -queue_size = min_t(u32, queue_size,
+                            -get_feat_ctx->max_queues.max_cq_depth);
+        -queue_size = min_t(u32, queue_size,
+                            -get_feat_ctx->max_queues.max_sq_depth);
+        -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
+            -queue_size = min_t(u32, queue_size,
+                               -get_feat_ctx->max_queues.max_llq_depth);
+            -queue_size = rounddown_pow_of_two(queue_size);
+        +static void set_default_llq_configurations(struct ena_llq_configurations *llq_config)
+        +{
+        -static int ena_calc_queue_size(struct pci_dev *pdev,
-        -struct ena_com_dev *ena_dev,
-        -u16 *max_tx_sgl_size,
-        -u16 *max_rx_sgl_size,
-        -struct ena_com_dev_get_features_ctx *get_feat_ctx)
-        -{
-        -    u32 queue_size = ENA_DEFAULT_RING_SIZE;
-        -    -queue_size = min_t(u32, queue_size,
-        -                    -get_feat_ctx->max_queues.max_cq_depth);
-        -    -queue_size = min_t(u32, queue_size,
-        -                    -get_feat_ctx->max_queues.max_sq_depth);
-        -    -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
-        -        -queue_size = min_t(u32, queue_size,
-        -                        -get_feat_ctx->max_queues.max_llq_depth);
-        -        -queue_size = rounddown_pow_of_two(queue_size);
-        -    +static void set_default_llq_configurations(struct ena_llq_configurations *llq_config)
-        -    +{
-        -        -static int ena_calc_queue_size(struct pci_dev *pdev,
-        -        -struct ena_com_dev *ena_dev,
-        -        -u16 *max_tx_sgl_size,
-        -        -u16 *max_rx_sgl_size,
-        -        -struct ena_com_dev_get_features_ctx *get_feat_ctx)
-        -        -{
-        -        -    u32 queue_size = ENA_DEFAULT_RING_SIZE;
-        -        -    -queue_size = min_t(u32, queue_size,
-        -        -                    -get_feat_ctx->max_queues.max_cq_depth);
-        -        -    -queue_size = min_t(u32, queue_size,
-        -        -                    -get_feat_ctx->max_queues.max_sq_depth);
-        -        -    -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
-        -        -        -queue_size = min_t(u32, queue_size,
-        -        -                        -get_feat_ctx->max_queues.max_llq_depth);
-        -        -        -queue_size = rounddown_pow_of_two(queue_size);
-        -        -    +static void set_default_llq_configurations(struct ena_llq_configurations *llq_config)
-        -        -    +{
-        -        -        -static int ena_calc_queue_size(struct pci_dev *pdev,
-        -        -        -struct ena_com_dev *ena_dev,
-        -        -        -u16 *max_tx_sgl_size,
-        -        -        -u16 *max_rx_sgl_size,
-        -        -        -struct ena_com_dev_get_features_ctx *get_feat_ctx)
-        -        -        -{
-        -        -        -    u32 queue_size = ENA_DEFAULT_RING_SIZE;
-        -        -        -    -queue_size = min_t(u32, queue_size,
-        -        -        -                    -get_feat_ctx->max_queues.max_cq_depth);
-        -        -        -    -queue_size = min_t(u32, queue_size,
-        -        -        -                    -get_feat_ctx->max_queues.max_sq_depth);
-        -        -        -    -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
-        -        -        -        -queue_size = min_t(u32, queue_size,
-        -        -        -                        -get_feat_ctx->max_queues.max_llq_depth);
-        -        -        -        -queue_size = rounddown_pow_of_two(queue_size);
-        -        -        -    +static void set_default_llq_configurations(struct ena_llq_configurations *llq_config)
-        -        -        -    +{
-        -        -        -        -static int ena_calc_queue_size(struct pci_dev *pdev,
-        -        -        -        -struct ena_com_dev *ena_dev,
-        -        -        -        -u16 *max_tx_sgl_size,
-        -        -        -        -u16 *max_rx_sgl_size,
-        -        -        -        -struct ena_com_dev_get_features_ctx *get_feat_ctx)
-        -        -        -        -{
-        -        -        -        -    u32 queue_size = ENA_DEFAULT_RING_SIZE;
-        -        -        -        -    -queue_size = min_t(u32, queue_size,
-        -        -        -        -                    -get_feat_ctx->max_queues.max_cq_depth);
-        -        -        -        -    -queue_size = min_t(u32, queue_size,
-        -        -        -        -                    -get_feat_ctx->max_queues.max_sq_depth);
-        -        -        -        -    -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
-        -        -        -        -        -queue_size = min_t(u32, queue_size,
-        -        -        -        -                        -get_feat_ctx->max_queues.max_llq_depth);
-        -        -        -        -        -queue_size = rounddown_pow_of_two(queue_size);
-        -        -        -        -    +static void set_default_llq_configurations(struct ena_llq_configurations *llq_config)
-        -        -        -        -    +{
-        -        -        -        -        -static int ena_calc_queue_size(struct pci_dev *pdev,
-        -        -        -        -        -struct ena_com_dev *ena_dev,
-        -        -        -        -        -u16 *max_tx_sgl_size,
-        -        -        -        -        -u16 *max_rx_sgl_size,
-        -        -        -        -        -struct ena_com_dev_get_features_ctx *get_feat_ctx)
-        -        -        -        -        -{
-        -        -        -        -        -    u32 queue_size = ENA_DEFAULT_RING_SIZE;
-        -        -        -        -        -    -queue_size = min_t(u32, queue_size,
-        -        -        -        -        -                    -get_feat_ctx->max_queues.max_cq_depth);
-        -        -        -        -        -    -queue_size = min_t(u32, queue_size,
-        -        -        -        -        -                    -get_feat_ctx->max_queues.max_sq_depth);
-        -        -        -        -        -    -if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
-        -        -        -        -        -        -queue_size = min_t(u32, queue_size,
-        -        -        -        -        -                        -get_feat_ctx->max_queues.max_llq_depth);
-        -        -        -        -        -        -queue_size = rounddown_pow_of_two(queue_size);
-        -        -        -        -        -    +static void set_default_llq_configurations(struct ena_llq_configurations *llq_config)
+llq_config->llq_header_location = ENA_ADMIN_INLINE_HEADER;
+llq_config->llq_ring_entry_size = ENA_ADMIN_LIST_ENTRY_SIZE_128B;
+llq_config->llq_stride_ctrl = ENA_ADMIN_MULTIPLE_DESCS_PER_ENTRY;
+llq_config->llq_num_decs_before_header = ENA_ADMIN_LLQ_NUM_DESCS_BEFORE_HEADER_2;
+llq_config->llq_ring_entry_size_value = 128;
+
+static int ena_calc_queue_size(struct ena_calc_queue_size_ctx *ctx)
+{
+    struct ena_admin_feature_llq_desc *llq = &ctx->get_feat_ctx->llq;
+    struct ena_com_dev *ena_dev = ctx->ena_dev;
+    u32 tx_queue_size = ENA_DEFAULT_RING_SIZE;
+    u32 rx_queue_size = ENA_DEFAULT_RING_SIZE;
+    u32 max_tx_queue_size;
+    u32 max_rx_queue_size;
+
+    if (ctx->ena_dev->supported_features & BIT(ENA_ADMIN_MAX_QUEUES_EXT)) {
+        struct ena_admin_queue_ext_feature_fields *max_queue_ext =
+            &ctx->get_feat_ctx->max_queue_ext.max_queue_ext;
+        max_rx_queue_size = min_t(u32, max_queue_ext->max_rx_cq_depth,
+                                max_queue_ext->max_rx_sq_depth);
+        max_tx_queue_size = max_queue_ext->max_tx_cq_depth;
+        if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
+            max_tx_queue_size = min_t(u32, max_tx_queue_size,
+                                      llq->max_llq_depth);
+        else
+            max_tx_queue_size = min_t(u32, max_tx_queue_size,
+                                        max_queue_ext->max_per_packet_tx_descs);
+    } else {
+        struct ena_admin_queue_feature_desc *max_queues =
+            &ctx->get_feat_ctx->max_queues;
+        max_rx_queue_size = min_t(u32, max_queues->max_cq_depth,
+                                      max_queues->max_sq_depth);
+        max_tx_queue_size = max_queues->max_cq_depth;
+        if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
+            max_tx_queue_size = min_t(u32, max_tx_queue_size,
+                                      llq->max_llq_depth);
+    }
+
+    if (unlikely(!queue_size)) {
+        dev_err(&pdev->dev, "Invalid queue size\n");
+        return -EFAULT;
+    }
+    ctx->max_tx_sgl_size = min_t(u16, ENA_PKT_MAX_BUFS,
+                              max_queue_ext->max_per_packet_tx_descs);
+    ctx->max_rx_sgl_size = min_t(u16, ENA_PKT_MAX_BUFS,
+                              max_queue_ext->max_per_packet_rx_descs);
+} else {
+    struct ena_admin_queue_feature_desc *max_queues =
+        &ctx->get_feat_ctx->max_queues;
+    max_rx_queue_size = min_t(u32, max_queues->max_cq_depth,
+                              max_queues->max_sq_depth);
+    max_tx_queue_size = max_queues->max_cq_depth;
+    if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV)
+        max_tx_queue_size = min_t(u32, max_tx_queue_size,
+                                      llq->max_llq_depth);
+else
+max_tx_queue_size = min_t(u32, max_tx_queue_size,
+ max_queues->max_sq_depth);
+
-*max_tx_sgl_size = min_t(u16, ENA_PKT_MAX_BUFS,
- get_feat_ctx->max_queues.max_packet_tx_descs);
-*max_rx_sgl_size = min_t(u16, ENA_PKT_MAX_BUFS,
- get_feat_ctx->max_queues.max_packet_rx_descs);
+ctx->max_tx_sgl_size = min_t(u16, ENA_PKT_MAX_BUFS,
+ max_queues->max_packet_tx_descs);
+ctx->max_rx_sgl_size = min_t(u16, ENA_PKT_MAX_BUFS,
+ max_queues->max_packet_rx_descs);
+
+ max_tx_queue_size = rounddown_pow_of_two(max_tx_queue_size);
+ max_rx_queue_size = rounddown_pow_of_two(max_rx_queue_size);
+
+tx_queue_size = clamp_val(tx_queue_size, ENA_MIN_RING_SIZE,
+ max_tx_queue_size);
+rx_queue_size = clamp_val(rx_queue_size, ENA_MIN_RING_SIZE,
+ max_rx_queue_size);
+
+tx_queue_size = rounddown_pow_of_two(tx_queue_size);
+rx_queue_size = rounddown_pow_of_two(rx_queue_size);
+
+ctx->max_tx_queue_size = max_tx_queue_size;
+ctx->max_rx_queue_size = max_rx_queue_size;
+ctx->tx_queue_size = tx_queue_size;
+ctx->rx_queue_size = rx_queue_size;

-return queue_size;
+return 0;
}

/* ena_probe - Device Initialization Routine
@@ -3124,28 +3420,30 @@
static int ena_probe(struct pci_dev *pdev, const struct pci_device_id *ent)
{
 struct ena_com_dev_get_features_ctxt get_feat_ctxt;
-STATIC int version_printed;
-struct net_device *netdev;
-struct ena_adapter *adapter;
+struct ena_calc_queue_size_ctxt calc_queue_ctxt = { 0 };
+struct ena_llq_configurations llq_config;
 struct ena_com_dev *ena_dev = NULL;
-STATIC int adapters_found;
+struct ena_adapter *adapter;
 int io_queue_num, bars, rc;

Open Source Used In 5GaaS Edge AC-4 24096
-int queue_size;
-u16 tx_sgl_size = 0;
-u16 rx_sgl_size = 0;
+struct net_device *netdev;
+static int adapters_found;
+char *queue_type_str;
bool wd_state;

dev_dbg(&pdev->dev, "%s", __func__);

-if (version_printed++ == 0)
-dev_info(&pdev->dev, "%s", version);
-
rc = pci_enable_device_mem(pdev);
if (rc) {
    dev_err(&pdev->dev, "pci_enable_device_mem() failed!
    return rc;
}

+rc = dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(ENA_MAX_PHYS_ADDR_SIZE_BITS));
+if (rc) {
    dev_err(&pdev->dev, "dma_set_mask_and_coherent failed %d
    goto err_disable_device;
+
    pci_set_master(pdev);

ena_dev = vzalloc(sizeof(*ena_dev));
@@ -3181,32 +3479,38 @@
goto err_free_region;
}

-ena_set_push_mode(pdev, ena_dev, &get_feat_ctx);
+set_default_llq_configurations(&llq_config);

-if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_DEV) {
-    ena_dev->mem_bar = devm_ioremap_wc(&pdev->dev,
-        pci_resource_start(pdev, ENA_MEM_BAR),
-        pci_resource_len(pdev, ENA_MEM_BAR));
-    if (!ena_dev->mem_bar) {
-        rc = -EFAULT;
-        goto err_device_destroy;
-    }
+
    +rc = ena_set_queues_placement_policy(pdev, ena_dev, &get_feat_ctx.llq,
    +        &llq_config);
    +if (rc) {
    +    dev_err(&pdev->dev, "ena device init failed\n"
    +        goto err_device_destroy;

Open Source Used In 5GaaS Edge AC-4 24097
-/* Initial Tx interrupt delay. Assumes 1 usec granularity.
+calc_queue_ctx.ena_dev = ena_dev;
+calc_queue_ctx.get_feat_ctx = &get_feat_ctx;
+calc_queue_ctx.pdev = pdev;
+
+/* Initial Tx and RX interrupt delay. Assumes 1 usec granularity.
* Updated during device initialization with the real granularity
*/
ena_dev->intr_moder_tx_interval = ENA_INTR_INITIAL_TX_INTERVAL_USECS;
+ena_dev->intr_moder_rx_interval = ENA_INTR_INITIAL_RX_INTERVAL_USECS;
+ena_dev->intr_delay_resolution = ENA_DEFAULT_INTR_DELAY_RESOLUTION;
io_queue_num = ena_calc_io_queue_num(pdev, ena_dev, &get_feat_ctx);
-queue_size = ena_calc_queue_size(pdev, ena_dev, &tx_sgl_size,
-    &rx_sgl_size, &get_feat_ctx);
-if ((queue_size <= 0) || (io_queue_num <= 0)) {
+rc = ena_calc_queue_size(&calc_queue_ctx);
+if (rc || io_queue_num <= 0) {
    rc = -EFAULT;
goto err_device_destroy;
}

-netdev = alloc_etherdev_mq(sizeof(struct ena_adapter), io_queue_num);

-adapter->tx_ring_size = queue_size;
-adapter->rx_ring_size = queue_size;
+adapter->requested_tx_ring_size = calc_queue_ctx.tx_queue_size;
+adapter->requested_rx_ring_size = calc_queue_ctx.rx_queue_size;
+adapter->max_tx_ring_size = calc_queue_ctx.max_tx_queue_size;
+adapter->max_rx_ring_size = calc_queue_ctx.max_rx_queue_size;
+adapter->max_tx_sgl_size = calc_queue_ctx.max_tx_sgl_size;
+adapter->max_rx_sgl_size = calc_queue_ctx.max_rx_sgl_size;

-adapter->max_tx_sgl_size = tx_sgl_size;

adapter->max_rx_sgl_size = rx_sgl_size;
-
adapter->num_queues = io_queue_num;
+adapter->num_io_queues = io_queue_num;
adapter->last_monitored_tx_qid = 0;

adapter->rx_copybreak = ENA_DEFAULT_RX_COPYBREAK;
@@ -3274,6 +3579,11 @@

ena_config_debug_area(adapter);

+if (!ena_update_hw_stats(adapter))
+adapter->eni_stats_supported = true;
+else
+adapter->eni_stats_supported = false;
+
memcpy(adapter->netdev->perm_addr, adapter->mac_addr, netdev->addr_len);

netif_carrier_off(netdev);
@@ -3296,9 +3606,15 @@
timer_setup(&adapter->timer_service, ena_timer_service, 0);
mod_timer(&adapter->timer_service, round_jiffies(jiffies + HZ));

-dev_info(&pdev->dev, "\%s found at mem %lx, mac addr %pM Queues %d\n",
+if (ena_dev->tx_mem_queue_type == ENA_ADMIN_PLACEMENT_POLICY_HOST)
+queue_type_str = "Regular";
+else
+queue_type_str = "Low Latency";
+
+dev_info(&pdev->dev,
+ "\%s found at mem %lx, mac addr %pM Queues %d. Placement policy: \%s\n",
DEVICE_NAME, (long)pci_resource_start(pdev, 0),
- netdev->dev_addr, io_queue_num);
+ netdev->dev_addr, io_queue_num, queue_type_str);

set_bit(ENA_FLAG_DEVICE_RUNNING, &adapter->flags);
@@ -3311,10 +3627,11 @@
ena_com_rss_destroy(ena_dev);
err_free_msix:
ena_com_dev_reset(ena_dev, ENA_REGS_RESET_INIT_ERR);
+/* stop submitting admin commands on a device that was reset */
+ena_com_set_admin_running_state(ena_dev, false);
ena_free_mgmnt_irq(adapter);
ena_disable_msix(adapter);
err_worker_destroy:
-ena_com_destroy_interrupt_moderation(ena_dev);
del_timer(&adapter->timer_service);
err_netdev_destroy:
free_netdev(netdev);
@@ -3358,13 +3675,15 @@
/***************************************************************************/
/***************************************************************************/

-/* ena_remove - Device Removal Routine
+/* __ena_shutoff - Helper used in both PCI remove/shutdown routines
 * @pdev: PCI device information struct
+ * @shutdown: Is it a shutdown operation? If false, means it is a removal
 * 
- * ena_remove is called by the PCI subsystem to alert the driver
- * that it should release a PCI device.
+ * __ena_shutoff is a helper routine that does the real work on shutdown and
+ * removal paths; the difference between those paths is with regards to whether
+ * dettach or unregister the netdevice.
 */
-static void ena_remove(struct pci_dev *pdev)
+static void __ena_shutoff(struct pci_dev *pdev, bool shutdown)
{
    struct ena_adapter *adapter = pci_get_drvdata(pdev);
    struct ena_com_dev *ena_dev;
    @@ -3380,28 +3699,23 @@
}
#endif /* CONFIG_RFS_ACCEL */

-unregister_netdev(netdev);
+/* Make sure timer and reset routine won't be called after
+ * freeing device resources.
+ */
+del_timer_sync(&adapter->timer_service);
+
cancel_work_sync(&adapter->reset_task);

-/* Reset the device only if the device is running. */
-if (test_bit(ENA_FLAG_DEVICE_RUNNING, &adapter->flags))
-ena_com_dev_reset(ena_dev, adapter->reset_reason);
-
-ena_free_mgmnt_irq(adapter);
-
-ena_disable_msix(adapter);
-
-free_netdev(netdev);
-
-ena_com_mmmio_reg_read_request_destroy(ena_dev);
-
-ena_com_abort_admin_commands(ena_dev);
-
-ena_com_wait_for_abort_completion(ena_dev);
-
-ena_com_admin_destroy(ena_dev);
+rtnl_lock(); /* lock released inside the below if-else block */
+ena_destroy_device(adapter, true);
+if (shutdown) {
    netif_device_detach(netdev);
    dev_close(netdev);
    rtln_unlock();
    } else {
    rtln_unlock();
    unregister_netdev(netdev);
    free_netdev(netdev);
    }

ena_com_rss_destroy(ena_dev);

@@ -3413,11 +3727,33 @@
pci_disable_device(pdev);

-ena_com_destroy_interrupt_moderation(ena_dev);
-
-vfree(ena_dev);
}

+/* ena_remove - Device Removal Routine
+ * @pdev: PCI device information struct
+ *
+ * ena_remove is called by the PCI subsystem to alert the driver
+ * that it should release a PCI device.
+ */
+
+static void ena_remove(struct pci_dev *pdev)
+{
+    __ena_shutoff(pdev, false);
+}
+
+/* ena_shutdown - Device Shutdown Routine
+ * @pdev: PCI device information struct
+ *
+ * ena_shutdown is called by the PCI subsystem to alert the driver that
+ * a shutdown/reboot (or kexec) is happening and device must be disabled.
+ */
+
+static void ena_shutdown(struct pci_dev *pdev)
+{
+    __ena_shutoff(pdev, true);
ifdef CONFIG_PM
/* ena_suspend - PM suspend callback
 * @pdev: PCI device information struct
@@ -3437,7 +3773,7 @@
     "ignoring device reset request as the device is being suspended\n"); clear_bit(ENA_FLAG_TRIGGER_RESET, &adapter->flags);
 }
-ena_destroy_device(adapter);
+ena_destroy_device(adapter, true);
rtnl_unlock();
return 0;
}
@@ -3467,6 +3803,7 @@
 .id_table	= ena_pci_tbl,
 .probe		= ena_probe,
 .remove		= ena_remove,
+#ifdef CONFIG_PM
 .suspend    = ena_suspend,
 .resume     = ena_resume,
@@ -3476,8 +3813,6 @@
 static int __init ena_init(void)
 {
- pr_info("%s", version);
- ena_wq = create_singlenode_workqueue(DRV_MODULE_NAME);
 if (!ena_wq) {
 pr_err("Failed to create workqueue\n");
@@ -3456,6 +3792,9 @@
 rx_drops = ((u64)desc->rx_drops_high << 32) | desc->rx_drops_low;
 u64_stats_update_begin(&adapter->syncp);
+/* These stats are accumulated by the device, so the counters indicate
+ * all drops since last reset.
+ */
 adapter->dev_stats.rx_drops = rx_drops;
 u64_stats_update_end(&adapter->syncp);
 }
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_netdev.h
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_netdev.h
@@ -1,39 +1,13 @@
+/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
 /*
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- */
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+ */

#ifndef ENA_H
#define ENA_H

#include <linux/bitops.h>
+/#include <linux/dim.h>
#include <linux/etherdevice.h>
#include <linux/inetdevice.h>
#include <linux/interrupt.h>
@@ -43,24 +17,24 @@
#include "ena_com.h"
#include "ena_eth_com.h"

-#define DRV_MODULE_VER_MAJOR	1
-#define DRV_MODULE_VER_MINOR	3
-#define DRV_MODULE_VER_SUBMINOR 0
-
-#define DRV_MODULE_NAME	"ena"
-#ifndef DRV_MODULE_VERSION

-#define DRV_MODULE_VERSION \
-__stringify(DRV_MODULE_VER_MAJOR) "."\n-__stringify(DRV_MODULE_VER_MINOR) "."\n-__stringify(DRV_MODULE_VER_SUBMINOR) "K"
-#endif
-
#define DEVICE_NAME"Elastic Network Adapter (ENA)"

/* 1 for AENQ + ADMIN */
#define ENA_ADMIN_MSIX_VEC1
#define ENA_MAX_MSIX_VEC(io_queues)(ENA_ADMIN_MSIX_VEC + (io_queues))

+/* The ENA buffer length fields is 16 bit long. So when PAGE_SIZE == 64kB the
+ * driver passes 0.
+ * Since the max packet size the ENA handles is ~9kB limit the buffer length to
+ * 16kB.
+ */
+#if PAGE_SIZE > SZ_16K
+#define ENA_PAGE_SIZE SZ_16K
+else
+#define ENA_PAGE_SIZE PAGE_SIZE
+#endif
+
#define ENA_MIN_MSIX_VEC2

#define ENA_REG_BAR0
@@ -68,9 +42,12 @@
#define ENA_BAR_MASK (BIT(ENA_REG_BAR) | BIT(ENA_MEM_BAR))

#define ENA_DEFAULT_RING_SIZE(1024)
+#define ENA_MIN_RING_SIZE(256)
+
+#define ENA_MIN_NUM_IO_QUEUES(1)

#define ENA_TX_WAKEUP_THRESH(MAX_SKB_FRAGS + 2)
-#define ENA_DEFAULT_RX_COPYBREAK(128 - NET_IP_ALIGN)
+#define ENA_DEFAULT_RX_COPYBREAK(256 - NET_IP_ALIGN)

/* limit the buffer size to 600 bytes to handle MTU changes from very
 * small to very large, in which case the number of buffers per packet
 @@ -95,10 +72,11 @@
 */
#define ENA_TX_POLL_BUDGET_DIVIDER4

-/* Refill Rx queue when number of available descriptors is below
- * QUEUE_SIZE / ENA_RX_REFILL_THRESH_DIVIDER
+/* Refill Rx queue when number of required descriptors is above
+ * QUEUE_SIZE / ENA_RX_REFILL_THRESH_DIVIDER or ENA_RX_REFILL_THRESH_PACKET
/*
#define ENA_RX_REFILL_THRESH_DIVIDER 8
+#define ENA_RX_REFILL_THRESH_PACKET 256

/*/ Number of queues to check for missing queues per timer service */
#define ENA_MONITORED_TX_QUEUES 4
@@ -113,6 +91,8 @@
#define ENA_IO_TXQ_IDX(q) (2 * (q))
#define ENA_IO_RXQ_IDX(q) (2 * (q) + 1)
+#define ENA_IO_TXQ_IDX_TO_COMBINED_IDX(q) ((q) / 2)
+#define ENA_IO_RXQ_IDX_TO_COMBINED_IDX(q) (((q) - 1) / 2)

#define ENA_MGMT_IRQ_IDX 0
#define ENA_IO_IRQ_FIRST_IDX 1
@@ -122,6 +102,7 @@
 /* We wait for 6 sec just to be on the safe side. */
 */
#define ENA_DEVICE_KALIVE_TIMEOUT (6 * HZ)
+#define ENA_MAX_NO_INTERRUPT_ITERATIONS 3

#define ENA_MMIO_DISABLE_REG_READ BIT(0)
@@ -139,6 +120,19 @@
struct ena_ring *tx_ring;
struct ena_ring *rx_ring;
u32 qid;
+struct dim dim;
+}
+
+struct ena_calc_queue_size_ctx {
+        struct ena_com_dev_get_features_ctx *get_feat_ctx;
+        struct ena_com_dev *ena_dev;
+        struct pci_dev *pdev;
+        u16 tx_queue_size;
+        u16 rx_queue_size;
+        u16 max_tx_queue_size;
+        u16 max_rx_queue_size;
+        u16 max_rx_sgl_size;
+        u16 max_rx_sgl_size;
+    };

struct ena_tx_buffer {
@@ -150,6 +144,9 @@
/* num of buffers used by this skb */
u32 num_of_bufs;

+/* Indicate if bufs[0] map the linear data of the skb. */
+u8 map_linear_data;
+
/* Used for detect missing tx packets to limit the number of prints */
+u32 print_once;
/* Save the last jiffies to detect missing tx packets */
@@ -185,31 +182,32 @@
+tu64 tx_poll;
+tu64 doorbells;
+tu64 bad_req_id;
+tu64 llq_buffer_copy;
+tu64 missed_tx;
+tu64 unmask_interrupt;
+
};

struct ena_stats_rx {
    tu64 cnt;
+tu64 bytes;
+tu64 rx_copybreak_pkt;
+tu64 csum_good;
+tu64 refil_partial;
+tu64 bad_csum;
+tu64 page_alloc_fail;
+tu64 skb_alloc_fail;
+tu64 dma_mapping_err;
+tu64 bad_desc_num;
    -tu64 rx_copybreak_pkt;
-    tu64 bad_req_id;
+    tu64 csum_unchecked;
};

struct ena_ring {
    -union {
        -/* Holds the empty requests for TX/RX */
        - * out of order completions */
        - u16 *free_tx_ids;
        - u16 *free_rx_ids;
        -};
    +/* Holds the empty requests for TX/RX */
    + * out of order completions */
    + u16 *free_ids;

    union {
        struct ena_tx_buffer *tx_buffer_info;
        @@ -236,6 +234,9 @@
/* The maximum header length the device can handle */
u8 tx_max_header_size;

+bool first_interrupt;
+u16 no_interrupt_event_cnt;
+
/* cpu for TPH */
int cpu;
/* number of tx/rx_buffer_info's entries */
@@ -246,13 +247,14 @@
struct ena_com_rx_buf_info ena_bufs[ENA_PKT_MAX_BUFS];
u32 smoothed_interval;
u32 per_napi_packets;
- u32 per_napi_bytes;
-enum ena_intr_moder_level moder_tbl_idx;
+u16 non_empty_napi_events;
struct u64_stats_sync syncp;
union {
struct ena_stats_tx tx_stats;
struct ena_stats_rx rx_stats;
};
+
+u8 *push_buf_intermediate_buf;
int empty_rx_queue;
} ____cacheline_aligned;

@@ -289,17 +291,17 @@
u32 rx_copybreak;
u32 max_mtu;

-int num_queues;
+int num_io_queues;

int msix_vecs;

u32 missing_tx_completion_threshold;

-u32 tx_usecs, rx_usecs; /* interrupt moderation */
-u32 tx_frames, rx_frames; /* interrupt moderation */
+u32 requested_tx_ring_size;
+u32 requested_rx_ring_size;

-u32 tx_ring_size;
-u32 rx_ring_size;
+u32 max_tx_ring_size;
+u32 max_rx_ring_size;

u32 msg_enable;
struct u64_stats_sync syncp;
struct ena_stats_dev dev_stats;
+struct ena_admin_eni_stats eni_stats;
+bool eni_stats_supported;

/* last queue index that was checked for uncompleted tx packets */
u32 last_monitored_tx_qid;

void ena_dump_stats_to_buf(struct ena_adapter *adapter, u8 *buf);

+int ena_update_hw_stats(struct ena_adapter *adapter);
+
+int ena_update_queue_sizes(struct ena_adapter *adapter,
 + u32 new_tx_size,
 + u32 new_rx_size);
+int ena_update_queue_count(struct ena_adapter *adapter, u32 new_channel_count);
+
int ena_get_sset_count(struct net_device *netdev, int sset);

#endif /* !(ENA_H) */
--- linux-4.15.0.orig/drivers/net/ethernet/amazon/ena/ena_pci_id_tbl.h
+++ linux-4.15.0/drivers/net/ethernet/amazon/ena/ena_pci_id_tbl.h
@@ -1,33 +1,6 @@
+/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
+/
+/*
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- *   provided with the distribution.
- */
Open Source Used In 5GaaS Edge AC-4 24108
#ifndef _ENA_REGS_H_
#define _ENA_REGS_H_

enum ena_regs_reset_reason_types {
- ENA_REGS_RESET_NORMAL = 0,
- ENA_REGS_RESET_KEEP_ALIVE_TO = 1,
- ENA_REGS_RESET_ADMIN_TO = 2,
- ENA_REGS_RESET_MISS_TX_CMPL = 3,
- ENA_REGS_RESET_INV_RX_REQ_ID = 4,
- ENA_REGS_RESET_INV_TX_REQ_ID = 5,
- ENA_REGS_RESET_TOO_MANY_RX_DESCS = 6,
- ENA_REGS_RESET_INIT_ERR = 7,
- ENA_REGS_RESET_DRIVER_INVALID_STATE = 8,
- ENA_REGS_RESET_OS_TRIGGER = 9,
- ENA_REGS_RESET_OS_NETDEV_WD = 10,
- ENA_REGS_RESET_SHUTDOWN = 11,
- ENA_REGS_RESET_USER_TRIGGER = 12,
- ENA_REGS_RESET_GENERIC = 13,
+ ENA_REGS_RESET_NORMAL = 0,
+ ENA_REGS_RESET_KEEP_ALIVE_TO = 1,
+ ENA_REGS_RESET_ADMIN_TO = 2,
+ ENA_REGS_RESET_MISS_TX_CMPL = 3,
+ ENA_REGS_RESET_INV_RX_REQ_ID = 4,
+ ENA_REGS_RESET_INV_TX_REQ_ID = 5,
+ ENA_REGS_RESET_TOO_MANY_RX_DESCS = 6,
+ ENA_REGS_RESET_INIT_ERR = 7,
+ ENA_REGS_RESET_DRIVER_INVALID_STATE = 8,
+ ENA_REGS_RESET_OS_TRIGGER = 9,
+ ENA_REGS_RESET_OS_NETDEV_WD = 10,
+ ENA_REGS_RESET_SHUTDOWN = 11,
+ ENA_REGS_RESET_USER_TRIGGER = 12,
+ ENA_REGS_RESET_GENERIC = 13,
+ ENA_REGS_RESET_MISS_INTERRUPT = 14,
};
/* ena_registers offsets */
#define ENA_REGS_VERSION_OFF 0x0
#define ENA_REGS_CONTROLLER_VERSION_OFF 0x4
#define ENA_REGS_CAPS_OFF 0x8
#define ENA_REGS_CAPS_EXT_OFF 0xc
#define ENA_REGS_AQ_BASE_LO_OFF 0x10
#define ENA_REGS_AQ_BASE_HI_OFF 0x14
#define ENA_REGS_AQ_CAPS_OFF 0x18
#define ENA_REGS_AQ_DB_OFF 0x2c
#define ENA_REGS_AENQ_BASE_LO_OFF 0x38
#define ENA_REGS_AENQ_BASE_HI_OFF 0x3c
#define ENA_REGS_AENQ_HEAD_DB_OFF 0x40
#define ENA_REGS_AENQ_TAIL_OFF 0x44
#define ENA_REGS_INTR_MASK_OFF 0x4c
#define ENA_REGS_DEV_CTL_OFF 0x54
#define ENA_REGS_DEV_STS_OFF 0x58
#define ENA_REGS_MMIO_REG_READ_OFF 0x5c
#define ENA_REGS_MMIO_RESP_LO_OFF 0x60
#define ENA_REGS_MMIO_RESP_HI_OFF 0x64
#define ENA_REGS_RSS_IND_ENTRY_UPDATE_OFF 0x68

+/* 0 base */
+define ENA_REGS_VERSION_OFF 0x0
+define ENA_REGS_CONTROLLER_VERSION_OFF 0x4
+define ENA_REGS_CAPS_OFF 0x8
+define ENA_REGS_CAPS_EXT_OFF 0xc
+define ENA_REGS_AQ_BASE_LO_OFF 0x10
+define ENA_REGS_AQ_BASE_HI_OFF 0x14
+define ENA_REGS_AQ_CAPS_OFF 0x18
+define ENA_REGS_AQ_DB_OFF 0x2c
+define ENA_REGS_AENQ_BASE_LO_OFF 0x38
+define ENA_REGS_AENQ_BASE_HI_OFF 0x3c
+define ENA_REGS_AENQ_HEAD_DB_OFF 0x40
+define ENA_REGS_AENQ_TAIL_OFF 0x44
+define ENA_REGS_INTR_MASK_OFF 0x4c
+define ENA_REGS_DEV_CTL_OFF 0x54
+define ENA_REGS_DEV_STS_OFF 0x58
/* version register */
-#define ENA_REGS_VERSION_MINOR_VERSION_MASK 0xff
-#define ENA_REGS_VERSION_MAJOR_VERSION_SHIFT 8
-#define ENA_REGS_VERSION_MAJOR_VERSION_MASK 0xff00

/* controller_version register */
-#define ENA_REGS_CONTROLLER_VERSION_SUBMINOR_VERSION_MASK 0xff
-#define ENA_REGS_CONTROLLER_VERSION_MINOR_VERSION_SHIFT 8
-#define ENA_REGS_CONTROLLER_VERSION_MINOR_VERSION_MASK 0xff00
-#define ENA_REGS_CONTROLLER_VERSION_MAJOR_VERSION_SHIFT 16
-#define ENA_REGS_CONTROLLER_VERSION_MAJOR_VERSION_MASK 0xff0000
-#define ENA_REGS_CONTROLLER_VERSION_IMPL_ID_SHIFT 24
-#define ENA_REGS_CONTROLLER_VERSION_IMPL_ID_MASK 0xff000000

/* caps register */
-#define ENA_REGS_CAPS_CONTIGUOUS_QUEUE_REQUIRED_MASK 0x1
-#define ENA_REGS_CAPS_RESET_TIMEOUT_SHIFT 1
-#define ENA_REGS_CAPS_RESET_TIMEOUT_MASK 0x3e
-#define ENA_REGS_CAPS_DMA_ADDR_WIDTH_SHIFT 8
-#define ENA_REGS_CAPS_DMA_ADDR_WIDTH_MASK 0xff00
-#define ENA_REGS_CAPS_ADMIN_CMD_TO_SHIFT 16
-#define ENA_REGS_CAPS_ADMIN_CMD_TO_MASK 0xf0000

/* aq_caps register */
-#define ENA_REGS_AQ_CAPS_AQ_DEPTH_MASK 0xffff
-#define ENA_REGS_AQ_CAPS_AQ_ENTRY_SIZE_SHIFT 16
/ * acq_caps register */
-#define ENA_REGS_ACQ_CAPS_ACQ_DEPTH_MASK 0xffff
-#define ENA_REGS_ACQ_CAPS_ACQ_ENTRY_SIZE_SHIFT 16
-#define ENA_REGS_ACQ_CAPS_ACQ_ENTRY_SIZE_MASK 0xffff0000
+#define ENA_REGS_ACQ_CAPS_ACQ_DEPTH_MASK 0xffff
+#define ENA_REGS_ACQ_CAPS_ACQ_ENTRY_SIZE_SHIFT 16
+#define ENA_REGS_ACQ_CAPS_ACQ_ENTRY_SIZE_MASK 0xffff0000

/ * aenq_caps register */
-#define ENA_REGS_AENQ_CAPS_AENQ_DEPTH_MASK 0xffff
-#define ENA_REGS_AENQ_CAPS_AENQ_ENTRY_SIZE_SHIFT 16
-#define ENA_REGS_AENQ_CAPS_AENQ_ENTRY_SIZE_MASK 0xffff0000
+#define ENA_REGS_AENQ_CAPS_AENQ_DEPTH_MASK 0xffff
+#define ENA_REGS_AENQ_CAPS_AENQ_ENTRY_SIZE_SHIFT 16
+#define ENA_REGS_AENQ_CAPS_AENQ_ENTRY_SIZE_MASK 0xffff0000

/ * dev_ctl register */
-#define ENA_REGS_DEV_CTL_DEV_RESET_MASK 0x1
-#define ENA_REGS_DEV_CTL_AQ_RESTART_SHIFT 1
-#define ENA_REGS_DEV_CTL_AQ_RESTART_MASK 0x2
-#define ENA_REGS_DEV_CTL_QUIESCENT_SHIFT 2
-#define ENA_REGS_DEV_CTL_QUIESCENT_MASK 0x4
-#define ENA_REGS_DEV_CTL_IO_RESUME_SHIFT 3
-#define ENA_REGS_DEV_CTL_IO_RESUME_MASK 0x8
-#define ENA_REGS_DEV_CTL_RESET_REASON_SHIFT 28
-#define ENA_REGS_DEV_CTL_RESET_REASON_MASK 0xf0000000
+#define ENA_REGS_DEV_CTL_DEV_RESET_MASK 0x1
+#define ENA_REGS_DEV_CTL_AQ_RESTART_SHIFT 1
+#define ENA_REGS_DEV_CTL_AQ_RESTART_MASK 0x2
+#define ENA_REGS_DEV_CTL_QUIESCENT_SHIFT 2
+#define ENA_REGS_DEV_CTL_QUIESCENT_MASK 0x4
+#define ENA_REGS_DEV_CTL_IO_RESUME_SHIFT 3
+#define ENA_REGS_DEV_CTL_IO_RESUME_MASK 0x8
+#define ENA_REGS_DEV_CTL_RESET_REASON_SHIFT 28
+#define ENA_REGS_DEV_CTL_RESET_REASON_MASK 0xf0000000

/ * dev_sts register */
-#define ENA_REGS_DEV_STS_READY_MASK 0x1
-#define ENA_REGS_DEV_STS_AQ_RESTART_IN_PROGRESS_SHIFT 1
-#define ENA_REGS_DEV_STS_AQ_RESTART_IN_PROGRESS_MASK 0x2
-#define ENA_REGS_DEV_STS_AQ_RESTART_FINISHED_SHIFT 2
-#define ENA_REGS_DEV_STS_AQ_RESTART_FINISHED_MASK 0x4
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_SHIFT 3
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_MASK 0x8
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_SHIFT 28
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_MASK 0x8
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_SHIFT 28
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_MASK 0x8
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_SHIFT 28
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_MASK 0x8
-#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_MASK 0x8
-#define ENA_REGS_DEV_STS_RESET_FINISHED_SHIFT 4
-#define ENA_REGS_DEV_STS_RESET_FINISHED_MASK 0x10
-#define ENA_REGS_DEV_STS_FATAL_ERROR_SHIFT 5
-#define ENA_REGS_DEV_STS_FATAL_ERROR_MASK 0x20
-#define ENA_REGS_DEV_STS_QUIESCENT_STATE_IN_PROGRESS_SHIFT 6
-#define ENA_REGS_DEV_STS_QUIESCENT_STATE_IN_PROGRESS_MASK 0x40
-#define ENA_REGS_DEV_STS_QUIESCENT_STATE_ACHIEVED_SHIFT 7
-#define ENA_REGS_DEV_STS_QUIESCENT_STATE_ACHIEVED_MASK 0x80
+#define ENA_REGS_DEV_STS_READY_MASK 0x1
+#define ENA_REGS_DEV_STS_AQ_RESTART_IN_PROGRESS_SHIFT 1
+#define ENA_REGS_DEV_STS_AQ_RESTART_IN_PROGRESS_MASK 0x2
+#define ENA_REGS_DEV_STS_AQ_RESTART_FINISHED_SHIFT 2
+#define ENA_REGS_DEV_STS_AQ_RESTART_FINISHED_MASK 0x4
+#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_SHIFT 3
+#define ENA_REGS_DEV_STS_RESET_IN_PROGRESS_MASK 0x8
+#define ENA_REGS_DEV_STS_RESET_FINISHED_SHIFT 4
+#define ENA_REGS_DEV_STS_RESET_FINISHED_MASK 0x10
+#define ENA_REGS_DEV_STS_FATAL_ERROR_SHIFT 5
+#define ENA_REGS_DEV_STS_FATAL_ERROR_MASK 0x20
+#define ENA_REGS_DEV_STS_QUIESCENT_STATE_IN_PROGRESS_SHIFT 6
+#define ENA_REGS_DEV_STS_QUIESCENT_STATE_IN_PROGRESS_MASK 0x40
+#define ENA_REGS_DEV_STS_QUIESCENT_STATE_ACHIEVED_SHIFT 7
+#define ENA_REGS_DEV_STS_QUIESCENT_STATE_ACHIEVED_MASK 0x80

/* mmio_reg_read register */
-#define ENA_REGS_MMIO_REG_READ_REQ_ID_MASK 0xffff
-#define ENA_REGS_MMIO_REG_READ_REG_OFF_SHIFT 16
-#define ENA_REGS_MMIO_REG_READ_REG_OFF_MASK 0xffff0000
+#define ENA_REGS_MMIO_REG_READ_REQ_ID_MASK 0xffff
+#define ENA_REGS_MMIO_REG_READ_REG_OFF_SHIFT 16
+#define ENA_REGS_MMIO_REG_READ_REG_OFF_MASK 0xffff0000

/* rss_ind_entry_update register */
-#define ENA_REGS_RSS_IND_ENTRY_UPDATE_INDEX_MASK 0xffff
-#define ENA_REGS_RSS_IND_ENTRY_UPDATE_CQ_IDX_SHIFT 16
-#define ENA_REGS_RSS_IND_ENTRY_UPDATE_CQ_IDX_MASK 0xffff0000
+#define ENA_REGS_RSS_IND_ENTRY_UPDATE_INDEX_MASK 0xffff
+#define ENA_REGS_RSS_IND_ENTRY_UPDATE_CQ_IDX_SHIFT 16
+#define ENA_REGS_RSS_IND_ENTRY_UPDATE_CQ_IDX_MASK 0xffff0000

#endif /*_ENA_REGS_H_ */
--- linux-4.15.0.orig/drivers/net/ethernet/amd/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/amd/Kconfig
@@ -44,7 +44,7 @@
  tristate "AMD LANCE and PCnet (AT1500 and NE2100) support"

config LANCE
  tristate "AMD LANCE and PCnet (AT1500 and NE2100) support"
-depends on ISA && ISA_DMA_API && !ARM
+depends on ISA && ISA_DMA_API && !ARM && !PPC32
--- help ---
If you have a network (Ethernet) card of this type, say Y here.
Some LinkSys cards are of this type.
@@ -138,7 +138,7 @@
config NI65
tristate "NI6510 support"
-depends on ISA && ISA_DMA_API && !ARM
+depends on ISA && ISA_DMA_API && !ARM && !PPC32
--- help ---
If you have a network (Ethernet) card of this type, say Y here.

--- linux-4.15.0.orig/drivers/net/ethernet/amd/am79c961a.c
+++ linux-4.15.0/drivers/net/ethernet/amd/am79c961a.c
@@ -440,7 +440,7 @@
  
    
 /*
- * Transmit a packet
+ * Transmit a packet
 */
-static int
+static netdev_tx_t
+am79c961_sendpacket(struct sk_buff *skb, struct net_device *dev)
{ 
  struct dev_priv *priv = netdev_priv(dev);
--- linux-4.15.0.orig/drivers/net/ethernet/amd/atarilance.c
+++ linux-4.15.0/drivers/net/ethernet/amd/atarilance.c
@@ -339,7 +339,8 @@
    static void lance_init_ring( struct net_device *dev);
+static netdev_tx_t lance_start_xmit(struct sk_buff *skb,
+    struct net_device *dev);
  static irqreturn_t lance_interrupt( int irq, void *dev_id );
  static int lance_rx( struct net_device *dev );
  static int lance_close( struct net_device *dev );
@@ -769,7 +770,8 @@
/* XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX */

-static int lance_start_xmit( struct sk_buff *skb, struct net_device *dev )
+static netdev_tx_t
+lance_start_xmit(struct sk_buff *skb, struct net_device *dev)
{ 
  struct lance_private *lp = netdev_priv(dev);
  struct lance_ioreg *IO = lp->iobase;
--- linux-4.15.0.orig/drivers/net/ethernet/amd/declance.c
netif_wake_queue(dev);

static int lance_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct lance_private *lp = netdev_priv(dev);
    volatile struct lance_regs *ll = lp->ll;
    int i, ret;
    unsigned long esar_base;
    unsigned char *esar;
    const char *desc;
    if (dec_lance_debug && version_printed++ == 0)
        printk(version);
    switch (type) {
    case ASIC_LANCE:
        printk("%s: IOASIC onboard LANCE", name);
        desc = "IOASIC onboard LANCE";
        break;
    case PMAD_LANCE:
        printk("%s: PMAD-AA", name);
        desc = "PMAD-AA";
        break;
    case PMAX_LANCE:
        printk("%s: PMAX onboard LANCE", name);
        desc = "PMAx onboard LANCE";
        break;
    }
    for (i = 0; i < 6; i++)
        dev->dev_addr[i] = esar[i * 4];

    -printk("%s: %s, addr = %pM, irq = %d\n", name, desc, dev->dev_addr, dev->irq);
    +printk("%s: %s, addr = %pM, irq = %d\n", name, desc, dev->dev_addr, dev->irq);
    dev->netdev_ops = &lance_netdev_ops;
    dev->watchdog_timeo = 5*HZ;
    pci_set_master(pdev);
}
-ioaddr = pci_resource_start(pdev, 0);
-if (!ioaddr) {
+if (!pci_resource_len(pdev, 0)) {
if (pcnet32_debug & NETIF_MSG_PROBE)
  pr_err("card has no PCI IO resources, aborting\n");
  return -ENODEV;
@@ -1561,6 +1560,8 @@
  pr_err("architecture does not support 32bit PCI busmaster DMA\n");
  return err;
}
+  
+ioaddr = pci_resource_start(pdev, 0);
if (!request_region(ioaddr, PCNET32_TOTAL_SIZE, "pcnet32_probe_pci")) {
  if (pcnet32_debug & NETIF_MSG_PROBE)
  --- linux-4.15.0.orig/drivers/net/ethernet/amd/sun3lance.c
+++ linux-4.15.0/drivers/net/ethernet/amd/sun3lance.c
@@ -236,7 +236,8 @@
  static int lance_probe( struct net_device *dev);
  static int lance_open( struct net_device *dev );
  static void lance_init_ring( struct net_device *dev );
-  static int lance_start_xmit( struct sk_buff *skb, struct net_device *dev );
+  static netdev_tx_t lance_start_xmit(struct sk_buff *skb,
+          struct net_device *dev);
  static irqreturn_t lance_interrupt( int irq, void *dev_id);
  static int lance_rx( struct net_device *dev );
  static int lance_close( struct net_device *dev );
@@ -511,7 +512,8 @@
}

-  static int lance_start_xmit( struct sk_buff *skb, struct net_device *dev )
+static netdev_tx_t lance_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
  struct lance_private *lp = netdev_priv(dev);
  int entry, len;
  --- linux-4.15.0.orig/drivers/net/ethernet/amd/sunlance.c
+++ linux-4.15.0/drivers/net/ethernet/amd/sunlance.c
@@ -1106,7 +1106,7 @@
  netif_wake_queue(dev);
}

-  static int lance_start_xmit( struct sk_buff *skb, struct net_device *dev )
+static netdev_tx_t lance_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
  struct lance_private *lp = netdev_priv(dev);
int entry, skblen, len;
@@ -1419,7 +1419,7 @@
    prop = of_get_property(nd, "tpe-link-test?", NULL);
    if (!prop)
        goto no_link_test;
+    goto node_put;

    if (strcmp(prop, "true")) {
        printk(KERN_NOTICE "SunLance: warning: overriding option 
@@ -1428,6 +1428,8 @@
        "to ecd@skynet.be\n");
        auxio_set_lte(AUXIO_LTE_ON);
    }
+    +node_put:
+    +of_node_put(nd);
    no_link_test:
    lp->auto_select = 1;
    lp->tpe = 0;
--- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-common.h
+++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-common.h
@@ -431,8 +431,6 @@
 #define MAC_MDIOSCAR_PA_WIDTH		5
 #define MAC_MDIOSCAR_RA_INDEX		0
 #define MAC_MDIOSCAR_RA_WIDTH		16
-#define MAC_MDIOSCAR_REG_INDEX		0
-#define MAC_MDIOSCAR_REG_WIDTH		21
#define MAC_MDIOSCCDR_BUSY_INDEX	22
#define MAC_MDIOSCCDR_BUSY_WIDTH	1
#define MAC_MDIOSCCDR_CMD_INDEX		16
@@ -1281,10 +1279,18 @@
 #define MDIO_PMA_10GBR_FECCTRL		0x00ab
 #endif
+    +#ifndef MDIO_PMA_RX_CTRL1
+    +#define MDIO_PMA_RX_CTRL1		0x8051
+    +#endif
+    +
+    +#ifndef MDIO_PCS_DIG_CTRL
+    +#define MDIO_PCS_DIG_CTRL0x8000
+    +#endif

+    +#ifndef MDIO_PCS_DIGITAL_STAT
+    +#define MDIO_PCS_DIGITAL_STAT0x8010
+    +#endif
+    +
+    +#ifndef MDIO_AN_XNP
+    +#define MDIO_AN_XNP0x0016

end
#endif
@@ -1321,6 +1327,10 @@
#define MDIO_VEND2_AN_STAT0x8002
#endif
+#ifndef MDIO_VEND2_PMA_CDR_CONTROL
+#define MDIO_VEND2_PMA_CDR_CONTROL0x8056
+#endif
+
#ifndef MDIO_CTRL1_SPEED1G
#define MDIO_CTRL1_SPEED1G(MDIO_CTRL1_SPEED10G & ~BMCR_SPEED100)
#endif
@@ -1356,6 +1366,8 @@
#define XGBE_KR_TRAINING_ENABLEBIT(1)
#define XGBE_PCS_CL37_BPBIT(12)
+#define XGBE_PCS_PSEQ_STATE_MASK0x1c
+#define XGBE_PCS_PSEQ_STATE_POWER_GOOD0x10
#define XGBE_AN_CL37_INT_CMPLTBIT(0)
#define XGBE_AN_CL37_INT_MASK0x01
@@ -1369,6 +1381,14 @@
#define XGBE_AN_CL37_TX_CONFIG_MASK0x08
#define XGBE_AN_CL37_MII_CTRL_8BIT0x0100
+#define XGBE_PMA_CDR_TRACK_EN_MASK0x01
+#define XGBE_PMA_CDR_TRACK_EN_OFF0x00
+#define XGBE_PMA_CDR_TRACK_EN_ON0x01
+
+#define XGBE_PMA_RX_RST_0_MASKBIT(4)
+#define XGBE_PMA_RX_RST_0_RESET_ON0x10
+#define XGBE_PMA_RX_RST_0_RESET_OFF0x00
+
/* Bit setting and getting macros
* The get macro will extract the current bit field value from within
* the variable
--- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-debugfs.c
+++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-debugfs.c
@@ -519,6 +519,22 @@
"debugfs_create_file failed\n");
}
+if (pdata->vdata->an_cdr_workaround) {
+pfile = debugfs_create_bool("an_cdr_workaround", 0600,
+ pdata->xgbe_debugfs,
+ &pdata->debugfs_an_cdr_workaround);
+if (!pfile)
+netdev_err(pdata->netdev,

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"debugfs_create_bool failed\n")
+
+pfile = debugfs_create_bool("an_cdr_track_early", 0600,
+  pdata->xgbe_debugfs,
+  &pdata->debugfs_an_cdr_track_early);
+if (!pfile)
+  netdev_err(pdata->netdev,
+    "debugfs_create_bool failed\n")
+
+
kfree(buf);
}

--- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-desc.c
+++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-desc.c
@@ -289,7 +289,7 @@
 struct page *pages = NULL;
 dma_addr_t pages_dma;
 gfp_t gfp;
-int order, ret;
+int order;

 again:
 order = alloc_order;
@@ -316,10 +316,9 @@
 /* Map the pages */
 pages_dma = dma_map_page(pdata->dev, pages, 0,
 PAGE_SIZE << order, DMA_FROM_DEVICE);
-if (dma_mapping_error(pdata->dev, pages_dma)) {
+if (dma_mapping_error(pdata->dev, pages_dma)) {
   put_page(pages);
   -return ret;
   +return -ENOMEM;
   }
 pa->pages = pages;
--- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-dev.c
+++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-dev.c
@@ -1284,6 +1284,20 @@
 }
 }

+static unsigned int xgbe_create_mdio_sca(int port, int reg)
+{
+  unsigned int mdio_sca, da;
+
+  +da = (reg & MII_ADDR_C45) ? reg >> 16 : 0;


```
+ **mdio_sca = 0;**
+ **XGMAC_SET_BITS(mdio_sca, MAC_MDIOSCAR, RA, reg);**
+ **XGMAC_SET_BITS(mdio_sca, MAC_MDIOSCAR, PA, port);**
+ **XGMAC_SET_BITS(mdio_sca, MAC_MDIOSCAR, DA, da);**
+ **return mdio_sca;**
+
+ static int xgbe_write_ext_mii_regs(struct xgbe_prv_data *pdata, int addr,
+   int reg, u16 val)
+ {
+     @@ -1291,9 +1305,7 @@
+     reinit_completion(&pdata->mdio_complete);
+
+     -mdio_sca = 0;
+     -XGMAC_SET_BITS(mdio_sca, MAC_MDIOSCAR, REG, reg);
+     -XGMAC_SET_BITS(mdio_sca, MAC_MDIOSCAR, DA, addr);
+     +mdio_sca = xgbe_create_mdio_sca(addr, reg);
+     XGMAC_IOWRITE(pdata, MAC_MDIOSCAR, mdio_sca);
+
+     mdio_sccd = 0;
+     @@ -1317,9 +1329,7 @@
+     reinit_completion(&pdata->mdio_complete);
+
+     -mdio_sca = 0;
+     -XGMAC_SET_BITS(mdio_sca, MAC_MDIOSCAR, REG, reg);
+     -XGMAC_SET_BITS(mdio_sca, MAC_MDIOSCAR, DA, addr);
+     +mdio_sca = xgbe_create_mdio_sca(addr, reg);
+     XGMAC_IOWRITE(pdata, MAC_MDIOSCAR, mdio_sca);
+
+     mdio_sccd = 0;
+     --- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-drv.c
+     +++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-drv.c
+     @@ -515,7 +515,7 @@
+     xgbe_disable_rx_tx_ints(pdata);
+
+     /* Turn on polling */
+     -__napi_schedule_irqoff(&pdata->napi);
+     +__napi_schedule(&pdata->napi);
+     }
+     } else {
+     /* Don't clear Rx/Tx status if doing per channel DMA
+     @@ -595,7 +595,7 @@
+
+     reissue_mask = 1 << 0;
```
if (!pdata->per_channel_irq)
- reissue_mask |= 0xffff < 4;
+ reissue_mask |= 0xffff << 4;

XP_IOWRITE(pdata, XP_INT_REISSUE_EN, reissue_mask);
}
@@ -1377,6 +1377,7 @@
return;

netif_tx_stop_all_queues(netdev);
+netif_carrier_off(pdata->netdev);

xgbe_stop_timers(pdata);
flush_workqueue(pdata->dev_workqueue);
@@ -1962,7 +1963,7 @@
return 0;
}

-static int xgbe_xmit(struct sk_buff *skb, struct net_device *netdev)
+static netdev_tx_t xgbe_xmit(struct sk_buff *skb, struct net_device *netdev)
{
 struct xgbe_prv_data *pdata = netdev_priv(netdev);
 struct xgbe_hw_if *hw_if = &pdata->hw_if;
@@ -1971,7 +1972,7 @@
 struct xgbe_ring *ring;
 struct xgbe_packet_data *packet;
 struct netdev_queue *txq;
- int ret;
+ netdev_tx_t ret;

 DBGPR("--xgbe_xmit: skb->len = %d\n", skb->len);

--- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-main.c
+++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-main.c
@@ -349,6 +349,7 @@
 XGMAC_SET_BITS(pdata->rss_options, MAC_RSSCR, UDP4TE, 1);

 /* Call MDIOPHY initialization routine */
+pdata->debugs_an_cdr_workaround = pdata->vdata->an_cdr_workaround;
 ret = pdata->phy_if.phy_init(pdata);
 if (ret)
 return ret;
@@ -486,13 +487,19 @@
 ret = xgbe_platform_init();
 if (ret)
 -return ret;
+goto err_platform_init;
ret = xgbe_pci_init();
if (ret)
    -return ret;
+goto err_pci_init;

return 0;
+
+err_pci_init:
+xgbe_platform_exit();
+err_platform_init:
+unregister_netdevice_notifier(&xgbe_netdev_notifier);
+return ret;
}

static void __exit xgbe_mod_exit(void)
--- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-mdio.c
+++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-mdio.c
@@ -432,11 +432,16 @@
    xgbe_an73_set(pdata, false, false);
    xgbe_an73_disable_interrupts(pdata);

+pdata->an_start = 0;
+
    netif_dbg(pdata, link, pdata->netdev, "CL73 AN disabled\n");
}

static void xgbe_an_restart(struct xgbe_prv_data *pdata)
{
+if (pdata->phy_if.phy_impl.an_pre)
+pdata->phy_if.phy_impl.an_pre(pdata);
+
    switch (pdata->an_mode) {
    case XGBE_AN_MODE_CL73:
    case XGBE_AN_MODE_CL73_REDRV:
@@ -453,6 +458,9 @@
    }

static void xgbe_an_disable(struct xgbe_prv_data *pdata)
{
+if (pdata->phy_if.phy_impl.an_post)
+pdata->phy_if.phy_impl.an_post(pdata);
+
    switch (pdata->an_mode) {
    case XGBE_AN_MODE_CL73:
    case XGBE_AN_MODE_CL73_REDRV:
@@ -505,11 +513,11 @@
    }

    XMDIO_WRITE(pdata, MDIO_MMD_PMAPMD, MDIO_PMA_10GBR_PMD_CTRL, reg);
- if (pdata->phy_if.phy_impl.kr_training_post)
  pdata->phy_if.phy_impl.kr_training_post(pdata);
-
  netif_dbg(pdata, link, pdata->netdev,
    "KR training initiated\n");
+
  if (pdata->phy_if.phy_impl.kr_training_post)
  pdata->phy_if.phy_impl.kr_training_post(pdata);
}

return XGBE_AN_PAGE_RECEIVED;
@@ -637,11 +645,11 @@
return XGBE_AN_NO_LINK;
}
-
-xgbe_an73_disable(pdata);
+  xgbe_an_disable(pdata);

  xgbe_switch_mode(pdata);
-
-xgbe_an73_restart(pdata);
+  xgbe_an_restart(pdata);

  return XGBE_AN_INCOMPAT_LINK;
}
@@ -820,6 +828,9 @@
  pdata->an_result = pdata->an_state;
  pdata->an_state = XGBE_AN_READY;
+
  if (pdata->phy_if.phy_impl.an_post)
  pdata->phy_if.phy_impl.an_post(pdata);
+
  netif_dbg(pdata, link, pdata->netdev, "CL37 AN result: %s\n",
    xgbe_state_as_string(pdata->an_result));
}
@@ -903,6 +914,9 @@
  pdata->kx_state = XGBE_RX_BPA;
  pdata->an_start = 0;
+
  if (pdata->phy_if.phy_impl.an_post)
  pdata->phy_if.phy_impl.an_post(pdata);
+
  netif_dbg(pdata, link, pdata->netdev, "CL73 AN result: %s\n",
    xgbe_state_as_string(pdata->an_result));
}
@@ -1114,14 +1128,14 @@
if (pdata->tx_pause != pdata->phy.tx_pause) {
    new_state = 1;
    pdata->hw_if.config_rx_flow_control(pdata);
    pdata->tx_pause = pdata->phy.tx_pause;
    pdata->hw_if.config_tx_flow_control(pdata);
}

if (pdata->rx_pause != pdata->phy.rx_pause) {
    new_state = 1;
    pdata->hw_if.config_rx_flow_control(pdata);
    pdata->rx_pause = pdata->phy.rx_pause;
    pdata->hw_if.config_rx_flow_control(pdata);
}

/* Speed support */
@@ -1341,7 +1355,7 @@
    &an_restart);
    if (an_restart) {
        xgbe_phy_config_aneg(pdata);
-    return;
+    goto adjust_link;
    }

    if (pdata->phy.link) {
        @@ -1392,7 +1406,6 @@
        pdata->phy_if.phy_impl.stop(pdata);
        pdata->phy.link = 0;
        -netif_carrier_off(pdata->netdev);
        xgbe_phy_adjust_link(pdata);
    }

--- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-pci.c
+++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-pci.c
@@ -426,6 +426,8 @@
 struct net_device *netdev = pdata->netdev;
 int ret = 0;

+XP_IOWRITE(pdata, XP_INT_EN, 0x1fffff);
 +
 pdata->lpm_ctrl &= ~MDIO_CTRL1_LPOWER;
 XMDIO_WRITE(pdata, MDIO_MMD_PCS, MDIO_CTRL1, pdata->lpm_ctrl);
@@ -454,6 +456,7 @@
 .irq_reissue_support= 1,
 .tx_desc_prefetch= 5,
 .rx_desc_prefetch= 5,
+  .an_cdr_workaround= 1,
static const struct xgbe_version_data xgbe_v2b = {
  .irq_reissue_support= 1,
  .tx_desc_prefetch= 5,
  .rx_desc_prefetch= 5,
  .an_cdr_workaround	= 1,
};

static const struct pci_device_id xgbe_pci_table[] = {
  --- linux-4.15.0.orig/drivers/net/ethernet/amd/xgbe/xgbe-phy-v2.c
  +++ linux-4.15.0/drivers/net/ethernet/amd/xgbe/xgbe-phy-v2.c
  @@ -147,6 +147,14 @@
    /* Rate-change complete wait/retry count */
    #define XGBE_RATECHANGE_COUNT500

    +/* CDR delay values for KR support (in usec) */
    +#define XGBE_CDR_DELAY_INIT10000
    +#define XGBE_CDR_DELAY_INC10000
    +#define XGBE_CDR_DELAY_MAX100000
    +
    +/* RRC frequency during link status check */
    +#define XGBE_RRC_FREQUENCY10
    +
    enum xgbe_port_mode {
      XGBE_PORT_MODE_RSVD = 0,
      XGBE_PORT_MODE_BACKPLANE,
      @@ -245,6 +253,10 @@
      #define XGBE_SFP_BASE_VENDOR_SN	4
      #define XGBE_SFP_BASE_VENDOR_SN_LEN	16
      +#define XGBE_SFP_EXTD_OPT1	1
      +#define XGBE_SFP_EXTD_OPT1_RX_LOS	BIT(1)
      +#define XGBE_SFP_EXTD_OPT1_TX_FAULT	BIT(3)
      +
      #define XGBE_SFP_EXTD_DIAG	28
      #define XGBE_SFP_EXTD_DIAG_ADDR_CHANGE	BIT(2)
      @@ -324,6 +336,10 @@

      unsigned int sfp_gpio_address;
      unsigned int sfp_gpio_mask;
      +unsigned int sfp_gpio_inputs;
      unsigned int sfp_gpio_rx_los;
      unsigned int sfp_gpio_tx_fault;
      unsigned int sfp_gpio_mod_absent;
      @@ -355,6 +368,10 @@
unsigned int redrv_addr;
unsigned int redrv_lane;
unsigned int redrv_model;
+
+/* KR AN support */
+unsigned int phy_cdr_notrack;
+unsigned int phy_cdr_delay;
};
/* I2C, MDIO and GPIO lines are muxed, so only one device at a time */
@@ -974,6 +991,49 @@
phy_data->sfp_phy_avail = 1;
}
+static bool xgbe_phy_check_sfp_rx_los(struct xgbe_phy_data *phy_data)
+{
+u8 *sfp_extd = phy_data->sfp_eeprom.extd;
+
+if (!(sfp_extd[XGBE_SFP_EXTD_OPT1] & XGBE_SFP_EXTD_OPT1_RX_LOS))
+return false;
+
+if (phy_data->sfp_gpio_mask & XGBE_GPIO_NO_RX_LOS)
+return false;
+
+if (phy_data->sfp_gpio_inputs & (1 << phy_data->sfp_gpio_rx_los))
+return true;
+
+return false;
+}
+
+static bool xgbe_phy_check_sfp_tx_fault(struct xgbe_phy_data *phy_data)
+{
+u8 *sfp_extd = phy_data->sfp_eeprom.extd;
+
+if (!(sfp_extd[XGBE_SFP_EXTD_OPT1] & XGBE_SFP_EXTD_OPT1_TX_FAULT))
+return false;
+
+if (phy_data->sfp_gpio_mask & XGBE_GPIO_NO_TX_FAULT)
+return false;
+
+if (phy_data->sfp_gpio_inputs & (1 << phy_data->sfp_gpio_tx_fault))
+return true;
+
+return false;
+}
+
+static bool xgbe_phy_check_sfp_mod_absent(struct xgbe_phy_data *phy_data)
+{

Open Source Used In 5GaaS Edge AC-4 24127


+if (phy_data->sfp_gpio_mask & XGBE_GPIO_NO_MOD_ABSENT)
+return false;
+
+if (phy_data->sfp_gpio_inputs & (1 << phy_data->sfp_gpio_mod_absent))
+return true;
+
+return false;
+
static bool xgbe_phy_belfuse_parse_quirks(struct xgbe_prv_data *pdata)
{
struct xgbe_phy_data *phy_data = pdata->phy_data;
//@ -1019,6 +1079,10 @@
if (sfp_base[XGBE_SFP_BASE_EXT_ID] != XGBE_SFP_EXT_ID_SFP)
return;

+/* Update transceiver signals (eeprom extd/options) */
+phy_data->sfp_tx_fault = xgbe_phy_check_sfp_tx_fault(phy_data);
+phy_data->sfp_rx_los = xgbe_phy_check_sfp_rx_los(phy_data);
+
if (xgbe_phy_sfp_parse_quirks(pdata))
return;

//@ -1184,7 +1248,6 @@
static void xgbe_phy_sfp_signals(struct xgbe_prv_data *pdata)
{
struct xgbe_phy_data *phy_data = pdata->phy_data;
-unsigned int gpio_input;
+u8 gpio_reg, gpio_ports[2];
int ret;

//@ -1199,23 +1262,9 @@
return;
}

-gpio_input = (gpio_ports[1] << 8) | gpio_ports[0];
-
-if (phy_data->sfp_gpio_mask & XGBE_GPIO_NO_MOD_ABSENT) {
-/* No GPIO, just assume the module is present for now */
-phy_data->sfp_mod_absent = 0;
-} else {
-if (!(gpio_input & (1 << phy_data->sfp_gpio_mod_absent)))
-phy_data->sfp_mod_absent = 0;
-}
+phy_data->sfp_gpio_inputs = (gpio_ports[1] << 8) | gpio_ports[0];

-phy_data->sfp_gpio_mask & XGBE_GPIO_NO_RX_LOS) &&
- (gpio_input & (1 << phy_data->sfp_gpio_rx_los))
-phy_data->sfp_rx_los = 1;
-
-if (!(phy_data->sfp_gpio_mask & XGBE_GPIO_NO_TX_FAULT) &&
-    (gpio_input & (1 << phy_data->sfp_gpio_tx_fault)))
-phy_data->sfp_tx_fault = 1;
+phy_data->sfp_mod_absent = xgbe_phy_check_sfp_mod_absent(phy_data);
}

static void xgbe_phy_sfp_mod_absent(struct xgbe_prv_data *pdata)
@@ -1733,6 +1782,27 @@
xgbe_phy_put_comm_ownership(pdata);
 }

+static void xgbe_phy_rx_reset(struct xgbe_prv_data *pdata)
+{
+  int reg;
+  +
+  reg = XMDIO_READ_BITS(pdata, MDIO_MMD_PCS, MDIO_PCS_DIGITAL_STAT,
+    XGBE_PCS_PSEQ_STATE_MASK);
+  if (reg == XGBE_PCS_PSEQ_STATE_POWER_GOOD) {
+    /* Mailbox command timed out, reset of RX block is required.
+     * This can be done by asserting the reset bit and wait for
+     * its comeletion.
+     */
+    XMDIO_WRITE_BITS(pdata, MDIO_MMD_PMAPMD, MDIO_PMA_RX_CTRL1,
+      XGBE_PMA_RX_RST_0_MASK, XGBE_PMA_RX_RST_0_RESET_ON);
+    ndelay(20);
+    XMDIO_WRITE_BITS(pdata, MDIO_MMD_PMAPMD, MDIO_PMA_RX_CTRL1,
+      XGBE_PMA_RX_RST_0_MASK, XGBE_PMA_RX_RST_0_RESET_OFF);
+    usleep_range(40, 50);
+    netif_err(pdata, link, pdata->netdev, "firmware mailbox reset performed\n");
+  }  
+}
+
+static void xgbe_phy_perform_ratechange(struct xgbe_prv_data *pdata,
unsigned int cmd, unsigned int sub_cmd)
{
@@ -1740,9 +1810,11 @@
unsigned int wait;
/* Log if a previous command did not complete */
-if (XP_IOREAD_BITS(pdata, XP_DRIVER_INT_RO, STATUS))
+if (XP_IOREAD_BITS(pdata, XP_DRIVER_INT_RO, STATUS)) {
    netif_dbg(pdata, link, pdata->netdev,
      "firmware mailbox not ready for command\n");
+    xgbe_phy_rx_reset(pdata);
+  }
+}
/* Construct the command */
XP_SET_BITS(s0, XP_DRIVER_SCRATCH_0, COMMAND, cmd);
@@ -1764,6 +1836,9 @@

netif_dbg(pdata, link, pdata->netdev,
    "firmware mailbox command did not complete\n");
+
+/* Reset on error */
+xgbe_phy_rx_reset(pdata);
}

static void xgbe_phy_rrc(struct xgbe_prv_data *pdata)
@@ -2360,8 +2435,16 @@

+if (phy_data->rrc_count++)
+phy_data->rrc_count = 0;
+xgbe_phy_rrc(pdata);
}
@@ -2669,6 +2752,103 @@

static void xgbe_phy_cdr_track(struct xgbe_prv_data *pdata)
+
+struct xgbe_phy_data *phy_data = pdata->phy_data;
+
+if (!pdata->debugfs_an_cdr_workaround)
+return;
+
+if (!phy_data->phy_cdr_notrack)
+usleep_range(phy_data->phy_cdr_delay,
+phy_data->phy_cdr_delay + 500);
+
+XMDIO_WRITE_BITS(pdata, MDIO_MMD_PMAPMD, MDIO_VEND2_PMA_CDR_CONTROL,
+ XGBE_PMA_CDR_TRACK_EN_MASK,
+ XGBE_PMA_CDR_TRACK_EN_ON);
+
+phy_data->phy_cdr_notrack = 0;
+
+static void xgbe_phy_cdr_notrack(struct xgbe_prv_data *pdata)
+{
+struct xgbe_phy_data *phy_data = pdata->phy_data;
+
+if (!pdata->debugfs_an_cdr_workaround)
+return;
+
+if (phy_data->phy_cdr_notrack)
+return;
+
+XMDIO_WRITE_BITS(pdata, MDIO_MMD_PMAPMD, MDIO_VEND2_PMA_CDR_CONTROL,
+ XGBE_PMA_CDR_TRACK_EN_MASK,
+ XGBE_PMA_CDR_TRACK_EN_OFF);
+
+xgbe_phy_rrc(pdata);
+
+phy_data->phy_cdr_notrack = 1;
+
+static void xgbe_phy_kr_training_post(struct xgbe_prv_data *pdata)
+{
+if (!pdata->debugfs_an_cdr_track_early)
+xgbe_phy_cdr_track(pdata);
+
+static void xgbe_phy_kr_training_pre(struct xgbe_prv_data *pdata)
+{
+if (pdata->debugfs_an_cdr_track_early)
+xgbe_phy_cdr_track(pdata);
+
+static void xgbe_phy_an_post(struct xgbe_prv_data *pdata)
+{
+struct xgbe_phy_data *phy_data = pdata->phy_data;
+
+switch (pdata->an_mode) {
+case XGBE_AN_MODE_CL73:
+case XGBE_AN_MODE_CL73_REDRV:
+if (phy_data->cur_mode != XGBE_MODE_KR)
+break;
+
+xgbe_phy_cdr_track(pdata);
+switch (pdata->an_result) {
+case XGBE_AN_READY:
+case XGBE_AN_COMPLETE:
+break;
+default:
+if (phy_data->phy_cdr_delay < XGBE_CDR_DELAY_MAX)
+phy_data->phy_cdr_delay += XGBE_CDR_DELAY_INC;
+else
+phy_data->phy_cdr_delay = XGBE_CDR_DELAY_INIT;
+break;
+
+default:
+break;
+
+default:
+break;
+
+static void xgbe_phy_an_pre(struct xgbe_prv_data *pdata)
+{
+struct xgbe_phy_data *phy_data = pdata->phy_data;
+
+switch (pdata->an_mode) {
+case XGBE_AN_MODE_CL73:
+case XGBE_AN_MODE_CL73_REDRV:
+if (phy_data->cur_mode != XGBE_MODE_KR)
+break;
+
+xgbe_phy_cdr_notrack(pdata);
+break;
+default:
+break;
+
+default:
+
+static void xgbe_phy_stop(struct xgbe_prv_data *pdata)
+{struct xgbe_phy_data *phy_data = pdata->phy_data;
+ struct xgbe_phy_data *phy_data = pdata->phy_data;
+ @ @ -2680,6 +2860,9 @@
xgbe_phy_sfp_reset(phy_data);
xgbe_phy_sfp_mod_absent(pdata);
+
+/* Reset CDR support */
xgbe_phy_cdr_track(pdata);
+
+/* Power off the PHY */
xgbe_phy_power_off(pdata);
/* Start in highest supported mode */
xgbe_phy_set_mode(pdata, phy_data->start_mode);

/* Reset CDR support */
xgbe_phy_cdr_track(pdata);

/* After starting the I2C controller, we can check for an SFP */
switch (phy_data->port_mode) {
  case XGBE_PORT_MODE_SFP:
    /* Register for driving external PHYs */
mii = devm_mdiobus_alloc(pdata->dev);
    if (!mii) {
      /* This structure represents implementation specific routines for an
       * implementation of a PHY. All routines are required unless noted below.

#define XGBE_DMA_SYS_AWCR	0x30303030
#define XGBE_DMA_PCI_ARCR	0x00000003
#define XGBE_DMA_PCI_AWCR	0x13131313
#define XGBE_DMA_PCI_AWARCR	0x00000313
#define XGBE_DMA_PCI_ARCR	0x000f0f0f
#define XGBE_DMA_PCI_AWCR	0x0f0f0f0f
#define XGBE_DMA_PCI_AWARCR	0x00000f0f
#define XGBE_DMA_SYS_AWCR0x30303030
#define XGBE_DMA_PCI_ARCR0x00000003
#define XGBE_DMA_PCI_ARCR0x13131313
#define XGBE_DMA_PCI_ARCR0x00000313
#define XGBE_DMA_PCI_ARCR0x000f0f0f
#define XGBE_DMA_PCI_ARCR0x0f0f0f0f
#define XGBE_DMA_PCI_ARCR0x00000f0f
#define XGBE_IRQ_MODE_EDGE	0
*/
*/ DMA cache settings - PCI device */
*/ DMA channel interrupt modes */
```
* Optional routines:
+ * an_pre, an_post
+ kr_training_pre, kr_training_post
*/
struct xgbe_phy_impl_if {
    /* Process results of auto-negotiation */
    enum xgbe_mode (*an_outcome)(struct xgbe_prv_data *);

    /* Pre/Post auto-negotiation support */
    void (*an_pre)(struct xgbe_prv_data *);
    void (*an_post)(struct xgbe_prv_data *);

    /* Pre/Post KR training enablement support */
    void (*kr_training_pre)(struct xgbe_prv_data *);
    void (*kr_training_post)(struct xgbe_prv_data *);

    unsigned int irq_reissue_support;
    unsigned int tx_desc_prefetch;
    unsigned int rx_desc_prefetch;
    unsigned int an_cdr_workaround;
};

struct xgbe_vxlan_data {
    unsigned int debugfs_xprop_reg;
    unsigned int debugfs_xi2c_reg;
    bool debugfs_an_cdr_workaround;
    bool debugfs_an_cdr_track_early;
};

/* Function prototypes*/
--- linux-4.15.0.orig/drivers/net/ethernet/apm/xgene-v2/main.c
+++ linux-4.15.0/drivers/net/ethernet/apm/xgene-v2/main.c
@@ -691,11 +691,13 @@
         ret = register_netdev(ndev);
         if (ret) {
             netdev_err(ndev, "Failed to register netdev\n");
         -goto err;
         +goto err_mdio_remove;
         }

         return 0;

         +err_mdio_remove:
         +xge_mdio_remove(ndev);
err:
free_netdev(ndev);

--- linux-4.15.0.orig/drivers/net/ethernet/apm/xgene/xgene_enet_main.c
+++ linux-4.15.0/drivers/net/ethernet/apm/xgene/xgene_enet_main.c
@@ -29,9 +29,6 @@
 #define RES_RING_CSR1
 #define RES_RING_CMD2

-static const struct of_device_id xgene_enet_of_match[];
-static const struct acpi_device_id xgene_enet_acpi_match[];
-
-static void xgene_enet_init_bufpool(struct xgene_enet_desc_ring *buf_pool)
{
  struct xgene_enet_raw_desc16 *raw_desc;
@@ -2037,7 +2034,7 @@
     ndev = alloc_etherdev_mqs(sizeof(struct xgene_enet_pdata),
-                  XGENE_NUM_RX_RING, XGENE_NUM_TX_RING);
+                  XGENE_NUM_TX_RING, XGENE_NUM_RX_RING);
     if (!ndev)
         return -ENOMEM;

--- linux-4.15.0.orig/drivers/net/ethernet/apple/bmac.c
+++ linux-4.15.0/drivers/net/ethernet/apple/bmac.c
@@ -1185,7 +1185,7 @@
     for (i = 0; i < 6; i++)
         reset_and_select_srom(dev);
     data = read_srom(dev, i + EnetAddressOffset/2, SROMAddressBits);
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/Makefile
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/Makefile
@@ -39,4 +39,5 @@
     hw_atl/hw_atl_a0.o \
     hw_atl/hw_atl_b0.o \
     hw_atl/hw_atl_utils.o \
+hw_atl/hw_atl_utils_fw2x.o \
     hw_atl/hw_atl_llh.o
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_cfg.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_cfg.h
@@ -36,12 +36,14 @@
     #define AQ_CFG_TX_FRAME_MAX  (16U * 1024U)
     #define AQ_CFG_RX_FRAME_MAX  (4U * 1024U)
/* LRO */
#define AQ_CFG_IS_LRO_DEF
   1U

/* RSS */
#define AQ_CFG_RSS_INDIRECTION_TABLE_MAX
    256U
#define AQ_CFG_RSS_HASHKEY_SIZE
    320U
#define AQ_CFG_RSS_INDIRECTION_TABLE_MAX
   64U
#define AQ_CFG_RSS_HASHKEY_SIZE
    40U
#define AQ_CFG_IS_RSS_DEF
    1U
#define AQ_CFG_NUM_RSS_QUEUES_DEF
   AQ_CFG_VECS_DEF
#define AQ_CFG_NAPI_WEIGHT
   64U
#define AQ_CFG_MULTICAST_ADDRESS_MAX
   32U

/*#define AQ_CFG_MAC_ADDR_PERMANENT {0x30, 0x0E, 0xE3, 0x12, 0x34, 0x56}*/
#define AQ_CFG_FC_MODE
    3U
#define AQ_NIC_FC_OFF
   0U
#define AQ_NIC_FC_TX
    1U
#define AQ_NIC_FC_RX
    2U
#define AQ_NIC_FC_FULL
    3U
#define AQ_NIC_FC_AUTO
    4U
#define AQ_CFG_FC_MODE
   AQ_NIC_FC_FULL
#define AQ_CFG_SPEED_MSK
    0xFFFFU /* 0xFFFFU==auto_neg */

--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_common.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_common.h
@@ -16,8 +16,45 @@
#include <linux/pci.h>
#include "ver.h"
#include "aq_nic.h"
#include "aq_cfg.h"
#include "aq_utils.h"
#define PCI_VENDOR_ID_AQUANTIA
    0x1D6A
#define AQ_DEVICE_ID_0001
    0x0001
#define AQ_DEVICE_ID_D100
    0xD100
#define AQ_DEVICE_ID_D107
    0xD107
+#define AQ_DEVICE_ID_D108 0xD108
+define AQ_DEVICE_ID_D109 0xD109
+
+#define AQ_DEVICE_ID_AQC100 0x00B1
+#define AQ_DEVICE_ID_AQC107 0x07B1
+#define AQ_DEVICE_ID_AQC108 0x08B1
+#define AQ_DEVICE_ID_AQC109 0x09B1
+#define AQ_DEVICE_ID_AQC111 0x11B1
+#define AQ_DEVICE_ID_AQC112 0x12B1
+
+#define AQ_DEVICE_ID_AQC100S 0x80B1
+#define AQ_DEVICE_ID_AQC107S 0x87B1
+#define AQ_DEVICE_ID_AQC108S 0x88B1
+#define AQ_DEVICE_ID_AQC109S 0x89B1
+#define AQ_DEVICE_ID_AQC111S 0x91B1
+#define AQ_DEVICE_ID_AQC112S 0x92B1
+
+#define AQ_DEVICE_ID_AQC111E 0x51B1
+#define AQ_DEVICE_ID_AQC112E 0x52B1
+
+#define HW_ATL_NIC_NAME "aQuantia AQtion 10Gbit Network Adapter"
+
+#define AQ_HWREV_ANY 0
+#define AQ_HWREV_11 1
+#define AQ_HWREV_22 2
+
+#define AQ_NIC_RATE_10G BIT(0)
+#define AQ_NIC_RATE_5G BIT(1)
+#define AQ_NIC_RATE_5GS BIT(2)
+#define AQ_NIC_RATE_2GS BIT(3)
+#define AQ_NIC_RATE_1G BIT(4)
+#define AQ_NIC_RATE_100M BIT(5)
+
#endif /* AQ_COMMON_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_hw.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_hw.h
@@ -7,7 +7,7 @@
 * version 2, as published by the Free Software Foundation.
 */

-/* Fileaq_hw.h: Declaration of abstract interface for NIC hardware specific
+/* Fileaq_hw.h: Declaration of abstract interface for NIC hardware specific
  * functions.
 */

@@ -15,12 +15,15 @@
#define AQ_HW_H
/* NIC H/W capabilities */
struct aq_hw_caps_s {
    u64 hw_features;
    u64 link_speed_msk;
    unsigned int hw_priv_flags;
    +u32 media_type;
    u32 rxds;
    u32 txds;
    u32 txhwb_alignment;
    @@ -28,7 +31,7 @@
    u32 vecs;
    u32 mtu;
    u32 mac_regs_count;
    -u8 ports;
    +u32 hw_alive_check_addr;
    u8 msix_irqs;
    u8 tcs;
    u8 rxd_alignment;
    @@ -39,7 +42,6 @@
    u8 rx_ring;
    bool flow_control;
    bool is_64_dma;
    -u32 fw_ver_expected;
};

struct aq_hw_link_status_s {
    @@ -86,30 +88,45 @@
#define AQ_HW_FLAG_ERRORS      (AQ_HW_FLAG_ERR_HW | AQ_HW_FLAG_ERR_UNPLUG)

#define AQ_NIC_FLAGS_IS_NOT_READY (AQ_NIC_FLAG_STOPPING | \
    AQ_NIC_FLAG_RESETTING | AQ_NIC_FLAG_CLOSING | \
    AQ_NIC_FLAG_ERR_UNPLUG | AQ_NIC_FLAG_ERR_HW)
+
#define AQ_NIC_FLAGS_IS_NOT_TX_READY (AQ_NIC_FLAGS_IS_NOT_READY | \
    AQ_NIC_LINK_DOWN)
+
#define AQ_HW_MEDIA_TYPE_TP    1U
#define AQ_HW_MEDIA_TYPE_FIBRE 2U
+
#define AQ_HW_MULTICAST_ADDRESS_MAX     32U
+
struct aq_hw_s {
    -struct aq_obj_s header;

+atomic_t flags;
+u8 rbl_enabled:1;
struct aq_nic_cfg_s *aq_nic_cfg;
-struct aq_pci_func_s *aq_pci_func;
+const struct aq_fw_ops *aq_fw_ops;
void __iomem *mmio;
-unsigned int not_ff_addr;
struct aq_hw_link_status_s aq_link_status;
+struct hw_aq_atl_utils_mbox mbox;
+struct hw_atl_stats_s last_stats;
+struct aq_stats_s curr_stats;
+u64 speed;
+u32 itr_tx;
+u32 itr_rx;
+unsigned int chip_features;
+u32 fw_ver_actual;
+atomic_t dpc;
+u32 mbox_addr;
+u32 rpc_addr;
+u32 rpc_tid;
+struct hw_aq_atl_utils_fw_rpc rpc;
};

struct aq_ring_s;
struct aq_ring_param_s;
-struct aq_nic_cfg_s;
struct sk_buff;

struct aq_hw_ops {
-struct aq_hw_s *(*create)(struct aq_pci_func_s *aq_pci_func,
- unsigned int port, struct aq_hw_ops *ops);
-
-void (*destroy)(struct aq_hw_s *self);
-
-int (*get_hw_caps)(struct aq_hw_s *self,
- struct aq_hw_caps_s *aq_hw_caps,
- unsigned short device,
- unsigned short subsystem_device);

int (*hw_ring_tx_xmit)(struct aq_hw_s *self, struct aq_ring_s *aq_ring,
 unsigned int frags);
@@ -123,20 +140,11 @@
int (*hw_ring_tx_head_update)(struct aq_hw_s *self,
 struct aq_ring_s *aq_ring);

-int (*hw_get_mac_permanent)(struct aq_hw_s *self,
- struct aq_hw_caps_s *aq_hw_caps,
- u8 *mac);
int (*hw_set_mac_address)(struct aq_hw_s *self, u8 *mac_addr);

-int (*hw_get_link_status)(struct aq_hw_s *self);
-
-int (*hw_set_link_speed)(struct aq_hw_s *self, u32 speed);
-
int (*hw_reset)(struct aq_hw_s *self);

-int (*hw_init)(struct aq_hw_s *self, struct aq_nic_cfg_s *aq_nic_cfg,
-    u8 *mac_addr);
+int (*hw_init)(struct aq_hw_s *self, u8 *mac_addr);

int (*hw_start)(struct aq_hw_s *self);

@@ -171,7 +179,7 @@
     unsigned int packet_filter);

int (*hw_multicast_list_set)(struct aq_hw_s *self,
-    u8 ar_mac[AQ_CFG_MULTICAST_ADDRESS_MAX]
+    u8 ar_mac[AQ_HW_MULTICAST_ADDRESS_MAX]
     [ETH_ALEN],
     u32 count);
@@ -184,9 +192,8 @@
     struct aq_rss_parameters *rss_params);

int (*hw_get_regs)(struct aq_hw_s *self,
-    struct aq_hw_caps_s *aq_hw_caps, u32 *regs_buff);
-    
-int (*hw_update_stats)(struct aq_hw_s *self);
+    const struct aq_hw_caps_s *aq_hw_caps,
+    u32 *regs_buff);

struct aq_stats_s *(*hw_get_hw_stats)(struct aq_hw_s *self);
@@ -197,4 +204,20 @@
int (*hw_set_power)(struct aq_hw_s *self, unsigned int power_state);
};

+struct aq_fw_ops {
+    int (*init)(struct aq_hw_s *self);
+    +int (*reset)(struct aq_hw_s *self);
+    +int (*get_mac_permanent)(struct aq_hw_s *self, u8 *mac);
+    +int (*set_link_speed)(struct aq_hw_s *self, u32 speed);
+int (*set_state)(struct aq_hw_s *self, enum hal_atl_utils_fw_state_e state);
+
+int (*update_link_status)(struct aq_hw_s *self);
+
+int (*update_stats)(struct aq_hw_s *self);
+
};

#endif /* AQ_HW_H */

--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_hw_utils.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_hw_utils.c
@@ -13,6 +13,7 @@
#include "aq_hw_utils.h"
#include "aq_hw.h"
+#include "aq_nic.h"

void aq_hw_write_reg_bit(struct aq_hw_s *aq_hw, u32 addr, u32 msk, u32 shift, u32 val)
@@ -39,8 +40,10 @@
{ u32 value = readl(hw->mmio + reg);

-if ((~0U) == value && (~0U) == readl(hw->mmio + hw->not_ff_addr))
-aq_utils_obj_set(&hw->header.flags, AQ_HW_FLAG_ERR_UNPLUG);
+if ((~0U) == value &&
+    (~0U) == readl(hw->mmio +
+    hw->aq_nic_cfg->aq_hw_caps->hw_alive_check_addr))
+aq_utils_obj_set(&hw->flags, AQ_HW_FLAG_ERR_UNPLUG);

return value;
}
@@ -54,11 +57,11 @@
{ int err = 0;

-if (aq_utils_obj_test(&hw->header.flags, AQ_HW_FLAG_ERR_UNPLUG)) {
+if (aq_utils_obj_test(&hw->flags, AQ_HW_FLAG_ERR_UNPLUG)) {
  err = -ENXIO;
  goto err_exit;
} 

-if (aq_utils_obj_test(&hw->header.flags, AQ_HW_FLAG_ERR_HW)) {
+if (aq_utils_obj_test(&hw->flags, AQ_HW_FLAG_ERR_HW)) {
  err = -EIO;
  goto err_exit;
} 

--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_hw_utils.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_hw_utils.h
+define aq_pr_err(...) pr_err(AQ_CFG_DRV_NAME "": "__VA_ARGS__")
+define aq_pr_trace(...) pr_info(AQ_CFG_DRV_NAME "": "__VA_ARGS__")

struct aq_hw_s;

void aq_hw_write_reg_bit(struct aq_hw_s *aq_hw, u32 addr, u32 msk,
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_main.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_main.c
@@ -13,55 +13,47 @@
#include "aq_nic.h"
#include "aq_pci_func.h"
#include "aq_ethtool.h"
+-include "hw_atl/hw_atl_a0.h"
+-include "hw_atl/hw_atl_b0.h"

#include <linux/netdevice.h>
#include <linux/module.h>

-static const struct pci_device_id aq_pci_tbl[] = {
 -{ PCI_VDEVICE(AQUANTIA, HW_ATL_DEVICE_ID_0001), },
 -{ PCI_VDEVICE(AQUANTIA, HW_ATL_DEVICE_ID_D100), },
 -{ PCI_VDEVICE(AQUANTIA, HW_ATL_DEVICE_ID_D107), },
 -{ PCI_VDEVICE(AQUANTIA, HW_ATL_DEVICE_ID_D108), },
 -{ PCI_VDEVICE(AQUANTIA, HW_ATL_DEVICE_ID_D109), },
 -{ }
 -};
 -
-MODULE_DEVICE_TABLE(pci, aq_pci_tbl);
 -
 MODULE_LICENSE("GPL v2");
 MODULE_VERSION(AQ_CFG_DRV_VERSION);
 MODULE_AUTHOR(AQ_CFG_DRV_AUTHOR);
 MODULE_DESCRIPTION(AQ_CFG_DRV_DESC);

-static struct aq_hw_ops *aq_pci_probe_get_hw_ops_by_id(struct pci_dev *pdev)
+static const struct net_device_ops aq_ndev_ops;
 +
+struct net_device *aq_ndev_alloc(void)
 { 
-struct aq_hw_ops *ops = NULL;
+struct net_device *ndev = NULL;
+struct aq_nic_s *aq_nic = NULL;

-ops = hw_atl_a0_get_ops_by_id(pdev);
static int aq_ndev_open(struct net_device *ndev) {
    struct aq_nic_s *aq_nic = NULL;
    int err = 0;

    aq_nic = netdev_priv(ndev);
    if (!aq_nic) {
        err = -ENOMEM;
        goto err_exit;
    }
    err = aq_nic_init(aq_nic);
    if (err < 0)
        goto err_exit;
    err = aq_nic_start(aq_nic);
    if (err < 0)
        goto err_exit;
    if (err < 0) {
        aq_nic_stop(aq_nic);
        goto err_exit;
    }
    err_exit:
    if (err < 0)
        aq_nic_deinit(aq_nic);
    return err;
}

static void aq_ndev_set_multicast_settings(struct net_device *ndev) {  

    if (!ops)
        ops = hw_atl_b0_get_ops_by_id(pdev);
    ndev = alloc_etherdev_mq(sizeof(struct aq_nic_s), AQ_CFG_VECS_MAX);
    if (!ndev)
        return NULL;

    aq_nic = netdev_priv(ndev);
    aq_nic->ndev = ndev;
    ndev->netdev_ops = &aq_ndev_ops;
    ndev->ethtool_ops = &aq_ethtool_ops;

    return ndev;
}

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```c
struct aq_nic_s *aq_nic = netdev_priv(ndev);
-int err = 0;
-
-int err = aq_nic_set_packet_filter(aq_nic, ndev->flags);
-if (err < 0)
-goto err_exit;
-
-if (netdev_mc_count(ndev)) {
-int err = aq_nic_set_multicast_list(aq_nic, ndev);
-if (err < 0)
-goto err_exit;
-
-aq_nic_set_packet_filter(aq_nic, ndev->flags);
}
-
-aq_nic_set_multicast_list(aq_nic, ndev);
}

static const struct net_device_ops aq_ndev_ops = {
-ndo_set_mac_address = aq_ndev_set_mac_address,
-ndo_set_features = aq_ndev_set_features
};
-
-static int aq_pci_probe(struct pci_dev *pdev,
-const struct pci_device_id *pci_id)
-{]
-struct aq_hw_ops *aq_hw_ops = NULL;
-struct aq_pci_func_s *aq_pci_func = NULL;
-int err = 0;
-
-int err = pci_enable_device(pdev);
-if (err < 0)
-goto err_exit;
-
-aq_hw_ops = aq_pci_probe_get_hw_ops_by_id(pdev);
-aq_pci_func = aq_pci_func_alloc(aq_hw_ops, pdev,
-&aq_ndev_ops, &aq_ethtool_ops);
-if (!aq_pci_func) {
-int err = -ENOMEM;
-goto err_exit;
-
-int err = aq_pci_func_init(aq_pci_func);
-if (err < 0)
-goto err_exit;
-
-err_exit;
-if (err < 0) {
```
if (aq_pci_func)
aq_pci_func_free(aq_pci_func);
-
return err;
-
static void aq_pci_remove(struct pci_dev *pdev)
-
{ 
struct aq_pci_func_s *aq_pci_func = pci_get_drvdata(pdev);
-
-aq_pci_func_deinit(aq_pci_func);
aq_pci_func_free(aq_pci_func);
-
-
static int aq_pci_suspend(struct pci_dev *pdev, pm_message_t pm_msg)
-
{ 
struct aq_pci_func_s *aq_pci_func = pci_get_drvdata(pdev);
-
-return aq_pci_func_change_pm_state(aq_pci_func, &pm_msg);
-
-
static int aq_pci_resume(struct pci_dev *pdev)
-
{ 
struct aq_pci_func_s *aq_pci_func = pci_get_drvdata(pdev);
-pm_message_t pm_msg = PMSG_RESTORE;
-
-return aq_pci_func_change_pm_state(aq_pci_func, &pm_msg);
-
-
static struct pci_driver aq_pci_ops = {
-name = AQ_CFG_DRV_NAME,
.id_table = aq_pci_tbl,
.probe = aq_pci_probe,
.remove = aq_pci_remove,
.suspend = aq_pci_suspend,
.resume = aq_pci_resume,
};
-
-module_pci_driver(aq_pci_ops);
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_main.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_main.h
@@ -14,4 +14,6 @@
#include "aq_common.h"

+struct net_device *aq_ndev_alloc(void);
+
#endif /* AQ_MAIN_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_nic.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_nic.c
@@ -14,7 +14,6 @@
 #include "aq_vec.h"
 #include "aq_hw.h"
 #include "aq_pci_func.h"
-#include "aq_nic_internal.h"

 #include <linux/moduleparam.h>
 #include <linux/netdevice.h>
@@ -45,7 +44,7 @@
 struct aq_rss_parameters *rss_params = &cfg->aq_rss;
 int i = 0;

-static u8 rss_key[40] = {
+static u8 rss_key[AQ_CFG_RSS_HASHKEY_SIZE] = {
    0x1e, 0xad, 0x71, 0x87, 0x65, 0xfc, 0x26, 0x7d,
    0x0d, 0x45, 0x67, 0x74, 0xcd, 0x06, 0x1a, 0x18,
    0xb6, 0xc1, 0xf0, 0xc7, 0xbb, 0x18, 0xbe, 0xf8,
@@ -61,19 +60,13 @@
         rss_params->indirection_table[i] = i & (num_rss_queues - 1);
     }

-/* Fills aq_nic_cfg with valid defaults */
-static void aq_nic_cfg_init_defaults(struct aq_nic_s *self)
+/* Checks hw_caps and 'corrects' aq_nic_cfg in runtime */
+void aq_nic_cfg_start(struct aq_nic_s *self)
{
    struct aq_nic_cfg_s *cfg = &self->aq_nic_cfg;

-    cfg->aq_hw_caps = &self->aq_hw_caps;
-    cfg->vecs = AQ_CFG_V ECS_DEF;
-    cfg->tcs = AQ_CFG_TCS_DEF;
-    cfg->rxds = AQ_CFG_RXDS_DEF;
-    cfg->txds = AQ_CFG_TXDS_DEF;
-    cfg->is_polling = AQ_CFG_IS_POLLING_DEF;

    cfg->itr = aq_itr;
@@ -94,19 +87,13 @@
         aq_nic_rss_init(self, cfg->num_rss_queues);
     }

-/* Checks hw_caps and 'corrects' aq_nic_cfg in runtime */
-int aq_nic_cfg_start(struct aq_nic_s *self)
-
-struct aq_nic_cfg_s *cfg = &self->aq_nic_cfg;

/* descriptors */
-cfg->rxds = min(cfg->rxds, cfg->aq_hw_caps->rxds);
-cfg->txds = min(cfg->txds, cfg->aq_hw_caps->txds);
+cfg->rxds = min(cfg->aq_hw_caps->rxds, AQ_CFG_RXDS_DEF);
+cfg->txds = min(cfg->aq_hw_caps->txds, AQ_CFG_TXDS_DEF);

/* rss rings */
-cfg->vecs = min(cfg->vecs, cfg->aq_hw_caps->vecs);
+cfg->vecs = min(cfg->aq_hw_caps->vecs, AQ_CFG_VECS_DEF);

cfg->vecs = min(cfg->vecs, num_online_cpus());
/* cfg->vecs should be power of 2 for RSS */
if (cfg->vecs >= 8U)
@@ -120,23 +107,22 @@
    if (cfg->vecs == 1U) {
        cfg->is_rss = 0U;
        cfg->vecs = 1U;
    } 

-cfg->link_speed_msk &= self->aq_hw_caps.link_speed_msk;
-cfg->hw_features = self->aq_hw_caps.hw_features;
-return 0;
+cfg->link_speed_msk &= cfg->aq_hw_caps->link_speed_msk;
+cfg->hw_features = cfg->aq_hw_caps->hw_features;
}

static int aq_nic_update_link_status(struct aq_nic_s *self)
{
-int err = self->aq_hw_ops.hw_get_link_status(self->aq_hw);
+int err = self->aq_fw_ops->update_link_status(self->aq_hw);

    if (err)
    return err;
@@ -150,9 +136,9 @@
        return 0;

    self->link_status = self->aq_hw->aq_link_status;
if (!netif_carrier_ok(self->ndev) && self->link_status.mbps) {
   -aq_utils_obj_set(&self->header.flags, AQ_NIC_FLAG_STARTED);
   +aq_utils_obj_set(&self->flags, AQ_NIC_FLAG_STARTED);
   -aq_utils_obj_clear(&self->header.flags, AQ_NIC_LINK_DOWN);
   +aq_utils_obj_clear(&self->flags, AQ_NIC_LINK_DOWN);
   netif_carrier_on(self->ndev);
   netif_tx_wake_all_queues(self->ndev);
@@ -160,7 +146,7 @@
   if (netif_carrier_ok(self->ndev) && !self->link_status.mbps) {
      netif_carrier_off(self->ndev);
      netif_tx_disable(self->ndev);
-   -aq_utils_obj_set(&self->header.flags, AQ_NIC_FLAGS_IS_NOT_READY)
+   +aq_utils_obj_set(&self->flags, AQ_NIC_FLAGS_IS_NOT_READY)
      goto err_exit;
   }
   err = aq_nic_update_link_status(self);
@@ -171,15 +157,15 @@
   int ctimer = AQ_CFG_SERVICE_TIMER_INTERVAL;
   int err = 0;
-   if (aq_utils_obj_test(&self->header.flags, AQ_NIC_FLAGS_IS_NOT_READY))
+   if (aq_utils_obj_test(&self->flags, AQ_NIC_FLAGS_IS_NOT_READY))
      goto err_exit;
   err = aq_nic_update_link_status(self);
   if (err)
      goto err_exit;
-   if (self->aq_hw_ops.hw_update_stats)
-      self->aq_hw_ops.hw_update_stats(self->aq_hw);
+   if (self->aq_fw_ops->update_stats)
+      self->aq_fw_ops->update_stats(self->aq_hw);
   aq_nic_update_ndev_stats(self);
@@ -205,60 +191,6 @@
   AQ_CFG_POLLING_TIMER_INTERVAL);
 }
-static struct net_device *aq_nic_ndev_alloc(void)
-{
-   return alloc_etherdev_mq(sizeof(struct aq_nic_s), AQ_CFG_VECS_MAX);
-}
-struct aq_nic_s *aq_nic_alloc_cold(const struct net_device_ops *ndev_ops,
- struct pci_dev *pdev,
- struct aq_pci_func_s *aq_pci_func,
- unsigned int port,
- const struct aq_hw_ops *aq_hw_ops
-
- struct net_device *ndev = NULL;
- struct aq_nic_s *self = NULL;
- int err = 0;

- ndev = aq_nic_ndev_alloc();
- if (!ndev) {
  - err = -ENOMEM;
  - goto err_exit;
  -
  - self = netdev_priv(ndev);
  -
  - ndev->netdev_ops = ndev_ops;
  - ndev->ethtool_ops = et_ops;
  -
  - SET_NETDEV_DEV(ndev, &pdev->dev);
  -
  - ndev->if_port = port;
  - self->ndev = ndev;
  -
  - self->aq_pci_func = aq_pci_func;
  -
  - self->aq_hw_ops = *aq_hw_ops;
  - self->port = (u8)port;
  -
  - self->aq_hw = self->aq_hw_ops.create(aq_pci_func, self->port,
  - &self->aq_hw_ops);
  - err = self->aq_hw_ops.get_hw_caps(self->aq_hw, &self->aq_hw_caps,
  - pdev->device, pdev->subsystem_device);
  - if (err < 0)
    - goto err_exit;
    -
    - aq_nic_cfg_init_defaults(self);
    -
    - err_exit:
    - if (err < 0) {
      - aq_nic_free_hot_resources(self);
      - self = NULL;
      - }
      - return self;
      - }

- int aq_nic_ndev_register(struct aq_nic_s *self)
{  
int err = 0;  
@@ -267,10 +199,14 @@  
err = -EINVAL;  
goto err_exit;  
}  
-err = self->aq_hw_ops.hw_get_mac_permanent(self->aq_hw,  
-    self->aq_nic_cfg.aq_hw_caps;  
+err = hw_atl_utils_initfw(self->aq_hw, &self->aq_fw_ops);  
+if (err)  
+    goto err_exit;  
+err = self->aq_fw_ops->get_mac_permanent(self->aq_hw,  
-    self->ndev->dev_addr);  
-if (err < 0)  
+if (err)  
    goto err_exit;  
#if defined(AQ_CFG_MAC_ADDR_PERMANENT)  
@@ -281,83 +217,43 @@  
}  
#endif  
+for (self->aq_vecs = 0; self->aq_vecs < aq_nic_get_cfg(self)->vecs;  
+    self->aq_vecs++) {  
+    self->aq_vec[self->aq_vecs] =  
+        aq_vec_alloc(self, self->aq_vecs, aq_nic_get_cfg(self));  
+    if (!self->aq_vec[self->aq_vecs]) {  
+        err = -ENOMEM;  
+        goto err_exit;  
+    }  
+}  
+netif_carrier_off(self->ndev);  

netif_tx_disable(self->ndev);  

err = register_netdev(self->ndev);  
-if (err < 0)  
+if (err)  
    goto err_exit;  

err_exit:  
return err;  
}  

-int aq_nic_ndev_init(struct aq_nic_s *self)
+void aq_nic_ndev_init(struct aq_nic_s *self)
{
  struct aq_hw_caps_s *aq_hw_caps = self->aq_nic_cfg.aq_hw_caps;
+const struct aq_hw_caps_s *aq_hw_caps = self->aq_nic_cfg.aq_hw_caps;
  struct aq_nic_cfg_s *aq_nic_cfg = &self->aq_nic_cfg;

  self->ndev->hw_features |= aq_hw_caps->hw_features;
  self->ndev->features = aq_hw_caps->hw_features;
  *self->ndev->vlan_features |= NETIF_F_HW_CSUM | NETIF_F_RXCSUM |
+ NETIF_F_RXHASH | NETIF_F_SG | NETIF_F_LRO;
  self->ndev->priv_flags = aq_hw_caps->hw_priv_flags;
  -self->ndev->max_mtu = aq_nic_cfg->mtu - ETH_HLEN;
-self->ndev->priv_flags |= IFF_LIVE_ADDR_CHANGE;

-aq_nic_ndev_free(struct aq_nic_s *self)
{
  if (!self->ndev)
    goto err_exit;

  if (self->ndev->reg_state == NETREG_REGISTERED)
    unregister_netdev(self->ndev);

  if (self->aq_hw)
    self->aq_hw_ops.destroy(self->aq_hw);

  free_netdev(self->ndev);

  -err_exit;:
  +self->ndev->priv_flags |= IFF_LIVE_ADDR_CHANGE;

-struct aq_nic_s *aq_nic_alloc_hot(struct net_device *ndev)
{
  struct aq_nic_s *self = NULL;
  int err = 0;

  if (!ndev) {
    err = -EINVAL;
    goto err_exit;
  }

  self = netdev_priv(ndev);

  if (!self) {
    err = -EINVAL;
    goto err_exit;
  }

  return self;
}

}
if (netif_running(ndev))
-netif_tx_disable(ndev);
-netif_carrier_off(self->ndev);

for (self->aq_vecs = 0; self->aq_vecs < self->aq_nic_cfg.vecs;
self->aq_vecs++) {
self->aq_vec[self->aq_vecs] =
aq_vec_alloc(self, self->aq_vecs, &self->aq_nic_cfg);  
if (!self->aq_vec[自我->aq_vecs]) {
err = -ENOMEM;
goto err_exit;
}
}
self->ndev->mtu = aq_nic_cfg->mtu - ETH_HLEN;
self->ndev->max_mtu = aq_hw_caps->mtu - ETH_FCS_LEN - ETH_HLEN;

err_exit:
if (err < 0) {
aq_nic_free_hot_resources(self);
self = NULL;
}
return self;

void aq_nic_set_tx_ring(struct aq_nic_s *self, unsigned int idx,  
self->aq_ring_tx[idx] = ring;
}

struct device *aq_nic_get_dev(struct aq_nic_s *self)  
{return self->ndev->dev.parent;
}

struct net_device *aq_nic_get_ndev(struct aq_nic_s *self)  
{return self->ndev;

unsigned int i = 0U;
self->power_state = AQ_HW_POWER_STATE_D0;
err = self->aq_hw_ops.hw_reset(self->aq_hw);
+err = self->aq_hw_ops->hw_reset(self->aq_hw);
if (err < 0)
goto err_exit;

-err = self->aq_hw_ops.hw_init(self->aq_hw, &self->aq_nic_cfg,
aq_nic_get_ndev(self)->dev_addr);
+err = self->aq_hw_ops->hw_init(self->aq_hw,
+    aq_nic_get_ndev(self)->dev_addr);
if (err < 0)
goto err_exit;

for (i = 0U, aq_vec = self->aq_vec[0];
    self->aq_vecs > i; ++i, aq_vec = self->aq_vec[i])
    -aq_vec_init(aq_vec, &self->aq_hw_ops, self->aq_hw);
    +aq_vec_init(aq_vec, self->aq_hw_ops, self->aq_hw);
+    +netif_carrier_off(self->ndev);

err_exit:
    return err;
@@ -406,13 +299,13 @@
    int err = 0;
    unsigned int i = 0U;

    -err = self->aq_hw_ops.hw_multicast_list_set(self->aq_hw,
    +err = self->aq_hw_ops->hw_multicast_list_set(self->aq_hw,
                self->mc_list.ar,
                self->mc_list.count);
    if (err < 0)
        goto err_exit;

    -err = self->aq_hw_ops.hw_packet_filter_set(self->aq_hw,
    +err = self->aq_hw_ops->hw_packet_filter_set(self->aq_hw,
                self->packet_filter);
    if (err < 0)
        goto err_exit;
@@ -424,7 +317,7 @@
    }

    -err = self->aq_hw_ops.hw_start(self->aq_hw);
    +err = self->aq_hw_ops->hw_start(self->aq_hw);
    if (err < 0)
        goto err_exit;
@@ -442,14 +335,14 @@
    }
 else {
    for (i = 0U, aq_vec = self->aq_vec[0];
        self->aq_vecs > i; ++i, aq_vec = self->aq_vec[i]) {
        -err = aq_pci_func_alloc_irq(self->aq_pci_func, aq_vec,
        +err = aq_pci_func_alloc_irq(self, aq_vec,
            self->ndev->name, aq_vec,
        -aq_vec_get_affinity_mask(aq_vec));
aq_vec_get_affinity_mask(aq_vec));
if (err < 0)
goto err_exit;
}

err = self->aq_hw_ops.hw_irq_enable(self->aq_hw,
AQ_CFG_IRQ_MASK);
if (err < 0)
goto err_exit;
@@ -505,8 +398,10 @@
dx_buff->len,
     DMA_TO_DEVICE);

@@ -634,13 +529,8 @@
frags = aq_nic_map_skb(self, skb, ring);

if (likely(frags)) {
-err = self->aq_hw_ops.hw_ring_tx_xmit(self->aq_hw,
-       ring,
-       frags);
-    if (err >= 0) {
-        ++ring->stats.tx.packets;
-        ring->stats.tx.bytes += skb->len;
-    }
+err = self->aq_hw_ops->hw_ring_tx_xmit(self->aq_hw,
+    ring, frags);
} else {
    err = NETDEV_TX_BUSY;
}@@ -651,14 +541,14 @@

int aq_nic_update_interrupt_moderation_settings(struct aq_nic_s *self)
{
    return self->aq_hw_ops.hw_interrupt_moderation_set(self->aq_hw);
}@@ -2505,11 +2398,10 @@

int aq_nic_set_packet_filter(struct aq_nic_s *self, unsigned int flags)
{
int err = 0;

-err = self->aq_hw_ops.hw_packet_filter_set(self->aq_hw, flags);
+err = self->aq_hw_ops->hw_packet_filter_set(self->aq_hw, flags);
if (err < 0)
goto err_exit;

@@ -670,34 +560,41 @@

int aq_nic_set_multicast_list(struct aq_nic_s *self, struct net_device *ndev)
{
    unsigned int packet_filter = self->packet_filter;
    struct netdev_hw_addr *ha = NULL;
    unsigned int i = 0U;

    -self->mc_list.count = 0U;
    -netdev_for_each_mc_addr(ha, ndev) {
        -ether_addr_copy(self->mc_list.ar[i++], ha->addr);
        +++self->mc_list.count;
        +self->mc_list.count = 0;
+    } else {
        +netdev_for_each_uc_addr(ha, ndev) {
            +ether_addr_copy(self->mc_list.ar[i++], ha->addr);

            -if (i >= AQ_CFG_MULTICAST_ADDRESS_MAX)
            -break;
            +if (i >= AQ_HW_MULTICAST_ADDRESS_MAX)
            +break;
            +}
    }

    -if (i >= AQ_CFG_MULTICAST_ADDRESS_MAX)
    -/*
    - Number of filters is too big: atlantic does not support this.
    - * Force all multi filter to support this.
    - * With this we disable all UC filters and setup "all pass"
    - * multicast mask
    - */
    -self->packet_filter |= IFF_ALLMULTI;
    -self->aq_hw->aq_nic_cfg->mc_list_count = 0;
    -return self->aq_hw_ops.hw_packet_filter_set(self->aq_hw,
    -self->packet_filter);
+if (i + netdev_mc_count(ndev) > AQ_HW_MULTICAST_ADDRESS_MAX) {
+    +packet_filter |= IFF_ALLMULTI;
+} else {
+    +return self->aq_hw_ops.hw_multicast_list_set(self->aq_hw,
int aq_nic_set_mtu(struct aq_nic_s *self, int new_mtu)

int aq_nic_set_mac(struct aq_nic_s *self, struct net_device *ndev)
{
    return self->aq_hw_ops->hw_set_mac_address(self->aq_hw, ndev->dev_addr);
}

unsigned int aq_nic_get_link_speed(struct aq_nic_s *self)
{
    u32 *regs_buff = p;
    int err = 0;

    if (unlikely(!self->aq_hw_ops->hw_get_regs))
        return -EOPNOTSUPP;

    if (err < 0)
        goto err_exit;

    @ @ -735,7 +636,10 @@
int aq_nic_get_regs_count(struct aq_nic_s *self)
{
    return self->aq_hw_caps.mac_regs_count;
+    if (unlikely(!self->aq_hw_ops->hw_get_regs))
+        return 0;
    +
    +    return self->aq_nic_cfg.aq_hw_caps->mac_regs_count;
}

void aq_nic_get_stats(struct aq_nic_s *self, u64 *data)
@@ -743,7 +647,7 @@
    unsigned int i = 0U;
    unsigned int count = 0U;
    struct aq_vec_s *aq_vec = NULL;
-+    struct aq_stats_s *stats = self->aq_hw_ops.hw_get_hw_stats(self->aq_hw);
+    struct aq_stats_s *stats = self->aq_hw_ops->hw_get_hw_stats(self->aq_hw);
    if (!stats)
        goto err_exit;
@@ -774,7 +678,6 @@
    data += i;
    -count = 0U;
    for (i = 0U, aq_vec = self->aq_vec[0];
@@ -788,7 +705,46 @@
    static void aq_nic_update_ndev_stats(struct aq_nic_s *self)
    {
        struct net_device *ndev = self->ndev;
-+            struct aq_stats_s *stats = self->aq_hw_ops.hw_get_hw_stats(self->aq_hw);
+            struct aq_stats_s *stats = self->aq_hw_ops->hw_get_hw_stats(self->aq_hw);
        ndev->stats.rx_packets = stats->uprc + stats->mprc + stats->bprc;
        ndev->stats.rx_bytes = stats->ubrc + stats->mbrc + stats->bbrc;
@@ -802,39 +705,46 @@
    void aq_nic_get_link_ksettings(struct aq_nic_s *self,
            struct ethtool_link_ksettings *cmd)
    {
-+            cmd->base.port = PORT_TP;
            +if (self->aq_nic_cfg.aq_hw_caps->media_type == AQ_HW_MEDIA_TYPE_FIBRE)
+            +cmd->base.port = PORT_FIBRE;
+            else
+            +cmd->base.port = PORT_TP;
        /* This driver supports only 10G capable adapters, so DUPLEX_FULL */
+        cmd->base.duplex = DUPLEX_FULL;
cmd->base.autoneg = self->aq_nic_cfg.is_autoneg;

ethtool_link_ksettings_zero_link_mode(cmd, supported);

-if (self->aq_hw_caps.link_speed_msk & AQ_NIC_RATE_10G)
+if (self->aq_nic_cfg.aq_hw_caps->link_speed_msk & AQ_NIC_RATE_10G)
ethtool_link_ksettings_add_link_mode(cmd, supported,
10000baseT_Full);

-if (self->aq_hw_caps.link_speed_msk & AQ_NIC_RATE_5G)
+if (self->aq_nic_cfg.aq_hw_caps->link_speed_msk & AQ_NIC_RATE_5G)
ethtool_link_ksettings_add_link_mode(cmd, supported,
5000baseT_Full);

-if (self->aq_hw_caps.link_speed_msk & AQ_NIC_RATE_2GS)
+if (self->aq_nic_cfg.aq_hw_caps->link_speed_msk & AQ_NIC_RATE_2GS)
ethtool_link_ksettings_add_link_mode(cmd, supported,
2500baseT_Full);

-if (self->aq_hw_caps.link_speed_msk & AQ_NIC_RATE_1G)
+if (self->aq_nic_cfg.aq_hw_caps->link_speed_msk & AQ_NIC_RATE_1G)
ethtool_link_ksettings_add_link_mode(cmd, supported,
1000baseT_Full);

-if (self->aq_hw_caps.link_speed_msk & AQ_NIC_RATE_100M)
+if (self->aq_nic_cfg.aq_hw_caps->link_speed_msk & AQ_NIC_RATE_100M)
ethtool_link_ksettings_add_link_mode(cmd, supported,
100baseT_Full);

-if (self->aq_hw_caps.flow_control)
+if (self->aq_nic_cfg.aq_hw_caps->flow_control)
ethtool_link_ksettings_add_link_mode(cmd, supported,
Pause);

ethtool_link_ksettings_add_link_mode(cmd, supported, Autoneg);
-ethtool_link_ksettings_add_link_mode(cmd, supported, TP);
+ ethtool_link_ksettings_add_link_mode(cmd, supported, FIBRE);
+else
+ethtool_link_ksettings_add_link_mode(cmd, supported, TP);

ethtool_link_ksettings_zero_link_mode(cmd, advertising);

@@ -865,7 +775,10 @@
ethtool_link_ksettings_add_link_mode(cmd, advertising,
    Pause);

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ethtool_link_ksettings_add_link_mode(cmd, advertising, TP);
if (self->aq_nic_cfg.aq_hw_caps->media_type == AQ_HW_MEDIA_TYPE_FIBRE)
ethtool_link_ksettings_add_link_mode(cmd, advertising, FIBRE);
else
+ethtool_link_ksettings_add_link_mode(cmd, advertising, TP);
}

int aq_nic_set_link_ksettings(struct aq_nic_s *self,
@@ -876,7 +789,7 @@
if (cmd->base.autoneg == AUTONEG_ENABLE) {
-rate = self->aq_hw_caps.link_speed_msk;
+rate = self->aq_nic_cfg.aq_hw_caps->link_speed_msk;
self->aq_nic_cfg.is_autoneg = true;
} else {
  speed = cmd->base.speed;
@@ -907,7 +820,7 @@
goto err_exit;
break;
}
-if (!(self->aq_hw_caps.link_speed_msk & rate)) {
+if (!(self->aq_nic_cfg.aq_hw_caps->link_speed_msk & rate)) {
  err = -1;
  goto err_exit;
  }
@@ -915,7 +828,7 @@
self->aq_nic_cfg.is_autoneg = false;
}

-err = self->aq_hw_ops.hw_set_link_speed(self->aq_hw, rate);
+err = self->aq_fw_ops->set_link_speed(self->aq_hw, rate);
if (err < 0)
goto err_exit;
@@ -934,7 +847,7 @@
{
  u32 fw_version = 0U;
-self->aq_hw_ops.hw_get_fw_version(self->aq_hw, &fw_version);
+self->aq_hw_ops->hw_get_fw_version(self->aq_hw, &fw_version);

  return fw_version;
}
@@ -949,18 +862,18 @@
del_timer_sync(&self->service_timer);
-self->aq_hw_ops.hw_irq_disable(self->aq_hw, AQ_CFG_IRQ_MASK);
+self->aq_hw_ops->hw_irq_disable(self->aq_hw, AQ_CFG_IRQ_MASK);

if (self->aq_nic_cfg.is_polling)
  del_timer_sync(&self->polling_timer);
else
-  aq_pci_func_free_irqs(self->aq_pci_func);
  +aq_pci_func_free_irqs(self);

  for (i = 0U, aq_vec = self->aq_vec[0];
  self->aq_vecs > i; ++i, aq_vec = self->aq_vec[i])
  aq_vec_stop(aq_vec);

-  return self->aq_hw_ops.hw_stop(self->aq_hw);
  +return self->aq_hw_ops->hw_stop(self->aq_hw);
}

void aq_nic_deinit(struct aq_nic_s *self)
@@ -976,23 +889,23 @@
  aq_vec_deinit(aq_vec);

  if (self->power_state == AQ_HW_POWER_STATE_D0) {
-    (void)self->aq_hw_ops.hw_deinit(self->aq_hw);
+    (void)self->aq_hw_ops->hw_deinit(self->aq_hw);
  } else {
-    (void)aq_hw_ops.hw_set_power(self->aq_hw,
+    (void)self->aq_hw_ops->hw_set_power(self->aq_hw,
        self->power_state);
  }

  err_exit;:
  }

-void aq_nic_free_hot_resources(struct aq_nic_s *self)
+void aq_nic_free_vectors(struct aq_nic_s *self)
{
  unsigned int i = 0U;

  if (!self)
    goto err_exit;

  for (i = AQ_DIMOF(self->aq_vec); i--; )
-    for (i = ARRAY_SIZE(self->aq_vec); i--; )
+    for (i = ARRAY_SIZE(self->aq_vec); i--; )
      if (self->aq_vec[i])
        aq_vec_free(self->aq_vec[i]);
      else
        self->aq_vec[i] = NULL;
@@ -1039,3 +952,25 @@
  out:
return err;
}
+
+void aq_nic_shutdown(struct aq_nic_s *self)
+{
+ int err = 0;
+ 
+ if (!self->ndev)
+ return;
+ 
+ rtnl_lock();
+ 
+ netif_device_detach(self->ndev);
+ 
+ if (netif_running(self->ndev)) {
+ err = aq_nic_stop(self);
+ if (err < 0)
+ goto err_exit;
+ }
+ aq_nic_deinit(self);
+ 
+ err_exit:
+ rtnl_unlock();
+ }
\ No newline at end of file
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_nic.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_nic.h
@@ -14,26 +14,15 @@
#include "aq_common.h"
#include "aq_rss.h"
+include "aq_hw.h"

struct aq_ring_s;
-struct aq_pci_func_s;
struct aq_hw_ops;
-
#define AQ_NIC_FC_OFF    0U
#define AQ_NIC_FC_TX     1U
#define AQ_NIC_FC_RX     2U
#define AQ_NIC_FC_FULL   3U
#define AQ_NIC_FC_AUTO   4U
-
#define AQ_NIC_RATE_10G        BIT(0)
#define AQ_NIC_RATE_5G         BIT(1)
#define AQ_NIC_RATE_5GSR       BIT(2)
#define AQ_NIC_RATE_2GS        BIT(3)
#define AQ_NIC_RATE_1G         BIT(4)
```c
#define AQ_NIC_RATE_100M BIT(5)
+struct aq_fw_s;
+struct aq_vec_s;

struct aq_nic_cfg_s {
    struct aq_hw_caps_s *aq_hw_caps;
    const struct aq_hw_caps_s *aq_hw_caps;
    u64 hw_features;
    u32 rxds; /* rx ring size, descriptors */
    u32 txds; /* tx ring size, descriptors */
    @ @ -44,7 +33,6 @@
    u16 tx_itr;
    u32 num_rss_queues;
    u32 mtu;
    -u32 ucp_0x364;
    u32 flow_control;
    u32 link_speed_msk;
    u32 vlan_id;
    @ @ -69,20 +57,43 @@
    #define AQ_NIC_TCVEC2RING(_NIC_, _TC_, _VEC_)
         ((_TC_) * AQ_CFG_TCS_MAX + (_VEC_))

    -struct aq_nic_s *aq_nic_alloc_cold(const struct net_device_ops *ndev_ops,
        const struct ethtool_ops *et_ops,
        struct pci_dev *pdev,
        struct aq_pci_func_s *aq_pci_func,
        unsigned int port,
        const struct aq_hw_ops *aq_hw_ops);
    -int aq_nic_ndev_init(struct aq_nic_s *self);
+	atomic_t flags;
+	struct aq_vec_s *aq_vec[AQ_CFG_VECS_MAX];
+	struct aq_ring_s *aq_ring_tx[AQ_CFG_VECS_MAX * AQ_CFG_TCS_MAX];
+	struct aq_hw_s *aq_hw;
+	struct net_device *ndev;
+	unsigned int aq_vecs;
+	unsigned int packet_filter;
+	unsigned int power_state;
+	u8 port;
+	const struct aq_hw_ops *aq_hw_ops;
+	const struct aq-fw_ops *aq-fw_ops;
+	struct aq_nic_cfg_s aq_nic_cfg;
+	struct timer_list service_timer;
+	struct timer_list polling_timer;
+	struct aq_hw_link_status_s link_status;
+	struct {
+	+u32 count;
+	+u8 ar[AQ_HW_MULTICAST_ADDRESS_MAX][ETH_ALEN];
```
+} mc_list;
+
+struct pci_dev *pdev;
+unsigned int msix_entry_mask;
+
+}
+
+static inline struct device *aq_nic_get_dev(struct aq nic_s *self)
+{
+    return self->ndev->dev.parent;
+
+
+void aq_nicioned_init(struct aq nic_s *self);
+struct aq nic_s *aq nic_alloc_hot(struct net_device *ndev);
+void aq nic_set_tx_ring(struct aq nic_s *self, unsigned int idx,
+struct aq_ring_s *ring);
+-struct device *aq_nic_get_dev(struct aq nic_s *self);
+struct net_device *aq_nic_get_ndev(struct aq nic_s *self);
+int aq nic_init(struct aq nic_s *self);
+-int aq nic_cfg_start(struct aq nic_s *self);
+void aq nic_cfg_start(struct aq nic_s *self);
+int aq nic_ndev_register(struct aq nic_s *self);
+void aq nic_ndev_free(struct aq nic_s *self);
+int aq nic_start(struct aq nic_s *self);
+@ @ -93.6 +104.7 @@
+int aq nic_stop(struct aq nic_s *self);
+void aq nic_deinit(struct aq nic_s *self);
+void aq nic_free_hot_resources(struct aq nic_s *self);
+void aq nic_free_vectors(struct aq nic_s *self);
+int aq nic_set_mtu(struct aq nic_s *self, int new_mtu);
+int aq nic_set_mac(struct aq nic_s *self, struct net_device *ndev);
+int aq nic_set_packet_filter(struct aq nic_s *self, unsigned int flags);
+@ @ -106.5 +118.6 @@
+u32 aq nic_get_fw_version(struct aq nic_s *self);
+int aq nic_change_pm_state(struct aq nic_s *self, pm_message_t *pm_msg);
+int aq nic_update Interrupt_moderation_settings(struct aq nic_s *self);
+void aq nic_shutdown(struct aq nic_s *self);
+
+#endif /* AQ_NIC_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_pci_func.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_pci_func.c
@@ -9,181 +9,135 @@

/* File aq_pci_func.c: Definition of PCI functions. */

-#include "aq_pci_func.h"
+#include <linux/interrupt.h>
+﻿#include <linux/module.h>
+
+include "aq_main.h"
#include "aq_nic.h"
#include "aq_vec.h"
#include "aq_hw.h"
+#include <linux/interrupt.h>
+include "aq_pci_func.h"
+include "hw_atl/hw_atl_a0.h"
+include "hw_atl/hw_atl_b0.h"

-struct aq_pci_func_s {
	struct pci_dev *pdev;
-struct aq_nic_s *port[AQ_CFG_PCI_FUNC_PORTS];
-void __iomem *mmio;
-void *aq_vec[AQ_CFG_PCI_FUNC_MSIX_IRQS];
-resource_size_t mmio_pa;
-unsigned int msix_entry_mask;
-unsigned int ports;
-bool is_pci_enabled;
-bool is_regions;
-bool is_pci_using_dac;
-struct aq_hw_caps_s aq_hw_caps;
+static const struct pci_device_id aq_pci_tbl[] = {
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_0001), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_D100), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_D107), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_D108), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_D109), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC100), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC107), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC108), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC109), },
+{ PCI_VDEVICE(AQUANTIA, AQDEVICE_ID_AQC111), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC112), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC100S), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC107S), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC108S), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC109S), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC111S), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC112S), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC111E), },
+{ PCI_VDEVICE(AQUANTIA, AQ_DEVICE_ID_AQC112E), },
+{"}
-struct aq_pci_func_s *aq_pci_func_alloc(struct aq_hw_ops *aq_hw_ops,
-struct pci_dev *pdev,
-const struct net_device_ops *ndev_ops,
-const struct ethtool_ops *eth_ops)
{
-struct aq_pci_func_s *self = NULL;
-int err = 0;
-unsigned int port = 0U;
+const struct aq_board_revision_s hw_atl_boards[] = {
+    { AQ_DEVICE_ID_0001, AQ_HWREV_1, &hw_atl_ops_a0, &hw_atl_a0_caps_aqc107, },
+    { AQ_DEVICE_ID_D100, AQ_HWREV_1, &hw_atl_ops_a0, &hw_atl_a0_caps_aqc100, },
+    { AQ_DEVICE_ID_D107, AQ_HWREV_1, &hw_atl_ops_a0, &hw_atl_a0_caps_aqc107, },
+    { AQ_DEVICE_ID_D108, AQ_HWREV_1, &hw_atl_ops_a0, &hw_atl_a0_caps_aqc108, },
+    { AQ_DEVICE_ID_D109, AQ_HWREV_1, &hw_atl_ops_a0, &hw_atl_a0_caps_aqc109, },
+    { AQ_DEVICE_ID_D100, AQ_HWREV_2, &hw_atl_ops_b0, &hw_atl_b0_caps_aqc107, },
+    { AQ_DEVICE_ID_D107, AQ_HWREV_2, &hw_atl_ops_b0, &hw_atl_b0_caps_aqc100, },
+    { AQ_DEVICE_ID_D108, AQ_HWREV_2, &hw_atl_ops_b0, &hw_atl_b0_caps_aqc107, },
+    { AQ_DEVICE_ID_D109, AQ_HWREV_2, &hw_atl_ops_b0, &hw_atl_b0_caps_aqc108, },
+    { AQ_DEVICE_ID_AQC100, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc100, },
+    { AQ_DEVICE_ID_AQC107, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc107, },
+    { AQ_DEVICE_ID_AQC108, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc108, },
+    { AQ_DEVICE_ID_AQC109, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc109, },
+    { AQ_DEVICE_ID_AQC111, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc111, },
+    { AQ_DEVICE_ID_AQC112, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc112, },
+    { AQ_DEVICE_ID_AQC100S, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc100s, },
+    { AQ_DEVICE_ID_AQC107S, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc107s, },
+    { AQ_DEVICE_ID_AQC108S, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc108s, },
+    { AQ_DEVICE_ID_AQC109S, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc109s, },
+    { AQ_DEVICE_ID_AQC111S, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc111s, },
+    { AQ_DEVICE_ID_AQC112S, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc112s, },
-    if (!aq_hw_ops) {
-        err = -EFAULT;
-        goto err_exit;
-    }
-    self = kzalloc(sizeof(*self), GFP_KERNEL);
-    if (!self) {
-        err = -ENOMEM;
-        goto err_exit;
-    }
+    { AQ_DEVICE_ID_AQC111E, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc111e, },
+    { AQ_DEVICE_ID_AQC112E, AQ_HWREV_ANY, &hw_atl_ops_b1, &hw_atl_b0_caps_aqc112e, },
+};
-pci_set_drvdata(pdev, self);
-self->pdev = pdev;
+MODULE_DEVICE_TABLE(pci, aq_pci_tbl);

-err = aq_hw_ops->get_hw_caps(NULL, &self->aq_hw_caps, pdev->device,
- pdev->subsystem_device);
-if (err < 0)
-goto err_exit;
+static int aq_pci_probe_get_hw_by_id(struct pci_dev *pdev,
+ const struct aq_hw_ops **ops,
+ const struct aq_hw_caps_s **caps)
+
+int i = 0;

-self->ports = self->aq_hw_caps.ports;
+if (pdev->vendor != PCI_VENDOR_ID_AQUANTIA)
+return -EINVAL;

-for (port = 0; port < self->ports; ++port) {
-struct aq_nic_s *aq_nic = aq_nic_alloc_cold(ndev_ops, eth_ops,
- pdev, self,
- port, aq_hw_ops);
-
-if (!aq_nic) {
-err = -ENOMEM;
-goto err_exit;
+for (i = 0; i < ARRAY_SIZE(hw_atl_boards); i++) {
+if (hw_atl_boards[i].devid == pdev->device &&
+ (hw_atl_boards[i].revision == AQ_HWREV_ANY ||
+ hw_atl_boards[i].revision == pdev->revision)) {
+*ops = hw_atl_boards[i].ops;
+*caps = hw_atl_boards[i].caps;
+break;
+}
-self->port[port] = aq_nic;
}

-err_exit:
-if (err < 0) {
-if (self)
-aq_pci_func_free(self);
-self = NULL;
-}
+if (i == ARRAY_SIZE(hw_atl_boards))
+return -EINVAL;

-(void)err;
-return self;
int aq_pci_func_init(struct pci_dev *pdev)
{
    int err = 0;
    unsigned int bar = 0U;
    unsigned int port = 0U;
    unsigned int numvecs = 0U;
    
    err = pci_enable_device(pdev);
    if (err < 0)
        goto err_exit;
    self->is_pci_enabled = true;
    
    err = pci_set_dma_mask(pdev, DMA_BIT_MASK(64));
    if (!err) {
        err = pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(64));
        self->is_pci_using_dac = 1;
    } else
    
    err = pci_set_dma_mask(pdev, DMA_BIT_MASK(32));
    if (!err) {
        err = pci_set_consistent_dma_mask(pdev,
            DMA_BIT_MASK(32));
        self->is_pci_using_dac = 0;
    } else
    
    if (err != 0) {
        err = -ENOSR;
        goto err_exit;
    }

    err = pci_request_regions(pdev, AQ_CFG_DRV_NAME "_mmio");
    if (err < 0)
        goto err_exit;
    self->is_regions = true;
    +pci_set_master(pdev);

    -pci_set_master(self->pdev);
for (bar = 0; bar < 4; ++bar) {
    if (IORESOURCE_MEM & pci_resource_flags(self->pdev, bar)) {
        resource_size_t reg_sz;
        self->mmio_pa = pci_resource_start(self->pdev, bar);
        if (self->mmio_pa == 0U) {
            err = -EIO;
            goto err_exit;
        }
        reg_sz = pci_resource_len(self->pdev, bar);
        if ((reg_sz <= 24 /*ATL_REGS_SIZE*/)) {
            err = -EIO;
            goto err_exit;
        }
        self->mmio = ioremap_nocache(self->mmio_pa, reg_sz);
        if (!self->mmio) {
            err = -EIO;
            goto err_exit;
        }
        break;
    }
}
numvecs = min((u8)AQ_CFG_VECS_DEF, self->aq_hw_caps.msix_irqs);
numvecs = min(numvecs, num_online_cpus());

/* enable interrupts */
#if !AQ_CFG_FORCE_LEGACY_INT
    err = pci_alloc_irq_vectors(self->pdev, numvecs, numvecs, PCI_IRQ_MSIX);
    if (err < 0) {
        err = pci_alloc_irq_vectors(self->pdev, 1, 1,
            PCI_IRQ_MSI | PCI_IRQ_LEGACY);
        if (err < 0)
            goto err_exit;
    }
#endif /* AQ_CFG_FORCE_LEGACY_INT */

/* net device init */
for (port = 0; port < self->ports; ++port) {
    if (!self->port[port])
        continue;
    err = aq_nic_cfg_start(self->port[port]);
    if (err < 0)
goto err_exit;
-
-err = aq_nic_ndev_init(self->port[port]);
-if (err < 0)
-goto err_exit;
-
-err = aq_nic_ndev_register(self->port[port]);
-if (err < 0)
-goto err_exit;
-}
+return 0;

err_exit:
-if (err < 0)
-aq_pci_func_deinit(self);
return err;
}

-int aq_pci_func_alloc_irq(struct aq_pci_func_s *self, unsigned int i,
+int aq_pci_func_alloc_irq(struct aq_nic_s *self, unsigned int i,
    char *name, void *aq_vec, cpumask_t *affinity_mask)
{
  struct pci_dev *pdev = self->pdev;
@@ -204,11 +158,10 @@
    irq_set_affinity_hint(pci_irq_vector(pdev, i),
       affinity_mask);
  }
- return err;
+}

-void aq_pci_func_free_irqs(struct aq_pci_func_s *self)
+void aq_pci_func_free_irqs(struct aq_nic_s *self)
{
  struct pci_dev *pdev = self->pdev;
-unsigned int i = 0U;
@@ -224,12 +177,7 @@
  }
 }

-void __iomem *aq_pci_func_get_mmio(struct aq_pci_func_s *self)
-{
-    return self->mmio;
-}
-
-unsigned int aq_pci_func_get_irq_type(struct aq_pci_func_s *self)
+unsigned int aq_pci_func_get_irq_type(struct aq_nic_s *self)
{

if (self->pdev->msix_enabled)
return AQ_HW_IRQ_MSIX;
@@ -238,62 +186,172 @@
return AQ_HW_IRQ_LEGACY;
}

-void aq_pci_func_deinit(struct aq_pci_func_s *self)
+static void aq_pci_free_irq_vectors(struct aq_nic_s *self)
{
    -if (!self)
        goto err_exit;
    -aq_pci_func_free_irqs(self);
    pci_free_irq_vectors(self->pdev);
    +}

    -if (self->is_regions)
    -pci_release_regions(self->pdev);
    +static int aq_pci_probe(struct pci_dev *pdev,
    +const struct pci_device_id *pci_id)
    +{
        +struct aq_nic_s *self = NULL;
        +int err = 0;
        +struct net_device *ndev;
        +resource_size_t mmio_pa;
        +u32 bar;
        +u32 numvecs;

        -if (self->is_pci_enabled)
        -pci_disable_device(self->pdev);
        +err = pci_enable_device(pdev);
        +if (err)
            +return err;
            +err = aq_pci_func_init(pdev);
            +if (err)
                +goto err_pci_func;
                +ndev = aq_ndev_alloc();
                +if (!ndev)
                    +goto err_ndev;

                -err_exit;
                -}
                +self = netdev_priv(ndev);
                +self->pdev = pdev;
                +SET_NETDEV_DEV(ndev, &pdev->dev);
                +pci_set_drvdata(pdev, self);
void aq_pci_func_free(struct aq_pci_func_s *self)
{
    unsigned int port = 0U;
    err = aq_pci_probe_get_hw_by_id(pdev, &self->aq_hw_ops,
        &aq_nic_get_cfg(self)->aq_hw_caps);
    if (err)
        goto err_ioremap;

    if (!self)
        goto err_exit;

    self->aq_hw = kzalloc(sizeof(*self->aq_hw), GFP_KERNEL);
    self->aq_hw->aq_nic_cfg = aq_nic_get_cfg(self);

    for (port = 0; port < self->ports; ++port) {
        if (!self->port[port])
            continue;
        for (bar = 0; bar < 4; ++bar) {
            if (IORESOURCE_MEM & pci_resource_flags(pdev, bar)) {
                resource_size_t reg_sz;
                mmio_pa = pci_resource_start(pdev, bar);
                if (mmio_pa == 0U) {
                    err = -EIO;
                    goto err_ioremap;
                }
                reg_sz = pci_resource_len(pdev, bar);
                if ((reg_sz <= 24 /*ATL_REGS_SIZE*/)) {
                    err = -EIO;
                    goto err_ioremap;
                }
                aq_nic_ndev_free(self->port[port]);
                self->aq_hw->mmio = ioremap_nocache(mmio_pa, reg_sz);
                if (!self->aq_hw->mmio) {
                    err = -EIO;
                    goto err_ioremap;
                }
                break;
            }
        }
        if (self->mmio)
            iounmap(self->mmio);
        if (bar == 4) {
            err = -EIO;
            goto err_ioremap;
        }
        break;
    }

    aq_nic_ndev_free(self->port[port]);
    if (!self->aq_hw->mmio = ioremap_nocache(mmio_pa, reg_sz)) {
        err = -EIO;
        goto err_ioremap;
    }
    break;
}

if (self->mmio)
    iounmap(self->mmio);
if (bar == 4) {
    err = -EIO;
    goto err_ioremap;
}
```c
-kfree(self);
+numvecs = min((u8)AQ_CFG_VECS_DEF,
+  aq_nic_get_cfg(self)->aq_hw_caps->msix_irqs);
+numvecs = min(numvecs, num_online_cpus());
+#if !AQ_CFG_FORCE_LEGACY_INT
+err = pci_alloc_irq_vectors(self->pdev, numvecs, numvecs,
+  PCI_IRQ_MSIX);
-err_exit:
+if (err < 0) {
+err = pci_alloc_irq_vectors(self->pdev, 1, 1,
+  PCI_IRQ_MSI | PCI_IRQ_LEGACY);
+if (err < 0)
+  goto err_hwinit;
+}
+#endif
+
+/* net device init */
+aq_nic_cfg_start(self);
+
aq_nic_ndev_init(self);
+
+err = aq_nic_ndev_register(self);
+if (err < 0)
+  goto err_register;
+
+return 0;
+
+err_register:
+aq_nic_free_vectors(self);
+aq_pci_free_irq_vectors(self);
+err_hwinit:
iounmap(self->aq_hw->mmio);
+err_ioremap:
+free_netdev(ndev);
+err_pci_func:
+pci_release_regions(pdev);
+err_ndev:
+pci_disable_device(pdev);
+return err;
}

-int aq_pci_func_change_pm_state(struct aq_pci_func_s *self,
-  pm_message_t *pm_msg)
+static void aq_pci_remove(struct pci_dev *pdev)
```
{  
-int err = 0;
-unsigned int port = 0U;
+struct aq_nic_s *self = pci_get_drvdata(pdev);

-\if (!self) {  
-err = -EFAULT;
-goto err_exit;
+\if (self->ndev) {  
+\if (self->ndev->reg_state == NETREG_REGISTERED)  
+unregister_netdev(self->ndev);
+aq_nic_free_vectors(self);
+aq_pci_free_irq_vectors(self);
+\iounmap(self->aq_hw->mmio);
+kfree(self->aq_hw);
+pci_release_regions(pdev);
+free_netdev(self->ndev);
-\}  
-\for (port = 0; port < self->ports; ++port) {  
-\if (!self->port[port])  
-continue;

-(void)aq_nic_change_pm_state(self->port[port], pm_msg);
+pci_disable_device(pdev);
+\}  
+\static void aq_pci_shutdown(struct pci_dev *pdev)  
+{  
+struct aq_nic_s *self = pci_get_drvdata(pdev);
+  
+aq_nic_shutdown(self);
+  
+pci_disable_device(pdev);
+  
+\if (system_state == SYSTEM_POWER_OFF) {  
+pci_wake_from_d3(pdev, false);
+pci_set_power_state(pdev, PCI_D3hot);
+  }
+  }

-err_exit:
-\return err;
+static int aq_pci_suspend(struct pci_dev *pdev, pm_message_t pm_msg)  
+{  
+struct aq_nic_s *self = pci_get_drvdata(pdev);
+  
+return aq_nic_change_pm_state(self, &pm_msg);
+  }

}
+static int aq_pci_resume(struct pci_dev *pdev)
+{
+  struct aq_nic_s *self = pci_get_drvdata(pdev);
+  pm_message_t pm_msg = PMSG_RESTORE;
+  +return aq_nic_change_pm_state(self, &pm_msg);
+}
+static struct pci_driver aq_pci_ops = {
+  .name = AQ_CFG_DRV_NAME,
+  .id_table = aq_pci_tbl,
+  .probe = aq_pci_probe,
+  .remove = aq_pci_remove,
+  .suspend = aq_pci_suspend,
+  .resume = aq_pci_resume,
+  .shutdown = aq_pci_shutdown,
+};
+
+module_pci_driver(aq_pci_ops);

--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_pci_func.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_pci_func.h
@@ -13,22 +13,20 @@
#define AQ_PCI_FUNC_H
#include "aq_common.h"
#include "aq_nic.h"

-struct aq_pci_func_s *aq_pci_func_alloc(struct aq_hw_ops *hw_ops,
-    struct pci_dev *pdev,
-    struct aq_board_revision_s {
-    unsigned short devid;
-    unsigned short revision;
-    const struct aq_hw_ops *ops;
-    const struct aq.hw_caps_s *caps;
-    });
-#define AQ_PCI_FUNC_H
-#include "aq_common.h"
-+include "aq_nic.h"
-
-struct aq_pci_func_s *aq_pci_func_alloc(struct aq_hw_ops *hw_ops,
-    struct pci_dev *pdev,
-    struct net_device_ops *ndev_ops,
-    struct ethtool_ops *eth_ops);
-+int aq_pci_func_init(struct aq_pci_func_s *self);
-+int aq_pci_func_alloc_irq(struct aq_pci_func_s *self, unsigned int i,
-    char *name, void *aq_vec,
-    cpumask_t *affinity_mask);
-+void aq_pci_func_free_irqs(struct aq_pci_func_s *self);
-+int aq_pci_func_start(struct aq_pci_func_s *self);
-+void __iomem *aq_pci_func_get_mmio(struct aq_pci_func_s *self);
unsigned int aq_pci_func_get_irq_type(struct aq_pci_func_s *self);
void aq_pci_func_deinit(struct aq_pci_func_s *self);
void aq_pci_func_free(struct aq_pci_func_s *self);
int aq_pci_func_change_pm_state(struct aq_pci_func_s *self,
																																																									pm_message_t *pm_msg);
+void aq_pci_func_free_irqs(struct aq_nic_s *self);
+unsigned int aq_pci_func_get_irq_type(struct aq_nic_s *self);

#ifndef /* AQ_PCI_FUNC_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_ring.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_ring.c
@@ -136,12 +136,13 @@
    netif_stop_subqueue(ndev, ring->idx);

-void aq_ring_tx_clean(struct aq_ring_s *self)
+bool aq_ring_tx_clean(struct aq_ring_s *self)
{
    struct device *dev = aq_nic_get_dev(self->aq_nic);
    unsigned int budget;

    for (; self->sw_head != self->hw_head;
-		self->sw_head = aq_ring_next_dx(self, self->sw_head)) {
+    for (budget = AQ_CFG_TX_CLEAN_BUDGET;
+     budget && self->sw_head != self->hw_head; budget--) {
        struct aq_ring_buff_s *buff = &self->buff_ring[self->sw_head];
        if (likely(buff->is_mapped)) {
@@ -161,12 +162,40 @@
            self->sw_head = aq_ring_next_dx(self, self->sw_head);
        } else {
            ++self->stats.rx.packets;
+            self->stats.tx.bytes += buff->skb->len;
            ++self->stats.rx.packets;
            ++self->stats.tx.bytes += buff->skb->len;

+            if (likely(buff->is_mapped)) {
+                dev_kfree_skb_any(buff->skb);
+            }
+            dev_kfree_skb_any(buff->skb);
+        }
    }
    return !!budget;

    if (unlikely(buff->is_eop))
-dev_kfree_skb_any(buff->skb);
+if (unlikely(buff->is_eop)) {
+    ++self->stats.rx.packets;
+    self->stats.tx.bytes += buff->skb->len;
+
+    dev_kfree_skb_any(buff->skb);
+}
    buff->pa = 0U;
    buff->eop_index = 0xffffU;
+    self->sw_head = aq_ring_next_dx(self, self->sw_head);
}
+static void aq_rx_checksum(struct aq_ring_s *self,
+  struct aq_ring_buff_s *buff,
+  struct sk_buff *skb)
+{
+  if (!((self->aq_nic->ndev->features & NETIF_F_RXCSUM)))
+    return;
+  
+  if (unlikely(buff->is_cso_err)) {
+    ++self->stats.rx.errors;
+    skb->ip_summed = CHECKSUM_NONE;
+    return;
+  }
+  
+  if (buff->is_ip_cso) {
+    skb_incr_checksum_unnecessary(skb);
+  } else {
+    skb->ip_summed = CHECKSUM_NONE;
+  }
+  
+  if (buff->is_udp_cso || buff->is_tcp_cso)
+    skb_incr_checksum_unnecessary(skb);
+
+
+
+#define AQ_SKB_ALIGN SKB_DATA_ALIGN(sizeof(struct skb_shared_info))
@ @ -222,9 +251,10 @@
} /* for single fragment packets use build_skb() */
- if (buff->is_eop) {
+ if (buff->is_eop &&
+    buff->len <= AQ_CFG_RX_FRAME_MAX - AQ_SKB_ALIGN) {
 skb = build_skb(page_address(buff->page),
-    -buff->len + AQ_SKB_ALIGN);
+    +AQ_CFG_RX_FRAME_MAX);
    if (unlikely(!skb)) {
      err = -ENOMEM;
      goto err_exit;
@@ -244,34 +274,27 @@
    buffer->len - ETH_HLEN,
    skb_add_rx_frag(skb, i, buff->page, 0,
    -buffer->len,
    -SKB_TRUESIZE(buffer->len -
    -ETH_HLEN));
buff_->is_cleaned = 1;
+if (!buff->is_eop) {
  for (i = 1U, next_ = buff->next;
   true; next_ = buff_->next,
   buff_ = &self->buff_ring[next_], ++i) {
+skb_add_rx_frag(skb, i,
+buff_->page, 0,
+buff_->len,
+SKB_TRUESIZE(buff->len -
+ETH_HLEN));
+buff_->_is_cleaned = 1;

-if (buff_->_is_eop)
-break;
+if (buff_->_is_eop)
+break;
+}
}
}

skb->protocol = eth_type_trans(skb, ndev);
-if (unlikely(buff->is_cso_err)) {
++self->stats.rx.errors;
-skb->ip_summed = CHECKSUM_NONE;
} else {
-if (buff->is_ip_cso) {
-__skb_incr_checksum_unnecessary(skb);
-if (buff->is_udp_cso || buff->is_tcp_cso)
-__skb_incr_checksum_unnecessary(skb);
} else {
-skb->ip_summed = CHECKSUM_NONE;
-
-
+aq_rx_checksum(self, buff, skb);

skb_set_hash(skb, buff->rss_hash,
    buff->is_hash_l4 ? PKT_HASH_TYPE_L4 :
@ @ .279,10 +302,10 @@

skb_record_rx_queue(skb, self->idx);

-napi_gro_receive(napi, skb);
-
++self->stats.rx.packets;
self->stats.rx.bytes += skb->len;
+
+napi_gro_receive(napi, skb);
}

err_exit:
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_ring.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_ring.h
@@ -15,6 +15,7 @@
 #include "aq_common.h"

 struct page;
+struct aq_nic_cfg_s;

 /*
  *   TxC       SOP       DX       EOP
  *  +----------+----------+----------+-----------
  @ @ -105.7 +106.6 @ @
 */

struct aq_ring_s {
  struct aq_obj_s header;
struct aq_ring_buff_s *buff_ring;
  u8 *dx_ring;/* descriptors ring, dma shared mem */
  struct aq_nic_s *aq_nic;
  @ @ -153.7 +153.7 @ @
  void aq_ring_update_queue_state(struct aq_ring_s *ring);
  void aq_ring_queue_wake(struct aq_ring_s *ring);
  void aq_ring_queue_stop(struct aq_ring_s *ring);
  -void aq_ring_tx_clean(struct aq_ring_s *self);
+bool aq_ring_tx_clean(struct aq_ring_s *self);
  int aq_ring_rx_clean(struct aq_ring_s *self,
       struct napi_struct *napi,
       int *work_done,
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_vec.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_utils.h
@@ -14,12 +14,6 @@
 #include "aq_common.h"

-#define AQ_DIMOF(_ARY_) ARRAY_SIZE(_ARY_)

-struct aq_obj_s {
-  atomic_t flags;
-};

- static inline void aq_utils_obj_set(atomic_t *flags, u32 mask)
{ unsigned long flags_old, flags_new;
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_vec.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_vec.c

#include <linux/netdevice.h>

struct aq_vec_s {
-struct aq_obj_s header;
-struct aq_hw_ops *aq_hw_ops;
+const struct aq_hw_ops *aq_hw_ops;
 struct aq_hw_s *aq_hw;
 struct aq_nic_s *aq_nic;
 unsigned int tx_rings;
@@ -19,8 +19,7 @@
static int aq_vec_poll(struct napi_struct *napi, int budget)
 {
 struct aq_vec_s *self = container_of(napi, struct aq_vec_s, napi);
+unsigned int sw_tail_old = 0U;
 struct aq_ring_s *ring = NULL;
+bool was_tx_cleaned = true;
+unsigned int i = 0U;
 int work_done = 0;
 int err = 0;
-unsigned int i = 0U;
-unsigned int sw_tail_old = 0U;
-bool was_tx_cleaned = false;

 if (!self) {
 err = -EINVAL;
@@ -58,9 +57,8 @@
 if (ring[AQ_VEC_TX_ID].sw_head !=
     ring[AQ_VEC_TX_ID].hw_head) {
-    aq_ring_tx_clean(&ring[AQ_VEC_TX_ID]);
+    was_tx_cleaned = aq_ring_tx_clean(&ring[AQVEC_TX_ID]);
 aq_ring_update_queue_state(&ring[AQ_VEC_TX_ID]);
-    was_tx_cleaned = true;
 } 

 err = self->aq_hw_ops->hw_ring_rx_receive(self->aq_hw,
@@ -100,7 +99,7 @@
 }
 }

-if (was_tx_cleaned)
+err_exit:
+if (!was_tx_cleaned)
 work_done = budget;

 if (work_done < budget) {
@@ -100,7 +99,7 @@
1U << self->aq_ring_param.vec_idx);
}

-err_exit:
+
return work_done;
}

@@ -166,7 +165,7 @@
return self;
}

-int aq_vec_init(struct aq_vec_s *self, struct aq_hw_ops *aq_hw_ops,
+int aq_vec_init(struct aq_vec_s *self, const struct aq_hw_ops *aq_hw_ops,
struct aq_hw_s *aq_hw)
{
struct aq_ring_s *ring = NULL;
@@ -310,15 +309,13 @@
struct aq_vec_s *self = private;
u64 irq_mask = 0U;
-irqreturn_t err = 0;
+int err;

-if (!self) {
-err = -EINVAL;
-goto err_exit;
-}
+if (!self)
+return IRQ_NONE;
err = self->aq_hw_ops->hw_irq_read(self->aq_hw, &irq_mask);
if (err < 0)
-goto err_exit;
+return IRQ_NONE;

if (irq_mask) {
self->aq_hw_ops->hw_irq_disable(self->aq_hw,
@@ -326,11 +323,10 @@
napi_schedule(&self->napi);
} else {
self->aq_hw_ops->hw_irq_enable(self->aq_hw, 1U);
-err = IRQ_NONE;
+return IRQ_NONE;
}

-err_exit:
-return err >= 0 ? IRQ_HANDLED : IRQ_NONE;
+return IRQ_HANDLED;
cpumask_t *aq_vec_get_affinity_mask(struct aq_vec_s *self)
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/aq_vec.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/aq_vec.h
@@ -19,6 +19,8 @@
struct aq_hw_s;
 struct aq_hw_ops;
 +struct aq_nic_s;
 +struct aq_nic_cfg_s;
 struct aq_ring_stats_rx_s;
 struct aq_ring_stats_tx_s;

@@ -26,7 +28,7 @@
 irqreturn_t aq_vec_isr_legacy(int irq, void *private);
 struct aq_vec_s *aq_vec_alloc(struct aq_nic_s *aq_nic, unsigned int idx,
     struct aq_nic_cfg_s *aq_nic_cfg);
-int aq_vec_init(struct aq_vec_s *self, struct aq_hw_ops *aq_hw_ops,
+int aq_vec_init(struct aq_vec_s *self, const struct aq_hw_ops *aq_hw_ops,
     struct aq_hw_s *aq_hw);
 void aq_vec_deinit(struct aq_vec_s *self);
 void aq_vec_free(struct aq_vec_s *self);
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0.c
@@ -12,78 +12,100 @@
 #include "../aq_ring.h"
 #include "../aq_nic.h"
 #include "hw_atl_a0.h"
 #include "hw_atl_llh.h"
 #include "hw_atl_a0_internal.h"
 
-static int hw_atl_a0_get_hw_caps(struct aq_hw_s *self,
- struct aq_hw_caps_s *aq_hw_caps,
- unsigned short device,
- unsigned short subsystem_device)
-{
-    -memcpy(aq_hw_caps, &hw_atl_a0_hw_caps_, sizeof(*aq_hw_caps));
-    -if (device == HW_ATL_DEVICE_ID_D108 && subsystem_device == 0x0001)
-        aq_hw_caps->link_speed_msk &= ~HW_ATL_A0_RATE_10G;
-    -if (device == HW_ATL_DEVICE_ID_D109 && subsystem_device == 0x0001) {
-        aq_hw_caps->link_speed_msk &= ~HW_ATL_A0_RATE_10G;
-        aq_hw_caps->link_speed_msk &= ~HW_ATL_A0_RATE_5G;
static struct aq_hw_s *hw_atl_a0_create(struct aq_pci_func_s *aq_pci_func,
 unsigned int port,
 struct aq_hw_ops *ops)
 {
 struct hw_atl_s *self = NULL;

 self = kzalloc(sizeof(*self), GFP_KERNEL);
 if (!self)
  goto err_exit;

 self->base.aq_pci_func = aq_pci_func;

#define DEFAULT_A0_BOARD_BASIC_CAPABILITIES
 + .is_64_dma = true, \n + .msix_irqs = 4U, \n + .irq_mask = ~0U, \n + .vecs = HW_ATL_A0_RSS_MAX, \n + .tcs = HW_ATL_A0_TC_MAX, \n + .rxd_alignment = 1U, \n + .rxd_size = HW_ATL_A0_RXD_SIZE, \n + .txds = 248U, \n + .txd_alignment = 1U, \n + .txd_size = HW_ATL_A0_TXD_SIZE, \n + .txds = 8U * 1024U, \n + .txhwb_alignment = 4096U, \n + .tx_rings = HW_ATL_A0_TX_RINGS, \n + .rx_rings = HW_ATL_A0_RX_RINGS, \n + .hw_features = NETIF_F_HW_CSUM | \n + NETIF_F_RXHASH | \n + NETIF_F_RXCSUM | \n + NETIF_F_SG | \n + NETIF_F_TSO, \n + .hw_priv_flags = IFF_UNICASTFLT, \n + .flow_control = true, \n + .mtu = HW_ATL_A0_MTU_JUMBO, \n + .mac_regs_count = 88, \n + .hw_alive_check_addr = 0x10U
 +
 + const struct aq_hw_caps_s hw_atl_a0_caps_aqc100 = {
 + DEFAULT_A0_BOARD_BASIC_CAPABILITIES,
 + .media_type = AQ_HW_MEDIA_TYPE_FIBRE,
 + .link_speed_msk = HW_ATL_A0_RATE_5G | HW_ATL_A0_RATE_2G5 | HW_ATL_A0_RATE_1G |
+ HW_ATL_A0_RATE_100M,
+};

-self->base.not_ff_addr = 0x10U;
+const struct aq_hw_caps_s hw_atl_a0_caps_aqc107 = {
 +DEFAULT_A0_BOARD_BASIC_CAPABILITIES,
 +.media_type = AQ_HW_MEDIA_TYPE_TP,
 +.link_speed_msk = HW_ATL_A0_RATE_10G |
 + HW_ATL_A0_RATE_5G |
 + HW_ATL_A0_RATE_2G5 |
 + HW_ATL_A0_RATE_1G |
 + HW_ATL_A0_RATE_100M,
+};

-err_exit:
-return (struct aq_hw_s *)self;
-
+const struct aq_hw_caps_s hw_atl_a0_caps_aqc108 = {
 +DEFAULT_A0_BOARD_BASIC_CAPABILITIES,
 +.media_type = AQ_HW_MEDIA_TYPE_TP,
 +.link_speed_msk = HW_ATL_A0_RATE_5G |
 + HW_ATL_A0_RATE_2G5 |
 + HW_ATL_A0_RATE_1G |
 + HW_ATL_A0_RATE_100M,
+};

-static void hw_atl_a0_destroy(struct aq_hw_s *self)
-
-kfree(self);
-
+const struct aq_hw_caps_s hw_atl_a0_caps_aqc109 = {
 +DEFAULT_A0_BOARD_BASIC_CAPABILITIES,
 +.media_type = AQ_HW_MEDIA_TYPE_TP,
 +.link_speed_msk = HW_ATL_A0_RATE_2G5 |
 + HW_ATL_A0_RATE_1G |
 + HW_ATL_A0_RATE_100M,
+};

static int hw_atl_a0_hw_reset(struct aq_hw_s *self)
{
 int err = 0;

-glbl_glb_reg_res_dis_set(self, 1U);
-pci_pci_reg_res_dis_set(self, 0U);
-rx_rx_reg_res_dis_set(self, 0U);
-tx_tx_reg_res_dis_set(self, 0U);
+hw_atl_glb_glb_reg_res_dis_set(self, 1U);
+hw_atl_pci_pci_reg_res_dis_set(self, 0U);
+hw_atl_rx_rx_reg_res_dis_set(self, 0U);
+hw_atl_tx_tx_reg_res_dis_set(self, 0U);

HW_ATL_FLUSH();
-glb_soft_res_set(self, 1);
+hw_atl_glb_soft_res_set(self, 1);

/* check 10 times by 1ms */
-AQ_HW_WAIT_FOR(glb_soft_res_get(self) == 0, 1000U, 10U);
+AQ_HW_WAIT_FOR(hw_atl_glb_soft_res_get(self) == 0, 1000U, 10U);
if (err < 0)
goto err_exit;

-itr_irq_reg_res_dis_set(self, 0U);
-itr_res_irq_set(self, 1U);
+hw_atl_itr_irq_reg_res_dis_set(self, 0U);
+hw_atl_itr_res_irq_set(self, 1U);

/* check 10 times by 1ms */
-AQ_HW_WAIT_FOR(itr_res_irq_get(self) == 0, 1000U, 10U);
+AQ_HW_WAIT_FOR(hw_atl_itr_res_irq_get(self) == 0, 1000U, 10U);
if (err < 0)
goto err_exit;

-hw_atl_utils_mpi_set(self, MPI_RESET, 0x0U);
+self->aq_fw_ops->set_state(self, MPI_RESET);
err = aq_hw_err_from_flags(self);

@@ -99,51 +121,53 @@
bool is_rx_flow_control = false;

/* TPS Descriptor rate init */
-tps_tx_pkt_shed_desc_rate_cur_time_res_set(self, 0x0U);
-tps_tx_pkt_shed_desc_rate_limb_set(self, 0xA);
+hw_atl_tps_tx_pkt_shed_desc_rate_cur_time_res_set(self, 0x0U);
+hw_atl_tps_tx_pkt_shed_desc_rate_limb_set(self, 0xA);

/* TPS VM init */
-tps_tx_pkt_shed_desc_vm_arb_mode_set(self, 0U);
+hw_atl_tps_tx_pkt_shed_desc_vm_arb_mode_set(self, 0U);

/* TPS TC credits init */
-tps_tx_pkt_shed_desc_tc_arb_mode_set(self, 0U);
-tps_tx_pkt_shed_data Arb_mode_set(self, 0U);
+hw_atl_tps_tx_pkt_shed_desc_tc_arb_mode_set(self, 0U);
+hw_atl_tps_tx_pkt_shed_data_arb_mode_set(self, 0U);
-tps_tx_pkt_shed_tc_data_max_credit_set(self, 0xFFF, 0U);
-tps_tx_pkt_shed_tc_data_weight_set(self, 0x64, 0U);
-tps_tx_pkt_shed_desc_tc_max_credit_set(self, 0x50, 0U);
-tps_tx_pkt_shed_desc_tc_weight_set(self, 0x1E, 0U);
+hw_atl_tps_tx_pkt_shed_tc_data_max_credit_set(self, 0xFFF, 0U);
+hw_atl_tps_tx_pkt_shed_tc_data_weight_set(self, 0x64, 0U);
+hw_atl_tps_tx_pkt_shed_desc_tc_max_credit_set(self, 0x50, 0U);
+hw_atl_tps_tx_pkt_shed_desc_tc_weight_set(self, 0x1E, 0U);

/* Tx buf size */
buff_size = HW_ATL_A0_TXBUF_MAX;

-tpb_tx_pkt_buff_size_per_tc_set(self, buff_size, tc);
-tpb_tx_buff_hi_threshold_per_tc_set(self,
  - (buff_size * (1024U / 32U) * 66U) /
  - 100U, tc);
-tpb_tx_buff_lo_threshold_per_tc_set(self,
  - (buff_size * (1024U / 32U) * 50U) /
  - 100U, tc);
+hw_atl_tpb_tx_pkt_buff_size_per_tc_set(self, buff_size, tc);
+hw_atl_tpb_tx_buff_hi_threshold_per_tc_set(self,
  + (buff_size *
  + (1024U / 32U) * 66U) /
  + 100U, tc);
+hw_atl_tpb_tx_buff_lo_threshold_per_tc_set(self,
  + (buff_size *
  + (1024U / 32U) * 50U) /
  + 100U, tc);

/* QoS Rx buf size per TC */
tc = 0;
is_rx_flow_control = (AQ_NIC_FC_RX & self->aq_nic_cfg->flow_control);
buff_size = HW_ATL_A0_RXBUF_MAX;

-rpb_rx_pkt_buff_size_per_tc_set(self, buff_size, tc);
-rpb_rx_buff_hi_threshold_per_tc_set(self,
  - (buff_size *
  - (1024U / 32U) * 66U) /
  - 100U, tc);
-rpb_rx_buff_lo_threshold_per_tc_set(self,
  - (buff_size *
  - (1024U / 32U) * 50U) /
  - 100U, tc);
-rpb_rx_xoff_en_per_tc_set(self, is_rx_flow_control ? 1U : 0U, tc);
+hw_atl_rpb_rx_pkt_buff_size_per_tc_set(self, buff_size, tc);
+hw_atl_rpb_rx_buff_hi_threshold_per_tc_set(self,
  + (buff_size *
  + (1024U / 32U) * 66U) /
+ hw_atl_rpb_rx_buff_lo_threshold_per_tc_set(self, 
+ (buff_size * 
+ (1024U / 32U) * 50U) / 
+ 100U, tc); 
+ hw_atl_rpb_rx_xoff_en_per_tc_set(self, is_rx_flow_control ? 1U : 0U, tc); 

/* QoS 802.1p priority -> TC mapping */ 
for (i_priority = 8U; i_priority--;)
- rpf_rpb_user_priority_tc_map_set(self, i_priority, 0U);
+ hw_atl_rpf_rpb_user_priority_tc_map_set(self, i_priority, 0U);
return aq_hw_err_from_flags(self); 
}
@@ -151,20 +175,19 @@
static int hw_atl_a0_hw_rss_hash_set(struct aq_hw_s *self, 
struct aq_rss_parameters *rss_params)
{
- struct aq_nic_cfg_s *cfg = NULL;
+ struct aq_nic_cfg_s *cfg = self->aq_nic_cfg;
int err = 0;
unsigned int i = 0U;
unsigned int addr = 0U;

- cfg = self->aq_nic_cfg;
- 
+ for (i = 10, addr = 0U; i--; ++addr) {
  u32 key_data = cfg->is_rss?
    __swab32(rss_params->hash_secret_key[i]) : 0U;
- rpf_rss_key_wr_data_set(self, key_data);
- rpf_rss_key_addr_set(self, addr);
- rpf_rss_key_wr_en_set(self, 1U);
- AQ_HW_WAIT_FOR(rpf_rss_key_wr_en_get(self) == 0, 1000U, 10U);
+ hw_atl_rpf_rss_key_wr_data_set(self, key_data);
+ hw_atl_rpf_rss_key_addr_set(self, addr);
+ hw_atl_rpf_rss_key_wr_en_set(self, 1U);
+ AQ_HW_WAIT_FOR(hw_atl_rpf_rss_key_wr_en_get(self) == 0, 
+ 1000U, 10U);
if (err < 0)
goto err_exit;
}
@@ -182,8 +205,8 @@
  u32 i = 0U;
  u32 num_rss_queues = max(1U, self->aq_nic_cfg->num_rss_queues);
  int err = 0;
- u16 bitary[(HW_ATL_A0_RSS_REDIRECTION_MAX *
- HW_ATL_A0_RSS_REDIRECTION_BITS / 16U)];
+ u16 bitary[1 + (HW_ATL_A0_RSS_REDIRECTION_MAX *
memset(bitary, 0, sizeof(bitary));

for (i = ARRAY_SIZE(bitary); i--;) {
    hw_atl_rpf_rss_redir_tbl_wr_data_set(self, bitary[i]);
    hw_atl_rpf_rss_redir_tbl_addr_set(self, i);
    hw_atl_rpf_rss_redir_wr_en_set(self, 1U);
    AQ_HW_WAIT_FOR(hw_atl_rpf_rss_redir_wr_en_get(self) == 0, 1000U, 10U);
}

if (err < 0)
goto err_exit;

struct aq_nic_cfg_s *aq_nic_cfg)
{
    /* TX checksums offloads*/
    -tpo_ipv4header_crc_offload_en_set(self, 1);
    -tpo_tcp_udp_crc_offload_en_set(self, 1);
    +hw_atl_tpo_ipv4header_crc_offload_en_set(self, 1);
    +hw_atl_tpo_tcp_udp_crc_offload_en_set(self, 1);
    /* RX checksums offloads*/
    -rpo_ipv4header_crc_offload_en_set(self, 1);
    -rpo_tcp_udp_crc_offload_en_set(self, 1);
    +hw_atl_rpo_ipv4header_crc_offload_en_set(self, 1);
    +hw_atl_rpo_tcp_udp_crc_offload_en_set(self, 1);
    /* LSO offloads*/
    -tdm_large_send_offload_en_set(self, 0xFFFFFFFFU);
    +hw_atl_tdm_large_send_offload_en_set(self, 0xFFFFFFFFU);
    return aq_hw_err_from_flags(self);
}

static int hw_atl_a0_hw_init_tx_path(struct aq_hw_s *self)
{
    -thm_lso_tcp_flag_of_first_pkt_set(self, 0x0FF6U);
    -thm_lso_tcp_flag_of_middle_pkt_set(self, 0x0FF6U);
    +thm_lso_tcp_flag_of_first_pkt_set(self, 0x0FF6U);
    +thm_lso_tcp_flag_of_middle_pkt_set(self, 0x0FF6U);
Thm_lso_tcp_flag_of_last_pkt_set(self, 0x0F7FU);
+hwa_thm_lso_tcp_flag_of_first_pkt_set(self, 0x0FF6U);
+hwa_thm_lso_tcp_flag_of_middle_pkt_set(self, 0x0FF6U);
+hwa_thm_lso_tcp_flag_of_last_pkt_set(self, 0x0F7FU);

/* Tx interrupts */
-tdm_tx_desc_wr_wb_irq_en_set(self, 1U);
+hwa_atl_tdm_tx_desc_wr_wb_irq_en_set(self, 1U);

/* misc */
aq_hw_write_reg(self, 0x000007040U, IS_CHIP_FEATURE(TPO2) ?
    0x00010000U : 0x00000000U);
-tdm_tx_dca_en_set(self, 0U);
-tdm_tx_dca_mode_set(self, 0U);
+hwa_atl_tdm_tx_dca_en_set(self, 0U);
+hwa_atl_tdm_tx_dca_mode_set(self, 0U);

-tpb_tx_path_scp_ins_en_set(self, 1U);
+hwa_atl_tpb_tx_path_scp_ins_en_set(self, 1U);

return aq_hw_err_from_flags(self);
}

int i;

/* Rx TC/RSS number config */
-rpb_rpf_rx_traf_class_mode_set(self, 1U);
+hwa_atl_rpb_rpf_rx_traf_class_mode_set(self, 1U);

/* Rx flow control */
-rpb_rx_flow_ctl_mode_set(self, 1U);
+hwa_atl_rpb_rx_flow_ctl_mode_set(self, 1U);

/* RSS Ring selection */
-reg_rx_flr_rss_control1set(self, cfg->is_rss ?
    0xB3333333U : 0x00000000U);
-rpb2_uc_flr_en_set(self, (i == 0U) ? 1U : 0U, i);
-rpb2unicast_flr_act_set(self, 1U, i);
+hwa_atl_rpb2_uc_flr_en_set(self, (i == 0U) ? 1U : 0U, i);
+hwa_atl_rpb2unicast_flr_act_set(self, 1U, i);
}

-reg_rx_flr_mcst_flr_msk_set(self, 0x00000000U);
-reg_rx_flr_mcst_flr_set(self, 0x00000000U);
+hw_atl_reg_rx_flr_mcast_flr_msk_set(self, 0x00000000U);
+hw_atl_reg_rx_flr_mcast_flr_set(self, 0x0010FFFFU, 0U);

/* Vlan filters */
-rpf_vlan_outer_eth_set(self, 0x88A8U);
-rpf_vlan_inner_eth_set(self, 0x8100U);
-rpf_vlan_prom_mode_en_set(self, 1);
+hw_atl_rpf_vlan_outer_eth_set(self, 0x88A8U);
+hw_atl_rpf_vlan_inner_eth_set(self, 0x8100U);
+hw_atl_rpf_vlan_prom_mode_en_set(self, 1);

/* Rx Interrupts */
-rdm_rx_desc_wr_wb_irq_en_set(self, 1U);
+hw_atl_rdm_rx_desc_wr_wb_irq_en_set(self, 1U);

/* misc */
-rpfl2broadcast_flr_act_set(self, 1U);
-rpfl2broadcast_count_threshold_set(self, 0xFFFFU & (~0U / 256U));
+hw_atl_rpfl2broadcast_flr_act_set(self, 1U);
+hw_atl_rpfl2broadcast_count_threshold_set(self, 0xFFFFU & (~0U / 256U));

-rdm_rx_dca_en_set(self, 0U);
-rdm_rx_dca_mode_set(self, 0U);
+hw_atl_rdm_rx_dca_en_set(self, 0U);
+hw_atl_rdm_rx_dca_mode_set(self, 0U);

return aq_hw_err_from_flags(self);
}
@@ -301,10 +325,10 @@

       (mac_addr[4] << 8) | mac_addr[5];

-rpfl2_uc_flr_en_set(self, 0U, HW_ATL_A0_MAC);
-rpfl2unicast_dest_addresslsw_set(self, l, HW_ATL_A0_MAC);
-rpfl2unicast_dest_addressmsw_set(self, h, HW_ATL_A0_MAC);
-rpfl2_uc_flr_en_set(self, 1U, HW_ATL_A0_MAC);
+hw_atl_rpfl2_uc_flr_en_set(self, 0U, HW_ATL_A0_MAC);
+hw_atl_rpfl2unicast_dest_addresslsw_set(self, l, HW_ATL_A0_MAC);
+hw_atl_rpfl2unicast_dest_addressmsw_set(self, h, HW_ATL_A0_MAC);
+hw_atl_rpfl2_uc_flr_en_set(self, 1U, HW_ATL_A0_MAC);

err = aq_hw_err_from_flags(self);

@@ -312,9 +336,7 @@

return err;
}

-static int hw_atl_a0_hw_init(struct aq_hw_s *self,
static int hw_atl_a0_hw_init(struct aq_hw_s *self, u8 *mac_addr) {
    struct aq_nic_cfg_s *aq_nic_cfg = self->aq_nic_cfg;

    hw_atl_a0_hw_init_tx_path(self);
    hw_atl_a0_hw_init_rx_path(self);

    hw_atl_a0_hw_mac_addr_set(self, mac_addr);

    hw_atl_a0_hw_qos_set(self);
    hw_atl_a0_hw_rss_set(&aq_nic_cfg->aq_rss);

    int err = 0;
    self->aq_nic_cfg = aq_nic_cfg;

    -hw_atl_utils_hw_chip_features_init(self,
      -&PHAL_ATLANTIC_A0->chip_features);
    +struct aq_nic_cfg_s *aq_nic_cfg = self->aq_nic_cfg;

    hw_atl_a0_hw_init_tx_path(self);
    hw_atl_a0_hw_init_rx_path(self);

    hw_atl_a0_hw_mac_addr_set(self, mac_addr);

    -hw_atl_utils_mpi_set(self, MPI_INIT, aq_nic_cfg->link_speed_msk);
    +self->aq_fw_ops->set_link_speed(self, aq_nic_cfg->link_speed_msk);
    +self->aq_fw_ops->set_state(self, MPI_INIT);

    -reg_tx_dma_debug_ctl_set(self, 0x800000b8U);
    -reg_tx_dma_debug_ctl_set(self, 0x000000b8U);
    +hw_atl_reg_tx_dma_debug_ctl_set(self, 0x800000b8U);
    +hw_atl_reg_tx_dma_debug_ctl_set(self, 0x000000b8U);

    hw_atl_a0_hw_qos_set(self);
    hw_atl_a0_hw_rss_set(self, &aq_nic_cfg->aq_rss);

    /* Reset link status and read out initial hardware counters */
    self->aq_link_status.mbps = 0;
    -hw_atl_utils_update_stats(self);
    +self->aq_fw_ops->update_stats(self);

    err = aq_hw_err_from_flags(self);
    if (err < 0)
        goto err_exit;

    /* Interrupts */
    -reg_irq_glb_ctl_set(self,
      -aq_hw_atl_igcr_table_[aq_nic_cfg->irq_type]
      -[(aq_nic_cfg->vecs > 1U) ?
        -1 : 0]);

    /* Interrupts */
    -reg_irq_glb_ctl_set(self,
      -aq_hw_atl_igcr_table_[aq_nic_cfg->irq_type]
      -[(aq_nic_cfg->vecs > 1U) ?
        -1 : 0]);
+hw_atl_reg_irq_glbCtl_set(self,
+    aq_hw_atl_igar_table[aq_nic_cfg->irq_type]
+    [(aq_nic_cfg->vecs > 1U) ? 1 : 0]);

-itr_irq_auto_mask_lsw_set(self, aq_nic_cfg->aq_hw_caps->irq_mask);
+hw_atl_itr_irq_auto_mask_lsw_set(self, aq_nic_cfg->aq_hw_caps->irq_mask);

/* Interrupts */
-reg_gen_irq_map_set(self,
-    ((HW_ATL_A0_ERR_INT << 0x18) | (1U << 0x1F)) |
-    ((HW_ATL_A0_ERR_INT << 0x10) | (1U << 0x17)) |
-    ((HW_ATL_A0_ERR_INT << 8) | (1U << 0xF)) |
-    ((HW_ATL_A0_ERR_INT) | (1U << 0x7)), 0U);
+hw_atl_reg_gen_irq_map_set(self,
+    ((HW_ATL_A0_ERR_INT << 0x18) | (1U << 0x1F)) |
+    ((HW_ATL_A0_ERR_INT << 0x10) | (1U << 0x17)) |
+    ((HW_ATL_A0_ERR_INT << 8) | (1U << 0xF)) |
+    ((HW_ATL_A0_ERR_INT) | (1U << 0x7)), 0U);

hw_atl_a0_hw_offload_set(self, aq_nic_cfg);

@@ -376,28 +395,28 @@
static int hw_atl_a0_hw_ring_tx_start(struct aq_hw_s *self,
    struct aq_ring_s *ring)
{
-    tdm_tx_desc_en_set(self, 1, ring->idx);
+    hw_atl_tdm_tx_desc_en_set(self, 1, ring->idx);
    return aq_hw_err_from_flags(self);
}

static int hw_atl_a0_hw_ring_rx_start(struct aq_hw_s *self,
    struct aq_ring_s *ring)
{
-    rdm_rx_desc_en_set(self, 1, ring->idx);
+    hw_atl_rdm_rx_desc_en_set(self, 1, ring->idx);
    return aq_hw_err_from_flags(self);
}

static int hw_atl_a0_hw_start(struct aq_hw_s *self)
{
-    tpb_tx_buff_en_set(self, 1);
-    rpb_rx_buff_en_set(self, 1);
+    hw_atl_tpb_tx_buff_en_set(self, 1);
+    hw_atl_rpb_rx_buff_en_set(self, 1);
    return aq_hw_err_from_flags(self);
}

static int hw_atl_a0_hw_tx_ring_tail_update(struct aq_hw_s *self,
struct aq_ring_s *ring)
{
- reg_tx_dma_desc_tail_ptr_set(self, ring->sw_tail, ring->idx);
+ hw_atl_reg_tx_dma_desc_tail_ptr_set(self, ring->sw_tail, ring->idx);
return 0;
}

@@ -483,36 +502,37 @@
  u32 dma_desc_addr_lsw = (u32)aq_ring->dx_ring_pa;
  u32 dma_desc_addr_msw = (u32)(((u64)aq_ring->dx_ring_pa) >> 32);

- rdm_rx_desc_en_set(self, false, aq_ring->idx);
+ hw_atl_rdm_rx_desc_en_set(self, false, aq_ring->idx);

- rdm_rx_desc_head_splitting_set(self, 0U, aq_ring->idx);
+ hw_atl_rdm_rx_desc_head_splitting_set(self, 0U, aq_ring->idx);

- reg_rx_dma_desc_base_addresslswset(self, dma_desc_addr_lsw,
-    dma_desc_addr_lsw, aq_ring->idx);
+ hw_atl_reg_rx_dma_desc_base_addresslswset(self, dma_desc_addr_lsw,
+    dma_desc_addr_lsw, aq_ring->idx);

- reg_rx_dma_desc_base_addressmswset(self, dma_desc_addr_msw, aq_ring->idx);
+ hw_atl_reg_rx_dma_desc_base_addressmswset(self, dma_desc_addr_msw, aq_ring->idx);

- rdm_rx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);
+ hw_atl_rdm_rx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);

- rdm_rx_desc_head_buff_size_set(self, 0U, aq_ring->idx);
- rdm_rx_desc_head_splitting_set(self, 0U, aq_ring->idx);
- rpo_rx_desc_vlan_stripping_set(self, 0U, aq_ring->idx);
+ hw_atl_rdm_rx_desc_head_buff_size_set(self, 0U, aq_ring->idx);
+ hw_atl_rdm_rx_desc_head_splitting_set(self, 0U, aq_ring->idx);
+ hw_atl_rpo_rx_desc_vlan_stripping_set(self, 0U, aq_ring->idx);

/* Rx ring set mode */

/* Mapping interrupt vector */
- itr_irq_map_rx_set(self, aq_ring_param->vec_idx, aq_ring->idx);

itr_irq_map_en_rx_set(self, true, aq_ring->idx);
+hw_atl_itr_irq_map_rx_set(self, aq_ring_param->vec_idx, aq_ring->idx);
+hw_atl_itr_irq_map_en_rx_set(self, true, aq_ring->idx);

rdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
-rdm_rx_desc_dca_en_set(self, 0U, aq_ring->idx);
-rdm_rx_head_dca_en_set(self, 0U, aq_ring->idx);
-rdm_rx_pld_dca_en_set(self, 0U, aq_ring->idx);
+hw_atl_rdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
+hw_atl_rdm_rx_desc_dca_en_set(self, 0U, aq_ring->idx);
+hw_atl_rdm_rx_head_dca_en_set(self, 0U, aq_ring->idx);
+hw_atl_rdm_rx_pld_dca_en_set(self, 0U, aq_ring->idx);

return aq_hw_err_from_flags(self);
}

@@ -524,25 +544,25 @@
u32 dma_desc_lsw_addr = (u32)aq_ring->dx_ring_pa;
u32 dma_desc_msw_addr = (u32)(((u64)aq_ring->dx_ring_pa) >> 32);

-reg_tx_dma_desc_base_addresslswset(self, dma_desc_lsw_addr,
-  aq_ring->idx);
+hw_atl_reg_tx_dma_desc_base_addresslswset(self, dma_desc_lsw_addr,
  aq_ring->idx);

-reg_tx_dma_desc_base_addressmswset(self, dma_desc_msw_addr,
-  aq_ring->idx);
+hw_atl_reg_tx_dma_desc_base_addressmswset(self, dma_desc_msw_addr,
  aq_ring->idx);

-tdm_tx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);
+hw_atl_tdm_tx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);

hw_atl_a0_hw_tx_ring_tail_update(self, aq_ring);

/* Set Tx threshold */
-tdm_tx_desc_wr_wb_threshold_set(self, 0U, aq_ring->idx);
+hw_atl_tdm_tx_desc_wr_wb_threshold_set(self, 0U, aq_ring->idx);

/* Mapping interrupt vector */
-itr_irq_map_tx_set(self, aq_ring_param->vec_idx, aq_ring->idx);
-itr_irq_map_en_tx_set(self, true, aq_ring->idx);
+hw_atl_itr_irq_map_tx_set(self, aq_ring_param->vec_idx, aq_ring->idx);
+hw_atl_itr_irq_map_en_tx_set(self, true, aq_ring->idx);

-tdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
-tdm_tx_desc_dca_en_set(self, 0U, aq_ring->idx);
+hw_atl_tdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
+hw_atl_tdm_tx_desc_dca_en_set(self, 0U, aq_ring->idx);
return aq_hw_err_from_flags(self);
}
@@ -563,7 +583,7 @@
    rxd->hdr_addr = 0U;
}
-reg_rx_dma_desc_tail_ptr_set(self, sw_tail_old, ring->idx);
+hw_atl_reg_rx_dma_desc_tail_ptr_set(self, sw_tail_old, ring->idx);

return aq_hw_err_from_flags(self);
}
@@ -572,13 +592,13 @@
 struct aq_ring_s *ring)
 {
     int err = 0;
-    unsigned int hw_head_ = tdm_tx_desc_head_ptr_get(self, ring->idx);
+    unsigned int hw_head = hw_atl_tdm_tx_desc_head_ptr_get(self, ring->idx);
-    if (aq_utils_obj_test(&self->header.flags, AQ_HW_FLAG_ERR_UNPLUG)) {
+    if (aq_utils_obj_test(&self->flags, AQ_HW_FLAG_ERR_UNPLUG)) {
        err = -ENXIO;
        goto err_exit;
    }
    -    ring->hw_head = hw_head_;
    +    ring->hw_head = hw_head;
    err = aq_hw_err_from_flags(self);

err_exit:
@@ -602,15 +622,16 @@
 if (!(rxd_wb->status & 0x5U)) { /* RxD is not done */
     if ((1U << 4) &
-        reg_rx_dma_desc_status_get(self, ring->idx)) {
+        hw_atl_reg_rx_dma_desc_status_get(self, ring->idx)) {
         -        rdm_rx_desc_en_set(self, false, ring->idx);
+        hw_atl_rdm_rx_desc_en_set(self, false, ring->idx);
         -        rdm_rx_desc_res_set(self, true, ring->idx);
+        hw_atl_rdm_rx_desc_res_set(self, true, ring->idx);
         -        rdm_rx_desc_res_set(self, false, ring->idx);
+        hw_atl_rdm_rx_desc_res_set(self, false, ring->idx);
         -        rdm_rx_desc_en_set(self, true, ring->idx);
+        hw_atl_rdm_rx_desc_en_set(self, true, ring->idx);
     }
     if (ring->hw_head ||
         -(rdm_rx_desc_head_ptr_get(self, ring->idx) < 2U)) {
+        (hw_atl_rdm_rx_desc_head_ptr_get(self,
static int hw_atl_a00_hw_irq_enable(struct aq_hw_s *self, u64 mask)
{
    -itr_irq_msk_setlsw_set(self, LODWORD(mask))
+hw_atl_itr_irq_msk_setlsw_set(self, LODWORD(mask))
    (1U << HW_ATL_A0_ERR_INT));
    return aq_hw_err_from_flags(self);
}

static int hw_atl_a00_hw_irq_disable(struct aq_hw_s *self, u64 mask)
{
    -itr_irq_msk_clearlsw_set(self, LODWORD(mask));
    -itr_irq_status_clearlsw_set(self, LODWORD(mask));
+hw_atl_itr_irq_msk_clearlsw_set(self, LODWORD(mask));
+hw_atl_itr_irq_status_clearlsw_set(self, LODWORD(mask));

    -if ((1U << 16) & reg_gen_irq_status_get(self))
        -atomic_inc(&PHAL_ATLANTIC_A0->dpc);
+if ((1U << 16) & hw_atl_reg_gen_irq_status_get(self))
        +atomic_inc(&self->dpc);

    return aq_hw_err_from_flags(self);
}

static int hw_atl_a00_hw_irq_read(struct aq_hw_s *self, u64 *mask)
{
    -*mask = itr_irq_statuslsw_get(self);
    +*mask = hw_atl_itr_irq_statuslsw_get(self);
    return aq_hw_err_from_flags(self);
}

unsigned int i = 0U;
-rpfl2promiscuous_mode_en_set(self, IS_FILTER_ENABLED(IFF_PROMISC));
-rpfl2multicast_flr_en_set(self, IS_FILTER_ENABLED(IFF_MULTICAST), 0);
-rpfl2broadcast_en_set(self, IS_FILTER_ENABLED(IFF_BROADCAST));
+hw_atl_rpfl2promiscuous_mode_en_set(self,
    + IS_FILTER_ENABLED(IFF_PROMISC));
+hw_atl_rpfl2multicast_flr_en_set(self,
    + IS_FILTER_ENABLED(IFF_MULTICAST), 0);
self->aq_nic_cfg->is_mc_list_enabled = IS_FILTER_ENABLED(IFF_MULTICAST);

for (i = HW_ATL_A0_MAC_MIN; i < HW_ATL_A0_MAC_MAX; ++i)
- rpfll2_uc_flr_en_set(self, 
- (self->aq_nic_cfg->is_mc_list_enabled && 
- (i <= self->aq_nic_cfg->mc_list_count)) ?
- 1U : 0U, i);
+ hw_atl_rpfl2_uc_flr_en_set(self, 
+ (self->aq_nic_cfg->is_mc_list_enabled && 
+ (i <= self->aq_nic_cfg->mc_list_count)) ?
+ 1U : 0U, i);

return aq_hw_err_from_flags(self);
}
@@ -743,14 +765,14 @@
static int hw_atl_a0_hw_multicast_list_set(struct aq_hw_s *self, 
    u8 ar_mac[
- [AQ_CFG_MULTICAST_ADDRESS_MAX]
+ [AQ_HW_MULTICAST_ADDRESS_MAX]
    [ETH_ALEN],
    u32 count)
{
    int err = 0;

    if (count > (HW_ATL_A0_MAC_MAX - HW_ATL_A0_MAC_MIN)) {
        -err = EBADRQC;
        +err = -EBADRQC;
        goto err_exit;
    }
    for (self->aq_nic_cfg->mc_list_count = 0U;
@@ -761,17 +783,19 @@
        u32 l = (ar_mac[i][2] << 24) | (ar_mac[i][3] << 16) | 
            (ar_mac[i][4] << 8) | ar_mac[i][5];
        -rpfll2_uc_flr_en_set(self, 0U, HW_ATL_A0_MAC_MIN + i);
-        -rpfll2unicast_dest_addresslsw_set(self, 
-            l, HW_ATL_A0_MAC_MIN + i);
-        -rpfll2unicast_dest_addressmsw_set(self, 
-            h, HW_ATL_A0_MAC_MIN + i);
+        +hw_atl_rpfl2_uc_flr_en_set(self, 0U, HW_ATL_A0_MAC_MIN + i);
+        +rpfll2uncast_dest_addresslsw_set(self, 
+            l, HW_ATL_A0_MAC_MIN + i);
+        +rpfll2unicast_dest_addressmsw_set(self, 
+            h, HW_ATL_A0_MAC_MIN + i);
+        +hw_atl_rpfl2_uc_flr_en_set(self, 0U, HW_ATL_A0_MAC_MIN + i);
+        +rpfll2uncast_dest_addresslsw_set(self, 
+            l, HW_ATL_A0_MAC_MIN + i);
+        +rpfll2unicast_dest_addressmsw_set(self, 
+            h, HW_ATL_A0_MAC_MIN + i);
        -rpfll2_uc_flr_en_set(self, 
        -self->aq_nic_cfg->is_mc_list_enabled && 
        - (i <= self->aq_nic_cfg->mc_list_count)) ?
        - 1U : 0U, i);
    }

return aq_hw_err_from_flags(self);
}
- (self->aq_nic_cfg->is_mc_list_enabled),
- HW_ATL_A0_MAC_MIN + i);
+hw_atl_rpfl2unicast_dest_addressmsw_set(self,
  +1,
  +HW_ATL_A0_MAC_MIN + i);
+
+hw_atl_rpfl2unicast_dest_addressmsw_set(self,
  +h,
  +HW_ATL_A0_MAC_MIN + i);
+
+hw_atl_rpfl2_uc_flr_en_set(self,
  + (self->aq_nic_cfg->is_mc_list_enabled),
  + HW_ATL_A0_MAC_MIN + i);
}

err = aq_hw_err_from_flags(self);
@@ -823,7 +847,7 @@
}

for (i = HW_ATL_A0_RINGS_MAX; i--;)
-reg_irq_thr_set(self, itr_rx, i);
+hw_atl_reg_irq_thr_set(self, itr_rx, i);

return aq_hw_err_from_flags(self);
}
@@ -837,38 +861,19 @@
static int hw_atl_a0_hw_ring_tx_stop(struct aq_hw_s *self,
   struct aq_ring_s *ring)
{
  -tdm_tx_desc_en_set(self, 0U, ring->idx);
  +hw_atl_tdm_tx_desc_en_set(self, 0U, ring->idx);
  return aq_hw_err_from_flags(self);
}

static int hw_atl_a0_hw_ring_rx_stop(struct aq_hw_s *self,
   struct aq_ring_s *ring)
{
  -rdm_rx_desc_en_set(self, 0U, ring->idx);
  +hw_atl_rdm_rx_desc_en_set(self, 0U, ring->idx);
  return aq_hw_err_from_flags(self);
}

-static int hw_atl_a0_hw_set_speed(struct aq_hw_s *self, u32 speed)
-{
- int err = 0;
- -
- err = hw_atl_utils_mpi_set_speed(self, speed, MPI_INIT);
- if (err < 0)
goto err_exit;
-
-err_exit:
-return err;
-
-static struct aq_hw_ops hw_atl_ops_ = {
 -create               = hw_atl_a0_create,
 -destroy              = hw_atl_a0_destroy,
 -get_hw_caps          = hw_atl_a0_get_hw_caps,
 -
 -hw_get_mac_permanent = hw_atl_utils_get_mac_permanent,
 +const struct aq_hw_ops hw_atl_ops_a0 = {
 -.hw_set_mac_address   = hw_atl_a0_hw_mac_addr_set,
 -.hw_get_link_status   = hw_atl_utils_mpi_get_link_status,
 -.hw_set_link_speed    = hw_atl_a0_hw_set_speed,
 -.hw_init              = hw_atl_a0_hw_init,
 -.hw_deinit            = hw_atl_utils_hw_deinit,
 -.hw_set_power         = hw_atlutils_hw_set_power,
@@ -898,21 +903,6 @@
 -.hw_rss_set                  = hw_atl_a0_hw_rss_set,
 -.hw_rss_hash_set             = hw_atl_a0_hw_rss_hash_set,
 -.hw_get_regs                 = hw_atl_utils_hw_get_regs,
 -hw_update_stats              = hw_atl_utils_update_stats,
 -.hw_get_hw_stats             = hw_atl_utils_get_hw_stats,
 -.hw_get_fw_version           = hw_atl_utils_get_fw_version,
};
-
-struct aq_hw_ops *hw_atl_a0_get_ops_by_id(struct pci_dev *pdev)
-{      
-bool is_vid_ok = (pdev->vendor == PCI_VENDOR_ID_AQUANTIA);
-bool is_did_ok = (pdev->device == HW_ATL_DEVICE_ID_0001) ||
 -(pdev->device == HW_ATL_DEVICE_ID_D100) ||
 -(pdev->device == HW_ATL_DEVICE_ID_D107) ||
 -(pdev->device == HW_ATL_DEVICE_ID_D108) ||
 -(pdev->device == HW_ATL_DEVICE_ID_D109));
-
-bool is_rev_ok = (pdev->revision == 1U);
-
-return (is_vid_ok && is_did_ok && is_rev_ok)? &hw_atl_ops_: NULL;
-}
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0.h
@@ -16,19 +16,11 @@
#include "../aq_common.h"

#ifndef PCI_VENDOR_ID_AQUANTIA

Open Source Used In 5GaaS Edge AC-4 24198

--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0.h
@@ -16,19 +16,11 @@
#include "../aq_common.h"

#ifndef PCI_VENDOR_ID_AQUANTIA

Open Source Used In 5GaaS Edge AC-4 24198
+extern const struct aq_hw_caps_s hw_atl_a0_caps_aqc100;
+extern const struct aq_hw_caps_s hw_atl_a0_caps_aqc107;
+extern const struct aq_hw_caps_s hw_atl_a0_caps_aqc108;
+extern const struct aq_hw_caps_s hw_atl_a0_caps_aqc109;

-#define PCI_VENDOR_ID_AQUANTIA 0x1D6A
-#define HW_ATL_DEVICE_ID_0001 0x0001
-#define HW_ATL_DEVICE_ID_D100 0xD100
-#define HW_ATL_DEVICE_ID_D107 0xD107
-#define HW_ATL_DEVICE_ID_D108 0xD108
-#define HW_ATL_DEVICE_ID_D109 0xD109
-
-#define HW_ATL_NIC_NAME "aQuantia AQtion 5Gbit Network Adapter"
-
-#endif
-
-struct aq_hw_ops *hw_atl_a0_get_ops_by_id(struct pci_dev *pdev);
+extern const struct aq_hw_ops hw_atl_ops_a0;

endf /* HW_ATL_A0_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0_internal.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_a0_internal.h
@@ -88,69 +88,4 @@

#define HW_ATL_A0_FW_VER_EXPECTED 0x01050006U

-/* Hardware tx descriptor */
-struct __packed hw_atl_txd_s {
-u64 buf_addr;
-u32 ctl;
-u32 ctl2; /* 63..46 - payload length, 45 - ctx enable, 44 - ctx index */
-};
-
-/* Hardware tx context descriptor */
-struct __packed hw_atl_txc_s {
-u32 rsvd;
-u32 len;
-u32 ctl;
-u32 len2;
-};
-
-/* Hardware rx descriptor */
-struct __packed hw_atl_rxd_s {
-u64 buf_addr;
-u64 hdr_addr;
-};
-
-/* Hardware rx descriptor writeback */
- struct __packed hw_atl_rxd_wb_s {
  -u32 type;
  -u32 rss_hash;
  -u16 status;
  -u16 pkt_len;
  -u16 next_desc_ptr;
  -u16 vlan;
  -};
- /* HW layer capabilities */
- static struct aq_hw_caps_s hw_atl_a0_hw_caps_ = {
  .ports = 1U,
  .is_64_dma = true,
  .msix_irqs = 4U,
  .irq_mask = ~0U,
  .vecs = HW_ATL_A0_RSS_MAX,
  .tcs = HW_ATL_A0_TC_MAX,
  .rxd_alignment = 1U,
  .rxd_size = HW_ATL_A0_RXD_SIZE,
  .rxds = 248U,
  .txd_alignment = 1U,
  .txd_size = HW_ATL_A0_TXD_SIZE,
  .txds = 8U * 1024U,
  .txhwb_alignment = 4096U,
  .tx Rings = HW_ATL_A0_TX_RINGS,
  .rx Rings = HW_ATL_A0_RX_RINGS,
  .hw_features = NETIF_F_HW_CSUM |
  NETIF_F_RXCSUM |
  NETIF_F_RXHASH |
  NETIF_F_SG |
  NETIF_F_TSO,
  .hw_priv_flags = IFF_UNICAST_FLT,
  .link_speed_msk = (HW_ATL_A0_RATE_10G |
  HW_ATL_A0_RATE_5G |
  HW_ATL_A0_RATE_2G5 |
  HW_ATL_A0_RATE_1G |
  HW_ATL_A0_RATE_100M),
  .flow_control = true,
  .mtu = HW_ATL_A0_MTU_JUMBO,
  .mac_regs_count = 88,
  .fw_ver_expected = HW_ATL_A0_FW_VER_EXPECTED,
  -};
- #endif /* HW_ATL_A0_INTERNAL_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_b0.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_b0.c
@@ -12,83 +12,89 @@
#include "aq_hw_utils.h"
#include "aq_ring.h"
+#include "aq_nic.h"
#include "hw_atl_b0.h"
#include "hw_atl_utils.h"
#include "hw_atl_llh.h"
#include "hw_atl_b0_internal.h"
#include "hw_atl_llh_internal.h"

- static int hw_atl_b0_get_hw_caps(struct aq_hw_s *self,
  struct aq_hw_caps_s *aq_hw_caps,
  unsigned short device,
  unsigned short subsystem_device)
  {
    - memcpy(aq_hw_caps, &hw_atl_b0_hw_caps_, sizeof(*aq_hw_caps));
    -
    - if (device == HW_ATL_DEVICE_ID_D108 && subsystem_device == 0x0001)
      aq_hw_caps->link_speed_msk &= ~HW_ATL_B0_RATE_10G;
    -
    - if (device == HW_ATL_DEVICE_ID_D109 && subsystem_device == 0x0001) {
      aq_hw_caps->link_speed_msk &= ~HW_ATL_B0_RATE_10G;
      aq_hw_caps->link_speed_msk &= ~HW_ATL_B0_RATE_5G;
    }
    -
    - return 0;
  -

- static struct aq_hw_s *hw_atl_b0_create(struct aq_pci_func_s *aq_pci_func,
  unsigned int port,
  struct aq_hw_ops *ops)
  {
    - struct hw_atl_s *self = NULL;
    -
    - self = kzalloc(sizeof(*self), GFP_KERNEL);
    - if (!self)
      goto err_exit;
    -
    - self->base.aq_pci_func = aq_pci_func;
    +#define DEFAULT_B0_BOARD_BASIC_CAPABILITIES
    +  .is_64_dma = true,
    +  .msix_irqs = 4U,
    +  .irq_mask = ~0U,
    +  .vecs = HW_ATL_B0_RSS_MAX,
    +  .tcs = HW_ATL_B0_TC_MAX,
    +  .rxd_alignment = 1U,
    +  .rxd_size = HW_ATL_B0_RXD_SIZE,
    +  .rxds = 4U * 1024U,
    +  .txd_alignment = 1U,
.txd_size = HW_ATL_B0_TXD_SIZE,
.txds = 1024U,
.txhwb_alignment = 4096U,
.tx_rings = HW_ATL_B0_TX_RINGS,
.rx_rings = HW_ATL_B0_RX_RINGS,
.hw_features = NETIF_F_HW_CSUM |
.NETIF_F_RXCSUM |
.NETIF_F_RXHASH |
.NETIF_F_SG |
.NETIF_F_TSO |
.NETIF_F_LRO, 
.hw_priv_flags = IFF_UNICAST_FLT, 
.flow_control = true,
.mtu = HW_ATL_B0_MTU_JUMBO,
.mac_regs_count = 88,
.hw_alive_check_addr = 0x10U
+const struct aq_hw_caps_s hw_atl_b0_caps_aqc100 = {
.DEFAULT_B0_BOARD_BASIC_CAPABILITIES,
.media_type = AQ_HW_MEDIA_TYPE_FIBRE,
.link_speed_msk = HW_ATL_B0_RATE_10G |
+ HW_ATL_B0_RATE_5G |
+ HW_ATL_B0_RATE_2G5 |
+ HW_ATL_B0_RATE_1G |
+ HW_ATL_B0_RATE_100M,
+};

-self->base.not_ff_addr = 0x10U;
+const struct aq_hw_caps_s hw_atl_b0_caps_aqc107 = {
.DEFAULT_B0_BOARD_BASIC_CAPABILITIES,
.media_type = AQ_HW_MEDIA_TYPE TP,
.link_speed_msk = HW_ATL_B0_RATE_10G |
+ HW_ATL_B0_RATE_5G |
+ HW_ATL_B0_RATE_2G5 |
+ HW_ATL_B0_RATE_1G |
+ HW_ATL_B0_RATE_100M,
+};

-err_exit:
-return (struct aq_hw_s *)self;
-}
+const struct aq_hw_caps_s hw_atl_b0_caps_aqc108 = {
.DEFAULT_B0_BOARD_BASIC_CAPABILITIES,
.media_type = AQ_HW_MEDIA_TYPE TP,
.link_speed_msk = HW_ATL_B0_RATE_5G |
+ HW_ATL_B0_RATE_2G5 |
+ HW_ATL_B0_RATE_1G |
+ HW_ATL_B0_RATE_100M,
const struct aq_hw_caps_s hw_atl_b0_caps_aqc109 = {
    DEFAULT_B0_BOARD_BASIC_CAPABILITIES,
    .media_type = AQ_HW_MEDIA_TYPE_TP,
    .link_speed_msk = HW_ATL_B0_RATE_2G5 |
    HW_ATL_B0_RATE_1G |
    HW_ATL_B0_RATE_100M,
};

static int hw_atl_b0_hw_reset(struct aq_hw_s *self)
{
    int err = 0;

    -glb_glb_reg_res_dis_set(self, 1U);
    -pci_pci_reg_res_dis_set(self, 0U);
    -rx_rx_reg_res_dis_set(self, 0U);
    -tx_tx_reg_res_dis_set(self, 0U);
    -
    -HW_ATL_FLUSH();
    -glb_soft_res_set(self, 1);
    -
    /* check 10 times by 1ms */
    -AQ_HW_WAIT_FOR(glb_soft_res_get(self) == 0, 1000U, 10U);
    -if (err < 0)
        -goto err_exit;
    -
    -itr_irq_reg_res_dis_set(self, 0U);
    -itr_res_irq_set(self, 1U);
    -
    /* check 10 times by 1ms */
    -AQ_HW_WAIT_FOR(itr_res_irq_get(self) == 0, 1000U, 10U);
    -if (err < 0)
        -goto err_exit;
    +err = hw_atl_utils_soft_reset(self);
    +if (err)
        +return err;
    -}
    -
    -hw_atl_utils_mpi_set(self, MPI_RESET, 0x0U);
    +self->aq_fw_ops->set_state(self, MPI_RESET);
    -
    -err_exit:
bool is_rx_flow_control = false;

/* TPS Descriptor rate init */
-tps_txd_pkt_shed_desc_rate_curr_time_res_set(self, 0x0U);
-tps_txd_pkt_shed_desc_rate_lim_set(self, 0xA);
+hw_atl_tps_txd_pkt_shed_desc_rate_curr_time_res_set(self, 0x0U);
+hw_atl_tps_txd_pkt_shed_desc_rate_lim_set(self, 0xA);

/* TPS VM init */
-tps_txd_pkt_shed_desc_vm_arb_mode_set(self, 0U);
+hw_atl_tps_txd_pkt_shed_desc_vm_arb_mode_set(self, 0U);

/* TPS TC credits init */
-tps_txd_pkt_shed_desc_tc_arb_mode_set(self, 0U);
-tps_txd_pkt_shed_data_arb_mode_set(self, 0U);
+hw_atl_tps_txd_pkt_shed_desc_tc_arb_mode_set(self, 0U);
+hw_atl_tps_txd_pkt_shed_data_arb_mode_set(self, 0U);

-tps_txd_pkt_shed_tc_data_max_credit_set(self, 0xFFF, 0U);
-tps_txd_pkt_shed_tc_data_weight_set(self, 0x64, 0U);
-tps_txd_pkt_shed_desc_tc_max_credit_set(self, 0x50, 0U);
-tps_txd_pkt_shed_desc_tc_weight_set(self, 0x1E, 0U);
+hw_atl_tps_txd_pkt_shed_tc_data_max_credit_set(self, 0xFFF, 0U);
+hw_atl_tps_txd_pkt_shed_tc_data_weight_set(self, 0x64, 0U);
+hw_atl_tps_txd_pkt_shed_desc_tc_max_credit_set(self, 0x50, 0U);
+hw_atl_tps_txd_pkt_shed_desc_tc_weight_set(self, 0x1E, 0U);

/* Tx buf size */
buff_size = hw_atl_b0_txbuf_max;

-tpb_txd_pkt_buff_size_per_tc_set(self, buff_size, tc);
-tpb_txd_pkt_buff_hi_threshold_per_tc_set(self,
  - (buff_size * (1024 / 32U) * 66U) /
  - 100U, tc);
-tpb_txd_pkt_buff_lo_threshold_per_tc_set(self,
  - (buff_size * (1024 / 32U) * 50U) /
  - 100U, tc);
+hw_atl_tpb_txd_pkt_buff_size_per_tc_set(self, buff_size, tc);
+hw_atl_tpb_txd_pkt_buff_hi_threshold_per_tc_set(self,
  + (buff_size *
  + (1024 / 32U) * 66U) /
  + 100U, tc);
+hw_atl_tpb_txd_pkt_buff_lo_threshold_per_tc_set(self,
  + (buff_size *
/* QoS Rx buf size per TC */
tc = 0;
is_rx_flow_control = (AQ_NIC_FC_RX & self->aq_nic_cfg->flow_control);
buf_size = HW_ATL_B0_RXBUF_MAX;

-rpb_rx_pkt_buff_size_per_tc_set(self, buff_size, tc);
-rpb_rx_buff_hi_threshold_per_tc_set(self,
  - (buff_size *
  - (1024U / 32U) * 66U) /
  - 100U, tc);
-rpb_rx_buff_lo_threshold_per_tc_set(self,
  - (buff_size *
  - (1024U / 32U) * 50U) /
  - 100U, tc);
-rpb_rx_xoff_en_per_tc_set(self, is_rx_flow_control ? 1U : 0U, tc);
+hw_atl_rpb_rx_pkt_buff_size_per_tc_set(self, buff_size, tc);
+hw_atl_rpb_rx_buff_hi_threshold_per_tc_set(self,
  + (buff_size *
  + (1024U / 32U) * 66U) /
  + 100U, tc);
+hw_atl_rpb_rx_buff_lo_threshold_per_tc_set(self,
  + (buff_size *
  + (1024U / 32U) * 50U) /
  + 100U, tc);
+hw_atl_rpb_rx_xoff_en_per_tc_set(self, is_rx_flow_control ? 1U : 0U, tc);

/* QoS 802.1p priority -> TC mapping */
for (i_priority = 8U; i_priority--;)
  -rpf_rpb_user_priority_tc_map_set(self, i_priority, 0U);
+hw_atl_rpf_rpb_user_priority_tc_map_set(self, i_priority, 0U);

return aq_hw_err_from_flags(self);

static int hw_atl_b0_hw_rss_hash_set(struct aq_hw_s *self,
struct aq_rss_parameters *rss_params)
{
-struct aq_nic_cfg_s *cfg = NULL;
+struct aq_nic_cfg_s *cfg = self->aq_nic_cfg;
int err = 0;
unsigned int i = 0U;
unsigned int addr = 0U;

-cfg = self->aq_nic_cfg;
-
for (i = 10, addr = 0U; i--; ++addr) {
    u32 key_data = cfg->is_rss ?
        __swab32(rss_params->hash_secret_key[i]) : 0U;
    -rpf_rss_key_wr_data_set(self, key_data);
    -rpf_rss_key_addr_set(self, addr);
    -rpf_rss_key_wr_en_set(self, 1U);
    -AQ_HW_WAIT_FOR(rpf_rss_key_wr_en_get(self) == 0, 1000U, 10U);
    +hw_atl_rpf_rss_key_wr_data_set(self, key_data);
    +hw_atl_rpf_rss_key_addr_set(self, addr);
    +hw_atl_rpf_rss_key_wr_en_set(self, 1U);
    +AQ_HW_WAIT_FOR(hw_atl_rpf_rss_key_wr_en_get(self) == 0,
        +1000U, 10U);
    if (err < 0)
        goto err_exit;
}
@@ -183,8 +190,8 @@
s32 i = 0U;
    u32 num_rss_queues = max(1U, self->aq_nic_cfg->num_rss_queues);
    int err = 0;
    -u16 bitary[(HW_ATL_B0_RSS_REDIRECTION_MAX *
        -HW_ATL_B0_RSS_REDIRECTION_BITS / 16U)];
    +u16 bitary[1 + (HW_ATL_B0_RSS_REDIRECTION_MAX *
        +HW_ATL_B0_RSS_REDIRECTION_BITS / 16U)];
    memset(bitary, 0, sizeof(bitary));

    @@ -194,11 +201,12 @@
    ((i * 3U) & 0xFU));
    }

    -for (i = AQ_DIMOF(bitary); i--; ) {
        -rpf_rss_redir_tbl_wr_data_set(self, bitary[i]);
        -rpf_rss_redir_tbl_addr_set(self, i);
        -rpf_rss_redir_wr_en_set(self, 1U);
        -AQ_HW_WAIT_FOR(rpf_rss_redir_wr_en_get(self) == 0, 1000U, 10U);
    +for (i = ARRAY_SIZE(bitary); i--; ) {
        +hw_atl_rpf_rss_redir_tbl_wr_data_set(self, bitary[i]);
        +hw_atl_rpf_rss_redir_tbl_addr_set(self, i);
        +hw_atl_rpf_rss_redir_wr_en_set(self, 1U);
        +AQ_HW_WAIT_FOR(hw_atl_rpf_rss_redir_wr_en_get(self) == 0,
            +1000U, 10U);
    if (err < 0)
        goto err_exit;
    }

    @@ -215,15 +223,15 @@
    unsigned int i;

    /* TX checksums offloads*/
-tpo_ipv4header_crc_offload_en_set(self, 1);
tpo_tcp_udp_crc_offload_en_set(self, 1);
+hw_atl_tpo_ipv4header_crc_offload_en_set(self, 1);
+hw_atl_tpo_tcp_udp_crc_offload_en_set(self, 1);

/* RX checksums offloads */
-rpo_ipv4header_crc_offload_en_set(self, 1);
-rpo_tcp_udp_crc_offload_en_set(self, 1);
+hw_atl_rpo_ipv4header_crc_offload_en_set(self, 1);
+hw_atl_rpo_tcp_udp_crc_offload_en_set(self, 1);

/* LSO offloads */
tdm_large_send_offload_en_set(self, 0xFFFFFFFFU);
+hw_atl_tdm_large_send_offload_en_set(self, 0xFFFFFFFFU);

/* LRO offloads */
{
@@ -232,43 +240,44 @@
((2U < HW_ATL_B0_LRO_RXD_MAX) ? 0x1U : 0x0));

for (i = 0; i < HW_ATL_B0_RINGS_MAX; i++)
-rpo_lro_max_num_of_descriptors_set(self, val, i);
+hw_atl_rpo_lro_max_num_of_descriptors_set(self, val, i);

-rpo_lro_time_base_divider_set(self, 0x61AU);
-rpo_lro_inactive_interval_set(self, 0);
-rpo_lro_max_coalescing_interval_set(self, 2);
+hw_atl_rpo_lro_time_base_divider_set(self, 0x61AU);
+hw_atl_rpo_lro_inactive_interval_set(self, 0);
+hw_atl_rpo_lro_max_coalescing_interval_set(self, 2);

-rpo_lro_qsessions_lim_set(self, 1U);
+hw_atl_rpo_lro_qsessions_lim_set(self, 1U);

-rpo_lro_total_desc_lim_set(self, 2U);
+hw_atl_rpo_lro_total_desc_lim_set(self, 2U);

-rpo_lro_patch_optimization_en_set(self, 0U);
+hw_atl_rpo_lro_patch_optimization_en_set(self, 0U);

-rpo_lro_min_pay_of_first_pkt_set(self, 10U);
+hw_atl_rpo_lro_min_pay_of_first_pkt_set(self, 10U);

-rpo_lro_pkt_lim_set(self, 1U);
+hw_atl_rpo_lro_pkt_lim_set(self, 1U);

-rpo_lro_en_set(self, aq_nic_cfg->is_lro ? 0xFFFFFFFFU : 0U);
+hw_atl_rpo_lro_en_set(self,
static int hw_atl_b0_hw_init_tx_path(struct aq_hw_s *self) {
    -thm_lso_tcp_flag_of_first_pkt_set(self, 0x0FF6U);
    -thm_lso_tcp_flag_of_middle_pkt_set(self, 0x0FF6U);
    -thm_lso_tcp_flag_of_last_pkt_set(self, 0x0F7FU);
    +hw_atl_thm_lso_tcp_flag_of_first_pkt_set(self, 0x0FF6U);
    +hw_atl_thm_lso_tcp_flag_of_middle_pkt_set(self, 0x0FF6U);
    +hw_atl_thm_lso_tcp_flag_of_last_pkt_set(self, 0x0F7FU);

    /* Tx interrupts */
    -tdm_tx_desc_wr_wb_irq_en_set(self, 1U);
    +hw_atl_tdm_tx_desc_wr_wb_irq_en_set(self, 1U);

    /* misc */
    aq_hw_write_reg(self, 0x00007040U, IS_CHIP_FEATURE(TPO2) ? 0x00010000U : 0x00000000U);
    -tdm_tx_dca_en_set(self, 0U);
    -tdm_tx_dca_mode_set(self, 0U);
    +hw_atl_tdm_tx_dca_en_set(self, 0U);
    +hw_atl_tdm_tx_dca_mode_set(self, 0U);

    -tpb_tx_path_scp_ins_en_set(self, 1U);
    +hw_atl_tpb_tx_path_scp_ins_en_set(self, 1U);

    return aq_hw_err_from_flags(self);
}

/* Rx TC/RSS number config */
-rpb_rpf_rx_traf_class_mode_set(self, 1U);
+hw_atl_rpb_rpf_rx_traf_class_mode_set(self, 1U);

/* Rx flow control */
-rpb_rx_flow_ctl_mode_set(self, 1U);
+hw_atl_rpb_rx_flow_ctl_mode_set(self, 1U);

/* RSS Ring selection */
-reg_rx_rfl_rss_contr1set(self, cfg->is_rss ? 0xB3333333U : 0x00000000U);
+hw_atl_reg_rx_rfl_rss_contr1set(self, cfg->is_rss ? 0xB3333333U : 0x00000000U);

/* Multicast filters */
for (i = HW_ATL_B0_MAC_MAX; i--;)
   - rpfl2_uc_flr_en_set(self, (i == 0U) ? 1U : 0U, i);
   - rpfl2unicast_flr_act_set(self, 1U, i);
   + hw_atl_rpfl2_uc_flr_en_set(self, (i == 0U) ? 1U : 0U, i);
   + hw_atl_rpfl2unicast_flr_act_set(self, 1U, i);
}

- reg_rx_flr_mcst_flr_msk_set(self, 0x00000000U);
- reg_rx_flr_mcst_flr_set(self, 0x00010FFFU, 0U);
+ hw_atl_reg_rx_flr_mcst_flr_msk_set(self, 0x00000000U);
+ hw_atl_reg_rx_flr_mcst_flr_set(self, 0x00010FFFU, 0U);

/* Vlan filters */
- rpf_vlan_outer_etht_set(self, 0x88A8U);
- rpf_vlan_inner_etht_set(self, 0x8100U);
+ hw_atl_rpf_vlan_outer_etht_set(self, 0x88A8U);
+ hw_atl_rpf_vlan_inner_etht_set(self, 0x8100U);

if (cfg->vlan_id) {
   - rpf_vlan_flr_act_set(self, 1U, 0U);
   - rpf_vlan_id_flr_set(self, 0U, 0U);
   - rpf_vlan_flr_en_set(self, 0U, 0U);
   -
   - rpf_vlan_accept_untagged_packets_set(self, 1U);
   - rpf_vlan_untagged_act_set(self, 1U);
   -
   - rpf_vlan_flr_act_set(self, 1U, 1U);
   - rpf_vlan_id_flr_set(self, cfg->vlan_id, 0U);
   - rpf_vlan_flr_en_set(self, 1U, 1U);
   + hw_atl_rpf_vlan_flr_act_set(self, 1U, 0U);
   + hw_atl_rpf_vlan_id_flr_set(self, 0U, 0U);
   + hw_atl_rpf_vlan_flr_en_set(self, 1U, 0U);
   +
   + hw_atl_rpf_vlan_accept_untagged_packets_set(self, 1U);
   + hw_atl_rpf_vlan_untagged_act_set(self, 1U);
   +
   + hw_atl_rpf_vlan_flr_act_set(self, 1U, 1U);
   + hw_atl_rpf_vlan_id_flr_set(self, cfg->vlan_id, 0U);
   + hw_atl_rpf_vlan_flr_en_set(self, 1U, 1U);
} else {
   - rpf_vlan_prom_mode_en_set(self, 1);
   + hw_atl_rpf_vlan_prom_mode_en_set(self, 1);
}

/* Rx Interrupts */
- rdm_rx_desc_wr_wb_irq_en_set(self, 1U);
+ hw_atl_rdm_rx_desc_wr_wb_irq_en_set(self, 1U);
aq_hw_write_reg(self, 0x00005040U, IS_CHIP_FEATURE(RPF2) ? 0x000F0000U : 0x00000000U);

-rpfl2broadcast_flr_act_set(self, 1U);
rpfl2broadcast_count_threshold_set(self, 0xFFFFU & (~0U / 256U));
+hw_atl_rpfl2broadcast_flr_act_set(self, 1U);
+hw_atl_rpfl2broadcast_count_threshold_set(self, 0xFFFFU & (~0U / 256U));

-rdm_rx_dca_en_set(self, 0U);
-rdm_rx_dca_mode_set(self, 0U);
+hw_atl_rdm_rx_dca_en_set(self, 0U);
+hw_atl_rdm_rx_dca_mode_set(self, 0U);

return aq_hw_err_from_flags(self);
}

static int hw_atl_b0_hw_init(struct aq_hw_s *self, u8 *mac_addr)
{
static u32 aq_hw_atl_igcr_table_[4][2] = {
    { 0x20000000U, 0x20000000U }, /* AQ_IRQ_INVALID */
    @ @ -371,51 +378,50 @ @
    int err = 0;
u32 val;

    -self->aq_nic_cfg = aq_nic_cfg;
    -
-hw_atl_utils_hw_chip_features_init(self,
    - &PHAL_ATLANTIC_B0->chip_features);
+struct aq_nic_cfg_s *aq_nic_cfg = self->aq_nic_cfg;

hw_atl_b0_hw_init_tx_path(self);
hw_atl_b0_hw_init_rx_path(self);

hw_atl_b0_hw_mac_addr_set(self, mac_addr);

-hw_atl_utils_mpi_set(self, MPI_INIT, aq_nic_cfg->link_speed_msk);
+self->aq_fw_ops->set_link_speed(self, aq_nic_cfg->link_speed_msk);
+self->aq_fw_ops->set_state(self, MPI_INIT);

hw_atl_b0_hw_qos_set(self);
hw_atl_b0_hw_rss_set(self, &aq_nic_cfg->aq_rss);
hw_atl_b0_hw_rss_hash_set(self, &aq_nic_cfg->aq_rss);

/* Force limit MRRS on RDM/TDM to 2K */
-va = aq_hw_read_reg(self, pci_reg_control6_adr);
-aq_hw_write_reg(self, pci_reg_control6_adr, (val & ~0x707) | 0x404);
+val = aq_hw_read_reg(self, HW_ATL_PCI_REG_CONTROL6_ADR,
   + (val & ~0x707) | 0x404);

/* TX DMA total request limit. B0 hardware is not capable to
 * handle more than (8K-MRRS) incoming DMA data.
 * Value 24 in 256byte units
 */
-aq_hw_write_reg(self, tx_dma_total_req_limit_adr, 24);
+aq_hw_write_reg(self, HW_ATL_TX_DMA_TOTAL_REQ_LIMIT_ADR, 24);

/* Reset link status and read out initial hardware counters */
self->aq_link_status.mbps = 0;
-hw_atl_utils_update_stats(self);
+self->aq_fw_ops->update_stats(self);

err = aq_hw_err_from_flags(self);
if (err < 0)
goto err_exit;

/* Interrupts */
-reg_irq_glb_ctl_set(self,
    - aq_hw_atl_igcr_table_[aq_nic_cfg->irq_type]
+hw_atl_reg_irq_glb_ctl_set(self,
    + aq_hw_atl_igcr_table_[aq_nic_cfg->irq_type]
        [(aq_nic_cfg->vecs > 1U) ?
        1 : 0]);
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-itr_irq_auto_masklsw_set(self, aq_nic_cfg->aq_hw_caps->irq_mask);
+hw_atl_itr_irq_auto_masklsw_set(self, aq_nic_cfg->aq_hw_caps->irq_mask);

/* Interrupts */
-reg_gen_irq_map_set(self,
-    ((HW_ATL_B0_ERR_INT << 0x18) | (1U << 0x1F)) |
+hw_atl_reg_gen_irq_map_set(self,
+    ((HW_ATL_B0_ERR_INT << 0x18) | (1U << 0x1F)) |
    ((HW_ATL_B0_ERR_INT << 0x10) | (1U << 0x17)), 0U);

hw_atl_b0_hw_offload_set(self, aq_nic_cfg);
@@ -427,28 +433,28 @@
static int hw_atl_b0_hw_ring_tx_start(struct aq_hw_s *self,
    struct aq_ring_s *ring)
{
-    tdm_tx_desc_en_set(self, 1, ring->idx);
+    hw_atl_tdm_tx_desc_en_set(self, 1, ring->idx);
    return aq_hw_err_from_flags(self);
}

static int hw_atl_b0_hw_ring_rx_start(struct aq_hw_s *self,
    struct aq_ring_s *ring)
{
-    rdm_rx_desc_en_set(self, 1, ring->idx);
+    hw_atl_rdm_rx_desc_en_set(self, 1, ring->idx);
    return aq_hw_err_from_flags(self);
}

static int hw_atl_b0_hw_start(struct aq_hw_s *self)
{
-    tpb_tx_buff_en_set(self, 1);
-    rpb_rx_buff_en_set(self, 1);
+    hw_atl_tpb_tx_buff_en_set(self, 1);
+    hw_atl_rpb_rx_buff_en_set(self, 1);
    return aq_hw_err_from_flags(self);
}

static int hw_atl_b0_hw_tx_ring_tail_update(struct aq_hw_s *self,
    struct aq_ring_s *ring)
{
-    reg_tx_dma_desc_tail_ptr_set(self, ring->sw_tail, ring->idx);
+    hw_atl_reg_tx_dma_desc_tail_ptr_set(self, ring->sw_tail, ring->idx);
    return 0;
}

@@ -534,36 +540,36 @@
    dma_desc_addr_lsw = (u32)aq_ring->dx_ring_pa;
    dma_desc_addr_msw = (u32)(((u64)aq_ring->dx_ring_pa) >> 32);
- rdm_rx_desc_en_set(self, false, aq_ring->idx);
+ hw_atl_rdm_rx_desc_en_set(self, false, aq_ring->idx);

- rdm_rx_desc_head_splitting_set(self, 0U, aq_ring->idx);
+ hw_atl_rdm_rx_desc_head_splitting_set(self, 0U, aq_ring->idx);

- rdm_rx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);
+ hw_atl_rdm_rx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);

- rdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
- rdm_rx_desc_dca_en_set(self, 0U, aq_ring->idx);
- rdm_rx_head_dca_en_set(self, 0U, aq_ring->idx);
- rdm_rx_pld_dca_en_set(self, 0U, aq_ring->idx);
+ hw_atl_rdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
+ hw_atl_rdm_rx_desc_dca_en_set(self, 0U, aq_ring->idx);
+ hw_atl_rdm_rx_head_dca_en_set(self, 0U, aq_ring->idx);
+ hw_atl_rdm_rx_pld_dca_en_set(self, 0U, aq_ring->idx);

/* Rx ring set mode */

/* Mapping interrupt vector */
- itr_irq_map_rx_set(self, aq_ring_param->vec_idx, aq_ring->idx);
- itr_irq_map_en_rx_set(self, true, aq_ring->idx);
+ hw_atl_itr_irq_map_rx_set(self, aq_ring_param->vec_idx, aq_ring->idx);
+ hw_atl_itr_irq_map_en_rx_set(self, true, aq_ring->idx);

return aq_hw_err_from_flags(self);
}
@@ -575,25 +581,25 @@
  u32 dma_desc_lsw_addr = (u32)aq_ring->dx_ring_pa;
  u32 dma_desc_msw_addr = (u32)(((u64)aq_ring->dx_ring_pa) >> 32);

-reg_tx_dma_desc_base_addresslswset(self, dma_desc_lsw_addr,
    aq_ring->idx);
+hw_atl_reg_tx_dma_desc_base_addresslswset(self, dma_desc_lsw_addr,
 + aq_ring->idx);

-reg_tx_dma_desc_base_addressmswset(self, dma_desc_msw_addr,
    aq_ring->idx);
+hw_atl_reg_tx_dma_desc_base_addressmswset(self, dma_desc_msw_addr,
 + aq_ring->idx);

-tdm_tx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);
+hw_atl_tdm_tx_desc_len_set(self, aq_ring->size / 8U, aq_ring->idx);

hw_atl_b0_hw_tx_ring_tail_update(self, aq_ring);

/* Set Tx threshold */
-tdm_tx_desc_wr_wb_threshold_set(self, 0U, aq_ring->idx);
+hw_atl_tdm_tx_desc_wr_wb_threshold_set(self, 0U, aq_ring->idx);

/* Mapping interrupt vector */
-itr_irq_map_tx_set(self, aq_ring_param->vec_idx, aq_ring->idx);
-itr_irq_map_en_tx_set(self, true, aq_ring->idx);
+hw_atl_itr_irq_map_tx_set(self, aq_ring_param->vec_idx, aq_ring->idx);
+hw_atl_itr_irq_map_en_tx_set(self, true, aq_ring->idx);

-tdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
-tdm_tx_desc_dca_en_set(self, 0U, aq_ring->idx);
+hw_atl_tdm_cpu_id_set(self, aq_ring_param->cpu, aq_ring->idx);
+hw_atl_tdm_tx_desc_dca_en_set(self, 0U, aq_ring->idx);

return aq_hw_err_from_flags(self);
}
@@ -614,7 +620,7 @@
rxd->hdr_addr = 0U;
}

-reg_rx_dma_desc_tail_ptr_set(self, sw_tail_old, ring->idx);
+hw_atl_reg_rx_dma_desc_tail_ptr_set(self, sw_tail_old, ring->idx);

return aq_hw_err_from_flags(self);
struct aq_ring_s *ring)
{
    int err = 0;
-    unsigned int hw_head_ = tdm_tx_desc_head_ptr_get(self, ring->idx);
+    unsigned int hw_head_ = hw_atl_tdm_tx_desc_head_ptr_get(self, ring->idx);

    if (aq_utils_obj_test(&self->header.flags, AQ_HW_FLAG_ERR_UNPLUG)) {
+        if (aq_utils_obj_test(&self->flags, AQ_HW_FLAG_ERR_UNPLUG)) {
            err = -ENXIO;
            goto err_exit;
        }
    }

    struct hw_atl_rxd_wb_s *rxd_wb = (struct hw_atl_rxd_wb_s *)
        &ring->dx_ring[ring->hw_head * HW_ATL_B0_RXD_SIZE];

    unsigned int is_err = 1U;
    unsigned int is_rx_check_sum_enabled = 0U;
    unsigned int pkt_type = 0U;
+    u8 rx_stat = 0U;

    if (!(rxd_wb->status & 0x1U)) { /* RxD is not done */
        break;
    }

    buff = &ring->buff_ring[ring->hw_head];

-    is_err = (0x0000003CU & rxd_wb->status);
+    is_err = (0x0000003CU & rxd_wb->status) >> 2;

-    is_rx_check_sum_enabled = (rxd_wb->type) & (0x3U << 19);
+    is_rx_check_sum_enabled = (rxd_wb->type >> 19) & 0x3U;

-    is_err &= ~0x20U; /* exclude validity bit */
+    is_rx_check_sum_enabled = (rxd_wb->type >> 19) & 0x3U;

    pkt_type = 0xFFU & (rxd_wb->type >> 4);

-    if (is_rx_check_sum_enabled) {
+    if (is_rx_check_sum_enabled & BIT(0) &&
        (0x0U == (pkt_type & 0x3U))) {
+        if (is_rx_check_sum_enabled & BIT(1)) {
+            if (0x4U == (pkt_type & 0x1CU)) {
                buff->is_udp_cso = (rx_stat & BIT(2)) ? 0U : 1U;
            }
        }
    }
}

++Open Source Used In 5GasS Edge AC-4 24215
+ !(rx_stat & BIT(3));
else if (0x0U == (pkt_type & 0x1CU))
  -buff->is_tcp_cso = buff->is_cso_err ? 0U : 1U;
-
  /* Checksum offload workaround for small packets */
  -if (rxd_wb->pkt_len <= 60) {
    -buff->is_ip_cso = 0U;
    -buff->is_cso_err = 0U;
  -}
+ !((rx_stat & BIT(2)) ? 0U : !(rx_stat & BIT(3));
+}
+buff->is_cso_err = !((rx_stat & 0x6);
+/* Checksum offload workaround for small packets */
+if (unlikely(rxd_wb->pkt_len <= 60)) {
  +buff->is_ip_cso = 0U;
  +buff->is_cso_err = 0U;
}
-
-is_err &= ~0x18U;

dma_unmap_page(ndev, buff->pa, buff->len, DMA_FROM_DEVICE);
-
-if (is_err || rxd_wb->type & 0x1000U) {
  -/* status error or DMA error */
  +if (((rx_stat & BIT(0)) || rxd_wb->type & 0x1000U) {
    +/* MAC error or DMA error */
    +buff->is_error = 1U;
  -} else {
    -if (self->aq_nic_cfg->is_rss) {
      -/* last 4 byte */
      -u16 rss_type = rxd_wb->type & 0xFU;
      
      /* last 4 byte */
      -if (rss_type && rss_type < 0x8U) {
        -buff->is_hash_l4 = (rss_type == 0x4 ||
        -rss_type == 0x5);
        -buff->rss_hash = rxd_wb->rss_hash;
      -}
      +}
      +if (self->aq_nic_cfg->is_rss) {
      +/* last 4 byte */
      +u16 rss_type = rxd_wb->type & 0xFU;
      +
      +if (rss_type && rss_type < 0x8U) {
        +buff->is_hash_l4 = (rss_type == 0x4 ||
        +rss_type == 0x5);
        +buff->rss_hash = rxd_wb->rss_hash;
      -}
if (HW_ATL_B0_RXD_WB_STAT2_EOP & rxd_wb->status) {  
  buff->len = rxd_wb->pkt_len % 
  AQ_CFG_RX_FRAME_MAX;  
  buff->len = buff->len ? buff->len : AQ_CFG_RX_FRAME_MAX;  
  buff->next = 0U;  
  buff->is_eop = 1U;  
  if (HW_ATL_B0_RXD_WB_STAT2_EOP & rxd_wb->status) {  
    buff->len = rxd_wb->pkt_len % 
    AQ_CFG_RX_FRAME_MAX;  
    buff->len = buff->len ? buff->len : AQ_CFG_RX_FRAME_MAX;  
    buff->next = 0U;  
    buff->is_eop = 1U;  
  } else {  
    buff->len = 
    rxd_wb->pkt_len > AQ_CFG_RX_FRAME_MAX ? 
    AQ_CFG_RX_FRAME_MAX : rxd_wb->pkt_len;  
    if (HW_ATL_B0_RXD_WB_STAT2_RSCCNT & 
        rxd_wb->status) {  
      /* LRO */  
      ++ring->stats.rx.lro_packets;  
    } else {  
      /* jumbo */  
      buff->next = 
      aq_ring_next_dx(ring, 
      ring->hw_head);  
      ++ring->stats.rx.jumbo_packets;  
    }  
  }  
}
static int hw_atl_b0_hw_irq_enable(struct aq_hw_s *self, u64 mask) {
    -itr_irq_msk_setlsw_set(self, LODWORD(mask));
    +hw_atl_itr_irq_msk_setlsw_set(self, LODWORD(mask));
    return aq_hw_err_from_flags(self);
}
static int hw_atl_b0_hw_irq_disable(struct aq_hw_s *self, u64 mask) {
    -itr_irq_msk_clearlsw_set(self, LODWORD(mask));
    -itr_irq_status_clearlsw_set(self, LODWORD(mask));
    +hw_atl_itr_irq_msk_clearlsw_set(self, LODWORD(mask));
    +hw_atl_itr_irq_status_clearlsw_set(self, LODWORD(mask));
    -atomic_inc(&PHAL_ATLANTIC_B0->dpc);
    +atomic_inc(&self->dpc);
    return aq_hw_err_from_flags(self);
}
static int hw_atl_b0_hw_irq_read(struct aq_hw_s *self, u64 *mask) {
    -*mask = itr_irq_statuslsw_get(self);
    +*mask = hw_atl_itr_irq_statuslsw_get(self);
    return aq_hw_err_from_flags(self);
}
unsigned int i = 0U;

-rpfl2promiscuous_mode_en_set(self, IS_FILTER_ENABLED(IFF_PROMISC));
-rpfl2multicast_flr_en_set(self,
    - IS_FILTER_ENABLED(IFF_MULTICAST), 0);
    +hw_atl_rpfl2promiscuous_mode_en_set(self, IS_FILTER_ENABLED(IFF_PROMISC));
    +hw_atl_rpfl2multicast_flr_en_set(self,
    + IS_FILTER_ENABLED(IFF_ALLMULTI), 0);
-rpfl2_accept_all_mc_packets_set(self,
    -IS_FILTER_ENABLED(IFF_ALLMULTI));
    +hw_atl_rpfl2_accept_all_mc_packets_set(self,
    + IS_FILTER_ENABLED(IFF_ALLMULTI));
-rpfl2broadcast_en_set(self, IS_FILTER_ENABLED(IFF_BROADCAST));
    +hw_atl_rpfl2broadcast_en_set(self, IS_FILTER_ENABLED(IFF_BROADCAST));

self->aq_nic_cfg->is_mc_list_enabled = IS_FILTER_ENABLED(IFF_MULTICAST);
for (i = HW_ATL_B0_MAC_MIN; i < HW_ATL_B0_MAC_MAX; ++i)
   - rpfl2_uc_flr_en_set(self, 
    - (self->aq_nic_cfg->is_mc_list_enabled && 
    + hw_atl_rpfl2_uc_flr_en_set(self, 
     + (self->aq_nic_cfg->is_mc_list_enabled && 
      (i <= self->aq_nic_cfg->mc_list_count) ? 
       1U : 0U, i);

@@ -788,7 +797,7 @@

static int hw_atl_b0_hw_multicast_list_set(struct aq_hw_s *self, 
   u8 ar_mac 
    [AQ_CFG_MULTICAST_ADDRESS_MAX]
+ [AQ_HW_MULTICAST_ADDRESS_MAX]
    [ETH_ALEN],
   u32 count)
{
   @@ -796,17 +805,17 @@
   u32 l = (ar_mac[i][2] << 24) | (ar_mac[i][3] << 16) | 
            (ar_mac[i][4] << 8) | ar_mac[i][5];

   - rpfl2_uc_flr_en_set(self, 0U, HW_ATL_B0_MAC_MIN + i);
+ hw_atl_rpfl2_uc_flr_en_set(self, 0U, HW_ATL_B0_MAC_MIN + i);
   
   - rpfl2unicast_dest_addresslsw_set(self, l, HW_ATL_B0_MAC_MIN + i);
+ hw_atl_rpfl2unicast_dest_addresslsw_set(self, l, HW_ATL_B0_MAC_MIN + i);
   
   - rpfl2unicast_dest_addressmsw_set(self, h, HW_ATL_B0_MAC_MIN + i);
+ hw_atl_rpfl2unicast_dest_addressmsw_set(self, h, HW_ATL_B0_MAC_MIN + i);
   
   - rpfl2_uc_flr_en_set(self, 
    - (self->aq_nic_cfg->is_mc_list_enabled),
    - HW_ATL_B0_MAC_MIN + i);
+ hw_atl_rpfl2_uc_flr_en_set(self, 
    + (self->aq_nic_cfg->is_mc_list_enabled),
    + HW_ATL_B0_MAC_MIN + i);
    
    err = aq_hw_err_from_flags(self);
@@ -824,10 +833,10 @@
   switch (self->aq_nic_cfg->itr) {
      case AQ_CFG_INTERRUPT_MODERATION_ON:
      case AQ_CFG_INTERRUPT_MODERATION_AUTO:
       -tdm_tx_desc_wr_wb_irq_en_set(self, 0U);
if (self->aq_nic_cfg->itr == AQ_CFG_INTERRUPT_MODERATION_ON) {
    /* HW timers are in 2us units */
    break;
}

for (i = HW_ATL_B0_RINGS_MAX; i--;) {
    -reg_tx_intr_moder_ctrl_set(self, itr_tx, i);
    -reg_rx_intr_moder_ctrl_set(self, itr_rx, i);
    +hw_atl_reg_tx_intr_moder_ctrl_set(self, itr_tx, i);
    +hw_atl_reg_rx_intr_moder_ctrl_set(self, itr_rx, i);
}

return aq_hw_err_from_flags(self);

static int hw_atl_b0_hw_stop(struct aq_hw *self) {
    hw_atl_b0_hw_irq_disable(self, HW_ATL_B0_INT_MASK);
    +/* Invalidate Descriptor Cache to prevent writing to the cached
       + descriptors and to the data pointer of those descriptors
     */
    +hw_atl_rdm_rx_dma_desc_cache_init_set(self, 1);
    return aq_hw_err_from_flags(self);
}
static int hw_atl_b0_hw_ring_tx_stop(struct aq_hw_s *self, 
   struct aq_ring_s *ring) 
{
  -tdm_tx_desc_en_set(self, 0U, ring->idx);
  +hw_atl_tdm_tx_desc_en_set(self, 0U, ring->idx);
  return aq_hw_err_from_flags(self);
}

static int hw_atl_b0_hw_ring_rx_stop(struct aq_hw_s *self, 
   struct aq_ring_s *ring) 
{
  -rdm_rx_desc_en_set(self, 0U, ring->idx);
  +hw_atl_rdm_rx_desc_en_set(self, 0U, ring->idx);
  return aq_hw_err_from_flags(self);
}

-static int hw_atl_b0_hw_set_speed(struct aq_hw_s *self, u32 speed) 
-{
  -int err = 0;
  -
  -err = hw_atl_utils_mpi_set_speed(self, speed, MPI_INIT);
  -if (err < 0)
  -goto err_exit;
  -
  -err_exit:
  -return err;
  -
  -static struct aq_hw_ops hw_atl_ops_ = {
  -.create               = hw_atl_b0_create,
  -.destroy              = hw_atl_b0_destroy,
  -.get_hw_caps          = hw_atl_b0_get_hw_caps,
  -
  -.hw_get_mac_permanent = hw_atl_utils_get_mac_permanent,
  +const struct aq_hw_ops hw_atl_ops_b0 = {
      .hw_set_mac_address   = hw_atl_b0_hw_mac_addr_set,
      -.get_link_status    = hw_atl_utils_mpi_get_link_status,
      -.hw_set_link_speed   = hw_atl_b0_hw_set_speed,
      .hw_init               = hw_atl_b0_hw_init,
      .hw_deinit             = hw_atl_utils_hw_deinit,
      .hw_set_power          = hw_atl_utils_hw_set_power,
      @@ -974,21 +970,6 @@
      .hw_rss_set            = hw_atl_b0_hw_rss_set,
      .hw_rss_hash_set       = hw_atl_b0_hw_rss_hash_set,
      .hw_get_regs           = hw_atl_utils_hw_get_regs,
      -.update_stats         = hw_atl_utils_update_stats,
      .hw_get_hw_stats       = hw_atl_utils_get_hw_stats,
      .hw_get_fw_version     = hw_atl_utils_get_fw_version,
struct aq_hw_ops *hw_atl_b0_get_ops_by_id(struct pci_dev *pdev) {
    bool is_vid_ok = (pdev->vendor == PCI_VENDOR_ID_AQUANTIA);
    bool is_did_ok = ((pdev->device == HW_ATL_DEVICE_ID_0001) ||
                      (pdev->device == HW_ATL_DEVICE_ID_D100) ||
                      (pdev->device == HW_ATL_DEVICE_ID_D107) ||
                      (pdev->device == HW_ATL_DEVICE_ID_D108) ||
                      (pdev->device == HW_ATL_DEVICE_ID_D109));
    bool is_rev_ok = (pdev->revision == 2U);

    return (is_vid_ok && is_did_ok && is_rev_ok) ? &hw_atl_ops_ : NULL;
}

#include "../aq_common.h"

#elseif PCI_VENDOR_ID_AQUANTIA
+extern const struct aq_hw_caps_s hw_atl_b0_caps_aqc100;
+extern const struct aq_hw_caps_s hw_atl_b0_caps_aqc107;
+extern const struct aq_hw_caps_s hw_atl_b0_caps_aqc108;
+extern const struct aq_hw_caps_s hw_atl_b0_caps_aqc109;

+#define PCI_VENDOR_ID_AQUANTIA 0x1D6A
+#define HW_ATL_DEVICE_ID_0001 0x0001
+#define HW_ATL_DEVICE_ID_D100 0xD100
+#define HW_ATL_DEVICE_ID_D107 0xD107
+#define HW_ATL_DEVICE_ID_D108 0xD108
+#define HW_ATL_DEVICE_ID_D109 0xD109
+#+define hw_atl_b0_caps_aqc111 hw_atl_b0_caps_aqc108
+#+define hw_atl_b0_caps_aqc112 hw_atl_b0_caps_aqc109

+#define HW_ATL_NIC_NAME "aQuantia AQtion 5Gbit Network Adapter"
+#+define hw_atl_b0_caps_aqc100s hw_atl_b0_caps_aqc100
+#+define hw_atl_b0_caps_aqc107s hw_atl_b0_caps_aqc107
+#+define hw_atl_b0_caps_aqc108s hw_atl_b0_caps_aqc108
+#+define hw_atl_b0_caps_aqc109s hw_atl_b0_caps_aqc109

-#endif
+#+define hw_atl_b0_caps_aqc111s hw_atl_b0_caps_aqc108
+#+define hw_atl_b0_caps_aqc112s hw_atl_b0_caps_aqc109

-struct aq_hw_ops *hw_atl_b0_get_ops_by_id(struct pci_dev *pdev);
+##define hw_atl_b0_caps_aqc111e hw_atl_b0_caps_aqc108
+#define hw_atl_b0_caps_aqc112e hw_atl_b0_caps_aqc109
+
+extern const struct aq_hw_ops hw_atl_ops_b0;
+
+#define hw_atl_ops_b1 hw_atl_ops_b0

#ifndef HW_ATL_B0_H
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_b0_internal.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_b0_internal.h
@@ -142,70 +142,6 @@
# define HW_ATL_INTR_MODER_MAX 0x1FF
# define HW_ATL_INTR_MODER_MIN 0xFF

-/* Hardware tx descriptor */
-struct __packed hw_atl_txd_s {
-    u64 buf_addr;
-    u32 ctl;
-    u32 ctl2; /* 63..46 - payload length, 45 - ctx enable, 44 - ctx index */
-};
-
-/* Hardware tx context descriptor */
-struct __packed hw_atl_txc_s {
-    u32 rsvd;
-    u32 len;
-    u32 ctl;
-    u32 len2;
-};
-
-/* Hardware rx descriptor */
-struct __packed hw_atl_rxd_s {
-    u64 buf_addr;
-    u64 hdr_addr;
-};
-
-/* Hardware rx descriptor writeback */
-struct __packed hw_atl_rxd_wb_s {
-    u32 type;
-    u32 rss_hash;
-    u16 status;
-    u16 pkt_len;
-    u16 next_desc_ptr;
-    u16 vlan;
-};
-
-/* HW layer capabilities */
-struct aq_hw_caps_s hw_atl_b0_hw_caps_ = {
-    .ports = 1U,
-    .is_64_dma = true,
- .msix_irqs = 4U,
- .irq_mask = ~0U,
- .vecs = HW_ATL_B0_RSS_MAX,
- .tcs = HW_ATL_B0_TC_MAX,
- .rxd_alignment = 1U,
- .rxd_size = HW_ATL_B0_RXD_SIZE,
- .rxd = 8U * 1024U,
- .txd_alignment = 1U,
- .txd_size = HW_ATL_B0_TXD_SIZE,
- .txd = 8U * 1024U,
- .txhwb_alignment = 4096U,
- .tx Rings = HW_ATL_B0_TX_RINGS,
- .rx Rings = HW_ATL_B0_RX_RINGS,
- .hw_features = NETIF_F_HW_CSUM |
- NETIF_F_RXCSUM |
- NETIF_F_RXHASH |
- NETIF_F_SG |
- NETIF_F_TSO |
- NETIF_F_LRO,
- .hw_priv_flags = IFF_UNICAST_FLT,
- .link_speed_msk = (HW_ATL_B0_RATE_10G |
- HW_ATL_B0 RATE_5G |
- HW_ATL_B0 RATE_2G5 |
- HW_ATL_B0 RATE_1G |
- HW_ATL_B0 RATE_100M),
- .flow_control = true,
- .mtu = HW_ATL_B0_MTU_JUMBO,
- .mac_regs.count = 88,
- .fw_ver_expected = HW_ATL_B0_FW_VER_EXPECTED,
- );

#include "/aq_hw-utils.h"

/* global */

-void reg_glb_cpu_sem_set(struct aq_hw_s *aq_hw, u32 glb_cpu_sem, u32 semaphore)
+void hw_atl_reg_glb_cpu_sem_set(struct aq_hw_s *aq_hw, u32 glb_cpu_sem,
+u32 semaphore)
{
  -aq_hw_write_reg(aq_hw, glb_cpu_sem adr(semaphore), glb_cpu_sem);
  +aq_hw_write_reg(aq_hw, HW_ATL_GLB_CPU_SEM_ADR(semaphore), glb_cpu_sem);
}

-u32 reg_glb_cpu_sem_get(struct aq hw_s *aq hw, u32 semaphore)
+u32 hw_atl_reg_glb_cpu_sem_get(struct aq hw_s *aq hw, u32 semaphore)
{
    -return aq_hw_read_reg(aq_hw, glb_cpu_sem_adr(semaphore));
+return aq_hw_read_reg(aq_hw, HW_ATL_GLB_CPU_SEM_ADR(semaphore));
}

-void glb_glb_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 glb_reg_res_dis)
+void hw_atl_glb_glb_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 glb_reg_res_dis)
{
    -aq_hw_write_reg_bit(aq_hw, glb_reg_res_dis_adr,
    -    glb_reg_res_dis_msk,
    -    glb_reg_res_dis_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_GLB_REG_RES_DIS_ADR,
    +    HW_ATL_GLB_REG_RES_DIS_MSK,
    +    HW_ATL_GLB_REG_RES_DIS_SHIFT,
    +    glb_reg_res_dis);
}

-void glb_soft_res_set(struct aq_hw_s *aq_hw, u32 soft_res)
+void hw_atl_glb_soft_res_set(struct aq_hw_s *aq_hw, u32 soft_res)
{
    -aq_hw_write_reg_bit(aq_hw, glb_soft_res_adr, glb_soft_res_msk,
    -    glb_soft_res_shift, soft_res);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_GLB_SOFT_RES_ADR,
    +    HW_ATL_GLB_SOFT_RES_MSK,
    +    HW_ATL_GLB_SOFT_RES_SHIFT, soft_res);
}

-u32 glb_soft_res_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_glb_soft_res_get(struct aq_hw_s *aq_hw)
{
    -return aq_hw_read_reg_bit(aq_hw, glb_soft_res_adr,
    -    glb_soft_res_msk,
    -    glb_soft_res_shift);
    +return aq_hw_read_reg_bit(aq_hw, HW_ATL_GLB_SOFT_RES_ADR,
    +    HW_ATL_GLB_SOFT_RES_MSK,
    +    HW_ATL_GLB_SOFT_RES_SHIFT);
}

-u32 reg_rx_dma_stat_counter7get(struct aq_hw_s *aq_hw)
+u32 hw_atl_reg_rx_dma_stat_counter7get(struct aq_hw_s *aq_hw)
{
    -return aq_hw_read_reg(aq_hw, rx_dma_stat_counter7_adr);
    +return aq_hw_read_reg(aq_hw, HW_ATL_RX_DMA_STAT_COUNTER7_ADR);
}

-u32 reg_glb_mif_id_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_reg_glb_mif_id_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, glb_mif_id_adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_GLB_MIF_ID_ADR);
}

/* stats */
-u32 rpb_rx_dma_drop_pkt_cnt_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_rpb_rx_dma_drop_pkt_cnt_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, rpb_rx_dma_drop_pkt_cnt_adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_RPB_RX_DMA_DROP_PKT_CNT_ADR);
}

-u32 stats_rx_dma_good_octet_counterlsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_rx_dma_good_octet_counterlsw_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, stats_rx_dma_good_octet_counterlsw__adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_STATS_RX_DMA_GOOD_OCTET_COUNTERLSW);
}

-u32 stats_rx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_rx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, stats_rx_dma_good_pkt_counterlsw__adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_STATS_RX_DMA_GOOD_PKT_COUNTERLSW);
}

-u32 stats_tx_dma_good_octet_counterlsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_tx_dma_good_octet_counterlsw_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, stats_tx_dma_good_octet_counterlsw__adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_STATS_TX_DMA_GOOD_OCTET_COUNTERLSW);
}

-u32 stats_tx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_tx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, stats_tx_dma_good_pkt_counterlsw__adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_STATS_TX_DMA_GOOD_PKT_COUNTERLSW);
}

-u32 stats_rx_dma_good_octet_countermsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_rx_dma_good_octet_countermsw_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, stats_rx_dma_good_octet_countermsw__adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_STATS_RX_DMA_GOOD_OCTET_COUNTERMSW);
}

-u32 stats_rx_dma_good_pkt_countermsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_rx_dma_good_pkt_countermsw_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, stats_rx_dma_good_pkt_countermsw__adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_STATS_TX_DMA_GOOD_PKT_COUNTERMSW);
}

-u32 stats_msu_gnb_fdd_sm_msg_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_msu_gnb_fdd_sm_msg_get(struct aq_hw_s *aq_hw)
{
- return aq_hw_read_reg(aq_hw, stats_msu_gnb_fdd_sm_msg__adr);
+ return aq_hw_read_reg(aq_hw, HW_ATL_STATS_MSU_GNB_FDD_SM_MSG);
}
+u32 hw_atl_stats_rx_dma_good_pkt_countermsw_get(struct aq_hw_s *aq_hw)
{
    return aq_hw_read_reg(aq_hw, stats_rx_dma_good_pkt_countermsw__adr);
    return aq_hw_read_reg(aq_hw, HW_ATL_STATS_RX_DMA_GOOD_PKT_COUNTERMSW);
}

-u32 stats_tx_dma_good_octet_countermsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_tx_dma_good_octet_countermsw_get(struct aq_hw_s *aq_hw)
{
    return aq_hw_read_reg(aq_hw, stats_tx_dma_good_octet_countermsw__adr);
    return aq_hw_read_reg(aq_hw, HW_ATL_STATS_TX_DMA_GOOD_OCTET_COUNTERMSW);
}

-u32 stats_tx_dma_good_pkt_countermsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_stats_tx_dma_good_pkt_countermsw_get(struct aq_hw_s *aq_hw)
{
    return aq_hw_read_reg(aq_hw, stats_tx_dma_good_pkt_countermsw__adr);
    return aq_hw_read_reg(aq_hw, HW_ATL_STATS_TX_DMA_GOOD_PKT_COUNTERMSW);
}

/* interrupt */
-void itr_irq_auto_masklsw_set(struct aq_hw_s *aq_hw, u32 irq_auto_masklsw)
+void hw_atl_itr_irq_auto_masklsw_set(struct aq_hw_s *aq_hw,
    + u32 irq_auto_masklsw)
{
    aq_hw_write_reg(aq_hw, itr_iamrlsw_adr, irq_auto_masklsw);
    aq_hw_write_reg(aq_hw, HW_ATL_ITR_IAMRLSW_ADR, irq_auto_masklsw);
}

-void itr_irq_map_en_rx_set(struct aq_hw_s *aq_hw, u32 irq_map_en_rx, u32 rx)
+void hw_atl_itr_irq_map_en_rx_set(struct aq.hw_s *aq_hw, u32 irq_map_en_rx,
    + u32 rx)
{
    /* register address for bitfield imr_rx{r}_en */
    static u32 itr_imr_rxren_adr[32] = {
        0x000002100U, 0x000002100U, 0x000002104U, 0x000002104U,
        -0x000002108U, 0x000002108U, 0x00000210cU, 0x00000210cU,
        +0x000002110U, 0x000002110U, 0x000002114U, 0x000002114U,
        -0x000002118U, 0x000002118U, 0x00000211cU, 0x00000211cU,
        +0x000002120U, 0x000002120U, 0x000002124U, 0x000002124U,
        -0x000002128U, 0x000002128U, 0x00000212cU, 0x00000212cU,
        +0x000002130U, 0x000002130U, 0x000002134U, 0x000002134U,
        -0x000002138U, 0x000002138U, 0x00000213cU, 0x00000213cU
    +0x000002138U, 0x000002138U, 0x00000213cU, 0x00000213cU
    };
/* bitmask for bitfield imr_rx[r] _en */
@@ -149,18 +153,19 @@
    irq_map_en_rx);
 }

-void itr_irq_map_en_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_en_tx, u32 tx)
+void hw_atl_itr_irq_map_en_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_en_tx, 
+  u32 tx)
{

    /* register address for bitfield imr_tx[t] _en */
static u32 itr_imr_txten_adr[32] = {
    0x00002100U, 0x00002100U, 0x00002104U, 0x00002104U,
-    0x00002108U, 0x00002108U, 0x0000210cU, 0x0000210cU,
+    0x00002108U, 0x00002108U, 0x0000210CU, 0x0000210CU,
    0x00002110U, 0x00002110U, 0x00002114U, 0x00002114U,
-    0x00002118U, 0x00002118U, 0x0000211cU, 0x0000211cU,
+    0x00002118U, 0x00002118U, 0x0000211CU, 0x0000211CU,
    0x00002120U, 0x00002120U, 0x00002124U, 0x00002124U,
-    0x00002128U, 0x00002128U, 0x0000212cU, 0x0000212cU,
+    0x00002128U, 0x00002128U, 0x0000212CU, 0x0000212CU,
    0x00002130U, 0x00002130U, 0x00002134U, 0x00002134U,
-    0x00002138U, 0x00002138U, 0x0000213cU, 0x0000213cU,
+    0x00002138U, 0x00002138U, 0x0000213CU, 0x0000213CU
};

/* bitmask for bitfield imr_tx[t] _en */
@@ -189,30 +194,30 @@
    irq_map_en_tx);
 }

-void itr_irq_map_rx_set(struct aq_hw_s *aq_hw, u32 irq_map_rx, u32 rx)
+void hw_atl_itr_irq_map_rx_set(struct aq_hw_s *aq_hw, u32 irq_map_rx, u32 rx)
{

    /* register address for bitfield imr_rx[r][4:0] */
static u32 itr_imr_rxr_adr[32] = {
    0x00002100U, 0x00002100U, 0x00002104U, 0x00002104U,
-    0x00002108U, 0x00002108U, 0x0000210cU, 0x0000210cU,
+    0x00002108U, 0x00002108U, 0x0000210CU, 0x0000210CU,
    0x00002110U, 0x00002110U, 0x00002114U, 0x00002114U,
-    0x00002118U, 0x00002118U, 0x0000211cU, 0x0000211cU,
+    0x00002118U, 0x00002118U, 0x0000211CU, 0x0000211CU,
    0x00002120U, 0x00002120U, 0x00002124U, 0x00002124U,
-    0x00002128U, 0x00002128U, 0x0000212cU, 0x0000212cU,
+    0x00002128U, 0x00002128U, 0x0000212CU, 0x0000212CU,
    0x00002130U, 0x00002130U, 0x00002134U, 0x00002134U,
-    0x00002138U, 0x00002138U, 0x0000213cU, 0x0000213cU,
+    0x00002138U, 0x00002138U, 0x0000213CU, 0x0000213CU
};
/* bitmask for bitfield imr_rx[r][4:0] */
static u32 itr_imr_rxf_msk[32] = {
    -0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    -0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    -0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    -0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    -0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    -0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    -0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
+0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U,
    +0x000001f00U, 0x000000f00U, 0x000000f00U, 0x000000f00U
};

/* lower bit position of bitfield imr_rx[r][4:0] */
@@ -229,30 +234,30 @@
    irq_map_rx);
}

-void itr_irq_map_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_tx, u32 tx)
+void hw_atl_itr_irq_map_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_tx, u32 tx)
{
    /* register address for bitfield imr_tx[t][4:0] */
    static u32 itr_imr_txt_adr[32] = {
        0x00002100U, 0x00002100U, 0x00002104U, 0x00002104U,
        +0x00002108U, 0x00002108U, 0x0000210cU, 0x0000210cU,
        0x00002110U, 0x00002110U, 0x00002114U, 0x00002114U,
        +0x00002118U, 0x00002118U, 0x0000211cU, 0x0000211cU,
        +0x00002118U, 0x00002118U, 0x0000211cU, 0x0000211cU,
        0x00002120U, 0x00002120U, 0x00002124U, 0x00002124U,
-0x00002128U, 0x00002128U, 0x0000212cU, 0x0000212cU,
+0x00002128U, 0x00002128U, 0x0000212cU, 0x0000212cU,
        0x00002130U, 0x00002130U, 0x00002134U, 0x00002134U,
-0x00002138U, 0x00002138U, 0x0000213cU, 0x0000213cU,
+0x00002138U, 0x00002138U, 0x0000213cU, 0x0000213cU
    +0x00002138U, 0x00002138U, 0x0000213cU, 0x0000213cU
};

/* bitmask for bitfield imr_tx[t][4:0] */
static u32 itr_imr_txt_msk[32] = {
    /* lower bit position of bitfield imr_tx[t][4:0] */

/* lower bit position of bitfield imr_tx{t}[4:0] */
@ @ -269,429 +274,471 @@
    irq_map_tx);
}

-void itr_irq_msk_clearlsw_set(struct aq_hw_s *aq_hw, u32 irq_msk_clearlsw)
+void hw_atl_itr_irq_msk_clearlsw_set(struct aq_hw_s *aq_hw,
  +u32 irq_msk_clearlsw)
{
    -aq_hw_write_reg(aq_hw, itr_imcrlsw_adr, irq_msk_clearlsw);
+aq_hw_write_reg(aq_hw, HW_ATL_ITR_IMCRLSW_ADR, irq_msk_clearlsw);
}

-void itr_irq_msk_setlsw_set(struct aq_hw_s *aq_hw, u32 irq_msk_setlsw)
+void hw_atl_itr_irq_msk_setlsw_set(struct aq_hw_s *aq_hw, u32 irq_msk_setlsw)
{
    -aq_hw_write_reg(aq_hw, itr_imsrlsw_adr, irq_msk_setlsw);
+aq_hw_write_reg(aq_hw, HW_ATL_ITR_IMSRLSW_ADR, irq_msk_setlsw);
}

-void itr_irq_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 irq_reg_res_dis)
+void hw_atl_itr_irq_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 irq_reg_res_dis)
{
    -aq_hw_write_reg_bit(aq_hw, itr_reg_res_dsbl_adr,
        -itr_reg_res_dsbl_msk,
        -itr_reg_res_dsbl_shift, irq_reg_res_dis);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_ITR_REG_RES_DSBL_ADR,
        +HW_ATL_ITR_REG_RES_DSBL_MSK,
        +HW_ATL_ITR_REG_RES_DSBL_SHIFT, irq_reg_res_dis);
}
-void itr_irq_status_clearlsw_set(struct aq_hw_s *aq_hw, 
- u32 irq_status_clearlsw)
+void hw_atl_itr_irq_status_clearlsw_set(struct aq_hw_s *aq_hw, 
+ u32 irq_status_clearlsw)
{
-aq_hw_write_reg(aq_hw, itr_iscrslsw_adr, irq_status_clearlsw);
+aq_hw_write_reg(aq_hw, HW_ATL_ITR_ISCRLSW_ADR, irq_status_clearlsw);
}

-u32 itr_irq_statuslsw_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_itr_irq_statuslsw_get(struct aq_hw_s *aq_hw)
{
-return aq_hw_read_reg(aq_hw, itr_isrlsw_adr);
+return aq_hw_read_reg(aq_hw, HW_ATL_ITR_ISRLSW_ADR);
}

-u32 itr_res_irq_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_itr_res_irq_get(struct aq_hw_s *aq_hw)
{
-return aq_hw_read_reg_bit(aq_hw, itr_res_adr, itr_res_msk, 
- itr_res_shift);
+return aq_hw_read_reg_bit(aq_hw, HW_ATL_ITR_RES_ADR, HW_ATL_ITR_RES_MSK, 
+ HW_ATL_ITR_RES_SHIFT);
}

-void itr_res_irq_set(struct aq_hw_s *aq_hw, u32 res_irq)
+void hw_atl_itr_res_irq_set(struct aq_hw_s *aq_hw, u32 res_irq)
{
-aq_hw_write_reg_bit(aq_hw, itr_res_adr, itr_res_msk, 
- itr_res_shift, res_irq);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_ITR_RES_ADR, HW_ATL_ITR_RES_MSK, 
+ HW_ATL_ITR_RES_SHIFT, res_irq);
}

/* rdm */
-void rdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca)
+void hw_atl_rdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca)
{
-aq_hw_write_reg_bit(aq_hw, rdm_dcadcpuid_adr(dca), 
- rdm_dcadcpuid_MSK, 
- rdm_dcadcpuid_shift, cpuid);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DCADCPUID_ADR(dca), 
+ HW_ATL_RDM_DCADCPUID_MSK, 
+ HW_ATL_RDM_DCADCPUID_SHIFT, cpuid);
}

-void rdm_rx_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_dca_en)
+void hw_atl_rdm_rx_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_dca_en) {
    -aq_hw_write_reg_bit(aq_hw, rdm_dca_en_adr, rdm_dca_en_msk,
    - rdm_dca_en_shift, rx_dca_en);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DCA_EN_ADR, HW_ATL_RDM_DCA_EN_MSK,
    + HW_ATL_RDM_DCA_EN_SHIFT, rx_dca_en);
}

-void rdm_rx_dca_mode_set(struct aq_hw_s *aq_hw, u32 rx_dca_mode)
+void hw_atl_rdm_rx_dca_mode_set(struct aq_hw_s *aq_hw, u32 rx_dca_mode)
{
    -aq_hw_write_reg_bit(aq_hw, rdm_dca_mode_adr, rdm_dca_mode_msk,
    - rdm_dca_mode_shift, rx_dca_mode);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DCA_MODE_ADR,
    + HW_ATL_RDM_DCA_MODE_MSK,
    + HW_ATL_RDM_DCA_MODE_SHIFT, rx_dca_mode);
}

-void rdm_rx_desc_data_buff_size_set(struct aq_hw_s *aq_hw, u32 rx_desc_data_buff_size, u32 descriptor)
+void hw_atl_rdm_rx_desc_data_buff_size_set(struct aq_hw_s *aq_hw, u32 rx_desc_data_buff_size,
    + u32 descriptor)
{
    -aq_hw_write_reg_bit(aq_hw, rdm_descddata_size_adr(descriptor),
    - rdm_descddata_size_msk,
    - rdm_descddata_size_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DESCDDATA_SIZE_ADR(descriptor),
    + HW_ATL_RDM_DESCDDATA_SIZE_MSK,
    + HW_ATL_RDM_DESCDDATA_SIZE_SHIFT,
    rx_desc_data_buff_size);
}

-void rdm_rx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_dca_en, u32 dca)
+void hw_atl_rdm_rx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_dca_en,
    + u32 dca)
{
    -aq_hw_write_reg_bit(aq_hw, rdm_dcaddesc_en_adr(dca),
    - rdm_dcaddesc_en_msk,
    - rdm_dcaddesc_en_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DCADDESC_EN_ADR(dca),
    + HW_ATL_RDM_DCADDESC_EN_MSK,
    + HW_ATL_RDM_DCADDESC_EN_SHIFT,
    rx_desc_dca_en);
}

-void rdm_rx_desc_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_en, u32 descriptor)
+void hw_atl_rdm_rx_desc_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_en,
+ u32 descriptor)
{
  aq_hw_write_reg_bit(aq_hw, rdm_descden_adr(descriptor),
  rdm_descden_msk,
  rdm_descden_shift,
  aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DESCDEN_ADR(descriptor),
  HW_ATL_RDM_DESCDEN_MSK,
  HW_ATL_RDM_DESCDEN_SHIFT, rx_desc_en);
}

void rdm_rx_desc_head_buff_size_set(struct aq_hw_s *aq_hw,
  u32 rx_desc_head_buff_size, u32 descriptor)
{
  aq_hw_write_reg_bit(aq_hw, rdm_descdhdr_size_adr(descriptor),
  rdm_descdhdr_size_msk,
  rdm_descdhdr_size_shift,
  void hw_atl_rdm_rx_desc_head_buff_size_set(struct aq_hw_s *aq_hw,
  u32 rx_desc_head_buff_size,
  u32 descriptor)
  aq.hw_write_reg_bit(aq.hw, HW_ATL_RDM_DESCDHDR_SIZE_ADR(descriptor),
  HW_ATL_RDM_DESCDHDR_SIZE_MSK,
  HW_ATL_RDM_DESCDHDR_SIZE_SHIFT, rx_desc_head_buff_size);
}

void rdm_rx_desc_head_splitting_set(struct aq.hw_s *aq.hw,
  u32 rx_desc_head_splitting, u32 descriptor)
{
  aq_hw_write_reg_bit(aq_hw, rdm_descdhdr_split_adr(descriptor),
  rdm_descdhdr_split_msk,
  rdm_descdhdr_split_shift,
  void hw_atl_rdm_rx_desc_head_splitting_set(struct aq.hw_s *aq.hw,
  u32 rx_desc_head_splitting,
  u32 descriptor)
  aq.hw_write_reg_bit(aq.hw, HW_ATL_RDM_DESCDHDR_SPLIT_ADR(descriptor),
  HW_ATL_RDM_DESCDHDR_SPLIT_MSK,
  HW_ATL_RDM_DESCDHDR_SPLIT_SHIFT, rx_desc_head_splitting);
}

u32 rdm_rx_desc_head_ptr_get(struct aq.hw_s *aq.hw, u32 descriptor)
+u32 hw_atl_rdm_rx_desc_head_ptr_get(struct aq.hw_s *aq.hw, u32 descriptor)
{
  return aq_hw_read_reg_bit(aq_hw, rdm_descdhd_adr(descriptor),
  rdm_descdhd_msk, rdm_descdhd_shift);
return aq_hw_read_reg_bit(aq_hw, HW_ATL_RDM_DESCDHD_ADR(descriptor),
   HW_ATL_RDM_DESCDHD_MSK,
   HW_ATL_RDM_DESCDHD_SHIFT);
}

void rdm_rx_desc_len_set(struct aq_hw_s *aq_hw, u32 rx_desc_len, u32 descriptor)
{
   aq_hw_write_reg_bit(aq_hw, rdm_descdlen_adr(descriptor),
      rdm_descdlen_msk, rdm_descdlen_shift,
   rx_desc_len);
}

void rdm_rx_desc_res_set(struct aq_hw_s *aq_hw, u32 rx_desc_res, u32 descriptor)
{
   aq_hw_write_reg_bit(aq_hw, rdm_descdreset_adr(descriptor),
      rdm_descdreset_msk, rdm_descdreset_shift,
   rx_desc_res);
}

void rdm_rx_head_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_head_dca_en, u32 dca)
{
   aq_hw_write_reg_bit(aq_hw, rdm_dcadhdr_en_adr(dca),
      rdm_dcadhdr_en_msk,
   rx_desc_wrb_irq_en);
}

void rdm_rx_wr_wb_irq_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_wr_wb_irq_en)
{
   void hw_atl_rdm_rx_desc_len_set(struct aq_hw_s *aq_hw, u32 rx_desc_len,
   +u32 descriptor)
   {
      aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DESCDLEN_ADR(descriptor),
         HW_ATL_RDM_DESCDLEN_MSK, HW_ATL_RDM_DESCDLEN_SHIFT,
         rx_desc_len);
   }

   void hw_atl_rdm_rx_desc_res_set(struct aq_hw_s *aq_hw, u32 rx_desc_res,
   +u32 descriptor)
   {
      aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DESCDRESET_ADR(descriptor),
         HW_ATL_RDM_DESCDRESET_MSK,
         HW_ATL_RDM_DESCDRESET_SHIFT,
         rx_desc_res);
   }

   void hw_atl_rdm_rx_wr_wb_irq_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_wr_wb_irq_en)
   {
      aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_INT_DESC_WRB_EN_ADR,
         HW_ATL_RDM_INT_DESC_WRB_EN_MSK,
         HW_ATL_RDM_INT_DESC_WRB_EN_SHIFT,
         rx_desc_wrb_irq_en);
   }
- rdm_dcadhdr_en_shift,
+ aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DCADHDR_EN_ADR(dca),
+    HW_ATL_RDM_DCADHDR_EN_MSK,
+    HW_ATL_RDM_DCADHDR_EN_SHIFT,
    rx_head_dca_en);
}

-void rdm_rx_pld_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_pld_dca_en, u32 dca)
+void hw_atl_rdm_rx_pld_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_pld_dca_en,
+    u32 dca)
{
-aq_hw_write_reg_bit(aq_hw, rdm_dcadpay_en_adr(dca),
-    rdm_dcadpay_en_msk, rdm_dcadpay_en_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_DCADPAY_EN_ADR(dca),
+    HW_ATL_RDM_DCADPAY_EN_MSK,
+    HW_ATL_RDM_DCADPAY_EN_SHIFT,
    rx_pld_dca_en);
}

-void rdm_rdm_intr_moder_en_set(struct aq_hw_s *aq_hw, u32 rdm_intr_moder_en)
+void hw_atl_rdm_rdm_intr_moder_en_set(struct aq_hw_s *aq_hw,
+    u32 rdm_intr_moder_en)
{
-aq_hw_write_reg_bit(aq_hw, rdm_int_rim_en_adr,
-    rdm_int_rim_en_msk,
-    rdm_int_rim_en_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_INT_RIM_EN_ADR,
+    HW_ATL_RDM_INT_RIM_EN_MSK,
+    HW_ATL_RDM_INT_RIM_EN_SHIFT,
    rdm_intr_moder_en);
}
/* reg */
-void reg_gen_irq_map_set(struct aq_hw_s *aq_hw, u32 gen_intr_map, u32 regidx)
+void hw_atl_reg_gen_irq_map_set(struct aq_hw_s *aq_hw, u32 gen_intr_map,
+    u32 regidx)
{
-aq_hw_write_reg(aq_hw, gen_intr_map_adr(regidx), gen_intr_map);
+aq_hw_write_reg(aq_hw, HW_ATL_GEN_INTR_MAP_ADR(regidx), gen_intr_map);
}

-u32 reg_gen_irq_status_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_reg_gen_irq_status_get(struct aq_hw_s *aq_hw)
{
-return aq_hw_read_reg(aq_hw, gen_intr_stat_adr);
+return aq_hw_read_reg(aq_hw, HW_ATL_GEN_INTR_STAT_ADR);
void reg_irq_glb_ctl_set(struct aq_hw_s *aq_hw, u32 intr_glb_ctl)
{
    -aq_hw_write_reg(aq_hw, intr_glb_ctl adr, intr_glb_ctl);
    +aq_hw_write_reg(aq_hw, HW_ATL_INTR_GLB_CTL_ADR, intr_glb_ctl);
}

void reg_irq_thr_set(struct aq_hw_s *aq_hw, u32 intr_thr, u32 throttle)
{
    -aq_hw_write_reg(aq_hw, intr_thr adr(throttle), intr_thr);
    +aq_hw_write_reg(aq_hw, HW_ATL_INTR_THR_ADR(throttle), intr_thr);
}

void reg_rx_dma_desc_base_addresslswset(struct aq_hw_s *aq_hw, u32 rx_dma_desc_base_addrlsw, u32 descriptor)
{
    -aq_hw_write_reg(aq_hw, rx_dma_desc_base_addrlsw_adr(descriptor), rx_dma_desc_base_addrlsw);
    +aq_hw_write_reg(aq_hw, HW_ATL_RX_DMA_DESC_BASE_ADDRLSW_ADR(descriptor), rx_dma_desc_base_addrlsw);
}

void reg_rx_dma_desc_base_addressmswset(struct aq_hw_s *aq_hw, u32 rx_dma_desc_base_addrmsw, u32 descriptor)
{
    -aq_hw_write_reg(aq_hw, rx_dma_desc_base_addrmsw_adr(descriptor), rx_dma_desc_base_addrmsw);
    +aq_hw_write_reg(aq_hw, HW_ATL_RX_DMA_DESC_BASE_ADDRMSW_ADR(descriptor), rx_dma_desc_base_addrmsw);
}

u32 reg_rx_dma_desc_status_get(struct aq_hw_s *aq_hw, u32 descriptor)
{
    return aq_hw_read_reg(aq_hw, rx_dma_desc_stat_adr(descriptor));
}

void reg_rx_dma_desc_tail_ptr_set(struct aq_hw_s *aq_hw, u32 rx_dma_desc_tail_ptr, u32 descriptor)
{
    -aq_hw_write_reg(aq_hw, rx_dma_desc_tail_ptr adr(descriptor), rx_dma_desc_tail_ptr);
    +aq_hw_write_reg(aq_hw, HW_ATL_RX_DMA_DESC_TAIL_PTR_ADR(descriptor), rx_dma_desc_tail_ptr);
}

void hw_atl_reg_irq_glb_ctl_set(struct aq_hw_s *aq_hw, u32 intr_glb_ctl)
{
    aq_hw_write_reg(aq_hw, HW_ATL_INTR_GLB_CTL_ADR, intr_glb_ctl);
}

void hw_atl_reg_irq_thr_set(struct aq_hw_s *aq_hw, u32 intr_thr, u32 throttle)
{
    aq_hw_write_reg(aq_hw, HW_ATL_INTR_THR_ADR(throttle), intr_thr);
}

void hw_atl_reg_rx_dma_desc_base_addresslswset(struct aq_hw_s *aq_hw, u32 rx_dma_desc_base_addrlsw, u32 descriptor)
{
    aq_hw_write_reg(aq_hw, HW_ATL_RX_DMA_DESC_BASE_ADDRLSW_ADR(descriptor), rx_dma_desc_base_addrlsw);
}

void hw_atl_reg_rx_dma_desc_base_addressmswset(struct aq_hw_s *aq_hw, u32 rx_dma_desc_base_addrmsw, u32 descriptor)
{
    aq_hw_write_reg(aq_hw, HW_ATL_RX_DMA_DESC_BASE_ADDRMSW_ADR(descriptor), rx_dma_desc_base_addrmsw);
}

void hw_atl_reg_rx_dma_desc_status_get(struct aq_hw_s *aq_hw, u32 descriptor)
{
    return aq_hw_read_reg(aq_hw, HW_ATL_RX_DMA_DESC_STAT_ADR(descriptor));
}

void hw_atl_reg_rx_dma_desc_tail_ptr_set(struct aq_hw_s *aq_hw, u32 rx_dma_desc_tail_ptr, u32 descriptor)
{
    aq_hw_write_reg(aq_hw, HW_ATL_RX_DMA_DESC_TAIL_PTR_ADR(descriptor), rx_dma_desc_tail_ptr);
}
\begin{verbatim}
+ u32 rx_dma_desc_tail_ptr,
+ u32 descriptor)
{
  -aq_hw_write_reg(aq_hw, rx_dma_desc_tail_ptr_adr(descriptor),
  +aq_hw_write_reg(aq_hw, HW_ATL_RX_DMA_DESC_TAIL_PTR_ADR(descriptor),
  rx_dma_desc_tail_ptr);
}

-void reg_rx_flr_mcst_flr_msk_set(struct aq_hw_s *aq_hw, u32 rx_flr_mcst_flr_msk)
+void hw_atl_reg_rx_flr_mcst_flr_msk_set(struct aq_hw_s *aq_hw,
  +u32 rx_flr_mcst_flr_msk)
{
  -aq_hw_write_reg(aq_hw, rx_flr_mcst_flr_msk_adr, rx_flr_mcst_flr_msk);
  +aq_hw_write_reg(aq_hw, HW_ATL_RX_FLR_MCST_FLR_MSK_ADR,
    +rx_flr_mcst_flr_msk);
}

-void reg_rx_flr_mcst_flr_set(struct aq_hw_s *aq_hw, u32 rx_flr_mcst_flr,
  - u32 filter)
+void hw_atl_reg_rx_flr_mcst_flr_set(struct aq_hw_s *aq_hw, u32 rx_flr_mcst_flr,
  + u32 filter)
{
  -aq_hw_write_reg(aq_hw, rx_flr_mcst_flr_adr(filter), rx_flr_mcst_flr);
  +aq_hw_write_reg(aq_hw, HW_ATL_RX_FLR_MCST_FLR_ADR(filter),
    +rx_flr_mcst_flr);
}

-void reg_rx_flr_rss_control1set(struct aq_hw_s *aq_hw, u32 rx_flr_rss_control1)
+void hw_atl_reg_rx_flr_rss_control1set(struct aq_hw_s *aq_hw,
  + u32 rx_flr_rss_control1)
{
  -aq_hw_write_reg(aq_hw, rx_flr_rss_control1_adr, rx_flr_rss_control1);
  +aq_hw_write_reg(aq_hw, HW_ATL_RX_FLR_RSS_CONTROL1_ADR,
    +rx_flr_rss_control1);
}

-void reg_rx_flr_control2_set(struct aq_hw_s *aq_hw, u32 rx_filter_control2)
+void hw_atl_reg_rx_flr_control2_set(struct aq_hw_s *aq_hw,
  + u32 rx_filter_control2)
{
  -aq_hw_write_reg(aq_hw, rx_flr_control2_adr, rx_filter_control2);
  +aq_hw_write_reg(aq_hw, HW_ATL_RX_FLR_CONTROL2_ADR, rx_filter_control2);
}

-void reg_rx_intr_moder_ctrl_set(struct aq_hw_s *aq_hw,
  - u32 rx_intr_moderation_ctl,
  - u32 queue)
+void hw_atl_reg_rx_intr_moder_ctrl_set(struct aq_hw_s *aq_hw,
  + u32 rx_intr_moderation_ctl,
  + u32 queue)
{
  -aq_hw_write_reg(aq_hw, rx_intr_moderation_ctl_adr,
    +aq_hw_write_reg(aq_hw, HW_ATL_RX_INTR_MODERCONTROL_ADR,
      +rx_intr_moderation_ctl);

  +aq_hw_write_reg(aq_hw, HW_ATL_RX_INTR_MODERCONTROL2_ADR,
    +rx_filter_control2);
    
  +aq_hw_write_reg(aq_hw, HW_ATL_RX_INTR_MODERCONTROL2_ADR,
    +rx_filter_control2);
}

\end{verbatim}
+    u32 rx_intr_moderation_ctl,
+    u32 queue)
+    {
+      aq_hw_write_reg(aq_hw, rx_intr_moderation_ctl_adr(queue),
+                     rx_intr_moderation_ctl);
+    }
+
+  void reg_tx_dma_debug_ctl_set(struct aq_hw_s *aq_hw, u32 tx_dma_debug_ctl)
+  {
+    aq_hw_write_reg(aq_hw, tx_dma_debug_ctl_adr, tx_dma_debug_ctl);
+  }
+
+  void reg_tx_dma_desc_base_addresslswset(struct aq_hw_s *aq_hw,
+                                           u32 tx_dma_desc_base_addrlsw,
+                                           u32 descriptor)
+  {
+    aq_hw_write_reg(aq_hw, tx_dma_desc_base_addrlsw_adr(descriptor),
+                     tx_dma_desc_base_addrlsw);
+  }
tx_dma_desc_tail_ptr);
}

-void reg_rx_intr_modCtrl_set(struct aq_hw_s *aq_hw,
-u32 rx_intr_moderation_ctl,
-u32 queue)
+void hw_atl_reg_rx_intr_modCtrl_set(struct aq_hw_s *aq_hw,
+   u32 rx_intr_moderation_ctl,
+   u32 queue)
{
-aq_hw_write_reg(aq_hw, rx_intr_moderation_ctl_adr(queue),
+   aq_hw_write_reg(aq_hw, HW_ATL_RX_INTR_MODERATION_CTL_ADR(queue),
  tx_intr_moderation_ctl);
}

/* RPB: rx packet buffer */
-void rpb_dma_sys_lbk_set(struct aq_hw_s *aq_hw, u32 dma_sys_lbk)
+void hw_atl_rpb_dma_sys_lbk_set(struct aq_hw_s *aq_hw, u32 dma_sys_lbk)
{
-aq_hw_write_reg_bit(aq_hw, rpb_dma_sys_lbk_adr, rpb_dma_sys_lbk_msk,
-   rpb_dma_sys_lbk_shift, dma_sys_lbk);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_DMA_SYS_LBK_ADR, HW_ATL_RPB_DMA_SYS_LBK_MSK,
+   HW_ATL_RPB_DMA_SYS_LBK_SHIFT, dma_sys_lbk);
}

-void rpb_rpf_rx_traf_class_mode_set(struct aq_hw_s *aq_hw,
-u32 rx_traf_class_mode)
+void hw_atl_rpb_rpf_rx_traf_class_mode_set(struct aq_hw_s *aq_hw,
+   u32 rx_traf_class_mode)
{
-aq_hw_write_reg_bit(aq_hw, rpb_rpf_rx_tc_mode_adr, rpb_rpf_rx_tc_mode_msk,
-   rpb_rpf_rx_tc_mode_shift, rx_traf_class_mode);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_RPF_RX_TC_MODE_ADR, HW_ATL_RPB_RPF_RX_TC_MODE_MSK,
+   HW_ATL_RPB_RPF_RX_TC_MODE_SHIFT, rx_traf_class_mode);
}

-void rpb_rx_buff_en_set(struct aq_hw_s *aq_hw, u32 rx_buff_en)
+void hw_atl_rpb_rx_buff_en_set(struct aq_hw_s *aq_hw, u32 rx_buff_en)
{
-aq_hw_write_reg_bit(aq_hw, rpb_rx_buff_en_adr, rpb_rx_buff_en_msk,
-   rpb_rx_buff_en_shift, rx_buff_en);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_RX_BUF_EN_ADR, HW_ATL_RPB_RX_BUF_EN_MSK,
+   HW_ATL_RPB_RX_BUF_EN_MSK,
+HW_ATL_RPB_RX_BUF_EN_SHIFT, rx_buff_en);
}

-void rpb_rx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw,
  -u32 rx_buff_hi_threshold_per_tc,
  -u32 buffer)
+void hw_atl_rpb_rx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw,
  +u32 rx_buff_hi_threshold_per_tc,
  +u32 buffer)
{
  -aq_hw_write_reg_bit(aq_hw, rpb_rxhi_thresh_adr(buffer),
    -rpb_rxhi_thresh_msk, rpb_rxhi_thresh_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_RXBHI_THRESH_ADR(buffer),
    +HW_ATL_RPB_RXBHI_THRESH_MSK,
    +HW_ATL_RPB_RXBHI_THRESH_SHIFT,
    rx_buff_hi_threshold_per_tc);
}

-void rpb_rx_buff_lo_threshold_per_tc_set(struct aq_hw_s *aq_hw,
  -u32 rx_buff_lo_threshold_per_tc,
  -u32 buffer)
+
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_RXBLO_THRESH_ADR(buffer),
    +HW_ATL_RPB_RXBLO_THRESH_MSK,
    +HW_ATL_RPB_RXBLO_THRESH_SHIFT,
    rx_buff_lo_threshold_per_tc);
}

-void rpb_rx_flow_ctl_mode_set(struct aq_hw_s *aq_hw,
  -u32 rx_flow_ctl_mode)
+void hw_atl_rpb_rx_flow_ctl_mode_set(struct aq_hw_s *aq_hw, u32 rx_flow_ctl_mode)
{
  -aq_hw_write_reg_bit(aq_hw, rpb_rx_fc_mode_adr,
    -rpb_rx_fc_mode_msk,
    -rpb_rx_fc_mode_shift, rx_flow_ctl_mode);
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_RX_FC_MODE_ADR,
    +HW_ATL_RPB_RX_FC_MODE_MSK,
    +HW_ATL_RPB_RX_FC_MODE_SHIFT, rx_flow_ctl_mode);
}

-void rpb_rx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw,
  -u32 rx_pkt_buff_size_per_tc, u32 buffer)
```c
+void hw_atl_rdm_rx_dma_desc_cache_init_set(struct aq_hw_s *aq_hw, u32 init)
{
    aq_hw_write_reg_bit(aq_hw, rpb_rxbbuf_size_adr(buffer),
    rpb_rxbbuf_size_msk, rpb_rxbbuf_size_shift,
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_ADR,
    HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_MSK,
    HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_SHIFT,
    init);
    +}
+
+void hw_atl_rpb_rx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw,
    u32 rx_pkt_buff_size_per_tc, u32 buffer)
+
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_RXBBUF_SIZE_ADR(buffer),
    HW_ATL_RPB_RXBBUF_SIZE_MSK,
    HW_ATL_RPB_RXBBUF_SIZE_SHIFT,
    rx_pkt_buff_size_per_tc);
}

-void rpb_rx_xoff_en_per_tc_set(struct aq_hw_s *aq_hw, u32 rx_xoff_en_per_tc,
    u32 buffer)
+void hw_atl_rpb_rx_xoff_en_per_tc_set(struct aq_hw_s *aq_hw, u32 rx_xoff_en_per_tc,
    u32 buffer)
{
    aq_hw_write_reg_bit(aq_hw, rpb_rxbxoff_en_adr(buffer),
    rpb_rxbxoff_en_msk, rpb_rxbxoff_en_shift,
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RPB_RXBXOFF_EN_ADR(buffer),
    HW_ATL_RPB_RXBXOFF_EN_MSK,
    HW_ATL_RPB_RXBXOFF_EN_SHIFT,
    rx_xoff_en_per_tc);
}
/* rpf */

-void rpfl2broadcast_count_threshold_set(struct aq_hw_s *aq_hw,
    u32 l2broadcast_count_threshold)
+void hw_atl_rpfl2broadcast_count_threshold_set(struct aq_hw_s *aq_hw,
    u32 l2broadcast_count_threshold)
{
    aq_hw_write_reg_bit(aq_hw, rpfl2bc_thresh_adr,
    rpfl2bc_thresh_msk,
    rpfl2bc_thresh_shift,
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2BC_THRESH_ADR,
    HW_ATL_RPFL2BC_THRESH_MSK,
    HW_ATL_RPFL2BC_THRESH_SHIFT,
    l2broadcast_count_threshold);
}
```

-void rpfl2broadcast_en_set(struct aq_hw_s *aq_hw, u32 l2broadcast_en)
+void hw_atl_rpfl2broadcast_en_set(struct aq_hw_s *aq_hw, u32 l2broadcast_en)
{
    -aq_hw_write_reg_bit(aq_hw, rpfl2bc_en_adr, rpfl2bc_en_msk,
        rpfl2bc_en_shift, l2broadcast_en);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2BC_EN_ADR, HW_ATL_RPFL2BC_EN_MSK,
        HW_ATL_RPFL2BC_EN_SHIFT, l2broadcast_en);
}

-void rpfl2broadcast_flr_act_set(struct aq_hw_s *aq_hw, u32 l2broadcast_flr_act)
+void hw_atl_rpfl2broadcast_flr_act_set(struct aq_hw_s *aq_hw,
        u32 l2broadcast_flr_act)
{
    -aq_hw_write_reg_bit(aq_hw, rpfl2bc_act_adr, rpfl2bc_act_msk,
        rpfl2bc_act_shift, l2broadcast_flr_act);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2BC_ACT_ADR,
        HW_ATL_RPFL2BC_ACT_MSK,
        HW_ATL_RPFL2BC_ACT_SHIFT, l2broadcast_flr_act);
}

-void rpfl2multicast_flr_en_set(struct aq_hw_s *aq_hw, u32 l2multicast_flr_en,
    u32 filter)
+void hw_atl_rpfl2multicast_flr_en_set(struct aq_hw_s *aq_hw,
    u32 l2multicast_flr_en,
    u32 filter)
{
    -aq_hw_write_reg_bit(aq_hw, rpfl2mc_enf_adr(filter),
        rpfl2mc_enf_msk,
        rpfl2mc_enf_shift, l2multicast_flr_en);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2MC_ENF_ADR(filter),
        HW_ATL_RPFL2MC_ENF_MSK,
        HW_ATL_RPFL2MC_ENF_SHIFT, l2multicast_flr_en);
}

-void rpfl2promiscuous_mode_en_set(struct aq_hw_s *aq_hw,
    u32 l2promiscuous_mode_en)
+void hw_atl_rpfl2promiscuous_mode_en_set(struct aq_hw_s *aq_hw,
    u32 l2promiscuous_mode_en)
{
    -aq_hw_write_reg_bit(aq_hw, rpfl2promis_mode_adr,
        rpfl2promis_mode_msk,
        rpfl2promis_mode_shift,
        l2promiscuous_mode_en);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2PROMIS_MODE_ADR,
        HW_ATL_RPFL2PROMIS_MODE_MSK,
        HW_ATL_RPFL2PROMIS_MODE_SHIFT,
        l2promiscuous_mode_en);
}
-void rpfl2unicast_flr_act_set(struct aq_hw_s *aq_hw, u32 l2unicast_flr_act,
 -  u32 filter)
+void hw_atl_rpfl2unicast_flr_act_set(struct aq_hw_s *aq_hw,
 +  u32 l2unicast_flr_act,
 +  u32 filter)
{
-aq_hw_write_reg_bit(aq_hw, rpfl2uc_actf_adr(filter),
 -  rpfl2uc_actf_msk, rpfl2uc_actf_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2UC_ACTF_ADR(filter),
 +  HW_ATL_RPFL2UC_ACTF_MSK, HW_ATL_RPFL2UC_ACTF_SHIFT,
   l2unicast_flr_act); 
}

-void rpfl2_uc_flr_en_set(struct aq_hw_s *aq_hw, u32 l2unicast_flr_en,
 -  u32 filter)
+void hw_atl_rpfl2_uc_flr_en_set(struct aq_hw_s *aq_hw, u32 l2unicast_flr_en,
+u32 filter)
{
-aq_hw_write_reg_bit(aq_hw, rpfl2uc_enf_adr(filter),
 -  rpfl2uc_enf_msk,
 -  rpfl2uc_enf_shift, l2unicast_flr_en);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2UC_ENF_ADR(filter),
 +  HW_ATL_RPFL2UC_ENF_MSK,
 +  HW_ATL_RPFL2UC_ENF_SHIFT, l2unicast_flr_en);
}

-void rpfl2unicast_dest_addresslsw_set(struct aq_hw_s *aq_hw, u32 l2unicast_dest_addresslsw,
 -  u32 filter)
+void hw_atl_rpfl2unicast_dest_addresslsw_set(struct aq_hw_s *aq_hw,
 +  u32 l2unicast_dest_addresslsw,
 +u32 filter)
{
-aq_hw_write_reg(aq_hw, rpfl2uc_dafmsw_adr(filter),
 -  l2unicast_dest_addresslsw);
+void hw_atl_rpfl2unicast_dest_addressmsw_set(struct aq_hw_s *aq_hw, u32 l2unicast_dest_addressmsw,
 +  u32 filter)
{
-aq_hw_write_reg(aq_hw, rpfl2uc_dafmsw_adr(filter),
 -  rpfl2uc_dafmsw_msk, rpfl2uc_dafmsw_shift,
+aq_hw_write_reg(aq_hw, HW_ATL_RPFL2UC_DAFMSW_ADR(filter),
 +  l2unicast_dest_addressmsw);
}

-void rpfl2unicast_dest_addressmsw_set(struct aq_hw_s *aq_hw, u32 l2unicast_dest_addressmsw,
 -  u32 filter)
-{
-aq_hw_write_reg_bit(aq_hw, rpfl2uc_dafmsw_adr(filter),
 -  rpfl2uc_dafmsw_msk, rpfl2uc_dafmsw_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPFL2UC_DAFMSW_ADR(filter),
 +  l2unicast_dest_addressmsw,
 +  u32 filter)
 +{
+aq.hw_write_reg_bit(aq_hw, HW_ATL_RPFL2UC_DAFMSW_ADR(filter),
  +HW_ATL_RPFL2UC_DAFMSW_MSK,
  +HW_ATL_RPFL2UC_DAFMSW_SHIFT,
  l2unicast_dest_addressmsw);
}

-void rpfl2_accept_all_mc_packets_set(struct aq_hw_s *aq_hw,
  -u32 l2_accept_all_mc_packets)
+void hw_atl_rpfl2_accept_all_mc_packets_set(struct aq_hw_s *aq_hw,
  +u32 l2_accept_all_mc_packets)
{
-aq.hw_write_reg_bit(aq_hw, rpfl2mc_accept_all_adr,
  -rpfl2mc_accept_all_msk,
  -rpfl2mc_accept_all_shift,
+aq.hw_write_reg_bit(aq_hw, HW_ATL_RPFL2MC_ACCEPT_ALL_ADR,
  +HW_ATL_RPFL2MC_ACCEPT_ALL_MSK,
  +HW_ATL_RPFL2MC_ACCEPT_ALL_SHIFT,
  l2_accept_all_mc_packets);
}

-void rpf_rpb_user_priority_tc_map_set(struct aq_hw_s *aq_hw,
  -u32 user_priority_tc_map, u32 tc)
+void hw_atl_rpf_rpb_user_priority_tc_map_set(struct aq_hw_s *aq_hw,
  +u32 user_priority_tc_map, u32 tc)
{
/* register address for bitfield rx_tc_up{t}[2:0] */
static u32 rpf_rpb_rx_tc_upt_adr[8] = {
  -0x000054C4U, 0x000054C4U, 0x000054C4U, 0x000054C4U,
  -0x000054C4U, 0x000054C4U, 0x000054C4U, 0x000054C4U,
  +0x000054C4U, 0x000054C4U, 0x000054C4U, 0x000054C4U,
  +0x000054C4U, 0x000054C4U, 0x000054C4U, 0x000054C4U
};

/*/ bitmask for bitfield rx_tc_up{t}[2:0] */
@@ -711,273 +758,290 @@
  user_priority_tc_map);
  
-void rpf rss_key_addr_set(struct aq_hw_s *aq_hw, u32 rss_key_addr)
+void hw_atl_rpf rss_key_addr_set(struct aq_hw_s *aq_hw, u32 rss_key_addr)
{
-aq.hw_write_reg_bit(aq_hw, rpf rss_key_addr_adr,
  -rpf rss_key_addr_msk,
  -rpf rss_key_addr_shift,
+aq.hw_write_reg_bit(aq_hw, HW_ATL_RPF RSS_KEY_ADDR_ADR,
  +HW_ATL_RPF RSS_KEY_ADDR_MSK,
  +HW_ATL_RPF RSS_KEY_ADDR_SHIFT,
  rss_key_addr);
void rpf_rss_key_wr_data_set(struct aq_hw_s *aq_hw, u32 rss_key_wr_data)
+void hw_atl_rpf_rss_key_wr_data_set(struct aq_hw_s *aq_hw, u32 rss_key_wr_data)
{
  aq_hw_write_reg(aq_hw, rpf_rss_key_wr_data_adr,
  aq_hw_write_reg(aq_hw, HW_ATL_RPF_RSS_KEY_WR_DATA_ADR,
  rss_key_wr_data);
}

-u32 rpf_rss_key_wr_en_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_rpf_rss_key_wr_en_get(struct aq_hw_s *aq_hw)
{
  return aq_hw_read_reg_bit(aq_hw, rpf_rss_key_wr_eni_adr,
  - rpf_rss_key_wr_eni_msk,
  - rpf_rss_key_wr_eni_shift);
+return aq_hw_read_reg_bit(aq_hw, HW_ATL_RPF_RSS_KEY_WR_ENI_ADR,
  + HW_ATL_RPF_RSS_KEY_WR_ENI_MSK,
  + HW_ATL_RPF_RSS_KEY_WR_ENI_SHIFT);
}

 void rpf_rss_key_wr_en_set(struct aq_hw_s *aq_hw, u32 rss_key_wr_en)
+void hw_atl_rpf_rss_key_wr_en_set(struct aq_hw_s *aq_hw, u32 rss_key_wr_en)
{
  -aq_hw_write_reg_bit(aq_hw, rpf_rss_key_wr_eni_adr,
  - rpf_rss_key_wr_eni_msk,
  - rpf_rss_key_wr_eni_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_RSS_KEY_WR_ENI_ADR,
  + HW_ATL_RPF_RSS_KEY_WR_ENI_MSK,
  + HW_ATL_RPF_RSS_KEY_WR_ENI_SHIFT,
  rss_key_wr_en);
}

 void rpf_rss_redir_tbl_addr_set(struct aq_hw_s *aq_hw, u32 rss_redir_tbl_addr)
+void hw_atl_rpf_rss_redir_tbl_addr_set(struct aq_hw_s *aq_hw,
  + u32 rss_redir_tbl_addr)
{
  -aq_hw_write_reg_bit(aq_hw, rpf_rss_redir_addr_adr,
  - rpf_rss_redir_addr_msk,
  - rpf_rss_redir_addr_shift, rss_redir_tbl_addr);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_RSS_REDIR_ADDR_ADR,
  + HW_ATL_RPF_RSS_REDIR_ADDR_MSK,
  + HW_ATL_RPF_RSS_REDIR_ADDR_SHIFT,
  + rss_redir_tbl_addr);
}

 void rpf_rss_redir_tbl_wr_data_set(struct aq_hw_s *aq_hw,
  - u32 rss_redir_tbl_wr_data)
+void hw_atl_rpf_rss_redir_tbl_wr_data_set(struct aq_hw_s *aq_hw,
  u32 rss_redir_tbl_wr_data)
{
  -aq_hw_write_reg_bit(aq_hw, rss_redir_tbl_wr_data_adr,
  - rss_redir_tbl_wr_data_msk,
  - rss_redir_tbl_wr_data_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_RSS_REDIR_WR_DATA_ADR,
  + HW_ATL_RPF_RSS_REDIR_WR_DATA_MSK,
  + HW_ATL_RPF_RSS_REDIR_WR_DATA_SHIFT,
    rss_redir_tbl_wr_data);
}

-u32 rpf_rss_redir_wr_en_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_rpf_rss_redir_wr_en_get(struct aq_hw_s *aq_hw)
{
  -return aq_hw_read_reg_bit(aq_hw, rpf_rss_redir_wr_eni_adr,
  - rpf_rss_redir_wr_eni_msk,
  - rpf_rss_redir_wr_eni_shift);
  +return aq_hw_read_reg_bit(aq_hw, HW_ATL_RPF_RSS_REDIR_WR_ENI_ADR,
  + HW_ATL_RPF_RSS_REDIR_WR_ENI_MSK,
  + HW_ATL_RPF_RSS_REDIR_WR_ENI_SHIFT);
}

-void rpf_rss_redir_wr_en_set(struct aq_hw_s *aq_hw, u32 rss_redir_wr_en)
+void hw_atl_rpf_rss_redir_wr_en_set(struct aq_hw_s *aq_hw, u32 rss_redir_wr_en)
{
  -aq_hw_write_reg_bit(aq_hw, rpf_rss_redir_wr_eni_adr,
  - rpf_rss_redir_wr_eni_msk,
  - rpf_rss_redir_wr_eni_shift, rss_redir_wr_en);
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_RSS_REDIR_WR_ENI_ADR,
  + HW_ATL_RPF_RSS_REDIR_WR_ENI_MSK,
  + HW_ATL_RPF_RSS_REDIR_WR_ENI_SHIFT, rss_redir_wr_en);
}

-void rpf_tpo_to_rpf_sys_lbk_set(struct aq_hw_s *aq_hw, u32 tpo_to_rpf_sys_lbk)
+void hw_atl_rpf_tpo_to_rpf_sys_lbk_set(struct aq_hw_s *aq_hw,
  + u32 tpo_to_rpf_sys_lbk)
{
  -aq_hw_write_reg_bit(aq_hw, rpf_tpo_rpf_sys_lbk_adr,
  - rpf_tpo_rpf_sys_lbk_msk,
  - rpf_tpo_rpf_sys_lbk_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_TPO_RPF_SYS_LBK_ADR,
  + HW_ATL_RPF_TPO_RPF_SYS_LBK_MSK,
  + HW_ATL_RPF_TPO_RPF_SYS_LBK_SHIFT, tpo_to_rpf_sys_lbk);
}

-void rpf_vlan_inner_etht_set(struct aq_hw_s *aq_hw, u32 vlan_inner_etht)
+void hw_atl_rpf_vlan_inner_etht_set(struct aq_hw_s *aq_hw, u32 vlan_inner_etht) {
    aq_hw_write_reg_bit(aq_hw, rpf_vl_inner_tpid_adr,
    - rpf_vl_inner_tpid_msk,
    - rpf_vl_inner_tpid_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_INNER_TPID_ADR,
        + HW_ATL_RPF_VL_INNER_TPID_MSK,
        + HW_ATL_RPF_VL_INNER_TPID_SHIFT,
        vlan_inner_etht);
}

-void rpf_vlan_outer_etht_set(struct aq_hw_s *aq_hw, u32 vlan_outer_etht)
+void hw_atl_rpf_vlan_outer_etht_set(struct aq_hw_s *aq_hw, u32 vlan_outer_etht) {
    aq_hw_write_reg_bit(aq_hw, rpf_vl_outer_tpid_adr,
    - rpf_vl_outer_tpid_msk,
    - rpf_vl_outer_tpid_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_OUTER_TPID_ADR,
        + HW_ATL_RPF_VL_OUTER_TPID_MSK,
        + HW_ATL_RPF_VL_OUTER_TPID_SHIFT,
        vlan_outer_etht);
}

-void rpf_vlan_prom_mode_en_set(struct aq_hw_s *aq_hw, u32 vlan_prom_mode_en)
+void hw_atl_rpf_vlan_prom_mode_en_set(struct aq_hw_s *aq_hw, u32 vlan_prom_mode_en) {
    aq_hw_write_reg_bit(aq_hw, rpf_vl_promis_mode_adr,
    - rpf_vl_promis_mode_msk,
    - rpf_vl_promis_mode_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_PROMIS_MODE_ADR,
        + HW_ATL_RPF_VL_PROMIS_MODE_MSK,
        + HW_ATL_RPF_VL_PROMIS_MODE_SHIFT,
        vlan_prom_mode_en);
}

-void rpf_vlan_accept_untagged_packets_set(struct aq_hw_s *aq_hw, u32 vlan_accept_untagged_packets)
+void hw_atl_rpf_vlan_accept_untagged_packets_set(struct aq_hw_s *aq_hw, u32 vlan_acc_untagged_packets) {
    aq_hw_write_reg_bit(aq_hw, rpf_vl_accept_untagged_mode_adr,
    - rpf_vl_accept_untagged_mode_msk,
    - rpf_vl_accept_untagged_mode_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_ADR,
        + HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_MSK,
        + HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_SHIFT,
void rpf_vlan_untagged_act_set(struct aq_hw_s *aq_hw, u32 vlan_untagged_act)
{
    aq_hw_write_reg_bit(aq_hw, rpf_vl_untagged_act_adr,
                      rpf_vl_untagged_act_msk,
                      rpf_vl_untagged_act_shift,
                      vlan_untagged_act);
}

void hw_atl_rpf_vlan_untagged_act_set(struct aq_hw_s *aq_hw,
                                      u32 vlan_untagged_act)
{
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_UNTAGGED_ACT_ADR,
                        HW_ATL_RPF_VL_UNTAGGED_ACT_MSK,
                        HW_ATL_RPF_VL_UNTAGGED_ACT_SHIFT,
                        vlan_untagged_act);
}

void rpf_vlan_flr_en_set(struct aq_hw_s *aq_hw, u32 vlan_flr_en, u32 filter)
{
    aq_hw_write_reg_bit(aq_hw, rpf_vl_en_f_adr(filter),
                        rpf_vl_en_f_msk,
                        rpf_vl_en_f_shift,
                        vlan_flr_en);
}

void hw_atl_rpf_vlan_flr_en_set(struct aq_hw_s *aq_hw, u32 vlan_flr_en,
                                u32 filter)
{
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_EN_F_ADR(filter),
                        HW_ATL_RPF_VL_EN_F_MSK,
                        HW_ATL_RPF_VL_EN_F_SHIFT,
                        vlan_flr_en);
}

void rpf_vlan_flr_act_set(struct aq_hw_s *aq_hw, u32 vlan_flr_act, u32 filter)
{
    aq_hw_write_reg_bit(aq_hw, rpf_vl_act_f_adr(filter),
                        rpf_vl_act_f_msk,
                        rpf_vl_act_f_shift,
                        vlan_flr_act);
}

void hw_atl_rpf_vlan_flr_act_set(struct aq_hw_s *aq_hw, u32 vlan_flr_act,
                                 u32 filter)
{
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_ACT_F_ADR(filter),
                        HW_ATL_RPF_VL_ACT_F_MSK,
                        HW_ATL_RPF_VL_ACT_F_SHIFT,
                        vlan_flr_act);
}

void rpf_vlan_id_flr_set(struct aq_hw_s *aq_hw, u32 vlan_id_flr, u32 filter)
{
    aq_hw_write_reg_bit(aq_hw, rpf_vl_id_f_adr(filter),
                        rpf_vl_id_f_msk,
                        rpf_vl_id_f_shift,
                        vlan_id_flr);
}

void hw_atl_rpf_vlan_id_flr_set(struct aq_hw_s *aq_hw, u32 vlan_id_flr,
                                 u32 filter)
{
    aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_ID_F_ADR(filter),
                        HW_ATL_RPF_VL_ID_F_MSK,
                        HW_ATL_RPF_VL_ID_F_SHIFT,
                        vlan_id_flr);
}
- rpf_vl_id_f_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_VL_ID_F_ADR(filter),
  + HW_ATL_RPF_VL_ID_F_MSK,
  + HW_ATL_RPF_VL_ID_F_SHIFT,
  vlan_id_flr);
}

-void rpf_etht_flr_en_set(struct aq_hw_s *aq_hw, u32 etht_flr_en, u32 filter)
+void hw_atl_rpf_etht_flr_en_set(struct aq_hw_s *aq_hw, u32 etht_flr_en,
  +u32 filter)
{
-aq_hw_write_reg_bit(aq_hw, rpf_et_enf_adr(filter),
  - rpf_et_enf_msk,
  - rpf_et_enf_shift, etht_flr_en);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_ET_ENF_ADR(filter),
  + HW_ATL_RPF_ET_ENF_MSK,
  + HW_ATL_RPF_ET_ENF_SHIFT, etht_flr_en);
}

-void rpf_etht_user_priority_en_set(struct aq_hw_s *aq_hw,
  - u32 etht_user_priority_en, u32 filter)
+void hw_atl_rpf_etht_user_priority_en_set(struct aq_hw_s *aq_hw,
  + u32 etht_user_priority_en, u32 filter)
{
-aq_hw_write_reg_bit(aq_hw, rpf_et_upfen_adr(filter),
  - rpf_et_upfen_msk, rpf_et_upfen_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_ET_UPFEN_ADR(filter),
    + HW_ATL_RPF_ET_UPFEN_MSK, HW_ATL_RPF_ET_UPFEN_SHIFT,
    etht_user_priority_en);
}

-void rpf_etht_rx_queue_en_set(struct aq_hw_s *aq_hw, u32 etht_rx_queue_en,
  - u32 filter)
{
-aq_hw_write_reg_bit(aq_hw, rpf_et_rxqfen_adr(filter),
  - rpf_et_rxqfen_msk, rpf_et_rxqfen_shift,
  +void hw_atl_rpf_etht_rx_queue_en_set(struct aq_hw_s *aq_hw,
    + u32 etht_rx_queue_en,
    + u32 filter)
  +{
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_ET_RXQFEN_ADR(filter),
    + HW_ATL_RPF_ET_RXQFEN_MSK,
    + HW_ATL_RPF_ET_RXQFEN_SHIFT,
    etht_rx_queue_en);
  }

-void rpf_etht_user_priority_set(struct aq_hw_s *aq_hw, u32 etht_user_priority,
  -u32 filter)
+void hw_atl_rpf_etht_user_priority_set(struct aq_hw_s *aq_hw, u32 etht_user_priority, u32 filter) 
{
    aq_hw_write_reg_bit(aq_hw, rpf_et_upf_adr(filter),
        rpf_et_upf_msk,
        rpf_et_upf_shift, etht_user_priority);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_ET_UPF_ADR(filter),
        HW_ATL_RPF_ET_UPF_MSK,
        HW_ATL_RPF_ET_UPF_SHIFT, etht_user_priority);
}

-void rpf_etht_rx_queue_set(struct aq_hw_s *aq_hw, u32 etht_rx_queue, u32 filter) 
+void hw_atl_rpf_etht_rx_queue_set(struct aq_hw_s *aq_hw, u32 etht_rx_queue, u32 filter) 
{
    aq_hw_write_reg_bit(aq_hw, rpf_et_rxqf_adr(filter),
        rpf_et_rxqf_msk,
        rpf_et_rxqf_shift, etht_rx_queue);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_ET_RXQF_ADR(filter),
        HW_ATL_RPF_ET_RXQF_MSK,
        HW_ATL_RPF_ET_RXQF_SHIFT, etht_rx_queue);
}

-void rpf_etht_mgt_queue_set(struct aq_hw_s *aq_hw, u32 etht_mgt_queue, u32 filter) 
+void hw_atl_rpf_etht_mgt_queue_set(struct aq_hw_s *aq_hw, u32 etht_mgt_queue, u32 filter) 
{
    aq_hw_write_reg_bit(aq_hw, rpf_et_mng_rxqf_adr(filter),
        rpf_et_mng_rxqf_msk, rpf_et_mng_rxqf_shift,
        etht_mgt_queue);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_ET_MNG_RXQF_ADR(filter),
        HW_ATL_RPF_ET_MNG_RXQF_MSK,
        HW_ATL_RPF_ET_MNG_RXQF_SHIFT, etht_mgt_queue);
}

-void rpf_etht_flr_act_set(struct aq_hw_s *aq_hw, u32 etht_flr_act, u32 filter) 
+void hw_atl_rpf_etht_flr_act_set(struct aq_hw_s *aq_hw, u32 etht_flr_act, u32 filter) 
{
    aq_hw_write_reg_bit(aq_hw, rpf_et_actf_adr(filter),
        rpf_et_actf_msk,
        rpf_et_actf_shift, etht_flr_act);
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPF_ET_ACTF_ADR(filter),
        HW_ATL_RPF_ET_ACTF_MSK,
        HW_ATL_RPF_ET_ACTF_SHIFT, etht_flr_act);
-void rpf_etht_flr_set(struct aq_hw_s *aq_hw, u32 etht_flr, u32 filter)
+void hw_atl_rpf_etht_flr_set(struct aq_hw_s *aq_hw, u32 etht_flr, u32 filter)
{
-aq_hw_write_reg_bit(aq_hw, rpf_et_valf_adr(filter),
-  rpf_et_valf_msk,
-  rpf_et_valf_shift, etht_flr);
+aq_hw_write_reg_bit(aq.hw, HW_ATL_RPF_ET_VALF_ADR(filter),
+  HW_ATL_RPF_ET_VALF_MSK,
+  HW_ATL_RPF_ET_VALF_SHIFT, etht_flr);
}

/* RPO: rx packet offload */
-void rpo_ipv4header_crc_offload_en_set(struct aq_hw_s *aq_hw,
-  u32 ipv4header_crc_offload_en)
+void hw_atl_rpo_ipv4header_crc_offload_en_set(struct aq_hw_s *aq_hw,
+  u32 ipv4header_crc_offload_en)
{
-aq_hw_write_reg_bit(aq.hw, rpo_ipv4chk_en_adr,
-  rpo_ipv4chk_en_msk,
-  rpo_ipv4chk_en_shift,
+aq_hw_write_reg_bit(aq.hw, HW_ATL_RPO_IPV4CHK_EN_ADR,
+  HW_ATL_RPO_IPV4CHK_EN_MSK,
+  HW_ATL_RPO_IPV4CHK_EN_SHIFT,
    ipv4header_crc_offload_en);
}

-void rpo_rx_desc_vlan_stripping_set(struct aq_hw_s *aq_hw,
-  u32 rx_desc_vlan_stripping, u32 descriptor)
-{
-aq_hw_write_reg_bit(aq.hw, rpo_descdvl_strip_adr(descriptor),
-  rpo_descdvl_strip_msk,
-  rpo_descdvl_strip_shift,
+aq_hw_write_reg_bit(aq.hw, HW_ATL_RPO_DESCDVL_STRIP_ADR(descriptor),
+  HW_ATL_RPO_DESCDVL_STRIP_MSK,
+  HW_ATL_RPO_DESCDVL_STRIP_SHIFT,
    rx_desc_vlan_stripping);
}

-void rpo_tcp_udp_crc_offload_en_set(struct aq_hw_s *aq_hw,
-  u32 tcp_udp_crc_offload_en)
+void hw_atl_rpo_tcp_udp_crc_offload_en_set(struct aq_hw_s *aq_hw,
+  u32 tcp_udp_crc_offload_en)
{   
aq_hw_write_reg_bit(aq_hw, rpo4chk_en_adr, rpo4chk_en_msk,
   - rpo4chk_en_shift, tcp_udp_crc_offload_en);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPOL4CHK_EN_ADR,
   + HW_ATL_RPOL4CHK_EN_MSK,
   + HW_ATL_RPOL4CHK_EN_SHIFT, tcp_udp_crc_offload_en);
}

-void rpo_lro_en_set(struct aq_hw_s *aq_hw, u32 lro_en)
+void hw_atl_rpo_lro_en_set(struct aq_hw_s *aq_hw, u32 lro_en)
{
   -aq_hw_write_reg(aq_hw, rpo_lro_en_adr, lro_en);
   +aq_hw_write_reg(aq_hw, HW_ATL_RPO_LRO_EN_ADR, lro_en);
}

-void rpo_lro_patch_optimization_en_set(struct aq_hw_s *aq_hw,
   - u32 lro_patch_optimization_en)
+void hw_atl_rpo_lro_patch_optimization_en_set(struct aq_hw_s *aq_hw,
   + u32 lro_patch_optimization_en)
{
   -aq_hw_write_reg_bit(aq_hw, rpo_lro_ptopt_en_adr,
   - rpo_lro_ptopt_en_msk,
   - rpo_lro_ptopt_en_shift,
   +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPO_LRO_PTOPT_EN_ADR,
   + HW_ATL_RPO_LRO_PTOPT_EN_MSK,
   + HW_ATL_RPO_LRO_PTOPT_EN_SHIFT,
   lro_patch_optimization_en);
}

-void rpo_lro_qsessions_lim_set(struct aq_hw_s *aq_hw,
   - u32 lro_qsessions_lim)
+void hw_atl_rpo_lro_qsessions_lim_set(struct aq_hw_s *aq_hw,
   + u32 lro_qsessions_lim)
{
   -aq_hw_write_reg_bit(aq_hw, rpo_lro_qses_lmt_adr,
   - rpo_lro_qses_lmt_msk,
   - rpo_lro_qses_lmt_shift,
   +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPO_LRO_QSES_LMT_ADR,
   + HW_ATL_RPO_LRO_QSES_LMT_MSK,
   + HW_ATL_RPO_LRO_QSES_LMT_SHIFT,
   lro_qsessions_lim);
}

-void rpo_lro_total_desc_lim_set(struct aq_hw_s *aq_hw, u32 lro_total_desc_lim)
+void hw_atl_rpo_lro_total_desc_lim_set(struct aq_hw_s *aq_hw,
   + u32 lro_total_desc_lim)
{
   -aq_hw_write_reg_bit(aq_hw, rpo_lro_tot_dsc_lmt_adr,
- rpo_lro_tot_dsc_lmt_msk,
- rpo_lro_tot_dsc_lmt_shift,
+ aq_hw_write_reg_bit(aq_hw, HW_ATL_RPO_LRO_TOT_DSC_LMT_ADR,
+     HW_ATL_RPO_LRO_TOT_DSC_LMT_MSK,
+     HW_ATL_RPO_LRO_TOT_DSC_LMT_SHIFT,
     lro_total_desc_lim);
}

-void rpo_lro_min_pay_of_first_pkt_set(struct aq_hw_s *aq_hw,
-    u32 lro_min_pld_of_first_pkt)
+void hw_atl_rpo_lro_min_pay_of_first_pkt_set(struct aq_hw_s *aq_hw,
+    u32 lro_min_pld_of_first_pkt)
{
    -aq_hw_write_reg_bit(aq_hw, rpo_lro_pkt_min_adr,
    -    rpo_lro_pkt_min_msk,
    -    rpo_lro_pkt_min_shift,
    +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPO_LRO_PKT_MIN_ADR,
    +    HW_ATL_RPO_LRO_PKT_MIN_MSK,
    +    HW_ATL_RPO_LRO_PKT_MIN_SHIFT,
    lro_min_pld_of_first_pkt);
}

-void rpo_lro_pkt_lim_set(struct aq_hw_s *aq_hw, u32 lro_pkt_lim)
+void hw_atl_rpo_lro_pkt_lim_set(struct aq_hw_s *aq_hw, u32 lro_pkt_lim)
{
    -aq_hw_write_reg(aq_hw, rpo_lro_rsc_max_adr, lro_pkt_lim);
    +aq_hw_write_reg(aq_hw, HW_ATL_RPO_LRO_RSC_MAX_ADR, lro_pkt_lim);
}

-void rpo_lro_max_num_of_descriptors_set(struct aq_hw_s *aq_hw,
-    u32 lro_max_number_of_descriptors,
-    u32 lro)
+void hw_atl_rpo_lro_max_num_of_descriptors_set(struct aq_hw_s *aq_hw,
+    u32 lro_max_number_of_descriptors,
+    u32 lro)
{
    /* Register address for bitfield lro{L}_des_max[1:0] */
    static u32 rpo_lro_ldes_max_adr[32] = {
    @@ -1017,378 +1081,398 @@
    lro_max_number_of_descriptors);
}
- rpo_lro_tb_div_msk,
- rpo_lro_tb_div_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_RPO_LRO_TB_DIV_ADR,
  + HW_ATL_RPO_LRO_TB_DIV_MSK,
  + HW_ATL_RPO_LRO_TB_DIV_SHIFT,
        lro_time_base_divider);
}

-void rpo_lro_inactive_interval_set(struct aq_hw_s *aq_hw,
  - u32 lro_inactive_interval)
+void hw_atl_rpo_lro_inactive_interval_set(struct aq_hw_s *aq_hw,
  + u32 lro_inactive_interval)
{
  -aq_hw_write_reg_bit(aq_hw, rpo_lro_ina_ival_adr,
  - rpo_lro_ina_ival_msk,
  - rpo_lro_ina_ival_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPO_LRO_INA_IVAL_ADR,
    + HW_ATL_RPO_LRO_INA_IVAL_MSK,
    + HW_ATL_RPO_LRO_INA_IVAL_SHIFT,
        lro_inactive_interval);
}

-void rpo_lro_max_coalescing_interval_set(struct aq_hw_s *aq_hw,
  - u32 lro_max_coalescing_interval)
+void hw_atl_rpo_lro_max_coalescing_interval_set(struct aq_hw_s *aq_hw,
  + u32 lro_max_coal_interval)
{
  -aq_hw_write_reg_bit(aq_hw, rpo_lro_max_ival_adr,
  - rpo_lro_max_ival_msk,
  - rpo_lro_max_ival_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RPO_LRO_MAX_IVAL_ADR,
    + HW_ATL_RPO_LRO_MAX_IVAL_MSK,
    + HW_ATL_RPO_LRO_MAX_IVAL_SHIFT,
        lro_max_coal_interval);
}

/\* rx */
-void rx_rx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 rx_reg_res_dis)
+void hw_atl_rx_rx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 rx_reg_res_dis)
{
  -aq_hw_write_reg_bit(aq_hw, rx_reg_res_dsbl_adr,
  - rx_reg_res_dsbl_msk,
  - rx_reg_res_dsbl_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_RX_REG_RES_DSBL_ADR,
    + HW_ATL_RX_REG_RES_DSBL_MSK,
    + HW_ATL_RX_REG_RES_DSBL_SHIFT,
        rx_reg_res_dis);
void tdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca) {
    aq_hw_write_reg_bit(aq_hw, tdm_dcadcpuid_adr(dca),
    tdm_dcadcpuid_msk,
    tdm_dcadcpuid_shift, cpuid);
}

void tdm_large_send_offload_en_set(struct aq_hw_s *aq_hw,
    u32 large_send_offload_en) {
    aq_hw_write_reg(aq_hw, tdm_lso_en_adr, large_send_offload_en);
}

void tdm_tx_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_dca_en) {
    aq_hw_write_reg_bit(aq_hw, tdm_dca_en_adr, tdm_dca_en_msk,
    tdm_dca_en_shift, tx_dca_en);
}

void tdm_tx_dca_mode_set(struct aq_hw_s *aq_hw, u32 tx_dca_mode) {
    aq_hw_write_reg_bit(aq_hw, tdm_dca_mode_adr, tdm_dca_mode_msk,
    tdm_dca_mode_shift, tx_dca_mode);
}

void tdm_tx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_dca_en, u32 dca) {
    aq_hw_write_reg_bit(aq_hw, tdm_dcaddesc_en_adr(dca),
    tdm_dcaddesc_en_msk, tdm_dcaddesc_en_shift,
    HW_ATL_TDM_DCADCPUID_MSK, HW_ATL_TDM_DCADCPUID_SHIFT, dca);
}

/* tdm */

void hw_atl_tdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca) {
    aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_DCADCPUID_ADR(dca),
    HW_ATL_TDM_DCADCPUID_MSK,
    HW_ATL_TDM_DCADCPUID_SHIFT, cpuid);
}

void hw_atl_tdm_large_send_offload_en_set(struct aq_hw_s *aq_hw,
    u32 large_send_offload_en) {
    aq_hw_write_reg(aq_hw, HW_ATL_TDM_LSO_EN_ADR, large_send_offload_en);
}

void hw_atl_tdm_tx_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_dca_en) {
    aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_DCA_EN_ADR, HW_ATL_TDM_DCA_EN_MSK,
    HW_ATL_TDM_DCA_EN_SHIFT, tx_dca_en);
}

void hw_atl_tdm_tx_dca_mode_set(struct aq_hw_s *aq_hw, u32 tx_dca_mode) {
    aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_DCA_MODE_ADR, HW_ATL_TDM_DCA_MODE_MSK,
    HW_ATL_TDM_DCA_MODE_SHIFT, tx_dca_mode);
}

void hw_atl_tdm_tx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_dca_en, u32 dca) {
    aq_hw_write_reg_bit(aq_hw, tdm_dcaddesc_en_adr(dca),
    tdm_dcaddesc_en_msk, tdm_dcaddesc_en_shift,
    HW_ATL_TDM_DCADCPUID_MSK, HW_ATL_TDM_DCADCPUID_SHIFT, dca);
}
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_DCADDDESC_EN_ADR(dca),
  + HW_ATL_TDM_DCADDDESC_EN_MSK,
  + HW_ATL_TDM_DCADDDESC_EN_SHIFT,
    tx_desc_dca_en);
}

-void tdm_tx_desc_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_en, u32 descriptor)
+void hw_atl_tdm_tx_desc_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_en,
  + u32 descriptor)
{
-aq_hw_write_reg_bit(aq_hw, tdm_descden_adr(descriptor),
  - tdm_descden_msk,
  - tdm_descden_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_DESCDEN_ADR(descriptor),
  + HW_ATL_TDM_DESCDEN_MSK,
  + HW_ATL_TDM_DESCDEN_SHIFT,
    tx_desc_en);
}

-u32 tdm_tx_desc_head_ptr_get(struct aq_hw_s *aq_hw, u32 descriptor)
+u32 hw_atl_tdm_tx_desc_head_ptr_get(struct aq_hw_s *aq_hw, u32 descriptor)
{
-return aq_hw_read_reg_bit(aq_hw, tdm_descdhd_adr(descriptor),
  - tdm_descdhd_msk, tdm_descdhd_shift);
+return aq_hw_read_reg_bit(aq_hw, HW_ATL_TDM_DESCDHD_ADR(descriptor),
  + HW_ATL_TDM_DESCDHD_MSK,
  + HW_ATL_TDM_DESCDHD_SHIFT);
}

-void tdm_tx_desc_len_set(struct aq_hw_s *aq_hw, u32 tx_desc_len,
  - u32 descriptor)
+void hw_atl_tdm_tx_desc_len_set(struct aq_hw_s *aq_hw, u32 tx_desc_len,
  + u32 descriptor)
{
-aq_hw_write_reg_bit(aq_hw, tdm_descdlen_adr(descriptor),
  - tdm_descdlen_msk,
  - tdm_descdlen_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_DESCDLEN_ADR(descriptor),
  + HW_ATL_TDM_DESCDLEN_MSK,
  + HW_ATL_TDM_DESCDLEN_SHIFT,
    tx_desc_len);
}

-void tdm_tx_desc_wr_wb_irq_en_set(struct aq_hw_s *aq_hw,
  - u32 tx_desc_wr_wb_irq_en)
+void hw_atl_tdm_tx_desc_wr_wb_irq_en_set(struct aq_hw_s *aq_hw,
  + u32 tx_desc_wr_wb_irq_en)
{
```c
- aq_hw_write_reg_bit(aq_hw, tdm_int_desc_wrb_en_adr,
- tdm_int_desc_wrb_en_msk,
- tdm_int_desc_wrb_en_shift,
+ aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_INT_DESC_WRB_EN_ADR,
+ HW_ATL_TDM_INT_DESC_WRB_EN_MSK,
+ HW_ATL_TDM_INT_DESC_WRB_EN_SHIFT,
  tx_desc_wr_wb_irq_en);
}

-void tdm_tx_desc_wr_wb_threshold_set(struct aq_hw_s *aq_hw,
- u32 tx_desc_wr_wb_threshold,
- u32 descriptor)
-{
- aq_hw_write_reg_bit(aq_hw, tdm_descdwrb_thresh_adr(descriptor),
- tdm_descdwrb_thresh_msk,
- tdm_descdwrb_thresh_shift,
+ void hw_atl_tdm_tx_desc_wr_wb_threshold_set(struct aq_hw_s *aq_hw,
+ u32 tx_desc_wr_wb_threshold,
+ u32 descriptor)
+{
+ aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_DESCDWRB_THRESH_ADR(descriptor),
+ HW_ATL_TDM_DESCDWRB_THRESH_MSK,
+ HW_ATL_TDM_DESCDWRB_THRESH_SHIFT,
  tx_desc_wr_wb_threshold);
}

-void tdm_tdm_intr_moder_en_set(struct aq_hw_s *aq_hw,
- u32 tdm_irq_moderation_en)
+void hw_atl_tdm_tdm_intr_moder_en_set(struct aq_hw_s *aq_hw,
+ u32 tdm_irq_moderation_en)
{
- aq_hw_write_reg_bit(aq_hw, tdm_int_mod_en_adr,
- tdm_int_mod_en_msk,
- tdm_int_mod_en_shift,
+ aq_hw_write_reg_bit(aq_hw, HW_ATL_TDM_INT_MOD_EN_ADR,
+ HW_ATL_TDM_INT_MOD_EN_MSK,
+ HW_ATL_TDM_INT_MOD_EN_SHIFT,
  tdm_irq_moderation_en);
}

/* thm */
-void thm_lso_tcp_flag_of_first_pkt_set(struct aq_hw_s *aq_hw,
- u32 lso_tcp_flag_of_first_pkt)
+void hw_atl_thm_lso_tcp_flag_of_first_pkt_set(struct aq_hw_s *aq_hw,
+ u32 lso_tcp_flag_of_first_pkt)
{
- aq_hw_write_reg_bit(aq_hw, thm_lso_tcp_flag_first_adr,
- thm_lso_tcp_flag_first_msk,
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```c
- thm_lso_tcp_flag_first_shift,
+ thm_lso_tcp_flag_first_shift,
+ aq_hw_write_reg_bit(aq_hw, HW_ATL_THM_LSO_TCP_FLAG_FIRST_ADR,
  + HW_ATL_THM_LSO_TCP_FLAG_FIRST_MSK,
  + HW_ATL_THM_LSO_TCP_FLAG_FIRST_SHIFT,
    lso_tcp_flag_of_first_pkt);
}

-void thm_lso_tcp_flag_of_last_pkt_set(struct aq_hw_s *aq_hw,
  - u32 lso_tcp_flag_of_last_pkt)
+void hw_atl_thm_lso_tcp_flag_of_last_pkt_set(struct aq_hw_s *aq_hw,
  + u32 lso_tcp_flag_of_last_pkt)
{
  -aq_hw_write_reg_bit(aq_hw, thm_lso_tcp_flag_last_adr,
    - thm_lso_tcp_flag_last_msk,
    - thm_lso_tcp_flag_last_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_THM_LSO_TCP_FLAG_LAST_ADR,
    + HW_ATL_THM_LSO_TCP_FLAG_LAST_MSK,
    + HW_ATL_THM_LSO_TCP_FLAG_LAST_SHIFT,
      lso_tcp_flag_of_last_pkt);
}

-void thm_lso_tcp_flag_of_middle_pkt_set(struct aq_hw_s *aq_hw,
  - u32 lso_tcp_flag_of_middle_pkt)
+void hw_atl_thm_lso_tcp_flag_of_middle_pkt_set(struct aq_hw_s *aq_hw,
  + u32 lso_tcp_flag_of_middle_pkt)
{
  -aq_hw_write_reg_bit(aq_hw, thm_lso_tcp_flag_mid_adr,
    - thm_lso_tcp_flag_mid_msk,
    - thm_lso_tcp_flag_mid_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_THM_LSO_TCP_FLAG_MID_ADR,
    + HW_ATL_THM_LSO_TCP_FLAG_MID_MSK,
    + HW_ATL_THM_LSO_TCP_FLAG_MID_SHIFT,
      lso_tcp_flag_of_middle_pkt);
}

/* TPB: tx packet buffer */

-void tpb_tx_buff_en_set(struct aq_hw_s *aq_hw, u32 tx_buff_en)
+void hw_atl_tpb_tx_buff_en_set(struct aq_hw_s *aq_hw, u32 tx_buff_en)
{
  -aq_hw_write_reg_bit(aq_hw, tpb_tx_buff_en_adr, tpb_tx_buff_en_msk,
    - tpb_tx_buff_en_shift, tx_buff_en);
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_TPB_TX_BUF_EN_ADR,
    + HW_ATL_TPB_TX_BUF_EN_MSK,
    + HW_ATL_TPB_TX_BUF_EN_SHIFT, tx_buff_en);
}

-void tpb_tx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw,
  - u32 tx_buff_hi_threshold_per_tc,
  + u32 tx_buff_hi_threshold_per_tc,
+void hw_atl_tpb_tx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw, u32 tx_buff_hi_threshold_per_tc, u32 buffer)
{
    -aq_hw_write_reg_bit(aq_hw, tpb_txbhi_thresh_adr(buffer),
        - tpb_txbhi_thresh_msk, tpb_txbhi_thresh_shift,
        +aq_hw_write_reg_bit(aq_hw, HW_ATL_TPB_TXBHI_THRESH_ADR(buffer),
            + HW_ATL_TPB_TXBHI_THRESH_MSK,
            + HW_ATL_TPB_TXBHI_THRESH_SHIFT,
            tx_buff_hi_threshold_per_tc);
}

-void tpb_tx_buff_lo_threshold_per_tc_set(struct aq_hw_s *aq_hw, u32 tx_buff_lo_threshold_per_tc, u32 buffer)
{
    -aq_hw_write_reg_bit(aq_hw, tpb_txblo_thresh_adr(buffer),
        - tpb_txblo_thresh_msk, tpb_txblo_thresh_shift,
        +aq_hw_write_reg_bit(aq_hw, HW_ATL_TPB_TXBLO_THRESH_ADR(buffer),
            + HW_ATL_TPB_TXBLO_THRESH_MSK,
            + HW_ATL_TPB_TXBLO_THRESH_SHIFT,
            tx_buff_lo_threshold_per_tc);
}

-void tpb_tx_dma_sys_lbk_en_set(struct aq_hw_s *aq_hw, u32 tx_dma_sys_lbk_en)
+void hw_atl_tpb_tx_dma_sys_lbk_en_set(struct aq_hw_s *aq_hw, u32 tx_dma_sys_lbk_en)
{
    -aq_hw_write_reg_bit(aq_hw, tpb_dma_sys_lbk_adr,
        - tpb_dma_sys_lbk_msk,
        - tpb_dma_sys_lbk_shift,
        +aq_hw_write_reg_bit(aq_hw, HW_ATL_TPB_DMA_SYS_LBK_ADR,
            + HW_ATL_TPB_DMA_SYS_LBK_MSK,
            + HW_ATL_TPB_DMA_SYS_LBK_SHIFT,
            tx_dma_sys_lbk_en);
}

-void tpb_tx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw, u32 tx_pkt_buff_size_per_tc, u32 buffer)
+void hw_atl_tpb_tx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw, u32 tx_pkt_buff_size_per_tc, u32 buffer)
{
    -aq_hw_write_reg_bit(aq_hw, tpb_txbbuf_size_adr(buffer),
        - tpb_txbbuf_size_msk,
        - tpb_txbbuf_size_shift,
        +aq_hw_write_reg_bit(aq_hw, HW_ATL_TPB_TXBBUF_SIZE_ADR(buffer),
            + HW_ATL_TPB_TXBBUF_SIZE_MSK,
+ \text{HW\_ATL\_TPB\_TXBBUF\_SIZE\_SHIFT},
tx\_pkt\_buf\_size\_per\_tc);
}

-void tpb\_tx\_path\_scp\_ins\_en\_set(struct aq\_hw\_s *aq\_hw, u32 tx\_path\_scp\_ins\_en)
+void hw\_atl\_tpb\_tx\_path\_scp\_ins\_en\_set(struct aq\_hw\_s *aq\_hw, u32 tx\_path\_scp\_ins\_en)
{
    -aq\_hw\_write\_reg\_bit(aq\_hw, tpb\_tx\_scp\_ins\_en\_adr,
-    tpb\_tx\_scp\_ins\_en\_msk,
-    tpb\_tx\_scp\_ins\_en\_shift,
+    aq\_hw\_write\_reg\_bit(aq\_hw, \text{HW\_ATL\_TPB\_TX\_SCP\_INS\_EN\_ADR},
+        \text{HW\_ATL\_TPB\_TX\_SCP\_INS\_EN\_MSK},
+        \text{HW\_ATL\_TPB\_TX\_SCP\_INS\_EN\_SHIFT},
+        tx\_path\_scp\_ins\_en);
}

/* TPO: tx packet offload */
-void tpo\_ipv4header\_crc\_offload\_en\_set(struct aq\_hw\_s *aq\_hw,
    -u32 ipv4header\_crc\_offload\_en)
+void hw\_atl\_tpo\_ipv4header\_crc\_offload\_en\_set(struct aq\_hw\_s *aq\_hw,
    +u32 ipv4header\_crc\_offload\_en)
{
    -aq\_hw\_write\_reg\_bit(aq\_hw, tpo\_ipv4chk\_en\_adr,
-    tpo\_ipv4chk\_en\_msk,
-    tpo\_ipv4chk\_en\_shift,
+    aq\_hw\_write\_reg\_bit(aq\_hw, \text{HW\_ATL\_TP0\_IPV4CHK\_EN\_ADR},
+        \text{HW\_ATL\_TP0\_IPV4CHK\_EN\_MSK},
+        \text{HW\_ATL\_TP0\_IPV4CHK\_EN\_SHIFT},
        ipv4header\_crc\_offload\_en);
}

-void tpo\_tcp\_udp\_crc\_offload\_en\_set(struct aq\_hw\_s *aq\_hw,
    -u32 tcp\_udp\_crc\_offload\_en)
+void hw\_atl\_tpo\_tcp\_udp\_crc\_offload\_en\_set(struct aq\_hw\_s *aq\_hw,
    +u32 tcp\_udp\_crc\_offload\_en)
{
    -aq\_hw\_write\_reg\_bit(aq\_hw, tpol4chk\_en\_adr,
-    tpol4chk\_en\_msk,
-    tpol4chk\_en\_shift,
+    aq\_hw\_write\_reg\_bit(aq\_hw, \text{HW\_ATL\_TPOL4CHK\_EN\_ADR},
+        \text{HW\_ATL\_TPOL4CHK\_EN\_MSK},
+        \text{HW\_ATL\_TPOL4CHK\_EN\_SHIFT},
        tcp\_udp\_crc\_offload\_en);
}

-void tpo\_tx\_pkt\_sys\_lbk\_en\_set(struct aq\_hw\_s *aq\_hw, u32 tx\_pkt\_sys\_lbk\_en)
+void hw\_atl\_tpo\_tx\_pkt\_sys\_lbk\_en\_set(struct aq\_hw\_s *aq\_hw,
    +u32 tx\_pkt\_sys\_lbk\_en)
void hw_atl_tps_tx_pkt_shed_data_arb_mode_set(struct aq_hw_s *aq_hw, u32 tx_pkt_shed_data_arb_mode)
{
    aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DATA_TC_ARB_MODE_ADR, HW_ATL_TPS_DATA_TC_ARB_MODE_MSK, HW_ATL_TPS_DATA_TC_ARB_MODE_SHIFT, tx_pkt_shed_data_arb_mode);
}

void hw_atl_tps_tx_pkt_shed_desc_rate_curr_time_res_set(struct aq_hw_s *aq_hw, u32 curr_time_res)
{
    aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DESC_RATE_TA_RST_ADR, HW_ATL_TPS_DESC_RATE_TA_RST_MSK, HW_ATL_TPS_DESC_RATE_TA_RST_SHIFT, curr_time_res);
}

void hw_atl_tps_tx_pkt_shed_desc_rate_lim_set(struct aq_hw_s *aq_hw, u32 tx_pkt_shed_desc_rate_lim)
{
    aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DESC_RATE_LIM_ADR, HW_ATL_TPS_DESC_RATE_LIM_MSK, HW_ATL_TPS_DESC_RATE_LIM_SHIFT, tx_pkt_shed_desc_rate_lim);
}
+ HW_ATL_TPS_DESC_RATE_LIM_MSK,
+ HW_ATL_TPS_DESC_RATE_LIM_SHIFT,
  tx_pkt_shed_desc_rate_lim);
}

-void tps_tx_pkt_shed_desc_tc_arb_mode_set(struct aq_hw_s *aq_hw,
  u32 tx_pkt_shed_desc_tc_arb_mode)
+void hw_atl_tps_tx_pkt_shed_desc_tc_arb_mode_set(struct aq_hw_s *aq_hw,
  +u32 arb_mode)
{
-aq_hw_write_reg_bit(aq_hw, tps_desc_tc_arb_mode_adr,
  -tps_desc_tc_arb_mode_msk,
  -tps_desc_tc_arb_mode_shift,
  -tx_pkt_shed_desc_tc_arb_mode);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DESC_TC_ARB_MODE_ADR,
  +HW_ATL_TPS_DESC_TC_ARB_MODE_MSK,
  +HW_ATL_TPS_DESC_TC_ARB_MODE_SHIFT,
  +arb_mode);
}

-void tps_tx_pkt_shed_desc_tc_max_credit_set(struct aq_hw_s *aq_hw,
  u32 tx_pkt_shed_desc_tc_max_credit,
  u32 tc)
+void hw_atl_tps_tx_pkt_shed_desc_tc_max_credit_set(struct aq_hw_s *aq_hw,
  +u32 max_credit,
  +u32 tc)
{
-aq_hw_write_reg_bit(aq_hw, tps_dec_tctcredit_max_adr(tc),
  -tps_dec_tctcredit_max_msk,
  -tps_dec_tctcredit_max_shift,
  -tx_pkt_shed_desc_tc_max_credit);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DESC_TCTCREDIT_MAX_ADR(tc),
  +HW_ATL_TPS_DESC_TCTCREDIT_MAX_MSK,
  +HW_ATL_TPS_DESC_TCTCREDIT_MAX_SHIFT,
  +max_credit);
}

-void tps_tx_pkt_shed_desc_tc_weight_set(struct aq_hw_s *aq_hw,
  u32 tx_pkt_shed_desc_tc_weight, u32 tc)
+void hw_atl_tps_tx_pkt_shed_desc_tc_weight_set(struct aq_hw_s *aq_hw,
  +u32 tx_pkt_shed_desc_tc_weight,
  +u32 tc)
{
-aq_hw_write_reg_bit(aq_hw, tps_desc_tctweight_adr(tc),
  -tps_desc_tctweight_msk,
  -tps_desc_tctweight_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DESC_TCTWEIGHT_MAX_ADR(tc),
  +HW_ATL_TPS_DESC_TCTWEIGHT_MAX_MSK,
  +HW_ATL_TPS_DESC_TCTWEIGHT_MAX_SHIFT,
  +HW_ATL_TPS_DESC_TCTWEIGHT_MSK,}
+ HW_ATL_TPS_DESC_TCTWEIGHT_SHIFT,
  tx_pkt_shed_desc_tc_weight);
}

-void tps_tx_pkt_shed_desc_vm_arb_mode_set(struct aq_hw_s *aq_hw,
  u32 tx_pkt_shed_desc_vm_arb_mode)
+void hw_atl_tps_tx_pkt_shed_desc_vm_arb_mode_set(struct aq_hw_s *aq_hw,
  u32 Arb_mode)
{
-aq_hw_write_reg_bit(aq_hw, tps_desc_vm_arb_mode adr,
  - tps_desc_vm_arb_mode_msk,
  - tps_desc_vm_arb_mode_shift,
  - tx_pkt_shed_desc_vm_arb_mode);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DESC_VM_ARB_MODE_ADR,
  + HW_ATL_TPS_DESC_VM_ARB_MODE_MSK,
  + HW_ATL_TPS_DESC_VM_ARB_MODE_SHIFT,
  + Arb_mode);
}

-void tps_tx_pkt_shed_tc_data_max_credit_set(struct aq_hw_s *aq_hw,
  - u32 tx_pkt_shed_tc_data_max_credit,
  - u32 tc)
+void hw_atl_tps_tx_pkt_shed_tc_data_max_credit_set(struct aq_hw_s *aq_hw,
  + u32 max_credit,
  + u32 tc)
{
-aq_hw_write_reg_bit(aq_hw, tps_data_tctcredit_max adr(tc),
  - tps_data_tctcredit_max_msk,
  - tps_data_tctcredit_max_shift,
  - tx_pkt_shed_desc_vm_arb_mode);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DATA_TCTCREDIT_MAX_ADR(tc),
  + HW_ATL_TPS_DATA_TCTCREDIT_MAX_MSK,
  + HW_ATL_TPS_DATA_TCTCREDIT_MAX_SHIFT,
  + max_credit);
}

-void tps_tx_pkt_shed_tc_data_weight_set(struct aq_hw_s *aq_hw,
  - u32 tx_pkt_shed_tc_data_weight, u32 tc)
+void hw_atl_tps_tx_pkt_shed_tc_data_weight_set(struct aq_hw_s *aq_hw,
  + u32 tx_pkt_shed_tc_data_weight,
  + u32 tc)
{
-aq_hw_write_reg_bit(aq_hw, tps_data_tctweight adr(tc),
  - tps_data_tctweight_msk,
  - tps_data_tctweight_shift,
  +aq_hw_write_reg_bit(aq_hw, HW_ATL_TPS_DATA_TCTWEIGHT_ADR(tc),
  + HW_ATL_TPS_DATA_TCTWEIGHT_MSK,
  + HW_ATL_TPS_DATA_TCTWEIGHT_SHIFT,
  + Arb_mode);
}
tx_pkt_shed_tc_data_weight);

/* tx */
-void tx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 tx_reg_res_dis)
+void hw_atl_tx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 tx_reg_res_dis)
 {
-aq_hw_write_reg_bit(aq_hw, tx_reg_res_dsbl_adr,
 - tx_reg_res_dsbl_msk,
 - tx_reg_res_dsbl_shift, tx_reg_res_dis);
+aq_hw_write_reg_bit(aq_hw, HW_ATL_TX_REG_RES_DSBL_ADR,
 + HW_ATL_TX_REG_RES_DSBL_MSK,
 + HW_ATL_TX_REG_RES_DSBL_SHIFT, tx_reg_res_dis);
 }

/* msm */
-u32 msm_reg_access_status_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_msm_reg_access_status_get(struct aq_hw_s *aq_hw)
 {
-return aq_hw_read_reg_bit(aq_hw, msm_reg_access_busy_adr,
 - msm_reg_access_busy_msk,
 - msm_reg_access_busy_shift);
+return aq_hw_read_reg_bit(aq_hw, HW_ATL_MSM_REG_ACCESS_BUSY_ADR,
 + HW_ATL_MSM_REG_ACCESS_BUSY_MSK,
 + HW_ATL_MSM_REG_ACCESS_BUSY_SHIFT);
 }

-void msm_reg_addr_for_indirect_addr_set(struct aq_hw_s *aq_hw,
 -u32 reg_addr_for_indirect_addr)
+void hw_atl_msm_reg_addr_for_indirect_addr_set(struct aq_hw_s *aq_hw,
 +u32 reg_addr_for_indirect_addr)
 {
-aq_hw_write_reg_bit(aq_hw, msm_reg_addr_adr,
 - msm_reg_addr_msk,
 - msm_reg_addr_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_MSM_REG_ADDR_ADR,
 + HW_ATL_MSM_REG_ADDR_MSK,
 + HW_ATL_MSM_REG_ADDR_SHIFT,
  reg_addr_for_indirect_addr);
 }

-void msm_reg_rd_strobe_set(struct aq_hw_s *aq_hw, u32 reg_rd_strobe)
+void hw_atl_msm_reg_rd_strobe_set(struct aq_hw_s *aq_hw, u32 reg_rd_strobe)
 {
-aq_hw_write_reg_bit(aq_hw, msm_reg_rd_strobe_adr,
 - msm_reg_rd_strobe_msk,
 - msm_reg_rd_strobe_shift,
+aq_hw_write_reg_bit(aq_hw, HW_ATL_MSM_REG_RD_STROBE_ADR,
+  HW_ATL_MSK_REG_RD_STROBE_MSK,
+  HW_ATL_MSK_REG_RD_STROBE_SHIFT,
    reg_rd_strobe);
}

-u32 msm_reg_rd_data_get(struct aq_hw_s *aq_hw)
+u32 hw_atl_msm_reg_rd_data_get(struct aq_hw_s *aq_hw)
{
  return aq_hw_read_reg(aq_hw, msm_reg_rd_data_adr);
+  return aq_hw_read_reg(aq_hw, HW_ATL_MSK_REG_RD_DATA_ADR);
}

-void msm_reg_wr_data_set(struct aq_hw_s *aq_hw, u32 reg_wr_data)
+void hw_atl_msm_reg_wr_data_set(struct aq_hw_s *aq_hw, u32 reg_wr_data)
{
  aq_hw_write_reg(aq_hw, msm_reg_wr_data_adr, reg_wr_data);
+  aq_hw_write_reg(aq_hw, HW_ATL_MSK_REG_WR_DATA_ADR, reg_wr_data);
}

-void msm_reg_wr_strobe_set(struct aq_hw_s *aq_hw, u32 reg_wr_strobe)
+void hw_atl_msm_reg_wr_strobe_set(struct aq_hw_s *aq_hw, u32 reg_wr_strobe)
{
+  aq_hw_write_reg_bit(aq_hw, HW_ATL_MSK_REG_WR_STROBE_ADR,
+    HW_ATL_MSK_REG_WR_STROBE_MSK,
+    HW_ATL_MSK_REG_WR_STROBE_SHIFT,
    reg_wr_strobe);
}

/* pci */
-void pci_pci_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 pci_reg_res_dis)
+void hw_atl_pci_pci_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 pci_reg_res_dis)
{
  aq_hw_write_reg_bit(aq_hw, pci_reg_res_dsbl_adr,
    -  pci_reg_res_dsbl_msk,
    -  pci_reg_res_dsbl_shift,
    +  HW_ATL_PCI_REG_RES_DSBL_MSK,
    +  HW_ATL_PCI_REG_RES_DSBL_SHIFT,
    pci_reg_res_dis);
}

-void reg_glb_cpu_scratch_scp_set(struct aq_hw_s *aq_hw, u32 glb_cpu_scratch_scp,
-  u32 scratch_scp)
+void hw_atl_reg_glb_cpu_scratch_scp_set(struct aq_hw_s *aq_hw,
+  u32 glb_cpu_scratch_scp,
+u32 scratch scp)
{
aq hw write_reg(aq hw, glb cpu scratch scp adr(scratch scp),
aq_hw_write_reg(aq_hw, HW_ATL_GLB_CPU_SCRATCH_SCP_ADR(scratch scp),
glb_cpu_scratch scp);
}
+
+void hw_atl_mcp_up_force_intr_set(struct aq_hw_s *aq_hw, u32 up_force_intr)
+
+aq_hw_write_reg_bit(aq_hw, HW_ATL_MCP_UP_FORCE_INTERRUPT_ADR,
+ HW_ATL_MCP_UP_FORCE_INTERRUPT_MSK,
+ HW_ATL_MCP_UP_FORCE_INTERRUPT_SHIFT,
+ up_force_intr);
+
*/ global */

/* set global microprocessor semaphore */
-void reg_glb_cpu_sem_set(struct aq_hw_s *aq_hw,u32 glb_cpu_sem,
- u32 semaphore);
+void hw_atl_reg_glb_cpu_sem_set(struct aq_hw_s *aq_hw,u32 glb_cpu_sem,
+u32 semaphore);

/* get global microprocessor semaphore */
-u32 reg_glb_cpu_sem_get(struct aq_hw_s *aq_hw, u32 semaphore);
+u32 hw_atl_reg_glb_cpu_sem_get(struct aq_hw_s *aq_hw, u32 semaphore);

/* set global register reset disable */
-void glb_glb_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 glb_reg_res_dis);
+void hw_atl_glb_glb_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 glb_reg_res_dis);

/* set soft reset */
-void glb_soft_res_set(struct aq_hw_s *aq_hw, u32 soft_res);
+void hw_atl_glb_soft_res_set(struct aq_hw_s *aq_hw, u32 soft_res);

/* get soft reset */
-u32 glb_soft_res_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_glb_soft_res_get(struct aq_hw_s *aq_hw);

/* stats */

-u32 rpb rx_dma_drop_pkt_cnt_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_rpb_rx_dma_drop_pkt_cnt_get(struct aq_hw_s *aq_hw);

/* get rx dma good octet counter lsw */
-u32 stats rx_dma_good_octet_counterlsw_get(struct aq_hw_s *aq_hw);

/* get rx dma good packet counter lsw */
-#u32 stats_rx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_stats_rx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw);

/* get tx dma good octet counter lsw */
-#u32 stats_tx_dma_good_octet_counterlsw_get(struct aq_hw_s *aq.hw);
+u32 hw_atl_stats_tx_dma_good_octet_counterlsw_get(struct aq_hw_s *aq_hw);

/* get tx dma good packet counter lsw */
-#u32 stats_tx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_stats_tx_dma_good_pkt_counterlsw_get(struct aq_hw_s *aq_hw);

/* get rx dma good octet counter msw */
-#u32 stats_rx_dma_good_octet_countermsw_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_stats_rx_dma_good_octet_countermsw_get(struct aq.hw_s *aq.hw);

/* get rx dma good packet counter msw */
-#u32 stats_rx_dma_good_pkt_countermsw_get(struct aq_hw_s *aq.hw);
+u32 hw_atl_stats_rx_dma_good_pkt_countermsw_get(struct aq.hw_s *aq.hw);

/* get tx dma good octet counter msw */
-#u32 stats_tx_dma_good_octet_countermsw_get(struct aq_hw_s *aq.hw);
+u32 hw_atl_stats_tx_dma_good_octet_countermsw_get(struct aq.hw_s *aq.hw);

/* get tx dma good packet counter msw */
-#u32 stats_tx_dma_good_pkt_countermsw_get(struct aq_hw_s *aq.hw);
+u32 hw_atl_stats_tx_dma_good_pkt_countermsw_get(struct aq.hw_s *aq.hw);

/* get msm rx errors counter register */
-#u32 reg_mac_msm_rx_errs_cnt_get(struct aq.hw_s *aq.hw);
+u32 hw_atl_reg_mac_msm_rx_errs_cnt_get(struct aq.hw_s *aq.hw);

/* get msm rx unicast frames counter register */
-#u32 reg_mac_msm_rx_ucst_frm_cnt_get(struct aq_hw_s *aq.hw);
+u32 hw_atl_reg_mac_msm_rx_ucst_frm_cnt_get(struct aq_hw_s *aq.hw);

/* get msm rx multicast frames counter register */
-#u32 reg_mac_msm_rx_mcst_frm_cnt_get(struct aq_hw_s *aq.hw);
+u32 hw_atl_reg_mac_msm_rx_mcst_frm_cnt_get(struct aq_hw_s *aq.hw);

/* get msm rx broadcast frames counter register */
-#u32 reg_mac_msm_rx_bcst_frm_cnt_get(struct aq_hw_s *aq.hw);
+u32 hw_atl_reg_mac_msm_rx_bcst_frm_cnt_get(struct aq_hw_s *aq.hw);

/* get msm rx broadcast octets counter register 1 */
-#u32 reg_mac_msm_rx_bcst_octets_counter1_get(struct aq_hw_s *aq.hw);

+u32 hw_atl_reg_mac_msm_rx_bcst_octets_counter1get(struct aq_hw_s *aq_hw);

/* get msm rx unicast octets counter register 0 */
-u32 reg_mac_msm_rx_ucst_octets_counter0get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_rx_ucst_octets_counter0get(struct aq_hw_s *aq_hw);

/* get rx dma statistics counter 7 */
-u32 reg_rx_dma_stat_counter7get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_rx_dma_stat_counter7get(struct aq_hw_s *aq_hw);

/* get msm tx errors counter register */
-u32 reg_mac_msm_tx_errs_cnt_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_tx_errs_cnt_get(struct aq_hw_s *aq_hw);

/* get msm tx unicast frames counter register */
-u32 reg_mac_msm_tx_ucst_frm_cnt_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_tx_ucst_frm_cnt_get(struct aq_hw_s *aq_hw);

/* get msm tx multicast frames counter register */
-u32 reg_mac_msm_tx_mcst_frm_cnt_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_tx_mcst_frm_cnt_get(struct aq_hw_s *aq_hw);

/* get msm tx broadcast frames counter register */
-u32 reg_mac_msm_tx_bcst_frm_cnt_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_tx_bcst_frm_cnt_get(struct aq_hw_s *aq_hw);

/* get msm tx multicast octets counter register 1 */
-u32 reg_mac_msm_tx_mcst_octets_counter1get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_tx_mcst_octets_counter1get(struct aq_hw_s *aq_hw);

/* get msm tx broadcast octets counter register 1 */
-u32 reg_mac_msm_tx_bcst_octets_counter1get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_tx_bcst_octets_counter1get(struct aq_hw_s *aq_hw);

/* get msm tx unicast octets counter register 0 */
-u32 reg_mac_msm_tx_ucst_octets_counter0get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_mac_msm_tx_ucst_octets_counter0get(struct aq_hw_s *aq_hw);

/* get global mif identification */
-u32 reg_glb_mif_id_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_glb_mif_id_get(struct aq_hw_s *aq_hw);

/* interrupt */

/* set interrupt auto mask lsw */
-void itr_irq_auto_masklsw_set(struct aq_hw_s *aq_hw, u32 irq_auto_masklsw);
+void hw_atl_itr_irq_auto_masklsw_set(struct aq_hw_s *aq_hw,
    u32 irq_auto_masklsw);
/* set interrupt mapping enable rx */
-void itr_irq_map_en_rx_set(struct aq_hw_s *aq_hw, u32 irq_map_en_rx, u32 rx);
+void hw_atl_itr_irq_map_en_rx_set(struct aq_hw_s *aq_hw, u32 irq_map_en_rx,
+ u32 rx);

/* set interrupt mapping enable tx */
-void itr_irq_map_en_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_en_tx, u32 tx);
+void hw_atl_itr_irq_map_en_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_en_tx,
+ u32 tx);

/* set interrupt mapping rx */
-void itr_irq_map_rx_set(struct aq_hw_s *aq_hw, u32 irq_map_rx, u32 rx);
+void hw_atl_itr_irq_map_rx_set(struct aq_hw_s *aq_hw, u32 irq_map_rx, u32 rx);

/* set interrupt mapping tx */
-void itr_irq_map_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_tx, u32 tx);
+void hw_atl_itr_irq_map_tx_set(struct aq_hw_s *aq_hw, u32 irq_map_tx, u32 tx);

/* set interrupt mask clear lsw */
-void itr_irq_msk_clearlsw_set(struct aq_hw_s *aq_hw, u32 irq_msk_clearlsw);
+void hw_atl_itr_irq_msk_clearlsw_set(struct aq_hw_s *aq_hw,
 + u32 irq_msk_clearlsw);

/* set interrupt mask set lsw */
-void itr_irq_msk_setlsw_set(struct aq_hw_s *aq_hw, u32 irq_msk_setlsw);
+void hw_atl_itr_irq_msk_setlsw_set(struct aq_hw_s *aq_hw, u32 irq_msk_setlsw);

/* set interrupt register reset disable */
-void itr_irq_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 irq_reg_res_dis);
+void hw_atl_itr_irq_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 irq_reg_res_dis);

/* set interrupt status clear lsw */
-void itr_irq_status_clearlsw_set(struct aq_hw_s *aq_hw, u32 irq_status_clearlsw);
+void hw_atl_itr_irq_status_clearlsw_set(struct aq_hw_s *aq_hw, u32 irq_status_clearlsw);

/* get interrupt status lsw */
-u32 itr_irq_statuslsw_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_itr_irq_statuslsw_get(struct aq_hw_s *aq_hw);

/* get reset interrupt */
-u32 itr_res_irq_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_itr_res_irq_get(struct aq_hw_s *aq_hw);

/* set reset interrupt */
-void itr_res_irq_set(struct aq_hw_s *aq_hw, u32 res_irq);
+void hw_atl_itr_res_irq_set(struct aq_hw_s *aq_hw, u32 res_irq);

/*/ rdm */

/*/ set cpu id */
-void rdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca);
+void hw_atl_rdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca);

/*/ set rx dca enable */
-void rdm_rx_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_dca_en);
+void hw_atl_rdm_rx_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_dca_en);

/*/ set rx dca mode */
-void rdm_rx_dca_mode_set(struct aq_hw_s *aq_hw, u32 rx_dca_mode);
+void hw_atl_rdm_rx_dca_mode_set(struct aq_hw_s *aq_hw, u32 rx_dca_mode);

/*/ set rx descriptor data buffer size */
-void rdm_rx_desc_data_buff_size_set(struct aq_hw_s *aq_hw, u32 rx_desc_data_buff_size, u32 descriptor);
+void hw_atl_rdm_rx_desc_data_buff_size_set(struct aq_hw_s *aq_hw, u32 rx_desc_data_buff_size, u32 descriptor);

/*/ set rx descriptor dca enable */
-void rdm_rx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_dca_en, u32 dca);
+void hw_atl_rdm_rx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_dca_en, u32 dca);

/*/ set rx descriptor enable */
-void rdm_rx_desc_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_en, u32 descriptor);
+void hw_atl_rdm_rx_desc_en_set(struct aq_hw_s *aq_hw, u32 rx_desc_en, u32 descriptor);

/*/ set rx descriptor header splitting */
-void rdm_rx_desc_head_splitting_set(struct aq_hw_s *aq_hw, u32 rx_desc_head_splitting);
+void hw_atl_rdm_rx_desc_head_splitting_set(struct aq_hw_s *aq_hw, u32 rx_desc_head_splitting);

/*/ get rx descriptor head pointer */
-u32 rdm_rx_desc_head_ptr_get(struct aq_hw_s *aq_hw, u32 descriptor);
+u32 hw_atl_rdm_rx_desc_head_ptr_get(struct aq_hw_s *aq_hw, u32 descriptor);

/*/ set rx descriptor length */
-void rdm_rx_desc_len_set(struct aq_hw_s *aq_hw, u32 rx_desc_len,
void hw_atl_rdm_rx_desc_len_set(struct aq_hw_s *aq_hw, u32 rx_desc_len,
+u32 descriptor);

/* set rx descriptor write-back interrupt enable */
-void rdm_rx_desc_wr_wb_irq_en_set(struct aq_hw_s *aq_hw,
- u32 rx_desc_wr_wb_irq_en);
+void hw_atl_rdm_rx_desc_wr_wb_irq_en_set(struct aq_hw_s *aq_hw,
+ u32 rx_desc_wr_wb_irq_en);

/* set rx header dca enable */
-void rdm_rx_head_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_head_dca_en,
- u32 dca);
+void hw_atl_rdm_rx_head_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_head_dca_en,
 + u32 dca);

/* set rx payload dca enable */
-void rdm_rx_pld_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_pld_dca_en, u32 dca);
+void hw_atl_rdm_rx_pld_dca_en_set(struct aq_hw_s *aq_hw, u32 rx_pld_dca_en,
 + u32 dca);

/* set rx descriptor header buffer size */
-void rdm_rx_desc_head_buff_size_set(struct aq_hw_s *aq_hw,
- u32 rx_desc_head_buff_size,
- u32 descriptor);
+void hw_atl_rdm_rx_desc_head_buff_size_set(struct aq_hw_s *aq_hw,
 + u32 rx_desc_head_buff_size,
 + u32 descriptor);

/* set rx descriptor reset */
-void rdm_rx_desc_res_set(struct aq_hw_s *aq_hw, u32 rx_desc_res,
- u32 descriptor);
+void hw_atl_rdm_rx_desc_res_set(struct aq_hw_s *aq_hw, u32 rx_desc_res,
+u32 descriptor);

/* Set RDM Interrupt Moderation Enable */
-void rdm_rdm_intr_moder_en_set(struct aq_hw_s *aq_hw, u32 rdm_intr_moder_en);
+void hw_atl_rdm_rdm_intr_moder_en_set(struct aq_hw_s *aq_hw,
 + u32 rdm_intr_moder_en);

/* reg */

/* set general interrupt mapping register */
-void reg_gen_irq_map_set(struct aq_hw_s *aq_hw, u32 gen_intr_map, u32 regidx);
+void hw_atl_reg_gen_irq_map_set(struct aq_hw_s *aq_hw, u32 gen_intr_map,
 +u32 regidx);

/* get general interrupt status register */

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-u32 reg_gen_irq_status_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_reg_gen_irq_status_get(struct aq_hw_s *aq_hw);

/* set interrupt global control register */
-void reg_irq_glb_ctl_set(struct aq_hw_s *aq_hw, u32 intr_glb_ctl);
+void hw_atl_reg_irq_glb_ctl_set(struct aq_hw_s *aq_hw, u32 intr_glb_ctl);

/* set interrupt throttle register */
-void reg_irq_thr_set(struct aq_hw_s *aq_hw, u32 intr_thr, u32 throttle);
+void hw_atl_reg_irq_thr_set(struct aq_hw_s *aq_hw, u32 intr_thr, u32 throttle);

/* set rx dma descriptor base address lsw */
-void reg_rx_dma_desc_base_addresslswset(struct aq_hw_s *aq_hw,
        u32 rx_dma_desc_base_addrlsw,
+void hw_atl_reg_rx_dma_desc_base_addresslswset(struct aq_hw_s *aq_hw,
        u32 rx_dma_desc_base_addrlsw,
        u32 descriptor);

/* set rx dma descriptor base address msw */
-void reg_rx_dma_desc_base_addressmswset(struct aq_hw_s *aq_hw,
        u32 rx_dma_desc_base_addrsw,
+void hw_atl_reg_rx_dma_desc_base_addressmswset(struct aq_hw_s *aq_hw,
        u32 rx_dma_desc_base_addrsw,
        u32 descriptor);

/* get rx dma descriptor status register */
-u32 reg_rx_dma_desc_status_get(struct aq_hw_s *aq_hw, u32 descriptor);
+u32 hw_atl_reg_rx_dma_desc_status_get(struct aq_hw_s *aq_hw, u32 descriptor);

/* set rx dma descriptor tail pointer register */
-void reg_rx_dma_desc_tail_ptr_set(struct aq_hw_s *aq_hw,
        u32 rx_dma_desc_tail_ptr,
+void hw_atl_reg_rx_dma_desc_tail_ptr_set(struct aq_hw_s *aq_hw,
        u32 rx_dma_desc_tail_ptr,
        u32 descriptor);

/* set rx filter multicast filter mask register */
-void reg_rx_flr_mcst_flr_msk_set(struct aq_hw_s *aq_hw,
        u32 rx_flr_mcst_flr_msk);
+void hw_atl_reg_rx_flr_mcst_flr_msk_set(struct aq_hw_s *aq_hw,
        u32 rx_flr_mcst_flr_msk);

/* set rx filter multicast filter register */
-void reg_rx_flr_mcst_flr_set(struct aq_hw_s *aq_hw, u32 rx_flr_mcst_flr,
        - u32 filter);
+void hw_atl_reg_rx_flr_mcst_flr_set(struct aq_hw_s *aq_hw, u32 rx_flr_mcst_flr,
        + u32 filter);
/* set rx filter rss control register 1 */
-void reg_rx_frl_rss_control1set(struct aq_hw_s *aq_hw,
- u32 rx_frl_rss_control1);
+void hw_atl_reg_rx_frl_rss_control1set(struct aq_hw_s *aq_hw,
 + u32 rx_frl_rss_control1);

/* Set RX Filter Control Register 2 */
-void reg_rx_frl_control2_set(struct aq_hw_s *aq_hw, u32 rx_frl_control2);
+void hw_atl_reg_rx_frl_control2_set(struct aq_HW_s *aq_hw, u32 rx_frl_control2);

/* Set RX Interrupt Moderation Control Register */
-void reg_rx_intr_moder_ctrl_set(struct aq_hw_s *aq_hw,
- u32 rx_intr_moderation_ctl,
+void hw_atl_reg_rx_intr_moder_ctrl_set(struct aq_hw_s *aq_hw, u32 rx_intr_moderation_ctl,
 + u32 queue);

/* set tx dma debug control */
-void reg_tx_dma_debug_ctl_set(struct aq_hw_s *aq_hw, u32 tx_dma_debug_ctl);
+void hw_atl_reg_tx_dma_debug_ctl_set(struct aq_hw_s *aq_hw, u32 tx_dma_debug_ctl);

/* set tx dma descriptor base address lsw */
-void reg_tx_dma_desc_base_addresslswset(struct aq_hw_s *aq_hw,
- u32 tx_dma_desc_base_addrlsw,
+void hw_atl_reg_tx_dma_desc_base_addresslswset(struct aq_hw_s *aq_hw, u32 tx_dma_desc_base_addrlsw,
 + u32 descriptor);

/* set tx dma descriptor base address msw */
-void reg_tx_dma_desc_base_addressmswset(struct aq_hw_s *aq_hw,
- u32 tx_dma_desc_base_addrmsw,
+void hw_atl_reg_tx_dma_desc_base_addressmswset(struct aq_hw_s *aq_hw, u32 tx_dma_desc_base_addrmsw,
 + u32 descriptor);

/* set tx dma descriptor tail pointer register */
-void reg_tx_dma_desc_tail_ptr_set(struct aq_hw_s *aq_hw,
- u32 tx_dma_desc_tail_ptr,
- u32 descriptor);
+void hw_atl_reg_tx_dma_desc_tail_ptr_set(struct aq_hw_s *aq_hw,
 + u32 tx_dma_desc_tail_ptr,
 + u32 descriptor);

/* Set TX Interrupt Moderation Control Register */
-void reg_tx_intr_moder_ctrl_set(struct aq_hw_s *aq_hw,
- u32 tx_intr_moderation_ctl,
- u32 queue);
+void hw_atl_reg_tx_intr_moder_ctrl_set(struct aq_hw_s *aq_hw,
+    u32 tx_intr_moderation_ctl,
+    u32 queue);

/* set global microprocessor scratch pad */
-void reg_glb_cpu_scratch_scp_set(struct aq_hw_s *aq_hw,
    - u32 glb_cpu_scratch_scp, u32 scratch_scp);
+void hw_atl_reg_glb_cpu_scratch_scp_set(struct aq_hw_s *aq_hw,
    +u32 glb_cpu_scratch_scp,
    +u32 scratch_scp);

/* rpb */
/* set dma system loopback */
-void rpb_dma_sys_lbk_set(struct aq_hw_s *aq_hw, u32 dma_sys_lbk);
+void hw_atl_rpb_dma_sys_lbk_set(struct aq_hw_s *aq_hw, u32 dma_sys_lbk);

/* set rx traffic class mode */
-void rpb_rpf_rx_traf_class_mode_set(struct aq_hw_s *aq_hw,
    - u32 rx_traf_class_mode);
+void hw_atl_rpb_rpf_rx_traf_class_mode_set(struct aq_hw_s *aq_hw,
    +u32 rx_traf_class_mode);

/* set rx buffer enable */
-void rpb_rx_buff_en_set(struct aq_hw_s *aq_hw, u32 rx_buff_en);
+void hw_atl_rpb_rx_buff_en_set(struct aq_hw_s *aq_hw, u32 rx_buff_en);

/* set rx buffer high threshold (per tc) */
-void rpb_rx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw,
    - u32 rx_buff_hi_threshold_per_tc,
    - u32 buffer);
+void hw_atl_rpb_rx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw,
    +u32 rx_buff_hi_threshold_per_tc,
    +u32 buffer);

/* set rx buffer low threshold (per tc) */
-void rpb_rx_buff_lo_threshold_per_tc_set(struct aq_hw_s *aq_hw,
    - u32 rx_buff_lo_threshold_per_tc,
    - u32 buffer);
+void hw_atl_rpb_rx_buff_lo_threshold_per_tc_set(struct aq_hw_s *aq_hw,
    +u32 rx_buff_lo_threshold_per_tc,
    +u32 buffer);

/* set rx flow control mode */
-void rpb_rx_flow_ctl_mode_set(struct aq_hw_s *aq_hw, u32 rx_flow_ctl_mode);
+void hw_atl_rpb_rx_flow_ctl_mode_set(struct aq_hw_s *aq_hw, u32 rx_flow_ctl_mode);

/* set rx packet buffer size (per tc) */
-void rpb_rx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw,
- u32 rx_pkt_buff_size_per_tc,
- u32 buffer);
+void hw_atl_rpb_rx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw,
     u32 rx_pkt_buff_size_per_tc,
     u32 buffer);
+
+/* set rdm rx dma descriptor cache init */
+void hw_atl_rdm_rx_dma_desc_cache_init_set(struct aq_hw_s *aq_hw, u32 init);

/* set rx xoff enable (per tc) */
-void rpb_rx_xoff_en_per_tc_set(struct aq_hw_s *aq_hw, u32 rx_xoff_en_per_tc,
     u32 buffer);
+void hw_atl_rpb_rx_xoff_en_per_tc_set(struct aq_hw_s *aq_hw, u32 rx_xoff_en_per_tc,
     u32 buffer);

/* rpf */

/* set l2 broadcast count threshold */
-void rpfl2broadcast_count_threshold_set(struct aq_hw_s *aq_hw,
     u32 l2broadcast_count_threshold);
+void hw_atl_rpfl2broadcast_count_threshold_set(struct aq_hw_s *aq_hw,
     u32 l2broadcast_count_threshold);

/* set l2 broadcast enable */
-void rpfl2broadcast_en_set(struct aq_hw_s *aq_hw, u32 l2broadcast_en);
+void hw_atl_rpfl2broadcast_en_set(struct aq_hw_s *aq_hw, u32 l2broadcast_en);

/* set l2 broadcast filter action */
-void rpfl2broadcast_flr_act_set(struct aq_hw_s *aq_hw,
     u32 l2broadcast_flr_act);
+void hw_atl_rpfl2broadcast_flr_act_set(struct aq_hw_s *aq_hw,
     u32 l2broadcast_flr_act);

/* set l2 multicast filter enable */
-void rpfl2multicast_flr_en_set(struct aq_hw_s *aq_hw, u32 l2multicast_flr_en,
     u32 filter);
+void hw_atl_rpfl2multicast_flr_en_set(struct aq_hw_s *aq_hw,
     u32 l2multicast_flr_en,
     u32 filter);

/* set l2 promiscuous mode enable */
-void rpfl2promiscuous_mode_en_set(struct aq_hw_s *aq_hw,
     u32 l2promiscuous_mode_en);
+void hw_atl_rpfl2promiscuous_mode_en_set(struct aq_hw_s *aq_hw,
     u32 l2promiscuous_mode_en);

/* set l2 unicast filter action */
-void rpfl2unicast_flr_act_set(struct aq_hw_s *aq_hw, u32 l2unicast_flr_act,
void hw_atl_rpfl2unicast_flr_act_set(struct aq_hw_s *aq_hw,
     u32 l2unicast_flr_act,
     u32 filter);

/* set l2 unicast filter enable */
void rpfl2_uc_flr_en_set(struct aq_hw_s *aq_hw, u32 l2unicast_flr_en,
    u32 filter);

void hw_atl_rpfl2_uc_flr_en_set(struct aq_hw_s *aq_hw, u32 l2unicast_flr_en,
    u32 filter);

/* set l2 unicast destination address lsw */
void rpfl2unicast_dest_addresslsw_set(struct aq_hw_s *aq_hw,
    u32 l2unicast_dest_addresslsw,
    u32 filter);

void hw_atl_rpfl2unicast_dest_addresslsw_set(struct aq_hw_s *aq_hw,
    u32 l2unicast_dest_addresslsw,
    u32 filter);

/* Set L2 Accept all Multicast packets */
void rpfl2_accept_all_mc_packets_set(struct aq_hw_s *aq_hw,
    u32 l2_accept_all_mc_packets);

void hw_atl_rpfl2_accept_all_mc_packets_set(struct aq_hw_s *aq_hw,
    u32 l2_accept_all_mc_packets);

/* set user-priority tc mapping */
void rpf_rpb_user_priority_tc_map_set(struct aq_hw_s *aq_hw,
    u32 user_priority_tc_map, u32 tc);

void hw_atl_rpf_rpb_user_priority_tc_map_set(struct aq_hw_s *aq_hw,
    u32 user_priority_tc_map, u32 tc);

/* get rss key write enable */
void rpf_rss_key_wr_en_get(struct aq_hw_s *aq_hw);

void hw_atl_rpf_rss_key_wr_en_get(struct aq_hw_s *aq_hw);
/* set rss key write enable */
-void rpf_rss_key_wr_en_set(struct aq_hw_s *aq_hw, u32 rss_key_wr_en);
+void hw_atl_rpf_rss_key_wr_en_set(struct aq_hw_s *aq_hw, u32 rss_key_wr_en);

/* set rss redirection table address */
-void rpf_rss_redir_tbl_addr_set(struct aq_hw_s *aq_hw,
+void hw_atl_rpf_rss_redir_tbl_addr_set(struct aq_hw_s *aq_hw,
				u32 rss_redir_tbl_addr);
+ u32 rss_redir_tbl_addr);

/* set rss redirection table write data */
-void rpf_rss_redir_tbl_wr_data_set(struct aq_hw_s *aq_hw,
- u32 rss_redir_tbl_wr_data);
+void hw_atl_rpf_rss_redir_tbl_wr_data_set(struct aq_hw_s *aq_hw,
+ u32 rss_redir_tbl_wr_data);

/* set rss redirection write enable */
-u32 rpf_rss_redir_wr_en_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_rpf_rss_redir_wr_en_get(struct aq_hw_s *aq_hw);

/* set tpo to rpf system loopback */
-void rpf_tpo_to_rpf_sys_lbk_set(struct aq_hw_s *aq_hw,
- u32 tpo_to_rpf_sys_lbk);
+void hw_atl_rpf_tpo_to_rpf_sys_lbk_set(struct aq_hw_s *aq_hw,
+ u32 tpo_to_rpf_sys_lbk);

/* set vlan inner ethertype */
-void rpf_vlan_inner_etht_set(struct aq_hw_s *aq_hw, u32 vlan_inner_etht);
+void hw_atl_rpf_vlan_inner_etht_set(struct aq_hw_s *aq_hw, u32 vlan_inner_etht);

/* set vlan outer ethertype */
-void rpf_vlan_outer_etht_set(struct aq_hw_s *aq_hw, u32 vlan_outer_etht);
+void hw_atl_rpf_vlan_outer_etht_set(struct aq_hw_s *aq_hw, u32 vlan_outer_etht);

/* set vlan promiscuous mode enable */
-void rpf_vlan_prom_mode_en_set(struct aq_hw_s *aq_hw, u32 vlan_prom_mode_en);
+void hw_atl_rpf_vlan_prom_mode_en_set(struct aq_hw_s *aq_hw,
+ u32 vlan_prom_mode_en);

/* Set VLAN untagged action */
-void rpf_vlan_untagged_act_set(struct aq_hw_s *aq_hw, u32 vlan_untagged_act);
+void hw_atl_rpf_vlan_untagged_act_set(struct aq_hw_s *aq_hw,
+ u32 vlan_untagged_act);
/* Set VLAN accept untagged packets */
-void rpf_vlan_accept_untagged_packets_set(struct aq_hw_s *aq_hw,  
	u32 vlan_accept_untagged_packets);
+void hw_atl_rpf_vlan_accept_untagged_packets_set(struct aq_hw_s *aq_hw,  
	u32 vlan_acc_untagged_packets);

/* Set VLAN filter enable */
-void rpf_vlan_flr_en_set(struct aq_hw_s *aq_hw, u32 vlan_flr_en, u32 filter);
+void hw_atl_rpf_vlan_flr_en_set(struct aq_hw_s *aq_hw, u32 vlan_flr_en,  
	u32 filter);

/* Set VLAN Filter Action */
-void rpf_vlan_flr_act_set(struct aq_hw_s *aq_hw, u32 vlan_filter_act,  
	u32 filter);
+void hw_atl_rpf_vlan_flr_act_set(struct aq_hw_s *aq_hw, u32 vlan_filter_act,  
	u32 filter);

/* Set VLAN ID Filter */
-void rpf_vlan_id_flr_set(struct aq_hw_s *aq_hw, u32 vlan_id_flr, u32 filter);
+void hw_atl_rpf_vlan_id_flr_set(struct aq_hw_s *aq_hw, u32 vlan_id_flr,  
	u32 filter);

/* set ethertype filter enable */
-void rpf_etht_flr_en_set(struct aq_hw_s *aq_hw, u32 etht_flr_en, u32 filter);
+void hw_atl_rpf_etht_flr_en_set(struct aq_hw_s *aq_hw, u32 etht_flr_en,  
	u32 filter);

/* set  ethertype user-priority enable */
-void rpf_etht_user_priority_en_set(struct aq_hw_s *aq_hw,  
	u32 etht_user_priority_en, u32 filter);
+void hw_atl_rpf_etht_user_priority_en_set(struct aq_hw_s *aq_hw,  
	u32 etht_user_priority_en,  
	u32 filter);

/* set ethertype rx queue enable */
-void rpf_etht_rx_queue_en_set(struct aq_hw_s *aq_hw, u32 etht_rx_queue_en,  
	u32 filter);
+void hw_atl_rpf_etht_rx_queue_en_set(struct aq_hw_s *aq_hw,  
	u32 etht_rx_queue_en,  
	u32 filter);

/* set ethertype rx queue */
-void rpf_etht_rx_queue_set(struct aq_hw_s *aq_hw, u32 etht_rx_queue,  
	u32 filter);
+void hw_atl_rpf_etht_rx_queue_set(struct aq_hw_s *aq_hw, u32 etht_rx_queue,  
	u32 filter);
/* set ethertype user-priority */
-void rpf_etht_user_priority_set(struct aq_hw_s *aq_hw, u32 etht_user_priority,
- u32 filter);
+void hw_atl_rpf_etht_user_priority_set(struct aq_hw_s *aq_hw,
- u32 etht_user_priority,
+ u32 filter);

/* set ethertype management queue */
-void rpf_etht_mgt_queue_set(struct aq_hw_s *aq_hw, u32 etht_mgt_queue,
- u32 filter);
+void hw_atl_rpf_etht_mgt_queue_set(struct aq_hw_s *aq_hw, u32 etht_mgt_queue,
- u32 filter);

/* set ethertype filter action */
-void rpf_etht_flr_act_set(struct aq_hw_s *aq_hw, u32 etht_flr_act,
- u32 filter);
+void hw_atl_rpf_etht_flr_act_set(struct aq_hw_s *aq_hw, u32 etht_flr_act,
- u32 filter);

/* set ethertype filter */
-void rpf_etht_flr_set(struct aq_hw_s *aq_hw, u32 etht_flr, u32 filter);
+void hw_atl_rpf_etht_flr_set(struct aq_hw_s *aq_hw, u32 etht_flr, u32 filter);

/* rpo */

/* set ipv4 header checksum offload enable */
-void rpo_ipv4header_crc_offload_en_set(struct aq_hw_s *aq_hw,
- u32 ipv4header_crc_offload_en);
+void hw_atl_rpo_ipv4header_crc_offload_en_set(struct aq_hw_s *aq_hw,
+ u32 ipv4header_crc_offload_en);

/* set rx descriptor vlan stripping */
-void rpo_rx_desc_vlan_stripping_set(struct aq_hw_s *aq_hw,
- u32 rx_desc_vlan_stripping,
- u32 descriptor);
+void hw_atl_rpo_rx_desc_vlan_stripping_set(struct aq_hw_s *aq_hw,
+ u32 rx_desc_vlan_stripping,
+ u32 descriptor);

/* set tcp/udp checksum offload enable */
-void rpo_tcp_udp_crc_offload_en_set(struct aq_hw_s *aq_hw,
- u32 tcp_udp_crc_offload_en);
+void hw_atl_rpo_tcp_udp_crc_offload_en_set(struct aq_hw_s *aq_hw,
+ u32 tcp_udp_crc_offload_en);

/* Set LRO Patch Optimization Enable. */
-void rpo_lro_patch_optimization_en_set(struct aq_hw_s *aq_hw,
- u32 lro_patch_optimization_en);
void hw_atl_rpo_lro_patch_optimization_en_set(struct aq_hw_s *aq_hw, u32 lro_patch_optimization_en);

/* Set Large Receive Offload Enable */
void rpo_lro_en_set(struct aq_hw_s *aq_hw, u32 lro_en);
void hw_atl_rpo_lro_en_set(struct aq_hw_s *aq_hw, u32 lro_en);

/* Set LRO Q Sessions Limit */
void rpo_lro_qsessions_lim_set(struct aq_hw_s *aq_hw, u32 lro_qsessions_lim);
void hw_atl_rpo_lro_qsessions_lim_set(struct aq_hw_s *aq_hw, u32 lro_qsessions_lim);

/* Set LRO Total Descriptor Limit */
void rpo_lro_total_desc_lim_set(struct aq_hw_s *aq_hw, u32 lro_total_desc_lim);
void hw_atl_rpo_lro_total_desc_lim_set(struct aq_hw_s *aq_hw, u32 lro_total_desc_lim);

/* Set LRO Min Payload of First Packet */
void rpo_lro_min_pay_of_first_pkt_set(struct aq_hw_s *aq_hw, u32 lro_min_pld_of_first_pkt);
void hw_atl_rpo_lro_min_pay_of_first_pkt_set(struct aq_hw_s *aq_hw, u32 lro_min_pld_of_first_pkt);

/* Set LRO Packet Limit */
void rpo_lro_pkt_lim_set(struct aq_hw_s *aq_hw, u32 lro_packet_lim);
void hw_atl_rpo_lro_pkt_lim_set(struct aq_hw_s *aq_hw, u32 lro_packet_lim);

/* Set LRO Max Number of Descriptors */
void rpo_lro_max_num_of_descriptors_set(struct aq_hw_s *aq_hw, u32 lro_max_desc_num, u32 lro);
void hw_atl_rpo_lro_max_num_of_descriptors_set(struct aq_hw_s *aq_hw, u32 lro_max_desc_num, u32 lro);

/* Set LRO Time Base Divider */
void rpo_lro_time_base_divider_set(struct aq_hw_s *aq_hw, u32 lro_time_base_divider);
void hw_atl_rpo_lro_time_base_divider_set(struct aq_hw_s *aq_hw, u32 lro_time_base_divider);

/* Set LRO Inactive Interval */
void rpo_lro_inactive_interval_set(struct aq_hw_s *aq_hw, u32 lro_inactive_interval);
void hw_atl_rpo_lro_inactive_interval_set(struct aq_hw_s *aq_hw, u32 lro_inactive_interval);

/* Set LRO Max Coalescing Interval */
void rpo_lro_max_coalescing_interval_set(struct aq_hw_s *aq_hw, u32 lro_max_coalescing_interval);
+void hw_atl_rpo_lro_max_coalescing_interval_set(struct aq_hw_s *aq_hw, 
+u32 lro_max_coal_interval);

/* rx */

/* set rx register reset disable */
-void rx_rx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 rx_reg_res_dis);
+void hw_atl_rx_rx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 rx_reg_res_dis);

/* tdm */

/* set cpu id */
-void tdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca);
+void hw_atl_tdm_cpu_id_set(struct aq_hw_s *aq_hw, u32 cpuid, u32 dca);

/* set large send offload enable */
-void tdm_large_send_offload_en_set(struct aq_hw_s *aq_hw, 
- u32 large_send_offload_en);
+void hw_atl_tdm_large_send_offload_en_set(struct aq_hw_s *aq_hw, 
+ u32 large_send_offload_en);

/* set tx descriptor enable */
-void tdm_tx_desc_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_en, u32 descriptor);
+void hw_atl_tdm_tx_desc_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_en, 
+ u32 descriptor);

/* set tx dca enable */
-void tdm_tx_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_dca_en);
+void hw_atl_tdm_tx_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_dca_en);

/* set tx dca mode */
-void tdm_tx_dca_mode_set(struct aq_hw_s *aq_hw, u32 tx_dca_mode);
+void hw_atl_tdm_tx_dca_mode_set(struct aq_hw_s *aq_hw, u32 tx_dca_mode);

/* set tx descriptor dca enable */
-void tdm_tx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_dca_en, u32 dca);
+void hw_atl_tdm_tx_desc_dca_en_set(struct aq_hw_s *aq_hw, u32 tx_desc_dca_en, 
+ u32 dca);

/* get tx descriptor head pointer */
-u32 tdm_tx_desc_head_ptr_get(struct aq_hw_s *aq_hw, u32 descriptor);
+u32 hw_atl_tdm_tx_desc_head_ptr_get(struct aq_hw_s *aq_hw, u32 descriptor);

/* set tx descriptor length */
-void tdm_tx_desc_len_set(struct aq_hw_s *aq_hw, u32 tx_desc_len, 
- u32 descriptor);
+void hw_atl_tdm_tx_desc_len_set(struct aq_hw_s *aq_hw, u32 tx_desc_len, 
+u32 descriptor);
/* set tx descriptor write-back interrupt enable */
-void tdm_tx_desc_wr_wb_irq_en_set(struct aq_hw_s *aq_hw,
   u32 tx_desc_wr_wb_irq_en);
+void hw_atl_tdm_tx_desc_wr_wb_irq_en_set(struct aq_hw_s *aq_hw,
   +u32 tx_desc_wr_wb_irq_en);

/* set tx descriptor write-back threshold */
-void tdm_tx_desc_wr_wb_threshold_set(struct aq_hw_s *aq_hw,
   u32 tx_desc_wr_wb_threshold,
   +void hw_atl_tdm_tx_desc_wr_wb_threshold_set(struct aq_hw_s *aq_hw,
   +u32 tx_desc_wr_wb_threshold,
   u32 descriptor);

/* Set TDM Interrupt Moderation Enable */
-void tdm_tdm_intr_moder_en_set(struct aq_hw_s *aq_hw,
   u32 tdm_irq_moderation_en);
+void hw_atl_tdm_tdm_intr_moder_en_set(struct aq_hw_s *aq_hw,
   u32 tdm_irq_moderation_en);

/* thm */

/* set lso tcp flag of first packet */
-void thm_lso_tcp_flag_of_first_pkt_set(struct aq_hw_s *aq_hw,
   u32 lso_tcp_flag_of_first_pkt);
+void hw_atl_thm_lso_tcp_flag_of_first_pkt_set(struct aq_hw_s *aq_hw,
   +u32 lso_tcp_flag_of_first_pkt);

/* set lso tcp flag of last packet */
-void thm_lso_tcp_flag_of_last_pkt_set(struct aq_hw_s *aq_hw,
   u32 lso_tcp_flag_of_last_pkt);
+void hw_atl_thm_lso_tcp_flag_of_last_pkt_set(struct aq_hw_s *aq_hw,
   +u32 lso_tcp_flag_of_last_pkt);

/* set lso tcp flag of middle packet */
-void thm_lso_tcp_flag_of_middle_pkt_set(struct aq_hw_s *aq_hw,
   u32 lso_tcp_flag_of_middle_pkt);
+void hw_atl_thm_lso_tcp_flag_of_middle_pkt_set(struct aq_hw_s *aq_hw,
   +u32 lso_tcp_flag_of_middle_pkt);

/* tpb */

/* set tx buffer enable */
-void tpb_tx_buff_en_set(struct aq_hw_s *aq_hw, u32 tx_buff_en);
+void hw_atl_tpb_tx_buff_en_set(struct aq_hw_s *aq_hw, u32 tx_buff_en);

/* set tx buffer high threshold (per tc) */
-void tpb_tx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw,
   u32 tx_buff_hi_threshold_per_tc,
+void hw_atl_tpb_tx_buff_hi_threshold_per_tc_set(struct aq_hw_s *aq_hw, 
  u32 tx_buff_hi_threshold_per_tc, 
  u32 buffer);

/* set tx buffer low threshold (per tc) */
-void tpb_tx_buff_lo_threshold_per_tc_set(struct aq_hw_s *aq_hw, 
  u32 tx_buff_lo_threshold_per_tc, 
+void hw_atl_tpb_tx_buff_lo_threshold_per_tc_set(struct aq_hw_s *aq_hw, 
  u32 tx_buff_lo_threshold_per_tc, 
  u32 buffer);

/* set tx dma system loopback enable */
-void tpb_tx_dma_sys_lbk_en_set(struct aq_hw_s *aq_hw, u32 tx_dma_sys_lbk_en); 
+void hw_atl_tpb_tx_dma_sys_lbk_en_set(struct aq_hw_s *aq_hw, u32 tx_dma_sys_lbk_en);

/* set tx packet size (per tc) */
-void tpb_tx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw, 
  u32 tx_pkt_buff_size_per_tc, u32 buffer); 
+void hw_atl_tpb_tx_pkt_buff_size_per_tc_set(struct aq_hw_s *aq_hw, 
  u32 tx_pkt_buff_size_per_tc, u32 buffer);

/* set tx path pad insert enable */
-void tpb_tx_path_scp_ins_en_set(struct aq_hw_s *aq_hw, u32 tx_path_scp_ins_en); 
+void hw_atl_tpb_tx_path_scp_ins_en_set(struct aq_hw_s *aq_hw, u32 tx_path_scp_ins_en);

/* tpo */

/* set ipv4 header checksum offload enable */
-void tpo_ipv4header_crc_offload_en_set(struct aq_hw_s *aq_hw, 
  u32 ipv4header_crc_offload_en); 
+void hw_atl_tpo_ipv4header_crc_offload_en_set(struct aq_hw_s *aq_hw, 
  u32 ipv4header_crc_offload_en);

/* set tcp/udp checksum offload enable */
-void tpo_tcp_udp_crc_offload_en_set(struct aq_hw_s *aq_hw, 
  u32 tcp_udp_crc_offload_en); 
+void hw_atl_tpo_tcp_udp_crc_offload_en_set(struct aq_hw_s *aq_hw, 
  u32 tcp_udp_crc_offload_en);

/* set tx pkt system loopback enable */
-void tpo_tx_pkt_sys_lbk_en_set(struct aq_hw_s *aq_hw, u32 tx_pkt_sys_lbk_en); 
+void hw_atl_tpo_tx_pkt_sys_lbk_en_set(struct aq_hw_s *aq_hw, 
  u32 tx_pkt_sys_lbk_en);

/* tps */

/* set tx packet scheduler data arbitration mode */
-void tps_tx_pkt_shed_data_arb_mode_set(struct aq_hw_s *aq_hw, 

- u32 tx_pkt_shed_data_arb_mode);
+ void hw_atl_tps_tx_pkt_shed_data_arb_mode_set(struct aq_hw_s *aq_hw,
  + u32 tx_pkt_shed_data_arb_mode);

/* set tx packet scheduler descriptor rate current time reset */
-void tps_tx_pkt_shed_desc_rate_curr_time_res_set(struct aq_hw_s *aq_hw,
  - u32 curr_time_res);
+ void hw_atl_tps_tx_pkt_shed_desc_rate_curr_time_res_set(struct aq_hw_s *aq_hw,
  + u32 curr_time_res);

/* set tx packet scheduler descriptor rate limit */
-void tps_tx_pkt_shed_desc_rate_lim_set(struct aq_hw_s *aq_hw,
  - u32 tx_pkt_shed_desc_rate_lim);
+ void hw_atl_tps_tx_pkt_shed_desc_rate_lim_set(struct aq_hw_s *aq.hw,
  + u32 tx_pkt_shed_desc_rate_lim);

/* set tx packet scheduler descriptor tc arbitration mode */
-void tps_tx_pkt_shed_desc_tc_arb_mode_set(struct aq_hw_s *aq_hw,
  - u32 tx_pkt_shed_desc_tc_arb_mode);
+ void hw_atl_tps_tx_pkt_shed_desc_tc_arb_mode_set(struct aq.hw *aq.hw,
  + u32 arb_mode);

/* set tx packet scheduler descriptor tc max credit */
-void tps_tx_pkt_shed_desc_tc_max_credit_set(struct aq_hw_s *aq.hw,
  - u32 tx_pkt.shed_desc.tc_max_credit,
+ void hw_atl_tps_tx_pkt_shed_desc_tc_max_credit_set(struct aq.hw_s *aq.hw,
  + u32 max.credit,
    u32 tc);

/* set tx packet scheduler descriptor tc weight */
-void tps_tx_pkt_shed_desc_tc_weight_set(struct aq_hw_s *aq.hw,
  - u32 tx_pkt.shed_desc.tc_weight,
+ void hw_atl_tps_tx_pkt_shed_desc_tc_weight_set(struct aq.hw_s *aq.hw,
  + u32 tx_pkt_shed_desc.tc_weight,
    u32 tc);

/* set tx packet scheduler descriptor vm arbitration mode */
-void tps_tx_pkt.shed_desc.vm_arb_mode_set(struct aq.hw_s *aq.hw,
  - u32 tx_pkt.shed_desc.vm_arb_mode);
+ void hw_atl_tps_tx_pkt_shed_desc_vm_arb_mode_set(struct aq.hw_s *aq.hw,
  + u32 arb_mode);

/* set tx packet scheduler tc data max credit */
-void tps Tx_pkt_shed_tc_data_max_credit_set(struct aq.hw_s *aq.hw,
  - u32 tx_pkt.shed.tc.data_max_credit,
+ void hw_atl_tps_tx_pkt_shed_tc_data_max_credit_set(struct aq.hw_s *aq.hw,
  + u32 max.credit,
    u32 tc);
/* set tx packet scheduler tc data weight */
-void tps_tx_pkt_shed_tc_data_weight_set(struct aq_hw_s *aq_hw,
-u32 tx_pkt_shed_tc_data_weight,
+void hw_atl_tps_tx_pkt_shed_tc_data_weight_set(struct aq_hw_s *aq_hw,
      u32 tx_pkt_shed_tc_data_weight,
    u32 tc);

/* tx */

/* set tx register reset disable */
-void tx_tx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 tx_reg_res_dis);
+void hw_atl_tx_tx_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 tx_reg_res_dis);

/* msm */

/* get register access status */
-u32 msm_reg_access_status_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_msm_reg_access_status_get(struct aq_hw_s *aq_hw);

/* set register address for indirect address */
-void msm_reg_addr_for_indirect_addr_set(struct aq_hw_s *aq_hw,
   u32 reg_addr_for_indirect_addr);
+void hw_atl_msm_reg_addr_for_indirect_addr_set(struct aq_hw_s *aq_hw,
       u32 reg_addr_for_indirect_addr);

/* set register read strobe */
-void msm_reg_rd_strobe_set(struct aq_hw_s *aq_hw, u32 reg_rd_strobe);
+void hw_atl_msm_reg_rd_strobe_set(struct aq_hw_s *aq_hw, u32 reg_rd_strobe);

/* get register read data */
-u32 msm_reg_rd_data_get(struct aq_hw_s *aq_hw);
+u32 hw_atl_msm_reg_rd_data_get(struct aq_hw_s *aq_hw);

/* set register write data */
-void msm_reg_wr_data_set(struct aq_hw_s *aq_hw, u32 reg_wr_data);
+void hw_atl_msm_reg_wr_data_set(struct aq_hw_s *aq_hw, u32 reg_wr_data);

/* set register write strobe */
-void msm_reg_wr_strobe_set(struct aq_hw_s *aq_hw, u32 reg_wr_strobe);
+void hw_atl_msm_reg_wr_strobe_set(struct aq_hw_s *aq_hw, u32 reg_wr_strobe);

/* pci */

/* set pci register reset disable */
-void pci_pci_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 pci_reg_res_dis);
+void hw_atl_pci_pci_reg_res_dis_set(struct aq_hw_s *aq_hw, u32 pci_reg_res_dis);
void hw_atl_mcp_up_force_intr_set(struct aq_hw_s *aq_hw, u32 up_force_intr);

/* register address for bitfield rx dma good octet counter lsw [1f:0] */
#define HW_ATL_STATS_RX_DMA_GOOD_OCTET_COUNTERLSW 0x00006800

/* register address for bitfield tx dma good octet counter msw [3f:20] */
#define HW_ATL_STATS_TX_DMA_GOOD_OCTET_COUNTERMSW 0x00008804

/* register address for bitfield tx dma good packet counter msw [3f:20] */
#define HW_ATL_STATS_TX_DMA_GOOD_PKT_COUNTERMSW 0x00008804

/* preprocessor definitions for msm rx errors counter register */
#define mac_msm_rx_errs_cnt_adr 0x00000120u

/* preprocessor definitions for msm rx unicast frames counter register */
#define mac_msm_rx_ucst_frm_cnt_adr 0x000000e0u

/* preprocessor definitions for msm rx multicast frames counter register */
#define mac_msm_rx_mcst_frm_cnt_adr 0x000000e8u
/* preprocessor definitions for msm rx broadcast frames counter register */
#define mac_msm_rx_bcst_frm_cnt_adr 0x000000f0u
+#define HW_ATL_MAC_MSM_RX_BCST_FRM_CNT_ADR 0x000000f0u

/* preprocessor definitions for msm rx broadcast octets counter register 1 */
#define mac_msm_rx_bcst_octets_counter1_adr 0x000001b0u
+#define HW_ATL_MAC_MSM_RX_BCST_OCTETS_COUNTER1_ADR 0x000001b0u

/* preprocessor definitions for msm rx broadcast octets counter register 2 */
#define mac_msm_rx_bcst_octets_counter2_adr 0x000001b4u
+#define HW_ATL_MAC_MSM_RX_BCST_OCTETS_COUNTER2_ADR 0x000001b4u

/* preprocessor definitions for msm rx unicast octets counter register 0 */
#define mac_msm_rx_ucst_octets_counter0_adr 0x000001b8u
+#define HW_ATL_MAC_MSM_RX_UCST_OCTETS_COUNTER0_ADR 0x000001b8u

/* preprocessor definitions for rx dma statistics counter 7 */
#define rx_dma_stat_counter7_adr 0x00006818u
+#define HW_ATL_RX_DMA_STAT_COUNTER7_ADR 0x00006818u

/* preprocessor definitions for msm tx unicast frames counter register */
#define mac_msm_tx_ucst_frm_cnt_adr 0x00000108u
+#define HW_ATL_MAC_MSM_TX_UCST_FRM_CNT_ADR 0x00000108u

/* preprocessor definitions for msm tx multicast frames counter register */
#define mac_msm_tx_mcst_frm_cnt_adr 0x00000110u
+#define HW_ATL_MAC_MSM_TX_MCST_FRM_CNT_ADR 0x00000110u

/* preprocessor definitions for global mif identification */
#define glb_mif_id_adr 0x0000001cu
+#define HW_ATL_GLB_MIF_ID_ADR 0x0000001cu

/* register address for bitfield iamr_lsw[1f:0] */
#define itr_iamrlsw_adr 0x000002090
+#define HW_ATL_ITR_IAMRLSW_ADR 0x000002090

/* register address for bitfield rx dma drop packet counter [1f:0] */
#define rpb_rx_dma_drop_pkt_cnt_adr 0x00006818
+#define HW_ATL_RPB_RX_DMA_DROP_PKT_CNT_ADR 0x00006818

/* register address for bitfield imcr_lsw[1f:0] */
#define itr_imcrlsw_adr 0x000002070
+#define HW_ATL_ITR_IMCRLSW_ADR 0x000002070

/* register address for bitfield imsr_lsw[1f:0] */
#define itr_imsrlsw_adr 0x000002060
+#define HW_ATL_ITR_IMSRLSW_ADR 0x000002060

/* register address for bitfield itr_reg_res_dsbl */
#define itr_reg_res_dsbl_adr 0x00002300
/* bitmask for bitfield itr_reg_res_dsbl */
#define HW_ATL_ITR_REG_RES_DSBL_ADR 0x00002300
/* lower bit position of bitfield itr_reg_res_dsbl */
#define HW_ATL_ITR_REG_RES_DSBL_SHIFT 29
#define HW_ATL_ITR_REG_RES_DSBL_MSK 0x20000000
#define HW_ATL_ITR_REG_RES_DSBL_ADR 0x00002050
/* register address for bitfield iscr_lsw[1f:0] */
#define HW_ATL_ITR_ISCRLSW_ADR 0x00002000
/* register address for bitfield isr_lsw[1f:0] */
#define HW_ATL_ITR_ISRLSW_ADR 0x00002300
/* register address for bitfield itr_reset */
#define HW_ATL_ITR_RES_ADR 0x00002300
/* bitmask for bitfield itr_reset */
#define HW_ATL_ITR_RES_MSK 0x80000000
#define HW_ATL_ITR_RES_SHIFT 31
#define HW_ATL_ITR_RES_MSK 0x80000000
#define HW_ATL_ITR_RES_ADR 0x00002300
/* register address for bitfield dca{d}_cpuid[7:0] */
#define HW_ATL_RDM_DCADCPUID_ADR(dca) (0x00006100 + (dca) * 0x4)
/* bitmask for bitfield dca{d}_cpuid[7:0] */
#define HW_ATL_RDM_DCADCPUID_MSK 0x000000ff
#define HW_ATL_RDM_DCADCPUID_SHIFT 0
#define HW_ATL_RDM_DCADCPUID_MSK 0x000000ff
#define HW_ATL_RDM_DCADCPUID_ADR 0x00006100
/* register address for bitfield dca_en */
#define HW_ATL_RDM_DCA_EN_ADR 0x00006180
/* bitmask for bitfield dca_en */
#define HW_ATL_RDM_DCA_EN_MSK 0x80000000
/* inverted bitmask for bitfield dca_en */

/* rx dca_en bitfield definitions */
************
/* preprocessor definitions for the bitfield "dca_en". */
************
/* register address for bitfield dca_en */
#define HW_ATL_RDM_DCA_EN_ADR 0x00006180
/* bitmask for bitfield dca_en */
#define HW_ATL_RDM_DCA_EN_MSK 0x80000000
/* inverted bitmask for bitfield dca_en */
-#define rdm_dca_en_maskn 0x7fffffff
+#define HW_ATL_RDM_DCA_EN_MSKN 0x7fffffff
 /* lower bit position of bitfield dca_en */
-#define rdm_dca_en_shift 31
+#define HW_ATL_RDM_DCA_EN_SHIFT 31
 /* width of bitfield dca_en */
-#define rdm_dca_en_width 1
+#define HW_ATL_RDM_DCA_EN_WIDTH 1
 /* default value of bitfield dca_en */
-#define rdm_dca_en_default 0x1
+#define HW_ATL_RDM_DCA_EN_DEFAULT 0x1

 /* rx dca_mode[3:0] bitfield definitions */
 * preprocessor definitions for the bitfield "dca_mode[3:0]".
 @ @ -128,17 +128,17 @ @
 */

 /* register address for bitfield dca_mode[3:0] */
-#define rdm_dca_mode_adr 0x00006180
+#define HW_ATL_RDM_DCA_MODE_ADR 0x00006180
 /* bitmask for bitfield dca_mode[3:0] */
-#define rdm_dca_mode_msk 0x0000000f
+#define HW_ATL_RDM_DCA_MODE_MSK 0x0000000f
 /* inverted bitmask for bitfield dca_mode[3:0] */
-#define rdm_dca_mode_mskn 0xfffffff0
+#define HW_ATL_RDM_DCA_MODE_MSKN 0xfffffff0
 /* lower bit position of bitfield dca_mode[3:0] */
-#define rdm_dca_mode_shift 0
+#define HW_ATL_RDM_DCA_MODE_SHIFT 0
 /* width of bitfield dca_mode[3:0] */
-#define rdm_dca_mode_width 4
+#define HW_ATL_RDM_DCA_MODE_WIDTH 4
 /* default value of bitfield dca_mode[3:0] */
-#define rdm_dca_mode_default 0x0
+#define HW_ATL_RDM_DCA_MODE_DEFAULT 0x0

 /* rx desc[d]_data_size[4:0] bitfield definitions */
 * preprocessor definitions for the bitfield "desc[d]_data_size[4:0]".
 @ @ -147,17 +147,18 @ @
 */

 /* register address for bitfield desc[d]_data_size[4:0] */
-#define rdm_descddata_size_adr(descriptor) (0x00005b18 + (descriptor) * 0x20)
+#define HW_ATL_RDM_DESCDDATA_SIZE_ADR(descriptor) 
  (0x00005b18 + (descriptor) * 0x20)
 /* bitmask for bitfield desc[d]_data_size[4:0] */
-#define rdm_descddata_size_msk 0x0000001f
+#define HW_ATL_RDM_DESCDDATA_SIZE_MSK 0x0000001f

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/* inverted bitmask for bitfield desc{d}_data_size[4:0] */
#define rdm_descddata_size_mskn 0xffffffe0
+#define HW_ATL_RDM_DESCDDATA_SIZE_MSKN 0xffffffe0
/* lower bit position of bitfield desc{d}_data_size[4:0] */
-#define rdm_descddata_size_shift 0
+#define HW_ATL_RDM_DESCDDATA_SIZE_SHIFT 0
/* width of bitfield desc{d}_data_size[4:0] */
-#define rdm_descddata_size_width 5
+#define HW_ATL_RDM_DESCDDATA_SIZE_WIDTH 5
/* default value of bitfield desc{d}_data_size[4:0] */
-#define rdm_descddata_size_default 0x0
+#define HW_ATL_RDM_DESCDDATA_SIZE_DEFAULT 0x0

/* rx dca{d}_desc_en bitfield definitions */
* preprocessor definitions for the bitfield "dca{d}_desc_en".
@@ -166,17 +167,17 @@
*/
/* register address for bitfield dca{d}_desc_en */
-#define rdm_dcaddesc_en_adr(dca) (0x00006100 + (dca) * 0x4)
+#define HW_ATL_RDM_DCADDESC_EN_ADR(dca) (0x00006100 + (dca) * 0x4)
/* bitmask for bitfield dca{d}_desc_en */
-#define rdm_dcaddesc_en_msk 0x80000000
+#define HW_ATL_RDM_DCADDESC_EN_MSK 0x80000000
/* inverted bitmask for bitfield dca{d}_desc_en */
-#define rdm_dcaddesc_en_mskn 0x7fffffff
+#define HW_ATL_RDM_DCADDESC_EN_MSKN 0x7fffffff
/* lower bit position of bitfield dca{d}_desc_en */
-#define rdm_dcaddesc_en_shift 31
+#define HW_ATL_RDM_DCADDESC_EN_SHIFT 31
/* width of bitfield dca{d}_desc_en */
-#define rdm_dcaddesc_en_width 1
+#define HW_ATL_RDM_DCADDESC_EN_WIDTH 1
/* default value of bitfield dca{d}_desc_en */
-#define rdm_dcaddesc_en_default 0x0
+#define HW_ATL_RDM_DCADDESC_EN_DEFAULT 0x0

/* rx desc{d}_en bitfield definitions */
* preprocessor definitions for the bitfield "desc{d}_en".
@@ -185,17 +186,17 @@
*/
/* register address for bitfield desc{d}_en */
-#define rdm_descden_adr(descriptor) (0x00005b08 + (descriptor) * 0x20)
+#define HW_ATL_RDM_DESCDEN_ADR(descriptor) (0x00005b08 + (descriptor) * 0x20)
/* bitmask for bitfield desc{d}_en */
-#define rdm_descden_msk 0x80000000
+#define HW_ATL_RDM_DESCDEN_MSK 0x80000000
/* inverted bitmask for bitfield desc{d}_en */
-#define rdm_descden_mskn 0x7fffffff
+#define HW_ATL_RDM_DESCDEN_MSKN 0x7fffffff
/* lower bit position of bitfield desc{d}_en */
-#define rdm_descden_shift 31
+#define HW_ATL_RDM_DESCDEN_SHIFT 31
/* width of bitfield desc{d}_en */
-#define rdm_descden_width 1
+#define HW_ATL_RDM_DESCDEN_WIDTH 1
/* default value of bitfield desc{d}_en */
-#define rdm_descden_default 0x0
+#define HW_ATL_RDM_DESCDEN_DEFAULT 0x0
/* inverted bitmask for bitfield desc{d}_en */
#define rdm_descden_mskn 0x7fffffff
#define HW_ATL_RDM_DESCDEN_MSKN 0x7fffffff
/* lower bit position of bitfield desc{d}_en */
#define rdm_descden_shift 31
#define HW_ATL_RDM_DESCDEN_SHIFT 31
/* width of bitfield desc{d}_en */
#define rdm_descden_width 1
#define HW_ATL_RDM_DESCDEN_WIDTH 1
/* default value of bitfield desc{d}_en */
#define rdm_descden_default 0x0
#define HW_ATL_RDM_DESCDEN_DEFAULT 0x0

/* rx desc{d}_hdr_size[4:0] bitfield definitions */
/* preprocessor definitions for the bitfield "desc{d}_hdr_size[4:0]". */
@@ -204,17 +205,18 @@
*/
/* register address for bitfield desc{d}_hdr_size[4:0] */
#define rdm_descdhdr_size_adr(descriptor) (0x00005b18 + (descriptor) * 0x20)
#define HW_ATL_RDM_DESCDHDR_SIZE_ADR(descriptor) 
 +(0x00005b18 + (descriptor) * 0x20)
/* bitmask for bitfield desc{d}_hdr_size[4:0] */
#define rdm_descdhdr_size_msk 0x00001f00
#define HW_ATL_RDM_DESCDHDR_SIZE_MSK 0x00001f00
/* inverted bitmask for bitfield desc{d}_hdr_size[4:0] */
#define rdm_descdhdr_size_mskn 0xffffe0ff
#define HW_ATL_RDM_DESCDHDR_SIZE_MSKN 0xffffe0ff
/* lower bit position of bitfield desc{d}_hdr_size[4:0] */
#define rdm_descdhdr_size_shift 8
#define HW_ATL_RDM_DESCDHDR_SIZE_SHIFT 8
/* width of bitfield desc{d}_hdr_size[4:0] */
#define rdm_descdhdr_size_width 5
#define HW_ATL_RDM_DESCDHDR_SIZE_WIDTH 5
/* default value of bitfield desc{d}_hdr_size[4:0] */
#define rdm_descdhdr_size_default 0x0
#define HW_ATL_RDM_DESCDHDR_SIZE_DEFAULT 0x0

/* rx desc{d}_hdr_split bitfield definitions */
/* preprocessor definitions for the bitfield "desc{d}_hdr_split". */
@@ -223,17 +225,18 @@
*/
/* register address for bitfield desc{d}_hdr_split */
#define rdm_descdhdr_split_adr(descriptor) (0x00005b08 + (descriptor) * 0x20)
#define HW_ATL_RDM_DESCDHDR_SPLIT_ADR(descriptor) 
 +(0x00005b08 + (descriptor) * 0x20)
/* bitmask for bitfield desc{d}_hdr_split */
/* register address for bitfield desc[d]_hd[c:0] */
-#define rdm_descdhd_adr(descriptor) (0x00005b0c + (descriptor) * 0x20)
+#define HW_ATL_RDM_DESCDHD_ADR(descriptor) (0x00005b0c + (descriptor) * 0x20)
/* bitmask for bitfield desc[d]_hd[c:0] */
-#define rdm_descdhd_msk 0x00001fff
+#define HW_ATL_RDM_DESCDHD_MSK 0x00001fff
/* inverted bitmask for bitfield desc[d]_hd[c:0] */
-#define rdm_descdhd_mskn 0xffffe000
+#define HW_ATL_RDM_DESCDHD_MSKN 0xffffe000
/* lower bit position of bitfield desc[d]_hd[c:0] */
-#define rdm_descdhd_shift 0
+#define HW_ATL_RDM_DESCDHD_SHIFT 0
/* width of bitfield desc[d]_hd[c:0] */
-#define rdm_descdhd_width 13
+#define HW_ATL_RDM_DESCDHD_WIDTH 13

/* register address for bitfield desc[d]_len[9:0] */
-#define rdm_descdlen_adr(descriptor) (0x00005b08 + (descriptor) * 0x20)
+#define HW_ATL_RDM_DESCDLEN_ADR(descriptor) (0x00005b08 + (descriptor) * 0x20)
/* bitmask for bitfield desc[d]_len[9:0] */
-#define rdm_descdlen_msk 0x00001ff8
+#define HW_ATL_RDM_DESCDLEN_MSK 0x00001ff8
/* inverted bitmask for bitfield desc[d]_len[9:0] */
-#define rdm_descdlen_mskn 0xffffffff
+#define HW_ATL_RDM_DESCDLEN_MSKN 0xffffffff
/* lower bit position of bitfield desc[d]_len[9:0] */
-#define rdm_descdlen_shift 0
+#define HW_ATL_RDM_DESCDLEN_SHIFT 0
/* width of bitfield desc[d]_len[9:0] */
-#define rdm_descdlen_width 13
+#define HW_ATL_RDM_DESCDLEN_WIDTH 13

/* rx desc[d]_hd[c:0] bitfield definitions */
* preprocessor definitions for the bitfield "desc[d]_hd[c:0]".
@@ -242,15 +245,15 @@
*/
/* rx desc[d]_len[9:0] bitfield definitions */
* preprocessor definitions for the bitfield "desc[d]_len[9:0]".
@@ -259,17 +262,17 @@
#define rdm_descdlen_mskn 0xffffe007
+#define HW_ATL_RDM_DESCDLEN_MSKN 0xffffe007
/* lower bit position of bitfield desc{d}_len[9:0] */
-#define rdm_descdlen_shift 3
+#define HW_ATL_RDM_DESCDLEN_SHIFT 3
/* width of bitfield desc{d}_len[9:0] */
-#define rdm_descdlen_width 10
+#define HW_ATL_RDM_DESCDLEN_WIDTH 10
/* default value of bitfield desc{d}_len[9:0] */
-#define rdm_descdlen_default 0x0
+#define HW_ATL_RDM_DESCDLEN_DEFAULT 0x0

/* rx desc{d}_reset bitfield definitions */
* preprocessor definitions for the bitfield "desc{d}_reset".
@@ -278,17 +281,35 @@
 */

/* register address for bitfield desc{d}_reset */
-#define rdm_descdreset_adr(descriptor) (0x00005b08 + (descriptor) * 0x20)
+#define HW_ATL_RDM_DESCDRESET_ADR(descriptor) (0x00005b08 + (descriptor) * 0x20)
/* bitmask for bitfield desc{d}_reset */
-#define rdm_descdreset_msk 0x02000000
+#define HW_ATL_RDM_DESCDRESET_MSK 0x02000000
/* inverted bitmask for bitfield desc{d}_reset */
-#define rdm_descdreset_mskn 0xfdffffff
+#define HW_ATL_RDM_DESCDRESET_MSKN 0xfdffffff
/* lower bit position of bitfield desc{d}_reset */
-#define rdm_descdreset_shift 25
+#define HW_ATL_RDM_DESCDRESET_SHIFT 25
/* width of bitfield desc{d}_reset */
-#define rdm_descdreset_width 1
+#define HW_ATL_RDM_DESCDRESET_WIDTH 1
/* default value of bitfield desc{d}_reset */
-#define rdm_descdreset_default 0x0
+#define HW_ATL_RDM_DESCDRESET_DEFAULT 0x0

+/* rdm_desc_init_i bitfield definitions */
+/* preprocessor definitions for the bitfield rdm_desc_init_i.
+ * port="pif_rdm_desc_init_i"
+ */
+
+/* register address for bitfield rdm_desc_init_i */
+#define HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_ADR 0x00005a00
/* bitmask for bitfield rdm_desc_init_i */
+#define HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_MSK 0xffffffff
/* inverted bitmask for bitfield rdm_desc_init_i */
+#define HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_MSKN 0x00000000
/* lower bit position of bitfield rdm_desc_init_i */
+`#define HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_SHIFT 0`
+`/* width of bitfield rdm_desc_init_i */`
+`#define HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_WIDTH 32`
+`/* default value of bitfield rdm_desc_init_i */`
+`#define HW_ATL_RDM_RX_DMA_DESC_CACHE_INIT_DEFAULT 0x0`

/* rx int_desc_wrb_en bitfield definitions */
* preprocessor definitions for the bitfield "int_desc_wrb_en".  
@@ -296,17 +317,17 @@
*/
/* register address for bitfield int_desc_wrb_en */
-`#define rdm_int_desc_wrb_en_adr 0x00005a30`
+`#define HW_ATL_RDM_INT_DESC_WRB_EN_ADR 0x00005a30`
/* bitmask for bitfield int_desc_wrb_en */
-`#define rdm_int_desc_wrb_en_msk 0x00000004`
+`#define HW_ATL_RDM_INT_DESC_WRB_EN_MSK 0x00000004`
/* inverted bitmask for bitfield int_desc_wrb_en */
-`#define rdm_int_desc_wrb_en_mskn 0xfffffffb`
+`#define HW_ATL_RDM_INT_DESC_WRB_EN_MSKN 0xfffffffb`
/* lower bit position of bitfield int_desc_wrb_en */
-`#define rdm_int_desc_wrb_en_shift 2`
+`#define HW_ATL_RDM_INT_DESC_WRB_EN_SHIFT 2`
/* width of bitfield int_desc_wrb_en */
-`#define rdm_int_desc_wrb_en_width 1`
+`#define HW_ATL_RDM_INT_DESC_WRB_EN_DEFAULT 0x0`
+`#define HW_ATL_RDM_INT_DESC_WRB_EN_DEFAULT 0x0`

/* rx dca{d} hdr_en bitfield definitions */
* preprocessor definitions for the bitfield "dca{d} hdr_en".  
@@ -315,17 +336,17 @@
*/
/* register address for bitfield dca{d} hdr_en */
-`#define rdm_dcadhdr_en_adr(dca) (0x00006100 + (dca) * 0x4)`
+`#define HW_ATL_RDM_DCADHDR_EN_ADR(dca) (0x00006100 + (dca) * 0x4)`
/* bitmask for bitfield dca{d} hdr_en */
-`#define rdm_dcadhdr_en_msk 0x40000000`
+`#define HW_ATL_RDM_DCADHDR_EN_MSK 0x40000000`
/* inverted bitmask for bitfield dca{d} hdr_en */
-`#define rdm_dcadhdr_en_mskn 0xbfffffff`
+`#define HW_ATL_RDM_DCADHDR_EN_MSKN 0xbfffffff`
/* lower bit position of bitfield dca{d} hdr_en */
-`#define rdm_dcadhdr_en_shift 30`
+`#define HW_ATL_RDM_DCADHDR_EN_SHIFT 30`
/* width of bitfield dca{d} hdr_en */
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#define rdm_dcadhdr_en_width 1
#define HW_ATL_RDM_DCADHDR_EN_WIDTH 1
/* default value of bitfield dca[d]_hdr_en */
#define rdm_dcadhdr_en_default 0x0
#define HW_ATL_RDM_DCADHDR_EN_DEFAULT 0x0

/* rx dca[d]_pay_en bitfield definitions */
/* preprocessor definitions for the bitfield "dca[d]_pay_en". */
@@ -334,17 +355,17 @@
*/
/* register address for bitfield dca[d]_pay_en */
#define rdm_dcadpay_en_adr(dca) (0x00006100 + (dca) * 0x4)
#define HW_ATL_RDM_DCADPAY_EN_ADR(dca) (0x00006100 + (dca) * 0x4)
/* bitmask for bitfield dca[d]_pay_en */
#define rdm_dcadpay_en_msk 0x20000000
#define HW_ATL_RDM_DCADPAY_EN_MSK 0x20000000
/* inverted bitmask for bitfield dca[d]_pay_en */
#define rdm_dcadpay_en_mskn 0xdfffffff
#define HW_ATL_RDM_DCADPAY_EN_MSKN 0xdfffffff
/* lower bit position of bitfield dca[d]_pay_en */
#define rdm_dcadpay_en_shift 29
#define HW_ATL_RDM_DCADPAY_EN_SHIFT 29
/* width of bitfield dca[d]_pay_en */
#define rdm_dcadpay_en_width 1
#define HW_ATL_RDM_DCADPAY_EN_WIDTH 1
/* default value of bitfield dca[d]_pay_en */
#define rdm_dcadpay_en_default 0x0
#define HW_ATL_RDM_DCADPAY_EN_DEFAULT 0x0

/* RX rdm_int_rim_en Bitfield Definitions */
/* Preprocessor definitions for the bitfield "rdm_int_rim_en". */
@@ -352,51 +373,51 @@
*/
/* Register address for bitfield rdm_int_rim_en */
#define rdm_int_rim_en_adr 0x00005A30
#define HW_ATL_RDM_INT_RIM_EN_ADR 0x00005A30
/* Bitmask for bitfield rdm_int_rim_en */
#define rdm_int_rim_en_msk 0x00000008
#define HW_ATL_RDM_INT_RIM_EN_MSK 0x00000008
/* Inverted bitmask for bitfield rdm_int_rim_en */
#define rdm_int_rim_en_mskn 0xFFFFFFF7
#define HW_ATL_RDM_INT_RIM_EN_MSKN 0xFFFFFFF7
/* Lower bit position of bitfield rdm_int_rim_en */
#define rdm_int_rim_en_shift 3
#define HW_ATL_RDM_INT_RIM_EN_SHIFT 3
/* Width of bitfield rdm_int_rim_en */
```
/* general interrupt mapping register definitions */
* preprocessor definitions for general interrupt mapping register
* base address: 0x00002180
* parameter: regidx [f] | stride size 0x4 | range [0, 3]
*/
#define gen_intr_map_adr(regidx) (0x00002180u + (regidx) * 0x4)

/* general interrupt status register definitions */
* preprocessor definitions for general interrupt status register
* address: 0x000021A0
*/
#define gen_intr_stat_adr 0x000021A4U

/* interrupt global control register definitions */
* preprocessor definitions for interrupt global control register
* address: 0x00002300
*/
#define intr_glb_ctl_adr 0x00002300u

/* interrupt throttle register definitions */
* preprocessor definitions for interrupt throttle register
* base address: 0x00002800
* parameter: throttle [t] | stride size 0x4 | range [0, 31]
*/
#define intr_thr_adr(throttle) (0x00002800u + (throttle) * 0x4)

/* rx dma descriptor base address lsw definitions */
* preprocessor definitions for rx dma descriptor base address lsw
* base address: 0x00005b00
* parameter: descriptor [d] | stride size 0x20 | range [0, 31]
*/
#define rx_dma_desc_base_addrlsw_adr(descriptor) (0x00005b00u + (descriptor) * 0x20)

/* rx dma descriptor base address msw definitions */
@ @ -404,7 +425,7 @@
* base address: 0x00005b04
* parameter: descriptor {d} | stride size 0x20 | range [0, 31]

-#define rx_dma_desc_base_addrmw_addr(descriptor) 
+#define HW_ATL_RX_DMA_DESC_BASE_ADDRMSW_ADR(descriptor) 
(0x00005b04u + (descriptor) * 0x20)

/* rx dma descriptor status register definitions
 * @ @ -412,46 +433,48 @@
 * base address: 0x00005b14
 * parameter: descriptor {d} | stride size 0x20 | range [0, 31]

-#define rx_dma_desc_stat_adr(descriptor) (0x00005b14u + (descriptor) * 0x20)
+#define HW_ATL_RX_DMA_DESC_STAT_ADR(descriptor) 
+(0x00005b14u + (descriptor) * 0x20)

/* rx dma descriptor tail pointer register definitions
 * preprocessor definitions for rx dma descriptor tail pointer register
 * base address: 0x00005b10
 * parameter: descriptor {d} | stride size 0x20 | range [0, 31]

-#define rx_dma_desc_tail_ptr_adr(descriptor) (0x00005b10u + (descriptor) * 0x20)
+#define HW_ATL_RX_DMA_DESC_TAIL_PTR_ADR(descriptor) 
+(0x00005b10u + (descriptor) * 0x20)

/* rx interrupt moderation control register definitions
 * Preprocessor definitions for RX Interrupt Moderation Control Register
 * Base Address: 0x00005A40
 * Parameter: RIM {R} | stride size 0x4 | range [0, 31]

-#define rx_intr_moderation_ctl_adr(rim) (0x00005A40u + (rim) * 0x4)
+#define HW_ATL_RX_INTR_MODERATION_CTL_ADR(rim) (0x00005A40u + (rim) * 0x4)

/* rx filter multicast filter mask register definitions
 * preprocessor definitions for rx filter multicast filter mask register
 * address: 0x00005270

-#define rx_flr_mcst_flr_msk_adr 0x00005270u
+#define HW_ATL_RX_FLR_MCST_FLR_MSK_ADR 0x00005270u

/* rx filter multicast filter register definitions
 * preprocessor definitions for rx filter multicast filter register
 * base address: 0x00005250
 * parameter: filter {f} | stride size 0x4 | range [0, 7]

-#define rx_flr_mcst_flr_adr(filter) (0x00005250u + (filter) * 0x4)
+#define HW_ATL_RX_FLR_MCST_FLR_ADR(filter) (0x00005250u + (filter) * 0x4)
/* RX Filter RSS Control Register 1 Definitions */
* Preprocessor definitions for RX Filter RSS Control Register 1
* Address: 0x000054C0u
*/
#define rx_flr_rss_control1_adr 0x000054C0u

/* RX Filter Control Register 2 Definitions */
* Preprocessor definitions for RX Filter Control Register 2
* Address: 0x00005104u
*/
#define rx_flr_control2_adr 0x00005104u

/* tx tx dma debug control [1f:0] bitfield definitions */
* preprocessor definitions for the bitfield "tx dma debug control [1f:0]".
*/
#define tdm_tx_dma_debug_ctl_adr 0x00008920u
#define tdm_tx_dma_debug_ctl_msk 0xffffffff
#define tdm_tx_dma_debug_ctl_mskn 0x00000000
#define tdm_tx_dma_debug_ctl_shift 0
#define tdm_tx_dma_debug_ctl_width 32
#define tdm_tx_dma_debug_ctl_default 0x0

/* tx tx dma descriptor base address lsw definitions */
* preprocessor definitions for tx dma descriptor base address lsw
* base address: 0x00007c00u
* parameter: descriptor \{d\} | stride size 0x40 | range [0, 31]
*/
#define tx_dma_desc_base_addrlsw_adr(descriptor) (0x00007c00u + (descriptor) * 0x40)
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@@ -484,7 +507,8 @@
* base address: 0x00007c10
* parameter: descriptor {d} | stride size 0x40 | range [0, 31]
*/
#define tx_dma_desc_tail_ptr_adr(descriptor) (0x00007c10u + (descriptor) * 0x40)
+#define HW_ATL_TX_DMA_DESC_TAIL_PTR_ADR(descriptor) \
+   (0x00007c10u + (descriptor) * 0x40)

/* rx dma_sys_loopback bitfield definitions
* preprocessor definitions for the bitfield "dma_sys_loopback".
@@ -492,17 +516,17 @@
*/

/* register address for bitfield dma_sys_loopback */
-#define rpb_dma_sys_lbk_adr 0x00005000
+#define HW_ATL_RPB_DMA_SYS_LBK_ADR 0x00005000
/* bitmask for bitfield dma_sys_loopback */
-#define rpb_dma_sys_lbk_msk 0x00000040
+#define HW_ATL_RPB_DMA_SYS_LBK_MSK 0x00000040
/* inverted bitmask for bitfield dma_sys_loopback */
-#define rpb_dma_sys_lbk_mskn 0xffffffbf
+#define HW_ATL_RPB_DMA_SYS_LBK_MSKN 0xffffffbf
/* lower bit position of bitfield dma_sys_loopback */
-#define rpb_dma_sys_lbk_shift 6
+#define HW_ATL_RPB_DMA_SYS_LBK_SHIFT 6
/* width of bitfield dma_sys_loopback */
-#define rpb_dma_sys_lbk_width 1
+#define HW_ATL_RPB_DMA_SYS_LBK_WIDTH 1
/* default value of bitfield dma_sys_loopback */
-#define rpb_dma_sys_lbk_default 0x0
+#define HW_ATL_RPB_DMA_SYS_LBK_DEFAULT 0x0

/* rx rx_tc_mode bitfield definitions
* preprocessor definitions for the bitfield "rx_tc_mode".
@@ -510,17 +534,17 @@
*/

/* register address for bitfield rx_tc_mode */
-#define rpb_rpf_rx_tc_mode_adr 0x00005700
+#define HW_ATL_RPB_RPF_RX_TC_MODE_ADR 0x00005700
/* bitmask for bitfield rx_tc_mode */
-#define rpb_rpf_rx_tc_mode_msk 0x00000100
+#define HW_ATL_RPB_RPF_RX_TC_MODE_MSK 0x00000100
/* inverted bitmask for bitfield rx_tc_mode */
-#define rpb_rpf_rx_tc_mode_mskn 0xfffffeff
+#define HW_ATL_RPB_RPF_RX_TC_MODE_MSKN 0xfffffeff
/* lower bit position of bitfield rx_tc_mode */
-#define rpb_rpf_rx_tc_mode_shift 8
+#define HW_ATL_RPB_RPF_RX_TC_MODE_SHIFT 8
+#define HW_ATL_RPB_RPF_RX_TC_MODE_SHIFT 8
/* width of bitfield rx_tc_mode */
-#define rpb_rpf_rx_tc_mode_width 1
+#define HW_ATL_RPB_RPF_RX_TC_MODE_WIDTH 1
/* default value of bitfield rx_tc_mode */
-#define rpb_rpf_rx_tc_mode_default 0x0
+#define HW_ATL_RPB_RPF_RX_TC_MODE_DEFAULT 0x0

/* rx rx_buf_en bitfield definitions
 * preprocessor definitions for the bitfield "rx_buf_en".
@@ -528,17 +552,17 @@ */
*/

/* register address for bitfield rx_buf_en */
-#define rpb_rx_buf_en_adr 0x00005700
+#define HW_ATL_RPB_RX_BUF_EN_ADR 0x00005700
/* bitmask for bitfield rx_buf_en */
-#define rpb_rx_buf_en_msk 0x00000001
+#define HW_ATL_RPB_RX_BUF_EN_MSK 0x00000001
/* inverted bitmask for bitfield rx_buf_en */
-#define rpb_rx_buf_en_mskn 0xfffffffe
+#define HW_ATL_RPB_RX_BUF_EN_MSKN 0xfffffffe
/* lower bit position of bitfield rx_buf_en */
-#define rpb_rx_buf_en_shift 0
+#define HW_ATL_RPB_RX_BUF_EN_SHIFT 0
/* width of bitfield rx_buf_en */
-#define rpb_rx_buf_en_width 1
+#define HW_ATL_RPB_RX_BUF_EN_WIDTH 1
/* default value of bitfield rx_buf_en */
-#define rpb_rx_buf_en_default 0x0
+#define HW_ATL_RPB_RX_BUF_EN_DEFAULT 0x0

/* rx rx{b}_hi_thresh[d:0] bitfield definitions
 * preprocessor definitions for the bitfield "rx{b}_hi_thresh[d:0]".
@@ -547,17 +571,17 @@ */
*/

/* register address for bitfield rx{b}_hi_thresh[d:0] */
-#define rpb_rx{b}_hi_thresh_adr(buffer) (0x00005714 + (buffer) * 0x10)
+#define HW_ATL_RPB_RXBHI_THRESH_ADR(buffer) (0x00005714 + (buffer) * 0x10)
/* bitmask for bitfield rx{b}_hi_thresh[d:0] */
-#define rpb_rx{b}_hi_thresh_msk 0x3fff0000
+#define HW_ATL_RPB_RXBHI_THRESH_MSK 0x3fff0000
/* inverted bitmask for bitfield rx{b}_hi_thresh[d:0] */
-#define rpb_rx{b}_hi_thresh_mskn 0xc000ffff
+#define HW_ATL_RPB_RXBHI_THRESH_MSKN 0xc000ffff
/* lower bit position of bitfield rx{b}_hi_thresh[d:0] */
-#define rpb_rx{b}_hi_thresh_shift 16
+#define HW_ATL_RPB_RXBHI_THRESH_SHIFT 16
+#define HW_ATL_RPB_RXBHI_THRESH_SHIFT 16
/* width of bitfield rx{b}_hi_thresh[d:0] */
-#define rpb_rxbhi_thresh_width 14
+#define HW_ATL_RPB_RXBHI_THRESH_WIDTH 14
/* default value of bitfield rx{b}_hi_thresh[d:0] */
-#define rpb_rxbhi_thresh_default 0x0
+#define HW_ATL_RPB_RXBHI_THRESH_DEFAULT 0x0

/* rx rx{b}_lo_thresh[d:0] bitfield definitions
 * preprocessor definitions for the bitfield "rx{b}_lo_thresh[d:0]".
 @@ -566,17 +590,17 @@ */
 */

/* register address for bitfield rx{b}_lo_thresh[d:0] */
-#define rpb_rxblo_thresh_adr(buffer) (0x00005714 + (buffer) * 0x10)
+#define HW_ATL_RPB_RXBLO_THRESH_ADR(buffer) (0x00005714 + (buffer) * 0x10)
/* bitmask for bitfield rx{b}_lo_thresh[d:0] */
-#define rpb_rxblo_thresh_msk 0x00003fff
+#define HW_ATL_RPB_RXBLO_THRESH_MSK 0x00003fff
/* inverted bitmask for bitfield rx{b}_lo_thresh[d:0] */
-#define rpb_rxblo_thresh_mskn 0xffffc000
+#define HW_ATL_RPB_RXBLO_THRESH_MSKN 0xffffc000
/* lower bit position of bitfield rx{b}_lo_thresh[d:0] */
-#define rpb_rxblo_thresh_shift 0
+#define HW_ATL_RPB_RXBLO_THRESH_SHIFT 0
/* width of bitfield rx{b}_lo_thresh[d:0] */
-#define rpb_rxblo_thresh_width 14
+#define HW_ATL_RPB_RXBLO_THRESH_WIDTH 14
/* default value of bitfield rx{b}_lo_thresh[d:0] */
-#define rpb_rxblo_thresh_default 0x0
+#define HW_ATL_RPB_RXBLO_THRESH_DEFAULT 0x0

/* rx rx_fc_mode[1:0] bitfield definitions
 * preprocessor definitions for the bitfield "rx_fc_mode[1:0]".
 @@ -584,17 +608,17 @@ */
 */

/* register address for bitfield rx_fc_mode[1:0] */
-#define rpb_rx_fc_mode_adr 0x00005700
+#define HW_ATL_RPB_RX_FC_MODE_ADR 0x00005700
/* bitmask for bitfield rx_fc_mode[1:0] */
-#define rpb_rx_fc_mode_msk 0x00000030
+#define HW_ATL_RPB_RX_FC_MODE_MSK 0x00000030
/* inverted bitmask for bitfield rx_fc_mode[1:0] */
-#define rpb_rx_fc_mode_mskn 0xffffffcf
+#define HW_ATL_RPB_RX_FC_MODE_MSKN 0xffffffcf
/* lower bit position of bitfield rx_fc_mode[1:0] */
-#define rpb_rx_fc_mode_shift 4
+#define HW_ATL_RPB_RX_FC_MODE_SHIFT 4
+#define HW_ATL_RPB_RX_FC_MODE_SHIFT 4
/* width of bitfield rx_fc_mode[1:0] */
-#define rpb_rx_fc_mode_width 2
+#define HW_ATL_RPB_RX_FC_MODE_WIDTH 2
/* default value of bitfield rx_fc_mode[1:0] */
-#define rpb_rx_fc_mode_default 0x0
+#define HW_ATL_RPB_RX_FC_MODE_DEFAULT 0x0

/* rx rx[\texttt{b}].buf_size[8:0] bitfield definitions
* preprocessor definitions for the bitfield "rx[\texttt{b}].buf_size[8:0]".
@@ -603,17 +627,17 @@
*/

/* register address for bitfield rx[\texttt{b}].buf_size[8:0] */
-#define rpb_rxbbuf_size_adr(buffer) (0x00005710 + (buffer) * 0x10)
+#define HW_ATL_RPB_RXBBUF_SIZE_ADR(buffer) (0x00005710 + (buffer) * 0x10)
/* bitmask for bitfield rx[\texttt{b}].buf_size[8:0] */
-#define rpb_rxbbuf_size_msk 0x000001ff
+#define HW_ATL_RPB_RXBBUF_SIZE_MSK 0x000001ff
/* inverted bitmask for bitfield rx[\texttt{b}].buf_size[8:0] */
-#define rpb_rxbbuf_size_mskn 0xfffffe00
+#define HW_ATL_RPB_RXBBUF_SIZE_MSKN 0xfffffe00
/* lower bit position of bitfield rx[\texttt{b}].buf_size[8:0] */
-#define rpb_rxbbuf_size_shift 0
+#define HW_ATL_RPB_RXBBUF_SIZE_SHIFT 0
/* width of bitfield rx[\texttt{b}].buf_size[8:0] */
-#define rpb_rxbbuf_size_width 9
+#define HW_ATL_RPB_RXBBUF_SIZE_WIDTH 9
/* default value of bitfield rx[\texttt{b}].buf_size[8:0] */
-#define rpb_rxbbuf_size_default 0x0
+#define HW_ATL_RPB_RXBBUF_SIZE_DEFAULT 0x0

/* rx rx[\texttt{b}].xoff_en bitfield definitions
* preprocessor definitions for the bitfield "rx[\texttt{b}].xoff_en".
@@ -622,17 +646,17 @@
*/

/* register address for bitfield rx[\texttt{b}].xoff_en */
-#define rpb_rxbxoff_en_adr(buffer) (0x00005714 + (buffer) * 0x10)
+#define HW_ATL_RPB_RXBXOFF_EN_ADR(buffer) (0x00005714 + (buffer) * 0x10)
/* bitmask for bitfield rx[\texttt{b}].xoff_en */
-#define rpb_rxbxoff_en_msk 0x80000000
+#define HW_ATL_RPB_RXBXOFF_EN_MSK 0x80000000
/* inverted bitmask for bitfield rx[\texttt{b}].xoff_en */
-#define rpb_rxbxoff_en_mskn 0x7fffffff
+#define HW_ATL_RPB_RXBXOFF_EN_MSKN 0x7fffffff
/* lower bit position of bitfield rx[\texttt{b}].xoff_en */
-#define rpb_rxbxoff_en_shift 31
+#define HW_ATL_RPB_RXBXOFF_EN_SHIFT 31
+define HW_ATL_RPB_RXBXOFF_EN_SHIFT 31
/* width of bitfield rx[b]_xoff_en */
-define rpb_rxbxoff_en_width 1
+define HW_ATL_RPB_RXBXOFF_EN_WIDTH 1
/* default value of bitfield rx[b]_xoff_en */
-define rpb_rxbxoff_en_default 0x0
+define HW_ATL_RPB_RXBXOFF_EN_DEFAULT 0x0

/* rx l2_bc_thresh[f:0] bitfield definitions
 * preprocessor definitions for the bitfield "l2_bc_thresh[f:0]".
 @@ -640,17 +664,17 @@
 */

/* register address for bitfield l2_bc_thresh[f:0] */
-define rpfl2bc_thresh_adr 0x00005100
+define HW_ATL_RPFL2BC_THRESH_ADR 0x00005100
/* bitmask for bitfield l2_bc_thresh[f:0] */
-define rpfl2bc_thresh_msk 0xffff0000
+define HW_ATL_RPFL2BC_THRESH_MSK 0xffff0000
/* inverted bitmask for bitfield l2_bc_thresh[f:0] */
-define rpfl2bc_thresh_mskn 0x0000ffff
+define HW_ATL_RPFL2BC_THRESH_MSKN 0x0000ffff
/* lower bit position of bitfield l2_bc_thresh[f:0] */
-define rpfl2bc_thresh_shift 16
+define HW_ATL_RPFL2BC_THRESH_SHIFT 16
/* width of bitfield l2_bc_thresh[f:0] */
-define rpfl2bc_thresh_width 16
+define HW_ATL_RPFL2BC_THRESH_WIDTH 16
/* default value of bitfield l2_bc_thresh[f:0] */
-define rpfl2bc_thresh_default 0x0
+define HW_ATL_RPFL2BC_THRESH_DEFAULT 0x0

/* rx l2_bc_en bitfield definitions
 * preprocessor definitions for the bitfield "l2_bc_en".
 @@ -658,17 +682,17 @@
 */

/* register address for bitfield l2_bc_en */
-define rpfl2bc_en_adr 0x00005100
+define HW_ATL_RPFL2BC_EN_ADR 0x00005100
/* bitmask for bitfield l2_bc_en */
-define rpfl2bc_en_msk 0x00000001
+define HW_ATL_RPFL2BC_EN_MSK 0x00000001
/* inverted bitmask for bitfield l2_bc_en */
-define rpfl2bc_en_mskn 0xfffffffe
+define HW_ATL_RPFL2BC_EN_MSKN 0xfffffffe
/* lower bit position of bitfield l2_bc_en */
-define rpfl2bc_en_shift 0
+define HW_ATL_RPFL2BC_EN_SHIFT 0
+#define HW_ATL_RPFL2BC_EN_SHIFT 0
/* width of bitfield l2_bc_en */
-#define rpfl2bc_en_width 1
+#define HW_ATL_RPFL2BC_EN_WIDTH 1
/* default value of bitfield l2_bc_en */
-#define rpfl2bc_en_default 0x0
+#define HW_ATL_RPFL2BC_EN_DEFAULT 0x0

/* rx l2_bc_act[2:0] bitfield definitions
 * preprocessor definitions for the bitfield "l2_bc_act[2:0]".
@@ -676,17 +700,17 @@
 */

/* register address for bitfield l2_bc_act[2:0] */
-#define rpfl2bc_act_adr 0x00005100
+#define HW_ATL_RPFL2BC_ACT_ADR 0x00005100
/* bitmask for bitfield l2_bc_act[2:0] */
-#define rpfl2bc_act_msk 0x00007000
+#define HW_ATL_RPFL2BC_ACT_MSK 0x00007000
/* inverted bitmask for bitfield l2_bc_act[2:0] */
-#define rpfl2bc_act_mskn 0xffff8fff
+#define HW_ATL_RPFL2BC_ACT_MSKN 0xffff8fff
/* lower bit position of bitfield l2_bc_act[2:0] */
-#define rpfl2bc_act_shift 12
+#define HW_ATL_RPFL2BC_ACT_SHIFT 12
/* width of bitfield l2_bc_act[2:0] */
-#define rpfl2bc_act_width 3
+#define HW_ATL_RPFL2BC_ACT_WIDTH 3
/* default value of bitfield l2_bc_act[2:0] */
-#define rpfl2bc_act_default 0x0
+#define HW_ATL_RPFL2BC_ACT_DEFAULT 0x0

/* rx l2_mc_en{f} bitfield definitions
 * preprocessor definitions for the bitfield "l2_mc_en{f}".
@@ -695,17 +719,17 @@
 */

/* register address for bitfield l2_mc_en{f} */
-#define rpfl2mc_enf_adr(filter) (0x00005250 + (filter) * 0x4)
+#define HW_ATL_RPFL2MC_ENF_ADR(filter) (0x00005250 + (filter) * 0x4)
/* bitmask for bitfield l2_mc_en{f} */
-#define rpfl2mc_enf_msk 0x80000000
+#define HW_ATL_RPFL2MC_ENF_MSK 0x80000000
/* inverted bitmask for bitfield l2_mc_en{f} */
-#define rpfl2mc_enf_mskn 0x7fffffff
+#define HW_ATL_RPFL2MC_ENF_MSKN 0x7fffffff
/* lower bit position of bitfield l2_mc_en{f} */
-#define rpfl2mc_enf_shift 31
+#define HW_ATL_RPFL2MC_ENF_SHIFT 31
+#define HW_ATL_RPFL2MC_ENF_WIDTH 1
/* width of bitfield l2_mc_en{f} */
+#define rpfl2mc_enf_width 1
+#define HW_ATL_RPFL2MC_ENF_DEFAULT 0x0
/* default value of bitfield l2_mc_en{f} */
+#define rpfl2mc_enf_default 0x0

/* rx l2_promis_mode bitfield definitions
 * preprocessor definitions for the bitfield "l2_promis_mode".
 @@ -713,17 +737,17 @@*/

/* register address for bitfield l2_promis_mode */
-#define rpfl2promis_mode_adr 0x00005100
+#define HW_ATL_RPFL2PROMIS_MODE_ADR 0x00005100
/* bitmask for bitfield l2_promis_mode */
-#define rpfl2promis_mode_msk 0x00000008
+#define HW_ATL_RPFL2PROMIS_MODE_MSK 0x00000008
/* inverted bitmask for bitfield l2_promis_mode */
-#define rpfl2promis_mode_mskn 0xffffffff7
+#define HW_ATL_RPFL2PROMIS_MODE_MSKN 0xffffffff7
/* lower bit position of bitfield l2_promis_mode */
-#define rpfl2promis_mode_shift 3
+#define HW_ATL_RPFL2PROMIS_MODE_SHIFT 3
/* width of bitfield l2_promis_mode */
-#define rpfl2promis_mode_width 1
+#define HW_ATL_RPFL2PROMIS_MODE_WIDTH 1
/* default value of bitfield l2_promis_mode */
-#define rpfl2promis_mode_default 0x0
+#define HW_ATL_RPFL2PROMIS_MODE_DEFAULT 0x0

/* rx l2_uc_act{f}[2:0] bitfield definitions
 * preprocessor definitions for the bitfield "l2_uc_act{f}[2:0]".
 @@ -732,17 +756,17 @@*/

/* register address for bitfield l2_uc_act{f}[2:0] */
-#define rpfl2uc_actf_adr(filter) (0x00005114 + (filter) * 0x8)
+#define HW_ATL_RPFL2UC_ACTF_ADR(filter) (0x00005114 + (filter) * 0x8)
/* bitmask for bitfield l2_uc_act{f}[2:0] */
-#define rpfl2uc_actf_msk 0x00070000
+#define HW_ATL_RPFL2UC_ACTF_MSK 0x00070000
/* inverted bitmask for bitfield l2_uc_act{f}[2:0] */
-#define rpfl2uc_actf_mskn 0xffffff67
+#define HW_ATL_RPFL2UC_ACTF_MSKN 0xffffff67
/* lower bit position of bitfield l2_uc_act{f}[2:0] */
-#define rpfl2uc_actf_shift 16
+#define HW_ATL_RPFL2UC_ACTF_SHIFT 16
```c
#define HW_ATL_RPFL2UC_ACTF_SHIFT 16  
/* width of bitfield l2_uc_act{f}[2:0] */
#define rpfl2uc_actf_width 3
#define HW_ATL_RPFL2UC_ACTF_WIDTH 3  
/* default value of bitfield l2_uc_act{f}[2:0] */
#define rpfl2uc_actf_default 0x0
#define HW_ATL_RPFL2UC_ACTF_DEFAULT 0x0

/* rx l2_uc_en{f} bitfield definitions */
/* preprocessor definitions for the bitfield "l2_uc_en{f}". */
@@ -751,26 +775,26 @@

/* register address for bitfield l2_uc_en{f} */
#define rpfl2uc_enf_adr(filter) (0x00005114 + (filter) * 0x8)
#define HW_ATL_RPFL2UC_ENF_ADR(filter) (0x00005114 + (filter) * 0x8)
/* bitmask for bitfield l2_uc_en{f} */
#define rpfl2uc_enf_msk 0x80000000
#define HW_ATL_RPFL2UC_ENF_MSK 0x80000000
/* inverted bitmask for bitfield l2_uc_en{f} */
#define rpfl2uc_enf_mskn 0x7fffffff
#define HW_ATL_RPFL2UC_ENF_MSKN 0x7fffffff
/* lower bit position of bitfield l2_uc_en{f} */
#define rpfl2uc_enf_shift 31
#define HW_ATL_RPFL2UC_ENF_SHIFT 31
/* width of bitfield l2_uc_en{f} */
#define rpfl2uc_enf_width 1
#define HW_ATL_RPFL2UC_ENF_WIDTH 1
/* default value of bitfield l2_uc_en{f} */
#define rpfl2uc_enf_default 0x0
#define HW_ATL_RPFL2UC_ENF_DEFAULT 0x0

/* register address for bitfield l2_uc_da{f}_lsw[1f:0] */
#define rpfl2uc_daflsw_adr(filter) (0x00005110 + (filter) * 0x8)
#define HW_ATL_RPFL2UC_DAFMSW_ADR(filter) (0x00005110 + (filter) * 0x8)
/* register address for bitfield l2_uc_da{f}_msw[f:0] */
#define rpfl2uc_dafmsw_adr(filter) (0x00005114 + (filter) * 0x8)
#define HW_ATL_RPFL2UC_DAFMSW_ADR(filter) (0x00005114 + (filter) * 0x8)
/* bitmask for bitfield l2_uc_da{f}_msw[f:0] */
#define rpfl2uc_dafmsw_msk 0x0000ffff
#define HW_ATL_RPFL2UC_DAFMSW_MSK 0x0000ffff
/* lower bit position of bitfield l2_uc_da{f}_msw[f:0] */
#define rpfl2uc_dafmsw_shift 0
#define HW_ATL_RPFL2UC_DAFMSW_SHIFT 0

/* rx l2_mc_accept_all bitfield definitions */
/* Preprocessor definitions for the bitfield "l2_mc_accept_all". */
@@ -778,22 +802,22 @@
```
/* Register address for bitfield l2_mc_accept_all */
#define rpfl2mc_accept_all_adr 0x00005270
#define HW_ATL_RPFL2MC_ACCEPT_ALL_ADR 0x00005270
/* Bitmask for bitfield l2_mc_accept_all */
#define rpfl2mc_accept_all_msk 0x00004000
#define HW_ATL_RPFL2MC_ACCEPT_ALL_MSK 0x00004000
/* Inverted bitmask for bitfield l2_mc_accept_all */
#define rpfl2mc_accept_all_mskn 0xFFFFBFFF
#define HW_ATL_RPFL2MC_ACCEPT_ALL_MSKN 0xFFFFBFFF
/* Lower bit position of bitfield l2_mc_accept_all */
#define rpfl2mc_accept_all_shift 14
#define HW_ATL_RPFL2MC_ACCEPT_ALL_SHIFT 14
/* Width of bitfield l2_mc_accept_all */
#define rpfl2mc_accept_all_width 1
#define HW_ATL_RPFL2MC_ACCEPT_ALL_WIDTH 1
/* Default value of bitfield l2_mc_accept_all */
#define rpfl2mc_accept_all_default 0x0
#define HW_ATL_RPFL2MC_ACCEPT_ALL_DEFAULT 0x0

/* width of bitfield rx_tc_up{t}[2:0] */
#define rpf_rpb_rx_tc_upt_width 3
#define HW_ATL_RPF_RPB_RX_TC_UPT_WIDTH 3
/* default value of bitfield rx_tc_up{t}[2:0] */
#define rpf_rpb_rx_tc_upt_default 0x0
#define HW_ATL_RPF_RPB_RX_TC_UPT_DEFAULT 0x0

/* rx rss_key_addr[4:0] bitfield definitions */
#define rpf_rss_key_addr_adr 0x000054d0
#define HW_ATL_RPF_RSS_KEY_ADDR_ADR 0x000054d0
#define rpf_rss_key_addr_msk 0x0000001f
#define HW_ATL_RPF_RSS_KEY_ADDR_MSK 0x0000001f
#define rpf_rss_key_addr_mskn 0xffffffe0
#define HW_ATL_RPF_RSS_KEY_ADDR_MSKN 0xffffffe0
#define rpf_rss_key_addr_shift 0
#define HW_ATL_RPF_RSS_KEY_ADDR_SHIFT 0
#define rpf_rss_key_addr_width 5
#define HW_ATL_RPF_RSS_KEY_ADDR_WIDTH 5
/* default value of bitfield rss_key_addr[4:0] */
#define rpf_rss_key_addr_default 0x0
+#define HW_ATL_RPF_RSS_KEY_ADDR_DEFAULT 0x0

/* rx rss_key_wr_data[1f:0] bitfield definitions
 * preprocessor definitions for the bitfield "rss_key_wr_data[1f:0]".
@@ -819,17 +843,17 @@
 */

/* register address for bitfield rss_key_wr_data[1f:0] */
-#define rpf_rss_key_wr_data_adr 0x000054d4
+#define HW_ATL_RPF_RSS_KEY_WR_DATA_ADR 0x000054d4
/* bitmask for bitfield rss_key_wr_data[1f:0] */
-#define rpf_rss_key_wr_data_msk 0xffffffff
+#define HW_ATL_RPF_RSS_KEY_WR_DATA_MSK 0xffffffff
/* inverted bitmask for bitfield rss_key_wr_data[1f:0] */
-#define rpf_rss_key_wr_data_mskn 0x00000000
+#define HW_ATL_RPF_RSS_KEY_WR_DATA_MSKN 0x00000000
/* lower bit position of bitfield rss_key_wr_data[1f:0] */
-#define rpf_rss_key_wr_data_shift 0
+#define HW_ATL_RPF_RSS_KEY_WR_DATA_SHIFT 0
/* width of bitfield rss_key_wr_data[1f:0] */
-#define rpf_rss_key_wr_data_width 32
+#define HW_ATL_RPF_RSS_KEY_WR_DATA_WIDTH 32
/* default value of bitfield rss_key_wr_data[1f:0] */
-#define rpf_rss_key_wr_data_default 0x0
+#define HW_ATL_RPF_RSS_KEY_WR_DATA_DEFAULT 0x0

/* rx rss_key_wr_en_i bitfield definitions
 * preprocessor definitions for the bitfield "rss_key_wr_en_i".
@@ -837,17 +861,17 @@
 */

/* register address for bitfield rss_key_wr_en_i */
-#define rpf_rss_key_wr_eni_adr 0x000054d0
+#define HW_ATL_RPF_RSS_KEY_WR_ENI_ADR 0x000054d0
/* bitmask for bitfield rss_key_wr_en_i */
-#define rpf_rss_key_wr_eni_msk 0x00000020
+#define HW_ATL_RPF_RSS_KEY_WR_ENI_MSK 0x00000020
/* inverted bitmask for bitfield rss_key_wr_en_i */
-#define rpf_rss_key_wr_eni_mskn 0xffffffdf
+#define HW_ATL_RPF_RSS_KEY_WR_ENI_MSKN 0xffffffdf
/* lower bit position of bitfield rss_key_wr_en_i */
-#define rpf_rss_key_wr_eni_shift 5
+#define HW_ATL_RPF_RSS_KEY_WR_ENI_SHIFT 5
/* width of bitfield rss_key_wr_en_i */
-#define rpf_rss_key_wr_eni_width 1
+#define HW_ATL_RPF_RSS_KEY_WR_ENI_WIDTH 1
/* default value of bitfield rss_key_wr_en_i */
#define rpf_rss_key_wr_en_i_default 0x0
+#define HW_ATL_RPF_RSS_KEY_WR_ENI_DEFAULT 0x0

/* rx rss_redir_addr[3:0] bitfield definitions */
* preprocessor definitions for the bitfield "rss_redir_addr[3:0]".
@@ -855,17 +879,17 @@
 */

/* register address for bitfield rss_redir_addr[3:0] */
-#define rpf_rss_redir_addr_adr 0x000054e0
+/#define HW_ATL_RPF_RSS_REDIR_ADDR_ADR 0x000054e0
/* bitmask for bitfield rss_redir_addr[3:0] */
-#define rpf_rss_redir_addr_msk 0x0000000f
+/#define HW_ATL_RPF_RSS_REDIR_ADDR_MSK 0x0000000f
/* inverted bitmask for bitfield rss_redir_addr[3:0] */
-#define rpf_rss_redir_addr_mskn 0xffffffff
+/#define HW_ATL_RPF_RSS_REDIR_ADDR_MSKN 0xffffffff
/* lower bit position of bitfield rss_redir_addr[3:0] */
-#define rpf_rss_redir_addr_shift 0
+/#define HW_ATL_RPF_RSS_REDIR_ADDR_SHIFT 0
/* width of bitfield rss_redir_addr[3:0] */
-#define rpf_rss_redir_addr_width 4
+/#define HW_ATL_RPF_RSS_REDIR_ADDR_WIDTH 4
/* default value of bitfield rss_redir_addr[3:0] */
-#define rpf_rss_redir_addr_default 0x0
+/#define HW_ATL_RPF_RSS_REDIR_ADDR_DEFAULT 0x0

/* rx rss_redir_wr_data[f:0] bitfield definitions */
* preprocessor definitions for the bitfield "rss_redir_wr_data[f:0]".
@@ -873,17 +897,17 @@
 */

/* register address for bitfield rss_redir_wr_data[f:0] */
-#define rpf_rss_redir_wr_data_adr 0x000054e4
+/#define HW_ATL_RPF_RSS_REDIR_WR_DATA_ADR 0x000054e4
/* bitmask for bitfield rss_redir_wr_data[f:0] */
-#define rpf_rss_redir_wr_data_msk 0x0000ffff
+/#define HW_ATL_RPF_RSS_REDIR_WR_DATA_MSK 0x0000ffff
/* inverted bitmask for bitfield rss_redir_wr_data[f:0] */
-#define rpf_rss_redir_wr_data_mskn 0xffffff00
+/#define HW_ATL_RPF_RSS_REDIR_WR_DATA_MSKN 0xffffff00
/* lower bit position of bitfield rss_redir_wr_data[f:0] */
-#define rpf_rss_redir_wr_data_shift 0
+/#define HW_ATL_RPF_RSS_REDIR_WR_DATA_SHIFT 0
/* width of bitfield rss_redir_wr_data[f:0] */
-#define rpf_rss_redir_wr_data_width 16
+/#define HW_ATL_RPF_RSS_REDIR_WR_DATA_WIDTH 16

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/* default value of bitfield rss_redir_wr_data[f:0] */
-#define rpf_rss_redir_wr_data_default 0x0
+#define HW_ATL_RPF_RSS_REDIR_WR_DATA_DEFAULT 0x0

/* rx rss_redir_wr_en_i bitfield definitions */
* preprocessor definitions for the bitfield "rss_redir_wr_en_i".
@@ -891,17 +915,17 @@
 */

/* register address for bitfield rss_redir_wr_en_i */
-#define rpf_rss_redir_wr_eni_adr 0x000054e0
+#define HW_ATL_RPF_RSS_REDIR_WR_ENI_ADR 0x000054e0
/* bitmask for bitfield rss_redir_wr_en_i */
-#define rpf_rss_redir_wr_eni_msk 0x00000010
+#define HW_ATL_RPF_RSS_REDIR_WR_ENI_MSK 0x00000010
/* inverted bitmask for bitfield rss_redir_wr_en_i */
-#define rpf_rss_redir_wr_eni_mskn 0xffffffef
+#define HW_ATL_RPF_RSS_REDIR_WR_ENI_MSKN 0xffffffef
/* lower bit position of bitfield rss_redir_wr_en_i */
-#define rpf_rss_redir_wr_eni_shift 4
+#define HW_ATL_RPF_RSS_REDIR_WR_ENI_SHIFT 4
/* width of bitfield rss_redir_wr_en_i */
-#define rpf_rss_redir_wr_eni_width 1
+#define HW_ATL_RPF_RSS_REDIR_WR_ENI_WIDTH 1
/* default value of bitfield rss_redir_wr_en_i */
-#define rpf_rss_redir_wr_eni_default 0x0
+#define HW_ATL_RPF_RSS_REDIR_WR_ENI_DEFAULT 0x0

/* rx tpo_rpf_sys_loopback bitfield definitions */
* preprocessor definitions for the bitfield "tpo_rpf_sys_loopback".
@@ -909,17 +933,17 @@
 */

/* register address for bitfield tpo_rpf_sys_loopback */
-#define rpf_tpo_rpf_sys_lbk_adr 0x00005000
+#define HW_ATL_RPF_TPO_RPF_SYS_LBK_ADR 0x00005000
/* bitmask for bitfield tpo_rpf_sys_loopback */
-#define rpf_tpo_rpf_sys_lbk_msk 0x00000100
+#define HW_ATL_RPF_TPO_RPF_SYS_LBK_MSK 0x00000100
/* inverted bitmask for bitfield tpo_rpf_sys_loopback */
-#define rpf_tpo_rpf_sys_lbk_mskn 0xfffffeff
+#define HW_ATL_RPF_TPO_RPF_SYS_LBK_MSKN 0xfffffeff
/* lower bit position of bitfield tpo_rpf_sys_loopback */
-#define rpf_tpo_rpf_sys_lbk_shift 8
+#define HW_ATL_RPF_TPO_RPF_SYS_LBK_SHIFT 8
/* width of bitfield tpo_rpf_sys_loopback */
-#define rpf_tpo_rpf_sys_lbk_width 1
+#define HW_ATL_RPF_TPO_RPF_SYS_LBK_WIDTH 1
/* default value of bitfield tpo_rpf_sys_loopback */
#define rpf_tpo_rpf_sys_lbk_default 0x0
+#define HW_ATL_RPF_TPO_RPF_SYS_LBK_DEFAULT 0x0

/* rx vl_inner_tpid[f:0] bitfield definitions */
* preprocessor definitions for the bitfield "vl_inner_tpid[f:0]".
@@ -927,17 +951,17 @@
*/

/* register address for bitfield vl_inner_tpid[f:0] */
#define rpf_vl_inner_tpid_adr 0x00005284
+#define HW_ATL_RPF_VL_INNER_TPID_ADR 0x00005284
/* bitmask for bitfield vl_inner_tpid[f:0] */
#define rpf_vl_inner_tpid_msk 0x0000ffff
+#define HW_ATL_RPF_VL_INNER_TPID_MSK 0x0000ffff
/* inverted bitmask for bitfield vl_inner_tpid[f:0] */
#define rpf_vl_inner_tpid_mskn 0xffff0000
+#define HW_ATL_RPF_VL_INNER_TPID_MSKN 0xffff0000
/* lower bit position of bitfield vl_inner_tpid[f:0] */
#define rpf_vl_inner_tpid_shift 0
+#define HW_ATL_RPF_VL_INNER_TPID_SHIFT 0
/* width of bitfield vl_inner_tpid[f:0] */
#define rpf_vl_inner_tpid_width 16
+#define HW_ATL_RPF_VL_INNER_TPID_WIDTH 16
/* default value of bitfield vl_inner_tpid[f:0] */
#define rpf_vl_inner_tpid_default 0x8100
+#define HW_ATL_RPF_VL_INNER_TPID_DEFAULT 0x8100

/* rx vl_outer_tpid[f:0] bitfield definitions */
* preprocessor definitions for the bitfield "vl_outer_tpid[f:0]".
@@ -945,17 +969,17 @@
*/

/* register address for bitfield vl_outer_tpid[f:0] */
#define rpf_vl_outer_tpid_adr 0x00005284
+#define HW_ATL_RPF_VL_OUTER_TPID_ADR 0x00005284
/* bitmask for bitfield vl_outer_tpid[f:0] */
#define rpf_vl_outer_tpid_msk 0xffff0000
+#define HW_ATL_RPF_VL_OUTER_TPID_MSK 0xffff0000
/* inverted bitmask for bitfield vl_outer_tpid[f:0] */
#define rpf_vl_outer_tpid_mskn 0x0000ffff
+#define HW_ATL_RPF_VL_OUTER_TPID_MSKN 0x0000ffff
/* lower bit position of bitfield vl_outer_tpid[f:0] */
#define rpf_vl_outer_tpid_shift 16
+#define HW_ATL_RPF_VL_OUTER_TPID_SHIFT 16
/* width of bitfield vl_outer_tpid[f:0] */
#define rpf_vl_outer_tpid_width 16
+#define HW_ATL_RPF_VL_OUTER_TPID_WIDTH 16
/* default value of bitfield vl_outer_tpid[f:0] */
-#define rpf_vl_outer_tpid_default 0x88a8
+#define HW_ATL_RPF_VL_OUTER_TPID_DEFAULT 0x88a8

/* rx vl_promis_mode bitfield definitions
  * preprocessor definitions for the bitfield "vl_promis_mode".
@ @ -963,17 +987,17 @@ */
*/

/* register address for bitfield vl_promis_mode */
-#define rpf_vl_promis_mode_adr 0x00005280
+#define HW_ATL_RPF_VL_PROMIS_MODE_ADR 0x00005280
/* bitmask for bitfield vl_promis_mode */
-#define rpf_vl_promis_mode_msk 0x00000002
+#define HW_ATL_RPF_VL_PROMIS_MODE_MSK 0x00000002
/* inverted bitmask for bitfield vl_promis_mode */
-#define rpf_vl_promis_mode_mskn 0xfffffffd
+#define HW_ATL_RPF_VL_PROMIS_MODE_MSKN 0xfffffffd
/* lower bit position of bitfield vl_promis_mode */
-#define rpf_vl_promis_mode_shift 1
+#define HW_ATL_RPF_VL_PROMIS_MODE_SHIFT 1
/* width of bitfield vl_promis_mode */
-#define rpf_vl_promis_mode_width 1
+#define HW_ATL_RPF_VL_PROMIS_MODE_WIDTH 1
/* default value of bitfield vl_promis_mode */
-#define rpf_vl_promis_mode_default 0x0
+#define HW_ATL_RPF_VL_PROMIS_MODE_DEFAULT 0x0

/* RX vl_accept_untagged_mode Bitfield Definitions
  * Preprocessor definitions for the bitfield "vl_accept_untagged_mode".
@ @ -981,17 +1005,17 @@ */
*/

/* Register address for bitfield vl_accept_untagged_mode */
-#define rpf_vl_accept_untagged_mode_adr 0x00005280
+#define HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_ADR 0x00005280
/* Bitmask for bitfield vl_accept_untagged_mode */
-#define rpf_vl_accept_untagged_mode_msk 0x00000004
+#define HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_MSK 0x00000004
/* Inverted bitmask for bitfield vl_accept_untagged_mode */
-#define rpf_vl_accept_untagged_mode_mskn 0xFFFFFFFF
+#define HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_MSKN 0xFFFFFFFF
/* lower bit position of bitfield vl_accept_untagged_mode */
-#define rpf_vl_accept_untagged_mode_shift 2
+#define HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_SHIFT 2
/* Width of bitfield vl_accept_untagged_mode */
-#define rpf_vl_accept_untagged_mode_width 1
+#define HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_WIDTH 1
/* Default value of bitfield vl_accept_untagged_mode */
#define rpf_vl_accept_untagged_mode_default 0x0
+
#define HW_ATL_RPF_VL_ACCEPT_UNTAGGED_MODE_DEFAULT 0x0

/* RX vl_untagged_act[2:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "vl_untagged_act[2:0]".
@@ -999,17 +1023,17 @@
 */

/* Register address for bitfield vl_untagged_act[2:0] */
-#define rpf_vl_untagged_act adr 0x00005280
+"HW_ATL_RPF_VL_UNTAGGED_ACT_ADR 0x00005280
/* Bitmask for bitfield vl_untagged_act[2:0] */
-#define rpf_vl_untagged_act msk 0x00000038
+"HW_ATL_RPF_VL_UNTAGGED_ACT_MSK 0x00000038
/* Inverted bitmask for bitfield vl_untagged_act[2:0] */
-#define rpf_vl_untagged_act_mskn 0xFFFFFFC7
+"HW_ATL_RPF_VL_UNTAGGED_ACT_MSKN 0xFFFFFFC7
/* Lower bit position of bitfield vl_untagged_act[2:0] */
-#define rpf_vl_untagged_act_shift 3
+"HW_ATL_RPF_VL_UNTAGGED_ACT_SHIFT 3
/* Width of bitfield vl_untagged_act[2:0] */
-#define rpf_vl_untagged_act_width 3
+"HW_ATL_RPF_VL_UNTAGGED_ACT_WIDTH 3
/* Default value of bitfield vl_untagged_act[2:0] */
-#define rpf_vl_untagged_act default 0x0
+"HW_ATL_RPF_VL_UNTAGGED_ACT_DEFAULT 0x0

/* RX vl_en[F] Bitfield Definitions */
* Preprocessor definitions for the bitfield "vl_en[F]".
@@ -1018,17 +1042,17 @@
 */

/* Register address for bitfield vl_en[F] */
-#define rpf_vl_en_f adr(filter) (0x00005290 + (filter) * 0x4)
+"HW_ATL_RPF_VL_EN_F_ADR(filter) (0x00005290 + (filter) * 0x4)
/* Bitmask for bitfield vl_en[F] */
-#define rpf_vl_en_f msk 0x80000000
+"HW_ATL_RPF_VL_EN_F_MSK 0x80000000
/* Inverted bitmask for bitfield vl_en[F] */
-#define rpf_vl_en_f_mskn 0x7FFFFFFF
+"HW_ATL_RPF_VL_EN_F_MSKN 0x7FFFFFFF
/* Lower bit position of bitfield vl_en[F] */
-#define rpf_vl_en_f_shift 31
+"HW_ATL_RPF_VL_EN_F_SHIFT 31
/* Width of bitfield vl_en[F] */
-#define rpf_vl_en_f_width 1
+"HW_ATL_RPF_VL_EN_F_WIDTH 1
/* Default value of bitfield vl_en{F} */
-#define rpf_vl_en_f_default 0x0
+#define HW_ATL_RPF_VL_EN_F_DEFAULT 0x0

/* RX vl_act{F}[2:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "vl_act{F}[2:0]".
@@ -1037,17 +1061,17 @@
 */

/* Register address for bitfield vl_act{F}[2:0] */
-#define rpf_vl_act_f_adr(filter) (0x00005290 + (filter) * 0x4)
+#define HW_ATL_RPF_VL_ACT_F_ADR(filter) (0x00005290 + (filter) * 0x4)
/* Bitmask for bitfield vl_act{F}[2:0] */
-#define rpf_vl_act_f_msk 0x00070000
+#define HW_ATL_RPF_VL_ACT_F_MSK 0x00070000
/* Inverted bitmask for bitfield vl_act{F}[2:0] */
-#define rpf_vl_act_f_mskn 0xFFF8FFFF
+#define HW_ATL_RPF_VL_ACT_F_MSKN 0xFFF8FFFF
/* Lower bit position of bitfield vl_act{F}[2:0] */
-#define rpf_vl_act_f_shift 16
+#define HW_ATL_RPF_VL_ACT_F_SHIFT 16
/* Width of bitfield vl_act{F}[2:0] */
-#define rpf_vl_act_f_width 3
+#define HW_ATL_RPF_VL_ACT_F_WIDTH 3
/* Default value of bitfield vl_act{F}[2:0] */
-#define rpf_vl_act_f_default 0x0
+#define HW_ATL_RPF_VL_ACT_F_DEFAULT 0x0

/* RX vl_id{F}[B:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "vl_id{F}[B:0]".
@@ -1056,17 +1080,17 @@
 */

/* Register address for bitfield vl_id{F}[B:0] */
-#define rpf_vl_id_f_adr(filter) (0x00005290 + (filter) * 0x4)
+#define HW_ATL_RPF_VL_ID_F_ADR(filter) (0x00005290 + (filter) * 0x4)
/* Bitmask for bitfield vl_id{F}[B:0] */
-#define rpf_vl_id_f_msk 0x00000FFF
+#define HW_ATL_RPF_VL_ID_F_MSK 0x00000FFF
/* Inverted bitmask for bitfield vl_id{F}[B:0] */
-#define rpf_vl_id_f_mskn 0xFFFFF000
+#define HW_ATL_RPF_VL_ID_F_MSKN 0xFFFFF000
/* Lower bit position of bitfield vl_id{F}[B:0] */
-#define rpf_vl_id_f_shift 0
+#define HW_ATL_RPF_VL_ID_F_SHIFT 0
/* Width of bitfield vl_id{F}[B:0] */
-#define rpf_vl_id_f_width 12
+#define HW_ATL_RPF_VL_ID_F_WIDTH 12
/* Default value of bitfield vl_id{F}[B:0] */
#define rpf_vl_id_f_default 0x0
+#define HW_ATL_RPF_VL_ID_F_DEFAULT 0x0

/* RX et_en{F} Bitfield Definitions
* Preprocessor definitions for the bitfield "et_en{F}".
@@ -1075,17 +1099,17 @@ */
*/

/* Register address for bitfield et_en{F} */
#define rpf_et_en_f_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_EN_F_ADR(filter) (0x00005300 + (filter) * 0x4)
/* Bitmask for bitfield et_en{F} */
#define rpf_et_en_f_msk 0x80000000
+#define HW_ATL_RPF_ET_EN_F_MSK 0x80000000
/* Inverted bitmask for bitfield et_en{F} */
#define rpf_et_en_f_mskn 0x7fffffff
+#define HW_ATL_RPF_ET_EN_F_MSKN 0x7fffffff
/* Lower bit position of bitfield et_en{F} */
#define rpf_et_en_f_shift 31
+#define HW_ATL_RPF_ET_EN_F_SHIFT 31
/* Width of bitfield et_en{F} */
#define rpf_et_en_f_width 1
+#define HW_ATL_RPF_ET_EN_F_WIDTH 1
/* Default value of bitfield et_en{F} */
#define rpf_et_en_f_default 0x0
+#define HW_ATL_RPF_ET_EN_F_DEFAULT 0x0

/* rx et_en{f} bitfield definitions
* preprocessor definitions for the bitfield "et_en{f}".
@@ -1094,17 +1118,17 @@ */
*/

/* register address for bitfield et_en{f} */
#define rpf_et_enf_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_ENF_ADR(filter) (0x00005300 + (filter) * 0x4)
/* bitmask for bitfield et_en{f} */
#define rpf_et_enf_msk 0x80000000
+#define HW_ATL_RPF_ET_ENF_MSK 0x80000000
/* inverted bitmask for bitfield et_en{f} */
#define rpf_et_enf_mskn 0x7fffffff
+#define HW_ATL_RPF_ET_ENF_MSKN 0x7fffffff
/* lower bit position of bitfield et_en{f} */
#define rpf_et_enf_shift 31
+#define HW_ATL_RPF_ET_ENF_SHIFT 31
/* width of bitfield et_en{f} */
#define rpf_et_enf_width 1
+#define HW_ATL_RPF_ET_ENF_WIDTH 1
/* default value of bitfield et_en[f] */
#define rpf_et_en_default 0x0
+#define HW_ATL_RPF_ET_ENF_DEFAULT 0x0

/* rx et_up[f]_en bitfield definitions */
* preprocessor definitions for the bitfield "et_up[f]_en".
@ @ -1113,17 +1137,17 @@ */

/* register address for bitfield et_up[f]_en */
-#define rpf_et_upfen_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_UPFEN_ADR(filter) (0x00005300 + (filter) * 0x4)
/* bitmask for bitfield et_up[f]_en */
-#define rpf_et_upfen_msk 0x40000000
+#define HW_ATL_RPF_ET_UPFEN_MSK 0x40000000
/* inverted bitmask for bitfield et_up[f]_en */
-#define rpf_et_upfen_mskn 0xbfffffff
+#define HW_ATL_RPF_ET_UPFEN_MSKN 0xbfffffff
/* lower bit position of bitfield et_up[f]_en */
-#define rpf_et_upfen_shift 30
+#define HW_ATL_RPF_ET_UPFEN_SHIFT 30
/* width of bitfield et_up[f]_en */
-#define rpf_et_upfen_width 1
+#define HW_ATL_RPF_ET_UPFEN_WIDTH 1
/* default value of bitfield et_up[f]_en */
-#define rpf_et_upfen_default 0x0
+#define HW_ATL_RPF_ET_UPFEN_DEFAULT 0x0

/* rx et_rxq[f]_en bitfield definitions */
* preprocessor definitions for the bitfield "et_rxq[f]_en".
@ @ -1132,17 +1156,17 @@ */

/* register address for bitfield et_rxq[f]_en */
-#define rpf_et_rxqfen_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_RXQFEN_ADR(filter) (0x00005300 + (filter) * 0x4)
/* bitmask for bitfield et_rxq[f]_en */
-#define rpf_et_rxqfen_msk 0x20000000
+#define HW_ATL_RPF_ET_RXQFEN_MSK 0x20000000
/* inverted bitmask for bitfield et_rxq[f]_en */
-#define rpf_et_rxqfen_mskn 0xdfffffff
+#define HW_ATL_RPF_ET_RXQFEN_MSKN 0xdfffffff
/* lower bit position of bitfield et_rxq[f]_en */
-#define rpf_et_rxqfen_shift 29
+#define HW_ATL_RPF_ET_RXQFEN_SHIFT 29
/* width of bitfield et_rxq[f]_en */
-#define rpf_et_rxqfen_width 1
+#define HW_ATL_RPF_ET_RXQFEN_WIDTH 1
/* default value of bitfield et_rxq{f}[4]:en */
#define rpf_et_rxqfen_default 0x0
+#define HW_ATL_RPF_ET_RXQFEN_DEFAULT 0x0

/* rx et_up{f}[2:0] bitfield definitions
 * preprocessor definitions for the bitfield "et_up{f}[2:0]".
@@ -1151,17 +1175,17 @@
 */

/* register address for bitfield et_up{f}[2:0] */
-#define rpf_et_upf_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_UPFADR(filter) (0x00005300 + (filter) * 0x4)
/* bitmask for bitfield et_up{f}[2:0] */
-#define rpf_et_upf_msk 0x1c000000
+#define HW_ATL_RPF_ET_UPF_MSK 0x1c000000
/* inverted bitmask for bitfield et_up{f}[2:0] */
-#define rpf_et_upf_mskn 0xe3ffffff
+#define HW_ATL_RPF_ET_UPF_MSKN 0xe3ffffff
/* lower bit position of bitfield et_up{f}[2:0] */
-#define rpf_et_upf_shift 26
+#define HW_ATL_RPF_ET_UPF_SHIFT 26
/* width of bitfield et_up{f}[2:0] */
-#define rpf_et_upf_width 3
+#define HW_ATL_RPF_ET_UPF_WIDTH 3
/* default value of bitfield et_up{f}[2:0] */
-#define rpf_et_upf_default 0x0
+#define HW_ATL_RPF_ET_UPF_DEFAULT 0x0

/* rx et_rxq{f}[4:0] bitfield definitions
 * preprocessor definitions for the bitfield "et_rxq{f}[4:0]".
@@ -1170,17 +1194,17 @@
 */

/* register address for bitfield et_rxq{f}[4:0] */
-#define rpf_et_rxqf_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_RXQFADR(filter) (0x00005300 + (filter) * 0x4)
/* bitmask for bitfield et_rxq{f}[4:0] */
-#define rpf_et_rxqf_msk 0x01f00000
+#define HW_ATL_RPF_ET_RXQF_MSK 0x01f00000
/* inverted bitmask for bitfield et_rxq{f}[4:0] */
-#define rpf_et_rxqf_mskn 0xfe0fffff
+#define HW_ATL_RPF_ET_RXQF_MSKN 0xfe0fffff
/* lower bit position of bitfield et_rxq{f}[4:0] */
-#define rpf_et_rxqf_shift 20
+#define HW_ATL_RPF_ET_RXQF_SHIFT 20
/* width of bitfield et_rxq{f}[4:0] */
-#define rpf_et_rxqf_width 5
+#define HW_ATL_RPF_ET_RXQF_WIDTH 5
/* default value of bitfield et_rxq[f][4:0] */
#define rpf_et_rxqf_default 0x0
+#define HW_ATL_RPF_ET_RXQF_DEFAULT 0x0

/* rx et_mng_rxq[f] bitfield definitions */
* preprocessor definitions for the bitfield "et_mng_rxq[f]".
 @ @ -1189,17 +1213,17 @@
 */

/* register address for bitfield et_mng_rxq[f] */
-#define rpf_et_mng_rxqf_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_MNG_RXQF_ADR(filter) (0x00005300 + (filter) * 0x4)

/* bitmask for bitfield et_mng_rxq[f] */
-#define rpf_et_mng_rxqf_msk 0x00080000
-#define rpf_et_mng_rxqf_mskn 0xfff7ffff
-#define rpf_et_mng_rxqf_shift 19
-#define rpf_et_mng_rxqf_width 1
-#define rpf_et_mng_rxqf_default 0x0
+#define HW_ATL_RPF_ET_MNG_RXQF_MSK 0x00080000
+#define HW_ATL_RPF_ET_MNG_RXQF_MSKN 0xfff7ffff
+#define HW_ATL_RPF_ET_MNG_RXQF_SHIFT 19
+#define HW_ATL_RPF_ET_MNG_RXQF_WIDTH 1
+#define HW_ATL_RPF_ET_MNG_RXQF_DEFAULT 0x0

/* rx et_act[f][2:0] bitfield definitions */
* preprocessor definitions for the bitfield "et_act[f][2:0]".
 @ @ -1208,17 +1232,17 @@
 */

/* register address for bitfield et_act[f][2:0] */
-#define rpf_et_actf_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_ACTF_ADR(filter) (0x00005300 + (filter) * 0x4)

/* bitmask for bitfield et_act[f][2:0] */
-#define rpf_et_actf_msk 0x00070000
-#define rpf_et_actf_mskn 0xfff8ffff
-#define rpf_et_actf_shift 16
-#define rpf_et_actf_width 3
-#define rpf_et_actf_default 0x0
+#define HW_ATL_RPF_ET_ACTF_MSK 0x00070000
+#define HW_ATL_RPF_ET_ACTF_MSKN 0xfff8ffff
+#define HW_ATL_RPF_ET_ACTF_SHIFT 16
+#define HW_ATL_RPF_ET_ACTF_WIDTH 3
/* default value of bitfield et_act[f][2:0] */
#define rpf_et_actf_default 0x0
+#define HW_ATL_RPF_ET_ACTF_DEFAULT 0x0

/* rx et_val[f][f:0] bitfield definitions */
* preprocessor definitions for the bitfield "et_val[f][f:0]".
@@ -1227,17 +1251,17 @@
 */

/* register address for bitfield et_val[f][f:0] */
-#define rpf_et_valf_adr(filter) (0x00005300 + (filter) * 0x4)
+#define HW_ATL_RPF_ET_VALF_ADR(filter) (0x00005300 + (filter) * 0x4)
/* bitmask for bitfield et_val[f][f:0] */
-#define rpf_et_valf_msk 0x0000ffff
+#define HW_ATL_RPF_ET_VALF_MSK 0x0000ffff
/* inverted bitmask for bitfield et_val[f][f:0] */
-#define rpf_et_valf_mskn 0xffff0000
+#define HW_ATL_RPF_ET_VALF_MSKN 0xffff0000
/* lower bit position of bitfield et_val[f][f:0] */
-#define rpf_et_valf_shift 0
+#define HW_ATL_RPF_ET_VALF_SHIFT 0
/* width of bitfield et_val[f][f:0] */
-#define rpf_et_valf_width 16
+#define HW_ATL_RPF_ET_VALF_WIDTH 16
/* default value of bitfield et_val[f][f:0] */
-#define rpf_et_valf_default 0x0
+#define HW_ATL_RPF_ET_VALF_DEFAULT 0x0

/* rx ipv4_chk_en bitfield definitions */
* preprocessor definitions for the bitfield "ipv4_chk_en".
@@ -1245,17 +1269,17 @@
 */

/* register address for bitfield ipv4_chk_en */
-#define rpo_ipv4chk_en_adr 0x00005580
+#define HW_ATL_RPO_IPV4CHK_EN_ADR 0x00005580
/* bitmask for bitfield ipv4_chk_en */
-#define rpo_ipv4chk_en_msk 0x00000002
+#define HW_ATL_RPO_IPV4CHK_EN_MSK 0x00000002
/* inverted bitmask for bitfield ipv4_chk_en */
-#define rpo_ipv4chk_en_mskn 0xfffffffd
+#define HW_ATL_RPO_IPV4CHK_EN_MSKN 0xfffffffd
/* lower bit position of bitfield ipv4_chk_en */
-#define rpo_ipv4chk_en_shift 1
+#define HW_ATL_RPO_IPV4CHK_EN_SHIFT 1
/* width of bitfield ipv4.chk_en */
-#define rpo_ipv4chk_en_width 1
+#define HW_ATL_RPO_IPV4CHK_EN_WIDTH 1
/* default value of bitfield ipv4_chk_en */
#define rpo_ipv4chk_en_default 0x0
+#define HW_ATL_RPO_IPV4CHK_EN_DEFAULT 0x0

/* rx desc[d]_vl_strip bitfield definitions
 * preprocessor definitions for the bitfield "desc[d]_vl_strip".
@@ -1264,17 +1288,18 @@ */
*/

/* register address for bitfield desc[d]_vl_strip */
-#define rpo_descdvl_strip_adr(descriptor) (0x00005b08 + (descriptor) * 0x20)
+##define HW_ATL_RPO_DESCDVL_STRIP_ADR(descriptor)
 	(0x00005b08 + (descriptor) * 0x20)
/* bitmask for bitfield desc[d]_vl_strip */
-#define rpo_descdvl_strip_msk 0x20000000
+##define HW_ATL_RPO_DESCDVL_STRIP_MSK 0x20000000
/* inverted bitmask for bitfield desc[d]_vl_strip */
-#define rpo_descdvl_strip_mskn 0xdfffffff
+##define HW_ATL_RPO_DESCDVL_STRIP_MSKN 0xdfffffff
/* lower bit position of bitfield desc[d]_vl_strip */
-#define rpo_descdvl_strip_shift 29
+##define HW_ATL_RPO_DESCDVL_STRIP_SHIFT 29
/* width of bitfield desc[d]_vl_strip */
-#define rpo_descdvl_strip_width 1
+##define HW_ATL_RPO_DESCDVL_STRIP_WIDTH 1
/* default value of bitfield desc[d]_vl_strip */
-#define rpo_descdvl_strip_default 0x0
+##define HW_ATL_RPO_DESCDVL_STRIP_DEFAULT 0x0

/* rx l4_chk_en bitfield definitions
 * preprocessor definitions for the bitfield "l4_chk_en".
@@ -1282,17 +1307,17 @@ */
*/

/* register address for bitfield l4_chk_en */
-#define rpol4chk_en_adr 0x00005580
+##define HW_ATL_RPOL4CHK_EN_ADR 0x00005580
/* bitmask for bitfield l4_chk_en */
-#define rpol4chk_en_msk 0x00000001
+##define HW_ATL_RPOL4CHK_EN_MSK 0x00000001
/* inverted bitmask for bitfield l4_chk_en */
-#define rpol4chk_en_mskn 0xffffffff
+##define HW_ATL_RPOL4CHK_EN_MSKN 0xffffffff
/* lower bit position of bitfield l4_chk_en */
-#define rpol4chk_en_shift 0
+##define HW_ATL_RPOL4CHK_EN_SHIFT 0
/* width of bitfield l4_chk_en */
-#define rpol4chk_en_width 1
+##define HW_ATL_RPOL4CHK_EN_WIDTH 1
+#define HW_ATL_RPOL4CHK_EN_WIDTH 1
/* default value of bitfield l4_chk_en */
#define rpol4chk_en_default 0x0
+#define HW_ATL_RPOL4CHK_EN_DEFAULT 0x0

/* rx reg_res_dsbl bitfield definitions */
* preprocessor definitions for the bitfield "reg_res_dsbl".
@@ -1300,17 +1325,17 @@ */

/* register address for bitfield reg_res_dsbl */
-#define rx_reg_res_dsbl adr 0x00005000
+##define HW_ATL_RX_REG_RES_DSBL_ADR 0x00005000
/* bitmask for bitfield reg_res_dsbl */
-#define rx_reg_res_dsbl msk 0x20000000
+##define HW_ATL_RX_REG_RES_DSBL_MSK 0x20000000
/* inverted bitmask for bitfield reg_res_dsbl */
-#define rx_reg_res_dsbl mskn 0xdfffffff
+##define HW_ATL_RX_REG_RES_DSBL_MSKN 0xdfffffff
/* lower bit position of bitfield reg_res_dsbl */
-#define rx_reg_res_dsbl_shift 29
+##define HW_ATL_RX_REG_RES_DSBL_SHIFT 29
/* width of bitfield reg_res_dsbl */
-#define rx_reg_res_dsbl width 1
+##define HW_ATL_RX_REG_RES_DSBL_WIDTH 1
/* default value of bitfield reg_res_dsbl */
-#define rx_reg_res_dsbl_default 0x1
+##define HW_ATL_RX_REG_RES_DSBL_DEFAULT 0x1

/* tx dca{d}_cpuid[7:0] bitfield definitions */
* preprocessor definitions for the bitfield "dca{d}_cpuid[7:0]".
@@ -1319,17 +1344,17 @@ */

/* register address for bitfield dca{d}_cpuid */
-#define tdm_dcadcpuid adr(dca) (0x00008400 + (dca) * 0x4)
+##define HW_ATL_TDM_DCADCPUID_ADR(dca) (0x00008400 + (dca) * 0x4)
/* bitmask for bitfield dca{d}_cpuid */
-#define tdm_dcadcpuid msk 0x000000ff
+##define HW_ATL_TDM_DCADCPUID_MSK 0x000000ff
/* inverted bitmask for bitfield dca{d}_cpuid */
-#define tdm_dcadcpuid mskn 0xffffff00
+##define HW_ATL_TDM_DCADCPUID_MSKN 0xffffff00
/* lower bit position of bitfield dca{d}_cpuid */
-#define tdm_dcadcpuid_shift 0
+##define HW_ATL_TDM_DCADCPUID_SHIFT 0
/* width of bitfield dca{d}_cpuid */
-#define tdm_dcadcpuid width 8
+##define HW_ATL_TDM_DCADCPUID_WIDTH 8
```c
// define HW_ATL_TDM_DCADCPUID_WIDTH 8
/* default value of bitfield dca[d]_cpuid[7:0] */
-#define tdm_dcadcpuid_default 0x0
+#define HW_ATL_TDM_DCADCPUID_DEFAULT 0x0

/* tx lso_en[1f:0] bitfield definitions
 * preprocessor definitions for the bitfield "lso_en[1f:0]".
 @ @ -1337,17 +1362,17 @ @ */

/* register address for bitfield lso_en[1f:0] */
-#define tdm_lso_en_adr 0x00007810
+#define HW_ATL_TDM_LSO_EN_ADR 0x00007810
/* bitmask for bitfield lso_en[1f:0] */
-#define tdm_lso_en_msk 0xffffffff
+#define HW_ATL_TDM_LSO_EN_MSK 0xffffffff
/* inverted bitmask for bitfield lso_en[1f:0] */
-#define tdm_lso_en_mskn 0x00000000
+#define HW_ATL_TDM_LSO_EN_MSKN 0x00000000
/* lower bit position of bitfield lso_en[1f:0] */
-#define tdm_lso_en_shift 0
+#define HW_ATL_TDM_LSO_EN_SHIFT 0
/* width of bitfield lso_en[1f:0] */
-#define tdm_lso_en_width 32
+#define HW_ATL_TDM_LSO_EN_WIDTH 32
/* default value of bitfield lso_en[1f:0] */
-#define tdm_lso_en_default 0x0
+#define HW_ATL_TDM_LSO_EN_DEFAULT 0x0

/* tx dca_en bitfield definitions
 * preprocessor definitions for the bitfield "dca_en".
 @ @ -1355,17 +1380,17 @ @ */

/* register address for bitfield dca_en */
-#define tdm_dca_en_adr 0x00008480
+#define HW_ATL_TDM_DCA_EN_ADR 0x00008480
/* bitmask for bitfield dca_en */
-#define tdm_dca_en_msk 0x80000000
+#define HW_ATL_TDM_DCA_EN_MSK 0x80000000
/* inverted bitmask for bitfield dca_en */
-#define tdm_dca_en_mskn 0x7fffffff
+#define HW_ATL_TDM_DCA_EN_MSKN 0x7fffffff
/* lower bit position of bitfield dca_en */
-#define tdm_dca_en_shift 31
+#define HW_ATL_TDM_DCA_EN_SHIFT 31
/* width of bitfield dca_en */
-#define tdm_dca_en_width 1
+#define tdm_dca_en_width 1
```
/* tx dca_mode[3:0] bitfield definitions */
/* preprocessor definitions for the bitfield "dca_mode[3:0]". */
@@ -1373,17 +1398,17 @@
/* register address for bitfield dca_mode[3:0] */
-#define tdm_dca_mode_adr 0x00008480
+#define HW_ATL_TDM_DCA_MODE_ADR 0x00008480
/* bitmask for bitfield dca_mode[3:0] */
-#define tdm_dca_mode_msk 0x0000000f
+#define HW_ATL_TDM_DCA_MODE_MSK 0x0000000f
/* inverted bitmask for bitfield dca_mode[3:0] */
-#define tdm_dca_mode_mskn 0xfffffff0
+#define HW_ATL_TDM_DCA_MODE_MSKN 0xfffffff0
/* lower bit position of bitfield dca_mode[3:0] */
-#define tdm_dca_mode_shift 0
+#define HW_ATL_TDM_DCA_MODE_SHIFT 0
/* width of bitfield dca_mode[3:0] */
-#define tdm_dca_mode_width 4
+#define HW_ATL_TDM_DCA_MODE_WIDTH 4
/* default value of bitfield dca_mode[3:0] */
-#define tdm_dca_mode_default 0x0
+#define HW_ATL_TDM_DCA_MODE_DEFAULT 0x0

/* tx dca{d}_desc_en bitfield definitions */
/* preprocessor definitions for the bitfield "dca{d}_desc_en". */
@@ -1392,17 +1417,17 @@
/* register address for bitfield dca{d}_desc_en */
-#define tdm_dcadesc_en_adr(dca) (0x00008400 + (dca) * 0x4)
+#define HW_ATL_TDM_DCADDESC_EN_ADR(dca) (0x00008400 + (dca) * 0x4)
/* bitmask for bitfield dca{d}_desc_en */
-#define tdm_dcadesc_en_msk 0x80000000
+#define HW_ATL_TDM_DCADDESC_EN_MSK 0x80000000
/* inverted bitmask for bitfield dca{d}_desc_en */
-#define tdm_dcadesc_en_mskn 0x7fffffff
+#define HW_ATL_TDM_DCADDESC_EN_MSKN 0x7fffffff
/* lower bit position of bitfield dca{d}_desc_en */
-#define tdm_dcadesc_en_shift 31
+#define HW_ATL_TDM_DCADDESC_EN_SHIFT 31
/* width of bitfield dca{d}_desc_en */
-#define tdm_dcadesc_en_width 1
+\#define HW_ATL_TDM_DCADDESC_EN_WIDTH 1
/* default value of bitfield dca\{d\}_{desc en} */
-\#define tdm_dcaddesc_en_default 0x0
+\#define HW_ATL_TDM_DCADDESC_EN_DEFAULT 0x0

/*/ tx desc\{d\}_{en} bitfield definitions
 * preprocessor definitions for the bitfield "desc\{d\}_{en}".
@@ -1411,17 +1436,17 @@ */
*/

+\#define HW_ATL_TDM_DESCDEN_ADR(descriptor) (0x00007c08 + (descriptor) * 0x40)
+\#define HW_ATL_TDM_DESCDEN_MSK 0x80000000
+\#define HW_ATL_TDM_DESCDEN_MSKN 0x7fffffff
+\#define HW_ATL_TDM_DESCDEN_SHIFT 31
+\#define HW_ATL_TDM_DESCDEN_DEFAULT 0x0

/*/ register address for bitfield desc\{d\}_{en} */
-\#define tdm_descden_adr(descriptor) (0x00007c08 + (descriptor) * 0x40)
-\#define tdm_descden_msk 0x80000000
-\#define tdm_descden_mskn 0x7fffffff
-\#define tdm_descden_shift 31
-\#define tdm_descden_width 1
-\#define tdm_descden_default 0x0
-\#define HW_ATL_TDM_DESCDEN_ADR(descriptor) (0x00007c08 + (descriptor) * 0x40)
-\#define HW_ATL_TDM_DESCDEN_MSK 0x80000000
-\#define HW_ATL_TDM_DESCDEN_MSKN 0x7fffffff
-\#define HW_ATL_TDM_DESCDEN_SHIFT 31
-\#define HW_ATL_TDM_DESCDEN_DEFAULT 0x0

/*/ tx desc\{d\}_{hd[c:0]} bitfield definitions
 * preprocessor definitions for the bitfield "desc\{d\}_{hd[c:0]}".
@@ -1430,15 +1455,15 @@ */
*/

+\#define tdm_descdhd_adr(descriptor) (0x00007c0c + (descriptor) * 0x40)
+\#define tdm_descdhd_msk 0x00001fff
+\#define tdm_descdhd_mskn 0xffffe000
+\#define tdm_descdhd_shift 0
+\#define tdm_descdhd_width 13
+\#define HW_ATL_TDM_DESCDHD_ADR(descriptor) (0x00007c0c + (descriptor) * 0x40)
+\#define HW_ATL_TDM_DESCDHD_MSK 0x00001fff
+\#define HW_ATL_TDM_DESCDHD_MSKN 0xffffe000
+\#define HW_ATL_TDM_DESCDHD_SHIFT 0
+\#define HW_ATL_TDM_DESCDHD_DEFAULT 0x0

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/* tx desc[d]_len[9:0] bitfield definitions
 * preprocessor definitions for the bitfield "desc[d]_len[9:0]".
@@ -1447,17 +1472,17 @@ */

/* register address for bitfield desc[d]_len[9:0] */
-#define tdm_descdlen_adr(descriptor) (0x00007c08 + (descriptor) * 0x40)
+#define HW_ATL_TDM_DESCDLEN_ADR(descriptor) (0x00007c08 + (descriptor) * 0x40)
/* bitmask for bitfield desc[d]_len[9:0] */
-#define tdm_descdlen_msk 0x00001ff8
+#define HW_ATL_TDM_DESCDLEN_MSK 0x00001ff8
/* inverted bitmask for bitfield desc[d]_len[9:0] */
-#define tdm_descdlen_mskn 0xffffe007
+#define HW_ATL_TDM_DESCDLEN_MSKN 0xffffe007
/* lower bit position of bitfield desc[d]_len[9:0] */
-#define tdm_descdlen_shift 3
+#define HW_ATL_TDM_DESCDLEN_SHIFT 3
/* width of bitfield desc[d]_len[9:0] */
-#define tdm_descdlen_width 10
+#define HW_ATL_TDM_DESCDLEN_WIDTH 10
/* default value of bitfield desc[d]_len[9:0] */
-#define tdm_descdlen_default 0x0
+#define HW_ATL_TDM_DESCDLEN_DEFAULT 0x0

/* tx int_desc_wrb_en bitfield definitions
 * preprocessor definitions for the bitfield "int_desc_wrb_en".
@@ -1465,17 +1490,17 @@ */

/* register address for bitfield int_desc_wrb_en */
-#define tdm_int_desc_wrb_en_adr 0x00007b40
+#define HW_ATL_TDM_INT_DESC_WRB_EN_ADR 0x00007b40
/* bitmask for bitfield int_desc_wrb_en */
-#define tdm_int_desc_wrb_en_msk 0x00000002
+#define HW_ATL_TDM_INT_DESC_WRB_EN_MSK 0x00000002
/* inverted bitmask for bitfield int_desc_wrb_en */
-#define tdm_int_desc_wrb_en_mskn 0xfffffffd
+#define HW_ATL_TDM_INT_DESC_WRB_EN_MSKN 0xfffffffd
/* lower bit position of bitfield int_desc_wrb_en */
-#define tdm_int_desc_wrb_en_shift 1
+#define HW_ATL_TDM_INT_DESC_WRB_EN_SHIFT 1
/* width of bitfield int_desc_wrb_en */
-#define tdm_int_desc_wrb_en_width 1
+#define HW_ATL_TDM_INT_DESC_WRB_EN_WIDTH 1
/* default value of bitfield int_desc_wrb_en */
-#define tdm_int_desc_wrb_en_default 0x0
+#define HW_ATL_TDM_INT_DESC_WRB_EN_DEFAULT 0x0
+\#define HW_ATL_TDM_INT_DESC_WRB_EN_DEFAULT 0x0

/* tx desc{d}_wrbl_thresh[6:0] bitfield definitions
 * preprocessor definitions for the bitfield "desc{d}_wrbl_thresh[6:0]".
 @ @ -1484,17+1509,18 @@
 */

/* register address for bitfield desc{d}_wrbl_thresh[6:0] */
-\#define tdm_descdwrbl_thresh_adr(descriptor) (0x00007c18 + (descriptor) * 0x40)
+\#define HW_ATL_TDM_DESCDWRB_THRESH_ADR(descriptor) 
+\(0x00007c18 + (descriptor) * 0x40\)
/* bitmask for bitfield desc{d}_wrbl_thresh[6:0] */
-\#define tdm_descdwrbl_thresh_msk 0x00007f00
+\#define HW_ATL_TDM_DESCDWRB_THRESH_MSK 0x00007f00
/* inverted bitmask for bitfield desc{d}_wrbl_thresh[6:0] */
-\#define tdm_descdwrbl_thresh_mskn 0xffff80ff
+\#define HW_ATL_TDM_DESCDWRB_THRESH_MSKN 0xffff80ff
/* lower bit position of bitfield desc{d}_wrbl_thresh[6:0] */
-\#define tdm_descdwrbl_thresh_shift 8
+\#define HW_ATL_TDM_DESCDWRB_THRESH_SHIFT 8
/* width of bitfield desc{d}_wrbl_thresh[6:0] */
-\#define tdm_descdwrbl_thresh_width 7
+\#define HW_ATL_TDM_DESCDWRB_THRESH_WIDTH 7
/* default value of bitfield desc{d}_wrbl_thresh[6:0] */
-\#define tdm_descdwrbl_thresh_default 0x0
+\#define HW_ATL_TDM_DESCDWRB_THRESH_DEFAULT 0x0

/* tx lso_tcp_flag_first[b:0] bitfield definitions
 * preprocessor definitions for the bitfield "lso_tcp_flag_first[b:0]".
 @ @ -1502,17+1528,17 @@
 */

/* register address for bitfield lso_tcp_flag_first[b:0] */
-\#define thm_lso_tcp_flag_first_adr 0x00007820
+\#define HW_ATL_THM_LSO_TCP_FLAG_FIRST_ADR 0x00007820
/* bitmask for bitfield lso_tcp_flag_first[b:0] */
-\#define thm_lso_tcp_flag_first_msk 0x00000fff
+\#define HW_ATL_THM_LSO_TCP_FLAG_FIRST_MSK 0x00000fff
/* inverted bitmask for bitfield lso_tcp_flag_first[b:0] */
-\#define thm_lso_tcp_flag_first_mskn 0xfffff000
+\#define HW_ATL_THM_LSO_TCP_FLAG_FIRST_MSKN 0xfffff000
/* lower bit position of bitfield lso_tcp_flag_first[b:0] */
-\#define thm_lso_tcp_flag_first_shift 0
+\#define HW_ATL_THM_LSO_TCP_FLAG_FIRST_SHIFT 0
/* width of bitfield lso_tcp_flag_first[b:0] */
-\#define thm_lso_tcp_flag_first_width 12
+\#define HW_ATL_THM_LSO_TCP_FLAG_FIRST_WIDTH 12
/* default value of bitfield lso_tcp_flag_first[b:0] */
#define thm_lso_tcp_flag_first_default 0x0
+#define HW_ATL_THM_LSO_TCP_FLAG_FIRST_DEFAULT 0x0

/* tx lso_tcp_flag_last[b:0] bitfield definitions
 * preprocessor definitions for the bitfield "lso_tcp_flag_last[b:0]". 
@@ -1520,17 +1546,17 @@
 */

/* register address for bitfield lso_tcp_flag_last[b:0] */
-#define thm_lso_tcp_flag_last_adr 0x00007824
+#define HW_ATL_THM_LSO_TCP_FLAG_LAST_ADR 0x00007824
 /* bitmask for bitfield lso_tcp_flag_last[b:0] */
-#define thm_lso_tcp_flag_last_msk 0x00000fff
+#define HW_ATL_THM_LSO_TCP_FLAG_LAST_MSK 0x00000fff
 /* inverted bitmask for bitfield lso_tcp_flag_last[b:0] */
-#define thm_lso_tcp_flag_last_mskn 0xfffff000
+#define HW_ATL_THM_LSO_TCP_FLAG_LAST_MSKN 0xfffff000
 /* lower bit position of bitfield lso_tcp_flag_last[b:0] */
-#define thm_lso_tcp_flag_last_shift 0
+#define HW_ATL_THM_LSO_TCP_FLAG_LAST_SHIFT 0
 /* width of bitfield lso_tcp_flag_last[b:0] */
-#define thm_lso_tcp_flag_last_width 12
+#define HW_ATL_THM_LSO_TCP_FLAG_LAST_WIDTH 12
 /* default value of bitfield lso_tcp_flag_last[b:0] */
-#define thm_lso_tcp_flag_last_default 0x0
+#define HW_ATL_THM_LSO_TCP_FLAG_LAST_DEFAULT 0x0

/* tx lso_tcp_flag_mid[b:0] bitfield definitions
 * preprocessor definitions for the bitfield "lso_tcp_flag_mid[b:0]". 
@@ -1538,17 +1564,17 @@
 */

/* Register address for bitfield lro_rsc_max[1F:0] */
-#define rpo_lro_rsc_max_adr 0x00005598
+#define HW_ATL_RPO_LRO_RSC_MAX_ADR 0x00005598
 /* Bitmask for bitfield lro_rsc_max[1F:0] */
-#define rpo_lro_rsc_max_msk 0xFFFFFFFF
+#define HW_ATL_RPO_LRO_RSC_MAX_MSK 0xFFFFFFFF
 /* Inverted bitmask for bitfield lro_rsc_max[1F:0] */
-#define rpo_lro_rsc_max_mskn 0x00000000
+#define HW_ATL_RPO_LRO_RSC_MAX_MSKN 0x00000000
 /* Lower bit position of bitfield lro_rsc_max[1F:0] */
-#define rpo_lro_rsc_max_shift 0
+#define HW_ATL_RPO_LRO_RSC_MAX_SHIFT 0
 /* Width of bitfield lro_rsc_max[1F:0] */
-#define rpo_lro_rsc_max_width 32
+#define HW_ATL_RPO_LRO_RSC_MAX_WIDTH 32
 /* Default value of bitfield lro_rsc_max[1F:0] */
/* RX lro_en[1F:0] Bitfield Definitions
* Preprocessor definitions for the bitfield "lro_en[1F:0]".
@@ -1556,17 +1582,17 @@
*/

/* Register address for bitfield lro_en[1F:0] */
#define rpo_lro_en_adr 0x00005590
+#define HW_ATL_RPO_LRO_EN_ADR 0x00005590
/* Bitmask for bitfield lro_en[1F:0] */
#define rpo_lro_en_msk 0xFFFFFFFF
-#define HW_ATL_RPO_LRO_EN_MSK 0xFFFFFFFF
/* Inverted bitmask for bitfield lro_en[1F:0] */
-#define rpo_lro_en_mskn 0x00000000
-#define HW_ATL_RPO_LRO_EN_MSKN 0x00000000
/* Lower bit position of bitfield lro_en[1F:0] */
-#define rpo_lro_en_shift 0
-#define HW_ATL_RPO_LRO_EN_SHIFT 0
/* Width of bitfield lro_en[1F:0] */
-#define rpo_lro_en_width 32
+define HW_ATL_RPO_LRO_EN_WIDTH 32
/* Default value of bitfield lro_en[1F:0] */
-#define rpo_lro_en_default 0x0
-#define HW_ATL_RPO_LRO_EN_DEFAULT 0x0

/* RX lro_ptopt_en Bitfield Definitions
* Preprocessor definitions for the bitfield "lro_ptopt_en".
@@ -1574,17 +1600,17 @@
*/

/* Register address for bitfield lro_ptopt_en */
#define rpo_lro_ptopt_en_adr 0x00005594
+define HW_ATL_RPO_LRO_PTOPT_EN_ADR 0x00005594
/* Bitmask for bitfield lro_ptopt_en */
#define rpo_lro_ptopt_en_msk 0x00008000
-#define HW_ATL_RPO_LRO_PTOPT_EN_MSK 0x00008000
/* Inverted bitmask for bitfield lro_ptopt_en */
-#define rpo_lro_ptopt_en_mskn 0xFFFF7FFF
-#define HW_ATL_RPO_LRO_PTOPT_EN_MSKN 0xFFFF7FFF
/* Lower bit position of bitfield lro_ptopt_en */
-#define rpo_lro_ptopt_en_shift 15
+define HW_ATL_RPO_LRO_PTOPT_EN_SHIFT 15
/* Width of bitfield lro_ptopt_en */
-#define rpo_lro_ptopt_en_width 1
+define HW_ATL_RPO_LRO_PTOPT_EN_WIDTH 1
/* Default value of bitfield lro_ptopt_en */
#define rpo_lro_ptopt_en_defalt 0x1
+#define HW_ATL_RPO_LRO_PTOPT_EN_DEFAULT 0x1

/* RX lro_q_ses_lmt Bitfield Definitions
 * Preprocessor definitions for the bitfield "lro_q_ses_lmt".
 @@ -1592,17 +1618,17 @@ *
 */

 /* Register address for bitfield lro_q_ses_lmt */
-#define rpo_lro_qses_lmt_adr 0x00005594
+#define HW_ATL_RPO_LRO_QSES_LMT_ADR 0x00005594
 /* Bitmask for bitfield lro_q_ses_lmt */
-#define rpo_lro_qses_lmt_msk 0x00003000
+#define HW_ATL_RPO_LRO_QSES_LMT_MSK 0x00003000
 /* Inverted bitmask for bitfield lro_q_ses_lmt */
-#define rpo_lro_qses_lmt_mskn 0xFFFFCFFF
+#define HW_ATL_RPO_LRO_QSES_LMT_MSKN 0xFFFFCFFF
 /* Lower bit position of bitfield lro_q_ses_lmt */
-#define rpo_lro_qses_lmt_shift 12
+#define HW_ATL_RPO_LRO_QSES_LMT_SHIFT 12
 /* Width of bitfield lro_q_ses_lmt */
-#define rpo_lro_qses_lmt_width 2
+#define HW_ATL_RPO_LRO_QSES_LMT_WIDTH 2
 /* Default value of bitfield lro_q_ses_lmt */
-#define rpo_lro_qses_lmt_default 0x1
+#define HW_ATL_RPO_LRO_QSES_LMT_DEFAULT 0x1

/* RX lro_tot_dsc_lmt[1:0] Bitfield Definitions
 * Preprocessor definitions for the bitfield "lro_tot_dsc_lmt[1:0]".
 @@ -1610,17 +1636,17 @@ *
 */

 /* Register address for bitfield lro_tot_dsc_lmt[1:0] */
-#define rpo_lro_tot_dsc_lmt_adr 0x00005594
+#define HW_ATL_RPO_LRO_TOT_DSC_LMT_ADR 0x00005594
 /* Bitmask for bitfield lro_tot_dsc_lmt[1:0] */
-#define rpo_lro_tot_dsc_lmt_msk 0x00000060
+#define HW_ATL_RPO_LRO_TOT_DSC_LMT_MSK 0x00000060
 /* Inverted bitmask for bitfield lro_tot_dsc_lmt[1:0] */
-#define rpo_lro_tot_dsc_lmt_mskn 0xFFFFFF9F
+#define HW_ATL_RPO_LRO_TOT_DSC_LMT_MSKN 0xFFFFFF9F
 /* Lower bit position of bitfield lro_tot_dsc_lmt[1:0] */
-#define rpo_lro_tot_dsc_lmt_shift 5
+#define HW_ATL_RPO_LRO_TOT_DSC_LMT_SHIFT 5
 /* Width of bitfield lro_tot_dsc_lmt[1:0] */
-#define rpo_lro_tot_dsc_lmt_width 2
+#define HW_ATL_RPO_LRO_TOT_DSC_LMT_WIDTH 2
 /* Default value of bitfield lro_tot_dsc_lmt[1:0] */
/* RX lro_pkt_min[4:0] Bitfield Definitions
   * Preprocessor definitions for the bitfield "lro_pkt_min[4:0]".
   @ @ -1628,22 +1654,22 @ @
   */

/* Register address for bitfield lro_pkt_min[4:0] */
-#define rpo_lro_pkt_min_adr 0x00005594
+#define HW_ATL_RPO_LRO_PKT_MIN_ADR 0x00005594
/* Bitmask for bitfield lro_pkt_min[4:0] */
-#define rpo_lro_pkt_min_msk 0x0000001F
+#define HW_ATL_RPO_LRO_PKT_MIN_MSK 0x0000001F
/* Inverted bitmask for bitfield lro_pkt_min[4:0] */
-#define rpo_lro_pkt_min_mskn 0xFFFFFFE0
+#define HW_ATL_RPO_LRO_PKT_MIN_MSKN 0xFFFFFFE0
/* Lower bit position of bitfield lro_pkt_min[4:0] */
-#define rpo_lro_pkt_min_shift 0
+#define HW_ATL_RPO_LRO_PKT_MIN_SHIFT 0
/* Width of bitfield lro_pkt_min[4:0] */
-#define rpo_lro_pkt_min_width 5
+#define HW_ATL_RPO_LRO_PKT_MIN_WIDTH 5
/* Default value of bitfield lro_pkt_min[4:0] */
-#define rpo_lro_pkt_min_default 0x8
+#define HW_ATL_RPO_LRO_PKT_MIN_DEFAULT 0x8

/* Width of bitfield lro[L]_des_max[1:0] */
-#define rpo_lro_ldes_max_width 2
+#define HW_ATL_RPO_LRO_LDES_MAX_WIDTH 2
/* Default value of bitfield lro[L]_des_max[1:0] */
-#define rpo_lro_ldes_max_default 0x0
+#define HW_ATL_RPO_LRO_LDES_MAX_DEFAULT 0x0

/* RX lro_tb_div[11:0] Bitfield Definitions
   * Preprocessor definitions for the bitfield "lro_tb_div[11:0]"
   @ @ -1651,17 +1677,17 @ @
   */

/* Register address for bitfield lro_tb_div[11:0] */
-#define rpo_lro_tb_div_adr 0x00005620
+#define HW_ATL_RPO_LRO_TB_DIV_ADR 0x00005620
/* Bitmask for bitfield lro_tb_div[11:0] */
-#define rpo_lro_tb_div_msk 0xFFF00000
+#define HW_ATL_RPO_LRO_TB_DIV_MSK 0xFFF00000
/* Inverted bitmask for bitfield lro_tb_div[11:0] */
-#define rpo_lro_tb_div_mskn 0x000FFFFF
+#define HW_ATL_RPO_LRO_TB_DIV_MSKN 0x000FFFFF
/* Lower bit position of bitfield lro_tb_div[11:0] */
#define rpo_lro_tb_div_shift 20
+#define HW_ATL_RPO_LRO_TB_DIV_SHIFT 20
/* Width of bitfield lro_tb_div[11:0] */
#define rpo_lro_tb_div_width 12
+#define HW_ATL_RPO_LRO_TB_DIV_WIDTH 12
/* Default value of bitfield lro_tb_div[11:0] */
#define rpo_lro_tb_div_default 0xC35
+#define HW_ATL_RPO_LRO_TB_DIV_DEFAULT 0xC35

/* RX lro_ina_ival[9:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "lro_ina_ival[9:0]".
@@ -1669,17 +1695,17 @@
*/
/* Register address for bitfield lro_ina_ival[9:0] */
#define rpo_lro_ina_ival_adr 0x00005620
+#define HW_ATL_RPO_LRO_INA_IVAL_ADR 0x00005620
/* Bitmask for bitfield lro_ina_ival[9:0] */
#define rpo_lro_ina_ival_msk 0x000FFC00
+#define HW_ATL_RPO_LRO_INA_IVAL_MSK 0x000FFC00
/* Inverted bitmask for bitfield lro_ina_ival[9:0] */
#define rpo_lro_ina_ival_mskn 0xFFF003FF
+#define HW_ATL_RPO_LRO_INA_IVAL_MSKN 0xFFF003FF
/* Lower bit position of bitfield lro_ina_ival[9:0] */
#define rpo_lro_ina_ival_shift 10
+#define HW_ATL_RPO_LRO_INA_IVAL_SHIFT 10
/* Width of bitfield lro_ina_ival[9:0] */
#define rpo_lro_ina_ival_width 10
+#define HW_ATL_RPO_LRO_INA_IVAL_WIDTH 10
/* Default value of bitfield lro_ina_ival[9:0] */
#define rpo_lro_ina_ival_default 0xA
+#define HW_ATL_RPO_LRO_INA_IVAL_DEFAULT 0xA

/* RX lro_max_ival[9:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "lro_max_ival[9:0]".
@@ -1687,17 +1713,17 @@
*/
/* Register address for bitfield lro_max_ival[9:0] */
#define rpo_lro_max_ival_adr 0x00005620
+#define HW_ATL_RPO_LRO_MAX_IVAL_ADR 0x00005620
/* Bitmask for bitfield lro_max_ival[9:0] */
#define rpo_lro_max_ival_msk 0x000003FF
+#define HW_ATL_RPO_LRO_MAX_IVAL_MSK 0x000003FF
/* Inverted bitmask for bitfield lro_max_ival[9:0] */
#define rpo_lro_max_ival_mskn 0xFFFFFC00
+#define HW_ATL_RPO_LRO_MAX_IVAL_MSKN 0xFFFFFC00
/* Lower bit position of bitfield lro_max_ival[9:0] */
#define rpo_lro_max_ival_shift 0
*/ Width of bitfield lro_max_ival[9:0] */
#define rpo_lro_max_ival_width 10
*/ Default value of bitfield lro_max_ival[9:0] */
#define rpo_lro_max_ival_default 0x19
*/ TX dca[D].cpuid[7:0] Bitfield Definitions */
Preprocessor definitions for the bitfield "dca[D].cpuid[7:0]".
@@ -1706,17 +1732,17 @@ */
*/ Register address for bitfield dca[D].cpuid[7:0] */
#define tdm_dca_dcpuuid_adr(dca) (0x00008400 + (dca) * 0x4)
*/ Bitmask for bitfield dca[D].cpuid[7:0] */
#define tdm_dca_dcpuuid_msk 0x000000FF
*/ Inverted bitmask for bitfield dca[D].cpuid[7:0] */
#define tdm_dca_dcpuuid_mskn 0xFFFFFF00
*/ Lower bit position of bitfield dca[D].cpuid[7:0] */
#define tdm_dca_dcpuuid_shift 0
*/ Width of bitfield dca[D].cpuid[7:0] */
#define tdm_dca_dcpuuid_width 8
*/ Default value of bitfield dca[D].cpuid[7:0] */
#define tdm_dca_dcpuuid_default 0x0
*/ TX dca[D].desc_en Bitfield Definitions */
Preprocessor definitions for the bitfield "dca[D].desc_en".
@@ -1725,17 +1751,17 @@ */
*/ Register address for bitfield dca[D].desc_en */
#define tdm_dca_ddesc_en_adr(dca) (0x00008400 + (dca) * 0x4)
*/ Bitmask for bitfield dca[D].desc_en */
#define tdm_dca_ddesc_en_msk 0x80000000
*/ Inverted bitmask for bitfield dca[D].desc_en */
#define tdm_dca_ddesc_en_mskn 0x7FFFFFFF
*/ Lower bit position of bitfield dca[D].desc_en */
#define tdm_dca_ddesc_en_shift 0
*/ Width of bitfield dca[D].desc_en */
#define tdm_dca_ddesc_en_width 8
*/ Default value of bitfield dca[D].desc_en */
#define tdm_dca_ddesc_en_default 0x0
*/ TX dca[D].desc_en Bitfield Definitions */
Preprocessor definitions for the bitfield "dca[D].desc_en".
@@ -1725,17 +1751,17 @@ */
/* Lower bit position of bitfield dca{D}_desc_en */
-#define tdm_dca_ddesc_en_shift 31
+#define HW_ATL_TDM_DCA_DDESC_EN_SHIFT 31
/* Width of bitfield dca{D}_desc_en */
-#define tdm_dca_ddesc_en_width 1
+#define HW_ATL_TDM_DCA_DDESC_EN_WIDTH 1
/* Default value of bitfield dca{D}_desc_en */
-#define tdm_dca_ddesc_en_default 0x0
+#define HW_ATL_TDM_DCA_DDESC_EN_DEFAULT 0x0

/* TX desc{D}_en Bitfield Definitions */
* Preprocessor definitions for the bitfield "desc{D}_en".
@@ -1744,17 +1770,17 @@ */
/* Register address for bitfield desc{D}_en */
-#define tdm_desc_den_adr(descriptor) (0x00007C08 + (descriptor) * 0x40)
+#define HW_ATL_TDM_DESC_DEN_ADR(descriptor) (0x00007C08 + (descriptor) * 0x40)
/* Bitmask for bitfield desc{D}_en */
-#define tdm_desc_den_msk 0x80000000
+#define HW_ATL_TDM_DESC_DEN_MSK 0x80000000
/* Inverted bitmask for bitfield desc{D}_en */
-#define tdm_desc_den_mskn 0x7FFFFFFF
+#define HW_ATL_TDM_DESC_DEN_MSKN 0x7FFFFFFF
/* Lower bit position of bitfield desc{D}_en */
-#define tdm_desc_den_shift 31
+#define HW_ATL_TDM_DESC_DEN_SHIFT 31
/* Width of bitfield desc{D}_en */
-#define tdm_desc_den_width 1
+#define HW_ATL_TDM_DESC_DEN_WIDTH 1
/* Default value of bitfield desc{D}_en */
-#define tdm_desc_den_default 0x0
+#define HW_ATL_TDM_DESC_DEN_DEFAULT 0x0

/* TX desc{D}_hd[C:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "desc{D}_hd[C:0]".
@@ -1763,15 +1789,15 @@ */
/* Register address for bitfield desc{D}_hd[C:0] */
-#define tdm_desc_dhd_adr(descriptor) (0x00007C0C + (descriptor) * 0x40)
+#define HW_ATL_TDM_DESC_DHD_ADR(descriptor) (0x00007C0C + (descriptor) * 0x40)
/* Bitmask for bitfield desc{D}_hd[C:0] */
-#define tdm_desc_dhd_msk 0x00001FFF
+#define HW_ATL_TDM_DESC_DHD_MSK 0x00001FFF
/* Inverted bitmask for bitfield desc{D}_hd[C:0] */
-#define tdm_desc_dhd_mskn 0xFFFFE000
+#define HW_ATL_TDM_DESC_DHD_MSKN 0xFFFFE000

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/* Lower bit position of bitfield desc{D}_hd[0:0] */
#define tdm_desc_dhd_shift 0
+#define HW_ATL_TDM_DESC_DHD_SHIFT 0
/* Width of bitfield desc{D}_hd[0:0] */
#define tdm_desc_dhd_width 13
+#define HW_ATL_TDM_DESC_DHD_WIDTH 13

/* TX desc{D}_len[9:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "desc{D}_len[9:0]".
@@ -1780,17 +1806,17 @@ *

/* Register address for bitfield desc{D}_len[9:0] */
-#define tdm_desc_dlen_adr(descriptor) (0x00007C08 + (descriptor) * 0x40)
+#define HW_ATL_TDM_DESC_DLEN_ADR(descriptor) (0x00007C08 + (descriptor) * 0x40)
/* Bitmask for bitfield desc{D}_len[9:0] */
-#define tdm_desc_dlen_msk 0x00001FF8
+#define HW_ATL_TDM_DESC_DLEN_MSK 0x00001FF8
/* Inverted bitmask for bitfield desc{D}_len[9:0] */
-#define tdm_desc_dlen_mskn 0xFFFFE007
+#define HW_ATL_TDM_DESC_DLEN_MSKN 0xFFFFE007
/* Lower bit position of bitfield desc{D}_len[9:0] */
-#define tdm_desc_dlen_shift 3
+#define HW_ATL_TDM_DESC_DLEN_SHIFT 3
/* Width of bitfield desc{D}_len[9:0] */
-#define tdm_desc_dlen_width 10
+#define HW_ATL_TDM_DESC_DLEN_WIDTH 10
/* Default value of bitfield desc{D}_len[9:0] */
-#define tdm_desc_dlen_default 0x0
+#define HW_ATL_TDM_DESC_DLEN_DEFAULT 0x0

/* TX desc{D}_wrb_thresh[6:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "desc{D}_wrb_thresh[6:0]".
@@ -1799,18 +1825,18 @@ *

/* Register address for bitfield desc{D}_wrb_thresh[6:0] */
-#define tdm_desc_dwrb_thresh_adr(descriptor) \
- (0x00007C18 + (descriptor) * 0x40)
+#define HW_ATL_TDM_DESC_DWRB_THRESH_ADR(descriptor) \
+ (0x00007C18 + (descriptor) * 0x40)
/* Bitmask for bitfield desc{D}_wrb_thresh[6:0] */
-#define tdm_desc_dwrb_thresh_msk 0x00007F00
+#define HW_ATL_TDM_DESC_DWRB_THRESH_MSK 0x00007F00
/* Inverted bitmask for bitfield desc{D}_wrb_thresh[6:0] */
-#define tdm_desc_dwrb_thresh_mskn 0xFFFF80FF
+#define HW_ATL_TDM_DESC_DWRB_THRESH_MSKN 0xFFFF80FF
/* Lower bit position of bitfield desc{D}_wrb_thresh[6:0] */
-#define tdm_desc_dwrb_thresh_shift 8
+#define HW_ATL_TDM_DESC_DWRB_THRESH_SHIFT 8
+define HW_ATL_TDM_DESC_DWRB_THRESH_SHIFT 8
/* Width of bitfield desc[D]_wrb_thresh[6:0] */
+define tdm_desc_dwrb_thresh_width 7
+define HW_ATL_TDM_DESC_DWRB_THRESH_WIDTH 7
/* Default value of bitfield desc[D]_wrb_thresh[6:0] */
+define tdm_desc_dwrb_thresh_default 0x0
+define HW_ATL_TDM_DESC_DWRB_THRESH_DEFAULT 0x0

/* TX tdm_int_mod_en Bitfield Definitions */
* Preprocessor definitions for the bitfield "tdm_int_mod_en".
@ @ -1818.34 +1844.34 @@ */

/* Register address for bitfield tdm_int_mod_en */
-define tdm_int_mod_en_adr 0x00007B40
+define HW_ATL_TDM_INT_MOD_EN_ADR 0x00007B40
/* Bitmask for bitfield tdm_int_mod_en */
-define tdm_int_mod_en_msk 0x00000010
+define HW_ATL_TDM_INT_MOD_EN_MSK 0x00000010
/* Inverted bitmask for bitfield tdm_int_mod_en */
-define tdm_int_mod_en_mskn 0xFFFFFFEF
+define HW_ATL_TDM_INT_MOD_EN_MSKN 0xFFFFFFEF
/* Lower bit position of bitfield tdm_int_mod_en */
-define tdm_int_mod_en_shift 4
+define HW_ATL_TDM_INT_MOD_EN_SHIFT 4
/* Width of bitfield tdm_int_mod_en */
-define tdm_int_mod_en_width 1
+define HW_ATL_TDM_INT_MOD_EN_WIDTH 1
/* Default value of bitfield tdm_int_mod_en */
-define tdm_int_mod_en_default 0x0
+define HW_ATL_TDM_INT_MOD_EN_DEFAULT 0x0

/* TX lso_tcp_flag_mid[B:0] Bitfield Definitions */
* Preprocessor definitions for the bitfield "lso_tcp_flag_mid[B:0]".
* PORT=":pif_thm_lso_tcp_flag_mid_i[11:0]"
* */
/* Register address for bitfield lso_tcp_flag_mid[b:0] */
-define thm_lso_tcp_flag_mid_adr 0x00007820
+define HW_ATL_THM_LSO_TCP_FLAG_MID_ADR 0x00007820
/* Bitmask for bitfield lso_tcp_flag_mid */
-define thm_lso_tcp_flag_mid_msk 0x0fff0000
+define HW_ATL_THM_LSO_TCP_FLAG_MID_MSK 0x0fff0000
/* Inverted bitmask for bitfield lso_tcp_flag_mid */
-define thm_lso_tcp_flag_mid_mskn 0xffff00ff
+define HW_ATL_THM_LSO_TCP_FLAG_MID_MSKN 0xffff00ff
/* Lower bit position of bitfield lso_tcp_flag_mid */
-define thm_lso_tcp_flag_mid_shift 16
+define HW_ATL_THM_LSO_TCP_FLAG_MID_SHIFT 16
/* width of bitfield lso_tcp_flag_mid[b:0] */
#define thm_lso_tcp_flag_mid_width 12
+#define HW_ATL_THM_LSO_TCP_FLAG_MID_WIDTH 12
/* default value of bitfield lso_tcp_flag_mid[b:0] */
#define thm_lso_tcp_flag_mid_default 0x0
+#define HW_ATL_THM_LSO_TCP_FLAG_MID_DEFAULT 0x0

/* tx tx_buf_en bitfield definitions
 * preprocessor definitions for the bitfield "tx_buf_en".
@@ -1853,17 +1879,17 @@
 */
/* register address for bitfield tx_buf_en */
#define tpb_tx_buf_en_adr 0x00007900
+#define HW_ATL_TPB_TX_BUF_EN_ADR 0x00007900
/* bitmask for bitfield tx_buf_en */
#define tpb_tx_buf_en_msk 0x00000001
+#define HW_ATL_TPB_TX_BUF_EN_MSK 0x00000001
/* inverted bitmask for bitfield tx_buf_en */
#define tpb_tx_buf_en_mskn 0xfffffffe
+#define HW_ATL_TPB_TX_BUF_EN_MSKN 0xfffffffe
/* lower bit position of bitfield tx_buf_en */
#define tpb_tx_buf_en_shift 0
+#define HW_ATL_TPB_TX_BUF_EN_SHIFT 0
/* width of bitfield tx_buf_en */
#define tpb_tx_buf_en_width 1
+#define HW_ATL_TPB_TX_BUF_EN_WIDTH 1
/* default value of bitfield tx_buf_en */
#define tpb_tx_buf_en_default 0x0
+#define HW_ATL_TPB_TX_BUF_EN_DEFAULT 0x0

/* tx tx{b}_hi_thresh[c:0] bitfield definitions
 * preprocessor definitions for the bitfield "tx{b}_hi_thresh[c:0]".
@@ -1872,17 +1898,17 @@
 */
/* register address for bitfield tx{b}_hi_thresh */
#define tpb_txbhi_thresh_adr(buffer) (0x00007914 + (buffer) * 0x10)
+#define HW_ATL_TPB_TXBHI_THRESH_ADR(buffer) (0x00007914 + (buffer) * 0x10)
/* bitmask for bitfield tx{b}_hi_thresh[c:0] */
#define tpb_txbhi_thresh_msk 0x1fff0000
+#define HW_ATL_TPB_TXBHI_THRESH_MSK 0x1fff0000
/* inverted bitmask for bitfield tx{b}_hi_thresh[c:0] */
#define tpb_txbhi_thresh_mskn 0xe000ffff
+#define HW_ATL_TPB_TXBHI_THRESH_MSKN 0xe000ffff
/* lower bit position of bitfield tx{b}_hi_thresh[c:0] */
#define tpb_txbhi_thresh_shift 16
+#define HW_ATL_TPB_TXBHI_THRESH_SHIFT 16
/* width of bitfield tx{b}_hi_thresh[c:0] */
#define tpb_txbhi_thresh_width 13
+#define HW_ATL_TPB_TXBHIVAL_THRESH_WIDTH 13
/* default value of bitfield tx{b}_hi_thresh[c:0] */
#define tpb_txbhi_thresh_default 0x0
+#define HW_ATL_TPB_TXBHIVAL_THRESH_DEFAULT 0x0

/* tx tx{b}_lo_thresh[c:0] bitfield definitions */
* preprocessor definitions for the bitfield "tx{b}_lo_thresh[c:0]".
@@ -1891,17 +1917,17 @@
*/

/* register address for bitfield tx{b}_lo_thresh[c:0] */
-#define tpb_txblo_thresh_adr(buffer) (0x00007914 + (buffer) * 0x10)
+#define HW_ATL_TPB_TXBLO_THRESH_ADR(buffer) (0x00007914 + (buffer) * 0x10)
/* bitmask for bitfield tx{b}_lo_thresh[c:0] */
-#define tpb_txblo_thresh_msk 0x00001fff
+#define HW_ATL_TPB_TXBLO_THRESH_MSK 0x00001fff
/* inverted bitmask for bitfield tx{b}_lo_thresh[c:0] */
-#define tpb_txblo_thresh_mskn 0xffffffe000
+#define HW_ATL_TPB_TXBLO_THRESH_MSKN 0xffffffe000
/* lower bit position of bitfield tx{b}_lo_thresh[c:0] */
-#define tpb_txblo_thresh_shift 0
+#define HW_ATL_TPB_TXBLO_THRESH_SHIFT 0
/* width of bitfield tx{b}_lo_thresh[c:0] */
-#define tpb_txblo_thresh_width 13
+#define HW_ATL_TPB_TXBLO_THRESH_WIDTH 13
/* default value of bitfield tx{b}_lo_thresh[c:0] */
-#define tpb_txblo_thresh_default 0x0
+#define HW_ATL_TPB_TXBLO_THRESH_DEFAULT 0x0

/* tx dma_sys_loopback bitfield definitions */
* preprocessor definitions for the bitfield "dma_sys_loopback".
@@ -1909,17 +1935,17 @@
*/

/* register address for bitfield dma_sys_loopback */
-#define tpb_dma_system_loopback_adr 0x00007000
+#define HW_ATL_TPB_DMA_SYS_LBK_ADR 0x00007000
/* bitmask for bitfield dma_sys_loopback */
-#define tpb_dma_system_loopback_msk 0x00000040
+#define HW_ATL_TPB_DMA_SYS_LBK_MSK 0x00000040
/* inverted bitmask for bitfield dma_sys_loopback */
-#define tpb_dma_system_loopback_mskn 0xffffffbf
+#define HW_ATL_TPB_DMA_SYS_LBK_MSKN 0xffffffbf
/* lower bit position of bitfield dma_sys_loopback */
-#define tpb_dma_system_loopback_shift 6
+#define HW_ATL_TPB_DMA_SYS_LBK_SHIFT 6
/* width of bitfield dma_sys_loopback */
#define tpb_dma_sys_loopback_width 1
+#define HW_ATL_TPB_DMA_SYS_LBK_WIDTH 1
/* default value of bitfield dma_sys_loopback */
#define tpb_dma_sys_loopback_default 0x0
+#define HW_ATL_TPB_DMA_SYS_LBK_DEFAULT 0x0

/* tx tx{b}_buf_size[7:0] bitfield definitions */
* preprocessor definitions for the bitfield "tx{b}_buf_size[7:0]".
@@ -1928,17 +1954,17 @@
 */

/* register address for bitfield tx{b}_buf_size[7:0] */
-#define tpb_txbbuf_size_addr(buffer) (0x00007910 + (buffer) * 0x10)
+#define HW_ATL_TPB_TXBBUF_SIZE_ADR(buffer) (0x00007910 + (buffer) * 0x10)
/* bitmask for bitfield tx{b}_buf_size[7:0] */
-#define tpb_txbbuf_size_msk 0x000000ff
+#define HW_ATL_TPB_TXBBUF_SIZE_MSK 0x000000ff
/* inverted bitmask for bitfield tx{b}_buf_size[7:0] */
-#define tpb_txbbuf_size_mskn 0xffffff00
+#define HW_ATL_TPB_TXBBUF_SIZE_MSKN 0xffffff00
/* lower bit position of bitfield tx{b}_buf_size[7:0] */
-#define tpb_txbbuf_size_shift 0
+#define HW_ATL_TPB_TXBBUF_SIZE_SHIFT 0
/* width of bitfield tx{b}_buf_size[7:0] */
-#define tpb_txbbuf_size_width 8
+#define HW_ATL_TPB_TXBBUF_SIZE_WIDTH 8
/* default value of bitfield tx{b}_buf_size[7:0] */
-#define tpb_txbbuf_size_default 0x0
+#define HW_ATL_TPB_TXBBUF_SIZE_DEFAULT 0x0

/* tx tx_scp_ins_en bitfield definitions */
* preprocessor definitions for the bitfield "tx_scp_ins_en".
@@ -1946,17 +1972,17 @@
 */

/* register address for bitfield tx_scp_ins_en */
-#define tpb_tx_scp_ins_en_addr 0x00007900
+#define HW_ATL_TPB_TX_SCP_INS_EN_ADR 0x00007900
/* bitmask for bitfield tx_scp_ins_en */
-#define tpb_tx_scp_ins_en_msk 0x00000004
+#define HW_ATL_TPB_TX_SCP_INS_EN_MSK 0x00000004
/* inverted bitmask for bitfield tx_scp_ins_en */
-#define tpb_tx_scp_ins_en_mskn 0xfffffffb
+#define HW_ATL_TPB_TX_SCP_INS_EN_MSKN 0xfffffffb
/* lower bit position of bitfield tx_scp_ins_en */
-#define tpb_tx_scp_ins_en_shift 2
+#define HW_ATL_TPB_TX_SCP_INS_EN_SHIFT 2
/* width of bitfield tx_scp_ins_en */
#define tpb_tx_scp_ins_en_width 1
+#define HW_ATL_TXP_TX_SCP_INS_EN_WIDTH 1
/* default value of bitfield tx_scp_ins_en */
#define tpb_tx_scp_ins_en_default 0x0
+#define HW_ATL_TXP_TX_SCP_INS_EN_DEFAULT 0x0

/* tx ipv4_chk_en bitfield definitions
 * preprocessor definitions for the bitfield "ipv4_chk_en".
 @@ -1964,17 +1990,17 @@ */

/* register address for bitfield ipv4_chk_en */
-#define tpo_ipv4chk_en_adr 0x00007800
+#define HW_ATL_TPO_IPV4CHK_EN_ADR 0x00007800
/* bitmask for bitfield ipv4_chk_en */
-#define tpo_ipv4chk_en_msk 0x00000002
+#define HW_ATL_TPO_IPV4CHK_EN_MSK 0x00000002
/* inverted bitmask for bitfield ipv4_chk_en */
-#define tpo_ipv4chk_en_mskn 0xfffffffd
+#define HW_ATL_TPO_IPV4CHK_EN_MSKN 0xfffffffd
/* lower bit position of bitfield ipv4_chk_en */
-#define tpo_ipv4chk_en_shift 1
+#define HW_ATL_TPO_IPV4CHK_EN_SHIFT 1
/* width of bitfield ipv4_chk_en */
-#define tpo_ipv4chk_en_width 1
+#define HW_ATL_TPO_IPV4CHK_EN_WIDTH 1
/* default value of bitfield ipv4_chk_en */
-#define tpo_ipv4chk_en_default 0x0
+#define HW_ATL_TPO_IPV4CHK_EN_DEFAULT 0x0

/* tx l4_chk_en bitfield definitions
 * preprocessor definitions for the bitfield "l4_chk_en".
 @@ -1982,17 +2008,17 @@ */

/* register address for bitfield l4_chk_en */
-#define tpol4chk_en_adr 0x00007800
+#define HW_ATL_TPOL4CHK_EN_ADR 0x00007800
/* bitmask for bitfield l4_chk_en */
-#define tpol4chk_en_msk 0x00000001
+#define HW_ATL_TPOL4CHK_EN_MSK 0x00000001
/* inverted bitmask for bitfield l4_chk_en */
-#define tpol4chk_en_mskn 0xfffffffe
+#define HW_ATL_TPOL4CHK_EN_MSKN 0xfffffffe
/* lower bit position of bitfield l4_chk_en */
-#define tpol4chk_en_shift 0
+#define HW_ATL_TPOL4CHK_EN_SHIFT 0
/* width of bitfield l4_chk_en */
#define tpol4chk_en_width 1
+#define HW_ATL_TPOL4CHK_EN_WIDTH 1
/* default value of bitfield l4_chk_en */
#define tpol4chk_en_default 0x0
+#define HW_ATL_TPOL4CHK_EN_DEFAULT 0x0

/* tx pkt_sys_loopback bitfield definitions */
* preprocessor definitions for the bitfield "pkt_sys_loopback".
@@ -2000,17 +2026,17 @@
*/
/* register address for bitfield pkt_sys_loopback */
#define tpo_pkt_sys_lbk_adr 0x00007000
+#define HW_ATL_TPO_PKT_SYS_LBK_ADR 0x00007000
/* bitmask for bitfield pkt_sys_loopback */
#define tpo_pkt_sys_lbk_msk 0x00000080
+#define HW_ATL_TPO_PKT_SYS_LBK_MSK 0x00000080
/* inverted bitmask for bitfield pkt_sys_loopback */
#define tpo_pkt_sys_lbk_mskn 0xffffff7f
+#define HW_ATL_TPO_PKT_SYS_LBK_MSKN 0xffffff7f
/* lower bit position of bitfield pkt_sys_loopback */
#define tpo_pkt_sys_lbk_shift 7
+#define HW_ATL_TPO_PKT_SYS_LBK_SHIFT 7
/* width of bitfield pkt_sys_loopback */
#define tpo_pkt_sys_lbk_width 1
+#define HW_ATL_TPO_PKT_SYS_LBK_WIDTH 1
/* default value of bitfield pkt_sys_loopback */
#define tpo_pkt_sys_lbk_default 0x0
+#define HW_ATL_TPO_PKT_SYS_LBK_DEFAULT 0x0

/* tx data_tc_arb_mode bitfield definitions */
* preprocessor definitions for the bitfield "data_tc_arb_mode".
@@ -2018,17 +2044,17 @@
*/
/* register address for bitfield data_tc_arb_mode */
#define tps_data_tc_arb_mode_adr 0x00007100
+#define HW_ATL_TPS_DATA_TC_ARB_MODE_ADR 0x00007100
/* bitmask for bitfield data_tc_arb_mode */
#define tps_data_tc_arb_mode_msk 0x00000001
+#define HW_ATL_TPS_DATA_TC_ARB_MODE_MSK 0x00000001
/* inverted bitmask for bitfield data_tc_arb_mode */
#define tps_data_tc_arb_mode_mskn 0xfffffffe
+#define HW_ATL_TPS_DATA_TC_ARB_MODE_MSKN 0xfffffffe
/* lower bit position of bitfield data_tc_arb_mode */
#define tps_data_tc_arb_mode_shift 0
+#define HW_ATL_TPS_DATA_TC_ARB_MODE_SHIFT 0
/* width of bitfield data_tc_arb_mode */
#define tps_data_tc_arb_mode_width 1
+#define HW_ATL_TPS_DATA_TC_ARB_MODE_WIDTH 1
/* default value of bitfield data_tc_arb_mode */
#define tps_data_tc_arb_mode_default 0x0
+#define HW_ATL_TPS_DATA_TC_ARB_MODE_DEFAULT 0x0

/* tx desc_rate_ta_rst bitfield definitions */
* preprocessor definitions for the bitfield "desc_rate_ta_rst".
@@ -2036,17 +2062,17 @@
 */

/* register address for bitfield desc_rate_ta_rst */
#define tps_desc_rate_ta_rst_adr 0x00007310
+#define HW_ATL_TPS_DESC_RATE_TA_RST_ADR 0x00007310
/* bitmask for bitfield desc_rate_ta_rst */
#define tps_desc_rate_ta_rst_msk 0x80000000
+#define HW_ATL_TPS_DESC_RATE_TA_RST_MSK 0x80000000
/* inverted bitmask for bitfield desc_rate_ta_rst */
#define tps_desc_rate_ta_rst_mskn 0x7fffffff
+#define HW_ATL_TPS_DESC_RATE_TA_RST_MSKN 0x7fffffff
/* lower bit position of bitfield desc_rate_ta_rst */
#define tps_desc_rate_ta_rst_shift 31
+#define HW_ATL_TPS_DESC_RATE_TA_RST_SHIFT 31
/* width of bitfield desc_rate_ta_rst */
#define tps_desc_rate_ta_rst_width 1
+#define HW_ATL_TPS_DESC_RATE_TA_RST_WIDTH 1
/* default value of bitfield desc_rate_ta_rst */
#define tps_desc_rate_ta_rst_default 0x0
+#define HW_ATL_TPS_DESC_RATE_TA_RST_DEFAULT 0x0

/* tx desc_rate_limit[a:0] bitfield definitions */
* preprocessor definitions for the bitfield "desc_rate_limit[a:0]".
@@ -2054,17 +2080,17 @@
 */

/* register address for bitfield desc_rate_limit[a:0] */
#define tps_desc_rate_lim_adr 0x00007310
+#define HW_ATL_TPS_DESC_RATE_LIM_ADR 0x00007310
/* bitmask for bitfield desc_rate_limit[a:0] */
#define tps_desc_rate_lim_msk 0x000007ff
+#define HW_ATL_TPS_DESC_RATE_LIM_MSK 0x000007ff
/* inverted bitmask for bitfield desc_rate_limit[a:0] */
#define tps_desc_rate_lim_mskn 0xfffff800
+#define HW_ATL_TPS_DESC_RATE_LIM_MSKN 0xfffff800
/* lower bit position of bitfield desc_rate_limit[a:0] */
#define tps_desc_rate_lim_shift 0
+#define HW_ATL_TPS_DESC_RATE_LIM_SHIFT 0
/* width of bitfield desc_rate_limit[a:0] */
#define tps_desc_rate_limit_width 11
+#define HW_ATL_TPS_DESC_RATE_LIM_WIDTH 11
/* default value of bitfield desc_rate_limit[a:0] */
#define tps_desc_rate_limit_default 0x0
+#define HW_ATL_TPS_DESC_RATE_LIM_DEFAULT 0x0

/* tx desc_tc_arb_mode[1:0] bitfield definitions
 * preprocessor definitions for the bitfield "desc_tc_arb_mode[1:0]".
@@ -2072,17 +2098,17 @@*/
/* register address for bitfield desc_tc_arb_mode[1:0] */
#define tps_desc_tc_arb_mode_adr 0x00007200
+#define HW_ATL_TPS_DESC_TC_ARB_MODE_ADR 0x00007200
/* bitmask for bitfield desc_tc_arb_mode[1:0] */
#define tps_desc_tc_arb_mode_msk 0x00000003
+#define HW_ATL_TPS_DESC_TC_ARB_MODE_MSK 0x00000003
/* inverted bitmask for bitfield desc_tc_arb_mode[1:0] */
#define tps_desc_tc_arb_mode_mskn 0xfffffffc
+#define HW_ATL_TPS_DESC_TC_ARB_MODE_MSKN 0xfffffffc
/* lower bit position of bitfield desc_tc_arb_mode[1:0] */
#define tps_desc_tc_arb_mode_shift 0
+#define HW_ATL_TPS_DESC_TC_ARB_MODE_SHIFT 0
/* width of bitfield desc_tc_arb_mode[1:0] */
#define tps_desc_tc_arb_mode_width 2
+#define HW_ATL_TPS_DESC_TC_ARB_MODE_WIDTH 2
/* default value of bitfield desc_tc_arb_mode[1:0] */
#define tps_desc_tc_arb_mode_default 0x0
+#define HW_ATL_TPS_DESC_TC_ARB_MODE_DEFAULT 0x0

/* tx desc_tc[1]_credit_max[b:0] bitfield definitions
 * preprocessor definitions for the bitfield "desc_tc[1]_credit_max[b:0]".
@@ -2091,17 +2117,17 @@*/
/* register address for bitfield desc_tc[1]_credit_max[b:0] */
#define tps_desc_tctcredit_max_adr(tc) (0x00007210 + (tc) * 0x4)
+#define HW_ATL_TPS_DESC_TCTCREDIT_MAX_ADR(tc) (0x00007210 + (tc) * 0x4)
/* bitmask for bitfield desc_tc[1]_credit_max[b:0] */
#define tps_desc_tctcredit_max_msk 0x0fff0000
+#define HW_ATL_TPS_DESC_TCTCREDIT_MAX_MSK 0x0fff0000
/* inverted bitmask for bitfield desc_tc[1]_credit_max[b:0] */
#define tps_desc_tctcredit_max_mskn 0xf000ffff
+#define HW_ATL_TPS_DESC_TCTCREDIT_MAX_MSKN 0xf000ffff
/* lower bit position of bitfield desc_tc[1]_credit_max[b:0] */
#define tps_desc_tctcredit_max_shift 16
+#define HW_ATL_TPS_DESC_TCTCREDIT_MAX_SHIFT 16
/* width of bitfield desc_tc[t].credit_max[8:0] */
#define tps_desc_tctcredit_max_width 12
+#define HW_ATL_TPS_DESC_TCTCREDIT_MAX_WIDTH 12
/* default value of bitfield desc_tc[t].credit_max[8:0] */
#define tps_desc_tctcredit_max_default 0x0
+#define HW_ATL_TPS_DESC_TCTCREDIT_MAX_DEFAULT 0x0

/* tx desc_tc[t].weight[8:0] bitfield definitions */
* preprocessor definitions for the bitfield "desc_tc[t].weight[8:0]".
@@ -2110,17 +2136,17 @@
*/

/* register address for bitfield desc_tc[t].weight[8:0] */
-#define tps_desc_tctweight_adr(tc) (0x00007210 + (tc) * 0x4)
+#define HW_ATL_TPS_DESC_TCTWEIGHT_ADR(tc) (0x00007210 + (tc) * 0x4)
/* bitmask for bitfield desc_tc[t].weight[8:0] */
-#define tps_desc_tctweight_msk 0x000001ff
+#define HW_ATL_TPS_DESC_TCTWEIGHT_MSK 0x000001ff
/* inverted bitmask for bitfield desc_tc[t].weight[8:0] */
-#define tps_desc_tctweight_mskn 0xfffffe00
+#define HW_ATL_TPS_DESC_TCTWEIGHT_MSKN 0xfffffe00
/* lower bit position of bitfield desc_tc[t].weight[8:0] */
-#define tps_desc_tctweight_shift 0
+#define HW_ATL_TPS_DESC_TCTWEIGHT_SHIFT 0
/* width of bitfield desc_tc[t].weight[8:0] */
-#define tps_desc_tctweight_width 9
+#define HW_ATL_TPS_DESC_TCTWEIGHT_WIDTH 9
/* default value of bitfield desc_tc[t].weight[8:0] */
-#define tps_desc_tctweight_default 0x0
+#define HW_ATL_TPS_DESC_TCTWEIGHT_DEFAULT 0x0

/* tx desc_vm_arb_mode bitfield definitions */
* preprocessor definitions for the bitfield "desc_vm_arb_mode".
@@ -2128,17 +2154,17 @@
*/

/* register address for bitfield desc_vm_arb_mode */
-#define tps_desc_vm_arb_mode_adr 0x00007300
+#define HW_ATL_TPS_DESC_VM_ARB_MODE_ADR 0x00007300
/* bitmask for bitfield desc_vm_arb_mode */
-#define tps_desc_vm_arb_mode_msk 0x00000001
+#define HW_ATL_TPS_DESC_VM_ARB_MODE_MSK 0x00000001
/* inverted bitmask for bitfield desc_vm_arb_mode */
-#define tps_desc_vm_arb_mode_mskn 0xfffffffe
+#define HW_ATL_TPS_DESC_VM_ARB_MODE_MSKN 0xfffffffe
/* lower bit position of bitfield desc_vm_arb_mode */
-#define tps_desc_vm_arb_mode_shift 0
+#define HW_ATL_TPS_DESC_VM_ARB_MODE_SHIFT 0

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/* width of bitfield desc_vm_arb_mode */
#define tps_desc_vm_arb_mode_width 1
+#define HW_ATL_TPS_DESC_VM_ARB_MODE_WIDTH 1
/* default value of bitfield desc_vm_arb_mode */
#define tps_desc_vm_arb_mode_default 0x0
+#define HW_ATL_TPS_DESC_VM_ARB_MODE_DEFAULT 0x0

/* tx data_tc{t}_credit_max[b:0] bitfield definitions */
/* preprocessor definitions for the bitfield "data_tc{t}_credit_max[b:0]". */
@@ -2147,17 +2173,17 @@
 */

/* register address for bitfield data_tc{t}_credit_max[b:0] */
#define tps_data_tctcredit_max_adr(tc) (0x00007110 + (tc) * 0x4)
+#define HW_ATL_TPS_DATA_TCTCREDIT_MAX_ADR(tc) (0x00007110 + (tc) * 0x4)
/* bitmask for bitfield data_tc{t}_credit_max[b:0] */
#define tps_data_tctcredit_max_msk 0x0fff0000
+#define HW_ATL_TPS_DATA_TCTCREDIT_MAX_MSK 0x0fff0000
/* inverted bitmask for bitfield data_tc{t}_credit_max[b:0] */
#define tps_data_tctcredit_max_mskn 0xf000ffff
+#define HW_ATL_TPS_DATA_TCTCREDIT_MAX_MSKN 0xf000ffff
/* lower bit position of bitfield data_tc{t}_credit_max[b:0] */
#define tps_data_tctcredit_max_shift 16
+#define HW_ATL_TPS_DATA_TCTCREDIT_MAX_SHIFT 16
/* width of bitfield data_tc{t}_credit_max[b:0] */
#define tps_data_tctcredit_max_width 12
+#define HW_ATL_TPS_DATA_TCTCREDIT_MAX_WIDTH 12
/* default value of bitfield data_tc{t}_credit_max[b:0] */
#define tps_data_tctcredit_max_default 0x0
+#define HW_ATL_TPS_DATA_TCTCREDIT_MAX_DEFAULT 0x0

/* tx data_tc{t}_weight[8:0] bitfield definitions */
/* preprocessor definitions for the bitfield "data_tc{t}_weight[8:0]". */
@@ -2166,17 +2192,17 @@
 */

/* register address for bitfield data_tc{t}_weight[8:0] */
#define tps_data_tctweight_adr(tc) (0x00007110 + (tc) * 0x4)
+#define HW_ATL_TPS_DATA_TCTWEIGHTADR(tc) (0x00007110 + (tc) * 0x4)
/* bitmask for bitfield data_tc{t}_weight[8:0] */
#define tps_data_tctweight_msk 0x000001ff
+#define HW_ATL_TPS_DATA_TCTWEIGHT_MSK 0x000001ff
/* inverted bitmask for bitfield data_tc{t}_weight[8:0] */
#define tps_data_tctweight_mskn 0xfffffe00
+#define HW_ATL_TPS_DATA_TCTWEIGHT_MSKN 0xfffffe00
/* lower bit position of bitfield data_tc{t}_weight[8:0] */
#define tps_data_tctweight_shift 0
+#define HW_ATL_TPS_DATA_TCTWEIGHT_SHIFT 0
/* width of bitfield data_t[tc]{t}_weight[8:0] */
#define tps_data_tctweight_width 9
+#define HW_ATL_TPS_DATA_TCTWEIGHT_WIDTH 9
/* default value of bitfield data_t[tc]{t}_weight[8:0] */
#define tps_data_tctweight_default 0x0
+#define HW_ATL_TPS_DATA_TCTWEIGHT_DEFAULT 0x0

/* tx_reg_res_dsbl bitfield definitions
 * preprocessor definitions for the bitfield "reg_res_dsbl".
@@ -2184,17 +2210,17 @@*/
/* register address for bitfield reg_res_dsbl */
#define tx_reg_res_dsbl_adr 0x00007000
+#define HW_ATL_TX_REG_RES_DSBL_ADR 0x00007000
/* bitmask for bitfield reg_res_dsbl */
#define tx_reg_res_dsbl_msk 0x20000000
+#define HW_ATL_TX_REG_RES_DSBL_MSK 0x20000000
/* inverted bitmask for bitfield reg_res_dsbl */
#define tx_reg_res_dsbl_mskn 0xdfffffff
+#define HW_ATL_TX_REG_RES_DSBL_MSKN 0xdfffffff
/* lower bit position of bitfield reg_res_dsbl */
#define tx_reg_res_dsbl_shift 29
+#define HW_ATL_TX_REG_RES_DSBL_SHIFT 29
/* width of bitfield reg_res_dsbl */
#define tx_reg_res_dsbl_width 1
+#define HW_ATL_TX_REG_RES_DSBL_WIDTH 1
/* default value of bitfield reg_res_dsbl */
#define tx_reg_res_dsbl_default 0x1
+#define HW_ATL_TX_REG_RES_DSBL_DEFAULT 0x1

/* mac_phy register access busy bitfield definitions
 * preprocessor definitions for the bitfield "register access busy".
@@ -2202,15 +2228,15 @@*/
/* register address for bitfield register access busy */
#define msm_reg_access_busy_adr 0x00004400
+#define HW_ATL_MSM_REG_ACCESS_BUSY_ADR 0x00004400
/* bitmask for bitfield register access busy */
#define msm_reg_access_busy_msk 0x00001000
+#define HW_ATL_MSM_REG_ACCESS_BUSY_MSK 0x00001000
/* inverted bitmask for bitfield register access busy */
#define msm_reg_access_busy_mskn 0xffffefff
+#define HW_ATL_MSM_REG_ACCESS_BUSY_MSKN 0xffffefff
/* lower bit position of bitfield register access busy */
#define msm_reg_access_busy_shift 12
+#define HW_ATL_MSM_REG_ACCESS_BUSY_SHIFT 12
/* width of bitfield register access busy */
#define msm_reg_access_busy_width 1
+#define HW_ATL_MSM_REG_ACCESS_BUSY_WIDTH 1

/* mac_phy msm register address[7:0] bitfield definitions */
/* preprocessor definitions for the bitfield "msm register address[7:0]". */
@ @ -2218,17 +2244,17 @@ */

/* register address for bitfield msm register address[7:0] */
#define msm_reg_addr_adr 0x00004400
+#define HW_ATL_MSM_REG_ADDR_ADR 0x00004400
/* bitmask for bitfield msm register address[7:0] */
#define msm_reg_addr_msk 0x000000ff
+#define HW_ATL_MSM_REG_ADDR_MSK 0x000000ff
/* inverted bitmask for bitfield msm register address[7:0] */
#define msm_reg_addr_mskn 0xffffff00
+#define HW_ATL_MSM_REG_ADDR_MSKN 0xffffff00
/* lower bit position of bitfield msm register address[7:0] */
#define msm_reg_addr_shift 0
+#define HW_ATL_MSM_REG_ADDR_SHIFT 0
/* width of bitfield msm register address[7:0] */
#define msm_reg_addr_width 8
+#define HW_ATL_MSM_REG_ADDR_WIDTH 8
/* default value of bitfield msm register address[7:0] */
#define msm_reg_addr_default 0x0
+#define HW_ATL_MSM_REG_ADDR_DEFAULT 0x0

/* mac_phy register read strobe bitfield definitions */
/* preprocessor definitions for the bitfield "register read strobe". */
@ @ -2236,17 +2262,17 @@ */

/* register address for bitfield register read strobe */
#define msm_reg_rd_strobe_adr 0x00004400
+#define HW_ATL_MSM_REG_RD_STROBE_ADDR 0x00004400
/* bitmask for bitfield register read strobe */
#define msm_reg_rd_strobe_msk 0x00000200
+#define HW_ATL_MSM_REG_RD_STROBE_MSK 0x00000200
/* inverted bitmask for bitfield register read strobe */
#define msm_reg_rd_strobe_mskn 0xffffffdf
+#define HW_ATL_MSM_REG_RD_STROBE_MSKN 0xffffffdf
/* lower bit position of bitfield register read strobe */
#define msm_reg_rd_strobe_shift 9
+#define HW_ATL_MSM_REG_RD_STROBE_SHIFT 9
/* width of bitfield register read strobe */
#define msm_reg_rd_strobe_width 1
+#define HW_ATL_MSM_REG_RD_STROBE_WIDTH 1
/* default value of bitfield register read strobe */
-#define msm_reg_rd_strobe_default 0x0
+#define HW_ATL_MSM_REG_RD_STROBE_DEFAULT 0x0

/* mac_phy msm register read data[31:0] bitfield definitions
 * preprocessor definitions for the bitfield "msm register read data[31:0]".
@@ -2254,15 +2280,15 @@*/
/* register address for bitfield msm register read data[31:0] */
-#define msm_reg_rd_data_adr 0x00004408
+#define HW_ATL_MSM_REG_RD_DATA_ADR 0x00004408
/* bitmask for bitfield msm register read data[31:0] */
-#define msm_reg_rd_data_msk 0xffffffff
+#define HW_ATL_MSM_REG_RD_DATA_MSK 0xffffffff
/* inverted bitmask for bitfield msm register read data[31:0] */
-#define msm_reg_rd_data_mskn 0x00000000
+#define HW_ATL_MSM_REG_RD_DATA_MSKN 0x00000000
/* lower bit position of bitfield msm register read data[31:0] */
-#define msm_reg_rd_data_shift 0
+#define HW_ATL_MSM_REG_RD_DATA_SHIFT 0
/* width of bitfield msm register read data[31:0] */
-#define msm_reg_rd_data_width 32
+#define HW_ATL_MSM_REG_RD_DATA_WIDTH 32

/* mac_phy msm register write data[31:0] bitfield definitions
 * preprocessor definitions for the bitfield "msm register write data[31:0]".
@@ -2270,17 +2296,17 @@*/
/* register address for bitfield msm register write data[31:0] */
-#define msm_reg_wr_data_adr 0x00004404
+#define HW_ATL_MSM_REG_WR_DATA_ADR 0x00004404
/* bitmask for bitfield msm register write data[31:0] */
-#define msm_reg_wr_data_msk 0xffffffff
+#define HW_ATL_MSM_REG_WR_DATA_MSK 0xffffffff
/* inverted bitmask for bitfield msm register write data[31:0] */
-#define msm_reg_wr_data_mskn 0x00000000
+#define HW_ATL_MSM_REG_WR_DATA_MSKN 0x00000000
/* lower bit position of bitfield msm register write data[31:0] */
-#define msm_reg_wr_data_shift 0
+#define HW_ATL_MSM_REG_WR_DATA_SHIFT 0
/* width of bitfield msm register write data[31:0] */
-#define msm_reg_wr_data_width 32
+#define HW_ATL_MSM_REG_WR_DATA_WIDTH 32
/* default value of bitfield msm register write data[31:0] */
-#define msm_reg_wr_data_default 0x0
+#define HW_ATL_MSM_REG_WR_DATA_DEFAULT 0x0

---

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/* mac_phy register write strobe bitfield definitions */
* preprocessor definitions for the bitfield "register write strobe".
@@ -2288,17 +2314,17 @@ */

/* register address for bitfield register write strobe */
#define msm_reg_wr_strobe_adr 0x00004400
+define HW_ATL_MSM_REG_WR_STROBE_ADR 0x00004400
/* bitmask for bitfield register write strobe */
#define msm_reg_wr_strobe_msk 0x00000100
+define HW_ATL_MSM_REG_WR_STROBE_MSK 0x00000100
/* inverted bitmask for bitfield register write strobe */
#define msm_reg_wr_strobe_mskn 0xfffffeff
+define HW_ATL_MSM_REG_WR_STROBE_MSKN 0xfffffeff
/* lower bit position of bitfield register write strobe */
#define msm_reg_wr_strobe_shift 8
+define HW_ATL_MSM_REG_WR_STROBE_SHIFT 8
/* width of bitfield register write strobe */
#define msm_reg_wr_strobe_width 1
+define HW_ATL_MSM_REG_WR_STROBE_WIDTH 1
/* default value of bitfield register write strobe */
#define msm_reg_wr_strobe_default 0x0
+define HW_ATL_MSM_REG_WR_STROBE_DEFAULT 0x0

/* mif soft reset bitfield definitions */
* preprocessor definitions for the bitfield "soft reset".
@@ -2306,17 +2332,17 @@ */

/* register address for bitfield soft reset */
#define glb_soft_res_adr 0x00000000
+define HW_ATL_GLB_SOFT_RES_ADR 0x00000000
/* bitmask for bitfield soft reset */
#define glb_soft_res_msk 0x00008000
+define HW_ATL_GLB_SOFT_RES_MSK 0x00008000
/* inverted bitmask for bitfield soft reset */
#define glb_soft_res_mskn 0xffff7fff
+define HW_ATL_GLB_SOFT_RES_MSKN 0xffff7fff
/* lower bit position of bitfield soft reset */
#define glb_soft_res_shift 15
+define HW_ATL_GLB_SOFT_RES_SHIFT 15
/* width of bitfield soft reset */
#define glb_soft_res_width 1
+define HW_ATL_GLB_SOFT_RES_WIDTH 1
/* default value of bitfield soft reset */
#define glb_soft_res_default 0x0
+define HW_ATL_GLB_SOFT_RES_DEFAULT 0x0
/* mif register reset disable bitfield definitions
 * preprocessor definitions for the bitfield "register reset disable".
@@ -2324,27 +2350,27 @@
*/

/* register address for bitfield register reset disable */
#define HW_ATL_GLB_REG_RES_DIS_ADR 0x00000000
#define HW_ATL_GLB_REG_RES_DIS_MSK 0x00004000
#define HW_ATL_GLB_REG_RES_DIS_MSKN 0xffffbfff
#define HW_ATL_GLB_REG_RES_DIS_SHIFT 14
#define HW_ATL_GLB_REG_RES_DIS_WIDTH 1
#define HW_ATL_GLB_REG_RES_DIS_DEFAULT 0x1

/* tx dma debug control definitions */
#define HW_ATL_TX_DMA_DEBUG_CTL_ADR 0x00008920u

/* tx dma descriptor base address msw definitions */
#define HW_ATL_TX_DMA_DESC_BASE_ADDRMSW_ADR(descriptor) (0x00007c04u + (descriptor) * 0x40)

/* tx dma total request limit */
#define HW_ATL_TX_DMA_TOTAL_REQ_LIMIT_ADR 0x00007b20u

/* tx interrupt moderation control register definitions
 * Preprocessor definitions for TX Interrupt Moderation Control Register
@@ -2352,7 -2378,7 @@

/* pcie reg_res_dsbl bitfield definitions

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* preprocessor definitions for the bitfield "reg_res_dsbl".
@@ -2360,22 +2386,36 @@
/* register address for bitfield reg_res_dsbl */
-#define pci_reg_res_dsbl_adr 0x00001000
+#define HW_ATL_PCI_REG_RES_DSBL_ADR 0x00001000
/* bitmask for bitfield reg_res_dsbl */
-#define pci_reg_res_dsbl_msk 0x20000000
+#define HW_ATL_PCI_REG_RES_DSBL_MSK 0x20000000
/* inverted bitmask for bitfield reg_res_dsbl */
-#define pci_reg_res_dsbl_mskn 0xdfffffff
+#define HW_ATL_PCI_REG_RES_DSBL_MSKN 0xdfffffff
/* lower bit position of bitfield reg_res_dsbl */
-#define pci_reg_res_dsbl_shift 29
+#define HW_ATL_PCI_REG_RES_DSBL_SHIFT 29
/* width of bitfield reg_res_dsbl */
-#define pci_reg_res_dsbl_width 1
+#define HW_ATL_PCI_REG_RES_DSBL_WIDTH 1
/* default value of bitfield reg_res_dsbl */
-#define pci_reg_res_dsbl_default 0x1
+#define HW_ATL_PCI_REG_RES_DSBL_DEFAULT 0x1

 /* PCI core control register */
-#define pci_reg_control6_adr 0x1014u
+#define HW_ATL_PCI_REG_CONTROL6_ADR 0x1014u

 /* global microprocessor scratch pad definitions */
-#define glb_cpu_scratch_scp_adr(scratch_scp) (0x00000300u + (scratch_scp) * 0x4)
+#define HW_ATL_GLB_CPU_SCRATCH_SCP_ADR(scratch_scp) \
+(0x00000300u + (scratch_scp) * 0x4)
+
+/* register address for bitfield uP Force Interrupt */
+#define HW_ATL_MCP_UP_FORCE_INTERRUPT_ADR 0x00000404
+/* bitmask for bitfield uP Force Interrupt */
+#define HW_ATL_MCP_UP_FORCE_INTERRUPT_MSK 0x00000002
+/* inverted bitmask for bitfield uP Force Interrupt */
+#define HW_ATL_MCP_UP_FORCE_INTERRUPT_MSKN 0xFFFFFFFF
+/* lower bit position of bitfield uP Force Interrupt */
+#define HW_ATL_MCP_UP_FORCE_INTERRUPT_SHIFT 1
+/* width of bitfield uP Force Interrupt */
+#define HW_ATL_MCP_UP_FORCE_INTERRUPT_WIDTH 1
+/* default value of bitfield uP Force Interrupt */
+#define HW_ATL_MCP_UP_FORCE_INTERRUPT_DEFAULT 0x0

#endif /* HW_ATL_LLH_INTERNAL_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_utils.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_utils.c
@@ -11,62 +11,305 @@
 /* abstraction layer.
 */

#include ".\aq_hw.h"
+include ".\aq_nic.h"
#include ".\aq_pci_func.h"
-include ".\aq_ring.h"
-include ".\aq_vec.h"
#include ".\aq_pci_func.h"
#include ".\aq_vec.h"
#include "hw_atl_utils.h"
#include "hw_atl_llh.h"
+/include "hw_atl_llh_internal.h"

#include <linux/random.h>

#define HW_ATL_UCP_0X370_REG 0x0370U

+define HW_ATL_MIF_CMD 0x0200U
+define HW_ATL_MIF_ADDR 0x0208U
+define HW_ATL_MIF_VAL 0x020CU
+
#define HW_ATL_FW_SM_RAM 0x2U
+define HW_ATL_MPI_FW_VERSION 0x18
#define HW_ATL_MPI_CONTROL_ADR 0x0368U
#define HW_ATL_MPI_STATE_ADR 0x036CU
#define HW_ATL_MPI_STATE_MSK 0x00FFU
#define HW_ATL_MPI_STATE_SHIFT 0U
-define HW_ATL_MPI_SPEED_MSK 0xFFFFU
+define HW_ATL_MPI_SPEED_MSK 0xFFFF0000U
#define HW_ATL_MPI_SPEED_SHIFT 16U

+define HW_ATL_MPI_DAISY_CHAIN_STATUS 0x704
+define HW_ATL_MPI_BOOT_EXIT_CODE 0x388
+
+define HW_ATL_MAC_PHY_CONTROL 0x4000
+define HW_ATL_MAC_PHY_MPI_RESET_BIT 0x1D
+
+define HW_ATL_FW_VER_1X 0x01050006U
+define HW_ATL_FW_VER_2X 0x02000000U
+define HW_ATL_FW_VER_3X 0x03000000U
+
+define FORCE_FLASHLESS 0
+
+define hw_atl_utils_ver_match(u32 ver_expected, u32 ver_actual);

static int hw_atl_utils_fw_downld_dwords(struct aq_hw_s *self, u32 a,
- u32 *p, u32 cnt)
+static int hw_atl_utils_fw_downld_dwords(struct aq_hw_s *self, u32 a,
- u32 *p, u32 cnt)
+static int hw_atl_utils_mpi_set_state(struct aq_hw_s *self,
+    enum hal_atl_utils_fw_state_e state);
+
+int hw_atl_utils_initfw(struct aq_hw_s *self, const struct aq_fw_ops **fw_ops)
+{
    int err = 0;

    -AQ_HW_WAIT_FOR(reg_glb_cpu_sem_get(self,
        -HW_ATL_FW_SM_RAM) == 1U,
        -1U, 10000U);
    +err = hw_atl_utils_soft_reset(self);
    +if (err)
    +return err;
    +
    +hw_atl_utils_hw_chip_features_init(self,
        +&self->chip_features);
    +
    +hw_atl_utils_get_fw_version(self, &self->fw_ver_actual);
    +
    +if (hw_atl_utils_ver_match(HW_ATL_FW_VER_1X,
        +self->fw_ver_actual) == 0) {
        +*fw_ops = &aq_fw_1x_ops;
    } else if (hw_atl_utils_ver_match(HW_ATL_FW_VER_2X,
        +self->fw_ver_actual) == 0) {
        +*fw_ops = &aq_fw_2x_ops;
    } else if (hw_atl_utils_ver_match(HW_ATL_FW_VER_3X,
        +self->fw_ver_actual) == 0) {
        +*fw_ops = &aq_fw_2x_ops;
    } else {
        +aq_pr_err("Bad FW version detected: \%x\n",
            +self->fw_ver_actual);
        +return -EOPNOTSUPP;
    }
    self->aq_fw_ops = *fw_ops;
    +err = self->aq_fw_ops->init(self);
    +return err;
}
+
+static int hw_atl_utils_soft_reset_flb(struct aq_hw_s *self)
+{
    +u32 gsr, val;
    +int k = 0;
    +
    +aq_hw_write_reg(self, 0x404, 0x40e1);
    +AQ_HW_SLEEP(50);
    +
    +/* Cleanup SPI */
    +val = aq_hw_read_reg(self, 0x53C);
+aq_hw_write_reg(self, 0x53C, val | 0x10);
+
+gsr = aq_hw_read_reg(self, HW_ATL_GLB_SOFT_RES_ADR);
+aq_hw_write_reg(self, HW_ATL_GLB_SOFT_RES_ADR, (gsr & 0xBFFF) | 0x8000);
+
+/* Kickstart MAC */
+aq_hw_write_reg(self, 0x404, 0x80e0);
+aq_hw_write_reg(self, 0x32a8, 0x0);
+aq_hw_write_reg(self, 0x520, 0x1);
+
+/* Reset SPI again because of possible interrupted SPI burst */
+val = aq_hw_read_reg(self, 0x53C);
+aq_hw_write_reg(self, 0x53C, val | 0x10);
+AQ_HW_SLEEP(10);
+/* Clear SPI reset state */
+aq_hw_write_reg(self, 0x53C, val & ~0x10);
+
+aq_hw_write_reg(self, 0x404, 0x180e0);
+
+for (k = 0; k < 1000; k++) {
+u32 flb_status = aq_hw_read_reg(self, HW_ATL_MPI_DAISY_CHAIN_STATUS);
+
+flb_status = flb_status & 0x10;
+if (flb_status)
+break;
+AQ_HW_SLEEP(10);
+}
+
+if (k == 1000) {
+aq_pr_err("MAC kickstart failed\n");
+return -EIO;
+}
+
+/* FW reset */
+aq_hw_write_reg(self, 0x404, 0x80e0);
+AQ_HW_SLEEP(50);
+aq_hw_write_reg(self, 0x3a0, 0x1);
+
+/* Kickstart PHY - skipped */
+
+/* Global software reset*/
+hw_atl_rx_rx_reg_res_dis_set(self, 0U);
+hw_atl_tx_tx_reg_res_dis_set(self, 0U);
+aq_hw_write_reg_bit(self, HW_ATL_MAC_PHY_CONTROL, BIT(HW_ATL_MAC_PHY_MPI_RESET_BIT),
+HW_ATL_MAC_PHY_MPI_RESET_BIT, 0x0);
+gsr = aq_hw_read_reg(self, HW_ATL_GLB_SOFT_RES_ADR);
+aq_hw_write_reg(self, HW_ATL_GLB_SOFT_RES_ADR, (gsr & 0xBFFF) | 0x8000);
+for (k = 0; k < 1000; k++) {
+u32 fw_state = aq_hw_read_reg(self, HW_ATL_MPI_FW_VERSION);
+if (fw_state)
+break;
+AQ_HW_SLEEP(10);
+}
+if (k == 1000) {
+aq_pr_err("FW kickstart failed\n");
+return -EIO;
+}
+/* Old FW requires fixed delay after init */
+AQ_HW_SLEEP(15);
+
+/* Old FW requires fixed delay after init */
+static int hw_atl_utils_soft_reset_rbl(struct aq_hw_s *self)
+{
+u32 gsr, val, rbl_status;
+int k;
+
+aq_hw_write_reg(self, 0x404, 0x40e1);
+aq_hw_write_reg(self, 0x3a0, 0x1);
+aq_hw_write_reg(self, 0x32a8, 0x0);
+
+/* Alter RBL status */
+aq_hw_write_reg(self, 0x388, 0xDEAD);
+
+/* Cleanup SPI */
+val = aq_hw_read_reg(self, 0x53C);
+aq_hw_write_reg(self, 0x53C, val | 0x10);
+
+/* Global software reset*/
+hw_atl_rx_rx_reg_res_dis_set(self, 0U);
+hw_atl_tx_tx_reg_res_dis_set(self, 0U);
+aq_hw_write_reg_bit(self, HW_ATL_MAC_PHY_CONTROL,
+BIT(HW_ATL_MAC_PHY_MPI_RESET_BIT),
+HW_ATL_MAC_PHY_MPI_RESET_BIT, 0x0);
+gsr = aq_hw_read_reg(self, HW_ATL_GLB_SOFT_RES_ADR);
+aq_hw_write_reg(self, HW_ATL_GLB_SOFT_RES_ADR,
+ (gsr & 0xFFFFBFFF) | 0x8000);
+
+if (FORCE_FLASHLESS)
+aq_hw_write_reg(self, 0x534, 0x0);
+
+aq_hw_write_reg(self, 0x404, 0x40e0);
+ /* Wait for RBL boot */
+for (k = 0; k < 1000; k++) {
+rbl_status = aq_hw_read_reg(self, 0x388) & 0xFFFF;
+if (rbl_status && rbl_status != 0xDEAD)
+break;
+AQ_HW_SLEEP(10);
+}
+if (!rbl_status || rbl_status == 0xDEAD) {
+aq_pr_err("RBL Restart failed");
+return -EIO;
+}
+
+ /* Restore NVR */
+if (FORCE_FLASHLESS)
+aq_hw_write_reg(self, 0x534, 0xA0);
+
+if (rbl_status == 0xF1A7) {
+aq_pr_err("No FW detected. Dynamic FW load not implemented\n");
+return -ENOTSUPP;
+}
+
+for (k = 0; k < 1000; k++) {
+u32 fw_state = aq_hw_read_reg(self, HW_ATL_MPI_FW_VERSION);
+
+if (fw_state)
+break;
+AQ_HW_SLEEP(10);
+}
+if (k == 1000) {
+aq_pr_err("FW kickstart failed\n");
+return -EIO;
+}
+/* Old FW requires fixed delay after init */
+AQ_HW_SLEEP(15);
+
+return 0;
+}
+
+int hw_atl_utils_soft_reset(struct aq_hw_s *self)
+{
+int k;
+u32 boot_exit_code = 0;
+
+for (k = 0; k < 1000; ++k) {
+u32 flb_status = aq_hw_read_reg(self, HW_ATL_MPI_DAISY_CHAIN_STATUS);
+boot_exit_code = aq_hw_read_reg(self,
if (k == 1000) {
  aq_pr_err("Neither RBL nor FLB firmware started\n");
  return -EOPNOTSUPP;
}

self->rbl_enabled = (boot_exit_code != 0);

/* FW 1.x may boot up in an invalid POWER state (WOL feature).
 * We should work around this by forcing its state back to DEINIT
 * */
if (!hw_atl_utils_ver_match(HW_ATL_FW_VER_1X,
  aq_hw_read_reg(self,
  HW_ATL_MPI_FW_VERSION))) {
  int err = 0;
  hw_atl_utils_mpi_set_state(self, MPI_DEINIT);
  AQ_HW_WAIT_FOR((aq_hw_read_reg(self, HW_ATL_MPI_STATE_ADR) &
  HW_ATL_MPI_STATE_MSK) == MPI_DEINIT,
  10, 1000U);
  if (err)
    return err;
}

if (self->rbl_enabled)
  return hw_atl_utils_soft_reset_rbl(self);
else
  return hw_atl_utils_soft_reset_flb(self);

int hw_atl_utils_fw_downld_dwords(struct aq_hw_s *self, u32 a,
  u32 *p, u32 cnt)
{
  int err = 0;
  AQ_HW_WAIT_FOR(hw_atl_reg_glb_cpu_sem_get(self,
  HW_ATL_FW_SM_RAM) == 1U,
  1U, 10000U);
  if (err < 0) { 
    bool is_locked;

    -reg_glb_cpu_sem_set(self, 1U, HW_ATL_FW_SM_RAM);
    -is_locked = reg_glb_cpu_sem_get(self, HW_ATL_FW_SM_RAM);

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+hw_atl_reg_glb_cpu_sem_set(self, 1U, HW_ATL_FW_SM_RAM);
+is_locked = hw_atl_reg_glb_cpu_sem_get(self, HW_ATL_FW_SM_RAM);
if (!is_locked) {
    err = -ETIME;
    goto err_exit;
}
}

-aq_hw_write_reg(self, 0x00000208U, a);
-
-for (++cnt; --cnt;) {
    -u32 i = 0U;
    +aq_hw_write_reg(self, HW_ATL_MIF_ADDR, a);

    -aq_hw_write_reg(self, 0x00000200U, 0x00008000U);
    +for (++cnt; --cnt && !err;) {
        +aq_hw_write_reg(self, HW_ATL_MIF_CMD, 0x00008000U);
        +for (i = 1024U;
            (0x100U & aq_hw_read_reg(self, 0x00000200U)) && --i;)
            +aq_hw_write_reg(self, 0x00000200U, 0x00008000U);
        
    -for (i = 1024U;
        -(0x100U & aq_hw_read_reg(self, 0x00000200U)) && --i;) {
    -}
    +if (IS_CHIP_FEATURE(REVISION_B1))
        +AQ_HW_WAIT_FOR(a != aq_hw_read_reg(self, HW_ATL_MIF_ADDR),
                        +1, 1000U);
    +else
        +AQ_HW_WAIT_FOR(!(0x100 & aq_hw_read_reg(self, HW_ATL_MIF_CMD)),
                        +1, 1000U);
    
    -*(p++) = aq_hw_read_reg(self, 0x0000020CU);
    +*(p++) = aq_hw_read_reg(self, HW_ATL_MIF_VAL);
    +a += 4;
}

-reg_glb_cpu_sem_set(self, 1U, HW_ATL_FW_SM_RAM);
+hw_atl_reg_glb_cpu_sem_set(self, 1U, HW_ATL_FW_SM_RAM);

err_exit:
return err;
@@ -78,26 +321,40 @@
int err = 0;
bool is_locked;

-is_locked = reg_glb_cpu_sem_get(self, HW_ATL_FW_SM_RAM);
+is_locked = hw_atl_reg_glb_cpu_sem_get(self, HW_ATL_FW_SM_RAM);
if (!is_locked) {
    err = -ETIME;

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goto err_exit;
}
+if (IS_CHIP_FEATURE(REVISION_B1)) {
+u32 offset = 0;

-aq_hw_write_reg(self, 0x00000208U, a);
+for (; offset < cnt; ++offset) {
+aq_hw_write_reg(self, 0x00000238, p[offset]);
+aq_hw_write_reg(self, 0x32C,
+((0x80000000 | (0xFFFF & (offset * 4))));
+hw_atl_mcp_up_force_intr_set(self, 1);
+/* 1000 times by 10us = 10ms */
+AQ_HW_WAIT_FOR((aq_hw_read_reg(self,
+ 0x32C) & 0xF0000000) !=
+ 0x80000000,
+ 10, 1000);
+}
+} else {
+u32 offset = 0;

-for (++cnt; --cnt;) {
-u32 i = 0U;
+aq_hw_write_reg(self, 0x208, a);

-aq_hw_write_reg(self, 0x0000020CU, *(p++));
-aq_hw_write_reg(self, 0x00000200U, 0xC000U);
+for (; offset < cnt; ++offset) {
+aq_hw_write_reg(self, 0x20C, p[offset]);
+aq_hw_write_reg(self, 0x200, 0xC000);

-for (i = 1024U;
-(0x100U & aq_hw_read_reg(self, 0x00000200U)) && --i) {
+AQ_HW_WAIT_FOR((aq_hw_read_reg(self, 0x200U) &
+0x100) == 0, 10, 1000);
}
}

-reg_glb_cpu_sem_set(self, 1U, HW_ATL_FW_SM_RAM);
+hw_atl_reg_glb_cpu_sem_set(self, 1U, HW_ATL_FW_SM_RAM);

err_exit:
return err;
@@ -119,7 +376,7 @@
}

static int hw_atl_utils_init_ucp(struct aq_hw_s *self,
- struct aq_hw_caps_s *aq_hw_caps)
+ const struct aq_hw_caps_s *aq_hw_caps)
{  
    int err = 0;

    @@ -133,20 +390,12 @@  
aq_hw_write_reg(self, HW_ATL_UCP_0X370_REG, ucp_0x370);
    }

    /* check 10 times by 1ms */
    -AQ_HW_WAIT_FOR(0U != (PHAL_ATLANTIC_A0->mbox_addr =
    +AQ_HW_WAIT_FOR(0U != (self->mbox_addr =
        aq_hw_read_reg(self, 0x360U)), 1000U, 10U);

    -err = hw_atl_utils_ver_match(aq_hw_caps->fw_ver_expected,
    -    aq_hw_read_reg(self, 0x18U));
    -
    -if (err < 0)
    -    pr_err("%s: Bad FW version detected: expected=%x, actual=%x\n",
    -        AQ_CFG_DRV_NAME,
    -        aq_hw_caps->fw_ver_expected,
    -        aq_hw_read_reg(self, 0x18U));
    return err;
    }

    @@ -165,7 +414,7 @@

    #define hw_atl_utils_fw_rpc_init(_H_) hw_atl_utils_fw_rpc_wait(_H_, NULL)

    static int hw_atl_utils_fw_rpc_call(struct aq_hw_s *self, unsigned int rpc_size)
    +int hw_atl_utils_fw_rpc_call(struct aq_hw_s *self, unsigned int rpc_size)
    {
        int err = 0;
        struct aq_hw_atl_utils_fw_rpc_tid_s sw;
        @@ -174,14 +423,14 @@
        err = -1;
        goto err_exit;
    }

    -err = hw_atl_utils_fw_upload_dwords(self, PHAL_ATLANTIC->rpc_addr,
    -    (u32 *)(void *)&PHAL_ATLANTIC->rpc,
    +err = hw_atl_utils_fw_upload_dwords(self, self->rpc_addr,
    +    (u32 *)(void *)&self->rpc,
            (rpc_size + sizeof(u32) -
                sizeof(u8)) / sizeof(u32));
        if (err < 0)
            goto err_exit;

    }
- sw.tid = 0xFFFFU & (++PHAL_ATLANTIC->rpc_tid);
+ sw.tid = 0xFFFFU & (++self->rpc_tid);
sw.len = (u16)rpc_size;
aq_hw_write_reg(self, HW_ATL_RPC_CONTROL_ADR, sw.val);

@@ -189,8 +438,8 @@
return err;
}

-int hw_atl_utils_fw_rpc_wait(struct aq_hw_s *self,
-    struct hw_aq_atl_utils_fw_rpc **rpc)
+int hw_atl_utils_fw_rpc_wait(struct aq_hw_s *self,
+    struct hw_aq_atl_utils_fw_rpc **rpc)
{
    int err = 0;
    struct aq_hw_atl_utils_fw_rpc_tid_s sw;
@@ -199,7 +448,7 @@
    do {
        sw.val = aq_hw_read_reg(self, HW_ATL_RPC_CONTROL_ADR);

-        PHAL_ATLANTIC->rpc_tid = sw.tid;
+        self->rpc_tid = sw.tid;

        AQ_HW_WAIT_FOR(sw.tid ==
                (fw.val =
@@ -221,9 +470,9 @@
                    if (fw.len) {
                        err =
                            hw_atl_utils_fw_downld_dwords(self,
-                                PHAL_ATLANTIC->rpc_addr,
+                                self->rpc_addr,
                                        (u32 *)(void *)
-                                &PHAL_ATLANTIC->rpc,
+                                &self->rpc,
                                               (fw.len + sizeof(u32) -
                                                sizeof(u8)) /
                                                sizeof(u32));
@@ -231,19 +480,18 @@
                        goto err_exit;
                    }

-                *rpc = &PHAL_ATLANTIC->rpc;
+                *rpc = &self->rpc;

            err_exit:
            return err;
        }


static int hw_atl_utils_mpi_create(struct aq_hw_s *self,  
struct aq_hw_caps_s *aq_hw_caps)
{
    int err = 0;

    err = hw_atl_utils_init_ucp(self, aq_hw_caps);
    if (err < 0)
        goto err_exit;

    struct hw_aq_atl_utils_mbox_header *pmbox)
    }

return hw_atl_utils_fw_downld_dwords(self,  
    PHAL_ATLANTIC->mbox_addr,  
    (u32 *)(void *)pmbox,  
    sizeof(*pmbox) / sizeof(u32));
}

int err = 0;
err = hw_atl_utils_fw_downld_dwords(self,  
    PHAL_ATLANTIC->mbox_addr,  
    (u32 *)(void *)pmbox,  
    sizeof(*pmbox) / sizeof(u32));
if (err < 0)
    goto err_exit;

self->aq_nic_cfg->mtu : 1514U;
pmbox->stats.ubrc = pmbox->stats.uprc * mtu;
pmbox->stats.ubtc = pmbox->stats.uptc * mtu;
- pmbox->stats.dpc = atomic_read(&PHAL_ATLANTIC_A0->dpc);  
+ pmbox->stats.dpc = atomic_read(&self->dpc);
} else {
    pmbox->stats.dpc = reg_rx_dma_stat_counter7get(self);
    + pmbox->stats.dpc = hw_atl_reg_rx_dma_stat_counter7get(self);
}

err_exit:;

-int hw_atl_utils_mpi_set_speed(struct aq_hw_s *self, u32 speed,  
    enum hal_atl_utils_fw_state_e state)
+int hw_atl_utils_mpi_set_speed(struct aq_hw_s *self, u32 speed)
void hw_atl_utils_mpi_set(struct aq_hw_s *self,
  - enum hal_atl_utils_fw_state_e state, u32 speed)
+ enum hal_atl_utils_fw_state_e state,
+ u32 speed)
{
  int err = 0;
  u32 transaction_id = 0;
  @@ -320,11 +568,22 @@
    goto err_exit;
}

-err = hw_atl_utils_mpi_set_speed(self, speed, state);
+aq_hw_write_reg(self, HW_ATL_MPI_CONTROL_ADR,
+(speed << HW_ATL_MPI_SPEED_SHIFT) | state);

err_exit:;
}

+static int hw_atl_utils_mpi_set_state(struct aq_hw_s *self,
+  - enum hal_atl_utils_fw_state_e state)
+{
+  u32 val = aq_hw_read_reg(self, HW_ATL_MPI_CONTROL_ADR);
+  +val = state | (val & HW_ATL_MPI_SPEED_MSK);
+  +aq_hw_write_reg(self, HW_ATL_MPI_CONTROL_ADR, val);
+  +return 0;
+}
+int hw_atl_utils_mpi_get_link_status(struct aq_hw_s *self)
{
  u32 cp0x036C = aq_hw_read_reg(self, HW_ATL_MPI_STATE_ADR);
  @@ -365,7 +624,6 @@
    return 0;
    }

int hw_atl_utils_get_mac_permanent(struct aq_hw_s *self,
  - struct aq_hw_caps_s *aq_hw_caps,
    u8 *mac)
int err = 0;
@@ -373,15 +631,6 @@
        u32 l = 0U;
        u32 mac_addr[2];

        -self->mmio = aq_pci_func_get_mmio(self->aq_pci_func);
        -
        -hw_atl_utils_hw_chip_features_init(self,
        -    &PHAL_ATLANTIC_A0->chip_features);
        -
        -err = hw_atl_utils_mpi_create(self, aq_hw_caps);
        -if (err < 0)
        -    goto err_exit;
        -
        if (!aq_hw_read_reg(self, HW_ATL_UCP_0X370_REG)) {
            unsigned int rnd = 0;
            unsigned int ucp_0x370 = 0;
@@ -396,7 +645,7 @@
                AQ_DIMOF(mac_addr));
                +    ARRAY_SIZE(mac_addr));
            if (err < 0) {
                mac_addr[0] = 0U;
                mac_addr[1] = 0U;
@@ -427,7 +676,6 @@
                mac[0] = (u8)(0xFFU & h);
            }

        -err_exit:
        return err;
    }

    void hw_atl_utils_hw_chip_features_init(struct aq_hw_s *self, u32 *p)
    {
        u32 chip_features = 0U;
        -u32 val = reg_glb_mif_id_get(self);
        +u32 val = hw_atl_reg_glb_mif_id_get(self);
        u32 mif_rev = val & 0xFFU;

        -if ((3U & mif_rev) == 1U) {
        -chip_features |=
        -HAL_ATLANTIC_UTILS_CHIP_REVISION_A0 |
        +if ((0xFU & mif_rev) == 1U) {
        +chip_features |= HAL_ATLANTIC_UTILS_CHIP_REVISION_A0 |
HAL_ATLANTIC_UTILS_CHIP_MPI_AQ |
HAL_ATLANTIC_UTILS_CHIP_MIPS;
-} else if ((3U & mif_rev) == 2U) {
  -chip_features |=
  -HAL_ATLANTIC_UTILS_CHIP_REVISION_B0 |
+} else if ((0xFU & mif_rev) == 2U) {
+chip_features |= HAL_ATLANTIC_UTILS_CHIP_REVISION_B0 |
+HAL_ATLANTIC_UTILS_CHIP_MPI_AQ |
+HAL_ATLANTIC_UTILS_CHIP_MIPS |
+HAL_ATLANTIC_UTILS_CHIP_TPO2 |
+HAL_ATLANTIC_UTILS_CHIP_RPF2;
+} else if ((0xFU & mif_rev) == 0xAU) {
+chip_features |= HAL_ATLANTIC_UTILS_CHIP_REVISION_B1 |
HAL_ATLANTIC_UTILS_CHIP_MPI_AQ |
HAL_ATLANTIC_UTILS_CHIP_MIPS |
HAL_ATLANTIC_UTILS_CHIP_TPO2 |
@@ -500,13 +752,13 @@

int hw_atl_utils_update_stats(struct aq_hw_s *self)
{
-struct hw_atl_s *hw_self = PHAL_ATLANTIC;
struct hw_aq_atl_utils_mbox mbox;

hw_atl_utils_mpi_read_stats(self, &mbox);

-#define AQ_SDELTA(_N_) (hw_self->curr_stats._N_ += \
-            mbox.stats._N_ - hw_self->last_stats._N_)
+#define AQ_SDELTA(_N_) (self->curr_stats._N_ += \
+            mbox.stats._N_ - self->last_stats._N_)
+
if (self->aq_link_status.mbps) {
AQ_SDELTA(uprc);
AQ_SDELTA(mprc);
@@ -527,19 +779,19 @@
AQ_SDELTA(dpc);
}
#undef AQ_SDELTA
-hw_self->curr_stats.dma_pkt_rc = stats_rx_dma_good_pkt_counterlsw_get(self);
-hw_self->curr_stats.dma_pkt_tc = stats_tx_dma_good_pkt_counterlsw_get(self);
-hw_self->curr_stats.dma_oct_rc = stats_rx_dma_good_octet_counterlsw_get(self);
-hw_self->curr_stats.dma_oct_tc = stats_tx_dma_good_octet_counterlsw_get(self);
+self->curr_stats.dma_pkt_rc = hw_atl_stats_rx_dma_good_pkt_counterlsw_get(self);
+self->curr_stats.dma_pkt_tc = hw_atl_stats_tx_dma_good_pkt_counterlsw_get(self);
+self->curr_stats.dma_oct_rc = hw_atl_stats_rx_dma_good_octet_counterlsw_get(self);
+self->curr_stats.dma_oct_tc = hw_atl_stats_tx_dma_good_octet_counterlsw_get(self);

-memcpy(&hw_self->last_stats, &mbox.stats, sizeof(mbox.stats));
+memcpy(&self->last_stats, &mbox.stats, sizeof(mbox.stats));
return 0;
}

struct aq_stats_s *hw_atl_utils_get_hw_stats(struct aq_hw_s *self)
{
    return &PHAL_ATLANTIC->curr_stats;
    return &self->curr_stats;
}

static const u32 hw_atl_utils_hw_mac_regs[] = {
    @@ -568,14 +820,14 @@
};

int hw_atl_utils_hw_get_regs(struct aq_hw_s *self, 
-    struct aq_hw_caps_s *aq_hw_caps, 
+    const struct aq_hw_caps_s *aq_hw_caps, 
    u32 *regs_buff)
{
    unsigned int i = 0U;
    for (i = 0; i < aq_hw_caps->mac_regs_count; i++)
        regs_buff[i] = aq_hw_read_reg(self, 
-            hw_atl_utils_hw_mac_regs[i]);
+            hw_atl_utils_hw_mac_regs[i]);
    return 0;
}

@@ -584,3 +836,13 @@
    *fw_version = aq_hw_read_reg(self, 0x18U);
    return 0;
}
+    +const struct aq_fw_ops aq_fw_1x_ops = {
+        .init = hw_atl_utils_mpi_create,
+        .reset = NULL,
+        .get_mac_permanent = hw_atl_utils_get_mac_permanent,
+        .set_link_speed = hw_atl_utils_mpi_set_speed,
+        .set_state = hw_atl_utils_mpi_set_state,
+        .update_link_status = hw_atl_utils_mpi_get_link_status,
+        .update_stats = hw_atl_utils_update_stats,
+    };
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_utils.h
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_utils.h
@@ -14,10 +14,39 @@
#ifndef HW_ATL_UTILS_H
#define HW_ATL_UTILS_H

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-include "./aq_common.h"
-
define HW_ATL_FLUSH() { (void)aq_hw_read_reg(self, 0x10); }

/* Hardware tx descriptor */
+struct __packed hw_atl_txd_s {
+u64 buf_addr;
+u32 ctl;
+u32 ctl2; /* 63..46 - payload length, 45 - ctx enable, 44 - ctx index */
+};
+
/* Hardware tx context descriptor */
+struct __packed hw_atl_txc_s {
+u32 rsvd;
+u32 len;
+u32 ctl;
+u32 len2;
+};
+
/* Hardware rx descriptor */
+struct __packed hw_atl_rxd_s {
+u64 buf_addr;
+u64 hdr_addr;
+};
+
/* Hardware rx descriptor writeback */
+struct __packed hw_atl_rxd_wb_s {
+u32 type;
+u32 rss_hash;
+u16 status;
+u16 pkt_len;
+u16 next_desc_ptr;
+u16 vlan;
+};
+
struct __packed hw_atl_stats_s {
u32 uprc;
u32 mprc;
@@ -126,35 +155,16 @@
struct hw_atl_stats_s stats;
};
-
-struct __packed hw_atl_s {
-struct aq_hw_s base;
-struct hw_atl_stats_s last_stats;
-struct aq_stats_s curr_stats;
-u64 speed;
-unsigned int chip_features;
- u32 fw_ver_actual;
- atomic_t dpc;
- u32 mbox_addr;
- u32 rpc_addr;
- u32 rpc_tid;
- struct hw_aq_atl_utils_fw_rpc rpc;
};

- #define SELF ((struct hw_atl_s *)self)

- #define PHAL_ATLANTIC ((struct hw_atl_s *)((void *)(self)))
- #define PHAL_ATLANTIC_A0 ((struct hw_atl_s *)((void *)(self)))
- #define PHAL_ATLANTIC_B0 ((struct hw_atl_s *)((void *)(self)))

- #define HAL_ATLANTIC_UTILS_CHIP_MIPS 0x00000001U
- #define HAL_ATLANTIC_UTILS_CHIP_TPO2 0x00000002U
- #define HAL_ATLANTIC_UTILS_CHIP_RPF2 0x00000004U
- #define HAL_ATLANTIC_UTILS_CHIP_MPI_AQ 0x00000010U
- #define HAL_ATLANTIC_UTILS_CHIP_REVISION_A0 0x01000000U
- #define HAL_ATLANTIC_UTILS_CHIP_REVISION_B0 0x02000000U
+ #define HAL_ATLANTIC_UTILS_CHIP_REVISION_B1 0x04000000U

#define IS_CHIP_FEATURE(_F_) (HAL_ATLANTIC_UTILS_CHIP_##_F_ & 
- PHAL_ATLANTIC->chip_features)
+ self->chip_features)

enum hal_atl_utils_fw_state_e {
    MPI_DEINIT = 0,
    @ @ -.171.6 +181.73 @ @
#define HAL_ATLANTIC_RATE_100M BIT(5)
#define HAL_ATLANTIC_RATE_INVALID BIT(6)

+enum hw_atl_fw2x_rate {
    +FW2X_RATE_100M = 0x20,
    +FW2X_RATE_1G = 0x100,
    +FW2X_RATE_2G5 = 0x200,
    +FW2X_RATE_5G = 0x400,
    +FW2X_RATE_10G = 0x800,
+};
+
+enum hw_atl_fw2x_caps_lo {
+CAPS_LO_10BASET_HD = 0x00,
+CAPS_LO_10BASET_FD,
+CAPS_LO_100BASETX_HD,
+CAPS_LO_100BASET4_HD,
+CAPS_LO_100BASET2_HD,
+CAPS_LO_100BASET2_FD,
+CAPS_LO_100BASET4_FD,
+CAPS_LO_1000BASET_HD,
+CAPS_LO_1000BASET_FD,
+CAPS_LO_2P5GBASET_FD,
+CAPS_LO_5GBASET_FD,
+CAPS_LO_10GBASET_FD,
+
+enum hw_atl_fw2x_caps_hi {
+  CAPS_HI_RESERVED1 = 0x00,
+  CAPS_HI_10BASET_EEE,
+  CAPS_HI_RESERVED2,
+  CAPS_HI_PAUSE,
+  CAPS_HIASYMMETRIC_PAUSE,
+  CAPS_HI_100BASETX_EEE,
+  CAPS_HI_RESERVED3,
+  CAPS_HI_RESERVED4,
+  CAPS_HI_1000BASET_FD_EEE,
+  CAPS_HI_2P5GBASET_FD_EEE,
+  CAPS_HI_5GBASET_FD_EEE,
+  CAPS_HI_10GBASET_FD_EEE,
+  CAPS_HI_RESERVED5,
+  CAPS_HI_RESERVED6,
+  CAPS_HI_RESERVED7,
+  CAPS_HI_RESERVED8,
+  CAPS_HI_RESERVED9,
+  CAPS_HI_CABLE_DIAG,
+  CAPS_HI_TEMPERATURE,
+  CAPS_HI_DOWNSHIFT,
+  CAPS_HI_PTP_AVB_EN,
+  CAPS_HI_MEDIA_DETECT,
+  CAPS_HI_LINK_DROP,
+  CAPS_HI_SLEEP_PROXY,
+  CAPS_HI_WAKE_UP,
+  CAPS_HI_MAC_STOP,
+  CAPS_HI_EXT_LOOPBACK,
+  CAPS_HI_INT_LOOPBACK,
+  CAPS_HI_EFUSE_AGENT,
+  CAPS_HI_WOL_TIMER,
+  CAPS_HI_STATISTICS,
+  CAPS_HI_TRANSACTION_ID,
+};
+
+struct aq_hw_s;
+struct aq_fw_ops;
+struct aq_hw_caps_s;
+struct aq_hw_link_status_s;
+
+int hw_atl_utils_initfw(struct aq_hw_s *self, const struct aq_fw_ops **fw_ops);
int hw_atl_utils_soft_reset(struct aq_hw_s *self);

void hw_atl_utils_hw_chip_features_init(struct aq_hw_s *self, u32 *p);

int hw_atl_utils_mpi_read_mbox(struct aq_hw_s *self,
                           int hw_atl_utils_soft_reset(struct aq_hw_s *self);
                           void hw_atl_utils_hw_chip_features_init(struct aq_hw_s *self, u32 *p);

int hw_atl_utils_mpi_set_speed(struct aq_hw_s *self, u32 speed,
                           -int hw_atl_utils_mpi_set_speed(struct aq_hw_s *self, u32 speed,
                           -  enum hal_atl_utils_fw_state_e state);
                           -
                           int hw_atl_utils_mpi_get_link_status(struct aq_hw_s *self);

int hw_atl_utils_get_mac_permanent(struct aq_hw_s *self,
                           - struct aq_hw_caps_s *aq_hw_caps,
                           - u8 *mac);

unsigned int hw_atl_utils_mbps_2_speed_index(unsigned int mbps);

int hw_atl_utils_hw_get_regs(struct aq_hw_s *self,
                           - struct aq_hw_caps_s *aq_hw_caps,
                           + const struct aq_hw_caps_s *aq_hw_caps,
                           + u32 *regs_buff);

int hw_atl_utils_hw_set_power(struct aq_hw_s *self,
                           @@ -208,5 +281,15 @@
                           + struct aq_hw_caps_s *aq_hw_caps,
                           +  u32 *regs_buff);

int hw_atl_utils_hw_get_regs(struct aq_hw_s *self,
                           - struct aq_hw_caps_s *aq_hw_caps,
                           + const struct aq_hw_caps_s *aq_hw_caps,
                           +  u32 *regs_buff);

int hw_atl_utils_update_stats(struct aq_hw_s *self);

struct aq_stats_s *hw_atl_utils_get_hw_stats(struct aq_hw_s *self);
+int hw_atl_utils_fw_downld_dwords(struct aq_hw_s *self, u32 a,
+ + u32 *p, u32 cnt);
+ +
+ +int hw_atl_utils_fw_rpc_call(struct aq_hw_s *self, unsigned int rpc_size);
+ +
+ +int hw_atl_utils_fw_rpc_wait(struct aq_hw_s *self,
+ +  struct hw_aq_atl_utils_fw_rpc **rpc);
+ +
+ +extern const struct aq_fw_ops aq_fw_1x_ops;
+ +extern const struct aq_fw_ops aq_fw_2x_ops;

#endif /* HW_ATL_UTILS_H */
--- linux-4.15.0.orig/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_utils_fw2x.c
+++ linux-4.15.0/drivers/net/ethernet/aquantia/atlantic/hw_atl/hw_atl_utils_fw2x.c
@@ -0,0 +1,189 @@
+/*
 + * aQuantia Corporation Network Driver

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version 2, as published by the Free Software Foundation.

File hw_atl_utils_fw2x.c: Definition of firmware 2.x functions for
Atlantic hardware abstraction layer.

#include "../aq_hw.h"
#include "../aq_hw_utils.h"
#include "../aq_pci_func.h"
#include "../aq_ring.h"
#include "../aq_vec.h"
#include "hw_atl_utils.h"
#include "hw_atl_llh.h"

#define HW_ATL_FW2X_MPI_EFUSE_ADDR 0x364
#define HW_ATL_FW2X_MPI_MBOX_ADDR 0x360
#define HW_ATL_FW2X_MPI_RPC_ADDR 0x334
#define HW_ATL_FW2X_MPI_CONTROL_ADDR 0x368
#define HW_ATL_FW2X_MPI_CONTROL2_ADDR 0x36C
#define HW_ATL_FW2X_MPI_STATE_ADDR 0x370
#define HW_ATL_FW2X_MPI_STATE2_ADDR 0x374

static int aq_fw2x_init(struct aq_hw_s *self)
{
    int err = 0;

    /* check 10 times by 1ms */
    AQ_HW_WAIT_FOR(0U != (self->mbox_addr =
        aq_hw_read_reg(self, HW_ATL_FW2X_MPI_MBOX_ADDR)),
        1000U, 10U);
    AQ_HW_WAIT_FOR(0U != (self->rpc_addr =
        aq_hw_read_reg(self, HW_ATL_FW2X_MPI_RPC_ADDR)),
        1000U, 100U);

    return err;
}

static enum hw_atl_fw2x_rate link_speed_mask_2fw2x_ratemask(u32 speed)
{
    enum hw_atl_fw2x_rate rate = 0;

/*...*/
+if (speed & AQ_NIC_RATE_10G)
+rate |= FW2X_RATE_10G;
+
+if (speed & AQ_NIC_RATE_5G)
+rate |= FW2X_RATE_5G;
+
+if (speed & AQ_NIC_RATE_5GSR)
+rate |= FW2X_RATE_5G;
+
+if (speed & AQ_NIC_RATE_2GS)
+rate |= FW2X_RATE_2G5;
+
+if (speed & AQ_NIC_RATE_1G)
+rate |= FW2X_RATE_1G;
+
+if (speed & AQ_NIC_RATE_100M)
+rate |= FW2X_RATE_100M;
+
+return rate;
+
+static int aq_fw2x_set_link_speed(struct aq_hw_s *self, u32 speed)
+{
+u32 val = link_speed_mask_2fw2x_ratemask(speed);
+
+aq_hw_write_reg(self, HW_ATL_FW2X_MPI_CONTROL_ADDR, val);
+
+return 0;
+
+}
+
+static int aq_fw2x_set_state(struct aq_hw_s *self,
+enum hal_atl_utils_fw_state_e state)
+{
+/* No explicit state in 2x fw */
+return 0;
+}
+
+static int aq_fw2x_update_link_status(struct aq_hw_s *self)
+{
+u32 mpi_state = aq_hw_read_reg(self, HW_ATL_FW2X_MPI_STATE_ADDR);
+u32 speed = mpi_state & (FW2X_RATE_100M | FW2X_RATE_1G |
+FW2X_RATE_2G5 | FW2X_RATE_5G | FW2X_RATE_10G);
+struct aq_hw_link_status_s *link_status = &self->aq_link_status;
+
+if (speed) {
+if (speed & FW2X_RATE_10G)
+link_status->mbps = 10000;
+else if (speed & FW2X_RATE_5G)
+link_status->mbps = 5000;
+else if (speed & FW2X_RATE_2G5)
+link_status->mbps = 2500;
+else if (speed & FW2X_RATE_1G)
+link_status->mbps = 1000;
+else if (speed & FW2X_RATE_100M)
+link_status->mbps = 100;
+else
+link_status->mbps = 10000;
+} else {
+link_status->mbps = 0;
+}
+
+return 0;
+}
+
+int aq_fw2x_get_mac_permanent(struct aq_hw_s *self, u8 *mac)
+
+int err = 0;
+u32 h = 0U;
+u32 l = 0U;
+u32 mac_addr[2] = { 0 };
+u32 efuse_addr = aq_hw_read_reg(self, HW_ATL_FW2X_MPI_EFUSE_ADDR);
+
+if (efuse_addr != 0) {
+err = hw_atl_utils_fw_downld_dwords(self,
+    efuse_addr + (40U * 4U),
+    mac_addr,
+    ARRAY_SIZE(mac_addr));
+if (err)
+    return err;
+    mac_addr[0] = __swab32(mac_addr[0]);
+    mac_addr[1] = __swab32(mac_addr[1]);
+}
+
+ether_addr_copy(mac, (u8 *)mac_addr);
+
+if (((mac[0] & 0x01U) || ((mac[0] | mac[1] | mac[2]) == 0x00U)) {
+unsigned int rnd = 0;
+get_random_bytes(&rnd, sizeof(unsigned int));
+
+1 = 0xE3000000U
+| (0xFFFU & rnd)
+| (0x00 << 16);
+h = 0x8001300EU;
+
+mac[5] = (u8)(0xFFU & 1);
+l >>= 8;
+mac[4] = (u8)(0xFFU & l);
+l >>= 8;
+mac[3] = (u8)(0xFFU & l);
+l >>= 8;
+mac[2] = (u8)(0xFFU & l);
+mac[1] = (u8)(0xFFU & h);
+h >>= 8;
+mac[0] = (u8)(0xFFU & h);
+
+return err;
+
+
+static int aq_fw2x_update_stats(struct aq_hw_s *self)
+{
+  int err = 0;
+  u32 mpi_opts = aq_hw_read_reg(self, HW_ATL_FW2X_MPI_CONTROL2_ADDR);
+  u32 orig_stats_val = mpi_opts & BIT(CAPS_HI_STATISTICS);
+
+  /* Toggle statistics bit for FW to update */
+  mpi_opts = mpi_opts ^ BIT(CAPS_HI_STATISTICS);
+  aq_hw_write_reg(self, HW_ATL_FW2X_MPI_CONTROL2_ADDR, mpi_opts);
+
+  /* Wait FW to report back */
+  AQ_HW_WAIT_FOR(orig_stats_val !=
+                   (aq_hw_read_reg(self, HW_ATL_FW2X_MPI_STATE2_ADDR) &
+                    BIT(CAPS_HI_STATISTICS)),
+                   1U, 10000U);
+  if (err)
+    return err;
+
+  return hw_atl_utils_update_stats(self);
+}
+
+const struct aq_fw_ops aq_fw_2x_ops = {
+  .init = aq_fw2x_init,
+  .reset = NULL,
+  .get_mac_permanent = aq_fw2x_get_mac_permanent,
+  .set_link_speed = aq_fw2x_set_link_speed,
+  .set_state = aq_fw2x_set_state,
+  .update_link_status = aq_fw2x_update_link_status,
+  .update_stats = aq_fw2x_update_stats,
+};
-#define NIC_MAJOR_DRIVER_VERSION 1
-#define NIC_MINOR_DRIVER_VERSION 6
-#define NIC_BUILD_DRIVER_VERSION 13
-#define NIC_REVISION_DRIVER_VERSION 0
+#define NIC_MAJOR_DRIVER_VERSION 2
+#define NIC_MINOR_DRIVER_VERSION 0
+#define NIC_BUILD_DRIVER_VERSION 2
+#define NIC_REVISION_DRIVER_VERSION 1

#define AQ_CFG_DRV_VERSION_SUFFIX "-kern"

--- linux-4.15.0.orig/drivers/net/ethernet/arc/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/arc/Kconfig
@@ -20,6 +20,7 @@
 depends on ARC || ARCH_ROCKCHIP || COMPILE_TEST
 select MII
 select PHYLIB
+select CRC32

 config ARC_EMAC
 tristate "ARC EMAC support"
--- linux-4.15.0.orig/drivers/net/ethernet/arc/emac_mdio.c
+++ linux-4.15.0/drivers/net/ethernet/arc/emac_mdio.c
@@ -153,6 +153,7 @@
 if (IS_ERR(data->reset_gpio)) {
 error = PTR_ERR(data->reset_gpio);
 dev_err(priv->dev, "Failed to request gpio: %d\n", error);
+mdiobus_free(bus);
 return error;
 }

--- linux-4.15.0.orig/drivers/net/ethernet/arc/emac_rockchip.c
+++ linux-4.15.0/drivers/net/ethernet/arc/emac_rockchip.c
@@ -169,8 +169,10 @@
 /* Optional regulator for PHY */
 priv->regulator = devm_regulator_get_optional(dev, "phy");
 if (IS_ERR(priv->regulator)) {
- if (PTR_ERR(priv->regulator) == -EPROBE_DEFER)
- return -EPROBE_DEFER;
+ if (PTR_ERR(priv->regulator) == -EPROBE_DEFER) {
+ err = -EPROBE_DEFER;
+ goto out_clk_disable;
+ }
 dev_err(dev, "no regulator found\n");
 priv->regulator = NULL;
 }
@@ -263,6 +265,9 @@
if (priv->regulator)
regulator_disable(priv->regulator);

+if (priv->soc_data->need_div_macclk)
+clk_disable_unprepare(priv->macclk);
+
free_netdev(ndev);
return err;
}

--- linux-4.15.0.orig/drivers/net/ethernet/atheros/alx/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/atheros/alx/ethtool.c
@@ -46,6 +46,8 @@
#include "reg.h"
#include "hw.h"

+extern const bool enable_wol;
+
/* The order of these strings must match the order of the fields in */
/* struct alx_hw_stats */
/* See hw.h */
@@ -310,11 +312,50 @@
}
}

+static void alx_get_wol(struct net_device *netdev, struct ethtool_wolinfo *wol)
+{
+struct alx_priv *alx = netdev_priv(netdev);
+struct alx_hw *hw = &alx->hw;
+
+if (!enable_wol)
+return;
+
+wol->supported = WAKE_MAGIC | WAKE_PHY;
+wol->wolopts = 0;
+
+if (hw->sleep_ctrl & ALX_SLEEP_WOL_MAGIC)
+wol->wolopts |= WAKE_MAGIC;
+if (hw->sleep_ctrl & ALX_SLEEP_WOL_PHY)
+wol->wolopts |= WAKE_PHY;
+
+}
+
+static int alx_set_wol(struct net_device *netdev, struct ethtool_wolinfo *wol)
+{
+struct alx_priv *alx = netdev_priv(netdev);
+struct alx_hw *hw = &alx->hw;
+
+if (!enable_wol || (wol->wolopts & ~(WAKE_MAGIC | WAKE_PHY)))
+return -EOPNOTSUPP;
+hw->sleep_ctrl = 0;
+
+if (wol->wolopts & WAKE_MAGIC)
+hw->sleep_ctrl |= ALX_SLEEP_WOL_MAGIC;
+if (wol->wolopts & WAKE_PHY)
+hw->sleep_ctrl |= ALX_SLEEP_WOL_PHY;
+
+device_set_wakeup_enable(&alx->hw.pdev->dev, hw->sleep_ctrl);
+
+return 0;
+
}
+
const struct ethtool_ops alx_ethtool_ops = {
    .get_pauseparam= alx_get_pauseparam,
    .set_pauseparam= alx_set_pauseparam,
    .get_msglevel= alx_get_msglevel,
    .set_msglevel= alx_set_msglevel,
    .get_wol= alx_get_wol,
    .set_wol= alx_set_wol,
    .get_link= ethtool_op_get_link,
    .get_strings= alx_get_strings,
    .get_sset_count= alx_get_sset_count,
    --- linux-4.15.0.orig/drivers/net/ethernet/atheros/alx/hw.c
    +++ linux-4.15.0/drivers/net/ethernet/atheros/alx/hw.c
    @@ -332,6 +332,16 @@
    alx_write_mem32(hw, ALX_STAD1, val);
    }

+static void alx_enable_osc(struct alx_hw *hw)
+{
+    u32 val;
+
+    /* rising edge */
+    ++val = alx_read_mem32(hw, ALX_MISC);
+    alx_write_mem32(hw, ALX_MISC, val & ~ALX_MISC_INTNLOSC_OPEN);
+    alx_write_mem32(hw, ALX_MISC, val | ALX_MISC_INTNLOSC_OPEN);
+}
+
+static void alx_reset_osc(struct alx_hw *hw, u8 rev)
+{
+    u32 val, val2;
+    @ @ -774,7 +784,6 @@
+    return err;
+}
+
+ void alx_post_phy_link(struct alx_hw *hw)
int alx_pre_suspend(struct alx_hw *hw, int speed, u8 duplex)
{
    u32 master, mac, phy, val;
    int err = 0;
    
    master = alx_read_mem32(hw, ALX_MASTER);
    master &= ~ALX_MASTER_PCLKSEL_SRDS;
    mac = hw->rx_ctrl;
    /* 10/100 half */
    ALX_SET_FIELD(mac, ALX_MAC_CTRL_Speed, ALX_MAC_CTRL_Speed_10_100);
    mac &= ~(ALX_MAC_CTRL_FULLD | ALX_MAC_CTRL_RX_EN | ALX_MAC_CTRL_TX_EN);
    
    phy = alx_read_mem32(hw, ALX_PHY_CTRL);
    phy &= ~(ALX_PHY_CTRL_DSPRST_OUT | ALX_PHY_CTRL_CLS);
    phy |= ALX_PHY_CTRL_RST_ANALOG | ALX_PHY_CTRL_HIB_PULSE |
            ALX_PHY_CTRL_HIB_EN;
    
    /* without any activity */
    if (!(hw->sleep_ctrl & ALX_SLEEP_ACTIVE)) {
        err = alx_write_phy_reg(hw, ALX_MII_IER, 0);
        if (err)
            return err;
        phy |= ALX_PHY_CTRL_IDDQ | ALX_PHY_CTRL_POWER_DOWN;
    } else {
        if (hw->sleep_ctrl & (ALX_SLEEP_WOL_MAGIC | ALX_SLEEP_CIFS))
            mac |= ALX_MAC_CTRL_RX_EN | ALX_MAC_CTRL_BRD_EN;
        if (hw->sleep_ctrl & ALX_SLEEP_CIFS)
            mac |= ALX_MAC_CTRL_TX_EN;
        if (duplex == DUPLEX_FULL)
            mac |= ALX_MAC_CTRL_FULLD;
        if (speed == SPEED_1000)
            ALX_SET_FIELD(mac, ALX_MAC_CTRL_SPEED, ALX_MAC_CTRL_SPEED_1000);
        phy |= ALX_PHY_CTRL_DSPRST_OUT;
        err = alx_write_phy_ext(hw, ALX_MIIEXT_ANEG,
                                ALX_MIIEXT_S3DIG10,
                                ALX_MIIEXT_S3DIG10_SL);
        if (err)
            return err;
    }
return err;
+
+alx_enable_osc(hw);
+hw->rx_ctrl = mac;
+alx_write_mem32(hw, ALX_MASTER, master);
+alx_write_mem32(hw, ALX_MAC_CTRL, mac);
+alx_write_mem32(hw, ALX_PHY_CTRL, phy);
+
+/* set val of PDLL D3PLLOFF */
+val = alx_read_mem32(hw, ALX_PDLL_TRNS1);
+val |= ALX_PDLL_TRNS1_D3PLLOFF_EN;
+alx_write_mem32(hw, ALX_PDLL_TRNS1, val);
+
+return 0;
+

bool alx_phy_configured(struct alx_hw *hw)
{
    u32 cfg, hw_cfg:
    return alx_read_phy_reg(hw, ALX_MII_ISR, &isr);
}

int alx_config_wol(struct alx_hw *hw)
{
    u32 wol = 0;
    int err = 0;
    
    /* turn on magic packet event */
    if (hw->sleep_ctrl & ALX_SLEEP_WOL_MAGIC)
        wol |= ALX_WOL0_MAGIC_EN | ALX_WOL0_PME_MAGIC_EN;
    
    /* turn on link up event */
    if (hw->sleep_ctrl & ALX_SLEEP_WOL_PHY) {
        wol |= ALX_WOL0_LINK_EN | ALX_WOL0_PME_LINK;
        /* only link up can wake up */
        err = alx_write_phy_reg(hw, ALX_MII_IER, ALX_IER_LINK_UP);
    }
    alx_write_mem32(hw, ALX_WOL0, wol);
    
    return err;
}

void alx_disable_rss(struct alx_hw *hw)
{
    u32 ctrl = alx_read_mem32(hw, ALX_RXQ0);
}
alx_post_write(hw);
}

+int alx_select_powersaving_speed(struct alx_hw *hw, int *speed, u8 *duplex)
+{
  +int i, err;
  +u16 lpa;
  +
  +err = alx_read_phy_link(hw);
  +if (err)
  +return err;
  +
  +if (hw->link_speed == SPEED_UNKNOWN) {
  +  *speed = SPEED_UNKNOWN;
  +  *duplex = DUPLEX_UNKNOWN;
  +  return 0;
  +}
  +
  +err = alx_read_phy_reg(hw, MII_LPA, &lpa);
  +if (err)
  +return err;
  +
  +if (!(lpa & LPA_LPACK)) {
  +  *speed = hw->link_speed;
  +  return 0;
  +}
  +
  +if (!((lpa & LPA_LPACK))) {
  +  *speed = hw->link_speed;
  +  return 0;
  +}
  +
  +if (lpa & LPA_10FULL) {
  +  *speed = SPEED_10;
  +  *duplex = DUPLEX_FULL;
  +} else if (lpa & LPA_10HALF) {
  +  *speed = SPEED_10;
  +  *duplex = DUPLEX_HALF;
  +} else if (lpa & LPA_100FULL) {
  +  *speed = SPEED_100;
  +  *duplex = DUPLEX_FULL;
  +} else {
  +  *speed = SPEED_100;
  +  *duplex = DUPLEX_HALF;
  +}
  +
  +if (*speed == hw->link_speed && *duplex == hw->duplex)
  +return 0;
  +err = alx_write_phy_reg(hw, ALX_MII_IER, 0);
  +if (err)
  +return err;
  +err = alx_setup_speed_duplex(hw, alx_speed_to_ethadv(*speed, *duplex) |
  +ADVERTISED_Autoneg, ALX_FC_ANEG |
+ALX_FC_RX | ALX_FC_TX);
+if (err)
+return err;
+
+/* wait for linkup */
+for (i = 0; i < ALX_MAX_SETUP_LNK_CYCLE; i++) {
+msleep(100);
+
+err = alx_read_phy_link(hw);
+if (err < 0)
+return err;
+if (hw->link_speed != SPEED_UNKNOWN)
+break;
+}
+if (i == ALX_MAX_SETUP_LNK_CYCLE)
+return -ETIMEDOUT;
+
+return 0;
+
bool alx_get_phy_info(struct alx_hw *hw)
{

spinlock_t mdio_lock;
spinlock_t mdio_lock;

void alx_enable_aspm(struct alx_hw *hw, bool l0s_en, bool l1_en);
int alx_setup_speed_duplex(struct alx_hw *hw, u32 ethadv, u8 flowctrl);
void alx_post_phy_link(struct alx_hw *hw);
+int alx_pre_suspend(struct alx_hw *hw, int speed, u8 duplex);
int alx_read_phy_reg(struct alx_hw *hw, u16 reg, u16 *phy_data);
int alx_write_phy_reg(struct alx_hw *hw, u16 reg, u16 phy_data);
int alx_read_phy_ext(struct alx_hw *hw, u8 dev, u16 reg, u16 *pdata);
int alx_write_phy_ext(struct alx_hw *hw, u8 dev, u16 reg, u16 data);
int alx_read_phy_link(struct alx_hw *hw);
int alx_clear_phy_intr(struct alx_hw *hw);
+int alx_config_wol(struct alx_hw *hw);
void alx_config_wol(struct alx_hw *hw, u8 fc);
void alx_start_mac(struct alx_hw *hw);
int alx_reset_mac(struct alx_hw *hw);
void alx_configure_basic(struct alx_hw *hw);
void alx_mask_msix(struct alx_hw *hw, int index, bool mask);
void alx_disable_rss(struct alx_hw *hw);
int alx_select_powersaving_speed(struct alx_hw *hw, int *speed, u8 *duplex);
bool alx_get_phy_info(struct alx_hw *hw);
void alx_update_hw_stats(struct alx_hw *hw);

const char alx_drv_name[] = "alx";

/* disable WoL by default */
bool enable_wol;
module_param(enable_wol, bool, 0644);
MODULE_PARM_DESC(enable_wol, "Enable Wake on Lan feature");

static void alx_free_txbuf(struct alx_tx_queue *txq, int entry)
{
    struct alx_buffer *txb = &txq->bufs[entry];
    alx->dev->max_mtu = ALX_MAX_FRAME_LEN(ALX_MAX_FRAME_SIZE);
    alx->tx_ringsz = 256;
    alx->rx_ringsz = 512;
    hw->sleep_ctrl = ALX_SLEEP_WOL_MAGIC | ALX_SLEEP_WOL_PHY;
    hw->int_mask = ALX_ISR_MISC;
    hw->dma_chnl = hw->max_dma_chnl;
}

static void __alx_stop(struct alx_priv *alx)
{
    alx->halt(alx);
    alx_free_irq(alx);
    cancel_work_sync(&alx->link_check_wk);
    cancel_work_sync(&alx->reset_wk);
    alx->halt(alx);
    alx_free_rings(alx);
    alx_free_napis(alx);
}

return 0;
}
+static int __alx_shutdown(struct pci_dev *pdev, bool *wol_en)
+{
+struct alx_priv *alx = pci_get_drvdata(pdev);
+struct net_device *netdev = alx->dev;
+struct alx_hw *hw = &alx->hw;
+int err, speed;
+u8 duplex;
+
+netif_device_detach(netdev);
+
+if (netif_running(netdev))
+  __alx_stop(alx);
+
+#ifdef CONFIG_PM_SLEEP
+err = pci_save_state(pdev);
+if (err)
+  return err;
+#endif
+
+err = alx_select_powersaving_speed(hw, &speed, &duplex);
+if (err)
+  return err;
+err = alx_clear_phy_intr(hw);
+if (err)
+  return err;
+err = alx_pre_suspend(hw, speed, duplex);
+if (err)
+  return err;
+err = alx_config_wol(hw);
+if (err)
+  return err;
+
+*wol_en = false;
+if (hw->sleep_ctrl & ALX_SLEEP_ACTIVE) {
+  netif_info(alx, wol, netdev,
+    "wol: ctrl=%X, speed=%X\n",
+    hw->sleep_ctrl, speed);
+  device_set_wakeup_enable(&pdev->dev, true);
+  *wol_en = true;
+}
+
+pci_disable_device(pdev);
+
+return 0;
+
+#}
+
+static void alx_shutdown(struct pci_dev *pdev)
int err;
bool wol_en;

err = __alx_shutdown(pdev, &wol_en);
if (!err) {
pci_wake_from_d3(pdev, wol_en);
pci_set_power_state(pdev, PCI_D3hot);
} else {
dev_err(&pdev->dev, "shutdown fail %d\n", err);
}
}

static void alx_link_check(struct work_struct *work)
{
struct alx_priv *alx;

device_set_wakeup_enable(&pdev->dev, hw->sleep_ctrl);

netdev_info(netdev,
    "Qualcomm Atheros AR816x/AR817x Ethernet [%pM]\n",
    netdev->dev_addr);
free_netdev(netdev);
out_pci_release:
pci_release_mem_regions(pdev);
pci_disable_pcie_error_reporting(pdev);
out_pci_disable:
pci_disable_device(pdev);
return err;

struct alx_priv *alx = pci_get_drvdata(pdev);

alx_set_macaddr(hw, hw->perm_addr);

static int alx_suspend(struct device *dev)
{
struct pci_dev *pdev = to_pci_dev(dev);
struct alx_priv *alx = pci_get_drvdata(pdev);

alx_set_macaddr(hw, hw->perm_addr);

static int alx_suspend(struct device *dev)
{
struct pci_dev *pdev = to_pci_dev(dev);
-struct alx_priv *alx = pci_get_drvdata(pdev);
+int err;
bool wol_en;
+
+ err = __alx_shutdown(pdev, &wol_en);
+ if (err) {
+ dev_err(&pdev->dev, "shutdown fail in suspend %d\n", err);
+ return err;
+ }
+
+ if (wol_en) {
+ pci_prepare_to_sleep(pdev);
+ } else {
+ pci_wake_from_d3(pdev, false);
+ pci_set_power_state(pdev, PCI_D3hot);
+ }
-
-if (!netif_running(alx->dev))
- return 0;
-netif_device_detach(alx->dev);
-__alx_stop(alx);
return 0;
}

@@ -1896,23 +1976,71 @@
{
 struct pci_dev *pdev = to_pci_dev(dev);
 struct alx_priv *alx = pci_get_drvdata(pdev);
+ struct net_device *netdev = alx->dev;
+ struct alx_hw *hw = &alx->hw;
+ int err;
+ 
+ pci_set_power_state(pdev, PCI_D0);
+ pci_restore_state(pdev);
+ pci_save_state(pdev);
+
+ pci_enable_wake(pdev, PCI_D3hot, 0);
+ pci_enable_wake(pdev, PCI_D3cold, 0);
+ 
+ hw->link_speed = SPEED_UNKNOWN;
+ alx->int_mask = ALX_ISR_MISC;
+ 
+ alx_reset_pcie(hw);
 alx_reset_phy(hw);

- if (!netif_running(alx->dev))
- return 0;
- netif_device_attach(alx->dev);
- return __alx_open(alx, true);
+ pci_set_power_state(pdev, PCI_D0);
pci_restore_state(pdev);
pci_save_state(pdev);
pci_enable_wake(pdev, PCI_D3hot, 0);
pci_enable_wake(pdev, PCI_D3cold, 0);
hw->link_speed = SPEED_UNKNOWN;
alx->int_mask = ALX_ISR_MISC;
alx_reset_pcie(hw);
alx_reset_phy(hw);
err = alx_reset_mac(hw);
if (err) {
  netif_err(alx, hw, alx->dev,
    "resume:reset_mac fail %d\n", err);
  return -EIO;
}
err = alx_setup_speed_duplex(hw, hw->adv_cfg, hw->flowctrl);
if (err) {
  netif_err(alx, hw, alx->dev,
    "resume:setup_speed_duplex fail %d\n", err);
  return -EIO;
}
if (netif_running(netdev)) {
  rtnl_lock();
  err = __alx_open(alx, true);
  rtnl_unlock();
  if (err)
    return err;
}
netif_device_attach(netdev);
return err;
#endif
#ifdef CONFIG_PM_SLEEP
static SIMPLE_DEV_PM_OPS(alx_pm_ops, alx_suspend, alx_resume);
#define ALX_PM_OPS      (&alx_pm_ops)
#else
#define ALX_PM_OPS      NULL
#endif
static pci_ers_result_t alx_pci_error_detected(struct pci_dev *pdev,
    pci_channel_state_t state)
{
    @ @ -1955,6 +2083,8 @@
}

pci_set_master(pdev);
+pci_enable_wake(pdev, PCI_D3hot, 0);
+pci_enable_wake(pdev, PCI_D3cold, 0);

alx_reset_pcie(hw);
if (!alx_reset_mac(hw))
@@ -2011,6 +2141,7 @@
    .id_table    = alx_pci_tbl,
    .probe       = alx_probe,
    .remove      = alx_remove,
+   .shutdown    = alx_shutdown,
    .err_handler = &alx_err_handlers,
    .driver.pm   = ALX_PM_OPS,
};
--- linux-4.15.0.orig/drivers/net/ethernet/atheros/atl1c/atl1c_main.c
+++ linux-4.15.0/drivers/net/ethernet/atheros/atl1c/atl1c_main.c
@@ -1686,6 +1686,7 @@
    skb = build_skb(page_address(page) + adapter->rx_page_offset,
        adapter->rx_frag_size);
    if (likely(skb)) {
+       skb_reserve(skb, NET_SKB_PAD);
        adapter->rx_page_offset += adapter->rx_frag_size;
    if (adapter->rx_page_offset >= PAGE_SIZE)
        adapter->rx_page = NULL;
--- linux-4.15.0.orig/drivers/net/ethernet/atheros/atl1e/atl1e_main.c
+++ linux-4.15.0/drivers/net/ethernet/atheros/atl1e/atl1e_main.c
@@ -473,7 +473,9 @@
{
    struct atl1e_adapter *adapter = netdev_priv(netdev);

-atl1e_write_phy_reg(&adapter->hw, reg_num & MDIO_REG_ADDR_MASK, val);
+if (atl1e_write_phy_reg(&adapter->hw,
+   reg_num & MDIO_REG_ADDR_MASK, val))
+   netdev_err(netdev, "write phy register failed\n");
}

static int atl1e_mii_ioctl(struct net_device *netdev,
--- linux-4.15.0.orig/drivers/net/ethernet/atheros/atlx/atl2.c
+++ linux-4.15.0/drivers/net/ethernet/atheros/atlx/atl2.c
@@ -1335,13 +1335,11 @@
{
    struct net_device *netdev;
struct atl2_adapter *adapter;
static int cards_found;
+static int cards_found = 0;
unsigned long mmio_start;
int mmio_len;
int err;

cards_found = 0;
-
err = pci_enable_device(pdev);
if (err)
return err;
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/b44.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/b44.c
@@ -1519,8 +1519,10 @@
int ethaddr_bytes = ETH_ALEN;

memset(ppattern + offset, 0xff, magicsync);
-for (j = 0; j < magicsync; j++)
-	set_bit(len++, (unsigned long *) pmask);
+for (j = 0; j < magicsync; j++) {
+tmask[len >> 3] |= BIT(len & 7);
+len++;
+
}
for (j = 0; j < B44_MAX_PATTERNS; j++) {
if ((B44_PATTERN_SIZE - len) >= ETH_ALEN)
@@ -1532,7 +1534,8 @@
for (k = 0; k < ethaddr_bytes; k++) {
ppattern[offset + magicsync +
(j * ETH_ALEN) + k] = macaddr[k];
-set_bit(len++, (unsigned long *) pmask);
+pmask[len >> 3] |= BIT(len & 7);
+len++;
}
return len - 1;
@@ -2386,7 +2389,8 @@
goto err_out_free_dev;
}

-if (dma_set_mask_and_coherent(sdev-&gt;dma_dev, DMA_BIT_MASK(30))) {
+err = dma_set_mask_and_coherent(sdev-&gt;dma_dev, DMA_BIT_MASK(30));
+if (err) {
+dev_err(sdev-&gt;dev,
"Required 30BIT DMA mask unsupported by the system\n\n);
goto err_out_powerdown;
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bcm63xx_enet.c
static int bcm_enet_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct bcm_enet_priv *priv;
    struct bcm_enet_desc *desc;
    u32 len_stat;
    int ret;
    netdev_tx_t ret;

    priv = netdev_priv(dev);

    priv->rx_chk_en = !(wanted & NETIF_F_RXCSUM);
    reg = rxchk_readl(priv, RXCHK_CONTROL);
    /* Clear L2 header checks, which would prevent BPDUs from being received. */
    reg &= ~RXCHK_L2_HDR_DIS;
    if (priv->rx_chk_en)
        reg |= RXCHK_EN;
    else
    {
        struct ethtool_wolinfo *wol
        {
            struct bcm.sysport_priv *priv = netdev_priv(dev);
            u32 reg;

            wol->supported = WAKE_MAGIC | WAKE_MAGICSECURE;
            wol->wolopts = priv->wolopts;
            if (!(priv->wolopts & WAKE_MAGICSECURE))
                return;

            /* Return the programmed SecureOn password */
            reg = umac_readl(priv, UMAC_PSW_MS);
            put_unaligned_be16(reg, &wol->sopass[0]);
            reg = umac_readl(priv, UMAC_PSW_LS); 
            put_unaligned_be32(reg, &wol->sopass[2]);
            memcpy(wol->sopass, priv->sopass, sizeof(priv->sopass));
        }
    }
}
static int bcm_sysport_set_wol(struct net_device *dev, 
@@ -547,13 +546,8 @@
if (wol->wolopts & ~supported)
    return -EINVAL;

-/* Program the SecureOn password */
-if (wol->wolopts & WAKE_MAGICSECURE) {
-    umac_writel(priv, get_unaligned_be16(&wol->sopass[0]),
-               UMAC_PSW_MS);
-    umac_writel(priv, get_unaligned_be32(&wol->sopass[2]),
-               UMAC_PSW_LS);
-}
+if (wol->wolopts & WAKE_MAGICSECURE)
+    memcpy(priv->sopass, wol->sopass, sizeof(priv->sopass));

/* Flag the device and relevant IRQ as wakeup capable */
if (wol->wolopts) {
@@ -651,7 +645,8 @@
dma_addr_t mapping;

/* Allocate a new SKB for a new packet */
-skb = netdev_alloc_skb(priv->netdev, RX_BUF_LENGTH);
+skb = __netdev_alloc_skb(priv->netdev, RX_BUF_LENGTH, 
+                         GFP_ATOMIC | __GFP_NOWARN);
if (!skb) {
    priv->mib.alloc_rx_buff_failed++;
    netif_err(priv, rx_err, ndev, "SKB alloc failed\n");
@@ -855,10 +850,12 @@
static unsigned int __bcm_sysport_tx_reclaim(struct bcm_sysport_priv *priv,
               struct bcm_sysport_tx_ring *ring)
{
-unsigned int c_index, last_c_index, last_tx_cn, num_tx_cbs;
unsigned int pkts_compl = 0, bytes_compl = 0;
struct net_device *ndev = priv->netdev;
+unsigned int txbds_processed = 0;
struct bcm_sysport_cb *cb;
+unsigned int txbds_ready;
+unsigned int c_index;
    u32 hw_ind;

/* Clear status before servicing to reduce spurious interrupts */
@@ -871,29 +868,23 @@
/* Compute how many descriptors have been processed since last call */
    hw_ind = tdma_readl(priv, TDMA_DESC_RING_PROD_CONS_INDEX(ring->index));
    c_index = (hw_ind >> RING_CONS_INDEX_SHIFT) & RING_CONS_INDEX_MASK;
    -ring->p_index = (hw_ind & RING_PROD_INDEX_MASK);
- last_c_index = ring->c_index;
- num_tx_cbs = ring->size;
- c_index &= (num_tx_cbs - 1);
- if (c_index >= last_c_index)
  last_tx_cn = c_index - last_c_index;
else
  last_tx_cn = num_tx_cbs - last_c_index + c_index;
+ txbds_ready = (c_index - ring->c_index) & RING_CONS_INDEX_MASK;

netif_dbg(priv, tx_done, ndev,
  "ring=%d c_index=%d last_tx_cn=%d last_c_index=%d",
  ring->index, c_index, last_tx_cn, last_c_index);
+ "ring=%d old_c_index=%u c_index=%u txbds_ready=%u",
  ring->index, ring->c_index, c_index, txbds_ready);

-while (last_tx_cn-- > 0) {
  cb = ring->cbs + last_c_index;
+while (txbds_processed < txbds_ready) {
+ cb = &ring->cbs[ring->clean_index];
  bcm_sysport_tx_reclaim_one(ring, cb, &bytes_compl, &pkts_compl);
}

ring->desc_count++;
- last_c_index++;
- last_c_index &= (num_tx_cbs - 1);
+ txbds_processed++;
+ if (likely(ring->clean_index < ring->size - 1))
  ring->clean_index++;
else
  ring->clean_index = 0;
}

u64_stats_update_begin(&priv->syncp);
@@ -1005,14 +996,22 @@
{
 u32 reg;

-/* Stop monitoring MPD interrupt */
  -intrl2_0_mask_set(priv, INTRL2_0_MPD);
-  /* Clear the MagicPacket detection logic */
  reg = umac_readl(priv, UMAC_MPD_CTRL);
  reg &= ~MPD_EN;
  umac_writel(priv, reg, UMAC_MPD_CTRL);
reg = intrl2_0_readl(priv, INTRL2_CPU_STATUS);
+if (reg & INTRL2_0_MPD)
+    netdev_info(priv->netdev, "Wake-on-LAN (MPD) interrupt!n");
+
+if (reg & INTRL2_0_BRCM_MATCH_TAG) {
+    reg = rxchk_readl(priv, RXCHK_BRCM_TAG_MATCH_STATUS) &
+          RXCHK_BRCM_TAG_MATCH_MASK;
+    netdev_info(priv->netdev, "Wake-on-LAN (filters 0x%02x) interrupt!n", reg);
+}
+
    netif_dbg(priv, wol, priv->netdev, "resumed from WOL!
"
}

@@ -1047,11 +1046,6 @@
if (priv->irq0_stat & INTRL2_0_TX_RING_FULL)
    bcm_sysport_tx_reclaim_all(priv);

-if (priv->irq0_stat & INTRL2_0_MPD) {
-    netdev_info(priv->netdev, "Wake-on-LAN interrupt!n");
-    bcm_sysport_resume_from_wol(priv);
-
-    if (!priv->is_lite)
-        goto out;

@@ -1406,6 +1400,7 @@
netif_tx_napi_add(priv->netdev, &ring->napi, bcm_sysport_tx_poll, 64);
    ring->index = index;
    ring->size = size;
+    ring->clean_index = 0;
    ring->alloc_size = ring->size;
    ring->desc_cpu = p;
    ring->desc_count = ring->size;
@@ -1790,9 +1785,6 @@
intrl2_1_mask_clear(priv, 0xffffffff);
else
    intrl2_0_mask_clear(priv, INTRL2_0_TDMA_MBDONE_MASK);
-
-/* Last call before we start the real business */
    -netif_tx_start_all_queues(dev);
}

static void rbuf_init(struct bcm_sysport_priv *priv)
@@ -1870,8 +1862,8 @@
    if (!priv->is_lite)
        priv->crc_fwd = !!umac_readl(priv, UMAC_CMD) & CMD_CRC_FWD);
else

priv->crc_fwd = !!(gib_readl(priv, GIB_CONTROL) &
    GIB_FCS_STRIP);
+priv->crc_fwd = !((gib_readl(priv, GIB_CONTROL) &
    GIB_FCS_STRIP) >> GIB_FCS_STRIP_SHIFT);

phydev = of_phy_connect(dev, priv->phy_dn, bcm_sysport_adj_link,
0, priv->phy_interface);
@@ -1938,6 +1930,8 @@

netif_tx_start_all_queues(dev);
+
return 0;

out_clear_rx_int:
@@ -1961,7 +1955,7 @@

struct bcm_sysport_priv *priv = netdev_priv(dev);

/* stop all software from updating hardware */
-netif_tx_stop_all_queues(dev);
+netif_tx_disable(dev);
    napi_disable(&priv->napi);
    phy_stop(dev->phydev);
@@ -2067,14 +2061,21 @@

    .ndo_select_queue = bcm_sysport_select_queue,
    }

-static int bcm_sysport_map_queues(struct net_device *dev,
+static int bcm_sysport_map_queues(struct notifier_block *nb,
    struct bcm_sysport_priv *priv = netdev_priv(dev);

    /* We can't be setting up queue inspection for non directly attached
* switches
@@ -2097,6 +2098,7 @@
    if (priv->is_lite)
    netif_set_real_num_tx_queues(slave_dev, 
      slave_dev->num_tx_queues / 2);
+    num_tx_queues = slave_dev->real_num_tx_queues;

    if (priv->per_port_num_tx_queues &&
@@ -2124,7 +2126,7 @@
          return 0;
      }

-    static int bcm_sysport_dsa_notifier(struct notifier_block *unused,
+    static int bcm_sysport_dsa_notifier(struct notifier_block *nb,
          unsigned long event, void *ptr)
      {
          struct dsa_notifier_register_info *info;
@@ -2134,7 +2136,7 @@
      }

      info = ptr;

-    return notifier_from_errno(bcm_sysport_map_queues(info->master, info));
+    return notifier_from_errno(bcm_sysport_map_queues(nb, info));
      }

#define REV_FMT "v%2x.%02x"
@@ -2203,8 +2205,10 @@
    priv->tx_rings = devm_kcalloc(&pdev->dev, txq, 
          sizeof(struct bcm_sysport_tx_ring),
          GFP_KERNEL);
    if (!priv->tx_rings)
-      return -ENOMEM;
-    goto err_free_netdev;
+      ret = -ENOMEM;
+      goto err_free_netdev;
+    }

    priv->is_lite = params->is_lite;
    priv->num_rx_desc_words = params->num_rx_desc_words;
@@ -2233,7 +2237,7 @@
    priv->phy_interface = of_get_phy_mode(dn);
    /* Default to GMII interface mode */
    if (priv->phy_interface < 0)
-      if ((int)priv->phy_interface < 0)
+      if ((int)priv->phy_interface < 0)
        priv->phy_interface = PHY_INTERFACE_MODE_GMII;
/* In the case of a fixed PHY, the DT node associated */
@@ -2267,6 +2271,7 @@
/* HW supported features, none enabled by default */
dev->hw_features |= NETIF_F_RXCSUM | NETIF_F_HIGHDMA |
NETIF_F_IP_CSUM | NETIF_F_IPV6_CSUM;
+dev->max_mtu = UMAC_MAX_MTU_SIZE;

/* Request the WOL interrupt and advertise suspend if available */
priv->wol_irq_disabled = 1;
@@ -2344,12 +2349,17 @@
unsigned int timeout = 1000;
 u32 reg;

-/* Password has already been programmed */
reg = umac_readl(priv, UMAC_MPCTRL);
reg |= MPD_EN;
reg &=-PSW_EN;
-if (priv->wolopts & WAKE_MAGICSECURE)
+if (priv->wolopts & WAKE_MAGICSECURE) {
+ /* Program the SecureOn password */
+ umac_writel(priv, get_unaligned_be16(&priv->sopass[0]),
+  UMAC_PSW_MS);
+ umac_writel(priv, get_unaligned_be32(&priv->sopass[2]),
+  UMAC_PSW_LS);
reg |= PSW_EN;
+}
umac_writel(priv, reg, UMAC_MPCTRL);

/* Make sure RBUF entered WoL mode as result */
@@ -2373,9 +2383,6 @@
/* UniMAC receive needs to be turned on */
umac_enable_set(priv, CMD_RX_EN, 1);

-/* Enable the interrupt wake-up source */
-intrl2_0_mask_clear(priv, INTRL2_0_MPD);

- netif_dbg(priv, wol, ndev, "entered WOL mode\n");

return 0;
@@ -2392,12 +2399,12 @@
if (!netif_running(dev))
    return 0;

+netif_device_detach(dev);
+ bcm_sysport_netif_stop(dev);

phy_suspend(dev->phydev);
- netif_device_detach(dev);

/* Disable UniMAC RX */
umac_enable_set(priv, CMD_RX_EN, 0);

@@ -2456,6 +2463,9 @@

umac_reset(priv);

+/* Disable the UniMAC RX/TX */
+umac_enable_set(priv, CMD_RX_EN | CMD_TX_EN, 0);
+
/+ We may have been suspended and never received a WOL event that
+ * would turn off MPD detection, take care of that now
+ */
@@ -2481,8 +2491,6 @@
goto out_free_rx_ring;
}

- netif_device_attach(dev);

/* RX pipe enable */
topctrl_writel(priv, 0, RX_FLUSH_CNTL);

@@ -2527,6 +2535,8 @@

bcm_sysport_netif_start(dev);

+ netif_device_attach(dev);
+
return 0;

out_free_rx_ring:
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bcmsysport.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bcmsysport.h
@@ -11,6 +11,7 @@

#define  GIB_GTX_CLK_EXT_CLK		(0 << GIB_GTX_CLK_SEL_SHIFT)
#define  GIB_GTX_CLK_125MHZ		(1 << GIB_GTX_CLK_SEL_SHIFT)
#define  GIB_GTX_CLK_250MHZ		(2 << GIB_GTX_CLK_SEL_SHIFT)

/* Receive/transmit descriptor format */
@@ -277,7 +278,8 @@
#define GIB_GTX_CLK_EXT_CLK(0 << GIB_GTX_CLK_SEL_SHIFT)
#define GIB_GTX_CLK_125MHZ(1 << GIB_GTX_CLK_SEL_SHIFT)
#define GIB_GTX_CLK_250MHZ(2 << GIB_GTX_CLK_SEL_SHIFT)
-#define  GIB_FCS_STRIP(1 << 6)
+##define  GIB_FCS_STRIP_SHIFT6
+##define  GIB_FCS_STRIP(1 << GIB_FCS_STRIP_SHIFT)
#define  GIB_LCL_LOOP_EN(1 << 7)
#define  GIB_LCL_LOOP_TXEN(1 << 8)
#define  GIB_RMT_LOOP_EN(1 << 9)
@@ -706,7 +708,7 @@
unsigned int	desc_count;/* Number of descriptors */
unsigned intcurr_desc/* Current descriptor */
unsigned intc_index/* Last consumer index */
-unsigned intp_index/* Current producer index */
+unsigned intclean_index/* Current clean index */
struct bcm_sysport_cb *cbs;/* Transmit control blocks */
struct dma_desc*desc_cpu;/* CPU view of the descriptor */
struct bcm_sysport_priv *priv;/* private context backpointer */
@@ -756,6 +758,7 @@
unsigned intcrc_fwd:1;
u16rev;
u32wolopts;
+u8sopass[SOPASS_MAX];
unsigned intwol_irq_disabled:1;

/* MIB related fields */
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bgmac.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bgmac.c
@@ -548,7 +548,8 @@
int i;

for (i = 0; i < BGMAC_TX_RING_SLOTS; i++) {
- int len = dma_desc[i].ctl1 & BGMAC_DESC_CTL1_LEN;
+ u32 ctl1 = le32_to_cpu(dma_desc[i].ctl1);
+ unsigned int len = ctl1 & BGMAC_DESC_CTL1_LEN;

 slot = &ring->slots[i];
dev_kfree_skb(slot->skb);
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bgmac.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bgmac.h
@@ -479,9 +479,9 @@
struct bgmac {
 union {
 -void *base;
-void *idm_base;
-void *nicpm_base;
+void __iomem *base;
+void __iomem *idm_base;
+void __iomem *nicpm_base;
 } plat;
struct {
  struct bcma_device *core;
}

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2.c
@@ -8252,9 +8252,9 @@
      BNX2_WR(bp, PCI_COMMAND, reg);
  } else if ((BNX2_CHIP_ID(bp) == BNX2_CHIP_ID_5706_A1) &&
              !(bp->flags & BNX2_FLAG_PCIE)) {
-    dev_err(&pdev->dev, "5706 A1 can only be used in a PCIX bus, aborting\n");
+    rc = -EPERM;
    goto err_out_unmap;
  }

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x.h
@@ -1278,6 +1278,7 @@
      BNX2X_SP_RTNL_TX_STOP,
      BNX2X_SP_RTNL_GET_DRV_VERSION,
      BNX2X_SP_RTNL_CHANGE_UDP_PORT,
+      BNX2X_SP_RTNL_UPDATE_SVID,
    };

enum bnx2x iov_flag {
  @ @ -1529,6 +1530,7 @ @
  struct link_vars link_vars;
  u32 link_cnt;
  struct bnx2x_link_report_data last_reported_link;
+  bool force_link_down;

  struct mdio_if_info mdio;

@@ -2186,6 +2188,13 @@
#define PMF_DMAE_C(bp)(BP_PORT(bp) * MAX_DMAE_C_PER_PORT +
                        E1HVN_MAX)

+/* Following is the DMAE channel number allocation for the clients.
+ * MFW: OCBB/OCSD implementations use DMAE channels 14/15 respectively.
+ * Driver: 0-3 and 8-11 (for PF dmae operations)
+ * 4 and 12 (for stats requests)
+ */
+#define BNX2X_FW_DMAE_C 13 /* Channel for FW DMAE operations */
+
/* PCIE link and speed */
#define PCICFG_LINK_WIDTH 0x1f0000
#define PCICFG_LINK_WIDTH_SHIFT 20

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_cmn.c

Open Source Used In 5GaaS Edge AC-4 24397
hw_cons = le16_to_cpu(*txdata->tx_cons_sb);
sw_cons = txdata->tx_pkt_cons;

/* Ensure subsequent loads occur after hw_cons */
+smp_rmb();
+
while (sw_cons != hw_cons) {
    u16 pkt_cons;
    
    /* reread mf_cfg */
    if (IS_PF(bp) && !CHIP_IS_E1(bp))
        bnx2x_read_mf_cfg(bp);
    
    /* select a non-FCoE queue */
    -return fallback(dev, skb) % (BNX2X_NUM_ETH_QUEUES(bp) * bp->max_cos);
    +return fallback(dev, skb) % (BNX2X_NUM_ETH_QUEUES(bp));
}

void bnx2x_set_num_queues(struct bnx2x *bp)
{
    /* Allocated memory for FW statistics */
    -if (bnx2x_alloc_fw_stats_mem(bp))
        +rc = bnx2x_alloc_fw_stats_mem(bp);
        +if (rc)
            LOAD_ERROR_EXIT(bp, load_error0);

    /* request pf to initialize status blocks */
    -@ @ -2817,6 +2826,7 @@
        bp->pending_max = 0;
    }

        +bp->force_link_down = false;
        if (bp->port.pmf) {
rc = bnx2x_initial_phy_init(bp, load_mode);
if (rc)
@@ -3048,12 +3058,13 @@
/* if VF indicate to PF this function is going down (PF will delete sp
 * elements and clear initializations
 */
 -if (IS_VF(bp))
 +if (IS_VF(bp)) {
 +bnx2x_clear_vlan_info(bp);
 bnx2x_vfpf_close_vf(bp);
 -else if (unload_mode != UNLOAD_RECOVERY)
 +} else if (unload_mode != UNLOAD_RECOVERY) {
 /* if this is a normal/close unload need to clean up chip*/
 bnx2x_chip_cleanup(bp, unload_mode, keep_link);
-else {
+} else {
 /* Send the UNLOAD_REQUEST to the MCP */
 bnx2x_sendUnload_req(bp, unload_mode);
@@ -3850,9 +3861,12 @@

 if (unlikely(skb_shinfo(skb)->tx_flags & SKBTX_HW_TSTAMP)) {
 if (!!(bp->flags & TX_TIMESTAMPING_EN)) {
 +bp->eth_stats.ptp_skip_tx_ts++;
 BNX2X_ERR("Tx timestamping was not enabled, this packet will not be timestamped\n");
 } else if (bp->ptp_tx_skb) {
 -BNX2X_ERR("The device supports only a single outstanding packet to timestamp, this packet will not be
 timestamped\n");
 +bp->eth_stats.ptp_skip_tx_ts++;
 +netdev_err_once(bp->dev,
 +"Device supports only a single outstanding packet to timestamp, this packet won't be timestamped\n");
 } else {
 skb_shinfo(skb)->tx_flags |= SKBTX_IN_PROGRESS;
 /* schedule check for Tx timestamp */
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_cmn.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_cmn.h
 @@@ -425,6 +425,8 @@
 void bnx2x_disable_close_the_gate(struct bnx2x *bp);
 int bnx2x_init_hw_func_cnic(struct bnx2x *bp);

 +void bnx2x_clear_vlan_info(struct bnx2x *bp);
 +
 +/**
 + * bnx2x_sp_event - handle ramrods completion.
 + *
 + @@ -1110,7 +1112,7 @@
 for (i = 0; i < E1H_FUNC_MAX / 2; i++) {
 u32 func_config =
MF_CFG_RD(bp,
-  func_mf_config[BP_PORT(bp) + 2 * i].
+  func_mf_config[BP_PATH(bp) + 2 * i].
  config);
  func_num +=
  ((func_config & FUNC_MF_CFG_FUNC_HIDE) ? 0 : 1);
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_ethtool.c
@@ -182,7 +182,9 @@
    { STATS_OFFSET32(driver_filtered_tx_pkt),
      4, false, "driver_filtered_tx_pkt" },
    { STATS_OFFSET32(eee_tx_lpi),
-     4, true, "Tx LPI entry count" }
+     4, true, "Tx LPI entry count" },
+    { STATS_OFFSET32(ptp_skip_tx_ts),
+     4, false, "ptp_skipped_tx_tstamp" },
};

#define BNX2X_NUM_STATS ARRAY_SIZE(bnx2x_stats_arr)
@@ -1581,7 +1583,8 @@
} else {
  if (!sff8472_comp ||
    (diag_type & SFP_EEPROM_DIAG_ADDR_CHANGE_REQ)) {
+    (diag_type & SFP_EEPROM_DIAG_ADDR_CHANGE_REQ) ||
    !(diag_type & SFP_EEPROM_DDM_IMPLEMENTED)) {
      modinfo->type = ETH_MODULE_SFF_8079;
      modinfo->eeprom_len = ETH_MODULE_SFF_8079_LEN;
    } else {
@@ -3387,14 +3390,18 @@
  if ((info->flow_type == UDP_V6_FLOW) &&
    (bp->rss_conf_obj.udp_rss_v6 != udp_rss_requested)) {
    bp->rss_conf_obj.udp_rss_v6 = udp_rss_requested;
  } else if ((info->flow_type == UDP_V6_FLOW) &&
    (bp->rss_conf_obj.udp_rss_v6 != udp_rss_requested)) {
    bp->rss_conf_obj.udp_rss_v6 = udp_rss_requested;
  } else if ((info->flow_type == UDP_V6_FLOW) &&
    (bp->rss_conf_obj.udp_rss_v6 != udp_rss_requested)) {
    bp->rss_conf_obj.udp_rss_v6 = udp_rss_requested;
  } else if ((info->flow_type == UDP_V6_FLOW) &&
    (bp->rss_conf_obj.udp_rss_v6 != udp_rss_requested)) {
    bp->rss_conf_obj.udp_rss_v6 = udp_rss_requested;
  } else if ((info->flow_type == UDP_V6_FLOW) &&
    (bp->rss_conf_obj.udp_rss_v6 != udp_rss_requested)) {
    bp->rss_conf_obj.udp_rss_v6 = udp_rssRequested;
return 0;

@@ -3508,7 +3515,10 @@
 bp->rss_conf_obj.ind_table[i] = indir[i] + bp->fp->cl_id;
 }

-return bnx2x_config_rss_eth(bp, false);
+if (bp->state == BNX2X_STATE_OPEN)
+return bnx2x_config_rss_eth(bp, false);
+return 0;
}

/**
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_link.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_link.c
@@ -588,7 +588,7 @@
 * slots for the highest priority.
 */
 REG_WR(bp, (port) ? NIG_REG_P1_TX_ARB_NUM_STRICT_ARB_SLOTS :
- NIG_REG_P1_TX_ARB_NUM_STRICT_ARB_SLOTS, 0x100);
+ NIG_REG_P0_TX_ARB_NUM_STRICT_ARB_SLOTS, 0x100);
 /* Mapping between the CREDIT_WEIGHT registers and actual client
 * numbers
 */
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_link.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_link.h
@@ -62,6 +62,7 @@
#define SFP_EEPROM_DIAG_TYPE_ADDR		0x5c
#define SFP_EEPROM_DIAG_TYPE_SIZE		1
#define SFP_EEPROM_DIAG_ADDR_CHANGE_REQ		(1<<2)
+#define SFP_EEPROM_DDM_IMPLEMENTED		(1<<6)
#define SFP_EEPROM_SFF_8472_COMP_ADDR		0x5e
#define SFP_EEPROM_SFF_8472_COMP_SIZE		1
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_main.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_main.c
@@ -2925,6 +2925,10 @@
 func_params.f_obj = &bp->func_obj;
 func_params.cmd = BNX2X_F_CMD_SWITCH_UPDATE;
++
+/* Prepare parameters for function state transitions */
+__set_bit(RAMROD_COMP_WAIT, &func_params.ramrod_flags);
+__set_bit(RAMROD_RETRY, &func_params.ramrod_flags);
+
 if (IS_MF_UFP(bp) || IS_MF_BD(bp)) {
 int func = BP_ABS_FUNC(bp);
 u32 val;
static void bnx2x_config_mf_bw(struct bnx2x *bp) {
    /* Workaround for MFW bug.
    * MFW is not supposed to generate BW attention in
    * single function mode.
    */
    if (!IS_MF(bp)) {
        DP(BNX2X_MSG_MCP, "Ignoring MF BW config in single function mode\n");
        return;
    }

    if (bp->link_vars.link_up) {
        bnx2x_cmng_fns_init(bp, true, CMNG_FNS_MINMAX);
        bnx2x_link_sync_notify(bp);
        bnx2x_handle_eee_event(bp);

        if (val & DRV_STATUS_OEM_UPDATE_SVID)
            bnx2x_handle_update_svid_cmd(bp);
        bnx2x_schedule_sp_rtnl(bp,
            BNX2X_SP_RTNL_UPDATE_SVID, 0);
        if (bp->link_vars.periodic_flags &
            PERIODIC_FLAGS_LINK_EVENT) {
            @ @ -8462,6 +8477,7 @@
            /* Fill a user request section if needed */
            if (!test_bit(RAMROD_CONT, ramrod_flags)) {
                ramrod_param.user_req.u.vlan.vlan = vlan;
                _set_bit(BNX2X_VLAN, &ramrod_param.user_req.vlan_mac_flags);
                /* Set the command: ADD or DEL */
                if (set)
                    ramrod_param.user_req.cmd = BNX2X_VLAN_MAC_ADD;
                @ @ -8482,6 +8498,34 @@
                return rc;
            }

            void bnx2x_clear_vlan_info(struct bnx2x *bp)
            +{
            +struct bnx2x_vlan_entry *vlan;
            +
            +/* Mark that hw forgot all entries */
            +list_for_each_entry(vlan, &bp->vlan_reg, link)
            +vlan->hw = false;
            +
            +bp->vlan_cnt = 0;
        }
    }
}
static int bnx2x_del_all_vlans(struct bnx2x *bp)
{
    struct bnx2x_vlan_mac_obj *vlan_obj = &bp->sp_objs[0].vlan_obj;
    unsigned long ramrod_flags = 0, vlan_flags = 0;
    int rc;
    __set_bit(RAMROD_COMP_WAIT, &ramrod_flags);
    __set_bit(BNX2X_VLAN, &vlan_flags);
    rc = vlan_obj->delete_all(bp, vlan_obj, &vlan_flags, &ramrod_flags);
    if (rc)
        return rc;
    bnx2x_clear_vlan_info(bp);
    return 0;
}

int bnx2x_del_all_macs(struct bnx2x *bp, struct bnx2x_vlan_mac_obj *mac_obj, int mac_type, bool wait_for_comp)
{
    if (!CHIP_IS_E1x(bp)) {
        /* Remove all currently configured VLANs */
        int rc = bnx2x_del_all_vlans(bp);
        if (rc < 0)
            BNX2X_ERR("Failed to delete all VLANs
");
    }
    /* Disable LLH */
    if (!CHIP_IS_E1(bp))
        REG_WR(bp, NIG_REG_LLH0_FUNC_EN + port*8, 0);
    /* The whole *vlan_obj structure may be not initialized if VLAN
     * filtering offload is not supported by hardware. Currently this is
     * true for all hardware covered by CHIP_IS_E1x().
     */
    if (!CHIP_IS_E1x(bp)) {
        /* Remove all currently configured VLANs */
        int rc = bnx2x_del_all_vlans(bp);
        if (rc < 0)
            BNX2X_ERR("Failed to delete all VLANs
");
    }
    if (!CHIP_IS_E1(bp))
        REG_WR(bp, NIG_REG_LLH0_FUNC_EN + port*8, 0);
    /* Disable LLH */
    if (!CHIP_IS_E1(bp))
        REG_WR(bp, NIG_REG_LLH0_FUNC_EN + port*8, 0);
    /* The whole *vlan_obj structure may be not initialized if VLAN
     * filtering offload is not supported by hardware. Currently this is
     * true for all hardware covered by CHIP_IS_E1x().
     */
    if (!CHIP_IS_E1x(bp)) {
        /* Remove all currently configured VLANs */
        int rc = bnx2x_del_all_vlans(bp);
        if (rc < 0)
            BNX2X_ERR("Failed to delete all VLANs
");
    }
    if (!CHIP_IS_E1(bp))
        REG_WR(bp, NIG_REG_LLH0_FUNC_EN + port*8, 0);
}

static void bnx2x_parity_recover(struct bnx2x *bp)
{
    bool is_parity, global = false;
    u32 error_recovered, error_unrecovered;
    
}
+ifdef CONFIG_BNX2X_SRIOV
+int vf_idx;
+
+for (vf_idx = 0; vf_idx < bp->requested_nr_virtfn; vf_idx++) {
+struct bnx2x_virtf *vf = BP_VF(bp, vf_idx);

+if (vf)
+vf->state = VF_LOST;
+
+endif

DP(NETIF_MSG_HW, "Handling parity\n");
while (1) {
switch (bp->recovery_state) {
@@ -10279,6 +10342,12 @@
bp->sp_rtnl_state = 0;
smp_mb();

+/* Immediately indicate link as down */
+bp->link_vars.link_up = 0;
+bp->force_link_down = true;
+netif_carrier_off(bp->dev);
+BNX2X_ERR("Indicating link is down due to Tx-timeout\n");
+
bnx2x_nicUnload(bp, UNLOAD_NORMAL, true);
/* When ret value shows failure of allocation failure,
* the nic is rebooted again. If open still fails, a error
@@ -10343,6 +10412,9 @@
&bp->sp_rtnl_state))
bnx2x_update_mng_version(bp);

+if (test_and_clear_bit(BNX2X_SP_RTNL_UPDATE_SVID, &bp->sp_rtnl_state))
+bnx2x_handle_update_svid_cmd(bp);
+
+if (test_and_clear_bit(BNX2X_SP_RTNL_CHANGE_UDP_PORT,
   &bp->sp_rtnl_state)) {
   if (bnx2x_udp_port_update(bp)) {
@@ -11734,8 +11806,10 @@
   * If maximum allowed number of connections is zero -
   * disable the feature.
   */
-}if (!bp->cnic_eth_dev.max_fcoe_conn)
+if (!bp->cnic_eth_dev.max_fcoe_conn) {
bp->flags |= NO_FCOE_FLAG;
+eth_zero_addr(bp->fip_mac);
+}
}

static void bnx2x_get_cnic_info(struct bnx2x *bp)
struct net_device *dev,
    netdev_features_t features)
{
    /*
    * A skb with gso_size + header length > 9700 will cause a
    * firmware panic. Drop GSO support.
    *
    * Eventually the upper layer should not pass these packets down.
    *
    * For speed, if the gso_size is <= 9000, assume there will
    * not be 700 bytes of headers and pass it through. Only do a
    * full (slow) validation if the gso_size is > 9000.
    *
    * (Due to the way SKB_BY_FRAGS works this will also do a full
    * validation in that case.)
    */
    +*/
+if (unlikely(skb_is_gso(skb) &&
+   (skb_shinfo(skb)->gso_size > 9000) &&
+   !skb_gso_validate_mac_len(skb, 9700)))
+    features &= ~NETIF_F_GSO_MASK;
+}
features = vlan_features_check(skb, features);
return vxlan_features_check(skb, features);
}

int bnx2x_vlan_reconfigure_vid(struct bnx2x *bp)
{
    struct bnx2x_vlan_entry *vlan;
-
    /* The hw forgot all entries after reload */
    -list_for_each_entry(vlan, &bp->vlan_reg, link)
        -vlan->hw = false;
    -bp->vlan_cnt = 0;
-
    /* Don't set rx mode here. Our caller will do it. */
    bnx2x_vlan_configure(bp, false);

    @ @ -15209,11 +15294,24 @ @
    u32 val_seq;
    u64 timestamp, ns;
    struct skb_shared_hwtstamps shhwtstamps;
    +bool bail = true;
    +int i;
    +*/
    /* FW may take a while to complete timestamping; try a bit and if it's
    * still not complete, may indicate an error state - bail out then.
    */

for (i = 0; i < 10; i++) {
    /* Read Tx timestamp registers */
    val_seq = REG_RD(bp, port ? NIG_REG_P1_TLLH_PTP_BUF_SEQID :
        NIG_REG_P0_TLLH_PTP_BUF_SEQID);
    if (val_seq & 0x10000) {
        bail = false;
        break;
    }
    msleep(1 << i);
}

/* Read Tx timestamp registers */
val_seq = REG_RD(bp, port ? NIG_REG_P1_TLLH_PTP_BUF_SEQID :
    NIG_REG_P0_TLLH_PTP_BUF_SEQID);
if (val_seq & 0x10000) {
    if (!bail) {
        /* There is a valid timestamp value */
        timestamp = REG_RD(bp, port ? NIG_REG_P1_TLLH_PTP_BUF_TS_MSB :
            NIG_REG_P0_TLLH_PTP_BUF_TS_MSB);
        memset(&shhwtstamps, 0, sizeof(shhwtstamps));
        shhwtstamps.hwtstamp = ns_to_ktime(ns);
        skb_tstamp_tx(bp->ptp_tx_skb, &shhwtstamps);
        dev_kfree_skb_any(bp->ptp_tx_skb);
        bp->ptp_tx_skb = NULL;
        DP(BNX2X_MSG_PTP, "Tx timestamp, timestamp cycles = %llu, ns = %llu\n",
            timestamp, ns);
    } else {
        /* There is no valid Tx timestamp yet\n*/
        /* Reschedule to keep checking for a valid timestamp value */
        schedule_work(&bp->ptp_task);
        DP(BNX2X_MSG_PTP, "Tx timestamp is not recorded (register read=%u)\n",
            val_seq);
        bp->eth_stats.ptp_skip_tx_ts++;
    }
    +dev_kfree_skb_any(bp->ptp_tx_skb);
    bp->ptp_tx_skb = NULL;
}

void bnx2x_set_rx_ts(struct bnx2x *bp, struct sk_buff *skb)
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sp.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sp.c
@@ -6149,6 +6149,7 @@
    rdata->sd_vlan_tag= cpu_to_le16(start_params->sd_vlan_tag);
}

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rdata->path_id= BP_PATH(bp);
rdata->network_cos_mode= start_params->network_cos_mode;
+rdata->dmae_cmd_id= BNX2X_FW_DMAE_C;

rdata->vxlun_dst_port= cpu_to_le16(start_params->vxlun_dst_port);
rdata->geneve_dst_port= cpu_to_le16(start_params->geneve_dst_port);
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sp.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sp.h
@@ -265,6 +265,7 @@
BNX2X_ETH_MAC,
BNX2X_ISCSI_ETH_MAC,
BNX2X_NETQ_ETH_MAC,
+BNX2X_VLAN,
BNX2X_DONT_CONSUME_CAM_CREDIT,
BNX2X_DONT_CONSUME_CAM_CREDIT_DEST,
};
@@ -272,7 +273,8 @@
#define BNX2X_VLAN_MAC_CMP_MASK	(1 << BNX2X_UC_LIST_MAC |
 1 << BNX2X_ETH_MAC |
 1 << BNX2X_ISCSI_ETH_MAC |
- 1 << BNX2X_NETQ_ETH_MAC)
+	 1 << BNX2X_NETQ_ETH_MAC | 
+	 1 << BNX2X_VLAN)
#define BNX2X_VLAN_MAC_CMP_FLAGS(flags) 
((flags) & BNX2X_VLAN_MAC_CMP_MASK)

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sriov.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sriov.c
@@ -1237,8 +1237,10 @@
go to failed;

/* SR-IOV capability was enabled but there are no VFs*/
-if (iov->total == 0)
+if (iov->total == 0) {
 +err = 0;
 goto failed;
 +}

 iov->nr_virtfn = min_t(u16, iov->total, num_vfs_param);

@@ -2384,15 +2386,21 @@
 /* send the ramrod on all the queues of the PF */
 for_each_eth_queue(bp, i) {
 struct bnx2x_fastpath *fp = &bp->fp[i];
+int tx_idx;

 /* Set the appropriate Queue object */
 q_params.q_obj = &bnx2x_sp_obj(bp, fp).q_obj;
/* Update the Queue state */
rc = bnx2x_queue_state_change(bp, &q_params);
-if (rc) {
-BNX2X_ERR("Failed to configure Tx switching\n");
-return rc;
+for (tx_idx = FIRST_TX_COS_INDEX;
+     tx_idx < fp->max_cos; tx_idx++) {
+q_params.params.update.cid_index = tx_idx;
+
+/* Update the Queue state */
+rc = bnx2x_queue_state_change(bp, &q_params);
+if (rc) {
+BNX2X_ERR("Failed to configure Tx switching\n");
+return rc;
+}
}

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sriov.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_sriov.h
@@ -139,6 +139,7 @@
#define VF_ACQUIRED	1	/* VF acquired, but not initialized */
#define VF_ENABLED	2	/* VF Enabled */
#define VF_RESET	3	/* VF FLR'd, pending cleanup */
+#define VF_LOST	4	/* Recovery while VFs are loaded */

bool flr_clnup_stage;/* true during flr cleanup */
bool malicious; /* true if FW indicated so, until FLR */
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_stats.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_stats.h
@@ -207,6 +207,9 @@
    u32 driver_filtered_tx_pkt;
 /* src: Clear-on-Read register; Will not survive PMF Migration */
    u32 eee_tx_lpi;
+    /* PTP */
+    u32 ptp_skip_tx_ts;
    };

struct bnx2x_eth_q_stats {
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnx2x/bnx2x_vfpf.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnx2x/bnx2x_vfpf.c
@@ -2112,6 +2112,18 @@
    }
    int i;

+if (vf->state == VF_LOST) {

/* Just ack the FW and return if VFs are lost
 * in case of parity error. VFs are supposed to be timedout
 * on waiting for PF response.
 */

+DP(BNX2X_MSG_IOV,
+ "VF 0x%x lost, not handling the request\n", vf->abs_vfid);
+
storm_memset_vf_mbx_ack(bp, vf->abs_vfid);
+return;
+
/* check if tlv type is known */
if (bnx2x_tlv_supported(mbx->first_tlv.tl.type)) {
    /* Lock the per vf op mutex and note the locker's identity.
    --- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt.c
    +++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt.c
    @@ -274,6 +274,26 @@
    return md_dst->u.port_info.port_id;
    }
+
+static bool bnxt_txr_netif_try_stop_queue(struct bnxt *bp,
+    struct bnxt_tx_ring_info *txr,
+    struct netdev_queue *txq)
+{
+    netif_tx_stop_queue(txq);
+
+    /* netif_tx_stop_queue() must be done before checking
+     * tx index in bnxt_tx_avail() below, because in
+     * bnxt_tx_int(), we update tx index before checking for
+     * netif_tx_queue_stopped().
+     */
+    smp_mb();
+    if (bnxt_tx_avail(bp, txr) >= bp->tx_wake_thresh) {
+        netif_tx_wake_queue(txq);
+        return false;
+    }
+
    return true;
+
+}

static netdev_tx_t bnxt_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct bnxt *bp = netdev_priv(dev);
    free_size = bnxt_tx_avail(bp, txr);
    if (unlikely(free_size < skb_shinfo(skb)->nr_frags + 2)) {
        -netif_tx_stop_queue(txq);
-return NETDEV_TX_BUSY;
+if (bnxt_txr_netif_try_stop_queue(bp, txr, txq))
+return NETDEV_TX_BUSY;
}

length = skb->len;
@@ -455,6 +475,12 @@
}

length >>= 9;
+if (unlikely(length >= ARRAY_SIZE(bnxt_lhint_arr))) {
+dev_warn_ratelimited(&pdev->dev, "Dropped oversize %d bytes TX packet.\n",
+ skb->len);
+i = 0;
+goto tx_dma_error;
+}
flags |= bnxt_lhint_arr[length];
txbd->tx_bd_len_flags_type = cpu_to_le32(flags);

@@ -507,16 +533,7 @@
if (skb->xmit_more && !tx_buf->is_push)
    bnxt_db_write(bp, txr->tx_doorbell, DB_KEY_TX | prod);

-    netif_tx_stop_queue(txq);
-    /* netif_tx_stop_queue() must be done before checking
-     * tx index in bnxt_tx_avail() below, because in
-     * bnxt_tx_int(), we update tx index before checking for
-     * netif_tx_queue_stopped().
-    */
-    smp_mb();
-    if (bnxt_tx_avail(bp, txr) > bp->tx_wake_thresh)
-        netif_tx_wake_queue(txq);
+    bnxt_txr_netif_try_stop_queue(bp, txr, txq);
}

return NETDEV_TX_OK;

@@ -600,14 +617,9 @@
smp_mb();

    if (unlikely(netif_tx_queue_stopped(txq)) &&
        (bnxt_tx_avail(bp, txr) > bp->tx_wake_thresh)) {
        __netif_tx_lock(txq, smp_processor_id());
+        if (netif_tx_queue_stopped(txq) &&
+            bnxt_tx_avail(bp, txr) > bp->tx_wake_thresh &&
+            txr->dev_state != BNXT_DEV_STATE_CLOSING)

        -netif_tx_wake_queue(txq);
        -__netif_tx_unlock(txq);
static struct page *__bnxt_alloc_rx_page(struct bnxt *bp, dma_addr_t *mapping,
@@ -1078,6 +1090,8 @@
    if (unlikely(cons != rxr->rx_next_cons)) {
        +netdev_warn(bp->dev, "TXA cons %x != expected cons %x\n",
        + cons, rxr->tx_next_cons);
@@ -1530,15 +1544,17 @@
    cons = rxcmp->rx_cmpOpaque;
    -rx_buf = &rxr->rx_buf_ring[cons];
    -data = rx_buf->data;
    -data_ptr = rx_buf->data_ptr;
    if (unlikely(cons != rxr->rx_next_cons)) {
        int rc1 = bnxt_discard_rx(bp, bnapi, raw_cons, rxcmp);
        +netdev_warn(bp->dev, "RX cons %x != expected cons %x\n",
        + cons, rxr->rx_next_cons);
    bnxt_sched_reset(bp, rxr);
    return rc1;
    }
@@ -1555,11 +1571,17 @@
    rx_buf->data = NULL;
    if (rxcmp1->rx_cmp_cfa_code_errors_v2 & RX_CMP_L2_ERRORS) {
        +u32 rx_err = le32_to_cpu(rxcmp1->rx_cmp_cfa_code_errors_v2);
    +bnxt_reuse_rx_data(rxr, cons, data);
    if (agg_bufs)
        bnxt_reuse_rx_agg_bufs(bnapi, cp_cons, agg_bufs);
    rc = -EIO;
```c
@if (rx_err & RX_CMPL_ERRORS_BUFFER_ERROR_MASK) {
  netdev_warn(bp->dev, "RX buffer error %x\n", rx_err);
  bnxt_sched_reset(bp, rxr);
} goto next_rx;

skb = bnxt_copy_skb(bnapi, data_ptr, len, dma_addr);
bnxt_reuse_rx_data(rxr, cons, data);
@if (!skb) {
  if (agg_bufs)
    bnxt_reuse_rx_agg_bufs(bnapi, cp_cons, agg_bufs);
  rc = -ENOMEM;
  goto next_rx;
}@@ -1575,6 +1597,8 @@

if (BNXT_VF(bp))
goto async_event_process_exit;
-if (data1 & 0x20000) {
  +*/
  +/* print unsupported speed warning in forced speed mode only */
  +if (!!(link_info->autoneg & BNXT_AUTONEG_SPEED) &&
    +  (data1 & 0x20000)) {
    u16 fw_speed = link_info->force_link_speed;
    u32 speed = bnxt_fw_to_ethtool_speed(fw_speed);

    -netdev_warn(bp->dev, "Link speed %d no longer supported\n",
      -  speed);
    +if (speed != SPEED_UNKNOWN)
    +netdev_warn(bp->dev, "Link speed %d no longer supported\n",
      +  speed);
  }
  set_bit(BNXT_LINK_SPEED_CHNG_SPEVENT, &bp->sp_event);
  /* fall thru */
@@ -1868,8 +1896,11 @@
-if (TX_CMP_TYPE(txcmp) == CMP_TYPE_TX_L2_CMP) {
  tx_pkts++;
  /* return full budget so NAPI will complete. */
  -if (unlikely(tx_pkts > bp->tx_wake_thresh))
  +if (unlikely(tx_pkts >= bp->tx_wake_thresh)) {
    rx_pkts = budget;
    +raw_cons = NEXT_RAW_CMP(raw_cons);
    +break;
    +}
  } else if ((TX_CMP_TYPE(txcmp) & 0x30) == 0x10) {
    if (likely(budget))
```

*Open Source Used In 5GaaS Edge AC-4 24412*
rc = bnxt_rx_pkt(bp, bnapi, &raw_cons, &event);
@@ -1897,7 +1928,7 @@
}
raw_cons = NEXT_RAW_CMP(raw_cons);

@if (rx_pkts == budget)
+if (rx_pkts && rx_pkts == budget)
break;
@
@@ -2011,8 +2042,12 @@
while (1) {
work_done += bnxt_poll_work(bp, bnapi, budget - work_done);

-if (work_done >= budget)
+if (work_done >= budget) {
+if (!budget)
+BNXT_CP_DB_REARM(cpr->cp_doorbell,
+ cpr->cp_raw_cons);
break;
+}

if (!bnxt_has_work(bp, cpr)) {
if (napi_complete_done(napi, work_done))
@@ -2635,7 +2670,7 @@
u16 i;
bp->tx_wake_thresh = max_t(int, bp->tx_ring_size / 2,
- MAX_SKB_FRAGS + 1);
+ BNXT_MIN_TX_DESC_CNT);

for (i = 0; i < bp->tx_nr_rings; i++) {
struct bnxt_tx_ring_info *txr = &bp->tx_ring[i];
@@ -2962,10 +2997,11 @@
{
struct pci_dev *pdev = bp->pdev;

-dma_free_coherent(&pdev->dev, PAGE_SIZE, bp->hwrm_cmd_resp_addr,
- bp->hwrm_cmd_resp_dma_addr);
-
- bp->hwrm_cmd_resp_addr = NULL;
+if (bp->hwrm_cmd_resp_addr) {
+dma_free_coherent(&pdev->dev, PAGE_SIZE, bp->hwrm_cmd_resp_addr,
+ bp->hwrm_cmd_resp_dma_addr);
+bp->hwrm_cmd_resp_addr = NULL;
+}
if (bp->hwrm_dbg_resp_addr) {
 dma_free_coherent(&pdev->dev, HWRM_DBG_REG_BUF_SIZE,
bp->hwrm_dbg_resp_addr,
@@ -3813,6 +3849,9 @@
    struct bnxt_vnic_info *vnic = &bp->vnic_info[vnic_id];
    struct hwrm_vnic_tpa_cfg_input req = {0};

    +if (vnic->fw_vnic_id == INVALID_HW_RING_ID)
    +return 0;
    +
    bnxt_hwrm_cmd_hdr_init(bp, &req, HWRM_VNIC_TPA_CFG, -1, -1);

    if (tpa_flags) {
    @@ -4761,7 +4800,6 @@
        pf->fw_fid = le16_to_cpu(resp->fid);
        pf->port_id = le16_to_cpu(resp->port_id);
        -bp->dev->dev_port = pf->port_id;
        memcpy(pf->mac_addr, resp->mac_address, ETH_ALEN);
        pf->max_rsscos_ctxs = le16_to_cpu(resp->max_rsscos_ctx);
        pf->max_cp_rings = le16_to_cpu(resp->max_cmpl_rings);
    @@ -5340,7 +5378,7 @@
        int tcs, i;

        tcs = netdev_get_num_tc(dev);
        -if (tcs > 1) {
        +if (tcs) {
            int i, off, count;

            for (i = 0; i < tcs; i++) {
                @@ -5459,7 +5497,15 @@
                return min_t(unsigned int, bp->pf.max_irqs, bp->pf.max_cp_rings);
            }

            -void bnxt_set_max_func_irqs(struct bnxt *bp, unsigned int max_irqs)
            +static void bnxt_set_max_func_irqs(struct bnxt *bp, unsigned int max_irqs)
            {
                #if defined(CONFIG_BNXT_SRIOV)
                if (BNXT_VF(bp))
                @@ -5714,12 +5752,15 @@
                    if (bp->tx_ring) {
                        for (i = 0; i < bp->tx_nr_rings; i++) {
                            txr = &bp->tx_ring[i];
                            -txr->dev_state = BNXT_DEV_STATE_CLOSING;
                            +WRITE_ONCE(txr->dev_state, BNXT_DEV_STATE_CLOSING);
                        }
                    }
                
            */ Make sure napi polls see @dev_state change */
            +synchronize_net();
            */ Drop carrier first to prevent TX timeout */


---
void bnxt_tx_enable(struct bnxt *bp)
@@ -5729,8 +5770,10 @@
 for (i = 0; i < bp->tx_nr_rings; i++) {
     txr = &bp->tx_ring[i];
     -txr->dev_state = 0;
@@ -5745,6 +5788,11 @@
         fec;
         netif_carrier_on(bp->dev);
         +speed = bnxt_fw_to_ethtool_speed(bp->link_info.link_speed);
@@ -5918,6 +5965,9 @@
     mutex_unlock(&bp->hwrm_cmd_lock);
 
     +if (!BNXT_SINGLE_PF(bp))
@@ -176,7 +223 @@
         }
link_info->support_auto_speeds) {
rc = bnxt_request_irq(bp);
if (rc) {
    netdev_err(bp->dev, "bnxt_request_irq err: %x\n", rc);
    -goto open_err;
    +goto open_err_irq;
}

-bnxt_enable_napi(bp);

rc = bnxt_init_nic(bp, irq_re_init);
if (rc) {
    netdev_err(bp->dev, "bnxt_init_nic err: %x\n", rc);
    -goto open_err;
    +goto open_err_irq;
}

+bnxt_enable_napi(bp);
+
    if (link_re_init) {
        mutex_lock(&bp->link_lock);
        rc = bnxt_update_phy_setting(bp);
        -@ @ -6372,8 +6422,7 @@
        bnxt_vf_reps_open(bp);
        return 0;

    -open_err:
    -bnxt_disable_napi(bp);
    +open_err_irq:
        bnxt_del_napi(bp);

open_err_free_mem:
    -@ @ -6446,6 +6495,9 @@
        test_bit(BNXT_STATE_READ_STATS, &bp->state));
    }

+static void bnxt_get_ring_stats(struct bnxt *bp,
+struct rtnl_link_stats64 *stats);
+
int bnxt_close_nic(struct bnxt *bp, bool irq_re_init, bool link_re_init)
{
    int rc = 0;
    -@ @ -6480,6 +6532,9 @@
    del_timer_sync(&bp->timer);
    bnxt_free_skbs(bp);

Save ring stats before shutdown
if (bp->bnapi && irq_re_init)
bnxt_get_ring_stats(bp, &bp->net_stats_prev);
if (irq_re_init) {
bntx_free_irq(bp);
bnxt_del_napi(bp);

static void
bnxt_get_stats64(struct net_device *dev, struct rtnl_link_stats64 *stats)
static void bnxt_get_ring_stats(struct bnxt *bp,
struct rtnl_link_stats64 *stats)
{
int i;
struct bnxt *bp = netdev_priv(dev);

set_bit(BNXT_STATE_READ_STATS, &bp->state);
/* Make sure bnxt_close_nic() sees that we are reading stats before
 * we check the BNXT_STATE_OPEN flag.
 */
smp_mb__after_atomic();
if (!test_bit(BNXT_STATE_OPEN, &bp->state)) {
clear_bit(BNXT_STATE_READ_STATS, &bp->state);
return;
}

/* TODO check if we need to synchronize with bnxt_close path */
for (i = 0; i < bp->cp_nr_rings; i++) {
struct bnxt_napi *bnapi = bp->bnapi[i];
struct bnxt_cp_ring_info *cpr = &bnapi->cp_ring;
stats->tx_dropped += le64_to_cpu(hw_stats->tx_drop_pkts);
}

static void bnxt_add_prev_stats(struct bnxt *bp,
struct rtnl_link_stats64 *stats)
{
struct rtnl_link_stats64 *prev_stats = &bp->net_stats_prev;
stats->rx_packets += prev_stats->rx_packets;
stats->tx_packets += prev_stats->tx_packets;
stats->rx_bytes += prev_stats->rx_bytes;
stats->tx_bytes += prev_stats->tx_bytes;
+static void 
+bnxtn_get_stats64(struct net_device *dev, struct rtnl_link_stats64 *stats) 
+{ 
+struct bnxt *bp = netdev_priv(dev); 
+ 
+set_bit(BNXT_STATE_READ_STATS, &bp->state); 
+/* Make sure bnxt_close_nic() sees that we are reading stats before 
+ * we check the BNXT_STATE_OPEN flag. 
+ */ 
+ +smp_mb__after_atomic(); 
+if (!test_bit(BNXT_STATE_OPEN, &bp->state)) { 
+clear_bit(BNXT_STATE_READ_STATS, &bp->state); 
+*stats = bp->net_stats_prev; 
+return;  
+} 
+  
+bnxt_get_ring_stats(bp, stats); 
+bnxt_add_prev_stats(bp, stats); 

if (bp->flags & BNXT_FLAG_PORT_STATS) { 
struct rx_port_stats *rx = bp->hw_rx_port_stats; 
@@ -6730,8 +6808,15 @@
skip_uc: 
rc = bnxt_hwrn_cfa_l2_set_rx_mask(bp, 0); 
+if (rc && vnic->mc_list_count) { 
+netdev_info(bp->dev, "Failed setting MC filters rc: %d, turning on ALL_MCAST mode\n", 
+ +rc); 
+vnic->rx_mask |= CFA_L2_SET_RX_MASK_REQ_MASK_ALL_MCAST; 
+vnic->mc_list_count = 0; 
+rc = bnxt_hwrn_cfa_l2_set_rx_mask(bp, 0); 
+} 
if (rc) 
-netdev_err(bp->dev, "HWRM cfa l2 rx mask failure rc: %x\n", 
+netdev_err(bp->dev, "HWRM cfa l2 rx mask failure rc: %d\n", 
+ rc); 

return rc; 
@@ -6780,6 +6865,7 @@
 netdev_features_t features) 
{ 
struct bnxt *bp = netdev_priv(dev); 
+netdev_features_t vlan_features;
if ((features & NETIF_F_NTUPLE) && !bnxt_rfs_capable(bp))
features &= ~NETIF_F_NTUPLE;
@@ -6787,12 +6873,14 @@
/* Both CTAG and STAG VLAN acceleration on the RX side have to be
 * turned on or off together.
 */
-if ((features & (NETIF_F_HW_VLAN_CTAG_RX | NETIF_F_HW_VLAN_STAG_RX)) !=
-    (NETIF_F_HW_VLAN_CTAG_RX | NETIF_F_HW_VLAN_STAG_RX)) {
+vlan_features = features & (NETIF_F_HW_VLAN_CTAG_RX |
+    NETIF_F_HW_VLAN_STAG_RX);
+if (vlan_features != (NETIF_F_HW_VLAN_CTAG_RX |
+    NETIF_F_HW_VLAN_STAG_RX)) {
    if (dev->features & NETIF_F_HW_VLAN_CTAG_RX)
        features &= ~(NETIF_F_HW_VLAN_CTAG_RX |
@@ -7196,7 +7284,8 @@
    if (dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(64)) != 0 &&
            dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(32)) != 0) {
    dev_err(&pdev->dev, "System does not support DMA, aborting\n");
-goto init_err_disable;
+rc = -EIO;
+goto init_err_release;
 }
pci_set_master(pdev);
@@ -7266,7 +7355,7 @@
 if (ether_addr_equal(addr->sa_data, dev->dev_addr))
 return 0;

-rc = bnxt_approve_mac(bp, addr->sa_data);
+rc = bnxt_approve_mac(bp, addr->sa_data, true);
if (rc)
    return rc;

@@ -7285,13 +7374,13 @@
 struct bnxt *bp = netdev_priv(dev);

 if (netif_running(dev))
-bnxt_close_nic(bp, false, false);
+bnxt_close_nic(bp, true, false);

 dev->mtu = new_mtu;
null
return bnxt_trim_rings(bp, max_rx, max_tx, cp, shared);
}

/* Not enough rings, try disabling agg rings. */
bp->flags &= ~BNXT_FLAG_AGG_RINGS;
rc = bnxt_get_max_rings(bp, max_rx, max_tx, shared);
@if (rc)
+if (rc) {
+/* set BNXT_FLAG_AGG_RINGS back for consistency */
+bp->flags |= BNXT_FLAG_AGG_RINGS;
return rc;
+
} bp->flags |= BNXT_FLAG_NO_AGG_RINGS;
bp->dev->hw_features &= ~NETIF_F_LRO;
bp->dev->features &= ~NETIF_F_LRO;
@@@@.7997,6 +8083,10 @@@
bp->rx_nr_rings++;
bp->cp_nr_rings++;
+
+if (rc) {
+bp->tx_nr_rings = 0;
+bp->rx_nr_rings = 0;
+
} return rc;

@@@@.7998,14 +8106,19 @@@
} else {
#ifdef CONFIG_BNXT_SRIOV
struct bnxt_vf_info *vf = &bp->vf;
+bool strict_approval = true;
if (is_valid_ether_addr(vf->mac_addr)) {
/* overwrite netdev dev_addr with admin VF MAC */
memcpy(bp->dev->dev_addr, vf->mac_addr, ETH_ALEN);
+/* Older PF driver or firmware may not approve this
+ * correctly.
+ */
+strict_approval = false;
} else {
eth_hw_addr_random(bp->dev);
-rc = bnxt_approve_mac(bp, bp->dev->dev_addr);
}
+rc = bnxt_approve_mac(bp, bp->dev->dev_addr, strict_approval);
#endif
}
return rc;
create_singlethread_workqueue("bnxt_pf_wq");
if (!bnxt_pf_wq) {
    dev_err(&pdev->dev, "Unable to create workqueue.\n");
    rc = -ENOMEM;
    goto init_err_pci_clean;
}

bnxt_parse_log_pcie_link(bp);

+pci_save_state(pdev);
return 0;

init_err_cleanup_tc:
@@ -8240,6 +8355,8 @@
    bnxt_clear_int_mode(bp);

init_err_pci_clean:
+bnxt_free_hwrn_short_cmd_req(bp);
+bnxt_free_hwrn_resources(bp);
bnxt_cleanup_pci(bp);

init_err_free:
@@ -8392,6 +8509,8 @@
    "Cannot re-enable PCI device after reset.\n");
} else {
    pci_set_master(pdev);
    +pci_restore_state(pdev);
    +pci_save_state(pdev);

    err = bnxt_hwrn_func_reset(bp);
    if (!err && !netif_running(netdev))
@@ -8403,8 +8522,11 @@
        }
    }

    +if (result != PCI_ERS_RESULT_RECOVERED) {
        if (netif_running(netdev))
            +dev_close(netdev);
        +pci_disable_device(pdev);
        +}

    rtnl_unlock();
err); /* non-fatal, continue */
}

return PCI_ERS_RESULT_RECOVERED;
+return result;
}

/**
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt.h
@@ -8415,7 +8537,7 @@
err); /* non-fatal, continue */
-
	return PCI_ERS_RESULT_RECOVERED;
+
	return result;
}

/* Minimum TX BDs for a TX packet with MAX_SKB_FRAGS + 1. We need one extra
 + * BD because the first TX BD is always a long BD.
 + */
+#define BNXT_MIN_TX_DESC_CNT	(MAX_SKB_FRAGS + 2)
+
#define RX_RING(x)((x) & ~(RX_DESC_CNT - 1)) >> (BNXT_PAGE_SHIFT - 4)
#define RX_IDX(x)((x) & (RX_DESC_CNT - 1))

@@ -774,7 +779,6 @@
#define BNXT_VF_SPOOFCHK	0x2
#define BNXT_VF_LINK_FORCED	0x4
#define BNXT_VF_LINK_UP	0x8
-"func_flags; /* func cfg flags */
+u32	func_flags; /* func cfg flags */

u32 min_tx_rate;

@@ -1244,6 +1248,7 @@

struct rtnl_link_stats64	net_stats_prev;
struct rx_port_stats*hw_rx_port_stats;
struct tx_port_stats*hw_tx_port_stats;
dma_addr_thwrm_dbg_resp_dma_addr;
#define HWRM_DBG_REG_BUF_SIZE	128

+struct rtnl_link_stats64	net_stats_prev;
+struct rx_port_stats*hw_rx_port_stats;
+struct tx_port_stats*hw_tx_port_stats;
dma_addr_thwrm_dbg_resp_dma_addr;
#define HWRM_DBG_REG_BUF_SIZE	128

void bnxt_set_max_func_stat_ctxs(struct bnxt *bp, unsigned int max);
unsigned int bnxt_get_max_func_cp_rings(struct bnxt *bp);
void bnxt_set_max_func_cp_rings(struct bnxt *bp, unsigned int max);
-void bnxt_set_max_func_irqs(struct bnxt *bp, unsigned int max);
void bnxt_tx_disable(struct bnxt *bp);
void bnxt_tx_enable(struct bnxt *bp);
int bnxt_hwrm_set_pause(struct bnxt *);
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt_dcb.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt_dcb.c
@@ -387,24 +387,26 @@
 {
     struct bnxt *bp = netdev_priv(dev);
     struct ieee_ets *my_ets = bp->ieee_ets;
     int rc;

     ets->ets_cap = bp->max_tc;

     if (!my_ets) {
         -int rc;
         -
         if (bp->dcbx_cap & DCB_CAP_DCBX_HOST)
             return 0;

         my_ets = kzalloc(sizeof(*my_ets), GFP_KERNEL);
         if (!my_ets)
             -return 0;
         -
         rc = bnxt_hwrm_queue_cos2bw_qcfg(bp, my_ets);
         if (rc)
             -return 0;
         +goto error;
         rc = bnxt_hwrm_queue_pri2cos_qcfg(bp, my_ets);
         if (rc)
             -return 0;
         +goto error;
         +
         /* cache result */
         +bp->ieee_ets = my_ets;
     }

     ets->cbs = my_ets->cbs;
     @ @ -413,6 +415,9 @@
     memcpy(ets->tc_tsa, my_ets->tc_tsa, sizeof(ets->tc_tsa));
     memcpy(ets->prio_tc, my_ets->prio_tc, sizeof(ets->prio_tc));
     return 0;
     +error:
     +kfree(my_ets);
     +return rc;
 }

 static int bnxt_dcbnl_ieee_setets(struct net_device *dev, struct ieee_ets *ets)
 --- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt_ethtool.c
@@ -356,7 +356,7 @@
         if ((ering->rx_pending > BNXT_MAX_RX_DESC_CNT) ||
             
     memcpy(ets->tc_tsa, ering->tc_tsa, sizeof(ering->tc_tsa));
     memcpy(ets->prio_tc, ering->prio_tc, sizeof(ering->prio_tc));
     return 0;
     +error:
     +kfree(ering);
     +return rc;
 }

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(ering->tx_pending > BNXT_MAX_TX_DESC_CNT) ||
- (ering->tx_pending <= MAX_SKB_FRAGS))
+ (ering->tx_pending < BNXT_MIN_TX_DESC_CNT))
return -EINVAL;

if (netif_running(dev))
@@ -1261,9 +1261,12 @@
if (!BNXT_SINGLE_PF(bp))
return -EOPNOTSUPP;

+mutex_lock(&bp->link_lock);
if (epause->autoneg) {
-if (!(link_info->autoneg & BNXT_AUTONEG_SPEED))
-return -EINVAL;
+if (!(link_info->autoneg & BNXT_AUTONEG_SPEED)) {
+rc = -EINVAL;
+goto pause_exit;
+}

link_info->autoneg |= BNXT_AUTONEG_FLOW_CTRL;
if (bp->hwrm_spec_code >= 0x10201)
@@ -1286,6 +1289,9 @@

if (netif_running(dev))
rc = bnxt_hwrm_set_pause(bp);
+
+pause_exit:
+mutex_unlock(&bp->link_lock);
return rc;
}

@@ -1336,14 +1342,22 @@
rc = hwrm_send_message(bp, &req, sizeof(req), FLASH_NVRAM_TIMEOUT);
dma_free_coherent(&bp->pdev->dev, data_len, kmem, dma_handle);

+if (rc == HWRM_ERR_CODE_RESOURCE_ACCESS_DENIED) {
+netdev_info(dev,
+ "PF does not have admin privileges to flash the device\n");
+rc = -EACCES;
+} else if (rc) {
+rc = -EIO;
+}
return rc;
}

static int bnxt_firmware_reset(struct net_device *dev,
    u16 dir_type)
{
```c
-struct bnxt *bp = netdev_priv(dev);
struct hwrm_fw_reset_input req = {0};
+struct bnxt *bp = netdev_priv(dev);
+int rc;

bnxt_hwrm_cmd_hdr_init(bp, &req, HWRM_FW_RESET, -1, -1);

@@ -1380,7 +1394,15 @@
return -EINVAL;
}

-rc = hwrm_send_message(bp, &req, sizeof(req), HWRM_CMD_TIMEOUT);
+rc = hwrm_send_message(bp, &req, sizeof(req), HWRM_CMD_TIMEOUT);
+if (rc == HWRM_ERR_CODE_RESOURCE_ACCESS_DENIED) {
    +netdev_info(dev, "PF does not have admin privileges to reset the device\n");
    +rc = -EACCESS;
    +} else if (rc) {
    +rc = -EIO;
    +}
    +return rc;
}

static int bnxt_flash_firmware(struct net_device *dev,
@@ -1587,9 +1609,9 @@
struct hwrm_nvm_install_update_output *resp = bp->hwrm_cmd_resp_addr;
struct hwrm_nvm_install_update_input install = {0};
const struct firmware *fw;
+int rc, hwrm_err = 0;
    u32 item_len;
    u16 index;
    -int rc;

bnxt_hwrm_fw_set_time(bp);

@@ -1632,15 +1654,16 @@
memcpy(kmem, fw->data, fw->size);
modify.host_src_addr = cpu_to_le64(dma_handle);

-rc = hwrm_send_message(bp, &modify, sizeof(modify),
-    FLASH_PACKAGE_TIMEOUT);
-+hwrm_err = hwrm_send_message(bp, &modify,
-    +sizeof(modify),
-    +FLASH_PACKAGE_TIMEOUT);
-dma_free_coherent(&bp->pdev->dev, fw->size, kmem,
-dma_handle);
+
}
```
release_firmware(fw);
-if (rc)
-return rc;
+if (rc || hwrm_err)
+goto err_exit;

if (((install_type & 0xffff) == 0)
install_type >>= 16;
@@ -1648,26 +1671,21 @@
install.install_type = cpu_to_le32(install_type);

mutex_lock(&bp->hwrm_cmd_lock);
-rc = _hwrm_send_message(bp, &install, sizeof(install),
-INSTALL_PACKAGE_TIMEOUT);
-if (rc) {
-rc = -EOPNOTSUPP;
-goto flash_pkg_exit;
-}
-
-if (resp->error_code) {
+hwrm_err = _hwrm_send_message(bp, &install, sizeof(install),
+INSTALL_PACKAGE_TIMEOUT);
+if (hwrm_err) {
 u8 error_code = ((struct hwrm_err_output *)resp)->cmd_err;

-    if (error_code == NVM_INSTALL_UPDATE_CMD_ERR_CODE_FRAG_ERR) {
+    if (resp->error_code && error_code ==
+        NVM_INSTALL_UPDATE_CMD_ERR_CODE_FRAG_ERR) {
install.flags |= cpu_to_le16(
    NVM_INSTALL_UPDATE_REQ_FLAGS_ALLOWED_TO_DEFrag);
-rc = _hwrm_send_message(bp, &install, sizeof(install),
-INSTALL_PACKAGE_TIMEOUT);
-if (rc) {
-rc = -EOPNOTSUPP;
-goto flash_pkg_exit;
-}
+hwrm_err = _hwrm_send_message(bp, &install,
+INSTALL_PACKAGE_TIMEOUT);
+if (hwrm_err)
+goto flash_pkg_exit;
+
-
  if (resp->result) {
@@ -1677,6 +1695,14 @@

flash_pkg_exit:
mutex_unlock(&bp->hwrm_cmd_lock);
+err_exit:
+if (hwrm_err == HWRM_ERR_CODE_RESOURCE_ACCESS_DENIED) {
+    netdev_info(dev,
+    "PF does not have admin privileges to flash the device\n");
+rc = -EACCES;
+} else if (hwrm_err) {
+    rc = -EOPNOTSUPP;
+}
return rc;
}

@@ -1738,6 +1764,9 @@
if (rc != 0)
    return rc;

+if (!dir_entries || !entry_length)
+    return -EIO;
+
+/* Insert 2 bytes of directory info (count and size of entries) */
+if (len < 2)
    return -EINVAL;
+
-static char *bnxt_get_pkgver(struct net_device *dev, char *buf, size_t buflen)
+static void bnxt_get_pkgver(struct net_device *dev)
{
+    struct bnxt *bp = netdev_priv(dev);
    u16 index = 0;
    -u32 datalen;
+    char *pkgver;
+    u32 pkglen;
+    u8 *pkgbuf;
+    int len;

    if (bnxt_find_nvram_item(dev, BNX_DIR_TYPE_PKG_LOG,
            BNX_DIR_ORDINAL_FIRST, BNX_DIR_EXT_NONE,
            &index, NULL, &datalen) != 0)
        return NULL;
+    &index, NULL, &pkglen) != 0)
+        return;

-    memset(buf, 0, buflen);
-    if (bnxt_get_nvram_item(dev, index, 0, datalen, buf) != 0)
+    pkgbuf = kzalloc(pkglen, GFP_KERNEL);
+if (!pkgbuf) {
+dev_err(&bp->pdev->dev, "Unable to allocate memory for pkg version, length = %\u003c%\n",
+pkglen);
+return;
+}
+
+if (bnxt_get_nvram_item(dev, index, 0, pkglen, pkgbuf))
+goto err;
-
+return bnxt_parse_pkglog(BNX_PKG_LOG_FIELD_IDX_PKG_VERSION, buf,
-datalen);
+pkgver = bnxt_parse_pkglog(BNX_PKG_LOG_FIELD_IDX_PKG_VERSION, pkgbuf,
+  pkglen);
+if (pkgver & *pkgver != 0 & & isdigit(*pkgver)) {
+len = strlen(bp->fw_ver_str);
+snprintf(bp->fw_ver_str + len, FW_VER_STR_LEN - len - 1,
+  "/pkg %s", pkgver);
++}
+err:
+kfree(pkgbuf);
}

static int bnxt_get_eeprom(struct net_device *dev,
@@ -1954,8 +2000,7 @@
struct bnxt *bp = netdev_priv(dev);
struct ethtool_eee *eee = &bp->eee;
struct bnxt_link_info *link_info = &bp->link_info;
-u32 advertising =
-  _bnxt_fw_to_ethtool_adv_spds(link_info->advertising, 0);
+u32 advertising =
int rc = 0;

if (!BNXT_SINGLE_PF(bp))
@@ -1964,19 +2009,23 @@
if (!(bp->flags & BNXT_FLAG_EEE_CAP))
return -EOPNOTSUPP;

+mutex_lock(&bp->link_lock);
+advertising = _bnxt_fw_to_ethtool_adv_spds(link_info->advertising, 0);
if (!edata->eee_enabled)
goto eee_ok;

if (!!(link_info->autoneg & BNXT_AUTONEG_SPEED)) {
netdev_warn(dev, "EEE requires autoneg\n");
-return -EINVAL;
+rc = -EINVAL;
+goto eee_exit;
}
if (edata->tx_lpi_enabled) {
    if (bp->lpi_tmr_hi && (edata->tx_lpi_timer > bp->lpi_tmr_hi ||
          edata->tx_lpi_timer < bp->lpi_tmr_lo)) {
        netdev_warn(dev, "Valid LPI timer range is %d and %d microsecs\n",
                     bp->lpi_tmr_lo, bp->lpi_tmr_hi);
        return -EINVAL;
    } else if (!bp->lpi_tmr_hi) {
        edata->tx_lpi_timer = eee->tx_lpi_timer;
    }
}

if (edata->advertised & ~advertising) {
    netdev_warn(dev, "EEE advertised %x must be a subset of autoneg advertised speeds %x\n",
                                 edata->advertised, advertising);
    return -EINVAL;
}

eee->advertised = edata->advertised;

if (netif_running(dev))
    rc = bnxt_hwrm_set_link_setting(bp, false, true);

+eee_exit:
    mutex_unlock(&bp->link_lock);
    return rc;
}

/* Read A2 portion of the EEPROM */
if (length) {
    start -= ETH_MODULE_SFF_8436_LEN;
    -rc = bnxt_read_sfp_module_eeprom_info(bp, I2C_DEV_ADDR_A2, 1,
                                           start, length, data);
}

return rc;

static int bnxt_query_force_speeds(struct bnxt *bp, u16 *force_speeds)
{
    struct hwrm_port_phy_qcaps_output *resp = bp->hwrm_cmd_resp_addr;
    struct hwrm_port_phy_qcaps_input req = {0};
    +int rc;

+bnxt_hwrm_cmd_hdr_init(bp, &req, HWRM_PORT_PHY_QCAPS, -1, -1);
+mutex_lock(&bp->hwrm_cmd_lock);
+rc = _hwrm_send_message(bp, &req, sizeof(req), HWRM_CMD_TIMEOUT);
+if (!rc)
+*force_speeds = le16_to_cpu(resp->supported_speeds_force_mode);
+
+mutex_unlock(&bp->hwrm_cmd_lock);
+return rc;
+
static int bnxt_disable_an_for_lpbk(struct bnxt *bp,
   struct hwrm_port_phy_cfg_input *req)
{
   struct bnxt_link_info *link_info = &bp->link_info;
   u16 fw_advertising = link_info->advertising;
   if (!link_info->autoneg)
      return 0;
+
   rc = bnxt_query_force_speeds(bp, &fw_advertising);
   if (rc)
      return rc;
+
   fw_speed = PORT_PHY_CFG_REQ_FORCE_LINK_SPEED_1GB;
   if (netif_carrier_ok(bp->dev))
      fw_speed = bp->link_info.link_speed;
   if (rc)
      return rc;
+
   if (!bp->num_tests || !BNXT_SINGLE_PF(bp))
      return;
+
   bnxt_hwrm_phy_loopback(bp, false);
   bnxt_half_close_nic(bp);
   bnxt_open_nic(bp, false, true);
   +rc = bnxt_open_nic(bp, false, true);
   }
buf[BNXT_IRQ_TEST_IDX] = 1;
etest->flags |= ETH_TEST_FL_FAILED;
}
@@ -2535,22 +2607,10 @@
struct hwrm_selftest_qlist_input req = {0};
struct bnxt_test_info *test_info;
struct net_device *dev = bp->dev;
-char *pkglog;
int i, rc;

-pkglog = kzalloc(BNX_PKG_LOG_MAX_LENGTH, GFP_KERNEL);
-if (pkglog) {
-char *pkgver;
-int len;
-
-pkgver = bnxt_get_pkgver(dev, pkglog, BNX_PKG_LOG_MAX_LENGTH);
-if (pkgver && *pkgver != 0 && isdigit(*pkgver)) {
-len = strlen(bp->fw_ver_str);
-snprintf(bp->fw_ver_str + len, FW_VER_STR_LEN - len - 1,
-"/pkg %s", pkgver);
-}
-kfree(pkglog);
-}
+bkxt_get_pkgver(dev);
+if (bp->hwrm_spec_code < 0x10704 || !BNXT_SINGLE_PF(bp))
return;

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt_nvm_defs.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt_nvm_defs.h
@@ -59,8 +59,6 @@
#define BNX_DIR_ATTR_NO_CHKSUM			(1 << 0)
#define BNX_DIR_ATTR_PROP_STREAM		(1 << 1)
-#define BNX_PKG_LOG_MAX_LENGTH			4096
-
enum bnxnvm_pkglog_field_index {
BNX_PKG_LOG_FIELD_IDX_INSTALLED_TIMESTAMP	= 0,
BNX_PKG_LOG_FIELD_IDX_PKG_DESCRIPTION		= 1,
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt_sriov.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt_sriov.c
@@ @ -99,11 +99,10 @@
if (old_setting == setting)
return 0;

-functional = vf->func_flags;
if (setting)
-func_flags |= FUNC_CFG_REQ_FLAGS_SRC_MAC_ADDR_CHECK_ENABLE;
+func_flags = FUNC_CFG_REQ_FLAGS_SRC_MAC_ADDR_CHECK_ENABLE;
else
-func_flags |= FUNC_CFG_REQ_FLAGS_SRC_MAC_ADDR_CHECK_DISABLE;
+func_flags = FUNC_CFG_REQ_FLAGS_SRC_MAC_ADDR_CHECK_DISABLE;
/*TODO: if the driver supports VLAN filter on guest VLAN,
* the spoof check should also include vlan anti-spoofing
*/
@@ -112,7 +111,6 @@
req.flags = cpu_to_le32(func_flags);
rc = hwrm_send_message(bp, &req, sizeof(req), HWRM_CMD_TIMEOUT);
if (!rc) {
-vf->func_flags = func_flags;
if (setting)
@@ -176,7 +174,6 @@
memcpy(vf->mac_addr, mac, ETH_ALEN);
b nxt_hwrm_cmd_hdr_init(bp, &req, HWRM_FUNC_CFG, -1, -1);
req.fid = cpu_to_le16(vf->fw_fid);
.req.flags = cpu_to_le32(vf->func_flags);
req.enables = cpu_to_le32(FUNC_CFG_REQ_ENABLES_DFLT_MAC_ADDR);
memcpy(req.dflt_mac_addr, mac, ETH_ALEN);
return hwrm_send_message(bp, &req, sizeof(req), HWRM_CMD_TIMEOUT);
@@ -214,7 +211,6 @@
b nxt_hwrm_cmd_hdr_init(bp, &req, HWRM_FUNC_CFG, -1, -1);
req.fid = cpu_to_le16(vf->fw_fid);
.req.flags = cpu_to_le32(vf->func_flags);
req.dflt_vlan = cpu_to_le16(vlan_tag);
req.enables = cpu_to_le32(FUNC_CFG_REQ_ENABLES_DFLT_VLAN);
rc = hwrm_send_message(bp, &req, sizeof(req), HWRM_CMD_TIMEOUT);
@@ -253,7 +249,6 @@
return 0;
b nxt_hwrm_cmd_hdr_init(bp, &req, HWRM_FUNC_CFG, -1, -1);
req.fid = cpu_to_le16(vf->fw_fid);
.req.flags = cpu_to_le32(vf->func_flags);
req.enables = cpu_to_le32(FUNC_CFG_REQ_ENABLES_MAX_BW);
req.max_bw = cpu_to_le32(max_tx_rate);
req.enables |= cpu_to_le32(FUNC_CFG_REQ_ENABLES_MIN_BW);
@@ -349,6 +344,7 @@
} }
}
+bp->pf.active_vfs = 0;
kfree(bp->pf.vf);
bp->pf.vf = NULL;
}
@@ -613,7 +609,6 @@
bnxt_free_vf_resources(bp);

-bp->pf.active_vfs = 0;
/* Reclaim all resources for the PF. */
 rtnl_lock();
bnxt_restore_pf_fw_resources(bp);
@@ -902,7 +897,7 @@
 mutex_unlock(&bp->hwrm_cmd_lock);
 }

-int bnxt_approve_mac(struct bnxt *bp, u8 *mac)
+int bnxt_approve_mac(struct bnxt *bp, u8 *mac, bool strict)
 {
   struct hwrm_func_vf_cfg_input req = {0};
   int rc = 0;
@@ -920,12 +915,13 @@
     memcpy(req.dflt_mac_addr, mac, ETH_ALEN);
     rc = hwrm_send_message(bp, &req, sizeof(req), HWRM_CMD_TIMEOUT);
   mac_done:
     -if (rc) {
       +if (rc && strict) {
         rc = -EADDRNOTAVAIL;
         netdev_warn(bp->dev, "VF MAC address %pM not approved by the PF\n",
           mac);
       +return rc;
     }
     -return rc;
     +#else

@@ -942,7 +938,7 @@
 {
 }

-int bnxt_approve_mac(struct bnxt *bp, u8 *mac)
+int bnxt_approve_mac(struct bnxt *bp, u8 *mac, bool strict)
 {
   return 0;
 }
+int bnxt_approve_mac(struct bnxt *, u8 *, bool);
#endif
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt_tc.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt_tc.c
@@ -68,17 +68,23 @@
 return 0;
 }

-static void bnxt_tc_parse_vlan(struct bnxt *bp,
-struct bnxt_tc_actions *actions,
-const struct tc_action *tc_act)
+static int bnxt_tc_parse_vlan(struct bnxt *bp,
+struct bnxt_tc_actions *actions,
+const struct tc_action *tc_act)
 {
- if (tcf_vlan_action(tc_act) == TCA_VLAN_ACT_POP) {
- switch (tcf_vlan_action(tc_act)) {
+ switch (tcf_vlan_action(tc_act)) {
+case TCA_VLAN_ACT_POP:
 actions->flags |= BNXT_TC_ACTION_FLAG_POP_VLAN;
- } else if (tcf_vlan_action(tc_act) == TCA_VLAN_ACT_PUSH) {
+break;
+case TCA_VLAN_ACT_PUSH:
 actions->flags |= BNXT_TC_ACTION_FLAG_PUSH_VLAN;
 actions->push_vlan_tci = htons(tcf_vlan_push_vid(tc_act));
 actions->push_vlan_tpid = tcf_vlan_push_proto(tc_act);
+break;
+default:
+return -EOPNOTSUPP;
 } 
+return 0;
 }

 static int bnxt_tc_parse_tunnel_set(struct bnxt *bp,
 @@ -129,7 +135,9 @@
 /* Push/pop VLAN */
 if (is_tcf_vlan(tc_act)) {
- bnxt_tc_parse_vlan(bp, actions, tc_act);
+ rc = bnxt_tc_parse_vlan(bp, actions, tc_act);
+ if (rc)
+ return rc;
 continue;
 }

 @@ -148,9 +156,6 @@

 /* Push/pop VLAN */

if (rc)
  return rc;
-
  if (actions->flags & BNXT_TC_ACTION_FLAG_FWD) {
    if (actions->flags & BNXT_TC_ACTION_FLAG_TUNNEL_ENCAP) {
      /* dst_fid is PF's fid */
      return rc;
    }
  }
-
  return rc;
+
  return 0;
}

#define GET_KEY(flow_cmd, key_type)
@@ -982,8 +987,10 @@
/* Check if there's another flow using the same tunnel decap.
  * If not, add this tunnel to the table and resolve the other
  * tunnel header fields
  * tunnel header fields. Ignore src_port in the tunnel_key,
  * since it is not required for decap filters.
  */
  +decap_key->tp_src = 0;
  decap_node = bnxt_tc_get_tunnel_node(bp, &tc_info->decap_table,
    &tc_info->decap_ht_params,
    decap_key);
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/bnxt/bnxt_ulp.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/bnxt/bnxt_ulp.c
@@ -130,7 +130,6 @@
    ent[i].ring_idx = idx + i;
    ent[i].db_offset = (idx + i) * 0x80;
  }
-  bnxt_set_max_func_irqs(bp, max_idx - avail_msix);
  bnxt_set_max_func_cp_rings(bp, max_cp_rings - avail_msix);
  edev->ulp_tbl[ulp_id].msix_requested = avail_msix;
  return avail_msix;
@@ -150,7 +149,6 @@
  msix_requested = edev->ulp_tbl[ulp_id].msix_requested;
  bnxt_set_max_func_cp_rings(bp, max_cp_rings + msix_requested);
  edev->ulp_tbl[ulp_id].msix_requested = 0;
-  bnxt_set_max_func_irqs(bp, bp->total_irqs);
  return 0;
}

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/genet/bcmgenet.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/genet/bcmgenet.c
@@ -72,6 +72,9 @@
#define GENET_RDMA_REG_OFF((priv->hw_params->rdma_offset + \ TOTAL_DESC * DMA_DESC_SIZE))

+/* Forward declarations */+
+static void bcmgenet_set_rx_mode(struct net_device *dev);
+
static inline void bcmgenet_writel(u32 value, void __iomem *offset)
{
 /* MIPS chips strapped for BE will automagically configure the
@@ -969,6 +972,8 @@
if (netif_running(dev))
    bcmgenet_update_mib_counters(priv);
+
    +dev->netdev_ops->ndo_get_stats(dev);
    +
    for (i = 0; i < BCMGENET_STATS_LEN; i++) {
        const struct bcmgenet_stats *s;
        char *p:
@@ -1140,7 +1145,7 @@
        break;
    }

    -return 0;
    +return ret;
}

static void bcmgenet_power_up(struct bcmgenet_priv *priv,
@@ -1155,7 +1160,8 @@
switch (mode) {
    case GENET_POWER_PASSIVE:
        -reg &=(~(EXT_PWR_DOWN_DLL | EXT_PWR_DOWN_BIAS));
@@ -1558,11 +1564,6 @@
goto out;
}

    -if (skb_padto(skb, ETH_ZLEN)) {
        -ret = NETDEV_TX_OK;
        -goto out;
    -}

    /* Retain how many bytes will be sent on the wire, without TSB inserted
    * by transmit checksum offload
len_stat = (size << DMA_BUFSIZE_SHIFT) |
(priv->hw_params->qtag_mask << DMA_TX_QTAG_SHIFT);

/* Note: if we ever change from DMA_TX_APPEND_CRC below we
* will need to restore software padding of "runt" packets
*/
if (!i) {
    len_stat |= DMA_TX_APPEND_CRC | DMA_SOP;
    if (skb->ip_summed == CHECKSUM_PARTIAL)
@@ -1667,7 +1671,8 @@
        dma_addr_t mapping;
/* Allocate a new Rx skb */
    skb = __netdev_alloc_skb(priv->dev, skb->socket->data->max_backlog + SKB_ALIGNMENT, __GFP_ATOMIC | __GFP_NOWARN);
    if (!skb) {
@@ -1941,8 +1946,6 @@
        bcmgenet_umac_writel(priv, CMD_SW_RESET | CMD_LCL_LOOP_EN, UMAC_CMD);
        -udelay(2);
        -bcmgenet_umac_writel(priv, 0, UMAC_CMD);
    }

static void bcmgenet_intr_disable(struct bcmgenet_priv *priv)
@@ -1963,6 +1966,8 @@
/* issue soft reset with (rg)mii loopback to ensure a stable rxclk */
    bcmgenet_umac_writel(priv, CMD_SW_RESET | CMD_LCL_LOOP_EN, UMAC_CMD);
    -udelay(2);
    -bcmgenet_umac_writel(priv, 0, UMAC_CMD);
    }

static void bcmgenet_intr_disable(struct bcmgenet_priv *priv)
@ @ -1963,6 +1966,8 @@
 */
    if (priv->internal_phy) {
        int0_enable |= UMAC_IRQ_LINK_EVENT;
        +if (GENET_IS_V1(priv) || GENET_IS_V2(priv) || GENET_IS_V3(priv))
            +int0_enable |= UMAC_IRQ_PHY_DET_R;
    } else if (priv->ext_phy) {
        int0_enable |= UMAC_IRQ_LINK_EVENT;
    } else if (priv->phy_interface == PHY_INTERFACE_MODE_MOCA) {
        @@ -2078,8 +2083,8 @@
            DMA_END_ADDR);
/* Initialize Tx NAPI */
    netif_napi_add(priv->dev, &ring->napi, bcmgenet_tx_poll,
        NAPI_POLL_WEIGHT);
    netif_tx_napi_add(priv->dev, &ring->napi, bcmgenet_tx_poll,
        NAPI_POLL_WEIGHT);
    }

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/* Initialize a RDMA ring */
@@ -2526,10 +2531,17 @@
    priv->irq0_stat = 0;
    spin_unlock_irq(&priv->lock);

+if (status & UMAC_IRQ_PHY_DET_R &&
+    priv->dev->phydev->autoneg != AUTONEG_ENABLE) {
+    phy_init_hw(priv->dev->phydev);
+    genphy_config_aneg(priv->dev->phydev);
+} 
+
/* Link UP/DOWN event */
if (status & UMAC_IRQ_LINK_EVENT)
    phy_mac_interrupt(priv->dev->phydev,
    !!((status & UMAC_IRQ_LINK_UP));
+
}

/* bcmgenet_isr1: handle Rx and Tx priority queues */
@@ -2622,7 +2634,7 @@

/* all other interested interrupts handled in bottom half */
-status &~= UMAC_IRQ_LINK_EVENT;
+status &~= (UMAC_IRQ_LINK_EVENT | UMAC_IRQ_PHY_DET_R);
if (status) {
/* Save irq status for bottom-half processing. */
    spin_lock_irqsave(&priv->lock, flags);
@@ -2686,15 +2698,21 @@

/* Returns a reusable dma control register value */
static u32 bcmgenet_dma_disable(struct bcmgenet_priv *priv)
{
+unsigned int i;
    u32 reg;
    u32 dma_ctrl;

/* disable DMA */
    dma_ctrl = 1 << (DESC_INDEX + DMA_RING_BUF_EN_SHIFT) | DMA_EN;
    for (i = 0; i < priv->hw_params->tx_queues; i++)
+    dma_ctrl |= (1 << (i + DMA_RING_BUF_EN_SHIFT));
    reg = bcmgenet_tdma_readl(priv, DMA_CTRL);
    reg &= ~dma_ctrl;
    bcmgenet_tdma_writel(priv, reg, DMA_CTRL);

+dma_ctrl = 1 << (DESC_INDEX + DMA_RING_BUF_EN_SHIFT) | DMA_EN;
+for (i = 0; i < priv->hw_params->rx_queues; i++)
+    dma_ctrl |= (1 << (i + DMA_RING_BUF_EN_SHIFT));
reg = bcmgenet_rdma_readl(priv, DMA_CTRL);
reg &= ~dma_ctrl;
bcmgenet_rdma_writel(priv, reg, DMA_CTRL);
@@ -2756,11 +2774,11 @@
struct bcmgenet_priv *priv = netdev_priv(dev);

/* Start the network engine */
+bcmgenet_set_rx_mode(dev);
bcmgenet_enable_rx_napi(priv);

umac_enable_set(priv, CMD_TX_EN | CMD_RX_EN, true);

-netif_tx_start_all_queues(dev);
bcmgenet_enable_tx_napi(priv);

/* Monitor link interrupts now */
@@ -2798,12 +2816,6 @@
  
  bcmgenet_set_hw_addr(priv, dev->dev_addr);

-if (priv->internal_phy) {
-  -reg = bcmgenet_ext_readl(priv, EXT_EXT_PWR_MGMT);
-  -reg |= EXT_ENERGY_DET_MASK;
-  -bcmgenet_ext_writel(priv, reg, EXT_EXT_PWR_MGMT);
-}
-
-/* Disable RX/TX DMA and flush TX queues */
dma_ctrl = bcmgenet_dma_disable(priv);

@@ -2842,6 +2854,8 @@
  
  bcmgenet_netif_start(dev);

+netif_tx_start_all_queues(dev);
+  
  return 0;

err_irq1:
@@ -2863,7 +2877,7 @@
  
  struct bcmgenet_priv *priv = netdev_priv(dev);

  bcmgenet_disable_tx_napi(priv);
  -netif_tx_stop_all_queues(dev);
  +netif_tx_disable(dev);

  /* Disable MAC receive */
  umac_enable_set(priv, CMD_RX_EN, false);
@@ -2990,39 +3004,42 @@
static inline void bcmgenet_set_mdf_addr(struct bcmgenet_priv *priv, unsigned char *addr, int *i, int *mc)
{
    u32 reg;
    bcmgenet_umac_writel(priv, addr[0] << 8 | addr[1], UMAC_MDF_ADDR + (*i * 4));
    reg = bcmgenet_umac_readl(priv, UMAC_MDF_CTRL);
    reg |= (1 << (MAX_MC_COUNT - *mc));
    bcmgenet_umac_writel(priv, reg, UMAC_MDF_CTRL);
    *i += 2;
    (*mc)++;
}

static void bcmgenet_set_rx_mode(struct net_device *dev)
{
    struct bcmgenet_priv *priv = netdev_priv(dev);
    struct netdev_hw_addr *ha;
    int i, mc;
    int i, nfilter;
    u32 reg;

    netif_dbg(priv, hw, dev, "%s: %08X\n", __func__, dev->flags);

    /* Promiscuous mode */
    /* Number of filters needed */
    nfilter = netdev_uc_count(dev) + netdev_mc_count(dev) + 2;
    +
    /*
     * Turn on promicuous mode for three scenarios
     * 1. IFF_PROMISC flag is set
     * 2. IFF_ALLMULTI flag is set
     * 3. The number of filters needed exceeds the number filters
     * supported by the hardware.
     */
    reg = bcmgenet_umac_readl(priv, UMAC_CMD);
-if (dev->flags & IFF_PROMISC) {
+if ((dev->flags & (IFF_PROMISC | IFF_ALLMULTI)) ||
    (nfilter > MAX_MDF_FILTER)) {
    reg |= CMD_PROMISC;
    bcmgenet_umac_writel(priv, reg, UMAC_CMD);
    bcmgenet_umac_writel(priv, 0, UMAC_MDF_CTRL);
    bcmgenet_umac_writel(priv, reg, UMAC_CMD);
}

/* UniMac doesn't support ALLMULTI */
-if (dev->flags & IFF_ALLMULTI) {
    netdev_warn(dev, "ALLMULTI is not supported\n");
    return;
}

/* update MDF filter */
i = 0;
-mc = 0;
/* Broadcast */
-bcmgenet_set_mdf_addr(priv, dev->broadcast, &i, &mc);
/* my own address.*/
-bcmgenet_set_mdf_addr(priv, dev->dev_addr, &i, &mc);
/* Unicast list*/
-if (netdev_uc_count(dev) > (MAX_MC_COUNT - mc))
    return;
+bcmgenet_set_mdf_addr(priv, dev->dev_addr, &i);

-/* Unicast */
+netdev_for_each_uc_addr(ha, dev)
+bcmgenet_set_mdf_addr(priv, ha->addr, &i);
+/* Multicast */
-netdev_for_each_mc_addr(ha, dev)
-bcmgenet_set_mdf_addr(priv, ha->addr, &i, &mc);
+/* Enable filters */
+reg = GENMASK(MAX_MDF_FILTER - 1, MAX_MDF_FILTER - nfilter);
+bcmgenet_umac_writel(priv, reg, UMAC_MDF_CTRL);
}
/* Set the hardware MAC address. */
@@ -3115,6 +3124,7 @@
dev->stats.rx_packets = rx_packets;
dev->stats.rx_errors = rx_errors;
dev->stats.rx_missed_errors = rx_errors;
+dev->stats.rx_dropped = rx_dropped;
return &dev->stats;
}

@@ -3485,8 +3495,10 @@
clk_disable_unprepare(priv->clk);

t = register_netdev(dev);
-if (err)
+if (err) {
+bcmgenet_mii_exit(dev);
goto err;
+
}

return err;

@@ -3510,43 +3522,12 @@
}

#ifdef CONFIG_PM_SLEEP
-static int bcmgenet_suspend(struct device *d)
-{
-struct net_device *dev = dev_get_drvdata(d);
-struct bcmgenet_priv *priv = netdev_priv(dev);
-int ret = 0;
-
-if (!netif_running(dev))
-return 0;
-
-bcmgenet_netif_stop(dev);
-
-if (!device_may_wakeup(d))
-phy_suspend(dev->phydev);
-
-netif_device_detach(dev);
-
-/* Prepare the device for Wake-on-LAN and switch to the slow clock */
-if (device_may_wakeup(d) && priv->wolopts) {
-ret = bcmgenet_power_down(priv, GENET_POWER_WOL_MAGIC);
-clk_prepare_enable(priv->clk_wol);
-} else if (priv->internal_phy) {
-ret = bcmgenet_power_down(priv, GENET_POWER_PASSIVE);
static int bcmgenet_resume(struct device *d)
{
    struct net_device *dev = dev_get_drvdata(d);
    struct bcmgenet_priv *priv = netdev_priv(dev);
    unsigned long dma_ctrl;
    int ret;
    u32 reg;

    if (!netif_running(dev))
        return 0;
@@ -3573,16 +3554,11 @@
        phy_init_hw(dev->phydev);

        /* Speed settings must be restored */
        +genphy_config_aneg(dev->phydev);
        bcmgenet_mii_config(priv->dev, false);

        bcmgenet_set_hw_addr(priv, dev->dev_addr);
-        if (priv->internal_phy) {
-            reg = bcmgenet_ext_readl(priv, EXT_EXT_PWR_MGMT);
-            reg |= EXT_ENERGY_DET_MASK;
-            bcmgenet_ext_writel(priv, reg, EXT_EXT_PWR_MGMT);
-        }
-        
-        if (priv->wolopts)
-            bcmgenet_power_up(priv, GENET_POWER_WOL_MAGIC);

@@ -3599,8 +3583,6 @@
                netif_device_attach(dev);
                
            if (!device_may_wakeup(d))
                phy_resume(dev->phydev);
@@ -3609,6 +3583,8 @@
                    bcmgenet_netif_start(dev);
+netif_device_attach(dev);
+
return 0;

out_clk_disable:
@@ -3617,6 +3593,39 @@
clk_disable_unprepare(priv->clk);
return ret;
}
+
+static int bcmgenet_suspend(struct device *d)
+{
+struct net_device *dev = dev_get_drvdata(d);
+struct bcmgenet_priv *priv = netdev_priv(dev);
+int ret = 0;
+
+if (!netif_running(dev))
+return 0;
+
+netif_device_detach(dev);
+
+bcmgenet_netif_stop(dev);
+
+if (!device_may_wakeup(d))
+phy_suspend(dev->phydev);
+
+/* Prepare the device for Wake-on-LAN and switch to the slow clock */
+if (device_may_wakeup(d) && priv->wolopts) {
+ret = bcmgenet_power_down(priv, GENET_POWER_WOL_MAGIC);
+clk_prepare_enable(priv->clk_wol);
+} else if (priv->internal_phy) {
+ret = bcmgenet_power_down(priv, GENET_POWER_PASSIVE);
+}
+
+/* Turn off the clocks */
+clk_disable_unprepare(priv->clk);
+
+if (ret)
+bcmgenet_resume(d);
+
+return ret;
+
#endif /* CONFIG_PM_SLEEP */

static SIMPLE_DEV_PM_OPS(bcmgenet_pm_ops, bcmgenet_suspend, bcmgenet_resume);
@@ -3636,3 +3645,4 @@
MODULE_DESCRIPTION("Broadcom GENET Ethernet controller driver");
```c
MODULE_ALIAS("platform:bcmgenet");
MODULE_LICENSE("GPL");
+MODULE_SOFTDEP("pre: mdio-bcm-unimac");
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/genet/bcmgenet.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/genet/bcmgenet.h
@@ -185,6 +185,9 @@
#define UMAC_MAC1			0x010
#define UMAC_MAX_FRAME_LEN		0x014
+#define UMAC_MODE			0x44
+#define  MODE_LINK_STATUS		(1 << 5)
+                                
+                        #define UMAC_EEE_CTRL0x064
#define EN_LPI_RX_PAUSE(1 << 0)
#define EN_LPI_TX_PFC(1 << 1)
@@ -365,6 +368,7 @@
#define  EXT_PWR_DOWN_PHY_EN		(1 << 20)
#define EXT_PWR_DOWN_PHY_EN(1 << 20)

#define EXT_RGMII_OOB_CTRL0x0C
+#define RGMII_MODE_EN_V123(1 << 0)
#define RGMII_LINK(1 << 4)
#define OOB_DISABLE(1 << 5)
#define RGMII_MODE_EN(1 << 6)
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/genet/bcmgenet_wol.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/genet/bcmgenet_wol.c
@@ -166,12 +166,6 @@
reg |= CMD_RX_EN;
bcmgenet_umac_writel(priv, reg, UMAC_CMD);

-#if (priv->hw_params->flags & GENET_HAS_EXT) {
-        reg = bcmgenet_ext_readl(priv, EXT_EXT_PWR_MGMT);
-        reg &= ~EXT_ENERGY_DET_MASK;
-        bcmgenet_ext_writel(priv, reg, EXT_EXT_PWR_MGMT);
-} else {
-        return 0;
-}

@@ -186,6 +180,8 @@

reg = bcmgenet_umac_readl(priv, UMAC_MPD_CTRL);
+if (!(reg & MPD_EN))
+        return; /* already powered up so skip the rest */
reg &= ~MPD_EN;
bcmgenet_umac_writel(priv, reg, UMAC_MPD_CTRL);

--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/genet/bcmimmii.c
```
static int bcmgenet_fixed_phy_link_update(struct net_device *dev, 
   struct fixed_phy_status *status)
{
    if (dev && dev->phydev && status)
        status->link = dev->phydev->link;
    struct bcmgenet_priv *priv;
    u32 reg;
    if (dev && dev->phydev && status) {
        priv = netdev_priv(dev);
        reg = bcmgenet_umac_readl(priv, UMAC_MODE);
        status->link = !!((reg & MODE_LINK_STATUS) ? 1 : 0);
    }

    return 0;
}

static int phy_read(struct phydev *phydev, int reg,
                     int mask, int default_value)
{
    int ret = 0;
    struct phy_priv *priv = phy_priv(phydev);
    int cnt = 10;
    phy_rescan_phydev(phydev, &curr_phydev);
    for (; cnt; --cnt) {
        reg = phy_readl(phydev, reg);
        if (reg & mask) {
            reg &= ~mask;
            ret = default_value;
        } else { /* no change */
            ret = reg;
        }
        if (reg == default_value) {
            phy_rescan_phydev(phydev, &curr_phydev);
            --cnt;
        } else { /* if change occurred */
            phy_rescan_phydev(phydev, &curr_phydev);
            return ret;
        }
    }
    return ret;
}

static int phy_write(struct phydev *phydev, int reg, int val)
{
    int ret = 0;
    struct phy_priv *priv = phy_priv(phydev);
    int cnt = 10;
    phy_rescan_phydev(phydev, &curr_phydev);
    for (; cnt; --cnt) {
        reg = phy_writeval(phydev, reg, val);
        if (reg == val) {
            phy_rescan_phydev(phydev, &curr_phydev);
            return ret;
        } else { /* if change occurred */
            phy_rescan_phydev(phydev, &curr_phydev);
            return ret;
        }
    }
    return ret;
}

static void phy_rescan_phydev(struct phydev *phydev, struct phydev **curr_phydev)
{
    struct phy_priv *priv = phy_priv(phydev);
    int i;
    for (i = 0; i < phydev->num_phy; i++)
        phy_dev_rescan((struct phydev *) &phydev->phy[i]);
}

int phy_rescan(struct phydev *phydev, int phy_count)
{
    int ret;
    struct phy_dev *phy_dev;
    if (phy_dev->rescan_callback) {
        ret = phy_dev->rescan_callback(phy_dev, phy_count);
        if (ret)
            return ret;
    }
    for (i = 0; i < phy_dev->num_phy; i++)
        phy_dev_rescan((struct phydev *) &phy_dev->phy[i]);
    return 0;
}

int phy_dev_rescan(struct phydev *phydev)
{
    int ret;
    struct phy_priv *priv = phy_priv(phydev);
    int cnt = 5;
    phy_dev_rescan(phydev, priv);
    for (; cnt; --cnt) {
        if (cnt)
            phy_dev_rescan(phydev, priv);
        else {
            ret = phy_dev_rescan(phydev, priv);
            if (ret)
                return ret;
            phy_dev_rescan(phydev, priv);
        }
    }
    return 0;
}

int phy_dev_rescan(struct phydev *phydev, struct phy_priv *priv)
{
    int ret = 0;
    struct phy_priv *curr_priv = priv;
    struct phy_dev *phy_dev = phy_dev(phydev);
    struct phy_priv *next_priv = NULL;
    int phy_count = phy_dev->num_phy;
    int cnt = 5;
    for (i = 0; i < phy_dev->num_phy; i++)
        phy_dev_rescan(phydev, priv, phy_dev);
+reg &= ~(CMD_SW_RESET | CMD_LCL_LOOP_EN);
+bcmgenet_umac_writel(priv, reg, UMAC_CMD);
+/
+*/ Ensure 5 more clocks before Rx is enabled */
+udelay(2);
+
+priv->ext_phy = !priv->internal_phy &&
(phy->phy_interface != PHY_INTERFACE_MODE_MOCA);

@@ -211,6 +247,9 @@
phydev->supported &= PHY_BASIC_FEATURES;
bcmgenet_sys_writel(priv,
    PORT_MODE_EXT_EPHY, SYS_PORT_CTRL);
+/* Restore the MII PHY after isolation */
+if (bmcr >= 0)
+phy_write(phydev, MII_BMCR, bmcr);
break;

CASE PHY_INTERFACE_MODE_REVMII:
@@ -220,11 +259,10 @@
*/ capabilities, use that knowledge to also configure the
* Reverse MII interface correctly.
/*/ 
-if ((dev->phydev->supported & PHY_BASIC_FEATURES) ==
-PHY_BASIC_FEATURES)
-port_ctrl = PORT_MODE_EXT_RVMII_25;
-else
+if (dev->phydev->supported & PHY_1000BT_FEATURES)
+port_ctrl = PORT_MODE_EXT_RVMII_50;
+else
+port_ctrl = PORT_MODE_EXT_RVMII_25;
bcmgenet_sys_writel(priv, port_ctrl, SYS_PORT_CTRL);
break;

@@ -255,7 +312,11 @@
*/
if (priv->ext_phy) {
    reg = bcmgenet_ext_readl(priv, EXT_RGMII_OOB_CTRL);
-    reg |= RGMII_MODE_EN | id_mode_dis;
+    reg |= id_mode_dis;
+    if (GENET_IS_V1(priv) || GENET_IS_V2(priv) || GENET_IS_V3(priv))
+        reg |= RGMII_MODE_EN_V123;
+    else
+        reg |= RGMII_MODE_EN;
bcmgenet_ext_writel(priv, reg, EXT_RGMII_OOB_CTRL);
}
struct bcmgenet_priv *priv = netdev_priv(dev);
struct device_node *dn = priv->pdev->dev.of_node;
struct phy_device *phydev;
    ->phy_flags;
+u32 phy_flags = 0;
int ret;

/* Communicate the integrated PHY revision */
-phy_flags = priv->gphy_rev;
+if (priv->internal_phy)
+phy_flags = priv->gphy_rev;

/* Initialize link state variables that bcmgenet_mii_setup() uses */
priv->old_link = -1;
@ @ -.315,9 +358,12 @@
phydev->advertising = phydev->supported;

/* The internal PHY has its link interrupts routed to the
- Ethernet MAC ISRs
+ Ethernet MAC ISRs. On GENETv5 there is a hardware issue
+ that prevents the signaling of link UP interrupts when
+ the link operates at 10Mbps, so fallback to polling for
+ those versions of GENET.
 */
-if (priv->internal_phy)
+if (priv->internal_phy && !GENET_IS_V5(priv))
dev->phydev->irq = PHY_IGNORE_INTERRUPT;

return 0;
@ @ -.333,7 +379,7 @@
if (!compat)
return NULL;

-priv->mdio_dn = of_find_compatible_node(dn, NULL, compat);
+priv->mdio_dn = of_get_compatible_child(dn, compat);
kfree(compat);
if (!priv->mdio_dn) {
    dev_err(kdev, "unable to find MDIO bus node\n");
@ @ -.382,6 +428,10 @@
int id, ret;

pres = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+if (!pres) {
    dev_err(&pdev->dev, "Invalid resource\n");
+return -EINVAL;
    +}
memset(&res, 0, sizeof(res));
memset(&ppd, 0, sizeof(ppd));
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/sb1250-mac.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/sb1250-mac.c
@@ -299,7 +299,7 @@
 static void sbmac_promiscuous_mode(struct sbmac_softc *sc, int onoff);
 static uint64_t sbmac_addr2reg(unsigned char *ptr);
 static irqreturn_t sbmac_intr(int irq, void *dev_instance);
-@-static int sbmac_start_tx(struct sk_buff *skb, struct net_device *dev);
+static netdev_tx_t sbmac_start_tx(struct sk_buff *skb, struct net_device *dev);
 static void sbmac_setmulti(struct sbmac_softc *sc);
 static int sbmac_init(struct platform_device *pldev, long long base);
 static int sbmac_set_speed(struct sbmac_softc *s, enum sbmac_speed speed);
@@ -2028,7 +2028,7 @@
 */
-@-static int sbmac_start_tx(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t sbmac_start_tx(struct sk_buff *skb, struct net_device *dev)
 {
 struct sbmac_softc *sc = netdev_priv(dev);
 unsigned long flags;
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/tg3.c
+++ linux-4.15.0/drivers/net/ethernet/broadcom/tg3.c
@@ -820,7 +820,7 @@
 tg3_ape_unlock(tp, TG3_APE_LOCK_MEM);
-udelay(10);
+usleep_range(10, 20);
 timeout_us -= (timeout_us > 10) ? 10 : timeout_us;
 }
@@ -922,8 +922,8 @@
 if (!(apedata & APE_FW_STATUS_READY))
 return -EAGAIN;
-/* Wait for up to 1 millisecond for APE to service previous event. */
-err = tg3_ape_event_lock(tp, 1000);
+/* Wait for up to 20 millisecond for APE to service previous event. */
+err = tg3_ape_event_lock(tp, 20000);
 if (err)
 return err;
@@ -946,6 +946,7 @@
 switch (kind) {
 case RESET_KIND_INIT:
+tg3_ape_write32(tp, TG3_APE_HOST_HEARTBEAT_COUNT, tp->ape hb++);
tg3_ape_write32(tp, TG3_APE_HOST_SEG_SIG, APE_HOST_SEG_SIG_MAGIC);
tg3_ape_write32(tp, TG3_APE_HOST_SEG_LEN, @@ -962,13 +963,6 @@
event = APE_EVENT_STATUS_STATE_START;
break;
case RESET_KIND_SHUTDOWN:
    /* With the interface we are currently using,
     * APE does not track driver state. Wiping
     * the HOST SEGMENT SIGNATURE forces
     * the APE to assume OS absent status.
     */
    -tg3_ape_write32(tp, TG3_APE_HOST_SEG_SIG, 0x0);
    -
    if (device_may_wakeup(&tp->pdev->dev) &&
        tg3_flag(tp, WOL_ENABLE)) {
        tg3_ape_write32(tp, TG3_APE_HOST_WOL_SPEED,
 @@ -990,6 +984,18 @@
tg3_ape_send_event(tp, event);
    }

    +static void tg3_send_ape_heartbeat(struct tg3 *tp,
+    unsigned long interval)
+    +{
+        +# Check if hb interval has exceeded */
+        +if (!tg3_flag(tp, ENABLE_APE) ||
+            time_before(jiffies, tp->ape_hb_jiffies + interval))
+            +return;
+            +
+            +tg3_ape_write32(tp, TG3_APE_HOST_HEARTBEAT_COUNT, tp->ape_hb++);
+            +tp->ape_hb_jiffies = jiffies;
+            +}
+    +
    +static void tg3_disable_ints(struct tg3 *tp)
    +{
    int i;
    @@ -7206,8 +7212,8 @@

    static inline void tg3_reset_task_cancel(struct tg3 *tp)
    {
        -cancel_work_sync(&tp->reset_task);
        -tg3_flag_clear(tp, RESET_TASK_PENDING);
        +if (test_and_clear_bit(TG3_FLAG_RESET_TASK_PENDING, tp->tg3_flags))
        +cancel_work_sync(&tp->reset_task);
        tg3_flag_clear(tp, TX_RECOVERY_PENDING);
    }

    @@ -7262,6 +7268,7 @@


```c
+tg3_send_ape_heartbeat(tp, TG3_APE_HB_INTERVAL << 1);
return work_done;

tx_recovery:
@@ -7344,6 +7351,7 @@
    
    
+tg3_send_ape_heartbeat(tp, TG3_APE_HB_INTERVAL << 1);
return work_done;

tx_recovery:
@@ -8725,14 +8733,15 @@
    tg3_mem_rx_release(tp);
    tg3_mem_tx_release(tp);

    /* Protect tg3_get_stats64() from reading freed tp->hw_stats. */
    -tg3_full_lock(tp, 0);
    +/* tp->hw_stats can be referenced safely:
    +   1. under rtnl_lock
    +   2. or under tp->lock if TG3_FLAG_INIT_COMPLETE is set.
    + */
    if (tp->hw_stats) {
        dma_free_coherent(&tp->pdev->dev, sizeof(struct tg3_hw_stats),
            tp->hw_stats, tp->stats_mapping);
        tp->hw_stats = NULL;
    }
    -tg3_full_unlock(tp);
}

/*
@@ -9280,6 +9289,15 @@
    tg3_restore_clk(tp);

    /* Increase the core clock speed to fix tx timeout issue for 5762
    + * with 100Mbps link speed.
    + */
    +if (tg3_asic_rev(tp) == ASIC_REV_5762) {
        +val = tr32(TG3_CPMU_CLCK_ORIDE_ENABLE);
        +tw32(TG3_CPMU_CLCK_ORIDE_ENABLE, val |
            TG3_CPMU_MAC_ORIDE_ENABLE);
    +} +
    /* Reprobe ASF enable state. */
```
tg3_flag_clear(tp, ENABLE ASF);

if (tg3_flag(tp, ENABLE_APE))
    /* Write our heartbeat update interval to APE. */
    tg3_ape_write32(tp, TG3_APE_HOST_heartbeat_INT_MS,
                    -APE_HOST_heartbeat_INT_DISABLE);
    +APE_HOST_heartbeat_INT_5SEC);

tg3_write_sig_post_reset(tp, RESET_KIND_INIT);

    +/* Update the APE heartbeat every 5 seconds.*/
    +tg3_send_ape_heartbeat(tp, TG3_APE_HB_INTERVAL);
    +
    spin_unlock(&tp->lock);

restart_timer:
    @ @ -11172.18 +11193.27 @@

tg3_halt(tp, RESET_KIND_SHUTDOWN, 0);
err = tg3_init_hw(tp, true);
-if (err)
+if (err) {
    +tg3_full_unlock(tp);
    +tp->irq_sync = 0;
    +tg3_napi_enable(tp);
    +/* Clear this flag so that tg3_reset_task_cancel() will not
       + * call cancel_work_sync() and wait forever.
       + */
    +tg3_flag_clear(tp, RESET_TASK_PENDING);
    +dev_close(tp->dev);
    goto out;
    +}

    tg3_netif_start(tp);

-out:
    tg3_full_unlock(tp);

    if (!err)
        tg3_phy_start(tp);
    +out:
rtm_unlock();

@@ -12385,6 +12415,7 @@
 struct tg3 *tp = netdev_priv(dev);
 int i, irq_sync = 0, err = 0;
+bool reset_phy = false;

 if ((ering->rx_pending > tp->rx_std_ring_mask) ||
     (ering->rx_jumbo_pending > tp->rx_jmb_ring_mask))
@@ -12416,7 +12447,13 @@
 if (netif_running(dev)) {
 tg3_halt(tp, RESET_KIND_SHUTDOWN, 1);
-err = tg3_restart_hw(tp, false);
+/* Reset PHY to avoid PHY lock up */
+if (tg3_asic_rev(tp) == ASIC_REV_5717 ||
+    tg3_asic_rev(tp) == ASIC_REV_5719 ||
+    tg3_asic_rev(tp) == ASIC_REV_5720)
+    reset_phy = true;
+
+err = tg3_restart_hw(tp, reset_phy);
 if (!err)
     tg3_netif_start(tp);
@@ -12450,6 +12487,7 @@
 if (netif_running(dev)) {
 tg3_halt(tp, RESET_KIND_SHUTDOWN, 1);
-err = tg3_restart_hw(tp, false);
+/* Reset PHY to avoid PHY lock up */
+if (tg3_asic_rev(tp) == ASIC_REV_5717 ||
+    tg3_asic_rev(tp) == ASIC_REV_5719 ||
+    tg3_asic_rev(tp) == ASIC_REV_5720)
+    reset_phy = true;
+
+err = tg3_restart_hw(tp, reset_phy);
 if (!err)
     tg3_netif_start(tp);
struct tg3 *tp = netdev_priv(dev);

spin_lock_bh(&tp->lock);
-if (!tp->hw_stats) {
+if (!tp->hw_stats || !tg3_flag(tp, INIT_COMPLETE)) {
*stats = tp->net_stats_prev;
spin_unlock_bh(&tp->lock);
return;
@@ -16636,6 +16680,8 @@
    pci_state_reg);

tg3_ape_lock_init(tp);
+tp->ape_hb_interval =
+msecs_to_jiffies(APE_HOST_HEARTBEAT_INT_5SEC);
}

/* Set up tp->grc_local_ctrl before calling */
@@ -18155,8 +18201,8 @@

tnl_lock();

-/* We probably don't have netdev yet */
-if (!netdev || !netif_running(netdev))
+/* Could be second call or maybe we don't have netdev yet */
+if (!netdev || tp->pcierr_recovery || !netif_running(netdev))
goto done;

/* We needn't recover from permanent error */
--- linux-4.15.0.orig/drivers/net/ethernet/broadcom/tg3.h
+++ linux-4.15.0/drivers/net/ethernet/broadcom/tg3.h
@@ -2499,6 +2499,7 @@
#define TG3_APE_LOCK_PHY3		5
#define TG3_APE_LOCK_GPIO		7
+  #define TG3_APE_HB_INTERVAL		(tp->ape_hb_interval)
#define TG3_AEEPROM_SB_F1R2_MBA_OFF	0x10
@@ -3413,6 +3414,10 @@
           struct device		*hwmon_dev;
           bool			link_up;
           bool			pcierr_recovery;
+         +u32                             ape_hb;
+         +unsigned long	           ape_hb_interval;
+         +unsigned long	           ape_hb_jiffies;

"
/* Accessor macros for chip and asic attributes */

/* only when transition is over 4K */
int err, mtu;
struct bnad *bnad = netdev_priv(netdev);

mutex_lock(&bnad->conf_mutex);

/* rx_count > 0 - new rx created */
err = bnad_mtu_set(bnad, new_frame);
if (err)
    err = -EBUSY;

/* Bitfields in TISUBN */
#define GEM_SUBNSINCR_OFFSET			0
#define GEM_SUBNSINCR_SIZE			16
#define GEM_SUBNSINCRH_OFFSET			0
#define GEM_SUBNSINCRH_SIZE			16
#define GEM_SUBNSINCR_SIZE			24

/* Bitfields in TI */
#define GEM_NSINCR_OFFSET			0
#define GEM_NSINCR_SIZE			24

#define MACB_TX_ERR_FLAGS	(MACB_BIT(ISR_TUND)			|
                         MACB_BIT(ISR_RLE)		|
/* Max length of transmit frame must be a multiple of 8 bytes */
#define MACB_TX_LEN_ALIGN 8
#define MACB_MAX_TX_LEN((unsigned int)((1 << MACB_TX_FRMLEN_SIZE) - 1) & ~((unsigned int)(MACB_TX_LEN_ALIGN - 1)))
#define GEM_MAX_TX_LEN((unsigned int)((1 << GEM_TX_FRMLEN_SIZE) - 1) & ~((unsigned int)(MACB_TX_LEN_ALIGN - 1)))
/+* Limit maximum TX length as per Cadence TSO errata. This is to avoid a
+ * false amba_error in TX path from the DMA assuming there is not enough
+ * space in the SRAM (16KB) even when there is.
+ */
#define GEM_MAX_TX_LEN(unsigned int)(0x3FC0)

#define GEM_MTU_MIN_SIZE ETH_MIN_MTU
#define MACB_NETIF_LSONETIF_F_TSO

if (!(status & MACB_BIT(TGO)))
return 0;

-USLEEP_RANGE(10, 250);
+UDelay(250);
} while (time_before(halt_time, timeout));

return -ETIMEDOUT;

if (bp->hw_dma_cap & HW_DMA_CAP_64B) {
desc_64 = macb_64b_desc(bp, desc);
desc_64->addrh = upper_32_bits(addr);
/+* The low bits of RX address contain the RX_USED bit, clearing
+ * of which allows packet RX. Make sure the high bits are also
+ * visible to HW at that point.
+ */
+dma_wait();
}
#endif
desc->addr = lower_32_bits(addr);

/* First, update TX stats if needed */
if (skb) {
-if (gem_ptp_do_tstamp(queue, skb, desc) == 0) {
+if (unlikely(skb_shinfo(skb)->tx_flags &
    SKB_TX_HW_TSTAMP) &&
    gem_ptp_do_tstamp(queue, skb, desc) == 0) {

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/* skb now belongs to timestamp buffer */
* and will be removed later */
@@ -920,14 +932,19 @@
if (entry == bp->rx_ring_size - 1)
paddr |= MACB_BIT(RX_WRAP);
-mach_set_addr(bp, desc, paddr);
desc->ctrl = 0;
+/* Setting addr clears RX USED and allows reception,
+ * make sure ctrl is cleared first to avoid a race.
+ */
+dma_wmb();
+mach_set_addr(bp, desc, paddr);
/* properly align Ethernet header */
skb_reserve(skb, NET_IP_ALIGN);
} else {
-desc->addr &= ~MACB_BIT(RX_USED);
desc->ctrl = 0;
+dma_wmb();
desc->addr &= ~MACB_BIT(RX_USED);
}
}

@@ -980,11 +997,15 @@
rxused = (desc->addr & MACB_BIT(RX_USED)) ? true : false;
addr = macb_get_addr(bp, desc);
-ctrl = desc->ctrl;

if (!rxused)
break;

+/* Ensure ctrl is at least as up-to-date as rxused */
+dma_rmb();
+
+ctrl = desc->ctrl;
+
+bp->rx_tail++;
+count++;

@@ -1152,11 +1173,14 @@
/* Make hw descriptor updates visible to CPU */
rmb();
-ctrl = desc->ctrl;
-
if (!((desc->addr & MACB_BIT(RX_USED)))
break;

+/* Ensure ctrl is at least as up-to-date as addr */
+dma_rmb();
+
+ctrl = desc->ctrl;
+
+if (ctrl & MACB_BIT(RX_SOF)) {
    if (first_frag != -1)
        discard_partial_frame(bp, first_frag, tail);
    return work_done;
}

+static void macb_tx_restart(struct macb_queue *queue)
+{
+    unsigned int head = queue->tx_head;
+    unsigned int tail = queue->tx_tail;
+    struct macb *bp = queue->bp;
+
+    +if (bp->caps & MACB_CAPS_ISR_CLEAR_ON_WRITE)
+        queue_writel(queue, ISR, MACB_BIT(TXUBR));
+
+    +if (head == tail)
+        return;
+
+    macb_writel(bp, NCR, macb_readl(bp, NCR) | MACB_BIT(TSTART));
+
+}
+
+static irqreturn_t macb_interrupt(int irq, void *dev_id)
{
    struct macb_queue *queue = dev_id;
    @ @ -1301,6 +1340,9 @@
    if (status & MACB_BIT(TCOMP))
        macb_tx_interrupt(queue);
+
+    if (status & MACB_BIT(TXUBR))
+        macb_tx_restart(queue);
+
+    /* Link change detection isn't possible with RMII, so we'll
+     * add that if/when we get our hands on a full-blown MII PHY.
+     */
+    @ @ -1547,16 +1589,14 @@

    /* Validate LSO compatibility */

    /* there is only one buffer */
-if (!skb_is_nonlinear(skb))
+/* there is only one buffer or protocol is not UDP */
+if (!skb_is_nonlinear(skb) || (ip_hdr(skb)->protocol != IPPROTO_UDP))
    return features;
   
    /* length of header */
    hdrlen = skb_transport_offset(skb);
-    if (ip_hdr(skb)->protocol == IPPROTO_TCP)
-        hdrlen += tcp_hdrlen(skb);
-    /* For LSO:
-     */
-    /* For UFO only:
-     * When software supplies two or more payload buffers all payload buffers
-     * apart from the last must be a multiple of 8 bytes in size.
-     */
-    @@ -1885,14 +1925,17 @@
-    { 
-        struct macb_queue *queue;
-        unsigned int q;
-        u32 ctrl = macb_readl(bp, NCR);
-        
-        /* Disable RX and TX (XXX: Should we halt the transmission
-         * more gracefully?) */
-        -mach_writel(bp, NCR, 0);
-        +ctrl &= ~(MACB_BIT(RE) | MACB_BIT(TE));
-        
-        /* Clear the stats registers (XXX: Update stats first?) */
-        -mach_writel(bp, NCR, MACB_BIT(CLRSTAT));
-        +ctrl |= MACB_BIT(CLRSTAT);
-        +
-        +mach_writel(bp, NCR, ctrl);
-        
-        /* Clear all status flags */
-        mach_writel(bp, TSR, -1);
-        @@ -1998,6 +2041,7 @@
-         else
-        dmacfg &= ~GEM_BIT(TXCOEN);
-         +dmacfg &= ~GEM_BIT(ADDR64);
-        #ifdef CONFIG_ARCH_DMA_ADDR_T_64BIT
-         if (bp->hw_dma_cap & HW_DMA_CAP_64B)
-         dmacfg |= GEM_BIT(ADDR64);
-         @@ -2071,7 +2115,7 @@
-         }
-         
-        /* Enable TX and RX */
-        -mach_writel(bp, NCR, MACB_BIT(RE) | MACB_BIT(TE) | MACB_BIT(MPE));
/* The hash address register is 64 bits long and takes up two
   @ @ -2294.6 +2338.9 @ @
struct gem_stats *hwstat = &bp->hw_stats.gem;
struct net_device_stats *nstat = &bp->dev->stats;

+if (!netif_running(bp->dev))
+return nstat;
+
gem_update_stats(bp);

nstat->rx_errors = (hwstat->rx_frame_check_sequence_errors +
@@ -2294,6 +2338,9 @@
    *hclk = devm_clk_get(&pdev->dev, "hclk");
    }

-if (IS_ERR(*pclk)) {
+if (IS_ERR_OR_NULL(*pclk)) {
    err = PTR_ERR(*pclk);
    -dev_err(&pdev->dev, "failed to get macb_clk (%u)\n", err);
+    if (!err)
+        err = -ENODEV;
    +
    +dev_err(&pdev->dev, "failed to get macb_clk (%d)\n", err);
    return err;
    }

-if (IS_ERR(*hclk)) {
+if (IS_ERR_OR_NULL(*hclk)) {
    err = PTR_ERR(*hclk);
    -dev_err(&pdev->dev, "failed to get hclk (%u)\n", err);
+    if (!err)
+        err = -ENODEV;
    +
    +dev_err(&pdev->dev, "failed to get hclk (%d)\n", err);
    return err;
    }

@@ -2807,25 +2860,25 @@

    err = clk_prepare_enable(*pclk);
    if (err) {
        -dev_err(&pdev->dev, "failed to enable pclk (%u)\n", err);
+        +dev_err(&pdev->dev, "failed to enable pclk (%d)\n", err);
        return err;
    }
err = clk_prepare_enable(*hclk);
if (err) {
    -dev_err(&pdev->dev, "failed to enable hclk (%u)\n", err);
    +dev_err(&pdev->dev, "failed to enable hclk (%d)\n", err);
goto err_disable_pclk;
}

err = clk_prepare_enable(*tx_clk);
if (err) {
    -dev_err(&pdev->dev, "failed to enable tx_clk (%u)\n", err);
    +dev_err(&pdev->dev, "failed to enable tx_clk (%d)\n", err);
goto err_disable_hclk;
}

err = clk_prepare_enable(*rx_clk);
if (err) {
    -dev_err(&pdev->dev, "failed to enable rx_clk (%u)\n", err);
    +dev_err(&pdev->dev, "failed to enable rx_clk (%d)\n", err);
goto err_disable_txclk;
}

@@ -3260,7 +3313,7 @@
err = clk_prepare_enable(*pclk);
if (err) {
    -dev_err(&pdev->dev, "failed to enable pclk (%u)\n", err);
    +dev_err(&pdev->dev, "failed to enable pclk (%d)\n", err);
return err;
}

@@ -3274,6 +3327,8 @@
int err;
    u32 reg;

    +bp->queues[0].bp = bp;
    +
    dev->netdev_ops = &at91ether_netdev_ops;
    dev->ethtool_ops = &macb_ethtool_ops;

@@ -3299,6 +3354,13 @@
    .init = macb_init,
};

+static const struct macb_config sama5d3macb_config = {
    +.caps = MACB_CAPS_SG_DISABLED
    +    | MACB_CAPS_USRIO_HAS_CLKEN | MACB_CAPS_USRIO_DEFAULT_IS_MII_GMII,
    +.clk_init = mach_clk_init,
static const struct macb_config pc302gem_config = {
    .caps = MACB_CAPS_SG_DISABLED | MACB_CAPS_GIGABIT_MODE_AVAILABLE,
    .dma_burst_length = 16,
    .init = macb_init,
};

static const struct macb_config pc302gem_config = {
    .compatible = "cdns,gem", .data = &pc302gem_config },
    .compatible = "atmel,sama5d2-gem", .data = &sama5d2_config },
    .compatible = "atmel,sama5d3-gem", .data = &sama5d3_config },
+{ .compatible = "atmel,sama5d3-macb", .data = &sama5d3macb_config },
    .compatible = "atmel,sama5d4-gem", .data = &sama5d4_config },
    .compatible = "cdns,at91rm9200-emac", .data = &emac_config },
    .compatible = "cdns,emac", .data = &emac_config },
};

bp->wol = 0;
if (of_get_property(np, "magic-packet", NULL))
bp->wol |= MACB_WOL_HAS_MAGIC_PACKET;
-device_init_wakeup(&pdev->dev, bp->wol & MACB_WOL_HAS_MAGIC_PACKET);
+device_set_wakeup_capable(&pdev->dev, bp->wol & MACB_WOL_HAS_MAGIC_PACKET);

spin_lock_init(&bp->lock);

--- linux-4.15.0.orig/drivers/net/ethernet/cadence/macb_pci.c
+++ linux-4.15.0/drivers/net/ethernet/cadence/macb_pci.c
@@ -123,9 +123,9 @@
struct platform_device *plat_dev = pci_get_drvdata(pdev);
struct macb_platform_data *plat_data = dev_get_platdata(&plat_dev->dev);
-platf orm_device_unregister(plat_dev);
+platform_device_unregister(plat_dev);

clk_unregister(plat_data->pclk);
clk_unregister(plat_data->hclk);
+platform_device_unregister(plat_dev);
}

static const struct pci_device_id dev_id_table[] = {
--- linux-4.15.0.orig/drivers/net/ethernet/cadence/macb_ptp.c
+++ linux-4.15.0/drivers/net/ethernet/cadence/macb_ptp.c
@@ -115,7 +115,10 @@
     * to take effect.
     */
+gem_writel(bp, TISUBN, GEM_BF(SUBNSINCR, incr_spec->sub_ns));
+/* RegBit[15:0] = Subns[23:8]; RegBit[31:24] = Subns[7:0] */
+gem_writel(bp, TISUBN, GEM_BF(SUBNSINCR, incr_spec->sub_ns) |
+    GEM_BF(SUBNSINCRH, (incr_spec->sub_ns >>
+    GEM_SUBNSINCR_SIZE)));
+gem_writel(bp, TI, GEM_BF(NSINCR, incr_spec->ns));
spin_unlock_irqrestore(&bp->tsu_clk_lock, flags);

@@ -170,10 +173,7 @@
 if (delta > TSU_NSEC_MAX_VAL) {
     gem_tsu_get_time(&bp->ptp_clock_info, &now);
     - if (sign)
     - now = timespec64_sub(now, then);
     - else
     - now = timespec64_add(now, then);
     + now = timespec64_add(now, then);
     gem_tsu_set_time(&bp->ptp_clock_info,
                     (const struct timespec64 *)&now);
@@ -286,6 +286,12 @@
 if (GEM_BFEXT(DMA_RXVALID, desc->addr)) {
     desc_ptp = mach_ptp_desc(bp, desc); /* Unlikely but check */
     + if (!desc_ptp) {
     + dev_warn_ratelimited(&bp->pdev->dev,
     + "Timestamp not supported in BD\n");
     + return;
     +}
     gem_hw_timestamp(bp, desc_ptp->ts_1, desc_ptp->ts_2, &ts);
     memset(shhwtstamps, 0, sizeof(struct skb_shared_hwtstamps));
@@ -318,10 +324,15 @@
     - skb_shinfo(skb)->tx_flags |= SKBTX_IN_PROGRESS;
     desc_ptp = mach_ptp_desc(queue->bp, desc); /* Unlikely but check */
     + if (!desc_ptp)
         + return -EINVAL;
     skb_shinfo(skb)->tx_flags |= SKBTX_IN_PROGRESS;
     tx_timestamp = &queue->tx_timestamps[head];
     tx_timestamp->skb = skb; /* ensure ts_1/ts_2 is loaded after ctrl (TX_USED check) */
     dma_rmb();
     tx_timestamp->desc_ptp.ts_1 = desc_ptp->ts_1;
     tx_timestamp->desc_ptp.ts_2 = desc_ptp->ts_2; /* move head */
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/cn23xx_pf_device.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/cn23xx_pf_device.c
 @@ -420,7 +420,7 @@
     * bits 32:47 indicate the PVF num.

for (q_no = 0; q_no < ern; q_no++) {
    reg_val = oct->pcie_port << CN23XX_PKT_INPUT_CTL_MAC_NUM_POS;
} for VF assigned queues. */
if (q_no < oct->sriov_info.pf_srn) {
    reg_val = octeon_read_csr(oct, CN23XX_SLI_OQ_PKT_CONTROL(q_no));
}
/* clear IPTR */
+reg_val &=-CN23XX_PKT_OUTPUT_CTL_IPTR;
+
/* set DPTR */
reg_val |= CN23XX_PKT_OUTPUT_CTL_DPTR;

oct->pf_num = ((fdl_bit >> CN23XX_PCIE_SRIOV_FDL_BIT_POS) &
    CN23XX_PCIE_SRIOV_FDL_MASK);
} else {
    ret = EINVAL;
+ret = -EINVAL;

/* Under some virtual environments, extended PCI regs are
* inaccessible, in which case the above read will have failed.
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/cn23xx_pf_regs.h
+++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/cn23xx_pf_regs.h
@@ -521,7 +521,7 @@
#define    CN23XX_BAR1_INDEX_OFFSET                3
#define    CN23XX_PEM_BAR1_INDEX_REG(port, idx)		(CN23XX_PEM_BAR1_INDEX_START + ((port) << CN23XX_PEM_OFFSET) + 
		(CN23XX_PEM_BAR1_INDEX_START + (((u64)port) << CN23XX_PEM_OFFSET) + 
		((idx) << CN23XX_BAR1_INDEX_OFFSET))

--- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/cn23xx_vf_device.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/cn23xx_vf_device.c
@@ -165,6 +165,9 @@
    reg_val =
    octeon_read_csr(oct, CN23XX_VF_SLI_OQ_PKT_CONTROL(q_no));
}
/* clear IPTR */
+reg_val &=-CN23XX_PKT_OUTPUT_CTL_IPTR;
+
/* set DPTR */
reg_val |= CN23XX_PKT_OUTPUT_CTL_DPTR;
@@ -412,7 +412,7 @@
   | CN6XXX_INTR_M0UNWI_ERR             
   | CN6XXX_INTR_M1UPB0_ERR             
   | CN6XXX_INTR_M1UPWI_ERR             
-   | CN6XXX_INTR_M1UPB0_ERR             
+   | CN6XXX_INTR_M1UNB0_ERR             
   | CN6XXX_INTR_M1UNWI_ERR             
   | CN6XXX_INTR_INSTR_DB_OF_ERR        
   | CN6XXX_INTR_SLIST_DB_OF_ERR        
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/lio_core.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/lio_core.c
 @@ -848,7 +848,7 @@
     if (droq->ops.poll_mode) {
         droq->ops.napi_fn(droq);
         oq_priv->napi_mask |= I << oq_no);
+        oq_priv->napi_mask |= BIT_ULL(oq_no);
     } else {
         tasklet_schedule(&oq_priv->droq_tasklet);
     }
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/lio_main.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/lio_main.c
 @@ -2666,7 +2666,7 @@
 * @returns whether the packet was transmitted to the device okay or not
 *             (NETDEV_TX_OK or NETDEV_TX_BUSY)
 */
-    static int liquidio_xmit(struct sk_buff *skb, struct net_device *netdev)
+    static netdev_tx_t liquidio_xmit(struct sk_buff *skb, struct net_device *netdev)
 {
     struct lio *lio;
     struct octnet_buf_free_info *finfo;
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/lio_vf_main.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/lio_vf_main.c
 @@ -1743,7 +1743,7 @@
 */
     -static int liquidio_xmit(struct sk_buff *skb, struct net_device *netdev)
     +static netdev_tx_t liquidio_xmit(struct sk_buff *skb, struct net_device *netdev)
 {
     struct octnet_buf_free_info *finfo;
     union octnic_cmd_setup cmdsetup;
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/lio_vf_rep.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/lio_vf_rep.c
 @@ -31,7 +31,8 @@

static int lio_vf_rep_open(struct net_device *ndev);
static int lio_vf_rep_stop(struct net_device *ndev);
- static int lio_vf_rep_pkt_xmit(struct sk_buff *skb, struct net_device *ndev);
+ static netdev_tx_t lio_vf_rep_pkt_xmit(struct sk_buff *skb,
   + struct net_device *ndev);
static void lio_vf_rep_tx_timeout(struct net_device *netdev);
static int lio_vf_rep_phys_port_name(struct net_device *dev,
   char *buf, size_t len);
@@ -366,20 +367,22 @@
    struct octeon_soft_command *sc = (struct octeon_soft_command *)buf;
    struct sk_buff *skb = sc->ctxptr;
    struct net_device *ndev = skb->dev;
+u32 iq_no;

dma_unmap_single(&oct->pci_dev->dev, sc->dmadptr,
    sc->datasize, DMA_TO_DEVICE);
    dev_kfree_skb_any(skb);
+       iq_no = sc->iq_no;
    octeon_free_soft_command(oct, sc);

-    if (octnet_iq_is_full(oct, sc->iq_no))
+    if (octnet_iq_is_full(oct, iq_no))
        return;

    if (netif_queue_stopped(ndev))
        netif_wake_queue(ndev);
}

-    static int
-+    static netdev_tx_t
    lio_vf_rep_pkt_xmit(struct sk_buff *skb, struct net_device *ndev)
    {
    struct lio_vf_rep_desc *vf_rep = netdev_priv(ndev);
    --- linux-4.15.0.orig/drivers/net/ethernet/cavium/liquidio/octeon_device.c
    +++ linux-4.15.0/drivers/net/ethernet/cavium/liquidio/octeon_device.c
    @ @ -1457,8 +1457,9 @@
    }
    if (iq) {
        spin_lock_bh(&iq->lock);
-        writel(iq->pkt_in_done, iq->inst_cnt_reg);
-        iq->pkt_in_done = 0;
+        writel(iq->pkts_processed, iq->inst_cnt_reg);
+        iq->pkt_in_done -= iq->pkts_processed;
+        iq->pkts_processed = 0;
/* this write needs to be flushed before we release the lock */
        mmiowb();
        spin_unlock_bh(&iq->lock);
u32 pkt_in_done;

+u32 pkts_processed;
+
/** A spinlock to protect access to the input ring. */
spinlock_t iq_flush_running_lock;

/* Initialize the spinlock for this instruction queue */
spin_lock_init(&iq->lock);

oct->num_iqs++;
-if (oct->fn_list.enable_io_queues(oct))
+if (oct->fn_list.enable_io_queues(oct)) {
+octeon_delete_instr_queue(oct, iq_no);
return 1;
+}

return 0;
}

lio_process_iq_request_list(oct, iq, 0);
if (inst_processed) {
+iq->pkts_processed += inst_processed;
atomic_sub(inst_processed, &iq->instr_pending);
iq->stats.instr_processed += inst_processed;
}

/* Put it in the ring. */
p->rx_ring[p->rx_next_fill] = re.d64;
+/* Make sure there is no reorder of filling the ring and ringing
+ * the bell
+ */
+wmb();
+
+dma_sync_single_for_device(p->dev, p->rx_ring_handle,
    ring_size_to_bytes(OCTEON_MGMT_RX_RING_SIZE),
    DMA_BIDIRECTIONAL);
@@ -643,13 +648,21 @@
static int octeon_mgmt_change_mtu(struct net_device *netdev, int new_mtu)
{
    struct octeon_mgmt *p = netdev_priv(netdev);
-    int size_without_fcs = new_mtu + OCTEON_MGMT_RX_HEADROOM;
+    int max_packet = new_mtu + ETH_HLEN + ETH_FCS_LEN;

    netdev->mtu = new_mtu;

    cvmx_write_csr(p->agl + AGL_GMX_RX_FRM_MAX, size_without_fcs);
+    /* HW lifts the limit if the frame is VLAN tagged
+       * (+4 bytes per each tag, up to two tags)
+     */
+    +cvmx_write_csr(p->agl + AGL_GMX_RX_FRM_MAX, max_packet);
+    /* Set the hardware to truncate packets larger than the MTU. The jabber
+       * register must be set to a multiple of 8 bytes, so round up. JABBER is
+       * an unconditional limit, so we need to account for two possible VLAN
+       * tags.
+     */
+    cvmx_write_csr(p->agl + AGL_GMX_RX_JABBER,
-        (size_without_fcs + 7) & 0xfff8);
+        (max_packet + 7 + VLAN_HLEN * 2) & 0xfff8);

    return 0;
}
@@ -1260,12 +1273,13 @@
return 0;
}

-static int octeon_mgmt_xmit(struct sk_buff *skb, struct net_device *netdev)
+static netdev_tx_t
+octeon_mgmt_xmit(struct sk_buff *skb, struct net_device *netdev)
{
    struct octeon_mgmt *p = netdev_priv(netdev);
    union mgmt_port_ring_entry re;
    unsigned long flags;
-    int rv = NETDEV_TX_BUSY;
+    netdev_tx_t rv = NETDEV_TX_BUSY;

    re.d64 = 0;
    re.s.tstamp = ((skb_shinfo(skb)->tx_flags & SKBTX_HW_TSTAMP) != 0);
@@ -1487,7 +1501,7 @@
 netdev->ethtool_ops = &octeon_mgmt_ethtool_ops;
 netdev->min_mtu = 64 - OCTEON_MGMT_RX_HEADROOM;
-netdev->max_mtu = 16383 - OCTEON_MGMT_RX_HEADROOM;
+netdev->max_mtu = 16383 - OCTEON_MGMT_RX_HEADROOM - VLAN_HLEN;

 mac = of_get_mac_address(pdev->dev.of_node);

--- linux-4.15.0.orig/drivers/net/ethernet/cavium/thunder/nic_main.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/thunder/nic_main.c
@@ -990,7 +990,7 @@
 case NIC_MBOX_MSG_CFG_DONE:
 /* Last message of VF config msg sequence */
  nic_enable_vf(nic, vf, true);
 -goto unlock;
 +break;
 case NIC_MBOX_MSG_SHUTDOWN:
 /* First msg in VF teardown sequence */
 if (vf >= nic->num_vf_en)
@@ -1354,6 +1354,9 @@
 {
 struct nicpf *nic = pci_get_drvdata(pdev);
+
+if (!nic)
+return;
 +
+if (nic->flags & NIC_SRIOV_ENABLED)
  pci_disable_sriov(pdev);

--- linux-4.15.0.orig/drivers/net/ethernet/cavium/thunder/nicvf_main.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/thunder/nicvf_main.c
@@ -29,6 +29,13 @@
 #define DRV_NAME	"thunder-nicvf"
 #define DRV_VERSION	"1.0"

+/* NOTE: Packets bigger than 1530 are split across multiple pages and XDP needs
+ the buffer to be contiguous. Allow XDP to be set up only if we don't exceed
+ this value, keeping headroom for the 14 byte Ethernet header and two
+ VLAN tags (for QinQ)
+ */
+#define MAX_XDP_MTU(1530 - ETH_HLEN - VLAN_HLEN * 2)
+
+/* Supported devices */
 static const struct pci_device_id nicvf_id_table[] = {
 | PCI_DEVICE_SUB(PCI_VENDOR_ID_CAVIUM,
@@ -166,6 +173,17 @@
 return 1;

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+static void nicvf_send_cfg_done(struct nicvf *nic)
+{
+union nic_mbx mbx = { }
+
+mbx.msg.msg = NIC_MBOX_MSG_CFG_DONE;
+if (nicvf_send_msg_to_pf(nic, &mbx)) {
+netdev_err(nic->netdev,
+ "PF didn't respond to CFG DONE msg\n");
+}
+
+static void nicvf_read_bgx_stats(struct nicvf *nic, struct bgx_stats_msg *bgx)
+{
+if (bgx->rx)
+@@ -1330,7 +1348,6 @@
+struct nicvf *nic = netdev_priv(netdev);
+struct queue_set *qs = nic->qs;
+struct nicvf_cq_poll *cq_poll = NULL;
-union nic_mbx mbx = { }
+
+union nic_mbx mbx = { }
+;
+
+netif_carrier_off(netdev);
+
+@@ -1339,15 +1357,14 @@
+nicvf_enable_intr(nic, NICVF_INTR_RBDR, qidx);
+
+/* Send VF config done msg to PF */
+mbx.msg.msg = NIC_MBOX_MSG_CFG_DONE;
+nicvf_write_to_mbx(nic, &mbx);
+nicvf_send_cfg_done(nic);
+
+return 0;
+
+cleanup:
+@@ -1446,6 +1462,15 @@
+struct nicvf *nic = netdev_priv(netdev);
+int orig_mtu = netdev->mtu;
+
+/* For now just support only the usual MTU sized frames,
+ * plus some headroom for VLAN, QinQ.
+ */
+if (nic->xdp_prog && new_mtu > MAX_XDP_MTU) {
+netdev_warn(netdev, "Jumbo frames not yet supported with XDP, current MTU %d,\n",
+ netdev->mtu);
+return -EINVAL;
+}
+
+netdev->mtu = new_mtu;

if (!netif_running(netdev))
@@ -1692,9 +1717,12 @@
    bool if_up = netif_running(nic->netdev);
    struct bpf_prog *old_prog;
    bool bpf_attached = false;
+ int ret = 0;

 /* For now just support only the usual MTU sized frames */
- if (prog && (dev->mtu > 1500)) {
+ if (prog && (dev->mtu > MAX_XDP_MTU)) {
    netdev_warn(dev, "Jumbo frames not yet supported with XDP, current MTU %d,\n",
        dev->mtu);
    return -EOPNOTSUPP;
@@ -1725,8 +1753,12 @@
    if (nic->xdp_prog) {
        /* Attach BPF program */
        nic->xdp_prog = bpf_prog_add(nic->xdp_prog, nic->rx_queues - 1);
-     if (!IS_ERR(nic->xdp_prog))
+     if (!IS_ERR(nic->xdp_prog)) {
            bpf_attached = true;
+         } else {
+             ret = PTR_ERR(nic->xdp_prog);
+             nic->xdp_prog = NULL;
+         }
    }

 /* Calculate Tx queues needed for XDP and network stack */
@@ -1738,7 +1770,7 @@
    netif_trans_update(nic->netdev);
 }

 -return 0;
+return ret;
 }

 static int nicvf_xdp(struct net_device *netdev, struct netdev_bpf *xdp)
@@ -1833,6 +1865,11 @@
    nic->pdev = pdev;
    nic->pnicvf = nic;
    nic->max_queues = qcount;
+ /* If no of CPUs are too low, there won't be any queues left
+  * for XDP_TX, hence double it.
+ */
+ if (!nic->t88)
```c
+nic->max_queues *= 2;

/* MAP VF's configuration registers */
nic->reg_base = pcim_iomap(pdev, PCI_CFG_REG_BAR_NUM, 0);
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/thunder/nicvf_queues.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/thunder/nicvf_queues.c
@@ -105,20 +105,19 @@
/* Check if page can be recycled */
if (page) {
    ref_count = page_ref_count(page);
    /* Check if this page has been used once i.e 'put_page'
    - * called after packet transmission i.e internal ref_count
    - * and page's ref_count are equal i.e page can be recycled.
    */
    /* This page can be recycled if internal ref_count and page's
    + * ref_count are equal, indicating that the page has been used
    + * once for packet transmission. For non-XDP mode, internal
    + * ref_count is always '1'.
    */
    if (rbdr->is_xdp && (ref_count == pgcache->ref_count))
        pgcache->ref_count--;
    else
        page = NULL;

    /* In non-XDP mode, page's ref_count needs to be '1' for it
    - * to be recycled.
    - */
    if (!rbdr->is_xdp && (ref_count != 1))
        if (rbdr->is_xdp) {
            if (ref_count == pgcache->ref_count)
                pgcache->ref_count--;
            else
                page = NULL;
        } else if (ref_count != 1) {
            page = NULL;
        }
    }

    if (!page) {
        while (head < rbdr->pgcnt) {
            pgcache = &rbdr->pgcache[head];
            if (pgcache->page && page_ref_count(pgcache->page) != 0) {
                if (!rbdr->is_xdp) {
                    -put_page(pgcache->page);
                    -continue;
                    +if (rbdr->is_xdp) {
                        +page_ref_sub(pgcache->page,
                                       +pgcache->ref_count - 1);
                    }
                }
            }
        }
    }
```
if (!sq->dmem.base)
    return;

   if (sq->tso_hdrs) {
        dma_free_coherent(&nic->pdev->dev,
                         sq->dmem.q_len * TSO_HEADER_SIZE,
                         sq->tso_hdrs, sq->tso_hdrs_phys);
        sq->tso_hdrs = NULL;
    }

/* Free pending skbs in the queue */

mbx.rq.msg = NIC_MBOX_MSG_RQ_RQ;
mbx.rq.qs_num = qs->vnic_id;
mbx.rq.rq_num = qidx;
mbx.rq.cfg = (rq->caching << 26) | (rq->cq_qs << 19) |
             (rq->cq_idx << 16) | (rq->cont_rbdr_qs << 9) |
             (rq->cont_qs_rbdr_idx << 8) |
             (rq->start_rbdr_qs << 1) | (rq->start_qs_rbdr_idx);
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/thunder/thunder_bgx.c
+++ linux-4.15.0/drivers/net/ethernet/cavium/thunder/thunder_bgx.c
@@ -234,10 +234,19 @@
lmac = &bgx->lmac[lmacid];

cfg = bgx_reg_read(bgx, lmacid, BGX_CMRX_CFG);
   -if (enable)
   +if (enable) {
        cfg |= CMR_PKT_RX_EN | CMR_PKT_TX_EN;
   -else
   +/* enable TX FIFO Underflow interrupt */
        bgx_reg_modify(bgx, lmacid, BGX_GMP_GMI_TXX_INT_ENA_W1S,
                      GMI_TXX_INT_UNDFLW);
        } else {
              cfg &= ~(CMR_PKT_RX_EN | CMR_PKT_TX_EN);
   +/* Disable TX FIFO Underflow interrupt */
        bgx_reg_modify(bgx, lmacid, BGX_GMP_GMI_TXX_INT_ENA_W1C,
                      GMI_TXX_INT_UNDFLW);
bgx_reg_write(bgx, lmacid, BGX_CMRX_CFG, cfg);

if (bgx->is_rgx)
     phy_interface_mode(lmac->lmac_type))
    return -ENODEV;

phy_start_aneg(lmac->phydev);
phy_start(lmac->phydev);
return 0;
}

return bgx_init_of_phy(bgx);
}

static irqreturn_t bgx_intr_handler(int irq, void *data)
{
    struct bgx *bgx = (struct bgx *)data;
    u64 status, val;
    int lmac;
    
    for (lmac = 0; lmac < bgx->lmac_count; lmac++) {
        status = bgx_reg_read(bgx, lmac, BGX_GMP_GMI_TXX_INT);
        if (status & GMI_TXX_INT_UNDFLW) {
            pci_err(bgx->pdev, "BGX%d lmac%d UNDFLW\n",
                bgx->bgx_id, lmac);
            val = bgx_reg_read(bgx, lmac, BGX_CMRX_CFG);
            val &= ~CMR_EN;
            bgx_reg_write(bgx, lmac, BGX_CMRX_CFG, val);
            val |= CMR_EN;
            bgx_reg_write(bgx, lmac, BGX_CMRX_CFG, val);
        }
        /* clear interrupts */
        bgx_reg_write(bgx, lmac, BGX_GMP_GMI_TXX_INT, status);
    }
    
    return IRQ_HANDLED;
}

static void bgx_register_intr(struct pci_dev *pdev)
{
    struct bgx *bgx = pci_get_drvdata(pdev);
    int ret;
    
    ret = pci_alloc_irq_vectors(pdev, BGX_LMAC_VEC_OFFSET, 
        BGX_LMAC_VEC_OFFSET, PCI_IRQ_ALL_TYPES);
```c
+if (ret < 0) {
+pci_err(pdev, "Req for #d msix vectors failed\n", 
+BGX_LMAC_VEC_OFFSET);
+return;
+}
+ret = pci_request_irq(pdev, GMPX_GMI_TX_INT, bgx_intr_handler, NULL, 
+    bgx, "BGX%d", bgx->bgx_id); 
+if (ret)
+pci_free_irq(pdev, GMPX_GMI_TX_INT, bgx); 
+
+static int bgx_probe(struct pci_dev *pdev, const struct pci_device_id *ent)
+{
+int err;
++ -1355,7 +1406,7 @@
+
+pci_set_drvdata(pdev, bgx);
++ -1355,7 +1406,7 @@
+-err = pci_enable_device(pdev);
+-err = pcim_enable_device(pdev);
+if (err) {
+dev_err(dev, "Failed to enable PCI device\n");
+pci_set_drvdata(pdev, NULL);
++ -1409,6 +1460,8 @@
+
+bgx_init_hw(bgx);
++ -1355,7 +1406,7 @@
+
+bgx_register_intr(pdev);
++ -1355,7 +1406,7 @@
+/* Enable all LMACs */
+for (lmac = 0; lmac < bgx->lmac_count; lmac++) {
+err = bgx_lmac_enable(bgx, lmac);
++ -1425,6 +1478,7 @@
+
+err_enable:
+bgx_vnic[bgx->bgx_id] = NULL;
+pci_free_irq(pdev, GMPX_GMI_TX_INT, bgx);
+err_release_regions:
+pci_release_regions(pdev);
+err_disable_device:
++ -1442,6 +1496,8 @@
+for (lmac = 0; lmac < bgx->lmac_count; lmac++)
+bgx_lmac_disable(bgx, lmac);
++ -1442,6 +1496,8 @@
+
+pci_free_irq(pdev, GMPX_GMI_TX_INT, bgx);
+bgx_vnic[bgx->bgx_id] = NULL;
+pci_release_regions(pdev);
```
pci_disable_device(pdev);
--- linux-4.15.0.orig/drivers/net/ethernet/cavium/thunder/thunder_bgx.h
+++ linux-4.15.0/drivers/net/ethernet/cavium/thunder/thunder_bgx.h
@@ -179,6 +179,15 @@
#define BGX_GMP_GMI_TXX_BURST 0x38228
#define BGX_GMP_GMI_TXX_MIN_PKT 0x38240
#define BGX_GMP_GMI_TXX_SGMII_CTL 0x38300
+#define BGX_GMP_GMI_TXX_INT 0x38500
+#define BGX_GMP_GMI_TXX_INT_W1S 0x38508
+#define BGX_GMP_GMI_TXX_INT_ENA_W1C 0x38510
+#define BGX_GMP_GMI_TXX_INT_ENA_W1S 0x38518
+#define GMI_TXX_INT_PTP_LOSTBIT_ULL(4)
+#define GMI_TXX_INT_LATE_COLBIT_ULL(3)
+#define GMI_TXX_INT_XSDEFBIT_ULL(2)
+#define GMI_TXX_INT_XSCOLBIT_ULL(1)
+#define GMI_TXX_INT_UNDFLWBIT_ULL(0)

#define BGX_MSIX_VEC_0_29_ADDR 0x400000 /* +(0..29) << 4 */
#define BGX_MSIX_VEC_0_29_CTL 0x400008
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb/cxgb2.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb/cxgb2.c
@@ -1157,6 +1157,7 @@
if (!adapter->registered_device_map) {
    pr_err("%s: could not register any net devices\n",
        pci_name(pdev));
+    err = -EINVAL;
   goto out_release_adapter_res;
}

--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb3/cxgb3_main.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb3/cxgb3_main.c
@@ -51,6 +51,7 @@
#include <linux/uaccess.h>
#include <linux/nospec.h>
#include "common.h"
+include "cxgb3_ioctl.h"
@@ -2158,6 +2159,8 @@
return -EPERM;
if (copy_from_user(&t, useraddr, sizeof(t)))
    return -EFAULT;
+if (t.cmd != CHELSIO_SET_QSET_PARAMS)
    return -EINVAL;
if (t.qset_idx >= SGE_QSETS)
    return -EINVAL;
if (!in_range(t.intr_lat, 0, M_NEWTIMER) ||
if (copy_from_user(&t, useraddr, sizeof(t)))
return -EFAULT;

+if (t.cmd != CHELSIO_GET_QSET_PARAMS)
+return -EINVAL;
+
/* Display qsets for all ports when offload enabled */
if (test_bit(OFFLOAD_DEVMAP_BIT, &adapter->open_device_map)) {
q1 = 0;
@@ -2268,6 +2274,7 @@
if (t.qset_idx >= nqsets)
return -EINVAL;
+t.qset_idx = array_index_nospec(t.qset_idx, nqsets);

q = &adapter->params.sge.qset[q1 + t.qset_idx];
t.rspq_size = q->rspq_size;
@@ -2301,6 +2308,8 @@
return -EBUSY;
if (copy_from_user(&edata, useraddr, sizeof(edata)))
return -EFAULT;
+if (edata.cmd != CHELSIO_SET_QSET_NUM)
+return -EINVAL;
if (edata.val < 1 ||
(edata.val > 1 && !(adapter->flags & USING_MSIX)))
return -EINVAL;
@@ -2341,6 +2350,8 @@
return -EPERM;
if (copy_from_user(&t, useraddr, sizeof(t)))
return -EFAULT;
+if (t.cmd != CHELSIO_LOAD_FW)
+return -EINVAL;
/* Check t.len sanity ? */
fw_data = memdup_user(useraddr + sizeof(t), t.len);
if (IS_ERR(fw_data))
@@ -2364,6 +2375,8 @@
return -EBUSY;
if (copy_from_user(&m, useraddr, sizeof(m)))
return -EFAULT;
+if (m.cmd != CHELSIO_SETMTUTAB)
+return -EINVAL;
if (m.mtus != NMTUS)
return -EINVAL;
if (m.mtus[0] < 81) /* accommodate SACK */
@@ -2405,6 +2418,8 @@
return -EBUSY;
if (copy_from_user(&m, useraddr, sizeof(m)))
return -EFAULT;
+if (m.cmd != CHELSIO_SET_PM)
+return -EINVAL;
if (!is_power_of_2(m.rx_pg_sz) ||
!is_power_of_2(m.tx_pg_sz))
return -EINVAL;/* not power of 2 */
@@ -2434,10 +2449,14 @@
if (!is_offload(adapter))
    return -EOPNOTSUPP;
+if (!capable(CAP_NET_ADMIN))
+    return -EPERM;
if (!((adapter->flags & FULL_INIT_DONE))
    return -EIO;/* need the memory controllers */
if (copy_from_user(&t, useraddr, sizeof(t)))
    return -EFAULT;
+if (t.cmd != CHELSIO_GET_MEM)
+    return -EINVAL;
if ((t.addr & 7) || (t.len & 7))
    return -EINVAL;
if (t.mem_id == MEM_CM)
@@ -2490,6 +2509,8 @@
    return -EAGAIN;
    if (copy_from_user(&t, useraddr, sizeof(t)))
        return -EFAULT;
+if (t.cmd != CHELSIO_SET_TRACE_FILTER)
+    return -EINVAL;

    tp = (const struct trace_params *)&t.sip;
    if (t.config_tx)
@@ -3251,7 +3272,7 @@
        if (!adapter->regs) {
            dev_err(&pdev->dev, "cannot map device registers\n");
            err = -ENOMEM;
        -goto out_free_adapter;
-        goto out_free_adapter_nofail;
        }

        adapter->pdev = pdev;
@@ -3371,6 +3392,9 @@
        if (adapter->port[i])
            free_netdev(adapter->port[i]);
+
        out_free_adapter_nofail:
        kfree_skb(adapter->nofail_skb);
+        out_free_adapter:
        kfree(adapter);
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb3/l2t.h
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb3/l2t.h
@@ -75,8 +75,8 @@
 struct l2t_entry *rover; /* starting point for next allocation */
 atomic_t nfree; /* number of free entries */
 rwlock_t lock;
-struct l2t_entry l2tab[0];
+struct l2t_entry l2tab[];
 struct rcu_head rcu_head; /* to handle rcu cleanup */
+struct l2t_entry l2tab[];
};

typedef void (*arp_failure_handler_func)(struct t3cdev * dev,
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb3/sge.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb3/sge.c
@@ -3177,6 +3177,7 @@
 GFP_KERNEL | __GFP_COMP);
 if (!avail) {
     CH_ALERT(adapter, "free list queue 0 initialization failed\n");
+    ret = -ENOMEM;
     goto err;
 } else {
     if (avail < q->fl[0].size)
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cudbg_lib.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cudbg_lib.c
@@ @ -156,7 +156,7 @@
} else {
     size = padap->params.cim_la_size / 10 + 1;
-    size *= 11 * sizeof(u32);
+    size *= 10 * sizeof(u32);
     } else {
     size = padap->params.cim_la_size / 8;
     size *= 8 * sizeof(u32);
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_dcb.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_dcb.c
@@ @ @ -273,8 +273,8 @@
 case CUDBG_CIM_LA:
     if (is_t6(adap->params.chip)) {
         len = adap->params.cim_la_size / 10 + 1;
-        len *= 11 * sizeof(u32);
+        len *= 10 * sizeof(u32);
     } else {
         len = adap->params.cim_la_size / 8;
         len *= 8 * sizeof(u32);
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_dcb.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_dcb.c
@@ @ @ -273,8 +273,8 @@
enum cxgb4_dcb_state_input input =
((pcmd->u.dcb.control.all_syncd_pkd &
  FW_PORT_CMD_ALL_SYNCD_F)
  ? CXGB4_DCB_STATE_FW_ALLSYNCED
  : CXGB4_DCB_STATE_FW_INCOMPLETE);

if (dcb->dcb_version != FW_PORT_DCB_VER_UNKNOWN) {
  dcb_running_version = FW_PORT_CMD_DCB_VERSION_G(
    --- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_dcb.h
    +++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_dcb.h
    @@ -67,7 +67,7 @@
    do {
      if ((__dcb)->dcb_version == FW_PORT_DCB_VER_IEEE)
        cxgb4_dcb_state_fsm((__dev),
        - CXGB4_DCB_STATE_FW_ALLSYNCED);
        + CXGB4_DCB_INPUT_FW_ALLSYNCED);
    } while (0)

  /* States we can be in for a port's Data Center Bridging.
   --- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_debugfs.c
   +++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_debugfs.c
   @@ -2448,7 +2447,7 @@
   seq_printf(seq, "%-12s", s); \
   for (i = 0; i < n; ++i) \n     seq_printf(seq, "%16" fmt_spec, v); \
     -seq_putchar(seq, '\n'); \n     +seq_putchar(seq, '\n'); \
   } while (0)
   #define S(s, v) S3("s", s, v)
   #define T3(fmt_spec, s, v) S3(fmt_spec, s, tx[i].v)
   @@ -2778,8 +2777,10 @@
   return -ENOMEM;
   err = bitmap_parse_user(ubuf, count, t, adap->sge.egr_sz);
   -if (err) 
   +if (err) {

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+kvfree(t);
return err;
+
bitmap_copy(adap->sge.blocked_fl, t, adap->sge.egr_sz);
kvfree(t);
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_filter.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_filter.c
@@ -146,13 +146,13 @@
    int err;

    /* do a set-tcb for smac-sel and CWR bit.. */
-    err = set_tcb_tflag(adap, f, f->tid, TF_CCTRL_CWR_S, 1, 1);
-    if (err)
-        goto smac_err;
-
-    err = set_tcb_field(adap, f, f->tid, TCB_SMAC_SEL_W,
-                     TCB_SMAC_SEL_V(TCB_SMAC_SEL_M),
-                     TCB_SMAC_SEL_V(f->smt->idx), 1);
+    err = set_tcb_tflag(adap, f, f->tid, TF_CCTRL_CWR_S, 1, 1);
+    if (err)
+        goto smac_err;
+    if (err)
+        goto smac_err;
+
    if (!err)
        return 0;
@@ -578,6 +578,7 @@
 FW_FILTER_WR_DIRSTEERHASH_V(f->fs.dirsteerhash) |
 FW_FILTER_WR_LPBK_V(f->fs.action == FILTER_SWITCH) |
 FW_FILTER_WR_DMAC_V(f->fs.newdmac) |
+    FW_FILTER_WR_SMAC_V(f->fs.newsmac) |
 FW_FILTER_WR_INSVLAN_V(f->fs.newvlan == VLAN_INSERT ||
                     f->fs.newvlan == VLAN_REWRITE) |
 FW_FILTER_WR_RMVLAN_V(f->fs.newvlan == VLAN_REMOVE ||
@@ -595,7 +596,8 @@
 FW_FILTER_WR_OVLAN_VLDM_V(f->fs.mask.ovlan_vld));
-fwr->smac_sel = 0;
+if (f->fs.newsmac)
+    fwr->smac_sel = f->smt->idx;
    fwr->rx_chan_rx_rpl_iq =
    htons(FW_FILTER_WR_RX_CHAN_V(0) |
           FW_FILTER_WR_RX_RPL_IQ_V(adapter->sge.evtq.abs_id));
@@ -772,16 +774,16 @@
 struct in_addr *addr;
 addr = (struct in_addr *)ipmask;
-if (addr->s_addr == 0xffffffff)
+if (addr->s_addr == htonl(0xffffffff))
    return true;
} else if (family == AF_INET6) {
    struct in6_addr *addr6;

    addr6 = (struct in6_addr *)ipmask;
    -if (addr6->s6_addr32[0] == 0xffffffff &&
    -    addr6->s6_addr32[1] == 0xffffffff &&
    -    addr6->s6_addr32[2] == 0xffffffff &&
    -    addr6->s6_addr32[3] == 0xffffffff)
+if (addr6->s6_addr32[0] == htonl(0xffffffff) &&
+    addr6->s6_addr32[1] == htonl(0xffffffff) &&
+    addr6->s6_addr32[2] == htonl(0xffffffff) &&
+    addr6->s6_addr32[3] == htonl(0xffffffff))
        return true;
    }
    return false;
@@ -814,7 +816,7 @@
    }
    struct tp_params *tp = &adap->params.tp;
    u64 hash_filter_mask = tp->hash_filter_mask;
-    u32 mask;
+    u64 ntuple_mask = 0;
    if (!is_hashfilter(adap))
        return false;
@@ -843,73 +845,45 @@
    if (!fs->val.fport || fs->mask.fport != 0xffff)
        return false;
    -if (tp->fcoe_shift >= 0) {
    -    mask = (hash_filter_mask >> tp->fcoe_shift) & FT_FCOE_W;
    -    if (mask && !fs->mask.fcoe)
    -        return false;
    -}
+/* calculate tuple mask and compare with mask configured in hw */
+    if (tp->fcoe_shift >= 0)
+        ntuple_mask |= (u64)fs->mask.fcoe << tp->fcoe_shift;

    -if (tp->port_shift >= 0) {
    -    mask = (hash_filter_mask >> tp->port_shift) & FT_PORT_W;
    -    if (mask && !fs->mask.iport)
    -        return false;
    -}
+    if (tp->port_shift >= 0)
+        ntuple_mask |= (u64)fs->mask.iport << tp->port_shift;
if (tp->vnic_shift >= 0) {
    mask = (hash_filter_mask >> tp->vnic_shift) & FT_VNIC_ID_W;
    if ((adap->params.tp.ingress_config & VNIC_F)) {
        if (mask && !fs->mask.pfvf_vld)
            return false;
    } else {
        if (mask && !fs->mask.ovlan_vld)
            return false;
    }
    if ((adap->params.tp.ingress_config & VNIC_F))
        ntuple_mask |= (u64)fs->mask.pfvf_vld << tp->vnic_shift;
    else
        ntuple_mask |= (u64)fs->mask.ovlan_vld << tp->vnic_shift;
}

if (tp->vlan_shift >= 0) {
    mask = (hash_filter_mask >> tp->vlan_shift) & FT_VLAN_W;
    if (mask && !fs->mask.ivlan)
        return false;
    if (tp->vlan_shift >= 0)
        ntuple_mask |= (u64)fs->mask.ivlan << tp->vlan_shift;
}

if (tp->tos_shift >= 0) {
    mask = (hash_filter_mask >> tp->tos_shift) & FT_TOS_W;
    if (mask && !fs->mask.tos)
        return false;
    if (tp->tos_shift >= 0)
        ntuple_mask |= (u64)fs->mask.tos << tp->tos_shift;
}

if (tp->protocol_shift >= 0) {
    mask = (hash_filter_mask >> tp->protocol_shift) & FT_PROTOCOL_W;
    if (mask && !fs->mask.proto)
        return false;
    if (tp->protocol_shift >= 0)
        ntuple_mask |= (u64)fs->mask.proto << tp->protocol_shift;
}

if (tp->ethertype_shift >= 0) {
    mask = (hash_filter_mask >> tp->ethertype_shift) & FT_ETHERTYPE_W;
    if (mask && !fs->mask.ethtype)
        return false;
    if (tp->ethertype_shift >= 0)
+ntuple_mask |= (u64)fs->mask.ethtype << tp->ethertype_shift;

-if (tp->macmatch_shift >= 0) {
- mask = (hash_filter_mask >> tp->macmatch_shift) & FT_MACMATCH_W;
- if (mask & !fs->mask.macidx)
- return false;
- }
+if (tp->macmatch_shift >= 0)
+ ntuple_mask |= (u64)fs->mask.macidx << tp->macmatch_shift;
+
+if (tp->matchtype_shift >= 0)
+ ntuple_mask |= (u64)fs->mask.matchtype << tp->matchtype_shift;
+
+if (tp->frag_shift >= 0)
+ ntuple_mask |= (u64)fs->mask.frag << tp->frag_shift;
+
+if (ntuple_mask != hash_filter_mask)
+ return false;

-if (tp->matchtype_shift >= 0) {
- mask = (hash_filter_mask >> tp->matchtype_shift) &
- FT_MPSHITTYPE_W;
- if (mask & !fs->mask.matchtype)
- return false;
- }
-if (tp->frag_shift >= 0) {
- mask = (hash_filter_mask >> tp->frag_shift) &
- FT_FRAGMENTATION_W;
- if (mask & !fs->mask.frag)
- return false;
- }
return true;
}

@@ -1001,11 +975,8 @@
    TX_QUEUE_V(f->fs.nat_mode) |
    T5_OPT_2_VALID_F |
    RX_CHANNEL_F |
-    CONG_CNTRL_V(f->fs.action == FILTER_DROP) |
-    (f->fs.dirsteer << 1)) | 
-    PACE_V((f->fs.maskhash) |
-    ((f->fs.dirsteerhash) << 1)) |
-    CTRL_ECN_V((f->fs.action == FILTER_SWITCH));
+    (f->fs.dirsteerhash) << 1)));
}

static void mk_act_open_req(struct filter_entry *f, struct sk_buff *skb,
@@ -1043,11 +1014,8 @@
TX_QUEUE_V(f->fs.nat_mode) |
T5_OPT_2_VALID_F |
RX_CHANNEL_F |
- CONG_CNTRL_V((f->fs.action == FILTER_DROP) |
- (f->fs.dirsteer << 1)) |
PACE_V((f->fs.maskhash) |
- ((f->fs.dirsteerhash) << 1)) |
- CTRL_ECN_V((f->fs.action == FILTER_SWITCH));
+				   ((f->fs.dirsteerhash) << 1)));
}

static int cxgb4_set_hash_filter(struct net_device *dev, 
static int configure_filter_tcb(struct adapter *adap, unsigned int tid, 
struct filter_entry *f)
{
    -if (f->fs.hitcnts)
+if (f->fs.hitcnts) {
        set_tcb_field(adap, f, tid, TCB_TIMESTAMP_W,
        - TCB_TIMESTAMP_V(TCB_TIMESTAMP_M) |
+ TCB_TIMESTAMP_V(TCB_TIMESTAMP_M),
+ TCB_TIMESTAMP_V(0ULL),
+ 1);
        +set_tcb_field(adap, f, tid, TCB_RTT_TS_RECENT_AGE_W,
            TCB_RTT_TS_RECENT_AGE_V(TCB_RTT_TS_RECENT_AGE_M),
        - TCB_TIMESTAMP_V(0ULL) |
        TCB_RTT_TS_RECENT_AGE_V(0ULL),
        1);
+}

if (f->fs.newdmac)
    set_tcb_tflag(adap, f, tid, TF_CTRL_ECE_S, 1,
    @@ -1613,6 +1584,20 @@
    } return;

+switch (f->fs.action) {
+case FILTER_PASS:
+if (f->fs.dirsteer)
+set_tcb_tflag(adap, f, tid,
+   TF_DIRECT_STEER_S, 1, 1);
+break;
+case FILTER_DROP:
+set_tcb_tflag(adap, f, tid, TF_DROP_S, 1, 1);
+break;
+case FILTER_SWITCH:
+set_tcb_tflag(adap, f, tid, TF_LPBK_S, 1, 1);
+break;
default:
    @ @ -1672,22 +1657,11 @@
    if (ctx)
    ctx->result = 0;
} else if (ret == FW_FILTER_WR FLT ADDED) {
    -int err = 0;
    -
    -if (f->fs.newsmac)
    -err = configure_filter_smac(adap, f);
    -
    -if (!err) {
    -f->pending = 0; /* async setup completed */
    -f->valid = 1;
    -if (ctx) {
    -ctx->result = 0;
    -ctx->tid = idx;
    -}
    -} else {
    -clear_filter(adap, f);
    -if (ctx)
    -ctx->result = err;
    +f->pending = 0; /* async setup completed */
    +f->valid = 1;
    +if (ctx) {
    +ctx->result = 0;
    +ctx->tid = idx;
    +}
    } else {
    /* Something went wrong. Issue a warning about the
    --- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_main.c
    +++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_main.c
    @@ -256,7 +256,7 @@
    "Can't %s DCB Priority on port %d, TX Queue %d: err=%d\n",
    enable ? "set" : "unset", pi->port_id, i, -err);
    else
    -txq->dcb_prio = value;
    +txq->dcb_prio = enable ? value : 0;
    }
    }
    }
    }
    @ @ -830,8 +830,6 @@

    err = t4_sge_alloc_rxq(adap, &s->fw_evtq, true, adap->port[0],
        adap->msi_idx, NULL, fwevtq_handler, NULL, -1);
-if (err)
-t4_free_sge_resources(adap);
-return err;
}

@@ -2258,8 +2256,6 @@
#if IS_ENABLED(CONFIG_IPV6)
 update_clip(adap);
#endif
-/* Initialize hash mac addr list*/
-INIT_LIST_HEAD(&adap->mac_hlist);
-return err;

irq_err:
@@ -2281,6 +2277,7 @@
t4_sge_stop(adapter);
t4_free_sge_resources(adapter);
+
+adapter->flags &= ~FULL_INIT_DONE;
}

@@ -4772,7 +4769,6 @@
/* Initialize the device structure. */
dev->netdev_ops = &cxgb4_mgmt_netdev_ops;
dev->ethtool_ops = &cxgb4_mgmt_ethtool_ops;
-dev->needs_free_netdev = true;
}

static int config_mgmt_dev(struct pci_dev *pdev)
@@ -5058,6 +5054,9 @@
(is_t5(adapter->params.chip) ? STATMODE_V(0) : T6_STATMODE_V(0));

+%/* Initialize hash mac addr list */
+INIT_LIST_HEAD(&adapter->mac_hlist);
+for_each_port(adapter, i) {
+netdev = alloc_etherdev_mq(sizeof(struct port_info),
+ MAX_ETH_QSETS);
+@@ -5222,6 +5221,13 @@
+if (err)
goto out_free_dev;
+
+err = setup_fw_sge_queues(adapter);
+if (err) {
+dev_err(adapter->pdev_dev, "FW sge queue allocation failed, err %d", err);
goto out_free_dev;
+
+
/*
 * The card is now ready to go. If any errors occur during device
 * registration we do not fail the whole card but rather proceed only
 @@ -5270,7 +5276,6 @@
 cxgb4_ptp_init(adapter);

 print_adapter_info(adapter);
- setup_fw_sge_queues(adapter);
 return 0;

 sriov:
 @@ -5326,6 +5331,7 @@
 #endif
 out_free_dev:
 +t4_free_sge_resources(adapter);
 free_some_resources(adapter);
 if (adapter->flags & USING_MSIX)
 free_msix_info(adapter);
 @@ -5353,6 +5359,7 @@
 static void remove_one(struct pci_dev *pdev)
 {
 struct adapter *adapter = pci_get_drvdata(pdev);
 +struct hash_mac_addr *entry, *tmp;

 if (!adapter) {
 pci_release_regions(pdev);
 @@ -5398,6 +5405,12 @@
 if (adapter->num_uld || adapter->num_ofld_uld)
 t4_uld_mem_free(adapter);
 free_some_resources(adapter);
 + list_for_each_entry_safe(entry, tmp, &adapter->mac_hlist,
 + list) {
 + list_del(&entry->list);
 + kfree(entry);
 + }
 +
 +#if IS_ENABLED(CONFIG_IPV6)
 t4_cleanup_clip_tbl(adapter);
 #endif
 @@ -5504,15 +5517,24 @@
 ret = pci_register_driver(&cxgb4_driver);
 if (ret < 0)
 -debugfs_remove(cxgb4_debugfs_root);
+goto err_pci;

#if IS_ENABLED(CONFIG_IPV6)
if (!inet6addr_registered) {
    register_inet6addr_notifier(&cxgb4_inet6addr_notifier);
    inet6addr_registered = true;
    ret = register_inet6addr_notifier(&cxgb4_inet6addr_notifier);
    if (ret)
        pci_unregister_driver(&cxgb4_driver);
    else
        inet6addr_registered = true;
}
#endif

+if (ret == 0)
+return ret;
+
+err_pci:
+debugfs_remove(cxgb4_debugfs_root);
+
return ret;
}

--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_ptp.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_ptp.c
@@ -246,6 +246,9 @@
          FW_PTP_CMD_PORTID_V(0));
    c.retval_len16 = cpu_to_be32(FW_CMD_LEN16_V(sizeof(c) / 16));
    c.u.ts.sc = FW_PTP_SC_ADJ_FTIME;
+c.u.ts.sign = (delta < 0) ? 1 : 0;
+if (delta < 0)
+    delta = -delta;
    c.u.ts.tm = cpu_to_be64(delta);

    err = t4_wr_mbox(adapter, adapter->mbox, &c, sizeof(c), NULL);
@@ -308,32 +311,17 @@
*/
static int cxgb4_ptp_gettime(struct ptp_clock_info *ptp, struct timespec64 *ts)
{
    struct adapter *adapter = (struct adapter *)container_of(ptp,
    - struct adapter, ptp_clock_info);
    - struct fw_ptp_cmd c;
    + struct adapter *adapter = container_of(ptp, struct adapter,
      ptp_clock_info);
    u64 ns;
    - int err;

    -memset(&c, 0, sizeof(c));
- c.op_to_portid = cpu_to_be32(FW_CMD_OP_V(FW_PTP_CMD) | FW_CMD_REQUEST_F | FW_CMD_READ_F | FW_PTP_CMD_PORTID_V(0));
- c.retval_len16 = cpu_to_be32(FW_CMD_LEN16_V(sizeof(c) / 16));
- c.u.ts.sc = FW_PTP_SC_GET_TIME;
-
- err = t4_wr_mbox(adapter, adapter->mbox, &c, sizeof(c), &c);
- if (err < 0) {
- dev_err(adapter->pdev_dev, "PTP: %s error %d", __func__, -err);
- return err;
- }
+ ns = t4_read_reg(adapter, T5_PORT_REG(0, MAC_PORT_PTP_SUM_LO_A));
+ ns |= (u64)t4_read_reg(adapter,
+ T5_PORT_REG(0, MAC_PORT_PTP_SUM_HI_A)) << 32;

/* convert to timespec*/
- ns = be64_to_cpu(c.u.ts.tm);
+ *ts = ns_to_timespec64(ns);
- return err;
+ return 0;
}

/**
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_tc_flower.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_tc_flower.c
@@ -67,7 +67,8 @@
 static struct ch_tc_flower_entry *allocate_flower_entry(void)
 {
     struct ch_tc_flower_entry *new = kzalloc(sizeof(*new), GFP_KERNEL);
-    spin_lock_init(&new->lock);
+    if (new)
+       spin_lock_init(&new->lock);
     return new;
 }

@@ -211,6 +212,9 @@
     fs->val.ivlan = vlan_tci;
     fs->mask.ivlan = vlan_tci_mask;
+
     /* Chelsio adapters use ivlan_vld bit to match vlan packets */
     * as 802.1Q. Also, when vlan tag is present in packets,
     * ethtype match is used then to match on ethtype of inner
* ethtype value with ethtype of inner header. */
if (fs->val.ethtype == ETH_P_8021Q) {
    fs->val.ivlan_vld = 1;
    fs->mask.ivlan_vld = 1;
    fs->val.ethtype = 0;
    fs->mask.ethtype = 0;
}

bool next_header)
{
    unsigned int i, j;
    u32 val, mask;
    __be32 val, mask;
    int off, err;
    bool found;

    /* Try to find matches that allow jumps to next header. */
    for (i = 0; next[i].jump; i++) {
        if (next[i].offoff != cls->knode.sel->offoff ||
            next[i].shift != cls->knode.sel->offshift ||
            next[i].mask != cls->knode.sel->offmask ||
            next[i].offset != cls->knode.sel->off)
            continue;

        /* Found a possible candidate. Find a key that
        ...
if (next[i].match_off == off &&
  next[i].match_val == val &&
  next[i].match_mask == mask) {
  if (next[i].key.off == off &&
      next[i].key.val == val &&
      next[i].key.mask == mask) {
    found = true;
    break;
  }
}
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
{
    memcpy(&f->val.fip[0], &val, sizeof(u32));
    memcpy(&f->mask.fip[0], &mask, sizeof(u32));
    @ @ -92,7 +92,7 @ @
}

static inline int cxgb4_fill_ipv4_dst_ip(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
{
    memcpy(&f->val.lip[0], &val, sizeof(u32));
    memcpy(&f->mask.lip[0], &mask, sizeof(u32));
    @ @ -111,7 +111,7 @ @

/* IPv6 match fields */
static inline int cxgb4_fill_ipv6_tos(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
{
    f->val.tos = (ntohl(val) >> 20) & 0x000000FF;
    f->mask.tos = (ntohl(mask) >> 20) & 0x000000FF;
    @ @ -120,7 +120,7 @ @
}

static inline int cxgb4_fill_ipv6_proto(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
{
    f->val.proto = (ntohl(val) >> 8) & 0x000000FF;
    f->mask.proto = (ntohl(mask) >> 8) & 0x000000FF;
    @ @ -129,7 +129,7 @ @
}

static inline int cxgb4_fill_ipv6_src_ip0(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
{
    memcpy(&f->val.fip[0], &val, sizeof(u32));
    memcpy(&f->mask.fip[0], &mask, sizeof(u32));
    @ @ -138,7 +138,7 @ @
}

static inline int cxgb4_fill_ipv6_src_ip1(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
{
memcpy(&f->val.fip[4], &val, sizeof(u32));
memcpy(&f->mask.fip[4], &mask, sizeof(u32));
@@ -147,7 +147,7 @@
 }

static inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcpystatic inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcpystatic inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcpystatic inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcyprevious line
@@ -156,7 +156,7 @@
 }

static inline int cxgb4_fill_ipv6_src3(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcpystatic inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcyprevious line
@@ -165,7 +165,7 @@
 }

static inline int cxgb4_fill_ipv6_dst0(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcpystatic inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcyprevious line
@@ -174,7 +174,7 @@
 }

static inline int cxgb4_fill_ipv6_dst1(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcpystatic inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcyprevious line
@@ -183,7 +183,7 @@
 }

static inline int cxgb4_fill_ipv6_dst2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcpystatic inline int cxgb4_fill_ipv6_src2(struct ch_filter_specification *f,
- u32 val, u32 mask)
+ __be32 val, __be32 mask)
 {
 memcyprevious line
@@ -192,7 +192,7 @@
static inline int cxgb4_fill_ipv6_dst_ip3(struct ch_filter_specification *f,
    u32 val, u32 mask)
static inline int cxgb4_fill_l4_ports(struct ch_filter_specification *f,
    u32 val, u32 mask)
{
    memcpy(&f->val.lip[12], &val, sizeof(u32));
    memcpy(&f->mask.lip[12], &mask, sizeof(u32));
}

/* TCP/UDP match */
static inline int cxgb4_fill_l4_ports(struct ch_filter_specification *f,
    __be32 val, __be32 mask)
{
    f->val.fport  = ntohl(val)  >> 16;
    f->mask.fport = ntohl(mask) >> 16;
}

struct cxgb4_next_header {
    unsigned int offset; /* Offset to next header */
    /* Offset, shift, and mask added to offset above
    * to get to next header. Useful when using a header
    * field's value to jump to next header such as IHL field
    * in IPv4 header.
    */
    unsigned int offoff;
    u32 shift;
    u32 mask;
    /* match criteria to make this jump */
    unsigned int match_off;
    u32 match_val;
    u32 match_mask;
    struct tc_u32_sel sel;
    struct tc_u32_key key;
    /* location of jump to make */
    const struct cxgb4_match_field *jump;
};

/* IPv4 header. */
static const struct cxgb4_next_header cxgb4_ipv4_jumps[] = {
    { .offset = 0, .offoff = 0, .shift = 6, .mask = 0xF,
      .match_off = 8, .match_val = 0x600, .match_mask = 0xFF00,
      .jump = cxgb4_tcp_fields },
    { .offset = 0, .offoff = 0, .shift = 6, .mask = 0xF,
- .match_off = 8, .match_val = 0x1100, .match_mask = 0xFF00,
- .jump = cxgb4_udp_fields 

- { .jump = NULL }

+{ 
+/* TCP Jump */
+ .sel = {
+ .off = 0,
+ .offoff = 0,
+ .offshift = 6,
+ .offmask = cpu_to_be16(0x0f00),
+ }
+ .key = {
+ .off = 8,
+ .val = cpu_to_be32(0x00060000),
+ .mask = cpu_to_be32(0x00ff0000),
+ }
+ .jump = cxgb4_tcp_fields,
+ }
+{ 
+/* UDP Jump */
+ .sel = {
+ .off = 0,
+ .offoff = 0,
+ .offshift = 6,
+ .offmask = cpu_to_be16(0x0f00),
+ }
+ .key = {
+ .off = 8,
+ .val = cpu_to_be32(0x00110000),
+ .mask = cpu_to_be32(0x00ff0000),
+ }
+ .jump = cxgb4_udp_fields,
+ }
+{ .jump = NULL },
};

/* Accept a rule with a jump directly past the 40 Bytes of IPv6 fixed header
 * to get to transport layer header.
 */
static const struct cxgb4_next_header cxgb4_ipv6_jumps[] = {
- { .offset = 0x28, .offoff = 0, .shift = 0, .mask = 0,
- .match_off = 4, .match_val = 0x60000, .match_mask = 0xFF0000,
- .jump = cxgb4_tcp_fields },
- { .offset = 0x28, .offoff = 0, .shift = 0, .mask = 0,
- .match_off = 4, .match_val = 0x110000, .match_mask = 0xFF0000,
- .jump = cxgb4_udp_fields },
- { .jump = NULL }
+{
/* TCP Jump */
.sel = {
  .off = 40,
  .offoff = 0,
  .offshift = 0,
  .offmask = 0,
},
.key = {
  .off = 4,
  .off = 4,
  .val = cpu_to_be32(0x00000600),
  .mask = cpu_to_be32(0x00000f00),
},
.jump = cxgb4_tcp_fields,
};

/* UDP Jump */
.sel = {
  .off = 40,
  .offoff = 0,
  .offshift = 0,
  .offmask = 0,
},
.key = {
  .off = 4,
  .val = cpu_to_be32(0x00001100),
  .mask = cpu_to_be32(0x00000f00),
},
.jump = cxgb4_udp_fields,
};

{"jump = NULL },
};

struct cxgb4_link {
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/cxgb4_uld.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/cxgb4_uld.c
@@ -137,13 +137,12 @@
static int alloc_uld_rxqs(struct adapter *adap,
struct sge_uld_rxq_info *rxq_info, bool lro)
{
-struct sge *s = &adap->sge;
unsigned int nq = rxq_info->nrq + rxq_info->nciq;
+int i, err, msi_idx, que_idx = 0, bmap_idx = 0;
struct sge_ofld_rxq *q = rxq_info->uld_rxq;
unsigned short *ids = rxq_info->uldsq;
-unsigned int bmap_idx = 0;
-unsigned int per_chan;
-int i, err, msi_idx, que_idx = 0;

per_chan = rxq_info->nrxq / adap->params.nports;

@@ -161,6 +160,10 @@
     if (msi_idx >= 0) {
         bmap_idx = get_msix_idx_from_bmap(adap);
+       if (bmap_idx < 0) {
+         err = -ENOSPC;
+         goto freeout;
+     }
     msi_idx = adap->msix_info_ults[bmap_idx].idx;
}
err = t4_sge_alloc_rxq(adap, &q->rspq, false,
@@ -342,6 +345,7 @@
     {
         struct sge_uld_rxq_info *rxq_info = adap->sge.uld_rxq_info[uld_type];

+     adap->sge.uld_rxq_info[uld_type] = NULL;
     kfree(rxq_info->rspq_id);
     kfree(rxq_info->uldrxq);
     kfree(rxq_info);
@@ -666,10 +670,10 @@
     lld->fr_nsmr_tpte_wr_support = adap->params.fr_nsmr_tpte_wr_support;
 }

 static void uld_attach(struct adapter *adap, unsigned int uld)
+static int uld_attach(struct adapter *adap, unsigned int uld)
{
     void *handle;
     struct cxgb4_lld_info lli;
     +void *handle;

     uld_init(adap, &lli);
     uld_queue_init(adap, uld, &lli);
@@ -679,7 +683,7 @@
     dev_warn(adap->pdev_dev,
             "could not attach to the %s driver, error %ld\n",
             adap->uld[uld].name, PTR_ERR(handle));
-    return;
+    return PTR_ERR(handle);
 }

 adap->uld[uld].handle = handle;
@@ -687,23 +691,24 @@

 if (adap->flags & FULL_INIT_DONE)
     adap->uld[uld].state_change(handle, CXGB4_STATE_UP);
+return 0;
}

/**
 * cxgb4_register_uld - register an upper-layer driver
 * @type: the ULD type
 * @p: the ULD methods
 */
int cxgb4_register_uld(enum cxgb4_uld type, const struct cxgb4_uld_info *p)
{
    int ret = 0;
unsigned int adap_idx = 0;
struct adapter *adap;
    +int ret = 0;
if (type >= CXGB4_ULD_MAX)
    return -EINVAL;
@@ -737,12 +742,16 @@
    if (ret)
        goto free_irq;
adap->uld[type] = *p;
-uld_attach(adap, type);
+ret = uld_attach(adap, type);
+if (ret)
    +goto free_txq;
adap_idx++;
}
mutex_unlock(&uld_mutex);
return 0;

+free_txq:
+release_sge_txq_uld(adap, type);
free_irq:
if (adap->flags & FULL_INIT_DONE)
quiesce_rx_uld(adap, type);
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/l2t.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/l2t.c
@@ -507,40 +507,19 @@)
EXPORT_SYMBOL(cxgb4_select_ntuple);
/
- * Called when address resolution fails for an L2T entry to handle packets
- * on the arpq head. If a packet specifies a failure handler it is invoked,
- * otherwise the packet is sent to the device.
- */
-static void handle_failed_resolution(struct adapter *adap, struct l2t_entry *e)
-{
- struct sk_buff *skb;
- 
- while ((skb = __skb_dequeue(&e->arpq)) != NULL) {
- const struct l2t_skb_cb *cb = L2T_SKB_CB(skb);
- 
- spin_unlock(&e->lock);
- if (cb->arp_err_handler)
- cb->arp_err_handler(cb->handle, skb);
- else
- t4_ofld_send(adap, skb);
- spin_lock(&e->lock);
- }
- }
- 
- /*
- * Called when the host's neighbor layer makes a change to some entry that is
- * loaded into the HW L2 table.
- */
void t4_l2t_update(struct adapter *adap, struct neighbour *neigh)
{
 struct l2t_entry *e;
 struct sk_buff_head *arpq = NULL;
 struct l2t_data *d = adap->l2t;
 unsigned int addr_len = neigh->tbl->key_len;
 u32 *addr = (u32 *) neigh->primary_key;
- int ifidx = neigh->dev->ifindex;
- int hash = addr_hash(d, addr, addr_len, ifidx);
+ int hash, ifidx = neigh->dev->ifindex;
+ struct sk_buff_head *arpq = NULL;
+ struct l2t_data *d = adap->l2t;
+ struct l2t_entry *e;

+ hash = addr_hash(d, addr, addr_len, ifidx);
 read_lock_bh(&d->lock);
 for (e = d->l2tab[hash].first; e; e = e->next)
 if (!addreq(e, addr) && e->ifindex == ifidx) {
@@ -573,8 +552,25 @@
write_l2e(adap, e, 0);
}

-if (arpq)
-handle_failed_resolution(adap, e);
+if (arpq) {
+struct sk_buff *skb;
+
+/* Called when address resolution fails for an L2T
+ * entry to handle packets on the arpq head. If a
+ * packet specifies a failure handler it is invoked,
+ * otherwise the packet is sent to the device.
+ */
+while ((skb = __skb_dequeue(&e->arpq)) != NULL) {
+const struct l2t_skb_cb *cb = L2T_SKB_CB(skb);
+
+spin_unlock(&e->lock);
+if (cb->arp_err_handler)
+cb->arp_err_handler(cb->handle, skb);
+else
+t4_ofld_send(adap, skb);
+spin_lock(&e->lock);
+}
+}
spin_unlock_bh(&e->lock);
}

static void *l2t_seq_next(struct seq_file *seq, void *v, loff_t *pos)
{
    v = l2t_get_idx(seq, *pos);
    -if (v)
        +++*pos;
        ++++(*pos);
    return v;
}

--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/sge.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/sge.c
@@ -1818,6 +1818,7 @@
    txq_info = adap->sge.uld_txq_info[tx_uld_type];
    if (unlikely(!txq_info)) {
        WARN_ON(true);
-        kfree_skb(skb);
+        kfree_skb(skb);
        return NET_XMIT_DROP;
    }

@@ -2094,7 +2095,7 @@
hwtstamps = skb_hwtstamps(skb);
memset(hwtstamps, 0, sizeof(*hwtstamps));
-hwtstamps->hwtstamp = ns_to_ktime(be64_to_cpu(*((u64 *)data)));
+hwtstamps->hwtstamp = ns_to_ktime(get_unaligned_be64(data));

return RX_PTP_PKT_SUC;
}
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/smt.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/smt.c
@@ -98,11 +98,9 @@
static void t4_smte_free(struct smt_entry *e)
{
    -spin_lock_bh(&e->lock);
    if (atomic_read(&e->refcnt) == 0) { /* hasn't been recycled */
        e->state = SMT_STATE_UNUSED;
    }
    -spin_unlock_bh(&e->lock);
}

/**
@@ -112,8 +110,10 @@
*/
void cxgb4_smt_release(struct smt_entry *e)
{
    +spin_lock_bh(&e->lock);
    if (atomic_dec_and_test(&e->refcnt))
        t4_smte_free(e);
    +spin_unlock_bh(&e->lock);
}
EXPORT_SYMBOL(cxgb4_smt_release);

--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/t4_hw.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/t4_hw.c
@@ -2632,7 +2632,6 @@
}
#define EEPROM_STAT_ADDR   0x7bfc
-#define VPD_SIZE           0x800
#define VPD_BASE           0x400
#define VPD_BASE_OLD       0
#define VPD_LEN            1024
@@ -2699,15 +2698,6 @@
if (!vpd)
    return -ENOMEM;
-/* We have two VPD data structures stored in the adapter VPD area.

#define E
By default, Linux calculates the size of the VPD area by traversing
the first VPD area at offset 0x0, so we need to tell the OS what
our real VPD size is.

* /
ret = pci_set_vpd_size(adapter->pdev, VPD_SIZE);
if (ret < 0)
goto out;
/
/* Card information normally starts at VPD_BASE but early cards had
it at 0.
*/
@@ -3398,7 +3388,7 @@
drv_fw = &fw_info->fw_hdr;

/* Read the header of the firmware on the card */
-ret = -t4_read_flash(adap, FLASH_FW_START,
+ret = t4_read_flash(adap, FLASH_FW_START,
    sizeof(*card_fw) / sizeof(uint32_t),
    (uint32_t *)card_fw, 1);
if (ret == 0) {
    @ @ -3427,8 +3417,8 @@
        should_install_fs_fw(adap, card_fw_usable,
            be32_to_cpu(fs_fw->fw_ver),
            be32_to_cpu(card_fw->fw_ver))) {
            -ret = -t4_fw_upgrade(adap, adap->mbox, fw_data,
            - fw_size, 0);
            +ret = t4_fw_upgrade(adap, adap->mbox, fw_data,
            + fw_size, 0);
        if (ret != 0) {
            dev_err(adap->pdev_dev,
                "failed to install firmware: %d
                "
                ret);
    @ @ -3459,7 +3449,7 @@
    FW_HDR_FW_VER_MICRO_G(c), FW_HDR_FW_VER_BUILD_G(c),
    FW_HDR_FW_VER_MAJOR_G(k), FW_HDR_FW_VER_MINOR_G(k),
    FW_HDR_FW_VER_MICRO_G(k), FW_HDR_FW_VER_BUILD_G(k));
    -ret = EINV;
    +ret = -EINV;
    goto bye;
}
return 0;
@@ -3788,7 +3778,7 @@
c.param[0].mnem = cpu_to_be32(FW_PARAMS_MNEM_V(FW_PARAMS_MNEM_DEV) |
    FW_PARAMS_PARAM_X_V(FW_PARAMS_PARAM_DEV_FWCACHE));
-c.param[0].val = ((__force __be32)op);
+c.param[0].val = cpu_to_be32(op);

return t4_wr_mbox(adap, adap->mbox, &c, sizeof(c), NULL);
}
@@ -8358,7 +8348,7 @@
unsigned int part, manufacturer;
-unsigned int density, size;
+unsigned int density, size = 0;
unsigned int flashid = 0;
int ret;

@@ -8428,11 +8418,6 @@
case 0x22: /* 256MB */
    size = 1 << 28;
    break;
    -default:
-dev_err(adap->pdev_dev, "Micron Flash Part has bad size, ID = %#x, Density code = %#x\n",
        flashid, density);
-dev_return -EINVAL;
}
break;
}
@@ -8448,10 +8433,6 @@
case 0x18: /* 16MB */
    size = 1 << 24;
    break;
    -default:
-dev_err(adap->pdev_dev, "Macronix Flash Part has bad size, ID = %#x, Density code = %#x\n",
        flashid, density);
-dev_return -EINVAL;
}
break;
}
@@ -8467,17 +8448,21 @@
case 0x18: /* 16MB */
    size = 1 << 24;
    break;
    -default:
-dev_err(adap->pdev_dev, "Winbond Flash Part has bad size, ID = %#x, Density code = %#x\n",
        flashid, density);
-dev_return -EINVAL;
}
break;
}
-flashid, density);
-return -EINVAL;
}
break;
}
-default:
-dev_err(adap->pdev_dev, "Unsupported Flash Part, ID = %#x\n",
-flashid);
-return -EINVAL;
+
/* If we didn't recognize the FLASH part, that's no real issue: the
 * Hardware/Software contract says that Hardware will _*ALWAYS*_
 * use a FLASH part which is at least 4MB in size and has 64KB
 * sectors. The unrecognized FLASH part is likely to be much larger
 * than 4MB, but that's all we really need.
 */
+if (size == 0) {
+dev_warn(adap->pdev_dev, "Unknown Flash Part, ID = %#x, assuming 4MB\n",
+ flashid);
+size = 1 << 22;
}

/* Store decoded Flash size and fall through into vetting code. */
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/t4_regs.h
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/t4_regs.h
@@ -1856,6 +1856,9 @@
#define MAC_PORT_CFG2_A 0x818

+#define MAC_PORT_PTP_SUM_LO_A 0x990
+#define MAC_PORT_PTP_SUM_HI_A 0x994
+
#define MPS_CMN_CTL_A 0x9000
#define COUNTPAUSEMCRX_S 5
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4/t4_tcb.h
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4/t4_tcb.h
@@ @ -42,6 +42,10 @@
#define TCB_T_FLAGS_W 1

+#define TF_DROP_S 22
+#define TF_DIRECT_STEER_S 23
+#define TF_LPBK_S 59
+
#define TF_CCTRL_ECE_S 60
#define TF_CCTRL_CWR_S 61
```c
#define TF_CCTRL_RFR_S62
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4vf/cxgb4vf_main.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4vf/cxgb4vf_main.c
@@ -714,6 +714,7 @@
     
     if (adapter->flags & USING_MSIX)
       name_msix_vecs(adapter);
+    adapter->flags |= FULL_INIT_DONE;
 }

 @@ -739,8 +740,6 @@
     enable_rx(adapter);
     t4vf_sge_start(adapter);

-/* Initialize hash mac addr list*/
-INIT_LIST_HEAD(&adapter->mac_hlist);
   return 0;
 }

@@ -2992,6 +2991,9 @@
     /* Initialize hash mac addr list */
     INIT_LIST_HEAD(&adapter->mac_hlist);
     +
     /*
      * Allocate our "adapter ports" and stitch everything together.
      */
--- linux-4.15.0.orig/drivers/net/ethernet/chelsio/cxgb4vf/sge.c
+++ linux-4.15.0/drivers/net/ethernet/chelsio/cxgb4vf/sge.c
@@ -2619,8 +2619,8 @@
     int t4vf_sge_init(struct adapter *adapter)
     {
       struct sge_params *sge_params = &adapter->params.sge;
-     u32 fl0 = sge_params->sge_fl_buffer_size[0];
-     u32 fl1 = sge_params->sge_fl_buffer_size[1];
+     u32 fl_small_pg = sge_params->sge_fl_buffer_size[0];
+     u32 fl_large_pg = sge_params->sge_fl_buffer_size[1];
     struct sge *s = &adapter->sge;

     /*
      * the Physical Function Driver. Ideally we should be able to deal
      * with _any_ configuration. Practice is different ...
      */
-    if (fl0 != PAGE_SIZE || (fl1 != 0 && fl1 <= fl0)) {

```
+ /* We only bother using the Large Page logic if the Large Page Buffer
+ * is larger than our Page Size Buffer.
+ */
+ if (fl_large_pg <= fl_small_pg)
+ fl_large_pg = 0;
+
+ /* The Page Size Buffer must be exactly equal to our Page Size and the
+ * Large Page Size Buffer should be 0 (per above) or a power of 2.
+ */
+ if (fl_small_pg != PAGE_SIZE ||
+ (fl_large_pg & (fl_large_pg - 1)) != 0) {
+ dev_err(adapter->pdev_dev, "bad SGE FL buffer sizes [%d, %d]n",
+ -fl0, fl1);
+ fl_small_pg, fl_large_pg);
+ return -EINVAL;
+ }
+
+ if ((sge_params->sge_control & RXPKTCPLMODE_F) !=
+ @@ -2642,8 +2653,8 @@
+ * Now translate the adapter parameters into our internal forms.
+ */
+ -if (fl1)
+ -s->fl_pg_order = ilog2(fl1) - PAGE_SHIFT;
+ +if (fl_large_pg)
+ +s->fl_pg_order = ilog2(fl_large_pg) - PAGE_SHIFT;
+ s->stat_len = ((sge_params->sge_control & EGRSTATUSPAGESIZE_F)
+ -128 : 64);
+ s->pktshift = PKTSHIFT_G(sge_params->sge_control);
+ --- linux-4.15.0.orig/drivers/net/ethernet/cirrus/Kconfig
+ +++ linux-4.15.0/drivers/net/ethernet/cirrus/Kconfig
+ @@ -19,6 +19,7 @@
+ config CS89x0
+ tristate "CS89x0 support"
+ depends on ISA || EISA || ARM
+ +depends on !PPC32
+ ---help---
+ Support for CS89x0 chipset based Ethernet cards. If you have a
+ network (Ethernet) card of this type, say Y and read the file
+ --- linux-4.15.0.orig/drivers/net/ethernet/cirrus/ep93xx_eth.c
+ +++ linux-4.15.0/drivers/net/ethernet/cirrus/ep93xx_eth.c
+ @@ -767,6 +767,7 @@
+    }
+    struct net_device *dev;
+    struct ep93xx_priv *ep;
+    struct resource *mem;
+
+    dev = platform_get_drvdata(pdev);
if (dev == NULL)  
    iounmap(ep->base_addr);

if (ep->res != NULL) {
    -release_resource(ep->res);
    -kfree(ep->res);
    +mem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    +release_mem_region(mem->start, resource_size(mem));
}

free_netdev(dev);
--- linux-4.15.0.orig/drivers/net/ethernet/cisco/enic/enic.h
+++ linux-4.15.0/drivers/net/ethernet/cisco/enic/enic.h
@@ -168,6 +168,7 @@
    #endif
    spinlock_t enic_api_lock;
    +bool enic_api_busy;
    struct enic_port_profile *pp;

    /* work queue cache line section */
--- linux-4.15.0.orig/drivers/net/ethernet/cisco/enic/enic_api.c
+++ linux-4.15.0/drivers/net/ethernet/cisco/enic/enic_api.c
@@ -34,6 +34,12 @@
    struct vnic_dev *vdev = enic->vdev;
    spin_lock(&enic->enic_api_lock);
    +while (enic->enic_api_busy) {
    +spin_unlock(&enic->enic_api_lock);
    +cpu_relax();
    +spin_lock(&enic->enic_api_lock);
    +}
    +
    spin_lock_bh(&enic->devcmd_lock);

    vnic_dev_cmd_proxy_by_index_start(vdev, vf);
--- linux-4.15.0.orig/drivers/net/ethernet/cisco/enic/enic_clsf.c
+++ linux-4.15.0/drivers/net/ethernet/cisco/enic/enic_clsf.c
@@ -79,7 +79,6 @@
    enic->rfs_h.free = enic->rfs_h.max;
    enic->rfs_h.toclean = 0;
    -enic_rfs_timer_start(enic);
}

void enic_rfs_flw_tbl_free(struct enic *enic)
@@ @ -88,7 +87,6 @@
enic_rfs_timer_stop(enic);
spin_lock_bh(&enic->rfs_h.lock);
-enic->rfs_h.free = 0;
for (i = 0; i < (1 << ENIC_RFS_FLW_BITSHIFT); i++) {
    struct hlist_head *hhead;
    struct hlist_node *tmp;
    @ @ -99.6 +97.7 @@
enic_delfltr(enic, n->fltr_id);
hlist_del(&n->node);
kfree(n);
+enic->rfs_h.free++;
}
}
spin_unlock_bh(&enic->rfs_h.lock);
--- linux-4.15.0.orig/drivers/net/ethernet/cisco/enic/enic_main.c
+++ linux-4.15.0/drivers/net/ethernet/cisco/enic/enic_main.c
@@ -119,7 +119,7 @@
for (i = 0; i < enic->intr_count; i++) {
    if (enic_is_err_intr(enic, i) || enic_is_notify_intr(enic, i)) ||
        (enic->msix[i].affinity_mask &&
@@ -148,7 +148,7 @@
for (i = 0; i < enic->intr_count; i++) {
    if (enic_is_err_intr(enic, i) ||
        !enic->msix[i].affinity_mask) ||
@@ -763,7 +763,7 @@
    return err;
}

-if (enic->msix[wq_intr].affinity_mask &&
+if (cpumask_available(enic->msix[wq_intr].affinity_mask) &&
    ![cpumask_empty(enic->msix[wq_intr].affinity_mask))
netif_set_xps_queue(enic->netdev, enic->msix[wq_intr].affinity_mask, @ @ -763.7 +763.7 @@
return err;
- static inline void enic_queue_wq_skb(struct enic *enic, struct vnic_wq *wq, struct sk_buff *skb)
{
    unsigned int mss = skb_shinfo(skb)->gso_size;
    wq->to_use = buf->next;
    dev_kfree_skb(skb);
} + return err;

/* netif_tx_lock held, process context with BHs disabled, or BH */ @@ -852,13 +853,15 @@
    return NETDEV_TX_BUSY;
}
-enic_queue_wq_skb(enic, wq, skb);
+if (enic_queue_wq_skb(enic, wq, skb))
+    goto error;

if (vnic_wq_desc_avail(wq) < MAX_SKB_FRAGS + ENIC_DESC_MAX_SPLITS) netif_tx_stop_queue(txq);
if (!skb->xmit_more || netif_xmit_stopped(txq))
    vnic_wq_doorbell(wq);

+error:
spin_unlock(&enic->wq_lock[txq_map]);

return NETDEV_TX_OK;
@@ -1393,7 +1396,8 @@
    skb->ip_summed = CHECKSUM_UNNECESSARY;
    skb->csum_level = encap;
}
@@ -1879,7 +1883,7 @@
{
    struct enic *enic = netdev_priv(netdev);
    unsigned int i;
-    int err;
+    int err, ret;

    err = enic_request_intr(enic);
if (err) {
@@ -1897,6 +1901,8 @@
 for (i = 0; i < enic->rq_count; i++) {
+/* enable rq before updating rq desc */
+vnic_rq_enable(&enic->rq[i]);
 vnic_rq_fill(&enic->rq[i], enic_rq_alloc_buf);
 /* Need at least one buffer on ring to get going */
 if (vnic_rq_desc_used(&enic->rq[i]) == 0) {
@@ -1908,8 +1914,6 @@
 for (i = 0; i < enic->wq_count; i++)
 vnic_wq_enable(&enic->wq[i]);
 -for (i = 0; i < enic->rq_count; i++)
- vnic_rq_enable(&enic->rq[i]);
 if (!enic_is_dynamic(enic) && !enic_is_sriov_vf(enic))
 enic_dev_add_station_addr(enic);
@@ -1930,13 +1934,16 @@
 vnic_intr_unmask(&enic->intr[i]);

 enic_notify_timer_start(enic);
 -enic_rfs_flw_tbl_init(enic);
 +enic_rfs_timer_start(enic);

 return 0;

 err_out_free_rq:
 -for (i = 0; i < enic->rq_count; i++)
- vnic_rq_clean(&enic->rq[i], enic_free_rq_buf);
 +for (i = 0; i < enic->rq_count; i++) {
+ ret = vnic_rq_disable(&enic->rq[i]);
+ if (!ret)
+ vnic_rq_clean(&enic->rq[i], enic_free_rq_buf);
+ }
 enic_dev_notify_unset(enic);
 err_out_free_intr:
 enic_unset_affinity_hint(enic);
@@ -1968,10 +1975,10 @@
 netif_carrier_off(netdev);
 -netif_tx_disable(netdev);
 if (vnic_dev_get_intr_mode(enic->vdev) == VNIC_DEV_INTR_MODE_MSIX)
 for (i = 0; i < enic->wq_count; i++)
 napi_disable(&enic->napi[enic_cq_wq(enic, i)]);
 +netif_tx_disable(netdev);
if (!enic_is_dynamic(enic) && !enic_is_sriov_vf(enic))
enic_dev_del_station_addr(enic);
@@ -2003,28 +2010,42 @@
return 0;
}

+static int _enic_change_mtu(struct net_device *netdev, int new_mtu)
+{
+bool running = netif_running(netdev);
+int err = 0;
+
+ASSERT_RTNL();
+if (running) {
+err = enic_stop(netdev);
+if (err)
+return err;
+
+netdev->mtu = new_mtu;
+
+if (running) {
+err = enic_open(netdev);
+if (err)
+return err;
+
+return 0;
+
+static int enic_change_mtu(struct net_device *netdev, int new_mtu)
+
{struct enic *enic = netdev_priv(netdev);
-int running = netif_running(netdev);

if (enic_is_dynamic(enic) || enic_is_sriov_vf(enic))
return -EOPNOTSUPP;

-if (running)
-enic_stop(netdev);
-
-netdev->mtu = new_mtu;
-
-if (netdev->mtu > enic->port_mtu)
-netdev_warn(netdev,
-"interface MTU (%d) set higher than port MTU (%d)\n",
-netdev->mtu, enic->port_mtu);
-
if (running)
-    enic_open(netdev);
+    "interface MTU (%d) set higher than port MTU (%d)\n",
+    netdev->mtu, enic->port_mtu);

    return 0;
+    return _enic_change_mtu(netdev, new_mtu);
 }

static void enic_change_mtu_work(struct work_struct *work)
@@ -2032,47 +2053,9 @@
    struct enic *enic = container_of(work, struct enic, change_mtu_work);
    struct net_device *netdev = enic->netdev;
    int new_mtu = vnic_dev_mtu(enic->vdev);
-int err;
-unsigned int i;
-
-new_mtu = max_t(int, ENIC_MIN_MTU, min_t(int, ENIC_MAX_MTU, new_mtu));

    rtnl_lock();
-
-/* Stop RQ */
-    del_timer_sync(&enic->notify_timer);
-
-    for (i = 0; i < enic->rq_count; i++)
-        napi_disable(&enic->napi[i]);
-
-    vnic_intr_mask(&enic->intr[0]);
-    enic_synchronize_irqs(enic);
-    err = vnic_rq_disable(&enic->rq[0]);
-    if (err) {
-        rtnl_unlock();
-        netdev_err(netdev, "Unable to disable RQ.\n");
-        return;
-    }
-    vnic_rq_clean(&enic->rq[0], enic_free_rq_buf);
-    vnic_cq_clean(&enic->cq[0]);
-    vnic_intr_clean(&enic->intr[0]);
-
-    /* Fill RQ with new_mtu-sized buffers */
-    netdev->mtu = new_mtu;
-    vnic_rq_fill(&enic->rq[0], enic_rq_alloc_buf);
-
-    /* Need at least one buffer on ring to get going */
-    if (vnic_rq_desc_used(&enic->rq[0]) == 0) {
-        rtnl_unlock();
-        netdev_err(netdev, "Unable to alloc receive buffers.\n");
-        return;
-    }
- /* Start RQ */
- vnic_rq_enable(&enic->rq[0]);
- napi_enable(&enic->napi[0]);
- vnic_intr_unmask(&enic->intr[0]);
- enic_notify_timer_start(enic);
- 
- +(void)_enic_change_mtu(netdev, new_mtu);
  rtnl_unlock();

  netdev_info(netdev, "interface MTU set as %d\n", netdev->mtu);
  @ @ -2121,8 +2104,6 @@
  int done;
  int err;

  -BUG_ON(in_interrupt());
  -
  err = start(vdev, arg);
  if (err)
    return err;
  @@ -2299,6 +2280,13 @@
    rss_hash_bits, rss_base_cpu, rss_enable);
  }

+static void enic_set_api_busy(struct enic *enic, bool busy)
+{ 
+  +spin_lock(&enic->enic_api_lock);
+  +enic->enic_api_busy = busy;
+  +spin_unlock(&enic->enic_api_lock);
+  +}
+
+static void enic_reset(struct work_struct *work)
+{
+  struct enic *enic = container_of(work, struct enic, reset);
+  @@ -2308,7 +2296,9 @@
+  rtnl_lock();

+  -spin_lock(&enic->enic_api_lock);
+  /* Stop any activity from infiniband */
+  +enic_set_api_busy(enic, true);
+  +
  enic_stop(enic->netdev);
  enic_dev_soft_reset(enic);
  enic_reset_addr_lists(enic);
  @@ -2316,7 +2306,10 @@
  enic_set_rss_nic_cfg(enic);
  enic_dev_set_ig_vlan_rewrite_mode(enic);
enic_open(enic->netdev);
-spin_unlock(&enic->enic_api_lock);
+
+/* Allow infiniband to fiddle with the device again */
+enic_set_api_busy(enic, false);
+
+call_netdevice_notifiers(NETDEV_REBOOT, enic->netdev);

rtnl_unlock();
@@ -2328,7 +2321,9 @@

rtnl_lock();

-spin_lock(&enic->enic_api_lock);
+/* Stop any activity from infiniband */
+enic_set_api_busy(enic, true);
+
+enic_dev_hang_notify(enic);
enic_stop(enic->netdev);
enic_dev_hang_reset(enic);
@@ -2337,7 +2332,10 @@
enic_set_rss_nic_cfg(enic);
enic_dev_set_ig_vlan_rewrite_mode(enic);
enic_open(enic->netdev);
-spin_unlock(&enic->enic_api_lock);
+
+/* Allow infiniband to fiddle with the device again */
+enic_set_api_busy(enic, false);
+
+call_netdevice_notifiers(NETDEV_REBOOT, enic->netdev);

rtnl_unlock();
@@ -2699,11 +2697,11 @@
pci_set_master(pdev);

/* Query PCI controller on system for DMA addressing
 - * limitation for the device. Try 64-bit first, and
 + * limitation for the device. Try 47-bit first, and
 * fail to 32-bit.
 * /

-err = pci_set_dma_mask(pdev, DMA_BIT_MASK(64));
+err = pci_set_dma_mask(pdev, DMA_BIT_MASK(47));
if (err) {
    err = pci_set_dma_mask(pdev, DMA_BIT_MASK(32));
    if (err) {
@@ -2717,10 +2715,10 @@
go_to err_out_release_regions;
else {
    err = pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(64));
    if (err) {
        dev_err(dev, "Unable to obtain %u-bit DMA 
            "for consistent allocations, aborting\n", 64);
        goto err_out_release_regions;
    }
}
using_dac = 1;
@@ -2848,6 +2846,7 @@
timer_setup(&enic->notify_timer, enic_notify_timer, 0);

+enic_rfs_flw_tbl_init(enic);
enic_set_rx_coal_setting(enic);
INIT_WORK(&enic->reset, enic_reset);
INIT_WORK(&enic->tx_hang_reset, enic_tx_hang_reset);
@@ -2860,7 +2859,6 @@
/*
enic->port_mtu = enic->config.mtu;
-(void)enic_change_mtu(netdev, enic->port_mtu);

err = enic_set_mac_addr(netdev, enic->mac_addr);
if (err) {
    /* MTU range: 68 - 9000 */
    netdev->min_mtu = ENIC_MIN_MTU;
    netdev->max_mtu = ENIC_MAX_MTU;
+netdev->mtu = enic->port_mtu;
    err = register_netdev(netdev);
    if (err) {
        -- linux-4.15.0.orig/drivers/net/ethernet/davicom/dm9000.c
+++ linux-4.15.0/drivers/net/ethernet/davicom/dm9000.c
@@ -143,6 +143,8 @@
    u32 wake_state;
    int tip_summed;
+    struct regulator *power_supply;
    }

    /* debug code */
    @@ -1460,7 +1459,6 @@
    if (ret) {

dev_err(dev, "failed to request reset gpio %d: %d\n",
reset_gpios, ret);
-return -ENODEV;
+goto out_regulator_disable;
}

/* According to manual PWRST# Low Period Min 1ms */
@@ -1472,14 +1474,18 @@
if (!pdata) {
pdata = dm9000_parse_dt(&pdev->dev);
-if (IS_ERR(pdata))
-return PTR_ERR(pdata);
+if (IS_ERR(pdata)) {
+ret = PTR_ERR(pdata);
+goto out_regulator_disable;
+}
}

/* Init network device */
ndev = alloc_etherdev(sizeof(struct board_info));
-if (!ndev)
-return -ENOMEM;
+if (!ndev) {
+ret = -ENOMEM;
+goto out_regulator_disable;
+}

SET_NETDEV_DEV(ndev, &pdev->dev);
@@ -1490,6 +1496,8 @@
db->dev = &pdev->dev;
db->ndev = ndev;
+if (!IS_ERR(power))
+db->power_supply = power;

spin_lock_init(&db->lock);
mutex_init(&db->addr_lock);
@@ -1716,6 +1724,10 @@
dm9000_release_board(pdev, db);
free_netdev(ndev);

+out_regulator_disable:
+if (!IS_ERR(power))
+regulator_disable(power);
+return ret;
dm9000_drv_remove(struct platform_device *pdev)
{
    struct net_device *ndev = platform_get_drvdata(pdev);
    struct board_info *dm = to_dm9000_board(ndev);

    unregister_netdev(ndev);
    -dm9000_release_board(pdev, netdev_priv(ndev));
    +dm9000_release_board(pdev, dm);
    free_netdev(ndev); /* free device structure */
    +if (dm->power_supply)
    +regulator_disable(dm->power_supply);

dev_dbg(&pdev->dev, "released and freed device\n");
return 0;

--- linux-4.15.0.orig/drivers/net/ethernet/dec/tulip/de2104x.c
+++ linux-4.15.0/drivers/net/ethernet/dec/tulip/de2104x.c
@@ -91,7 +91,7 @@
#define DSL CONFIG_DE2104X_DSL
#endif

-#define DE_RX_RING_SIZE 64
+#define DE_RX_RING_SIZE 128
#define DE_TX_RING_SIZE 64
#define DE_RING_BYTES ((sizeof(struct de_desc) * DE_RX_RING_SIZE) +

--- linux-4.15.0.orig/drivers/net/ethernet/dec/tulip/de4x5.c
+++ linux-4.15.0/drivers/net/ethernet/dec/tulip/de4x5.c
@@ -2107,7 +2107,6 @@.
    .remove = de4x5_eisa_remove,
             }
};
-MODULE_DEVICE_TABLE(eisa, de4x5_eisa_ids);
#endif

#elifdef CONFIG_PCI
@@ -4922,11 +4921,11 @@
        u_char breg[2];
    } a;
    int i, r2, r3, ret=0;/*
-       int r2, r3;
+       int r2;

    /* Read r2 and r3 */
    r2 = mii_rd(MII_ID0, phyaddr, ioaddr);
-    r3 = mii_rd(MII_ID1, phyaddr, ioaddr);
mii_rd(MII_ID1, phyaddr, ioaddr);

/* SEEQ and Cypress way */
/* Shuffle r2 and r3 */
a.reg=0;

--- linux-4.15.0.orig/drivers/net/ethernet/dec/tulip/dmfe.c
+++ linux-4.15.0/drivers/net/ethernet/dec/tulip/dmfe.c
@@ -2222,15 +2222,16 @@
 if (cr6set)
  dmfe_cr6_user_set = cr6set;

- switch(mode) {
- case DMFE_10MHF:
- +switch (mode) {
- +case DMFE_10MHF:
+ case DMFE_10MHF:
+ case DMFE_100MHF:
+ case DMFE_10MFD:
+ case DMFE_100MFD:
+ case DMFE_1M_HPNA:
+ dmfe_media_mode = mode;
+ break;
+ default: dmfe_media_mode = DMFE_AUTO;
+ break;
}

--- linux-4.15.0.orig/drivers/net/ethernet/dec/tulip/media.c
+++ linux-4.15.0/drivers/net/ethernet/dec/tulip/media.c
@@ -319,13 +319,8 @@
 case 5: case 6: {
- +u16 setup[5];
- 
+ new_csr6 = 0; /* FIXME */
- 
- for (i = 0; i < 5; i++)
- -setup[i] = get_u16(&p[i*2 + 1]);
- 
+ if (startup && mtable->has_reset) {
 struct medialeaf *rleaf = &mtable->mleaf[mtable->has_reset];
 unsigned char *rst = rleaf->leafdata;
 --- linux-4.15.0.orig/drivers/net/ethernet/dec/tulip/uli526x.c
+++ linux-4.15.0/drivers/net/ethernet/dec/tulip/uli526x.c
@@ -1817,8 +1817,8 @@
 if (cr6set)
  uli526x_cr6_user_set = cr6set;

- switch (mode) {
- case ULI526X_10MHF:
+ switch (mode) {
+ case ULI526X_10MHF:
+ case ULI526X_100MHF:
 case ULI526X_10MFD:
 case ULI526X_100MFD:
--- linux-4.15.0.orig/drivers/net/ethernet/dec/tulip/winbond-840.c
+++ linux-4.15.0/drivers/net/ethernet/dec/tulip/winbond-840.c
@@ -367,7 +367,7 @@
 int i, option = find_cnt < MAX_UNITS ? options[find_cnt] : 0;
 void __iomem *ioaddr;

-i = pci_enable_device(pdev);
+i = pcim_enable_device(pdev);
 if (i) return i;

pci_set_master(pdev);
@@ -389,7 +389,7 @@
 ioaddr = pci_iomap(pdev, TULIP_BAR, netdev_res_size);
 if (!ioaddr)
- goto err_out_free_res;
+ goto err_out_netdev;
+for (i = 0; i < 3; i++)
+ (__le16 *)dev->dev_addr[i] = cpu_to_le16(eeprom_read(ioaddr, i));
@@ -468,8 +468,6 @@
 err_out_cleardev:
 pci_iounmap(pdev, ioaddr);
-err_out_free_res:
-pci_release_regions(pdev);
 err_out_netdev:
 free_netdev (dev);
 return -ENODEV;
@@ -1535,7 +1533,6 @@
 if (dev) {
 struct netdev_private *np = netdev_priv(dev);
 unregister_netdev(dev);
-pci_release_regions(pdev);
 pci_iounmap(pdev, np->base_addr);
 free_netdev(dev);
 }
--- linux-4.15.0.orig/drivers/net/ethernet/ec_bhf.c
+++ linux-4.15.0/drivers/net/ethernet/ec_bhf.c
@@ -585,10 +585,12 @@
 struct ec_bhf_priv *priv = netdev_priv(net_dev);
unregister_netdev(net_dev);
-free_netdev(net_dev);

pci_iounmap(dev, priv->dma_io);
pci_iounmap(dev, priv->io);
+
+free_netdev(net_dev);
+
pci_release_regions(dev);
pci_clear_master(dev);
pci_disable_device(dev);
--- linux-4.15.0.orig/drivers/net/ethernet/emulex/benet/be_cmds.c
+++ linux-4.15.0/drivers/net/ethernet/emulex/benet/be_cmds.c
@@ -4500,7 +4500,7 @@
port_res->max_vfs += le16_to_cpu(pcie->num_vfs);
}
}
-return status;
+goto err;
}

pcie = be_get_pcie_desc(resp->func_param, desc_count,
--- linux-4.15.0.orig/drivers/net/ethernet/emulex/benet/be_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/emulex/benet/be_ethtool.c
@@ -893,7 +893,7 @@
        u64 *data)
 {
        struct be_adapter *adapter = netdev_priv(netdev);
-        int status;
+        int status, cnt;
        u8 link_status = 0;
        u64 link_status = 0;

        if (adapter->function_caps & BE_FUNCTION_CAPS_SUPER_NIC) {
@@ -904,6 +904,9 @@
memset(data, 0, sizeof(u64) * ETHTOOL_TESTS_NUM);

+/* check link status before offline tests */
+        link_status = netif_carrier_ok(netdev);
+        if (test->flags & ETH_TEST_FL_OFFLINE) {
+            if (be_loopback_test(adapter, BE_MAC_LOOPBACK, &data[0]) != 0)
+                test->flags |= ETH_TEST_FL_FAILED;
@@ -924,13 +927,26 @@


-status = be_cmd_link_status_query(adapter, NULL, &link_status, 0);
-if (status) {
-test->flags |= ETH_TEST_FL_FAILED;
-data[4] = -1;
-} else if (!link_status) {
+/* link status was down prior to test */
+if (!link_status) {
+test->flags |= ETH_TEST_FL_FAILED;
+data[4] = 1;
+return;
+}
+
+for (cnt = 10; cnt; cnt--) {
+status = be_cmd_link_status_query(adapter, NULL, &link_status, 0);
+if (status) {
+test->flags |= ETH_TEST_FL_FAILED;
+data[4] = -1;
+break;
+}
+
+if (link_status)
+break;
+
+msleep_interruptible(500);
}
}

@@ -1103,7 +1119,7 @@
cmd->data = be_get_rss_hash_opts(adapter, cmd->flow_type);
break;
case ETHTOOL_GXRINGS:
+cmd->data = adapter->num_rx_qs;
-case ETHTOOL_GXRINGS:
-cmd->data = adapter->num_rx qs - 1;
+break;
default:
return -EINVAL;
--- linux-4.15.0.orig/drivers/net/ethernet/emulex/benet/be_main.c
+++ linux-4.15.0/drivers/net/ethernet/emulex/benet/be_main.c
@@ -3294,7 +3294,9 @@
if ((val & POST_STAGE_FAT_LOG_START) != POST_STAGE_FAT_LOG_START & &
   (val & POST_STAGE_ARMFW_UE) - != POST_STAGE_ARMFW_UE)
+ ! = POST_STAGE_ARMFW_UE & &
+ (val & POST_STAGE_RECOVERABLE_ERR)
+ != POST_STAGE_RECOVERABLE_ERR)
return;
netdev->hw_enc_features |= NETIF_F_IP_CSUM | NETIF_F_IPV6_CSUM | NETIF_F_TSO | NETIF_F_TSO6 | NETIF_F_GSO_UDP_TUNNEL;
-netdev->hw_features |= NETIF_F_GSO_UDP_TUNNEL;
-netdev->features |= NETIF_F_GSO_UDP_TUNNEL;

netdev->hw_enc_features = 0;
-netdev->hw_features &= ~(NETIF_F_GSO_UDP_TUNNEL);
-netdev->features &= ~(NETIF_F_GSO_UDP_TUNNEL);

static void be_calculate_vf_res(struct be_adapter *adapter, u16 num_vfs,
 struct net_device *netdev = adapter->netdev;
int status;

-if (netif_running(netdev))
+if (netif_running(netdev)) {
+/* device cannot transmit now, avoid dev_watchdog timeouts */
+netif_carrier_off(netdev);
+
be_close(netdev);
+}

be_cancel_worker(adapter);

struct be_adapter *adapter = netdev_priv(netdev);

netdev->hw_features |= NETIF_F_SG | NETIF_F_TSO | NETIF_F_TSO6 | NETIF_F_GSO_UDP_TUNNEL |
+NETIF_F_IP_CSUM | NETIF_F_IPV6_CSUM | NETIF_F_RXCSUM |
NETIF_F_HW_VLAN_CTAG_TX;
if ((be_if_cap_flags(adapter) & BE_IF_FLAGS_RSS))
@@ -5923,6 +5926,7 @@
unmap_bars:
be_unmap_pci_bars(adapter);
free_netdev:
+pci_disable_pcie_error_reporting(pdev);
free_netdev(netdev);
rel_reg:
pci_release_regions(pdev);
--- linux-4.15.0.orig/drivers/net/ethernet/ethoc.c
+++ linux-4.15.0/drivers/net/ethernet/ethoc.c
@@ -1212,7 +1212,7 @@
 ret = mdiobus_register(priv->mdio);
 if (ret) {
 dev_err(&netdev->dev, "failed to register MDIO bus\n");
-goto free2;
+goto free3;
 }

 ret = ethoc_mdio_probe(netdev);
@@ -1244,6 +1244,7 @@
 netif_napi_del(&priv->napi);
 error:
 mdiobus_unregister(priv->mdio);
+free3:
 mdiobus_free(priv->mdio);
 free2:
 if (priv->clk)
--- linux-4.15.0.orig/drivers/net/ethernet/ezchip/nps_enet.c
+++ linux-4.15.0/drivers/net/ethernet/ezchip/nps_enet.c
@@ -623,7 +623,7 @@
 /* Get IRQ number */
 priv->irq = platform_get_irq(pdev, 0);
-if (!priv->irq) {
+if (priv->irq < 0) {
 dev_err(dev, "failed to retrieve <irq Rx-Tx> value from device tree\n");
 err = -ENOMEM;
 goto out_netdev;
@@ -658,8 +658,8 @@
 struct nps_enet_priv *priv = netdev_priv(ndev);
 unregister_netdev(ndev);
 -free_netdev(ndev);
 netif_napi_del(&priv->napi);
+free_netdev(ndev);

 return 0;
 }
--- linux-4.15.0.orig/drivers/net/ethernet/faraday/ftgmac100.c
+++ linux-4.15.0/drivers/net/ethernet/faraday/ftgmac100.c
@@ -712,8 +712,8 @@
 skb_checksum_help(skb) == 0;
 }

 Open Source Used In 5GaaS Edge AC-4 24525
-static int ftgmac100_hard_start_xmit(struct sk_buff *skb,
  struct net_device *netdev)
+static netdev_tx_t ftgmac100_hard_start_xmit(struct sk_buff *skb,
  struct net_device *netdev)
{
  struct ftgmac100 *priv = netdev_priv(netdev);
  struct ftgmac100_txdes *txdes, *first;
@@ -739,6 +739,18 @@

nfrags = skb_shinfo(skb)->nr_frags;

+/* Setup HW checksumming */
csum_vlan = 0;
+if (skb->ip_summed == CHECKSUM_PARTIAL &&
  !ftgmac100_prep_tx_csum(skb, &csum_vlan))
  goto drop;
+
+/* Add VLAN tag */
+if (skb_vlan_tag_present(skb)) {
+  csum_vlan |= FTGMAC100_TXDES1_INS_VLANTAG;
+  csum_vlan |= skb_vlan_tag_get(skb) & 0xffff;
+}
+
  /* Get header len */
  len = skb_headlen(skb);
@@ -765,19 +777,6 @@

  if (nfrags == 0)
    f_ctl_stat |= FTGMAC100_TXDES0_LTS;
  txdes->txdes3 = cpu_to_le32(map);
- /* Setup HW checksumming */
- csum_vlan = 0;
- if (skb->ip_summed == CHECKSUM_PARTIAL &&
-    !ftgmac100_prep_tx_csum(skb, &csum_vlan))
-     goto drop;
-
-/* Add VLAN tag */
- if (skb_vlan_tag_present(skb)) {
-   csum_vlan |= FTGMAC100_TXDES1_INS_VLANTAG;
-   csum_vlan |= skb_vlan_tag_get(skb) & 0xffff;
- }
-
- txdes->txdes1 = cpu_to_le32(csum_vlan);

/* Next descriptor */
@@ -1334,6 +1333,7 @@
*/
if (unlikely(priv->need_mac_restart)) {
    ftgmac100_start_hw(priv);
    priv->need_mac_restart = false;
}

/* Re-enable "bad" interrupts */
iowrite32(FTGMAC100_INT_BAD, @@ -1885,6 +1885,8 @@
    return 0;

    err_ncsi_dev:
    +if (priv->ndev)
    +ncsi_unregister_dev(priv->ndev);
    err_register_netdev:
    ftgmac100_destroy_mdio(netdev);
    err_setup_mdio:
    @@ -1905,6 +1907,8 @@
    netdev = platform_get_drvdata(pdev);
    priv = netdev_priv(netdev);

    +if (priv->ndev)
    +ncsi_unregister_dev(priv->ndev);
    unregister_netdev(netdev);

    clk_disable_unprepare(priv->clk);
--- linux-4.15.0.orig/drivers/net/ethernet/faraday/ftmac100.c
+++ linux-4.15.0/drivers/net/ethernet/faraday/ftmac100.c
@@ -633,8 +633,8 @@
    ;
 }

- static int ftmac100_xmit(struct ftmac100 *priv, struct sk_buff *skb,
-    dma_addr_t map)
+ static netdev_tx_t ftmac100_xmit(struct ftmac100 *priv, struct sk_buff *skb,
+    dma_addr_t map)
 {
    struct net_device *netdev = priv->netdev;
    struct ftmac100_txdes *txdes;
@@ -871,11 +871,10 @@
    struct net_device *netdev = dev_id;
    struct ftmac100 *priv = netdev_priv(netdev);

    -if (likely(netif_running(netdev))) {
    -/* Disable interrupts for polling */
    -ftmac100_disable_all_int(priv);
    +/* Disable interrupts for polling */
    +ftmac100_disable_all_int(priv);
    +if (likely(netif_running(netdev)))
        napi_schedule(&priv->napi);
return IRQ_HANDLED;
}
@ @ -1015.7 +1014.8 @@
return 0;
}

-static int ftmac100_hard_start_xmit(struct sk_buff *skb, struct net_device *netdev)
+static netdev_tx_t
+ftmac100_hard_start_xmit(struct sk_buff *skb, struct net_device *netdev)
{
    struct ftmac100 *priv = netdev_priv(netdev);
    dma_addr_t map;
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/freescale/Kconfig
@@ -76,6 +76,7 @@
   depends on QUICC_ENGINE
 select FSL_PQ_MDIO
 select PHYLIB
+  select FIXED_PHY
 ---help---
     This driver supports the Gigabit Ethernet mode of the QUICC Engine,
     which is available on some Freescale SOCs.
@@ -89,6 +90,7 @@
   depends on HAS_DMA
 select FSL_PQ_MDIO
 select PHYLIB
+  select FIXED_PHY
 select CRC32
---help---
     This driver supports the Gigabit TSEC on the MPC83xx, MPC85xx,
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/dpaa/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/freescale/dpaa/Kconfig
@@ -2,6 +2,7 @@
 tristate "DPAA Ethernet"
 depends on FSL_DPAA && FSL_FMAN
 select PHYLIB
+  select FIXED_PHY
 select FSL_FMAN_MAC
---help---
     Data Path Acceleration Architecture Ethernet driver,
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/dpaa/dpaa_eth.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/dpaa/dpaa_eth.c
@@ -125,6 +125,9 @@
        /* Default alignment for start of data in an Rx FD */
#define DPAA_FD_DATA_ALIGNMENT 16
/* The DPAA requires 256 bytes reserved and mapped for the SGT */
#define DPAA_SGT_SIZE 256

/* Values for the L3R field of the FM Parse Results */
/* L3 Type field: First IP Present IPv4 */
@@ -1607,8 +1610,8 @@
    if (unlikely(qm_fd_get_format(fd) == qm_fd_sg)) {
        nr_frags = skb_shinfo(skb)->nr_frags;
        dma_unmap_single(dev, addr, qm_fd_get_offset(fd) +
            sizeof(struct qm_sg_entry) * (1 + nr_frags),
        +dma_unmap_single(dev, addr, qm_fd_get_offset(fd) + DPAA_SGT_SIZE, dma_dir);

    /* The sgt buffer has been allocated with netdev_alloc_frag(),
        @ @ -1621,7 +1624,7 @@
        qm_sg_entry_get_len(&sgt[0]), dma_dir);

    /* remaining pages were mapped with skb_frag_dma_map() */
    -for (i = 1; i < nr_frags; i++) {
       +for (i = 1; i <= nr_frags; i++) {
          WARN_ON(qm_sg_entry_is_ext(&sgt[i]));

          dma_unmap_page(den, qm_sg_addr(&sgt[i]),
        @ @ -1893,8 +1896,7 @@
        void *sgt_buf;

    /* get a page frag to store the SGTable */
    -sz = SKB_DATA_ALIGN(priv->tx_headroom +
            sizeof(struct qm_sg_entry) * (1 + nr_frags));
       +sz = SKB_DATA_ALIGN(priv->tx_headroom + DPAA_SGT_SIZE);
        sgt_buf = netdev_alloc_frag(sz);
        if (unlikely(!sgt_buf)) {
            netdev_err(net_dev, "netdev_alloc_frag() failed for size %d\n",
                @ @ -1916,8 +1918,10 @@
            goto csum_failed;
        }

    /* SGT[0] is used by the linear part */
    sgt = (struct qm_sg_entry *)(sgt_buf + priv->tx_headroom);
    -qm_sg_entry_set_len(&sgt[0], skb_headlen(skb));
       +frag_len = skb_headlen(skb);
        +qm_sg_entry_set_len(&sgt[0], frag_len);
        sgt[0].bpid = FSL_DPAA_BPID_INV;
        sgt[0].offset = 0;
        addr = dma_map_single(dev, skb->data,
qm_sg_entry_set64(&sgt[0], addr);

/* populate the rest of SGT entries */
-frag = &skb_shinfo(skb)->frags[0];
-frag_len = frag->size;
-for (i = 1; i <= nr_frags; i++, frag++) {
+for (i = 0; i < nr_frags; i++) {
+frag = &skb_shinfo(skb)->frags[i];
+frag_len = frag->size;
WARN_ON(!skb_frag_page(frag));
addr = skb_frag_dma_map(dev, frag, 0,
frag_len, dma_dir);
goto sg_map_failed;
}

-qm_sg_entry_set64(&sgt[i], frag_len);
-sgt[i].bpid = FSL_DPAA_BPID_INV;
-sgt[i].offset = 0;
+qm_sg_entry_set64(&sgt[i + 1], frag_len);
+sgt[i + 1].bpid = FSL_DPAA_BPID_INV;
+sgt[i + 1].offset = 0;
/* keep the offset in the address */
-qm_sg_entry_set64(&sgt[i], addr);
-frag_len = frag->size;
+qm_sg_entry_set64(&sgt[i + 1], addr);
}
-qm_sg_entry_set_f(&sgt[i - 1], frag_len);
+
+/* Set the final bit in the last used entry of the SGT */
+qm_sg_entry_set_f(&sgt[nr_frags], frag_len);

qm_fd_set_sg(fd, priv->tx_headroom, skb->len);

skbh = (struct sk_buff **)buffer_start;
*skbh = skb;

-addr = dma_map_single(dev, buffer_start, priv->tx_headroom +
-sizeof(struct qm_sg_entry) * (1 + nr_frags),
-dma_dir);
+addr = dma_map_single(dev, buffer_start,
+priv->tx_headroom + DPAA_SGT_SIZE, dma_dir);
if (unlikely(dma_mapping_error(dev, addr))) {
  dev_err(dev, "DMA mapping failed");
  err = -EINVAL;
if (unlikely(err < 0)) {
    -percpu_stats->tx_errors++;
    percpu_stats->tx_fifo_errors++;
    return err;
}

static int dpaa_start_xmit(struct sk_buff *skb, struct net_device *net_dev)
{ const int queue_mapping = skb_get_queue_mapping(skb);
  bool nonlinear = skb_is_nonlinear(skb);
  struct rtnl_link_stats64 *percpu_stats;
  struct dpaa_percpu_priv *percpu_priv;
  struct netdev_queue *txq;
  struct dpaa_priv *priv;
  struct qm_fd fd;
  int offset = 0;
  @ @ -2070,6 +2075,11 @@
  if (unlikely(err < 0))
    goto skb_to_fd_failed;

  +txq = netdev_get_tx_queue(net_dev, queue_mapping);
  +*/ LLTX requires to do our own update of trans_start */
  +txq->trans_start = jiffies;
  +
  if (likely(dpaa_xmit(priv, percpu_stats, queue_mapping, &fd) == 0))
    return NETDEV_TX_OK;

  @@ -2278,7 +2288,6 @@
  vaddr = phys_to_virt(addr);
  prefetch(vaddr + qm_fd_get_offset(fd));

  -fd_format = qm_fd_get_format(fd);
  /* The only FD types that we may receive are contig and S/G */
  WARN_ON((fd_format != qm_fd_contig) && (fd_format != qm_fd_sg));

  @@ -2311,8 +2320,10 @@

  skb_len = skb->len;
-if (unlikely(netif_receive_skb(skb) == NET_RX_DROP))
+if (unlikely(netif_receive_skb(skb) == NET_RX_DROP)) {
  +percpu_stats->rx_dropped++;
  return qman_cb_dqrr_consume;
+
  percpu_stats->rx_packets++;
  percpu_stats->rx_bytes += skb_len;
@@ -2662,9 +2673,7 @@
  headroom = (u16)(bl->priv_data_size + DPAA_PARSE_RESULTS_SIZE +
                   DPAA_TIME_STAMP_SIZE + DPAA_HASH_RESULTS_SIZE);

-return DPAA_FD_DATA_ALIGNMENT ? ALIGN(headroom,
-        DPAA_FD_DATA_ALIGNMENT) : headroom;
+return ALIGN(headroom, DPAA_FD_DATA_ALIGNMENT);
 }

static int dpaa_eth_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/dpaa/dpaa_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/dpaa/dpaa_ethtool.c
@@ -211,7 +211,7 @@
  if (epause->rx_pause)
     newadv = ADVERTISED_Pause | ADVERTISED_Asym_Pause;
  if (epause->tx_pause)
-    newadv |= ADVERTISED_Asym_Pause;
+    newadv ^= ADVERTISED_Asym_Pause;
  oldadv = phydev->advertising &
           (ADVERTISED_Pause | ADVERTISED_Asym_Pause);
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fec.h
+++ linux-4.15.0/drivers/net/ethernet/freescale/fec.h
@@ -451,6 +451,10 @@
 */
#define FEC_QUIRK_MIB_CLEAR		(1 << 15)
+/* Only i.MX25/i.MX27/i.MX28 controller supports FRBR,FRSR registers,
+ * those FIFO receive registers are resolved in other platforms.
+ */
+#define FEC_QUIRK_HAS_FRREG		(1 << 16)

struct bufdesc_prop {
  int qid;
@@ -483,6 +487,12 @@
  struct  sk_buff *rx_skbuff[RX_RING_SIZE];
};

+struct fec_stop_mode_gpr {
* The FEC buffer descriptors track the ring buffers. The rx_bd_base and
* tx_bd_base always point to the base of the buffer descriptors. The
* cur_rx and cur_tx point to the currently available buffer.

```c
int hwts_tx_en;
struct delayed_work time_keep;
struct regulator *reg_phy;
+struct fec_stop_mode_gpr stop_gpr;
```

unsigned int tx_align;
unsigned int rx_align;
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fec_main.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fec_main.c
@@ -60,6 +60,8 @@
 #include <linux/if_vlan.h>
 #include <linux/pinctrl/consumer.h>
 #include <linux/prefetch.h>
+#include <linux/mfd/syscon.h>
+#include <linux/regmap.h>
 #include <soc/imx/cpuidle.h>

#include <asm/cacheflush.h>
@@ -82,6 +84,56 @@
#define FEC_ENET_OPD_V	0xFFF0
#define FEC_MDIO_PM_TIMEOUT 100 /* ms */

+struct fec_devinfo {
+  u32 quirks;
+  u8 stop_gpr_reg;
+  u8 stop_gpr_bit;
+};
+
+static const struct fec_devinfo fec_imx25_info = {
+  .quirks = FEC_QUIRK_USE_GASKET | FEC_QUIRK_MIB_CLEAR |
+            FEC_QUIRK_HAS_FRREG,
+};
+
+static const struct fec_devinfo fec_imx27_info = {
+  .quirks = FEC_QUIRK_MIB_CLEAR | FEC_QUIRK_HAS_FRREG,
+};
+
+static const struct fec_devinfo fec_imx28_info = {
+  .quirks = FEC_QUIRK_ENET_MAC | FEC_QUIRK_SWAP_FRAME |
+ FEC_QUIRK_SINGLE_MDI | FEC_QUIRK_HAS_RACC |
+ FEC_QUIRK_HAS_FRREG,
+};
+
+static const struct fec_devinfo fec_imx6q_info = {
+ .quirks = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_GBIT |
+ FEC_QUIRK_HAS_BUFDESC_EX | FEC_QUIRK_HAS_CSUM |
+ FEC_QUIRK_HAS_VLAN | FEC_QUIRK_ERR006358 |
+ FEC_QUIRK_HAS_RACC,
+.stop_gpr_reg = 0x34,
+.stop_gpr_bit = 27,
+};
+
+static const struct fec_devinfo fec_mvf600_info = {
+ .quirks = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_RACC,
+};
+
+static const struct fec_devinfo fec_imx6x_info = {
+ .quirks = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_GBIT |
+ FEC_QUIRK_HAS_BUFDESC_EX | FEC_QUIRK_HAS_CSUM |
+ FEC_QUIRK_HAS_VLAN | FEC_QUIRK_HAS_AVB |
+ FEC_QUIRK_ERR007885 | FEC_QUIRK_BUG_CAPTURE |
+ FEC_QUIRK_HAS_RACC | FEC_QUIRK_HAS_COALESCE,
+};
+
+static const struct fec_devinfo fec_imx6ul_info = {
+ .quirks = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_GBIT |
+ FEC_QUIRK_HAS_BUFDESC_EX | FEC_QUIRK_HAS_CSUM |
+ FEC_QUIRK_HAS_VLAN | FEC_QUIRK_ERR007885 |
+ FEC_QUIRK_BUG_CAPTURE | FEC_QUIRK_HAS_RACC |
+ FEC_QUIRK_HAS_COALESCE,
+};
+
static struct platform_device_id fec_devtype[] = {
{
/* keep it for coldfire */
@@ -89,37 +141,25 @@
.driver_data = 0,
}, {
.name = "imx25-fec",
-.driver_data = FEC_QUIRK_USE_GASKET | FEC_QUIRK_MIB_CLEAR,
+ .driver_data = (kernel_ulong_t)&fec_imx25_info,
}, {
.name = "imx27-fec",
-.driver_data = FEC_QUIRK_MIB_CLEAR,
+ .driver_data = (kernel_ulong_t)&fec_imx27_info,
}, {
.name = "imx28-fec",

- .driver_data = FEC_QUIRK_ENET_MAC | FEC_QUIRK_SWAP_FRAME | 
- FEC_QUIRK_SINGLE_MDIO | FEC_QUIRK_HAS_RACC, 
+ .driver_data = (kernel_ulong_t)&fec_imx28_info, 
}, 
.name = "imx6q-fec",
- .driver_data = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_GBIT | 
- FEC_QUIRK_HAS_BUFDESC_EX | FEC_QUIRK_HAS_CSUM | 
- FEC_QUIRK_HAS_VLAN | FEC_QUIRK_ERR006358 | 
- FEC_QUIRK_HAS_RACC, 
+ .driver_data = (kernel_ulong_t)&fec_imx6q_info, 
}, 
.name = "mvf600-fec",
- .driver_data = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_RACC, 
+ .driver_data = (kernel_ulong_t)&fec_mvf600_info, 
}, 
.name = "imx6sx-fec",
- .driver_data = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_GBIT | 
- FEC_QUIRK_HAS_BUFDESC_EX | FEC_QUIRK_HAS_CSUM | 
- FEC_QUIRK_HAS_VLAN | FEC_QUIRK_HAS_AVB | 
- FEC_QUIRK_ERR007885 | FEC_QUIRK_BUG_CAPTURE | 
- FEC_QUIRK_HAS_RACC | FEC_QUIRK_HAS_COALESCE, 
+ .driver_data = (kernel_ulong_t)&fec_imx6x_info, 
}, 
.name = "imx6ul-fec",
- .driver_data = FEC_QUIRK_ENET_MAC | FEC_QUIRK_HAS_GBIT | 
- FEC_QUIRK_HAS_BUFDESC_EX | FEC_QUIRK_HAS_CSUM | 
- FEC_QUIRK_HAS_VLAN | FEC_QUIRK_ERR007885 | 
- FEC_QUIRK_BUG_CAPTURE | FEC_QUIRK_HAS_RACC | 
- FEC_QUIRK_HAS_COALESCE, 
+ .driver_data = (kernel_ulong_t)&fec_imx6ul_info, 
}, /* sentinel */
} 
@@ -1084,11 +1124,28 @@

+static void fec_enet_stop_mode(struct fec_enet_private *fep, bool enabled) 
+{ 
+struct fec_platform_data *pdata = fep->pdev->dev.platform_data; 
+struct fec_stop_mode_gpr *stop_gpr = &fep->stop_gpr; 
+ 
+ if (stop_gpr->gpr) 
+ if (enabled) 
+ regmap_update_bits(stop_gpr->gpr, stop_gpr->reg, 
+ BIT(stop_gpr->bit), 
+ BIT(stop_gpr->bit)); 
+ else
static void
fec_stop(struct net_device *ndev)
{
struct fec_enet_private *fep = netdev_priv(ndev);
-struct fec_platform_data *pdata = fep->pdev->dev.platform_data;
u32 rmii_mode = readl(fep->hwp + FEC_R_CNTRL) & (1 << 8);
u32 val;
@@ -1117,9 +1174,7 @@
 val = readl(fep->hwp + FEC_ECNTRL);
 val |= (FEC_ECR_MAGICEN | FEC_ECR_SLEEP);
 writel(val, fep->hwp + FEC_ECNTRL);
-
-@ -1155,7 +1210,7 @@
 napi_disable(&fep->napi);
netif_tx_lock_bh(ndev);
fec_restart(ndev);
-netif_wake_queue(ndev);
+netif_tx_wake_all_queues(ndev);
 netif_tx_unlock_bh(ndev);
napi_enable(&fep->napi);
}
@@ -1270,7 +1325,7 @@
/* Since we have freed up a buffer, the ring is no longer full */
-@ -1684,10 +1739,10 @@
+if (netif_queue_stopped(nq)) {
 entries_free = fec_enet_get_free_txdesc_num(txq);
 if (entries_free >= txq->tx_wake_threshold)
 netif_tx_wake_queue(nq);
@@ -1684,10 +1739,10 @@
 */
 if (!is_valid_ether_addr(iap)) {
 /* Report it and use a random ethernet address instead */

- netdev_err(ndev, "Invalid MAC address: %pM", iap);
+ dev_err(&fep->pdev->dev, "Invalid MAC address: %pM", iap);
eth_hw_addr_random(ndev);
- netdev_info(ndev, "Using random MAC address: %pM",
  - ndev->dev_addr);
+ dev_info(&fep->pdev->dev, "Using random MAC address: %pM",
  + ndev->dev_addr);
return;
}

@@ -1743,7 +1798,7 @@
napi_disable(&fep->napi);
netif_tx_lock_bh(ndev);
fec_restart(ndev);
- netif_wake_queue(ndev);
+ netif_tx_wake_all_queues(ndev);
netif_tx_unlock_bh(ndev);
napi_enable(&fep->napi);
} @@ -1845,13 +1900,9 @@
int ret;

if (enable) {
- ret = clk_prepare_enable(fep->clk_ahb);
- if (ret)
- return ret;
- ret = clk_prepare_enable(fep->clk_enet_out);
if (ret)
  goto failed_clk_enet_out;
if (fep->clk_ptp) {
mutex_lock(&fep->ptp_clk_mutex);
@@ -1869,7 +1920,6 @@
if (ret)
  goto failed_clk_ptp;
} else {
- clk_disable_unprepare(fep->clk_ahb);
clk_disable_unprepare(fep->clk_enet_out);
if (fep->clk_ptp) {
mutex_lock(&fep->ptp_clk_mutex);
@@ -1888,8 +1938,6 @@
failed_clk_ptp:
if (fep->clk_enet_out)
  clk_disable_unprepare(fep->clk_enet_out);
-failed_clk_enet_out:
- clk_disable_unprepare(fep->clk_ahb);
return ret;
}
@@ -2162,7 +2210,13 @@
memset(buf, 0, regs->len);

for (i = 0; i < ARRAY_SIZE(fec_enet_register_offset); i++) {
-  off = fec_enet_register_offset[i] / 4;
+  off = fec_enet_register_offset[i];
+  if ((off == FEC_R_BOUND || off == FEC_R_FSTART) &&
+      !(fep->quirks & FEC_QUIRK_HAS_FRREG))
+    continue;
+  off >>= 2;
  buf[off] = readl(&theregs[off]);
}
@@ -2245,7 +2299,7 @@
netif_tx_lock_bh(ndev);
fec_restart(ndev);
-  netif_wake_queue(ndev);
+  netif_tx_wake_all_queues(ndev);
netif_tx_unlock_bh(ndev);
napi_enable(&fep->napi);
@@ -2473,15 +2527,15 @@ return -EINVAL;
}

-cycle = fec_enet_us_to_itr_clock(ndev, fep->rx_time_itr);
+cycle = fec_enet_us_to_itr_clock(ndev, ec->rx_coalesce_usecs);
if (cycle > 0xFFFF) {
  pr_err("Rx coalesed usec exceed hardware limitation\n");
  return -EINVAL;
}

-cycle = fec_enet_us_to_itr_clock(ndev, fep->tx_time_itr);
+cycle = fec_enet_us_to_itr_clock(ndev, ec->tx_coalesce_usecs);
if (cycle > 0xFFFF) {
  -pr_err("Tx coalesed usec exceed hardware limitation\n");
  +pr_err("Tx coalesed usec exceed hardware limitation\n");
  return -EINVAL;
}

@@ -3327,6 +3381,37 @@
return irq_cnt;

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static int fec_enet_init_stop_mode(struct fec_enet_private *fep, 
    struct fec_devinfo *dev_info, 
    struct device_node *np) 
{
    struct device_node *gpr_np;
    int ret = 0;
+
    if (!dev_info)
        return 0;
+
    gpr_np = of_parse_phandle(np, "gpr", 0);
    if (!gpr_np)
        return 0;
+
    fep->stop_gpr.gpr = syscon_node_to_regmap(gpr_np);
    if (IS_ERR(fep->stop_gpr.gpr)) {
        dev_err(&fep->pdev->dev, "could not find gpr regmap\n");
        ret = PTR_ERR(fep->stop_gpr.gpr);
        fep->stop_gpr.gpr = NULL;
        goto out;
    }
+
    fep->stop_gpr.reg = dev_info->stop_gpr_reg;
    fep->stop_gpr.bit = dev_info->stop_gpr_bit;
+
out:
    of_node_put(gpr_np);
+
    return ret;
+
+
static int
fec_probe(struct platform_device *pdev) 
{
    int num_rx_qs;
    char irq_name[8];
    int irq_cnt;
+
    fec_enet_get_queue_num(pdev, &num_tx_qs, &num_rx_qs);
+
    of_id = of_match_device(fec_dt_ids, &pdev->dev);
    if (of_id)
        pdev->id_entry = of_id->data;
fep->quirks = pdev->id_entry->driver_data;
+dev_info = (struct fec_devinfo *)pdev->id_entry->driver_data;
+if (dev_info)
+fep->quirks = dev_info->quirks;

fep->netdev = ndev;
fep->num_rx_queues = num_rx_qs;
@ @ -3394,6 +3482,10 @@
if (of_get_property(np, "fsl,magic-packet", NULL))
fep->wol_flag |= FEC_WOL_HAS_MAGIC_PACKET;

+ret = fec_enet_init_stop_mode(fep, dev_info, np);
+if (ret)
+goto failed_stop_mode;
+
phy_node = of_parse_phandle(np, "phy-handle", 0);
if (!phy_node && of_phy_is_fixed_link(np)) {
ret = of_phy_register_fixed_link(np);
@@ -3458,6 +3550,9 @@
ret = clk_prepare_enable(fep->clk_ipg);
if (ret)
goto failed_clk_ipg;
+ret = clk_prepare_enable(fep->clk_ahb);
+if (ret)
+goto failed_clk_ahb;

fep->reg_phy = devm_regulator_get(&pdev->dev, "phy");
if (!IS_ERR(fep->reg_phy)) {
@@ -3545,18 +3640,22 @@
failed_irq:
failed_init:
fec_ptp_stop(pdev);
-if (fep->reg_phy)
-regulator_disable(fep->reg_phy);
failed_reset:
.pm_runtime_put(&pdev->dev);
+pm_runtime_put_noidle(&pdev->dev);
pm_runtime_disable(&pdev->dev);
+if (fep->reg_phy)
+regulator_disable(fep->reg_phy);
failed_regulator:
+clk_disable_unprepare(fep->clk_ahb);
+failed_clk_ahb:
+clk_disable_unprepare(fep->clk_ipg);
failed_clk_ipg:
fec_enet_clk_enable(ndev, false);
failed_clk:
if (of_phy_is_fixed_link(np))
of_phy_deregister_fixed_link(np);
of_node_put(phy_node);
+failed_stop_mode:
failed_phy:
dev_id--;
failed_ioremap:
@@ -3571,6 +3670,11 @@
 struct net_device *ndev = platform_get_drvdata(pdev);
 struct fec_enet_private *fep = netdev_priv(ndev);
 struct device_node *np = pdev->dev.of_node;
+int ret;
 +
 +ret = pm_runtime_get_sync(&pdev->dev);
 +if (ret < 0)
 +return ret;

cancel_work_sync(&fep->tx_timeout_work);
fec_ptp_stop(pdev);
@@ -3578,11 +3682,17 @@
fec_enet_mii_remove(fep);
 if (fep->reg_phy)
 regulator_disable(fep->reg_phy);
 +
 +if (of_phy_is_fixed_link(np))
 of_phy_deregister_fixed_link(np);
 of_node_put(fep->phy_node);
-free_netdev(ndev);

+clk_disable_unprepare(fep->clk_ahb);
+clk_disable_unprepare(fep->clk_ipg);
+pm_runtime_put_noidle(&pdev->dev);
+pm_runtime_disable(&pdev->dev);
 +
 +free_netdev(ndev);
 return 0;
}

@@ -3623,7 +3733,6 @@
{
 struct net_device *ndev = dev_get_drvdata(dev);
 struct fec_enet_private *fep = netdev_priv(ndev);
-struct fec_platform_data *pdata = fep->pdev->dev.platform_data;
 int ret;
 int val;

@@ -3641,8 +3750,8 @@
goto failed_clk;
}
if (fep->wol_flag & FEC_WOL_FLAG_ENABLE) {
    if (pdata && pdata->sleep_mode_enable)
        pdata->sleep_mode_enable(false);
    +fec_enet_stop_mode(fep, false);
    +
    val = readl(fep->hwp + FEC_ECNTRL);
    val &= ~(FEC_ECR_MAGICEN | FEC_ECR_SLEEP);
    writel(val, fep->hwp + FEC_ECNTRL);
}

struct net_device *ndev = dev_get_drvdata(dev);
struct fec_enet_private *fep = netdev_priv(ndev);

+clk_disable_unprepare(fep->clk_ahb);
clk_disable_unprepare(fep->clk_ipg);

return 0;

struct net_device *ndev = dev_get_drvdata(dev);
struct fec_enet_private *fep = netdev_priv(ndev);
+int ret;

-return clk_prepare_enable(fep->clk_ipg);
+ret = clk_prepare_enable(fep->clk_ahb);
+if (ret)
++return ret;
+ret = clk_prepare_enable(fep->clk_ipg);
+if (ret)
++goto failed_clk_ipg;
+
++return 0;
++
++failed_clk_ipg:
+clk_disable_unprepare(fep->clk_ahb);
++return ret;
}

static const struct dev_pm_ops fec_pm_ops = {
    --- linux-4.15.0.orig/drivers/net/ethernet/freescale/fec_mpc52xx.c
    +++ linux-4.15.0/drivers/net/ethernet/freescale/fec_mpc52xx.c
    @ @ -305.7 +305.8 @ @
    * invariant will hold if you make sure that the netif_*_queue() 
    * calls are done at the proper times.
    */
-static int mpc52xx_fec_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+mpc52xx_fec_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
struct mpc52xx_fec_priv *priv = netdev_priv(dev);
struct bcom_fec_bd *bd;

--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fec_ptp.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fec_ptp.c
@@ -234,15 +234,13 @@
{
    struct fec_enet_private *fep =
        container_of(cc, struct fec_enet_private, cc);
-   const struct platform_device_id *id_entry =
-      platform_get_device_id(fep->pdev);
    u32 tempval;
    tempval = readl(fep->hwp + FEC_ATIME_CTRL);
    tempval |= FEC_T_CTRL_CAPTURE;
    writel(tempval, fep->hwp + FEC_ATIME_CTRL);

-  if (id_entry->driver_data & FEC_QUIRK_BUG_CAPTURE)
+  if (fep->quirks & FEC_QUIRK_BUG_CAPTURE)
      udelay(1);

    return readl(fep->hwp + FEC_ATIME);
    @@ -396,9 +394,16 @@
    u64 ns;
    unsigned long flags;

    +mutex_lock(&adapter->ptp_clk_mutex);
    /*! Check the ptp clock */
    +if (!adapter->ptp_clk_on) {
        +mutex_unlock(&adapter->ptp_clk_mutex);
        +return -EINVAL;
    +}
    spin_lock_irqsave(&adapter->tmreg_lock, flags);
    ns = timecounter_read(&adapter->tc);
    spin_unlock_irqrestore(&adapter->tmreg_lock, flags);
    +mutex_unlock(&adapter->ptp_clk_mutex);

    *ts = ns_to_timespec64(ns);
    @@ -612,6 +617,10 @@
    fep->ptp_caps.enable = fec_ptp_enable;

    fep->cycle_speed = clk_get_rate(fep->clk_ptp);
    +if (!fep->cycle_speed) {
        +fep->cycle_speed = NSEC_PER_SEC;
        +dev_err(&fep->pdev->dev, "clk_ptp clock rate is zero\n");
    +}
    fep->ptp_inc = NSEC_PER_SEC / fep->cycle_speed;


spin_lock_init(&fep->tmreg_lock);
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/Kconfig
@@ -8,3 +8,31 @@
	help
Freescale Data-Path Acceleration Architecture Frame Manager
(FMan) support
+
+config DPAA_ERRATUM_A050385
+bool
+depends on ARM64 && FSL_DPAA
+default y
+help
+DPAA FMan erratum A050385 software workaround implementation:
+align buffers, data start, SG fragment length to avoid FMan DMA
+splits.
+FMAN DMA read or writes under heavy traffic load may cause FMAN
+internal resource leak thus stopping further packet processing.
+The FMAN internal queue can overflow when FMAN splits single
+read or write transactions into multiple smaller transactions
+such that more than 17 AXI transactions are in flight from FMAN
+to interconnect. When the FMAN internal queue overflows, it can
+stall further packet processing. The issue can occur with any
+one of the following three conditions:
+1. FMAN AXI transaction crosses 4K address boundary (Errata
+A010022)
+2. FMAN DMA address for an AXI transaction is not 16 byte
+aligned, i.e. the last 4 bits of an address are non-zero
+3. Scatter Gather (SG) frames have more than one SG buffer in
+the SG list and any one of the buffers, except the last
+buffer in the SG list has data size that is not a multiple
+of 16 bytes, i.e., other than 16, 32, 48, 64, etc.
+With any one of the above three conditions present, there is
+likelihood of stalled FMAN packet processing, especially under
+stress with multiple ports injecting line-rate traffic.
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/fman.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/fman.c
@@ -1,5 +1,6 @@
*/
/*
 * Copyright 2008-2015 Freescale Semiconductor Inc.
 + * Copyright 2020 NXP
 * *
 * Redistribution and use in source and binary forms, with or without
 * modification, are permitted provided that the following conditions are met:
 @ @ -566,6 +567,10 @@
 u32 qmi_def_tnums_thresh;
);//
+ifdef CONFIG_DPAA_ERRATUM_A050385
+static bool fman_has_err_a050385;
+endif
+
static irqreturn_t fman_exceptions(struct fman *fman,
    enum fman_exceptions exception)
{
    @@ -1391,8 +1396,7 @@
    {
    struct fman_fpm_regs __iomem *fpm_rg = fman->fpm_regs;
    u16 fm_clk_freq = fman->state->fm_clk_freq;
-    u32 tmp, intgr, ts_freq;
-    u64 frac;
+    u32 tmp, intgr, ts_freq, frac;

    ts_freq = (u32)(1 << fman->state->count1_micro_bit);
    /* configure timestamp so that bit 8 will count 1 microsecond
    @@ -2517,6 +2521,14 @@
    }
    EXPORT_SYMBOL(fman_bind);

+ifdef CONFIG_DPAA_ERRATUM_A050385
+bool fman_has_errata_a050385(void)
+{
+    return fman_has_err_a050385;
+}
+EXPORT_SYMBOL(fman_has_errata_a050385);
+endif
+
static irqreturn_t fman_err_irq(int irq, void *handle)
{
    struct fman *fman = (struct fman *)handle;
    @@ -2786,7 +2798,7 @@
    if (!muram_node) {
    dev_err(&of_dev->dev, "%s: could not find MURAM node\n",
       __func__);  
    -goto fman_node_put;
+    goto fman_free;
    }  

    err = of_address_to_resource(muram_node, 0,
    @@ -2795,11 +2807,10 @@
    of_node_put(muram_node);
    dev_err(&of_dev->dev, "%s: of_address_to_resource() = %d\n",
       __func__, err);
    -goto fman_node_put;
+    goto fman_free;
    }


of_node_put(muram_node);
-of_node_put(fm_node);

err = devm_request_irq(&of_dev->dev, irq, fman_irq, 0, "fman", fman);
if (err < 0) {
    goto fman_free;
}

#ifdef CONFIG_DPAA_ERRATUM_A050385
    fman_has_err_a050385 =
    of_property_read_bool(fm_node, "fsl.erratum-a050385");
#endif

return fman;

fman_node_put:
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/fman.h
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/fman.h
@@ -1,5 +1,6 @@
/*
 * Copyright 2008-2015 Freescale Semiconductor Inc.
 * Copyright 2020 NXP
 * *
 */
/*
 * Redistribution and use in source and binary forms, with or without
 * modification, are permitted provided that the following conditions are met:
 @@ -397,6 +398,10 @@
 int fman_get_rx_extra_headroom(void);

#ifdef CONFIG_DPAA_ERRATUM_A050385
    bool fman_has_errata_a050385(void);
#endif

struct fman *fman_bind(struct device *dev);
@endif /* __FM_H */
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/fman_dtsec.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/fman_dtsec.c
@@ -1100,7 +1100,7 @@
 set_bucket(dtsec->regs, bucket, true);

 /* Create element to be added to the driver hash table */
-hash_entry = kmalloc(sizeof(*hash_entry), GFP_KERNEL);
+hash_entry = kmalloc(sizeof(*hash_entry), GFP_ATOMIC);
 if (!hash_entry)
     return -ENOMEM;

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hash_entry->addr = addr;
@@ -1159,7 +1159,7 @@
    list_for_each(pos,
        &dtsec->multicast_addr_hash->lsts[bucket]) {
    hash_entry = ETH_HASH_ENTRY_OBJ(pos);
    -if (hash_entry->addr == addr) {
    +if (hash_entry && hash_entry->addr == addr) {
        list_del_init(&hash_entry->node);
        kfree(hash_entry);
        break;
@@ -1172,7 +1172,7 @@
    list_for_each(pos,
        &dtsec->unicast_addr_hash->lsts[bucket]) {
    hash_entry = ETH_HASH_ENTRY_OBJ(pos);
    -if (hash_entry->addr == addr) {
    +if (hash_entry && hash_entry->addr == addr) {
        list_del_init(&hash_entry->node);
        kfree(hash_entry);
        break;
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/fman_mac.h
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/fman_mac.h
@@ -252,7 +252,7 @@
    struct eth_hash_t *hash;
    /* Allocate address hash table */
    -hash = kmalloc_array(size, sizeof(struct eth_hash_t *), GFP_KERNEL);
    +hash = kmalloc(sizeof(*hash), GFP_KERNEL);
    if (!hash)
        return NULL;
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/fman_memac.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/fman_memac.c
@@ -110,7 +110,7 @@
    switch (phy_if) {
        case PHY_INTERFACE_MODE_XGMII:
            -tmp |= IF_MODE_XGMII;
            +tmp |= IF_MODE_10G;
            break;
/* Interface Mode Register (IF_MODE) */
#endif
#define IF_MODE_MASK 0x00000003 /* 30-31 Mask on i/f mode bits */
#define IF_MODE_XGMII0x00000000 /* 30-31 XGMII (10G) interface */
#define IF_MODE_10G0x00000000 /* 30-31 10G interface */
#define IF_MODE_GMII0x00000002 /* 30-31 GMII (1G) interface */
#define IF_MODE_RGMII0x00000004
#define IF_MODE_RGMII_AUTO0x00008000
@@ -439,7 +439,7 @@
tmp = 0;
    switch (phy_if) {
        case PHY_INTERFACE_MODE_XGMII:
            -tmp |= IF_MODE_XGMII;
            +tmp |= IF_MODE_10G;
            break;
default:
tmp |= IF_MODE_GMII;
@@ -855,7 +855,6 @@
tmp = ioread32be(&regs->command_config);
tmp &= ~CMD_CFG_PFC_MODE;
-priority = 0;
iowrite32be(tmp, &regs->command_config);
@@ -927,7 +926,7 @@
hash = get_mac_addr_hash_code(addr) & HASH_CTRL_ADDR_MASK;

/* Create element to be added to the driver hash table */
-hash_entry = kmalloc(sizeof(*hash_entry), GFP_KERNEL);
+hash_entry = kmalloc(sizeof(*hash_entry), GFP_ATOMIC);
if (!hash_entry)
    return -ENOMEM;
hash_entry->addr = addr;
@@ -957,7 +956,7 @@
list_for_each(pos, &memac->multicast_addr_hash->lsts[hash]) {
    hash_entry = ETH_HASH_ENTRY_OBJ(pos);
    if (!hash_entry || hash_entry->addr == addr) {
        list_del_init(&hash_entry->node);
        kfree(hash_entry);
        break;
    -- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/fman_port.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/fman_port.c
@@ -324,6 +324,10 @@
#define HWP_HXS_PHE_REPORT 0x00000800
#define HWP_HXS_PCAC_PSTAT 0x00000100
#define HWP_HXS_PCAC_PSTOP 0x00000001
+#define HWP_HXS_TCP_OFFSET 0xA
+#define HWP_HXS_UDP_OFFSET 0xB
+#define HWP_HXS_SH_PAD_REM 0x80000000
+
    struct fman_port_hwp_regs {
    struct {
        u32 ssa; /* Soft Sequence Attachment */
    }@@ -728,6 +732,10 @@
iowrite32be(0xffffffff, &regs->pmda[i].lcv);
    }

    /* Short packet padding removal from checksum calculation */
+iowrite32be(HWP_HXS_SH_PAD_REM, &regs->pmda[HWP_HXS_TCP_OFFSET].ssa);
+iowrite32be(HWP_HXS_SH_PAD_REM, &regs->pmda[HWP_HXS_UDP_OFFSET].ssa);
+ start_port_hwp(port);
}

@@ -1738,6 +1746,7 @@
struct fman_port *port;
struct fman *fman;
struct device_node *fm_node, *port_node;
+struct platform_device *fm_pdev;
struct resource res;
struct resource *dev_res;
u32 val;
@@ -1762,8 +1771,14 @@
goto return_err;
}

-fman = dev_get_drvdata(&of_find_device_by_node(fm_node)->dev);
+fm_pdev = of_find_device_by_node(fm_node);
of_node_put(fm_node);
+if (!fm_pdev) {
+   err = -EINVAL;
+   goto return_err;
+}
+
+fman = dev_get_drvdata(&fm_pdev->dev);
if (!fman) {
err = -EINVAL;
goto return_err;
+}
+
+fman = dev_get_drvdata(&fm_pdev->dev);
if (!fman) {
err = -EINVAL;
goto return_err;
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fman/fman_tgec.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fman/fman_tgec.c
@@ -551,7 +551,7 @@
hash = (crc >> TGEC_HASH_MCAST_SHIFT) & TGEC_HASH_ADR_MSK;

/* Create element to be added to the driver hash table */
-hash_entry = kmalloc(sizeof(*hash_entry), GFP_KERNEL);
+hash_entry = kmalloc(sizeof(*hash_entry), GFP_ATOMIC);
if (!hash_entry)
  return -ENOMEM;
hash_entry->addr = addr;
@@ -585,7 +585,7 @@
list_for_each(pos, &tgec->multicast_addr_hash->lsts[hash]) {
  hash_entry = ETH_HASH_ENTRY_OBJ(pos);
  -if (hash_entry->addr == addr) {
  +if (hash_entry && hash_entry->addr == addr) {
      list_del_init(&hash_entry->node);
kfree(hash_entry);
      break;
static int fs_enet_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct fs_enet_private *fep = netdev_priv(dev);
    cbd_t __iomem *bdp;
}

module_platform_driver(fs_enet_bb_mdio_driver);
+MODULE_LICENSE("GPL");

module_platform_driver(fs_enet_fec_mdio_driver);
+MODULE_LICENSE("GPL");

const char gfar_driver_version[] = "2.0";

static int gfar_enet_open(struct net_device *dev);
-static int gfar_start_xmit(struct sk_buff *skb, struct net_device *dev);
+static netdev_tx_t gfar_start_xmit(struct sk_buff *skb, struct net_device *dev);
static void gfar_reset_task(struct work_struct *work);
static void gfar_timeout(struct net_device *dev);
static int gfar_close(struct net_device *dev);
@@ -485,7 +485,11 @@
static int gfar_set_mac_addr(struct net_device *dev, void *p)
{
    -eth_mac_addr(dev, p);
    +int ret;
    +
    +ret = eth_mac_addr(dev, p);
    +if (ret)
    +return ret;

--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fs_enet/fs_enet-main.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fs_enet/fs_enet-main.c
@@ -481,7 +481,8 @@
#endif
-static int fs_enet_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+fs_enet_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
 struct fs_enet_private *fep = netdev_priv(dev);
 cbd_t __iomem *bdp;
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fs_enet/mii-bitbang.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fs_enet/mii-bitbang.c
@@ -223,3 +223,4 @@
};

module_platform_driver(fs_enet_bb_mdio_driver);
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fs_enet/mii-fec.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fs_enet/mii-fec.c
@@ -224,3 +224,4 @@
};

module_platform_driver(fs_enet_fec_mdio_driver);
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/gianfar.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/gianfar.c
@@ -112,7 +112,7 @@
 const char gfar_driver_version[] = "2.0";

 static int gfar_enet_open(struct net_device *dev);
-static int gfar_start_xmit(struct sk_buff *skb, struct net_device *dev);
+static netdev_tx_t gfar_start_xmit(struct sk_buff *skb, struct net_device *dev);
 static void gfar_reset_task(struct work_struct *work);
 static void gfar_timeout(struct net_device *dev);
 static int gfar_close(struct net_device *dev);
@@ -485,7 +485,11 @@
static int gfar_set_mac_addr(struct net_device *dev, void *p)
{
    -eth_mac_addr(dev, p);
    +int ret;
    +
    +ret = eth_mac_addr(dev, p);
    +if (ret)
    +return ret;

--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fs_enet/mii-bitbang.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fs_enet/mii-bitbang.c
@@ -223,3 +223,4 @@
};

module_platform_driver(fs_enet_bb_mdio_driver);
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/fs_enet/mii-fec.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/fs_enet/mii-fec.c
@@ -224,3 +224,4 @@
};

module_platform_driver(fs_enet_fec_mdio_driver);
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/net/ethernet/freescale/gianfar.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/gianfar.c
@@ -112,7 +112,7 @@
 const char gfar_driver_version[] = "2.0";

 static int gfar_enet_open(struct net_device *dev);
-static int gfar_start_xmit(struct sk_buff *skb, struct net_device *dev);
+static netdev_tx_t gfar_start_xmit(struct sk_buff *skb, struct net_device *dev);
 static void gfar_reset_task(struct work_struct *work);
 static void gfar_timeout(struct net_device *dev);
 static int gfar_close(struct net_device *dev);
@@ -485,7 +485,11 @@
static int gfar_set_mac_addr(struct net_device *dev, void *p)
{
    -eth_mac_addr(dev, p);
    +int ret;
    +
    +ret = eth_mac_addr(dev, p);
    +if (ret)
    +return ret;
gfar_set_mac_for_addr(dev, 0, dev->dev_addr);
@@ -844,8 +848,10 @@
 continue;

 err = gfar_parse_group(child, priv, model);
-if (err)
+if (err) {
+ of_node_put(child);
 goto err_grp_init;
+}
 }

 } else { /* SQ_SG_MODE */
 err = gfar_parse_group(np, priv, model);
@@ -1386,7 +1392,7 @@
 if (dev->features & NETIF_F_IP_CSUM ||
 priv->device_flags & FSL_GIANFAR_DEV_HAS_TIMER)
 -dev->needed_headroom = GMAC_FCB_LEN;
+dev->needed_headroom = GMAC_FCB_LEN + GMAC_TXPAL_LEN;

 /* Initializing some of the rx/tx queue level parameters */
 for (i = 0; i < priv->num_tx_queues; i++) {
@@ -2334,7 +2340,7 @@
 /* This is called by the kernel when a frame is ready for transmission.
 * It is pointed to by the dev->hard_start_xmit function pointer
 */
-static int gfar_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t gfar_start_xmit(struct sk_buff *skb, struct net_device *dev)
 {
 struct gfar_private *priv = netdev_priv(dev);
 struct gfar_priv_tx_q *tx_queue = NULL;
@@ -2368,20 +2374,12 @@
 fcb_len = GMAC_FCB_LEN + GMAC_TXPAL_LEN;

 /* make space for additional header when fcb is needed */
 -if (fcb_len && unlikely(skb_headroom(skb) < fcb_len)) {
- struct sk_buff *skb_new;
- skb_new = skb_realloc_headroom(skb, fcb_len);
- if (!skb_new) {
- if (fcb_len) {
- if (unlikely(skb_cow_head(skb, fcb_len))) {
- dev->stats.tx_errors++;
- dev_kfree_skb_any(skb);
- return NETDEV_TX_OK;
- }
- }
-if (skb->sk)
- skb_set_owner_w(skb_new, skb->sk);
- dev_consume_skb_any(skb);
- skb = skb_new;
}

/* total number of fragments in the SKB */
@@ -2685,13 +2683,17 @@
 skb_dirtytx = tx_queue->skb_dirtytx;

 while ((skb = tx_queue->tx_skbuff[skb_dirtytx])) {
+ bool do_tstamp;
 +
+ do_tstamp = (skb_shinfo(skb)->tx_flags & SKBTX_HW_TSTAMP) &&
+ priv->hwts_tx_en;

 frags = skb_shinfo(skb)->nr_frags;

 /* When time stamping, one additional TxBD must be freed.
 * Also, we need to dma_unmap_single() the TxPAL.
 */
@@ -2705,7 +2707,7 @@
 break;

 -if (unlikely(skb_shinfo(skb)->tx_flags & SKBTX_IN_PROGRESS)) {
- if (unlikely(do_tstamp)) {
- next = next_txbd(bdp, base, tx_ring_size);
- buflen = be16_to_cpu(next->length) +
- GMAC_FCB_LEN + GMAC_TXPAL_LEN;
- @ @ -2715,7 +2717,7 @@
- dma_unmap_single(priv->dev, be32_to_cpu(bdp->bufPtr),
- buflen, DMA_TO_DEVICE);

 -if (unlikely(skb_shinfo(skb)->tx_flags & SKBTX_IN_PROGRESS)) {
+ if (unlikely(do_tstamp)) {
 struct skb_shared_hwtstamps shhwtstamps;
 u64 *ns = (u64 *)(((uintptr_t)skb->data + 0x10) &
- ~0x7UL);
- @ @ -2932,7 +2934,7 @@
 static bool gfar_add_rx_frag(struct gfar_rx_buff *rxb, u32 lstatus,
 struct sk_buff *skb, bool first)
 {
unsigned int size = lstatus & BD_LENGTH_MASK;
+int size = lstatus & BD_LENGTH_MASK;

struct page *page = rxb->page;
bool last = !(lstatus & BD_LFLAG(RXBD_LAST));

@ @ -2947,11 +2949,20 @ @
if (last)
size -= skb->len;

-/* in case the last fragment consisted only of the FCS */
+/* in case the last fragment consisted only of the FCS */
+WARN(size < 0, "gianfar: rx fragment size underflow");
+if (size < 0)
+return false;
+
+/* Add the last fragment if it contains something other than
+ * the FCS, otherwise drop it and trim off any part of the FCS
+ * that was already received.
+ */
+if (size > 0)
skb_add_rx_frag(skb, skb_shinfo(skb)->nr_frags, page,
rxb->page_offset + RXBUF_ALIGNMENT,
size, GFAR_RXB_TRUESIZE);
+else if (size < 0)
+pskb_trim(skb, skb->len + size);
}

/*@ -3067,9 +3078,6 @*/
if (ndev->features & NETIF_F_RXCSUM)
gfar_rx_checksum(skb, fcb);

-/* Tell the skb what kind of packet this is */
-skbb->protocol = eth_type_trans(skb, ndev);
-
-/* There's need to check for NETIF_F_HW_VLAN_CTAG_RX here.
 * Even if vlan rx accel is disabled, on some chips
 * RXFCB_VLN is pseudo randomly set.
-@ @ -3110,6 +3118,17 @@
if (lstatus & BD_LFLAG(RXBD_EMPTY))
break;

+/* lost RXBD_LAST descriptor due to overrun */
+if (skb &&
+ (lstatus & BD_LFLAG(RXBD_FIRST)) {
+/* discard faulty buffer */
+dev_kfree_skb(skb);
+skb = NULL;
+rx_queue->stats.rx_dropped++;
+ /* can continue normally */
+{
+ /* order rx buffer descriptor reads */
+ rmb();
+
@@ -3140,13 +3159,15 @@
+ continue;
+}
+
+gfar_process_frame(ndev, skb);
+
+/* Increment the number of packets */
+ total_pkts++;
+ total_bytes += skb->len;
+
+skb_record_rx_queue(skb, rx_queue->qindex);
+
- gfar_process_frame(ndev, skb);
+ skb->protocol = eth_type_trans(skb, ndev);
+
+/* Send the packet up the stack */
+ napi_gro_receive(&rx_queue->grp->napi_rx, skb);

--- linux-4.15.0.orig/drivers/net/ethernet/freescale/ucc_geth.c
+++ linux-4.15.0/drivers/net/ethernet/freescale/ucc_geth.c
@@ -45,6 +45,7 @@
 #include <soc/fsl/qe/ucc.h>
 #include <soc/fsl/qe/ucc_fast.h>
 #include <asm/machdep.h>
+ #include <net/sch_generic.h>

 #include "ucc_geth.h"

@@ -1551,11 +1552,8 @@
 static void ugeth_quiesce(struct ucc_geth_private *ugeth)
 {
- /* Prevent any further xmits, plus detach the device. */
- -netif_device_detach(ugeth->ndev);
- -
- /* Wait for any current xmits to finish. */
- -netif_tx_disable(ugeth->ndev);
- +/* Prevent any further xmits */
- +netif_tx_stop_all_queues(ugeth->ndev);
+
+/* Disable the interrupt to avoid NAPI rescheduling. */
+ disable_irq(ugeth->ug_info->uf_info.irq);
napi_enable(&ugeth->napi);
enable_irq(ugeth->ug_info->uf_info.irq);
-netif_device_attach(ugeth->ndev);
+
+/* allow to xmit again */
+netif_tx_wake_all_queues(ugeth->ndev);
+__netdev_watchdog_up(ugeth->ndev);
}

/* Called every time the controller might need to be made
@@ -2291,6 +2292,8 @@
  u16 i, j;
  u8 __iomem *bd;

  netdev_reset_queue(ugeth->ndev);
  +ug_info = ugeth->ug_info;
  uf_info = &ug_info->uf_info;

@@ -3083,7 +3086,8 @@

/* This is called by the kernel when a frame is ready for transmission. */
/* It is pointed to by the dev->hard_start_xmit function pointer */
-static int ucc_geth_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+ucc_geth_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
  struct ucc_geth_private *ugeth = netdev_priv(dev);
  #ifdef CONFIG_UGETH_TX_ON_DEMAND
@@ -3891,6 +3895,7 @@
 INIT_WORK(&ugeth->timeout_work, ucc_geth_timeout_work);
 netif_napi_add(dev, &ugeth->napi, ucc_geth_poll, 64);
 dev->mtu = 1500;
+dev->max_mtu = 1518;

 ugeth->msg_enable = netif_msg_init(debug.msg_enable, UGETH_MSG_DEFAULT);
 ugeth->phy_interface = phy_interface;
@@ -3936,12 +3941,12 @@
 unregister_netdev(dev);
 -free_netdev(dev);
 ucc_geth_memclean(ugeth);
 if (of_phy_is_fixed_link(np))
  of_phy_deregister_fixed_link(np);
 of_node_put(ugeth->ug_info->tbi_node);

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of_node_put(ugeth->ug_info->phy_node);
+free_netdev(dev);

return 0;
}
bool is_little_endian;
+bool has_a011043;
};

static u32 xgmac_read32(void __iomem *regs,
@@ -226,7 +227,8 @@
     return ret;

 /* Return all Fs if nothing was there */
-    if (xgmac_read32(&regs->mdio_stat, endian) & MDIO_STAT_RD_ER) {    
+    if ((xgmac_read32(&regs->mdio_stat, endian) & MDIO_STAT_RD_ER) &&   
+        !priv->has_a011043) {   
    dev_err(&bus->dev,     
"Error while reading PHY%d reg at %d.%hhu\n",
    phy_id, dev_addr, regnum);  
@@ -274,6 +276,9 @@
     priv->is_little_endian = of_property_read_bool(pdev->dev.of_node, 
        "little-endian");

+    priv->has_a011043 = of_property_read_bool(pdev->dev.of_node, 
+        "fsl.erratum-a011043");
        +
        ret = of_mdiobus_register(bus, np);
        if (ret) {
        dev_err(&pdev->dev, "cannot register MDIO bus\n");
--- linux-4.15.0.orig/drivers/net/ethernet/fujitsu/fmvj18x_cs.c
+++ linux-4.15.0/drivers/net/ethernet/fujitsu/fmvj18x_cs.c
@@ -547,6 +547,11 @@
     return -1;

 base = ioremap(link->resource[2]->start, resource_size(link->resource[2]));
+    if (!base) { 
+        pcmcia_release_window(link, link->resource[2]);
+        return -1;
+    }
+    pcmcia_map_mem_page(link, link->resource[2], 0);

/*
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/Kconfig
@@ -85,31 +85,45 @@
drivers(like ODP)to register with HNAE devices and their associated
operations.

+if HNS3
+config HNS3_HCLGE
tristate "Hisilicon HNS3 HCLGE Acceleration Engine & Compatibility Layer Support"
+default m
depends on PCI_MSI
-depends on HNS3
---help---
This selects the HNS3_HCLGE network acceleration engine & its hardware compatibility layer. The engine would be used in Hisilicon hip08 family of SoCs and further upcoming SoCs.

+config HNS3_DCB
+bool "Hisilicon HNS3 Data Center Bridge Support"
+default n
+depends on HNS3_HCLGE & DCB
+---help---
+ Say Y here if you want to use Data Center Bridging (DCB) in the HNS3 driver.
+ If unsure, say N.
+
+config HNS3_HCLGEVF
+tristate "Hisilicon HNS3VF Acceleration Engine & Compatibility Layer Support"
+depends on PCI_MSI
+depends on HNS3_HCLGE
+---help---
+ This selects the HNS3 VF drivers network acceleration engine & its hardware compatibility layer. The engine would be used in Hisilicon hip08 family of SoCs and further upcoming SoCs.
+
config HNS3_ENET
tristate "Hisilicon HNS3 Ethernet Device Support"
+default m
depends on 64BIT & PCI
-depends on HNS3 & HNS3_HCLGE
+depends on INET
---help---
This selects the Ethernet Driver for Hisilicon Network Subsystem 3 for hip08 family of SoCs. This module depends upon HNAE3 driver to access the HNAE3 devices and their associated operations.

-config HNS3_DCB
-bool "Hisilicon HNS3 Data Center Bridge Support"
-default n
-depends on HNS3 & HNS3_HCLGE & DCB
---help---
- Say Y here if you want to use Data Center Bridging (DCB) in the HNS3 driver.
-
- If unsure, say N.
+endif #HNS3
endif # NET_VENDOR_HISILICON
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hip04_eth.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hip04_eth.c
@@ -157,6 +157,7 @@
+struct device *dev;
struct net_device *ndev;

dma_addr_t rx_phys[RX_DESC_NUM];
unsigned int rx_head;
unsigned int rx_buf_size;
+unsigned int rx_cnt_remaining;

struct device_node *phy_node;
struct phy_device *phy;
@@ -185,7 +187,7 @@
static inline unsigned int tx_count(unsigned int head, unsigned int tail) {
  -return (head - tail) % (TX_DESC_NUM - 1);
  +return (head - tail) % TX_DESC_NUM;
}

static void hip04_config_port(struct net_device *ndev, u32 speed, u32 duplex) {
@@ -387,7 +389,7 @@

if (priv->tx_phys[tx_tail]) {
  -dma_unmap_single(&ndev->dev, priv->tx_phys[tx_tail],
  +dma_unmap_single(priv->dev, priv->tx_phys[tx_tail],
    priv->tx_skb[tx_tail]->len,
    DMA_TO_DEVICE);
  priv->tx_phys[tx_tail] = 0;
  @@ -422,7 +424,8 @@
    ns, HRTIMER_MODE_REL);
}

-static int hip04_mac_start_xmit(struct sk_buff *skb, struct net_device *ndev)
+static netdev_tx_t
+hip04_mac_start_xmit(struct sk_buff *skb, struct net_device *ndev) {
  struct hip04_priv *priv = netdev_priv(ndev);
  struct net_device_stats *stats = &ndev->stats;
  @@ -437,8 +440,8 @@

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return NETDEV_TX_BUSY;
}

-phys = dma_map_single(&ndev->dev, skb->data, skb->len, DMA_TO_DEVICE);
-if (dma_mapping_error(&ndev->dev, phys)) {
+phys = dma_map_single(priv->dev, skb->data, skb->len, DMA_TO_DEVICE);
+if (dma_mapping_error(priv->dev, phys)) {
    dev_kfree_skb(skb);
    return NETDEV_TX_OK;
}
@@ -453,9 +456,9 @@
    skb_tx_timestamp(skb);

    hip04_set_xmit_desc(priv, phys);
-priv->tx_head = TX_NEXT(tx_head);
-count++;
-netdev_sent_queue(ndev, skb->len);
+priv->tx_head = TX_NEXT(tx_head);

    stats->tx_bytes += skb->len;
    stats->tx_packets++;
@@ -486,7 +489,6 @@
    struct hip04_priv *priv = container_of(napi, struct hip04_priv, napi);
    struct net_device *ndev = priv->ndev;
    struct net_device_stats *stats = &ndev->stats;
-unsigned int cnt = hip04_recv_cnt(priv);
    struct rx_desc *desc;
    struct sk_buff *skb;
    unsigned char *buf;
@@ -497,7 +499,10 @@
    u16 len;
    u32 err;

    while (cnt && !last) {
        /* clean up tx descriptors */
        +tx_remaining = hip04_tx_reclaim(ndev, false);
        +priv->rx_cnt_remaining += hip04_recv_cnt(priv);
        +while (priv->rx_cnt_remaining && !last) {
            buf = priv->rx_buf[priv->rx_head];
            skb = build_skb(buf, priv->rx_buf_size);
            if (unlikely(!skb)) {
                @@ -505,7 +510,7 @@
                goto refill;
            }
        }
    }

    -dma_unmap_single(&ndev->dev, priv->rx_phys[priv->rx_head],
    +dma_unmap_single(priv->dev, priv->rx_phys[priv->rx_head],
    RX_BUF_SIZE, DMA_FROM_DEVICE);
priv->rx_phys[priv->rx_head] = 0;

@@ -534,20 +539,22 @@
    buf = netdev_alloc_frag(priv->rx_buf_size);
    if (!buf)
        goto done;
-	    -phys = dma_map_single(&ndev->dev, buf, RX_BUF_SIZE, DMA_FROM_DEVICE);
+	    -phys = dma_map_single(priv->dev, buf, RX_BUF_SIZE, DMA_FROM_DEVICE);
    -if (dma_mapping_error(&ndev->dev, phys))
    +if (dma_mapping_error(priv->dev, phys))
        goto done;
    priv->rx_buf[priv->rx_head] = buf;
    priv->rx_phys[priv->rx_head] = phys;
    hip04_set_recv_desc(priv, phys);

    priv->rx_head = RX_NEXT(priv->rx_head);
    -if (rx >= budget)
    +if (rx >= budget) {
        +--priv->rx_cnt_remaining;
        goto done;
    +}

    -if (--cnt == 0)
    -cnt = hip04_recv_cnt(priv);
    +if (--priv->rx_cnt_remaining == 0)
    +priv->rx_cnt_remaining += hip04_recv_cnt(priv);
}

if (!(priv->reg_inten & RCV_INT)) {
    @@ -557,8 +564,7 @@
    }
    napi_complete_done(napi, rx);
    done:
-
    /* clean up tx descriptors and start a new timer if necessary */
    -tx_remaining = hip04_tx_reclaim(ndev, false);
    +/* start a new timer if necessary */
    if (rx < budget && tx_remaining)
        hip04_start_tx_timer(priv);

    @@ -633,6 +639,7 @@
    int i;
    priv->rx_head = 0;
    +priv->rx_cnt_remaining = 0;
    priv->tx_head = 0;
    priv->tx_tail = 0;
    hip04_reset_ppe(priv);
for (i = 0; i < RX_DESC_NUM; i++) {
    dma_addr_t phys;

    -phys = dma_map_single(&ndev->dev, priv->rx_buf[i],
    +phys = dma_map_single(priv->dev, priv->rx_buf[i],
    RX_BUF_SIZE, DMA_FROM_DEVICE);
    -if (dma_mapping_error(&ndev->dev, phys))
    +if (dma_mapping_error(priv->dev, phys))
        return -EIO;

    priv->rx_phys[i] = phys;
}

for (i = 0; i < RX_DESC_NUM; i++) {
    if (priv->rx_phys[i]) {
        -dma_unmap_single(&ndev->dev, priv->rx_phys[i],
        +dma_unmap_single(priv->dev, priv->rx_phys[i],
        RX_BUF_SIZE, DMA_FROM_DEVICE);
        priv->rx_phys[i] = 0;
    }
}

priv = netdev_priv(ndev);
+priv->dev = d;
priv->ndev = ndev;
platform_set_drvdata(pdev, ndev);
SET_NETDEV_DEV(ndev, &pdev->dev);

ret = register_netdev(ndev);
-if (ret) {
    -free_netdev(ndev);
    +free_irq(ndev->irq, ndev);
    goto alloc_fail;
-}

return 0;

hip04_free_ring(ndev, d);
unregister_netdev(ndev);
-free_irq(ndev->irq, ndev);
of_node_put(priv->phy_node);
cancel_work_sync(&priv->tx_timeout_task);

free_netdev(ndev);

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hix5hd2_gmac.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hix5hd2_gmac.c
@@ -736,7 +736,7 @
return 0;
}

static int hix5hd2_net_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t hix5hd2_net_xmit(struct sk_buff *skb, struct net_device *dev)
{
struct hix5hd2_priv *priv = netdev_priv(dev);
struct hix5hd2_desc *desc;
@@ -1202,7 +1202,7 @@
goto err_free_mdio;

priv->phy_mode = of_get_phy_mode(node);
-if (priv->phy_mode < 0) {
+if ((int)priv->phy_mode < 0) {
    netdev_err(ndev, "not find phy-mode\n");
    ret = -EINVAL;
    goto err_mdiobus;
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hnae.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hnae.c
@@ -84,7 +84,7 @@
if (cb->type == DESC_TYPE_SKB)
dma_unmap_single(ring_to_dev(ring), cb->dma, cb->length,
    ring_to_dma_dir(ring));
-else
+else if (cb->length)
dma_unmap_page(ring_to_dev(ring), cb->dma, cb->length,
    ring_to_dma_dir(ring));
}
@@ -150,7 +150,6 @@
/* free desc along with its attached buffer */
static void hnae_free_desc(struct hnae_ring *ring)
{
    -hnae_free_buffers(ring);
    dma_unmap_single(ring_to_dev(ring), ring->desc_dma_addr,
        ring->desc_num * sizeof(ring->desc[0]),
        ring_to_dma_dir(ring));
@@ -183,6 +182,9 @@
/* fini ring, also free the buffer for the ring */
static void hnae_fini_ring(struct hnae_ring *ring)
{
+if (is_rx_ring(ring))
+hnae_free_buffers(ring);
+    hnae_free_desc(ring);
kfree(ring->desc_cb);
ring->desc_cb = NULL;
@@ -201,7 +203,6 @@
ring->q = q;
ring->flags = flags;
- spin_lock_init(&ring->lock);
ring->coal_param = q->handle->coal_param;
assert(!ring->desc && !ring->desc_cb && !ring->desc_dma_addr);

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hnae.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hnae.h
@@ -87,7 +87,7 @@
#define HNAE_AE_REGISTER 0x1

- #define RCB_RING_NAME_LEN 16
+ #define RCB_RING_NAME_LEN (IFNAMSIZ + 4)

#define HNAE_LOWEST_LATENCY_COAL_PARAM30
#define HNAE_LOW_LATENCY_COAL_PARAM80
@@ -220,10 +220,10 @@
/* priv data for the desc, e.g. skb when use with ip stack*/
void *priv;
-u16 page_offset;
-u16 reuse_flag;
+u32 page_offset;
+u32 length; /* length of the buffer */

-u16 length; /* length of the buffer */
+u16 reuse_flag;

    /* desc type, used by the ring user to mark the type of the priv data */
-u16 type;
@@ -278,9 +278,6 @@
/* statistic */
struct ring_stats stats;

- /* ring lock for poll one */
- spinlock_t lock;
-
dma_addr_t desc_dma_addr;
u32 buf_size; /* size for hnae_desc->addr, preset by AE */
-u16 desc_num; /* total number of desc */
@@ -486,6 +483,8 @@
u8 *auto_neg, u16 *speed, u8 *duplex);
void (*toggle_ring_irq)(struct hnae_ring *ring, u32 val);
void (*adjust_link)(struct hnae_handle *handle, int speed, int duplex);
+bool (*need_adjust_link)(struct hnae_handle *handle,
+ int speed, int duplex);
int (*set_loopback)(struct hnae_handle *handle,
        enum hnae_loop loop_mode, int en);
void (*get_ring_bdnun_limit)(struct hnae_queue *queue,
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_ae_adapt.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_ae_adapt.c
@@ -70,8 +70,8 @@
    return container_of(q, struct ring_pair_cb, q);
 }

- struct hnae_handle *hns_ae_get_handle(struct hnae_ae_dev *dev,
-    u32 port_id)
+static struct hnae_handle *hns_ae_get_handle(struct hnae_ae_dev *dev,
+    u32 port_id)
{
    int vfnum_per_port;
    int qnum_per_vf;
    @ @ -147,12 +147,45 @@
    struct hnae_vf_cb *vf_cb = hns_ae_get_vf_cb(handle);
    int i;

    -vf_cb->mac_cb = NULL;
    +for (i = 0; i < handle->q_num; i++)
    +hns_ae_get_ring_pair(handle->qs[i])->used_by_vf = 0;
    kfree(vf_cb);
    +

    -for (i = 0; i < handle->q_num; i++)
    -hns_ae_get_ring_pair(handle->qs[i])->used_by_vf = 0;
    +static int hns_ae_wait_flow_down(struct hnae_handle *handle)
    +{
    +struct dsaf_device *dsaf_dev;
    +struct hns_ppe_cb *ppe_cb;
    +struct hnae_vf_cb *vf_cb;
    +int ret;
    +int i;
    +
    +for (i = 0; i < handle->q_num; i++) {
    +ret = hns_rcb_wait_tx_ring_clean(handle->qs[i]);
    +if (ret)
    +return ret;
    +}
    +
    +ppe_cb = hns_get_ppe_cb(handle);
    +ret = hns_ppe_wait_tx_fifo_clean(ppe_cb);
if (ret)
  return ret;
+
dsaf_dev = hns_ae_get_dsaf_dev(handle->dev);
+if (!dsaf_dev)
  return -EINVAL;
  ret = hns_dsaf_wait_pkt_clean(dsaf_dev, handle->dport_id);
  if (ret)
    return ret;
  ret = hns_mac_wait_fifo_clean(vf_cb->mac_cb);
  if (ret)
    return ret;
  mdelay(10);
  return 0;
}

static void hns_ae_ring_enable_all(struct hnae_handle *handle, int val)
@@ -329,7 +362,7 @@
return 0;
}

-void hns_ae_stop(struct hnae_handle *handle)
+static void hns_ae_stop(struct hnae_handle *handle)
{
  struct hns_mac_cb *mac_cb = hns_get_mac_cb(handle);

@@ -344,6 +377,9 @@
  hns_ae_ring_enable_all(handle, 0);

+/* clean rx fbd. */
+hns_rcb_wait_fbd_clean(handle->qs, handle->q_num, RCB_INT_FLAG_RX);
+ (void)hns_mac_vm_config_bc_en(mac_cb, 0, false);

@@ -357,7 +393,7 @@
}

-void hns_ae_toggle_ring_irq(struct hnae_ring *ring, u32 mask)
+static void hns_ae_toggle_ring_irq(struct hnae_ring *ring, u32 mask)
{
  u32 flag;
return hns_mac_get_port_info(mac_cb, auto_neg, speed, duplex);
}

+static bool hns_ae_need_adjust_link(struct hnae_handle *handle, int speed,
+    int duplex)
+{
+    struct hns_mac_cb *mac_cb = hns_get_mac_cb(handle);
+    return hns_mac_need_adjust_link(mac_cb, speed, duplex);
+}
+
+static void hns_ae_adjust_link(struct hnae_handle *handle, int speed,
+    int duplex)
{
    struct hns_mac_cb *mac_cb = hns_get_mac_cb(handle);
-
+    switch (mac_cb->dsaf_dev->dsaf_ver) {
+        case AE_VERSION_1:
+            hns_mac_adjust_link(mac_cb, speed, duplex);
+            break;
+        case AE_VERSION_2:
+            /* chip need to clear all pkt inside */
+            hns_mac_disable(mac_cb, MAC_COMM_MODE_RX);
+            if (hns_ae_wait_flow_down(handle)) {
+                hns_mac_enable(mac_cb, MAC_COMM_MODE_RX);
+                break;
+            }
+            hns_mac_adjust_link(mac_cb, speed, duplex);
+            hns_mac_enable(mac_cb, MAC_COMM_MODE_RX);
+            break;
+        default:
+            break;
+    }
+    return;
}

static void hns_ae_get_ring_bdnum_limit(struct hnae_queue *queue,
*rx_usecs_high = HNS_RCB_RX_USECS_HIGH;
}
- struct net_device_stats *net_stats)
+static void hns_ae_update_stats(struct hnae_handle *handle,
+struct net_device_stats *net_stats)
 {
   int port;
   int idx;
   net_stats->multicast = mac_cb->hw_stats.rx_mc_pkts;
 }

-void hns_ae_get_stats(struct hnae_handle *handle, u64 *data)
+static void hns_ae_get_stats(struct hnae_handle *handle, u64 *data)
 {
   int idx;
   struct hns_mac_cb *mac_cb;
   hns_dsaf_get_stats(vf_cb->dsaf_dev, p, vf_cb->port_index);
 }

-void hns_ae_get_strings(struct hnae_handle *handle,
-u32 stringset, u8 *data)
+static void hns_ae_get_strings(struct hnae_handle *handle,
+u32 stringset, u8 *data)
 {
   int port;
   int idx;
   hns_dsaf_get_strings(stringset, p, port, dsaf_dev);
 }

-int hns_ae_get_sset_count(struct hnae_handle *handle, int stringset)
+static int hns_ae_get_sset_count(struct hnae_handle *handle, int stringset)
 {
   u32 sset_count = 0;
   struct hns_mac_cb *mac_cb;
   return ret;
 }

-void hns_ae_update_led_status(struct hnae_handle *handle)
+static void hns_ae_update_led_status(struct hnae_handle *handle)
 {
   struct hns_mac_cb *mac_cb;

   hns_set_led_opt(mac_cb);
 }
-int hns_ae_cpld_set_led_id(struct hnae_handle *handle,
  - enum hnae_led_state status)
+static int hns_ae_cpld_set_led_id(struct hnae_handle *handle,
 +  enum hnae_led_state status)
{
  struct hns_mac_cb *mac_cb;

  return hns_cpld_led_set_id(mac_cb, status);
}

-void hns_ae_get_regs(struct hnae_handle *handle, void *data)
+static void hns_ae_get_regs(struct hnae_handle *handle, void *data)
{
  u32 *p = data;
  int i;

  hns_dsaf_get_regs(vf_cb->dsaf_dev, vf_cb->port_index, p);
}

-int hns_ae_get_regs_len(struct hnae_handle *handle)
+static int hns_ae_get_regs_len(struct hnae_handle *handle)
{
  u32 total_num;
  struct hnae_vf_cb *vf_cb = hns_ae_get_vf_cb(handle);

  hns_dsaf_get_regs(vf_cb->dsaf_dev, vf_cb->port_index, p);
}

/*enable GE rX/tX */
-if ((mode == MAC_COMM_MODE_TX) || (mode == MAC_COMM_MODE_RX_AND_TX))
+if (mode == MAC_COMM_MODE_TX || mode == MAC_COMM_MODE_RX_AND_TX)
  dsaf_set_dev_bit(drv, GMAC_PORT_EN_REG, GMAC_PORT_TX_EN_B, 1);

-if ((mode == MAC_COMM_MODE_RX) || (mode == MAC_COMM_MODE_RX_AND_TX))
+if (mode == MAC_COMM_MODE_RX || mode == MAC_COMM_MODE_RX_AND_TX) {
  dsaf_set_dev_bit(drv, GMAC_PCS_RX_EN_REG, 0, 0);
  dsaf_set_dev_bit(drv, GMAC_PORT_EN_REG, GMAC_PORT_RX_EN_B, 1);
static void hns_gmac_disable(void *mac_drv, enum mac_common_mode mode)
{
    struct mac_driver *drv = (struct mac_driver *)mac_drv;

    /* disable GE rX/tX */
    -if ((mode == MAC_COMM_MODE_TX) || (mode == MAC_COMM_MODE_RX_AND_TX))
        -dsaf_set_dev_bit(drv, GMAC_PORT_EN_REG, GMAC_PORT_TX_EN_B, 0);
-    if ((mode == MAC_COMM_MODE_RX) || (mode == MAC_COMM_MODE_RX_AND_TX))
        -dsaf_set_dev_bit(drv, GMAC_PORT_EN_REG, GMAC_PORT_RX_EN_B, 0);
+
    /* disable rx pcs */
    +dsaf_set_dev_bit(drv, GMAC_PCS_RX_EN_REG, 0, 1);
    +}
    +}

/* hns_gmac_get_en - get port enable */
@@ -257,6 +263,16 @@
    +tx_pause_en = dsaf_get_bit(pause_en, GMAC_PAUSE_EN_TX_FDFC_B);
    +}

+static bool hns_gmac_need_adjust_link(void *mac_drv, enum mac_speed speed,
+    int duplex)
+{
+    struct mac_driver *drv = (struct mac_driver *)mac_drv;
+    struct hns_mac_cb *mac_cb = drv->mac_cb;
+    +return (mac_cb->speed != speed) ||
+        +(mac_cb->half_duplex == duplex);
+    +}
+
    static int hns_gmac_adjust_link(void *mac_drv, enum mac_speed speed,
    u32 fullDuplex)
    {
    @@ -309,6 +325,30 @@
        hns_gmac_set_uc_match(mac_drv, en);
    }

    +static int hns_gmac_wait_fifo_clean(void *mac_drv)
    +{
        struct mac_driver *drv = (struct mac_driver *)mac_drv;
        +int wait_cnt;
        +u32 val;
        +

+wait_cnt = 0;
+while (wait_cnt++ < HNS_MAX_WAIT_CNT) {
+val = dsaf_read_dev(drv, GMAC_FIFO_STATE_REG);
+/* bit5~bit0 is not send complete pkts */
+if ((val & 0x3f) == 0)
+break;
+usleep_range(100, 200);
+}
+
+if (wait_cnt >= HNS_MAX_WAIT_CNT) {
+dev_err(drv->dev, "hns ge %d fifo was not idle\n", drv->mac_id);
+return -EBUSY;
+}
+
+return 0;
+
+static void hns_gmac_init(void *mac_drv)
{
    u32 port;
    @@ -339,7 +379,7 @@
        GMAC_TX_WATER_LINE_SHIFT, 8);
}
-
-void hns_gmac_update_stats(void *mac_drv)
+static void hns_gmac_update_stats(void *mac_drv)
{
    struct mac_hw_stats *hw_stats = NULL;
    struct mac_driver *drv = (struct mac_driver *)mac_drv;
    @@ -666,7 +706,7 @@

static int hns_gmac_get_sset_count(int stringset)
{
    -if (stringset == ETH_SS_STATS || stringset == ETH_SS_PRIV_FLAGS)
+if (stringset == ETH_SS_STATS)
        return ARRAY_SIZE(g_gmac_stats_string);

    return 0;
    @@ -690,6 +730,7 @@
        mac_drv->mac_disable = hns_gmac_disable;
        mac_drv->mac_free = hns_gmac_free;
        mac_drv->adjust_link = hns_gmac_adjust_link;
+mac_drv->need_adjust_link = hns_gmac_need_adjust_link;
        mac_drv->set_tx_auto_pause_frames = hns_gmac_set_tx_auto_pause_frames;
        mac_drv->config_max_frame_length = hns_gmac_config_max_frame_length;
        mac_drv->mac_pausefrm_cfg = hns_gmac_pause_frm_cfg;
    @@ -717,6 +758,7 @@
```c
mac_drv->get_strings = hns_gmac_get_strings;
mac_drv->update_stats = hns_gmac_update_stats;
mac_drv->set_promiscuous = hns_gmac_set_promisc;
+mac_drv->wait_fifo_clean = hns_gmac_wait_fifo_clean;

return (void *)mac_drv;
}
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_dsaf_mac.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_dsaf_mac.c
@@ -114,6 +114,26 @@
return 0;
}

+/**
+ * hns_mac_is_adjust_link - check is need change mac speed and duplex register
+ * @mac_cb: mac device
+ * @speed: phy device speed
+ * @.duplex:phy device duplex
+ *
+ */
+bool hns_mac_need_adjust_link(struct hns_mac_cb *mac_cb, int speed, int duplex)
+{
+struct mac_driver *mac_ctrl_drv;
+
+mac_ctrl_drv = (struct mac_driver *)(mac_cb->priv.mac);
+
+if (mac_ctrl_drv->need_adjust_link)
+        return mac_ctrl_drv->need_adjust_link(mac_ctrl_drv,
+            (enum mac_speed)speed, duplex);
+else
+        return true;
+}
+
void hns_mac_adjust_link(struct hns_mac_cb *mac_cb, int speed, int duplex)
{
    int ret;
    @ @ -369,7 +389,6 @@
    {
        int ret;
        struct dsaf_device *dsaf_dev = mac_cb->dsaf_dev;
-        u8 addr[ETH_ALEN] = {0xff, 0xff, 0xff, 0xff, 0xff, 0xff};
+        struct dsaf_drv_mac_single_dest_entry mac_entry;
            /* directy return ok in debug network mode */
            @ @ -377,7 +396,7 @@
        return 0;
    }
    if (!HNS_DSAF_IS_DEBUG(dsaf_dev)) {
```
memcpy(mac_entry.addr, addr, sizeof(mac_entry.addr));
+eth_broadcast_addr(mac_entry.addr);
mac_entry.in_vlan_id = vlan_id;
mac_entry.in_port_num = mac_cb->mac_id;
mac_entry.port_num = port_num;
@@ -404,7 +423,6 @@
int ret;
struct dsaf_device *dsaf_dev = mac_cb->dsaf_dev;
  u8 port_num;
-  u8 addr[ETH_ALEN] = {0xff, 0xff, 0xff, 0xff, 0xff, 0xff};
  struct mac_entry_idx *uc_mac_entry;
  struct dsaf_drv_mac_single_dest_entry mac_entry;

@@ -414,7 +432,7 @@
uc_mac_entry = &mac_cb->addr_entry_idx[vmid];

if (!HNS_DSAF_IS_DEBUG(dsaf_dev)) {
    -memcpy(mac_entry.addr, addr, sizeof(mac_entry.addr));
    +eth_broadcast_addr(mac_entry.addr);
    mac_entry.in_vlan_id = uc_mac_entry->vlan_id;
    mac_entry.in_port_num = mac_cb->mac_id;
    ret = hns_mac_get_inner_port_num(mac_cb, vmid, &port_num);
@@ -432,6 +450,16 @@
    return 0;
}

+int hns_mac_wait_fifo_clean(struct hns_mac_cb *mac_cb)
+{
+    struct mac_driver *drv = hns_mac_get_drv(mac_cb);
+    +if (drv->wait_fifo_clean)
+        return drv->wait_fifo_clean(drv);
+    +return 0;
+}
+
void hns_mac_reset(struct hns_mac_cb *mac_cb)
{
    struct mac_driver *drv = hns_mac_get_drv(mac_cb);
@@ -460,11 +488,6 @@
{
    struct mac_driver *drv = hns_mac_get_drv(mac_cb);
    u32 new_frm = new_mtu + ETH_HLEN + ETH_FCS_LEN + VLAN_HLEN;
-    u32 max_frm = AE_IS_VER1(mac_cb->dsaf_dev->dsaf_ver) ?
-        MAC_MAX_MTU_V2 : MAC_MAX_MTU;
-    -if (mac_cb->mac_type == HNAE_PORT_DEBUG)
-        max_frm = MAC_MAX_MTU_DBG;

if (new_frm > HNS_RCB_RING_MAX_BD_PER_PKT * buf_size)
return -EINVAL;
@@ -753,6 +776,17 @@
return rc;
}

+static void hns_mac_remove_phydev(struct hns_mac_cb *mac_cb)
+{ 
+if (!to_acpi_device_node(mac_cb->fw_port) || !mac_cb->phy_dev)
+return;
+
+phy_device_remove(mac_cb->phy_dev);
+phy_device_free(mac_cb->phy_dev);
+
+mac_cb->phy_dev = NULL;
+}
+
+#define MAC_MEDIA_TYPE_MAX_LEN		16

static const struct {
@@ -933,8 +967,9 @@
}
}

-u8 __iomem *hns_mac_get_vaddr(struct dsaf_device *dsaf_dev,
-    struct hns_mac_cb *mac_cb, u32 mac_mode_idx)
+static u8 __iomem *
+hns_mac_get_vaddr(struct dsaf_device *dsaf_dev,
+    struct hns_mac_cb *mac_cb, u32 mac_mode_idx)
{
    u8 __iomem *base = dsaf_dev->io_base;
    int mac_id = mac_cb->mac_id;
@@ -952,7 +987,8 @@
 @ @ -952,7 +987,8 @@
 * @mac_cb: mac control block
 * return 0 - success , negative --fail
 */
-    int hns_mac_get_cfg(struct dsaf_device *dsaf_dev, struct hns_mac_cb *mac_cb)
+static int
+hns_mac_get_cfg(struct dsaf_device *dsaf_dev, struct hns_mac_cb *mac_cb)
{
    int ret;
    u32 mac_mode_idx;
@@ -1001,6 +1037,20 @@
 return DSAF_MAX_PORT_NUM;
}

+void hns_mac_enable(struct hns_mac_cb *mac_cb, enum mac_commom_mode mode)
struct mac_driver *mac_ctrl_drv = hns_mac_get_drv(mac_cb);

mac_ctrl_drv->mac_enable(mac_cb->priv.mac, mode);

void hns_mac_disable(struct hns_mac_cb *mac_cb, enum mac_common_mode mode)
{
struct mac_driver *mac_ctrl_drv = hns_mac_get_drv(mac_cb);

mac_ctrl_drv->mac_disable(mac_cb->priv.mac, mode);
}

/**
 * hns_mac_init - init mac
 */
int max_port_num = hns_mac_get_max_port_num(dsaf_dev);
for (i = 0; i < max_port_num; i++) {
    if (!dsaf_dev->mac_cb[i])
        continue;
    dsaf_dev->misc_op->cpld_reset_led(dsaf_dev->mac_cb[i]);
    hns_mac_remove_phydev(dsaf_dev->mac_cb[i]);
    dsaf_dev->mac_cb[i] = NULL;
}

int hns_cpld_led_set_id(struct hns_mac_cb *mac_cb, enum hnae_led_state status)
{
    if (!mac_cb || !mac_cb->cpld_ctrl)
        return 0;
    return mac_cb->dsaf_dev->misc_op->cpld_set_led_id(mac_cb, status);
}

return mac_cb->dsaf_dev->misc_op->cpld_set_led_id(mac_cb, status);

/*adjust mac mode of port, include speed and duplex*/
int (*adjust_link)(void *mac_drv, enum mac_speed speed, u32 full_duplex);

/* need adjust link */
bool (*need_adjust_link)(void *mac_drv, enum mac_speed speed, int duplex);

/* config autogotaite mode of port*/
void (*set_an_mode)(void *mac_drv, u8 enable);
void (*get_info)(void *mac_drv, struct mac_info *mac_info);
void (*update_stats)(void *mac_drv);
+int (*wait_fifo_clean)(void *mac_drv);
enum mac_mode mac_mode;
u8 mac_id;
int hns_mac_init(struct dsaf_device *dsaf_dev);
void mac_adjust_link(struct net_device *net_dev);
+bool hns_mac_need_adjust_link(struct hns_mac_cb *mac_cb, int speed, int duplex);
void hns_mac_get_link_status(struct hns_mac_cb *mac_cb, u32 *link_status);
int hns_mac_change_vf_addr(struct hns_mac_cb *mac_cb, u32 vmid, char *addr);
int hns_mac_set_multi(struct hns_mac_cb *mac_cb,
    const unsigned char *addr);
int hns_mac_rm_uc_addr(struct hns_mac_cb *mac_cb, u8 vf_id,
    const unsiigned char *addr);
int hns_mac_clr_multicast(struct hns_mac_cb *mac_cb, int vfn);
+void hns_mac_enable(struct hns_mac_cb *mac_cb, enum mac_common_mode mode);
+void hns_mac_disable(struct hns_mac_cb *mac_cb, enum mac_common_mode mode);
+int hns_mac_wait_fifo_clean(struct hns_mac_cb *mac_cb);

const char *g_dsaf_mode_match[DSAF_MODE_MAX] = {
    [DSAF_MODE_DISABLE_2PORT_64VM] = "2port-64vf",
    [DSAF_MODE_DISABLE_6PORT_0VM] = "6port-16rss",
    [DSAF_MODE_DISABLE_6PORT_16VM] = "6port-16vf",
};
MODULE_DEVICE_TABLE(acpi, hns_dsaf_acpi_match);

-int hns_dsaf_get_cfg(struct dsaf_device *dsaf_dev)
+static int hns_dsaf_get_cfg(struct dsaf_device *dsaf_dev)
    {
    int ret, i;
    u32 desc_num;
    @ @ -935,6 +935,62 @@
hns_dsaf_tcam_uc_cfg_vague(struct dsaf_device *dsaf_dev, u32 address, struct dsaf_tbl_tcam_data *tcam_data, struct dsaf_tbl_tcam_data *tcam_mask, struct dsaf_tbl_tcam_ucast_cfg *tcam_uc) {
    spin_lock_bh(&dsaf_dev->tcam_lock);
    hns_dsaf_tbl_tcam_addr_cfg(dsaf_dev, address);
    hns_dsaf_tbl_tcam_data_cfg(dsaf_dev, tcam_data);
    hns_dsaf_tbl_tcam_ucast_cfg(dsaf_dev, tcam_uc);
    hns_dsaf_tbl_tcam_match_cfg(dsaf_dev, tcam_mask);
    hns_dsaf_tbl_tcam_data_ucast_pul(dsaf_dev);

    /* Restore Match Data */
    tcam_mask->tbl_tcam_data_high = 0xffffffff;
    tcam_mask->tbl_tcam_data_low = 0xffffffff;
    hns_dsaf_tbl_tcam_match_cfg(dsaf_dev, tcam_mask);

    spin_unlock_bh(&dsaf_dev->tcam_lock);
}

hns_dsaf_tcam_mc_cfg_vague(struct dsaf_device *dsaf_dev, u32 address, struct dsaf_tbl_tcam_data *tcam_data, struct dsaf_tbl_tcam_data *tcam_mask, struct dsaf_tbl_tcam_mcast_cfg *tcam_mc) {
    spin_lock_bh(&dsaf_dev->tcam_lock);
    hns_dsaf_tbl_tcam_addr_cfg(dsaf_dev, address);
    hns_dsaf_tbl_tcam_data_cfg(dsaf_dev, tcam_data);
    hns_dsaf_tbl_tcam_mcast_cfg(dsaf_dev, tcam_mc);
    hns_dsaf_tbl_tcam_match_cfg(dsaf_dev, tcam_mask);
    hns_dsaf_tbl_tcam_data_mcast_pul(dsaf_dev);
+ /*Restore Match Data*/
+ tcam_mask->tbl_tcam_data_high = 0xffffffff;
+ tcam_mask->tbl_tcam_data_low = 0xffffffff;
+ hns_dsaf_tbl_tcam_match_cfg(dsaf_dev, tcam_mask);
+ +spin_unlock_bh(&dsaf_dev->tcam_lock);
+ +}
+ +/**
+ * hns_dsaf_tcam_mc_invld - INT
+ * @dsaf_id: dsa fabric id
+ * @address
+ * @ @ -959,7 +1015,8 @@
+ * spin_unlock_bh(&dsaf_dev->tcam_lock);
+ */
+
+static void
+hns_dsaf_tcam_addr_get(struct dsaf_drv_tbl_tcam_key *mac_key, u8 *addr)
+{ 
+addr[0] = mac_key->high.bits.mac_0;
+addr[1] = mac_key->high.bits.mac_1;
+@ @ -1492,6 +1549,27 @@
+
+/**
+ * hns_dsaf_find_empty_mac_entry_reverse
+ * search dsa fabric soft empty-entry from the end
+ * @dsaf_dev: dsa fabric device struct pointer
+ */
+ +static u16 hns_dsaf_find_empty_mac_entry_reverse(struct dsaf_device *dsaf_dev)
+ +{
+struct dsaf_drv_priv *priv = hns_dsaf_dev_priv(dsaf_dev);
+struct dsaf_drv_soft_mac_tbl *soft_mac_entry;
+int i;
+ +soft_mac_entry = priv->soft_mac_tbl + (DSAF_TCAM_SUM - 1);
+for (i = (DSAF_TCAM_SUM - 1); i > 0; i--) {
+/* search all entry from end to start.*/
+if (soft_mac_entry->index == DSAF_INVALID_ENTRY_IDX)
+return i;
+soft_mac_entry--;
+}
+return DSAF_INVALID_ENTRY_IDX;
+}
static void hns_dsaf_set_mac_key(struct dsaf_device *dsaf_dev, u8 *mac_key)
{
    struct dsaf_tbl_tcam_key *tmp_mac_key = NULL;
    struct dsaf_tbl_tcam_data tcam_data;
    u8 mc_addr[ETH_ALEN];
    u8 *mc_mask = NULL;
    int mskid;

    ether_addr_copy(mc_addr, mac_entry->addr);
    if (!AE_IS_VER1(dsaf_dev->dsaf_ver)) {
        u8 mc_mask[ETH_ALEN];
        /* prepare for key data setting */
        hns_dsaf_setup_mc_mask(dsaf_dev, mac_entry->in_port_num,
            mc_mask, mac_entry->addr);
        hns_dsaf_mc_mask_bit_clear(mc_addr, mc_mask);
        /* config key mask */
        @ @ -1728,10 +1816,6 @@
        /* if exist, add in */
        hns_dsaf_tcam_mc_get(dsaf_dev, entry_index, &tcam_data, &mac_data);
    }

    /* check mac addr */
    @ @ -1687,9 +1772,12 @@
    }

    ether_addr_copy(mc_addr, mac_entry->addr);
    -mc_mask = dsaf_dev->mac_cb[mac_entry->in_port_num]->mc_mask;
    if (!AE_IS_VER1(dsaf_dev->dsaf_ver)) {
        +u8 mc_mask[ETH_ALEN];
        +/* prepare for key data setting */
        +hns_dsaf_setup_mc_mask(dsaf_dev, mac_entry->in_port_num,
            +mc_mask, mac_entry->addr);
        +hns_dsaf_mc_mask_bit_clear(mc_addr, mc_mask);
        /* config key mask */
        @ @ -1728,10 +1816,6 @@
        /* if exist, add in */
        hns_dsaf_tcam_mc_get(dsaf_dev, entry_index, &tcam_data, &mac_data);

    }
- tmp_mac_key.high.val = le32_to_cpu(tcam_data.tbl_tcam_data_high);
- tmp_mac_key.low.val = le32_to_cpu(tcam_data.tbl_tcam_data_low);
}

/* config hardware entry */
@@ -1841,10 +1925,9 @@
struct dsaf_tbl_tcam_data tcam_data;
int mskid;
const u8 empty_msk[sizeof(mac_data.tbl_mcast_port_msk)] = {0};
-struct dsaf_drv_tbl_tcam_key mask_key, tmp_mac_key;
+struct dsaf_drv_tbl_tcam_key mask_key;
struct dsaf_tbl_tcam_data *pmask_key = NULL;
u8 mc_addr[ETH_ALEN];
-u8 *mc_mask;

if (!((void *)mac_entry)) {
    dev_err(dsaf_dev->dev,
    @@ -1861,14 +1944,17 @@
/* always mask vlan_id field */
    ether_addr_copy(mc_addr, mac_entry->addr);
    -mc_mask = dsaf_dev->mac_cb[mac_entry->in_port_num]->mc_mask;
    +u8 mc_mask[ETH_ALEN];
    +
    /* prepare for key data setting */
    +hns_dsaf_setup_mc_mask(dsaf_dev, mac_entry->in_port_num,
    +    mc_mask, mac_entry->addr);
    hns_dsaf_mc_mask_bit_clear(mc_addr, mc_mask);

    /* config key mask */
    -hns_dsaf_set_mac_key(dsaf_dev, &mask_key, 0x00, 0xff, mc_addr);
    +hns_dsaf_set_mac_key(dsaf_dev, &mask_key, 0x00, 0xff, mc_mask);

    mask_key.high.val = le32_to_cpu(mask_key.high.val);
    mask_key.low.val = le32_to_cpu(mask_key.low.val);
    @@ -1902,9 +1988,6 @@
/* read entry */
    hns_dsaf_tcam_mc_get(dsaf_dev, entry_index, &tcam_data, &mac_data);

    -tmp_mac_key.high.val = le32_to_cpu(tcam_data.tbl_tcam_data_high);
    -tmp_mac_key.low.val = le32_to_cpu(tcam_data.tbl_tcam_data_low);
    -
    /*del the port*/
    if (mac_entry->port_num < DSAF_SERVICE_NW_NUM) {

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mskid = mac_entry->port_num;
@@ -2071,8 +2154,9 @@
* @dsaf_id: dsa fabric id
* @xge_ge_work_mode
*/
-void hns_dsaf_port_work_rate_cfg(struct dsaf_device *dsaf_dev, int mac_id,
-    enum dsaf_port_rate_mode rate_mode)
+static void
+hns_dsaf_port_work_rate_cfg(struct dsaf_device *dsaf_dev, int mac_id,
    enum dsaf_port_rate_mode rate_mode)
{
    u32 port_work_mode;

@@ -2159,9 +2243,9 @@
    DSAF_INODE_LOCAL_ADDR_FALSE_NUM_0_REG + 0x80 * (u64)node_num);
    hw_stats->vlan_drop += dsaf_read_dev(dsaf_dev,
-        DSAF_INODE_SW_VLAN_TAG_DISC_0_REG + 0x80 * (u64)node_num);
+        DSAF_INODE_SW_VLAN_TAG_DISC_0_REG + 4 * (u64)node_num);
    hw_stats->stp_drop += dsaf_read_dev(dsaf_dev,
-        DSAF_INODE_IN_DATA_STP_DISC_0_REG + 0x80 * (u64)node_num);
+        DSAF_INODE_IN_DATA_STP_DISC_0_REG + 4 * (u64)node_num);
    /* pfc pause frame statistics stored in dsaf inode*/
    if ((node_num < DSAF_SERVICE_NW_NUM) && !is_ver1) {
        @@ -2278,237 +2362,237 @@
            DSAF_INODE_BD_ORDER_STATUS_0_REG + j * 4);
            p[223 + i] = dsaf_read_dev(ddev,
            DSAF_INODE_SW_VLAN_TAG_DISC_0_REG + j * 4);
-            -p[224 + i] = dsaf_read_dev(ddev,
+            -p[226 + i] = dsaf_read_dev(ddev,
+                DSAF_INODE_IN_DATA_STP_DISC_0_REG + j * 4);
     }
-    -p[227] = dsaf_read_dev(ddev, DSAF_INODE_GE_FC_EN_0_REG + port * 4);
+    +p[229] = dsaf_read_dev(ddev, DSAF_INODE_VC1_IN_PKT_NUM_0_REG + port * 0x80);

    for (i = 0; i < DSAF_INODE_NUM / DSAF_COMM_CHN; i++) {
        j = i * DSAF_COMM_CHN + port;
        -p[228 + i] = dsaf_read_dev(ddev,
+        +p[228 + i] = dsaf_read_dev(ddev,
            DSAF_INODE_VC0_IN_PKT_NUM_0_REG + j * 4);
    }
-    -p[231] = dsaf_read_dev(ddev,
+    +p[233] = dsaf_read_dev(ddev,
        -DSAIF_INODE_VC1_IN_PKT_NUM_0_REG + port * 4);
+        +DSAIF_INODE_VC1_IN_PKT_NUM_0_REG + port * 0x80);
/* dsaf inode registers */
for (i = 0; i < HNS_DSAF_SBM_NUM(ddev) / DSAF_COMM_CHN; i++) {
    j = i * DSAF_COMM_CHN + port;
    p[232 + i] = dsaf_read_dev(ddev,
    +p[234 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_CFG_REG_0_REG + j * 0x80);
    -p[235 + i] = dsaf_read_dev(ddev,
    +p[237 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_BP_CFG_0_XGE_REG_0_REG + j * 0x80);
    -p[238 + i] = dsaf_read_dev(ddev,
    +p[240 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_BP_CFG_1_REG_0_REG + j * 0x80);
    -p[241 + i] = dsaf_read_dev(ddev,
    +p[243 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_BP_CFG_2_XGE_REG_0_REG + j * 0x80);
    -p[244 + i] = dsaf_read_dev(ddev,
    +p[246 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_FREE_CNT_0_0_REG + j * 0x80);
    -p[245 + i] = dsaf_read_dev(ddev,
    +p[249 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_FREE_CNT_1_0_REG + j * 0x80);
    -p[248 + i] = dsaf_read_dev(ddev,
    +p[252 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_BP_CNT_0_0_REG + j * 0x80);
    -p[251 + i] = dsaf_read_dev(ddev,
    +p[255 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_BP_CNT_1_0_REG + j * 0x80);
    -p[254 + i] = dsaf_read_dev(ddev,
    +p[258 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_BP_CNT_2_0_REG + j * 0x80);
    -p[257 + i] = dsaf_read_dev(ddev,
    +p[261 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_BPCNT_3_0_REG + j * 0x80);
    -p[260 + i] = dsaf_read_dev(ddev,
    +p[264 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_INER_ST_0_REG + j * 0x80);
    -p[263 + i] = dsaf_read_dev(ddev,
    +p[267 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_MIB_REQ_FAILED_TC_0_REG + j * 0x80);
    -p[266 + i] = dsaf_read_dev(ddev,
    +p[270 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_LNK_IMPORT_CNT_0_REG + j * 0x80);
    -p[269 + i] = dsaf_read_dev(ddev,
    +p[273 + i] = dsaf_read_dev(ddev,
    DSAF_SBM_LNK_DROP_CNT_0_REG + j * 0x80);
    -p[272 + i] = dsaf_read_dev(ddev,
    +p[276 + i] = dsaf_read_dev(ddev,
DSAF_SBM_INF_OUTPORT_CNT_0_REG + j * 0x80);
-p[275 + i] = dsaf_read_dev(ddev);
+p[279 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC0_CNT_0_REG + j * 0x80);
-p[278 + i] = dsaf_read_dev(ddev);
+p[282 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC1_CNT_0_REG + j * 0x80);
-p[281 + i] = dsaf_read_dev(ddev);
+p[285 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC2_CNT_0_REG + j * 0x80);
-p[284 + i] = dsaf_read_dev(ddev);
+p[288 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC3_CNT_0_REG + j * 0x80);
-p[287 + i] = dsaf_read_dev(ddev);
+p[291 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC4_CNT_0_REG + j * 0x80);
-p[290 + i] = dsaf_read_dev(ddev);
+p[294 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC5_CNT_0_REG + j * 0x80);
-p[293 + i] = dsaf_read_dev(ddev);
+p[297 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC6_CNT_0_REG + j * 0x80);
-p[296 + i] = dsaf_read_dev(ddev);
+p[300 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_INPORT_TC7_CNT_0_REG + j * 0x80);
-p[299 + i] = dsaf_read_dev(ddev);
+p[303 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_REQ_CNT_0_REG + j * 0x80);
-p[302 + i] = dsaf_read_dev(ddev);
+p[306 + i] = dsaf_read_dev(ddev);

DSAF_SBM_LNK_RELS_CNT_0_REG + j * 0x80);
-p[305 + i] = dsaf_read_dev(ddev);
+p[309 + i] = dsaf_read_dev(ddev);

DSAF_SBM_BP_CFG_3_REG_0_REG + j * 0x80);
-p[311 + i] = dsaf_read_dev(ddev);
+p[315 + i] = dsaf_read_dev(ddev);

DSAF_XOD_ETS_TSA_TC0_TC3_CFG_0_REG + i * 0x90);
-p[319 + i] = dsaf_read_dev(ddev);
+p[323 + i] = dsaf_read_dev(ddev);

DSAF_XOD_ETS_TSA_TC4_TC7_CFG_0_REG + i * 0x90);
-p[327 + i] = dsaf_read_dev(ddev);

/* dsaf xnode registers */
for (i = 0; i < DSAF_XOD_NUM; i++) {

-p[311 + i] = dsaf_read_dev(ddev);
+p[315 + i] = dsaf_read_dev(ddev);

DSAF_XOD_ETS_TSA_TC0_TC3_CFG_0_REG + i * 0x90);
-p[319 + i] = dsaf_read_dev(ddev);
+p[323 + i] = dsaf_read_dev(ddev);

DSAF_XOD_ETS_TSA_TC4_TC7_CFG_0_REG + i * 0x90);
-p[327 + i] = dsaf_read_dev(ddev);
for (i = 0; i < DSAF_XOD_BIG_NUM / DSAF_COMM_CHN; i++) {
    j = i * DSAF_COMM_CHN + port;
    -p[362 + i] = dsaf_read_dev(ddev,
     +p[366 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_GNT_L_0_REG + j * 0x90);
    -p[365 + i] = dsaf_read_dev(ddev,
     +p[369 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_GNT_H_0_REG + j * 0x90);
    -p[368 + i] = dsaf_read_dev(ddev,
     +p[372 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_CONNECT_STATE_0_REG + j * 0x90);
    -p[371 + i] = dsaf_read_dev(ddev,
     +p[375 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_RCVPKT_CNT_0_REG + j * 0x90);
    -p[374 + i] = dsaf_read_dev(ddev,
     +p[378 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_RCVTC0_CNT_0_REG + j * 0x90);
    -p[377 + i] = dsaf_read_dev(ddev,
     +p[381 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_RCVTC1_CNT_0_REG + j * 0x90);
    -p[380 + i] = dsaf_read_dev(ddev,
     +p[384 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_RCVTC2_CNT_0_REG + j * 0x90);
    -p[383 + i] = dsaf_read_dev(ddev,
     +p[387 + i] = dsaf_read_dev(ddev,
     DSAF_XOD_RCVTC3_CNT_0_REG + j * 0x90);
    -p[386 + i] = dsaf_read_dev(ddev,
     +p[390 + i] = dsaf_read_dev(ddev,
DSAF_XOD_RCVVC0_CNT_0_REG + j * 0x90);  
-p[389 + i] = dsaf_read_dev(ddev,  
+p[393 + i] = dsaf_read_dev(ddev,  
DSAF_XOD_RCVVC1_CNT_0_REG + j * 0x90);  
}

-p[392] = dsaf_read_dev(ddev,  
+p[396] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN0_CNT_0_REG + port * 0x90);  
-p[393] = dsaf_read_dev(ddev,  
+p[397] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN1_CNT_0_REG + port * 0x90);  
-p[394] = dsaf_read_dev(ddev,  
+p[398] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN2_CNT_0_REG + port * 0x90);  
-p[395] = dsaf_read_dev(ddev,  
+p[399] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN3_CNT_0_REG + port * 0x90);  
-p[396] = dsaf_read_dev(ddev,  
+p[400] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN4_CNT_0_REG + port * 0x90);  
-p[397] = dsaf_read_dev(ddev,  
+p[401] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN5_CNT_0_REG + port * 0x90);  
-p[398] = dsaf_read_dev(ddev,  
+p[402] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN6_CNT_0_REG + port * 0x90);  
-p[399] = dsaf_read_dev(ddev,  
+p[403] = dsaf_read_dev(ddev,  
DSAF_XOD_XGE_RCVIN7_CNT_0_REG + port * 0x90);  
-p[400] = dsaf_read_dev(ddev,  
+p[404] = dsaf_read_dev(ddev,  
DSAF_XOD_PPE_RCVIN0_CNT_0_REG + port * 0x90);  
-p[401] = dsaf_read_dev(ddev,  
+p[405] = dsaf_read_dev(ddev,  
DSAF_XOD_PPE_RCVIN1_CNT_0_REG + port * 0x90);  
-p[402] = dsaf_read_dev(ddev,  
+p[406] = dsaf_read_dev(ddev,  
DSAF_XOD_ROCEE_RCVIN0_CNT_0_REG + port * 0x90);  
-p[403] = dsaf_read_dev(ddev,  
+p[407] = dsaf_read_dev(ddev,  
DSAF_XOD_ROCEE_RCVIN1_CNT_0_REG + port * 0x90);  
-p[404] = dsaf_read_dev(ddev,  
+p[408] = dsaf_read_dev(ddev,  
DSAF_XOD_FIFO_STATUS_0_REG + port * 0x90);

/* dsaf voq registers */
for (i = 0; i < DSAF_VOQ_NUM / DSAF_COMM_CHN; i++) {
j = (i * DSAF_COMM_CHN + port) * 0x90;
-p[405 + i] = dsaf_read_dev(ddev,
+p[409 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_ECC_INVERT_EN_0_REG + j);
-p[408 + i] = dsaf_read_dev(ddev,
+p[412 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_SRAM_PKT_NUM_0_REG + j);
-p[411 + i] = dsaf_read_dev(ddev, DSAF_VOQ_IN_PKT_NUM_0_REG + j);
-p[414 + i] = dsaf_read_dev(ddev,
+p[415 + i] = dsaf_read_dev(ddev, DSAF_VOQ_IN_PKT_NUM_0_REG + j);
+p[418 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_OUT_PKT_NUM_0_REG + j);
-p[417 + i] = dsaf_read_dev(ddev,
+p[421 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_ECC_ERR_ADDR_0_REG + j);
-p[420 + i] = dsaf_read_dev(ddev, DSAF_VOQ_BP_STATUS_0_REG + j);
-p[423 + i] = dsaf_read_dev(ddev, DSAF_VOQ_SPUP_IDLE_0_REG + j);
-p[426 + i] = dsaf_read_dev(ddev,
+p[424 + i] = dsaf_read_dev(ddev, DSAF_VOQ_BP_STATUS_0_REG + j);
+p[427 + i] = dsaf_read_dev(ddev, DSAF_VOQ_SPUP_IDLE_0_REG + j);
+p[430 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_XGE_XOD_REQ_0_0_REG + j);
-p[429 + i] = dsaf_read_dev(ddev,
+p[433 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_XGE_XOD_REQ_1_0_REG + j);
-p[432 + i] = dsaf_read_dev(ddev,
+p[436 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_PPE_XOD_REQ_0_REG + j);
-p[435 + i] = dsaf_read_dev(ddev,
+p[439 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_ROCEE_XOD_REQ_0_REG + j);
-p[438 + i] = dsaf_read_dev(ddev,
+p[442 + i] = dsaf_read_dev(ddev,
DSAF_VOQ_BP_ALL_THRD_0_REG + j);
}

/* dsaf tbl registers */
-p[441] = dsaf_read_dev(ddev, DSAF_TBL_CTRL_0_REG);
-p[442] = dsaf_read_dev(ddev, DSAF_TBL_INT_MSK_0_REG);
-p[443] = dsaf_read_dev(ddev, DSAF_TBL_INT_SRC_0_REG);
-p[444] = dsaf_read_dev(ddev, DSAF_TBL_INT_STS_0_REG);
-p[445] = dsaf_read_dev(ddev, DSAF_TBL_TCAM_ADDR_0_REG);
-p[446] = dsaf_read_dev(ddev, DSAF_TBL_LINE_ADDR_0_REG);
-p[447] = dsaf_read_dev(ddev, DSAF_TBL_TCAM_HIGH_0_REG);
-p[448] = dsaf_read_dev(ddev, DSAF_TBL_TCAM_LOW_0_REG);
-p[449] = dsaf_read_dev(ddev, DSAF_TBL_TCAM_MCAST_CFG_4_0_REG);
-p[450] = dsaf_read_dev(ddev, DSAF_TBL_TCAM_MCAST_CFG_3_0_REG);
-p[451] = dsaf_read_dev(ddev, DSAF_TBL_TCAM_MCAST_CFG_2_0_REG);
for (i = 0; i < DSAF_SW_PORT_NUM; i++) {
    j = i * 0x8;
    -p[464 + 2 * i] = dsaf_read_dev(ddev, DSAF_TBL_DA0_MIS_INFO1_0_REG + j);
    -p[465 + 2 * i] = dsaf_read_dev(ddev, DSAF_TBL_DA0_MIS_INFO0_0_REG + j);
}
-p[482] = dsaf_read_dev(ddev, DSAF_TBL_SA_MIS_INFO0_0_REG);
-p[483] = dsaf_read_dev(ddev, DSAF_TBL_PUL_0_REG);
-p[484] = dsaf_read_dev(ddev, DSAF_TBL_OLD_RSLT_0_REG);
-p[485] = dsaf_read_dev(ddev, DSAF_TBL_OLD_SCAN_VAL_0_REG);
-p[486] = dsaf_read_dev(ddev, DSAF_TBL_DFX_CTRL_0_REG);
-p[487] = dsaf_read_dev(ddev, DSAF_TBL_DFX_STAT_0_REG);
-p[488] = dsaf_read_dev(ddev, DSAF_TBL_DFX_STAT_2_0_REG);
-p[489] = dsaf_read_dev(ddev, DSAF_TBL_LKUP_NUM_I_0_REG);
-p[490] = dsaf_read_dev(ddev, DSAF_TBL_LKUP_NUM_O_0_REG);
-p[491] = dsaf_read_dev(ddev, DSAF_TBL_UCAST_BCAST_MIS_INFO_0_0_REG);
+p[484] = dsaf_read_dev(ddev, DSAF_TBL_SA_MIS_INFO2_0_REG);
+p[485] = dsaf_read_dev(ddev, DSAF_TBL_SA_MIS_INFO1_0_REG);
+p[486] = dsaf_read_dev(ddev, DSAF_TBL_SA_MIS_INFO0_0_REG);
+p[487] = dsaf_read_dev(ddev, DSAF_TBL_PUL_0_REG);
+p[488] = dsaf_read_dev(ddev, DSAF_TBL_OLD_RSLT_0_REG);
+p[489] = dsaf_read_dev(ddev, DSAF_TBL_OLD_SCAN_VAL_0_REG);
+p[490] = dsaf_read_dev(ddev, DSAF_TBL_DFX_CTRL_0_REG);
+p[491] = dsaf_read_dev(ddev, DSAF_TBL_DFX_STAT_0_REG);
+p[492] = dsaf_read_dev(ddev, DSAF_TBL_DFX_STAT_2_0_REG);
+p[493] = dsaf_read_dev(ddev, DSAF_TBL_LKUP_NUM_I_0_REG);
+p[494] = dsaf_read_dev(ddev, DSAF_TBL_LKUP_NUM_O_0_REG);
+p[495] = dsaf_read_dev(ddev, DSAF_TBL_UCAST_BCAST_MIS_INFO_0_0_REG);

/* dsaf other registers */
-p[492] = dsaf_read_dev(ddev, DSAF_INODE_FIFO_WL_0_REG + port * 0x4);
-p[493] = dsaf_read_dev(ddev, DSAF_ONODE_FIFO_WL_0_REG + port * 0x4);
-p[494] = dsaf_read_dev(ddev, DSAF_XGE_GE_WORK_MODE_0_REG + port * 0x4);
-p[495] = dsaf_read_dev(ddev, DSAF_XGE_APP_RX_LINK_UP_0_REG + port * 0x4);
+p[496] = dsaf_read_dev(ddev, DSAF_INODE_FIFO_WL_0_REG + port * 0x4);
+p[497] = dsaf_read_dev(ddev, DSAF_ONODE_FIFO_WL_0_REG + port * 0x4);
+p[498] = dsaf_read_dev(ddev, DSAF_XGE_GE_WORK_MODE_0_REG + port * 0x4);
+p[499] = dsaf_read_dev(ddev, DSAF_XGE_APP_RX_LINK_UP_0_REG + port * 0x4);

if (!is_ver1)
-p[498] = dsaf_read_dev(ddev, DSAF_PAUSE_CFG_REG + port * 0x4);
+p[502] = dsaf_read_dev(ddev, DSAF_PAUSE_CFG_REG + port * 0x4);

/* mark end of dsaf regs */
-for (i = 499; i < 504; i++)
+for (i = 503; i < 504; i++)
  p[i] = 0xdddddddd;
}
return DSAF_DUMP_REGS_NUM;
}

/* Reserve the last TCAM entry for promisc support */
#define dsaf_promisc_tcam_entry(port) 
(DSAF_TCAM_SUM - DSAFV2_MAC_FUZZY_TCAM_NUM + (port))

void hns_dsaf_set_promisc_tcam(struct dsaf_device *dsaf_dev, 
    u32 port, bool enable)
+static int hns_dsaf_get_port_id(u8 port)
{
  if (port < DSAF_SERVICE_NW_NUM)
    return port;
  +if (port >= DSAF_BASE_INNER_PORT_NUM)
    return port - DSAF_BASE_INNER_PORT_NUM + DSAF_SERVICE_NW_NUM;
  +
  +return -EINVAL;
  +
  +
  +static void set_promisc_tcam_enable(struct dsaf_device *dsaf_dev, u32 port)
  +{
  +
  +struct dsaf_tbl_tcam_ucast_cfg tbl_tcam_ucast = {0, 1, 0, 0, 0x80};
  +struct dsaf_tbl_tcam_data tbl_tcam_data_mc = {0x01000000, port};
  +struct dsaf_tbl_tcam_data tbl_tcam_mask_uc = {0x01000000, 0xf};
  +struct dsaf_tbl_tcam_mcast_cfg tbl_tcam_mcast = {0, 0, {0} };
  +struct dsaf_drv_priv *priv = hns_dsaf_dev_priv(dsaf_dev);
  -struct dsaf_drv_soft_mac_tbl *soft_mac_entry = priv->soft_mac_tbl;
  -u16 entry_index;
  -struct dsaf_drv_tbl_tcam_key tbl_tcam_data, tbl_tcam_mask;
  -struct dsaf_tbl_tcam_mcast_cfg mac_data = {0};
  +struct dsaf_tbl_tcam_data tbl_tcam_data_mc = {0x01000000, port};
  +struct dsaf_drv_mac_single_dest_entry mask_entry;
  +struct dsaf_drv_tbl_tcam_key temp_key, mask_key;
  +struct dsaf_drv_soft_mac_tbl *soft_mac_entry;
  +u16 entry_index = DSAF_INVALID_ENTRY_IDX;
  -struct dsaf_drv_tbl_tcam_key tbl_tcam_key tbl_tcam_mask;
  -struct dsaf_tbl_tcam_data tbl_tcam_data = {0};
  +struct dsaf_tbl_tcam_data tbl_tcam_data = {0};
  +struct dsaf_drv_tbl_tcam_key temp_key, mask_key;
  +struct dsaf_drv_soft_mac_tbl *soft_mac_entry;
  +u16 entry_index = DSAF_INVALID_ENTRY_IDX;
  +struct dsaf_drv_tbl_tcam_key mac_key;
  +struct hns_mac_cb *mac_cb;
  +u8 addr[ETH_ALEN] = {0};
  +u8 port_num;
  +int mskid;

  if ((AE_IS_VER1(dsaf_dev->dsaf_ver)) || HNS_DSAF_IS_DEBUG(dsaf_dev))
  /* promisc use vague table match with vlanid = 0 & macaddr = 0 */
  +hns_dsaf_set_mac_key(dsaf_dev, &mac_key, 0x00, port, addr);
  +entry_index = hns_dsaf_find_soft_mac_entry(dsaf_dev, &mac_key);
  +if (entry_index != DSAF_INVALID_ENTRY_IDX)
    return;
+/* put promisc tcam entry in the end. */
+/* 1. set promisc unicast vague tcam entry. */
+entry_index = hns_dsaf_find_empty_mac_entry_reverse(dsaf_dev);
+if (entry_index == DSAF_INVALID_ENTRY_IDX) {
+dev_err(dsaf_dev->dev,
+"enable uc promisc failed (port:%#x)\n",
+port);
+return;
+
-/* find the tcam entry index for promisc */
-entry_index = dsaf_promisc_tcam_entry(port);
+mac_cb = dsaf_dev->mac_cb[port];
+(void)hns_mac_get_inner_port_num(mac_cb, 0, &port_num);
+tbl_tcam_ucast.tbl_ucast_out_port = port_num;
+
+/* config uc vague table */
+hns_dsaf_tcam_uc_cfg_vague(dsaf_dev, entry_index, &tbl_tcam_data_uc,
+ &tbl_tcam_mask_uc, &tbl_tcam_ucast);

-memset(&tbl_tcam_data, 0, sizeof(tbl_tcam_data));
-memset(&tbl_tcam_mask, 0, sizeof(tbl_tcam_mask));
+/* update software entry */
+soft_mac_entry = priv->soft_mac_tbl;
+soft_mac_entry += entry_index;
+soft_mac_entry->index = entry_index;
+soft_mac_entry->tcam_key.high.val = mac_key.high.val;
+soft_mac_entry->tcam_key.low.val = mac_key.low.val;
+
+/* step back to the START for mc. */
+soft_mac_entry = priv->soft_mac_tbl;

-/* config key mask */
-if (enable) {
-dsaf_set_field(tbl_tcam_data.low.bits.port_vlan,
- DSAF_TBL_TCAM_KEY_PORT_M,
- DSAF_TBL_TCAM_KEY_PORT_S, port);
-dsaf_set_field(tbl_tcam_mask.low.bits.port_vlan,
- DSAF_TBL_TCAM_KEY_PORT_M,
- DSAF_TBL_TCAM_KEY_PORT_S, 0xf);
-
-/* SUB_QID */
-dsaf_set_bit(mac_data.tbl_mcast_port_msk[0],
- DSAF_SERVICE_NW_NUM, true);
-mac_data.tbl_mcast_item_vld = true; /* item_vld bit */
-} else {
-mac_data.tbl_mcast_item_vld = false; /* item_vld bit */
+
+/* 2. set promisc multicast vague tcam entry. */
entry_index = hns_dsaf_find_empty_mac_entry_reverse(dsaf_dev);
if (entry_index == DSAF_INVALID_ENTRYIDX) {
  dev_err(dsaf_dev-&gt;dev, 
  "enable mc promisc failed (port:%#x)\n", 
  port);
  return;
}

dev_dbg(dsaf_dev-&gt;dev, 
  "set_promisc_entry, %s Mac key(%#x:%#x) entry_index%d\n", 
  dsaf_dev-&gt;ae_dev.name, tbl_tcam_data.high.val, 
  tbl_tcam_data.low.val, entry_index);

/* set promisc entry with mask */
- hns_dsaf_tcam_mc_cfg(dsaf_dev, entry_index, 
  (struct dsaf_tbl_tcam_data *)&amp;tbl_tcam_data, 
  (struct dsaf_tbl_tcam_data *)&amp;tbl_tcam_mask, 
  &amp;mac_data);
- memset(&amp;mask_entry, 0x0, sizeof(mask_entry));
- memset(&amp;mask_key, 0x0, sizeof(mask_key));
- memset(&amp;temp_key, 0x0, sizeof(temp_key));
+ memset(&amp;mask_entry, 0x0, sizeof(mask_entry));
+ memset(&amp;mask_key, 0x0, sizeof(mask_key));
+ memset(&amp;temp_key, 0x0, sizeof(temp_key));
+ mask_entry.addr[0] = 0x01;
+ hns_dsaf_set_mac_key(dsaf_dev, &amp;mask_key, mask_entry.in_vlan_id, 
  0xf, mask_entry.addr);
+ tbl_tcam_mcast.tbl_mcast_item_vld = 1;
+ tbl_tcam_mcast.tbl_mcast_old_en = 0;

/* set MAC port to handle multicast */
+ mskid = hns_dsaf_get_port_id(port);
+if (mskid == -EINVAL) {
  dev_err(dsaf_dev-&gt;dev, "%s,pnum(%d)error,key(%#x:%#x)\n", 
  dsaf_dev-&gt;ae_dev.name, port, 
  mask_key.high.val, mask_key.low.val);
  return;
  + } 
+ dsaf_set_bit(tbl_tcam_mcast.tbl_mcast_port_msk[mskid / 32], 
  mskid % 32, 1);

/* config software entry */
/* set pool bit map to handle multicast */
+ mskid = hns_dsaf_get_port_id(port_num);
+if (mskid == -EINVAL) {
  dev_err(dsaf_dev-&gt;dev, "%s,pnum(%d)error,key(%#x:%#x)\n", 
  dsaf_dev-&gt;ae_dev.name, port_num, 
  mask_key.high.val, mask_key.low.val);
  return;
  + }
+ dsaf_set_bit(tbl_tcam_mcast.tbl_mcast_port_msk[mskid / 32], 
  mskid % 32, 1);
+dsaf_set_bit(tbl_tcam_mcast.tbl_mcast_port_msk[mskid / 32],
+    mskid % 32, 1);
+
+memcpy(&temp_key, &mask_key, sizeof(mask_key));
+hns_dsaf_tcam_mc_cfg_vague(dsaf_dev, entry_index, &tbl_tcam_data_mc,
+    (struct dsaf_tbl_tcam_data *)&mask_key),
+    &tbl_tcam_mcast);
+
+    /* update software entry */
+    soft_mac_entry += entry_index;
-soft_mac_entry->index = enable ? entry_index : DSAF_INVALID_ENTRY_IDX;
+soft_mac_entry->index = entry_index;
+soft_mac_entry->tcam_key.high.val = temp_key.high.val;
+soft_mac_entry->tcam_key.low.val = temp_key.low.val;
+
+
+static void set_promisc_tcam_disable(struct dsaf_device *dsaf_dev, u32 port)
+
+{
+struct dsaf_tbl_tcam_data tbl_tcam_data_mc = {0x01000000, port};
+struct dsaf_tbl_tcam_ucast_cfg tbl_tcam_ucast = {0, 0, 0, 0, 0};
+struct dsaf_tbl_tcam_mcast_cfg tbl_tcam_mcast = {0, 0, {0} };
+struct dsaf_drv_priv *priv = hns_dsaf_dev_priv(dsaf_dev);
+struct dsaf_tbl_tcam_data tbl_tcam_data_uc = {0, 0};
+struct dsaf_tbl_tcam_data tbl_tcam_mask = {0, 0};
+struct dsaf_drv_soft_mac_tbl *soft_mac_entry;
+u16 entry_index = DSAF_INVALID_ENTRY_IDX;
+struct dsaf_drv_tbl_tcam_key mac_key;
+u8 addr[ETH_ALEN] = {0};
+
+    /* 1. delete uc vague tcam entry. */
+    /* promisc use vague table match with vlanid = 0 & macaddr = 0 */
+    hns_dsaf_set_mac_key(dsaf_dev, &mac_key, 0x00, port, addr);
+    entry_index = hns_dsaf_find_soft_mac_entry(dsaf_dev, &mac_key);
+    +
+    +if (entry_index == DSAF_INVALID_ENTRY_IDX)
+        return;
+    +
+    +    /* config uc vague table */
+    +hns_dsaf_tbl_tcam_uc_cfg_vague(dsaf_dev, entry_index, &tbl_tcam_data_uc,
+        &tbl_tcam_mask, &tbl_tcam_ucast);
+/* update soft management table. */
+    +soft_mac_entry = priv->soft_mac_tbl;
+    +soft_mac_entry += entry_index;
+    +soft_mac_entry->index = DSAF_INVALID_ENTRY_IDX;
+/* step back to the START for mc. */
+    +soft_mac_entry = priv->soft_mac_tbl;
+    +
+    +/* 2. delete mc vague tcam entry. */
addr[0] = 0x01;
memset(&mac_key, 0x0, sizeof(mac_key));
hns_dsaf_set_mac_key(dsaf_dev, &mac_key, 0x00, port, addr);
entry_index = hns_dsaf_find_soft_mac_entry(dsaf_dev, &mac_key);
if (entry_index == DSAF_INVALID_ENTRY_IDX)
    return;

/* config mc vague table */
hns_dsaf_tcam_mc_cfg_vague(dsaf_dev, entry_index, &tbl_tcam_data_mc,
   &tbl_tcam_mask, &tbl_tcam_mcast);
/* update soft management table. */
soft_mac_entry += entry_index;
soft_mac_entry->index = DSAF_INVALID_ENTRY_IDX;
}

/* Reserve the last TCAM entry for promisc support */
void hns_dsaf_set_promisc_tcam(struct dsaf_device *dsaf_dev,
       u32 port, bool enable)
{
    if (enable)
        set_promisc_tcam_enable(dsaf_dev, port);
    else
        set_promisc_tcam_disable(dsaf_dev, port);
}

int hns_dsaf_wait_pkt_clean(struct dsaf_device *dsaf_dev, int port)
{
    u32 val, val_tmp;
    int wait_cnt;
    if (port >= DSAF_SERVICE_NW_NUM)
        return 0;
    wait_cnt = 0;
    while (wait_cnt++ < HNS_MAX_WAIT_CNT) {
        val = dsaf_read_dev(dsaf_dev, DSAF_VOQ_IN_PKT_NUM_0_REG +
            (port + DSAF_XGE_NUM) * 0x40);
        val_tmp = dsaf_read_dev(dsaf_dev, DSAF_VOQ_OUT_PKT_NUM_0_REG +
            (port + DSAF_XGE_NUM) * 0x40);
        if (val == val_tmp)
            break;
        usleep_range(100, 200);
    }
    if (wait_cnt >= HNS_MAX_WAIT_CNT) {
        dev_err(dsaf_dev->dev, "hns dsaf clean wait timeout(%u - %u).\n",
+val, val_tmp);
+return -EBUSY;
+
+return 0;
}

/**
 * @ -2870,6 +3102,7 @@
dsaf_dev = dev_get_drvdata(&pdev->dev);
if (!dsaft_dev) {
    dev_err(&pdev->dev, "dsaft_dev is NULL\n");
+put_device(&pdev->dev);
    return -ENODEV;
}

@@ -2877,6 +3110,7 @@
if (AE_IS_VER1(dsaft_dev->dsaf_ver)) {
    dev_err(dsaft_dev->dev, "%s v1 chip doesn't support RoCE\n",
        dsaft_dev->ae_dev.name);
+    put_device(&pdev->dev);
    return -ENODEV;
}

@@ -2915,6 +3149,9 @@
dsaft_set_bit(credit, DSAF_SBMSROCEE_CFG_CRD_EN_B, 1);
dsaft_write_dev(dsaft_dev, DSAF_SBMSROCEE_CFG_REG_REG, credit);
} 
+
+put_device(&pdev->dev);
+ return 0;
}
EXPORT_SYMBOL(hns_dsaft_roce_reset);
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_dsaft_main.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_dsaft_main.h @ -44,6 +44,8 @@
#define DSAF_ROCE_CREDIT_CHN8
#define DSAF_ROCE_CHAN_MODE3
+
+#define HNS_MAX_WAIT_CNT 10000
+
+enum dsaft_roce_port_mode {
    DSAF_ROCE_6PORT_MODE,
    DSAF_ROCE_4PORT_MODE,
    @ -463,5 +465,6 @@

    int hns_dsaft_clr_mac_mc_port(struct dsaft_device *dsaft_dev,
u8 mac_id, u8 port_num);

int hns_dsaf_wait_pkt_clean(struct dsaf_device *dsaf_dev, int port);

@endef /*_HNS_DSAF_MAIN_H__*/
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_dsaf_misc.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_dsaf_misc.c
@@ -18,6 +18,7 @@
HNS_OP_LED_SET_FUNC             = 0x3,
HNS_OP_GET_PORT_TYPE_FUNC       = 0x4,
HNS_OP_GET_SFP_STAT_FUNC        = 0x5,
+HNS_OP_LOCATE_LED_SET_FUNC      = 0x6,
};

enum _dsm_rst_type {
@@ -43,12 +44,17 @@
static u32 dsaf_read_sub(struct dsaf_device *dsaf_dev, u32 reg)
{
  -u32 ret;
  +u32 ret = 0;
  +int err;

  -if (dsaf_dev->sub_ctrl)
  -ret = dsaf_read_syscon(dsaf_dev->sub_ctrl, reg);
  -else
  +if (dsaf_dev->sub_ctrl) {
  +err = dsaf_read_syscon(dsaf_dev->sub_ctrl, reg, &ret);
  +if (err)
  +dev_err(dsaf_dev->dev, "dsaf_read_syscon error %d!\n",
  +err);
  +} else {
  ret = dsaf_read_reg(dsaf_dev->sc_base, reg);
  +}

  return ret;
}
@@ -81,6 +87,33 @@
    ACPI_FREE(obj);
}

+static void hns_dsaf_acpi_locate_ledctrl_by_port(struct hns_mac_cb *mac_cb,
+    u8 op_type, u32 locate,
+    u32 port)
+{
+  union acpi_object obj_args[2], argv4;
+  union acpi_object *obj;
+  
+  obj_args[0].integer.type = ACPI_TYPE_INTEGER;
+obj_args[0].integer.value = locate;
+obj_args[1].integer.type = ACPI_TYPE_INTEGER;
+obj_args[1].integer.value = port;
+
+argv4.type = ACPI_TYPE_PACKAGE;
+argv4.package.count = 2;
+argv4.package.elements = obj_args;
+
+obj = acpi_evaluate_dsm(ACPI_HANDLE(mac_cb->dev),
+&hns_dsaf_acpi_dsm_guid, 0, op_type, &argv4);
+if (!obj) {
+dev_err(mac_cb->dev, "ledctrl fail, locate:%d port:%d\n",
+locate, port);
+return;
+}
+
+ACPI_FREE(obj);
+
+static void hns_cpld_set_led(struct hns_mac_cb *mac_cb, int link_status,
+u16 speed, int data)
{
@@ -160,15 +193,23 @@
static int cpld_set_led_id(struct hns_mac_cb *mac_cb,
 enum hnae_led_state status)
{
+u32 val = 0;
+int ret;
+
+if (!mac_cb->cpld_ctrl)
+return 0;
+
+switch (status) {
+case HNAE_LED_ACTIVE:
+mac_cb->cpld_led_value =
+dsaf_read_syscon(mac_cb->cpld_ctrl,
+ mac_cb->cpld_ctrl_reg);
+dsaf_set_bit(mac_cb->cpld_led_value, DSAF_LED_ANCHOR_B,
+ CPLD_LED_ON_VALUE);
+ret = dsaf_read_syscon(mac_cb->cpld_ctrl, mac_cb->cpld_ctrl_reg,
+ &val);
+if (ret)
+return ret;
+
+dsaf_set_bit(val, DSAF_LED_ANCHOR_B, CPLD_LED_ON_VALUE);
+dsaf_write_syscon(mac_cb->cpld_ctrl, mac_cb->cpld_ctrl_reg,
+ mac_cb->cpld_led_value);
+ val);
+mac_cb->cpld_led_value = val;
break;

case HNAE_LED_INACTIVE:
dsaF_set_bit(mac_cb->cpld_led_value, DSAF_LED_ANCHOR_B,
@@ -184,6 +225,30 @@
return 0;
}

+static int cpld_set_led_id_acpi(struct hns_mac_cb *mac_cb,
+enum hnae_led_state status)
+{
+switch (status) {
+case HNAE_LED_ACTIVE:
+hns_dsaf_acpi_locate_ledctrl_by_port(mac_cb,
+ HNS_OP_LOCATE_LED_SET_FUNC,
+ CPLD_LED_ON_VALUE,
+ mac_cb->mac_id);
+break;
+case HNAE_LED_INACTIVE:
+hns_dsaf_acpi_locate_ledctrl_by_port(mac_cb,
+ HNS_OP_LOCATE_LED_SET_FUNC,
+ CPLD_LED_DEFAULT_VALUE,
+ mac_cb->mac_id);
+break;
+default:
+dev_err(mac_cb->dev, "invalid led state: %d!", status);
+return -EINVAL;
+}
+
+return 0;
+
#define RESET_REQ_OR_DREQ 1

static void hns_dsaf_acpi_srst_by_port(struct dsaf_device *dsaf_dev, u8 op_type,
@@ -275,7 +340,8 @@
* bit18-19 for com/dfx
 * @enable: false - request reset , true - drop reset
 */
-void hns_dsaf_srst_chns(struct dsaf_device *dsaf_dev, u32 msk, bool dereset)
+static void
+hns_dsaf_srst_chns(struct dsaf_device *dsaf_dev, u32 msk, bool dereset)
{
 u32 reg_addr;
@@ -297,7 +363,7 @@
 * bit18-19 for com/dfx
 * @enable: false - request reset , true - drop reset
*/
-void
+static void
hns_dsaf_srst_chns_acpi(struct dsaf_device *dsaf_dev, u32 msk, bool dereset)
{
    hns_dsaf_acpi_srst_by_port(dsaf_dev, HNS_OP_RESET_FUNC,
@ @ -305.7 +371.7 @@
    msk, dereset);
}

-void hns_dsaf_roce_srst(struct dsaf_device *dsaf_dev, bool dereset)
+static void hns_dsaf_roce_srst(struct dsaf_device *dsaf_dev, bool dereset)
{
    if (!dereset) {
        dsaf_write_sub(dsaf_dev, DSAF_SUB_SC_ROCEE_RESET_REQ_REG, 1);
    @ @ -319.7 +385.7 @@
    }
}

-void hns_dsaf_roce_srst_acpi(struct dsaf_device *dsaf_dev, bool dereset)
+static void hns_dsaf_roce_srst_acpi(struct dsaf_device *dsaf_dev, bool dereset)
{
    hns_dsaf_acpi_srst_by_port(dsaf_dev, HNS_OP_RESET_FUNC,
HNS_ROCE_RESET_FUNC, 0, dereset);
@ @ -503.18 +569.25 @@
    return phy_if;
}

-int hns_mac_get_sfp_prsnt(struct hns_mac_cb *mac_cb, int *sfp_prsnt)
+static int hns_mac_get_sfp_prsnt(struct hns_mac_cb *mac_cb, int *sfp_prsnt)
{
    u32 val = 0;
    int ret;
+
    if (!mac_cb->cpld_ctrl)
        return -ENODEV;

    *sfp_prsnt = !dsaf_read_syscon(mac_cb->cpld_ctrl, mac_cb->cpld_ctrl_reg
      + MAC_SFP_PORT_OFFSET);
    +ret = dsaf_read_syscon(mac_cb->cpld_ctrl,
      + mac_cb->cpld_ctrl_reg + MAC_SFP_PORT_OFFSET,
      + &val);
    +if (ret)
        return ret;

    +*sfp_prsnt = !val;
    return 0;
}
#include <linux/sockios.h>
#define RX_CSR(lane, reg) ((0x4080 + (reg) * 0x0002 + (lane) * 0x0200) * 2)

u64 reg_offset = RX_CSR(lane_id[mac_cb->mac_id], 0);

-int sfp_prsnt;
+int sfp_prsnt = 0;
int ret = hns_mac_get_sfp_prsnt(mac_cb, &sfp_prsnt);

if (!mac_cb->phy_dev) {
    @ @ -572,7 +645,7 @@
}

if (mac_cb->serdes_ctrl) {
    -u32 origin;
+u32 origin = 0;

    if (!AE_IS_VER1(mac_cb->dsaf_dev->dsaf_ver)) {
        #define HILINK_ACCESS_SEL_CFG		0x40008
@@ -589,7 +662,10 @@
            HILINK_ACCESS_SEL_CFG, 3);
    }

    -origin = dsaf_read_syscon(mac_cb->serdes_ctrl, reg_offset);
+ret = dsaf_read_syscon(mac_cb->serdes_ctrl, reg_offset,
        + &origin);
+if (ret)
+return ret;

dsaf_set_field(origin, 1ull << 10, 10, en);
dsaf_write_syscon(mac_cb->serdes_ctrl, reg_offset, origin);
@@ -660,7 +736,7 @@
} else if (is_acpi_node(dsaf_dev->dev->fwnode)) {
    misc_op->cpld_set_led = hns_cpld_set_led_acpi;
misc_op->cpld_reset_led = cpld_led_reset_acpi;
    -misc_op->cpld_set_led_id = cpld_set_led_id;
+misc_op->cpld_set_led_id = cpld_set_led_id_acpi;

    misc_op->dsaf_reset = hns_dsaf_rst_acpi;
misc_op->xge_srst = hns_dsaf_xge_srst_by_port_acpi;
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_dsaf_ppe.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_dsaf_ppe.c
@@ -73,7 +73,7 @@

* comm_index: common index
* return 0 - success, negative -- fail */

-int hns_ppe_common_get_cfg(struct dsaf_device *dsaf_dev, int comm_index)
+static int hns_ppe_common_get_cfg(struct dsaf_device *dsaf_dev, int comm_index)
{
    struct ppe_common_cb *ppe_common;
    int ppe_num;
    @@ -104,7 +104,8 @@
    return 0;
}

-void hns_ppe_common_free_cfg(struct dsaf_device *dsaf_dev, u32 comm_index)
+static void
+hns_ppe_common_free_cfg(struct dsaf_device *dsaf_dev, u32 comm_index)
{
    dsaf_dev->ppe_common[comm_index] = NULL;
    @@ -203,9 +204,9 @@
    enum dsaf_mode dsaf_mode = dsaf_dev->dsaf_mode;

    dsaf_dev->misc_op->ppe_comm_srst(dsaf_dev, 0);
    -mdelay(100);
    +msleep(100);
    dsaf_dev->misc_op->ppe_comm_srst(dsaf_dev, 1);
    -mdelay(100);
    +msleep(100);
    
    if (ppe_common->ppe_mode == PPE_COMMON_MODE_SERVICE) {
        switch (dsaf_mode) {
            @@ -274,6 +275,29 @@
            dsaf_write_dev(ppe_cb, PPE_INTEN_REG, msk_vlue & vld_msk);
        }
    }

    ++int hns_ppe_wait_tx_fifo_clean(struct hns_ppe_cb *ppe_cb)
    +{
        +int wait_cnt;
        +u32 val;
        +
        +wait_cnt = 0;
        +while (wait_cnt++ < HNS_MAX_WAIT_CNT) {
            +val = dsaf_read_dev(ppe_cb, PPE_CURR_TX_FIFO0_REG) & 0x3ffU;
            +if (!val)
            +break;
            +
            +usleep_range(100, 200);
        }
        +

+if (wait_cnt >= HNS_MAX_WAIT_CNT) {
+dev_err(ppe_cb->dev, "hns ppe tx fifo clean wait timeout, still has %u pkt\n",
+val);
+return -EBUSY;
+}
+
+return 0;
+}

/**
 * ppe_init_hw - init ppe
 * @ppe_cb: ppe device
 *
 */

void hns_ppe_uninit_ex(struct ppe_common_cb *ppe_common)
+static void hns_ppe_uninit_ex(struct ppe_common_cb *ppe_common)
{
    u32 i;

    int hns_ppe_get_sset_count(int stringset)
    {
        -if (stringset == ETH_SS_STATS || stringset == ETH_SS_PRIV_FLAGS)
        +if (stringset == ETH_SS_STATS)
            return ETH_PPE_STATIC_NUM;
        return 0;
    }

    int hns_ppe_wait_tx_fifo_clean(struct hns_ppe_cb *ppe_cb);
    int hns_ppe_init(struct dsaf_device *dsaf_dev);
    void hns_ppe_uninit(struct dsaf_device *dsaf_dev);

    int hns_ppe_wait_tx_fifo_clean(struct hns_ppe_cb *ppe_cb);
    int hns_ppe_init(struct dsaf_device *dsaf_dev);
    void hns_ppe_uninit(struct dsaf_device *dsaf_dev);

    "queue(%d) wait fbd(%d) clean fail!!\n", i, fbd_num);
}

+int hns_rcb_wait_tx_ring_clean(struct hnae_queue *qs)
+{


+u32 head, tail;
+int wait_cnt;
+
+tail = dsaf_read_dev(&qs->tx_ring, RCB_REG_TAIL);
+wait_cnt = 0;
+while (wait_cnt++ < HNS_MAX_WAIT_CNT) {
+head = dsaf_read_dev(&qs->tx_ring, RCB_REG_HEAD);
+if (tail == head)
++break;
+
+usleep_range(100, 200);
+}
+
+if (wait_cnt >= HNS_MAX_WAIT_CNT) {
+dev_err(qs->dev->dev, "rcb wait timeout, head not equal to tail.
");
+return -EBUSY;
+}
+
+return 0;
+
/**
 * hns_rcb_reset_ring_hw - ring reset
 * @q: ring struct pointer
 @@ -705,7 +728,7 @@
 }
 }

-int hns_rcb_get_ring_num(struct dsaf_device *dsaf_dev)
+static int hns_rcb_get_ring_num(struct dsaf_device *dsaf_dev)
 {
 switch (dsaf_dev->dsaf_mode) {
 case DSAF_MODE_ENABLE_FIX:
 @@ -741,7 +764,7 @@
 }
 }

-void __iomem *hns_rcb_common_get_vaddr(struct rcb_common_cb *rcb_common)
+static void __iomem *hns_rcb_common_get_vaddr(struct rcb_common_cb *rcb_common)
 {
 struct dsaf_device *dsaf_dev = rcb_common->dsaf_dev;

 @@ -876,7 +899,7 @@
 */
 int hns_rcb_get_ring_sset_count(int stringset)
 {
-if (stringset == ETH_SS_STATS || stringset == ETH_SS_PRIV_FLAGS)
+if (stringset == ETH_SS_STATS)

return HNS_RING_STATIC_REG_NUM;

return 0;
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_dsaf_rcb.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_dsaf_rcb.h
@@ -136,6 +136,7 @@
void hns_rcb_init_hw(struct ring_pair_cb *ring);
void hns_rcb_reset_ring_hw(struct hnae_queue *q);
void hns_rcb_wait_fbd_clean(struct hnae_queue **qs, int q_num, u32 flag);
+int hns_rcb_wait_tx_ring_clean(struct hnae_queue *qs);

u32 hns_rcb_get_rx_coalesced_frames(
struct rcb_common_cb *rcb_common, u32 port_idx);
++ u32 hns_rcb_get_rx_coalesced_frames(------- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_dsaf_reg.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_dsaf_reg.h
@@ -176,7 +176,7 @@
#define DSAF_INODE_IN_DATA_STP_DISC_0_REG	0x1A50
#define DSAF_INODE_GE_FC_EN_0_REG		0x1B00
#define DSAF_INODE_VC0_IN_PKT_NUM_0_REG		0x1B50
-#define DSAF_INODE_VC1_IN_PKT_NUM_0_REG		0x1C00
+#define DSAF_INODE_VC1_IN_PKT_NUM_0_REG		0x103C
#define DSAF_INODE_IN_PRIO_PAUSE_BASE_REG	0x1C00
#define DSAF_INODE_IN_PRIO_PAUSE_BASE_OFFSET	0x100
#define DSAF_INODE_IN_PRIO_PAUSE_OFFSET		0x50
@@ -404,11 +404,11 @@
#define RCB_ECC_ERR_ADDR4_REG0x460
#define RCB_ECC_ERR_ADDR5_REG0x464

-#define RCB_COM_SF_CFG_INTMASK_RING0x480
-#define RCB_COM_SF_CFG_RING_STS0x484
-#define RCB_COM_SF_CFG_RING0x488
-#define RCB_COM_SF_CFG_INTMASK_BD0x48C
-#define RCB_COM_SF_CFG_BD_RINT_STS0x470
+#define RCB_COM_SF_CFG_INTMASK_RING0x470
+#define RCB_COM_SF_CFG_RING_STS0x474
+#define RCB_COM_SF_CFG_RING0x478
+#define RCB_COM_SF_CFG_INTMASK_BD0x47C
+#define RCB_COM_SF_CFG_BD_RINT_STS0x480
#define RCB_COM_RCB_RD_BD_BUSY0x490
#define RCB_COM_RCB_FBD_CRT_EN0x494
#define RCB_COM_AXI_WR_ERR_INTMASK0x498
@@ @ -464,6 +464,7 @@
#define RCB_RING_INTMSK_TX_OVERTIME_REG0x000C4
#define RCB_RING_INTSTS_TX_OVERTIME_REG0x000C8

+#define GMAC_FIFO_STATE_REG0x0000UL
#define GMAC_DUPLEX_TYPE_REG0x0008UL
#define GMAC_FD_FC_TYPE_REG0x000CUL

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#define GMAC_TX_WATER_LINE_REG 0x0010UL
#define GMAC_LD_LINK_COUNTER_REG 0x01D0UL
#define GMAC_LOOP_REG 0x01DCUL
#define GMAC_RECV_CONTROL_REG 0x01E0UL
#define GMAC_PCS_RX_EN_REG 0x01E4UL
#define GMAC_VLAN_CODE_REG 0x01E8UL
#define GMAC_RX_OVERRUN_CNT_REG 0x01ECUL
#define GMAC_RX_LENGTHFIELD_ERR_CNT_REG 0x01F4UL
#define GMAC_RX_LENGTHFIELD_ERR_CNT_REG 0x01F4UL

regmap_write(base, reg, value);
}

static inline u32 dsaf_read_syscon(struct regmap *base, u32 reg)
static inline int dsaf_read_syscon(struct regmap *base, u32 reg, u32 *val)
{
    unsigned int val;
    regmap_read(base, reg, &val);
    return val;
    return regmap_read(base, reg, val);
}
#define dsaf_read_dev(a, reg) \
    dsaf_set_bit(val, XGMAC_UNIDIR_EN_B, 0);
dsafr_set_bit(val, XGMAC_RF_TX_EN_B, 1);
dsafr_set_field(val, XGMAC_LF_RF_INSERT_M, XGMAC_LF_RF_INSERT_S, 0);
dsaf_write_reg(mac_drv, XGMAC_MAC_TX_LF_RF_CONTROL_REG, val);
+saf_write_dev(mac_drv, XGMAC_MAC_TX_LF_RF_CONTROL_REG, val);

/**
    u32 port = drv->mac_id;

dsafr_dev->misc_op->xge_srst(saf_dev, port, 0);
mdelay(100);
+msleep(100);
dsafr_dev->misc_op->xge_srst(saf_dev, port, 1);

    -mdelay(100);
    +msleep(100);
    hns_xgmac_lf_rf_control_init(drv);
    hns_xgmac_exc_irq_en(drv, 0);
dsaf_write_dev(drv, XGMAC_MAC_MAX_PKT_SIZE_REG, newval);
}

void hns_xgmac_update_stats(void *mac_drv)
{
    struct mac_driver *drv = (struct mac_driver *)mac_drv;
    struct mac_hw_stats *hw_stats = &drv->mac_cb->hw_stats;
}

#define SERVICE_TIMER_HZ (1 * HZ)

#define NIC_TX_CLEAN_MAX_NUM 256
#define NIC_RX_CLEAN_MAX_NUM 64

#define RCB_IRQ_NOT_INITED 0
#define RCB_IRQ_INITED 1
#define HNS_BUFFER_SIZE_2048 2048

static void fill_v2_desc(struct hnae_ring *ring, void *priv,
    int size, dma_addr_t dma, int frag_end,
    int buf_num, enum hns_desc_type type, int mtu)
{
    struct hnae_desc *desc = &ring->desc[ring->next_to_use];
    struct hnae_desc_cb *desc_cb = &ring->desc_cb[ring->next_to_use];
    desc->addr = cpu_to_le64(dma);
    desc->tx.send_size = cpu_to_le16((u16)size);
    desc->type = type;
    desc->addr = cpu_to_le64(dma);
    desc->tx.send_size = cpu_to_le16((u16)size);
}

/* config bd buffer end */
hnae_set_bit(rcfv, HNSV2_TXD_VLD_B, 1);

+ int size, dma_addr_t dma, int frag_end,
+ int buf_num, enum hns_desc_type type, int mtu)
+
+{  
+  fill_v2_desc_hw(ring, priv, size, size, dma, frag_end,  
+  buf_num, type, mtu);
+
+
+ static const struct acpi_device_id hns_enet_acpi_match[] = {
+  { "HISI00C1", 0 },
+  { "HISI00C2", 0 },
+  @ @ -289,15 +294,15 @ @
+
+ /* when the frag size is bigger than hardware, split this frag */
+ for (k = 0; k < frag_buf_num; k++)
+  -fill_v2_desc(ring, priv,
+  - (k == frag_buf_num - 1) ?
+  +fill_v2_desc_hw(ring, priv, k == 0 ? size : 0,
+  + (k == frag_buf_num - 1) ?
+  +sizeoflast : BD_MAX_SEND_SIZE,
+  + dma + BD_MAX_SEND_SIZE * k,
+  + frag_end && (k == frag_buf_num - 1) ? 1 : 0,
+  + buf_num,
+  - (type == DESC_TYPE_SKB && !k) ?
+  + dma + BD_MAX_SEND_SIZE * k,
+  + frag_end && (k == frag_buf_num - 1) ? 1 : 0,
+  + buf_num,
+  +(type == DESC_TYPE_SKB && !k) ?
+  DESC_TYPE_SKB : DESC_TYPE_PAGE,
+  - mtu);
+  +mtu);
+
+ netdev_tx_t hns_nic_net_xmit_hw(struct net_device *ndev,
+ @ @ -368,8 +373,6 @ @
+ wmb(); /* commit all data before submit */
+ assert(skb->queue_mapping < priv->ae_handle->q_num);
+ hnae_queue_xmit(priv->ae_handle->qs[skb->queue_mapping], buf_num);
+ -ring->stats.tx_pkts++;
+ -ring->stats.tx_bytes += skb->len;
+
+ return NETDEV_TX_OK;
+
+ @ @ -406,113 +409,13 @ @
+ return NETDEV_TX_BUSY;
+
+/**
+ * hns_nic_get_headlen - determine size of header for RSC/LRO/GRO/FCOE
static unsigned int hns_nic_get_headlen(unsigned char *data, u32 flag,
unsigned int max_size)
{
    unsigned char *network;
    u8 hlen;

    /* this should never happen, but better safe than sorry */
    if (max_size < ETH_HLEN)
        return max_size;

    /* initialize network frame pointer */
    network = data;

    /* set first protocol and move network header forward */
    network += ETH_HLEN;

    /* handle any vlan tag if present */
    if (hnae_get_field(flag, HNS_RXD_VLAN_M, HNS_RXD_VLAN_S) ==
        HNS_RX_FLAG_VLAN_PRESENT) {
        if ((typeof(max_size))(network - data) > (max_size - VLAN_HLEN))
            return max_size;

        /* access ihl as a u8 to avoid unaligned access on ia64 */
        hlen = (network[0] & 0x0F) << 2;

        /* verify hlen meets minimum size requirements */
        if (hlen < sizeof(struct iphdr))
            return network - data;
/* record next protocol if header is present */
-} else if (hnae_get_field(flag, HNS_RXD_L3ID_M, HNS_RXD_L3ID_S)
-== HNS_RX_FLAG_L3ID_IPV6) {
-if (((typeof(max_size))(network - data) >
- (max_size - sizeof(struct ipv6hdr)))
-return max_size;
-
-/* record next protocol */
-hlen = sizeof(struct ipv6hdr);
-} else {
-return network - data;
-}
-
-/* relocate pointer to start of L4 header */
-network += hlen;
-
-/* finally sort out TCP/UDP */
-if (hnae_get_field(flag, HNS_RXD_L4ID_M, HNS_RXD_L4ID_S)
-== HNS_RX_FLAG_L4ID_TCP) {
-if (((typeof(max_size))(network - data) >
- (max_size - sizeof(struct tcphdr)))
-return max_size;
-
-/* access doff as a u8 to avoid unaligned access on ia64 */
-hlen = (network[12] & 0xF0) >> 2;
-
-/* verify hlen meets minimum size requirements */
-if (hlen < sizeof(struct tcphdr))
-return network - data;
-
-network += hlen;
-} else if (hnae_get_field(flag, HNS_RXD_L4ID_M, HNS_RXD_L4ID_S)
-== HNS_RX_FLAG_L4ID_UDP) {
-if (((typeof(max_size))(network - data) >
- (max_size - sizeof(struct udphdr)))
-return max_size;
-
-network += sizeof(struct udphdr);
-}
-
-/* If everything has gone correctly network should be the
- * data section of the packet and will be the end of the header.
- * If not then it probably represents the end of the last recognized
- * header.
- */
-if (((typeof(max_size))(network - data) < max_size)
-return network - data;
-else
-return max_size;
-
static void hns_nic_reuse_page(struct sk_buff *skb, int i,
    struct hnae_ring *ring, int pull_len,
    struct hnae_desc_cb *desc_cb)
{
    struct hnae_desc *desc;
    int truesize, size;
    u32 truesize;
    int size;
    int last_offset;
    bool twobufs;

    skb_add_rx_frag(skb, i, desc_cb->priv, desc_cb->page_offset + pull_len,
        -size - pull_len, truesize - pull_len);
    +size - pull_len, truesize);

    /* avoid re-using remote pages, flag default unreuse */
    if (unlikely(page_to_nid(desc_cb->priv) != numa_node_id()))
        return -ENOMEM;
}

skb = *out_skb = napi_alloc_skb(&ring_data->napi,
    HNS_RX_HEAD_SIZE);
if (unlikely(!skb)) {
    netdev_err(ndev, "alloc rx skb fail\n");
    ring->stats.sw_err_cnt++;
    return -ENOMEM;
}

ring->stats.seg_pkt_cnt++;

-pull_len = hns_nic_get_headlen(va, bnum_flag, HNS_RX_HEAD_SIZE);
+pull_len = eth_get_headlen(va, HNS_RX_HEAD_SIZE);
memcpy(__skb_put(skb, pull_len), va,
    ALIGN(pull_len, sizeof(long)));

return u > c ? (h > c && h <= u) : (h > c || h <= u);

/* netif_tx_lock will turn down the performance, set only when necessary */
-#ifdef CONFIG_NET_POLL_CONTROLLER
-#define NETIF_TX_LOCK(ring) spin_lock(&(ring)->lock)
-#define NETIF_TX_UNLOCK(ring) spin_unlock(&(ring)->lock)
/* reclaim all desc in one budget */
* return error or number of desc left */
@@ -1066,21 +959,16 @@
int head;
int bytes, pkts;

-NETIF_TX_LOCK(ring);
-
head = readl_relaxed(ring->io_base + RCB_REG_HEAD);
rmb(); /* make sure head is ready before touch any data */

-if (is_ring_empty(ring) || head == ring->next_to_clean) {
-NETIF_TX_UNLOCK(ring);
+if (is_ring_empty(ring) || head == ring->next_to_clean)
return 0; /* no data to poll */
-}

if (!is_valid_clean_head(ring, head)) {
netdev_err(ndev, "wrong head (%d, %d-%d)\n", head,
        ring->next_to_use, ring->next_to_clean);
        ring->stats.io_err_cnt++;
-NETIF_TX_UNLOCK(ring);
return -EIO;
}

@@ -1091,8 +979,9 @@
/* issue prefetch for next Tx descriptor */
prefetch(&ring->desc_cb[ring->next_to_clean]);
}
-
-NETIF_TX_UNLOCK(ring);
+/* update tx ring statistics. */
+ring->stats.tx_pkts += pkts;
+ring->stats.tx_bytes += bytes;

dev_queue = netdev_get_tx_queue(ndev, ring_data->queue_index);
netdev_tx_completed_queue(dev_queue, pkts, bytes);
@@ -1153,16 +1042,12 @@
int head;
int bytes, pkts;

-NETIF_TX_LOCK(ring);
head = ring->next_to_use; /* ntu :soft setted ring position*/
bytes = 0;
pkts = 0;
while (head != ring->next_to_clean)
hns_nic_reclaim_one_desc(ring, &bytes, &pkts);

-NETIF_TX_UNLOCK(ring);

dev_queue = netdev_get_tx_queue(ndev, ring_data->queue_index);
netdev_tx_reset_queue(dev_queue);
}
@@ -1174,7 +1059,6 @@
container_of(napi, struct hns_nic_ring_data, napi);
struct hnae_ring *ring = ring_data->ring;

-try_again:
clean_complete += ring_data->poll_one(
ring_data, budget - clean_complete,
ring_data->ex_process);
@@ -1184,7 +1068,7 @@
napi_complete(napi);
ring->q->handle->dev->ops->toggle_ring_irq(ring, 0);
} else {
+return budget;
+}
}

@@ -1212,11 +1096,26 @@
struct hnae_handle *h = priv->ae_handle;
int state = 1;

/* If there is no phy, do not need adjust link */
if (ndev->phydev) {
- h->dev->ops->adjust_link(h, ndev->phydev->speed,
- ndev->phydev->duplex);
- state = ndev->phydev->link;
+ When phy link down, do nothing */
+ if (ndev->phydev->link == 0)
+ return;
+ +
+ if (h->dev->ops->need_adjust_link(h, ndev->phydev->speed,
+ ndev->phydev->duplex)) {
+/* because Hi161X chip don't support to change gmac
+ * speed and duplex with traffic. Delay 200ms to
+ * make sure there is no more data in chip FIFO.
+ */
+}
netif_carrier_off(ndev);
+msleep(200);
+h->dev->ops->adjust_link(h, ndev->phydev->speed,
+ ndev->phydev->duplex);
+netif_carrier_on(ndev);
+
+
+
+
+state = state && h->dev->ops->get_status(h);
+
+
+
+
+if (state != priv->link) {
+ if (!h->phy_dev)
+ return 0;
+
+phy_dev->supported &= h->if_support;
+phy_dev->advertising = phy_dev->supported;
+
+if (h->phy_if == PHY_INTERFACE_MODE_XGMII)
+phy_dev->autoneg = false;
+
+if (phy_dev->supported &!= PHY_INTERFACE_MODE_XGMII) {
+ phy_dev->dev_flags = 0;
+
+phy_dev->supported &= h->if_support;
+phy_dev->advertising = phy_dev->supported;
+
+if (h->phy_if != PHY_INTERFACE_MODE_XGMII) {
+ phy_dev->dev_flags = 0;
+
+if (unlikely(ret))
+ return -ENODEV;
+
+phy_dev->supported &!= h->if_support;
+phy_dev->advertising = phy_dev->supported;
+-
-phy_dev->autoneg = false;
-}
-}
-}
-}
-
-void hns_nic_update_stats(struct net_device *netdev)
+static void hns_nic_update_stats(struct net_device *netdev)
+{
struct hns_nic_priv *priv = netdev_priv(netdev);
struct hnae_handle *h = priv->ae_handle;
+ if (h->ae_if == AE_INTERFACE_MODE_XGMII)
-phy_dev->autoneg = false;
-}

return cpu;
+static void hns_nic_free_irq(int q_num, struct hns_nic_priv *priv)
+{
+int i;
+
+for (i = 0; i < q_num * 2; i++) {
+if (priv->ring_data[i].ring->irq_init_flag == RCB_IRQ_INITED) {
+irq_set_affinity_hint(priv->ring_data[i].ring->irq, NULL);
+free_irq(priv->ring_data[i].ring->irq, &priv->ring_data[i]);
+priv->ring_data[i].ring->irq_init_flag = RCB_IRQ_NOT_INITED;
+}
+}
+
+static int hns_nic_init_irq(struct hns_nic_priv *priv)
+{
+struct hnae_handle *h = priv->ae_handle;
+if (ret) {
+netdev_err(priv->netdev, "request irq(%d) fail\n", rd->ring->irq);
+return ret;
+}
+disable_irq(rd->ring->irq);
+}
+
+out_free_irq:
+hns_nic_free_irq(h->q_num, priv);
+return ret;
+
+static int hns_nic_net_up(struct net_device *ndev)
+int i, j;
+int ret;
+
+out_free_irq:
+hns_nic_free_irq(h->q_num, priv);
+return ret;
+
+if (!test_bit(NIC_STATE_DOWN, &priv->state))
+return 0;
+
+static int hns_nic_net_up(struct net_device *ndev)
ret = hns_nic_init_irq(priv);
if (ret != 0) {
    netdev_err(ndev, "hns init irq failed! ret=%d\n", ret);
    for (j = i - 1; j >= 0; j--)
        hns_nic_ring_close(ndev, j);
    hns_nic_free_irq(h->q_num, priv);
    set_bit(NIC_STATE_DOWN, &priv->state);
}

return ret;

static void hns_tx_timeout_reset(struct hns_nic_priv *priv);
#define HNS_TX_TIMEO_LIMIT (40 * HZ)
static void hns_nic_net_timeout(struct net_device *ndev)
{
    struct hns_nic_priv *priv = netdev_priv(ndev);

    hns_tx_timeout_reset(priv);
    if (ndev->watchdog_timeo < HNS_TX_TIMEO_LIMIT) {
        ndev->watchdog_timeo *= 2;
        netdev_info(ndev, "watchdog_timo changed to %d\n",
            ndev->watchdog_timeo);
    } else {
        ndev->watchdog_timeo = HNS_NIC_TX_TIMEOUT;
        hns_tx_timeout_reset(priv);
    }
}

static int hns_nic_do_ioctl(struct net_device *netdev, struct ifreq *ifr,
@@ -1580,21 +1511,6 @@
    return phy_mii_ioctl(phy_dev, ifr, cmd);
}

-/* use only for netconsole to poll with the device without interrupt */
-#ifdef CONFIG_NET_POLL_CONTROLLER
-void hns_nic_poll_controller(struct net_device *ndev)
-{
-    struct hns_nic_priv *priv = netdev_priv(ndev);
-    unsigned long flags;
-    int i;
-
-    local_irq_save(flags);
-    for (i = 0; i < priv->ae_handle->q_num * 2; i++)
-        napi_schedule(&priv->ring_data[i].napi);
-    local_irq_restore(flags);
static netdev_tx_t hns_nic_net_xmit(struct sk_buff *skb, struct net_device *ndev)
{
    skb = hns_assemble_skb(ndev);
    if (!skb) { ret = -ENOMEM; goto out; }
    rd = &tx_ring_data(priv, skb->queue_mapping);
    hns_nic_net_xmit_hw(ndev, skb, rd);
}

* return void */
-void hns_set_multicast_list(struct net_device *ndev)
+static void hns_set_multicast_list(struct net_device *ndev)
{
    struct hns_nic_priv *priv = netdev_priv(ndev);
    struct hnae_handle *h = priv->ae_handle;
    hns_nic_set_rx_mode(struct net_device *ndev)
+static void hns_nic_set_rx_mode(struct net_device *ndev)
{
    struct hns_nic_priv *priv = netdev_priv(ndev);
    struct hnae_handle *h = priv->ae_handle;
    }
struct hnae_handle *h = priv->ae_handle;

+hns_nic_reset_subtask(priv);
hib_read_fails_count = 0;
hib_read_data_count = 0;
hns_nic_update_link_status(priv->netdev);
h->dev->ops->update_led_status(h);
hns_nic_update_stats(priv->netdev);

-hns_nic_reset_subtask(priv);
hib_read_fails_count = 0;
hib_read_data_count = 0;
hns_nic_service_event_complete(priv);
}

netif_napi_add(priv->netdev, &rd->napi,
-    hns_nic_common_poll, NIC_TX_CLEAN_MAX_NUM);
+    hns_nic_common_poll, NAPI_POLL_WEIGHT);
rd->ring->irq_init_flag = RCB_IRQ_NOT_INITED;
}
for (i = h->q_num; i < h->q_num * 2; i++) {

netif_napi_add(priv->netdev, &rd->napi,
-    hns_nic_common_poll, NIC_RX_CLEAN_MAX_NUM);
+    hns_nic_common_poll, NAPI_POLL_WEIGHT);
rd->ring->irq_init_flag = RCB_IRQ_NOT_INITED;
}

priv->enet_ver = AE_VERSION_1;
else if (acpi_dev_found(hns_enet_acpi_match[1].id))
    priv->enet_ver = AE_VERSION_2;
else
    -return -ENXIO;
+else {
    +ret = -ENXIO;
    +goto out_read_prop_fail;
    +}

/* try to find port-idx-in-ae first */
ret = ACPI_node_get_property_reference(dev->fwnode,
    @ @ -2395,7 +2312,8 @ @
priv->fwnode = ACPI_fwnode_handle(args.adev);
} else {
    dev_err(dev, "cannot read cfg data from OF or acpi\n");
    -return -ENXIO;
    +ret = -ENXIO;
+goto out_read_prop_fail;
}

ret = device_property_read_u32(dev, "port-idx-in-ae", &port_id);
@@ -2428,10 +2346,11 @@
ndev->min_mtu = MAC_MIN_MTU;
switch (priv->enet_ver) {
case AE_VERSION_2:
-ndev->features |= NETIF_F_TSO | NETIF_F_TSO6;
+ndev->features |= NETIF_F_TSO | NETIF_F_TSO6 | NETIF_F_NTUPLE;
ndev->hw_features |= NETIF_F_IP_CSUM | NETIF_F_IPV6_CSUM |
.NETIF_F_RXCSUM | NETIF_F_SG | NETIF_F_GSO |
.NETIF_F_GRO | NETIF_F_TSO | NETIF_F_TSO6;
+ndev->vlan_features |= NETIF_F_TSO | NETIF_F_TSO6;
ndev->max_mtu = MAC_MAX_MTU_V2 -
(ETH_HLEN + ETH_FCS_LEN + VLAN_HLEN);
break;
@@ -2473,6 +2392,8 @@
out_notify_fail:
(void)cancel_work_sync(&priv->service_task);
out_read_prop_fail:
+/* safe for ACPI FW */
+of_node_put(to_of_node(priv->fwnode));
free_netdev(ndev);
return ret;
}
@@ -2502,6 +2423,9 @@
set_bit(NIC_STATE_REMOVING, &priv->state);
(void)cancel_work_sync(&priv->service_task);

+/* safe for ACPI FW */
+of_node_put(to_of_node(priv->fwnode));
+
free_netdev(ndev);
return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns_ethtool.c
@@ -243,7 +243,9 @@
}

if (h->dev->ops->adjust_link) {
+netif_carrier_off(net_dev);
h->dev->ops->adjust_link(h, (int)speed, cmd->base.duplex);
+netif_carrier_on(net_dev);
return 0;
}
break;
case MAC_LOOP_PHY_NONE:
ret = hns_nic_config_phy_loopback(phy_dev, 0x0);
+/* fall through */
case MAC_LOOP_NONE:
if (!ret && h->dev->ops->set_loopback) {
if (priv->ae_handle->phy_if != PHY_INTERFACE_MODE_XGMII)
@@ -336,6 +339,7 @@
static int __lb_up(struct net_device *ndev,
    enum hnae_loop loop_mode)
{
#define NIC_LB_TEST_WAIT_PHY_LINK_TIME 300
struct hns_nic_priv *priv = netdev_priv(ndev);
struct hnae_handle *h = priv->ae_handle;
int speed, duplex;
@@ -362,6 +366,9 @@
    h->dev->ops->adjust_link(h, speed, duplex);

+/* wait adjust link done and phy ready */
+msleep(NIC_LB_TEST_WAIT_PHY_LINK_TIME);
    +
    return 0;
}
@@ -412,6 +419,10 @@
/* for mutl buffer*/
new_skb = skb_copy(skb, GFP_ATOMIC);
dev_kfree_skb_any(skb);
+if (!new_skb) {
+netdev_err(ndev, "skb alloc failed\n");
+return;
+}
skb = new_skb;
check_ok = 0;
@@ -658,8 +669,8 @@
@end{net_device *net_dev,
    struct ethtool_param *param)
+static void hns_get_ringparam(struct net_device *net_dev,
+  struct ethtool_ringparam *ops)
{
    struct hns_nic_priv *priv = netdev_priv(net_dev);
    struct hnae_ae_ops *ops;

@@ -808,7 +819,8 @@
 * @dev: net device
 * @ch: channel info.
 */
-void hns_get_channels(struct net_device *net_dev, struct ethtool_channels *ch)
+static void hns_get_channels(struct net_device *net_dev, struct ethtool_channels *ch)
 {  
 struct hns_nicPriv *priv = netdev_priv(net_dev);

@@ -825,8 +837,8 @@
 * @stats: statistics info.
 * @data: statistics data.
 */
-void hns_get_ethtool_stats(struct net_device *netdev, struct ethtool_stats *stats, u64 *data)
+static void hns_get_ethtool_stats(struct net_device *netdev, struct ethtool_stats *stats, u64 *data)
 {  
 u64 *p = data;
 struct hns_nicPriv *priv = netdev_priv(netdev);
@@ -883,7 +895,7 @@
 * @stats: string set ID.
 * @data: objects data.
 */
-void hns_get_strings(struct net_device *netdev, u32 stringset, u8 *data)
+static void hns_get_strings(struct net_device *netdev, u32 stringset, u8 *data)
 {  
 struct hns_nicPriv *priv = netdev_priv(netdev);
 struct hnae_handle *h = priv->ae_handle;
@@ -973,7 +985,7 @@
 *
 * Return string set count.
 */
-int hns_get_sset_count(struct net_device *netdev, int stringset)
+static int hns_get_sset_count(struct net_device *netdev, int stringset)
 {  
 struct hns_nicPriv *priv = netdev_priv(netdev);
 struct hnae_handle *h = priv->ae_handle;
@@ -993,8 +1005,10 @@
 cnt--;
 }

 return cnt;
 -} else {
+} else if (stringset == ETH_SS_STATS) {
 return (HNS_NET_STATS_CNT + ops->get_sset_count(h, stringset));
+} else {
+return -EOPNOTSUPP;
* Return 0 on success, negative on failure. */
-int hns_phy_led_set(struct net_device *netdev, int value)
+static int hns_phy_led_set(struct net_device *netdev, int value)
 {
 int retval;
 struct phy_device *phy_dev = netdev->phydev;
 * Return 0 on success, negative on failure. */
-int hns_set_phys_id(struct net_device *netdev, enum ethtool_phys_id_state state)
+static int
+hns_set_phys_id(struct net_device *netdev, enum ethtool_phys_id_state state)
 {
 struct hns_nic_priv *priv = netdev_priv(netdev);
 struct hnae_handle *h = priv->ae_handle;
 * @cmd: ethtool cmd
 * @date: register data
 */
-void hns_get_regs(struct net_device *net_dev, struct ethtool_regs *cmd,
- void *data)
+static void hns_get_regs(struct net_device *net_dev, struct ethtool_regs *cmd,
+ void *data)
 {
 struct hns_nic_priv *priv = netdev_priv(net_dev);
 struct hnae_ae_ops *ops;
 */
 static int hns_nic_nway_reset(struct net_device *netdev)
 {
 -int ret = 0;
 struct phy_device *phy = netdev->phydev;

 -if (netif_running(netdev)) {
  /* if autoneg is disabled, don't restart auto-negotiation */
 -if (phy && phy->autoneg == AUTONEG_ENABLE)
  -ret = genphy_restart_aneg(phy);
  -}
 +if (!netif_running(netdev))
  +return 0;


-return ret;
+if (!phy)
+return -EOPNOTSUPP;
+
+if (phy->autoneg != AUTONEG_ENABLE)
+return -EINVAL;
+
+return genphy_restart_aneg(phy);
}

static u32
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/Makefile
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/Makefile
@@ -1,7 +1,14 @@
+# SPDX-License-Identifier: GPL-2.0+
#
# Makefile for the HISILICON network device drivers.
#

obj-$(CONFIG_HNS3) += hns3pf/
+obj-$(CONFIG_HNS3) += hns3vf/

obj-$(CONFIG_HNS3) += hnae3.o
+obj-$(CONFIG_HNS3) += hns3.vf/

obj-$(CONFIG_HNS3) += hnae3.o
+obj-$(CONFIG_HNS3_ENET) += hns3.o
+hns3-objs = hns3_enet.o hns3_ethtool.o hns3_debugfs.o
+
+hns3-$(CONFIG_HNS3_DCB) += hns3_dcbnl.o
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hclge_mbx.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hclge_mbx.h
@@ -0,0 +1,115 @@
/* SPDX-License-Identifier: GPL-2.0+ */
/* Copyright (c) 2016-2017 Hisilicon Limited. */
+
+ifndef __HCLGE_MBX_H
+#define __HCLGE_MBX_H
+#include <linux/init.h>
+#include <linux/mutex.h>
+#include <linux/types.h>
+
+#define HCLGE_MBX_VF_MSG_DATA_NUM	16
+
+#enum HCLGE_MBX_OPCODE {
+HCLGE_MBX_RESET = 0x01,/* (VF -> PF) assert reset */
+HCLGE_MBX_ASSERTING_RESET,/* (PF -> VF) PF is asserting reset*/
+HCLGE_MBX_SET_UNICAST,/* (VF -> PF) set UC addr */
+HCLGE_MBX_SET_MULTICAST,/* (VF -> PF) set MC addr */
+HCLGE_MBX_SET_VLAN,/* (VF -> PF) set VLAN */
+HCLGE_MBX_MAP_RING_TO_VECTOR,/* (VF -> PF) map ring-to-vector */
+HCLGE_MBX_UNMAP_RING_TO_VECTOR,/* (VF -> PF) unmap ring-to-vector */
+HCLGE_MBX_SET_PROMISC_MODE,/* (VF -> PF) set promiscuous mode */
+HCLGE_MBX_SET_MACVLAN,/* (VF -> PF) set unicast filter */
+HCLGE_MBX_API_NEGOTIATE,/* (VF -> PF) negotiate API version */
+HCLGE_MBX_GET_QINFO,/* (VF -> PF) get queue config */
+HCLGE_MBX_GET_TCINFO,/* (VF -> PF) get TC config */
+HCLGE_MBX_GET_QINFO,/* (VF -> PF) get queue config */
+HCLGE_MBX_GET_RSS_KEY,/* (VF -> PF) get RSS key */
+HCLGE_MBX_GET_MAC_ADDR,/* (VF -> PF) get MAC addr */
+HCLGE_MBX_PF_VF_RESP,/* (PF -> VF) generate response to VF */
+HCLGE_MBX_GET_BDNUM,/* (VF -> PF) get BD num */
+HCLGE_MBX_GET_BUFSIZE,/* (VF -> PF) get buffer size */
+HCLGE_MBX_GET_STREAMID,/* (VF -> PF) get stream id */
+HCLGE_MBX_SET_AESTART,/* (VF -> PF) start ae */
+HCLGE_MBX_SET_TSOSTATS,/* (VF -> PF) get tso stats */
+HCLGE_MBX_LINK_STAT_CHANGE,/* (PF -> VF) link status has changed */
+HCLGE_MBX_GET_BASE_CONFIG,/* (VF -> PF) get config */
+HCLGE_MBX_BIND_FUNC_QUEUE,/* (VF -> PF) bind function and queue */
+HCLGE_MBX_GET_LINK_STATUS,/* (VF -> PF) get link status */
+HCLGE_MBX_GET_QID_IN_PF,/* (VF -> PF) get queue id in pf */
+}
+
+/* below are per-VF mac-vlan subcodes */
+enum hclge_mbx_mac_vlan_subcode {
+HCLGE_MBX_MAC_VLAN_UC_MODIFY = 0,/* modify UC mac addr */
+HCLGE_MBX_MAC_VLAN_UC_ADD,/* add a new UC mac addr */
+HCLGE_MBX_MAC_VLAN_UC_REMOVE,/* remove a new UC mac addr */
+HCLGE_MBX_MAC_VLAN_MC_MODIFY,/* modify MC mac addr */
+HCLGE_MBX_MAC_VLAN_MC_ADD,/* add new MC mac addr */
+HCLGE_MBX_MAC_VLAN_MC_REMOVE,/* remove MC mac addr */
+}
+
+/* below are per-VF vlan cfg subcodes */
+enum hclge_mbx_vlan_cfg_subcode {
+HCLGE_MBX_VLAN_FILTER = 0,/* set vlan filter */
+HCLGE_MBX_VLAN_TX_OFF_CFG,/* set tx side vlan offload */
+HCLGE_MBX_VLAN_RX_OFF_CFG,/* set rx side vlan offload */
+}
+
+#define HCLGE_MBX_MAX_MSG_SIZE 16
+#define HCLGE_MBX_MAX_RESP_DATA_SIZE 8
+#define HCLGE_MBX_RING_MAP_BASIC_MSG_NUM 3
+#define HCLGE_MBX_RING_NODE_VARIABLE_NUM 3
+ struct hclgevf_mbx_resp_status {
+ struct mutex mbx_mutex; /* protects against contending sync cmd resp */
+ u32 origin_mbx_msg;
+ bool received_resp;
+ int resp_status;
+ u8 additional_info[HCLGE_MBX_MAX_RESP_DATA_SIZE];
+ };
+
+ struct hclge_mbx_vf_to_pf_cmd {
+ u8 rsv;
+ u8 mbx_src_vfid; /* Auto filled by IMP */
+ u8 rsv1[2];
+ u8 msg_len;
+ u8 rsv2[3];
+ u8 msg[HCLGE_MBX_MAX_MSG_SIZE];
+ };
+
+ struct hclge_mbx_pf_to_vf_cmd {
+ u8 dest_vfid;
+ u8 rsv[3];
+ u8 msg_len;
+ u8 rsv1[3];
+ u16 msg[8];
+ };
+
+ struct hclge_vf_rst_cmd {
+ u8 dest_vfid;
+ u8 vf_rst;
+ u8 rsv[22];
+ };
+
+ /* used by VF to store the received Async responses from PF */
+ struct hclgevf_mbx_arq_ring {
+ #define HCLGE_MBX_MAX_ARQ_MSG_SIZE 8
+ #define HCLGE_MBX_MAX_ARQ_MSG_NUM 1024
+ struct hclgev_dev *hdev;
+ u32 head;
+ u32 tail;
+ u32 count;
+ u16 msg_q[HCLGE_MBX_MAX_ARQ_MSG_NUM][HCLGE_MBX_MAX_ARQ_MSG_SIZE];
+ };
+
+ #define hclge_mbx_ring_ptr_move_crq(crq) \
+ (crq->next_to_use = (crq->next_to_use + 1) % crq->desc_num)
+ #define hclge_mbx_tail_ptr_move_arq(arq) \
+ (arq.tail = (arq.tail + 1) % HCLGE_MBX_MAX_ARQ_MSG_NUM)
+ #define hclge_mbx_head_ptr_move_arq(arq) \

+(arq.head = (arq.head + 1) % HCLGE_MBX_MAX_ARQ_MSG_NUM)
+#endif
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hnae3.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hnae3.c
@@ -1,14 +1,7 @@
-/*
- * Copyright (c) 2016-2017 Hisilicon Limited.
- *
- * This program is free software; you can redistribute it and/or modify
- * it under the terms of the GNU General Public License as published by
- * the Free Software Foundation; either version 2 of the License, or
- * (at your option) any later version.
- */
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.

#include <linux/list.h>
-#include <linux/slab.h>
#include <linux/spinlock.h>

#include "hnae3.h"
@@ -17,6 +10,27 @@
 static LIST_HEAD(hnae3_client_list);
 static LIST_HEAD(hnae3_ae_dev_list);

+void hnae3_unregister_ae_algo_prepare(struct hnae3_ae_algo *ae_algo)
+{+
+ const struct pci_device_id *pci_id;
+ struct hnae3_ae_dev *ae_dev;
+ +
+ if (!ae_algo)
+ return;
+ +
+ list_for_each_entry(ae_dev, &hnae3_ae_dev_list, node) {+
+ if (!hnae3_get_bit(ae_dev->flag, HNAE3_DEV_INITED_B))
+ continue;
+ +
+ pci_id = pci_match_id(ae_algo->pdev_id_table, ae_dev->pdev);
+ if (!pci_id)
+ continue;
+ +
+ if (IS_ENABLED(CONFIG_PCI_IOV))
+ pci_disable_sriov(ae_dev->pdev);
+ }
+ }
+ 
+EXPORT_SYMBOL(hnae3_unregister_ae_algo_prepare);
+ +
+ /* we are keeping things simple and using single lock for all the
+ * list. This is a non-critical code so other updations, if happen
+
in parallel, can wait.
return false;
}

+void hnae3_set_client_init_flag(struct hnae3_client *client,
+struct hnae3_ae_dev *ae_dev, int inited)
+
+switch (client->type) {
+case HNAE3_CLIENT_KNIC:
+hnae3_set_bit(ae_dev->flag, HNAE3_KNIC_CLIENT_INITED_B, inited);
+break;
+case HNAE3_CLIENT_UNIC:
+hnae3_set_bit(ae_dev->flag, HNAE3_UNIC_CLIENT_INITED_B, inited);
+break;
+case HNAE3_CLIENT_ROCE:
+hnae3_set_bit(ae_dev->flag, HNAE3_ROCE_CLIENT_INITED_B, inited);
+break;
+default:
+break;
+
+EXPORT_SYMBOL(hnae3_set_client_init_flag);
+
+static int hnae3_get_client_init_flag(struct hnae3_client *client,
+struct hnae3_ae_dev *ae_dev)
+
+int inited = 0;
+
+switch (client->type) {
+case HNAE3_CLIENT_KNIC:
+inited = hnae3_get_bit(ae_dev->flag,
+ HNAE3_KNIC_CLIENT_INITED_B);
+break;
+case HNAE3_CLIENT_UNIC:
+inited = hnae3_get_bit(ae_dev->flag,
+ HNAE3_UNIC_CLIENT_INITED_B);
+break;
+case HNAE3_CLIENT_ROCE:
+inited = hnae3_get_bit(ae_dev->flag,
+ HNAE3_ROCE_CLIENT_INITED_B);
+break;
+default:
+break;
+
+return inited;
+}

Open Source Used In 5GaaS Edge AC-4 24625
static int hnae3_match_nInstantiate(struct hnae3_client *client,
    struct hnae3_ae_dev *ae_dev, bool is_reg)
{
    /* check if this client matches the type of ae_dev */
    if (!hnae3_client_match(client->type, ae_dev->dev_type) &&
        !hnae_get_bit(ae_dev->flag, HNAE3_DEV_INITED_B)) {
        return 0;
    }

    ret = ae_dev->ops->init_client_instance(client, ae_dev);
    if (ret)
        dev_err(&ae_dev->pdev->dev,
            "fail to instantiate client\n");
    return ret;
}

ret = hnae3_match_nInstantiate(client, ae_dev, true);
if (ret)
    dev_err(&ae_dev->pdev->dev,
        "match and instantiation failed for port\n");
exit:
    mutex_unlock(&hnae3_common_lock);
    return ret;
}
EXPORT_SYMBOL(hnae3_register_client);

@@ -112,7 +177,7 @@
 * @ae_algo: AE algorithm
 * NOTE: the duplicated name will not be checked
 */
-int hnae3_register_ae_algo(struct hnae3_ae_algo *ae_algo)
+void hnae3_register_ae_algo(struct hnae3_ae_algo *ae_algo)
 {
 const struct pci_device_id *id;
 struct hnae3_ae_dev *ae_dev;
-@@ -129,15 +194,21 @@
+if (!id)
+continue;

-/* ae_dev init should set flag */
+/* ae_dev init should set flag */
+if (!ae_algo->ops) {
+dev_err(&ae_dev->pdev->dev, "ae_algo ops are null\n");
+continue;
+}
+ae_dev->ops = aealgo->ops;
+
+ret = ae_algo->ops->init_ae_dev(ae_dev);
+if (ret) {
+dev_err(&ae_dev->pdev->dev, "init ae_dev error.\n");
+continue;
+}

-hnae_set_bit(ae_dev->flag, HNAE3_DEV_INITED_B, 1);
+/* check the client list for the match with this ae_dev type and
+ * initialize the figure out client instance
+ @ @ -146,13 +217,12 @@
+ret = hnae3_match_n_instantiate(client, ae_dev, true);
+if (ret)
dev_err(&ae_dev->pdev->dev,
-"match and instantiation failed\n");
+"match and instantiation failed, ret = %d\n",
+ret);
+}
+}
+
+mutex_unlock(&hnae3_common_lock);
-
return ret;
}
EXPORT_SYMBOL(hnae3_register_ae_algo);

mutex_lock(&hnae3_common_lock);
/* Check if there are matched ae_dev */
list_for_each_entry(ae_dev, &hnae3_ae_dev_list, node) {
+if (!hnae3_get_bit(ae_dev->flag, HNAE3_DEV_INITED_B))
+continue;
+id = pci_match_id(ae_algo->pdev_id_table, ae_dev->pdev);
if (!id)
continue;

hnae3_match_n_instantiate(client, ae_dev, false);

ae_algo->ops->uninit_ae_dev(ae_dev);  
-hnae_set_bit(ae_dev->flag, HNAE3_DEV_INITED_B, 0);  
+hnae3_set_bit(ae_dev->flag, HNAE3_DEV_INITED_B, 0);  
+ae_dev->ops = NULL;
}
list_del(&ae_algo->node);
mutex_lock(&hnae3_common_lock);
+
list_add_tail(&ae_dev->node, &hnae3_ae_dev_list);

/* Check if there are matched ae_algo */
@@ -207,21 +282,22 @@
if (!id)
continue;

-ae_dev->ops = ae_algo->ops;
-
-if (!ae_dev->ops) {
-dev_err(&ae_dev->pdev->dev, "ae_dev ops are null\n");
+if (!ae_algo->ops) {
+dev_err(&ae_dev->pdev->dev, "ae_algo ops are null\n");
+ret = -EOPNOTSUPP;
+goto out_err;
}  
+ae_dev->ops = ae_algo->ops;

-/* ae_dev init should set flag */
ret = ae_dev->ops->init_ae_dev(ae_dev);
if (ret) {
-dev_err(&ae_dev->pdev->dev, "init ae_dev error\n");
+dev_err(&ae_dev->pdev->dev,
+"init ae_dev error, ret = %d\n", ret);
go to out_err;
}

-hnae_set_bit(ae_dev->flag, HNAE3_DEV_INITED_B, 1);
+/* ae_dev init should set flag */
+hnae3_set_bit(ae_dev->flag, HNAE3_DEV_INITED_B, 1);
break;
}

@@ -232,10 +308,16 @@
ret = hnae3_match_n_instantiate(client, ae_dev, true);
if (ret)
-dev_err(&ae_dev->pdev->dev, 
-"match and instantiation failed\n");
+dev_err(&ae_dev->pdev, 
+"match and instantiation failed, ret = %d\n", 
+ret);
} }

+mutex_unlock(&hnae3_common_lock);
+return 0;
+out_err:
+list_del(&ae_dev->node);
mutex_unlock(&hnae3_common_lock);

return ret;
@@ -254,6 +347,8 @@
mutex_lock(&hnae3_common_lock);
/* Check if there are matched ae_algo */
list_for_each_entry(ae_algo, &hnae3_ae_algo_list, node) {
+if (!hnae3_get_bit(ae_dev->flag, HNAE3_DEV_INITED_B))
+continue;

id = pci_match_id(ae_algo->pdev_id_table, ae_dev->pdev);
if (!id)
continue;
@@ -262,7 +347,8 @@
hnae3_match_n_instantiate(client, ae_dev, false);

ae_algo->ops->uninit_ae_dev(ae_dev);
-hnae_set_bit(ae_dev->flag, HNAE3_DEV_INITED_B, 0);
+hnae3_set_bit(ae_dev->flag, HNAE3_DEV_INITED_B, 0);
ae_dev->ops = NULL;
}

list_del(&ae_dev->node);
@@ -273,3 +359,4 @@

MODULE_AUTHOR("Huawei Tech. Co., Ltd.");
MODULE_LICENSE("GPL");
MODULE_DESCRIPTION("HNAE3(Hisilicon Network Acceleration Engine) Framework");
+MODULE_VERSION(HNAE3_MOD_VERSION);
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hnae3.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hnae3.h
@@ -1,11 +1,5 @@

-/* Copyright (c) 2016-2017 Hisilicon Limited.
-*
-This program is free software; you can redistribute it and/or modify
-* it under the terms of the GNU General Public License as published by
-* the Free Software Foundation; either version 2 of the License, or
-* (at your option) any later version.
-*/
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.

#ifndef __HNAE3_H
#define __HNAE3_H
@ @ -36,6 +30,8 @@
#include <linux/pci.h>
#include <linux/types.h>

+#define HNAE3_MOD_VERSION "1.0"
+
+/* Device IDs */
+#define HNAE3_DEV_ID_GE				0xA220
+#define HNAE3_DEV_ID_25GE			0xA221
@@ -52,15 +48,26 @@
+#define HNAE3_DEV_INITED_B			0x0
+#define HNAE3_DEV_SUPPORT_ROCE_B		0x1
+#define HNAE3_DEV_SUPPORT_DCB_B			0x2
+#define HNAE3_KNIC_CLIENT_INITED_B		0x3
+#define HNAE3_UNIC_CLIENT_INITED_B		0x4
+#define HNAE3_ROCE_CLIENT_INITED_B		0x5
+#define HNAE3_DEV_SUPPORT_FD_B			0x6
+#define HNAE3_DEV_SUPPORT_GRO_B			0x7
#define HNAE3_DEV_SUPPORT_ROCE_DCB_BITS (BIT(HNAE3_DEV_SUPPORT_DCB_B) |
BIT(HNAE3_DEV_SUPPORT_ROCE_B))

#define hnae3_dev_roce_supported(hdev) \
#define hnae3_dev_dcb_supported(hdev) \
    hnae3_get_bit((hdev)->ae_dev->flag, HNAE3_DEV_SUPPORT_DCB_B) \
+    hnae3_get_bit((hdev)->ae_dev->flag, HNAE3_DEV_SUPPORT_DCB_B)
+
+#define hnae3_dev_fd_supported(hdev) \ 
    hnae3_get_bit((hdev)->ae_dev->flag, HNAE3_DEV_SUPPORT_FD_B) \
+    hnae3_get_bit((hdev)->ae_dev->flag, HNAE3_DEV_SUPPORT_FD_B)
+
+#define hnae3_dev_gro_supported(hdev) \ 
    hnae3_get_bit((hdev)->ae_dev->flag, HNAE3_DEV_SUPPORT_GRO_B) \
+    hnae3_get_bit((hdev)->ae_dev->flag, HNAE3_DEV_SUPPORT_GRO_B)

#define ring_ptr_move_fw(ring, p) \ 
 (ring)->p = ((ring)->p + 1) % (ring)->desc_num

/*hnae3 loop mode*/
enum hnae3_loop {
    HNAE3_MAC_INTER_LOOP_MAC, 
    HNAE3_MAC_INTER_LOOP_SERDES, 
    HNAE3_MAC_INTER_LOOP_PHY, 
    HNAE3_MAC_LOOP_NONE, 
    +HNAE3_LOOP_APP, 
    +HNAE3_LOOP_SERIAL_SERDES, 
    +HNAE3_LOOP_PARALLEL_SERDES, 
    +HNAE3_LOOP_PHY, 
    +HNAE3_LOOP_NONE, 
};

enum hnae3_client_type { 
    +HNAE3_MEDIA_TYPE_FIBER, 
    HNAE3_MEDIA_TYPE_COPPER, 
    HNAE3_MEDIA_TYPE_BACKPLANE, 
    +HNAE3_MEDIA_TYPE_NONE, 
};

enum hnae3_reset_notify_type { 
    +HNAE3_VF_RESET, 
    +HNAE3_VF_FUNC_RESET, 
    +HNAE3_VF_PF_FUNC_RESET, 
    +HNAE3_VF_FULL_RESET, 
    +HNAE3_FLR_RESET, 
};

enum hnae3_reset_type { 
    +HNAE3_VF_RESET, 
    +HNAE3_VF_FUNC_RESET, 
    +HNAE3_VF_PF_FUNC_RESET, 
    +HNAE3_VF_FULL_RESET, 
    +HNAE3_FLR_RESET, 
};
HNAE3_FUNC_RESET,
HNAE3_CORE_RESET,
HNAE3_GLOBAL_RESET,
HNAE3_IMP_RESET,
+HNAE3_UNKNOWN_RESET,
HNAE3_NONE_RESET,
};

+enum hnae3_flr_state {
+   HNAE3_FLR_DOWN,
+   HNAE3_FLR_DONE,
+};
+
struct hnae3_vector_info {
    u8 __iomem *io_addr;
    int vector;

#define HNAE3_RING_TYPE_B 0
#define HNAE3_RING_TYPE_TX 0
#define HNAE3_RING_TYPE_RX 1
+   #define HNAE3_RING_GL_IDX_S 0
+   #define HNAE3_RING_GL_IDX_M GENMASK(1, 0)
+   #define HNAE3_RING_GL_RX 0
+   #define HNAE3_RING_GL_TX 1

struct hnae3_ring_chain_node {
    struct hnae3_ring_chain_node *next;
    u32 tqp_index;
    u32 flag;
    +   u32 int_gl_idx;
};

#define HNAE3_CLIENT_NAME_LENGTH 16
struct hnae3_client {
    char name[HNAE3_CLIENT_NAME_LENGTH];
    -u16 version;
    unsigned long state;
    enum hnae3_client_type type;
    const struct hnae3_client_ops *ops;

#define HNAE3_CLIENT_NAME_LENGTH 16
struct hnae3_client {
    char name[HNAE3_CLIENT_NAME_LENGTH];
    -u16 version;
    unsigned long state;
    enum hnae3_client_type type;
    const struct hnae3_client_ops *ops;

#define HNAE3_IS_TX_RING(node) \
   @@ -133,11 +153,16 @@
   #define HNAE3_RING_TYPE_B 0
   #define HNAE3_RING_TYPE_TX 0
   #define HNAE3_RING_TYPE_RX 1
   +   #define HNAE3_RING_GL_IDX_S 0
   +   #define HNAE3_RING_GL_IDX_M GENMASK(1, 0)
   +   #define HNAE3_RING_GL_RX 0
   +   #define HNAE3_RING_GL_TX 1

struct hnae3_ring_chain_node {
    struct hnae3_ring_chain_node *next;
    u32 tqp_index;
    u32 flag;
    +   u32 int_gl_idx;
};

#define HNAE3_CLIENT_NAME_LENGTH 16
struct hnae3_client {
    char name[HNAE3_CLIENT_NAME_LENGTH];
    -u16 version;
    unsigned long state;
    enum hnae3_client_type type;
    const struct hnae3_client_ops *ops;

#define HNAE3_CLIENT_NAME_LENGTH 16
struct hnae3_client {
    char name[HNAE3_CLIENT_NAME_LENGTH];
    -u16 version;
    unsigned long state;
    enum hnae3_client_type type;
    const struct hnae3_client_ops *ops;
struct list_head node;
uint32_t flag;
enum hnae3_dev_type dev_type;
enum hnae3_reset_type reset_type;
void *priv;
};

/**
 * Enable the hardware
 * Disable the hardware
 * Inform the hclge that client has been started
 * Inform the hclge that client has been stopped
 * Get the carrier state of the back channel of the handle, 1 for ok, 0 for non-ok
 * Get the size of handle
 * Get vector number and vector information
 * Put the vector in hdev
 * Map rings to vector
 * Unmap rings from vector
 * Add tunnel information to hardware
 * Delete tunnel information from hardware
 * Get firmware version
 * Get media typr of phy
 * Enable vlan filter
 * Enable/disable hardware strip vlan tag of packets received
 */
struct hnae3_ae_ops {
int (*init_ae_dev)(struct hnae3_ae_dev *ae_dev);
void (*uninit_ae_dev)(struct hnae3_ae_dev *ae_dev);

+void (*flr_prepare)(struct hnae3_ae_dev *ae_dev);
+void (*flr_done)(struct hnae3_ae_dev *ae_dev);
int (*init_client_instance)(struct hnae3_client *client,
    struct hnae3_ae_dev *ae_dev);
void (*uninit_client_instance)(struct hnae3_client *client,
    struct hnae3_ae_dev *ae_dev);
int (*start)(struct hnae3_handle *handle);
void (*stop)(struct hnae3_handle *handle);
+int (*client_start)(struct hnae3_handle *handle);
+void (*client_stop)(struct hnae3_handle *handle);
int (*get_status)(struct hnae3_handle *handle);
void (*get_ksettings_an_result)(struct hnae3_handle *handle,
    u8 *auto_neg, u32 *speed, u8 *duplex);
@@ -302,7 +337,8 @@
    int (*set_loopback)(struct hnae3_handle *handle,
    enum hnae3_loop loop_mode, bool en);
-void (*set_promisc_mode)(struct hnae3_handle *handle, u32 en);
+int (*set_promisc_mode)(struct hnae3_handle *handle, bool en_uc_pmc,
+    bool en_mc_pmc);
int (*set_mtu)(struct hnae3_handle *handle, int new_mtu);
void (*get_pauseparam)(struct hnae3_handle *handle,
    u32 *tx_usecs_high, u32 *rx_usecs_high);
void (*get_mac_addr)(struct hnae3_handle *handle, void *p);
-int (*set_mac_addr)(struct hnae3_handle *handle, void *p);
+int (*set_mac_addr)(struct hnae3_handle *handle, void *p,
+    bool is_first);
+int (*do_ioctl)(struct hnae3_handle *handle,
+    struct ifreq *ifr, int cmd);
int (*add_uc_addr)(struct hnae3_handle *handle,
    const unsigned char *addr);
int (*rm_uc_addr)(struct hnae3_handle *handle,
    const unsigned char *addr);
-int (*set_tso_stats)(struct hnae3_handle *handle, int enable);
void (*update_stats)(struct hnae3_handle *handle,
    struct net_device_stats *net_stats);
@@ -347,7 +385,8 @@
    u32 stringset, u8 *data);
int (*get_sset_count)(struct hnae3_handle *handle, int stringset);

void (*get_regs)(struct hnae3_handle *handle, void *data);
+void (*get_regs)(struct hnae3_handle *handle, u32 *version,
+    void *data);
int (*get_regs_len)(struct hnae3_handle *handle);

u32 (*get_rss_key_size)(struct hnae3_handle *handle);
@@ -365,6 +404,7 @@
int (*get_vector)(struct hnae3_handle *handle, u16 vector_num,
    struct hnae3_vector_info *vector_info);
+int (*put_vector)(struct hnae3_handle *handle, int vector_num);
int (*map_ring_to_vector)(struct hnae3_handle *handle,
    int vector_num,
    struct hnae3_ring_chain_node *vr_chain);
@@ -372,20 +412,53 @@
int vector_num,
    struct hnae3_ring_chain_node *vr_chain);
-int (*add_tunnel_udp)(struct hnae3_handle *handle, u16 port_num);
-int (*del_tunnel_udp)(struct hnae3_handle *handle, u16 port_num);
-
-void (*reset_queue)(struct hnae3_handle *handle, u16 queue_id);
+int (*reset_queue)(struct hnae3_handle *handle, u16 queue_id);
    u32 (*get_fw_version)(struct hnae3_handle *handle);
    void (*get_mdix_mode)(struct hnae3_handle *handle,
        u8 *tp_mdix_ctrl, u8 *tp_mdix);
+void (*enable_vlan_filter)(struct hnae3_handle *handle, bool enable);
    int (*set_vlan_filter)(struct hnae3_handle *handle, __be16 proto,
        u16 vlan_id, bool is_kill);
    int (*set_vf_vlan_filter)(struct hnae3_handle *handle, int vfld,
        u16 vlan, u8 qos, __be16 proto);
-void (*reset_event)(struct hnae3_handle *handle,
-    enum hnae3_reset_type reset);
+int (*enable_hw_strip_rxvtag)(struct hnae3_handle *handle, bool enable);
+void (*reset_event)(struct pci_dev *pdev, struct hnae3_handle *handle);
+void (*set_default_reset_request)(struct hnae3_ae_dev *ae_dev,
+    enum hnae3_reset_type rst_type);
+void (*get_channels)(struct hnae3_handle *handle,
+    struct ethtool_channels *ch);
    void (*get_tqps_and_rss_info)(struct hnae3_handle *h,
        u16 *alloc_tqps, u16 *maxrss_size);
    int (*set_channels)(struct hnae3_handle *handle, u32 new_tqps_num);
    void (*get_flowctrl_adv)(struct hnae3_handle *handle,
        u32 *flowctrl_adv);
    int (*set_led_id)(struct hnae3_handle *handle,
enum ethtool_phys_id_state status);
+void (*get_link_mode)(struct hnae3_handle *handle,
+ unsigned long *supported,
+ unsigned long *advertising);
+int (*add_fd_entry)(struct hnae3_handle *handle,
+ struct ethtool_rxnf *cmd);
+int (*del_fd_entry)(struct hnae3_handle *handle,
+ struct ethtool_rxnf *cmd);
+void (*del_all_fd_entries)(struct hnae3_handle *handle,
+ bool clear_list);
+int (*get_fd_rule_cnt)(struct hnae3_handle *handle,
+ struct ethtool_rxnf *cmd);
+int (*get_fd_rule_info)(struct hnae3_handle *handle,
+ struct ethtool_rxnf *cmd);
+int (*add_fd_entry)(struct hnae3_handle *handle,
+ struct ethtool_rxnf *cmd);
+int (*del_fd_entry)(struct hnae3_handle *handle,
+ struct ethtool_rxnf *cmd);
+int (*restore_fd_rules)(struct hnae3_handle *handle);
+void (*enable_fd)(struct hnae3_handle *handle, bool enable);
+int (*dbg_run_cmd)(struct hnae3_handle *handle, char *cmd_buf);
+pci_ers_result_t (*handle_hw_ras_error)(struct hnae3_ae_dev *ae_dev);
+bool (*get_hw_reset_stat)(struct hnae3_handle *handle);
+bool (*ae_dev_resetting)(struct hnae3_handle *handle);
+unsigned long (*ae_dev_reset_cnt)(struct hnae3_handle *handle);
+u16 (*get_global_queue_id)(struct hnae3_handle *handle, u16 queue_id);
+void (*set_timer_task)(struct hnae3_handle *handle, bool enable);
};

struct hnae3_dcb_ops {
  char name[HNAE3_CLASS_NAME_SIZE];
  const struct hnae3_ae_ops *ops;
  struct list_head node;
  u16 int_rl_setting;
  enum pkt_hash_types rss_type;
};

struct hnae3_roce_private_info {
  __iomem *roce_io_base;

  struct hnae3_dcb_ops {
    struct hnae3_ae_algo {
      const struct hnae3_ae_ops *ops;
      struct list_head node;
      char name[HNAE3_CLASS_NAME_SIZE];
      const struct pci_device_id *pdev_id_table;
    }
  }

  u16 int_rl_setting;
  enum pkt_hash_types rss_type;
};

struct hnae3_roce_private_info {
  __iomem *roce_io_base;
int base_vector;
int num_vectors;
+
+/* The below attributes defined for RoCE client, hnae3 gives
+ * initial values to them, and RoCE client can modify and use
+ * them.
+ */
+unsigned long reset_state;
+unsigned long instance_state;
+unsigned long state;
+}
+
};

struct hnae3_unic_private_info {
struct hnae3_queue **tqp; /* array base of all TQPs of this instance */
};

#define HNAE3_SUPPORT_MAC_LOOPBACK 1
#define HNAE3_SUPPORT_PHY_LOOPBACK 2
#define HNAE3_SUPPORT_SERDES_LOOPBACK 4
#define HNAE3_SUPPORT_APP_LOOPBACK BIT(0)
#define HNAE3_SUPPORT_PHY_LOOPBACK BIT(1)
#define HNAE3_SUPPORT_SERDES_SERIAL_LOOPBACK BIT(2)
#define HNAE3_SUPPORT_VF BIT(3)
#define HNAE3_SUPPORT_SERDES_PARALLEL_LOOPBACK BIT(4)
+
#define HNAE3_USER_UPE BIT(0) /* unicast promisc enabled by user */
#define HNAE3_USER_MPE BIT(1) /* mulitcast promisc enabled by user */
#define HNAE3_BPE BIT(2) /* broadcast promisc enable */
#define HNAE3_OVERFLOW_UPE BIT(3) /* unicast mac vlan overflow */
#define HNAE3_OVERFLOW_MPE BIT(4) /* multicart mac vlan overflow */
#define HNAE3_VLAN_FLTR BIT(5) /* enable vlan filter */
#define HNAE3_UPE(HNAE3_USER_UPE | HNAE3_OVERFLOW_UPE)
#define HNAE3_MPE(HNAE3_USER_MPE | HNAE3_OVERFLOW_MPE)

struct hnae3_handle {
struct hnae3_client *client;
@ @-471.26 +565.33 @ @
};

u32 numa_node_mask; /* for multi-chip support */
+
+u8 netdev_flags;
+struct dentry *hnae3_dbgfs;
+};

#define hnae_set_field(origin, mask, shift, val) \
#define hnae3_set_field(origin, mask, shift, val) \

```c
int hnae3_register_ae_dev(struct hnae3_ae_dev *ae_dev);
void hnae3_unregister_ae_dev(struct hnae3_ae_dev *ae_dev);

+void hnae3_unregister_ae_algo_prepare(struct hnae3_ae_algo *ae_algo);
void hnae3_unregister_ae_algo(struct hnae3_ae_algo *ae_algo);
-int hnae3_register_ae_algo(struct hnae3_ae_algo *ae_algo);
+void hnae3_register_ae_algo(struct hnae3_ae_algo *ae_algo);

void hnae3_unregister_client(struct hnae3_client *client);
int hnae3_register_client(struct hnae3_client *client);
+
+void hnae3_set_client_init_flag(struct hnae3_client *client,
+struct hnae3_ae_dev *ae_dev, int inited);
#endif
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3_dcbnl.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3_dcbnl.c
@@ -0,0 +1,106 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.
+
+#include "hnae3.h"
+#include "hns3_enet.h"
+
+static
+int hns3_dcbnl_ieee_getets(struct net_device *ndev, struct ieee_ets *ets)
+{
+struct hnae3_handle *h = hns3_get_handle(ndev);
+
+if (hns3_nic_resetting(ndev))
+return -EBUSY;
+
+if (h->kinfo.dcb_ops->ieee_getets)
+return h->kinfo.dcb_ops->ieee_getets(ndev);
+else
+	return -ENODEV;
+
+if (h->kinfo.dcb_ops->ieee_setets)
+	h->kinfo.dcb_ops->ieee_setets(ndev, ets);
+
+return 0;
```

+return h->kinfo.dcb_ops->ieee_getets(h, ets);
+
+return -EOPNOTSUPP;
+
+static
+int hns3_dcbnl_ieee_setets(struct net_device *ndev, struct ieee_ets *ets)
+{
+struct hnae3_handle *h = hns3_get_handle(ndev);
+
+if (hns3_nic_resetting(ndev))
+return -EBUSY;
+
+if (h->kinfo.dcb_ops->ieee_setets)
+return h->kinfo.dcb_ops->ieee_setets(h, ets);
+
+return -EOPNOTSUPP;
+
+}
+
+static
+int hns3_dcbnl_ieee_getpfc(struct net_device *ndev, struct ieee_pfc *pfc)
+{
+struct hnae3_handle *h = hns3_get_handle(ndev);
+
+if (hns3_nic_resetting(ndev))
+return -EBUSY;
+
+if (h->kinfo.dcb_ops->ieee_getpfc)
+return h->kinfo.dcb_ops->ieee_getpfc(h, pfc);
+
+return -EOPNOTSUPP;
+
+}
+
+static
+int hns3_dcbnl_ieee_setpfc(struct net_device *ndev, struct ieee_pfc *pfc)
+{
+struct hnae3_handle *h = hns3_get_handle(ndev);
+
+if (hns3_nic_resetting(ndev))
+return -EBUSY;
+
+if (h->kinfo.dcb_ops->ieee_setpfc)
+return h->kinfo.dcb_ops->ieee_setpfc(h, pfc);
+
+return -EOPNOTSUPP;
+
+/* DCBX configuration */
+static u8 hns3_dcbnl_getdcbx(struct net_device *ndev)
+{
+struct hnae3_handle *h = hns3_get_handle(ndev);
+
+if (h->kinfo.dcb_ops->getdcbx)
+return h->kinfo.dcb_ops->getdcbx(h);
+
+return 0;
+}
+
+/* return 0 if successful, otherwise fail */
+static u8 hns3_dcbnl_setdcbx(struct net_device *ndev, u8 mode)
+{
+struct hnae3_handle *h = hns3_get_handle(ndev);
+
+if (h->kinfo.dcb_ops->setdcbx)
+return h->kinfo.dcb_ops->setdcbx(h, mode);
+
+return 1;
+}
+
+static const struct dcbnl_rtnl_ops hns3_dcbnl_ops = {
+.ieee_getets = hns3_dcbnl_ieee_getets,
+.ieee_setets = hns3_dcbnl_ieee_setets,
+.ieee_getpfc = hns3_dcbnl_ieee_getpfc,
+.ieee_setpfc = hns3_dcbnl_ieee_setpfc,
+.getdcbx = hns3_dcbnl_getdcbx,
+.setdcbx = hns3_dcbnl_setdcbx,
+};
+
+/* hclge_dcbnl_setup - DCBNL setup */
+* @handle: the corresponding vport handle
+* Set up DCBNL
+*/
+void hns3_dcbnl_setup(struct hnae3_handle *handle)
+{
+struct net_device *dev = handle->kinfo.netdev;
+
+if (!handle->kinfo.dcb_ops || (handle->flags & HNAE3_SUPPORT_VF))
+return;
+
+dev->dcbnl_ops = &hns3_dcbnl_ops;
+}

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3_debugfs.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3_debugfs.c
@@ -0,0 +1,399 @@
+// SPDX-License-Identifier: GPL-2.0+
+/* Copyright (c) 2018-2019 Hisilicon Limited. */
```c
#include <linux/debugfs.h>
#include <linux/device.h>

#include "hnae3.h"
#include "hns3_enet.h"

#define HNS3_DBG_READ_LEN 256

static struct dentry *hns3_dbgfs_root;

static int hns3_dbg_queue_info(struct hnae3_handle *h, char *cmd_buf)
{
    struct hns3_nic_priv *priv = h->priv;
    struct hns3_nic_ring_data *ring_data;
    struct hns3_enet_ring *ring;
    u32 base_add_l, base_add_h;
    u32 queue_num, queue_max;
    u32 value, i = 0;
    int cnt;

    if (!priv->ring_data) {
        dev_err(&h->pdev->dev, "ring_data is NULL\n");
        return -EFAULT;
    }

    queue_max = h->kinfo.num_tqps;
    cnt = kstrtouint(&cmd_buf[11], 0, &queue_num);
    if (cnt)
        queue_num = 0;
    else
        queue_max = queue_num + 1;

    dev_info(&h->pdev->dev, "queue info\n");
    if (queue_num >= h->kinfo.num_tqps)
        dev_err(&h->pdev->dev, "Queue number(%u) is out of range(%u)\n", queue_num, h->kinfo.num_tqps - 1);
        return -EINVAL;

    ring_data = priv->ring_data;
    for (i = queue_num; i < queue_max; i++) {
        /* Each cycle needs to determine whether the instance is reset, 
         * to prevent reference to invalid memory. And need to ensure 
         * that the following code is executed within 100ms. 
         */
        
```
+if (!test_bit(HNS3_NIC_STATE_INITED, &priv->state) ||
+    test_bit(HNS3_NIC_STATE_RESETTING, &priv->state))
+return -EPERM;
+	ring = ring_data[(u32)(i + h->kinfo.num_tqps)].ring;
+base_add_h = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_BASEADDR_H_REG);
+base_add_l = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_BASEADDR_L_REG);
+dev_info(&h->pdev->dev, "RX(%d) BASE ADD: 0x%08x%08x\n", i,
+    base_add_h, base_add_l);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_BD_NUM_REG);
+dev_info(&h->pdev->dev, "RX(%d) RING BD NUM: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_BD_LEN_REG);
+dev_info(&h->pdev->dev, "RX(%d) RING BD LEN: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_TAIL_REG);
+dev_info(&h->pdev->dev, "RX(%d) RING TAIL: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_HEAD_REG);
+dev_info(&h->pdev->dev, "RX(%d) RING HEAD: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_FBDNUM_REG);
+dev_info(&h->pdev->dev, "RX(%d) RING FBDNUM: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_RX_RING_PKTNUM_RECORD_REG);
+dev_info(&h->pdev->dev, "RX(%d) RING PKTNUM: %u\n", i, value);
+
+ring = ring_data[i].ring;
+base_add_h = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_BASEADDR_H_REG);
+base_add_l = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_BASEADDR_L_REG);
+dev_info(&h->pdev->dev, "TX(%d) BASE ADD: 0x%08x%08x\n", i,
+    base_add_h, base_add_l);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_BD_NUM_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING BD NUM: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_BD_LEN_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING BD LEN: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_TAIL_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING TAIL: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_HEAD_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING HEAD: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_FBDNUM_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING FBDNUM: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+    HNS3_RING_TX_RING_PKTNUM_RECORD_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING PKTNUM: %u\n", i, value);
+
+ring = ring_data[i].ring;
+value = readl_relaxed(ring->tqp->io_base +
+ HNS3_RING_TX_RING_TC_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING TC: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+ HNS3_RING_TX_RING_TAIL_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING TAIL: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+ HNS3_RING_TX_RING_HEAD_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING HEAD: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+ HNS3_RING_TX_RING_FBDNUM_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING FBDNUM: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+ HNS3_RING_TX_RING_OFFSET_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING OFFSET: %u\n", i, value);
+
+value = readl_relaxed(ring->tqp->io_base +
+ HNS3_RING_TX_RING_PKTNUM_RECORD_REG);
+dev_info(&h->pdev->dev, "TX(%d) RING PKTNUM: %u\n\n", i,
+ value);
+
+} 
+
+return 0;
+}
+
+static int hns3_dbg_queue_map(struct hnae3_handle *h)
+{
+struct hns3_nic_priv *priv = h->priv;
+struct hns3_nic_ring_data *ring_data;
+int i;
+
+if (!h->ae_algo->ops->get_global_queue_id)
+return -EOPNOTSUPP;
+
+dev_info(&h->pdev->dev, "map info for queue id and vector id\n");
+dev_info(&h->pdev->dev, "local queue id | global queue id | vector id\n");
+for (i = 0; i < h->kinfo.num_tqps; i++) {
+u16 global_qid;
+
+global_qid = h->ae_alo->ops->get_global_queue_id(h, i);
+ring_data = &priv->ring_data[i];
+if (!ring_data || !ring_data->ring ||
+ !ring_data->ring->tqp_vector)
+continue;
+
+dev_info(&h->pdev->dev,
+    "%4d %4d %4d\n",
+  i, global_qid,
+  ring_data->ring->tqp_vector->vector_irq);
+
+} +
+
+return 0;
+
+
+static int hns3_dbg_bd_info(struct hnae3_handle *h, char *cmd_buf)
+{
+    struct hns3_nic_priv *priv = h->priv;
+    struct hns3_nic_ring_data *ring_data;
+    struct hns3_desc *rx_desc, *tx_desc;
+    struct device *dev = &h->pdev->dev;
+    struct hns3_enet_ring *ring;
+    u32 tx_index, rx_index;
+    u32 q_num, value;
+    int cnt;
+    
+    cnt = sscanf(&cmd_buf[8], "%u %u", &q_num, &tx_index);
+    if (cnt == 2) {
+        tx_index = tx_index;
+    } else if (cnt != 1) {
+        dev_err(dev, "bd info: bad command string, cnt=%d\n", cnt);
+        return -EINVAL;
+    }
+    
+    if (q_num >= h->kinfo.num_tqps) {
+        dev_err(dev, "Queue number(%u) is out of range(%u)\n", q_num,
+            h->kinfo.num_tqps - 1);
+        return -EINVAL;
+    }
+    
+    ring_data = priv->ring_data;
+    ring  = ring_data[q_num].ring;
+    value = readl_relaxed(ring->tqp->io_base + HNS3_RING_TX_RING_TAIL_REG);
+    tx_index = (cnt == 1) ? value : tx_index;
+    
+    if (tx_index >= ring->desc_num) {
+        dev_err(dev, "bd index (%u) is out of range(%u)\n", tx_index,
+            ring->desc_num - 1);
+        return -EINVAL;
+    }
+    
+    tx_desc = &ring->desc[tx_index];
```c
+dev_info(dev, "TX Queue Num: %u, BD Index: %u\n", q_num, tx_index);
+dev_info(dev, "(TX) addr: 0x%llx\n", tx_desc->addr);
+dev_info(dev, "(TX) vlan_tag: %u\n", tx_desc->tx.vlan_tag);
+dev_info(dev, "(TX) send_size: %u\n", tx_desc->tx.send_size);
+dev_info(dev, "(TX) vlan_tso: %u\n", tx_desc->tx.type_cs_vlan_tso);
+dev_info(dev, "(TX) l2_len: %u\n", tx_desc->tx.l2_len);
+dev_info(dev, "(TX) l3_len: %u\n", tx_desc->tx.l3_len);
+dev_info(dev, "(TX) l4_len: %u\n", tx_desc->tx.l4_len);
+dev_info(dev, "(TX) outer_vlan_tag: %u\n", tx_desc->tx.outer_vlan_tag);
+dev_info(dev, "(TX) tv: %u\n", tx_desc->tx.tv);
+dev_info(dev, "(TX) vlan_msec: %u\n", tx_desc->tx.ol_type_vlan_msec);
+dev_info(dev, "(TX) l2_len: %u\n", tx_desc->tx.ol2_len);
+dev_info(dev, "(TX) l3_len: %u\n", tx_desc->tx.ol3_len);
+dev_info(dev, "(TX) l4_len: %u\n", tx_desc->tx.ol4_len);
+dev_info(dev, "(TX) paylen: %u\n", tx_desc->tx.paylen);
+dev_info(dev, "(TX) bdtp_fe_sc_vld_ra_ri: %u\n", tx_desc->tx.bdtp_fe_sc_vld_ra_ri);
+dev_info(dev, "(TX) mss: %u\n", tx_desc->tx.mss);

+ring = ring_data[q_num + h->kinfo.num_tqps].ring;
+value = readl_relaxed(ring->tqp->io_base + HNS3_RING_RX_RING_TAIL_REG);
+rx_index = (cnt == 1) ? value : tx_index;
+rx_desc = &ring->desc[rx_index];
+
+dev_info(dev, "RX Queue Num: %u, BD Index: %u\n", q_num, rx_index);
+dev_info(dev, "(RX) addr: 0x%llx\n", rx_desc->addr);
+dev_info(dev, "(RX) pkt_len: %u\n", rx_desc->rx.pkt_len);
+dev_info(dev, "(RX) size: %u\n", rx_desc->rx.size);
+dev_info(dev, "(RX) rss_hash: %u\n", rx_desc->rx.rss_hash);
+dev_info(dev, "(RX) fd_id: %u\n", rx_desc->rx.fd_id);
+dev_info(dev, "(RX) vlan_tag: %u\n", rx_desc->rx.vlan_tag);
+dev_info(dev, "(RX) o_dm_vlan_id_fb: %u\n", rx_desc->rx.o_dm_vlan_id_fb);
+dev_info(dev, "(RX) ot_vlan_tag: %u\n", rx_desc->rx.ot_vlan_tag);
+dev_info(dev, "(RX) bd_base_info: %u\n", rx_desc->rx.bd_base_info);
+
+return 0;
+
+static void hns3_dbg_help(struct hnae3_handle *h)
+{
+  +
+  +#define HNS3DBG_BUF_LEN 256
+  +
+  +char printf_buf[HNS3DBG_BUF_LEN];
+  +
+  +dev_info(&h->pdev->dev, "available commands\n");
+  +dev_info(&h->pdev->dev, "queue info [number]\n");
+  +dev_info(&h->pdev->dev, "queue map\n");
+  +dev_info(&h->pdev->dev, "bd info [q_num] <bd index>\n");
+  +dev_info(&h->pdev->dev, "dump fd tcam\n");
+}
```
+dev_info(&h->pdev->dev, "dump tc
");
+dev_info(&h->pdev->dev, "dump tm map [q_num]n");
+dev_info(&h->pdev->dev, "dump tm
");
+dev_info(&h->pdev->dev, "dump qos pause cfg\n");
+dev_info(&h->pdev->dev, "dump qos pri map\n");
+dev_info(&h->pdev->dev, "dump qos buf cfg\n");
+dev_info(&h->pdev->dev, "dump mng tbl\n");
+
+memset(printf_buf, 0, HNS3_DBG_BUF_LEN);
+strncat(printf_buf, "dump reg [[bios common] [ssu <prt_id>]",
+HNS3_DBG_BUF_LEN - 1);
+strncat(printf_buf + strlen(printf_buf),
+" [igu egu <prt_id>] [rpu <tc_queue_num>]",
+HNS3_DBG_BUF_LEN - strlen(printf_buf) - 1);
+strncat(printf_buf + strlen(printf_buf),
+" [rtc] [ppp] [rcb] [tqp <q_num>]\n",
+HNS3_DBG_BUF_LEN - strlen(printf_buf) - 1);
+dev_info(&h->pdev->dev, "%s", printf_buf);
+
+memset(printf_buf, 0, HNS3_DBG_BUF_LEN);
+strncat(printf_buf, "dump reg dcb [port_id] [pri_id] [pg_id]",
+HNS3_DBG_BUF_LEN - 1);
+strncat(printf_buf + strlen(printf_buf), " [rq_id] [nq_id] [qset_id]\n",
+HNS3_DBG_BUF_LEN - strlen(printf_buf) - 1);
+dev_info(&h->pdev->dev, "%s", printf_buf);
+}

+static ssize_t hns3_dbg_cmd_read(struct file *filp, char __user *buffer,
+ size_t count, loff_t *ppos)
+
+
+int uncopy_bytes;
+char *buf;
+int len;
+
+if (*ppos != 0)
+return 0;
+
+if (count < HNS3_DBG_READ_LEN)
+return -ENOSPC;
+
+buf = kzalloc(HNS3_DBG_READ_LEN, GFP_KERNEL);
+if (!buf)
+return -ENOMEM;
+
+len = snprintf(buf, HNS3_DBG_READ_LEN, "%s\n",
+ "Please echo help to cmd to get help information");
+uncopy_bytes = copy_to_user(buffer, buf, len);
+
+}
+-kfree(buf);
+  
+ if (uncopy_bytes)
+ return -EFAULT;
+  
+ return (*ppos = len);
+} 
+ 
+ static ssize_t hns3_dbg_cmd_write(struct file *filp, const char __user *buffer, 
+ size_t count, loff_t *ppos)
+{
+ struct hnae3_handle *handle = filp->private_data;
+ struct hns3_nic_priv *priv = handle->priv;
+ char *cmd_buf, *cmd_buf_tmp;
+ int uncopied_bytes;
+ int ret = 0;
+ 
+ if (*ppos != 0)
+ return 0;
+
+ /* Judge if the instance is being reset. */
+ if (!test_bit(HNS3_NIC_STATE_INITED, &priv->state) ||
+    test_bit(HNS3_NIC_STATE_RESETTING, &priv->state))
+ return 0;
+ 
+ cmd_buf = kzalloc(count + 1, GFP_KERNEL);
+ if (!cmd_buf)
+ return count;
+ 
+ uncopied_bytes = copy_from_user(cmd_buf, buffer, count);
+ if (uncopied_bytes) {
+ kfree(cmd_buf);
+ return -EFAULT;
+ }
+ 
+ cmd_buf[count] = '\0';
+ 
+ cmd_buf_tmp = strchr(cmd_buf, '\n');
+ if (cmd_buf_tmp) {
+ *cmd_buf_tmp = '\0';
+ count = cmd_buf_tmp - cmd_buf + 1;
+ }
+ 
+ if (strncmp(cmd_buf, "help", 4) == 0)
+ hns3_dbg_help(handle);
+ else if (strncmp(cmd_buf, "queue info", 10) == 0)
+ ret = hns3_dbg_queue_info(handle, cmd_buf);
+ else if (strncmp(cmd_buf, "queue map", 9) == 0)
else if (strncmp(cmd_buf, "bd info", 7) == 0)
    ret = hns3_dbg_bd_info(handle, cmd_buf);
else if (handle->ae_algo->ops->dbg_run_cmd)
    ret = handle->ae_algo->ops->dbg_run_cmd(handle, cmd_buf);
+
    if (ret)
        hns3_dbg_help(handle);
    +
    kfree(cmd_buf);
    cmd_buf = NULL;
    +
    return count;
}
+
static const struct file_operations hns3_dbg_cmd_fops = {
    .owner = THIS_MODULE,
    .open  = simple_open,
    .read  = hns3_dbg_cmd_read,
    .write = hns3_dbg_cmd_write,
    +};
+
    void hns3_dbg_init(struct hnae3_handle *handle)
    +{
        const char *name = pci_name(handle->pdev);
        struct dentry *pfile;
        +
        handle->hnae3_dbgfs = debugfs_create_dir(name, hns3_dbgfs_root);
        +if (!handle->hnae3_dbgfs)
            return;
        +
        pfile = debugfs_create_file("cmd", 0600, handle->hnae3_dbgfs, handle,
            + &hns3_dbg_cmd_fops);
        +if (!pfile) {
            debugfs_remove_recursive(handle->hnae3_dbgfs);
            handle->hnae3_dbgfs = NULL;
            +dev_warn(&handle->pdev->dev, "create file for %s fail\n",
                + name);
            +}
        +
        +void hns3_dbg_uninit(struct hnae3_handle *handle)
            +{
                +debugfs_remove_recursive(handle->hnae3_dbgfs);
                +handle->hnae3_dbgfs = NULL;
                +}
            +
        +
        +void hns3_dbg_register_debugfs(const char *debugfs_dir_name)
hns3_dbgfs_root = debugfs_create_dir(debugfs_dir_name, NULL);
if (!hns3_dbgfs_root) {
    pr_warn("Register debugfs for %s fail\n", debugfs_dir_name);
    return;
}
}
}

void hns3_dbg_unregister_debugfs(void)
{
    debugfs_remove_recursive(hns3_dbgfs_root);
    hns3_dbgfs_root = NULL;
}

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3_enet.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3_enet.c
@@ -0,0 +1,4356 @@
+# SPDX-License-Identifier: GPL-2.0+
+# Copyright (c) 2016-2017 Hisilicon Limited.
+
+#include <linux/dma-mapping.h>
+#include <linux/etherdevice.h>
+#include <linux/interrupt.h>
+#include <linux/if_vlan.h>
+#include <linux/ip.h>
+#include <linux/ipv6.h>
+#include <linux/module.h>
+#include <linux/pci.h>
+#include <linux/aer.h>
+#include <linux/skbuff.h>
+#include <linux/sctp.h>
+#include <linux/vermagic.h>
+#include <net/gre.h>
+#include <net/pkt_cls.h>
+#include <net/tcp.h>
+#include <net/vxlan.h>
+
+#include "hnae3.h"
+#include "hns3_enet.h"
+
+#define hns3_tx_bd_count(S) DIV_ROUND_UP(S, HNS3_MAX_BD_SIZE)
+
+static void hns3_clear_all_ring(struct hnae3_handle *h);
+static void hns3_force_clear_all_rx_ring(struct hnae3_handle *h);
+static void hns3_remove_hw_addr(struct net_device *netdev);
+
+static const char hns3_driver_name[] = "hns3";
+const char hns3_driver_version[] = VERMAGIC_STRING;
+static const char hns3_driver_string[] =
"Hisilicon Ethernet Network Driver for Hip08 Family";
static const char hns3_copyright[] = "Copyright (c) 2017 Huawei Corporation."
static struct hnae3_client client;

#define HNS3_MIN_TX_LEN 33U

#define HNS3_MIN_TUN_PKT_LEN 65U

/* hns3_pci_tbl - PCI Device ID Table */

static struct pci_device_id hns3_pci_tbl[] = {
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_GE), 0},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_25GE), 0},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_25GE_RDMA),
  HNAE3_DEV_SUPPORT_ROCE_DCB_BITS},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_25GE_RDMA_MACSEC),
  HNAE3_DEV_SUPPORT_ROCE_DCB_BITS},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_50GE_RDMA),
  HNAE3_DEV_SUPPORT_ROCE_DCB_BITS},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_50GE_RDMA_MACSEC),
  HNAE3_DEV_SUPPORT_ROCE_DCB_BITS},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_100G_RDMA_MACSEC),
  HNAE3_DEV_SUPPORT_ROCE_DCB_BITS},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_100G_VF), 0},
{PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_100G_RDMA_DCB_PFC_VF),
  HNAE3_DEV_SUPPORT_ROCE_DCB_BITS},
/* required last entry */
{0, }
};
MODULE_DEVICE_TABLE(pci, hns3_pci_tbl);

static irqreturn_t hns3_irq_handle(int irq, void *vector)
{
  struct hns3_enet_tqp_vector *tqp_vector = vector;
  napi_schedule(&tqp_vector->napi);
  return IRQ_HANDLED;
}

/* This callback function is used to set affinity changes to the irq affinity */

/* masks when the irq_set_affinity_notifier function is used. */
```c
+static void hns3_nic_irq_affinity_notify(struct irq_affinity_notify *notify,
  + const cpumask_t *mask)
+
+static void hns3_nic_irq_affinity_release(struct kref *ref)
+
+static void hns3_nic_uninit_irq(struct hns3_nic_priv *priv)
+
+for (i = 0; i < priv->vector_num; i++) {
  +tqp_vectors = &priv->tqp_vector[i];
  +
  +if (tqp_vectors->irq_init_flag != HNS3_VECTOR_INITED)
  +continue;
  +
  +/* clear the affinity notifier and affinity mask */
  +irq_set_affinity_notifier(tqp_vectors->vector_irq, NULL);
  +irq_set_affinity_hint(tqp_vectors->vector_irq, NULL);
  +
  +/* release the irq resource */
  +free_irq(tqp_vectors->vector_irq, tqp_vectors);
  +tqp_vectors->irq_init_flag = HNS3_VECTOR_NOT_INITED;
  +
  +}
+
+static int hns3_nic_init_irq(struct hns3_nic_priv *priv)
+
+for (i = 0; i < priv->vector_num; i++) {
  +tqp_vectors = &priv->tqp_vector[i];
  +
  +if (tqp_vectors->irq_init_flag != HNS3_VECTOR_INITED)
  +continue;
  +
  +for (i = 0; i < priv->vector_num; i++) {
  +tqp_vectors = &priv->tqp_vector[i];
  +
  +if (tqp_vectors->irq_init_flag == HNS3_VECTOR_INITED)
  +continue;
  +
  +static void hns3_nic_irq_affinity_notify(struct irq_affinity_notify *notify,
  + const cpumask_t *mask)
+}
+struct hns3_enet_tqp_vector *tqp_vectors =
+container_of(notify, struct hns3_enet_tqp_vector,
  + affinity_notify);
+
+tqp_vectors->affinity_mask = *mask;
+
+static void hns3_nic_irq_affinity_release(struct kref *ref)
+
+static void hns3_nic_uninit_irq(struct hns3_nic_priv *priv)
+
+static int hns3_nic_init_irq(struct hns3_nic_priv *priv)
+
+for (i = 0; i < priv->vector_num; i++) {
  +tqp_vectors = &priv->tqp_vector[i];
  +
  +if (tqp_vectors->irq_init_flag != HNS3_VECTOR_INITED)
  +continue;
  +
  +for (i = 0; i < priv->vector_num; i++) {
  +tqp_vectors = &priv->tqp_vector[i];
  +
  +if (tqp_vectors->irq_init_flag == HNS3_VECTOR_INITED)
  +continue;
  +
```
continue;
+
+if (tqp_vectors->tx_group.ring && tqp_vectors->rx_group.ring) {
+snprintf(tqp_vectors->name, HNAE3_INT_NAME_LEN - 1,
+"%s-%s-%d", priv->netdev->name, "TxRx",
+txrx_int_idx++);
+txrx_int_idx++;
+} else if (tqp_vectors->tx_group.ring) {
+snprintf(tqp_vectors->name, HNAE3_INT_NAME_LEN - 1,
+"%s-%s-%d", priv->netdev->name, "Tx",
+tx_int_idx++);
+} else if (tqp_vectors->rx_group.ring) {
+snprintf(tqp_vectors->name, HNAE3_INT_NAME_LEN - 1,
+"%s-%s-%d", priv->netdev->name, "Rx",
+rx_int_idx++);
+} else {
+/* Skip this unused q_vector */
+continue;
+
+tqp_vectors->name[HNAE3_INT_NAME_LEN - 1] = '\0';
+
+ret = request_irq(tqp_vectors->vector_irq, hns3_irq_handle, 0,
+ tqp_vectors->name,
+ tqp_vectors);
+if (ret) {
+netdev_err(priv->netdev, "request_irq(%d) fail\n",
+ tqp_vectors->vector_irq);
+return ret;
+
+tqp_vectors->affinity_notify.notify =
+hns3_nic_irq_affinity_notify;
+tqp_vectors->affinity_notify.release =
+hns3_nic_irq_affinity_release;
+irq_set_affinity_notifier(tqp_vectors->vector_irq,
+ &tqp_vectors->affinity_notify);
+irq_set_affinity_hint(tqp_vectors->vector_irq,
+ &tqp_vectors->affinity_mask);
+
+tqp_vectors->irq_init_flag = HNS3_VECTOR_INITED;
+
+return 0;
+
+}
+
+static void hns3_mask_vector_irq(struct hns3_enet_tqp_vector *tqp_vector,
+ u32 mask_en)
+{ +writel(mask_en, tqp_vector->mask_addr); +} +
+static void hns3_vector_enable(struct hns3_enet_tqp_vector *tqp_vector) +{ +napi_enable(&tqp_vector->napi); + +/* enable vector */ +hns3_mask_vector_irq(tqp_vector, 1); +} +
+static void hns3_vector_disable(struct hns3_enet_tqp_vector *tqp_vector) +{ +/* disable vector */ +hns3_mask_vector_irq(tqp_vector, 0); + +disable_irq(tqp_vector->vector_irq); +napi_disable(&tqp_vector->napi); +} +
+void hns3_set_vector_coalesce_rl(struct hns3_enet_tqp_vector *tqp_vector, + u32 rl_value) +{ + u32 rl_reg = hns3_rl_usec_to_reg(rl_value); + +/* this defines the configuration for RL (Interrupt Rate Limiter). + * RL defines rate of interrupts i.e. number of interrupts-per-second + * GL and RL(Rate Limiter) are 2 ways to acheive interrupt coalescing + */ + +if (rl_reg > 0 && !tqp_vector->tx_group.coal.gl_adapt_enable && +    !tqp_vector->rx_group.coal.gl_adapt_enable) +/* According to the hardware, the range of rl_reg is + * 0-59 and the unit is 4. + */ +rl_reg |= HNS3_INT_RL_ENABLE_MASK; + +writel(rl_reg, tqp_vector->mask_addr + HNS3_VECTOR_RL_OFFSET); +} +
+void hns3_set_vector_coalesce_rx_gl(struct hns3_enet_tqp_vector *tqp_vector, + u32 gl_value) +{ + u32 rx_gl_reg = hns3_gl_usec_to_reg(gl_value); + +writel(rx_gl_reg, tqp_vector->mask_addr + HNS3_VECTOR_GL0_OFFSET); +}
+ void hns3_set_vector_coalesce_tx_gl(struct hns3_enet_tqp_vector *tqp_vector,
+     u32 gl_value)
+{
+     u32 tx_gl_reg = hns3_gl_usec_to_reg(gl_value);
+     writel(tx_gl_reg, tqp_vector->mask_addr + HNS3_VECTOR_GL1_OFFSET);
+ }
+
+ static void hns3_vector_gl_rl_init(struct hns3_enet_tqp_vector *tqp_vector,
+     struct hns3_nic_priv *priv)
+{
+     /* initialize the configuration for interrupt coalescing.
+        + 1. GL (Interrupt Gap Limiter)
+        + 2. RL (Interrupt Rate Limiter)
+        */
+     /* Default: enable interrupt coalescing self-adaptive and GL */
+     tqp_vector->tx_group.coal.gl_adapt_enable = 1;
+     tqp_vector->rx_group.coal.gl_adapt_enable = 1;
+     tqp_vector->tx_group.coal.int_gl = HNS3_INT_GL_50K;
+     tqp_vector->rx_group.coal.int_gl = HNS3_INT_GL_50K;
+     tqp_vector->rx_group.coal.flow_level = HNS3_FLOW_LOW;
+     tqp_vector->tx_group.coal.flow_level = HNS3_FLOW_LOW;
+ }
+
+ static void hns3_vector_gl_rl_init_hw(struct hns3_enet_tqp_vector *tqp_vector,
+     struct hns3_nic_priv *priv)
+{
+     struct hnae3_handle *h = priv->ae_handle;
+     hns3_set_vector_coalesce_tx_gl(tqp_vector,
+         tqp_vector->tx_group.coal.int_gl);
+     hns3_set_vector_coalesce_rx_gl(tqp_vector,
+         tqp_vector->rx_group.coal.int_gl);
+     hns3_set_vector_coalesce_rl(tqp_vector, h->kinfo.int_rl_setting);
+ }
+
+ static int hns3_nic_set_real_num_queue(struct net_device *netdev)
+{
+     struct hnae3_handle *h = hns3_get_handle(netdev);
+     struct hnae3_knic_private_info *kinfo = &h->kinfo;
+     unsigned int queue_size = kinfo->rss_size * kinfo->num_tc;
+     int i, ret;
+     if (kinfo->num_tc <= 1) {
+netdev_reset_tc(netdev);
+} else {
+ret = netdev_set_num_tc(netdev, kinfo->num_tc);
+if (ret) {
+netdev_err(netdev,
+ "netdev_set_num_tc fail, ret=%d\n", ret);
+return ret;
+}
+
+for (i = 0; i < HNAE3_MAX_TC; i++) {
+if (!kinfo->tc_info[i].enable)
+continue;
+
+netdev_set_tc_queue(netdev,
+    kinfo->tc_info[i].tc,
+    kinfo->tc_info[i].tqp_count,
+    kinfo->tc_info[i].tqp_offset);
+}
+
+ret = netif_set_real_num_tx_queues(netdev, queue_size);
+if (ret) {
+netdev_err(netdev,
+ "netif_set_real_num_tx_queues fail, ret=%d\n", ret);
+return ret;
+}
+
+ret = netif_set_real_num_rx_queues(netdev, queue_size);
+if (ret) {
+netdev_err(netdev,
+ "netif_set_real_num_rx_queues fail, ret=%d\n", ret);
+return ret;
+}
+
+ret = hns3_get_max_available_channels(h);
+
+static u16 hns3_get_max_available_channels(struct hnae3_handle *h)
+{
+u16 alloc_tqps, max_rss_size, rss_size;
+
+h->ae_algo->ops->get_tqps_and_rss_info(h, &alloc_tqps, &max_rss_size);
+rss_size = alloc_tqps / h->kinfo.num_tc;
+
+return min_t(u16, rss_size, max_rss_size);
+}
+static void hns3_tqp_enable(struct hnae3_queue *tqp)
+{
+u32 rcb_reg;
+
+rcb_reg = hns3_read_dev(tqp, HNS3_RING_EN_REG);
+rcb_reg |= BIT(HNS3_RING_EN_B);
+hns3_write_dev(tqp, HNS3_RING_EN_REG, rcb_reg);
+}
+
+static void hns3_tqp_disable(struct hnae3_queue *tqp)
+{
+u32 rcb_reg;
+
+rcb_reg = hns3_read_dev(tqp, HNS3_RING_EN_REG);
+rcb_reg &= ~BIT(HNS3_RING_EN_B);
+hns3_write_dev(tqp, HNS3_RING_EN_REG, rcb_reg);
+}
+
+static int hns3_nic_net_up(struct net_device *netdev)
+{
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+struct hnae3_handle *h = priv->ae_handle;
+int i, j;
+int ret;
+
+ret = hns3_nic_reset_all_ring(h);
+if (ret)
+return ret;
+
+/* get irq resource for all vectors */
+ret = hns3_nic_init_irq(priv);
+if (ret) {
+netdev_err(netdev, "hns init irq failed! ret=%d\n", ret);
+return ret;
+}
+
+/* enable the vectors */
+for (i = 0; i < priv->vector_num; i++)
+hns3_vector_enable(&priv->tqp_vector[i]);
+
+/* enable rcb */
+for (j = 0; j < h->kinfo.num_tqps; j++)
+hns3_tqp_enable(h->kinfo.tqp[j]);
+
+/* start the ae_dev */
+ret = h->ae_algo->ops->start ? h->ae_algo->ops->start(h) : 0;
+if (ret)
+goto out_start_err;
+clear_bit(HNS3_NIC_STATE_DOWN, &priv->state);
+
+return 0;
+
+out_start_err:
+while (j--)
+hns3_tqp_disable(h->kinfo.tqp[j]);
+
+for (j = i - 1; j >= 0; j--)
+hns3_vector_disable(&priv->tqp_vector[j]);
+
+hns3_nic_uninit_irq(priv);
+
+return ret;
+
+}
+
+static int hns3_nic_net_open(struct net_device *netdev)
+{
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+struct hnae3_handle *h = hns3_get_handle(netdev);
+struct hnae3_knic_private_info *kinfo;
+int i, ret;
+
+if (hns3_nic_resetting(netdev))
+return -EBUSY;
+
+netif_carrier_off(netdev);
+
+ret = hns3_nic_set_real_num_queue(netdev);
+if (ret)
+return ret;
+
+ret = hns3_nic_net_up(netdev);
+if (ret) {
+netdev_err(netdev,
+ "hns net up fail, ret=%d\n", ret);
+return ret;
+}
+
+kinfo = &h->kinfo;
+
+for (i = 0; i < HNAE3_MAX_USER_PRIO; i++) {
+netdev_set_prio_tc_map(netdev, i,
+kinfo->prio_tc[i]);
+}
+
+if (h->ae_algo->ops->set_timer_task)
+h->ae_algo->ops->set_timer_task(priv->ae_handle, true);
static void hns3_nic_net_down(struct net_device *netdev)
{
    struct hns3_nic_priv *priv = netdev_priv(netdev);
    struct hnae3_handle *h = hns3_get_handle(netdev);
    const struct hnae3_ae_ops *ops;
    int i;
    
    /* disable vectors */
    for (i = 0; i < priv->vector_num; i++)
        hns3_vector_disable(&priv->tqp_vector[i]);
    
    /* disable rcb */
    for (i = 0; i < h->kinfo.num_tqps; i++)
        hns3_tqp_disable(h->kinfo.tqp[i]);
    
    /* stop ae_dev */
    ops = priv->ae_handle->ae_algo->ops;
    if (ops->stop)
        ops->stop(priv->ae_handle);
    
    /* free irq resources */
    hns3_nic_uninit_irq(priv);
    hns3_clear_all_ring(priv->ae_handle);
}

static int hns3_nic_net_stop(struct net_device *netdev)
{
    struct hns3_nic_priv *priv = netdev_priv(netdev);
    struct hnae3_handle *h = hns3_get_handle(netdev);
    
    if (test_and_set_bit(HNS3_NIC_STATE_DOWN, &priv->state))
        return 0;
    
    if (h->ae_algo->ops->set_timer_task)
        h->ae_algo->ops->set_timer_task(priv->ae_handle, false);
    netif_tx_stop_all_queues(netdev);
    netif_carrier_off(netdev);
    
    hns3_nic_net_down(netdev);
    
    return 0;
}
+static int hns3_nic_uc_sync(struct net_device *netdev,
+    const unsigned char *addr)
+{
+  struct hnae3_handle *h = hns3_get_handle(netdev);
+  if (h->ae_algo->ops->add_uc_addr)
+    return h->ae_algo->ops->add_uc_addr(h, addr);
+  return 0;
+}
+
+static int hns3_nic_uc_unsync(struct net_device *netdev,
+    const unsigned char *addr)
+{
+  struct hnae3_handle *h = hns3_get_handle(netdev);
+  if (h->ae_algo->ops->rm_uc_addr)
+    return h->ae_algo->ops->rm_uc_addr(h, addr);
+  return 0;
+}
+
+static int hns3_nic_mc_sync(struct net_device *netdev,
+    const unsigned char *addr)
+{
+  struct hnae3_handle *h = hns3_get_handle(netdev);
+  if (h->ae_algo->ops->add_mc_addr)
+    return h->ae_algo->ops->add_mc_addr(h, addr);
+  return 0;
+}
+
+static int hns3_nic_mc_unsync(struct net_device *netdev,
+    const unsigned char *addr)
+{
+  struct hnae3_handle *h = hns3_get_handle(netdev);
+  if (h->ae_algo->ops->rm_mc_addr)
+    return h->ae_algo->ops->rm_mc_addr(h, addr);
+  return 0;
+}
+
+static u8 hns3_get_netdev_flags(struct net_device *netdev)
+{
+  u8 flags = 0;
+  return flags;
if (netdev->flags & IFF_PROMISC) {
    flags = HNAE3_USER_UPE | HNAE3_USER_MPE;
} else {
    flags |= HNAE3_VLAN_FLTR;
    if (netdev->flags & IFF_ALLMULTI)
        flags |= HNAE3_USER_MPE;
}
+
+return flags;
+
+static void hns3_nic_set_rx_mode(struct net_device *netdev)
+{
+    struct hnae3_handle *h = hns3_get_handle(netdev);
+    u8 new_flags;
+    int ret;
+    
+    new_flags = hns3_get_netdev_flags(netdev);
+    
+    ret = __dev_uc_sync(netdev, hns3_nic_uc_sync, hns3_nic_uc_unsync);
+    if (ret) {
+        netdev_err(netdev, "sync uc address fail\n");
+        if (ret == -ENOSPC)
+            new_flags |= HNAE3_OVERFLOW_UPE;
+    }
+    
+    if (netdev->flags & IFF_MULTICAST) {
+        ret = __dev_mc_sync(netdev, hns3_nic_mc_sync,
+            hns3_nic_mc_unsync);
+        if (ret) {
+            netdev_err(netdev, "sync mc address fail\n");
+            if (ret == -ENOSPC)
+                new_flags |= HNAE3_OVERFLOW_MPE;
+        }
+    }
+    
+    hns3_update_promisc_mode(netdev, new_flags);
+    /* User mode Promisc mode enable and vlan filtering is disabled to
+    * let all packets in. MAC-VLAN Table overflow Promisc enabled and
+    * vlan filtering is enabled
+    */
+    hns3_enable_vlan_filter(netdev, new_flags & HNAE3_VLAN_FLTR);
+    h->netdev_flags = new_flags;
+}
+
+int hns3_update_promisc_mode(struct net_device *netdev, u8 promisc_flags)
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+struct hnae3_handle *h = priv->ae_handle;
+
+if (h->ae_algo->ops->set_promisc_mode) {
+    return h->ae_algo->ops->set_promisc_mode(h,
+        promise_flags & HNAE3_UPE,
+        promise_flags & HNAE3_MPE);
+}
+
+return 0;
+
+}
+
+void hns3_enable_vlan_filter(struct net_device *netdev, bool enable)
+{
+    struct hns3_nic_priv *priv = netdev_priv(netdev);
+    struct hnae3_handle *h = priv->ae_handle;
+
+    bool last_state;
+
+    if (h->pdev->revision >= 0x21 && h->ae_algo->ops->enable_vlan_filter) {
+        last_state = h->netdev_flags & HNAE3_VLAN_FLTR ? true : false;
+        if (enable != last_state) {
+            netdev_info(netdev,
+                "%s vlan filter\n",
+                enable ? "enable" : "disable");
+            h->ae_algo->ops->enable_vlan_filter(h, enable);
+        }
+    }
+
+
+static int hns3_set_tso(struct sk_buff *skb, u32 *paylen,
+    u16 *mss, u32 *type_cs_vlan_tso)
+{
+    u32 l4_offset, hdr_len;
+    union l3_hdr_info l3;
+    union l4_hdr_info l4;
+    u32 l4_paylen;
+    int ret;
+
+    if (!skb_is_gso(skb))
+        return 0;
+
+    ret = skb_cow_head(skb, 0);
+    if (ret)
+        return ret;
+
+    l3.hdr = skb_network_header(skb);
+    l4.hdr = skb_transport_header(skb);
+    +

Software should clear the IPv4's checksum field when tso is needed.

/* tunnel packet.*/
if (skb_shinfo(skb)->gso_type & (SKB_GSO_GRE | SKB_GSO_GRE_CSUM | SKB_GSO_UDP_TUNNEL | SKB_GSO_UDP_TUNNEL_CSUM)) {
  if (!(skb_shinfo(skb)->gso_type & SKB_GSO_PARTIAL)) &&
    (skb_shinfo(skb)->gso_type & SKB_GSO_UDP_TUNNEL_CSUM)) {
    /* Software should clear the udp's checksum field when tso is needed.*/
    /* normal or tunnel packet*/
    l4_offset = l4.hdr - skb->data;
    hdr_len = (l4.tcp->doff << 2) + l4_offset;
    /* remove payload length from inner pseudo checksum when tso*/
    l4_paylen = skb->len - l4_offset;
    csum_replace_by_diff(&l4.tcp->check, (__force __wsum)htonl(l4_paylen));
    /* find the txbd field values */
    *paylen = skb->len - hdr_len;
    hnae3_set_bit(*type_cs_vlan_tso, HNS3_TXD_TSO_B, 1);
    /* get MSS for TSO */
    *mss = skb_shinfo(skb)->gso_size;
  }
}
+return 0;
+}
+
+static int hns3_get_l4_protocol(struct sk_buff *skb, u8 *ol4_proto,
+u8 *il4_proto)
+{
+union {
+struct iphdr *v4;
+struct ipv6hdr *v6;
+unsigned char *hdr;
+} l3;
+unsigned char *l4_hdr;
+unsigned char *exthdr;
+u8 l4_proto_tmp;
+__be16 frag_off;
+
+/* find outer header point */
+l3.hdr = skb_network_header(skb);
+l4_hdr = skb_transport_header(skb);
+
+if (skb->protocol == htons(ETH_P_IPV6)) {
+exthdr = l3.hdr + sizeof(*l3.v6);
+l4_proto_tmp = l3.v6->nexthdr;
+if (l4_hdr != exthdr)
+ipv6_skip_exthdr(skb, exthdr - skb->data,
+ &l4_proto_tmp, &frag_off);
+} else if (skb->protocol == htons(ETH_P_IP)) {
+l4_proto_tmp = l3.v4->protocol;
+} else {
+return -EINVAL;
+}
+
+*ol4_proto = l4_proto_tmp;
+
+/* tunnel packet */
+if (!skb->encapsulation) {
+*il4_proto = 0;
+return 0;
+}
+
+/* find inner header point */
+l3.hdr = skb_inner_network_header(skb);
+l4_hdr = skb_inner_transport_header(skb);
+
+if (l3.v6->version == 6) {
+exthdr = l3.hdr + sizeof(*l3.v6);
+l4_proto_tmp = l3.v6->nexthdr;
+if (l4_hdr != exthdr)
+ipv6_skip_exthdr(skb, exthdr - skb->data,+
+ &l4_proto_tmp, &frag_off);+
+} else if (l3.v4->version == 4) {
+ l4_proto_tmp = l3.v4->protocol;
+}
+
+*il4_proto = l4_proto_tmp;
+
+return 0;
+
+
+static void hns3_set_l2l3l4_len(struct sk_buff *skb, u8 ol4_proto,
+ u8 il4_proto, u32 *type_cs_vlan_tso,
+ u32 *ol_type_vlan_len_msec)
+{
+ union {
+ struct iphdr *v4;
+ struct ipv6hdr *v6;
+ unsigned char *hdr;
+ } l3;
+ union {
+ struct tcphdr *tcp;
+ struct udphdr *udp;
+ struct gre_base_hdr *gre;
+ unsigned char *hdr;
+ } l4;
+ unsigned char *l2_hdr;
+ u8 l4_proto = ol4_proto;
+ u32 ol2_len;
+ u32 ol3_len;
+ u32 ol4_len;
+ u32 l2_len;
+ u32 l3_len;
+
+ l3.hdr = skb_network_header(skb);
+ l4.hdr = skb_transport_header(skb);
+
+ /* compute L2 header size for normal packet, defined in 2 Bytes */
+ l2_len = l3.hdr - skb->data;
+ hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L2LEN_M,
+ HNS3_TXD_L2LEN_S, l2_len >> 1);
+
+ /* tunnel packet*/
+ if (skb->encapsulation) {
+ /* compute OL2 header size, defined in 2 Bytes */
+ ol2_len = l2_len;
+ hnae3_set_field(*ol_type_vlan_len_msec,
+ HNS3_TXD_L2LEN_M,
HNS3_TXD_L2LEN_S, ol2_len >> 1);
+
+/* compute OL3 header size, defined in 4 Bytes */
+ol3_len = l4.hdr - l3.hdr;
+hnae3_set_field(*ol_type_vlan_len_msec, HNS3_TXD_L3LEN_M,
+HNS3_TXD_L3LEN_S, ol3_len >> 2);
+
+/* MAC in UDP, MAC in GRE (0x6558)*/
+if (((ol4_proto == IPPROTO_UDP) || (ol4_proto == IPPROTO_GRE)) { 
+/* switch MAC header ptr from outer to inner header */
+l2_hdr = skb_inner_mac_header(skb);
+
+/* compute OL4 header size, defined in 4 Bytes. */
+ol4_len = l2_hdr - l4.hdr;
+hnae3_set_field(*ol_type_vlan_len_msec,
+HNS3_TXD_L4LEN_M, HNS3_TXD_L4LEN_S,
+ol4_len >> 2);
+
+/* switch IP header ptr from outer to inner header */
+l3.hdr = skb_inner_network_header(skb);
+
+/* compute inner l2 header size, defined in 2 Bytes. */
+l2_len = l3.hdr - l2_hdr;
+hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L2LEN_M,
+HNS3_TXD_L2LEN_S, l2_len >> 1);
+} else {
+/* skb packet types not supported by hardware,
+ * txbd len fild doesn't be filled.
+ */
+return;
+}
+
+/* switch L4 header pointer from outer to inner */
+l4.hdr = skb_inner_transport_header(skb);
+
+l4_proto = il4_proto;
+
+/* compute inner/(normal) L3 header size, defined in 4 Bytes */
+l3_len = l4.hdr - l3.hdr;
+hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L3LEN_M,
+HNS3_TXD_L3LEN_S, l3_len >> 2);
+
+/* compute inner/(normal) L4 header size, defined in 4 Bytes */
+switch (l4_proto) {
+case IPPROTO_TCP:
+hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L4LEN_M,
+HNS3_TXD_L4LEN_S, l4.tcp->doff);
+break;
+case IPPROTO_SCTP:
+hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L4LEN_M, 
+HNS3_TXD_L4LEN_S, 
+((sizeof(struct sctphdr) >> 2));
+break;
+case IPPROTO_UDP:
+hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L4LEN_M, 
+HNS3_TXD_L4LEN_S, 
+(sizeof(struct udphdr) >> 2));
+break;
+default:
+/" skb packet types not supported by hardware,
+ * txbd len fild doesn't be filled.
+ */
+return;
+}
+
+/* when skb->encapsulation is 0, skb->ip_summed is CHECKSUM_PARTIAL 
+ * and it is udp packet, which has a dest port as the IANA assigned. 
+ * the hardware is expected to do the checksum offload, but the 
+ * hardware will not do the checksum offload when udp dest port is 
+ * 4789.
+ */
+static bool hns3_tunnel_csum_bug(struct sk_buff *skb)
+{
+#define IANA_VXLAN_PORT	4789
+union {
+struct tcphdr *tcp;
+struct udphdr *udp;
+struct gre_base_hdr *gre;
+unsigned char *hdr;
+} l4;
+
+l4.hdr = skb_transport_header(skb);
+
+if (!(!skb->encapsulation &&& l4.udp->dest == htons(IANA_VXLAN_PORT)))
+return false;
+
+return true;
+}
+
+static int hns3_set_l3l4_type_csum(struct sk_buff *skb, u8 ol4_proto,
+ u8 il4_proto, u32 *type_cs_vlan_tso,
+ u32 *ol_type_vlan_len_msec)
+{
+union {


struct iphdr *v4;
struct ipv6hdr *v6;
unsigned char *hdr;
}
l3:
u32 l4_proto = ol4_proto;
+l3.hdr = skb_network_header(skb);
+
"/* define OL3 type and tunnel type(OL4). */
+if (skb->encapsulation) {
+"/* define outer network header type. */
+if (skb->protocol == htons(ETH_P_IP)) {
++if (skb_is_gso(skb))
+hnae3_set_field(*ol_type_vlan_len_msec,
+HNS3_TXD OL3T M,
+HNS3_TXD OL3T S,
+HNS3 OL3T IPV4 CSUM);
+}
++else if (skb->protocol == htons(ETH_P_IPV6)) {
+hnae3_set_field(*ol_type_vlan_len_msec,
+HNS3_TXD OL3T M,
+HNS3_TXD OL3T S,
+HNS3 OL3T IPV6);
+}
+
+"/* define tunnel type(OL4). */
+switch (l4_proto) {
+case IPPROTO_UDP:
+hnae3_set_field(*ol_type_vlan_len_msec,
+HNS3_TXD TUNTYPE M,
+HNS3_TXD TUNTYPE S,
+HNS3_TUN MAC IN UDP);
+break;
+case IPPROTO_GRE:
+hnae3_set_field(*ol_type_vlan_len_msec,
+HNS3_TXD TUNTYPE M,
+HNS3_TXD TUNTYPE S,
+HNS3_TUN_NVGRE);
+break;
+default:
+"/* drop the skb tunnel packet if hardware don't support,
+* because hardware can't calculate csum when TSO.
+ */
+if (skb_is_gso(skb))
+return -EDOM;
+ /* the stack computes the IP header already, 
+ * driver calculate l4 checksum when not TSO. 
+ */
+ return skb_checksum_help(skb);
+ }
+ + l3.hdr = skb_inner_network_header(skb);
+ l4_proto = il4_proto;
+ +
+ if (l3.v4->version == 4) {
+ hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L3T_M,
+ HNS3_TXD_L3T_S, HNS3_L3T_IPV4);
+ + /* the stack computes the IP header already, the only time we 
+ * need the hardware to recompute it is in the case of TSO. 
+ */
+ + if (skb_is_gso(skb))
+ hnae3_set_bit(*type_cs_vlan_tso, HNS3_TXD_L3CS_B, 1);
+ + } else if (l3.v6->version == 6) {
+ hnae3_set_field(*type_cs_vlan_tso, HNS3_TXD_L3T_M,
+ HNS3_TXD_L3T_S, HNS3_L3T_IPV6);
+ +}
+ +
+ switch (l4_proto) {
+ case IPPROTO_TCP:
+ hnae3_set_bit(*type_cs_vlan_tso, HNS3_TXD_L4CS_B, 1);
+ hnae3_set_field(*type_cs_vlan_tso,
+ HNS3_TXD_L4T_M,
+ HNS3_TXD_L4T_S,
+ HNS3_L4T_TCP);
+ break;
+ case IPPROTO_UDP:
+ if (hns3_tunnel_csum_bug(skb)) {
+ int ret = skb_put_padto(skb, HNS3_MIN_TUN_PKT_LEN);
+ +
+ return ret ? skb_checksum_help(skb);
+ +}
+ +
+ hnae3_set_bit(*type_cs_vlan_tso, HNS3_TXD_L4CS_B, 1);
+ hnae3_set_field(*type_cs_vlan_tso,
+ HNS3_TXD_L4T_M,
+ HNS3_TXD_L4T_S,
+ HNS3_L4T_UDP);
+ break;
+ case IPPROTO_SCTP:
+ hnae3_set_bit(*type_cs_vlan_tso, HNS3_TXD_L4CS_B, 1);
+hnae3_set_field(*type_cs_vlan_tso,
+HNS3_TXD_L4T_M,
+HNS3_TXD_L4T_S,
+HNS3_L4T_SCTP);
+break;
+default:
+/* drop the skb tunnel packet if hardware don’t support,
+ * because hardware can’t calculate csum when TSO.
+ */
+if (skb_is_gso(skb))
+return -EDOM;
+
+/* the stack computes the IP header already,
+ * driver calculate l4 checksum when not TSO.
+ */
+return skb_checksum_help(skb);
+
+return 0;
+
+static void hns3_set_txbd_baseinfo(u16 *bdtp_fe_sc_vld_ra_ri, int frag_end)
+{
+/* Config bd buffer end */
+hnae3_set_field(*bdtp_fe_sc_vld_ra_ri, HNS3_TXD_BDTYPE_M,
+HNS3_TXD_BDTYPE_S, 0);
+hnae3_set_bit(*bdtp_fe_sc_vld_ra_ri, HNS3_TXD_FE_B, !!frag_end);
+hnae3_set_bit(*bdtp_fe_sc_vld_ra_ri, HNS3_TXD_VLD_B, 1);
+hnae3_set_field(*bdtp_fe_sc_vld_ra_ri, HNS3_TXD_SC_M, HNS3_TXD_SC_S, 0);
+
+static int hns3_fill_desc_vtags(struct sk_buff *skb,
+struct hns3_enet_ring *tx_ring,
+u32 *inner_vlan_flag,
+u32 *out_vlan_flag,
+u16 *inner_vtag,
+u16 *out_vtag)
+{
+#define HNS3_TX_VLAN_PRIO_SHIFT 13
+
+if (skb->protocol == htons(ETH_P_8021Q) &&
+ !tx_ring->tqp->handle->kinfo.netdev->features &
+ NETIF_F_HW_VLAN_CTAG_TX}) {
+/* When HW VLAN acceleration is turned off, and the stack
+ * sets the protocol to 802.1q, the driver just need to
+ * set the protocol to the encapsulated ethertype.
+ */
+skb->protocol = vlan_get_protocol(skb);
+return 0;
+
+if (skb_vlan_tag_present(skb)) {
+u16 vlan_tag;
+
+vlan_tag = skb_vlan_tag_get(skb);
+vlan_tag |= (skb->priority & 0x7) << HNS3_TX_VLAN_PRIO_SHIFT;
+
+/* Based on hw strategy, use out_vtag in two layer tag case, 
+ * and use inner_vtag in one tag case.
+ */
+if (skb->protocol == htons(ETH_P_8021Q)) {
+hnae3_set_bit(*out_vlan_flag, HNS3_TXD_OVLAN_B, 1);
+*out_vtag = vlan_tag;
+} else {
+hnae3_set_bit(*inner_vlan_flag, HNS3_TXD_VLAN_B, 1);
+*inner_vtag = vlan_tag;
+}
+} else if (skb->protocol == htons(ETH_P_8021Q)) {
+struct vlan_ethhdr *vhdr;
+
t = skb->protocol = vlan_get_protocol(skb);
+return 0;
+
+static int hns3_fill_desc(struct hns3_enet_ring *ring, void *priv, 
+int size, int frag_end, enum hns_desc_type type)
+{
+struct hns3_desc_cb *desc_cb = &ring->desc_cb[ring->next_to_use];
+struct hns3_desc *desc = &ring->desc[ring->next_to_use];
+struct device *dev = ring_to_dev(ring);
+u32 ol_type_vlan_len_msec = 0;
+u16 bdtp_fe_sc_vld_ra_ri = 0;
+struct skb_frag_struct *frag;
+unsigned int frag_buf_num;
+u32 type_cs_vlan_tso = 0;
+struct sk_buff *skb;
+u16 inner_vtag = 0;
+u16 out_vtag = 0;
+unsigned int k;
+int sizeoflast;
+u32 paylen = 0;
+dma_addr_t dma;
+u16 mss = 0;
+u8 ol4_proto;
+u8 il4_proto;
+int ret;
+
+if (type == DESC_TYPE_SKB) {
+skb = (struct sk_buff *)priv;
+paylen = skb->len;
+
+ret = hns3_fill_desc_vtags(skb, ring, &type_cs_vlan_tso,
+  &ol_type_vlan_len_msec,
+  &inner_vtag, &out_vtag);
+if (unlikely(ret))
+return ret;
+
+if (skb->ip_summed == CHECKSUM_PARTIAL) {
+skb_reset_mac_len(skb);
+
+ret = hns3_get_l4_protocol(skb, &ol4_proto, &il4_proto);
+if (ret)
+return ret;

+ret = hns3_set_l2l3l4_len(skb, ol4_proto, il4_proto,
+  &type_cs_vlan_tso,
+  &ol_type_vlan_len_msec);
+ret = hns3_set_l3l4_type_csum(skb, ol4_proto, il4_proto,
+  &type_cs_vlan_tso,
+  &ol_type_vlan_len_msec);
+if (ret)
+return ret;
+
+ret = hns3_set_tso(skb, &paylen, &mss,
+  &type_cs_vlan_tso);
+if (ret)
+return ret;
+
+/* Set txbd */
+desc->tx.ol_type_vlan_len_msec =
+cpu_to_le32(ol_type_vlan_len_msec);
+desc->tx.type_cs_vlan_tso_len =
+cpu_to_le32(type_cs_vlan_tso);
+desc->tx.paylen = cpu_to_le32(paylen);
+desc->tx.mss = cpu_to_le16(mss);
+desc->tx.vlan_tag = cpu_to_le16(inner_vtag);
+desc->tx.outer_vlan_tag = cpu_to_le16(out_vtag);
+
+dma = dma_map_single(dev, skb->data, size, DMA_TO_DEVICE);
+} else {
+frag = (struct skb_frag_struct *)priv;
+dma = skb_frag_dma_map(dev, frag, 0, size, DMA_TO_DEVICE);
+}
+
+if (dma_mapping_error(ring->dev, dma)) {
+ring->stats.sw_err_cnt++;
+return -ENOMEM;
+}
+
+desc_cb->length = size;
+
+frag_buf_num = hns3_tx_bd_count(size);
+sizeoflast = size & HNS3_TX_LAST_SIZE_M;
+sizeoflast = sizeoflast ? sizeoflast : HNS3_MAX_BD_SIZE;
+
+/* When frag size is bigger than hardware limit, split this frag */
+for (k = 0; k < frag_buf_num; k++) {
+/* The txbd's baseinfo of DESC_TYPE_PAGE & DESC_TYPE_SKB */
+desc_cb->priv = priv;
+desc_cb->dma = dma + HNS3_MAX_BD_SIZE * k;
+desc_cb->type = (type == DESC_TYPE_SKB && !k) ?
+DESC_TYPE_SKB : DESC_TYPE_PAGE;
+
+/* now, fill the descriptor */
+desc->addr = cpu_to_le64(dma + HNS3_MAX_BD_SIZE * k);
+desc->tx.send_size = cpu_to_le16((k == frag_buf_num - 1) ?
+(u16)sizeoflast : (u16)HNS3_MAX_BD_SIZE);
+hns3_set_txbd_baseinfo(&bdtp_fe_sc_vld_ra_ri,
+frag_end && (k == frag_buf_num - 1) ?
+1 : 0);
+desc->tx.bdtp_fe_sc_vld_ra_ri =
+cpu_to_le16(bdtp_fe_sc_vld_ra_ri);
+
+/* move ring pointer to next.*/
+ring_ptr_move_fw(ring, next_to_use);
+
+desc_cb = &ring->desc_cb[ring->next_to_use];
+desc = &ring->desc[ring->next_to_use];
+
+return 0;
+}
static unsigned int hns3_nic_bd_num(struct sk_buff *skb)
+
+unsigned int bd_num;
+int i;
+
+/* if the total len is within the max bd limit */
+if (likely(skb->len <= HNS3_MAX_BD_SIZE))
+return skb_shinfo(skb)->nr_frags + 1;
+
+bd_num = hns3_tx_bd_count(skb_headlen(skb));
+
+for (i = 0; i < skb_shinfo(skb)->nr_frags; i++) {
+struct skb_frag_struct *frag = &skb_shinfo(skb)->frags[i];
+bd_num += hns3_tx_bd_count(skb_frag_size(frag));
+}
+
+return bd_num;
+
+static int hns3_nic_maybe_stop_tx(struct hns3_enet_ring *ring,
+struct net_device *netdev,
+struct sk_buff *skb)
+
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+struct hns3_nic_ring_data *ring_data =
+&tx_ring_data(priv, skb->queue_mapping);
+unsigned int bd_num;
+
+bd_num = hns3_nic_bd_num(skb);
+
+if (unlikely(bd_num > HNS3_MAX_BD_NUM_NORMAL)) {
+if (__skb_linearize(skb))
+ return -ENOMEM;
+
+bd_num = hns3_nic_bd_num(skb);
+if ((skb_is_gso(skb) && bd_num > HNS3_MAX_BD_NUM_TSO) ||
+(!skb_is_gso(skb) && bd_num > HNS3_MAX_BD_NUM_NORMAL))
+ return -ENOMEM;
+
+u64_stats_update_begin(&ring->syncp);
+ring->stats.tx_copy++;
+u64_stats_update_end(&ring->syncp);
+}
+
+if (likely(ring_space(ring) >= bd_num))
+return bd_num;
+
+netif_stop_subqueue(netdev, ring_data->queue_index);
+smp_mb(); /* Memory barrier before checking ring_space */
+
+/* Start queue in case hns3_clean_tx_ring has just made room
+ * available and has not seen the queue stopped state performed
+ * by netif_stop_subqueue above.
+ */
+if (ring_space(ring) >= bd_num && netif_carrier_ok(netdev) &&
+    !test_bit(HNS3_NIC_STATE_DOWN, &priv->state)) {
+    netif_start_subqueue(netdev, ring_data->queue_index);
+    return bd_num;
+}
+
+return -EBUSY;
+
+static void hns3_clear_desc(struct hns3_enet_ring *ring, int next_to_use_orig)
+
+{ /* check if this is where we started */
+    if (ring->next_to_use == next_to_use_orig)
+        break;
+
+    /* unmap the descriptor dma address */
+    if (ring->desc_cb[ring->next_to_use].type == DESC_TYPE_SKB)
+        dma_unmap_single(dev,
+                       ring->desc_cb[ring->next_to_use].dma,
+                       ring->desc_cb[ring->next_to_use].length,
+                       DMA_TO_DEVICE);
+    else if (ring->desc_cb[ring->next_to_use].length)
+        dma_unmap_page(dev,
+                        ring->desc_cb[ring->next_to_use].dma,
+                        ring->desc_cb[ring->next_to_use].length,
+                        DMA_TO_DEVICE);
+    ring->desc_cb[ring->next_to_use].length = 0;
+    /* rollback one */
+    ring_ptr_move_bw(ring, next_to_use);
+}
+
+netdev_tx_t hns3_nic_net_xmit(struct sk_buff *skb, struct net_device *netdev)
+
+{ /* rollback one */
+    ring_ptr_move_bw(ring, next_to_use);
+}
+
+netdev_tx_t hns3_nic_net_xmit(struct sk_buff *skb, struct net_device *netdev)
+
+{ /* rollback one */
+    ring_ptr_move_bw(ring, next_to_use);
+}
+
+netdev_tx_t hns3_nic_net_xmit(struct sk_buff *skb, struct net_device *netdev)
+
+{ /* rollback one */
+    ring_ptr_move_bw(ring, next_to_use);
+}
+&tx_ring_data(priv, skb->queue_mapping);
+struct hns3_enet_ring *ring = ring_data->ring;
+struct netdev_queue *dev_queue;
+struct skb_frag_struct *frag;
+int next_to_use_head;
+int next_to_use_frag;
+int buf_num;
+int seg_num;
+int size;
+int ret;
+int i;
+
+/* Hardware can only handle short frames above 32 bytes */
+if (skb_put_padto(skb, HNS3_MIN_TX_LEN))
+return NETDEV_TX_OK;
+
+/* Prefetch the data used later */
+prefetch(skb->data);
+
+buf_num = hns3_nic_maybe_stop_tx(ring, netdev, skb);
+if (unlikely(buf_num <= 0)) {
+if (buf_num == -EBUSY) {
+u64_stats_update_begin(&ring->syncp);
+ring->stats.tx_busy++;
+u64_stats_update_end(&ring->syncp);
+return NETDEV_TX_BUSY;
+} else if (buf_num == -ENOMEM) {
+u64_stats_update_begin(&ring->syncp);
+ring->stats.sw_err_cnt++;
+u64_stats_update_end(&ring->syncp);
+}
+}
+
+if (net_ratelimit())
+netdev_err(netdev, "xmit error: %d\n", buf_num);
+
+goto out_err_tx_ok;
+}
+
+/* No. of segments (plus a header) */
+seg_num = skb_shinfo(skb)->nr_frags + 1;
+/* Fill the first part */
+size = skb_headlen(skb);
+
+next_to_use_head = ring->next_to_use;
+
+ret = hns3_fill_desc(ring, skb, size, seg_num == 1 ? 1 : 0,
+ DESC_TYPE_SKB);
+if (ret)
goto head_fill_err;
+
next_to_use_frag = ring->next_to_use;
+ /* Fill the fragments */
+ for (i = 1; i < seg_num; i++) {
+ frag = skb_shinfo(skb)->frags[i-1];
+ size = skb_frag_size(frag);
+ +ret = hns3_fill_desc(ring, frag, size,
+ seg_num - 1 == i ? 1 : 0,
+ DESC_TYPE_PAGE);
+ +if (ret)
+ goto frag_fill_err;
+ }
+ + /* Complete translate all packets */
+ dev_queue = netdev_get_tx_queue(netdev, ring_data->queue_index);
+ netdev_tx_sent_queue(dev_queue, skb->len);
+ +wmb(); /* Commit all data before submit */
+ +hnae3_queue_xmit(ring->tqp, buf_num);
+ +return NETDEV_TX_OK;
+ +frag_fill_err:
+ hns3_clear_desc(ring, next_to_use_frag);
+ +head_fill_err:
+ hns3_clear_desc(ring, next_to_use_head);
+ +out_err_tx_ok:
+ dev_kfree_skb_any(skb);
+ +return NETDEV_TX_OK;
+ }
+
+static int hns3_nic_net_set_mac_address(struct net_device *netdev, void *p)
+{
+ struct hnae3_handle *h = hns3_get_handle(netdev);
+ struct sockaddr *mac_addr = p;
+ int ret;
+ +if (!mac_addr || !is_valid_ether_addr((const u8 *)mac_addr->sa_data))
+ return -EADDRNOTAVAIL;
+ +if (ether_addr_equal(netdev->dev_addr, mac_addr->sa_data)) {
+ netdev_info(netdev, "already using mac address %pM\n", netdev->dev_addr, mac_addr->sa_data);
mac_addr->sa_data);
+    return 0;
+}
+
+ret = h->ae_algo->ops->set_mac_addr(h, mac_addr->sa_data, false);
+if (ret) {
+    netdev_err(netdev, "set_mac_address fail, ret=%d\n", ret);
+    return ret;
+}
+
+ether_addr_copy(netdev->dev_addr, mac_addr->sa_data);
+
+return 0;
+}
+
+static int hns3_nic_do_ioctl(struct net_device *netdev,
+     struct ifreq *ifr, int cmd)
+{
+    struct hnae3_handle *h = hns3_get_handle(netdev);
+    if (!netif_running(netdev))
+        return -EINVAL;
+    if (!h->ae_algo->ops->do_ioctl)
+        return -EOPNOTSUPP;
+    return h->ae_algo->ops->do_ioctl(h, ifr, cmd);
+}
+
+static int hns3_nic_set_features(struct net_device *netdev,
+     netdev_features_t features)
+{
+    netdev_features_t changed = netdev->features ^ features;
+    struct hns3_nic_priv *priv = netdev_priv(netdev);
+    struct hnae3_handle *h = priv->ae_handle;
+    if ((changed & NETIF_F_HW_VLAN_CTAG_FILTER) &&
+        h->ae_algo->ops->enable_vlan_filter) {
+        if (features & NETIF_F_HW_VLAN_CTAG_FILTER)
+            h->ae_algo->ops->enable_vlan_filter(h, true);
+        else
+            h->ae_algo->ops->enable_vlan_filter(h, false);
+    }
+
+    if ((changed & NETIF_F_HW_VLAN_CTAG_RX) &&
+        h->ae_algo->ops->enable_vlan_filter(h, true);
+else
+    h->ae_algo->ops->enable_vlan_filter(h, false);
+}
ret = h->ae_algo->ops->enable_hw_strip_rxvtag(h, true);
else
ret = h->ae_algo->ops->enable_hw_strip_rxvtag(h, false);
+
if (ret)
+return ret;
+
+if ((changed & NETIF_F_NTUPLE) & h->ae_algo->ops->enable_fd) {
+if (features & NETIF_F_NTUPLE)
+h->ae_algo->ops->enable_fd(h, true);
+else
+h->ae_algo->ops->enable_fd(h, false);
+}
+
+netdev->features = features;
+return 0;
+
+
+static void hns3_nic_get_stats64(struct net_device *netdev,
+ struct rtnl_link_stats64 *stats)
+
{ 
+struct hns3_nic_priv *priv = netdev_priv(netdev); 
+int queue_num = priv->ae_handle->kinfo.num_tqps; 
+struct hnae3_handle *handle = priv->ae_handle; 
+struct hns3_enet_ring *ring; 
+unsigned int start; 
+unsigned int idx; 
+u64 tx_bytes = 0; 
+u64 rx_bytes = 0; 
+u64 tx_pkts = 0; 
+u64 rx_pkts = 0; 
+u64 tx_drop = 0; 
+u64 rx_drop = 0; 
+
+if (test_bit(HNS3_NIC_STATE_DOWN, &priv->state))
+return;
+
+handle->ae_algo->ops->update_stats(handle, &netdev->stats);
+
+for (idx = 0; idx < queue_num; idx++) {
+/* fetch the tx stats */
+ring = priv->ring_data[idx].ring;
+do { 
+start = u64_stats_fetch_begin_irq(&ring->syncp);
+tx_bytes += ring->stats.tx_bytes;
+tx_pkts += ring->stats.tx_pkts;
+tx_drop += ring->stats.tx_busy;
tx_drop += ring->stats.sw_err_cnt;
+} while (u64_stats_fetch_retry_irq(&ring->syncp, start));
+
+// fetch the rx stats */
+ring = priv->ring_data[idx + queue_num].ring;
+do {
+start = u64_stats_fetch_begin_irq(&ring->syncp);
+rx_bytes += ring->stats.rx_bytes;
+rx_pkts += ring->stats.rx_pkts;
+rx_drop += ring->stats.non_vld_descs;
+rx_drop += ring->stats.err_pkt_len;
+rx_drop += ring->stats.l2_err;
+} while (u64_stats_fetch_retry_irq(&ring->syncp, start));
+
+stats->tx_bytes = tx_bytes;
+stats->tx_packets = tx_pkts;
+stats->rx_bytes = rx_bytes;
+stats->rx_packets = rx_pkts;
+
+stats->rx_errors = netdev->stats.rx_errors;
+stats->multicast = netdev->stats.multicast;
+stats->rx_length_errors = netdev->stats.rx_length_errors;
+stats->rx_crc_errors = netdev->stats.rx_crc_errors;
+stats->rx_missed_errors = netdev->stats.rx_missed_errors;
+
+stats->tx_errors = netdev->stats.tx_errors;
+stats->rx_dropped = rx_drop + netdev->stats.rx_dropped;
+stats->tx_dropped = tx_drop + netdev->stats.tx_dropped;
+stats->collisions = netdev->stats.collisions;
+stats->rx_over_errors = netdev->stats.rx_over_errors;
+stats->rx_frame_errors = netdev->stats.rx_frame_errors;
+stats->rx_fifo_errors = netdev->stats.rx_fifo_errors;
+stats->tx_aborted_errors = netdev->stats.tx_aborted_errors;
+stats->tx_carrier_errors = netdev->stats.tx_carrier_errors;
+stats->tx_fifo_errors = netdev->stats.tx_fifo_errors;
+stats->tx_heartbeat_errors = netdev->stats.tx_heartbeat_errors;
+stats->tx_window_errors = netdev->stats.tx_window_errors;
+stats->rx_compressed = netdev->stats.rx_compressed;
+stats->tx_compressed = netdev->stats.tx_compressed;
+
+
+
	'+hns3_setup_tc(struct net_device *netdev, void *type_data)
+{ 
+struct tc_mqprio_qopt_offload *mqprio_qopt = type_data;
+struct hnae3_handle *h = hns3_get_handle(netdev);
+struct hnae3_knic_private_info *kinfo = &h->kinfo;
+u8 *prio_tc = mqprio_qopt->qopt.prio_tc_map;
+u8 tc = mqprio_qopt->qopt.num_tc;
+u16 mode = mqprio_qopt->mode;
+u8 hw = mqprio_qopt->qopt.hw;
+bool if_running;
+int ret;
+
+if (!(hw == TC_MQPRIO_HW_OFFLOAD_TCS &&
    mode == TC_MQPRIO_MODE_CHANNEL) || (!hw && tc == 0))
+return -EOPNOTSUPP;
+
+if (tc > HNAE3_MAX_TC)
+return -EINVAL;
+
+if (!netdev)
+return -EINVAL;
+
+if_running = netif_running(netdev);
+if (if_running) {
+hns3_nic_net_stop(netdev);
+msleep(100);
+}
+
+ret = (kinfo->dcb_ops && kinfo->dcb_ops->setup_tc) ?
+kinfo->dcb_ops->setup_tc(h, tc, prio_tc) : -EOPNOTSUPP;
+if (ret)
+goto out;
+
+ret = hns3_nic_set_real_num_queue(netdev);
+
+out:
+if (if_running)
+hns3_nic_net_open(netdev);
+
+return ret;
+
+static int hns3_nic_setup_tc(struct net_device *dev, enum tc_setup_type type,
    void *type_data)
+{
+if (type != TC_SETUP_QDISC_MQPRIO)
+return -EOPNOTSUPP;
+
+return hns3_setup_tc(dev, type_data);
+}
+
+static int hns3_vlan_rx_add_vid(struct net_device *netdev,
+    __be16 proto, u16 vid)
+{
struct hnae3_handle *h = hns3_get_handle(netdev);
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+int ret = -EIO;
+
+if (h->ae_algo->ops->set_vlan_filter)
+ret = h->ae_algo->ops->set_vlan_filter(h, proto, vid, false);
+
+if (!ret)
+set_bit(vid, priv->active_vlans);
+
+return ret;
+
+static int hns3_vlan_rx_kill_vid(struct net_device *netdev,
				__be16 proto, u16 vid)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+int ret = -EIO;
+
+if (h->ae_algo->ops->set_vlan_filter)
+ret = h->ae_algo->ops->set_vlan_filter(h, proto, vid, true);
+
+if (!ret)
+clear_bit(vid, priv->active_vlans);
+
+return ret;
+
+static int hns3_restore_vlan(struct net_device *netdev)
+{
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+int ret = 0;
+u16 vid;
+
+for_each_set_bit(vid, priv->active_vlans, VLAN_N_VID) {
++ret = hns3_vlan_rx_add_vid(netdev, htons(ETH_P_8021Q), vid);
++if (ret) {
+netdev_err(netdev, "Restore vlan: %d filter, ret:%d\n",
++vid, ret);
++return ret;
++}
++}
+
+static int hns3_ndo_set_vf_vlan(struct net_device *netdev, int vf, u16 vlan,
{u8 qos, __be16 vlan_proto)
+
+struct hnae3_handle *h = hns3_get_handle(netdev);
+int ret = -EIO;
+
+if (h->ae_algo->ops->set_vf_vlan_filter)
+ret = h->ae_algo->ops->set_vf_vlan_filter(h, vf, vlan,
+qos, vlan_proto);
+
+return ret;
+
+}
+
+static int hns3_nic_change_mtu(struct net_device *netdev, int new_mtu)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+int ret;
+
+if (!h->ae_algo->ops->set_mtu)
+return -EOPNOTSUPP;
+
+ret = h->ae_algo->ops->set_mtu(h, new_mtu);
+if (ret)
+netdev_err(netdev, "failed to change MTU in hardware %d
",
+ret);
+else
+netdev->mtu = new_mtu;
+
+return ret;
+
+}
+
+static bool hns3_get_tx_timeo_queue_info(struct net_device *ndev)
+{
+struct hns3_nic_priv *priv = netdev_priv(ndev);
+struct hns3_enet_ring *tx_ring = NULL;
+int timeout_queue = 0;
+int hw_head, hw_tail;
+int i;
+
+/* Find the stopped queue the same way the stack does */
+for (i = 0; i < ndev->num_tx_queues; i++) {
+struct netdev_queue *q;
+unsigned long trans_start;
+
+q = netdev_get_tx_queue(ndev, i);
+trans_start = q->trans_start;
++if (netif_xmit_stopped(q) &&
++time_after(jiffies,
++(trans_start + ndev->watchdog_timeo))) {

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timeout_queue = i;
+netdev_info(ndev, "queue state: 0x%lx, delta msecs: %u\n",
+    q->state,
+    jiffies_to_msecs(jiffies - trans_start));
+break;
+
+if (i == ndev->num_tx_queues) {
+    netdev_info(ndev, 
+        "no netdev TX timeout queue found, timeout count: %llu\n",
+        priv->tx_timeout_count);
+    return false;
+}
+
+tx_ring = priv->ring_data[timeout_queue].ring;
+
+hw_head = readl_relaxed(tx_ring->tqp->io_base +
+    HNS3_RING_TX_RING_HEAD_REG);
+hw_tail = readl_relaxed(tx_ring->tqp->io_base +
+    HNS3_RING_TX_RING_TAIL_REG);
+netdev_info(ndev, 
+    "tx_timeout count: %llu, queue id: %d, SW_NTU: 0x%x, SW_NTC: 0x%x, HW_HEAD: 0x%x, HW_TAIL: 0x%x, INT: 0x%x\n",
+    priv->tx_timeout_count,
+    timeout_queue,
+    tx_ring->next_to_use,
+    tx_ring->next_to_clean,
+    hw_head,
+    hw_tail,
+    readl(tx_ring->tqp_vector->mask_addr));
+
+return true;
+
+static void hns3_nic_net_timeout(struct net_device *ndev)
+{
+    struct hns3_nic_priv *priv = netdev_priv(ndev);
+    struct hnae3_handle *h = priv->ae_handle;
+    if (!hns3_get_tx_timeo_queue_info(ndev))
+        return;
+    priv->tx_timeout_count++;
+    /* request the reset, and let the hclge to determine
+     * which reset level should be done
+     */
+if (h->ae_algo->ops->reset_event)
+h->ae_algo->ops->reset_event(h->pdev, h);
+
+static const struct net_device_ops hns3_nic_netdev_ops = {
+    .ndo_open= hns3_nic_net_open,
+    .ndo_stop= hns3_nic_net_stop,
+    .ndo_start_xmit= hns3_nic_net_start_xmit,
+    .ndo_timeout= hns3_nic_net_timeout,
+    .ndo_set_mac_address= hns3_nic_net_set_mac_address,
+    .ndo_do_ioctl= hns3_nic_do_ioctl,
+    .ndo_change_mtu= hns3_nic_change_mtu,
+    .ndo_set_features= hns3_nic_set_features,
+    .ndo_get_stats64= hns3_nic_get_stats64,
+    .ndo_setup_tc= hns3_nic_setup_tc,
+    .ndo_rx_mode= hns3_nic_rx_mode,
+    .ndo_vlan_rx_add_vid= hns3_vlan_rx_add_vid,
+    .ndo_vlan_rx_kill_vid= hns3_vlan_rx_kill_vid,
+    .ndo_set_vf_vlan= hns3_nic_set_vf_vlan,
+};
+
+static bool hns3_is_phys_func(struct pci_dev *pdev)
+{
+u32 dev_id = pdev->device;
+
+switch (dev_id) {
+    +case HNAE3_DEV_ID_GE:
+    +case HNAE3_DEV_ID_25GE:
+    +case HNAE3_DEV_ID_25GE_RDMA:
+    +case HNAE3_DEV_ID_25GE_RDMA_MACSEC:
+    +case HNAE3_DEV_ID_50GE_RDMA:
+    +case HNAE3_DEV_ID_50GE_RDMA_MACSEC:
+    +case HNAE3_DEV_ID_100G_RDMA_MACSEC:
+        +return true;
+    +case HNAE3_DEV_ID_100G_VF:
+    +case HNAE3_DEV_ID_100G_RDMA_DCB_PFC_VF:
+        +return false;
+    +default:
+        +dev_warn(&pdev->dev, "un-recognized pci device-id %d",
+            dev_id);
+        +}
+        +return false;
+    +}
+
+static void hns3_disable_sriov(struct pci_dev *pdev)
+{
+    /* If our VFs are assigned we cannot shut down SR-IOV
+    + */
}
+ * without causing issues, so just leave the hardware
+ * available but disabled
+ */
+if (pci_vfs_assigned(pdev)) {
+dev_warn(&pdev->dev,
+ "disabling driver while VFs are assigned\n");
+return;
+}
+
+pci_disable_sriov(pdev);
+}
+
+static void hns3_get_dev_capability(struct pci_dev *pdev,
+    struct hnae3_ae_dev *ae_dev)
+{
+if (pdev->revision >= 0x21) {
+hnae3_set_bit(ae_dev->flag, HNAE3_DEV_SUPPORT_FD_B, 1);
+hnae3_set_bit(ae_dev->flag, HNAE3_DEV_SUPPORT_GRO_B, 1);
+}
+}
+
+/* hns3_probe - Device initialization routine
+ * @pdev: PCI device information struct
+ * @ent: entry in hns3_pci_tbl
+ * @ The OS initialization, configuring of the PF private structure,
+ * and a hardware reset occur.
+ * Returns 0 on success, negative on failure
+ */
+static int hns3_probe(struct pci_dev *pdev, const struct pci_device_id *ent)
+{
+struct hnae3_ae_dev *ae_dev;
+int ret;
+
+ae_dev = devm_kzalloc(&pdev->dev, sizeof(*ae_dev),
+ GFP_KERNEL);
+if (!ae_dev) {
+ret = -ENOMEM;
+return ret;
+}
+
+ae_dev->pdev = pdev;
+ae_dev->flag = ent->driver_data;
+ae_dev->dev_type = HNAE3_DEV_KNIC;
+ae_dev->reset_type = HNAE3_NONE_RESET;
+hns3_get_dev_capability(pdev, ae_dev);
+pci_set_drvdata(pdev, ae_dev);
+
+ret = hnae3_register_ae_dev(ae_dev);
+if (ret) {
+devm_kfree(&pdev->dev, ae_dev);
+pci_set_drvdata(pdev, NULL);
+}
+
+return ret;
+}
+
+/* hns3_remove - Device removal routine */
+* @pdev: PCI device information struct
+*/
+static void hns3_remove(struct pci_dev *pdev)
+{
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+
+if (hns3_is_phys_func(pdev) && IS_ENABLED(CONFIG_PCI_IOV))
+hns3_disable_sriov(pdev);
+
+hnae3_unregister_ae_dev(ae_dev);
+pci_set_drvdata(pdev, NULL);
+}
+
+/**
+ * hns3_pci_sriov_configure
+ * @pdev: pointer to a pci_dev structure
+ * @num_vfs: number of VFs to allocate
+ *
+ * Enable or change the number of VFs. Called when the user updates the number
+ * of VFs in sysfs.
+ */
+static int hns3_pci_sriov_configure(struct pci_dev *pdev, int num_vfs)
+{
+int ret;
+
+if (!(hns3_is_phys_func(pdev) && IS_ENABLED(CONFIG_PCI_IOV))) {
+dev_warn(pdev->dev, "Can not config SRIOV\n");
+return -EINVAL;
+}
+
+if (num_vfs) {
+ret = pci_enable_sriov(pdev, num_vfs);
+if (ret)
+dev_err(pdev->dev, "SRIOV enable failed %d\n", ret);
+else
+return num_vfs;
+}
+} else if (!pci_vfs_assigned(pdev)) {
+pci_disable_sriov(pdev);
+} else {
+dev_warn(pdev-&dev,
+"Unable to free VF(s because some are assigned to VMs.\n");
+
+return 0;
+}
+
+static void hns3_shutdown(struct pci_dev *pdev)
+
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+
+hnae3_unregister_ae_dev(ae_dev);
+devm_kfree(pdev-&dev, ae_dev);
+pci_set_drvdata(pdev, NULL);
+
+if (system_state == SYSTEM_POWER_OFF)
+pci_set_power_state(pdev, PCI_D3hot);
+
+static pci_ers_result_t hns3_error_detected(struct pci_dev *pdev,
+pci_channel_state_t state)
+
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+
+pci_ers_result_t ret;
+
+dev_info(pdev-&dev, "PCI error detected, state(=%d)!!n", state);
+
+if (state == pci_channel_io_perm_failure)
+return PCI_ERS_RESULT_DISCONNECT;
+
+if (!ae_dev)
+dev_err(pdev-&dev,
+"Can't recover - error happened during device init\n");
+return PCI_ERS_RESULT_NONE;
+
+if (ae_dev-&ops-&handle_hw_ras_error)
+ret = ae_dev-&ops-&handle_hw_ras_error(ae_dev);
+else
+return PCI_ERS_RESULT_NONE;
+
+static pci_ers_result_t hns3_slot_reset(struct pci_dev *pdev)
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+struct device *dev = &pdev->dev;
+
+dev_info(dev, "requesting reset due to PCI error\n");
+
+/* request the reset */
+if (ae_dev->ops->reset_event) {
+    ae_dev->ops->reset_event(pdev, NULL);
+return PCI_ERS_RESULT_RECOVERED;
+}
+
+return PCI_ERS_RESULT_DISCONNECT;
+}
+
+static void hns3_reset_prepare(struct pci_dev *pdev)
+{
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+
+dev_info(pdev->dev, "hns3 flr prepare\n");
+if (ae_dev && ae_dev->ops && ae_dev->ops->flr_prepare)
+    ae_dev->ops->flr_prepare(ae_dev);
+}
+
+static void hns3_reset_done(struct pci_dev *pdev)
+{
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+
+dev_info(pdev->dev, "hns3 flr done\n");
+if (ae_dev && ae_dev->ops && ae_dev->ops->flr_done)
+    ae_dev->ops->flr_done(ae_dev);
+}
+
+static const struct pci_error_handlers hns3_err_handler = {
+    .error_detected = hns3_error_detected,
+    .slot_reset     = hns3_slot_reset,
+    .reset_prepare	= hns3_reset_prepare,
+    .reset_done	= hns3_reset_done,
+};
+
+static struct pci_driver hns3_driver = {
+    .name     = hns3_driver_name,
+    .id_table = hns3_pci_tbl,
+    .probe    = hns3_probe,
+    .remove   = hns3_remove,
+    .shutdown = hns3_shutdown,
+    .sriov_configure = hns3_pci_sriov_configure,
+    .err_handler    = &hns3_err_handler,
/* set default feature to hns3 */
static void hns3_set_default_feature(struct net_device *netdev)
{
    struct hnae3_handle *h = hns3_get_handle(netdev);
    struct pci_dev *pdev = h->pdev;

    netdev->priv_flags |= IFF_UNICAST_FLT;

    netdev->hw_enc_features |= NETIF_F_IP_CSUM | NETIF_F_IPV6_CSUM |
                        NETIF_F_RXCSUM | NETIF_F_GSO |
                      NETIF_F_GRO | NETIF_F_TSO | NETIF_F_TSO6 | NETIF_F_GSO_GRE |
                      NETIF_F_GSO_GRE_CSUM | NETIF_F_GSO_UDP_TUNNEL |
                      NETIF_F_GSO_UDP_TUNNEL_CSUM | NETIF_F_SCTP_CRC;

    netdev->gso_partial_features |= NETIF_F_TSO_MANGLEID;

    netdev->gso_features |= NETIF_F_GSO_GRE_CSUM;

    netdev->features |= NETIF_F_IP_CSUM | NETIF_F_IPV6_CSUM |
                        NETIF_F_HW_VLAN_CTAG_FILTER |
                        NETIF_F_IPV6CHOOL | NETIF_F_HW_VLAN_CTAG_RX |
                        NETIF_F_RXCSUM | NETIF_F_GSO |
                      NETIF_F_GRO | NETIF_F_TSO | NETIF_F_TSO6 | NETIF_F_GSO_GRE |
                      NETIF_F_GSO_GRE_CSUM | NETIF_F_GSO_UDP_TUNNEL |
                      NETIF_F_GSO_UDP_TUNNEL_CSUM | NETIF_F_SCTP_CRC;

    if (pdev->revision >= 0x21) {
        netdev->hw_features |= NETIF_F_HW_VLAN_CTAG_FILTER;
    }
    if (!(h->flags & HNAE3_SUPPORT_VF)) {
        netdev->features |= NETIF_F_NTUPLE;
    }
    if (!h->flags & HNAE3_SUPPORT_VF) {
        netdev->features |= NETIF_F_NTUPLE;
    }
static int hns3_alloc_buffer(struct hns3_enet_ring *ring,
    struct hns3_desc_cb *cb)
{
    unsigned int order = hnae3_page_order(ring);
    struct page *p;

    p = dev_alloc_pages(order);
    if (!p)
        return -ENOMEM;
    cb->priv = p;
    cb->page_offset = 0;
    cb->reuse_flag = 0;
    cb->buf = page_address(p);
    cb->length = hnae3_page_size(ring);
    cb->type = DESC_TYPE_PAGE;
    return 0;
}

static void hns3_free_buffer(struct hns3_enet_ring *ring,
    struct hns3_desc_cb *cb)
{
    if (cb->type == DESC_TYPE_SKB)
        dev_kfree_skb_any((struct sk_buff *)cb->priv);
    else if (!HNAE3_IS_TX_RING(ring))
        put_page((struct page *)cb->priv);
    memset(cb, 0, sizeof(*cb));
}

static int hns3_map_buffer(struct hns3_enet_ring *ring, struct hns3_desc_cb *cb)
{
    cb->dma = dma_map_page(ring_to_dev(ring), cb->priv, 0,
     cb->length, ring_to_dma_dir(ring));
    if (unlikely(dma_mapping_error(ring_to_dev(ring), cb->dma)))
        return -EIO;
    return 0;
}

static void hns3_unmap_buffer(struct hns3_enet_ring *ring,
    struct hns3_desc_cb *cb)
+if (cb->type == DESC_TYPE_SKB)
+    dma_unmap_single(ring_to_dev(ring), cb->dma, cb->length,
+    ring_to_dma_dir(ring));
+else if (cb->length)
+    dma_unmap_page(ring_to_dev(ring), cb->dma, cb->length,
+    ring_to_dma_dir(ring));
+
+static void hns3_buffer_detach(struct hns3_enet_ring *ring, int i)
+{
+    hns3_unmap_buffer(ring, &ring->desc_cb[i]);
+    ring->desc[i].addr = 0;
+}
+
+static void hns3_free_buffer_detach(struct hns3_enet_ring *ring, int i)
+{
+    struct hns3_desc_cb *cb = &ring->desc_cb[i];
+    if (!cb->dma)
+        return;
+    hns3_buffer_detach(ring, i);
+    hns3_free_buffer(ring, cb);
+}
+
+static void hns3_free_buffers(struct hns3_enet_ring *ring)
+{
+    int i;
+    for (i = 0; i < ring->desc_num; i++)
+        hns3_free_buffer_detach(ring, i);
+    /* free desc along with its attached buffer */
+    static void hns3_free_desc(struct hns3_enet_ring *ring)
+    {
+        int size = ring->desc_num * sizeof(ring->desc[0]);
+        hns3_free_buffers(ring);
+        if (ring->desc) {
+            dma_free_coherent(ring_to_dev(ring), size,
+                ring->desc, ring->desc_dma_addr);
+            ring->desc = NULL;
+        }
+    }
+    static int hns3_alloc_desc(struct hns3_enet_ring *ring)
+{  
+  int size = ring->desc_num * sizeof(ring->desc[0]);  
+  
+  ring->desc = dma_zalloc_coherent(ring_to_dev(ring), size,  
+  &ring->desc_dma_addr,  
+  GFP_KERNEL);  
+  if (!ring->desc)  
+    return -ENOMEM;  
+  +return 0;  
+}  
+
+static int hns3_reserve_buffer_map(struct hns3_enet_ring *ring,  
+  struct hns3_desc_cb *cb)  
+{  
+  int ret;  
+  
+  ret = hns3_alloc_buffer(ring, cb);  
+  if (ret)  
+    goto out;  
+  
+  ret = hns3_map_buffer(ring, cb);  
+  if (ret)  
+    goto out_with_buf;  
+  +return 0;  
+  +  
+  out_with_buf:  
+  hns3_free_buffer(ring, cb);  
+  out:  
+  +return ret;  
+}  
+
+static int hns3_alloc_buffer_attach(struct hns3_enet_ring *ring, int i)  
+{  
+  int ret = hns3_reserve_buffer_map(ring, &ring->desc_cb[i]);  
+  
+  if (ret)  
+    +return ret;  
+  
+  ring->desc[i].addr = cpu_to_le64(ring->desc_cb[i].dma);  
+  +  
+  +return 0;  
+}  
+
+/* Allocate memory for raw pkg, and map with dma */  
+static int hns3_alloc_ring_buffers(struct hns3_enet_ring *ring)  
+{  
+  
+}
+int i, j, ret;
+
+for (i = 0; i < ring->desc_num; i++) {
+ret = hns3_alloc_buffer_attach(ring, i);
+if (ret)
+goto out_buffer_fail;
+}
+
+return 0;
+
+out_buffer_fail:
+for (j = i - 1; j >= 0; j--)
+hns3_free_buffer_detach(ring, j);
+return ret;
+
+} /* detach a in-used buffer and replace with a reserved one */
+static void hns3_replace_buffer(struct hns3_enet_ring *ring, int i,
+struct hns3_desc_cb *res_cb)
+{
+hns3_unmap_buffer(ring, &ring->desc_cb[i]);
+ring->desc_cb[i] = *res_cb;
+ring->desc[i].addr = cpu_to_le64(ring->desc_cb[i].dma);
+ring->desc[i].rx.bd_base_info = 0;
+}
+
+static void hns3_reuse_buffer(struct hns3_enet_ring *ring, int i)
+{
+ring->desc_cb[i].reuse_flag = 0;
+ring->desc[i].addr = cpu_to_le64(ring->desc_cb[i].dma
++ ring->desc_cb[i].page_offset);
+ring->desc[i].rx.bd_base_info = 0;
+}
+
+static void hns3_nic_reclaim_desc(struct hns3_enet_ring *ring, int head,
+ int *bytes, int *pkts)
+{
+int ntc = ring->next_to_clean;
+struct hns3_desc_cb *desc_cb;
+
+while (head != ntc) {
+desc_cb = &ring->desc[ntc];
+(*pkts) += (desc_cb->type == DESC_TYPE_SKB);
+(*bytes) += desc_cb->length;
+/* desc_cb will be cleaned, after hnae3_free_buffer_detach */
+hns3_free_buffer_detach(ring, ntc);
+
+if (++ntc == ring->desc_num)
ntc = 0;
+
+/* Issue prefetch for next Tx descriptor */
+prefetch(&ring->desc_cb[ntc]);
+
+/* This smp_store_release() pairs with smp_load_acquire() in
+ * ring_space called by hns3_nic_net_xmit.
+ */
+smp_store_release(&ring->next_to_clean, ntc);
+
+static int is_valid_clean_head(struct hns3_enet_ring *ring, int h)
+
+{ int u = ring->next_to_use;
+ int c = ring->next_to_clean;
+ +if (unlikely(h > ring->desc_num))
+ return 0;
+ +
+ return u > c ? (h > c && h <= u) : (h > c || h <= u);
+ } 
+
+void hns3_clean_tx_ring(struct hns3_enet_ring *ring)
+
+{ struct net_device *netdev = ring->tqp->handle->kinfo.netdev;
+ struct hns3_nic_priv *priv = netdev_priv(netdev);
+ struct netdev_queue *dev_queue;
+ int bytes, pkts;
+ int head;
+ +head = readl_relaxed(ring->tqp->io_base + HNS3_RING_TX_RING_HEAD_REG);
+ rmb(); /* Make sure head is ready before touch any data */
+ +if (is_ring_empty(ring) || head == ring->next_to_clean)
+ return; /* no data to poll */
+ +if (unlikely(!is_valid_clean_head(ring, head))) {
+ netdev_err(netdev, "wrong head (%d, %d-%d)\n", head,
+ ring->next_to_use, ring->next_to_clean);
+ +u64_stats_update_begin(&ring->syncp);
+ ring->stats.io_err_cnt++;
+ u64_stats_update_end(&ring->syncp);
+ return;
+ }
+ +bytes = 0;
+pkts = 0;
+hns3_nic_reclaim_desc(ring, head, &bytes, &pkts);
+
+ring->tqp VECTOR->tx_group.total_bytes += bytes;
+ring->tqp VECTOR->tx_group.total_packets += pkts;
+
+u64_stats_update_begin(&ring->syncp);
+ring->stats.tx_bytes += bytes;
+ring->stats.tx_pkts += pkts;
+u64_stats_update_end(&ring->syncp);
+
+dev_queue = netdev_get_tx_queue(netdev, ring->tqp->tqp_index);
+netdev tx_completed_queue(dev_queue, pkts, bytes);
+
+if (unlikely(netif_carrier_ok(netdev) &&
+     (ring_space(ring) > HNS3_MAX_BD_PER_PKT))) {
+  /* Make sure that anybody stopping the queue after this
+  * sees the new next_to_clean.
+  */
+  +smp_mb();
+  +if (netif_tx_queue_stopped(dev_queue) &&
+  +!test_bit(HNS3_NIC_STATE_DOWN, &priv->state)) {
+    netif_tx_wake_queue(dev_queue);
+    ring->stats.restart_queue++;
+  +}
+  +}
+  +}
+  +}
+
+static int hns3_desc_unused(struct hns3_enet_ring *ring)
+{  
+int ntc = ring->next_to_clean;
+int ntu = ring->next_to_use;
+
+return ((ntc >= ntu) ? 0 : ring->desc_num) + ntc - ntu;
+}
+
+static void
+hns3_nic_alloc_rx_buffers(struct hns3_enet_ring *ring, int cleand_count)
+{  
+struct hns3_desc_cb *desc_cb;
+struct hns3_desc_cb res_cbs;
+int i, ret;
+
+for (i = 0; i < cleand_count; i++) {
+  desc_cb = &ring->desc_cb[ring->next_to_use];
+  if (desc_cb->reuse_flag) {
+    u64_stats_update_begin(&ring->syncp);
+    ring->stats.reuse_pg_cnt++;
+  }  
+  res_cbs = desc_cb;
+  desc cb = &ring->desc_cb[ring->next_to_use];
+  if (desc cb->reuse_flag) {
+    u64_stats_update_begin(&ring->syncp);
+    ring->stats.reuse_pg_cnt++;
+  }  
+  desc_cb = &ring->desc_cb[ring->next_to_use];
+  if (desc cb->reuse_flag) {
+    u64_stats_update_begin(&ring->syncp);
+    ring->stats.reuse_pg_cnt++;
+  }  

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```c
+u64_stats_update_end(&ring->syncp);
+
+hns3_reuse_buffer(ring, ring->next_to_use);
+} else {
+ret = hns3_reserve_buffer_map(ring, &res_cbs);
+if (ret) {
+u64_stats_update_begin(&ring->syncp);
+ring->stats.sw_err_cnt++;
+u64_stats_update_end(&ring->syncp);
+
+netdev_err(ring->tqp->handle->kinfo.netdev,
+    "hnae reserve buffer map failed.\n");
+break;
+}
+hns3_replace_buffer(ring, ring->next_to_use, &res_cbs);
+}
+
+ring_ptr_move_fw(ring, next_to_use);
+}
+
+wmb(); /* Make all data has been write before submit */
+writel_relaxed(i, ring->tqp->io_base + HNS3_RING_RX_RING_HEAD_REG);
+}
+
+static void hns3_nic_reuse_page(struct sk_buff *skb, int i,
+    struct hns3_enet_ring *ring, int pull_len,
+    struct hns3_desc_cb *desc_cb)
+{
+    struct hns3_desc *desc;
+    u32 truesize;
+    int size;
+    int last_offset;
+    bool twobufs;
+
+    twobufs = ((PAGE_SIZE < 8192) &&
        hnae3_buf_size(ring) == HNS3_BUFFER_SIZE_2048);
+
+    desc = &ring->desc[ring->next_to_clean];
+    size = le16_to_cpu(desc->rx.size);
+
+    truesize = hnae3_buf_size(ring);
+
+    if (!twobufs)
+        last_offset = hnae3_page_size(ring) - hnae3_buf_size(ring);
+
+    skb_add_rx_frag(skb, i, desc_cb->priv, desc_cb->page_offset + pull_len,
+        size - pull_len, truesize);
+
```

---

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/* Avoid re-using remote pages, flag default unreuse */
+if (unlikely((page_to_nid(desc_cb->priv) != numa_node_id())))
  +return;
+
+if (twobufs) {
  /* If we are only owner of page we can reuse it */
  +if (likely(page_count(desc_cb->priv) == 1)) {
    /* Flip page offset to other buffer */
    +desc_cb->page_offset ^= truesize;
    +
    +desc_cb->reuse_flag = 1;
    /* Bump ref count on page before it is given */
    +get_page(desc_cb->priv);
    +}
  +return;
  +}
+
  /* Move offset up to the next cache line */
  +desc_cb->page_offset += truesize;
  +
  +if (desc_cb->page_offset <= last_offset) {
    +desc_cb->reuse_flag = 1;
    /* Bump ref count on page before it is given */
    +get_page(desc_cb->priv);
    +}
  +}
+
+static int hns3_gro_complete(struct sk_buff *skb)
+{
  __be16 type = skb->protocol;
  +struct tcphdr *th;
  +int depth = 0;
  +
  +while (type == htons(ETH_P_8021Q)) {
    +struct vlan_hdr *vh;
    +
    +if (((depth + VLAN_HLEN) > skb_headlen(skb)))
      +return -EFAULT;
    +
    +vh = (struct vlan_hdr *)skb->data + depth;
    +type = vh->h_vlan_encapsulated_proto;
    +depth += VLAN_HLEN;
    +}
  +
  +if (type == htons(ETH_P_IP)) {
    +depth += sizeof(struct iphdr);
    +}
  +else if (type == htons(ETH_P_IPV6)) {
    +depth += sizeof(struct ipv6hdr);
    +}
+} else {
+ netdev_err(skb->dev,
+ "Error: FW GRO supports only IPv4/IPv6, not 0x%04x, depth: %
+ be16_to_cpu(type), depth);
+ return -EFAULT;
+
+ th = (struct tcphdr *)(skb->data + depth);
+ skb_shinfo(skb)->gso_segs = NAPI_GRO_CB(skb)->count;
+ if (th->cwr)
+ skb_shinfo(skb)->gso_type |= SKB_GSO_TCP_ECN;
+
+ skb->ip_summed = CHECKSUM_UNNECESSARY;
+
+ return 0;
+}
+
+static void hns3_rx_checksum(struct hns3_enet_ring *ring, struct sk_buff *skb,
+ u32 l234info, u32 bd_base_info)
+{
+ struct net_device *netdev = ring->tqp->handle->kinfo.netdev;
+ int l3_type, l4_type;
+ int ol4_type;
+ skb->ip_summed = CHECKSUM_NONE;
+ skb_checksum_none_assert(skb);
+ if (!(netdev->features & NETIF_F_RXCSUM))
+ return;
+
+ /* check if hardware has done checksum */
+ if (!hnae3_get_bit(bd_base_info, HNS3_RXD_L3L4P_B))
+ return;
+
+ if (unlikely(hnae3_get_bit(l234info, HNS3_RXD_L3E_B) ||
+ hnae3_get_bit(l234info, HNS3_RXD_L3L4E_B) ||
+ hnae3_get_bit(l234info, HNS3_RXD_OL3E_B) ||
+ hnae3_get_bit(l234info, HNS3_RXD_OL4E_B))) {
+ u64_stats_update_begin(&ring->syncp);
+ ring->stats.l3l4_csum_err++;
+ u64_stats_update_end(&ring->syncp);
+ return;
+}
+
+ l3_type = hnae3_get_field(l234info, HNS3_RXD_L3ID_M,
+ HNS3_RXD_L3ID_S);
+l4_type = hnae3_get_field(l234info, HNS3_RXD_L4ID_M,
  + HNS3_RXD_L4ID_S);
+
+ol4_type = hnae3_get_field(l234info, HNS3_RXD_OL4ID_M,
  + HNS3_RXD_OL4ID_S);
+switch (ol4_type) {
+case HNS3_OL4_TYPE_MAC_IN_UDP:
+case HNS3_OL4_TYPE_NVGRE:
+skb->csum_level = 1;
+/* fall through */
+case HNS3_OL4_TYPE_NO_TUN:
+/* Can checksum ipv4 or ipv6 + UDP/TCP/SCTP packets */
+if ((l3_type == HNS3_L3_TYPE_IPV4 ||
+    l3_type == HNS3_L3_TYPE_IPV6) &&
+    (l4_type == HNS3_L4_TYPE_UDP ||
+     l4_type == HNS3_L4_TYPE_TCP ||
+     l4_type == HNS3_L4_TYPE_SCTP))
+skb->ip_summed = CHECKSUM_UNNECESSARY;
+break;
+default:
+break;
+}
+}
+
+static void hns3_rx_skb(struct hns3_enet_ring *ring, struct sk_buff *skb)
+{
+if (skb_has_frag_list(skb))
+napi_gro_flush(&ring->tqp_vector->napi, false);
+
+napi_gro_receive(&ring->tqp_vector->napi, skb);
+}
+
+static bool hns3_parse_vlan_tag(struct hns3_enet_ring *ring,
+struct hns3_desc *desc, u32 l234info,
+u16 *vlan_tag)
+{
+struct pci_dev *pdev = ring->tqp->handle->pdev;
+
+if (pdev->revision == 0x20) {
+*vlan_tag = le16_to_cpu(desc->rx.ot_vlan_tag);
+napi_fast_remark(skb, skb->queuebast, skb->dev);
+} else {
+*vlan_tag = le16_to_cpu(desc->rx_vlan_tag);
+napi_fast_remark(skb, skb->queuebast, skb->dev);
+}
+
+#define HNS3_STRP_OUTER_VLAN	0x1
+#define HNS3_STRP_INNER_VLAN	0x2
+switch (hnae3_get_field(l234info, HNS3_RXD_STRP_TAGP_M,
   +HNS3_RXD_STRP_TAGP_S)) {
   +case HNS3_STRP_OUTER_VLAN:
   +*vlan_tag = le16_to_cpu(desc->rx.ot_vlan_tag);
   +return true;
   +case HNS3_STRP_INNER_VLAN:
   +*vlan_tag = le16_to_cpu(desc->rx.vlan_tag);
   +return true;
   +default:
   +return false;
   +}
   +}
   +static int hns3_alloc_skb(struct hns3_enet_ring *ring, int length,
   + unsigned char *va)
   +{
   +#define HNS3_NEED_ADD_FRAG1
   +struct hns3_desc_cb *desc_cb = &ring->desc_cb[ring->next_to_clean];
   +struct net_device *netdev = ring->tqp->handle->kinfo.netdev;
   +struct sk_buff *skb;
   +
   +ring->skb = napi_alloc_skb(&ring->tqp_vector->napi, HNS3_RX_HEAD_SIZE);
   +skb = ring->skb;
   +if (unlikely(!skb)) {
   +netdev_err(netdev, "alloc rx skb fail\n");
   +
   +u64_stats_update_begin(&ring->syncp);
   +ring->stats.sw_err_cnt++;
   +u64_stats_update_end(&ring->syncp);
   +
   +return -ENOMEM;
   +}
   +
   +prefetchw(skb->data);
   +
   +ring->pending_buf = 1;
   +ring->frag_num = 0;
   +ring->tail_skb = NULL;
   +if (length <= HNS3_RX_HEAD_SIZE) {
   +memcpy(__skb_put(skb, length), va, ALIGN(length, sizeof(long)));
   +
   */ We can reuse buffer as-is, just make sure it is local */
   +if (likely(page_to_nid(desc_cb->priv) == numa_node_id()))
   +desc_cb->reuse_flag = 1;
   +else /* This page cannot be reused so discard it */
   +put_page(desc_cb->priv);
   +
+ring_ptr_move_fw(ring, next_to_clean);
+return 0;
+
+u64_stats_update_begin(&ring->syncp);
+ring->stats.seg_pkt_cnt++;
+u64_stats_update_end(&ring->syncp);
+
+ring->pull_len = eth_get_headlen(va, HNS3_RX_HEAD_SIZE);
+__skb_put(skb, ring->pull_len);
+hns3_nicReuse_page(skb, ring->frag_num++, ring, ring->pull_len,
+    desc_cb);
+ring_ptr_move_fw(ring, next_to_clean);
+
+return HNS3_NEED_ADD_FRAG;
+
+
+static int hns3_add_frag(struct hns3_enet_ring *ring, struct hns3_desc *desc,
+    struct sk_buff **out_skb, bool pending)
+{
+    struct sk_buff *skb = *out_skb;
+    struct sk_buff *head_skb = *out_skb;
+    struct sk_buff *new_skb;
+    struct hns3_desc_cb *desc_cb;
+    struct hns3_desc *pre_desc;
+    u32 bd_base_info;
+    int pre_bd;
+
+    /* if there is pending bd, the SW param next_to_clean has moved
+     * to next and the next is NULL
+     */
+    if (pending) {
+        pre_bd = (ring->next_to_clean - 1 + ring->desc_num) %
+            ring->desc_num;
+        pre_desc = &ring->desc[pre_bd];
+        bd_base_info = le32_to_cpu(pre_desc->rx.bd_base_info);
+    } else {
+        bd_base_info = le32_to_cpu(desc->rx.bd_base_info);
+    }
+    /* make sure HW write desc complete */
+    dma_rmb();
+    if (!hnae3_get_bit(bd_base_info, HNS3_RXD_FE_B)) {
+        bd_base_info = le32_to_cpu(desc->rx.bd_base_info);
+    }
    +while (!hnae3_get_bit(bd_base_info, HNS3_RXD_FE_B)) {
+        desc = &ring->desc[ring->next_to_clean];
+        desc_cb = &ring->desc_cb[ring->next_to_clean];
+        bd_base_info = le32_to_cpu(desc->rx.bd_base_info);
+    }
+    +return -ENXIO;
+}
if (unlikely(ring->frag_num >= MAX_SKB_FRAGS)) {
    new_skb = napi_alloc_skb(&ring->tqp_vector->napi,
            HNS3_RX_HEAD_SIZE);
    if (unlikely(!new_skb)) {
        netdev_err(ring->tqp->handle->kinfo.netdev,
                "alloc rx skb frag failn");
        return -ENXIO;
    }
    ring->frag_num = 0;
}
if (ring->tail_skb) {
    ring->tail_skb->next = new_skb;
    ring->tail_skb = new_skb;
} else {
    skb_shinfo(skb)->frag_list = new_skb;
    ring->tail_skb = new_skb;
}
if (ring->tail_skb) {
    head_skb->truesize += hnae3_buf_size(ring);
    head_skb->data_len += le16_to_cpu(desc->rx.size);
    head_skb->len += le16_to_cpu(desc->rx.size);
    skb = ring->tail_skb;
}

hns3_nic_reuse_page(skb, ring->frag_num++, ring, 0, desc_cb);
ring_ptr_move_fw(ring, next_to_clean);
ring->pending_buf++;
return 0;
}

static int hns3_set_gro_and_checksum(struct hns3_enet_ring *ring,
        struct sk_buff *skb, u32 l234info,
        u32 bd_base_info)
{
    u16 gro_count;
    u32 l3_type;
    gro_count = hnae3_get_field(l234info, HNS3_RXD_GRO_COUNT_M,
            HNS3_RXD_GRO_COUNT_S);
    /* if there is no HW GRO, do not set gro params */
    if (!gro_count) {
        hns3_rx_checksum(ring, skb, l234info, bd_base_info);
        return 0;
    }
+NAPI_GRO_CB(skb)->count = gro_count;
+
+l3_type = hnae3_get_field(l234info, HNS3_RXD_L3ID_M, 
+ HNS3_RXD_L3ID_S);
+if (l3_type == HNS3_L3_TYPE_IPV4)
+skb_shinfo(skb)->gso_type = SKB_GSO_TCPV4;
+else if (l3_type == HNS3_L3_TYPE_IPV6)
+skb_shinfo(skb)->gso_type = SKB_GSO_TCPV6;
+else
+return -EFAULT;
+
+skb_shinfo(skb)->gso_size = hnae3_get_field(bd_base_info, 
+ HNS3_RXD_GRO_SIZE_M, 
+ HNS3_RXD_GRO_SIZE_S);
+
+return hns3_gro_complete(skb);
+
+static void hns3_set_rx_skb_rss_type(struct hns3_enet_ring *ring, 
+ struct sk_buff *skb)
+{
+struct hnae3_handle *handle = ring->tqp->handle;
+enum pkt_hash_types rss_type;
+struct hns3_desc *desc;
+int last_bd;
+
+/* When driver handle the rss type, ring->next_to_clean indicates the 
+ * first descriptor of next packet, need -1 here.
+ */
+last_bd = (ring->next_to_clean - 1 + ring->desc_num) % ring->desc_num;
+desc = &ring->desc[last_bd];
+
+if (le32_to_cpu(desc->rx.rss_hash))
+rss_type = handle->kinfo.rss_type;
+else
+rss_type = PKT_HASH_TYPE_NONE;
+
+skb_set_hash(skb, le32_to_cpu(desc->rx.rss_hash), rss_type);
+
+static int hns3_handle_bdinfo(struct hns3_enet_ring *ring, struct sk_buff *skb, 
+ struct hns3_desc *desc)
+{
+struct net_device *netdev = ring->tqp->handle->kinfo.netdev;
+u32 bd_base_info = le32_to_cpu(desc->rx.bd_base_info);
+u32 i234info = le32_to_cpu(desc->rx.i234_info);
+enum hns3_pkt_l2t_type l2_frame_type;
unsigned int len;
+int ret;
+
+/* Based on hw strategy, the tag offloaded will be stored at
+ * ot_vlan_tag in two layer tag case, and stored at vlan_tag
+ * in one layer tag case.
+ */
+if (netdev->features & NETIF_F_HW_VLAN_CTAG_RX)
+u16 vlan_tag;
+
+if (hns3_parse_vlan_tag(ring, desc, l234info, &vlan_tag))
+_vlan_hwaccel_put_tag(skb, htons(ETH_P_8021Q),
+vlan_tag);
+
+if (unlikely(!(bd_base_info & BIT(HNS3_RXD_VLD_B)))) {
+u64_stats_update_begin(&ring->syncp);
+ring->stats.non_vld_descs++;
+u64_stats_update_end(&ring->syncp);
+
+return -EINVAL;
+}
+
+if (unlikely(!desc->rx.pkt_len || (l234info & (BIT(HNS3_RXD_TRUNCAT_B) |
+BIT(HNS3_RXD_L2E_B))))) {
+u64_stats_update_begin(&ring->syncp);
+if (l234info & BIT(HNS3_RXD_L2E_B))
+ring->stats.l2_err++;
+else
+ring->stats.err_pkt_len++;
+u64_stats_update_end(&ring->syncp);
+
+return -EFAULT;
+}
+
+len = skb->len;
+
+/* Do update ip stack process */
+skb->protocol = eth_type_trans(skb, netdev);
+
+/* This is needed in order to enable forwarding support */
+ret = hns3_set_gro_and_checksum(ring, skb, l234info, bd_base_info);
+if (unlikely(ret)) {
+u64_stats_update_begin(&ring->syncp);
+ring->stats.rx_err_cnt++;
+u64_stats_update_end(&ring->syncp);
+return ret;
+}
+  l2_frame_type = hnae3_get_field(l234info, HNS3_RXD_DMAC_M,
+  HNS3_RXD_DMAC_S);
+  u64_stats_update_begin(&ring->syncp);
+  ring->stats.rx_pks++;
+  ring->stats.rx_bytes += len;
+  if (l2_frame_type == HNS3_L2_TYPE_MULTICAST)
+      ring->stats.rx_multicast++;
+  u64_stats_update_end(&ring->syncp);
+  ring->tqp_vector->rx_group.total_bytes += len;
+  return 0;
+}
+
+static int hns3_handle_rx_bd(struct hns3_enet_ring *ring,
+     struct sk_buff **out_skb)
+{
+  struct sk_buff **skb = ring->skb;
+  struct hns3_desc_cb *desc_cb;
+  struct hns3_desc *desc;
+  u32 bd_base_info;
+  int length;
+  int ret;
+  desc = &ring->desc[ring->next_to_clean];
+  desc_cb = &ring->desc_cb[ring->next_to_clean];
+  prefetch(desc);
+  length = le16_to_cpu(desc->rx.size);
+  bd_base_info = le32_to_cpu(desc->rx.bd_base_info);
+  /* Check valid BD */
+  if (unlikely(!hnae3_get_bit(bd_base_info, HNS3_RXD_VLD_B)))
+      return -ENXIO;
+  if (!skb)
+      ring->va = (unsigned char *)desc_cb->buf + desc_cb->page_offset;
+  /* Prefetch first cache line of first page
+     Idea is to cache few bytes of the header of the packet. Our L1 Cache
+     line size is 64B so need to prefetch twice to make it 128B. But in
+     actual we can have greater size of caches with 128B Level 1 cache
+     lines. In such a case, single fetch would suffice to cache in the
+     relevant part of the header.
/*
+ * prefetch(ring->va);
+ */
+ if L1_CACHE_BYTES < 128
+ prefetch(ring->va + L1_CACHE_BYTES);
+ 
+ if (!skb) {
+ ret = hns3_alloc_skb(ring, length, ring->va);
+ *out_skb = skb = ring->skb;
+ 
+ if (ret < 0) /* alloc buffer fail */
+ return ret;
+ 
+ if (ret > 0) { /* need add frag */
+ ret = hns3_add_frag(ring, desc, &skb, false);
+ if (ret)
+ return ret;
+ 
+ /* As the head data may be changed when GRO enable, copy
+ * the head data in after other data rx completed
+ */
+ memcpy(skb->data, ring->va,
+ ALIGN(ring->pull_len, sizeof(long));
+ )
+ } else {
+ ret = hns3_add_frag(ring, desc, &skb, true);
+ if (ret)
+ return ret;
+ 
+ /* As the head data may be changed when GRO enable, copy
+ * the head data in after other data rx completed
+ */
+ memcpy(skb->data, ring->va,
+ ALIGN(ring->pull_len, sizeof(long));
+ )
+ 
+ ret = hns3_handle_bdinfo(ring, skb, desc);
+ if (unlikely(ret)) {
+ dev_kfree_skb_any(skb);
+ return ret;
+ }
+ 
+ *out_skb = skb;
+ 
+ int hns3_clean_rx_ring(
struct hns3_enet_ring *ring, int budget,
void (*rx_fn)(struct hns3_enet_ring *, struct sk_buff *)
+
+#define RCB_NOF_ALLOC_RX_BUFF_ONCE 16
+int recv_pkts, recv_bds, clean_count, err;
+int unused_count = hns3_desc_unused(ring) - ring->pending_buf;
+struct sk_buff *skb = ring->skb;
+int num;
+
+num = readl_relaxed(ring->tqp->io_base + HNS3_RING_RX_RING_FBDNUM_REG);
+rmb(); /* Make sure num taken effect before the other data is touched */
+
+recv_pkts = 0, recv_bds = 0, clean_count = 0;
+num -= unused_count;
+
+while (recv_pkts < budget && recv_bds < num) {
+/* Reuse or realloc buffers */
+if (clean_count + unused_count >= RCB_NOF_ALLOC_RX_BUFF_ONCE) {
+hns3_nic_alloc_rx_buffers(ring,
+ clean_count + unused_count);
+clean_count = 0;
+unused_count = hns3_desc_unused(ring) -
+ring->pending_buf;
+}
+
+/* Poll one pkt */
+err = hns3_handle_rx_bd(ring, &skb);
+if (unlikely(!skb)) /* This fault cannot be repaired */
+goto out;
+
+if (err == -ENXIO) { /* Do not get FE for the packet */
+goto out;
+} else if (unlikely(err)) { /* Do jump the err */
+recv_bds += ring->pending_buf;
+clean_count += ring->pending_buf;
+ring->skb = NULL;
+ring->pending_buf = 0;
+continue;
+}
+
+rx_fn(ring, skb);
+recv_bds += ring->pending_buf;
+clean_count += ring->pending_buf;
+ring->skb = NULL;
+ring->pending_buf = 0;
+
+recv_pkts++;
+}
+ out:
+ */ Make all data has been write before submit */
+ if (clean_count + unused_count > 0)
+ hns3_nic_alloc_rx_buffers(ring,
+   clean_count + unused_count);
+ +
+ return recv_pkts;
+
+ static bool hns3_get_new_int_gl(struct hns3_enet_ring_group *ring_group)
+ {
+   struct hns3_enet_tqp_vector *tqp_vector =
+     ring_group->ring->tqp_vector;
+   enum hns3_flow_level_range new_flow_level;
+   int packets_per_msecs;
+   int bytes_per_msecs;
+   u32 time_passed_ms;
+   u16 new_int_gl;
+
+   if (!tqp_vector->last_jiffies)
+     return false;
+
+   if (ring_group->total_packets == 0) {
+     ring_group->coal.int_gl = HNS3_INT_GL_50K;
+     ring_group->coal.flow_level = HNS3_FLOW_LOW;
+     return true;
+   }
+
+   /* Simple throttlerate management
+    * 0-10MB/s   lower     (50000 ints/s)
+    * 10-20MB/s   middle    (20000 ints/s)
+    * 20-1249MB/s high      (18000 ints/s)
+    * > 40000pps ultra     (8000 ints/s)
+    */
+   new_flow_level = ring_group->coal.flow_level;
+   new_int_gl = ring_group->coal.int_gl;
+   time_passed_ms =
+     jiffies_to_msecs(jiffies - tqp_vector->last_jiffies);
+
+   if (!time_passed_ms)
+     return false;
+
+   do_div(ring_group->total_packets, time_passed_ms);
+   packets_per_msecs = ring_group->total_packets;
+
+   do_div(ring_group->total_bytes, time_passed_ms);
+   bytes_per_msecs = ring_group->total_bytes;


```c
#define HNS3_RX_LOW_BYTE_RATE 10000
#define HNS3_RX_MID_BYTE_RATE 20000

switch (new_flow_level) {
    case HNS3_FLOW_LOW:
        if (bytes_per_msecs > HNS3_RX_LOW_BYTE_RATE)
            new_flow_level = HNS3_FLOW_MID;
        break;

    case HNS3_FLOW_MID:
        if (bytes_per_msecs > HNS3_RX_MID_BYTE_RATE)
            new_flow_level = HNS3_FLOW_HIGH;
        else if (bytes_per_msecs <= HNS3_RX_LOW_BYTE_RATE)
            new_flow_level = HNS3_FLOW_LOW;
        break;

    case HNS3_FLOW_HIGH:
    case HNS3_FLOW_ULTRA:
        default:
            if (bytes_per_msecs <= HNS3_RX_MID_BYTE_RATE)
                new_flow_level = HNS3_FLOW_MID;
            break;
    }

#define HNS3_RX_ULTRA_PACKET_RATE 40

if (packets_per_msecs > HNS3_RX_ULTRA_PACKET_RATE &&
    &tqp_vector->rx_group == ring_group)
    new_flow_level = HNS3_FLOW_ULTRA;

switch (new_flow_level) {
    case HNS3_FLOW_LOW:
        new_int_gl = HNS3_INT_GL_50K;
        break;

    case HNS3_FLOW_MID:
        new_int_gl = HNS3_INT_GL_20K;
        break;

    case HNS3_FLOW_HIGH:
        new_int_gl = HNS3_INT_GL_18K;
        break;

    case HNS3_FLOW_ULTRA:
        new_int_gl = HNS3_INT_GL_8K;
        break;
    default:
    break;
    +}

+ring_group->total_bytes = 0;
+ring_group->total_packets = 0;
```
+ring_group->coal.flow_level = new_flow_level;
+if (new_int_gl != ring_group->coal.int_gl) {
+    ring_group->coal.int_gl = new_int_gl;
+    return true;
+}
+    return false;
+
+static void hns3_update_new_int_gl(struct hns3_enet_tqp_vector *tqp_vector)
+{
+    struct hns3_enet_ring_group *rx_group = &tqp_vector->rx_group;
+    struct hns3_enet_ring_group *tx_group = &tqp_vector->tx_group;
+    bool rx_update, tx_update;
+
+    /* update param every 1000ms * /
+    if (time_before(jiffies,
+        tqp_vector->last_jiffies + msecs_to_jiffies(1000)))
+        return;
+    if (rx_group->coal.gl_adapt_enable) {
+        rx_update = hns3_get_new_int_gl(rx_group);
+        if (rx_update)
+            hns3_set_vector_coalesce_rx_gl(tqp_vector,
+                tx_group->coal.int_gl);
+    }
+
+    if (tx_group->coal.gl_adapt_enable) {
+        tx_update = hns3_get_new_int_gl(&tqp_vector->tx_group);
+        if (tx_update)
+            hns3_set_vector_coalesce_tx_gl(tqp_vector,
+                tx_group->coal.int_gl);
+    }
+
+    tqp_vector->last_jiffies = jiffies;
+}
+
+static int hns3_nic_common_poll(struct napi_struct *napi, int budget)
+{
+    struct hns3_nic_priv *priv = netdev_priv(napi->dev);
+    struct hns3_enet_ring *ring;
+    int rx_pkt_total = 0;
+    struct hns3_enet_tqp_vector *tqp_vector =
+        container_of(napi, struct hns3_enet_tqp_vector, napi);
+    bool clean_complete = true;
+    int rx_budget;
+    if (unlikely(test_bit(HNS3_NIC_STATE_DOWN, &priv->state))) {
napi_complete(napi);
return 0;
+
+"/* Since the actual Tx work is minimal, we can give the Tx a larger
+ * budget and be more aggressive about cleaning up the Tx descriptors.
+ */
+hns3_for_each_ring(ring, tqp_vector->tx_group)
+hns3_clean_tx_ring(ring);
+
+/" make sure rx ring budget not smaller than 1 */
+rx_budget = max(budget / tqp_vector->num_tqps, 1);
+
+hns3_for_each_ring(ring, tqp_vector->rx_group) {
+int rx_cleaned = hns3_clean_rx_ring(ring, rx_budget,
+ hns3_rx_skb);
+
+if (rx_cleaned >= rx_budget)
+clean_complete = false;
+
+rx_pkt_total += rx_cleaned;
+
+tqp_vector->rx_group.total_packets += rx_pkt_total;
+
+if (!clean_complete)
+return budget;
+
+if (napi_complete(napi) &&
+ likely(!test_bit(HNS3_NIC_STATE_DOWN, &priv->state))) {
+hns3_update_new_int_gl(tqp_vector);
+hns3_mask_vector_irq(tqp_vector, 1);
+
+return rx_pkt_total;
+
+static int hns3_get_vector_ring_chain(struct hns3_enet_tqp_vector *tqp_vector,
+    struct hnae3_ring_chain_node *head)
+{
+    struct pci_dev *pdev = tqp_vector->handle->pdev;
+    struct hnae3_ring_chain_node *cur_chain = head;
+    struct hnae3_ring_chain_node *chain;
+    struct hns3_enet_ring *tx_ring;
+    struct hns3_enet_ring *rx_ring;
+
+    tx_ring = tqp_vector->tx_group.ring;
+    if (tx_ring) {

+cur_chain->tqp_index = tx_ring->tqp->tqp_index;
+hnae3_set_bit(cur_chain->flag, HNAE3_RING_TYPE_B,
+ HNAE3_RING_TYPE_TX);
+hnae3_set_field(cur_chain->int_gl_idx, HNAE3_RING_GL_IDX_M,
+HNAE3_RING_GL_IDX_S, HNAE3_RING_GL_TX);
+
+cur_chain->next = NULL;
+
+while (tx_ring->next) {
+tx_ring = tx_ring->next;
+
+chain = devm_kzalloc(&pdev->dev, sizeof(*chain),
+ GFP_KERNEL);
+if (!chain)
+goto err_free_chain;
+
+cur_chain->next = chain;
+chain->tqp_index = tx_ring->tqp->tqp_index;
+hnae3_set_bit(chain->flag, HNAE3_RING_TYPE_B,
+ HNAE3_RING_TYPE_TX);
+hnae3_set_field(chain->int_gl_idx,
+HNAE3_RING_GL_IDX_M,
+HNAE3_RING_GL_IDX_S,
+HNAE3_RING_GL_TX);
+
+cur_chain = chain;
+}
+
+rx_ring = tqp_vector->rx_group.ring;
+if (!tx_ring && rx_ring) {
+cur_chain->next = NULL;
+cur_chain->tqp_index = rx_ring->tqp->tqp->tqp_index;
+hnae3_set_bit(cur_chain->flag, HNAE3_RING_TYPE_B,
+ HNAE3_RING_TYPE_RX);
+hnae3_set_field(cur_chain->int_gl_idx, HNAE3_RING_GL_IDX_M,
+HNAE3_RING_GL_IDX_S, HNAE3_RING_GL_RX);
+
+rx_ring = rx_ring->next;
+}
+
+while (rx_ring) {
+chain = devm_kzalloc(&pdev->dev, sizeof(*chain), GFP_KERNEL);
+if (!chain)
+goto err_free_chain;
+
+cur_chain->next = chain;
+chain->tqp_index = rx_ring->tqp->tqp_index;
hnae3_set_bit(chain->flag, HNAE3_RING_TYPE_B,
+      HNAE3_RING_TYPE_RX);
+hnae3_set_field(chain->int_gl_idx, HNAE3_RING_GLIDX_M,
+HNAE3_RING_GLIDX_S, HNAE3_RING_GLIDX_RX);
+
+cur_chain = chain;
+
+rx_ring = rx_ring->next;
+
+return 0;
+
+err_free_chain:
+cur_chain = head->next;
+while (cur_chain) {
+    chain = cur_chain->next;
+    devm_kfree(&pdev->dev, cur_chain);
+    cur_chain = chain;
+}
+head->next = NULL;
+
+return -ENOMEM;
+
+
+static void hns3_free_vector_ring_chain(struct hns3_enet_tqp_vector *tqp_vector,
+struct hnae3_ring_chain_node *head)
+{
+    struct pci_dev *pdev = tqp_vector->handle->pdev;
+    struct hnae3_ring_chain_node *chain_tmp, *chain;
+
+    chain = head->next;
+    while (chain) {
+        chain_tmp = chain->next;
+        devm_kfree(pdev->dev, chain);
+        chain = chain_tmp;
+    }
+}
+
+
+static void hns3_add_ring_to_group(struct hns3_enet_ring_group *group,
+    struct hns3_enet_ring *ring)
+{
+    ring->next = group->ring;
+    group->ring = ring;
+
+    group->count++;
+
+}
+static void hns3_nic_set_cpumask(struct hns3_nic_priv *priv)
+{
+struct pci_dev *pdev = priv->ae_handle->pdev;
+struct hns3_enet_tqp_vector *tqp_vector;
+int num_vectors = priv->vector_num;
+int numa_node;
+int vector_i;
+
+numa_node = dev_to_node(&pdev->dev);
+
+for (vector_i = 0; vector_i < num_vectors; vector_i++) {
+tqp_vector = &priv->tqp_vector[vector_i];
+cpumask_set_cpu(cpumask_local_spread(vector_i, numa_node),
+&tqp_vector->affinity_mask);
+
+
+
+static int hns3_nic_init_vector_data(struct hns3_nic_priv *priv)
+{
+struct hnae3_handle *h = priv->ae_handle;
+struct hns3_enet_tqp_vector *tqp_vector;
+int ret = 0;
+int i;
+
+hns3_nic_set_cpumask(priv);
+
+for (i = 0; i < priv->vector_num; i++) {
+tqp_vector = &priv->tqp_vector[i];
+hns3_vector_gl_rl_init_hw(tqp_vector, priv);
+tqp_vector->num_tqps = 0;
+
+
+
}
for (i = 0; i < priv->vector_num; i++) {
    struct hnae3_ring_chain_node vector_ring_chain;
    tqp_vector = &priv->tqp_vector[i];
    tqp_vector->rx_group.total_bytes = 0;
    tqp_vector->rx_group.total_packets = 0;
    tqp_vector->tx_group.total_bytes = 0;
    tqp_vector->tx_group.total_packets = 0;
    tqp_vector->handle = h;
    ret = hns3_get_vector_ring_chain(tqp_vector,
        &vector_ring_chain);
    if (ret)
        goto map_ring_fail;
    ret = h->ae_algo->ops->map_ring_to_vector(h,
        tqp_vector->vector_irq, &vector_ring_chain);
    if (ret)
        goto map_ring_fail;
    netif_napi_add(priv->netdev, &tqp_vector->napi,
        hns3_nic_common_poll, NAPI_POLL_WEIGHT);
}

return 0;

map_ring_fail:
while (i--)
    netif_napi_del(&priv->tqp_vector[i].napi);
return ret;

static int hns3_nic_alloc_vector_data(struct hns3_nic_priv *priv)
{
    #define HNS3_VECTOR_PF_MAX_NUM 64
    struct hnae3_handle *h = priv->ae_handle;
    struct hns3_enet_tqp_vector *tqp_vector;
    struct hnae3_vector_info *vector;
    struct pci_dev *pdev = h->pdev;
    u16 tqp_num = h->kinfo.num_tqps;
    u16 vector_num;
int ret = 0;

u16 i;

/* RSS size, cpu online and vector_num should be the same */
/* Should consider 2p/4p later */
vector_num = min_t(u16, num_online_cpus(), tqp_num);
vector_num = min_t(u16, vector_num, HNS3_VECTOR_PF_MAX_NUM);
vector = devm_kcalloc(&pdev->dev, vector_num, sizeof(*vector),
                    GFP_KERNEL);
if (!vector)
    return -ENOMEM;

vector_num = h->ae_algo->ops->get_vector(h, vector_num, vector);

priv->vector_num = vector_num;
priv->tqp_vector = (struct hns3_enet_tqp_vector *)
    devm_kcalloc(&pdev->dev, vector_num, sizeof(*priv->tqp_vector),
             GFP_KERNEL);
if (!priv->tqp_vector) {
    ret = -ENOMEM;
    goto out;
}

for (i = 0; i < priv->vector_num; i++) {
    tqp_vector = &priv->tqp_vector[i];
    tqp_vector->idx = i;
    tqp_vector->mask_addr = vector[i].io_addr;
    tqp_vector->vector_irq = vector[i].vector;
    hns3_vector_gl_rl_init(tqp_vector, priv);
}

out:
devm_kfree(&pdev->dev, vector);
return ret;

static void hns3_clear_ring_group(struct hns3_enet_ring_group *group) {
    group->ring = NULL;
    group->count = 0;
}

static int hns3_nic_uninit_vector_data(struct hns3_nic_priv *priv) {
    struct hnae3_ring_chain_node vector_ring_chain;
    struct hnae3_handle *h = priv->ae_handle;
    struct hns3_enet_tqp_vector *tqp_vector;

    ...
int i, ret;
+
for (i = 0; i < priv->vector_num; i++) {
    struct hns3_enet_tqp_vector *tqp_vector = &priv->tqp_vector[i];
    +
ret = hns3_get_vector_ring_chain(tqp_vector, &vector_ring_chain);
    +if (ret)
        +return ret;
    +
ret = hns->ae_algos->ops->unmap_ring_from_vector(h, tqp_vector->vector_irq, &vector_ring_chain);
    +if (ret)
        +return ret;
    +
ret = hns3_free_vector_ring_chain(tqp_vector, &vector_ring_chain);
    +
    +if (tqp_vector->irq_init_flag == HNS3_VECTOR_INITED) {
        irq_set_affinity_notifier(tqp_vector->vector_irq, NULL);
        irq_set_affinity_hint(tqp_vector->vector_irq, NULL);
        free_irq(tqp_vector->vector_irq, tqp_vector);
        tqp_vector->irq_init_flag = HNS3_VECTOR_NOT_INITED;
    +}
    +
    +priv->ring_data[i].ring->irq_init_flag = HNS3_VECTOR_NOT_INITED;
    +hns3_clear_ring_group(&tqp_vector->rx_group);
    +hns3_clear_ring_group(&tqp_vector->tx_group);
    +netif_napi_del(&priv->tqp_vector[i].napi);
    +}
    +
+return 0;
+
+static int hns3_nic_dealloc_vector_data(struct hns3_nic_priv *priv)
+{
+    struct hnae3_handle *h = priv->ae_handle;
+    struct pci_dev *pdev = h->pdev;
+    int i, ret;
+    +for (i = 0; i < priv->vector_num; i++) {
+        struct hns3_enet_tqp_vector *tqp_vector = &priv->tqp_vector[i];
+        +ret = h->ae_algos->ops->unmap_vector(h, tqp_vector->vector_irq);
+        +if (ret)
+            +return ret;
+    +}
+devm_kfree(&pdev->dev, priv->tqp_vector);
+return 0;
+
+static int hns3_ring_get_cfg(struct hnae3_queue *q, struct hns3_nic_priv *priv,
+    int ring_type)
+{
+    struct hns3_nic_ring_data *ring_data = priv->ring_data;
+    int queue_num = priv->ae_handle->kinfo.num_tqps;
+    struct pci_dev *pdev = priv->ae_handle->pdev;
+    struct hns3_enet_ring *ring;
+
+    ring = devm_kzalloc(pdev->dev, sizeof(*ring), GFP_KERNEL);
+    if (!ring)
+        return -ENOMEM;
+
+    if (ring_type == HNAE3_RING_TYPE_TX) {
+        ring_data[q->tqp_index].ring = ring;
+        ring_data[q->tqp_index].queue_index = q->tqp_index;
+        ring->io_base = (u8 __iomem *)q->io_base + HNS3_TX_REG_OFFSET;
+    } else {
+        ring_data[q->tqp_index + queue_num].ring = ring;
+        ring_data[q->tqp_index + queue_num].queue_index = q->tqp_index;
+        ring->io_base = q->io_base;
+    }
+
+    hnae3_set_bit(ring->flag, HNAE3_RING_TYPE_B, ring_type);
+
+    ring->tqp = q;
+    ring->desc = NULL;
+    ring->desc_cb = NULL;
+    ring->dev = priv->dev;
+    ring->desc_dma_addr = 0;
+    ring->buf_size = q->buf_size;
+    ring->desc_num = q->desc_num;
+    ring->next_to_use = 0;
+    ring->next_to_clean = 0;
+
+    return 0;
+}
+
+static int hns3_queue_to_ring(struct hnae3_queue *tqp,
+    struct hns3_nic_priv *priv)
+{
+    struct hns3_nic_ring_data * ring_data = priv->ring_data;
+    int queue_num = priv->ae_handle->kinfo.num_tqps;
+    struct pci_dev *pdev = priv->ae_handle->pdev;
+    struct hns3_enet_ring *ring;
+
+    ring = devm_kzalloc(pdev->dev, sizeof(*ring), GFP_KERNEL);
+    if (!ring)
+        return -ENOMEM;
+
+    if (ring_type == HNAE3_RING_TYPE_TX) {
+        ring_data[q->tqp_index].ring = ring;
+        ring_data[q->tqp_index].queue_index = q->tqp_index;
+        ring->io_base = (u8 __iomem *)q->io_base + HNS3_TX_REG_OFFSET;
+    } else {
+        ring_data[q->tqp_index + queue_num].ring = ring;
+        ring_data[q->tqp_index + queue_num].queue_index = q->tqp_index;
+        ring->io_base = q->io_base;
+    }
+
+    hnae3_set_bit(ring->flag, HNAE3_RING_TYPE_B, ring_type);
+
+    ring->tqp = q;
+    ring->desc = NULL;
+    ring->desc_cb = NULL;
+    ring->dev = priv->dev;
+    ring->desc_dma_addr = 0;
+    ring->buf_size = q->buf_size;
+    ring->desc_num = q->desc_num;
+    ring->next_to_use = 0;
+    ring->next_to_clean = 0;
+
+    return 0;
+}
+if (ret)
+  return ret;
+
+  ret = hns3_ring_get_cfg(tqp, priv, HNAE3_RING_TYPE_RX);
+  if (ret) {
+    devm_kfree(priv->dev, priv->ring_data[tqp->tqp_index].ring);
+    return ret;
+  }
+  return 0;
+}
+
+static int hns3_get_ring_config(struct hns3_nic_priv *priv)
+{
+  struct hnae3_handle *h = priv->ae_handle;
+  struct pci_dev *pdev = h->pdev;
+  int i, ret;
+
+  priv->ring_data = devm_kzalloc(&pdev->dev, h->kinfo.num_tqps *
+                     sizeof(*priv->ring_data) * 2,
+                     GFP_KERNEL);
+  if (!priv->ring_data)
+    return -ENOMEM;
+
+  for (i = 0; i < h->kinfo.num_tqps; i++) {
+    ret = hns3_queue_to_ring(h->kinfo.tqp[i], priv);
+    if (ret)
+      goto err;
+  }
+  return 0;
+err:
+  while (i--)
+    devm_kfree(priv->dev, priv->ring_data[i].ring);
+  devm_kfree(pdev, priv->ring_data[i + h->kinfo.num_tqps].ring);
+  devm_kfree(pdev->dev, priv->ring_data);
+  return ret;
+}
+
+static void hns3_put_ring_config(struct hns3_nic_priv *priv)
+{
+  struct hnae3_handle *h = priv->ae_handle;
+  int i;
+
+  for (i = 0; i < h->kinfo.num_tqps; i++)

static int hns3_alloc_ring_memory(struct hns3_enet_ring *ring)
{
    int ret;

    if (ring->desc_num <= 0 || ring->buf_size <= 0)
        return -EINVAL;

    ring->desc_cb = kcalloc(ring->desc_num, sizeof(ring->desc_cb[0]), GFP_KERNEL);
    if (!ring->desc_cb)
    {
        ret = -ENOMEM;
        goto out;
    }

    ret = hns3_alloc_desc(ring);
    if (ret)
        goto out_with_desc_cb;

    if (!HNAE3_IS_TX_RING(ring))
    {
        ret = hns3_alloc_ring_buffers(ring);
        if (ret)
            goto out_with_desc;
    }

    return 0;

out_with_desc:
    hns3_free_desc(ring);
out_with_desc_cb:
    kfree(ring->desc_cb);
    ring->desc_cb = NULL;
out:
    return ret;
}
+ring->next_to_use = 0;
+
+static int hns3_buf_size2type(u32 buf_size)
+{
+int bd_size_type;
+
+switch (buf_size) {
+case 512:
+bd_size_type = HNS3_BD_SIZE_512_TYPE;
+break;
+case 1024:
+bd_size_type = HNS3_BD_SIZE_1024_TYPE;
+break;
+case 2048:
+bd_size_type = HNS3_BD_SIZE_2048_TYPE;
+break;
+case 4096:
+bd_size_type = HNS3_BD_SIZE_4096_TYPE;
+break;
+default:
+bd_size_type = HNS3_BD_SIZE_2048_TYPE;
+}
+
+return bd_size_type;
+
+static void hns3_init_ring_hw(struct hns3_enet_ring *ring)
+{
+dma_addr_t dma = ring->desc_dma_addr;
+struct hnae3_queue *q = ring->tqp;
+
+if (!HNAE3_IS_TX_RING(ring)) {
+hns3_write_dev(q, HNS3_RING_RX_RING_BASEADDR_L_REG,
+ (u32)dma);
+hns3_write_dev(q, HNS3_RING_RX_RING_BASEADDR_H_REG,
+ (u32)((dma >> 31) >> 1));
+
+hns3_write_dev(q, HNS3_RING_RX_RING_BD_LEN_REG,
+ hns3_buf_size2type(ring->buf_size));
+hns3_write_dev(q, HNS3_RING_RX_RING_BD_NUM_REG,
+ ring->desc_num / 8 - 1);
+
+} else {
+hns3_write_dev(q, HNS3_RING_TX_RING_BASEADDR_L_REG,
+ (u32)dma);
+hns3_write_dev(q, HNS3_RING_TX_RING_BASEADDR_H_REG,
+ (u32)((dma >> 31) >> 1));
+

+hns3_write_dev(q, HNS3_RING_TX_RING_BD_NUM_REG, 
+    ring->desc_num / 8 - 1);
+
+static void hns3_init_tx_ring_tc(struct hns3_nic_priv *priv)
+{
+    struct hnae3_knic_private_info *kinfo = &priv->ae_handle->kinfo;
+    int i;
+    
+    for (i = 0; i < HNAE3_MAX_TC; i++) {
+        struct hnae3_tc_info *tc_info = &kinfo->tc_info[i];
+        int j;
+        
+        if (!tc_info->enable)
+            continue;
+        
+        for (j = 0; j < tc_info->tqp_count; j++) {
+            struct hnae3_queue *q;
+            
+            q = priv->ring_data[tc_info->tqp_offset + j].ring->tqp;
+            hns3_write_dev(q, HNS3_RING_TX_RING_TC_REG, 
+                tc_info->tc);
+        }
+    }
+}
+
+int hns3_init_all_ring(struct hns3_nic_priv *priv)
+{
+    struct hnae3_handle *h = priv->ae_handle;
+    int ring_num = h->kinfo.num_tqps * 2;
+    int i, j;
+    int ret;
+    
+    for (i = 0; i < ring_num; i++) {
+        ret = hns3_alloc_ring_memory(priv->ring_data[i].ring);
+        if (ret) {
+            dev_err(priv->dev, 
+                "%s Alloc ring memory fail! ret=%d\n", ret);
+            goto out_when_alloc_ring_memory;
+        }
+        
+        u64_stats_init(&priv->ring_data[i].ring->syncp);
+    }
+    
+    return 0;
+}
+out_when_alloc_ring_memory:
+for (j = i - 1; j >= 0; j--)
+hns3_fini_ring(priv->ring_data[j].ring);
+
+return -ENOMEM;
+
+int hns3_uninit_all_ring(struct hns3_nic_priv *priv)
+{
+struct hnae3_handle *h = priv->ae_handle;
+int i;
+
+for (i = 0; i < h->kinfo.num_tqps; i++) {
+hns3_fini_ring(priv->ring_data[i].ring);
+hns3_fini_ring(priv->ring_data[i + h->kinfo.num_tqps].ring);
+}
+return 0;
+}
+
+/* Set mac addr if it is configured. or leave it to the AE driver */
+static int hns3_init_mac_addr(struct net_device *netdev, bool init)
+{
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+struct hnae3_handle *h = priv->ae_handle;
+u8 mac_addr_temp[ETH_ALEN];
+int ret = 0;
+
+if (h->ae_algo->ops->get_mac_addr && init) {
+h->ae_algo->ops->get_mac_addr(h, mac_addr_temp);
+ether_addr_copy(netdev->dev_addr, mac_addr_temp);
+}
+
+/* Check if the MAC address is valid, if not get a random one */
+if (!is_valid_ether_addr(netdev->dev_addr)) {
+eth_hw_addr_random(netdev);
+dev_warn(priv->dev, "using random MAC address %pM\n",
+netdev->dev_addr);
+}
+
+if (h->ae_algo->ops->set_mac_addr)
+ret = h->ae_algo->ops->set_mac_addr(h, netdev->dev_addr, true);
+
+return ret;
+}
+
+static int hns3_restore_fd_rules(struct net_device *netdev)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
int ret = 0;
+
if (h->ae_algo->ops->restore_fd_rules)
ret = h->ae_algo->ops->restore_fd_rules(h);
+
return ret;
+
static void hns3_del_all_fd_rules(struct net_device *netdev, bool clear_list)
+
{
    struct hnae3_handle *h = hns3_get_handle(netdev);
+
    if (h->ae_algo->ops->del_all_fd_entries)
        h->ae_algo->ops->del_all_fd_entries(h, clear_list);
    
+
static int hns3_client_start(struct hnae3_handle *handle)
+
{
    if (!handle->ae_algo->ops->client_start)
        return 0;
+
    return handle->ae_algo->ops->client_start(handle);
    
+
static void hns3_client_stop(struct hnae3_handle *handle)
+
{
    if (!handle->ae_algo->ops->client_stop)
        return;
+
    handle->ae_algo->ops->client_stop(handle);
    
+
static int hns3_client_init(struct hnae3_handle *handle)
+
{
    struct pci_dev *pdev = handle->pdev;
    +u16 alloc_tqps, max_rss_size;
    +struct hns3_nic_priv *priv;
    +struct net_device *netdev;
    +int ret;
+
    handle->ae_algo->ops->get_tqps_and_rss_info(handle, &alloc_tqps,
        +&max_rss_size);
    +netdev = alloc_etherdev_mq(sizeof(struct hns3_nic_priv), alloc_tqps);
        +if (!netdev)
        +return -ENOMEM;
+
    priv = netdev_priv(netdev);
    +priv->dev = &pdev->dev;
+priv->netdev = netdev;
+priv->ae_handle = handle;
+priv->tx_timeout_count = 0;
+
+handle->kinfo.netdev = netdev;
+handle->priv = (void *)priv;
+
+hns3_init_mac_addr(netdev, true);
+
+hns3_set_default_feature(netdev);
+
+netdev->watchdog_timeo = HNS3_TX_TIMEOUT;
+netdev->priv_flags |= IFF_UNICAST_FLT;
+netdev->netdev_ops = &hns3_nic_netdev_ops;
+SET_NETDEV_DEV(netdev, &pdev->dev);
+hns3_ethtool_set_ops(netdev);
+
+%/* Carrier off reporting is important to ethtool even BEFORE open */
+netif_carrier_off(netdev);
+
+ret = hns3_get_ring_config(priv);
+if (ret) {
+ret = -ENOMEM;
+goto out_get_ring_cfg;
+}
+
+ret = hns3_nic_alloc_vector_data(priv);
+if (ret) {
+ret = -ENOMEM;
+goto out_alloc_vector_data;
+}
+
+ret = hns3_nic_init_vector_data(priv);
+if (ret) {
+ret = -ENOMEM;
+goto out_init_vector_data;
+}
+
+ret = hns3_init_all_ring(priv);
+if (ret) {
+ret = -ENOMEM;
+goto out_init_ring_data;
+}
+
+ret = register_netdev(netdev);
+if (ret) {
+dev_err(priv->dev, "probe register netdev fail!\n");
+goto out_reg_netdev_fail;
ret = hns3_client_start(handle);
if (ret) {
    dev_err(priv->dev, "hns3_client_start fail! ret=%d\n", ret);
go_to out_reg_netdev_fail;
}

hns3_dcbnl_setup(handle);

hns3_dbg_init(handle);

/* MTU range: (ETH_MIN_MTU(kernel default) - 9702) */
netdev->max_mtu = HNS3_MAX_MTU;

set_bit(HNS3_NIC_STATE_INITED, &priv->state);

return ret;

out_reg_netdev_fail:
out_init_ring_data:
(void)hns3_nic_uninit_vector_data(priv);
out_init_vector_data:

hns3_nic_dealloc_vector_data(priv);
out_alloc_vector_data:

priv->ring_data = NULL;
out_get_ring_cfg:

free_netdev(netdev);

return ret;

static void hns3_client_uninit(struct hnae3_handle *handle, bool reset)
{
    struct net_device *netdev = handle->kinfo.netdev;
    struct hns3_nic_priv *priv = netdev_priv(netdev);
    int ret;

    hns3_client_stop(handle);

    hns3_remove_hw_addr(netdev);

    if (netdev->reg_state != NETREG_UNINITIALIZED)
        unregister_netdev(netdev);
    
    if (!test_and_clear_bit(HNS3_NIC_STATE_INITED, &priv->state)) {
        netdev_warn(netdev, "already uninitialized\n");
go_to out_netdev_free;
    }
}
static void hns3_link_status_change(struct hnae3_handle *handle, bool linkup)
{
    struct net_device *netdev = handle->kinfo.netdev;

    if (!netdev)
        return;

    if (linkup) {
        netif_carrier_on(netdev);
        netif_tx_wake_all_queues(netdev);
        netdev_info(netdev, "link up\n");
    } else {
        netif_carrier_off(netdev);
        netif_tx_stop_all_queues(netdev);
        netdev_info(netdev, "link down\n");
    }
}

+static void hns3_link_status_change(struct hnae3_handle *handle, bool linkup)
+
+static int hns3_client_setup_tc(struct hnae3_handle *handle, u8 tc)
+struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+struct net_device *ndev = kinfo->netdev;
+bool if_running;
+int ret;
+
+if (tc > HNAE3_MAX_TC)
+return -EINVAL;
+
+if (!ndev)
+return -ENODEV;
+
+if_running = netif_running(ndev);
+
+if (if_running) {
+(void)hns3_nic_net_stop(ndev);
+msleep(100);
+}
+
+ret = (kinfo->dcb_ops && kinfo->dcb_ops->map_update) ?
+kinfo->dcb_ops->map_update(handle) : -EOPNOTSUPP;
+if (ret)
+goto err_out;
+
+ret = hns3_nic_set_real_num_queue(ndev);
+
+err_out:
+if (if_running)
+(void)hns3_nic_net_open(ndev);
+
+return ret;
+
+static int hns3_recover_hw_addr(struct net_device *ndev)
+{
+struct netdev_hw_addr_list *list;
+struct netdev_hw_addr *ha, *tmp;
+int ret = 0;
+
+/* go through and sync uc_addr entries to the device */
+list = &ndev->uc;
+list_for_each_entry_safe(ha, tmp, &list->list, list) {
+ret = hns3_nic_uc_sync(ndev, ha->addr);
+if (ret)
+return ret;
+}
+
+/* go through and sync mc_addr entries to the device */
+list = &ndev->mc;
+list_for_each_entry_safe(ha, tmp, &list->list, list) {
+ret = hns3_nic_mc_sync(ndev, ha->addr);
+if (ret)
+return ret;
+}
+
+return ret;
+
+static void hns3_remove_hw_addr(struct net_device *netdev)
+{
+struct netdev_hw_addr_list *list;
+struct netdev_hw_addr *ha, *tmp;
+
+hns3_nic_uc_unsync(netdev, netdev->dev_addr);
+
+/* go through and unsync uc_addr entries to the device */
+list = &netdev->uc;
+list_for_each_entry_safe(ha, tmp, &list->list, list)
+hns3_nic_uc_unsync(netdev, ha->addr);
+
+/* go through and unsync mc_addr entries to the device */
+list = &netdev->mc;
+list_for_each_entry_safe(ha, tmp, &list->list, list)
+if (ha->refcount > 1)
+hns3_nic_mc_unsync(netdev, ha->addr);
+}
+
+static void hns3_clear_tx_ring(struct hns3_enet_ring *ring)
+{
+while (ring->next_to_clean != ring->next_to_use) {
+ring->desc[ring->next_to_clean].tx.bdtp_fe_sc_vld_ra_ri = 0;
+hns3_free_buffer_detach(ring, ring->next_to_clean);
+ring_ptr_move_fw(ring, next_to_clean);
+}
+}
+
+static int hns3_clear_rx_ring(struct hns3_enet_ring *ring)
+{
+struct hns3_desc_cb res_cbs;
+int ret;
+
+while (ring->next_to_use != ring->next_to_clean) {
+/* When a buffer is not reused, it's memory has been
+ * freed in hns3_handle_rx_bd or will be freed by
+ * stack, so we need to replace the buffer here.
+ */
+if (!ring->desc[ring->next_to_use].reuse_flag) {
+}
ret = hns3_reserve_buffer_map(ring, &res_cbs);
+ if (ret) {
+ u64_stats_update_begin(&ring->syncp);
+ ring->stats.sw_err_cnt++;
+ u64_stats_update_end(&ring->syncp);
+ /* if alloc new buffer fail, exit directly
+ * and reclear in up flow.
+ */
+ netdev_warn(ring->tqp->handle->kinfo.netdev,
+ "reserve buffer map failed, ret = %d\n",
+ ret);
+ return ret;
+ }
+ hns3_replace_buffer(ring, ring->next_to_use,
+ &res_cbs);
+ }
+ ring_ptr_move_fw(ring, next_to_use);
+ }
+ return 0;
+ }
+
+static void hns3_force_clear_rx_ring(struct hns3_enet_ring *ring)
+{
+ while (ring->next_to_use != ring->next_to_clean) {
+ /* When a buffer is not reused, it's memory has been
+ * freed in hns3_handle_rx_bd or will be freed by
+ * stack, so only need to unmap the buffer here.
+ */
+ if (!ring->desc_cb[ring->next_to_use].reuse_flag) {
+ hns3_unmap_buffer(ring,
+ &ring->desc_cb[ring->next_to_use]);
+ ring->desc_cb[ring->next_to_use].dma = 0;
+ }
+ }
+ ring_ptr_move_fw(ring, next_to_use);
+ }
+
+static void hns3_force_clear_all_rx_ring(struct hnae3_handle *h)
+{
+ struct net_device *ndev = h->kinfo.netdev;
+ struct hns3_nic_priv *priv = netdev_priv(ndev);
+ struct hns3_enet_ring *ring;
+ u32 i;
+ for (i = 0; i < h->kinfo.num_tqps; i++) {
+ ring = priv->ring_data[i + h->kinfo.num_tqps].ring;
static void hns3_clear_all_ring(struct hnae3_handle *h) {
    struct net_device *ndev = h->kinfo.netdev;
    struct hns3_nic_priv *priv = netdev_priv(ndev);
    u32 i;

    for (i = 0; i < h->kinfo.num_tqps; i++) {
        struct netdev_queue *dev_queue;
        struct hns3_enet_ring *ring;

        ring = priv->ring_data[i].ring;
        hns3_clear_tx_ring(ring);
        dev_queue = netdev_get_tx_queue(ndev, priv->ring_data[i].queue_index);
        netdev_tx_reset_queue(dev_queue);

        ring = priv->ring_data[i + h->kinfo.num_tqps].ring;
        /* Continue to clear other rings even if clearing some
         * rings failed.
         */
        hns3_clear_rx_ring(ring);
    }
}

int hns3_nic_reset_all_ring(struct hnae3_handle *h) {
    struct net_device *ndev = h->kinfo.netdev;
    struct hns3_nic_priv *priv = netdev_priv(ndev);
    struct hns3_enet_ring *rx_ring;

    int i, j;
    int ret;

    for (i = 0; i < h->kinfo.num_tqps; i++) {
        ret = h->ae_algo->ops->reset_queue(h, i);
        if (ret)
            return ret;

        hns3_init_ring_hw(priv->ring_data[i].ring);
        /* We need to clear tx ring here because self test will
         * use the ring and will not run down before up
         */
        hns3_clear_tx_ring(priv->ring_data[i].ring);
        priv->ring_data[i].ring->next_to_clean = 0;
    }
}

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+priv->ring_data[i].ring->next_to_use = 0;
+
+rx_ring = priv->ring_data[i + h->kinfo.num_tqps].ring;
+hns3_init_ring_hw(rx_ring);
+ret = hns3_clear_rx_ring(rx_ring);
+if (ret)
+return ret;
+
+/* We can not know the hardware head and tail when this
+ * function is called in reset flow, so we reuse all desc.
+ */
+for (j = 0; j < rx_ring->desc_num; j++)
+hns3_reuse_buffer(rx_ring, j);
+
+rx_ring->next_to_clean = 0;
+rx_ring->next_to_use = 0;
+}
+
+hns3_init_tx_ring_tc(priv);
+
+return 0;
+
+static void hns3_store_coal(struct hns3_nic_priv *priv)
+{
+    /* ethtool only support setting and querying one coal
+     * configuration for now, so save the vector 0' coal
+     * configuration here in order to restore it.
+     */
+    memcpy(&priv->tx_coal, &priv->tqp_vector[0].tx_group.coal,
+            sizeof(struct hns3_enet_coalesce));
+    memcpy(&priv->rx_coal, &priv->tqp_vector[0].rx_group.coal,
+            sizeof(struct hns3_enet_coalesce));
+}
+
+static void hns3_restore_coal(struct hns3_nic_priv *priv)
+{
+    u16 vector_num = priv->vector_num;
+    int i;
+    
+    for (i = 0; i < vector_num; i++) {
+        memcpy(&priv->tqp_vector[i].tx_group.coal, &priv->tx_coal,
+               sizeof(struct hns3_enet_coalesce));
+        memcpy(&priv->tqp_vector[i].rx_group.coal, &priv->rx_coal,
+               sizeof(struct hns3_enet_coalesce));
+    }
+}
+static int hns3_reset_notify_down_enet(struct hnae3_handle *handle)
+{
+    struct hnae3_ae_dev *ae_dev = pci_get_drvdata(handle->pdev);
+    struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+    struct net_device *ndev = kinfo->netdev;
+    struct hns3_nic_priv *priv = netdev_priv(ndev);
+    +
+    +if (test_and_set_bit(HNS3_NIC_STATE_RESETTING, &priv->state))
+        return 0;
+    +
+    +/* it is cumbersome for hardware to pick-and-choose entries for deletion
+    + * from table space. Hence, for function reset software intervention is
+    + * required to delete the entries
+    + */
+    +if (hns3_dev_ongoing_func_reset(ae_dev)) {
+        hns3_remove_hw_addr(ndev);
+        hns3_del_all_fd_rules(ndev, false);
+    +}
+    +
+    +if (!netif_running(ndev))
+        return 0;
+    +
+    +return hns3_nic_net_stop(ndev);
+    +}
+
+static int hns3_reset_notify_up_enet(struct hnae3_handle *handle)
+{
+    struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+    struct hns3_nic_priv *priv = netdev_priv(kinfo->netdev);
+    int ret = 0;
+    +
+    +clear_bit(HNS3_NIC_STATE_RESETTING, &priv->state);
+    +
+    +if (netif_running(kinfo->netdev)) {
+        ret = hns3_nic_net_open(kinfo->netdev);
+        if (ret) {
+            set_bit(HNS3_NIC_STATE_RESETTING, &priv->state);
+            netdev_err(kinfo->netdev,
+                "hns net up fail, ret=%d!\n", ret);
+            return ret;
+        +}
+        +}
+    +
+    +return ret;
+    +}
+
+static int hns3_reset_notify_init_enet(struct hnae3_handle *handle)
+{

struct net_device *netdev = handle->kinfo.netdev;
struct hns3_nic_priv *priv = netdev_priv(netdev);
bool vlan_filter_enable;
int ret;

ret = hns3_init_mac_addr(netdev, false);
if (ret)
    return ret;

ret = hns3_recover_hw_addr(netdev);
if (ret)
    return ret;

ret = hns3_update_promisc_mode(netdev, handle->netdev_flags);
if (ret)
    return ret;

vlan_filter_enable = netdev->flags & IFF_PROMISC ? false : true;
hns3_enable_vlan_filter(netdev, vlan_filter_enable);

/* Hardware table is only clear when pf resets */
if (!(handle->flags & HNAE3_SUPPORT_VF)) {
    ret = hns3_restore_vlan(netdev);
    if (ret)
        return ret;
}

ret = hns3_restore_fd_rules(netdev);
if (ret)
    return ret;

/* Carrier off reporting is important to ethtool even BEFORE open */
netif_carrier_off(netdev);

ret = hns3_nic_alloc_vector_data(priv);
if (ret)
    return ret;

hns3_restore_coal(priv);

ret = hns3_nic_init_vector_data(priv);
if (ret)
    goto err_dealloc_vector;

ret = hns3_init_all_ring(priv);
if (ret)
    goto err_uninit_vector;


```c
+set_bit(HNS3_NIC_STATE_INITED, &priv->state);
+
+return ret;
+
+err_uninit_vector:
+hns3_nic_uninit_vector_data(priv);
+priv->ring_data = NULL;
+err_dealloc_vector:
+hns3_nic_dealloc_vector_data(priv);
+
+return ret;
+
+static int hns3_reset_notify_uninit_enet(struct hnae3_handle *handle)
+{
+struct net_device *netdev = handle->kinfo.netdev;
+struct hns3_nic_priv *priv = netdev_priv(netdev);
+int ret;
+
+if (!test_bit(HNS3_NIC_STATE_INITED, &priv->state)) {
+netdev_warn(netdev, "already uninitialized\n");
+return 0;
+} 
+
+hns3_force_clear_all_rx_ring(handle);
+
+ret = hns3_nic_uninit_vector_data(priv);
+if (ret) {
+netdev_err(netdev, "uninit vector error\n");
+ret = hns3_nic_dealloc_vector_data(priv);
+if (ret)
+netdev_err(netdev, "dealloc vector error\n");
+
+clear_bit(HNS3_NIC_STATE_INITED, &priv->state);
+
+return ret;
+
+static int hns3_reset_notify(struct hnae3_handle *handle,
```

---

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enum hnae3_reset_notify_type type) {
    int ret = 0;
    +
    +switch (type) {
    +case HNAE3_UP_CLIENT:
    +    ret = hns3_reset_notify_up_enet(handle);
    +    break;
    +case HNAE3_DOWN_CLIENT:
    +    ret = hns3_reset_notify_down_enet(handle);
    +    break;
    +case HNAE3_INIT_CLIENT:
    +    ret = hns3_reset_notify_init_enet(handle);
    +    break;
    +case HNAE3_UNINIT_CLIENT:
    +    ret = hns3_reset_notify_uninit_enet(handle);
    +    break;
    +default:
    +    break;
    +} +
    +return ret;
    +}
    +
    +static int hns3_modify_tqp_num(struct net_device *netdev, u16 new_tqp_num) {
    +struct hns3_nic_priv *priv = netdev_priv(netdev);
    +struct hnae3_handle *h = hns3_get_handle(netdev);
    +int ret;
    +
    +    ret = h->ae_algo->ops->set_channels(h, new_tqp_num);
    +if (ret)
    +    return ret;
    +
    +    ret = hns3_get_ring_config(priv);
    +if (ret)
    +    return ret;
    +
    +    ret = hns3_nic_alloc_vector_data(priv);
    +if (ret)
    +    goto err_alloc_vector;
    +
    +    hns3_restore_coal(priv);
    +
    +    ret = hns3_nic_init_vector_data(priv);
    +if (ret)
    +    goto err_uninit_vector;
    +
static int hns3_adjust_tqps_num(u8 num_tc, u32 new_tqp_num) {
    return (new_tqp_num / num_tc) * num_tc;
}

int hns3_set_channels(struct net_device *netdev, struct ethtool_channels *ch) {
    struct hns3_nic_priv *priv = netdev_priv(netdev);
    struct hnae3_handle *h = hns3_get_handle(netdev);
    struct hnae3_knic_private_info *kinfo = &h->kinfo;
    bool if_running = netif_running(netdev);
    u32 new_tqp_num = ch->combined_count;
    u16 org_tqp_num;
    int ret;

    if (ch->rx_count || ch->tx_count)
        return -EINVAL;

    if (new_tqp_num > hns3_get_max_available_channels(h) ||
        new_tqp_num < kinfo->num_tc) {
        dev_err(&netdev->dev, "Change tqps fail, the tqp range is from %d to %d",
            kinfo->num_tc, hns3_get_max_available_channels(h));
        return -EINVAL;
    }

    new_tqp_num = hns3_adjust_tqps_num(kinfo->num_tc, new_tqp_num);
    if (kinfo->num_tqps == new_tqp_num)
        return 0;

    if (if_running)
+hns3_nic_net_stop(netdev);
+
+ret = hns3_nic_uninit_vector_data(priv);
+if (ret) {
+  dev_err(&netdev->dev,
+  "Unbind vector with tqp fail, nothing is changed");
+  goto open_netdev;
+}
+
+hns3_store_coal(priv);
+
+hns3_nic_dealloc_vector_data(priv);
+
+hns3_uninit_all_ring(priv);
+hns3_put_ring_config(priv);
+
+org_tqp_num = h->kinfo.num_tqps;
+ret = hns3_modify_tqp_num(netdev, new_tqp_num);
+if (ret) {
+  ret = hns3_modify_tqp_num(netdev, org_tqp_num);
+  if (ret) {
+    /* If revert to old tqp failed, fatal error occurred */
+    dev_err(&netdev->dev,
+    "Revert to old tqp num fail, ret=%d", ret);
+    return ret;
+  }
+  dev_info(&netdev->dev,
+  "Change tqp num fail, Revert to old tqp num");
+  }
+
+open_netdev:
+if (if_running)
+hns3_nic_net_open(netdev);
+
+return ret;
+}
+
+static const struct hnae3_client_ops client_ops = {
+.init_instance = hns3_client_init,
+.uninit_instance = hns3_client_uninit,
+.link_status_change = hns3_link_status_change,
+.setup_tc = hns3_client_setup_tc,
+.reset_notify = hns3_client_reset_notify,
+};
+
+/* hns3_init_module - Driver registration routine
+ * hns3_init_module is the first routine called when the driver is
+ * loaded. All it does is register with the PCI subsystem.
+ */
+static int __init hns3_init_module(void)
+{
+    int ret;
+
+    printk("%s: %s - version\n", hns3_driver_name, hns3_driver_string);
+    printk("%s: %s\n", hns3_driver_name, hns3_copyright);
+
+    client.type = HNAE3_CLIENT_KNIC;
+    snprintf(client.name, HNAE3_CLIENT_NAME_LENGTH - 1, "%s",
+             hns3_driver_name);
+
+    client.ops = &client_ops;
+
+    INIT_LIST_HEAD(&client.node);
+
+    hns3_dbg_register_debugfs(hns3_driver_name);
+
+    ret = hnae3_register_client(&client);
+    if (ret)
+        goto err_reg_client;
+
+    ret = pci_register_driver(&hns3_driver);
+    if (ret)
+        goto err_reg_driver;
+
+    return ret;
+
+err_reg_driver:
+    hnae3_unregister_client(&client);
+    hns3_dbg_unregister_debugfs();
+
+module_init(hns3_init_module);
+
+/* hns3_exit_module - Driver exit cleanup routine
+ * hns3_exit_module is called just before the driver is removed
+ * from memory.
+ */
+static void __exit hns3_exit_module(void)
+{
+    pci_unregister_driver(&hns3_driver);
+    hnae3_unregister_client(&client);
+    hns3_dbg_unregister_debugfs();
+
+} }
+module_exit(hns3_exit_module);
+MODULE_DESCRIPTION("HNS3: Hisilicon Ethernet Driver");
+MODULE_AUTHOR("Huawei Tech. Co., Ltd.");
+MODULE_LICENSE("GPL");
+MODULE_ALIAS("pci:hns-nic");
+MODULE_VERSION(HNS3_MOD_VERSION);
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3_enet.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3_enet.h
@@ -0,0 +1,687 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.
+
+#ifndef __HNS3_ENET_H
+#define __HNS3_ENET_H
+
+#include <linux/if_vlan.h>
+
+#include "hnae3.h"
+
+#define HNS3_MOD_VERSION "1.0"
+
+extern const char hns3_driver_version[];
+
+enum hns3_nic_state {
+HNS3_NIC_STATE_TESTING,
+HNS3_NIC_STATE_RESETTING,
+HNS3_NIC_STATE_INITED,
+HNS3_NIC_STATE_DOWN,
+HNS3_NIC_STATE_DISABLED,
+HNS3_NIC_STATE_REMOVING,
+HNS3_NIC_STATE_SERVICE_INITED,
+HNS3_NIC_STATE_SERVICE_SCHED,
+HNS3_NIC_STATE2_RESET_REQUESTED,
+HNS3_NIC_STATE_MAX
+};
+
+#define HNS3_RING_RX_RING_BASEADDR_L_REG	0x00000
+#define HNS3_RING_RX_RING_BASEADDR_H_REG	0x00004
+#define HNS3_RING_RX_RING_BD_NUM_REG		0x00008
+#define HNS3_RING_RX_RING_BD_LEN_REG		0x0000C
+#define HNS3_RING_RX_RING_TAIL_REG		0x00018
+#define HNS3_RING_RX_RING_HEAD_REG		0x0001C
+#define HNS3_RING_RX_RING_FBDNUM_REG		0x00020
+#define HNS3_RING_RX_RING_PKTNUM_RECORD_REG	0x0002C
+
+#define HNS3_RING_TX_RING_BASEADDR_L_REG	0x00040
+#define HNS3_RING_TX_RING_BASEADDR_H_REG	0x00044
+#define HNS3_RING_TX_RING_BD_NUM_REG		0x00048
+#define HNS3_RING_TX_RING_TC_REG		0x00050
+\#define HNS3_RING_TX_RING_TAIL_REG 0x00058
+\#define HNS3_RING_TX_RING_HEAD_REG 0x0005C
+\#define HNS3_RING_TX_RING_FBDNUM_REG 0x00060
+\#define HNS3_RING_TX_RING_OFFSET_REG 0x00064
+\#define HNS3_RING_TX_RING_PKTNUM_RECORD_REG 0x0006C
+
+\#define HNS3_RING_PREFETCH_EN_REG 0x0007C
+\#define HNS3_RING_CFG_VF_NUM_REG 0x00080
+\#define HNS3_RING_ASID_REG 0x0008C
+\#define HNS3_RING_EN_REG 0x00090
+\#define HNS3_RING_T0_BE_RST 0x00094
+\#define HNS3_RING_COULD_BE_RST 0x00098
+\#define HNS3_RING_WRR_WEIGHT_REG 0x0009C
+
+\#define HNS3_RING_INTMSK_RXWL_REG 0x000A0
+\#define HNS3_RING_INTSTS_RX_RING_REG 0x000A4
+\#define HNS3_RX_RING_INT_STS_REG 0x000A8
+\#define HNS3_RING_INTMSK_TXWL_REG 0x000AC
+\#define HNS3_RING_INTSTS_TX_RING_REG 0x000B0
+\#define HNS3_TX_RING_INT_STS_REG 0x000B4
+\#define HNS3_RING_INTMSK_RX_OVERTIME_REG 0x000B8
+\#define HNS3_RING_INTSTS_RX_OVERTIME_REG 0x000BC
+\#define HNS3_RING_INTMSK_TX_OVERTIME_REG 0x000C4
+\#define HNS3_RING_INTSTS_TX_OVERTIME_REG 0x000C8
+
+\#define HNS3_RING_MB_CTRL_REG 0x00100
+\#define HNS3_RING_MB_DATA_BASE_REG 0x00200
+
+\#define HNS3_RX_HEAD_SIZE 256
+
+\#define HNS3_TX_TIMEOUT (5 * HZ)
+\#define HNS3_RING_NAME_LEN 16
+\#define HNS3_BUFFER_SIZE_2048 2048
+\#define HNS3_RING_MAX_PENDING 32768
+\#define HNS3_RING_MIN_PENDING 8
+\#define HNS3_RING_BD_MULTIPLE 8
+/\* max frame size of mac */
+\#define HNS3_MAC_MAX_FRAME 9728
+\#define HNS3_MAX_MTU
+((HNS3_MAC_MAX_FRAME - (ETH_HLEN + ETH_FCS_LEN + 2 * VLAN_HLEN))
+
+\#define HNS3_BD_SIZE_512_TYPE 0
+\#define HNS3_BD_SIZE_1024_TYPE 1
+\#define HNS3_BD_SIZE_2048_TYPE 2
+\#define HNS3_BD_SIZE_4096_TYPE 3
+
+#define HNS3_RXD_EXTEND_B7
+#define HNS3_RXD_FE_B8
+#define HNS3_RXD_LUM_B9
+#define HNS3_RXD_CRCP_B10
+#define HNS3_RXD_L3L4P_B11
+#define HNS3_RXD_TSIND_S12
+#define HNS3_RXD_TSIND_M(0x7 << HNS3_RXD_TSIND_S)
+#define HNS3_RXD_LKBK_B15
+#define HNS3_RXD_GRO_SIZE_S16
+#define HNS3_RXD_GRO_SIZE_M(0x3ff << HNS3_RXD_GRO_SIZE_S)
+
+#define HNS3_TXD_L3T_S0
+#define HNS3_TXD_L3T_M(0x3 << HNS3_TXD_L3T_S)
+#define HNS3_TXD_L4T_S2
+#define HNS3_TXD_L4T_M(0x3 << HNS3_TXD_L4T_S)
+#define HNS3_TXD_L3CS_B4
+#define HNS3_TXD_L4CS_B5
+#define HNS3_TXD_VLAN_B6
+#define HNS3_TXD_TSO_B7
+
+#define HNS3_TXD_L2LEN_S8
+#define HNS3_TXD_L2LEN_M(0xff << HNS3_TXD_L2LEN_S)
+#define HNS3_TXD_L3LEN_S16
+#define HNS3_TXD_L3LEN_M(0xff << HNS3_TXD_L3LEN_S)
+#define HNS3_TXD_L4LEN_S24
+#define HNS3_TXD_L4LEN_M(0xff << HNS3_TXD_L4LEN_S)
+
+#define HNS3_TXD_OL3T_S0
+#define HNS3_TXD_OL3T_M(0x3 << HNS3_TXD_OL3T_S)
+#define HNS3_TXD_OVLAN_B2
+#define HNS3_TXD_MACSEC_B3
+#define HNS3_TXD_TUNTYPE_S4
+#define HNS3_TXD_TUNTYPE_M(0xf << HNS3_TXD_TUNTYPE_S)
+
+#define HNS3_TXD_BDTYPE_S0
+#define HNS3_TXD_BDTYPE_M(0xf << HNS3_TXD_BDTYPE_S)
+#define HNS3_TXD_FE_B4
+#define HNS3_TXD_SC_S5
+#define HNS3_TXD_SC_M(0x3 << HNS3_TXD_SC_S)
+#define HNS3_TXD_EXTEND_B7
+#define HNS3_TXD_VLD_B8
+#define HNS3_TXD_RI_B9
+#define HNS3_TXD_RA_B10
+#define HNS3_TXD_TSYN_B11
+#define HNS3_TXD_DECTTL_S12
+#define HNS3_TXD_DECTTL_M(0xf << HNS3_TXD_DECTTL_S)
+
+#define HNS3_TXD_MSS_S0
```c
#define HNS3_TXD_MSS_M (0x3fff << HNS3_TXD_MSS_S)
+
#define HNS3_TX_LAST_SIZE_M 0xffff
+
#define HNS3_VECTOR_TX_IRQ BIT_ULL(0)
#define HNS3_VECTOR_RX_IRQ BIT_ULL(1)
+
#define HNS3_VECTOR_NOT_INITED0
#define HNS3_VECTOR_INITED1
+
#define HNS3_MAX_BD_SIZE65535
#define HNS3_MAX_BD_NUM_NORMAL8
#define HNS3_MAX_BD_NUM_TSO63
#define HNS3_MAX_BD_PER_PKTMAX_SKB_FRAGS
+
#define HNS3_VECTOR_GL0_OFFSET0x100
#define HNS3_VECTOR_GL1_OFFSET0x200
#define HNS3_VECTOR_GL2_OFFSET0x300
#define HNS3_VECTOR_RL_OFFSET0x900
#define HNS3_VECTOR_RL_EN_B6
+
#define HNS3_RING_EN_B0
+
enum hns3_pkt_l2t_type {
    HNS3_L2_TYPE_UNICAST,
    HNS3_L2_TYPE_MULTICAST,
    HNS3_L2_TYPE_BROADCAST,
    HNS3_L2_TYPE_INVALID,
};
+
enum hns3_pkt_l3t_type {
    HNS3_L3T_NONE,
    HNS3_L3T_IPV6,
    HNS3_L3T_IPV4,
    HNS3_L3T_RESERVED
};
+
enum hns3_pkt_l4t_type {
    HNS3_L4T_UNKNOWN,
    HNS3_L4T_TCP,
    HNS3_L4T_UDP,
    HNS3_L4T_SCTP
};
+
enum hns3_pkt_ol3t_type {
    HNS3_OL3T_NONE,
    HNS3_OL3T_IPV6,
    HNS3_OL3T_IPV4_NO_CSUM,
};
```
enum hns3_pkt_tun_type {
    HNS3_TUN_NONE,
    HNS3_TUN_MAC_IN_UDP,
    HNS3_TUN_NVGRE,
    HNS3_TUN_OTHER
};

/* hardware spec ring buffer format */
struct __packed hns3_desc {
    __le64 addr;
    union {
        struct {
            __le16 vlan_tag;
            __le16 send_size;
        } tx;
        struct {
            __le32 type_cs_vlan_tso_len;
            __u8 type_cs_vlan_tso;
            __u8 l2_len;
            __u8 l3_len;
            __u8 l4_len;
        };
        __le16 outer_vlan_tag;
        __le16 tv;
        __le32 ol_type_vlan_len_msec;
        __u8 ol_type_vlan_msec;
        __u8 ol2_len;
        __u8 ol3_len;
        __u8 ol4_len;
    };
    __u16 bdtp_fe_sc_vld_ra_ri;
    __le16 mss;
} tx;
    struct {
        __le32 1234_info;
        __le16 pkt_len;
        __le16 size;
+___le32 rss_hash;
+___le16 fd_id;
+___le16 vlan_tag;
+
+union {
+___le32 ol_info;
+struct {
+___le16 o_dm_vlan_id_fb;
+___le16 ot_vlan_tag;
+};
+};
+
+___le32 bd_base_info;
+} rx;
+};
+};
+
+struct hns3_desc_cb {
+dma_addr_t dma; /* dma address of this desc */
+void *buf; /* cpu addr for a desc */
+
+/* priv data for the desc, e.g. skb when use with ip stack */
+void *priv;
+u32 page_offset;
+u32 length; /* length of the buffer */
+
+u16 reuse_flag;
+
+ /* desc type, used by the ring user to mark the type of the priv data */
+u16 type;
+};
+
+enum hns3_pkt_l3type {
+HNS3_L3_TYPE_IPV4,
+HNS3_L3_TYPE_IPV6,
+HNS3_L3_TYPE_ARP,
+HNS3_L3_TYPE_RARP,
+HNS3_L3_TYPE_IPV4_OPT,
+HNS3_L3_TYPE_IPV6_EXT,
+HNS3_L3_TYPE_LLDP,
+HNS3_L3_TYPE_BPDU,
+HNS3_L3_TYPE_MAC_PAUSE,
+HNS3_L3_TYPE_PFC_PAUSE,/* 0x9*/
+
+/* reserved for 0xA~0xB*/
+
+HNS3_L3_TYPE_CNM = 0xc,
+ /* reserved for 0xD~0xE*/
+ +HNS3_L3_TYPE_PARSE_FAIL= 0xf /* must be last */
+rella
+
+enum hns3_pkt_l4type {
+HNS3_L4_TYPE_UDP,
+HNS3_L4_TYPE_TCP,
+HNS3_L4_TYPE_GRE,
+HNS3_L4_TYPE_SCTP,
+HNS3_L4_TYPE_IGMP,
+HNS3_L4_TYPE_ICMP,
+
+/* reserved for 0x6~0xE */
+
+HNS3_L4_TYPE_PARSE_FAIL= 0xf /* must be last */
+rella
+
+enum hns3_pkt_ol3type {
+HNS3_OL3_TYPE_IPV4 = 0,
+HNS3_OL3_TYPE_IPV6,
+/* reserved for 0x2~0x3 */
+HNS3_OL3_TYPE_IPV4_OPT = 4,
+HNS3_OL3_TYPE_IPV6_EXT,
+
+/* reserved for 0x6~0xE*/
+
+HNS3_OL3_TYPE_PARSE_FAIL = 0xf/* must be last */
+rella
+
+enum hns3_pkt_ol4type {
+HNS3_OL4_TYPE_NO_TUN,
+HNS3_OL4_TYPE_MAC_IN_UDP,
+HNS3_OL4_TYPE_NVGRE,
+HNS3_OL4_TYPE_UNKNOWN
+rella
+
+struct ring_stats {
+u64 io_err_cnt;
+u64 sw_err_cnt;
+u64 seg_pkt_cnt;
+union {
+struct {
+u64 tx_pkts;
+u64 tx_bytes;
+u64 tx_err_cnt;
+u64 restart_queue;
+u64 tx_busy;
+u64 tx_copy;
+};
+struct {
+u64 rx_pkts;
+u64 rx_bytes;
+u64 rx_err_cnt;
+u64 reuse_pg_cnt;
+u64 err_pkt_len;
+u64 non_vld_descs;
+u64 err_bd_num;
+u64 l2_err;
+u64 l3l4_csum_err;
+u64 rx_multicast;
+};
+};
+
+struct hns3_enet_ring {
+u8 __iomem *io_base; /* base io address for the ring */
+struct hns3_desc *desc; /* dma map address space */
+struct hns3_desc_cb *desc_cb;
+struct hns3_enet_ring *next;
+struct hns3_enet_tqp_vector *tqp_vector;
+struct hnae3_queue *tqp;
+char ring_name[HNS3_RING_NAME_LEN];
+struct device *dev; /* will be used for DMA mapping of descriptors */
+
+/* statistic */
+struct ring_stats stats;
+struct u64_stats_sync syncp;
+
+dma_addr_t desc_dma_addr;
+u32 buf_size; /* size for hnae_desc->addr, preset by AE */
+u16 desc_num; /* total number of desc */
+u16 max_desc_num_per_pkt;
+u16 max_raw_data_sz_per_desc;
+u16 max_pkt_size;
+int next_to_use; /* idx of next spare desc */
+
+/* idx of lastest sent desc, the ring is empty when equal to
+ * next_to_use
+ */
+int next_to_clean;
+
+int pull_len; /* head length for current packet */
+u32 frag_num;
+unsigned char *va; /* first buffer address for current packet */
+u32 flag;     /* ring attribute */
+int irq_init_flag;
+
+int numa_node;
+cpumask_t affinity_mask;
+
+int pending_buf;
+struct sk_buff *skb;
+struct sk_buff *tail_skb;
+}
+
+struct hns_queue;
+
+struct hns3_nic_ring_data {
+struct hns3_enet_ring *ring;
+struct napi_struct napi;
+int queue_index;
+int (*poll_one)(struct hns3_nic_ring_data *, int, void *);
+void (*ex_process)(struct hns3_nic_ring_data *, struct sk_buff *);
+void (*fini_process)(struct hns3_nic_ring_data *);
+};
+
+enum hns3_flow_level_range {
+HNS3_FLOW_LOW = 0,
+HNS3_FLOW_MID = 1,
+HNS3_FLOW_HIGH = 2,
+HNS3_FLOW_ULTRA = 3,
+};
+
+enum hns3_link_mode_bits {
+HNS3_LM_FIBRE_BIT = BIT(0),
+HNS3_LM_AUTONEG_BIT = BIT(1),
+HNS3_LM_TP_BIT = BIT(2),
+HNS3_LM_PAUSE_BIT = BIT(3),
+HNS3_LM_BACKPLANE_BIT = BIT(4),
+HNS3_LM_10BASET_HALF_BIT = BIT(5),
+HNS3_LM_10BASET_FULL_BIT = BIT(6),
+HNS3_LM_100BASET_HALF_BIT = BIT(7),
+HNS3_LM_100BASET_FULL_BIT = BIT(8),
+HNS3_LM_1000BASET_FULL_BIT = BIT(9),
+HNS3_LM_10000BASEKR_FULL_BIT = BIT(10),
+HNS3_LM_25000BASEKR_FULL_BIT = BIT(11),
+HNS3_LM_40000BASELR4_FULL_BIT = BIT(12),
+HNS3_LM_50000BASEKR2_FULL_BIT = BIT(13),
+HNS3_LM_100000BASEKR4_FULL_BIT = BIT(14),
+HNS3_LM_COUNT = 15
+};
+ #define HNS3_INT_GL_MAX	0x1FE0
+ #define HNS3_INT_GL_50K	0x0014
+ #define HNS3_INT_GL_20K	0x0032
+ #define HNS3_INT_GL_18K	0x0036
+ #define HNS3_INT_GL_8K	0x007C
+
+ #define HNS3_INT_RL_MAX	0x00EC
+ #define HNS3_INT_RL_ENABLE_MASK	0x40
+
+ struct hns3_enet_coalesce {
    u16 int_gl;
    u8 gl_adapt_enable;
    enum hns3_flow_level_range flow_level;
};
+
+ struct hns3_enet_ring_group {
    /* array of pointers to rings */
    struct hns3_enet_ring *ring;
    u64 total_bytes; /* total bytes processed this group */
    u64 total_packets; /* total packets processed this group */
    u16 count;
    struct hns3_enet_coalesce coal;
};
+
+ struct hns3_enet_tqp_vector {
    struct hnae3_handle *handle;
    u8 __iomem *mask_addr;
    int vector_irq;
    int irq_init_flag;

    u16 idx; /* index in the TQP vector array per handle. */

    struct napi_struct napi;

    struct hns3_enet_ring_group rx_group;
    struct hns3_enet_ring_group tx_group;

    cpumask_t affinity_mask;
    u16 num_tqps; /* total number of tqps in TQP vector */
    struct irq_affinity_notify affinity_notify;

    char name[HNAE3_INT_NAME_LEN];

    unsigned long last_jiffies;
};

+HNS3_UDP_TNL_VXLAN,
+HNS3_UDP_TNL_GENEVE,
+HNS3_UDP_TNL_MAX,
+
+struct hns3_udp_tunnel {
+u16 dst_port;
+int used;
+};
+
+struct hns3_udp_tunnel {
+u16 dst_port;
+int used;
+};
+
+struct hns3_udp_tunnel {
+u16 dst_port;
+int used;
+};
+
+struct hns3_nic_priv {
+struct hnae3_handle *ae_handle;
+u32 enet_ver;
+u32 port_id;
+struct net_device *netdev;
+struct device *dev;
+
+/**
+ * the cb for nic to manage the ring buffer, the first half of the
+ * array is for tx_ring and vice versa for the second half
+ */
+struct hns3_nic_ring_data *ring_data;
+struct hns3_enet_tqp_vector *tqp_vector;
+u16 vector_num;
+
+/* The most recently read link state */
+int link;
+u64 tx_timeout_count;
+
+unsigned long state;
+
+struct timer_list service_timer;
+
+struct work_struct service_task;
+
+struct notifier_block notifier_block;
+/** Vxlan/Geneve information */
+struct hns3_udp_tunnel udp_tnl[HNS3_UDP_TNL_MAX];
+unsigned long active_vlans[BITS_TO_LONGS(VLAN_N_VID)];
+struct hns3_enet_coalesce tx_coal;
+struct hns3_enet_coalesce rx_coal;
+};
+
+union l3_hdr_info {
+struct iphdr *v4;
+struct ipv6hdr *v6;
+unsigned char *hdr;
+};
union l4_hdr_info {
    struct tcphdr *tcp;
    struct udphdr *udp;
    unsigned char *hdr;
};

static inline int ring_space(struct hns3_enet_ring *ring)
{
    /* This smp_load_acquire() pairs with smp_store_release() in
     * hns3_nic_reclaim_one_desc called by hns3_clean_tx_ring.
     */
    int begin = smp_load_acquire(&ring->next_to_clean);
    int end = READ_ONCE(ring->next_to_use);
    +
    +return ((end >= begin) ? (ring->desc_num - end + begin) :
    +begin - end)) - 1;
    +}
    +
static inline int is_ring_empty(struct hns3_enet_ring *ring)
{
    +return ring->next_to_use == ring->next_to_clean;
    +}
    +
static inline u32 hns3_read_reg(void __iomem *base, u32 reg)
{
    +return readl(base + reg);
    +}
    +
static inline void hns3_write_reg(void __iomem *base, u32 reg, u32 value)
{
    +u8 __iomem *reg_addr = READ_ONCE(base);
    +
    +writel(value, reg_addr + reg);
    +}
    +
static inline bool hns3_dev_ongoing_func_reset(struct hnae3_ae_dev *ae_dev)
{
    +return (ae_dev && (ae_dev->reset_type == HNAE3_FUNC_RESET ||
    +ae_dev->reset_type == HNAE3_FLR_RESET ||
    +ae_dev->reset_type == HNAE3_VF_FUNC_RESET ||
    +ae_dev->reset_type == HNAE3_VF_FULL_RESET ||
    +ae_dev->reset_type == HNAE3_VF_PF_FUNC_RESET));
    +}
    +
#define hns3_read_dev(a, reg) \ 
    +hns3_read_reg((a)->io_base, (reg))
    +

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+static inline bool hns3_nic_resetting(struct net_device *netdev)
+{
+  struct hns3_nic_priv *priv = netdev_priv(netdev);
+  
+  return test_bit(HNS3_NIC_STATE_RESETTING, &priv->state);
+}
+
+#define hns3_write_dev(a, reg, value) \
+  hns3_write_reg((a)->io_base, (reg), (value))
+
+#define hnae3_queue_xmit(tqp, buf_num) writel_relaxed(buf_num, \ 
+  +(tqp)->io_base + HNS3_RING_TX_RING_TAIL_REG)
+
+#define ring_to_dev(ring) (&(ring)->tqp->handle->pdev->dev)
+
+#define ring_to_dma_dir(ring) (HNAE3_IS_TX_RING(ring) ? \ 
+  DMA_TO_DEVICE : DMA_FROM_DEVICE)
+
+#define tx_ring_data(priv, idx) ((priv)->ring_data[idx])
+
+#define hnae3_buf_size(_ring) ((_ring)->buf_size)
+#define hnae3_page_order(_ring) (get_order(hnae3_buf_size(_ring)))
+#define hnae3_page_size(_ring) (PAGE_SIZE << hnae3_page_order(_ring))
+
/* iterator for handling rings in ring group */
+#define hns3_for_each_ring(pos, head) \
+  for (pos = (head).ring; pos; pos = pos->next)
+
+#define hns3_get_handle(ndev) \
+  (((struct hns3_nic_priv *)netdev_priv(ndev))->ae_handle)
+
+#define hns3_gl_usec_to_reg(int_gl) (int_gl >> 1)
+#define hns3_gl_round_down(int_gl) round_down(int_gl, 2)
+
+#define hns3_rl_usec_to_reg(int_rl) (int_rl >> 2)
+#define hns3_rl_round_down(int_rl) round_down(int_rl, 4)
+
void hns3_ethtool_set_ops(struct net_device *netdev);
int hns3_set_channels(struct net_device *netdev, 
  struct ethtool_channels *ch);

+void hns3_clean_tx_ring(struct hns3_enet_ring *ring);
+int hns3_init_all_ring(struct hns3_nic_priv *priv);
+int hns3_uninit_all_ring(struct hns3_nic_priv *priv);
+int hns3_nic_reset_all_ring(struct hnae3_handle *h);
+netdev_tx_t hns3_nic_net_xmit(struct sk_buff *skb, struct net_device *netdev);
+int hns3_clean_rx_ring(
+  struct hns3_enet_ring *ring, int budget,
+void (*rx_fn)(struct hns3_enet_ring *, struct sk_buff *));
+
+void hns3_set_vector_coalesce_rx_gl(struct hns3_enet_tqp_vector *tqp_vector,
+ u32 gl_value);
+void hns3_set_vector_coalesce_tx_gl(struct hns3_enet_tqp_vector *tqp_vector,
+ u32 gl_value);
+void hns3_set_vector_coalesce_rl(struct hns3_enet_tqp_vector *tqp_vector,
+ u32 rl_value);
+
+void hns3_enable_vlan_filter(struct net_device *netdev, bool enable);
+int hns3_update_promisc_mode(struct net_device *netdev, u8 promisc_flags);
+
+若有CONFIG_HNS3_DCB
+void hns3_dcbnl_setup(struct hnae3_handle *handle);
+#else
+static inline void hns3_dcbnl_setup(struct hnae3_handle *handle) {}  
+#endif
+
+若有 hns3_dbg_init(struct hnae3_handle *handle);
+void hns3_dbg_uninit(struct hnae3_handle *handle);  
+void hns3_dbg_register_debugfs(const char *debugfs_dir_name);
+void hns3_dbg_unregister_debugfs(void);
+#endif
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3_ethtool.c
@@ -0,0 +1,1164 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.
+
+#include <linux/etherdevice.h>
+#include <linux/string.h>
+#include <linux/phy.h>
+
+#include "hns3_enet.h"
+
+struct hns3_stats {
+ char stats_string[ETH_GSTRING_LEN];
+ int stats_offset;
+ }
;
+
+/* tqp related stats */
+#define HNS3_TQP_STAT(_string, _member)\  
+ .stats_string = _string,\  
+ .stats_offset = offsetof(struct hns3_enet_ring, stats) +\  
+ offsetof(struct ring_stats, _member),\  
+ *1
+
+static const struct hns3_stats hns3_stats hns3_txq_stats[] = {  

+/* Tx per-queue statistics */
+HNS3_TQP_STAT("io_err_cnt", io_err_cnt),
+HNS3_TQP_STAT("dropped", sw_err_cnt),
+HNS3_TQP_STAT("seg_pkt_cnt", seg_pkt_cnt),
+HNS3_TQP_STAT("packets", tx_pkts),
+HNS3_TQP_STAT("bytes", tx_bytes),
+HNS3_TQP_STAT("errors", tx_err_cnt),
+HNS3_TQP_STAT("wake", restart_queue),
+HNS3_TQP_STAT("busy", tx_busy),
+HNS3_TQP_STAT("copy", tx_copy),
+};
+
+#define HNS3_TXQ_STATS_COUNT ARRAY_SIZE(hns3_txq_stats)
+
+static const struct hns3_stats hns3_rxq_stats[] = {
+/* Rx per-queue statistics */
+HNS3_TQP_STAT("io_err_cnt", io_err_cnt),
+HNS3_TQP_STAT("dropped", sw_err_cnt),
+HNS3_TQP_STAT("seg_pkt_cnt", seg_pkt_cnt),
+HNS3_TQP_STAT("packets", rx_pkts),
+HNS3_TQP_STAT("bytes", rx_bytes),
+HNS3_TQP_STAT("errors", rx_err_cnt),
+HNS3_TQP_STAT("reuse_pg_cnt", reuse_pg_cnt),
+HNS3_TQP_STAT("err_pkt_len", err_pkt_len),
+HNS3_TQP_STAT("non_vld_descs", non_vld_descs),
+HNS3_TQP_STAT("err_bd_num", err_bd_num),
+HNS3_TQP_STAT("l2_err", l2_err),
+HNS3_TQP_STAT("l3l4_csum_err", l3l4_csum_err),
+HNS3_TQP_STAT("multicast", rx_multicast),
+};
+
+#define HNS3_RXQ_STATS_COUNT ARRAY_SIZE(hns3_rxq_stats)
+
+#define HNS3_TQP_STATS_COUNT (HNS3_TXQ_STATS_COUNT + HNS3_RXQ_STATS_COUNT)
+
+#define HNS3_SELF_TEST_TYPE_NUM         3
+#define HNS3_NIC_LB_TEST_PKT_NUM	1
+#define HNS3_NIC_LB_TEST_RING_ID	0
+#define HNS3_NIC_LB_TEST_PACKET_SIZE	128
+
+/* Nic loopback test err */
+#define HNS3_NIC_LB_TEST_NO_MEM_ERR	1
+#define HNS3_NIC_LB_TEST_TX_CNT_ERR	2
+#define HNS3_NIC_LB_TEST_RX_CNT_ERR3
+
+struct hns3_link_mode_mapping {
+u32 hns3_link_mode;
+u32 ethtool_link_mode;
+static int hns3_lp_setup(struct net_device *ndev, enum hnae3_loop loop, bool en)
{
    struct hnae3_handle *h = hns3_get_handle(ndev);
    bool vlan_filter_enable;
    int ret;
    
    if (!h->ae_algo->ops->set_loopback ||
        !h->ae_algo->ops->set_promisc_mode)
        return -EOPNOTSUPP;
    
    switch (loop) {
        case HNAE3_LOOP_SERIAL_SERDES:
        case HNAE3_LOOP_PARALLEL_SERDES:
        case HNAE3_LOOP_APP:
            ret = h->ae_algo->ops->set_loopback(h, loop, en);
            break;
        default:
            ret = -ENOTSUPP;
            break;
    }
    
    if (ret)
        return ret;
    
    if (en) {
        h->ae_algo->ops->set_promisc_mode(h, true, true);
    } else {
        /* recover promisc mode before loopback test */
        hns3_update_promisc_mode(ndev, h->netdev_flags);
        vlan_filter_enable = ndev->flags & IFF_PROMISC ? false : true;
        hns3_enable_vlan_filter(ndev, vlan_filter_enable);
    }
    
    return ret;
}

+static int hns3_lp_up(struct net_device *ndev, enum hnae3_loop loop_mode)
{
    struct hnae3_handle *h = hns3_get_handle(ndev);
    int ret;
    
    ret = hns3_nic_reset_all_ring(h);
    if (ret)
        return ret;
    
    ret = hns3_lp_setup(ndev, loop_mode, true);
    return ret;
}
+usleep_range(10000, 20000);
+
+return 0;
+
+static int hns3_lp_down(struct net_device *ndev, enum hnae3_loop loop_mode)
+{
+    int ret;
+
+    ret = hns3 lp_setup(ndev, loop_mode, false);
+    if (ret) {
+        netdev_err(ndev, "lb_setup return error: %d\n", ret);
+        return ret;
+    }
+
+    usleep_range(10000, 20000);
+
+    return 0;
+}
+
+static void hns3 lp_setup_skb(struct sk_buff *skb)
+{
+    struct net_device *ndev = skb->dev;
+    unsigned char *packet;
+    struct ethhdr *ethh;
+    unsigned int i;
+
+    skb_reserve(skb, NET_IP_ALIGN);
+    ethh = skb_put(skb, sizeof(struct ethhdr));
+    packet = skb_put(skb, HNS3_NIC_LB_TEST_PACKET_SIZE);
+    +memcpy(ethh->h_dest, ndev->dev_addr, ETH_ALEN);
+    +ethh->h_dest[5] += 0x1f;
+    +eth_zero_addr(ethh->h_source);
+    +ethh->h_proto = htons(ETH_P_ARP);
+    +skb_reset_mac_header(skb);
+    +
+    +for (i = 0; i < HNS3_NIC_LB_TEST_PACKET_SIZE; i++)
+        +packet[i] = (unsigned char)(i & 0xff);
+    +}
+
+static void hns3_lb_check_skb_data(struct hns3_enet_ring *ring,
+        struct sk_buff *skb)
+{
+    struct hns3_tqp_vector *tqp_vector = ring->tqp_vector;
+    unsigned char *packet = skb->tqp_vector = skb->data;
+    +u32 len = skb_headlen(skb);
+    +u32 i;
+len = min_t(u32, len, HNS3NIC_LB_TEST_PACKET_SIZE);
+
+for (i = 0; i < len; i++)
+if (packet[i] != (unsigned char)(i & 0xff))
+break;
+
+/* The packet is correctly received */
+if (i == HNS3NIC_LB_TEST_PACKET_SIZE)
+tqp_vector->rx_group.total_packets++;
+else
+print_hex_dump(KERN_ERR, "selftest:", DUMP_PREFIX_OFFSET, 16, 1,
+ skb->data, len, true);
+
+dev_kfree_skb_any(skb);
+
+
+static u32 hns3_lb_check_rx_ring(struct hns3_nic_priv *priv, u32 budget)
+{
+struct hnae3_handle *h = priv->ae_handle;
+struct hnae3_knic_private_info *kinfo;
+u32 i, rcv_good_pkt_total = 0;
+
+kinfo = &h->kinfo;
+for (i = kinfo->num_tqps; i < kinfo->num_tqps * 2; i++) {
+struct hns3_enet_ring *ring = priv->ring_data[i].ring;
+struct hns3_enet_ring_group *rx_group;
+u64 pre_rx_pkt;
+
+rx_group = &ring->tqp_vector->rx_group;
+pre_rx_pkt = rx_group->total_packets;
+
+preempt_disable();
+hns3_clean_rx_ring(ring, budget, hns3_lb_check_skb_data);
+preempt_enable();
+
+rcv_good_pkt_total += (rx_group->total_packets - pre_rx_pkt);
+rx_group->total_packets = pre_rx_pkt;
+
+}
+return rcv_good_pkt_total;
+
+
+static void hns3_lb_clear_tx_ring(struct hns3_nic_priv *priv, u32 start_ringid,
+ u32 end_ringid, u32 budget)
+{
+u32 i;
+
+for (i = start_ringid; i <= end_ringid; i++) {
struct hns3_enet_ring *ring = priv->ring_data[i].ring;
+
+hns3_clean_tx_ring(ring);
+}
+}
+
+/**
+ * hns3_lp_run_test - run loopback test
+ * @ndev: net device
+ * @mode: loopback type
+ */
+static int hns3_lp_run_test(struct net_device *ndev, enum hnae3_loop mode)
+
+{
+    struct hns3_nic_priv *priv = netdev_priv(ndev);
+    struct sk_buff *skb;
+    u32 i, good_cnt;
+    int ret_val = 0;
+    skb = alloc_skb(HNS3_NIC_LB_TEST_PACKET_SIZE + ETH_HLEN + NET_IP_ALIGN,
+                    GFP_KERNEL);
+    if (!skb)
+        return HNS3_NIC_LB_TEST_NO_MEM_ERR;
+    skb->dev = ndev;
+    hns3_lp_setup_skb(skb);
+    skb->queue_mapping = HNS3_NIC_LB_TEST_RING_ID;
+    good_cnt = 0;
+    for (i = 0; i < HNS3_NIC_LB_TEST_PKT_NUM; i++) {
+        netdev_net_xmit(skb, ndev);
+        skb_get(skb);
+        tx_ret = hns3_nic_net_xmit(skb, ndev);
+        if (tx_ret == NETDEV_TX_OK) {
+            good_cnt++;
+        } else {
+            kfree_skb(skb);
+            netdev_err(ndev, "hns3_lb_run_test xmit failed: %d\n",
+                       tx_ret);
+        }
+    }
+    if (good_cnt != HNS3_NIC_LB_TEST_PKT_NUM) {
+        ret_val = HNS3_NIC_LB_TEST_TX_CNT_ERR;
+        netdev_err(ndev, "mode %d sent fail, cnt=0x%x, budget=0x%x\n",
+                   mode, good_cnt, HNS3_NIC_LB_TEST_PKT_NUM);
+        goto out;
+    }
+    +}
/* Allow 200 milliseconds for packets to go from Tx to Rx */
+msleep(200);
+
good_cnt = hns3_lb_check_rx_ring(priv, HNS3_NIC_LB_TEST_PKT_NUM);
+if (good_cnt != HNS3_NIC_LB_TEST_PKT_NUM) {
    ret_val = HNS3_NIC_LB_TEST_RX_CNT_ERR;
    netdev_err(ndev, "mode %d recv fail, cnt=0x%x, budget=0x%x\n",
        mode, good_cnt, HNS3_NIC_LB_TEST_PKT_NUM);
    +
+out:
    hns3_lb_clear_tx_ring(priv, HNS3_NIC_LB_TEST_RING_ID,
        HNS3_NIC_LB_TEST_RING_ID,
        HNS3_NIC_LB_TEST_PKT_NUM);
    kfree_skb(skb);
    +return ret_val;
    +}
+
+/**
 * hns3_nic_self_test - self test
 * @ndev: net device
 * @eth_test: test cmd
 * @data: test result
 * */
+static void hns3_self_test(struct net_device *ndev,
    struct ethtool_test *eth_test, u64 *data)
+
+{ +
    struct hns3_nic_priv *priv = netdev_priv(ndev);
    +struct hnae3_handle *h = priv->ae_handle;
    +int st_param[HNS3_SELF_TEST_TYPE_NUM][2];
    +#if IS_ENABLED(CONFIG_VLAN_8021Q)
    +bool dis_vlan_filter;
    +#endif
    +int test_index = 0;
    +u32 i;
    +
    +if (hns3_nic_resetting(ndev)) {
        netdev_err(ndev, "dev resetting!");
        +return;
        +}
        +
        +/* Only do offline selftest, or pass by default */
        +if (eth_test->flags != ETH_TEST_FL_OFFLINE)
            +return;
            +
            +st_param[HNAE3_LOOP_APP][0] = HNAE3_LOOP_APP;
+st_param[HNAE3_LOOP_APP][1] =
+h->flags & HNAE3_SUPPORT_APP_LOOPBACK;
+
+st_param[HNAE3_LOOP_SERIAL_SERDES][0] = HNAE3_LOOP_SERIAL_SERDES;
+st_param[HNAE3_LOOP_SERIAL_SERDES][1] =
+h->flags & HNAE3_SUPPORT_SERDES_SERIAL_LOOPBACK;
+
+st_param[HNAE3_LOOP_PARALLEL_SERDES][0] =
+HNAE3_LOOP_PARALLEL_SERDES;
+st_param[HNAE3_LOOP_PARALLEL_SERDES][1] =
+h->flags & HNAE3_SUPPORT_SERDES_PARALLEL_LOOPBACK;
+
+if (if_running)
+ndev->netdev_ops->ndo_stop(ndev);
+
+#if IS_ENABLED(CONFIG_VLAN_8021Q)
+/* Disable the vlan filter for selftest does not support it */
+dis_vlan_filter = (ndev->features & NETIF_F_HW_VLAN_CTAG_FILTER) &&
+h->ae_algo->ops->enable_vlan_filter;
+if (dis_vlan_filter)
+h->ae_algo->ops->enable_vlan_filter(h, false);
+#endif
+
+set_bit(HNS3_NIC_STATE_TESTING, &priv->state);
+
+for (i = 0; i < HNS3_SELF_TEST_TYPE_NUM; i++) {
+enum hnae3_loop loop_type = (enum hnae3_loop)st_param[i][0];
+
+if (!st_param[i][1])
+continue;
+
+data[test_index] = hns3_lp_up(ndev, loop_type);
+if (!data[test_index]) {
+data[test_index] = hns3_lp_run_test(ndev, loop_type);
+hns3_lp_down(ndev, loop_type);
+}
+
+if (data[test_index])
+eth_test->flags |= ETH_TEST_FL_FAILED;
+
+test_index++;
+}
+
+clear_bit(HNS3_NIC_STATE_TESTING, &priv->state);
+
+#if IS_ENABLED(CONFIG_VLAN_8021Q)
+if (dis_vlan_filter)
+h->ae_algo->ops->enable_vlan_filter(h, true);
+if (if_running)
+ndev->netdev_ops->ndo_open(ndev);
+
+static int hns3_get_sset_count(struct net_device *netdev, int stringset)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+const struct hnae3_ae_ops *ops = h->ae_algo->ops;
+
+if (!ops->get_sset_count)
+return -EOPNOTSUPP;
+
+switch (stringset) {
+case ETH_SS_STATS:
+return (HNS3_TQP_STATS_COUNT * h->kinfo.num_tqps) +
+ops->get_sset_count(h, stringset));
+
+case ETH_SS_TEST:
+return ops->get_sset_count(h, stringset);
+
+default:
+return -EOPNOTSUPP;
+}
+
+
+static void *hns3_update_strings(u8 *data, const struct hns3_stats *stats,
+u32 stat_count, u32 num_tqps, const char *prefix)
+{
+#define MAX_PREFIX_SIZE (6 + 4)
+u32 size_left;
+u32 i, j;
+u32 n1;
+
+for (i = 0; i < num_tqps; i++) {
++for (j = 0; j < stat_count; j++) {
+data[ETH_GSTRING_LEN - 1] = '0';
+
+/* first, prepend the prefix string */
+n1 = snprintf(data, MAX_PREFIX_SIZE, "%s%d_", 
+prefix, i);
+n1 = min_t(uint, n1, MAX_PREFIX_SIZE - 1);
+size_left = (ETH_GSTRING_LEN - 1) - n1;
+
+/* now, concatenate the stats string to it */
+strncat(data, stats[j].stats_string, size_left);
+data += ETH_GSTRING_LEN;
+\}
+
+ return data;
+\}
+
+static u8 *hns3_get_strings_tqps(struct hnae3_handle *handle, u8 *data)
+{
+ struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+ const char tx_prefix[] = "txq";
+ const char rx_prefix[] = "rxq";
+ /* get strings for Tx */
+ data = hns3_update_strings(data, hns3_txq_stats, HNS3_TXQ_STATS_COUNT,
+ kinfo->num_tqps, tx_prefix);
+ /* get strings for Rx */
+ data = hns3_update_strings(data, hns3_rxq_stats, HNS3_RXQ_STATS_COUNT,
+ kinfo->num_tqps, rx_prefix);
+ return data;
+}
+
+static void hns3_get_strings(struct net_device *netdev, u32 stringset, u8 *data)
+{
+ struct hnae3_handle *h = hns3_get_handle(netdev);
+ const struct hnae3_ae_ops *ops = h->ae_algo->ops;
+ char *buff = (char *)data;
+ if (!ops->get_strings)
+ return;
+ switch (stringset) {
+ case ETH_SS_STATS:
+ buff = hns3_get_strings_tqps(h, buff);
+ h->ae_algo->ops->get_strings(h, stringset, (u8 *)buff);
+ break;
+ case ETH_SS_TEST:
+ ops->get_strings(h, stringset, data);
+ break;
+ default:
+ break;
+ }
+ break;
+]
+}
+
+static u64 *hns3_get_stats_tqps(struct hnae3_handle *handle, u64 *data)
+{
+ struct hns3_nic_priv *nic_priv = (struct hns3_nic_priv *)handle->priv;
+struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+struct hns3_enet_ring *ring;
+u8 *stat;
+int i, j;
+
+/* get stats for Tx */
+for (i = 0; i < kinfo->num_tqps; i++) {
+  ring = nic_priv->ring_data[i].ring;
+  for (j = 0; j < HNS3_TXQ_STATS_COUNT; j++) {
+    stat = (u8 *)ring + hns3_txq_stats[j].stats_offset;
+    *data++ = *(u64 *)stat;
+  }
+}
+
+/* get stats for Rx */
+for (i = 0; i < kinfo->num_tqps; i++) {
+  ring = nic_priv->ring_data[i + kinfo->num_tqps].ring;
+  for (j = 0; j < HNS3_RXQ_STATS_COUNT; j++) {
+    stat = (u8 *)ring + hns3_rxq_stats[j].stats_offset;
+    *data++ = *(u64 *)stat;
+  }
+}
+
+return data;
+}
+
+/* hns3_get_stats - get detail statistics.
+ * @netdev: net device
+ * @stats: statistics info.
+ * @data: statistics data.
+ */
+static void hns3_get_stats(struct net_device *netdev,
+    struct ethtool_stats *stats, u64 *data)
+{
+  struct hnae3_handle *h = hns3_get_handle(netdev);
+  u64 *p = data;
+  
+  if (!h->ae_algo->ops->get_stats || !h->ae_algo->ops->update_stats) {
+    netdev_err(netdev, "could not get any statistics\n");
+    return;
+  }
+  
+  h->ae_algo->ops->update_stats(h, &netdev->stats);
+  
+  /* get per-queue stats */
+  p = hns3_get_stats_tqps(h, p);
+  
+  /* get MAC & other misc hardware stats */
+h->ae_algo->ops->get_stats(h, p);
+
+static void hns3_get_drvinfo(struct net_device *netdev,
   + struct ethtool_drvinfo *drvinfo)
   +{
   +struct hns3_nic_priv *priv = netdev_priv(netdev);
   +struct hnae3_handle *h = priv->ae_handle;
   +
   +strncpy(drvinfo->version, hns3_driver_version,
   +sizeof(drvinfo->version));
   +drvinfo->version[sizeof(drvinfo->version) - 1] = '\0';
   +
   +strncpy(drvinfo->driver, h->pdev->driver->name,
   +sizeof(drvinfo->driver));
   +drvinfo->driver[sizeof(drvinfo->driver) - 1] = '\0';
   +
   +strncpy(drvinfo->bus_info, pci_name(h->pdev),
   +sizeof(drvinfo->bus_info));
   +drvinfo->bus_info[ETHTOOL_BUSINFO_LEN - 1] = '\0';
   +
   +snprintf(drvinfo->fw_version, sizeof(drvinfo->fw_version), "0x%08x",
   + priv->ae_handle->ae_algo->ops->get_fw_version(h));
   +}
+
+static u32 hns3_get_link(struct net_device *netdev)
   +{
   +struct hnae3_handle *h = hns3_get_handle(netdev);
   +
   +if (h->ae_algo && h->ae_algo->ops && h->ae_algo->ops->get_status)
   +return h->ae_algo->ops->get_status(h);
   +else
   +return 0;
   +}
+
+static void hns3_get_ringparam(struct net_device *netdev, *
   +struct ethtool_ringparam *param)
   +{
   +struct hns3_nic_priv *priv = netdev_priv(netdev);
   +struct hnae3_handle *h = priv->ae_handle;
   +int queue_num = h->kinfo.num_tqps;
   +
   +if (hns3_nic_resetting(netdev)) {
   +netdev_err(netdev, "dev resetting!");
   +return;
   +}
   +
   +param->tx_max_pending = HNS3_RING_MAX_PENDING;
+param->rx_max_pending = HNS3_RING_MAX_PENDING;
+
+param->tx_pending = priv->ring_data[0].ring->desc_num;
+param->rx_pending = priv->ring_data[queue_num].ring->desc_num;
+
+static void hns3_get_pauseparam(struct net_device *netdev,
+struct ethtool_pauseparam *param)
+
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (h->ae_algo && h->ae_algo->ops && h->ae_algo->ops->get_pauseparam)
+h->ae_algo->ops->get_pauseparam(h, &param->autoneg,
+&param->rx_pause, &param->tx_pause);
+
+}
+
+static void hns3_set_pauseparam(struct net_device *netdev,
+struct ethtool_pauseparam *param)
+
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (h->ae_algo->ops->set_pauseparam)
+return h->ae_algo->ops->set_pauseparam(h, param->autoneg,
+param->rx_pause,
+param->tx_pause);
+return -EOPNOTSUPP;
+
+}
+
+static void hns3_get_ksettings(struct hnae3_handle *h,
+struct ethtool_link_ksettings *cmd)
+
+{
+const struct hnae3_ae_ops *ops = h->ae_algo->ops;
+
+/* 1.auto_neg & speed & duplex from cmd */
+ops->get_ksettings_an_result(h,
+&cmd->base.autoneg,
+&cmd->base.speed,
+&cmd->base.duplex);
+
+/* 2.get link mode*/
+if (ops->get_link_mode)
+ops->get_link_mode(h,
+cmd->link_modes.supported,
+cmd->link_modes.advertising);
+
+/* 3.mdix_ctrl&mdix get from phy reg */
+if (ops->get_mdix_mode)
+ops->get_mdix_mode(h, &cmd->base.eth_tp_mdix_ctrl,
+    &cmd->base.eth_tp_mdix);
+
+static int hns3_get_link_ksettings(struct net_device *netdev,
+    struct ethtool_link_ksettings *cmd)
+{
+    struct hnae3_handle *h = hns3_get_handle(netdev);
+    const struct hnae3_ae_ops *ops;
+    u8 media_type;
+    u8 link_stat;
+
+    if (!h->ae_algo || !h->ae_algo->ops)
+        return -EOPNOTSUPP;
+    ops = h->ae_algo->ops;
+    if (ops->get_media_type)
+        ops->get_media_type(h, &media_type);
+    else
+        return -EOPNOTSUPP;
+
+    switch (media_type) {
+    case HNAE3_MEDIA_TYPE_NONE:
+        cmd->base.port = PORT_NONE;
+        hns3_get_ksettings(h, cmd);
+        break;
+    case HNAE3_MEDIA_TYPE_FIBER:
+        cmd->base.port = PORT_FIBRE;
+        hns3_get_ksettings(h, cmd);
+        break;
+    case HNAE3_MEDIA_TYPE_COPPER:
+        if (!netdev->phydev)
+            return -EOPNOTSUPP;
+        cmd->base.port = PORT_TP;
+        phy_ethtool_ksettings_get(netdev->phydev, cmd);
+        break;
+    default:
+        netdev_warn(netdev, "Unknown media type");
+        return 0;
+    }
+
+    /* mdio support */
+    cmd->base.mdio_support = ETH_MDIO_SUPPORTS_C22;
+    +link_stat = hns3_get_link(netdev);
```c
+if (!link_stat) {
+cmd->base.speed = SPEED_UNKNOWN;
+cmd->base.duplex = DUPLEX_UNKNOWN;
+}
+
+return 0;
+}
+
+static int hns3_set_link_ksettings(struct net_device *netdev,
+    const struct ethtool_link_ksettings *cmd)
+{
+/* Only support ksettings_set for netdev with phy attached for now */
+if (netdev->phydev)
+return phy_ethtool_ksettings_set(netdev->phydev, cmd);
+
+return -EOPNOTSUPP;
+}
+
+static u32 hns3_get_rss_key_size(struct net_device *netdev)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (!h->ae_algo || !h->ae_algo->ops ||
+ !h->ae_algo->ops->get_rss_key_size)
+return 0;
+
+return h->ae_algo->ops->get_rss_key_size(h);
+}
+
+static u32 hns3_get_rss_indir_size(struct net_device *netdev)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (!h->ae_algo || !h->ae_algo->ops ||
+ !h->ae_algo->ops->get_rss_indir_size)
+return 0;
+
+return h->ae_algo->ops->get_rss_indir_size(h);
+}
+
+static int hns3_get_rss(struct net_device *netdev, u32 *indir, u8 *key,
+    u8 *hfunc)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (!h->ae_algo || !h->ae_algo->ops ||
+ !h->ae_algo->ops->get_rss)
+return -EOPNOTSUPP;
+
```
return h->ae_algo->ops->get_rss(h, indir, key, hfunc);
+
+static int hns3_get_rss(struct net_device *netdev, const u32 *indir, 
+const u8 *key, const u8 hfunc)
+
+{ 
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (!h->ae_algo || !h->ae_algo->ops || !h->ae_algo->ops->set_rss)
+return -EOPNOTSUPP;
+
+if ((h->pdev->revision == 0x20 && 
+ hfunc != ETH_RSS_HASH_TOP) || (hfunc != ETH_RSS_HASH_NO_CHANGE &&
+ hfunc != ETH_RSS_HASH_TOP && hfunc != ETH_RSS_HASH_XOR)) {
+netdev_err(netdev, "hash func not supported
");
+return -EOPNOTSUPP;
+}
+
+if (!indir) {
+netdev_err(netdev, 
+ "set rss failed for indir is empty
");
+return -EOPNOTSUPP;
+}
+
+return h->ae_algo->ops->set_rss(h, indir, key, hfunc);
+
+static int hns3_get_rxnfc(struct net_device *netdev, 
+struct ethtool_rxnfc *cmd, 
+u32 *rule_locs)
+
+{ 
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (!h->ae_algo || !h->ae_algo->ops)
+return -EOPNOTSUPP;
+
+switch (cmd->cmd) {
+case ETHTOOL_GRXRINGS:
+cmd->data = h->kinfo.num_tqps;
+return 0;
+case ETHTOOL_GRXFH:
+if (h->ae_algo->ops->get_rss_tuple)
+return h->ae_algo->ops->get_rss_tuple(h, cmd);
+return -EOPNOTSUPP;
+case ETHTOOL_GRXCLSRLCNT:
+if (h->ae_algo->ops->get_fd_rule_cnt)
+return h->ae_algo->ops->get_fd_rule_cnt(h, cmd);
+return -EOPNOTSUPP;
+case ETHTOOL_GRXCLSRLALL:
+if (h->ae_algo->ops->get_fd_all_rules)
+return h->ae_algo->ops->get_fd_all_rules(h, cmd, 
+    rule_locs);
+return -EOPNOTSUPP;
+default:
+return -EOPNOTSUPP;
+
+static int hns3_change_all_ring_bd_num(struct hns3_nic_priv *priv, 
+    u32 new_desc_num)
+{
+struct hnae3_handle *h = priv->ae_handle;
+int i;
+
+h->kinfo.num_desc = new_desc_num;
+
+for (i = 0; i < h->kinfo.num_tqps * 2; i++)
+priv->ring_data[i].ring->desc_num = new_desc_num;
+
+return hns3_init_all_ring(priv);
+
+}
+
+static int hns3_set_ringparam(struct net_device *ndev, 
+    struct ethtool_ringparam *param)
+{
+struct hns3_nic_priv *priv = netdev_priv(ndev);
+struct hnae3_handle *h = priv->ae_handle;
+bool if_running = netif_running(ndev);
+u32 old_desc_num, new_desc_num;
+int ret;
+
+if (hns3_nic_resetting(ndev))
+return -EBUSY;
+
+if (param->rx_mini_pending || param->rx_jumbo_pending)
+return -EINVAL;
+
+if (param->tx_pending != param->rx_pending) {
+netdev_err(ndev, 
+    "Descriptors of tx and rx must be equal");
+return -EINVAL;
+}
+ if (param->tx_pending > HNS3_RING_MAX_PENDING ||
+ param->tx_pending < HNS3_RING_MIN_PENDING) {
+     netdev_err(ndev,
+         "Descriptors requested (Tx/Rx: %d) out of range [%d-%d]\n",
+         param->tx_pending, HNS3_RING_MIN_PENDING,
+         HNS3_RING_MAX_PENDING);
+     return -EINVAL;
+ }
+
+ new_desc_num = param->tx_pending;
+
+ /* Hardware requires that its descriptors must be multiple of eight */
+ new_desc_num = ALIGN(new_desc_num, HNS3_RING_BD_MULTIPLE);
+ old_desc_num = h->kinfo.num_desc;
+ if (old_desc_num == new_desc_num)
+     return 0;
+
+ netdev_info(ndev,
+     "Changing descriptor count from %d to %d.\n",
+     old_desc_num, new_desc_num);
+
+ if (if_running)
+     dev_close(ndev);
+
+ ret = hns3_uninit_all_ring(priv);
+ if (ret)
+     return ret;
+
+ ret = hns3_change_all_ring_bd_num(priv, new_desc_num);
+ if (ret) {
+     ret = hns3_change_all_ring_bd_num(priv, old_desc_num);
+     if (ret) {
+         netdev_err(ndev,
+             "Revert to old bd num fail, ret=%d.\n", ret);
+         return ret;
+     }
+ }
+
+ if (if_running)
+     ret = dev_open(ndev);
+
+ return ret;
+
+ static int hns3_set_rxnfc(struct net_device *netdev, struct ethtool_rxnfc *cmd)
+ {
+     struct hnae3_handle *h = hns3_get_handle(netdev);
+if (!h->ae_algo || !h->ae_algo->ops)
+return -EOPNOTSUPP;
+
+switch (cmd->cmd) {
+case ETHTOOL_SRXFH:
+if (h->ae_algo->ops->set_rss_tuple)
+return h->ae_algo->ops->set_rss_tuple(h, cmd);
+return -EOPNOTSUPP;
+case ETHTOOL_SRXCLSRLINS:
+if (h->ae_algo->ops->add_fd_entry)
+return h->ae_algo->ops->add_fd_entry(h, cmd);
+return -EOPNOTSUPP;
+case ETHTOOL_SRXCLSRLDEL:
+if (h->ae_algo->ops->del_fd_entry)
+return h->ae_algo->ops->del_fd_entry(h, cmd);
+return -EOPNOTSUPP;
+default:
+return -EOPNOTSUPP;
+}
+
+static int hns3_nway_reset(struct net_device *netdev)
+{
+struct phy_device *phy = netdev->phydev;
+
+if (!netif_running(netdev))
+return 0;
+
+/* Only support nway_reset for netdev with phy attached for now */
+if (!phy)
+return -EOPNOTSUPP;
+
+if (phy->autoneg != AUTONEG_ENABLE)
+return -EINVAL;
+
+return genphy_restart_aneg(phy);
+}
+
+static void hns3_get_channels(struct net_device *netdev,
+ethtool_channels *ch)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (h->ae_algo->ops->get_channels)
+h->ae_algo->ops->get_channels(h, ch);
+}

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+static int hns3_get_coalesce_per_queue(struct net_device *netdev, u32 queue, 
+   struct ethtool_coalesce *cmd)
+{
+  struct hns3_enet_tqp_vector *tx_vector, *rx_vector;
+  struct hns3_nic_priv *priv = netdev_priv(netdev);
+  struct hnae3_handle *h = priv->ae_handle;
+  u16 queue_num = h->kinfo.num_tqps;
+  
+  if (hns3_nic_resetting(netdev))
+    return -EBUSY;
+  
+  if (queue >= queue_num) {
+    netdev_err(netdev, "Invalid queue value %d! Queue max id=%d\n", queue, queue_num - 1);
+    return -EINVAL;
+  }
+  
+  tx_vector = priv->ring_data[queue].ring->tqp_vector;
+  rx_vector = priv->ring_data[queue_num + queue].ring->tqp_vector;
+  
+  cmd->use_adaptive_tx_coalesce =
+    tx_vector->tx_group.coal.gl_adapt_enable;
+  cmd->use_adaptive_rx_coalesce =
+    rx_vector->rx_group.coal.gl_adapt_enable;
+  
+  cmd->tx_coalesce_usec = tx_vector->tx_group.coal.int_gl;
+  cmd->rx_coalesce_usec = rx_vector->rx_group.coal.int_gl;
+  
+  cmd->tx_coalesce_usec_high = h->kinfo.int_rl_setting;
+  cmd->rx_coalesce_usec_high = h->kinfo.int_rl_setting;
+  
+  return 0;
+}
+
+static int hns3_check_gl_coalesce_para(struct net_device *netdev, 
+    struct ethtool_coalesce *cmd)
+{
+  return hns3_get_coalesce_per_queue(netdev, 0, cmd);
+}
+
+static int hns3_get_coalesce(struct net_device *netdev, 
+    struct ethtool_coalesce *cmd)
+{
+  return hns3_get_coalesce_per_queue(netdev, 0, cmd);
+}
+
+static int hns3_check_gl_coalesce_para(struct net_device *netdev, 
+    struct ethtool_coalesce *cmd)
+{
+  return hns3_get_coalesce_per_queue(netdev, 0, cmd);
+}
+
"Invalid rx-usecs value, rx-usecs range is 0-%d\n",
+ HNS3_INT_GL_MAX);
+return -EINVAL;
+
+
+if (cmd->tx_coalesce_usecs > HNS3_INT_GL_MAX) {
+    netdev_err(netdev,
+    "Invalid tx-usecs value, tx-usecs range is 0-%d\n",
+    HNS3_INT_GL_MAX);
+    return -EINVAL;
+}
+
+rx_gl = hns3_gl_round_down(cmd->rx_coalesce_usecs);
+if (rx_gl != cmd->rx_coalesce_usecs) {
+    netdev_info(netdev,
+    "rx_usecs(%d) rounded down to %d, because it must be multiple of 2.\n",
+    cmd->rx_coalesce_usecs, rx_gl);
+}
+
+tx_gl = hns3_gl_round_down(cmd->tx_coalesce_usecs);
+if (tx_gl != cmd->tx_coalesce_usecs) {
+    netdev_info(netdev,
+    "tx_usecs(%d) rounded down to %d, because it must be multiple of 2.\n",
+    cmd->tx_coalesce_usecs, tx_gl);
+}
+
+return 0;
+
+
+static int hns3_check_rl_coalesce_para(struct net_device *netdev,
+        struct ethtool_coalesce *cmd)
+{
+    u32 rl;
+
+    if (cmd->tx_coalesce_usecs_high != cmd->rx_coalesce_usecs_high) {
+        netdev_err(netdev,
+        "tx_usecs_high must be same as rx_usecs_high.\n");
+        return -EINVAL;
+    }
+
+    if (cmd->rx_coalesce_usecs_high > HNS3_INT_RL_MAX) {
+        netdev_err(netdev,
+        "Invalid usecs_high value, usecs_high range is 0-%d\n",
+        HNS3_INT_RL_MAX);
+        return -EINVAL;
+    }
+
+    rl = hns3_rl_round_down(cmd->rx_coalesce_usecs_high);
+if (rl != cmd->rx_coalesce_usecs_high) {
  +netdev_info(netdev,
  +  "usecs_high(%d) rounded down to %d, because it must be multiple of 4.\n",
  +  cmd->rx_coalesce_usecs_high, rl);
  +}
  +
  +return 0;
  +}
  +
+static int hns3_check_coalesce_para(struct net_device *netdev,
  +  struct ethtool_coalesce *cmd)
  +{
  +int ret;
  +
  +ret = hns3_check_gl_coalesce_para(netdev, cmd);
  +if (ret) {
  +netdev_err(netdev,
  +  "Check gl coalesce param fail. ret = %d\n", ret);
  +return ret;
  +}
  +
  +ret = hns3_check_rl_coalesce_para(netdev, cmd);
  +if (ret) {
  +netdev_err(netdev,
  +  "Check rl coalesce param fail. ret = %d\n", ret);
  +return ret;
  +}
  +
  +if (cmd->use_adaptive_tx_coalesce == 1 ||
  +  cmd->use_adaptive_rx_coalesce == 1) {
  +netdev_info(netdev,
  +  "adaptive-tx=%d and adaptive-rx=%d, tx_usecs or rx_usecs will changed dynamically.\n",
  +  cmd->use_adaptive_tx_coalesce,
  +  cmd->use_adaptive_rx_coalesce);
  +}
  +
  +return 0;
  +}
  +
+static void hns3_set_coalesce_per_queue(struct net_device *netdev,
  +struct ethtool_coalesce *cmd,
  +u32 queue)
  +{
  +struct hns3_enet_tqp_vector *tx_vector, *rx_vector;
  +struct hns3_nic_priv *priv = netdev_priv(netdev);
  +struct hnae3_handle *h = priv->ae_handle;
  +int queue_num = h->kinfo.num_tqps;
  +

tx_vector = priv->ring_data[queue].ring->tqp_vector;
+rx_vector = priv->ring_data[queue_num + queue].ring->tqp_vector;
+tx_vector->tx_group.coal.gl_adapt_enable =
+cmd->use_adaptive_tx_coalesce;
+rx_vector->rx_group.coal.gl_adapt_enable =
+cmd->use_adaptive_rx_coalesce;
+
+tx_vector->tx_group.coal.int_gl = cmd->tx_coalesce_usecs;
+rx_vector->rx_group.coal.int_gl = cmd->rx_coalesce_usecs;
+
+hns3_set_vector_coalesce_tx_gl(tx_vector,
+    tx_vector->tx_group.coal.int_gl);
+hns3_set_vector_coalesce_rx_gl(rx_vector,
+    rx_vector->rx_group.coal.int_gl);
+
+hns3_set_vector_coalesce_rl(tx_vector, h->kinfo.int_rl_setting);
+hns3_set_vector_coalesce_rl(rx_vector, h->kinfo.int_rl_setting);
+}
+
+static int hns3_set_coalesce(struct net_device *netdev,
+    struct ethtool_coalesce *cmd)
+{
+    struct hnae3_handle *h = hns3_get_handle(netdev);
+    u16 queue_num = h->kinfo.num_tqps;
+    int ret;
+    int i;
+
+    if (hns3_nic_resetting(netdev))
+        return -EBUSY;
+    ret = hns3_check_coalesce_para(netdev, cmd);
+    if (!ret)
+        return ret;
+    h->kinfo.int_rl_setting =
+        hns3_rl_round_down(cmd->rx_coalesce_usecs_high);
+    for (i = 0; i < queue_num; i++)
+        hns3_set_coalesce_per_queue(netdev, cmd, i);
+    return 0;
+}
+
+static int hns3_get_regs_len(struct net_device *netdev)
+{
+    struct hnae3_handle *h = hns3_get_handle(netdev);
+if (!h->ae_algo->ops->get_regs_len)
+return -EOPNOTSUPP;
+
+return h->ae_algo->ops->get_regs_len(h);
+
+static void hns3_get_regs(struct net_device *netdev,
+ struct ethtool_regs *cmd, void *data)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (!h->ae_algo->ops->get_regs)
+return;
+
+h->ae_algo->ops->get_regs(h, &cmd->version, data);
+
+static int hns3_set_phys_id(struct net_device *netdev,
+ enum ethtool_phys_id_state state)
+{
+struct hnae3_handle *h = hns3_get_handle(netdev);
+
+if (!h->ae_algo || !h->ae_algo->ops || !h->ae_algo->ops->set_led_id)
+return -EOPNOTSUPP;
+
+return h->ae_algo->ops->set_led_id(h, state);
+
+static const struct ethtool_ops hns3vf_ethtool_ops = {
+ .get_drvinfo = hns3_get_drvinfo,
+ .get_ringparam = hns3_get_ringparam,
+ .set_ringparam = hns3_set_ringparam,
+ .get_strings = hns3_get_strings,
+ .get_ethtool_stats = hns3_get_stats,
+ .get_sset_count = hns3_get_sset_count,
+ .get_rxnfc = hns3_get_rxnfc,
+ .set_rxnfc = hns3_set_rxnfc,
+ .get_rxfh_key_size = hns3_get_rss_key_size,
+ .get_rxfh_indir_size = hns3_get_rss_indir_size,
+ .get_rxfh = hns3_get_rss,
+ .set_rxfh = hns3_set_rss,
+ .get_link_ksettings = hns3_get_link_ksettings,
+ .get_channels = hns3_get_channels,
+ .get_coalesce = hns3_get_coalesce,
+ .set_coalesce = hns3_set_coalesce,
+ .get_link = hns3_get_link,
+ };
+static const struct ethtool_ops hns3_ethtool_ops = {
+  .self_test = hns3_self_test,
+  .get_drvinfo = hns3_get_drvinfo,
+  .get_link = hns3_get_link,
+  .get_ringparam = hns3_get_ringparam,
+  .set_ringparam = hns3_set_ringparam,
+  .get_pauseparam = hns3_get_pauseparam,
+  .set_pauseparam = hns3_set_pauseparam,
+  .get_strings = hns3_get_strings,
+  .get_ethtool_stats = hns3_get_stats,
+  .get_sset_count = hns3_get_sset_count,
+  .get_rxnfc = hns3_get_rxnfc,
+  .set_rxnfc = hns3_set_rxnfc,
+  .get_rxfh_key_size = hns3_get_rss_key_size,
+  .get_rxfh_indir_size = hns3_get_rss_indir_size,
+  .get_rxfh = hns3_get_rss,
+  .set_rxfh = hns3_set_rss,
+  .get_link_ksettings = hns3_get_link_ksettings,
+  .set_link_ksettings = hns3_set_link_ksettings,
+  .nway_reset = hns3_nway_reset,
+  .get_channels = hns3_get_channels,
+  .set_channels = hns3_set_channels,
+  .get_coalesce = hns3_get_coalesce,
+  .set_coalesce = hns3_set_coalesce,
+  .get_regs_len = hns3_get_regs_len,
+  .get_regs = hns3_get_regs,
+  .set_phys_id = hns3_set_phys_id,
+};
+
+void hns3_ethtool_set_ops(struct net_device *netdev)
+{
+  struct hnae3_handle *h = hns3_get_handle(netdev);
+  
+  if (h->flags & HNAE3_SUPPORT_VF)
+    netdev->ethtool_ops = &hns3vf_ethtool_ops;
+  else
+    netdev->ethtool_ops = &hns3_ethtool_ops;
+}

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/Makefile
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/Makefile
@@ -1,3 +1,4 @@
+# SPDX-License-Identifier: GPL-2.0+
#
# Makefile for the HISILICON network device drivers.
#
@@ -5,11 +6,6 @@
 ccflags-y := -Idrivers/net/ethernet/hisilicon/hns3
obj-$(CONFIG_HNS3_HCLGE) += hclge.o
-hclge-objs = hclge_main.o hclge_cmd.o hclge_mdio.o hclge_tm.o
+hclge-objs = hclge_main.o hclge_cmd.o hclge_mdio.o hclge_tm.o hclge_mbx.o hclge_err.o hclge_debugfs.o

hclge-$(CONFIG_HNS3_DCB) += hclge_dcb.o
-
-obj-$(CONFIG_HNS3_ENET) += hns3.o
-hns3-objs = hns3_enet.o hns3_ethtool.o
-
-hns3-$(CONFIG_HNS3_DCB) += hns3_dcbnl.o
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_cmd.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_cmd.c
@@ -1,11 +1,5 @@
-/*
- * Copyright (c) 2016~2017 Hisilicon Limited.
- *
- * This program is free software; you can redistribute it and/or modify
- * it under the terms of the GNU General Public License as published by
- * the Free Software Foundation; either version 2 of the License, or
- * (at your option) any later version.
- */
-+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.

#include <linux/dma-mapping.h>
#include <linux/slab.h>
@@ -18,8 +12,7 @@
#include "hclge_main.h"

#define hclge_is_csq(ring) ((ring)->flag & HCLGE_TYPE_CSQ)
-#define hclge_ring_to_dma_dir(ring) (hclge_is_csq(ring) ?
+D-MASK_TO_DEVICE : DMA_FROM_DEVICE)
+
#define cmq_ring_to_dev(ring)   (&(ring)->dev->pdev->dev)

static int hclge_ring_space(struct hclge_cmq_ring *ring)
@@ -31,35 +24,39 @@
return ring->desc_num - used - 1;
}

+static int is_valid_csq_clean_head(struct hclge_cmq_ring *ring, int head)
+{
++int ntu = ring->next_to_use;
++int ntc = ring->next_to_clean;
++
++if (ntu > ntc)
++return head >= ntc && head <= ntu;
++
return head >= ntc || head <= ntu;
+
static int hclge_alloc_cmd_desc(struct hclge_cmq_ring *ring)
{
    int size = ring->desc_num * sizeof(struct hclge_desc);

    -ring->desc = kzalloc(size, GFP_KERNEL);
    +ring->desc = dma_zalloc_coherent(cmq_ring_to_dev(ring),
        + size, &ring->desc_dma_addr,
        + GFP_KERNEL);
    if (!ring->desc)
        return -ENOMEM;

    -ring->desc_dma_addr = dma_map_single(cmq_ring_to_dev(ring), ring->desc,
        - size, DMA_BIDIRECTIONAL);
    -if (dma_mapping_error(cmq_ring_to_dev(ring), ring->desc_dma_addr)) {
        -ring->desc_dma_addr = 0;
        -kfree(ring->desc);
        -ring->desc = NULL;
        -return -ENOMEM;
    -}
    -
    return 0;
}

static void hclge_free_cmd_desc(struct hclge_cmq_ring *ring)
{
    -dma_unmap_single(cmq_ring_to_dev(ring), ring->desc_dma_addr,
        - ring->desc_num * sizeof(ring->desc[0]),
        - DMA_BIDIRECTIONAL);
    -
    -ring->desc_dma_addr = 0;
    -kfree(ring->desc);
    -ring->desc = NULL;
    +int size = ring->desc_num * sizeof(struct hclge_desc);
    +
    +if (ring->desc) {
        +dma_free_coherent(cmq_ring_to_dev(ring), size,
            + ring->desc, ring->desc_dma_addr);
        +ring->desc = NULL;
        +}
    }
}

static int hclge_alloc_cmd_queue(struct hclge_dev *hdev, int ring_type)
@@ -69,7 +66,7 @@
    (ring_type == HCLGE_TYPE_CSQ) ? &hw->cmq.csq : &hw->cmq.crq;
    int ret;
-ring->flag = ring_type;
+ring->ring_type = ring_type;
ring->dev = hdev;

ret = hclge_alloc_cmd_desc(ring);
@@ -100,8 +97,6 @@
if (is_read)
desc->flag |= cpu_to_le16(HCLGE_CMD_FLAG_WR);
-else
-    desc->flag &= cpu_to_le16(~HCLGE_CMD_FLAG_WR);
}

static void hclge_cmd_config_regs(struct hclge_cmq_ring *ring)
@@ -110,26 +105,26 @@
struct hclge_dev *hdev = ring->dev;
struct hclge_hw *hw = &hdev->hw;

-if (ring->flag == HCLGE_TYPE_CSQ) {
+if (ring->ring_type == HCLGE_TYPE_CSQ) {
    hclge_write_dev(hw, HCLGE_NIC_CSQ_BASEADDR_L_REG,
    -(u32)dma);
+    lower_32_bits(dma));
    hclge_write_dev(hw, HCLGE_NIC_CSQ_BASEADDR_H_REG,
    -(u32)((dma >> 31) >> 1));
+    upper_32_bits(dma));
    if (ring->desc_num >> HCLGE_NIC_CMQ_DESC_NUM_S) |
        HCLGE_NIC_CMQ_ENABLE);
    hclge_write_dev(hw, HCLGE_NIC_CSQ_TAIL_REG, 0);
    hclge_write_dev(hw, HCLGE_NIC_CSQ_HEAD_REG, 0);
    +hclge_write_dev(hw, HCLGE_NIC_CSQ_TAIL_REG, 0);
} else {
    hclge_write_dev(hw, HCLGE_NIC_CRQ_BASEADDR_L_REG,
    -(u32)dma);
+    lower_32_bits(dma));
    hclge_write_dev(hw, HCLGE_NIC_CRQ_BASEADDR_H_REG,
    -(u32)((dma >> 31) >> 1));
+    upper_32_bits(dma));
    if (ring->desc_num >> HCLGE_NIC_CMQ_DESC_NUM_S) |
        HCLGE_NIC_CMQ_ENABLE);
    hclge_write_dev(hw, HCLGE_NIC_CRQ_TAIL_REG, 0);
    hclge_write_dev(hw, HCLGE_NIC_CRQ_HEAD_REG, 0);
    +hclge_write_dev(hw, HCLGE_NIC_CRQ_TAIL_REG, 0);
}
static int hclge_cmd_csq_clean(struct hclge_hw *hw) {
    struct hclge_dev *hdev = container_of(hw, struct hclge_dev, hw);
    struct hclge_cmq_ring *csq = &hw->cmq.csq;
    u16 ntc = csq->next_to_clean;
    struct hclge_desc *desc;
    int clean = 0;
    u32 head;

    desc = &csq->desc[ntc];
    head = hclge_read_dev(hw, HCLGE_NIC_CSQ_HEAD_REG);
    rmb(); /* Make sure head is ready before touch any data */

    while (head != ntc) {
        memset(desc, 0, sizeof(*desc));
        ntc++;
        if (ntc == csq->desc_num)
            ntc = 0;
        desc = &csq->desc[ntc];
        clean++;
        if (!is_valid_csq_clean_head(csq, head)) {
            dev_warn(&hdev->pdev->dev, "wrong cmd head (%d, %d-%d)\n", head,
                csq->next_to_use, csq->next_to_clean);
            dev_warn(&hdev->pdev->dev,
                "Disabling any further commands to IMP firmware\n");
            set_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
            dev_warn(&hdev->pdev->dev,
                "IMP firmware watchdog reset soon expected!\n");
            return -EIO;
        }
        csq->next_to_clean = ntc;

        clean = (head - csq->next_to_clean + csq->desc_num) % csq->desc_num;
        csq->next_to_clean = head;
        return clean;
    }

    return -EIO;
}

static bool hclge_is_special_opcode(u16 opcode) {
    u16 spec_opcode[3] = {0x0030, 0x0031, 0x0032};
    /* these commands have several descriptors,
    * and use the first one to save opcode and return value

*+ */
+u16 specOpcode[3] = {HCLGE_OPC_STATS_64_BIT,
+HCLGE_OPC_STATS_32_BIT, HCLGE_OPC_STATS_MAC};
+int i;
+
+for (i = 0; i < ARRAY_SIZE(specOpcode); i++) {
+@@ -193,7 +194,7 @@
+/**
+int hclge_cmd_send(struct hclge_hw *hw, struct hclge_desc *desc, int num)
+{
+ -struct hclge_dev *hdev = (struct hclge_dev *)hw->back;
+ +struct hclge_dev *hdev = container_of(hw, struct hclge_dev, hw);
+ struct hclge_desc *desc_to_use;
+ bool complete = false;
+ u32 timeout = 0;
+ @@ -204,7 +205,8 @@
+
+ spin_lock_bh(&(hw->cmq.csq.lock));
+
+ -if (num > hclge_ring_space(&hw->cmq.csq)) {
+ +if (num > hclge_ring_space(&hw->cmq.csq)) ||
+ + test_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state)) {
+ spin_unlock_bh(&(hw->cmq.csq.lock));
+ return -EBUSY;
+ }
+ @@ -233,33 +235,36 @@
+ */
+ if (HCLGE_SEND_SYNC(le16_to_cpu(desc->flag))) {
+ do {
+ -if (hclge_cmd_csq_done(hw))
+ +if (hclge_cmd_csq_done(hw)) {
+ +complete = true;
+ break;
+ +}
+ udelay(1);
+ timeout++;
+ } while (timeout < hw->cmq.tx_timeout);
+ }
+
+ -if (hclge_cmd_csq_done(hw)) {
+ -complete = true;
+ +if (!complete) {
+ +retval = -EAGAIN;
+ +} else {
+ handle = 0;
+ while (handle < num) {
+ /* Get the result of hardware write back */
+ desc_to_use = &(hw->cmq.csq.desc[ntc]);
+ 
+ 
+ OPEN SOURCE USED IN 5GaaS EDGE AC-4 24783
desc[handle] = *desc_to_use;
-pr_debug("Get cmd desc\n");

if (likely(!hclge_is_special_opcode(opcode)))
desc_ret = le16_to_cpu(desc[handle].retval);
else
desc_ret = le16_to_cpu(desc[0].retval);

-if ((enum hclge_cmd_return_status)desc_ret ==
 -  HCLGE_CMD_EXEC_SUCCESS)
+if (desc_ret == HCLGE_CMD_EXEC_SUCCESS)
  retval = 0;
+else if (desc_ret == HCLGE_CMD_NOT_SUPPORTED)
  retval = -EOPNOTSUPP;
else
  retval = -EIO;
-hw->cmq.last_status = (enum hclge_cmd_status)desc_ret;
+hw->cmq.last_status = desc_ret;
ntc++;
handle++;
if (ntc == hw->cmq.csq.desc_num)
@@ -267,15 +272,13 @@
   @ @ -267,15 +272,13 @ @
 }
 }

-if (!complete)
-retval = -EAGAIN;
-
/* Clean the command send queue */
handle = hclge_cmd_csq_clean(hw);
-if (handle != num) {
+if (handle < 0)
+retval = handle;
+else if (handle != num)
    dev_warn(&hdev->pdev->dev,
        "cleaned %d, need to clean %d\n", handle, num);
-}

spin_unlock_bh(&hw->cmq.csq.lock);
@@ -303,6 +306,10 @@
 {
 int ret;

+/* Setup the lock for command queue */
+spin_lock_init(&hdev->hw.cmq.csq.lock);
+spin_lock_init(&hdev->hw.cmq.crq.lock);
+  

/* Setup the queue entries for use cmd queue */
hdev->hw.cmq.csq.desc_num = HCLGE_NIC_CMQ_DESC_NUM;
hdev->hw.cmq.crq.desc_num = HCLGE_NIC_CMQ_DESC_NUM;
int ret;

+spin_lock_bh(&hdev->hw.cmq.csq.lock);
+spin_lock_bh(&hdev->hw.cmq.crq.lock);
+
+
hdev->hw.cmq.csq.next_to_clean = 0;
hdev->hw.cmq.csq.next_to_use = 0;
hdev->hw.cmq.crq.next_to_clean = 0;
hdev->hw.cmq.crq.next_to_use = 0;

-/* Setup the lock for command queue */
-spin_lock_init(&hdev->hw.cmq.csq.lock);
-spin_lock_init(&hdev->hw.cmq.crq.lock);
-
-
hclge_cmd_init_regs(&hdev->hw);

+spin_unlock_bh(&hdev->hw.cmq.crq.lock);
+spin_unlock_bh(&hdev->hw.cmq.csq.lock);
+
+-clear_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
+
+/* Check if there is new reset pending, because the higher level
+ * reset may happen when lower level reset is being processed.
+ */
+if ((hclge_is_reset_pending(hdev))) {
+set_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
+return -EBUSY;
+}
+
+ret = hclge_cmd_query_firmware_version(&hdev->hw, &version);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+@@ -362,9 +381,9 @@
+
+static void hclge_destroy_queue(struct hclge_cmq_ring *ring)
+
+spin_lock_bh(&ring->lock);
+spin_lock(&ring->lock);
+hclge_free_cmd_desc(ring);
+spin_unlock_bh(&ring->lock);
+spin_unlock(&ring->lock);
+}
void hclge_destroy_cmd_queue(struct hclge_hw *hw)
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_cmd.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_cmd.h
@@ -1,18 +1,12 @@
-/*
- * Copyright (c) 2016~2017 Hisilicon Limited.
- *
- * This program is free software; you can redistribute it and/or modify
- * it under the terms of the GNU General Public License as published by
- * the Free Software Foundation; either version 2 of the License, or
- * (at your option) any later version.
- */
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.

 ifndef __HCLGE_CMD_H
#define __HCLGE_CMD_H
#include <linux/types.h>
#include <linux/io.h>

+#define HCLGE_CMDQ_TX_TIMEOUT1000
+#define HCLGE_CMDQ_TX_TIMEOUT30000

 struct hclge_dev;
 struct hclge_desc {
    __le32 data[6];
};

-struct hclge_desc_cb {
-    dma_addr_t dma;
-    void *va;
-    u32 length;
-};
-
- struct hclge_cmq_ring {
-    dma_addr_t desc_dma_addr;
-    struct hclge_desc *desc;
- struct hclge_desc *desc;
- struct hclge_dev *dev;
+struct hclge_dev *dev;
    u32 head;
    u32 tail;
    u16 desc_num;
    int next_to_use;
    int next_to_clean;
}
-u8 flag;
+u8 ring_type; /* cmq ring type */
spinlock_t lock; /* Command queue lock */
}

enum hclge_cmd_return_status {
    HCLGE_CMD_EXEC_SUCCESS= 0,
    HCLGE_CMD_NO_AUTH= 1,
    HCLGE_CMD_NOT_EXEC= 2,
    +HCLGE_CMD_NOT_SUPPORTED= 2,
    HCLGE_CMD_QUEUE_FULL= 3,
};

@@ -71,26 +58,19 @@
struct hclge_cmq {
    struct hclge_cmq_ring csq;
    struct hclge_cmq_ring crq;
    -u16 tx_timeout; /* Tx timeout */
    +#define HCLGE_CMD_FLAG_IN_VALID_SHIFT	0
    +#define HCLGE_CMD_FLAG_OUT_VALID_SHIFT	1
    +#define HCLGE_CMD_FLAG_NEXT_SHIFT	2
    +#define HCLGE_CMD_FLAG_WR_OR_RD_SHIFT	3
    +#define HCLGE_CMD_FLAG_NO_INTR_SHIFT	4
    +#define HCLGE_CMD_FLAG_ERR_INTR_SHIFT	5
    -
    +#define HCLGE_CMD_FLAG_IN(HCLGE_CMD_FLAG_IN_VALID_SHIFT)
    +#define HCLGE_CMD_FLAG_OUT(HCLGE_CMD_FLAG_OUT_VALID_SHIFT)
    +#define HCLGE_CMD_FLAG_NEXT(HCLGE_CMD_FLAG_NEXT_SHIFT)
    +#define HCLGE_CMD_FLAG_WR(HCLGE_CMD_FLAG_WR_OR_RD_SHIFT)
    +#define HCLGE_CMD_FLAG_NO_INTR(HCLGE_CMD_FLAG_NO_INTR_SHIFT)
    +#define HCLGE_CMD_FLAG_ERR_INTR(HCLGE_CMD_FLAG_ERR_INTR_SHIFT)
    +#define HCLGE_CMD_FLAG_INBIT(0)
    +#define HCLGE_CMD_FLAG_OUTBIT(1)
    +#define HCLGE_CMD_FLAG_NEXTBIT(2)
    +#define HCLGE_CMD_FLAG_WRBIT(3)
    +#define HCLGE_CMD_FLAG_NO_INTRBIT(4)
    +#define HCLGE_CMD_FLAG_ERR_INTRBIT(5)

    enum hclge_opcode_type {
        /* Generic command */
        /* Generic commands */
        HCLGE_OPC_QUERY_FW_VER		= 0x0001,
        HCLGE_OPC_CFG_RST_TRIGGER	= 0x0020,
        HCLGE_OPC_GBL_RST_STATUS	= 0x0021,
HCLGE_OPC_STATS_64_BIT = 0x0030,
HCLGE_OPC_STATS_32_BIT = 0x0031,
HCLGE_OPC_STATS_MAC = 0x0032,
/* Device management command */

/* MAC command */
+HCLGE_OPC_QUERY_REG_NUM = 0x0040,
+HCLGE_OPC_QUERY_32_BIT_REG = 0x0041,
+HCLGE_OPC_QUERY_64_BIT_REG = 0x0042,
+HCLGE_OPC_DFX_BD_NUM = 0x0043,
+HCLGE_OPC_DFX_BIOS_COMMON_REG = 0x0044,
+HCLGE_OPC_DFX_SSU_REG_0 = 0x0045,
+HCLGE_OPC_DFX_SSU_REG_1 = 0x0046,
+HCLGE_OPC_DFX_IGU_EGU_REG = 0x0047,
+HCLGE_OPC_DFX_RPU_REG_0 = 0x0048,
+HCLGE_OPC_DFX_RPU_REG_1 = 0x0049,
+HCLGE_OPC_DFX_NCSI_REG = 0x004A,
+HCLGE_OPC_DFX_RTC_REG = 0x004B,
+HCLGE_OPC_DFX_PPP_REG = 0x004C,
+HCLGE_OPC_DFX_RCB_REG = 0x004D,
+HCLGE_OPC_DFX_TQP_REG = 0x004E,
+HCLGE_OPC_DFX_SSU_REG_2 = 0x004F,
+HCLGE_OPC_DFX_QUERY_CHIP_CAP = 0x0050,

/* MAC command */
HCLGE_OPC_CONFIG_MAC_MODE = 0x0301,
HCLGE_OPC_CONFIG_AN_MODE = 0x0304,
-HCLGE_OPC_QUERY_AN_RESULT = 0x0306,
HCLGE_OPC_QUERY_LINK_STATUS = 0x0307,
HCLGE_OPC_CONFIG_MAX_FRM_SIZE = 0x0308,
HCLGE_OPC_CONFIG_SPEED_DUP = 0x0309,
/* MACSEC command */
+HCLGE_OPC_ETS_TC_WEIGHT = 0x0843,
+HCLGE_OPC_QSET_DFX_STS = 0x0844,
+HCLGE_OPC_PRI_DFX_STS = 0x0845,
+HCLGE_OPC_PG_DFX_STS = 0x0846,

/* PFC/Pause CMD*/
/* PFC/Pause commands */
+HCLGE_OPC_CFG_MAC_PAUSE_EN = 0x0701,
+HCLGE_OPC_CFG_PFC_PAUSE_EN = 0x0702,
+HCLGE_OPC_CFG_MAC_PARA = 0x0703,
+HCLGE_OPC_PORT_DFX_STS= 0x0847,
+HCLGE_OPC_SCH_NQ_CNT= 0x0848,
+HCLGE_OPC_SCH_RQ_CNT= 0x0849,
+HCLGE_OPC_TM_INTERNAL_STS= 0x0850,
+HCLGE_OPC_TM_INTERNAL_CNT= 0x0851,
+HCLGE_OPC_TM_INTERNAL_STS_1= 0x0852,

-/* Packet buffer allocate command */
+/* Packet buffer allocate commands */
HCLGE_OPC_TX_BUFF_ALLOC= 0x0901,
HCLGE_OPC_RX_PRIV_BUFF_ALLOC= 0x0902,
HCLGE_OPC_RX_PRIV_WL_ALLOC= 0x0903,
@@ -152,14 +158,14 @@
HCLGE_OPC_RX_COM_WL_ALLOC= 0x0905,
HCLGE_OPC_RX_GBL_PKT_CNT= 0x0906,

-/* PTP command */
+/* TQP management command */
HCLGE_OPC_SET_TQP_MAP= 0xA01,

-/* TQP command */
+/* TQP commands */
HCLGE_OPC_CFG_TX_QUEUE= 0xB01,
HCLGE_OPC_QUERY_TX_POINTER= 0xB02,
HCLGE_OPC_QUERY_TX_STATUS= 0xB03,
+HCLGE_OPC_TQP_TX_QUEUE_TC= 0xB04,
HCLGE_OPC_CFG_RX_QUEUE= 0xB11,
HCLGE_OPC_QUERY_RX_POINTER= 0xB12,
HCLGE_OPC_QUERY_RX_STATUS= 0xB13,
@@ -168,10 +174,39 @@
HCLGE_OPC_CFG_COM_TQP_QUEUE= 0xB20,
HCLGE_OPC_RESET_TQP_QUEUE= 0xB22,

-/* TSO cmd */
+/* TSO command */
HCLGE_OPC_TSO_GENERIC_CONFIG= 0xC01,
+HCLGE_OPC_GRO_GENERIC_CONFIG = 0xC10,

-/* RSS cmd */
+/* RSS commands */
HCLGE_OPC_RSS_GENERIC_CONFIG= 0xD01,
HCLGE_OPC_RSS_INDIR_TABLE= 0xD07,
HCLGE_OPC_RSS_TC_MODE= 0xD08,
@@ -180,33 +187,39 @@
HCLGE_OPC_CFG_PROMISC_MODE= 0xE01,

-/* Interrupts cmd */
/* Vlan offload commands */
HCLGE_OPC_VLAN_PORT_TX_CFG = 0x0F01,
HCLGE_OPC_VLAN_PORT_RX_CFG = 0x0F02,

/* Interrupts commands */
HCLGE_OPC_ADD_RING_TO_VECTOR = 0x1503,
HCLGE_OPC_DEL_RING_TO_VECTOR = 0x1504,

/* MAC command */
HCLGE_OPC_MAC_VLAN_ADD = 0x1000,
HCLGE_OPC_MAC_VLAN_REMOVE = 0x1001,
HCLGE_OPC_MAC_VLAN_TYPE_ID = 0x1002,
HCLGE_OPC_MAC_VLAN_INSERT = 0x1003,
HCLGE_OPC_MAC_VLAN_ALLOCATE = 0x1004,
HCLGE_OPC_MAC_ETHTYPE_ADD = 0x1010,
HCLGE_OPC_MAC_ETHTYPE_REMOVE = 0x1011,

/* Multicast linear table cmd */
HCLGE_OPC_MTA_MAC_MODE_CFG = 0x1020,
HCLGE_OPC_MTA_MAC_FUNC_CFG = 0x1021,
HCLGE_OPC_MTA_TBL_ITEM_CFG = 0x1022,
HCLGE_OPC_MTA_TBL_ITEM_QUERY = 0x1023,

/* VLAN command */
HCLGE_OPC_VLAN_FILTER_CTRL = 0x1100,
HCLGE_OPC_VLAN_FILTER_PF_CFG = 0x1101,
HCLGE_OPC_VLAN_FILTER_VF_CFG = 0x1102,

/* Flow Director commands */
HCLGE_OPC_FD_MODE_CTRL = 0x1200,
HCLGE_OPC_FD_GET_ALLOCATION = 0x1201,
HCLGE_OPC_FD_KEY_CONFIG = 0x1202,
HCLGE_OPC_FD_TCAM_OP = 0x1203,
HCLGE_OPC_FD_AD_OP = 0x1204,

/* MDIO command */
HCLGE_OPC_MDIO_CONFIG = 0x1900,

/* QCN command */
HCLGE_OPC_QCN_MOD_CFG = 0x1A01,
HCLGE_OPC_QCN_GRP_TMPLT_CFG = 0x1A02,
HCLGE_OPC_QCN_SHAPING_IR_CFG = 0x1A03,
HCLGE_OPC_QCN_AJUST_INIT = 0x1A07,
HCLGE_OPC_QCN_DFX_CNT_STATUS = 0x1A08,
Mailbox command
HCLGEVF_OPC_MBX_PF_TO_VF = 0x2000,
+
Led command
HCLGE_OPC_LED_STATUS_CFG = 0xB000,
+
SFP command
HCLGE_OPC_SFP_GET_SPEED = 0x7104,
+
Error INT commands
HCLGE_MAC_COMMON_INT_EN = 0x030E,
HCLGE_TM_SCH_ECC_INT_EN = 0x0829,
HCLGE_SSU_ECC_INT_CMD = 0x0989,
HCLGE_SSU_COMMON_INT_CMD = 0x098C,
HCLGE_PPU_MPF_ECC_INT_CMD = 0x0B40,
HCLGE_PPU_MPF_OTHER_INT_CMD = 0x0B41,
HCLGE_PPU_PF_OTHER_INT_CMD = 0x0B42,
HCLGE_COMMON_ECC_INT_CFG = 0x1505,
HCLGE_QUERY_RAS_INT_STS_BD_NUM = 0x1510,
HCLGE_QUERY_CLEAR_MPF_RAS_INT = 0x1511,
HCLGE_QUERY_CLEAR_PF_RAS_INT = 0x1512,
HCLGE_QUERY_MSIX_INT_STS_BD_NUM = 0x1513,
HCLGE_QUERY_CLEAR_ALL_MPF_MSIX_INT = 0x1514,
HCLGE_QUERY_CLEAR_ALL_PF_MSIX_INT = 0x1515,
HCLGE_CONFIG_ROCEE_RAS_INT_EN = 0x1580,
HCLGE_QUERY_CLEAR_ROCEE_RAS_INT = 0x1581,
HCLGE_ROCEE_PF_RAS_INT_CMD = 0x1584,
HCLGE_IGU_EGU_TNL_INT_EN = 0x1803,
HCLGE_IGU_COMMON_INT_EN = 0x1806,
HCLGE_TM_QCN_MEM_INT_CFG = 0x1A14,
HCLGE_PPP_CMD0_INT_CMD = 0x2100,
HCLGE_PPP_CMD1_INT_CMD = 0x2101,
HCLGE_MAC_ETHERTYPE_IDX_RD = 0x2105,
HCLGE_NCSI_INT_EN = 0x2401,
};

#define HCLGE_TQP_REG_OFFSET 0x80000
@@ -369,11 +414,15 @@
__le16 buf_size;
__le16 msixcap_localid_ba_nic;
__le16 msixcap_localid_ba_rocee;
+#define HCLGE_MSIX_OFT_ROCEE_S
+#define HCLGE_MSIX_OFT_ROCEE_M
#define HCLGE_PF_VEC_NUM_S (0xff << HCLGE_PF_VEC_NUM_S)
#define HCLGE_PF_VEC_NUM_M GENMASK(7, 0)

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-#define HCLGE_QUERY_DUPLEX_B
-
-#define HCLGE_QUERY_SPEED_M		GENMASK(4, 0)
-#define HCLGE_QUERY_AN_M		BIT(HCLGE_QUERY_AN_B)
-#define HCLGE_QUERY_DUPLEX_M		BIT(HCLGE_QUERY_DUPLEX_B)
-
-struct hclge_query_an_speed_dup_cmd {
  u8 an_syn_dup_speed;
  u8 pause;
  u8 rsv[23];
};
-
#define HCLGE_RING_ID_MASK		GENMASK(9, 0)
#define HCLGE_TQP_ENABLE_B		0
@@ -549,13 +592,17 @@
  u8      rsv[20];
};
-
-#define HCLGE_MAC_MIN_MTU		64
-#define HCLGE_MAC_MAX_MTU		9728
+struct hclge_sfp_speed_cmd {
+  __le32 sfp_speed;
+  u32 rsv[5];
+};
+
+#define HCLGE_MAC_UPLINK_PORT		0x100

struct hclge_config_max_frm_size_cmd {
  __le16  max_frm_size;
-  u8      rsv[22];
+  u8      min_frm_size;
+  u8      rsv[21];
};

enum hclge_mac_vlan_tbl_opcode {
  @@ -565,13 +612,13 @@
    HCLGE_MAC_VLAN_LKUP,    /* Lookup a entry through mac_vlan key */
};
-
-#define HCLGE_MAC_VLAN_BIT0_EN_B	0x0
-#define HCLGE_MAC_VLAN_BIT1_EN_B	0x1
-#define HCLGE_MAC_EPORT_SW_EN_B		0xc
-#define HCLGE_MAC_EPORT_TYPE_B		0xb
-#define HCLGE_MAC_EPORT_VFID_S		0x3
+#define HCLGE_MAC_VLAN_BIT0_EN_B	0
+#define HCLGE_MAC_VLAN_BIT1_EN_B	1
+#define HCLGE_MAC_EPORT_SW_EN_B		12
+define HCLGE_MAC_EPORT_TYPE_B11
+define HCLGE_MAC_EPORT_VFID_S3
#define HCLGE_MAC_EPORT_VFID_MGENMASK(10, 3)
-#define HCLGE_MAC_EPORT_PFID_S0x0
+#define HCLGE_MAC_EPORT_PFID_S0
#define HCLGE_MAC_EPORT_PFID_MGENMASK(2, 0)
struct hclge_mac_vlan_tbl_entry_cmd {
    u8 flags;
    @ @ -587.28 +634.34 @ @
    u8 rsv2[6];
};

-#define HCLGE_CFG_MTA_MAC_SEL_S0x0
-#define HCLGE_CFG_MTA_MAC_SEL_MGENMASK(1, 0)
-#define HCLGE_CFG_MTA_MAC_EN_B0x7
-struct hclge_mta_filter_mode_cmd {
    u8 mac_sel_en; /* Use lowest 2 bit as sel_mode, bit 7 as enable */
    u8 rsv[23];
};

-#define HCLGE_CFG_FUNC_MTA_ACCEPT_B0x0
-struct hclge_cfg_func_mta_filter_cmd {
    u8 accept; /* Only used lowest 1 bit */
    u8 function_id;
    u8 rsv[22];
};

-#define HCLGE_CFG_MTA_ITEM_ACCEPT_B0x0
-define HCLGE_CFG_MTA_ITEM_IDX_S0x0
-define HCLGE_CFG_MTA_ITEM_IDX_MGENMASK(11, 0)
-struct hclge_cfg_func_mta_item_cmd {
    __le16 item_idx; /* Only used lowest 12 bit */
    u8 accept; /* Only used lowest 1 bit */
    u8 rsv[21];
}+
#define HCLGE_UMV_SPC_ALC_B0x0
+struct hclge_umd_spc_alc_cmd {
    u8 allocate;
    u8 rsv1[3];
    + __le32 space_size;
    u8 rsv2[16];
};

+define HCLGE_MAC_MGR_MASK_VLAN_B BIT(0)
+define HCLGE_MAC_MGR_MASK_MAC_B BIT(1)
+define HCLGE_MAC_MGR_MASK_ETHERTYPE_B BIT(2)
+define HCLGE_MAC_ETHERTYPE_LLDP 0x88cc
+
+struct hclge_mac_mgr_tbl_entry_cmd {
union {
    u8 flags;
    u8 resp_code;
    __le16 vlan_tag;
    __le32 mac_addr_hi32;
    __le16 mac_addr_lo16;
    __le16 rsv1;
    __le16 ether_type;
    __le16 egress_port;
    __le16 egress_queue;
    u8 sw_port_id_aware;
    u8 rsv2;
    u8 i_port_bitmap;
    u8 i_port_direction;
    u8 rsv3[2];
};

struct hclge_mac_vlan_add_cmd {
    @ @ -658.6 +711.50 @@
    u8 vf_bitmap[16];
}:

#define HCLGE_ACCEPT_TAG1_B		0
#define HCLGE_ACCEPT_UNTAG1_B		1
#define HCLGE_PORT_INS_TAG1_EN_B	2
#define HCLGE_PORT_INS_TAG2_EN_B	3
#define HCLGE_CFG_NIC_ROCE_SEL_B	4
#define HCLGE_ACCEPT_TAG2_B		5
#define HCLGE_ACCEPT_UNTAG2_B		6

struct hclge_vport_vtag_tx_cfg_cmd {
    u8 vport_vlan_cfg;
    u8 vf_offset;
    u8 rsv1[2];
    __le16 def_vlan_tag1;
    __le16 def_vlan_tag2;
    u8 vf_bitmap[8];
    u8 rsv2[8];
    +};

#define HCLGE_REM_TAG1_EN_B		0
#define HCLGE_REM_TAG2_EN_B		1
#define HCLGE_SHOW_TAG1_EN_B		2
#define HCLGE_SHOW_TAG2_EN_B		3

struct hclge_vport_vtag_rx_cfg_cmd {
    u8 vport_vlan_cfg;
    u8 vf_offset;
    u8 rsv1[6];
    u8 vf_bitmap[8];
+u8 rsv2[8];
+
+struct hclge_tx_vlan_type_cfg_cmd {
+  __le16 ot_vlan_type;
+  __le16 in_vlan_type;
+  u8 rsv[20];
+};
+
+struct hclge_rx_vlan_type_cfg_cmd {
+  __le16 ot_fst_vlan_type;
+  __le16 ot_sec_vlan_type;
+  __le16 in_fst_vlan_type;
+  __le16 in_sec_vlan_type;
+  u8 rsv[16];
+};
+
+struct hclge_cfg_com_tqp_queue_cmd {
+  __le16 tqp_id;
+  __le16 stream_id;
@@ -674,6 +771,24 @@
+  u8 rsv[14];
+};
+
+ #pragma pack(1)
+ struct hclge_mac_ethertype_idx_rd_cmd {
+  u8 flags;
+  u8 resp_code;
+  __le16 vlan_tag;
+  u8  mac_add[6];
+  __le16 index;
+  __le16 ethertype;
+  __le16 egress_port;
+  __le16 egress_queue;
+  __le16 rev0;
+  u8 i_port_bitmap;
+  u8 i_port_direction;
+  u8 rev1[2];
+  
+};
+
+ #pragma pack()
+
+#define HCLGE_TSO_MSS_MIN_S 0
+#define HCLGE_TSO_MSS_MIN_M GENMASK(13, 0)

@@ -686,6 +801,12 @@
+ u8 rsv[20];
+define HCLGE_GRO_EN_B0
+struct hclge_cfg_gro_status_cmd {
+__le16 gro_en;
+u8 rsv[22];
+};
+
#define HCLGE_TSO_MSS_MIN256
#define HCLGE_TSO_MSS_MAX9668

@@ -704,10 +825,23 @@
    u8 fun_reset_vfid;
    u8 rsv[22];
    ];
+     +#define HCLGE_CMD_SERDES_SERIAL_INNER_LOOP_BBIT(0)
+     +#define HCLGE_CMD_SERDES_PARALLEL_INNER_LOOP_BBIT(2)
+     +#define HCLGE_CMD_SERDES_DONE_BBIT(0)
+     +#define HCLGE_CMD_SERDES_SUCCESS_BBIT(1)
+     +struct hclge_serdes_lb_cmd {
+     +u8 mask;
+     +u8 enable;
+     +u8 result;
+     +u8 rsv[21];
+     +};
+     +
+     +#define HCLGE_DEFAULT_TX_BUF		0x4000 /* 16k bytes */
+     +#define HCLGE_TOTAL_PKT_BUF		0x108000 /* 1.03125M bytes */
+     +#define HCLGE_DEFAULT_DV		0xA000	 /* 40k byte */
+     +#define HCLGE_DEFAULT_NON_DCB_DV	0x7800	/* 30K byte */
+     +#define HCLGE_NON_DCB_ADDITIONAL_BUF	0x200	/* 512 byte */

#define HCLGE_TYPE_CRQ			0
#define HCLGE_TYPE_CSQ			1
@@ -726,6 +860,85 @@
     +#define HCLGE_NIC_CMQ_DESC_NUM	1024
     +#define HCLGE_NIC_CMQ_DESC_NUM_S	3

+     +#define HCLGE_LED_LOCATE_STATE_S0
+     +#define HCLGE_LED_LOCATE_STATE_MGENMASK(1, 0)
+     +
+     +struct hclge_set_led_state_cmd {
+     +u8 rsv1[3];
+     +u8 locate_led_config;
+     +u8 rsv2[20];
+     +};
+     +
+     +struct hclge_get_fd_mode_cmd {

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+u8 mode;
+u8 enable;
+u8 rsv[22];
+};
+
+struct hclge_get_fd_allocation_cmd {
+__le32 stage1_entry_num;
+__le32 stage2_entry_num;
+__le16 stage1_counter_num;
+__le16 stage2_counter_num;
+u8 rsv[12];
+};
+
+struct hclge_set_fd_key_config_cmd {
+u8 stage;
+u8 key_select;
+u8 inner_sipv6_word_en;
+u8 inner_dipv6_word_en;
+u8 outer_sipv6_word_en;
+u8 outer_dipv6_word_en;
+u8 rsv1[2];
+__le32 tuple_mask;
+__le32 meta_data_mask;
+u8 rsv2[8];
+};
+
+#define HCLGE_FD_EPORT_SW_EN_B
+struct hclge_fd_tcam_config_1_cmd {
+u8 stage;
+u8 xy_sel;
+u8 port_info;
+u8 rsv1[1];
+__le32 index;
+u8 entry_vld;
+u8 rsv2[7];
+u8 tcam_data[8];
+};
+
+struct hclge_fd_tcam_config_2_cmd {
+u8 tcam_data[24];
+};
+
+struct hclge_fd_tcam_config_3_cmd {
+u8 tcam_data[20];
+u8 rsv[4];
+};
+
+#define HCLGE_FD_AD_DROP_B
+\#define HCLGE_FD_AD_DIRECT_QID_B1
+\#define HCLGE_FD_AD_QID_S2
+\#define HCLGE_FD_AD_QID_MGENMASK(12, 2)
+\#define HCLGE_FD_AD_USE_COUNTER_B12
+\#define HCLGE_FD_AD_COUNTER_NUM_S13
+\#define HCLGE_FD_AD_COUNTER_NUM_MGENMASK(20, 13)
+\#define HCLGE_FD_AD_NXT_STEP_B20
+\#define HCLGE_FD_AD_NXT_KEY_S21
+\#define HCLGE_FD_AD_NXT_KEY_MGENMASK(26, 21)
+\#define HCLGE_FD_AD_WR_RULE_ID_B0
+\#define HCLGE_FD_AD_RULE_ID_S1
+\#define HCLGE_FD_AD_RULE_ID_MGENMASK(13, 1)
+
+struct hclge_fd_ad_config_cmd {
+u8 stage;
+u8 rsv1[3];
+__le32 index;
+__le64 ad_data;
+u8 rsv2[8];
+};
+
+int hclge_cmd_init(struct hclge_dev *hdev);
+static inline void hclge_write_reg(void __iomem *base, u32 reg, u32 value)
+{ ...
static int hclge_dcb_common_validate(struct hclge_dev *hdev, u8 num_tc,
   u8 *prio_tc)
{
    int i;

    if (num_tc > hdev->tc_max) {
      dev_err(&hdev->pdev->dev,
        "tc num checking failed, %u > tc_max(%u)\n",
        num_tc, hdev->tc_max);
      return -EINVAL;
    }

    for (i = 0; i < HNAE3_MAX_USER_PRIO; i++) {
      if (prio_tc[i] >= num_tc) {
        dev_err(&hdev->pdev->dev,
          "prio_tc[%u] checking failed, %u >= num_tc(%u)\n",
          i, prio_tc[i], num_tc);
        return -EINVAL;
      }
    }

    for (i = 0; i < hdev->num_alloc_vport; i++) {
      if (num_tc > hdev->vport[i].alloc_tqps) {
        dev_err(&hdev->pdev->dev,
          "allocated tqp(%u) checking failed, %u > tqp(%u)\n",
          i, num_tc, hdev->vport[i].alloc_tqps);
        return -EINVAL;
      }
    }

    return 0;
}

static int hclge_ets_validate(struct hclge_dev *hdev, struct ieee_ets *ets,
   u8 *tc, bool *changed)
{
  bool has_ets_tc = false;
  u32 total_ets_bw = 0;
  u8 max_tc = 0;
  int ret;
  u8 i;


```c
-for (i = 0; i < HNAE3_MAX_TC; i++) {
-    if (ets->prio_tc[i] >= hdev->tc_max ||
-        i >= hdev->tc_max)
-        return -EINVAL;
-
+for (i = 0; i < HNAE3_MAX_USER_PRIO; i++) {
        if (ets->prio_tc[i] != hdev->tm_info.prio_tc[i])
            *changed = true;

        if (ets->prio_tc[i] > max_tc)
            max_tc = ets->prio_tc[i];
+
+    ret = hclge_dcb_common_validate(hdev, max_tc + 1, ets->prio_tc);
+    if (ret)
+        return ret;
+    for (i = 0; i < hdev->tc_max; i++) {
        switch (ets->tc_tsa[i]) {
            case IEEE_8021QAZ_TSA_STRICT:
            if (hdev->tm_info.tc_info[i].tc_sch_mode !=
@@ -101,18 +134,28 @@
                *changed = true;
                break;
            case IEEE_8021QAZ_TSA_ETS:
                /* The hardware will switch to sp mode if bandwidth is
                + 0, so limit ets bandwidth must be greater than 0.
                + */
                if (!ets->tc_tx_bw[i]) {
                    dev_err(&hdev->pdev->dev,
                        "tc%u ets bw cannot be 0\n", i);
                    return -EINVAL;
                }
            +
            +    if (hdev->tm_info.tc_info[i].tc_sch_mode !=
            + HCLGE_SCH_MODE_DWRR)
            +        *changed = true;
            +
            +        total_ets_bw += ets->tc_tx_bw[i];
            -break;
            +has_ets_tc = true;
            +break;
            default:
            return -EINVAL;
        }
    }
```
if (total_ets_bw != BW_PERCENT)
+if (has_ets_tc && total_ets_bw != BW_PERCENT)
return -EINVAL;

*tc = max_tc + 1;
@@ -144,6 +187,8 @@
if (ret)
    return ret;

+hc Kanye ed initi熛 cfg(hdev);
+ return hc Kanye ed init_hw(hdev);
}
@@ -203,23 +248,28 @@
static int hc Kanye ieee_getpfc(struct hnae3_handle *h, struct ieee_pfc *pfc)
{
    u64 requests[HNAE3_MAX_TC], indications[HNAE3_MAX_TC];
    struct hc Kanye_vport *vport = hc Kanye get_vport(h);
    struct hc Kanye dev *hdev = vport->back;
    u8 i, j, pfc_map, *prio_tc;
    int ret;
    u8 i;

    memset(pfc, 0, sizeof(*pfc));
    pfc->pfc_cap = hdev->pfc_max;
    -prio_tc = hdev->tm_info.prio_tc;
    -pfc_map = hdev->tm_info.hw_pfc_map;
+ret = hc Kanye pfc_tx_stats_get(hdev, requests);
+if (ret)
+    return ret;
+ret = hc Kanye pfc_rx_stats_get(hdev, indications);
+if (ret)
+    return ret;
+
+for (i = 0; i < HCLGE_MAX_TC_NUM; i++) {
+    pfc->requests[i] = requests[i];
+}
+indications[i] = indications[i];
+
return 0;
}

return -EINVAL;

+if (pfc->pfc_en == hdev->tm_info.pfc_en)
+return 0;
+
prio_tc = hdev->tm_info.prio_tc;

hdev->tm_info.pfc_en = pfc->pfc_en;

return hclge_pause_setup_hw(hdev);
}

-@ @ -245,10 +298,8 @@

-if (pfc_map == hdev->tm_info.hw_pfc_map)
-return 0;
-
-hdev->tm_info.hw_pfc_map = pfc_map;
+hdev->tm_info.pfc_en = pfc->pfc_en;

return -EINVAL;

-if (tc > hdev->tc_max) {
-dev_err(&hdev->pdev->dev,
-"setup tc failed, tc(%u) > tc_max(%u)\n",
-tc, hdev->tc_max);
+return -EINVAL;
+
return -EINVAL;
-
-hclge_tm_schd_info_update(hdev, tc);
-
-hclge_tm_prio_tc_info_update(hdev, prio_tc);
+
return -EINVAL;
-
-hclge_tm_init_hw(hdev);
-
ret = hclge_tm_prio_tc_info_update(hdev, prio_tc);
+if (ret)
return -EINVAL;
-

hclge_tm_schd_info_update(hdev, tc);
-
-ret = hclge_tm_prio_tc_info_update(hdev, prio_tc);
-if (ret)
-return ret;
+
hclge_tm_prio_tc_info_update(hdev, prio_tc);
+
ret = hclge_tm_init_hw(hdev);
if (ret)
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_dcb.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_dcb.h
@@ -1,11 +1,5 @@
-/*
- * Copyright (c) 2016~2017 Hisilicon Limited.
- *
- * This program is free software; you can redistribute it and/or modify
- * it under the terms of the GNU General Public License as published by
- * the Free Software Foundation; either version 2 of the License, or
- * (at your option) any later version.
- */
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.

#ifndef __HCLGE_DCB_H__
#define __HCLGE_DCB_H__
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_debugfs.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_debugfs.c
@@ -0,0 +1,933 @@
+// SPDX-License-Identifier: GPL-2.0+
+/* Copyright (c) 2018-2019 Hisilicon Limited. */
+
+#include <linux/device.h>
+
+#include "hclge_debugfs.h"
+#include "hclge_cmd.h"
+#include "hclge_main.h"
+#include "hclge_tm.h"
+#include "hnae3.h"
+
+static int hclge_dbg_get_dfx_bd_num(struct hclge_dev *hdev, int offset)
+{
+    struct hclge_desc desc[4];
+    int ret;
+    +hclge_cmd_setup_basic_desc(&desc[0], HCLGE_OPC_DFX_BD_NUM, true);
+    +desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+    +hclge_cmd_setup_basic_desc(&desc[1], HCLGE_OPC_DFX_BD_NUM, true);
+    +desc[1].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+    +hclge_cmd_setup_basic_desc(&desc[2], HCLGE_OPC_DFX_BD_NUM, true);
+    +desc[2].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+    +hclge_cmd_setup_basic_desc(&desc[3], HCLGE_OPC_DFX_BD_NUM, true);
+    +ret = hclge_cmd_send(&hdev->hw, desc, 4);
+    +if (ret != HCLGE_CMD_EXEC_SUCCESS) {
+        dev_err(&hdev->pdev->dev, "get dfx bdnum fail, status is %d\n", ret);
+        return -1;
+    }

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return ret;
+
+return (int)desc[offset / 6].data[offset % 6];
+
+static int hclge_dbg_cmd_send(struct hclge_dev *hdev,
+  struct hclge_desc *desc_src,
+  int index, int bd_num,
+  enum hclge_opcode_type cmd)
+{
+  struct hclge_desc *desc = desc_src;
+  int ret, i;
+
+  hclge_cmd_setup_basic_desc(desc, cmd, true);
+  desc->data[0] = cpu_to_le32(index);
+
+  for (i = 1; i < bd_num; i++) {
+    desc->flag = cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+    desc++;
+    hclge_cmd_setup_basic_desc(desc, cmd, true);
+  }
+
+  ret = hclge_cmd_send(&hdev->hw, desc_src, bd_num);
+  if (ret) {
+    dev_err(&hdev->pdev->dev,
+      "read reg cmd send fail, status is %d\n", ret);
+    return ret;
+  }
+
+  return ret;
+
+static void hclge_dbg_dump_reg_common(struct hclge_dev *hdev,
+  struct hclge_dbg_dfx_message *dfx_message,
+  char *cmd_buf, int msg_num, int offset,
+  enum hclge_opcode_type cmd)
+{
+  struct hclge_desc *desc_src;
+  struct hclge_desc *desc;
+  int bd_num, buf_len;
+  int ret, i;
+  int index;
+  int max;
+
+  ret = kstrtouint(cmd_buf, 10, &index);
+  index = (ret != 0) ? 0 : index;
bd_num = hclge_dbg_get_dfx_bd_num(hdev, offset);
+if (bd_num <= 0)
+return;
+
+buf_len = sizeof(struct hclge_desc) * bd_num;
+desc_src = kzalloc(buf_len, GFP_KERNEL);
+if (!desc_src)
+dev_err(&hdev->pdev->dev, "call kzalloc failed\n");
+return;
+
+desc = desc_src;
+ret  = hclge_dbg_cmd_send(hdev, desc, index, bd_num, cmd);
+if (ret != HCLGE_CMD_EXEC_SUCCESS) {
+kfree(desc_src);
+return;
+}
+
+max = (bd_num * 6) <= msg_num ? (bd_num * 6) : msg_num;
+
+desc = desc_src;
+for (i = 0; i < max; i++) {
+((i / 6) > 0) && ((i % 6) == 0)) ? desc++ : desc;
+if (dfx_message->flag)
+dev_info(&hdev->pdev->dev, "%s: 0x%x
",
+ dfx_message->message, desc->data[i % 6]);
+
+dfx_message++;
+}
+
+kfree(desc_src);
+
+static void hclge_dbg_dump_dcb(struct hclge_dev *hdev, char *cmd_buf)
+{
+struct device *dev = &hdev->pdev->dev;
+struct hclge_dbg_bitmap_cmd *bitmap;
+int rq_id, pri_id, qset_id;
+int port_id, nq_id, pg_id;
+struct hclge_desc desc[2];
+
+cnt = sscanf(cmd_buf, "%i %i %i %i %i %i",
+ &port_id, &pri_id, &pg_id, &rq_id, &nq_id, &qset_id);
+if (cnt != 6) {
+dev_err(&hdev->pdev->dev,
+"dump dcb: bad command parameter, cnt=%d\n", cnt);
return;
+
ret = hclge_dbg_cmd_send(hdev, desc, qset_id, 1, HCLGE_OPC_QSET_DFX_STS);
+if (ret)
+return;
+
+bitmap = (struct hclge_dbg_bitmap_cmd *)&desc[0].data[1];
+dev_info(dev, "roce_qset_mask: 0x%x\n", bitmap->bit0);
+dev_info(dev, "nic_qs_mask: 0x%x\n", bitmap->bit1);
+dev_info(dev, "qs_shaping_pass: 0x%x\n", bitmap->bit2);
+dev_info(dev, "qs_bp_sts: 0x%x\n", bitmap->bit3);
+
+ret = hclge_dbg_cmd_send(hdev, desc, pri_id, 1, HCLGE_OPC_PRI_DFX_STS);
+if (ret)
+return;
+
+bitmap = (struct hclge_dbg_bitmap_cmd *)&desc[0].data[1];
+dev_info(dev, "pri_mask: 0x%x\n", bitmap->bit0);
+dev_info(dev, "pri_cshaping_pass: 0x%x\n", bitmap->bit1);
+dev_info(dev, "pri_pshaping_pass: 0x%x\n", bitmap->bit2);
+
+ret = hclge_dbg_cmd_send(hdev, desc, pg_id, 1, HCLGE_OPC_PG_DFX_STS);
+if (ret)
+return;
+
+bitmap = (struct hclge_dbg_bitmap_cmd *)&desc[0].data[1];
+dev_info(dev, "pg_mask: 0x%x\n", bitmap->bit0);
+dev_info(dev, "pg_cshaping_pass: 0x%x\n", bitmap->bit1);
+dev_info(dev, "pg_pshaping_pass: 0x%x\n", bitmap->bit2);
+
+ret = hclge_dbg_cmd_send(hdev, desc, port_id, 1, HCLGE_OPC_PORT_DFX_STS);
+if (ret)
+return;
+
+bitmap = (struct hclge_dbg_bitmap_cmd *)&desc[0].data[1];
+dev_info(dev, "port_mask: 0x%x\n", bitmap->bit0);
+dev_info(dev, "port_shaping_pass: 0x%x\n", bitmap->bit1);
+if (ret)
+return;
+
+dev_info(dev, "sch_rq_cnt: 0x%x\n", desc[0].data[1]);
+
+ret = hclge_dbg_cmd_send(hdev, desc, 0, 2, HCLGE_OPC_TM_INTERNAL_STS);
+if (ret)
+return;
+
+dev_info(dev, "pri_bp: 0x%x\n", desc[0].data[1]);
+dev_info(dev, "fifo_dfx_info: 0x%x\n", desc[0].data[2]);
+dev_info(dev, "sch_roce_fifo_afull_gap: 0x%x\n", desc[0].data[3]);
+dev_info(dev, "tx_private_waterline: 0x%x\n", desc[0].data[4]);
+dev_info(dev, "tm_bypass_en: 0x%x\n", desc[0].data[5]);
+dev_info(dev, "SSU_TM_BYPASS_EN: 0x%x\n", desc[1].data[0]);
+dev_info(dev, "SSU_RESERVE_CFG: 0x%x\n", desc[1].data[1]);
+
+ret = hclge_dbg_cmd_send(hdev, desc, port_id, 1,
+HCLGE_OPC_TM_INTERNAL_CNT);
+if (ret)
+return;
+
+dev_info(dev, "SCH_NIC_NUM: 0x%x\n", desc[0].data[1]);
+dev_info(dev, "SCH_ROCE_NUM: 0x%x\n", desc[0].data[2]);
+
+ret = hclge_dbg_cmd_send(hdev, desc, port_id, 1,
+HCLGE_OPC_TM_INTERNAL_STS_1);
+if (ret)
+return;
+
+dev_info(dev, "TC_MAP_SEL: 0x%x\n", desc[0].data[1]);
+dev_info(dev, "IGU_PFC_PRI_EN: 0x%x\n", desc[0].data[2]);
+dev_info(dev, "MAC_PFC_PRI_EN: 0x%x\n", desc[0].data[3]);
+dev_info(dev, "IGU_PRI_MAP_TC_CFG: 0x%x\n", desc[0].data[4]);
+dev_info(dev, "IGU_TX_PRI_MAP_TC_CFG: 0x%x\n", desc[0].data[5]);
+
+static void hclge_dbg_dump_reg_cmd(struct hclge_dev *hdev, char *cmd_buf)
+{
+int msg_num;
+
+if (strcmp(&cmd_buf[9], "bios common", 11) == 0) {
+msg_num = sizeof(hclge_dbg_bios_common_reg) /
+sizeof(struct hclge_dbg_dfx_message);
+hclge_dbg_dump_reg_common(hdev, hclge_dbg_bios_common_reg,
+cmd_buf[21], msg_num,
+HCLGE_DBG_DFX_BIOS_OFFSET,
+HCLGE_OPC_DFX_BIOS_COMMON_REG);
+} else if (strncmp(&cmd_buf[9], "ssu", 3) == 0) {
+    msg_num = sizeof(hclge_dbg_ssu_reg_0) / 
+             sizeof(struct hclge_dbg_dfx_message);
+    hclge_dbg_dump_reg_common(hdev, hclge_dbg_ssu_reg_0, 
+                              &cmd_buf[13], msg_num, 
+                              HCLGE_DBG_DFX_SSU_0_OFFSET, 
+                              HCLGE_OPC_DFX_SSU_REG_0);
+    
+    msg_num = sizeof(hclge_dbg_ssu_reg_1) / 
+             sizeof(struct hclge_dbg_dfx_message);
+    hclge dbg_dump_reg_common(hdev, hclge_dbg_ssu_reg_1, 
+                              &cmd_buf[13], msg_num, 
+                              HCLGE_DBG_DFX_SSU_1_OFFSET, 
+                              HCLGE_OPC_DFX_SSU_REG_1);
+    
+    msg_num = sizeof(hclge_dbg_ssu_reg_2) / 
+             sizeof(struct hclge_dbg_dfx_message);
+    hclge dbg_dump_reg_common(hdev, hclge_dbg_ssu_reg_2, 
+                              &cmd_buf[13], msg_num, 
+                              HCLGE_DBG_DFX_SSU_2_OFFSET, 
+                              HCLGE_OPC_DFX_SSU_REG_2);
+} else if (strncmp(&cmd_buf[9], "igu egu", 7) == 0) {
+    msg_num = sizeof(hclge_dbg_igu_egu_reg) / 
+              sizeof(struct hclge_dbg_dfx_message);
+    hclge dbg_dump_reg_common(hdev, hclge_dbg_igu_egu_reg, 
+                              &cmd_buf[17], msg_num, 
+                              HCLGE_DBG_DFX_IGU_OFFSET, 
+                              HCLGE_OPC_DFX_IGU_EGU_REG);
+} else if (strncmp(&cmd_buf[9], "rpu", 3) == 0) {
+    msg_num = sizeof(hclge_dbg_rpu_reg_0) / 
+              sizeof(struct hclge_dbg_dfx_message);
+    hclge dbg_dump_reg_common(hdev, hclge_dbg_rpu_reg_0, 
+                              &cmd_buf[13], msg_num, 
+                              HCLGE_DBG_DFX_RPU_0_OFFSET, 
+                              HCLGE_OPC_DFX_RPU_REG_0);
+    
+    msg_num = sizeof(hclge_dbg_rpu_reg_1) / 
+              sizeof(struct hclge_dbg_dfx_message);
+    hclge dbg_dump_reg_common(hdev, hclge_dbg_rpu_reg_1, 
+                              &cmd_buf[13], msg_num, 
+                              HCLGE_DBG_DFX_RPU_1_OFFSET, 
+                              HCLGE_OPC_DFX_RPU_REG_1);
+} else if (strncmp(&cmd_buf[9], "ncsi", 4) == 0) {
+    msg_num = sizeof(hclge_dbg_ncsi_reg) / 
+              sizeof(struct hclge_dbg_dfx_message);
+    hclge dbg_dump_reg_common(hdev, hclge_dbg_ncsi_reg, 
+                              &cmd_buf[14], msg_num, 
+                              HCLGE_DBG_DFX_NCSI_OFFSET,
+ HCLGE_OPC_DFX_NCSI_REG;
+ } else if (strncmp(&cmd_buf[9], "rtc", 3) == 0) {
+ msg_num = sizeof(hclge_dbg_rtc_reg) /
+ sizeof(struct hclge_dbg_dfx_message);
+ hclge_dbg_dump_reg_common(hdev, hclge_dbg_rtc_reg,
+ &cmd_buf[13], msg_num,
+ HCLGE_DBG_DFX_RTC_OFFSET,
+ HCLGE_OPC_DFX_RTC_REG);
+ } else if (strncmp(&cmd_buf[9], "ppp", 3) == 0) {
+ msg_num = sizeof(hclge_dbg_ppp_reg) /
+ sizeof(struct hclge_dbg_dfx_message);
+ hclge_dbg_dump_reg_common(hdev, hclge_dbg_ppp_reg,
+ &cmd_buf[13], msg_num,
+ HCLGE_DBG_DFX_PPP_OFFSET,
+ HCLGE_OPC_DFX_PPP_REG);
+ } else if (strncmp(&cmd_buf[9], "rcb", 3) == 0) {
+ msg_num = sizeof(hclge_dbg_rcb_reg) /
+ sizeof(struct hclge_dbg_dfx_message);
+ hclge_dbg_dump_reg_common(hdev, hclge_dbg_rcb_reg,
+ &cmd_buf[13], msg_num,
+ HCLGE_DBG_DFX_RCB_OFFSET,
+ HCLGE_OPC_DFX_RCB_REG);
+ } else if (strncmp(&cmd_buf[9], "tqp", 3) == 0) {
+ msg_num = sizeof(hclge_dbg_tqp_reg) /
+ sizeof(struct hclge_dbg_dfx_message);
+ hclge_dbg_dump_reg_common(hdev, hclge_dbg_tqp_reg,
+ &cmd_buf[13], msg_num,
+ HCLGE_DBG_DFX_TQP_OFFSET,
+ HCLGE_OPC_DFX_TQP_REG);
+ } else if (strncmp(&cmd_buf[9], "dcb", 3) == 0) {
+ hclge_dbg_dump_dcb(hdev, &cmd_buf[13]);
+ } else {
+ dev_info(&hdev->pdev->dev, "unknown command\n");
+ return;
+ }
+ }
+ 
+ static void hclge_title_idx_print(struct hclge_dev *hdev, bool flag, int index,
+ char *title_buf, char *true_buf,
+ char *false_buf)
+ {
+ if (flag)
+ dev_info(&hdev->pdev->dev, "%s(%d): %s\n", title_buf, index,
+ true_buf);
+ else
+ dev_info(&hdev->pdev->dev, "%s(%d): %s\n", title_buf, index,
+ false_buf);
+ 
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+static void hclge_dbg_dump_tc(struct hclge_dev *hdev)
+{
+struct hclge_ets_tc_weight_cmd *ets_weight;
+struct hclge_desc desc;
+int i, ret;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_ETS_TC_WEIGHT, true);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(&hdev->pdev->dev, "dump tc fail, status is %d\n", ret);
+return;
+}
+
+ets_weight = (struct hclge_ets_tc_weight_cmd *)desc.data;
+
+dev_info(&hdev->pdev->dev, "dump tc\n");
+dev_info(&hdev->pdev->dev, "weight_offset: %u\n",
+ets_weight->weight_offset);
+
+for (i = 0; i < HNAE3_MAX_TC; i++)
+hclge_title_idx_print(hdev, ets_weight->tc_weight[i], i,
+ "tc", "no sp mode", "sp mode");
+
+
+static void hclge_dbg_dump_tm_pg(struct hclge_dev *hdev)
+{
+struct hclge_port_shapping_cmd *port_shap_cfg_cmd;
+struct hclge_bp_to_qs_map_cmd *bp_to_qs_map_cmd;
+struct hclge_pg_shapping_cmd *pg_shap_cfg_cmd;
+enum hclge_opcode_type cmd;
+struct hclge_desc desc;
+int ret;
+
+cmd = HCLGE_OPC_TM_PG_C_SHAPPING;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_pg_cmd_send;
+
+pg_shap_cfg_cmd = (struct hclge_pg_shapping_cmd *)desc.data;
+
+dev_info(&hdev->pdev->dev, "PG_C pg_id: %u\n", pg_shap_cfg_cmd->pg_id);
+dev_info(&hdev->pdev->dev, "PG_C pg_shapping: 0x%x\n",
+pg_shap_cfg_cmd->pg_shapping_para);
+
+cmd = HCLGE_OPC_TM_PG_P_SHAPPING;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_pg_cmd_send;
+
++pg_shap_cfg_cmd = (struct hclge_pg_shapping_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "PG_P pg_id: %u\n", pg_shap_cfg_cmd->pg_id);
+dev_info(&hdev->pdev->dev, "PG_P pg_shapping: 0x%x\n",
+ pg_shap_cfg_cmd->pg_shapping_para);
+
++cmd = HCLGE_OPC_TM_PORT_SHAPPING;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_pg_cmd_send;
+
++port_shap_cfg_cmd = (struct hclge_port_shapping_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "PORT port_shapping: 0x%x\n",
+ port_shap_cfg_cmd->port_shapping_para);
+
++cmd = HCLGE_OPC_TM_PG_SCH_MODE_CFG;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_pg_cmd_send;
+
++dev_info(&hdev->pdev->dev, "PG_SCH pg_id: %u\n", desc.data[0]);
+
++cmd = HCLGE_OPC_TM_PRI_SCH_MODE_CFG;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_pg_cmd_send;
+
++dev_info(&hdev->pdev->dev, "PRI_SCH pg_id: %u\n", desc.data[0]);
+
++cmd = HCLGE_OPC_TM_QS_SCH_MODE_CFG;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_pg_cmd_send;
+
++dev_info(&hdev->pdev->dev, "QS_SCH pg_id: %u\n", desc.data[0]);
+
++cmd = HCLGE_OPC_TM_BP_TO_QSET_MAPPING;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_pg_cmd_send;
+
bp_to_qs_map_cmd = (struct hclge_bp_to_qs_map_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "BP_TO_QSET pg_id: %u\n",
+ bp_to_qs_map_cmd->tc_id);
+dev_info(&hdev->pdev->dev, "BP_TO_QSET pg_shapping: 0x%x\n",
+ bp_to_qs_map_cmd->qs_group_id);
+dev_info(&hdev->pdev->dev, "BP_TO_QSET qs_bit_map: 0x%x\n",
+ bp_to_qs_map_cmd->qs_bit_map);
+return;
+
+err_tm_pg_cmd_send:
+dev_err(&hdev->pdev->dev, "dump tm_pg fail(0x%x), status is %d\n",
+cmd, ret);
+}
+
+static void hclge_dbg_dump_tm(struct hclge_dev *hdev)
+{
+struct hclge_priority_weight_cmd *priority_weight;
+struct hclge.pg_to_pri_link_cmd *pg_to_pri_map;
+struct hclge_qs_to_pri_link_cmd *qs_to_pri_map;
+struct hclge_nq_to_qs_link_cmd *nq_to_qs_map;
+struct hclge_pri_shapping_cmd *shap_cfg_cmd;
+struct hclge.pg_weight_cmd *pg_weight;
+struct hclge_qs_weight_cmd *qs_weight;
+enum hclgeOpcode_type cmd;
+struct hclge_desc desc;
+int ret;
+
+cmd = HCLGE_OPCODE_TM_PG_TO_PRI_LINK;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_cmd_send;
+
+pg_to_pri_map = (struct hclge.pg_to_pri_link_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "dump tm_pg\n");
+dev_info(&hdev->pdev->dev, "GP_TO_PRI gp_id: %u\n",
+ pg_to_pri_map->pg_id);
+dev_info(&hdev->pdev->dev, "GP_TO_PRI map: 0x%x\n",
+ pg_to_pri_map->pri_bit_map);
+
+cmd = HCLGE_OPCODE_TM_QS_TO_PRI_LINK;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_cmd_send;
+
+qs_to_pri_map = (struct hclge_qs_to_pri_link_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "QS_TO_PRI qs_id: %u
",
+ qs_to_pri_map->qs_id);
+dev_info(&hdev->pdev->dev, "QS_TO_PRI priority: %u
",
+ qs_to_pri_map->priority);
+dev_info(&hdev->pdev->dev, "QS_TO_PRI link_vld: %u
",
+ qs_to_pri_map->link_vld);
+
+cmd = HCLGE_OPC_TM_NQ_TO_QS_LINK;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_cmd_send;
+
+nq_to_qs_map = (struct hclge_nq_to_qs_link_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "NQ_TO_QS nq_id: %u
", nq_to_qs_map->nq_id);
+dev_info(&hdev->pdev->dev, "NQ_TO_QS qset_id: %u
",
+ nq_to_qs_map->qset_id);
+
+cmd = HCLGE_OPC_TM_PG_WEIGHT;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_cmd_send;
+
+pg_weight = (struct hclge_pg_weight_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "PG pg_id: %u
", pg_weight->pg_id);
+dev_info(&hdev->pdev->dev, "PG dwrr: %u
", pg_weight->dwrr);
+
+cmd = HCLGE_OPC_TM_QS_WEIGHT;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_cmd_send;
+
+qs_weight = (struct hclge_qs_weight_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "QS qs_id: %u
", qs_weight->qs_id);
+dev_info(&hdev->pdev->dev, "QS dwrr: %u
", qs_weight->dwrr);
+
+cmd = HCLGE_OPC_TM_PRI_WEIGHT;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_cmd_send;
+
+priority_weight = (struct hclge_priority_weight_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "PRI pri_id: %u
", priority_weight->pri_id);
+dev_info(&hdev->pdev->dev, "PRI dwrr: %u
", priority_weight->dwrr);
cmd = HCLGE_OPC_TM_PRI_C_SHAPPING;
hclge_cmd_setup_basic_desc(&desc, cmd, true);
ret = hclge_cmd_send(&hdev->hw, &desc, 1);
if (ret)
    goto err_tm_cmd_send;

shap_cfg_cmd = (struct hclge_pri_shapping_cmd *)desc.data;
deep_info(&hdev->pdev->dev, "PRI_C pri_id: %u\n", shap_cfg_cmd->pri_id);
deep_info(&hdev->pdev->dev, "PRI_C pri_shapping: 0x%x\n",
    shap_cfg_cmd->pri_shapping_para);

cmd = HCLGE_OPC_TM_PRI_P_SHAPPING;
hclge_cmd_setup_basic_desc(&desc, cmd, true);
ret = hclge_cmd_send(&hdev->hw, &desc, 1);
if (ret)
    goto err_tm_cmd_send;

shap_cfg_cmd = (struct hclge_pri_shapping_cmd *)desc.data;
deep_info(&hdev->pdev->dev, "PRI_P pri_id: %u\n", shap_cfg_cmd->pri_id);
deep_info(&hdev->pdev->dev, "PRI_P pri_shapping: 0x%x\n",
    shap_cfg_cmd->pri_shapping_para);

hclge_dbg_dump_tm_pg(hdev);

return;

err_tm_cmd_send:
    deep_err(&hdev->pdev->dev, "dump tm fail(0x%x), status is %d\n",
    cmd, ret);
}

static void hclge_dbg_dump_tm_map(struct hclge_dev *hdev, char *cmd_buf)
{
    struct hclge_bp_to_qs_map_cmd *bp_to_qs_map_cmd;
    struct hclge_nq_to_qs_link_cmd *nq_to_qs_map;
    struct hclge_qs_to_pri_link_cmd *map;
    struct hclge_tqp_tx_queue_tc_cmd *tc;
    enum hclge_opcode_type cmd;
    struct hclge_desc desc;
    int queue_id, group_id;
    u32 qset_mapping[32];
    int tc_id, qset_id;
    int pri_id, ret;
    u32 i;
    
    ret = kstrtouint(&cmd_buf[12], 10, &queue_id);
    queue_id = (ret != 0) ? 0 : queue_id;
}
cmd = HCLGE_OPC_TM_NQ_TO_QS_LINK;
+q_to QS_map = (struct hclge_nq_to_qs_link_cmd *)desc.data;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+q_to QS_map->nq_id = cpu_to_le16(queue_id);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_map_cmd_send;
+qset_id = q_to QS_map->qset_id & 0x3FF;
+
+cmd = HCLGE_OPC_TM_QS_TO_PRI_LINK;
+map = (struct hclge_qs_to_pri_link_cmd *)desc.data;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+map->qs_id = cpu_to_le16(qset_id);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_map_cmd_send;
+pri_id = map->priority;
+
+cmd = HCLGE_OPC_TQP_TX_QUEUE_TC;
+tc = (struct hclge_tqp_tx_queue_tc_cmd *)desc.data;
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+tc->queue_id = cpu_to_le16(queue_id);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_map_cmd_send;
+tc_id = tc->tc_id & 0x7;
+
+dev_info(&hdev->pdev->dev, "queue_id | qset_id | pri_id | tc_id\n");
+dev_info(&hdev->pdev->dev, "%04d | %04d | %02d | %02d\n", queue_id, qset_id, pri_id, tc_id);
+
+cmd = HCLGE_OPC_TM_BP_TO_QSET_MAPPING;
+bp_to QS_map cmd = (struct hclge_bp_to_qs_map_cmd *)desc.data;
+for (group_id = 0; group_id < 32; group_id++) {
+hclge_cmd_setup_basic_desc(&desc, cmd, true);
+bp_to QS_map cmd->tc_id = tc_id;
+bp_to QS_map cmd->qs_group_id = group_id;
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+goto err_tm_map_cmd_send;
+
+qset_mapping[group_id] = bp_to QS_map cmd->qs_bit_map;
+}
+
+dev_info(&hdev->pdev->dev, "index | tm bp qset maping:\n");
+
+i = 0;
+for (group_id = 0; group_id < 4; group_id++) {
+dev_info(&hdev->pdev->dev,
+  "%04d | %08x:%08x:%08x:%08x:%08x:%08x:%08x:%08x
",
+  group_id * 256, qset_maping[(u32)(i + 7)],
+  qset_maping[(u32)(i + 6)], qset_maping[(u32)(i + 5)],
+  qset_maping[(u32)(i + 4)], qset_maping[(u32)(i + 3)],
+  qset_maping[(u32)(i + 2)], qset_maping[(u32)(i + 1)],
+  qset_maping[i]);
+i += 8;
+
+return;
+
+err_tm_map_cmd_send:
+dev_err(&hdev->pdev->dev, "dump tqp map fail(0x%x), status is %d\n",
+        cmd, ret);
+
+static void hclge_dbg_dump_qos_pausecfg(struct hclge_dev *hdev)
+{
+    struct hclge_cfg_pause_param_cmd *pause_param;
+    struct hclge_desc desc;
+    int ret;
+    
+    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CFG_MAC_PARA, true);
+    
+    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+    if (ret) {
+        dev_err(&hdev->pdev->dev, "dump checksum fail, status is %d\n",
+                ret);
+        return;
+    }
+
+    pause_param = (struct hclge_cfg_pause_param_cmd *)desc.data;
+    dev_info(&hdev->pdev->dev, "dump qos pause cfg\n");
+    dev_info(&hdev->pdev->dev, "pause_trans_gap: 0x%x\n",
+        pause_param->pause_trans_gap);
+    dev_info(&hdev->pdev->dev, "pause_trans_time: 0x%x\n",
+        pause_param->pause_trans_time);
+}
+
+static void hclge_dbg_dump_qos_prior_map(struct hclge_dev *hdev)
+{
+    struct hclge_qos_pri_map_cmd *pri_map;
+    struct hclge_desc desc;
+    int ret;
+    
+    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_PRI_TO_TC_MAPPING, true);
+    

+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"dump qos pri map fail, status is %d\n", ret);
+return;
+}
+
+*pri_map = (struct hclge_qos_pri_map_cmd *)desc.data;
+dev_info(&hdev->pdev->dev, "dump qos pri map\n");
+dev_info(&hdev->pdev->dev, "vlan_to_pri: 0x%x\n", pri_map->vlan_pri);
+dev_info(&hdev->pdev->dev, "pri_0_to_tc: 0x%x\n", pri_map->pri0_tc);
+dev_info(&hdev->pdev->dev, "pri_1_to_tc: 0x%x\n", pri_map->pri1_tc);
+dev_info(&hdev->pdev->dev, "pri_2_to_tc: 0x%x\n", pri_map->pri2_tc);
+dev_info(&hdev->pdev->dev, "pri_3_to_tc: 0x%x\n", pri_map->pri3_tc);
+dev_info(&hdev->pdev->dev, "pri_4_to_tc: 0x%x\n", pri_map->pri4_tc);
+dev_info(&hdev->pdev->dev, "pri_5_to_tc: 0x%x\n", pri_map->pri5_tc);
+dev_info(&hdev->pdev->dev, "pri_6_to_tc: 0x%x\n", pri_map->pri6_tc);
+dev_info(&hdev->pdev->dev, "pri_7_to_tc: 0x%x\n", pri_map->pri7_tc);
+
+static void hclge_dbg_dump_qos_buf_cfg(struct hclge_dev *hdev)
+{
+*struct hclge_tx_buff_alloc_cmd *tx_buff_cmd;
+*struct hclge_rx_privBuff_cmd *rx_buff_cmd;
+*struct hclge_rx_priv_wl Buf *rx_priv_wl;
+*struct hclge_rx_com_wl *rx_packet_cnt;
+*struct hclge_rx_com_thrd *rx_com_thrd;
+*enum hclge_opcode_type cmd;
+*struct hclge_desc desc[2];
+int i, ret;
+
+*cmd = HCLGE_OPC_TX_BUFF_ALLOC;
+*hclge_cmd_setup_basic_desc(desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, desc, 1);
+if (ret)
+goto err_qos_cmd_send;
+
+*dev_info(&hdev->pdev->dev, "dump qos buf cfg\n");
+
+*tx_buff_cmd = (struct hclge_tx_buff_alloc_cmd *)desc[0].data;
+for (i = 0; i < HCLGE_TC_NUM; i++)
+*dev_info(&hdev->pdev->dev, "tx_packet_buff_tc_%d: 0x%x\n", i,
+*tx_buff_cmd->tx_pkt_buff[i]);
+
+*cmd = HCLGE_OPC_RX_PRIV_BUFF_ALLOC;
+*hclge_cmd_setup_basic_desc(desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, desc, 1);
+if (ret)
+goto err_qos_cmd_send;
+
+dev_info(&hdev->pdev->dev, "\n");
+rx_buf_cmd = (struct hclge_rx_priv_buff_cmd *)desc[0].data;
+for (i = 0; i < HCLGE_TC_NUM; i++)
+dev_info(&hdev->pdev->dev, "rx_packetbuf_TC%d: 0x%x\n", i,
+rx_buf_cmd->buf_num[i]);
+
+dev_info(&hdev->pdev->dev, "rx_sharebuf: 0x%x\n",
+rx_buf_cmd->shared_buf);
+
+cmd = HCLGE_OPC_RX_PRIV_WL_ALLOC;
+hclge_cmd_setup_basic_desc(&desc[0], cmd, true);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+hclge_cmd_setup_basic_desc(&desc[1], cmd, true);
+ret = hclge_cmd_send(&hdev->hw, desc, 2);
+if (ret)
+goto err_qos_cmd_send;
+
+dev_info(&hdev->pdev->dev, "\n");
+rx_priv_wl = (struct hclge_rx_priv_wl_buf *)desc[0].data;
+for (i = 0; i < HCLGE_TC_NUM_ONE_DESC; i++)
+dev_info(&hdev->pdev->dev,
+"rx_priv_wl_TC%d: high: 0x%x, low: 0x%x\n", i,
+rx_priv_wl->tc_wl[i].high, rx_priv_wl->tc_wl[i].low);
+
+rx_priv_wl = (struct hclge_rx_priv_wl_buf *)desc[1].data;
+for (i = 0; i < HCLGE_TC_NUM_ONE_DESC; i++)
+dev_info(&hdev->pdev->dev,
+"rx_priv_wl TC%d: high: 0x%x, low: 0x%x\n", i + 4,
+rx_priv_wl->tc_wl[i].high, rx_priv_wl->tc_wl[i].low);
+
+cmd = HCLGE_OPC_RX_COM_THRD_ALLOC;
+hclge_cmd_setup_basic_desc(&desc[0], cmd, true);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+hclge_cmd_setup_basic_desc(&desc[1], cmd, true);
+ret = hclge_cmd_send(&hdev->hw, desc, 2);
+if (ret)
+goto err_qos_cmd_send;
+
+dev_info(&hdev->pdev->dev, "\n");
+rx_com_thrd = (struct hclge_rx_com_thrd *)desc[0].data;
+for (i = 0; i < HCLGE_TC_NUM_ONE_DESC; i++)
+dev_info(&hdev->pdev->dev,
+"rx_com_thrd_TC%d: high: 0x%x, low: 0x%x\n", i,
+rx_com_thrd->com_thrd[i].high,
+rx_com_thrd->com_thrd[i].low);
+rx_com_thrd = (struct hclge_rx_com_thrd *)desc[1].data;
+for (i = 0; i < HCLGE_TC_NUM_ONE_DESC; i++)
+dev_info(&(hdev->pdev)->dev,
+ "rx_com_thrd tc_%d: high: 0x%x, low: 0x%x\n", i + 4,
+ rx_com_thrd->com_thrd[i].high,
+ rx_com_thrd->com_thrd[i].low);
+
+cmd = HCLGE_OPC_RX_COM_WL_ALLOC;
+hclge_cmd_setup_basic_desc(desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, desc, 1);
+if (ret)
+goto err_qos_cmd_send;
+
+rx_com_wl = (struct hclge_rx_com_wl *)desc[0].data;
+dev_info(&(hdev->pdev)->dev, "\n");
+dev_info(&(hdev->pdev)->dev, "rx_com_wl: high: 0x%x, low: 0x%x\n",
+ rx_com_wl->com_wl.high, rx_com_wl->com_wl.low);
+
+cmd = HCLGE_OPC_RX_GBL_PKT_CNT;
+hclge_cmd_setup_basic_desc(desc, cmd, true);
+ret = hclge_cmd_send(&hdev->hw, desc, 1);
+if (ret)
+goto err_qos_cmd_send;
+
+rx_packet_cnt = (struct hclge_rx_com_wl *)desc[0].data;
+dev_info(&(hdev->pdev)->dev,
+ "rx_global_packet_cnt: high: 0x%x, low: 0x%x\n",
+ rx_packet_cnt->com_wl.high, rx_packet_cnt->com_wl.low);
+
+return;
+
+err_qos_cmd_send:
+dev_err(&(hdev->pdev)->dev,
+"dump qos buf cfg fail(0x%x), status is %d\n", cmd, ret);
+}
+
+static void hclge_dbg_dump_mng_table(struct hclge_dev *hdev)
+{
+struct hclge_mac_ethertype_idx_rd_cmd *req0;
+char printf_buf[HCLGE_DBG_BUF_LEN];
+struct hclge_desc desc;
+int ret, i;
+
+dev_info(&(hdev->pdev)->dev, "mng tab:\n");
+memset(printf_buf, 0, HCLGE_DBG_BUF_LEN);
+strncat(printf_buf, "entry|mac_addr |mask|ether|mask|vlan|mask",
+"\n");
HCLGE_DBG_BUF_LEN - 1);  
strncat(printf_buf + strlen(printf_buf),  
"|i_map|i_dir|e_type|pf_id|vf_id|q_id|drop
",  
HCLGE_DBG_BUF_LEN - strlen(printf_buf) - 1);  
+  
+dev_info(&hdev->pdev->dev, "%s", printf_buf);  
+  
+for (i = 0; i < HCLGE_DBG_MNG_TBL_MAX; i++) {  
+hclge_cmd_setup_basic_desc(&desc, HCLGE_MAC_ETHERTYPE_IDX_RD,  
+ true);  
+req0 = (struct hclge_mac_etheretype_idx_rd_cmd *)&desc.data;  
+req0->index = cpu_to_le16(i);  
+  
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);  
+if (ret) {  
+dev_err(&hdev->pdev->dev, 
+"call hclge_cmd_send fail, ret = %d\n", ret);  
+return;  
+}  
+  
+if (!req0->resp_code)  
+continue;  
+  
+memset(printf_buf, 0, HCLGE_DBG_BUF_LEN);  
+snprintf(printf_buf, HCLGE_DBG_BUF_LEN,  
+"%02u |%02x:%02x:%02x:%02x:%02x:%02x|",  
+req0->index, req0->mac_add[0], req0->mac_add[1],  
+req0->mac_add[2], req0->mac_add[3], req0->mac_add[4],  
+req0->mac_add[5]);  
+  
+snprintf(printf_buf + strlen(printf_buf),  
+ strlen(printf_buf),  
+"%!%04x|%04x|%02x|%04x|",  
+!(req0->flags & HCLGE_DBG_MNG_MAC_MASK_B),  
+req0->ethter_type,  
+!(req0->flags & HCLGE_DBG_MNG_ETHER_MASK_B),  
+req0->vlan_tag & HCLGE_DBG_MNG_VLAN_TAG,  
+!(req0->flags & HCLGE_DBG_MNG_VLAN_MASK_B),  
+req0->i_port_bitmap, req0->i_port_direction);  
+  
+snprintf(printf_buf + strlen(printf_buf),  
+ strlen(printf_buf),  
+"%!%d|\%d|\%02d|\%04d\%x\n",  
+!(req0->egress_port & HCLGE_DBG_MNG_E_TYPE_B),  
+req0->egress_port & HCLGE_DBG_MNG_PF_ID,  
+(req0->egress_port >> 3) & HCLGE_DBG_MNG_VF_ID,  
+req0->egress_queue,  
+!(req0->egress_port & HCLGE_DBG_MNG_DROP_B));
static void hclge_dbg_fd_tcam_read(struct hclge_dev *hdev, u8 stage,
   bool sel_x, u32 loc)
{
    struct hclge_fd_tcam_config_1_cmd *req1;
    struct hclge_fd_tcam_config_2_cmd *req2;
    struct hclge_fd_tcam_config_3_cmd *req3;
    struct hclge_desc desc[3];
    int ret, i;
    u32 *req;

    hclge_cmd_setup_basic_desc(&desc[0], HCLGE_OPC_FD_TCAM_OP, true);
    desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
    hclge_cmd_setup_basic_desc(&desc[1], HCLGE_OPC_FD_TCAM_OP, true);
    desc[1].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
    hclge_cmd_setup_basic_desc(&desc[2], HCLGE_OPC_FD_TCAM_OP, true);

    req1 = (struct hclge_fd_tcam_config_1_cmd *)desc[0].data;
    req2 = (struct hclge_fd_tcam_config_2_cmd *)desc[1].data;
    req3 = (struct hclge_fd_tcam_config_3_cmd *)desc[2].data;

    req1->stage = stage;
    req1->xy_sel = sel_x ? 1 : 0;
    req1->index = cpu_to_le32(loc);

    ret = hclge_cmd_send(&hdev->hw, desc, 3);
    if (ret)
        return;

    dev_info(&hdev->pdev->dev, " read result tcam key %s(%u):
", sel_x ? "x" : "y", loc);
    req = (u32 *)req1->tcam_data;
    for (i = 0; i < 2; i++)
        dev_info(&hdev->pdev->dev, "%08x
", *req);
    req = (u32 *)req2->tcam_data;
    for (i = 0; i < 6; i++)
        dev_info(&hdev->pdev->dev, "%08x
", *req);
    req = (u32 *)req3->tcam_data;
    for (i = 0; i < 5; i++)
        dev_info(&hdev->pdev->dev, "%08x
", *req);
}
static void hclge_dbg_fd_tcam(struct hclge_dev *hdev)
{
    u32 i;
    
    for (i = 0; i < hdev->fd_cfg.rule_num[0]; i++) {
        hclge_dbg_fd_tcam_read(hdev, 0, true, i);
        hclge_dbg_fd_tcam_read(hdev, 0, false, i);
    }
    
    int hclge_dbg_run_cmd(struct hnae3_handle *handle, char *cmd_buf)
    {
        struct hclge_vport *vport = hclge_get_vport(handle);
        struct hclge_dev *hdev = vport->back;
        
        if (strncmp(cmd_buf, "dump fd tcam", 12) == 0) {
            hclge_dbg_fd_tcam(hdev);
        } else if (strncmp(cmd_buf, "dump tc", 7) == 0) {
            hclge_dbg_dump_tc(hdev);
        } else if (strncmp(cmd_buf, "dump tm map", 11) == 0) {
            hclge_dbg_dump_tm_map(hdev, cmd_buf);
        } else if (strncmp(cmd_buf, "dump tm", 7) == 0) {
            hclge_dbg_dump_tm(hdev);
        } else if (strncmp(cmd_buf, "dump qos pause cfg", 18) == 0) {
            hclge_dbg_dump_qos_pause_cfg(hdev);
        } else if (strncmp(cmd_buf, "dump qos pri map", 16) == 0) {
            hclge_dbg_dump_qos_pri_map(hdev);
        } else if (strncmp(cmd_buf, "dump qos buf cfg", 16) == 0) {
            hclge_dbg_dump_qos_buf_cfg(hdev);
        } else if (strncmp(cmd_buf, "dump mng tbl", 12) == 0) {
            hclge_dbg_dump_mng_table(hdev);
        } else if (strncmp(cmd_buf, "dump reg", 8) == 0) {
            hclge_dbg_dump_reg_cmd(hdev, cmd_buf);
        } else {
            dev_info(&hdev->pdev->dev, "unknown command\n");
            return -EINVAL;
        }

        return 0;
    }

    --- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns/hns3/hns3pf/hclge_debugfs.h
    +++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns/hns3/hns3pf/hclge_debugfs.h
    @@ -0,0 +1,713 @@
    */ SPDX-License-Identifier: GPL-2.0 */
    */ Copyright (c) 2018-2019 Hisilicon Limited. */
    +
    +#ifndef __HCLGE_DEBUGFS_H
+#define __HCLGE_DEBUGFS_H
+
+#define HCLGE_DBG_BUF_LEN 256
+#define HCLGE_DBG_MNG_TBL_MAX 64
+
+#define HCLGE_DBG_MNG_VLAN_MASK_B BIT(0)
+#define HCLGE_DBG_MNG_MAC_MASK_B BIT(1)
+#define HCLGE_DBG_MNG_EETHER_MASK_B BIT(2)
+#define HCLGE_DBG_MNG_E_TYPE_B BIT(11)
+#define HCLGE_DBG_MNG_DROP_B BIT(13)
+#define HCLGE_DBG_MNG_VLAN_TAG 0x0FFF
+#define HCLGE_DBG_MNG_PF_ID 0x0007
+#define HCLGE_DBG_MNG_VF_ID 0x00FF
+
+/* Get DFX BD number offset */
+#define HCLGE_DBG_DFX_BIOS_OFFSET 1
+#define HCLGE_DBG_DFX_SSU_0_OFFSET 2
+#define HCLGE_DBG_DFX_SSU_1_OFFSET 3
+#define HCLGE_DBG_DFX_IGU_OFFSET 4
+#define HCLGE_DBG_DFX_RPU_0_OFFSET 5
+
+#define HCLGE_DBG_DFX_RPU_1_OFFSET 6
+#define HCLGE_DBG_DFX_NCSI_OFFSET 7
+#define HCLGE_DBG_DFX_RTC_OFFSET 8
+#define HCLGE_DBG_DFX_PPP_OFFSET 9
+#define HCLGE_DBG_DFX_RCB_OFFSET 10
+#define HCLGE_DBG_DFX_TQP_OFFSET 11
+
+#define HCLGE_DBG_DFX_SSU_2_OFFSET 12
+
+#pragma pack(1)
+
+struct hclge_qos_pri_map_cmd {
  u8 pri0_tc : 4,
  + pri1_tc : 4;
  u8 pri2_tc : 4,
  + pri3_tc : 4;
  u8 pri4_tc : 4,
  + pri5_tc : 4;
  u8 pri6_tc : 4,
  + pri7_tc : 4;
  u8 vlan_pri : 4,
  + rev : 4;
};
+
+struct hclge_dbg_bitmap_cmd {
  union {
    u8 bitmap;
  };

+struct {
+u8 bit0 : 1,
+ bit1 : 1,
+ bit2 : 1,
+ bit3 : 1,
+ bit4 : 1,
+ bit5 : 1,
+ bit6 : 1,
+ bit7 : 1;
+};
+);
+);
+
+struct hclge_dbg_dfx_message {
+int flag;
+char message[60];
+};
+
+#pragma pack()
+
+static struct hclge_dbg_dfx_message hclge_dbg_bios_common_reg[] = {
+{false, "Reserved"},
+{true,"BP_CPU_STATE"},
+{true,"DFX_MSIX_INFO_NIC_0"},
+{true,"DFX_MSIX_INFO_NIC_1"},
+{true,"DFX_MSIX_INFO_NIC_2"},
+{true,"DFX_MSIX_INFO_NIC_3"},
+{true,"DFX_MSIX_INFO_ROC_0"},
+{true,"DFX_MSIX_INFO_ROC_1"},
+{true,"DFX_MSIX_INFO_ROC_2"},
+{true,"DFX_MSIX_INFO_ROC_3"},
+{false, "Reserved"},
+{false, "Reserved"},
+};
+
+static struct hclge_dbg_dfx_message hclge_dbg_ssu_reg_0[] = {
+{false, "Reserved"},
+{true,"SSU_ETS_PORT_STATUS"},
+{true,"SSU_ETS_TCG_STATUS"},
+{false, "Reserved"},
+{false, "Reserved"},
+{true,"SSU_BP_STATUS_0"},
+{true,"SSU_BP_STATUS_1"},
+{true,"SSU_BP_STATUS_2"},
+{true,"SSU_BP_STATUS_3"},
+{true,"SSU_BP_STATUS_4"},
+;
+{true,"SSU_BP_STATUS_5"},
+{true,"SSU_MAC_TX_PFC_IND"},
+
+{true,"MAC_SSU_RX_PFC_IND"},
+{true,"BTMP_AGEING_ST_B0"},
+{true,"BTMP_AGEING_ST_B1"},
+{true,"BTMP_AGEING_ST_B2"},
+{false,"Reserved"},
+{false,"Reserved"},
+
+{true,"FULL_DROP_NUM"},
+{true,"PART_DROP_NUM"},
+{true,"PPP_KEY_DROP_NUM"},
+{true,"PPP_RLT_DROP_NUM"},
+{true,"LO_PRI_UNICAST_RLT_DROP_NUM"},
+{true,"HI_PRI_MULTICAST_RLT_DROP_NUM"},
+
+{true,"LO_PRI_MULTICAST_RLT_DROP_NUM"},
+{true,"NCSI_PACKET_CURR_BUFFER_CNT"},
+{true,"BTMP_AGEING_RLS_CNT_BANK0"},
+{true,"BTMP_AGEING_RLS_CNT_BANK1"},
+{true,"BTMP_AGEING_RLS_CNT_BANK2"},
+{true,"SSU_MB_RD_RLT_DROP_CNT"},
+
+{true,"SSU_PPP_MAC_KEY_NUM_L"},
+{true,"SSU_PPP_MAC_KEY_NUM_H"},
+{true,"SSU_PPP_HOST_KEY_NUM_L"},
+{true,"SSU_PPP_HOST_KEY_NUM_H"},
+{true,"PPP_SSU_MAC_RLT_NUM_L"},
+{true,"PPP_SSU_MAC_RLT_NUM_H"},
+
+{true,"PPP_SSU_HOST_RLT_NUM_L"},
+{true,"PPP_SSU_HOST_RLT_NUM_H"},
+{true,"NCSI_RX_PACKET_IN_CNT_L"},
+{true,"NCSI_RX_PACKET_IN_CNT_H"},
+{true,"NCSI_TX_PACKET_OUT_CNT_L"},
+{true,"NCSI_TX_PACKET_OUT_CNT_H"},
+
+{true,"SSU_KEY_DROP_NUM"},
+{true,"MB_UNCOPY_NUM"},
+{true,"RX_OQ_DROP_PKT_CNT"},
+{true,"TX_OQ_DROP_PKT_CNT"},
+{true,"BANK_UNBALANCE_DROP_CNT"},
+{true,"BANK_UNBALANCE_RX_DROP_CNT"},
+
+{true,"NIC_L2_ERR_DROP_PKT_CNT"},
+{true,"ROC_L2_ERR_DROP_PKT_CNT"},
+{true,"NIC_L2_ERR_DROP_PKT_CNT_RX"},
+{true,"ROC_L2_ERR_DROP_PKT_CNT_RX"},
+{true,"RX_OQ_GLB_DROP_PKT_CNT"},
+{false,"Reserved"},
+
+{true,"LO_PRI_UNICAST_CUR_CNT"},
+{true,"HI_PRI_MULTICAST_CUR_CNT"},
+{true,"LO_PRI_MULTICAST_CUR_CNT"},
+{false,"Reserved"},
+{false,"Reserved"},
+{false,"Reserved"},
+};
+
+static struct hclge_dbg_dfx_message hclge_dbg_ssu_reg_1[] = {
+{true,"prt_id"},
+{true,"PACKET_TC_CURR_BUFFER_CNT_0"},
+{true,"PACKET_TC_CURR_BUFFER_CNT_1"},
+{true,"PACKET_TC_CURR_BUFFER_CNT_2"},
+{true,"PACKET_TC_CURR_BUFFER_CNT_3"},
+{true,"PACKET_TC_CURR_BUFFER_CNT_4"},
+
+{true,"PACKET_TC_CURR_BUFFER_CNT_5"},
+{true,"PACKET_TC_CURR_BUFFER_CNT_6"},
+{true,"PACKET_TC_CURR_BUFFER_CNT_7"},
+{true,"PACKET_CURR_BUFFER_CNT"},
+{false,"Reserved"},
+{false,"Reserved"},
+
+{true,"RX_PACKET_IN_CNT_L"},
+{true,"RX_PACKET_IN_CNT_H"},
+{true,"RX_PACKET_OUT_CNT_L"},
+{true,"RX_PACKET_OUT_CNT_H"},
+{true,"TX_PACKET_IN_CNT_L"},
+{true,"TX_PACKET_IN_CNT_H"},
+
+{true,"TX_PACKET_OUT_CNT_L"},
+{true,"TX_PACKET_OUT_CNT_H"},
+{true,"ROC_RX_PACKET_IN_CNT_L"},
+{true,"ROC_RX_PACKET_IN_CNT_H"},
+{true,"ROC_TX_PACKET_OUT_CNT_L"},
+{true,"ROC_TX_PACKET_OUT_CNT_H"},
+
+{true,"RX_PACKET_TC_IN_CNT_0_L"},
+{true,"RX_PACKET_TC_IN_CNT_0_H"},
+{true,"RX_PACKET_TC_IN_CNT_1_L"},
+{true,"RX_PACKET_TC_IN_CNT_1_H"},
+{true,"RX_PACKET_TC_IN_CNT_2_L"},
+{true,"RX_PACKET_TC_IN_CNT_2_H"},
+}
+[true,"RX_PACKET_TC_IN_CNT_3_L"],
+[true,"RX_PACKET_TC_IN_CNT_3_H"],
+[true,"RX_PACKET_TC_IN_CNT_4_L"],
+[true,"RX_PACKET_TC_IN_CNT_4_H"],
+[true,"RX_PACKET_TC_IN_CNT_5_L"],
+[true,"RX_PACKET_TC_IN_CNT_5_H"],
+
+[true,"RX_PACKET_TC_IN_CNT_6_L"],
+[true,"RX_PACKET_TC_IN_CNT_6_H"],
+[true,"RX_PACKET_TC_IN_CNT_7_L"],
+[true,"RX_PACKET_TC_IN_CNT_7_H"],
+[true,"RX_PACKET_TC_OUT_CNT_0_L"],
+[true,"RX_PACKET_TC_OUT_CNT_0_H"],
+
+[true,"RX PACKET TC_OUT_CNT_1_L"],
+[true,"RX PACKET TC_OUT_CNT_1_H"],
+[true,"RX PACKET TC_OUT_CNT_2_L"],
+[true,"RX PACKET TC_OUT_CNT_2_H"],
+[true,"RX_PACKET_TC_OUT_CNT_3_L"],
+[true,"RX_PACKET_TC_OUT_CNT_3_H"],
+
+[true,"RX_PACKET_TC_OUT_CNT_4_L"],
+[true,"RX_PACKET_TC_OUT_CNT_4_H"],
+[true,"RX_PACKET_TC_OUT_CNT_5_L"],
+[true,"RX_PACKET_TC_OUT_CNT_5_H"],
+[true,"RX_PACKET_TC_OUT_CNT_6_L"],
+[true,"RX_PACKET_TC_OUT_CNT_6_H"],
+
+[true,"RX_PACKET_TC_OUT_CNT_7_L"],
+[true,"RX_PACKET_TC_OUT_CNT_7_H"],
+[true,"TX_PACKET_TC_IN_CNT_0_L"],
+[true,"TX_PACKET_TC_IN_CNT_0_H"],
+[true,"TX PACKET_TC_IN_CNT_1_L"],
+[true,"TX_PACKET_TC_IN_CNT_1_H"],
+
+[true,"TX_PACKET_TC_IN_CNT_2_L"],
+[true,"TX_PACKET_TC_IN_CNT_2_H"],
+[true,"TX_PACKET_TC_IN_CNT_3_L"],
+[true,"TX_PACKET_TC_IN_CNT_3_H"],
+[true,"TX_PACKET_TC_IN_CNT_4_L"],
+[true,"TX_PACKET_TC_IN_CNT_4_H"],
+
+[true,"TX_PACKET_TC_IN_CNT_5_L"],
+[true,"TX_PACKET_TC_IN_CNT_5_H"],
+[true,"TX_PACKET_TC_IN_CNT_6_L"],
+[true,"TX_PACKET_TC_IN_CNT_6_H"],
+[true,"TX_PACKET_TC_IN_CNT_7_L"],
+[true,"TX_PACKET_TC_IN_CNT_7_H"],

+ {true,"TX_PACKET_TC_OUT_CNT_0_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_0_H"},
+ {true,"TX_PACKET_TC_OUT_CNT_1_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_1_H"},
+ {true,"TX_PACKET_TC_OUT_CNT_2_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_2_H"},
+ {true,"TX_PACKET_TC_OUT_CNT_3_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_3_H"},
+ {true,"TX_PACKET_TC_OUT_CNT_4_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_4_H"},
+ {true,"TX_PACKET_TC_OUT_CNT_5_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_5_H"},
+ {true,"TX_PACKET_TC_OUT_CNT_6_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_6_H"},
+ {true,"TX_PACKET_TC_OUT_CNT_7_L"},
+ {true,"TX_PACKET_TC_OUT_CNT_7_H"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},

+ static struct hclge_dbg_dfx_message hclge_dbg_ssu_reg_2[] = {
+ {true,"OQ_INDEX"},
+ {true,"QUEUE_CNT"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},

+ static struct hclge_dbg_dfx_message hclge_dbg_igu_egu_reg[] = {
+ {true,"prt_id"},
+ {true,"IGU_RX_ERR_PKT"},
+ {true,"IGU_RX_NO_SOF_PKT"},
+ {true,"EGU_TX_1588_SHORT_PKT"},
+ {true,"EGU_TX_1588_PKT"},
+ {true,"EGU_TX_ERR_PKT"},
+ {true,"IGU_RX_OUT_L2_PKT"},
+ {true,"IGU_RX_OUT_L3_PKT"},
+ {true,"IGU_RX_OUT_L4_PKT"},
+ {true,"IGU_RX_IN_L2_PKT"},
+ {true,"IGU_RX_IN_L3_PKT"},
+ {true,"IGU_RX_IN_L4_PKT"},
+ {true,"IGU_RX_EL3E_PKT"},
+{true,"IGU_RX_EL4E_PKT"},
+{true,"IGU_RX_L3E_PKT"},
+{true,"IGU_RX_L4E_PKT"},
+{true,"IGU_RX_ROCEE_PKT"},
+{true,"IGU_RX_OUT_UDP0_PKT"},
+
+{true,"IGU_RX_IN_UDP0_PKT"},
+{false,"Reserved"},
+{false,"Reserved"},
+{false,"Reserved"},
+{false,"Reserved"},
+
+{true,"IGU_RX_OVERSIZE_PKT_L"},
+{true,"IGU_RX_OVERSIZE_PKT_H"},
+{true,"IGU_RX_UNDERSIZE_PKT_L"},
+{true,"IGU_RX_UNDERSIZE_PKT_H"},
+{true,"IGU_RX_OUT_ALL_PKT_L"},
+{true,"IGU_RX_OUT_ALL_PKT_H"},
+
+{true,"IGU_TX_OUT_ALL_PKT_L"},
+{true,"IGU_TX_OUT_ALL_PKT_H"},
+{true,"IGU_RX_UNI_PKT_L"},
+{true,"IGU_RX_UNI_PKT_H"},
+{true,"IGU_RX_MULTI_PKT_L"},
+{true,"IGU_RX_MULTI_PKT_H"},
+
+{true,"IGU_RX_BROAD_PKT_L"},
+{true,"IGU_RX_BROAD_PKT_H"},
+{true,"EGU_TX_OUT_ALL_PKT_L"},
+{true,"EGU_TX_OUT_ALL_PKT_H"},
+{true,"EGU_TX_UNI_PKT_L"},
+{true,"EGU_TX_UNI_PKT_H"},
+
+{true,"EGU_TX_MULTI_PKT_L"},
+{true,"EGU_TX_MULTI_PKT_H"},
+{true,"EGU_TX_BROAD_PKT_L"},
+{true,"EGU_TX_BROAD_PKT_H"},
+{true,"IGU_TX_KEY_NUM_L"},
+{true,"IGU_TX_KEY_NUM_H"},
+
+{true,"IGU_RX_NON_TUN_PKT_L"},
+{true,"IGU_RX_NON_TUN_PKT_H"},
+{true,"IGU_RX_TUN_PKT_L"},
+{true,"IGU_RX_TUN_PKT_H"},
+{false,"Reserved"},
+{false,"Reserved"},
+};
+static struct hclge_dbg_dfx_message hclge_dbg_rpu_reg_0[] = {
    {true, "tc_queue_num"},
    {true, "FSM_DFX_ST0"},
    {true, "FSM_DFX_ST1"},
    {true, "RPU_RX_PKT_DROP_CNT"},
    {true, "BUF_WAIT_TIMEOUT"},
    {true, "BUF_WAIT_TIMEOUT_QID"},
};
+
+static struct hclge_dbg_dfx_message hclge_dbg_rpu_reg_1[] = {
    {false, "Reserved"},
    {true, "FIFO_DFX_ST0"},
    {true, "FIFO_DFX_ST1"},
    {true, "FIFO_DFX_ST2"},
    {true, "FIFO_DFX_ST3"},
    {true, "FIFO_DFX_ST4"},
    +
    {true, "FIFO_DFX_ST5"},
    {false, "Reserved"},
    {false, "Reserved"},
    {false, "Reserved"},
    {false, "Reserved"},
    {false, "Reserved"},
};
+
+static struct hclge_dbg_dfx_message hclge_dbg_ncsi_reg[] = {
    {false, "Reserved"},
    {true, "NCSI_EGU_TX_FIFO_STS"},
    {true, "NCSI_PAUSE_STATUS"},
    {true, "NCSI_RX_CTRL_DMAC_ERR_CNT"},
    {true, "NCSI_RX_CTRL_SMAC_ERR_CNT"},
    {true, "NCSI_RX_CTRL_CKS_ERR_CNT"},
    +
    {true, "NCSI_RX_CTRL_PKT_CNT"},
    {true, "NCSI_RX_PT_DMAC_ERR_CNT"},
    {true, "NCSI_RX_PT_SMAC_ERR_CNT"},
    {true, "NCSI_RX_PT_PKT_CNT"},
    {true, "NCSI_TX_CTRL_DMAC_ERR_CNT"},
    +
    {true, "NCSI_TX_CTRL_SMAC_ERR_CNT"},
    {true, "NCSI_TX_CTRL_PKT_CNT"},
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    {true, "NCSI_TX_PT_SMAC_ERR_CNT"},
    {true, "NCSI_TX_PT_PKT_CNT"},
    {true, "NCSI_TX_PT_PKT_TRUNC_CNT"},
    +
    {true, "NCSI_TX_CTRL_DMAC_ERR_CNT"},
    {true, "NCSI_TX_CTRL_SMAC_ERR_CNT"},
    {true, "NCSI_TX_CTRL_PKT_CNT"},
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    {true, "NCSI_TX_PT_SMAC_ERR_CNT"},
    {true, "NCSI_TX_PT_PKT_CNT"},
    {true, "NCSI_TX_PT_PKT_TRUNC_CNT"},
    +
+{true,"NCSI_TX_PT_PKT_ERR_CNT"},
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+{true,"NCSI_RX_CTRL_PKT_CFLIT_CNT"},
+{false,"Reserved"},
+{false,"Reserved"},
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+{true,"NCSI_MAC_RX_OCTETS_OK"},
+{true,"NCSI_MAC_RX_OCTETS_BAD"},
+{true,"NCSI_MAC_RX_UC_PKTS"},
+{true,"NCSI_MAC_RX_MC_PKTS"},
+{true,"NCSI_MAC_RX_BC_PKTS"},
+{true,"NCSI_MAC_RX_PKTS_64OCTETS"},
+
+{true,"NCSI_MAC_RX_PKTS_65TO127OCTETS"},
+{true,"NCSI_MAC_RX_PKTS_128TO255OCTETS"},
+{true,"NCSI_MAC_RX_PKTS_255TO511OCTETS"},
+{true,"NCSI_MAC_RX_PKTS_512TO1023OCTETS"},
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+{true,"NCSI_MAC_RX_PKTS_1519TOMAXOCTETS"},
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+{true,"NCSI_MAC_RX_FCS_ERRORS"},
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static struct hclge_dbg_dfx_message hclge_dbg_rtc_reg[] = {
    {false, "Reserved"},
    {true,"LGE_IGU_AFIFO_DFX_0"},
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    {true,"LGE_EGU_AFIFO_DFX_5"},
    {true,"LGE_EGU_AFIFO_DFX_6"},
    {true,"LGE_EGU_AFIFO_DFX_7"},
    {true,"CGE_IGU_AFIFO_DFX_0"},
    {true,"CGE_IGU_AFIFO_DFX_1"},
    {true,"CGE_EGU_AFIFO_DFX_0"},
    {true,"CGE_EGU_AFIFO_DFX_1"},
    {false; "Reserved"},
    {false, "Reserved"},
    {false, "Reserved"}};

static struct hclge_dbg_dfx_message hclge_dbg_ppp_reg[] = {
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    {true,"DROP_MNG_CNT"},
    {true,"DROP_FD_CNT"},
    {true,"DROP_NO_DST_CNT"},
    {true,"DROP_MC_MBID_FULL_CNT"},
    {true,"DROP_SC_FILTERED"},
    {true,"PPP_MC_DROP_PKT_CNT"},
    {true,"DROP_PT_CNT"},
    {true,"DROP_MAC_ANTI_SPOOF_CNT"},
    {true,"DROP_IG_VFV_CNT"},
    {true,"DROP_NO_DST_CNT"},
    {true,"DROP_MC_MBID_FULL_CNT"},
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    {true,"PPP_MC_DROP_PKT_CNT"},
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    {true,"DROP_IG_VFV_CNT"},
+ {true, "DROP_IQ_PKT_CNT"},
+ {true, "DROP_CN_M_PFC_PAUSE_CNT"},
+ {true, "DROP_TORUS_TC_CNT"},
+ {true, "DROP_TORUS_LP BK_CNT"},
+ {true, "PPP_HFS_STS"},
+
+ {true, "PPP_MC_RSLT_STS"},
+ {true, "PPP_P3U_STS"},
+ {true, "PPP_RSLT_DESCR_STS"},
+ {true, "PPP_UMV_STS_0"},
+ {true, "PPP_UMV_STS_1"},
+ {true, "PPP_VFV_STS"},
+
+ {true, "PPP_GRO_KEY_CNT"},
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+ {true, "PPP_GRO_DROP_CNT"},
+ {true, "PPP_GRO_OUT_CNT"},
+ {true, "PPP_GRO_KEY_MATCH_DATA_CNT"},
+ {true, "PPP_GRO_KEY_MATCH_TCAM_CNT"},
+
+ {true, "PPP_GRO_INFO_MATCH_CNT"},
+ {true, "PPP_GRO_FREE_ENTRY_CNT"},
+ {true, "PPP_GRO_INNER_DFX_SIGNAL"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+ {false, "Reserved"},
+
+ {true, "GET_RX_PKT_CNT_L"},
+ {true, "GET_RX_PKT_CNT_H"},
+ {true, "GET_TX_PKT_CNT_L"},
+ {true, "GET_TX_PKT_CNT_H"},
+ {true, "SEND_UC_PRT2HOST_PKT_CNT_L"},
+ {true, "SEND_UC_PRT2HOST_PKT_CNT_H"},
+
+ {true, "SEND_UC_PRT2PRT_PKT_CNT_L"},
+ {true, "SEND_UC_PRT2PRT_PKT_CNT_H"},
+ {true, "SEND_UC_HOST2HOST_PKT_CNT_L"},
+ {true, "SEND_UC_HOST2HOST_PKT_CNT_H"},
+ {true, "SEND_UC_HOST2PRT_PKT_CNT_L"},
+ {true, "SEND_UC_HOST2PRT_PKT_CNT_H"},
+
+ {true, "SEND_MC_FROM_PRT_PKT_CNT_L"},
+ {true, "SEND_MC_FROM_PRT_PKT_CNT_H"},
+ {true, "SEND_MC_FROM_HOST_PKT_CNT_L"},
+ {true, "SEND_MC_FROM_HOST_PKT_CNT_H"},
+ {true, "SSU_MC_RD_PKT_CNT_L"},
+ {true, "SSU_MC_RD_PKT_CNT_H"},
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static struct hclge_dbg_dfx_message hclge_dbg_rcb_reg[] = {
    {false, "Reserved"},
    {false, "Reserved"},
    {false, "Reserved"},
    +
    {true,"PROMIS_TBL_HIT_CNT_L"},
    +{true,"PROMIS_TBL_HIT_CNT_H"},
    +{true,"GET_TUNL_PKT_CNT_L"},
    +{true,"GET_TUNL_PKT_CNT_H"},
    +{true,"GET_BMC_PKT_CNT_L"},
    +{true,"GET_BMC_PKT_CNT_H"},
    +
    +{true,"SEND_UC_PRT2BMC_PKT_CNT_L"},
    +{true,"SEND_UC_PRT2BMC_PKT_CNT_H"},
    +{true,"SEND_UC_HOST2BMC_PKT_CNT_L"},
    +{true,"SEND_UC_HOST2BMC_PKT_CNT_H"},
    +{true,"SEND_UC_BMC2HOST_PKT_CNT_L"},
    +{true,"SEND_UC_BMC2HOST_PKT_CNT_H"},
    +
    +{true,"SEND_UC_BMC2PRT_PKT_CNT_L"},
    +{true,"SEND_UC_BMC2PRT_PKT_CNT_H"},
    +{true,"PPP_MC_2BMC_PKT_CNT_L"},
    +{true,"PPP_MC_2BMC_PKT_CNT_H"},
    +{true,"VLAN_MIRR_CNT_L"},
    +{true,"VLAN_MIRR_CNT_H"},
    +
    +{true,"IG_MIRR_CNT_L"},
    +{true,"IG_MIRR_CNT_H"},
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    +
    +{true,"LAN_PAIR_CNT_L"},
    +{true,"LAN_PAIR_CNT_H"},
    +{true,"UM_TBL_MC_HIT_PKT_CNT_L"},
    +{true,"UM_TBL_MC_HIT_PKT_CNT_H"},
    +{true,"MTA_TBL_HIT_PKT_CNT_L"},
    +{true,"MTA_TBL_HIT_PKT_CNT_H"},
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    +{false, "Reserved"},
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    +{false, "Reserved"},
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    +;
    +
};

static struct hclge_dbg_dfx_message hclge_dbg_rcb_reg[] = {
    {false, "Reserved"},
    +{true,"FSM_DFX_ST0"},
    +{true,"FSM_DFX_ST1"},
    +

+ {true, "FSM_DFX_ST2"},
+ {true, "FIFO_DFX_ST0"},
+ {true, "FIFO_DFX_ST1"},
+
+ {true, "FIFO_DFX_ST2"},
+ {true, "FIFO_DFX_ST3"},
+ {true, "FIFO_DFX_ST4"},
+ {true, "FIFO_DFX_ST5"},
+ {true, "FIFO_DFX_ST6"},
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+
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+ {true, "FIFO_DFX_ST9"},
+ {true, "FIFO_DFX_ST10"},
+ {true, "FIFO_DFX_ST11"},
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static struct hclge_dbg_dfx_message hclge_dbg_tqp_reg[] = {
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    {true, "RCB_CFG_RX_RING_HEAD"},
    {true, "RCB_CFG_RX_RING_FBDNUM"},
    {true, "RCB_CFG_RX_RING_OFFSET"},
    {true, "RCB_CFG_RX_RING_PKTNUM_RECORD"},
    {true, "RCB_CFG_TX_RING_TAIL"},
    {true, "RCB_CFG_TX_RING_HEAD"},
    {true, "RCB_CFG_TX_RING_FBDNUM"},
    {true, "RCB_CFG_TX_RING_OFFSET"},
    {true, "RCB_CFG_TX_RING_EBDNUM"},
};
+{ .int_msk = BIT(5), .msg = "imp_itcm2_ecc_mbit_err" },
+{ .int_msk = BIT(7), .msg = "imp_itcm3_ecc_mbit_err" },
+{ .int_msk = BIT(9), .msg = "imp_dtcn0_mem0_ecc_mbit_err" },
+{ .int_msk = BIT(11), .msg = "imp_dtcn0_mem1_ecc_mbit_err" },
+{ .int_msk = BIT(13), .msg = "imp_dtcn1_mem0_ecc_mbit_err" },
+{ .int_msk = BIT(15), .msg = "imp_dtcn1_mem1_ecc_mbit_err" },
+{ .int_msk = BIT(17), .msg = "imp_itcm4_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_cmdq_nic_mem_ecc_int[] = {
+{ .int_msk = BIT(1), .msg = "cmdq_nic_rx_depth_ecc_mbit_err" },
+{ .int_msk = BIT(3), .msg = "cmdq_nic_tx_depth_ecc_mbit_err" },
+{ .int_msk = BIT(5), .msg = "cmdq_nic_rx_tail_ecc_mbit_err" },
+{ .int_msk = BIT(7), .msg = "cmdq_nic_tx_tail_ecc_mbit_err" },
+{ .int_msk = BIT(9), .msg = "cmdq_nic_rx_head_ecc_mbit_err" },
+{ .int_msk = BIT(11), .msg = "cmdq_nic_tx_head_ecc_mbit_err" },
+{ .int_msk = BIT(13), .msg = "cmdq_nic_rx_addr_ecc_mbit_err" },
+{ .int_msk = BIT(15), .msg = "cmdq_nic_tx_addr_ecc_mbit_err" },
+{ .int_msk = BIT(17), .msg = "cmdq_rocee_rx_depth_ecc_mbit_err" },
+{ .int_msk = BIT(19), .msg = "cmdq_rocee_tx_depth_ecc_mbit_err" },
+{ .int_msk = BIT(21), .msg = "cmdq_rocee_rx_tail_ecc_mbit_err" },
+{ .int_msk = BIT(23), .msg = "cmdq_rocee_tx_tail_ecc_mbit_err" },
+{ .int_msk = BIT(25), .msg = "cmdq_rocee_rx_head_ecc_mbit_err" },
+{ .int_msk = BIT(27), .msg = "cmdq_rocee_tx_head_ecc_mbit_err" },
+{ .int_msk = BIT(29), .msg = "cmdq_rocee_rx_addr_ecc_mbit_err" },
+{ .int_msk = BIT(31), .msg = "cmdq_rocee_tx_addr_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_tqp_int_ecc_int[] = {
+{ .int_msk = BIT(6), .msg = "tqp_int_cfg_even_ecc_mbit_err" },
+{ .int_msk = BIT(7), .msg = "tqp_int_cfg_odd_ecc_mbit_err" },
+{ .int_msk = BIT(8), .msg = "tqp_int_ctrl_even_ecc_mbit_err" },
+{ .int_msk = BIT(9), .msg = "tqp_int_ctrl_odd_ecc_mbit_err" },
+{ .int_msk = BIT(10), .msg = "tx_que_scan_int_ecc_mbit_err" },
+{ .int_msk = BIT(11), .msg = "rx_que_scan_int_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_msix_sram_ecc_int[] = {
+{ .int_msk = BIT(1), .msg = "msix_nic_ecc_mbit_err" },
+{ .int_msk = BIT(3), .msg = "msix_rocee_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_igu_int[] = {
+{ .int_msk = BIT(0), .msg = "igu_rx_buf0_ecc_mbit_err" },

+{ .int_msk = BIT(2), .msg = "igu_rx_buf1_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_igu_egu_tnl_int[] = {
+{ .int_msk = BIT(0), .msg = "rx_buf_overflow" },
+{ .int_msk = BIT(1), .msg = "rx_stp_fifo_overflow" },
+{ .int_msk = BIT(2), .msg = "rx_stp_fifo_undeflow" },
+{ .int_msk = BIT(3), .msg = "tx_buf_overflow" },
+{ .int_msk = BIT(4), .msg = "tx_buf_underun" },
+{ .int_msk = BIT(5), .msg = "rx_stp_buf_overflow" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_ncsi_err_int[] = {
+{ .int_msk = BIT(1), .msg = "ncsi_tx_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_ppp_mpf_abnormal_int_st1[] = {
+{ .int_msk = BIT(0), .msg = "vf_vlan_ad_mem_ecc_mbit_err" },
+{ .int_msk = BIT(1), .msg = "umv_mcast_group_mem_ecc_mbit_err" },
+{ .int_msk = BIT(2), .msg = "umv_key_mem0_ecc_mbit_err" },
+{ .int_msk = BIT(3), .msg = "umv_key_mem1_ecc_mbit_err" },
+{ .int_msk = BIT(4), .msg = "umv_key_mem2_ecc_mbit_err" },
+{ .int_msk = BIT(5), .msg = "umv_key_mem3_ecc_mbit_err" },
+{ .int_msk = BIT(6), .msg = "umv_ad_mem_ecc_mbit_err" },
+{ .int_msk = BIT(7), .msg = "rss_tc_mode_mem_ecc_mbit_err" },
+{ .int_msk = BIT(8), .msg = "rss_idt_mem0_ecc_mbit_err" },
+{ .int_msk = BIT(9), .msg = "rss_idt_mem1_ecc_mbit_err" },
+{ .int_msk = BIT(10), .msg = "rss_idt_mem2_ecc_mbit_err" },
+{ .int_msk = BIT(11), .msg = "rss_idt_mem3_ecc_mbit_err" },
+{ .int_msk = BIT(12), .msg = "rss_idt_mem4_ecc_mbit_err" },
+{ .int_msk = BIT(13), .msg = "rss_idt_mem5_ecc_mbit_err" },
+{ .int_msk = BIT(14), .msg = "rss_idt_mem6_ecc_mbit_err" },
+{ .int_msk = BIT(15), .msg = "rss_idt_mem7_ecc_mbit_err" },
+{ .int_msk = BIT(16), .msg = "rss_idt_mem8_ecc_mbit_err" },
+{ .int_msk = BIT(17), .msg = "rss_idt_mem9_ecc_mbit_err" },
+{ .int_msk = BIT(18), .msg = "rss_idt_mem10_ecc_mbit_err" },
+{ .int_msk = BIT(19), .msg = "rss_idt_mem11_ecc_mbit_err" },
+{ .int_msk = BIT(20), .msg = "rss_idt_mem12_ecc_mbit_err" },
+{ .int_msk = BIT(21), .msg = "rss_idt_mem13_ecc_mbit_err" },
+{ .int_msk = BIT(22), .msg = "rss_idt_mem14_ecc_mbit_err" },
+{ .int_msk = BIT(23), .msg = "rss_idt_mem15_ecc_mbit_err" },
+{ .int_msk = BIT(24), .msg = "port_vlan_mem_ecc_mbit_err" },
+{ .int_msk = BIT(25), .msg = "mcast_linear_table_mem_ecc_mbit_err" },
+{ .int_msk = BIT(26), .msg = "mcast_result_mem_ecc_mbit_err" },
+{ .int_msk = BIT(27),}
+.msg = "flow_director_ad_mem0_ecc_mbit_err" },
+{ .int_msk = BIT(28),
+.msg = "flow_director_ad_mem1_ecc_mbit_err" },
+{ .int_msk = BIT(29),
+.msg = "rx_vlan_tag_memory_ecc_mbit_err" },
+{ .int_msk = BIT(30),
+.msg = "Tx_UP_mapping_config_mem_ecc_mbit_err" },
+{ /* sentinel */ }
+;
+
+static const struct hclge_hw_error hclge_ppp_pf_abnormal_int[] = {
+{ .int_msk = BIT(0), .msg = "tx_vlan_tag_err" },
+{ .int_msk = BIT(1), .msg = "rss_list_tc_unassigned_queue_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_ppp_mpf_abnormal_int_st3[] = {
+{ .int_msk = BIT(0), .msg = "hfs_fifo_mem_ecc_mbit_err" },
+{ .int_msk = BIT(1), .msg = "rslt_descr_fifo_mem_ecc_mbit_err" },
+{ .int_msk = BIT(2), .msg = "tx_vlan_tag_mem_ecc_mbit_err" },
+{ .int_msk = BIT(3), .msg = "FD_CN0_memory_ecc_mbit_err" },
+{ .int_msk = BIT(4), .msg = "FD_CN1_memory_ecc_mbit_err" },
+{ .int_msk = BIT(5), .msg = "GRO_AD_memory_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_tm_sch_rint[] = {
+{ .int_msk = BIT(1), .msg = "tm_sch_ecc_mbit_err" },
+{ .int_msk = BIT(2), .msg = "tm_sch_port_shap_sub_fifo_wr_err" },
+{ .int_msk = BIT(3), .msg = "tm_sch_port_shap_sub_fifo_rd_err" },
+{ .int_msk = BIT(4), .msg = "tm_sch_pg_pshap_sub_fifo_wr_err" },
+{ .int_msk = BIT(5), .msg = "tm_sch_pg_pshap_sub_fifo_rd_err" },
+{ .int_msk = BIT(6), .msg = "tm_sch_pg_cshap_sub_fifo_wr_err" },
+{ .int_msk = BIT(7), .msg = "tm_sch_pg_cshap_sub_fifo_rd_err" },
+{ .int_msk = BIT(8), .msg = "tm_sch_pri_pshap_sub_fifo_wr_err" },
+{ .int_msk = BIT(9), .msg = "tm_sch_pri_pshap_sub_fifo_rd_err" },
+{ .int_msk = BIT(10), .msg = "tm_sch_pri_cshap_sub_fifo_wr_err" },
+{ .int_msk = BIT(11), .msg = "tm_sch_pri_cshap_sub_fifo_rd_err" },
+{ .int_msk = BIT(12),
+ .msg = "tm_sch_port_shap_offset_fifo_wr_err" },
+{ .int_msk = BIT(13),
+ .msg = "tm_sch_port_shap_offset_fifo_rd_err" },
+{ .int_msk = BIT(14),
+ .msg = "tm_sch_pg_pshap_offset_fifo_wr_err" },
+{ .int_msk = BIT(15),
+ .msg = "tm_sch_pg_pshap_offset_fifo_rd_err" },
+{ .int_msk = BIT(16),
+ .msg = "tm_sch_pg_cshap_offset_fifo_wr_err" },
+{ .int_msk = BIT(17),
  + .msg = "tm_sch_pg_cshap_offset_fifo_rd_err" },
+{ .int_msk = BIT(18),
  + .msg = "tm_sch_pri_pshap_offset_fifo_wr_err" },
+{ .int_msk = BIT(19),
  + .msg = "tm_sch_pri_pshap_offset_fifo_rd_err" },
+{ .int_msk = BIT(20),
  + .msg = "tm_sch_pri_cshap_offset_fifo_wr_err" },
+{ .int_msk = BIT(21),
  + .msg = "tm_sch_pri_cshap_offset_fifo_rd_err" },
+{ .int_msk = BIT(22), .msg = "tm_sch_rq_fifo_wr_err" },
+{ .int_msk = BIT(23), .msg = "tm_sch_rq_fifo_rd_err" },
+{ .int_msk = BIT(24), .msg = "tm_sch_nq_fifo_wr_err" },
+{ .int_msk = BIT(25), .msg = "tm_sch_nq_fifo_rd_err" },
+{ .int_msk = BIT(26), .msg = "tm_sch_roce_up_fifo_wr_err" },
+{ .int_msk = BIT(27), .msg = "tm_sch_roce_up_fifo_rd_err" },
+{ .int_msk = BIT(28), .msg = "tm_sch_rcb_byte_fifo_wr_err" },
+{ .int_msk = BIT(29), .msg = "tm_sch_rcb_byte_fifo_rd_err" },
+{ .int_msk = BIT(30), .msg = "tm_sch_ssu_byte_fifo_wr_err" },
+{ .int_msk = BIT(31), .msg = "tm_sch_ssu_byte_fifo_rd_err" },
+{" sentinel */ }
+
+static const struct hclge_hw_error hclge_qcn_fifo_rint[] = {
+{ .int_msk = BIT(0), .msg = "qcn_shap_gp0_sch_fifo_rd_err" },
+{ .int_msk = BIT(1), .msg = "qcn_shap_gp0_sch_fifo_wr_err" },
+{ .int_msk = BIT(2), .msg = "qcn_shap_gp1_sch_fifo_wr_err" },
+{ .int_msk = BIT(3), .msg = "qcn_shap_gp1_sch_fifo_rd_err" },
+{ .int_msk = BIT(4), .msg = "qcn_shap_gp2_sch_fifo_wr_err" },
+{ .int_msk = BIT(5), .msg = "qcn_shap_gp2_sch_fifo_rd_err" },
+{ .int_msk = BIT(6), .msg = "qcn_shap_gp3_sch_fifo_wr_err" },
+{ .int_msk = BIT(7), .msg = "qcn_shap_gp3_sch_fifo_rd_err" },
+{ .int_msk = BIT(8), .msg = "qcn_shap_gp0_offset_fifo_rd_err" },
+{ .int_msk = BIT(9), .msg = "qcn_shap_gp0_offset_fifo_wr_err" },
+{ .int_msk = BIT(10), .msg = "qcn_shap_gp1_offset_fifo_rd_err" },
+{ .int_msk = BIT(11), .msg = "qcn_shap_gp1_offset_fifo_wr_err" },
+{ .int_msk = BIT(12), .msg = "qcn_shap_gp2_offset_fifo_rd_err" },
+{ .int_msk = BIT(13), .msg = "qcn_shap_gp2_offset_fifo_wr_err" },
+{ .int_msk = BIT(14), .msg = "qcn_shap_gp3_offset_fifo_rd_err" },
+{ .int_msk = BIT(15), .msg = "qcn_shap_gp3_offset_fifo_wr_err" },
+{ .int_msk = BIT(16), .msg = "qcn_byte_info_fifo_rd_err" },
+{ .int_msk = BIT(17), .msg = "qcn_byte_info_fifo_wr_err" },
+{" sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_qcn_ecc_rint[] = {
+{ .int_msk = BIT(1), .msg = "qcn_byte_mem_ecc_mbit_err" },
+{ .int_msk = BIT(3), .msg = "qcn_time_mem_ecc_mbit_err" },
+{ .int_msk = BIT(5), .msg = "qcn_fb_mem_ecc_mbit_err" },
+{ .int_msk = BIT(7), .msg = "qcn_link_mem_ecc_mbit_err" },
+{ .int_msk = BIT(9), .msg = "qcn_rate_mem_ecc_mbit_err" },
+{ .int_msk = BIT(11), .msg = "qcn_tmplt_mem_ecc_mbit_err" },
+{ .int_msk = BIT(13), .msg = "qcn_shap_cfg_mem_ecc_mbit_err" },
+{ .int_msk = BIT(15), .msg = "qcn_gp0_barrel_mem_ecc_mbit_err" },
+{ .int_msk = BIT(17), .msg = "qcn_gp1_barrel_mem_ecc_mbit_err" },
+{ .int_msk = BIT(19), .msg = "qcn_gp2_barrel_mem_ecc_mbit_err" },
+{ .int_msk = BIT(21), .msg = "qcn_gp3_barrel_mem_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_mac_afifo_tnl_int[] = {
+{ .int_msk = BIT(0), .msg = "egu_cge_afifo_ecc_1bit_err" },
+{ .int_msk = BIT(1), .msg = "egu_cge_afifo_ecc_mbit_err" },
+{ .int_msk = BIT(2), .msg = "egu_lge_afifo_ecc_1bit_err" },
+{ .int_msk = BIT(3), .msg = "egu_lge_afifo_ecc_mbit_err" },
+{ .int_msk = BIT(4), .msg = "cge_igu_afifo_ecc_1bit_err" },
+{ .int_msk = BIT(5), .msg = "cge_igu_afifo_ecc_mbit_err" },
+{ .int_msk = BIT(6), .msg = "lge_igu_afifo_ecc_1bit_err" },
+{ .int_msk = BIT(7), .msg = "lge_igu_afifo_ecc_mbit_err" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_ppu_mpf_abnormal_int_st2[] = {
+{ .int_msk = BIT(13), .msg = "rpu_rx_pkt_bit32_ecc_mbit_err" },
+{ .int_msk = BIT(14), .msg = "rpu_rx_pkt_bit33_ecc_mbit_err" },
+{ .int_msk = BIT(15), .msg = "rpu_rx_pkt_bit34_ecc_mbit_err" },
+{ .int_msk = BIT(16), .msg = "rpu_rx_pkt_bit35_ecc_mbit_err" },
+{ .int_msk = BIT(17), .msg = "rcb_tx_ring_ecc_mbit_err" },
+{ .int_msk = BIT(18), .msg = "rcb_rx_ring_ecc_mbit_err" },
+{ .int_msk = BIT(19), .msg = "rcb_tx_fbd_ecc_mbit_err" },
+{ .int_msk = BIT(20), .msg = "rcb_rx_ebd_ecc_mbit_err" },
+{ .int_msk = BIT(21), .msg = "rcb_iso_info_ecc_mbit_err" },
+{ .int_msk = BIT(22), .msg = "rcb_tx_int_info_ecc_mbit_err" },
+{ .int_msk = BIT(23), .msg = "rcb_rx_int_info_ecc_mbit_err" },
+{ .int_msk = BIT(24), .msg = "tpu_tx_pkt_0_ecc_mbit_err" },
+{ .int_msk = BIT(25), .msg = "tpu_tx_pkt_1_ecc_mbit_err" },
+{ .int_msk = BIT(26), .msg = "rd_bus_err" },
+{ .int_msk = BIT(27), .msg = "wr_bus_err" },
+{ .int_msk = BIT(28), .msg = "reg_search_miss" },
+{ .int_msk = BIT(29), .msg = "rx_q_search_miss" },
+{ .int_msk = BIT(30), .msg = "ooo_ecc_err_detect" },
+{ .int_msk = BIT(31), .msg = "ooo_ecc_err_multpl" },
+{ /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_ppu_mpf_abnormal_int_st3[] = {
+}
static const struct hclge_hw_error hclge_ppu_pf_abnormal_int[] = {
    { .int_msk = BIT(0), .msg = "over_8bd_no_fe" },
    { .int_msk = BIT(1), .msg = "tso_mss_cmp_min_err" },
    { .int_msk = BIT(2), .msg = "tso_mss_cmp_max_err" },
    { .int_msk = BIT(3), .msg = "tx_rd_fbd_poison" },
    { .int_msk = BIT(4), .msg = "rx_rd_ebd_poison" },
    { .int_msk = BIT(5), .msg = "buf_wait_timeout" },
    /* sentinel */
};

static const struct hclge_hw_error hclge_ssu_com_err_int[] = {
    { .int_msk = BIT(0), .msg = "buf_sum_err" },
    { .int_msk = BIT(1), .msg = "ppp_mb_num_err" },
    { .int_msk = BIT(2), .msg = "ppp_mbid_err" },
    { .int_msk = BIT(3), .msg = "ppp_rlt_mac_err" },
    { .int_msk = BIT(4), .msg = "ppp_rlt_host_err" },
    { .int_msk = BIT(5), .msg = "cks_edit_position_err" },
    { .int_msk = BIT(6), .msg = "cks_edit_condition_err" },
    { .int_msk = BIT(7), .msg = "vlan_edit_condition_err" },
    { .int_msk = BIT(8), .msg = "vlan_num_ot_err" },
    { .int_msk = BIT(9), .msg = "vlan_num_in_err" },
    /* sentinel */
};

static const struct hclge_hw_error hclge_ssu_port_based_err_int[] = {
    { .int_msk = BIT(0), .msg = "roc_pkt_without_key_port" },
    { .int_msk = BIT(1), .msg = "tpu_pkt_without_key_port" },
    { .int_msk = BIT(2), .msg = "igu_pkt_without_key_port" },
    { .int_msk = BIT(3), .msg = "roc_eof_mis_match_port" },
    { .int_msk = BIT(4), .msg = "tpu_eof_mis_match_port" },
    { .int_msk = BIT(5), .msg = "igu_eof_mis_match_port" },
    { .int_msk = BIT(6), .msg = "roc_sof_mis_match_port" },
    { .int_msk = BIT(7), .msg = "tpu_sof_mis_match_port" },
    { .int_msk = BIT(8), .msg = "igu_sof_mis_match_port" },
    { .int_msk = BIT(11), .msg = "ets_rd_int_rx_port" },
    { .int_msk = BIT(12), .msg = "ets_wr_int_rx_port" },
    { .int_msk = BIT(13), .msg = "ets_rd_int_tx_port" },
    { .int_msk = BIT(14), .msg = "ets_wr_int_tx_port" },
    /* sentinel */
};
+static const struct hclge_hw_error hclge_ssu_fifo_overflow_int[] = {
+  { .int_msk = BIT(0), .msg = "ig_mac_inf_int" },
+  { .int_msk = BIT(1), .msg = "ig_host_inf_int" },
+  { .int_msk = BIT(2), .msg = "ig_roc_buf_int" },
+  { .int_msk = BIT(3), .msg = "ig_host_data_fifo_int" },
+  { .int_msk = BIT(4), .msg = "ig_host_key_fifo_int" },
+  { .int_msk = BIT(5), .msg = "tx_qcn_fifo_int" },
+  { .int_msk = BIT(6), .msg = "rx_qcn_fifo_int" },
+  { .int_msk = BIT(7), .msg = "tx_pf_rd_fifo_int" },
+  { .int_msk = BIT(8), .msg = "rx_pf_rd_fifo_int" },
+  { .int_msk = BIT(9), .msg = "qm_eof_fifo_int" },
+  { .int_msk = BIT(10), .msg = "mb_rlt_fifo_int" },
+  { .int_msk = BIT(11), .msg = "dup_uncopy_fifo_int" },
+  { .int_msk = BIT(12), .msg = "dup_cnt_rd_fifo_int" },
+  { .int_msk = BIT(13), .msg = "dup_cnt_drop_fifo_int" },
+  { .int_msk = BIT(14), .msg = "dup_cnt_wrb_fifo_int" },
+  { .int_msk = BIT(15), .msg = "host_cmd_fifo_int" },
+  { .int_msk = BIT(16), .msg = "mac_cmd_fifo_int" },
+  { .int_msk = BIT(17), .msg = "host_cmd_bitmap_empty_int" },
+  { .int_msk = BIT(18), .msg = "mac_cmd_bitmap_empty_int" },
+  { .int_msk = BIT(19), .msg = "dup_bitmap_empty_int" },
+  { .int_msk = BIT(20), .msg = "out_queue_bitmap_empty_int" },
+  { .int_msk = BIT(21), .msg = "bank2_bitmap_empty_int" },
+  { .int_msk = BIT(22), .msg = "bank1_bitmap_empty_int" },
+  { .int_msk = BIT(23), .msg = "bank0_bitmap_empty_int" },
+  { /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_ssu_ets_tcg_int[] = {
+  { .int_msk = BIT(0), .msg = "ets_rd_int_rx_tcg" },
+  { .int_msk = BIT(1), .msg = "ets_wr_int_rx_tcg" },
+  { .int_msk = BIT(2), .msg = "ets_rd_int_tx_tcg" },
+  { .int_msk = BIT(3), .msg = "ets_wr_int_tx_tcg" },
+  { /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_ssu_port_based_pf_int[] = {
+  { .int_msk = BIT(0), .msg = "roc_pkt_without_key_port" },
+  { .int_msk = BIT(9), .msg = "low_water_line_err_port" },
+  { .int_msk = BIT(10), .msg = "hi_water_line_err_port" },
+  { /* sentinel */ }
+};
+
+static const struct hclge_hw_error hclge_rocee_qmm_ovf_err_int[] = {
+  { .int_msk = 0, .msg = "rocee qmm ovf: sgid invalid err" },
+  { .int_msk = 0x4, .msg = "rocee qmm ovf: sgid ovf err" },
+  { .int_msk = 0x8, .msg = "rocee qmm ovf: smac invalid err" },
+  { .int_msk = 0xC, .msg = "rocee qmm ovf: smac ovf err" },
+};
static void hclge_log_error(struct device *dev, char *reg,
    const struct hclge_hw_error *err,
    u32 err_sts)
{
    while (err->msg) {
        if (err->int_msk & err_sts)
            dev_warn(dev, "%s %s found [error status=0x%x]\n",
                reg, err->msg, err_sts);
        err++;
    }
}

/* hclge_cmd_query_error: read the error information
 * @hdev: pointer to struct hclge_dev
 * @desc: descriptor for describing the command
 * @cmd: command opcode
 * @flag: flag for extended command structure
 * @w_num: offset for setting the read interrupt type.
 * @int_type: select which type of the interrupt for which the error
 * info will be read(RAS-CE/RAS-NFE/RAS-FE etc).
 *
 * This function query the error info from hw register/s using command
 */

static int hclge_cmd_query_error(struct hclge_dev *hdev,
    struct hclge_desc *desc, u32 cmd,
    u16 flag, u8 w_num,
    enum hclge_err_int_type int_type)
{
    struct device *dev = &hdev->pdev->dev;
int num = 1;
int ret;

hclge_cmd_setup_basic_desc(&desc[0], cmd, true);
if (flag) {
    desc[0].flag |= cpu_to_le16(flag);
    hclge_cmd_setup_basic_desc(&desc[1], cmd, true);
    num = 2;
}
if (w_num)
    desc[0].data[w_num] = cpu_to_le32(int_type);
ret = hclge_cmd_send(&hdev->hw, &desc[0], num);
if (ret)
    dev_err(dev, "query error cmd failed (%d)\n", ret);
return ret;

static int hclge_config_common_hw_err_int(struct hclge_dev *hdev, bool en)
{
    struct device *dev = &hdev->pdev->dev;
    struct hclge_desc desc[2];

    /* configure common error interrupts */
    hclge_cmd_setup_basic_desc(&desc[0], HCLGE_COMMON_ECC_INT_CFG, false);
    desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
    hclge_cmd_setup_basic_desc(&desc[1], HCLGE_COMMON_ECC_INT_CFG, false);

    if (en) {
        desc[0].data[0] = cpu_to_le32(HCLGE_IMP_TCM_ECC_ERR_INT_EN);
        desc[0].data[2] = cpu_to_le32(HCLGE_CMDQ_NIC_ECC_ERR_INT_EN |
            HCLGE_CMDQ_ROCEE_ECC_ERR_INT_EN);
        desc[0].data[3] = cpu_to_le32(HCLGE_IMP_RD_POISON_ERR_INT_EN);
        desc[0].data[4] = cpu_to_le32(HCLGE_TQP_ECC_ERR_INT_EN |
            HCLGE_MSIX_SRAM_ECC_ERR_INT_EN);
        desc[0].data[5] = cpu_to_le32(HCLGE_IMP_ITCM4_ECC_ERR_INT_EN);
    }
    desc[1].data[0] = cpu_to_le32(HCLGE_IMP_TCM_ECC_ERR_INT_EN_MASK);
        HCLGE_CMDQ_ROCEE_ECC_ERR_INT_EN_MASK);
    desc[1].data[3] = cpu_to_le32(HCLGE_IMP_RD_POISON_ERR_INT_EN_MASK);
        HCLGE_MSIX_SRAM_ECC_ERR_INT_EN_MASK);
    desc[1].data[5] = cpu_to_le32(HCLGE_IMP_ITCM4_ECC_ERR_INT_EN_MASK);
}
+ret = hclge_cmd_send(&hdev->hw, &desc[0], 2);
+if (ret)
+dev_err(dev,
+"fail(%d) to configure common err interrupts\n", ret);
+
+return ret;
+
+static int hclge_config_ncsi_hw_err_int(struct hclge_dev *hdev, bool en)
+{
+struct device *dev = &hdev->pdev->dev;
+struct hclge_desc desc;
+int ret;
+
+if (hdev->pdev->revision < 0x21)
+return 0;
+
+/* configure NCSI error interrupts */
+hclge_cmd_setup_basic_desc(&desc, HCLGE_NCSI_INT_EN, false);
+if (en)
+desc.data[0] = cpu_to_le32(HCLGE_NCSI_ERR_INT_EN);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+dev_err(dev,
+"fail(%d) to configure NCSI error interrupts\n", ret);
+
+return ret;
+
+static int hclge_config_igu_egu_hw_err_int(struct hclge_dev *hdev, bool en)
+{
+struct device *dev = &hdev->pdev->dev;
+struct hclge_desc desc;
+int ret;
+
+/* configure IGU,EGU error interrupts */
+hclge_cmd_setup_basic_desc(&desc, HCLGE_IGU_COMMON_INT_EN, false);
+if (en)
+desc.data[0] = cpu_to_le32(HCLGE_IGU_ERR_INT_EN);
+
+desc.data[1] = cpu_to_le32(HCLGE_IGU_ERR_INT_EN_MASK);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(dev,
+"fail(%d) to configure IGU common interrupts\n", ret);
+
+return ret;
hclge_cmd_setup_basic_desc (&desc, HCLGE_IGU_EGU_TNL_INT_EN, false);
if (en)
    desc.data[0] = cpu_to_le32(HCLGE_IGU_TNL_ERR_INT_EN);
+desc.data[1] = cpu_to_le32(HCLGE_IGU_TNL_ERR_INT_EN_MASK);
+ret = hclge_cmd_send (&hdev->hw, &desc, 1);
+if (ret) {
  +dev_err (dev,
  +"fail(%)d to configure IGU-EGU TNL interrupts\n", ret);
  +return ret;
  +}
  +
  +ret = hclge_config_ncsi_hw_err_int (hdev, en);
  +
  +return ret;
  +}

static int hclge_config_ppp_error_interrupt (struct hclge_dev *hdev, u32 cmd,
    bool en)
{
  struct device *dev = &hdev->pdev->dev;
  struct hclge_desc desc[2];
  int ret;
  
  /* configure PPP error interrupts */
  hclge_cmd_setup_basic_desc (&desc[0], cmd, false);
  desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
  hclge_cmd_setup_basic_desc (&desc[1], cmd, false);
  
  if (cmd == HCLGE_PPP_CMD0_INT_CMD) {
    if (en) {
      desc[0].data[0] =
        cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT0_EN);
      desc[0].data[1] =
        cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT1_EN);
      desc[0].data[4] = cpu_to_le32(HCLGE_PPP_PF_ERR_INT_EN);
    }
    desc[1].data[0] =
      cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT0_EN_MASK);
    desc[1].data[1] =
      cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT1_EN_MASK);
    if (hdev->pdev->revision &gt;= 0x21)
      desc[1].data[2] =
        cpu_to_le32(HCLGE_PPP_PF_ERR_INT_EN_MASK);
  }
+} else if (cmd == HCLGE_PPP_CMD1_INT_CMD) {
+    if (en) {
+        desc[0].data[0] =
+            cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT2_EN);
+        desc[0].data[1] =
+            cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT3_EN);
+    }
+    +
+    desc[1].data[0] =
+        cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT2_EN_MASK);
+    desc[1].data[1] =
+        cpu_to_le32(HCLGE_PPP_MPF_ECC_ERR_INT3_EN_MASK);
+}
+
+    ret = hclge_cmd_send(&hdev->hw, &desc[0], 2);
+    if (ret)
+        dev_err(dev, "fail(%d) to configure PPP error intr\n", ret);
+    +
+    return ret;
+
+static int hclge_config_ppp_hw_err_int(struct hclge_dev *hdev, bool en)
+{
+    int ret;
+    +
+    ret = hclge_config_ppp_error_interrupt(hdev, HCLGE_PPP_CMD0_INT_CMD,
+        en);
+    if (ret)
+        return ret;
+    ret = hclge_config_ppp_error_interrupt(hdev, HCLGE_PPP_CMD1_INT_CMD,
+        en);
+    +
+    return ret;
+
+static int hclge_config_tm_hw_err_int(struct hclge_dev *hdev, bool en)
+{
+    struct device *dev = &hdev->pdev->dev;
+    struct hclge_desc desc;
+    int ret;
+    +    +
+    /* configure TM SCH hw errors */
+    hclge_cmd_setup_basic_desc(&desc, HCLGE_TM_SCH_ECC_INT_EN, false);
+    if (en)
+        desc.data[0] = cpu_to_le32(HCLGE_TM_SCH_ECC_ERR_INT_EN);
+    +
+    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(dev, "fail(%d) to configure TM SCH errors\n", ret);
+return ret;
+}
+
+/* configure TM QCN hw errors */
+ret = hclge_cmd_query_error(hdev, &desc, HCLGE_TM_QCN_MEM_INT_CFG,
+ 0, 0, 0);
+if (ret) {
+dev_err(dev, "fail(%d) to read TM QCN CFG status\n", ret);
+return ret;
+}
+
+hclge_cmd_reuse_desc(&desc, false);
+if (en)
+desc.data[1] = cpu_to_le32(HCLGE_TM_QCN_MEM_ERR_INT_EN);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+dev_err(dev,
+"fail(%d) to configure TM QCN mem errors\n", ret);
+
+return ret;
+}
+
+static int hclge_config_mac_err_int(struct hclge_dev *hdev, bool en)
+{
+struct device *dev = &hdev->pdev->dev;
+struct hclge_desc desc;
+int ret;
+
+/* configure MAC common error interrupts */
+hclge_cmd_setup_basic_desc(&desc, HCLGE_MAC_COMMON_INT_EN, false);
+if (en)
+desc.data[0] = cpu_to_le32(HCLGE_MAC_COMMON_ERR_INT_EN);
+
+desc.data[1] = cpu_to_le32(HCLGE_MAC_COMMON_ERR_INT_EN_MASK);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+dev_err(dev,
+"fail(%d) to configure MAC COMMON error intr\n", ret);
+
+return ret;
+}
+
+static int hclge_config_ppu_error_interrupts(struct hclge_dev *hdev, u32 cmd,
struct device *dev = &hdev->pdev->dev;
struct hclge_desc desc[2];
int num = 1;
int ret;
+
/* configure PPU error interrupts */
+if (cmd == HCLGE_PPU_MPF_ECC_INT_CMD) {
+hclge_cmd_setup_basic_desc(&desc[0], cmd, false);
+desc[0].flag |= HCLGE_CMD_FLAG_NEXT;
+hclge_cmd_setup_basic_desc(&desc[1], cmd, false);
+if (en) {
+desc[0].data[0] = HCLGE_PPU_MPF_ABNORMAL_INT0_EN;
+desc[0].data[1] = HCLGE_PPU_MPF_ABNORMAL_INT1_EN;
+desc[1].data[3] = HCLGE_PPU_MPF_ABNORMAL_INT3_EN;
+}
+
+desc[1].data[0] = HCLGE_PPU_MPF_ABNORMAL_INT0_EN_MASK;
+desc[1].data[1] = HCLGE_PPU_MPF_ABNORMAL_INT1_EN_MASK;
+desc[1].data[3] = HCLGE_PPU_MPF_ABNORMAL_INT3_EN_MASK;
+num = 2;
+} else if (cmd == HCLGE_PPU_MPF_OTHER_INT_CMD) {
+hclge_cmd_setup_basic_desc(&desc[0], cmd, false);
+if (en) {
+desc[0].data[0] = HCLGE_PPU_MPF_ABNORMAL_INT2_EN2;
+}
+
+desc[0].data[2] = HCLGE_PPU_MPF_ABNORMAL_INT2_EN2_MASK;
+} else if (cmd == HCLGE_PPU_PF_OTHER_INT_CMD) {
+hclge_cmd_setup_basic_desc(&desc[0], cmd, false);
+if (en) {
+desc[0].data[0] = HCLGE_PPU_PF_ABNORMAL_INT_EN;
+}
+
+desc[0].data[2] = HCLGE_PPU_PF_ABNORMAL_INT_EN_MASK;
+} else {
+dev_err(dev, "Invalid cmd to configure PPU error interrupts\n");
+return -EINVAL;
+}
+
+ret = hclge_cmd_send(&hdev->hw, &desc[0], num);
+
+return ret;
+};
+int ret;
+
+ret = hclge_config_ppu_error_interrupts(hdev, HCLGE_PPU_MPF_ECC_INT_CMD,
+en);
+if (ret) {
+dev_err(dev, "fail(%d) to configure PPU MPF ECC error interrupts", ret);
+return ret;
+
+ret = hclge_config_ppu_error_interrupts(hdev,
+HCLGE_PPU_MPF_OTHER_INT_CMD,
+en);
+if (ret) {
+dev_err(dev, "fail(%d) to configure PPU MPF other interrupts", ret);
+return ret;
+
+ret = hclge_config_ppu_error_interrupts(hdev,
+HCLGE_PPU_PF_OTHER_INT_CMD, en);
+if (ret)
+dev_err(dev, "fail(%d) to configure PPU PF error interrupts", ret);
+return ret;
+
+static int hclge_config_ssu_hw_err_int(struct hclge_dev *hdev, bool en)
+
+
+/* configure SSU ecc error interrupts */
+hclge_cmd_setup_basic_desc(&desc[0], HCLGE_SSU_ECC_INT_CMD, false);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+hclge_cmd_setup_basic_desc(&desc[1], HCLGE_SSU_ECC_INT_CMD, false);
+if (en) {
+desc[0].data[0] = cpu_to_le32(HCLGE_SSU_1BIT_ECC_ERR_INT_EN);
+desc[0].data[1] =
+cpu_to_le32(HCLGE_SSU_MULTI_BIT_ECC_ERR_INT_EN);
+desc[0].data[4] = cpu_to_le32(HCLGE_SSU_BIT32_ECC_ERR_INT_EN);
+
+desc[1].data[0] = cpu_to_le32(HCLGE_SSU_1BIT_ECC_ERR_INT_EN_MASK);
+desc[1].data[1] = cpu_to_le32(HCLGE_SSU_MULTI_BIT_ECC_ERR_INT_EN_MASK);
+desc[1].data[2] = cpu_to_le32(HCLGE_SSU_BIT32_ECC_ERR_INT_EN_MASK);
+
+ret = hclge_cmd_send(&hdev->hw, &desc[0], 2);
+if (ret) {
+dev_err(dev,
+"fail(%d) to configure SSU ECC error interrupt\n", ret);
+return ret;
+}
+
+/* configure SSU common error interrupts */
+hclge_cmd_setup_basic_desc(&desc[0], HCLGE_SSU_COMMON_INT_CMD, false);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+hclge_cmd_setup_basic_desc(&desc[1], HCLGE_SSU_COMMON_INT_CMD, false);
+
+if (en) {
+if (hdev->pdev->revision >= 0x21)
+desc[0].data[0] =
+cpu_to_le32(HCLGE_SSU_COMMON_INT_EN);
+else
+desc[0].data[0] =
+cpu_to_le32(HCLGE_SSU_COMMON_INT_EN & ~BIT(5));
+desc[0].data[1] = cpu_to_le32(HCLGE_SSU_PORT_BASED_ERR_INT_EN);
+desc[0].data[2] =
+cpu_to_le32(HCLGE_SSU_FIFO_OVERFLOW_ERR_INT_EN);
+
+desc[1].data[0] = cpu_to_le32(HCLGE_SSU_COMMON_INT_EN_MASK |
+HCLGE_SSU_PORT_BASED_ERR_INT_EN_MASK);
+desc[1].data[1] = cpu_to_le32(HCLGE_SSU_FIFO_OVERFLOW_ERR_INT_EN_MASK);
+
+ret = hclge_cmd_send(&hdev->hw, &desc[0], 2);
+if (ret)
+dev_err(dev,
+"fail(%d) to configure SSU COMMON error intr\n", ret);
+
+return ret;
+}
+
+#define HCLGE_SET_DEFAULT_RESET_REQUEST(reset_type) \
+do { \
+if (ae_dev->ops->set_default_reset_request) \
+ae_dev->ops->set_default_reset_request(ae_dev, \
+    reset_type); \
+} while (0)
+
+/* hclge_handle_mpf_ras_error: handle all main PF RAS errors
+ * @hdev: pointer to struct hclge_dev
+ * @desc: descriptor for describing the command
+ * @num: number of extended command structures
+ * @ reset: This function handles all the main PF RAS errors in the
+ * hw register/s using command.
+ */
+static int hclge_handle_mpf_ras_error(struct hclge_dev *hdev,
+    struct hclge_desc *desc,
+    int num)
+{
+    struct hnae3_ae_dev *ae_dev = hdev->ae_dev;
+    struct device *dev = &hdev->pdev->dev;
+    __le32 *desc_data;
+    u32 status;
+    int ret;
+    
+    /* query all main PF RAS errors */
+    hclge_cmd_setup_basic_desc(&desc[0], HCLGE_QUERY_CLEAR_MPF_RAS_INT,
+        true);
+    desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+    ret = hclge_cmd_send(&hdev->hw, &desc[0], num);
+    if (ret) {
+        dev_err(dev, "query all mpf ras int cmd failed (%d)\n", ret);
+        return ret;
+    }
+    
+    /* log HNS common errors */
+    status = le32_to_cpu(desc[0].data[0]);
+    if (status) {
+        hclge_log_error(dev, "IMP_TCM_ECC_INT_STS",
+            hclge_imp_tcm_ecc_int[0], status);
+        HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);
+    }
+    
+    status = le32_to_cpu(desc[0].data[1]);
+    if (status) {
+        hclge_log_error(dev, "CMDQ_MEM_ECC_INT_STS",
+            hclge_cmdq_nic_mem_ecc_int[0], status);
+        HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);
+    }
+    
+    if ((le32_to_cpu(desc[0].data[2])) & BIT(0)) {
+        dev_warn(dev, "imp_rd_data_poison_err found\n");
+        HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);
+    }
+    
+    status = le32_to_cpu(desc[0].data[3]);
+    if (status) {
+        hclge_log_error(dev, "TQP_INT_ECC_INT_STS",
+            hclge_tqp_int_ecc_int[0], status);
+        HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+status = le32_to_cpu(desc[0].data[4]);
+if (status) {
+hclge_log_error(dev, "MSIX_ECC_INT_STS",
+&hclge_msix_sram_ecc_int[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+
+/* log SSU(Storage Switch Unit) errors */
+desc_data = (__le32 *)&desc[2];
+status = le32_to_cpu(*(desc_data + 2));
+if (status) {
+dev_warn(dev, "SSU_ECC_MULTI_BIT_INT_0 ssu_ecc_mbit_int[31:0]"");
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+
+/* log IGU(Ingress Unit) errors */
+desc_data = (__le32 *)&desc[3];
+status = le32_to_cpu(*desc_data) & HCLGE_IGU_INT_MASK;
+if (status) {
+hclge_log_error(dev, "IGU_INT_STS",
+&hclge_igu_int[0], status);
+
+/* log PPP(Programmable Packet Process) errors */
+desc_data = (__le32 *)&desc[4];
+status = le32_to_cpu(*(desc_data + 1));
+if (status) {
+hclge_log_error(dev, "PPP_MPF_ABNORMAL_INT_ST1",
+&hclge_ppp_mpf_abnormal_int_st1[0], status);
+
+status = le32_to_cpu(*(desc_data + 3)) & HCLGE_PPP_MPF_INT_ST3_MASK;
+if (status) {
+hclge_log_error(dev, "PPP_MPF_ABNORMAL_INT_ST3",
+&hclge_ppp_mpf_abnormal_int_st3[0], status);
/* log PPU(RCB) errors */
+desc_data = (__le32 *)&desc[5];
+status = le32_to_cpu(*(desc_data + 1));
+if (status) {
+dev_warn(dev, "PPU_MPF_ABNORMAL_INT_ST1 %s found\n",
+"ru_rx_pkt_ecc_mbit_err");
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+}
+
+status = le32_to_cpu(*(desc_data + 2));
+if (status) {
+hclge_log_error(dev, "PPU_MPF_ABNORMAL_INT_ST2",
+&hclge_ppu_mpf_abnormal_int_st2[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+}
+
+status = le32_to_cpu(*(desc_data + 3)) & HCLGE_PPU_MPF_INT_ST3_MASK;
+if (status) {
+hclge_log_error(dev, "PPU_MPF_ABNORMAL_INT_ST3",
+&hclge_ppu_mpf_abnormal_int_st3[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+}
+
+/* log TM(Traffic Manager) errors */
+desc_data = (__le32 *)&desc[6];
+status = le32_to_cpu(*desc_data);
+if (status) {
+hclge_log_error(dev, "TM_SCH_RINT",
+&hclge_tm_sch_rint[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+}
+
+/* log QCN(Quantized Congestion Control) errors */
+desc_data = (__le32 *)&desc[7];
+status = le32_to_cpu(*desc_data) & HCLGE_QCN_FIFO_INT_MASK;
+if (status) {
+hclge_log_error(dev, "QCN_FIFO_RINT",
+&hclge_qcn_fifo_rint[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+}
+
+status = le32_to_cpu(*(desc_data + 1)) & HCLGE_QCN_ECC_INT_MASK;
+if (status) {
+hclge_log_error(dev, "QCN_ECC_RINT",
+&hclge_qcn_ecc_rint[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+}
+
+/* log NCSI errors */
+desc_data = ((__le32 *)&desc[9];
+status = le32_to_cpu(*desc_data) & HCLGE_NCSI_ECC_INT_MASK;
+if (status) {
+hclge_log_error(dev, "NCSI_ECC_INT_RPT",
+&hclge_ncsi_err_int[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_CORE_RESET);
+}
+
+/* clear all main PF RAS errors */
+hclge_cmd_reuse_desc(&desc[0], false);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+
+ret = hclge_cmd_send(&hdev->hw, &desc[0], num);
+if (ret)
+dev_err(dev, "clear all mpf ras int cmd failed (%d)\n", ret);
+
+return ret;
+}
+
+/* hclge_handle_pf_ras_error: handle all PF RAS errors
+ * @hdev: pointer to struct hclge_dev
+ * @desc: descriptor for describing the command
+ * @num: number of extended command structures
+ *
+ * This function handles all the PF RAS errors in the
+ * hw register/s using command.
+ */
+static int hclge_handle_pf_ras_error(struct hclge_dev *hdev,
+ struct hclge_desc *desc,
+ int num)
+
+{ 
+struct hnae3_ae_dev *ae_dev = hdev->ae_dev;
+struct device *dev = &hdev->pdev->dev;
+__le32 *desc_data;
+u32 status;
+int ret;
+
+/* query all PF RAS errors */
+hclge_cmd_setup_basic_desc(&desc[0], HCLGE_QUERY_CLEAR_PF_RAS_INT,
+ true);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+
+ret = hclge_cmd_send(&hdev->hw, &desc[0], num);
+if (ret) {
+dev_err(dev, "query all pf ras int cmd failed (%d)\n", ret);
+return ret;
/* log SSU(Storage Switch Unit) errors */
+status = le32_to_cpu(desc[0].data[0]);
+if (status) {
+hclge_log_error(dev, "SSU_PORT_BASED_ERR_INT",
+&hclge_ssu_port_based_err_int[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);
+}
+
+status = le32_to_cpu(desc[0].data[1]);
+if (status) {
+hclge_log_error(dev, "SSU_FIFO_OVERFLOW_INT",
+&hclge_ssu_fifo_overflow_int[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);
+}
+
+status = le32_to_cpu(desc[0].data[2]);
+if (status) {
+hclge_log_error(dev, "SSU_ETS_TCG_INT",
+&hclge_ssu_ets_tcg_int[0], status);
+HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);
+}
+
+/* log IGU(Ingress Unit) EGU(Egress Unit) TNL errors */
desc_data = (__le32 *)&desc[1];
+status = le32_to_cpu(*desc_data) & HCLGE_IGU_EGU_TNL_INT_MASK;
+if (status)
+hclge_log_error(dev, "IGU_EGU_TNL_INT_STS",
+&hclge_igu_egu_tnl_int[0], status);
+
+/* clear all PF RAS errors */
+hclge_cmd_reuse_desc(&desc[0], false);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+
+ret = hclge_cmd_send(&hdev->hw, &desc[0], num);
+if (ret)
+dev_err(dev, "clear all pf ras int cmd failed (%d)n", ret);
+
+return ret;
+
+static int hclge_handle_all_ras_errors(struct hclge_dev *hdev)
+{
+struct device *dev = &hdev->pdev->dev;
+u32 mpf_bd_num, pf_bd_num, bd_num;
+struct hclge_desc desc_bd;
+struct hclge_desc *desc;
int ret;
+
/* query the number of registers in the RAS int status */
hclge_cmd_setup_basic_desc(&desc_bd, HCLGE_QUERY_RAS_INT_STS_BD_NUM,
  true);
ret = hclge_cmd_send(&hdev->hw, &desc_bd, 1);
if (ret) {
  dev_err(dev, "fail(%d) to query ras int status bd num\n", ret);
  return ret;
}
mpf_bd_num = le32_to_cpu(desc_bd.data[0]);
pf_bd_num = le32_to_cpu(desc_bd.data[1]);
bd_num = max_t(u32, mpf_bd_num, pf_bd_num);
+
desc = kcalloc(bd_num, sizeof(struct hclge_desc), GFP_KERNEL);
if (!desc)
  return -ENOMEM;
+
/* handle all main PF RAS errors */
ret = hclge_handle_mpf_ras_error(hdev, desc, mpf_bd_num);
if (ret) {
  kfree(desc);
  return ret;
}
memset(desc, 0, bd_num * sizeof(struct hclge_desc));
+
/* handle all PF RAS errors */
ret = hclge_handle_pf_ras_error(hdev, desc, pf_bd_num);
kfree(desc);
+
return ret;
+
static int hclge_log_rocee_ovf_error(struct hclge_dev *hdev)
{
  struct device *dev = &hdev->pdev->dev;
desc[0];
  +
  static int hclge_log_rocee_ovf_error(struct hclge_dev *hdev)
  {
    +
    struct device *dev = &hdev->pdev->dev;
    struct hclge_desc desc[2];
    int ret;
    +
    /* read overflow error status */
    ret = hclge_cmd_query_error(hdev, &desc[0],
    + HCLGE_ROCEE_PF_RAS_INT_CMD,
    + 0, 0, 0);
    if (ret) {
      dev_err(dev, "failed(%d) to query ROCEE OVF error st\n", ret);
      return ret;
    }
/* log overflow error */
+if (le32_to_cpu(desc[0].data[0]) & HCLGE_ROCEE_OVF_ERR_INT_MASK) {
    +const struct hclge_hw_error *err;
    +u32 err sts;
    +
    +err = &hclge_rocee_qmm_ovf_err_int[0];
    +err sts = HCLGE_ROCEE_OVF_ERR_TYPE_MASK &
        + le32_to_cpu(desc[0].data[0]);
    +while (err->msg) {
        +if (err->int msk == err sts) {
            +dev_warn(dev, "%s [error status=0x%] found\n",
                +err->msg,
                + le32_to_cpu(desc[0].data[0]));
            +break;
            +}
            +err++;
            +}
            +}
            +}
            +if (le32_to_cpu(desc[0].data[1]) & HCLGE_ROCEE_OVF_ERR_INT_MASK) {
                +dev_warn(dev, "ROCEE TSP OVF [error status=0x%] found\n",
                    + le32_to_cpu(desc[0].data[1]));
                +}
                +}
                +}
                +if (le32_to_cpu(desc[0].data[2]) & HCLGE_ROCEE_OVF_ERR_INT_MASK) {
                    +dev_warn(dev, "ROCEE SCC OVF [error status=0x%] found\n",
                        + le32_to_cpu(desc[0].data[2]));
                    +}
                    +}
                    +}
                    +return 0;
                    +}
                    +}
                    +static int hclge_log_and_clear_rocee_ras_error(struct hclge_dev *hdev)
                    +{
                    +enum hnae3_reset_type reset_type = HNAE3_FUNC_RESET;
                    +struct hnae3_ae_dev *ae_dev = hdev->ae_dev;
                    +struct device *dev = &hdev->pdev->dev;
                    +struct hclge_desc desc[2];
                    +unsigned int status;
                    +int ret;
                    +
                    +/* read RAS error interrupt status */
                    +ret = hclge_cmd_query_error(hdev, &desc[0],
                        + HCLGE_QUERY_CLEAR_ROCEE_RAS_INT,
                        + 0, 0, 0);
                    +if (ret) {
                        +dev_err(dev, "failed(%d) to query ROCEE RAS INT SRC\n", ret);
                        +/* reset everything for now */
                    }
HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);

status = le32_to_cpu(desc[0].data[0]);
if (status & HCLGE_ROCEE_RERR_INT_MASK)
    dev_warn(dev, "ROCEE RAS AXI rresp error\n");
if (status & HCLGE_ROCEE_BERR_INT_MASK)
    dev_warn(dev, "ROCEE RAS AXI bresp error\n");
if (status & HCLGE_ROCEE_ECC_INT_MASK) {
    dev_warn(dev, "ROCEE RAS 2bit ECC error\n");
    reset_type = HNAE3_GLOBAL_RESET;
}
if (status & HCLGE_ROCEE_OVF_INT_MASK) {
    ret = hclge_log_rocee_ovf_error(hdev);
    if (ret) {
        dev_err(dev, "failed(%d) to process ovf error\n", ret);
        /* reset everything for now */
        HCLGE_SET_DEFAULT_RESET_REQUEST(HNAE3_GLOBAL_RESET);
        return ret;
    }
}
/* clear error status */
hclge_cmd_reuse_desc(&desc[0], false);
ret = hclge_cmd_send(&hdev->hw, &desc[0], 1);
if (ret) {
    dev_err(dev, "failed(%d) to clear ROCEE RAS error\n", ret);
    /* reset everything for now */
    reset_type = HNAE3_GLOBAL_RESET;
}
HCLGE_SET_DEFAULT_RESET_REQUEST(reset_type);
return ret;

static int hclge_config_rocee_ras_interrupt(struct hclge_dev *hdev, bool en)
{
    struct device *dev = &hdev->pdev->dev;
    struct hclge_desc desc;
    int ret;
    if (hdev->pdev->revision < 0x21 || !hnae3_dev_roce_supported(hdev))
+return 0;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_CONFIG_ROCEE_RAS_INT_EN, false);
+if (en) {
    /* enable ROCEE hw error interrupts */
    desc.data[0] = cpu_to_le32(HCLGE_ROCEE_RAS_NFE_INT_EN);
    desc.data[1] = cpu_to_le32(HCLGE_ROCEE_RAS_CE_INT_EN);
    +
    hclge_log_and_clear_rocee_ras_error(hdev);
    +}
    desc.data[2] = cpu_to_le32(HCLGE_ROCEE_RAS_NFE_INT_EN_MASK);
    desc.data[3] = cpu_to_le32(HCLGE_ROCEE_RAS_CE_INT_EN_MASK);
    +
    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    +if (ret)
    +dev_err(dev, "failed(%d) to config ROCEE RAS interrupt\n", ret);
    +
    +return ret;
    +}
+
+static int hclge_handle_rocee_ras_error(struct hnae3_ae_dev *ae_dev)
+
+{
+    struct hclge_dev *hdev = ae_dev->priv;
+    +
+    +if (test_bit(HCLGE_STATE_RST_HANDLING, &hdev->state) ||
+        hdev->pdev->revision < 0x21)
+    +    return HNAE3_NONE_RESET;
+    +
+    +return hclge_log_and_clear_rocee_ras_error(hdev);
+    +}
+
+static const struct hclge_hw_blk hw_blk[] = {
+{
+    .msk = BIT(0), .name = "IGU_EGU",
+    .config_err_int = hclge_config_igu_egu_hw_err_int,
+    +},
+{
+    .msk = BIT(1), .name = "PPP",
+    .config_err_int = hclge_config_ppp_hw_err_int,
+    +},
+{
+    .msk = BIT(2), .name = "SSU",
+    .config_err_int = hclge_config_ssu_hw_err_int,
+    +},
+{
+    .msk = BIT(3), .name = "PPU",
+    .config_err_int = hclge_config_ppu_hw_err_int,
+    +}
+{
+  .msk = BIT(4), .name = "TM",
+  .config_err_int = hclge_config_tm_hw_err_int,
+},
+
+
+
+
+
+
+int hclge_hw_error_set_state(struct hclge_dev *hdev, bool state)
+{
+  const struct hclge_hw_blk *module = hw_blk;
+  struct device *dev = &hdev->pdev->dev;
+  int ret = 0;
+
+  while (module->name) {
+    if (module->config_err_int) {
+      ret = module->config_err_int(hdev, state);
+      if (ret)
+        return ret;
+    }
+    module++;
+  }
+
+  ret = hclge_config_rocee_ras_interrupt(hdev, state);
+  if (ret)
+    dev_err(dev, "fail(%d) to configure ROCEE err int\n", ret);
+
+  return ret;
+}
+
+pci_ers_result_t hclge_handle_hw_ras_error(struct hnae3_ae_dev *ae_dev)
+{
+  struct hclge_dev *hdev = ae_dev->priv;
+  struct device *dev = &hdev->pdev->dev;
+  u32 status;
+
+  status = hclge_read_dev(&hdev->hw, HCLGE_RAS_PF_OTHER_INT_STS_REG);
+
+  /* Handling Non-fatal HNS RAS errors */
+  if (status & HCLGE_RAS_REG_NFE_MASK) {
+    dev_warn(dev,
+      +  /* sentinel */
+      +};
"HNS Non-Fatal RAS error(status=0x%x) identified\n",
  + status);
+ hclge_handle_all_ras_errors(hdev);
+ } else {
+ if (test_bit(HCLGE_STATE_RST_HANDLING, &hdev->state) ||
  + hdev->pdev->revision < 0x21)
+ return PCI_ERS_RESULT_RECOVERED;
+ }
+
+ if (status & HCLGE_RAS_REG_ROCEE_ERR_MASK) {
+ dev_warn(dev, "ROCEE uncorrected RAS error identified\n");
+ hclge_handle_rocee_ras_error(ae_dev);
+ }
+
+ if (status & HCLGE_RAS_REG_NFE_MASK ||
+ status & HCLGE_RAS_REG_ROCEE_ERR_MASK)
+ return PCI_ERS_RESULT_NEED_RESET;
+ +
+ return PCI_ERS_RESULT_RECOVERED;
+ }
+
+ int hclge_handle_hw_msix_error(struct hclge_dev *hdev,
+     unsigned long *reset_requests)
+ {
+     struct device *dev = &hdev->pdev->dev;
+     u32 mpf_bd_num, pf_bd_num, bd_num;
+     struct hclge_desc desc_bd;
+     struct hclge_desc *desc;
+     __le32 *desc_data;
+     int ret = 0;
+     u32 status;
+     +
+     /* set default handling */
+     set_bit(HNAE3_FUNC_RESET, reset_requests);
+     +
+     /* query the number of bds for the MSIx int status */
+     hclge_cmd_setup_basic_desc(&desc_bd, HCLGE_QUERY_MSIX_INT_STS BD_NUM,
+        true);
+     ret = hclge_cmd_send(&hdev->hw, &desc_bd, 1);
+     if (ret) {
+     dev_err(dev, "fail(%d) to query msix int status bd num\n",
+        ret);
+     +
+     /* reset everything for now */
+     set_bit(HNAE3_GLOBAL_RESET, reset_requests);
+     return ret;
+     }
+     mpf_bd_num = le32_to_cpu(desc_bd.data[0]);
+pf_bd_num = le32_to_cpu(desc_bd.data[1]);
+bd_num = max_t(u32, mpf_bd_num, pf_bd_num);
+
+desc = kmalloc(bd_num, sizeof(struct hclge_desc), GFP_KERNEL);
+if (!desc)
+goto out;
+
+/* query all main PF MSIx errors */
+hclge_cmd_setup_basic_desc(&desc[0], HCLGE_QUERY_CLEAR_ALL_MPF_MSIX_INT,
+    true);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+ret = hclge_cmd_send(&hdev->hw, &desc[0], mpf_bd_num);
+if (ret) {
+    dev_err(dev, "query all mpf msix int cmd failed (%d)\n",
+    ret);
+    /* reset everything for now */
+    set_bit(HNAE3_GLOBAL_RESET, reset_requests);
+    goto msi_error;
+}
+
+/* log MAC errors */
+desc_data = (__le32 *)&desc[1];
+status = le32_to_cpu(*desc_data);
+if (status) {
+    hclge_log_error(dev, "MAC_AFIFO_TNL_INT_R",
+    &hclge_mac_afifo_tnl_int[0], status);
+    set_bit(HNAE3_GLOBAL_RESET, reset_requests);
+}
+
+/* log PPU(RCB) errors */
+desc_data = (__le32 *)&desc[5];
+status = le32_to_cpu((desc_data + 2)) &
+HCLGE_PPU_MPF_INT_ST2_MSIX_MASK;
+if (status) {
+    dev_warn(dev,
+    "PPU_MPF_ABNORMAL_INT_ST2[28:29], err_status(0x%x)\n",
+    status);
+    set_bit(HNAE3_CORE_RESET, reset_requests);
+}
+
+/* clear all main PF MSIx errors */
+hclge_cmd_reuse_desc(&desc[0], false);
+desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+ret = hclge_cmd_send(&hdev->hw, &desc[0], mpf_bd_num);
+if (ret) {
+    dev_err(dev, "clear all mpf msix int cmd failed (%d)\n",
+
+ret);
+ /* reset everything for now */
+ set_bit(HNAE3_GLOBAL_RESET, reset_requests);
+ goto msi_error;
+ }
+
+ /* query all PF MSIx errors */
+ memset(desc, 0, bd_num * sizeof(struct hclge_desc));
+ hclge_cmd_setup_basic_desc(&desc[0], HCLGE_QUERY_CLEAR_ALL_PF_MSIX_INT,
+  true);
+ desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+ ret = hclge_cmd_send(&hdev->hw, &desc[0], pf_bd_num);
+ if (ret) {
+ dev_err(dev, "query all pf msix int cmd failed (%d)\n",
+ ret);
+ /* reset everything for now */
+ set_bit(HNAE3_GLOBAL_RESET, reset_requests);
+ goto msi_error;
+ }
+
+ /* log SSU PF errors */
+ status = le32_to_cpu(desc[0].data[0]) & HCLGE_SSU_PORT_INT_MSIX_MASK;
+ if (status) {
+ hclge_log_error(dev, "SSU_PORT_BASED_ERR_INT",
+ &hclge_ssu_port_based_pf_int[0], status);
+ set_bit(HNAE3_GLOBAL_RESET, reset_requests);
+ }
+
+ /* read and log PPP PF errors */
+ desc_data = (__le32 *)&desc[2];
+ status = le32_to_cpu(*desc_data);
+ if (status)
+ hclge_log_error(dev, "PPP_PF_ABNORMAL_INT_ST0",
+ &hclge_ppp_pf_abnormal_int[0], status);
+
+ /* PPU(RCB) PF errors */
+ desc_data = (__le32 *)&desc[3];
+ status = le32_to_cpu(*desc_data) & HCLGE_PPU_PF_INT_MSIX_MASK;
+ if (status)
+ hclge_log_error(dev, "PPU_PF_ABNORMAL_INT_ST",
+ &hclge_ppu_pf_abnormal_int[0], status);
+
+ /* clear all PF MSIx errors */
+ hclge_cmd_reuse_desc(&desc[0], false);
+ desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+ ret = hclge_cmd_send(&hdev->hw, &desc[0], pf_bd_num);
if (ret) {
    dev_err(dev, "clear all pf msix int cmd failed (%d)\n", ret);
    /* reset everything for now */
    set_bit(HNAE3_GLOBAL_RESET, reset_requests);
}

msi_error:
kfree(desc);
out:
return ret;
}

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hc1ge_err.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hc1ge_err.h
@@ -0,0 +1,120 @@
/* SPDX-License-Identifier: GPL-2.0+ */
/*  Copyright (c) 2016-2017 Hisilicon Limited. */
+
+#ifndef __HCLGE_ERR_H
+#define __HCLGE_ERR_H
+
+#include "hclge_main.h"
+
+#define HCLGE_RAS_PF_OTHER_INT_STS_REG   0x20B00
+#define HCLGE_RAS_REG_NFE_MASK   0xFF00
+#define HCLGE_RAS_REG_ROCEE_ERR_MASK   0x3000000
+
+#define HCLGE_VECTOR0_PF_OTHER_INT_STS_REG   0x20800
+#define HCLGE_VECTOR0_REG_MSIX_MASK   0x1FF00
+
+#define HCLGE_IMP_TCM_ECC_ERR_INT_EN	0xFFFF0000
+#define HCLGE_IMP_TCM_ECC_ERR_INT_EN_MASK	0xFFFF0000
+#define HCLGE_IMP_ITCM4_ECC_ERR_INT_EN	0x300
+#define HCLGE_IMP_ITCM4_ECC_ERR_INT_EN_MASK	0x300
+#define HCLGE_CMDQ_NIC_ECC_ERR_INT_EN	0xFFFF
+#define HCLGE_CMDQ_NIC_ECC_ERR_INT_EN_MASK	0xFFFF
+#define HCLGE_CMDQ_ROCEE_ECC_ERR_INT_EN	0xFFFF0000
+#define HCLGE_CMDQ_ROCEE_ECC_ERR_INT_EN_MASK	0xFFFF0000
+#define HCLGE_IMP_RD_POISON_ERR_INT_EN	0x0100
+#define HCLGE_IMP_RD_POISON_ERR_INT_EN_MASK	0x0100
+#define HCLGE_TQP_ECC_ERR_INT_EN	0x0FFF
+#define HCLGE_TQP_ECC_ERR_INT_EN_MASK	0x0FFF
+#define HCLGE_MSIX_SRAM_ECC_ERR_INT_EN_MASK	0x0F000000
+#define HCLGE_MSIX_SRAM_ECC_ERR_INT_EN	0x0F000000
+#define HCLGE_IGU_ERR_INT_EN	0x0000066F
+#define HCLGE_IGU_ERR_INT_EN_MASK	0x000F
+#define HCLGE_IGU_TNL_ERR_INT_EN    0x0002AABF
+#define HCLGE_IGU_TNL_ERR_INT_EN_MASK  0x003F
+  #define HCLGE_PPPEnd MPPF ECC ERR_INT0_EN 0xFFFFFFFF
+  #define HCLGE_PPPEnd MPPF ECC ERR_INT0_EN MASK 0xFFFFFFFF
+  #define HCLGE_PPPEnd MPPF ECC ERR_INT1_EN 0xFFFFFFFF
+  #define HCLGE_PPPEnd MPPF ECC ERR_INT1_EN MASK 0xFFFFFFFF
+  #define HCLGE_PPPEnd PF ERR INT EN0x0003
+  #define HCLGE_PPPEnd PF ERR INT EN MASK0x0003
+  #define HCLGE_PPPEnd MPPF ECC ERR INT2_EN 0x003F
+  #define HCLGE_PPPEnd MPPF ECC ERR INT2 MASK 0x003F
+  #define HCLGE_PPPEnd MPPF ECC ERR INT3_EN 0x003F
+  #define HCLGE_PPPEnd MPPF ECC ERR INT3 MASK 0x003F
+  #define HCLGE_TP SCHED ECC ERR INT EN0x3
+  #define HCLGE_TP SCHED ECC ERR INT MASK 0xFFFFFFFF
+  #define HCLGE_NCSI ERR INT EN0x3
+  #define HCLGE_NCSI ERR INT TYPE0x9
+  #define HCLGE_MAC COMMON ERR INT EN GENMASK(7, 0)
+  #define HCLGE_MAC COMMON ERR INT EN MASK GENMASK(7, 0)
+  #define HCLGE_PPPEnd MPF ABNORMAL INT EN0x0003
+  #define HCLGE_PPPEnd MPF ABNORMAL INT EN MASK0x0003
+  #define HCLGE_PPPEnd MPF ABNORMAL INT1 EN0x0003
+  #define HCLGE_PPPEnd MPF ABNORMAL INT1 MASK0x0003
+  #define HCLGE_PPPEnd MPF ABNORMAL INT2 EN0x3FFFF3FFF
+  #define HCLGE_PPPEnd MPF ABNORMAL INT2 MASK0x3FFFF3FFF
+  #define HCLGE_PPPEnd MPF ABNORMAL INT2 EN2 0x2
+  #define HCLGE_PPPEnd MPF ABNORMAL INT2 MASK0x2
+  #define HCLGE_PPPEnd MPF ABNORMAL INT3 GENMASK(7, 0)
+  #define HCLGE_PPPEnd MPF ABNORMAL INT3 MASK GENMASK(7, 0)
+  #define HCLGE_PPPEnd PF ABNORMAL INT EN GENMARK(5, 0)
+  #define HCLGE_PPPEnd PF ABNORMAL INT EN MASK GENMARK(5, 0)
+  #define HCLGE_PPPEnd SSU 1 BIT ECC ERR INT EN GENMASK(31, 0)
+  #define HCLGE_PPPEnd SSU 1 BIT ECC ERR INT EN MASK GENMASK(31, 0)
+  #define HCLGE_PPPEnd SSU MULTI BIT ECC ERR INT EN GENMASK(31, 0)
+  #define HCLGE_PPPEnd SSU MULTI BIT ECC ERR INT EN MASK GENMASK(31, 0)
+  #define HCLGE_PPPEnd SSU BIT32 ECC ERR INT EN0x0101
+  #define HCLGE_PPPEnd SSU BIT32 ECC ERR INT MASK0x0101
+  #define HCLGE_PPPEnd SSU COMMON INT EN GENMASK(9, 0)
+  #define HCLGE_PPPEnd SSU COMMON INT EN MASK GENMASK(9, 0)
+  #define HCLGE_PPPEnd SSU PORT BASED ERR INT EN0x0BFF
+  #define HCLGE_PPPEnd SSU PORT BASED ERR INT EN MASK0x0BFF0000
+  #define HCLGE_PPPEnd FIFO OVERFLOW ERR INT EN GENMASK(23, 0)
+  #define HCLGE_PPPEnd FIFO OVERFLOW ERR INT EN MASK GENMASK(23, 0)
+  #define HCLGE_PPPEnd COMMON ERR INT EN MASK GENMASK(9, 0)
+  #define HCLGE_PPPEnd PORT INT MSIX MASK0x7BFF
+  #define HCLGE_PPPEnd IGU INT GENMASK(3, 0)
+  #define HCLGE_PPPEnd IGU EGU TNL INT GENMASK(5, 0)
+  #define HCLGE_PPPEnd MPF INT ST3 MASK GENMASK(5, 0)
+  #define HCLGE_PPPEnd MPF INT ST3 MASK GENMASK(7, 0)
+  #define HCLGE_PPPEnd MPF INT ST2 MSIX MASK GENMASK(29, 28)
```c
#define HCLGE_PPU_PF_INT_MSIX_MASK	0x27
#define HCLGE_QCN_FIFO_INT_MASK	GENMASK(17, 0)
#define HCLGE_QCN_ECC_INT_MASK	GENMASK(21, 0)
#define HCLGE_NCSI_ECC_INT_MASK	GENMASK(1, 0)

#define HCLGE_ROCEE_RAS_NFE_INT_EN0xF
#define HCLGE_ROCEE_RAS_CE_INT_EN0x1
#define HCLGE_ROCEE_RAS_NFE_INT_EN_MASK	0xF
#define HCLGE_ROCEE_RAS_CE_INT_EN_MASK	0x1
#define HCLGE_ROCEE_RERR_INT_MASK	BIT(0)
#define HCLGE_ROCEE_BERR_INT_MASK	BIT(1)
#define HCLGE_ROCEE_ECC_INT_MASK	BIT(2)
#define HCLGE_ROCEE_OVF_INT_MASK	BIT(3)
#define HCLGE_ROCEE_OVF_ERR_INT_MASK	0x10000
#define HCLGE_ROCEE_OVF_ERR_TYPE_MASK	0x3F

enum hclge_err_int_type {
    HCLGE_ERR_INT_MSIX = 0,
    HCLGE_ERR_INT_RAS_CE = 1,
    HCLGE_ERR_INT_RAS_NFE = 2,
    HCLGE_ERR_INT_RAS_FE = 3,
};

struct hclge_hw_blk {
    u32 msk;
    const char *name;
    int (*config_err_int)(struct hclge_dev *hdev, bool en);
};

struct hclge_hw_error {
    u32 int_msk;
    const char *msg;
};

int hclge_hw_error_set_state(struct hclge_dev *hdev, bool state);
pci_ers_result_t hclge_handle_hw_ras_error(struct hnae3_ae_dev *ae_dev);
int hclge_handle_hw_msix_error(struct hclge_dev *hdev,
    unsigned long *reset_requests);
#endif
```

---

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_main.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_main.c
@@ -1,11 +1,5 @@
-/*
- * Copyright (c) 2016-2017 Hisilicon Limited.
- *
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- * the Free Software Foundation; either version 2 of the License, or
```
- * (at your option) any later version.
- */

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#include <linux/acpi.h>
#include <linux/device.h>
@@ -17,25 +11,28 @@
#include <linux/netdevice.h>
#include <linux/pci.h>
#include <linux/platform_device.h>
-
+#include <linux/if_vlan.h>
+#include <net/rtnetlink.h>
#include "hclge_cmd.h"
#include "hclge_decb.h"
#include "hclge_main.h"
+#include "hclge_mbx.h"
#include "hclge_mdio.h"
#include "hclge_tm.h"
+#include "hclge_err.h"
#include "hnae3.h"

#define HCLGE_NAME	*hclge"
#define HCLGE_STATS_READ(p, offset) (*((u64 *)((u8 *)(p) + (offset))))
#define HCLGE_MAC_STATS_FIELD_OFF(f) (offsetof(struct hclge_mac_stats, f))
-
#define HCLGE_64BIT_STATS_FIELD_OFF(f) (offsetof(struct hclge_64_bit_stats, f))
#define HCLGE_32BIT_STATS_FIELD_OFF(f) (offsetof(struct hclge_32_bit_stats, f))

-#static int hclge_set_mta_filter_mode(struct hclge_dev *hdev,
-    enum hclge_mta_dmac_sel_type mta_mac_sel,
-    bool enable);
+static int hclge_set_mac_mtu(struct hclge_dev *hdev, int new_mps);
static int hclge_init_vlan_config(struct hclge_dev *hdev);
static int hclge_reset_ae_dev(struct hnae3_ae_dev *ae_dev);
+static int hclge_set_umv_space(struct hclge_dev *hdev, u16 space_size,
   +   u16 *allocated_size, bool is_alloc);

static struct hnae3_ae_algo ae_algo;

@@ -51,174 +48,69 @@
   {0, }
   ];

-static const char hns3_nic_test_strs[] = {"Mac  Loopback test",

- "Serdes Loopback test",
- "Phy Loopback test"
-};
+MODULE_DEVICE_TABLE(pci, ae_algo_pci_tbl);

- static const struct hclge_comm_stats_str g_all_64bit_stats_string[] = {
  -{"igu_rx_oversize_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(igu_rx_oversize_pkt)},
  -{"igu_rx_undersize_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(igu_rx_undersize_pkt)},
  -{"igu_rx_out_all_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(igu_rx_out_all_pkt)},
  -{"igu_rx_uni_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(igu_rx_uni_pkt)},
  -{"igu_rx_multi_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(igu_rx_multi_pkt)},
  -{"igu_rx_broad_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(igu_rx_broad_pkt)},
  -{"egu_tx_out_all_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(egu_tx_out_all_pkt)},
  -{"egu_tx_uni_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(egu_tx_uni_pkt)},
  -{"egu_tx_multi_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(egu_tx_multi_pkt)},
  -{"egu_tx_broad_pkt",
    HCLGE_64BIT_STATS_FIELD_OFF(egu_tx_broad_pkt)},
  -{"ssu_ppp_mac_key_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ssu_ppp_mac_key_num)},
  -{"ssu_ppp_host_key_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ssu_ppp_host_key_num)},
  -{"ppp_ssu_mac_rlt_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ppp_ssu_mac_rlt_num)},
  -{"ppp_ssu_host_rlt_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ppp_ssu_host_rlt_num)},
  -{"ssu_tx_in_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ssu_tx_in_num)},
  -{"ssu_tx_out_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ssu_tx_out_num)},
  -{"ssu_rx_in_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ssu_rx_in_num)},
  -{"ssu_rx_out_num",
    HCLGE_64BIT_STATS_FIELD_OFF(ssu_rx_out_num)}
};
+static const u32 cmdq_reg_addr_list[] = {
  +HCLGE_CMDQ_TX_ADDR_L_REG,
  +HCLGE_CMDQ_TX_ADDR_H_REG,
  +HCLGE_CMDQ_TX_DEPTH_REG,
  +HCLGE_CMDQ_TX_TAIL_REG,
  +HCLGE_CMDQ_TX_HEAD_REG,
+ HCLGE_CMDQ_RX_ADDR_L_REG,
+ HCLGE_CMDQ_RX_ADDR_H_REG,
+ HCLGE_CMDQ_RX_DEPTH_REG,
+ HCLGE_CMDQ_RX_TAIL_REG,
+ HCLGE_CMDQ_RX_HEAD_REG,
+ HCLGE_VECTOR0_CMDQ_SRC_REG,
+ HCLGE_CMDQ_INTR_STS_REG,
+ HCLGE_CMDQ_INTR_EN_REG,
+ HCLGE_CMDQ_INTR_GEN_REG};
+
+static const u32 common_reg_addr_list[] = {HCLGE_MISC_VECTOR_REG_BASE,
+  HCLGE_VECTOR0_OTER_EN_REG,
+  HCLGE_MISC_RESET_STS_REG,
+  HCLGE_MISC_VECTOR_INT_STS,
+  HCLGE_GLOBAL_RESET_REG,
+  HCLGE_FUN_RST_ING,
+  HCLGE_GRO_EN_REG};
+
+static const u32 ring_reg_addr_list[] = {HCLGE_RING_RX_ADDR_L_REG,
+  HCLGE_RING_RX_ADDR_H_REG,
+  HCLGE_RING_RX_BD_NUM_REG,
+  HCLGE_RING_RX_LENGTH_REG,
+  HCLGE_RING_RX_MERGE_EN_REG,
+  HCLGE_RING_RX_TAIL_REG,
+  HCLGE_RING_RX_HEAD_REG,
+  HCLGE_RING_RX_FBD_NUM_REG,
+  HCLGE_RING_RX_OFFSET_REG,
+  HCLGE_RING_RX_FBD_OFFSET_REG,
+  HCLGE_RING_RX_STASH_REG,
+  HCLGE_RING_RX_ERR_REG,
+  HCLGE_RING_TX_ADDR_L_REG,
+  HCLGE_RING_TX_ADDR_H_REG,
+  HCLGE_RING_TX_BD_NUM_REG,
+  HCLGE_RING_TX_PRIORITY_REG,
+  HCLGE_RING_TX_TC_REG,
+  HCLGE_RING_TX_MERGE_EN_REG,
+  HCLGE_RING_TX_TAIL_REG,
+  HCLGE_RING_TX_HEAD_REG,
+  HCLGE_RING_TX_FBD_NUM_REG,
+  HCLGE_RING_TX_OFFSET_REG,
+  HCLGE_RING_TX_EBD_NUM_REG,
+  HCLGE_RING_TX_EBD_OFFSET_REG,
+  HCLGE_RING_TX_ERR_REG,
+  HCLGE_RING_EN_REG};
+
+static const u32 tqp_intr_reg_addr_list[] = {HCLGE_TQP_INTR_CTRL_REG,
+  HCLGE_TQP_INTR_GL0_REG,
+  HCLGE_TQP_INTR_GL1_REG,
static const struct hclge_comm_stats_str g_all_32bit_stats_string[] = {
    {"igu_rx_err_pkt", HCLGE_32BIT_STATS_FIELD_OFF(igu_rx_err_pkt)},
    {"igu_rx_no_eof_pkt", HCLGE_32BIT_STATS_FIELD_OFF(igu_rx_no_eof_pkt)},
    {"igu_rx_no_sof_pkt", HCLGE_32BIT_STATS_FIELD_OFF(igu_rx_no_sof_pkt)},
    {"egu_tx_1588_pkt", HCLGE_32BIT_STATS_FIELD_OFF(egu_tx_1588_pkt)},
    {"ssu_full_drop_num", HCLGE_32BIT_STATS_FIELD_OFF(ssu_full_drop_num)},
    {"ssu_part_drop_num", HCLGE_32BIT_STATS_FIELD_OFF(ssu_part_drop_num)},
    {"ppp_key_drop_num", HCLGE_32BIT_STATS_FIELD_OFF(ppp_key_drop_num)},
    {"ppp_rlt_drop_num", HCLGE_32BIT_STATS_FIELD_OFF(ppp_rlt_drop_num)},
    {"ssu_key_drop_num", HCLGE_32BIT_STATS_FIELD_OFF(ssu_key_drop_num)},
    {"pkt_curr_buf_cnt", HCLGE_32BIT_STATS_FIELD_OFF(pkt_curr_buf_cnt)},
    {"qcn_fb_rcv_cnt", HCLGE_32BIT_STATS_FIELD_OFF(qcn_fb_rcv_cnt)},
    {"qcn_fb_drop_cnt", HCLGE_32BIT_STATS_FIELD_OFF(qcn_fb_drop_cnt)},
    {"qcn_fb_invaild_cnt", HCLGE_32BIT_STATS_FIELD_OFF(qcn_fb_invaild_cnt)},
    {"rx_packet_tc0_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc0_in_cnt)},
    {"rx_packet_tc1_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc1_in_cnt)},
    {"rx_packet_tc2_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc2_in_cnt)},
    {"rx_packet_tc3_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc3_in_cnt)},
    {"rx_packet_tc4_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc4_in_cnt)},
    {"rx_packet_tc5_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc5_in_cnt)},
    {"rx_packet_tc6_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc6_in_cnt)},
    {"rx_packet_tc7_in_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc7_in_cnt)},
    {"rx_packet_tc0_out_cnt", HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc0_out_cnt)},
};
- {"rx_packet_tc1_out_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc1_out_cnt)},
- {"rx_packet_tc2_out_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc2_out_cnt)},
- {"rx_packet_tc3_out_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc3_out_cnt)},
- {"rx_packet_tc4_out_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc4_out_cnt)},
- {"rx_packet_tc5_out_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc5_out_cnt)},
- {"rx_packet_tc6_out_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc6_out_cnt)},
- {"rx_packet_tc7_out_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(rx_packet_tc7_out_cnt)},
- {"tx_packet_tc0_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc0_in_cnt)},
- {"tx_packet_tc1_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc1_in_cnt)},
- {"tx_packet_tc2_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc2_in_cnt)},
- {"tx_packet_tc3_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc3_in_cnt)},
- {"tx_packet_tc4_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc4_in_cnt)},
- {"tx_packet_tc5_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc5_in_cnt)},
- {"tx_packet_tc6_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc6_in_cnt)},
- {"tx_packet_tc7_in_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(tx_packet_tc7_in_cnt)},
- {"pkt_curr_buf_tc0_cnt",
  HCLGE_32BIT_STATS_FIELD_OFF(pkt_curr_buf_tc0_cnt)},
static const char hns3_nic_test_strs[][ETH_GSTRING_LEN] = {
    "App    Loopback test",
    "Serdes serial Loopback test",
    "Serdes parallel Loopback test",
    "Phy    Loopback test"
};

static const struct hclge_comm_stats_str g_mac_stats_string[] = {
    {"mac_tx_broad_pkt_num", HCLGE_MAC_STATS_FIELD_OFF(mac_tx_broad_pkt_num)},
    {"mac_tx_undersize_pkt_num", HCLGE_MAC_STATS_FIELD_OFF(mac_tx_undersize_pkt_num)},
    {"mac_tx_overrsize_pkt_num", HCLGE_MAC_STATS_FIELD_OFF(mac_tx_overrsize_pkt_num)},
    {"mac_tx_64_oct_pkt_num", HCLGE_MAC_STATS_FIELD_OFF(mac_tx_64_oct_pkt_num)},
    {"roc_12_err_drop_pkt_cnt", HCLGE_MAC_STATS_FIELD_OFF(roc_12_err_drop_pkt_cnt)}
};
{"mac_tx_65_127_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_512_1023_oct_pkt_num)},
{"mac_tx_1024_1518_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_1024_1518_oct_pkt_num)},
-{"mac_tx_1519_max_oct_pkt_num",
-HCLGE_MAC_STATS_FIELD_OFF(mac_tx_1519_max_oct_pkt_num)},
+{"mac_tx_1519_2047_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_1519_2047_oct_pkt_num)},
+{"mac_tx_2048_4095_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_2048_4095_oct_pkt_num)},
+{"mac_tx_4096_8191_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_4096_8191_oct_pkt_num)},
+{"mac_tx_8192_9216_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_8192_9216_oct_pkt_num)},
+{"mac_tx_9217_12287_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_9217_12287_oct_pkt_num)},
+{"mac_tx_12288_16383_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_12288_16383_oct_pkt_num)},
+{"mac_tx_1519_max_good_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_1519_max_good_oct_pkt_num)},
+{"mac_tx_1519_max_bad_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_tx_1519_max_bad_pkt_num)},
{"mac_rx_total_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_rx_total_pkt_num)},
-{"mac_rx_64_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_rx_64_oct_pkt_num)},
-{"mac_rx_65_127_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_rx_512_1023_oct_pkt_num)},
-{"mac_rx_1024_1518_oct_pkt_num",
HCLGE_MAC_STATS_FIELD_OFF(mac_rx_1024_1518_oct_pkt_num)},
-{"mac_rx_1519_max_oct_pkt_num",
-HCLGE_MAC_STATS_FIELD_OFF(mac_rx_1519_max_oct_pkt_num)},
-{"mac_trans_fragment_pkt_num",
-HCLGE_MAC_STATS_FIELD_OFF(mac_trans_fragment_pkt_num)},
-{"mac_trans_undermin_pkt_num",
-HCLGE_MAC_STATS_FIELD_OFF(mac_trans_undermin_pkt_num)},
- "mac_trans_jabber_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_trans_jabber_pkt_num),
- "mac_trans_err_all_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_trans_err_all_pkt_num),
- "mac_trans_from_app_good_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_trans_from_app_good_pkt_num),
- "mac_trans_from_app_bad_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_trans_from_app_bad_pkt_num),
- "mac_rcv_fragment_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rcv_fragment_pkt_num),
- "mac_rcv_undermin_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rcv_undermin_pkt_num),
- "mac_rcv_jabber_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rcv_jabber_pkt_num),
- "mac_rx_1519_2047_oct_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_1519_2047_oct_pkt_num),
- "mac_rx_2048_4095_oct_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_2048_4095_oct_pkt_num),
- "mac_rx_4096_8191_oct_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_4096_8191_oct_pkt_num),
- "mac_rx_8192_9216_oct_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_8192_9216_oct_pkt_num),
- "mac_rx_9217_12287_oct_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_9217_12287_oct_pkt_num),
- "mac_rx_12288_16383_oct_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_12288_16383_oct_pkt_num),
- "mac_rx_1519_max_good_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_1519_max_good_pkt_num),
- "mac_rx_1519_max_bad_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_rx_1519_max_bad_pkt_num),
- "mac_tx_fragment_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_tx_fragment_pkt_num),
- "mac_tx_undermin_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_tx_undermin_pkt_num),
- "mac_tx_jabber_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_tx_jabber_pkt_num),
- "mac_tx_err_all_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_tx_err_all_pkt_num),
- "mac_tx_from_app_good_pkt_num",
  - HCLGE_MAC_STATS_FIELD_OFF(mac_tx_from_app_good_pkt_num),
- "mac_tx_from_app_bad_pkt_num",
+HCLGE_MAC_STATS_FIELD_OFF(mac_tx_from_app_bad_pkt_num),
+{"mac_rx_fragment_pkt_num",
+HCLGE_MAC_STATS_FIELD_OFF(mac_rx_fragment_pkt_num),
+{"mac_rx_undermin_pkt_num",
+HCLGE_MAC_STATS_FIELD_OFF(mac_rx_undermin_pkt_num)},
+{"mac_rx_jabber_pkt_num",
+HCLGE_MAC_STATS_FIELD_OFF(mac_rx_jabber_pkt_num),
+{"mac_rx_fcs_err_pkt_num",
+HCLGE_MAC_STATS_FIELD_OFF(mac_rx_fcs_err_pkt_num)},
+{"mac_rx_send_app_good_pkt_num",
+HCLGE_MAC_STATS_FIELD_OFF(mac_rx_send_app_good_pkt_num)},
+{"mac_rx_send_app_bad_pkt_num",
+HCLGE_MAC_STATS_FIELD_OFF(mac_rx_send_app_bad_pkt_num)}
};

-static int hclge_64_bit_update_stats(struct hclge_dev *hdev)
{-
-#define HCLGE_64_BIT_CMD_NUM 5
-#define HCLGE_64_BIT_RTN_DATANUM 4
-u64 *data = (u64 *)&hdev->hw_stats.all_64_bit_stats;
-struct hclge_desc desc[HCLGE_64_BIT_CMD_NUM];
-__le64 *desc_data;
-int i, k, n;
-int ret;
-
-hclge_cmd_setup_basic_desc(&desc[0], HCLGE_OPC_STATS_64_BIT, true);
-ret = hclge_cmd_send(&hdev->hw, desc, HCLGE_64_BIT_CMD_NUM);
-if (ret) {
-dev_err(&hdev->pdev->dev,
-"Get 64 bit pkt stats fail, status = %d,\n", ret);
-return ret;
-}
-
-for (i = 0; i < HCLGE_64_BIT_CMD_NUM; i++) {
- if (unlikely(i == 0)) {
- desc_data = (__le64 *)&desc[i].data[0];
- n = HCLGE_64_BIT_RTN_DATANUM - 1;
- } else {
- desc_data = (__le64 *)&desc[i];
- n = HCLGE_64_BIT_RTN_DATANUM;
- }
- for (k = 0; k < n; k++) {
- *data++ += le64_to_cpu(*desc_data);
- desc_data++;
- }
-
-
-return 0;
-}
static void hclge_reset_partial_32bit_counter(struct hclge_32_bit_stats *stats)
{
    stats->pkt_curr_buf_cnt = 0;
    stats->pkt_curr_buf_tc0_cnt = 0;
    stats->pkt_curr_buf_tc1_cnt = 0;
    stats->pkt_curr_buf_tc2_cnt = 0;
    stats->pkt_curr_buf_tc3_cnt = 0;
    stats->pkt_curr_buf_tc4_cnt = 0;
    stats->pkt_curr_buf_tc5_cnt = 0;
    stats->pkt_curr_buf_tc6_cnt = 0;
    stats->pkt_curr_buf_tc7_cnt = 0;
}

static int hclge_32_bit_update_stats(struct hclge_dev *hdev)
{
    #define HCLGE_32_BIT_CMD_NUM 8
    #define HCLGE_32_BIT_RTN_DATANUM 8

    struct hclge_desc desc[HCLGE_32_BIT_CMD_NUM];
    struct hclge_32_bit_stats *all_32_bit_stats;
    __le32 *desc_data;
    int i, k, n;
    u64 *data;
    int ret;

    all_32_bit_stats = &hdev->hw_stats.all_32_bit_stats;
    data = (u64 *)&all_32_bit_stats->egu_tx_1588_pkt;

    hclge_cmd_setup_basic_desc(&desc[0], HCLGE_OPC_STATS_32_BIT, true);
    ret = hclge_cmd_send(&hdev->hw, desc, HCLGE_32_BIT_CMD_NUM);
    if (ret) {
        dev_err(&hdev->pdev->dev,
                "Get 32 bit pkt stats fail, status = %d\n", ret);
        return ret;
    }

    hclge_reset_partial_32bit_counter(all_32_bit_stats);
    for (i = 0; i < HCLGE_32_BIT_CMD_NUM; i++) {
        if (unlikely(i == 0)) {
            __le16 *desc_data_16bit;
            all_32_bit_stats->igu_rx_err_pkt +=
            le32_to_cpu(desc[i].data[0]);
            desc_data_16bit = (__le16 *)&desc[i].data[1];
            }
- all_32_bit_stats->igu_rx_no_eof_pkt +=
- le16_to_cpu(desc_data_16bit);

- desc_data_16bit++;
- all_32_bit_stats->igu_rx_no_sof_pkt +=
- le16_to_cpu(desc_data_16bit);

- desc_data = &desc[i].data[2];
- n = HCLGE_32_BIT_RTN_DATANUM - 4;
- } else {
- desc_data = (__le32 *)&desc[i];
- n = HCLGE_32_BIT_RTN_DATANUM;
- }
- for (k = 0; k < n; k++) {
- *data++ += le32_to_cpu(desc_data);
- desc_data++;
- }
- }
- return 0;
- }
+
static const struct hclge_mac_mgr_tbl_entry_cmd hclge_mgr_table[] = {
+ {
+ .flags = HCLGE_MAC_MGR_MASK_VLAN_B,
+ .ethter_type = cpu_to_le16(HCLGE_MAC_ETHERTYPE_LLDP),
+ .mac_addr_hi32 = cpu_to_le32(htonl(0x0180C200)),
+ .mac_addr_lo16 = cpu_to_le16(htons(0x000E)),
+ .i_port_bitmap = 0x1,
+ },
+);
+
static int hclge_mac_update_stats(struct hclge_dev *hdev)
{
- #define HCLGE_MAC_CMD_NUM 17
+ #define HCLGE_MAC_CMD_NUM 21
#define HCLGE_RTN_DATA_NUM 4

u64 *data = (u64 *)(hdev->hw_stats.mac_stats);
@@ -524,7 +351,7 @@
return ret;
}
tqp->tqp_stats.rcb_rx_ring_pktnum_rcd +=
- le32_to_cpu(desc[0].data[4]);
+ le32_to_cpu(desc[0].data[1]);
}

for (i = 0; i < kinfo->num_tqps; i++) {
@@ -544,7 +371,7 @@
return ret;
}
tqp->tqp_stats.rcb_tx_ring_pktnum_rcd +=
-le32_to_cpu(desc[0].data[4]);
+le32_to_cpu(desc[0].data[1]);
}

return 0;
@@ -586,7 +413,7 @@
for (i = 0; i < kinfo->num_tqps; i++) {
 struct hclge_tqp *tqp = container_of(handle->kinfo.tqp[i],
 struct hclge_tqp, q):
-snprintf(buff, ETH_GSTRING_LEN, "rcb_q%d_tx_pktnum_rcd",
+snprintf(buff, ETH_GSTRING_LEN, "txq%d_pktnum_rcd",
 tqp->index);
 buff = buff + ETH_GSTRING_LEN;
 }
@@ -594,7 +421,7 @@
for (i = 0; i < kinfo->num_tqps; i++) {
 struct hclge_tqp *tqp = container_of(kinfo->tqp[i],
 struct hclge_tqp, q):
-snprintf(buff, ETH_GSTRING_LEN, "rcb_q%d_rx_pktnum_rcd",
+snprintf(buff, ETH_GSTRING_LEN, "rxq%d_pktnum_rcd",
 tqp->index);
 buff = buff + ETH_GSTRING_LEN;
 }
@@ -626,8 +453,7 @@
return buff;
for (i = 0; i < size; i++) {
-snprintf(buff, ETH_GSTRING_LEN, 
-strs[i].desc);
+snprintf(buff, ETH_GSTRING_LEN, "%s", strs[i].desc);
 buff = buff + ETH_GSTRING_LEN;
 }
@@ -638,27 +464,20 @@
 struct net_device_stats *net_stats)
 {
 net_stats->tx_dropped = 0;
- net_stats->rx_dropped = hw_stats->all_32_bit_stats.ssu_full_drop_num;
- net_stats->rx_dropped += hw_stats->all_32_bit_stats.ppp_key_drop_num;
- net_stats->rx_dropped += hw_stats->all_32_bit_stats.ssu_key_drop_num;
- net_stats->rx_errors = hw_stats->mac_stats.mac_rx_overrsize_pkt_num;
+net_stats->rx_errors = hw_stats->mac_stats.mac_rx_oversize_pkt_num;
 net_stats->rx_errors += hw_stats->mac_stats.mac_rx_undersize_pkt_num;
- net_stats->rx_errors += hw_stats->all_32_bit_stats.igu_rx_err_pkt;

- net_stats->rx_errors += hw_stats->all_32_bit_stats.igu_rx_no_eof_pkt;
- net_stats->rx_errors += hw_stats->all_32_bit_stats.igu_rx_no_sof_pkt;
- net_stats->rx_errors += hw_stats->mac_stats.mac_rcv_fcs_err_pkt_num;
+ net_stats->rx_errors += hw_stats->mac_stats.mac_rx_fcs_err_pkt_num;

net_stats->multicast = hw_stats->mac_stats.mac_tx_multi_pkt_num;
net_stats->multicast += hw_stats->mac_stats.mac_rx_multi_pkt_num;

- net_stats->rx_crc_errors = hw_stats->mac_stats.mac_rcv_fcs_err_pkt_num;
+ net_stats->rx_crc_errors = hw_stats->mac_stats.mac_rx_fcs_err_pkt_num;
net_stats->rx_length_errors =
  hw_stats->mac_stats.mac_rx_undersize_pkt_num;
net_stats->rx_length_errors +=
  hw_stats->mac_stats.mac_rx_oversize_pkt_num;
+ hw_stats->mac_stats.mac_rx_oversize_pkt_num;
net_stats->rx_over_errors =
  hw_stats->mac_stats.mac_rx_oversize_pkt_num;
+ hw_stats->mac_stats.mac_rx_oversize_pkt_num;
}

static void hclge_update_stats_for_all(struct hclge_dev *hdev)
@@ -681,12 +500,6 @@
    dev_err(&hdev->pdev->dev,
            "Update MAC stats fail, status = %d\n", status);

- status = hclge_32_bit_update_stats(hdev);
- if (status)
-    dev_err(&hdev->pdev->dev,
-            "Update 32 bit stats fail, status = %d\n",
-            status);
-  
-  hclge_update_netstat(&hdev->hw_stats, &handle->kinfo.netdev->stats);
}@@ -698,24 +511,15 @@

 struct hclge_hw_stats *hw_stats = &hdev->hw_stats;
 int status;

+if (test_and_set_bit(HCLGE_STATE_STATISTICS_UPDATING, &hdev->state))
+    return;
+  
  status = hclge_mac_update_stats(hdev);
  if (status)
    dev_err(&hdev->pdev->dev,
            "Update MAC stats fail, status = %d\n",
            status);

  -status = hclge_32_bit_update_stats(hdev);
if (status)
  dev_err(&hdev->pdev->dev,
    "Update 32 bit stats fail, status = %d
    ",
    status);
-
  status = hclge_64_bit_update_stats(hdev);
  if (status)
    dev_err(&hdev->pdev->dev,
      "Update 64 bit stats fail, status = %d
      ",
      status);
-
  status = hclge_tqps_update_stats(handle);
  if (status)
    dev_err(&hdev->pdev->dev,
      "Update TQPS stats fail, status = %d.
      ",
      status);
-
  hclge_update_netstat(hw_stats, net_stats);
+
  clear_bit(HCLGE_STATE_STATISTICS_UPDATING, &hdev->state);
}

static int hclge_get_sset_count(struct hnae3_handle *handle, int stringset)
{
-#define HCLGE_LOOPBACK_TEST_FLAGS 0x7
+#define HCLGE_LOOPBACK_TEST_FLAGS (HNAE3_SUPPORT_APP_LOOPBACK |
+HNAE3_SUPPORT_PHY_LOOPBACK |
+HNAE3_SUPPORT_SERDES_SERIAL_LOOPBACK |
+HNAE3_SUPPORT_SERDES_PARALLEL_LOOPBACK)

  struct hclge_vport *vport = hclge_get_vport(handle);
  struct hclge_dev *hdev = vport->back;
  @ @ -741,18 +550,19 @@
  if (stringset == ETH_SS_TEST) {
    /* clear loopback bit flags at first */
    handle->flags = (handle->flags & (~HCLGE_LOOPBACK_TEST_FLAGS));
    -if (hdev->hw.mac.speed == HCLGE_MAC_SPEED_10M ||
    +if (hdev->pdev->revision >= 0x21 ||
         hdev->hw.mac.speed == HCLGE_MAC_SPEED_10M ||
         hdev->hw.mac.speed == HCLGE_MAC_SPEED_100M ||
         hdev->hw.mac.speed == HCLGE_MAC_SPEED_1G) {
      count += 1;
      -handle->flags |= HNAE3_SUPPORT_MAC_LOOPBACK;
      -} else {
      -count = -EOPNOTSUPP;
      +handle->flags |= HNAE3_SUPPORT_APP_LOOPBACK;
      }
  +
count += 2;
+handle->flags |= HNAE3_SUPPORT_SERDES_SERIAL_LOOPBACK;
+handle->flags |= HNAE3_SUPPORT_SERDES_PARALLEL_LOOPBACK;
} else if (stringset == ETH_SS_STATS) {
    count = ARRAY_SIZE(g_mac_stats_string) +
ARRAY_SIZE(g_all_32bit_stats_string) +
ARRAY_SIZE(g_all_64bit_stats_string) +
hclge_tqps_get_sset_count(handle, stringset);
}

@@ -772,33 +582,29 @@
    g_mac_stats_string,
    size,
    p);
-size = ARRAY_SIZE(g_all_32bit_stats_string);
-p = hclge_comm_get_strings(stringset,
-    g_all_32bit_stats_string,
-    size,
-    p);
-size = ARRAY_SIZE(g_all_64bit_stats_string);
-p = hclge_comm_get_strings(stringset,
-    g_all_64bit_stats_string,
-    size,
-    p);
-p = hclge_tqps_get_strings(handle, p);
} else if (stringset == ETH_SS_TEST) {
    if (handle->flags & HNAE3_SUPPORT_MAC_LOOPBACK) {
+    if (handle->flags & HNAE3_SUPPORT_APP_LOOPBACK) {
        memcpy(p,
            hns3_nic_test_strs[HNAE3_MAC_INTER_LOOP_MAC],
            ETH_GSTRING_LEN);
        p += ETH_GSTRING_LEN;
    }
+    if (handle->flags & HNAE3_SUPPORT_SERDES_SERIAL_LOOPBACK) {
+        memcpy(p,
+            hns3_nic_test_strs[HNAE3_LOOP_SERIAL_SERDES],
+            ETH_GSTRING_LEN);
+        p += ETH_GSTRING_LEN;
+    }
+    if (handle->flags & HNAE3_SUPPORT_SERDES_PARALLEL_LOOPBACK) {
+        memcpy(p,
+            hns3_nic_test_strs[HNAE3_LOOP_PARALLEL_SERDES],
+            ETH_GSTRING_LEN);
+        p += ETH_GSTRING_LEN;
    }
}
if (handle->flags & HNAE3_SUPPORT_PHY_LOOPBACK) {
    memcpy(p,
           hns3_nic_test_strs[HNAE3_MAC_INTER_LOOP_PHY],
           ETH_GSTRING_LEN);
    p += ETH_GSTRING_LEN;
}
@@ -815,14 +621,6 @@
g_mac_stats_string,
    ARRAY_SIZE(g_mac_stats_string),
    data);
-p = hclge_comm_get_stats(&hdev->hw_stats.all_32_bit_stats,
    - g_all_32bit_stats_string,
    - ARRAY_SIZE(g_all_32bit_stats_string),
    - p);
-p = hclge_comm_get_stats(&hdev->hw_stats.all_64_bit_stats,
    - g_all_64bit_stats_string,
    - ARRAY_SIZE(g_all_64bit_stats_string),
    - p);
    p = hclge_tqps_get_stats(handle, p);
}

@@ -890,19 +688,39 @@
hdev->num_tqps = __le16_to_cpu(req->tqp_num);
hdev->pkt_buf_size = __le16_to_cpu(req->buf_size) << HCLGE_BUF_UNIT_S;
    +if (req->tx_buf_size)
    +hdev->tx_buf_size =
    +__le16_to_cpu(req->tx_buf_size) << HCLGE_BUF_UNIT_S;
    +else
    +hdev->tx_buf_size = HCLGE_DEFAULT_TX_BUF;
    +
    +hdev->tx_buf_size = roundup(hdev->tx_buf_size, HCLGE_BUF_SIZE_UNIT);
    +
    +if (req->dv_buf_size)
    +hdev->dv_buf_size =
    +__le16_to_cpu(req->dv_buf_size) << HCLGE_BUF_UNIT_S;
    +else
    +hdev->dv_buf_size = HCLGE_DEFAULT_DV;
    +
    +hdev->dv_buf_size = roundup(hdev->dv_buf_size, HCLGE_BUF_SIZE_UNIT);
    +
    if (hnae3_dev_roce_supported(hdev)) {
        +hdev->roce_base_msix_offset =
        +hnae3_get_field(__le16_to_cpu(req->msixcap_localid_ba_rocee),
            +HCLGE_MSIX_OFT_ROCEE_M, HCLGE_MSIX_OFT_ROCEE_S);
        +hdev->num_roce_msi =
            -hnae_get_field(__le16_to_cpu(req->pf_intr_vector_number),


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- HCLGE_PF_VEC_NUM_M, HCLGE_PF_VEC_NUM_S);
+hnae3_get_field(__le16_to_cpu(req->pf_intr_vector_number),
+HCLGE_PF_VEC_NUM_M, HCLGE_PF_VEC_NUM_S);

/* PF should have NIC vectors and Roce vectors,
 * NIC vectors are queued before Roce vectors.
 */
hdev->num_msi = hdev->num_roce_msi + HCLGE_ROCE VECTOR_OFFSET;
+hdev->num_msi = hdev->num_roce_msi +
+hdev->roce_base_msix_offset;
} else {
    hdev->num_msi =
-hnae_get_field(__le16_to_cpu(req->pf_intr_vector_number),
- HCLGE_PF_VEC_NUM_M, HCLGE_PF_VEC_NUM_S);
+hnae3_get_field(__le16_to_cpu(req->pf_intr_vector_number),
+HCLGE_PF_VEC_NUM_M, HCLGE_PF_VEC_NUM_S);
}

return 0;
@@ -942,6 +760,45 @@
return 0;
}

+static void hclge_parse_fiber_link_mode(struct hclge_dev *hdev,
+u8 speed_ability)
+{
+    unsigned long *supported = hdev->hw.mac.supported;
+    +if (speed_ability & HCLGE_SUPPORT_1G_BIT)
+        set_bit(ETHTOOL_LINK_MODE_1000baseX_Full_BIT,
+            *supported);
+    +if (speed_ability & HCLGE_SUPPORT_10G_BIT)
+        set_bit(ETHTOOL_LINK_MODE_10000baseSR_Full_BIT,
+            *supported);
+    +if (speed_ability & HCLGE_SUPPORT_25G_BIT)
+        set_bit(ETHTOOL_LINK_MODE_25000baseSR_Full_BIT,
+            *supported);
+    +if (speed_ability & HCLGE_SUPPORT_50G_BIT)
+        set_bit(ETHTOOL_LINK_MODE_50000baseSR2_Full_BIT,
+            *supported);
+    +if (speed_ability & HCLGE_SUPPORT_100G_BIT)
+        set_bit(ETHTOOL_LINK_MODE_100000baseSR4_Full_BIT,
+            *supported);
+    +if (speed_ability & HCLGE_SUPPORT_1G_BIT)
+set_bit(ETHTOOL_LINK_MODE_FIBRE_BIT, supported);
+set_bit(ETHTOOL_LINK_MODE_Pause_BIT, supported);
+
+static void hclge_parse_link_mode(struct hclge_dev *hdev, u8 speed_ability)
+{
+u8 media_type = hdev->hw.mac.media_type;
+
+if (media_type != HNAE3_MEDIA_TYPE_FIBER)
+return;
+
+hclge_parse_fiber_link_mode(hdev, speed_ability);
+
+
+}
+
+static void hclge_parse_cfg(struct hclge_cfg *cfg, struct hclge_desc *desc)
{
struct hclge_cfg_param_cmd *req;
@@ -952,40 +809,53 @@
req = (struct hclge_cfg_param_cmd *)desc[0].data;

/* get the configuration */
-cfg->vmdq_vport_num = hnae_get_field(__le32_to_cpu(req->param[0]),
 - HCLGE_CFG_VMDQ_M,
 - HCLGE_CFG_VMDQ_S);
-cfg->tc_num = hnae_get_field(__le32_to_cpu(req->param[0]),
 - HCLGE_CFG_TC_NUM_M, HCLGE_CFG_TC_NUM_S);
-cfg->tqp_desc_num = hnae_get_field(__le32_to_cpu(req->param[0]),
 - HCLGE_CFG_TQP_DESC_N_M,
 - HCLGE_CFG_TQP_DESC_N_S);
-
-cfg->phy_addr = hnae_get_field(__le32_to_cpu(req->param[1]),
 - HCLGE_CFG_PHY_ADDR_M,
 - HCLGE_CFG_PHY_ADDR_S);
-cfg->media_type = hnae_get_field(__le32_to_cpu(req->param[1]),
 - HCLGE_CFG_MEDIA_TP_M,
 - HCLGE_CFG_MEDIA_TP_S);
-cfg->rx_buf_len = hnae_get_field(__le32_to_cpu(req->param[1]),
 - HCLGE_CFG_RX_BUF_LEN_M,
 - HCLGE_CFG_RX_BUF_LEN_S);
+
+cfg->vmdq_vport_num = hnae3_get_field(__le32_to_cpu(req->param[0]),
+ HCLGE_CFG_VMDQ_M,
+ HCLGE_CFG_VMDQ_S);
+
+cfg->tc_num = hnae3_get_field(__le32_to_cpu(req->param[0]),
+ HCLGE_CFG_TC_NUM_M, HCLGE_CFG_TC_NUM_S);
+cfg->tqp_desc_num = hnae3_get_field(__le32_to_cpu(req->param[0]),
+ HCLGE_CFG_TQP_DESC_N_M,
+ HCLGE_CFG_TQP_DESC_N_S);
+
+cfg->phy_addr = hnae3_get_field(__le32_to_cpu(req->param[1]),
+HCLGE_CFG_PHY_ADDR_M,
+HCLGE_CFG_PHY_ADDR_S);
+cfg->media_type = hnae3_get_field(__le32_to_cpu(req->param[1]),
+ HCLGE_CFG_MEDIA_TP_M,
+ HCLGE_CFG_MEDIA_TP_S);
+cfg->rx_buf_len = hnae3_get_field(__le32_to_cpu(req->param[1]),
+ HCLGE_CFG_RX_BUF_LEN_M,
+ HCLGE_CFG_RX_BUF_LEN_S);

/* get mac address */
mac_addr_tmp = __le32_to_cpu(req->param[2]);
mac_addr_tmp_high = hnae3_get_field(__le32_to_cpu(req->param[3]),
+ HCLGE_CFG_MAC_ADDR_H_M,
+ HCLGE_CFG_MAC_ADDR_H_S);
mac_addr_tmp |= (mac_addr_tmp_high << 31) << 1;

-cfg->default_speed = hnae_get_field(__le32_to_cpu(req->param[3]),
- HCLGE_CFG_DEFAULT_SPEED_M,
- HCLGE_CFG_DEFAULT_SPEED_S);
+cfg->default_speed = hnae3_get_field(__le32_to_cpu(req->param[3]),
+ HCLGE_CFG_DEFAULT_SPEED_M,
+ HCLGE_CFG_DEFAULT_SPEED_S);
+cfg->rss_size_max = hnae3_get_field(__le32_to_cpu(req->param[3]),
+ HCLGE_CFG_RSS_SIZE_M,
+ HCLGE_CFG_RSS_SIZE_S);
+
for (i = 0; i < ETH_ALEN; i++)
cfg->mac_addr[i] = (mac_addr_tmp >> (8 * i)) & 0xff;

req = (struct hclge_cfg_param_cmd *)desc[1].data;
cfg->numa_node_map = __le32_to_cpu(req->param[0]);
+
+cfg->speed_ability = hnae3_get_field(__le32_to_cpu(req->param[1]),
+ HCLGE_CFG_SPEED_ABILITY_M,
+ HCLGE_CFG_SPEED_ABILITY_S);
+cfg->umv_space = hnae3_get_field(__le32_to_cpu(req->param[1]),
+ HCLGE_CFG_UVM_TBL_SPACE_M,
+ HCLGE_CFG_UVM_TBL_SPACE_S);
+if (!cfg->umv_space)
+cfg->umv_space = HCLGE_DEFAULT_UVM_SPACE_PER_PF;
}

/* hclge_get_cfg: query the static parameter from flash
@@ -1004,22 +874,22 @@*/
req = (struct hclge_cfg_param_cmd *)desc[i].data;

hclge_cmd_setup_basic_desc(&desc[i], HCLGE_OPC_GET_CFG_PARAM,
    true);

- hnae_set_field(offset, HCLGE_CFG_OFFSET_M,
    + hnae3_set_field(offset, HCLGE_CFG_OFFSET_M,
    -     HCLGE_CFG_OFFSET_S, i * HCLGE_CFG_RD_LEN_BYTES);
    +HCLGE_CFG_OFFSET_S, i * HCLGE_CFG_RD_LEN_BYTES);

/* Len should be united by 4 bytes when send to hardware */
- hnae_set_field(offset, HCLGE_CFG_RD_LEN_M, HCLGE_CFG_RD_LEN_S,
    + hnae3_set_field(offset, HCLGE_CFG_RD_LEN_M, HCLGE_CFG_RD_LEN_S,
    -     HCLGE_CFG_RD_LEN_BYTES / HCLGE_CFG_RD_LEN_UNIT);
    +HCLGE_CFG_RD_LEN_BYTES / HCLGE_CFG_RD_LEN_UNIT);

req->offset = cpu_to_le32(offset);
}

ret = hclge_cmd_send(&hdev->hw, desc, HCLGE_PF_CFG_DESC_NUM);
if (ret) {
    dev_err(&hdev->pdev->dev,
        "get config failed %d.\n", ret);
    return ret;
}

hclge_parse_cfg(hcfg, desc);
+
return 0;
}

@@ -1036,13 +906,10 @@
/* get pf resource */
ret = hclge_query_pf_resource(hdev);
if (ret) {
    dev_err(&hdev->pdev->dev,
        "get pf resource error %d.\n", ret);
    return ret;
-}
+if (ret)
    +dev_err(&hdev->pdev->dev, "query pf resource error %d.\n", ret);

-return 0;
+return ret;
}

static int hclgeConfigure(struct hclge_dev *hdev)
@@ -1058,7 +925,7 @@
hdev->num_vmdq_vport = cfg.vmdq_vport_num;
hdev->base_tqp_pid = 0;
-hdev->rss_size_max = 1;
+hdev->rss_size_max = cfg.rss_size_max;
hdev->rx_buf_len = cfg.rx_buf_len;
ether_addr_copy(hdev->hw.mac.mac_addr, cfg.mac_addr);
hdev->hw.mac.media_type = cfg.media_type;
@@ -1067,6 +934,7 @@
hdev->tm_info.num_pg = 1;
hdev->tc_max = cfg.tc_num;
hdev->tm_info.hw_pfc_map = 0;
+hdev->wanted_umv_size = cfg.umv_space;

ret = hclge_parse_speed(cfg.default_speed, &hdev->hw.mac.speed);
if (ret) {
@@ -1074,6 +942,8 @@
return ret;
}

+hclge_parse_link_mode(hdev, cfg.speed_ability);
+
if ((hdev->tc_max > HNAE3_MAX_TC) ||
    (hdev->tc_max < 1)) {
  dev_warn(&hdev->pdev->dev, "TC num = %d:\n",
@@ -1089,16 +959,13 @@
hdev->pfc_max = hdev->tc_max;
}
-hdev->tm_info.num_tc = hdev->tc_max;
+hdev->tm_info.num_tc = 1;
/* Currently not support uncontious tc */
for (i = 0; i < hdev->tm_info.num_tc; i++)
  -hnae_set_bit(hdev->hw_tc_map, i, 1);
  +hnae3_set_bit(hdev->hw_tc_map, i, 1);
-if (!hdev->num_vmdq_vport && !hdev->num_req_vfs)
  -hdev->tx_sch_mode = HCLGE_FLAG_TC_BASE_SCH_MODE;
-else
  -hdev->tx_sch_mode = HCLGE_FLAG_VNET_BASE_SCH_MODE;
  +hdev->tx_sch_mode = HCLGE_FLAG_TC_BASE_SCH_MODE;

return ret;
}
tso_mss = 0;
-hnae_set_field(tso_mss, HCLGE_TSO_MSS_MIN_M,
- HCLGE_TSO_MSS_MIN_S, tso_mss_max);
+hnnae3_set_field(tso_mss, HCLGE_TSO_MSS_MIN_M,
+ HCLGE_TSO_MSS_MIN_S, tso_mss_max);
req->tso_mss_max = cpu_to_le16(tso_mss);

return hclge_cmd_send(&hdev->hw, &desc, 1);
}

+static int hclge_config_gro(struct hclge_dev *hdev, bool en)
+{
+struct hclge_cfg_gro_status_cmd *req;
+struct hclge_desc desc;
+int ret;
+
+if (!hnae3_dev_gro_supported(hdev))
+return 0;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_GRO_GENERIC_CONFIG, false);
+req = (struct hclge_cfg_gro_status_cmd *)desc.data;
+
+req->gro_en = cpu_to_le16(en ? 1 : 0);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+dev_err(&hdev->pdev->dev,
+"GRO hardware config cmd failed, ret = %d\n", ret);
+
+return ret;
+
+
+static int hclge_alloc_tqps(struct hclge_dev *hdev)
+
+{ struct hclge_tqp *tqp;
+@@ -1172,44 +1061,43 @@
+req->tqp_vid = cpu_to_le16(tqp_vid);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(&hdev->pdev->dev, "TQP map failed %d\n", ret);
++
+return ret;
+}
static int hclge_assign_tqp(struct hclge_vport *vport, struct hnae3_queue **tqp, u16 num_tqps)
static int hclge_assign_tqp(struct hclge_vport *vport)
{
    struct hnae3_knic_private_info *kinfo = &vport->nic.kinfo;
    struct hclge_dev *hdev = vport->back;
    int i, alloced;

    for (i = 0, alloced = 0; i < hdev->num_tqps && alloced < kinfo->num_tqps; i++) {
        if (!hdev->htqp[i].allocated) {
            hdev->htqp[i].q.handle = &vport->nic;
            hdev->htqp[i].q.tqp_index = alloced;
            -tqp[alloced] = &hdev->htqp[i].q;
            +%kinfo->tqp[alloced] = &hdev->htqp[i].q;
            hdev->htqp[i].allocated = true;
            alloced++;
        }
    }

    vport->alloc_tqps = num_tqps;
    +vport->alloc_tqps = kinfo->num_tqps;

    return 0;
}

static int hclge_knic_setup(struct hclge_vport *vport, u16 num_tqps)
static int hclge_knic_setup(struct hclge_vport *vport, u16 num_tqps, u16 num_desc)
{
    struct hnae3_handle *nic = &vport->nic;
    struct hnae3_knic_private_info *kinfo = &nic->kinfo;
    struct hclge_dev *hdev = vport->back;
    int i, ret;

    -kinfo->num_desc = hdev->num_desc;
    +%kinfo->num_desc = num_desc;
    kinfo->rx_buf_len = hdev->rx_buf_len;
    kinfo->num_tc = min_t(u16, num_tqps, hdev->tm_info.num_tc);
kinfo->rss_size
@@ -1236,13 +1124,11 @@
if (!kinfo->tqp)
    return -ENOMEM;

    ret = hclge_assign_tqp(vport, kinfo->tqp, kinfo->num_tqps);
    if (ret) {
        +ret = hclge_assign_tqp(vport);
        +if (ret)
        dev_err(&hdev->pdev->dev, "fail to assign TQPs %d\n", ret);
        -return -EINVAL;
    }

    return 0;
    +return ret;
}

static int hclge_map_tqp_to_vport(struct hclge_dev *hdev,
@@ -1304,7 +1190,7 @@
    nic->numa_node_mask = hdev->numa_node_mask;

    if (hdev->ae_dev->dev_type == HNAE3_DEV_KNIC) {
        -ret = hclge_knic_setup(vport, num_tqps);
        +ret = hclge_knic_setup(vport, num_tqps, hdev->num_desc);
        if (ret) {
            dev_err(&hdev->pdev->dev, "knic setup failed %d\n", ret);
            @@ -1329,8 +1215,11 @@
                /* We need to alloc a vport for main NIC of PF */
                num_vport = hdev->num_vmdq_vport + hdev->num_req_vfs + 1;

                -if (hdev->num_tqps < num_vport)
                -num_vport = hdev->num_tqps;
                +if (hdev->num_tqps < num_vport) {
                +dev_err(&hdev->pdev->dev, "tqps(%d) is less than vports(%d)",
                +hdev->num_tqps, num_vport);
                +return -EINVAL;
                +}

                /* Alloc the same number of TQPs for every vport */
                tqp_per_vport = hdev->num_tqps / num_vport;
                @@ -1344,25 +1233,13 @@
                hdev->vport = vport;
                hdev->num_alloc_vport = num_vport;

                -#ifdef CONFIG_PCI_IOV
                /* Enable SRIOV */
                -if (hdev->num_req_vfs) {

                "Open Source Used In 5GaaS Edge AC-4  24894"
-dev_info(&pdev->dev, "active VFs(%d) found, enabling SRIOV\n",
-hdev->num_req_vfs);
-ret = pci_enable_sriov(hdev->pdev, hdev->num_req_vfs);
-if (ret) {
-hdev->num_alloc_vfs = 0;
-dev_err(&pdev->dev, "SRIOV enable failed \%d\n",
-ret);
-return ret;
-
-hdev->num_alloc_vfs = hdev->num_req_vfs;
-
#endif
+if (IS_ENABLED(CONFIG_PCI_IOV))
+hdev->num_alloc_vfs = hdev->num_req_vfs;

for (i = 0; i < num_vport; i++) {
  vport->back = hdev;
  vport->vport_id = i;
  +vport->mpc = HCLGE_MAC_DEFAULT_FRAME;

  if (i == 0)
    ret = hclge_vport_setup(vport, tqp_main_vport);
    @@ -1404,13 +1281,11 @@

    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    -if (ret) {
      +if (ret)
        dev_err(&hdev->pdev->dev, "tx buffer alloc cmd failed %d,\n",
            ret);
    -return ret;
    -
    -return 0;
    +return ret;
  }

  int ret = hclge_cmd_alloc_tx_buff(hdev, buf_alloc);
  @ @ -1418,13 +1293,10 @@
  
  int ret = hclge_cmd_alloc_tx_buff(hdev, buf_alloc);

  -if (ret) {
    +if (ret)
      -dev_err(&hdev->pdev->dev, "tx buffer alloc failed %d\n", ret);
      -return ret;
    -}

dev_err(&hdev->pdev->dev, "tx buffer alloc failed %d\n", ret);

return 0;
return ret;
}

static int hclge_get_tc_num(struct hclge_dev *hdev)
@@ -1513,40 +1385,51 @@
{
    u32 shared_buf_min, shared_buf_tc, shared_std;
    int tc_num, pfc_enable_num;
    -u32 shared_buf;
    +u32 shared_buf, aligned_mps;
    u32 rx_priv;
    int i;

    tc_num = hclge_get_tc_num(hdev);
    pfc_enable_num = hclge_get_pfc_enable_num(hdev);
    +aligned_mps = roundup(hdev->mps, HCLGE_BUF_SIZE_UNIT);

    if (hnae3_dev_dcb_supported(hdev))
    -shared_buf_min = 2 * hdev->mps + HCLGE_DEFAULT_DV;
    +shared_buf_min = 2 * aligned_mps + hdev->dv_buf_size;
    else
    -shared_buf_min = 2 * hdev->mps + HCLGE_DEFAULT_NON_DCB_DV;
    +shared_buf_min = aligned_mps + HCLGE_NON_DCB_ADDITIONAL_BUF
    ++ hdev->dv_buf_size;

    -shared_buf_tc = pfc_enable_num * hdev->mps +
    -(tc_num - pfc_enable_num) * hdev->mps / 2 +
    -hdev->mps;
    +shared_buf_tc = pfc_enable_num * aligned_mps +
    +(tc_num - pfc_enable_num) * aligned_mps / 2 +
    +aligned_mps;
    +shared_std = roundup(max_t(u32, shared_buf_min, shared_buf_tc),
    +     HCLGE_BUF_SIZE_UNIT);

    rx_priv = hclge_get_rx_priv_buff_allocated(buf_alloc);
    -if (rx_all <= rx_priv + shared_std)
    +if (rx_all < rx_priv + shared_std)
        return false;

    -shared_buf = rx_all - rx_priv;
    +shared_buf = rounddown(rx_all - rx_priv, HCLGE_BUF_SIZE_UNIT);
    buf_alloc->s_buf.buf_size = shared_buf;
    -buf_alloc->s_buf.self.high = shared_buf;
    -buf_alloc->s_buf.self.low = 2 * hdev->mps;
+if (hnae3_dev_dcb_supported(hdev)) {
+buf_alloc->s_buf.self.high = shared_buf - hdev->dv_buf_size;
+buf_alloc->s_buf.self.low = buf_alloc->s_buf.self.high
+- roundup(aligned_mps / 2, HCLGE_BUF_SIZE_UNIT);
+} else {
+buf_alloc->s_buf.self.high = aligned_mps +
+HCLGE_NON_DC_B_ADDITIONAL_BUF;
+buf_alloc->s_buf.self.low =
+roundup(aligned_mps / 2, HCLGE_BUF_SIZE_UNIT);
+
}

for (i = 0; i < HCLGE_MAX_TC_NUM; i++) {
if ((hdev->hw_tc_map & BIT(i)) &&
    (hdev->tm_info.hw_pfc_map & BIT(i))) {
    -buf_alloc->s_buf.tc_thrd[i].low = hdev->mps;
    -buf_alloc->s_buf.tc_thrd[i].high = 2 * hdev->mps;
    +buf_alloc->s_buf.tc_thrd[i].low = aligned_mps;
    +buf_alloc->s_buf.tc_thrd[i].high = 2 * aligned_mps;
} else {
    buf_alloc->s_buf.tc_thrd[i].low = 0;
    -buf_alloc->s_buf.tc_thrd[i].high = hdev->mps;
    +buf_alloc->s_buf.tc_thrd[i].high = aligned_mps;
    }
}

@@ -1564,11 +1447,11 @@
for (i = 0; i < HCLGE_MAX_TC_NUM; i++) {
struct hclge_priv_buf *priv = &buf_alloc->priv_buf[i];

-if (total_size < HCLGE_DEFAULT_TX_BUF)
+if (total_size < hdev->tx_buf_size)
    return -ENOMEM;

if (hdev->hw_tc_map & BIT(i))
-priv->tx_buf_size = HCLGE_DEFAULT_TX_BUF;
+priv->tx_buf_size = hdev->tx_buf_size;
else
    priv->tx_buf_size = 0;

@@ -1586,11 +1469,12 @@
static int hclge_rx_buffer_calc(struct hclge_dev *hdev,
struct hclge_pkt_buf_alloc *buf_alloc)
{
    -u32 rx_all = hdev->pkt_buf_size;
    +u32 rx_all = hdev->pkt_buf_size, aligned_mps;
    int no_pfc_priv_num, pfc_priv_num;
    struct hclge_priv_buf *priv;
    int i;
aligned_mps = round_up(hdev->mps, HCLGE_BUF_SIZE_UNIT);
rx_all -= hclge_get_tx_buff_allocated(buf_alloc);

/* When DCB is not supported, rx private */
if (hdev->hw_tc_map & BIT(i)) {
    priv->enable = 1;
    if (hdev->tm_info.hw_pfc_map & BIT(i)) {
        -priv->wl.low = hdev->mps;
        -priv->wl.high = priv->wl.low + hdev->mps;
        +priv->wl.low = aligned_mps;
        +priv->wl.high =
            roundup(priv->wl.low + aligned_mps,
                   HCLGE_BUF_SIZE_UNIT);
        priv->buf_size = priv->wl.high +
                        HCLGE_DEFAULT_DV;
        +hdev->dv_buf_size;
    } else {
        priv->wl.low = 0;
        -priv->wl.high = 2 * hdev->mps;
        -priv->buf_size = priv->wl.high;
        +priv->wl.high = 2 * aligned_mps;
        +priv->buf_size = priv->wl.high +
                        hdev->dv_buf_size;
    }
    } else {
    priv->enable = 0;
}

if (hdev->tm_info.hw_pfc_map & BIT(i)) {
    -priv->wl.low = 128;
    -priv->wl.high = priv->wl.low + hdev->mps;
    -priv->buf_size = priv->wl.high + HCLGE_DEFAULT_DV;
    +priv->wl.low = 256;
    +priv->wl.high = priv->wl.low + aligned_mps;
    +priv->buf_size = priv->wl.high + hdev->dv_buf_size;
} else {
    priv->wl.low = 0;
    -priv->wl.high = hdev->mps;
    -priv->buf_size = priv->wl.high;
    +priv->wl.high = aligned_mps;
    +priv->buf_size = priv->wl.high + hdev->dv_buf_size;
}

@@ -1742,17 +1629,13 @@
(1 << HCLGE_TC0_PRI_BUF_EN_B));

ret = hclge_cmd_send(&hdev->hw, &desc, 1);
-if (ret) {
+if (ret)
  dev_err(&hdev->pdev->dev,
   "rx private buffer alloc cmd failed %d\n", ret);
 -return ret;
-
 -return 0;
+return ret;
}

#define HCLGE_PRIV_ENABLE(a) ((a) > 0 ? 1 : 0)
-
static int hclge_rx_priv_wl_config(struct hclge_dev *hdev,
    struct hclge_pkt_buf_alloc *buf_alloc)
{
    req->tc_wl[j].high =
    cpu_to_le16(priv->wl.high >> HCLGE_BUF_UNIT_S);
    req->tc_wl[j].high |=
    -cpu_to_le16(HCLGE_PRIV_ENABLE(priv->wl.high) <<
    - HCLGE_RX_PRIV_EN_B);
    +cpu_to_le16(BIT(HCLGE_RX_PRIV_EN_B));
    req->tc_wl[j].low =
    cpu_to_le16(priv->wl.low >> HCLGE_BUF_UNIT_S);
    req->tc_wl[j].low |=
    -cpu_to_le16(HCLGE_PRIV_ENABLE(priv->wl.low) <<
    - HCLGE_RX_PRIV_EN_B);
    + cpu_to_le16(BIT(HCLGE_RX_PRIV_EN_B));
}

/* Send 2 descriptor at one time */
ret = hclge_cmd_send(&hdev->hw, desc, 2);
-if (ret) {
+if (ret)
  dev_err(&hdev->pdev->dev,
   "rx private waterline config cmd failed %d\n", ret);
 -return ret;
-
 -return 0;
+return ret;
}
static int hclge_common_thrd_config(struct hclge_dev *hdev,
@@ -1828,24 +1707,20 @@
    req->com_thrd[j].high =
    cpu_to_le16(tc->high >> HCLGE_BUF_UNIT_S);
    req->com_thrd[j].high |=
    -cpu_to_le16(HCLGE_PRIV_ENABLE(tc->high) <<
        -HCLGE_RX_PRIV_EN_B);
    +cpu_to_le16(BIT(HCLGE_RX_PRIV_EN_B));
    req->com_thrd[j].low =
    cpu_to_le16(tc->low >> HCLGE_BUF_UNIT_S);
    req->com_thrd[j].low |=
    -cpu_to_le16(HCLGE_PRIV_ENABLE(tc->low) <<
        -HCLGE_RX_PRIV_EN_B);
    +cpu_to_le16(BIT(HCLGE_RX_PRIV_EN_B));
}
}

/* Send 2 descriptors at one time */
ret = hclge_cmd_send(&hdev->hw, desc, 2);
-if (ret) {
    +if (ret)
        dev_err(&hdev->pdev->dev,
            "common threshold config cmd failed %d\n", ret);
        return ret;
    -}
    -return 0;
    +return ret;
}

static int hclge_common_wl_config(struct hclge_dev *hdev,
@@ -1860,23 +1735,17 @@
    req = (struct hclge_rx_com_wl *)desc.data;
    req->com_wl.high = cpu_to_le16(buf->self.high >> HCLGE_BUF_UNIT_S);
    -req->com_wl.high |=
        -cpu_to_le16(HCLGE_PRIV_ENABLE(buf->self.high) <<
            -HCLGE_RX_PRIV_EN_B);
        +req->com_wl.high |=  cpu_to_le16(BIT(HCLGE_RX_PRIV_EN_B));
    req->com_wl.low = cpu_to_le16(buf->self.low >> HCLGE_BUF_UNIT_S);
    -req->com_wl.low |=
        -cpu_to_le16(HCLGE_PRIV_ENABLE(buf->self.low) <<
            -HCLGE_RX_PRIV_EN_B);
        +req->com_wl.low |=  cpu_to_le16(BIT(HCLGE_RX_PRIV_EN_B));
}

ret = hclge_cmd_send(&hdev->hw, &desc, 1);
-if (ret) {
    +if (ret)
dev_err(&hdev->pdev->dev,  
"common waterline config cmd failed %d\n", ret);  
-return ret;  
-}

-return 0;  
+return ret;  
}

int hclge_buffer_alloc(struct hclge_dev *hdev)
@@ -1991,7 +1860,7 @@
hdev->num_msi_left = vectors;  
hdev->base_msi_vector = pdev->irq;  
hdev->roce_base_vector = hdev->base_msi_vector +  
-HCLGE_ROCE_VECTOR_OFFSET;  
+hdev->roce_base_msix_offset;

hdev->vector_status = devm_kcalloc(&pdev->dev, hdev->num_msi,  
    sizeof(u16), GFP_KERNEL);  
@@ -2013,19 +1882,17 @@
return 0;
}

-static void hclge_check_speed_dup(struct hclge_dev *hdev, int duplex, int speed)
+static u8 hclge_check_speed_dup(u8 duplex, int speed)
{
-struct hclge_mac *mac = &hdev->hw.mac;
+struct hclge_mac *mac = &hdev->hw.mac;

-if ((speed == HCLGE_MAC_SPEED_10M) || (speed == HCLGE_MAC_SPEED_100M))  
-mac->duplex = (u8)duplex;
-else
-mac->duplex = HCLGE_MAC_FULL;
+if (!(speed == HCLGE_MAC_SPEED_10M || speed == HCLGE_MAC_SPEED_100M))
+duplex = HCLGE_MAC_FULL;

-mac->speed = speed;
+return duplex;
}

-int hclge_cfg_mac_speed_dup(struct hclge_dev *hdev, int speed, u8 duplex)
+static int hclge_cfg_mac_speed_dup_hw(struct hclge_dev *hdev, int speed,  
+    u8 duplex)
{
 struct hclge_config_mac_speed_dup_cmd *req;
 struct hclge_desc desc;
@@ -2035,48 +1902,48 @@

 hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CONFIG_SPEED_DUP, false);
switch (speed) {
    case HCLGE_MAC_SPEED_10M:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 6);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 6);
        break;
    case HCLGE_MAC_SPEED_100M:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 7);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 7);
        break;
    case HCLGE_MAC_SPEED_1G:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 0);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 0);
        break;
    case HCLGE_MAC_SPEED_10G:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 1);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 1);
        break;
    case HCLGE_MAC_SPEED_25G:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 2);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 2);
        break;
    case HCLGE_MAC_SPEED_40G:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 3);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 3);
        break;
    case HCLGE_MAC_SPEED_50G:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 4);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 4);
        break;
    case HCLGE_MAC_SPEED_100G:
        -hnae_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 5);
        +hnae3_set_field(req->speed_dup, HCLGE_CFG_SPEED_M, HCLGE_CFG_SPEED_S, 5);
        break;
    default:
        break;
}


- **hnae_set_field**.(req->speed_dup, HCLGE_CFG_SPEED_M,  
  - HCLGE_CFG_SPEED_S, 5);  
+ **hnae3_set_field**.(req->speed_dup, HCLGE_CFG_SPEED_M,  
+ HCLGE_CFG_SPEED_S, 5);  
break;  
default:  
dev_err(&hdev->pdev->dev, "invalid speed (%d)\n", speed);  
return -EINVAL;  
}  
  
- **hnae_set_bit**.(req->mac_change_fec_en, HCLGE_CFG_MAC_SPEED_CHANGE_EN_B,  
  - 1);  
+ **hnae3_set_bit**.(req->mac_change_fec_en, HCLGE_CFG_MAC_SPEED_CHANGE_EN_B,  
+ 1);  
ret = hclge_cmd_send(&hdev->hw, &desc, 1);  
if (ret) {  
  @@ -2085,73 +1952,34 @@  
  return ret;  
}  
  
- **hclge_check_speed_dup**.(hdev, duplex, speed);  
-  
return 0;  
}  
  
- static int hclge_cfg_mac_speed_dup_h(struct hnae3_handle *handle, int speed,  
  - u8 duplex)  
- {  
-   struct hclge_vport *vport = hclge_get_vport(handle);  
-   struct hclge_dev *hdev = vport->back;  
-   
-   return hclge_cfg_mac_speed_dup(hdev, speed, duplex);  
- }  
-  
- static int hclge_query_mac_an_speed_dup(struct hclge_dev *hdev, int *speed,  
-   u8 *duplex)  
+ int hclge_cfg_mac_speed_dup(struct hclge_dev *hdev, int speed, u8 duplex)  
+ {  
-   struct hclge_query_an_speed_dup_cmd *req;  
-   struct hclge_desc desc;  
-   int speed_tmp;  
int ret;  
  
+ req = (struct hclge_query_an_speed_dup_cmd *)desc.data;  
+ duplex = hclge_check_speed_dup(duplex, speed);  
+ if (hdev->hw.mac.speed == speed && hdev->hw.mac.duplex == duplex)  
+ return 0;  

- hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_QUERY_AN_RESULT, true);
- ret = hclge_cmd_send(&hdev->hw, &desc, 1);
- if (ret) {
  - dev_err(&hdev->pdev->dev,
      - "mac speed/autoneg/duplex query cmd failed %d\n",
      - ret);
  + ret = hclge_cfg_mac_speed_dup_hw(hdev, speed, duplex);
  + if (ret)
      return ret;
  - }

  -*duplex = hnae_get_bit(req->an_syn_dup_speed, HCLGE_QUERY_DUPLEX_B);
  -speed_tmp = hnae_get_field(req->an_syn_dup_speed, HCLGE_QUERY_SPEED_M,
    - HCLGE_QUERY_SPEED_S);
  -
  - ret = hclge_parse_speed(speed_tmp, speed);
  - if (ret) {
    - dev_err(&hdev->pdev->dev,
        - "could not parse speed(=%%d), %%d\n", speed_tmp, ret);
    - return -EIO;
    - }
  + hdev->hw.mac.speed = speed;
  + hdev->hw.mac.duplex = duplex;

  return 0;
  -

- static int hclge_query_autoneg_result(struct hclge_dev *hdev)
+ static int hclge_cfg_mac_speed_dup_h(struct hnae3_handle *handle, int speed,
  + u8 duplex)
  + {
  - struct hclge_mac *mac = &hdev->hw.mac;
  - struct hclge_query_an_speed_dup_cmd *req;
  - struct hclge_desc desc;
  - int ret;
  -
  - req = (struct hclge_query_an_speed_dup_cmd *)desc.data;
  -
  - hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_QUERY_AN_RESULT, true);
  - ret = hclge_cmd_send(&hdev->hw, &desc, 1);
  - if (ret) {
    - dev_err(&hdev->pdev->dev,
        - "autoneg result query cmd failed %d\n", ret);
    - return ret;
    - }
  -
  - mac->autoneg = hnae_get_bit(req->an_syn_dup_speed, HCLGE_QUERY_AN_B);
struct hclge_vport *vport = hclge_get_vport(handle);
struct hclge_dev *hdev = vport->back;

return 0;

return hclge_cfg_mac_speed_dup(hdev, speed, duplex);
}

static int hclge_set_autoneg_en(struct hclge_dev *hdev, bool enable)
{
    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CONFIG_AN_MODE, false);

    req = (struct hclge_config_auto_neg_cmd *)desc.data;
    hnae_set_bit(flag, HCLGE_MAC_CFG_AN_EN_B, !!enable);
    hnae3_set_bit(flag, HCLGE_MAC_CFG_AN_EN_B, !!enable);
    req->cfg_an_cmd_flag = cpu_to_le32(flag);

    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (ret) {
        dev_err(&hdev->pdev->dev, "auto neg set cmd failed %d
", ret);
        return ret;
    }

    return ret;
}

static int hclge_set_autoneg(struct hnae3_handle *handle, bool enable)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    struct hclge_dev *hdev = vport->back;
    struct phy_device *phydev = hdev->hw.mac.phydev;

    hclge_query_autoneg_result(hdev);
    if (phydev)
        return phydev->autoneg;

    return hdev->hw.mac.autoneg;
}

struct hclge_mac *mac = &hdev->hw.mac;
int ret;

-ret = hclge_cfg_mac_speedDup(hdev, hdev->hw.mac.speed, HCLGE_MAC_FULL);
+hdev->support_sfp_query = true;
+hdev->hw.mac.duplex = HCLGE_MAC_FULL;
ret = hclge_cfg_mac_speed_dup_hw(hdev, hdev->hw.mac.speed, hdev->hw.mac.duplex);
if (ret) {
    dev_err(&hdev->pdev->dev, "Config mac speed dup fail ret=%d\n", ret);
}

mac->link = 0;

/* Initialize the MTA table work mode */
-hdev->accept_mta_mc= true;
-hdev->enable_mta= true;
-hdev->mta_mac_sel_type= HCLGE_MAC_ADDR_47_36;
-
-ret = hclge_set_mta_filter_mode(hdev,
-hdev->mta_mac_sel_type,
-hdev->enable_mta);
+ret = hclge_set_mac_mtu(hdev, hdev->mps);
if (ret) {
    -dev_err(&hdev->pdev->dev, "set mta filter mode failed %d\n",
    -ret);
    +dev_err(&hdev->pdev->dev, "set mtu failed ret=%d\n", ret);
    return ret;
}

-return hclge_cfg_func_mta_filter(hdev, 0, hdev->accept_mta_mc);
+ret = hclge_buffer_alloc(hdev);
+if (ret)
+    dev_err(&hdev->pdev->dev, "allocate buffer fail, ret=%d\n", ret);
+
+return ret;
+
+static void hclge_mbx_task_schedule(struct hclge_dev *hdev)
+{
+    +if (!test_and_set_bit(HCLGE_STATE_MBX_SERVICE_SCHED, &hdev->state))
+        schedule_work(&hdev->mbx_service_task);
+    +
+    +static void hclge_reset_task_schedule(struct hclge_dev *hdev)
+    +{
+        +if (!test_and_set_bit(HCLGE_STATE_RST_SERVICE_SCHED, &hdev->state))
+            schedule_work(&hdev->rst_service_task);
+    }

static void hclge_task_schedule(struct hclge_dev *hdev)
@@ -2250,7 +2090,7 @@
req = (struct hclge_link_status_cmd *)desc.data;

link_status = req->status & HCLGE_LINK_STATUS;

return !!link_status;
}

int mac_state;
int link_stat;

@if (test_bit(HCLGE_STATE_DOWN, &hdev->state))
+return 0;
+
mac_state = hclge_get_mac_link_status(hdev);

if (hdev->hw.mac.phydev) {
-endif
+if (hdev->hw.mac.phydev->state == PHY_RUNNING)
link_stat = mac_state &
hdev->hw.mac.phydev->link;
else
@end
}

+static int hclge_get_sfp_speed(struct hclge_dev *hdev, u32 *speed)
+{
+struct hclge_sfp_speed_cmd *resp = NULL;
+struct hclge_desc desc;
+int ret;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_SFP_GET_SPEED, true);
+resp = (struct hclge_sfp_speed_cmd *)desc.data;
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret == -EOPNOTSUPP) {
+dev_warn(&hdev->pdev->dev,
+ "IMP do not support get SFP speed %d\n", ret);
+return ret;
+} else if (ret) {
+dev_err(&hdev->pdev->dev, "get sfp speed failed %d\n", ret);
+return ret;
+} else {
+*speed = resp->sfp_speed;
+
+return 0;
static int hclge_update_speed_duplex(struct hclge_dev *hdev)
{
    struct hclge_mac mac = hdev->hw.mac;
    u8 duplex;
    int speed;
    int ret;

    /* get the speed and duplex as autoneg result from mac cmd when phy
     get the speed from SFP cmd when phy doesn't exist.
     */
    if (mac.phydev || !mac.autoneg)
        return 0;
    if (mac.phydev)
        return 0;
    ret = hclge_query_mac_an_speed_dup(hdev, &speed, &duplex);
    if (ret) {
        dev_err(&hdev->pdev->dev, "mac autoneg/speed/duplex query failed %d\n", ret);
        /* if IMP does not support get SFP/qSFP speed, return directly */
        if (!hdev->support_sfp_query)
            return 0;
        ret = hclge_get_sfp_speed(hdev, &speed);
        if (ret == -EOPNOTSUPP) {
            hdev->support_sfp_query = false;
            return ret;
        } else if (ret) {
            return ret;
        }
    }
    +ret = hclge_get_sfp_speed(hdev, &speed);
    if (ret == -EOPNOTSUPP) {
        +hdev->support_sfp_query = false;
        +return ret;
    } else if (ret) {
        +return 0;
    } else if ((mac.speed != speed) || (mac.duplex != duplex)) {
        ret = hclgeCfg_mac_speed_dup(hdev, speed, duplex);
        if (ret) {
            dev_err(&hdev->pdev->dev, "mac speed/duplex config failed %d\n", ret);
            -return ret;
        }
    } else if (speed == HCLGE_MAC_SPEED_UNKNOWN)
        return 0; /* do nothing if no SFP */
    -return 0;
    +/* must config full duplex for SFP */
    +return hclgeCfg_mac_speed_dup(hdev, speed, HCLGE_MAC_FULL);
}
static int hclge_update_speed_duplex_hi(struct hnae3_handle *handle)
@@ -2350,6 +2215,7 @@
    struct hclge_dev *hdev = from_timer(hdev, t, service_timer);

    mod_timer(&hdev->service_timer, jiffies + HZ);
+    hdev->hw_stats.stats_timer++;
    hclge_task_schedule(hdev);
    }

@@ -2362,6 +2228,86 @@
    clear_bit(HCLGE_STATE_SERVICE_SCHED, &hdev->state);
    }

+static u32 hclge_check_event_cause(struct hclge_dev *hdev, u32 *clearval)
+{
+    u32 rst_src_reg, cmdq_src_reg, msix_src_reg;
+    +/* fetch the events from their corresponding regs */
+    rst_src_reg = hclge_read_dev(&hdev->hw, HCLGE_MISC_VECTOR_INT_STS);
+    cmdq_src_reg = hclge_read_dev(&hdev->hw, HCLGE_VECTOR0_CMDQ_SRC_REG);
+    msix_src_reg = hclge_read_dev(&hdev->hw,
+        HCLGE_VECTOR0_PF_OTHER_INT_STS_REG);
+    +    HCLGE_VECTOR0_PF_OTHER_INT_STS_REG);
+    +/* Assumption: If by any chance reset and mailbox events are reported
+    + together then we will only process reset event in this go and will
+    + defer the processing of the mailbox events. Since, we would have not
+    + cleared RX CMDQ event this time we would receive again another
+    + interrupt from H/W just for the mailbox.
+    +*/
+    +
+    +/* check for vector0 reset event sources */
+    +if (BIT(HCLGE_VECTOR0_IMPRESET_INT_B) & rst_src_reg) {
+        dev_info(&hdev->pdev->dev, "IMP reset interrupt\n");
+        set_bit(HNAE3_IMP_RESET, &hdev->reset_pending);
+        set_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
+        *clearval = BIT(HCLGE_VECTOR0_IMPRESET_INT_B);
+        return HCLGE_VECTOR0_EVENT_RST;
+    } +
+    +
+    +if (BIT(HCLGE_VECTOR0_GLOBALRESET_INT_B) & rst_src_reg) {
+        dev_info(&hdev->pdev->dev, "global reset interrupt\n");
+        set_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
+        set_bit(HNAE3_GLOBAL_RESET, &hdev->reset_pending);
+        *clearval = BIT(HCLGE_VECTOR0_GLOBALRESET_INT_B);
+        return HCLGE_VECTOR0_EVENT_RST;
+    } +

```c
+if (BIT(HCLGE_VECTOR0_CORERESET_INT_B) & rst_src_reg) {
+  dev_info(&hdev->pdev->dev, "core reset interrupt\n");
+  set_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
+  set_bit(HNAE3_CORE_RESET, &hdev->reset_pending);
+  *clearval = BIT(HCLGE_VECTOR0_CORERESET_INT_B);
+  return HCLGE_VECTOR0_EVENT_RST;
+}
+
+/* check for vector0 msix event source */
+if (msix_src_reg & HCLGE_VECTOR0_REG_MSIX_MASK)
+  return HCLGE_VECTOR0_EVENT_ERR;
+
+/* check for vector0 mailbox(=CMDQ RX) event source */
+if (BIT(HCLGE_VECTOR0_RX_CMDQ_INT_B) & cmdq_src_reg) {
+  cmdq_src_reg &= ~BIT(HCLGE_VECTOR0_RX_CMDQ_INT_B);
+  *clearval = cmdq_src_reg;
+  return HCLGE_VECTOR0_EVENT_MBX;
+}
+
+return HCLGE_VECTOR0_EVENT_OTHER;
+}
+
+static void hclge_clear_event_cause(struct hclge_dev *hdev, u32 event_type,
+    u32 regclr)
+{
+  switch (event_type) {
+    case HCLGE_VECTOR0_EVENT_RST:
+      hclge_write_dev(&hdev->hw, HCLGE_MISC_RESET_STS_REG, regclr);
+      break;
+    case HCLGE_VECTOR0_EVENT_MBX:
+      hclge_write_dev(&hdev->hw, HCLGE_VECTOR0_CMDQ_SRC_REG, regclr);
+      break;
+    default:
+      break;
+  }
+}
+
+static void hclge_clear_all_event_cause(struct hclge_dev *hdev)
+{
+  hclge_clear_event_cause(hdev, HCLGE_VECTOR0_EVENT_RST,
+    BIT(HCLGE_VECTOR0_GLOBALRESET_INT_B) |
+    BIT(HCLGE_VECTOR0_CORERESET_INT_B) |
+    BIT(HCLGE_VECTOR0_IMPRESET_INT_B));
+  hclge_clear_event_cause(hdev, HCLGE_VECTOR0_EVENT_MBX, 0);
+}
+
+static void hclge_enable_vector(struct hclge_misc_vector *vector, bool enable)
+{
```
writel(enable ? 1 : 0, vector->addr);
@@ -2370,16 +2316,65 @@
static irqreturn_t hclge_misc_irq_handle(int irq, void *data)
{
    struct hclge_dev *hdev = data;
    u32 event_cause;
    u32 clearval;

    hclge_enable_vector(&hdev->misc_vector, false);
    -if (!(test_and_set_bit(HCLGE_STATE_SERVICE_SCHED, &hdev->state))
    -schedule_work(&hdev->service_task);
    +event_cause = hclge_check_event_cause(hdev, &clearval);
    +
    +/* vector 0 interrupt is shared with reset and mailbox source events.*/
    +switch (event_cause) {
            +case HCLGE_VECTOR0_EVENT_ERR:
            +/* we do not know what type of reset is required now. This could
            + * only be decided after we fetch the type of errors which
            + * caused this event. Therefore, we will do below for now:
            + * 1. Assert HNAE3_UNKNOWN_RESET type of reset. This means we
            + * have deferred type of reset to be used.
            + * 2. Schedule the reset service task.
            + * 3. When service task receives HNAE3_UNKNOWN_RESET type it
            + * will fetch the correct type of reset. This would be done
            + * by first decoding the types of errors.
            + */
            +set_bit(HNAE3_UNKNOWN_RESET, &hdev->reset_request);
            +/* fall through */
            +case HCLGE_VECTOR0_EVENT_RST:
            +hclge_reset_task_schedule(hdev);
            +break;
            +case HCLGE_VECTOR0_EVENT_MBX:
            +/* If we are here then,
            + * 1. Either we are not handling any mbx task and we are not
            + * scheduled as well
            + * OR
            + * 2. We could be handling a mbx task but nothing more is
            + * scheduled.
            + * In both cases, we should schedule mbx task as there are more
            + * mbx messages reported by this interrupt.
            + */
            +hclge_mbx_task_schedule(hdev);
            +break;
            +default:
            +dev_warn(&hdev->pdev->dev,
            +"received unknown or unhandled event of vector0\n");
            +break;
    +}
/* clear the source of interrupt if it is not cause by reset */
+if (event_cause == HCLGE_VECTOR0_EVENT_MBX) {
+  hclge_clear_event_cause(hdev, event_cause, clearval);
+  hclge_enable_vector(&hdev->misc_vector, true);
+
} return IRQ_HANDLED;

static void hclge_free_vector(struct hclge_dev *hdev, int vector_id) {
  +if (hdev->vector_status[vector_id] == HCLGE_INVALID_VPORT) {
  +  dev_warn(&hdev->pdev->dev,
  +    "vector(vector_id %d) has been freed.\n", vector_id);
  +  return;
  +}
  +
  hdev->vector_status[vector_id] = HCLGE_INVALID_VPORT;
  hdev->num_msi_left += 1;
  hdev->num_msi_used -= 1;
  return;
}

hclge_get_misc_vector(hdev);

+static void hclge_misc_irq_uninit(struct hclge_dev *hdev) {
  +free_irq(hdev->misc_vector.vector_irq, hdev);
  +hclge_free_vector(hdev, 0);
  +}
+
+static int hclge_notify_client(struct hclge_dev *hdev,
+enum hnae3_reset_notify_type type)
+{
+  return ret;
+}
int ret;

ret = client->ops->reset_notify(handle, type);
;if (ret)
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"notify nic client failed %d(%d)\n", type, ret);
return ret;
+}
}

return 0;
}

+static int hclge_notify_roce_client(struct hclge_dev *hdev,
+    enum hnae3_reset_notify_type type)
+{
+struct hnae3_client *client = hdev->roce_client;
+int ret = 0;
+u16 i;
+
+if (!client)
+return 0;
+
+if (!client->ops->reset_notify)
+return -EOPNOTSUPP;
+
+for (i = 0; i < hdev->num_vmdq_vport + 1; i++) {
+struct hnae3_handle *handle = &hdev->vport[i].roce;
+
+ret = client->ops->reset_notify(handle, type);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"notify roce client failed %d(%d)\n", type, ret);
+return ret;
+}
+}
+
+return ret;
+}
+
+static int hclge_reset_wait(struct hclge_dev *hdev)
{ 
#define HCLGE_RESET_WAIT_MST	100
-#define HCLGE_RESET_WAIT_CNT	5
+#define HCLGE_RESET_WAIT_CNT	200
u32 val, reg, reg_bit;

u32 cnt = 0;

switch (hdev->reset_type) {
+case HNAE3_IMP_RESET:
+reg = HCLGE_GLOBAL_RESET_REG;
+reg_bit = HCLGE_IMP_RESET_BIT;
+break;
+break;
 case HNAE3_GLOBAL_RESET:
reg = HCLGE_GLOBAL_RESET_REG;
reg_bit = HCLGE_GLOBAL_RESET_BIT;
@@ -2457,6 +2493,8 @@
reg = HCLGE_FUN_RST_ING;
reg_bit = HCLGE_FUN_RST_ING_B;
break;
+case HNAE3_FLR_RESET:
+break;
+break;
 default:
 dev_err(&hdev->pdev->dev,
"Wait for unsupported reset type: %d\n",
@@ -2464,19 +2502,27 @@
return -EINVAL;
}

+if (hdev->reset_type == HNAE3_FLR_RESET) {
+while (!test_bit(HNAE3_FLR_DONE, &hdev->flr_state) &&
+       cnt++ < HCLGE_RESET_WAIT_CNT)
+msleep(HCLGE_RESET_WATI_MS);
+}
+if (!test_bit(HNAE3_FLR_DONE, &hdev->flr_state)) {
+dev_err(&hdev->pdev->dev,
+"flr wait timeout: %d\n", cnt);
+return -EBUSY;
+}
+return 0;
+
+val = hclge_read_dev(&hdev->hw, reg);
-while (hnae_get_bit(val, reg_bit) && cnt < HCLGE_RESET_WAIT_CNT) {
+while (hnae3_get_bit(val, reg_bit) && cnt < HCLGE_RESET_WAIT_CNT) {
+msleep(HCLGE_RESET_WATI_MS);
val = hclge_read_dev(&hdev->hw, reg);
cnt++;
}

-/* must clear reset status register to
- * prevent driver detect reset interrupt again
- */
- reg = hclge_read_dev(&hdev->hw, HCLGE_MISC_RESET_STS_REG);
- hclge_write_dev(&hdev->hw, HCLGE_MISC_RESET_STS_REG, reg);

if (cnt >= HCLGE_RESET_WAIT_CNT) {
        dev_warn(&hdev->pdev->dev,
"Wait for reset timeout: %dn", hdev->reset_type);
        return 0;
    }

static int hclge_func_reset_cmd(struct hclge_dev *hdev, int func_id)
+
static int hclge_set_vf_rst(struct hclge_dev *hdev, int func_id, bool reset)
+
{
+struct hclge_vf_rst_cmd *req;
+struct hclge_desc desc;
+
+req = (struct hclge_vf_rst_cmd *)desc.data;
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPCODE, 0x1);
+req->dest_vfid = func_id;
+
+if (reset)
+    req->vf_rst = 0x1;
+
+return hclge_cmd_send(&hdev->hw, &desc, 1);
+
+int hclge_set_all_vf_rst(struct hclge_dev *hdev, bool reset)
+
{
+int i;
+
+for (i = hdev->num_vmdq_vport + 1; i < hdev->num_alloc_vport; i++) {
+struct hclge_vport *vport = &hdev->vport[i];
+int ret;
+
+ /* Send cmd to set/clear VF's FUNC_RST_ING */
+ret = hclge_set_vf_rst(hdev, vport->vport_id, reset);
+if (ret) {
+    dev_err(&hdev->pdev->dev,
+"set vf(%d) rst failed %dn",
+vport->vport_id, ret);
+    return ret;
+}
+
+ /* Inform VF to process the reset. */
+ * hclge_inform_reset_assert_to_vf may fail if VF
/* driver is not loaded. *
+ */
+ret = hclge_inform_reset_assert_to_vf(vport);
+if (ret)
+dev_warn(&hdev->pdev->dev,
+ "Inform reset to vf(%d) failed %d\n",
+ vport->vport_id, ret);
+}
+
+return 0;
+
+int hclge_func_reset_cmd(struct hclge *hdev, int func_id)
+
+{
+struct hclge_desc desc;
+struct hclge_reset_cmd *req = (struct hclge_reset_cmd *)desc.data;
+int ret;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CFG_RST_TRIGGER, false);
-tnae_set_bit(req->mac_func_reset, HCLGE_CFG_RESET_MAC_B, 0);
-tnae_set_bit(req->mac_func_reset, HCLGE_CFG_RESET_FUNC_B, 1);
+hnae3_set_bit(req->mac_func_reset, HCLGE_CFG_RESET_FUNC_B, 1);
+req->fun_reset_vfid = func_id;
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+}
+
+static void hclge_do_reset(struct hclge_dev *hdev, enum hnae3_reset_type type)
+static void hclge_do_reset(struct hclge_dev *hdev)
+
+{
+struct pci_dev *pdev = hdev->pdev;
+u32 val;
+
+-switch (type) {
+-switch (hdev->reset_type) {
+case HNAE3_GLOBAL_RESET:
+val = hclge_read_dev(&hdev->hw, HCLGE_GLOBAL_RESET_REG);
-tnae_set_bit(val, HCLGE_GLOBAL_RESET_BIT, 1);
+hnae3_set_bit(val, HCLGE_GLOBAL_RESET_BIT, 1);
+hclge_write_dev(&hdev->hw, HCLGE_GLOBAL_RESET_REG, val);
+dev_info(pdev->dev, "Global Reset requested\n");
+break;
+case HNAE3_CORE_RESET:
+val = hclge_read_dev(&hdev->hw, HCLGE_GLOBAL_RESET_REG);
-tnae_set_bit(val, HCLGE_CORE_RESET_BIT, 1);
+hnae3_set_bit(val, HCLGE_CORE_RESET_BIT, 1);
+break;
+default:
+break;
+}
+break;
+}
+return ret;
+}
hclge_write_dev(&hdev->hw, HCLGE_GLOBAL_RESET_REG, val);
dev_info(&pdev->dev, "Core Reset requested\n");
bread;
case HNAE3_FUNC_RESET:
dev_info(&pdev->dev, "PF Reset requested\n");
-hclge_func_reset_cmd(hdev, 0);
+/* schedule again to check later */
+set_bit(HNAE3_FUNC_RESET, &hdev->reset_pending);
+hclge_reset_task_schedule(hdev);
+break;
+case HNAE3_FLR_RESET:
+dev_info(&pdev->dev, "FLR requested\n");
+/* schedule again to check later */
+set_bit(HNAE3_FLR_RESET, &hdev->reset_pending);
+hclge_reset_task_schedule(hdev);
break;
default:
dev_warn(&pdev->dev,
+ "Unsupported reset type: %d
", hdev->reset_type);
break;
} }

-static enum hnae3_reset_type hclge_detected_reset_event(struct hclge_dev *hdev)
+static enum hnae3_reset_type hclge_get_reset_level(struct hclge_dev *hdev,
+ unsigned long *addr)
{
enum hnae3_reset_type rst_level = HNAE3_NONE_RESET;
+u32 rst_reg_val;

-rst_reg_val = hclge_read_dev(&hdev->hw, HCLGE_MISC_RESET_STS_REG);
-if (BIT(HCLGE_VECTOR0_GLOBALRESET_INT_B) & rst_reg_val)
+/* first, resolve any unknown reset type to the known type(s) */
+if (test_bit(HNAE3_UNKNOWN_RESET, *addr)) {
+ /* we will intentionally ignore any errors from this function
+ + as we will end up in *some* reset request in any case
+ */
+ hclge_handle_hw_msix_error(hdev, *addr);
+clear_bit(HNAE3_UNKNOWN_RESET, *addr);
+/* We defered the clearing of the error event which caused
+ + interrupt since it was not possbile to do that in
+ + interrupt context (and this is the reason we introduced
+ + new UNKNOWN reset type). Now, the errors have been
+ + handled and cleared in hardware we can safely enable
+ + interrupts. This is an exception to the norm.
+ */
+ hclge_enable_vector(&hdev->misc_vector, true);
+} /* return the highest priority reset level amongst all */
+if (test_bit(HNAE3_IMP_RESET, addr)) {
+rst_level = HNAE3_IMP_RESET;
+clear_bit(HNAE3_IMP_RESET, addr);
+clear_bit(HNAE3_GLOBAL_RESET, addr);
+clear_bit(HNAE3_CORE_RESET, addr);
+clear_bit(HNAE3_FUNC_RESET, addr);
+} else if (test_bit(HNAE3_GLOBAL_RESET, addr)) {
+rst_level = HNAE3_GLOBAL_RESET;
-else if (BIT(HCLGE_VECTOR0_CORERESET_INT_B) & rst_reg_val)
+clear_bit(HNAE3_GLOBAL_RESET, addr);
+clear_bit(HNAE3_CORE_RESET, addr);
+clear_bit(HNAE3_FUNC_RESET, addr);
+} else if (test_bit(HNAE3_CORE_RESET, addr)) {
+rst_level = HNAE3_CORE_RESET;
-else if (BIT(HCLGE_VECTOR0_IMPRESET_INT_B) & rst_reg_val)
+clear_bit(HNAE3_CORE_RESET, addr);
+clear_bit(HNAE3_FUNC_RESET, addr);
+} else if (test_bit(HNAE3_FUNC_RESET, addr)) {
+rst_level = HNAE3_FUNC_RESET;
+clear_bit(HNAE3_FUNC_RESET, addr);
+} else if (test_bit(HNAE3_FLR_RESET, addr)) {
+rst_level = HNAE3_FLR_RESET;
+clear_bit(HNAE3_FLR_RESET, addr);
+}

return rst_level;
}

-static void hclge_reset_event(struct hnae3_handle *handle,
-    enum hnae3_reset_type reset)
+static void hclge_clear_reset_cause(struct hclge_dev *hdev)
{
-struct hclge_vport *vport = hclge_get_vport(handle);
-struct hclge_dev *hdev = vport->back;
+u32 clearval = 0;

-dev_info(&hdev->pdev->dev,
    "Receive reset event , reset_type is %d", reset);
-
-    -switch (reset) {
-        -case HNAE3_FUNC_RESET:
-        -case HNAE3_CORE_RESET:
            +switch (hdev->reset_type) {
+            +case HNAE3_IMP_RESET:
+clearval = BIT(HCLGE_VECTOR0_IMPRESST_INT_B);
+break;
case HNAE3_GLOBAL_RESET:
-if (test_bit(HCLGE_STATE_RESET_INT, &hdev->state)) {
-dev_err(&hdev->pdev->dev, "Already in reset state");
-return;
-}
-hdev->reset_type = reset;
-set_bit(HCLGE_STATE_RESET_INT, &hdev->state);
-set_bit(HCLGE_STATE_SERVICE_SCHED, &hdev->state);
-schedule_work(&hdev->service_task);
+clearval = BIT(HCLGE_VECTOR0_GLOBALRESET_INT_B);
+break;
+case HNAE3_CORE_RESET:
+clearval = BIT(HCLGE_VECTOR0_CORERESET_INT_B);
break;
default:
-dev_warn(&hdev->pdev->dev, "Unsupported reset event:%d", reset);
break;
}
+
+if (!clearval)
+return;
+
+hclge_write_dev(&hdev->hw, HCLGE_MISC_RESET_STS_REG, clearval);
+hclge_enable_vector(&hdev->misc_vector, true);
}

-static void hclge_reset_subtask(struct hclge_dev *hdev)
+static int hclge_reset_prepare_down(struct hclge_dev *hdev)
{
-bool do_reset;
+int ret = 0;

-do_reset = hdev->reset_type != HNAE3_NONE_RESET;
+switch (hdev->reset_type) {
+case HNAE3_FUNC_RESET: /* fall through */
+case HNAE3_FLR_RESET:
+ret = hclge_set_all_vf_rst(hdev, true);
+break;
+default: break;
+}

-/* Reset is detected by interrupt */
-if (hdev->reset_type == HNAE3_NONE_RESET)
-hdev->reset_type = hclge_detected_reset_event(hdev);
+return ret;
+
- if (hdev->reset_type == HNAE3_NONE_RESET)
- return;
+
+ static int hclge_reset_prepare_wait(struct hclge_dev *hdev)
+ {
+ u32 reg_val;
+ int ret = 0;

 switch (hdev->reset_type) {
 case HNAE3_FUNC_RESET:
 case HNAE3_CORE_RESET:
 case HNAE3_GLOBAL_RESET:
+ /* There is no mechanism for PF to know if VF has stopped IO
+ * for now, just wait 100 ms for VF to stop IO
+ */
+ msleep(100);
+ ret = hclge_func_reset_cmd(hdev, 0);
+ if (ret) {
+ dev_err(&hdev->pdev->dev,
+ "asserting function reset fail %d\n", ret);
+ return ret;
+ }
+ /* After performaning pf reset, it is not necessary to do the
+ * mailbox handling or send any command to firmware, because
+ * any mailbox handling or command to firmware is only valid
+ * after hclge_cmd_init is called.
+ */
+ set_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
+ break;
+ case HNAE3_FLR_RESET:
+ /* There is no mechanism for PF to know if VF has stopped IO
+ * for now, just wait 100 ms for VF to stop IO
+ */
+ msleep(100);
+ set_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state);
+ set_bit(HNAE3_FLR_DOWN, &hdev->flr_state);
+ break;
+ case HNAE3_IMP_RESET:
- hclge_notify_client(hdev, HNAE3_DOWN_CLIENT);
+ reg_val = hclge_read_dev(&hdev->hw, HCLGE_PF_OTHER_INT_REG);
+ hclge_write_dev(&hdev->hw, HCLGE_PF_OTHER_INT_REG,
+ BIT(HCLGE_VECTOR0_IMP_RESET_INT_B) | reg_val);
+ break;
+ default:
+ break;
+}

- if (do_reset)
- hclge_do_reset(hdev, hdev->reset_type);
- else
- set_bit(HCLGE_STATE_RESET_INT, &hdev->state);
+ dev_info(&hdev->pdev->dev, "prepare wait ok\n");

- if (!hclge_reset_wait(hdev)) {
- hclge_notify_client(hdev, HNAE3_UNINIT_CLIENT);
- hclge_reset_ae_dev(hdev->ae_dev);
- hclge_notify_client(hdev, HNAE3_INIT_CLIENT);
- clear_bit(HCLGE_STATE_RESET_INT, &hdev->state);
+ return ret;
+ }
+
+ static bool hclge_reset_err_handle(struct hclge_dev *hdev, bool is_timeout)
+ {
+ #define MAX_RESET_FAIL_CNT 5
+ #define RESET_UPGRADE_DELAY_SEC 10
+
+ if (hdev->reset_pending)
+ dev_info(&hdev->pdev->dev, "Reset pending \%lu\n");
+ hdev->reset_pending);
+ return true;
+ } else if ((hdev->reset_type != HNAE3_IMP_RESET) &&
+ (hclge_read_dev(&hdev->hw, HCLGE_GLOBAL_RESET_REG) &
+ BIT(HCLGE_IMP_RESET_BIT))){
+ dev_info(&hdev->pdev->dev,
+ "reset failed because IMP Reset is pending\n");
+ hclge_clear_reset_cause(hdev);
+ return false;
+ } else if (hdev->reset_fail_cnt < MAX_RESET_FAIL_CNT) {
+ hdev->reset_fail_cnt++;
+ if (is_timeout) {
+ set_bit(hdev->reset_type, &hdev->reset_pending);
+ dev_info(&hdev->pdev->dev,
+ "re-schedule to wait for hw reset done\n");
+ return true;
+ }
- hclge_notify_client(hdev, HNAE3_UP_CLIENT);
+
+ dev_info(&hdev->pdev->dev, "Upgrade reset level\n");
+ hclge_clear_reset_cause(hdev);
+ mod_timer(&hdev->reset_timer,
+ jiffies + RESET_UPGRADE_DELAY_SEC * HZ);
+ return false;
hclge_reset_prepare_up(struct hclge *hdev)
{
    int ret = 0;
    switch (hdev->reset_type) {
    case HNAE3_FUNC_RESET:
        /* fall through */
    case HNAE3_FLR_RESET:
        ret = hclge_set_all_vf_rst(hdev, false);
        break;
    default:
        dev_err(&hdev->pdev->dev, "Unsupported reset type:%d
", hdev->reset_type);
        break;
    }
    return ret;
}

static void hclge_reset(struct hclge_dev *hdev)
{
    struct hnae3_ae_dev *ae_dev = pci_get_drvdata(hdev->pdev);
    bool is_timeout = false;
    int ret;
    ae_dev->reset_type = hdev->reset_type;
    hdev->reset_count++;
    /* Initialize ae_dev reset status as well, in case enet layer wants to
     * know if device is undergoing reset
     *
    */
    ae_dev->reset_type = hdev->reset_type;
    hdev->reset_count++;
    /* perform reset of the stack & ae device for a client */
    ret = hclge_notify_roce_client(hdev, HNAE3_DOWN_CLIENT);
    if (ret)
        goto err_reset;
    ret = hclge_reset_prepare_down(hdev);
    if (ret)
        goto err_reset;
    rtnl_lock();
    ret = hclge_notify_client(hdev, HNAE3_DOWN_CLIENT);
    return ret;
}
+if (ret)
+goto err_reset_lock;
+
+rtnl_unlock();
+
+ret = hclge_reset_prepare_wait(hdev);
+if (ret)
+goto err_reset;
+
+if (hclge_reset_wait(hdev)) {
+is_timeout = true;
+goto err_reset;
+
+ret = hclge_notify_roce_client(hdev, HNAE3_UNINIT_CLIENT);
+if (ret)
+goto err_reset;
+
+rtnl_lock();
+ret = hclge_notify_client(hdev, HNAE3_UNINIT_CLIENT);
+if (ret)
+goto err_reset_lock;
+
+ret = hclge_reset_ae_dev(hdev->ae_dev);
+if (ret)
+goto err_reset_lock;
+
+ret = hclge_notify_client(hdev, HNAE3_INIT_CLIENT);
+if (ret)
+goto err_reset_lock;
+
+rtnl_unlock();
+ret = hclge_clear_reset_cause(hdev);
+
+ret = hclge_reset_prepare_up(hdev);
+if (ret)
+goto err_reset_lock;
+
+ret = hclge_notify_client(hdev, HNAE3_UP_CLIENT);
+if (ret)
+goto err_reset_lock;
+
+rtnl_unlock();
+
+ret = hclge_notify_roce_client(hdev, HNAE3_INIT_CLIENT);
+if (ret)
+goto err_reset;
+
+ret = hclge_notify_roce_client(hdev, HNAE3_UP_CLIENT);
+if (ret)
+goto err_reset;
+
+hdev->last_reset_time = jiffies;
+hdev->reset_fail_cnt = 0;
+ae_dev->reset_type = HNAE3_NONE_RESET;
+
+return;
+
+err_reset_lock:
+rtnl_unlock();
+err_reset:
+if (hclge_reset_err_handle(hdev, is_timeout))
+hclge_reset_task_schedule(hdev);
+}
+
+static void hclge_reset_event(struct pci_dev *pdev, struct hnae3_handle *handle)
+{
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+struct hclge_dev *hdev = ae_dev->priv;
+
+/* We might end up getting called broadly because of 2 below cases:
+ * 1. Recoverable error was conveyed through APEI and only way to bring
+ * normalcy is to reset.
+ * 2. A new reset request from the stack due to timeout
+ */
+/* For the first case,error event might not have ae handle available.
+ * check if this is a new reset request and we are not here just because
+ * last reset attempt did not succeed and watchdog hit us again. We will
+ * know this if last reset request did not occur very recently (watchdog
+ * timer = 5*HZ, let us check after sufficiently large time, say 4*5*Hz)
+ * In case of new request we reset the "reset level" to PF reset.
+ * And if it is a repeat reset request of the most recent one then we
+ * want to make sure we throttle the reset request. Therefore, we will
+ * not allow it again before 3*HZ times.
+ */
+if (!handle)
+handle = &hdev->vport[0].nic;
+
+if (time_before(jiffies, (hdev->last_reset_time + 3 * HZ)))
+return;
+else if (hdev->default_reset_request)
+hdev->reset_level =
+hclge_get_reset_level(hdev,
+ &hdev->default_reset_request);
+else if (time_after(jiffies, (hdev->last_reset_time + 4 * 5 * HZ)))
+hdev->reset_level = HNAE3_FUNC_RESET;
dev_info(&hdev->pdev->dev, "received reset event, reset type is %d",
+ hdev->reset_level);
+
+ /* request reset & schedule reset task */
+ set_bit(hdev->reset_level, &hdev->reset_request);
+ hclge_reset_task_schedule(hdev);
+
+ if (hdev->reset_level < HNAE3_GLOBAL_RESET)
+ hdev->reset_level++;
+
+ static void hclge_set_def_reset_request(struct hnae3_ae_dev *ae_dev,
+ enum hnae3_reset_type rst_type)
+ {
+ struct hclge_dev *hdev = ae_dev->priv;
+
+ set_bit(rst_type, &hdev->default_reset_request);
+ }
+
+ static void hclge_reset_timer(struct timer_list *t)
+ {
+ struct hclge_dev *hdev = from_timer(hdev, t, reset_timer);
+
+ dev_info(&hdev->pdev->dev,
+ "triggering global reset in reset timer\n");
+ set_bit(HNAE3_GLOBAL_RESET, &hdev->default_reset_request);
+ hclge_reset_event(hdev->pdev, NULL);
+ }
+
+ static void hclge_reset_subtask(struct hclge_dev *hdev)
+ {
+ /* check if there is any ongoing reset in the hardware. This status can
+ * be checked from reset_pending. If there is then, we need to wait for
+ * hardware to complete reset.
+ * a. If we are able to figure out in reasonable time that hardware
+ * has fully resetted then, we can proceed with driver, client
+ * reset.
+ * b. else, we can come back later to check this status so re-sched
+ * now.
+ */
+ hdev->last_reset_time = jiffies;
+ hdev->reset_type = hclge_get_reset_level(hdev, &hdev->reset_pending);
+ if (hdev->reset_type != HNAE3_NONE_RESET)
+ hclge_reset(hdev);
+
+ /* check if we got any *new* reset requests to be honored */
+ hdev->reset_type = hclge_get_reset_level(hdev, &hdev->reset_request);
+ if (hdev->reset_type != HNAE3_NONE_RESET)
+hclge_do_reset(hdev);
+
+hdev->reset_type = HNAE3_NONE_RESET;
}

-static void hclge_misc_irq_service_task(struct hclge_dev *hdev)
+static void hclge_reset_service_task(struct work_struct *work)
{
+struct hclge_dev *hdev =
+container_of(work, struct hclge_dev, rst_service_task);
+
+if (test_and_set_bit(HCLGE_STATE_RST_HANDLING, &hdev->state))
+return;
+
+clear_bit(HCLGE_STATE_RST_SERVICE_SCHED, &hdev->state);
+
+hclge_reset_subtask(hdev);
-hclge_enable_vector(&hdev->misc_vector, true);
+
+clear_bit(HCLGE_STATE_RST_HANDLING, &hdev->state);
}

-static void hclge_service_task(struct work_struct *work)
+static void hclge_mailbox_service_task(struct work_struct *work)
{
struct hclge_dev *hdev =
-container_of(work, struct hclge_dev, service_task);
+container_of(work, struct hclge_dev, mbx_service_task);
-
+hclge_misc_irq_service_task(hdev);
-hclge_update_speed_duplex(hdev);
-hclge_update_link_status(hdev);
-hclge_update_stats_for_all(hdev);
-hclge_service_complete(hdev);
+if (test_and_set_bit(HCLGE_STATE_MBX_HANDLING, &hdev->state))
+return;
+
+clear_bit(HCLGE_STATE_MBX_SERVICE_SCHED, &hdev->state);
+
+hclge_mbx_handler(hdev);
+
+clear_bit(HCLGE_STATE_MBX_HANDLING, &hdev->state);
}

-static void hclge_disable_sriov(struct hclge_dev *hdev)
+static void hclge_update_vport_alive(struct hclge_dev *hdev)
{
-/* If our VFs are assigned we cannot shut down SR-IOV

- * without causing issues, so just leave the hardware
- * available but disabled
- */
-if (pci_vfs_assigned(hdev->pdev)) {
-dev_warn(&hdev->pdev->dev,
- "disabling driver while VFs are assigned\n");
-return;
+int i;
+
+/* start from vport 1 for PF is always alive */
+for (i = 1; i < hdev->num_alloc_vport; i++) {
+struct hclge_vport *vport = &hdev->vport[i];
+
+if (time_after(jiffies, vport->last_active_jiffies + 8 * HZ))
+clear_bit(HCLGE_VPORT_STATE_ALIVE, &vport->state);
+
+/* If vf is not alive, set to default value */
+if (!test_bit(HCLGE_VPORT_STATE_ALIVE, &vport->state))
+vport->mps = HCLGE_MAC_DEFAULT_FRAME;
++}
+
+pci_disable_sriov(hdev->pdev);
+static void hclge_service_task(struct work_struct *work)
+{ struct hclge_dev *hdev =
+container_of(work, struct hclge_dev, service_task);
+
+if (hdev->hw_stats.stats_timer >= HCLGE_STATS_TIMER_INTERVAL) {
+hclge_update_stats_for_all(hdev);
+hdev->hw_stats.stats_timer = 0;
+}
+
+hclge_update_speed_duplex(hdev);
+hclge_update_link_status(hdev);
+hclge_update_vport_alive(hdev);
+hclge_service_complete(hdev);
}

+static int hclge_put_vector(struct hnae3_handle *handle, int vector)
+{ struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+int vector_id;
+
+vector_id = hclge_get_vector_index(hdev, vector);
+if (vector_id < 0) {
+dev_err(&hdev->pdev->dev,
+"Get vector index fail. vector_id =\%d\n", vector_id);
+return vector_id;
+
+hclge_free_vector(hdev, vector_id);
+
+return 0;
+
}
+
static u32 hclge_get_rss_key_size(struct hnae3_handle *handle)
{
return HCLGE_RSS_KEY_SIZE;
@@ -2720,31 +3149,6 @@
return HCLGE_RSS_IND_TBL_SIZE;
}

-static int hclge_get_rss_algo(struct hclge_dev *hdev)
-
-{ struct hclge_rss_config_cmd *req;
-struct hclge_desc desc;
-int rss_hash_algo;
-int ret;
-
-hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_RSS_GENERIC_CONFIG, true);
-
-ret = hclge_cmd_send(&hdev->hw, &desc, 1);
-\if (ret) {
-\dev_err(&hdev->pdev->dev,
-"Get link status error, status =\%d\n", ret);
-\return ret;
-\}
-
-req = (struct hclge_rss_config_cmd *)desc.data;
-rss_hash_algo = (req->hash_config & HCLGE_RSS_HASH_ALGO_MASK);
-
-\if (rss_hash_algo == HCLGE_RSS_HASH_ALGO_TOEPLITZ)
-\return ETH_RSS_HASH_TOP;
-\-
-\return -EINVAL;
-\}
-
-static int hclge_set_rss_algo_key(struct hclge_dev *hdev,
const u8 hfunc, const u8 *key)
static int hclge_set_rss_indir_table(struct hclge_dev *hdev, const u32 *indir)
{
    struct hclge_rss_indirection_table_cmd *req;
    struct hclge_desc desc;
    for (i = 0; i < HCLGE_MAX_TC_NUM; i++) {
        u16 mode = 0;

        -hnae_set_bit(mode, HCLGE_RSS_TC_VALID_B, (tc_valid[i] & 0x1));
        -hnae_set_field(mode, HCLGE_RSS_TC_SIZE_M,
            -HCLGE_RSS_TC_SIZE_S, tc_size[i]);
        -hnae_set_field(mode, HCLGE_RSS_TC_OFFSET_M,
            -HCLGE_RSS_TC_OFFSET_S, tc_offset[i]);
        +hnae3_set_bit(mode, HCLGE_RSS_TC_VALID_B, (tc_valid[i] & 0x1));
        +hnae3_set_field(mode, HCLGE_RSS_TC_SIZE_M,
            +HCLGE_RSS_TC_SIZE_S, tc_size[i]);
        +hnae3_set_field(mode, HCLGE_RSS_TC_OFFSET_M,
            +HCLGE_RSS_TC_OFFSET_S, tc_offset[i]);

        req->rss_tc_mode[i] = cpu_to_le16(mode);
    }

    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    -if (ret) {
        +if (ret)
            dev_err(&hdev->pdev->dev,
                "Configure rss tc mode fail, status = %d\n", ret);
        -return ret;
    } -}

    -return 0;
    +return ret;

+static void hclge_get_rss_type(struct hclge_vport *vport)
{+
    +if (vport->rss_tuple_sets.ipv4_tcp_en ||
        vport->rss_tuple_sets.ipv4_udp_en ||
        vport->rss_tuple_sets.ipv4_sctp_en ||
        vport->rss_tuple_sets.ipv6_tcp_en ||
        vport->rss_tuple_sets.ipv6_udp_en ||
        vport->rss_tuple_sets.ipv6_sctp_en)


static int hclge_set_rss_input_tuple(struct hclge_dev *hdev)
{
    req = (struct hclge_rss_input_tuple_cmd *)desc.data;
    -req->ipv4_tcp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv4_udp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv4_sctp_en = HCLGE_RSS_INPUT_TUPLE_SCTP;
    -req->ipv4_fragment_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv6_tcp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv6_udp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv6_sctp_en = HCLGE_RSS_INPUT_TUPLE_SCTP;
    -req->ipv6_fragment_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    
    /* Get the tuple cfg from pf */
    req->ipv4_tcp_en = hdev->vport[0].rss_tuple_sets.ipv4_tcp_en;
    req->ipv4_udp_en = hdev->vport[0].rss_tuple_sets.ipv4_udp_en;
    req->ipv4_sctp_en = hdev->vport[0].rss_tuple_sets.ipv4_sctp_en;
    req->ipv4_fragment_en = hdev->vport[0].rss_tuple_sets.ipv4_fragment_en;
    req->ipv6_tcp_en = hdev->vport[0].rss_tuple_sets.ipv6_tcp_en;
    req->ipv6_udp_en = hdev->vport[0].rss_tuple_sets.ipv6_udp_en;
    req->ipv6_sctp_en = hdev->vport[0].rss_tuple_sets.ipv6_sctp_en;
    req->ipv6_fragment_en = hdev->vport[0].rss_tuple_sets.ipv6_fragment_en;
    
    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    
    if (ret) {
        dev_err(&hdev->pdev->dev,
            "Configure rss input fail, status = %d\n", ret);
        -return ret;
    }
    -return 0;
    +return ret;
}

static int hclge_get_rss(struct hnae3_handle *handle, u32 *indir,
    u8 *key, u8 *hfunc)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    
    +vport->nic.kinfo.rss_type = PKT_HASH_TYPE_L4;
    +else if (vport->rss_tuple_sets.ipv4_fragment_en ||
        vport->rss_tuple_sets.ipv6_fragment_en)
    +vport->nic.kinfo.rss_type = PKT_HASH_TYPE_L3;
    +else
    +vport->nic.kinfo.rss_type = PKT_HASH_TYPE_NONE;
    }

static int hclge_set_rss_input_tuple(struct hclge_dev *hdev)
{  
    req = (struct hclge_rss_input_tuple_cmd *)desc.data;
    -req->ipv4_tcp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv4_udp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv4_sctp_en = HCLGE_RSS_INPUT_TUPLE_SCTP;
    -req->ipv4_fragment_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv6_tcp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv6_udp_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    -req->ipv6_sctp_en = HCLGE_RSS_INPUT_TUPLE_SCTP;
    -req->ipv6_fragment_en = HCLGE_RSS_INPUT_TUPLE_OTHER;
    
    /* Get the tuple cfg from pf */
    req->ipv4_tcp_en = hdev->vport[0].rss_tuple_sets.ipv4_tcp_en;
    req->ipv4_udp_en = hdev->vport[0].rss_tuple_sets.ipv4_udp_en;
    req->ipv4_sctp_en = hdev->vport[0].rss_tuple_sets.ipv4_sctp_en;
    req->ipv4_fragment_en = hdev->vport[0].rss_tuple_sets.ipv4_fragment_en;
    req->ipv6_tcp_en = hdev->vport[0].rss_tuple_sets.ipv6_tcp_en;
    req->ipv6_udp_en = hdev->vport[0].rss_tuple_sets.ipv6_udp_en;
    req->ipv6_sctp_en = hdev->vport[0].rss_tuple_sets.ipv6_sctp_en;
    req->ipv6_fragment_en = hdev->vport[0].rss_tuple_sets.ipv6_fragment_en;
    
    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    
    if (ret) {
        dev_err(&hdev->pdev->dev,
            "Configure rss input fail, status = %d\n", ret);
        -return ret;
    }
    -return 0;
    +return ret;
}
/* Get hash algorithm */
-if (hfunc)
- hfunc = hclge_get_rss_algo(hdev);
+if (hfunc) {
+ switch (vport->rss_algo) {
+ case HCLGE_RSS_HASH_ALGO_TOEPLITZ:
+ hfunc = ETH_RSS_HASH_TOP;
+ break;
+ case HCLGE_RSS_HASH_ALGO_SIMPLE:
+ hfunc = ETH_RSS_HASH_XOR;
+ break;
+ default:
+ hfunc = ETH_RSS_HASH_UNKNOWN;
+ break;
+ }
+ }
+
/* Get the RSS Key required by the user */
if (key)
@@ -2908,17 +3336,27 @@
/* Set the RSS Hash Key if specified by the user */
if (key) {
-/* Update the shadow RSS key with user specified qids */
-memcpy(vport->rss_hash_key, key, HCLGE_RSS_KEY_SIZE);
-
-/* if (hfunc == ETH_RSS_HASH_TOP ||
- hfunc == ETH_RSS_HASH_NO_CHANGE)
+switch (hfunc) {
+ case ETH_RSS_HASH_TOP:
+ hash_algo = HCLGE_RSS_HASH_ALGO_TOEPLITZ;
+ break;
+ case ETH_RSS_HASH_XOR:
+ hash_algo = HCLGE_RSS_HASH_ALGO_SIMPLE;
+ break;
+ case ETH_RSS_HASH_NO_CHANGE:
+ hash_algo = vport->rss_algo;
+ break;
+ default:
+ return -EINVAL;
+ }
+ ret = hclge_set_rss_algo_key(hdev, hash_algo, key);
if (ret)
return ret;
+/* Update the shadow RSS key with user specified qids */
+memcpy(vport->rss_hash_key, key, HCLGE_RSS_KEY_SIZE);
+vport->rss_algo = hash_algo;
}

/* Update the shadow RSS table with user specified qids */
@@ -2926,8 +3364,7 @@
 vport->rss_indirection_tbl[i] = indir[i];

/* Update the hardware */
- ret = hclge_set_rss_indir_table(hdev, indir);
- return ret;
+return hclge_set_rss_indir_table(hdev, vport->rss_indirection_tbl);
}

static u8 hclge_get_rss_hash_bits(struct ethtool_rxnfc *nfc)
@@ -2970,15 +3407,16 @@
 return -EINVAL;

 req = (struct hclge_rss_input_tuple_cmd *)desc.data;
- hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_RSS_INPUT_TUPLE, true);
- ret = hclge_cmd_send(&hdev->hw, &desc, 1);
- if (ret) {
- dev_err(&hdev->pdev->dev,
- "Read rss tuple fail, status = %d\n", ret);
- return ret;
- }
+ hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_RSS_INPUT_TUPLE, false);

- hclge_cmd_reuse_desc(&desc, false);
+req->ipv4_tcp_en = vport->rss_tuple_sets.ipv4_tcp_en;
+req->ipv4_udp_en = vport->rss_tuple_sets.ipv4_udp_en;
+req->ipv4_sctp_en = vport->rss_tuple_sets.ipv4_sctp_en;
+req->ipv4_fragment_en = vport->rss_tuple_sets.ipv4_fragment_en;
+req->ipv6_tcp_en = vport->rss_tuple_sets.ipv6_tcp_en;
+req->ipv6_udp_en = vport->rss_tuple_sets.ipv6_udp_en;
+req->ipv6_sctp_en = vport->rss_tuple_sets.ipv6_sctp_en;
+req->ipv6_fragment_en = vport->rss_tuple_sets.ipv6_fragment_en;

tuple_sets = hclge_get_rss_hash_bits(nfc);
 switch (nfc->flow_type) {
@@ -3015,52 +3453,50 @@
 }

 ret = hclge_cmd_send(&hdev->hw, &desc, 1);
- if (ret)
if (ret) {
    dev_err(&hdev->pdev->dev, "Set rss tuple fail, status = %d\n", ret);
    return ret;
}

return ret;

vport->rss_tuple_sets.ipv4_tcp_en = req->ipv4_tcp_en;
vport->rss_tuple_sets.ipv4_udp_en = req->ipv4_udp_en;
vport->rss_tuple_sets.ipv4_sctp_en = req->ipv4_sctp_en;
vport->rss_tuple_sets.ipv4_fragment_en = req->ipv4_fragment_en;
vport->rss_tuple_sets.ipv6_tcp_en = req->ipv6_tcp_en;
vport->rss_tuple_sets.ipv6_udp_en = req->ipv6_udp_en;
vport->rss_tuple_sets.ipv6_sctp_en = req->ipv6_sctp_en;
vport->rss_tuple_sets.ipv6_fragment_en = req->ipv6_fragment_en;
hclge_get_rss_type(vport);
return 0;
}

static int hclge_get_rss_tuple(struct hnae3_handle *handle, struct ethtool_rxfc *nfc) {
    struct hclge_vport *vport = hclge_get_vport(handle);
    struct hclge_dev *hdev = vport->back;
    struct hclge_rss_input_tuple_cmd *req;
    struct hclge_desc desc;
    u8 tuple_sets;
    int ret;

    nfc->data = 0;

    req = (struct hclge_rss_input_tuple_cmd *)desc.data;
    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_RSS_INPUT_TUPLE, true);
    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (ret) {
        dev_err(&hdev->pdev->dev, "Read rss tuple fail, status = %d\n", ret);
        return ret;
    }

    switch (nfc->flow_type) {
    case TCP_V4_FLOW:
        tuple_sets = req->ipv4_tcp_en;
        break;
    case UDP_V4_FLOW:
        tuple_sets = req->ipv4_udp_en;
        break;
    
    return ret;
    }
}
break;
case TCP_V6_FLOW:
- tuple_sets = req->ipv6_tcp_en;
+ tuple_sets = vport->rss_tuple_sets.ipv6_tcp_en;
break;
case UDP_V6_FLOW:
- tuple_sets = req->ipv6_udp_en;
+ tuple_sets = vport->rss_tuple_sets.ipv6_udp_en;
break;
case SCTP_V4_FLOW:
- tuple_sets = req->ipv4_sctp_en;
+ tuple_sets = vport->rss_tuple_sets.ipv4_sctp_en;
break;
case SCTP_V6_FLOW:
- tuple_sets = req->ipv6_sctp_en;
+ tuple_sets = vport->rss_tuple_sets.ipv6_sctp_en;
break;
case IPV4_FLOW:
case IPV6_FLOW:

int hclge_rss_init_hw(struct hclge_dev *hdev)
{
-const u8 hfunc = HCLGE_RSS_HASH_ALGO_TOEPLITZ;
struct hclge_vport *vport = hdev->vport;
+ u8 *rss_indir = vport[0].rss_indirection_tbl;
+ u16 rss_size = vport[0].alloc_rss_size;
+ u8 *key = vport[0].rss_hash_key;
+ u8 hfunc = vport[0].rss_algo;
u16 tc_offset[HCLGE_MAX_TC_NUM];
- u8 rss_key[HCLGE_MAX_TC_NUM];
- u16 tc_valid[HCLGE_MAX_TC_NUM];
- u16 tc_size[HCLGE_MAX_TC_NUM];
- u32 *rss_indir = NULL;
- u16 rss_size = 0, roundup_size;
- const u8 *key;
- int i, ret, j;
-
- rss_indir = kcalloc(HCLGE_RSS_IND_TBL_SIZE, sizeof(u32), GFP_KERNEL);
- if (!rss_indir)
- return -ENOMEM;
-
- /* Get default RSS key */
- netdev_rss_key_fill(rss_key, HCLGE_RSS_KEY_SIZE);
-
- /* Initialize RSS indirect table for each vport */
- for (j = 0; j < hdev->num_vmdq_vport + 1; j++) {
- for (i = 0; i < HCLGE_RSS_IND_TBL_SIZE; i++) {

vport[j].rss_indirection_tbl[i] =
- i % vport[j].alloc_rss_size;
- /* vport 0 is for PF */
- if (j != 0)
- continue;
+ u16 roundup_size;
+ int i, ret;

-rss_size = vport[j].alloc_rss_size;
-rss_indir[i] = vport[j].rss_indirection_tbl[i];
-
-
ret = hclge_set_rss_indir_table(hdev, rss_indir);
if (ret)
- goto err;
+ return ret;

-key = rss_key;
ret = hclge_set_rss_algo_key(hdev, hfunc, key);
if (ret)
- goto err;
+ return ret;

ret = hclge_set_rss_input_tuple(hdev);
if (ret)
- goto err;
+ return ret;

/* Each TC have the same queue size, and tc_size set to hardware is
* the log2 of roundup power of two of rss_size, the actual queue
@@ -3148,8 +3562,7 @@
dev_err(&hdev->pdev->dev,
"Configure rss tc size failed, invalid TC_SIZE = %d\n",
rss_size);
- ret = -EINVAL;
- goto err;
+ return -EINVAL;
}

roundup_size = roundup_pow_of_two(rss_size);
@@ -3166,57 +3579,99 @@
tc_offset[i] = rss_size * i;
}

-ret = hclge_set_rss_tc_mode(hdev, tc_valid, tc_size, tc_offset);
+return hclge_set_rss_tc_mode(hdev, tc_valid, tc_size, tc_offset);
+}
+void hclge_rss_indir_init_cfg(struct hclge_dev *hdev)
+
+struct hclge_vport *vport = hdev->vport;
+int i, j;
+
+return ret;
+
+for (j = 0; j < hdev->num_vmdq_vport + 1; j++) {
+for (i = 0; i < HCLGE_RSS_IND_TBL_SIZE; i++)
+vport[j].rss_indirection_tbl[i] =
+i % vport[j].alloc_rss_size;
+}
+
+int hclge_map_vport_ring_to_vector(struct hclge_vport *vport, int vector_id,
+struct hnae3_ring_chain_node *ring_chain)
+static void hclge_rss_init_cfg(struct hclge_dev *hdev)
+
+struct hclge_vport *vport = hdev->vport;
+int i;
+
+for (i = 0; i < hdev->num_vmdq_vport + 1; i++) {
+vport[i].rss_tuple_sets.ipv4_tcp_en =
+HCLGE_RSS_INPUT_TUPLE_OTHER;
+vport[i].rss_tuple_sets.ipv4_udp_en =
+HCLGE_RSS_INPUT_TUPLE_OTHER;
+vport[i].rss_tuple_sets.ipv4_sctp_en =
+HCLGE_RSS_INPUT_TUPLE_SCTP;
+vport[i].rss_tuple_sets.ipv4_fragment_en =
+HCLGE_RSS_INPUT_TUPLE_OTHER;
+vport[i].rss_tuple_sets.ipv6_tcp_en =
+HCLGE_RSS_INPUT_TUPLE_OTHER;
+vport[i].rss_tuple_sets.ipv6_udp_en =
+HCLGE_RSS_INPUT_TUPLE_OTHER;
+vport[i].rss_tuple_sets.ipv6_sctp_en =
+HCLGE_RSS_INPUT_TUPLE_SCTP;
+vport[i].rss_tuple_sets.ipv6_fragment_en =
+HCLGE_RSS_INPUT_TUPLE_OTHER;
+
+vport[i].rss_algo = HCLGE_RSS_HASH_ALGO_TOEPLITZ;
+
+netdev_rss_key_fill(vport[i].rss_hash_key, HCLGE_RSS_KEY_SIZE);
+}
+
+hclge_rss_indir_init_cfg(hdev);
int helge_bind_ring_with_vector(struct helge_vport *vport, int vector_id, bool en, struct hnae3_ring_chain_node *ring_chain)
{
    struct helge_dev *hdev = vport->back;
    struct helge_ctrl_vector_chain_cmd *req;
    struct hnae3_ring_chain_node *node;
    struct helge_desc desc;
    int ret;
    struct helge_ctrl_vector_chain_cmd *req = (struct helge_ctrl_vector_chain_cmd *)desc.data;
    enum helge_cmd_status status;
    enum helge_opcode_type op;
    u16 tqp_type_and_id;
    int i;

    -helge_cmd_setup_basic_desc(&desc, HCLGE_OPC_ADD_RING_TOVECTOR, false);
    -req = (struct helge_ctrl_vector_chain_cmd *)desc.data;
    +op = en ? HCLGE_OPC_ADD_RING_TOVECTOR : HCLGE_OPC_DEL_RING_TOVECTOR;
    +helge_cmd_setup_basic_desc(&desc, op, false);
    req->int_vector_id = vector_id;
    i = 0;
    for (node = ring_chain; node; node = node->next) {
        -u16 type_and_id = 0;
        -hnae_set_field(type_and_id, HCLGE_INT_TYPE_M, HCLGE_INT_TYPE_S,
                        hnae_get_bit(node->flag, HNAE3_RING_TYPE_B));
        -hnae_set_field(type_and_id, HCLGE_TQP_ID_M, HCLGE_TQP_ID_S,
                        node->tqp_index);
        -hnae_set_field(type_and_id, HCLGE_INT_GL_IDX_M,
                        HCLGE_INT_GL_IDX_S,
                        hnae_get_bit(node->flag, HNAE3_RING_TYPE_B));
        req->tqp_type_and_id[i] = cpu_to_le16(type_and_id);
        req->vfid = vport->vport_id;
        -
        +tqp_type_and_id = le16_to_cpu(req->tqp_type_and_id[i]);
        +hnae3_set_field(tqp_type_and_id, HCLGE_INT_TYPE_M,
                         HCLGE_INT_TYPE_S,
                         hnae3_get_bit(node->flag, HNAE3_RING_TYPE_B));
        +hnae3_set_field(tqp_type_and_id, HCLGE_TQP_ID_M, HCLGE_TQP_ID_S,
                         node->tqp_index);
        +hnae3_set_field(tqp_type_and_id, HCLGE_INT_GL_IDX_M,
                         HCLGE_INT_GL_IDX_S,
                         hnae3_get_field(node->int_gl_idx,
                                        HNAE3_RING_GL_IDX_M,
                                        HNAE3_RING_GLIDX_M);
+HNAE3_RING_GL_IDX_S));
+req->tqp_type_and_id[i] = cpu_to_le16(tqp_type_and_id);
if (++i >= HCLGE_VECTOR_ELEMENTS_PER_CMD) {
  req->int_cause_num = HCLGE_VECTOR_ELEMENTS_PER_CMD;
+req->vfid = vport->vport_id;

  ret = hclge_cmd_send(&hdev->hw, &desc, 1);
  -if (ret) {
      status = hclge_cmd_send(&hdev->hw, &desc, 1);
      +if (status) {
          dev_err(&hdev->pdev->dev, "Map TQP fail, status is %d\n",
                  ret);
          -return ret;
          +return status);
          +return -EIO;
      }
  }
  i = 0;

  hclge_cmd_setup_basic_desc(&desc, -
      HCLGE_OPC_ADD_RING_TO_VECTOR,
      + op,
      false);
  req->int_vector_id = vector_id;
}
@@ -3224,21 +3679,21 @@

if (i > 0) {
  req->int_cause_num = i;
  -
  -ret = hclge_cmd_send(&hdev->hw, &desc, 1);
  -if (ret) {
      +req->vfid = vport->vport_id;
      +status = hclge_cmd_send(&hdev->hw, &desc, 1);
      +if (status) {
          dev_err(&hdev->pdev->dev, -"Map TQP fail, status is %d\n", ret);
          -return ret;
          +"Map TQP fail, status is %d\n", status);
          +return -EIO;
      }
  }

  return 0;
}

-static int hclge_map_handle_ring_to_vector(
  -struct hnae3_handle *handle, int vector,
struct hnae3_ring_chain_node *ring_chain)
+static int hclge_map_ring_to_vector(struct hnae3_handle *handle,
  +  int vector,
  +  struct hnae3_ring_chain_node *ring_chain)
{
  struct hclge_vport *vport = hclge_get_vport(handle);
  struct hclge_dev *hdev = vport->back;
  vector_id = hclge_get_vector_index(hdev, vector);
  if (vector_id < 0) {
    dev_err(&hdev->pdev->dev,
      -  "Get vector index fail. ret =%d\n",
      +  "Get vector index fail. vector_id =%d\n", vector_id);
    return vector_id;
  }

  return hclge_map_vport_ring_to_vector(vport, vector_id, ring_chain);
}

+static int hclge_bind_ring_with_vector(struct hnae3_handle *handle,
  +  int vector_id, true, ring_chain);

-static int hclge_unmap_ring_from_vector(
  -struct hnae3_handle *handle, int vector,
  -struct hnae3_ring_chain_node *ring_chain)
+
+
+static int hclge_unmap_ring_frm_vector(struct hnae3_handle *handle,
  +  int vector,
  +  struct hnae3_ring_chain_node *ring_chain)
{
  struct hclge_vport *vport = hclge_get_vport(handle);
  struct hclge_dev *hdev = vport->back;
  vector_id = hclge_get_vector_index(hdev, vector);
  if (vector_id < 0) {
    return vector_id;
  }

  hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_DEL_RING_TO_VECTOR, false);
  -req = (struct hclge_ctrl_vector_chain_cmd *)desc.data;
  -hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_DEL_RING_TO_VECTOR, false);
  -req = (struct hclge_ctrl_vector_chain_cmd *)desc.data;
-req->int_vector_id = vector_id;
-i = 0;
-for (node = ring_chain; node; node = node->next) {
-u16 type_and_id = 0;
-hnae_set_field(type_and_id, HCLGE_INT_TYPE_M, HCLGE_INT_TYPE_S,
hnae_get_bit(node->flag, HNAE3_RING_TYPE_B));
-hnae_set_field(type_and_id, HCLGE_TQP_ID_M, HCLGE_TQP_ID_S,
node->tqp_index);
-hnae_set_field(type_and_id, HCLGE_INT_GL_IDX_M,
HCLGE_INT_GL_IDX_S,
hnae_get_bit(node->flag, HNAE3_RING_TYPE_B));
-req->tqp_type_and_id[i] = cpu_to_le16(type_and_id);
-req->vfid = vport->vport_id;
-if (++i >= HCLGE_VECTOR_ELEMENTS_PER_CMD) {
-req->int_cause_num = HCLGE_VECTOR_ELEMENTS_PER_CMD;
-ret = hclge_cmd_send(&hdev->hw, &desc, 1);
-if (ret) {
-dev_err(&hdev->pdev->dev,
-"Unmap TQP fail, status is %d.\n",
-ret);
-return ret;
-}
-i = 0;
-hclge_cmd_setup_basic_desc(&desc,
- HCLGE_OPC_DEL_RING_TO_VECTOR,
- false);
-req->int_vector_id = vector_id;
-}
-}
-if (i > 0) {
-req->int_cause_num = i;
-ret = hclge_cmd_send(&hdev->hw, &desc, 1);
-if (ret) {
-dev_err(&hdev->pdev->dev,
-"Unmap TQP fail, status is %d.\n", ret);
-return ret;
-}
-}
+ret = hclge_bind_ring_with_vector(vport, vector_id, false, ring_chain);
+if (ret)
+dev_err(&handle->pdev->dev,

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Unmap ring from vector fail. vectorid=%d, ret =%d\n",
+vector_id,
+ret);

return 0;
+return ret;
}

int hclge_cmd_set_promisc_mode(struct hclge_dev *hdev,
@@ -3336,15 +3748,21 @@
req = (struct hclge_promisc_cfg_cmd *)desc.data;
req->vf_id = param->vf_id;
-req->flag = (param->enable << HCLGE_PROMISC_EN_B);
+-/* HCLGE_PROMISC_TX_EN_B and HCLGE_PROMISC_RX_EN_B are not supported on
+- pdev revision(0x20), new revision support them. The
+- value of this two fields will not return error when driver
+- send command to fireware in revision(0x20),
+- */
+req->flag = (param->enable << HCLGE_PROMISC_EN_B) |
+HCLGE_PROMISC_TX_EN_B | HCLGE_PROMISC_RX_EN_B;
ret = hclge_cmd_send(&hdev->hw, &desc, 1);
-if (ret) {
+if (ret)
  dev_err(&hdev->pdev->dev,
"Set promisc mode fail, status is %d\n", ret);
-return ret;
-}
-return 0;
+
+return ret;
}

void hclge_promisc_param_init(struct hclge_promisc_param *param, bool en_uc,
@@ -3363,14 +3781,1324 @@
param->vf_id = vport_id;
}

-static void hclge_set_promisc_mode(struct hnae3_handle *handle, u32 en)
+static int hclge_set_promisc_mode(struct hnae3_handle *handle, bool en_uc_pmc,
+  bool en_mc_pmc)
+{
+  struct hclge_vport *vport = hclge_get_vport(handle);
+  struct hclge_dev *hdev = vport->back;
+  struct hclge_promisc_param param;
+}
-hclge_promisc_param_init(&param, en, en, true, vport->vport_id);
-hclge_cmd_set_promisc_mode(hdev, &param);
+hclge_promisc_param_init(&param, en_uc_pmc, en_mc_pmc, true,
+ vport->vport_id);
+return hclge_cmd_set_promisc_mode(hdev, &param);
+
+static int hclge_get_fd_mode(struct hclge_dev *hdev, u8 *fd_mode)
+{
+struct hclge_get_fd_mode_cmd *req;
+struct hclge_desc desc;
+int ret;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_FD_MODE_CTRL, true);
+
+req = (struct hclge_get_fd_mode_cmd *)desc.data;
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(&hdev->pdev->dev, "get fd mode fail, ret=%d\n", ret);
+return ret;
+}
+
+*fd_mode = req->mode;
+
+return ret;
+
+static int hclge_get_fd_allocation(struct hclge_dev *hdev,
+ u32 *stage1_entry_num,
+ u32 *stage2_entry_num,
+ u16 *stage1_counter_num,
+ u16 *stage2_counter_num)
+{
+struct hclge_get_fd_allocation_cmd *req;
+struct hclge_desc desc;
+int ret;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_FD_GET_ALLOCATION, true);
+
+req = (struct hclge_get_fd_allocation_cmd *)desc.data;
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(&hdev->pdev->dev, "query fd allocation fail, ret=%d\n",
+ret);
+return ret;
+}
```c
+ stage1_entry_num = le32_to_cpu(req->stage1_entry_num);
+ stage2_entry_num = le32_to_cpu(req->stage2_entry_num);
+ stage1_counter_num = le16_to_cpu(req->stage1_counter_num);
+ stage2_counter_num = le16_to_cpu(req->stage2_counter_num);
+
+ return ret;
+
+ static int hclge_set_fd_key_config(struct hclge_dev *hdev, int stage_num) {
+ struct hclge_set_fd_key_config_cmd *req;
+ struct hclge_fd_key_cfg *stage;
+ struct hclge_desc desc;
+ int ret;
+
+ hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_FD_KEY_CONFIG, false);
+
+ req = (struct hclge_set_fd_key_config_cmd *)desc.data;
+ stage = &hdev->fd_cfg.key_cfg[stage_num];
+ req->stage = stage_num;
+ req->key_select = stage->key_sel;
+ req->inner_sipv6_word_en = stage->inner_sipv6_word_en;
+ req->inner_dipv6_word_en = stage->inner_dipv6_word_en;
+ req->outer_sipv6_word_en = stage->outer_sipv6_word_en;
+ req->outer_dipv6_word_en = stage->outer_dipv6_word_en;
+ req->tuple_mask = cpu_to_le32(~stage->tuple_active);
+ req->meta_data_mask = cpu_to_le32(~stage->meta_data_active);
+
+ ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+ if (ret)
+ dev_err(&hdev->pdev->dev, "set fd key fail, ret=%d\n", ret);
+
+ return ret;
+
+ static int hclge_init_fd_config(struct hclge_dev *hdev) {
+
+ #define LOW_2_WORDS 0x03
+ struct hclge_fd_key_cfg *key_cfg;
+ int ret;
+
+ if (!hnae3_dev_fd_supported(hdev))
+ return 0;
+
+ ret = hclge_get_fd_mode(hdev, &hdev->fd_cfg.fd_mode);
+ if (ret)
+ return ret;
```
switch (hdev->fd_cfg.fd_mode) {
  case HCLGE_FD_MODE_DEPTH_2K_WIDTH_400B_STAGE_1:
    hdev->fd_cfg.max_key_length = MAX_KEY_LENGTH;
    break;
  case HCLGE_FD_MODE_DEPTH_4K_WIDTH_200B_STAGE_1:
    hdev->fd_cfg.max_key_length = MAX_KEY_LENGTH / 2;
    break;
  default:
    dev_err(&hdev->pdev->dev, "Unsupported flow director mode \%d\n",
            hdev->fd_cfg.fd_mode);
    return -EOPNOTSUPP;
  }

  hdev->fd_cfg.fd_en = true;
  hdev->fd_cfg.proto_support =
      TCP_V4_FLOW | UDP_V4_FLOW | SCTP_V4_FLOW | TCP_V6_FLOW |
      UDP_V6_FLOW | SCTP_V6_FLOW | IPV4_USER_FLOW | IPV6_USER_FLOW;
  key_cfg = &hdev->fd_cfg.key_cfg[HCLGE_FD_STAGE_1];
  key_cfg->key_sel = HCLGE_FD_KEY_BASE_ON_TUPLE,
  key_cfg->inner_sipv6_word_en = LOW_2_WORDS;
  key_cfg->inner_dipv6_word_en = LOW_2_WORDS;
  key_cfg->outer_sipv6_word_en = 0;
  key_cfg->outer_dipv6_word_en = 0;

  key_cfg->tuple_active = BIT(INNER_VLAN_TAG_FST) | BIT(INNER_ETH_TYPE) |
                         BIT(INNER_IP_PROTO) | BIT(INNER_IP_TOS) |
                         BIT(INNER_SRC_IP) | BIT(INNER_DST_IP) |
                         BIT(INNER_SRC_PORT) | BIT(INNER_DST_PORT);

  /* If use max 400bit key, we can support tuples for ether type */
  if (hdev->fd_cfg.max_key_length == MAX_KEY_LENGTH) {
    hdev->fd_cfg.proto_support |= ETHER_FLOW;
    key_cfg->tuple_active |=
        BIT(INNER_DST_MAC) | BIT(INNER_SRC_MAC);
  }

  /* roce_type is used to filter roce frames
   * dst_vport is used to specify the rule
   */
  key_cfg->meta_data_active = BIT(ROCE_TYPE) | BIT(DST_VPORT);

  ret = hclge_get_fd_allocation(hdev,
      &hdev->fd_cfg.rule_num[HCLGE_FD_STAGE_1],
      &hdev->fd_cfg.rule_num[HCLGE_FD_STAGE_2],
      &hdev->fd_cfg.cnt_num[HCLGE_FD_STAGE_1],
      &hdev->fd_cfg.cnt_num[HCLGE_FD_STAGE_2]);
+if (ret)
+ return ret;
+ return hclge_set_fd_key_config(hdev, HCLGE_FD_STAGE_1);
+}
+
+static int hclge_fd_tcam_config(struct hclge_dev *hdev, u8 stage, bool sel_x,
+ int loc, u8 *key, bool is_add)
+{
+ struct hclge_fd_tcam_config_1_cmd *req1;
+ struct hclge_fd_tcam_config_2_cmd *req2;
+ struct hclge_fd_tcam_config_3_cmd *req3;
+ struct hclge_desc desc[3];
+ int ret;
+ +
+ hclge_cmd_setup_basic_desc(&desc[0], HCLGE_OPC_FD_TCAM_OP, false);
+ desc[0].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+ hclge_cmd_setup_basic_desc(&desc[1], HCLGE_OPC_FD_TCAM_OP, false);
+ desc[1].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+ hclge_cmd_setup_basic_desc(&desc[2], HCLGE_OPC_FD_TCAM_OP, false);
+ +
+ req1 = (struct hclge_fd_tcam_config_1_cmd *)desc[0].data;
+ req2 = (struct hclge_fd_tcam_config_2_cmd *)desc[1].data;
+ req3 = (struct hclge_fd_tcam_config_3_cmd *)desc[2].data;
+ +
+ req1->stage = stage;
+ req1->xy_sel = sel_x ? 1 : 0;
+ hnae3_set_bit(req1->port_info, HCLGE_FD_EPORT_SW_EN_B, 0);
+ req1->index = cpu_to_le32(loc);
+ req1->entry_vld = sel_x ? is_add : 0;
+ +
+ if (key) {
+ memcpy(req1->tcam_data, &key[0], sizeof(req1->tcam_data));
+ memcpy(req2->tcam_data, &key[sizeof(req1->tcam_data)],
+ sizeof(req2->tcam_data));
+ memcpy(req3->tcam_data, &key[sizeof(req1->tcam_data)] +
+ sizeof(req2->tcam_data), sizeof(req3->tcam_data));
+ }
+ +
+ ret = hclge_cmd_send(&hdev->hw, desc, 3);
+ +
+ if (ret)
+ + dev_err(&hdev->pdev->dev,
+ "config tcam key fail, ret=%d\n",
+ ret);
+ +
+ return ret;
+ }
+ +
+static int hclge_fd_ad_config(struct hclge_dev *hdev, u8 stage, int loc,
+    struct hclge_fd_ad_data *action)
+{
+    struct hclge_fd_ad_config_cmd *req;
+    struct hclge_desc desc;
+    u64 ad_data = 0;
+    int ret;
+    
+    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_FD_AD_OP, false);
+    
+    req = (struct hclge_fd_ad_config_cmd *)&desc.data;
+    req->index = cpu_to_le32(loc);
+    req->stage = stage;
+    
+    hnae3_set_bit(ad_data, HCLGE_FD_AD_WR_RULE_ID_B,
+        action->write_rule_id_to_bd);
+    hnae3_set_field(ad_data, HCLGE_FD_AD_RULE_ID_M, HCLGE_FD_AD_RULE_ID_S,
+        action->rule_id);
+    ad_data <<= 32;
+    hnae3_set_bit(ad_data, HCLGE_FD_AD_DROP_B, action->drop_packet);
+    hnae3_set_bit(ad_data, HCLGE_FD_AD_DIRECT_QID_B,
+        action->forward_to_direct_queue);
+    hnae3_set_field(ad_data, HCLGE_FD_AD_QID_M, HCLGE_FD_AD_QID_S,
+        action->queue_id);
+    hnae3_set_bit(ad_data, HCLGE_FD_AD_USE_COUNTER_B, action->use_counter);
+    hnae3_set_field(ad_data, HCLGE_FD_AD_COUNTER_NUM_M, HCLGE_FD_AD_COUNTER_NUM_S,
+        action->counter_id);
+    hnae3_set_bit(ad_data, HCLGE_FD_AD_NXT_STEP_B, action->use_next_stage);
+    hnae3_set_field(ad_data, HCLGE_FD_AD_NXT_KEY_M, HCLGE_FD_AD_NXT_KEY_S,
+        action->counter_id);
+    
+    req->ad_data = cpu_to_le64(ad_data);
+    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+    if (ret)
+        dev_err(&hdev->pdev->dev, "fd ad config fail, ret=%d\n", ret);
+    
+    return ret;
+}
+
+static bool hclge_fd_convert_tuple(u32 tuple_bit, u8 *key_x, u8 *key_y,
+    struct hclge_fd_rule *rule)
+{
+    u16 tmp_x_s, tmp_y_s;
+    u32 tmp_x_l, tmp_y_l;
+    int i;
+    
+    if (rule->unused_tuple & tuple_bit)
+        return true;
switch (tuple_bit) {
    case 0:
        return false;
    case BIT(INNER_DST_MAC):
        for (i = 0; i < 6; i++) {
            calc_x(key_x[5 - i], rule->tuples.dst_mac[i],
                   rule->tuples_mask.dst_mac[i]);
            calc_y(key_y[5 - i], rule->tuples.dst_mac[i],
                   rule->tuples_mask.dst_mac[i]);
        }
        return true;
    case BIT(INNER_SRC_MAC):
        for (i = 0; i < 6; i++) {
            calc_x(key_x[5 - i], rule->tuples.src_mac[i],
                   rule->tuples.src_mac[i]);
            calc_y(key_y[5 - i], rule->tuples.src_mac[i],
                   rule->tuples.src_mac[i]);
        }
        return true;
    case BIT(INNER_VLAN_TAG_FST):
        calc_x(tmp_x_s, rule->tuples.vlan_tag1,
               rule->tuples_mask.vlan_tag1);
        calc_y(tmp_y_s, rule->tuples.vlan_tag1,
               rule->tuples_mask.vlan_tag1);
        *(__le16 *)key_x = cpu_to_le16(tmp_x_s);
        *(__le16 *)key_y = cpu_to_le16(tmp_y_s);
        return true;
    case BIT(INNER_ETH_TYPE):
        calc_x(tmp_x_s, rule->tuples.ether_proto,
               rule->tuples.ether_proto);
        calc_y(tmp_y_s, rule->tuples.ether_proto,
               rule->tuples.ether_proto);
        *(__le16 *)key_x = cpu_to_le16(tmp_x_s);
        *(__le16 *)key_y = cpu_to_le16(tmp_y_s);
        return true;
    case BIT(INNER_IP_TOS):
        calc_x(*key_x, rule->tuples.ip_tos, rule->tuples_mask.ip_tos);
        calc_y(*key_y, rule->tuples.ip_tos, rule->tuples_mask.ip_tos);
        return true;
    case BIT(INNER_IP_PROTO):
        calc_x(*key_x, rule->tuples.ip_proto,
               rule->tuples_mask.ip_proto);
        return true;
}
calc_y(*key_y, rule->tuples.ip_proto,
   + rule->tuples_mask.ip_proto);
+
+return true;
+}
+
+
+static u32 hclge_get_port_number(enum HLCGE_PORT_TYPE port_type, u8 pf_id,
+    u8 vf_id, u8 network_port_id)
+{
u32 port_number = 0;
+
+if (port_type == HOST_PORT) {
+  hnae3_set_field(port_number, HCLGE_PF_ID_M, HCLGE_PF_ID_S, 
+                  pf_id);
+  hnae3_set_field(port_number, HCLGE_VF_ID_M, HCLGE_VF_ID_S, 
+                  vf_id);
+  hnae3_set_bit(port_number, HCLGE_PORT_TYPE_B, HOST_PORT);
+} else {
+  hnae3_set_field(port_number, HCLGE_NETWORK_PORT_ID_M, 
+                  HCLGE_NETWORK_PORT_ID_S, network_port_id);
+  hnae3_set_bit(port_number, HCLGE_PORT_TYPE_B, NETWORK_PORT);
+
+  return port_number;
+}
+
+static void hclge_fd_convert_meta_data(struct hclge_fd_key_cfg *key_cfg,
+                                        __le32 *key_x, __le32 *key_y,
+                                        struct hclge_fd_rule *rule)
+{
+  u32 tuple_bit, meta_data = 0, tmp_x, tmp_y, port_number;
+  u8 cur_pos = 0, tuple_size, shift_bits;
+  int i;
+  +
+  for (i = 0; i < MAX_META_DATA; i++) {
+    tuple_size = meta_data_key_info[i].key_length;
+    tuple_bit = key_cfg->meta_data_active & BIT(i);
+    switch (tuple_bit) {
+      case BIT(ROCE_TYPE):
+        hnae3_set_bit(meta_data, cur_pos, NIC_PACKET);
+        cur_pos += tuple_size;
+        break;
+      case BIT(DST_VPORT):
+        port_number = hclge_get_port_number(HOST_PORT, 0,
+                                              rule->vf_id, 0);
+        hnae3_set_field(meta_data,
+                        GENMASK(cur_pos + tuple_size, cur_pos),
+                        cur_pos, port_number);
+        cur_pos += tuple_size;
+        break;
+      default:
+        break;
+      }
+  }
+  +
+  calc_x(tmp_x, meta_data, 0xFFFFFFFF);
+calc_y(tmp_y, meta_data, 0xFFFFFFFF);
+shift_bits = sizeof(meta_data) * 8 - cur_pos;
+
+*key_x = cpu_to_le32(tmp_x << shift_bits);
+*key_y = cpu_to_le32(tmp_y << shift_bits);
+
+/* A complete key is combined with meta data key and tuple key.
+ * Meta data key is stored at the MSB region, and tuple key is stored at
+ * the LSB region, unused bits will be filled 0.
+ */
+
+static int hclge_config_key(struct hclge_dev *hdev, u8 stage,
+ struct hclge_fd_rule *rule)
+{
+struct hclge_fd_key_cfg *key_cfg = &hdev->fd_cfg.key_cfg[stage];
+u8 key_x[MAX_KEY_BYTES], key_y[MAX_KEY_BYTES];
+u8 *cur_key_x, *cur_key_y;
+int i, ret, tuple_size;
+u8 meta_data_region;
+
+memset(key_x, 0, sizeof(key_x));
+memset(key_y, 0, sizeof(key_y));
+*cur_key_x = key_x;
+*cur_key_y = key_y;
+
+for (i = 0 ; i < MAX_TUPLE; i++) {
+bool tuple_valid;
+u32 check_tuple;
+
+tuple_size = tuple_key_info[i].key_length / 8;
+check_tuple = key_cfg->tuple_active & BIT(i);
+
+tuple_valid = hclge_fd_convert_tuple(check_tuple, cur_key_x,
+                                    cur_key_y, rule);
+if (tuple_valid) {
+  cur_key_x += tuple_size;
+  cur_key_y += tuple_size;
+}
+}
+
+meta_data_region = hdev->fd_cfg.max_key_length / 8 -
+MAX_META_DATA_LENGTH / 8;
+
+hclge_fd_convert_meta_data(key_cfg,
+                        (__le32 *)(key_x + meta_data_region),
+                        (__le32 *)(key_y + meta_data_region),
+                        rule);
+ret = hclge_fd_tcam_config(hdev, stage, false, rule->location, key_y,
+  true);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"fd key_y config fail, loc=%d, ret=%d\n",
+rule->queue_id, ret);
+return ret;
+}
+
+ret = hclge_fd_tcam_config(hdev, stage, true, rule->location, key_x,
+  true);
+if (ret)
+dev_err(&hdev->pdev->dev,
+"fd key_x config fail, loc=%d, ret=%d\n",
+rule->queue_id, ret);
+return ret;
+}
+
+static int hclge_config_action(struct hclge_dev *hdev, u8 stage,
+  struct hclge_fd_rule *rule)
+{
+struct hclge_fd_ad_data ad_data;
+
ad_data.ad_id = rule->location;
+
+if (rule->action == HCLGE_FD_ACTION_DROP_PACKET) {
+ad_data.drop_packet = true;
+ad_data.forward_to_direct_queue = false;
+ad_data.queue_id = 0;
+} else {
+ad_data.drop_packet = false;
+ad_data.forward_to_direct_queue = true;
+ad_data.queue_id = rule->queue_id;
+}
+
ad_data.use_counter = false;
+ad_data.counter_id = 0;
+
ad_data.use_next_stage = false;
+ad_data.next_input_key = 0;
+
ad_data.write_rule_id_to_bd = true;
+ad_data.rule_id = rule->location;
+
+return hclge_fd_ad_config(hdev, stage, ad_data.ad_id, &ad_data);
+}
+
+static int hclge_fd_check_spec(struct hclge_dev *hdev,
struct ethtool_rx_flow_spec *fs, u32 *unused)
{
    struct ethtool_tcpi4_spec *tcp_ip4_spec;
    struct ethtool_usrip4_spec *usr_ip4_spec;
    struct ethtool_tcpi6_spec *tcp_ip6_spec;
    struct ethtool_usrip6_spec *usr_ip6_spec;
    struct ethhdr *ether_spec;

    if (fs->location >= hdev->fd_cfg.rule_num[HCLGE_FD_STAGE_1])
        return -EINVAL;

    if (!(fs->flow_type & hdev->fd_cfg.proto_support))
        return -EOPNOTSUPP;

    if ((fs->flow_type & FLOW_EXT) &&
        (fs->h_ext.data[0] != 0 || fs->h_ext.data[1] != 0)) {
        dev_err(&hdev->pdev->dev, "user-def bytes are not supported\n");
        return -EOPNOTSUPP;
    }

    switch (fs->flow_type & ~(FLOW_EXT | FLOW_MAC_EXT)) {
    case SCTP_V4_FLOW:
    case TCP_V4_FLOW:
    case UDP_V4_FLOW:
        tcp_ip4_spec = &fs->h_u.tcp_ip4_spec;
        *unused |= BIT(INNER_SRC_MAC) | BIT(INNER_DST_MAC);
        if (!tcp_ip4_spec->ip4src)
            *unused |= BIT(INNER_SRC_IP);
        if (!tcp_ip4_spec->ip4dst)
            *unused |= BIT(INNER_DST_IP);
        if (!tcp_ip4_spec->psrc)
            *unused |= BIT(INNER_SRC_PORT);
        if (!tcp_ip4_spec->pdst)
            *unused |= BIT(INNER_DST_PORT);
        if (!tcp_ip4_spec->tos)
            *unused |= BIT(INNER_IP_TOS);
        break;
    case IP_USER_FLOW:
        usr_ip4_spec = &fs->h_u.usr_ip4_spec;
        *unused |= BIT(INNER_SRC_MAC) | BIT(INNER_DST_MAC) |
        BIT(INNER_SRC_PORT) | BIT(INNER_DST_PORT);
        break;
    }
+if (!usr_ip4_spec->ip4src)
+ *unused |= BIT(INNER_SRC_IP);
+
+if (!usr_ip4_spec->ip4dst)
+ *unused |= BIT(INNER_DST_IP);
+
+if (!usr_ip4_spec->tos)
+ *unused |= BIT(INNER_IP_TOS);
+
+if (!usr_ip4_spec->proto)
+ *unused |= BIT(INNER_IP_PROTO);
+
+if (usr_ip4_spec->l4_4_bytes)
+ return -EOPNOTSUPP;
+
+if (usr_ip4_spec->ip_ver != ETH_RX_NFC_IP4)
+ return -EOPNOTSUPP;
+
+break;
+case SCTP_V6_FLOW:
+case TCP_V6_FLOW:
+case UDP_V6_FLOW:
+ tcp_ip6_spec = &fs->h_u.tcp_ip6_spec;
+ *unused |= BIT(INNER_SRC_MAC) | BIT(INNER_DST_MAC) |
+ BIT(INNER_SRC_PORT);
+
+if (!tcp_ip6_spec->ip6src[0] && !tcp_ip6_spec->ip6src[1] &&
+ *unused |= BIT(INNER_SRC_IP);
+
+ *unused |= BIT(INNER_DST_IP);
+
+if (!tcp_ip6_spec->psrc)
+ *unused |= BIT(INNER_SRC_PORT);
+
+if (!tcp_ip6_spec->pdst)
+ *unused |= BIT(INNER_DST_PORT);
+
+if (tcp_ip6_spec->tclass)
+ return -EOPNOTSUPP;
+
+break;
+case IPV6_USER_FLOW:
+usr_ip6_spec = &fs->h_u.usr_ip6_spec;
+ *unused |= BIT(INNER_SRC_MAC) | BIT(INNER_DST_MAC) |
+ BIT(INNER_IP_TOS) | BIT(INNER_SRC_PORT) |
+BIT(INNER_DST_PORT);
+
+if (!usr_ip6_spec->ip6src[0] && !usr_ip6_spec->ip6src[1] &&
+*unused |= BIT(INNER_SRC_IP);
+
+*unused |= BIT(INNER_DST_IP);
+
+if (!usr_ip6_spec->l4_proto)
+*unused |= BIT(INNER_IP_PROTO);
+
+if (usr_ip6_spec->tclass)
+return -EOPNOTSUPP;
+
+if (usr_ip6_spec->l4_4_bytes)
+return -EOPNOTSUPP;
+
+break;
+case ETHER_FLOW:
+ether_spec = &fs->h_u.ether_spec;
+*unused |= BIT(INNER_SRC_IP) | BIT(INNER_DST_IP) |
+BIT(INNER_SRC_PORT) | BIT(INNER_DST_PORT) |
+BIT(INNER_IP_TOS) | BIT(INNER_IP_PROTO);
+
+if (is_zero_ether_addr(ether_spec->h_source))
+*unused |= BIT(INNER_SRC_MAC);
+
+if (is_zero_ether_addr(ether_spec->h_dest))
+*unused |= BIT(INNER_DST_MAC);
+
+if (!ether_spec->h_proto)
+*unused |= BIT(INNER_ETH_TYPE);
+
+break;
+default:
+return -EOPNOTSUPP;
+
+if ((fs->flow_type & FLOW_EXT)) {
+if (fs->h_ext.vlan_etype)
+return -EOPNOTSUPP;
+if (!fs->h_ext.vlan_tci)
+*unused |= BIT(INNER_VLAN_TAG_FST);
+
+if (!fs->h_ext.vlan_tci)
+*unused |= BIT(INNER_VLAN_TAG_FST);
+
+if (be16_to_cpu(fs->h_ext.vlan_tci) >= VLAN_N_VID)
return -EINVAL;
}
return 0;
}

static bool hclge_fd_rule_exist(struct hclge_dev *hdev, u16 location)
{
    struct hclge_fd_rule *rule = NULL;
    struct hlist_node *node2;

    hlist_for_each_entry_safe(rule, node2, &hdev->fd_rule_list, rule_node) {
        if (rule->location >= location)
            break;
    }

    return rule && rule->location == location;
}

static int hclge_fd_update_rule_list(struct hclge_dev *hdev,
    struct hclge_fd_rule *new_rule,
    u16 location,
    bool is_add)
{
    struct hclge_fd_rule *rule = NULL, *parent = NULL;
    struct hlist_node *node2;

    if (is_add && !new_rule)
        return -EINVAL;

    hlist_for_each_entry_safe(rule, node2, &hdev->fd_rule_list, rule_node) {
        if (rule->location >= location)
            break;
    }

    return rule && rule->location == location;
}

+static int hclge_fd_update_rule_list(struct hclge_dev *hdev,
    struct hclge_fd_rule *new_rule,
    u16 location,
    bool is_add)
{
    struct hclge_fd_rule *rule = NULL, *parent = NULL;
    struct hlist_node *node2;

    if (is_add && !new_rule)
        return -EINVAL;

    hlist_for_each_entry_safe(rule, node2, &hdev->fd_rule_list, rule_node) {
        if (rule->location >= location)
            break;
    }

    return rule && rule->location == location;

    +parent = rule;
+ if (rule && rule->location == location) {
+ hlist_del(&rule->rule_node);
+ kfree(rule);
+ hdev->hclge_fd_rule_num--;
+ +
+ if (!lis_add)
+ return 0;
+ +
+ +} else if (!lis_add) {
+ dev_err(&hdev->pdev->dev,
+ "delete fail, rule %d is inexistent\n",
+ location);
+ return -EINVAL;
+ +}
+ +
+ INIT_HLIST_NODE(&new_rule->rule_node);
+ +
+ if (parent)
+ hlist_add_behind(&new_rule->rule_node, &parent->rule_node);
+ else
+ hlist_add_head(&new_rule->rule_node, &hdev->fd_rule_list);
+ +
+ hdev->hclge_fd_rule_num++;
+ +
+ return 0;
+ +}
+ +
+ static int hclge_fd_get_tuple(struct hclge_dev *hdev,
+ struct ethtool_rx_flow_spec *fs,
+ struct hclge_fd_rule *rule)
+ {
+ u32 flow_type = fs->flow_type & ~(FLOW_EXT | FLOW_MAC_EXT);
+ +
+ switch (flow_type) {
+ case SCTP_V4_FLOW:
+ case TCP_V4_FLOW:
+ case UDP_V4_FLOW:
+ rule->tuples.src_ip[3] =
+ be32_to_cpu(fs->h_u.tcp_ip4_spec.ip4src);
+ rule->tuples_mask.src_ip[3] =
+ be32_to_cpu(fs->m_u.tcp_ip4_spec.ip4src);
+ +
+ rule->tuples.dst_ip[3] =
+ be32_to_cpu(fs->h_u.tcp_ip4_spec.ip4dst);
+ rule->tuples_mask.dst_ip[3] =
+ be32_to_cpu(fs->m_u.tcp_ip4_spec.ip4dst);
+rule->tuples.src_port = be16_to_cpu(fs->h_u.tcp_ip4_spec.psrc);
+rule->tuples_mask.src_port =
+be16_to_cpu(fs->m_u.tcp_ip4_spec.psrc);
+
+rule->tuples.dst_port = be16_to_cpu(fs->h_u.tcp_ip4_spec.pdst);
+rule->tuples_mask.dst_port =
+be16_to_cpu(fs->m_u.tcp_ip4_spec.pdst);
+
+rule->tuples.ip_tos = fs->h_u.tcp_ip4_spec.tos;
+rule->tuples_mask.ip_tos = fs->m_u.tcp_ip4_spec.tos;
+
+rule->tuples.ether_proto = ETH_P_IP;
+rule->tuples_mask.ether_proto = 0xFFFF;
+
+break;
+case IP_USER_FLOW:
+rule->tuples.src_ip[3] =
+be32_to_cpu(fs->h_u.usr_ip4_spec.ip4src);
+rule->tuples_mask.src_ip[3] =
+be32_to_cpu(fs->m_u.usr_ip4_spec.ip4src);
+
+rule->tuples.dst_ip[3] =
+be32_to_cpu(fs->h_u.usr_ip4_spec.ip4dst);
+rule->tuples_mask.dst_ip[3] =
+be32_to_cpu(fs->m_u.usr_ip4_spec.ip4dst);
+
+rule->tuples.ip_tos = fs->h_u.usr_ip4_spec.tos;
+rule->tuples_mask.ip_tos = fs->m_u.usr_ip4_spec.tos;
+
+rule->tuples.ip_proto = fs->h_u.usr_ip4_spec.proto;
+rule->tuples_mask.ip_proto = fs->m_u.usr_ip4_spec.proto;
+
+rule->tuples.ether_proto = ETH_P_IP;
+rule->tuples_mask.ether_proto = 0xFFFF;
+
+break;
+case SCTP_V6_FLOW:
+case TCP_V6_FLOW:
+case UDP_V6_FLOW:
+be32_to_cpu_array(rule->tuples.src_ip,
+ fs->h_u.tcp_ip6_spec.ip6src, 4);
+be32_to_cpu_array(rule->tuples_mask.src_ip,
+ fs->m_u.tcp_ip6_spec.ip6src, 4);
+
+be32_to_cpu_array(rule->tuples.dst_ip,
+ fs->h_u.tcp_ip6_spec.ip6dst, 4);
+be32_to_cpu_array(rule->tuples_mask.dst_ip,
+ fs->m_u.tcp_ip6_spec.ip6dst, 4);
+
+rule->tuples.src_port = be16_to_cpu(fs->h_u.tcp_ip6_spec.psrc);
+rule->tuples_mask.src_port =
+be16_to_cpu(fs->m_u.tcp_ip6_spec.psrc);
+
+rule->tuples.dst_port = be16_to_cpu(fs->h_u.tcp_ip6_spec.pdst);
+rule->tuples_mask.dst_port =
+be16_to_cpu(fs->m_u.tcp_ip6_spec.pdst);
+
+rule->tuples.ether_proto = ETH_P_IPV6;
+rule->tuples_mask.ether_proto = 0xFFFF;
+
+break;
+case IPV6_USER_FLOW:
+be32_to_cpu_array(rule->tuples.src_ip,
+ fs->h_u.usr_ip6_spec.ip6src, 4);
+be32_to_cpu_array(rule->tuples_mask.src_ip,
+ fs->m_u.usr_ip6_spec.ip6src, 4);
+
+be32_to_cpu_array(rule->tuples.dst_ip,
+ fs->h_u.usr_ip6_spec.ip6dst, 4);
+be32_to_cpu_array(rule->tuples_mask.dst_ip,
+ fs->m_u.usr_ip6_spec.ip6dst, 4);
+
+rule->tuples.ip_proto = fs->h_u.usr_ip6_spec.l4_proto;
+rule->tuples_mask.ip_proto = fs->m_u.usr_ip6_spec.l4_proto;
+
+rule->tuples.ether_proto = ETH_P_IPV6;
+rule->tuples_mask.ether_proto = 0xFFFF;
+
+break;
+case ETHER_FLOW:
+ether_addr_copy(rule->tuples.src_mac,
+ fs->h_u.ether_spec.h_source);
+ether_addr_copy(rule->tuples_mask.src_mac,
+ fs->m_u.ether_spec.h_source);
+
+ether_addr_copy(rule->tuples.dst_mac,
+ fs->h_u.ether_spec.h_dest);
+ether_addr_copy(rule->tuples_mask.dst_mac,
+ fs->m_u.ether_spec.h_dest);
+
+rule->tuples.ether_proto =
+be16_to_cpu(fs->h_u.ether_spec.h_proto);
+rule->tuples_mask.ether_proto =
+be16_to_cpu(fs->m_u.ether_spec.h_proto);
break;
default:
+}
+
switch (flow_type) {
+case SCTP_V4_FLOW:
+case SCTP_V6_FLOW:
+rule->tuples.ip_proto = IPPROTO_SCTP;
+rule->tuples_mask.ip_proto = 0xFF;
+break;
+case TCP_V4_FLOW:
+case TCP_V6_FLOW:
+rule->tuples.ip_proto = IPPROTO_TCP;
+rule->tuples_mask.ip_proto = 0xFF;
+break;
+case UDP_V4_FLOW:
+case UDP_V6_FLOW:
+rule->tuples.ip_proto = IPPROTO_UDP;
+rule->tuples_mask.ip_proto = 0xFF;
+break;
+default:
+break;
+}
+
+if ((fs->flow_type & FLOW_EXT)) {
+rule->tuples.vlan_tag1 = be16_to_cpu(fs->h_ext.vlan_tci);
+rule->tuples_mask.vlan_tag1 = be16_to_cpu(fs->m_ext.vlan_tci);
+}
+
+if (fs->flow_type & FLOW_MAC_EXT) {
+ether_addr_copy(rule->tuples.dst_mac, fs->h_ext.h_dest);
+ether_addr_copy(rule->tuples_mask.dst_mac, fs->m_ext.h_dest);
+}
+
+return 0;
+}
+
+static int hclge_add_fd_entry(struct hnae3_handle *handle,
+ struct ethtool_rxnfc *cmd)
+
+{
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+u16 dst_vport_id = 0, q_index = 0;
+struct ethtool_rx_flow_spec *fs;
+struct hclge_fd_rule *rule;
+u32 unused = 0;
+u8 action;
int ret;

if (!hnae3_dev_fd_supported(hdev))
    return -EOPNOTSUPP;

if (!hdev->fd_cfg.fd_en) {
    dev_warn(&hdev->pdev->dev, 
        "Please enable flow director first\n");
    return -EOPNOTSUPP;
}

fs = (struct ethtool_rx_flow_spec *)&cmd->fs;

ret = hclge_fd_check_spec(hdev, fs, &unused);
if (ret) {
    dev_err(&hdev->pdev->dev, "Check fd spec failed\n");
    return ret;
}

if (fs->ring_cookie == RX_CLS_FLOW_DISC) {
    action = HCLGE_FD_ACTION_DROP_PACKET;
} else {
    u32 ring = ethtool_get_flow_spec_ring(fs->ring_cookie);
    u8 vf = ethtool_get_flow_spec_ring_vf(fs->ring_cookie);
    u16 tqps;

    if (vf > hdev->num_req_vfs) {
        dev_err(&hdev->pdev->dev, 
            "Error: vf id (%d) > max vf num (%d)\n",
            vf, hdev->num_req_vfs);
        return -EINVAL;
    }

    dst_vport_id = vf ? hdev->vport[vf].vport_id : vport->vport_id;
    tqps = vf ? hdev->vport[vf].alloc_tqps : vport->alloc_tqps;

    if (ring >= tqps) {
        dev_err(&hdev->pdev->dev, 
            "Error: queue id (%d) > max tqp num (%d)\n",
            ring, tqps - 1);
        return -EINVAL;
    }

    action = HCLGE_FD_ACTION_ACCEPT_PACKET;
    q_index = ring;
}

rule = kzalloc(sizeof(*rule), GFP_KERNEL);
+if (!rule)
+return -ENOMEM;
+
+ret = hclge_fd_get_tuple(hdev, fs, rule);
+if (ret)
+goto free_rule;
+
+rule->flow_type = fs->flow_type;
+
+rule->location = fs->location;
+rule->unused_tuple = unused;
+rule->vf_id = dst_vport_id;
+rule->queue_id = q_index;
+rule->action = action;
+
+ret = hclge_config_action(hdev, HCLGE_FD_STAGE_1, rule);
+if (ret)
+goto free_rule;
+
+ret = hclge_config_key(hdev, HCLGE_FD_STAGE_1, rule);
+if (ret)
+goto free_rule;
+
+ret = hclge_fd_update_rule_list(hdev, rule, fs->location, true);
+if (ret)
+goto free_rule;
+
+return ret;
+
+free_rule:
+kfree(rule);
+return ret;
+
+
+static int hclge_del_fd_entry(struct hnae3_handle *handle,
+    struct ethtool_rxnfc *cmd)
+{
+    struct hclge_vport *vport = hclge_get_vport(handle);
+    struct hclge_dev *hdev = vport->back;
+    struct ethtool_rx_flow_spec *fs;
+    int ret;
+
+    if (!hnae3_dev_fd_supported(hdev))
+        return -EOPNOTSUPP;
+    
+    fs = (struct ethtool_rx_flow_spec *)&cmd->fs;
+    +if (fs->location >= hdev->fd_cfg.rule_num[HCLGE_FD_STAGE_1])

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return -EINVAL;

if (!hclge_fd_rule_exist(hdev, fs->location)) {
    dev_err(&hdev->pdev->dev,
    "Delete fail, rule %d is inexistent\n",
    fs->location);
    return -ENOENT;
}

ret = hclge_fd_tcam_config(hdev, HCLGE_FD_STAGE_1, true,
    fs->location, NULL, false);
if (ret)
    return ret;

return hclge_fd_update_rule_list(hdev, NULL, fs->location,
    false);
}

static void hclge_del_all_fd_entries(struct hnae3_handle *handle,
    bool clear_list)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    struct hclge_dev *hdev = vport->back;
    struct hclge_fd_rule *rule;
    struct hlist_node *node;

    if (!hnae3_dev_fd_supported(hdev))
        return;

    if (clear_list) {
        hlist_for_each_entry_safe(rule, node, &hdev->fd_rule_list,
            rule_node) {
            hclge_fd_tcam_config(hdev, HCLGE_FD_STAGE_1, true,
                rule->location, NULL, false);
            hlist_del(&rule->rule_node);
            kfree(rule);
            hdev->hclge_fd_rule_num--;
        }
    } else {
        hlist_for_each_entry_safe(rule, node, &hdev->fd_rule_list,
            rule_node)
            hclge_fd_tcam_config(hdev, HCLGE_FD_STAGE_1, true,
                rule->location, NULL, false);
        }
    }
}

static int hclge_restore_fd_entries(struct hnae3_handle *handle)
{

}
struct hclge_vport *vport = hclge_get_vport(handle);
struct hclge_dev *hdev = vport->back;
struct hclge_fd_rule *rule;
struct hlist_node *node;
int ret;

/* Return ok here, because reset error handling will check this
   * return value. If error is returned here, the reset process will
   * fail.
   */
if (!hnae3_dev_fd_supported(hdev))
  return 0;

/* if fd is disabled, should not restore it when reset */
if (!hdev->fd_cfg.fd_en)
  return 0;

hlist_for_each_entry_safe(rule, node, &hdev->fd_rule_list, rule_node) {
  ret = hclge_config_action(hdev, HCLGE_FD_STAGE_1, rule);
  if (!ret)
    ret = hclge_config_key(hdev, HCLGE_FD_STAGE_1, rule);
  if (ret) {
    dev_warn(&hdev->pdev->dev,
              "Restore rule %d failed, remove it\n",
              rule->location);
    hlist_del(&rule->rule_node);
    kfree(rule);
    hdev->hclge_fd_rule_num--;
  }
}
return 0;

static int hclge_get_fd_rule_cnt(struct hnae3_handle *handle,
    struct ethtool_rxcnt *cmd)
{
  struct hclge_vport *vport = hclge_get_vport(handle);
  struct hclge_dev *hdev = vport->back;
  if (!hnae3_dev_fd_supported(hdev))
    return -EOPNOTSUPP;
  cmd->rule_cnt = hdev->hclge_fd_rule_num;
  cmd->data = hdev->fd_cfg.rule_num[HCLGE_FD_STAGE_1];
  return 0;
}
static int hclge_get_fd_rule_info(struct hnae3_handle *handle,
  struct ethtool_rxnfc *cmd) {
  struct hclge_vport *vport = hclge_get_vport(handle);
  struct hclge_fd_rule *rule = NULL;
  struct hclge_dev *hdev = vport->back;
  struct ethtool_rx_flow_spec *fs;
  struct hlist_node *node2;

  if (!hnae3_dev_fd_supported(hdev))
    return -EOPNOTSUPP;

  fs = (struct ethtool_rx_flow_spec *)&cmd->fs;

  hlist_for_each_entry_safe(rule, node2, &hdev->fd_rule_list, rule_node) {
    if (rule->location >= fs->location)
      break;
  }

  if (!rule || fs->location != rule->location)
    return -ENOENT;

  fs->flow_type = rule->flow_type;
  switch (fs->flow_type & ~(FLOW_EXT | FLOW_MAC_EXT)) {
    case SCTP_V4_FLOW:
    case TCP_V4_FLOW:
    case UDP_V4_FLOW:
      fs->h_u.tcp_ip4_spec.ip4src = cpu_to_be32(rule->tuples.src_ip[3]);
      fs->m_u.tcp_ip4_spec.ip4src = rule->unused_tuple & BIT(INNER_SRC_IP) ? 0 : cpu_to_be32(rule->tuples_mask.src_ip[3]);
      fs->h_u.tcp_ip4_spec.ip4dst = cpu_to_be32(rule->tuples.dst_ip[3]);
      fs->m_u.tcp_ip4_spec.ip4dst = rule->unused_tuple & BIT(INNER_DST_IP) ? 0 : cpu_to_be32(rule->tuples_mask.dst_ip[3]);
      fs->h_u.tcp_ip4_spec.psrc = cpu_to_be16(rule->tuples.src_port);
      fs->m_u.tcp_ip4_spec.psrc =.rule->unused_tuple & BIT(INNER_SRC_PORT) ? 0 : cpu_to_be16(rule->tuples_mask.src_port);
      fs->h_u.tcp_ip4_spec.pdst = cpu_to_be16(rule->tuples.dst_port);
      fs->m_u.tcp_ip4_spec.pdst = rule->unused_tuple & BIT(INNER_DST_PORT) ? 0 : cpu_to_be16(rule->tuples_mask.dst_port);
0 : cpu_to_be16(rule->tuples_mask.dst_port);
+
+fs->h_u.tcp_ip4_spec.tos = rule->tuples.ip_tos;
+fs->m_u.tcp_ip4_spec.tos =
+rule->unused_tuple & BIT(INNER_IP_TOS) ?
+0 : rule->tuples_mask.ip_tos;
+
+break;
+case IP_USER_FLOW:
+fs->h_u.usr_ip4_spec.ip4src =
+cpu_to_be32(rule->tuples.src_ip[3]);
+fs->m_u.tcp_ip4_spec.ip4src =
+rule->unused_tuple & BIT(INNER_SRC_IP) ?
+0 : cpu_to_be32(rule->tuples_mask.src_ip[3]);
+
+fs->h_u.usr_ip4_spec.ip4dst =
+cpu_to_be32(rule->tuples.dst_ip[3]);
+fs->m_u.tcp_ip4_spec.ip4dst =
+rule->unused_tuple & BIT(INNER_DST_IP) ?
+0 : cpu_to_be32(rule->tuples_mask.dst_ip[3]);
+
+fs->h_u.usr_ip4_spec.tos = rule->tuples.ip_tos;
+fs->m_u.usr_ip4_spec.tos =
+rule->unused_tuple & BIT(INNER_IP_TOS) ?
+0 : rule->tuples_mask.ip_tos;
+
+fs->h_u.usr_ip4_spec.proto = rule->tuples.ip_proto;
+fs->m_u.usr_ip4_spec.proto =
+rule->unused_tuple & BIT(INNERPROTO) ?
+0 : rule->tuples_mask.ip_proto;
+
+fs->h_u.usr_ip4_spec.ip_ver = ETH_RX_NFC_IP4;
+
+break;
+case SCTP_V6_FLOW:
+case TCP_V6_FLOW:
+case UDP_V6_FLOW:
+cpu_to_be32_array(fs->h_u.tcp_ip6_spec.ip6src,
+ rule->tuples.src_ip, 4);
+if (rule->unused_tuple & BIT(INNER_SRC_IP))
+memset(fs->m_u.tcp_ip6_spec.ip6src, 0, sizeof(int) * 4);
+else
+cpu_to_be32_array(fs->m_u.tcp_ip6_spec.ip6src,
+ rule->tuples_mask.src_ip, 4);
+
+cpu_to_be32_array(fs->h_u.tcp_ip6_spec.ip6dst,
+ rule->tuples.dst_ip, 4);
+if (rule->unused_tuple & BIT(INNER_DST_IP))

memset(fs->m_u.tcp_ip6_spec.ip6dst, 0, sizeof(int) * 4);
else
cpu_to_be32_array(fs->m_u.tcp_ip6_spec.ip6dst, + rule->tuples_mask.dst_ip, 4);

fs->h_u.tcp_ip6_spec.psrc = cpu_to_be16(rule->tuples.src_port);
fs->m_u.tcp_ip6_spec.psrc =
+rule->unused_tuple & BIT(INNER_SRC_PORT) ?
+0 : cpu_to_be16(rule->tuples_mask.src_port);

fs->h_u.tcp_ip6_spec.pdst = cpu_to_be16(rule->tuples.dst_port);
fs->m_u.tcp_ip6_spec.pdst =
+rule->unused_tuple & BIT(INNER_DST_PORT) ?
+0 : cpu_to_be16(rule->tuples_mask.dst_port);

break;
case IPV6_USER_FLOW:
cpu_to_be32_array(fs->h_u.usr_ip6_spec.ip6src,
+ rule->tuples.src_ip, 4);
if (rule->unused_tuple & BIT(INNER_SRC_IP))
memset(fs->m_u.usr_ip6_spec.ip6src, 0, sizeof(int) * 4);
else
cpu_to_be32_array(fs->m_u.usr_ip6_spec.ip6src,
+ rule->tuples_mask.src_ip, 4);

cpu_to_be32_array(fs->h_u.usr_ip6_spec.ip6dst,
+ rule->tuples.dst_ip, 4);
if (rule->unused_tuple & BIT(INNER_DST_IP))
memset(fs->m_u.usr_ip6_spec.ip6dst, 0, sizeof(int) * 4);
else
cpu_to_be32_array(fs->m_u.usr_ip6_spec.ip6dst,
+ rule->tuples_mask.dst_ip, 4);

fs->h_u.usr_ip6_spec.l4_proto = rule->tuples.proto;
fs->m_u.usr_ip6_spec.l4_proto =
+rule->unused_tuple & BIT(INNER_PROTO) ?
+0 : rule->tuples_mask.proto;

break;
case ETHER_FLOW:
ether_addr_copy(fs->h_u.ether_spec.h_source,
+rule->tuples.src_mac);
if (rule->unused_tuple & BIT(INNER_SRC_MAC))
eth_zero_addr(fs->m_u.ether_spec.h_source);
else
ether_addr_copy(fs->m_u.ether_spec.h_source,
+rule->tuples_mask.src_mac);
ether_addr_copy(fs->h_u.ether_spec.h_dest,
+rule->tuples.dst_mac);
+if (rule->unused_tuple & BIT(INNER_DST_MAC))
+eth_zero_addr(fs->m_u.ether_spec.h_dest);
+else
+ether_addr_copy(fs->m_u.ether_spec.h_dest,
+rule->tuples_mask.dst_mac);
+
+fs->h_u.ether_spec.h_proto =
+cpu_to_be16(rule->tuples.ether_proto);
+fs->m_u.ether_spec.h_proto =
+rule->unused_tuple & BIT(INNER_ETH_TYPE) ?
+0 : cpu_to_be16(rule->tuples_mask.ether_proto);
+
+break;
+default:
+return -EOPNOTSUPP;
+
+if (fs->flow_type & FLOW_EXT) {
+fs->h_ext.vlan_tci = cpu_to_be16(rule->tuples.vlan_tag1);
+fs->m_ext.vlan_tci =
+rule->unused_tuple & BIT(INNER_VLAN_TAG_FST) ?
+cpu_to_be16(VLAN_VID_MASK) :
+cpu_to_be16(rule->tuples_mask.vlan_tag1);
+}
+
+if (fs->flow_type & FLOW_MAC_EXT) {
+ether_addr_copy(fs->h_ext.h_dest, rule->tuples.dst_mac);
+if (rule->unused_tuple & BIT(INNER_DST_MAC))
+eth_zero_addr(fs->m_u.ether_spec.h_dest);
+else
+ether_addr_copy(fs->m_u.ether_spec.h_dest,
+rule->tuples_mask.dst_mac);
+}
+
+if (rule->action == HCLGE_FD_ACTION_DROP_PACKET) {
+fs->ring_cookie = RX_CLS_FLOW_DISC;
+} else {
+u64 vf_id;
+
+fs->ring_cookie = rule->queue_id;
+vf_id = rule->vf_id;
+vf_id <<= ETHTOOL_RX_FLOW_SPEC_RING_VF_OFF;
+fs->ring_cookie |= vf_id;
+}
+
+return 0;
static int hclge_get_all_rules(struct hnae3_handle *handle, struct ethtool_rxnfc *cmd, u32 *rule_locs)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    struct hclge_dev *hdev = vport->back;
    struct hclge_fd_rule *rule;
    struct hlist_node *node2;
    int cnt = 0;

    if (!hnae3_dev_fd_supported(hdev))
        return -EOPNOTSUPP;

    cmd->data = hdev->fd_cfg.rule_num[HCLGE_FD_STAGE_1];
    hlist_for_each_entry_safe(rule, node2, &hdev->fd_rule_list, rule_node) {
        if (cnt == cmd->rule_cnt)
            return -EMSGSIZE;
        rule_locs[cnt] = rule->location;
        cnt++;
    }
    cmd->rule_cnt = cnt;
    return 0;
}

static bool hclge_get_hw_reset_stat(struct hnae3_handle *handle)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    struct hclge_dev *hdev = vport->back;
    return hclge_read_dev(&hdev->hw, HCLGE_GLOBAL_RESET_REG) ||
        hclge_read_dev(&hdev->hw, HCLGE_FUN_RST_ING);
}

static bool hclge_ae_dev_resetting(struct hnae3_handle *handle)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    struct hclge_dev *hdev = vport->back;
    return test_bit(HCLGE_STATE_RST_HANDLING, &hdev->state);
}

static unsigned long hclge_ae_dev_reset_cnt(struct hnae3_handle *handle)
+{
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+
+return hdev->reset_count;
+}
+
+static void hclge_enable_fd(struct hnae3_handle *handle, bool enable)
+{
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+
+hdev->fd_cfg.fd_en = enable;
+if (!enable)
+hclge_del_all_fd_entries(handle, false);
+else
+hclge_restore_fd_entries(handle);
}

static void hclge_cfg_mac_mode(struct hclge_dev *hdev, bool enable)
{

hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CONFIG_MAC_MODE, false);
-hnae_set_bit(loop_en, HCLGE_MAC_TX_EN_B, enable);
-hnae_set_bit(loop_en, HCLGE_MAC_RX_EN_B, enable);
-hnae_set_bit(loop_en, HCLGE_MAC_PAD_TX_B, enable);
-hnae_set_bit(loop_en, HCLGE_MAC_PAD_RX_B, enable);
-hnae_set_bit(loop_en, HCLGE_MAC_1588_TX_B, 0);
-hnae_set_bit(loop_en, HCLGE_MAC_1588_RX_B, 0);
-hnae_set_bit(loop_en, HCLGE_MAC_APP_LP_B, 0);
-hnae_set_bit(loop_en, HCLGE_MAC_LINE_LP_B, 0);
-hnae_set_bit(loop_en, HCLGE_MAC_FCS_TX_B, enable);
-hnae_set_bit(loop_en, HCLGE_MAC_RX_FCS_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_TX_EN_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_RX_EN_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_PAD_TX_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_PAD_RX_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_1588_TX_B, 0);
+hnae3_set_bit(loop_en, HCLGE_MAC_1588_RX_B, 0);
+hnae3_set_bit(loop_en, HCLGE_MAC_APP_LP_B, 0);
+hnae3_set_bit(loop_en, HCLGE_MAC_LINE_LP_B, 0);
+hnae3_set_bit(loop_en, HCLGE_MAC_FCS_TX_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_RX_FCS_B, enable);
hnae3_set_bit(loop_en, HCLGE_MAC_RX_FCS_STRIP_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_TX_OVERSIZE_TRUNCATE_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_RX_OVERSIZE_TRUNCATE_B, enable);
+hnae3_set_bit(loop_en, HCLGE_MAC_TX_UNDER_MIN_ERR_B, enable);
req->txrx_pad_fcs_loop_en = cpu_to_le32(loop_en);

ret = hclge_cmd_send(&hdev->hw, &desc, 1);
@
-3404.57 +5132.105 @@
"mac enable fail, ret =%d\n", ret);
}

-static int hclge_set_loopback(struct hnae3_handle *handle,
  -enum hnae3_loop loop_mode, bool en)
+static int hclge_set_app_loopback(struct hclge_dev *hdev, bool en)
{
-struct hclge_vport *vport = hclge_get_vport(handle);
struct hclge_config_mac_mode_cmd *req;
-struct hclge_dev *hdev = vport->back;
struct hclge_desc desc;
u32 loop_en;
int ret;

+req = (struct hclge_config_mac_mode_cmd *)&desc.data[0];
+/* 1 Read out the MAC mode config at first */
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CONFIG_MAC_MODE, true);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+  dev_err(&hdev->pdev->dev,
+    "mac loopback get fail, ret =%d\n", ret);
+  return ret;
+}
+ /* 2 Then setup the loopback flag */
+loop_en = le32_to_cpu(req->txrx_pad_fcs_loop_en);
+hnae3_set_bit(loop_en, HCLGE_MAC_APP_LP_B, en ? 1 : 0);
+hnae3_set_bit(loop_en, HCLGE_MAC_TX_EN_B, en ? 1 : 0);
+hnae3_set_bit(loop_en, HCLGE_MAC_RX_EN_B, en ? 1 : 0);
+
+req->txrx_pad_fcs_loop_en = cpu_to_le32(loop_en);
+
+/* 3 Config mac work mode with loopback flag
+ * and its original configure parameters
+ */
+hclge_cmd_reuse_desc(&desc, false);
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+  dev_err(&hdev->pdev->dev,
+    "mac loopback set fail, ret =%d\n", ret);
+return ret;
+
+static int hclge_set_serdes_loopback(struct hclge_dev *hdev, bool en,
+    enum hnae3_loop loop_mode)
+
+#define HCLGE_SERDES_RETRY_MS10
+#define HCLGE_SERDES_RETRY_NUM100
+struct hclge_serdes_lb_cmd *req;
+struct hclge_desc desc;
+int ret, i = 0;
+u8 loop_mode_b;
+
+req = (struct hclge_serdes_lb_cmd *)desc.data;
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_SERDES_LOOPBACK, false);
+
switch (loop_mode) {
    case HNAE3_MAC_INTER_LOOP_MAC:
        req = (struct hclge_config_mac_mode_cmd *)&desc.data[0];
        /* 1 Read out the MAC mode config at first */
        hclge_cmd_setup_basic_desc(&desc,
            HCLGE_OPC_CONFIG_MAC_MODE,
            case HNAE3_LOOP_SERIAL_SERDES:
            loop_mode_b = HCLGE_CMD_SERDES_SERIAL_INNER_LOOP_B;
            break;
            case HNAE3_LOOP_PARALLEL_SERDES:
            loop_mode_b = HCLGE_CMD_SERDES_PARALLEL_INNER_LOOP_B;
            break;
            default:
                dev_err(&hdev->pdev->dev,
                    "unsupported serdes loopback mode %d
\n", loop_mode);
                return -ENOTSUPP;
            }
            
            if (en) {
                req->enable = loop_mode_b;
                req->mask = loop_mode_b;
            } else {
            req->mask = loop_mode_b;
        }
+
        ret = hclge_cmd_send(&hdev->hw, &desc, 1);
        if (ret) {
            dev_err(&hdev->pdev->dev,
                "serdes loopback set fail, ret = %d
\n", ret);
            return ret;
            
        }
+do {
+  msleep(HCLGE_SERDES_RETRY_MS);
+  hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_SERDES_LOOPBACK, true);
  ret = hclge_cmd_send(&hdev->hw, &desc, 1);
  if (ret) {
    dev_err(&hdev->pdev->dev, -
      "mac loopback get fail, ret =%d\n", -
      ret);
    +"serdes loopback get, ret = %d\n", ret);
    return ret;
  } +} while (++i < HCLGE_SERDES_RETRY_NUM && + !(req->result & HCLGE_CMD_SERDES_DONE_B));

  /* 2 Then setup the loopback flag */
  -loop_en = le32_to_cpu(req->txrx_pad_fcs_loop_en);
  -if (en)
  -  hnae_set_bit(loop_en, HCLGE_MAC_APP_LP_B, 1);
  -else
  -  hnae_set_bit(loop_en, HCLGE_MAC_APP_LP_B, 0);
  -
  -req->txrx_pad_fcs_loop_en = cpu_to_le32(loop_en);
  -
  -/* 3 Config mac work mode with loopback flag
  - * and its original configure parameters
  - */
  -hclge_cmd_reuse_desc(&desc, false);
  -ret = hclge_cmd_send(&hdev->hw, &desc, 1);
  -if (ret)
  -  dev_err(&hdev->pdev->dev, -
  -"mac loopback set fail, ret =%d\n", ret);
  -break;
  -default:
  -ret = -ENOTSUPP;
  -dev_err(&hdev->pdev->dev, -
  -"loop_mode %d is not supported\n", loop_mode);
  -break;
  +if (!req->result & HCLGE_CMD_SERDES_DONE_B)) {
  +  dev_err(&hdev->pdev->dev, "serdes loopback set timeout\n");
  +  return -EBUSY;
  +} else if (!req->result & HCLGE_CMD_SERDES_SUCCESS_B)) {
  +  dev_err(&hdev->pdev->dev, "serdes loopback set failed in fw\n");
  +  return -EIO;
  }

  return ret;
  +hclge_cfg_mac_mode(hdev, en);
+return 0;
}

static int hclge_tqp_enable(struct hclge_dev *hdev, int tqp_id,
@@ -3477,6 +5253,37 @@
return ret;
}

+static int hclge_set_loopback(struct hnae3_handle *handle,
+   enum hnae3_loop loop_mode, bool en)
+{
+    struct hclge_vport *vport = hclge_get_vport(handle);
+    struct hclge_dev *hdev = vport->back;
+    int i, ret;
+    +switch (loop_mode) {
+    +case HNAE3_LOOP_APP:
+        ret = hclge_set_app_loopback(hdev, en);
+        break;
+    +case HNAE3_LOOP_SERIAL_SERDES:
+    +case HNAE3_LOOP_PARALLEL_SERDES:
+        ret = hclge_set_serdes_loopback(hdev, en, loop_mode);
+        break;
+    +default:
+        ret = -ENOTSUPP;
+        dev_err(&hdev->pdev->dev,
+            "loop_mode %d is not supported\n", loop_mode);
+        break;
+    +}
+    +for (i = 0; i < vport->alloc_tqps; i++) {
+        ret = hclge_tqp_enable(hdev, i, 0, en);
+        if (ret)
+            return ret;
+    }
+    +return 0;
+}

static void hclge_reset_tqp_stats(struct hnae3_handle *handle)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    @@ -3491,36 +5298,35 @@
}

static void hclge_set_timer_task(struct hnae3_handle *handle, bool enable)

-static int hclge_ae_start(struct hnae3_handle *handle)
+static void hclge_set_timer_task(struct hnae3_handle *handle, bool enable)

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struct hclge_vport *vport = hclge_get_vport(handle);
struct hclge_dev *hdev = vport->back;

-int i, queue_id, ret;

-for (i = 0; i < vport->alloc_tqps; i++) {
-/* todo clear interrupt */
-/* ring enable */
-queue_id = hclge_get_queue_id(handle->kinfo.tqp[i]);
-if (queue_id < 0) {
-dev_warn(&hdev->pdev->dev,
- "Get invalid queue id, ignore it\n");
-continue;
-}
-
-hclge_tqp_enable(hdev, queue_id, 0, true);
+if (enable) {
+mod_timer(&hdev->service_timer, jiffies + HZ);
+} else {
+del_timer_sync(&hdev->service_timer);
+cancel_work_sync(&hdev->service_task);
+clear_bit(HCLGE_STATE_SERVICE_SCHED, &hdev->state);
} }
+
+static int hclge_ae_start(struct hnae3_handle *handle)
+{
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+
+/* mac enable */
+hclge_cfg_mac_mode(hdev, true);
+clear_bit(HCLGE_STATE_DOWN, &hdev->state);
+-mod_timer(&hdev->service_timer, jiffies + HZ);
- ret = hclge_mac_start_phy(hdev);
-if (ret)
-return ret;
+hdev->hw.mac.link = 0;

/* reset tqp stats */
hclge_reset_tqp_stats(handle);

+hclge_mac_start_phy(hdev);
+ return 0;
}
struct hclge_vport *vport = hclge_get_vport(handle);
struct hclge_dev *hdev = vport->back;

int i, queue_id;

for (i = 0; i < vport->alloc_tqps; i++) {
  /* Ring disable */
  queue_id = hclge_get_queue_id(handle->kinfo.tqp[i]);
  if (queue_id < 0) {
    dev_warn(&hdev->pdev->dev,
      "Get invalid queue id, ignore it\n");
    continue;
  }
  hclge_tqp_enable(hdev, queue_id, 0, false);

  /* If it is not PF reset, the firmware will disable the MAC,
  * so it only need to stop phy here.
  */
  if (test_bit(HCLGE_STATE_RST_HANDLING, &hdev->state) &&
      hdev->reset_type != HNAE3_FUNC_RESET) {
    hclge_mac_stop_phy(hdev);
    return;
  }

  for (i = 0; i < handle->kinfo.num_tqps; i++)
    hclge_reset_tqp(handle, i);

  /* Mac disable */
  hclge_cfg_mac_mode(hdev, false);
}

/* reset tqp stats */
hclge_reset_tqp_stats(handle);

/* update link status */
hclge_update_link_status(hdev);

int hclge_vport_start(struct hclge_vport *vport) {
  set_bit(HCLGE_VPORT_STATE_ALIVE, &vport->state);
  vport->last_active_jiffies = jiffies;
  return 0;
}

void hclge_vport_stop(struct hclge_vport *vport)
static int hclge_client_start(struct hnae3_handle *handle)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    return hclge_vport_start(vport);
}

static void hclge_client_stop(struct hnae3_handle *handle)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    hclge_vport_stop(vport);
}

static int hclge_get_mac_vlan_cmd_status(struct hclge_vport *vport,
@@ -3568,11 +5404,11 @@
    if ((!resp_code) || (resp_code == 1)) {
        return_status = 0;
    } else if (resp_code == 2) {
        -return_status = -EIO;
        +return_status = -ENOSPC;
        dev_err(&hdev->pdev->dev,
             "add mac addr failed for uc_overflow.
        } else if (resp_code == 3) {
            -return_status = -EIO;
            +return_status = -ENOSPC;
            dev_err(&hdev->pdev->dev,
                "add mac addr failed for mc_overflow.
        } else {
            @ @ -3584,7 +5420,7 @@
            if (!resp_code) {
                return_status = 0;
            } else if (resp_code == 1) {
                -return_status = -EIO;
                +return_status = -ENOENT;
                dev_dbg(&hdev->pdev->dev,
                    "remove mac addr failed for miss.
            } else {
                @ @ -3596,7 +5432,7 @@
                if (!resp_code) {
                    return_status = 0;
                } else if (resp_code == 1) {
                    -return_status = -EIO;
                    +return_status = -ENOENT;

dev_dbg(&hdev->pdev->dev,
"lookup mac addr failed for miss.\n");
} else {
    resp_code);
}
} else {
-    return_status = -EIO;
+    return_status = -EINVAL;
    dev_err(&hdev->pdev->dev,
        "unknown opcode for get_mac_vlan_cmd_status,opcode=%d\n",
        op);
-    return_status = -EIO;
+    return_status = -EINVAL;
    dev_dbg(&hdev->pdev->dev,
    "unknown opcode for get_mac_vlan_cmd_status,opcode=%d\n",
    op);

#define HCLGE_FUNC_NUMBER_PER_DESC 6
int i, j;

-    for (i = 0; i < HCLGE_DESC_NUMBER; i++)
+    for (i = 1; i < HCLGE_DESC_NUMBER; i++)
        for (j = 0; j < HCLGE_FUNC_NUMBER_PER_DESC; j++)
            if (desc[i].data[j])
                return false;

-    static u16 hclge_get_mac_addr_to_mta_index(struct hclge_vport *vport,
+    static int hclge_set_mta_filter_mode(struct hclge_dev *hdev,
    -    const u8 *addr)
-    { u16 high_val = addr[1] | (addr[0] << 8);
-        struct hclge_dev *hdev = vport->back;
-        u32 rsh = 4 - hdev->mta_mac_sel_type;
-        u16 ret_val = (high_val >> rsh) & 0xfff;
-        return ret_val;
-    }
-    return ret_val;
-
-    static int hclge_set_mta_filter_mode(struct hclge_dev *hdev,
    -    enum hclge_mta_dmac_sel_type mta_mac_sel,
    -    bool enable)
    -    { struct hclge_mta_filter_mode_cmd *req;
        struct hclge_desc desc;
        int ret;
        -        req = (struct hclge_mta_filter_mode_cmd *)desc.data;
        -        hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MTA_MAC_MODE_CFG, false);
        -        hnae_set_bit(req->dmae_sel_en, HCLGE_CFG_MTA_MAC_EN_B,

int hclge_cfg_func_mta_filter(struct hclge_dev *hdev,
    u8 func_id,
    bool enable)
{
    struct hclge_cfg_func_mta_filter_cmd *req;
    struct hclge_desc desc;
    int ret;

    req = (struct hclge_cfg_func_mta_filter_cmd *)desc.data;
    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MTA_MAC_FUNC_CFG, false);
    
    hnae_set_bit(req->accept, HCLGE_CFG_FUNC_MTA_ACCEPT_B, enable);
    req->function_id = func_id;

    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (ret) {
        dev_err(&hdev->pdev->dev, "Config func_id enable failed for cmd_send, ret =%d\n", ret);
        return ret;
    }

    return 0;
}

static int hclge_set_mta_table_item(struct hclge_vport *vport,
    u16 idx,
    bool enable)
{
    struct hclge_dev *hdev = vport->back;
    struct hclge_cfg_func_mta_item_cmd *req;

    struct hclge_desc desc;
- u16 item_idx = 0;
- int ret;
-
- req = (struct hclge_cfg_func_mta_item_cmd *)desc.data;
- hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MTA_TBL_ITEM_CFG, false);
- hnae_set_bit(req->accept, HCLGE_CFG_MTA_ITEM_ACCEPT_B, enable);
-
- hnae_set_field(item_idx, HCLGE_CFG_MTA_ITEM_IDX_M,
-       HCLGE_CFG_MTA_ITEM_IDX_S, idx);
- req->item_idx = cpu_to_le16(item_idx);
-
- ret = hclge_cmd_send(&hdev->hw, &desc, 1);
- if (ret) {
-    dev_err(&hdev->pdev->dev,
-        "Config mta table item failed for cmd_send, ret =%d.\n",
-        -ret);
-    return ret;
- } 
-
- return 0;

static int hclge_remove_mac_vlan_tbl(struct hclge_vport *vport,
       struct hclge_mac_vlan_tbl_entry_cmd *req)
{

    return cfg_status;
}

+static int hclge_init_umv_space(struct hclge_dev *hdev)
+{
+    u16 allocated_size = 0;
+    int ret;
+    
+    ret = hclge_set_umv_space(hdev, hdev->wanted_umv_size, &allocated_size,
+        true);
+    if (ret)
+        return ret;
+    
+    if (allocated_size < hdev->wanted_umv_size)
+        dev_warn(&hdev->pdev->dev,
+            "Alloc umv space failed, want %d, get %d\n",
+                hdev->wanted_umv_size, allocated_size);
+    
+    mutex_init(&hdev->umv_mutex);
+    hdev->max_umv_size = allocated_size;
+    hdev->priv_umv_size = hdev->max_umv_size / (hdev->num_req_vfs + 2);
+    hdev->share_umv_size = hdev->priv_umv_size +
hdev->max_umv_size % (hdev->num_req_vfs + 2);
+
+return 0;
+
+static int hclge_uninit_umv_space(struct hclge_dev *hdev)
+{
+    int ret;
+
+    if (hdev->max_umv_size > 0) {
+        ret = hclge_set_umv_space(hdev, hdev->max_umv_size, NULL,
+            false);
+        if (ret)
+            return ret;
+        hdev->max_umv_size = 0;
+    }
+    mutex_destroy(&hdev->umv_mutex);
+
+    return 0;
+}
+
+static int hclge_set_umv_space(struct hclge_dev *hdev, u16 space_size,
+        u16 *allocated_size, bool is_alloc)
+{
+    struct hclge_umv_spc_alc_cmd *req;
+    struct hclge_desc desc;
+    int ret;
+
+    req = (struct hclge_umv_spc_alc_cmd *)desc.data;
+    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MAC_VLAN_ALLOCATE, false);
+    hnae3_set_bit(req->allocate, HCLGE_UMV_SPC_ALC_B, !is_alloc);
+    req->space_size = cpu_to_le32(space_size);
+    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+    if (ret) {
+        dev_err(&hdev->pdev->dev,
+            "%s umv space failed for cmd_send, ret =%d\n",
+            is_alloc ? "allocate" : "free", ret);
+        return ret;
+    }
+
+    if (is_alloc && allocated_size)
+        *allocated_size = le32_to_cpu(desc.data[1]);
+    +return 0;
+}
+
+static void hclge_reset_umv_space(struct hclge_dev *hdev)
+{
+struct hclge_vport *vport;
+int i;
+
+for (i = 0; i < hdev->num_alloc_vport; i++) {
+vport = &hdev->vport[i];
+vport->used_umv_num = 0;
+}
+
+mutex_lock(&hdev->umv_mutex);
+hdev->share_umv_size = hdev->priv_umv_size +
+hdev->max_umv_size % (hdev->num_req_vfs + 2);
+mutex_unlock(&hdev->umv_mutex);
+}
+
+static bool hclge_is_umv_space_full(struct hclge_vport *vport)
+{
+struct hclge_dev *hdev = vport->back;
+bool is_full;
+
+mutex_lock(&hdev->umv_mutex);
+is_full = (vport->used_umv_num >= hdev->priv_umv_size &&
+ hdev->share_umv_size == 0);
+mutex_unlock(&hdev->umv_mutex);
+
+return is_full;
+}
+
+static void hclge_update_umv_space(struct hclge_vport *vport, bool is_free)
+{
+struct hclge_dev *hdev = vport->back;
+
+mutex_lock(&hdev->umv_mutex);
+if (is_free) {
++vport->used_umv_num;
+hdev->share_umv_size++;
+} else {
--vport->used_umv_num;
+hdev->share_umv_size--;
+}
+mutex_unlock(&hdev->umv_mutex);
+}
+
+static int hclge_add_uc_addr(struct hnae3_handle *handle,
     const unsigned char *addr)
{

@@ -3896,8 +5751,9 @@
{
 struct hclge_dev *hdev = vport->back;
 struct hclge_mac_vlan_tbl_entry_cmd req;
-enum hclge_cmd_status status;
+	struct hclge_desc desc;
 u16 egress_port = 0;
 +int ret;

 /* mac addr check */
 if (is_zero_ether_addr(addr) ||
@@ -3913,25 +5769,46 @@
 memset(&req, 0, sizeof(req));
-htnae_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
-htnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
-htnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT1_EN_B, 0);
-htnae_set_bit(req.mc_mac_en, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
-htnae_set_bit(egress_port, HCLGE_MAC_EPORT_SW_EN_B, 0);
-htnae_set_bit(egress_port, HCLGE_MAC_EPORT_TYPE_B, 0);
-htnae_set_field(egress_port, HCLGE_MAC_EPORT_VFID_M,
-htnae_set_bit(req.mc_mac_en, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
-
-htnae_set_bit(egress_port, HCLGE_MAC_EPORT_SWAP_EN_B, 0);
-htnae_set_bit(egress_port, HCLGE_MAC_EPORT_TYPE_B, 0);
-htnae_set_field(egress_port, HCLGE_MAC_EPORT_VFID_M,
-htnae_set_bit(req.mc_mac_en, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
+
 hnae3_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
+
 hnae3_set_field(egress_port, HCLGE_MAC_EPORT_VFID_M,
+HCLGE_MAC_EPORT_VFID_S, vport->vport_id);
+
 req.egress_port = cpu_to_le16(egress_port);

 hclge_prepare_mac_addr(&req, addr);

-/* Lookup the mac address in the mac_vlan table, and add
- * it if the entry is inexistent. Repeated unicast entry
- * is not allowed in the mac vlan table.
- */
+ret = hclge_add_mac_vlan_tbl(vport, &req, NULL);
+if (ret == -ENOENT) {
+if (!hclge_is_umv_space_full(vport)) {
+ret = hclge_add_mac_vlan_tbl(vport, &req, NULL);
+if (!ret)
+hclge_update_umv_space(vport, false);
+return ret;
+}
return status;
+dev_err(&hdev->pdev->dev, "UC MAC table full(%u)\n",
+hdev->priv_umv_size);
+
+return -ENOSPC;
+
+/* check if we just hit the duplicate */
+if (!ret) {
+dev_warn(&hdev->pdev->dev, "VF %d mac(%pM) exists\n",
+vport->vport_id, addr);
+return 0;
+
+dev_err(&hdev->pdev->dev,
+"PF failed to add unicast entry(%pM) in the MAC table\n",
+addr);
+
+return ret;
}

static int hclge_rm_uc_addr(struct hnae3_handle *handle,
@@ -3947,7 +5824,7 @@
{
struct hclge_dev *hdev = vport->back;
struct hclge_mac_vlan_tbl_entry_cmd req;
-enum hclge_cmd_status status;
+int ret;

/* mac addr check */
if (is_zero_ether_addr(addr) ||
@@ -3960,12 +5837,14 @@
}
memset(&req, 0, sizeof(req));
-hnae_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
-hnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
+hnae_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
+hnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
hclge_prepare_mac_addr(&req, addr);
-status = hclge_remove_mac_vlan_tbl(vport, &req);
+ret = hclge_remove_mac_vlan_tbl(vport, &req);
+if (!ret)
+hclge_update_umv_space(vport, true);

-return status;
+return ret;
static int hclge_add_mc_addr(struct hnae3_handle *handle,
@@ -3973,7 +5852,7 @@
{
 struct hclge_vport *vport = hclge_get_vport(handle);

-return hclge_add_mc_addr_common(vport, addr);
+return hclge_add_mc_addr_common(vport, addr);
 }

int hclge_add_mc_addr_common(struct hclge_vport *vport,
@@ -3982,7 +5861,6 @@
 struct hclge_dev *hdev = vport->back;
 struct hclge_mac_vlan_tbl_entry_cmd req;
 struct hclge_desc desc[3];
-u16 tbl_idx;

int status;

/* mac addr check */
@@ -3993,10 +5871,10 @@
 return -EINVAL;
 }

memset(&req, 0, sizeof(req));
-hnae_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
-hnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
-hnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT1_EN_B, 1);
-hnae_set_bit(req.mc_mac_en, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
+hnae3_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
+hnae3_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
+hnae3_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT1_EN_B, 1);
+hnae3_set_bit(req.mc_mac_en, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
hclge_prepare_mac_addr(&req, addr);
status = hclge_lookup_mac_vlan_tbl(vport, &req, desc, true);
if (!status) {
@@ -4012,9 +5890,8 @@
 status = hclge_add_mac_vlan_tbl(vport, &req, desc);
 }

/* Set MTA table for this MAC address */
-table_idx = hclge_get_mac_addr_to_mta_index(vport, addr);
-status = hclge_set_mta_table_item(vport, tbl_idx, true);
+if (status == -ENOSPC)
+dev_err(&hdev->pdev->dev, "mc mac vlan table is full\n");

return status;
}
@@ -4034,7 +5911,6 @@
struct hclge_mac_vlan_tbl_entry_cmd req;
enum hclge_cmd_status status;
struct hclge_desc desc[3];
-u16 tbl_idx;

/* mac addr check */
if (!is_multicast_ether_addr(addr)) {
  @@ -4045,10 +5921,10 @@
    memset(&req, 0, sizeof(req));
    -hnae_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
    -hnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
    -hnae_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT1_EN_B, 1);
    -hnae_set_bit(req.mc_mac_en, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
    +hnae3_set_bit(req.flags, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
    +hnae3_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT0_EN_B, 0);
    +hnae3_set_bit(req.entry_type, HCLGE_MAC_VLAN_BIT1_EN_B, 1);
    +hnae3_set_bit(req.mc_mac_en, HCLGE_MAC_VLAN_BIT0_EN_B, 1);
    hclge_prepare_mac_addr(&req, addr);
    status = hclge_lookup_mac_vlan_tbl(vport, &req, desc, true);
    if (!status) {
      @@ -4063,18 +5939,101 @@
        status = hclge_add_mac_vlan_tbl(vport, &req, desc);
    } else {
        /* This mac addr do not exist, can't delete it */
        /* Maybe this mac address is in mta table, but it cannot be
         * deleted here because an entry of mta represents an address
         * range rather than a specific address. the delete action to
         * all entries will take effect in update_mta_status called by
         * hns3_nic_set_rx_mode.
         */
        +status = 0;
        +}
        +return status;
        +}
        +
        +static int hclge_get_mac_ethertype_cmd_status(struct hclge_dev *hdev,
          +  u16 cmdq_rsp, u8 resp_code)
        +{
            +#define HCLGE_ETHERTYPE_SUCCESS_ADD0
            +#define HCLGE_ETHERTYPE_ALREADY_ADD1
            +#define HCLGE_ETHERTYPE_MGR_TBL_OVERFLOW2
            +#define HCLGE_ETHERTYPE_KEY_CONFLICT3
            +
            +int return_status;
if (cmdq_resp) {
    dev_err(&hdev->pdev->dev,
              "Rm multicast mac addr failed, ret = %d\n",
              status);
    +"cmdq execute failed for get_mac_ethertype_cmd_status, status=%d\n",
    +cmdq_resp);
    return -EIO;
}

/* Set MTB table for this MAC address */
tbl_idx = hclge_get_mac_addr_to_mta_index(vport, addr);
status = hclge_set_mta_table_item(vport, tbl_idx, false);
switch (resp_code) {
+case HCLGE_ETHERTYPE_SUCCESS_ADD:
+case HCLGE_ETHERTYPE_ALREADY_ADD:
    return_status = 0;
    break;
+case HCLGE_ETHERTYPE_MGR_TBL_OVERFLOW:
    dev_err(&hdev->pdev->dev,
            "add mac ethertype failed for manager table overflow.\n");
    return_status = -EIO;
    break;
+case HCLGE_ETHERTYPE_KEY_CONFLICT:
    dev_err(&hdev->pdev->dev,
            "add mac ethertype failed for key conflict.\n");
    return_status = -EIO;
    break;
+default:
    dev_err(&hdev->pdev->dev,
            "add mac ethertype failed for undefined, code=%d\n",
            resp_code);
    return_status = -EIO;
    +}

-return_status;
+return return_status;
+
+static int hclge_add_mgr_tbl(struct hclge_dev *hdev,
+ const struct hclge_mac_mgr_tbl_entry_cmd *req)
+{
+struct hclge_desc desc;
+u8 resp_code;
+u16 retval;
+int ret;
+  hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MAC_ETHTYPE_ADD, false);
memcpy(desc.data, req, sizeof(struct hclge_mac_mgr_tbl_entry_cmd));
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"add mac ethertype failed for cmd_send, ret =%d\n",
+ret);
+return ret;
+}
+
+resp_code = (le32_to_cpu(desc.data[0]) >> 8) & 0xff;
+retval = le16_to_cpu(desc.retval);
+
+return hclge_get_mac_ethertype_cmd_status(hdev, retval, resp_code);
+
+
+static int init_mgr_tbl(struct hclge_dev *hdev)
+{
+int ret;
+int i;
+
+for (i = 0; i < ARRAY_SIZE(hclge_mgr_table); i++) {
+ret = hclge_add_mgr_tbl(hdev, &hclge_mgr_table[i]);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"add mac ethertype failed, ret =%d\n",
+ret);
+return ret;
+}
+}
+
+return 0;
}

static void hclge_get_mac_addr(struct hnae3_handle *handle, u8 *p)
@@ -4085,11 +6044,13 @@
ether_addr_copy(p, hdev->hw.mac.mac_addr);
 }

-static int hclge_set_mac_addr(struct hnae3_handle *handle, void *p)
+static int hclge_set_mac_addr(struct hnae3_handle *handle, void *p,
+    bool is_first)
+{
const unsigned char *new_addr = (const unsigned char *)p;
struct hclge_vport *vport = hclge_get_vport(handle);
struct hclge_dev *hdev = vport->back;
+int ret;
/* mac addr check */
if (is_zero_ether_addr(new_addr) ||
    return -EINVAL;
}

-hclge_rm_uc_addr(handle, hdev->hw.mac.mac_addr);
+if (!is_first && hclge_rm_uc_addr(handle, hdev->hw.mac.mac_addr))
+    dev_warn(&hdev->pdev->dev,
+        "remove old uc mac address fail\n");

-if (!hclge_add_uc_addr(handle, new_addr)) {
- ether_addr_copy(hdev->hw.mac.mac_addr, new_addr);
- return 0;
+ ret = hclge_add_uc_addr(handle, new_addr);
+ if (ret) {
+     dev_err(&hdev->pdev->dev,
+         "add uc mac address fail, ret =%d\n",
+         ret);
+     if (!is_first &&
+         hclge_add_uc_addr(handle, hdev->hw.mac.mac_addr))
+         dev_err(&hdev->pdev->dev,
+             "restore uc mac address fail\n");
+     return -EIO;
+ }
}

- return -EIO;
+ ret = hclge_pause_addr_cfg(hdev, new_addr);
+ if (ret) {
+     dev_err(&hdev->pdev->dev,
+         "configure mac pause address fail, ret =%d\n",
+         ret);
+     return -EIO;
+ }

+ ether_addr_copy(hdev->hw.mac.mac_addr, new_addr);
+ return 0;
+
+ static int helge_do_ioctl(struct hnae3_handle *handle, struct ifreq *ifr,
+ int cmd)
+ {
+     struct helge_vport *vport = hclge_get_vport(handle);
+     struct helge_dev *hdev = vport->back;
+     

if (!hdev->hw.mac.phydev)
  return -EOPNOTSUPP;
+
+return phy_mii_ioctl(hdev->hw.mac.phydev, ifr, cmd);
}

static int hclge_set_vlan_filter_ctrl(struct hclge_dev *hdev, u8 vlan_type,
      u8 fe_type, bool filter_en)
{
  struct hclge_vlan_filter_ctrl_cmd *req;
  struct hclge_desc desc;
  @@ -4122,20 +6116,51 @@

  req = (struct hclge_vlan_filter_ctrl_cmd *)desc.data;
  req->vlan_type = vlan_type;
  -req->vlan_fe = filter_en;
  +req->vlan_fe = filter_en ? fe_type : 0;

  ret = hclge_cmd_send(&hdev->hw, &desc, 1);
  -if (ret) {
  +if (ret)
  dev_err(&hdev->pdev->dev, "set vlan filter fail, ret =%d.\n", ret);
  -return ret;
  -}

  -return 0;
  +return ret;
  +}

+#define HCLGE_FILTER_TYPE_VF	0
+#define HCLGE_FILTER_TYPE_PORT	1
+#define HCLGE_FILTER_FE_EGRESS_V1_BBIT(0)
+#define HCLGE_FILTER_FE_NIC_INGRESS_BBIT(0)
+#define HCLGE_FILTER_FE_NIC_EGRESS_BBIT(1)
+#define HCLGE_FILTER_FE_ROCE_INGRESS_BBIT(2)
+#define HCLGE_FILTER_FE_ROCE_EGRESS_BBIT(3)
+#define HCLGE_FILTER_FE_EGRESS(HCLGE_FILTER_FE_NIC_EGRESS_B
  +| HCLGE_FILTER_FE_ROCE_EGRESS_B)
+#define HCLGE_FILTER_FE_INGRESS(HCLGE_FILTER_FE_NIC_INGRESS_B
  +| HCLGE_FILTER_FE_ROCE_INGRESS_B)
+
+static void hclge_enable_vlan_filter(struct hnae3_handle *handle, bool enable)
  +{
  +struct hclge_vport *vport = hclge_get_vport(handle);
  +struct hclge_dev *hdev = vport->back;
  +}
if (hdev->pdev->revision >= 0x21) {
    hclge_set_vlan_filter_ctrl(hdev, HCLGE_FILTER_TYPE_VF,
        HCLGE_FILTER_FE_EGRESS, enable);
    hclge_set_vlan_filter_ctrl(hdev, HCLGE_FILTER_TYPE_PORT,
        HCLGE_FILTER_FE_INGRESS, enable);
} else {
    hclge_set_vlan_filter_ctrl(hdev, HCLGE_FILTER_TYPE_VF,
        HCLGE_FILTER_FE_EGRESS_V1_B, enable);
}
if (enable)
    handle->netdev_flags |= HNAE3_VLAN_FLTR;
else
    handle->netdev_flags &= ~HNAE3_VLAN_FLTR;
}

-hclge_set_vf_vlan_common(struct hclge_dev *hdev, int vfid,
    bool is_kill, u16 vlan, u8 qos, __be16 proto)
+static int hclge_set_vf_vlan_common(struct hclge_dev *hdev, int vfid,
    bool is_kill, u16 vlan, u8 qos,
    __be16 proto)
{
#define HCLGE_MAX_VF_BYTES 16
struct hclge_vlan_filter_vf_cfg_cmd *req0;
@@ -4175,16 +6200,31 @@
    if (!req0->resp_code || req0->resp_code == 1)
        return 0;
    if (req0->resp_code == HCLGE_VF_VLAN_NO_ENTRY) {
+        dev_warn(&hdev->pdev->dev,
+            "vf vlan table is full, vf vlan filter is disabled\n"");
        return 0;
    }
    dev_err(&hdev->pdev->dev,
        "Add vf vlan filter fail, ret =%d\n",
        req0->resp_code);
} else {
#define HCLGE_VF_VLAN_DEL_NO_FOUND 1
    if (!req0->resp_code)
        return 0;
    if (req0->resp_code == HCLGE_VF_VLAN_DEL_NO_FOUND) {
+        dev_warn(&hdev->pdev->dev,
+            "vlan %d filter is not in vf vlan table\n",

+ vlan);        
+ return 0;  
+
+ dev_err(&hdev->pdev->dev,  
"Kill vf vlan filter fail, ret =%d\n",  
req0->resp_code);  
@@ -4193,12 +6233,9 @@  
return -EIO;
}

-static int hclge_set_port_vlan_filter(struct hnae3_handle *handle,  
-    __be16 proto, u16 vlan_id,  
-    bool is_kill)  
+static int hclge_set_port_vlan_filter(struct hclge_dev *hdev, __be16 proto,  
+    u16 vlan_id, bool is_kill)  
{
-    struct hclge_vport *vport = hclge_get_vport(handle);  
-    struct hclge_dev *hdev = vport->back;  
+    struct hclge_vlan_filter_pf_cfg_cmd *req;  
+    struct hclge_desc desc;  
+    u8 vlan_offset_byte_val;  
@@ -4218,22 +6255,69 @@  
req->vlan_offset_bitmap[vlan_offset_byte] = vlan_offset_byte_val;

    ret = hclge_cmd_send(&hdev->hw, &desc, 1);  
    +if (ret)  
    +    dev_err(&hdev->pdev->dev,  
    +        "port vlan command, send fail, ret =%d\n", ret);  
    +return ret;  
+}
+
+static int hclge_set_vlan_filter_hw(struct hclge_dev *hdev, __be16 proto,  
+    u16 vport_id, u16 vlan_id, u8 qos,  
+    bool is_kill)  
+{
+    u16 vport_idx, vport_num = 0;  
+    int ret;  
+    
+    +if (is_kill && !vlan_id)  
+        return 0;  
+    +ret = hclge_set_vf_vlan_common(hdev, vport_id, is_kill, vlan_id,  
+        0, proto);  
+    if (ret) {
+        dev_err(&hdev->pdev->dev,  
-        "port vlan command, send fail, ret =%d\n",  
-        -ret);

    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    +if (ret)  
    +    dev_err(&hdev->pdev->dev,  
    +        "port vlan command, send fail, ret =%d\n",  
    +        -ret);

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/* Set %d vport vlan filter config fail, ret =%d\n",
+vport_id, ret);
return ret;
}

-ret = hclge_set_vf_vlan_common(hdev, 0, is_kill, vlan_id, 0, proto);
-if (ret) {
+/* vlan 0 may be added twice when 8021q module is enabled */
+if (!is_kill && !vlan_id &&
+test_bit(vport_id, hdev->vlan_table[vlan_id]))
+return 0;
+
+if (!is_kill && test_and_set_bit(vport_id, hdev->vlan_table[vlan_id])) {
dev_err(&hdev->pdev->dev,
-dev_err(hdev->pdev->dev,
-"Set pf vlan filter config fail, ret =%d\n",
-ret);
-return -EIO;
+"Add port vlan failed, vport %d is already in vlan %d\n",
+vport_id, vlan_id);
+return -EINVAL;
}

-return 0;
+if (is_kill &&
+!test_and_clear_bit(vport_id, hdev->vlan_table[vlan_id])) {
+dev_err(hdev->pdev->dev,
+"Delete port vlan failed, vport %d is not in vlan %d\n",
+vport_id, vlan_id);
+return -EINVAL;
+}
+
+for_each_set_bit(vport_idx, hdev->vlan_table[vlan_id], HCLGE_VPORT_NUM)
+vport_num++; 
+
+if ((is_kill && vport_num == 0) || (!is_kill && vport_num == 1))
+ret = hclge_set_port_vlan_filter(hdev, proto, vlan_id,
+is_kill);
+
+return ret;
+
+
+int hclge_set_vlan_filter(struct hnae3_handle *handle, __be16 proto,
+ u16 vlan_id, bool is_kill)
+{
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+
+return hclge_set_vlan_filter_hw(hdev, proto, vport->vport_id, vlan_id,
static int hclge_set_vlan_filter(struct hnae3_handle *handle, int vfid, int proto, int vlan, int qos)
{
    int status = 0;

    if (proto != htons(ETH_P_8021Q))
        return -EPROTONOSUPPORT;

    return hclge_set_vlan_common(hdev, vfid, false, vlan, qos, proto);
}

static int hclge_set_vlan_tx_offload_cfg(struct hclge_vport *vport)
{
    struct hclge_vport_vtag_tx_cfg_cmd *req;
    struct hclge_dev *hdev = vport->back;
    struct hclge_desc desc;
    u16 bmap_index;
    int status;

    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_VLAN_PORT_TX_CFG, false);
    req = (struct hclge_vport_vtag_tx_cfg_cmd *)desc.data;
    req->def_vlan_tag1 = cpu_to_le16(vport->txvlan_cfg->default_tag1);
    req->def_vlan_tag2 = cpu_to_le16(vport->txvlan_cfg->default_tag2);
    req->vf_offset = vport->vport_id / HCLGE_VF_NUM_PER_CMD;
    bmap_index = vport->vport_id % HCLGE_VF_NUM_PER_CMD / HCLGE_VF_NUM_PER_BYTE;
    req->vf_bitmap[bmap_index] = 1U << (vport->vport_id % HCLGE_VF_NUM_PER_BYTE);
    status = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (status)
+dev_err(&hdev->pdev->dev,
"Send port txvlan cfg command fail, ret =%d\n",
+status);
+
+return status;
+
+static int hclge_set_vlan_rx_offload_cfg(struct hclge_vport *vport)
+
+{
+struct hclge_rx_vtag_cfg *vcfg = &vport->rxvlan_cfg;
+struct hclge_vport_vtag_rx_cfg_cmd *req;
+struct hclge_dev *hdev = vport->back;
+struct hclge_desc desc;
+u16 bmap_index;
+int status;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPCODE_VLAN_PORT_RX_CFG, false);
+
+req = (struct hclge_vport_vtag_rx_cfg_cmd *)desc.data;
+hnae3_set_bit(req->vport_vlan_cfg, HCLGE_REM_TAG1_EN_B,
    +vcfg->strip_tag1_en ? 1 : 0);
+hnae3_set_bit(req->vport_vlan_cfg, HCLGE_REM_TAG2_EN_B,
    +vcfg->strip_tag2_en ? 1 : 0);
+hnae3_set_bit(req->vport_vlan_cfg, HCLGE_SHOW_TAG1_EN_B,
    +vcfg->vlan1_vlan_prionly ? 1 : 0);
+hnae3_set_bit(req->vport_vlan_cfg, HCLGE_SHOW_TAG2_EN_B,
    +vcfg->vlan2_vlan_prionly ? 1 : 0);
+
+req->vf_offset = vport->vport_id / HCLGE_VF_NUM_PER_CMD;
+bmap_index = vport->vport_id % HCLGE_VF_NUM_PER_CMD /
    +HCLGE_VF_NUM_PER_BYTE;
+req->vf_bitmap[bmap_index] =
    +1U << (vport->vport_id % HCLGE_VF_NUM_PER_BYTE);
+
+status = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (status)
+dev_err(&hdev->pdev->dev,
"Send port rxvlan cfg command fail, ret =%d\n",
+status);
+
+return status;
+
+static int hclge_set_vlan_protocol_type(struct hclge_dev *hdev)
+
+{
+struct hclge_rx_vlan_type_cfg_cmd *rx_req;
+struct hclge_tx_vlan_type_cfg_cmd *tx_req;
+struct hclge_desc desc;
#include <linux/types.h>
#include <linux/delay.h>
#include <linux/module.h>
#include <linux/netdevice.h>
#include <linux/vlan.h>
#include <linux/hubdev.h>
#include <linux/hubdev_event.h>
#include <linux/hubdev_types.h>

static int hclge_init_vlan_config(struct hclge_dev *hdev)
{
    int status;

    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MAC_VLAN_TYPE_ID, false);
    tx_req = (struct hclge_tx_vlan_type_cfg_cmd *)desc.data;
    tx_req->ot_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_ot_vlan_type);
    tx_req->in_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_in_vlan_type);
    status = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (status)
        dev_err(&hdev->pdev->dev, "Send txvlan protocol type command fail, ret =%d\n", status);
    return status;
}

static int hclge_init_vlan_config(struct hclge_dev *hdev)
{
    int status;

    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MAC_VLAN_INSERT, false);
    tx_req = (struct hclge_tx_vlan_type_cfg_cmd *)desc.data;
    tx_req->ot_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_ot_vlan_type);
    tx_req->in_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_in_vlan_type);
    status = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (status)
        dev_err(&hdev->pdev->dev, "Send txvlan protocol type command fail, ret =%d\n", status);
    return status;
}

static int hclge_init_vlan_config(struct hclge_dev *hdev)
{
    int status;

    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MAC_VLAN_TYPE_ID, false);
    tx_req = (struct hclge_tx_vlan_type_cfg_cmd *)desc.data;
    tx_req->ot_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_ot_vlan_type);
    tx_req->in_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_in_vlan_type);
    status = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (status)
        dev_err(&hdev->pdev->dev, "Send txvlan protocol type command fail, ret =%d\n", status);
    return status;
}

static int hclge_init_vlan_config(struct hclge_dev *hdev)
{
    int status;

    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MAC_VLAN_INSERT, false);
    tx_req = (struct hclge_tx_vlan_type_cfg_cmd *)desc.data;
    tx_req->ot_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_ot_vlan_type);
    tx_req->in_vlan_type = cpu_to_le16(hdev->vlan_type_cfg.tx_in_vlan_type);
    status = hclge_cmd_send(&hdev->hw, &desc, 1);
    if (status)
        dev_err(&hdev->pdev->dev, "Send txvlan protocol type command fail, ret =%d\n", status);
    return status;
}
ret = hclge_set_vlan_filter_ctrl(hdev, HCLGE_VLAN_TYPE_VF_TABLE, 
true);
if (ret)
return ret;
+if (hdev->pdev->revision >= 0x21) {
+ret = hclge_set_vlan_filter_ctrl(hdev, HCLGE_FILTER_TYPE_VF, 
+HCLGE_FILTER_FE_EGRESS, true);
+if (ret)
+return ret;
+
+ret = hclge_set_vlan_filter_ctrl(hdev, HCLGE_FILTER_TYPE_PORT, 
+HCLGE_FILTER_FE_INGRESS, true);
+if (ret)
+return ret;
+} else {
+ret = hclge_set_vlan_filter_ctrl(hdev, HCLGE_FILTER_TYPE_VF, 
+HCLGE_FILTER_FE_EGRESS_V1_B, 
+true);
+if (ret)
+return ret;
+} 

ret = hclge_set_vlan_filter_ctrl(hdev, HCLGE_VLAN_TYPE_PORT_TABLE, 
true);
handle->netdev_flags |= HNAE3_VLAN_FLTR;
+
+hdev->vlan_type_cfg.rx_in_fst_vlan_type = HCLGE_DEF_VLAN_TYPE;
+hdev->vlan_type_cfg.rx_in_sec_vlan_type = HCLGE_DEF_VLAN_TYPE;
+hdev->vlan_type_cfg.rx_ot_fst_vlan_type = HCLGE_DEF_VLAN_TYPE;
+hdev->vlan_type_cfg.rx_ot_sec_vlan_type = HCLGE_DEF_VLAN_TYPE;
+hdev->vlan_type_cfg.tx_ot_vlan_type = HCLGE_DEF_VLAN_TYPE;
+hdev->vlan_type_cfg.tx_in_vlan_type = HCLGE_DEF_VLAN_TYPE;
+
+ret = hclge_set_vlan_protocol_type(hdev);
if (ret)
return ret;
-
-handle = &hdev->vport[0].nic;
-return hclge_set_port_vlan_filter(handle, htons(ETH_P_8021Q), 0, false);

for (i = 0; i < hdev->num_alloc_vport; i++) {
+vport = &hdev->vport[i];
+vport->txvlan_cfg.accept_tag1 = true;
+vport->txvlan_cfg.accept_untag1 = true;
+
+/* accept_tag2 and accept_untag2 are not supported on 
+ * pdev revision(0x20), new revision support them. The 
+ * value of this two fields will not return error when driver 
+ * send command to fireware in revision(0x20).
This two fields can not configured by user.

```c
vport->txvlan_cfg.insert_tag1_en = false;
vport->txvlan_cfg.insert_tag2_en = false;
vport->txvlan_cfg.default_tag1 = 0;
vport->txvlan_cfg.default_tag2 = 0;
+ret = hclge_set_vlan_tx_offload_cfg(vport);
+if (ret)
+return ret;
+
+vport->rxvlan_cfg.strip_tag1_en = false;
vport->rxvlan_cfg.strip_tag2_en = enable;
vport->rxvlan_cfg.vlan1_vlan_prionly = false;
vport->rxvlan_cfg.vlan2_vlan_prionly = false;
+ret = hclge_set_vlan_rx_offload_cfg(vport);
+if (ret)
+return ret;
+
+return hclge_set_vlan_filter(handle, htons(ETH_P_8021Q), 0, false);
}

static int hclge_set_mtu(struct hnae3_handle *handle, int new_mtu)
+int hclge_en_hw_strip_rxvtag(struct hnae3_handle *handle, bool enable)
{
struct hclge_vport *vport = hclge_get_vport(handle);
+
+vport->rxvlan_cfg.strip_tag1_en = false;
vport->rxvlan_cfg.strip_tag2_en = enable;
vport->rxvlan_cfg.vlan1_vlan_prionly = false;
vport->rxvlan_cfg.vlan2_vlan_prionly = false;
+
+return hclge_set_vlan_rx_offload_cfg(vport);
+
+static int hclge_set_mac_mtu(struct hclge_dev *hdev, int new_mps)
+{
struct hclge_config_max_frm_size_cmd *req;
-struct hclge_dev *hdev = vport->back;
struct hclge_desc desc;
-int ret;

-if ((new_mtu < HCLGE_MAC_MIN_MTU) || (new_mtu > HCLGE_MAC_MAX_MTU))
```
req = (struct hclge_config_max_frm_size_cmd *)desc.data;
req->max_frm_size = cpu_to_le16(new_mps);
req->min_frm_size = HCLGE_MAC_MIN_FRAME;

return hclge_cmd_send(&hdev->hw, &desc, 1);

static int hclge_set_mtu(struct hnae3_handle *handle, int new_mtu)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    return hclge_set_vport_mtu(vport, new_mtu);
}

int hclge_set_vport_mtu(struct hclge_vport *vport, int new_mtu)
{
    struct hclge_dev *hdev = vport->back;
    int i, max_frm_size, ret = 0;
    if (max_frm_size < HCLGE_MAC_MIN_FRAME ||
        max_frm_size > HCLGE_MAC_MAX_FRAME)
        return -EINVAL;
    if (hdev->num_alloc_vport)
        ret = hclge_cmd_send(&hdev->hw, &desc, 1);
    return 0;
}

if (vport->vport_id && max_frm_size > hdev->mps) {
    mutex_unlock(&hdev->vport_lock);
    return -EINVAL;
} else if (vport->vport_id) {
    vport->mps = max_frm_size;
    mutex_unlock(&hdev->vport_lock);
    return 0;
}

if (max_frm_size < hdev->vport[i].mps) {
    mutex_unlock(&hdev->vport_lock);
    return -EINVAL;
}

if (max_frm_size < hdev->vport[i].mps) {
    mutex_unlock(&hdev->vport_lock);
    return -EINVAL;
}

if (max_frm_size < hdev->vport[i].mps) {
    mutex_unlock(&hdev->vport_lock);
    return -EINVAL;
}

if (max_frm_size < hdev->vport[i].mps) {
    mutex_unlock(&hdev->vport_lock);
    return -EINVAL;
}
+ret = hclge_set_mac_mtu(hdev, max_frm_size);
if (ret) {
    dev_err(&hdev->pdev->dev, "set mtu fail, ret =%d\n", ret);
    return ret;
    dev_err(&hdev->pdev->dev,
    "Change mtu fail, ret =%d\n", ret);
    goto out;
}
return 0;

hdev->mps = max_frm_size;
vport->mps = max_frm_size;

ret = hclge_buffer_alloc(hdev);
if (ret)
    dev_err(&hdev->pdev->dev,
    "Allocate buffer fail, ret =%d\n", ret);

out:
    hclge_notify_client(hdev, HNAE3_UP_CLIENT);
    mutex_unlock(&hdev->vport_lock);
    return ret;
}

static int hclge_send_reset_tqp_cmd(struct hclge_dev *hdev, u16 queue_id,
req = (struct hclge_reset_tqp_queue_cmd *)desc.data;
req->tqp_id = cpu_to_le16(queue_id & HCLGE_RING_ID_MASK);
-hnae_set_bit(req->reset_req, HCLGE_TQP_RESET_B, enable);
+hnae3_set_bit(req->reset_req, HCLGE_TQP_RESET_B, enable);
ret = hclge_cmd_send(&hdev->hw, &desc, 1);
if (ret) {
    return ret;
}

-return hnae_get_bit(req->ready_to_reset, HCLGE_TQP_RESET_B);
+return hnae3_get_bit(req->ready_to_reset, HCLGE_TQP_RESET_B);
}
struct hnae3_queue *queue;
struct hclge_tqp *tqp;

queue = handle->kinfo.tqp[queue_id];
tqp = container_of(queue, struct hclge_tqp, q);
return tqp->index;
}

int hclge_reset_tqp(struct hnae3_handle *handle, u16 queue_id)
{
    struct hclge_vport *vport = hclge_get_vport(handle);
    struct hclge_dev *hdev = vport->back;

    int reset_try_times = 0;
    int reset_status;

    +u16 queue_gid;
    +int ret = 0;

    queue_gid = hclge_covert_handle_qid_global(handle, queue_id);

    ret = hclge_tqp_enable(hdev, queue_id, 0, false);
    if (ret) {
        dev_err(&hdev->pdev->dev, "Disable tqp fail, ret = %d\n", ret);
        return ret;
    }

    ret = hclge_send_reset_tqp_cmd(hdev, queue_gid, true);
    if (ret) {
        dev_err(&hdev->pdev->dev, "Send reset tqp cmd fail, ret = %d\n", ret);
        return ret;
    }

    reset_try_times = 0;
    while (reset_try_times++ < HCLGE_TQP_RESET_TRY_TIMES) {
        /* Wait for tqp hw reset */
        msleep(20);
        reset_status = hclge_get_reset_status(hdev, queue_gid);
        if (reset_status)
            break;
    }

    if (reset_status)
        break;

    +if (reset_try_times >= HCLGE_TQP_RESET_TRY_TIMES) {
        dev_err(&hdev->pdev->dev, "Reset TQP fail\n");
        return ret;
    }

    return 0;
}
+}  
+}  
+ret = hclge_send_reset_tqp_cmd(hdev, queue_gid, false);  
+if (ret)  
+dev_err(&hdev->pdev->dev,  
+"Deassert the soft reset fail, ret = %%d\n", ret);  
+}  
+return ret;  
+}  
+  
+void hclge_reset_vf_queue(struct hclge_vport *vport, u16 queue_id)  
+{  
+struct hnae3_handle *handle = &vport->nic;  
+struct hclge_dev *hdev = vport->back;  
+int reset_try_times = 0;  
+int reset_status;  
+u16 queue_gid;  
+int ret;  
+  
+if (queue_id >= handle->kinfo.num_tqps) {  
+dev_warn(&hdev->pdev->dev, "Invalid vf queue id(%%u)\n",  
+ queue_id);  
+ return;  
+}  
+  
- ret = hclge_send_reset_tqp_cmd(hdev, queue_id, true);  
+-queue_gid = hclge_covert_handle_qid_global(&vport->nic, queue_id);  
++ret = hclge_send_reset_tqp_cmd(hdev, queue_gid, true);  
+  
+if (ret) {  
+dev_warn(&hdev->pdev->dev,  
+"Send reset tqp cmd fail, ret = %%d\n", ret);  
+}  
+  
@ @ -4366.7 +6744.7 @@  
while (reset_try_times++ < HCLGE_TQP_RESET_TRY_TIMES) {  
/* Wait for tqp hw reset */  
msleep(20);  
-reset_status = hclge_get_reset_status(hdev, queue_id);  
+reset_status = hclge_get_reset_status(hdev, queue_gid);  
+if (reset_status)  
+break;  
+}  
+ @ @ -4376.12 +6754.10 @@  
+return;  
+}  
+  
- ret = hclge_send_reset_tqp_cmd(hdev, queue_id, false);  
-if (ret) {  
+ret = hclge_send_reset_tqp_cmd(hdev, queue_gid, false);  
+return;  
+}  
+  

```c
+if (ret)
  dev_warn(&hdev->pdev->dev,
      "Deassert the soft reset fail, ret = %d\n", ret);
  return;
-}
}

static u32 hclge_get_fw_version(struct hnae3_handle *handle)
@@ -4392,6 +6768,86 @@
      return hdev->fw_version;
 }

+static void hclge_set_flowctrl_adv(struct hclge_dev *hdev, u32 rx_en, u32 tx_en)
+{
+  struct phy_device *phydev = hdev->hw.mac.phydev;
+  +if (!phydev)
+    return;
+  +phydev->advertising &= ~(ADVERTISED_Pause | ADVERTISED_Asym_Pause);
+  +if (rx_en)
+    phydev->advertising |= ADVERTISED_Pause | ADVERTISED_Asym_Pause;
+  +if (tx_en)
+    phydev->advertising ^= ADVERTISED_Asym_Pause;
+}
+
+static int hclge_cfg_pauseparam(struct hclge_dev *hdev, u32 rx_en, u32 tx_en)
+{
+  int ret;
+  +if (rx_en && tx_en)
+    hdev->fc_mode_last_time = HCLGE_FC_FULL;
+  +else if (rx_en && !tx_en)
+    hdev->fc_mode_last_time = HCLGE_FC_RX_PAUSE;
+  +else if (!rx_en && tx_en)
+    hdev->fc_mode_last_time = HCLGE_FC_TX_PAUSE;
+  +else
+    hdev->fc_mode_last_time = HCLGE_FC_NONE;
+  +if (hdev->tm_info.fc_mode == HCLGE_FC_PFC)
+    return 0;
+  +ret = hclge_mac_pause_en_cfg(hdev, tx_en, rx_en);
+  +if (ret)
+    +dev_err(&hdev->pdev->dev, "configure pauseparam error, ret = %d\n", ret);
```
int hclge_cfg_flowctrl(struct hclge_dev *hdev) {
    struct phy_device *phydev = hdev->hw.mac.phydev;
    u16 remote_advertising = 0;
    u16 local_advertising = 0;
    u32 rx_pause, tx_pause;
    u8 flowctl;
    if (!phydev->link || !phydev->autoneg) return 0;
    if (phydev->advertising & ADVERTISED_Pause) local_advertising = ADVERTISE_PAUSE_CAP;
    if (phydev->advertising & ADVERTISED_Asym_Pause) local_advertising |= ADVERTISE_PAUSE_ASYM;
    if (phydev->pause) remote_advertising = LPA_PAUSE_CAP;
    if (phydev->asym_pause) remote_advertising |= LPA_PAUSE_ASYM;
    flowctl = mii_resolve_flowctrl_fdx(local_advertising, remote_advertising);
    tx_pause = flowctl & FLOW_CTRL_TX;
    rx_pause = flowctl & FLOW_CTRL_RX;
    if (phydev->duplex == HCLGE_MAC_HALF) {
        tx_pause = 0;
        rx_pause = 0;
    }
    return hclge_cfg_pauseparam(hdev, rx_pause, tx_pause);
}

static void hclge_get_pauseparam(struct hnae3handle *handle, u32 *auto_neg, u32 *rx_en, u32 *tx_en) {
    @@ -4421.6 +6877.41 @@
+static int hclge_set_pauseparam(struct hnae3_handle *handle, u32 auto_neg,
+u32 rx_en, u32 tx_en)
+{
+    struct hclge_vport *vport = hclge_get_vport(handle);
+    struct hclge_dev *hdev = vport->back;
+    struct phy_device *phydev = hdev->hw.mac.phydev;
+    u32 fc_autoneg;
+    
+    fc_autoneg = hclge_get_autoneg(handle);
+    if (auto_neg != fc_autoneg) {
+        dev_info(&hdev->pdev->dev,
+                "To change autoneg please use: ethtool -s <dev> autoneg <on|off>\n");
+        return -EOPNOTSUPP;
+    }
+    
+    if (hdev->tm_info.fc_mode == HCLGE_FC_PFC) {
+        dev_info(&hdev->pdev->dev,
+                "Priority flow control enabled. Cannot set link flow control.\n");
+        return -EOPNOTSUPP;
+    }
+    
+    hclge_set_flowctrl_adv(hdev, rx_en, tx_en);
+    
+    if (!fc_autoneg)
+        return hclge_cfg_pauseparam(hdev, rx_en, tx_en);
+    
+    /* Only support flow control negotiation for netdev with
+     * phy attached for now.
+     */
+    
+    if (!phydev)
+        return -EOPNOTSUPP;
+    
+    return phy_start_aneg(phydev);
+}
+
+static void hclge_get_ksettings_an_result(struct hnae3_handle *handle,
+u8 *auto_neg, u32 *speed, u8 *duplex)
+
+
+static int hclge_get_aneg(struct hnae3_handle *handle)
+{
+    phy_write(phydev, HCLGE_PHY_PAGE_REG, HCLGE_PHY_PAGE_MDIX);
+    
+    retval = phy_read(phydev, HCLGE_PHY_PAGE_REG, HCLGE_PHY_PAGE_MDIX);
+    
+    mdix_ctrl = hnae3_get_field(retval, HCLGE_PHY_MDIX_CTRL_M,
+    - HCLGE_PHY_MDIX_CTRL_S);
+    
+    return retval;
+}
```c
+ HCLGE_PHY_MDIX_CTRL_S);

retval = phy_read(phydev, HCLGE_PHY_CSS_REG);
-mdix = hnae_get_bit(retval, HCLGE_PHY_MDIX_STATUS_B);
-is_resolved = hnae_get_bit(retval, HCLGE_PHY_SPEED_DUP_RESOLVE_B);
+mdix = hnae3_get_bit(retval, HCLGE_PHY_MDIX_STATUS_B);
+is_resolved = hnae3_get_bit(retval, HCLGE_PHY_SPEED_DUP_RESOLVE_B);

phy_write(phydev, HCLGE_PHY_PAGE_REG, HCLGE_PHY_PAGE_COPPER);

@@ -4493,6 +6984,16 @@
 *
@Override
^tp_mdix = ETH_TP_MDI;
}

+static int hclge_init_instance_hw(struct hclge_dev *hdev)
+{
+    return hclge_mac_connect_phy(hdev);
+}
+
+static void hclge_uninit_instance_hw(struct hclge_dev *hdev)
+{
+    hclge_mac_disconnect_phy(hdev);
+}
+
+static int hclge_init_client_instance(struct hnae3_client *client,
+    struct hnae3_ae_dev *ae_dev)
+    struct hnae3_client *client,
+    struct hnae3_ae_dev *ae_dev)
+{
@@ -4510,7 +7011,16 @@
         vport->nic.client = client;
         ret = client->ops->init_instance(&vport->nic);
         if (ret)
-                goto err;
+                goto clear_nic;
+         ret = hclge_init_instance_hw(hdev);
+         if (ret) {
+                client->ops->uninit_instance(&vport->nic,
+                    0);
+                goto clear_nic;
+         }
+         hnae3_set_client_init_flag(client, ae_dev, 1);
+
         if (hdev->roce_client &&
             hnae3_dev_roce_supported(hdev)) {
@@ -4518,11 +7028,14 @@
             ret = hclge_init_roce_base_info(vport);
```
if (ret)
        -goto err;
+goto clear_roce;

ret = rc->ops->init_instance(&vport->roce);
if (ret)
        -goto err;
+goto clear_roce;
+
+hnae3_set_client_init_flag(hdev->roce_client,
    +    ae_dev, 1);
}
break;
@@ -4532,7 +7045,9 @@

ret = client->ops->init_instance(&vport->nic);
if (ret)
        -goto err;
+goto clear_nic;
+
+hnae3_set_client_init_flag(client, ae_dev, 1);

break;
case HNAE3_CLIENT_ROCE:
        @@ -4544,17 +7059,30 @@
if (hdev->roce_client && hdev->nic_client) {
    ret = hclge_init_roce_base_info(vport);
    if (ret)
        -goto err;
+goto clear_roce;

    ret = client->ops->init_instance(&vport->roce);
    if (ret)
        -goto err;
+goto clear_roce;
+
+hnae3_set_client_init_flag(client, ae_dev, 1);
}     
+
+break;
+default:
    +return -EINVAL;
}    
}

return 0;
-err:
clear_nic:
    hdev->nic_client = NULL;
    vport->nic.client = NULL;
    return ret;

clear_roce:
    hdev->roce_client = NULL;
    vport->roce.client = NULL;
    return ret;

if (client->type == HNAE3_CLIENT_ROCE)
    return;

    if (client->ops->uninit_instance) {
        hclge_uninit_instance_hw(hdev);
        client->ops->uninit_instance(&vport->nic, 0);
        hdev->nic_client = NULL;
        vport->nic.client = NULL;
    }

    ret = pci_enable_device(pdev);
    if (ret) {
        dev_err(&pdev->dev, "failed to enable PCI device\n");
        goto err_no_drvdata;
        return ret;
    }

    ret = dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(64));

pci_set_master(pdev);
    hw = &hdev->hw;
    hw->back = hdev;
    hw->io_base = pcim_iomap(pdev, 2, 0);
    if (!hw->io_base) {
        dev_err(&pdev->dev, "Can't map configuration register space\n");
        goto err_no_drvdata;
    }
    pci_release_regions(pdev);
    err_disable_device:
    pci_disable_device(pdev);
    -err_no_drvdata:
    -pci_set_drvdata(pdev, NULL);

    return ret;
}
struct pci_dev *pdev = hdev->pdev;

+pcim_iounmap(pdev, hdev->hw.io_base);
pci_free_irq_vectors(pdev);
cpci_clear_master(pdev);
cpci_release_mem_regions(pdev);
cpci_disable_device(pdev);
}

+static void hclge_state_init(struct hclge_dev *hdev)
+
+set_bit(HCLGE_STATE_SERVICE_INITED, &hdev->state);
+set_bit(HCLGE_STATE_DOWN, &hdev->state);
+clear_bit(HCLGE_STATE_RST_SERVICE_SCHED, &hdev->state);
+clear_bit(HCLGE_STATE_RST_HANDLING, &hdev->state);
+clear_bit(HCLGE_STATE_MBX_SERVICE_SCHED, &hdev->state);
+clear_bit(HCLGE_STATE_MBX_HANDLING, &hdev->state);
+
+
+static void hclge_state_uninit(struct hclge_dev *hdev)
+
+set_bit(HCLGE_STATE_DOWN, &hdev->state);
+
+if (hdev->service_timer.function)
+del_timer_sync(&hdev->service_timer);
+if (hdev->reset_timer.function)
+del_timer_sync(&hdev->reset_timer);
+if (hdev->service_task.func)
+cancel_work_sync(&hdev->service_task);
+if (hdev->rst_service_task.func)
+cancel_work_sync(&hdev->rst_service_task);
+if (hdev->mbx_service_task.func)
+cancel_work_sync(&hdev->mbx_service_task);
+
+
+static void hclge_flr_prepare(struct hnae3_ae_dev *ae_dev)
+
+#define HCLGE_FLR_WAIT_MS 100
+#define HCLGE_FLR_WAIT_CNT 50
+struct hclge_dev *hdev = ae_dev->priv;
+int cnt = 0;
+
+clear_bit(HNAE3_FLR_DOWN, &hdev->flr_state);
+clear_bit(HNAE3_FLR_DONE, &hdev->flr_state);
+set_bit(HNAE3_FLR_RESET, &hdev->default_reset_request);
+hclge_reset_event(hdev->pdev, NULL);
+}
+while (!test_bit(HNAE3_FLR_DOWN, &hdev->flr_state) &
+        cnt++ < HCLGE_FLR_WAIT_CNT)
+    msleep(HCLGE_FLR_WAIT_MS);
+
+        /*flr wait down timeout: %d\n", cnt);*/
+    }
+
+        static void hclge_flr_done(struct hnae3_ae_dev *ae_dev)
+        {
+            struct hclge_dev *hdev = ae_dev->priv;
+
+                set_bit(HNAE3_FLR_DONE, &hdev->flr_state);
+        }
+
+        static int hclge_init_ae_dev(struct hnae3_ae_dev *ae_dev)
+        {
+            struct pci_dev *pdev = ae_dev->pdev;
+
+                ret = hclge_pci_init(hdev);
+                if (ret) {
+                    dev_err(&pdev->dev, "PCI init failed\n");
+                    -return ret;
+                }
+        }
+
+        ret = hclge_pci_init(hdev);
+        if (ret) {
+            dev_err(&pdev->dev, "PCI init failed\n");
+            -return ret;
+        }
+
+/* Firmware command queue initialize */
+ret = hclge_cmd_queue_init(hdev);
+if (ret) {
+    dev_err(&pdev->dev, "Cmd queue init failed, ret = %d\n", ret);
+    -return ret;
+    }
+}
+goto err_pci_uninit;
}

/* Firmware command initialize */
ret = hclge_cmd_init(hdev);
if (ret)
    -goto err_cmd_init;
+goto err_cmd_uninit;

ret = hclge_get_cap(hdev);
if (ret) {
    dev_err(&pdev->dev, "get hw capability error, ret = %d\n", ret);
    -return ret;
+goto err_cmd_uninit;
}

ret = hclge_configure(hdev);
if (ret) {
    dev_err(&pdev->dev, "Configure dev error, ret = %d\n", ret);
    -return ret;
+goto err_cmd_uninit;
}

ret = hclge_init_msi(hdev);
if (ret) {
    dev_err(&pdev->dev, "Init MSI/MSI-X error, ret = %d\n", ret);
    -return ret;
+goto err_cmd_uninit;
}

ret = hclge_misc_irq_init(hdev);
@@ -4705,88 +7290,131 @@
    dev_err(&pdev->dev, "Misc IRQ(vector0) init error, ret = %d\n", ret);
    -return ret;
+goto err_msi_uninit;
}

ret = hclge_alloc_tqps(hdev);
if (ret) {
    dev_err(&pdev->dev, "Allocate TQPs error, ret = %d\n", ret);
    -return ret;
+goto err_msi_irq_uninit;
}

ret = hclge_alloc_vport(hdev);
if (ret) {
    dev_err(&pdev->dev, "Allocate vport error, ret = %d\n", ret);
    return ret;
+    goto err_msi_irq_uninit;
}

ret = hclge_map_tqp(hdev);
if (ret) {
    dev_err(&pdev->dev, "Map tqp error, ret = %d\n", ret);
    return ret;
+    goto err_msi_irq_uninit;
+
    if (hdev->hw.mac.media_type == HNAE3_MEDIA_TYPE_COPPER) {
+        ret = hclge_mac_mdio_config(hdev);
+        if (ret) {
+            dev_err(&hdev->pdev->dev,
+                "mdio config fail ret=%d\n", ret);
+            goto err_msi_irq_uninit;
+        }
+w        ret = hclge_mdio_config(hdev);
+
        if (hdev->hw.mac.media_type == HNAE3_MEDIA_TYPE_COPPER) {
+            ret = hclge_mac_mdio_config(hdev);
+            if (ret) {
+                dev_err(&hdev->pdev->dev,
+                    "mdio config fail ret=%d\n", ret);
+                goto err_msi_irq_uninit;
+            }
        }
+
        if (hdev->hw.mac.media_type == HNAE3_MEDIA_TYPE_COPPER) {
+            ret = hclge_mdio_config(hdev);
+            if (ret) {
+                dev_err(&hdev->pdev->dev,
+                    "mdio config fail ret=%d\n", ret);
+                goto err_msi_irq_uninit;
+            }
+m        }
+
        ret = hclge_mdio_config(hdev);
+        ret = hclge_init_umv_space(hdev);
+        if (ret) {
+            dev_warn(&hdev->pdev->dev,
+                "mdio config fail ret=%d\n", ret);
+            return ret;
+        }
+
        dev_err(&hdev->pdev->dev, "mdio config fail ret=%d\n", ret);
+        goto err_msi_irq_uninit;
+
        ret = hclge_mdio_config(hdev);
        if (ret) {
            dev_errno(dev, "mdio config fail ret=%d\n", ret);
            return ret;
        }
    }

    ret = hclge_mac_init(hdev);
    if (ret) {
        dev_err(&pdev->dev, "Mac init error, ret = %d\n", ret);
        return ret;
    }
-
    ret = hclge_mdio_config(hdev);
    if (ret) {
        dev_errno(dev, "mdio config fail ret=%d\n", ret);
        return ret;
    }

    ret = hclge_buffer_alloc(hdev);
    if (ret) {
        dev_errno(dev, "Buffer allocate fail, ret=%d\n", ret);
        return ret;
    }

    ret = hclge_config_tso(hdev, HCLGE_TSO_MSS_MIN, HCLGE_TSO_MSS_MAX);
    if (ret) {
        dev_errno(dev, "Enable tso fail, ret=%d\n", ret);
        return ret;
    }
+goto err_mdiobus_unreg;
}

+ret = hclge_config_gro(hdev, true);
+if (ret)
+goto err_mdiobus_unreg;
+
ret = hclge_init_vlan_config(hdev);
if (ret) {
dev_err(&pdev->dev, "VLAN init fail, ret =%d\n", ret);
+return ret;
+goto err_mdiobus_unreg;
}

ret = hclge_tm_schd_init(hdev);
if (ret) {
dev_err(&pdev->dev, "tm schd init fail, ret =%d\n", ret);
+return ret;
+goto err_mdiobus_unreg;
}

+hclge_rss_init_cfg(hdev);
ret = hclge_rss_init_hw(hdev);
if (ret) {
dev_err(&pdev->dev, "Rss init fail, ret =%d\n", ret);
+return ret;
+goto err_mdiobus_unreg;
}

+ret = init_mgr_tbl(hdev);
+if (ret) {
+dev_err(&pdev->dev, "manager table init fail, ret =%d\n", ret);
+goto err_mdiobus_unreg;
+
+ret = hclge_init_fd_config(hdev);
+if (ret) {
+dev_err(&pdev->dev,
+"fd table init fail, ret =%d\n", ret);
+goto err_mdiobus_unreg;
+
+ret = hclge_hw_error_set_state(hdev, true);
+if (ret) {
+dev_err(&pdev->dev,
+"fail(%d) to enable hw error interrupts\n", ret);
+goto err_mdiobus_unreg;
+}
hclge_dcb_ops_set(hdev);

timer_setup(&hdev->service_timer, hclge_service_timer, 0);
+timer_setup(&hdev->reset_timer, hclge_reset_timer, 0);
INIT_WORK(&hdev->service_task, hclge_service_task);
+INIT_WORK(&hdev->rst_service_task, hclge_reset_service_task);
+INIT_WORK(&hdev->mbx_service_task, hclge_mailbox_service_task);
+
+hclge_clear_all_event_cause(hdev);

/* Enable MISC vector(vector0) */
hclge_enable_vector(&hdev->misc_vector, true);

-set_bit(HCLGE_STATE_SERVICE_INITED, &hdev->state);
-set_bit(HCLGE_STATE_DOWN, &hdev->state);
+hclge_state_init(hdev);
+hdev->last_reset_time = jiffies;

pr_info("%s driver initialization finished.\n", HCLGE_DRIVER_NAME);
return 0;

-err_cmd_init:
+err_mdiobus_unreg:
+if (hdev->hw.mac.phydev)
+mдиобus_unregister(hdev->hw.mac.mdio_bus);
+err_msi_irq_uninit:
+hclge_misc_irq_uninit(hdev);
+err_msi_uninit:
+pci_free_irq_vectors(pdev);
+err_cmd_uninit:
+hclge_destroy_cmd_queue(&hdev->hw);
+err_pci_uninit:
+pcim_iounmap(pdev, hdev->hw.io_base);
+pci_clear_master(pdev);
pci_release_regions(pdev);
-err_pci_init:
-pci_set_drvdata(pdev, NULL);
-err_hclge_dev:
+pci_disable_device(pdev);
+out:
return ret;
}
+static void hclge_reset_vport_state(struct hclge_dev *hdev)
+{
+struct hclge_vport *vport = hdev->vport;
+int i;
+
+for (i = 0; i < hdev->num_alloc_vport; i++) {
+hclge_vport_start(vport);
+vport++;
+}
+
+static int hclge_reset_ae_dev(struct hnae3_ae_dev *ae_dev)
+{
+struct hclge_dev *hdev = ae_dev->priv;
+set_bit(HCLGE_STATE_DOWN, &hdev->state);
+
+hclge_stats_clear(hdev);
+memset(hdev->vlan_table, 0, sizeof(hdev->vlan_table));
+
+ret = hclge_cmd_init(hdev);
+if (ret) {
+dev_err(&pdev->dev, "get hw capability error, ret = %d.\n", ret);
+return ret;
+} else {
+ret = hclge_get_cap(hdev);
+if (ret) {
+dev_err(&pdev->dev, "get hw capability error, ret = %d.\n", ret);
+return ret;
+} else {
+ret = hclge_configure(hdev);
+if (ret) {
+dev_err(&pdev->dev, "Configure dev error, ret = %d.\n", ret);
+return ret;
+} else {
+ret = hclge_map_tqp(hdev);
+if (ret) {
+dev_err(&pdev->dev, "Map tqp error, ret = %d.\n", ret);
+return ret;
+} else {
+ret = hclge_mac_init(hdev);
+
+hclge_reset_umv_space(hdev);
+
+ret = hclge_mac_init(hdev);
if (ret) {
    dev_err(&pdev->dev, "Mac init error, ret = \%d\n", ret);
    return ret;
}

ret = hclge_buffer_alloc(hdev);
if (ret) {
    dev_err(&pdev->dev, "Buffer allocate fail, ret =\%d\n", ret);
    return ret;
}

ret = hclge_config_tso(hdev, HCLGE_TSO_MSS_MIN, HCLGE_TSO_MSS_MAX);
if (ret) {
    dev_err(&pdev->dev, "Enable tso fail, ret =\%d\n", ret);
    return ret;
}

+ret = hclge_config_gro(hdev, true);
+if (ret)
+return ret;
+
ret = hclge_init_vlan_config(hdev);
if (ret) {
    dev_err(&pdev->dev, "VLAN init fail, ret =\%d\n", ret);
    return ret;
}

-ret = hclge_tm_schd_init(hdev);
+ret = hclge_init_fd_config(hdev);
+if (ret) {
+    dev_err(&pdev->dev, "fd table init fail, ret =\%d\n", ret);
+    return ret;
+}
+
@@ -4866,8 +7493,24 @@
return ret;
}

-/* Enable MISC vector(vector0) */
-hclge_enable_vector(&hdev->misc_vector, true);
+ret = hclge_init_fd_config(hdev);
+if (ret) {
+    dev_err(&pdev->dev, "fd table init fail, ret =\%d\n", ret);
+    return ret;
+}

+*/
Re-enable the hw error interrupts because
the interrupts get disabled on core/global reset.

/* Re-enable the hw error interrupts because
   the interrupts get disabled on core/global reset. */
ret = hclge_hw_error_set_state(hdev, true);
if (ret)
    dev_err(&pdev->dev,
    "fail(%d) to re-enable HNS hw error interrupts\n", ret);
return ret;
+	hclge_reset_vport_state(hdev);

dev_info(&pdev->dev, "Reset done, %s driver initialization finished.\n", HCLGE_DRIVER_NAME);

- set_bit(HCLGE_STATE_DOWN, &hdev->state);
- if (IS_ENABLED(CONFIG_PCI_IOV))
    hclge_disable_sriov(hdev);
- if (hdev->service_timer.function)
    del_timer_sync(&hdev->service_timer);
- if (hdev->service_task.func)
    cancel_work_sync(&hdev->service_task);
+ hclge_state_uninit(hdev);
if (mac->phydev)
    mdiobus_unregister(mac->mdio_bus);

+ hclge_uninit_umv_space(hdev);
+ /* Disable MISC vector(vector0) */
+ hclge_enable_vector(&hdev->misc_vector, false);
+ hclge_free_vector(hdev, 0);
+ synchronize_irq(hdev->misc_vector.vector_irq);
+ hclge_hw_error_set_state(hdev, false);
+ hclge_destroy_cmd_queue(&hdev->hw);
+ hclge_misc_irq_uninit(hdev);
+ hclge_pci_uninit(hdev);
+ mutex_destroy(&hdev->vport_lock);
+ ae_dev->priv = NULL;
}

+static u32 hclge_get_max_channels(struct hnae3_handle *handle)
+{
+struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+
++return min_t(u32, hdev->rss_size_max,
++vport->alloc_tqps / kinfo->num_tc);
+}
+
+static void hclge_get_channels(struct hnae3_handle *handle,
++struct ethtool_channels *ch)
+{
+ch->max_combined = hclge_get_max_channels(handle);
+ch->other_count = 1;
+ch->max_other = 1;
+ch->combined_count = handle->kinfo.rss_size;
+}
+
+static void hclge_get_tqps_and_rss_info(struct hnae3_handle *handle,
++u16 *alloc_tqps, u16 *max_rss_size)
+{
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+
++*alloc_tqps = vport->alloc_tqps;
++*max_rss_size = hdev->rss_size_max;
+}
+
+static void hclge_release_tqp(struct hclge_vport *vport)
+{
+struct hnae3_knic_private_info *kinfo = &vport->nic.kinfo;
+struct hclge_dev *hdev = vport->back;
+int i;
+
++for (i = 0; i < kinfo->num_tqps; i++) {
++struct hclge_tqp *tqp =
++container_of(kinfo->tqp[i], struct hclge_tqp, q);
++
++tqp->q.handle = NULL;
++tqp->q.tqp_index = 0;
++tqp->allocated = false;
++}
++
++devm_kfree(&hdev->pdev->dev, kinfo->tqp);
++kinfo->tqp = NULL;
+}
+
+static int hclge_set_channels(struct hnae3_handle *handle, u32 new_tqps_num)
struct hclge_vport *vport = hclge_get_vport(handle);
struct hnae3_knic_private_info *kinfo = &vport->nic.kinfo;
struct hclge_dev *hdev = vport->back;
int cur_rss_size = kinfo->rss_size;
int cur_tqps = kinfo->num_tqps;
+u16 tc_offset[HCLGE_MAX_TC_NUM];
+u16 tc_valid[HCLGE_MAX_TC_NUM];
+u16 tc_size[HCLGE_MAX_TC_NUM];
+u16 roundup_size;
+u32 *rss_indir;
+int ret, i;
+
+/* Free old tqp's, and reallocate with new tqp number when nic setup */
+hclge_release_tqp(vport);
+
+ret = hclge_knic_setup(vport, new_tqps_num, kinfo->num_desc);
+if (ret) {
+dev_err(&hdev->pdev->dev, "setup nic fail, ret =\%d\n", ret);
+return ret;
+}
+
+ret = hclge_map_tqp_to_vport(hdev, vport);
+if (ret) {
+dev_err(&hdev->pdev->dev, "map vport tqp fail, ret =\%d\n", ret);
+return ret;
+}
+
+ret = hclge_tm_schd_init(hdev);
+if (ret) {
+dev_err(&hdev->pdev->dev, "tm schd init fail, ret =\%d\n", ret);
+return ret;
+}
+
+roundup_size = roundup_pow_of_two(kinfo->rss_size);
+roundup_size = ilog2(roundup_size);
+/* Set the RSS TC mode according to the new RSS size */
+for (i = 0; i < HCLGE_MAX_TC_NUM; i++) {
+tc_valid[i] = 0;
+
+if (!(hdev->hw_tc_map & BIT(i)))
+continue;
+
+tc_valid[i] = 1;
+tc_size[i] = roundup_size;
+tc_offset[i] = kinfo->rss_size * i;
+}
+ret = hclge_set_rss_tc_mode(hdev, tc_valid, tc_size, tc_offset);
```c
+if (ret)
+return ret;
+
+/* Reinitializes the rss indirect table according to the new RSS size */
+rss_indir = kcalloc(HCLGE_RSS_IND_TBL_SIZE, sizeof(u32), GFP_KERNEL);
+if (!rss_indir)
+    return -ENOMEM;
+
+for (i = 0; i < HCLGE_RSS_IND_TBL_SIZE; i++)
+rss_indir[i] = i % kinfo->rss_size;
+
+ret = hclge_set_rss(handle, rss_indir, NULL, 0);
+if (ret)
+dev_err(&hdev->pdev->dev, "set rss indir table fail, ret=%d\n", 
+ret);
+
+kfree(rss_indir);
+
+if (!ret)
+dev_info(&hdev->pdev->dev, 
+"Channels changed, rss_size from %d to %d, tqps from %d to %d",
+cur_rss_size, kinfo->rss_size,
+cur_tqps, kinfo->rss_size * kinfo->num_tc);
+
+return ret;
+
+}
+
+static int hclge_get_regs_num(struct hclge_dev *hdev, u32 *regs_num_32_bit,
+    u32 *regs_num_64_bit)
+{
+    struct hclge_desc desc;
+    u32 total_num;
+    int ret;
+
+    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_QUERY_REG_NUM, true);
+    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+    if (ret) {
+        dev_err(&hdev->pdev->dev, 
+"Query register number cmd failed, ret = %d\n", ret);
+        return ret;
+    }
+
+    *regs_num_32_bit = le32_to_cpu(desc.data[0]);
+    *regs_num_64_bit = le32_to_cpu(desc.data[1]);
+    }
+    +total_num = *regs_num_32_bit + *regs_num_64_bit;
+    if (!total_num)
+        return -EINVAL;
```
+return 0;
+
+static int hclge_get_32_bit_regs(struct hclge_dev *hdev, u32 regs_num,
+    void *data)
+{
+#define HCLGE_32_BIT_REG_RTN_DATANUM 8
+
+struct hclge_desc *desc;
+u32 *reg_val = data;
+_le32 *desc_data;
+int cmd_num;
+int i, k, n;
+int ret;
+
+if (regs_num == 0)
+    return 0;
+
+cmd_num = DIV_ROUND_UP(regs_num + 2, HCLGE_32_BIT_REG_RTN_DATANUM);
+desc = kcalloc(cmd_num, sizeof(struct hclge_desc), GFP_KERNEL);
+if (!desc)
+    return -ENOMEM;
+
+hclge_cmd_setup_basic_desc(&desc[0], HCLGE_OPC_QUERY_32_BIT_REG, true);
+ret = hclge_cmd_send(&hdev->hw, desc, cmd_num);
+if (ret)
+    dev_err(&hdev->pdev->dev,
+            "Query 32 bit register cmd failed, ret = %d\n", ret);
+kfree(desc);
+return ret;
+
+for (i = 0; i < cmd_num; i++) {
+    if (i == 0) {
+        desc_data = (__le32 *)(&desc[i].data[0]);
+        n = HCLGE_32_BIT_REG_RTN_DATANUM - 2;
+    } else {
+        desc_data = (__le32 *)(&desc[i]);
+        n = HCLGE_32_BIT_REG_RTN_DATANUM;
+    }
+    for (k = 0; k < n; k++) {
+        *reg_val++ = le32_to_cpu(*desc_data);
+    }
+    regs_num--;
+    if (!regs_num)
+        break;
+}
static int hclge_get_64_bit_regs(struct hclge_dev *hdev, u32 regs_num, void *data)
{
#define HCLGE_64_BIT_REG_RTN_DATANUM 4

struct hclge_desc *desc;
u64 *reg_val = data;
__le64 *desc_data;
int cmd_num;
int i, k, n;
int ret;

if (regs_num == 0)
	return 0;

cmd_num = DIV_ROUND_UP(regs_num + 1, HCLGE_64_BIT_REG_RTN_DATANUM);
desc = kcalloc(cmd_num, sizeof(struct hclge_desc), GFP_KERNEL);
if (!desc)
	return -ENOMEM;

hclge_cmd_setup_basic_desc(&desc[0], HCLGE_OPC_QUERY_64_BIT_REG, true);
ret = hclge_cmd_send(&hdev->hw, desc, cmd_num);
if (ret) {
	dev_err(&hdev->pdev->dev,
		"Query 64 bit register cmd failed, ret = %d.\n", ret);
	kfree(desc);
	return ret;
}

for (i = 0; i < cmd_num; i++) {
	if (i == 0) {
		desc_data = (__le64 *)&desc[0].data[0];
	} else {
		desc_data = (__le64 *)&desc[i];
	}
	n = HCLGE_64_BIT_REG_RTN_DATANUM - 1;
	for (k = 0; k < n; k++) {
		*reg_val++ = le64_to_cpu(*desc_data);
		regs_num--;
	}
}
break;
+
+kfree(desc);
+return 0;
+
#define MAX_SEPARATE_NUM	4
#define SEPARATOR_VALUE	0xFFFFFFFF
#define REG_NUM_PER_LINE	4
#define REG_LEN_PER_LINE(REG_NUM_PER_LINE * sizeof(u32))
+
+static int hclge_get_regs_len(struct hnae3_handle *handle)
+{
+    int cmdq_lines, common_lines, ring_lines, tqp_intr_lines;
+    struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+    struct hclge_vport *vport = hclge_get_vport(handle);
+    struct hclge_dev *hdev = vport->back;
+    u32 regs_num_32_bit, regs_num_64_bit;
+    int ret;
+    
+    ret = hclge_get_regs_num(hdev, &regs_num_32_bit, &regs_num_64_bit);
+    if (ret) {
+        dev_err(&hdev->pdev->dev,
+            "Get register number failed, ret = %d.\n", ret);
+        return -EOPNOTSUPP;
+    }
+    
+    cmdq_lines = sizeof(cmdq_reg_addr_list) / REG_LEN_PER_LINE + 1;
+    common_lines = sizeof(common_reg_addr_list) / REG_LEN_PER_LINE + 1;
+    ring_lines = sizeof(ring_reg_addr_list) / REG_LEN_PER_LINE + 1;
+    tqp_intr_lines = sizeof(tqp_intr_reg_addr_list) / REG_LEN_PER_LINE + 1;
+    
+    return (cmdq_lines + common_lines + ring_lines * kinfo->num_tqps +
+        tqp_intr_lines * (hdev->num_msi_used - 1)) * REG_LEN_PER_LINE +
+        regs_num_32_bit * sizeof(u32) + regs_num_64_bit * sizeof(u64);
+}
+
+static void hclge_get_regs(struct hnae3_handle *handle, u32 *version,
+    void *data)
+{
+    struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+    struct hclge_vport *vport = hclge_get_vport(handle);
+    struct hclge_dev *hdev = vport->back;
+    u32 regs_num_32_bit, regs_num_64_bit;
+    int i, j, reg_um, separator_num;
+    u32 *reg = data;

int ret;
+
*version = hdev->fw_version;
+
ret = hclge_get_regs_num(hdev, &regs_num_32_bit, &regs_num_64_bit);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"Get register number failed, ret = \%d\n", ret);
+return;
+
+/* fetching per-PF registers values from PF PCIe register space */
+reg_um = sizeof(cmdq_reg_addr_list) / sizeof(u32);
+separator_num = MAX_SEPARATE_NUM - reg_um % REG_NUM_PER_LINE;
+for (i = 0; i < reg_um; i++)
+*reg++ = hclge_read_dev(&hdev->hw, cmdq_reg_addr_list[i]);
+for (i = 0; i < separator_num; i++)
+*reg++ = SEPARATOR_VALUE;
+
+reg_um = sizeof(common_reg_addr_list) / sizeof(u32);
+separator_num = MAX_SEPARATE_NUM - reg_um % REG_NUM_PER_LINE;
+for (i = 0; i < reg_um; i++)
+*reg++ = hclge_read_dev(&hdev->hw, common_reg_addr_list[i]);
+for (i = 0; i < separator_num; i++)
+*reg++ = SEPARATOR_VALUE;
+
+reg_um = sizeof(ring_reg_addr_list) / sizeof(u32);
+separator_num = MAX_SEPARATE_NUM - reg_um % REG_NUM_PER_LINE;
+for (j = 0; j < kinfo->num_tqps; j++) {
+for (i = 0; i < reg_um; i++)
+*reg++ = hclge_read_dev(&hdev->hw, ring_reg_addr_list[i] +
+0x200 * j);
+for (i = 0; i < separator_num; i++)
+*reg++ = SEPARATOR_VALUE;
+
+reg_um = sizeof(tqp_intr_reg_addr_list) / sizeof(u32);
+separator_num = MAX_SEPARATE_NUM - reg_um % REG_NUM_PER_LINE;
+for (j = 0; j < hdev->num_msi_used - 1; j++) {
+for (i = 0; i < reg_um; i++)
+*reg++ = hclge_read_dev(&hdev->hw, tqp_intr_reg_addr_list[i] +
+4 * j);
+for (i = 0; i < separator_num; i++)
+*reg++ = SEPARATOR_VALUE;
+}
/* fetching PF common registers values from firmware */
+ret = hclge_get_32_bit_regs(hdev, regs_num_32_bit, reg);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"Get 32 bit register failed, ret = %d\n", ret);
+return;
+}
+
+reg += regs_num_32_bit;
+ret = hclge_get_64_bit_regs(hdev, regs_num_64_bit, reg);
+if (ret)
+dev_err(&hdev->pdev->dev,
+"Get 64 bit register failed, ret = %d\n", ret);
+}
+
+static int hclge_set_led_status(struct hclge_dev *hdev, u8 locate_led_status)
+{
+struct hclge_set_led_state_cmd *req;
+struct hclge_desc desc;
+int ret;
+
+hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_LED_STATUS_CFG, false);
+
+req = (struct hclge_set_led_state_cmd *)desc.data;
+hnae3_set_field(req->locate_led_config, HCLGE_LED_LOCATE_STATE_M,
+HCLGE_LED_LOCATE_STATE_S, locate_led_status);
+
+ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+dev_err(&hdev->pdev->dev,
+"Send set led state cmd error, ret =%d\n", ret);
+
+return ret;
+}
+
+enum hclge_led_status {
+HCLGE_LED_OFF,
+HCLGE_LED_ON,
+HCLGE_LED_NO_CHANGE = 0xFF,
+};
+
+static int hclge_set_led_id(struct hnae3_handle *handle,
+    enum ethtool_phys_id_state status)
+{
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+
+switch (status) {
+case ETHTOOL_ID_ACTIVE:
+return hclge_set_led_status(hdev, HCLGE_LED_ON);
+case ETHTOOL_ID_INACTIVE:
+return hclge_set_led_status(hdev, HCLGE_LED_OFF);
+default:
+return -EINVAL;
+
+static void hclge_get_link_mode(struct hnae3_handle *handle,
+unsigned long *supported,
+unsigned long *advertising)
+
+{
+unsigned int size = BITS_TO_LONGS(__ETHTOOL_LINK_MODE_MASK_NBITS);
+struct hclge_vport *vport = hclge_get_vport(handle);
+struct hclge_dev *hdev = vport->back;
+unsigned int idx = 0;
+
+for (; idx < size; idx++) {
+supported[idx] = hdev->hw.mac.supported[idx];
+advertising[idx] = hdev->hw.mac.advertising[idx];
+
+}
+
+static const struct hnae3_ae_ops hclge_ops = {
+.init_ae_dev = hclge_init_ae_dev,
+.uninit_ae_dev = hclge_uninit_ae_dev,
+.flr_prepare = hclge_flr_prepare,
+.flr_done = hclge_flr_done,
+.init_client_instance = hclge_init_client_instance,
+.uninit_client_instance = hclge_uninit_client_instance,
-.map_ring_to_vector = hclge_map_handle_ring_to_vector,
-.unmap_ring_from_vector = hclge_unmap_ring_from_vector,
+.map_ring_to_vector = hclge_map_ring_to_vector,
+.unmap_ring_from_vector = hclge_unmap_ring_frm_vector,
+.get_vector = hclge_get_vector,
+.put_vector = hclge_put_vector,
+.set_promisc_mode = hclge_set_promisc_mode,
+.set_loopback = hclge_set_loopback,
+.start = hclge_ae_start,
+.stop = hclge_ae_stop,
+.client_start = hclge_client_start,
+.client_stop = hclge_client_stop,
+.get_status = hclge_get_status,
+.get_ksettings_an_result = hclge_get_ksettings_an_result,
+.update_speed_duplex_h = hclge_update_speed_duplex_h,
@@ -4927,6 +7982,7 @@
+.get_tc_size = hclge_get_tc_size,
.get_mac_addr = hclge_get_mac_addr,
.set_mac_addr = hclge_set_mac_addr,
+do_ioctl = hclge_do_ioctl,
.add_uc_addr = hclge_add_uc_addr,
.rm_uc_addr = hclge_rm_uc_addr,
.add_mc_addr = hclge_add_mc_addr,
.set_autoneg = hclge_set_autoneg,
.get_autoneg = hclge_get_autoneg,
.set_pauseparam = hclge_set_pauseparam,
+set_pauseparam = hclge_set_pauseparam,
.set_mtu = hclge_set_mtu,
.reset_queue = hclge_reset_tqp,
.get_stats = hclge_get_stats,
@@ -4934,6 +7990,7 @@
.get_sset_count = hclge_get_sset_count,
.get_fw_version = hclge_get_fw_version,
.get_mdix_mode = hclge_get_mdix_mode,
.set_vlan_filter = hclge_set_port_vlan_filter,
+enable_vlan_filter = hclge_enable_vlan_filter,
+set_vlan_filter = hclge_set_vlan_filter,
.set_vf_vlan_filter = hclge_set_vf_vlan_filter,
+enable_hw_strip_rxvtag = hclge_en_hw_strip_rxvtag,
.reset_event = hclge_reset_event,
+set_default_reset_request = hclge_set_def_reset_request,
+get_tqps_and_rss_info = hclge_get_tqps_and_rss_info,
+set_channels = hclge_set_channels,
+get_channels = hclge_get_channels,
+get_regs_len = hclge_get_regs_len,
+get_regs = hclge_get_regs,
+set_led_id = hclge_set_led_id,
+get_link_mode = hclge_get_link_mode,
+add_fd_entry = hclge_add_fd_entry,
+del_fd_entry = hclge_del_fd_entry,
+del_all_fd_entries = hclge_del_all_fd_entries,
+get_fd_rule_cnt = hclge_get_fd_rule_cnt,
+get_fd_rule_info = hclge_get_fd_rule_info,
+get_fd_all_rules = hclge_get_all_rules,
+restore_fd_rules = hclge_restore_fd_entries,
+enable_fd = hclge_enable_fd,
+dbg_run_cmd = hclge_dbg_run_cmd,
+handle_hw_ras_error = hclge_handle_hw_ras_error,
+get_hw_reset_stat = hclge_get_hw_reset_stat,
+ae_dev_resetting = hclge_ae_dev_resetting,
+ae_dev_reset_cnt = hclge_ae_dev_reset_cnt,
+get_global_queue_id = hclge_covert_handle_qid_global,
+set_timer_task = hclge_set_timer_task,
};
static struct hnae3_ae_algo ae_algo = {
    .ops = &hclge_ops,
    .name = HCLGE_NAME,
    .pdev_id_table = ae_algo_pci_tbl,
};

@@ -4957,11 +8038,14 @@
 {
     pr_info("%s is initializing\n", HCLGE_NAME);
     -return hnae3_register_ae_algo(&ae_algo);
+    hnae3_register_ae_algo(&ae_algo);
     +
     +return 0;
 } 

static void hclge_exit(void)
{
+    hnae3_unregister_ae_algo_prepare(&ae_algo);
    hnae3_unregister_ae_algo(&ae_algo);
}
module_init(hclge_init);
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_main.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_main.h
@@ -1,26 +1,22 @@
-/*
- * Copyright (c) 2016~2017 Hisilicon Limited.
- */
- *
- * This program is free software; you can redistribute it and/or modify
- * it under the terms of the GNU General Public License as published by
- * the Free Software Foundation; either version 2 of the License, or
- * (at your option) any later version.
- */
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.

#ifndef __HCLGE_MAIN_H
#define __HCLGE_MAIN_H
#include <linux/fs.h>
#include <linux/types.h>
#include <linux/phy.h>
+ #include <linux/if_vlan.h>
+
#include "hclge_cmd.h"
#include "hnae3.h"

#define HCLGE_MOD_VERSION "v1.0"
+#define HCLGE_MOD_VERSION "1.0"
#define HCLGE_DRIVER_NAME "hclge"

-#define HCLGE_INVALID_VPORT 0xffff
+#define HCLGE_MAX_PF_NUM 8

-#define HCLGE_ROCE_VECTOR_OFFSET 96
+#define HCLGE_INVALID_VPORT 0xffff

#define HCLGE_PF_CFG_BLOCK_SIZE 32
#define HCLGE_PF_CFG_DESC_NUM
@@ -32,13 +28,69 @@
#define HCLGE_VECTOR_REG_OFFSET 0x4
#define HCLGE_VECTOR_VF_OFFSET 0x10000

+#define HCLGE_CMDQ_TX_ADDR_L_REG 0x27000
+#define HCLGE_CMDQ_TX_ADDR_H_REG 0x27004
+#define HCLGE_CMDQ_TX_DEPTH_REG 0x27008
+#define HCLGE_CMDQ_TX_TAIL_REG 0x27010
+#define HCLGE_CMDQ_TX_HEAD_REG 0x27014
+#define HCLGE_CMDQ_RX_ADDR_L_REG 0x27018
+#define HCLGE_CMDQ_RX_ADDR_H_REG 0x2701C
+#define HCLGE_CMDQ_RX_DEPTH_REG 0x27020
+#define HCLGE_CMDQ_RX_TAIL_REG 0x27024
+#define HCLGE_CMDQ_RX_HEAD_REG 0x27028
+#define HCLGE_CMDQ_INTR_SRC_REG 0x27100
+#define HCLGE_CMDQ_INTR_STS_REG 0x27104
+#define HCLGE_CMDQ_INTR_EN_REG 0x27108
+#define HCLGE_CMDQ_INTR_GEN_REG 0x2710C
+
+/* bar registers for common func */
+#define HCLGE_VECTOR0_OTER_EN_REG 0x20600
+#define HCLGE_RAS_OTHER_STS_REG 0x20B00
+#define HCLGE_FUNC_RESET_STS_REG 0x20C00
+#define HCLGE_GRO_EN_REG 0x28000
+
+/* bar registers for rcb */
+#define HCLGE_RING_RX_ADDR_L_REG 0x80000
+#define HCLGE_RING_RX_ADDR_H_REG 0x80004
+#define HCLGE_RING_RX_BD_NUM_REG 0x80008
+#define HCLGE_RING_RX_BD_LENGTH_REG 0x8000C
+#define HCLGE_RING_RX_MERGE_EN_REG 0x80014
+#define HCLGE_RING_RX_TAIL_REG 0x80018
+#define HCLGE_RING_RX_HEAD_REG 0x8001C
+#define HCLGE_RING_RX_FBD_NUM_REG 0x80020
+#define HCLGE_RING_RX_OFFSET_REG 0x80024
+#define HCLGE_RING_RX_FBD_OFFSET_REG 0x80028
+#define HCLGE_RING_RX_STASH_REG 0x80030
```c
#define HCLGE_RING_RX_BD_ERR_REG	0x80034
#define HCLGE_RING_TX_ADDR_L_REG	0x80040
#define HCLGE_RING_TX_ADDR_H_REG	0x80044
#define HCLGE_RING_TX_NUM_REG	0x80048
#define HCLGE_RING_TX_PRIORITY_REG	0x8004C
#define HCLGE_RING_TX_TC_REG		0x80050
#define HCLGE_RING_TX_MERGE_EN_REG	0x80054
#define HCLGE_RING_TX_TAIL_REG		0x80058
#define HCLGE_RING_TX_HEAD_REG		0x8005C
#define HCLGE_RING_TX_FBD_NUM_REG	0x80060
#define HCLGE_RING_TX_OFFSET_REG	0x80064
#define HCLGE_RING_TX_EBD_NUM_REG	0x80068
#define HCLGE_RING_TX_EBD_OFFSET_REG	0x80070
#define HCLGE_RING_TX_BD_ERR_REG	0x80074
#define HCLGE_RING_EN_REG0x80090
+  +/* bar registers for tqp interrupt */
#define HCLGE_TQP_INTR_CTRL_REG		0x20000
#define HCLGE_TQP_INTR_GL0_REG		0x20100
#define HCLGE_TQP_INTR_GL1_REG		0x20200
#define HCLGE_TQP_INTR_GL2_REG		0x20300
#define HCLGE_TQP_INTR_RL_REG		0x20900
+  +
#define HCLGE_RSS_IND_TBL_SIZE		512
#define HCLGE_RSS_SET_BITMAP_MSK	GENMASK(15, 0)
#define HCLGE_RSS_KEY_SIZE		40
#define HCLGE_RSS_HASH_ALGO_TOEPLITZ	0
#define HCLGE_RSS_HASH_ALGO_SIMPLE	1
#define HCLGE_RSS_HASH_ALGO_SYMMETRIC	2
-#define HCLGE_RSS_HASH_ALGO_MASK	0xf
+#define HCLGE_RSS_HASH_ALGO_MASK	GENMASK(3, 0)
#define HCLGE_RSS_CFG_TBL_NUM
(HCLGE_RSS_IND_TBL_SIZE / HCLGE_RSS_CFG_TBL_SIZE)
@@ -59,6 +111,10 @@
#define HCLGE_RSS_TC_SIZE_6		64
#define HCLGE_RSS_TC_SIZE_7		128
+#define HCLGE_UMV_TBL_SIZE		3072
+#define HCLGE_DEFAULT_UMV_SPACE_PER_PF
+(HCLGE_UMV_TBL_SIZE / HCLGE_MAX_PF_NUM)
+  +
#define HCLGE_TQP_RESET_TRY_TIMES	10
#define HCLGE_PHY_PAGE_MDIX		0
@@ -73,17 +129,37 @@
/* Copper Specific Status Register */
#define HCLGE_PHY_CSS_REG		17
@@ -59,6 +111,10 @@
#define HCLGE_RSS_TC_SIZE_664
#define HCLGE_RSS_TC_SIZE_7128
+  +
#define HCLGE_TQP_RESET_TRY_TIMES10
#define HCLGE_PHY_PAGE_MDIX0
@@ -73,17 +129,37 @@
  +/* Copper Specific Status Register */
#define HCLGE_PHY_CSS_REG17
```

#define HCLGE_PHY_MDIX_CTRL_S		(5)
+#define HCLGE_PHY_MDIX_CTRL_S5
#define HCLGE_PHY_MDIX_CTRL_M		GENMASK(6, 5)

#define HCLGE_PHY_MDIX_STATUS_B	(6)
#define HCLGE_PHY_SPEED_DUP_RESOLVE_B	(11)
+#define HCLGE_PHY_MDIX_STATUS_B		6
+#define HCLGE_PHY_SPEED_DUP_RESOLVE_B	11
+
+/* Factor used to calculate offset and bitmap of VF num */
+#define HCLGE_VF_NUM_PER_CMD 64
+#define HCLGE_VF_NUM_PER_BYTE 8
+
+enum HLCGE_PORT_TYPE {
+HOST_PORT,
+NETWORK_PORT
+};
+
+#define HCLGE_PF_ID_S			0
+#define HCLGE_PF_ID_M			GENMASK(2, 0)
+#define HCLGE_VF_ID_S			3
+#define HCLGE_VF_ID_M			GENMASK(10, 3)
+#define HCLGE_PORT_TYPE_B		11
+#define HCLGE_NETWORK_PORT_ID_S		0
+#define HCLGE_NETWORK_PORT_ID_M		GENMASK(3, 0)

/* Reset related Registers */
+#define HCLGE_PF_OTHER_INT_REG		0x20600
#define HCLGE_MISC_RESET_STS_REG	0x20700
+#define HCLGE_MISC_VECTOR_INT_STS	0x20800
#define HCLGE_GLOBAL_RESET_REG		0x20A00
-
#define HCLGE_GLOBAL_RESET_BIT		0x0
-
#define HCLGE_Core_RESET_BIT		0x1
+#define HCLGE_GLOBAL_RESET_BIT		0
+#define HCLGE_CORE_RESET_BIT		1
+#define HCLGE_IMP_RESET_BIT		2
#define HCLGE_FUN_RST_ING		0x20C00
#define HCLGE_FUN_RST_ING_B		0
#define HCLGE_VECTOR0_CORERESET_INT_B	6
#define HCLGE_VECTOR0_IMPRESET_INT_B	7
+
+/* Vector0 interrupt CMDQ event source register(RW) */
+#define HCLGE_VECTOR0_CMDQ_SRC_REG	0x27100
+
+/* CMDQ register bits for RX event(=MBX event) */
+#define HCLGE_VECTOR0_RX_CMDQ_INT_B1

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```c
#define HCLGE_VECTOR0_IMP_RESET_INT_B1
+
#define HCLGE_MAC_DEFAULT_FRAME \
+ (ETH_HLEN + ETH_FCS_LEN + 2 * VLAN_HLEN + ETH_DATA_LEN)
+
#define HCLGE_MAC_MIN_FRAME 64
+
#define HCLGE_MAC_MAX_FRAME 9728
+
#define HCLGE_SUPPORT_1G_BIT BIT(0)
+
#define HCLGE_SUPPORT_10G_BIT BIT(1)
+
#define HCLGE_SUPPORT_25G_BIT BIT(2)
+
#define HCLGE_SUPPORT_50G_BIT BIT(3)
+
#define HCLGE_SUPPORT_100G_BIT BIT(4)
+

enum HCLGE_DEV_STATE { 
    HCLGE_STATE_REINITING,
    HCLGE_STATE_DOWN,
    @ @ -99.21 +193.26 @ @
    HCLGE_STATE_REMOVING,
    HCLGE_STATE_SERVICE_INITED,
    HCLGE_STATE_SERVICE_SCHED,
    +HCLGE_STATE_RST_SERVICE_SCHED,
    +HCLGE_STATE_RST_HANDLING,
    +HCLGE_STATE_MBX_SERVICE_SCHED,
    HCLGE_STATE_MBX_HANDLING,
    -HCLGE_STATE_MBX_IRQ,
    -HCLGE_STATE_RESET_INT,
    +HCLGE_STATE_STATISTICS_UPDATING,
    +HCLGE_STATE_CMD_DISABLE,
    HCLGE_STATE_MAX
};

-#define HCLGE_MPF_ENBALE 1
-
-struct hclge_caps { 
-    u16 num_tqp;
-    u16 num_buffer_cell;
-    u32 flag;
-    u16 vmdq;
+    enum hclge_evt_cause { 
+        HCLGE_VECTOR0_EVENT_RST,
+        HCLGE_VECTOR0_EVENT_MBX,
+        HCLGE_VECTOR0_EVENT_ERR,
+        HCLGE_VECTOR0_EVENT_OTHER,
+    };
+
+    #define HCLGE_MPF_ENBALE 1
+
+    enum HCLGE_MAC_SPEED {
```
HCLGE_MAC_SPEED_UNKNOWN = 0, /* unknown */
HCLGE_MAC_SPEED_10M = 10, /* 10 Mbps */
HCLGE_MAC_SPEED_100M = 100, /* 100 Mbps */
HCLGE_MAC_SPEED_1G = 1000, /* 1000 Mbps = 1 Gbps */
@@ -129,13 +228,6 @@
HCLGE_MAC_FULL
];

-enum hclge_mta_dmac_sel_type {
-HCLGE_MAC_ADDR_47_36,
-HCLGE_MAC_ADDR_46_35,
-HCLGE_MAC_ADDR_45_34,
-HCLGE_MAC_ADDR_44_33,
-};

-struct hclge_mac {
  u8 phy_addr;
  u8 flag;
@@ -148,6 +240,8 @@
  struct phy_device *phydev;
  struct mii_bus *mdio_bus;
  phy_interface_t phy_if;
  +__ETHTOOL_DECLARE_LINK_MODE_MASK(supported);
  +__ETHTOOL_DECLARE_LINK_MODE_MASK(advertising);
  };

struct hclge_hw {
@@ -155,8 +249,6 @@
  struct hclge_mac mac;
  int num_vec;
  struct hclge_cmq cmq;
  -struct hclge_caps caps;
  -void *back;
  };

/* TQP stats */
@@ -168,7 +260,10 @@
  };

struct hclge_tqp {
-struct device *dev; /* Device for DMA mapping */
+/* copy of device pointer from pci_dev,
+ * used when perform DMA mapping
+ */
+struct device *dev;
  struct hnae3_queue q;
  struct hclge_tqp_stats tqp_stats;
  u16 index; /* Global index in a NIC controller */
struct hclge_tm_info {
  u8 tc_num;
  u16 tqp_desc_num;
  u16 rx_buf_len;
  +u16 rss_size_max;
  u8 phy_addr;
  u8 media_type;
  u8 mac_addr[ETH_ALEN];
  u8 default_speed;
  u32 numa_node_map;
  +u8 speed_ability;
  +u16 umv_space;
};

struct hclge_tc_info tc_info[HNAE3_MAX_TC];
enum hclge_fc_mode fc_mode;
u8 hw_pfc_map; /* Allow for packet drop or not on this TC */
+u8 pfc_en; /* PFC enabled or not for user priority */
};

struct hclge_comm_stats_str {
  unsigned long offset;
};

/* all 64bit stats, opcode id: 0x0030 */
-struct hclge_64_bit_stats {
  /* query_igu_stat */
  u64 igu_rx_oversize_pkt;
  u64 igu_rx_undersize_pkt;
  u64 igu_rx_out_all_pkt;
  u64 igu_rx_uni_pkt;
  u64 igu_rx_multi_pkt;
  u64 igu_rx_broad_pkt;
  rsv0;
  -
  /* query_egu_stat */
  u64 egu_tx_out_all_pkt;
  u64 egu_tx_uni_pkt;
  u64 egu_tx_multi_pkt;
  u64 egu_tx_broad_pkt;
  -
  /* ssu_ppp packet stats */
  u64 ssu_ppp_mac_key_num;
  u64 ssu_ppp_host_key_num;
  u64 pppsséu_mac_rlt_num;
u64 ppp_ssu_host_rlt_num;
-
/* ssu_tx_in_out_dfx_stats */
-u64 ssu_tx_in_num;
-u64 ssu_tx_out_num;
/* ssu_rx_in_out_dfx_stats */
-u64 ssu_rx_in_num;
-u64 ssu_rx_out_num;
-
/* all 32bit stats, opcode id: 0x0031 */
struct hclge_32_bit_stats {
  u64 igu_rx_err_pkt;
  u64 igu_rx_no_eof_pkt;
  u64 igu_rx_no_sof_pkt;
  u64 egu_tx_1588_pkt;
  u64 egu_tx_err_pkt;
  u64 ssu_full_drop_num;
  u64 ssu_part_drop_num;
  u64 ppp_key_drop_num;
  u64 ppp_rlt_drop_num;
  u64 ssu_key_drop_num;
  u64 pkt_curr_buf_cnt;
  u64 qcn_fb_rcv_cnt;
  u64 qcn_fb_drop_cnt;
  u64 qcn_fb_invaild_cnt;
  u64 rsv0;
  u64 rx_packet_tc0_in_cnt;
  u64 rx_packet_tc1_in_cnt;
  u64 rx_packet_tc2_in_cnt;
  u64 rx_packet_tc3_in_cnt;
  u64 rx_packet_tc4_in_cnt;
  u64 rx_packet_tc5_in_cnt;
  u64 rx_packet_tc6_in_cnt;
  u64 rx_packet_tc7_in_cnt;
  u64 rx_packet_tc0_out_cnt;
  u64 rx_packet_tc1_out_cnt;
  u64 tx_packet_tc2_in_cnt;
- u64 tx_packet_tc3_in_cnt;
- u64 tx_packet_tc4_in_cnt;
- u64 tx_packet_tc5_in_cnt;
- u64 tx_packet_tc6_in_cnt;
- u64 tx_packet_tc7_in_cnt;
- u64 tx_packet_tc0_out_cnt;
- u64 tx_packet_tc1_out_cnt;
- u64 tx_packet_tc2_out_cnt;
- u64 tx_packet_tc3_out_cnt;
- u64 tx_packet_tc4_out_cnt;
- u64 tx_packet_tc5_out_cnt;
- u64 tx_packet_tc6_out_cnt;
- u64 tx_packet_tc7_out_cnt;
-
- /* packet buffer statistics */
- u64 pktCurr_buf_tc0_cnt;
- u64 pktCurr_buf_tc1_cnt;
- u64 pktCurr_buf_tc2_cnt;
- u64 pktCurr_buf_tc3_cnt;
- u64 pktCurr_buf_tc4_cnt;
- u64 pktCurr_buf_tc5_cnt;
- u64 pktCurr_buf_tc6_cnt;
- u64 pktCurr_buf_tc7_cnt;
-
- u64 mb_uncopy_num;
- u64 lo_pri_unicast_rlt_drop_num;
- u64 hi_pri_multicast_rlt_drop_num;
- u64 lo_pri_multicast_rlt_drop_num;
- u64 rx_oq_drop_pkt_cnt;
- u64 tx_oq_drop_pkt_cnt;
- u64 nic_l2_err_drop_pkt_cnt;
- u64 roc_l2_err_drop_pkt_cnt;
- );
-
- /* mac stats ,opcode id: 0x0032 */
struct hclge_mac_stats {
  u64 mac_tx_mac_pause_num;
  u64 mac_tx_multi_pkt_num;
  u64 mac_tx_broad_pkt_num;
  u64 mac_tx_undersize_pkt_num;
  u64 mac_tx_oversize_pkt_num;
  u64 mac_tx_64_oct_pkt_num;
  u64 mac_tx_65_127_oct_pkt_num;
  u64 mac_tx_128_255_oct_pkt_num;
  u64 mac_tx_256_511_oct_pkt_num;
  u64 mac_tx_512_1023_oct_pkt_num;
u64 mac_tx_1024_1518_oct_pkt_num;
-u64 mac_tx_1519_max_oct_pkt_num;
+u64 mac_tx_1519_2047_oct_pkt_num;
+u64 mac_tx_2048_4095_oct_pkt_num;
+u64 mac_tx_4096_8191_oct_pkt_num;
+u64 rsv0;
+u64 mac_tx_8192_9216_oct_pkt_num;
+u64 mac_tx_9217_12287_oct_pkt_num;
+u64 mac_tx_12288_16383_oct_pkt_num;
+u64 mac_tx_1519_max_good_oct_pkt_num;
+u64 mac_tx_1519_max_bad_oct_pkt_num;
+
+u64 mac_rx_total_pkt_num;
+u64 mac_rx_total_oct_num;
+u64 mac_rx_good_pkt_num;
@@ -382,35 +387,268 @@
+u64 mac_rx_multi_pkt_num;
+u64 mac_rx_broad_pkt_num;
+u64 mac_rx_oversize_pkt_num;
+u64 mac_rx_oversize_pkt_num;
+u64 mac_rx_64_oct_pkt_num;
+u64 mac_rx_65_127_oct_pkt_num;
+u64 mac_rx_128_255_oct_pkt_num;
+u64 mac_rx_256_511_oct_pkt_num;
+u64 mac_rx_512_1023_oct_pkt_num;
+u64 mac_rx_1024_1518_oct_pkt_num;
-64 mac_rx_1519_max_oct_pkt_num;
-
-64 mac_trans_fragment_pkt_num;
-64 mac_trans_undermin_pkt_num;
-64 mac_trans_jabber_pkt_num;
-64 mac_trans_err_all_pkt_num;
-64 mac_trans_from_app_good_pkt_num;
-64 mac_trans_from_app_bad_pkt_num;
-64 mac_rcv_fragment_pkt_num;
-64 mac_rcv_undermin_pkt_num;
-64 mac_rcv_jabber_pkt_num;
-64 mac_rcv_fcs_err_pkt_num;
-64 mac_rcv_send_app_good_pkt_num;
-64 mac_rcv_send_app_bad_pkt_num;
+u64 mac_rx_1519_2047_oct_pkt_num;
+u64 mac_rx_2048_4095_oct_pkt_num;
+u64 mac_rx_4096_8191_oct_pkt_num;
+u64 rsv1;
+u64 mac_rx_8192_9216_oct_pkt_num;
+u64 mac_rx_9217_12287_oct_pkt_num;
+u64 mac_rx_12288_16383_oct_pkt_num;
+u64 mac_rx_1519_max_good_oct_pkt_num;
+u64 mac_rx_1519_max_bad_oct_pkt_num;
+
Open Source Used In 5GaaS Edge AC-4 25036
+u64 mac_rx_1519_max_good_oct_pkt_num;
+u64 mac_rx_1519_max_bad_oct_pkt_num;
+
+u64 mac_tx_fragment_pkt_num;
+u64 mac_tx_undermin_pkt_num;
+u64 mac_tx_jabber_pkt_num;
+u64 mac_tx_err_all_pkt_num;
+u64 mac_tx_from_app_good_pkt_num;
+u64 mac_tx_from_app_bad_pkt_num;
+u64 mac_rx_fragment_pkt_num;
+u64 mac_rx_from_app_good_pkt_num;
+u64 mac_rx_undermin_pkt_num;
+u64 mac_rx_jabber_pkt_num;
+u64 mac_rx_fcs_err_pkt_num;
+u64 mac_rx_send_app_good_pkt_num;
+u64 mac_rx_send_app_bad_pkt_num;
};

+#define HCLGE_STATS_TIMER_INTERVAL (60 * 5)

struct hclge_hw_stats {
    struct hclge_mac_stats      mac_stats;
    -struct hclge_64_bit_stats   all_64_bit_stats;
    -struct hclge_32_bit_stats   all_32_bit_stats;
    +u32 stats_timer;
};
+
+struct hclge_vlan_type_cfg {
    +u16 rx_ot_fst_vlan_type;
    +u16 rx_ot_sec_vlan_type;
    +u16 rx_in_fst_vlan_type;
    +u16 rx_in_sec_vlan_type;
    +u16 tx_ot_vlan_type;
    +u16 tx_in_vlan_type;
};

+enum HCLGE_FD_MODE {
    +HCLGE_FD_MODE_DEPTH_2K_WIDTH_400B_STAGE_1,
    +HCLGE_FD_MODE_DEPTH_1K_WIDTH_400B_STAGE_2,
    +HCLGE_FD_MODE_DEPTH_4K_WIDTH_200B_STAGE_1,
    +HCLGE_FD_MODE_DEPTH_2K_WIDTH_200B_STAGE_2,
};
+
+enum HCLGE_FD_KEY_TYPE {
    +HCLGE_FD_KEY_BASE_ON_PTYPE,
    +HCLGE_FD_KEY_BASE_ON_TUPLE,
};
+
+enum HCLGE_FD_STAGE {
    +HCLGE_FD_STAGE_1,
+HCLGE_FD_STAGE_2,
+
*/ OUTER_XXX indicates tuples in tunnel header of tunnel packet
* INNER_XXX indicate tuples in tunneled header of tunnel packet or
* tuples of non-tunnel packet
*/
+enum HCLGE_FD_TUPLE {
+OUTER_DST_MAC,
+OUTER_SRC_MAC,
+OUTER_VLAN_TAG_FST,
+OUTER_VLAN_TAG_SEC,
+OUTER_ETH_TYPE,
+OUTER_L2_RSV,
+OUTER_IP_TOS,
+OUTER_IP_PROTO,
+OUTER_SRC_IP,
+OUTER_DST_IP,
+OUTER_L3_RSV,
+OUTER_SRC_PORT,
+OUTER_DST_PORT,
+OUTER_L4_RSV,
+OUTER_TUN_VNI,
+OUTER_TUN_FLOW_ID,
+INNER_DST_MAC,
+INNER_SRC_MAC,
+INNER_VLAN_TAG_FST,
+INNER_VLAN_TAG_SEC,
+INNER_ETH_TYPE,
+INNER_L2_RSV,
+INNER_IP_TOS,
+INNER_IP_PROTO,
+INNER_SRC_IP,
+INNER_DST_IP,
+INNER_L3_RSV,
+INNER_SRC_PORT,
+INNER_DST_PORT,
+INNER_L4_RSV,
+MAX_TUPLE,
+}
+
+enum HCLGE_FD_META_DATA {
+PACKET_TYPE_ID,
+IP.FRAGMENT,
+ROCE_TYPE,
+NEXT_KEY,
+VLAN_NUMBER,
+SRC_VPORT,
+DST_VPORT,
+TUNNEL_PACKET,
+MAX_META_DATA,
+};
+
+struct key_info {
+u8 key_type;
+u8 key_length;
+};
+
+static const struct key_info meta_data_key_info[] = {
+{ PACKET_TYPE_ID, 6},
+{ IP_FRAGMENT, 1},
+{ ROCE_TYPE, 1},
+{ NEXT_KEY, 5},
+{ VLAN_NUMBER, 2},
+{ SRC_VPORT, 12},
+{ DST_VPORT, 12},
+{ TUNNEL_PACKET, 1},
+};
+
+static const struct key_info tuple_key_info[] = {
+{ OUTER_DST_MAC, 48},
+{ OUTER_SRC_MAC, 48},
+{ OUTER_VLAN_TAG_FST, 16},
+{ OUTER_VLAN_TAG_SEC, 16},
+{ OUTER_ETH_TYPE, 16},
+{ OUTER_L2_RSV, 16},
+{ OUTER_IP_TOS, 8},
+{ OUTER_IP_PROTO, 8},
+{ OUTER_SRC_IP, 32},
+{ OUTER_DST_IP, 32},
+{ OUTER_L3_RSV, 16},
+{ OUTER_SRC_PORT, 16},
+{ OUTER_DST_PORT, 16},
+{ OUTER_L4_RSV, 32},
+{ OUTER_TUN_VNI, 24},
+{ OUTER_TUN_FLOW_ID, 8},
+{ INNER_DST_MAC, 48},
+{ INNER_SRC_MAC, 48},
+{ INNER_VLAN_TAG_FST, 16},
+{ INNER_VLAN_TAG_SEC, 16},
+{ INNER_ETH_TYPE, 16},
+{ INNER_L2_RSV, 16},
+{ INNER_IP_TOS, 8},
+{ INNER_IP_PROTO, 8},
+{ INNER_SRC_IP, 32},
+{ INNER_DST_IP, 32},
+{ INNER_L3_RSV, 16},
+{ INNER_SRC_PORT, 16},
+{ INNER_DST_PORT, 16},
+{ INNER_L4_RSV, 32},
+};
+
+#define MAX_KEY_LENGTH 400
+#define MAX_KEY_DWORDS DIV_ROUND_UP(MAX_KEY_LENGTH / 8, 4)
+#define MAX_KEY_BYTES(MAX_KEY_DWORDS * 4)
+#define MAX_META_DATA_LENGTH 32
+
+enum HCLGE_FD_PACKET_TYPE {
+NIC_PACKET,
+ROCE_PACKET,
+};
+
+enum HCLGE_FD_ACTION {
+HCLGE_FD_ACTION_ACCEPT_PACKET,
+HCLGE_FD_ACTION_DROP_PACKET,
+};
+
+struct hclge_fd_key_cfg {
+u8 key_sel;
+u8 inner_sipv6_word_en;
+u8 inner_dipv6_word_en;
+u8 outer_sipv6_word_en;
+u8 outer_dipv6_word_en;
+u32 tuple_active;
+u32 meta_data_active;
+};
+
+struct hclge_fd_cfg {
+u8 fd_mode;
+u8 fd_en;
+u16 max_key_length;
+u32 proto_support;
+u32 rule_num[2]; /* rule entry number */
+u16 cnt_num[2]; /* rule hit counter number */
+struct hclge_fd_key_cfg key_cfg[2];
+};
+
+struct hclge_fd_rule_tuples {
+u8 src_mac[6];
+u8 dst_mac[6];
+u32 src_ip[4];
+u32 dst_ip[4];
+u16 src_port;
+u16 dst_port;
+u16 vlan_tag1;
+u16 ether_proto;
+u8 ip_tos;
+u8 ip_proto;
+};
+
+struct hclge_fd_rule {
+struct hlist_node rule_node;
+struct hclge_fd_rule_tuples tuples;
+struct hclge_fd_rule_tuples tuples_mask;
+u32 unused_tuple;
+u32 flow_type;
+u8 action;
+u16 vf_id;
+u16 queue_id;
+u16 location;
+};
+
+struct hclge_fd_ad_data {
+u16 ad_id;
+u8 drop_packet;
+u8 forward_to_direct_queue;
+u16 queue_id;
+u8 use_counter;
+u8 counter_id;
+u8 use_next_stage;
+u8 write_rule_id_to_bd;
+u8 next_input_key;
+u16 rule_id;
+};
+
+/* For each bit of TCAM entry, it uses a pair of 'x' and
  * 'y' to indicate which value to match, like below:
  * --------------------------
  * | bit x | bit y | search value |
  * --------------------------
  * | 0     | 0     | always hit   |
  * --------------------------
  * | 1     | 0     | match '0'    |
  * --------------------------
  * | 0     | 1     | match '1'    |
  * --------------------------
  * | 1     | 1     | invalid      |
  * --------------------------
  * Then for input key(k) and mask(v), we can calculate the value by
  * the formulae:
  * x = (~k) & v
  * y = (k ^ ~v) & k
```c
+ */
#define calc_x(x, k, v) ((x) = (~(k) & (v)))
#define calc_y(y, k, v) \
+do { \
+const typeof(k) _k_ = (k); \
+const typeof(v) _v_ = (v); \
+(y) = (_k_ ^ ~_v_) & (_k_); \
+} while (0)
+#define HCLGE_VPORT_NUM 256
struct hclge_dev {
struct pci_dev *pdev;
struct hnae3_ae_dev *ae_dev;
@@ -418,20 +656,26 @@
struct hclge_misc_vector misc_vector;
struct hclge_hw_stats hw_stats;
unsigned long state;
+unsigned long flr_state;
+unsigned long last_reset_time;
enum hnae3_reset_type reset_type;
+enum hnae3_reset_type reset_level;
+unsigned long default_reset_request;
+unsigned long reset_request;/* reset has been requested */
+unsigned long reset_pending;/* client rst is pending to be served */
+unsigned long reset_count;/* the number of reset has been done */
+u32 reset_fail_cnt;
u32 fw_version;
u16 num_vmdq_vport;/* Num vmdq vport this PF has set up */
u16 num_tqps;/* Num task queue pairs of this PF */
u16 num_req_vfs;/* Num VFs requested for this PF */

-/* Base task tqp physical id of this PF */
-u16 base_tqp_pid;
+u16 base_tqp_pid;/* Base task tqp physical id of this PF */
u16 alloc_rss_size;/* Allocated RSS task queue */
u16 rss_size_max;/* HW defined max RSS task queue */

-/* Num of guaranteed filters for this PF */
-u16 fdir_pf_filter_count;
+u16 fdir_pf_filter_count;/* Num of guaranteed filters for this PF */
u16 numALLOC_vport;/* Num vports this driver supports */
u32 numa_node_mask;
u16 rx_buf_len;
@@ -439,6 +683,7 @@
u8 hw_tc_map;
u8 tc_num_last_time;
enum hclge_fc_mode fc_mode_last_time;
```
+u8 support_sfp_query;

#define HCLGE_FLAG_TC_BASE_SCH_MODE1
#define HCLGE_FLAG_VNET_BASE_SCH_MODE2
@@ -453,6 +698,7 @@
 u16 num_msi;
 u16 num_msi_left;
 u16 num_msi_used;
+u16 roce_base_msix_offset;
 u32 base_msi_vector;
 u16 *vector_status;
 int *vector_irq;
@@ -468,7 +714,10 @@
 unsigned long service_timer_period;
 unsigned long service_timer_previous;
 struct timer_list service_timer;
+struct timer_list reset_timer;
 struct work_struct service_task;
+struct work_struct rst_service_task;
+struct work_struct mbx_service_task;

 bool cur_promisc;
 int num_alloc_vfs;/* Actual number of VFs allocated */
@@ -488,11 +737,65 @@
 u32 flag:

 u32 pkt_buf_size;/* Total pf buf size for tx/rx */
+u32 tx_buf_size;/* Tx buffer size for each TC */
+u32 dv_buf_size;/* Dv buffer size for each TC */
+u32 mps;/* Max packet size */
+/* vport_lock protect resource shared by vports */
+struct mutex vport_lock;
+
+struct hclge_vlan_type_cfg vlan_type_cfg;
+
+unsigned long vlan_table[VLAN_N_VID][BITS_TO_LONGS(HCLGE_VPORT_NUM)];

 -enum hclge_mta_dmac_sel_type mta_mac_sel_type;
-bool enable_mta;/* Mutilcast filter enable */
-bool accept_mta_mc;/* Whether accept mta filter multicast */
+struct hclge_fd_cfg fd_cfg;
+struct hlist_head fd_rule_list;
+u16 hclge_fd_rule_num;
+
+u16 wanted_umv_size;
+/* max available unicast mac vlan space */
+u16 max_umv_size;
/* private unicast mac vlan space, it's same for PF and its VFs */
u16 priv_umv_size;
/* unicast mac vlan space shared by PF and its VFs */
u16 share_umv_size;
+struct mutex umv_mutex; /* protect share_umv_size */
+
+/* VPort level vlan tag configuration for TX direction */
+struct hclge_tx_vtag_cfg {
+  bool accept_tag1;/* Whether accept tag1 packet from host */
+  bool accept_untag1;/* Whether accept untag1 packet from host */
+  bool accept_tag2;
+  bool accept_untag2;
+  bool insert_tag1_en;/* Whether insert inner vlan tag */
+  bool insert_tag2_en;/* Whether insert outer vlan tag */
+  u16  default_tag1;/* The default inner vlan tag to insert */
+  u16  default_tag2;/* The default outer vlan tag to insert */
+};
+
+/* VPort level vlan tag configuration for RX direction */
+struct hclge_rx_vtag_cfg {
+  bool strip_tag1_en;/* Whether strip inner vlan tag */
+  bool strip_tag2_en;/* Whether strip outer vlan tag */
+  bool vlan1_vlan_prionly;/* Inner VLAN Tag up to descriptor Enable */
+  bool vlan2_vlan_prionly;/* Outer VLAN Tag up to descriptor Enable */
+};
+
+struct hclge_rss_tuple_cfg {
+  u8 ipv4_tcp_en;
+  u8 ipv4_udp_en;
+  u8 ipv4_sctp_en;
+  u8 ipv4_fragment_en;
+  u8 ipv6_tcp_en;
+  u8 ipv6_udp_en;
+  u8 ipv6_sctp_en;
+  u8 ipv6_fragment_en;
+};
+
+enum HCLGE_VPORT_STATE {
+  HCLGE_VPORT_STATE_ALIVE,
+  HCLGE_VPORT_STATE_MAX
+};
+int rss_algo;/* User configured hash algorithm */
+/* User configured rss tuple sets */
+struct hclge_rss_tuple_cfg rss_tuple_sets;
+
+u16 alloc_rss_size;
+
+u16 qs_offset;
-u16 bw_limit;/* VSI BW Limit (0 = disabled) */
+u32 bw_limit;/* VSI BW Limit (0 = disabled) */
+u8 dwrr;
+
+struct hclge_tx_vtag_cfg txvlan_cfg;
+struct hclge_rx_vtag_cfg rxvlan_cfg;
+
+u16 used_umv_num;
+
+int vport_id;
struct hclge_dev *back; /* Back reference to associated dev */
struct hnae3_handle nic;
struct hnae3_handle roce;
+
+unsigned long state;
+unsigned long last_active_jiffies;
+u32 mps; /* Max packet size */
};

void hclge_promisc_param_init(struct hclge_promisc_param *param, bool en_uc,
@@ -525,12 +841,11 @@
int hclge_rm_mc_addr_common(struct hclge_vport *vport,
    const unsigned char *addr);

-int hclge_cfg_func_mta_filter(struct hclge_dev *hdev,
-  u8 func_id,
-  bool enable);
struct hclge_vport *hclge_get_vport(struct hnae3_handle *handle);
-int hclge_map_vport_ring_to_vector(struct hclge_vport *vport, int vector,
-  struct hnae3_ring_chain_node *ring_chain);
+int hclge_bind_ring_with_vector(struct hclge_vport *vport,
+  int vector_id, bool en,
+  struct hnae3_ring_chain_node *ring_chain);
+
+static inline int hclge_get_queue_id(struct hnae3_queue *queue)
+{
+    struct hclge_tqp *tqp = container_of(queue, struct hclge_tqp, q);
+    return tqp->index;
+}
static inline bool hclge_is_reset_pending(struct hclge_dev *hdev)
{
    return !!hdev->reset_pending;
}

int hclge_inform_reset_assert_to_vf(struct hclge_vport *vport);
int hclge_cfg_mac_speed_dup(struct hclge_dev *hdev, int speed, u8 duplex);
int hclge_set_vf_vlan_common(struct hclge_dev *vport, int vfid,
    bool is_kill, u16 vlan, u8 qos, __be16 proto);
int hclge_set_vf_vlan_filter(struct hnae3_handle *handle, __be16 proto,
    u16 vlan_id, bool is_kill);
int hclge_en_hw_strip_rxvtag(struct hnae3_handle *handle, bool enable);

int hclge_buffer_alloc(struct hclge_dev *hdev);
int hclge_rss_init_hw(struct hclge_dev *hdev);
void hclge_rss_indir_init_cfg(struct hclge_dev *hdev);

int hclge_inform_reset_assert_to_vf(struct hclge_vport *vport);
void hclge_mbx_handler(struct hclge_dev *hdev);
int hclge_reset_tqp(struct hnae3_handle *handle, u16 queue_id);
void hclge_reset_vf_queue(struct hclge_vport *vport, u16 queue_id);
int hclge_cfg_flowctrl(struct hclge_dev *hdev);
int hclge_func_reset_cmd(struct hclge_dev *hdev, int func_id);
int hclge_vport_start(struct hclge_vport *vport);
void hclge_vport_stop(struct hclge_vport *vport);
int hclge_set_vport_mtu(struct hclge_vport *vport, int new_mtu);
int hclge_dbg_run_cmd(struct hnae3_handle *handle, char *cmd_buf);

u16 hclge_covert_handle_qid_global(struct hnae3_handle *handle, u16 queue_id);

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_mbx.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_mbx.c
@@ -0,0 +1,566 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.
+
+#include "hclge_main.h"
+#include "hclge_mbx.h"
+#include "hnae3.h"
+
+/* hclge_gen_resp_to_vf: used to generate a synchronous response to VF when PF
+ receives a mailbox message from VF.
+ @vport: pointer to struct hclge_vport
+ @vf_to_pf_req: pointer to hclge_mbx_vf_to_pf_cmd of the original mailbox
+ @message
+ @resp_status: indicate to VF whether its request success(0) or failed.
+ */
+static int hclge_gen_resp_to_vf(struct hclge_vport *vport,
+    struct hclge_mbx_vf_to_pf_cmd *vf_to_pf_req,
int resp_status,
+u8 *resp_data, u16 resp_data_len)
+
+struct hclge_mbx_pf_to_vf_cmd *resp_pf_to_vf;
+struct hclge_dev *hdev = vport->back;
+enum hclge_cmd_status status;
+struct hclge_desc desc;
+
+resp_pf_to_vf = (struct hclge_mbx_pf_to_vf_cmd *)desc.data;
+
+if (resp_data_len > HCLGE_MBX_MAX_RESP_DATA_SIZE) {
+dev_err(&hdev->pdev->dev,
+"PF fail to gen resp to VF len %d exceeds max len %d\n",
+resp_data_len,
+HCLGE_MBX_MAX_RESP_DATA_SIZE);
+
+hclge_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_MBX_PF_TO_VF, false);
+
+resp_pf_to_vf->dest_vfid = vf_to_pf_req->mbx_src_vfid;
+resp_pf_to_vf->msg_len = vf_to_pf_req->msg_len;
+
+resp_pf_to_vf->msg[0] = HCLGE_MBX_PF_VF_RESP;
+resp_pf_to_vf->msg[1] = vf_to_pf_req->msg[0];
+resp_pf_to_vf->msg[2] = vf_to_pf_req->msg[1];
+resp_pf_to_vf->msg[3] = (resp_status == 0) ? 0 : 1;
+
+if (resp_data && resp_data_len > 0)
+memcpy(&resp_pf_to_vf->msg[4], resp_data, resp_data_len);
+
+status = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (status)
+dev_err(&hdev->pdev->dev,
+"PF failed(=%d) to send response to VF\n", status);
+
+return status;
+}
+hclge_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_MBX_PF_TO_VF, false);
+
+resp_pf_to_vf->dest_vfid = dest_vfid;
+resp_pf_to_vf->msg_len = msg_len;
+resp_pf_to_vf->msg[0] = mbx_opcode;
+
+memcpy(&resp_pf_to_vf->msg[1], msg, msg_len);
+
+status = hclge_cmd_send(&hdev->hw, &desc, 1);
+if (status)
+dev_err(&hdev->pdev->dev,
+"PF failed(=%d) to send mailbox message to VF\n",
+status);
+
+return status;
+
+int hclge_inform_reset_assert_to_vf(struct hclge_vport *vport)
+{
+struct hclge_dev *hdev = vport->back;
+enum hnae3_reset_type reset_type;
+u8 msg_data[2];
+u8 dest_vfid;
+
+dest_vfid = (u8)vport->vport_id;
+
+if (hdev->reset_type == HNAE3_FUNC_RESET)
+reset_type = HNAE3_VF_PF_FUNC_RESET;
+else if (hdev->reset_type == HNAE3_FLR_RESET)
+reset_type = HNAE3_VF_FULL_RESET;
+else
+return -EINVAL;
+
+memcpy(&msg_data[0], &reset_type, sizeof(u16));
+
+/* send this requested info to VF */
+return hclge_send_mbx_msg(vport, msg_data, sizeof(msg_data),
+HCLGE_MBX_ASSERTING_RESET, dest_vfid);
+}
+
+static void hclge_free_vector_ring_chain(struct hnae3_ring_chain_node *head)
+{
+struct hnae3_ring_chain_node *chain_tmp, *chain;
+
+chain = head->next;
+
+while (chain) {
+chain_tmp = chain->next;
+kzfree(chain);
+chain = chain_tmp;
+
+} }
+
+/* hclge_get_ring_chain_from_mbx: get ring type & tqp id & int_gl idx
+ * from mailbox message
+ * msg[0]: opcode
+ * msg[1]: <not relevant to this function>
+ * msg[2]: ring_num
+ * msg[3]: first ring type (TX|RX)
+ * msg[4]: first tqp id
+ * msg[5]: first int_gl idx
+ * msg[6] ~ msg[14]: other ring type, tqp id and int_gl idx
+ */
+static int hclge_get_ring_chain_from_mbx(
+struct hclge_mbx_vf_to_pf_cmd *req,
+struct hnae3_ring_chain_node *ring_chain,
+struct hclge_vport *vport)
+
+{" struct hnae3_ring_chain_node *cur_chain, *new_chain;
+int ring_num;
+int i;
+
+ring_num = req->msg[2];
+
+if (ring_num > ((HCLGE_MBX_VF_MSG_DATA_NUM -
+HCLGE_MBX_RING_MAP_BASIC_MSG_NUM) /
+HCLGE_MBX_RING_NODE_VARIABLE_NUM))
+return -ENOMEM;
+
+hnae3_set_bit(ring_chain->flag, HNAE3_RING_TYPE_B, req->msg[3]);
+ring_chain->tqp_index =
+hclge_get_queue_id(vport->nic.kinfo.tqp[req->msg[4]]);
+hnae3_set_field(ring_chain->int_gl_idx, HNAE3_RING_GL_IDX_M,
+HNAE3_RING_GL_IDX_S,
+req->msg[5]);
+
+cur_chain = ring_chain;
+
+for (i = 1; i < ring_num; i++) {
+new_chain = kzalloc(sizeof(*new_chain), GFP_KERNEL);
+if (!new_chain)
+goto err;
+
+hnae3_set_bit(new_chain->flag, HNAE3_RING_TYPE_B,
+req->msg[HCLGE_MBX_RING_NODE_VARIABLE_NUM * i +
+HCLGE_MBX_RING_MAP_BASIC_MSG_NUM]);
+}
hclge_get_queue_id(vport->nic.kinfo.tqp + [req->msg[HCLGE_MBX_RING_NODE_VARIABLE_NUM * i + HCLGE_MBX_RING_MAP_BASIC_MSG_NUM + 1]]);

hclge_set_field(new_chain->int_gl_idx, HNAE3_RING_GL_IDX_M, HNAE3_RING_GL_IDX_S, req->msg[HCLGE_MBX_RING_NODE_VARIABLE_NUM * i + HCLGE_MBX_RING_MAP_BASIC_MSG_NUM + 2]);

cur_chain->next = new_chain;
cur_chain = new_chain;
}

return 0;
}

err:

hclge_free_vector_ring_chain(ring_chain);
return -ENOMEM;
}

static int hclge_map_unmap_ring_to_vf_vector(struct hclge_vport *vport, bool en, struct hclge_mbx_vf_to_pf_cmd *req)
{

static int hclge_map_unmap_ring_to_vf_vector(struct hclge_vport *vport, bool en, struct hclge_mbx_vf_to_pf_cmd *req)
{

static int hclge_set_vf_promisc_mode(struct hclge_vport *vport, struct hclge_mbx_vf_to_pf_cmd *req)
{
struct hclge_promisc_param param;

/* always enable broadcast promise bit */
+hclge_promisc_param_init(&param, en_uc, en_mc, true, vport->vport_id);
+return hclge_cmd_set_promisc_mode(vport->back, &param);
+
+static int hclge_set_vf_uc_mac_addr(struct hclge_vport *vport,
+    struct hclge_mbx_vf_to_pf_cmd *mbx_req,
+    bool gen_resp)
+{
+    const u8 *mac_addr = (const u8 *)(&mbx_req->msg[2]);
+    struct hclge_dev *hdev = vport->back;
+    int status;
+    +
+    if (mbx_req->msg[1] == HCLGE_MBX_MAC_VLAN_UC_MODIFY) {
+        const u8 *old_addr = (const u8 *)(&mbx_req->msg[8]);
+        +hclge_rm_uc_addr_common(vport, old_addr);
+        status = hclge_add_uc_addr_common(vport, mac_addr);
+        if (status)
+            hclge_add_uc_addr_common(vport, old_addr);
+    } else if (mbx_req->msg[1] == HCLGE_MBX_MAC_VLAN_UC_ADD) {
+        status = hclge_add_uc_addr_common(vport, mac_addr);
+    } else if (mbx_req->msg[1] == HCLGE_MBX_MAC_VLAN_UC_REMOVE) {
+        status = hclge_rm_uc_addr_common(vport, mac_addr);
+    } else {
+        dev_err(&hdev->pdev->dev, "failed to set unicast mac addr, unknown subcode %d\n",
+            mbx_req->msg[1]);
+        return -EIO;
+    }
+    +
+    if (gen_resp)
+        hclge_gen_resp_to_vf(vport, mbx_req, status, NULL, 0);
+    +
+    return 0;
+}
+
+static int hclge_set_vf_mc_mac_addr(struct hclge_vport *vport,
+    struct hclge_mbx_vf_to_pf_cmd *mbx_req,
+    bool gen_resp)
+{
+    const u8 *mac_addr = (const u8 *)(&mbx_req->msg[2]);
+    struct hclge_dev *hdev = vport->back;
+    u8 resp_len = 0;
+    u8 resp_data;
+    int status;
+    +
+    if (mbx_req->msg[1] == HCLGE_MBX_MAC_VLAN_MC_ADD) {
+        status = hclge_add_mc_addr_common(vport, mac_addr);
+    } else if (mbx_req->msg[1] == HCLGE_MBX_MAC_VLAN_MC_RM) {
+        status = hclge_rm_mc_addr_common(vport, mac_addr);
+    } else {
+        dev_err(&hdev->pdev->dev, "failed to set multicast mac addr, unknown subcode %d\n",
+            mbx_req->msg[1]);
+        return -EIO;
+    }
+    +
+    if (gen_resp)
+        hclge_gen_resp_to_vf(vport, mbx_req, status, NULL, 0);
+    +
+    return 0;
+}

else if (mbx_req->msg[1] == HCLGE_MB_MAC_VLAN_MC_REMOVE) {
    status = hclge_rm_mc_addr_common(vport, mac_addr);
} else {
    dev_err(&hdev->pdev->dev,
        "failed to set mcast mac addr, unknown subcode %d\n",
        mbx_req->msg[1]);
    return -EIO;
}

if (gen_resp)
    hclge_gen_resp_to_vf(vport, mbx_req, status,
    &resp_data, resp_len);

return 0;
}

static int hclge_set_vf_vlan_cfg(struct hclge_vport *vport,
    struct hclge_mbx_vf_to_pf_cmd *mbx_req,
    bool gen_resp)
{
    int status = 0;

    if (mbx_req->msg[1] == HCLGE_MBX_VLAN_FILTER) {
        struct hnae3_handle *handle = &vport->nic;
        u16 vlan, proto;
        bool is_kill;
        is_kill = !!mbx_req->msg[2];
        memcpy(&vlan, &mbx_req->msg[3], sizeof(vlan));
        memcpy(&proto, &mbx_req->msg[5], sizeof(proto));
        status = hclge_set_vlan_filter(handle, cpu_to_be16(proto),
            vlan, is_kill);
    } else if (mbx_req->msg[1] == HCLGE_MBX_VLAN_RX_OFF_CFG) {
        struct hnae3_handle *handle = &vport->nic;
        status = hclge_en_hw_strip_rxvtag(handle, en);
    }

    if (gen_resp)
        status = hclge_gen_resp_to_vf(vport, mbx_req, status, NULL, 0);

    return status;
}

static int hclge_set_vf_alive(struct hclge_vport *vport,
    struct hclge_mbx_vf_to_pf_cmd *mbx_req,
    bool gen_resp)
bool alive = !!mbx_req->msg[2];
int ret = 0;
+
if (alive)
ret = hclge_vport_start(vport);
else
hclge_vport_stop(vport);
+
return ret;
+
+
static int hclge_get_vf_tcinfo(struct hclge_vport *vport,
    struct hclge_mbx_vf_to_pf_cmd *mbx_req,
    bool gen_resp)
{
    struct hclge_dev *hdev = vport->back;
    int ret;
    +
    ret = hclge_gen_resp_to_vf(vport, mbx_req, 0, &hdev->hw_tc_map,
    sizeof(u8));
    +
    return ret;
    +
}
+
static int hclge_get_vf_queue_info(struct hclge_vport *vport,
    struct hclge_mbx_vf_to_pf_cmd *mbx_req,
    bool gen_resp)
{
    #define HCLGE_TQPS_RSS_INFO_LEN 8
    u8 resp_data[HCLGE_TQPS_RSS_INFO_LEN];
    struct hclge_dev *hdev = vport->back;
    +
    /* get the queue related info */
    memcpy(&resp_data[0], &vport->alloc_tqps, sizeof(u16));
    memcpy(&resp_data[2], &vport->nic.kinfo.rss_size, sizeof(u16));
    memcpy(&resp_data[4], &hdev->num_desc, sizeof(u16));
    memcpy(&resp_data[6], &hdev->rx_buf_len, sizeof(u16));
    +
    return hclge_gen_resp_to_vf(vport, mbx_req, 0, resp_data,
    HCLGE_TQPS_RSS_INFO_LEN);
    +
}
+
static int hclge_get_link_info(struct hclge_vport *vport,
    struct hclge_mbx_vf_to_pf_cmd *mbx_req)
{
    struct hclge_dev *hdev = vport->back;
    +u16 link_status;
u8 msg_data[8];
+u8 dest_vfid;
+u16 duplex;
+
+/* mac.link can only be 0 or 1 */
+link_status = (u16)hdev->hw.mac.link;
+duplex = hdev->hw.mac.duplex;
+memcpy(&msg_data[0], &link_status, sizeof(u16));
+memcpy(&msg_data[2], &hdev->hw.mac.speed, sizeof(u32));
+memcpy(&msg_data[6], &duplex, sizeof(u16));
+dest_vfid = mbx_req->mbx_src_vfid;
+
+/* send this requested info to VF */
+return hclge_send_mbx_msg(vport, msg_data, sizeof(msg_data),
+ HCLGE_MBX_LINK_STAT_CHANGE, dest_vfid);
+}
+
+static void hclge_mbx_reset_vf_queue(struct hclge_vport *vport,
+ struct hclge_mbx_vf_to_pf_cmd *mbx_req)
+{
+u16 queue_id;
+
+memcpy(&queue_id, &mbx_req->msg[2], sizeof(queue_id));
+
+hclge_reset_vf_queue(vport, queue_id);
+
+/* send response msg to VF after queue reset complete*/
+hclge_gen_resp_to_vf(vport, mbx_req, 0, NULL, 0);
+}
+
+static void hclge_reset_vf(struct hclge_vport *vport,
+ struct hclge_mbx_vf_to_pf_cmd *mbx_req)
+{
+struct hclge_dev *hdev = vport->back;
+int ret;
+
+dev_warn(&hdev->pdev->dev, "PF received VF reset request from VF %d!",
+ vport->vport_id);
+
+ret = hclge_func_reset_cmd(hdev, vport->vport_id);
+
+hclge_gen_resp_to_vf(vport, mbx_req, ret, NULL, 0);
+}
+
+static void hclge_vf_keep_alive(struct hclge_vport *vport,
+ struct hclge_mbx_vf_to_pf_cmd *mbx_req)
+{
+vport->last_active_jiffies = jiffies;
+}
+static int hclge_set_vf_mtu(struct hclge_vport *vport,  
  struct hclge_mbx_vf_to_pf_cmd *mbx_req)  
+{  
  int ret;  
  +u32 mtu;  
  +  
  +memcpy(&mtu, &mbx_req->msg[2], sizeof(mtu));  
  +ret = hclge_set_vport_mtu(vport, mtu);  
  +  
  +return hclge_gen_resp_to_vf(vport, mbx_req, ret, NULL, 0);  
+}  
+  
+static int hclge_get_queue_id_in_pf(struct hclge_vport *vport,  
+  struct hclge_mbx_vf_to_pf_cmd *mbx_req)  
+{  
+  +u16 queue_id, qid_in_pf;  
+  +u8 resp_data[2];  
+  +memcpy(&queue_id, &mbx_req->msg[2], sizeof(queue_id));  
+  +qid_in_pf = hclge_covert_handle_qid_global(&vport->nic, queue_id);  
+  +memcpy(resp_data, &qid_in_pf, sizeof(qid_in_pf));  
+  +return hclge_gen_resp_to_vf(vport, mbx_req, 0, resp_data, 2);  
+}  
+  
+static bool hclge_cmd_crq_empty(struct hclge_hw *hw)  
+{  
+  +u32 tail = hclge_read_dev(hw, HCLGE_NIC_CRQ_TAIL_REG);  
+  +return tail == hw->cmq.crq.next_to_use;  
+}  
+  
+void hclge_mbx_handler(struct hclge_dev *hdev)  
+{  
+  +struct hclge_cmq_ring *crq = &hdev->hw.cmq.crq;  
+  +struct hclge_mbx_vf_to_pf_cmd *req;  
+  +struct hclge_vport *vport;  
+  +struct hclge_desc *desc;  
+  +int ret, flag;  
+  
+  +/* handle all the mailbox requests in the queue */  
+  +while (!hclge_cmd_crq_empty(&hdev->hw)) {  
+    +if (test_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state)) {  
+      +dev_warn(&hdev->pdev->dev,  
+        +"command queue needs re-initializing\n");  
+      +return;  
+    +}  
+    +  
+    +if (test_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state)) {  
+      +dev_warn(&hdev->pdev->dev,  
+        +"command queue needs re-initializing\n");  
+      +return;  
+    +}  
+  +}  
+}
+desc = &crq->desc[crq->next_to_use];
+req = (struct hclge_mbx_vf_to_pf_cmd *)desc->data;
+
+flag = le16_to_cpu(crq->desc[crq->next_to_use].flag);
+if (unlikely(!hnae3_get_bit(flag, HCLGE_CMDQ_RX_OUTVLD_B))) {
+  dev_warn(&hdev->pdev->dev,
+    "dropped invalid mailbox message, code = %d\n",
+    req->msg[0]);
+
+  /* dropping/not processing this invalid message */
+  crq->desc[crq->next_to_use].flag = 0;
+hclge_mbx_ring_ptr_move_crq(crq);
+continue;
+}
+
+vport = &hdev->vport[req->mbx_src_vfid];
+
+switch (req->msg[0]) {
+  case HCLGE_MBX_MAP_RING_TO_VECTOR:
+    ret = hclge_map_unmap_ring_to_vf_vector(vport, true,
+        +req);
+    +break;
+  case HCLGE_MBX_UNMAP_RING_TO_VECTOR:
+    ret = hclge_map_unmap_ring_to_vf_vector(vport, false,
+        +req);
+    +break;
+  case HCLGE_MBX_SET_PROMISC_MODE:
+    ret = hclge_set_vf_promisc_mode(vport, req);
+    if (ret)
+      dev_err(&hdev->pdev->dev,
+        +"PF fail(%d) to set VF promisc mode\n",
+        +ret);
+    +break;
+  case HCLGE_MBX_SET_UNICAST:
+    ret = hclge_set_vf_uc_mac_addr(vport, req, true);
+    if (ret)
+      dev_err(&hdev->pdev->dev,
+        +"PF fail(%d) to set VF UC MAC Addr\n",
+        +ret);
+    +break;
+  case HCLGE_MBX_SET_MULTICAST:
+    ret = hclge_set_vf_mc_mac_addr(vport, req, false);
+    if (ret)
+      dev_err(&hdev->pdev->dev,
+        +"PF fail(%d) to set VF MC MAC Addr\n",
+        +ret);
+    +break;
+case HCLGE_MBX_SET_VLAN:
+ ret = hclge_set_vf_vlan_cfg(vport, req, false);
+ if (ret)
+ dev_err(&hdev->pdev->dev,
+ "PF failed(%d) to config VF's VLAN",
+ ret);
+ break;
+case HCLGE_MBX_SET_ALIVE:
+ ret = hclge_set_vf_alive(vport, req, false);
+ if (ret)
+ dev_err(&hdev->pdev->dev,
+ "PF failed(%d) to set VF's ALIVE",
+ ret);
+ break;
+case HCLGE_MBX_GET_QINFO:
+ ret = hclge_get_vf_queue_info(vport, req, true);
+ if (ret)
+ dev_err(&hdev->pdev->dev,
+ "PF failed(%d) to get Q info for VF",
+ ret);
+ break;
+case HCLGE_MBX_GET_TCINFO:
+ ret = hclge_get_vf_tcinfo(vport, req, true);
+ if (ret)
+ dev_err(&hdev->pdev->dev,
+ "PF failed(%d) to get TC info for VF",
+ ret);
+ break;
+case HCLGE_MBX_GET_LINK_STATUS:
+ ret = hclge_get_link_info(vport, req);
+ if (ret)
+ dev_err(&hdev->pdev->dev,
+ "PF fail(%d) to get link stat for VF",
+ ret);
+ break;
+case HCLGE_MBX_QUEUE_RESET:
+ hclge_mbx_reset_vf_queue(vport, req);
+ break;
+case HCLGE_MBX_RESET:
+ hclge_reset_vf(vport, req);
+ break;
+case HCLGE_MBX_KEEP_ALIVE:
+ hclge_vf_keep_alive(vport, req);
+ break;
+case HCLGE_MBX_SET_MTU:
+ ret = hclge_set_vf_mtu(vport, req);
+ if (ret)
+ dev_err(&hdev->pdev->dev,
VF fail(%d) to set mtu
+, ret);
+break;
+case HCLGE_MBX_GET_QID_IN_PF:
+ret = hclge_get_queue_id_in_pf(vport, req);
+if (ret)
+dev_err(&hdev->pdev->dev,
+"PF failed(%d) to get qid for VF\n", ret);
+break;
+default:
+dev_err(&hdev->pdev->dev,
+"un-supported mailbox message, code = %d\n",
+req->msg[0]);
+break;
+
+/* Write back CMDQ_RQ header pointer, M7 need this pointer */
+hclge_write_dev(&hdev->hw, HCLGE_NIC_CRQ_HEAD_REG, crq->next_to_use);
+
+/* This program is free software; you can redistribute it and/or modify
+ it under the terms of the GNU General Public License as published by
+ the Free Software Foundation; either version 2 of the License, or
+ (at your option) any later version.
+ */
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.
+
+#include <linux/etherdevice.h>
+#include <linux/kernel.h>
+@ @ -17,9 +11,10 @ @
+#define HCLGE_PHY_SUPPORTED_FEATURES(SUPPORTED_Autoneg |
+ SUPPORTED_TP |
+ SUPPORTED_Pause |
+ SUPPORTED_Asym_Pause |
+ PHY_10BT_FEATURES |
+ PHY_100BT_FEATURES |
+ PHY_1000BT_FEATURES |
+ SUPPORTED_1000baseT_Full)
enum hclge_mdio_c22_op_seq {
  HCLGE_MDIO_C22_WRITE = 1,
}@ -59,20 +54,23 @@
struct hclge_desc desc;
int ret;

+if (test_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state))
+return 0;
+
    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MDIO_CONFIG, false);

    mdio_cmd = (struct hclge_mdio_cfg_cmd *)desc.data;

-hnae_set_field(mdio_cmd->phyid, HCLGE_MDIO_PHYID_M,
  - HCLGE_MDIO_PHYID_S, phyid);
-hnae_set_field(mdio_cmd->phyad, HCLGE_MDIO_PHYREG_M,
  - HCLGE_MDIO_PHYREG_S, regnum);
-
-hnae_set_bit(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_START_B, 1);
-hnae_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_ST_M,
  - HCLGE_MDIO_CTRL_ST_S, 1);
-hnae_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_OP_M,
  - HCLGE_MDIO_CTRL_OP_S, HCLGE_MDIO_C22_WRITE);
+hnae3_set_field(mdio_cmd->phyid, HCLGE_MDIO_PHYID_M,
  +HCLGE_MDIO_PHYID_S, phyid);
+hnae3_set_field(mdio_cmd->phyad, HCLGE_MDIO_PHYREG_M,
  +HCLGE_MDIO_PHYREG_S, regnum);
+
    hnae3_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_START_B, 1);
+hnae3_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_ST_M,
  +HCLGE_MDIO_CTRL_ST_S, 1);
+hnae3_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_OP_M,
  +HCLGE_MDIO_CTRL_OP_S, HCLGE_MDIO_C22_WRITE);

    mdio_cmd->data_wr = cpu_to_le16(data);
}@ -94,20 +92,23 @@
struct hclge_desc desc;
int ret;

+if (test_bit(HCLGE_STATE_CMD_DISABLE, &hdev->state))
+return 0;
+
    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_MDIO_CONFIG, true);

    mdio_cmd = (struct hclge_mdio_cfg_cmd *)desc.data;

-hnae_set_field(mdio_cmd->phyid, HCLGE_MDIO_PHYID_M,
- HCLGE_MDIO_PHYID_S, phyid);
- hnae_set_field(mdio_cmd->phyad, HCLGE_MDIO_PHYREG_M,
- HCLGE_MDIO_PHYREG_S, regnum);
-
- hnae_set_bit(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_START_B, 1);
- hnae_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_ST_M,
- HCLGE_MDIO_CTRL_ST_S, 1);
- hnae_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_OP_M,
- HCLGE_MDIO_CTRL_OP_S, HCLGE_MDIO_C22_READ);
+ hnae3_set_field(mdio_cmd->phyid, HCLGE_MDIO_PHYID_M,
+ HCLGE_MDIO_PHYID_S, phyid);
+ hnae3_set_field(mdio_cmd->phyad, HCLGE_MDIO_PHYREG_M,
+ HCLGE_MDIO_PHYREG_S, regnum);
+
+ hnae3_set_bit(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_START_B, 1);
+ hnae3_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_ST_M,
+ HCLGE_MDIO_CTRL_ST_S, 1);
+ hnae3_set_field(mdio_cmd->ctrl_bit, HCLGE_MDIO_CTRL_OP_M,
+ HCLGE_MDIO_CTRL_OP_S, HCLGE_MDIO_C22_READ);

/* Read out phy data */
ret = hclge_cmd_send(&hdev->hw, &desc, 1);
@@ -118,7 +119,7 @@
return ret;
}

@if (hnae_get_bit(le16_to_cpu(mdio_cmd->sta), HCLGE_MDIO_STA_B)) {
+if (hnae3_get_bit(le16_to_cpu(mdio_cmd->sta), HCLGE_MDIO_STA_B)) {
  dev_err(&hdev->pdev->dev, "mdio read data error\n");
  return -EIO;
}
@@ -133,8 +134,11 @@
struct mii_bus *mdio_bus;
int ret;

-if (hdev->hw.mac.phy_addr >= PHY_MAX_ADDR)
-  return 0;
+if (hdev->hw.mac.phy_addr >= PHY_MAX_ADDR) {
+  dev_err(&hdev->pdev->dev, "phy_addr(%d) is too large.\n",
+           hdev->hw.mac.phy_addr);
+  return -EINVAL;
+}

mdio_bus = devm_mdiobus_alloc(&hdev->pdev->dev);
if (!mdio_bus)
@@ -177,15 +181,23 @@
  struct mii_bus *mdio_bus;
  int ret;

-int duplex, speed;
  int ret;

When phy link down, do nothing

if (netdev->phydev->link == 0)
+return;
+
speed = netdev->phydev->speed;
duplex = netdev->phydev->duplex;

ret = hclge_cfg_mac_speed_dup(hdev, speed, duplex);
if (ret)
netdev_err(netdev, "failed to adjust link.
");
+
ret = hclge_cfg_flowctrl(hdev);
if (ret)
+netdev_err(netdev, "failed to configure flow control.
");
}

+int hclge_mac_start_phy(struct hclge_dev *hdev)
+int hclge_mac_connect_phy(struct hclge_dev *hdev)
{
struct net_device *netdev = hdev->vport[0].nic.netdev;
struct phy_device *phydev = hdev->hw.mac.phydev;
@@ -194,6 +206,8 @@
if (!phydev)
    return 0;

+phydev->supported &= ~SUPPORTED_FIBRE;
+
ret = phy_connect_direct(netdev, phydev,
  hclge_mac_adjust_link,
  PHY_INTERFACE_MODE_SGMII);
@@ -205,11 +219,31 @@
phydev->supported &= HCLGE_PHY_SUPPORTED_FEATURES;
phydev->advertising = phydev->supported;

-phy_start(phydev);
-
return 0;
}

+void hclge_mac_disconnect_phy(struct hclge_dev *hdev)
+{
+struct phy_device *phydev = hdev->hw.mac.phydev;
+
+if (!phydev)
+return;
+
+phy_disconnect(phydev);
void hclge_mac_start_phy(struct hclge_dev *hdev) {
    struct phy_device *phydev = hdev->hw.mac.phydev;
    if (!phydev)
        return;
    phy_loopback(phydev, false);
    phy_start(phydev);
}

void hclge_mac_stop_phy(struct hclge_dev *hdev) {
    struct net_device *netdev = hdev->vport[0].nic.netdev;
    phy_stop(phydev);
    phy_disconnect(phydev);
}

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 * it under the terms of the GNU General Public License as published by
 * the Free Software Foundation; either version 2 of the License, or
 * (at your option) any later version.
 * (at your option) any later version.
 */

int hclge_mac_mdio_config(struct hclge_dev *hdev);  
int hclge_mac_start_phy(struct hclge_dev *hdev);   
int hclge_mac_connect_phy(struct hclge_dev *hdev);  
void hclge_mac_disconnect_phy(struct hclge_dev *hdev);  
void hclge_mac_start_phy(struct hclge_dev *hdev);  
void hclge_mac_stop_phy(struct hclge_dev *hdev);
#endif

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_mdio.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_mdio.h
@@ -1,17 +1,13 @@

/*
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 */

int hclge_mac_mdio_config(struct hclge_dev *hdev);  
int hclge_mac_start_phy(struct hclge_dev *hdev);   
int hclge_mac_connect_phy(struct hclge_dev *hdev);  
void hclge_mac_disconnect_phy(struct hclge_dev *hdev);  
void hclge_mac_start_phy(struct hclge_dev *hdev);  
void hclge_mac_stop_phy(struct hclge_dev *hdev);
#endif
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_tm.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_tm.c
@@ -1,11 +1,5 @@
-/*
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- * it under the terms of the GNU General Public License as published by
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- * (at your option) any later version.
- */
+// SPDX-License-Identifier: GPL-2.0+
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#include <linux/etherdevice.h>

@@ -23,8 +17,11 @@
HCLGE_SHAPER_LVL_PF	= 1,
};

-#define HCLGE_SHAPER_BS_U_DEF	1
-#define HCLGE_SHAPER_BS_S_DEF	4
+#define HCLGE_TM_PFC_PKT_GET_CMD_NUM	3
+#define HCLGE_TM_PFC_NUM_GET_PER_CMD	3
+
+#define HCLGE_SHAPER_BS_U_DEF	5
+#define HCLGE_SHAPER_BS_S_DEF	20

#define HCLGE_ETHER_MAX_RATE	100000

@@ -57,7 +54,8 @@
tick = tick_array[shaper_level];
return 0;
}
+struct hclge_desc desc[HCLGE_TM_PFC_PKT_GET_CMD_NUM];
+int ret, i, j;
+
+if (!(opcode == HCLGE_OPC_QUERY_PFC_RX_PKT_CNT ||
+      opcode == HCLGE_OPC_QUERY_PFC_TX_PKT_CNT))
+return -EINVAL;
+
+for (i = 0; i < HCLGE_TM_PFC_PKT_GET_CMD_NUM; i++) {
+  hclge_cmd_setup_basic_desc(&desc[i], opcode, true);
+  if (i != (HCLGE_TM_PFC_PKT_GET_CMD_NUM - 1))
+    desc[i].flag |= cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+  else
+    desc[i].flag &= ~cpu_to_le16(HCLGE_CMD_FLAG_NEXT);
+}
+
+ret = hclge_cmd_send(&hdev->hw, desc, HCLGE_TM_PFC_PKT_GET_CMD_NUM);
+if (ret)
+  return ret;
+
+for (i = 0; i < HCLGE_TM_PFC_PKT_GET_CMD_NUM; i++) {
+  struct hclge_pfc_stats_cmd *pfc_stats =
+    (struct hclge_pfc_stats_cmd *)desc[i].data;
+  for (j = 0; j < HCLGE_TM_PFC_NUM_GET_PER_CMD; j++) {
+    u32 index = i * HCLGE_TM_PFC_PKT_GET_CMD_NUM + j;
+    if (index < HCLGE_MAX_TC_NUM)
+      stats[index] =
+        le64_to_cpu(pfc_stats->pkt_num[j]);
+  }
+}
+
+return 0;
+
+int hclge_pfc_rx_stats_get(struct hclge_dev *hdev, u64 *stats)
+{
+  return hclge_pfc_stats_get(hdev, HCLGE_OPC_QUERY_PFC_RX_PKT_CNT, stats);
+}
+
+int hclge_pfc_tx_stats_get(struct hclge_dev *hdev, u64 *stats)
+{
+  return hclge_pfc_stats_get(hdev, HCLGE_OPC_QUERY_PFC_TX_PKT_CNT, stats);
+}
+
+int hclge_mac_pause_en_cfg(struct hclge_dev *hdev, bool tx, bool rx)
+{
  struct hclge_desc desc;
u8 pfc_bitmap)
{
    struct hclge_desc desc;
    struct hclge_pfc_en_cmd *pfc = (struct hclge_pfc_en_cmd *)&desc.data;
    struct hclge_pfc_en_cmd *pfc = (struct hclge_pfc_en_cmd *)desc.data;

    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CFG_PFC_PAUSE_EN, false);

    return hclge_cmd_send(&hdev->hw, &desc, 1);
}

+static int hclge_pause_param_cfg(struct hclge_dev *hdev, const u8 *addr,
    u8 pause_trans_gap, u16 pause_trans_time)
+
+{
    struct hclge_cfg_pause_param_cmd *pause_param;
    struct hclge_desc desc;
+
    pause_param = (struct hclge_cfg_pause_param_cmd *)desc.data;
+
    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CFG_MAC_PARA, false);
+
    ether_addr_copy(pause_param->mac_addr, addr);
    ether_addr_copy(pause_param->mac_addr_extra, addr);
    pause_param->pause_trans_gap = pause_trans_gap;
    pause_param->pause_trans_time = cpu_to_le16(pause_trans_time);
+
    return hclge_cmd_send(&hdev->hw, &desc, 1);
+
+
+int hclge_pause_addr_cfg(struct hclge_dev *hdev, const u8 *mac_addr)
+
+{
    struct hclge_cfg_pause_param_cmd *pause_param;
    struct hclge_desc desc;
    u16 trans_time;
    u8 trans_gap;
    int ret;
+
    pause_param = (struct hclge_cfg_pause_param_cmd *)desc.data;
+
    hclge_cmd_setup_basic_desc(&desc, HCLGE_OPC_CFG_MAC_PARA, true);
+
    ret = hclge_cmd_send(&hdev->hw, &desc, 1);
+    if (ret)
+        return ret;
+
    +trans_gap = pause_param->pause_trans_gap;
trans_time = le16_to_cpu(pause_param->pause_trans_time);
+
+return hclge_pause_param_cfg(hdev, mac_addr, trans_gap,
+trans_time);
+
static int hclge_fill_pri_array(struct hclge_dev *hdev, u8 *pri, u8 pri_id)
{
    u8 tc;
    @@ -213,7 +299,7 @@
}

static int hclge_tm_q_to_qs_map_cfg(struct hclge_dev *hdev, u8 q_id, u16 qs_id)
{
    struct hclge_nq_to_qs_link_cmd *map;
    struct hclge_desc desc;
    @@ -410,7 +496,8 @@
    return hclge_cmd_send(&hdev->hw, &desc, 1);
}

-static int hclge_tm_qs_bp_cfg(struct hclge_dev *hdev, u8 tc)
+static int hclge_tm_qs_bp_cfg(struct hclge_dev *hdev, u8 tc, u8 grp_id,
+      u32 bit_map)
{
    struct hclge_bp_to_qs_map_cmd *bp_to_qs_map_cmd;
    struct hclge_desc desc;
    @@ -421,9 +508,8 @@
    bp_to_qs_map_cmd = (struct hclge_bp_to_qs_map_cmd *)desc.data;

    bp_to_qs_map_cmd->tc_id = tc;
    -
    -/* Qset and tc is one by one mapping */
    -bp_to_qs_map_cmd->qs_bit_map = cpu_to_le32(1 << tc);
    +bp_to_qs_map_cmd->qs_group_id = grp_id;
    +bp_to_qs_map_cmd->qs_bit_map = cpu_to_le32(bit_map);

    return hclge_cmd_send(&hdev->hw, &desc, 1);
}
@@ -973,6 +1059,9 @@
int ret;
    u8 i;

+if (vport->vport_id >= HNAE3_MAX_TC)
+return -EINVAL;
+
    ret = hclge_tm_pri_schd_mode_cfg(hdev, vport->vport_id);
if (ret)
    return ret;
@@ -1056,6 +1145,15 @@
    return hclge_tm_schd_mode_hw(hdev);
}

+static int hclge_pause_param_setup_hw(struct hclge_dev *hdev)
+{
+    struct hclge_mac *mac = &hdev->hw.mac;
+    return hclge_pause_param_cfg(hdev, mac->mac_addr,
+        HCLGE_DEFAULT_PAUSE_TRANS_GAP, 
+        HCLGE_DEFAULT_PAUSE_TRANS_TIME);
+}
+
+static int hclge_pfc_setup_hw(struct hclge_dev *hdev)
+
+u8 enable_bitmap = 0;
+@@ -1065,7 +1163,40 @@
+    return hclge_pfc_pause_en_cfg(hdev, enable_bitmap, 
+        hdev->tm_info.hw_pfc_map);
+}
+
+/* Each Tc has a 1024 queue sets to backpress, it divides to 
+ * 32 group, each group contains 32 queue sets, which can be 
+ * represented by u32 bitmap.
+ */
+static int hclge_bp_setup_hw(struct hclge_dev *hdev, u8 tc)
+{
+    int i;
+    u32 qs_bitmap = 0;
+    for (i = 0; i < HCLGE_BP_GRP_NUM; i++) {
+        for (k = 0; k < hdev->num_alloc_vport; k++) {
+            struct hclge_vport *vport = &hdev->vport[k];
+            u16 qs_id = vport->qs_offset + tc;
+            u8 grp, sub grp;
+            grp = hnae3_get_field(qs_id, HCLGE_BP_GRP_ID_M, 
+                HCLGE_BP_GRP_ID_S);
+            sub grp = hnae3_get_field(qs_id, HCLGE_BP_SUB_GRP_ID_M, 
+                HCLGE_BP_SUB_GRP_ID_S);
+            if (i == grp)
+qs_bitmap |= (1 << sub_grp);
+
+ret = hclge_tm_qs_bp_cfg(hdev, tc, i, qs_bitmap);
+if (ret)
+return ret;
+
+return 0;
}

static int hclge_mac_pause_setup_hw(struct hclge_dev *hdev)
{

tx_en = true;
rx_en = true;
break;
+case HCLGE_FC_PFC:
+tx_en = false;
+rx_en = false;
+break;
default:
    tx_en = true;
    rx_en = true;
@@ -1102,8 +1237,13 @@
    int ret;
    u8 i;

    -if (hdev->tm_info.fc_mode != HCLGE_FC_PFC)
    -return hclge_mac_pause_setup_hw(hdev);
    +ret = hclge_pause_param_setup_hw(hdev);
    +if (ret)
    +return ret;
    +
    +ret = hclge_mac_pause_setup_hw(hdev);
    +if (ret)
    +return ret;

    /* Only DCB-supported dev supports qset back pressure and pfc cmd */
    if (!hnae3_dev_dcb_supported(hdev))
    @@ -1115,7 +1255,7 @@
        dev_warn(&hdev->pdev->dev, "set pfc pause failed:%d\n", ret);

        for (i = 0; i < hdev->tm_info.num_tc; i++) {
            -ret = hclge_tm_qs_bp_cfg(hdev, i);
            +ret = hclge_bp_setup_hw(hdev, i);
            if (ret)
                return ret;
        }

}
return 0;

void hclge_tm_prio_tc_info_update(struct hclge_dev *hdev, u8 *prio_tc)
{
    struct hclge_vport *vport = hdev->vport;
    struct hnae3_knic_private_info *kinfo;
    u32 i, k;

    for (i = 0; i < HNAE3_MAX_USER_PRIO; i++) {
        if (prio_tc[i] >= hdev->tm_info.num_tc)
            return -EINVAL;
        hdev->tm_info.prio_tc[i] = prio_tc[i];
    }

    for (k = 0; k < hdev->num_alloc_vport; k++) {
        kinfo->prio_tc[i] = prio_tc[i];
    }
    -return 0;
}

void hclge_tm_schd_info_update(struct hclge_dev *hdev, u8 num_tc)
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_tm.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3pf/hclge_tm.h
@@ -18,6 +12,9 @@

/*
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 * it under the terms of the GNU General Public License as published by
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 * (at your option) any later version.
 */
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.

#ifndef __HCLGE_TM_H
#define __HCLGE_TM_H
@@ -18,6 +12,9 @@

#define HCLGE_TM_PORT_BASE_MODE_MSK (BIT(0)
#define HCLGE_DEFAULT_PAUSE_TRANS_GAP 0xFF
#define HCLGE_DEFAULT_PAUSE_TRANS_TIME 0xFFFF

/* SP or DWRR */
#define HCLGE_TM_TX_SCHD_DWRR_MSK BIT(0)
#define HCLGE_TM_TX_SCHD_SP_MSK (0xFE)
@@ -43,6 +40,13 @@
    __le16 qset_id;
    }
+
+struct hclge_tqp_tx_queue_tc_cmd {
+    __le16 queue_id;
+    __le16 rsvd;
+    u8 tc_id;
+    u8 rev[3];
+    }
+
+struct hclge_pg_weight_cmd {
    u8 pg_id;
    u8 dwrr;
    @@ -58,6 +62,12 @@
    u8 dwrr;
    }
+
+struct hclge_ets_tc_weight_cmd {
    u8 tc_weight[HNAE3_MAX_TC];
    u8 weight_offset;
    +u8 rsvd[15];
    +};
    +
#define HCLGE_TM_SHAP_IR_B_MSK GENMASK(7, 0)
#define HCLGE_TM_SHAP_IR_B_LSH 0
#define HCLGE_TM_SHAP_IR_U_MSK GENMASK(11, 8)
@@ -86,6 +96,11 @@
    __le32 pg_shapping_para;
    }
+
+#define HCLGE_BP_GRP_NUM 32
+#define HCLGE_BP_SUB_GRP_ID_S 0
+#define HCLGE_BP_SUB_GRP_ID_M GENMASK(4, 0)
+#define HCLGE_BP_GRP_ID_S 5
+#define HCLGE_BP_GRP_ID_M GENMASK(9, 5)
+struct hclge_bp_to_qs_map_cmd {
    u8 tc_id;
    u8 rsvd[2];
    @@ -99,23 +114,43 @@
    u8 pri_en_bitmap;
    }
+
+struct hclge_cfg_pause_param_cmd {
    u8 mac_addr[ETH_ALEN];
+u8 pause_trans_gap;
+u8 rsvd;
+__le16 pause_trans_time;
+u8 rsvd1[6];
+ /* extra mac address to do double check for pause frame */
+u8 mac_addr_extra[ETH_ALEN];
+u16 rsvd2;
+
+struct hclge_pfc_stats_cmd {
+__le64 pkt_num[3];
+};
+
+struct hclge_port_shapping_cmd {
__le32 port_shapping_para;
};

#define hclge_tm_set_field(dest, string, val) \ 
- hnae_set_field((dest), (HCLGE_TM_SHAP_##string##_MSK), \ 
- (HCLGE_TM_SHAP_##string##_LSH), val) 
+ hnae3_set_field((dest), \ 
+ (HCLGE_TM_SHAP_##string##_MSK), \ 
+ (HCLGE_TM_SHAP_##string##_LSH), val) 
#define hclge_tm_get_field(src, string) \ 
- hnae_get_field((src), (HCLGE_TM_SHAP_##string##_MSK), \ 
+ hnae3_get_field((src), (HCLGE_TM_SHAP_##string##_MSK), \ 
( HCLGE_TM_SHAP_##string##_LSH))

int hclge_tm_schd_init(struct hclge_dev *hdev);
int hclge_pause_setup_hw(struct hclge_dev *hdev);
int hclge_tm_schd_mode_hw(struct hclge_dev *hdev);
-int hclge_tm_prio_tc_info_update(struct hclge_dev *hdev, u8 *prio_tc);
+void hclge_tm_prio_tc_info_update(struct hclge_dev *hdev, u8 *prio_tc);
 void hclge_tm_schd_info_update(struct hclge_dev *hdev, u8 num_tc);
int hclge_tm_dwrr_cfg(struct hclge_dev *hdev);
int hclge_tm_map_cfg(struct hclge_dev *hdev);
int hclge_tm_init_hw(struct hclge_dev *hdev);
+int hclge_mac_pause_en_cfg(struct hclge_dev *hdev, bool tx, bool rx);
+int hclge_pause_addr_cfg(struct hclge_dev *hdev, const u8 *mac_addr);
+int hclge_pfc_rx_stats_get(struct hclge_dev *hdev, u64 *stats);
+int hclge_pfc_tx_stats_get(struct hclge_dev *hdev, u64 *stats);
#endif
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3vf/Makefile
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3vf/Makefile
@@ -0,0 +1,9 @@
+# SPDX-License-Identifier: GPL-2.0+
+#
+# Makefile for the HISILICON network device drivers.
+ccflags-y := -Idrivers/net/ethernet/hisilicon/hns3
+
+obj-S(CONFIG_HNS3_HCLGEVF) += hclgevf.o
+hclgevf-objs = hclgevf_main.o hclgevf_cmd.o hclgevf_mbx.o

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3vf/hclgevf_cmd.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3vf/hclgevf_cmd.c
@@ -0,0 +1,370 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.
+
+﻿#include <linux/device.h>
+﻿#include <linux/dma-direction.h>
+﻿#include <linux/dma-mapping.h>
+﻿#include <linux/err.h>
+﻿#include <linux/pci.h>
+﻿#include <linux/slab.h>
+﻿#include "hclgevf_cmd.h"
+﻿#include "hclgevf_main.h"
+﻿#include "hnae3.h"
+
+﻿#define hclgevf_is_csq(ring) ((ring)->flag & HCLGEVF_TYPE_CSQ)
+﻿#define hclgevf_ring_to_dma_dir(ring) (hclgevf_is_csq(ring) ?
+            DMA_TO_DEVICE : DMA_FROM_DEVICE)
+﻿#define cmq_ring_to_dev(ring)   (&(ring)->dev->pdev->dev)
+
+static int hclgevf_ring_space(struct hclgevf_cmq_ring *ring)
+{
+    int ntc = ring->next_to_clean;
+    int ntu = ring->next_to_use;
+    int used;
+    +used = (ntu - ntc + ring->desc_num) % ring->desc_num;
+    +return ring->desc_num - used - 1;
+}
+
+static int hclgevf_cmd_csq_clean(struct hclgevf_hw *hw)
+{
+    struct hclgevf_cmq_ring *csq = &hw->cmq.csq;
+    u16 ntc = csq->next_to_clean;
+    struct hclgevf_desc *desc;
+    int clean = 0;
+    u32 head;
+    +desc = &csq->desc[ntc];
+head = hclgevf_read_dev(hw, HCLGEVF_NIC_CSQ_HEAD_REG);
+while (head != ntc) {
+memset(desc, 0, sizeof(*desc));
+ntc++;
+if (ntc == csq->desc_num)
+ntc = 0;
+desc = &csq->desc[ntc];
+clean++;
+
+csq->next_to_clean = ntc;
+
+return clean;
+
+
+static bool hclgevf_cmd_csq_done(struct hclgevf_hw *hw)
+{
+u32 head;
+
+head = hclgevf_read_dev(hw, HCLGEVF_NIC_CSQ_HEAD_REG);
+
+return head == hw->cmq.csq.next_to_use;
+
+
+static bool hclgevf_is_special_opcode(u16 opcode)
+{
+u16 spec_opcode[] = {0x30, 0x31, 0x32};
+int i;
+
+for (i = 0; i < ARRAY_SIZE(spec_opcode); i++) {
+if (spec_opcode[i] == opcode)
+return true;
+
+return false;
+
+
+static void hclgevf_cmd_config_regs(struct hclgevf_cmq_ring *ring)
+{
+struct hclgevf_dev *hdev = ring->dev;
+struct hclgevf_hw *hw = &hdev->hw;
+u32 reg_val;
+
+if (ring->flag == HCLGEVF_TYPE_CSQ) {
+reg_val = (u32)ring->desc_dma_addr;
+hclgevf_write_dev(hw, HCLGEVF_NIC_CSQ_BASEADDR_L_REG, reg_val);
+reg_val = (u32)((ring->desc_dma_addr >> 31) >> 1);
+hclgevf_write_dev(hw, HCLGEVF_NIC_CSQ_BASEADDR_H_REG, reg_val);
+}
+reg_val = (ring->desc_num >> HCLGEVF_NIC_CMQ_DESC_NUM_S);
+reg_val |= HCLGEVF_NIC_CMQ_ENABLE;
+hclgevf_write_dev(hw, HCLGEVF_NIC_CSQ_DEPTH_REG, reg_val);
+
+hclgevf_write_dev(hw, HCLGEVF_NIC_CSQ_HEAD_REG, 0);
+hclgevf_write_dev(hw, HCLGEVF_NIC_CSQ_TAIL_REG, 0);
+} else {
+reg_val = (u32)ring->desc_dma_addr;
+hclgevf_write_dev(hw, HCLGEVF_NIC_CRQ_BASEADDR_L_REG, reg_val);
+reg_val = (u32)((ring->desc_dma_addr >> 31) >> 1);
+hclgevf_write_dev(hw, HCLGEVF_NIC_CRQ_BASEADDR_H_REG, reg_val);
+
+hclgevf_write_dev(hw, HCLGEVF_NIC_CMQ_DESC_NUM_S);
+reg_val |= HCLGEVF_NIC_CMQ_ENABLE;
+hclgevf_write_dev(hw, HCLGEVF_NIC_CRQ_DEPTH_REG, reg_val);
+
+hclgevf_write_dev(hw, HCLGEVF_NIC_CRQ_HEAD_REG, 0);
+hclgevf_write_dev(hw, HCLGEVF_NIC_CRQ_TAIL_REG, 0);
+}
+
+static void hclgevf_cmd_init_regs(struct hclgevf_hw *hw)
+{
+hclgevf_cmd_config_regs(&hw->cmq.csq);
+hclgevf_cmd_config_regs(&hw->cmq.crq);
+}
+
+static int hclgevf_alloc_cmd_desc(struct hclgevf_cmq_ring *ring)
+{
+int size = ring->desc_num * sizeof(struct hclgevf_desc);
+
+ring->desc = dma_zalloc_coherent(cmq_ring_to_dev(ring),
+ size, &ring->desc_dma_addr,
+ GFP_KERNEL);
+if (!ring->desc)
+return -ENOMEM;
+
+return 0;
+}
+
+static void hclgevf_free_cmd_desc(struct hclgevf_cmq_ring *ring)
+{
+int size  = ring->desc_num * sizeof(struct hclgevf_desc);
+
+if (!ring->desc)
+return -ENOMEM;
+
+return 0;
+}
static int hclgevf_alloc_cmd_queue(struct hclgevf_dev *hdev, int ring_type)
{
    struct hclgevf_hw *hw = &hdev->hw;
    struct hclgevf_cmq_ring *ring =
        (ring_type == HCLGEVF_TYPE_CSQ) ? &hw->cmq.csq : &hw->cmq.crq;
    int ret;
    
    ring->dev = hdev;
    ring->flag = ring_type;
    
    /**************************************************************************/
    ret = hclgevf_alloc_cmd_desc(ring);
    if (ret)
        dev_err(&hdev->pdev->dev, "failed(%d) to alloc %s desc
");
    /**************************************************************************/
    return ret;
}

void hclgevf_cmd_setup_basic_desc(struct hclgevf_desc *desc,
        enum hclgevf_opcode_type opcode, bool is_read)
{
    memset(desc, 0, sizeof(struct hclgevf_desc));
    desc->opcode = cpu_to_le16(opcode);
    desc->flag = cpu_to_le16(HCLGEVF_CMD_FLAG_NO_INTR |
         HCLGEVF_CMD_FLAG_IN);
    if (is_read)
        desc->flag |= cpu_to_le16(HCLGEVF_CMD_FLAG_WR);
    else
        desc->flag &= cpu_to_le16(~HCLGEVF_CMD_FLAG_WR);
}

/* hclgevf_cmd_send - send command to command queue */
/* @hw: pointer to the hw struct */
/* @desc: prefilled descriptor for describing the command */
/* @num : the number of descriptors to be sent */
/* This is the main send command for command queue, it */
/* sends the queue, cleans the queue, etc */
/* */
int hclgevf_cmd_send(struct hclgevf_hw *hw, struct hclgevf_desc *desc, int num)
{
    struct hclgevf_dev *hdev = (struct hclgevf_dev *)hw->hdev;
    struct hclgevf_desc *desc_to_use;
    bool complete = false;
```c
+u32 timeout = 0;
+int handle = 0;
+int status = 0;
+u16 retval;
+u16 opcode;
+int ntc;
+
+spin_lock_bh(&hw->cmq.csq.lock);
+
+if (num > hclgevf_ring_space(&hw->cmq.csq) ||
+ test_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state)) {
+spin_unlock_bh(&hw->cmq.csq.lock);
+return -EBUSY;
+}
+
+/* Record the location of desc in the ring for this time
+ * which will be use for hardware to write back
+ */
+ntc = hw->cmq.csq.next_to_use;
+opcode = le16_to_cpu(desc[0].opcode);
+while (handle < num) {
+desc_to_use = &hw->cmq.csq.desc[hw->cmq.csq.next_to_use];
+*desc_to_use = desc[handle];
+(hw->cmq.csq.next_to_use)++;
+if (hw->cmq.csq.next_to_use == hw->cmq.csq.desc_num)
+hw->cmq.csq.next_to_use = 0;
+handle++;
+}
+
+/* Write to hardware */
+hclgevf_write_dev(hw, HCLGEVF_NIC_CSQ_TAIL_REG,
+ hw->cmq.csq.next_to_use);
+
+/* If the command is sync, wait for the firmware to write back,
+ * if multi descriptors to be sent, use the first one to check
+ */
+if (HCLGEVF_SEND_SYNC(le16_to_cpu(desc->flag))) {
+do {
+if (hclgevf_cmd_csq_done(hw))
+break;
+udelay(1);
+timeout++;
+} while (timeout < hw->cmq.tx_timeout);
+
+if (hclgevf_cmd_csq_done(hw)) {
+complete = true;
+handle = 0;
}```
while (handle < num) {
    /* Get the result of hardware write back */
    desc_to_use = &hw->cmq.csq.desc[ntc];
    desc[handle] = *desc_to_use;
    
    if (likely(!hclgevf_is_special_opcode(opcode)))
        retval = le16_to_cpu(desc[handle].retval);
    else
        retval = le16_to_cpu(desc[0].retval);
    
    if ((enum hclgevf_cmd_return_status)retval ==
        HCLGEVF_CMD_EXEC_SUCCESS)
        status = 0;
    else
        status = -EIO;
    hw->cmq.last_status = (enum hclgevf_cmd_status)retval;
    ntc++;
    handle++;
    if (ntc == hw->cmq.csq.desc_num)
        ntc = 0;
} 

if (!complete)
    status = -EAGAIN;

/* Clean the command send queue */
handle = hclgevf_cmd_csq_clean(hw);
if (handle != num) {
    dev_warn(&hdev->pdev->dev,
        "cleaned %d, need to clean %d\n", handle, num);
}

spin_unlock_bh(&hw->cmq.csq.lock);

return status;
}

static int  hclgevf_cmd_query_firmware_version(struct hclgevf_hw *hw,
        u32 *version)
{
    struct hclgevf_query_version_cmd *resp;
    struct hclgevf_desc desc;
    int status;
    
    resp = (struct hclgevf_query_version_cmd *)desc.data;
+hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_QUERY_FW_VER, 1);
+status = hclgevf_cmd_send(hw, &desc, 1);
+if (!status)
+*version = le32_to_cpu(resp->firmware);
+
+return status;
+
+int hclgevf_cmd_queue_init(struct hclgevf_dev *hdev)
+{
+int ret;
+
+"Setup the lock for command queue */
+spin_lock_init(&hdev->hw.cmq.csq.lock);
+spin_lock_init(&hdev->hw.cmq.crq.lock);
+
+hdev->hw.cmq.tx_timeout = HCLGEVF_CMDQ_TX_TIMEOUT;
+hdev->hw.cmq.csq.desc_num = HCLGEVF_NIC_CMQ_DESC_NUM;
+hdev->hw.cmq.crq.desc_num = HCLGEVF_NIC_CMQ_DESC_NUM;
+
+ret = hclgevf_alloc_cmd_queue(hdev, HCLGEVF_TYPE_CSQ);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"CSQ ring setup error %d\n", ret);
+return ret;
+}
+
+ret = hclgevf_alloc_cmd_queue(hdev, HCLGEVF_TYPE_CRQ);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"CRQ ring setup error %d\n", ret);
+goto err_csq;
+}
+
+return 0;
+err_csq:
+hclgevf_free_cmd_desc(&hdev->hw.cmq.csq);
+return ret;
+
+int hclgevf_cmd_init(struct hclgevf_dev *hdev)
+{
+u32 version;
+int ret;
+
+spin_lock_bh(&hdev->hw.cmq.csq.lock);
+spin_lock_bh(&hdev->hw.cmq.crq.lock);
+
/* initialize the pointers of async rx queue of mailbox */
+hdev->arq.hdev = hdev;
+hdev->arq.head = 0;
+hdev->arq.tail = 0;
+hdev->arq.count = 0;
+hdev->hw.cmq.csq.next_to_clean = 0;
+hdev->hw.cmq.csq.next_to_use = 0;
+hdev->hw.cmq.crq.next_to_clean = 0;
+hdev->hw.cmq.crq.next_to_use = 0;
+
+hclgevf_cmd_init_regs(&hdev->hw);
+
+spin_unlock_bh(&hdev->hw.cmq.crq.lock);
+spin_unlock_bh(&hdev->hw.cmq.csq.lock);
+
+clear_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state);
+
;/* Check if there is new reset pending, because the higher level
+ * reset may happen when lower level reset is being processed.
+ */
+if (hclgevf_is_reset_pending(hdev)) {
+set_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state);
+return -EBUSY;
+}
+
/* get firmware version */
+ret = hclgevf_cmd_query_firmware_version(&hdev->hw, &version);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"failed(%d) to query firmware version\n", ret);
+return ret;
+}
+hdev->fw_version = version;
+
+dev_info(&hdev->pdev->dev, "The firmware version is %08x\n", version);
+
+return 0;
+}
+
+void hclgevf_cmd_uninit(struct hclgevf *hdev)
+{
+hclgevf_free_cmd_desc(&hdev->hw.cmq.crq);
+hclgevf_free_cmd_desc(&hdev->hw.cmq.csq);
+
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3vf/hclgevf_cmd.h
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3vf/hclgevf_cmd.h
@@ -0,0 +1,273 @@
+/* SPDX-License-Identifier: GPL-2.0+ */
+/* Copyright (c) 2016-2017 Hisilicon Limited. */
+
+#ifndef __HCLGEVF_CMD_H
+#define __HCLGEVF_CMD_H
+#include <linux/io.h>
+#include <linux/types.h>
+#include "hnae3.h"
+
+#define HCLGEVF_CMDQ_TX_TIMEOUT	30000
+#define HCLGEVF_CMDQ_RX_INVLD_B	0
+#define HCLGEVF_CMDQ_RX_OUTVLD_B	1
+
+struct hclgevf_hw;
+struct hclgevf_dev;
+
+struct hclgevf_desc {
+__le16 opcode;
+__le16 flag;
+__le16 retval;
+__le16 rsv;
+__le32 data[6];
+};
+
+struct hclgevf_desc_cb {
+dma_addr_t dma;
+void *va;
+u32 length;
+};
+
+struct hclgevf_cmq_ring {
+dma_addr_t desc_dma_addr;
+struct hclgevf_desc *desc;
+struct hclgevf_desc_cb *desc_cb;
+struct hclgevf_dev *dev;
+u32 head;
+u32 tail;
+u16 buf_size;
+u16 desc_num;
+int next_to_use;
+int next_to_clean;
+u8 flag;
+spinlock_t lock; /* Command queue lock */
+};
+
+enum hclgevf_cmd_return_status {
+HCLGEVF_CMD_EXEC_SUCCESS= 0,
+HCLGEVF_CMD_NO_AUTH= 1,
+HCLGEVF_CMD_NOT_EXEC= 2,
+HCLGEVF_CMD_QUEUE_FULL= 3,
+
+enum hclgevf_cmd_status {
+HCLGEVF_STATUS_SUCCESS= 0,
+HCLGEVF_ERR_CSQ_FULL= -1,
+HCLGEVF_ERR_CSQ_TIMEOUT= -2,
+HCLGEVF_ERR_CSQ_ERROR= -3
+};
+
+struct hclgevf_cmq {
+struct hclgevf_cmq_ring csq;
+struct hclgevf_cmq_ring crq;
+u16 tx_timeout; /* Tx timeout */
+enum hclgevf_cmd_status last_status;
+};
+
+#define HCLGEVF_CMD_FLAG_IN_VALID_SHIFT   0
+#define HCLGEVF_CMD_FLAG_OUT_VALID_SHIFT  1
+#define HCLGEVF_CMD_FLAG_NEXT_SHIFT      2
+#define HCLGEVF_CMD_FLAG_WR_OR_RD_SHIFT  3
+#define HCLGEVF_CMD_FLAG_NO_INTR_SHIFT   4
+#define HCLGEVF_CMD_FLAG_ERR_INTR_SHIFT  5
+
+#define HCLGEVF_CMD_FLAG_IN     BIT(HCLGEVF_CMD_FLAG_IN_VALID_SHIFT)
+#define HCLGEVF_CMD_FLAG_OUT    BIT(HCLGEVF_CMD_FLAG_OUT_VALID_SHIFT)
+#define HCLGEVF_CMD_FLAG_NEXT   BIT(HCLGEVF_CMD_FLAG_NEXT_SHIFT)
+#define HCLGEVF_CMD_FLAG_WR     BIT(HCLGEVF_CMD_FLAG_WR_OR_RD_SHIFT)
+#define HCLGEVF_CMD_FLAG_NO_INTR BIT(HCLGEVF_CMD_FLAG_NO_INTR_SHIFT)
+#define HCLGEVF_CMD_FLAG_ERR_INTR BIT(HCLGEVF_CMD_FLAG_ERR_INTR_SHIFT)
+
+enum hclgevf_opcode_type {
+/* Generic command */
+HCLGEVF_OPC_QUERY_FW_VER= 0x0001,
+HCLGEVF_OPC_QUERY_VF_RSRC= 0x0024,
+/* TQP command */
+HCLGEVF_OPC_QUERY_TX_STATUS= 0x0B03,
+HCLGEVF_OPC_QUERY_RX_STATUS= 0x0B13,
+HCLGEVF_OPC_CFG_COM_TQP_QUEUE= 0x0B20,
+/* GRO command */
+HCLGEVF_OPC_GRO_GENERIC_CONFIG= 0x0C10,
+/* RSS cmd */
+HCLGEVF_OPC_RSS_GENERIC_CONFIG= 0x0D01,
+HCLGEVF_OPC_RSS_INPUT_TUPLE  = 0x0D02,
+HCLGEVF_OPC_RSS_INDIR_TABLE= 0x0D07,
+HCLGEVF_OPC_RSS_TC_MODE  = 0x0D08,
+/* Mailbox cmd */
+HCLGEVF_OPC_MBX_VF_TO_PF= 0x2001,
+
+#define HCLGEVF_TQP_REG_OFFSET0x80000
+#define HCLGEVF_TQP_REG_SIZE0x200
+
+struct hclgevf_tqp_map {
+ __le16 tqp_id;/* Absolute tqp id for in this pf */
+ u8 tqp_vf;/* VF id */
+#define HCLGEVF_TQP_MAP_TYPE_PF0
+#define HCLGEVF_TQP_MAP_TYPE_VF1
+#define HCLGEVF_TQP_MAP_TYPE_B0
+#define HCLGEVF_TQP_MAP_EN_B1
+u8 tqp_flag;/* Indicate it's pf or vf tqp */
+ __le16 tqp_vid;/* Virtual id in this pf/vf */
+u8 rsv[18];
+};
+
+#define HCLGEVF_VECTOR_ELEMENTS_PER_CMD10
+
+enum hclgevf_int_type {
+ HCLGEVF_INT_TX = 0,
+ HCLGEVF_INT_RX,
+ HCLGEVF_INT_EVENT,
+};
+
+struct hclgevf_ctrl_vector_chain {
+ u8 int_vector_id;
+ u8 int_cause_num;
+#define HCLGEVF_INT_TYPE_S0
+#define HCLGEVF_INT_TYPE_M0x3
+#define HCLGEVF_TQP_ID_S2
+#define HCLGEVF_TQP_ID_M(0x3fff << HCLGEVF_TQP_ID_S)
+ __le16 tqp_type_and_id[HCLGEVF_VECTOR_ELEMENTS_PER_CMD];
+u8 vfid;
+u8 rsv;
+};
+
+struct hclgevf_query_version_cmd {
+ __le32 firmware;
+ __le32 firmware_rsv[5];
+};
+
+#define HCLGEVF_MSIX_OFT_ROCEE_S       0
+#define HCLGEVF_MSIX_OFT_ROCEE_M       (0xffff << HCLGEVF_MSIX_OFT_ROCEE_S)
+#define HCLGEVF_VEC_NUM_S              0
+#define HCLGEVF_VEC_NUM_M              (0xff << HCLGEVF_VEC_NUM_S)
+struct hclgevf_query_res_cmd {

+__le16 tqp_num;
+__le16 reserved;
+__le16 msixcap_localid_ba_nic;
+__le16 msixcap_localid_ba_rocee;
+__le16 vf_intr_vector_number;
+__le16 rsv[7];
+
+define HCLGEVF_GRO_EN_B 0
+struct hclgevf_cfg_gro_status_cmd {
+__le16 gro_en;
+u8 rsv[22];
+};
+
+define HCLGEVF_RSS_DEFAULT_OUTPORT_B4
+define HCLGEVF_RSS_HASH_KEY_OFFSET_B4
+define HCLGEVF_RSS_HASH_KEY_NUM16
+struct hclgevf_rss_config_cmd {
+u8 hash_config;
+u8 rsv[7];
+u8 hash_key[HCLGEVF_RSS_HASH_KEY_NUM];
+};
+
+struct hclgevf_rss_input_tuple_cmd {
+u8 ipv4_tcp_en;
+u8 ipv4_udp_en;
+u8 ipv4_sctp_en;
+u8 ipv4_fragment_en;
+u8 ipv6_tcp_en;
+u8 ipv6_udp_en;
+u8 ipv6_sctp_en;
+u8 ipv6_fragment_en;
+u8 rsv[16];
+};
+
+define HCLGEVF_RSS_CFG_TBL_SIZE16
+
+struct hclgevf_rss_indirection_table_cmd {
+u16 start_table_index;
+u16 rss_set_bitmap;
+u8 rsv[4];
+u8 rss_result[HCLGEVF_RSS_CFG_TBL_SIZE];
+};
+
+define HCLGEVF_RSS_TC_OFFSET_S 0
+define HCLGEVF_RSS_TC_OFFSET_M(0x3ff << HCLGEVF_RSS_TC_OFFSET_S)
+define HCLGEVF_RSS_TC_SIZE_S12
+define HCLGEVF_RSS_TC_SIZE_M(0x7 << HCLGEVF_RSS_TC_SIZE_S)
+\#define HCLGEVF_RSS_TC_VALID_B 15
+\#define HCLGEVF_MAX_TC_NUM 8
+struct hclgevf_rss_tc_mode_cmd {
+u16 rss_tc_mode[HCLGEVF_MAX_TC_NUM];
+u8 rsv[8];
+};
+
+\#define HCLGEVF_LINK_STS_B 0
+\#define HCLGEVF_LINK_STATUS BIT(HCLGEVF_LINK_STS_B)
+struct hclgevf_link_status_cmd {
+u8 status;
+u8 rsv[23];
+};
+
+\#define HCLGEVF_RING_ID_MASK 0x3ff
+\#define HCLGEVF_TQP_ENABLE_B 0
+
+struct hclgevf_cfg_com_tqp_queue_cmd {
+__le16 tqp_id;
+__le16 stream_id;
+u8 enable;
+u8 rsv[19];
+};
+
+struct hclgevf_cfg_tx_queue_pointer_cmd {
+__le16 tqp_id;
+__le16 tx_tail;
+__le16 tx_head;
+__le16 fbd_num;
+__le16 ring_offset;
+u8 rsv[14];
+};
+
+\#define HCLGEVF_TYPE_CRQ 0
+\#define HCLGEVF_TYPE_CSQ 1
+\#define HCLGEVF_NIC_CSQ_BASEADDR_L_REG 0x27000
+\#define HCLGEVF_NIC_CSQ_BASEADDR_H_REG 0x27004
+\#define HCLGEVF_NIC_CSQ_DEPTH_REG 0x27008
+\#define HCLGEVF_NIC_CSQ_TAIL_REG 0x27010
+\#define HCLGEVF_NIC_CSQ_HEAD_REG 0x27014
+\#define HCLGEVF_NIC_CRQ_BASEADDR_L_REG 0x27018
+\#define HCLGEVF_NIC_CRQ_BASEADDR_H_REG 0x2701c
+\#define HCLGEVF_NIC_CRQ_DEPTH_REG 0x27020
+\#define HCLGEVF_NIC_CRQ_TAIL_REG 0x27024
+\#define HCLGEVF_NIC_CRQ_HEAD_REG 0x27028
+\#define HCLGEVF_NIC_CMQ_EN_B 16
+\#define HCLGEVF_NIC_CMQ_ENABLE BIT(HCLGEVF_NIC_CMQ_EN_B)
+\#define HCLGEVF_NIC_CMQ_DESC_NUM 1024
static inline void hclgevf_write_reg(void __iomem *base, u32 reg, u32 value) {
    writel(value, base + reg);
}

static inline u32 hclgevf_read_reg(u8 __iomem *base, u32 reg) {
    u8 __iomem *reg_addr = READ_ONCE(base);
    return readl(reg_addr + reg);
}

#define hclgevf_write_dev(a, reg, value) \
    hclgevf_write_reg((a)->io_base, (reg), (value))

#define hclgevf_read_dev(a, reg) \
    hclgevf_read_reg((a)->io_base, (reg))

#define HCLGEVF_SEND_SYNC(flag) \
    ((flag) & HCLGEVF_CMD_FLAG_NO_INTR)

int hclgevf_cmd_init(struct hclgevf_dev *hdev);
void hclgevf_cmd_uninit(struct hclgevf_dev *hdev);
int hclgevf_cmd_queue_init(struct hclgevf_dev *hdev);

int hclgevf_cmd_send(struct hclgevf_hw *hw, struct hclgevf_desc *desc, int num);
void hclgevf_cmd_setup_basic_desc(struct hclgevf_desc *desc, 
    enum hclgevf_opcode_type opcode, 
    bool is_read);
#endif
+static int hclgevf_reset_hdev(struct hclgevf_dev *hdev);
+static struct hnae3_ae_algo ae_algovf;
+
+static const struct pci_device_id ae_algovf_pci_tbl[] = {
+    {PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_100G_VF), 0},
+    {PCI_VDEVICE(HUAWEI, HNAE3_DEV_ID_100G_RDMA_DCB_PFC_VF), 0},
+    /* required last entry */
+    {0, },
+};
+
+MODULE_DEVICE_TABLE(pci, ae_algovf_pci_tbl);
+
+static const u32 cmdq_reg_addr_list[] = {
+    HCLGEVF_CMDQ_TX_ADDR_L_REG,
+    HCLGEVF_CMDQ_TX_ADDR_H_REG,
+    HCLGEVF_CMDQ_TX_DEPTH_REG,
+    HCLGEVF_CMDQ_TX_TAIL_REG,
+    HCLGEVF_CMDQ_TX_HEAD_REG,
+    HCLGEVF_CMDQ_RX_ADDR_L_REG,
+    HCLGEVF_CMDQ_RX_ADDR_H_REG,
+    HCLGEVF_CMDQ_RX_DEPTH_REG,
+    HCLGEVF_CMDQ_RX_TAIL_REG,
+    HCLGEVF_CMDQ_RX_HEAD_REG,
+    HCLGEVF_VECTOR0_CMDQ_SRC_REG,
+    HCLGEVF_CMDQ_INTR_STS_REG,
+    HCLGEVF_CMDQ_INTR_EN_REG,
+    HCLGEVF_CMDQ_INTR_GEN_REG};
+
+static const u32 common_reg_addr_list[] = {
+    HCLGEVF_MISC_VECTOR_REG_BASE,
+    HCLGEVF_RST_ING,
+    HCLGEVF_GRO_EN_REG};
+
+static const u32 ring_reg_addr_list[] = {
+    HCLGEVF_RING_RX_ADDR_L_REG,
+    HCLGEVF_RING_RX_ADDR_H_REG,
+    HCLGEVF_RING_RX_NUM_REG,
+    HCLGEVF_RING_RX_LENGTH_REG,
+    HCLGEVF_RING_RX_MERGE_EN_REG,
+    HCLGEVF_RING_RX_TAIL_REG,
+    HCLGEVF_RING_RX_HEAD_REG,
+    HCLGEVF_RING_RX_FBD_NUM_REG,
+    HCLGEVF_RING_RX_OFFSET_REG,
+    HCLGEVF_RING_RX_FBD_OFFSET_REG,
+    HCLGEVF_RING_RX_STASH_REG,
+    HCLGEVF_RING_RX_BD_ERR_REG,
+    HCLGEVF_RING_TX_ADDR_L_REG,
+    HCLGEVF_RING_TX_ADDR_H_REG,
+    HCLGEVF_RING_TX_NUM_REG,
+    HCLGEVF_RING_TX_PRIORITY_REG,
+    HCLGEVF_RING_TX_TC_REG,
+ HCLGEVF_RING_TX_MERGE_EN_REG,
+ HCLGEVF_RING_TX_TAIL_REG,
+ HCLGEVF_RING_TX_HEAD_REG,
+ HCLGEVF_RING_TX_FBD_NUM_REG,
+ HCLGEVF_RING_TX_OFFSET_REG,
+ HCLGEVF_RING_TX_EBD_NUM_REG,
+ HCLGEVF_RING_TX_EBD_OFFSET_REG,
+ HCLGEVF_RING_TX_BD_ERR_REG,
+ HCLGEVF_RING_EN_REG};
+
+static const u32 tqp_intr_reg_addr_list[] = {HCLGEVF_TQP_INTR_CTRL_REG,
+     HCLGEVF_TQP_INTR_GL0_REG,
+     HCLGEVF_TQP_INTR_GL1_REG,
+     HCLGEVF_TQP_INTR_GL2_REG,
+     HCLGEVF_TQP_INTR_RL_REG};
+
+static inline struct hclgevf_dev *hclgevf_ae_get_hdev(
+    struct hnae3_handle *handle)
+{
+    if (!handle->client)
+        return container_of(handle, struct hclgevf_dev, nic);
+    else if (handle->client->type == HNAE3_CLIENT_ROCE)
+        return container_of(handle, struct hclgevf_dev, roce);
+    else
+        return container_of(handle, struct hclgevf_dev, nic);
+}
+
+static int hclgevf_tqps_update_stats(struct hnae3_handle *handle)
+{
+    struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    struct hclgevf_desc desc;
+    struct hclgevf_tqp *tqp;
+    int status;
+    int i;
+    +for (i = 0; i < kinfo->num_tqps; i++) {
+        tqp = container_of(kinfo->tqp[i], struct hclgevf_tqp, q);
+        hclgevf_cmd_setup_basic_desc(&desc,
+            HCLGEVF_OPC_QUERY_RX_STATUS,
+            true);
+        desc.data[0] = cpu_to_le32(tqp->index & 0x1ff);
+        status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+        if (status) {
+            dev_err(&hdev->pdev->dev,
+                "Query tqp stat fail, status = %d, queue = %d\n",
+                status,i);


```c
+return status;
+
+desc.data[0] = cpu_to_le32(tqp->index & 0x1ff);
+status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (status) {
+dev_err(&hdev->pdev->dev,
+"Query tqp stat fail, status = %d,queue = %d\n",
+status, i);
+return status;
+}
+tqp->tqp_stats.rcb_tx_ring_pktnum_rcd +=
+le32_to_cpu(desc.data[1]);
+
+desc.data[0] = cpu_to_le32(tqp->index & 0x1ff);
+status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (status) {
+dev_err(&hdev->pdev->dev,
+"Query tqp stat fail, status = %d,queue = %d\n",
+status, i);
+return status;
+}
+tqp->tqp_stats.rcb_rx_ring_pktnum_rcd +=
+le32_to_cpu(desc.data[1]);
+
+return 0;
+}
+
+static u64 *hclgevf_tqps_get_stats(struct hnae3_handle *handle, u64 *data)
+{
+struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+struct hclgevf_tqp *tqp;
+u64 *buff = data;
+int i;
+
+for (i = 0; i < kinfo->num_tqps; i++) {
+tqp = container_of(kinfo->tqp[i], struct hclgevf_tqp, q);
+*buff++ = tqp->tqp_stats.rcb_tx_ring_pktnum_rcd;
+}
+for (i = 0; i < kinfo->num_tqps; i++) {
+tqp = container_of(kinfo->tqp[i], struct hclgevf_tqp, q);
+*buff++ = tqp->tqp_stats.rcb_rx_ring_pktnum_rcd;
+}
+
+return buff;
+}
+
+static int hclgevf_tqps_get_sset_count(struct hnae3_handle *handle, int strset)
+{
+struct hnae3_knic_private_info *kinfo = &handle->kinfo;
+
+return kinfo->num_tqps * 2;
+}

```
static u8 *hclgevf_tqps_get_strings(struct hnae3_handle *handle, u8 *data)
{
    struct hnae3_knic_private_info *kinfo = &handle->kinfo;
    u8 *buff = data;
    int i = 0;

    for (i = 0; i < kinfo->num_tqps; i++) {
        struct hclgevf_tqp *tqp = container_of(kinfo->tqp[i],
            struct hclgevf_tqp, q);
        snprintf(buff, ETH_GSTRING_LEN, "txq%d_pktnum_rcd",
            tqp->index);
        buff += ETH_GSTRING_LEN;
    }

    for (i = 0; i < kinfo->num_tqps; i++) {
        struct hclgevf_tqp *tqp = container_of(kinfo->tqp[i],
            struct hclgevf_tqp, q);
        snprintf(buff, ETH_GSTRING_LEN, "rxq%d_pktnum_rcd",
            tqp->index);
        buff += ETH_GSTRING_LEN;
    }

    return buff;
}

static void hclgevf_update_stats(struct hnae3_handle *handle,
    struct net_device_stats *net_stats)
{
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
    int status;

    status = hclgevf_tqps_update_stats(handle);
    if (status)
        dev_err(&hdev->pdev->dev,
            "VF update of TQPS stats fail, status = %d\n",
            status);

    static int hclgevf_get_sset_count(struct hnae3_handle *handle, int strset)
    {
        if (strset == ETH_SS_TEST)
            return -EOPNOTSUPP;
        else if (strset == ETH_SS_STATS)
            return hclgevf_tqps_get_sset_count(handle, strset);
        return 0;
    }
}
+static void hclgevf_get_strings(struct hnae3_handle *handle, u32 strset,
+u8 *data)
+{
    u8 *p = (char *)data;
    +
    +if (strset == ETH_SS_STATS)
    +    p = hclgevf_tqps_get_strings(handle, p);
    +}
    +
+static void hclgevf_get_stats(struct hnae3_handle *handle, u64 *data)
+{
    hclgevf_tqps_get_stats(handle, data);
    +}
    +
+static int hclgevf_get_tc_info(struct hclgevf_dev *hdev)
+{
    u8 resp_msg;
    int status;
    +
    +status = hclgevf_send_mbx_msg(hdev, HCLGE_MBX_GET_TCINFO, 0, NULL, 0,
    +    true, &resp_msg, sizeof(u8));
    +if (status) {
    +    dev_err(&hdev->pdev->dev,
    +        "VF request to get TC info from PF failed %d",
    +        status);
    +    return status;
    +}
    +
    +hdev->hw_tc_map = resp_msg;
    +
    +return 0;
    +}
    +
+static int hclgevf_get_queue_info(struct hclgevf_dev *hdev)
+{
+    #define HCLGEVF_TQPS_RSS_INFO_LEN 8
+    u8 resp_msg[HCLGEVF_TQPS_RSS_INFO_LEN];
+    int status;
+    +
    +status = hclgevf_send_mbx_msg(hdev, HCLGE_MBX_GET_QINFO, 0, NULL, 0,
+    +    true, resp_msg,
+    +    HCLGEVF_TQPS_RSS_INFO_LEN);
+    +if (status) {
+        dev_err(&hdev->pdev->dev,
+            "VF request to get tqp info from PF failed %d",
+            status);
+        return status;
+    }
+} }
+
+memcpy(&hdev->num_tqps, &resp_msg[0], sizeof(u16));
+memcpy(&hdev->rss_size_max, &resp_msg[2], sizeof(u16));
+memcpy(&hdev->num_desc, &resp_msg[4], sizeof(u16));
+memcpy(&hdev->rx_buf_len, &resp_msg[6], sizeof(u16));
+
+return 0;
+
+
+static u16 hclgevf_get_qid_global(struct hnae3_handle *handle, u16 queue_id)
+{
+ struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+ u8 msg_data[2], resp_data[2];
+ u16 qid_in_pf = 0;
+ int ret;
+
+ memcpy(&msg_data[0], &queue_id, sizeof(queue_id));
+
+ ret = hclgevf_send_mbx_msg(hdev, HCLGE_MBX_GET_QID_IN_PF, 0, msg_data,
+ 2, true, resp_data, 2);  
+ if (!ret)
+ qid_in_pf = *(u16 *)resp_data;
+
+ return qid_in_pf;
+ }
+
+
+static int hclgevf_alloc_tqps(struct hclgevf_dev *hdev)
+{
+ struct hclgevf_tqp *tqp;
+ int i;
+
+ hdev->htqp = devm_kcalloc(&hdev->pdev->dev, hdev->num_tqps,
+ sizeof(struct hclgevf_tqp), GFP_KERNEL);
+ if (!hdev->htqp)
+ return -ENOMEM;
+
+ tqp = hdev->htqp;
+
+ for (i = 0; i < hdev->num_tqps; i++) {
+ tqp->dev = &hdev->pdev->dev;
+ tqp->index = i;
+
+ tqp->q.ae_algo = &ae_algovf;
+ tqp->q.buf_size = hdev->rx_buf_len;
+ tqp->q.desc_num = hdev->num_desc;
+ tqp->q.io_base = hdev->hw.io_base + HCLGEVF_TQP_REG_OFFSET +
+ i * HCLGEVF_TQP_REG_SIZE;
+
+  tqp++;
+
+}
+
+return 0;
+
}
+
+static int hclgevf_knic_setup(struct hclgevf_dev *hdev)
+
{
+  struct hnae3_handle *nic = &hdev->nic;
+  struct hnae3_knic_private_info *kinfo;
+  u16 new_tqps = hdev->num_tqps;
+  int i;
+
+  kinfo = &nic->kinfo;
+  kinfo->num_tc = 0;
+  kinfo->num_desc = hdev->num_desc;
+  kinfo->rx_buf_len = hdev->rx_buf_len;
+  for (i = 0; i < HCLGEVF_MAX_TC_NUM; i++)
+    if (hdev->hw_tc_map & BIT(i))
+      kinfo->num_tc++;
+
+  kinfo->rss_size
+    = min_t(u16, hdev->rss_size_max, new_tqps / kinfo->num_tc);
+  new_tqps = kinfo->rss_size * kinfo->num_tc;
+  kinfo->num_tqps = min(new_tqps, hdev->num_tqps);
+
+  kinfo->tqp = devm_kcalloc(&hdev->pdev->dev, kinfo->num_tqps,
+    sizeof(struct hnae3_queue *), GFP_KERNEL);
+  if (!kinfo->tqp)
+    return -ENOMEM;
+
+  for (i = 0; i < kinfo->num_tqps; i++) {
+    hdev->htqp[i].q.handle = &hdev->nic;
+    hdev->htqp[i].q.tqp_index = i;
+    kinfo->tqp[i] = &hdev->htqp[i].q;
+  }
+
+  return 0;
+
}
+
+static void hclgevf_request_link_info(struct hclgevf_dev *hdev)
+
{
+  int status;
+  u8 resp_msg;
+
+  status = hclgevf_send_mbx_msg(hdev, HCLGE_MBX_GET_LINK_STATUS, 0, NULL,
+    0, false, &resp_msg, sizeof(u8));
+  

+if (status)
+dev_err(&hdev->pdev->dev,
+"VF failed to fetch link status(%d) from PF", status);
+
+void hclgevf_update_link_status(struct hclgevf_dev *hdev, int link_state)
{+
+struct hnae3_handle *handle = &hdev->nic;
+struct hnae3_client *client;
+
+client = handle->client;
+
+link_state =
+test_bit(HCLGEVF_STATE_DOWN, &hdev->state) ? 0 : link_state;
+
+if (link_state != hdev->hw.mac.link) {
+client->ops->link_status_change(handle, !!link_state);
+hdev->hw.mac.link = link_state;
+}
+
+
+static int hclgevf_set_handle_info(struct hclgevf_dev *hdev)
{+
+struct hnae3_handle *nic = &hdev->nic;
+int ret;
+
+nic->ae_algo = &ae_algovf;
+nic->pdev = hdev->pdev;
+nic->numa_node_mask = hdev->numa_node_mask;
+nic->flags |= HNAE3_SUPPORT_VF;
+
+if (hdev->ae_dev->dev_type != HNAE3_DEV_KNIC) {
+dev_err(&hdev->pdev->dev, "unsupported device type %d\n",
+hdev->ae_dev->dev_type);
+return -EINVAL;
+}
+
+ret = hclgevf_knic_setup(hdev);
+if (ret)
+dev_err(&hdev->pdev->dev, "VF knic setup failed \n",
+ret);
+return ret;
+}
+
+static void hclgevf_free_vector(struct hclgevf_dev *hdev, int vector_id)
{+
+if (hdev->vector_status[vector_id] == HCLGEVF_INVALID_VPORT) {
+dev_warn(&hdev->pdev->dev,
+"VF failed to fetch vector info(%d) from PF", status);
+}
+
Open Source Used In 5GaaS Edge AC-4  25093
"vector(vector_id %d) has been freed." % vector_id;
+}
+
+Indian Open Source Used In 5GaaS Edge AC-4  25094
+
+"vector(vector_id %d) has been freed.
",
+
+return;
+
+}
+
+hdev->vector_status[vector_id] = HCLGEVF_INVALID_VPORT;
+hdev->num_msi_left += 1;
+hdev->num_msi_used -= 1;
+
+
+static int hclgevf_get_vector(struct hnae3_handle *handle, u16 vector_num,
+
+  struct hnae3_vector_info *vector_info)
+
+{
+  struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+  struct hnae3_vector_info *vector = vector_info;
+  int alloc = 0;
+  int i, j;
+
+  vector_num = min(hdev->num_msi_left, vector_num);
+
+  for (j = 0; j < vector_num; j++) {
+    for (i = HCLGEVF_MISC_VECTOR_NUM + 1; i < hdev->num_msi; i++) {
+      if (hdev->vector_status[i] == HCLGEVF_INVALID_VPORT) {
+        vector->vector = pci_irq_vector(hdev->pdev, i);
+        vector->io_addr = hdev->hw.io_base +
+          HCLGEVF_VECTOR_REG_BASE +
+          (i - 1) * HCLGEVF_VECTOR_REG_OFFSET;
+        hdev->vector_status[i] = 0;
+        hdev->vector_irq[i] = vector->vector;
+
+        vector++;  
+        alloc++;  
+        break;
+      }
+    }
+  }
+
+  hdev->num_msi_left -= alloc;
+  hdev->num_msi_used += alloc;
+
+  return alloc;
+
+
+static int helgevf_get_vector_index(struct hclgevf_dev *hdev, int vector)
+
+{
+  int i;
+
+  for (i = 0; i < hdev->num_msi; i++)
+    if (vector == hdev->vector_irq[i])
+      return i;  
+  return -1;  
+}
return i;
+
+return -EINVAL;
+
+
+static int hclgevf_set_rss_algo_key(struct hclgevf_dev *hdev,
  +  const u8 hfunc, const u8 *key)
+{
+  +struct hclgevf_config_cmd *req;
+  +struct hclgevf_desc desc;
+  +int key_offset;
+  +int key_size;
+  +int ret;
+  +
+  +req = (struct hclgevf_config_cmd *)desc.data;
+  +
+  +for (key_offset = 0; key_offset < 3; key_offset++) {
+    +hclgevf_cmd_setup_basic_desc(&desc,
+      HCLGEVF_OPC_RSS_GENERIC_CONFIG,
+      false);
+    +
+    +req->hash_config |= (hfunc & HCLGEVF_RSS_HASH_ALGO_MASK);
+    +req->hash_config |=
+      (key_offset << HCLGEVF_RSS_HASH_KEY_OFFSET_B);
+    +
+    +if (key_offset == 2)
+      +key_size =
+        HCLGEVF_RSS_KEY_SIZE - HCLGEVF_RSS_HASH_KEY_NUM * 2;
+    +else
+      +key_size = HCLGEVF_RSS_HASH_KEY_NUM;
+    +
+    +memcpy(req->hash_key,
+      +key + key_offset * HCLGEVF_RSS_HASH_KEY_NUM, key_size);
+    +
+    +ret = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+    +if (ret) {
+      +dev_err(&hdev->pdev->dev,
+        +"Configure RSS config fail, status = %d\n",
+        +ret);
+      +return ret;
+    +}
+    +
+  +}
+  +
+  +return 0;
+}
+
+static u32 hclgevf_get_rss_key_size(struct hnae3_handle *handle)
+return HCLGEVF_RSS_KEY_SIZE;
+
+static u32 hclgevf_get_rss_indir_size(struct hnae3_handle *handle)
+{
+    return HCLGEVF_RSS_IND_TBL_SIZE;
+}
+
+static int hclgevf_set_rss_indir_table(struct hclgevf_dev *hdev)
+{
+    const u8 *indir = hdev->rss_cfg.rss_indirection_tbl;
+    struct hclgevf_rss_indirection_table_cmd *req;
+    struct hclgevf_desc desc;
+    int status;
+    int i, j;
+
+    req = (struct hclgevf_rss_indirection_table_cmd *)desc.data;
+
+    for (i = 0; i < HCLGEVF_RSS_CFG_TBL_NUM; i++) {
+        hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_RSS_INDIR_TABLE,
+            false);
+        req->start_table_index = i * HCLGEVF_RSS_CFG_TBL_SIZE;
+        req->rss_set_bitmap = HCLGEVF_RSS_SET_BITMAP_MSK;
+        for (j = 0; j < HCLGEVF_RSS_CFG_TBL_SIZE; j++)
+            req->rss_result[j] = indir[i * HCLGEVF_RSS_CFG_TBL_SIZE + j];
+        status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+        if (status) {
+            dev_err(&hdev->pdev->dev,
+                "VF failed(=%d) to set RSS indirection table\n",
+                status);
+            return status;
+        }
+    }

    return 0;
}

+static int hclgevf_set_rss_tc_mode(struct hclgevf_dev *hdev, u16 rss_size)
+{
+    struct hclgevf_rss_tc_mode_cmd *req;
+    u16 tc_offset[HCLGEVF_MAX_TC_NUM];
+    u16 tc_valid[HCLGEVF_MAX_TC_NUM];
+    u16 tc_size[HCLGEVF_MAX_TC_NUM];
+    struct hclgevf_desc desc;
+    u16 roundup_size;
+    int status;
int i;
+
req = (struct hclgevf_rss_tc_mode_cmd *)desc.data;
+
roundup_size = roundup_pow_of_two(rss_size);
+roundup_size = ilog2(roundup_size);
+
for (i = 0; i < HCLGEVF_MAX_TC_NUM; i++) {
+tc_valid[i] = !(hdev->hw_tc_map & BIT(i));
+tc_size[i] = roundup_size;
+tc_offset[i] = rss_size * i;
++
} 
+
hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_RSS_TC_MODE, false);
+for (i = 0; i < HCLGEVF_MAX_TC_NUM; i++) {
+hnae3_set_bit(req->rss_tc_mode[i], HCLGEVF_RSS_TC_VALID_B,
+ (tc_valid[i] & 0x1));
+hnae3_set_field(req->rss_tc_mode[i], HCLGEVF_RSS_TC_SIZE_M,
+ HCLGEVF_RSS_TC_SIZE_S, tc_size[i]);
+hnae3_set_field(req->rss_tc_mode[i], HCLGEVF_RSS_TC_OFFSET_M,
+ HCLGEVF_RSS_TC_OFFSET_S, tc_offset[i]);
++
} 
+hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (status)
+dev_err(&hdev->pdev->dev,
+"VF failed(=%d) to set rss tc mode", status);
+
return status;
+}
+
static int hclgevf_get_rss(struct hnae3_handle *handle, u32 *indir, u8 *key,
+u8 *hfunc)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+struct hclgevf_rss_cfg *rss_cfg = &hdev->rss_cfg;
+int i;
+
+if (handle->pdev->revision >= 0x21) {
+/* Get hash algorithm */
+if (hfunc) {
+switch (rss_cfg->hash_algo) {
+case HCLGEVF_RSS_HASH_ALGO_TOEPLITZ:
+*hfunc = ETH_RSS_HASH_TOP;
+break;
+case HCLGEVF_RSS_HASH_ALGO_SIMPLE:
+*hfunc = ETH_RSS_HASH_XOR;
+break;
+default:
/* Get the RSS Key required by the user */
if (key)
    memcpy(key, rss_cfg->rss_hash_key,
            HCLGEVF_RSS_KEY_SIZE);
+
+if (indir)
+for (i = 0; i < HCLGEVF_RSS_IND_TBL_SIZE; i++)
+indir[i] = rss_cfg->rss_indirection_tbl[i];
+
+return 0;
+
+static int hclgevf_set_rss(struct hnae3_handle *handle, const u32 *indir,
+    const u8 *key, const u8 hfunc)
+
+{ struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    struct hclgevf_rss_cfg *rss_cfg = &hdev->rss_cfg;
+    int ret, i;
+
+    if (handle->pdev->revision >= 0x21) {
+    /* Set the RSS Hash Key if specified by the user */
+    if (key) {
+        switch (hfunc) {
+        case ETH_RSS_HASH_TOP:
+            rss_cfg->hash_algo =
+                HCLGEVF_RSS_HASH_ALGO_TOEPLITZ;
+            break;
+        case ETH_RSS_HASH_XOR:
+            rss_cfg->hash_algo =
+                HCLGEVF_RSS_HASH_ALGO_SIMPLE;
+            break;
+        case ETH_RSS_HASH_NO_CHANGE:
+            break;
+        default:
+            return -EINVAL;
+        }
+        +
+        ret = hclgevf_set_rss_algo_key(hdev, rss_cfg->hash_algo,
+                key);
+        if (ret)
+            return ret;
+        +
+        +}
/* Update the shadow RSS key with user specified qids */
memcpy(rss_cfg->rss_hash_key, key, HCLGEVF_RSS_KEY_SIZE);

/* update the shadow RSS table with user specified qids */
for (i = 0; i < HCLGEVF_RSS_IND_TBL_SIZE; i++)
rss_cfg->rss_indirection_tbl[i] = indir[i];

/* update the hardware */
return hclgevf_set_rss_indir_table(hdev);

static u8 hclgevf_get_rss_hash_bits(struct ethtool_rxnfc *nfc)
{
u8 hash_sets = nfc->data & RXH_L4_B_0_1 ? HCLGEVF_S_PORT_BIT : 0;
if (nfc->data & RXH_L4_B_2_3)
hash_sets |= HCLGEVF_D_PORT_BIT;
else
hash_sets &= ~HCLGEVF_D_PORT_BIT;
if (nfc->data & RXH_IP_SRC)
hash_sets |= HCLGEVF_S_IP_BIT;
else
hash_sets &= ~HCLGEVF_S_IP_BIT;
if (nfc->data & RXH_IP_DST)
hash_sets |= HCLGEVF_D_IP_BIT;
else
hash_sets &= ~HCLGEVF_D_IP_BIT;
if (nfc->flow_type == SCTP_V4_FLOW || nfc->flow_type == SCTP_V6_FLOW)
hash_sets |= HCLGEVF_V_TAG_BIT;
return hash_sets;

static int hclgevf_set_rss_tuple(struct hnae3_handle *handle,
struct ethtool_rxnfc *nfc)
{
struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
struct hclgevf_rss_cfg *rss_cfg = &hdev->rss_cfg;
struct hclgevf rss_input_tuple_cmd *req;
struct hclgevf_desc desc;
u8 tuple_sets;
int ret;
+ if (handle->pdev->revision == 0x20)
+ return -EOPNOTSUPP;
+
+ if (nfc->data &
+ ~((RXH_IP_SRC | RXH_IP_DST | RXH_L4_B_0_1 | RXH_L4_B_2_3)))
+ return -EINVAL;
+
+ req = (struct hclgevf_rss_input_tuple_cmd *)desc.data;
+ hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPCODE_RSS_INPUT_TUPLE, false);
+
+ req->ipv4_tcp_en = rss_cfg->rss_tuple_sets.ipv4_tcp_en;
+ req->ipv4_udp_en = rss_cfg->rss_tuple_sets.ipv4_udp_en;
+ req->ipv4_sctp_en = rss_cfg->rss_tuple_sets.ipv4_sctp_en;
+ req->ipv4_fragment_en = rss_cfg->rss_tuple_sets.ipv4_fragment_en;
+ req->ipv6_tcp_en = rss_cfg->rss_tuple_sets.ipv6_tcp_en;
+ req->ipv6_udp_en = rss_cfg->rss_tuple_sets.ipv6_udp_en;
+ req->ipv6_sctp_en = rss_cfg->rss_tuple_sets.ipv6_sctp_en;
+ req->ipv6_fragment_en = rss_cfg->rss_tuple_sets.ipv6_fragment_en;
+
+ tuple_sets = hclgevf_get_rss_hash_bits(nfc);
+ switch (nfc->flow_type) {
+ case TCP_V4_FLOW:
+ req->ipv4_tcp_en = tuple_sets;
+ break;
+ case TCP_V6_FLOW:
+ req->ipv6_tcp_en = tuple_sets;
+ break;
+ case UDP_V4_FLOW:
+ req->ipv4_udp_en = tuple_sets;
+ break;
+ case UDP_V6_FLOW:
+ req->ipv6_udp_en = tuple_sets;
+ break;
+ case SCTP_V4_FLOW:
+ req->ipv4_sctp_en = tuple_sets;
+ break;
+ case SCTP_V6_FLOW:
+ if ((nfc->data & RXH_L4_B_0_1) ||
+ (nfc->data & RXH_L4_B_2_3))
+ return -EINVAL;
+ + req->ipv6_sctp_en = tuple_sets;
+ break;
+ case IPV4_FLOW:
+ req->ipv4_fragment_en = HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+ break;
+ case IPV6_FLOW:
+req->ipv6_fragment_en = HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+break;
+default:
+return -EINVAL;
+}
+
+ret = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+    dev_err(&hdev->pdev->dev,
+            "Set rss tuple fail, status = %d\n", ret);
+    return ret;
+}
+
+rss_cfg->rss_tuple_sets.ipv4_tcp_en = req->ipv4_tcp_en;
+rss_cfg->rss_tuple_sets.ipv4_udp_en = req->ipv4_udp_en;
+rss_cfg->rss_tuple_sets.ipv4_sctp_en = req->ipv4_sctp_en;
+rss_cfg->rss_tuple_sets.ipv4_fragment_en = req->ipv4_fragment_en;
+rss_cfg->rss_tuple_sets.ipv6_tcp_en = req->ipv6_tcp_en;
+rss_cfg->rss_tuple_sets.ipv6_udp_en = req->ipv6_udp_en;
+rss_cfg->rss_tuple_sets.ipv6_sctp_en = req->ipv6_sctp_en;
+rss_cfg->rss_tuple_sets.ipv6_fragment_en = req->ipv6_fragment_en;
+return 0;
+}
+
+static int hclgevf_get_rss_tuple(struct hnae3_handle *handle,
+struct ethtool_rxnfc *nfc)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    struct hclgevf_rss_cfg *rss_cfg = &hdev->rss_cfg;
+    u8 tuple_sets;
+    
+    +if (handle->pdev->revision == 0x20)
+        +return -EOPNOTSUPP;
+    +nfc->data = 0;
+    +
+    +switch (nfc->flow_type) {
+    +case TCP_V4_FLOW:
+        +tuple_sets = rss_cfg->rss_tuple_sets.ipv4_tcp_en;
+        +break;
+    +case UDP_V4_FLOW:
+        +tuple_sets = rss_cfg->rss_tuple_sets.ipv4_udp_en;
+        +break;
+    +case TCP_V6_FLOW:
+        +tuple_sets = rss_cfg->rss_tuple_sets.ipv6_tcp_en;
+        +break;
+    +case UDP_V6_FLOW:
+        +tuple_sets = rss_cfg->rss_tuple_sets.ipv6_udp_en;
+        +break;
+    +}
break;
+case SCTP_V4_FLOW:
++tuple_sets = rss_cfg->rss_tuple_sets.ipv4_sctp_en;
++break;
+case SCTP_V6_FLOW:
++tuple_sets = rss_cfg->rss_tuple_sets.ipv6_sctp_en;
++break;
+case IPV4_FLOW:
+case IPV6_FLOW:
++tuple_sets = HCLGEVF_S_IP_BIT | HCLGEVF_D_IP_BIT;
++break;
+default:
++return -EINVAL;
+}
+
+if (!tuple_sets)
++return 0;
+
+if (tuple_sets & HCLGEVF_D_PORT_BIT)
++nfc->data |= RXH_L4_B_2_3;
+if (tuple_sets & HCLGEVF_S_PORT_BIT)
++nfc->data |= RXH_L4_B_0_1;
+if (tuple_sets & HCLGEVF_D_IP_BIT)
++nfc->data |= RXH_IP_DST;
+if (tuple_sets & HCLGEVF_S_IP_BIT)
++nfc->data |= RXH_IP_SRC;
+
++return 0;
+}
+
+static int hclgevf_set_rss_input_tuple(struct hclgevf_dev *hdev,
++struct hclgevf_rss_cfg *rss_cfg)
++{
++struct hclgevf_rss_input_tuple_cmd *req;
++struct hclgevf_desc desc;
++int ret;
++
++hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_RSS_INPUT_TUPLE, false);
++
++req = (struct hclgevf_rss_input_tuple_cmd *)desc.data;
++
++req->ipv4_tcp_en = rss_cfg->rss_tuple_sets.ipv4_tcp_en;
++req->ipv4_udp_en = rss_cfg->rss_tuple_sets.ipv4_udp_en;
++req->ipv4_sctp_en = rss_cfg->rss_tuple_sets.ipv4_sctp_en;
++req->ipv4_fragment_en = rss_cfg->rss_tuple_sets.ipv4_fragment_en;
++req->ipv6_tcp_en = rss_cfg->rss_tuple_sets.ipv6_tcp_en;
++req->ipv6_udp_en = rss_cfg->rss_tuple_sets.ipv6_udp_en;
++req->ipv6_sctp_en = rss_cfg->rss_tuple_sets.ipv6_sctp_en;
+ret = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (ret)
+dev_err(&hdev->pdev->dev,
+"Configure rss input fail, status = %d\n", ret);
+return ret;
+
+static int hclgevf_get_tc_size(struct hnae3_handle *handle)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+struct hclgevf_rss_cfg *rss_cfg = &hdev->rss_cfg;
+return rss_cfg->rss_size;
+}
+
+static int hclgevf_bind_ring_to_vector(struct hnae3_handle *handle, bool en, int vector_id, struct hnae3_ring_chain_node *ring_chain)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+struct hnae3_ring_chain_node *node;
+struct hclge_mbx_vf_to_pf_cmd *req;
+struct hclgevf_desc desc;
+int i = 0;
+int status;
+u8 type;

+req = (struct hclge_mbx_vf_to_pf_cmd *)desc.data;
+for (node = ring_chain; node; node = node->next) {
+int idx_offset = HCLGE_MBX_RING_MAP_BASIC_MSG_NUM +
+HCLGE_MBX_RING_NODE_VARIABLE_NUM * i;
+
+if (i == 0) {
+hclgevf_cmd_setup_basic_desc(&desc,
+HCLGEVF_OPC_MBX_VF_TO_PF,
+false);
+type = en ?
+HCLGE_MBX_MAP_RING_TO_VECTOR :
+HCLGE_MBX_UNMAP_RING_TO_VECTOR;
+req->msg[0] = type;
+req->msg[1] = vector_id;
+}
+
+req->msg[idx_offset] =
+hnae3_get_bit(node->flag, HNAE3_RING_TYPE_B);
+req->msg[idx_offset + 1] = node->tqp_index;
+req->msg[idx_offset + 2] = hnae3_get_field(node->int_idx,
  + HNAE3_RING_GL_IDX_M,
  + HNAE3_RING_GL_IDX_S);
+
i++;
+if ((i == (HCLGE_MBX_VF_MSG_DATA_NUM -
  + HCLGE_MBX_RING_MAP_BASIC_MSG_NUM) /
  + HCLGE_MBX_RING_NODE_VARIABLE_NUM) ||
  + !node->next) {
  +req->msg[2] = i;
  +
  +status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
  +if (status) {
    +dev_err(&hdev->pdev->dev,
    +"Map TQP fail, status is %d.\n",
    +status);
    +return status;
    +}
  +i = 0;
  +hclgevf_cmd_setup_basic_desc(&desc,
  + HCLGEVF_OPC_MBX_VF_TO_PF,
  + false);
  +req->msg[0] = type;
  +req->msg[1] = vector_id;
  +}
  +}
  +
  +return 0;
  +}
  +
  +static int hclgevf_map_ring_to_vector(struct hnae3_handle *handle, int vector,
  + struct hnae3_ring_chain_node *ring_chain)
  +{
  +struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
  +int vector_id;
  +
  +vector_id = hclgevf_get_vector_index(hdev, vector);
  +if (vector_id < 0) {
    +dev_err(&handle->pdev->dev,
    +"Get vector index fail. ret =%d\n", vector_id);
    +return vector_id;
    +}
  +
  +return hclgevf_bind_ring_to_vector(handle, true, vector_id, ring_chain);
  +}
  +
  +static int hclgevf_unmap_ring_from_vector(
struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);

int ret, vector_id;

if (test_bit(HCLGEVF_STATE_RST_HANDLING, &hdev->state))
    return 0;

vector_id = hclgevf_get_vector_index(hdev, vector);
if (vector_id < 0) {
    dev_err(&handle->pdev->dev, "Get vector index fail. ret =%d\n", vector_id);
    return vector_id;
}

ret = hclgevf_bind_ring_to_vector(handle, false, vector_id, ring_chain);
if (ret)
    dev_err(&handle->pdev->dev, "Unmap ring from vector fail. vector=%d, ret =%d\n", vector_id, ret);

return ret;

static int hclgevf_put_vector(struct hnae3_handle *handle, int vector)
{
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
    int vector_id;

    vector_id = hclgevf_get_vector_index(hdev, vector);
    if (vector_id < 0) {
        dev_err(&handle->pdev->dev, "hclgevf_put_vector get vector index fail. ret =%d\n", vector_id);
        return vector_id;
    }

    hclgevf_free_vector(hdev, vector_id);
    return 0;
}

static int hclgevf_cmd_set_promisc_mode(struct hclgevf_dev *hdev, bool en_uc_pmc, bool en_mc_pmc)
{
+struct hclge_mbx_vf_to_pf_cmd *req;
+struct hclgevf_desc desc;
+int status;
+
+req = (struct hclge_mbx_vf_to_pf_cmd *)desc.data;
+
+hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_MBX_VF_TO_PF, false);
+req->msg[0] = HCLGE_MBX_SET_PROMISC_MODE;
+req->msg[1] = en_uc_pmc ? 1 : 0;
+
+status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (status)
+dev_err(&hdev->pdev->dev,
+"Set promisc mode fail, status is %d\n", status);
+
+return status;
+
+static int hclgevf_set_promisc_mode(struct hnae3_handle *handle,
+    bool en_uc_pmc, bool en_mc_pmc)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+
+    return hclgevf_cmd_set_promisc_mode(hdev, en_uc_pmc, en_mc_pmc);
+}
+
+static int hclgevf_tqp_enable(struct hclgevf_dev *hdev, int tqp_id,
+    int stream_id, bool enable)
+{
+    struct hclgevf_cfg_com_tqp_queue_cmd *req;
+    struct hclgevf_desc desc;
+    int status;
+
+    req = (struct hclgevf_cfg_com_tqp_queue_cmd *)desc.data;
+
+hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_CFG_COM_TQP_QUEUE,
+    false);
+req->tqp_id = cpu_to_le16(tqp_id & HCLGEVF_RING_ID_MASK);
+req->stream_id = cpu_to_le16(stream_id);
+req->enable |= enable << HCLGEVF_TQP_ENABLE_B;
+
+status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (status)
+dev_err(&hdev->pdev->dev,
+"TQP enable fail, status =%d\n", status);
+
+return status;
static void hclgevf_reset_tqp_stats(struct hnae3_handle *handle) {
    struct hnae3_knic_private_info *kinfo = &handle->kinfo;
    struct hclgevf_tqp *tqp;
    int i;
    for (i = 0; i < kinfo->num_tqps; i++) {
        tqp = container_of(kinfo->tqp[i], struct hclgevf_tqp, q);
        memset(&tqp->tqp_stats, 0, sizeof(tqp->tqp_stats));
    }
}

static void hclgevf_get_mac_addr(struct hnae3_handle *handle, u8 *p) {
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
    ether_addr_copy(p, hdev->hw.mac.mac_addr);
}

static int hclgevf_set_mac_addr(struct hnae3_handle *handle, void *p,
                                 bool is_first) {
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
    u8 *old_mac_addr = (u8 *)hdev->hw.mac.mac_addr;
    u8 *new_mac_addr = (u8 *)p;
    u8 msg_data[ETH_ALEN * 2];
    u16 subcode;
    int status;
    ether_addr_copy(msg_data, new_mac_addr);
    ether_addr_copy(&msg_data[ETH_ALEN], old_mac_addr);
    subcode = is_first ? HCLGE_MBX_MAC_VLAN_UC_ADD :
                   HCLGE_MBX_MAC_VLAN_UC_MODIFY;
    status = hclgevf_send_mbx_msg(hdev, HCLGE_MBX_SET_UNICAST,
                                   subcode, msg_data, ETH_ALEN * 2,
                                   true, NULL, 0);
    if (!status)
        ether_addr_copy(hdev->hw.mac.mac_addr, new_mac_addr);
    return status;
}

static int hclgevf_add_uc_addr(struct hnae3_handle *handle,
                                 const unsigned char *addr)
+{  
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);  
+  
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_SET_UNICAST,  
+    HCLGE_MB_MAC_VLAN_UC_ADD,  
+    addr, ETH_ALEN, false, NULL, 0);  
+}
+
+static int hclgevf_rm_uc_addr(struct hnae3_handle *handle,  
+    const unsigned char *addr)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);  
+  
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_SET_UNICAST,  
+    HCLGE_MB_MAC_VLAN_UC_REMOVE,  
+    addr, ETH_ALEN, false, NULL, 0);  
+}
+
+static int hclgevf_add_mc_addr(struct hnae3_handle *handle,  
+    const unsigned char *addr)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);  
+  
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_SET_MULTICAST,  
+    HCLGE_MB_MAC_VLAN_MC_ADD,  
+    addr, ETH_ALEN, false, NULL, 0);  
+}
+
+static int hclgevf_rm_mc_addr(struct hnae3_handle *handle,  
+    const unsigned char *addr)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);  
+  
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_SET_MULTICAST,  
+    HCLGE_MB_MAC_VLAN_MC_REMOVE,  
+    addr, ETH_ALEN, false, NULL, 0);  
+}
+
+static int hclgevf_set_vlan_filter(struct hnae3_handle *handle,  
+    __be16 proto, u16 vlan_id,  
+    bool is_kill)
+{
+#define HCLGEVF_VLAN_MB_MSG_LEN 5  
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);  
+u8 msg_data[HCLGEVF_VLAN_MB_MSG_LEN];  
+  
+if (vlan_id > 4095)
+  
+return -EINVAL;
+if (proto != htons(ETH_P_8021Q))
+return -EPROTONOSUPPORT;
+
+msg_data[0] = is_kill;
+memcpy(&msg_data[1], &vlan_id, sizeof(vlan_id));
+memcpy(&msg_data[3], &proto, sizeof(proto));
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_SET_VLAN,
+ HCLGE_MB_VLAN_FILTER, msg_data,
+ HCLGEVF_VLAN_MBX_MSG_LEN, false, NULL, 0);
+)
+
+static int hclgevf_en_hw_strip_rxvtag(struct hnae3_handle *handle, bool enable)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+u8 msg_data;
+
+msg_data = enable ? 1 : 0;
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_SET_VLAN,
+ HCLGE_MB_VLAN_RX_OFF_CFG, &msg_data,
+ 1, false, NULL, 0);
+)
+
+static int hclgevf_reset_tqp(struct hnae3_handle *handle, u16 queue_id)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+u8 msg_data[2];
+int ret;
+
+memcpy(&msg_data[0], &queue_id, sizeof(queue_id));
+
+/* disable vf queue before send queue reset msg to PF */
+ret = hclgevf_tqp_enable(hdev, queue_id, 0, false);
+if (ret)
+return ret;
+
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_QUEUE_RESET, 0, msg_data,
+ 2, true, NULL, 0);
+)
+
+static int hclgevf_set_mtu(struct hnae3_handle *handle, int new_mtu)
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_SET_MTU, 0, (u8 *)&new_mtu,
+ sizeof(new_mtu), true, NULL, 0);
+}
+
+static int hclgevf_notify_client(struct hclgevf_dev *hdev,
+      enum hnae3_reset_notify_type type)
+{
+    struct hnae3_client *client = hdev->nic_client;
+    struct hnae3_handle *handle = &hdev->nic;
+    int ret;
+    
+    if (!client->ops->reset_notify)
+      return -EOPNOTSUPP;
+    
+    ret = client->ops->reset_notify(handle, type);
+    if (ret)
+      dev_err(&hdev->pdev->dev, "notify nic client failed %d(%d)\n",
+        type, ret);
+    
+    return ret;
+  }
+
+static void hclgevf_flr_done(struct hnae3_ae_dev *ae_dev)
+{
+    struct hclgevf_dev *hdev = ae_dev->priv;
+    
+    set_bit(HNAE3_FLR_DONE, &hdev->flr_state);
+  }
+
+static int hclgevf_flr_poll_timeout(struct hclgevf_dev *hdev,
+    unsigned long delay_us,
+    unsigned long wait_cnt)
+{
+    unsigned long cnt = 0;
+    
+    while (!test_bit(HNAE3_FLR_DONE, &hdev->flr_state) &&
+           cnt++ < wait_cnt)
+      usleep_range(delay_us, delay_us * 2);
+    
+    if (!test_bit(HNAE3_FLR_DONE, &hdev->flr_state)) {
+      dev_err(&hdev->pdev->dev, "flr wait timeout\n");
+      return -ETIMEDOUT;
+    }
+    
+    return 0;
+  }
+
+static int hclgevf_reset_wait(struct hclgevf_dev *hdev)
+{
+    #define HCLGEVF_RESET_WAIT_US 20000
+    #define HCLGEVF_RESET_WAIT_CNT 2000

+#define HCLGEVF_RESET_WAIT_TIMEOUT_US\
+ (HCLGEVF_RESET_WAIT_US * HCLGEVF_RESET_WAIT_CNT)
+
+u32 val;
+int ret;
+
+/* wait to check the hardware reset completion status */
+val = hclgevf_read_dev(&hdev->hw, HCLGEVF_RST_ING);
+dev_info(&hdev->pdev->dev, "checking vf resetting status: %x\n", val);
+
+if (hdev->reset_type == HNAE3_FLR_RESET)
+ return hclgevf_flr_poll_timeout(hdev,
+ HCLGEVF_RESET_WAIT_US,
+ HCLGEVF_RESET_WAIT_CNT);
+
+ret = readl_poll_timeout(hdev->hw.io_base + HCLGEVF_RST_ING, val,
+ !(val & HCLGEVF_RST_ING_BITS),
+ HCLGEVF_RESET_WAIT_US,
+ HCLGEVF_RESET_WAIT_TIMEOUT_US);
+
+/* hardware completion status should be available by this time */
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"could'nt get reset done status from h/w, timeout\n\n2");
+return ret;
+
+/* we will wait a bit more to let reset of the stack to complete. This
+ * might happen in case reset assertion was made by PF. Yes, this also
+ * means we might end up waiting bit more even for VF reset.
+ */
+msleep(5000);
+
+return 0;
+
+static int hclgevf_reset_stack(struct hclgevf_dev *hdev)
+{
+int ret;
+
+/* uninitialize the nic client */
+ret = hclgevf_uninit_client(hdev, HNAE3_UNINIT_CLIENT);
+if (ret)
+ return ret;
+
+/* re-initialize the hclge device */
+ret = hclgevf_init_stack(hdev);
+if (ret) {
+dev_err(&hdev->pdev->dev, "+"hlclge device re-init failed, VF is disabled!\n"); 
+return ret; 
+} 
+
+/* bring up the nic client again */ 
+ret = hclgevf_notify_client(hdev, HNAE3_INIT_CLIENT); 
+if (ret) 
+return ret; 
+
+return 0; 
+
+/* bring up the nic client again */ 
+ret = hclgevf_notify_client(hdev, HNAE3_INIT_CLIENT); 
+if (ret) 
+ret = hclgevf_send_mbx_msg(hdev, HCLGE_MB RESET, 0, NULL, 
+ 0, true, NULL, sizeof(u8)); 
+break; 
+} 
+
+switch (hdev->reset_type) { 
+case HNAE3_VF_FUNC_RESET: 
+ret = hclgevf_send_mbx_msg(hdev, HCLGE_MB RESET, 0, NULL, 
+ 0, true, NULL, sizeof(u8)); 
+break; 
+case HNAE3_FLR_RESET: 
+set_bit(HNAE3_FLR_DOWN, &hdev->flr_state); 
+break; 
+default: 
+break; 
+} 
+
+set_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state); 
+
+dev_info(&hdev->pdev->dev, "prepare reset(%d) wait done, ret:%d\n", 
+hdev->reset_type, ret); 
+
+return ret; 
+
+static int hclgevf_reset(struct hclgevf_dev *hdev) 
+{ 
+struct hnae3_ae_dev *ae_dev = pci_get_drvdata(hdev->pdev); 
+int ret; 
+
+/* Initialize ae_dev reset status as well, in case enet layer wants to 
+ * know if device is undergoing reset 
+ */ 
+ae_dev->reset_type = hdev->reset_type; 
+hdev->reset_count++; 
+rtnl_lock();
+ /* bring down the nic to stop any ongoing TX/RX */
+ ret = hclgevf_notify_client(hdev, HNAE3_DOWN_CLIENT);
+ if (ret)
+ goto err_reset_lock;
+ rtnl_unlock();
+
+ /* check if VF could successfully fetch the hardware reset completion */
+ ret = hclgevf_reset_prepare_wait(hdev);
+ if (ret)
+ goto err_reset;
+
+ /* bring up the nic to enable TX/RX again */
+ ret = hclgevf_notify_client(hdev, HNAE3_UP_CLIENT);
+ if (ret)
+ goto err_reset_lock;
+ rtnl_unlock();
+ * can restore it, so re-initialize the command queue to receive
+ * this higher reset event.
+ */
+hclgevf_cmd_init(hdev);
+dev_err(&hdev->pdev->dev, "failed to reset VF\n");
+
+return ret;
+
+static enum hnae3_reset_type hclgevf_get_reset_level(struct hclgevf_dev *hdev,
+    unsigned long *addr)
+{
+enum hnae3_reset_type rst_level = HNAE3_NONE_RESET;
+
+/* return the highest priority reset level amongst all */
+if (test_bit(HNAE3_VF_RESET, addr)) {
+rst_level = HNAE3_VF_RESET;
+clear_bit(HNAE3_VF_RESET, addr);
+clear_bit(HNAE3_VF_PF_FUNC_RESET, addr);
+clear_bit(HNAE3_VF_FUNC_RESET, addr);
+} else if (test_bit(HNAE3_VF_FULL_RESET, addr)) {
+rst_level = HNAE3_VF_FULL_RESET;
+clear_bit(HNAE3_VF_FULL_RESET, addr);
+clear_bit(HNAE3_VF_FUNC_RESET, addr);
+} else if (test_bit(HNAE3_VF_PF_FUNC_RESET, addr)) {
+rst_level = HNAE3_VF_PF_FUNC_RESET;
+clear_bit(HNAE3_VF_PF_FUNC_RESET, addr);
+clear_bit(HNAE3_VF_FUNC_RESET, addr);
+} else if (test_bit(HNAE3_FLR_RESET, addr)) {
+rst_level = HNAE3_FLR_RESET;
+clear_bit(HNAE3_FLR_RESET, addr);
+}
+
+return rst_level;
+
+static void hclgevf_reset_event(struct pci_dev *pdev,
+    struct hnae3_handle *handle)
+{
+    struct hnae3_ae_dev *ae_dev = pci_get_drvdata(pdev);
+    struct hclgevf_dev *hdev = ae_dev->priv;
+    
+    dev_info(&hdev->pdev->dev, "received reset request from VF enet\n");
+    
+    if (hdev->default_reset_request)
hdev->reset_level =
hclgevf_get_reset_level(hdev, &hdev->default_reset_request);
else
hdev->reset_level = HNAE3_VF_FUNC_RESET;
+
/* reset of this VF requested */
+set_bit(HCLGEVF_RESET_REQUESTED, &hdev->reset_state);
+hclgevf_reset_task_schedule(hdev);
+
+hdev->last_reset_time = jiffies;
+
+static void hclgevf_set_def_reset_request(struct hnae3_ae_dev *ae_dev,
					  enum hnae3_reset_type rst_type)
+
{
+struct hclgevf_dev *hdev = ae_dev->priv;
+
+set_bit(rst_type, &hdev->default_reset_request);
+
}
+
+static void hclgevf_flr_prepare(struct hnae3_ae_dev *ae_dev)
+
#define HCLGEVF_FLR_WAIT_MS	100
#define HCLGEVF_FLR_WAIT_CNT	50
+struct hclgevf_dev *hdev = ae_dev->priv;
+int cnt = 0;
+
+clear_bit(HNAE3_FLR_DOWN, &hdev->flr_state);
+clear_bit(HNAE3_FLR_DONE, &hdev->flr_state);
+set_bit(HNAE3_FLR_RESET, &hdev->default_reset_request);
+hclgevf_reset_event(hdev->pdev, NULL);
+
+while (!test_bit(HNAE3_FLR_DOWN, &hdev->flr_state) &&
    cnt++ < HCLGEVF_FLR_WAIT_CNT)
+msleep(HCLGEVF_FLR_WAIT_MS);
+
+if (!test_bit(HNAE3_FLR_DOWN, &hdev->flr_state))
+dev_err(&hdev->pdev->dev,
    "flr wait down timeout: %d\n", cnt);
+
+static u32 hclgevf_get_fw_version(struct hnae3_handle *handle)
+
{+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+
+return hdev->fw_version;
+}
+static void hclgevf_get_misc_vector(struct hclgevf_dev *hdev)
+{
+    struct hclgevf_misc_vector *vector = &hdev->misc_vector;
+    vector->vector_irq = pci_irq_vector(hdev->pdev, HCLGEVF_MISC_VECTOR_NUM);
+    vector->addr = hdev->hw.io_base + HCLGEVF_MISC_VECTOR_REG_BASE;
+    hdev->vector_status[HCLGEVF_MISC_VECTOR_NUM] = 0;
+    hdev->vector_irq[HCLGEVF_MISC_VECTOR_NUM] = vector->vector_irq;
+    hdev->num_msi_left -= 1;
+    hdev->num_msi_used += 1;
+}
+
+void hclgevf_reset_task_schedule(struct hclgevf_dev *hdev)
+{
+    if (!test_bit(HCLGEVF_STATE_RST_SERVICE_SCHED, &hdev->state) &&
+        !test_bit(HCLGEVF_STATE_RST_HANDLING, &hdev->state)) {
+        set_bit(HCLGEVF_STATE_RST_SERVICE_SCHED, &hdev->state);
+        schedule_work(&hdev->rst_service_task);
+    }
+}
+
+void hclgevf_mbx_task_schedule(struct hclgevf_dev *hdev)
+{
+    if (!test_bit(HCLGEVF_STATE_MBX_SERVICE_SCHED, &hdev->state) &&
+        !test_bit(HCLGEVF_STATE_MBX_HANDLING, &hdev->state)) {
+        set_bit(HCLGEVF_STATE_MBX_SERVICE_SCHED, &hdev->state);
+        schedule_work(&hdev->mbx_service_task);
+    }
+}
+
+static void hclgevf_task_schedule(struct hclgevf_dev *hdev)
+{
+    if (!test_bit(HCLGEVF_STATE_DOWN, &hdev->state)  &&
+        !test_and_set_bit(HCLGEVF_STATE_SERVICE_SCHED, &hdev->state))
+        schedule_work(&hdev->service_task);
+}
+
+static void hclgevf_deferred_task_schedule(struct hclgevf_dev *hdev)
+{
+    /* if we have any pending mailbox event then schedule the mbx task */
+    if (hdev->mbx_event_pending)
+        hclgevf_mbx_task_schedule(hdev);
+    if (test_bit(HCLGEVF_RESET_PENDING, &hdev->reset_state))
hclgevf_reset_task_schedule(hdev);
+
static void hclgevf_service_timer(struct timer_list *t)
+
struct hclgevf_dev *hdev = from_timer(hdev, t, service_timer);
+
mod_timer(&hdev->service_timer, jiffies + 5 * HZ);
+
+ hclgevf_task_schedule(hdev);
+
static void hclgevf_reset_service_task(struct work_struct *work)
+
+struct hclgevf_dev *hdev =
+container_of(work, struct hclgevf_dev, rst_service_task);
+int ret;
+
+if (test_and_set_bit(HCLGEVF_STATE_RST_HANDLING, &hdev->state))
+return;
+
+clear_bit(HCLGEVF_STATE_RST_SERVICE_SCHED, &hdev->state);
+
+if (test_and_clear_bit(HCLGEVF_RESET_PENDING,
+    &hdev->reset_state)) {
+  /* PF has initmated that it is about to reset the hardware.
+     * We now have to poll & check if harware has actually completed
+     * the reset sequence. On hardware reset completion, VF needs to
+     * reset the client and ae device.
+     */
+  hdev->reset_attempts = 0;
+
+  hdev->last_reset_time = jiffies;
+  while ((hdev->reset_type =
+    hclgevf_get_reset_level(hdev, &hdev->reset_pending))
+      != HNAE3_NONE_RESET) {
+    ret = hclgevf_reset(hdev);
+    if (ret)
+      dev_err(&hdev->pdev->dev,
+        "VF stack reset failed %d\n", ret);
+  }
+  else if (test_and_clear_bit(HCLGEVF_RESET_REQUESTED,
+    &hdev->reset_state)) {
+    /* we could be here when either of below happens:
+       * 1. reset was initiated due to watchdog timeout due to
+          a. IMP was earlier reset and our TX got choked down and
+          which resulted in watchdog reacting and inducing VF
+       *  reset. This also means our cmdq would be unreliable.
+     */
+  }
+}
b. problem in TX due to other lower layer (example link layer not functioning properly etc.)
2. VF reset might have been initiated due to some config change.

NOTE: There's no clear way to detect above cases than to react to the response of PF for this reset request. PF will ack the 1b and 2. cases but we will not get any intimation about 1a from PF as cmdq would be in unreliable state i.e. mailbox communication between PF and VF would be broken.

/* if we are never getting into pending state it means either:
1. PF is not receiving our request which could be due to IMP reset
2. PF is screwed
We cannot do much for 2. but to check first we can try reset our PCIe + stack and see if it alleviates the problem.
*/

if (hdev->reset_attempts > 3) {
    /* prepare for full reset of stack + pcie interface */
    set_bit(HNAE3_VF_FULL_RESET, &hdev->reset_pending);
    /* "defer" schedule the reset task again */
    set_bit(HCLGEVF_RESET_PENDING, &hdev->reset_state);
} else {
    hdev->reset_attempts++;
    set_bit(hdev->reset_level, &hdev->reset_pending);
    set_bit(HCLGEVF_RESET_PENDING, &hdev->reset_state);
}

hclgevf_reset_task_schedule(hdev);

static void hclgevf_mailbox_service_task(struct work_struct *work)
{
    struct hclgevf_dev *hdev;

    hdev = container_of(work, struct hclgevf_dev, mbx_service_task);

    clear_bit(HCLGEVF_STATE_MBX_HANDLING, &hdev->state);

    static void hclgevf_mailbox_service_task(struct work_struct *work)
    {
        hdev = container_of(work, struct hclgevf_dev, mbx_service_task);
        if (test_and_set_bit(HCLGEVF_STATE_MBX_HANDLING, &hdev->state))
            return;

        clear_bit(HCLGEVF_STATE_MBX_SERVICE_SCHED, &hdev->state);
+hclgevf_mbx_async_handler(hdev);
+
+clear_bit(HCLGEVF_STATE_MBX_HANDLING, &hdev->state);
+
+static void hclgevf_keep_alive_timer(struct timer_list *t)
+{
+struct hclgevf_dev *hdev = from_timer(hdev, t, keep_alive_timer);
+
+schedule_work(&hdev->keep_alive_task);
+mod_timer(&hdev->keep_alive_timer, jiffies + 2 * HZ);
+
+
+static void hclgevf_keep_alive_task(struct work_struct *work)
+{
+struct hclgevf_dev *hdev;
+u8 respmsg;
+int ret;
+
+hdev = container_of(work, struct hclgevf_dev, keep_alive_task);
+ret = hclgevf_send_mbx_msg(hdev, HCLGE_MBX_KEEP_ALIVE, 0, NULL,
+ 0, false, &respmsg, sizeof(u8));
+
+if (ret)
+dev_err(&hdev->pdev->dev,
+"VF sends keep alive cmd failed(=%d)\n", ret);
+
+
+static void hclgevf_service_task(struct work_struct *work)
+{
+struct hclgevf_dev *hdev;
+
+hdev = container_of(work, struct hclgevf_dev, service_task);
+
+/* request the link status from the PF. PF would be able to tell VF
+ * about such updates in future so we might remove this later
+ */
+hclgevf_request_link_info(hdev);
+
+hclgevf_deferred_task_schedule(hdev);
+
+clear_bit(HCLGEVF_STATE_SERVICE_SCHED, &hdev->state);
+
+
+static void hclgevf_clear_event_cause(struct hclgevf_dev *hdev, u32 regclr)
+{
+hclgevf_write_dev(&hdev->hw, HCLGEVF_VECTOR0_CMDQ_SRC_REG, regclr);
+
}
+static enum hclgevf_evt_cause hclgevf_check_evt_cause(struct hclgevf_dev *hdev,
+    u32 *clearval)
+{
+   u32 cmdq_src_reg, rst_ing_reg;
+
+   /* fetch the events from their corresponding regs */
+   cmdq_src_reg = hclgevf_read_dev(&hdev->hw, 
+     HCLGEVF_VECTOR0_CMDQ_SRC_REG);
+   +if (BIT(HCLGEVF_VECTOR0_RST_INT_B) & cmdq_src_reg) {
+      rst_ing_reg = hclgevf_read_dev(&hdev->hw, HCLGEVF_RST_ING);
+      dev_info(&hdev->pdev->dev,
+         "receive reset interrupt 0x%x!", rst_ing_reg);
+      set_bit(HNAE3_VF_RESET, &hdev->reset_pending);
+      set_bit(HCLGEVF_RESET_PENDING, &hdev->reset_state);
+      set_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state);
+      cmdq_src_reg &= ~BIT(HCLGEVF_VECTOR0_RST_INT_B);
+      *clearval = cmdq_src_reg;
+      return HCLGEVF_VECTOR0_EVENT_RST;
+   }  
+   +/* check for vector0 mailbox(=CMDQ RX) event source */
+   if (BIT(HCLGEVF_VECTOR0_RX_CMDQ_INT_B) & cmdq_src_reg) {
+      cmdq_src_reg &= ~BIT(HCLGEVF_VECTOR0_RX_CMDQ_INT_B);
+      *clearval = cmdq_src_reg;
+      return HCLGEVF_VECTOR0_EVENT_MBX;
+   }  
+   +dev_dbg(&hdev->pdev->dev, "vector 0 interrupt from unknown source\n");
+   +return HCLGEVF_VECTOR0_EVENT_OTHER;
+   +
+   +static void hclgevf_enable_vector(struct hclgevf_misc_vector *vector, bool en)
+   +{
+      writel(en ? 1 : 0, vector->addr);
+   +}
+   +
+   +static irqreturn_t hclgevf_misc_irq_handle(int irq, void *data)
+   +{
+      enum hclgevf_evt_cause event_cause;
+      struct hclgevf_dev *hdev = data;
+      u32 clearval;
+      +helgevf_enable_vector(&hdev->misc_vector, false);
+      +event_cause = hclgevf_check_evt_cause(hdev, &clearval);
+      +switch (event_cause) {
case HCLGEVF_VECTOR0_EVENT_RST:
    hclgevf_reset_task_schedule(hdev);
    break;

case HCLGEVF_VECTOR0_EVENT_MBX:
    hclgevf_mbx_handler(hdev);
    break;
default:
    break;
}

if (event_cause != HCLGEVF_VECTOR0_EVENT_OTHER) {
    hclgevf_clear_event_cause(hdev, clearval);
    hclgevf_enable_vector(&hdev->misc_vector, true);
}

return IRQ_HANDLED;

static int hclgevf_configure(struct hclgevf_dev *hdev)
{
    int ret;

    hdev->hw.mac.media_type = HNAE3_MEDIA_TYPE_NONE;

    /* get queue configuration from PF */
    ret = hclgevf_get_queue_info(hdev);
    if (ret)
        return ret;

    /* get tc configuration from PF */
    return hclgevf_get_tc_info(hdev);
}

static int hclgevf_alloc_hdev(struct hnae3_ae_dev *ae_dev)
{
    struct pci_dev *pdev = ae_dev->pdev;

    hdev = devm_kzalloc(&pdev->dev, sizeof(*hdev), GFP_KERNEL);
    if (!hdev)
        return -ENOMEM;

    hdev->pdev = pdev;
    hdev->ae_dev = ae_dev;
    ae_dev->priv = hdev;

    return 0;
}
+static int hclgevf_init_roce_base_info(struct hclgevf_dev *hdev) {
+    struct hnae3_handle *roce = &hdev->roce;
+    struct hnae3_handle *nic = &hdev->nic;
+    roce->rinfo.num_vectors = hdev->num_roce_msix;
+    if (hdev->num_msi_left < roce->rinfo.num_vectors ||
        hdev->num_msi_left == 0)
        return -EINVAL;
    roce->rinfo.base_vector = hdev->roce_base_vector;
    roce->rinfo.netdev = nic->kinfo.netdev;
    roce->rinfo.roce_io_base = hdev->hw.io_base;
    roce->pdev = nic->pdev;
    roce->ae_algo = nic->ae_algo;
    roce->numa_node_mask = nic->numa_node_mask;
    return 0;
}
+
+static int hclgevf_config_gro(struct hclgevf_dev *hdev, bool en) {
+    struct hclgevf_cfg_gro_status_cmd *req;
+    struct hclgevf_desc desc;
+    int ret;
+    if (!hnae3_dev_gro_supported(hdev))
        return 0;
+    hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_GRO_GENERIC_CONFIG,
        false);
    req = (struct hclgevf_cfg_gro_status_cmd *)desc.data;
    req->gro_en = cpu_to_le16(en ? 1 : 0);
    ret = hclgevf_cmd_send(&hdev->hw, &desc, 1);
    if (ret)
        dev_err(&hdev->pdev->dev,
            "VF GRO hardware config cmd failed, ret = %d\n", ret);
    return ret;
}
```c
+struct hclgevf_rss_cfg *rss_cfg = &hdev->rss_cfg;
+int i, ret;
+
+rss_cfg->rss_size = hdev->rss_size_max;
+
+if (hdev->pdev->revision >= 0x21) {
+rss_cfg->hash_algo = HCLGEVF_RSS_HASH_ALGO_TOEPLITZ;
+netdev_rss_key_fill(rss_cfg->rss_hash_key,
+ HCLGEVF_RSS_KEY_SIZE);
+
+ret = hclgevf_set_rss_algo_key(hdev, rss_cfg->hash_algo,
+ rss_cfg->rss_hash_key);
+if (ret)
+return ret;
+
+rss_cfg->rss_tuple_sets.ipv4_tcp_en =
+HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+rss_cfg->rss_tuple_sets.ipv4_udp_en =
+HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+rss_cfg->rss_tuple_sets.ipv4_sctp_en =
+HCLGEVF_RSS_INPUT_TUPLE_SCTP;
+rss_cfg->rss_tuple_sets.ipv4_fragment_en =
+HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+rss_cfg->rss_tuple_sets.ipv6_tcp_en =
+HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+rss_cfg->rss_tuple_sets.ipv6_udp_en =
+HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+rss_cfg->rss_tuple_sets.ipv6_sctp_en =
+HCLGEVF_RSS_INPUT_TUPLE_SCTP;
+rss_cfg->rss_tuple_sets.ipv6_fragment_en =
+HCLGEVF_RSS_INPUT_TUPLE_OTHER;
+
+ret = hclgevf_set_rss_input_tuple(hdev, rss_cfg);
+if (ret)
+return ret;
+
+rss_cfg->rss_indirection_tbl[i] = i % hdev->rss_size_max;
+
+ret = hclgevf_set_rss_indir_table(hdev);
+if (ret)
+return ret;
+
+return hclgevf_set_rss_tc_mode(hdev, hdev->rss_size_max);
+}
```

+static int hclgevf_init_vlan_config(struct hclgevf_dev *hdev)
+{
+    /* other vlan config(like, VLAN TX/RX offload) would also be added
+    * here later
+    */
+    return hclgevf_set_vlan_filter(&hdev->nic, htons(ETH_P_8021Q), 0,
+        false);
+}
+
+static void hclgevf_set_timer_task(struct hnae3_handle *handle, bool enable)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    if (enable) {
+        mod_timer(&hdev->service_timer, jiffies + HZ);
+    } else {
+        del_timer_sync(&hdev->service_timer);
+        cancel_work_sync(&hdev->service_task);
+        clear_bit(HCLGEVF_STATE_SERVICE_SCHED, &hdev->state);
+    }
+}
+
+static int hclgevf_ae_start(struct hnae3_handle *handle)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    /* reset tqp stats */
+    hclgevf_reset_tqp_stats(handle);
+    hclgevf_request_link_info(hdev);
+    clear_bit(HCLGEVF_STATE_DOWN, &hdev->state);
+    return 0;
+}
+
+static void hclgevf_ae_stop(struct hnae3_handle *handle)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    int i;
+    set_bit(HCLGEVF_STATE_DOWN, &hdev->state);
+    for (i = 0; i < handle->kinfo.num_tqps; i++)
+        hclgevf_reset_tqp(handle, i);
+    /* reset tqp stats */
+hclgevf_res
+te_tqp_stats(handle);
+hclgevf_updat
+e_link_status(hdev, 0);
+
+
+static int hclgevf_set_alive(struct hnae3_handle *handle, bool alive)
+
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+u8 msg_data;
+
+msg_data = alive ? 1 : 0;
+return hclgevf_send_mbx_msg(hdev, HCLGE_MB_X_SET_ALIVE,
+ 0, &msg_data, 1, false, NULL, 0);
+
+
+
+static int hclgevf_client_start(struct hnae3_handle *handle)
+
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+
+mod_timer(&hdev->keep_alive_timer, jiffies + 2 * HZ);
+return hclgevf_set_alive(handle, true);
+
+
+
+static void hclgevf_client_stop(struct hnae3_handle *handle)
+
+{
+struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+
+int ret;
+
+ret = hclgevf_set_alive(handle, false);
+
+if (ret)
+dev_warn(&hdev->pdev->dev,
+ "%s failed %d\n", __func__, ret);
+
+del_timer_sync(&hdev->keep_alive_timer);
+cancel_work_sync(&hdev->keep_alive_task);
+
+
+static void hclgevf_state_init(struct hclgevf_dev *hdev)
+
+{
+/* setup tasks for the MBX */
+INIT_WORK(&hdev->mbx_service_task, hclgevf_mailbox_service_task);
+clear_bit(HCLGEVF_STATE_MBX_SERVICE_SCHED, &hdev->state);
+clear_bit(HCLGEVF_STATE_MBX_HANDLING, &hdev->state);
+
+/* setup tasks for service timer */
+timer_setup(&hdev->service_timer, hclgevf_service_timer, 0);
+
+INIT_WORK(&hdev->service_task, hclgevf_service_task);
+clear_bit(HCLGEVF_STATE_SERVICE_SCHED, &hdev->state);
INIT_WORK(&hdev->rst_service_task, hclgevf_reset_service_task);
mutext_init(&hdev->mbx_resp.mbx_mutex);

/* bring the device down */
set_bit(HCLGEVF_STATE_DOWN, &hdev->state);
}

static void hclgevf_state_uninit(struct hclgevf_dev *hdev)
{
set_bit(HCLGEVF_STATE_DOWN, &hdev->state);

if (hdev->service_timer.function)
del_timer_sync(&hdev->service_timer);
if (hdev->service_task.func)
cancel_work_sync(&hdev->service_task);
if (hdev->mbx_service_task.func)
cancel_work_sync(&hdev->mbx_service_task);
if (hdev->rst_service_task.func)
cancel_work_sync(&hdev->rst_service_task);
mutex_destroy(&hdev->mbx_resp.mbx_mutex);
}

static int hclgevf_init_msi(struct hclgevf_dev *hdev)
{
struct pci_dev *pdev = hdev->pdev;
int vectors;
int i;

if (hnae3_get_bit(hdev->ae_dev->flag, HNAE3_DEV_SUPPORT_ROCE_B))
vectors = pci_alloc_irq_vectors(pdev,
hdev->roce_base_msix_offset + 1,
hdev->num_msi,
PCI_IRQ_MSIX);
else
vectors = pci_alloc_irq_vectors(pdev, 1, hdev->num_msi,
PCI_IRQ_MSI | PCI_IRQ_MSIX);

if (vectors < 0) {
dev_err(pdev->dev,
"failed(%d) to allocate MSI/MSI-X vectors\n",
vectors);
return vectors;
}
if (vectors < hdev->num_msi)
dev_warn(pdev->dev,
"requested %d MSI/MSI-X, but allocated %d MSI/MSI-X"

hdev->num_msi = vectors;

hdev->num_msi_left = vectors;

hdev->base_msi_vector = pdev->irq;

hdev->roce_base_vector = pdev->irq + hdev->roce_base_msix_offset;

hdev->vector_status = devm_kcalloc(&pdev->dev, hdev->num_msi,
+ sizeof(u16), GFP_KERNEL);

if (!hdev->vector_status) {
	pci_free_irq_vectors(pdev);
+return -ENOMEM;
+
+for (i = 0; i < hdev->num_msi; i++)
+hdev->vector_status[i] = HCLGEVF_INVALID_VPORT;
+
hdev->vector_irq = devm_kcalloc(&pdev->dev, hdev->num_msi,
+sizeof(int), GFP_KERNEL);
+if (!hdev->vector_irq) {
+devm_kfree(&pdev->dev, hdev->vector_status);
+pci_free_irq_vectors(pdev);
+return -ENOMEM;
+
+static void hclgevf_uninit_msi(struct hclgevf_dev *hdev)
+{
+struct pci_dev *pdev = hdev->pdev;
+
+devm_kfree(&pdev->dev, hdev->vector_status);
+devm_kfree(&pdev->dev, hdev->vector_irq);
+pci_free_irq_vectors(pdev);
+
+static int hclgevf_misc_irq_init(struct hclgevf_dev *hdev)
+{
+int ret = 0;
+
+hclgevf_get_misc_vector(hdev);
+
+ret = request_irq(hdev->misc_vector.vector_irq, hclgevf_misc_irq_handle,
+ 0, "hclgevf_cmd", hdev);
+if (ret) {
+dev_err(&pdev->dev, "VF failed to request misc irq(%d)");
hdev->misc_vector.vector_irq);
+return ret;
+
+hdevf_clear_event_cause(hdev, 0);
+
+/* enable misc. vector(vector 0) */
+hdevf_enable_vector(&hdev->misc_vector, true);
+
+return ret;
+
+static void hdevf_misc_irq_uninit(struct hdevf_dev *hdev)
+{
+  /* disable misc vector(vector 0) */
+hdevf_disable_vector(&hdev->misc_vector, false);
+synchronize_irq(hdev->misc_vector.vector_irq);
+free_irq(hdev->misc_vector.vector_irq, hdev);
+hdevf_free_vector(hdev, 0);
+}
+
+static int hdevf_init_client_instance(struct hnae3_client *client,
+struct hnae3_ae_dev *ae_dev)
+{
+struct hdevf_dev *hdev = ae_dev->priv;
+int ret;
+
+switch (client->type) {
+case HNAE3_CLIENT_KNIC:
+hdev->nic_client = client;
+hdev->nic.client = client;
+
+ret = client->ops->init_instance(&hdev->nic);
+if (ret)
+  goto clear_nic;
+
+hdevf_set_client_init_flag(client, ae_dev, 1);
+
+if (hdev->roce_client && hnae3_dev_roce_supported(hdev)) {
+struct hnae3_client *rc = hdev->roce_client;
+
+ret = hdevf_init_roce_base_info(hdev);
+if (ret)
+  goto clear_roce;
+ret = rc->ops->init_instance(&hdev->roce);
+if (ret)
+  goto clear_roce;
+}
+hnae3_set_client_init_flag(hdev->roce_client, ae_dev, 1);
+break;
+case HNAE3_CLIENT_UNIC:
+hdev->nic_client = client;
+hdev->nic.client = client;
+
+ret = client->ops->init_instance(&hdev->nic);
+if (ret)
+goto clear_nic;
+
+hnae3_set_client_init_flag(client, ae_dev, 1);
+break;
+case HNAE3_CLIENT_ROCE:
+if (hnae3_dev_roce_supported(hdev)) {
+hdev->roce_client = client;
+hdev->roce.client = client;
+
+if (hdev->roce_client && hdev->nic_client) {
+ret = hclgevf_init_roce_base_info(hdev);
+if (ret)
+goto clear_roce;
+
+ret = client->ops->init_instance(&hdev->roce);
+if (ret)
+goto clear_roce;
+
+hnae3_set_client_init_flag(client, ae_dev, 1);
+break;
+default:
+return -EINVAL;
+
+return 0;
+
clear_nic:
+hdev->nic_client = NULL;
+hdev->nic.client = NULL;
+return ret;
+
clear_roce:
+hdev->roce_client = NULL;
+hdev->roce.client = NULL;
+return ret;
+}
+static void hclgevf_uninit_client_instance(struct hnae3_client *client,
+    struct hnae3_ae_dev *ae_dev)
+{
+    struct hclgevf_dev *hdev = ae_dev->priv;
+
+    /* un-init roce, if it exists */
+    if (hdev->roce_client) {
+        hdev->roce_client->ops->uninit_instance(&hdev->roce, 0);
+        hdev->roce_client = NULL;
+        hdev->roce.client = NULL;
+    }
+
+    /* un-init nic/unic, if this was not called by roce client */
+    if (client->ops->uninit_instance && hdev->nic_client &&
+        client->type != HNAE3_CLIENT_ROCE) {
+        client->ops->uninit_instance(&hdev->nic, 0);
+        hdev->nic_client = NULL;
+        hdev->nic.client = NULL;
+    }
+
+    static int hclgevf_pci_init(struct hclgevf_dev *hdev)
+    {
+        struct pci_dev *pdev = hdev->pdev;
+        struct hclgevf_hw *hw;
+        int ret;
+        
+        ret = pci_enable_device(pdev);
+        if (ret) {
+            dev_err(&pdev->dev, "failed to enable PCI device\n");
+            return ret;
+        }
+
+        ret = dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(64));
+        if (ret) {
+            dev_err(&pdev->dev, "can't set consistent PCI DMA, exiting\n");
+            goto err_disable_device;
+        }
+
+        ret = pci_request_regions(pdev, HCLGEVF_DRIVER_NAME);
+        if (ret) {
+            dev_err(&pdev->dev, "PCI request regions failed %d\n", ret);
+            goto err_disable_device;
+        }
+
+        hw = &hdev->hw;
+        hw->hdev = hdev;
+hw->io_base = pci_iomap(pdev, 2, 0);
+if (!hw->io_base) {
+dev_err(&pdev->dev, "can't map configuration register space\n");
+ret = -ENOMEM;
+goto err_clr_master;
+
+return 0;
+
+err_clr_master:
+pci_clear_master(pdev);
+pci_release_regions(pdev);
+err_disable_device:
+pci_disable_device(pdev);
+
+return ret;
+
+
+static void hclgevf_pci_uninit(struct hclgevf_dev *hdev)
+{
+struct pci_dev *pdev = hdev->pdev;
+
+pci_iounmap(pdev, hdev->hw.io_base);
+pci_clear_master(pdev);
+pci_release_regions(pdev);
+pci_disable_device(pdev);
+
+
+static int hclgevf_query_vf_resource(struct hclgevf_dev *hdev)
+{
+struct hclgevf_query_res_cmd *req;
+struct hclgevf_desc desc;
+int ret;
+
+hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_QUERY_VF_RSRC, true);
+ret = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"query vf resource failed, ret = %d.\n", ret);
+return ret;
+
+req = (struct hclgevf_query_res_cmd *)desc.data;
+
+if (hnae3_get_bit(hdev->ae_dev->flag, HNAE3_DEV_SUPPORT_ROCE_B)) {
+hdev->roce_base_msix_offset =
+hnae3_get_field(__le16_to_cpu(req->msixcap_localid_racee),
+HCLGEVF_MSIX_OFT_ROCEE_M,
}
HCLGEVF_MSIX_OFT_ROCEE_S);
hdev->num_roce_msix =
hnae3_get_field(__le16_to_cpu(req->vf_intr_vector_number),
HCLGEVF_VEC_NUM_M, HCLGEVF_VEC_NUM_S);
+
/* VF should have NIC vectors and Roce vectors, NIC vectors
+ * are queued before Roce vectors. The offset is fixed to 64.
+ */
hdev->num_msi = hdev->num_roce_msix +
hdev->roce_base_msix_offset;
} else {
    hdev->num_msi =
    hnae3_get_field(__le16_to_cpu(req->vf_intr_vector_number),
    HCLGEVF_VEC_NUM_M, HCLGEVF_VEC_NUM_S);
}
+
{return 0;
}
+
static int hclgevf_pci_reset(struct hclgevf_dev *hdev)
{
    struct pci_dev *pdev = hdev->pdev;
    int ret = 0;

    if (hdev->reset_type == HNAE3_VF_FULL_RESET &&
        test_bit(HCLGEVF_STATE_IRQ_INITED, &hdev->state)) {
        hclgevf_misc_irq_uninit(hdev);
        hclgevf_uninit_msi(hdev);
        clear_bit(HCLGEVF_STATE_IRQ_INITED, &hdev->state);
    }
+
    if (!test_bit(HCLGEVF_STATE_IRQ_INITED, &hdev->state)) {
        pci_set_master(pdev);
        ret = hclgevf_init_msi(hdev);
        if (ret) {
            dev_err(&pdev->dev,
                "failed(%d) to init MSI/MSI-X\n", ret);
            return ret;
        }
        ret = hclgevf_misc_irq_init(hdev);
        if (ret) {
            hclgevf_uninit_msi(hdev);
            dev_err(&pdev->dev, "failed(%d) to init Misc IRQ(vector0)\n", ret);
            return ret;
        }
        +
        return ret;
    }
    +
}
+set_bit(HCLGEVF_STATE_IRQ_INITED, &hdev->state);
+
+return ret;
+
+static int hclgevf_reset_hdev(struct hclgevf_dev *hdev)
+{
+struct pci_dev *pdev = hdev->pdev;
+int ret;
+
+ret = hclgevf_pci_reset(hdev);
+if (ret) {
+dev_err(&pdev->dev, "pci reset failed %d\n", ret);
+return ret;
+}
+
+ret = hclgevf_cmd_init(hdev);
+if (ret) {
+dev_err(&pdev->dev, "cmd failed %d\n", ret);
+return ret;
+}
+
+ret = hclgevf_rss_init_hw(hdev);
+if (ret) {
+dev_err(&hdev->pdev->dev, "failed(%d) to initialize RSS\n", ret);
+return ret;
+}
+
+ret = hclgevf_config_gro(hdev, true);
+if (ret)
+return ret;
+
+ret = hclgevf_init_vlan_config(hdev);
+if (ret) {
+dev_err(&hdev->pdev->dev, "failed(%d) to initialize VLAN config\n", ret);
+return ret;
+}
+
+dev_info(&hdev->pdev->dev, "Reset done\n");
+
+return 0;
+
+static int hclgevf_init_hdev(struct hclgevf_dev *hdev)
+{
}
+struct pci_dev *pdev = hdev->pdev;
+int ret;
+
+ret = hclgevf_pci_init(hdev);
+if (ret) {
+dev_err(&pdev->dev, "PCI initialization failed\n");
+return ret;
+}
+
+ret = hclgevf_cmd_queue_init(hdev);
+if (ret) {
+dev_err(&pdev->dev, "Cmd queue init failed: %d\n", ret);
+goto err_cmd_queue_init;
+}
+
+ret = hclgevf_cmd_init(hdev);
+if (ret)
+goto err_cmd_init;
+
+ret = hclgevf_query_vf_resource(hdev);
+if (ret) {
+dev_err(&pdev->dev, "Query vf status error, ret = %d\n", ret);
+goto err_cmd_init;
+}
+
+ret = hclgevf_init_msi(hdev);
+if (ret) {
+dev_err(&pdev->dev, "failed(%d) to init MSI/MSI-X\n", ret);
+goto err_cmd_init;
+}
+
+hclgevf_state_init(hdev);
+hdev->reset_level = HNAE3_VF_FUNC_RESET;
+
+ret = hclgevf_misc_irq_init(hdev);
+if (ret) {
+dev_err(&pdev->dev, "failed(%d) to init Misc IRQ(vector0)\n", ret);
+goto err_misc_irq_init;
+}
+
+set_bit(HCLGEVF_STATE_IRQ_INITED, &hdev->state);
+
+ret = hclgevf_configure(hdev);
+if (ret) {
+dev_err(&pdev->dev, "failed(%d) to fetch configuration\n", ret);
+}
+goto err_config;
+
+ret = hclgevf_alloc_tqps(hdev);
+if (ret) {
+dev_err(&pdev->dev, "failed(\%d) to allocate TQPs\n", ret);
+goto err_config;
+}
+
+ret = hclgevf_set_handle_info(hdev);
+if (ret) {
+dev_err(&pdev->dev, "failed(\%d) to set handle info\n", ret);
+goto err_config;
+}
+
+ret = hclgevf_config_gro(hdev, true);
+if (ret)
+goto err_config;
+
+/* Initialize RSS for this VF */
+ret = hclgevf_rss_init_hw(hdev);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"failed(\%d) to initialize RSS\n", ret);
+goto err_config;
+}
+
+ret = hclgevf_init_vlan_config(hdev);
+if (ret) {
+dev_err(&hdev->pdev->dev,
+"failed(\%d) to initialize VLAN config\n", ret);
+goto err_config;
+}
+
+hdev->last_reset_time = jiffies;
+pr_info("finished initializing %s driver\n", HCLGEVF_DRIVER_NAME);
+
+return 0;
+
+err_config:
+hclgevf_misc_irq_uninit(hdev);
+err_misc_irq_init:
+hclgevf_state_uninit(hdev);
+hclgevf_uninit_msi(hdev);
+err_cmd_init:
+hclgevf_cmd_uninit(hdev);
+err_cmd_queue_init:
+hclgevf_pci_uninit(hdev);
clear_bit(HCLGEVF_STATE_IRQ_INITED, &hdev->state);
+return ret;
+
static void hclgevf_uninit_hdev(struct hclgevf_dev *hdev)
+
    hclgevf_state_uninit(hdev);
+
    if (test_bit(HCLGEVF_STATE_IRQ_INITED, &hdev->state)) {
        hclgevf_misc_irq_uninit(hdev);
        hclgevf_uninit_msi(hdev);
    }
+
    hclgevf_pci_uninit(hdev);
    hclgevf_cmd_uninit(hdev);
+
    static int hclgevf_init_ae_dev(struct hnae3_ae_dev *ae_dev)
+
    struct pci_dev *pdev = ae_dev->pdev;
    struct hclgevf_dev *hdev;
    int ret;
+
    ret = hclgevf_alloc_hdev(ae_dev);
    if (ret) {
        dev_err(&pdev->dev, "hclge device allocation failed\n");
        return ret;
    }
+
    ret = hclgevf_init_hdev(ae_dev->priv);
    if (ret) {
        dev_err(&pdev->dev, "hclge device initialization failed\n");
        return ret;
    }
+
    hdev = ae_dev->priv;
+
    timer_setup(&hdev->keep_alive_timer, hclgevf_keep_alive_timer, 0);
+
    INIT_WORK(&hdev->keep_alive_task, hclgevf_keep_alive_task);
+
    return 0;
+
    static void hclgevf_uninit_ae_dev(struct hnae3_ae_dev *ae_dev)
+
    hclgevf_uninit_hdev(hdev);
+
    hclgevf_uninit_ae_dev(ae_dev);
static u32 hclgevf_get_max_channels(struct hclgevf_dev *hdev)
{
    struct hnae3_handle *nic = &hdev->nic;
    struct hnae3_knic_private_info *kinfo = &nic->kinfo;

    return min_t(u32, hdev->rss_size_max,
                 hdev->num_tqps / kinfo->num_tc);
}

/**
 * hclgevf_get_channels - Get the current channels enabled and max supported.
 * @handle: hardware information for network interface
 * @ch: ethtool channels structure
 * + We don't support separate tx and rx queues as channels. The other count
 * + represents how many queues are being used for control. max_combined counts
 * + how many queue pairs we can support. They may not be mapped 1 to 1 with
 * + q_vectors since we support a lot more queue pairs than q_vectors.
 * + */
static void hclgevf_get_channels(struct hnae3_handle *handle,
    struct ethtool_channels *ch)
{
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);

    ch->max_combined = hclgevf_get_max_channels(hdev);
    ch->other_count = 0;
    ch->max_other = 0;
    ch->combined_count = handle->kinfo.rss_size;
}

static void hclgevf_get_tqps_and_rss_info(struct hnae3_handle *handle,
    u16 *alloc_tqps, u16 *max_rss_size)
{
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);

    *alloc_tqps = hdev->num_tqps;
    *max_rss_size = hdev->rss_size_max;
}

static int hclgevf_get_status(struct hnae3_handle *handle)
{
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);

    return hdev->hw.mac.link;
}
+static void hclgevf_get_ksettings_an_result(struct hnae3_handle *handle,
+    u8 *auto_neg, u32 *speed,
+    u8 *duplex)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    
+    if (speed)
+        *speed = hdev->hw.mac.speed;
+    if (duplex)
+        *duplex = hdev->hw.mac.duplex;
+    if (auto_neg)
+        *auto_neg = AUTONEG_DISABLE;
+}
+
+void hclgevf_update_speed_duplex(struct hclgevf_dev *hdev, u32 speed,
+    u8 duplex)
+{
+    hdev->hw.mac.speed = speed;
+    hdev->hw.mac.duplex = duplex;
+}
+
+static void hclgevf_get_media_type(struct hnae3_handle *handle,
+    u8 *media_type)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    
+    if (media_type)
+        *media_type = hdev->hw.mac.media_type;
+}
+
+static bool hclgevf_get_hw_reset_stat(struct hnae3_handle *handle)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    
+    return !!hclgevf_read_dev(&hdev->hw, HCLGEVF_RST_ING);
+}
+
+static bool hclgevf_ae_dev_resetting(struct hnae3_handle *handle)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    
+    return test_bit(HCLGEVF_STATE_RST_HANDLING, &hdev->state);
+}
+
+static unsigned long hclgevf_ae_dev_reset_cnt(struct hnae3_handle *handle)
+{
+    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
+    
+    return hdev->reset_count;
```c
#define MAX_SEPARATE_NUM 4
#define SEPARATOR_VALUE 0xFFFFFFFF
#define REG_NUM_PER_LINE 4
#define REG_LEN_PER_LINE (REG_NUM_PER_LINE * sizeof(u32))

static int hclgevf_get_regs_len(struct hnae3_handle *handle)
{
    int cmdq_lines, common_lines, ring_lines, tqp_intr_lines;
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);

    cmdq_lines = sizeof(cmdq_reg_addr_list) / REG_LEN_PER_LINE + 1;
    common_lines = sizeof(common_reg_addr_list) / REG_LEN_PER_LINE + 1;
    ring_lines = sizeof(ring_reg_addr_list) / REG_LEN_PER_LINE + 1;
    tqp_intr_lines = sizeof(tqp_intr_reg_addr_list) / REG_LEN_PER_LINE + 1;

    return (cmdq_lines + common_lines + ring_lines * hdev->num_tqps +
            tqp_intr_lines * (hdev->num_msi_used - 1)) * REG_LEN_PER_LINE;
}

static void hclgevf_get_regs(struct hnae3_handle *handle, u32 *version,
                              void *data)
{
    struct hclgevf_dev *hdev = hclgevf_ae_get_hdev(handle);
    int i, j, reg_num, separator_num;
    u32 *reg = data;

    *version = hdev->fw_version;

    /* fetching per-VF registers values from VF PCIe register space */
    reg_num = sizeof(cmdq_reg_addr_list) / sizeof(u32);
    separator_num = MAX_SEPARATE_NUM - reg_num % REG_NUM_PER_LINE;
    for (i = 0; i < reg_num; i++)
        *reg++ = hclgevf_read_dev(&hdev->hw, cmdq_reg_addr_list[i]);
    for (i = 0; i < separator_num; i++)
        *reg++ = SEPARATOR_VALUE;

    reg_num = sizeof(common_reg_addr_list) / sizeof(u32);
    separator_num = MAX_SEPARATE_NUM - reg_num % REG_NUM_PER_LINE;
    for (i = 0; i < reg_num; i++)
        *reg++ = hclgevf_read_dev(&hdev->hw, common_reg_addr_list[i]);
    for (i = 0; i < separator_num; i++)
        *reg++ = SEPARATOR_VALUE;

    reg_num = sizeof(ring_reg_addr_list) / sizeof(u32);
    separator_num = MAX_SEPARATE_NUM - reg_num % REG_NUM_PER_LINE;
    for (j = 0; j < hdev->num_tqps; j++)
```
for (i = 0; i < reg_um; i++)
    *reg++ = hclgevf_read_dev(&hdev->hw, ring_reg_addr_list[i] + 0x200 * j);

for (i = 0; i < separator_num; i++)
    *reg++ = SEPARATOR_VALUE;
}

reg_um = sizeof(tqp_intr_reg_addr_list) / sizeof(u32);
separator_num = MAX_SEPARATOR_NUM - reg_um % REG_NUM_PER_LINE;

for (j = 0; j < hdev->num_msi_used - 1; j++) {
    for (i = 0; i < reg_um; i++)
        *reg++ = hclgevf_read_dev(&hdev->hw, tqp_intr_reg_addr_list[i] + 4 * j);
    for (i = 0; i < separator_num; i++)
        *reg++ = SEPARATOR_VALUE;
}

static const struct hnae3_ae_ops hclgevf_ops = {
    .init_ae_dev = hclgevf_init_ae_dev,
    .uninit_ae_dev = hclgevf_uninit_ae_dev,
    .flr_prepare = hclgevf_flr_prepare,
    .flr_done = hclgevf_flr_done,
    .init_client_instance = hclgevf_init_client_instance,
    .uninit_client_instance = hclgevf_uninit_client_instance,
    .start = hclgevf_ae_start,
    .stop = hclgevf_ae_stop,
    .client_start = hclgevf_client_start,
    .client_stop = hclgevf_client_stop,
    .map_ring_to_vector = hclgevf_map_ring_to_vector,
    .unmap_ring_from_vector = hclgevf_unmap_ring_from_vector,
    .get_vector = hclgevf_get_vector,
    .put_vector = hclgevf_put_vector,
    .reset_queue = hclgevf_reset_tqp,
    .set_promisc_mode = hclgevf_set_promisc_mode,
    .get_mac_addr = hclgevf_get_mac_addr,
    .set_mac_addr = hclgevf_set_mac_addr,
    .add_uc_addr = hclgevf_add_uc_addr,
    .rm_uc_addr = hclgevf_rm_uc_addr,
    .add_mc_addr = hclgevf_add_mc_addr,
    .rm_mc_addr = hclgevf_rm_mc_addr,
    .get_stats = hclgevf_get_stats,
    .update_stats = hclgevf_update_stats,
    .get_strings = hclgevf_get_strings,
    .get_sset_count = hclgevf_get_sset_count,
    .get_rss_key_size = hclgevf_get_rss_key_size,
+get_rss_indir_size = hclgevf_get_rss_indir_size,
+get_rss = hclgevf_get_rss,
+set_rss = hclgevf_set_rss,
+get_rss_tuple = hclgevf_get_rss_tuple,
+set_rss_tuple = hclgevf_set_rss_tuple,
+get_tc_size = hclgevf_get_tc_size,
+get_fw_version = hclgevf_get_fw_version,
+set_vlan_filter = hclgevf_set_vlan_filter,
+enable_hw_strip_rxvtag = hclgevf_en_hw_strip_rxvtag,
+reset_event = hclgevf_reset_event,
+set_default_reset_request = hclgevf_set_def_reset_request,
+get_channels = hclgevf_get_channels,
+get_tqps_and_rss_info = hclgevf_get_tqps_and_rss_info,
+get_regs_len = hclgevf_get_regs_len,
+get_regs = hclgevf_get_regs,
+get_status = hclgevf_get_status,
+get_ksettings_an_result = hclgevf_get_ksettings_an_result,
+get_media_type = hclgevf_get_media_type,
+get_hw_reset_stat = hclgevf_get_hw_reset_stat,
+ae_dev_resetting = hclgevf_ae_dev_resetting,
+ae_dev_reset_cnt = hclgevf_ae_dev_reset_cnt,
+set_mtu = hclgevf_set_mtu,
+get_global_queue_id = hclgevf_get_qid_global,
+set_timer_task = hclgevf_set_timer_task,
+};
+
+static struct hnae3_ae_algo ae_algovf = {
  .ops = &hclgevf_ops,
  .pdev_id_table = ae_algovf_pci_tbl,
+};
+
+static int hclgevf_init(void)
+{
  pr_info("%s is initializing\n", HCLGEVF_NAME);
+  +hnae3_register_ae_algo(&ae_algovf);
  +
  +return 0;
  +}
+
+static void hclgevf_exit(void)
+{
  +hnae3_unregister_ae_algo(&ae_algovf);
  +}
+module_init(hclgevf_init);
+module_exit(hclgevf_exit);
+
+MODULE_LICENSE("GPL");
+#ifdef __HCLGEVF_MAIN_H
+/* SPDX-License-Identifier: GPL-2.0+ */
+/* Copyright (c) 2016-2017 Hisilicon Limited. */
+
++#ifndef __HCLGEVF_MAIN_H
+/* This number in actual depends upon the total number of VFs
+ * created by physical function. But the maximum number of
+ * possible vector-per-VF is [VFn(1-32), VECTn(32 + 1)].
+ */
++#define HCLGEVF_MAX_VF_VECTOR_NUM (32 + 1)
+
+/* bar registers for cmdq */
+/#define HCLGEVF_CMDQ_TX_ADDR_L_REG 0x27000
+/#define HCLGEVF_CMDQ_TX_ADDR_H_REG 0x27004
+/#define HCLGEVF_CMDQ_TX_DEPTH_REG 0x27008
+/#define HCLGEVF_CMDQ_TX_TAIL_REG 0x27010
+/#define HCLGEVF_CMDQ_TX_HEAD_REG 0x27014
+/#define HCLGEVF_CMDQ_RX_ADDR_L_REG 0x27018
+/#define HCLGEVF_CMDQ_RX_ADDR_H_REG 0x2701C
+/#define HCLGEVF_CMDQ_RX_DEPTH_REG 0x27020
+/#define HCLGEVF_CMDQ_RX_TAIL_REG 0x27024
+/#define HCLGEVF_CMDQ_RX_HEAD_REG 0x27028
+/#define HCLGEVF_CMDQ_INTR_SRC_REG 0x27100
+/#define HCLGEVF_CMDQ_INTR_STS_REG 0x27104
+//define HCLGEVF_CMDQ_INTR_EN_REG 0x27108
+//define HCLGEVF_CMDQ_INTR_GEN_REG 0x2710C
+
+/* bar registers for common func */
+//define HCLGEVF_GRO_EN_REG 0x28000
+
+/* bar registers for rcb */
+//define HCLGEVF_RING_RX_ADDR_L_REG 0x80000
+//define HCLGEVF_RING_RX_ADDR_H_REG 0x80004
+//define HCLGEVF_RING_RX_BD_NUM_REG 0x80008
+//define HCLGEVF_RING_RX_BD_LENGTH_REG 0x8000C
+//define HCLGEVF_RING_RX_MERGE_EN_REG 0x80014
+//define HCLGEVF_RING_RX_TAIL_REG 0x80018
+//define HCLGEVF_RING_RX_HEAD_REG 0x8001C
+//define HCLGEVF_RING_RX_FBD_NUM_REG 0x80020
+//define HCLGEVF_RING_RX_FBD_OFFSET_REG 0x80024
+//define HCLGEVF_RING_RX_STASH_REG 0x80030
+//define HCLGEVF_RING_RX_BD_ERR_REG 0x80034
+//define HCLGEVF_RING_TX_ADDR_L_REG 0x80040
+//define HCLGEVF_RING_TX_ADDR_H_REG 0x80044
+//define HCLGEVF_RING_TX_BD_NUM_REG 0x80048
+//define HCLGEVF_RING_TX_PRIORITY_REG 0x8004C
+//define HCLGEVF_RING_TX_TC_REG 0x80050
+//define HCLGEVF_RING_TX_MERGE_EN_REG 0x80054
+//define HCLGEVF_RING_TX_TAIL_REG 0x80058
+//define HCLGEVF_RING_TX_HEAD_REG 0x8005C
+//define HCLGEVF_RING_TX_FBD_NUM_REG 0x80060
+//define HCLGEVF_RING_TX_EBD_NUM_REG 0x80068
+//define HCLGEVF_RING_TX_EBD_OFFSET_REG 0x80070
+//define HCLGEVF_RING_TX_BD_ERR_REG 0x80074
+//define HCLGEVF_RING_EN_REG 0x80090
+
+/* bar registers for tqp interrupt */
+//define HCLGEVF_TQP_INTR_CTRL_REG 0x20000
+//define HCLGEVF_TQP_INTR_GL0_REG 0x20100
+//define HCLGEVF_TQP_INTR_GL1_REG 0x20200
+//define HCLGEVF_TQP_INTR_RL_REG 0x20900
+
+/* Vector0 interrupt CMDQ event source register(RW) */
+//define HCLGEVF_VECTOR0_CMDQ_SRC_REG 0x27100
+/* CMDQ register bits for RX event(=MBX event) */
+//define HCLGEVF_VECTOR0_RX_CMDQ_INT_B 1
+/* RST register bits for RESET event */
+//define HCLGEVF_VECTOR0_RST_INT_B 2
+
```c
#define HCLGEVF_TQP_RESET_TRY_TIMES 10

#define HCLGEVF_RST_ING0x20C00
#define HCLGEVF_FUN_RST_ING_BITBIT(0)
#define HCLGEVF_GLOBAL_RST_ING_BITBIT(5)
#define HCLGEVF_CORE_RST_ING_BITBIT(6)
#define HCLGEVF_IMP_RST_ING_BITBIT(7)
#define HCLGEVF_RST_ING_BITS
  (HCLGEVF_FUN_RST_ING_BIT | HCLGEVF_GLOBAL_RST_ING_BIT | 
   HCLGEVF_CORE_RST_ING_BIT | HCLGEVF_IMP_RST_ING_BIT)

#define HCLGEVF_RSS_IND_TBL_SIZE 512
#define HCLGEVF_RSS_SET_BITMAP_MSK 0xffffff
#define HCLGEVF_RSS_KEY_SIZE 40
#define HCLGEVF_RSS_HASH_ALGO_TOEPLITZ0
#define HCLGEVF_RSS_HASH_ALGO_SIMPLE1
#define HCLGEVF_RSS_HASH_ALGO_SYMMETRIC2
#define HCLGEVF_RSS_HASH_ALGO_MASK 0xf

#define HCLGEVF_RSS_CFG_TBL_NUM
  (HCLGEVF_RSS_IND_TBL_SIZE / HCLGEVF_RSS_CFG_TBL_SIZE)
#define HCLGEVF_RSS_INPUT_TUPLE_OTHER
  GENMASK(3, 0)
#define HCLGEVF_RSS_INPUT_TUPLE_SCTP
  GENMASK(4, 0)
#define HCLGEVF_D_PORT_BIT
  BIT(0)
#define HCLGEVF_S_PORT_BIT
  BIT(1)
#define HCLGEVF_D_IP_BIT
  BIT(2)
#define HCLGEVF_S_IP_BIT
  BIT(3)
#define HCLGEVF_V_TAG_BIT
  BIT(4)

enum hclgevf_evt_cause {
  HCLGEVF_VECTOR0_EVENT_RST,
  HCLGEVF_VECTOR0_EVENT_MBX,
  HCLGEVF_VECTOR0_EVENT_OTHER,
};

/* states of hclgevf device & tasks */
enum hclgevf_states {
  /* device states */
  HCLGEVF_STATE_DOWN,
  HCLGEVF_STATE_DISABLED,
  HCLGEVF_STATE_IRQ_INITED,
  /* task states */
  HCLGEVF_STATE_SERVICE_SCHED,
  HCLGEVF_STATE_RST_SERVICE_SCHED,
  HCLGEVF_STATE_RST_HANDLING,
  HCLGEVF_STATE_MBX_SERVICE_SCHED,
  HCLGEVF_STATE_MBX_HANDLING,
  HCLGEVF_STATE_CMD_DISABLE,
};
```
```c
#define HCLGEVF_MPFE_ENABLE 1

struct hclgevf_mac {
    u8 media_type;
    u8 mac_addr[ETH_ALEN];
    int link;
    u8 duplex;
    u32 speed;
};

struct hclgevf_hw {
    void __iomem *io_base;
    int num_vec;
    struct hclgevf_cmq cmq;
    struct hclgevf_mac mac;
    void *hdev; /* hchgevf device it is part of */
};

/* TQP stats */
struct hlcgevf_tqp_stats {
    /* query_tqp_tx_queue_statistics, opcode id: 0x0B03 */
    u64 rcb_tx_ring_pktnum_rcd; /* 32bit */
    /* query_tqp_rx_queue_statistics, opcode id: 0x0B13 */
    u64 rcb_rx_ring_pktnum_rcd; /* 32bit */
};

struct hclgevf_tqp {
    struct device *dev; /* device for DMA mapping */
    struct hnae3_queue q;
    struct hlcgevf_tqp_stats tqp_stats;
    u16 index; /* global index in a NIC controller */
    bool allocated;
};

struct hclgevf_cfg {
    u8 vmdq_vport_num;
    u8 tc_num;
    u16 tqp_desc_num;
    u16 rx_buf_len;
    u8 phy_addr;
    u8 media_type;
    u8 mac_addr[ETH_ALEN];
    u32 numa_node_map;
};

struct hclgevf_rss_tuple_cfg {
```
+u8 ipv4_tcp_en;
+u8 ipv4_udp_en;
+u8 ipv4_sctp_en;
+u8 ipv4_fragment_en;
+u8 ipv6_tcp_en;
+u8 ipv6_udp_en;
+u8 ipv6_sctp_en;
+u8 ipv6_fragment_en;
+};
+
+struct hclgevf_rss_cfg {
+u8 rss_hash_key[HCLGEVF_RSS_KEY_SIZE]; /* user configured hash keys */
+u32 hash_algo;
+u32 rss_size;
+u8 hw_tc_map;
+u8 rss_indirection_tbl[HCLGEVF_RSS_IND_TBL_SIZE]; /* shadow table */
+struct hclgevf_rss_tuple_cfg rss_tuple_sets;
+};
+
+struct hclgevf_misc_vector {
+u8 __iomem *addr;
+int vector_irq;
+};
+
+struct hclgevf_dev {
+struct pci_dev *pdev;
+struct hnae3_ae_dev *ae_dev;
+struct hclgevf_hw hw;
+struct hclgevf_misc_vector misc_vector;
+struct hclgevf_rss_cfg rss_cfg;
+unsigned long state;
+unsigned long flr_state;
+unsigned long default_reset_request;
+unsigned long last_reset_time;
+enum hnae3_reset_type reset_level;
+unsigned long reset_pending;
+enum hnae3_reset_type reset_type;
+
+#define HCLGEVF_RESET_REQUESTED 0
+#define HCLGEVF_RESET_PENDING 1
+unsigned long reset_state; /* requested, pending */
+unsigned long reset_count; /* the number of reset has been done */
+u32 reset_attempts;
+
+u32 fw_version;
+u16 num_tqps; /* num task queue pairs of this PF */
+
+u16 alloc_rss_size; /* allocated RSS task queue */
+u16 rss_size_max; /* HW defined max RSS task queue */
+
+u16 num.alloc_vport; /* num vports this driver supports */
+u32 numa_node_mask;
+u16 rx_buf_len;
+u16 num_desc;
+u8 hw_tc_map;
+
+u16 num_msi;
+u16 num_msi_left;
+u16 num_msi_used;
+u16 num_roce_msix; /* Num of roce vectors for this VF */
+u16 roce_base_msix_offset;
+int roce_base_vector;
+u32 base_msi_vector;
+u16 *vector_status;
+int *vector_irq;
+
+bool mbx_event_pending;
+struct hclgevf_mbx_resp_status mbx_resp; /* mailbox response */
+struct hclgevf_mbx_arq_ring arq; /* mailbox async rx queue */
+
+struct timer_list service_timer;
+struct timer_list keep_alive_timer;
+struct work_struct service_task;
+struct work_struct keep_alive_task;
+struct work_struct rst_service_task;
+struct work_struct mbx_service_task;
+
+struct hclgevf_tqp *htqp;
+
+struct hnae3_handle nic;
+struct hnae3_handle roce;
+
+struct hnae3_client *nic_client;
+struct hnae3_client *roce_client;
+u32 flag;
+};
+
+static inline bool hclgevf_is_reset_pending(struct hclgevf_dev *hdev)
+{
+return !!hdev->reset_pending;
+}
+
+int hclgevf_send_mbx_msg(struct hclgevf_dev *hdev, u16 code, u16 subcode,
+const u8 *msg_data, u8 msg_len, bool need_resp,
+u8 *resp_data, u16 resp_len);
+void hclgevf_mbx_handler(struct hclgevf_dev *hdev);
+void hclgevf_mbx_async_handler(struct hclgevf_dev *hdev);
+
+void hclgevf_update_link_status(struct hclgevf_dev *hdev, int link_state);
+void hclgevf_update_speed_duplex(struct hclgevf_dev *hdev, u32 speed,
+u8 duplex);
+void hclgevf_reset_task_schedule(struct hclgevf_dev *hdev);
+void hclgevf_mbx_task_schedule(struct hclgevf_dev *hdev);
+#endif

--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns3/hns3vf/hclgevf_mbx.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns3/hns3vf/hclgevf_mbx.c
@@ -0,0 +1,302 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright (c) 2016-2017 Hisilicon Limited.
+
+// include "hclge_mbx.h"
+#include "hclgevf_main.h"
+#include "hnae3.h"
+
+static void hclgevf_reset_mbx_resp_status(struct hclgevf_dev *hdev)
+{
+/* this function should be called with mbx_resp.mbx_mutex held
+ * to protect the received_response from race condition
+ */
+hdev->mbx_resp.received_resp = false;
+hdev->mbx_resp.origin_mbx_msg = 0;
+hdev->mbx_resp.resp_status = 0;
+memset(hdev->mbx_resp.additional_info, 0, HCLGE_MBX_MAX_RESP_DATA_SIZE);
+
+/* hclgevf_get_mbx_resp: used to get a response from PF after VF sends a mailbox
+ * message to PF.
+ * @hdev: pointer to struct hclgevf_dev
+ * @resp_msg: pointer to store the original message type and response status
+ * @len: the resp_msg data array length.
+ */
+static int hclgevf_get_mbx_resp(struct hclgevf_dev *hdev, u16 code0, u16 code1,
+u8 *resp_data, u16 resp_len)
+{[
+/* define HCLGEVF_MAX_TRY_TIMES500
+define HCLGEVF_SLEEP_USECOND1000
+struct hclgevf_mbx_resp_status *mbx_resp;
+u16 r_code0, r_code1;
+int i = 0;
+
+if (resp_len > HCLGE_MBX_MAX_RESP_DATA_SIZE) {
+dev_err(&hdev->pdev->dev,
+"VF mbx response len(=%d) exceeds maximum(=%d)%n",
+resp_len,
+HCLGE_MBX_MAX_RESP_DATA_SIZE);
+return -EINVAL;
+
+}
+
+while ((!hdev->mbxResp.received_resp) && (i < HCLGEVF_MAX_TRY_TIMES)) {
+if (test_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state))
+return -EIO;
+
+usleep_range(HCLGEVF_SLEEP_USECOND, HCLGEVF_SLEEP_USECOND * 2);
+i++;  
+}
+
+if (i >= HCLGEVF_MAX_TRY_TIMES) {
+dev_err(&hdev->pdev->dev,
	"VF could not get mbx resp(=%d) from PF in %d tries\n",
+hdev->mbxResp.received_resp, i);
+return -EIO;
+}
+
+mbxResp = &hdev->mbxResp;
+r_code0 = (u16)(mbxResp->origin_mbx_msg >> 16);
+r_code1 = (u16)(mbxResp->origin_mbx_msg & 0xff);
+
+if (mbxResp->resp_status)
+return mbxResp->resp_status;
+
+if (resp_data)
+memcpy(resp_data, &mbxResp->additional_info[0], resp_len);
+
hclgevf_reset_mbxResp_status(hdev);
+
+if (!(r_code0 == code0 && r_code1 == code1 && !mbxResp->resp_status)) {
+dev_err(&hdev->pdev->dev,
"VF could not match resp code(code0=%d,code1=%d), %d",
+code0, code1, mbxResp->resp_status);
+return -EIO;
+}
+
+return 0;
+
}
+
int hclgevf_send_mbx_msg(struct hclgevf_dev *hdev, u16 code, u16 subcode,
+const u8 *msg_data, u8 msg_len, bool needResp,
+u8 *resp_data, u16 resp_len)
+{
+struct hclge_mbx_vf_to_pf_cmd *req;
+struct hclgevf_desc desc;
+int status;
+
+req = (struct hclge_mbx_vf_to_pf_cmd *)desc.data;
+
+"/* first two bytes are reserved for code & subcode */
+if (msg_len > (HCLGE_MBX_MAX_MSG_SIZE - 2)) {
+dev_err(&hdev->pdev->dev,
+"VF send mbx msg fail, msg len %d exceeds max len %d\n",
+msg_len, HCLGE_MBX_MAX_MSG_SIZE);
+return -EINVAL;
+}
+
+hclgevf_cmd_setup_basic_desc(&desc, HCLGEVF_OPC_MBX_VF_TO_PF, false);
+req->msg[0] = code;
+req->msg[1] = subcode;
+memcpy(&req->msg[2], msg_data, msg_len);
+
+"/* synchronous send */
+if (need_resp) {
+mutex_lock(&hdev->mbx_resp.mbx_mutex);
+hclgevf_reset_mbx_resp_status(hdev);
+status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (status) {
+dev_err(&hdev->pdev->dev,
+"VF failed(=%d) to send mbx message to PF\n",
+status);
+mutex_unlock(&hdev->mbx_resp.mbx_mutex);
+return status;
+}
+
+status = hclgevf_get_mbx_resp(hdev, code, subcode, resp_data,
+ resp_len);
+mutex_unlock(&hdev->mbx_resp.mbx_mutex);
+} else {
+"/* asynchronous send */
+status = hclgevf_cmd_send(&hdev->hw, &desc, 1);
+if (status) {
+dev_err(&hdev->pdev->dev,
+"VF failed(=%d) to send mbx message to PF\n",
+status);
+return status;
+}
+}
+
+return status;
+
+static bool hclgevf_cmd_crq_empty(struct hclgevf_hw *hw)
+{
+u32 tail = hclgevf_read_dev(hw, HCLGEVF_NIC_CRQ_TAIL_REG);
+
+return tail == hw->cmq.crq.next_to_use;
+
+}
+
+void hclgevf_mbx_handler(struct hclgevf_dev *hdev)
+{
+struct hclgevf_mbx_resp_status *resp;
+struct hclge_mbx_pf_to_vf_cmd *req;
+struct hclgevf_cmq_ring *crq;
+struct hclgevf_desc *desc;
+u16 *msg_q;
+u16 flag;
+u8 *temp;
+int i;
+
+resp = &hdev->mbx_resp;
+crq = &hdev->hw.cmq.crq;
+
+while (!hclgevf_cmd_crq_empty(&hdev->hw)) {
+if (test_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state)) {
+dev_info(&hdev->pdev->dev, "vf crq need init\n");
+return;
+}
+
+desc = &crq->desc[crq->next_to_use];
+req = (struct hclge_mbx_pf_to_vf_cmd *)desc->data;
+
+flag = le16_to_cpu(crq->desc[crq->next_to_use].flag);
+if (unlikely(!hnae3_get_bit(flag, HCLGEVF_CMDQ_RX_OUTVLD_B))) {
+dev_warn(&hdev->pdev->dev,
+"dropped invalid mailbox message, code = %d\n",
+req->msg[0]);
+
+/* dropping/not processing this invalid message */
+crq->desc[crq->next_to_use].flag = 0;
+hclge_mbx_ring_ptr_move_crq(crq);
+continue;
+}
+
+/* synchronous messages are time critical and need preferential
+ treatment. Therefore, we need to acknowledge all the sync
+ responses as quickly as possible so that waiting tasks do not
+ timeout and simultaneously queue the async messages for later
+ processing in context of mailbox task i.e. the slow path.
+ */
+switch (req->msg[0]) {
+case HCLGE_MBX_PF_VF_RESP:
if (resp->received_resp)
    dev_warn(&hdev->pdev->dev,
        "VF mbx resp flag not clear(%d)\n",
        req->msg[1]);
    resp->received_resp = true;

    resp->origin_mbx_msg = (req->msg[1] << 16);
    resp->origin_mbx_msg |= req->msg[2];
    resp->resp_status = req->msg[3];

    temp = (u8 *)&req->msg[4];
    for (i = 0; i < HCLGE_MBX_MAX_RESP_DATA_SIZE; i++)
        resp->additional_info[i] = *temp;
        temp++;
    break;

    /* set this mbx event as pending. This is required as we
     * might loose interrupt event when mbx task is busy
     * handling. This shall be cleared when mbx task just
     * enters handling state.
     */
    hdev->mbx_event_pending = true;

    /* we will drop the async msg if we find ARQ as full
     * and continue with next message
     */
    if (hdev->arq.count >= HCLGE_MBX_MAX_ARQ_MSG_NUM) {
        dev_warn(&hdev->pdev->dev,
            "Async Q full, dropping msg(%d)\n",
            req->msg[1]);
            break;
        }

        /* tail the async message in arq */
        msg_q = hdev->arq.msg_q[hdev->arq.tail];
        memcpy(&msg_q[0], req->msg,
            HCLGE_MBX_MAX_ARQ_MSG_SIZE * sizeof(u16));
        hclge_mbx_tail_ptr_move_arq(hdev->arq);
        hdev->arq.count++;

        hclgevf_mbx_task_schedule(hdev);
        break;
    default:
        dev_err(&hdev->pdev->dev,
            "VF received unsupported(%d) mbx msg from PF\n",
+req->msg[0]);
+break;
+
+crq->desc[crq->next_to_use].flag = 0;
+hclge_mbx_ring_ptr_move_crq(crq);
+
+/* Write back CMDQ_RQ header pointer, M7 need this pointer */
+hclgevf_write_dev(&hdev->hw, HCLGEVF_NIC_CRQ_HEAD_REG,
+ crq->next_to_use);
+
+void hclgevf_mbx_async_handler(struct hclgevf_dev *hdev)
+
+enum hnae3_reset_type reset_type;
+u16 link_status;
+u16 *msg_q;
+u8 duplex;
+u32 speed;
+u32 tail;
+
+/* we can safely clear it now as we are at start of the async message
+ * processing
+ */
+hdev->mbx_event_pending = false;
+
+tail = hdev->arq.tail;
+
+/* process all the async queue messages */
+while (tail != hdev->arq.head) {
+if (test_bit(HCLGEVF_STATE_CMD_DISABLE, &hdev->state)) {
+dev_info(&hdev->pdev->dev,
+ "vf crq need init in async\n");
+return;
+}
+
+msg_q = hdev->arq.msg_q[hdev->arq.head];
+
+switch (msg_q[0]) {
+case HCLGE_MBX_LINK_STAT_CHANGE:
+link_status = le16_to_cpu(msg_q[1]);
+memcpy(&speed, &msg_q[2], sizeof(speed));
+duplex = (u8)le16_to_cpu(msg_q[4]);
+
+/* update upper layer with new link link status */
+hclgevf_update_link_status(hdev, link_status);
+hclgevf_update_speed_duplex(hdev, speed, duplex);
+break;
+case HCLGE_MBX_ASSERTING_RESET:
+/* PF has asserted reset hence VF should go in pending
+ * state and poll for the hardware reset status till it
+ * has been completely reset. After this stack should
+ * eventually be re-initialized.
+ */
+reset_type = le16_to_cpu(msg_q[1]);
+set_bit(reset_type, &hdev->reset_pending);
+set_bit(HCLGEVF_RESET_PENDING, &hdev->reset_state);
+hclgevf_reset_task_schedule(hdev);
+
+break;
+default:
+dev_err(&hdev->pdev->dev,
+"fetched unsupported(%d) message from arq\n",
+msg_q[0]);
+break;
+}
+
+hclge_mbx_head_ptr_move_arq(hdev->arq);
+hdev->arq.count--;
+msg_q = hdev->arq.msg_q[hdev->arq.head];
+}
+}
--- linux-4.15.0.orig/drivers/net/ethernet/hisilicon/hns_mdio.c
+++ linux-4.15.0/drivers/net/ethernet/hisilicon/hns_mdio.c
@@ -156,11 +156,15 @@
{
u32 time_cnt;
u32 reg_value;
+int ret;
regmap_write(mdio_dev->subctrl_vbase, cfg_reg, set_val);
for (time_cnt = MDIO_TIMEOUT; time_cnt; time_cnt--) {
-regmap_read(mdio_dev->subctrl_vbase, st_reg, &reg_value);
+ret = regmap_read(mdio_dev->subctrl_vbase, st_reg, &reg_value);
+if (ret)
+return ret;
+
reg_value &= st_msk;
if ((!!check_st) == (!!reg_value))
break;
@@ -321,7 +325,7 @@
}
hns_mdio_cmd_write(mdio_dev, is_c45,

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- MDIO_C45_WRITE_ADDR, phy_id, devad);
+ MDIO_C45_READ, phy_id, devad);
}

/* Step 5: waiting for MDIO_COMMAND_REG 's mdio_start==0, */
--- linux-4.15.0.orig/drivers/net/ethernet/hp/hp100.c
+++ linux-4.15.0/drivers/net/ethernet/hp/hp100.c
@@ -2634,7 +2634,7 @@
 /* Wait for link to drop */
time = jiffies + (HZ / 10);
do {
- if (!(hp100_inb(VG_LAN_CFG_1) & HP100_LINK_UP_ST))
+ if (!(hp100_inb(VG_LAN_CFG_1) & HP100_LINK_UP_ST))
    break;
if (!in_interrupt())
schedule_timeout_interruptible(1);
--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/Kconfig
@@ -4,7 +4,7 @@
config HINIC
  tristate "Huawei Intelligent PCIE Network Interface Card"
  -depends on (PCI_MSI && X86)
  +depends on (PCI_MSI && (X86 || ARM64))
  ---help---
- This driver supports HiNIC PCIE Ethernet cards.
+ To compile this driver as part of the kernel, choose Y here.
--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_cmdq.c
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_cmdq.c
@@ -398,7 +398,8 @@
    spin_unlock_bh(&cmdq->cmdq_lock);
- if (!wait_for_completion_timeout(&done, CMDQ_TIMEOUT)) {
+ if (!wait_for_completion_timeout(&done,
+    msecs_to_jiffies(CMDQ_TIMEOUT))) {
    spin_lock_bh(&cmdq->cmdq_lock);

    if (cmdq->errcode[curr_prod_idx] == &errcode)
    --- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_dev.c
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_dev.c
@@ -312,6 +312,7 @@
    hw_ioctx.func_idx = HINIC_HWIF_FUNC_IDX(hwif);
+hw_ioctx.ppf_idx = HINIC_HWIF_PPF_IDX(hwif);
    hw_ioctx.set_cmdq_depth = HW_IOCTX_SET_CMDQ_DEPTH_DEFAULT;

```
hw_iocxt.cmdq_depth = 0;
@@ -372,50 +373,6 @@ return -EFAULT;
}

-static int wait_for_io_stopped(struct hinic_hwdev *hwdev)
-{
- struct hinic_cmd_io_status cmd_io_status;
- struct hinic_hwif *hwif = hwdev->hwif;
- struct pci_dev *pdev = hwif->pdev;
- struct hinic_pfhwdev *pfhwdev;
- unsigned long end;
- u16 out_size;
- int err;
- 
- if (!HINIC_IS_PF(hwif) && !HINIC_IS_PPF(hwif)) {
- dev_err(pdev->dev, "Unsupported PCI Function type\n");
- return -EINVAL;
- }
- 
- pfhwdev = container_of(hwdev, struct hinic_pfhwdev, hwdev);
- 
- cmd_io_status.func_idx = HINIC_HWIF_FUNC_IDX(hwif);
- 
- end = jiffies + msecs_to_jiffies(IO_STATUS_TIMEOUT);
- do {
- err = hinic_msg_to_mgmt(&pfhwdev->pf_to_mgmt, HINIC_MOD_COMM,
- HINIC_COMM_CMD_IO_STATUS_GET,
- &cmd_io_status, sizeof(cmd_io_status),
- &cmd_io_status, &out_size,
- HINIC_MGMT_MSG_SYNC);
- if ((err) || (out_size != sizeof(cmd_io_status))) {
- dev_err(pdev->dev, "Failed to get IO status, ret = %d\n",
- err);
- return err;
- }
- 
- if (cmd_io_status.status == IO_STOPPED) {
- dev_info(pdev->dev, "IO stopped\n");
- return 0;
- }
- 
- msleep(20);
- } while (time_before(jiffies, end));
- 
- dev_err(pdev->dev, "Wait for IO stopped - Timeout\n");
- return -ETIMEDOUT;
- }
/**
 * clear_io_resource - set the IO resources as not active in the NIC
 * @hwdev: the NIC HW device
 * @return -EINVAL;
 */

int clear_io_resource(const struct hwdev *hwdev)
{
    int err = wait_for_io_stopped(hwdev);
    if (err) {
        dev_err(&pdev->dev, "IO has not stopped yet\n");
        return err;
    }

    /* sleep 100ms to wait for firmware stopping I/O */
    msleep(100);

    cmd_clear_io_res.func_idx = HINIC_HWIF_FUNC_IDX(hwif);

    &hw_ci, sizeof(hw_ci), NULL,
    NULL, HINIC_MGMT_MSG_SYNC);
}

/**
 * hinic_hwdev_set_msix_state- set msix state
 * @hwdev: the NIC HW device
 * @msix_index: IRQ corresponding index number
 * @flag: msix state
 */

void hinic_hwdev_set_msix_state(struct hinic_hwdev *hwdev, u16 msix_index,
        enum hinic_msix_state flag)
{
    hinic_set_msix_state(hwdev->hwif, msix_index, flag);
}

--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_dev.h
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_dev.h
@@ -50,6 +50,8 @@
    HINIC_PORT_CMD_GET_LINK_STATE   = 24,
    HINIC_PORT_CMD_SET_RX_CSUM	= 26,
    HINIC_PORT_CMD_SET_PORT_STATE   = 41,
    HINIC_PORT_CMD_FWCTXT_INIT      = 69,
@@ -58,6 +60,8 @@
HINIC_PORT_CMD_GET_GLOBAL_QPN  = 102,
+HINIC_PORT_CMD_SET_TSO       = 112,
+ HINIC_PORT_CMD_GET_CAP       = 170,
};
@@ -104,8 +108,8 @@
 u8      rsvd2;
 u8      rsvd3;
 +u8      ppf_idx;
 u8      rsvd4;
 -u8      rsvd5;
 u16     rq_depth;
 u16     rx_buf_sz_idx;
 @@ -236,4 +240,7 @@
 int hinic_hwdev_hw_ci_addr_set(struct hinic_hwdev *hwdev, struct hinic_sq *sq,
       u8 pending_limit, u8 coalesce_timer);
 +void hinic_hwdev_set_msix_state(struct hinic_hwdev *hwdev, u16 msix_index,
 +  +enum hinic_msix_state flag);
 +
 #endif
 --- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_if.c
 +++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_if.c
 @@ -168,6 +168,22 @@
 hinic_hwif_write_reg(hwif, HINIC_CSR_FUNC_ATTR4_ADDR, attr4);
 }
 +void hinic_set_msix_state(struct hinic_hwif *hwif, u16 msix_idx,
 +  +enum hinic_msix_state flag)
 +{
 +u32 offset = msix_idx * HINIC_PCI_MSIX_ENTRY_SIZE +
 +HINIC_PCI_MSIX_ENTRY_VECTOR_CTRL;
 +u32 mask_bits;
 +
 +mask_bits = readl(hwif->intr_regs_base + offset);
 +mask_bits &= ~HINIC_PCI_MSIX_ENTRY_CTRL_MASKBIT;
 +
 +if (flag)
 +mask_bits |= HINIC_PCI_MSIX_ENTRY_CTRL_MASKBIT;
 +
 +write4(mask_bits, hwif->intr_regs_base + offset);
 +}
 +
 /**

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* hwif_ready - test if the HW is ready for use
* @hwif: the HW interface of a pci function device
@@ -321,6 +337,13 @@
return -ENOMEM;
}

+hwif->intr_regs_base = pci_ioremap_bar(pdev, HINIC_PCI_INTR_REGS_BAR);
+if (!hwif->intr_regs_base) {
+dev_err(&pdev->dev, "Failed to map configuration regs\n");
+err = -ENOMEM;
+goto err_map_intr_bar;
+}
+err = hwif_ready(hwif);
if (err) {
dev_err(&pdev->dev, "HW interface is not ready\n");
@@ -337,7 +360,11 @@
return 0;
}

err_hwif_ready:
+iounmap(hwif->intr_regs_base);
+
+err_map_intr_bar:
iounmap(hwif->cfg_regs_bar);
+
return err;
}

@@ -347,5 +374,6 @@
**/
void hinic_free_hwif(struct hinic_hwif *hwif)
{
+iounmap(hwif->intr_regs_base);
iounmap(hwif->cfg_regs_bar);
}
```
#define HINIC_PCI_INTR_REGS_BAR     2
#define HINIC_PCI_DB_BAR           4
#define HINIC_PCIE_ST_DISABLE     0
#define HINIC_EQ_MSIX_LLI_CREDIT_LIMIT_DEFAULT 0    /* Disabled */
#define HINIC_EQ_MSIX_RESEND_TIMER_DEFAULT   7    /* max */

#define HINIC_PCI_MSIX_ENTRY_SIZE               16
#define HINIC_PCI_MSIX_ENTRY_VECTOR_CTRL        12
#define HINIC_PCI_MSIX_ENTRY_CTRL_MASKBIT       1

enum hinic_pcie_nosnoop {
    HINIC_PCIE_SNOOP        = 0,
    HINIC_PCIE_NO_SNOOP     = 1,
};

enum hinic_msix_state {
    HINIC_MSIX_ENABLE,
    HINIC_MSIX_DISABLE,
};

struct hinic_func_attr {
    u16                     func_idx;
    u8                      pf_idx;
};

struct hinic_hwif {
    struct pci_dev          *pdev;
    void __iomem            *cfg_regs_bar;
    void __iomem            *intr_regs_base;
    struct hinic_func_attr  attr;
};

void hinic_set_msix_state(struct hinic_hwif *hwif, u16 msix_idx,			  enum hinic_msix_state flag);

int hinic_msix_attr_cnt_clear(struct hinic_hwif *hwif, u16 msix_index);
void hinic_set_pf_action(struct hinic_hwif *hwif, enum hinic_pf_action action);
```

```c
#define MSG_NOT_RESP                  0xFFFF
-#define MGMT_MSG_TIMEOUT            1000
+  #define MGMT_MSG_TIMEOUT            5000
+
+  #define SET_FUNC_PORT_MGMT_TIMEOUT 25000

#define mgmt_to_pfhwdev(pf_mgmt)      
    container_of(pf_mgmt, struct hinic_pfhwdev, pf_to_mgmt)
@@ -247,12 +249,13 @@
    u8 *buf_in, u16 in_size,
    u8 *buf_out, u16 *out_size,
    enum mgmt_direction_type direction,
-    u16 resp_msg_id)
+    u16 resp_msg_id, u32 timeout)
{
    struct hinic_hwif *hwif = pf_to_mgmt->hwif;
    struct pci_dev *pdev = hwif->pdev;
    struct hinic_recv_msg *recv_msg;
    struct completion *recv_done;
+
    unsigned long timeo;
    u16 msg_id;
    int err;

    @@ -276,7 +279,9 @@
    goto unlock_sync_msg;
}

-if (!wait_for_completion_timeout(recv_done, MGMT_MSG_TIMEOUT)) {
+  timeo = msecs_to_jiffies(timeout ? timeout : MGMT_MSG_TIMEOUT);
+  if (!wait_for_completion_timeout(recv_done, timeo)) {
    dev_err(&pdev->dev, "MGMT timeout, MSG id = %d\n", msg_id);
    err = -ETIMEDOUT;
    goto unlock_sync_msg;
@@ -350,6 +355,7 @@
{
    struct hinic_hwif *hwif = pf_to_mgmt->hwif;
    struct pci_dev *pdev = hwif->pdev;
+    u32 timeout = 0;
    if (sync != HINIC_MGMT_MSG_SYNC) {
        dev_err(&pdev->dev, "Invalid MGMT msg type\n");
        err = -EINVAL;
@@ -361,9 +367,12 @@
    return -EINVAL;
```
+if (cmd == HINIC_PORT_CMD_SET_FUNC_STATE)  
+timeout = SET_FUNC_PORT_MGMT_TIMEOUT;  
+return msg_to_mgmt_sync(pf_to_mgmt, mod, cmd, buf_in, in_size,  
+buf_out, out_size, MGMT_DIRECT_SEND,  
-MSG_NOT_RESP);  
+MSG_NOT_RESP, timeout);  
}  
/**  
--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_qp.c  
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_qp.c  
@@ -70,8 +70,6 @@  
#define SQ_MASKED_IDX(sq, idx)  ((idx) & (sq)->wq->mask)  
#define RQ_MASKED_IDX(rq, idx)  ((idx) & (rq)->wq->mask)  

-#define TX_MAX_MSS_DEFAULT 0x3E00  
-enum sq_wqe_type {  
-SQ_NORMAL_WQE = 0,  
};  
@@ -494,33 +492,16 @@  
-HINIC_SQ_CTRL_SET(TX_MAX_MSS_DEFAULT,  
-HINIC_SQ_CTRL_SET(ctrl_size, LEN);  
-ctrl->queue_info = HINIC_SQ_CTRL_SET(TX_MAX_MSS_DEFAULT,  
-HINIC_SQ_CTRL_SET(0, L2HDR_LEN) |  
-HINIC_SQ_CTRL_SET(HINIC_L4_OFF_DISABLE, L4_OFFLOAD) |  
-HINIC_SQ_CTRL_SET(HINIC_OUTER_L3TYPE_UNKNOWN,  
-INNER_L3TYPE) |  
-HINIC_SQ_CTRL_SET(HINIC_VLAN_OFF_DISABLE,  
-VLAN_OFFLOAD) |  
-HINIC_SQ_CTRL_SET(HINIC_PKT_NOT_PARSED, PARSE_FLAG);  
}  
static void sq_prepare_task(struct hinic_sq_task *task)  
{
-task->pkt_info0 =  
-HINIC_SQ_TASK_INFO0_SET(0, L2HDR_LEN) |  
-HINIC_SQ_TASK_INFO0_SET(HINIC_L4_OFF_DISABLE, L4_OFFLOAD) |  
-HINIC_SQ_TASK_INFO0_SET(HINIC_OUTER_L3TYPE_UNKNOWN,  
-INNER_L3TYPE) |  
-HINIC_SQ_TASK_INFO0_SET(HINIC_VLAN_OFF_DISABLE,  
-VLAN_OFFLOAD) |  
-HINIC_SQ_TASK_INFO0_SET(HINIC_PKT_NOT_PARSED, PARSE_FLAG);  
-  
-task->pkt_info1 =  
-HINIC_SQ_TASK_INFO1_SET(HINIC_MEDIA_UNKNOWN, MEDIA_TYPE) |  
-HINIC_SQ_TASK_INFO1_SET(0, INNER_L4_LEN) |  
-HINIC_SQ_TASK_INFO1_SET(0, INNER_L3_LEN);  
-  

task->pkt_info0 = 0;
task->pkt_info1 = 0;
task->pkt_info2 = 0;
task->ufo_v6_identify = 0;

@@ -529,6 +510,86 @@
task->zero_pad = 0;
}

+void hinic_task_set_l2hdr(struct hinic_sq_task *task, u32 len)
+{
+task->pkt_info0 |= HINIC_SQ_TASK_INFO0_SET(len, L2HDR_LEN);
+}
+
+void hinic_task_set_l2hdr(struct hinic_sq_task *task, u32 len)
+{
+task->pkt_info0 |= HINIC_SQ_TASK_INFO0_SET(len, L2HDR_LEN);
+}
+
+void hinic_task_set_outter_l3(struct hinic_sq_task *task,
+    + enum hinic_l3_offload_type l3_type,
+    + u32 network_len)
+{
+    +task->pkt_info2 |= HINIC_SQ_TASK_INFO2_SET(l3_type, OUTER_L3TYPE) |
+    + HINIC_SQ_TASK_INFO2_SET(network_len, OUTER_L3LEN);
+}
+
+void hinic_task_set_inner_l3(struct hinic_sq_task *task,
+    + enum hinic_l3_offload_type l3_type,
+    + u32 network_len)
+{
+    +task->pkt_info0 |= HINIC_SQ_TASK_INFO0_SET(l3_type, INNER_L3TYPE);
+    +task->pkt_info1 |= HINIC_SQ_TASK_INFO1_SET(network_len, INNER_L3LEN);
+}
+
+void hinic_task_set_tunnel_l4(struct hinic_sq_task *task,
+    + enum hinic_l4_tunnel_type l4_type,
+    + u32 tunnel_len)
+{
+    +task->pkt_info2 |= HINIC_SQ_TASK_INFO2_SET(l4_type, TUNNEL_L4TYPE) |
+    + HINIC_SQ_TASK_INFO2_SET(tunnel_len, TUNNEL_L4LEN);
+}
+
+void hinic_set_cs_inner_l4(struct hinic_sq_task *task, u32 *queue_info,
+    + enum hinic_l4_offload_type l4_offload,
+ u32 l4_len, u32 offset)
+
+{  
+    tcp_udp_cs = 0, scpt = 0;
+    mss = HINIC_MSS_DEFAULT;
+    
+    if (l4_offload == TCP_OFFLOAD_ENABLE ||  
+     l4_offload == UDP_OFFLOAD_ENABLE)  
+     tcp_udp_cs = 1;
+    else if (l4_offload == SCTP_OFFLOAD_ENABLE)  
+     scpt = 1;
+  
+  task->pkt_info0 |= HINIC_SQ_TASK_INFO0_SET(l4_offload, L4_OFFLOAD);
+  task->pkt_info1 |= HINIC_SQ_TASK_INFO1_SET(l4_len, INNER_L4LEN);
+  
+  *queue_info |= HINIC_SQ_CTRL_SET(offset, QUEUE_INFO_PLDOFF) |  
+      HINIC_SQ_CTRL_SET(tcp_udp_cs, QUEUE_INFO_TCPUDP_CS) |  
+      HINIC_SQ_CTRL_SET(scpt, QUEUE_INFO_SCTP);
+  
+  *queue_info |= HINIC_SQ_CTRL_CLEAR(*queue_info, QUEUE_INFO_MSS);
+  *queue_info |= HINIC_SQ_CTRL_SET(mss, QUEUE_INFO_MSS);
+  }
  
+void hinic_set_tso_inner_l4(struct hinic_sq_task *task, u32 *queue_info,  
+    enum hinic_l4_offload_type l4_offload,  
+    u32 l4_len, u32 offset, u32 ip_ident, u32 mss)
+{  
+    tso = 0, ufo = 0;
+    
+    if (l4_offload == TCP_OFFLOAD_ENABLE)  
+      tso = 1;
+    else if (l4_offload == UDP_OFFLOAD_ENABLE)  
+      ufo = 1;
+  
+  task->ufo_v6_identify = ip_ident;
+  
+  task->pkt_info0 |= HINIC_SQ_TASK_INFO0_SET(l4_offload, L4_OFFLOAD);
+  task->pkt_info0 |= HINIC_SQ_TASK_INFO0_SET(tso || ufo, TSO_FLAG);
+  task->pkt_info1 |= HINIC_SQ_TASK_INFO1_SET(l4_len, INNER_L4LEN);
+  
+  *queue_info |= HINIC_SQ_CTRL_SET(offset, QUEUE_INFO_PLDOFF) |  
+      HINIC_SQ_CTRL_SET(tso, QUEUE_INFO_TSO) |  
+      HINIC_SQ_CTRL_SET(ufo, QUEUE_INFO_UFO) |  
+      HINIC_SQ_CTRL_SET(!!l4_offload, QUEUE_INFO_TCPUDP_CS);
+  
+/* set MSS value */
+  *queue_info |= HINIC_SQ_CTRL_CLEAR(*queue_info, QUEUE_INFO_MSS);
+  *queue_info |= HINIC_SQ_CTRL_SET(mss, QUEUE_INFO_MSS);
+}
/**
* hinic_sq_return_wqe - return the wqe to the sq
* @sq: send queue
* @wqe_size: the size of the wqe
*/
void hinic_sq_return_wqe(struct hinic_sq *sq, unsigned int wqe_size)
{
    hinic_return_wqe(sq->wq, wqe_size);
}

/**
* hinic_sq_write_wqe - write the wqe to the sq
* @sq: send queue
* @prod_idx: pi of the wqe
*/

/**
* hinic_sq_read_wqe - read wqe ptr in the current ci and update the ci
* @sq: send queue
* @skb: return skb that was saved
* @wqe_size: the size of the wqe
* @cons_idx: consumer index of the wqe
* Return wqe in ci position
*/
- struct hinic_sq_wqe *hinic_sq_read_wqe(struct hinic_sq *sq,
-     struct sk_buff **skb,
-     unsigned int *wqe_size, u16 *cons_idx)
+ struct hinic_sq_wqebb *hinic_sq_read_wqebb(struct hinic_sq *sq,
+     struct sk_buff **skb,
+     unsigned int *wqe_size, u16 *cons_idx)
{
    struct hinic_hw_wqe *hw_wqe;
    struct hinic_sq_wqe *sq_wqe;
    ...
    if (IS_ERR(hw_wqe))
        return NULL;

*skb = sq->saved_skb[*cons_idx];
+
+ sq_wqe = &hw_wqe->sq_wqe;
+ ctrl = &sq_wqe->ctrl;
+ ctrl_info = be32_to_cpu(ctrl->ctrl_info);
+ @ @ -665,11 +739,28 @ @

*wqe_size = sizeof(*ctrl) + sizeof(sq_wqe->task);
*wqe_size += SECT_SIZE_FROM_8BYTES(buf_sect_len);
+*wqe_size = ALIGN(*wqe_size, sq->wq->wqebb_size);

- *skb = sq->saved_skb[*cons_idx];
- return &hw_wqe->sq_wqe;
+
+
+ /* using the real wqe size to read wqe again */
+ hw_wqe = hinic_read_wqe(sq->wq, *wqe_size, cons_idx);
+/**
+ * hinic_sq_read_wqe - read wqe ptr in the current ci and update the ci
+ * @sq: send queue
+ * @skb: return skb that was saved
+ * @wqe_size: the size of the wqe
+ * @cons_idx: consumer index of the wqe
+ *
+ * Return wqe in ci position
+ */
+ struct hinic_sq_wqe *hinic_sq_read_wqe(struct hinic_sq *sq,
+ struct sk_buff **skb,
+ unsigned int wqe_size, u16 *cons_idx)
+
+*skb = sq->saved_skb[*cons_idx];
+
+return &hw_wqe->sq_wqe;
+}

--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_qp.h
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_qp.h
@@ -103,6 +103,7 @@
     struct hinic_wq         *wq;
     struct cpumask		affinity_mask;
     u32                     irq;
+    u16                     msix_entry;
int hinic_get_rq_free_wqebbs(struct hinic_rq *rq);

+void hinic_task_set_l2hdr(struct hinic_sq_task *task, u32 len);
+ void hinic_task_set_outer_l3(struct hinic_sq_task *task,
+   enum hinic_l3_offload_type l3_type,
+   u32 network_len);
+ void hinic_task_set_inner_l3(struct hinic_sq_task *task,
+   enum hinic_l3_offload_type l3_type,
+   u32 network_len);
+ void hinic_task_set_tunnel_l4(struct hinic_sq_task *task,
+   enum hinic_l4_tunnel_type l4_type,
+   u32 tunnel_len);
+ void hinic_set_cs_inner_l4(struct hinic_sq_task *task,
+   u32 *queue_info,
+   enum hinic_l4_offload_type l4_offload,
+   u32 l4_len, u32 offset);
+ void hinic_set_tso_inner_l4(struct hinic_sq_task *task,
+   u32 *queue_info,
+   enum hinic_l4_offload_type l4_offload,
+   u32 l4_len,
+   u32 offset, u32 ip_ident, u32 mss);
+void hinic_sq_prepare_wqe(struct hinic_sq *sq, u16 prod_idx,
   struct hinic_sq_wqe *wqe, struct hinic_sge *sges,
   int nr_sges);
@@ -159,13 +185,19 @@
struct hinic_sq_wqe *hinic_sq_get_wqe(struct hinic_sq *sq,
   unsigned int wqe_size, u16 *cons_idx);
+void hinic_sq_return_wqe(struct hinic_sq *sq, unsigned int wqe_size);
+void hinic_sq_write_wqe(struct hinic_sq *sq, u16 prod_idx,
   struct hinic_sq_wqe *wqe, struct sk_buff *skb,
   unsigned int wqe_size);
+struct hinic_sq_wqe *hinic_sq_read_wqebb(struct hinic_sq *sq,
+ struct sk_buff **skb;
+ unsigned int *wqe_size, u16 *cons_idx);

void hinic_sq_put_wqe(struct hinic_sq *sq, unsigned int wqe_size);

--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_wq.c
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_wq.c
@@ -74,12 +74,6 @@

-define WQE_PAGE_OFF(wq, idx)   (((idx) & ((wq)->num_wqebbs_per_page - 1)) *
-(wq)->wqebb_size)
-
-define WQE_PAGE_NUM(wq, idx)   (((idx) / ((wq)->num_wqebbs_per_page))
-& ((wq)->num_q_pages - 1))
-
#define WQ_PAGE_ADDR(wq, idx)           
((wq)->shadow_block_vaddr[WQE_PAGE_NUM(wq, idx)])

@@ -93,6 +87,17 @@

+static inline int WQE_PAGE_OFF(struct hinic_wq *wq, u16 idx)
+{
+return (((idx) & ((wq)->num_wqebbs_per_page - 1))
+<< (wq)->wqebb_size_shift);
+
+static inline int WQE_PAGE_NUM(struct hinic_wq *wq, u16 idx)
+{
+return (((idx) >> ((wq)->wqebbs_per_page_shift))
+& ((wq)->num_q_pages - 1));
+
/* queue_alloc_page - allocate page for Queue
 * @hwif: HW interface for allocating DMA
 @@ -513,10 +518,11 @@
 struct hinic_hwif *hwif = wqs->hwif;
 struct pci_dev *pdev = hwif->pdev;
 u16 num_wqebbs_per_page;
+u16 wqebb_size_shift;
 int err;

-if (wqebb_size == 0) {
-dev_err(&pdev->dev, "wqebb_size must be > 0n");
+if (!is_power_of_2(wqebb_size)) {


---
+dev_err(&pdev->dev, "wqebb_size must be power of 2\n");
return -EINVAL;
}

@@ -530,9 +536,11 @@
return -EINVAL;
}

-num_wqebbs_per_page = ALIGN(wq_page_size, wqebb_size) / wqebb_size;
+wqebb_size_shift = ilog2(wqebb_size);
+num_wqebbs_per_page = ALIGN(wq_page_size, wqebb_size)
+>>> wqebb_size_shift;

-if (num_wqebbs_per_page & (num_wqebbs_per_page - 1)) {
+if (!is_power_of_2(num_wqebbs_per_page)) {
dev_err(&pdev->dev, "num wqebbs per page must be power of 2\n");
return -EINVAL;
}

@@ -550,7 +558,8 @@

wq->wqebbs_per_page_shift = ilog2(num_wqebbs_per_page);
+wq->wqebb_size_shift = wqebb_size_shift;
wq->block_vaddr = WQ_BASE_VADDR(wqs, wq);
wq->shadow_block_vaddr = WQ_BASE_ADDR(wqs, wq);
@@ -604,11 +613,13 @@

u16 q_depth, u16 max_wqe_size)
{
    struct pci_dev *pdev = hwif->pdev;
+u16 num_wqebbs_per_page_shift;
+u16 wqebb_size_shift;
    int i, j, err = -ENOMEM;

-if (wqebb_size == 0) {
-    dev_err(&pdev->dev, "wqebb_size must be > 0\n");
+if (!is_power_of_2(wqebb_size)) {
+    dev_err(&pdev->dev, "wqebb_size must be power of 2\n");
    return -EINVAL;
}

@@ -622,9 +633,11 @@
return -EINVAL;
}
- num_wqebbs_per_page = ALIGN(wq_page_size, wqebb_size) / wqebb_size;
+ wqebb_size_shift = ilog2(wqebb_size);
+ num_wqebbs_per_page = ALIGN(wq_page_size, wqebb_size)
+ >> wqebb_size_shift;

- if (num_wqebbs_per_page & (num_wqebbs_per_page - 1)) {
+ if (!is_power_of_2(num_wqebbs_per_page)) {
  dev_err(&pdev->dev, "num wqebbs per page must be power of 2\n");
  return -EINVAL;
}
@@ -636,6 +649,7 @@
  dev_err(&pdev->dev, "Failed to allocate CMDQ page\n");
  return err;
+ num_wqebbs_per_page_shift = ilog2(num_wqebbs_per_page);

  for (i = 0; i < cmdq_blocks; i++) {
+ wq[i].wqebbs_per_page_shift = num_wqebbs_per_page_shift;
+ wq[i].wqebb_size_shift = wqebb_size_shift;
  wq[i].hwif = hwif;
  wq[i].q_depth = q_depth;
  wq[i].max_wqe_size = max_wqe_size;
  wq[i].num_wqebbs_per_page = num_wqebbs_per_page;
  wq[i].block_vaddr = CMDQ_BASE_VADDR(cmdq_pages, &wq[i]);
  wq[i].shadow_block_vaddr = CMDQ_BASE_ADDR(cmdq_pages, &wq[i]);
  wq[i].block_paddr = CMDQ_BASE_PADDR(cmdq_pages, &wq[i]);
  @ @ -741,7 +756,7 @@

  ** prod_idx = MASKED_WQE_IDX(wq, atomic_read(&wq->prod_idx));

- num_wqebbs = ALIGN(wqe_size, wq->wqebb_size) / wq->wqebb_size;
+ num_wqebbs = ALIGN(wqe_size, wq->wqebb_size) >> wq->wqebb_size_shift;

  if (atomic_sub_return(num_wqebbs, &wq->delta) <= 0) {
    atomic_add(num_wqebbs, &wq->delta);
    @ @ -775,13 +790,28 @@
  }

  /**
+ * hinic_return_wqe - return the wqe when transmit failed
+ * @wq: wq to return wqe
+ * @wqe_size: wqe size
+ **/
+ void hinic_return_wqe(struct hinic_wq *wq, unsigned int wqe_size)
+ {
+ int num_wqebbs = ALIGN(wqe_size, wq->wqebb_size) / wq->wqebb_size:
atomic_sub(num_wqebbs, &wq->prod_idx);
atomic_add(num_wqebbs, &wq->delta);

/**
 hinic_put_wqe - return the wqe place to use for a new wqe
 * @wq: wq to return wqe
 * @wqe_size: wqe size
 /**
 void hinic_put_wqe(struct hinic_wq *wq, unsigned int wqe_size)
 {
- int num_wqebbs = ALIGN(wqe_size, wq->wqebb_size) / wq->wqebb_size;
+ int num_wqebbs = ALIGN(wqe_size, wq->wqebb_size)
+ >> wq->wqebb_size_shift;

 atomic_add(num_wqebbs, &wq->cons_idx);

@@ -799,7 +829,8 @@
 struct hinic_hw_wqe *hinic_read_wqe(struct hinic_wq *wq, unsigned int wqe_size,
     u16 *cons_idx)
 {
- int num_wqebbs = ALIGN(wqe_size, wq->wqebb_size) / wq->wqebb_size;
+ int num_wqebbs = ALIGN(wqe_size, wq->wqebb_size)
+ >> wq->wqebb_size_shift;
 u16 curr_cons_idx, end_cons_idx;
 int curr_pg, end_pg;

--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_wq.h
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_wq.h
@@ -39,7 +39,8 @@
 u16             q_depth;
 u16             max_wqe_size;
 u16             num_wqebbs_per_page;
- +u16 wqebbs_per_page_shift;
+ u16 wqebb_size_shift;
 /* The addresses are 64 bit in the HW */
 u64             block_paddr;
 void             **shadow_block_vaddr;
@@ -104,6 +105,8 @@
 struct hinic_hw_wqe *hinic_get_wqe(struct hinic_wq *wq, unsigned int wqe_size,
     u16 *prod_idx);

+void hinic_return_wqe(struct hinic_wq *wq, unsigned int wqe_size);
+ void hinic_put_wqe(struct hinic_wq *wq, unsigned int wqe_size);
struct hinic_hw_wqe *hinic_read_wqe(struct hinic_wq *wq, unsigned int wqe_size,
--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_hw_wqe.h
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_hw_wqe.h
@@ -62,19 +62,33 @@
  (((val) >> HINIC_CMDQ_WQE_HEADER_##member##_SHIFT) &
 & HINIC_CMDQ_WQE_HEADER_##member##_MASK)

-#define HINIC_SQ_CTRL_BUFDESC_SECT_LEN_SHIFT    0
-#define HINIC_SQ_CTRL_TASKSECT_LEN_SHIFT        16
-#define HINIC_SQ_CTRL_DATA_FORMAT_SHIFT         22
-#define HINIC_SQ_CTRL_LEN_SHIFT                 29
-
-#define HINIC_SQ_CTRL_BUFDESC_SECT_LEN_MASK     0xFF
-#define HINIC_SQ_CTRL_TASKSECT_LEN_MASK         0x1F
-#define HINIC_SQ_CTRL_DATA_FORMAT_MASK          0x1
-#define HINIC_SQ_CTRL_LEN_MASK                  0x3
-
-#define HINIC_SQ_CTRL_QUEUE_INFO_MSS_SHIFT      13
-
-#define HINIC_SQ_CTRL_QUEUE_INFO_MSS_MASK       0x3FFF

+#define HINIC_SQ_CTRL_BUFDESC_SECT_LEN_SHIFT           0
+#define HINIC_SQ_CTRL_TASKSECT_LEN_SHIFT               16
+#define HINIC_SQ_CTRL_DATA_FORMAT_SHIFT                22
+#define HINIC_SQ_CTRL_LEN_SHIFT                        29
+
+#define HINIC_SQ_CTRL_BUFDESC_SECT_LEN_MASK            0xFF
+#define HINIC_SQ_CTRL_TASKSECT_LEN_MASK                0x1F
+#define HINIC_SQ_CTRL_DATA_FORMAT_MASK                 0x1
+#define HINIC_SQ_CTRL_LEN_MASK                         0x3
+
+#define HINIC_SQ_CTRL_QUEUE_INFO_MSS_SHIFT             13
+
+#define HINIC_SQ_CTRL_QUEUE_INFO_MSS_MASK              0x3FFF
+#define HINIC_SQ_CTRL_QUEUE_INFO_PLDOFF_SHIFT          2
+#define HINIC_SQ_CTRL_QUEUE_INFO_UFO_SHIFT            10
+#define HINIC_SQ_CTRL_QUEUE_INFO_TSO_SHIFT            11
+#define HINIC_SQ_CTRL_QUEUE_INFO_TCPUDP_CS_SHIFT      12
+#define HINIC_SQ_CTRL_QUEUE_INFO_MSS_SHIFT            13
+#define HINIC_SQ_CTRL_QUEUE_INFO_SCTP_SHIFT           27
+#define HINIC_SQ_CTRL_QUEUE_INFO_UC_SHIFT             28
+#define HINIC_SQ_CTRL_QUEUE_INFO_PRI_SHIFT            29
+
+#define HINIC_SQ_CTRL_QUEUE_INFO_PLDOFF_MASK          0xFF
+#define HINIC_SQ_CTRL_QUEUE_INFO_UFO_MASK              0x1
+#define HINIC_SQ_CTRL_QUEUE_INFO_TSO_MASK              0x1
+#define HINIC_SQ_CTRL_QUEUE_INFO_TCPUDP_CS_MASK        0x1
+#define HINIC_SQ_CTRL_QUEUE_INFO_MSS_MASK              0x3FFF
+#define HINIC_SQ_CTRL_QUEUE_INFO_SCTP_MASK             0x1
+#define HINIC_SQ_CTRL_QUEUE_INFO_UC_MASK               0x1
+#define HINIC_SQ_CTRL_QUEUE_INFO_PRI_MASK              0x7
#define HINIC_SQ_CTRL_SET(val, member)          
  (((u32)(val) & HINIC_SQ_CTRL_##member##_MASK) \
    @ @ -84.6 +98.10 @ @ 
  (((val) >> HINIC_SQ_CTRL_##member##_SHIFT) \
    & HINIC_SQ_CTRL_##member##_MASK)

+define HINIC_SQ_CTRL_CLEAR(val, member)
+(val) & (~HINIC_SQ_CTRL_##member##_MASK 
+ < HINIC_SQ_CTRL_##member##_SHIFT))
+
#define HINIC_SQ_TASK_INFO0_L2HDR_LEN_SHIFT     0
#define HINIC_SQ_TASK_INFO0_L4_OFFLOAD_SHIFT    8
#define HINIC_SQ_TASK_INFO0_INNER_L3TYPE_SHIFT  10
/* 8 bits reserved */
#define HINIC_SQ_TASK_INFO1_MEDIA_TYPE_SHIFT    8
-define HINIC_SQ_TASK_INFO1_INNER_L4_LEN_SHIFT 16
-define HINIC_SQ_TASK_INFO1_INNER_L3_LEN_SHIFT 24
+define HINIC_SQ_TASK_INFO1_INNER_L4LEN_SHIFT 16
+define HINIC_SQ_TASK_INFO1_INNER_L3LEN_SHIFT 24
/* 8 bits reserved */
#define HINIC_SQ_TASK_INFO1_MEDIA_TYPE_MASK     0xFF
-define HINIC_SQ_TASK_INFO1_INNER_L4_LEN_MASK 0xFF
-define HINIC_SQ_TASK_INFO1_INNER_L3_LEN_MASK 0xFF
+define HINIC_SQ_TASK_INFO1_INNER_L4LEN_MASK 0xFF
+define HINIC_SQ_TASK_INFO1_INNER_L3LEN_MASK 0xFF
#define HINIC_SQ_TASK_INFO1_SET(val, member)    
  (((u32)(val) & HINIC_SQ_TASK_INFO1_##member##_MASK) <<  
    HINIC_SQ_TASK_INFO1_##member##_SHIFT)
-define HINIC_SQ_TASK_INFO2_TUNNEL_L4_LEN_SHIFT 0
-define HINIC_SQ_TASK_INFO2_OUTER_L3_LEN_SHIFT 0
-define HINIC_SQ_TASK_INFO2_TUNNEL_L4TYPE_SHIFT 19
+/define HINIC_SQ_TASK_INFO2_TUNNEL_L4LEN_SHIFT 0
+define HINIC_SQ_TASK_INFO2_OUTER_L3LEN_SHIFT 8
+/define HINIC_SQ_TASK_INFO2_TUNNEL_L4TYPE_SHIFT 16
/* 1 bit reserved */
-define HINIC_SQ_TASK_INFO2_OUTER_L3TYPE_SHIFT 0
+/define HINIC_SQ_TASK_INFO2_OUTER_L3TYPE_SHIFT 22
+/define HINIC_SQ_TASK_INFO2_OUTER_L3TYPE_SHIFT 24
/* 8 bits reserved */
-define HINIC_SQ_TASK_INFO2_TUNNEL_L4_LEN_MASK 0xFFF
-define HINIC_SQ_TASK_INFO2_OUTER_L3_LEN_MASK 0x7F
-define HINIC_SQ_TASK_INFO2_TUNNEL_L4TYPE_MASK 0x3
/* 1 bit reserved */
#define HINIC_SQ_TASK_INFO2_TUNNEL_L4TYPE_MASK  0x7
/* 8 bits reserved */
@@ -152,6 +170,10 @@
#define HINIC_RQ_CQE_STATUS_RXDONE_MASK         0x1
+#define HINIC_RQ_CQE_STATUS_CSUM_ERR_SHIFT    0
+#define HINIC_RQ_CQE_STATUS_CSUM_ERR_MASK     0xFFFFU
+
+#define HINIC_RQ_CQE_STATUS_GET(val, member)    
    (((val) >> HINIC_RQ_CQE_STATUS_##member##_SHIFT) & HINIC_RQ_CQE_STATUS_##member##_MASK)
@@ -187,12 +209,15 @@

#define HINIC_SCMD_DATA_LEN             16
+#define HINIC_SCMD_DATA_LEN                     16
+
+#define HINIC_MAX_SQ_BUFDESCS                   17
-#define HINIC_MAX_SQ_BUFDESCS           17
+#define HINIC_SQ_WQE_MAX_SIZE                   320
+#define HINIC_RQ_WQE_SIZE                       32
-#define HINIC_SQ_WQE_MAX_SIZE           320
-#define HINIC_RQ_WQE_SIZE               32
+#define HINIC_MSS_DEFAULT	        0x3E00
+#define HINIC_MSS_MIN		                0x50

enum hinic_l4offload_type {
    HINIC_L4_OFF_DISABLE            = 0,
    HINIC_PKT_PARSED     = 1,
};

+enum hinic_l3_offload_type {
    +L3TYPE_UNKNOWN = 0,
    +IPV6_PKT = 1,
    +IPV4_PKT_NO_CHKSUM_OFFLOAD = 2,
    +IPV4_PKT_WITH_CHKSUM_OFFLOAD = 3,
};
enum hinic_l4_offload_type {
    OFFLOAD_DISABLE     = 0,
    TCP_OFFLOAD_ENABLE  = 1,
    SCTP_OFFLOAD_ENABLE = 2,
    UDP_OFFLOAD_ENABLE  = 3,
};

enum hinic_l4_tunnel_type {
    NOT_TUNNEL,
    TUNNEL_UDP_NO_CSUM,
    TUNNEL_UDP_CSUM,
};

enum hinic_outer_l3type {
    HINIC_OUTER_L3TYPE_UNKNOWN              = 0,
    HINIC_OUTER_L3TYPE_IPV6                 = 1,
    --- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_main.c
    +++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_main.c
    @@ -51,7 +51,9 @@
    module_param(rx_weight, uint, 0644);
    MODULE_PARM_DESC(rx_weight, "Number Rx packets for NAPI budget (default=64"));

#define PCI_DEVICE_ID_HI1822_PF         0x1822
+#define HINIC_DEV_ID_QUAD_PORT_25GE     0x1822
+#define HINIC_DEV_ID_DUAL_PORT_25GE     0x0200
+#define HINIC_DEV_ID_DUAL_PORT_100GE    0x0201

#define HINIC_WQ_NAME                   "hinic_dev"

@@ -473,7 +475,6 @@
 {  
     struct hinic_dev *nic_dev = netdev_priv(netdev);
     unsigned int flags;
     -int err;
     down(&nic_dev->mgmt_lock);

@@ -487,20 +488,9 @@
     up(&nic_dev->mgmt_lock);

     -err = hinic_port_set_func_state(nic_dev, HINIC_FUNC_PORT_DISABLE);
     -if (err) {
         -netif_err(nic_dev, drv, netdev,
         -    "Failed to set func port state\u");
         -nic_dev->flags |= (flags & HINIC_INTF_UP);
         -return err;
         -}
+hinic_port_set_state(nic_dev, HINIC_PORT_DISABLE);

-err = hinic_port_set_state(nic_dev, HINIC_PORT_DISABLE);
-if (err) {
-netif_err(nic_dev, drv, netdev, "Failed to set port state\n");
-nic_dev->flags |= (flags & HINIC_INTF_UP);
-return err;
-}
+hinic_port_set_func_state(nic_dev, HINIC_FUNC_PORT_DISABLE);
free_rxqs(nic_dev);
free_txqs(nic_dev);
@@ -598,9 +588,6 @@
 u16 vid = 0;
 int err;

-if (!is_valid_ether_addr(addr))
-return -EADDRNOTAVAIL;
-
-netif_info(nic_dev, drv, netdev, "set mac addr = %02x %02x %02x %02x %02x %02x\n",
-addr[0], addr[1], addr[2], addr[3], addr[4], addr[5]);

@@ -787,23 +774,6 @@
stats->tx_errors = nic_tx_stats->tx_dropped;
}

-#ifdef CONFIG_NET_POLL_CONTROLLER
 static void hinic_netpoll(struct net_device *netdev)
{ -
-struct hinic_dev *nic_dev = netdev_priv(netdev);
-int i, num_qps;
-
- num_qps = hinic_hwdev_num_qps(nic_dev->hwdev);
- for (i = 0; i < num_qps; i++) {
- struct hinic_txq *txq = &nic_dev->txqs[i];
- struct hinic_rxq *rxq = &nic_dev->rxqs[i];
- 
- napi_schedule(&txq->napi);
- napi_schedule(&rxq->napi);
- }
-}
-#endif
-
 static const struct net_device_ops hinic_netdev_ops = {
 .ndo_open = hinic_open,
 .ndo_stop = hinic_close,
@@ -816,14 +786,13 @@
 .ndo_start_xmit = hinic_xmit_frame,
.ndo_tx_timeout = hinic_tx_timeout,
.ndo_get_stats64 = hinic_get_stats64,
-#ifdef CONFIG_NET_POLL_CONTROLLER
-ndo_poll_controller = hinic_netpoll,
-#endif
};

static void netdev_features_init(struct net_device *netdev)
{
- netdev->hw_features = NETIF_F_SG | NETIF_F_HIGHDMA;
+ netdev->hw_features = NETIF_F_SG | NETIF_F_HIGHDMA | NETIF_F_IP_CSUM |
+ NETIF_F_IPV6_CSUM | NETIF_F_TSO | NETIF_F_TSO6 |
+ NETIF_F_RXCSUM;

netdev->vlan_features = netdev->hw_features;

@@ -881,6 +850,24 @@
 *out_size = sizeof(*ret_link_status);
 }

+static int set_features(struct hinic_dev *nic_dev,
+		 netdev_features_t pre_features,
+		 netdev_features_t features, bool force_change)
+{
+ netdev_features_t changed = force_change ? ~0 : pre_features ^ features;
+u32 csum_en = HINIC_RX_CSUM_OFFLOAD_EN;
+int err = 0;
+
+ if (changed & NETIF_F_TSO)
+ err = hinic_port_set_tso(nic_dev, (features & NETIF_F_TSO) ?
+ HINIC_TSO_ENABLE : HINIC_TSO_DISABLE);
+
+ if (changed & NETIF_F_RXCSUM)
+ err = hinic_set_rx_csum_offload(nic_dev, csum_en);
+
+ return err;
+ }
+
/**
 * nic_dev_init - Initialize the NIC device
 * @pdev: the NIC pci device
 @@ -981,6 +968,12 @@
 hinic_hwdev_cb_register(nic_dev->hwdev, HINIC_MGMT_MSG_CMD_LINK_STATUS,
 nic_dev, link_status_event_handler);

+err = set_features(nic_dev, 0, nic_dev->netdev->features, true);
+if (err)
+goto err_set_features;

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```c
+SET_NETDEV_DEV(netdev, &pdev->dev);
+
err = register_netdev(netdev);
if (err) {
    dev_err(&pdev->dev, "Failed to register netdev\n");
    return 0;
}

err_reg_netdev:
+err_set_features:
    hinic_hwdev_cb_unregister(nic_dev->hwdev,
        HINIC_MGMT_MSG_CMD_LINK_STATUS);
cancel_work_sync(&rx_mode_work->work);
    return 0;
}

static void hinic_shutdown(struct pci_dev *pdev)
+
{  
+pci_disable_device(pdev);
+}
+
static const struct pci_device_id hinic_pci_table[] = {
    { PCI_VDEVICE(HUAWEI, PCI_DEVICE_ID_HI1822_PF), 0},
    { PCI_VDEVICE(HUAWEI, HINIC_DEV_ID_QUAD_PORT_25GE), 0},
    { PCI_VDEVICE(HUAWEI, HINIC_DEV_ID_DUAL_PORT_25GE), 0},
    { PCI_VDEVICE(HUAWEI, HINIC_DEV_ID_DUAL_PORT_100GE), 0},
    { 0, 0}
};

MODULE_DEVICE_TABLE(pci, hinic_pci_table);

module_pci_driver(hinic_driver);

--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_port.c
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_port.c
@@ -377,3 +377,65 @@

return 0;
}

+/**
+ * hinic_port_set_tso - set port tso configuration
+ */
```
+ @nic_dev: nic device
+ @state: the tso state to set
+ *
+ * Return 0 - Success, negative - Failure
+ ***/
+int hinic_port_set_tso(struct hinic_dev *nic_dev, enum hinic_tso_state state)
+{
+struct hinic_hwdev *hwdev = nic_dev->hwdev;
+struct hinic_hwif *hwif = hwdev->hwif;
+struct hinic_tso_config tso_cfg = {0};
+struct pci_dev *pdev = hwif->pdev;
+u16 out_size;
+int err;
+
tso_cfg.func_id = HINIC_HWIF_FUNC_IDX(hwif);
+tso_cfg.tso_en = state;
+
+err = hinic_port_msg_cmd(hwdev, HINIC_PORT_CMD_SET_TSO,
+&tso_cfg, sizeof(tso_cfg),
+&tso_cfg, &out_size);
+if (err || out_size != sizeof(tso_cfg) || tso_cfg.status) {
+dev_err(&pdev->dev,
+"Failed to set port tso, ret = %d
",
+tso_cfg.status);
+return -EINVAL;
+}
+
+return 0;
+}
+
+int hinic_set_rx_csum_offload(struct hinic_dev *nic_dev, u32 en)
+{
+struct hinic_checksum_offload rx_csum_cfg = {0};
+struct hinic_hwdev *hwdev = nic_dev->hwdev;
+struct hinic_hwif *hwif;
+struct pci_dev *pdev;
+u16 out_size;
+int err;
+
+if (!hwdev)
+return -EINVAL;
+
+hwif = hwdev->hwif;
+pdev = hwif->pdev;
+rx_csum_cfg.func_id = HINIC_HWIF_FUNC_IDX(hwif);
+rx_csum_cfg.rx_csum_offload = en;
+
+err = hinic_port_msg_cmd(hwdev, HINIC_PORT_CMD_SET_RX_CSUM,
+ &rx_csum_cfg, sizeof(rx_csum_cfg),
+ &rx_csum_cfg, &out_size);
+if (err || !out_size || rx_csum_cfg.status) {
+dev_err(&pdev->dev,
+"Failed to set rx csum offload, ret = %d\n",
+rx_csum_cfg.status);
+return -EINVAL;
+}
+
+return 0;
}

--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_port.h
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_port.h
@@ -72,6 +72,11 @@
HINIC_SPEED_UNKNOWN = 0xFF,
};

+enum hinic_tso_state {
+HINIC_TSO_DISABLE = 0,
+HINIC_TSO_ENABLE = 1,
+};
+
+struct hinic_port_mac_cmd {
+u8 status;
+u8 version;
+};
+
+struct hinic_tso_config {
+u8 status;
+u8 version;
+u8 rsvd0[6];
+
+u16 func_id;
+u16 rsvd1;
+u8 tso_en;
+u8 resv2[3];
+};
+
+struct hinic_checksum_offload {
+u8 status;
+u8 version;
+u8 rsvd0[6];
+
+u16 func_id;
+u16 rsvd1;
+u32 rx_csum_offload;
int hinic_port_add_mac(struct hinic_dev *nic_dev, const u8 *addr, u16 vlan_id);

int hinic_port_get_cap(struct hinic_dev *nic_dev, struct hinic_port_cap *port_cap);

int hinic_port_set_tso(struct hinic_dev *nic_dev, enum hinic_tso_state state);
int hinic_set_rx_csum_offload(struct hinic_dev *nic_dev, u32 en);

#define RX_IRQ_NO_LLI_TIMER 0
#define RX_IRQ_NO_CREDIT 0
#define RX_IRQ_NO_RESEND_TIMER 0
#define HINIC_RX_BUFFER_WRITE 16

/**
 * hinic_rxq_clean_stats - Clean the statistics of specific queue
 */
static void rx_csum(struct hinic_rxq *rxq, u16 cons_idx, struct sk_buff *skb) {
    struct net_device *netdev = rxq->netdev;
    struct hinic_rq_cqe *cqe = rxq->rq->cqe[cons_idx];
    status = be32_to_cpu(cqe->status);
    csum_err = HINIC_RQ_CQE_STATUS_GET(status, CSUM_ERR);
    if (!(netdev->features & NETIF_F_RXCSUM))
        return;
    if (!csum_err)
        skb->ip_summed = CHECKSUM_UNNECESSARY;
    else
        skb->ip_summed = CHECKSUM_NONE;
}
/**
 * rx_alloc_skb - allocate skb and map it to dma address
 * @rxq: rx queue
 @@ -209,7 +232,6 @@
 hinic_rq_update(rxq->rq, prod_idx);
 }

 -tasklet_schedule(&rxq->rx_task);
 return i;
 }

 @@ -237,17 +259,6 @@
 }

 /**
 - * rx_alloc_task - tasklet for queue allocation
 - * @data: rx queue
 - ***/
 -static void rx_alloc_task(unsigned long data)
 {
 - void)rx_alloc_pkts(rxq);
 - }
 - (void)rx_alloc_pkts(rxq);
 - }
 -
 - /**
 - * rx_recv_jumbo_pkt - Rx handler for jumbo pkt
 - * @rxq: rx queue
 @@ -311,6 +322,7 @@
 struct hinic_qp *qp = container_of(rxq->rq, struct hinic_qp, rq);
 u64 pkt_len = 0, rx_bytes = 0;
 struct hinic_rq_wqe *rq_wqe;
 +unsigned int free_wqebbs;
 int num_wqes, pkts = 0;
 struct hinic_sge sge;
 struct sk_buff *skb;
 @@ -328,6 +340,8 @@
 rx_unmap_skb(rxq, hinic_sge_to_dma(&sge));
 +rx_csum(rxq, ci, skb);
 + prefetch(skb->data);

 pkt_len = sge.len;
 @@ -352,8 +366,9 @@
 rx_bytes += pkt_len;
-if (pkts)
-tasklet_schedule(&rxq->rx_task); /* rx_alloc_pkts */
+free_wqebbs = hinic_get_rq_free_wqebbs(rxq->rq);
+if (free_wqebbs > HINIC_RX_BUFFER_WRITE)
+rx_alloc_pkts(rxq);

u64_stats_update_begin(&rxq->rxq_stats.syncp);
rxq->rxq_stats.pkts += pkts;
@@ -366,6 +381,7 @@
static int rx_poll(struct napi_struct *napi, int budget)
{
    struct hinic_rxq *rxq = container_of(napi, struct hinic_rxq, napi);
    struct hinic_dev *nic_dev = netdev_priv(rxq->netdev);
    struct hinic_rq *rq = rxq->rq;
    int pkts;

    @@ -374,7 +390,10 @@
    return pkts;
}

@@ -399,7 +418,10 @@
struct hinic_dev *nic_dev;
/* Disable the interrupt until napi will be completed */
-disable_irq_nosync(rq->irq);
+hinic_hwdev_set_msix_state(nic_dev->hwdev,
 + rq->msix_entry,
 + HINIC_MSIX_ENABLE);
 +
    return pkts;
}

@@ -414,7 +436,6 @@
struct hinic_hwdev *hwdev = nic_dev->hwdev;
struct hinic_rq *rq = rxq->rq;
struct hinic_qp *qp;
-struct cpumask mask;

napi_complete(napi);
-enable_irq(rq->irq);
+hinic_hwdev_set_msix_state(nic_dev->hwdev,
 + rq->msix_entry,
 + HINIC_MSIX_DISABLE);

nic_dev = netdev_priv(rxq->netdev);
hinic_hwdev_msix_cnt_set(nic_dev->hwdev, rq->msix_entry);
@@ -414,7 +436,6 @@
struct hinic_hwdev *hwdev = nic_dev->hwdev;
struct hinic_rq *rq = rxq->rq;
struct hinic_qp *qp;
-struct cpumask mask;

int err;
rx_add_napi(rxq);
@@ -431,14 +452,15 @@
qp = container_of(rq, struct hinic_qp, rq);
-cpu_mask_set_cpu(qp->q_id % num_online_cpus(), &mask);
-return irq_set_affinity_hint(rq->irq, &mask);
+cpu_mask_set_cpu(qp->q_id % num_online_cpus(), &rq->affinity_mask);
+return irq_set_affinity_hint(rq->irq, &rq->affinity_mask);
}

static void rx_free_irq(struct hinic_rxq *rxq)
{
    struct hinic_rq *rq = rxq->rq;

    -irq_set_affinity_hint(rq->irq, NULL);
    free_irq(rq->irq, rxq);
    rx_del_napi(rxq);
    }
@@ -469,8 +491,6 @@
    sprintf(rxq->irq_name, "hinic_rxq%d", qp->q_id);
    -tasklet_init(&rxq->rx_task, rx_alloc_task, (unsigned long)rxq);
    pkts = rx_alloc_pkts(rxq);
    if (!pkts) {
      err = -ENOMEM;
      @@ -487,7 +507,6 @@
      err_req_rx_irq:
      err_rx_pkts:
      -tasklet_kill(&rxq->rx_task);
      free_all_rx_skbs(rxq);
      devm_kfree(&netdev->dev, rxq->irq_name);
      return err;
    @@ -503,7 +522,6 @@
    rx_free_irq(rxq);
    -tasklet_kill(&rxq->rx_task);
    free_all_rx_skbs(rxq);
    devm_kfree(&netdev->dev, rxq->irq_name);
{}
--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_rx.h
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_rx.h
@@ -23,6 +23,10 @@
```c
#include "hinic_hw_qp.h"

#define HINIC_RX_CSUM_OFFLOAD_EN 0xFFF
#define HINIC_RX_CSUM_HW_CHECK_NONE BIT(7)
#define HINIC_RX_CSUM_IPSU_OTHER_ERRBIT(8)
+
struct hinic_rxq_stats {
  u64 pkts;
  u64 bytes;
  @ @ -38.8 +42.6 @ @

  char *irq_name;
  -
  struct tasklet_struct  rx_task;
  -
  struct napi_struct napi;
};

--- linux-4.15.0.orig/drivers/net/ethernet/huawei/hinic/hinic_tx.c
+++ linux-4.15.0/drivers/net/ethernet/huawei/hinic/hinic_tx.c
@@ -26,6 +26,13 @@
  #include <linux/smmu.h>
  #include <asm/byteorder.h>
  +#include <linux/ip.h>
  +#include <linux/tcp.h>
  +#include <linux/sctp.h>
  +#include <linux/ipv6.h>
  +#include <net/ipv6.h>
  +#include <net/checksum.h>
  +#include <net/ip6_checksum.h>

  #include "hinic_common.h"
  #include "hinic_hw_if.h"
@@ -45,9 +52,31 @@
  #define CI_UPDATE_NO_PENDING            0
  #define CI_UPDATE_NO_COALESC            0

-#define HW_CONS_IDX(sq)            be16_to_cpu(*(u16 *)((sq)->hw_ci_addr))
+  #define HW_CONS_IDX(sq)            be16_to_cpu(*(u16 *)((sq)->hw_ci_addr))

-#define MIN_SKB_LEN             64
+  #define MIN_SKB_LEN             64
+  +#define MAX_PAYLOAD_OFFSET     221
+  #define TRANSPORT_OFFSET(l4_hdr, skb)((u32)((l4_hdr) - (skb)->data))

```
+union hinic_l3 {
+struct iphdr *v4;
+struct ipv6hdr *v6;
+unsigned char *hdr;
+};
+
+union hinic_l4 {
+struct tcphdr *tcp;
+struct udphdr *udp;
+unsigned char *hdr;
+};
+
+enum hinic_offload_type {
+TX_OFFLOAD_TSO     = BIT(0),
+TX_OFFLOAD_CSUM    = BIT(1),
+TX_OFFLOAD_VLAN    = BIT(2),
+TX_OFFLOAD_INVALID = BIT(3),
+};

/**
 * hinic_txq_clean_stats - Clean the statistics of specific queue
 * @ skb: The skb to clean the statistics
 * @ offload_type: The offload type
 * @ l3_type: The l3 type
 * @ l4_proto: The l4 protocol
 */
+static void get_inner_l3_l4_type(struct sk_buff *skb, union hinic_l3 *ip,
+    union hinic_l4 *l4,
+    enum hinic_offload_type offload_type,
+    enum hinic_l3_offload_type *l3_type,
+    u8 *l4_proto)
+{
+    u8 *exthdr;
+
+    if (ip->v4->version == 4) {
+        *l3_type = (offload_type == TX_OFFLOAD_CSUM) ?
+            IPV4_PKT_NO_CHKSUM_OFFLOAD :
+            IPV4_PKT_WITH_CHKSUM_OFFLOAD;
+        *l4_proto = ip->v4->protocol;
+    } else if (ip->v4->version == 6) {
+        *l3_type = IPV6_PKT;
+        exthdr = ip->hdr + offsetof(*ip->v6);
+        *l4_proto = ip->v6->nexthdr;
+        if (exthdr != l4->hdr) {
+            int start = exthdr - skb->data;
+            __be16 frag_off;
+            +ipv6_skip_exthdr(skb, start, l4_proto, &frag_off);
+        }
+    }
+} else {
+ *l3_type = L3TYPE_UNKNOWN;
+ *l4_proto = 0;
+ }
+ }
+
+static void get_inner_l4_info(struct sk_buff *skb, union hinic_l4 *l4,
+ enum hinic_offload_type offload_type, u8 l4_proto,
+ enum hinic_l4_offload_type *l4_offload,
+ u32 *l4_len, u32 *offset)
+ {
+ *l4_offload = OFFLOAD_DISABLE;
+ *offset = 0;
+ *l4_len = 0;
+ +
+ switch (l4_proto) {
+ case IPPROTO_TCP:
+ *l4_offload = TCP_OFFLOAD_ENABLE;
+ /* doff in unit of 4B */
+ *l4_len = l4->tcp->doff * 4;
+ *offset = *l4_len + TRANSPORT_OFFSET(l4_hdr, skb);
+ break;
+ +
+ case IPPROTO_UDP:
+ *l4_offload = UDP_OFFLOAD_ENABLE;
+ *l4_len = sizeof(struct udphdr);
+ *offset = TRANSPORT_OFFSET(l4_hdr, skb);
+ break;
+ +
+ case IPPROTO_SCTP:
+ /* only csum offload support sctp */
+ if (offload_type != TX_OFFLOAD_CSUM)
+ break;
+ +
+ *l4_offload = SCTP_OFFLOAD_ENABLE;
+ *l4_len = sizeof(struct sctphdr);
+ *offset = TRANSPORT_OFFSET(l4_hdr, skb);
+ break;
+ +
+ default:
+ break;
+ +}
+
+static __sum16 csum_magic(union hinic_l3 *ip, unsigned short proto)
+ {
+ return (ip->v4->version == 4) ?
+ csum_tcpudp_magic(ip->v4->saddr, ip->v4->daddr, 0, proto, 0) :
csum_ipv6_magic(&ip->v6->saddr, &ip->v6->daddr, 0, proto, 0);
+
+static int offload_tso(struct hinic_sq_task *task, u32 *queue_info,
+    struct sk_buff *skb)
+{
+    u32 offset, l4_len, ip_identify, network_hdr_len;
+    enum hinic_l3_offload_type l3_offload;
+    enum hinic_l4_offload_type l4_offload;
+    union hinic_l3 ip;
+    union hinic_l4 l4;
+    u8 l4_proto;
+
+    if (!skb_is_gso(skb))
+        return 0;
+
+    if (skb_cow_head(skb, 0) < 0)
+        return -EPROTONOSUPPORT;
+
+    if (skb->encapsulation) {
+        u32 gso_type = skb_shinfo(skb)->gso_type;
+        u32 tunnel_type = 0;
+        u32 l4_tunnel_len;
+        ip.hdr = skb_network_header(skb);
+        l4.hdr = skb_transport_header(skb);
+        network_hdr_len = skb_inner_network_header_len(skb);
+        
+        if (ip.v4->version == 4) {
+            ip.v4->tot_len = 0;
+            l3_offload = IPV4_PKT_WITH_CHKSUM_OFFLOAD;
+        } else if (ip.v4->version == 6) {
+            l3_offload = IPV6_PKT;
+        } else {
+            l3_offload = 0;
+        }
+
+        hinic_task_set_outer_l3(task, l3_offload,
+            skb_network_header_len(skb));
+
+        if (gso_type & SKB_GSO_UDP_TUNNEL_CSUM) {
+            l4.udp->check = ~csum_magic(&ip, IPPROTO_UDP);
+            tunnel_type = TUNNEL_UDP_CSUM;
+        } else if (gso_type & SKB_GSO_UDP_TUNNEL) {
+            tunnel_type = TUNNEL_UDP_NO_CSUM;
+        }
+
+        l4_tunnel_len = skb_inner_network_offset(skb) -
+skb_transport_offset(skb);
+hinic_task_set_tunnel_l4(task, tunnel_type, l4_tunnel_len);
+
+ip.hdr = skb_inner_network_header(skb);
+l4.hdr = skb_inner_transport_header(skb);
+} else {
+ip.hdr = skb_network_header(skb);
+l4.hdr = skb_transport_header(skb);
+network_hdr_len = skb_network_header_len(skb);
+
+
+;/* initialize inner IP header fields */
+if (ip.v4->version == 4)
+ip.v4->tot_len = 0;
+else
+ip.v6->payload_len = 0;
+
+get_inner_l3_l4_type(skb, &ip, &l4, TX_OFFLOAD_TSO, &l3_offload,
+ &l4_proto);
+
+hinic_task_set_inner_l3(task, l3_offload, network_hdr_len);
+
+ip_identify = 0;
+if (l4_proto == IPPROTO_TCP)
+l4.tcp->check = ~csum_magic(&ip, IPPROTO_TCP);
+
+get_inner_l4_info(skb, &l4, TX_OFFLOAD_TSO, l4_proto, &l4_offload,
+ &l4_len, &offset);
+
+hinic_set_tso_inner_l4(task, queue_info, l4_offload, l4_len, offset,
+ ip_identify, skb_shinfo(skb)->gso_size);
+
+return 1;
+
+
+static int offload_csum(struct hinic_sq_task *task, u32 *queue_info,
+struct sk_buff *skb)
+
+{ enum hinic_l4_offload_type l4_offload;
+u32 offset, l4_len, network_hdr_len;
+enum hinic_l3_offload_type l3_type;
+union hinic_l3 ip;
+union hinic_l4 l4;
+u8 l4_proto;
+
+if (skb->ip_summed != CHECKSUM_PARTIAL)
+return 0;
+}
+if (skb->encapsulation) {
+u32 l4_tunnel_len;
+
+ip.hdr = skb_network_header(skb);
+
+if (ip.v4->version == 4)
+l3_type = IPV4_PKT_NO_CHKSUM_OFFLOAD;
+else if (ip.v4->version == 6)
+l3_type = IPV6_PKT;
+else
+l3_type = L3TYPE_UNKNOWN;
+
+hinic_task_set_outter_l3(task, l3_type,
+ skb_network_header_len(skb));
+
+l4_tunnel_len = skb_inner_network_offset(skb) -
+ skb_transport_offset(skb);
+
+hinic_task_set_tunnel_l4(task, TUNNEL_UDP_NO_CSUM,
+ l4_tunnel_len);
+
+ip.hdr = skb_inner_network_header(skb);
+l4.hdr = skb_inner_transport_header(skb);
+network_hdr_len = skb_inner_network_header_len(skb);
+} else {
+ip.hdr = skb_network_header(skb);
+l4.hdr = skb_transport_header(skb);
+network_hdr_len = skb_network_header_len(skb);
+}
+
+get_inner_l3_l4_type(skb, &ip, &l4, TX_OFFLOAD_CSUM, &l3_type,
+ &l4_proto);
+
+hinic_task_set_inner_l3(task, l3_type, network_hdr_len);
+
+get_inner_l4_info(skb, &l4, TX_OFFLOAD_CSUM, l4_proto, &l4_offload,
+ &l4_len, &offset);
+
+hinic_set_cs_inner_l4(task, queue_info, l4_offload, l4_len, offset);
+
+return 1;
+}
+
+static int hinic_tx_offload(struct sk_buff *skb, struct hinic_sq_task *task,
+ u32 *queue_info)
+{
+enum hinic_offload_type offload = 0;
+int enabled;
enabled = offload_tso(task, queue_info, skb);

+ if (enabled > 0) {
+ offload |= TX_OFFLOAD_TSO;
+ } else if (enabled == 0) {
+ enabled = offload_csum(task, queue_info, skb);
+ if (enabled)
+ offload |= TX_OFFLOAD_CSUM;
+ } else {
+ return -EPROTONOSUPPORT;
+ }
+
+ if (offload)
+ hinic_task_set_l2hdr(task, skb_network_offset(skb));
+
+ /* payload offset should not more than 221 */
+ if (HINIC_SQ_CTRL_GET(*queue_info, QUEUE_INFO_PLDOFF) >
+ MAX_PAYLOAD_OFFSET) {
+ return -EPROTONOSUPPORT;
+ }
+
+ /* mss should not less than 80 */
+ if (HINIC_SQ_CTRL_GET(*queue_info, QUEUE_INFO_MSS) < HINIC_MSS_MIN) {
+ *queue_info = HINIC_SQ_CTRL_CLEAR(*queue_info, QUEUE_INFO_MSS);
+ *queue_info |= HINIC_SQ_CTRL_SET(HINIC_MSS_MIN, QUEUE_INFO_MSS);
+ }
+
+ return 0;
+
+ netdev_tx_t hinic_xmit_frame(struct sk_buff *skb, struct net_device *netdev)
+ {
+ struct hinic_dev *nic_dev = netdev_priv(netdev);
+ u16 prod_idx, q_id = skb->queue_mapping;
+ struct netdev_queue *netdev_txq;
+ int nr_sges, err = NETDEV_TX_OK;
+ struct hinic_sq_wqe *sq_wqe;
+ unsigned int wqe_size;
+ struct hinic_txq *txq;
+ struct hinic_qp *qp;
+ u16 prod_idx;
+
+ txq = &nic_dev->txqs(skb->queue_mapping);
+ txq = &nic_dev->txqs[q_id];
+ qp = container_of(txq->sq, struct hinic_qp, sq);
+
+ if (skb->len < MIN_SKB_LEN) {
+ @ @ -229,21 +503,30 @ @
txq->txq_stats.tx_busy++;

u64_stats_update_end(&txq->txq_stats.syncp);

err = NETDEV_TX_BUSY;
+wqe_size = 0;
goto flush_skbs;
}

process_sq_wqe:

hinic_sq_prepare_wqe(txq->sq, prod_idx, sq_wqe, txq->sges, nr_sges);

+err = hinic_tx_offload(skb, &sq_wqe->task, &sq_wqe->ctrl.queue_info);
+if (err)
+goto offload_error;
+
hinic_sq_write_wqe(txq->sq, prod_idx, sq_wqe, skb, wqe_size);

flush_skbs:

- netdev_txq = netdev_get_tx_queue(netdev, skb->queue_mapping);
+ netdev_txq = netdev_get_tx_queue(netdev, q_id);
if ((!skb->xmit_more) || (netif_xmit_stopped(netdev_txq))
hinic_sq_write_db(txq->sq, prod_idx, wqe_size, 0);

return err;

+offload_error:
+hinic_sq_return_wqe(txq->sq, wqe_size);
+tx_unmap_skb(nic_dev, skb, txq->sges);
+
skb_error:

dev_kfree_skb_any(skb);

@@ -251,7 +534,8 @@
u64_stats_update_begin(&txq->txq_stats.syncp);

txq->txq_stats.tx_dropped++;

-u64_stats_update_end(&txq->txq_stats.syncp);
-return err;
+
+return NETDEV_TX_OK;
}

/**
 @@ -282,7 +566,11 @@

 int nr_sges;
 u16 ci;

-while ((sq_wqe = hinic_sq_read_wqe(sq, &skb, &wqe_size, &ci))) {
+while ((sq_wqe = hinic_sq_read_wqebb(sq, &skb, &wqe_size, &ci))) {
+sq_wqe = hinic_sq_read_wqe(sq, &skb, wqe_size, &ci);
if (!sq_wqe)
+ break;
+
nr_sges = skb_shinfo(skb)->nr_frags + 1;

hinic_sq_get_sges(sq_wqe, txq->free_sges, nr_sges);
@@ -318,11 +606,21 @@
do {
    hw_ci = HW_CONS_IDX(sq) & wq->mask;
-
-    sq_wqe = hinic_sq_read_wqe(sq, &skb, &wqe_size, &sw_ci);
+ /* Reading a WQEBB to get real WQE size and consumer index. */
+    sq_wqe = hinic_sq_read_wqebb(sq, &skb, &wqe_size, &sw_ci);
    if ((!sq_wqe) ||
        (((hw_ci - sw_ci) & wq->mask) * wq->wqebb_size < wqe_size))
        break;
+
+    /* If this WQE have multiple WQEBBs, we will read again to get
+     * full size WQE.
+     */
+    if (wqe_size > wq->wqebb_size) {
+        sq_wqe = hinic_sq_read_wqebb(sq, &skb, &wqe_size, &sw_ci);
+        if (unlikely(!sq_wqe))
+            break;
+    }
+
+    tx_bytes += skb->len;
+    pkts++;
+}
@@ -357,7 +655,9 @@

    if (pkts < budget) {
        napi_complete(napi);
        -enable_irq(sq->irq);
+        hinic_hwdev_set_msix_state(nic_dev->hwdev,
+            sq->msix_entry,
+            HINIC_MSIX_ENABLE);
        return pkts;
    }
@@ -384,7 +684,9 @@

    nic_dev = netdev_priv(txq->netdev);

    /* Disable the interrupt until napi will be completed */
    -disable_irq_nosync(txq->sq->irq);
    +hinic_hwdev_set_msix_state(nic_dev->hwdev,
    +    txq->msix_entry,
    +    HINIC_MSIX_DISABLE);
hinic_hwdev_msix_cnt_set(nic->hwdev, txq->sq->msix_entry);

--- linux-4.15.0.orig/drivers/net/ethernet/i825xx/82596.c
+++ linux-4.15.0/drivers/net/ethernet/i825xx/82596.c
@@ -1155,7 +1155,7 @@
 err = -ENODEV;
goto out;
}
-memcpy(eth_addr, (void *) 0xfffc1f2c, ETH_ALEN); /* YUCK! Get addr from NOVRAM */
+memcpy(eth_addr, absolute_pointer(0xfffc1f2c), ETH_ALEN); /* YUCK! Get addr from NOVRAM */
dev->base_addr = MVME_I596_BASE;
dev->irq = (unsigned) MVME16x_IRQ_I596;
goto found;
--- linux-4.15.0.orig/drivers/net/ethernet/i825xx/lasi_82596.c
+++ linux-4.15.0/drivers/net/ethernet/i825xx/lasi_82596.c
@@ -96,6 +96,8 @@
#define OPT_SWAP_PORT	0x0001	/* Need to wordswp on the MPU port */
+
#define LIB82596_DMA_ATTR	DMA_ATTR_NON_CONSISTENT
+
#define DMA_WBACK(ndev, addr, len) \
do { dma_cache_sync((ndev)->dev.parent, (void *)addr, len, DMA_TO_DEVICE); } while (0)

@@ -199,7 +201,7 @@
unregister_netdev (dev);
dma_free_attrs(&pdev->dev, sizeof(struct i596_private), lp->dma,
- lp->dma_addr, DMA_ATTR_NON_CONSISTENT);
+ lp->dma_addr, LIB82596_DMA_ATTR);
free_netdev (dev);
return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/i825xx/lib82596.c
+++ linux-4.15.0/drivers/net/ethernet/i825xx/lib82596.c
@@ -1065,7 +1065,7 @@
dma = dma_alloc_attrs(dev->dev.parent, sizeof(struct i596_dma),
- dma->dma_addr, DMA_ATTR_NON_CONSISTENT);
+ LIB82596_DMA_ATTR);
if (!dma) {
printk(KERN_ERR "%s: Couldn't get shared memory\n", __FILE__);
return -ENOMEM;
@@ -1087,7 +1087,7 @@
i = register_netdev(dev);
if (i) {

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dma_free_attrs(dev->dev.parent, sizeof(struct i596_dma),
   -   dma, lp->dma_addr, DMA_ATTR_NON_CONSISTENT);
+   dma, lp->dma_addr, LIB82596_DMA_ATTR);
return i;
}

--- linux-4.15.0.orig/drivers/net/ethernet/i825xx/sni_82596.c
+++ linux-4.15.0/drivers/net/ethernet/i825xx/sni_82596.c
@@ -23,6 +23,8 @@
static const char sni_82596_string[] = "snirm_82596";

+#define LIB82596_DMA_ATTR 0
+
#define DMA_WBACK(priv, addr, len)     do { } while (0)
#define DMA_INV(priv, addr, len)       do { } while (0)
#define DMA_WBACK_INV(priv, addr, len) do { } while (0)
@@ -151,7 +153,7 @@
unregister_netdev(dev);
dma_free_attrs(dev->dev.parent, sizeof(struct i596_private), lp->dma,
   -   lp->dma_addr, DMA_ATTR_NON_CONSISTENT);
+   lp->dma_addr, LIB82596_DMA_ATTR);
iounmap(lp->ca);
iounmap(lp->mpu_port);
free_netdev (dev);
--- linux-4.15.0.orig/drivers/net/ethernet/ibm/ehea/ehea_main.c
+++ linux-4.15.0/drivers/net/ethernet/ibm/ehea/ehea_main.c
@@ -1475,7 +1475,7 @@
memset(pr, 0, sizeof(struct ehea_port_res));

-pr->tx_bytes = rx_bytes;
+pr->tx_bytes = tx_bytes;
pr->tx_packets = tx_packets;
pr->rx_bytes = rx_bytes;
pr->rx_packets = rx_packets;
@@ -2038,7 +2038,7 @@
dev_consume_skb_any(skb);
}

-static int ehea_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t ehea_start_xmit(struct sk_buff *skb, struct net_device *dev)
{ struct ehea_port *port = netdev_priv(dev);
  struct ehea_swqe *swqe;
  @@ -2647,10 +2647,8 @@
  u16 dummy16 = 0;
cb0 = (void *)get_zeroed_page(GFP_KERNEL);
-if (!cb0) {
- ret = -ENOMEM;
- goto out;
- }
+ if (!cb0)
+  return -ENOMEM;
for (i = 0; i < (port->num_def_qps); i++) {
  struct ehea_port_res *pr = &port->port_res[i];
@@ -2670,6 +2668,7 @@
    cb0);
  if (hret != H_SUCCESS) {
    netdev_err(dev, "query_ehea_qp failed (1)\n");
+ ret = -EFAULT;
    goto out;
  }
@@ -2682,6 +2681,7 @@
    &dummy64, &dummy16, &dummy16);
  if (hret != H_SUCCESS) {
    netdev_err(dev, "modify_ehea_qp failed (1)\n");
+ ret = -EFAULT;
    goto out;
  }
@@ -2690,6 +2690,7 @@
    cb0);
  if (hret != H_SUCCESS) {
    netdev_err(dev, "query_ehea_qp failed (2)\n");
+ ret = -EFAULT;
    goto out;
  }
@@ -3176,6 +3177,7 @@
  if (ehea_add_adapter_mr(adapter)) {
    pr_err("creating MR failed\n");
+ of_node_put(eth_dn);
    return -EIO;
  }
--- linux-4.15.0.orig/drivers/net/ethernet/ibm/emac/core.c
+++ linux-4.15.0/drivers/net/ethernet/ibm/emac/core.c
@@ -494,9 +494,6 @@
case 16384:
    ret |= EMAC_MR1_RFS_16K;

break;
case 8192:
	ret |= EMAC4_MR1_RFS_8K;
	break;
case 4096:
	ret |= EMAC_MR1_RFS_4K;
	break;
@@ -537,6 +534,9 @@
case 16384:
	ret |= EMAC4_MR1_RFS_16K;
	break;
+case 8192:
+ret |= EMAC4_MR1_RFS_8K;
+break;
case 4096:
	ret |= EMAC4_MR1_RFS_4K;
	break;
@@ -1409,7 +1409,7 @@
return 0;
}

-static inline int emac_xmit_finish(struct emac_instance *dev, int len)
+static inline netdev_tx_t emac_xmit_finish(struct emac_instance *dev, int len)
{
	struct emac_regs __iomem *p = dev->emacp;
	struct net_device *ndev = dev->ndev;
@@ -1436,7 +1436,7 @@
/* Tx lock BH */
-static int emac_start_xmit(struct sk_buff *skb, struct net_device *ndev)
+static netdev_tx_t emac_start_xmit(struct sk_buff *skb, struct net_device *ndev)
{
	struct emac_instance *dev = netdev_priv(ndev);
	unsigned int len = skb->len;
@@ -1494,7 +1494,8 @@
/* Tx lock BH disabled (SG version for TAH equipped EMACs) */
-static int emac_start_xmit_sg(struct sk_buff *skb, struct net_device *ndev)
+static netdev_tx_t emac_start_xmit_sg(struct sk_buff *skb, struct net_device *ndev)
{
	struct emac_instance *dev = netdev_priv(ndev);
	int nr_frags = skb_shinfo(skb)->nr_frags;
@@ -2677,12 +2678,17 @@
if (of_phy_is_fixed_link(np)) {
    int res = emac_dt_mdio_probe(dev);
if (!res) {
    res = of_phy_register_fixed_link(np);
    if (res)
        mdiobus_unregister(dev->mii_bus);
    if (res)
        return res;
    res = of_phy_register_fixed_link(np);
    dev->phy_dev = of_phy_find_device(np);
    if (res || !dev->phy_dev) {
        mdiobus_unregister(dev->mii_bus);
        return res ? res : -EINVAL;
    }
    emac_adjust_link(dev->ndev);
    put_device(&dev->phy_dev->mdio.dev);
}
return 0;

--- linux-4.15.0.orig/drivers/net/ethernet/ibm/emac/emac.h
+++ linux-4.15.0/drivers/net/ethernet/ibm/emac/emac.h
@@ -244,7 +244,7 @@
#define EMAC_STACR_PHYE 0x00004000
#define EMAC_STACR_STAC_MASK 0x00003000
#define EMAC_STACR_STAC_READ 0x00001000
-#define EMAC_STACR_STAC_WRITE 0x00000800
+#define EMAC_STACR_STAC_WRITE 0x00002000
#define EMAC_STACR_OPBC_MASK 0x00000C00
#define EMAC_STACR_OPBC_50 0x00000000
#define EMAC_STACR_OPBC_66 0x00000400
--- linux-4.15.0.orig/drivers/net/ethernet/ibm/ibmveth.c
+++ linux-4.15.0/drivers/net/ethernet/ibm/ibmveth.c
@@ -1172,11 +1172,15 @@
    dma_unmap_page(&adapter->vdev->dev, descs[i].fields.address,
             descs[i].fields.flags_len & IBMVETH_BUF_LEN_MASK,
             DMA_TO_DEVICE);

    dma_unmap_single(&adapter->vdev->dev,
             + descs[0].fields.address,
             + descs[0].fields.flags_len & IBMVETH_BUF_LEN_MASK,
             + DMA_TO_DEVICE);
    map_failed:

if (!firmware_has_feature(FW_FEATURE_CMO))
netdev_err(netdev, "tx: unable to map xmit buffer\n");
@@ -1310,7 +1314,6 @@
unsigned long ipar_rc;
u16 mss = 0;

-restart_poll:
while (frames_processed < budget) {
if (!ibmveth_rxq_pending_buffer(adapter))
break;
@@ -1327,6 +1330,7 @@
int offset = ibmveth_rxq_frame_offset(adapter);
int csum_good = ibmveth_rxq_csum_good(adapter);
int lrg_pkt = ibmveth_rxq_large_packet(adapter);
+__sum16 iph_check = 0;

skb = ibmveth_rxq_get_buffer(adapter);

@@ -1363,16 +1367,26 @@
skb_put(skb, length);
skb->protocol = eth_type_trans(skb, netdev);

-if (csum_good) {
-skb->ip_summed = CHECKSUM_UNNECESSARY;
-ibmveth_rx_csum_helper(skb, adapter);
+/* PHYP without PLSO support places a -1 in the ip
+ * checksum for large send frames.
+ */
+if (skb->protocol == cpu_to_be16(ETH_P_IP)) {
+struct iphdr *iph = (struct iphdr *)skb->data;
+  +iph_check = iph->check;
} 

-if (length > netdev->mtu + ETH_HLEN) {
+if ((length > netdev->mtu + ETH_HLEN) ||
+  lrg_pkt || iph_check == 0xffff) {
  ibmveth_rx_mss_helper(skb, mss, lrg_pkt);
  adapter->rx_large_packets++;
}

+if (csum_good) {
+skb->ip_summed = CHECKSUM_UNNECESSARY;
+ibmveth_rx_csum_helper(skb, adapter);
+
+napi_gro_receive(napi, skb); /* send it up */
netdev->stats.rx_packets++;
@@ -1398,7 +1412,6 @@
    napi_reschedule(napi)) {
  lpar_rc = h_vio_signal(adapter->vdev->unit_address,
    VIO_IRQ_DISABLE);
@@ -1398,7 +1412,6 @@
   goto restart_poll;
 }

@@ -1616,7 +1629,7 @@
 struct net_device *netdev;
 struct ibmveth_adapter *adapter;
 unsigned char *mac_addr_p;
-unsigned int *mcastFilterSize_p;
+__be32 *mcastFilterSize_p;
 unsigned int *mcastFilterSize_p;
 +__be32 *mcastFilterSize_p;
 long ret;
 unsigned long ret_attr;

@@ -1638,8 +1651,9 @@
 return -EINVAL;
 }

-mcastFilterSize_p = (unsigned int *)vio_get_attribute(dev,
-  VETH_MCAST_FILTER_SIZE, NULL);
+__be32 *mcastFilterSize_p = (__be32 *)vio_get_attribute(dev,
+  VETH_MCAST_FILTER_SIZE,
  NULL);
  if (!mcastFilterSize_p) {
    dev_err(&dev->dev, "Can’t find VETH_MCAST_FILTER_SIZE 
    "attribute\n");
@@ -1656,7 +1670,7 @@
 adapter->vdev = dev;
 adapter->netdev = netdev;
-adapter->mcastFilterSize = *mcastFilterSize_p;
+adapter->mcastFilterSize = be32_to_cpu(*mcastFilterSize_p);
 adapter->pool_config = 0;

 netif_napi_add(netdev, &adapter->napi, ibmveth_poll, 16);
@@ -1692,7 +1706,7 @@
 }

 netdev->min_mtu = IBMVETH_MIN_MTU;
 netdev->max_mtu = ETH_MAX_MTU - IBMVETH_BUFF_OH;
 memcpyp(netdev->dev_addr, mac_addr_p, ETH_ALEN);
--- linux-4.15.0.orig/drivers/net/ethernet/ibm/ibmvnic.c
+++ linux-4.15.0/drivers/net/ethernet/ibm/ibmvnic.c
@@ -59,6 +59,7 @@
#include <linux/mm.h>
#include <linux/ethtool.h>
#include <linux/proc_fs.h>
+#include <linux/if_arp.h>
#include <linux/in.h>
#include <linux/ip.h>
#include <linux/ipv6.h>
@@ -203,8 +204,13 @@
if (!ltb->buff)
    return;
+	/* VIOS automatically unmaps the long term buffer at remote
+ * end for the following resets:
+ * FAILOVER, MOBILITY, TIMEOUT.
+ */
if (adapter->reset_reason != VNIC_RESET_FAILOVER &&
    adapter->reset_reason != VNIC_RESET_MOBILITY)
+    adapter->reset_reason != VNIC_RESET_MOBILITY &&
+    adapter->reset_reason != VNIC_RESET_TIMEOUT)
    send_request_unmap(adapter, ltb->map_id);
    dma_free_coherent(dev, ltb->size, ltb->buff, ltb->addr);
}
@@ -316,7 +322,8 @@
        return;

failure:
-dev_info(dev, "replenish pools failure\n");
+if (lpar_rc != H_PARAMETER && lpar_rc != H_CLOSED)
+dev_err_ratelimited(dev, "rx: replenish packet buffer failed\n");
    pool->free_map[pool->next_free] = index;
    pool->rx_buff[index].skb = NULL;
    if (!dma_mapping_error(dev, dma_addr))
@@ -353,6 +360,8 @@
    }
    kfree(adapter->tx_stats_buffers);
    kfree(adapter->rx_stats_buffers);
+    adapter->tx_stats_buffers = NULL;
+    adapter->rx_stats_buffers = NULL;
    }

static int init_stats_buffers(struct ibmvnic_adapter *adapter)
@@ -471,8 +480,8 @@
    for (j = 0; j < rx_pool->size; j++) {
        if (rx_pool->rx_buff[j].skb) {

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dev_kfree_skb_any(rx_pool->rx_buff[i].skb);
rx_pool->rx_buff[i].skb = NULL;
+dev_kfree_skb_any(rx_pool->rx_buff[j].skb);
+rx_pool->rx_buff[j].skb = NULL;
}
}

@@ -598,6 +607,8 @@
kfree(adapter->vpd->buff);
kfree(adapter->vpd);
+
+adapter->vpd = NULL;
}

static void release_tx_pools(struct ibmvnic_adapter *adapter)
@@ -786,6 +797,18 @@
return 0;
}

+static void release_login_buffer(struct ibmvnic_adapter *adapter)
+
+{ 
+kfree(adapter->login_buf);
+adapter->login_buf = NULL;
+}
+
+static void release_login_rsp_buffer(struct ibmvnic_adapter *adapter)
+
+{ 
+kfree(adapter->login_rsp_buf);
+adapter->login_rsp_buf = NULL;
+}
+
static void release_resources(struct ibmvnic_adapter *adapter)
{
int i;
@@ -795,8 +818,6 @@
release_tx_pools(adapter);
release_rx_pools(adapter);

-release_stats_token(adapter);
-release_stats_buffers(adapter);
release_error_buffers(adapter);

if (adapter->napi) {
@@ -808,6 +829,10 @@

}
+kfree(adapter->napi);
+adapter->napi = NULL;
+
+release_login_rsp_buffer(adapter);
}

static int set_link_state(struct ibmvnic_adapter *adapter, u8 link_state)
@@ -908,6 +933,7 @@
if (dma_mapping_error(dev, adapter->vpd->dma_addr)) {
    dev_err(dev, "Could not map VPD buffer\n");
kfree(adapter->vpd->buff);
+    adapter->vpd->buff = NULL;
    return -ENOMEM;
}
@@ -931,14 +957,6 @@
if (rc)
    return rc;

    -rc = init_stats_buffers(adapter);
    -if (rc)
    -    return rc;
    -
    -rc = init_stats_token(adapter);
    -if (rc)
    -    return rc;
    -
    adapter->vpd = kzalloc(sizeof(*adapter->vpd), GFP_KERNEL);
    if (!adapter->vpd)
        return -ENOMEM;
@@ -1003,8 +1021,7 @@
    rc = set_link_state(adapter, IBMVNIC_LOGICAL_LNK_UP);
    if (rc) {
        -for (i = 0; i < adapter->req_rx_queues; i++)
        -napi_disable(&adapter->napi[i]);
        +ibmvnic_napi_disable(adapter);
        release_resources(adapter);
        return rc;
    }
@@ -1051,6 +1068,35 @@
    return rc;
}

+static void clean_rx_pools(struct ibmvnic_adapter *adapter)
+
+{ 
+    struct ibmvnic_rx_pool *rx_pool;
+    u64 rx_entries;
int rx_scrqs;
int i, j;

if (!adapter->rx_pool)
    return;

rx_scrqs = be32_to_cpu(adapter->login_rsp_buf->num_rxadd_subcrqs);
rx_entries = adapter->req_rx_add_entries_per_subcrq;

/* Free any remaining skb's in the rx buffer pools */
for (i = 0; i < rx_scrqs; i++) {
    rx_pool = &adapter->rx_pool[i];
    if (!rx_pool)
        continue;

    netdev_dbg(adapter->netdev, "Cleaning rx_pool[%d]\n", i);
    for (j = 0; j < rx_entries; j++) {
        if (rx_pool->rx_buff[j].skb) {
            dev_kfree_skb_any(rx_pool->rx_buff[j].skb);
        }
        rx_pool->rx_buff[j].skb = NULL;
    }

    free_skb(skb); /* Free the skb */
}

static void clean_rx_pools(struct ibmvnic_adapter *adapter)
{
    struct ibmvnic_rx_pool *rx_pool;
    for (i = 0; i < rx_scrqs; i++) {
        rx_pool = &adapter->rx_pool[i];
        if (!rx_pool)
            continue;

        netdev_dbg(adapter->netdev, "Cleaning rx_pool[%d]\n", i);
        for (j = 0; j < rx_entries; j++) {
            if (rx_pool->rx_buff[j].skb) {
                dev_kfree_skb_any(rx_pool->rx_buff[j].skb);
            }
            rx_pool->rx_buff[j].skb = NULL;
        }
    }

    clean_rx_pools(adapter);
    clean_tx_pools(adapter);
    adapter->state = VNIC_CLOSED;
    return rc;
}

else if (ipv6_hdr(skb)->nexthdr == IPPROTO_UDP)
    hdr_len[2] = sizeof(struct udphdr);
else if (skb->protocol == htons(ETH_P_ARP)) {
    hdr_len[1] = arp_hdr_len(skb->dev);
    hdr_len[2] = 0;
}

memset(hdr_data, 0, 120);
txbuff->indir_arr + 1);
}

-static int ibmvnic_xmit(struct sk_buff *skb, struct net_device *netdev)
+static netdev_tx_t ibmvnic_xmit(struct sk_buff *skb, struct net_device *netdev)
{
    struct ibmvnic_adapter *adapter = netdev_priv(netdev);
    int queue_num = skb_get_queue_mapping(skb);
    u64 *handle_array;
    int index = 0;
    u8 proto = 0;
    int ret = 0;
    +netdev_tx_t ret = NETDEV_TX_OK;
    if (adapter->resetting) {
        if (!netif_subqueue_stopped(netdev, skb))
            skb_copy_from_linear_data(skb, dst, skb->len);
    }

    /* post changes to long_term_buff *dst before VIOS accessing it */
    /* post changes to long_term_buff *dst before VIOS accessing it */
    +dma_wmb();
    +
    tx_pool->consumer_index =
        (tx_pool->consumer_index + 1) %
    adapter->req_tx_entries_per_subcrq;
    tx_crq.v1.sge_len = cpu_to_be32(skb->len);
    tx_crq.v1.ioba = cpu_to_be64(data_dma_addr);

    -if (adapter->vlan_header_insertion) {
        +if (adapter->vlan_header_insertion && skb_vlan_tag_present(skb)) {
            tx_crq.v1.flags2 |= IBMVNIC_TX_VLAN_INSERT;
            tx_crq.v1.vlan_id = cpu_to_be16(skb->vlan_tci);
        }
        hdrs += 2;
    }
    /* determine if l2/3/4 headers are sent to firmware */
    -if (*((hdrs >> 7) & 1) &
        -(skb->protocol == htons(ETH_P_IP) ||
        skb->protocol == htons(ETH_P_IPV6))) {
            build_hdr_descs_arr(tx_buff, &num_entries, *hdrs);
            tx_crq.v1.n_cq_elm = num_entries;
            tx_buff->indir_arr[0] = tx_crq;
            @ @ -1437,7 +1487,8 @@
&tx_crq);
}
if (lpar_rc != H_SUCCESS) {
-dev_err(dev, "tx failed with code %ld\n", lpar_rc);
+if (lpar_rc != H_CLOSED && lpar_rc != H_PARAMETER)
+dev_err_ratelimited(dev, "tx: send failed\n");

if (tx_pool->consumer_index == 0)
  tx_pool->consumer_index =
@@ -1543,15 +1594,19 @@
crq.change_mac_addr.first = IBMVNIC_CRQ_CMD;
crq.change_mac_addr.cmd = CHANGE_MAC_ADDR;
ether_addr_copy(&crq.change_mac_addr.mac_addr[0], addr->sa_data);
+
+init_completion(&adapter->fw_done);
ibmvnic_send_crq(adapter, &crq);
+wait_for_completion(&adapter->fw_done);
/* netdev->dev_addr is changed in handle_change_mac_rsp function */
-return 0;
+return adapter->fw_done_rc ? -EIO : 0;
}

static int ibmvnic_set_mac(struct net_device *netdev, void *p)
{
  struct ibmvnic_adapter *adapter = netdev_priv(netdev);
  struct sockaddr *addr = p;
  +int rc;

  if (adapter->state == VNIC_PROBED) {
    memcpy(&adapter->desired.mac, addr, sizeof(struct sockaddr));
@@ -1559,9 +1614,9 @@
    return 0;
  }
  -__ibmvnic_set_mac(netdev, addr);
  +rc = __ibmvnic_set_mac(netdev, addr);

  -return 0;
  +return rc;
  }

/**
@@ -1573,7 +1628,7 @@
  }
  u64 old_num_rx_queues, old_num_tx_queues;
  struct net_device *netdev = adapter->netdev;
-int i, rc;
+int rc;

netdev_dbg(adapter->netdev, "Re-setting driver (%d)\n", rwi->reset_reason);
@@ -1619,8 +1674,8 @@
 rc = ibmvnic_login(netdev);
 if (rc) {
-    adapter->state = VNIC_PROBED;
-    return 0;
+    adapter->state = reset_state;
+    return rc;
 }

 if (adapter->reset_reason == VNIC_RESET_CHANGE_PARAM ||
@@ -1630,10 +1685,15 @@
 return rc;
 } else if (adapter->req_rx_queues != old_num_rx_queues ||
-    adapter->req_tx_queues != old_num_tx_queues) {
+    adapter->map_id = 1;
 release_rx_pools(adapter);
 release_tx_pools(adapter);
-    init_rx_pools(netdev);
-    init_tx_pools(netdev);
+    rc = init_rx_pools(netdev);
+    if (rc)
+        return rc;
+    rc = init_tx_pools(netdev);
+    if (rc)
+        return rc;
 } else {
 rc = reset_tx_pools(adapter);
 if (rc)
@@ -1642,12 +1702,14 @@ rc = reset_rx_pools(adapter);
 return rc;
-    if (reset_state == VNIC_CLOSED)
-        return 0;
 } 

+    adapter->state = VNIC_CLOSED;
+    if (reset_state == VNIC_CLOSED)
+        return 0;
+    rc = __ibmvnic_open(netdev);
if (rc) {
  if (list_empty(&adapter->rwi_list))
    return 0;
}

-netif_carrier_on(netdev);
+/* refresh device's multicast list */
+ibmvnic_set_multi(netdev);

-/* kick napi */
- for (i = 0; i < adapter->req_rx_queues; i++)
-  napi_schedule(&adapter->napi[i]);
+if (adapter->reset_reason != VNIC_RESET_FAILOVER &&
   adapter->reset_reason != VNIC_RESET_CHANGE_PARAM) {
+  call_netdevice_notifiers(NETDEV_NOTIFY_PEERS, netdev);
+  call_netdevice_notifiers(NETDEV_RESEND_IGMP, netdev);
+}

-if (adapter->reset_reason != VNIC_RESET_FAILOVER)
-  netdev_notify_peers(netdev);
+netif_carrier_on(netdev);

return 0;
}

static struct ibmvnic_rwi *get_next_rwi(struct ibmvnic_adapter *adapter)
{
  struct ibmvnic_rwi *rwi;
+unsigned long flags;

  -mutex_lock(&adapter->rwi_lock);
+spin_lock_irqsave(&adapter->rwi_lock, flags);

  if (!list_empty(&adapter->rwi_list)) {
    rwi = list_first_entry(&adapter->rwi_list, struct ibmvnic_rwi,
      @ @ -1684,7 +1749,7 @@
    rwi = NULL;
  }

  -mutex_unlock(&adapter->rwi_lock);
+spin_unlock_irqrestore(&adapter->rwi_lock, flags);
  return rwi;
}

-rwi = get_next_rwi(adapter);


while (rwi) {
+  if (adapter->state == VNIC_REMOVING ||
+      adapter->state == VNIC_REMOVED) {
+    kfree(rwi);
+    rc = EBUSY;
+    break;
+  }
+  rc = do_reset(adapter, rwi, reset_state);
  kfree(rwi);
  if (rc && rc != IBMVNIC_INIT_FAILED)
    mutex_lock(&adapter->rwi_lock);
    struct ibmvnic_rwi *rwi, *tmp;
    struct net_device *netdev = adapter->netdev;
    struct list_head *entry;
    unsigned long flags;
    if (adapter->state == VNIC_REMOVING ||
        adapter->state == VNIC_REMOVED) {
      mutex_unlock(&adapter->rwi_lock);
      return;
    }
    rwi = kzalloc(sizeof(*rwi), GFP_ATOMIC);
    if (!rwi) {
      mutex_unlock(&adapter->rwi_lock);
      ibmvnic_close(netdev);
      return;
    }
    rwi->reset_reason = reason;
    list_add_tail(&rwi->list, &adapter->rwi_list);
    mutex_unlock(&adapter->rwi_lock);

    list_for_each(entry, &adapter->rwi_list) {
      tmp = list_entry(entry, struct ibmvnic_rwi, list);
      if (tmp->reset_reason == reason) {
        netdev_dbg(netdev, "Skipping matching reset\n");
        mutex_unlock(&adapter->rwi_lock);
        spin_unlock_irqrestore(&adapter->rwi_lock, flags);
        return;
      }
    }
    -rwi = kzalloc(sizeof(*rwi), GFP_KERNEL);
    +rwi = kzalloc(sizeof(*rwi), GFP_ATOMIC);
    if (!rwi) {
      mutex_unlock(&adapter->rwi_lock);
      spin_unlock_irqrestore(&adapter->rwi_lock, flags);
      ibmvnic_close(netdev);
      return;
    }
    mutex_unlock(&adapter->rwi_lock);
    list_add_tail(&rwi->list, &adapter->rwi_list);
    mutex_unlock(&adapter->rwi_lock);
+spin_unlock_irqrestore(&adapter->rwi_lock, flags);

netdev_dbg(adapter->netdev, "Scheduling reset (reason %d)\n", reason);
schedule_work(&adapter->ibmvnic_reset);
@@ -1822,7 +1895,8 @@
u16 offset;
u8 flags = 0;

- if (unlikely(adapter->resetting)) {
+ if (unlikely(adapter->resetting &&
      adapter->reset_reason != VNIC_RESET_NON_FATAL)) {
  enable_scrq_irq(adapter, adapter->rx_scrq[scrq_num]);
napi_complete_done(napi, frames_processed);
  return frames_processed;
@@ -1830,6 +1904,12 @@
  if (!pending_scrq(adapter, adapter->rx_scrq[scrq_num]))
    break;
+/* The queue entry at the current index is peeked at above
+ * to determine that there is a valid descriptor awaiting
+ * processing. We want to be sure that the current slot
+ * holds a valid descriptor before reading its contents.
+ */
+dma_rmb();

next = ibmvnic_next_scrq(adapter, adapter->rx_scrq[scrq_num]);
rx_buff =
  (struct ibmvnic_rx_buff *)be64_to_cpu(next->
@@ -1840,6 +1920,12 @@
      be16_to_cpu(next->rx_comp.rc));
/* free the entry */
  next->rx_comp.first = 0;
+dev_kfree_skb_any(rx_buff->skb);
+remove_buff_from_pool(adapter, rx_buff);
+continue;
+} else if (!rx_buff->skb) {
+/* free the entry */
+next->rx_comp.first = 0;
remove_buff_from_pool(adapter, rx_buff);
  continue;
} 
@@ -1848,6 +1934,8 @@
  offset = be16_to_cpu(next->rx_comp.off_frame_data);
  flags = next->rx_comp.flags;
  skb = rx_buff->skb;
+/* load long_term_buff before copying to skb */
+dma_rmb();
  skb_copy_to_linear_data(skb, rx_buff->data + offset,
  length);
memset(scrq->msgs, 0, 4 * PAGE_SIZE);
atomic_set(&scrq->used, 0);
scrq->cur = 0;
rc = h_reg_sub_crq(adapter->vdev->unit_address, scrq->msg_token,
{ int i, rc;

+if (!adapter->tx_scrq || !adapter->rx_scrq)
+return -EINVAL;
+
+for (i = 0; i < adapter->req_tx_queues; i++) {
    if (!adapter->tx_scrq || !adapter->rx_scrq)
        return -EINVAL;
    for (i = 0; i < adapter->req_tx_queues; i++) {
        netdev_dbg(adapter->netdev, "Re-setting tx_scrq[%d]", i);
        rc = reset_one_sub_crq_queue(adapter, adapter->tx_scrq[i]);
    }
    if (pending_scrq(adapter, scrq)) {
        unsigned int pool = scrq->pool_index;
        /* The queue entry at the current index is peeked at above
         * to determine that there is a valid descriptor awaiting
         * processing. We want to be sure that the current slot
         * holds a valid descriptor before reading its contents.
         */
        +dma_rmb();
        +
        next = ibmvnic_next_scrq(adapter, scrq);
        for (i = 0; i < next->tx_comp.num_comps; i++) {
            if (next->tx_comp.rcs[i]) {
                dev_err(dev, "tx error \%x\n",
                next->tx_comp.rcs[i]);
                continue;
            } -continue;
        }
        index = be32_to_cpu(next->tx_comp.correlators[i]);
        txbuff = &adapter->tx_pool[pool].tx_buff[index];
    }
    if (pending_scrq(adapter, scrq)) {
        unsigned int pool = scrq->pool_index;
        /* When booting a kdump kernel we can hit pending interrupts
         * prior to completing driver initialization.
         */
        +}
if (unlikely(adapter->state != VNIC_OPEN))
+return IRQ_NONE;
+
adapter->rx_stats_buffers[scrq->scrq_num].interrupts++;

if (napi_schedule_prep(&adapter->napi[scrq->scrq_num])) {
@@ -2554,7 +2657,7 @@
req_tx_irq_failed:
for (j = 0; j < i; j++) {
free_irq(adapter->tx_scrq[j]->irq, adapter->tx_scrq[j]);
-irq_dispose_mapping(adapter->rx_scrq[j]->irq);
+irq_dispose_mapping(adapter->tx_scrq[j]->irq);
} 
release_sub_crqs(adapter);
return rc;
@@ -2797,6 +2900,11 @@
} 
spin_unlock_irqrestore(&scrq->lock, flags);

+/* Ensure that the entire buffer descriptor has been
+ * loaded before reading its contents
+ */
+dma_rmb();
+
return entry;
}

@@ -2816,6 +2924,25 @@
return crq;
}

+static void print_subcrq_error(struct device *dev, int rc, const char *func)
+{
+switch (rc) {
+case H_PARAMETER:
+dev_warn_ratelimited(dev,
+ "%s failed: Send request is malformed or adapter failover pending. (rc=%d)\n",
+ func, rc);
+break;
+case H_CLOSED:
+dev_warn_ratelimited(dev,
+ "%s failed: Backing queue closed. Adapter is down or failover pending. (rc=%d)\n",
+ func, rc);
+break;
+default:
+dev_err_ratelimited(dev, "%s failed: (rc=%d)\n", func, rc);
+break;
+}
static int send_subcrq(struct ibmvnic_adapter *adapter, u64 remote_handle, union sub_crq *sub_crq)
{
    cpu_to_be64(u64_crq[2]),
    cpu_to_be64(u64_crq[3]));

    -if (rc) {
    -if (rc == H_CLOSED)
        -dev_warn(dev, "CRQ Queue closed\n");
        -dev_err(dev, "Send error (rc=%d)\n", rc);
    -}
    +if (rc)
        +print_subcrq_error(dev, rc, __func__);

    return rc;
}

    cpu_to_be64(remote_handle),
    ioba, num_entries);

    -if (rc) {
    -if (rc == H_CLOSED)
        -dev_warn(dev, "CRQ Queue closed\n");
        -dev_err(dev, "Send (indirect) error (rc=%d)\n", rc);
    -}
    +if (rc)
        +print_subcrq_error(dev, rc, __func__);

    return rc;
}

    cpu_to_be64(u64_crq[1]));

    if (rc) {
    -if (rc == H_CLOSED)
        +if (rc == H_CLOSED) {
            dev_warn(dev, "CRQ Queue closed\n");
            +if (adapter->resetting)
                +ibmvnic_reset(adapter, VNIC_RESET_FATAL);
        +}
        +dev_warn(dev, "Send error (rc=%d)\n", rc);
    }

    @@ -2990,6 +3115,7 @@


struct vnic_login_client_data *vlcd;
int i;

+release_login_rsp_buffer(adapter);
client_data_len = vnic_client_data_len(adapter);

buffer_size =
@@ -3271,7 +3397,7 @@
    struct ibmvnic_adapter *adapter)
{
    struct device *dev = &adapter->vdev->dev;
-    unsigned char *substr = NULL, *ptr = NULL;
+    unsigned char *substr = NULL;
    u8 fw_level_len = 0;

    memset(adapter->fw_version, 0, 32);
@@ -3290,7 +3416,7 @@ *
    / *
    substr = strnstr(adapter->vpd->buff, "RM", adapter->vpd->len);
    if (!substr) {
-        dev_info(dev, "No FW level provided by VPD
+        dev_info(dev, "Warning - No FW level has been provided in the VPD buffer by the VIOS Server\n");
        goto complete;
    }
    @ @ -3305,16 +3431,14 @@ /* copy firmware version string from vpd into adapter */
    if ((substr + 3 + fw_level_len) <
        (adapter->vpd->buff + adapter->vpd->len)) {
        -ptr = strncpy((char *)adapter->fw_version,
-                      substr + 3, fw_level_len);
-        -if (!ptr)
-            dev_err(dev, "Failed to isolate FW level string\n");
+        strncpy((char *)adapter->fw_version, substr + 3, fw_level_len);
+        } else {
+            dev_info(dev, "FW substr extrapolated VPD buff\n");
+        }
    }

    complete:
    @ @ -3558,8 +3682,8 @@
    ibmvnic_reset(adapter, VNIC_RESET_NON_FATAL);
    }
-static void handle_change_mac_rsp(union ibmvnic_crq *crq,  
- struct ibmvnic_adapter *adapter)  
+static int handle_change_mac_rsp(union ibmvnic_crq *crq,  
+ struct ibmvnic_adapter *adapter)  
{
    struct net_device *netdev = adapter->netdev;
    struct device *dev = &adapter->vdev->dev;
    rc = crq->change_mac_addr_rsp.rc.code;
    if (rc) {
        dev_err(dev, "Error %ld in CHANGE_MAC_ADDR_RSP\n", rc);
        return;
    }
    dev_info(dev, "Partner protocol version is %d\n",  
        ibmvnic_version);
    send_cap_queries(adapter);
    break;
}  
-static void handle_request_cap_rsp(union ibmvnic_crq *crq,  
- struct ibmvnic_adapter *adapter)  
+static int handle_request_cap_rsp(union ibmvnic_crq *crq,  
+ struct ibmvnic_adapter *adapter)  
{  
    ibmvnic_remove(adapter->vdev);
    return -EIO;
}  
+release_login_buffer(adapter);  
+return rc;
}  

return 0;
dev_err(dev, "Error %ld in VERSION_EXCHG_RSP\n", rc);
break;
}  
-dev_info(dev, "Partner protocol version is %d\n",  
- crq->version_exchange_rsp.version);
-if (be16_to_cpu(crq->version_exchange_rsp.version) <  
- ibmvnic_version)  
-ibmvnic_version =  
+ibmvnic_version =  
    be16_to_cpu(crq->version_exchange_rsp.version);
+dev_info(dev, "Partner protocol version is %d\n",  
+ ibmvnic_version);
+send_cap_queries(adapter);
+break;
-case QUERY_CAPABILITY_RSP:
+return -4031,7 +4157,7 @@
break;
case CHANGE_MAC_ADDR_RSP:
    netdev_dbg(netdev, "Got MAC address change Response\n");
    -handle_change_mac_rsp(crq, adapter);
    +adapter->fw_done_rc = handle_change_mac_rsp(crq, adapter);
    break;
case ERROR_INDICATION:
    netdev_dbg(netdev, "Got Error Indication\n");
@@ -4095,6 +4221,12 @@
while (!done) {
    /* Pull all the valid messages off the CRQ */
    while ((crq = ibmvnic_next_crq(adapter)) != NULL) {
        /* This barrier makes sure ibmvnic_next_crq()'s
        + * crq->generic.first & IBMVNIC_CRQ_CMD_RSP is loaded
        + * before ibmvnic_handle_crq()'s
        + * switch(gen_crq->first) and switch(gen_crq->cmd).
        + */
        +dma_rmb();
        ibmvnic_handle_crq(crq, adapter);
        crq->generic.first = 0;
    }
@@ -4141,6 +4273,9 @@
} while (rc == H_BUSY || H_IS_LONG_BUSY(rc));

        /* Clean out the queue */
+if (!crq->msgs)
+return -EINVAL;
+memset(crq->msgs, 0, PAGE_SIZE);
    crq->cur = 0;
    @@ -4310,6 +4445,14 @@
release_crq_queue(adapter);
}

+rc = init_stats_buffers(adapter);
+if (rc)
+return rc;
+
+rc = init_stats_token(adapter);
+if (rc)
+return rc;
+
return rc;
}
@@ -4335,7 +4478,7 @@
netdev = alloc_etherdev_mq(sizeof(struct ibmvnic_adapter),
- IBMVNIC_MAX_TX_QUEUES);
+ IBMVNIC_MAX_QUEUES);
if (!netdev)
return -ENOMEM;

@@ -4360,7 +4503,7 @@
INIT_WORK(&adapter->ibmvnic_reset, __ibmvnic_reset);
INIT_LIST_HEAD(&adapter->rwi_list);
mutex_init(&adapter->reset_lock);
-mutex_init(&adapter->rwi_lock);
+spin_lock_init(&adapter->rwi_lock);
adapter->resetting = false;

adapter->mac_change_pending = false;
@@ -4417,6 +4560,9 @@
release_sub_crqs(adapter);
release_crq_queue(adapter);
+
release_stats_token(adapter);
+release_stats_buffers(adapter);
+
adapter->state = VNIC_REMOVED;

mutex_unlock(&adapter->reset_lock);
@@ -4461,7 +4607,7 @@
return count;
}

-static DEVICE_ATTR(failover, 0200, NULL, failover_store);
+static DEVICE_ATTR_WO(failover);

static unsigned long ibmvnic_get_desired_dma(struct vio_dev *

{--- linux-4.15.0.orig/drivers/net/ethernet/ibm/ibmvnic.h
+++ linux-4.15.0/drivers/net/ethernet/ibm/ibmvnic.h
@@ -39,7 +39,7 @@
 #define IBMVNIC_RX_WEIGHT	16
 /* when changing this, update IBMVNIC_IO_ENTITLEMENT_DEFAULT */
 #define IBMVNIC_BUFFS_PER_POOL100
-#define IBMVNIC_MAX_TX_QUEUES5
+#define IBMVNIC_MAX_QUEUES10

 #define IBMVNIC_TSO_BUF_SZ	65536
 #define IBMVNIC_TSO_BUFS	64
 @@ -1097,7 +1097,8 @@
 struct tasklet struct tasklet;

---
enum vnic_state state;
enum ibmvnic_reset_reason reset_reason;
-struct mutex reset_lock, rwi_lock;
+struct mutex reset_lock;
+spinlock_t rwi_lock;
struct list_head rwi_list;
struct work_struct ibmvnic_reset;
bool resetting;
--- linux-4.15.0.orig/drivers/net/ethernet/intel/e100.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e100.c
@@ -1370,8 +1370,8 @@
   fw = e100_request_firmware(nic);
   /* If it's NULL, then no ucode is required */
   -if (!fw || IS_ERR(fw))
   +if (IS_ERR_OR_NULL(fw))
     return PTR_ERR_OR_ZERO(fw);
   if ((err = e100_exec_cb(nic, (void *)fw, e100_setup_ucode)))
     netif_err(nic, probe, nic->netdev,
@@ -1423,7 +1423,7 @@
     phy_type = (nic->eeprom[eeprom_phy_iface] >> 8) & 0x0f;
   +phy_type = (le16_to_cpu(nic->eeprom[eeprom_phy_iface]) >> 8) & 0x0f;

   switch (phy_type) {
   case NoSuchPhy: /* Non-MII PHY; UNTESTED! */
     @ @ -1543.7 +1543.7 @@
   mdio_write(netdev, nic->mii.phy_id, MII_BMCR, bmcr);
   } else if (((nic->mac >= mac_82550_D102) || ((nic->flags & ich) &&
     (mdio_read(netdev, nic->mii.phy_id, MII_TPISTATUS) & 0x8000) &&
     -(nic->eeprom[eeprom_config_mdix] & eeprom_mdix_enabled))) {
     + (le16_to_cpu(nic->eeprom[eeprom_config_mdix]) & eeprom_mdix_enabled))) {
     /* enable/disable MDI/MDI-X auto-switching. */
     mdio_write(netdev, nic->mii.phy_id, MII_NCONFIG,
     nic->mii.force_media ? 0 : NCONFIG_AUTO_SWITCH);
     @ @ -2289.9 +2289.9 @@
   }
   /* ASF can be enabled from eeprom */
   return (nic->pdev->device >= 0x1050) && (nic->pdev->device <= 0x1057) &&
   - (nic->eeprom[eeprom_config_asf] & eeprom_asf) &&
   - !(nic->eeprom[eeprom_config_gcl] & eeprom_gcl) &&
   - !(nic->eeprom[eeprom_smbus_addr] & 0xFF) != 0xFE);
   + (le16_to_cpu(nic->eeprom[eeprom_config_asf]) & eeprom_asf) &&
   + !(le16_to_cpu(nic->eeprom[eeprom_config_gcl]) & eeprom_gcl) &&
static int e100_up(struct nic *nic)
@@ -2458,11 +2458,15 @@
    sizeof(info->bus_info));
}

-#define E100_PHY_REGS 0x1C
+#define E100_PHY_REGS 0x1D
static int e100_get_regs_len(struct net_device *netdev)
{
    struct nic *nic = netdev_priv(netdev);
    return 1 + E100_PHY_REGS + sizeof(nic->mem->dump_buf);
    +/
    +/* We know the number of registers, and the size of the dump buffer.
    + * Calculate the total size in bytes.
    + */
    +return (1 + E100_PHY_REGS) * sizeof(u32) + sizeof(nic->mem->dump_buf);
}

static void e100_get_regs(struct net_device *netdev,
@@ -2476,14 +2480,18 @@
    buff[0] = ioread8(&nic->csr->scb.cmd_hi) << 24 |
            ioread8(&nic->csr->scb.cmd_lo) << 16 |
            ioread16(&nic->csr->scb.status);
    -for (i = E100_PHY_REGS; i >= 0; i--)
    -buff[1 + E100_PHY_REGS - i] =
    -mdio_read(netdev, nic->mii.phy_id, i);
    +for (i = 0; i < E100_PHY_REGS; i++)
    +/* Note that we read the registers in reverse order. This
    + ordering is the ABI apparently used by ethtool and other
    + applications.
    + */
    +buff[1 + i] = mdio_read(netdev, nic->mii.phy_id,
    +E100_PHY_REGS - 1 - i);
    memset(nic->mem->dump_buf, 0, sizeof(nic->mem->dump_buf));
    e100_exec_cb(nic, NULL, e100_dump);
    msleep(10);
    -memcpy(&buff[2 + E100_PHY_REGS], nic->mem->dump_buf,
    -sizeof(nic->mem->dump_buf));
    +memcpy(&buff[1 + E100_PHY_REGS], nic->mem->dump_buf,
    + sizeof(nic->mem->dump_buf));
}

static void e100_get_wol(struct net_device *netdev, struct ethtool_wolinfo *wol)
@@ -2947,7 +2955,7 @@
/* Wol magic packet can be enabled from eeprom */
if ((nic->mac >= mac_82558_D101_A4) &&
    - (nic->eeprom[eeprom_id] & eeprom_id_wol)) {
    + (le16_to_cpu(nic->eeprom[eeprom_id]) & eeprom_id_wol)) {
        nic->flags |= wol_magic;
        device_set_wakeup_enable(&pdev->dev, true);
    }
}

--- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000/e1000_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000/e1000_ethtool.c
@@ -627,6 +627,7 @@
for (i = 0; i < adapter->num_rx_queues; i++)
    rxdr[i].count = rxdr->count;

+err = 0;
if (netif_running(adapter->netdev)) {
    /* Try to get new resources before deleting old */
    err = e1000_setup_all_rx_resources(adapter);
    @@ -644,17 +645,16 @@
    adapter->tx_ring = tx_old;
    e1000_free_all_rx_resources(adapter);
    e1000_free_all_tx_resources(adapter);
    -kfree(tx_old);
    -kfree(rx_old);
    adapter->rx_ring = rxdr;
    adapter->tx_ring = txdr;
    err = e1000_up(adapter);
    -if (err)
    -goto err_setup;
    +kfree(tx_old);
    +kfree(rx_old);

    clear_bit(__E1000_RESETTING, &adapter->flags);
    -return 0;
    +return err;
    +
    err_setup_tx:
    e1000_free_all_rx_resources(adapter);
    err_setup_rx:
    @@ -664,8 +664,8 @@
    kfree(txdr);
    err_alloc_rx:
    e1000_up(adapter);
    -err_setup:
    +if (netif_running(adapter->netdev))
    +e1000_up(adapter);
    clear_bit(__E1000_RESETTING, &adapter->flags);
return err;
}
--- linux-4.15.0.org/drivers/net/ethernet/intel/e1000/e1000_main.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000/e1000_main.c
@@ -567,8 +567,13 @@
WARN_ON(in_interrupt());
while (test_and_set_bit(__E1000_RESETTING, &adapter->flags))
    msleep(1);
-e1000_down(adapter);
é1000_up(adapter);
+
 /* only run the task if not already down */
+if (!test_bit(__E1000_DOWN, &adapter->flags)) {
+    e1000_down(adapter);
+    e1000_up(adapter);
+}
+
clear_bit(__E1000_RESETTING, &adapter->flags);
}

@@ -1458,10 +1463,15 @@
struct e1000_hw *hw = &adapter->hw;
int count = E1000_CHECK_RESET_COUNT;

-while (test_bit(__E1000_RESETTING, &adapter->flags) && count--)
+while (test_and_set_bit(__E1000_RESETTING, &adapter->flags) && count--)
    usleep_range(10000, 20000);

-WARN_ON(test_bit(__E1000_RESETTING, &adapter->flags));
+WARN_ON(count < 0);
+
 /* signal that we're down so that the reset task will no longer run */
+set_bit(__E1000_DOWN, &adapter->flags);
+clear_bit(__E1000_RESETTING, &adapter->flags);
+e1000_down(adapter);
e1000_power_down_phy(adapter);
e1000_free_irq(adapter);
@@ -3169,8 +3179,9 @@
    hdr_len = skb_transport_offset(skb) + tcp_hdrlen(skb);
    if (skb->data_len && hdr_len == len) {
        switch (hw->mac_type) {
+        case e1000_82544: {
            unsigned int pull_size;
            unsigned int pull_size;
            switch (hw->mac_type) {
+            case e1000_82544: {
                switch (hw->mac_type) {
+                case e1000_82544: {
                    /* Make sure we have room to chop off 4 bytes,
                    * and that the end alignment will work out to
* this hardware's requirements
@@ -3191,6 +3202,7 @@
    }
    len = skb_headlen(skb);
    break;
+
    default:
    /* do nothing */
    break;
    --- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/80003es2lan.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/80003es2lan.c
@@ -977,7 +979,7 @@
    ew32(TCTL, tctl);
    e1e_flush();

    -usleep_range(10000, 20000);
    +usleep_range(10000, 11000);

    ctrl = er32(CTRL);

    --- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/82571.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/82571.c
@@ -917,6 +917,8 @@
    ret_val = e1e_wphy(hw, IGP02E1000_PHY_POWER_MGMT, data);
    +if (ret_val)
    +return ret_val;
    /* LPLU and SmartSpeed are mutually exclusive. LPLU is used
    * during Dx states where the power conservation is most
    * important. During driver activity we should enable
    @@ -977,7 +979,7 @@
    ew32(TCTL, tctl);
    e1e_flush();

    -usleep_range(10000, 20000);
    +usleep_range(10000, 11000);

    /* Must acquire the MDIO ownership before MAC reset.
    * Ownership defaults to firmware after a reset.
    --- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/defines.h
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/defines.h
@@ -400,6 +400,10 @@
     #define E1000_ICR_RXDMT0        0x00000010 /* Rx desc min. threshold (0) */
     #define E1000_ICR_RXO           0x00000040 /* Receiver Overrun */
     #define E1000_ICR_RXT0          0x00000080 /* Rx timer intr (ring 0) */
     +#define E1000_ICR_MDAC          0x00000200 /* MDIO Access Complete */
     +#define E1000_ICR_SRPD          0x00010000 /* Small Receive Packet Detected */
/* These are all of the events related to the OTHER interrupt. */
+/
+#define IMS_OTHER_MASK ( \
+ E1000_IMS_LSC | \
+ E1000_IMS_RXO | \
+ E1000_IMS_MDAC | \
+ E1000_IMS_SRPD | \
+ E1000_IMS_ACK | \
+ E1000_IMS_MNG)
+
/* Interrupt Mask Set */
+#define E1000_IMS_TXDW E1000_ICR_TXDW /* Transmit desc written back */
+#define E1000_IEMS_LSC E1000_ICR_LSC /* Link Status Change */
+#define E1000_IMS_RXSEQ E1000_ICR_RXSEQ /* Rx sequence error */
+#define E1000_IMS_RXDMT0 E1000_ICR_RXDMT0 /* Rx desc min. threshold */
+#define E1000_IMS_RXO E1000_ICR_RXO /* Receiver Overrun */
+#define E1000_IMS_RXT0 E1000_ICR_RXT0 /* Rx timer intr */
+#define E1000_IMS_MDAC E1000_ICR_MDAC /* MDIO Access Complete */
+#define E1000_IMS_SRDP E1000_ICR_SRDP /* Small Receive Packet */
+#define E1000_IMS_ACK E1000_ICR_ACK /* Receive ACK Frame Detected */
+#define E1000_IMS_MNG E1000_ICR_MNG /* Manageability Event */
+#define E1000_IMS_ECCER E1000_ICR_ECCER /* Uncorrectable ECC Error */
+#define E1000_IMS_RXQ0 E1000_ICR_RXQ0 /* Rx Queue 0 Interrupt */
+#define E1000_IMS_RXQ1 E1000_ICR_RXQ1 /* Rx Queue 1 Interrupt */
--
-struct timer_list watchdog_timer;
struct timer_list phy_info_timer;
struct timer_list blink_timer;

struct work_struct reset_task;
-struct work_struct watchdog_task;
+struct delayed_work watchdog_task;
+
+struct workqueue_struct *e1000_workqueue;

cnst struct e1000_info *ei;

@@ -592,7 +593,6 @@
#define er32(reg)__er32(hw, E1000_##reg)
-s32 __ew32_prepare(struct e1000_hw *hw);
void __ew32(struct e1000_hw *hw, unsigned long reg, u32 val);

#define ew32(reg, val)__ew32(hw, E1000_##reg, (val))
--- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/ethtool.c
@@ -1032,7 +1032,7 @@
/* Disable all the interrupts */
  ew32(IMC, 0xFFFFFFFF);
  e1e_flush();
  -usleep_range(10000, 20000);
  +usleep_range(10000, 11000);

/* Test each interrupt */
for (i = 0; i < 10; i++) {
  @@ -1064,7 +1064,7 @@
    ew32(IMC, mask);
    ew32(ICS, mask);
    e1e_flush();
    -usleep_range(10000, 20000);
    +usleep_range(10000, 11000);

    if (adapter->test_icr & mask) {
      *data = 3;
      @@ -1082,7 +1082,7 @@
        ew32(IMS, mask);
        ew32(ICS, mask);
        e1e_flush();
        -usleep_range(10000, 20000);
        +usleep_range(10000, 11000);

        if (!(adapter->test_icr & mask)) {

*data = 4;
@@ -1100,7 +1100,7 @@
ew32(IMC, ~mask & 0x00007FFF);
e32(ICS, ~mask & 0x00007FFF);
e1e_flush();
-usleep_range(10000, 20000);
+usleep_range(10000, 11000);

if (adapter->test_icr) {
*data = 5;
@@ -1112,7 +1112,7 @@
/* Disable all the interrupts */
ew32(IMC, 0xFFFFFFFF);
e1e_flush();
-usleep_range(10000, 20000);
+usleep_range(10000, 11000);

/* Unhook test interrupt handler */
free_irq(irq, netdev);
@@ -1488,7 +1488,7 @@
*/
ew32(SCTL, E1000_SCTL_ENABLE_SERDES_LOOPBACK);
e1e_flush();
-usleep_range(10000, 20000);
+usleep_range(10000, 11000);

return 0;
}
@@ -1602,7 +1602,7 @@
    hw->phy.media_type == e1000_media_type_internal_serdes) {
new32(SCTL, E1000_SCTL_DISABLE_SERDES_LOOPBACK);
e1e_flush();
-usleep_range(10000, 20000);
+usleep_range(10000, 11000);
break;
}
/* Fall Through */
--- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/hw.h
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/hw.h
@@ -104,6 +104,12 @@
#define E1000_DEV_ID_PCH_ICP_I219_V80x15E0
#define E1000_DEV_ID_PCH_ICP_I219_LM90x15E1
#define E1000_DEV_ID_PCH_ICP_I219_V90x15E2
+#define E1000_DEV_ID_PCH_CMP_I219_LM100x0D4E
+#define E1000_DEV_ID_PCH_CMP_I219_V100x0D4F
+#define E1000_DEV_ID_PCH_CMP_I219_LM110x0D4C
+#define E1000_DEV_ID_PCH_CMP_I219_V110x0D4D
+#define E1000_DEV_ID_PCH_CMP_I219_LM120x0D53
+\#define E1000_DEV_ID_PCH_CMP_I219_V120x0D55

#define E1000_REVISION_44

@@ -680,6 +686,7 @@
bool kmrn_lock_loss_workaround_enabled;
struct e1000_shadow_ram shadow_ram[E1000_ICH8_SHADOW_RAM_WORDS];
bool nvm_k1_enabled;
+bool disable_k1_off;
bool eee_disable;
u16 eee_lp_ability;
enum e1000_ulp_state ulp_state;
--- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/ich8lan.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/ich8lan.c
@@ -289,7 +289,7 @@
        u16 count = 20;

do {
    -usleep_range(5000, 10000);
+usleep_range(5000, 6000);
} while (!(er32(CTRL_EXT) & E1000_CTRL_EXT_LPCD) && count--);

msleep(30);
@@ -423,7 +423,7 @@ /* Ungate automatic PHY configuration on non-managed 82579 */
if ((hw->mac.type == e1000_pch2lan) &&
    !(fwsm & E1000_ICH_FWSM_FW_VALID)) {
    -usleep_range(10000, 20000);
+usleep_range(10000, 11000);
e1000_gate_hw_phy_config_ich8lan(hw, false);
}

@@ -549,7 +549,7 @@
phy->id = 0;
while ((e1000_phy_unknown == e1000e_get_phy_type_from_id(phy->id)) &&
        (i++ < 100)) {
    -usleep_range(1000, 2000);
+usleep_range(1000, 1100);
    ret_val = e1000e_get_phy_id(hw);
    if (ret_val)
        return ret_val;
@@ -1013,6 +1013,8 @@
{
    u32 reg = link << (E1000_LTRV_REQ_SHIFT + E1000_LTRV_NOSNOOP_SHIFT) |
             link << E1000_LTRV_REQ_SHIFT | E1000_LTRV_SEND;
+u16 max_ltr_enc_d = 0;/* maximum LTR decoded by platform */
+u16 lat_enc_d = 0;/* latency decoded */
    u16 lat_enc = 0;/* latency encoded */
if (link) {
    if (lat_enc > max_ltr_enc)
        lat_enc_d = (lat_enc & E1000_LTRV_VALUE_MASK) *
            (1U << (E1000_LTRV_SCALE_FACTOR *
                (lat_enc & E1000_LTRV_SCALE_MASK)
            ) >> E1000_LTRV_SCALE_SHIFT));
    
    max_ltr_enc_d = (max_ltr_enc & E1000_LTRV_VALUE_MASK) *
        (1U << (E1000_LTRV_SCALE_FACTOR *
            ((max_ltr_enc & E1000_LTRV_SCALE_MASK)
        ) >> E1000_LTRV_SCALE_SHIFT));
    
    if (lat_enc_d > max_ltr_enc_d)
        lat_enc = max_ltr_enc;
}

goto out;

-usleep_range(10000, 20000);
+usleep_range(10000, 11000);
}
e_dbg("ULP_CONFIGDONE cleared after %dmsec\n", i * 10);

* Checks to see if the link status of the hardware has changed. If a
* change in link status has been detected, then we read the PHY registers
* to get the current speed/duplex if link exists.
*/
static s32 e1000_check_for_copper_link_ich8lan(struct e1000_hw *hw)
{
    if (!mac->get_link_status)
        return 1;
    +return 0;
    +mac->get_link_status = false;
/* First we want to see if the MII Status Register reports
link. If so, then we want to get the current speed/duplex
@@ -1393,12 +1403,12 @@*/
ret_val = e1000e_phy_has_link_generic(hw, 1, 0, &link);
if (ret_val)
-  return ret_val;
+  goto out;

if (hw->mac.type == e1000_pchlan) {
  ret_val = e1000_k1_gig_workaround_hv(hw, link);
  if (ret_val)
-    return ret_val;
+    goto out;
}

/* When connected at 10Mbps half-duplex, some parts are excessively
@@ -1431,7 +1441,7 @@
ret_val = hw->phy.ops.acquire(hw);
if (ret_val)
  return ret_val;
+  goto out;

if (hw->mac.type == e1000_pch2lan)
  emi_addr = I82579_RX_CONFIG;
  @@ -1449,11 +1459,21 @@
else
  phy_reg |= 0xFA;
+  if (speed == SPEED_1000) {
+    hw->phy.ops.read_reg_locked(hw, HV_PM_CTRL,
+      &phy_reg);
+    +phy_reg |= HV_PM_CTRL_K1_CLK_REQ;
+    hw->phy.ops.write_reg_locked(hw, HV_PM_CTRL,
+      +phy_reg);
+  }
  }
hw->phy.ops.release(hw);

  if (ret_val)
-  return ret_val;
+  goto out;

  if (hw->mac.type >= e1000_pch_spt) {


u16 data;
@@ -1462,14 +1482,14 @@
if (speed == SPEED_1000) {
    ret_val = hw->phy.ops.acquire(hw);
    if (ret_val)
        return ret_val;
+    goto out;

    ret_val = e1e_rphy_locked(hw,
        PHY_REG(776, 20),
        &data);
    if (ret_val) {
        hw->phy.ops.release(hw);
-        return ret_val;
+        goto out;
    } else {
        ptr_gap = (data & (0x3FF << 2)) >> 2;
    } @ -1483,18 +1503,18 @@
    hw->phy.ops.release(hw);
    if (ret_val)
        return ret_val;
+    goto out;
} else {
    ret_val = hw->phy.ops.acquire(hw);
    if (ret_val)
-        return ret_val;
+        goto out;
    ret_val = e1e_wphy_locked(hw,
        PHY_REG(776, 20),
        0xC023);
    hw->phy.ops.release(hw);
    if (ret_val)
-        return ret_val;
+        goto out;
    }
}
@@ -1521,7 +1541,7 @@
    (hw->adapter->pdev->device == E1000_DEV_ID_PCH_I218_V3)) {
        ret_val = e1000_k1_workaround_lpt_lp(hw, link);
        if (ret_val)
-            return ret_val;
+            goto out;
    } else if (hw->mac.type >= e1000_pch_lpt) {

/* Set platform power management values for */
@@ -1529,7 +1549,7 @@
    */
ret_val = e1000_platform_pm_pch_lpt(hw, link);
if (ret_val)
+    return ret_val;
+    goto out;
    }

/* Clear link partner's EEE ability */
@@ -1548,13 +1568,14 @@
    if (hw->dev_spec.ich8lan.disable_k1_off == true)
    fextnvm6 &= ~E1000_FEXTNVM6_K1_OFF_ENABLE;
+    ew32(FEXTNVM6, fextnvm6);
    }

    if (!link)
    -return 0; /* No link detected */
    -mac->get_link_status = false;
        goto out;

    switch (hw->mac.type) {
    case e1000_pch2lan:
        @@ -1602,7 +1623,7 @@
        * we have already determined whether we have link or not.
        */
        if (!mac->autoneg)
            -return -E1000_ERR_CONFIG;
            +return 1;

        /* Auto-Neg is enabled. Auto Speed Detection takes care
        * of MAC speed/duplex configuration. So we only need to
        @@ -1616,12 +1637,14 @@
        * different link partner.
        */
        ret_val = e1000e_config_fc_after_link_up(hw);
        -if (ret_val) {
            +if (ret_val)
                e_dbg("Error configuring flow control\n");
            -return ret_val;
        }
        -return 1;
+return ret_val;
+
+out:
+mac->get_link_status = true;
+return ret_val;
}

static s32 e1000_get_variants_ich8lan(struct e1000_adapter *adapter)
@@ -2019,7 +2042,7 @@
while ((blocked = !(er32(FWSM) & E1000_ICH_FWSM_RSPCIPHY)) &&
    (i++ < 30))
-usleep_range(10000, 20000);
+usleep_range(10000, 11000);
return blocked ? E1000_BLK_PHY_RESET : 0;
}
@@ -2838,7 +2861,7 @@
/* Allow time for h/w to get to quiescent state after reset */
-usleep_range(10000, 20000);
+usleep_range(10000, 11000);
/* Perform any necessary post-reset workarounds */
switch (hw->mac.type) {
@@ -2874,7 +2897,7 @@
if (hw->mac.type == e1000_pch2lan) {
/* Ungate automatic PHY configuration on non-managed 82579 */
if (!er32(FWSM) & E1000_ICH_FWSM_FW_VALID) {
-lusleep_range(10000, 20000);
+usleep_range(10000, 11000);
e1000_gate_hw_phy_config_ich8lan(hw, false);
}
@@ -3895,7 +3918,7 @@
/*
if (!ret_val) {
    nvm->ops.reload(hw);
@@ -4046,7 +4069,7 @@ */
    if (!ret_val) {
        nvm->ops.reload(hw);
    }
@@ -4670,7 +4693,7 @@
e32(TCTL, E1000_TCTL_PSP);
e1e_flush();

   usleep_range(10000, 20000);
+   usleep_range(10000, 11000);
}

out:
@@ -228,7 +228,7 @@
   #define I217_PLL_CLOCK_GATE_REG PHY_REG(772, 28)
   @ @ -292,8 +292,11 @@

   /* PHY Power Management Control */
# define HV_PM_CTRLPHY_REG(770, 17)
-# define HV_PM_CTRL_PLL_STOP_IN_K1_GIGA 0x100
+# define HV_PM_CTRL_K1_CLK_REQ 0x200
# define HV_PM_CTRL_K1_ENABLE 0x4000
# define HV_PM_CTRL_K1_DISABLE 0x0000

# define 1217_PLL_CLOCK_GATE_REG PHY_REG(772, 28)
   @ @ -292,8 +292,11 @@

   /* Latency Tolerance Reporting */
# define E1000_LTRV0x000F8
+ # define E1000_LTRV_VALUE_MASK 0x00000000FF
+ # define E1000_LTRV_SCALE_MAX5
# define E1000_LTRV_SCALE_FACTOR5
+ # define E1000_LTRV_SCALE_SHIFT10
+ # define E1000_LTRV_SCALE_MASK0x000001C00
# define E1000_LTRV_REQ_SHIFT15
# define E1000_LTRV_NOSNOOP_SHIFT16
# define E1000_LTRV_SEND(1 << 30)
   --- linux-4.15.0.org/drivers/net/ethernet/intel/e1000e/mac.c
   +++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/mac.c
   @ @ -410,9 +410,6 @@
   * Checks to see of the link status of the hardware has changed. If a
   * change in link status has been detected, then we read the PHY registers
   * to get the current speed/duplex if link exists.
   * *
   - * Returns a negative error code (-E1000_ERR_*) or 0 (link down) or 1 (link
     * up).
   ***/
s32 e1000e_check_for_copper_link(struct e1000_hw *hw)
if (!mac->get_link_status)
-  return 1;
+  return 0;
+  mac->get_link_status = false;

  /* First we want to see if the MII Status Register reports
   * link. If so, then we want to get the current speed/duplex
   * of the PHY.
   */
  ret_val = e1000e_phy_has_link_generic(hw, 1, 0, &link);
  -if (ret_val)
  -  return ret_val;
  -
  -if (!link)
  -  return 0;/* No link detected */
  -
  -mac->get_link_status = false;
  +if (ret_val || !link)
  +  goto out;

  /* Check if there was DownShift, must be checked
   * immediately after link-up
 @@ -450,7 +443,7 @@
   * we have already determined whether we have link or not.
   */
  if (!mac->autoneg)
-    return -E1000_ERR_CONFIG;
+    return 1;

  /* Auto-Neg is enabled. Auto Speed Detection takes care
   * of MAC speed/duplex configuration. So we only need to
 @@ -464,12 +457,14 @@
   * different link partner.
   */
  ret_val = e1000e_config_fc_after_link_up(hw);
  -if (ret_val) {
  +if (ret_val) {
    e_dbg("Error configuring flow control\n");
    -return ret_val;
    -}
    
  -return 1;
  +return ret_val;
  +}
+out:
+mac->get_link_status = true;
+return ret_val;
}
struct e1000_adapter *adapter = tx_ring->adapter;
struct e1000_hw *hw = &adapter->hw;
-s32 ret_val = __ew32_prepare(hw);
+__ew32_prepare(hw);
writel(i, tx_ring->tail);

-if (unlikely(!ret_val && (i != readl(tx_ring->tail)))) {
+if (unlikely(i != readl(tx_ring->tail))) {
  u32 tctl = er32(TCTL);
  ew32(TCTL, tctl & ~E1000_TCTL_EN);
@@ -1798,7 +1796,8 @@
    }/* guard against interrupt when we're going down */
    if (!test_bit(__E1000_DOWN, &adapter->state))
      -mod_timer(&adapter->watchdog_timer, jiffies + 1);
+queue_delayed_work(adapter->e1000_workqueue,
+    &adapter->watchdog_task, 1);
}

/* Reset on uncorrectable ECC error */
@@ -1878,7 +1877,8 @@
    } /* guard against interrupt when we're going down */
    if (!test_bit(__E1000_DOWN, &adapter->state))
      -mod_timer(&adapter->watchdog_timer, jiffies + 1);
+queue_delayed_work(adapter->e1000_workqueue,
+    &adapter->watchdog_task, 1);
}

/* Reset on uncorrectable ECC error */
@@ -1914,30 +1914,21 @@
  struct net_device *netdev = data;
  struct e1000_adapter *adapter = netdev_priv(netdev);
  struct e1000_hw *hw = &adapter->hw;
    -u32 icr;
    -bool enable = true;
    +u32 icr = er32(ICR);
    +
    +if (icr & adapter->eiac_mask)
    +  ew32(ICS, (icr & adapter->eiac_mask));

    -icr = er32(ICR);
    -if (icr & E1000_ICR_RXO) {
    -ew32(ICR, E1000_ICR_RXO);
    -enable = false;
/* napi poll will re-enable Other, make sure it runs */
-if (napi_schedule_prep(&adapter->napi)) {
-adapter->total_rx_bytes = 0;
-adapter->total_rx_packets = 0;
-__napi_schedule(&adapter->napi);
-}
-
if (icr & E1000_ICR_LSC) {
-ew32(ICR, E1000_ICR_LSC);
hw->mac.get_link_status = true;
/* guard against interrupt when we're going down */
if (!test_bit(__E1000_DOWN, &adapter->state))
-mod_timer(&adapter->watchdog_timer, jiffies + 1);
+queue_delayed_work(adapter->e1000_workqueue,
+ &adapter->watchdog_task, 1);
}

-if (enable && !test_bit(__E1000_DOWN, &adapter->state))
-ew32(IMS, E1000_IMS_OTHER);
+if (!test_bit(__E1000_DOWN, &adapter->state))
+ew32(IMS, E1000_IMS_OTHER | IMS_OTHER_MASK);

return IRQ_HANDLED;
}
@@ -2040,7 +2031,6 @@
 hw->hw_addr + E1000_EITR_82574(vector));
 else
 writel(1, hw->hw_addr + E1000_EITR_82574(vector));
-adapter->eiac_mask |= E1000_IMS_OTHER;

/* Cause Tx interrupts on every write back */
ivar |= BIT(31);
@@ -2135,7 +2125,7 @@
 if (strlen(netdev->name) < (IFNAMSIZ - 5))
 snprintf(adapter->rx_ring->name,
 sizeof(adapter->rx_ring->name) - 1,
- "\%s-rx-0", netdev->name);
+ "\%s-rx-0", netdev->name);
 else
 memcpy(adapter->rx_ring->name, netdev->name, IFNAMSIZ);
 err = request_irq(adapter->msix_entries[vector].vector,
@@ -2151,7 +2141,7 @@
 if (strlen(netdev->name) < (IFNAMSIZ - 5))
 snprintf(adapter->tx_ring->name,
 sizeof(adapter->tx_ring->name) - 1,
- "\%s-tx-0", netdev->name);
+ "\%s-tx-0", netdev->name);
 else
 memmove(adapter->tx_ring->name, netdev->name, IFNAMSIZ);

memcpy(adapter->tx_ring->name, netdev->name, IFNAMSIZ);
err = request_irq(adapter->msix_entries[vector].vector,
@@ -2265,7 +2255,8 @@
if (adapter->msix_entries) {
    ew32(EIAC_82574, adapter->eiac_mask & E1000_EIAC_MASK_82574);
-    ew32(IMS, adapter->eiac_mask | E1000_IMS_LSC);
+    ew32(IMS, adapter->eiac_mask | E1000_IMS_OTHER |
+          IMS_OTHER_MASK);
} else if (hw->mac.type >= e1000_pch_lpt) {
    ew32(IMS, IMS_ENABLE_MASK | E1000_IMS_ECCER);
} else {
@@ -2333,8 +2324,8 @@
    struct pci_dev *pdev = adapter->pdev;

-    ring->desc = dma_alloc_coherent(&pdev->dev, ring->size, &ring->dma,
-        GFP_KERNEL);
+    ring->desc = dma_zalloc_coherent(&pdev->dev, ring->size, &ring->dma,
+        GFP_KERNEL);
    if (!ring->desc)
        return -ENOMEM;
@@ -2707,8 +2698,7 @@
napi_complete_done(napi, work_done);
    if (!test_bit(__E1000_DOWN, &adapter->state)) {
        if (adapter->msix_entries)
            ew32(IMS, adapter->rx_ring->ims_val |
-                E1000_IMS_OTHER);
+                E1000_IMS_OTHER);
            +ew32(IMS, adapter->rx_ring->ims_val);
        else
            e1000_irq_enable(adapter);
    }
@@ -3236,7 +3226,7 @@
    if (!(adapter->flags2 & FLAG2_NO_DISABLE_RX))
        ew32(RCTL, rctl & ~E1000_RCTL_EN);
e1e_flush();
-    usleep_range(10000, 20000);
+    usleep_range(10000, 11000);
    if (adapter->flags2 & FLAG2_DMA_BURST) {
        /* set the writeback threshold (only takes effect if the RDTR
@@ -3554,15 +3544,12 @@
        break;
    case e1000_pch_spt:
        -if (er32(TSYNCRXCTL) & E1000_TSYNCRXCTL_SYSCFI) {
-"*/ Stable 24MHz frequency */

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-incperiod = INCPERIOD_24MHZ;
-incvalue = INCVALUE_24MHZ;
-shift = INCVALUE_SHIFT_24MHZ;
-adapter->cc.shift = shift;
-break;
-
-return -EINVAL;
+/* Stable 24MHz frequency */
+incperiod = INCPERIOD_24MHZ;
+incvalue = INCVALUE_24MHZ;
+shift = INCVALUE_SHIFT_24MHZ;
+adapter->cc.shift = shift;
+break;
-case e1000_pch_cnp:
+if (er32(TSYNCRXCTL) & E1000_TSYNCRXCTL_SYSCFI) {
+/* Stable 24MHz frequency */
+@@ -4238,7 +4225,7 @@
+e1000_configure_msix(adapter);
+e1000_irq_enable(adapter);
+
-netif_start_queue(adapter->netdev);
+/* Tx queue started by watchdog timer when link is up */
+
e1000e_trigger_lsc(adapter);
+} 
+@@ -4302,13 +4289,12 @@
+/* flush both disables and wait for them to finish */
+e1e_flush();
+-usleep_range(10000, 20000);
+-usleep_range(10000, 11000);
+
e1000_irq_disable(adapter);

+napi_synchronize(&adapter->napi);
-
-del_timer_sync(&adapter->watchdog_timer);
-del_timer_sync(&adapter->phy_info_timer);

-spin_lock(&adapter->stats64_lock);
-@@ -4340,7 +4326,7 @@
-
-might_sleep();
-while (test_and_set_bit(__E1000_RESETTING, &adapter->state))
-@@ -4340,7 +4326,7 @@
-    usleep_range(10000, 20000);
-    usleep_range(10000, 11000);
-    e1000e_down(adapter, true);
-    e1000e_up(adapter);
clear_bit(__E1000_RESETTING, &adapter->state);
@@ -4614,6 +4600,7 @@
 pm_runtime_get_sync(&pdev->dev);

 netif_carrier_off(netdev);
 +netif_stop_queue(netdev);

 /* allocate transmit descriptors */
 err = e1000e_setup_tx_resources(adapter->tx_ring);
@@ -4674,7 +4661,6 @@
e1000_irq_enable(adapter);

 adapter->tx_hang_recheck = false;
 -netif_start_queue(netdev);

 hw->mac.get_link_status = true;
 pm_runtime_put(&pdev->dev);
@@ -4715,7 +4701,7 @@
 int count = E1000_CHECK_RESET_COUNT;

 while (test_bit(__E1000_RESETTING, &adapter->state) && count--)
 -usleep_range(10000, 20000);
 +usleep_range(10000, 11000);

 WARN_ON(test_bit(__E1000_RESETTING, &adapter->state));

 case e1000_media_type_copper:
 if (hw->mac.get_link_status) {
 ret_val = hw->mac.ops.check_for_link(hw);
 -link_active = ret_val > 0;
 +link_active = !hw->mac.get_link_status;
 } else {
 link_active = true;
 }
@@ -5158,25 +5144,11 @@
 }
 }

 /*
 -* e1000_watchdog - Timer Call-back
 -* @data: pointer to adapter cast into an unsigned long
 -**/
 -static void e1000_watchdog(struct timer_list *t)
 -{
 -struct e1000_adapter *adapter = from_timer(adapter, t, watchdog_timer);
 -
 -/* Do the rest outside of interrupt context */
 */
schedule_work(&adapter->watchdog_task);
-
-/* TODO: make this use queue_delayed_work() */
-}
-
static void e1000_watchdog_task(struct work_struct *work)
{
struct e1000_adapter *adapter = container_of(work,
    struct e1000_adapter,
-    watchdog_task);
+    watchdog_task.work);
struct net_device *netdev = adapter->netdev;
struct e1000_mac_info *mac = &adapter->hw.mac;
struct e1000_phy_info *phy = &adapter->hw.phy;
@@ -5281,6 +5253,10 @@
/* oops */
break;
}
+if (hw->mac.type == e1000_pch_spt) {
+    netdev->features &= ~NETIF_F_TSO;
+    netdev->features &= ~NETIF_F_TSO6;
+}
}

/* enable transmits in the hardware, need to do this */
@@ -5296,6 +5272,7 @@
if (phy->ops.cfg_on_link_up)
    phy->ops.cfg_on_link_up(hw);
+    netif_wake_queue(netdev);
    netif_carrier_on(netdev);

if (!test_bit(__E1000_DOWN, &adapter->state))
@@ -5309,6 +5286,7 @@
/* Link status message must follow this format */
pr_info("%s NIC Link is Down\n", adapter->netdev->name);
    netif_carrier_off(netdev);
+    netif_stop_queue(netdev);
if (!test_bit(__E1000_DOWN, &adapter->state))
    mod_timer(&adapter->phy_info_timer,
        round_jiffies(jiffies + 2 * HZ));
@@ -5406,8 +5384,9 @@
/* Reset the timer */
if (!test_bit(__E1000_DOWN, &adapter->state))
    -mod_timer(&adapter->watchdog_timer,
-    round_jiffies(jiffies + 2 * HZ));
+    queue_delayed_work(adapter->e1000_workqueue,
&adapter->watchdog_task,
+ round_jiffies(2 * HZ));
}
#endif

E1000_TX_FLAGS_CSUM = 0x00000001

if (!test_bit(__E1000_DOWN, &adapter->state)) {
    rtnl_unlock();
    return;
}
if (!(adapter->flags & FLAG_RESTART_NOW)) {
e1000e_dump(adapter);
e_err("Reset adapter unexpectedly\n");
} e1000e_reinit_locked(adapter);
+rtnl_unlock();
}/**
 @@ -6033,7 +6016,7 @@
 while (test_and_set_bit(__E1000_RESETTING, &adapter->state))
 -usleep_range(1000, 2000);
 +usleep_range(1000, 1100);
 /* e1000e_down -> e1000e_reset dependent on max_frame_size & mtu */
adaptor->max_frame_size = max_frame;
e_info("changing MTU from %d to %d\n", netdev->mtu, new_mtu);
 @@ -6313,7 +6296,7 @@
 int count = E1000_CHECK_RESET_COUNT;

 while (test_bit(__E1000_RESETTING, &adapter->state) && count--)
 -usleep_range(10000, 20000);
 +usleep_range(10000, 11000);
 WARN_ON(test_bit(__E1000_RESETTING, &adapter->state));

 @@ -6334,11 +6317,17 @@
 struct net_device *netdev = pci_get_drvdata(pdev);
 struct e1000_adapter *adapter = netdev_priv(netdev);
 struct e1000_hw *hw = &adapter->hw;

- u32 ctrl, ctrl_ext, rctl, status;
- /* Runtime suspend should only enable wakeup for link changes */
- u32 wufc = runtime ? E1000_WUFC_LNKC : adapter->wol;
+ u32 ctrl, ctrl_ext, rctl, status, wufc;
+ int retval = 0;
+
+ /* Runtime suspend should only enable wakeup for link changes */
+ if (runtime)
+ wufc = E1000_WUFC_LNKC;
+ else if (device_may_wakeup(&pdev->dev))
+ wufc = adapter->wol;
+ else
+ wufc = 0;
+
+ status = er32(STATUS);
+ if (status & E1000_STATUS_LU)
+ wufc &= ~E1000_WUFC_LNKC;
+ @ @ -6395,7 +6384,7 @ @
+ if (adapter->hw.phy.type == e1000_phy_igp_3) {
+ e1000e_igp3_phy_powerdown_workaround_ich8lan(&adapter->hw);
+ } else if (hw->mac.type >= e1000_pch_lpt) {
- if (!(wufc & (E1000_WUFC_EX | E1000_WUFC_MC | E1000_WUFC_BC)))
+ if (wufc && !(wufc & (E1000_WUFC_EX | E1000_WUFC_MC | E1000_WUFC_BC)))
+ /* ULP does not support wake from unicast, multicast
+ * or broadcast.
+ */
+ @ @ -6728,7 +6717,7 @ @
+ int count = E1000_CHECK_RESET_COUNT;
+
+ while (test_bit(__E1000_RESETTING, &adapter->state) && count--)
+ -usleep_range(10000, 20000);
+ +usleep_range(10000, 11000);
+
+ WARN_ON(test_bit(__E1000_RESETTING, &adapter->state));
+
+ @ @ -7270,11 +7259,21 @ @
+ goto err_eeprom;
+ }
+
- timer_setup(&adapter->watchdog_timer, e1000_watchdog, 0);
+ adapter->e1000_workqueue = alloc_workqueue("%s", WQ_MEM_RECLAIM, 0,
+ + e1000e_driver_name);
+ +
+ if (!adapter->e1000_workqueue) {
+ +err = -ENOMEM;
+ +goto err_workqueue;
+ +}
+ +
INIT_DELAYED_WORK(&adapter->watchdog_task, e1000_watchdog_task);
+queue_delayed_work(adapter->e1000_workqueue, &adapter->watchdog_task, 0);
+timer_setup(&adapter->phy_info_timer, e1000_update_phy_info, 0);

INIT_WORK(&adapter->reset_task, e1000_reset_task);
-INIT_WORK(&adapter->watchdog_task, e1000_watchdog_task);
INIT_WORK(&adapter->downshift_task, e1000e_downshift_workaround);
INIT_WORK(&adapter->update_phy_task, e1000e_update_phy_task);
INIT_WORK(&adapter->print_hang_task, e1000_print_hw_hang);

e1000_print_device_info(adapter);

-if (pci_dev_run_wake(pdev))
+dev_pm_set_driver_flags(&pdev->dev, DPM_FLAG_NEVER_SKIP);
+
+if (pci_dev_run_wake(pdev) && hw->mac.type < e1000_pch_cnp)
pm_runtime_put_noidle(&pdev->dev);

return 0;

err_register:
+flush_workqueue(adapter->e1000_workqueue);
+destroy_workqueue(adapter->e1000_workqueue);
+err_workqueue:
if (!adapt->flags & FLAG_HAS_AMT)
e1000e_release_hw_control(adapter);

error_eeprom:
@@ -7383,6 +7387,7 @@
free_netdev(netdev);
err_alloc_etherdev:
+pci_disable_pcie_error_reporting(pdev);
pci_release_mem_regions(pdev);
err_pci_reg:
err_dma:
@@ -7412,15 +7417,17 @@
*/
if (!down)
set_bit(__E1000_DOWN, &adapt->state);
-del_timer_sync(&adapter->watchdog_timer);
del_timer_sync(&adapter->phy_info_timer);

cancel_work_sync(&adapter->reset_task);
-cancel_work_sync(&adapter->watchdog_task);
cancel_work_sync(&adapter->downshift_task);
cancel_work_sync(&adapter->update_phy_task);
cancel_work_sync(&adapter->print_hang_task);

cancel_delayed_work(&adapter->watchdog_task);
flush_workqueue(adapter->e1000_workqueue);
destroy_workqueue(adapter->e1000_workqueue);
+
if (adapter->flags & FLAG_HAS_HW_TIMESTAMP) {
cancel_work_sync(&adapter->tx_hwtstamp_work);
}
if (adapter->tx_hwtstamp_skb) {
	@ @ -7561,6 +7568,12 @@
{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_ICP_I219_V8), board_pch_cnp },
{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_ICP_I219_LM9), board_pch_cnp },
{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_ICP_I219_V9), board_pch_cnp },
+{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_CMP_I219_LM10), board_pch_cnp },
+{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_CMP_I219_V10), board_pch_cnp },
+{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_CMP_I219_LM11), board_pch_cnp },
+{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_CMP_I219_V11), board_pch_cnp },
+{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_CMP_I219_LM12), board_pch_spt },
+{ PCI_VDEVICE(INTEL, E1000_DEV_ID_PCH_CMP_I219_V12), board_pch_spt },
{ 0, 0, 0, 0, 0, 0, 0 } /* terminate list */
};
--- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/nvm.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/nvm.c
@@ -410,7 +410,7 @@
break;
}

-usleep_range(10000, 20000);
+usleep_range(10000, 11000);
nvm->ops.release(hw);
}

--- linux-4.15.0.orig/drivers/net/ethernet/intel/e1000e/ptp.c
+++ linux-4.15.0/drivers/net/ethernet/intel/e1000e/ptp.c
@@ -191,10 +191,14 @@
        ptp_clock_info);
 unsigned long flags;
        -u64 ns;
+u64 cycles, ns;

        spin_lock_irqsave(&adapter->systim_lock, flags);
        -ns = timecounter_read(&adapter->tc);
+        /* Use timecounter_cyc2time() to allow non-monotonic SYSTIM readings */
+        +cycles = adapter->cc.read(&adapter->cc);
+ns = timecounter_cyc2time(&adapter->tc, cycles);
+
spin_unlock_irqrestore(&adapter->systim_lock, flags);

*ts = ns_to_timespec64(ns);
@@ -250,9 +254,12 @@
        systim_overflow_work.work);
struct e1000_hw *hw = &adapter->hw;
struct timespec64 ts;
+u64 ns;
-
-adapter->ptp_clock_info.gettime64(&adapter->ptp_clock_info, &ts);
+/* Update the timecounter */
+ns = timecounter_read(&adapter->tc);
+
+ts = ns_to_timespec64(ns);
+e_dbg("SYSTIM overflow check at %lld.%09lu\n",
        (long long) ts.tv_sec, ts.tv_nsec);

--- linux-4.15.0.orig/drivers/net/ethernet/intel/fm10k/fm10k_iov.c
+++ linux-4.15.0/drivers/net/ethernet/intel/fm10k/fm10k_iov.c
@@ -319,6 +319,28 @@
{}
{}
+
+static void fm10k_mask_aer_comp_abort(struct pci_dev *pdev)
+{
+  u32 err_mask;
+  int pos;
+  +
+  pos = pci_find_ext_capability(pdev, PCI_EXT_CAP_ID_ERR);
+  +if (!pos)
+    return;
+  +
+  +/* Mask the completion abort bit in the ERR_UNCOR_MASK register, 
+  + * preventing the device from reporting these errors to the upstream 
+  + * PCIe root device. This avoids bringing down platforms which upgrade 
+  + * non-fatal completer aborts into machine check exceptions. Completer 
+  + * aborts can occur whenever a VF reads a queue it doesn't own. 
+  + */
+  +pci_read_config_dword(pdev, pos + PCI_ERR_UNCOR_MASK, &err_mask);
+  +err_mask |= PCI_ERR_UNC_COMP_ABORT;
+  +pci_write_config_dword(pdev, pos + PCI_ERR_UNCOR_MASK, err_mask);
+  +mmiowb();
+}
+
+int fm10k_iov_resume(struct pci_dev *pdev)
struct fm10k_intfc *interface = pci_get_drvdata(pdev);
if (!iov_data)
    return -ENOMEM;

/* Lower severity of completer abort error reporting as
   the VFs can trigger this any time they read a queue
   that they don't own. */

fm10k_mask_aer_comp_abort(pdev);

/* allocate hardware resources for the VFs */
hw->iov.ops.assign_resources(hw, num_vfs, num_vfs);

static void fm10k_disable_aer_comp_abort(struct pci_dev *pdev)
{
    u32 err_sev;
    int pos;
    pos = pci_find_ext_capability(pdev, PCI_EXT_CAP_ID_ERR);
    if (!pos)
        return;

    pci_read_config_dword(pdev, pos + PCI_ERR_UNCOR_SEVER, &err_sev);
    err_sev &= ~PCI_ERR_UNC_COMP_ABORT;
    pci_write_config_dword(pdev, pos + PCI_ERR_UNCOR_SEVER, err_sev);
}

int fm10k_iov_configure(struct pci_dev *pdev, int num_vfs)
{
    int current_vfs = pci_num_vf(pdev);
    if (num_vfs && (num_vfs != current_vfs)) {
        /* Disable completer abort error reporting as
           the VFs can trigger this any time they read a queue
           that they don't own. */
        fm10k_disable_aer_comp_abort(pdev);
        err = pci_enable_sriov(pdev, num_vfs);
        if (err) {
dev_err(&pdev->dev, 
--- linux-4.15.0.orig/drivers/net/ethernet/intel/fm10k/fm10k_main.c 
+++ linux-4.15.0/drivers/net/ethernet/intel/fm10k/fm10k_main.c 
@@ -58,6 +58,8 @@
 /* create driver workqueue */
 fm10k_workqueue = alloc_workqueue("%s", WQ_MEM_RECLAIM, 0, 
 fm10k_driver_name);
+if (!fm10k_workqueue)
+return -ENOMEM;

 fm10k_dbg_init();

--- linux-4.15.0.orig/drivers/net/ethernet/intel/fm10k/fm10k_netdev.c 
+++ linux-4.15.0/drivers/net/ethernet/intel/fm10k/fm10k_netdev.c 
@@ -934,8 +934,12 @@
 if (vid >= VLAN_N_VID)
 return -EINVAL;
+/* Verify that we have permission to add VLANs. If this is a request 
+ to remove a VLAN, we still want to allow the user to remove the 
+ * VLAN device. In that case, we need to clear the bit in the 
+ * active_vlans bitmask. 
+ */
+if (set && hw->mac.vlan_override) 
+return -EACCES; 
+if (set && hw->mac.vlan_override)
+return 0; 
/* Do not remove default VLAN ID related entries from VLAN and MAC 
* tables 
*/
--- linux-4.15.0.orig/drivers/net/ethernet/intel/fm10k/fm10k_pci.c 
+++ linux-4.15.0/drivers/net/ethernet/intel/fm10k/fm10k_pci.c 
@@ -2351,6 +2351,7 @@
 err_ioremap:
 free_netdev(netdev);
 err_alloc_netdev:
+pci_disable_pcie_error_reporting(pdev);
pci_release_mem_regions(pdev);
err_pci_reg:
err_dma:
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e/i40e.h
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e/i40e.h
@@ -145,10 +145,12 @@
    __I40E_MDD_EVENT_PENDING,
    __I40E_VFLR_EVENT_PENDING,
    __I40E_RESET_RECOVERY_PENDING,
+  __I40E_TIMEOUT_RECOVERY_PENDING,
    __I40E_MISC_IRQ_REQUESTED,
    __I40E_RESET_INTR_RECEIVED,
    __I40E_REINIT_REQUESTED,
    __I40E_PF_RESET_REQUESTED,
+  __I40E_PF_RESET_AND_REBUILD_REQUESTED,
    __I40E_CORE_RESET_REQUESTED,
    __I40E_GLOBAL_RESET_REQUESTED,
    __I40E_EMP_RESET_REQUESTED,
@@ -161,11 +163,15 @@
    __I40E_RESET_FAILED,
    __I40E_PORT_SUSPENDED,
    __I40E_VF_DISABLE,
+  __I40E_VF_RESETS_DISABLED, /* disable resets during i40e_remove */
+  __I40E_VFS_RELEASING,
/* This must be last as it determines the size of the BITMAP */
    __I40E_STATE_SIZE__,
};

#define I40E_PF_RESET_FLAG BIT_ULL(__I40E_PF_RESET_REQUESTED)
+#define I40E_PF_RESET_AND_REBUILD_FLAG
+BIT_ULL(__I40E_PF_RESET_AND_REBUILD_REQUESTED)

/* VSI state flags */
enum i40e_vsi_state_t {
@@ -605,7 +611,7 @@
    unsigned long ptp_tx_start;
    struct hwtstamp_config tstamp_config;
    struct mutex tmreg_lock; /* Used to protect the SYSTIME registers. */
-  u64 ptp_base_adj;
+  u32 ptp_adj_mult;
u32 tx_hwtstamp_timeouts;
u32 tx_hwtstamp_skipped;
u32 rx_hwtstamp_cleared;
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e_adminq_cmd.h
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e_adminq_cmd.h
@@ -1228,7 +1228,7 @@
#define I40E_AQC_SET_VSI_PROMISC_BROADCAST I40E_AQC_SET_VSI_BROADCAST
+#define I40E_AQC_SET_VSI_BROADCAST
+ /* 1 if the VSI is promiscuous */

/* Open Source Used In 5GasS Edge AC-4 25248 */
#define I40E_AQC_SET_VSI_DEFAULT 0x08
#define I40E_AQC_SET_VSI_PROMISC_VLAN 0x10
-#define I40E_AQC_SET_VSI_PROMISC_TX 0x8000
+#define I40E_AQC_SET_VSI_PROMISC_RX_ONLY 0x8000
__le16 seid;
#define I40E_AQC_VSI_PROM_CMD_SEID_MASK 0x3FF
__le16 vlan_tag;
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e/i40e_common.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e/i40e_common.c
@@ -1667,23 +1667,15 @@ return status;
}

/**
 - * i40e_set_fc
 - * @hw: pointer to the hw struct
 - *
 - * Set the requested flow control mode using set_phy_config.
 - **/
-enum i40e_status_code i40e_set_fc(struct i40e_hw *hw, u8 *aq_failures,
-  bool atomic_restart)
+static noinline_for_stack enum i40e_status_code
+i40e_set_fc_status(struct i40e_hw *hw,
+ struct i40e_aq_get_phy Abilities Resp *abilities,
+ bool atomic_restart)
{
-enum i40e_fc_mode fc_mode = hw->fc.requested_mode;
-struct i40e_aq_get_phy Abilities Resp abilities;
struct i40e_aq_set_phy_config config;
-enum i40e_status_code status;
+enum i40e_fc_mode fc_mode = hw->fc.requested_mode;
 u8 pause_mask = 0x0;

-*aq_failures = 0x0;
-
 switch (fc_mode) { case I40E_FC_FULL:
 pause_mask |= I40E_AQ_PHY_FLAG_PAUSE_TX;
 @@ -1699,6 +1691,48 @@
 break;
 }
/* If the abilities have changed, then set the new config */
+if (config.abilities == abilities->abilities)
+return 0;
+
+/* Auto restart link so settings take effect */
+if (atomic_restart)
+config.abilities |= I40E_AQ_PHY_ENABLE_ATOMIC_LINK;
+/* Copy over all the old settings */
+config.phy_type = abilities->phy_type;
+config.phy_type_ext = abilities->phy_type_ext;
+config.link_speed = abilities->link_speed;
+config.eee_capability = abilities->eee_capability;
+config.eeer = abilities->eeer_val;
+config.low_power_ctrl = abilities->d3_lpan;
+config.fec_config = abilities->fec_cfg_curr_mod_ext_info &
+ I40E_AQ_PHY_FEC_CONFIG_MASK;
+
+return i40e_aq_set_phy_config(hw, &config, NULL);
+
/**
 * i40e_set_fc
 * @hw: pointer to the hw struct
 * @aq_failures: buffer to return AdminQ failure information
 * @atomic_restart: whether to enable atomic link restart
 *
 * Set the requested flow control mode using set_phy_config.
 * **/
+enum i40e_status_code i40e_set_fc(struct i40e_hw *hw, u8 *aq_failures,
+bool atomic_restart)
+
+/* Set the requested flow control mode using set_phy_config.*/
+* 
+* @hw: pointer to the hw struct
+* @aq_failures: buffer to return AdminQ failure information
+* @atomic_restart: whether to enable atomic link restart
+* 
+ * Get the current phy config */
+status = i40e_aq_get_phy_capabilities(hw, false, false, &abilities,
+    NULL);
+return status;
+

-memset(&config, 0, sizeof(struct i40e_aq_set_phy_config));
-/* clear the old pause settings */
-+config.abilities &= ~(I40E_AQ_PHY_FLAG_PAUSE_TX) &
+ ~I40E_AQ_PHY_FLAG_PAUSE_RX;
-/* set the new abilities */

Open Source Used In 5GaaS Edge AC-4  25250
- config.abilities |= pause_mask;

/* If the abilities have changed, then set the new config */
-if (config.abilities != abilities.abilities) {

/* Auto restart link so settings take effect */
-if (atomic_restart)
-config.abilities |= I40E_AQ_PHY_ENABLE_ATOMIC_LINK;

/* Copy over all the old settings */
-config.phy_type = abilities.phy_type;
-config.phy_type_ext = abilities.phy_type_ext;
-config.link_speed = abilities.link_speed;
-config.eee_capability = abilities.eee_capability;
-config.eeer = abilities.eeer_val;
-config.low_power_ctrl = abilities.d3_lpan;
-config.fec_config = abilities.fec_cfg_curr_mod_ext_info &
  I40E_AQ_PHY_FEC_CONFIG_MASK;
-status = i40e_aq_set_phy_config(hw, &config, NULL);
+status = i40e_set_fc_status(hw, &abilities, atomic_restart);
+if (status)
+aq_failures |= I40E_SET_FC_AQ_FAIL_SET;

-if (status)
-aq_failures |= I40E_SET_FC_AQ_FAIL_SET;
-
-} /* Update the link info */
+**
+ * i40e_is_aq_api_ver_ge
+ * @aq: pointer to AdminQ info containing HW API version to compare
+ * @maj: API major value
+ * @min: API minor value
+ *
+ * Assert whether current HW API version is greater/equal than provided.
+ ***/
+static bool i40e_is_aq_api_ver_ge(struct i40e_adming_info *aq, u16 maj,
+  u16 min)
+{
+  return (aq->api_maj_ver > maj ||
+  (aq->api_maj_ver == maj &
+   aq->api_min_ver >= min));
+}
+
+/**
* i40e_aq_add_vsi
* @hw: pointer to the hw struct
* @vsi_ctx: pointer to a vsi context struct
if (set) {
    flags |= I40E_AQC_SET_VSI_PROMISC_UNICAST;
    if (rx_only_promisc &&
        (((hw->aq.api_maj_ver == 1) && (hw->aq.api_min_ver >= 5)) ||
         (hw->aq.api_maj_ver > 1)))
        -flags |= I40E_AQC_SET_VSI_PROMISC_TX;
    +if (rx_only_promisc && i40e_is_aq_api_ver_ge(&hw->aq, 1, 5))
        +flags |= I40E_AQC_SET_VSI_PROMISC_RX_ONLY;
    }
    cmd->promiscuous_flags = cpu_to_le16(flags);
    cmd->valid_flags = cpu_to_le16(I40E_AQC_SET_VSI_PROMISC_UNICAST);
    -if (((hw->aq.api_maj_ver >= 1) && (hw->aq.api_min_ver >= 5)) ||
        (hw->aq.api_maj_ver > 1))
        -cmd->valid_flags |= cpu_to_le16(I40E_AQC_SET_VSI_PROMISC_TX);
    +if (i40e_is_aq_api_ver_ge(&hw->aq, 1, 5))
        +cmd->valid_flags |=
        +cpu_to_le16(I40E_AQC_SET_VSI_PROMISC_RX_ONLY);
    cmd->seid = cpu_to_le16(seid);
    status = i40e_asq_send_command(hw, &desc, NULL, 0, cmd_details);
}

if (enable) {
    flags |= I40E_AQC_SET_VSI_PROMISC_UNICAST;
    +if (i40e_is_aq_api_ver_ge(&hw->aq, 1, 5))
        +flags |= I40E_AQC_SET_VSI_PROMISC_RX_ONLY;
    }
    cmd->promiscuous_flags = cpu_to_le16(flags);
    cmd->valid_flags = cpu_to_le16(I40E_AQC_SET_VSI_PROMISC_UNICAST);
    +if (i40e_is_aq_api_ver_ge(&hw->aq, 1, 5))
        +cmd->valid_flags |=
        +cpu_to_le16(I40E_AQC_SET_VSI_PROMISC_RX_ONLY);
    cmd->seid = cpu_to_le16(seid);
    cmd->vlan_tag = cpu_to_le16(vid | I40E_AQC_SET_VSI_VLAN_VALID);

*i40e_update_link_status - update status of the HW network link
* @hw: pointer to the hw struct
**/
-i40e_status i40e_update_link_info(struct i40e_hw *hw)
```c
+noinline_for_stack i40e_status i40e_update_link_info(struct i40e_hw *hw)
{
    struct i40e_aq_get_phy_abilities_resp abilities;
    i40e_status status = 0;
    --- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e/i40e_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e/i40e_ethtool.c
@@ -664,7 +664,7 @@
     default:
     /* if we got here and link is up something bad is afoot */
     netdev_info(netdev,
-       "WARNING: Link is up but PHY type 0x%x is not recognized.
+       "WARNING: Link is up but PHY type 0x%x is not recognized, or incorrect cable is in use",
        hw_link_info->phy_type);
}
@@ -786,6 +786,7 @@
/* Set flow control settings */
ethtool_link_ksettings_add_link_mode(ks, supported, Pause);
+ethtool_link_ksettings_add_link_mode(ks, supported, Asym_Pause);

switch (hw->fc.requested_mode) {
    case I40E_FC_FULL:
@@ -937,8 +938,7 @@
        Autoneg) &&
-       hw->phy.link_info.phy_type !=
-       I40E_PHY_TYPE_10GBASE_T) {
+       hw->phy.media_type != I40E_MEDIA_TYPE_BASET) {
netdev_info(netdev, "Autoneg cannot be disabled on this phy\n");
    err = -EINVAL;
    goto done;
@@ -969,7 +969,9 @@
ethtool_link_ksettings_test_link_mode(ks, advertising,
        10000baseCR_Full) ||
    ethtool_link_ksettings_test_link_mode(ks, advertising,
-       10000baseSR_Full))
+       10000baseSR_Full)) ||
+       ethtool_link_ksettings_test_link_mode(ks, advertising,
+       10000baseLR_Full))
    config.link_speed |= I40E_LINK_SPEED_10GB;

    if (ethtool_link_ksettings_test_link_mode(ks, advertising,
        20000baseKR2_Full))
@@ -1121,6 +1123,7 @@
i40e_status status;
    u8 aq_failures;
    int err = 0;
```
+u32 is_an;

/* Changing the port's flow control is not supported if this isn't the
 * port's controlling PF
@@ -1133,15 +1136,14 @@
 if (vsi != pf->vsi[pf->lan_vsi])
 return -EOPNOTSUPP;

@if (pause->autoneg != ((hw_link_info->an_info & I40E_AQ_AN_COMPLETED) ?
    AUTONEG_ENABLE : AUTONEG_DISABLE)) {
+if (pause->autoneg != is_an) {
    is_an = hw_link_info->an_info & I40E_AQ_AN_COMPLETED;
    if (pause->autoneg != is_an)
        netdev_info(netdev, "To change autoneg please use: ethtool -s <dev> autoneg <on|off>\n");
    return -EOPNOTSUPP;
}

/* If we have link and don't have autoneg */
-if (!test_bit(__I40E_DOWN, pf->state) &&
-    !(hw_link_info->an_info & I40E_AQ_AN_COMPLETED)) {
+if (!test_bit(__I40E_DOWN, pf->state) && !is_an) {
    /* Send message that it might not necessarily work*/
    netdev_info(netdev, "Autoneg did not complete so changing settings may not result in an actual change:\n");
}
@@ -1192,7 +1194,7 @@
 err = -EAGAIN;
 }

@if (!test_bit(__I40E_DOWN, pf->state)) {
+if (!test_bit(__I40E_DOWN, pf->state) && is_an) {
    /* Give it a little more time to try to come back */
    msleep(75);
    if (!test_bit(__I40E_DOWN, pf->state))
@@ -2740,16 +2742,16 @@

 no_input_set:
 if (input_set & I40E_L3_SRC_MASK)
-    fsp->m_u.tcp_ip4_spec.ip4src = htonl(0xFFFF);
+    fsp->m_u.tcp_ip4_spec.ip4src = htonl(0xFFFFFFFF);

 if (input_set & I40E_L3_DST_MASK)
-    fsp->m_u.tcp_ip4_spec.ip4dst = htonl(0xFFFF);
+    fsp->m_u.tcp_ip4_spec.ip4dst = htonl(0xFFFFFFFF);

 if (input_set & I40E_L4_SRC_MASK)
-    fsp->m_u.tcp_ip4_spec.psrc = htons(0xFFFFFFFF);
+    fsp->m_u.tcp_ip4_spec.psrc = htons(0xFFFF);

 if (input_set & I40E_L4_DST_MASK)
-    fsp->m_u.tcp_ip4_spec.psrc = htonl(0xFFFFFFFF);
+    fsp->m_u.tcp_ip4_spec.psrc = htonl(0xFFFF);
fsp->m_u.tcp_ip4_spec.pdst = htons(0xFFFFFFFF);
+fsp->m_u.tcp_ip4_spec.pdst = htons(0xFFFF);

if (rule->dest_ctl == I40E_FILTERPROGRAM_DESC_DEST_DROP_PACKET)
fsp->ring_cookie = RX_CLS_FLOW_DISC;
@@ -3800,6 +3802,16 @@
i40e_write_fd_input_set(pf, index, new_mask);

+/* IP_USER_FLOW filters match both IPv4/Other and IPv4/Fragmented
+ * frames. If we're programming the input set for IPv4/Other, we also
+ * need to program the IPv4/Fragmented input set. Since we don't have
+ * separate support, we'll always assume and enforce that the two flow
+ * types must have matching input sets.
+ */
+if (index == I40E_FILTER_PCTYPE_NONF_IPV4_OTHER)
+i40e_write_fd_input_set(pf, I40E_FILTER_PCTYPE_FRAG_IPV4,
+new_mask);
+
+/* Add the new offset and update table, if necessary */
+if (new_flex_offset) {
+err = i40e_add_flex_offset(&pf->l4_flex_pit_list, src_offset,
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e/i40e_main.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e/i40e_main.c
@@ -65,6 +65,8 @@
static void i40e_determine_queue_usage(struct i40e_pf *pf);
static int i40e_setup_pf_filter_control(struct i40e_pf *pf);
static void i40e_prep_for_reset(struct i40e_pf *pf, bool lock_acquired);
+static void i40e_reset_and_rebuild(struct i40e_pf *pf, bool reinit,
+  bool lock_acquired);
+static int i40e_reset(struct i40e_pf *pf);
+static void i40e_rebuild(struct i40e_pf *pf, bool lock_acquired);
+static void i40e_fdir_sb_setup(struct i40e_pf *pf);
@@ -365,6 +367,10 @@
    (pf->tx_timeout_last_recovery + netdev->watchdog_timeo))
return; /* don't do any new action before the next timeout */

+/* don't kick off another recovery if one is already pending */
+if (test_and_set_bit(__I40E_TIMEOUT_RECOVERY_PENDING, pf->state))
+return;
+
+if (tx_ring) {
+    head = i40e_get_head(tx_ring);
+    /* Read interrupt register */
+    @@ -448,9 +454,9 @@
+        struct rtnl_link_stats64 *stats)
+    { 
+        struct i40e_netdev_priv *np = netdev_priv(netdev);
-struct i40e_ring *tx_ring, *rx_ring;
struct i40e_vsi *vsi = np->vsi;
struct rtnl_link_stats64 *vsi_stats = i40e_get_vsi_stats_struct(vsi);
+struct i40e_ring *ring;
int i;

if (test_bit(__I40E_VSI_DOWN, vsi->state))
@@ -464,24 +470,30 @@
u64 bytes, packets;
unsigned int start;

-tx_ring = READ_ONCE(vsi->tx_rings[i]);
-if (!tx_ring)
-    continue;
-i40e_get_netdev_stats_struct_tx(tx_ring, stats);
+i40e_get_netdev_stats_struct_tx(ring, stats);

-char *tx_ring = &tx_ring[1];
+if (i40e_enabled_xdp_vsi(vsi)) {
+    ring = READ_ONCE(vsi->tx_rings[i]);
+    if (!ring)
+        continue;
+    i40e_get_netdev_stats_struct_tx(ring, stats);
+}

+ring = READ_ONCE(vsi->tx_rings[i]);
+if (!ring)
+    continue;
+
+do {
+    start = u64_stats_fetch_begin_irq(&rx_ring->syncp);
+    packets = rx_ring->stats.packets;
+    bytes = rx_ring->stats.bytes;
+} while (u64_stats_fetch_retry_irq(&rx_ring->syncp, start));
+start = u64_stats_fetchBegin_irq(&ring->syncp);
+packets = ring->stats.packets;
+bytes = ring->stats.bytes;
+} while (u64_stats_fetch_retry_irq(&ring->syncp, start));

stats->rx_packets += packets;
stats->rx_bytes += bytes;

-if (i40e_enabled_xdp_vsi(vsi))
-i40e_get_netdev_stats_struct_tx(&rx_ring[1], stats);
+
rcu_read_unlock();
for (q = 0; q < vsi->num_queue_pairs; q++) {
/* locate Tx ring */
p = READ_ONCE(vsi->tx_rings[q]);
+if (!p)
+continue;

do {
    start = u64_stats_fetch_begin_irq(&p->syncp);
    tx_linearize += p->tx_stats.tx_linearize;
    tx_force_wb += p->tx_stats.tx_force_wb;

    /* Rx queue is part of the same block as Tx queue */
    +p = &p[1];
    +/* locate Rx ring */
    +p = READ_ONCE(vsi->rx_rings[q]);
    +if (!p)
    +continue;
    +
    do {
        start = u64_stats_fetch_begin_irq(&p->syncp);
        packets = p->stats.packets;
        netdev_info(netdev, "set new mac address %pM", addr->sa_data);

        /* Copy the address first, so that we avoid a possible race with
         * .set_rx_mode(). If we copy after changing the address in the filter
         * list, we might open ourselves to a narrow race window where
         * .set_rx_mode could delete our dev_addr filter and prevent traffic
         * from passing.
         * .set_rx_mode().
         * - Remove old address from MAC filter
         * - Copy new address
         * - Add new address to MAC filter
         */
        -ether_addr_copy(netdev->dev_addr, addr->sa_data);
        spin_lock_bh(&vsi->mac_filter_hash_lock);
        i40e_del_mac_filter(vsi, netdev->dev_addr);
        -i40e_add_mac_filter(vsi, addr->sa_data);
        +ether_addr_copy(netdev->dev_addr, addr->sa_data);
        +i40e_add_mac_filter(vsi, netdev->dev_addr);
        spin_unlock_bh(&vsi->mac_filter_hash_lock);
        +
        if (vsi->type == I40E_VSI_MAIN) {
            i40e_status ret;
        }
    }
}
struct i40e_pf *pf = vsi->back;
sections = 0;
netdev_tc = 0;
numtc = 0;
numtc = 1;
qcount;
offset;
qmap;
sections = I40E_AQ_VSI_PROP_QUEUE_MAP_VALID;
offset = 0;

/+ Number of queues per enabled TC */
+num_tc_qps = vsi->alloc_queue_pairs;
if (enabled_tc & (vsi->back->flags & I40E_FLAG_DCB_ENABLED)) {
/* Find numtc from enabled TC bitmap */
-for (i = 0; i < I40E_MAX_TRAFFIC_CLASS; i++) {
+for (i = 0; i < I40E_MAX_TRAFFIC_CLASS; i++) {
if (enabled_tc & BIT(i)) /* TC is enabled */
numtc++;
}
dev_warn(&pf->pdev->dev, "DCB is enabled but no TC enabled, forcing TC0\n");
numtc = 1;
}
-} else {
-/* At least TC0 is enabled in non-DCB, non-MQPRIO case */
-numtc = 1;
+num_tc_qps = num_tc_qps / numtc;
+num_tc_qps = min_t(int, num_tc_qps,
+ i40e_pf_get_max_q_per_tc(pf));
}

vsi->tc_config.numtc = numtc;
vsi->tc_config.enabled_tc = enabled_tc ? enabled_tc : 1;
-/* Number of queues per enabled TC */
-qcount = vsi->alloc_queue_pairs;

-num_tc_qps = qcount / numtc;
-num_tc_qps = min_t(int, num_tc_qps, i40e_pf_get_max_q_per_tc(pf));
+/* Do not allow use more TC queue pairs than MSI-X vectors exist */
+if (pf->flags & I40E_FLAG_MSIX_ENABLED)
+num_tc_qps = min_t(int, num_tc_qps, pf->num_lan_msix);

/* Setup queue offset/count for all TCs for given VSI */
for (i = 0; i < I40E_MAX_TRAFFIC_CLASS; i++) {
@@ -1827,9 +1845,13 @@

switch (vsi->type) {
    case I40E_VSI_MAIN:
        qcount = min_t(int, pf->alloc_rss_size,
                      num_tc_qps);
        break;
        +if (!(pf->flags & (I40E_FLAG_FD_SB_ENABLED |
                         I40E_FLAG_FD_ATR_ENABLED))) ||
        +vsi->tc_config.enabled_tc != 1) {
            qcount = min_t(int, pf->alloc_rss_size,
                            num_tc_qps);
            break;
        +}
    case I40E_VSI_FDIR:
    case I40E_VSI_SRIOV:
    case I40E_VSI_VMDQ2:
        /* Don't modify stripping options if a port VLAN is active */
        +if (vsi->info.pvid)
            +return;
        +
        if ((vsi->info.valid_sections &
            cpu_to_le16(I40E_AQ_VSI_PROP_VLAN_VALID)) &&
            ((vsi->info.port_vlan_flags & I40E_AQ_VSI_PVLAN_MODE_MASK) == 0))
            /* disable any further VFLR event notifications */
            +if (test_bit(__I40E_VF_RESETS_DISABLED, pf->state)) {
                +u32 reg = rd32(hw, I40E_PFINT_ICR0_ENA);
                +
            }
    }
    +/* Don't modify stripping options if a port VLAN is active */
    +if (vsi->info.pvid)
        +return;
    +
    if ((vsi->info.valid_sections &
        cpu_to_le16(I40E_AQ_VSI_PROP_VLAN_VALID)) &&
        ((vsi->info.port_vlan_flags & I40E_AQ_VSI_PVLAN_EMOD_MASK) ==
        @ @ -3887,8 +3917,16 @@
        })
    }
    if (icr0 & I40E_PFINT_ICR0_VFLR_MASK) {
        ena_mask &= ~I40E_PFINT_ICR0_ENA_VFLR_MASK;
        set_bit(__I40E_VFLR_EVENT_PENDING, pf->state);
        /* disable any further VFLR event notifications */
        +if (test_bit(__I40E_VF_RESETS_DISABLED, pf->state)) {
            +u32 reg = rd32(hw, I40E_PFINT_ICR0_ENA);
            +
        }
+reg &= ~I40E_PFINT_ICR0_VFLR_MASK;
+wr32(hw, I40E_PFINT_ICR0_ENA, reg);
+
+} else {
  +ena_mask &= ~I40E_PFINT_ICR0_ENA_VFLR_MASK;
+set_bit(__I40E_VFLR_EVENT_PENDING, pf->state);
+}
+
}

if (icr0 & I40E_PFINT_ICR0_GRST_MASK) {
  @@ -4676,7 +4714,8 @@
  {

  -$i40e_free_misc_vector(pf);
  +if (test_bit(__I40E_MISC_IRQ_REQUESTED, pf->state))
  +$i40e_free_misc_vector(pf);

  i40e_put_lump(pf->irq_pile, pf->iwl_pile, I40E_IWARP_IRQ_PILE_ID);
  @@ -5219,15 +5258,17 @@
  u8 *bw_share)
  {
   struct i40e_aqc_configure_vsi_tc_bw_data bw_data;
  +struct i40e_pf *pf = vsi->back;
  i40e_status ret;
  int i;

  -$if (vsi->back->flags & I40E_FLAG_TC_MQPRIO)
  +/* There is no need to reset BW when mqprio mode is on. */
  +if (pf->flags & I40E_FLAG_TC_MQPRIO)
  return 0;
  -$if (!vsi->mqprio_qopt.qopt.hw) {
  +if (!vsi->mqprio_qopt.qopt.hw && !(pf->flags & I40E_FLAG_DCB_ENABLED)) {
  ret = i40e_set_bw_limit(vsi, vseid, 0);
  if (ret)
    dev_info(&vsi->pdev->dev, "Failed to reset tx rate for vsi->seid %u\n",
    vseid);
  return ret;
  @@ -5236,12 +5277,11 @@
  for (i = 0; i < I40E_MAX_TRAFFIC_CLASS; i++)
  bw_data.tc_bwCredits[i] = bw_share[i];

  -$ret = i40e_aq_config_vsi_tc_bw(&vsi->back->hw, vseid, &bw_data,
  - NULL);
  +ret = i40e_aq_config_vsi_tc_bw(&pf->hw, vseid, &bw_data, NULL);
  if (ret) {
dev_info(&vsi->back->pdev->dev,
    dev_info(&pf->pdev->dev,
    "AQ command Config VSI BW allocation per TC failed = %d\n",
    vsi->back->hw.aq.asq_last_status);
    pf->hw.aq.asq_last_status);
    return -EINVAL;
}
@@ -6679,6 +6719,8 @@
} if (vsi->num_queue_pairs <
    (mqprio_qopt->qopt.offset[i] + mqprio_qopt->qopt.count[i])) {
+dev_err(&vsi->back->pdev->dev,
    +"Failed to create traffic channel, insufficient number of queues.\n");
    return -EINVAL;
} if (sum_max_rate > i40e_get_link_speed(vsi)) {
    @ @ -6729,10 +6771,12 @@
    struct i40e_pf *pf = vsi->back;
    u8 enabled_tc = 0, num_tc, hw;
    bool need_reset = false;
    +int old_queue_pairs;
    int ret = -EINVAL;
    u16 mode;
    int i;

    +old_queue_pairs = vsi->num_queue_pairs;
    num_tc = mqprio_qopt->qopt.num_tc;
    hw = mqprio_qopt->qopt.hw;
    mode = mqprio_qopt->mode;
    @ @ -6833,6 +6877,7 @@
    } ret = i40e_configure_queue_channels(vsi);
    if (ret) {
+    vsi->num_queue_pairs = old_queue_pairs;
        netdev_info(netdev,
            "Failed configuring queue channels\n");
        need_reset = true;
    @ @ -6930,6 +6975,8 @@
    if (filter->flags >= ARRAY_SIZE(flag_table))
        return I40E_ERR_CONFIG;
    +memset(&cld_filter, 0, sizeof(cld_filter));
    +
    /* copy element needed to add cloud filter from filter */
    i40e_set_cld_element(filter, &cld_filter);
    @ @ -6993,10 +7040,13 @@
/* adding filter using src_port/src_ip is not supported at this stage */
-if (filter->src_port || filter->src_ipv4)
+  if (filter->src_port)
    +  (filter->src_ipv4 && filter->n_proto != ETH_P_IPV6)
  !ipv6_addr_any(&filter->ip.v6.src_ip6))
return -EOPNOTSUPP;

+memset(&cld_filter, 0, sizeof(cld_filter));
+
/* copy element needed to add cloud filter from filter */
i40e_set_cld_element(filter, &cld_filter.element);

@@ -7020,7 +7070,7 @@
cpu_to_le16(I40E_AQC_ADD_CLOUD_FILTER_MAC_VLAN_PORT);
 }

-} else if (filter->dst_ipv4)
+} else if ((filter->dst_ipv4 && filter->n_proto != ETH_P_IPV6) ||
  !ipv6_addr_any(&filter->ip.v6.dst_ip6)) {
  cld_filter.element.flags =
cpu_to_le16(I40E_AQC_ADD_CLOUD_FILTER_IP_PORT);
@@ -7663,6 +7713,8 @@
dev_driver_string(&pf->pdev->dev),
dev_name(&pf->pdev->dev));
err = i40e_vsi_request_irq(vsi, int_name);
+if (err)
+goto err_setup_rx;

} else {
err = -EINVAL;
@@ -7744,6 +7907,14 @@
/* Reprogram the default input set for Other/IPv4 */
i40e_write_fd_input_set(pf, I40E_FILTER_PCTYPE_NONF_IPV4_OTHER, I40E_L3_SRC_MASK | I40E_L3_DST_MASK);
+  i40e_write_fd_input_set(pf, I40E_FILTER_PCTYPE_FRAG_IPV4, I40E_L3_SRC_MASK | I40E_L3_DST_MASK);
}

/**
@@ -7852,6 +7907,14 @@
dev_dbg(&pf->pdev->dev, "PFR requested\n")
i40e_handle_reset_warning(pf, lock_acquired);

+} else if (reset_flags & I40E_PF_RESET_AND_REBUILD_FLAG) {
+/* Request a PF Reset
+ * Resets PF and reinitializes PFs VSI.
+ */
+i40e_prep_for_reset(pf, lock_acquired);
+i40e_reset_and_rebuild(pf, true, lock_acquired);
+
} else if (reset_flags & BIT_ULL(__I40E_REINIT_REQUESTED)) {
    int v;

    if (pf->hw.aq.asq_last_status == I40E_AQ_RC_ENOMEM) {
        /* retry with a larger buffer */
        buf_len = data_size;
    } else if (pf->hw.aq.asq_last_status != I40E_AQ_RC_OK) {
        } else if (pf->hw.aq.asq_last_status != I40E_AQ_RC_OK || err) {
            dev_info(&pf->pdev->dev,
                "capability discovery failed, err %s aq_err %s\n",
                i40e_stat_str(&pf->hw, err),
            @ @ -9240,7 +9303,6 @@
        }
        struct i40e_vsi *vsi = pf->vsi[pf->lan_vsi];
        struct i40e_hw *hw = &pf->hw;
        -u8 set_fc_aq_fail = 0;
        u32 val;
        int v;
        @ @ -9259,6 +9321,17 @@
    }
    i40e_get_oem_version(&pf->hw);

    /* re-verify the eeprom if we just had an EMP reset */
    if (test_and_clear_bit(__I40E_EMP_RESET_INTR_RECEIVED, pf->state)) {
        mdelay(300);
    }
    +
    /* re-verify the eeprom if we just had an EMP reset */
    if (test_and_clear_bit(__I40E_EMP_RESET_INTR_RECEIVED, pf->state)) {
        i40e_verify_eeprom(pf);
        @ @ -9307,13 +9380,6 @@
        i40e_stat_str(&pf->hw, ret),
        i40e_aq_str(&pf->hw, pf->hw.aq.asq_last_status));
-/* make sure our flow control settings are restored */
-ret = i40e_set_fc(&pf->hw, &set_fc_aq_fail, true);
-if (ret)
-dev_dbg(&pf->pdev->dev, "setting flow control: ret = %s last_status = %s\n",
-   i40e_stat_str(&pf->hw, ret),
-   i40e_aq_str(&pf->hw, pf->hw.aq.asq_last_status));
-
- /* Rebuild the VSIs and VEBs that existed before reset.
 * They are still in our local switch element arrays, so only
 * need to rebuild the switch model in the HW.
@@ -9463,6 +9529,7 @@
clear_bit(__I40E_RESET_FAILED, pf->state);
 clear_recovery:
 clear_bit(__I40E_RESET_RECOVERY_PENDING, pf->state);
+clear_bit(__I40E_TIMEOUT_RECOVERY_PENDING, pf->state);
 }
/**
@@ -9510,7 +9577,6 @@
{
 struct i40e_hw *hw = &pf->hw;
 bool mdd_detected = false;
@@ -9556,19 +9622,12 @@
 reg = rd32(hw, I40E_PF_MDET_TX);
 if (reg & I40E_PF_MDET_TX_VALID_MASK) {
     wr32(hw, I40E_PF_MDET_TX, 0xFFFF);
-dev_info(&pf->pdev->dev, "TX driver issue detected, PF reset issued\n");
 -pf_mdd_detected = true;
 +dev_dbg(&pf->pdev->dev, "TX driver issue detected on PF\n");
 }
 reg = rd32(hw, I40E_PF_MDET_RX);
 if (reg & I40E_PF_MDET_RX_VALID_MASK) {
-dev_info(&pf->pdev->dev, "RX driver issue detected, PF reset issued\n");
 -pf_mdd_detected = true;
 -}
-/* Queue belongs to the PF, initiate a reset */
-if (pf_mdd_detected) {
-    set_bit(__I40E_PF_RESET_REQUESTED, pf->state);
-    i40e_service_event_schedule(pf);
+dev_dbg(&pf->pdev->dev, "RX driver issue detected on PF\n");
 }
}
 @@ -10023,10 +10082,10 @@
 if (vsi->tx_rings && vsi->tx_rings[0]) {
 for (i = 0; i < vsi->alloc_queue_pairs; i++) {
     kfree_rcu(vsi->tx_rings[i], rcu);
-     vsi->tx_rings[i] = NULL;
-     vsi->rx_rings[i] = NULL;
+     WRITE_ONCE(vsi->tx_rings[i], NULL);
+     WRITE_ONCE(vsi->rx_rings[i], NULL);
     if (vsi->xdp_rings)
         -     vsi->xdp_rings[i] = NULL;
+     vsi->xdp_rings[i] = NULL;
     +WRITE_ONCE(vsi->tx_rings[i], NULL);
     +WRITE_ONCE(vsi->xdp_rings[i], NULL);
 }
 }
@@ -10060,7 +10119,7 @@
 if (vsi->back->hw_features & I40E_HW_WB_ON_ITR_CAPABLE)
     ring->flags = I40E_TXR_FLAGS_WB_ON_ITR;
     ring->tx_itr_setting = pf->tx_itr_default;
-    vsi->tx_rings[i] = ring++;
+    WRITE_ONCE(vsi->tx_rings[i], ring++);
     if (!i40e_enabled_xdp_vsi(vsi))
 goto setup_rx;
    @@ -10078,7 +10137,7 @@
     ring->flags = I40E_TXR_FLAGS_WB_ON_ITR;
     set_ring_xdp(ring);
     ring->tx_itr_setting = pf->tx_itr_default;
-    vsi->xdp_rings[i] = ring++;
+    WRITE_ONCE(vsi->xdp_rings[i], ring++);
 setup_rx:
     ring->queue_index = i;
    @@ -10091,7 +10150,7 @@
     ring->size = 0;
     ring->dcb_tc = 0;
     ring->rx_itr_setting = pf->rx_itr_default;
-    vsi->rx_rings[i] = ring;
+    WRITE_ONCE(vsi->rx_rings[i], ring);
 }
 return 0;
    @@ -10896,6 +10955,8 @@
 struct i40e_aqc_configure_partition_bw_data bw_data;
 i40e_status status;

+memset(&bw_data, 0, sizeof(bw_data));
+/* Set the valid bit for this PF */
bw_data.pf_valid_bits = cpu_to_le16(BIT(pf->hw.pf_id));
bw_data.max_bw[pf->hw.pf_id] = pf->max_bw & I40E_ALT_BW_VALUE_MASK;

int err = 0;
int size;
+u16 pow;

/* Set default capability flags */
pf->flags = I40E_FLAG_RX_CSUM_ENABLED |
@@ -11020,6 +11082,11 @@
    pf->rss_table_size = pf->hw.func_caps.rss_table_size;
    pf->rss_size_max = min_t(int, pf->rss_size_max,
    pf->hw.func_caps.num_tx_qp);
+    /* find the next higher power-of-2 of num cpus */
+    pow = roundup_pow_of_two(num_online_cpus());
+    pf->rss_size_max = min_t(int, pf->rss_size_max, pow);
+    if (pf->hw.func_caps.rss) {
        pf->flags |= I40E_FLAG_RSS_ENABLED;
        pf->alloc_rss_size = min_t(int, pf->rss_size_max,
        @ @ -11765,6 +11832,8 @@
            NETIF_F_GSO_GRE|
            NETIF_F_GSO_GRE_CSUM|
            NETIF_F_GSO_PARTIAL|
+            NETIF_F_GSO_IPXIP4|
+            NETIF_F_GSO_IPXIP6|
            NETIF_F_GSO_UDP_TUNNEL|
            NETIF_F_GSO_UDP_TUNNEL_CSUM|
            NETIF_F_SCTP_CRC|
        @ @ -11848,6 +11917,9 @@
            ether_addr_copy(netdev->dev_addr, mac_addr);
            ether_addr_copy(netdev->perm_addr, mac_addr);

        /* i40iw_net_event() reads 16 bytes from neigh->primary_key */
        +netdev->neigh_priv_len = sizeof(u32) * 4;
+        netdev->priv_flags |= IFF_UNICAST_FLT;
        netdev->priv_flags |= IFF_SUPP_NOFCS;
        /* Setup netdev TC information */
        @ @ -13386,7 +13458,6 @@
        int err;
        u32 val;
        u32 i;
        -u8 set_fc_aq_fail;

        err = pci_enable_device_mem(pdev);
if (err)
@@ -13662,24 +13733,6 @@
} 
INIT_LIST_HEAD(&pf->vsi[pf->lan_vsi]->ch_list);

-/* Make sure flow control is set according to current settings */
-err = i40e_set_fc(hw, &set_fc_aq_fail, true);
-if (set_fc_aq_fail & I40E_SET_FC_AQ_FAIL_GET)
-dev_dbg(&pf->pdev->dev,
-"Set fc with err %s aq_err %s on get_phy_cap\n",
-i40e_stat_str(hw, err),
-i40e_aq_str(hw, hw->aq.asq_last_status));
-if (set_fc_aq_fail & I40E_SET_FC_AQ_FAIL_SET)
-dev_dbg(&pf->pdev->dev,
-"Set fc with err %s aq_err %s on set_phy_config\n",
-i40e_stat_str(hw, err),
-i40e_aq_str(hw, hw->aq.asq_last_status));
-if (set_fc_aq_fail & I40E_SET_FC_AQ_FAIL_UPDATE)
-dev_dbg(&pf->pdev->dev,
-"Set fc with err %s aq_err %s on get_link_info\n",
-i40e_stat_str(hw, err),
-i40e_aq_str(hw, hw->aq.asq_last_status));
-
-/* if FDIR VSI was set up, start it now */
-for (i = 0; i < pf->num_alloc_vsi; i++) {
-if (pf->vsi[i] && pf->vsi[i]->type == I40E_VSI_FDIR) {
@@ -13736,6 +13789,8 @@
if (err) {
-dev_info(&pdev->dev,
-"setup of misc vector failed: %d\n", err);
+i40e_cloud_filter_exit(pf);
+i40e_fdir_teardown(pf);
-goto err_vsis;
} 
}
@@ -13929,6 +13984,14 @@
i40e_write_rx_ctl(hw, I40E_PFQF_HENA(0), 0);
i40e_write_rx_ctl(hw, I40E_PFQF_HENA(1), 0);

+while (test_bit(__I40E_RESET_RECOVERY_PENDING, pf->state))
+usleep_range(1000, 2000);
+
+if (pf->flags & I40E_FLAG_SRIOV_ENABLED) {
+set_bit(__I40E_VF_RESETS_DISABLED, pf->state);
+i40e_free_vfs(pf);
+pf->flags &= ~I40E_FLAG_SRIOV_ENABLED;
+}
-/* no more scheduling of any task */
set_bit(__I40E_SUSPENDED, pf->state);
set_bit(__I40E_DOWN, pf->state);
@@ -13942,11 +14005,6 @@
 */
i40e_notify_client_of_netdev_close(pf->vsi[pf->lan_vsi], false);

-if (pf->flags & I40E_FLAG_SRIOV_ENABLED) {
-i40e_free_vfs(pf);
-pf->flags &= ~I40E_FLAG_SRIOV_ENABLED;
-}
- i40e_fdir_teardown(pf);

/* If there is a switch structure or any orphans, remove them.
@@ -13994,6 +14052,7 @@
 mutex_destroy(&hw->aq.asq_mutex);

 /* Clear all dynamic memory lists of rings, q_vectors, and VSIs */
+rtnl_lock();
i40e_clear_interrupt_scheme(pf);
 for (i = 0; i < pf->num_alloc_vsi; i++) {
   if (pf->vsi[i]) {
     @@ -14002,6 +14061,7 @@
       pf->vsi[i] = NULL;
     }
   }
+rtnl_unlock();

 for (i = 0; i < I40E_MAX_VEB; i++) {
   kfree(pf->veb[i]);
   @@ -14218,7 +14278,13 @@
   wr32(hw, I40E_PFPM_WUFC,
       (pf->wol_en ? I40E_PFPM_WUFC_MAG_MASK : 0));
+
+/* Since we're going to destroy queues during the
+ * i40e_clear_interrupt_scheme() we should hold the RTNL lock for this
+ * whole section
+ */
+rtnl_lock();
i40e_clear_interrupt_scheme(pf);
+rtnl_unlock();

 if (system_state == SYSTEM_POWER_OFF) {
   pci_wake_from_d3(pdev, pf->wol_en);
   @@ -14249,7 +14315,13 @@
   if (pf->wol_en && (pf->hw_features & I40E_HW_WOL_MC_MAGIC_PKT_WAKE))
     i40e_enable_mc_magic_wake(pf);
i40e_prep_for_reset(pf, false);
/* Since we're going to destroy queues during the
 * i40e_clear_interrupt_scheme() we should hold the RTNL lock for this
 * whole section
 */
+rtnl_lock();
+
i40e_prep_for_reset(pf, true);

wr32(hw, I40E_PFPM_APM, (pf->wol_en ? I40E_PFPM_APM_APME_MASK : 0));
wr32(hw, I40E_PFPM_WUFC, (pf->wol_en ? I40E_PFPM_WUFC_MAG_MASK : 0));
@@ -14261,6 +14333,8 @@
*/
i40e_clear_interrupt_scheme(pf);

+rtnl_unlock();
+
return 0;
}

@@ -14278,6 +14352,11 @@
if (!test_bit(__I40E_SUSPENDED, pf->state))
return 0;

+/* We need to hold the RTNL lock prior to restoring interrupt schemes,
 + * since we're going to be restoring queues
 + */
+rtnl_lock();
+
/* We cleared the interrupt scheme when we suspended, so we need to
 * restore it now to resume device functionality.
 */
@@ -14288,7 +14367,9 @@
}

clear_bit(__I40E_DOWN, pf->state);
i40e_reset_and_rebuild(pf, false, false);
i40e_reset_and_rebuild(pf, false, true);
+
+rtnl_unlock();

/* Clear suspended state last after everything is recovered */
clear_bit(__I40E_SUSPENDED, pf->state);
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e/i40e_ptp.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e/i40e_ptp.c
@@ -39,9 +39,9 @@
* At 1Gb link, the period is multiplied by 20. (32ns)
* 1588 functionality is not supported at 100Mbps.

#define I40E_PTP_40GB_INCVAL 0x0199999999ULL
#define I40E_PTP_10GB_INCVAL 0x0333333333ULL
#define I40E_PTP_1GB_INCVAL 0x2000000000ULL

#define I40E_PTP_40GB_INCVAL	0x0199999999ULL
#define I40E_PTP_10GB_INCVAL_MULT	2
#define I40E_PTP_1GB_INCVAL_MULT	20

#define I40E_PRTTSYN_CTL1_TSYNTYPE_V1 BIT(I40E_PRTTSYN_CTL1_TSYNTYPE_SHIFT)
#define I40E_PRTTSYN_CTL1_TSYNTYPE_V2

ppb = -ppb;
}
-/* Force any pending update before accessing. */
-adj = READ_ONCE(pf->ptp_base_adj);
-
-freq = adj;
+freq = I40E_PTP_40GB_INCVAL;
freq *= ppb;
diff = div_u64(freq, 1000000000ULL);

if (neg_adj)
-adj -= diff;
+adj = I40E_PTP_40GB_INCVAL - diff;
else
-adj += diff;
+adj = I40E_PTP_40GB_INCVAL + diff;
+
+/* At some link speeds, the base incval is so large that directly
+ multiplying by ppb would result in arithmetic overflow even when
+ * using a u64. Avoid this by instead calculating the new incval
+ * always in terms of the 40GbE clock rate and then multiplying by the
+ * link speed factor afterwards. This does result in slightly lower
+ * precision at lower link speeds, but it is fairly minor.
+ */
+smpl_mb(); /* Force any pending update before accessing. */
+adj *= READ_ONCE(pf->ptp_adj_mult);

wr32(hw, I40E_PRTTSYN_INC_L, adj & 0xFFFFFFFF);
wr32(hw, I40E_PRTTSYN_INC_H, adj >> 32);
@@ -337,6 +344,8 @@
**
void i40e_ptp_tx_hang(struct i40e_pf *pf)
{
+struct sk_buff *skb;
+
if (!(pf->flags & I40E_FLAG_PTP) || !pf->ptp_tx)
return;

@@ -349,9 +358,12 @@
 * within a second it is reasonable to assume that we never will.
 */
 if (time_is_before_jiffies(pf->ptp_tx_start + HZ)) {
-   		dev_kfree_skb_any(pf->ptp_tx_skb);
+   		skb = pf->ptp_tx_skb;
   
   pf->ptp_tx_skb = NULL;
   
+   /* Free the skb after we clear the bitlock */
+   dev_kfree_skb_any(skb);
   
   pf->tx_hwtstamp_timeouts++;
 }
@@ -461,6 +473,7 @@
 struct i40e_link_status *hw_link_info;
 struct i40e_hw *hw = &pf->hw;
 u64 incval;
+u32 mult;

 hw_link_info = &hw->phy.link_info;

@@ -468,10 +481,10 @@
 switch (hw_link_info->link_speed) {
 case I40E_LINK_SPEED_10GB:
-   		incval = I40E_PTP_10GB_INCVAL;
+   		mult = I40E_PTP_10GB_INCVAL_MULT;
   
   break;
 case I40E_LINK_SPEED_1GB:
-   		incval = I40E_PTP_1GB_INCVAL;
+   		mult = I40E_PTP_1GB_INCVAL_MULT;
   
   break;
 case I40E_LINK_SPEED_100MB:
{  
   		incval = 0;
   
   break;
 }  
 case I40E_LINK_SPEED_40GB:
    
-   incval = I40E_PTP_40GB_INCVAL;
mult = 1;
break;
}

/* The increment value is calculated by taking the base 40GbE incvalue */
/* and multiplying it by a factor based on the link speed. */
/* */
incval = I40E_PTP_40GB_INCVAL * mult;
+
/* Write the new increment value into the increment register. The */
/* hardware will not update the clock until both registers have been */
/* written. */
wr32(hw, I40E_PRTTSYN_INC_H, incval >> 32);

/* Update the base adjustment value. */
-WRITE_ONCE(pf->ptp_base_adj, incval);
+WRITE_ONCE(pf->ptp_adj_mult, mult);
smp_mb(); /* Force the above update. */
}

if (!IS_ERR_OR_NULL(pf->ptp_clock))
return 0;

-strncpy(pf->ptp_caps.name, i40e_driver_name, sizeof(pf->ptp_caps.name));
+strncpy(pf->ptp_caps.name, i40e_driver_name, sizeof(pf->ptp_caps.name) - 1);
pf->ptp_caps.owner = THIS_MODULE;
pf->ptp_caps.max_adj = 999999999;
pf->ptp_caps.n_ext_ts = 0;
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e/i40e_txrx.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e/i40e_txrx.c
@@ -2828,13 +2828,16 @@
 +l4_proto = ip.v4->protocol;
 } else if (*tx_flags & I40E_TX_FLAGS_IPV6) {
+  int ret;
+  +
+  tunnel |= I40E_TX_CTX_EXT_IP_IPV6;

  exthdr = ip.hdr + sizeof(*ip.v6);
  l4_proto = ip.v6->nexthdr;
-  if (l4.hdr != exthdr)
-    -ipv6_skip_exthdr(skb, exthdr - skb->data,
-      -&l4_proto, &frag_off);
+  ret = ipv6_skip_exthdr(skb, exthdr - skb->data,
+    &l4_proto, &frag_off);

if (ret < 0)
return -1;
}

/* define outer transport */
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40e/i40e_virtchnl_pf.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40e/i40e_virtchnl_pf.c
@@ -160,6 +160,7 @@
/**
static inline void i40e_vc_disable_vf(struct i40e_vf *vf)
{
+struct i40e_pf *pf = vf->pf;
int i;

i40e_vc_notify_vf_reset(vf);
@@ -170,6 +171,11 @@
 * ensure a reset.
 */
 for (i = 0; i < 20; i++) {
+/* If PF is in VFs releasing state reset VF is impossible,
+ * so leave it.
+ */
+if (test_bit(__I40E_VFS_RELEASING, pf->state))
+return;
if (i40e_reset_vf(vf, false))
return;
usleep_range(10000, 20000);
@@ -204,7 +210,7 @@
 * check for the valid queue id
 **/
static inline bool i40e_vc_isvalid_queue_id(struct i40e_vf *vf, u16 vsi_id,
- u8 qid)
+ u16 qid)
{
 struct i40e_pf *pf = vf->pf;
 struct i40e_vsi *vsi = i40e_find_vsi_from_id(pf, vsi_id);
@@ -219,7 +225,7 @@
 * check for the valid vector id
 **/
 static inline bool i40e_vc_isvalid_vector_id(struct i40e_vf *vf, u8 vector_id)
 static inline bool i40e_vc_isvalid_vector_id(struct i40e_vf *vf, u32 vector_id)
{
 struct i40e_pf *pf = vf->pf;
@@ -431,14 +437,28 @@
u32 v_idx, i, reg_idx, reg;
u32 next_q_idx, next_q_type;
u32 msix_vf, size;
+int ret = 0;
+
+msix_vf = pf->hw.func_caps.num_msix_vectors_vf;
+
+if (qvlist_info->num_vectors > msix_vf) {
+dev_warn(&pf->pdev->dev,
+"Incorrect number of iwarp vectors %u. Maximum %u allowed.\n",
+qvlist_info->num_vectors,
+msix_vf);
+ret = -EINVAL;
+goto err_out;
+}
+
size = sizeof(struct virtchnl_iwarp_qvlist_info) +
(sizeof(struct virtchnl_iwarp_qv_info) *
(qvlist_info->num_vectors - 1));
+kfree(vf->qvlist_info);
vf->qvlist_info = kzalloc(size, GFP_KERNEL);
-if (!vf->qvlist_info)
-    return -ENOMEM;
-
+if (!vf->qvlist_info) {
+    ret = -ENOMEM;
+    goto err_out;
+}
+
 vf->qvlist_info->num_vectors = qvlist_info->num_vectors;

msix_vf = pf->hw.func_caps.num_msix_vectors_vf;
@@ -449,8 +469,10 @@
 v_idx = qv_info->v_idx;
 /* Validate vector id belongs to this vf */
 -if (!i40e_vc_isvalid_vector_id(vf, v_idx))
-    goto err;
+if (!i40e_vc_isvalid_vector_id(vf, v_idx)) {
+    ret = -EINVAL;
+    goto err_free;
+}
+
 vf->qvlist_info->qv_info[i] = *qv_info;
@@ -492,10 +514,11 @@
 }

return 0;
-err:
+err_free:
kfree(vf->qvlist_info);
vf->qvlist_info = NULL;
+return -EINVAL;
+err_out:
+return ret;
}

/**
 * @vf: pointer to the VF structure
 * @flr: VFLR was issued or not
 *
 * Returns true if the VF is reset, false otherwise.
 * Returns true if the VF is in reset, resets successfully, or resets
 * are disabled and false otherwise.
 **/
bool i40e_reset_vf(struct i40e_vf *vf, bool flr)
{
    if (test_bit(__I40E_VF_RESETS_DISABLED, pf->state))
        return true;
    /* If the VFs have been disabled, this means something else is
     * resetting the VF, so we shouldn't continue.
     */
    if (test_and_set_bit(__I40E_VF_DISABLE, pf->state))
        return false;
    return true;

    i40e_trigger_vf_reset(vf, flr);
    if (!pf->vf)
        return;
    +set_bit(__I40E_VFS_RELEASING, pf->state);
    while (test_and_set_bit(__I40E_VF_DISABLE, pf->state))
        usleep_range(1000, 2000);
    i40e_notify_client_of_vf_enable(pf, 0);

    +/* Disable IOV before freeing resources. This lets any VF drivers
     * running in the host get themselves cleaned up before we yank
     * the carpet out from underneath their feet.
     */
+ */
+if (!pci_vfs_assigned(pf->pdev))
+pci_disable_sriov(pf->pdev);
+else
+dev_warn(&pf->pdev->dev, "VFs are assigned - not disabling SR-IOV\n");
+
/* Amortize wait time by stopping all VFs at the same time */
for (i = 0; i < pf->num_alloc_vfs; i++) {
  if (test_bit(I40E_VF_STATE_INIT, &pf->vf[i].vf_states))
    i40e_vsi_wait_queues_disabled(pf->vsi[pf->vf[i].lan_vsi_idx]);
}

-/* Disable IOV before freeing resources. This lets any VF drivers
- running in the host get themselves cleaned up before we yank
- the carpet out from underneath their feet.
- */
-if (!pci_vfs_assigned(pf->pdev))
-pci_disable_sriov(pf->pdev);
-else
-dev_warn(&pf->pdev->dev, "VFs are assigned - not disabling SR-IOV\n");
-
/* free up VF resources */
tmp = pf->num_alloc_vfs;
pf->num_alloc_vfs = 0;
}

clear_bit(__I40E_VF_DISABLE, pf->state);
+clear_bit(__I40E_VFS_RELEASING, pf->state);
}

#ifdef CONFIG_PCI_IOV
@@ -1425,7 +1455,7 @@
if (num_vfs) {
  if (!(pf->flags & I40E_FLAG_VEB_MODE_ENABLED)) {
    pf->flags |= I40E_FLAG_VEB_MODE_ENABLED;
-    i40e_do_reset_safe(pf, I40E_PF_RESET_FLAG);
+    i40e_do_reset_safe(pf, I40E_PF_RESET_AND_REBUILD_FLAG);
  }
  return i40e_pci_sriov_enable(pdev, num_vfs);
}
@@ -1433,7 +1463,7 @@
if (!pci_vfs_assigned(pf->pdev)) {
  i40e_free_vfs(pf);
  pf->flags &=- I40E_FLAG_VEB_MODE_ENABLED;
-  i40e_do_reset_safe(pf, I40E_PF_RESET_FLAG);
+  i40e_do_reset_safe(pf, I40E_PF_RESET_AND_REBUILD_FLAG);

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} else {
    dev_warn(&pdev->dev, "Unable to free VFs because some are assigned to VMs.\n");
    return -EINVAL;
}

/* If the VF is not trusted restrict the number of MAC/VLAN it can program */
#define I40E_VC_MAX_MAC_ADDR_PER_VF 12
+/* If the VF is not trusted restrict the number of MAC/VLAN it can program
 + * MAC filters: 16 for multicast, 1 for MAC, 1 for broadcast
 + */
+#define I40E_VC_MAX_MAC_ADDR_PER_VF (16 + 1 + 1)
#define I40E_VC_MAX_VLAN_PER_VF 8

/*@ -2279,6 +2311,16 @@
ret = I40E_ERR_INVALID_MAC_ADDR;
goto error_param;
}
+
@if (vf->pf_set_mac &
 + ether_addr_equal(al->list[i].addr,
 + vf->default_lan_addr.addr)) {
+dev_err(&pf->pdev->dev,
+"MAC addr %pM has been set by PF, cannot delete it for VF \%d, reset VF to change MAC addr\n",
+vf->default_lan_addr.addr, vf->vf_id);
+ret = I40E_ERR_PARAM;
+goto error_param;
+}
}

vsi = pf->vsi[vf->lan_vsi_idx];

/*@ -2888,6 +2930,7 @@
in ret = 0;
struct hlist_node *h;
int bkt;
+u8 i;

/* validate the request */
if (vf_id >= pf->num_alloc_vfs) {
/*@ -2899,6 +2942,21 @@

vf = &(pf->vf[vf_id]);
vsu = pf->vsi[vf->lan_vsi_idx];
+
+/* When the VF is resetting wait until it is done.
+ * It can take up to 200 milliseconds,
but wait for up to 300 milliseconds to be safe.
If the VF is indeed in reset, the vsi pointer has
to show on the newly loaded vsi under pf->vsi[id].
*/
for (i = 0; i < 15; i++) {
    if (test_bit(I40E_VF_STATE_INIT, &vf->vf_states)) {
        if (i > 0)
            vsi = pf->vsi[vf->lan_vsi_idx];
        break;
    }
    msleep(20);
}
if (!test_bit(I40E_VF_STATE_INIT, &vf->vf_states)) {
    dev_err(&pf->pdev->dev, "VF %d still in reset. Try again.\n",
    vf_id);
    vf->link_forced = true;
    vf->link_up = true;
    pfe.event_data.link_event.link_status = true;
    -pfe.event_data.link_event.link_speed = I40E_LINK_SPEED_40GB;
    +pfe.event_data.link_event.link_speed = VIRTCHNL_LINK_SPEED_40GB;
    break;
  case IFLA_VF_LINK_STATE_DISABLE:
    vf->link_forced = true;
  --- linux-4.15.0.orig/drivers/net/ethernet/intel/i40evf/i40e_txrx.c
  +++ linux-4.15.0/drivers/net/ethernet/intel/i40evf/i40e_txrx.c
  @ @ -1117,7 +1117,7 @@
    struct i40e_rx_buffer *rx_buffer,
    unsigned int size)
    {
        void *va = page_address(rx_buffer->page) + rx_buffer->page_offset;
        +void *va;
        #if (PAGE_SIZE < 8192)
        unsigned int truesize = i40e_rx_pg_size(rx_ring) / 2;
        #else
        @ @ -1127,6 +1127,7 @@
        struct sk_buff *skb;

        /* prefetch first cache line of first page */
        +va = page_address(rx_buffer->page) + rx_buffer->page_offset;
        prefetch(va);
        #if L1_CACHE_BYTES < 128
        prefetch(va + L1_CACHE_BYTES);
        @ @ -1181,7 +1182,7 @@
        struct i40e_rx_buffer *rx_buffer,
        unsigned int size)
        {
            -void *va = page_address(rx_buffer->page) + rx_buffer->page_offset;
void *va;
#if (PAGE_SIZE < 8192)
unsigned int truesize = i40e_rx_pg_size(rx_ring) / 2;
#else
@@ -1191,6 +1192,7 @@
struct sk_buff *skb;
/* prefetch first cache line of first page */
+va = page_address(rx_buffer->page) + rx_buffer->page_offset;
prefetch(va);
#if L1_CACHE_BYTES < 128
prefetch(va + L1_CACHE_BYTES);
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40evf/i40evf.h
+++ linux-4.15.0/drivers/net/ethernet/intel/i40evf/i40evf.h
@@ @ -187,6 +187,7 @@
enum i40evf_critical_section_t {
  __I40EVF_IN_CRITICAL_TASK, /* cannot be interrupted */
  __I40EVF_IN_CLIENT_TASK,
+ __I40EVF_IN_REMOVE_TASK, /* device being removed */
};
/* board specific private data structure */
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40evf/i40evf_main.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40evf/i40evf_main.c
@@ -1796,7 +1796,11 @@
adapter->flags |= I40EVF_FLAG_PF_COMMS_FAILED;
-if (netif_running(adapter->netdev)) {
+ /* We don't use netif_running() because it may be true prior to
+  * ndo_open() returning, so we can't assume it means all our open
+  * tasks have finished, since we're not holding the rtnl_lock here.
+  */
+if (adapter->state == __I40EVF_RUNNING) {
  set_bit(__I40E_VSI_DOWN, adapter->vsi.state);
  netif_carrier_off(adapter->netdev);
  netif_tx_disable(adapter->netdev);
@@ @ -1854,6 +1858,13 @@
struct i40evf_mac_filter *f;
  u32 reg_val;
  int i = 0, err;
+ bool running;
+  /* When device is being removed it doesn't make sense to run the reset
+  * task, just return in such a case.
+  */
+if (test_bit(__I40EVF_IN_REMOVE_TASK, &adapter->crit_section))
+return;
while (test_and_set_bit(__I40EVF_IN_CLIENT_TASK, &adapter->crit_section))
@@ -1913,7 +1924,13 @@

continue_reset:
-if (netif_running(netdev)) {
-/* We don't use netif_running() because it may be true prior to
- * ndo_open() returning, so we can't assume it means all our open
- * tasks have finished, since we're not holding the rtnl_lock here.
- */
+running = (adapter->state == __I40EVF_RUNNING);
 +
 +if (running) {
 netif_carrier_off(netdev);
 netif_tx_stop_all_queues(netdev);
 adapter->link_up = false;
@@ -1964,7 +1981,10 @@
 mod_timer(&adapter->watchdog_timer, jiffies + 2);

 -if (netif_running(adapter->netdev)) {
-/* We were running when the reset started, so we need to restore some
- * state here.
- */
+if (running) {
 /* allocate transmit descriptors */
 err = i40evf_setup_all_tx_resources(adapter);
 if (err)
@@ -2585,6 +2605,8 @@
 if (vfres->vf_cap_flags & VIRTCHNL_VF_OFFLOAD_VLAN)
 netdev->features |= NETIF_F_HW_VLAN_CTAG_FILTER;

+netdev->priv_flags |= IFF_UNICAST_FLT;
 +
 adapter->vsi.id = adapter->vsi_res->vsi_id;

 adapter->vsi.back = adapter;
@@ -2962,6 +2984,7 @@
 err_ioremap:
 free_netdev(netdev);
 err_alloc_etherdev:
+pci_disable_pcie_error_reporting(pdev);
 pci_release_regions(pdev);
 err_pci_reg:
 err_dma:
@@ -3066,7 +3089,8 @@
struct i40evf_mac_filter *f, *ftmp;
struct i40e_hw *hw = &adapter->hw;
int err;
-
+/* Indicate we are in remove and not to run reset_task */
+set_bit(__I40EVF_IN_REMOVE_TASK, &adapter->crit_section);
cancel_delayed_work_sync(&adapter->init_task);
cancel_work_sync(&adapter->reset_task);
cancel_delayed_work_sync(&adapter->client_task);
@@ -3103,6 +3127,8 @@
    flush_scheduled_work();

    cancel_work_sync(&adapter->adminq_task);
+
i40evf_free_rss(adapter);

if (hw->aq.asq.count)
--- linux-4.15.0.orig/drivers/net/ethernet/intel/i40evf/i40evf_virtchnl.c
+++ linux-4.15.0/drivers/net/ethernet/intel/i40evf/i40evf_virtchnl.c
@@ -176,6 +176,32 @@
 }

 /**
 + * i40evf_validate_num_queues
 + * @adapter: adapter structure
 + *
 + * Validate that the number of queues the PF has sent in
 + * VIRTCHNL_OP_GET_VF_RESOURCES is not larger than the VF can handle.
 + */
+static void i40evf_validate_num_queues(struct i40evf_adapter *adapter)
+{
+    if (adapter->vf_res->num_queue_pairs > I40EVF_MAX_REQ_QUEUES) {
+        struct virtchnl_vsi_resource *vsi_res;
+        int i;
+        
+        dev_info(&adapter->pdev->dev, "Received %d queues, but can only have a max of %d\n",
+         + adapter->vf_res->num_queue_pairs,
+         + I40EVF_MAX_REQ_QUEUES);
+        dev_info(&adapter->pdev->dev, "Fixing by reducing queues to %d\n",
+         + I40EVF_MAX_REQ_QUEUES);
+        adapter->vf_res->num_queue_pairs = I40EVF_MAX_REQ_QUEUES;
+        for (i = 0; i < adapter->vf_res->num_vsis; i++) {
+            vsi_res = &adapter->vf_res->vsi_res[i];
+            vsi_res->num_queue_pairs = I40EVF_MAX_REQ_QUEUES;
+        }
+    }
+    
+    

```c
/**
 * i40evf_get_vf_config
 * @hw: pointer to the hardware structure
 * @len: length of buffer
 *@@ -218,6 +244,11 @@
 * err = (i40e_status)le32_to_cpu(event.desc.cookie_low);
 * memcpy(adapter->vf_res, event.msg_buf, min(event.msg_len, len));
 */

 +/* some PFs send more queues than we should have so validate that
 + * we aren't getting too many queues
 + */
 +if (!err)
 +i40evf_validate_num_queues(adapter);
 i40e_vf_parse_hw_config(hw, adapter->vf_res);
 out_alloc:
 kfree(event.msg_buf);
 @@ -965,23 +996,34 @@
 if (v_opcode == VIRTCHNL_OP_EVENT) {
 struct virtchnl_pf_event *vpe =
 (struct virtchnl_pf_event *)msg;
 +bool link_up = vpe->event_data.link_event.link_status;
 switch (vpe->event) {
 case VIRTCHNL_EVENT_LINK_CHANGE:
 adapter->link_speed =
 vpe->event_data.link_event.link_speed;
 -if (adapter->link_up !=
 -vpe->event_data.link_event.link_status) {
 -adapter->link_up =
 -vpe->event_data.link_event.link_status;
 -if (adapter->link_up) {
 -netif_tx_start_all_queues(netdev);
 -netif_carrier_on(netdev);
 -} else {
 -netif_tx_stop_all_queues(netdev);
 -netif_carrier_off(netdev);
 -}
 -i40evf_print_link_message(adapter);
 +
 +/* we've already got the right link status, bail */
 +if (adapter->link_up == link_up)
 +break;
 +
 +/* If we get link up message and start queues before
 + * our queues are configured it will trigger a TX hang.
 + * In that case, just ignore the link status message,
 + * we'll get another one after we enable queues and
 + * actually prepared to send traffic.
 */
 ```
+ *\n+ if (link_up && adapter->state != __I40EVF_RUNNING)\n+ break;\n+\n+ adapter->link_up = link_up;\n+ if (link_up) {\n+ netif_tx_start_all_queues(netdev);\n+ netif_carrier_on(netdev);\n+ } else {\n+ netif_tx_stop_all_queues(netdev);\n+ netif_carrier_off(netdev);\n+ }\n+ i40evf_print_link_message(adapter);\nbreak;\n\ncase VIRTCHNL_EVENT_RESET_IMPENDING:\n dev_info(&adapter->pdev->dev, "PF reset warning received\n");\n @ @ -1046,6 +1088,7 @ @\n I40E_MAX_VF_VSI *\n sizeof(struct virtchnl_vsi_resource);\n memcpy(adapter->vf_res, msg, min(msglen, len));\n+ i40evf_validate_num_queues(adapter);\n i40e_vf_parse_hw_config(&adapter->hw, adapter->vf_res);\n */ restore current mac address */\n ether_addr_copy(adapter->hw.mac.addr, netdev->dev_addr);\n --- linux-4.15.0.orig/drivers/net/ethernet/intel/igb/e1000_82575.c\n +++ linux-4.15.0/drivers/net/ethernet/intel/igb/e1000_82575.c\n @ @ -562,7 +562,7 @@\n dev_spec->module_plugged = true;\n if (eth_flags->e1000_base_lx || eth_flags->e1000_base_sx) {\n hw->phy.media_type = e1000_media_type_internal_serdes;\n -} else if (eth_flags->e100_base_fx) {\n +} else if (eth_flags->e100_base_fx || eth_flags->e100_base_lx) {\n dev_spec->sgmii_active = true;\n hw->phy.media_type = e1000_media_type_internal_serdes;\n } else if (eth_flags->e1000_base_t) {\n @ @ -689,14 +689,10 @@\n break;\n}\n\n /* do not change link mode for 100BaseFX */\n -if (dev_spec->eth_flags.e100_base_fx)\n -break;\n -\n /* change current link mode setting */\n ctrl_ext &= ~E1000_CTRL_EXT_LINK_MODE_MASK;\n\n -if (hw->phy.media_type == e1000_media_type_copper)\n +if (dev_spec->sgmii_active)
ctrl_ext |= E1000_CTRL_EXT_LINK_MODE_SGMII;
else
ctrl_ext |= E1000_CTRL_EXT_LINK_MODE_PCIE_SERDES;

/* enable link status from external LINK_0 and LINK_1 pins */
#define E1000_CTRL_SWDPIN0 0x00040000 /* SWDPIN 0 value */
#define E1000_CTRL_SWDPIN1 0x00080000 /* SWDPIN 1 value */
#define E1000_CTRL_ADVD3WUC 0x00100000 /* D3 WUC */
#define E1000_CTRL_EN_PHY_PWR_MGMT 0x00200000 /* PHY PM enable */
#define E1000_CTRL_SDP0_DIR 0x00400000 /* SDP0 Data direction */
#define E1000_CTRL_SDP1_DIR 0x00800000 /* SDP1 Data direction */
#define E1000_CTRL_RST 0x04000000 /* Global reset */

phy_word = E1000_PHY_PLL_UNCONF;
for (i = 0; i < E1000_MAX_PLL_TRIES; i++) {
    /* check current state directly from internal PHY */
    phy_word = E1000_PHY_PLL_FREQ_REG;
    if (eth_flags->e100_base_fx || eth_flags->e100_base_lx) {
        supported |= SUPPORTED_100baseT_Full;
advertising |= ADVERTISED_100baseT_Full;
    }
}
status = pm_runtime_suspended(&adapter->pdev->dev) ? 
    0 : rd32(E1000_STATUS);
if (hw->phy.media_type == e1000_media_type_copper) {
    supported = (SUPPORTED_10baseT_Half |
    @ -201.7 +202.7 @
advertising &= ~ADVERTISED_100baseKX_Full;
}

- if (eth_flags->e100_base_fx) {
    + if (eth_flags->e100_base_fx || eth_flags->e100_base_lx) {
        supported |= SUPPORTED_100baseT_Full;
advertising |= ADVERTISED_100baseT_Full;
    }
--- linux-4.15.0.orig/drivers/net/ethernet/intel/igb/igb_main.c
+++ linux-4.15.0/drivers/net/ethernet/intel/igb/igb_main.c
@@ -961,7 +961,7 @@

++ -961.6 +961.7 @@
static int igb_request_msix(struct igb_adapter *adapter) {
    unsigned int num_q_vectors = adapter->num_q_vectors;
    struct net_device *netdev = adapter->netdev;
    int i, err = 0, vector = 0, free_vector = 0;

    if (err)
        goto err_out;

    for (i = 0; i < adapter->num_q_vectors; i++) {
        if (num_q_vectors > MAX_Q_VECTORS) {
            num_q_vectors = MAX_Q_VECTORS;
            dev_warn(&adapter->pdev->dev,
                "The number of queue vectors (%d) is higher than max allowed (%d)n",
                adapter->num_q_vectors, MAX_Q_VECTORS);
        }
        for (i = 0; i < num_q_vectors; i++) {
            struct igb_q_vector *q_vector = adapter->q_vector[i];

            vector++;
        }
    }

    WARN_ON(hw->mac.type != e1000_i210);
    WARN_ON(queue < 0 || queue > 1);

    if (enable) {
        /* i210 does not allow the queue 0 to be in the Strict
         * Priority mode while the Qav mode is enabled, so,
         * instead of disabling strict priority mode, we give
         * queue 0 the maximum of credits possible.
         *
         * See section 8.12.19 of the i210 datasheet, "Note:
         * Queue0 QueueMode must be set to 1b when
         * TransmitMode is set to Qav."
         * /
        if (queue == 0 && !enable) {
            /* max "linkspeed" idleslope in kbps */
            idleslope = 1000000;
            hicredit = ETH_FRAME_LEN;
        }
    }

    set_tx_desc_fetch_prio(hw, queue, TX_QUEUE_PRIO_HIGH);
    set_queue_mode(hw, queue, QUEUE_MODE_STREAM_RESERVATION);

    if ((hw->phy.media_type == e1000_media_type_copper) &&
        }
((!(connsw & E1000_CONNSW_AUTOSENSE_EN))){
    swap_now = true;
} else if (!(connsw & E1000_CONNSW_SERDESD)) {
    /* copper signal takes time to appear */
    if (adapter->copper_tries < 4) {
        adapter->copper_tries++;
        @ @ -3105,6 +3128,9 @@
        break;
    }
    +
+    dev_pm_set_driver_flags(&pdev->dev, DPM_FLAG_NEVER_SKIP);
+    pm_runtime_put_noidle(&pdev->dev);
    return 0;

    @ @ -3128,6 +3154,7 @@
    err_ioremap:
    free_netdev(netdev);
    err_alloc_etherdev:
    +pci_disable_pcie_error_reporting(pdev);
    pci_release_mem_regions(pdev);
    err_pci_reg:
    err_dma:
    @ @ -3676,7 +3703,7 @@

    int igb_close(struct net_device *netdev)
    {
        -if (netif_device_present(netdev))
        +if (netif_device_present(netdev) || netdev->dismantle)
        return __igb_close(netdev, false);
        return 0;
    }
    @ @ -4306,6 +4333,8 @@
         DMA_TO_DEVICE);
    }

    +tx_buffer->next_to_watch = NULL;
    +
    /* move us one more past the eop_desc for start of next pkt */
    tx_buffer++;
    i++;
    @ @ -5831,9 +5860,18 @@
    struct igb_adapter *adapter;
    adapter = container_of(work, struct igb_adapter, reset_task);
+rtwl_lock();
+/* If we're already down or resetting, just bail */
+if (test_bit(__IGB_DOWN, &adapter->state) ||
    test_bit(__IGB_RESETTING, &adapter->state)) {
+rtwl_unlock();
+return;
+}
+
+igb_dump(adapter);
+netdev_err(adapter->netdev, "Reset adapter\n");
+rtwl_unrocked(adapter);
+rtwl_unlock();
}

/**
 * @@ -8279,9 +8317,7 @@
 * struct e1000_hw *hw = &adapter->hw;
 * u32 ctrl, rctl, status;
 * u32 wufc = runtime ? E1000_WUFC_LNKC : adapter->wol;
-#ifdef CONFIG_PM
-int retval = 0;
-#endif
+bool wake;

 rtwl_lock();
 netif_device_detach(netdev);
 @@ -8294,12 +8330,6 @@
 igb_clear_interrupt_scheme(adapter);
 rtwl_unlock();

-#ifdef CONFIG_PM
-retval = pci_save_state(pdev);
-if (retval)
-return retval;
-endif
-
 status = rd32(E1000_STATUS);
 if (status & E1000_STATUS_LU)
 wufc &= ~E1000_WUFC_LNKC;
 @@ -8316,10 +8346,6 @@
 }

 ctrl = rd32(E1000_CTRL);
-/* advertise wake from D3Cold */
-#define E1000_CTRL_ADVD3WUC 0x00100000
-/* phy power management enable */
-#define E1000_CTRL_EN_PHY_PWR_MGMT 0x00200000
 ctrl |= E1000_CTRL_ADVD3WUC;
wr32(E1000_CTRL, ctrl);

@@ -8333,12 +8359,15 @@
    wr32(E1000_WUFC, 0);
 }

-  *enable_wake = wufc || adapter->en_mng_pt;
-  if (!*enable_wake)
+  *enable_wake = wake;
+  if (!wake)
    igb_power_down_link(adapter);
  else
    igb_power_up_link(adapter);

+  if (enable_wake)
+    *enable_wake = wake;
+  
 /* Release control of h/w to f/w.  If f/w is AMT enabled, this
  * would have already happened in close and is redundant.
  */
@@ -8381,22 +8410,7 @@
 static int __maybe_unused igb_suspend(struct device *dev)
 {
-  int retval;
-  bool wake;
-  struct pci_dev *pdev = to_pci_dev(dev);
-  
-  retval = __igb_shutdown(pdev, &wake, 0);
-  if (retval)
-    return retval;
-  if (wake) {
-    pci_prepare_to_sleep(pdev);
-  } else {
-    pci_wake_from_d3(pdev, false);
-    pci_set_power_state(pdev, PCI_D3hot);
-  }
-  
-  return 0;
+  return __igb_shutdown(to_pci_dev(dev), NULL, 0);
 }

 static int __maybe_unused igb_resume(struct device *dev)
 @@ -8467,22 +8481,7 @@
 static int __maybe_unused igb_runtime_suspend(struct device *dev)
 {

-struct pci_dev *pdev = to_pci_dev(dev);
-int retval;
-bool wake;
-
-retval = __igb_shutdown(pdev, &wake, 1);
-if (retval)
-return retval;
-
-if (wake) {
-pci_prepare_to_sleep(pdev);
-} else {
-pci_wake_from_d3(pdev, false);
-pci_set_power_state(pdev, PCI_D3hot);
-}
-
-return 0;
+return __igb_shutdown(to_pci_dev(dev), NULL, 1);
}

static int __maybe_unused igb_runtime_resume(struct device *dev)
@@ -8718,14 +8717,20 @@
/* Indicate to hardware the Address is Valid. */
if (adapter->mac_table[index].state & IGB_MAC_STATE_IN_USE) {
-rar_high |= E1000_RAH_AV;
+if (is_valid_ether_addr(addr))
+rar_high |= E1000_RAH_AV;

-if (hw->mac.type == e1000_82575)
+switch (hw->mac.type) {
+case e1000_82575:
+case e1000_i210:
+rar_high |= E1000_RAHA_POOL_1 *
+adapter->mac_table[index].queue;
-else
+break;
+default:
+rar_high |= E1000_RAHA_POOL_1 <<
+adapter->mac_table[index].queue;
+break;
+}
}

wr32(E1000_RAL(index), rar_low);
@@ -8756,17 +8761,36 @@
static int igb_ndo_set_vf_mac(struct net_device *netdev, int vf, u8 *mac)
{
 struct igb_adapter *adapter = netdev_priv(netdev);
-if (!is_valid_ether_addr(mac) || (vf >= adapter->vfs_allocated_count))
+
+if (vf >= adapter->vfs_allocated_count)
+return -EINVAL;
+
+/* Setting the VF MAC to 0 reverts the IGB_VF_FLAG_PF_SET_MAC
+ * flag and allows to overwrite the MAC via VF netdev. This
+ * is necessary to allow libvirt a way to restore the original
+ * MAC after unbinding vfio-pci and reloading igbvf after shutting
+ * down a VM.
+ */
+if (is_zero_ether_addr(mac)) {
+adapter->vf_data[vf].flags &= ~IGB_VF_FLAG_PF_SET_MAC;
+dev_info(&adapter->pdev->dev, "remove administratively set MAC on VF %d\n", + vf);
+} else if (is_valid_ether_addr(mac)) {
+adapter->vf_data[vf].flags |= IGB_VF_FLAG_PF_SET_MAC;
+dev_info(&adapter->pdev->dev, "setting MAC %pM on VF %d\n", + mac, vf);
+dev_info(&adapter->pdev->dev, "Reload the VF driver to make this change effective.");
+/* Generate additional warning if PF is down */
+if (test_bit(__IGB_DOWN, &adapter->state)) {
+dev_warn(&adapter->pdev->dev, "The VF MAC address has been set, but the PF device is not up.\n");
+dev_warn(&adapter->pdev->dev, "Bring the PF device up before attempting to use the VF device.\n");
+}
+} else {
+return -EINVAL;
+-adapter->vf_data[vf].flags |= IGB_VF_FLAG_PF_SET_MAC;
+-dev_info(&adapter->pdev->dev, "setting MAC %pM on VF %d\n", mac, vf);
+-dev_info(&adapter->pdev->dev, "Reload the VF driver to make this change effective.");
-if (test_bit(__IGB_DOWN, &adapter->state)) {
+dev_warn(&adapter->pdev->dev, "The VF MAC address has been set, but the PF device is not up.\n");
+dev_warn(&adapter->pdev->dev, "Bring the PF device up before attempting to use the VF device.\n");
} return igb_set_vf_mac(adapter, vf, mac);
}
--- linux-4.15.0.orig/drivers/net/ethernet/intel/igb/igb_ptp.c
+++ linux-4.15.0/drivers/net/ethernet/intel/igb/igb_ptp.c
@@ -65,9 +65,15 @@
 *
 * The 40 bit 82580 SYSTIM overflows every
\* \* 2\(^{40}\) * 10^{-9} / 60 = 18.3 \text{ minutes.}\*

\* SYSTIM is converted to real time using a timecounter. As
\* timecounter\_cyc2time() allows old timestamps, the timecounter
\* needs to be updated at least once per half of the SYSTIM interval.
\* Scheduling of delayed work is not very accurate, so we aim for 8
\* minutes to be sure the actual interval is shorter than 9.16 minutes.

\*/

#define IGB\_SYSTIM\_OVERFLOW\_PERIOD (HZ * 60 * 9)
#define IGB\_SYSTIM\_OVERFLOW\_PERIOD (HZ * 60 * 8)
#define IGB\_PTP\_TX\_TIMEOUT (HZ * 15)
#define INCPERIOD\_82576BIT (E1000\_TIMINCA\_16NS\_SHIFT)
#define INCPVALUE\_82576\_MASKGENMASK (E1000\_TIMINCA\_16NS\_SHIFT - 1, 0)

adapter->ptp\_tx\_skb = NULL;
clear\_bit\_unlock(_IGB\_PTP\_TX\_IN\_PROGRESS, &adapter->state);
adapter->tx\_hwtstamp\_timeouts++;

\*/
void igb\_ptp\_tx\_hang(struct igb\_adapter *adapter)
{

struct e1000\_hw *hw = &adapter->hw;
bool timeout = time\_is\_before\_jiffies(adapter->ptp\_tx\_start +
    IGB\_PTP\_TX\_TIMEOUT);

rd32(E1000\_TXSTMPH);
dev\_warn(&adapter->pdev->dev, "clearing Tx timestamp hang\n");
return;

rd32(E1000\_TXSTMPH);
dev\_warn(&adapter->pdev->dev, "clearing Tx timestamp hang\n");
return;

--- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe\_common.c
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe\_common.c
@@ -1895,7 +1895,12 @@
 if (enable\_addr != 0)
rar_high |= IXGBE_RAH_AV;

/* Record lower 32 bits of MAC address and then make
* sure that write is flushed to hardware before writing
* the upper 16 bits and setting the valid bit.
*/
IXGBE_WRITE_REG(hw, IXGBE_RAL(index), rar_low);
+IXGBE_WRITE_FLUSH(hw);
IXGBE_WRITE_REG(hw, IXGBE_RAH(index), rar_high);

return 0;
@@ -1927,8 +1932,13 @@
rar_high = IXGBE_READ_REG(hw, IXGBE_RAH(index));
rar_high &= ~(0x0000FFFF | IXGBE_RAH_AV);
-IXGBE_WRITE_REG(hw, IXGBE_RAL(index), 0);
+/* Clear the address valid bit and upper 16 bits of the address
+ before clearing the lower bits. This way we aren't updating
+ a live filter.
+*/
+IXGBE_WRITE_REG(hw, IXGBE_RAH(index), rar_high);
+IXGBE_WRITE_FLUSH(hw);
+IXGBE_WRITE_REG(hw, IXGBE_RAL(index), 0);

/* clear VMDq pool/queue selection for this RAR */
hw->mac.ops.clear_vmdq(hw, index, IXGBE_CLEAR_VMDQ_ALL);
@@ -2257,7 +2267,7 @@
    IXGBE_WRITE_REG(hw, IXGBE_FCTTV(i), reg);
    -- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe_ethtool.c
@@ -3253,7 +3253,8 @@
    page_swap = true;
    }
    -if (sff8472_rev == IXGBE_SFF_SFF_8472_UNSUP || page_swap) {
    +if (sff8472_rev == IXGBE_SFF_SFF_8472_UNSUP || page_swap ||
    +!(addr_mode & IXGBE_SFF_DDM_IMPLEMENTED)) {
/* We have a SFP, but it does not support SFF-8472 */
    modinfo->type = ETH_MODULE_SFF_8079;
    modinfo->eeprom_len = ETH_MODULE_SFF_8079_LEN;
    -- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe_lib.c
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe_lib.c
@@ -924,7 +924,7 @@
    ring->queue_index = txr_idx;

 /* assign ring to adapter */
-adapter->tx_ring[txr_idx] = ring;
+WRITE_ONCE(adapter->tx_ring[txr_idx], ring);

 /* update count and index */
 txr_count--;
@@ -951,7 +951,7 @@
 set_ring_xdp(ring);

 /* assign ring to adapter */
-adapter->xdp_ring[xdp_idx] = ring;
+WRITE_ONCE(adapter->xdp_ring[xdp_idx], ring);

 /* update count and index */
 xdp_count--;
@@ -998,7 +998,7 @@
 ring->queue_index = rrxr_idx;

 /* assign ring to adapter */
-adapter->rx_ring[rrxr_idx] = ring;
+WRITE_ONCE(adapter->rx_ring[rrxr_idx], ring);

 /* update count and index */
 rrxr_count--;
@@ -1027,13 +1027,13 @@
 ixgbe_for_each_ring(ring, q_vector->tx) { 
    if (ring_is_xdp(ring))
-adapter->xdp_ring[ring->queue_index] = NULL;
+WRITE_ONCE(adapter->xdp_ring[ring->queue_index], NULL);
    else
-adapter->tx_ring[ring->queue_index] = NULL;
+WRITE_ONCE(adapter->tx_ring[ring->queue_index], NULL);
 }

 ixgbe_for_each_ring(ring, q_vector->rx)
-adapter->rx_ring[ring->queue_index] = NULL;
+WRITE_ONCE(adapter->rx_ring[ring->queue_index], NULL);

 adapter->q_vector[v_idx] = NULL;
 napi_hash_del(&q_vector->napi);
--- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe_main.c
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe_main.c
@@ -1872,12 +1872,15 @@

static void ixgbe_dma_sync_frag(struct ixgbe_ring *rx_ring,
struct sk_buff *skb)
{
/* if the page was released unmap it, else just sync our portion */
-if (unlikely(IXGBE_CB(skb)->page_released)) {
-dma_unmap_page_attrs(rx_ring->dev, IXGBE_CB(skb)->dma,
- ixgbe_rx_pg_size(rx_ring),
- DMA_FROM_DEVICE,
- IXGBE_RX_DMA_ATTR);
+if (ring_uses_build_skb(rx_ring)) {
+unsigned long mask = (unsigned long)ixgbe_rx_pg_size(rx_ring) - 1;
+unsigned long offset = (unsigned long)(skb->data) & mask;
+
+dma_sync_single_range_for_cpu(rx_ring->dev,
+ IXGBE_CB(skb)->dma,
+ offset,
+ skb_headlen(skb),
+ DMA_FROM_DEVICE);
} else {
struct skb_frag_struct *frag = &skb_shinfo(skb)->frags[0];

@@ -1887,6 +1890,14 @@
    skb_frag_size(frag),
           DMA_FROM_DEVICE);
}
+
+/* If the page was released, just unmap it. */
+if (unlikely(IXGBE_CB(skb)->page_released)) {
+dma_unmap_page_attrs(rx_ring->dev, IXGBE_CB(skb)->dma,
+ ixgbe_rx_pg_size(rx_ring),
+ DMA_FROM_DEVICE,
+ IXGBE_RX_DMA_ATTR);
+}
+
}else
/**
@@ -1980,7 +1991,7 @@
    return (page_to_nid(page) != numa_mem_id()) || page_is_pmemalloc(page); }

-static bool ixgbe_can_reuse_rx_page(struct ixgbe_rx_buffer *rx_buffer)
+static bool ixgbe_can_reuse_rx_page(struct ixgbe_rx_buffer *rx_buffer,
+    int rx_buffer_pgcnt)
{
    unsigned int pagecnt_bias = rx_buffer->pagecnt_bias;
    struct page *page = rx_buffer->page;
@@ -1991,7 +2003,7 @@
#if (PAGE_SIZE < 8192)
/* if we are only owner of page we can reuse it */
- if (unlikely((page_ref_count(page) - pagecnt_bias) > 1))
+ if (unlikely((rx_buffer_pgcnt - pagecnt_bias) > 1))
    return false;
#else
/* The last offset is a bit aggressive in that we assume the
@@ -2056,11 +2068,18 @@
static struct ixgbe_rx_buffer *ixgbe_get_rx_buffer(struct ixgbe_ring *rx_ring,
    union ixgbe_adv_rx_desc *rx_desc,
    struct sk_buff **skb,
- const unsigned int size)
+ const unsigned int size,
+ int *rx_buffer_pgcnt)
{
    struct ixgbe_rx_buffer *rx_buffer;

    rx_buffer = &rx_ring->rx_buffer_info[rx_ring->next_to_clean];
    +*rx_buffer_pgcnt =
+#if (PAGE_SIZE < 8192)
+page_count(rx_buffer->page);
+#else
+0;
+#endif
    prefetchw(rx_buffer->page);
    *skb = rx_buffer->skb;

    @@ -2090,9 +2109,10 @@

 static void ixgbe_put_rx_buffer(struct ixgbe_ring *rx_ring,
    struct ixgbe_rx_buffer *rx_buffer,
    -struct sk_buff *skb)
-+struct sk_buff *skb,
+int rx_buffer_pgcnt)
{
    -if (ixgbe_can_reuse_rx_page(rx_buffer)) {
    +if (ixgbe_can_reuse_rx_page(rx_buffer, rx_buffer_pgcnt)) {
        /* hand second half of page back to the ring */
        ixgbe_reuse_rx_page(rx_ring, rx_buffer);
    } else {
    @@ -2226,9 +2246,10 @@
        return skb;
    }

    -#define IXGBE_XDP_PASS 0
-#define IXGBE_XDP_CONSUMED 1
-#define IXGBE_XDP_TX 2
+##define IXGBE_XDP_PASS0


+define IXGBE_XDP_CONSUMEDBIT(0)
+define IXGBE_XDP_TXBIT(1)
+define IXGBE_XDP_REDIRBIT(2)

static int ixgbe_xmit_xdp_ring(struct ixgbe_adapter *adapter,
    struct xdp_buff *xdp);
@@ -2257,7 +2278,7 @@
case XDP_REDIRECT:
    err = xdp_do_redirect(adapter->netdev, xdp, xdp_prog);
    if (!err)
-       result = IXGBE_XDP_TX;
+       result = IXGBE_XDP_REDIR;
    else
    result = IXGBE_XDP_CONSUMED;
    break;
@@ -2286,7 +2307,8 @@
    rx_buffer->page_offset ^= truesize;
    #else
    unsigned int truesize = ring_uses_build_skb(rx_ring) ?
-       SKB_DATA_ALIGN(IXGBE_SKB_PAD + size) :
+       SKB_DATA_ALIGN(IXGBE_SKB_PAD + size) +
+       SKB_DATA_ALIGN(sizeof(struct skb_shared_info)) :
        SKB_DATA_ALIGN(size);
    rx_buffer->page_offset += truesize;
    #endif /* IXGBE_FCOE */
    u16 cleaned_count = ixgbe_desc_unused(rx_ring);
    -bool xdp_xmit = false;
    +unsigned int xdp_xmit = 0;
    while (likely(total_rx_packets < budget)) {
        union ixgbe_adv_rx_desc *rx_desc;
        struct ixgbe_rx_buffer *rx_buffer;
        struct sk_buff *skb;
        struct xdp_buff xdp;
        +int rx_buffer_pgcnt;
        unsigned int size;

        /* return some buffers to hardware, one at a time is too slow */
        @ @ -2343,7 +2366,7 @@
        */
        dma_rmb();

        -rx_buffer = ixgbe_get_rx_buffer(rx_ring, rx_desc, &skb, size);
        +rx_buffer = ixgbe_get_rx_buffer(rx_ring, rx_desc, &skb, size, &rx_buffer_pgcnt);
/* retrieve a buffer from the ring */
if (!skb) {
  @@ -2358,8 +2381,10 @@
}

if (IS_ERR(skb)) {
  -if (PTR_ERR(skb) == -IXGBE_XDP_TX) {
      -xdp_xmit = true;
      +unsigned int xdp_res = -PTR_ERR(skb);
  +if (xdp_res & (IXGBE_XDP_TX | IXGBE_XDP_REDIR)) {
      +xdp_xmit |= xdp_res;
      ixgbe_rx_buffer_flip(rx_ring, rx_buffer, size);
      } else {
      rx_buffer->pagecnt_bias++;
      @@ -2383,7 +2408,7 @@
      break;
    }

    -ixgbe_put_rx_buffer(rx_ring, rx_buffer, skb);
    +ixgbe_put_rx_buffer(rx_ring, rx_buffer, skb, rx_buffer_pgcnt);
    cleaned_count++;

    /* place incomplete frames back on ring for completion */
    @@ -2431,7 +2456,10 @@
    total_rx_packets++;
    }

    -if (xdp_xmit) {
    +if (xdp_xmit & IXGBE_XDP_REDIR)
      +xdp_do_flush_map();
    +
    +if (xdp_xmit & IXGBE_XDP_TX) {
      struct ixgbe_ring *ring = adapter->xdp_ring[smp_processor_id()];

      /* Force memory writes to complete before letting h/w
      @@ -2439,8 +2467,6 @@ */
      wmb();
      writel(ring->next_to_use, ring->tail);
      -
      -xdp_do_flush_map();
    }

    u64_stats_update_begin(&rx_ring->syncp);
    @@ -2660,7 +2686,7 @@
    /* 16K ints/sec to 9.2K ints/sec */
    avg_wire_size *= 15;
avg_wire_size += 11452;
} else if (avg_wire_size <= 1980) {
+} else if (avg_wire_size < 1968) {
 /* 9.2K ints/sec to 8K ints/sec */
 avg_wire_size *= 5;
 avg_wire_size += 22420;
 @@ .2693,6+.2719,8 @@
 case IXGBE_LINK_SPEED_2_5GB_FULL:
 case IXGBE_LINK_SPEED_1GB_FULL:
 case IXGBE_LINK_SPEED_10_FULL:
+if (avg_wire_size > 8064)
+avg_wire_size = 8064;
 itr += DIV_ROUND_UP(avg_wire_size,
 IXGBE_ITR_ADAPTIVE_MIN_INC * 64) *
 IXGBE_ITR_ADAPTIVE_MIN_INC;
 @@ .3229,11+.3257,13 @@
 return budget;

 /* all work done, exit the polling mode */
 -napi_complete_done(napi, work_done);
 -if (adapter->rx_itr_setting & 1)
-ixgbe_set_itr(q_vector);
 -if (!test_bit(__IXGBE_DOWN, &adapter->state))
 -ixgbe_irq_enable_queues(adapter, BIT_ULL(q_vector->v_idx));
+if (likely(napi_complete_done(napi, work_done))) {
 +if (adapter->rx_itr_setting & 1)
 +ixgbe_set_itr(q_vector);
 +if (!test_bit(__IXGBE_DOWN, &adapter->state))
 +ixgbe_irq_enable_queues(adapter,
 +BIT_ULL(q_vector->v_idx));
 +}

 return min(work_done, budget - 1);
}
 @@ .3609,12+.3639,18 @@
 else
 mtqc |= IXGBE_MTQC_64VF;
 } else {
 -if (tcs > 4)
 +if (tcs > 4) {
 mtqc = IXGBE_MTQC_RT_ENA | IXGBE_MTQC_8TC_8TQ;
 -else if (tcs > 1)
 +} else if (tcs > 1) {
 mtqc = IXGBE_MTQC_RT_ENA | IXGBE_MTQC_4TC_4TQ;
 -else
 -mtqc = IXGBE_MTQC_64Q_1PB;
 +} else {
 +u8 max_txq = adapter->num_tx_queues +
+adapter->num_xdp_queues;
+if (max_txq > 63)
+mtqc = IXGBE_MTQC_RT_ENA | IXGBE_MTQC_4TC_4TQ;
+else
+mtqc = IXGBE_MTQC_64Q_1PB;
+
} 
}

IXGBE_WRITE_REG(hw, IXGBE_MTQC, mtqc);
@@ -3946,8 +3982,11 @@
else
mrqc = IXGBE_MRQC_VMDQRSS64EN;

-/* Enable L3/L4 for Tx Switched packets */
-mrqc |= IXGBE_MRQC_L3L4TXSWEN;
+/* Enable L3/L4 for Tx Switched packets only for X550,
+ older devices do not support this feature */
+if (hw->mac.type >= ixgbe_mac_X550)
+mrqc |= IXGBE_MRQC_L3L4TXSWEN;
} else {
if (tcs > 4)
mrqc = IXGBE_MRQC_RTRSS8TCEN;
@@ -4112,11 +4151,15 @@
  rxdctl &= ~0x3FFFFF;
  rxdctl |= 0x080420;
  #if (PAGE_SIZE < 8192)
-} else { 
-/* RXDCTL.RLPML does not work on 82599 */
-} else if (hw->mac.type != ixgbe_mac_82599EB) {
rxdctl &= ~(IXGBE_RXDCTL_RLPMLMASK |
  IXGBE_RXDCTL_RLPML_EN);

-/* Limit the maximum frame size so we don't overrun the skb */
+/* Limit the maximum frame size so we don't overrun the skb.
+ This can happen in SRIOV mode when the MTU of the VF is
+ * higher than the MTU of the PF. */
if (ring_uses_build_skb(ring) &&
  !test_bit(__IXGBE_RX_3K_BUFFER, &ring->state))
rxdctl |= IXGBE_MAX_2K_FRAME_BUILD_SKB |
@@ -5235,6 +5278,7 @@
struct ixgbe_hw *hw = &adapter->hw;
struct hlist_node *node2;
struct ixgbe_fdir_filter *filter;
+u8 queue;

spin_lock(&adapter->fdir_perfect_lock);
hlist_for_each_entry_safe(filter, node2, &adapter->fdir_filter_list, fdir_node) {
+if (filter->action == IXGBE_FDIR_DROP_QUEUE) {
+queue = IXGBE_FDIR_DROP_QUEUE;
+} else {
+u32 ring = ethtool_get_flow_spec_ring(filter->action);
+u8 vf = ethtool_get_flow_spec_ring_vf(filter->action);
+
+if (!vf && (ring >= adapter->num_rx_queues)) {
+e_err(drv, "FDIR restore failed without VF, ring: %u\n",
+     ring);
+continue;
+} else if (vf &&
+   ((vf > adapter->num_vfs) ||
+    ring >= adapter->num_rx_queues_per_pool)) {
+e_err(drv, "FDIR restore failed with VF, vf: %hhu, ring: %u\n",
+     vf, ring);
+continue;
+}
+
+  /* Map the ring onto the absolute queue index */
+if (!vf)
+queue = adapter->rx_ring[ring]->reg_idx;
+else
+queue = ((vf - 1) * 
+adapter->num_rx_queues_per_pool) + ring;
+}
+
+ixgbe_fdir_write_perfect_filter_82599(hw, 
-&filter->filter, 
-filter->sw_idx, 
-(filter->action == IXGBE_FDIR_DROP_QUEUE) ?
-IXGBE_FDIR_DROP_QUEUE : 
-adapter->rx_ring[filter->action]->reg_idx);
+&filter->filter, filter->sw_idx, queue);
}

spin_unlock(&adapter->fdir_perfect_lock);
@@ -6923,7 +6989,10 @@
}

for (i = 0; i < adapter->num_rx_queues; i++) {
-struct ixgbe_ring *rx_ring = adapter->rx_ring[i];
+struct ixgbe_ring *rx_ring = READ_ONCE(adapter->rx_ring[i]);
+
if (!rx_ring)
    continue;

non_eop_descs += rx_ring->rx_stats.non_eop_descs;
alloc_rx_page += rx_ring->rx_stats.alloc_rx_page;
alloc_rx_page_failed += rx_ring->rx_stats.alloc_rx_page_failed;

for (i = 0; i < adapter->num_tx_queues; i++) {
    struct ixgbe_ring *tx_ring = adapter->tx_ring[i];
    restart_queue += tx_ring->tx_stats.restart_queue;
    tx_busy += tx_ring->tx_stats.tx_busy;
    bytes += tx_ring->stats.bytes;
    packets += tx_ring->stats.packets;
}

for (i = 0; i < adapter->num_xdp_queues; i++) {
    struct ixgbe_ring *xdp_ring = adapter->xdp_ring[i];
    restart_queue += xdp_ring->tx_stats.restart_queue;
    tx_busy += xdp_ring->tx_stats.tx_busy;
    bytes += xdp_ring->stats.bytes;
}

if (unlikely(skb_shinfo(skb)->tx_flags & SKBTX_HW_TSTAMP) &&
    adapter->ptp_clock) {
    if (!test_and_set_bit_lock(__IXGBE_PTP_TX_IN_PROGRESS,
                                &adapter->state)) {
        skb_shinfo(skb)->tx_flags |= SKBTX_HW_TSTAMP;
        tx_flags |= IXGBE_TX_FLAGS_TSTAMP;
    } else {
        skb_shinfo(skb)->tx_flags &= ~SKBTX_HW_TSTAMP;
        tx_flags &= ~IXGBE_TX_FLAGS_TSTAMP;
    }
}

ixgbe_atr_compute_perfect_hash_82599(&input->filter, mask);
err = ixgbe_fdir_write_perfect_filter_82599(hw, &input->filter,
    input->sw_idx, queue);
- if (!err)
- ixgbe_update_ethtool_fdir_entry(adapter, input, input->sw_idx);
+ if (err)
+ goto err_out_w_lock;
+
+ ixgbe_update_ethtool_fdir_entry(adapter, input, input->sw_idx);
spin_unlock(&adapter->fdir_perfect_lock);

if ((uhtid != 0x800) && (adapter->jump_tables[uhtid]))
    disable_dev = !test_and_set_bit(__IXGBE_DISABLED, &adapter->state);
free_netdev(netdev);
err_alloc_etherdev:
+pci_disable_pcie_error_reporting(pdev);
pci_release_mem_regions(pdev);
err_pci_reg:
err_dma:
    rtnl_lock();
netif_deviceDetach(netdev);

+if (netif_running(netdev))
+ixgbe_close_suspend(adapter);
+
+ if (state == pci_channel_io_perm_failure) {
+    rtnl_unlock();
+    return PCI_ERS_RESULT_DISCONNECT;
+}

- if (netif_running(netdev))
- ixgbe_close_suspend(adapter);
-
- if (!test_and_set_bit(__IXGBE_DISABLED, &adapter->state))
pci_disable_device(pdev);
rtnl_unlock();
--- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe_phy.h
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe_phy.h
@@ -823,6 +823,7 @@
#define IXGBE_SFF_SOFT_RS_SELECT_10G0x8
#define IXGBE_SFF_SOFT_RS_SELECT_1G0x0
#define IXGBE_SFF_ADDRESSING_MODE0x4
+#define IXGBE_SFF_DDM_IMPLEMENTED0x40
#define IXGBE_SFF_QSFP_DA_ACTIVE_CABLE0x1
#define IXGBE_SFF_QSFP_DA_PASSIVE_CABLE0x8
#define IXGBE_SFF_QSFP_CONNECTOR_NOT_SEPARABLE	0x23
--- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe_sriov.c
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe_sriov.c
@@ -511,12 +511,16 @@
    return err;
 }
-
 struct ixgbe_set_vf_lpe(struct ixgbe_adapter *adapter, u32 *msgbuf, u32 vf)
+int ixgbe_set_vf_lpe(struct ixgbe_adapter *adapter, u32 max_frame, u32 vf)
 {
    struct ixgbe_hw *hw = &adapter->hw;
    int max_frame = msgbuf[1];
    u32 max_frs;

+    if (max_frame < ETH_MIN_MTU || max_frame > IXGBE_MAX_JUMBO_FRAME_SIZE) {
+        e_err(drv, "VF max_frame %d out of range\n", max_frame);
+        return -EINVAL;
+    }
+
    /* For 82599EB we have to keep all PFs and VFs operating with
     * the same max_frame value in order to avoid sending an oversize
     *@if (max_frame > IXGBE_MAX_JUMBO_FRAME_SIZE) {
+    e_err(drv, "VF max_frame %d out of range\n", max_frame);
+    return -EINVAL;
    }
    */
    /* MTU < 68 is an error and causes problems on some kernels */
-    if (max_frame > IXGBE_MAX_JUMBO_FRAME_SIZE) {
-        e_err(drv, "VF max_frame %d out of range\n", max_frame);
-        return -EINVAL;
-    }
    /* pull current max frame size from hardware */
    max_frs = IXGBE_READ_REG(hw, IXGBE_MAXFRS);
    max_frs &= IXGBE_MHADD_MFS_MASK;
    @@ -737,8 +735,12 @@
 static inline void ixgbe_vf_reset_event(struct ixgbe_adapter *adapter, u32 vf)
 {
    struct ixgbe_hw *hw = &adapter->hw;
+    struct ixgbe_ring_feature *vmdq = &adapter->ring_feature[RING_F_VMDQ];
    struct vf_data_storage *vfinfo = &adapter->vfinfo[vf];
+    u32 q_per_pool = __ALIGN_MASK(1, ~vmdq->mask);
    u8 num_tcs = netdev_get_num_tc(adapter->netdev);
+    u32 reg_val;
+    u32 queue;

    /* remove VLAN filters belonging to this VF */
    ixgbe_clear_vf_vlans(adapter, vf);
ixgbe_set_vmvr(adapter, vfinfo->pf_vlan, adapter->default_up, vf);

- if (vfinfo->spoofchk_enabled)
+ if (vfinfo->spoofchk_enabled) {
  hw->mac.ops.set_vlan_anti_spoofing(hw, true, vf);
+ hw->mac.ops.set_mac_anti_spoofing(hw, true, vf);
+ }
  }

/* reset multicast table array for vf */
 @@ -775,6 +779,35 @@
 */
 /* reset VF api back to unknown */
 adapter->vfinfo[vf].vf_api = ixgbe_mbox_api_10;
 +
+ /* Restart each queue for given VF */
+ for (queue = 0; queue < q_per_pool; queue++) {
+ unsigned int reg_idx = (vf * q_per_pool) + queue;
+ +reg_val = IXGBE_READ_REG(hw, IXGBE_PVFTXDCTL(reg_idx));
+ +/* Re-enabling only configured queues */
+ +if (reg_val) {
+ +reg_val |= IXGBE_TXDCTL_ENABLE;
+ +IXGBE_WRITE_REG(hw, IXGBE_PVFTXDCTL(reg_idx), reg_val);
+ +reg_val &= ~IXGBE_TXDCTL_ENABLE;
+ +IXGBE_WRITE_REG(hw, IXGBE_PVFTXDCTL(reg_idx), reg_val);
+ +}
+ +}
+ +
+ +IXGBE_WRITE_FLUSH(hw);
+ +}
+ +
+ +static void ixgbe_vf_clear_mbx(struct ixgbe_adapter *adapter, u32 vf)
+ +{
+ +struct ixgbe_hw *hw = &adapter->hw;
+ +u32 word;
+ +
+ +/* Clear VF's mailbox memory */
+ +for (word = 0; word < IXGBE_VFMAILBOX_SIZE; word++)
+ +IXGBE_WRITE_REG_ARRAY(hw, IXGBE_PFMBMEM(vf), word, 0);
+ +IXGBE_WRITE_FLUSH(hw);
+ }

static int ixgbe_set_vf_mac(struct ixgbe_adapter *adapter,

/* reset the filters for the device */
ixgbe_vf_reset_event(adapter, vf);

+ixgbe_vf_clear_mbx(adapter, vf);
+
/* set vf mac address */
if (!is_zero_ether_addr(vf_mac))
ixgbe_set_vf_mac(adapter, vf, vf_mac);
@@ -1246,7 +1281,7 @@
retval = ixgbe_set_vf_vlan_msg(adapter, msgbuf, vf);
break;

--- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe_type.h
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe_type.h
@@ -2508,6 +2508,7 @@
/* Translated register #defines */
#define IXGBE_PVFTDH(P)		(0x06010 + (0x40 * (P)))
#define IXGBE_PVFTDT(P)		(0x06018 + (0x40 * (P)))
+#define IXGBE_PVFTXDCTL(P)	(0x06028 + (0x40 * (P)))
#define IXGBE_PVFTDWBAL(P)	(0x06038 + (0x40 * (P)))
#define IXGBE_PVFTDWBAH(P)	(0x0603C + (0x40 * (P)))

--- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbe/ixgbe_x550.c
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbe/ixgbe_x550.c
@@ -3417,6 +3419,9 @@
hw->phy.sfp_setup_needed = false;

if (hw->phy.sfp_type == ixgbe_sfp_type_1g_sx_core0 ||
- hw->phy.sfp_type == ixgbe_sfp_type_1g_sx_core1) {
+ hw->phy.sfp_type == ixgbe_sfp_type_1g_sx_core1 ||
+ hw->phy.sfp_type == ixgbe_sfp_type_1g_sx_core1 ||
+ hw->phy.sfp_type == ixgbe_sfp_type_1g_lx_core0 ||
+ hw->phy.sfp_type == ixgbe_sfp_type_1g_lx_core1) {
*speed = IXGBE_LINK_SPEED_1GB_FULL;
return 0;
}
/* Reset PHY */
if (!hw->phy.reset_disable && hw->phy.ops.reset)
    hw->phy.ops.reset(hw);
--- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbevf/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/intel/ixgbevf/ethtool.c
@@ -95,22 +95,16 @@
    struct ethtool_link_ksettings *cmd)
{
    struct ixgbevf_adapter *adapter = netdev_priv(netdev);
-struct ixgbe_hw *hw = &adapter->hw;
-    u32 link_speed = 0;
-    bool link_up;
-ethtool_link_ksettings_zero_link_mode(cmd, supported);
-ethtool_link_ksettings_add_link_mode(cmd, supported, 10000baseT_Full);
    cmd->base.autoneg = AUTONEG_DISABLE;
    cmd->base.port = -1;

    hw->mac.get_link_status = 1;
    hw->mac.ops.check_link(hw, &link_speed, &link_up, false);
-
    -if (link_up) {
    +if (adapter->link_up) {
        __u32 speed = SPEED_10000;

        switch (link_speed) {
        +switch (adapter->link_speed) {
            case IXGBE_LINK_SPEED_10GB_FULL:
                speed = SPEED_10000;
                break;
        --- linux-4.15.0.orig/drivers/net/ethernet/intel/ixgbevf/ixgbevf_main.c
        +++ linux-4.15.0/drivers/net/ethernet/intel/ixgbevf/ixgbevf_main.c
        @@ -1858,11 +1858,6 @@
                    hw = &adapter->hw;
                    int count = 0;

                    -if ((netdev_uc_count(netdev)) > 10) {
                    +pr_err("Too many unicast filters - No Space\n");
                    -return -ENOSPC;
                    -}
        
                    if (!netdev_uc_empty(netdev)) {
                        struct netdev_hw_addr *ha;

                        @@ -3428,6 +3423,10 @@
                            skb_checksum_help(skb);
                            goto no_csum;
                        }

+if (first->protocol == htons(ETH_P_IP))
+type_tucmd |= IXGBE_ADVTXD_TUCMD_IPV4;
+
/* update TX checksum flag */
first->tx_flags |= IXGBE_TX_FLAGS_CSUM;

int skb_checksum_start_offset(skb) {
    return skb->data;
}

ether_addr_copy(hw->mac.addr, addr->sa_data);
ether_addr_copy(hw->mac.perm_addr, addr->sa_data);
ether_addr_copy(netdev->dev_addr, addr->sa_data);

return 0;

if (netif_running(netdev))
    ixgbevf_close_suspend(adapter);

if (state == pci_channel_io_perm_failure) {
    rtnl_unlock();
    return PCI_ERS_RESULT_DISCONNECT;
}

-if (netif_running(netdev))
    -ixgbevf_close_suspend(adapter);
-
    if (!test_and_set_bit(__IXGBEVF_DISABLED, &adapter->state))
        pci_disable_device(pdev);
    rtnl_unlock();
    --- linux-4.15.0.orig/drivers/net/ethernet/korina.c
    +++ linux-4.15.0/drivers/net/ethernet/korina.c
    @ @ -219,7 +219,7 @@
    dev_kfree_skb_any(skb);
    spin_unlock_irqrestore(&lp->lock, flags);

    -return NETDEV_TX_BUSY;
    +return NETDEV_TX_OK;
    }
    }

    return rc;

    probe_err_register:
- kfree(lp->td_ring);
+ kfree((struct dma_desc *)KSEG0ADDR(lp->td_ring));
probe_err_td_ring:
iounmap(lp->tx_dma_regs);
probe_err_dma_tx:
@@ -1133,6 +1133,7 @@
iounmap(lp->eth_regs);
iounmap(lp->rx_dma_regs);
iounmap(lp->tx_dma_regs);
+ kfree((struct dma_desc *)KSEG0ADDR(lp->td_ring));

unregister_netdev(bif->dev);
free_netdev(bif->dev);
--- linux-4.15.0.orig/drivers/net/ethernet/marvell/mv643xx_eth.c
+++ linux-4.15.0/drivers/net/ethernet/marvell/mv643xx_eth.c
@@ -2886,7 +2886,7 @@
ret = mv643xx_eth_shared_of_probe(pdev);
if (ret)
- return ret;
+ goto err_put_clk;
pd = dev_get_platdata(&pdev->dev);

msp->tx_csum_limit = (pd != NULL && pd->tx_csum_limit) ?
@@ -2894,6 +2894,11 @@
infer_hw_params(msp);

return 0;
+
+err_put_clk:
+if (!IS_ERR(msp->clk))
+ clk_disable_unprepare(msp->clk);
+ return ret;
+
static int mv643xx_eth_shared_remove(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/net/ethernet/marvell/mvmdio.c
+++ linux-4.15.0/drivers/net/ethernet/marvell/mvmdio.c
@@ -64,7 +64,7 @@
struct orion_mdio_dev {
 void __iomem *regs;
- struct clk *clk[3];
+ struct clk *clk[4];
/*
 * If we have access to the error interrupt pin (which is
 * somewhat misnamed as it not only reflects internal errors
@@ -319,11 +319,25 @@
init_waitqueue_head(&dev->smi_busy_wait);

    -for (i = 0; i < ARRAY_SIZE(dev->clk); i++) {
    -dev->clk[i] = of_clk_get(pdev->dev.of_node, i);
    -if (IS_ERR(dev->clk[i]))
    -break;
    -clk_prepare_enable(dev->clk[i]);
    +if (pdev->dev.of_node) {
    +    for (i = 0; i < ARRAY_SIZE(dev->clk); i++) {
    +    dev->clk[i] = of_clk_get(pdev->dev.of_node, i);
    +    if (IS_ERR(dev->clk[i]))
    +        break;
    +    clk_prepare_enable(dev->clk[i]);
    +}
    +if (IS_ERR(dev->clk[i]))
    +    break;
    +clock_prepare_enable(dev->clk[i]);
    +}
    +} else {
    +dev->clk[0] = clk_get(&pdev->dev, NULL);
    +if (PTR_ERR(dev->clk[0]) == -EPROBE_DEFER) {
    +    ret = -EPROBE_DEFER;
    +    goto out_clk;
    +}
    +if (!IS_ERR(dev->clk[0]))
    +    clk_prepare_enable(dev->clk[0]);
    }

dev->err_interrupt = platform_get_irq(pdev, 0);
@@ -365,6 +379,7 @@
    if (dev->err_interrupt > 0)
    writel(0, dev->regs + MVMDIO_ERR_INT_MASK);

+out_clk:
    for (i = 0; i < ARRAY_SIZE(dev->clk); i++) {
    if (IS_ERR(dev->clk[i]))
    break;
--- linux-4.15.0.orig/drivers/net/ethernet/marvell/mvneta.c
+++ linux-4.15.0/drivers/net/ethernet/marvell/mvneta.c
@@ -100,7 +100,7 @@
 #define MVNETA_DESC_SWAP BIT(6)
 #define MVNETA_TX_BRST_SZ_MASK(burst) ((burst) << 22)
 #define MVNETA_PORT_STATUS 0x2444
-#define MVNETA_TX_IN_PRGRS BIT(1)
+#define MVNETA_TX_IN_PRGRS BIT(0)
 #define MVNETA_TX_FIFO_EMPTY BIT(8)
 #define MVNETA_RX_MIN_FRAME_SIZE 0x247c
#define MVNETA_SERDES_CFG 0x24A0
@@ -1112,6 +1112,7 @@
 mvreg_write(pp, MVNETA_TXQ_CMD, q_map);

 +q_map = 0;
 /* Enable all initialized RXQs. */
 for (queue = 0; queue < rxq_number; queue++) {
 struct mvneta_rx_queue *rxq = &pp->rxqs[queue];
 @@ -1927,10 +1928,10 @@
 /* Main rx processing when using software buffer management */
 -static int mvneta_rx_swbm(struct mvneta_port *pp, int rx_todo,
 +static int mvneta_rx_swbm(struct napi_struct *napi,
   struct mvneta_port *pp, int rx_todo,
   struct mvneta_rx_queue *rxq)
 {
 -struct mvneta_pcpu_port *port = this_cpu_ptr(pp->ports);
 struct net_device *dev = pp->dev;
 int rx_done;
 u32 rcvd_pkts = 0;
 @@ -1958,7 +1959,7 @@
 rx_bytes = rx_desc->data_size - (ETH_FCS_LEN + MVNETA_MH_SIZE);
 index = rx_desc - rxq->descs;
 data = rxq->buf_virt_addr[index];
 -phys_addr = rx_desc->buf_phys_addr;
 +phys_addr = rx_desc->buf_phys_addr - pp->rx_offset_correction;

 if (!mvneta_rxq_desc_is_first_last(rx_status) ||
   (rx_status & MVNETA_RXD_ERR_SUMMARY)) {
 @@ -1985,7 +1986,7 @@
 skb->protocol = eth_type_trans(skb, dev);
 mvneta_rx_csum(pp, rx_status, skb);
 -napi_gro_receive(&port->napi, skb);
 +napi_gro_receive(napi, skb);

 rcvd_pkts++;
 rcvd_bytes += rx_bytes;
 @@ -2027,7 +2028,7 @@
 mvneta_rx_csum(pp, rx_status, skb);

 -napi_gro_receive(&port->napi, skb);
 +napi_gro_receive(napi, skb);
 }
if (rcvd_pkts) {
    @@ -2046,10 +2047,10 @@
}

/* Main rx processing when using hardware buffer management */
-static int mvneta_rx_hwbm(struct mvneta_port *pp, int rx_todo,
+static int mvneta_rx_hwbm(struct napi_struct *napi,
    struct mvneta_port *pp, int rx_todo,
    struct mvneta_rx_queue *rxq)
{
-    struct mvneta_pcpu_port *port = this_cpu_ptr(pp->ports);
    struct net_device *dev = pp->dev;
    int rx_done;
    u32 rcvd_pkts = 0;
    @@ -2101,7 +2102,7 @@
    if (unlikely(!skb))
        goto err_drop_frame_ret_pool;

-    dma_sync_single_range_for_cpu(dev->dev.parent,
+    dma_sync_single_range_for_cpu(&pp->bm_priv->pdev->dev,
        rx_desc->buf_phys_addr,
        MVNETA_MH_SIZE + NET_SKB_PAD,
        rx_bytes,
@@ -2111,7 +2112,7 @@
        skb->protocol = eth_type_trans(skb, dev);
    mvneta_rx_csum(pp, rx_status, skb);
-    napi_gro_receive(&port->napi, skb);
+    napi_gro_receive(napi, skb);
    rcvd_pkts++;
    rcvd_bytes += rx_bytes;
    @@ -2155,7 +2156,7 @@
    mvneta_rx_csum(pp, rx_status, skb);

-    napi_gro_receive(&port->napi, skb);
+    napi_gro_receive(napi, skb);
}

if (rcvd_pkts) {
    @@ -2758,17 +2759,18 @@
        /* For the case where the last mvneta_poll did not process all
         * RX packets
         */
-        -rx_queue = fls(((cause_rx_tx >> 8) & 0xff));
-        
+        cause_rx_tx |= pp->neta_armada3700 ? pp->cause_rx_tx :

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port->cause_rx_tx;

+rx_queue = fls((cause_rx_tx >> 8) & 0xff);
if (rx_queue) {
    rx_queue = rx_queue - 1;
    if (pp->bm_priv)
        -rx_done = mvneta_rx_hwbm(pp, budget, &pp->rxqs[rx_queue]);
        +rx_done = mvneta_rx_hwbm(napi, pp, budget,
            + &pp->rxqs[rx_queue]);
    else
        -rx_done = mvneta_rx_swmb(pp, budget, &pp->rxqs[rx_queue]);
        +rx_done = mvneta_rx_swmb(napi, pp, budget,
            + &pp->rxqs[rx_queue]);
}

if (rx_done < budget) {
    mvneta_tx_done_pkts_coal_set(pp, txq, txq->done_pkts_coal);
    /* Setup XPS mapping */
    -if (txq_number > 1)
        +if (pp->neta_armada3700)
            +cpu = 0;
        +else if (txq_number > 1)
            cpu = txq->id % num_present_cpus();
        else
            cpu = pp->rxq_def % num_present_cpus();
    on_each_cpu(mvneta_percpu_enable, pp, true);
    mvneta_start_dev(pp);
    -mvneta_port_up(pp);

    struct mvneta_pcpu_port *port = per_cpu_ptr(pp->ports, cpu);

    @ @ -3410,6 +3413,11 @ @
    netdev_update_features(dev);
    node_online);
    struct mvneta_pcpu_port *port = per_cpu_ptr(pp->ports, cpu);

    /* Armada 3700's per-cpu interrupt for mvneta is broken, all interrupts
    + * are routed to CPU 0, so we don't need all the cpu-hotplug support
    + */
    +if (pp->neta_armada3700)
        +return 0;

    spin_lock(&pp->lock);
    /*
    @@ -3856,13 +3864,18 @@

on_each_cpu(mvneta_percpu_mask_interrupt, pp, true);

-/* We have to synchronise on the napi of each CPU */
-fold_each_online_cpu(cpu) {
-struct mvneta_pcpu_port *pcpu_port =
-per_cpu_ptr(pp->ports, cpu);
+if (!pp->neta_armada3700) {
+/* We have to synchronise on the napi of each CPU */
+for_each_online_cpu(cpu) {
+struct mvneta_pcpu_port *pcpu_port =
+per_cpu_ptr(pp->ports, cpu);

-napi_synchronize(&pcpu_port->napi);
-napi_disable(&pcpu_port->napi);
+napi_synchronize(&pcpu_port->napi);
+napi_disable(&pcpu_port->napi);
+}
+} else {
+napi_synchronize(&pp->napi);
+napi_disable(&pp->napi);
}

pp->rxq_def = pp->indir[0];
@@ -3879,12 +3892,16 @@
mvneta_percpu_elect(pp);
spin_unlock(&pp->lock);

-/* We have to synchronise on the napi of each CPU */
-fold_each_online_cpu(cpu) {
-struct mvneta_pcpu_port *pcpu_port =
-per_cpu_ptr(pp->ports, cpu);
+if (!pp->neta_armada3700) {
+/* We have to synchronise on the napi of each CPU */
+for_each_online_cpu(cpu) {
+struct mvneta_pcpu_port *pcpu_port =
+per_cpu_ptr(pp->ports, cpu);

-napi_enable(&pcpu_port->napi);
-napi_disable(&pcpu_port->napi);
+napi_enable(&pcpu_port->napi);
+napi_disable(&pcpu_port->napi);
+}
+} else {
+napi_synchronize(&pp->napi);
+napi_disable(&pp->napi);
}

netif_tx_start_all_queues(pp->dev);
@@ -4350,7 +4367,7 @@
err = register_netdev(dev);
if (err < 0) {
    dev_err(&pdev->dev, "failed to register\n");
-goto err_free_stats;
+goto err_netdev;
}

netdev_info(dev, "Using %s mac address %pM\n", mac_from,
@@ -4369,13 +4386,11 @@
return 0;

err_netdev:
-.unregister_netdev(dev);
if (pp->bm_priv) {
    mvneta_bm_pool_destroy(pp->bm_priv, pp->pool_long, 1 << pp->id);
    mvneta_bm_pool_destroy(pp->bm_priv, pp->pool_short,
@@ -4369,13 +4386,11 @@
    1 << pp->id);
} -err_free_stats:
free_percpu(pp->stats);
err_free_ports:
free_percpu(pp->ports);
--- linux-4.15.0.orig/drivers/net/ethernet/marvell/mvpp2.c
+++ linux-4.15.0/drivers/net/ethernet/marvell/mvpp2.c
@@ -33,6 +33,7 @@
 #include <linux/hrtimer.h>
 #include <linux/ktime.h>
 #include <linux/regmap.h>
+  #include <linux/if_vlan.h>
 #include <uapi/linux/ppp_defs.h>
 #include <net/ip.h>
 #include <net/ipv6.h>
@@ -835,6 +836,8 @@
 #define MVPP2_MIB_COUNTERS_STATS_DELAY (1 * HZ)
 
+#define MVPP2_DESC_DMA_MASK DMA_BIT_MASK(40)
+
 /* Definitions */

 /* Shared Packet Processor resources */
@@ -1330,7 +1333,7 @@
 if (port->priv->hw_version == MVPP21)
     return tx_desc->pp21.buf_dma_addr;
 else
-    return tx_desc->pp22.buf_dma_addr_ptp & GENMASK_ULL(40, 0);
+    return tx_desc->pp22.buf_dma_addr_ptp & MVPP2_DESC_DMA_MASK;
static void mvpp2_txdesc_dma_addr_set(struct mvpp2_port *port,
@@ -1348,7 +1351,7 @@
    u64 val = (u64)addr;

    -tx_desc->pp22.buf_dma_addr_ptp &= ~GENMASK_ULL(40, 0);
+  tx_desc->pp22.buf_dma_addr_ptp &= ~MVPP2_DESC_DMA_MASK;
    tx_desc->pp22.buf_dma_addr_ptp |= val;
    tx_desc->pp22.packet_offset = offset;
}
@@ -1408,7 +1411,7 @@
  if (port->priv->hw_version == MVPP21)
    return rx_desc->pp21.buf_dma_addr;
  else
    -return rx_desc->pp22.buf_dma_addr_key_hash & GENMASK_ULL(40, 0);
+    return rx_desc->pp22.buf_dma_addr_key_hash & MVPP2_DESC_DMA_MASK;
  }

static unsigned long mvpp2_rxdesc_cookie_get(struct mvpp2_port *port,
@@ -1417,7 +1420,7 @@
  if (port->priv->hw_version == MVPP21)
    return rx_desc->pp21.buf_cookie;
  else
    -return rx_desc->pp22.buf_cookie_misc & GENMASK_ULL(40, 0);
+    return rx_desc->pp22.buf_cookie_misc & MVPP2_DESC_DMA_MASK;
  }

static size_t mvpp2_rxdesc_size_get(struct mvpp2_port *port,
@@ -1486,16 +1489,16 @@
  /* Write tcam index - indirect access */
  -mvpp2_write(priv, MVPP2_PRS_TCAM_IDX_REG, pe->index);
  for (i = 0; i < MVPP2_PRS_TCAM_WORDS; i++)
  -mvpp2_write(priv, MVPP2_PRS_TCAM_DATA_REG(i), pe->tcam.word[i]);
  -
  /* Write sram index - indirect access */
  mvpp2_write(priv, MVPP2_PRS_SRAM_IDX_REG, pe->index);
  for (i = 0; i < MVPP2_PRS_SRAM_WORDS; i++)
  mvpp2_write(priv, MVPP2_PRS_SRAM_DATA_REG(i), pe->sram.word[i]);
+
  /* Write tcam index - indirect access */
  +mvpp2_write(priv, MVPP2_PRS_TCAM_IDX_REG, pe->index);
  +for (i = 0; i < MVPP2_PRS_TCAM_WORDS; i++)
  +mvpp2_write(priv, MVPP2_PRS_TCAM_DATA_REG(i), pe->tcam.word[i]);
  +
  return 0;
/* Clear all ai bits for next iteration */
mvpp2_prs_sram_ai_update(&pe, 0,
MVPP2_PRS_SRAM_AI_MASK);

/* Set result info bits to 'single vlan' */
mvpp2_prs_sram_ri_update(&pe, MVPP2_PRS_RI_VLAN_SINGLE,
+MVPP2_PRS_RI_VLAN_MASK);

/* If packet is tagged continue check vlans */
mvpp2_prs_sram_nextlu_set(&pe, MVPP2_PRS_LU_VLAN);
} else {

regmap_read(priv->sysctrl_base, GENCONF_CTRL0, &val);
if (port->gop_id == 2)
-val |= GENCONF_CTRL0_PORT0_RGMII | GENCONF_CTRL0_PORT1_RGMII;
+val |= GENCONF_CTRL0_PORT0_RGMII;
else if (port->gop_id == 3)
val |= GENCONF_CTRL0_PORT1_RGMII_MII;
regmap_write(priv->sysctrl_base, GENCONF_CTRL0, val);

int i;

for (i = 0; i < ARRAY_SIZE(mvpp2_ethtool_regs); i++)
-memcpy(data + i * ETH_GSTRING_LEN,
- &mvpp2_ethtool_regs[i].string, ETH_GSTRING_LEN);
+strncpy(data + i * ETH_GSTRING_LEN,
+ mvpp2_ethtool_regs[i].string, ETH_GSTRING_LEN);
}

/* Set defaults to the MVPP2 port */
static void mvpp2_defaults_set(struct mvpp2_port *port)
{
-int tx_port_num, val, queue, ptxq, lrxq;
+int tx_port_num, val, queue, lrxq;

if (port->priv->hw_version == MVPP21) {
/* Configure port to loopback if needed */
@@ -5000,11 +5006,9 @@
mvpp2_write(port->priv, MVPP2_TXP_SCHED_CMD_1_REG, 0);

/* Close bandwidth for all queues */
- for (queue = 0; queue < MVPP2_MAX_TXQ; queue++) {
+ for (queue = 0; queue < MVPP2_MAX_TXQ; queue++)
mvpp2_write(port->priv, 
- MVPP2_TXQ_SCHED_TOKEN_CNTR_REG(ptxq), 0); 
-}
+ MVPP2_TXQ_SCHED_TOKEN_CNTR_REG(queue), 0);

/* Set refill period to 1 usec, refill tokens 
* and bucket size to maximum 
@@ -5300,7 +5304,7 @@ */
}

/* Set Tx descriptors fields relevant for CSUM calculation */
-static u32 mvpp2_txq_desc_csum(int l3_offs, int l3_proto,
+static u32 mvpp2_txq_desc_csum(int l3_offs, __be16 l3_proto,
    int ip_hdr_len, int l4_proto)
{
    u32 command;
@@ -5846,7 +5850,7 @@
    txq->descs_dma = 0;

/* Set minimum bandwidth for disabled TXQs */
-mvpp2_write(port->priv, MVPP2_TXQ_SCHED_TOKEN_CNTR_REG(txq->id), 0);
+mvpp2_write(port->priv, MVPP2_TXQ_SCHED_TOKEN_CNTR_REG(txq->log_id), 0);

/* Set Tx descriptors queue starting address and size */
cpu = get_cpu();
@@ -6267,14 +6271,15 @@
    if (skb->ip_summed == CHECKSUM_PARTIAL) {
        int ip_hdr_len = 0;
        u8 l4_proto;
@@ -6286,7 +6291,7 @@
    }
    return mvpp2_txq_desc_csum(skb_network_offset(skb),
- skb->protocol, ip_hdr_len, l4_proto);
+ l3_proto, ip_hdr_len, l4_proto);
}

return MVPP2_TXD_L4_CSUM_NOT | MVPP2_TXD_IP_CSUM_DISABLE;
@@ -6723,10 +6728,12 @@
   cause_rx_tx & ~MVPP2_CAUSE_MISC_SUM_MASK);
}

-cause_tx = cause_rx_tx & MVPP2_CAUSE_TXQ_OCCUP_DESC_ALL_MASK;
-if (cause_tx) {
-cause_tx >>= MVPP2_CAUSE_TXQ_OCCUP_DESC_ALL_OFFSET;
-mvpp2_tx_done(port, cause_tx, qv->sw_thread_id);
+if (port->has_tx_irqs) {
+cause_tx = cause_rx_tx & MVPP2_CAUSE_TXQ_OCCUP_DESC_ALL_MASK;
+if (cause_tx) {
+cause_tx >>= MVPP2_CAUSE_TXQ_OCCUP_DESC_ALL_OFFSET;
+mvpp2_tx_done(port, cause_tx, qv->sw_thread_id);
+}
}

/* Process RX packets */
@@ -7127,6 +7134,7 @@
 int id = port->id;
 bool allmulti = dev->flags & IFF_ALLMULTI;

+retry:
 mvpp2_prs_mac_promisc_set(priv, id, dev->flags & IFF_PROMISC);
 mvpp2_prs_mac_multi_set(priv, id, MVPP2_PE_MAC_MC_ALL, allmulti);
 mvpp2_prs_mac_multi_set(priv, id, MVPP2_PE_MAC_MC_IP6, allmulti);
@@ -7134,9 +7142,13 @@
 /* Remove all port->id's mcast enries */
mvpp2_prs_mcast_del_all(priv, id);

-if (allmulti && !netdev_mc_empty(dev)) {
-  netdev_for_each_mc_addr(ha, dev)
-  mvpp2_prs_mac_da_accept(priv, id, ha->addr, true);
+if (!allmulti) {
+  netdev_for_each_mc_addr(ha, dev) {
+  if (mvpp2_prs_mac_da_accept(priv, id, ha->addr, true)) {
+    allmulti = true;
+    goto retry;
+  }
+}
+}
}

@@ -7184,6 +7196,7 @@
 static int mvpp2_change_mtu(struct net_device *dev, int mtu)
struct mvpp2_port *port = netdev_priv(dev);
+bool running = netif_running(dev);
int err;
if (!IS_ALIGNED(MVPP2_RX_PKT_SIZE(mtu), 8)) {
    mtu = ALIGN(MVPP2_RX_PKT_SIZE(mtu), 8);
}

-if (!netif_running(dev)) {
    err = mvpp2_bm_update_mtu(dev, mtu);
    if (!err) {
        port->pkt_size = MVPP2_RX_PKT_SIZE(mtu);
        return 0;
    }
    /* Reconfigure BM to the original MTU */
    err = mvpp2_bm_update_mtu(dev, dev->mtu);
    if (err)
        goto log_error;
}

mvpp2_stop_dev(port);
if (running)
    mvpp2_stop_dev(port);

err = mvpp2_bm_update_mtu(dev, mtu);
-if (!err) {
    +if (err) {
        +netdev_err(dev, "failed to change MTU\n");
        /* Reconfigure BM to the original MTU */
        +mvpp2_bm_update_mtu(dev, dev->mtu);
        +} else {
            port->pkt_size = MVPP2_RX_PKT_SIZE(mtu);
            goto out_start;
        }
    /* Reconfigure BM to the original MTU */
    -err = mvpp2_bm_update_mtu(dev, dev->mtu);
    -if (err)
        goto log_error;
    -out_start:
        mvpp2_start_dev(port);
        mvpp2_egress_enable(port);
        mvpp2_ingress_enable(port);
        +if (running) {

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mvpp2_start_dev(port);
mvpp2_egress_enable(port);
mvpp2_ingress_enable(port);
+
}

- return 0;
- log_error:
- netdev_err(dev, "failed to change MTU
); return err;
}

@@ -7919,6 +7916,7 @@
dev->min_mtu = ETH_MIN_MTU;
/* 9676 == 9700 - 20 and rounding to 8 */
dev->max_mtu = 9676;
+ dev->dev.of_node = port_node;

err = register_netdev(dev);
if (err < 0) {
@@ -8273,12 +8271,12 @@
if (IS_ERR(priv->axi_clk)) {
 err = PTR_ERR(priv->axi_clk);
 if (err == -EPROBE_DEFER)
- goto err_gop_clk;
+ goto err_mg_clk;
 priv->axi_clk = NULL;
 } else {
 err = clk_prepare_enable(priv->axi_clk);
 if (err < 0)
- goto err_gop_clk;
+ goto err_mg_clk;
 }
 }

@@ -8286,9 +8294,9 @@
priv->tclk = clk_get_rate(priv->pp_clk);

if (priv->hw_version == MVPP22) {
- err = dma_set_mask(&pdev->dev, DMA_BIT_MASK(40));
+ err = dma_set_mask(&pdev->dev, MVPP2_DESC_DMA_MASK);
 if (err)
- goto err_mg_clk;
+ goto err_axi_clk;
 /* Sadly, the BM pools all share the same register to
 * store the high 32 bits of their address. So they
 * must all have the same high 32 bits, which forces
@@ -8296,21 +8294,21 @@*/
err = dma_set_coherent_mask(&pdev->dev, DMA_BIT_MASK(32));
if (err)
- goto err_mg_clk;
+ goto err_axi_clk;
}

/* Initialize network controller */
err = mvpp2_init(pdev, priv);
if (err < 0) {
  dev_err(&pdev->dev, "failed to initialize controller\n");
- goto err_mg_clk;
+ goto err_axi_clk;
}

priv->port_count = of_get_available_child_count(dn);
if (priv->port_count == 0) {
  dev_err(&pdev->dev, "no ports enabled\n");
  err = -ENODEV;
- goto err_mg_clk;
+ goto err_axi_clk;
}

priv->port_list = devm_kcalloc(&pdev->dev, priv->port_count,
@@ -8355,8 +8353,9 @@
  mvpp2_port_remove(priv->port_list[i]);
  i++;
}
- err_mg_clk:
- err_axi_clk:
clk_disable_unprepare(priv->axi_clk);
+err_mg_clk:
if (priv->hw_version == MVPP22)
  clk_disable_unprepare(priv->mg_clk);
err_gop_clk:
@@ -8373,9 +8372,6 @@
  struct device_node *port_node;
  int i = 0;

- flush_workqueue(priv->stats_queue);
- destroy_workqueue(priv->stats_queue);
- for_each_available_child_of_node(dn, port_node) {
  if (priv->port_list[i]) {
    mutex_destroy(&priv->port_list[i]->gather_stats_lock);
    @ @ -8384,6 +8380,8 @ @
    i++;
  }

destroy_workqueue(priv->stats_queue);
+
for (i = 0; i < MVPP2_BM_POOLS_NUM; i++) {
struct mvpp2_bm_pool *bm_pool = &priv->bm_pools[i];

--- linux-4.15.0.orig/drivers/net/ethernet/marvell/pxa168_eth.c
+++ linux-4.15.0/drivers/net/ethernet/marvell/pxa168_eth.c
@@ -1551,8 +1551,8 @@
mdiobus_unregister(pep->smi_bus);
mdiobus_free(pep->smi_bus);
-unregister_netdev(dev);
cancel_work_sync(&pep->tx_timeout_task);
+unregister_netdev(dev);
free_netdev(dev);
return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/marvell/skge.c
+++ linux-4.15.0/drivers/net/ethernet/marvell/skge.c
@@ -152,8 +152,10 @@
memcpy_fromio(p, 0, regs->len);
memcpy_fromio(p + B3_RI_WTO_R1, io + B3_RI_WTO_R1,
-t				      regs->len - B3_RI_WTO_R1);
+if (regs->len > B3_RI_WTO_R1) {
+    memcpy_fromio(p + B3_RI_WTO_R1, io + B3_RI_WTO_R1,
+                  regs->len - B3_RI_WTO_R1);
+}
}
/* Wake on Lan only supported on Yukon chips with rev 1 or above */
@@ -3120,7 +3122,7 @@
skb_put(skb, len);

if (dev->features & NETIF_F_RXCSUM) {
    skb->csum = csum;
+    skb->csum = le16_to_cpu(csum);
    skb->ip_summed = CHECKSUM_COMPLETE;
}

--- linux-4.15.0.orig/drivers/net/ethernet/marvell/sky2.c
+++ linux-4.15.0/drivers/net/ethernet/marvell/sky2.c
@@ -46,6 +46,7 @@
#include <linux/of_device.h>
#include <linux/dmi.h>
#include <asm/irq.h>

@@ -93,7 +94,7 @@
module_param(copybreak, int, 0);
MODULE_PARM_DESC(copybreak, "Receive copy threshold");

-static int disable_msi = 0;
+static int disable_msi = -1;
module_param(disable_msi, int, 0);
MODULE_PARM_DESC(disable_msi, "Disable Message Signaled Interrupt (MSI)");

@@ -214,7 +215,7 @@
static inline u16 gm_phy_read(struct sky2_hw *hw, unsigned port, u16 reg)
{
- u16 v;
+ u16 v = 0;
__gm_phy_read(hw, port, reg, &v);
return v;
}
@@ -4931,6 +4932,38 @@
return buf;
}

+static const struct dmi_system_id msi_blacklist[] = {
+{ 
+ .ident = "Dell Inspiron 1545",
+.matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc.") ,
+ DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 1545") ,
+ },
+ },
+{ 
+ .ident = "Gateway P-79",
+.matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Gateway") ,
+ DMI_MATCH(DMI_PRODUCT_NAME, "P-79") ,
+ },
+ },
+{ 
+ .ident = "ASUS P6T",
+.matches = {
+ DMI_MATCH(DMI_BOARD_VENDOR, "ASUSTeK Computer INC.") ,
+ DMI_MATCH(DMI_BOARD_NAME, "P6T") ,
+ },
+ },
+ .ident = "ASUS P6X",
+ .matches = {
+ DMI_MATCH(DMI_BOARD_VENDOR, "ASUSTeK Computer INC."),
+ DMI_MATCH(DMI_BOARD_NAME, "P6X"),
+ },
+ },
+ }
+
+ static int sky2_probe(struct pci_dev *pdev, const struct pci_device_id *ent)
+ {
+ struct net_device *dev, *dev1;
+ goto err_out_free_pci;
+ }
+
+ if (disable_msi == -1)
+ disable_msi = !!dmi_check_system(msi_blacklist);
+ if (!disable_msi && pci_enable_msi(pdev) == 0) {
+ err = sky2_test_msi(hw);
+ if (err) {
+ INIT_WORK(&hw->restart_work, sky2_restart);
+ }
+
+ return 0;
+
+ --- linux-4.15.0.orig/drivers/net/ethernet/mediatek/mtk_eth_soc.c
+++ linux-4.15.0/drivers/net/ethernet/mediatek/mtk_eth_soc.c
@@ -1041,7 +1041,7 @@
 skb->protocol = eth_type_trans(skb, netdev);
 @ @ -1788,6 +1788,7 @@
 static int mtk_start_dma(struct mtk_eth *eth)
 {
+ u32 rx_2b_offset = (NET_IP_ALIGN == 2) ? MTK_RX_2B_OFFSET : 0;
+ int err;
+ RX_DMA_VID(trxd.rxd3));
+ skb_record_rx_queue(skb, 0);
+ @ @ -1788,6 +1788,7 @@

 static int mtk_start_dma(struct mtk_eth *eth)
 {
+ u32 rx_2b_offset = (NET_IP_ALIGN == 2) ? MTK_RX_2B_OFFSET : 0;
+ int err;
err = mtk_dma_init(eth);
@@ -1804,7 +1805,7 @@
 MTK_QDMA_GLO_CFG);

 mtk_w32(eth,
 -MTK_RX_DMA_EN | MTK_RX_2B_OFFSET |
 +MTK_RX_DMA_EN | rx_2b_offset |
 MTK_RX_BT_32DWORDS | MTK_MULTI_EN, 
 MTK_PDMA_GLO_CFG);

 @@ -2306,13 +2307,13 @@
 switch (cmd->cmd) {
 case ETHTOOL_GRXRINGS:
 -if (dev->features & NETIF_F_LRO) {
 +if (dev->hw_features & NETIF_F_LRO) {
     cmd->data = MTK_MAX_RX_RING_NUM;
     ret = 0;
     break;
 case ETHTOOL_GRXCLSRLCNT:
 -if (dev->features & NETIF_F_LRO) {
 +if (dev->hw_features & NETIF_F_LRO) {
     struct mtk_mac *mac = netdev_priv(dev);
     cmd->rule_cnt = mac->hwlr0_ip_cnt;
     @@ -2320,11 +2321,11 @@
     break;
 case ETHTOOL_GRXCLSRULE:
 -if (dev->features & NETIF_F_LRO) {
 +if (dev->hw_features & NETIF_F_LRO) {
     ret = mtk_hwlr0_get_fdir_entry(dev, cmd); 
     break;
 case ETHTOOL_GRXCLSRLALL:
 -if (dev->features & NETIF_F_LRO) {
 +if (dev->hw_features & NETIF_F_LRO) {
     ret = mtk_hwlr0_get_fdir_all(dev, cmd,
         rule_locs);
     break;
 @@ -2341,11 +2342,11 @@
 switch (cmd->cmd) {
 case ETHTOOL_SRXCLSRLINS:
 -if (dev->features & NETIF_F_LRO) {
 +if (dev->hw_features & NETIF_F_LRO) {
     ret = mtk_hwlr0_add_ipaddr(dev, cmd);
break;
case ETHTOOL_SRXCLSRLDEL:
- if (dev->features & NETIF_F_LRO)
+ if (dev->hw_features & NETIF_F_LRO)
    ret = mtk_hwlro_del_ipaddr(dev, cmd);
    break;
default:
    @ @ -2453,6 +2454,8 @@
    eth->netdev[id]->irq = eth->irq[0];
    eth->netdev[id]->dev.of_node = np;

    +eth->netdev[id]->max_mtu = MTK_MAX_RX_LENGTH - MTK_RX_ETH_HLEN;
+ return 0;

free_netdev:
--- linux-4.15.0.orig/drivers/net/ethernet/mediatek/mtk_eth_soc.h
+++ linux-4.15.0/drivers/net/ethernet/mediatek/mtk_eth_soc.h
@@ -285,6 +285,7 @@
#define RX_DMA_DONEBIT(31)
#define RX_DMA_PLEN0(_x)(((_x) & 0x3fff) << 16)
#define RX_DMA_GET_PLEN0(_x)(((_x) >> 16) & 0x3fff)
+#define RX_DMA_VTAGBIT(15)

/* QDMA descriptor rxd3 */
#define RX_DMA_VID(_x)(((_x) & 0xfff)
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/Kconfig
@@ -5,7 +5,7 @@
config MLX4_EN
    tristate "Mellanox Technologies 1/10/40Gbit Ethernet support"
    depends on MAY_USE_DEVLINK
-    depends on PCI
+    depends on PCI && NETDEVICES && ETHERNET && INET
    select MLX4_CORE
    imply PTP_1588_CLOCK
---help---
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/alloc.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/alloc.c
@@ -337,7 +337,7 @@
    struct mlx4_zone_allocator *zone_alloc = zone->allocator;
    struct mlx4_zone_entry *curr_node;
@@ -2642,6 +2642,8 @@
if (!priv->cmd.context)
      return -ENOMEM;
+
      if (mlx4_is_mfunc(dev))
          mutex_lock(&priv->cmd.slave_cmd_mutex);
      down_write(&priv->cmd.switch_sem);
@@ -2667,6 +2669,8 @@
      down(&priv->cmd.poll_sem);
      priv->cmd.use_events = 1;
      up_write(&priv->cmd.switch_sem);
+
      if (mlx4_is_mfunc(dev))
          mutex_unlock(&priv->cmd.slave_cmd_mutex);

      return err;
  }
@@ -2679,6 +2683,8 @@
    struct mlx4_priv *priv = mlx4_priv(dev);
    int i;

+
      if (mlx4_is_mfunc(dev))
          mutex_lock(&priv->cmd.slave_cmd_mutex);
      down_write(&priv->cmd.switch_sem);
      priv->cmd.use_events = 0;
@@ -2686,9 +2692,12 @@
          down(&priv->cmd.event_sem);

          kfree(priv->cmd.context);
+
          priv->cmd.context = NULL;

          up(&priv->cmd.poll_sem);
          up_write(&priv->cmd.switch_sem);
+
          if (mlx4_is_mfunc(dev))
              mutex_unlock(&priv->cmd.slave_cmd_mutex);
    }

    struct mlx4_cmd_mailbox *mlx4_alloc_cmd_mailbox(struct mlx4_dev *dev)
struct mlx4_en_port_profile *prof = priv->prof;
struct mlx4_en_dev *mdev = priv->mdev;

u8 tx_pause, tx_ppp, rx_pause, rx_ppp;

if (!(priv->dcbx_cap & DCB_CAP_DCBX_VER_CEE))
    return 1;

if (priv->cee_config.pfc_state) {
    int tc;
    +rx_ppp = prof->rx_ppp;
    +tx_ppp = prof->tx_ppp;

    -priv->prof->rx_pause = 0;
    -priv->prof->tx_pause = 0;
    for (tc = 0; tc < CEE_DCBX_MAX_PRIO; tc++) {
        u8 tc_mask = 1 << tc;

        switch (priv->cee_config.dcb_pfc[tc]) {
        case pfc_disabled:
            -priv->prof->tx_ppp &= ~tc_mask;
            -priv->prof->rx_ppp &= ~tc_mask;
            +tx_ppp &= ~tc_mask;
            +rx_ppp &= ~tc_mask;
            break;
        case pfc_enabled_full:
            -priv->prof->tx_ppp |= tc_mask;
            -priv->prof->rx_ppp |= tc_mask;
            +tx_ppp |= tc_mask;
            +rx_ppp |= tc_mask;
            break;
        case pfc_enabled_tx:
            -priv->prof->tx_ppp |= tc_mask;
            -priv->prof->rx_ppp &= ~tc_mask;
            +tx_ppp |= tc_mask;
            +rx_ppp &= ~tc_mask;
            break;
        case pfc_enabled_rx:
            -priv->prof->tx_ppp &= ~tc_mask;
            -priv->prof->rx_ppp |= tc_mask;
            +tx_ppp &= ~tc_mask;
            +rx_ppp |= tc_mask;
            break;
        default:
            break;
            break;
    }
    -en_dbg(DRV, priv, "Set pfc on
    "+rx_pause = !!((rx_ppp || tx_ppp) ? 0 : prof->rx_pause;
+tx_pause = !!(rx_ppp || tx_ppp) ? 0 : prof->tx_pause;
} else {
+priv->prof->rx_pause = 1;
+priv->prof->tx_pause = 1;
-en_dbg(DRV, priv, "Set pfc on\n");
+rx_ppp = 0;
+tx_ppp = 0;
+rx_pause = prof->rx_pause;
+tx_pause = prof->tx_pause;
}

if (mlx4_SET_PORT_general(mdev->dev, priv->port,
- priv->rx_skb_size + ETH_FCS_LEN,
- priv->prof->tx_pause,
- priv->prof->tx_ppp,
- priv->prof->rx_pause,
- priv->prof->rx_ppp)) {
-en_err(priv, "Failed setting pause params\n");
return 1;
}

+prof->tx_ppp = tx_ppp;
+prof->rx_ppp = rx_ppp;
+prof->tx_pause = tx_pause;
+prof->rx_pause = rx_pause;
+
return 0;
}

@@ -310,6 +316,7 @@
}

switch (ets->tc_tsa[i]) {
+case IEEE_8021QAZ_TSA_VENDOR:
 case IEEE_8021QAZ_TSA_STRICT:
 break;
 case IEEE_8021QAZ_TSA_ETS:
@@ -347,6 +354,10 @@
 /* higher TC means higher priority => lower pg */
 for (i = IEEE_8021QAZ_MAX_TCS - 1; i >= 0; i--) {
 switch (ets->tc_tsa[i]) {
+case IEEE_8021QAZ_TSA_VENDOR:
+pg[i] = MLX4_EN_TC_VENDOR;
+tc_tx_bw[i] = MLX4_EN_BW_MAX;
+b++;
 case IEEE_8021QAZ_TSA_STRICT:
 pg[i] = num_strict++;
tc_tx_bw[i] = MLX4_EN_BW_MAX;
@@ -403,6 +414,7 @@
struct mlx4_en_priv *priv = netdev_priv(dev);
 struct mlx4_en_port_profile *prof = priv->prof;
 struct mlx4_en_dev *mdev = priv->mdev;
+u32 tx_pause, tx_ppp, rx_pause, rx_ppp;
 int err;

 en_dbg(DRV, priv, "cap: 0x%x en: 0x%x mbc: 0x%x delay: %d\n",
@@ -411,23 +423,26 @@
pfc->mbc,
pfc->delay);

-prof->rx_pause = !pfc->pfc_en;
-prof->tx_pause = !pfc->pfc_en;
-prof->rx_ppp = pfc->pfc_en;
-prof->tx_ppp = pfc->pfc_en;
+rx_pause = prof->rx_pause && !pfc->pfc_en;
+tx_pause = prof->tx_pause && !pfc->pfc_en;
+rx_ppp = pfc->pfc_en;
+tx_ppp = pfc->pfc_en;

 err = mlx4_SET_PORT_general(mdev->dev, priv->port,
- priv->rx_skb_size + ETH_FCS_LEN,
- prof->tx_pause,
- prof->tx_ppp,
- prof->rx_pause,
- prof->rx_ppp);
-if (err)
+ tx_pause, tx_ppp, rx_pause, rx_ppp);
+if (err) {
 en_err(priv, "Failed setting pause params\n");
-else
-mlx4_en_update_pfc_stats_bitmap(mdev->dev, &priv->stats_bitmap,
- prof->rx_ppp, prof->rx_pause,
- prof->tx_ppp, prof->tx_pause);
+return err;
+}
+
+mlx4_en_update_pfc_stats_bitmap(mdev->dev, &priv->stats_bitmap,
+rx_ppp, rx_pause, tx_ppp, tx_pause);
+
+prof->tx_ppp = tx_ppp;
+prof->rx_ppp = rx_ppp;
+prof->rx_pause = rx_pause;
+prof->tx_pause = tx_pause;

 return err;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/en_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/en_ethtool.c
@@ -47,7 +47,7 @@
#define EN_ETHTOOL_SHORT_MASK cpu_to_be16(0xffff)
#define EN_ETHTOOL_WORD_MASK cpu_to_be32(0xffffffff)

-static int mlx4_en_moderation_update(struct mlx4_en_priv *priv)
+int mlx4_en_moderation_update(struct mlx4_en_priv *priv)
{
    int i, t;
    int err = 0;
@@ -1013,6 +1013,22 @@
    if (!coal->tx_max_coalesced_frames_irq)
        return -EINVAL;
    if (coal->tx_coalesce_usec > MLX4_EN_MAX_COAL_TIME ||
+        coal->rx_coalesce_usec > MLX4_EN_MAX_COAL_TIME ||
+        coal->rx_coalesce_usec_low > MLX4_EN_MAX_COAL_TIME ||
+        coal->rx_coalesce_usec_high > MLX4_EN_MAX_COAL_TIME) {
+        netdev_info(dev, "%.s: maximum coalesce time supported is %d usecs\n",
+                __func__, MLX4_EN_MAX_COAL_TIME);
+        return -ERANGE;
+    }
+
+    if (coal->tx_max_coalesced_frames > MLX4_EN_MAX_COAL_PKTS ||
+        coal->rx_max_coalesced_frames > MLX4_EN_MAX_COAL_PKTS) {
+        netdev_info(dev, "%.s: maximum coalesced frames supported is %d\n",
+                __func__, MLX4_EN_MAX_COAL_PKTS);
+        return -ERANGE;
+    }
    
    priv->rx_frames = (coal->rx_max_coalesced_frames ==
        MLX4_EN_AUTO_CONF) ?
        MLX4_EN_RX_COAL_TARGET :
@@ -1046,27 +1062,32 @@
    { struct mlx4_en_priv *priv = netdev_priv(dev);
        struct mlx4_en_dev *mdev = priv->mdev;
        u8 tx_pause, tx_ppp, rx_pause, rx_ppp;
        int err;

        if (pause->autoneg)
            return -EINVAL;

-priv->prof->tx_pause = pause->tx_pause != 0;
-priv->prof->rx_pause = pause->rx_pause != 0;
+tx_pause = !!(pause->tx_pause);
rx_pause = !!(pause->rx_pause);
rx_ppp = (tx_pause || rx_pause) ? 0 : priv->prof->rx_ppp;
+tx_ppp = (tx_pause || rx_pause) ? 0 : priv->prof->tx_ppp;
+
err = mlx4_SET_PORT_general(mdev->dev, priv->port,
    priv->rx_skb_size + ETH_FCS_LEN,
    -priv->prof->tx_pause,
    -priv->prof->tx_ppp,
    -priv->prof->rx_pause,
    -priv->prof->rx_ppp);
-if (err)
    -en_err(priv, "Failed setting pause params\n");
-else
    -mlx4_en_update_pfc_stats_bitmap(mdev->dev, &priv->stats_bitmap,
        -priv->prof->tx_ppp,
        -priv->prof->rx_ppp,
        -priv->prof->tx_pause,
        -priv->prof->tx_pause);
+    +tx_pause, tx_ppp, rx_pause, rx_ppp);
+if (err) {
+    +en_err(priv, "Failed setting pause params, err = %d\n", err);
+    +return err;
+}
+
+mlx4_en_update_pfc_stats_bitmap(mdev->dev, &priv->stats_bitmap,
    +rx_ppp, rx_pause, tx_ppp, tx_pause);
+
+priv->prof->tx_pause = tx_pause;
+priv->prof->rx_pause = rx_pause;
+priv->prof->tx_ppp = tx_ppp;
+priv->prof->rx_ppp = rx_ppp;
+
return err;
}
@@ -1701,6 +1722,7 @@
err = mlx4_en_get_flow(dev, cmd, cmd->fs.location);
break;
case ETHTOOL_GRXCLSRLALL:
+cmd->data = MAX_NUM_OF_FS_RULES;
while (!err || err == -ENOENT) && priority < cmd->rule_cnt) {
err = mlx4_en_get_flow(dev, cmd, i);
-if (err)
    @ @ -1767,6 +1789,7 @ @
struct mlx4_en_dev *mdev = priv->mdev;
struct mlx4_en_port_profile new_prof;
struct mlx4_en_priv *tmp;
+int total_tx_count;
int port_up = 0;
int xdp_count;
int err = 0;
@@ -1781,13 +1804,12 @@
mutex_lock(&mdev->state_lock);

xdp_count = priv->tx_ring_num[TX_XDP] ? channel->rx_count : 0;
-if (channel->tx_count * priv->prof->num_up + xdp_count >
- priv->mdev->profile.max_num_tx_rings_p_up * priv->prof->num_up) {
+total_tx_count = channel->tx_count * priv->prof->num_up + xdp_count;
+if (total_tx_count > MAX_TX_RINGS) {
err = -EINVAL;
en_err(priv,
    "Total number of TX and XDP rings (%d) exceeds the maximum supported (%d)\n",
    - channel->tx_count * priv->prof->num_up + xdp_count,
    - MAX_TX_RINGS);
+    total_tx_count, MAX_TX_RINGS);
goto out;
}

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/en_main.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/en_main.c
@@ -163,9 +163,9 @@

for (i = 1; i <= MLX4_MAX_PORTS; i++) {
    -params->prof[i].rx_pause = 1;
    +params->prof[i].rx_pause = !(pfcrx || pfctx);
    params->prof[i].rx_ppp = pfcrx;
    -params->prof[i].tx_pause = 1;
    +params->prof[i].tx_pause = !(pfcrx || pfctx);
    params->prof[i].tx_ppp = pfctx;
    params->prof[i].tx_ring_size = MLX4_EN_DEF_TX_RING_SIZE;
    params->prof[i].rx_ring_size = MLX4_EN_DEF_RX_RING_SIZE;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/en_netdev.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/en_netdev.c
@@ -92,6 +92,7 @@

struct mlx4_en_dev *mdev = priv->mdev;
struct mlx4_en_port_profile new_prof;
struct mlx4_en_priv *tmp;
+int total_count;
int port_up = 0;
int err = 0;

@@ -105,6 +106,14 @@
        MLX4_EN_NUM_UP_HIGH;
        new_prof.tx_ring_num[TX] = new_prof.num_tx_rings_p_up *
        new_prof.num_up;
+        total_count = new_prof.tx_ring_num[TX] + new_prof.tx_ring_num[TX_XDP];
+if (total_count > MAX_TX_RINGS) {
+err = -EINVAL;
+en_err(priv,
+    "Total number of TX and XDP rings (%d) exceeds the maximum supported (%d)\n",
+    total_count, MAX_TX_RINGS);
+goto out;
+
} err = mlx4_en_try_alloc_resources(priv, tmp, &new_prof, true);
if (err)
goto out;
@@ -363,6 +372,9 @@
int nhoff = skb_network_offset(skb);
int ret = 0;

+if (skb->encapsulation)
+return -EPROTONOSUPPORT;
+
if (skb->protocol != htons(ETH_P_IP))
return -EPROTONOSUPPORT;

@@ -1389,8 +1401,10 @@
priv->port_stats.tx_timeout++;  
-ten_dbg(DRV, priv, "Scheduling watchdog\n");
-queue_work(mdev->workqueue, &priv->watchdog_task);
+if (!test_and_set_bit(MLX4_EN_STATE_FLAG_RESTARTING, &priv->state)) {
+ten_dbg(DRV, priv, "Scheduling port restart\n");
+queue_work(mdev->workqueue, &priv->restart_task);
+
}

@@ -1744,6 +1758,7 @@
mlx4_en_deactivate_cq(priv, cq);
goto tx_err;
}
+clear_bit(MLX4_EN_TX_RING_STATE_RECOVERING, &tx_ring->state);
if (t != TX_XDP) {
    tx_ring->tx_queue = netdev_get_tx_queue(dev, i);
    tx_ring->recycle_ring = NULL;
@@ -1840,6 +1855,7 @@
    local_bh_enable();
}
+clear_bit(MLX4_EN_STATE_FLAG_RESTARTING, &priv->state);
netif_tx_start_all_queues(dev);
netif_device_attach(dev);
static void mlx4_en_restart(struct work_struct *work)
{
    struct mlx4_en_priv *priv = container_of(work, struct mlx4_en_priv,
        - watchdog_task);
    + restart_task);
    struct mlx4_en_dev *mdev = priv->mdev;
    struct net_device *dev = priv->dev;

    if (netif_running(dev)) {
        mutex_lock(&mdev->state_lock);
        if (!mdev->device_up) {
            /* NIC is probably restarting - let watchdog task reset
             * the port */
            en_dbg(DRV, priv, "Change MTU called with card down!?\n");
        } else {
            @@ -2398,7 +2414,9 @@
            if (err) {
                en_err(priv, "Failed restarting port:%d\n",
                    -priv->port);
                -queue_work(mdev->workqueue, &priv->watchdog_task);
                +if (!test_and_set_bit(MLX4_EN_STATE_FLAG_RESTARTING,
                    + &priv->state))
                +queue_work(mdev->workqueue, &priv->restart_task);
            }
            }
        mutex_unlock(&mdev->state_lock);
    } else {
        @@ -2389,7 +2405,7 @@
        if (err) {
            en_err(priv, "Failed restarting port:%d\n",
                -priv->port);
            -queue_work(mdev->workqueue, &priv->watchdog_task);
            +if (!test_and_set_bit(MLX4_EN_STATE_FLAG_RESTARTING,
                + &priv->state))
            +queue_work(mdev->workqueue, &priv->restart_task);
        }
    }

    priv->counter_index = MLX4_SINK_COUNTER_INDEX(mdev->dev);
    spin_lock_init(&priv->stats_lock);
    INIT_WORK(&priv->rx_mode_task, mlx4_en_do_set_rx_mode);
    -INIT_WORK(&priv->watchdog_task, mlx4_en_do_set_rx_mode);
    +INIT_WORK(&priv->restart_task, mlx4_en_restart);
    INIT_WORK(&priv->linkstate_task, mlx4_en_linkstate);
    INIT_DELAYED_WORK(&priv->stats_task, mlx4_en_do_get_stats);
INIT_DELAYED_WORK(&priv->service_task, mlx4_en_service_task);
@@ -3319,12 +3338,11 @@
 MAX_TX_RINGS, GFP_KERNEL);
 if (!priv->tx_ring[t]) {
   err = -ENOMEM;
-   goto err_free_tx;
+   goto out;
 }
 priv->tx_cq[t] = kzalloc(sizeof(struct mlx4_en_cq *) * MAX_TX_RINGS, GFP_KERNEL);
 if (!priv->tx_cq[t]) {
-   kfree(priv->tx_ring[t]);
+   goto out;
   err = -ENOMEM;
   goto out;
 }
@@ -3336,6 +3354,13 @@
 priv->msg_enable = MLX4_EN_MSG_LEVEL;
 #ifdef CONFIG_MLX4_EN_DCB
 if (!mlx4_is_slave(priv->mdev->dev)) {
+   u8 prio;
+   +for (prio = 0; prio < IEEE_8021QAZ_MAX_TCS; ++prio) {
+     priv->ets.prio_tc[prio] = prio;
+     priv->ets.tc_tsa[prio]  = IEEE_8021QAZ_TSA_VENDOR;
+   }
+   priv->dcbx_cap = DCB_CAP_DCBX_VER_CEE | DCB_CAP_DCBX_HOST |
 DCB_CAP_DCBX_VER_IEEE;
 priv->flags |= MLX4_EN_DCB_ENABLED;
@@ -3500,8 +3525,8 @@
 dev->gso_partial_features = NETIF_F_GSO_UDP_TUNNEL_CSUM;
 }

/* MTU range: 46 - hw-specific max */
-dev->min_mtu = MLX4_EN_MIN_MTU;
+/* MTU range: 68 - hw-specific max */
+dev->min_mtu = ETH_MIN_MTU;
 dev->max_mtu = priv->max_mtu;

 mdev->pndev[port] = dev;
@@ -3570,11 +3595,6 @@
 return 0;

-err_free_tx:
-while (t--) {
-  kfree(priv->tx_ring[t]);
-  kfree(priv->tx_cq[t]);
+out:
+err = mlx4_en_moderation_update(priv);
out:
mutex_unlock(&mdev->state_lock);
kfree(tmp);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/en_rx.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/en_rx.c
@@ -471,10 +471,10 @@
{
    const struct mlx4_en_frag_info *frag_info = priv->frag_info;
    unsigned int true_size = 0;
    +bool release = true;
    int nr, frag_size;
    struct page *page;
    dma_addr_t dma;
    -bool release;

/* Collect used fragments while replacing them in the HW descriptors */
for (nr = 0; frags++) {
    @@ -497,7 +497,11 @@
        page_is_pfnemalloc(page) ||
        page_to_nid(page) != numa_mem_id();
    -} else {
    +} else if (!priv->rx_headroom) {
    +/* rx_headroom for non XDP setup is always 0.
    + * When XDP is set, the above condition will
    + * guarantee page is always released.
    + */
        u32 sz_align = ALIGN(frag_size, SMP_CACHE_BYTES);

        frags->page_offset += sz_align;
    @@ -617,13 +621,27 @@
    return 0;
    }
    #endif
    +
    +#define short_frame(size) ((size) <= ETH_ZLEN + ETH_FCS_LEN)
    +
    static int check_csum(struct mlx4_cqe *cqe, struct sk_buff *skb, void *va,
netdev_features_t dev_features)
{
    __wsum hw_checksum = 0;
    +void *hdr;

    -void *hdr = (u8 *)va + sizeof(struct ethhdr);
    +/* CQE csum doesn't cover padding octets in short ethernet
    + * frames. And the pad field is appended prior to calculating
    + * and appending the FCS field.
    + *
    + * Detecting these padded frames requires to verify and parse
    + * IP headers, so we simply force all those small frames to skip
    + * checksum complete.
    + */
    +if (short_frame(skb->len))
    +return -EINVAL;

    +hdr = (u8 *)va + sizeof(struct ethhdr);
    hw_checksum = csum_unfold((__force __sum16)cqe->checksum);

    if (cqe->vlan_my_qpn & cpu_to_be32(MLX4_CQE_CVLAN_PRESENT_MASK) &&
        skb_record_rx_queue(skb, cq_ring);
    if (likely(dev->features & NETIF_F_RXCSUM)) {
        /* TODO: For IP non TCP/UDP packets when csum complete is
        + * not an option (not supported or any other reason) we can
        + * actually check cqe IPOK status bit and report
        + * CHECKSUM_UNNECESSARY rather than CHECKSUM_NONE
        + */
        if (cqe->status & cpu_to_be16(MLX4_CQE_STATUS_TCP |
            MLX4_CQE_STATUS_UDP)) {
            MLX4_CQE_STATUS_UDP))
                bool clean_complete = true;
                int done;

        +if (!budget)
        +return 0;
        +
        if (priv->tx_ring_num[TX_XDP]) {
            xdp_tx_cq = priv->tx_cq[TX_XDP][cq->ring];
            if (xdp_tx_cq->xdp_busy) {
                @ @ -1169.7 +1195.7 @@
                err = mlx4_qp_alloc(mdev->dev, priv->base_qpn, rss_map->indir_qp);
                if (err) {
                    en_err(priv, "Failed to allocate RSS indirection QP\n");
                    goto rss_err;
+goto qp_alloc_err;
}

rss_map->indir_qp->event = mlx4_en_sqp_event;
@@ -1223,6 +1249,7 @@
MLX4_QP_STATE_RST, NULL, 0, 0, rss_map->indir_qp);
mlx4_qp_remove(mdev->dev, rss_map->indir_qp);
mlx4_qp_free(mdev->dev, rss_map->indir_qp);
+qp_alloc_err:
kfree(rss_map->indir_qp);
rss_map->indir_qp = NULL;

static void mlx4_en_handle_err_cqe(struct mlx4_en_priv *priv, struct mlx4_err_cqe *err_cqe,
  + u16 cqe_index, struct mlx4_en_tx_ring *ring)
+{
+    struct mlx4_en_dev *mdev = priv->mdev;
+    struct mlx4_en_tx_info *tx_info;
+    struct mlx4_en_tx_desc *tx_desc;
+    u16 wqe_index;
+    int desc_size;
+    +
+    +en_err(priv, "CQE error - cqn 0x%x, ci 0x%x, vendor syndrome: 0x%x syndrome: 0x%x\n",
+    +    ring->sp_cqn, cqe_index, err_cqe->vendor_err_syndrome, err_cqe->syndrome);
+    +print_hex_dump(KERN_WARNING, "", DUMP_PREFIX_OFFSET, 16, 1, err_cqe, sizeof(*err_cqe),
+    +    false);
+    +
+    +wqe_index = be16_to_cpu(err_cqe->wqe_index) & ring->size_mask;
+    +tx_info = &ring->tx_info[wqe_index];
+    +desc_size = tx_info->nr_txbb << LOG_TXBB_SIZE;
+    +en_err(priv, "Related WQE - qpn 0x%x, wqe index 0x%x, wqe size 0x%x\n",
+    +    ring->qpn, wqe_index, desc_size);
+    +print_hex_dump(KERN_WARNING, "", DUMP_PREFIX_OFFSET, 16, 1, tx_desc, desc_size, false);
if (test_and_set_bit(MLX4_EN_STATE_FLAG_RESTARTING, &priv->state))
    return;

err(priv, "Scheduling port restart\n");
queue_work(mdev->workqueue, &priv->restart_task);
}

bool mlx4_en_process_tx_cq(struct net_device *dev,
    struct mlx4_en_cq *cq, int napi_budget)
{
    drm_rmb();

    if (unlikely((cqe->owner_sr_opcode & MLX4_CQE_OPCODE_MASK) ==
        MLX4_CQE_OPCODE_ERROR)) {
        struct mlx4_err_cqe *cqe_err = (struct mlx4_err_cqe *)cqe;
        err(priv, "CQE error - vendor syndrome: 0x%x syndrome: 0x%x\n",
            cqe_err->vendor_err_syndrome,
            cqe_err->syndrome);
    } else {
        mlx4_en_handle_err_cqe(priv, (struct mlx4_err_cqe *)cqe, index,
            ring);
    }

    /* Skip over last polled CQE */
    new_index = be16_to_cpu(cqe->wqe_index) & size_mask;
    struct mlx4_en_tx_desc *tx_desc;
    struct mlx4_wqe_data_seg *data;
    struct mlx4_en_tx_info *tx_info;
    u32 __maybe_unused ring_cons;
    int tx_ind;
    int nr_txb;
    int desc_size;
    bool stop_queue;
    bool inline_ok;
    u8 data_offset;
    u32 ring_cons;
    bool bf_ok;

    tx_ind = skb_get_queue_mapping(skb);
struct mlx4_dev *dev = &priv->dev;
struct mlx4_eq *eq = &priv->eq_table.eq[vec];

-if (!eq->affinity_mask || cpumask_empty(eq->affinity_mask))
+if (!cpumask_available(eq->affinity_mask) ||
   cpumask_empty(eq->affinity_mask))
return;

hint_err = irq_set_affinity_hint(eq->irq, eq->affinity_mask);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/fw.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/fw.c
@@ -820,6 +820,7 @@
#define QUERY_DEV_CAP_MAD_DEMUX_OFFSET	0xb0
#define QUERY_DEV_CAP_DMFS_HIGH_RATE_QPN_BASE_OFFSET0xa8
#define QUERY_DEV_CAP_DMFS_HIGH_RATE_QPN_RANGE_OFFSET0xac
+#define QUERY_DEV_CAP_MAP_CLOCK_TO_USER 0xc1
#define QUERY_DEV_CAP_QP_RATE_LIMIT_NUM_OFFSET0xcc
#define QUERY_DEV_CAP_QP_RATE_LIMIT_MAX_OFFSET0xd0
#define QUERY_DEV_CAP_QP_RATE_LIMIT_MIN_OFFSET0xd2
@@ -838,6 +839,8 @@
if (mlx4_is_mfunc(dev))
disable_unsupported_roce_caps(outbox);
+MLX4_GET(field, outbox, QUERY_DEV_CAP_MAP_CLOCK_TO_USER);
+dev_cap->map_clock_to_user = field & 0x80;
MLX4_GET(field, outbox, QUERY_DEV_CAP_RSVD_QP_OFFSET);
dev_cap->reserved_qps = 1 << (field & 0xf);
MLX4_GET(field, outbox, QUERY_DEV_CAP_MAX_QP_OFFSET);

if (mlx4_is_mfunc(dev))
disable_unsupported_roce_caps(outbox);
+MLX4_GET(field, outbox, QUERY_DEV_CAP_MAP_CLOCK_TO_USER);
+dev_cap->map_clock_to_user = field & 0x80;
MLX4_GET(field, outbox, QUERY_DEV_CAP_RSVD_QP_OFFSET);
dev_cap->reserved_qps = 1 << (field & 0xf);
MLX4_GET(field, outbox, QUERY_DEV_CAP_MAX_QP_OFFSET);
struct mlx4_cmd_mailbox *mailbox;
  __be32 *outbox;
+u64 qword_field;
u32 dword_field;
-int err;
+u16 word_field;
u8 byte_field;
+int err;
  static const u8 a0_dmfs_query_hw_steering[] = {
     [0] = MLX4_STEERING_DMFS_A0_DEFAULT,
     [1] = MLX4_STEERING_DMFS_A0_DYNAMIC,
@@ -2078,19 +2083,32 @@
/* QPC/EEC/CQC/EQC/RDMARC attributes */
-MLX4_GET(param->qpc_base, outbox, INIT_HCA_QPC_BASE_OFFSET);
-MLX4_GET(param->log_num_qps, outbox, INIT_HCA_LOG_QP_OFFSET);
-MLX4_GET(param->srqc_base, outbox, INIT_HCA_SRQC_BASE_OFFSET);
-MLX4_GET(param->log_num_srqs, outbox, INIT_HCA_LOG_SRQ_OFFSET);
-MLX4_GET(param->cqc_base, outbox, INIT_HCA_CQC_BASE_OFFSET);
-MLX4_GET(param->log_num_cqs, outbox, INIT_HCA_LOG_CQ_OFFSET);
-MLX4_GET(param->altc_base, outbox, INIT_HCA_ALTC_BASE_OFFSET);
-MLX4_GET(param->auxc_base, outbox, INIT_HCA_AUXC_BASE_OFFSET);
-MLX4_GET(param->eqc_base, outbox, INIT_HCA_EQC_BASE_OFFSET);
-MLX4_GET(param->log_num_eqs, outbox, INIT_HCA_LOG_EQ_OFFSET);
-MLX4_GET(param->num_sys_eqs, outbox, INIT_HCA_NUM_SYS_EQS_OFFSET);
-MLX4_GET(param->rdmarc_base, outbox, INIT_HCA_RDMARC_BASE_OFFSET);
-MLX4_GET(param->log_rd_per_qp, outbox, INIT_HCA_LOG_RD_OFFSET);
+MLX4_GET(qword_field, outbox, INIT_HCA_QPC_BASE_OFFSET);
+param->qpc_base = qword_field & ~((u64)0x1f);
+param->qpc_base = qword_field & ~((u64)0x1f);
+param->log_num_qps = byte_field & 0x1f;
+MLX4_GET(qword_field, outbox, INIT_HCA_SRQC_BASE_OFFSET);
+param->srqc_base = qword_field & ~((u64)0x1f);
+param->log_num_srqs = byte_field & 0x1f;
+MLX4_GET(qword_field, outbox, INIT_HCA_CQC_BASE_OFFSET);
+param->cqc_base = qword_field & ~((u64)0x1f);
+param->log_num_cqs = byte_field & 0x1f;
+MLX4_GET(qword_field, outbox, INIT_HCA_ALTC_BASE_OFFSET);
+param->altc_base = qword_field;
+param->auxc_base = qword_field;
+MLX4_GET(qword_field, outbox, INIT_HCA_AUXC_BASE_OFFSET);
+param->eqc_base = qword_field & ~((u64)0x1f);
+MLX4_GET(byte_field, outbox, INIT_HCA_LOG_EQ_OFFSET);
+param->log_num_eqs = byte_field & 0x1f;
+MLX4_GET(word_field, outbox, INIT_HCA_NUM_SYS_EQS_OFFSET);
+param->num_sys_eqs = word_field & 0xfff;
+MLX4_GET(qword_field, outbox, INIT_HCA_RDMARC_BASE_OFFSET);
+param->rdmarc_base = qword_field & ~(u64)(0x1f);
+MLX4_GET(byte_field, outbox, INIT_HCA_LOG_RD_OFFSET);
+param->log_rd_per_qp = byte_field & 0x7;

MLX4_GET(dword_field, outbox, INIT_HCA_FLAGS_OFFSET);
if (dword_field & (1 << INIT_HCA_DEVICE_MANAGED_FLOW_STEERING_EN)) {
    /* steering attributes */
    if (param->steering_mode == MLX4_STEERING_MODE_DEVICE_MANAGED) {
        MLX4_GET(param->mc_base, outbox, INIT_HCA_FS_BASE_OFFSET);
        -MLX4_GET(param->log_mc_entry_sz, outbox,
                   - INIT_HCA_FS_LOG_ENTRY_SZ_OFFSET);
        -MLX4_GET(param->log_mc_table_sz, outbox,
                   - INIT_HCA_FS_LOG_TABLE_SZ_OFFSET);
        -MLX4_GET(byte_field, outbox,
                   - INIT_HCA_FS_A0_OFFSET);
        param->dmfs_high_steer_mode =
            a0_dmfs_query_hw_steering[(byte_field >> 6) & 3];
    } else {
        MLX4_GET(param->mc_base, outbox, INIT_HCA_MC_BASE_OFFSET);
        -MLX4_GET(param->log_mc_entry_sz, outbox,
                   - INIT_HCA_LOG_MC_ENTRY_SZ_OFFSET);
        -MLX4_GET(param->log_mc_hash_sz, outbox,
                   - INIT_HCA_LOG_MC_HASH_SZ_OFFSET);
        -MLX4_GET(param->log_mc_table_sz, outbox,
                   - INIT_HCA_LOG_MC_TABLE_SZ_OFFSET);
        +MLX4_GET(byte_field, outbox, INIT_HCA_LOG_MC_ENTRY_SZ_OFFSET);
        +param->log_mc_entry_sz = byte_field & 0x1f;
        +MLX4_GET(byte_field, outbox, INIT_HCA_LOG_MC_TABLE_SZ_OFFSET);
        +param->log_mc_table_sz = byte_field & 0x1f;
    }
}

/* CX3 is capable of extending CQEs/EQEs from 32 to 64 bytes */
@@ -2148,15 +2165,18 @@
    /* TPT attributes */
    MLX4_GET(param->dmpt_base, outbox, INIT_HCA_DMPT_BASE_OFFSET);
    -MLX4_GET(param->mw_enabled, outbox, INIT_HCA_TPT_MW_OFFSET);
-MLX4_GET(param->log_mpt_sz, outbox, INIT_HCA_LOG_MPT_SZ_OFFSET);
+MLX4_GET(byte_field, outbox, INIT_HCA_TPT_MW_OFFSET);
+param->mw_enabled = byte_field >> 7;
+MLX4_GET(byte_field, outbox, INIT_HCA_LOG_MPT_SZ_OFFSET);
+param->log_mpt_sz = byte_field & 0x3f;
MLX4_GET(param->mtt_base, outbox, INIT_HCA_MTT_BASE_OFFSET);
MLX4_GET(param->cmpt_base, outbox, INIT_HCA_CMPT_BASE_OFFSET);

/* UAR attributes */

MLX4_GET(param->uar_page_sz, outbox, INIT_HCA_UAR_PAGE_SZ_OFFSET);
-MLX4_GET(param->log_uar_sz, outbox, INIT_HCA_LOG_UAR_SZ_OFFSET);
+MLX4_GET(byte_field, outbox, INIT_HCA_LOG_UAR_SZ_OFFSET);
+param->log_uar_sz = byte_field & 0xf;

/* phv_check enable */
MLX4_GET(byte_field, outbox, INIT_HCA_CACHESZLINE_SZ_OFFSET);
@@ -2698,7 +2718,7 @@
if (err) {
    mlx4_err(dev, "Failed to retrieve required operation: %d\n",
            err);
-    return;
+-goto out;
    }
MLX4_GET(modifier, outbox, GET_OP_REQ_MODIFIER_OFFSET);
MLX4_GET(token, outbox, GET_OP_REQ_TOKEN_OFFSET);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/fw.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/fw.h
@@ -130,6 +130,7 @@
struct mlx4_rate_limit_caps rl_caps;
struct mlx4_port_cap port_cap[MLX4_MAX_PORTS + 1];
bool wol_port[MLX4_MAX_PORTS + 1];
+bool map_clock_to_user;
};

struct mlx4_func_cap {
    u64 cmpt_base;
    u64 mtt_base;
    u64 global_caps;
    -u16 log_mc_entry_sz;
    -u16 log_mc_hash_sz;
    +u8 log_mc_entry_sz;
    +u8 log_mc_hash_sz;
    u16 hca_core_clock; /* Internal Clock Frequency (in MHz) */
    u8  log_num_qps;
    u8  log_num_srqs;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/icm.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/icm.c
@@ -56,12 +56,12 @@
 int i;

 if (chunk->nsg > 0)
   -pci_unmap_sg(pdev->pdevice, chunk->mem, chunk->npages,
               +pci_unmap_sg(pdev->pdevice, chunk->sg, chunk->npages,
                PCI_DMA_BIDIRECTIONAL);

   for (i = 0; i < chunk->npages; ++i)
     __free_pages(sg_page(&chunk->mem[i]),
                 -get_order(chunk->mem[i].length));
     +get_order(chunk->sg[i].length));
   }

 static void mlx4_free_icm_coherent(struct mlx4_dev *dev, struct mlx4_icm_chunk *chunk)
@@ -70,9 +70,9 @@
 for (i = 0; i < chunk->npages; ++i)
   dma_free_coherent(&dev->pdevice, dev,
     -chunk->mem[i].length,
     -lowmem_page_address(sg_page(&chunk->mem[i])),
     -sg_dma_address(&chunk->mem[i]));
     +chunk->buf[i].size,
     +chunk->buf[i].addr,
     +chunk->buf[i].dma_addr);
   }

 void mlx4_free_icm(struct mlx4_dev *dev, struct mlx4_icm *icm, int coherent)
@@ -110,22 +110,21 @@
 return 0;
 }

 -static int mlx4_alloc_icm_coherent(struct device *dev, struct scatterlist *mem,
   -int order, gfp_t gfp_mask)
   +static int mlx4_alloc_icm_coherent(struct device *dev, struct mlx4_icm_chunk *chunk)
   {
     void *buf = dma_alloc_coherent(dev, PAGE_SIZE << order,
     &sg_dma_address(mem), gfp_mask);
     -if (!buf)
     +if (!chunk)
       return -ENOMEM;
     +buf->addr = dma_alloc_coherent(dev, PAGE_SIZE << order,
     +buf->dma_addr, gfp_mask);
     +if (!buf->addr)
       return -ENOMEM;

     -if (offset_in_page(buf)) {
     +if (offset_in_page(chunk)) {

---
- dma_free_coherent(dev, PAGE_SIZE << order,
- buf, sg_dma_address(mem));
+ if (offset_in_page(buf->addr)) {
+ dma_free_coherent(dev, PAGE_SIZE << order, buf->addr,
+ buf->dma_addr);
+ return -ENOMEM;
+ }

- sg_set_buf(mem, buf, PAGE_SIZE << order);
- sg_dma_len(mem) = PAGE_SIZE << order;
+ buf->size = PAGE_SIZE << order;
+ return 0;
}

@@ -157,21 +156,21 @@
while (npages > 0) {
    if (!chunk) {
        chunk = kmalloc_node(sizeof(*chunk),
+        chunk = kzalloc_node(sizeof(*chunk),
            gfp_mask & ~(__GFP_HIGHMEM |
            __GFP_NOWARN),
            dev->numa_node);
        if (!chunk) {
            chunk->coherent = coherent;
        }
    }
+    chunk->coherent = coherent;

    - sg_init_table(chunk->mem, MLX4_ICM_CHUNK_LEN);
    - chunk->npages = 0;
    - chunk->nsg   = 0;
    + if (!coherent)
    + sg_init_table(chunk->sg, MLX4_ICM_CHUNK_LEN);
    list_add_tail(&chunk->list, &icm->chunk_list);
}

@@ -180,10 +179,10 @@
if (coherent)
    ret = mlx4_alloc_icm_coherent(&dev->persist->pdev->dev,
-        chunk->mem[chunk->npages],
-        cur_order, gfp_mask);
+        &chunk->buf[chunk->npages],
        &chunk->coherent = coherent;

    - sg_init_table(chunk->mem, MLX4_ICM_CHUNK_LEN);
    - chunk->npages = 0;
    - chunk->nsg   = 0;
    + if (!coherent)
    + sg_init_table(chunk->sg, MLX4_ICM_CHUNK_LEN);
    list_add_tail(&chunk->list, &icm->chunk_list);
}
```c
+cur_order, gfp_mask);
else
- ret = mlx4_alloc_icm_pages(&chunk->mem[chunk->npages],
+ ret = mlx4_alloc_icm_pages(&chunk->sg[chunk->npages],
   cur_order, gfp_mask,
   dev->numa_node);

@@ -199,7 +198,7 @@
if (coherent)
  ++chunk->nsg;
else if (chunk->npages == MLX4_ICM_CHUNK_LEN) {
- chunk->nsg = pci_map_sg(dev->persist->pdev, chunk->mem,
+ chunk->nsg = pci_map_sg(dev->persist->pdev, chunk->sg,
    chunk->npages,
   PCI_DMA_BIDIRECTIONAL);

@@ -214,7 +213,7 @@
}

if (!coherent && chunk) {
- chunk->nsg = pci_map_sg(dev->persist->pdev, chunk->mem,
+ chunk->nsg = pci_map_sg(dev->persist->pdev, chunk->sg,
    chunk->npages,
   PCI_DMA_BIDIRECTIONAL);

@@ -314,7 +313,7 @@
  u64 idx;
  struct mlx4_icm_chunk *chunk;
  struct mlx4_icm *icm;
- struct page *page = NULL;
+ void *addr = NULL;

  if (!table->lowmem)
    return NULL;
@@ -330,28 +329,49 @@

  list_for_each_entry(chunk, &icm->chunk_list, list) {
    for (i = 0; i < chunk->npages; ++i) {
      +dma_addr_t dma_addr;
      +size_t len;
      +
      +if (table->coherent) {
        +len = chunk->buf[i].size;
        +dma_addr = chunk->buf[i].dma_addr;
        +addr = chunk->buf[i].addr;
      } else {
        +struct page *page;
        +
```
len = sg_dma_len(&chunk->sg[i]);
dma_addr = sg_dma_address(&chunk->sg[i]);

/* XXX: we should never do this for highmem allocation. This function either needs
to be split, or the kernel virtual address return needs to be made optional. */
page = sg_page(&chunk->sg[i]);
addr = lowmem_page_address(page);
}

if (dma_handle && dma_offset >= 0) {
    if (sg_dma_len(&chunk->mem[i]) > dma_offset)
        *dma_handle = sg_dma_address(&chunk->mem[i]) +
        -dma_offset;
    -dma_offset = sg_dma_len(&chunk->mem[i]);
    +if (len > dma_offset)
        +*dma_handle = dma_addr + dma_offset;
    +dma_offset = len;
}

/*
 * DMA mapping can merge pages but not split them,
 * so if we found the page, dma_handle has already
 * been assigned to.
 */
-If (chunk->mem[i].length > offset) {
    -page = sg_page(&chunk->mem[i]);
    +if (len > offset)
         goto out;
    -}
    -offset -= chunk->mem[i].length;
    +offset = len;
}

addr = NULL;
out:
mutex_unlock(&table->mutex);
-return page ? lowmem_page_address(page) + offset : NULL;
+return addr ? addr + offset : NULL;
}

int mlx4_table_get_range(struct mlx4_dev *dev, struct mlx4_icm_table *table,
+struct mlx4_icm_buf {
  +void*addr;
  +size_tsize;
  +dma_addr_ttdma_addr;
  +};
+
+struct mlx4_icm_chunk {
  struct list_headlist;
inntpages;
inmsg;
-struct scatterlistmem[MLX4_ICM_CHUNK_LEN];
+boolcoherent;
+union {
  +struct scatterlistsg[MLX4_ICM_CHUNK_LEN];
  +struct mlx4_icm_bufbuf[MLX4_ICM_CHUNK_LEN];
  +};
};

+struct mlx4_icm {
  +
static inline dma_addr_t mlx4_icm_addr(struct mlx4_icm_iter *iter) {
  +return sg_dma_address(&iter->chunk->mem[iter->page_idx]);
  +if (iter->chunk->coherent)
    +return iter->chunk->buf[iter->page_idx].dma_addr;
  +else
    +return sg_dma_address(&iter->chunk->sg[iter->page_idx]);
}

static inline unsigned long mlx4_icm_size(struct mlx4_icm_iter *iter) {
  +return sg_dma_len(&iter->chunk->mem[iter->page_idx]);
  +if (iter->chunk->coherent)
    +return iter->chunk->buf[iter->page_idx].size;
  +else
    +return sg_dma_len(&iter->chunk->sg[iter->page_idx]);
}

int mlx4_MAP_ICM_AUX(struct mlx4_dev *dev, struct mlx4_icm *icm);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/main.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/main.c
@@ -199,7 +199,7 @@
for (i = 0; i < dev->caps.num_ports - 1; i++) {
  if (port_type[i] != port_type[i + 1]) {
mlx4_err(dev, "Only same port types supported on this HCA, aborting\n");
-return -EINVAL;
+return -EOPNOTSUPP;
}
}
}

@@ -208,7 +208,7 @@
if (!(port_type[i] & dev->caps.supported_type[i+1])) {
 mlx4_err(dev, "Requested port type for port %d is not supported on this HCA\n",
 i + 1);
-return -EINVAL;
+return -EOPNOTSUPP;
}
}
return 0;
@@ -384,6 +384,7 @@
+dev->caps.map_clock_to_user = dev_cap->map_clock_to_user;
 dev->caps.uar_page_size  = PAGE_SIZE;
 dev->caps.num_uars      = dev_cap->uar_size / PAGE_SIZE;
 dev->caps.local_ca_ack_delay = dev_cap->local_ca_ack_delay;
@@ -1152,8 +1153,7 @@
 mlx4_err(mdev,
 "Requested port type for port %d is not supported on this HCA\n",
 info->port);
-err = -EINVAL;
-goto err_sup;
+return -EOPNOTSUPP;
}
mlx4_stop_sense(mdev);
@@ -1201,7 +1201,7 @@
 for (i = 1; i <= mdev->caps.num_ports; i++) {
 if (mdev->caps.possible_type[i] == MLX4_PORT_TYPE_AUTO) {
 mdev->caps.possible_type[i] = mdev->caps.port_type[i];
-err = -EINVAL;
+err = -EOPNOTSUPP;
 }
 }
@@ -1201,7 +1201,7 @@
 out:
 mlx4_start_sense(mdev);
 mutex_unlock(&priv->port_mutex);
-err_sup:
return err;
}

@@ -1914,6 +1914,11 @@
if (mlx4_is_slave(dev))
return -EOPNOTSUPP;

+if (!dev->caps.map_clock_to_user) {
+mlx4_dbg(dev, "Map clock to user is not supported.\n");
+return -EOPNOTSUPP;
+}
+
if (!params)
return -EINVAL;

@@ -2504,6 +2509,7 @@
if (!err || err == -ENOSPC) {
priv->def_counter[port] = idx;
+err = 0;
} else if (err == -ENOENT) {
err = 0;
continue;
@@ -2554,7 +2560,8 @@
MLX4_CMD_TIME_CLASS_A, MLX4_CMD_WRAPPED);
if (!err)
*idx = get_param_l(&out_param);
-
+if (WARN_ON(err == -ENOSPC))
+err = -EINVAL;
return err;
}
return __mlx4_counter_alloc(dev, idx);
@@ -3007,6 +3014,7 @@
mlx4_err(dev, "Failed to create file for port %d\n", port);
devlk_port_unregister(&info->devlink_port);
info->port = -1;
+return err;
}

sprintf(info->dev_mtu_name, "mlx4_port%d_mtu", port);
@@ -3028,9 +3036,10 @@
 &info->port_attr);
devlk_port_unregister(&info->devlink_port);
info->port = -1;
+return err;
}
static void mlx4_cleanup_port_info(struct mlx4_port_info *info)
@@ -3466,6 +3475,7 @@
    }
    }
    }
@@ -4189,12 +4199,14 @@
 static void mlx4_shutdown(struct pci_dev *pdev)
 {
    struct mlx4_dev_persistent *persist = pci_get_drvdata(pdev);
+    struct mlx4_dev *dev = persist->dev;

    mlx4_info(persist->dev, "mlx4_shutdown was called\n");
    mutex_lock(&persist->interface_state_mutex);
    if (persist->interface_state & MLX4_INTERFACE_STATE_UP)
+        mlx4_pci_disable_device(dev);
        mlx4_unload_one(pdev);
    mutex_unlock(&persist->interface_state_mutex);
+    mlx4_pci_disable_device(dev);
    }

 static const struct pci_error_handlers mlx4_err_handler = {
 --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/mcg.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/mcg.c
@@ -1490,7 +1490,7 @@
    rule.port = port;
    rule.qpn = qpn;
    INIT_LIST_HEAD(&rule.list);
-    mlx4_err(dev, "going promisc on %x\n", port);
+    mlx4_info(dev, "going promisc on %x\n", port);

    return mlx4_flow_attach(dev, &rule, regid_p);
    }
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/mlx4.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/mlx4.h
@@ -541,8 +541,8 @@
 struct resource_allocator {
     spinlock_t alloc_lock; /* protect quotas */
     union {
-        int res_reserved;
+        unsigned int res_reserved;
        int res_port_rsvd[MLX4_MAX_PORTS];
        +int res_port_rsvd[MLX4_MAX_PORTS];
        unsigned int res_reserved;
    }
+unsigned int res_port_rsvd[MLX4_MAX_PORTS];

union {
    int res_free;

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/mlx4_en.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/mlx4_en.h
@@ -131,6 +131,9 @@
#define MLX4_EN_TX_COAL_PKTS 16
#define MLX4_EN_TX_COAL_TIME 0x10
+#define MLX4_EN_MAX_COAL_PKTS U16_MAX
+#define MLX4_EN_MAX_COAL_TIME U16_MAX

#define MLX4_EN_RX_RATE_LOW 400000
#define MLX4_EN_RX_COAL_TIME_LOW 0
#define MLX4_EN_RX_RATE_HIGH 4500000
@@ -157,7 +160,6 @@
#define MLX4_SELFTEST_LB_MIN_MTU (MLX4_LOOPBACK_TEST_PAYLOAD + NET_IP_ALIGN + ETH_HLEN + PREAMBLE_LEN)

+#define MLX4_EN_MIN_MTU 46
/* VLAN_HLEN is added twice, to support skb vlan tagged with multiple * headers. (For example: ETH_P_8021Q and ETH_P_8021AD). */@@ -268,6 +270,10 @@
 struct mlx4_en_priv {
 enum {
 +MLX4_EN_TX_RING_STATE_RECOVERING,
+};
+
 struct mlx4_en_priv;

 struct mlx4_en_tx_ring {
@@ -314,6 +320,7 @@
 * Only queue_stopped might be used if BQL is not properly working. */
 unsigned long queue_stopped;
 +unsigned long state;

 struct mlx4_hwq_resources sp_wqres;
 struct mlx4_qspsp_qp;
 struct mlx4_qp_contextsp_context;  
@@ -479,6 +486,7 @@
#define MLX4_EN_BW_MIN 1
#define MLX4_EN_BW_MAX 100 /* Utilize 100% of the line */

+#define MLX4_EN_TC_VENDOR 0
#define MLX4_EN_TC_ETS 7

enum dcb_pfc_type {
    @@ -525,6 +533,10 @@
    struct mutex mutex; /* for mutual access to stats bitmap */
    }

+enum {
+    +MLX4_EN_STATE_FLAG_RESTARTING,
+    +}
+
    struct mlx4_en_priv {
    struct mlx4_en_dev *mdev;
    struct mlx4_en_port_profile *prof;
    @@ -549,8 +561,8 @@
    u16 rx_usecs_low;
    u32 pkt_rate_high;
    u16 rx_usecs_high;
    -u16 sample_interval;
    -u16 adaptive_rx_coal;
    +u32 sample_interval;
    +u32 adaptive_rx_coal;
    u32 msg_enable;
    u32 loopback_ok;
    u32 validate_loopback;
    @@ -590,7 +602,7 @@
    struct mlx4_en_cq *rx_cq[MAX_RX_RINGS];
    struct mlx4_qp drop_qp;
    struct work_struct rx_mode_task;
    -struct work_struct watchdog_task;
    +struct work_struct restart_task;
    struct work_struct linkstate_task;
    struct delayed_work stats_task;
    struct delayed_work service_task;
    @@ -637,6 +649,7 @@
    u32 pflags;
    u8 rss_key[MLX4_EN_RSS_KEY_SIZE];
    u8 rss_hash_fn;
    +unsigned long state;
    }

enum mlx4_en_wol {
    @@ -781,6 +794,7 @@
    #define DEV_FEATURE_CHANGED(dev, new_features, feature) \
    ((dev->features & feature) ^ (new_features & feature))

    +int mlx4_en_moderation_update(struct mlx4_en_priv *priv);
    int mlx4_en_reset_config(struct net_device *dev,
struct hwtstamp_config ts_config,
netdev_features_t new_features);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/mr.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/mr.c
@@ -114,7 +114,7 @@
goto err_out;
for (i = 0; i <= buddy->max_order; ++i) {
    s = BITS_TO_LONGS(1 << (buddy->max_order - i));
    +s = BITS_TO_LONGS(1UL << (buddy->max_order - i));
    buddy->bits[i] = kvmalloc_array(s, sizeof(long), GFP_KERNEL | __GFP_ZERO);
    if (!buddy->bits[i])
        goto err_out_free;
@@ -363,6 +363,7 @@
    (*mpt_entry)->lkey = 0;
    err = mlx4_SW2HW_MPT(dev, mailbox, key);
    }
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/port.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/port.c
@@ -1973,6 +1973,7 @@
#define I2C_ADDR_LOW 0x50
#define I2C_ADDR_HIGH 0x51
#define I2C_PAGE_SIZE 256
+#define I2C_HIGH_PAGE_SIZE 128
/* Module Info Data */
struct mlx4_cable_info {
    @@ -2026,6 +2027,88 @@
    return "Unknown Error";
    }
+static int mlx4_get_module_id(struct mlx4_dev *dev, u8 port, u8 *module_id)
+{
+    struct mlx4_cmd_mailbox *inbox, *outbox;
+    struct mlx4_mad_ifc *inmad, *outmad;
+    struct mlx4_cable_info *cable_info;
+    int ret;
+    +inbox = mlx4_alloc_cmd_mailbox(dev);
+    +if (IS_ERR(inbox))
+        return PTR_ERR(inbox);
+    +outbox = mlx4_alloc_cmd_mailbox(dev);
+    +if (IS_ERR(outbox)) {
 mlx4_free_cmd_mailbox(dev, inbox);
+return PTR_ERR(outbox);
+}
+
inmad = (struct mlx4_mad_ifc *)(inbox->buf);
+outmad = (struct mlx4_mad_ifc *)(outbox->buf);
+
inmad->method = 0x1; /* Get */
inmad->class_version = 0x1;
inmad->mgmt_class = 0x1;
inmad->base_version = 0x1;
inmad->attr_id = cpu_to_be16(0xFF60); /* Module Info */
+
cable_info = (struct mlx4_cable_info *)inmad->data;
cable_info->dev_mem_address = 0;
cable_info->page_num = 0;
cable_info->i2c_addr = I2C_ADDR_LOW;
cable_info->size = cpu_to_be16(1);
+
ret = mlx4_cmd_box(dev, inbox->dma, outbox->dma, port, 3,
+MLX4_CMD_MAD_IFC, MLX4_CMD_TIME_CLASS_C,
+MLX4_CMD_NATIVE);
+
if (ret)
+goto out;
+
if (be16_to_cpu(outmad->status)) {
+/* Mad returned with bad status */
+ret = be16_to_cpu(outmad->status);
+mlx4_warn(dev,
+"MLX4_CMD_MAD_IFC Get Module ID attr(%x) port(%d) i2c_addr(%x) offset(%d) size(%d): Response Mad Status(%x) - %s\n",
+0xFF60, port, I2C_ADDR_LOW, 0, 1, ret,
cable_info_mad_err_str(ret));
+ret = -ret;
+goto out;
+}
+
cable_info = (struct mlx4_cable_info *)outmad->data;
+module_id = cable_info->data[0];
+out:
+mlx4_free_cmd_mailbox(dev, inbox);
+mlx4_free_cmd_mailbox(dev, outbox);
+return ret;
+}
+
static void mlx4_sfp_eeprom_params_set(u8 *i2c_addr, u8 *page_num, u16 *offset)
+{
+*i2c_addr = I2C_ADDR_LOW;
+*page_num = 0;
+ if (*offset < I2C_PAGE_SIZE)
+ return;
+
+ *i2c_addr = I2C_ADDR_HIGH;
+ *offset -= I2C_PAGE_SIZE;
+ }
+
+ static void mlx4_qsfp_eeprom_params_set(u8 *i2c_addr, u8 *page_num, u16 *offset)
+ {
+ /* Offsets 0-255 belong to page 0.
+ * Offsets 256-639 belong to pages 01, 02, 03.
+ * For example, offset 400 is page 02: 1 + (400 - 256) / 128 = 2
+ */
+ if (*offset < I2C_PAGE_SIZE)
+ *page_num = 0;
+ else
+ *page_num = 1 + (*offset - I2C_PAGE_SIZE) / I2C_HIGH_PAGE_SIZE;
+ *i2c_addr = I2C_ADDR_LOW;
+ *offset -= *page_num * I2C_HIGH_PAGE_SIZE;
+ }
+
+ /**
+ * mlx4_get_module_info - Read cable module eeprom data
+ * @dev: mlx4_dev.
+ * @inbox: mlx4_cmd_mailbox *inbox, *outbox;
+ * @inmad: mlx4_mad_ifc *inmad, *outmad;
+ * @cable_info: mlx4_cable_info *cable_info;
+ * @i2c_addr:
+ * @page_num:
+ * @module_id:
+ * @ret:
+
+ if (size > MODULE_INFO_MAX_READ)
+ size = MODULE_INFO_MAX_READ;
+
+ ret = mlx4_get_module_id(dev, port, &module_id);
+ if (ret)
+ return ret;
+
+ switch (module_id) {
+ case MLX4_MODULE_ID_SFP:
+ mlx4_sfp_eeprom_params_set(&i2c_addr, &page_num, &offset);
+ break;
+ case MLX4_MODULE_ID_QSFP:
+ case MLX4_MODULE_ID_QSFP_PLUS:
+ case MLX4_MODULE_ID_QSFP28:
+ mlx4_qsfp_eeprom_params_set(&i2c_addr, &page_num, &offset);
+break;
+default:
+mlx4_err(dev, "Module ID not recognized: %#x\n", module_id);
+return -EINVAL;
+
+inbox = mlx4_alloc_cmd_mailbox(dev);
+if (IS_ERR(inbox))
+    return PTR_ERR(inbox);
@@ -2076,16 +2177,9 @@
    size -= offset + size - I2C_PAGE_SIZE;

    -i2c_addr = I2C_ADDR_LOW;
-    if (offset >= I2C_PAGE_SIZE) {
-        /* Reset offset to high page */
-        i2c_addr = I2C_ADDR_HIGH;
-        offset -= I2C_PAGE_SIZE;
-    }
-
-    cable_info = (struct mlx4_cable_info *)inmad->data;
-cable_info->dev_mem_address = cpu_to_be16(offset);
-cable_info->page_num = 0;
-    +cable_info->page_num = page_num;
-cable_info->i2c_addr = i2c_addr;
-cable_info->size = cpu_to_be16(size);

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/qp.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/qp.c
@@ -287,6 +287,9 @@
   u64 in_param = 0;
   int err;

+if (!cnt)
+    return;
+
+ if (mlx4_is_mfunc(dev)) {
+    set_param_l(&in_param, base_qpn);
+    set_param_h(&in_param, cnt);
+    @ @ -390,11 +393,11 @@
   struct mlx4_qp_table *qp_table = &mlx4_priv(dev)->qp_table;
   struct mlx4_qp *qp;

   -spin_lock(&qp_table->lock);
+spin_lock_irq(&qp_table->lock);

   qp = mlx4_qp_lookup(dev, qpn);
-spin_unlock(&qp_table->lock);
+spin_unlock_irq(&qp_table->lock);
return qp;
}

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx4/resource_tracker.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx4/resource_tracker.c
@@ -471,12 +471,31 @@
priv->mfunc.master.res_tracker.res_alloc[RES_MPT].quota[pf];
}

-static int get_max_guaranteed_vfs_counter(struct mlx4_dev *dev)
-{/* reduce the sink counter */
-return (dev->caps.max_counters - 1 -
- (MLX4_PF_COUNTERS_PER_PORT * MLX4_MAX_PORTS))
-/ MLX4_MAX_PORTS;
+static int
+mlx4_calc_res_counter_guaranteed(struct mlx4_dev *dev,
+ struct resource_allocator *res_alloc,
+ int vf)
+{
+ struct mlx4_active_ports actv_ports;
+ int ports, counters_guaranteed;
+
+/* For master, only allocate according to the number of phys ports */
+if (vf == mlx4_master_func_num(dev))
+return MLX4_PF_COUNTERS_PER_PORT * dev->caps.num_ports;
+
+/* calculate real number of ports for the VF */
+actv_ports = mlx4_get_active_ports(dev, vf);
+ports = bitmap_weight(actv_ports.ports, dev->caps.num_ports);
+counters_guaranteed = ports * MLX4_VF_COUNTERS_PER_PORT;
+
+/* If we do not have enough counters for this VF, do not
+ * allocate any for it. '-1' to reduce the sink counter.
+ */
+if ((res_alloc->res_reserved + counters_guaranteed) >
+ (dev->caps.max_counters - 1))
+return 0;
+
+return counters_guaranteed;
}

int mlx4_init_resource_tracker(struct mlx4_dev *dev)
@@ -484,7 +503,6 @@
struct mlx4_priv *priv = mlx4_priv(dev);
int i, j;


int t;
- int max_vfs_guarantee_counter = get_max_guaranteed_vfs_counter(dev);

priv->mfunc.master.res_tracker.slave_list =
kzalloc(dev->num_slaves * sizeof(struct slave_list),
@@ -601,16 +619,8 @@
break;
case RES_COUNTER:
 res_alloc->quota[t] = dev->caps.max_counters;
 - if (t == mlx4_master_func_num(dev))
- res_alloc->guaranteed[t] =
- MLX4_PF_COUNTERS_PER_PORT *
- MLX4_MAX_PORTS;
- else if (t <= max_vfs_guarantee_counter)
- res_alloc->guaranteed[t] =
- MLX4_VF_COUNTERS_PER_PORT *
- MLX4_MAX_PORTS;
- else
- res_alloc->guaranteed[t] = 0;
+ res_alloc->guaranteed[t] =
+ mlx4_calc_res_counter_guaranteed(dev, res_alloc, t);
 break;
 default:
 break;
@@ -2717,13 +2727,13 @@
 int total_pages;
 int total_mem;
 int page_offset = (be32_to_cpu(qpc->params2) >> 6) & 0x3f;
+ int tot;
 sq_size = 1 << (log_sq_size + log_sq_sride + 4);
 rq_size = (srq|rss|xrc) ? 0 : (1 << (log_rq_size + log_rq_stride + 4));
total_mem = sq_size + rq_size;
- total_pages =
- roundup_pow_of_two((total_mem + (page_offset << 6)) >>
- page_shift);
+ tot = (total_mem + (page_offset << 6)) >> page_shift;
+ total_pages = !tot ? 1 : roundup_pow_of_two(tot);

return total_pages;
} 
@@ -2956,7 +2966,7 @@
 u32 srqn = qp_get_srqn(qpc) & 0xffffff;
 int use_srq = (qp_get_srqn(qpc) >> 24) & 1;
 struct res_srq *srq;
- int local_qpn = be32_to_cpu(qpc->local_qpn) & 0xffffff;
+ int local_qpn = vhcr->in_modifier & 0xffffff;
err = adjust_qp_sched_queue(dev, slave, qpc, inbox);
if (err)
@@ -4978,6 +4988,7 @@
if (!fs_rule->mirr_mbox) {
    mlx4_err(dev, "rule mirroring mailbox is nulln");
+    mlx4_free_cmd_mailbox(dev, mailbox);
    return -EINVAL;
}
memcpy(mailbox->buf, fs_rule->mirr_mbox, fs_rule->mirr_mbox_size);
@@ -5088,6 +5099,7 @@
&tracker->res_tree[RES_FS_RULE]);
list_del(&fs_rule->com.list);
spin_unlock_irq(mlx4_tlock(dev));
+kfree(fs_rule->mirr_mbox);
kfree(fs_rule);
state = 0;
break;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/Kconfig
@@ -46,7 +46,7 @@
config MLX5_ESWITCH
bool "Mellanox Technologies MLX5 SRIOV E-Switch support"
-depends on MLX5_CORE_EN
+depends on MLX5_CORE_EN && NET_SWITCHDEV
default y
---help---
Mellanox Technologies Ethernet SRIOV E-Switch support in ConnectX NIC.
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/cmd.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/cmd.c
@@ -449,6 +449,7 @@
MLX5_COMMAND_STR_CASE(SET_HCA_CAP);
MLX5_COMMAND_STR_CASE(QUERY_ISSI);
MLX5_COMMAND_STR_CASE(SET_ISSI);
+MLX5_COMMAND_STR_CASE(SET_DRIVER_VERSION);
MLX5_COMMAND_STR_CASE(CREATE_MKEY);
MLX5_COMMAND_STR_CASE(QUERY_MKEY);
MLX5_COMMAND_STR_CASE(DESTROY_MKEY);
@@ -801,7 +802,9 @@
unsigned long flags;
bool poll_cmd = ent->polling;
int alloc_ret;
+int cmd_mode;
+complete(&ent->handling);
down(sem);
if (!ent->page_queue) {
    @@ -829,7 +832,6 @@
}

cmd->ent_arr[ent->idx] = ent;
- set_bit(MLX5_CMD_ENT_STATE_PENDING_COMP, &ent->state);
lay = get_inst(cmd, ent->idx);
ent->lay = lay;
memset(lay, 0, sizeof(*lay));
@@ -847,9 +849,11 @@
set_signature(ent, !cmd->checksum_disabled);
dump_command(dev, ent, 1);
ent->ts1 = ktime_get_ns();
+cmd_mode = cmd->mode;

if (ent->callback)
schedule_delayed_work(&ent->cb_timeout_work, cb_timeout);
+set_bit(MLX5_CMD_ENT_STATE_PENDING_COMP, &ent->state);

/* Skip sending command to fw if internal error */
if (pci_channel_offline(dev->pdev) ||
@@ -862,6 +866,10 @@
MLX5_SET(mbox_out, ent->out, syndrome, drv_synd);

mlx5_cmd_comp_handler(dev, 1UL << ent->idx, true);
+/* no doorbell, no need to keep the entry */
+free_ent(cmd, ent->idx);
+if (ent->callback)
+free_cmd(ent);
return;
}

@@ -871,7 +879,7 @@
iowrite32be(1 << ent->idx, &dev->iseg->cmd_dbell);
mmiowb();
/* if not in polling don't use ent after this point */
- if (cmd->mode == CMD_MODE_POLLING || poll_cmd) {
+ if (cmd_mode == CMD_MODE_POLLING || poll_cmd) {
poll_timeout(ent);
/* make sure we read the descriptor after ownership is SW */
rmb();
@@ -915,6 +923,11 @@
struct mlx5_cmd *cmd = &dev->cmd;
int err;

+if (!wait_for_completion_timeout(&ent->handling, timeout) &&
+ cancel_work_sync(&ent->work)) {
+ent->ret = -ECANCELED;
+ goto out_err;
+
+ if (cmd->mode == CMD_MODE_POLLING || ent->polling) {
+    wait_for_completion(&ent->done);
+} else if (!wait_for_completion_timeout(&ent->done, timeout)) {
+    mlx5_cmd_comp_handler(dev, 1UL << ent->idx, true);
+}
+
+ out_err:
+ err = ent->ret;
+
+ if (err == -ETIMEDOUT) {
+    mlx5_core_warn(dev, "%s(0x%x) timeout. Will cause a leak of a command resource\n",
+                    mlx5_command_str(msg_to_opcode(ent->in)),
+                    msg_to_opcode(ent->in));
+} else if (err == -ECANCELED) {
+    mlx5_core_warn(dev, "%s(0x%x) canceled on out of queue timeout.\n",
+                    mlx5_command_str(msg_to_opcode(ent->in)),
+                    msg_to_opcode(ent->in));
+}
+ mlx5_core_dbg(dev, "err %d, delivery status %s(%d)\n",
+                err, deliv_status_to_str(ent->status), ent->status);
+ mlx5_get(mbox_in, in->first.data, opcode);
+ if (!callback)
+    init_completion(&ent->done);
+
+ if (!callback)
+    if (!callback)
+        init_completion(&ent->done);
+
+ err = wait_func(dev, ent);
+ if (err == -ETIMEDOUT)
+    goto out;
+ else if (err == -ECANCELED)
+    goto out_free;
+
+ ds = ent->ts2 - ent->ts1;
+ op = MLX5_GET(mbox_in, in->first.data, opcode);
+ struct mlx5_core_dev *dev = filp->private_data;
+ struct mlx5_cmd_debug *dbg = &dev->cmd.dbg;
+ char outlen_str[8] = {0};
+ int outlen;
+ void *ptr;
int err;
@@ -1287,8 +1308,6 @@
 if (copy_from_user(outlen_str, buf, count))
   return -EFAULT;
-
   outlen_str[7] = 0;
-
   err = sscanf(outlen_str, "\%d", &outlen);
 if (err < 0)
   return err;
@@ -1802,7 +1821,7 @@
 cmd->checksum_disabled = 1;
 cmd->max_reg_cmds = (1 << cmd->log_sz) - 1;
 -cmd->bitmask = (1 << cmd->max_reg_cmds) - 1;
+cmd->bitmask = (1UL << cmd->max_reg_cmds) - 1;

 cmd->cmdif_rev = ioread32be(&dev->iseg->cmdif_rev_fw_sub) >> 16;
 if (cmd->cmdif_rev > CMD_IF_REV) {
 --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/dev.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/dev.c
@@ -132,11 +132,11 @@
 delayed_event_start(priv);
 dev_ctx->context = intf->add(dev);
 -set_bit(MLX5_INTERFACE_ADDED, &dev_ctx->state);
-  if (intf->attach)
-    set_bit(MLX5_INTERFACE_ATTACHED, &dev_ctx->state);
  
  if (dev_ctx->context) {
+    set_bit(MLX5_INTERFACE_ADDED, &dev_ctx->state);
+    if (intf->attach)
+      set_bit(MLX5_INTERFACE_ATTACHED, &dev_ctx->state);
+    spin_lock_irq(&priv->ctx_lock);
      list_add_tail(&dev_ctx->list, &priv->ctx_list);
@@ -211,12 +211,17 @@
 if (intf->attach) {
   if (test_bit(MLX5_INTERFACE_ATTACHED, &dev_ctx->state))
     goto out;
-   -inf->attach(dev, dev_ctx->context);
+    if (intf->attach(dev, dev_ctx->context))
+      goto out;
+    set_bit(MLX5_INTERFACE_ATTACHED, &dev_ctx->state);
   } else {
     if (test_bit(MLX5_INTERFACE_ADDED, &dev_ctx->state))
        goto out;
        }
goto out;
dev_ctx->context = intf->add(dev);
+if (!dev_ctx->context)
+goto out;
+
set_bit(MLX5_INTERFACE_ADDED, &dev_ctx->state);
}

@@ -302,7 +307,7 @@
struct mlx5_interface *intf;

mutex_lock(&mlx5_intf_mutex);
- list_for_each_entry(intf, &intf_list, list)
+ list_for_each_entry_reverse(intf, &intf_list, list)
mlx5_remove_device(intf, priv);
list_del(&priv->dev_list);
mutex_unlock(&mlx5_intf_mutex);
@@ -383,16 +388,17 @@
}
}

-static u16 mlx5_gen_pci_id(struct mlx5_core_dev *dev)
+static u32 mlx5_gen_pci_id(struct mlx5_core_dev *dev)
{
- return (u16)((dev->pdev->bus->number << 8) |
+ return (u32)((pci_domain_nr(dev->pdev->bus) << 16) |
      (dev->pdev->bus->number << 8) |
      PCI_SLOT(dev->pdev->devfn));
}

/* Must be called with intf_mutex held */
struct mlx5_core_dev *mlx5_get_next_phys_dev(struct mlx5_core_dev *dev)
{
- u16 pci_id = mlx5_gen_pci_id(dev);
+ u32 pci_id = mlx5_gen_pci_id(dev);
 struct mlx5_core_dev *res = NULL;
 struct mlx5_core_dev *tmp_dev;
 struct mlx5_priv *priv;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en.h
@@ -204,12 +204,14 @@
 "rx_cqe_moder",
 "tx_cqe_moder",
 "rx_cqe_compress",
+"rx_no_csum_complete",
];

 enum mlx5e_priv_flag {
MLX5E_PFLAG_RX_CQE_BASED_MODER = (1 << 0),
MLX5E_PFLAG_TX_CQE_BASED_MODER = (1 << 1),
MLX5E_PFLAG_RX_CQE_COMPRESS = (1 << 2),
+MLX5E_PFLAG_RX_NO_CSUM_COMPLETE = (1 << 3),

#define MLX5E_SET_PFLAG(params, pflag, enable)
@@ -293,6 +295,8 @@
enum {
  MLX5E_RQ_STATE_ENABLED,
  MLX5E_RQ_STATE_AM,
  +MLX5E_RQ_STATE_NO_CSUM_COMPLETE,
  +MLX5E_RQ_STATE_CSUM_FULL, /* cqe_csum_full hw bit is set */
};

#define MLX5E_TEST_BIT(state, nr) (state & BIT(nr))
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_accel/ipsec.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_accel/ipsec.c
@@ -426,9 +426,6 @@
        mlx5_core_dbg(mdev, "mlx5e: ESP and SWP offload not supported\n");
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_arfs.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_arfs.c
@@ -381,14 +381,14 @@
        hlist_add_head(&arfs_rule->hlist, &del_list);
        +if (quota++ > MLX5E_ARFS_EXPIRY_QUOTA)
        +break;
    }
    spin_unlock_bh(&priv->fs.arfs.arfs_lock);
    mlx5e_for_each_arfs_rule(arfs_rule, htmp, priv->fs.arfs.arfs_tables, i, j) {
    -if (quota++ > MLX5E_ARFS_EXPIRY_QUOTA)
    -break;
    }
    spin_unlock_bh(&priv->fs.arfs.arfs_lock);
@@ -439,12 +439,6 @@
return &arfs_t->rules_hash[bucket_idx];
}

static u8 arfs_get_ip_proto(const struct sk_buff *skb)
{
    return (skb->protocol == htons(ETH_P_IP)) ?
        ip_hdr(skb)->protocol : ipv6_hdr(skb)->nexthdr;
}
-
static struct arfs_table *arfs_get_table(struct mlx5e_arfs_tables *arfs,
    u8 ip_proto, __be16 etype)
{
    arfs_may_expire_flow(priv);
}

/* return L4 destination port from ip4/6 packets */
static __be16 arfs_get_dst_port(const struct sk_buff *skb)
{
    char *transport_header;
    transport_header = skb_transport_header(skb);
    if (arfs_get_ip_proto(skb) == IPPROTO_TCP)
        return ((struct tcphdr *)transport_header)->dest;
    return ((struct udphdr *)transport_header)->dest;
}

/* return L4 source port from ip4/6 packets */
static __be16 arfs_get_src_port(const struct sk_buff *skb)
{
    char *transport_header;
    transport_header = skb_transport_header(skb);
    if (arfs_get_ip_proto(skb) == IPPROTO_TCP)
        return ((struct tcphdr *)transport_header)->source;
    return ((struct udphdr *)transport_header)->source;
}

static struct arfs_rule *arfs_alloc_rule(struct mlx5e_priv *priv,
    struct arfs_table *arfs_t,
    const struct sk_buff *skb,
    const struct flow_keys *fk,
    u16 rxq, u32 flow_id)
{
    struct arfs_rule *rule;
    INIT_WORK(&rule->arfs_work, arfs_handle_work);
tuple = &rule->tuple;
-tuple->etype = skb->protocol;
+tuple->etype = fk->basic.n_proto;
+tuple->ip_proto = fk->basic.ip_proto;
if (tuple->etype == htons(ETH_P_IP)) {
    -tuple->src_ipv4 = ip_hdr(skb)->saddr;
    -tuple->dst_ipv4 = ip_hdr(skb)->daddr;
    +tuple->src_ipv4 = fk->addrs.v4addrs.src;
    +tuple->dst_ipv4 = fk->addrs.v4addrs.dst;
} else {
    -memcpy(&tuple->src_ipv6, &ipv6_hdr(skb)->saddr,
             sizeof(struct in6_addr));
    +memcpy(&tuple->src_ipv6, &fk->addrs.v6addrs.src,
             sizeof(struct in6_addr));
    -memcpy(&tuple->dst_ipv6, &ipv6_hdr(skb)->daddr,
             sizeof(struct in6_addr));
    +memcpy(&tuple->dst_ipv6, &fk->addrs.v6addrs.dst,
             sizeof(struct in6_addr));
}
-tuple->ip_proto = arfs_get_ip_proto(skb);
-tuple->src_port = arfs_get_src_port(skb);
-tuple->dst_port = arfs_get_dst_port(skb);
+tuple->src_port = fk->ports.src;
+tuple->dst_port = fk->ports.dst;
rule->flow_id = flow_id;
rule->filter_id = priv->fs.arfs.last_filter_id++ % RPS_NO_FILTER;
@@ -663,37 +635,33 @@
return rule;
}

-static bool arfs_cmp_ips(struct arfs_tuple *tuple,
                       const struct sk_buff *skb)
+static bool arfs_cmp(const struct arfs_tuple *tuple, const struct flow_keys *fk)
{
    -if (tuple->etype == htons(ETH_P_IP) &&
        -tuple->src_ipv4 == ip_hdr(skb)->saddr &&
        -tuple->dst_ipv4 == ip_hdr(skb)->daddr)
        -return true;
    -if (tuple->etype == htons(ETH_P_IPV6) &&
        -(memcmp(&tuple->src_ipv6, &ipv6_hdr(skb)->saddr,
                    sizeof(struct in6_addr))) &&
        -(memcmp(&tuple->dst_ipv6, &ipv6_hdr(skb)->daddr,
                    sizeof(struct in6_addr))))
        -return true;
    +if (tuple->src_port != fk->ports.src || tuple->dst_port != fk->ports.dst)
        +return false;
    +if (tuple->etype != fk->basic.n_proto)
        +return false;
    +if (tuple->etype == htons(ETH_P_IP))
        +return false;
return tuple->src_ipv4 == fk->addrs.v4addrs.src &&
+   tuple->dst_ipv4 == fk->addrs.v4addrs.dst;
+if (tuple->etype == htons(ETH_P_IPV6))
+return !memcmp(&tuple->src_ipv6, &fk->addrs.v6addrs.src,
+   sizeof(struct in6_addr)) &&
+   !memcmp(&tuple->dst_ipv6, &fk->addrs.v6addrs.dst,
+   sizeof(struct in6_addr));
return false;
}

static struct arfs_rule *arfs_find_rule(struct arfs_table *arfs_t,
-__be16 src_port = arfs_get_src_port(skb);
-__be16 dst_port = arfs_get_dst_port(skb);
+__be16 src_port = fk->ports.src;
+__be16 dst_port = fk->ports.dst;

    hlist_for_each_entry(arfs_rule, head, hlist) {
-    if (arfs_rule->tuple.src_port == src_port &&
-        arfs_rule->tuple.dst_port == dst_port &&
-        arfs_cmp_ips(&arfs_rule->tuple, skb)) {
+    if (arfs_cmp(&arfs_rule->tuple, fk))
        return arfs_rule;
-}
return NULL;
@@ -706,17 +674,24 @@
return -EPROTONOSUPPORT;
+if (!skb_flow_dissect_flow_keys(skb, &fk, 0))
+return -EPROTONOSUPPORT;
+if (fk.basic.n_proto != htons(ETH_P_IP) &&
+   fk.basic.n_proto != htons(ETH_P_IPV6))
+    return -EPROTONOSUPPORT;
-    if (skb->protocol != htons(ETH_P_IP) &&
-        skb->protocol != htons(ETH_P_IPV6))
-        return -EPROTONOSUPPORT;
+if (skb->encapsulation)
+return -EPROTONOSUPPORT;
- arfs_t = arfs_get_table(arfs, arfs_get_ip_proto(skb), skb->protocol);
+ arfs_t = arfs_get_table(arfs, fk.basic.ip_proto, fk.basic.n_proto);
if (!arfs_t)
    return -EPROTONOSUPPORT;

spin_lock_bh(&arfs->arfs_lock);
-arfs_rule = arfs_find_rule(arfs_t, skb);
+ arfs_rule = arfs_find_rule(arfs_t, &fk);
if (arfs_rule) {
    if (arfs_rule->rxq == rxq_index) {
        spin_unlock_bh(&arfs->arfs_lock);
@@ -724,8 +699,7 @@
    }
    arfs_rule->rxq = rxq_index;
} else {
-arfs_rule = arfs_alloc_rule(priv, arfs_t, skb,
-    rxq_index, flow_id);
+    arfs_rule = arfs_alloc_rule(priv, arfs_t, &fk, rxq_index, flow_id);
    if (!arfs_rule) {
        spin_unlock_bh(&arfs->arfs_lock);
        return -ENOMEM;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_common.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_common.c
@@ -45,7 +45,9 @@
    if (err)
        return err;

+    mutex_lock(&mdev->mlx5e_res.td.list_lock);
    list_add(&tir->list, &mdev->mlx5e_res.td.tirs_list);
+    mutex_unlock(&mdev->mlx5e_res.td.list_lock);
    return 0;
}
@@ -53,8 +55,10 @@
void mlx5e_destroy_tir(struct mlx5_core_dev *mdev,
    mlx5e_destroy_tir(mdev, tir->tirn);
    list_del(&tir->list);
+    mutex_unlock(&mdev->mlx5e_res.td.list_lock);
}

static int mlx5e_create_mkey(struct mlx5_core_dev *mdev, u32 pdn,
@@ -114,6 +118,7 @@
}
INIT_LIST_HEAD(&mdev->mlx5e_res.td.tirs_list);
+mutex_init(&mdev->mlx5e_res.td.list_lock);

return 0;

@@ -141,15 +146,17 @@
{
    struct mlx5_core_dev *mdev = priv->mdev;
    struct mlx5e_tir *tir;
    -int err  = -ENOMEM;
+int err  = 0;
    u32 tirn = 0;
    int inlen;
    void *in;

    inlen = MLX5_ST_SZBYTES(modify_tir_in);
    in = kvzalloc(inlen, GFP_KERNEL);
    -if (!in)
+    if (!in) {
+        err = -ENOMEM;
        goto out;
        +}

    if (enable_uc_lb)
        MLX5_SET(modify_tir_in, in, ctx.self_lb_block,
    @@ -157,6 +164,7 @@
        MLX5_SET(modify_tir_in, in, bitmask.self_lb_en, 1);

        +mutex_lock(&mdev->mlx5e_res.td.list_lock);
        list_for_each_entry(tir, &mdev->mlx5e_res.td.tirs_list, list) {
            tirn = tir->tirn;
            err = mlx5_core_modify_tir(mdev, tirn, in, inlen);
        @@ -168,6 +176,7 @@
            kvfree(in);
            if (err)
                netdev_err(priv->netdev, "refresh tir(0x%x) failed, %d\n", tirn, err);
                +mutex_unlock(&mdev->mlx5e_res.td.list_lock);

            return err;
        }

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_dcbnl.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_dcbnl.c
@@ -272,7 +272,8 @@
}
+ struct ieee_ets *ets,
+ bool zero_sum_allowed)
{
  bool have_ets_tc = false;
  int bw_sum = 0;
  @ -297,8 +298,9 @@
}

if (have_ets_tc && bw_sum != 100) {
  -netdev_err(netdev,
  -  "Failed to validate ETS: BW sum is illegal\n");
  +if (bw_sum || (!bw_sum && !zero_sum_allowed))
  +netdev_err(netdev,
  +  "Failed to validate ETS: BW sum is illegal\n");
  return -EINVAL;
}
return 0;
@ -313,7 +315,7 @@
if (!MLX5_CAP_GEN(priv->mdev, ets))
return -EOPNOTSUPP;

-err = mlx5e_dbcnl_validate_ets(netdev, ets);
+err = mlx5e_dbcnl_validate_ets(netdev, ets, false);
if (err)
  return err;
@@ -613,12 +615,9 @@
  ets.prio_tc[i]);
}

-err = mlx5e_dbcnl_validate_ets(netdev, &ets);
-if (err) {
  -netdev_err(netdev,
  -  "%s, Failed to validate ETS: %d\n", __func__, err);
  +err = mlx5e_dbcnl_validate_ets(netdev, &ets, true);
  +if (err)
  goto out;
  -}

err = mlx5e_dcbnl_ieee_setets_core(priv, &ets);
if (err) {
  @@ -1007,12 +1006,14 @@

  mutex_lock(&priv->state_lock);

  -if (!test_bit(MLX5E_STATE_OPENED, &priv->state))
  -  goto out;
  -

new_channels.params = priv->channels.params;
mlx5e_trust_update_tx_min_inline_mode(priv, &new_channels.params);

+if (!test_bit(MLX5E_STATE_OPENED, &priv->state)) {
+priv->channels.params = new_channels.params;
+goto out;
+}
+
 /* Skip if tx_min_inline is the same */
if (new_channels.params.tx_min_inline_mode ==
    priv->channels.params.tx_min_inline_mode)
    @ @ -1056.6 +1057.8 @@
struct mlx5_core_dev *mdev = priv->mdev;
int err;

+priv->dcbx_dp.trust_state = MLX5_QPTS_TRUST_PCP;
+
if (!MLX5_DSCP_SUPPORTED(mdev))
return 0;

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_ethtool.c
@@ -492,6 +492,9 @@
return mlx5e_ethtool_get_coalesce(priv, coal);
}

+#define MLX5E_MAX_COAL_TIME		MLX5_MAX_CQ_PERIOD
+#define MLX5E_MAX_COAL_FRAMES	MLX5_MAX_CQ_COUNT
+
static void
mlx5e_set_priv_channels_coalesce(struct mlx5e_priv *priv, struct ethtool_coalesce *coal)
{
    @ @ -526.6 +529.20 @@
if (!MLX5_CAP_GEN(mdev, cq_moderation))
return -EOPNOTSUPP;

+if (coal->tx_coalesce_usec > MLX5E_MAX_COAL_TIME ||
    coal->rx_coalesce_usec > MLX5E_MAX_COAL_TIME) {
+netdev_info(priv->netdev, "%s: maximum coalesce time supported is %lu usecs\n",
    + __func__, MLX5E_MAX_COAL_TIME);
+return -ERANGE;
+
+if (coal->tx_max_coalesced_frames > MLX5E_MAX_COAL_FRAMES ||
    coal->rx_max_coalesced_frames > MLX5E_MAX_COAL_FRAMES) {
+netdev_info(priv->netdev, "%s: maximum coalesced frames supported is %lu\n",
    + __func__, MLX5E_MAX_COAL_FRAMES);
+return -ERANGE;
mutex_lock(&priv->state_lock);
new_channels.params = priv->channels.params;

+ if (!MLX5_CAP_GEN(mdev, vport_group_manager))
+ return -EOPNOTSUPP;
+
if (pauseparam->autoneg)
return -EINVAL;

struct mlx5_core_dev *mdev = priv->mdev;

@@ -1165,6 +1182,9 @@

struct mlx5_core_dev *mdev = priv->mdev;
int err;

+info->so_timestamping |= SOF_TIMESTAMPING_TX_HARDWARE |
+ SOF_TIMESTAMPING_RX_HARDWARE |
+ SOF_TIMESTAMPING_RAW_HARDWARE;

info->tx_types = BIT(HWTSTAMP_TX_OFF) |
BIT(HWTSTAMP_TX_ON);

struct mlx5e_priv *priv = netdev_priv(netdev);
struct mlx5_core_dev *mdev = priv->mdev;
+int err;

if (!MLX5_CAP_GEN(mdev, cqe_compression))
return -EOPNOTSUPP;
@@ -1558,12 +1574,37 @@
{
    return -EINVAL;
}

-mlx5e_modify_rx_cqe_compression_locked(priv, enable);
+err = mlx5e_modify_rx_cqe_compression_locked(priv, enable);
+if (err)
+    return err;
+
priv->channels.params.rx_cqe_compress_def = enable;

return 0;
}

+static int set_pflag_rx_no_csum_complete(struct net_device *netdev, bool enable)
+{
+    struct mlx5e_priv *priv = netdev_priv(netdev);
+    struct mlx5e_channels *channels = &priv->channels;
+    struct mlx5e_channel *c;
+    int i;
+    
+    if (!test_bit(MLX5E_STATE_OPENED, &priv->state) ||
+        priv->channels.params.xdp_prog)
+        return 0;
+
+    for (i = 0; i < channels->num; i++) {
+        c = channels->c[i];
+        if (enable)
+            __set_bit(MLX5E_RQ_STATE_NO_CSUM_COMPLETE, &c->rq.state);
+        else
+            __clear_bit(MLX5E_RQ_STATE_NO_CSUM_COMPLETE, &c->rq.state);
+    }
+
+    return 0;
+
+}

+static int mlx5e_handle_pflag(struct net_device *netdev,
+                              u32 wanted_flags,
+                              enum mlx5e_priv_flag flag,
+                              @@ -1609,6 +1650,12 @@
                            err = mlx5e_handle_pflag(netdev, pflags,
                            MLX5E_PFLAG_RX_CQE_COMPRESS,
                            set_pflag_rx_cqe_compress);
+    if (err)
+        goto out;
+
+    err = mlx5e_handle_pflag(netdev, pflags,
+    +MLX5E_PFLAG_RX_NO_CSUM_COMPLETE,
out:
mutex_unlock(&priv->state_lock);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_fs.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_fs.c
@@ -217,6 +217,9 @@
break;
}

+if (WARN_ONCE(*rule_p, "VLAN rule already exists type %d", rule_type))
+return 0;
+
*rule_p = mlx5_add_flow_rules(ft, spec, &flow_act, &dest, 1);

if (IS_ERR(*rule_p)) {
@@ -277,7 +280,6 @@
break;
}

 case MLX5E_VLAN_RULE_TYPE_MATCH_CTAG_VID:
 -mlx5e_vport_context_update_vlans(priv);
 if (priv->fs.vlan.active_cvlans_rule[vid]) {
 mlx5_del_flow_rules(priv->fs.vlan.active_cvlans_rule[vid]);
 priv->fs.vlan.active_cvlans_rule[vid] = NULL;
@@ -398,8 +400,7 @@
 mlx5e_add_vlan_rule(priv, MLX5E_VLAN_RULE_TYPE_MATCH_STAG_VID, i);

 -if (priv->fs.vlan.cvlan_filter_disabled &&
 - !(priv->netdev->flags & IFF_PROMISC))
 +if (priv->fs.vlan.cvlan_filter_disabled)
 mlx5e_add_any_vid_rules(priv);
 }

 @@ -416,8 +417,12 @@
 mlx5e_del_vlan_rule(priv, MLX5E_VLAN_RULE_TYPE_MATCH_STAG_VID, i);

 -if (priv->fs.vlan.cvlan_filter_disabled &&
 - !(priv->netdev->flags & IFF_PROMISC))
 +WARN_ON_ONCE(!(test_bit(MLX5E_STATE_DESTROYING, &priv->state)));
 +/* must be called after DESTROY bit is set and
 + * set_rx_mode is called and flushed
 + */
 +if (priv->fs.vlan.cvlan_filter_disabled)
 mlx5e_del_any_vid_rules(priv);
 }
in = kvzalloc(inlen, GFP_KERNEL);
if (!in) {
  kfree(ft->g);
  +ft->g = NULL;
  return -ENOMEM;
}

ft->g[ft->num_groups] = NULL;
mlx5e_destroy_groups(ft);
kvfree(in);
+kfree(ft->g);

return err;
}
+ * XDP programs might manipulate packets which will render
+ * skb->checksum incorrect.
+ */
+if (MLX5E_GET_PFLAG(params, MLX5E_PFLAG_RX_NO_CSUM_COMPLETE) || c->xdp)
+__set_bit(MLX5E_RQ_STATE_NO_CSUM_COMPLETE, &c->rq.state);
+
return 0;

err_destroy_rq:
@@ -1461,13 +1474,15 @@
int err;
u32 i;

+err = mlx5_vector2eqn(mdev, param->eq_ix, &eqn_not_used, &irqn);
+if (err)
+return err;
+
err = mlx5_cqwq_create(mdev, &param->wq, param->cqc, &cq->wq,
   &cq->wq_ctrl);
if (err)
return err;

-mlx5_vector2eqn(mdev, param->eq_ix, &eqn_not_used, &irqn);
-
mcq->cqe_sz = 64;
mcq->set_ci_db = cq->wq_ctrl.db.db;
mcq->arm_db = cq->wq_ctrl.db.db + 1;
@@ -1525,6 +1540,10 @@
int eqn;
int err;

+err = mlx5_vector2eqn(mdev, param->eq_ix, &eqn, &irqn_not_used);
+if (err)
+return err;
+
inlen = MLX5_ST_SZ_BYTES(create_cq_in) +
sizeof(u64) * cq->wq_ctrl.frag_buf.npages;
in = kvzalloc(inlen, GFP_KERNEL);
@@ -1538,8 +1557,6 @@
mlx5_fill_page_frag_array(&cq->wq_ctrl.frag_buf,
   (__be64 *)MLX5_ADDR_OF(create_cq_in, in, pas));

-mlx5_vector2eqn(mdev, param->eq_ix, &eqn, &irqn_not_used);
-
MLX5_SET(cqc, cqc, cq_period_mode, param->cq_period_mode);
MLX5_SET(cqc, cqc, c_eqn, eqn);
MLX5_SET(cqc, cqc, uar_page, mdev->priv.uar->index);
@@ -1598,7 +1615,7 @@
static int mlx5e_get_cpu(struct mlx5e_priv *priv, int ix)
{
    return cpumask_first(priv->mdev->priv.irq_info[ix].mask);
}

static int mlx5e_open_tx_cqs(struct mlx5e_channel *c,
int err;
int eqn;

+err = mlx5_vector2eqn(priv->mdev, ix, &eqn, &irq);
+if (err)
+return err;
+
c = kzalloc_node(sizeof(*c), GFP_KERNEL, cpu_to_node(cpu));
if (!c)
return -ENOMEM;

-c->num_tc   = params->num_tc;
c->xdp      = !!params->xdp_prog;
-
-mlx5_vector2eqn(priv->mdev, ix, &eqn, &irq);
c->irq_desc = irq_to_desc(irq);

netif_napi_add(netdev, &c->napi, mlx5e_napi_poll, 64);
param->wq.linear = 1;
}

-static void mlx5e_build_drop_rq_param(struct mlx5e_rq_param *param)
+static void mlx5e_build_drop_rq_param(struct mlx5_core_dev *mdev,
+    struct mlx5e_rq_param *param)
{
    void *rqc = param->rqc;
    void *wq = MLX5_ADDR_OF(rqc, rqc, wq);
    MLX5_SET(wq, wq, wq_type, MLX5_WQ_TYPE_LINKED_LIST);
    MLX5_SET(wq, wq, log_wq_stride, ilog2(sizeof(struct mlx5e_rx_wqe)));
    +param->wq.buf_numa_node = dev_to_node(&mdev->pdev->dev);
}

static void mlx5e_build_sq_param_common(struct mlx5e_priv *priv,
uint64_t, mdev->priv.irq_info[ix].mask);
+return cpumask_first(priv->mdev->priv.irq_info[ix + MLX5_EQ_VEC_COMP_BASE].mask);
}

static int mlx5e_open_tx_cqs(struct mlx5e_channel *c,
int err;
int eqn;
+err = mlx5_vector2eqn(priv->mdev, ix, &eqn, &irq);
+if (err)
+return err;
+
c = kzalloc_node(sizeof(*c), GFP_KERNEL, cpu_to_node(cpu));
if (!c)
return -ENOMEM;

-c->num_tc   = params->num_tc;
c->xdp      = !!params->xdp_prog;
-
-mlx5_vector2eqn(priv->mdev, ix, &eqn, &irq);
c->irq_desc = irq_to_desc(irq);

netif_napi_add(netdev, &c->napi, mlx5e_napi_poll, 64);
param->wq.linear = 1;
}

-static void mlx5e_build_drop_rq_param(struct mlx5e_rq_param *param)
+static void mlx5e_build_drop_rq_param(struct mlx5_core_dev *mdev,
+    struct mlx5e_rq_param *param)
{
    void *rqc = param->rqc;
    void *wq = MLX5_ADDR_OF(rqc, rqc, wq);
    MLX5_SET(wq, wq, wq_type, MLX5_WQ_TYPE_LINKED_LIST);
    MLX5_SET(wq, wq, log_wq_stride, ilog2(sizeof(struct mlx5e_rx_wqe)));
    +param->wq.buf_numa_node = dev_to_node(&mdev->pdev->dev);
}

static void mlx5e_build_sq_param_common(struct mlx5e_priv *priv,
    struct mlx5e_priv *priv, int ix)
{
    return cpumask_first(priv->mdev->priv.irq_info[ix].mask);
}

static int mlx5e_open_tx_cqs(struct mlx5e_channel *c,
int err;
int eqn;
+err = mlx5_vector2eqn(priv->mdev, ix, &eqn, &irq);
+if (err)
+return err;
+
c = kzalloc_node(sizeof(*c), GFP_KERNEL, cpu_to_node(cpu));
if (!c)
return -ENOMEM;

-c->num_tc   = params->num_tc;
c->xdp      = !!params->xdp_prog;
-
-mlx5_vector2eqn(priv->mdev, ix, &eqn, &irq);
c->irq_desc = irq_to_desc(irq);

netif_napi_add(netdev, &c->napi, mlx5e_napi_poll, 64);
param->wq.linear = 1;
}
-if (MLX5_VPORT_MANAGER(priv->mdev))
+if (MLX5_ESWITCH_MANAGER(priv->mdev))
mlx5e_add_sqs_fwd_rules(priv);

mlx5e_wait_channels_min_rx_wqes(&priv->channels);
@@ -2626,7 +2649,7 @@

mlx5e_redirect_rqts_to_drop(priv);

-if (MLX5_VPORT_MANAGER(priv->mdev))
+if (MLX5_ESWITCH_MANAGER(priv->mdev))
mlx5e_remove_sqs_fwd_rules(priv);

/* FIXME: This is a W/A only for tx timeout watch dog false alarm when
@@ -2712,6 +2735,9 @@
 mlx5_set_port_admin_status(priv->mdev, MLX5_PORT_UP);
 mutex_unlock(&priv->state_lock);

+if (mlx5e_vxlan_allowed(priv->mdev))
+udp_tunnel_get_rx_info(netdev);
+
return err;
}

@@ -2774,6 +2800,9 @@
struct mlx5e_cq *cq,
 struct mlx5e_cq_param *param)
{
+param->wq.buf_numa_node = dev_to_node(&mdev->pdev->dev);
+param->wq.db_numa_node  = dev_to_node(&mdev->pdev->dev);
+
return mlx5e_alloc_cq_common(mdev, param, cq);
}

@@ -2785,7 +2814,7 @@
 struct mlx5e_cq *cq = &drop_rq->cq;
 int err;

-mlx5e_build_drop_rq_param(&rq_param);
+mlx5e_build_drop_rq_param(mdev, &rq_param);

err = mlx5e_alloc_drop_cq(mdev, cq, &cq_param);
if (err)
@@ -3271,6 +3300,7 @@
return 0;
}
+ifdef CONFIG_MLX5_ESWITCH
static int set_feature_tc_num_filters(struct net_device *netdev, bool enable)
{
    struct mlx5e_priv *priv = netdev_priv(netdev);
    return 0;
}
+endif

static int set_feature_rx_all(struct net_device *netdev, bool enable)
{
    err |= mlx5e_handle_feature(netdev, &oper_features, features,
        NETIF_F_HW_VLAN_CTAG_FILTER,
        set_feature_cvlan_filter);
+ifdef CONFIG_MLX5_ESWITCH
err |= mlx5e_handle_feature(netdev, &oper_features, features,
    NETIF_F_HW_TC, set_feature_tc_num_filters);
+endif
err |= mlx5e_handle_feature(netdev, &oper_features, features,
    NETIF_F_RXALL, set_feature_rx_all);
    struct mlx5e_params *params,
    u16 max_channels)
    {
    -u8 cq_period_mode = 0;
+u8 rx_cq_period_mode;
    u32 link_speed = 0;
    u32 pci_bw = 0;
    @ @ -4093.6 +4126.7 @ @
    params->rx_cqe_compress_def = cqe_compress_heuristic(link_speed, pci_bw);
    MLX5E_SET_PFLAG(params, MLX5E_PFLAG_RX_CQE_COMPRESS, params->rx_cqe_compress_def);
+MLX5E_SET_PFLAG(params, MLX5E_PFLAG_RX_NO_CSUM_COMPLETE, false);

    /* RQ */
    mlx5e_set_rq_params(mdev, params);
    @ @ -4105.12 +4139.12 @ @
    params->lro_timeout = mlx5e_choose_lro_timeout(mdev, MLX5E_DEFAULT_LRO_TIMEOUT);

    /* CQ moderation params */
    -cq_period_mode = MLX5_CAP_GEN(mdev, cq_period_start_from_cqe) ?
+rx_cq_period_mode = MLX5_CAP_GEN(mdev, cq_period_start_from_cqe) ?
        MLX5_CQ_PERIOD_MODE_START_FROM_CQE :
        MLX5_CQ_PERIOD_MODE_START_FROM_EQE;
params->rx_am_enabled = MLX5_CAP_GEN(mdev, cq_moderation);
-mlx5e_set_rx_cq_mode_params(params, cq_period_mode);
-mlx5e_set_tx_cq_mode_params(params, cq_period_mode);
+mlx5e_set_rx_cq_mode_params(params, rx_cq_period_mode);
+mlx5e_set_tx_cq_mode_params(params, MLX5_CQ_PERIOD_MODE_START_FROM_EQE);

/* TX inline */
params->tx_max_inline = mlx5e_get_max_inline_cap(mdev);
@@ -4161,7 +4195,7 @@

#ifdef IS_ENABLED(CONFIG_NET_SWITCHDEV) && IS_ENABLED(CONFIG_MLX5_ESWITCH)
+if IS_ENABLED(CONFIG_MLX5_ESWITCH)
static const struct switchdev_ops mlx5e_switchdev_ops = {
    .switchdev_port_attr_get= mlx5e_attr_get,
};
@@ -4188,14 +4222,18 @@
    netdev->ethtool_ops  = &mlx5e_ethtool_ops;

    netdev->vlan_features |= NETIF_F_SG;
    -netdev->vlan_features |= NETIF_F_IP_CSUM;
    -netdev->vlan_features |= NETIF_F_IPV6_CSUM;
    +netdev->vlan_features |= NETIF_F_HW_CSUM;
    netdev->vlan_features |= NETIF_F_GRO;
    netdev->vlan_features |= NETIF_F_TSO;
    netdev->vlan_features |= NETIF_F_TSO6;
    netdev->vlan_features |= NETIF_F_RXCSUM;
    netdev->vlan_features |= NETIF_F_RXHASH;

    +netdev->mpls_features |= NETIF_F_SG;
    +netdev->mpls_features |= NETIF_F_HW_CSUM;
    +netdev->mpls_features |= NETIF_F_TSO;
    +netdev->mpls_features |= NETIF_F_TSO6;
+    if (!!MLX5_CAP_ETH(mdev, lro_cap))
    netdev->vlan_features |= NETIF_F_LRO;

    @@ -4207,8 +4245,7 @@

    if (mlx5e_vxlan_allowed(mdev) || MLX5_CAP_ETH(mdev, tunnel_stateless_gre)) {
        netdev->hw_features    |= NETIF_F_GSO_PARTIAL;
        -netdev->hw_enc_features |= NETIF_F_IP_CSUM;
        -netdev->hw_enc_features |= NETIF_F_IPV6_CSUM;
        +netdev->hw_enc_features |= NETIF_F_HW_CSUM;
        netdev->hw_enc_features |= NETIF_F_TSO;
        netdev->hw_enc_features |= NETIF_F_TSO6;
        netdev->hw_enc_features |= NETIF_F_GSO_PARTIAL;

    Open Source Used In 5GaaS Edge AC-4  25382
mlx5e_set_netdev_dev_addr(netdev);

#ifdef CONFIG_NET_SWITCHDEV && CONFIG_MLX5_ESWITCH
  if (MLX5_VPORT_MANAGER(mdev))
    netdev->switchdev_ops = &mlx5e_switchdev_ops;
#endif

mlx5e_enable_async_events(priv);

#ifdef CONFIG_MLX5_CORE_EN_DCB
  mlx5e_dcbnl_init_app(priv);
#endif

/* Device already registered: sync netdev system state */
if (mlx5e_vxlan_allowed(mdev)) {
  rtnl_lock();
  udp_tunnel_get_rx_info(netdev);
  rtnl_unlock();
}

queue_work(priv->wq, &priv->set_rx_mode_work);

mlx5e_disable_async_events(priv);
profile = priv->profile;
clear_bit(MLX5E_STATE_DESTROYING, &priv->state);

/* max number of channels may have changed */
+max_nch = mlx5e_get_max_num_channels(priv->mdev);
+if (priv->channels.params.num_channels > max_nch) {
+mlx5_core_warn(priv->mdev, "MLX5E: Reducing number of channels to %d\n", max_nch);
+priv->channels.params.num_channels = max_nch;
+mlx5e_build_default_indir_rqt(priv->channels.params.indirection_rqt,
+    MLX5E_INDIR_RQT_SIZE, max_nch);
+
+err = profile->init_tx(priv);
+if (err)
+    goto out;
+
+#ifdef CONFIG_MLX5_ESWITCH
-    if (MLX5_VPORT_MANAGER(mdev)) {
+    if (MLX5_ESWITCH_MANAGER(mdev)) {
+rpriv = mlx5e_alloc_nic_rep_priv(mdev);
+    if (!rpriv) {
+        mlx5_core_warn(mdev, "Failed to alloc NIC rep priv data\n");
-        --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_rep.c
-+        linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_rep.c
+        @ @ -44,6 +44,11 @ @
+#include "en_tc.h"
+#include "fs_core.h"

+    +#define MLX5E_REP_PARAMS_LOG_SQ_SIZE
+    +max(0x6, MLX5E_PARAMS_MINIMUM_LOG_SQ_SIZE)
+    +#define MLX5E_REP_PARAMS_LOG_RQ_SIZE
+    +max(0x6, MLX5E_PARAMS_MINIMUM_LOG_RQ_SIZE)
+    +
+    static const char mlx5e_rep_driver_name[] = "mlx5e_rep";

    static void mlx5e_rep_get_drvinfo(struct net_device *dev,
        @ @ -121,6 +126,7 @ @
    s->tx_packets += sq_stats->packets;
    s->tx_bytes += sq_stats->bytes;
    +s->tx_queue_dropped += sq_stats->dropped;
    }
    }
    }
    @ @ -175,7 +181,7 @ @
struct mlx5_eswitch_rep *rep = rpriv->rep;
struct mlx5_eswitch *esw = priv->mdev->priv.eswitch;

-if (esw->mode == SRIOV_NONE)
+if (esw->mode != SRIOV_OFFLOADS)
return -EOPNOTSUPP;

switch (attr->id) {
@@ -231,7 +237,7 @@
static void mlx5e_rep_neigh_update_init_interval(struct mlx5e_rep_priv *rpriv)
{
 #if IS_ENABLED(CONFIG_IPV6)
-unsigned long ipv6_interval = NEIGH_VAR(&ipv6_stub->nd_tbl->parms,
+unsigned long ipv6_interval = NEIGH_VAR(&nd_tbl.parms,
DELAY_PROBE_TIME);
#else
unsigned long ipv6_interval = ~0UL;
#endif
@@ -367,7 +373,7 @@
case NETEVENT_NEIGH_UPDATE:
 n = ptr;
 #if IS_ENABLED(CONFIG_IPV6)
-if (n->tbl != ipv6_stub->nd_tbl && n->tbl != &arp_tbl)
+if (n->tbl != &nd_tbl && n->tbl != &arp_tbl)
#else
if (n->tbl != &arp_tbl)
#endif
@@ -415,7 +421,7 @@
 done per device delay prob time parameter.
 */
 #if IS_ENABLED(CONFIG_IPV6)
-if (!p->dev || (p->tbl != ipv6_stub->nd_tbl && p->tbl != &arp_tbl))
+if (!p->dev || (p->tbl != &nd_tbl && p->tbl != &arp_tbl))
#else
if (!p->dev || p->tbl != &arp_tbl)
#endif
@@ -611,7 +617,6 @@
 struct mlx5e_priv *priv = netdev_priv(dev);
 struct mlx5e_rep_priv *rpriv = priv->ppriv;
 struct mlx5_eswitch_rep *rep = rpriv->rep;
-struct mlx5_eswitch *esw = priv->mdev->priv.eswitch;
int err;

mutex_lock(&priv->state_lock);
@@ -619,8 +624,9 @@
if (err)
goto unlock;

@@ -611,7 +617,6 @@
 mutex_lock(&priv->state_lock);
@@ -619,8 +624,9 @@
if (err)
goto unlock;

-if (!mlx5_eswitch_set_vport_state(esw, rep->vport,
- MLX5_ESW_VPORT_ADMIN_STATE_UP)
+if (!mlx5_modify_vport_admin_state(priv->mdev,
+MLX5_QUERY_VPORT_STATE_IN_OP_MOD_ESW_VPORT,
+rep->vport, MLX5_ESW_VPORT_ADMIN_STATE_UP))
netif_carrier_on(dev);

unlock:
@@ -633,11 +639,12 @@
struct mlx5e_priv *priv = netdev_priv(dev);
struct mlx5e_rep_priv *rpriv = priv->ppriv;
struct mlx5_eswitch_rep *rep = rpriv->rep;
-struct mlx5_eswitch *esw = priv->mdev->priv.eswitch;
+int ret;
mutex_lock(&priv->state_lock);
-(void)mlx5_eswitch_set_vport_state(esw, rep->vport, MLX5_ESW_VPORT_ADMIN_STATE_DOWN);
+tmlx5_modify_vport_admin_state(priv->mdev,
+MLX5_QUERY_VPORT_STATE_IN_OP_MOD_ESW_VPORT,
+rep->vport, MLX5_ESW_VPORT_ADMIN_STATE_DOWN);
ret = mlx5e_close_locked(dev);
mutex_unlock(&priv->state_lock);
return ret;
@@ -730,7 +737,7 @@
struct mlx5e_rep_priv *rpriv = priv->ppriv;
struct mlx5_eswitch_rep *rep;
- if (!MLX5_CAP_GEN(priv->mdev, vport_group_manager))
+ if (!MLX5_ESWITCH_MANAGER(priv->mdev))
return false;

rep = rpriv->rep;
@@ -744,8 +751,12 @@
static bool mlx5e_is_vf_vport_rep(struct mlx5e_priv *priv)
{
 struct mlx5e_rep_priv *rpriv = priv->pppriv;
- struct mlx5_eswitch_rep *rep = rpriv->rep;
+ struct mlx5_eswitch_rep *rep;
+if (!MLX5_ESWITCH_MANAGER(priv->mdev))
+return false;
+
+rep = rpriv->rep;
 if (rep && rep->vport != FDB_UPLINK_VPORT)
return true;
@@ -823,9 +834,9 @@
MLX5_CQ_PERIOD_MODE_START_FROM_CQE:
MLX5_CQ_PERIOD_MODE_START_FROM_EQE:
-params->log_sq_size = MLX5E_PARAMS_MINIMUM_LOG_SQ_SIZE;
+params->log_sq_size = MLX5E_REP_PARAMS_LOG_SQ_SIZE;
params->rq_wq_type = MLX5_WQ_TYPE_LINKED_LIST;
-params->log_rq_size = MLX5E_PARAMS_MINIMUM_LOG_RQ_SIZE;
+params->log_rq_size = MLX5E_REP_PARAMS_LOG_RQ_SIZE;

params->rx_am_enabled = MLX5_CAP_GEN(mdev, cq_moderation);
mlx5e_set_rx_cq_mode_params(params, cq_period_mode);
@@ -845,9 +856,7 @@
netdev->ethtool_ops = &mlx5e_rep_ethtool_ops;

-#ifdef CONFIG_NET_SWITCHDEV
netdev->switchdev_ops = &mlx5e_rep_switchdev_ops;
-#endif

netdev->features |= NETIF_F_VLAN_CHALLENGED | NETIF_F_HW_TC | NETIF_F_NETNS_LOCAL;
netdev->hw_features |= NETIF_F_HW_TC;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_rx.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_rx.c
@@ -36,6 +36,8 @@
#include <linux/tcp.h>
#include <linux/bpf_trace.h>
#include <net/busy_poll.h>
+#include <net/ip6_checksum.h>
+#include <net/inet_ecn.h>
#include "en.h"
#include "en_tc.h"
#include "eswitch.h"
@@ -547,20 +549,33 @@
return true;
}

+static void mlx5e_lro_update_tcp_hdr(struct mlx5_cqe64 *cqe, struct tcphdr *tcp)
+{
+u8 l4_hdr_type = get_cqe_l4_hdr_type(cqe);
+u8 tcp_ack = (l4_hdr_type == CQE_L4_HDR_TYPE_TCP_ACK_NO_DATA) ||
+(l4_hdr_type == CQE_L4_HDR_TYPE_TCP_ACK_AND_DATA);
+
+tcp->check = 0;
+tcp->psh = get_cqe_lro_tcppsh(cqe);
+
+if (tcp_ack) {
+tcp->ack = 1;
+tcp->ack_seq = cqe->lro_ack_seq_num;
+tcp->window = cqe->lro_tcp_win;
+}

Open Source Used In 5GaaS Edge AC-4  25387
static void mlx5e_lro_update_hdr(struct sk_buff *skb, struct mlx5_cqe64 *cqe, u32 cqe_bcnt)
{
    struct ethhdr *eth = (struct ethhdr *)(skb->data);
    struct tcphdr *tcp;
    int network_depth = 0;
    __wsum check;
    __be16 proto;
    u16 tot_len;
    void *ip_p;

    u8 l4_hdr_type = get_cqe_l4_hdr_type(cqe);
    u8 tcp_ack = (l4_hdr_type == CQE_L4_HDR_TYPE_TCP_ACK_NO_DATA) ||
        (l4_hdr_type == CQE_L4_HDR_TYPE_TCP_ACK_AND_DATA);
    proto = __vlan_get_protocol(skb, eth->h_proto, &network_depth);

    tot_len = cqe_bcnt - network_depth;
    ipv4->check = 0;
    ipv4->check = ip_fast_csum((unsigned char *)ipv4, ipv4->ihl);
    mlx5e_lro_update_tcp_hdr(cqe, tcp);
    check = csum_partial(tcp, tcp->doff * 4,
        csum_unfold((__force __sum16)cqe->check_sum));
    /* Almost done, don't forget the pseudo header */
    tcp->check = csum_tcpudp_magic(ipv4->saddr, ipv4->daddr,
        tot_len - sizeof(struct iphdr), IPPROTO_TCP, check);
    else {
        u16 payload_len = tot_len - sizeof(struct ipv6hdr);
        struct ipv6hdr *ipv6 = ip_p;
        tcp = ip_p + sizeof(struct ipv6hdr);
        skb_shinfo(skb)->gso_type = SKB_GSO_TCPV6;

        ipv6->hop_limit = cqe->lro_min_ttl;
        ipv6->payload_len = cpu_to_be16(tot_len -
            sizeof(struct ipv6hdr));
    }
    tcp->psh = get_cqe_lro_tcppsh(cqe);
    if (tcp_ack) {
-tcp->ack = 1;
-tcp->ack_seq = cqe->lro_ack_seq_num;
-tcp->window = cqe->lro_tcp_win;
+mlx5e_lro_update_tcp_hdr(cqe, tcp);
+check = csum_partial(tcp, tcp->doff * 4,
 + csum_unfold((__force __sum16)cqe->check_sum));
+/* Almost done, don't forget the pseudo header */
+tcp->check = csum_ipv6_magic(&ipv6->saddr, &ipv6->daddr, payload_len,
 + IPPROTO_TCP, check);
}
}

@@ -607,12 +629,108 @@
skb_set_hash(skb, be32_to_cpu(cqe->rss_hash_result), ht);
 }

-static inline bool is_last_ethertype_ip(struct sk_buff *skb, int *network_depth)
+static inline bool is_last_ethertype_ip(struct sk_buff *skb, int *network_depth,
 +__be16 *proto)
 {
 -__be16 ethertype = ((struct ethhdr *)skb->data)->h_proto;
 +*proto = ((struct ethhdr *)skb->data)->h_proto;
 +*proto = __vlan_get_protocol(skb, *proto, network_depth);
 -ethertype = __vlan_get_protocol(skb, ethertype, network_depth);
 -return (ethertype == htons(ETH_P_IP) || ethertype == htons(ETH_P_IPV6));
 +if (*proto == htons(ETH_P_IP))
 +return pskb_may_pull(skb, *network_depth + sizeof(struct iphdr));
 +
 +if (*proto == htons(ETH_P_IPV6))
 +return pskb_may_pull(skb, *network_depth + sizeof(struct ipv6hdr));
 +
 +return false;
 +}
 +
+static inline void mlx5e_enable_ecn(struct mlx5e_rq *rq, struct sk_buff *skb)
+{
+int network_depth = 0;
 +__be16 proto;
 +void *ip;
 +int rc;
 +
 +if (unlikely(!is_last_ethertype_ip(skb, &network_depth, &proto)))
 +return;
 +
 +ip = skb->data + network_depth;
 +rc = ((proto == htons(ETH_P_IP)) ? IP_ECN_set_ce((struct iphdr *)ip) :
 + IP6_ECN_set_ce(skb, (struct ipv6hdr *)ip));
rq->stats.ecn_mark += !!rc;
+
+
static u8 get_ip_proto(struct sk_buff *skb, int network_depth, __be16 proto)
+
    void *ip_p = skb->data + network_depth;
    +
    +return (proto == htons(ETH_P_IP)) ? ((struct iphdr *)ip_p)->protocol :
    +    ((struct ipv6hdr *)ip_p)->nexthdr;
    +}
    +
#define short_frame(size) ((size) <= ETH_ZLEN + ETH_FCS_LEN)
    +
#define MAX_PADDING 8
    +

    static void
tail_padding_csum(struct sk_buff *skb, int offset, int len,
        + struct mlx5e_rq_stats *stats)
    +{
    +    struct mlx5e_rq_stats *stats;
    +}
    +struct mlx5e_rq_stats *stats)
    +{ +}
    +
    +static void
tail_padding_csum(struct sk_buff *skb, int offset,
        + struct mlx5e_rq_stats *stats)
    +{
    +    struct mlx5e_rq_stats *stats;
    +}
    +u8 tail_padding[MAX_PADDING];
    +int len = skb->len - offset;
    +void *tail;
    +
    +if (unlikely(len > MAX_PADDING)) {
    +    tail_padding_csum_slow(skb, offset, len, stats);
    +    return;
    +} +
    +
    +tail = skb_header_pointer(skb, offset, len, tail_padding);
    +if (unlikely(!tail)) {
    +    tail_padding_csum_slow(skb, offset, len, stats);
    +    return;
    +} +
    +
    +stats->csum->complete_tail++; +
    +skb->csum = csum_block_add(skb->csum, skb_checksum(skb, offset, len, 0),
    + offset);
    +}
    +
    +
    +static void
tail_padding_csum_slow(struct sk_buff *skb, int offset, int len,
        + struct mlx5e_rq_stats *stats)
    +{
    +    struct mlx5e_rq_stats *stats;
    +}
    +stats->csum->complete_tail++; +
    +skb->csum = csum_block_add(skb->csum, skb_checksum(skb, offset, len, 0),
    + offset);
    +}
    +
    +
    +static void
tail_padding_csum(struct sk_buff *skb, int offset,
        + struct mlx5e_rq_stats *stats)
    +{
    +    struct mlx5e_rq_stats *stats;
    +}
    +u8 tail_padding[MAX_PADDING];
    +int len = skb->len - offset;
    +void *tail;
    +
    +if (unlikely(len > MAX_PADDING)) {
    +    tail_padding_csum_slow(skb, offset, len, stats);
    +    return;
    +} +
    +
    +tail = skb_header_pointer(skb, offset, len, tail_padding);
    +if (unlikely(!tail)) {
    +    tail_padding_csum_slow(skb, offset, len, stats);
    +    return;
    +} +
    +
    +stats->csum->complete_tail++;
    +skb->csum = csum_block_add(skb->csum, skb_checksum(skb, offset, len, 0),
    + offset); +
    +}
static void mlx5e_skb_padding_csum(struct sk_buff *skb, int network_depth, __be16 proto, struct mlx5e_rq_stats *stats)
{
    struct ipv6hdr *ip6;
    struct iphdr   *ip4;
    int pkt_len;
    
    switch (proto) {
    case htons(ETH_P_IP):
        ip4 = (struct iphdr *)(skb->data + network_depth);
        pkt_len = network_depth + ntohs(ip4->tot_len);
        break;
    case htons(ETH_P_IPV6):
        ip6 = (struct ipv6hdr *)(skb->data + network_depth);
        pkt_len = network_depth + sizeof(*ip6) + ntohs(ip6->payload_len);
        break;
    default:
        return;
    }

    if (likely(pkt_len >= skb->len))
        return;

    tail_padding_csum(skb, pkt_len, stats);
}

static inline void mlx5e_handle_csum(struct net_device *netdev,
    bool   lro)
{
    int network_depth = 0;
    __be16 proto;

    if (unlikely(!(netdev->features & NETIF_F_RXCSUM)))
        goto csum_none;

    if (is_last_ethertype_ip(skb, &network_depth)) {
        /* True when explicitly set via priv flag, or XDP prog is loaded */
        if (test_bit(MLX5E_RQ_STATE_NO_CSUM_COMPLETE, &rq->state))
            goto csum_unnecessary;
    }

    /* CQE csum doesn't cover padding octets in short ethernet
     * frames. And the pad field is appended prior to calculating
and appending the FCS field.

* Detecting these padded frames requires to verify and parse
* IP headers, so we simply force all those small frames to be
* CHECKSUM_UNNECESSARY even if they are not padded.
 */
if (short_frame(skb->len))
goto csum_unnecessary;
+
if (likely(is_last_ethertype_ip(skb, &network_depth, &proto))) {
+if (unlikely(get_ip_proto(skb, network_depth, proto) == IPPROTO_SCTP))
goto csum_unnecessary;
+
+rq->stats.csum_complete++;
skb->ip_summed = CHECKSUM_COMPLETE;
skb->csum = csum_unfold((__force __sum16)cqe->check_sum);
+
+if (test_bit(MLX5E_RQ_STATE_CSUM_FULL, &rq->state))
+return; /* CQE csum covers all received bytes */
+
+/* csum might need some fixups */
if (network_depth > ETH_HLEN)
/* CQE csum is calculated from the IP header and does
 * not cover VLAN headers (if present). This will add
@@ -643,10 +786,11 @@
skb->csum = csum_partial(skb->data + ETH_HLEN,
network_depth - ETH_HLEN,
skb->csum);
rq->stats.csum_complete++;
+mlx5e_skb_padding_csum(skb, network_depth, proto, &rq->stats);
return;
}

csum_unnecessary:
if (likely((cqe->hds_ip_ext & CQE_L3_OK) &&
    (cqe->hds_ip_ext & CQE_L4_OK))) {
skb->ip_summed = CHECKSUM_UNNECESSARY;
@@ -664,6 +808,8 @@
rq->stats.csum_none++;
}

#define MLX5E_CE_BIT_MASK 0x80
+
static inline void mlx5e_build_rx_skb(struct mlx5_cqe64 *cqe,
    u32 cqe_bcnt,
    struct mlx5e_rq *rq,
@@ -703,6 +849,10 @@
skb->mark = be32_to_cpu(cqe->sop_drop_qpn) & MLX5E_TC_FLOW_ID_MASK;
 mlx5e_handle_csum(netdev, cqe, rq, skb, !!lro_num_seg);
+/* checking CE bit in cqe - MSB in ml_path field */
+if (unlikely(cqe->ml_path & MLX5E_CE_BIT_MASK))
+mlx5e_enable_ecn(rq, skb);
+
+ skb->protocol = eth_type_trans(skb, netdev);
} }

@@ -1051,21 +1201,25 @@
int mlx5e_poll_rx_cq(struct mlx5e_cq *cq, int budget)
{
 struct mlx5e_rq *rq = container_of(cq, struct mlx5e_rq, cq);
-struct mlx5e_xdpsq *xdpsq;
+struct mlx5e_xdpsq *xdpsq = &rq->xdpsq;
 struct mlx5_cqe64 *cqe;
 int work_done = 0;

 if (unlikely(!MLX5E_TEST_BIT(rq->state, MLX5E_RQ_STATE_ENABLED)))
 return 0;

- if (cq->decmprs_left)
+ if (cq->decmprs_left) {
 work_done += mlx5e_decompress_cqes_cont(rq, cq, 0, budget);
+ if (cq->decmprs_left || work_done >= budget)
+ goto out;
+
 cqe = mlx5_cqwq_get_cqe(&cq->wq);
- if (!cqe)
+ if (!cqe) {
+ if (unlikely(work_done))
+ goto out;
 return 0;
- }
+ xdpsq = &rq->xdpsq;
+ }

 do {
 if (mlx5_get_cqe_format(cqe) == MLX5_COMPRESSED) {
@@ -1080,6 +1234,7 @@
 rq->handle_rx_cqe(rq, cqe);
 } while (;++work_done < budget) && (cqe = mlx5_cqwq_get_cqe(&cq->wq));

+out:
+ if (xdpsq->db.doorbell) {
 mlx5e_xmit_xdp_doorbell(xdpsq);
 xdpsq->db.doorbell = false;


ifdef CONFIG_MLX5_CORE_IPOIB

#define MLX5_IB_GRH_SGID_OFFSET 8
#define MLX5_IB_GRH_DGID_OFFSET 24
#define MLX5_GID_SIZE 16

u32 cqe_bcct,
struct sk_buff *skb)
{
+struct hwtstamp_config *tstamp;
struct net_device *netdev;
+struct mlx5e_priv *priv;
char *pseudo_header;
+u32 flags_rqpn;
u32 qpn;
char *g;
@@ -1194,7 +1353,11 @@
return;
}

-g = (be32_to_cpu(cqe->flags_rqpn) >> 28) & 3;
+flags_rqpn = be32_to_cpu(cqe->flags_rqpn);
+g = (flags_rqpn >> 28) & 3;
dgid = skb->data + MLX5_IB_GRH_DGID_OFFSET;
if (!g || dgid[0] != 0xff)
skb->pkt_type = PACKET_HOST;
@@ -1203,9 +1366,15 @@
else
skb->pkt_type = PACKET_MULTICAST;

/* TODO: IB/ipoib: Allow mcast packets from other VFs
 * 68996ae6b760e5c7465473eeb57bf65628ae87f4
 */
+/* Drop packets that this interface sent, ie multicast packets
 + * that the HCA has replicated.
 + */
+if (g && (qpn == (flags_rqpn & 0xffffffff)) &&
+ (memcmp(netdev->dev_addr + 4, skb->data + MLX5_IB_GRH_SGID_OFFSET,
+ MLX5_GID_SIZE) == 0)) {
+skb->dev = NULL;
+return;
+}
skb_pull(skb, MLX5_IB_GRH_BYTES);

@@ -1214,7 +1383,7 @@
 skb->ip_summed = CHECKSUM_COMPLETE;
 skb->csum = csum_unfold((__force __sum16)cqe->check_sum);

- if (unlikely(mlx5e_rx_hw_stamp(rq->tstamp)))
+ if (unlikely(mlx5e_rx_hw_stamp(tstamp)))
 skb_hwtstamps(skb)->hwtstamp =
 mlx5_timecounter_cyc2time(rq->clock, get_cqe_ts(cqe));

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_rx_am.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_rx_am.c
 @@ -188,7 +188,7 @@
}

#define IS_SIGNIFICANT_DIFF(val, ref)\
- (((100 * abs((val) - (ref))) / (ref)) > 10) /* more than 10% difference */
+ (((100UL * abs((val) - (ref))) / (ref)) > 10) /* more than 10% difference */

static int mlx5e_am_stats_compare(struct mlx5e_rx_am_stats *curr,
    struct mlx5e_rx_am_stats *prev)
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_selftest.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_selftest.c
 @@ -98,18 +98,17 @@
 return 1;
 }

-#ifdef CONFIG_INET
- /* loopback test */
- #define MLX5E_TEST_PKT_SIZE (MLX5_MPWRQ_SMALL_PACKET_THRESHOLD - NET_IP_ALIGN)
- #define MLX5E_TEST_MAGIC 0x5AEED15C001ULL
- static struct mlx5ehdr {
-     __be32 version;
-     __be64 magic;
-     char   text[ETH_GSTRING_LEN];
- };

+#ifdef CONFIG_INET
+ /* loopback test */
+ #define MLX5E_TEST_PKT_SIZE (sizeof(struct ethhdr) + sizeof(struct iphdr) +
+     sizeof(struct udphdr) + sizeof(struct mlx5ehdr))
+ #define MLX5E_TEST_MAGIC 0x5AEED15C001ULL
+ static struct sk_buff *mlx5e_test_get_udp_skb(struct mlx5e_priv *priv)
struct sk_buff *skb = NULL;
struct ethhdr *ethh;
struct udphdr *udph;
struct iphdr *iph;

int datalen, iplen;

- datalen = MLX5E_TEST_PKT_SIZE -
- (sizeof(*ethh) + sizeof(*iph) + sizeof(*udph));
+int iplen;

skb = netdev_alloc_skb(priv->netdev, MLX5E_TEST_PKT_SIZE);
if (!skb) {
    skb = netdev_alloc_skb(priv->netdev, MLX5E_TEST_PKT_SIZE);
    /* Fill UDP header */
    udph->source = htons(9);
    udph->dest = htons(9); /* Discard Protocol */
    -udph->len = htons(datalen + sizeof(struct udphdr));
    +udph->len = htons(sizeof(struct mlx5ehdr) + sizeof(struct udphdr));
    udph->check = 0;

    /* Fill IP header */
    @@ -157,7 +153,8 @@
    iph->ttl = 32;
    iph->version = 4;
    iph->protocol = IPPROTO_UDP;
    -iplen = sizeof(struct iphdr) + sizeof(struct udphdr) + datalen;
    +iplen = sizeof(struct iphdr) + sizeof(struct udphdr) +
      sizeof(struct mlx5ehdr);
    iph->tot_len = htons(iplen);
    iph->frag_off = 0;
    iph->saddr = 0;
    @@ -170,9 +167,6 @@
    mlxh = skb_put(skb, sizeof(*mlxh));
    mlxh->version = 0;
    mlxh->magic = cpu_to_be64(MLX5E_TEST_MAGIC);
    -strlcpy(mlxh->text, mlx5e_test_text, sizeof(mlxh->text));
    -datalen -= sizeof(*mlxh);
    -skb_put_zero(skb, datalen);

    skb->csum = 0;
    skb->ip_summed = CHECKSUM_PARTIAL;
    @@ -216,7 +210,8 @@
    if (iph->protocol != IPPROTO_UDP)
        goto out;

    -udph = udp_hdr(skb);
/* Don't assume skb_transport_header() was set */
udph = (struct udphdr *)((u8 *)iph + 4 * iph->ihl);
if (udph->dest != htons(9))
    goto out;

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_stats.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_stats.c
@@ -45,10 +45,13 @@
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, tx_added_vlan_packets) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_lro_packets) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_lro_bytes) },
+{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_ecn_mark) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_removed_vlan_packets) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_csum_unnecessary) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_csum_complete) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_csum_complete_tail) },
+{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_csum_complete_tail_slow) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_csum_ecn_mark) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_xdp_drop) },
{ MLX5E_DECLARE_STAT(struct mlx5e_sw_stats, rx_xdp_tx) },
@@ -727,6 +730,8 @@
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, packets) },
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, bytes) },
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, csum_complete) },
+{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, csum_complete_tail) },
+{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, csum_complete_tail_slow) },
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, csum_ecn_mark) },
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, removed_vlan_packets) },
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, wqe_err) },
+{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, ecn_mark) },
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, removed_vlan_packets) },
{ MLX5E_DECLARE_RX_STAT(struct mlx5e_rq_stats, wqe_err) },
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_stats.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_stats.h
@@ -62,10 +62,13 @@
    u64 tx_added_vlan_packets;
    u64 rx_lro_packets;
    u64 rx_lro_bytes;
+    u64 rx_ecn_mark;
    u64 rx_removed_vlan_packets;
    u64 rx_csum_unnecessary;
    u64 rx_csum_complete;}
u64 rx_csum_complete;
+u64 rx_csum_complete_tail;
+u64 rx_csum_complete_tail_slow;
u64 rx_csum_unnecessary_inner;
u64 rx_xdp_drop;
u64 rx_xdp_tx;
@@ -150,11 +153,14 @@
    u64 packets;
    u64 bytes;
    u64 csum_complete;
    +u64 csum_complete_tail;
    +u64 csum_complete_tail_slow;
    u64 csum_unnecessary;
    u64 csum_unnecessary_inner;
    u64 csum_none;
    u64 lro_packets;
    u64 lro_bytes;
    +u64 ecn_mark;
    u64 removed_vlan_packets;
    u64 xdp_drop;
    u64 xdp_tx;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_tc.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_tc.c
@@ -81,6 +81,7 @@
    struct ip_tunnel_info tun_info;
    struct mlx5_flow_spec spec;
    int num_mod_hdr_actions;
    +int max_mod_hdr_actions;
    void *mod_hdr_actions;
    int mirred_ifindex;
    };
@@ -483,19 +484,19 @@
    void mlx5e_tc_update_neigh_used_value(struct mlx5e_neigh_hash_entry *nhe)
    {
    struct mlx5e_neigh *m_neigh = &nhe->m_neigh;
    -u64 bytes, packets, lastuse = 0;
    struct mlx5e_tc_flow *flow;
    struct mlx5e_encap_entry *e;
    struct mlx5_fc *counter;
    struct neigh_table *tbl;
    bool neigh_used = false;
    struct neighbour *n;
    +u64 lastuse;

    if (m_neigh->family == AF_INET)
        tbl = &arp_tbl;
    #if IS_ENABLED(CONFIG_IPV6)
        else if (m_neigh->family == AF_INET6)
    }
- tbl = ipv6_stub->nd_tbl;
+ tbl = &nd_tbl;
  #endif
else
  return;
@@ -506,7 +507,7 @@
list_for_each_entry(flow, &e->flows, encap) {
  if (flow->flags & MLX5E_TC_FLOW_OFFLOADED) {
    counter = mlx5_flow_rule_counter(flow->rule);
-    mlx5_fc_query_cached(counter, &bytes, &packets, &lastuse);
+    lastuse = mlx5_fc_query_lastuse(counter);
    if (time_after((unsigned long)lastuse, nhe->reported_lastuse)) {
      neigh_used = true;
      break;
@@ -720,7 +721,7 @@
static int __parse_cls_flower(struct mlx5e_priv *priv,
      struct mlx5_flow_spec *spec,
      struct tc_cls_flower_offload *f,
-    u8 *min_inline)
+    u8 *match_level)
{
  void *headers_c = MLX5_ADDR_OF(fte_match_param, spec->match_criteria,
      outer_headers):
@@ -729,7 +730,7 @@
    u16 addr_type = 0;
    u8 ip_proto = 0;

-    *min_inline = MLX5_INLINE_MODE_L2;
+    *match_level = MLX5_MATCH_NONE;

    if (dissector->used_keys &
      ~((BIT(FLOW_DISSECTOR_KEY_CONTROL) |
@@ -779,29 +780,6 @@
      inner_headers);
    }

-    if (dissector->used_keys &
-      ~((BIT(FLOW_DISSECTOR_KEY_CONTROL) |
@@ -779,29 +780,6 @@
      inner_headers);
    }

    - struct flow_dissector_key_control *key =
    - skb_flow_dissector_target(f->dissector,
-      FLOW_DISSECTOR_KEY_CONTROL,,
-      f->key);
-    - skb_flow_dissector_target(f->dissector,
-      FLOW_DISSECTOR_KEY_CONTROL,,
-      f->mask);
-    addr_type = key->addr_type;
if (mask->flags & FLOW_DIS_IS_FRAGMENT) {
-MLX5_SET(fte_match_set_lyr_2_4, headers_c, frag, 1);
-MLX5_SET(fte_match_set_lyr_2_4, headers_v, frag,
- key->flags & FLOW_DIS_IS_FRAGMENT);
-
/* the HW doesn't need L3 inline to match on frag=no */
-if (key->flags & FLOW_DIS_IS_FRAGMENT)
-*min_inline = MLX5_INLINE_MODE_IP;
-}
-
if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_BASIC)) {
    struct flow_dissector_key_basic *key =
    skb_flow_dissector_target(f->dissector,
    skb_flow_dissector_target(f->dissector,
    skb_flow_dissector_target(f->dissector,
    skb_flow_dissector_target(f->dissector,
    struct flow_dissector_key_vlan *mask =
    skb_flow_dissector_target(f->dissector,
    skb_flow_dissector_target(f->dissector,
    skb_flow_dissector_target(f->dissector,
    skb_flow_dissector_target(f->dissector,
    if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_VLAN)) {[/code]
+MLX5_SET(fte_match_set_lyr_2_4, headers_c, first_vid, mask->vlan_id);
+MLX5_SET(fte_match_set_lyr_2_4, headers_v, first_vid, key->vlan_id);
+
+MLX5_SET(fte_match_set_lyr_2_4, headers_c, first_prio, mask->vlan_priority);
+MLX5_SET(fte_match_set_lyr_2_4, headers_v, first_prio, key->vlan_priority);
+
+*match_level = MLX5_MATCH_L2;
+
+} else if (*match_level != MLX5_MATCH_NONE) {
+MLX5_SET(fte_match_set_lyr_2_4, headers_c, svlan_tag, 1);
+MLX5_SET(fte_match_set_lyr_2_4, headers_c, cvlan_tag, 1);
+*match_level = MLX5_MATCH_L2;
+
+}
+
@if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_ETH_ADDRS)) {
@@ -850,29 +848,61 @@
ether_addr_copy(MLX5_ADDR_OF(fte_match_set_lyr_2_4, headers_v,
smac_47_16),
key->src);
+
+if (!is_zero_ether_addr(mask->src) || !is_zero_ether_addr(mask->dst))
+*match_level = MLX5_MATCH_L2;
+
-}
-
-} else if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_VLAN)) {
-struct flow_dissector_key_vlan *key =
+if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_CONTROL)) {
+struct flow_dissector_key_control *key =
skb_flow_dissector_target(f->dissector,
- FLOW_DISSECTOR_KEY_VLAN,
+ FLOW_DISSECTOR_KEY_CONTROL,
    f->key);
-struct flow_dissector_key_vlan *mask =
+
+struct flow_dissector_key_control *mask =
skb_flow_dissector_target(f->dissector,
- FLOW_DISSECTOR_KEY_VLAN,
+ FLOW_DISSECTOR_KEY_CONTROL,
    f->mask);
-if (mask->vlan_id || mask->vlan_priority) {
-MLX5_SET(fte_match_set_lyr_2_4, headers_c, cvlan_tag, 1);
-MLX5_SET(fte_match_set_lyr_2_4, headers_v, cvlan_tag, 1);
+addr_type = key->addr_type;
+
-MLX5_SET(fte_match_set_lyr_2_4, headers_c, first_vid, mask->vlan_id);
-MLX5_SET(fte_match_set_lyr_2_4, headers_v, first_vid, key->vlan_id);
+
+/* the HW doesn't support frag first/later */
+if (mask->flags & FLOW_DIS_FIRST_FRAG)
+return -EOPNOTSUPP;

-MLX5_SET(fte_match_set_lyr_2_4, headers_c, first_prio, mask->vlan_priority);
-MLX5_SET(fte_match_set_lyr_2_4, headers_v, first_prio, key->vlan_priority);
+if (mask->flags & FLOW_DIS_IS_FRAGMENT) {
+MLX5_SET(fte_match_set_lyr_2_4, headers_c, frag, 1);
+MLX5_SET(fte_match_set_lyr_2_4, headers_v, frag,
+  key->flags & FLOW_DIS_IS_FRAGMENT);
+ /* the HW doesn't need L3 inline to match on frag=no */
+if (!((key->flags & FLOW_DIS_IS_FRAGMENT))
+  *match_level = MLX5_MATCH_L2;
+ /* *** L2 attributes parsing up to here *** */
+else
+  *match_level = MLX5_MATCH_L3;
}

+if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_BASIC)) {
  struct flow_dissector_key_basic *key =
  skb_flow_dissector_target(f->dissector,
  + FLOW_DISSECTOR_KEY_BASIC,
  + f->key);
  struct flow_dissector_key_basic *mask =
  skb_flow_dissector_target(f->dissector,
  + FLOW_DISSECTOR_KEY_BASIC,
  + f->mask);
  ip_proto = key->ip_proto;
  +
  +MLX5_SET(fte_match_set_lyr_2_4, headers_c, ip_protocol,
  + mask->ip_proto);
  +MLX5_SET(fte_match_set_lyr_2_4, headers_v, ip_protocol,
  + key->ip_proto);
  +
  +if (mask->ip_proto)
  +  *match_level = MLX5_MATCH_L3;
  +}
  +
  if (addr_type == FLOW_DISSECTOR_KEY_IPV4_ADDRS) {
  struct flow_dissector_key_ipv4_addrs *key =
  skb_flow_dissector_target(f->dissector,
  @@ -897,7 +927,7 @@
  &key->dst, sizeof(key->dst));

  if (mask->src || mask->dst)
  -*min_inline = MLX5_INLINE_MODE_IP;
  +*match_level = MLX5_MATCH_L3;
  }
if (addr_type == FLOW_DISSECTOR_KEY_IPV6_ADDRS) {
    @@ -926,7 +956,7 @@
    if (ipv6_addr_type(&mask->src) != IPV6_ADDR_ANY ||
        ipv6_addr_type(&mask->dst) != IPV6_ADDR_ANY)
        -*min_inline = MLX5_INLINE_MODE_IP;
        +*match_level = MLX5_MATCH_L3;
    }

    if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_IP)) {
        @@ -954,9 +984,11 @@
        return -EOPNOTSUPP;
    }

    if (mask->tos || mask->ttl)
        -*min_inline = MLX5_INLINE_MODE_IP;
        +*match_level = MLX5_MATCH_L3;
    }

    +/* ***  L3 attributes parsing up to here *** */
    +
    if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_PORTS)) {
        struct flow_dissector_key_ports *key =
            skb_flow_dissector_target(f->dissector,
        @@ -997,7 +1029,7 @@
            }

    if (mask->src || mask->dst)
        -*min_inline = MLX5_INLINE_MODE_TCP_UDP;
        +*match_level = MLX5_MATCH_L4;
    }

    if (dissector_uses_key(f->dissector, FLOW_DISSECTOR_KEY_TCP)) {
        @@ -1016,7 +1048,7 @@
            ntohs(key->flags));
        }

    if (mask->flags)
        -*min_inline = MLX5_INLINE_MODE_TCP_UDP;
        +*match_level = MLX5_MATCH_L4;
    }

    return 0;
    @@ -1031,19 +1063,19 @@
        struct mlx5_eswitch *esw = dev->priv.eswitch;
        struct mlx5e_rep_priv *ppriv = priv->ppriv;
        struct mlx5_eswitch_rep *rep;
        -u8 min_inline;
        +u8 match_level;
int err;

-err = __parse_cls_flower(priv, spec, f, &min_inline);
+err = __parse_cls_flower(priv, spec, f, &match_level);

if (!err && (flow->flags & MLX5E_TC_FLOW_ESWITCH)) {
    rep = rpriv->rep;
    if (rep->vport != FDB_UPLINK_VPORT &&
        (esw->offloads.inline_mode != MLX5_INLINE_MODE_NONE &&
         esw->offloads.inline_mode < min_inline)) {
        netdev_warn(priv->netdev,
            "Flow is not offloaded due to min inline setting, required %d actual %d\n",
            - min_inline, esw->offloads.inline_mode);
        return -EOPNOTSUPP;
    }
}
@@ -1132,9 +1164,9 @@
OFFLOAD(UDP_DPORT, 2, udp.dest, 0),
    }

/* On input attr->num_mod_hdr_actions tells how many HW actions can be parsed at
 * max from the SW pedit action. On success, it says how many HW actions were
 * actually parsed.
 */
static int offload_pedit_fields(struct pedit_headers *masks,
    struct pedit_headers *vals,
    @@ -1157,9 +1189,11 @@
            add_vals = &vals[TCA_PEDIT_KEY_EX_CMD_ADD];

            action_size = MLX5_UN_SZ_BYTES(set_action_in_add_action_in_auto);
-            action = parse_attr->mod_hdr_actions;
-            max_actions = parse_attr->num_mod_hdr_actions;
-            nactions = 0;
+            action = parse_attr->mod_hdr_actions +
+                parse_attr->num_mod_hdr_actions * action_size;
+            max_actions = parse_attr->max_mod_hdr_actions;
+            nactions = parse_attr->num_mod_hdr_actions;

            for (i = 0; i < ARRAY_SIZE(fields); i++) {
                f = &fields[i];
                @@ -1264,7 +1298,7 @@
                    if (!parse_attr->mod_hdr_actions)
return -ENOMEM;

-parse_attr->num_mod_hdr_actions = max_actions;
+parse_attr->max_mod_hdr_actions = max_actions;
return 0;
}
@@ -1308,9 +1342,11 @@
goto out_err;
}

-err = alloc_mod_hdr_actions(priv, a, namespace, parse_attr);
-if (err)
-goto out_err;
+if (!parse_attr->mod_hdr_actions) {
+err = alloc_mod_hdr_actions(priv, a, namespace, parse_attr);
+if (err)
+goto out_err;
+
}

err = offload_pedit_fields(masks, vals, parse_attr);
if (err < 0)
@@ -1394,7 +1430,8 @@
}

ip_proto = MLX5_GET(fte_match_set_lyr_2_4, headers_v, ip_protocol);
-if (modify_ip_header &amp; ip_proto != IPPROTO_TCP &amp; ip_proto != IPPROTO_UDP) {
+if (modify_ip_header &amp; ip_proto != IPPROTO_TCP &amp; ip_proto != IPPROTO_UDP &amp; ip_proto != IPPROTO_ICMP) {
     pr_info("can't offload re-write of ip proto %d\n", ip_proto);
     return false;
 }
@@ -1548,12 +1585,11 @@

#if IS_ENABLED(CONFIG_INET) &amp;&amp; IS_ENABLED(CONFIG_IPV6)
struct mlx5_eswitch *esw = priv-&gt;mdev-&gt;priv.eswitch;
-int ret;

-ret = ipv6_stub-&gt;ipv6_dst_lookup(dev_net(mirred_dev), NULL, &amp;dst,
- fl6);
-if (ret < 0)
-return ret;
+dst = ipv6_stub-&gt;ipv6_dst_lookup_flow(dev_net(mirred_dev), NULL, fl6,
+ NULL);
+if (IS_ERR(dst))
+return PTR_ERR(dst);

*out_ttl = ip6_dst_hoplimit(dst);
int max_encap_size = MLX5_CAP_ESW(priv->mdev, max_encap_header_size);
int ipv6_encap_size = ETH_HLEN + sizeof(struct ipv6hdr) + VXLAN_HLEN;
struct ip_tunnel_key *tun_key = &e->tun_info.key;
-struct net_device *out_dev;
+struct net_device *out_dev = NULL;
struct neighbour *n = NULL;
struct flowi6 fl6 = { };
char *encap_header;
@@ -2024,7 +2060,8 @@
} else if (tcf_vlan_action(a) == TCA_VLAN_ACT_PUSH) {
  -if (tcf_vlan_push_proto(a) != htons(ETH_P_8021Q))
  +if (tcf_vlan_push_proto(a) != htons(ETH_P_8021Q) ||
  +tcf_vlan_push_prio(a))
    return -EOPNOTSUPP;

  attr->action |= MLX5_FLOW_CONTEXT_ACTION_VLAN_PUSH;
@@ -2102,19 +2139,19 @@
    -if (flow->flags & MLX5E_TC_FLOW_ESWITCH) ||
    -if (!(flow->flags & MLX5E_TC_FLOW_ESWITCH) ||
    +kvfree(parse_attr);
    +
    err = rhashtable_insert_fast(&tc->ht, &flow->node,
      tc->ht_params);
    -} else if (err)
    -goto err_del_rule;
    +if (err)
    +{ mlx5e_tc_del_flow(priv, flow);
    +kvfree(flow);
    +}
    -err_del_rule:
    -mlx5e_tc_del_flow(priv, flow);
    -
    err_free:
    kvfree(parse_attr);
    kfree(flow);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/en_tx.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/en_tx.c
@@ -176,7 +176,7 @@
     default:
     hlen = mlx5e_skb_l2_header_offset(skb);
     }
-    return min_t(u16, hlen, skb->len);
+    return min_t(u16, hlen, skb_headlen(skb));
    }

 static inline void mlx5e_tx_skb_pull_inline(unsigned char **skb_data,
@@ -255,7 +255,7 @@
     dma_addr = dma_map_single(sq->pdev, skb_data, headlen,
             DMA_TO_DEVICE);
     if (unlikely(dma_mapping_error(sq->pdev, dma_addr)))
-        return -ENOMEM;
+        goto dma_unmap_wqe_err;
     }
     return num_dma;
+    }
+ dma_unmap_wqe_err:
+    mlx5e_dma_unmap_wqe_err(sq, num_dma);
+    return -ENOMEM;
 }

 static inline void mlx5e_txwqe_build_dsegs(sq, skb, skb_data, headlen,
@@ -380,17 +384,15 @@
     num_dma = mlx5e_txwqe_build_dsegs(sq, skb, skb_data, headlen,
             (struct mlx5_wq_data_seg *)cseg + ds_cnt);
     if (unlikely(num_dma < 0))
-        goto dma_unmap_wqe_err;
+        err_drop;
     mlx5e_txwqe_complete(sq, skb, opcode, ds_cnt + num_dma,
             }
num_bytes, num_dma, wi, cseg);

return NETDEV_TX_OK;

-dma_unmap_wqe_err:
+err_drop:
sq->stats.dropped++;
-mlx5e_dma_unmap_wqe_err(sq, wi->num_dma);
-
dev_kfree_skb_any(skb);

return NETDEV_TX_OK;
@@ -520,8 +522,9 @@
void mlx5e_free_txqsq_descs(struct mlx5e_txqsq *sq)
{
    struct mlx5e_tx_wqe_info *wi;
+    u32 nbytes = 0;
+    u16 ci, npkts = 0;
    struct sk_buff *skb;
-    u16 ci;
    int i;

    while (sq->cc != sq->pc) {
@@ -542,8 +545,11 @@  
        skb;
+        npkts++;
+        nbytes += wi->num_bytes;
        sq->cc += wi->num_wqebbs;
    }
+    netdev_tx_completed_queue(sq->txq, npkts, nbytes);
}

#ifndef CONFIG_MLX5_CORE_IPOIB
@@ -620,17 +626,15 @@
    num_dma = mlx5e_txwqe_build_dsegs(skb, skb_data, headlen,
        (struct mlx5_wqe_data_seg *)cseg + ds_cnt);
    if (unlikely(num_dma < 0))
        goto dma_unmap_wqe_err;
    goto err_drop;
    mlx5e_txwqe_complete(sq, skb, opcode, ds_cnt + num_dma,
        num_bytes, num_dma, wi, cseg);

return NETDEV_TX_OK;

-dma_unmap_wqe_err:
+err_drop:
sq->stats.dropped++;
-mlx5e_dma_unmap_wqe_err(sq, wi->num_dma);
-
dev_kfree_skb_any(skb);

return NETDEV_TX_OK;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/eq.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/eq.c
@@ -262,7 +262,7 @@
case MLX5_PFAULT_SUBTYPE_WQE:
 /* WQE based event */
pfault->type =
- be32_to_cpu(pf_eqe->wqe.pftype_wq) >> 24;
+ (be32_to_cpu(pf_eqe->wqe.pftype_wq) >> 24) & 0x7;
pfault->token =
 be32_to_cpu(pf_eqe->wqe.token);
pfault->wqe.wq_num =
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/eswitch.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/eswitch.c
@@ -79,8 +79,7 @@
 opcode, MLX5_CMD_OP_MODIFY_NIC_VPORT_CONTEXT);
 MLX5_SET(modify_nic_vport_context_in, in, field_select.change_event, 1);
 MLX5_SET(modify_nic_vport_context_in, in, vport_number, vport);
- if (vport)
- MLX5_SET(modify_nic_vport_context_in, in, other_vport, 1);
+ MLX5_SET(modify_nic_vport_context_in, in, other_vport, 1);
 nic_vport_ctx = MLX5_ADDR_OF(modify_nic_vport_context_in,
in, nic_vport_context);

@@ -108,8 +107,7 @@
 MLX5_SET(modify_esw_vport_context_in, in, opcode,
 MLX5_CMD_OP_MODIFY_ESW_VPORT_CONTEXT);
 MLX5_SET(modify_esw_vport_context_in, in, vport_number, vport);
- if (vport)
- MLX5_SET(modify_esw_vport_context_in, in, other_vport, 1);
+ MLX5_SET(modify_esw_vport_context_in, in, other_vport, 1);
 return mlx5_cmd_exec(dev, in, inlen, out, sizeof(out));
}

@@ -1126,13 +1124,6 @@
 int err = 0;
 u8 *smac_v;

- if (vport->info.spoofchk && !is_valid_ether_addr(vport->info.mac)) {
- mlx5_core_warn(esw->dev,
- "vport[%d] configure ingress rules failed, illegal mac with spoofchk\n",
- vport->vport);

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esw_vport_cleanup_ingress_rules(esw, vport);

if (!vport->info.vlan && !vport->info.qos && !vport->info.spoofchk) {
    return -EPERM;
}

/* Public E-Switch API */
#define ESW_ALLOWED(esw) ((esw) && MLX5_VPORT_MANAGER((esw)->dev))

int mlx5_eswitch_enable_sriov(struct mlx5_eswitch *esw, int nvfs, int mode)
{
    int err;
    int i, enabled_events;

    -if (!ESW_ALLOWED(esw))
        return 0;
    -
    -if (!MLX5_CAP_GEN(esw->dev, eswitch_flow_table) ||
        !ESW_ALLOWED(esw)) {
        esw_warn(esw->dev, "E-Switch FDB is not supported, aborting ...
    return -EOPNOTSUPP;
    @ @ -1728,7 +1717,7 @@
    u64 node_guid;
    int err = 0;

    -if (!ESW_ALLOWED(esw))
        return -EPERM;
    if (!LEGAL_VPORT(esw, vport) || is_multicast_ether_addr(mac))
        return -EINVAL;

    mutex_lock(&esw->state_lock);
    evport = &esw->vports[vport];

    -if (evport->info.spoofchk && !is_valid_ether_addr(mac)) {
        return -EPERM;
    -
    "MAC invalidation is not allowed when spoofchk is on, vport(\%d)/n",
    +"Set invalid MAC while spoofchk is on, vport(\%d)/n",
    -err = -EPERM;
    -goto unlock;
err = mlx5_modify_nic_vport_mac_address(esw->dev, vport, mac);
if (err) {
    @@ -1797,7 +1783,7 @@
    unlock:
    mutex_unlock(&esw->state_lock);
    -return 0;
    +return err;
}

int mlx5_eswitch_get_vport_config(struct mlx5_eswitch *esw,
    @@ -1805,7 +1791,7 @@
    {
    struct mlx5_vport *evport;

    -if (!ESW_ALLOWED(esw))
    +if (!esw || !MLX5_CAP_GEN(esw->dev, vport_group_manager))
        return -EPERM;
    if (!LEGAL_VPORT(esw, vport))
        return -EINVAL;
    @@ -1888,6 +1874,10 @@
        if (evport->enabled && esw->mode == SRIOV_LEGACY)
            evport->enabled = false;
        if (pschk)
            mlx5_core_warn(esw->dev,
                "Spoofchk in set while MAC is invalid, vport(%d)\n",
                evport->vport);
        if (evport->enabled && esw->mode == SRIOV_LEGACY)
            err = esw_vport_ingress_config(esw, evport);
        if (err)
            @@ -1924,19 +1914,22 @@
                u32 max_guarantee = 0;
                int i;

                -for (i = 0; i <= esw->total_vports; i++) {
                +for (i = 0; i < esw->total_vports; i++) {
                    evport = &esw->vports[i];
                    if (!evport->enabled || evport->info.min_rate < max_guarantee)
                        continue;
                    max_guarantee = evport->info.min_rate;
                }

                -return max_t(u32, max_guarantee / fw_max_bw_share, 1);
                +return max_t(u32, max_guarantee / fw_max_bw_share, 1);
static int normalize_vports_min_rate(struct mlx5_eswitch *esw, u32 divider)
{
    u32 fw_max_bw_share = MLX5_CAP_QOS(esw->dev, max_tsar_bw_share);
    u32 divider = calculate_vports_min_rate_divider(esw);
    struct mlx5_vport *evport;
    u32 vport_max_rate;
    u32 vport_min_rate;
    int err;
    int i;

    for (i = 0; i <= esw->total_vports; i++) {
        evport = &esw->vports[i];
        if (!evport->enabled)
            continue;
        vport_min_rate = evport->info.min_rate;
        vport_max_rate = evport->info.max_rate;
        bw_share = MLX5_RATE_TO_BW_SHARE(vport_min_rate, divider, fw_max_bw_share);
        if (!bw_share)
            continue;
        if (divider)
            bw_share = MLX5_MIN_BW_SHARE;
        @ @ -1944,15 +1937,15 @@
        int mlx5_eswitch_set_vport_rate(struct mlx5_eswitch *esw, int vport, u32 max_rate, u32 min_rate)
        {
            fw_max_bw_share = MLX5_CAP_QOS(esw->dev, max_tsar_bw_share);
            bool min_rate_supported = MLX5_CAP_QOS(esw->dev, esw_bw_share) &
            bool max_rate_supported = MLX5_CAP_QOS(esw->dev, esw_rate_limit);
            struct mlx5_vport *evport;
            u32 fw_max_bw_share;
            u32 previous_min_rate;
            u32 divider;
            bool min_rate_supported;
            bool max_rate_supported;
            int err = 0;

            if (!ESW_ALLOWED(esw))
                return -EPERM;

            return 0;
        }
    }
    return 0;
}
if (!LEGAL_VPORT(esw, vport))
return -EINVAL;
+
+fw_max_bw_share = MLX5_CAP_QOS(esw->dev, max_tsar_bw_share);
+min_rate_supported = MLX5_CAP_QOS(esw->dev, esw_bw_share) &&
+fw_max_bw_share >= MLX5_MIN_BW_SHARE;
+max_rate_supported = MLX5_CAP_QOS(esw->dev, esw_rate_limit);
+
+if ((min_rate && !min_rate_supported) || (max_rate && !max_rate_supported))
return -EOPNOTSUPP;

@@ -1998,8 +1995,7 @@
previous_min_rate = evport->info.min_rate;
evport->info.min_rate = min_rate;
-divider = calculate_vports_min_rate_divider(esw);
-err = normalize_vports_min_rate(divider);
+err = normalize_vports_min_rate(esw);
if (err) {
evport->info.min_rate = previous_min_rate;
goto unlock;
@@ -2054,26 +2050,35 @@
memset(vf_stats, 0, sizeof(*vf_stats));
vf_stats->rx_packets =
MLX5_GET_CTR(out, received_eth_unicast.packets) +
+MLX5_GET_CTR(out, received_ib_unicast.packets) +
MLX5_GET_CTR(out, received_eth_multicast.packets) +
+MLX5_GET_CTR(out, received_ib_multicast.packets) +
MLX5_GET_CTR(out, received_eth_broadcast.packets);

vf_stats->rx_bytes =
MLX5_GET_CTR(out, received_eth_unicast.octets) +
+MLX5_GET_CTR(out, received_ib_unicast.octets) +
MLX5_GET_CTR(out, received_eth_multicast.octets) +
+MLX5_GET_CTR(out, received_ib_multicast.octets) +
MLX5_GET_CTR(out, received_eth_broadcast.octets);

vf_stats->tx_packets =
MLX5_GET_CTR(out, transmitted_eth_unicast.packets) +
+MLX5_GET_CTR(out, transmitted_ib_unicast.packets) +
MLX5_GET_CTR(out, transmitted_eth_multicast.packets) +
+MLX5_GET_CTR(out, transmitted_ib_multicast.packets) +
MLX5_GET_CTR(out, transmitted_eth_broadcast.packets);

vf_stats->tx_bytes =
MLX5_GET_CTR(out, transmitted_eth_unicast.octets) +
+MLX5_GET_CTR(out, transmitted_ib_unicast.octets) +
MLX5_GET_CTR(out, transmitted_eth_multicast.octets) +

```c
+MLX5_GET CTR(out, transmitted_ib_multicast.octets) +
MLX5_GET CTR(out, transmitted_eth_broadcast.octets);

vf_stats->multicast =
-MLX5_GET CTR(out, received_eth_multicast.packets);
+MLX5_GET CTR(out, received_eth_multicast.packets) +
+MLX5_GET CTR(out, received_ib_multicast.packets);

vf_stats->broadcast =
MLX5_GET CTR(out, received_eth_broadcast.packets);

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/eswitch.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/eswitch.h
@@ -39,6 +39,8 @@
#include <linux/mlx5/device.h>
#include "lib/mpfs.h"

+#define MLX5_ESWITCH_MANAGER(mdev) MLX5_CAP_GEN(mdev, eswitch_manager)
+
enum {
SRIOV_NONE,
SRIOV_LEGACY,
@@ -245,6 +247,13 @@
#define MLX5_FLOW_CONTEXT_ACTION_VLAN_POP  0x4000
#define MLX5_FLOW_CONTEXT_ACTION_VLAN_PUSH 0x8000

+enum mlx5_flow_match_level {
+MLX5_MATCH_NONE= MLX5_INLINE_MODE_NONE,
+MLX5_MATCH_L2= MLX5_INLINE_MODE_L2,
+MLX5_MATCH_L3= MLX5_INLINE_MODE_IP,
+MLX5_MATCH_L4= MLX5_INLINE_MODE_TCP_UDP,
+};
+
+struct mlx5_esw_flow_attr {
+struct mlx5_eswitch_rep *in_rep;
+struct mlx5_eswitch_rep *out_rep;

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/eswitch_offloads.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/eswitch_offloads.c
@@ -557,6 +557,7 @@
if (err)
goto miss_rule_err;
kvfree(flow_group_in);
return 0;

miss_rule_err:
@@ -912,8 +912,8 @@
if (MLX5_CAP_GEN(dev, port_type) != MLX5_CAP_PORT_TYPE_ETH)
return -EOPNOTSUPP;
```
-if (!MLX5_CAP_GEN(dev, vport_group_manager))
-return -EOPNOTSUPP;
+if(!MLX5_ESWITCH_MANAGER(dev))
+return -EPERM;

if (dev->priv.eswitch->mode == SRIOV_NONE)
return -EOPNOTSUPP;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/fpga/conn.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/fpga/conn.c
@@ -462,8 +462,10 @@
{
    }err = mlx5_vector2eqn(mdev, smp_processor_id(), &eqn, &irqn);
    -if (err)
    +if (err) {
        +kvfree(in);
        goto err_cqwq;
        +}

cqc = MLX5_ADDR_OF(create_cq_in, in, cq_context);
MLX5_SET(cqc, cqc, log_cq_size, ilog2(cq_size));
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/fs_core.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/fs_core.c
@@ -36,6 +36,7 @@
    #include "fs_tracepoint.h"
    +#include "eswitch.h"
    #include "diag/fs_tracepoint.h"

    #define INIT_TREE_NODE_ARRAY_SIZE(...)sizeof((struct init_tree_node[]){__VA_ARGS__}) /\n    @ @ -182.6 +183.7 @ @
static void del_sw_hw_rule(struct fs_node *node);
static bool mlx5_flow_dests_cmp(struct mlx5_flow_destination *d1,
    struct mlx5_flow_destination *d2);
+static void cleanup_root_ns(struct mlx5_flow_root_namespace *root_ns);
static struct mlx5_flow_rule *
find_flow_rule(struct fs_fte *fte,
    struct mlx5_flow_root_namespace *root_ns);
struct mlx5_flow_rule *
    find_flow_rule(struct fs_fte *fte,
    struct mlx5_flow_destination *dest);
@@ -481,7 +483,7 @@
    if ((fte->action & MLX5_FLOW_CONTEXT_ACTION_FWD_DEST) &&
        --fte->dests_size) {
        -modify_mask = BIT(MLX5_SET_FTE_MODIFY_ENABLE_MASK_DESTINATION_LIST),
        +modify_mask = BIT(MLX5_SET_FTE_MODIFY_ENABLE_MASK_DESTINATION_LIST);
        update_fte = true;
        }

out:
@@ -565,7 +567,7 @@
    rhtable_destroy(&fg->ftes_hash);
    ida_destroy(&fg->fte_allocator);
    if (ft->autogroup.active)
-   if (ft->autogroup.active && fg->max_ftes == ft->autogroup.group_size)
+   if (ft->autogroup.active && fg->max_ftes == ft->autogroup.group_size)
       ft->autogroup.num_groups--;
    err = rhtable_remove(&ft->fgs_hash,
                       &fg->hash,
@@ -952,17 +954,19 @@
 static int connect_flow_table(struct mlx5_core_dev *dev, struct mlx5_flow_table *ft,
                                struct fs_prio *prio)
 {
-   struct mlx5_flow_table *next_ft;
+   struct mlx5_flow_table *next_ft, *first_ft;
   int err = 0;

    /* Connect_prev_fts and update_root_ft_create are mutually exclusive */
    if (list_empty(&prio->node.children)) {
+   first_ft = list_first_entry_or_null(&prio->node.children,
+      struct mlx5_flow_table, node.list);
     if (!first_ft || first_ft->level > ft->level) {
        err = connect_prev_fts(dev, ft, prio);
        if (err)
            return err;
    }
    next_ft = first_ft ? first_ft : find_next_chained_ft(prio);
+   next_ft = find_next_chained_ft(prio);
    err = connect_fwd_rules(dev, ft, next_ft);
    if (err)
        return err;
@@ -1052,6 +1056,7 @@
 destroy_ft:
 mlx5_cmd_destroy_flow_table(root->dev, ft);
 free_ft:
+   rhtable_destroy(&ft->fgs_hash);
 kfree(ft);
 unlock_root:
 mutex_unlock(&root->chain_lock);
@@ -1114,6 +1119,8 @@
 ft->autogroup.active = true;
 ft->autogroup.required_groups = max_num_groups;
+/* We save place for flow groups in addition to max types */
+ft->autogroup.group_size = ft->max_fte / (max_num_groups + 1);
return ft;
}
@@ -1320,8 +1327,7 @@
return ERR_PTR(-ENOENT);

if (ft->autogroup.num_groups < ft->autogroup.required_groups)
-/* We save place for flow groups in addition to max types */
-+group_size = ft->max_fte / (ft->autogroup.required_groups + 1);
+ group_size = ft->autogroup.group_size;

/* ft->max_fte == ft->autogroup.max_types */
if (group_size == 0)
@@ -1348,7 +1354,8 @@
if (IS_ERR(fg))
goto out;

-ft->autogroup.num_groups++;
+if (group_size == ft->autogroup.group_size)
+ ft->autogroup.num_groups++;

out:
return fg;
@@ -1583,9 +1590,9 @@
curr_match = kmalloc(sizeof(*curr_match), GFP_ATOMIC);
if (!curr_match) {
+rcu_read_unlock();
free_match_list(match_head);
-err = -ENOMEM;
-goto out;
+return -ENOMEM;
}
if (!tree_get_node(&g->node)) {
kfree(curr_match);
@@ -1594,7 +1601,6 @@
curr_match->g = g;
list_add_tail(&curr_match->list, &match_head->list);
}
-out:
rcu_read_unlock();
return err;
}
@@ -1755,8 +1761,13 @@
/* Collect all fgs which has a matching match_criteria */
err = build_match_list(&match_head, ft, spec);
-if (err)
+if (err) {
/* Collect all fgs which has a matching match_criteria */
err = build_match_list(&match_head, ft, spec);
-if (err)
if (take_write)
  up_write_ref_node(&ft->node);
else
  up_read_ref_node(&ft->node);
return ERR_PTR(err);
+
}

if (!take_write)
  up_read_ref_node(&ft->node);
@@ -1765,8 +1776,11 @@
dest_num, version);
free_match_list(&match_head);
if (!IS_ERR(rule) ||
-    (PTR_ERR(rule) != -ENOENT && PTR_ERR(rule) != -EAGAIN)) {
+    (PTR_ERR(rule) != -ENOENT && PTR_ERR(rule) != -EAGAIN)) {
  if (take_write)
    up_write_ref_node(&ft->node);
  return rule;
  +}

if (!take_write) {
  nested_down_write_ref_node(&ft->node, FS_LOCK_GRANDPARENT);
@@ -1960,7 +1974,7 @@
  node.list) == ft))
  return 0;

  next_ft = find_next_chained_ft(prio);
+next_ft = find_next_ft(ft);
  err = connect_fwd_rules(dev, next_ft, ft);
  if (err)
    return err;
@@ -2217,7 +2231,7 @@
  struct mlx5_flow_namespace *ns;

  /* Create the root namespace */
-  root_ns = kvzalloc(sizeof(*root_ns), GFP_KERNEL);
+  root_ns = kzalloc(sizeof(*root_ns), GFP_KERNEL);
  if (!root_ns)
    return NULL;
goto cleanup;
+return -ENOMEM;

-if (init_root_tree(steering, &root_fs, &steering->root_ns->ns.node))
-goto cleanup;
+err = init_root_tree(steering, &root_fs, &steering->root_ns->ns.node);
+if (err)
+goto out_err;

set_prio_attrs(steering->root_ns);
-
-if (create_anchor_flow_table(steering))
-goto cleanup;
+err = create_anchor_flow_table(steering);
+if (err)
+goto out_err;

return 0;

-cleanup:
-mlx5_cleanup_fs(steering->dev);
-return -ENOMEM;
+out_err:
+cleanup_root_ns(steering->root_ns);
+steering->root_ns = NULL;
+return err;
}

static void clean_tree(struct fs_node *node)
@@ -2481,7 +2499,7 @@
goto err;
}

-if (MLX5_CAP_GEN(dev, eswitch_flow_table)) {
+if (MLX5_ESWITCH_MANAGER(dev)) {
    if (MLX5_CAP_ESW_FLOWTABLE_FDB(dev, ft_support)) {
        err = init_fdb_root_ns(steering);
        if (err)
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/fs_core.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/fs_core.h
@@ -119,6 +119,7 @@
 struct {
     bool active;
     unsigned int required_groups;
+    unsigned int group_size;
     unsigned int num_groups;
 } autogroup;

 /* Protect fwd_rules */
u64 mlx5_fc_query_lastuse(struct mlx5_fc *counter)
{
    return counter->cache.lastuse;
}

void mlx5_fc_queryCached(struct mlx5_fc *counter,
    u64 *bytes, u64 *packets, u64 *lastuse)
{
    #include <linux/mlx5/cmd.h>
    #include <linux/module.h>
    #include "mlx5_core.h"
    +#include "eswitch.h"
    #include "./.mlxfw/mlxfw.h"

    static int mlx5_cmd_query_adapter(struct mlx5_core_dev *dev, u32 *out,
         @@ -159,13 +160,13 @@
            }
            if (MLX5_CAP_GEN(dev, vport_group_manager) &&
            -        MLX5_CAP_GEN(dev, eswitch_flow_table)) {
            +        MLX5_ESWITCH_MANAGER(dev)) {
                err = mlx5_core_get_caps(dev, MLX5_CAP_ESWITCH_FLOW_TABLE);
                if (err)
                    return err;
                }

                -if (MLX5_CAP_GEN(dev, eswitch_flow_table)) {
                +if (MLX5_ESWITCH_MANAGER(dev)) {
                    err = mlx5_core_get_caps(dev, MLX5_CAP_ESWITCH);
                    if (err)
                        return err;
                }

                --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/health.c
                +++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/health.c
                    add_timer(&health->timer);
                }

                -void mlx5_stop_health_poll(struct mlx5_core_dev *dev)
                +void mlx5_stop_health_poll(struct mlx5_core_dev *dev, bool disable_health)
struct mlx5_core_health *health = &dev->priv.health;
+-unsigned long flags;
+
+-if (disable_health) {
+-spin_lock_irqsave(&health->wq_lock, flags);
+-set_bit(MLX5_DROP_NEW_HEALTH_WORK, &health->flags);
+-set_bit(MLX5_DROP_NEW_RECOVERY_WORK, &health->flags);
+-spin_unlock_irqrestore(&health->wq_lock, flags);
+-}
-
del_timer_sync(&health->timer);
+-
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/ipoib/ipoib.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/ipoib/ipoib.c
@@ -83,6 +83,7 @@
priv->hard_mtu = MLX5_IB_GRH_BYTES + MLX5_IPOIB_HARD_LEN;
mutex_init(&priv->state_lock);

+INIT_DELAYED_WORK(&priv->update_stats_work, mlx5e_update_stats_work);
 mlx5e_build_nic_params(mdev, &priv->channels.params, profile->max_nch(mdev));
 mlx5i_build_nic_params(mdev, &priv->channels.params);

@@ -484,9 +485,9 @@
 mlx5i_uninit_underlay_qp(epriv);
 mlx5e_deactivate_priv_channels(epriv);
 mlx5e_close_channels(&epriv->channels);
 unlock:
 mutex_unlock(&epriv->state_lock);
 return 0;
@@ -628,7 +629,9 @@
 mlx5e_attach_netdev(epriv);
 mlx5i_attach_underlay_qp(mdev, ipriv->qp.qpn);
 mlx5i_uninit_underlay_qp(epriv);
 mlx5e_deactivate_priv_channels(epriv);
 mlx5e_close_channels(&epriv->channels);
 mlx5i_uninit_underlay_qp(epriv);
 unlock:
 mutex_unlock(&epriv->state_lock);
 return 0;
@@ -641,6 +644,11 @@
 mlx5e_attach_netdev(epriv);
 profile->init(mdev, netdev, profile, ipriv);

 mlx5e_attach_netdev(epriv);
+err = mlx5e_attach_netdev(epriv);
+if (err)
+goto detach;
 netif_carrier_off(netdev);

/* set rdma_netdev func pointers */
@@ -641,6 +644,11 @@

 return netdev;

+detach:
+profile->cleanup(epriv);
+if (ipriv->sub_interface)
+return NULL;
+mlx5e_destroy_mdev_resources(mdev);

destroy_ht:
mlx5i_pkey_qpn_ht_cleanup(netdev);

destroy_wq:

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/lib/clock.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/lib/clock.c
@@ -337,10 +337,31 @@
return 0;
}

+enum {
+MLX5_MTPPS_REG_CAP_PIN_X_MODE_SUPPORT_PPS_IN = BIT(0),
+MLX5_MTPPS_REG_CAP_PIN_X_MODE_SUPPORT_PPS_OUT = BIT(1),
+};
+
+static int mlx5_ptp_verify(struct ptp_clock_info *ptp, unsigned int pin,
+enum ptp_pin_function func, unsigned int chan)
{  
-return (func == PTP_PF_PHYSYNC) ? -EOPNOTSUPP : 0;
+struct mlx5_clock *clock = container_of(ptp, struct mlx5_clock,
+ptp_info);
+
+switch (func) {
+case PTP_PF_NONE:
+return 0;
+case PTP_PF_EXTTS:
+return !(clock->pps_info.pin_caps[pin] &
+ MLX5_MTPPS_REG_CAP_PIN_X_MODE_SUPPORT_PPS_IN);
+case PTP_PF_PEROUT:
+return !(clock->pps_info.pin_caps[pin] &
+ MLX5_MTPPS_REG_CAP_PIN_X_MODE_SUPPORT_PPS_OUT);
+default:
+return -EOPNOTSUPP;
+}
+
+return -EOPNOTSUPP;
}

static const struct ptp_clock_info mlx5_ptp_clock_info = {
@@ -458,6 +479,7 @@
void mlx5_init_clock(struct mlx5_core_dev *mdev)
{
struct mlx5_clock *clock = &mdev->clock;
+u64 overflow_cycles;
u64 ns;
u64 frac = 0;
u32 dev_freq;
@@ -479,11 +501,18 @@
ktime_to_ns(ktime_get_real()));

/* Calculate period in seconds to call the overflow watchdog - to make
 * sure counter is checked at least once every wrap around.
 * sure counter is checked at least twice every wrap around.
 + The period is calculated as the minimum between max HW cycles count
 + (The clock source mask) and max amount of cycles that can be
 + multiplied by clock multiplier where the result doesn't exceed
 + 64bits.
 */
-ns = cyclecounter_cyc2ns(&clock->cycles, clock->cycles.mask,
+overflow_cycles = div64_u64(~0ULL >> 1, clock->cycles.mult);
+overflow_cycles = min(overflow_cycles, div_u64(clock->cycles.mask, 3));
 +
+ns = cyclecounter_cyc2ns(&clock->cycles, overflow_cycles,
frac, &frac);
-do_div(ns, NSEC_PER_SEC / 2 / HZ);
+do_div(ns, NSEC_PER_SEC / HZ);
clock->overflow_period = ns;

INIT_WORK(&clock->pps_info.out_work, mlx5_pps_out);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/lib/mpfs.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/lib/mpfs.c
@@ -34,6 +34,7 @@
#include <linux/mlx5/driver.h>
#include <linux/mlx5/mlx5_ifc.h>
+#include "eswitch.h"
#include "lib/mpfs.h"

/* HW L2 Table (MPFS) management */
@@ -98,7 +99,7 @@
int l2table_size = 1 << MLX5_CAP_GEN(dev, log_max_l2_table);
struct mlx5_mpfs *mpfs;

-if (!MLX5_VPORT_MANAGER(dev))
+if (!MLX5_ESWITCH_MANAGER(dev))
    return 0;

    mpfs = kzalloc(sizeof(*mpfs), GFP_KERNEL);
    @ @ -122,7 +123,7 @@
    {
      struct mlx5_mpfs *mpfs = dev->priv.mpfs;
-if (!MLX5_VPORT_MANAGER(dev))
+if (!MLX5_ESWITCH_MANAGER(dev))
    return;

WARN_ON(!hlist_empty(mpfs->hash));
@@ -137,7 +138,7 @@
    u32 index;
    int err;

-if (!MLX5_VPORT_MANAGER(dev))
+if (!MLX5_ESWITCH_MANAGER(dev))
    return 0;

mutex_lock(&mpfs->lock);
@@ -179,7 +180,7 @@
    int err = 0;
    u32 index;

-if (!MLX5_VPORT_MANAGER(dev))
+if (!MLX5_ESWITCH_MANAGER(dev))
    return 0;

mutex_lock(&mpfs->lock);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/main.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/main.c
@@ -51,6 +51,7 @@
 #ifdef CONFIG_RFS_ACCEL
 #include <linux/cpu_rmap.h>
 #endif
+  #include <linux/version.h>
  #include <net/devlink.h>
  #include "mlx5_core.h"
  #include "fs_core.h"
@@ -156,26 +157,6 @@
         .size	= 8,
         .limit	= 4
     }
    -.mr_cache[16]= {
        .size= 8,
        .limit= 4
    }.
    -.mr_cache[17]= {
        .size= 8,
        .limit= 4
    }.
    -.mr_cache[18]= {
        .size= 8,
- .limit= 4
- },
- .mr_cache[19]= {
- .size= 4,
- .limit= 2
- },
- .mr_cache[20]= {
- .size= 4,
- .limit= 2
- },
},
};

@ @ -225,7 +206,10 @@
strncat(string, ",", remaining_size);

remaining_size = max_t(int, 0, driver_ver_sz - strlen(string));
-strncat(string, DRIVER_VERSION, remaining_size);
+*snprintf(string + strlen(string), remaining_size, ",%.u%.u%.u",
+ (u8)((LINUX_VERSION_CODE >> 16) & 0xff), (u8)((LINUX_VERSION_CODE >> 8) & 0xff),
+ (u16)(LINUX_VERSION_CODE & 0xffff));

/*Send the command*/
MLX5_SET(set_driver_version_in, in, opcode,
@ @ -623,18 +607,19 @@
static int mlx5_irq_set_affinity_hint(struct mlx5_core_dev *mdev, int i)
{
 struct mlx5_priv *priv = &mdev->priv;
- int irq = pci_irq_vector(mdev->pdev, MLX5_EQ_VEC_COMP_BASE + i);
+ int vecidx = MLX5_EQ_VEC_COMP_BASE + i;
+ int irq = pci_irq_vector(mdev->pdev, vecidx);

 -if (!zalloc_cpumask_var(&priv->irq_info[i].mask, GFP_KERNEL)) {
 +if (!zalloc_cpumask_var(&priv->irq_info[vecidx].mask, GFP_KERNEL)) {
 mx5_core_warn(mdev, "zalloc_cpumask_var failed");
 return -ENOMEM;
 }

cpumask_set_cpu(cpumask_local_spread(i, priv->numa_node),
-priv->irq_info[i].mask);
+priv->irq_info[vecidx].mask);

if (IS_ENABLED(CONFIG_SMP) &&
- irq_set_affinity_hint(irq, priv->irq_info[i].mask))
+ irq_set_affinity_hint(irq, priv->irq_info[vecidx].mask))
mlx5_core_warn(mdev, "irq_set_affinity_hint failed, irq 0x%.4x", irq);
static void mlx5_irq_clear_affinity_hint(struct mlx5_core_dev *mdev, int i)  
{
    int vecidx = MLX5_EQ_VEC_COMP_BASE + i;
    struct mlx5_priv *priv = &mdev->priv;
    int irq = pci_irq_vector(mdev->pdev, MLX5_EQ_VEC_COMP_BASE + i);
    irq_set_affinity_hint(irq, NULL);
    free_cpumask_var(priv->irq_info[i].mask);
+
    free_cpumask_var(priv->irq_info[vecidx].mask);
}

static int mlx5_irq_set_affinity_hints(struct mlx5_core_dev *mdev)
{
    priv->numa_node = dev_to_node(&dev->pdev->dev);
-
    priv->dbg_root = debugfs_create_dir(dev_name(&pdev->dev), mlx5_debugfs_root);
+
    if (mlx5_debugfs_root)
+
        priv->dbg_root =
+
        debugfs_create_dir(pci_name(pdev), mlx5_debugfs_root);

    err = mlx5_pci_enable_device(dev);
    if (err) {
        pci_clear_master(dev->pdev);
+
        release_bar(dev->pdev);
+
        mlx5_pci_disable_device(dev);
+        debugfs_remove(priv->dbg_root);
+        debugfs_remove_recursive(priv->dbg_root);
    }

static int mlx5_init_once(struct mlx5_core_dev *dev, struct mlx5_priv *priv)
{
    mlx5_cleanup_once(dev);
+
    err_stop_poll:
    -mlx5_stop_health_poll(dev);
+
    mlx5_stop_health_poll(dev, boot);
    if (mlx5_cmd_teardown_hca(dev)) {
        dev_err(&dev->pdev->dev, "tear_down_hca failed, skip cleanup\n");
        goto out_err;
    }
+
    out_err:
    }
mlx5_free_irq_vectors(dev);
if (cleanup)
mlx5_cleanup_once(dev);
-mlx5_stop_health_poll(dev);
+mlx5_stop_health_poll(dev, cleanup);
err = mlx5_cmd_teardown_hca(dev);
if (!err) {
    dev_err(&dev->pdev->dev, "tear_down_hca failed, skip cleanup\n");
    @ @ -1559,7 +1545,7 @@
    * with the HCA, so the health poll is no longer needed.
    */
    mlx5_drain_health_wq(dev);
    mlx5_stop_health_poll(dev);
    mlx5_stop_health_poll(dev, false);

    ret = mlx5_cmd_force_teardown_hca(dev);
    if (ret) {
        @ @ -1601,6 +1587,6 @@
        [ PCI_VDEVICE(MELLANOX, 0x101c), MLX5_PCI_DEV_IS_VF], /* ConnectX-6 VF */
        [ PCI_VDEVICE(MELLANOX, 0xa2d2) ], /* BlueField integrated ConnectX-5 network controller */
        [ PCI_VDEVICE(MELLANOX, 0xa2d3), MLX5_PCI_DEV_IS_VF], /* BlueField integrated ConnectX-5 network controller VF */
        +[ PCI_VDEVICE(MELLANOX, 0xa2d6) ], /* BlueField-2 integrated ConnectX-6 Dx network controller */
        [ 0, ]
    ];

    --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/pagealloc.c
    +++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/pagealloc.c
    @@ -331,6 +331,24 @@
    }

    +static u32 fwp_fill_manage_pages_out(struct fw_page *fwp, u32 *out, u32 index,
    +    u32 npages)
    +{
    +    u32 pages_set = 0;
    +    unsigned int n;
    +    +for_each_clear_bit(n, &fwp->bitmask, MLX5_NUM_4K_IN_PAGE) {
    +MLX5_ARRAY_SET64(manage_pages_out, out, pas, index + pages_set,
    +    fwp->addr + (n * MLX5_ADAPTER_PAGE_SIZE));
    +    pages_set++;
    +    +if (!-npages)
    +        break;
    +    +}
    +    +return pages_set;
static int reclaim_pages_cmd(struct mlx5_core_dev *dev,
   u32 *in, int in_size, u32 *out, int out_size)
{
    if (fwp->func_id != func_id)
    continue;

    i += fwp_fill_manage_pages_out(fwp, out, i, npages - i);
}
MLX5_SET(manage_pages_out, out, output_num_entries, i);
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/port.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/port.c
@@ -404,10 +404,6 @@
size -= offset + size - MLX5_EEPROM_PAGE_LENGTH;
    i2c_addr = MLX5_I2C_ADDR_LOW;
    if (offset >= MLX5_EEPROM_PAGE_LENGTH) {
        i2c_addr = MLX5_I2C_ADDR_HIGH;
-      offset -= MLX5_EEPROM_PAGE_LENGTH;
    }
    MLX5_SET(mcia_reg, in, l, 0);
    MLX5_SET(mcia_reg, in, module, module_num);
    static int mlx5_set_port_qetcr_reg(struct mlx5_core_dev *mdev, u32 *in,
      int inlen)
    {
      -u32 out[MLX5_ST_SZ_DW(qtct_reg)];
      +u32 out[MLX5_ST_SZ_DW(qetc_reg)];
      if (!MLX5_CAP_GEN(mdev, ets))
        return -EOPNOTSUPP;
      static int mlx5_query_port_qetcr_reg(struct mlx5_core_dev *mdev, u32 *out,
        int outlen)
      {
        -u32 in[MLX5_ST_SZ_DW(qtct_reg)];
        +u32 in[MLX5_ST_SZ_DW(qetc_reg)];
        if (!MLX5_CAP_GEN(mdev, ets))
          return -EOPNOTSUPP;
          --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/qp.c
          +++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/qp.c
struct mlx5_qp_table *table = &dev->priv.qp_table;
struct mlx5_core_rsc_common *common;
unsigned long flags;

spin_lock(&table->lock);
spin_lock_irqsave(&table->lock, flags);
common = radix_tree_lookup(&table->tree, rsn);
if (common)
    atomic_inc(&common->refcount);
spin_unlock_irqrestore(&table->lock, flags);

if (!common) {
    mlx5_core_warn(dev, "Async event for bogus resource 0x%x\n",
    "event 0x%.2x is not allowed on resource 0x%.8x\n",
    event_type, rsn);
    return;
}

switch (common->res) {
    default:
        mlx5_core_warn(dev, "invalid resource type for 0x%x\n", rsn);
}

mlx5_core_put_rsc(common);

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/sriov.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/sriov.c
@@ -88,6 +88,9 @@
return -EBUSY;
}

+if (!MLX5_ESWITCH_MANAGER(dev))
+    goto enable_vfs_hca;
+
err = mlx5_eswitch_enable_sriov(dev->priv.eswitch, num_vfs, SRIOV_LEGACY);
if (err) {

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return err;
}

+enable_vfs_hca:
for (vf = 0; vf < num_vfs; vf++) {
  err = mlx5_core_enable_hca(dev, vf + 1);
  if (err) {
    @ @ -140,7 +144,8 @@
  }
}

out:
-mlx5_eswitch_disable_sriov(dev->priv.eswitch);
+if (MLX5_ESWITCH_MANAGER(dev))
+mlx5_eswitch_disable_sriov(dev->priv.eswitch);

if (mlx5_wait_for_vf_pages(dev))
  mlx5_core_warn(dev, "timeout reclaiming VFs pages\n");
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlx5/core/vport.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlx5/core/vport.c
@@ -36,6 +36,9 @@

    " mlx5_core.h"

+/* Mutex to hold while enabling or disabling RoCE */
+static DEFINE_MUTEX(mlx5_roce_en_lock);
+
static int _mlx5_query_vport_state(struct mlx5_core_dev *mdev, u8 opmod,
    u16 vport, u32 *out, int outlen)
{
  @ @ -546,8 +549,6 @@
    return -EINVAL;
    if (!MLX5_CAP_GEN(mdev, vport_group_manager))
      return -EACCES;
    -if (!MLX5_CAP_ESW(mdev, nic_vport_node_guid_modify))
    -return -EOPNOTSUPP;

    in = kvzalloc(inlen, GFP_KERNEL);
    if (!in)
      @ @ -998,17 +999,35 @@

    int mlx5_nic_vport_enable_roce(struct mlx5_core_dev *mdev)
    {
      -if (atomic_inc_return(&mdev->roce.roce_en) != 1)
        -return 0;
      return mlx5_nic_vport_update_roce_state(mdev, MLX5_VPORT_ROCE_ENABLED);
      +int err = 0;
      +
mutex_lock(&mlx5_roce_en_lock);
if (!mdev->roce.roce_en)
    err = mlx5_nic_vport_update_roce_state(mdev, MLX5_VPORT_ROCE_ENABLED);
    if (!err)
        mdev->roce.roce_en++;
mutex_unlock(&mlx5_roce_en_lock);

mutex_lock(&mlx5_roce_en_lock);
if (mdev->roce.roce_en) {
    mdev->roce.roce_en--;
    if (mdev->roce.roce_en == 0)
        err = mlx5_nic_vport_update_roce_state(mdev, MLX5_VPORT_ROCE_DISABLED);

    if (err)
        mdev->roce.roce_en++;
}
mutex_unlock(&mlx5_roce_en_lock);
return err;

int mlx5_nic_vport_disable_roce(struct mlx5_core_dev *mdev) {
    -if (atomic_dec_return(&mdev->roce.roce_en) != 0)
        return 0;
    -return mlx5_nic_vport_update_roce_state(mdev, MLX5_VPORT_ROCE_DISABLED);
    +int err = 0;
    +
    +mutex_lock(&mlx5_roce_en_lock);
    +if (mdev->roce.roce_en) {
    +    mdev->roce.roce_en--;
    +    if (mdev->roce.roce_en == 0)
    +        err = mlx5_nic_vport_update_roce_state(mdev, MLX5_VPORT_ROCE_DISABLED);
    +
    +    if (err)
    +        mdev->roce.roce_en++;
    +}
    +mutex_unlock(&mlx5_roce_en_lock);
    +return err;
}
EXPORT_SYMBOL_GPL(mlx5_nic_vport_disable_roce);

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxfw/mlxfw_fsm.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxfw/mlxfw_fsm.c
@@ -86,6 +86,8 @@
    return err;
    if (fsm_state_err != MLXFW_FSM_STATE_ERR_OK) {
        fsm_state_err = min_t(enum mlxfw_fsm_state_err,
    +    fsm_state_err, MLXFW_FSM_STATE_ERR_MAX);
    pr_err("Firmware flash failed: %s\n",
        mlxfw_fsm_state_err_str[fsm_state_err]);
    return -EINVAL;
    --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxfw/mlxfw_mfa2.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxfw/mlxfw_mfa2.c
@@ -37,6 +37,7 @@
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/netlink.h>
+#include <linux/vmalloc.h>
#include <linux/xz.h>
#include "mlxfw_mfa2.h"
#include "mlxfw_mfa2_file.h"
@@ -579,7 +580,7 @@
comp_size = be32_to_cpu(comp->size);
comp_buf_size = comp_size + mlxfw_mfa2_comp_magic_len;

-comp_data = kmalloc(sizeof(*comp_data) + comp_buf_size, GFP_KERNEL);
+comp_data = vzalloc(sizeof(*comp_data) + comp_buf_size);
if (!comp_data)
return ERR_PTR(-ENOMEM);
comp_data->comp.data_size = comp_size;
@@ -601,7 +602,7 @@
comp_data->comp.data = comp_data->buff + mlxfw_mfa2_comp_magic_len;
return &comp_data->comp;
err_out:
-kfree(comp_data);
+vfree(comp_data);
return ERR_PTR(err);
}
@@ -610,7 +611,7 @@
const struct mlxfw_mfa2_comp_data *comp_data;

comp_data = container_of(comp, struct mlxfw_mfa2_comp_data, comp);
-kfree(comp_data);
+vfree(comp_data);
}
void mlxfw_mfa2_file_fini(struct mlxfw_mfa2_file *mfa2_file)
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/core.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/core.c
@@ -113,6 +113,7 @@
 struct mlxsw_thermal *thermal;
 struct mlxsw_core_port *ports;
 unsigned int max_ports;
+bool fw_flash_in_progress;
 unsigned long driver_priv[0];
 /* driver_priv has to be always the last item */
};
@@ -460,13 +461,18 @@
 struct mlxsw_thermal *thermal;
 struct mlxsw_core_port *ports;
 unsigned int max_ports;
+bool fw_flash_in_progress;
 unsigned long driver_priv[0];
 /* driver_priv has to be always the last item */
};
-#define MLXSW_EMAD_TIMEOUT_MS 200


static void mlxsw_emad_trans_timeout_schedule(struct mlxsw_reg_trans *trans) {
    unsigned long timeout = msecs_to_jiffies(MLXSW_EMAD_TIMEOUT_MS);
    
    -queue_delayed_work(trans->core->emad_wq, &trans->timeout_dw, timeout);
    +if (trans->core->fw_flash_in_progress)
        +timeout = msecs_to_jiffies(MLXSW_EMAD_TIMEOUT_DURING_FW_FLASH_MS);
        +queue_delayed_work(trans->core->emad_wq, &trans->timeout_dw,
        +timeout << trans->retries);
    }

static int mlxsw_emad_transmit(struct mlxsw_core *mlxsw_core,
    @@ -515,6 +521,9 @@
        err = mlxsw_emad_transmit(trans->core, trans);
        if (err == 0)
            return;
        +
        +if (!atomic_dec_and_test(&trans->active))
            +return;
        } else {
            err = -EIO;
        }
    } else {
        err = mlxsw_emad_transmit(trans->core, trans);
    if (err)
        return -ENOMEM;
 mlxsw_core->emad_wq = emad_wq;
    @@ -614,7 +623,7 @@
        err = mlxsw_core->driver->basic_trap_groups_set(mlxsw_core);
        if (err)
            goto err_emad_trap_set;
 mlxsw_core->emad_wq = emad_wq;
   @@ -626,6 +635,7 @@
        err = mlxsw_core->driver->basic_trap_groups_set(mlxsw_core);
        if (err)
            goto err_emad_trap_set;
 mlxsw_core->emad_wq = emad_wq;
    } else {
        err = mlxsw_emad_transmit(trans->core, trans);
        if (err)
            goto err_emad_trap_set;
 mlxsw_core->emad_wq = emad_wq;
    }

    #define MLXSW_EMAD_TIMEOUT_DURING_FW_FLASH_MS3000
    #define MLXSW_EMAD_TIMEOUT_MS200
+err_trap_register:
destroy_workqueue(mlxsw_core->emad_wq);
return err;
}
@@ -1355,7 +1365,7 @@
err = mlxsw_emad_reg_access(mlxsw_core, reg, payload, type, trans,
    bulk_list, cb, cb_priv, tid);
if (err) {
-    kfree(trans);
+    kfree_rcu(trans, rcu);
    return err;
}
return 0;
@@ -1568,11 +1578,13 @@
brk
-rcu_read_unlock();
-if (!found)
+if (!found) {
+    rcu_read_unlock();
goto drop;
+
 rxl->func(skb, local_port, rxl_item->priv);
+rcu_read_unlock();
return;

drop:
@@ -1791,14 +1803,26 @@
}
EXPORT_SYMBOL(mlxsw_core_flush_owq);

+void mlxsw_core_fw_flash_start(struct mlxsw_core *mlxsw_core)
+{
+    mlxsw_core->fw_flash_in_progress = true;
+}
+EXPORT_SYMBOL(mlxsw_core_fw_flash_start);
+
+void mlxsw_core_fw_flash_end(struct mlxsw_core *mlxsw_core)
+{
+    mlxsw_core->fw_flash_in_progress = false;
+}
+EXPORT_SYMBOL(mlxsw_core_fw_flash_end);
+
static int __init mlxsw_core_module_init(void)
{
    int err;
- mlxsw_wq = alloc_workqueue(mlxsw_core_driver_name, WQ_MEM_RECLAIM, 0);
+ mlxsw_wq = alloc_workqueue(mlxsw_core_driver_name, 0, 0);
if (!mlxsw_wq)
    return -ENOMEM;
- mlxsw_owq = alloc_ordered_workqueue("%s_ordered", WQ_MEM_RECLAIM,
+ mlxsw_owq = alloc_ordered_workqueue("%s_ordered", 0,
    mlxsw_core_driver_name);
if (!mlxsw_owq) {
    err = -ENOMEM;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/core.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/core.h
@@ -312,6 +312,9 @@
    const struct mlxsw_config_profile *profile;
};

+ void mlxsw_core_fw_flash_start(struct mlxsw_core *mlxsw_core);
+ void mlxsw_core_fw_flash_end(struct mlxsw_core *mlxsw_core);
+
+ bool mlxsw_core_res_valid(struct mlxsw_core *mlxsw_core,
+    enum mlxsw_res_id res_id);

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/core_acl_flex_actions.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/core_acl_flex_actions.c
@@ -319,7 +319,7 @@
    block = kzalloc(sizeof(*block), GFP_KERNEL);
if (!block)
    return NULL;
-    return ERR_PTR(-ENOMEM);
+    return ERR_PTR(-ENOMEM);
INIT_LIST_HEAD(&block->fwd_entry_ref_list);
block->afa = mlxsw_afa;
@@ -332,7 +332,7 @@
err_first_set_create:
    kfree(block);
-    return NULL;
+    return ERR_PTR(-ENOMEM);
}
EXPORT_SYMBOL(mlxsw_afa_block_create);
@@ -545,8 +545,8 @@
    char *oneact;
    char *actions;
-    if (WARN_ON(block->finished))
-        return NULL;

---
if (block->finished)
+return ERR_PTR(-EINVAL);
if (block->cur_act_index + action_size >
    block->afa->max_acts_per_set) {
    struct mlxsw_afa_set *set;
    @ @ -556,7 @ @
    set = mlxsw_afa_set_create(false);
    if (!set)
        -return NULL;
+    return ERR_PTR(-ENOBUFS);
    set->prev = block->cur_set;
    block->cur_act_index = 0;
    block->cur_set->next = set;
    @ @ -643,8 @ @
    MLXSW_AFA_VLAN_CODE,
    MLXSW_AFA_VLAN_SIZE);

    -if (!act)
        -return -ENOBUFS;
    +if (IS_ERR(act))
        +return PTR_ERR(act);
    mlxsw_afa_vlan_pack(act, MLXSW_AFA_VLAN_VLAN_TAG_CMD_NOP,
        MLXSW_AFA_VLAN_CMD_SET_OUTER, vid,
        MLXSW_AFA_VLAN_CMD_SET_OUTER, pcp,
        @ @ -707,8 @ @
        MLXSW_AFA_TRAPDISC_CODE,
        MLXSW_AFA_TRAPDISC_SIZE);

    -if (!act)
        -return -ENOBUFS;
    +if (IS_ERR(act))
        +return PTR_ERR(act);
    mlxsw_afa_trapdisc_pack(act, MLXSW_AFA_TRAPDISC_TRAP_ACTION_NOP,
        MLXSW_AFA_TRAPDISC_FORWARD_ACTION_DISCARD, 0);
    return 0;
    @ @ -721,8 @ @
    MLXSW_AFA_TRAPDISC_CODE,
    MLXSW_AFA_TRAPDISC_SIZE);

    -if (!act)
        -return -ENOBUFS;
    +if (IS_ERR(act))
        +return PTR_ERR(act);
    mlxsw_afa_trapdisc_pack(act, MLXSW_AFA_TRAPDISC_TRAP_ACTION_TRAP,
        MLXSW_AFA_TRAPDISC_FORWARD_ACTION_DISCARD, trap_id);
    @ @ -737,8 @ @
MLXSW_AFA_TRAPDISC_CODE,
MLXSW_AFA_TRAPDISC_SIZE);

-if (!act)
-return -ENOBUS;
+if (IS_ERR(act))
+return PTR_ERR(act);
mlxsw_afa_trapdisc_pack(act, MLXSW_AFA_TRAPDISC_TRAP_ACTION_TRAP,
MLXSW_AFA_TRAPDISC_FORWARD_ACTION_FORWARD,
trap_id);
@@ -802,8 +802,8 @@
act = mlxsw_afa_block_append_action(block, MLXSW_AFA_FORWARD_CODE,
     MLXSW_AFA_FORWARD_SIZE);
-if (!act) {
-err = -ENOBUS;
+if (IS_ERR(act)) {
+err = PTR_ERR(act);
 goto err_append_action;
 }
mlxsw_afa_forward_pack(act, MLXSW_AFA_FORWARD_TYPE_PBS,
@@ -859,8 +859,8 @@
char *act = mlxsw_afa_block_append_action(block,
     MLXSW_AFA_POLCNT_CODE,
     MLXSW_AFA_POLCNT_SIZE);
-if (!act)
-return -ENOBUS;
+if (IS_ERR(act))
+return PTR_ERR(act);
mlxsw_afa_polcnt_pack(act, MLXSW_AFA_POLCNT_COUNTER_SET_TYPE_PACKETS_BYTES,
     counter_index);
return 0;
@@ -904,8 +904,8 @@
char *act = mlxsw_afa_block_append_action(block,
     MLXSW_AFA_VIRFWD_CODE,
     MLXSW_AFA_VIRFWD_SIZE);
-if (!act)
-return -ENOBUS;
+if (IS_ERR(act))
+return PTR_ERR(act);
mlxsw_afa_virfwd_pack(act, MLXSW_AFA_VIRFWD_FID_CMD_SET, fid);
return 0;
}
@@ -974,8 +974,8 @@
char *act = mlxsw_afa_block_append_action(block,
     MLXSW_AFA_MCRUTER_CODE,
     MLXSW_AFA_MCRUTER_SIZE);
-if (!act)
- return -ENOBUS;
+ if (IS_ERR(act))
  + return PTR_ERR(act);
mlxsw_afer_mcrouter_pack(act, MLXSW_AFA_MCROUTER_RPF_ACTION_TRAP,
  expected_irif, min_mtu, rmid_valid, kvdl_index);
return 0;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/core_acl_flex_keys.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/core_acl_flex_keys.h
@@ -107,20 +107,20 @@
MLXSW_AFK_ELEMENT_INFO_U32(VID, 0x10, 8, 12),
MLXSW_AFK_ELEMENT_INFO_U32(PCP, 0x10, 20, 3),
MLXSW_AFK_ELEMENT_INFO_U32(TCP_FLAGS, 0x10, 23, 9),
-MLXSW_AFK_ELEMENT_INFO_U32(IP_TTL_, 0x14, 0, 8),
-MLXSW_AFK_ELEMENT_INFO_U32(IP_ECN, 0x14, 9, 2),
-MLXSW_AFK_ELEMENT_INFO_U32(IP_DSCP, 0x14, 11, 6),
-MLXSW_AFK_ELEMENT_INFO_U32(SRC_IP4, 0x18, 0, 32),
-MLXSW_AFK_ELEMENT_INFO_U32(DST_IP4, 0x1C, 0, 32),
-MLXSW_AFK_ELEMENT_INFO_BUF(SRC_IP6_HI, 0x18, 8),
-MLXSW_AFK_ELEMENT_INFO_BUF(SRC_IP6_LO, 0x20, 8),
-MLXSW_AFK_ELEMENT_INFO_BUF(DST_IP6_HI, 0x28, 8),
-MLXSW_AFK_ELEMENT_INFO_BUF(DST_IP6_LO, 0x30, 8),
MLXSW_AFK_ELEMENT_INFO_U32(DST_L4_PORT, 0x14, 0, 16),
MLXSW_AFK_ELEMENT_INFO_U32(SRC_L4_PORT, 0x14, 16, 16),
+MLXSW_AFK_ELEMENT_INFO_U32(IP_TTL_, 0x18, 0, 8),
+MLXSW_AFK_ELEMENT_INFO_U32(IP_ECN, 0x18, 9, 2),
+MLXSW_AFK_ELEMENT_INFO_U32(IP_DSCP, 0x18, 11, 6),
+MLXSW_AFK_ELEMENT_INFO_U32(SRC_IP4, 0x20, 0, 32),
+MLXSW_AFK_ELEMENT_INFO_U32(DST_IP4, 0x24, 0, 32),
+MLXSW_AFK_ELEMENT_INFO_BUF(SRC_IP6_HI, 0x30, 8),
+MLXSW_AFK_ELEMENT_INFO_BUF(SRC_IP6_LO, 0x38, 8),
+MLXSW_AFK_ELEMENT_INFO_BUF(DST_IP6_HI, 0x38, 8),
];

- #define MLXSW_AFK_ELEMENT_STORAGE_SIZE 0x38
+ #define MLXSW_AFK_ELEMENT_STORAGE_SIZE 0x40

struct mlxsw_afk_element_inst { /* element instance in actual block */
    const struct mlxsw_afk_element_info *info;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/pci.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/pci.c
@@ -1654,10 +1654,10 @@
    u32 val = mlxsw_pci_read32(mlxsw_pci, FW_READY);

    if ((val & MLXSW_PCI_FW_READY_MASK) == MLXSW_PCI_FW_READY_MAGIC)
-        break;
+        return 0;
        cond_resched();

} while (time_before(jiffies, end));
-return 0;
+return -EBUSY;
}

static int mlxsw_pci_probe(struct pci_dev *pdev, const struct pci_device_id *id)
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/pci_hw.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/pci_hw.h
@@ -58,7 +58,7 @@
#define MLXSW_PCI_SW_RESET			0xF0010
#define MLXSW_PCI_SW_RESET_RST_BIT		BIT(0)
#define MLXSW_PCI_SW_RESET_TIMEOUT_MSECS	5000
-#define MLXSW_PCI_FW_READY		0xA1844
+#define MLXSW_PCI_FW_READY		0xA1844
#define MLXSW_PCI_FW_READY_MASK		0xFFFF
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/reg.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/reg.h
@@ -911,7 +911,7 @@
MLXSW_REG_ZERO(spaft, payload);
mlxsw_reg_spaft_local_port_set(payload, local_port);
mlxsw_reg_spaft_allow_untagged_set(payload, allow_untagged);
-mlxsw_reg_spaft_allow_prio_tagged_set(payload, true);
+mlxsw_reg_spaft_allow_prio_tagged_set(payload, allow_untagged);
mlxsw_reg_spaft_allow_tagged_set(payload, true);
}

@@ -2636,7 +2636,7 @@
* Configures the ETS elements.
 */
#define MLXSW_REG_QEEC_ID 0x400D
-#define MLXSW_REG_QEEC_LEN 0x1C
+#define MLXSW_REG_QEEC_LEN 0x20
MLXSW_REG_DEFINE(qeec, MLXSW_REG_QEEC_ID, MLXSW_REG_QEEC_LEN);

@@ -2678,6 +2678,15 @@
*/
MLXSW_ITEM32(reg, qeec, next_element_index, 0x08, 0, 8);

+/* reg_qeec_mise
+ * Min shaper configuration enable. Enables configuration of the min
+ * shaper on this ETS element
+ * 0 - Disable
+ * 1 - Enable
+ * Access: RW
+ */

+MLXSW_ITEM32(reg, qeec, mise, 0x0C, 31, 1);
+
enum {
    MLXSW_REG_QEEC_BYTES_MODE,
    MLXSW_REG_QEEC_PACKETS_MODE,
} /* -2694.6 +2703.17 */
+/
MLXSW_ITEM32(reg, qeec, pb, 0x0C, 28, 1);
+/*
   The smallest permitted min shaper rate.
*/
+#define MLXSW_REG_QEEC_MIS_MIN	200000	/* Kbps */
+
+/* reg_qeec_min_shaper_rate
   * Min shaper information rate.
   * For CPU port, can only be configured for port hierarchy.
   * When in bytes mode, value is specified in units of 1000bps.
   * Access: RW
   */
+/
+MLXSW_ITEM32(reg, qeec, min_shaper_rate, 0x0C, 0, 28);
+
/* reg_qeec_mase
   * Max shaper configuration enable. Enables configuration of the max
   * shaper on this ETS element.
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/spectrum.c
@@ -335,8 +335,13 @@
 , .mlxsw_sp = mlxsw_sp
 ];
+int err;
+
+mlxsw_core_fw_flash_start(mlxsw_sp->core);
+err = mlxfw_firmware_flash(&mlxsw_sp_mlxfw_dev.mlxfw_dev, firmware);
+mlxsw_core_fw_flash_end(mlxsw_sp->core);
+
-return mlxfw_firmware_flash(&mlxsw_sp_mlxfw_dev.mlxfw_dev, firmware);
+return err;
}

static bool mlxsw_sp_fw_rev_ge(const struct mlxsw_fw_rev *a,
@@ -1158,8 +1163,9 @@
     for (i = 0; i < IEEE_8021QAZ_MAX_TCS; i++) {
        bool configure = false;
        bool pfc = false;
+       u16 thres_cells;
+       u16 delay_cells;
        bool lossy;
-       u16 thres;

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for (j = 0; j < IEEE_8021QAZ_MAX_TCS; j++) {
  if (prio_tc[j] == i) {
    continue;
  }
  thres = mlxsw_sp_pg_buf_threshold_get(mlxsw_sp, mtu);
  delay = mlxsw_sp_pg_buf_delay_get(mlxsw_sp, mtu, delay, pfc, pause_en);
  mlxsw_sp_pg_buf_pack(pbmc_pl, i, thres + delay, thres, lossy);
  mlxsw_sp_pg_buf_pack(pbmc_pl, i, thres_cells + delay_cells, thres_cells, lossy);
}

return mlxsw_reg_write(mlxsw_sp->core, MLXSW_REG(pbmc), pbmc_pl);

if (!netif_carrier_ok(mlxsw_sp_port->dev)) {
  /* Note: mlxsw_sp_port_down_wipe_counters() clears the cache as
   * necessary when port goes down.
   */
  goto out;
}

mlxsw_sp_port_vlan->mlxsw_sp_port = mlxsw_sp_port;
+mlxsw_sp_port_vlan->ref_count = 1;
mlxsw_sp_port_vlan->vid = vid;
list_add(&mlxsw_sp_port_vlan->list, &mlxsw_sp_port->vlans_list);

 mlxsw_sp_port_vlan = mlxsw_sp_port_vlan_find_by_vid(mlxsw_sp_port, vid);
 -if (mlxsw_sp_port_vlan)
 +if (mlxsw_sp_port_vlan) {
    mlxsw_sp_port_vlan->ref_count++;
    return mlxsw_sp_port_vlan;
  +}

return mlxsw_sp_port_vlan_create(mlxsw_sp_port, vid);
```c
struct mlxsw_sp_fid *fid = mlxsw_sp_port_vlan->fid;

+if (--mlxsw_sp_port_vlan->ref_count != 0)
+return;
+
if (mlxsw_sp_port_vlan->bridge_port)
mlxsw_sp_port_vlan_bridge_leave(mlxsw_sp_port_vlan);
else if (fid)
@@ -2082,7 +2098,7 @@
int i;

for (i = 0; i < MLXSW_SP_PORT_HW_PRIO_STATS_LEN; i++) {
- snprintf(*p, ETH_GSTRING_LEN, "%s_%d",
- mlxsw_sp_port_hw_prio_stats[i].str, prio);
+ snprintf(*p, ETH_GSTRING_LEN, "%.29s_%.1d",
 mlxsw_sp_port_hw_prio_stats[i].str, prio);
 *p += ETH_GSTRING_LEN;
 }
@@ -2093,7 +2109,7 @@
int i;

for (i = 0; i < MLXSW_SP_PORT_HW_TC_STATS_LEN; i++) {
- snprintf(*p, ETH_GSTRING_LEN, "%s_%d",
- mlxsw_sp_port_hw_tc_stats[i].str, tc);
+ snprintf(*p, ETH_GSTRING_LEN, "%.29s_%.1d",
 mlxsw_sp_port_hw_tc_stats[i].str, tc);
 *p += ETH_GSTRING_LEN;
 }
@@ -2568,6 +2584,10 @@
 mlxsw_reg_ptys_eth_unpack(ptys_pl, &eth_proto_cap, NULL, NULL);

 autoneg = cmd->base.autoneg == AUTONEG_ENABLE;
+if (!autoneg && cmd->base.speed == SPEED_56000) {
+ netdev_err(dev, "56G not supported with autoneg off\n");
+ return -EINVAL;
+ }
 eth_proto_new = autoneg ?
 mlxsw_sp_to_ptys_advert_link(cmd) :
 mlxsw_sp_to_ptys_speed(cmd->base.speed);
@@ -2584,11 +2604,11 @@
 if (err)
 return err;

+mlxsw_sp_port->link.autoneg = autoneg;
+
if (!netif_running(dev))
return 0;
```
mlxsw_sp_port->link.autoneg = autoneg;

mlxsw_sp_port_admin_status_set(mlxsw_sp_port, false);
mlxsw_sp_port_admin_status_set(mlxsw_sp_port, true);

@@ -2823,6 +2843,21 @@
return mlxsw_reg_write(mlxsw_sp->core, MLXSW_REG(qeec), qeec_pl);
}

+static int mlxsw_sp_port_min_bw_set(struct mlxsw_sp_port *mlxsw_sp_port,
+        enum mlxsw_reg_qeec_hr hr, u8 index,
+        u8 next_index, u32 minrate)
+{
+    struct mlxsw_sp *mlxsw_sp = mlxsw_sp_port->mlxsw_sp;
+    char qeec_pl[MLXSW_REG_QEEC_LEN];
+    mlxsw_reg_qeec_pack(qeec_pl, mlxsw_sp_port->local_port, hr, index,
+                        next_index);
+    mlxsw_reg_qeec_mise_set(qeec_pl, true);
+    mlxsw_reg_qeec_min_shaper_rate_set(qeec_pl, minrate);
+    return mlxsw_reg_write(mlxsw_sp->core, MLXSW_REG(qeec), qeec_pl);
+}

int mlxsw_sp_port_prio_tc_set(struct mlxsw_sp_port *mlxsw_sp_port,
        u8 switch_prio, u8 tclass)
{
@@ -2884,6 +2919,23 @@
        return err;
    +
    +err = mlxsw_sp_port_ets_maxrate_set(mlxsw_sp_port,
        MLXSW_REG_QEEC_HIERARCHY_TC,
        i + 8, i,
        MLXSW_REG_QEEC_MAS_DIS);
+if (err)
+    return err;
+}
+    /* Configure the min shaper for multicast TCs. */
+for (i = 0; i < IEEE_8021QAZ_MAX_TCS; i++) {
+    err = mlxsw_sp_port_min_bw_set(mlxsw_sp_port,
+        MLXSW_REG_QEEC_HIERARCHY_TC,
+        i + 8, i,
+        MLXSW_REG_QEEC_MIS_MIN);
+if (err)
/* Map all priorities to traffic class 0. */
@@ -3329,6 +3381,15 @@
    return 0;
 }

+static void
+mlxsw_sp_port_down_wipe_counters(struct mlxsw_sp_port *mlxsw_sp_port)
+{
+    int i;
+    
+    for (i = 0; i < TC_MAX_QUEUE; i++)
    mlxsw_sp_port->periodic_hw_stats.xstats.backlog[i] = 0;
+}
+
+static void mlxsw_sp_pude_event_func(const struct mlxsw_reg_info *reg,
+                                      char *pude_pl, void *priv)
+{
    @@ -3349,6 +3410,7 @@
        } else {
            netdev_info(mlxsw_sp_port->dev, "link down\n");
            netif_carrier_off(mlxsw_sp_port->dev);
+            mlxsw_sp_port_down_wipe_counters(mlxsw_sp_port);
        }
    }

    burst_size = 7;
    break;
    case MLXSW_REG_HTGT_TRAP_GROUP_SP_IP2ME:
    -is_bytes = true;
        rate = 4 * 1024;
        burst_size = 4;
        break;
    @@ -4026,6 +4087,25 @@
        dev_put(mlxsw_sp_port->dev);
    }

    +static void
    +mlxsw_sp_port_lag_uppers_cleanup(struct mlxsw_sp_port *mlxsw_sp_port,
    + struct net_device *lag_dev)
    +{
        struct net_device *br_dev = netdev_master_upper_dev_get(lag_dev);
        struct net_device *upper_dev;
        struct list_head *iter;
        +
if (netif_is_bridge_port(lag_dev))
 mlxsw_sp_port_bridge_leave(mlxsw_sp_port, lag_dev, br_dev);
-netdev_for_each_upper_dev_rcu(lag_dev, upper_dev, iter) {
 +if (!netif_is_bridge_port(upper_dev))
 +continue;
 +br_dev = netdev_master_upper_dev_get(upper_dev);
 +mlxsw_sp_port_bridge_leave(mlxsw_sp_port, upper_dev, br_dev);
 +}
+}
+
static int mlxsw_sp_lag_create(struct mlxsw_sp *mlxsw_sp, u16 lag_id)
 {
 char sldr_pl[MLXSW_REG_SLDR_LEN];
 err = mlxsw_sp_lag_col_port_add(mlxsw_sp_port, lag_id, port_index);
 if (err)
 goto err_col_port_add;
 -err = mlxsw_sp_lag_col_port_enable(mlxsw_sp_port, lag_id);
 -if (err)
 -goto err_col_port_enable;
 mlxsw_core_lag_mapping_set(mlxsw_sp->core, lag_id, port_index,
 mlxsw_sp_port->local_port);

 return 0;

 -err_col_port_enable:
 -mlxsw_sp_lag_col_port_remove(mlxsw_sp_port, lag_id);
 err_col_port_add:
 if (!lag->ref_count)
 mlxsw_sp_lag_destroy(mlxsw_sp, lag_id);
 @ @ -4215,11 +4290,14 @@
 lag = mlxsw_sp_lag_get(mlxsw_sp, lag_id);
 WARN_ON(lag->ref_count == 0);

 -mlxsw_sp_lag_col_port_disable(mlxsw_sp_port, lag_id);
 mlxsw_sp_lag_col_port_remove(mlxsw_sp_port, lag_id);
 /* Any VLANs configured on the port are no longer valid */
 mlxsw_sp_port_vlan_flush(mlxsw_sp_port);
 +/* Make the LAG and its directly linked uppers leave bridges they
 + are memeber in
 + */
 +mlxsw_sp_port_lag_uppers_cleanup(mlxsw_sp_port, lag_dev);

 if (lag->ref_count == 1)
mlxsw_sp_lag_destroy(mlxsw_sp, lag_id);
@@ -4256,21 +4334,56 @@

return mlxsw_reg_write(mlxsw_sp->core, MLXSW_REG(sldr), sldr_pl);
}

-static int mlxsw_sp_port_lag_tx_en_set(struct mlxsw_sp_port *mlxsw_sp_port,
  -    bool lag_tx_enabled)
+static int mlxsw_sp_port_lag_col_dist_enable(struct mlxsw_sp_port *mlxsw_sp_port)
{
  // if (lag_tx_enabled)
  -return mlxsw_sp_lag_dist_port_add(mlxsw_sp_port,
  -    mlxsw_sp_port->lag_id);
  -else
  -return mlxsw_sp_lag_dist_port_remove(mlxsw_sp_port,
  -    mlxsw_sp_port->lag_id);
  +int err;
  +
  +err = mlxsw_sp_lag_col_port_enable(mlxsw_sp_port,
  +    mlxsw_sp_port->lag_id);
  +if (err)
  +return err;
  +
  +err = mlxsw_sp_lag_dist_port_add(mlxsw_sp_port, mlxsw_sp_port->lag_id);
  +if (err)
  +goto err_dist_port_add;
  +
  +return 0;
  +
  +err_dist_port_add:
  +mlxsw_sp_lag_col_port_disable(mlxsw_sp_port, mlxsw_sp_port->lag_id);
  +return err;
  +}

+static int mlxsw_sp_port_lag_col_dist_disable(struct mlxsw_sp_port *mlxsw_sp_port)
+{
  +int err;
  +
  +err = mlxsw_sp_lag_dist_port_remove(mlxsw_sp_port,
  +    mlxsw_sp_port->lag_id);
  +if (err)
  +return err;
  +
  +err = mlxsw_sp_lag_col_port_disable(mlxsw_sp_port,
  +    mlxsw_sp_port->lag_id);
  +if (err)
  +goto err_col_port_disable;
+return 0;
+
+err_col_port_disable:
+mlxsw_sp_lag_dist_port_add(mlxsw_sp_port, mlxsw_sp_port->lag_id);
+return err;
}

static int mlxsw_sp_port_lag_changed(struct mlxsw_sp_port *mlxsw_sp_port,
    struct netdev_lag_lower_state_info *info)
{
    return mlxsw_sp_port_lag_tx_en_set(mlxsw_sp_port, info->tx_enabled);
    if (info->tx_enabled)
        return mlxsw_sp_port_lag_col_dist_enable(mlxsw_sp_port);
    else
        return mlxsw_sp_port_lag_col_dist_disable(mlxsw_sp_port);
}

static int mlxsw_sp_port_stp_set(struct mlxsw_sp_port *mlxsw_sp_port,
    struct netdev_lag_lower_state_info *info)
{
    @ @ -4409,6 +4522,11 @ @
"spectrum: Can not put a VLAN on an OVS port”;
return -EINVAL;
}
+if (is_vlan_dev(upper_dev) &&
+    vlan_dev_vlan_id(upper_dev) == 1) {
+NLL_SET_ERR_MSG_MOD(extack, "Creating a VLAN device with VID 1 is unsupported: VLAN 1 carries
untagged traffic”);
+return -EINVAL;
+
}
    case NETDEV_CHANGEUPPER:
    upper_dev = info->upper_dev;
    @ @ -4423,17 +4541,29 @ @
    lower_dev,
    upper_dev);
} else if (netif_is_lag_master(upper_dev)) {
    -if (info->linking) {
        err = mlxsw_sp_port_lag_join(mlxsw_sp_port,
            upper_dev);
    } else
        +mlxsw_sp_port_lag_col_dist_disable(mlxsw_sp_port);
    mlxsw_sp_port_lag_leave(mlxsw_sp_port,
        upper_dev);
    +
} else if (netif_is_ovs_master(upper_dev)) {
    if (info->linking)
err = mlxsw_sp_port_ovs_join(mlxsw_sp_port);
else
 mlxsw_sp_port_ovs_leave(mlxsw_sp_port);
+} else if (is_vlan_dev(upper_dev)) {
+struct net_device *br_dev;
+
+if (!netif_is_bridge_port(upper_dev))
+break;
+if (info->linking)
+break;
+br_dev = netdev_master_upper_dev_get(upper_dev);
+mlxsw_sp_port_bridge_leave(mlxsw_sp_port, upper_dev,
+ br_dev);
} break;

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum.h
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/spectrum.h
@@ -199,6 +199,7 @@
 struct list_head list;
 struct mlxsw_sp_port *mlxsw_sp_port;
 struct mlxsw_sp_fid *fid;
+unsigned int ref_count;
 u16 vid;
 struct mlxsw_sp_bridge_port *bridge_port;
 struct list_head bridge_vlan_node;
@@ -448,6 +449,8 @@
 void mlxsw_sp_port_vlan_router_leave(struct mlxsw_sp_port_vlan *mlxsw_sp_port_vlan);
 void mlxsw_sp_rif_destroy(struct mlxsw_sp_rif *rif);
+void mlxsw_sp_rif_destroy_by_dev(struct mlxsw_sp *mlxsw_sp,
+ struct net_device *dev);

 /* spectrum_kvdl.c */
 int mlxsw_sp_kvdl_init(struct mlxsw_sp *mlxsw_sp);
@@ -331,7 +331,8 @@
 rulei = kzalloc(sizeof(*rulei), GFP_KERNEL);
 if (!rulei)
- return NULL;
+ return ERR_PTR(-ENOMEM);
+ rulei->act_block = mlxsw_afa_block_create(acl->mlxsw_sp->afa);
 if (IS_ERR(rulei->act_block)) {
 err = PTR_ERR(rulei->act_block);
 --- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum_buffers.c
static const struct mlxsw_sp_sb_cm mlxsw_sp_cpu_port_sb_cms[] = {
    MLXSW_SP_CPU_PORT_SB_CM,
    +MLXSW_SP_SB_CM(MLXSW_PORT_MAX_MTU, 0, 0),
    +MLXSW_SP_SB_CM(MLXSW_PORT_MAX_MTU, 0, 0),
    +MLXSW_SP_SB_CM(MLXSW_PORT_MAX_MTU, 0, 0),
    +MLXSW_SP_SB_CM(MLXSW_PORT_MAX_MTU, 0, 0),
    +MLXSW_SP_SB_CM(MLXSW_PORT_MAX_MTU, 0, 0),
    MLXSW_SP_CPU_PORT_SB_CM,
    -MLXSW_SP_CPU_PORT_SB_CM,
    -MLXSW_SP_CPU_PORT_SB_CM,
    -MLXSW_SP_CPU_PORT_SB_CM,
    -MLXSW_SP_CPU_PORT_SB_CM,
    -MLXSW_SP_CPU_PORT_SB_CM(10000, 0, 0),
    +MLXSW_SP_SB_CM(MLXSW_PORT_MAX_MTU, 0, 0),
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
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    MLXSW_SP_CPU_PORT_SB_CM,
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    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
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    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
    MLXSW_SP_CPU_PORT_SB_CM,
static const int mlxsw_sp_sfgc_mc_packet_types[MLXSW_REG_SFGC_TYPE_MAX] = {
    [MLXSW_REG_SFGC_TYPE_UNREGISTERED_MULTICAST_IPV4]= 1,
    [MLXSW_REG_SFGC_TYPE_UNREGISTERED_MULTICAST_IPV6]= 1,
};

static const int *mlxsw_sp_packet_type_sfgc_types[] = {
    ...}

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum_flower.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/spectrum_flower.c
@@ -118,9 +118,11 @@
  u8 prio = tcf_vlan_push_prio(a);
  u16 vid = tcf_vlan_push_vid(a);

-  return mlxsw_sp_acl_rulei_act_vlan(mlxsw_sp, rulei,
-    - action, vid,
-    - proto, prio);
+  err = mlxsw_sp_acl_rulei_act_vlan(mlxsw_sp, rulei,
+    + action, vid,
+    + proto, prio);
+  if (err)
+    return err;
+  return err;
  }
}

--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum_mr.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/spectrum_mr.c
@@ -601,6 +601,16 @@
  u16 erif_index = 0;

  /* Add the eRIF */
+  if (mlxsw_sp_mr_vif_valid(rve->mr_vif)) {
+    erif_index = mlxsw_sp_rif_index(rve->mr_vif->rif);
+    err = mr->mr_ops->route_erif_add(mlxsw_sp,
+        rve->mr_route->route_priv,
+        erif_index);
+    if (err)
return err;
+
/* Update the route action, as the new eVIF can be a tunnel or a pimreg
 * device which will require updating the action.
 */
@@ -610,17 +620,7 @@
 rve->mr_route->route_priv,
         route_action);
 if (err)
    return err;
-}
-
-/* Add the eRIF */
-if (mlxsw_sp_mr_vif_valid(rve->mr_vif)) {
-    erif_index = mlxsw_sp_rif_index(rve->mr_vif->rif);
-    err = mr->mr_ops->route_erif_add(mlxsw_sp,
-        rve->mr_route->route_priv,
-        erif_index);
-    if (err)
-        goto err_route_erif_add;
+    goto err_route_action_update;
+
}
/* Update the minimum MTU */
@@ -638,14 +638,14 @@
 return 0;

 err_route_min_mtu_update:
      if (mlxsw_sp_mr_vif_valid(rve->mr_vif))
-        mr->mr_ops->route_erif_del(mlxsw_sp, rve->mr_route->route_priv,
-            erif_index);
-    err_route_erif_add:
-        if (route_action != rve->mr_route->route_action)
-            mr->mr_ops->route_action_update(mlxsw_sp,
-                rve->mr_route->route_priv,
-                rve->mr_route->route_action);
+    err_route_action_update:
+        if (mlxsw_sp_mr_vif_valid(rve->mr_vif))
+            mr->mr_ops->route_erif_del(mlxsw_sp, rve->mr_route->route_priv,
+                erif_index);
  return err;
}

@@ -714,12 +714,12 @@
 return 0;

 err_erif_unresolve:
list_for_each_entry_from_reverse(erve, &mr_vif->route_evif_list, vif_node)
+list_for_each_entry_continue_reverse(erve, &mr_vif->route_evif_list, vif_node)
mlxsw_sp_mr_route_evif_unresolve(mr_table, erve);
err_irif_unresolve:
-list_for_each_entry_from_reverse(irve, &mr_vif->route_ivif_list, vif_node)
+list_for_each_entry_continue_reverse(irve, &mr_vif->route_ivif_list, vif_node)
mlxsw_sp_mr_route_ivif_unresolve(mr_table, irve);
mr_vif->rif = NULL;
return err;
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum_mr_tcam.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/spectrum_mr_tcam.c
@@ -240,8 +240,8 @@
int err;
afa_block = mlxsw_afa_block_create(mlxsw_sp->afa);
-if (!afa_block)
-    return ERR_PTR(-ENOMEM);
+if (IS_ERR(afa_block))
+    return afa_block;
err = mlxsw_afa_block_append_counter(afa_block, counter_index);
if (err)
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum_router.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/spectrum_router.c
@@ -737,6 +737,9 @@
            struct mlxsw_sp_mr_table *mr4_table;
            struct mlxsw_sp_fib *fib4;
            struct mlxsw_sp_fib *fib6;
struct mlxsw_sp_vr *vr;
-int err;

err = mlxsw_afa_block_append_counter(afa_block, counter_index);
+u32 tb_id,
+    struct netlink_ext_ack *extack)
{
+struct mlxsw_sp_mr_table *mr4_table;
+struct mlxsw_sp_fib *fib4;
+struct mlxsw_sp_fib *fib6;
struct mlxsw_sp_vr *vr;
int err;

-err = mlxsw_sp_fib_create(vr, MLXSW_SP_L3_PROTO_IPV4);
-    if (!IS_ERR(vr->fib4))
-        return ERR_CAST(vr->fib4);
-    vr->fib4 = mlxsw_sp_fib_create(vr, MLXSW_SP_L3_PROTO_IPV4);
-    if (IS_ERR(vr->fib4))
-        return ERR_CAST(vr->fib4);
-    vr->fib6 = mlxsw_sp_fib_create(vr, MLXSW_SP_L3_PROTO_IPV6);
-    if (IS_ERR(vr->fib6))
+err = PTR_ERR(vr->fib6);
+fib4 = mlxsw_sp_fib_create(vr, MLXSW_SP_L3_PROTO_IPV4);
+if (IS_ERR(fib4))
+return ERR_CAST(fib4);
+fib6 = mlxsw_sp_fib_create(vr, MLXSW_SP_L3PROTO_IPV6);
+if (IS_ERR(fib6)) {
+err = PTR_ERR(fib6);
+goto err_fib6_create;
+}
-vr->mr4_table = mlxsw_sp_mr_table_create(mlxsw_sp, vr->id,
- MLXSW_SP_L3_PROTO_IPV4);
-if (IS_ERR(vr->mr4_table)) {
-err = PTR_ERR(vr->mr4_table);
+mr4_table = mlxsw_sp_mr_table_create(mlxsw_sp, vr->id,
+ MLXSW_SP_L3_PROTO_IPV4);
+if (IS_ERR(mr4_table)) {
+err = PTR_ERR(mr4_table);
+goto err_mr_table_create;
+}
+vr->fib4 = fib4;
+vr->fib6 = fib6;
+vr->mr4_table = mr4_table;
+vr->tb_id = tb_id;
+return vr;

err_mr_table_create:
-mlxsw_sp_fib_destroy(vr->fib6);
-vr->fib6 = NULL;
+mlxsw_sp_fib_destroy(fib6);
err_fib6_create:
-mlxsw_sp_fib_destroy(vr->fib4);
-vr->fib4 = NULL;
+mlxsw_sp_fib_destroy(fib4);
+return ERR_PTR(err);
}

@@ -958,7 +962,7 @@
if (d)
 return l3mdev_fib_table(d) ? : RT_TABLE_MAIN;
 else
- return l3mdev_fib_table(ol_dev) ? : RT_TABLE_MAIN;
+ return RT_TABLE_MAIN;
 }

static struct mlxsw_sp_rif *
@@ -1191,15 +1195,12 @@
 { u32 ul_tb_id = l3mdev_fib_table(ul_dev) ? : RT_TABLE_MAIN;
 enum mlxsw_sp_ipip_type ipipt = ipip_entry->ipipt;

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struct net_device *ipip_ul_dev;

if (mlxsw_sp->router->ipip_ops[ipipt]->ul_proto != ul_proto)
    return false;

ipip_ul_dev = __mlxsw_sp_ipip_netdev_ul_dev_get(ipip_entry->ol_dev);
return mlxsw_sp_ipip_entry_saddr_matches(mlxsw_sp, ul_proto, ul_dip,
    ul_tb_id, ipip_entry) &&
    (!ipip_ul_dev || ipip_ul_dev == ul_dev);
}

/* Given decap parameters, find the corresponding IPIP entry. */
@@ -1459,27 +1460,10 @@
{
    struct mlxsw_sp_ipip_entry *ipip_entry =
    mlxsw_sp_ipip_entry_find_by_ol_dev(mlxsw_sp, ol_dev);
    enum mlxsw_sp_l3proto ul_proto;
-    union mlxsw_sp_l3addr saddr;
-    u32 ul_tb_id;
    if (!ipip_entry)
        return 0;
    /* For flat configuration cases, moving overlay to a different VRF might
     * cause local address conflict, and the conflicting tunnels need to be
     * demoted.
     */
    ul_tb_id = mlxsw_sp_ipip_dev_ul_tb_id(ol_dev);
    ul_proto = mlxsw_sp->router->ipip_ops_arr[ipip_entry->ipipt]->ul_proto;
    saddr = mlxsw_sp_ipip_netdev_saddr(ul_proto, ol_dev);
    if (mlxsw_sp_ipip_demote_tunnel_by_saddr(mlxsw_sp, ul_proto,
        saddr, ul_tb_id,
        ipip_entry)) {
        mlxsw_sp_ipip_entry_demote_tunnel(mlxsw_sp, ipip_entry);
        return 0;
    }
-
    return __mlxsw_sp_ipip_entry_update_tunnel(mlxsw_sp, ipip_entry,
        true, false, false, extack);
} @@ -2173,7 +2157,7 @@
static void
mlxsw_sp_nexthop_neigh_update(struct mlxsw_sp_sp *mlxsw_sp,
    struct mlxsw_sp_neigh_entry *neigh_entry,
    bool removing);
static enum mlxsw_reg_rauht_op mlxsw_sp_rauht_op(bool adding)
{
    memcpy(neigh_entry->ha, ha, ETH_ALEN);
    mlxsw_sp_neigh_entry_update(mlxsw_sp, neigh_entry, entry_connected);
    mlxsw_sp_nexthop_neigh_update(mlxsw_sp, neigh_entry, !entry_connected);
    mlxsw_sp_nexthop_neigh_update(mlxsw_sp, neigh_entry, !entry_connected,
        dead);
    if (!neigh_entry->connected && list_empty(&neigh_entry->nexthop_list))
        mlxsw_sp_neigh_entry_destroy(mlxsw_sp, neigh_entry);

    nh->update = 1;
}

static int mlxsw_sp_nexthop_dead_neigh_replace(struct mlxsw_sp *mlxsw_sp,
    structmlxsw_sp_neigh_entry *neigh_entry)
{
    struct neighbour *n, *old_n = neigh_entry->key.n;
    struct mlxsw_sp_nexthop *nh;
    bool entry_connected;
    u8 nud_state, dead;
    int err;

    nh = list_first_entry(&neigh_entry->nexthop_list,
        struct mlxsw_sp_nexthop, neigh_list_node);
    n = neigh_lookup(nh->nh_grp->neigh_tbl, &nh->gw_addr, nh->rif->dev);
    if (!n) {
        n = neigh_create(nh->nh_grp->neigh_tbl, &nh->gw_addr,
            nh->rif->dev);
        if (IS_ERR(n))
            return PTR_ERR(n);
        neigh_event_send(n, NULL);
    }
    mlxsw_sp_neigh_entry_remove(mlxsw_sp, neigh_entry);
    neigh_entry->key.n = n;
    err = mlxsw_sp_neigh_entry_insert(mlxsw_sp, neigh_entry);
    if (err)
        goto err_neigh_entry_insert;
    read_lock_bh(&n->lock);
    nud_state = n->nud_state;
    dead = n->dead;
    read_unlock_bh(&n->lock);
entry_connected = nud_state & NUD_VALID && !dead;
+list_for_each_entry_nh(neigh_entry, nexthop_list, neigh_list_node) {
    neigh_release(old_n);
    neigh_clone(n);
    __mlxsw_sp_nexthop_neigh_update(nh, entry_connected);
    mlxsw_sp_nexthop_group_refresh(mlxsw_sp, nh->nh_grp);
    
}
+neigh_release(n);
+return 0;
+
+err_neigh_entry_insert:
+neigh_entry->key.n = old_n;
+mlxsw_sp_neigh_entry_insert(mlxsw_sp, neigh_entry);
+neigh_release(n);
+return err;
+
static void
mlxsw_sp_nexthop_neigh_update(struct mlxsw_sp *mlxsw_sp,
    struct mlxsw_sp_neigh_entry *neigh_entry,
    bool removing)
{
    struct mlxsw_sp_nexthop *nh;

    if (list_empty(&neigh_entry->nexthop_list))
        return;
    
    if (dead) {
        int err = mlxsw_sp_nexthop_neigh_replace(mlxsw_sp, neigh_entry);
        if (err)
            dev_err(mlxsw_sp->bus_info->dev, "Failed to replace dead neigh\n");
        return;
    }
    
    list_for_each_entry_nh(neigh_entry, nexthop_list, neigh_list_node) {
        __mlxsw_sp_nexthop_neigh_update(nh, removing);
    }

    mlxsw_sp_nexthop_group *nh_grp = fib_entry->nh_group;
    int i;
+if (!list_is_singular(&nh_grp->fib_list))
+return;
+
+for (i = 0; i < nh_grp->count; i++) {
    struct mlxsw_sp_nexthop *nh = &nh_grp->nexthops[i];

    switch (info->family) {
    case AF_INET:
        if (!fib4_rule_default(rule) && !rule->l3mdev)
            -err = -1;
        +err = -EOPNOTSUPP;
        break;
    case AF_INET6:
        if (!fib6_rule_default(rule) && !rule->l3mdev)
            -err = -1;
        +err = -EOPNOTSUPP;
        break;
    case RTNL_FAMILY_IPMR:
        if (!ipmr_rule_default(rule) && !rule->l3mdev)
            -err = -1;
        +err = -EOPNOTSUPP;
        break;
    }

    if (err < 0)
        -NL_SET_ERR_MSG(extack, "spectrum: FIB rules not supported. Aborting offload");
        +NL_SET_ERR_MSG_MOD(extack, "FIB rules not supported");

    return err;
}
@@ -5788,12 +5842,12 @@
    case FIB_EVENT_RULE_DEL:
        err = mlxsw_sp_router_fib_rule_event(event, info,
            router->mlxsw_sp);
-    if (!err)
-        return NOTIFY_DONE;
+    if (!err || info->extack)
+        return notifier_from_errno(err);
    }

    fib_work = kzalloc(sizeof(*fib_work), GFP_ATOMIC);
-    if (WARN_ON(!fib_work))
-        return NOTIFY_BAD;
+    if (!fib_work)
+        return NOTIFY_BAD;

    fib_work->mlxsw_sp = router->mlxsw_sp;
+void mlxsw_sp_rif_destroy_by_dev(struct mlxsw_sp *mlxsw_sp,
  struct net_device *dev)
+
+struct mlxsw_sp_rif *rif;
+
+rif = mlxsw_sp_rif_find_by_dev(mlxsw_sp, dev);
+if (!rif)
  +return;
+mlxsw_sp_rif_destroy(rif);
+
+static void
mlxsw_sp_rif_subport_params_init(struct mlxsw_sp_rif_params *params,
  struct mlxsw_sp_port_vlan *mlxsw_sp_port_vlan)
--- linux-4.15.0.orig/drivers/net/ethernet/mellanox/mlxsw/spectrum_switchdev.c
+++ linux-4.15.0/drivers/net/ethernet/mellanox/mlxsw/spectrum_switchdev.c
@@ -158,6 +158,24 @@
return !!mlxsw_sp_bridge_device_find(mlxsw_sp->bridge, br_dev);
}

+static int mlxsw_sp_bridge_device_upper_rif_destroy(struct net_device *dev,
  +void *data)
  +{
    +struct mlxsw_sp *mlxsw_sp = data;
    +
    +mlxsw_sp_rif_destroy_by_dev(mlxsw_sp, dev);
    +return 0;
  +}
  +
  +static void mlxsw_sp_bridge_device_rifs_destroy(struct mlxsw_sp *mlxsw_sp,
  +struct net_device *dev)
  +{
    +mlxsw_sp_rif_destroy_by_dev(mlxsw_sp, dev);
    +netdev_walk_all_upper_dev_rcu(dev,
      mlxsw_sp_bridge_device_upper_rif_destroy,
      mlxsw_sp);
  +}
  +
  +static struct mlxsw_sp_bridge_device *
mlxsw_sp_bridge_device_create(struct mlxsw_sp_bridge *bridge,
  struct net_device *br_dev)
@@ -196,6 +214,8 @@
mlxsw_sp_bridge_device_destroy(struct mlxsw_sp_bridge *bridge,
  struct mlxsw_sp_bridge_device *bridge_device)
static bool mlxsw_sp_bridge_port_should_destroy(const struct mlxsw_sp_bridge_port * bridge_port)
{
    struct mlxsw_sp *mlxsw_sp = mlxsw_sp_lower_get(bridge_port->dev);

    /* In case ports were pulled from out of a bridged LAG, then
     * it's possible the reference count isn't zero, yet the bridge
     * port should be destroyed, as it's no longer an upper of ours.
     */
    if (!mlxsw_sp && list_empty(&bridge_port->vlans_list))
        return true;
    else if (bridge_port->ref_count == 0)
        return true;
    else
        return false;
}

static struct mlxsw_sp_bridge_port *
mlxsw_sp_bridge_port_get(struct mlxsw_sp_bridge *bridge,
                        struct net_device *brport_dev)
{
    struct mlxsw_sp_bridge_device *bridge_device;

    -bridge_port->ref_count--;
    -if (!mlxsw_sp_bridge_port_should_destroy(bridge_port))
+if (--bridge_port->ref_count != 0)
        return;
    bridge_device = bridge_port->bridge_device;
    mlxsw_sp_bridge_port_destroy(bridge_port);
    @ @ -1013,8 +1014,10 @@
    int err;

    /* No need to continue if only VLAN flags were changed */
    -if (mlxsw_sp_port_vlan->bridge_port)
+if (mlxsw_sp_port_vlan->bridge_port) {
        mlxsw_sp_port_vlan_put(mlxsw_sp_port_vlan);
    
    mlxsw_sp_bridge_port_rifs_destroy(bridge->mlxsw_sp,
        bridge_device->dev);
    list_del(&bridge_device->list);
    if (bridge_device->vlan_enabled)
        bridge->vlan_enabled_exists = false;
    @ @ -293,24 +313,6 @@
    kfree(bridge_port);
}

-static bool mlxsw_sp_bridge_port_should_destroy(const struct mlxsw_sp_bridge_port * bridge_port)
{-
    struct mlxsw_sp *mlxsw_sp = mlxsw_sp_lower_get(bridge_port->dev);

    /* In case ports were pulled from out of a bridged LAG, then
     * it's possible the reference count isn't zero, yet the bridge
     * port should be destroyed, as it's no longer an upper of ours.
     */
    -if (!mlxsw_sp && list_empty(&bridge_port->vlans_list))
        return true;
    -else if (bridge_port->ref_count == 0)
        return true;
    -else
        return false;
-
    static struct mlxsw_sp_bridge_port *
    mlxsw_sp_bridge_port_get(struct mlxsw_sp_bridge *bridge,
                            struct net_device *brport_dev)
    @ @ -348,8 +350,7 @@
    {
        struct mlxsw_sp_bridge_device *bridge_device;

        -bridge_port->ref_count--;
        -if (!mlxsw_sp_bridge_port_should_destroy(bridge_port))
+if (--bridge_port->ref_count != 0)
            return;
        bridge_device = bridge_port->bridge_device;
        mlxsw_sp_bridge_port_destroy(bridge_port);
        @ @ -1013,8 +1014,10 @@
        int err;

        /* No need to continue if only VLAN flags were changed */
        -if (mlxsw_sp_port_vlan->bridge_port)
+if (mlxsw_sp_port_vlan->bridge_port) {
            mlxsw_sp_port_vlan_put(mlxsw_sp_port_vlan);
        
        mlxsw_sp_bridge_port_rifs_destroy(bridge->mlxsw_sp,
            bridge_device->dev);
        list_del(&bridge_device->list);
        if (bridge_device->vlan_enabled)
            bridge->vlan_enabled_exists = false;
        @ @ -293,24 +313,6 @@
        kfree(bridge_port);
    }
return 0;
+

err = mlxsw_sp_port_vlan_fid_join(mlxsw_sp_port_vlan, bridge_port);
if (err)
@@ -1188,7 +1191,7 @@
static enum mlxsw_reg_sfd_rec_policy mlxsw_sp_sfd_rec_policy(bool dynamic)
 {
 return dynamic ? MLXSW_REG_SFD_REC_POLICY_DYNAMIC_ENTRY_INGRESS :
- MLXSW_REG_SFD_REC_POLICY_STATIC_ENTRY;
+ MLXSW_REG_SFD_REC_POLICY_DYNAMIC_ENTRY_MLAG;
 }

static enum mlxsw_reg_sfd_op mlxsw_sp_sfd_op(bool adding)
@@ -1200,9 +1203,10 @@
static int __mlxsw_sp_port_fdb_uc_op(struct mlxsw_sp *mlxsw_sp, u8 local_port,
 const char *mac, u16 fid, bool adding,
 enum mlxsw_reg_sfd_rec_action action,
- bool dynamic)
+ enum mlxsw_reg_sfd_rec_policy policy)
 {
 char *sfd_pl;
+u8 num_rec;
 int err;

 sfd_pl = kmalloc(MLXSW_REG_SFD_LEN, GFP_KERNEL);
@@ -1210,11 +1214,17 @@
 return -ENOMEM;
 mlxsw_reg_sfd_pack(sfd_pl, mlxsw_sp_sfd_op(adding), 0);
-mlxsw_reg_sfd_uc_pack(sfd_pl, 0, mlxsw_sp_sfd_rec_policy(dynamic),
- mac, fid, action, local_port);
+mlxsw_reg_sfd_uc_pack(sfd_pl, 0, policy, mac, fid, action, local_port);
+num_rec = mlxsw_reg_sfd_num_rec_get(sfd_pl);
 err = mlxsw_reg_write(mlxsw_sp->core, MLXSW_REG(sfd), sfd_pl);
 -kfree(sfd_pl);
+if (err)
 +goto out;
 
+if (num_rec != mlxsw_reg_sfd_num_rec_get(sfd_pl))
+err = -EBUSY;
+
+out:
+kfree(sfd_pl);
 return err;
 }

@@ -1223,7 +1233,8 @@
bool dynamic)
{
    return __mlxsw_sp_port_fdb_uc_op(mlxsw_sp, local_port, mac, fid, adding,
    - MLXSW_REG_SFD_REC_ACTION_NOP, dynamic);
    + MLXSW_REG_SFD_REC_ACTION_NOP,
    + mlxsw_sp_sfd_rec_policy(dynamic));
}

int mlxsw_sp_rif_fdb_op(struct mlxsw_sp *mlxsw_sp, const char *mac, u16 fid,
@@ -1231,7 +1242,7 @@
    {
    return __mlxsw_sp_port_fdb_uc_op(mlxsw_sp, 0, mac, fid, adding,
    MLXSW_REG_SFD_REC_ACTION_FORWARD_IP_ROUTER,
    - false);
    + MLXSW_REG_SFD_REC_POLICY_STATIC_ENTRY);
}

static int mlxsw_sp_port_fdb_uc_lag_op(struct mlxsw_sp *mlxsw_sp, u16 lag_id,
@@ -1239,6 +1250,7 @@
    bool adding, bool dynamic)
    {
    char *sfd_pl;
    +u8 num_rec;
    int err;

    sfd_pl = kmalloc(MLXSW_REG_SFD_LEN, GFP_KERNEL);
    @@ -1249,9 +1261,16 @@
    mlxsw_reg_sfd_uc_lag_pack(sfd_pl, 0, mlxsw_sp_sfd_rec_policy(dynamic),
    mac, fid, MLXSW_REG_SFD_REC_ACTION_NOP,
    lag_vid, lag_id);
    +num_rec = mlxsw_reg_sfd_num_rec_get(sfd_pl);
    err = mlxsw_reg_write(mlxsw_sp->core, MLXSW_REG(sfd), sfd_pl);
    -kfree(sfd_pl);
    +if (err)
    +goto out;
    +
    +if (num_rec != mlxsw_reg_sfd_num_rec_get(sfd_pl))
    +err = -EBUSY;
    +
    
    +out:
    +kfree(sfd_pl);
    return err;
    }

    @@ -1296,6 +1315,7 @@
    u16 fid, u16 mid_idx, bool adding)
    {
    char *sfd_pl;
+u8 num_rec;
int err;

sfd_pl = kmalloc(MLXSW_REG_SFD_LEN, GFP_KERNEL);
@@ -1305,7 +1325,15 @@
 mlxsw_reg_sfd_pack(sfd_pl, mlxsw_sp_sfd_op(adding), 0);
 mlxsw_reg_sfd_mc_pack(sfd_pl, 0, addr, fid,
     MLXSW_REG_SFD_REC_ACTION_NOP, mid_idx);
+num_rec = mlxsw_reg_sfd_num_rec_get(sfd_pl);
err = mlxsw_reg_write(mlxsw_sp->core, MLXSW_REG(sfd), sfd_pl);
+if (err)
+  goto out;
+
+if (num_rec != mlxsw_reg_sfd_num_rec_get(sfd_pl))
+  err = -EBUSY;
+
+out:
  kfree(sfd_pl);
  return err;
}
@@ -1539,7 +1567,7 @@
 u16 fid_index;
 int err = 0;
-      if (switchdev_trans_ph_prepare(trans))
+      if (switchdev_trans_ph_commit(trans))
 return 0;

bridge_port = mlxsw_sp_bridge_port_find(mlxsw_sp->bridge, orig_dev);
@@ -1651,7 +1679,7 @@
 mlxsw_sp_bridge_port_vlan_del(struct mlxsw_sp_port *mlxsw_sp_port,
   struct mlxsw_sp_port_vlan *mlxsw_sp_port_vlan)
 {
-    u16 pvid = mlxsw_sp_port->pvid == vid ? 0 : vid;
+    u16 pvid = mlxsw_sp_port->pvid == vid ? 0 : mlxsw_sp_port->pvid;
   struct mlxsw_sp_port_vlan *mlxsw_sp_port_vlan = mlxsw_sp_port_vlan;

mlxsw_sp_port_vlan = mlxsw_sp_port_vlan_find_by_vid(mlxsw_sp_port, vid);
@@ -1693,13 +1721,11 @@
 struct net_device *dev = mlxsw_sp_port->dev;
 int err;

-      -if (bridge_port->bridge_device->multicast_enabled) {
-      -if (bridge_port->bridge_device->multicast_enabled) {
-        -err = mlxsw_sp_port_smid_set(mlxsw_sp_port, mid->mid,
-          false);
-        -if (err)
-          -netdev_err(dev, "Unable to remove port from SMID\n");
+err = mlxsw_sp_port_smid_set(mlxsw_sp_port, mid->mid, false);
+if (err)
+    netdev_err(dev, "Unable to remove port from SMID\n");
}

err = mlxsw_sp_port_remove_from_mid(mlxsw_sp_port, mid);

u16 vid = vlan_dev_vlan_id(bridge_port->dev);
mlxsw_sp_port_vlan = mlxsw_sp_port_vlan_find_by_vid(mlxsw_sp_port, vid);
-if (WARN_ON(!mlxsw_sp_port_vlan))
+if (!mlxsw_sp_port_vlan)
    return;

mlxsw_sp_port_vlan_bridge_leave(mlxsw_sp_port_vlan);

struct net_device *dev = switchdev_notifier_info_to_dev(ptr);
struct mlxsw_sp_switchdev_event_work *switchdev_work;
struct switchdev_notifier_fdb_info *fdb_info = ptr;
+struct net_device *br_dev;

-if (!mlxsw_sp_port_dev_lower_find_rcu(dev))
+/* Tunnel devices are not our uppers, so check their master instead */
+    br_dev = netdev_master_upper_dev_get_rcu(dev);
+if (!br_dev)
+    return NOTIFY_DONE;
+if (!netif_is_bridge_master(br_dev))
+    return NOTIFY_DONE;
+if (!mlxsw_sp_port_dev_lower_find_rcu(br_dev))
    return NOTIFY_DONE;

switchdev_work = kzalloc(sizeof(*switchdev_work), GFP_ATOMIC);

*sk_buff and adds it to the TX ring. It then kicks the TX DMA
*engine to ensure transmission begins.
*/

static int
ks8695_start_xmit(struct sk_buff *skb, struct net_device *ndev)
{
    struct ks8695_priv *ksp = netdev_priv(ndev);
}
unsigned i;

iomem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+if (!iomem) {
+    dev_err(&pdev->dev, "Invalid resource\n");
+    return -EINVAL;
+}
if (!request_mem_region(iomem->start, resource_size(iomem), DRV_NAME))
goto err_mem_region;

--- linux-4.15.0.orig/drivers/net/ethernet/micrel/ks8851.c
+++ linux-4.15.0/drivers/net/ethernet/micrel/ks8851.c
@@ -526,9 +526,8 @@
/* set dma read address */
ks8851_wrreg16(ks, KS_RXFDPR, RXFDPR_RXFPAI | 0x00);

-/* start the packet dma process, and set auto-dequeue rx */
-ks8851_wrreg16(ks, KS_RXQCR,
-    ks->rc_rxqcr | RXQCR_SDA | RXQCR_ADRFE);
+/* start DMA access */
+ks8851_wrreg16(ks, KS_RXQCR, ks->rc_rxqcr | RXQCR_SDA);

if (rxlen > 4) {
    unsigned int rxalign;
@@ -559,7 +558,8 @@
    }
}

-ks8851_wrreg16(ks, KS_RXQCR, ks->rc_rxqcr);
+/* end DMA access and dequeue packet */
+ks8851_wrreg16(ks, KS_RXQCR, ks->rc_rxqcr | RXQCR_RRXEF);
}

static int ks8851_net_open(struct net_device *dev)
{
    struct ks8851_net *ks = netdev_priv(dev);
    int ret;
    +
+    ret = request_threaded_irq(dev->irq, NULL, ks8851_irq,
+        IRQF_TRIGGER_LOW | IRQF_ONESHOT,
+        dev->name, ks);
+    if (ret < 0) {
+        netdev_err(dev, "failed to get irq\n");
+        return ret;
+    }

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/* lock the card, even if we may not actually be doing anything
 * else at the moment */
@@ -840,6 +849,7 @@
    netif_dbg(ks, ifup, ks->netdev, "network device up\n");

    mutex_unlock(&ks->lock);
+    mii_check_link(&ks->mii);
    return 0;
}

@@ -890,6 +900,8 @@
    dev_kfree_skb(txb);
}

+    free_irq(dev->irq, ks);
+
    return 0;
}

@@ -1499,6 +1511,7 @@
    spi_set_drvdata(spi, ks);

+    netif_carrier_off(ks->netdev);
    ndev->if_port = IF_PORT_100BASET;
    ndev->netdev_ops = &ks8851_netdev_ops;
    ndev->irq = spi->irq;
@@ -1520,14 +1533,6 @@
    ks8851_read_selftest(ks);
    ks8851_init_mac(ks);
-
-ret = request_threaded_irq(spi->irq, NULL, ks8851_irq,
- IRQF_TRIGGER_LOW | IRQF_ONESHOT,
- ndev->name, ks);
-if (ret < 0) {
-dev_err(&spi->dev, "failed to get irq\n");
-goto err_irq;
-}
-
-ret = register_netdev(ndev);
-if (ret) {
-dev_err(&spi->dev, "failed to register network device\n");
@@ -1540,14 +1545,10 @@
    return 0;
-
err_netdev:
-free_irq(ndev->irq, ks);
-
-err_irq:
+err_id:
if (gpio_is_valid(gpio))
gpio_set_value(gpio, 0);
-err_id:
regulator_disable(ks->vdd_reg);
err_reg:
regulator_disable(ks->vdd_io);
@@ -1565,7 +1566,6 @@
dev_info(&spi->dev, "remove\n");
unregister_netdev(priv->netdev);
-free_irq(spi->irq, priv);
if (gpio_is_valid(priv->gpio))
gpio_set_value(priv->gpio, 0);
regulator_disable(priv->vdd_reg);
--- linux-4.15.0.orig/drivers/net/ethernet/micrel/ks8851_mll.c
+++ linux-4.15.0/drivers/net/ethernet/micrel/ks8851_mll.c
@@ -475,21 +475,47 @@
/*

/ *
- * ks_rdreg8 - read 8 bit register from device
+ * ks_check_endian - Check whether endianness of the bus is correct
 * @ks : The chip information
- * @offset: The register address
 * 
- * Read a 8bit register from the chip, returning the result
+ * The KS8851-16MLL EESK pin allows selecting the endianness of the 16bit
+ * bus. To maintain optimum performance, the bus endianness should be set
+ * such that it matches the endianness of the CPU.
 */
-static u8 ks_rdreg8(struct ks_net *ks, int offset)
 +
+static int ks_check_endian(struct ks_net *ks)
 {
  -u16 data;
  -u8 shift_bit = offset & 0x03;
  -u8 shift_data = (offset & 1) << 3;
  -ks->cmd_reg_cache = (u16) offset | (u16)(BE0 << shift_bit);
  -iowrite16(ks->cmd_reg_cache, ks->hw_addr_cmd);
  -data = ioread16(ks->hw_addr);
  -return (u8)(data >> shift_data);
  +u16 cider;
 +
/*
 * Read CIDER register first, however read it the "wrong" way around.
 * If the endian strap on the KS8851-16MLL in incorrect and the chip
 * is operating in different endianness than the CPU, then the meaning
 * of BE[3:0] byte-enable bits is also swapped such that:
 * BE[3,2,1,0] becomes BE[1,0,3,2]
 * Luckily for us, the byte-enable bits are the top four MSbits of
 * the address register and the CIDER register is at offset 0xc0.
 * Hence, by reading address 0xc0c0, which is not impacted by endian
 * swapping, we assert either BE[3:2] or BE[1:0] while reading the
 * CIDER register.
 * If the bus configuration is correct, reading 0xc0c0 asserts
 * BE[3:2] and this read returns 0x0000, because to read register
 * with bottom two LSbits of address set to 0, BE[1:0] must be
 * asserted.
 * If the bus configuration is NOT correct, reading 0xc0c0 asserts
 * BE[1:0] and this read returns non-zero 0x8872 value.
 */
+iowrite16(BE3 | BE2 | KS_CIDER, ks->hw_addr_cmd);
cider = ioread16(ks->hw_addr);
if (!cider)
	return 0;

netdev_err(ks->netdev, "incorrect EESK endian strap setting\n");
+return -EINVAL;
}
/**
@@ -508,22 +534,6 @@
}
/**
- * ks_wrreg8 - write 8bit register value to chip
- * @ks: The chip information
- * @offset: The register address
- * @value: The value to write
- *
- */
-static void ks_wrreg8(struct ks_net *ks, int offset, u8 value)
-{
-u8 shift_bit = (offset & 0x03);
-u16 value_write = (u16)(value << ((offset & 1) << 3));
-ks->cmd_reg_cache = (u16)offset | (BE0 << shift_bit);
-iowrite16(ks->cmd_reg_cache, ks->hw_addr_cmd);
- iowrite16(value_write, ks->hw_addr);
- }
-
-/**
 * ks_wrreg16 - write 16bit register value to chip
 * @ks: The chip information
 * @offset: The register address
 */
@ @ -642,8 +652,7 @ @

u16 reg_data = 0;

/* Regardless of bus width, 8 bit read should always work.*/
-reg_data = ks_rdreg8(ks, KS_CCR) & 0x00FF;
-reg_data |= ks_rdreg8(ks, KS_CCR+1) << 8;
+reg_data = ks_rdreg16(ks, KS_CCR);

/* addr/data bus are multiplexed */
ks->sharedbus = (reg_data & CCR_SHARED) == CCR_SHARED;
@ @ -747,7 +756,7 @ @

/* 1. set sudo DMA mode */
ks_wrreg16(ks, KS_RXFDPR, RXFDPR_RXFPAI);
-ks_wrreg8(ks, KS_RXQCR, (ks->rc_rxqcr | RXQCR_SDA) & 0xff);
+ks_wrreg16(ks, KS_RXQCR, ks->rc_rxqcr | RXQCR_SDA);

/* 2. read prepend data */
/**
 @@ -764,7 +773,7 @@
 ks_inblk(ks, buf, ALIGN(len, 4));

/* 4. reset sudo DMA Mode */
-ks_wrreg8(ks, KS_RXQCR, ks->rc_rxqcr);
+ks_wrreg16(ks, KS_RXQCR, ks->rc_rxqcr);
}

/**
 @@ -866,14 +875,17 @@
 {
 struct net_device *netdev = pw;
 struct ks_net *ks = netdev_priv(netdev);
 +unsigned long flags;
 u16 status;

 +spin_lock_irqsave(&ks->statelock, flags);
 /* this should be the first in IRQ handler */
 ks_save_cmd_reg(ks);

 status = ks_rdreg16(ks, KS_ISR);
 if (unlikely(!status)) {

ks_restore_cmd_reg(ks);
+spin_unlock_irqrestore(&ks->statelock, flags);
return IRQ_NONE;
}

@@ -899,6 +911,7 @@
ks->netdev->stats.rx_over_errors++;
/* this should be the last in IRQ handler*/
ks_restore_cmd_reg(ks);
+spin_unlock_irqrestore(&ks->statelock, flags);
return IRQ_HANDLED;
}
@@ -968,6 +981,7 @@

/* shutdown RX/TX QMU */
ks_disable_qmu(ks);
+ks_disable_int(ks);

/* set powermode to soft power down to save power */
ks_set_powermode(ks, PMECR_PM_SOFTDOWN);
@@ -997,13 +1011,13 @@
ks->txh.txw[1] = cpu_to_le16(len);

/* 1. set sudo-DMA mode */
-ks_wrreg8(ks, KS_RXQCR, (ks->rc_rxqcr | RXQCR_SDA) & 0xff);
+ks_wrreg16(ks, KS_RXQCR, ks->rc_rxqcr | RXQCR_SDA);
/* 2. write status/lenth info */
ks_outblk(ks, ks->txh.txw, 4);
/* 3. write pkt data */
ks_outblk(ks, (u16 *)pdata, ALIGN(len, 4));
/* 4. reset sudo-DMA mode */
-ks_wrreg8(ks, KS_RXQCR, ks->rc_rxqcr);
+ks_wrreg16(ks, KS_RXQCR, ks->rc_rxqcr);
/* 5. Enqueue Tx(move the pkt from TX buffer into TXQ) */
ks_wrreg16(ks, KS_TXQCR, TXQCR_METFE);
/* 6. wait until TXQCR_METFE is auto-cleared */
@@ -1020,14 +1034,13 @@
* spin_lock_irqsave is required because tx and rx should be mutual exclusive.
* So while tx is in-progress, prevent IRQ interrupt from happenning.
*/
-static int ks_start_xmit(struct sk_buff *skb, struct net_device *netdev)
+static netdev_tx_t ks_start_xmit(struct sk_buff *skb, struct net_device *netdev)
{
    int retv = NETDEV_TX_OK;
+netdev_tx_t retv = NETDEV_TX_OK;
    struct ks_net *ks = netdev_priv(netdev);
    unsigned long flags;
    /* spin_lock_irqsave is required because tx and rx should be mutual exclusive.
    * So while tx is in-progress, prevent IRQ interrupt from happenning.
    */
-    static int ks_start_xmit(struct sk_buff *skb, struct net_device *netdev)
+static netdev_tx_t ks_start_xmit(struct sk_buff *skb, struct net_device *netdev)
{
-disable_irq(netdev->irq);
-ks_disable_int(ks);
-spin_lock(&ks->statelock);
+spin_lock_irqsave(&ks->statelock, flags);

/* Extra space are required:
*  4 byte for alignment, 4 for status/length, 4 for CRC
@@ -1041,9 +1054,7 @@
dev_kfree_skb(skb);
] else
retv = NETDEV_TX_BUSY;
-skip_unlock(&ks->statelock);
-ks_enable_int(ks);
-enable_irq(netdev->irq);
+spin_unlock_irqrestore(&ks->statelock, flags);
return retv;
}
@@ -1572,6 +1583,10 @@
goto err_free;
}
+err = ks_check_endian(ks);
+if (err)
+goto err_free;
netdev->irq = platform_get_irq(pdev, 0);

if ((int)netdev->irq < 0) {
--- linux-4.15.0.orig/drivers/net/ethernet/micrel/ksz884x.c
+++ linux-4.15.0/drivers/net/ethernet/micrel/ksz884x.c
@@ -1657,8 +1657,7 @@
#define HW_DELAY(hw, reg)			
do {					-		u16 dummy;			}
+-dummy = readw(hw->io + reg);
+readw(hw->io + reg);
} while (0)

/**
--- linux-4.15.0.orig/drivers/net/ethernet/microchip/encx24j600-regmap.c
+++ linux-4.15.0/drivers/net/ethernet/microchip/encx24j600-regmap.c
@@ -505,13 +505,19 @@
 .reg_read = regmap_encx24j600_phy_reg_read,
};
void devm_regmap_init_encx24j600(struct device *dev,
   struct encx24j600_context *ctx)
+
int devm_regmap_init_encx24j600(struct device *dev,
   struct encx24j600_context *ctx)
{
    mutex_init(&ctx->mutex);
    regcfg.lock_arg = ctx;
    ctx->regmap = devm_regmap_init(dev, &regmap_encx24j600, ctx, &regcfg);
    if (IS_ERR(ctx->regmap))
        return PTR_ERR(ctx->regmap);
    ctx->phymap = devm_regmap_init(dev, &phymap_encx24j600, ctx, &phycfg);
    if (IS_ERR(ctx->phymap))
        return PTR_ERR(ctx->phymap);
    return 0;
}

EXPORT_SYMBOL_GPL(devm_regmap_init_encx24j600);

--- linux-4.15.0.orig/drivers/net/ethernet/microchip/encx24j600.c
+++ linux-4.15.0/drivers/net/ethernet/microchip/encx24j600.c
@@ -1032,10 +1032,13 @@
    priv->speed = SPEED_100;

    priv->ctx.spi = spi;
-    devm_regmap_init_encx24j600(&spi->dev, &priv->ctx);
    ndev->irq = spi->irq;
    ndev->netdev_ops = &encx24j600_netdev_ops;

    +ret = devm_regmap_init_encx24j600(&spi->dev, &priv->ctx);
    +if (ret)
    +    goto out_free;
    +    mutex_init(&priv->lock);

/* Reset device and check if it is connected */
@@ -1075,7 +1078,7 @@
    if (unlikely(ret)) {
        netif_err(priv, probe, ndev, "Error %d initializing card encx24j600 card\n",
            ret);
-        goto out_free;
-        goto out_stop;
    }

    eidled = encx24j600_read_reg(priv, EIDLED);
@@ -1093,6 +1096,8 @@

    out_unregister:
    unregister_netdev(priv->ndev);
+out_stop:
+kthread_stop(priv->kworker_task);
out_free:
free_netdev(ndev);

@@ -1105,6 +1110,7 @@
struct encx24j600_priv *priv = dev_get_drvdata(&spi->dev);

unregister_netdev(priv->ndev);
+kthread_stop(priv->kworker_task);

free_netdev(priv->ndev);

--- linux-4.15.0.orig/drivers/net/ethernet/microchip/encx24j600_hw.h
+++ linux-4.15.0/drivers/net/ethernet/microchip/encx24j600_hw.h
@@ -15,8 +15,8 @@
int bank;

#ifdef devm_regmap_init_encx24j600(struct device *dev, -
 - struct encx24j600_context *ctx);
+int devm_regmap_init_encx24j600(struct device *dev, +
+struct encx24j600_context *ctx);

/* Single-byte instructions */
#define BANK_SELECT(bank) (0xC0 | ((bank & (BANK_MASK >> BANK_SHIFT)) << 1))
--- linux-4.15.0.orig/drivers/net/ethernet/moxa/moxart_ether.c
+++ linux-4.15.0/drivers/net/ethernet/moxa/moxart_ether.c
@@ -538,10 +538,8 @@
SET_NETDEV_DEV(ndev, &pdev->dev);

ret = register_netdev(ndev);
-if (ret) {
- free_netdev(ndev);
+if (ret)
+ goto init_fail;
- }

netdev_dbg(ndev, "%s: IRQ=%d address=%pMn", -
 - __func__, ndev->irq, ndev->dev_addr);
@@ -619,7 +619,7 @@
struct net_device *ndev = platform_get_drvdata(pdev);

unregister_netdev(ndev);
-if_irq(ndev->irq, ndev);
+devm_free_irq(&pdev->dev, ndev->irq, ndev);
moxart_mac_free_memory(ndev);
free_netdev(ndev);
dev_err(&pdev->dev, 
"invalid sram_size %dB or board span %ldB
",
mgp->sram_size, mgp->board_span);
+status = -EINVAL;
goto abort_with_ioremap;
} 
memcpy_fromio(mgp->eeprom_strings, 
@@ -3922,7 +3923,7 @@ 
* setup (if available). */ 
status = myri10ge_request_irq(mgp);
if (status != 0)
-goto abort_with_firmware;
+goto abort_with_slices;
myri10ge_free_irq(mgp);
/* Save configuration space to be restored if the
--- linux-4.15.0.orig/drivers/net/ethernet/natsemi/jazzsonic.c
+++ linux-4.15.0/drivers/net/ethernet/natsemi/jazzsonic.c
@@ -247,13 +247,15 @@
goto out;
err = register_netdev(dev);
if (err)
-goto out1;
+goto undo_probe1;

printk("%s: MAC %pM IRQ %d\n", dev->name, dev->dev_addr, dev->irq);

return 0;
-
-out1:
+undo_probe1:
+dma_free_coherent(lp->device, SIZEOF_SONIC_DESC * SONIC_BUS_SCALE(lp->dma_bitmode),
+   lp->descriptors, lp->descriptors_laddr);
release_mem_region(dev->base_addr, SONIC_MEM_SIZE);
out:
free_netdev(dev);
--- linux-4.15.0.orig/drivers/net/ethernet/natsemi/macsonic.c
+++ linux-4.15.0/drivers/net/ethernet/natsemi/macsonic.c
@@ -593,12 +593,15 @@
found:
err = register_netdev(dev);
if (err)
-goto out;
+goto undo_probe;
printk("%s: MAC %pM IRQ %d\n", dev->name, dev->dev_addr, dev->irq);

return 0;

+undo_probe:
+dma_free_coherent(lp->device,
+ SIZEOF_SONIC_DESC * SONIC_BUS_SCALE(lp->dma_bitmode),
+ lp->descriptors, lp->descriptors_laddr);
out:
free_netdev(dev);

--- linux-4.15.0.orig/drivers/net/ethernet/natsemi/natsemi.c
+++ linux-4.15.0/drivers/net/ethernet/natsemi/natsemi.c
@@ -819,7 +819,7 @@
printk(version);
#endif

-i = pci_enable_device(pdev);
+i = pcim_enable_device(pdev);
if (i) return i;

/* natsemi has a non-standard PM control register */
@@ -852,7 +852,7 @@
ioaddr = ioremap(iostart, iosize);
if (!ioaddr) {
  i = -ENOMEM;
  goto err_ioremap;
+goto err_pci_request_regions;
} }

/* Work around the dropped serial bit. */
@@ -974,9 +974,6 @@
erp_register_netdev:
iounmap(ioaddr);

- err_ioremap:
-pci_release_regions(pdev);
-
erp_pci_request_regions:
free_netdev(dev);
return i;
@@ -3242,7 +3239,6 @@
NATSEMI_REMOVE_FILE(pdev, dspcfg_workaround);
.unregister_netdev (dev);
-pci_release_regions (pdev);
iounmap(ioaddr);
free_netdev(dev);
}
--- linux-4.15.0.orig/drivers/net/ethernet/natsemi/sonic.c
+++ linux-4.15.0/drivers/net/ethernet/natsemi/sonic.c
@@ -68,10 +68,12 @@
lp->rx_skb[i] = skb;
}
+spin_lock_init(&lp->lock);
+
+for (i = 0; i < SONIC_NUM_RRS; i++) {
    dma_addr_t laddr = dma_map_single(lp->device, skb_put(lp->rx_skb[i], SONIC_RBSIZE),
        SONIC_RBSIZE, DMA_FROM_DEVICE);
    -if (!laddr) {
    +if (dma_mapping_error(lp->device, laddr)) {
        while(i > 0) { /* free any that were mapped successfully */
            --i;
        dma_unmap_single(lp->device, lp->rx_laddr[i], SONIC_RBSIZE, DMA_FROM_DEVICE);
    @@ -101,6 +103,24 @@
    return 0;
  }
+/* Wait for the SONIC to become idle. */
+static void sonic_quiesce(struct net_device *dev, u16 mask)
+{
+    struct sonic_local * __maybe_unused lp = netdev_priv(dev);
+    int i;
+    u16 bits;
+
+    for (i = 0; i < 1000; ++i) {
+        bits = SONIC_READ(SONIC_CMD) & mask;
+        if (!bits)
+            return;
+        if (irqs_disabled() || in_interrupt())
+            udelay(20);
+        else
+            usleep_range(100, 200);
+    }
+    WARN_ONCE(1, "command deadline expired! 0x%04x\n", bits);
+}
+
+/*
 * Close the SONIC device
 @@ -118,6 +138,9 @@
+SONIC_WRITE(SONIC_CMD, SONIC_CR_RXDIS);
SONIC_WRITE(SONIC_IMR, 0);
SONIC_WRITE(SONIC_ISR, 0x7fff);
SONIC_WRITE(SONIC_CMD, SONIC_CR_RST);
@@ -157,6 +180,9 @@
* put the Sonic into software-reset mode and
* disable all interrupts before releasing DMA buffers
*/
+SONIC_WRITE(SONIC_CMD, SONIC_CR_RXDIS);
+sonic_quiesce(dev, SONIC_CR_ALL);
+
SONIC_WRITE(SONIC_IMR, 0);
SONIC_WRITE(SONIC_ISR, 0x7fff);
SONIC_WRITE(SONIC_CMD, SONIC_CR_RST);
@@ -194,8 +220,6 @@
* wake the tx queue
* Concurrently with all of this, the SONIC is potentially writing to
* the status flags of the TDs.
- * Until some mutual exclusion is added, this code will not work with SMP. However,
- * MIPS Jazz machines and m68k Macs were all uni-processor machines.
*/

static int sonic_send_packet(struct sk_buff *skb, struct net_device *dev)
@@ -203,7 +227,8 @@
struct sonic_local *lp = netdev_priv(dev);
dma_addr_t laddr;
int length;
-int entry = lp->next_tx;
+int entry;
+unsigned long flags;

if (sonic_debug > 2)
printk("sonic_send_packet: skb=%p, dev=%p\n", skb, dev);
@@ -221,11 +246,15 @@

laddr = dma_map_single(lp->device, skb->data, length, DMA_TO_DEVICE);
if (!laddr) {
-printk(KERN_ERR "\%s: failed to map tx DMA buffer.\n", dev->name);
-dev_kfree_skb(skb);
-return NETDEV_TX_BUSY;
+pr_err_ratelimited("\%s: failed to map tx DMA buffer.\n", dev->name);
+dev_kfree_skb_any(skb);
+return NETDEV_TX_OK;
}

+spin_lock_irqsave(&lp->lock, flags);
+
entry = lp->next_tx;
+
sonic_tda_put(dev, entry, SONIC_TD_STATUS, 0); /* clear status */
sonic_tda_put(dev, entry, SONIC_TD_FRAG_COUNT, 1); /* single fragment */
sonic_tda_put(dev, entry, SONIC_TD_PKTSIZE, length); /* length of packet */
@@ -235,10 +264,6 @@
sonic_tda_put(dev, entry, SONIC_TD_LINK,
sonic_tda_get(dev, entry, SONIC_TD_LINK) | SONIC_EOL);
*/
-/*
- * Must set tx_skb[entry] only after clearing status, and
- * before clearing EOL and before stopping queue
- */
-wmb();
lp->tx_len[entry] = length;
lp->tx_laddr[entry] = laddr;
@@ -263,6 +288,8 @@
SONIC_WRITE(SONIC_CMD, SONIC_CR_TXP);
+	spin_unlock_irqrestore(&lp->lock, flags);
+
return NETDEV_TX_OK;
}

@@ -275,16 +302,29 @@
struct net_device *dev = dev_id;
struct sonic_local *lp = netdev_priv(dev);
int status;
+	unsigned long flags;
+
/* The lock has two purposes. Firstly, it synchronizes sonic_interrupt()
 + * with sonic_send_packet() so that the two functions can share state.
 + * Secondly, it makes sonic_interrupt() re-entrant, as that is required
 + * by macsonic which must use two IRQs with different priority levels.
 + */
+spin_lock_irqsave(&lp->lock, flags);
+
+status = SONIC_READ(SONIC_ISR) & SONIC_IMR_DEFAULT;
+if (!status) {
+spin_unlock_irqrestore(&lp->lock, flags);
+
-if (!status = SONIC_READ(SONIC_ISR) & SONIC_IMR_DEFAULT))
return IRQ_NONE;
+}

do {
+SONIC_WRITE(SONIC_ISR, status); /* clear the interrupt(s) */
if (status & SONIC_INT_PKTRX) {
    if (sonic_debug > 2)
        printk("%s: packet rx\n", dev->name);
    sonic_rx(dev); /* got packet(s) */
    S30NIC_WRITE(SONIC_ISR, SONIC_INT_PKTRX); /* clear the interrupt */
}

if (status & SONIC_INT_TXDN) {
    int td_status;
    int freed_some = 0;

    /* At this point, cur_tx is the index of a TD that is one of:
     * unallocated/freed                          (status set   & tx_skb[entry] clear)
     * allocated and sent                         (status set   & tx_skb[entry] set  )
     * allocated and not yet sent                 (status clear & tx_skb[entry] set  )
     * still being allocated by sonic_send_packet (status clear & tx_skb[entry] clear)
    */
    if (sonic_debug > 2)
        printk("the state of a Transmit Descriptor may be inferred
            * from { tx_skb[entry], td_status } as follows.
            * { clear, clear } => the TD has never been used
            * { set,   clear } => the TD was handed to SONIC
            * { set,   set   } => the TD was handed back
            * { clear, set   } => the TD is available for re-use
        
    if (sonic_debug > 2)
        printk("-if (td_status & 0x0001) {
            +if (td_status & SONIC_TCR_PTX) {
                lp->stats.tx_packets++;
                lp->stats.tx_bytes += sonic_tda_get(dev, entry, SONIC_TD_PKTSIZE);
            } else {
                lp->stats.tx_errors++;
            -if (td_status & 0x0642)
                +if (td_status & (SONIC_TCR_EXD | SONIC_TCR_EXC | SONIC_TCR_BCM))
                    lp->stats.tx_aborted_errors++;
                -if (td_status & 0x0180)
                    +if (td_status & (SONIC_TCR_NCRS | SONIC_TCR_CRLS))
                        lp->stats.tx_carrier_errors++;
                    -if (td_status & 0x0020)
                        +if (td_status & SONIC_TCR_OWC)
                            lp->stats.tx_window_errors++;
if (td_status & 0x0004)
lp->stats.tx_fifo_errors++;

if (td_status & SONIC_TCR_FU)
lp->stats.tx_fifo_errors++;

@@ -339,7 +381,6 @@
if (freed_some || lp->tx_skb[entry] == NULL)
    netif_wake_queue(dev);  /* The ring is no longer full */
lp->cur_tx = entry;
-SONIC_WRITE(SONIC_ISR, SONIC_INT_TXDN); /* clear the interrupt */
}

/*
@@ -348,41 +389,37 @@
if (status & SONIC_INT_RFO) {
    if (sonic_debug > 1)
        printk("%s: rx fifo overrun\n", dev->name);
    -lp->stats.rx_fifo_errors++;
-SONIC_WRITE(SONIC_ISR, SONIC_INT_RFO); /* clear the interrupt */
}
if (status & SONIC_INT_RDE) {
    if (sonic_debug > 1)
        printk("%s: rx descriptors exhausted\n", dev->name);
    -lp->stats.rx_dropped++;
-SONIC_WRITE(SONIC_ISR, SONIC_INT_RDE); /* clear the interrupt */
}
if (status & SONIC_INT_RBAE) {
    if (sonic_debug > 1)
        printk("%s: rx buffer area exceeded\n", dev->name);
    -lp->stats.rx_dropped++;
-SONIC_WRITE(SONIC_ISR, SONIC_INT_RBAE); /* clear the interrupt */
}
/* counter overruns; all counters are 16bit wide */
-if (status & SONIC_INT_FAE) {
+if (status & SONIC_INT_FAE)
    lp->stats.rx_frame_errors += 65536;
-SONIC_WRITE(SONIC_ISR, SONIC_INT_FAE); /* clear the interrupt */
-
-if (status & SONIC_INT_CRC) {
+if (status & SONIC_INT_CRC)
    lp->stats.rx_crc_errors += 65536;
-SONIC_WRITE(SONIC_ISR, SONIC_INT_CRC); /* clear the interrupt */
-
-if (status & SONIC_INT_MP) {
+if (status & SONIC_INT_MP)
    lp->stats.rx_missed_errors += 65536;
-SONIC_WRITE(SONIC_ISR, SONIC_INT_MP); /* clear the interrupt */

/* transmit error */
if (status & SONIC_INT_TXER) {
    /* transmit error */
    if ((SONIC_READ(SONIC_TCR) & SONIC_TCR_FU) && (sonic_debug > 2)) {
        printk(KERN_ERR "%s: tx fifo underrun\n", dev->name);
    -SONIC_WRITE(SONIC_ISR, SONIC_INT_TXER); /* clear the interrupt */
    +u16 tcr = SONIC_READ(SONIC_TCR);
    +
    +printk(KERN_ERR "%s: TXER intr, TCR %04x\n", 
        +dev->name, tcr);
    +
    +if (tcr & (SONIC_TCR_EXD | SONIC_TCR_EXC |
               +SONIC_TCR_FU | SONIC_TCR_BCM)) {
        /* Aborted transmission. Try again. */
        +netif_stop_queue(dev);
        +SONIC_WRITE(SONIC_CMD, SONIC_CR_TXP);
        +}
    }

    /* bus retry */
    @@ -392,107 +429,164 @@
    /* ... to help debug DMA problems causing endless interrupts. */
    /* Bounce the eth interface to turn on the interrupt again. */
    SONIC_WRITE(SONIC_IMR, 0);
    -SONIC_WRITE(SONIC_ISR, SONIC_INT_BR); /* clear the interrupt */
    }

    /* load CAM done */
    -if (status & SONIC_INT_LCD)
    -SONIC_WRITE(SONIC_ISR, SONIC_INT_LCD); /* clear the interrupt */
    -} while((status = SONIC_READ(SONIC_ISR) & SONIC_IMR_DEFAULT));
    +status = SONIC_READ(SONIC_ISR) & SONIC_IMR_DEFAULT;
    +} while (status);
    +
    +spin_unlock_irqrestore(&lp->lock, flags);
    +
    return IRQ_HANDLED;
    }

    +/* Return the array index corresponding to a given Receive Buffer pointer. */
    +static int index_from_addr(struct sonic_local *lp, dma_addr_t addr,
        +unsigned int last)
    +{
        unsigned int i = last;
        +
        +do {
            +i = (i + 1) & SONIC_RRS_MASK;
        

if (addr == lp->rx_laddr[i])
+ return i;
+ } while (i != last);
+
+ return -ENOENT;
+
+
+ /* Allocate a new skb to be used as a receive buffer. */
+ static bool sonic_alloc_rb(struct net_device *dev, struct sonic_local *lp,
+   struct sk_buff **new_skb, dma_addr_t *new_addr)
+ {
+   *new_skb = netdev_alloc_skb(dev, SONIC_RBSIZE + 2);
+   if (!*new_skb)
+     return false;
+   
+   if (SONIC_BUS_SCALE(lp->dma_bitmode) == 2)
+     skb_reserve(*new_skb, 2);
+   *new_addr = dma_map_single(lp->device, skb_put(*new_skb, SONIC_RBSIZE),
+     SONIC_RBSIZE, DMA_FROM_DEVICE);
+   if (!*new_addr) {
+     dev_kfree_skb(*new_skb);
+     *new_skb = NULL;
+     return false;
+   }
+   
+   return true;
+ }
+
+ /* Place a new receive resource in the Receive Resource Area and update RWP. */
+ static void sonic_update_rra(struct net_device *dev, struct sonic_local *lp,
+   dma_addr_t old_addr, dma_addr_t new_addr)
+ {
+   unsigned int entry = sonic_rr_entry(dev, SONIC_READ(SONIC_RWP));
+   unsigned int end = sonic_rr_entry(dev, SONIC_READ(SONIC_RRP));
+   u32 buf;
+   
+   do {
+     buf = (sonic_rra_get(dev, entry, SONIC_RR_BUFADR_H) << 16) |
+       sonic_rra_get(dev, entry, SONIC_RR_BUFADR_L);
+     
+     if (buf == old_addr)
+       break;
+     
+     entry = (entry + 1) & SONIC_RRS_MASK;
while (entry != end);
+
+WARN_ONCE(buf != old_addr, "failed to find resource!\n");
+
+sonic_rra_put(dev, entry, SONIC_RR_BUFADR_H, new_addr >> 16);
+sonic_rra_put(dev, entry, SONIC_RR_BUFADR_L, new_addr & 0xffff);
+
+entry = (entry + 1) & SONIC_RRS_MASK;
+
+SONIC_WRITE(SONIC_RWP, sonic_rr_addr(dev, entry));
+
/*
 * We have a good packet(s), pass it/them up the network stack.
 */
static void sonic_rx(struct net_device *dev)
{
    struct sonic_local *lp = netdev_priv(dev);
    int entry = lp->cur_rx;
    int status;

    /* If the RD has LPKT set, the chip has finished with the RB */
    if ((status & SONIC_RCR_PRX) && (status & SONIC_RCR_LPKT)) {
        struct sk_buff *new_skb;
        dma_addr_t new_laddr;
        u16 bufadr_h;
        u16 bufadr_l;
        int pkt_len =

        status = sonic_rda_get(dev, entry, SONIC_RD_STATUS);

        if (status & SONIC_RCR_PRX) {
            /* Malloc up new buffer. */
            struct sk_buff *new_skb = netdev_alloc_skb(dev, SONIC_RBSIZE + 2);

            if (new_skb == NULL) {

                lp->stats.rx_dropped++;

                status = sonic_rda_get(dev, entry, SONIC_RD_STATUS);

            }

            /* If the RD has LPKT set, the chip has finished with the RB */
            if ((status & SONIC_RCR_PRX) && (status & SONIC_RCR_LPKT)) {
                struct sk_buff *new_skb;
                dma_addr_t new_laddr;

                u32 addr = (sonic_rda_get(dev, entry,
                SONIC_RD_PKTPTAGR_H) << 16)

                sonic_rda_get(dev, entry, SONIC_RD_PKTPTADR_L);
if (i < 0) {
  WARN_ONCE(1, "failed to find buffer\n");
  break;
}
/* provide 16 byte IP header alignment unless DMA requires otherwise */
if (SONIC_BUS_SCALE(lp->dma_bitmode) == 2)
  skb_reserve(new_skb, 2);
-
  new_laddr = dma_map_single(lp->device, skb_put(new_skb, SONIC_RBSIZE),
                               SONIC_RBSIZE, DMA_FROM_DEVICE);
-
  if (!new_laddr) {
    dev_kfree_skb(new_skb);
    printk(KERN_ERR "%s: Failed to map rx buffer, dropping packet\n", dev->name);
    +
    if (sonic_alloc_rb(dev, lp, &new_skb, &new_laddr)) {
      struct sk_buff *used_skb = lp->rx_skb[i];
      int pkt_len;
      +
      /* Pass the used buffer up the stack */
      +dma_unmap_single(lp->device, addr, SONIC_RBSIZE,
                        DMA_FROM_DEVICE);
      +
      +pkt_len = sonic_rda_get(dev, entry,
                                SONIC_RD_PKTLEN);
      +skb_trim(used_skb, pkt_len);
      +used_skb->protocol = eth_type_trans(used_skb,
                                           dev);
      +netif_rx(used_skb);
      +lp->stats.rx_packets++;
      +lp->stats.rx_bytes += pkt_len;
      +
      +lp->rx_skb[i] = new_skb;
      +lp->rx_laddr[i] = new_laddr;
      +} else {
        /* Failed to obtain a new buffer so re-use it */
        +new_laddr = addr;
        lp->stats.rx_dropped++;
        -break;
        }
-
    /* now we have a new skb to replace it, pass the used one up the stack */
    -dma_unmap_single(lp->device, lp->rx_laddr[entry], SONIC_RBSIZE, DMA_FROM_DEVICE);
    -used_skb = lp->rx_skb[entry];
    -pkt_len = sonic_rda_get(dev, entry, SONIC_RD_PKTLEN);
    -skb_trim(used_skb, pkt_len);
    -used_skb->protocol = eth_type_trans(used_skb, dev);
    -netif_rx(used_skb);
    -lp->stats.rx_packets++;
-lp->stats.rx_bytes += pkt_len;
-
-/* and insert the new skb */
-lp->rx_laddr[entry] = new_laddr;
-lp->rx_skb[entry] = new_skb;
-
-bufadr_l = (unsigned long)new_laddr & 0xffff;
-bufadr_h = (unsigned long)new_laddr >> 16;
-sonic_rra_put(dev, entry, SONIC_RR_BUFADR_L, bufadr_l);
-sonic_rra_put(dev, entry, SONIC_RR_BUFADR_H, bufadr_h);
-} else {
-/* This should only happen, if we enable accepting broken packets. */
-lp->stats.rx_errors++;
-if (status & SONIC_RCR_FAER)
-lp->stats.rx_frame_errors++;  
-if (status & SONIC_RCR_CRCR)
-lp->stats.rx_crc_errors++;  
-}
-if (status & SONIC_RCR_LPKT) {
-/*
- * this was the last packet out of the current receive buffer
- * give the buffer back to the SONIC
-*/
-/* If RBE is already asserted when RWP advances then
- * it's safe to clear RBE after processing this packet.
-*/
-lp->cur_rwp += SIZEOF_SONIC_RR * SONIC_BUS_SCALE(lp->dma_bitmode);
-if (lp->cur_rwp >= lp->rra_end) lp->cur_rwp = lp->rra_laddr & 0xffff;
-SONIC_WRITE(SONIC_RWP, lp->cur_rwp);
-if (SONIC_READ(SONIC_ISR) & SONIC_INT_RBE) {
-    if (sonic_debug > 2)
-        printk("%s: rx buffer exhausted\n", dev->name);
-    SONIC_WRITE(SONIC_ISR, SONIC_INT_RBE); /* clear the flag */
-   }
-}
-sonic_rda_put(dev, entry, SONIC_RD_LINK,
-sonic_rda_get(dev, entry, SONIC_RD_LINK) | SONIC_EOL);
+sonic_update_rra(dev, lp, addr, new_laddr);
+}
/*
 * give back the descriptor
 */
-sonic_rda_put(dev, entry, SONIC_RD_LINK,
-sonic_rda_get(dev, entry, SONIC_RD_LINK) | SONIC_EOL);
+sonic_rda_put(dev, entry, SONIC_RD_STATUS, 0);
sonic_rda_put(dev, entry, SONIC_RD_IN_USE, 1);
-sonic_rda_put(dev, lp->eol_rx, SONIC_RD_LINK,
-sonic_rda_get(dev, lp->eol_rx, SONIC_RD_LINK) & ~SONIC_EOL);
-lp->eol_rx = entry;
-lp->cur_rx = entry = (entry + 1) & SONIC_RDS_MASK;
+
+prev_entry = entry;
+entry = (entry + 1) & SONIC_RDS_MASK;
+
+}
+
+lp->cur_rx = entry;
+
+if (prev_entry != lp->eol_rx) {
+/* Advance the EOL flag to put descriptors back into service */
+sonic_rda_put(dev, prev_entry, SONIC_RD_LINK, SONIC_EOL |
+   sonic_rda_get(dev, prev_entry, SONIC_RD_LINK));
+sonic_rda_put(dev, lp->eol_rx, SONIC_RD_LINK, ~SONIC_EOL &
+   sonic_rda_get(dev, lp->eol_rx, SONIC_RD_LINK));
+lp->eol_rx = prev_entry;
+}
+
+if (rbe)
+SONIC_WRITE(SONIC_ISR, SONIC_INT_RBE);
+
/*
 * If any worth-while packets have been received, netif_rx()
 * has done a mark_bh(NET_BH) for us and will work on them
@@ -542,6 +636,8 @@
 (netdev_mc_count(dev) > 15)) {
 rcr |= SONIC_RCR_AMC;
 } else {
+unsigned long flags;
+
 if (sonic_debug > 2)
 printk("sonic_multicast_list: mc_count %d\n",
         netdev_mc_count(dev));
@@ -556,9 +652,14 @@
i++;
 }
SONIC_WRITE(SONIC_CDC, 16);
-/!* issue Load CAM command */
SONIC_WRITE(SONIC_CDP, lp->cda_laddr & 0xffff);
+
+/!* LCAM and TXP commands can't be used simultaneously */
+spin_lock_irqsave(&lp->lock, flags);
+sonic_quiesce(dev, SONIC_CR_TXP);
+SONIC_WRITE(SONIC_CMD, SONIC_CR_LCAM);
+sonic_quiesce(dev, SONIC_CR_LCAM);
+spin_unlock_irqrestore(&lp->lock, flags);
}
}
static int sonic_init(struct net_device *dev)
{
    unsigned int cmd;
    struct sonic_local *lp = netdev_priv(dev);
    int i;

    SONIC_WRITE(SONIC_ISR, 0x7fff);
    SONIC_WRITE(SONIC_CMD, SONIC_CR_RST);

    /* While in reset mode, clear CAM Enable register */
    SONIC_WRITE(SONIC_CE, 0);
    +
    /*
     * clear software reset flag, disable receiver, clear and
     * enable interrupts, then completely initialize the SONIC
     */
    SONIC_WRITE(SONIC_CMD, 0);
    -SONIC_WRITE(SONIC_CMD, SONIC_CR_RXDIS);
    +sonic_quiesce(dev, SONIC_CR_ALL);

    /* initialize the receive resource area */
    SONIC_WRITE(SONIC_RSA, sonic_rr_addr(dev, 0));
    SONIC_WRITE(SONIC_REA, sonic_rr_addr(dev, SONIC_NUM_RRS));
    SONIC_WRITE(SONIC_RRP, sonic_rr_addr(dev, 0));
    SONIC_WRITE(SONIC_RWP, sonic_rr_addr(dev, SONIC_NUM_RRS - 1));
    SONIC_WRITE(SONIC_URRA, lp->rra_laddr >> 16);
    SONIC_WRITE(SONIC_EOBC, (SONIC_RBSIZE >> 1) - (lp->dma_bitmode ? 2 : 1));

    printk("sonic_init: issuing RRRA command\n");

    /* initialize all RRA registers */
    -lp->rra_end = (lp->rra_laddr + SONIC_NUM_RRS * SIZEOF_SONIC_RR *
        -SONIC_BUS_SCALE(lp->dma_bitmode)) & 0xffff;
    -lp->cur_rwp = (lp->rra_laddr + (SONIC_NUM_RRS - 1) * SIZEOF_SONIC_RR *
        -SONIC_BUS_SCALE(lp->dma_bitmode)) & 0xffff;
    -
    -SONIC_WRITE(SONIC_RSA, lp->rra_laddr & 0xffff);
    -SONIC_WRITE(SONIC_REA, lp->rra_end);
    -SONIC_WRITE(SONIC_RRP, lp->rra_laddr & 0xffff);
    -SONIC_WRITE(SONIC_RWP, lp->cur_rwp);
    +SONIC_WRITE(SONIC_RSA, sonic_rr_addr(dev, 0));
    +SONIC_WRITE(SONIC_REA, sonic_rr_addr(dev, SONIC_NUM_RRS));
    +SONIC_WRITE(SONIC_RRP, sonic_rr_addr(dev, 0));
    +SONIC_WRITE(SONIC_RWP, sonic_rr_addr(dev, SONIC_NUM_RRS - 1));
    SONIC_WRITE(SONIC_URRA, lp->rra_laddr >> 16);
    SONIC_WRITE(SONIC_EOBC, (SONIC_RBSIZE >> 1) - (lp->dma_bitmode ? 2 : 1));

    printk("sonic_init: issuing RRRA command\n");
SONIC_WRITE(SONIC_CMD, SONIC_CR_RRRA);
-i = 0;
-while (i++ < 100) {
-if (SONIC_READ(SONIC_CMD) & SONIC_CR_RRRA)
-break;
-}
-
-if (sonic_debug > 2)
-printk("sonic_init: status=%x i=%d\n", SONIC_READ(SONIC_CMD), i);
+sonic_quiesce(dev, SONIC_CR_RRRA);

/*
 * Initialize the receive descriptors so that they
 * load the CAM
 */
SONIC_WRITE(SONIC_CMD, SONIC_CR_LCAM);
-
-i = 0;
-while (i++ < 100) {
-if (SONIC_READ(SONIC_ISR) & SONIC_INT_LCD)
-break;
-}
-if (sonic_debug > 2) {
-printk("sonic_init: CMD=%x, ISR=%x\n, i=%d",
 - SONIC_READ(SONIC_CMD), SONIC_READ(SONIC_ISR), i);
-}
+sonic_quiesce(dev, SONIC_CR_LCAM);

/*
 * enable receiver, disable loopback
 * and enable all interrupts
 */
-SONIC_WRITE(SONIC_CMD, SONIC_CR_RXEN | SONIC_CR_STP);
SONIC_WRITE(SONIC_RCR, SONIC_RCR_DEFAULT);
SONIC_WRITE(SONIC_TCR, SONIC_TCR_DEFAULT);
SONIC_WRITE(SONIC_ISR, 0x7fff);
SONIC_WRITE(SONIC_IMR, SONIC_IMR_DEFAULT);
-
-cmd = SONIC_READ(SONIC_CMD);
-if ($(cmd & SONIC_CR_RXEN) == 0 || (cmd & SONIC_CR_STP) == 0)
-printk(KERN_ERR "sonic_init: failed, status=%x\n", cmd);
+SONIC_WRITE(SONIC_CMD, SONIC_CR_RXEN);

if (sonic_debug > 2)
printk("sonic_init: new status=%x\n",
--- linux-4.15.0.orig/drivers/net/ethernet/natsemi/sonic.h
#define SONIC_CR_TXP 0x0002
#define SONIC_CR_HTX 0x0001
+#define SONIC_CR_ALL (SONIC_CR_LCAM | SONIC_CR_RRRA | \ 
+ SONIC_CR_RXEN | SONIC_CR_TXP)
+
/*
 * SONIC data configuration bits
 */
@@ -175,6 +178,7 @@
#define SONIC_TCR_NCRS 0x0100
#define SONIC_TCR_CRLS 0x0080
#define SONIC_TCR_EXC 0x0040
+#define SONIC_TCR_OWC 0x0020
#define SONIC_TCR_PMB 0x0008
#define SONIC_TCR_FU 0x0004
#define SONIC_TCR_BCM 0x0002
@@ -274,8 +278,9 @@
#define SONIC_NUM_RDS SONIC_NUM_RRS /* number of receive descriptors */
#define SONIC_NUM_TDS 16 /* number of transmit descriptors */

-#define SONIC_RDS_MASK (SONIC_NUM_RDS-1)
-#define SONIC_TDS_MASK (SONIC_NUM_TDS-1)
+#define SONIC_RRS_MASK  (SONIC_NUM_RRS - 1)
+#define SONIC_RDS_MASK  (SONIC_NUM_RDS - 1)
+#define SONIC_TDS_MASK  (SONIC_NUM_TDS - 1)

#define SONIC_RBSIZE1520 /* size of one resource buffer */
@@ -312,6 +317,7 @@
u32 rda_laddr; /* logical DMA address of RDA */
dma_addr_t rx_laddr[SONIC_NUM_RRS]; /* logical DMA addresses of rx skbuffs */
dma_addr_t tx_laddr[SONIC_NUM_TDS]; /* logical DMA addresses of tx skbuffs */
-unsigned int rra_end;
-unsigned int cur_rwp;
unsigned int cur_rx;
unsigned int cur_tx;  /* first unacked transmit packet */
unsigned int eol_rx;
@@ -321,6 +324,7 @@
unsigned int next_tx; /* next free TD */
struct device *device; /* generic device */
struct net_device_stats stats;
+spinlock_t lock;
};

#define TX_TIMEOUT (3 * HZ)
as far as we can tell. */
/* OpenBSD calls this "SWO". I'd like to think that sonic_buf_put()
    is a much better name. */
-static inline void sonic_buf_put(void* base, int bitmode,
  int offset, __u16 val)
{
  if (bitmode)
    #ifdef __BIG_ENDIAN
    -((__u16 *) base + (offset*2))[1] = val;
    +__raw_writew(val, base + (offset * 2) + 1);
    #else
    -((__u16 *) base + (offset*2))[0] = val;
    +__raw_writew(val, base + (offset * 2) + 0);
    #endif
  else
    - ((__u16 *) base)[offset] = val;
    +__raw_writew(val, base + (offset * 1) + 0);
}

-static inline __u16 sonic_buf_get(void* base, int bitmode,
  int offset)
{
  if (bitmode)
    #ifdef __BIG_ENDIAN
    -return ((volatile __u16 *) base + (offset*2))[1];
    +__raw_readw(base + (offset * 2) + 1);
    #else
    -return ((volatile __u16 *) base + (offset*2))[0];
    +__raw_readw(base + (offset * 2) + 0);
    #endif
  else
    -return ((__u16 *) base)[offset];
    +__raw_readw(base + (offset * 1) + 0);
}

/* Inlines that you should actually use for reading/writing DMA buffers */
@@ -445,6 +449,22 @@
    (entry * SIZEOF_SONIC_RR) + offset);
}

+static inline u16 sonic_rr_addr(struct net_device *dev, int entry)
+{
+    struct sonic_local *lp = netdev_priv(dev);
+    +return lp->rra_laddr +

+       entry * SIZEOF_SONIC_RR * SONIC_BUS_SCALE(lp->dma_bitmode);
+}
+}
+static inline u16 sonic_rr_entry(struct net_device *dev, u16 addr)
+{
+struct sonic_local *lp = netdev_priv(dev);
+
+return (addr - (u16)lp->rra_laddr) / (SIZEOF_SONIC_RR *
+     SONIC_BUS_SCALE(lp->dma_bitmode));
+}
+
+static const char version[] =
+    "sonic.c:v0.92 20.9.98 tsbogend@alpha.franken.de\n";

--- linux-4.15.0.orig/drivers/net/ethernet/natsemi/xtsonic.c
+++ linux-4.15.0/drivers/net/ethernet/natsemi/xtsonic.c
@@ -274,14 +274,17 @@
if ((err = sonic_probe1(dev)))
    goto out;
if ((err = register_netdev(dev)))
-    goto out1;
+    goto undo_probe1;
printk("%s: SONIC ethernet @%08lx, MAC %pM, IRQ %d\n", dev->name,
    dev->base_addr, dev->dev_addr, dev->irq);
return 0;

-out1:
+undo_probe1:
+dma_free_coherent(lp->device,
+ SIZEOF_SONIC_DESC * SONIC_BUS_SCALE(lp->dma_bitmode),
+ lp->descriptors, lp->descriptors_laddr);
release_region(dev->base_addr, SONIC_MEM_SIZE);
out:
free_netdev(dev);
--- linux-4.15.0.orig/drivers/net/ethernet/neterion/s2io.c
+++ linux-4.15.0/drivers/net/ethernet/neterion/s2io.c
@@ -8569,7 +8569,7 @@
return;
}
-       if (s2io_set_mac_addr(netdev, netdev->dev_addr) == FAILURE) {
+       if (do_s2io_prog_unicast(netdev, netdev->dev_addr) == FAILURE) {
       s2io_card_down(sp);
       pr_err("Can't restore mac addr after reset.\n");
       return;
--- linux-4.15.0.orig/drivers/net/ethernet/neterion/vxge/vxge-config.c

--- linux-4.15.0.orig/drivers/net/ethernet/neterion/vxge/vxge-config.c
+++ linux-4.15.0/drivers/net/ethernet/neterion/vxge/vxge-config.c
+++ linux-4.15.0/drivers/net/ethernet/neterion/vxge/vxge-config.c
@@ -808,7 +808,7 @@
    struct vxge_hw_device_date *fw_date = &hw_info->fw_date;
    struct vxge_hw_device_version *flash_version = &hw_info->flash_version;
    struct vxge_hw_device_date *flash_date = &hw_info->flash_date;
-    u64 data0, data1 = 0, steer_ctrl = 0;
+    u64 data0 = 0, data1 = 0, steer_ctrl = 0;
    enum vxge_hw_status status;

    status = vxge_hw_vpath_fw_api(vpath,
@@ -2380,6 +2380,7 @@
        dma_object->addr))) {
    vxge_os_dma_free(devh->pdev, memblock,
        &dma_object->acc_handle);
    memblock = NULL;
    status = VXGE_HW_ERR_OUT_OF_MEMORY;
    goto exit;
    }
--- linux-4.15.0.orig/drivers/net/ethernet/neterion/vxge/vxge-config.h
+++ linux-4.15.0/drivers/net/ethernet/neterion/vxge/vxge-config.h
@@ -2065,7 +2065,7 @@
        if ((level >= VXGE_ERR && VXGE_COMPONENT_LL & VXGE_DEBUG_ERR_MASK) ||
           (level >= VXGE_TRACE && VXGE_COMPONENT_LL & VXGE_DEBUG_TRACE_MASK))
        if ((mask & VXGE_DEBUG_MASK) == mask)
-            printk(fmt "\n", __VA_ARGS__);       
+            printk(fmt "\n", ##__VA_ARGS__);       
        } while (0)
    #else
    #define vxge_debug_ll(level, mask, fmt, ...)
--- linux-4.15.0.orig/drivers/net/ethernet/neterion/vxge/vxge-main.c
+++ linux-4.15.0/drivers/net/ethernet/neterion/vxge/vxge-main.c
@@ -3529,13 +3529,13 @@
    kfree(vdev->vpaths);

    /* we are safe to free it now */
-    free_netdev(dev);
+    free_netdev(dev);

    vxge_debug_init(vdev->level_trace, "%s: ethernet device unregistered",
    buf);
    vxge_debug_entryexit(vdev->level_trace,"%s: %s%d Exiting...", buf,
        __func__, __LINE__);    
+    /* we are safe to free it now */
+    free_netdev(dev);
    }
*/
return ret;
}

#define VXGE_PXE_FIRMWARE "vxge/X3fw-pxe.ncf"
#define VXGE_FIRMWARE "vxge/X3fw.ncf"

static int vxge_probe_fw_update(struct vxgedev *vdev)
{
    u32 maj, min, bld;
    ret = vxge_fw_upgrade(vdev, fw_name, 0);
    /* -EINVAL and -ENOENT are not fatal errors for flashing firmware on */
    module_init(vxge_starter);
    module_exit(vxge_closer);
+MODULE_FIRMWARE(VXGE_PXE_FIRMWARE);
+MODULE_FIRMWARE(VXGE_FIRMWARE);
--- linux-4.15.0.orig/drivers/net/ethernet/neterion/vxge/vxge-main.h
+++ linux-4.15.0/drivers/net/ethernet/neterion/vxge/vxge-main.h
@@ -452,49 +452,49 @@

#if (VXGE_DEBUG_LL_CONFIG & VXGE_DEBUG_MASK)
    #define vxge_debug_ll_config(level, fmt, ...) \
        -vxge_debug_ll(level, VXGE_DEBUG_LL_CONFIG, fmt, __VA_ARGS__)
    #define vxge_debug_ll_config(level, fmt, ...) \
        +vxge_debug_ll(level, VXGE_DEBUG_LL_CONFIG, fmt, ##__VA_ARGS__)
#else
    #define vxge_debug_ll_config(level, fmt, ...)
#endif

#if (VXGE_DEBUG_INIT & VXGE_DEBUG_MASK)
    #define vxge_debug_init(level, fmt, ...) \
        -vxge_debug_init(level, VXGE_DEBUG_INIT, fmt, __VA_ARGS__)
    #define vxge_debug_init(level, fmt, ...) \
        +vxge_debug_init(level, VXGE_DEBUG_INIT, fmt, ##__ VA_ARGS__)
#else
    #define vxge_debug_init(level, fmt, ...)
#endif
#if (VXGE_DEBUG_TX & VXGE_DEBUG_MASK)
#define vxge_debug_tx(level, fmt, ...) \
-vxge_debug_ll(level, VXGE_DEBUG_TX, fmt, __VA_ARGS__) \
+vxge_debug_ll(level, VXGE_DEBUG_TX, fmt, ##__VA_ARGS__) 
#else
#define vxge_debug_tx(level, fmt, ...)
#endif

#if (VXGE_DEBUG_RX & VXGE_DEBUG_MASK)
#define vxge_debug_rx(level, fmt, ...) \
-vxge_debug_ll(level, VXGE_DEBUG_RX, fmt, __VA_ARGS__) \
+vxge_debug_ll(level, VXGE_DEBUG_RX, fmt, ##__VA_ARGS__) 
#else
#define vxge_debug_rx(level, fmt, ...)
#endif

#if (VXGE_DEBUG_MEM & VXGE_DEBUG_MASK)
#define vxge_debug_mem(level, fmt, ...) \
-vxge_debug_ll(level, VXGE_DEBUG_MEM, fmt, __VA_ARGS__) \
+vxge_debug_ll(level, VXGE_DEBUG_MEM, fmt, ##__VA_ARGS__) 
#else
#define vxge_debug_mem(level, fmt, ...)
#endif

#if (VXGE_DEBUG_ENTRYEXIT & VXGE_DEBUG_MASK)
#define vxge_debug_entryexit(level, fmt, ...) \
-vxge_debug_ll(level, VXGE_DEBUG_ENTRYEXIT, fmt, __VA_ARGS__) \
+vxge_debug_ll(level, VXGE_DEBUG_ENTRYEXIT, fmt, ##__VA_ARGS__) 
#else
#define vxge_debug_entryexit(level, fmt, ...)
#endif

#if (VXGE_DEBUG_INTR & VXGE_DEBUG_MASK)
#define vxge_debug_intr(level, fmt, ...) \
-vxge_debug_ll(level, VXGE_DEBUG_INTR, fmt, __VA_ARGS__) \
+vxge_debug_ll(level, VXGE_DEBUG_INTR, fmt, ##__VA_ARGS__) 
#else
#define vxge_debug_intr(level, fmt, ...)
#endif

--- linux-4.15.0.orig/drivers/net/ethernet/neterion/vxge/vxge-traffic.c
+++ linux-4.15.0/drivers/net/ethernet/neterion/vxge/vxge-traffic.c
@@ -29,8 +29,6 @@
*/
enum vxge_hw_status vxge_hw_vpath_intr_enable(struct __vxge_hw_vpath_handle *vp)
 {
 -u64 val64;
 -
 struct __vxge_hw_virtualpath *vpath;

---
struct vxge_hw_vpath_reg __iomem *vp_reg;
enum vxge_hw_status status = VXGE_HW_OK;
@@ -83,7 +81,7 @@
 __vxge_hw_pio_mem_write32_upper((u32)VXGE_HW_INTR_MASK_ALL,
 &vp_reg->xgmac_vp_int_status);

-val64 = readq(&vp_reg->vpath_general_int_status);
+readq(&vp_reg->vpath_general_int_status);

 /**< Mask unwanted interrupts */

 @ @ -156,8 +154,6 @@
 enum vxge_hw_status vxge_hw_vpath_intr_disable(
 struct __vxge_hw_vpath_handle *vp)
 {
 -u64 val64;
-struct __vxge_hw_virtualpath *vpath;
 enum vxge_hw_status status = VXGE_HW_OK;
 struct vxge_hw_vpath_reg __iomem *vp_reg;
-@@ -178,8 +174,6 @@
 (u32)VXGE_HW_INTR_MASK_ALL,
 &vp_reg->vpath_general_int_mask);

-val64 = VXGE_HW_TIM_CLR_INT_EN_VP(1 << (16 - vpath->vp_id));
-
-writeq(VXGE_HW_INTR_MASK_ALL, &vp_reg->kdfcctl_errors_mask);

 __vxge_hw_pio_mem_write32 UPPER((u32)VXGE_HW_INTR_MASK_ALL,
@@ -486,9 +480,7 @@
 */
 void vxge_hw_device_flush_io(struct __vxge_hw_device *hldev)
 {
 -u32 val32;
-
 -val32 = readl(&hldev->common_reg->titan_general_int_status);
+readl(&hldev->common_reg->titan_general_int_status);
 }

 /**
@@ -1726,8 +1718,8 @@
 enum vxge_hw_status
 vxge_hw_vpath_mac_addr_add(
 struct __vxge_hw_vpath_handle *vp,
-@ -8 (macaddr))[ETH_ALEN],
-@8 (macaddr_mask)[ETH_ALEN],
+u8 *macaddr,
+u8 *macaddr_mask,
enum vxge_hw_vpath_mac_addr_add_mode duplicate_mode)
{
    u32 i;
    //@ -1789.8 +1781.8 @@
enum vxge_hw_status
vxge_hw_vpath_mac_addr_get(  
    struct __vxge_hw_vpath_handle *vp,
    -u8 (macaddr)[ETH_ALEN],
    -u8 (macaddr_mask)[ETH_ALEN])
    +u8 *macaddr,
    +u8 *macaddr_mask)
{
    u32 i;
    u64 data1 = 0ULL;
    //@ -1841.8 +1833.8 @@
enum vxge_hw_status
vxge_hw_vpath_mac_addr_get_next(  
    struct __vxge_hw_vpath_handle *vp,
    -u8 (macaddr)[ETH_ALEN],
    -u8 (macaddr_mask)[ETH_ALEN])
    +u8 *macaddr,
    +u8 *macaddr_mask)
{
    u32 i;
    u64 data1 = 0ULL;
    //@ -1894.8 +1886.8 @@
enum vxge_hw_status
vxge_hw_vpath_mac_addr_delete(  
    struct __vxge_hw_vpath_handle *vp,
    -u8 (macaddr)[ETH_ALEN],
    -u8 (macaddr_mask)[ETH_ALEN])
    +u8 *macaddr,
    +u8 *macaddr_mask)
{
    u32 i;
    u64 data1 = 0ULL;
    //@ -2385.7 +2377.6 @@
    u8 t_code;
enum vxge_hw_status status = VXGE_HW_OK;
void *first_rxdh;
    -u64 val64 = 0;
int new_count = 0;

ring->cmpl_cnt = 0;
    //@ -2413.8 +2404.7 @@
    }
writeq(VXGE_HW_PRC_RXD_DOORBELL.NEW_QW_CNT(new_count),
&&ring->vp_reg->prc_rxd_doorbell);
val64 =
  - readl(&ring->common_reg->titan_general_int_status);
+readl(&ring->common_reg->titan_general_int_status);
ring->doorbell_cnt = 0;
} }
- meta->skip = true;
- return 0;
-
- wrp_alu_imm(nfp_prog, insn->dst_reg * 2, alu_op, insn->imm);
- wrp_immed(nfp_prog, reg_both(insn->dst_reg * 2 + 1), 0);

@@ -1255,7 +1261,7 @@
 static int xor_imm(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)
 {
- return wrp_alu32_imm(nfp_prog, meta, ALU_OP_XOR, !~meta->insn.imm);
+ return wrp_alu32_imm(nfp_prog, meta, ALU_OP_XOR);
 } static int and_reg(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)
 @ @ -1265,7 +1271,7 @@
 static int and_imm(struct nfp_prog *nfp_prog, struct nfpInsnMeta *meta)  
 {
- return wrp_alu32_imm(nfp_prog, meta, ALU_OP_AND, !~meta->insn.imm);
+ return wrp_alu32_imm(nfp_prog, meta, ALU_OP_AND);
 } static int or_reg(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)
 @ @ -1275,7 +1281,7 @@
 static int or_imm(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)  
 {
- return wrp_alu32_imm(nfp_prog, meta, ALU_OP_OR, !meta->insn.imm);
+ return wrp_alu32_imm(nfp_prog, meta, ALU_OP_OR);
 } static int add_reg(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)
 @ @ -1285,7 +1291,7 @@
 static int add_imm(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)  
 {
- return wrp_alu32_imm(nfp_prog, meta, ALU_OP_ADD, !meta->insn.imm);
+ return wrp_alu32_imm(nfp_prog, meta, ALU_OP_ADD);
 } static int sub_reg(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)
 @ @ -1295,7 +1301,7 @@
 static int sub_imm(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)  
 {
- return wrp_alu32_imm(nfp_prog, meta, ALU_OP_SUB, !meta->insn.imm);
static int neg_reg(struct nfp_prog *nfp_prog, struct nfp_insn_meta *meta)

ret = nfp_net_bpf_offload(nn, prog, running);
/* Stop offload if replace not possible */
-if (ret && prog)
-nfp_bpf_xdp_offload(app, nn, NULL);
+if (ret)
+return ret;

-nn->dp.bpf_offload_xdp = prog && !ret;
+nn->dp.bpf_offload_xdp = !!prog;
return ret;
}

static int nfp_bpf_vnic_alloc(struct nfp_app *app, struct nfp_net *nn, unsigned int id)
{
+struct nfp_pf *pf = app->pf;

int err;

+if (!pf->eth_tbl) {
+nfp_err(pf->cpp, "No ETH table\n");
+return -EINVAL;
+

nn->app_priv = kzalloc(sizeof(struct nfp_bpf_vnic), GFP_KERNEL);
if (!nn->app_priv)
return -ENOMEM;
@@ -152,6 +164,7 @@
    return err;

    bv->tc_prog = cls_bpf->prog;
+   nn->port->tc_offload_cnt = !!bv->tc_prog;
    return 0;

@@ -189,11 +202,6 @@
    }
 }

-static bool nfp_bpf_tc_busy(struct nfp_app *app, struct nfp_net *nn)
-{  
 -return nn->dp.ctrl & NFP_NET_CFG_CTRL_BPF;
 -}
-
 const struct nfp_app_type app_bpf = {
 .id= NFP_APP_BPF_NIC,
 .name= "ebpf",
@@ -204,7 +212,6 @@
 .vnic_free= nfp_bpf_vnic_free,
 .setup_tc= nfp_bpf_setup_tc,
 -.tc_busy= nfp_bpf_tc_busy,
 .xdp_offload= nfp_bpf_xdp_offload,
 .bpf_verifier_prep= nfp_bpf_verifier_prep,
 --- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/flower/action.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/flower/action.c
 @@ -67,8 +67,7 @@
 tmp_push_vlan_tci =
     FIELD_PREP(NFP_FL_PUSH_VLAN_PRIO, tcf_vlan_push_prio(action)) |
     -FIELD_PREP(NFP_FL_PUSH_VLAN_VID, tcf_vlan_push_vid(action)) |
@@ -255,12 +254,14 @@
 switch (off) {
 case offsetof(struct iphdr, daddr):
-   set_ip_addr->ipv4_dst_mask = mask;
+   set_ip_addr->ipv4_dst_mask |= mask;
+   set_ip_addr->ipv4_dst &= ~mask;

set_ip_addr->ipv4_dst |= exact & mask;
break;
case offsetof(struct iphdr, saddr):
  set_ip_addr->ipv4_src_mask = mask;
  set_ip_addr->ipv4_src = exact;
  set_ip_addr->ipv4_src_mask |= mask;
  set_ip_addr->ipv4_src &= ~mask;
  set_ip_addr->ipv4_src |= exact & mask;
break;
default:
  return -EOPNOTSUPP;
@@ -274,11 +275,12 @@

static void
-nfp_fl_set_ip6_helper(int opcode_tag, int idx, __be32 exact, __be32 mask,
+nfp_fl_set_ip6_helper(int opcode_tag, u8 word, __be32 exact, __be32 mask,
   struct nfp_fl_set_ipv6_addr *ip6)
{
  ip6->ipv6[idx % 4].mask = mask;
  ip6->ipv6[idx % 4].exact = exact;
  ip6->ipv6[word].mask |= mask;
  ip6->ipv6[word].exact &= ~mask;
  ip6->ipv6[word].exact |= exact & mask;

  ip6->reserved = cpu_to_be16(0);
  ip6->head.jump_id = opcode_tag;
@@ -291,6 +293,7 @@
  struct nfp_fl_set_ipv6_addr *ip_src)
{
  __be32 exact, mask;
+  u8 word;

  /* We are expecting tcf_pedit to return a big endian value */
  mask = (__force __be32)~tcf_pedit_mask(action, idx);
@@ -299,17 +302,20 @@
  if (exact & ~mask)
    return -EOPNOTSUPP;
-  if (off < offsetof(struct ipv6hdr, saddr))
-    +if (off < offsetof(struct ipv6hdr, saddr))
-      return -EOPNOTSUPP;
-    else if (off < offsetof(struct ipv6hdr, daddr))
-      nfp_fl_set_ip6_helper(NFP_FL_ACTION_OPCODE_SET_IPV6_SRC, idx,
-                            exact, mask, ip_src);
+
+if (off < offsetof(struct ipv6hdr, saddr))
    return -EOPNOTSUPP;
+  else if (off < offsetof(struct ipv6hdr, daddr))
+    nfp_fl_set_ip6_helper(NFP_FL_ACTION_OPCODE_SET_IPV6_SRC, idx,
+                           exact, mask, ip_src);
+  else if (off < offsetof(struct ipv6hdr, daddr))
+    nfp_fl_set_ip6_helper(NFP_FL_ACTION_OPCODE_SET_IPV6_SRC, word,
+                           exact, mask, ip_src);
-else if (off < offsetof(struct ipv6hdr, daddr) +
  sizeof(struct in6_addr))
  nfp_fl_set_ip6_helper(NFP_FL_ACTION_OPCODE_SET_IPV6_DST, idx,
  +) else if (off < offsetof(struct ipv6hdr, daddr) +
  + sizeof(struct in6_addr)) {
    word = (off - offsetof(struct ipv6hdr, daddr)) / sizeof(exact);
  nfp_fl_set_ip6_helper(NFP_FL_ACTION_OPCODE_SET_IPV6_DST, word,
    exact, mask, ip_dst);
-else
  +} else {
    return -EINVAL;
  +}

return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/flower/cmsg.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/flower/cmsg.c
@@ -168,20 +168,11 @@
cmsg_hdr = nfp_flower_cmsg_get_hdr(skb);

-if (unlikely(cmsg_hdr->version != NFP_FLOWER_CMSG_VER1)) {
-  nfp_flower_cmsg_warn(app, "Cannot handle repr control version \%u\n",
-    cmsg_hdr->version);
-  goto out;
-}
-
-  type = cmsg_hdr->type;
-type NFP_FLOWER_CMSG_TYPE_PORT_MOD:
-  nfp_flower_cmsg_portmod_rx(app, skb);
-break;
-  case NFP_FLOWER_CMSG_TYPE_FLOW_STATS:
-    nfp_flower_rx_flow_stats(app, skb);
-    break;
-  case NFP_FLOWER_CMSG_TYPE_NO_NEIGH:
-    nfp_tunnel_request_route(app, skb);
-break;
-  @ @ -217,7 +208,23 @@
-void nfp_flower_cmsg_rx(struct nfp_app *app, struct sk_buff *skb)
-{
  struct nfp_flow_priv *priv = app->priv;
  +struct nfp_flow_cmsg_hdr *cmsg_hdr;

  -skb_queue_tail(&priv->cmsg_skbs, skb);
  -schedule_work(&priv->cmsg_work);
  +cmsg_hdr = nfp_flower_cmsg_get_hdr(skb);
  +
if (unlikely(cmsg_hdr->version != NFP_FLOWER_CMSG_VER1)) {
    nfp_flower_cmsg_warn(app, "Cannot handle repr control version \%u\n",
        cmsg_hdr->version);
    dev_kfree_skb_any(skb);
    return;
}

if (cmsg_hdr->type == NFP_FLOWER_CMSG_TYPE_FLOW_STATS) {
    /* We need to deal with stats updates from HW asap */
    nfp_flower_rx_flow_stats(app, skb);
    dev_consume_skb_any(skb);
} else {
    skb_queue_tail(&priv->cmsg_skbs, skb);
    schedule_work(&priv->cmsg_work);
}
}

#define NFP_FLOWER_LAYER_ARP BIT(4)
#define NFP_FLOWER_MASK_VLAN_PRIO GENMASK(15, 13)
#define NFP_FLOWER_MASK_VLAN_CFI BIT(12)
#define NFP_FLOWER_MASK_VLAN_PRESENT BIT(12)
#define NFP_FLOWER_MASK_VLAN_VID GENMASK(11, 0)
#define NFP_FLOWER_MASK_MPLS_LB GENMASK(31, 12)
#define NFP_FL_OUT_FLAGS_TYPE_IDX GENMASK(2, 0)
#define NFP_FL_PUSH_VLAN_PRIO GENMASK(15, 13)
#define NFP_FL_PUSH_VLAN_CFI BIT(12)
#define NFP_FL_PUSH_VLAN_VID GENMASK(11, 0)

/* Tunnel ports */

repr_type = nfp_flower_repr_get_type_and_port(app, port_id, &port);
+if (repr_type > NFP_REPR_TYPE_MAX)
+return NULL;

reprs = rcu_dereference(app->reprs[repr_type]);
if (!reprs)
@@ -272,7 +274,7 @@}
    SET_NETDEV_DEV(reprs->reprs[phys_port], &priv->nn->pdev->dev);
    -nfp_net_get_mac_addr(app->pf, port);
    +nfp_net_get_mac_addr(app->pf, reprs->reprs[phys_port], port);

cmsg_port_id = nfp_flower_cmsg_phys_port(phys_port);
err = nfp_repr_init(app, reprs->reprs[phys_port],
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/flower/match.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/flower/match.c
@@ -56,14 +56,12 @@
    FLOW_DISSECTOR_KEY_VLAN,
             target);
/* Populate the tci field. */
-    if (flow_vlan->vlan_id) {
-        -tmp_tci = FIELD_PREP(NFP_FLOWER_MASK_VLAN_PRIO,
-                          flow_vlan->vlan_priority) |
-        -FIELD_PREP(NFP_FLOWER_MASK_VLAN_VID,
-                    flow_vlan->vlan_id) |
-        -NFP_FLOWER_MASK_VLAN_CFI;
-        -frame->tci = cpu_to_be16(tmp_tci);
-    }
+    tmp_tci = NFP_FLOWER_MASK_VLAN_PRESENT;
+    tmp_tci |= FIELD_PREP(NFP_FLOWER_MASK_VLAN_PRIO,
+                         flow_vlan->vlan_priority) |
+    FIELD_PREP(NFP_FLOWER_MASK_VLAN_VID,
+               flow_vlan->vlan_id);
+    frame->tci = cpu_to_be16(tmp_tci);
    }
}

@@ -125,6 +123,20 @@
    NFP_FLOWER_MASK_MPLS_Q;

    frame->mpls_lse = cpu_to_be32(t_mpls);
    +} else if (dissector_uses_key(flow->dissector,
    +    FLOW_DISSECTOR_KEY_BASIC)) {
    +/* Check for mpls ether type and set NFP_FLOWER_MASK_MPLS_Q
    + * bit, which indicates an mpls ether type but without any
    + * mpls fields.
```c
+*/
+struct flow_dissector_key_basic *key_basic;
+key_basic = skb_flow_dissector_target(flow->dissector,
   FLOW_DISSECTOR_KEY_BASIC,
   flow->key);
+if (key_basic->n_proto == cpu_to_be16(ETH_P_MPLS_UC) ||
   key_basic->n_proto == cpu_to_be16(ETH_P_MPLS_MC))
+frame->mpls_lse = cpu_to_be32(NFP_FLOWER_MASK_MPLS_Q);
}

--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/flower/offload.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/flower/offload.c
@@ -232,6 +232,14 @@
case cpu_to_be16(ETH_P_ARP):
    return -EOPNOTSUPP;
+case cpu_to_be16(ETH_P_MPLS_UC):
+case cpu_to_be16(ETH_P_MPLS_MC):
+    if (!(key_layer & NFP_FLOWER_LAYER_MAC)) {
+        key_layer |= NFP_FLOWER_LAYER_MAC;
+        key_size += sizeof(struct nfp_flower_mac_mpls);
+    }
+    break;
+    /* Will be included in layer 2. */
    case cpu_to_be16(ETH_P_8021Q):
    break;
@@ -325,6 +333,7 @@
nfp_flower_add_offload(struct nfp_app *app, struct net_device *netdev,
    struct tc_cls_flower_offload *flow, bool egress)
{
+    struct nfp_port *port = nfp_port_from_netdev(netdev);
    struct nfp_flower_priv *priv = app->priv;
    struct nfp_fl_payload *flow_pay;
    struct nfp_fl_key_ls *key_layer;
    INIT_HLIST_NODE(&flow_pay->link);
    flow_pay->tc_flower_cookie = flow->cookie;
    hash_add_rcu(priv->flow_table, &flow_pay->link, flow->cookie);
    +port->tc_offload_cnt++;

    /* Deallocate flow payload when flower rule has been destroyed. */
    kfree(key_layer);
    @ @ -395,6 +405,7 @@
    nfp_flower_del_offload(struct nfp_app *app, struct net_device *netdev,
        struct tc_cls_flower_offload *flow)
```
struct nfp_port *port = nfp_port_from_netdev(netdev);
struct nfp_fl_payload *nfp_flow;
int err;

@@ -416,6 +427,7 @@
terr_free_flow:
hash_del_rcu(&nfp_flow->link);
+port->tc_offload_cnt--;
kfree(nfp_flow->action_data);
kfree(nfp_flow->mask_data);
kfree(nfp_flow->unmasked_data);
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/flower/tunnel_conf.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/flower/tunnel_conf.c
@@ -194,6 +194,7 @@
return;
}
++rcu_read_lock();
for (i = 0; i < count; i++) {
ipv4_addr = payload->tun_info[i].ipv4;
port = be32_to_cpu(payload->tun_info[i].egress_port);
@@ -209,6 +210,7 @@
neigh_event_send(n, NULL);
neigh_release(n);
}
+rcu_read_unlock();
}

static bool nfp_tun_is_netdev_to_offload(struct net_device *netdev)
@@ -317,7 +319,7 @@
payload.dst_ipv4 = flow->daddr;
/* If entry has expired send dst IP with all other fields 0. */
-!if (!(neigh->nud_state & NUD_VALID)) {
+!if (!(neigh->nud_state & NUD_VALID) || neigh->dead) {
nfp_tun_del_route_from_cache(app, payload.dst_ipv4);
/* Trigger ARP to verify invalid neighbour state. */
neigh_event_send(neigh, NULL);
@@ -402,9 +404,10 @@
payload = nfp_flower_cmsg_get_data(skb);

+rcu_read_lock();
netdev = nfp_app_repr_get(app, be32_to_cpu(payload->ingress_port));
if (!netdev)
goto route_fail_warning;

/*
+goto fail_rcu_unlock;

flow.daddr = payload->ipv4_addr;
flow.flowi4_proto = IPPROTO_UDP;
@@ -414,21 +417,23 @@
rt = ip_route_output_key(dev_net(netdev), &flow);
err = PTR_ERR_OR_ZERO(rt);
if (err)
-    goto route_fail_warning;
+    goto fail_rcu_unlock;
#else
-    goto route_fail_warning;
+    goto fail_rcu_unlock;
#endif

/* Get the neighbour entry for the lookup */
n = dst_neigh_lookup(&rt->dst, &flow.daddr);
ip_rt_put(rt);
if (!n)
-    goto route_fail_warning;
-    nfp_tun_write_neigh(n->dev, app, &flow, n, GFP_KERNEL);
+    goto fail_rcu_unlock;
+    nfp_tun_write_neigh(n->dev, app, &flow, n, GFP_ATOMIC);
neigh_release(n);
+rcu_read_unlock();
return;

-route_fail_warning:
+fail_rcu_unlock:
+rcu_read_unlock();
nfp_flower_cmsg_warn(app, "Requested route not found\n");
}

--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_app.h
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_app.h
@@ -84,7 +84,6 @@
* @stop: stop application logic
* @ctrl_msg_rx: control message handler
* @setup_tc: setup TC ndo
- * @tc_busy: TC HW offload busy (rules loaded)
* @xdp_offload: offload an XDP program
* @bpf_verifier_prep: verifier prep for dev-specific BPF programs
* @bpf_translate: translate call for dev-specific BPF programs
@@ -124,7 +123,6 @@
int (*setup_tc)(struct nfp_app *app, struct net_device *netdev,
enum tc_setup_type type, void *type_data);
-boob (*tc_busy)(struct nfp_app *app, struct nfp_net *nn);
int (*xdp_offload)(struct nfp_app *app, struct nfp_net *nn,
     struct bpf_prog *prog);
int (*bpf_verifier_prep)(struct nfp_app *app, struct nfp_net *nn,
@@ -277,13 +275,6 @@
return app && app->type->setup_tc;
}

-static inline bool nfp_app_tc_busy(struct nfp_app *app, struct nfp_net *nn)
-{
-if (!app || !app->type->tc_busy)
-return false;
-return app->type->tc_busy(app, nn);
-}
-
static inline int nfp_app_setup_tc(struct nfp_app *app,
     struct net_device *netdev,
     enum tc_setup_type type, void *type_data)
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_app_nic.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_app_nic.c
@@ -69,7 +69,7 @@
       if (err)
       return err < 0 ? err : 0;
-cnfp_net_get_mac_addr(app->pf, nn->port);
+  tnfp_net_get_mac_addr(app->pf, nn->dp.netdev, nn->port);

return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_devlink.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_devlink.c
@@ -96,6 +96,7 @@
{struct nfp_pf *pf = devlink_priv(devlink);
 struct nfp_eth_table_port eth_port;
+unsigned int lanes;
 int ret;

 if (count < 2)
@@ -114,8 +115,12 @@
goto out;
 }
-cnfp_net_get_mac_addr(app->pf, nn->port);
+  tnfp_net_get_mac_addr(app->pf, nn->dp.netdev, nn->port);

return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_devlink.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_devlink.c
@@ -96,6 +96,7 @@
{struct nfp_pf *pf = devlink_priv(devlink);
 struct nfp_eth_table_port eth_port;
+unsigned int lanes;
 int ret;

 if (count < 2)
@@ -114,8 +115,12 @@
goto out;
 }

-ret = nfp_devlink_set_lanes(pf, eth_port.index,
-eth_port.port_lanes / count);
+/* Special case the 100G CXP -> 2x40G split */
+lanes = eth_port.port_lanes / count;
+if (eth_port.lanes == 10 && count == 2)
+lanes = 8 / count;
+ret = nfp_devlink_set_lanes(pf, eth_port.index, lanes);
out:
mutex_unlock(&pf->lock);

@@ -127,6 +132,7 @@
{
  struct nfp_pf *pf = devlink_priv(devlink);
  struct nfp_eth_table_port eth_port;
+  unsigned int lanes;
  int ret;

  mutex_lock(&pf->lock);
@@ -142,7 +148,12 @@
              goto out;
-	ret = nfp_devlink_set_lanes(pf, eth_port.index, eth_port.port_lanes);
+  /* Special case the 100G CXP -> 2x40G unsplit */
+  lanes = eth_port.port_lanes;
+  if (eth_port.port_lanes == 8)
+    lanes = 10;
+  +
+  ret = nfp_devlink_set_lanes(pf, eth_port.index, lanes);
out:
mutex_unlock(&pf->lock);
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_main.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_main.c
@@ -518,6 +518,7 @@
dev_err(&pdev->dev,
  "Error: %d VFs already enabled, but loaded FW can only support %d\n",
  pf->num_vfs, pf->limit_vfs);
+  err = -EINVAL;
  goto err_fw_unload;
}

--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_main.h
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_main.h
@@ -153,7 +153,9 @@
 int nfp_hwmon_register(struct nfp_pf *pf);
 void nfp_hwmon_unregister(struct nfp_pf *pf);

-void nfp_net_get_mac_addr(struct nfp_pf *pf, struct nfp_port *port);
+void
+nfp_net_get_mac_addr(struct nfp_pf *pf, struct net_device *netdev,
+  struct nfp_port *port);
bool nfp_ctrl_tx(struct nfp_net *nn, struct sk_buff *skb);

--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_net.h
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_net.h
@@ -573,6 +573,7 @@
 * @qcp_cfg:            Pointer to QCP queue used for configuration notification
 * @tx_bar:             Pointer to mapped TX queues
 * @rx_bar:             Pointer to mapped FL/RX queues
+ * @tlv_caps:	Parsed TLV capabilities
 * @debugfs_dir:Device directory in debugfs
 * @vnics_list:Entry on device vNIC list
 * @pdev:Backpointer to PCI device
@@ -639,6 +640,8 @@
 u8 __iomem *tx_bar;
 u8 __iomem *rx_bar;

+struct nfp_net_tlv_caps tlv_caps;
+
struct dentry *debugfs_dir;

struct list_head vnics_list;
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_net_common.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_net_common.c
@@ -227,29 +227,16 @@
 spin_unlock_bh(&nn->reconfig_lock);
 }

//**
- * nfp_net_reconfig() - Reconfigure the firmware
- * @nn:      NFP Net device to reconfigure
- * @update:  The value for the update field in the BAR config
- *
- * Write the update word to the BAR and ping the reconfig queue. The
- * poll until the firmware has acknowledged the update by zeroing the
- * update word.
- *
- * Return: Negative errno on error, 0 on success
- */
-#int nfp_net_reconfig(struct nfp_net *nn, u32 update)
+static void nfp_net_reconfig_sync_enter(struct nfp_net *nn)
{
    bool cancelled_timer = false;
    u32 pre_posted_requests;
    -int ret;

 spin_lock_bh(&nn->reconfig_lock);

 nn->reconfig_sync_present = true;
if (nn->reconfig_timer_active) {
    -del_timer(&nn->reconfig_timer);
    nn->reconfig_timer_active = false;
    cancelled_timer = true;
}

spin_unlock_bh(&(nn->reconfig_lock));

    -if (cancelled_timer)
+    if (cancelled_timer) {
+        -del_timer_sync(&nn->reconfig_timer);
+        nfp_net_reconfig_wait(nn, nn->reconfig_timer.expires);
+    }

/* Run the posted reconfigs which were issued before we started */
if (pre_posted_requests) {
    nfp_net_reconfig_start(nn, pre_posted_requests);
    nfp_net_reconfig_wait(nn, jiffies + HZ * NFP_NET_POLL_TIMEOUT);
}
+
+static void nfp_net_reconfig_wait_posted(struct nfp_net *nn)
+{
+    nfp_net_reconfig_sync_enter(nn);
+    
+    spin_lock_bh(&nn->reconfig_lock);
+    nn->reconfig_sync_present = false;
+    spin_unlock_bh(&nn->reconfig_lock);
+}
+
+/**
+ * nfp_net_reconfig() - Reconfigure the firmware
+ * @nn:      NFP Net device to reconfigure
+ * @update:  The value for the update field in the BAR config
+ *
+ * Write the update word to the BAR and ping the reconfig queue. The
+ * poll until the firmware has acknowledged the update by zeroing the
+ * update word.
+ *
+ * Return: Negative errno on error, 0 on success
+ */
+int nfp_net_reconfig(struct nfp_net *nn, u32 update)
+{
+    int ret;
+
+nfp_net_reconfig_sync_enter(nn);
nfp_net_reconfig_start(nn, update);
ret = nfp_net_reconfig_wait(nn, jiffies + HZ * NFP_NET_POLL_TIMEOUT);
@@ -1071,7 +1087,7 @@
 * Assumes that the device is stopped
 + * Assumes that the device is stopped, must be idempotent.
 */
static void
nfp_net_tx_ring_reset(struct nfp_net_dp *dp, struct nfp_net_tx_ring *tx_ring)
@@ -1273,13 +1289,18 @@
 * Assumes that the device is stopped, must be idempotent.
 */
static void nfp_net_rx_ring_reset(struct nfp_net_rx_ring *rx_ring)
{
unsigned int wr_idx, last_idx;

*/ wr_p == rd_p means ring was never fed FL bufs. RX rings are always
+ * kept at cnt - 1 FL bufs.
 + */
+if (rx_ring->wr_p == 0 && rx_ring->rd_p == 0)
  +return;
  +
 /* Move the empty entry to the end of the list */
 wr_idx = D_IDX(rx_ring, rx_ring->wr_p);
 last_idx = rx_ring->cnt - 1;
@@ -2033,14 +2054,17 @@
 return true;
}

- static void nfp_ctrl_rx(struct nfp_net_r_vector *r_vec)
+ static bool nfp_ctrl_rx(struct nfp_net_r_vector *r_vec)
{ struct nfp_net_rx_ring *rx_ring = r_vec->rx_ring;
  struct nfp_net *nn = r_vec->nfp_net;
  struct nfp_net_dp *dp = &nn->dp;
  unsigned int budget = 512;

-while (nfp_ctrl_rx_one(nn, dp, r_vec, rx_ring))
+while (nfp_ctrl_rx_one(nn, dp, r_vec, rx_ring) && budget--)
continue;
+return budget;
}

static void nfp_ctrl_poll(unsigned long arg)
@@ -2052,9 +2076,13 @@
    __nfp_ctrl_tx_queued(r_vec);
    spin_unlock_bh(&r_vec->lock);

    -nfp_ctrl_rx(r_vec);

    -nfp_net_irq_unmask(r_vec->nfp_net, r_vec->irq_entry);
+if (nfp_ctrl_rx(r_vec)) {
+    nfp_net_irq_unmask(r_vec->nfp_net, r_vec->irq_entry);
+} else {
+    tasklet_schedule(&r_vec->tasklet);
+    nn_dp_warn(&r_vec->nfp_net->dp,
+             "control message budget exceeded!\n");
+}
}

/* Setup and Configuration
@@ -2137,9 +2165,13 @@
    tx_ring->size = sizeof(*tx_ring->txds) * tx_ring->cnt;
    tx_ring->txds = dma_zalloc_coherent(dp->dev, tx_ring->size,
        &tx_ring->dma, GFP_KERNEL);
    -if (!tx_ring->txds)
    -if (!tx_ring->txds)
+if (!tx_ring->txds) {
+    &tx_ring->dma,
+    GFP_KERNEL | __GFP_NOWARN);
+if (!tx_ring->txds) {
+    netdev_warn(dp->netdev, "failed to allocate TX descriptor ring memory, requested descriptor count: %d, consider
+    lowering descriptor count\n");
+    tx_ring->cnt);
    goto err_alloc;
+}

    sz = sizeof(*tx_ring->txbufs) * tx_ring->cnt;
    tx_ring->txbufs = kzalloc(sz, GFP_KERNEL);
@@ -2282,9 +2314,13 @@
    rx_ring->cnt = dp->rxd_cnt;
    rx_ring->size = sizeof(*rx_ring->rxds) * rx_ring->cnt;
    rx_ring->rxds = dma_zalloc_coherent(dp->dev, rx_ring->size,
        &rx_ring->dma, GFP_KERNEL);
    -if (!rx_ring->rxds)
    -if (!rx_ring->rxds)
+if (!rx_ring->rxds) {
+    &rx_ring->dma,
+    GFP_KERNEL | __GFP_NOWARN);
+if (!rx_ring->rxds) {


netdev_warn(dp->netdev, "failed to allocate RX descriptor ring memory, requested descriptor count: %d, consider lowering descriptor count\n",
+   rx_ring->cnt);
goto err_alloc;
+
sz = sizeof(*rx_ring->rxbufs) * rx_ring->cnt;
rx_ring->rxbufs = kzalloc(sz, GFP_KERNEL);
@@ -2441,7 +2477,7 @@
/* ME timestamp ticks. There are 16 ME clock cycles for each timestamp
 * count.
 */
-factor = nn->me_freq_mhz / 16;
+factor = nn->tlv_caps.me_freq_mhz / 16;

/* copy RX interrupt coalesce parameters */
value = (nn->rx_coalesce_max_frames << 16) |
@@ -2485,6 +2521,8 @@
/**
 * nfp_net_clear_config_and_disable() - Clear control BAR and disable NFP
 * @nn:      NFP Net device to reconfigure
+ *
+ * Warning: must be fully idempotent.
 */
static void nfp_net_clear_config_and_disable(struct nfp_net *nn)
{
  new_ctrl &= ~NFP_NET_CFG_CTRL_GATHER;
}

-if (changed & NETIF_F_HW_TC && nfp_app_tc_busy(nn->app, nn)) {
-  nn_err(nn, "Cannot disable HW TC offload while in use\n");
-  return -EBUSY;
-}
+err = nfp_port_set_features(netdev, features);
+if (err)
+  return err;
+nn_dbg(nn, "Feature change 0x%llx -> 0x%llx (changed=0x%llx)\n",
   netdev->features, features, changed);
@@ -3563,6 +3600,7 @@

}/

# vim: syntax=ada autoindent:

ASSERTIONS

WARN_ON(timer_pending(&nn->reconfig_timer) || nn->reconfig_posted);
if (nn->xdp_prog)
bpf_prog_put(nn->xdp_prog);
netdev->features = netdev->hw_features;

-if (nfp_app_has_tc(nn->app))
+if (nfp_app_has_tc(nn->app) && nn->port)
netdev->hw_features |= NETIF_F_HW_TC;

/* Advertise but disable TSO by default. */
@@ -3800,6 +3838,11 @@
nn->dp.ctrl |= NFP_NET_CFG_CTRL_IRQMOD;
 }

+err = nfp_net_tlv_caps_parse(&nn->pdev->dev, nn->dp.ctrl_bar,
+    &nn->tlv_caps);
+if (err)
+    return err;
+
if (nn->dp.netdev)
nfp_net_netdev_init(nn);

@@ -3832,4 +3875,5 @@
return;

unregister_netdev(nn->dp.netdev);
+nfp_net_reconfig_wait_posted(nn);
}
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_net_ctrl.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_net_ctrl.c
@@ -0,0 +1,124 @@
+/*
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+ */
+
+#include <linux/bitfield.h>
+#include <linux/device.h>
+#include <linux/kernel.h>
+#include <linux/types.h>
+
+#include "nfp_net_ctrl.h"
+#include "nfp_net.h"
+
+static void nfp_net_tlv_caps_reset(struct nfp_net_tlv_caps *caps)
+{
+    memset(caps, 0, sizeof(*caps));
+    caps->me_freq_mhz = 1200;
+}
+
+int nfp_net_tlv_caps_parse(struct device *dev, u8 __iomem *ctrl_mem,
+    struct nfp_net_tlv_caps *caps)
+{
+    u8 __iomem *data = ctrl_mem + NFP_NET_CFG_TLV_BASE;
+    u8 __iomem *end = ctrl_mem + NFP_NET_CFG_BAR_SZ;
+    u32 hdr;
+    
+    nfp_net_tlv_caps_reset(caps);
+    
+    hdr = readl(data);
+    if (!hdr)
+        return 0;
+    while (true) {
+        unsigned int length, offset;
+        u32 hdr = readl(data);
+        
+        length = FIELD_GET(NFP_NET_CFG_TLV_HEADER_LENGTH, hdr);
+        offset = data - ctrl_mem;
+ /* Advance past the header */
data += 4;
+
+if (length % NFP_NET_CFG_TLV_LENGTH_INC) {
+dev_err(dev, "TLV size not multiple of %u len:%u\n",
+NFP_NET_CFG_TLV_LENGTH_INC, length);
+return -EINVAL;
+}
+if (data + length > end) {
+dev_err(dev, "oversized TLV offset:%u len:%u\n",
+offset, length);
+return -EINVAL;
+}
+
+switch (FIELD_GET(NFP_NET_CFG_TLV_HEADER_TYPE, hdr)) {
+case NFP_NET_CFG_TLV_TYPE_UNKNOWN:
+dev_err(dev, "NULL TLV at offset:%u\n", offset);
+return -EINVAL;
+case NFP_NET_CFG_TLV_TYPE_RESERVED:
+break;
+case NFP_NET_CFG_TLV_TYPE_END:
+if (!length)
+return 0;
+
+dev_err(dev, "END TLV should be empty, has len:%d\n", length);
+return -EINVAL;
+case NFP_NET_CFG_TLV_TYPE_ME_FREQ:
+if (length != 4) {
+dev_err(dev,
+"ME FREQ TLV should be 4B, is %dB\n", length);
+return -EINVAL;
+} 
+
caps->me_freq_mhz = readl(data);
+break;
+default:
+if (!FIELD_GET(NFP_NET_CFG_TLV_HEADER_REQUIRED, hdr))
+break;
+
+dev_err(dev, "unknown TLV type:%u offset:%u len:%u\n",
+FIELD_GET(NFP_NET_CFG_TLV_HEADER_TYPE, hdr),
+offset, length);
+return -EINVAL;
+} 
+
data += length;
if (data + 4 > end) {
    dev_err(dev, "reached end of BAR without END TLV\n");
    return -EINVAL;
}
/* Not reached */
return -EINVAL;
}

--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_net_ctrl.h
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_net_ctrl.h
@@ -43,9 +43,7 @@
#ifndef _NFP_NET_CTRL_H_
#define _NFP_NET_CTRL_H_
-/* IMPORTANT: This header file is shared with the FW,
-*      no OS specific constructs, please!
-* */
+#include <linux/types.h>
/**
 * Configuration BAR size.
 @@ -235,6 +233,12 @@
 #define   NFP_NET_CFG_RSS_CAP_HFUNC	 0xff000000

+ * TLV area start
+ * %NFP_NET_CFG_TLV_BASE:	start anchor of the TLV area
+ */
+#define NFP_NET_CFG_TLV_BASE		0x0058

+ * VXLAN/UDP encap configuration
+ * @NFP_NET_CFG_VLAN_FILTER_PROTO:	Base address of table of tunnels' UDP dst ports
+ * @NFP_NET_CFG_VLAN_FILTER_SZ:	Size of the UDP port table in bytes
@@ -428,4 +432,68 @@
#define  NFP_NET_CFG_VLAN_FILTER_PROTO	 (NFP_NET_CFG_VLAN_FILTER + 2)
#define NFP_NET_CFG_VLAN_FILTER_SZ	 0x0004

+ * TLV capabilities
+ * %NFP_NET_CFG_TLV_TYPE:	Offset of type within the TLV
+ * %NFP_NET_CFG_TLV_TYPE_REQUIRED: Driver must be able to parse the TLV
+ * %NFP_NET_CFG_TLV_LENGTH:	Offset of length within the TLV
+ * %NFP_NET_CFG_TLV_LENGTH_INC:	TLV length increments
+ * %NFP_NET_CFG_TLV_VALUE:	Offset of value with the TLV
+ */
+ * List of simple TLV structures, first one starts at %NFP_NET_CFG_TLV_BASE.
+ * Last structure must be of type %NFP_NET_CFG_TLV_TYPE_END. Presence of TLVs
+ * is indicated by %NFP_NET_CFG_TLV_BASE being non-zero. TLV structures may
+ * fill the entire remainder of the BAR or be shorter. FW must make sure TLVs
+ * don't conflict with other features which allocate space beyond
+ * %NFP_NET_CFG_TLV_BASE. %NFP_NET_CFG_TLV_TYPE_RESERVED should be used to wrap
+ * space used by such features.
+ * Note that the 4 byte TLV header is not counted in %NFP_NET_CFG_TLV_LENGTH.
+ */
+#define NFP_NET_CFG_TLV_TYPE		0x00
+#define   NFP_NET_CFG_TLV_TYPE_REQUIRED	  0x8000
+#define NFP_NET_CFG_TLV_LENGTH		0x02
+#define   NFP_NET_CFG_TLV_LENGTH_INC	  4
+#define NFP_NET_CFG_TLV_VALUE		0x04
+
+#define NFP_NET_CFG_TLV_HEADER_REQUIRED	0x80000000
+#define NFP_NET_CFG_TLV_HEADER_TYPE	0x7fff0000
+#define NFP_NET_CFG_TLV_HEADER_LENGTH	0x0000ffff
+
/**
 * Capability TLV types
 *
+ * %NFP_NET_CFG_TLV_TYPE_UNKNOWN:
+ * Special TLV type to catch bugs, should never be encountered. Drivers should
+ * treat encountering this type as error and refuse to probe.
+ *
+ * %NFP_NET_CFG_TLV_TYPE_RESERVED:
+ * Reserved space, may contain legacy fixed-offset fields, or be used for
+ * padding. The use of this type should be otherwise avoided.
+ *
+ * %NFP_NET_CFG_TLV_TYPE_END:
+ * Empty, end of TLV list. Must be the last TLV. Drivers will stop processing
+ * further TLVs when encountered.
+
+ * %NFP_NET_CFG_TLV_TYPE_ME_FREQ:
+ * Single word, ME frequency in MHz as used in calculation for
+ * %NFP_NET_CFG_RXR_IRQ_MOD and %NFP_NET_CFG_TXR_IRQ_MOD.
+ */
+#define NFP_NET_CFG_TLV_TYPE_UNKNOWN0
+#define NFP_NET_CFG_TLV_TYPE_RESERVED1
+#define NFP_NET_CFG_TLV_TYPE_END2
+#define NFP_NET_CFG_TLV_TYPE_ME_FREQ3
+
+struct device;
+
+/**
+ * struct nfp_net_tlv_caps - parsed control BAR TLV capabilities
+ * @me_freq_mhz:ME clock_freq (MHz)
+ struct nfp_net_tlv_caps {
+ u32 me_freq_mhz;
+ }
+
+ int nfp_net_tlv_caps_parse(struct device *dev, u8 __iomem *ctrl_mem,
+ struct nfp_net_tlv_caps *caps);
+
#ifend /* _NFP_NET_CTRL_H */
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_net_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_net_ethtool.c
@@ -296,6 +296,8 @@
 /* Init to unknowns */
ethtool_link_ksettings_add_link_mode(cmd, supported, FIBRE);
+ethtool_link_ksettings_add_link_mode(cmd, supported, Pause);
+ethtool_link_ksettings_add_link_mode(cmd, advertising, Pause);
 cmd->base.port = PORT_OTHER;
cmd->base.speed = SPEED_UNKNOWN;
cmd->base.duplex = DUPLEX_UNKNOWN;
@@ -752,8 +754,8 @@
 struct nfp_eth_table_port *eth_port;
 struct nfp_port *port;
+-param->active_fec = ETHTOOL_FEC_NONE_BIT;
+-param->fec = ETHTOOL_FEC_NONE_BIT;
+-param->active_fec = ETHTOOL_FEC_NONE;
+-param->fec = ETHTOOL_FEC_NONE;
 port = nfp_port_from_netdev(netdev);
eth_port = nfp_port_get_eth_port(port);
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_net_main.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_net_main.c
@@ -67,23 +67,26 @@
 /**
 * nfp_net_get_mac_addr() - Get the MAC address.
 * @pf:       NFP PF handle
- * @netdev:   net_device to set MAC address on
+ * @netdev: net_device to set MAC address on
 * @port:     NFP port structure
 *
 * First try to get the MAC address from NSP ETH table. If that
 * fails generate a random address.
 */
-void nfp_net_get_mac_addr(struct nfp_pf *pf, struct nfp_port *port)
+void
+nfp_net_get_mac_addr(struct nfp_pf *pf, struct net_device *netdev,
+ struct nfp_port *port)
struct nfp_eth_table_port *eth_port;

eth_port = __nfp_port_get_eth_port(port);
if (!eth_port) {
  eth_hw_addr_random(port->netdev);
+  eth_hw_addr_random(netdev);
  return;
}

-ether_addr_copy(port->netdev->dev_addr, eth_port->mac_addr);
-ether_addr_copy(port->netdev->perm_addr, eth_port->mac_addr);
+ether_addr_copy(netdev->dev_addr, eth_port->mac_addr);
+ether_addr_copy(netdev->perm_addr, eth_port->mac_addr);
}

static struct nfp_eth_table_port *
@@ -208,12 +211,6 @@
{
  int err;

-/* Get ME clock frequency from ctrl BAR
- * XXX for now frequency is hardcoded until we figure out how
- * to get the value from nfp-hwinfo into ctrl bar
- */
-nn->me_freq_mhz = 1200;
-
  err = nfp_net_init(nn);
  if (err)
    return err;
@@ -509,16 +506,18 @@
return PTR_ERR(mem);
}

-min_size = NFP_MAC_STATS_SIZE * (pf->eth_tbl->max_index + 1);
-pf->mac_stats_mem = nfp_rtsym_map(pf->rtbl, "_mac_stats",
-  "net.macstats", min_size,
-  &pf->mac_stats_bar);
-if (IS_ERR(pf->mac_stats_mem)) {
-if (PTR_ERR(pf->mac_stats_mem) != -ENOENT) {
-err = PTR_ERR(pf->mac_stats_mem);
-goto err_unmap_ctrl;
+if (pf->eth_tbl) {
+  min_size = NFP_MAC_STATS_SIZE * (pf->eth_tbl->max_index + 1);
+  pf->mac_stats_mem = nfp_rtsym_map(pf->rtbl, "_mac_stats",
+  "net.macstats", min_size,
+  &pf->mac_stats_bar);
+if (IS_ERR(pf->mac_stats_mem)) {
+if (PTR_ERR(pf->mac_stats_mem) != -ENOENT) {
err = PTR_ERR(pf->mac_stats_mem);
+goto err_unmap_ctrl;
+
+pf->mac_stats_mem = NULL;
}
-pf->mac_stats_mem = NULL;
}

pf->vf_cfg_mem = nfp_net_pf_map_rtsym(pf, "net.vfcfg",
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_net_repr.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_net_repr.c
@@ -200,7 +200,7 @@
ret = dev_queue_xmit(skb);
nfp_repr_inc_tx_stats(netdev, len, ret);
-
-return ret;
+return NETDEV_TX_OK;
}

static int nfp_repr_stop(struct net_device *netdev)
@@ -250,6 +250,7 @@
   .ndo_set_vf_links	= nfp_app_set_vf_links,
   .ndo_set_vf_spoofchk	= nfp_app_set_vf_spoofchk,
   .ndo_get_vf_config	= nfp_app_get_vf_config,
+  .ndo_set_features	= nfp_port_set_features,
   .ndo_set_vf_link_state	= nfp_app_set_vf_link_state,
+  .ndo_set_features	= nfp_port_set_features,
  )
  );

static void nfp_repr_clean(struct nfp_repr *repr)
@@ -299,6 +300,8 @@
   SWITCHDEV_SET_OPS(netdev, &nfp_port_switchdev_ops);

+netdev->priv_flags |= IFF_DISABLE_NETPOLL;
+
+if (nfp_app_has_tc(app)) {
   netdev->features |= NETIF_F_HW_TC;
   netdev->hw_features |= NETIF_F_HW_TC;
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_netvf_main.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_netvf_main.c
@@ -277,12 +277,6 @@
}  

nfp_net_irqs_assign(nn, vf->irq_entries, num_irqs);
-/* Get ME clock frequency from ctrl BAR
- * XXX for now frequency is hardcoded until we figure out how
- * to get the value from nfp-hwinfo into ctrl bar
- */
- nn->me_freq_mhz = 1200;

SWITCHDEV_SET_OPS(netdev, &nfp_port_switchdev_ops);
err = nfp_net_init(nn);
if (err)
goto err_irqs_disable;

--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_port.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_port.c
@@ -32,6 +32,7 @@
*/

#include <linux/netdevice.h>
#include <net/switchdev.h>
#include "nfpcore/nfp_cpp.h"

return nfp_app_setup_tc(port->app, netdev, type, type_data);
}

int nfp_port_set_features(struct net_device *netdev, netdev_features_t features)
{
 struct nfp_port *port;
 +
 +port = nfp_port_from_netdev(netdev);
 +if (!port)
 +return 0;
 +
 +if ((netdev->features & NETIF_F_HW_TC) > (features & NETIF_F_HW_TC) &&
 + port->tc_offload_cnt) {
 +netdev_err(netdev, "Cannot disable HW TC offload while offloads active\n");
 +return -EBUSY;
 +}
 +
 +return 0;
 +}
 +
 struct nfp_port *
 nfp_port_from_id(struct nfp_pf *pf, enum nfp_port_type type, unsigned int id)
 {
 --- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfp_port.h
 +++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfp_port.h
 @@ -72,6 +72,8 @@
 * @netdev: backpointer to associated netdev
 * @type: what port type does the entity represent
 * @flags: port flags
 + * @tc_offload_cnt: number of active TC offloads, how offloads are counted
 + * is not defined, use as a boolean
 * @app: backpointer to the app structure
 * @dl_port: devlink port structure

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enum nfp_port_type type;

unsigned long flags;
+unsigned long tc_offload_cnt;

struct nfp_app *app;

return port->type == NFP_PORT_PF_PORT || port->type == NFP_PORT_VF_PORT;
}

+int
+nfp_port_set_features(struct net_device *netdev, netdev_features_t features);
+
+struct nfp_port *nfp_port_from_netdev(struct net_device *netdev);
+struct nfp_port *
+nfp_port_from_id(struct nfp_pf *pf, enum nfp_port_type type, unsigned int id);

--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfpcore/nfp_nffw.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfpcore/nfp_nffw.c
@@ -232,7 +232,7 @@
in.sizeof(*fwinf));
-if (err < sizeof(*fwinf))
+if (err < (int)sizeof(*fwinf))
goto err_release;

if (!nffw_res_flg_init_get(fwinf))
--- linux-4.15.0.orig/drivers/net/ethernet/netronome/nfp/nfpcore/nfp_nsp.c
+++ linux-4.15.0/drivers/net/ethernet/netronome/nfp/nfpcore/nfp_nsp.c
@@ -68,10 +68,11 @@
/* CPP address to retrieve the data from */
#define NSP_BUFFER0x10
#define NSP_BUFFER_CPPGENMASK_Ull(63, 40)
-#define NSP_BUFFER_PCIEGENMASK_Ull(39, 38)
-#define NSP_BUFFER_ADDRESSGENMASK_Ull(37, 0)
+#define NSP_BUFFER_ADDRESSGENMASK_Ull(39, 0)

#define NSP_DFLT_BUFFER0x18
+#define NSP_DFLT_BUFFER_CPPGENMASK_Ull(63, 40)
+#define NSP_DFLT_BUFFER_ADDRESSGENMASK_Ull(39, 0)

#define NSP_DFLT_BUFFER_CONFIG0x20
#define NSP_DFLT_BUFFER_SIZE_MBGENMASK_Ull(7, 0)
@@ -276,8 +277,7 @@
if ((*reg & mask) == val)
return 0;

- if (msleep_interruptible(25))
- return -ERESTARTSYS;
+ msleep(25);

if (time_after(start_time, wait_until))
    return -ETIMEDOUT;
@@ -412,8 +412,8 @@
if (err < 0)
    return err;

-cpp_id = FIELD_GET(NSP_BUFFER_CPP, reg) << 8;
-cpp_buf = FIELD_GET(NSP_BUFFER_ADDRESS, reg);
+cpp_id = FIELD_GET(NSP_DFLT_BUFFER_CPP, reg) << 8;
+cpp_buf = FIELD_GET(NSP_DFLT_BUFFER_ADDRESS, reg);

if (in_buf && in_size) {
    err = nfp_cpp_write(cpp, cpp_id, cpp_buf, in_buf, in_size);
    --- linux-4.15.0.orig/drivers/net/ethernet/nuvoton/w90p910_ether.c
    +++ linux-4.15.0/drivers/net/ethernet/nuvoton/w90p910_ether.c
    @@ -912,7 +912,7 @@
        .ndo_validate_addr = eth_validate_addr,
    }

-static void __init get_mac_address(struct net_device *dev)
+static void get_mac_address(struct net_device *dev)
{
    struct w90p910_ether *ether = netdev_priv(dev);
    struct platform_device *pdev;
    --- linux-4.15.0.orig/drivers/net/ethernet/nxp/lpc_eth.c
    +++ linux-4.15.0/drivers/net/ethernet/nxp/lpc_eth.c
    @@ -845,7 +845,8 @@
        if (mdiobus_register(pldat->mii_bus))
            goto err_out_unregister_bus;
        -err = lpc_mii_probe(pldat->ndev) != 0)
+err = lpc_mii_probe(pldat->ndev);
+        if (err)
            goto err_out_unregister_bus;

        return 0;
        @@ -1371,13 +1372,14 @@
            pldat->dma_buff_base_p = dma_handle;

            netdev_dbg(ndev, "IO address space :%pR\n", res);
            -netdev_dbg(ndev, "IO address size :%d\n", resource_size(res));
            +netdev_dbg(ndev, "IO address size :%zd\n", res);

+(size_t)resource_size(res));
netdev_dbg(ndev, "IO address (mapped) :0x%p\n",
pldat->net_base);
netdev_dbg(ndev, "IRQ number :%d\n", ndev->irq);
- netdev_dbg(ndev, "DMA buffer size :%d\n", pdlat->dma_buff_size);
- netdev_dbg(ndev, "DMA buffer P address :0x%08x\n",
- pdlat->dma_buff_base_p);
+netdev_dbg(ndev, "DMA buffer size :%zd\n", pdlat->dma_buff_size);
+netdev_dbg(ndev, "DMA buffer P address :%pad\n",
+ &pldat->dma_buff_base_p);
netdev_dbg(ndev, "DMA buffer V address :0x%p\n",
pldat->dma_buff_base_v);

@@ -1424,8 +1426,8 @@
if (ret)
goto err_out_unregister_netdev;
- netdev_info(ndev, "LPC mac at 0x%08x irq %d\n",
- res->start, ndev->irq);
+ netdev_info(ndev, "LPC mac at 0x%08lx irq %d\n",
+ (unsigned long)res->start, ndev->irq);
phydev = ndev->phydev;

--- linux-4.15.0.orig/drivers/net/ethernet/oki-semi/pch_gbe/pch_gbe_main.c
+++ linux-4.15.0/drivers/net/ethernet/oki-semi/pch_gbe/pch_gbe_main.c
@@ -27,7 +27,6 @@
#define DRV_VERSION "1.01"
const char pch_driver_version[] = DRV_VERSION;

-#define PCI_DEVICE_ID_INTEL_IOH1_GBE 0x8802 /* Pci device ID */
#define PCI_GBE_VENDOR_ID_ROHM 0x10db
#define PCI_GBE_DEVICE_ID_ROHM_ML7223_GBE 0x8013
#define PCI_GBE_SHORT_PKT 64
#define DSC_INIT16 0xC000
@@ -38,11 +37,9 @@
#define PCI_GBE_PCI_BAR 1
#define PCI_GBE_RESERVE_MEMORY 0x200000 /* 2MB */

-/* Macros for ML7223 */
-#define PCI_VENDOR_ID_ROHM0x10db
-#define PCI_DEVICE_ID_ROHM_ML7223_GBE0x8013
+#define PCI_DEVICE_ID_INTEL_IOH1_GBE0x8802

-/* Macros for ML7831 */
+#define PCI_DEVICE_ID_ROHM_ML7831_GBE0x8802
#define PCI_GBE_TX_WEIGHT 64
{ u8 *data = skb->data; unsigned int offset; u16 *hi, *id; u16 hi, id; u32 lo; 

if (ptp_classify_raw(skb) == PTP_CLASS_NONE) 
@@ -135,14 +132,11 @@ 
if (skb->len < offset + OFF_PTP_SEQUENCE_ID + sizeof(seqid)) 
return 0;

- hi = (u16 *)(data + offset + OFF_PTP_SOURCE_UUID); 
- id = (u16 *)(data + offset + OFF_PTP_SEQUENCE_ID); 
-
- memcpy(&lo, &hi[1], sizeof(lo)); 
+ hi = get_unaligned_be16(data + offset + OFF_PTP_SOURCE_UUID + 0); 
+ lo = get_unaligned_be32(data + offset + OFF_PTP_SOURCE_UUID + 2); 
+ id = get_unaligned_be16(data + offset + OFF_PTP_SEQUENCE_ID); 

-return (uid_hi == *hi && 
- uid_lo == lo && 
- seqid == *id); 
+ return (uid_hi == hi && uid_lo == lo && seqid == id); }

static void 
@@ -152,7 +146,6 @@ 
 struct pci_dev *pdev; 
 u64 ns; 
 u32 hi, lo, val; 
-u16 uid, seq;

if (!adapter->hwts_rx_en) 
return; 
@@ -168,10 +161,7 @@ 
lo = pch_src_uuid_lo_read(pdev); 
hi = pch_src_uuid_hi_read(pdev); 

- uid = hi & 0xffff; 
- seq = (hi >> 16) & 0xffff; 
- 
- if (!pch_ptp_match(skb, htons(uid), htonl(lo), htons(seq))) 
+if (!pch_ptp_match(skb, hi, lo, hi >> 16)) 
goto out; 

ns = pch_rx_snap_read(pdev);
adapter->pdev = pdev;
adapter->hw.back = adapter;
adapter->hw.reg = pcim_iomap_table(pdev)[PCH_GBE_PCI_BAR];
+   adapter->pdata = (struct pch_gbe_privdata *)pci_id->driver_data;
-if (adapter->pdata && adapter->pdata->platform_init)
  -adapter->pdata->platform_init(pdev);
+if (adapter->pdata && adapter->pdata->platform_init) {
+    ret = adapter->pdata->platform_init(pdev);
+    if (ret)
+      goto err_free_netdev;
+   }

adapter->ptp_pdev = pci_get_bus_and_slot(adapter->pdev->bus->number,
   PCI_DEVFN(12, 4));
@ @ -2686,7 +2680,7 @@
  */
static int pch_gbe_minnow_platform_init(struct pci_dev *pdev)
{
  -unsigned long flags = GPIOF_DIR_OUT | GPIOF_INIT_HIGH | GPIOF_EXPORT;
+unsigned long flags = GPIOF_OUT_INIT_HIGH;
  unsigned gpio = MINNOW_PHY_RESET_GPIO;
  int ret;

--- linux-4.15.0.orig/drivers/net/ethernet/pasemi/pasemi_mac.c
+++ linux-4.15.0/drivers/net/ethernet/pasemi/pasemi_mac.c
@@ -1053,7 +1053,6 @@
    phydev = of_phy_connect(dev, phy_dn, &pasemi_adjust_link, 0,
   PHY_INTERFACE_MODE_SGMII);
  -of_node_put(phy_dn);

mac->link = 0;
mac->speed = 0;
@ @ -1062,6 +1061,7 @@
 phydev = of_phy_connect(dev, phy_dn, &pasemi_adjust_link, 0,
   PHY_INTERFACE_MODE_SGMII);

  +of_node_put(phy_dn);
  if (!phydev) {
     printk(KERN_ERR "%s: Could not attach to phy\n", dev->name);
     return -ENODEV;
  @ @ -1089,16 +1089,20 @@

mac->tx = pasemi_mac_setup_tx_resources(dev);

  -if (!mac->tx)
+if (!mac->tx) {
+ret = -ENOMEM;
goto out_tx_ring;
+}

/* We might already have allocated rings in case mtu was changed */
* before interface was brought up.
*/
if (dev->mtu > 1500 && !mac->num_cs) {
    pasemi_mac_setup_csrings(mac);
    -if (!mac->num_cs)
+    if (!mac->num_cs) {
+        ret = -ENOMEM;
goto out_tx_ring;
+    }
}

/* Zero out rmon counters */
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/netxen/netxen_nic_init.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/netxen/netxen_nic_init.c
@@ -1125,7 +1125,8 @@
    return -EINVAL;
    val = nx_get_bios_version(adapter);
    -netxen_rom_fast_read(adapter, NX_BIOS_VERSION_OFFSET, (int *)&bios);
+    if (netxen_rom_fast_read(adapter, NX_BIOS_VERSION_OFFSET, (int *)&bios))
+        return -EIO;
    if ((__force u32)val != bios) {
        dev_err(&pdev->dev, "%s: firmware bios is incompatible\n",
                fw_name[fw_type]);
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/netxen/netxen_nic_main.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/netxen/netxen_nic_main.c
@@ -586,11 +586,6 @@
 #endif
 }

-static inline bool netxen_function_zero(struct pci_dev *pdev)
-{,
-    return (PCI_FUNC(pdev->devfn) == 0) ? true : false;
-}.
-
-static inline void netxen_set_interrupt_mode(struct netxen_adapter *adapter,
-                                             u32 mode)
-{,
    netxen_initialize_interrupt_registers(adapter);
    netxen_set_msix_bit(pdev, 0);
if (netxen_function_zero(pdev)) {
  if (adapter->portnum == 0) {
    if (!netxen_setup_msi_interrupts(adapter, num_msix))
      netxen_set_interrupt_mode(adapter, NETXEN_MSI_MODE);
    else
      free_netdev(netdev);

  err_out_free_res:
  +if (NX_IS_REVISION_P3(pdev->revision))
  +pci_disable_pciie_error_reporting(pdev);
  pci_release_regions(pdev);

  err_out_disable_pdev:
  --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed.h
  +++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed.h
  @@ -829,7 +829,7 @@
  /* Prototypes */
  int qed_fill_dev_info(struct qed_dev *cdev,
    struct qed_dev_info *dev_info);
  -void qed_link_update(struct qed_hwfn *hwfn);
  +void qed_link_update(struct qed_hwfn *hwfn, struct qed_ptt *ptt);
  u32 qed_unzip_data(struct qed_hwfn *p_hwfn,
    u32 input_len, u8 *input_buf,
    u32 max_size, u8 *unzip_buf);
  --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed_cxt.c
  +++ linux-4.15.0/drivers/net/ethernet/qlogic/qed_cxt.c
  @@ -77,7 +77,7 @@
  #define ILT_CFG_REG(cli, reg) PSWRQ2_REG_##cli##_##reg##_RT_OFFSET

  /* ILT entry structure */
  +#define ILT_ENTRY_PHY_ADDR_MASK 0x0000000000000000ULL
  +#define ILT_ENTRY_PHY_ADDR_MASK(~0ULL >> 12)
  #define ILT_ENTRY_PHY_ADDR_SHIFT0
  #define ILT_ENTRY_VALID_MASK 0x1ULL
  #define ILT_ENTRY_VALID_SHIFT 52
  @@ -396,7 +396,7 @@
  vf_tids += segs[NUM_TASK_PF_SEGMENTS].count;
 }

 -iids->vf_cids += vf_cids * p_mngr->vf_count;
 +iids->vf_cids = vf_cids;
 iids->tids += vf_tids * p_mngr->vf_count;

 DP_VERBOSE(p_hwfn, QED_MSG_ILT,
  @@ -2070,8 +2070,8 @@
  num_srqs = min_t(u32, 32 * 1024, p_params->num_srqs);
if (p_hwfn->mcp_info->func_info.protocol == QED_PCI_ETH_RDMA) {
    -DP_NOTICE(p_hwfn,
    - "Current day drivers don't support RoCE & iWARP simultaneously on the same PF. Default to RoCE-only\n");
    +DP_VERBOSE(p_hwfn, QED_MSG_SP,
    + "Current day drivers don't support RoCE & iWARP simultaneously on the same PF. Default to RoCE-only\n");
    p_hwfn->hw_info.personality = QED_PCI_ETH_ROCE;
}

@@ -2477,7 +2477,10 @@
if (rc)
    return rc;

-/* Free Task CXT */
+/* Free Task CXT ( Intentionally RoCE as task-id is shared between 
+ * RoCE and iWARP )
+ */
+proto = PROTOCOLID_ROCE;
rc = qed_cxt_free_ilt_range(p_hwfn, QED_ELEM_TASK, 0,
    qed_cxt_get_proto_tid_count(p_hwfn, proto));
if (rc)
    --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_dcbx.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_dcbx.c
@@ -255,9 +255,8 @@
    *type = DCBX_PROTOCOL_ROCE_V2;
} else {
    *type = DCBX_MAX_PROTOCOL_TYPE;
-    -DP_ERR(p_hwfn,
+    +DP_ERR(p_hwfn, "No action required, App TLV id = 0x%x app_prio_bitmap = 0x%x\n",
+        id, app_prio_bitmap);
    +app_prio_bitmap);
    return false;
}

@@ -700,9 +699,9 @@
p_local = &p_hwfn->p_dcbx_info->lldp_local[LLDP_NEAREST_BRIDGE];

memcpy(params->lldp_local.local_chassis_id, p_local->local_chassis_id,
    ARRAY_SIZE(p_local->local_chassis_id));
+memcpy(p_local->local_chassis_id);
memcpy(params->lldp_local.local_port_id, p_local->local_port_id,
    ARRAY_SIZE(p_local->local_port_id));
} }

static void
@@ -714,9 +713,9 @@
p_remote = &p_hwfn->p_dcbx_info->lldp_remote[LLDP_NEAREST_BRIDGE];

memcpy(params->lldp_local.local_chassis_id, p_local->local_chassis_id,
    ARRAY_SIZE(p_local->local_chassis_id));
+memcpy(p_local->local_chassis_id);
memcpy(params->lldp_local.local_port_id, p_local->local_port_id,
    ARRAY_SIZE(p_local->local_port_id));
+memcpy(p_local->local_port_id);}
memcpy(params->lldp_remote.peer_chassis_id, p_remote->peer_chassis_id,
  - ARRAY_SIZE(p_remote->peer_chassis_id));
+ sizeof(p_remote->peer_chassis_id));
memcpy(params->lldp_remote.peer_port_id, p_remote->peer_port_id,
  - ARRAY_SIZE(p_remote->peer_port_id));
+ sizeof(p_remote->peer_port_id));
}

static int
@@ -1260,9 +1259,11 @@
p_hwfn->p_dcbx_info->set.ver_num |= DCBX_CONFIG_VERSION_STATIC;

p_hwfn->p_dcbx_info->set.enabled = dcbx_info->operational.enabled;
+BUILD_BUG_ON(sizeof(dcbx_info->operational.params) !=
  + sizeof(p_hwfn->p_dcbx_info->set.config.params));
memcpy(&p_hwfn->p_dcbx_info->set.config.params,
       &dcbx_info->operational.params,
       sizeof(struct qed_dcbx_admin_params));
@@ -1471,8 +1472,8 @@
*cap = 0x80;
break;
  case DCB_CAP_ATTR_DCBX:
-  *cap = (DCB_CAP_DCBX_LLD_MANAGED | DCB_CAP_DCBX_VER_CEE |
-DBCAP_DCBX_VER_IEEE | DCB_CAP_DCBX_STATIC);
+  *cap = (DCB_CAP_DCBX_VER_CEE | DCB_CAP_DCBX_VER_IEEE |
+DCB_CAP_DCBX_STATIC);
break;
  default:
    *cap = false;
@@ -1540,8 +1541,6 @@
if (!dcbx_info)
  return 0;
-  if (dcbx_info->operational.enabled)
-    mode |= DCB_CAP_DCBX_LLD_MANAGED;
if (dcbx_info->operational.ieee)
  mode |= DCB_CAP_DCBX_VER_IEEE;
if (dcbx_info->operational.cee)
  --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_debug.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_debug.c
@@ -3590,10 +3590,8 @@
total_blocks = big_ram->num_of_blocks[dev_data->chip_id];
ram_size = total_blocks * BIG_RAM_BLOCK_SIZE_DWORDS;
- strncpy(type_name, big_ram->instance_name,
- strlen(big_ram->instance_name));
- strncpy(mem_name, big_ram->instance_name,
- strlen(big_ram->instance_name));
+ strscpy(type_name, big_ram->instance_name, sizeof(type_name));
+ strscpy(mem_name, big_ram->instance_name, sizeof(mem_name));

/* Dump memory header */
offset += qed_grc_dump_mem_hdr(p_hwfn,
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_dev.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_dev.c
@@ -179,6 +179,10 @@
qed_iscsi_free(p_hwfn);
qed_ooo_free(p_hwfn);
}
+
+if (QED_IS_RDMA_PERSONALITY(p_hwfn))
+qed_rdma_info_free(p_hwfn);
+
qed iov_free(p_hwfn);
qed_l2_free(p_hwfn);
qed_dmae_info_free(p_hwfn);
@@ -435,13 +439,21 @@
/* get pq index according to PQ_FLAGS */
static u16 *qed_init_qm_get_idx_from_flags(struct qed_hwfn *p_hwfn,
    u32 pq_flags)
+ unsigned long pq_flags)
{
    struct qed_qm_info *qm_info = &p_hwfn->qm_info;

/* Can't have multiple flags set here */
-if (bitmap_weight((unsigned long *)&pq_flags, sizeof(pq_flags)) > 1)
+if (bitmap_weight(&pq_flags,
+    sizeof(pq_flags) * BITS_PER_BYTE) > 1) {
+    DP_ERR(p_hwfn, "requested multiple pq flags 0x%llx\n", pq_flags);
+    goto err;
+}
err:
- DP_ERR(p_hwfn, "BAD pq flags %d\n", pq_flags);
- return NULL;
+ return &qm_info->start_pq;
}

/* save pq index in qm info */
@@ -490,20 +501,32 @@
{
    u8 max_tc = qed_init_qm_get_num_tcs(p_hwfn);

+    if (max_tc == 0) {
+        DP_ERR(p_hwfn, "pq with flag 0x%lx do not exist\n", PQ_FLAGS_MCOS);
+        return p_hwfn->qm_info.start_pq;
+    }
+
+    if (tc > max_tc)
+        DP_ERR(p_hwfn, "tc %d must be smaller than %d\n", tc, max_tc);

    - return qed_get_cm_pq_idx(p_hwfn, PQ_FLAGS_MCOS) + tc;
    + return qed_get_cm_pq_idx(p_hwfn, PQ_FLAGS_MCOS) + (tc % max_tc);
}

u16 qed_get_cm_pq_idx_vf(struct qed_hwfn *p_hwfn, u16 vf)
{
    u16 max_vf = qed_init_qm_get_num_vfs(p_hwfn);

+    if (max_vf == 0) {
+        DP_ERR(p_hwfn, "pq with flag 0x%lx do not exist\n", PQ_FLAGS_VFS);
+        return p_hwfn->qm_info.start_pq;
+    }
+
+    if (vf > max_vf)
+        DP_ERR(p_hwfn, "vf %d must be smaller than %d\n", vf, max_vf);

    - return qed_get_cm_pq_idx(p_hwfn, PQ_FLAGS_VFS) + vf;
    + return qed_get_cm_pq_idx(p_hwfn, PQ_FLAGS_VFS) + (vf % max_vf);
}

u16 qed_get_cm_pq_idx_rl(struct qed_hwfn *p_hwfn, u8 rl)
@@ -1002,6 +1025,12 @@
goto alloc_err;
}
if (QED_IS_RDMA_PERSONALITY(p_hwfn)) {
    rc = qed_rdma_info_alloc(p_hwfn);
    if (rc)
        goto alloc_err;
}

/* DMA info initialization */
rc = qed_dmae_info_alloc(p_hwfn);
if (rc)
    goto alloc_err;

int qed_hw_init(struct qed_dev *cdev, struct qed_hw_init_params *p_params)
{
    struct qed_load_req_params load_req_params;
    u32 load_code, param, drv_mb_param;
    bool b_default_mtu = true;
    struct qed_hwfn *p_hwfn;
    int rc = 0, mfw_rc, i;

    if (IS_PF(cdev)) {
        p_hwfn = QED_LEADING_HWFN(cdev);
    }

    /* Get pre-negotiated values for stag, bandwidth etc. */
    +DP_VERBOS(p_hwfn,
        QED_MSG_SPQ,
        "Sending GET_OEM_UPDATES command to trigger stag/bandwidth attention handling\n"
    );
    +drv_mb_param = 1 << DRV_MB_PARAM_DUMMY_OEM_UPDATES_OFFSET;
    +rc = qed_mcp_cmd(p_hwfn, p_hwfn->p_main_ptt,
        DRV_MSG_CODE_GET_OEM_UPDATES,
        +drv_mb_param, &resp, &param);
    +if (rc)
        +DP_NOTICE(p_hwfn,
            "Failed to send GET_OEM_UPDATES attention request\n"
        );
    
    drv_mb_param = STORM_FW_VERSION;
    rc = qed_mcp_cmd(p_hwfn, p_hwfn->p_main_ptt,
        DRV_MSG_CODE_OV_UPDATE_STORM_FW_VER,
        @@ -1782,7 +1824,7 @@
        DP_INFO(p_hwfn, "Failed to update driver state\n");

    rc = qed_mcp_ov_update_eswitch(p_hwfn, p_hwfn->p_main_ptt,
        QED_OV_ESWITCH_VEB);
    +QED_OV_ESWITCH_NONE);
    if (rc)
        DP_INFO(p_hwfn, "Failed to update eswitch mode\n");
}

@@ -1986,11 +2028,8 @@
if (!p_ptt)
    return -EAGAIN;

    /* If roce info is allocated it means roce is initialized and should
     * be enabled in searcher.
     * */
    if (p_hwfn->p_rdma_info &&
        p_hwfn->b_rdma_enabled_in_prs)
        qed_wr(p_hwfn, p_ptt, p_hwfn->rdma_prs_search_reg, 0x1);

    /* Re-open incoming traffic */
    static int qed_hw_prepare_single(struct qed_hwfn *p_hwfn,
        void __iomem *p_regview,
        void __iomem *p_doorbells,
        u64 db_phys_addr,
        enum qed_pci_personality personality)
    {
        int rc = 0;
        if (IS_VF(p_hwfn->cdev))
            return qed_vf_hw_prepare(p_hwfn);

        if (cdev->num_hwfns > 1) {
            void __iomem *p_regview, *p_doorbell;
            u8 __iomem *addr;
            u64 db_phys_addr;
            u32 offset;
            /* adjust bar offset for second engine */
        }
addr = cdev->regview +
    qed_hw_bar_size(p_hwfn, p_hwfn->p_main_ptt, BAR_ID_0) / 2;
-p_regview = addr;
-
addr = cdev->doorbells +
    qed_hw_bar_size(p_hwfn, p_hwfn->p_main_ptt, BAR_ID_1) / 2;
-p_doorbell = addr;
+offset = qed_hw_bar_size(p_hwfn, p_hwfn->p_main_ptt, BAR_ID_0) / 2;
+p_regview = cdev->regview + offset;
+
+offset = qed_hw_bar_size(p_hwfn, p_hwfn->p_main_ptt, BAR_ID_1) / 2;
+
+p_doorbell = cdev->doorbells + offset;
+
+db_phys_addr = cdev->db_phys_addr + offset;

/* prepare second hw function */
rc = qed_hw_prepare_single(&cdev->hwfns[1], p_regview, p_doorbell, personality);
+ p_regview, p_doorbell, db_phys_addr,
+ personality);

/* in case of error, need to free the previously
* initialized hwfn 0. */
@@ -3125,26 +3171,20 @@
static void qed_chain_free_pbl(struct qed_dev *cdev, struct qed_chain *p_chain)
{
-void **pp_virt_addr_tbl = p_chain->pbl.pp_virt_addr_tbl;
+struct addr_tbl_entry *pp_addr_tbl = p_chain->pbl.pp_addr_tbl;
 u32 page_cnt = p_chain->page_cnt, i, pbl_size;
- struct addr_tbl_entry *pp_addr_tbl = p_chain->pbl.pp_addr_tbl;
-u8 *p_pbl_virt = p_chain->pbl_sp.p_virt_table;

-if (!pp_virt_addr_tbl)
+if (!pp_addr_tbl)
    return;

-if (!p_pbl_virt)
    goto out;
-
for (i = 0; i < page_cnt; i++) {
-if (!pp_virt_addr_tbl[i])
+if (!pp_addr_tbl[i].virt_addr || !pp_addr_tbl[i].dma_map)
    break;
dma_free_coherent(&cdev->pdev->dev, 
    QED_CHAIN_PAGE_SIZE, 
    - pp_virt_addr_tbl[i], 
    - *(dma_addr_t *)p_pbl_virt); 
- 
- p_pbl_virt += QED_CHAIN_PBL_ENTRY_SIZE; 
+ pp_addr_tbl[i].virt_addr, 
+ pp_addr_tbl[i].dma_map); 
} 

pbl_size = page_cnt * QED_CHAIN_PBL_ENTRY_SIZE; 
@@ -3154,9 +3194,9 @@ 
    pbl_size, 
    p_chain->pbl_sp.p_virt_table, 
    p_chain->pbl_sp.p_phys_table); 
-out:
- vfree(p_chain->pbl.pp_virt_addr_tbl); 
- p_chain->pbl.pp_virt_addr_tbl = NULL; 
+ vfree(p_chain->pbl.pp_addr_tbl); 
+ p_chain->pbl.pp_addr_tbl = NULL; 
} 

void qed_chain_free(struct qed_dev *cdev, struct qed_chain *p_chain) 
@@ -3257,19 +3297,19 @@ 
{
    u32 page_cnt = p_chain->page_cnt, size, i; 
    dma_addr_t p_phys = 0, p_pbl_phys = 0; 
- void **pp_virt_addr_tbl = NULL; 
+ struct addr_tbl_entry *pp_addr_tbl; 
 u8 *p_pbl_virt = NULL; 
 void *p_virt = NULL; 

-size = page_cnt * sizeof(*pp_virt_addr_tbl); 
-pp_virt_addr_tbl = vzalloc(size); 
-if (!pp_virt_addr_tbl) 
+size = page_cnt * sizeof(*pp_addr_tbl); 
+pp_addr_tbl = vzalloc(size); 
+if (!pp_addr_tbl) 
    return -ENOMEM;

/* The allocation of the PBL table is done with its full size, since it 
   is expected to be successive. 
   qed_chain_init_pbl_mem() is called even in a case of an allocation 
   failure, since pp_virt_addr_tbl was previously allocated, and it 
   failure, since tbl was previously allocated, and it 
   should be saved to allow its freeing during the error flow. */
size = page_cnt * QED_CHAIN_PBL_ENTRY_SIZE;
@@ -3283,8 +3323,7 @@
p_chain->b_external_pbl = true;
}

-qed_chain_init_pbl_mem(p_chain, p_pbl_virt, p_pbl_phys,
-       pp_virt_addr_tbl);
+qed_chain_init_pbl_mem(p_chain, p_pbl_virt, p_pbl_phys, pp_addr_tbl);
if (!p_pbl_virt)
  return -ENOMEM;
@@ -3303,7 +3342,8 @@
/* Fill the PBL table with the physical address of the page */
*(dma_addr_t *)p_pbl_virt = p_phys;
/* Keep the virtual address of the page */
-p_chain->pbl.pp_virt_addr_tbl[i] = p_virt;
+p_chain->pbl.pp_addr_tbl[i].virt_addr = p_virt;
+p_chain->pbl.pp_addr_tbl[i].dma_map = p_phys;

p_pbl_virt += QED_CHAIN_PBL_ENTRY_SIZE;
}
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_hsi.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_hsi.h
@@ -11539,6 +11539,7 @@
#define DRV_MSG_SET_RESOURCE_VALUE_MSG	0x35000000
#define DRV_MSG_CODE_OV_UPDATE_WOL	0x38000000
#define DRV_MSG_CODE_OV_UPDATE_ESWITCH_MODE	0x39000000
+贡献力量的OEM更新0x41000000
#define DRV_MSG_CODE_BW_UPDATE_ACK	0x32000000
#define DRV_MSG_CODE_NIG_DRAIN	0x30000000
@@ -11661,6 +11662,9 @@
#define DRV_MB_PARAM_ESWITCH_MODE_VEB	0x1
#define DRV_MB_PARAM_ESWITCH_MODE_VEPA	0x2
+贡献力量的OEM更新0x41000000
#define DRV_MB_PARAM_DUMMY_OEM_UPDATES_MASK	0x1
#define DRV_MB_PARAM_DUMMY_OEM_UPDATES_OFFSET	0
+
#define DRV_MB_PARAM_SET_LED_MODE_OPER	0x0
#define DRV_MB_PARAM_SET_LED_MODE_ON	0x1
#define DRV_MB_PARAM_SET_LED_MODE_OFF	0x2
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_int.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_int.c
@@ -939,7 +939,7 @@
snprintf(bit_name, 30,
  p_aeu->bit_name, num);
else
```c
-ncpy(bit_name,
+strlcpy(bit_name,
p_aeu->bit_name, 30);

/* We now need to pass bitmask in its
@@ -992,6 +992,8 @@
 */
do {
    index = p_sb_attn->sb_index;
    /* finish reading index before the loop condition */
    +dma_rmb();
    attn_bits = le32_to_cpu(p_sb_attn->atten_bits);
    attn_acks = le32_to_cpu(p_sb_attn->atten_ack);
} while (index != p(sb_attn->sb_index);
@@ -1013,7 +1015,8 @@
 index, attn_bits, attn_acks, asserted_bits,
    deasserted_bits, p sb_attn_sw->known attn);
    } else if (asserted_bits == 0x100) {
-    DP_INFO(p_hwfn, "MFW indication via attention\n");
+    DP_VERBOSE(p_hwfn, NETIF_MSG_INTR,
         "MFW indication via attention\n");
    } else {
        DP_VERBOSE(p_hwfn, NETIF_MSG_INTR,
            "MFW indication [deassertion]\n");
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_iwarp.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_iwarp.c
@@ -517,7 +517,8 @@
    /* Make sure ep is closed before returning and freeing memory. */
    if (ep) {
        while (ep->state != QED_IWARP_EP_CLOSED && wait_count++ < 200)
@@ -999,8 +1000,6 @@
        if (ep->state != QED_IWARP_EP_CLOSED)
            break;
    }
```

The code snippet is from an Open Source project that uses 5GaaS Edge AC-4 25539.
+if (fw_return_code != RDMA_RETURN_OK)
+/* paired with READ_ONCE in destroy_qp */
+snmp_store_release(&ep->state, QED_IWARP_EP_CLOSED);
+ep->event_cb(ep->cb_context, &params);

/* on passive side, if there is no associated QP (REJECT) we need to */
@@ -1669,6 +1672,15 @@
eth_hlen = ETH_HLEN + (vlan_valid ? sizeof(u32) : 0);

+if (!ether_addr_equal(ethh->h_dest,
+   p_hwfn->p_rdma_info->iwarp.mac_addr)) {
+  DP_VERBOSE(p_hwfn,
+    QED_MSG_RDMA,
+    "Got unexpected mac %pM instead of %pM\n",
+    ethh->h_dest, p_hwfn->p_rdma_info->iwarp.mac_addr);
+  return -EINVAL;
+}
+
ether_addr_copy(remote_mac_addr, ethh->h_source);
ether_addr_copy(local_mac_addr, ethh->h_dest);

@@ -1681,21 +1693,36 @@
iph = (struct iphdr *)((u8 *)(ethh) + eth_hlen);

if (eth_type == ETH_P_IP) {
  +if (iph->protocol != IPPROTO_TCP) {
  +  DP_NOTICE(p_hwfn,
  +    "Unexpected ip protocol on ll2 \%x\n",
  +    iph->protocol);
  +  return -EINVAL;
  +}
  +
  cm_info->local_ip[0] = ntohl(iph->daddr);
  cm_info->remote_ip[0] = ntohl(iph->saddr);
  -cm_info->ip_version = TCP_IPV4;
  +cm_info->ip_version = QED_TCP_IPV4;
  ip_hlen = (iph->ihl) * sizeof(u32);
  *payload_len = ntohs(iph->tot_len) - ip_hlen;
  } else if (eth_type == ETH_P_IPV6) {
  ip6h = (struct ipv6hdr *)iph;
  +if (ip6h->nexthdr != IPPROTO_TCP) {
  +  DP_NOTICE(p_hwfn,
  +    "Unexpected ip protocol on ll2 \%x\n",
  +    iph->protocol),
  +    return -EINVAL;
  +}
  +
  cm_info->local_ip[0] = ntohl(ip6h->sin6_flowinfo);
  cm_info->remote_ip[0] = ntohl(ip6h->sin6_flowinfo);
  -cm_info->ip_version = TCP_IPV4;
  +cm_info->ip_version = QED_TCP_IPV4;
  ip_hlen = (iph->ihl) * sizeof(u32);
  *payload_len = ntohs(iph->tot_len) - ip_hlen;
  }
+ iph->protocol);
+return -EINVAL;
+
for (i = 0; i < 4; i++) {
    cm_info->local_ip[i] =
        ntohl(ip6h->daddr.in6_u.u6_addr32[i]);
    cm_info->remote_ip[i] =
        ntohl(ip6h->saddr.in6_u.u6_addr32[i]);
}
-cm_info->ip_version = TCP_IPV6;
+cm_info->ip_version = QED_TCP_IPV6;

ip_hlen = sizeof(*ip6h);
*payload_len = ntohs(ip6h->payload_len);
@@ -1906,8 +1933,8 @@
    /* Missing lower byte is now available */
    mpa_len = fpdu->fpdu_length | *mpa_data;
    fpdu->fpdu_length = QED_IWARP_FPDU_LEN_WITH_PAD(mpa_len);
-    fpdu->mpa_frag_len = fpdu->fpdu_length;
+    fpdu->mpa_frag_len = 1;
    fpdu->incomplete_bytes = fpdu->fpdu_length - 1;
    DP_VERBOSE(p_hwfn,
        QED_MSG_RDMA,
        @@ -2583,7 +2610,7 @@
        struct qed_iwarp_info *iwarp_info;
        struct qed_ll2_acquire_data data;
        struct qed_ll2_cbs cbs;
-    u32 mpa_buff_size;
+    u32 buff_size;
    u16 n_ooo_bufs;
    int rc = 0;
    int i;
    @@ -2606,11 +2633,12 @@
        cbs.rx_release_cb = qed_iwarp_ll2_rel_rx_pkt;
        cbs.tx_comp_cb = qed_iwarp_ll2_comp_tx_pkt;
        cbs.tx_release_cb = qed_iwarp_ll2_rel_tx_pkt;
+        cbs.slowpath_cb = NULL;
        cbs.cookie = p_hwfn;
        memset(&data, 0, sizeof(data));
        data.input.conn_type = QED_LL2_TYPE_IWARP;
-        data.input.mtu = QED_IWARP_MAX_SYN_PKT_SIZE;
+        data.input.mtu = params->max_mtu;
        data.input.rx_num_desc = QED_IWARP_LL2_SYN_RX_SIZE;
        data.input.tx_num_desc = QED_IWARP_LL2_SYN_TX_SIZE;
        data.input.tx_max_bds_per_packet = 1;/* will never be fragmented */
buff_size = QED_IWARP_MAX_BUF_SIZE(params->max_mtu);
rc = qed_iwarp_ll2_alloc_buffers(p_hwfn,
    QED_IWARP_LL2_SYN_RX_SIZE,
    QED_IWARP_MAX_SYN_PKT_SIZE,
    iwarp_info->ll2_syn_handle);
if (rc)
goto err;

buff_size = QED_IWARP_MAX_BUF_SIZE(params->max_mtu);
rc = qed_iwarp_ll2_alloc_buffers(p_hwfn,
    QED_IWARP_LL2_SYN_RX_SIZE,
    QED_IWARP_MAX_SYN_PKT_SIZE,
    iwarp_info->ll2_syn_handle);
if (rc)
goto err;

data.input.rx_num_desc = n_ooo_bufs * 2;
data.input.tx_num_desc = data.input.rx_num_desc;
data.input.tx_max_bds_per_packet = QED_IWARP_MAX_BDS_PER_FPDU;
+data.input.tx_tc = PKT_LB_TC;
+data.input.tx_dest = QED_LL2_TX_DEST_LB;
data.p_connection_handle = &iwarp_info->ll2_mpa_handle;
data.input.secondary_queue = true;
data.cbs = &cbs;
if (rc)
goto err;

buff_size = QED_IWARP_MAX_BUF_SIZE(params->max_mtu);
rc = qed_iwarp_ll2_alloc_buffers(p_hwfn,
    data.input.rx_num_desc,
    buff_size,
    iwarp_info->ll2_mpa_handle);
if (rc)
goto err;

if (!iwarp_info->mpa_intermediate_buf)
    iwarp_info->mpa_intermediate_buf = kzalloc(mpa_buff_size, GFP_KERNEL);
if (!iwarp_info->mpa_intermediate_buf)
    rc = -ENOMEM;
goto err;

iwarp_info->max_num_partial_fpdus = (u16)p_hwfn->p_rdma_info->num_qps;
+iwarp_info->partial_fpdus = kalloc((u16)p_hwfn->p_rdma_info->num_qps,
    sizeof(*iwarp_info->partial_fpdus),
    GFP_KERNEL);
-if (!iwarp_info->partial_fpdus)
    +rc = -ENOMEM;
goto err;
+

iwarp_info->max_num_partial_fpdus = (u16)p_hwfn->p_rdma_info->num_qps;
iwarp_info->mpa_intermediate_buf = kzalloc(mpa_buff_size, GFP_KERNEL);
-if (!iwarp_info->mpa_intermediate_buf)
    +iwarp_info->mpa_intermediate_buf = kzalloc(buff_size, GFP_KERNEL);
+if (!iwarp_info->mpa_intermediate_buf) {
+rc = -ENOMEM;
+goto err;
+}

/* The mpa_bufs array serves for pending RX packets received on the
 * mpa ll2 that don't have place on the tx ring and require later
 @@ -2716,8 +2750,10 @@
iwarp_info->mpa_bufs = kcalloc(data.input.rx_num_desc,
 sizeof(*iwarp_info->mpa_bufs),
     GFP_KERNEL);
-if (!iwarp_info->mpa_bufs)
+if (!iwarp_info->mpa_bufs) {
+rc = -ENOMEM;
+goto err;
+}

INIT_LIST_HEAD(&iwarp_info->mpa_buf_pending_list);
INIT_LIST_HEAD(&iwarp_info->mpa_buf_list);
@@ -2792,7 +2828,9 @@
 params.status = (fw_return_code == IWARP_QP_IN_ERROR_GOOD_CLOSE) ?
 0 : -ECONNRESET;

-ep->state = QED_IWARP_EP_CLOSED;
+/* paired with READ_ONCE in destroy_qp */
+smp_store_release(&ep->state, QED_IWARP_EP_CLOSED);
+
 spin_lock_bh(&p_hwfn->p_rdma_info->iwarp.iw_lock);
 list_del(&ep->list_entry);
 spin_unlock_bh(&p_hwfn->p_rdma_info->iwarp.iw_lock);
@@ -2880,7 +2918,8 @@
 params.event = QED_IWARP_EVENT_ACTIVE_COMPLETE;
 params.ep_context = ep;
 params.cm_info = &ep->cm_info;
-ep->state = QED_IWARP_EP_CLOSED;
+/* paired with READ_ONCE in destroy_qp */
+smp_store_release(&ep->state, QED_IWARP_EP_CLOSED);

switch (fw_return_code) {
case IWARP_CONN_ERROR_TCP_CONNECT_INVALID_PACKET:
 --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_iwarp.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_iwarp.h
@@ @ -46,7 +46,6 @@

#define QED_IWARP_LL2_SYN_TX_SIZE       (128)
#define QED_IWARP_LL2_SYN_RX_SIZE       (256)
-#define QED_IWARP_MAX_SYN_PKT_SIZE    (128)
```c
#define QED_IWARP_LL2_OOO_DEF_TX_SIZE   (256)
#define QED_IWARP_MAX_OOO	(16)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_l2.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_l2.c
@@ -115,8 +115,7 @@
 void qed_l2_setup(struct qed_hwfn *p_hwfn)
 {
  -if (p_hwfn->hw_info.personality != QED_PCI_ETH &&
-    p_hwfn->hw_info.personality != QED_PCI_ETH_ROCE)
  +if (!QED_IS_L2_PERSONALITY(p_hwfn))
 return;

 mutex_init(&p_hwfn->p_l2_info->lock);
 @@ -126,8 +125,7 @@
 {
  u32 i;

-  -if (p_hwfn->hw_info.personality != QED_PCI_ETH &&
-    p_hwfn->hw_info.personality != QED_PCI_ETH_ROCE)
  +if (!QED_IS_L2_PERSONALITY(p_hwfn))
 return;

 if (!p_hwfn->p_l2_info)
 @@ -609,6 +607,10 @@
    (!!accept_filter & QED_ACCEPT_MCAST_MATCHED) &&
    (!!accept_filter & QED_ACCEPT_MCAST_UNMATCHED));

+  SET_FIELD(state, ETH_VPORT_TX_MODE_UCAST_ACCEPT_ALL,
+    (!!accept_filter & QED_ACCEPT_UCAST_MATCHED) &&
+    (!!accept_filter & QED_ACCEPT_UCAST_UNMATCHED));

+  SET_FIELD(state, ETH_VPORT_TX_MODE_BCAST_ACCEPT_ALL,
+    (!!accept_filter & QED_ACCEPT_BCAST));

@@ -745,6 +747,11 @@
 return rc;
 }

 p_ramrod->common.update_approx_mcast_flg = 1;
 for (i = 0; i < ETH_MULTICAST_MAC_BINS_IN_REGS; i++) {
  -u32 *p_bins = (u32 *)p_params->bins;
  +u32 *p_bins = p_params->bins;
  +u32 *p_bins = p_params->bins;

  p_ramrod->approx_mcast.bins[i] = cpu_to_le32(p_bins[i]);
 }
 @@ -745,6 +747,11 @@
 return rc;
 }
```
+if (p_params->update_ctl_frame_check) {
    +p_cmn->ctl_frame_mac_check_en = p_params->mac_chk_en;
    +p_cmn->ctl_frame_ethtype_check_en = p_params->ethtype_chk_en;
+}

/* Update mcast bins for VFs, PF doesn’t use this functionality */
qed_sp_update_mcast_bin(p_hwfn, p_ramrod, p_params);

@@ -1476,8 +1483,8 @@
enum sq_mode comp_mode,
struct qed_sqq_comp_cb *p_comp_data)
{
    -unsigned long bins[ETH_MULTICAST_MAC_BINS_IN_REGS];
    struct vport_update_ramrod_data *p_ramrod = NULL;
    +u32 bins[ETH_MULTICAST_MAC_BINS_IN_REGS];
    struct qed_sqq_entry *p_ent = NULL;
    struct qed_spq_init_data init_data;
    u8 abs_vport_id = 0;
@@ -1513,26 +1520,25 @@
/* explicitly clear out the entire vector */
    memset(&p_ramrod->approx_mcast.bins, 0,
            sizeof(p_ramrod->approx_mcast.bins));
    -memset(bins, 0, sizeof(unsigned long) *
            ETH_MULTICAST_MAC_BINS_IN_REGS);
    +memset(bins, 0, sizeof(bins));
/* filter ADD op is explicit set op and it removes
   * any existing filters for the vport
   */
    if (p_filter_cmd->opcode == QED_FILTER_ADD) {
        for (i = 0; i < p_filter_cmd->num_mc_addrs; i++) {
            -u32 bit;
            +u32 bit, nbits;
            bit = qed_mcast_bin_from_mac(p_filter_cmd->mac[i]);
            -__set_bit(bit, bins);
            +nbits = sizeof(u32) * BITS_PER_BYTE;
            +bins[bit / nbits] |= 1 << (bit % nbits);
        }
    }

/* Convert to correct endiarity */
    for (i = 0; i < ETH_MULTICAST_MAC_BINS_IN_REGS; i++) {
        struct vport_updateramrod_mcast *p_ramrod_mcast;
        -u32 *p_bins = (u32 *)bins;
        +p_ramrod_mcast = &p_ramrod->approx_mcast;
        -p_ramrod_mcast->bins[i] = cpu_to_le32(p_bins[i]);
        +p_ramrod_mcast->bins[i] = cpu_to_le32(bins[i]);
    }


- static void __qed_get_vport_pstats(struct qed_hwfn *p_hwfn,
-   struct qed_ptt *p_ptt,
-   struct qed_eth_stats *p_stats,
-   u16 statistics_bin)
+ static noinline_for_stack void
+ __qed_get_vport_pstats(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt,
+   struct qed_eth_stats *p_stats, u16 statistics_bin)
{
   struct eth_pstorm_per_queue_stat pstats;
   u32 pstats_addr = 0, pstats_len = 0;
   @ @ -1653,10 +1658,9 @ @
   HILO_64_REGPAIR(pstats.error_drop_pkts);
}

- static void __qed_get_vport_tstats(struct qed_hwfn *p_hwfn,
-   struct qed_ptt *p_ptt,
-   struct qed_eth_stats *p_stats,
-   u16 statistics_bin)
+ static noinline_for_stack void
+ __qed_get_vport_tstats(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt,
+   struct qed_eth_stats *p_stats, u16 statistics_bin)
{
   struct tstorm_per_port_stat tstats;
   u32 tstats_addr, tstats_len;
   @ @ -1699,10 +1703,9 @ @
}

- static void __qed_get_vport_ustats(struct qed_hwfn *p_hwfn,
-   struct qed_ptt *p_ptt,
-   struct qed_eth_stats *p_stats,
-   u16 statistics_bin)
+ static noinline_for_stack
+ void __qed_get_vport_ustats(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt,
+   struct qed_eth_stats *p_stats, u16 statistics_bin)
{
   struct eth_ustorm_per_queue_stat ustats;
   u32 ustats_addr = 0, ustats_len = 0;
   @ @ -1741,10 +1744,9 @ @
-static void __qed_get_vport_mstats(struct qed_hwfn *p_hwfn,
-    struct qed_ptt *p_ptt,
-    struct qed_eth_stats *p_stats,
-    u16 statistics_bin)
+static noinline_for_stack void
+__qed_get_vport_mstats(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt,
+    struct qed_eth_stats *p_stats, u16 statistics_bin)
{
  struct eth_mstorm_per_queue_stat mstats;
  u32 mstats_addr = 0, mstats_len = 0;
  HILO_64_REGPAIR(mstats.tpa_coalesced_bytes);
}

-static void __qed_get_vport_port_stats(struct qed_hwfn *p_hwfn,
-    struct qed_ptt *p_ptt,
-    struct qed_eth_stats *p_stats)
+static noinline_for_stack void
+__qed_get_vport_port_stats(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt,
+    struct qed_eth_stats *p_stats)
{
  struct qed_eth_stats_common *p_common = &p_stats->common;
  struct port_stats port_stats;
  @@ -2164,7 +2166,7 @@
  u16 num_queues = 0;

  /* Since the feature controls only queue-zones, 
   * make sure we have the contexts [rx, tx, xdp] to 
   * make sure we have the contexts [rx, xdp, tcs] to 
   * match.
   */
  for_each_hwfn(cdev, i) {
    @@ -2174,7 +2176,8 @@
    u16 cids;

    cids = hwfn->pf_params.eth_pf_params.num_cons;
    -num_queues += min_t(u16, l2_queues, cids / 3);
    +cids /= (2 + info->num_tc);
    +num_queues += min_t(u16, l2_queues, cids);
  }

  /* queues might theoretically be >256, but interrupts' 
   * make sure we have the contexts [rx, tx, xdp] to 
   * make sure we have the contexts [rx, xdp, tcs] to 
   * match.
   */
  if (type == QED_FILTER_RX_MODE_TYPE_PROMISC) {
    accept_flags.rx_accept_filter |= QED_ACCEPT_UCAST_UNMATCHED |
    QED_ACCEPT_MCAST_UNMATCHED;
    -accept_flags.tx_accept_filter |= QED_ACCEPT_MCAST_UNMATCHED;
    +accept_flags.tx_accept_filter |= QED_ACCEPT_UCAST_UNMATCHED |
+ QED_ACCEPT_MCAST_UNMATCHED;
} else if (type == QED_FILTER_RX_MODE_TYPE_MULTI_PROMISC) {
    accept_flags.rx_accept_filter |= QED_ACCEPT_MCAST_UNMATCHED;
    accept_flags.tx_accept_filter |= QED_ACCEPT_MCAST_UNMATCHED;
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_l2.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_l2.h
@@ -214,10 +214,13 @@
     u8				anti_spoofing_en;
     u8				update_accept_any_vlan_flg;
     u8accept_any_vlan;
-    unsigned long			bins[8];
+    u32				bins[8];
    struct qed_rss_params*rss_params;
    struct qed_filter_accept_flagsaccept_flags;
    struct qed_sge_tpa_params*sge_tpa_params;
+    u8update_ctl_frame_check;
+    u8mac_chk_en;
+    u8ethertype_chk_en;
};

int qed_sp_vport_update(struct qed_hwfn *p_hwfn,
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_ll2.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_ll2.c
@@ -201,8 +201,9 @@

if (!skb) {
-    rc = -ENOMEM;
-    goto out_post;
+    DP_INFO(cdev, "Failed to build SKB\n");
+    kfree(buffer->data);
+    goto out_post1;
}

skb = build_skb(buffer->data, 0);
if (!skb) {
-    rc = -ENOMEM;
-    goto out_post;
+    DP_INFO(cdev, "Failed to build SKB\n");
+    kfree(buffer->data);
+    goto out_post1;
}

data->u.placement_offset += NET_SKB_PAD;
@@ -224,8 +225,14 @@

cdev->ll2->cbs->rx_cb(cdev->ll2->cb_cookie, skb,
       data->opaque_data_0,
       data->opaque_data_1);
+} else {
+    DP_VERBOSE(p_hwfn, (NETIF_MSG_RX_STATUS | NETIF_MSG_PKTDATA |
+                     QED_MSG_LL2 | QED_MSG_STORAGE),
+                "Dropping the packet\n");
+    kfree(buffer->data);
}

+out_post1:
/* Update Buffer information and update FW producer */
buffer->data = new_data;
buffer->phys_addr = new_phys_addr;
@@ -292,6 +299,7 @@
struct qed_ll2_tx_packet *p_pkt = NULL;
struct qed_ll2_info *p_ll2_conn;
struct qed_ll2_tx_queue *p_tx;
+unsigned long flags = 0;
dma_addr_t tx_frag;

p_ll2_conn = qed_ll2_handle_sanity_inactive(p_hwfn, connection_handle);
@@ -300,6 +308,7 @@
p_tx = &p_ll2_conn->tx_queue;

+spin_lock_irqsave(&p_tx->lock, flags);
while (!list_empty(&p_tx->active_descq)) {
    p_pkt = list_first_entry(&p_tx->active_descq,
                      struct qed_ll2_tx_packet, list_entry);
    @@ -309,6 +318,7 @@
        list_del(&p_pkt->list_entry);
    b_last_packet = list_empty(&p_tx->active_descq);
    list_add_tail(&p_pkt->list_entry, &p_tx->free_descq);
+        spin_unlock_irqrestore(&p_tx->lock, flags);
    if (p_ll2_conn->input.conn_type == QED_LL2_TYPE_OOO) {
        struct qed_ooo_buffer *p_buffer;

        @@ -328,7 +338,9 @@
            b_last_frag,
            b_last_packet);
    }
+        spin_lock_irqsave(&p_tx->lock, flags);
    }
+        spin_unlock_irqrestore(&p_tx->lock, flags);
}

static int qed_ll2_txq_completion(struct qed_hwfn *p_hwfn, void *p_cookie)
@@ -553,6 +565,7 @@
struct qed_ll2_info *p_ll2_conn = NULL;
struct qed_ll2_rx_packet *p_pkt = NULL;
struct qed_ll2_rx_queue *p_rx;
+unsigned long flags = 0;

p_ll2_conn = qed_ll2_handle_sanity_inactive(p_hwfn, connection_handle);
if (!p_ll2_conn)
@@ -560,13 +573,14 @@
p_rx = &p_ll2_conn->rx_queue;

spin_lock_irqsave(&p_rx->lock, flags);
while (!list_empty(&p_rx->active_descq)) {
    p_pkt = list_first_entry(&p_rx->active_descq,
                        struct qed_ll2_rx_packet, list_entry);
    if (!p_pkt)
        break;
    list_move_tail(&p_pkt->list_entry, &p_rx->free_descq);
    spin_unlock_irqrestore(&p_rx->lock, flags);
}

if (p_ll2_conn->input.conn_type == QED_LL2_TYPE_OOO) {
    struct qed_ooo_buffer *p_buffer;
    cookie,
    rx_buf_addr, b_last);
}
spin_lock_irqsave(&p_rx->lock, flags);
}
spin_unlock_irqrestore(&p_rx->lock, flags);
}

static u8 qed_ll2_convert_rx_parse_to_tx_flags(u16 parse_flags)
static bool
qed_ll2_lb_rxq_handler_slowpath(struct qed_hwfn *p_hwfn,
        struct core_rx_slow_path_cqe *p_cqe) {
    u32 cid;
    if (p_cqe->ramrod_cmd_id != CORE_RAMROD_RX_QUEUE_FLUSH)
        return false;
    iscsi_ooo = (struct ooo_opaque *)&p_cqe->opaque_data;
    if (iscsi_ooo->ooo_opcode != TCP_EVENT_DELETE_ISLES)
        return false;
    /* Need to make a flush */
    cid = le32_to_cpu(iscsi_ooo->cid);
    qed_ooo_release_connection_isles(p_hwfn, p_hwfn->p_ooo_info, cid);
    return true;
}

static int qed_ll2_lb_rxq_handler(struct qed_hwfn *p_hwfn,
struct qed_ll2_info *p_ll2_conn)
{
    cq_old_idx = qed_chain_get_cons_idx(&p_rx->rcq_chain);
cqe_type = cqe->rx_cqe_sp.type;

+if (cqe_type == CORE_RX_CQE_TYPE_SLOW_PATH)
+if (qed_ll2_lb_rxq_handler_slowpath(p_hwfn,
    &cqe->rx_cqe_sp))
+continue;
+
+if (cqe_type != CORE_RX_CQE_TYPE_REGULAR) {
    DP_NOTICE(p_hwfn,
        "Got a non-regular LB LL2 completion [type 0x%02x]\n",
        tx_pkt.vlan = p_buffer->vlan;
tx_pkt.bd_flags = bd_flags;
tx_pkt.l4_hdr_offset_w = l4_hdr_offset_w;
+tx_pkt.tx_dest = p_ll2_conn->tx_dest;
+switch (p_ll2_conn->tx_dest) {
+case CORE_TX_DEST_NW:
+    tx_pkt.tx_dest = QED_LL2_TX_DEST_NW;
+break;
+case CORE_TX_DEST_LB:
+    tx_pkt.tx_dest = QED_LL2_TX_DEST_LB;
+break;
+case CORE_TX_DEST_DROP:
+default:
+    tx_pkt.tx_dest = QED_LL2_TX_DEST_DROP;
+break;
+}
    tx_pkt.first_frag = first_frag;
tx_pkt.first_frag_len = p_buffer->packet_length;
tx_pkt.cookie = p_buffer;
@@ -804,6 +857,9 @@
    struct qed_ll2_info *p_ll2_conn = (struct qed_ll2_info *)p_cookie;
    int rc;

+if (!QED_LL2_RX_REGISTERED(p_ll2_conn))
+return 0;
+
    rc = qed_ll2_lb_rxq_handler(p_hwfn, p_ll2_conn);
    if (rc)
        return rc;
@@ -824,6 +880,9 @@
    u16 new_idx = 0, num_bds = 0;
    int rc;
+if (!QED_LL2_TX_REGISTERED(p_ll2_conn))
+    return 0;
+
    new_idx = le16_to_cpu(*p_tx->p_fw_cons);
    num_bds = ((s16)new_idx - (s16)p_tx->bds_idx);

    cq_prod = qed_chain_get_prod_idx(&p_rx->rcq_chain);
    rx_prod.bd_prod = cpu_to_le16(bd_prod);
    rx_prod.cqe_prod = cpu_to_le16(cq_prod);
    +/* Make sure chain element is updated before ringing the doorbell */
    +    dma_wmb();
    +
    DIRECT_REG_WR(p_rx->set_prod_addr, *((u32 *)&rx_prod));

/* Stop Tx & Rx of connection, if needed */
if (QED_LL2_TX_REGISTERED(p_ll2_conn)) {
    +p_ll2_conn->tx_queue.b_cb_registred = false;
    +smp_wmb(); /* Make sure this is seen by ll2_lb_rxq_completion */
    rc = qed_sp_ll2_tx_queue_stop(p_hwfn, p_ll2_conn);
    if (rc)
        goto out;
    +
    qed_ll2_txq_flush(p_hwfn, connection_handle);
    +qed_int_unregister_cb(p_hwfn, p_ll2_conn->tx_queue.tx_sb_index);
}

if (QED_LL2_RX_REGISTERED(p_ll2_conn)) {
    +p_ll2_conn->rx_queue.b_cb_registred = false;
    +smp_wmb(); /* Make sure this is seen by ll2_lb_rxq_completion */
    rc = qed_sp_ll2_rx_queue_stop(p_hwfn, p_ll2_conn);
    if (rc)
        goto out;
    +
    qed_ll2_rxq_flush(p_hwfn, connection_handle);
    +qed_int_unregister_cb(p_hwfn, p_ll2_conn->rx_queue.rx_sb_index);
}

if (p_ll2_conn->input.conn_type == QED_LL2_TYPE_OOO)
    return;

-if (QED_LL2_RX_REGISTERED(p_ll2_conn)) {
- p_ll2_conn->rx_queue.b_cb_registed = false;
- qed_int_unregister_cb(p_hwfn, p_ll2_conn->rx_queue.rx_sb_index);
- }
- 
- if (QED_LL2_TX_REGISTERED(p_ll2_conn)) {
- p_ll2_conn->tx_queue.b_cb_registed = false;
- qed_int_unregister_cb(p_hwfn, p_ll2_conn->tx_queue.tx_sb_index);
- }
- 
- kfree(p_ll2_conn->tx_queue.descq_mem);
qed_chain_free(p_hwfn->cdev, &p_ll2_conn->tx_queue.txq_chain);
@@ -2363,19 +2424,24 @@
{
struct qed_ll2_tx_pkt_info pkt;
const skb_frag_t *frag;
+u8 flags = 0, nr_frags;
int rc = -EINVAL, i;
dma_addr_t mapping;
u16 vlan = 0;
-u8 flags = 0;

if (unlikely(skb->ip_summed != CHECKSUM_NONE)) {
DP_INFO(cdev, "Cannot transmit a checksumed packet\n");
return -EINVAL;
}

- if (1 + skb_shinfo(skb)->nr_frags > CORE_LL2_TX_MAX_BDS_PER_PACKET) {
+/* Cache number of fragments from SKB since SKB may be freed by
+ * the completion routine after calling qed_ll2_prepare_tx_packet()
+ */
+nr_frags = skb_shinfo(skb)->nr_frags;
+
+if (1 + nr_frags > CORE_LL2_TX_MAX_BDS_PER_PACKET) {
DP_ERR(cdev, "Cannot transmit a packet with %d fragments\n",  
- 1 + skb_shinfo(skb)->nr_frags);
+ 1 + nr_frags);
return -EINVAL;
}

@@ -2397,7 +2463,7 @@
}
memset(&pkt, 0, sizeof(pkt));
-pkt.num_of_bds = 1 + skb_shinfo(skb)->nr_frags;
+pkt.num_of_bds = 1 + nr_frags;
pkt.vlan = vlan;
pkt.bd_flags = flags;

pkt.tx_dest = QED_LL2_TX_DEST_NW;
@ @ -2405,12 +2471,17 @@
pkt.first_frag_len = skb->len;
pkt.cookie = skb;

+/* qed_ll2_prepare_tx_packet() may actually send the packet if
+ * there are no fragments in the skb and subsequently the completion
+ * routine may run and free the SKB, so no dereferencing the SKB
+ * beyond this point unless skb has any fragments.
+ */
rc = qed_ll2_prepare_tx_packet(&cdev->hwfns[0], cdev->ll2->handle,
    &pkt, 1);
if (rc)
goto err;

-for (i = 0; i < skb_shinfo(skb)->nr_frags; i++) {
+for (i = 0; i < nr_frags; i++) {
    frag = &skb_shinfo(skb)->frags[i];

    mapping = skb_frag_dma_map(&cdev->pdev->dev, frag, 0,
@@ -2419,6 +2490,7 @@
    if (unlikely(dma_mapping_error(&cdev->pdev->dev, mapping))) {
        DP_NOTICE(cdev,
            "Unable to map frag - dropping packet\n\n+
tc = -ENOMEM;
    goto err;
}

--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_main.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_main.c
@@ -437,7 +437,12 @@
    int_params->out.int_mode = QED_INT_MODE_MSIX;
    int_params->out.num_vectors = rc;
@@ -565,8 +570,16 @@
    /* Fastpath interrupts */
    for (j = 0; j < 64; j++) {
        if ((0x2ULL <<< j) & status) {
    
    -if (rc > 0) {
+/* For VFs, we should return with an error in case we didn't get the
+ * exact number of msix vectors as we requested.
+ * Not doing that will lead to a crash when starting queues for
+ * this VF.
+ */
+if ((IS_PF(cdev) && rc > 0) || (IS_VF(cdev) && rc == cnt)) {
+    /* MSI-x configuration was achieved */
+    int_params->out.int_mode = QED_INT_MODE_MSIX;
+    int_params->out.num_vectors = rc;
@@ -565,8 +570,16 @@
+    /* Fastpath interrupts */
+    for (j = 0; j < 64; j++) {
+        if ((0x2ULL <<< j) & status) {

---
-hwfn->simd_proto_handler[j].func(
-hwfn->simd_proto_handler[j].token);
+
+struct qed_simd_fp_handler *p_handler =
+&hwfn->simd_proto_handler[j];
+
+if (p_handler->func)
+p_handler->func(p_handler->token);
+else
+DP_NOTICE(hwfn,
+ "Not calling fastpath handler as it is NULL [handler #%d, status 0x%llx]n",
+ j, status);
+
+status &=~(0x2ULL << j);
+rc = IRQ_HANDLED;
+
@@ -779,6 +792,14 @@
 /* We want a minimum of one slowpath and one fastpath vector per hwfn */
 cdev->int_params.in.min_msix_cnt = cdev->num_hwfns * 2;
+
+if (is_kdump_kernel()) {
+DP_INFO(cdev,
+ "Kdump kernel: Limit the max number of requested MSI-X vectors to %hd\n",
+cdev->int_params.in.min_msix_cnt);
+cdev->int_params.in.num_vectors =
+cdev->int_params.in.min_msix_cnt;
+}
+
+rc = qed_set_int_mode(cdev, false);
+if (rc) {
+DP_ERR(cdev, "qed_slowpath_setup_int ERR\n");
+}
+else {
+DP_NOTICE(cdev,
+ "Failed to acquire PTT for aRFS\n");
+rc = -EINVAL;
+goto err;
+}
+}
+
@@ -1065,7 +1087,7 @@
 &drv_version);
 if (rc) {
 DP_NOTICE(cdev, "Failed sending drv version command\n");
-rc = -EINVAL;
-goto err4;
+
}
+
@@ -1073,6 +1095,8 @@
return 0;

+err4:
+qed_ll2_dealloc_if(cdev);
err3:
qed_hw_stop(cdev);
err2:
   @@ -1371,6 +1395,7 @@
 }

static void qed_fill_link(struct qed_hwfn *hwfn,
   + struct qed_ptt *ptt,
       struct qed_link_output *if_link)
{
struct qed_mcp_link_params params;
   @@ -1451,7 +1476,7 @@
 /* TODO - fill duplex properly */
       if_link->duplex = DUPLEX_FULL;
       -qed_mcp_get_media_type(hwfn->cdev, &media_type);
       +qed_mcp_get_media_type(hwfn, ptt, &media_type);
       if_link->port = qed_get_port_type(media_type);

       if_link->autoneg = params.speed.autoneg;
       @@ -1507,21 +1532,34 @@
 static void qed_get_current_link(struct qed_dev *cdev,
       struct qed_link_output *if_link)
{
   +struct qed_hwfn *hwfn;
   +struct qed_ptt *ptt;
   int i;

   -qed_fill_link(&cdev->hwfns[0], if_link);
   +hwfn = &cdev->hwfns[0];
   +if (IS_PF(cdev)) {
       +ptt = qed_ptt_acquire(hwfn);
       +if (ptt) {
           +qed_fill_link(hwfn, ptt, if_link);
           +qed_ptt_release(hwfn, ptt);
           +} else {
               +DP_NOTICE(hwfn, "Failed to fill link; No PTT\n");
               +}
           +} else {
               +qed_fill_link(hwfn, NULL, if_link);
               +}

   for_each_hwfn(cdev, i)
qed_inform_vf_link_state(&cdev->hwfns[i]);
}

-void qed_link_update(struct qed_hwfn *hwfn)
+void qed_link_update(struct qed_hwfn *hwfn, struct qed_ptt *ptt)
{
    void *cookie = hwfn->cdev->ops_cookie;
    struct qed_common_cb_ops *op = hwfn->cdev->protocol_ops.common;
    struct qed_link_output if_link;

    -qed_fill_link(hwfn, &if_link);
    +qed_fill_link(hwfn, ptt, &if_link);
    qed_inform_vf_link_state(hwfn);

    if (IS_LEAD_HWFN(hwfn) && cookie)
        return -EBUSY;
}
rc = qed_mcp_drain(hwfn, ptt);
+qed_ptt_release(hwfn, ptt);
if (rc)
    return rc;
-qed_ptt_release(hwfn, ptt);
}

return 0;
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_mcp.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_mcp.c
@@ -47,7 +47,7 @@
 #include "qed_reg_addr.h"
 #include "qed_sriov.h"

-#define CHIP_MCP_RESP_ITER_US 10
+#define QED_MCP_RESP_ITER_US 10

 #define QED_DRV_MB_MAX_RETRIES(500 * 1000)/* Account for 5 sec */
 #define QED_MCP_RESET_RETRIES(50 * 1000)/* Account for 500 msec */
@@ -182,18 +182,57 @@
 #define QED_MCP_SHMEM_RDY_MAX_RETRIES 20
 #define QED_MCP_SHMEM_RDY_ITER_MS 50

 static int qed_load_mcp_offsets(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt) 
{
    struct qed_mcp_info *p_info = p_hwfn->mcp_info;

+/* Maximum of 1 sec to wait for the SHMEM ready indication */
+#define QED_MCP_SHMEM_RDY_MAX_RETRIES20
+#define QED_MCP_SHMEM_RDY_ITER_MS50
+    


```c
+\text{u8} \text{cnt} = \text{QED\_MCP\_SHMEM\_RDY\_MAX\_RETRIES};
+\text{u8} \text{msec} = \text{QED\_MCP\_SHMEM\_RDY\_ITER\_MS};
\text{u32} \text{drv\_mb\_offsize}, \text{mfw\_mb\_offsize};
\text{u32} \text{mcp\_pf\_id} = \text{MCP\_PF\_ID(p\_hwfn)};

\text{p\_info\_->public\_base} = \text{qed\_rd(p\_hwfn, p\_ptt, MISC\_REG\_SHARED\_MEM\_ADDR)};
-\text{if} (!\text{p\_info\_->public\_base})
-\text{return} 0;
+\text{if} (!\text{p\_info\_->public\_base}) {
+\text{DP\_NOTICE(p\_hwfn},
+  \text{"The address of the MCP scratch-pad is not configured\n"});
+\text{return} -\text{EINVAL};
+}

\text{p\_info\_->public\_base} |= \text{GRCBASE\_MCP};

+/* \text{Get the MFW MB address and number of supported messages */}
+\text{mfw\_mb\_offsize} = \text{qed\_rd(p\_hwfn, p\_ptt,}
+  \text{SECTION\_OFFSIZE\_ADDR(p\_info\_->public\_base,}
+  \text{PUBLIC\_MFW\_MB});
+\text{p\_info\_->mfw\_mb\_addr} = \text{SECTION\_ADDR(mfw\_mb\_offsize, mcp\_pf\_id)};
+\text{p\_info\_->mfw\_mb\_length} = (\text{u16})\text{qed\_rd(p\_hwfn, p\_ptt,}
+  \text{p\_info\_->mfw\_mb\_addr} +
+  \text{offsetof(struct public\_mfw\_mb,}
+  \text{sup\_msgs)});
+
+/* \text{The driver can notify that there was an MCP reset, and might read the}
+ \text{SHMEM values before the MFW has completed initializing them.}
+ \text{To avoid this, the "sup\_msgs" field in the MFW mailbox is used as a}
+ \text{data ready indication.} */
+\text{while} (!\text{p\_info\_->mfw\_mb\_length} && --\text{cnt}) {
+\text{msleep(msec)};
+\text{p\_info\_->mfw\_mb\_length} =
+(\text{u16})\text{qed\_rd(p\_hwfn, p\_ptt,}
+  \text{p\_info\_->mfw\_mb\_addr} +
+  \text{offsetof(struct public\_mfw\_mb, sup\_msgs)});
+}
+
+if (!\text{cnt}) {
+\text{DP\_NOTICE(p\_hwfn},
+  \text{"Failed to get the SHMEM ready notification after %d msec\n"},
+  \text{QED\_MCP\_SHMEM\_RDY\_MAX\_RETRIES} * \text{msec});
+\text{return} -\text{EBUSY};
+}

+/* \text{Calculate the driver and MFW mailbox address */}
\text{drv\_mb\_offsize} = \text{qed\_rd(p\_hwfn, p\_ptt,}
```

SECTION_OFFSIZE_ADDR(p_info->public_base,
@@ -203,13 +242,6 @@
    "drv_mb_offsiz = 0x%x, drv_mb_addr = 0x%x mcp_pf_id = 0x%x\n",
    drv_mb_offsize, p_info->drv_mb_addr, mcp_pf_id);

-/* Set the MFW MB address */
-mfw_mb_offsize = qed_rd(p_hwfn, p_ptt,
-SECTION_OFFSIZE_ADDR(p_info->public_base,
- PUBLIC_MFW_MB));
-p_info->mfw_mb_addr = SECTION_ADDR(mfw_mb_offsize, mcp_pf_id);
-p_info->mfw_mb_length =	(u16)qed_rd(p_hwfn, p_ptt, p_info->mfw_mb_addr);
-
/* Get the current driver mailbox sequence before sending
 * the first command
 */
@@ -284,9 +316,15 @@

 int qed_mcp_reset(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt)
 {
    -u32 org_mcp_reset_seq, seq, delay = CHIP_MCP_RESP_ITER_US, cnt = 0;
+u32 org_mcp_reset_seq, seq, delay = QED_MCP_RESP_ITER_US, cnt = 0;
    int rc = 0;

    +if (p_hwfn->mcp_info->b_block_cmd) {
+    +DP_NOTICE(p_hwfn,
+        +"The MFW is not responsive. Avoid sending MCP_RESET mailbox command.\n");
+    +return -EBUSY;
+    +}
    +
    /* Ensure that only a single thread is accessing the mailbox */
    spin_lock_bh(&p_hwfn->mcp_info->cmd_lock);

@@ -412,14 +450,41 @@
            (p_mb_params->cmd | seq_num), p_mb_params->param);
        }

+static void qed_mcp_cmd_set_blocking(struct qed_hwfn *p_hwfn, bool block_cmd)
+{
+    +p_hwfn->mcp_info->b_block_cmd = block_cmd;
+    +
+    +DP_INFO(p_hwfn, "%s sending of mailbox commands to the MFW\n",
+        +block_cmd ? "Block" : "Unblock");
+    +}
+    +
+    +static void qed_mcp_print_cpu_info(struct qed_hwfn *p_hwfn,
+        +struct qed_ptt *p_prtt)
+    +{
+        +u32 cpu_mode, cpu_state, cpu_pc_0, cpu_pc_1, cpu_pc_2;
+u32 delay = QED_MCP_RESP_ITER_US;
+
+cpu_mode = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_MODE);
+cpu_state = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_STATE);
+cpu_pc_0 = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_PROGRAM_COUNTER);
+udelay(delay);
+cpu_pc_1 = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_PROGRAM_COUNTER);
+udelay(delay);
+cpu_pc_2 = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_PROGRAM_COUNTER);
+
+DP_NOTICE(p_hwfn,
+  "MCP CPU info: mode 0x%08x, state 0x%08x, pc {0x%08x, 0x%08x, 0x%08x}\n",
+  cpu_mode, cpu_state, cpu_pc_0, cpu_pc_1, cpu_pc_2);
+
+
static int
_qed_mcp_cmd_and_union(struct qed_hwfn *p_hwfn,
  struct qed_ptt *p_ptt,
  struct qed_mcp_mb_params *p_mb_params,
-  u32 max_retries, u32 delay)
+  u32 max_retries, u32 usecs)
{
  u32 cnt = 0, msecs = DIV_ROUND_UP(usecs, 1000);
  struct qed_mcp_cmd_elem *p_cmd_elem;
  -u32 cnt = 0;
  u16 seq_num;

  int rc = 0;

  @@ -432,17 +497,25 @@

  spin_lock_bh(&p_hwfn->mcp_info->cmd_lock);

  -if (!qed_mcp_has_pending_cmd(p_hwfn))
  +if (!qed_mcp_has_pending_cmd(p_hwfn)) {
  +spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);
  break;
  +}

  rc = qed_mcp_update_pending_cmd(p_hwfn, p_ptt);
  -if (!rc)
  +if (!rc) {
  +spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);
  break;
  -else if (rc != -EAGAIN)
  +} else if (rc != -EAGAIN) {
  goto err;
  +}
spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);
-udelay(delay);
+
+if (QED_MB_FLAGS_IS_SET(p_mb_params, CAN_SLEEP))
+msleep(msecs);
+else
+udelay(usecs);
} while (++cnt < max_retries);

if (cnt >= max_retries) {
@@ -452,6 +525,8 @@
@@ -452,6 +525,8 @@
 return -EAGAIN;
 }

+spin_lock_bh(&p_hwfn->mcp_info->cmd_lock);
+ /* Send the mailbox command */
 qed_mcp_reread_offsets(p_hwfn, p_ptt);
 seq_num = ++p_hwfn->mcp_info->drv_mb_seq;
@@ -471,17 +546,25 @@
 * The spinlock stays locked until the list element is removed.
 */

-udelay(delay);
+if (QED_MB_FLAGS_IS_SET(p_mb_params, CAN_SLEEP))
+msleep(msecs);
+else
+udelay(usecs);
+ spin_lock_bh(&p_hwfn->mcp_info->cmd_lock);

-if (p_cmd_elem->b_is_completed)
+if (p_cmd_elem->b_is_completed) {
 +spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);
 break;
 +}

 rc = qed_mcp_update_pending_cmd(p_hwfn, p_ptt);
 -if (!(rc)
 +if ('!rc) {
 +spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);
 break;
 -else if (rc != -EAGAIN)
 +} else if (rc != -EAGAIN) {
 goto err;
 +}

 spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);
while (++cnt < max_retries);
@@ -490,14 +573,19 @@
        "The MFW failed to respond to command 0x%08x [param 0x%08x].\n",
        p_mb_params->cmd, p_mb_params->param);
+qed_mcp_print_cpu_info(p_hwfn, p_ptt);

        spin_lock_bh(&p_hwfn->mcp_info->cmd_lock);
        qed_mcp_cmd_del_elem(p_hwfn, p_cmd_elem);
        spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);
+
        if (!QED_MB_FLAGS_IS_SET(p_mb_params, AVOID_BLOCK))
+        qed_mcp_cmd_set_blocking(p_hwfn, true);

        return -EAGAIN;
    }

+spin_lock_bh(&p_hwfn->mcp_info->cmd_lock);
    qed_mcp_cmd_del_elem(p_hwfn, p_cmd_elem);
+spin_unlock_bh(&p_hwfn->mcp_info->cmd_lock);

    @@ -506,7 +594,7 @@
        "MFW mailbox: response 0x%08x param 0x%08x [after %d.%03d ms]\n",
        p_mb_params->mcp_resp,
        p_mb_params->mcp_param,
-        (cnt * delay) / 1000, (cnt * delay) % 1000);
+        (cnt * usecs) / 1000, (cnt * usecs) % 1000);

    /* Clear the sequence number from the MFW response */
    p_mb_params->mcp_resp &= FW_MSG_CODE_MASK;
    @@ -524,7 +612,7 @@
    {
        size_t union_data_size = sizeof(union drv_union_data);
        u32 max_retries = QED_DRV_MB_MAX_ATTEMPTS;
-u32 delay = CHIP_MCP_RESP_ITER_US;
+u32 usecs = QED_MCP_RESP_ITER_US;
        /* MCP not initialized */
        if (!qed_mcp_is_init(p_hwfn)) {
            @@ -532,6 +620,13 @@
            return -EBUSY;
        }
        +if (p_hwfn->mcp_info->b_block_cmd) {
            +DP_NOTICE(p_hwfn,
                +"The MFW is not responsive. Avoid sending mailbox command 0x%08x [param 0x%08x].\n",
                +p_mb_params->cmd, p_mb_params->param);
            +return -EBUSY;
        }
    }

if (p_mb_params->data_src_size > union_data_size ||
    p_mb_params->data_dst_size > union_data_size) {
    DP_ERR(p_hwfn,
           @ @ -541,8 +636,13 @@
           return -EINVAL;
    }

+if (QED_MB_FLAGS_IS_SET(p_mb_params, CAN_SLEEP)) {
+    max_retries = DIV_ROUND_UP(max_retries, 1000);
+}
+
+return _qed_mcp_cmd_and_union(p_hwfn, p_ptt, p_mb_params, max_retries,
+    -       delay);
+    +       usecs);
+
int qed_mcp_cmd(struct qed_hwfn *p_hwfn,
    @ @ -731,6 +831,7 @@
    mb_params.data_src_size = sizeof(load_req);
    mb_params.p_data_dst = &load_rsp;
    mb_params.data_dst_size = sizeof(load_rsp);
+    mb_params.flags = QED_MB_FLAG_CAN_SLEEP | QED_MB_FLAG_AVOID_BLOCK;
    DP_VERBOSE(p_hwfn, QED_MSG_SP,
       "Load Request: param 0x%08x [init_hw %d, drv_type %d, hsi_ver %d, pda 0x%04x]n",
       @ @ -952,7 +1053,8 @@
int qed_mcp_unload_req(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt)
{
    -u32 wol_param, mcp_resp, mcp_param;
+struct qed_mcp_mb_params mb_params;
    +u32 wol_param;

    switch (p_hwfn->cdev->wol_config) {
    case QED_OV_WOL_DISABLED:
        @ @ -970,8 +1072,12 @@
        wol_param = DRV_MB_PARAM_UNLOAD_WOL_MCP;
    }
    -return qed_mcp_cmd(p_hwfn, p_ptt, DRV_MSG_CODE_UNLOAD_REQ, wol_param,
    -       &mcp_resp, &mcp_param);
+memset(&mb_params, 0, sizeof(mb_params));
+mb_params.cmd = DRV_MSG_CODE_UNLOAD_REQ;
+mb_params.param = wol_param;
+mb_params.flags = QED_MB_FLAG_CAN_SLEEP | QED_MB_FLAG_AVOID_BLOCK;
+return qed_mcp_cmd_and_union(p_hwfn, p_ptt, &mb_params);
}

int qed_mcp_unload_done(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt)
@@ -1182,6 +1288,7 @@
break;
default:
p_link->speed = 0;
+p_link->link_up = 0;
}

if (p_link->link_up && p_link->speed)
@@ -1256,7 +1363,7 @@
if (p_hwfn->mcp_info->capabilities & FW_MB_PARAM_FEATURE_SUPPORT_EEE)
qed_mcp_read_eee_config(p_hwfn, p_ptt, p_link);

-qqed_link_update(p_hwfn);
+qed_link_update(p_hwfn, p_ptt);
out:
spin_unlock_bh(&p_hwfn->mcp_info->link_lock);
}
@@ -1279,9 +1386,15 @@
phy_cfg.pause |= (params->pause.forced_tx) ? ETH_PAUSE_TX : 0;
phy_cfg.adv_speed = params->speed.advertised_speeds;
phy_cfg.loopback_mode = params->loopback_mode;
- if (p_hwfn->mcp_info->capabilities & FW_MB_PARAM_FEATURE_SUPPORT_EEE) {
- if (params->eee.enable)
-phy_cfg.eee_cfg |= EEE_CFG_EEE_ENABLED;
+ /* There are MFWs that share this capability regardless of whether
+ * this is feasible or not. And given that at the very least adv_caps
+ * would be set internally by qed, we want to make sure LFA would
+ * still work.
+ */
+ if ((p_hwfn->mcp_info->capabilities &
+ FW_MB_PARAM_FEATURE_SUPPORT_EEE) && params->eee.enable) {
+phy_cfg.eee_cfg |= EEE_CFG_EEE_ENABLED;
if (params->eee.tx_lpi_enable)
phy_cfg.eee_cfg |= EEE_CFG_TX_LPI;
if (params->eee.adv_caps & QED_EEE_1G_ADV)
@@ -1620,12 +1733,10 @@
    return 0;
}

-int qed_mcp_get_media_type(struct qed_dev *cdev, u32 *p_media_type)
+int qed_mcp_get_media_type(struct qed_hwfn *p_hwfn, u32 *p_media_type)
+ struct qed_ptt *p_ptt, u32 *p_media_type)

{  
-struct qed_hwfn *p_hwfn = &cdev->hwfns[0];
-struct qed_ptt *p_ptt;
-
-if (IS_VF(cdev))
+if (IS_VF(p_hwfn->cdev))
    return -EINVAL;

if (!qed_mcp_is_init(p_hwfn)) {
@@ -1633,16 +1744,15 @@
    return -EBUSY;
}

-    *p_media_type = MEDIA_UNSPECIFIED;
-
-    p_ptt = qed_ptt_acquire(p_hwfn);
-    if (!p_ptt)
-        return -EBUSY;
-
-    *p_media_type = qed_rd(p_hwfn, p_ptt, p_hwfn->mcp_info->port_addr +
-        offsetof(struct public_port, media_type));
+    if (!p_ptt) {
+        *p_media_type = MEDIA_UNSPECIFIED;
+        return -EINVAL;
+    }

    qed_ptt_release(p_hwfn, p_ptt);
    *p_media_type = qed_rd(p_hwfn, p_ptt,
        p_hwfn->mcp_info->port_addr +
        offsetof(struct public_port,
            media_type));

    return 0;
}
@@ -1959,31 +2069,65 @@
    return rc;
}

/+* A maximal 100 msec waiting time for the MCP to halt */
+#define QED_MCP_HALT_SLEEP_MS		10
+#define QED_MCP_HALT_MAX_RETRIES10
+
int qed_mcp_halt(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt)
{
    u32 resp = 0, param = 0;
+    u32 resp = 0, param = 0, cpu_state, cnt = 0;
    int rc;
rc = qed_mcp_cmd(p_hwfn, p_ptt, DRV_MSG_CODE_MCP_HALT, 0, &resp, &param);
-if (rc)
+if (rc) {
    DP_ERR(p_hwfn, "MCP response failure, aborting\n");
    +return rc;
    +}

-return rc;
+do {
    +msleep(QED_MCP_HALT_SLEEP_MS);
    +cpu_state = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_STATE);
    +if (cpu_state & MCP_REG_CPU_STATE_SOFT_HALTED)
    +break;
    +} while (++cnt < QED_MCP_HALT_MAX_RETRIES);
+
+if (cnt == QED_MCP_HALT_MAX_RETRIES) {
    +DP_NOTICE(p_hwfn,
        "Failed to halt the MCP [CPU_MODE = 0x%08x, CPU_STATE = 0x%08x]\n",
        + qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_MODE), cpu_state);
    +return -EBUSY;
    +}
+
+qed_mcp_cmd_set_blocking(p_hwfn, true);
+
+return 0;
}

+#define QED_MCP_RESUME_SLEEP_MS 10
+
int qed_mcp_resume(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ptt) {
-u32 value, cpu_mode;
+u32 cpu_mode, cpu_state;

    qed_wr(p_hwfn, p_ptt, MCP_REG_CPU_STATE, 0xffffffff);

    -value = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_MODE);
    -value &= ~MCP_REG_CPU_MODE_SOFT_HALT;
    -qed_wr(p_hwfn, p_ptt, MCP_REG_CPU_MODE, value);
    cpu_mode = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_MODE);
    +cpu_mode &= ~MCP_REG_CPU_MODE_SOFT_HALT;
    +qed_wr(p_hwfn, p_ptt, MCP_REG_CPU_MODE, cpu_mode);
    +msleep(QED_MCP_RESUME_SLEEP_MS);
    +cpu_state = qed_rd(p_hwfn, p_ptt, MCP_REG_CPU_STATE);

    -return (cpu_mode & MCP_REG_CPU_MODE_SOFT_HALT) ? -EAGAIN : 0;
    +if (cpu_state & MCP_REG_CPU_STATE_SOFT_HALTED) {
+DP_NOTICE(p_hwfn, 
+ "Failed to resume the MCP [CPU_MODE = 0x%08x, CPU_STATE = 0x%08x]n",
+ cpu_mode, cpu_state);
+return -EBUSY;
+}
+
+qed_mcp_cmd_set_blocking(p_hwfn, false);
+
+return 0;
}

int qed_mcp_ov_update_current_config(struct qed_hwfn *p_hwfn, 
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_mcp.h 
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_mcp.h 
@@ -284,14 +284,15 @@
 * @brief Get media type value of the port.
 * 
 * @param cdev - qed dev pointer
+ * @param p_ptt
 * @param mfw_ver - media type value
 * 
 * @return int -
 * 0 - Operation was successul.
 * -EBUSY - Operation failed
 */
-int qed_mcp_get_media_type(struct qed_dev *cdev, 
- u32 *media_type);
+int qed_mcp_get_media_type(struct qed_hwfn *p_hwfn, 
+ struct qed_ptt *p_ptt, u32 *media_type);

/**
 * @brief General function for sending commands to the MCP
 @@ -540,11 +541,14 @@
 */
 spinlock_tcmd_lock;

+/* Flag to indicate whether sending a MFW mailbox command is blocked */
+boolb_block_cmd;
+
+/* Spinlock used for syncing SW link-changes and link-changes
 * originating from attention context.
 */
 spinlock_tlink_lock;
-boolblock_mb_sending;
+ u32public_base;
 u32drv_mb_addr;
 u32mfw_mb_addr;
struct qed_mcp_mb_params {
    u32 cmd;
    u32 param;
    void *p_data_src;
    u8 data_src_size;
    void *p_data_dst;
    u8 data_dst_size;
    u32 mcp_resp;
    u32 mcp_param;
    u32 flags;
    #define QED_MB_FLAG_CAN_SLEEP (0x1 << 0)
    #define QED_MB_FLAG_AVOID_BLOCK (0x1 << 1)
    #define QED_MB_FLAGS_IS_SET(params, flag) \
        ((typeof(params) __params = (params); \ 
          (__params && (__params->flags & QED_MB_FLAG_ ## flag)); )
    
    /**
     * --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_rdma.c
     * +++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_rdma.c
     * @@ -140,22 +140,34 @@
     * return FEAT_NUM((struct qed_hwfn *)p_hwfn, QED_PF_L2_QUE) + rel_sb_id;
     */

     -static int qed_rdma_alloc(struct qed_hwfn *p_hwfn, 
       - struct qed_ptt *p_ptt, 
       - struct qed_rdma_start_in_params *params) 
       +int qed_rdma_info_alloc(struct qed_hwfn *p_hwfn) 
     { 
       struct qed_rdma_info *p_rdma_info;
       -u32 num_cons, num_tasks;
       -int rc = -ENOMEM;

       -DP_VERBOSE(p_hwfn, QED_MSG_RDMA, "Allocating RDMA\n");

       -/* Allocate a struct with current pf rdma info */
       p_rdma_info = kzalloc(sizeof(*p_rdma_info), GFP_KERNEL);
if (!p_rdma_info)
-    return rc;
+    return -ENOMEM;
+
+    spin_lock_init(&p_rdma_info->lock);

    p_hwfn->p_rdma_info = p_rdma_info;
+    return 0;
+
+void qed_rdma_info_free(struct qed_hwfn *p_hwfn)
+{
+    kfree(p_hwfn->p_rdma_info);
+    p_hwfn->p_rdma_info = NULL;
+}
+
+static int qed_rdma_alloc(struct qed_hwfn *p_hwfn)
+{
+    struct qed_rdma_info *p_rdma_info = p_hwfn->p_rdma_info;
+    u32 num_cons, num_tasks;
+    int rc = -ENOMEM;
+    
+    DP_VERBOSE(p_hwfn, QED_MSG_RDMA, "Allocating RDMA\n");
+    
+    if (QED_IS_IWARP_PERSONALITY(p_hwfn))
+        p_rdma_info->proto = PROTOCOLID_IWARP;
+    else
+        @@ -183,7 +195,7 @@
+            /* Allocate a struct with device params and fill it */
+            p_rdma_info->dev = kzalloc(sizeof(*p_rdma_info->dev), GFP_KERNEL);
+            if (!p_rdma_info->dev)
+                goto free_rdma_info;
+            return rc;
+
+            /* Allocate a struct with port params and fill it */
+            p_rdma_info->port = kzalloc(sizeof(*p_rdma_info->port), GFP_KERNEL);
+            @@ -284,8 +296,6 @@
+            kfree(p_rdma_info->port);
+            free_rdma_dev:
+            kfree(p_rdma_info->dev);
+            free_rdma_info:
+            kfree(p_rdma_info);
+
+            return rc;
+        }
+        @@ -354,8 +364,6 @@
+            kfree(p_rdma_info->port);
+

kfree(p_rdma_info->dev);
-
-kfree(p_rdma_info);
}

static void qed_rdma_free_tid(void *rdma_cxt, u32 itid)
@@ -380,6 +388,7 @@
qed_rdma_free_reserved_lkey(p_hwfn);
qed_rdma_resc_free(p_hwfn);
+qed_cxt_free_proto_ilt(p_hwfn, p_hwfn->p_rdma_info->proto);
}

static void qed_rdma_get_guid(struct qed_hwfn *p_hwfn, u8 *guid)
@@ -417,7 +426,7 @@ /* Vendor specific information */
dev->vendor_id = cdev->vendor_id;
devid->vendor_part_id = cdev->device_id;
-dev->hw_ver = 0;
+dev->hw_ver = cdev->chip_rev;
devid->fw_ver = (FW_MAJOR_VERSION << 24) | (FW_MINOR_VERSION << 16) |
+ (FW_REVISION_VERSION << 8) | (FW_ENGINEERING_VERSION);
@@ -654,8 +663,6 @@
DP_VERBOSE(p_hwfn, QED_MSG_RDMA, "RDMA setup");
-spin_lock_init(&p_hwfn->p_rdma_info->lock);
-
qed_rdma_init_devinfo(p_hwfn, params);
qed_rdma_init_port(p_hwfn);
qed_rdma_init_events(p_hwfn, params);
@@ -702,7 +709,7 @@ /* Disable RoCE search */
qed_wr(p_hwfn, p_ptt, p_hwfn->rdma_prs_search_reg, 0);
p_hwfn->b_rdma_enabled_in_prs = false;
-
+p_hwfn->p_rdma_info->active = 0;
qed_wr(p_hwfn, p_ptt, PRS_REG_ROCE_DEST_QP_MAX_PF, 0);

ll2_ethertype_en = qed_rd(p_hwfn, p_ptt, PRS_REG_LIGHT_L2_ETHERTYPE_EN);
@@ -772,7 +779,7 @@
dpi_start_offset +
((out_params->dpi) * p_hwfn->dpi_size));
-
-out_params->dpi_phys_addr = p_hwfn->cdev->db_phys_addr +
+out_params->dpi_phys_addr = p_hwfn->db_phys_addr +
dpi_start_offset +
((out_params->dpi) * p_hwfn->dpi_size);

@@ -1211,7 +1218,8 @@
 u8 max_stats_queues;
 int rc;

-if (!rdma_cxt || !in_params || !out_params || !p_hwfn->p_rdma_info) {
+if (!rdma_cxt || !in_params || !out_params || !p_hwfn->p_rdma_info->active) {
     DP_ERR(p_hwfn->cdev,
             "qed roce create qp failed due to NULL entry (rdma_cxt=%p, in=%p, out=%p, roce_info=?u",
             rdma_cxt, in_params, out_params);
@@ -1631,8 +1639,8 @@
 }
 bool result;

-/* if rdma info has not been allocated, naturally there are no qps */
-if (!p_hwfn->p_rdma_info)
+/* if rdma wasn't activated yet, naturally there are no qps */
+if (!p_hwfn->p_rdma_info->active)
    return false;

-spin_lock_bh(&p_hwfn->p_rdma_info->lock);
@@ -1678,7 +1686,7 @@
 if (!p_ptt)
     goto err;

-rc = qed_rdma_alloc(p_hwfn, p_ptt, params);
+rc = qed_rdma_alloc(p_hwfn);
 if (rc)
     goto err1;
@@ -1687,6 +1695,7 @@
 goto err2;

 qed_ptt_release(p_hwfn, p_ptt);
+p_hwfn->p_rdma_info->active = 1;

 return rc;

--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_rdma.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_rdma.h
@@ -100,6 +100,7 @@
 u16 max_queue_zones;
 enum protocol_type proto;
 struct qed_iwarp_info iwarp;
+u8 active:1;
 };
struct qed_rdma_qp {
    @@ -174,10 +175,14 @@
#if IS_ENABLED(CONFIG_QED_RDMA)
    void qed_rdma_dpm_bar(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ppt);
    void qed_rdma_dpm_conf(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ppt);
    +int qed_rdma_info_alloc(struct qed_hwfn *p_hwfn);
    +void qed_rdma_info_free(struct qed_hwfn *p_hwfn);
#else
    static inline void qed_rdma_dpm_conf(struct qed_hwfn *p_hwfn, struct qed_ptt *p_ppt) {}
    static inline void qed_rdma_dpm_bar(struct qed_hwfn *p_hwfn,
        struct qed_ptt *p_ppt) {}
    +static inline int qed_rdma_info_alloc(struct qed_hwfn *p_hwfn) {return -EINVAL;}
    +static inline void qed_rdma_info_free(struct qed_hwfn *p_hwfn) {}
#endif

int
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_reg_addr.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_reg_addr.h
@@ -554,8 +554,10 @@
    #define MCP_REG_CPU_STATE \
        0xe05004UL
    +#define MCP_REG_CPU_STATE_SOFT_HALTED(0x1UL << 10)
    #define MCP_REG_CPU_EVENT_MASK \
        0xe05008UL
    +#define MCP_REG_CPU_PROGRAM_COUNTER 0xe0501cUL
    #define PGLUE_B_REG_PF_BAR0_SIZE \
        0x2aae60UL
    #define PGLUE_B_REG_PF_BAR1_SIZE \
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_roce.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_roce.c
@@ -129,23 +129,16 @@
static enum roce_flavor qed_roce_mode_to_flavor(enum roce_mode roce_mode)
{
    -enum roce_flavor flavor;
    -
    switch (roce_mode) {
        case ROCE_V1:
            -flavor = PLAIN_ROCE;
            -break;
            +return PLAIN_ROCE;
        case ROCE_V2_IPV4:
            -flavor = RROCE_IPV4;
            -break;
            +return RROCE_IPV4;
        case ROCE_V2_IPV6:
            -flavor = RROCE_IPV6;
            -break;
            +return RROCE_IPV6;
-flavor = ROCE_V2_IPV6;
-break;
+return RROCE_IPV6;
default:
-flavor = MAX_ROCE_MODE;
-break;
+return MAX_ROCE_FLAVOR;
}
-return flavor;

void qed_roce_free_cid_pair(struct qed_hwfn *p_hwfn, u16 cid)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_sp.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_sp.h
@@ -167,6 +167,9 @@
enum spq_mode			 comp_mode;
struct qed_spq_comp_cb		 comp_cb;
struct qed_spq_comp_done	comp_done; /* SPQ_MODE_EBLOCK */
 +
+/* Posted entry for unlimited list entry in EBLOCK mode */
+*struct qed_spq_entry*post_ent;
+};

struct qed_eq {
@@ -377,6 +380,7 @@
* @param p_hwfn
 */
void qed_consq_free(struct qed_hwfn *p_hwfn);
+int qed_spq_pend_post(struct qed_hwfn *p_hwfn);

/**
 * @file
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_sp_commands.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_sp_commands.c
@@ -80,7 +80,7 @@
case QED_SPQ_MODE_BLOCK:
if (!p_data->p_comp_data)
- return -EINVAL;
+ goto err;

 p_ent->comp_cb.cookie = p_data->p_comp_data->cookie;
 break;
 @@ -95,7 +95,7 @@
default:
 DP_NOTICE(p_hwfn, "Unknown SPQE completion mode %d\n",
 p_ent->comp_mode);
-return -EINVAL;

+goto err;
}

DP_VERBOSE(p_hwfn, QED_MSG_SPQ,
@@ -109,6 +109,18 @@
memset(&p_ent->ramrod, 0, sizeof(p_ent->ramrod));

return 0;
+
+err:
+/* qed_spq_get_entry() can either get an entry from the free_pool,
+ * or, if no entries are left, allocate a new entry and add it to
+ * the unlimited_pending list.
+ */
+if (p_ent->queue == &p_hwfn->p_spq->unlimited_pending)
+kfree(p_ent);
+else
+qed_spq_return_entry(p_hwfn, p_ent);
+
+return -EINVAL;
}

static enum tunnel_clss qed_tunn_clss_to_fw_clss(u8 type)
@@ -154,7 +166,7 @@
static void qed_set_tunn_cls_info(struct qed_tunnel_info *p_tun,
struct qed_tunnel_info *p_src)
{
-enum tunnel_clss type;
+int type;

p_tun->b_update_rx_cls = p_src->b_update_rx_cls;
p_tun->b_update_tx_cls = p_src->b_update_tx_cls;
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_spq.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_spq.c
@@ -144,6 +144,7 @@
DP_INFO(p_hwfn, "Ramrod is stuck, requesting MCP drain\n");
rc = qed_mcp_drain(p_hwfn, p_ptt);
+qed_ptt_release(p_hwfn, p_ptt);
if (rc) {
DP_NOTICE(p_hwfn, "MCP drain failed\n");
goto err;
@@ -152,18 +153,15 @@
/* Retry after drain */
rc = __qed_spq_block(p_hwfn, p_ent, p_fw_ret, true);
if (!rc)
-goto out;
+return 0;

comp_done = (struct qed_spq_comp_done *)p_ent->comp_cb.cookie;
-if (comp_done->done == 1)
+if (comp_done->done == 1) {
  if (p_fw_ret)
    *p_fw_ret = comp_done->fw_return_code;
-out:
-qed_ptt_release(p_hwfn, p_ptt);
-return 0;
-
+return 0;
+
} err:
-qed_ptt_release(p_hwfn, p_ptt);
DP_NOTICE(p_hwfn,
  "Ramrod is stuck [CID %08x cmd %02x protocol %02x echo %04x\n",
  le32_to_cpu(p_ent->elem.hdr.cid),
@@ -406,6 +404,11 @@
qed_eq_prod_update(p_hwfn, qed_chain_get_prod_idx(p_chain));

+/* Attempt to post pending requests */
+spin_lock_bh(&p_hwfn->p_spq->lock);
+rc = qed_spq_pend_post(p_hwfn);
+spin_unlock_bh(&p_hwfn->p_spq->lock);
+
+return rc;
}

@@ -687,6 +690,8 @@
/* EBLOCK responsible to free the allocated p_ent */
if (p_ent->comp_mode != QED_SPQ_MODE_EBLOCK)
kfree(p_ent);
+else
+p_ent->post_ent = p_en2;

p_ent = p_en2;
}
@@ -747,7 +752,7 @@
return 0;
}

-static int qed_spq_pend_post(struct qed_hwfn *p_hwfn)
+int qed_spq_pend_post(struct qed_hwfn *p_hwfn)
{
  struct qed_spq *p_spq = p_hwfn->p_spq;
  struct qed_spq_entry *p_ent = NULL;
@@ -770,6 +775,25 @@
SPQ_HIGH_PRI_RESERVE_DEFAULT);
}

/* Avoid overriding of SPQ entries when getting out-of-order completions, by
 * marking the completions in a bitmap and increasing the chain consumer only
 * for the first successive completed entries.
 * */
+static void qed_spq_comp_bmap_update(struct qed_hwfn *p_hwfn, __le16 echo)
+{
+u16 pos = le16_to_cpu(echo) % SPQ_RING_SIZE;
+struct qed_spq *p_spq = p_hwfn->p_spq;
+
+/* Set bit(pos, p_spq->p_comp_bitmap);
+while (test_bit(p_spq->comp_bitmap_idx,
+p_spq->p_comp_bitmap)) {
+__clear_bit(p_spq->comp_bitmap_idx,
+p_spq->p_comp_bitmap);
+p_spq->comp_bitmap_idx++;
+qed_chain_return_produced(&p_spq->chain);
+}
+}
+
+int qed_spq_post(struct qed_hwfn *p_hwfn,
+struct qed_spq_entry *p_ent, u8 *fw_return_code)
+
+if (p_ent->queue == &p_spq->unlimited_pending) {
+/* This is an allocated p_ent which does not need to
+ * return to pool.
+ * */
+struct qed_spq_entry *p_post_ent = p_ent->post_ent;
+kfree(p_ent);
+return rc;
+}
+/* Return the entry which was actually posted */
+p_ent = p_post_ent;
+
+if (rc)
+qed_chain_return_produced(&p_spq->chain);
+qed_spq_comp_bmap_update(p_hwfn, p_ent->elem.hdr.echo);
spq_post_fail:
/* return to the free pool */
@@ -865,7 +890,6 @@
struct qed_spq_entry *p_ent = NULL;
struct qed_spq_entry *tmp;
struct qed_spq_entry *found = NULL;
-intrc;

if (!p_hwfn)
return -EINVAL;
@@ -877,25 +901,8 @@
spin_lock_bh(&p_spq->lock);
list_for_each_entry_safe(p_ent, tmp, &p_spq->completion_pending, list) {
if (p_ent->elem.hdr.echo == echo) {
- u16 pos = le16_to_cpu(echo) % SPQ_RING_SIZE;
-
list_del(&p_ent->list);
-
-/* Avoid overriding of SPQ entries when getting
- * out-of-order completions, by marking the completions
- * in a bitmap and increasing the chain consumer only
- * for the first successive completed entries.
- */
-__set_bit(pos, p_spq->p_comp_bitmap);
-
-while (test_bit(p_spq->comp_bitmap_idx,
-    p_spq->p_comp_bitmap)) {
-__clear_bit(p_spq->comp_bitmap_idx,
-    p_spq->p_comp_bitmap);
-    p_spq->comp_bitmap_idx++;
-    qed_chain_return_produced(&p_spq->chain);
-}
-
+qed_spq_comp_bmap_update(p_hwfn, echo);
 p_spq->comp_count++;
found = p_ent;
break;
@@ -934,20 +941,13 @@
 QED_MSG_SPQ,
 "Got a completion without a callback function\n"

- if ((found->comp_mode != QED_SPQ_MODE_EBLOCK) ||
- (found->queue == &p_spq->unlimited_pending))
+if (found->comp_mode != QED_SPQ_MODE_EBLOCK)
 /* EBLOCK is responsible for returning its own entry into the
- * free list, unless it originally added the entry into the
- * unlimited pending list.
*/
qed_spq_return_entry(p_hwfn, found);

-/* Attempt to post pending requests */
-spin_lock_bh(&p_spq->lock);
-rc = qed_spq_pend_post(p_hwfn);
-spin_unlock_bh(&p_spq->lock);
-
-return rc;
+return 0;
}

int qed_consq_alloc(struct qed_hwfn *p_hwfn)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_sriov.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_sriov.c
@@ -96,6 +96,7 @@
p_ramrod->personality = PERSONALITY_ETH;
bREAK;
case QED_PCI_ETH_ROCE:
+case QED_PCI_ETH_IWARP:
p_ramrod->personality = PERSONALITY_RDMA_AND_ETH;
bREAK;
default:
@@ -1963,7 +1964,9 @@
params.vport_id = vf->vport_id;
params.max_buffers_per_cqe = start->max_buffers_per_cqe;
params.mtu = vf->mtu;
-params.check_mac = true;
+
+/* Non trusted VFs should enable control frame filtering */
+params.check_mac = !vf->p_vf_info.is_trusted_configured;

rc = qed_sp_eth_vport_start(p_hwfn, &params);
if (rc) {
@@ -2826,7 +2829,7 @@
p_data->update_approx_mcast_flg = 1;
memcpy(p_data->bins, p_mcast_tlv->bins,
- sizeof(unsigned long) * ETH_MULTICAST_MAC_BINS_IN_REGS);
+ sizeof(u32) * ETH_MULTICAST_MAC_BINS_IN_REGS);
*tlv_mask |= 1 << QED_IOV_VP_UPDATE_MCAST;
}

@@ -4396,6 +4399,8 @@
static int qed_sriov_enable(struct qed_dev *cdev, int num)
{
 struct qed_iov_vf_init_params params;
+struct qed_hwf *hwfn;
+struct qed_ptt *ptt;
int i, j, rc;

if (num >= RESC_NUM(&cdev->hwfns[0], QED_VPORT)) {
  @@ -4408,8 +4413,8 @@

 /* Initialize HW for VF access */
 for_each_hwfn(cdev, j) {
-  	struct qed_hwf *hwfn = &cdev->hwfns[j];
-  	struct qed_ptt *ptt = qed_ptt_acquire(hwfn);
+  	hwfn = &cdev->hwfns[j];
+  	ptt = qed_ptt_acquire(hwfn);

 /* Make sure not to use more than 16 queues per VF */
 params.num_queues = min_t(int,
@@ -4445,6 +4450,19 @@
 goto err;
 }

 +hwfn = QED_LEADING_HWFN(cdev);
 +ptt = qed_ptt_acquire(hwfn);
+if (!ptt) {
  +DP_ERR(hwfn, "Failed to acquire ptt\n");
  +rc = -EBUSY;
  +goto err;
+}
  +
  +rc = qed_mcp_ov_update_eswitch(hwfn, ptt, QED_OV_ESWITCH_VEB);
+if (rc)
  +DP_INFO(cdev, "Failed to update eswitch mode\n");
+qed_ptt_release(hwfn, ptt);
+
return num;

err:
@@ -4895,6 +4913,9 @@
 params.opaque_fid = vf->opaque_fid;
 params.vport_id = vf->vport_id;

+params.update_ctl_frame_check = 1;
+params.mac_chk_en = !vf_info->is_trusted_configured;
+if (vf_info->rx_accept_mode & mask) {
  flags->update_rx_mode_config = 1;
  flags->rx_accept_filter = vf_info->rx_accept_mode;
@@ -4912,7 +4933,8 @@
if (flags->update_rx_mode_config ||
    flags->update_tx_mode_config)
+    flags->update_tx_mode_config ||
+    params.update_ctl_frame_check)
qed_sp_vport_update(hwfn, &params,
    QED_SPQ_MODE_EBLOCK, NULL);
}
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_vf.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_vf.c
@@ -81,12 +81,17 @@
mutex_unlock(&(p_hwfn->vf_iov_info->mutex));
}

+#define QED_VF_CHANNEL_USLEEP_ITERATIONS	90
+#define QED_VF_CHANNEL_USLEEP_DELAY	100
+#define QED_VF_CHANNEL_MSLEEP_ITERATIONS	10
+#define QED_VF_CHANNEL_MSLEEP_DELAY	25
+
+static int qed_send_msg2pf(struct qed_hwfn *p_hwfn, u8 *done, u32 resp_size)
+{
union vfpf_tlvs *p_req = p_hwfn->vf_iov_info->vf2pf_request;
struct ustorm_trigger_vf_zone trigger;
struct ustorm_vf_zone *zone_data;
-int rc = 0, time = 100;
+int iter, rc = 0;

zone_data = (struct ustorm_vf_zone *)PXP_VF_BAR0_START_USDM_ZONE_B;

@ @ -126,11 +131,19 @@
REG_WR(p_hwfn, (uintptr_t)&zone_data->trigger, *((u32 *)&trigger));

/* When PF would be done with the response, it would write back to the
    * `done' address. Poll until then.
    * `done' address from a coherent DMA zone. Poll until then.
    */
-while (((!done) && time) {
-msleep(25);
-time--;
+
+iter = QED_VF_CHANNEL_USLEEP_ITERATIONS;
+while (!(done) && iter--) {
+udelay(QED_VF_CHANNEL_USLEEP_DELAY);
+dma_rmb();
+}
+}
+
+iter = QED_VF_CHANNEL_MSLEEP_ITERATIONS;
+while (!(done) && iter--) {
+msleep(QED_VF_CHANNEL_MSLEEP_DELAY);
+dma_rmb();
}

if (!*done) {
@@ -261,6 +274,7 @@
    struct pfvf_acquire_resp_tlv *resp = &p_iov->pf2vf_reply->acquire_resp;
    struct pf_vf_pfdev_info *pfdev_info = &resp->pfdev_info;
    struct vf_pf_resc_request *p_resc;
+u8 retry_cnt = VF_ACQUIRE_THRESH;
    bool resources_acquired = false;
    struct vfpf_acquire_tlv *req;
    int rc = 0, attempts = 0;
@@ -314,6 +328,15 @@
    /* send acquire request */
    rc = qed_send_msg2pf(p_hwfn, &resp->hdr.status, sizeof(*resp));
    +
    /* Re-try acquire in case of vf-pf hw channel timeout */
    +if (retry_cnt && rc == -EBUSY) {
    +    DP_VERBOSE(p_hwfn, QED_MSG_IOCTL,
    +        "VF retrying to acquire due to VPC timeout\n");
    +    retry_cnt--;
    +    continue;
    +} else if (rc)
    goto exit;

@@ -413,7 +436,6 @@

static void
__qed_vf_prep_tunn_req_tlv(struct vfpf_update_tunn_param_tlv *p_req,
-    enum qed_tunn_class mask, u8 *p_cls)
+    enum qed_tunn_mode mask, u8 *p_cls)
{
    if (p_src->b_update_mode) {
        p_req->tun_mode_update_mask |= BIT(mask);
@@ -587,7 +609,7 @@
}

static void
__qed_vf_prep_tunn_req_tlv(struct vfpf_update_tunn_param_tlv *p_req,
-    struct qed_tunn_update_type *p_src,
-    enum qed_tunn_class mask, u8 *p_cls)
+    enum qed_tunn_class mask, u8 *p_cls)
{
    if (p_src->b_update_mode) {
        p_req->tun_mode_update_type |= BIT(mask);
@@ -587,7 +609,7 @@
}
qed_vf_prep_tunn_req_tlv(struct vfpf_update_tunn_param_tlv *p_req,
    struct qed_tunn_update_type *p_src,
    - enum qed_tunn_clss mask,
+ enum qed_tunn_mode mask,
    u8 *p_cls, struct qed_tunn_update_udp_port *p_port,
    u8 *p_update_port, u16 *p_udp_port)
{
    @@ -1126,7 +1148,7 @@
        resp_size += sizeof(struct pfvf_def_resp_tlv);

        memcpy(p_mcast_tlv->bins, p_params->bins,
            - sizeof(unsigned long) * ETH_MULTICAST_MAC_BINS_IN_REGS);
+            sizeof(u32) * ETH_MULTICAST_MAC_BINS_IN_REGS);
    }

    update_rx = p_params->accept_flags.update_rx_mode_config;
    @@ -1272,7 +1294,7 @@
        u32 bit;

        bit = qed_mcast_bin_from_mac(p_filter_cmd->mac[i]);
        -__set_bit(bit, sp_params.bins);
+        sp_params.bins[bit / 32] |= 1 << (bit % 32);
    }

    @@ -1660,7 +1682,7 @@
        ops->ports_update(cookie, vxlan_port, geneve_port);

        /* Always update link configuration according to bulletin */
    -qed_link_update(hwfn);
+    qed_link_update(hwfn, NULL);
    }

    void qed_iov_vf_task(struct work_struct *work)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qed/qed_vf.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qed/qed_vf.h
@@ -392,7 +392,12 @@
        struct channel_tlv tl;
        u8 padding[4];

        -u64 bins[8];
+/* There are only 256 approx bins, and in HSI they're divided into
+ * 32-bit values. As old VFs used to set-bit to the values on its side,
+ * the upper half of the array is never expected to contain any data.
+ */
+u64 bins[4];
+u64 obsolete_bins[4];
};
struct vfpf_vport_update_accept_param_tlv {
    --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qede/qede.h
    +++ linux-4.15.0/drivers/net/ethernet/qlogic/qede/qede.h
    @ @ -86,6 +86,7 @@
    u64 coalesced_aborts_num;
    u64 non_coalesced_pkts;
    u64 coalesced_bytes;
    +u64 ptp_skip_txts;

    /* port */
    u64 rx_64_byte_packets;
    @ @ -156,6 +157,8 @@
    struct list_head entry;
    struct list_head rdma_event_list;
    struct workqueue_struct *rdma_wq;
    +struct kref refcnt;
    +struct completion event_comp;
};

struct qede_ptp;
@ @ -178,6 +181,7 @@

const struct qed_eth_ops*ops;
struct qede_ptp*ptp;
+u64 ptp_skip_txts;

struct qed_dev_eth_info dev_info;
#define QEDE_MAX_RSS_CNT(edev)((edev)->dev_info.num_queues)
@ @ -526,12 +530,14 @@
#define RX_RING_SIZE(u16)BIT(RX_RING_SIZE_POW))
#define NUM_RX_BDS_MAX(RX_RING_SIZE - 1)
#define NUM_RX_BDS_MIN128
+##define NUM_RX_BDS_KDUMP_MIN63
#define NUM_RX_BDS_DEF((u16)BIT(10) - 1)

#define TX_RING_SIZE_POW13
#define TX_RING_SIZE((u16)BIT(TX_RING_SIZE_POW))
#define NUM_TX_BDS_MAX(TX_RING_SIZE - 1)
#define NUM_TX_BDS_MIN128
+##define NUM_TX_BDS_KDUMP_MIN63
#define NUM_TX_BDS_DEFNUM_TX_BDS_MAX

#define QEDE_MIN_PKT_LEN	64
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qede/qede_ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qede/qede_ethtool.c
@ @ -170,6 +170,8 @@
QEDE_STAT(coalesced_aborts_num),

QEDE_STAT(non_coalesced_pkts),
QEDE_STAT(coalesced_bytes),
+
+QEDE_STAT(ptp_skip_txts),
]

#define QEDE_NUM_STATS ARRAY_SIZE(qede_stats_arr)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qede/qede_filter.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qede/qede_filter.c
@@ -1181,7 +1181,7 @@
 netif_addr_lock_bh(ndev);

 mc_count = netdev.mc_count(ndev);
- if (mc_count < 64) {
+ if (mc_count <= 64) {
 netdev_for_each_mc_addr(ha, ndev) {
 ether_addr_copy(temp, ha->addr);
 temp += ETH_ALEN;
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qede/qede_fp.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qede/qede_fp.c
@@ -320,13 +320,11 @@
 barrier();
 writel(txq->tx_db.raw, txq->doorbell_addr);

-/* mmiowb is needed to synchronize doorbell writes from more than one
- * processor. It guarantees that the write arrives to the device before
- * the queue lock is released and another start_xmit is called (possibly
- * on another CPU). Without this barrier, the next doorbell can bypass
- * this doorbell. This is applicable to IA64/Altix systems.
+/* Fence required to flush the write combined buffer, since another
+ * CPU may write to the same doorbell address and data may be lost
+ * due to relaxed order nature of write combined bar.
+ */
+ mmiowb();
+ wmb();
} }

static int qede_xdp_xmit(struct qede_dev *edev, struct qede_fastpath *fp,
@@ -1248,16 +1246,10 @@
csum_flag = qede_check_csum(parse_flag);
 if (unlikely(csum_flag == QEDE_CSUM_ERROR)) {
- if (qede_pkt_is_ip_fragmented(fp_cqe, parse_flag)) {
+ if (qede_pkt_is_ip_fragmented(fp_cqe, parse_flag)) {
 rxq->rx_ip_frags++;
- } else {
- DP_NOTICE(edev,
- "CQE has error, flags = %x, dropping incoming packet\n",}
else
    rxq->rx_hw_errors++;
-qede_recycle_rx_bd_ring(rxq, fp_cqe->bd_num);
-return 0;
-
}

/* Basic validation passed; Need to prepare an SKB. This would also
@@ -1717,6 +1709,11 @@
    ntohs(udp_hdr(skb)->dest) != gnv_port))
return features & ~(NETIF_F_CSUM_MASK |
    NETIF_F_GSO_MASK);
+} else if (l4_proto == IPPROTO_IP) {
+    /* IP tunnels are unknown to the device or at least unsupported natively,
+    * offloads for them can't be done trivially, so disable them for such skb.
+    */
+    return features & ~(NETIF_F_CSUM_MASK | NETIF_F_GSO_MASK);
+}
}

--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qede/qede_main.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qede/qede_main.c
@@ -393,6 +394,7 @@
    p_common->brb_truncates = stats.common.brb_truncates;
    p_common->brb_discards = stats.common.brb_discards;
    p_common->tx_mac_ctrl_frames = stats.common.tx_mac_ctrl_frames;
+p_common->ptp_skip_txts = edev->ptp_skip_txts;
    if (QEDE_IS_BB(edev)) {
        struct qede_stats_bb *p_bb = &edev->stats.bb;
        @ @ -624,8 +626,14 @@
        edev->dp_module = dp_module;
        edev->dp_level = dp_level;
        edev->ops = qed_ops;
        -edev->q_num_rx_buffers = NUM_RX_BDS_DEF;
        -edev->q_num_tx_buffers = NUM_TX_BDS_DEF;
+        +if (is_kdump_kernel()) {
+            edev->q_num_rx_buffers = NUM_RX_BDS_KDUMP_MIN;
        }
+edev->q_num_tx_buffers = NUM_TX_BDS_KDUMP_MIN;
+} else {
+edev->q_num_rx_buffers = NUM_RX_BDS_DEF;
+edev->q_num_tx_buffers = NUM_TX_BDS_DEF;
+
}  

DP_INFO(edev, "Allocated netdev with %d tx queues and %d rx queues\n", info->num_queues, info->num_queues);
@@ -1052,8 +1060,16 @@
static void __qede_remove(struct pci_dev *pdev, enum qede_remove_mode mode)
{
    struct net_device *ndev = pci_get_drvdata(pdev);
    -struct qede_dev *edev = netdev_priv(ndev);
    -struct qed_dev *cdev = edev->cdev;
+struct qede_dev *edev;
+struct qed_dev *cdev;
+
+if (!ndev) {
+    dev_info(&pdev->dev, "Device has already been removed\n");
+    return;
+}
+
+edev = netdev_priv(ndev);
+cdev = edev->cdev;

    DP_INFO(edev, "Starting qede_remove\n");

    @@ -1575,6 +1591,7 @@
        edev->int_info.used_cnt = 0;
        +edev->int_info.msix_cnt = 0;
    }

static int qede_req_msix_irqs(struct qede_dev *edev)
    @@ -2000,6 +2017,9 @@
    out:
        if (!is_locked)
            __qede_unlock(edev);
        +edev->ptp_skip_txts = 0;
        +
        DP_INFO(edev, "Ending qede unload\n");
    }

    @@ -2066,8 +2086,6 @@
        link_params.link_up = true;
        edev->ops->common->set_link(edev->cdev, &link_params);

    edev->int_info.used_cnt = 0;
    +edev->int_info.msix_cnt = 0;
}
qede_rdma_dev_event_open(edev);

edev->state = QEDE_STATE_OPEN;

DP_INFO(edev, "Ending successfully qede load\n");
@@ -2075,7 +2093,6 @@
goto out;
err4:
qede_sync_free_irqs(edev);
-memset(&edev->int_info.msix_cnt, 0, sizeof(struct qed_int_info));
err3:
qede_napi_disable_remove(edev);
err2:
@@ -2168,12 +2185,14 @@
DP_NOTICE(edev, "Link is up\n");
netif_tx_start_all_queues(edev->ndev);
netif_carrier_on(edev->ndev);
+qede_rdma_dev_event_open(edev);
}
} else {
if (netif_carrier_ok(edev->ndev)) {
    DP_NOTICE(edev, "Link is down\n");
    netif_tx_disable(edev->ndev);
    netif_carrier_off(edev->ndev);
+qede_rdma_dev_event_close(edev);
}
}

--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qede/qede_ptp.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qede/qede_ptp.c
@@ -30,6 +30,7 @@
*/
#include "qede_ptp.h"
+#define QEDE_PTP_TX_TIMEOUT (2 * HZ)

struct qede_ptp {
    const struct qed_eth_ptp_ops*ops;
@@ -38,6 +39,7 @@
    struct timeoutrtc;
    struct ptp_clock*clock;
    struct work_struct*work;
        +unsigned longptp_tx_start;
    struct qede_dev*edev;
    struct sk_buff*tx_skb;

@@ -160,18 +162,30 @@
struct qede_dev *edev;
struct qede_ptp *ptp;
u64 timestamp, ns;
+bool timedout;
int rc;

ptp = container_of(work, struct qede_ptp, work);
edev = ptp->edev;
+timedout = time_is_before_jiffies(ptp->ptp_tx_start +
+QEDE_PTP_TX_TIMEOUT);

/* Read Tx timestamp registers */
spin_lock_bh(&ptp->lock);
rc = ptp->ops->read_tx_ts(edev->cdev, &timestamp);
spin_unlock_bh(&ptp->lock);
if (rc) {
-/* Reschedule to keep checking for a valid timestamp value */
-schedule_work(&ptp->work);
+if (unlikely(timedout)) {
+DP_INFO(edev, "Tx timestamp is not recorded\n");
+dev_kfree_skb_any(ptp->tx_skb);
+ptp->tx_skb = NULL;
+clear_bit_unlock(QEDE_FLAGS_PTP_TX_IN_PRORGESS,
+ &edev->flags);
+edev->ptp_skip_txts++;
+} else {
+/* Reschedule to keep checking for a valid TS value */
+schedule_work(&ptp->work);
+}
+return;
}

@@ -337,8 +351,14 @@
{
struct qede_ptp *ptp = edev->ptp;

-if (!ptp)
-return -EIO;
+if (!ptp) {
+info->so_timestamping = SOF_TIMESTAMPING_TX_SOFTWARE |
+SOF_TIMESTAMPING_RX_SOFTWARE |
+SOF_TIMESTAMPING_SOFTWARE;
+info->phc_index = -1;
+}
+return 0;
+
info->so_timestamping = SOF_TIMESTAMPING_TX_SOFTWARE |
ptp->clock = ptp_clock_register(&ptp->clock_info, &edev->pdev->dev);
if (IS_ERR(ptp->clock)) {
    -rc = -EINVAL;
    DP_ERR(edev, "PTP clock registration failed\n");
    +qede_ptp_disable(edev);
    +rc = -EINVAL;
    goto err2;
}
return 0;

-err2:
-qede_ptp_disable(edev);
-tp->clock = NULL;
err1:
    kfree(ptp);
+err2:
    edev->ptp = NULL;

return rc;
@@ -509,19 +528,28 @@
if (!ptp)
    return;

-if (test_and_set_bit_lock(QEDE_FLAGS_PTP_TX_IN_PRORGESS, &edev->flags))
+if (test_and_set_bit_lock(QEDE_FLAGS_PTP_TX_IN_PRORGESS, 
+    &edev->flags)) {
+    DP_ERR(edev, "Timestamping in progress\n");
+    edev->ptp_skip_txts++;
    return;
+}

if (unlikely(!edev->flags & QEDE_TX_TIMESTAMPING_EN)) {
    -DP_NOTICE(edev,
        - "Tx timestamping was not enabled, this packet will not be timestamped\n");
    +DP_ERR(edev,
        + "Tx timestamping was not enabled, this packet will not be timestamped\n");
    +clear_bit_unlock(QEDE_FLAGS_PTP_TX_IN_PRORGESS, &edev->flags);
    +edev->ptp_skip_txts++;
} else if (unlikely(ptp->tx_skb)) {
    -DP_NOTICE(edev,
        - "The device supports only a single outstanding packet to timestamp, this packet will not be timestamped\n");
    +DP_ERR(edev,
        + "The device supports only a single outstanding packet to timestamp, this packet will not be timestamped\n");
    +clear_bit_unlock(QEDE_FLAGS_PTP_TX_IN_PRORGESS, &edev->flags);
+edev->ptp_skip_txts++; 
} else {
    skb_shinfo(skb)->tx_flags |= SKBTX_IN_PROGRESS; 
/* schedule check for Tx timestamp */
    ptp->tx_skb = skb_get(skb);
+ptp->ptp_tx_start = jiffies;
    schedule_work(&ptp->work);
}

--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qede/qede_rdma.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qede/qede_rdma.c
@@ -57,6 +57,9 @@
static int qede_rdma_create_wq(struct qede_dev *edev)
{
    INIT_LIST_HEAD(&edev->rdma_info.rdma_event_list);
    +kref_init(&edev->rdma_info.refcnt);
    +init_completion(&edev->rdma_info.event_comp);
    +
edev->rdma_info.rdma_wq = create_singlethread_workqueue("rdma_wq");
    if (!edev->rdma_info.rdma_wq) {
        DP_NOTICE(edev, "qedr: Could not create workqueue\n");
@@ -81,8 +84,23 @@
}
+static void qede_rdma_complete_event(struct kref *ref)
+{
+    struct qede_rdma_dev *rdma_dev =
+    +container_of(ref, struct qede_rdma_dev, refcnt);
+    +/* no more events will be added after this */
+    +complete(&rdma_dev->event_comp);
+}
+    +
+    static void qede_rdma_destroy_wq(struct qede_dev *edev)
+    {
+        /* Avoid race with add_event flow, make sure it finishes before
+        + we start accessing the list and cleaning up the work
+        + */
+        +kref_put(&edev->rdma_info.refcnt, qede_rdma_complete_event);
+        +wait_for_completion(&edev->rdma_info.event_comp);
+        +qede_rdma_cleanup_event(edev);
+        destroy_workqueue(edev->rdma_info.rdma_wq);
+    }
@@ -238,7 +256,7 @@
if (!found) {
    event_node = kzalloc(sizeof(*event_node), GFP_KERNEL);
    event_node = kzalloc(sizeof(*event_node), GFP_ATOMIC);
    if (!event_node) {
        DP_NOTICE(edev, "qedr: Could not allocate memory for rdma work\n");
        return;
    }
    /* We don't want the cleanup flow to start while we're allocating and
     * scheduling the work
     */
    if (!kref_get_unless_zero(&edev->rdma_info.refcnt))
        return; /* already being destroyed */
    event_node = qede_rdma_get_free_event_node(edev);
    if (!event_node)
        goto out;
    event_node->event = event;
    event_node->ptr = edev;
    INIT_WORK(&event_node->work, qede_rdma_handle_event);
    queue_work(edev->rdma_info.rdma_wq, &event_node->work);
    kref_put(&edev->rdma_info.refcnt, qede_rdma_complete_event);
}

void qede_rdma_dev_event_open(struct qede_dev *edev)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qla3xxx.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qla3xxx.c
@@ -115,7 +115,7 @@
     value = readl(&port_regs->CommonRegs.semaphoreReg);
     if ((value & (sem_mask >> 16)) == sem_bits)
         return 0;
-    ssleep(1);
+    mdelay(1000);
 } while (--seconds);
 return -1;
 }
@@ -155,7 +155,7 @@
     "driver lock acquired\n");
 return 1;
 }
+mdelay(1000);
} while (++i < 10);

netdev_err(qdev->ndev, "Timed out waiting for driver lock...
");
			@ @ -380.8 +380.6 @ @

qdev->eeprom_cmd_data = AUBURN_EEPROM_CS_1;
ql_write_nvram_reg(qdev, spir, ISP_NVRAM_MASK | qdev->eeprom_cmd_data);
-ql_write_nvram_reg(qdev, spir,
-((ISP_NVRAM_MASK << 16) | qdev->eeprom_cmd_data));
}
/*
			@ @ -2758,6 +2756,9 @ @
int err;

for (i = 0; i < qdev->num_large_buffers; i++) {
+lrg_buf_cb = &qdev->lrg_buf[i];
+memset(lrg_buf_cb, 0, sizeof(struct ql_rcv_buf_cb));
+skb = netdev_alloc_skb(qdev->ndev,
+ldev->lrg_buffer_len);
 if (unlikely(!skb)) {
			@ @ -2768,11 +2769,7 @ @
ql_free_large_buffers(qdev);
 return -ENOMEM;
 } else {
- -lrg_buf_cb = &qdev->lrg_buf[i];
- -memset(lrg_buf_cb, 0, sizeof(struct ql_rcv_buf_cb));
 lrg_buf_cb->index = i;
- -lrg_buf_cb->skb = skb;
/*
 * We save some space to copy the ethhdr from first
 * buffer
				@ @ -2789,10 +2786,12 @ @
netdev_err(qdev->ndev,
 "PCI mapping failed with error: %d\n",
err);
+dev_kfree_skb_irq(skb);
ql_free_large_buffers(qdev);
return -ENOMEM;
}

+lrg_buf_cb->skb = skb;
dma_unmap_addr_set(lrg_buf_cb, mapaddr, map);
dma_unmap_len_set(lrg_buf_cb, maplen,
qdev->lrg_buffer_len -
```c
if ((value & ISP_CONTROL_SR) == 0)
    break;
ssleep(1);
mdelay(1000);
}
while (--max_wait_time);

ispControlStatus);
if ((value & ISP_CONTROL_FSR) == 0)
    break;
ssleep(1);
mdelay(1000);
}
while (--max_wait_time);
}
if (max_wait_time == 0)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic.h
@@ -1800,7 +1800,8 @@
    int (*config_loopback) (struct qlcnic_adapter *, u8);
    int (*clear_loopback) (struct qlcnic_adapter *, u8);
    int (*config_promisc_mode) (struct qlcnic_adapter *, u32);
-void (*change_l2_filter) (struct qlcnic_adapter *, u64 *, u16);
+void (*change_l2_filter)(struct qlcnic_adapter *adapter, u64 *addr,
 +    u16 vlan, struct qlcnic_host_tx_ring *tx_ring);
    int (*get_board_info) (struct qlcnic_adapter *);
    void (*set_mac_filter_count) (struct qlcnic_adapter *);
    void (*free_mac_list) (struct qlcnic_adapter *);
@@ -2064,9 +2065,10 @@
}
static inline void qlcnic_change_filter(struct qlcnic_adapter *adapter,
    -u64 *addr, u16 id)
    +u64 *addr, u16 vlan,
    +struct qlcnic_host_tx_ring *tx_ring)
{
    -adapter->ahw->hw_ops->change_l2_filter(adapter, addr, id);
    +adapter->ahw->hw_ops->change_l2_filter(adapter, addr, vlan, tx_ring);
}
static inline int qlcnic_get_board_info(struct qlcnic_adapter *adapter)
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_83xx_hw.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_83xx_hw.c
@@ -2134,7 +2134,8 @@
}
```
void qlcnic_83xx_change_l2_filter(struct qlcnic_adapter *adapter, u64 *addr,
- u16 vlan_id)
+ u16 vlan_id,
+ struct qlcnic_host_tx_ring *tx_ring)
{
    u8 mac[ETH_ALEN];
    memcpy(&mac, addr, ETH_ALEN);
    indirect_addr = QLC_83XX_FLASH_DIRECT_DATA(addr);
    ret = QLCRD32(adapter, indirect_addr, &err);
    -if (err == -EIO)
    +if (err == -EIO) {
    +qlcnic_83xx_unlock_flash(adapter);
    return err;
    +}

    word = ret;
    *(u32 *)p_data = word;
    ahw->diag_cnt = 0;
    ret = qlcnic_alloc_mbx_args(&cmd, adapter, QLCNIC_CMD_INTRPT_TEST);
    if (ret)
        goto fail_diag_irq;
    +goto fail_mbx_args;

    if (adapter->flags & QLCNIC_MSIX_ENABLED)
        intrpt_id = ahw->intr_tbl[0].id;
    @@ -3679,6 +3682,8 @@
        goto fail_mbx_args;

    done:
    qlcnic_free_mbx_args(&cmd);
    +
    +fail_mbx_args:
    qlcnic_83xx_diag_free_res(netdev, drv_sds_rings);

    fail_diag_irq:
    @@ -3891,7 +3896,7 @@
        struct list_head *head = &mbx->cmd_q;
        struct qlcnic_cmd_args *cmd = NULL;

        -spin_lock(&mbx->queue_lock);
        +spin_lock_bh(&mbx->queue_lock);

        while (!list_empty(head)) {
            cmd = list_entry(head->next, struct qlcnic_cmd_args, list);
            @@ -3902,7 +3907,7 @@
            qlcnic_83xx_notify_cmd_completion(adapter, cmd);
static int qlcnic_83xx_check_mbx_status(struct qlcnic_adapter *adapter)
{
    struct qlcnic_mailbox *mbx = adapter->ahw->mailbox;

    spin_lock_bh(&mbx->queue_lock);
    list_del(&cmd->list);
    mbx->num_cmds--;
    spin_unlock_bh(&mbx->queue_lock);

    qlcnic_83xx_notify_cmd_completion(adapter, cmd);
    spin_unlock_bh(&mbx->queue_lock);
    list_add_tail(&cmd->list, &mbx->cmd_q);
    mbx->num_cmds++;
    *timeout = cmd->total_cmds * QLC_83XX_MBX_TIMEOUT;
    queue_work(mbx->work_q, &mbx->work);

    spin_unlock_bh(&mbx->queue_lock);

    return 0;
}

mbx->rsp_status = QLC_83XX_MBX_RESPONSE_WAIT;
spin_unlock_irqrestore(&mbx->aen_lock, flags);

spin_lock(&mbx->queue_lock);
spin_unlock_bh(&mbx->queue_lock);
if (list_empty(head)) {
spin_unlock(&mbx->queue_lock);
+spin_unlock_bh(&mbx->queue_lock);
return;
}
cmd = list_entry(head->next, struct qlcnic_cmd_args, list);

-spin_unlock(&mbx->queue_lock);
+spin_unlock_bh(&mbx->queue_lock);

mbx_ops->encode_cmd(adapter, cmd);
mbx_ops->notify_fw(adapter, QLC_83XX_MBX_REQUEST);
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_83xx_hw.h
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_83xx_hw.h
@@ -550,7 +550,8 @@
int qlcnic_83xx_nic_set_promisc(struct qlcnic_adapter *, u32);
int qlcnic_83xx_config_hw_lro(struct qlcnic_adapter *, int);
int qlcnic_83xx_config_rss(struct qlcnic_adapter *, int);
-void qlcnic_83xx_change_l2_filter(struct qlcnic_adapter *, u64 *, u16);
+void qlcnic_83xx_change_l2_filter(struct qlcnic_adapter *adapter, u64 *addr,
+   u16 vlan, struct qlcnic_host_tx_ring *ring);
int qlcnic_83xx_get_pci_info(struct qlcnic_adapter *, struct qlcnic_pci_info *);
int qlcnic_83xx_set_nic_info(struct qlcnic_adapter *, struct qlcnic_info *);
void qlcnic_83xx_initialize_nic(struct qlcnic_adapter *, int);
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_83xx_init.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_83xx_init.c
@@ -1720,7 +1720,7 @@
ahw->reset.seq_error = 0;
ahw->reset.buff = kzalloc(QLC_83XX_RESTART_TEMPLATE_SIZE, GFP_KERNEL);
-if (p_dev->ahw->reset.buff == NULL)
+if (ahw->reset.buff == NULL)
   return -ENOMEM;
p_buff = p_dev->ahw->reset.buff;
@@ -2043,6 +2043,7 @@
break;
}
entry += p_hdr->size;
+cond_resched();
}
p_dev->ahw->reset.seq_index = index;
}
@@ -2250,7 +2250,8 @@
/* Boot either flash image or firmware image from host file system */
if (qlcnic_load_fw_file == 1) {
-if (qlcnic_83xx_load_fw_image_from_host(adapter))
+err = qlcnic_83xx_load_fw_image_from_host(adapter);
+if (err)
    return err;
} else {
    QLC_SHARED_REG_WR32(adapter, QLCNIC_FW_IMG_VALID,
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_dcb.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_dcb.c
@@ -883,7 +883,7 @@
    struct qlcnic_adapter *adapter = netdev_priv(netdev);

    if (!test_bit(QLCNIC_DCB_STATE, &adapter->dcb->state))
-       return 0;
+       return 1;
    switch (capid) {
      case DCB_CAP_ATTR_PG:
      -- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_ethtool.c
      +++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_ethtool.c
        for (i = 0; i < QLCNIC_NUM_ILB_PKT; i++) {
          skb = netdev_alloc_skb(adapter->netdev, QLCNIC_ILB_PKT_SIZE);
          skb_put(skb, QLCNIC_ILB_PKT_SIZE);
          qlcnic_put(skb, adapter->mac_addr);
          adapter->ahw->diag_cnt = 0;
@@ -1070,6 +1072,7 @@
            cnt++;
      }
      if (cnt != i) {
        +error:
        dev_err(&adapter->pdev->dev,
             "LB Test: failed, TX[%d], RX[%d]", i, cnt);
        if (mode != QLCNIC_ILB_MODE)  
            -- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_hw.h
        ++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_hw.h
            struct net_device *netdev);
    void qlcnic_82xx_get beacon state(struct qlcnic Adapter *);
    void qlcnic_82xx_change filter(struct qlcnic Adapter *adapter,
       - u64 *uaddr, u16 vlan_id);
       + u64 *uaddr, u16 vlan_id,
       + struct qlcnic host tx ring *tx_ring);
    int qlcnic_82xx config intr coalesce(struct qlcnic Adapter *,
       struct ethtool_coalesce *
    int qlcnic_82xx_set rx coalesce(struct qlcnic Adapter *);
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_init.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_init.c

QLCWR32(adapter, QLCNIC_CRB_PEG_NET_4 + 0x3c, 1);
msleep(20);

- qlcenic_rom_unlock(adapter);

/* big hammer don't reset CAM block on reset */
QLCWR32(adapter, QLCNIC_ROMUSB_GLB_SW_RESET, 0xfffffff);

--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcenic/qlcenic_io.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcenic/qlcenic_io.c
@@ -440,7 +440,6 @@
QLCWR32(adapter, QLCNIC_ROMUSB_GLB_SW_RESET, 0xfffffff);

--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcenic/qlcenic_io.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcenic/qlcenic_io.c
@@ -268,13 +268,12 @@
}

void qlcenic_82xx_change_filter(struct qlcenic_adapter *adapter, u64 *uaddr,
+ u16 vlan_id, struct qlcenic_host_tx_ring *tx_ring)
{
  struct cmd_desc_type0 *hwdesc;
  struct qlcenic_nic_req *req;
  struct qlcenic_mac_req *mac_req;
  struct qlcenic_vlan_req *vlan_req;
+  struct qlcenic_host_tx_ring *tx_ring = adapter->tx_ring;
  u32 producer;
  u64 word;

+    struct sk_buff *skb,
+    struct qlcenic_host_tx_ring *tx_ring)
+
+  struct vlan_ethhdr *vh = (struct vlan_ethhdr *)(skb->data);
+  struct ethhdr *phdr = (struct ethhdr *)(skb->data);
+  if (jiffies > (QLCNIC_READD_AGE * HZ + tmp_fil->ftime))
+    qlcenic_change_filter(adapter, &src_addr,
+      vlan_id);
+  tmp_fil->ftime = jiffies;
+  return;
+
+  if (!fil)
+    return;

static void qlcenic_send_filter(struct qlcenic_adapter *adapter,
  struct cmd_desc_type0 *first_desc,
-  struct sk_buff *skb)
+  struct sk_buff *skb,
+  struct qlcenic_host_tx_ring *tx_ring)
  {
  struct vlan_ethhdr *vh = (struct vlan_ethhdr *)(skb->data);
  struct ethhdr *phdr = (struct ethhdr *)(skb->data);
  if (jiffies > (QLCNIC_READD_AGE * HZ + tmp_fil->ftime))
    qlcenic_change_filter(adapter, &src_addr,
      vlan_id);
  tmp_fil->ftime = jiffies;
  return;
  }
+  if (!fil)
+    return;

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- qlcnic_change_filter(adapter, &src_addr, vlan_id);
+ qlcnic_change_filter(adapter, &src_addr, vlan_id, tx_ring);
fil->ftime = jiffies;
fil->vlan_id = vlan_id;
memcpy(fil->faddr, &src_addr, ETH_ALEN);
@@ -766,7 +766,7 @@
}

if (adapter->drv_mac_learn)
- qlcnic_send_filter(adapter, first_desc, skb);
+ qlcnic_send_filter(adapter, first_desc, skb, tx_ring);

tx_ring->tx_stats.tx_bytes += skb->len;
tx_ring->tx_stats.xmit_called++;
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_main.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_main.c
@@ -2511,6 +2511,7 @@
qlcnic_sriov_vf_register_map(ahw);
break;
default:
+ err = -EINVAL;
goto err_out_free_hw_res;
}
@@ -2710,6 +2711,7 @@
kfree(ahw);

err_out_free_res:
+pci_disable_pcie_error_reporting(pdev);
pci_release_regions(pdev);

err_out_disable_pdev:
--- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_minidump.c
+++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_minidump.c
@@ -703,6 +703,7 @@
addr += 16;
reg_read -= 16;
ret += 16;
+ cond_resched();
out:
mutex_unlock(&adapter->ahw->mem_lock);
@@ -1383,6 +1384,7 @@
buf_offset += entry->hdr.cap_size;
entry_offset += entry->hdr.offset;
buffer = fw_dump->data + buf_offset;
+ cond_resched();
}
fw_dump->clr = 1;
@@ -1424,6 +1426,7 @@
    if (fw_dump->tmpl_hdr == NULL || current_version > prev_version) {
        vfree(fw_dump->tmpl_hdr);
        +fw_dump->tmpl_hdr = NULL;
    }

    if (qlcnic_83xx_md_check_extended_dump_capability(adapter))
        extended = !qlcnic_83xx_extend_md_capab(adapter);
@@ -1442,6 +1445,8 @@
        struct qlcnic_83xx_dump_template_hdr *hdr;

        hdr = fw_dump->tmpl_hdr;
        +if (!hdr)
        +return;
        hdr->drv_cap_mask = 0x1f;
        fw_dump->cap_mask = 0x1f;
    dev_info(&pdev->dev,
 --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlcnic/qlcnic_sysfs.c
 +++ linux-4.15.0/drivers/net/ethernet/qlogic/qlcnic/qlcnic_sysfs.c
 @@ -1128,6 +1128,8 @@
             struct qlcnic_adapter *adapter = dev_get_drvdata(dev);

            ret = kstrtoul(buf, 16, &data);
            +if (ret)
            +return ret;

        switch (data) {
            case QLC_83XX_FLASH_SECTOR_ERASE_CMD:
 --- linux-4.15.0.orig/drivers/net/ethernet/qlogic/qlge/qlge_main.c
 +++ linux-4.15.0/drivers/net/ethernet/qlogic/qlge/qlge_main.c
 @@ -2385,26 +2385,20 @@
             return status;
         }

         -static netdev_features_t qlge_fix_features(struct net_device *ndev,
         -netdev_features_t features)
         -{
         -    -
         -    /* Update the behavior of vlan accel in the adapter */
         -    -err = qlge_update_hw_vlan_features(ndev, features);
         -    -if (err)
         -        -return err;
         -    -return features;
         -}
static int qlge_set_features(struct net_device *ndev, 
netdev_features_t features)
{
    netdev_features_t changed = ndev->features ^ features;
    int err;
    
    if (changed & NETIF_F_HW_VLAN_CTAG_RX) {
        /* Update the behavior of vlan accel in the adapter */
        err = qlge_update_hw_vlan_features(ndev, features);
        if (err)
            return err;
    }

    return 0;
}

if (changed & NETIF_F_HW_VLAN_CTAG_RX)
    qlge_vlan_mode(ndev, features);
+

return 0;
}

@@ -4718,7 +4712,6 @@
    .ndo_set_mac_address= qlge_set_mac_address,
    .ndo_validate_addr= eth_validate_addr,
    .ndo_tx_timeout= qlge_tx_timeout,
-    .ndo_fix_features= qlge_fix_features,
+    .ndo_fix_features= qlge_fix_features,
    .ndo_set_features= qlge_set_features,
    .ndo_vlan_rx_add_vid= qlge_vlan_rx_add_vid,
    .ndo_vlan_rx_kill_vid= qlge_vlan_rx_kill_vid,
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/emac/emac-mac.c
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/emac/emac-mac.c
@@ -1194,9 +1194,9 @@
    while (tx_q->tpd.consume_idx != hw_consume_idx) {
        tpbuf = GET_TPD_BUFFER(tx_q, tx_q->tpd.consume_idx);
        if (tpbuf->dma_addr) {
-            dma_unmap_single(adpt->netdev->dev.parent,
+            dma_unmap_page(adpt->netdev->dev.parent,
                tpbuf->dma_addr, tpbuf->length,
                DMA_TO_DEVICE);
            + dma_unmap_page(adpt->netdev->dev.parent,
+                tpbuf->dma_addr, tpbuf->length,
+                DMA_TO_DEVICE);
            tpbuf->dma_addr = 0;
        } 

        @@ -1353,9 +1353,11 @@
        tpbuf = GET_TPD_BUFFER(tx_q, tx_q->tpd.produce_idx);
        if (tpbuf->dma_addr) {
            - dma_unmap_single(adpt->netdev->dev.parent,
-                tpbuf->dma_addr, tpbuf->length,
-                DMA_TODEVICE);
+            dma_unmap_page(adpt->netdev->dev.parent,
+                tpbuf->dma_addr, tpbuf->length,
+                DMA_TODEVICE);
            tpbuf->dma_addr = 0;
        }
DMA_TODEVICE);
+tpbuf->dma_addr = dma_map_page(adpt->netdev->dev.parent,
+virt_to_page(skb->data),
+offset_in_page(skb->data),
+tpbuf->length,
+DMA_TODEVICE);
ret = dma_mapping_error(adpt->netdev->dev.parent,
+tpbuf->dma_addr);
if (ret)
@@ -1371,9 +1373,12 @@
if (mapped_len < len) {
  tpbuf = GET_TPDBUFFER(tx_q, tx_q->tpd.produce_idx);
  tpbuf->length = len - mapped_len;
-tpbuf->dma_addr = dma_map_single(adpt->netdev->dev.parent,
-skb->data + mapped_len,
-tpbuf->length, DMA_TODEVICE);
+tpbuf->dma_addr = dma_map_page(adpt->netdev->dev.parent,
 +virt_to_page(skb->data +
 +mapped_len),
 +offset_in_page(skb->data +
 +mapped_len),
 +tpbuf->length, DMA_TODEVICE);
ret = dma_mapping_error(adpt->netdev->dev.parent,
+tpbuf->dma_addr);
if (ret)
@@ -1443,6 +1448,7 @@
{
  struct emac_tpd tpd;
  u32 prod_idx;
+int len;
  memset(&tpd, 0, sizeof(tpd));

@@ -1462,9 +1468,10 @@
if (skb_network_offset(skb) != ETH_HLEN)
  TPD_TYP_SET(&tpd, 1);
+len = skb->len;
  emac_tx_fill_tpd(adpt, tx_q, skb, &tpd);
-  netdev_sent_queue(adpt->netdev, skb->len);
+  netdev_sent_queue(adpt->netdev, len);

/* Make sure the are enough free descriptors to hold one
 * maximum-sized SKB. We need one dese for each fragment,
ret = clk_prepare_enable(adpt->clk[EMAC_CLK_CFG_AHB]);
if (ret)
    -return ret;
+  goto disable_clk_axi;

ret = clk_set_rate(adpt->clk[EMAC_CLK_HIGH_SPEED], 19200000);
if (ret)
    -return ret;
+  goto disable_clk_cfg_ahb;
+
+  ret = clk_prepare_enable(adpt->clk[EMAC_CLK_HIGH_SPEED]);
+  if (ret)
+    goto disable_clk_cfg_ahb;
+
+  return 0;

-return clk_prepare_enable(adpt->clk[EMAC_CLK_HIGH_SPEED]);
+  disable_clk_cfg_ahb:
+  clk_disable_unprepare(adpt->clk[EMAC_CLK_CFG_AHB]);
+  +
+  clk_prepare_enable(adpt->clk[EMAC_CLK_HIGH_SPEED]);
+  if (ret)
+    goto disable_clk_cfg_ahb;
+
+  disable_clk_axi:
+  clk_disable_unprepare(adpt->clk[EMAC_CLK_AXI]);
+
+  return ret;
}

/* Enable clocks; needs emac_clks_phase1_init to be called before */
@@ -745,12 +756,13 @@
put_device(&adpt->phydev->mdio.dev);
mdiobus_unregister(adpt->mii_bus);
-free_netdev(netdev);
+free_netdev(netdev);

if (adpt->phy.digital)
iounmap(adpt->phy.digital);
iounmap(adpt->phy.base);
+free_netdev(netdev);
+
return 0;
}

--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/qca_7k.c
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/qca_7k.c
@@ -45,34 +45,33 @@
{
__be16 rx_data;
__be16 tx_data;

struct spi_transfer *transfer;
struct spi_message *msg;
+struct spi_transfer transfer[2];
+struct spi_message msg;
int ret;

+memset(transfer, 0, sizeof(transfer));
+
+spi_message_init(&msg);
+
+tx_data = cpu_to_be16(QCA7K_SPI_READ | QCA7K_SPI_INTERNAL | reg);
+*result = 0;
+
+transfer[0].tx_buf = &tx_data;
+transfer[0].len = QCASPI_CMD_LEN;
+transfer[1].rx_buf = &rx_data;
+transfer[1].len = QCASPI_CMD_LEN;
+
+spi_message_add_tail(&transfer[0], &msg);

if (qca->legacy_mode) {
-msg = &qca->spi_msg1;
-transfer = &qca->spi_xfer1;
-transfer->tx_buf = &tx_data;
-transfer->rx_buf = NULL;
-transfer->len = QCASPI_CMD_LEN;
-spi_sync(qca->spi_dev, msg);
} else {
-msg = &qca->spi_msg2;
-transfer = &qca->spi_xfer2[0];
-transfer->tx_buf = &tx_data;
-transfer->rx_buf = NULL;
-transfer->len = QCASPI_CMD_LEN;
-transfer = &qca->spi_xfer2[1];
+spi_sync(qca->spi_dev, &msg);
+spi_message_init(&msg);
}
+spi_message_add_tail(&transfer[1], &msg);
+ret = spi_sync(qca->spi_dev, &msg);

if (!ret)
-ret = msg->status;
+ret = msg.status;
if (ret)
qcaspi_spi_error(qca);
@@ -86,35 +85,32 @@
qcaspi_write_register(struct qcaspi *qca, u16 reg, u16 value)
{
    __be16 tx_data[2];
    -struct spi_transfer *transfer;
    -struct spi_message *msg;
    +struct spi_transfer transfer[2];
    +struct spi_message msg;
    int ret;

    +memset(&transfer, 0, sizeof(transfer));
    +
    +spi_message_init(&msg);
    +
    tx_data[0] = cpu_to_be16(QCA7K_SPI_WRITE | QCA7K_SPI_INTERNAL | reg);
    tx_data[1] = cpu_to_be16(value);

    +transfer[0].tx_buf = &tx_data[0];
    +transfer[0].len = QCASPI_CMD_LEN;
    +transfer[1].tx_buf = &tx_data[1];
    +transfer[1].len = QCASPI_CMD_LEN;
    +
    +spi_message_add_tail(&transfer[0], &msg);
    if (qca->legacy_mode) {
        -msg = &qca->spi_msg1;
        -transfer = &qca->spi_xfer1;
        -transfer->tx_buf = &tx_data[0];
        -transfer->rx_buf = NULL;
        -transfer->len = QCASPI_CMD_LEN;
        -spi_sync(qca->spi_dev, msg);
    } else {
        -msg = &qca->spi_msg2;
        -transfer = &qca->spi_xfer2[0];
        -transfer->tx_buf = &tx_data[0];
        -transfer->rx_buf = NULL;
        -transfer->len = QCASPI_CMD_LEN;
        -transfer = &qca->spi_xfer2[1];
        +spi_sync(qca->spi_dev, &msg);
        +spi_message_init(&msg);
    }
    -transfer->tx_buf = &tx_data[1];
    -transfer->rx_buf = NULL;
    -transfer->len = QCASPI_CMD_LEN;
    -ret = spi_sync(qca->spi_dev, msg);
    +spi_message_add_tail(&transfer[1], &msg);
    +ret = spi_sync(qca->spi_dev, &msg);
if (!ret)
    ret = msg->status;
+ret = msg.status;

if (ret)
    qcaspi_spi_error(qca);
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/qca_spi.c
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/qca_spi.c
@@ -99,22 +99,24 @@
qcaspi_write_burst(struct qcaspi *qca, u8 *src, u32 len)
{
    __be16 cmd;
    struct spi_message *msg = &qca->spi_msg2;
    struct spi_transfer *transfer = &qca->spi_xfer2[0];
    +struct spi_message msg;
    +struct spi_transfer transfer[2];
    int ret;

    -cmd = cpu_to_be16(QCA7K_SPI_WRITE | QCA7K_SPI_EXTERNAL);
    -transfer->tx_buf = &cmd;
    -transfer->rx_buf = NULL;
    -transfer->len = QCASPI_CMD_LEN;
    -transfer = &qca->spi_xfer2[1];
    -transfer->tx_buf = src;
    -transfer->rx_buf = NULL;
    -transfer->len = len;
    +memset(&transfer, 0, sizeof(transfer));
    +spi_message_init(&msg);

    -ret = spi_sync(qca->spi_dev, msg);
    +ret = spi_sync(qca->spi_dev, msg);
    +cmd = cpu_to_be16(QCA7K_SPI_WRITE | QCA7K_SPI_EXTERNAL);
    +transfer[0].tx_buf = &cmd;
    +transfer[0].len = QCASPI_CMD_LEN;
    +transfer[1].tx_buf = src;
    +transfer[1].len = len;
    +
    +spi_message_add_tail(&transfer[0], &msg);
    +spi_message_add_tail(&transfer[1], &msg);
    +ret = spi_sync(qca->spi_dev, &msg);

    -if (ret || (msg->actual_length != QCASPI_CMD_LEN + len)) {
    +if (ret || (msg.actual_length != QCASPI_CMD_LEN + len)) {
        qcaspi_spi_error(qca);
        return 0;
    }
}
qcaspi_write_legacy(struct qcaspi *qca, u8 *src, u32 len)
{
    struct spi_message *msg = &qca->spi_msg1;
    struct spi_transfer *transfer = &qca->spi_xfer1;
    struct spi_message msg;
    struct spi_transfer transfer;
    int ret;

    transfer->tx_buf = src;
    transfer->rx_buf = NULL;
    transfer->len = len;
    memset(&transfer, 0, sizeof(transfer));
    spi_message_init(&msg);

    ret = spi_sync(qca->spi_dev, msg);
    transfer.tx_buf = src;
    transfer.len = len;

    if (ret || (msg->actual_length != len)) {
        spi_message_add_tail(&transfer, &msg);
        ret = spi_sync(qca->spi_dev, &msg);
    }
    if (ret || (msg.actual_length != len)) {
        qcaspi_spi_error(qca);
        return 0;
    }
}

static u32 qcaspi_read_burst(struct qcaspi *qca, u8 *dst, u32 len)
{
    struct spi_message *msg = &qca->spi_msg2;
    struct spi_message msg;
    __be16 cmd;
    struct spi_transfer *transfer = &qca->spi_xfer2[0];
    struct spi_transfer transfer[2];
    int ret;

    cmd = cpu_to_be16(QCA7K_SPI_READ | QCA7K_SPI_EXTERNAL);
    transfer->tx_buf = &cmd;
    transfer->rx_buf = NULL;
    transfer->len = QCASPI_Cmd_LEN;
    transfer = &qca->spi_xfer2[1];
    transfer->tx_buf = NULL;
    transfer->rx_buf = dst;
    transfer->len = len;
    memset(&transfer, 0, sizeof(transfer));
    spi_message_init(&msg);
-ret = spi_sync(qca->spi_dev, msg);
+cmd = cpu_to_be16(QCA7K_SPI_READ | QCA7K_SPI_EXTERNAL);
+transfer[0].tx_buf = &cmd;
+transfer[0].len = QCASPI_CMD_LEN;
+transfer[1].rx_buf = dst;
+transfer[1].len = len;
+
+spi_message_add_tail(&transfer[0], &msg);
+spi_message_add_tail(&transfer[1], &msg);
+ret = spi_sync(qca->spi_dev, &msg);

@if (ret || (msg->actual_length != QCASPI_CMD_LEN + len)) {
+if (ret || (msg.actual_length != QCASPI_CMD_LEN + len)) {
    qcaspi_spi_error(qca);
    return 0;
}

static u32
qcaspi_read_legacy(struct qcaspi *qca, u8 *dst, u32 len)
{
-struct spi_message *msg = &qca->spi_msg1;
-struct spi_transfer *transfer = &qca->spi_xfer1;
+struct spi_message msg;
+struct spi_transfer transfer;
+int ret;

-transfer->tx_buf = NULL;
-transfer->rx_buf = dst;
-transfer->len = len;
+memset(&transfer, 0, sizeof(transfer));
+spi_message_init(&msg);
+
+transfer.rx_buf = dst;
+transfer.len = len;

-ret = spi_sync(qca->spi_dev, msg);
+spi_message_add_tail(&transfer, &msg);
+ret = spi_sync(qca->spi_dev, &msg);

-if (ret || (msg->actual_length != len)) {
+if (ret || (msg.actual_length != len)) {
    qcaspi_spi_error(qca);
    return 0;
}

qcaspi_tx_cmd(struct qcaspi *qca, u16 cmd)
{
    __be16 tx_data;
struct spi_message *msg = &qca->spi_msg1;
struct spi_transfer *transfer = &qca->spi_xfer1;
+struct spi_message msg;
+struct spi_transfer transfer;
int ret;

+memset(&transfer, 0, sizeof(transfer));
+
+spi_message_init(&msg);
+
tx_data = cpu_to_be16(cmd);
-transfer->len = sizeof(tx_data);
-transfer->tx_buf = &tx_data;
-transfer->rx_buf = NULL;
+transfer.len = sizeof(cmd);
+transfer.tx_buf = &tx_data;
+spi_message_add_tail(&transfer, &msg);

-ret = spi_sync(qca->spi_dev, msg);
+ret = spi_sync(qca->spi_dev, &msg);

if (!ret)
-ret = msg->status;
+ret = msg.status;

if (ret)
qcaspi_spi_error(qca);
@@ -399,7 +413,7 @@
skb_put(qca->rx_skb, retcode);
qca->rx_skb->protocol = eth_type_trans(
qca->rx_skb, qca->rx_skb->dev);
-qca->rx_skb->ip_summed = CHECKSUM_UNNECESSARY;
+skb_checksum_none_assert(qca->rx_skb);
netif_rx_ni(qca->rx_skb);
qca->rx_skb = netdev_alloc_skb_ip_align(net_dev,
net_dev->mtu + VLAN_ETH_HLEN);
@@ -461,7 +475,6 @@
u16 signature = 0;
u16 spi_config;
u16 wrbuf_space = 0;
-static u16 reset_count;

if (event == QCASPI_EVENT_CPUON) {
 /* Read signature twice, if not valid
@@ -514,13 +527,13 @@
quca->sync = QCASPI_SYNC_RESET;
quca->stats.trig_reset++;
reset_count = 0;
qca->reset_count = 0;
bias;

case QCASPI_SYNC_RESET:
reset_count++;
qca->reset_count++;
netdev_dbg(qca->net_dev, "sync: waiting for CPU on, count %u\n",
- reset_count);
-if (reset_count >= QCASPI_RESET_TIMEOUT) {
+ qca->reset_count);
+if (qca->reset_count >= QCASPI_RESET_TIMEOUT) {
/* reset did not seem to take place, try again */
qca->sync = QCASPI_SYNC_UNKNOWN;
qca->stats.reset_timeout++;
@@ -658,7 +671,7 @@
return ret;
}

-netif_start_queue(qca->net_dev);
+/* SPI thread takes care of TX queue */

return 0;
}
@@ -761,6 +774,9 @@
qca->net_dev->stats.tx_errors++;
/* Triger tx queue flush and QCA7000 reset */
qca->sync = QCASPI_SYNC_UNKNOWN;
+ 
+if (qca->spi_thread)
+wake_up_process(qca->spi_thread);
}

static int
@@ -833,16 +849,6 @@
qca = netdev_priv(dev);
memset(qca, 0, sizeof(struct qcaspi));

-memset(&qca->spi_xfer1, 0, sizeof(struct spi_transfer));
-memset(&qca->spi_xfer2, 0, sizeof(struct spi_transfer) * 2);
-
-spi_message_init(&qca->spi_msg1);
-spi_message_add_tail(&qca->spi_xfer1, &qca->spi_msg1);
-
-spi_message_init(&qca->spi_msg2);
-spi_message_add_tail(&qca->spi_xfer2[0], &qca->spi_msg2);
-spi_message_add_tail(&qca->spi_xfer2[1], &qca->spi_msg2);
-
memset(&qca->txr, 0, sizeof(qca->txr));
qca->txr.count = TX_RING_MAX_LEN;
}
@@ -879,22 +885,22 @@
if ((qcaspi_clkspeed < QCASPI_CLK_SPEED_MIN) ||
    (qcaspi_clkspeed > QCASPI_CLK_SPEED_MAX)) {
  -dev_info(&spi->dev, "Invalid clkspeed: %d\n",
  - qcaspi_clkspeed);
  +dev_err(&spi->dev, "Invalid clkspeed: %d\n",
  +qcaspi_clkspeed);
  return -EINVAL;
}

if ((qcaspi_burst_len < QCASPI_BURST_LEN_MIN) ||
    (qcaspi_burst_len > QCASPI_BURST_LEN_MAX)) {
  -dev_info(&spi->dev, "Invalid burst len: %d\n",
  - qcaspi_burst_len);
  +dev_err(&spi->dev, "Invalid burst len: %d\n",
  +qcaspi_burst_len);
  return -EINVAL;
}

if ((qcaspi_pluggable < QCASPI_PLUGGABLE_MIN) ||
    (qcaspi_pluggable > QCASPI_PLUGGABLE_MAX)) {
  -dev_info(&spi->dev, "Invalid pluggable: %d\n",
  - qcaspi_pluggable);
  +dev_err(&spi->dev, "Invalid pluggable: %d\n",
  +qcaspi_pluggable);
  return -EINVAL;
}
@@ -956,8 +962,8 @@
if (register_netdev(qcaspi_devs)) {
  -dev_info(&spi->dev, "Unable to register net device %s\n",
  - qcaspi_devs->name);
  +dev_err(&spi->dev, "Unable to register net device %s\n",
  +qcaspi_devs->name);
  free_netdev(qcaspi_devs);
  return -EFAULT;
}
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/qca_spi.h
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/qca_spi.h
@@ -83,11 +83,6 @@
 struct tx_ring txr;
 struct qcaspi_stats stats;

-struct spi_message spi_msg1;
-struct spi_message spi_msg2;
-struct spi_transfer spi_xfer1;
-struct spi_transfer spi_xfer2[2];
-
  u8 *rx_buffer;
u32 buffer_size;
u8 sync;
@@ -97,6 +92,7 @@
unsigned int intr_req;
unsigned int intr_svc;
+u16 reset_count;

#ifdef CONFIG_DEBUG_FS
struct dentry *device_root;
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/qca_uart.c
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/qca_uart.c
@@ -107,7 +107,7 @@
skb_put(qca->rx_skb, retcode);
qca->rx_skb->protocol = eth_type_trans(
qca->rx_skb, qca->rx_skb->dev);
- qca->rx_skb->ip_summed = CHECKSUM_UNNECESSARY;
+ skb_checksum_none_assert(qca->rx_skb);
netif_rx_ni(qca->rx_skb);
qca->rx_skb = netdev_alloc_skb_ip_align(netdev,
netdev->mtu +
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/rmnet/rmnet_config.c
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/rmnet/rmnet_config.c
@@ -67,10 +67,10 @@
if (port->nr_rmnet_devs)
return -EINVAL;

-kfree(port);
-
-netdev_rx_handler_unregister(real_dev);

+kfree(port);
+
/* release reference on real_dev */
dev_put(real_dev);

@@ -155,6 +155,11 @@
int err = 0;
u16 mux_id;

+if (!tb[IFLA_LINK]) {
+NL_SET_ERR_MSG_MOD(extack, "link not specified");
real_dev = __dev_get_by_index(src_net, nla_get_u32(tb[IFLA_LINK]));
if (!real_dev || !dev)
    return -ENODEV;

port = rmnet_get_port_rtnl(dev);
d.port = port;

netdev_walk_all_lower_dev_rcu(real_dev, rmnet_dev_walk_reg, &d);
unregister_netdevice_many(&list);

rmnet_unregister_real_device(real_dev, port);

/* Needs either rcu_read_lock() or rtnl lock */
-struct rmnet_port *rmnet_get_port(struct net_device *real_dev)
+struct rmnet_port *rmnet_get_port_rtnl(struct net_device *real_dev)
{
    if (rmnet_is_real_dev_registered(real_dev))
        return rcu_dereference_rtnl(real_dev->rx_handler_data);
    else
        return NULL;
}

struct rmnet_port *port, *slave_port;
int err;

-port = rmnet_get_port(real_dev);
+port = rmnet_get_port_rtnl(real_dev);

/* If there is more than one rmnet dev attached, its probably being
 * used for muxing. Skip the briding in that case
 @ @ -383,7 +385,7 @@
 if (err)
     return -EINVAL;

-slave_port = rmnet_get_port(slave_dev);
+slave_port = rmnet_get_port_rtnl(slave_dev);
slave_port->rmnet_mode = RMNET_EPMODE_BRIDGE;
slave_port->bridge_ep = real_dev;

@@ -401,12 +403,12 @@
struct net_device *real_dev = priv->real_dev;
struct rmnet_port *port, *slave_port;

-port = rmnet_get_port(real_dev);
+port = rmnet_get_port_rtnl(real_dev);
port->rmnet_mode = RMNET_EPMODE_VND;
port->bridge_ep = NULL;

netdev_upper_dev_unlink(slave_dev, rmnet_dev);
-port = rmnet_get_port(slave_dev);
+slave_port = rmnet_get_port_rtnl(slave_dev);
rmnet_unregister_real_device(slave_dev, slave_port);

netdev_dbg(slave_dev, "removed from rmnet as slave\n");
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/rmnet/rmnet_config.h
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/rmnet/rmnet_config.h
@@ -62,7 +62,7 @@
 struct gro_cells gro_cells;
 }

-struct rmnet_port *rmnet_get_port(struct net_device *real_dev);
+struct rmnet_port *rmnet_get_port_rcu(struct net_device *real_dev);
 struct rmnet_endpoint *rmnet_get_endpoint(struct rmnet_port *port, u8 mux_id);
 int rmnet_add_bridge(struct net_device *rmnet_dev,
 struct net_device *slave_dev,
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/rmnet/rmnet_handlers.c
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/rmnet/rmnet_handlers.c
@@ -125,7 +125,7 @@
 required_headroom = sizeof(struct rmnet_map_header);

 if (skb_headroom(skb) < required_headroom) {
-if (pskb_expand_head(skb, required_headroom, 0, GFP_KERNEL))
+if (pskb_expand_head(skb, required_headroom, 0, GFP_ATOMIC))
    goto fail;
 }

@@ -152,6 +152,9 @@
 static void
rmnet_bridge_handler(struct sk_buff *skb, struct net_device *bridge_dev) 
{
+if (skb_mac_header_was_set(skb))
+skb_push(skb, skb->mac_len);
+  if (bridge_dev)
+    skb->dev = bridge_dev;
dev_queue_xmit(skb);
@@ -173,8 +176,16 @@
    if (!skb)
    goto done;

+if (skb->pkt_type == PACKET_LOOPBACK)
+return RX_HANDLER_PASS;
+    dev = skb->dev;
-    port = rmnet_get_port(dev);
+    port = rmnet_get_port_rcu(dev);
+    if (unlikely(!port)) {
+        atomic_long_inc(&skb->dev->rx_nohandler);
+        kfree_skb(skb);
+        goto done;
+    }

    switch (port->rmnet_mode) {
    case RMNET_EPMODE_VND:
        skb->dev = priv->real_dev;
        mux_id = priv->mux_id;

        -port = rmnet_get_port(skb->dev);
+        port = rmnet_get_port_rcu(skb->dev);
        if (!port) {
            kfree_skb(skb);
            return;
--- linux-4.15.0.orig/drivers/net/ethernet/qualcomm/rmnet/rmnet_vnd.c
+++ linux-4.15.0/drivers/net/ethernet/qualcomm/rmnet/rmnet_vnd.c
@@ -179,12 +179,14 @@
             struct net_device *real_dev,
             struct rmnet_endpoint *ep)
             {
-            struct rmnet_priv *priv;
+            struct rmnet_priv *priv = netdev_priv(rmnet_dev);
            int rc;

            if (ep->egress_dev)
            return -EINVAL;

+            priv->real_dev = real_dev;
+            rc = register_netdevice(rmnet_dev);
            if (!rc) {
                ep->egress_dev = rmnet_dev;
                @@ -193,9 +195,7 @@
rmnet_dev->rtnl_link_ops = &rmnet_link_ops;

-prv = netdev_priv(rmnet_dev);
priv->mux_id = id;
-prv->real_dev = real_dev;

netdev_dbg(rmnet_dev, "rmnet dev created\n");
}
--- linux-4.15.0.orig/drivers/net/ethernet/rdc/r6040.c
+++ linux-4.15.0/drivers/net/ethernet/rdc/r6040.c
@@ -133,6 +133,8 @@
#define PHY_ST	0x8A	/* PHY status register */
#define MAC_SM0xAC/* MAC status machine */
#define MAC_SM_RST0x0002/* MAC status machine reset */
+#define MD_CSC0xb6/* MDC speed control register */
+##define MD_CSC_DEFAULT0x0030
#define MAC_ID0xBE/* Identifier register */

#define TX_DCNT0x80/* TX descriptor count */
@@ -368,8 +370,9 @@
{
void __iomem *ioaddr = lp->base;
int limit = MAC_DEF_TIMEOUT;
-u16 cmd;
+u16 cmd, md_csc;

+md_csc = ioread16(ioaddr + MD_CSC);
iowrite16(MAC_RST, ioaddr + MCR1);
while (limit--) {
    cmd = ioread16(ioaddr + MCR1);
    @ @ -381,6 +384,10 @ @
iowrite16(MAC_SM_RST, ioaddr + MAC_SM);
iowrite16(0, ioaddr + MAC_SM);
mdelay(5);
+/* Restore MDIO clock frequency */
+if (md_csc != MD_CSC_DEFAULT)
+iowrite16(md_csc, ioaddr + MD_CSC);
}

static void r6040_init_mac_regs(struct net_device *dev)
--- linux-4.15.0.orig/drivers/net/ethernet/realtek/8139cp.c
+++ linux-4.15.0/drivers/net/ethernet/realtek/8139cp.c
@@ -571,6 +571,7 @@
struct cp_private *cp;
int handled = 0;
    u16 status;
+u16 mask;
if (unlikely(dev == NULL))
    return IRQ_NONE;
@@ -578,6 +579,10 @@
    spin_lock(&cp->lock);

+mask = cpr16(IntrMask);
+if (!mask)
+    goto out_unlock;
    status = cpr16(IntrStatus);
    if (!status || (status == 0xFFFF))
        goto out_unlock;
--- linux-4.15.0.orig/drivers/net/ethernet/realtek/8139too.c
+++ linux-4.15.0/drivers/net/ethernet/realtek/8139too.c
@@ -2224,7 +2224,7 @@
    disable_irq(irq);
    rtl8139_interrupt(irq, dev);
    enable_irq(irq);
--- linux-4.15.0.orig/drivers/net/ethernet/realtek/r8169.c
+++ linux-4.15.0/drivers/net/ethernet/realtek/r8169.c
@@ -324,18 +324,21 @@

static const struct pci_device_id rtl8169_pci_tbl[] = {
+    { PCI_DEVICE(PCI_VENDOR_ID_NCUBE, 0x8168), 0, 0, RTL_CFG_1 },
    { PCI_DEVICE(PCI_VENDOR_ID_REALTEK, 0x2502), 0, 0, RTL_CFG_1 },
    { PCI_DEVICE(PCI_VENDOR_ID_REALTEK, 0x2600), 0, 0, RTL_CFG_1 },
    { PCI_DEVICE(PCI_VENDOR_ID_REALTEK, 0x8129), 0, 0, RTL_CFG_0 },
    { PCI_DEVICE(PCI_VENDOR_ID_REALTEK, 0x8136), 0, 0, RTL_CFG_2 },
    { PCI_DEVICE(PCI_VENDOR_ID_REALTEK, 0x8161), 0, 0, RTL_CFG_1 },
    { PCI DEVICE(PCI_VENDOR_ID_REALTEK, 0x8167), 0, 0, RTL_CFG_0 },
    { PCI_DEVICE(PCI_VENDOR_ID_REALTEK, 0x8168), 0, 0, RTL_CFG_1 },
+    { PCI_DEVICE(PCI_VENDOR_ID_NCUBE, 0x8168), 0, 0, RTL_CFG_1 },
    { PCI_DEVICE(PCI_VENDOR_ID_REALTEK, 0x8169), 0, 0, RTL_CFG_0 },
    { PCI_VENDOR_ID_DLINK, 0x4300, 0x4300, 0, 0, RTL_CFG_1 },
    { PCI_DEVICE(PCI_VENDOR_ID_DLINK, 0xb400), 0, 0, RTL_CFG_0 },
    { PCI DEVICE(PCI_VENDOR_ID_DLINK, 0x4300), 0, 0, RTL_CFG_0 },
    { PCI_DEVICE(PCI_VENDOR_ID_DLINK, 0x4302), 0, 0, RTL_CFG_0 },
    { PCI_DEVICE(PCI_VENDOR_ID_AT, 0xc107), 0, 0, RTL_CFG_0 },
-    { PCI_DEVICE(0x16ec, 0x0116), 0, 0, RTL_CFG_0 },
+    { PCI_DEVICE(PCI_VENDOR_ID_USR, 0x0116), 0, 0, RTL_CFG_0 },
    { PCI_VENDOR_ID_LINKSYS, 0x1032, 0x1032, 0, 0, RTL_CFG_0 },

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enum features {
    -RTL_FEATURE_WOL = (1 << 0),
    -RTL_FEATURE_MSI = (1 << 1),
    -RTL_FEATURE_GMII = (1 << 2),
    +RTL_FEATURE_GMII = (1 << 0),
};

struct rtl8169_counters {
    @@ -765,7 +766,7 @@
};

enum rtl_flag {
    -RTL_FLAG_TASK_ENABLED,
    +RTL_FLAG_TASK_ENABLED = 0,
    RTL_FLAG_TASK_SLOW_PENDING,
    RTL_FLAG_TASK_RESET_PENDING,
    RTL_FLAG_TASK_PHY_PENDING,
    @@ -1395,7 +1396,7 @@
    |
    void __iomem *ioaddr = tp->mmio_addr;

    -return RTL_R8(IBISR0) & 0x02;
    +return RTL_R8(IBISR0) & 0x20;
    }

static void rtl8168ep_stop_cmac(struct rtl8169_private *tp)
    @@ -1403,7 +1404,7 @@
    void __iomem *ioaddr = tp->mmio_addr;

    RTL_W8(IBCR2, RTL_R8(IBCR2) & ~0x01);
    -rtl_msleep_loop_wait_low(tp, &rtl_ocp_tx_cond, 50, 2000);
    +rtl_msleep_loop_wait_high(tp, &rtl_ocp_tx_cond, 50, 2000);
    RTL_W8(IBISR0, RTL_R8(IBISR0) & 0x20);
    RTL_W8(IBCR0, RTL_R8(IBCR0) & ~0x01);
    @@ -1868,10 +1869,6 @@
    rtl_lock_work(tp);

    -if (wol->wolopts)
    -tp->features |= RTL_FEATURE_WOL;
    -else
    -tp->features &= ~RTL_FEATURE_WOL;

    Open Source Used In 5GaaS Edge AC-4 25618
if (pm_runtime_active(d))
  __rtl8169_set_wol(tp, wol->wolopts);
else
  @-2357,7 +2354,7 @
{
  switch(stringset) {
    case ETH_SS_STATS:
      -memcpy(data, *rtl8169_gstrings, sizeof(rtl8169_gstrings));
      +memcpy(data, rtl8169_gstrings, sizeof(rtl8169_gstrings));
      break;
    }
  }
  @-4638,16 +4635,6 @
rtl_schedule_task(tp, RTL_FLAG_TASK_PHY_PENDING);
}

-void rtl8169_release_board(struct pci_dev *pdev, struct net_device *dev,
  - void __iomem *ioaddr)
  -{
    -iounmap(ioaddr);
    -pci_release_regions(pdev);
    -pci_clear_mwi(pdev);
    -pci_disable_device(pdev);
    -free_netdev(dev);
  -}

DECLARE_RTL_COND(rtl_phy_reset_cond)
{
  return tp->phy_reset_pending(tp);
  @-4726,6 +4713,58 @
  rtl_unlock_work(tp);
}

+static void rtl_init_rxcfg(struct rtl8169_private *tp)
  +{
    +void __iomem *ioaddr = tp->mmio_addr;
    +
    +switch (tp->mac_version) {
      +case RTL_GIGA_MAC_VER_01:
      +case RTL_GIGA_MAC_VER_02:
      +case RTL_GIGA_MAC_VER_03:
      +case RTL_GIGA_MAC_VER_04:
      +case RTL_GIGA_MAC_VER_05:
      +case RTL_GIGA_MAC_VER_06:
      +case RTL_GIGA_MAC_VER_10:
      +case RTL_GIGA_MAC_VER_11:
      +case RTL_GIGA_MAC_VER_12:
      +case RTL_GIGA_MAC_VER_13:
case RTL_GIGA_MAC_VER_14:
+break;
+case RTL_GIGA_MAC_VER_15:
+case RTL_GIGA_MAC_VER_16:
+case RTL_GIGA_MAC_VER_17:
+RTL_W32(RxConfig, RX_FIFO_THRESH | RX_DMA_BURST);
+break;
+case RTL_GIGA_MAC_VER_18:
+case RTL_GIGA_MAC_VER_19:
+case RTL_GIGA_MAC_VER_20:
+case RTL_GIGA_MAC_VER_21:
+case RTL_GIGA_MAC_VER_22:
+case RTL_GIGA_MAC_VER_23:
+case RTL_GIGA_MAC_VER_24:
+case RTL_GIGA_MAC_VER_34:
+case RTL_GIGA_MAC_VER_35:
+RTL_W32(RxConfig, RX128_INT_EN | RX_MULTI_EN | RX_DMA_BURST);
+break;
+case RTL_GIGA_MAC_VER_40:
+case RTL_GIGA_MAC_VER_41:
+case RTL_GIGA_MAC_VER_42:
+case RTL_GIGA_MAC_VER_43:
+case RTL_GIGA_MAC_VER_44:
+case RTL_GIGA_MAC_VER_45:
+case RTL_GIGA_MAC_VER_46:
+case RTL_GIGA_MAC_VER_47:
+case RTL_GIGA_MAC_VER_48:
+case RTL_GIGA_MAC_VER_49:
+case RTL_GIGA_MAC_VER_50:
+case RTL_GIGA_MAC_VER_51:
+RTL_W32(RxConfig, RX128_INT_EN | RX_MULTI_EN | RX_DMA_BURST | RX_EARLY_OFF);
+break;
+default:
+RTL_W32(RxConfig, RX128_INT_EN | RX_DMA_BURST);
+break;
+
static int rtl_set_mac_address(struct net_device *dev, void *p)
{
struct rtl8169_private *tp = netdev_priv(dev);
@@ -4744,6 +4783,10 @@
 pm_runtime_put_noidle(d);

+/* Reportedly at least Asus X453MA truncates packets otherwise */
+if (tp->mac_version == RTL_GIGA_MAC_VER_37)
+rtl_init_rxcfg(tp);
return 0;
}

@@ -4779,14 +4822,6 @@
  return -EOPNOTSUPP;
 }

-static void rtl_disable_msi(struct pci_dev *pdev, struct rtl8169_private *tp)
-{
-  if (tp->features & RTL_FEATURE_MSI) {
-    pci_disable_msi(pdev);
-    tp->features &= ~RTLFEATURE_MSI;
-  }
-  
- static void rtl_init_mdio_ops(struct rtl8169_private *tp)
{  
  struct mdio_ops *ops = &tp->mdio_ops;
  @ @ -5114,6 +5149,9 @@
  static void rtl_pll_power_up(struct rtl8169_private *tp)
  {
    rtl_generic_op(tp, tp->pll_power_ops.up);
    +
+    /* give MAC/PHY some time to resume */
+    msleep(20);
  }

  static void rtl_init_pll_power_ops(struct rtl8169_private *tp)
  @ @ -5178,58 +5216,6 @@
  }

 static void rtl_init_rxcfg(struct rtl8169_private *tp)
{  
  void __iomem *iomaddr = tp->mmio_addr;
  -
  -switch (tp->mac_version) {
  -case RTL_GIGA_MAC_VER_01:
  -case RTL_GIGA_MAC_VER_02:
  -case RTL_GIGA_MAC_VER_03:
  -case RTL_GIGA_MAC_VER_04:
  -case RTL_GIGA_MAC_VER_05:
  -case RTL_GIGA_MAC_VER_06:
  -case RTL_GIGA_MAC_VER_10:
  -case RTL_GIGA_MAC_VER_11:
  -case RTL_GIGA_MAC_VER_12:
  -case RTL_GIGA_MAC_VER_13:
  -case RTL_GIGA_MAC_VER_14:
-case RTL_GIGA_MAC_VER_15:
-RTL_W32(RxConfig, RX_FIFO_THRESH | RX_DMA_BURST);
-break;
-case RTL_GIGA_MAC_VER_16:
-case RTL_GIGA_MAC_VER_17:
-RTL_W32(RxConfig, RX128_INT_EN | RX_MULTI_EN | RX_DMA_BURST);
-break;
-case RTL_GIGA_MAC_VER_18:
-case RTL_GIGA_MAC_VER_19:
-case RTL_GIGA_MAC_VER_20:
-case RTL_GIGA_MAC_VER_21:
-case RTL_GIGA_MAC_VER_22:
-case RTL_GIGA_MAC_VER_23:
-case RTL_GIGA_MAC_VER_24:
-case RTL_GIGA_MAC_VER_25:
-case RTL_GIGA_MAC_VER_26:
-case RTL_GIGA_MAC_VER_27:
-case RTL_GIGA_MAC_VER_28:
-case RTL_GIGA_MAC_VER_29:
-case RTL_GIGA_MAC_VER_30:
-case RTL_GIGA_MAC_VER_31:
-case RTL_GIGA_MAC_VER_32:
-case RTL_GIGA_MAC_VER_33:
-case RTL_GIGA_MAC_VER_34:
-case RTL_GIGA_MAC_VER_35:
-RTL_W32(RxConfig, RX128_INT_EN | RX_MULTI_EN | RX_DMA_BURST);
-break;
-case RTL_GIGA_MAC_VER_36:
-case RTL_GIGA_MAC_VER_37:
-case RTL_GIGA_MAC_VER_38:
-case RTL_GIGA_MAC_VER_39:
-case RTL_GIGA_MAC_VER_40:
-case RTL_GIGA_MAC_VER_41:
-case RTL_GIGA_MAC_VER_42:
-case RTL_GIGA_MAC_VER_43:
-case RTL_GIGA_MAC_VER_44:
-case RTL_GIGA_MAC_VER_45:
-case RTL_GIGA_MAC_VER_46:
-case RTL_GIGA_MAC_VER_47:
-case RTL_GIGA_MAC_VER_48:
-case RTL_GIGA_MAC_VER_49:
-case RTL_GIGA_MAC_VER_50:
-case RTL_GIGA_MAC_VER_51:
-RTL_W32(RxConfig, RX128_INT_EN | RX_MULTI_EN | RX_DMA_BURST | RX_EARLY_OFF);
-break;
-default:
-RTL_W32(RxConfig, RX128_INT_EN | RX_DMA_BURST);
-break;
-
-
static void rtl8169_init_ring_indexes(struct rtl8169_private *tp)
{
  tp->dirty_tx = tp->cur_tx = tp->cur_rx = 0;
  @ @ -5289.7 +5275.7 @ @
  {
    void __iomem *ioaddr = tp->mmio_addr;

  -RTL_W8(MaxTxPacketSize, 0x3f);
+RTL_W8(MaxTxPacketSize, 0x24);
  RTL_W8(Config3, RTL_R8(Config3) | Jumbo_En0);
  RTL_W8(Config4, RTL_R8(Config4) | 0x01);
  rtl_tx_performance_tweak(tp->pci_dev, PCI_EXP_DEVCTL_READRQ_512B);
void __iomem *ioaddr = tp->mmio_addr;

-RTL_W8(MaxTxPacketSize, 0x0c);
+RTL_W8(MaxTxPacketSize, 0x3f);
RTL_W8(Config3, RTL_R8(Config3) & ~Jumbo_En0);
RTL_W8(Config4, RTL_R8(Config4) & ~0x01);
rtl_tx_performance_tweak(tp->pci_dev, 0x5 << MAX_READ_REQUEST_SHIFT);

RTL_W16(CPlusCmd, tp->cp_cmd);

-RTL_W16(IntrMitigate, 0x5151);
+RTL_W16(IntrMitigate, 0x5100);

/* Work around for RxFIFO overflow. */
if (tp->mac_version == RTL_GIGA_MAC_VER_11) {
   @@ -7361,7 +7347,8 @@
    opts[1] |= transport_offset << TCPHO_SHIFT;
} else {
    if (unlikely(rtl_test_hw_pad_bug(tp, skb)))
        -return !eth_skb_pad(skb);
+/* eth_skb_pad would free the skb on error */
+return !__skb_put_padto(skb, ETH_ZLEN, false);
    }

return true;

if (status & tp->event_slow) {
    status = rtl_get_events(tp);
    rtl_ack_events(tp, status & ~tp->event_slow);

    -if (status & RTL_EVENT_NAPI_RX)
    -work_done = rtl_rx(dev, tp, (u32) budget);
    +work_done = rtl_rx(dev, tp, (u32) budget);

    -if (status & RTL_EVENT_NAPI_TX)
    -rtl_tx(dev, tp);
    +rtl_tx(dev, tp);

    if (status & tp->event_slow) {

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enable_mask &= ~tp->event_slow;
@@ -7881,14 +7866,15 @@
rtl8169_update_counters(dev);

rtl_lock_work(tp);
-clear_bit(RTL_FLAG_TASK_ENABLED, tp->wk.flags);
+/* Clear all task flags */
+bitmap_zero(tp->wk.flags, RTL_FLAG_MAX);

rtl8169_down(dev);
rtl_unlock_work(tp);

cancel_work_sync(&tp->wk.work);
-
+free_irq(pdev->irq, dev);
+pci_free_irq(pdev, 0, dev);

dma_free_coherent(&pdev->dev, R8169_RX_RING_BYTES, tp->RxDescArray,
+tp->RxPhyAddr);
@@ -7907,7 +7893,7 @@
{
 struct rtl8169_private *tp = netdev_priv(dev);

-r rtl8169_interrupt(tp->pci_dev->irq, dev);
+rtl8169_interrupt(pci_irq_vector(tp->pci_dev, 0), dev);
 } #endif

@@ -8062,7 +8047,9 @@
rtl_lock_work(tp);
-reval = request_irq(pdev->irq, rtl8169_interrupt,
-        (tp->features & RTL_FEATURE_MSI) ? IRQF_SHARED,
-        dev->name, dev);
+retval = pci_request_irq(pdev, 0, rtl8169_interrupt, NULL, dev,
+        dev->name);
if (retval < 0)
goto err_release_fw_2;
@@ -7944,9 +7930,8 @@

t_0862,7 +8047,9 @@

rtl8169_interrupt(tp->pci_dev->irq, dev);
+rtl8169_interrupt(pci_irq_vector(tp->pci_dev, 0), dev);

rtl_unlock_work(tp);

rtl_pll_power_down(tp);
@@ -8251,9 +8238,6 @@
 unregister_netdev(dev);
 
-dma_free_coherent(&tp->pci_dev->dev, sizeof(*tp->counters),
- tp->counters, tp->counters_phys_addr);
-
rtl_release_firmware(tp);

if (pci_dev_run_wake(pdev))
@@ -8261,9 +8245,6 @@
 /* restore original MAC address */
 rtl_rar_set(tp, dev->perm_addr);
-
-rtl_disable_msi(pdev, tp);
-rtl8169_release_board(pdev, dev, tp->mmio_addr);
}

static const struct net_device_ops rtl_netdev_ops = {
@@ -8308,7 +8289,7 @@
 .region		= 2,
 .align		= 8,
 .event_slow	= SYSErr | LinkChg | RxOverflow,
- .features	= RTL_FEATURE_GMII | RTL_FEATURE_MSI,
+ .features	= RTL_FEATURE_GMII,
 .coalesce_info	= rtl_coalesce_info_8168_8136,
 .default_ver	= RTL_GIGA_MAC_VER_11,
 },
@@ -8318,32 +8299,31 @@
 .align		= 8,
 .event_slow	= SYSErr | LinkChg | RxOverflow | RxFIFOOver | PCSTimeout,
 .features	= RTL_FEATURE_MSI,
 .coalesce_info	= rtl_coalesce_info_8168_8136,
 .default_ver	= RTL_GIGA_MAC_VER_13,
 }

/* Cfg9346_Unlock assumed. */
- static unsigned rtl_try_msi(struct rtl8169_private *tp,
- const struct rtl_cfg_info *cfg)
+ static int rtl_alloc_irq(struct rtl8169_private *tp)
 { void __iomem *ioaddr = tp->mmio_addr;
unsigned msi = 0;
unsigned cfg2;

-cfg2 = RTL_R8(Config2) & ~MSIEnable;
-if ((cfg->features & RTL_FEATURE_MSI) {
   -if (pci_enable_msi(tp->pci_dev)) {
      -netif_info(tp, hw, tp->dev, "no MSI. Back to INTx,\n");
   -} else {
      -cfg2 |= MSIEnable;
      -msi = RTL_FEATURE_MSI;
   -}
  +unsigned int flags;
  +
  +switch (tp->mac_version) {
   +case RTL_GIGA_MAC_VER_02 ... RTL_GIGA_MAC_VER_06:
      +RTL_W8(Cfg9346, Cfg9346_Unlock);
      +RTL_W8(Config2, RTL_R8(Config2) & ~MSIEnable);
      +RTL_W8(Cfg9346, Cfg9346_Lock);
      +/* fall through */
   +case RTL_GIGA_MAC_VER_07 ... RTL_GIGA_MAC_VER_24:
      +flags = PCI_IRQ_LEGACY;
      +break;
      +default:
      +flags = PCI_IRQ_ALL_TYPES;
      +break;
   }
   -if (tp->mac_version <= RTL_GIGA_MAC_VER_06)
   -RTL_W8(Config2, cfg2);
   -return msi;
   +
   +return pci_alloc_irq_vectors(tp->pci dev, 1, 1, flags);
  }

DECLARE_RTL_COND(rtl_link_list_ready_cond)
@@ -8440,11 +8420,9 @@
    MODULENAME, RTL8169_VERSION);
 }

-dev = alloc_etherdev(sizeof (*tp));
 -if (!dev) {
    -rc = -ENOMEM;
    -goto out;
    -}
    +dev = devm_alloc_etherdev(&pdev->dev, sizeof (*tp));
    +if (!dev)
    +return -ENOMEM;

SET_NETDEV_DEV(dev, &pdev->dev);
dev->netdev_ops = &rtl_netdev_ops;
@@ -8467,13 +8445,13 @@
PCIE_LINK_STATE_CLKPM);

/* enable device (incl. PCI PM wakeup and hotplug setup) */
-rc = pci_enable_device(pdev);
+rc = pcim_enable_device(pdev);
if (rc < 0) {
    netif_err(tp, probe, dev, "enable failure\n");
-goto err_out_free_dev_1;
+return rc;
}

-if (pci_set_mwi(pdev) < 0)
+if (pcim_set_mwi(pdev) < 0)
    netif_info(tp, probe, dev, "Mem-Wr-Inval unavailable\n");

/* make sure PCI base addr 1 is MMIO */
@@ -8481,30 +8459,28 @@
netif_err(tp, probe, dev,
    "region #%d not an MMIO resource, aborting\n",
        region);
-rc = -ENODEV;
-goto err_out_mwi_2;
+return -ENODEV;
}

/* check for weird/broken PCI region reporting */
if (pci_resource_len(pdev, region) < R8169_REGS_SIZE) {
    netif_err(tp, probe, dev,
        "Invalid PCI region size(s), aborting\n"");
-
    -rc = -ENODEV;
    -goto err_out_mwi_2;
    +return -ENODEV;
}

rc = pci_request_regions(pdev, MODULENAME);
if (rc < 0) {
    netif_err(tp, probe, dev, "could not request regions\n");
-goto err_out_mwi_2;
+return rc;
}

/* ioremap MMIO region */
-ioaddr = ioremap(pci_resource_start(pdev, region), R8169_REGS_SIZE);
+ioaddr = devm_ioremap(&pdev->dev, pci_resource_start(pdev, region),
    +R8169_REGS_SIZE);
if (!ioaddr) {
netif_err(tp, probe, dev, "cannot remap MMIO, aborting\n");
-rc = -EIO;
-goto err_out_free_res_3;
+return -EIO;
}

tp->mmio_addr = ioaddr;

rc = pci_set_dma_mask(pdev, DMA_BIT_MASK(32));
if (rc < 0) {
netif_err(tp, probe, dev, "DMA configuration failed\n");
-goto err_out_unmap_4;
+return rc;
}
}

chipset = tp->mac_version;

tp->txd_version = rtl_chip_infos[chipset].txd_version;

-RTL_W8(Cfg9346, Cfg9346_Unlock);
-RTL_W8(Config1, RTL_R8(Config1) | PMEnable);
-RTL_W8(Config5, RTL_R8(Config5) & (BWF | MWF | UWF | LanWake | PMEStatus));
-switch (tp->mac_version) {
-case RTL_GIGA_MAC_VER_34:
-case RTL_GIGA_MAC_VER_35:
-case RTL_GIGA_MAC_VER_36:
-case RTL_GIGA_MAC_VER_37:
-case RTL_GIGA_MAC_VER_38:
-case RTL_GIGA_MAC_VER_40:
-case RTL_GIGA_MAC_VER_41:
-case RTL_GIGA_MAC_VER_42:
-case RTL_GIGA_MAC_VER_43:
-case RTL_GIGA_MAC_VER_44:
-case RTL_GIGA_MAC_VER_45:
-case RTL_GIGA_MAC_VER_46:
-case RTL_GIGA_MAC_VER_47:
-case RTL_GIGA_MAC_VER_48:
-case RTL_GIGA_MAC_VER_49:
-case RTL_GIGA_MAC_VER_50:
-case RTL_GIGA_MAC_VER_51:
-if (rtl_eri_read(tp, 0xdc, ERIAR_EXGMAC) & MagicPacket_v2)
-tp->features |= RTL_FEATURE_WOL;
-if ((RTL_R8(Config3) & LinkUp) != 0)
-tp->features |= RTL_FEATURE_WOL;
-break;
-default:
-if ((RTL_R8(Config3) & (LinkUp | MagicPacket)) != 0)
-tp->features |= RTL_FEATURE_WOL;
-break;
+rc = rtl_alloc_irq(tp);
+if (rc < 0) {
+netif_err(tp, probe, dev, "Can't allocate interrupt\n");
+return rc;
}
@if ((RTL_R8(Config5) & (UWF | BWF | MWF)) != 0)
-tp->features |= RTL_FEATURE_WOL;
-tp->features |= rtl_try_msi(tp, cfg);
-RTL_W8(Cfg9346, Cfg9346_Lock);
+
+tp->saved_wolopts = __rtl8169_get_wol(tp);

if (rtl_tbi_enabled(tp)) {
    tp->set_speed = rtl8169_set_speed_tbi;
    @ @ -8655,6 +8603,7 @@
    NETIF_F_HW_VLAN_CTAG_RX;
    dev->vlan_features = NETIF_F_SG | NETIF_F_IP_CSUM | NETIF_F_TSO |
    NETIF_F_HIGHDMA;
    +dev->priv_flags |= IFF_LIVE_ADDR_CHANGE;

    tp->cp_cmd |= RxChkSum | RxVlan;
    @ @ -8692,22 +8641,22 @@

    tp->rtl_fw = RTL_FIRMWARE_UNKNOWN;

    -tp->counters = dma_alloc_coherent (&pdev->dev, sizeof(*tp->counters),
    - &tp->counters_phys_addr, GFP_KERNEL);
    -if (!tp->counters) {
    -rc = -ENOMEM;
    -goto err_out_msi_5;
    -}
    +tp->counters = dmam_alloc_coherent (&pdev->dev, sizeof(*tp->counters),
    + &tp->counters_phys_addr,
    + GFP_KERNEL);
    +if (!tp->counters)
    +return -ENOMEM;
    +
    +pci_set_drvdata(pdev, dev);

    rc = register_netdev(dev);
    if (rc < 0)
        -goto err_out_cnt_6;
        -
        -pci_set_drvdata(pdev, dev);
        +return rc;
netif_info(tp, probe, dev, "%s at 0x%p, %pM, XID %08x IRQ %d\n",
    rtl_chip_infos[chipset].name, ioaddr, dev->dev_addr,
    (u32)(RTL_R32(TxConfig) & 0x9cf0f8ff), pdev->irq);
+    (u32)(RTL_R32(TxConfig) & 0x9cf0f8ff),
+    pci_irq_vector(pdev, 0));
if (rtl_chip_infos[chipset].jumbo_max != JUMBO_1K) {
    netif_info(tp, probe, dev, "jumbo features [frames: %d bytes, "
        "tx checksumming: %s]n",
    ...
RIS0_FRF16 = 0x00010000,
RIS0_FRF17 = 0x00020000,
+RIS0_RESERVED = GENMASK(31, 18),
};

/* RIC1 */
@@ -531,6 +533,7 @@
RIS2_QFF16 = 0x00010000,
RIS2_QFF17 = 0x00020000,
RIS2_RFFF = 0x80000000,
+RIS2_RESERVED = GENMASK(30, 18),
};

/* TIC */
@@ -547,6 +550,7 @@
TIS_FTF1 = 0x00000002, /* Undocumented? */
TIS_TFUF = 0x00000100,
TIS_TFWF = 0x00000200,
+TIS_RESERVED = (GENMASK(31, 20) | GENMASK(15, 12) | GENMASK(7, 4))
};

/* ISS */
@@ -620,6 +624,7 @@
enum GIS_BIT {
GIS_PTCF = 0x00000001, /* Undocumented? */
GIS_PTMF = 0x00000004,
+GIS_RESERVED = GENMASK(15, 10),
};

/* GIE (R-Car Gen3 only) */
@@ -1026,7 +1031,6 @@
phy_interface_t phy_interface;
int msg_enable;
int speed;
-int duplex;
int emac_irq;
enum ravb_chip_id chip_id;
int rx_irqs[NUM_RX_QUEUE];
--- linux-4.15.0.orig/drivers/net/ethernet/renesas/ravb_main.c
+++ linux-4.15.0/drivers/net/ethernet/renesas/ravb_main.c
@@ -1,6 +1,6 @@
/* Renesas Ethernet AVB device driver
 *
- * Copyright (C) 2014-2015 Renesas Electronics Corporation
+ * Copyright (C) 2014-2019 Renesas Electronics Corporation
 * Copyright (C) 2015 Renesas Solutions Corp.
 * Copyright (C) 2015-2016 Cogent Embedded, Inc. <source@cogentembedded.com>
 *
return error;
}

callback void ravb_set_duplex(struct net_device *ndev)
{
  struct ravb_private *priv = netdev_priv(ndev);
  -
  -ravb_modify(ndev, ECMR, ECMR_DM, priv->duplex ? ECMR_DM : 0);
  -
  -
  static void ravb_set_rate(struct net_device *ndev)
  {
    struct ravb_private *priv = netdev_priv(ndev);
    return error;
    /* E-MAC init function */
    static void ravb_emac_init(struct net_device *ndev)
    {
      struct ravb_private *priv = netdev_priv(ndev);
      -
      -/* Receive frame limit set register */
      ravb_write(ndev, ndev->mtu + ETH_HLEN + VLAN_HLEN + ETH_FCS_LEN, RFLR);
      /* EMAC Mode: PAUSE prohibition; Duplex; RX Checksum; TX; RX */
      -ravb_write(ndev, ECMR_ZPF | (priv->duplex ? ECMR_DM : 0) |
      +ravb_write(ndev, ECMR_ZPF | ECMR_DM |
      (ndev->features & NETIF_F_RXCSUM ? ECMR_RCSC : 0) |
      ECMR_TE | ECMR_RE, ECMR);
      @ @ -59.7 +450.7 @ @
      RCR_EFFS | RCR_ENCF | RCR_ETS0 | RCR_ESF | 0x18000000, RCR);
    /* Set FIFO size */
    -ravb_write(ndev, TGC_TQP_AVBMODE1 | 0x00222200, TGC);
    +ravb_write(ndev, TGC_TQP_AVBMODE1 | 0x00112200, TGC);
    /* Timestamp enable */
    ravb_write(ndev, TCCR_TFEN, TCCR);
    @ @ -514.7 +505.10 @ @
    kfree(ts_skb);
    if (tag == tfa_tag) {
      skb_tstamp_tx(skb, &shhwstamps);
      +dev_consume_skb_any(skb);
      break;
    } else {
      +dev_kfree_skb_any(skb);
    }
    }

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ravb_modify(ndev, TCCR, TCCR_TFR, TCCR_TFR);
    @ @ -525,13 +519,15 @@
    {
        u8 *hw_csum;

        /* The hardware checksum is 2 bytes appended to packet data */
        -if (unlikely(skb->len < 2))
        +/* The hardware checksum is contained in sizeof(__sum16) (2) bytes
        + * appended to packet data
        + */
        +if (unlikely(skb->len < sizeof(__sum16)))
            return;
        -hw_csum = skb_tail_pointer(skb) - 2;
        +hw_csum = skb_tail_pointer(skb) - sizeof(__sum16);
        skb->csum = csum_unfold((__force __sum16)get_unaligned_le16(hw_csum));
        skb->ip_summed = CHECKSUM_COMPLETE;
        skb_trim(skb, skb->len - 2);
        +skb_trim(skb, skb->len - sizeof(__sum16));
    }

    /* Packet receive function for Ethernet AVB */
    @ @ -738,10 +734,11 @@
    u32 eis, ris2;

    eis = ravb_read(ndev, EIS);
    -ravb_write(ndev, ~EIS_QFS, EIS);
    +ravb_write(ndev, ~(EIS_QFS | EIS_RESERVED), EIS);
    if (eis & EIS_QFS) {
        ris2 = ravb_read(ndev, RIS2);
        -ravb_write(ndev, ~(RIS2_QFF0 | RIS2_RFFF), RIS2);
        +ravb_write(ndev, ~(RIS2_QFF0 | RIS2_RFFF | RIS2_RESERVED), RIS2);
    }

    /* Receive Descriptor Empty int */
    if (ris2 & RIS2_QFF0)
        @ @ -794,7 +791,7 @@
        u32 tis = ravb_read(ndev, TIS);

        if (tis & TIS_TFUF) {
            -ravb_write(ndev, ~TIS_TFUF, TIS);
            +ravb_write(ndev, ~(TIS_TFUF | TIS_RESERVED), TIS);
            ravb_get_tx_tstamp(ndev);
            return true;
        }
        @ @ -929,7 +926,7 @@
    /* Processing RX Descriptor Ring */
    if (ris0 & mask) {
        /* Clear RX interrupt */
-ravb_write(ndev, ~mask, RIS0);
+ravb_write(ndev, ~(mask | RIS0_RESERVED), RIS0);
if (ravb_rx(ndev, &quota, q))
goto out;
}
@@ -937,7 +934,7 @@
if (tis & mask) {
    spin_lock_irqsave(&priv->lock, flags);
    /* Clear TX interrupt */
-    ravb_write(ndev, ~mask, TIS);
+    ravb_write(ndev, ~(mask | TIS_RESERVED), TIS);
    ravb_tx_free(ndev, q, true);
    netif_wake_subqueue(ndev, q);
    mmiowb();
@@ -976,14 +973,15 @@
    struct ravb_private *priv = netdev_priv(ndev);
    struct phy_device *phydev = ndev->phydev;
    bool new_state = false;
    +unsigned long flags;
    -if (phydev->link) {
    -if (phydev->duplex != priv->duplex) {
    -    new_state = true;
    -    priv->duplex = phydev->duplex;
    -    ravb_set_duplex(ndev);
    -}
    +spin_lock_irqsave(&priv->lock, flags);
    +/* Disable TX and RX right over here, if E-MAC change is ignored */
    +if (priv->no_avb_link)
    +ravb_rcv_snd_disable(ndev);

    +if (phydev->link) {
    if (phydev->speed != priv->speed) {
        new_state = true;
        priv->speed = phydev->speed;
        @ @ -993,18 +991,20 @@
        ravb_modify(ndev, ECMR, ECMR_TXF, 0);
        new_state = true;
        priv->link = phydev->link;
        -if (priv->no_avb_link)
        -ravb_rcv_snd_enable(ndev);
    } else if (priv->link) {
        new_state = true;
        priv->link = 0;
        priv->speed = 0;
        -priv->duplex = -1;
    }
priv->no_avb_link)
ravb_rcv_snd_disable(ndev);
}

/* Enable TX and RX right over here, if E-MAC change is ignored */
if (priv->no_avb_link && phydev->link)
ravb_rcv_snd_enable(ndev);
+
+mmiowb();
+spin_unlock_irqrestore(&priv->lock, flags);
+
if (new_state && netif_msg_link(priv))
    phy_print_status(phydev);
}

priv->link = 0;
priv->speed = 0;
-priv->duplex = -1;

/* Try connecting to PHY */
pn = of_parse_phandle(np, "phy-handle", 0);
-error = phy_ethtool_ksettings_set(ndev->phydev, cmd);
    if (error)
        goto error_exit;

    if (cmd->base.duplex == DUPLEX_FULL)
        priv->duplex = 1;
    else
        priv->duplex = 0;

    ravb_set_duplex(ndev);
- error_exit:
- mdelay(1);
-
- /* Enable TX and RX */
- ravb_rcv_snd_enable(ndev);
- 
- mmiowb();
- spin_unlock_irqrestore(&priv->lock, flags);
-
- return error;
+ return phy_ethtool_ksettings_set(ndev->phydev, cmd);
}

static int ravb_nway_reset(struct net_device *ndev)
{
 struct ravb_private *priv = netdev_priv(ndev);
 int error = -ENODEV;
 unsigned long flags;

- if (ndev->phydev) {
- spin_lock_irqsave(&priv->lock, flags);
+ if (ndev->phydev)
  error = phy_start_aneg(ndev->phydev);
- spin_unlock_irqrestore(&priv->lock, flags);
- }

  return error;
}

@@ -1514,6 +1479,7 @@
 struct ravb_private *priv = container_of(work, struct ravb_private,
 work);
 struct net_device *ndev = priv->ndev;
+ int error;

 netif_tx_stop_all_queues(ndev);

@@ -1522,15 +1488,36 @@
 ravb_ptp_stop(ndev);

 /* Wait for DMA stopping */
- ravb_stop_dma(ndev);
+ if (ravb_stop_dma(ndev)) {
+ /* If ravb_stop_dma() fails, the hardware is still operating
+  * for TX and/or RX. So, this should not call the following
+  * functions because ravb_dmac_init() is possible to fail too.
+  * Also, this should not retry ravb_stop_dma() again and again
+  * here because it's possible to wait forever. So, this just
+  */
+  ravb_dmac_stop(ndev);
+  ravb_dmac_deinit(ndev);
+  }
+ 
+ return error;
+}
+ * re-enables the TX and RX and skip the following
+ * re-initialization procedure.
+ */
+ ravb_rcv_snd_enable(ndev);
+ goto out;
+
}

ravb_ring_free(ndev, RAVB_BE);
ravb_ring_free(ndev, RAVB_NC);

/* Device init */
-ravb_dmac_init(ndev);
+error = ravb_dmac_init(ndev);
+if (error) {
+ /* If ravb_dmac_init() fails, descriptors are freed. So, this
+ * should return here to avoid re-enabling the TX and RX in
+ * ravb_emac_init().
+ */
+ netdev_err(ndev, "%s: ravb_dmac_init() failed, error %d\n",
+ __func__, error);
+ return;
+
}  
+ ravb_emac_init(ndev);
+
+out:
+ /* Initialise PTP Clock driver */
+ if (priv->chip_id == RCAR_GEN2)
+ ravb_ptp_init(ndev, priv->pdev);
+ @ @ -1611,7 +1598,7 @@
+ DMA_TO_DEVICE);
goto unmap;
} 
-ts_skb->skb = skb;
+ts_skb->skb = skb_get(skb);
+ts_skb->tag = priv->ts_skb_tag++;
prv->ts_skb_tag &= 0x3ff;
list_add_tail(&ts_skb->list, &priv->ts_skb_list);
@ @ -1739,6 +1726,7 @@
/* Clear the timestamp list */
list_for_each_entry_safe(ts_skb, ts_skb2, &priv->ts_skb_list, list) {
list_del(&ts_skb->list);
+kfree_skb(ts_skb->skb);
kfree(ts_skb);
}

@ @ -1777,12 +1765,16 @@
config.flags = 0;
config.tx_type = priv->tstamp_tx_ctrl ? HWTSTAMP_TX_ON :
HWTSTAMP_TX_OFF;
-if (priv->tstamp_rx_ctrl & RAVB_RXTSTAMP_TYPE_V2_L2_EVENT)
+switch (priv->tstamp_rx_ctrl & RAVB_RXTSTAMP_TYPE) {
+case RAVB_RXTSTAMP_TYPE_V2_L2_EVENT:
config.rx_filter = HWTSTAMP_FILTER_PTP_V2_L2_EVENT;
-else if (priv->tstamp_rx_ctrl & RAVB_RXTSTAMP_TYPE_ALL)
+break;
+case RAVB_RXTSTAMP_TYPE_ALL:
config.rx_filter = HWTSTAMP_FILTER_ALL;
-else
+break;
+default:
config.rx_filter = HWTSTAMP_FILTER_NONE;
+
return copy_to_user(req->ifr_data, &config, sizeof(config))?
-EFAULT : 0;
--- linux-4.15.0.orig/drivers/net/ethernet/renesas/ravb_ptp.c
+++ linux-4.15.0/drivers/net/ethernet/renesas/ravb_ptp.c
@@ -319,7 +319,7 @@
}
}
-
-travb_write(ndev, ~gis, GIS);
+travb_write(ndev, ~(gis | GIS_RESERVED), GIS);
}

void ravb_ptp_init(struct net_device *ndev, struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/net/ethernet/renesas/sh_eth.c
+++ linux-4.15.0/drivers/net/ethernet/renesas/sh_eth.c
@@ -533,6 +533,8 @@
.EESR_TDE,
.fdr_value	= 0x0000070f,
	.trscer_err_mask = DESC_I_RINT8 | DESC_I_RINT5,
+._no_psr= 1,
+.apr= 1,
+.mpr= 1,
 @ @ -753,6 +755,7 @ @
 .rpadir= 1,
 .rpadir_value = 2 << 16,
 .rtrate= 1,
+.dual_port= 1,
};

#define SH_GIGA_ETH_BASE	0xfee00000UL
@@ -831,6 +834,7 @@

static struct sh_eth_cpu_data sh7619_data = {
    .tsu = 1,
    .irq_flags = IRQF_SHARED,
    .magic = 1,
    .dual_port = 1,
};

static void sh_eth_set_default_cpu_data(struct sh_eth_cpu_data *cd)

    /* Set the RMII mode again if required */
    +if (mdp->cd->rmiimode)
        sh_eth_write(ndev, 0x1, RMIIMODE);
    +
    /* Set MAC address again */
    update_mac_address(ndev);
}

static struct sh_ether_data sh7734 = {
    .no_trimd = 1,
    .no_ade = 1,
    .tsu = 1,
    .dual_port = 1,
};

/* SH7734 */
@@ -901,6 +905,7 @@
    .tsu = 1,
    .irq_flags = IRQF_SHARED,
    .magic = 1,
+    .dual_port = 1,
};

static struct sh_eth_cpu_data sh7619_data = {
    .tsu = 1,
    .irq_flags = IRQF_SHARED,
    .magic = 1,
+    .dual_port = 1,
};

static void sh_eth_set_default_cpu_data(struct sh_eth_cpu_data *cd)
    /* Set the RMII mode again if required */
    +if (mdp->cd->rmiimode)
        sh_eth_write(ndev, 0x1, RMIIMODE);
    +
    /* Set MAC address again */
    update_mac_address(ndev);
}

/* Set MAC address again */
update_mac_address(ndev);
}

/* Set MAC address again */
update_mac_address(ndev);
}

/* Set MAC address again */
update_mac_address(ndev);
}

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update_mac_address(ndev);
}

/* Set MAC address again */
update_mac_address(ndev);
}

/* Set MAC address again */
update_mac_address(ndev);
}

/* Set MAC address again */
update_mac_address(ndev);
}

/* Set MAC address again */
update_mac_address(ndev);

if (phydev->link) {
    if (phydev->duplex != mdp->duplex) {
        new_state = 1;
    } else if (mdp->link) {
        new_state = 1;
        mdp->link = 0;
        mdp->speed = 0;
        mdp->duplex = -1;
    } else if (mdp->cd->no_psr || mdp->no_ether_link) {
        if (phydev->link) {
            new_state = 1;
            mdp->link = phydev->link;
            sh_eth_rcv_snd_disable(ndev);
        } else if (phydev->link) {
            new_state = 1;
            mdp->link = 0;
            mdp->speed = 0;
            mdp->duplex = -1;
        }
    }
}

/* Enable TX and RX right over here, if E-MAC change is ignored */
if ((mdp->cd->no_psr || mdp->no_ether_link) && phydev->link) {
    sh_eth_rcv_snd_enable(ndev);
    mmiowb();
    spin_unlock_irqrestore(&mdp->lock, flags);

    if (new_state && netif_msg_link(mdp))
        phy_print_status(phydev);
}

static int sh_eth_set_link_ksettings(struct net_device *ndev,
    const struct ethtool_link_ksettings *cmd)
{
    struct sh_eth_private *mdp = netdev_priv(ndev);
    unsigned long flags;
    int ret;
    if (!ndev->phydev)
        return -ENODEV;

    spin_lock_irqsave(&mdp->lock, flags);

    /* disable tx and rx */
    sh_eth_rcv_snd_disable(ndev);
    /* Enable TX and RX right over here, if E-MAC change is ignored */
    if ((mdp->cd->no_psr || mdp->no_ether_link) && phydev->link) {
        sh_eth_rcv_snd_enable(ndev);
        mmiowb();
        spin_unlock_irqrestore(&mdp->lock, flags);
        if (new_state && netif_msg_link(mdp))
            phy_print_status(phydev);
    }
}

static int sh_eth_set_link_ksettings(struct net_device *ndev,
    const struct ethtool_link_ksettings *cmd)
{
    struct sh_eth_private *mdp = netdev_priv(ndev);
    unsigned long flags;
    int ret;
    if (!ndev->phydev)
        return -ENODEV;

    spin_lock_irqsave(&mdp->lock, flags);

    /* disable tx and rx */
    sh_eth_rcv_snd_disable(ndev);
    /* Enable TX and RX right over here, if E-MAC change is ignored */
    if ((mdp->cd->no_psr || mdp->no_ether_link) && phydev->link) {
        sh_eth_rcv_snd_enable(ndev);
        mmiowb();
        spin_unlock_irqrestore(&mdp->lock, flags);
        if (new_state && netif_msg_link(mdp))
            phy_print_status(phydev);
    }
}
-ret = phy_ethtool_ksettings_set(ndev->phydev, cmd);
-if (ret)
-goto error_exit;
-
-if (cmd->base.duplex == DUPLEX_FULL)
-mdp->duplex = 1;
-else
-mdp->duplex = 0;
-
-if (mdp->cd->set_duplex)
-mdp->cd->set_duplex(ndev);
-
-error_exit:
-n_delay(1);
-
-/* enable tx and rx */
-sh_eth_rcv_snd_enable(ndev);
-
-spin_unlock_irqrestore(&mdp->lock, flags);
-
-return ret;
+return phy_ethtool_ksettings_set(ndev->phydev, cmd);
}  
/* If it is ever necessary to increase SH_ETH_REG_DUMP_MAX_REGS, the
@@ -2163,18 +2157,10 @@
static int sh_eth_nway_reset(struct net_device *ndev)
{
-struct sh_eth_private *mdp = netdev_priv(ndev);
-unsigned long flags;
-int ret;
-
-if (!ndev->phydev)
return -ENODEV;
-
-spin_lock_irqsave(&mdp->lock, flags);
-ret = phy_start_aneg(ndev->phydev);
-spin_unlock_irqrestore(&mdp->lock, flags);
-
-return ret;
+return phy_start_aneg(ndev->phydev);
}  
static u32 sh_eth_get_msglevel(struct net_device *ndev)
@@ -2222,7 +2208,7 @@
{
 switch (stringset) {
case ETH_SS_STATS:
    -memcpy(data, *sh_eth_gstrings_stats,
    +memcpy(data, sh_eth_gstrings_stats,
          sizeof(sh_eth_gstrings_stats));
    break;
}
@@ -2467,6 +2453,7 @@
 else
     txdesc->status |= cpu_to_le32(TD_TACT);
     +wmb(); /* cur_tx must be incremented after TACT bit was set */
 mdp->cur_tx++; 
if (!!(sh_eth_read(ndev, EDTRR) & sh_eth_get_edtrr_trns(mdp)))
@@ -2547,10 +2534,10 @@
 /* Free all the skbuffs in the Rx queue and the DMA buffer. */
     sh_eth_ring_free(ndev);
     -pm_runtime_put_sync(&mdp->pdev->dev);
     -
     mdp->is_opened = 0;
     +pm_runtime_put(&mdp->pdev->dev);
     +
     return 0;
}
@@ -2922,7 +2909,7 @@
 /* SuperH's TSU register init function */
 static void sh_eth_tsu_init(struct sh_eth_private *mdp)
 {
      -if (sh_eth_is_rz_fast_ether(mdp)) {
      +if (!mdp->cd->dual_port) {
     sh_eth_tsu_write(mdp, 0, TSU_TEN); /* Disable all CAM entry */
     sh_eth_tsu_write(mdp, TSU_FWSLC_POSTENU | TSU_FWSLC_POSTENL,
                        TSU_FWSLC); /* Enable POST registers */
     @@ -3076,12 +3063,16 @@
        struct device_node *np = dev->of_node;
        struct sh_eth_plat_data *pdata;
        const char *mac_addr;
        +int ret;

        pdata = devm_kzalloc(dev, sizeof(*pdata), GFP_KERNEL);
        if (!pdata)
            return NULL;
        -pdata->phy_interface = of_get_phy_mode(np);
        +ret = of_get_phy_mode(np);
+if (ret < 0)
+return NULL;
+pdata->phy_interface = ret;

mac_addr = of_get_mac_address(np);
if (mac_addr)
--- linux-4.15.0.orig/drivers/net/ethernet/renesas/sh_eth.h
+++ linux-4.15.0/drivers/net/ethernet/renesas/sh_eth.h
@@ -509,6 +509,7 @@
    unsigned rmiimode:1; /* EtherC has RMIIMODE register */
    unsigned rtrate:1; /* EtherC has RTRATE register */
    unsigned magic:1; /* EtherC has ECMR.MPDE and ECSR.MPD */
+    unsigned dual_port:1; /* Dual EtherC/E-DMAC */
};

struct sh_eth_private {
--- linux-4.15.0.orig/drivers/net/ethernet/rocker/rocker_main.c
+++ linux-4.15.0/drivers/net/ethernet/rocker/rocker_main.c
@@ -651,10 +651,10 @@
    rocker_dma_ring_destroy(rocker, &rocker->event_ring);
    rocker_dma_ring_create:
+    rocker_dma_cmd_ring_wait_alloc:
    rocker_dma_cmd_ring_wait_free(rocker);
+    rocker_dma_cmd_ring_wait_alloc:
    rocker_dma_cmd_ring_wait_free(rocker);
    rocker_dma_cmd_ring_destroy(rocker, &rocker->cmd_ring);
    return err;
@@ -2902,6 +2902,12 @@
    rocker->hw.id = rocker_read64(rocker, SWITCH_ID);
err = rocker_probe_ports(rocker);
-if (err) {
-dev_err(&pdev->dev, "failed to probe ports\n");
-goto err_probe_ports;
-}

dev_info(&pdev->dev, "Rocker switch with id %phN\n", 
(int)sizeof(rocker->hw.id), &rocker->hw.id);

return 0;

err_probe_ports:
-unregister_switchdev_notifier(&rocker_switchdev_notifier);
err_register_switchdev_notifier:
.unregister_fib_notifier(&rocker->fib_nb);
err_register_fib_notifier:
+rocker_remove_ports(rocker);
+err_probe_ports:
destroy_workqueue(rocker->rocker_owq);
err_alloc_ordered_workqueue:
free_irq(rocker_msix_vector(rocker, ROCKER_MSIX_VEC_EVENT), rocker);
@@ -2961,9 +2961,9 @@
{                
struct rocker *rocker = pci_get_drvdata(pdev);

-rocker_remove_ports(rocker);
-unregister_switchdev_notifier(&rocker_switchdev_notifier);
-unregister_fib_notifier(&rocker->fib_nb);
+rocker_remove_ports(rocker);
rocker_write32(rocker, CONTROL, ROCKER_CONTROL_RESET);
destroy_workqueue(rocker->rocker_owq);
free_irq(rocker_msix_vector(rocker, ROCKER_MSIX_VEC_EVENT), rocker);
--- linux-4.15.0.orig/drivers/net/ethernet/samsung/sxgbe/sxgbe_main.c
+++ linux-4.15.0/drivers/net/ethernet/samsung/sxgbe/sxgbe_main.c
@@ -2282,7 +2282,7 @@
if (!str || !*str)
    return -EINVAL;
while ((opt = strsep(&str, ",\")) != NULL) {
    -if (!strncmp(opt, "eee_timer:\", 6)) {
+if (!strncmp(opt, "eee_timer:\", 10)) {
        if (kstrtoint(opt + 10, 0, &eee_timer))
            goto err;
    }
--- linux-4.15.0.orig/drivers/net/ethernet/seeq/sgiseeq.c
+++ linux-4.15.0/drivers/net/ethernet/seeq/sgiseeq.c
@@ -734,6 +734,7 @@
if (!str || !"str)
    return -EINVAL;
while ((opt = strsep(&str, ",\")) != NULL) {
    -if (!strncmp(opt, "eee_timer:\", 6)) {
+if (!strncmp(opt, "eee_timer:\", 10)) {
        if (kstrtoint(opt + 10, 0, &eee_timer))
            goto err;
    }

platform_set_drvdata(pdev, dev);
+SET_NETDEV_DEV(dev, &pdev->dev);
sp = netdev_priv(dev);

/* Make private data page aligned */
@@ -791,15 +792,16 @@
printk(KERN_ERR "Sgiseeq: Cannot register net device, 
    "aborting.'n")
err = -ENODEV;
-goto err_out_free_page;
+goto err_out_free_attrs;
}

printk(KERN_INFO "%s: %s %pM\n", dev->name, sgiseeqstr, dev->dev_addr);

return 0;

-err_out_free_page:
-	free_page((unsigned long) sp->srings);
+err_out_free_attrs:
+dma_free_attrs(&pdev->dev, sizeof(*sp->srings), sp->srings,
+    sp->srings_dma, DMA_ATTR_NON_CONSISTENT);
err_out_free_dev:
free_netdev(dev);

--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ef10.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ef10.c
@@ -160,11 +160,31 @@
    */ On all EF10s up to and including SFC9220 (Medford1), all PFs use BAR 0 for
    * I/O space and BAR 2(&3) for memory. On SFC9250 (Medford2), there is no I/O
    * bar; PFs use BAR 0/1 for memory.
+ */
+static unsigned int efx_ef10_pf_mem_bar(struct efx_nic *efx)
+{
+switch (efx->pci_dev->device) {
+case 0x0b03: /* SFC9250 PF */
+return 0;
+default:
+return 2;
+}
+}
+/* All VF s use BAR 0/1 for memory */
+static unsigned int efx_ef10_vf_mem_bar(struct efx_nic *efx)
static unsigned int efx_ef10_mem_map_size(struct efx_nic *efx)
{
    int bar;

    bar = efx->type->mem_bar;
    return resource_size(&efx->pci_dev->resource[bar]);
}

static int efx_ef10_init_datapath_caps(struct efx_nic *efx)
{
    MCDI_DECLARE_BUF(outbuf, MC_CMD_GET_CAPABILITIES_V3_OUT_LEN);
    struct efx_ef10_nic_data *nic_data = efx->nic_data;
    size_t outlen;
    int rc;
    if (outlen >= MC_CMD_GET_CAPABILITIES_V3_OUT_LEN) {
        u8 vi_window_mode = MCDI_BYTE(outbuf, GET_CAPABILITIES_V3_OUT_VI_WINDOW_MODE);
        switch (vi_window_mode) {
            case MC_CMD_GET_CAPABILITIES_V3_OUT_VI_WINDOW_MODE_8K:
                efx->vi_stride = 8192;
                break;
            case MC_CMD_GET_CAPABILITIES_V3_OUT_VI_WINDOW_MODE_16K:
                efx->vi_stride = 16384;
                break;
            case MC_CMD_GET_CAPABILITIES_V3_OUT_VI_WINDOW_MODE_64K:
                efx->vi_stride = 65536;
                break;
            default:
                netif_err(efx, probe, efx->net_dev, "Unrecognised VI window mode %d\n", vi_window_mode);
                return -EIO;
        }
        netif_dbg(efx, probe, efx->net_dev, "vi_stride = %u\n", efx->vi_stride);
    } else {
        MCDI_DECLARE_BUF(outbuf, MC_CMD_GET_CAPABILITIES_V4_OUT_LEN);
    }
}
/* keep default VI stride */
+netif_dbg(efx, probe, efx->net_dev,
+ "firmware did not report VI window mode, assuming vi_stride = %u\n",
+ efx->vi_stride);
+
+if (outlen >= MC_CMD_GET_CAPABILITIES_V4_OUT_LEN) {  
+efx->num_mac_stats = MCDI_WORD(outbuf,
+GET_CAPABILITIES_V4_OUT_MAC_STATS_NUM_STATS);
+netif_dbg(efx, probe, efx->net_dev,
+ "firmware reports num_mac_stats = %u\n",
+ efx->num_mac_stats);
+}
+
+/* leave num_mac_stats as the default value, MC_CMD_MAC_NSTATS */
+netif_dbg(efx, probe, efx->net_dev,
+ "firmware did not report num_mac_stats, assuming %u\n",
+ efx->num_mac_stats);
+
+return 0;
}


static void efx_ef10_read_licensed_features(struct efx_nic *efx)
{
MCDI_DECLARE_BUF(inbuf, MC_CMD_LICENSING_V3_IN_LEN);
MCDI_DECLARE_BUF(outbuf, MC_CMD_LICENSING_V3_OUT_LEN);
struct efx_ef10_nic_data *nic_data = efx->nic_data;
size_t outlen;
int rc;

MCDI_SET_DWORD(inbuf, LICENSING_V3_IN_OP,
+ MC_CMD_LICENSING_V3_IN_OP_REPORT_LICENSE);
rc = efx_mcdi_rpc_quiet(efx, MC_CMD_LICENSING_V3, inbuf, sizeof(inbuf),
+outbuf, sizeof(outbuf), &outlen);
+if (rc || (outlen < MC_CMD_LICENSING_V3_OUT_LEN))
+return;
+
+nic_data->licensed_features = MCDI_QWORD(outbuf,
+ LICENSING_V3_OUT_LICENSED_FEATURES);
+
+static int efx_ef10_get_sysclk_freq(struct efx_nic *efx)
{  
MCDI_DECLARE_BUF(outbuf, MC_CMD_GET_CLOCK_OUT_LEN);
@@ -589,17 +670,6 @@
struct efx_ef10_nic_data *nic_data;
int i, rc;
-/* We can have one VI for each 8K region. However, until we
- * use TX option descriptors we need two TX queues per channel.
- */
efx->max_channels = min_t(unsigned int,
- EFX_MAX_CHANNELS,
- efx_ef10_mem_map_size(efx) /
- (EFX_VI_PAGE_SIZE * EFX_TXQ_TYPES));
efx->max_tx_channels = efx->max_channels;
if (WARN_ON(efx->max_channels == 0))
- return -EIO;
-
- nic_data = kzalloc(sizeof(*nic_data), GFP_KERNEL);
if (!nic_data)
return -ENOMEM;

+efx_ef10_read_licensed_features(efx);
+
+/* We can have one VI for each vi_stride-byte region.
+ * However, until we use TX option descriptors we need two TX queues
+ * per channel.
+ */
efx->max_channels = min_t(unsigned int,
+ EFX_MAX_CHANNELS,
+ efx_ef10_mem_map_size(efx) /
+ (efx->vi_stride * EFX_TXQ_TYPES));
efx->max_tx_channels = efx->max_channels;
+ if (WARN_ON(efx->max_channels == 0)) {
+ rc = -EIO;
+ goto fail5;
+}
+
efx->rx_packet_len_offset =
ES_DZ_RX_PREFIX_PKTLEN_OFST - ES_DZ_RX_PREFIX_SIZE;

@@ -695,7 +781,7 @@
if (rc && rc != -EPERM)
go to fail5;

-efx_ptp_probe(efx, NULL);
+efx_ptp_defer_probe_with_channel(efx);

#endif CONFIG_SFC_SRIOV
if ((efx->pci_dev->physfn) && (!efx->pci_dev->is_physfn)) {
@@ -865,6 +951,11 @@
/* Link a buffer to each TX queue */
efx_for_each_channel(channel, efx) {
+/* Extra channels, even those with TXQs (PTP), do not require
+ * PIO resources.
+ */
+if (!channel->type->want_pio)
+continue;

efx_for_each_channel_tx_queue(tx_queue, channel) { /* We assign the PIO buffers to queues in
 */
+ reverse order to allow for the following

} else {

tx_queue->piobuf =
nic_data->pio_write_base +
-index * EFX_VI_PAGE_SIZE + offset;
+index * efx->vi_stride + offset;

netif_dbg(efx, probe, efx->net_dev,
"linked VI %u to PIO buffer %u offset %x addr %p\n",

void __iomem *membase;

int rc;

-channel_vis = max(efx->n_channels, efx->n_tx_channels * EFX_TXQ_TYPES);
+channel_vis = max(efx->n_channels,
+ (efx->n_tx_channels + efx->n_extra_tx_channels) *
+ EFX_TXQ_TYPES);

#ifndef EFX_USEPIO
/* Try to allocate PIO buffers if wanted and if the full
 */

#else
/* The UC mapping contains (channel_vis - 1) complete VIs and the
 * first half of the next VI. Then the WC mapping begins with
 * the second half of this last VI.
 + * first 4K of the next VI. Then the WC mapping begins with
 + * the remainder of this last VI.
 */
-uc_mem_map_size = PAGE_ALIGN((channel_vis - 1) * EFX_VI_PAGE_SIZE +
+uc_mem_map_size = PAGE_ALIGN((channel_vis - 1) * efx->vi_stride +
    ER_DZ_TX_PIOBUF);

if (nic_data->n_piobufs) {
/* pio_write_vi_base rounds down to give the number of complete
 * VIs inside the UC mapping.
 */
-pio_write_vi_base = uc_mem_map_size / EFX_VI_PAGE_SIZE;
+pio_write_vi_base = uc_mem_map_size / efx->vi_stride;
wc_mem_map_size = (PAGE_ALIGN((pio_write_vi_base + 
nic_data->n_piofbfs) * 
- EFX_VI_PAGE_SIZE) -
+ efx->vi_stride) -
uc_mem_map_size);
max_vis = pio_write_vi_base + nic_data->n_piofbfs;
} else {
@@ -1337,7 +1430,7 @@
nic_data->pio_write_vi_base = pio_write_vi_base;
nic_data->pio_write_base =
nic_data->wc_membase +
-(pio_write_vi_base * EFX_VI_PAGE_SIZE + ER_DZ_TX_PIOBUF -
+(pio_write_vi_base * efx->vi_stride + ER_DZ_TX_PIOBUF -
uc_mem_map_size);

rc = efx_ef10_link_piofbfs(efx);
@@ -1571,6 +1664,28 @@
             EF10_DMA_STAT(tx_bad, VADAPTER_TX_BAD_PACKETS),
             EF10_DMA_STAT(tx_bad_bytes, VADAPTER_TX_BAD_BYTES),
             EF10_DMA_STAT(tx_overflow, VADAPTER_TX_OVERFLOW),
             +EF10_DMA_STAT(fec_uncorrected_errors, FEC_UNCORRECTED_ERRORS),
             +EF10_DMA_STAT(fec_corrected_errors, FEC_CORRECTED_ERRORS),
             +EF10_DMA_STAT(fec_corrected_symbols_lane0, FEC_CORRECTED_SYMBOLS_LANE0),
             +EF10_DMA_STAT(fec_corrected_symbols_lane1, FEC_CORRECTED_SYMBOLS_LANE1),
             +EF10_DMA_STAT(fec_corrected_symbols_lane2, FEC_CORRECTED_SYMBOLS_LANE2),
             +EF10_DMA_STAT(fec_corrected_symbols_lane3, FEC_CORRECTED_SYMBOLS_LANE3),
             +EF10_DMA_STAT(ctpio_vi_busy_fallback, CTPIO_VI_BUSY_FALLBACK),
             +EF10_DMA_STAT(ctpio_long_write_success, CTPIO_LONG_WRITE_SUCCESS),
             +EF10_DMA_STAT(ctpio_missing_dbell_fail, CTPIO_MISSING_DBELL_FAIL),
             +EF10_DMA_STAT(ctpio_overflow_fail, CTPIO_OVERFLOW_FAIL),
             +EF10_DMA_STAT(ctpio_underflow_fail, CTPIO_UNDERFLOW_FAIL),
             +EF10_DMA_STAT(ctpio_timeout_fail, CTPIO_TIMEOUT_FAIL),
             +EF10_DMA_STAT(ctpio_noncontig_wr_fail, CTPIO_NONCONTIG_WR_FAIL),
             +EF10_DMA_STAT(ctpio Frm_clobber_fail, CTPIO_FRM_CLOBBER_FAIL),
             +EF10_DMA_STAT(ctpio_invalid_wr_fail, CTPIO_INVALID_WR_FAIL),
             +EF10_DMA_STAT(ctpio_vi_clobber_fallback, CTPIO_VI_CLOBBER_FALLBACK),
             +EF10_DMA_STAT(ctpio_unqualified_fallback, CTPIO_UNQUALIFIED_FALLBACK),
             +EF10_DMA_STAT(ctpio_runt_fallback, CTPIO_RUNT_FALLBACK),
             +EF10_DMA_STAT(ctpio_success, CTPIO_SUCCESS),
             +EF10_DMA_STAT(ctpio_fallback, CTPIO_FALLBACK),
             +EF10_DMA_STAT(ctpio_poison, CTPIO_POISON),
             +EF10_DMA_STAT(ctpio_erase, CTPIO_ERASE),
};

#define HUNT_COMMON_STAT_MASK ((1ULL << EF10_STAT_port_tx_bytes) |\n@@ -1646,6 +1761,42 @@
             (1ULL << EF10_STAT_port_rx_dp_hlb_fetch) |\n             (1ULL << EF10_STAT_port_rx_dp_hlb_wait))
These statistics are only provided if the NIC supports MC_CMD_MAC_STATS_V2, indicated by returning a value >= MC_CMD_MAC_NSTATS_V2 in MC_CMD_GET_CAPABILITIES_V4_OUT_MAC_STATS_NUM_STATS. These bits are in the second u64 of the raw mask.

#define EF10_FEC_STAT_MASK (\n	(1ULL << (EF10_STAT_fec_uncorrected_errors - 64)) | \n	(1ULL << (EF10_STAT_fec_corrected_errors - 64)) | \n	(1ULL << (EF10_STAT_fec_corrected_symbols_lane0 - 64)) | \n	(1ULL << (EF10_STAT_fec_corrected_symbols_lane1 - 64)) | \n	(1ULL << (EF10_STAT_fec_corrected_symbols_lane2 - 64)) | \n	(1ULL << (EF10_STAT_fec_corrected_symbols_lane3 - 64)))

These statistics are only provided if the NIC supports MC_CMD_MAC_STATS_V3, indicated by returning a value >= MC_CMD_MAC_NSTATS_V3 in MC_CMD_GET_CAPABILITIES_V4_OUT_MAC_STATS_NUM_STATS. These bits are in the second u64 of the raw mask.

#define EF10_CTPIO_STAT_MASK (\n	(1ULL << (EF10_STAT_ctpio_vi_busy_fallback - 64)) | \n	(1ULL << (EF10_STAT_ctpio_long_write_success - 64)) | \n	(1ULL << (EF10_STAT_ctpio_missing_dbell_fail - 64)) | \n	(1ULL << (EF10_STAT_ctpio_overflow_fail - 64)) | \n	(1ULL << (EF10_STAT_ctpio_underflow_fail - 64)) | \n	(1ULL << (EF10_STAT_ctpio_timeout_fail - 64)) | \n	(1ULL << (EF10_STAT_ctpio_noncontig_wr_fail - 64)) | \n	(1ULL << (EF10_STAT_ctpio_fallback - 64)) | \n	(1ULL << (EF10_STAT_ctpio_poison - 64)) | \n	(1ULL << (EF10_STAT_ctpio_erase - 64)))

static u64 efx_ef10_raw_stat_mask(struct efx_nic *efx) {
    u64 raw_mask = HUNT_COMMON_STAT_MASK;
    if (nic_data->datapath_caps &
        (1 << MC_CMD_GET_CAPABILITIES_OUT_EVB_LBN)) {
        raw_mask[0] |= ~(1ULL << EF10_STAT_rx_unicast) - 1;
        raw_mask[1] = (1ULL << (EF10_STAT_COUNT - 63)) - 1;
    } else {
        raw_mask[1] = 0;
    }
}

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/* Only show FEC stats when NIC supports MC_CMD_MAC_STATS_V2 */
+if (efx->num_mac_stats >= MC_CMD_MAC_NSTATS_V2)
+raw_mask[1] |= EF10_FEC_STAT_MASK;
+
/* CTPIO stats appear in V3. Only show them on devices that actually
 * support CTPIO. Although this driver doesn't use CTPIO others might,
 * and we may be reporting the stats for the underlying port.
 +*/
+if (efx->num_mac_stats >= MC_CMD_MAC_NSTATS_V3 &&
 +    (nic_data->datapath_caps2 &
 +     (1 << MC_CMD_GET_CAPABILITIES_V4_OUT_CTPIO_LBN)))
+raw_mask[1] |= EF10_CTPIO_STAT_MASK;

#if BITS_PER_LONG == 64
BUILD_BUG_ON(BITS_TO_LONGS(EF10_STAT_COUNT) != 2);
@@ -1791,7 +1954,7 @@
dma_stats = efx->stats_buffer.addr;

-generation_end = dma_stats[MC_CMD_MAC_GENERATION_END];
+generation_end = dma_stats[efx->num_mac_stats - 1];
if (generation_end == EFX_MC_STATS_GENERATION_INVALID)
    return 0;
    rmb();
@@ -1839,7 +2002,7 @@
DECLARE_BITMAP(mask, EF10_STAT_COUNT);
__le64 generation_start, generation_end;
    u64 *stats = nic_data->stats;
    dma_len = MC_CMD_MAC_NSTATS * sizeof(u64);
+    dma_len = efx->num_mac_stats * sizeof(u64);
struct efx_buffer stats_buf;
__le64 *dma_stats;
int rc;
@@ -1864,7 +2027,7 @@
}
+generation_end = dma_stats[efx->num_mac_stats - 1];
if (generation_end == EFX_MC_STATS_GENERATION_INVALID) {
WARN_ON_ONCE(1);
goto out;
@@ -1951,8 +2114,9 @@
} else {
unsigned int ticks = efx_usecs_to_ticks(efx, usecs);
-EFX_POPULATE_DWORD_2(timer_cmd, ERF_DZ_TC_TIMER_MODE, mode,
- ERF_DZ_TC_TIMER_VAL, ticks);
+EFX_POPULATE_DWORD_3(timer_cmd, ERF_DZ_TC_TIMER_MODE, mode,
+ ERF_DZ_TC_TIMER_VAL, ticks,
+ ERF_FZ_TC_TMR_REL_VAL, ticks);
efx_writed_page(efx, &timer_cmd, ER_DZ_EVQ_TMR,
channel->channel);
}
@@ -2263,12 +2427,25 @@
int i;
BUILD_BUG_ON(MC_CMD_INIT_TXQ_OUT_LEN != 0);
+/* Only attempt to enable TX timestamping if we have the license for it,
+ * otherwise TXQ init will fail
+ */
+if (!(nic_data->licensed_features &
+
(1 << LICENSED_V3_FEATURES_TX_TIMESTAMPS_LBN))) {
+tx_queue->timestamping = false;
+/* Disable sync events on this channel. */
+if (efx->type->ptp_set_ts_sync_events)
+efx->type->ptp_set_ts_sync_events(efx, false, false);
+}
+
/* TSOv2 is a limited resource that can only be configured on a limited
* number of queues. TSO without checksum offload is not really a thing,
* so we only enable it for those queues.
+ * TSOv2 cannot be used with Hardware timestamping.
*/
if (csum_offload && (nic_data->datapath_caps2 &
-(1 << MC_CMD_GET_CAPABILITIES_V2_OUT_TX_TSO_V2_LBN))) {
+(1 << MC_CMD_GET_CAPABILITIES_V2_OUT_TX_TSO_V2_LBN)) &&
+ !tx_queue->timestamping) {
tso_v2 = true;
netif_dbg(efx, hw, efx->net_dev, "Using TSOv2 for channel %u\n",
channel->channel);
@@ -2294,14 +2471,16 @@
inlen = MC_CMD_INIT_TXQ_IN_LEN(entries);
do {
-MCDI_POPULATE_DWORD_3(inbuf, INIT_TXQ_IN_FLAGS,

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MCDI_PUBLISH_DWORD_4(inbuf, INIT_TXQ_IN_FLAG,
/* This flag was removed from mcdi_pcol.h for
* the non-_EXT version of INIT_TXQ. However,
* firmware still honours it.
*/
INIT_TXQ_EXT_IN_FLAG_TSOV2_EN, tso_v2,
INIT_TXQ_IN_FLAG_IP_CSUM_DIS, !csum_offload,
+INIT_TXQ_IN_FLAG_TCP_CSUM_DIS, !csum_offload);

rc = efx_mcdi_rpc_quiet(efx, MC_CMD_INIT_TXQ, inbuf, inlen,
NULL, 0, NULL);
@@ -2327,12 +2506,13 @@
    tx_queue->flags = EFX_TX_BUF_OPTION;
    tx_queue->insert_count = 1;
    txd = efx_txt_desc(tx_queue, 0);
-EFX_POPULATE_QWORD_4(*txd,
+EFX_POPULATE_QWORD_5(*txd,
    ESF_DZ_TX_DESC_IS_OPT, true,
    ESF_DZ_TX_OPTION_TYPE,
    ESF_DZ_TX_OPTION_DESC_CRC_CSUM,
    ESF_DZ_TX_OPTION_udp_tcp_csum, csum_offload,
- ESF_DZ_TX_OPTION_IP_CSUM, csum_offload);
+ ESF_DZ_TX_OPTION_IP_CSUM, csum_offload,
+ ESF_DZ_TX_TIMESTAMP, tx_queue->timestamping);
    tx_queue->write_count = 1;

    if (tso_v2) {
    @ @ -3233,8 +3413,8 @@
        if (unlikely((rx_encap_hdr != ESE_EZ_ENCAP_HDR_VXLAN &&
            (rx_l3_class != ESE_DZ_L3_CLASS_IP4 &&
             rx_l3_class != ESE_DZ_L3_CLASS_IP6)) ||
             (rx_l4_class != ESE_DZ_L4_CLASS_TCP &&
             rx_l4_class != ESE_DZ_L4_CLASS_UDP))))
            + (rx_l4_class != ESE_FZ_L4_CLASS_TCP &&
            + (rx_l4_class != ESE_FZ_L4_CLASS_UDP))))
        netdev_WARN(efx->net_dev,
            "invalid class for RX_TCPUDP_CKSUM_ERR: event="
        EFX_QWORD_FMT "n",
        @ @ -3271.8 +3451.8 @@
            EFX_QWORD_VAL(*event));
        else if (unlikely((rx_l3_class != ESE_DZ_L3_CLASS_IP4 &&
            rx_l3_class != ESE_DZ_L3_CLASS_IP6)) ||
            (rx_l4_class != ESE_DZ_L4_CLASS_TCP &&
            rx_l4_class != ESE_DZ_L4_CLASS_UDP))
            + (rx_l4_class != ESE_FZ_L4_CLASS_TCP &&
            + (rx_l4_class != ESE_FZ_L4_CLASS_UDP))}
netdev_WARN(efx->net_dev,
   "invalid class for RX_TCP_UDP.Inner_CHKSUM_ERR: event="
   EFX_QWORD_FMT "n",
@@ -3307,7 +3487,7 @@
next_ptr_lbits = EFX_QWORD_FIELD(*event, ESF_DZ_RX_DSC_PTR_LBITS);
rx_queue_label = EFX_QWORD_FIELD(*event, ESF_DZ_RX_QLABEL);
rx_l3_class = EFX_QWORD_FIELD(*event, ESF_DZ_RX_L3_CLASS);
-rx_l4_class = EFX_QWORD_FIELD(*event, ESF_DZ_RX_L4_CLASS);
+rtrx_l4_class = EFX_QWORD_FIELD(*event, ESF_FZ_RX_L4_CLASS);
rx_cont = EFX_QWORD_FIELD(*event, ESF_DZ_RX_CONT);
rx_encap_hdr =
nic_data->datapath_caps &
@@ -3385,8 +3565,8 @@
rx_l3_class, rx_l4_class,
event);
} else {
-bool tcpudp = rx_l4_class == ESE_DZ_L4_CLASS_TCP ||
-    rx_l4_class == ESE_DZ_L4_CLASS_UDP;
+bool tcpudp = rx_l4_class == ESE_FZ_L4_CLASS_TCP ||
+    rx_l4_class == ESE_FZ_L4_CLASS_UDP;
switch (rx_encap_hdr) {
case ESE_EZ_ENCAP_HDR_VXLAN: /* VxLAN or GENEVE */
@@ -3407,7 +3587,7 @@
}
}

-if (rx_l4_class == ESE_DZ_L4_CLASS_TCP)
+if (rx_l4_class == ESE_FZ_L4_CLASS_TCP)
flags |= EFX_RX_PKT_TCP;
channel->irq_mod_score += 2 * n_packets;
@@ -3427,31 +3607,92 @@
return n_packets;
}

-static int
+static u32 efx_ef10_extract_event_ts(efx_qword_t *event)
+{
+u32 tstamp;
+  +tstamp = EFX_QWORD_FIELD(*event, TX_TIMESTAMP_EVENT_TSTAMP_DATA_HI);
+tstamp <<= 16;
+tstamp |= EFX_QWORD_FIELD(*event, TX_TIMESTAMP_EVENT_TSTAMP_DATA_LO);
+  +return tstamp;
+}
static void
efx_ef10_handle_tx_event(struct efx_channel *channel, efx_qword_t *event)
{
    struct efx_nic *efx = channel->efx;
    struct efx_tx_queue *tx_queue;
    unsigned int tx_ev_desc_ptr;
    unsigned int tx_ev_q_label;
    int tx_descs = 0;
    unsigned int tx_ev_type;
    u64 ts_part;

    if (unlikely(READ_ONCE(efx->reset_pending)))
        return 0;

    if (unlikely(EFX_QWORD_FIELD(*event, ESF_DZ_TX_DROP_EVENT)))
        return 0;

    /* Transmit completion */
    tx_ev_desc_ptr = EFX_QWORD_FIELD(*event, ESF_DZ_TX_DESCR_INDX);
    tx_ev_q_label = EFX_QWORD_FIELD(*event, ESF_DZ_TX_QLABEL);
    tx_queue = efx_channel_get_tx_queue(channel, tx_ev_q_label % EFX_TXQ_TYPES);
    tx_descs = ((tx_ev_desc_ptr + 1 - tx_queue->read_count) &
                 tx_queue->ptr_mask);
    efx_xmit_done(tx_queue, tx_ev_desc_ptr & tx_queue->ptr_mask);

    /* Transmit timestamps are only available for 8XXX series. They result
     * in three events per packet. These occur in order, and are:
     * - the normal completion event
     * - the low part of the timestamp
     * - the high part of the timestamp
     * Each part of the timestamp is itself split across two 16 bit
     * fields in the event.
     */
    tx_ev_type = EFX_QWORD_FIELD(*event, ESF_EZ_TX_SOFT1);
switch (tx_ev_type) {
    case TX_TIMESTAMP_EVENT_TX_EV_COMPLETION:
        /* In case of Queue flush or FLR, we might have received
         * the previous TX completion event but not the Timestamp
         * events.
         */
        if (tx_queue->completed_desc_ptr != tx_queue->ptr_mask)
            efx_xmit_done(tx_queue, tx_queue->completed_desc_ptr);
        break;
    case TX_TIMESTAMP_EVENT_TX_EV_TSTMP_LO:
        ts_part = efx_ef10_extract_event_ts(event);
        tx_queue->completed_timestamp_minor = ts_part;
        break;
    case TX_TIMESTAMP_EVENT_TX_EV_TSTMP_HI:
        ts_part = efx_ef10_extract_event_ts(event);
        tx_queue->completed_timestamp_major = ts_part;
        efx_xmit_done(tx_queue, tx_queue->completed_desc_ptr);
        break;
    default:
        netif_err(efx, hw, efx->net_dev,
            "channel %d unknown tx event type %d (data 
                EFX_QWORD_FMT ");
            channel->channel, tx_ev_type,
            EFX_QWORD_VAL(*event));
        break;
    }
}

static void
efx_qword_t event, *p_event;
unsigned int read_ptr;
v
if (quota <= 0)


@@ -3553,13 +3793,7 @@
 break;
 case ESE_DZ_EV_CODE_TX_EV:
-        tx_descs += efx_ef10_handle_tx_event(channel, &event);
-        if (tx_descs > efx->txq_entries) {
-            spent = quota;
-            goto out;
-        } else if (++spent == quota) {
-            goto out;
-        }
+        efx_ef10_handle_tx_event(channel, &event);
 break;
 case ESE_DZ_EV_CODE_DRIVER_EV:
        efx_ef10_handle_driver_event(channel, &event);

@@ -5860,22 +6094,25 @@
 { NVRAM_PARTITION_TYPE_LICENSE, 0, 0, "sfc_license" },
 { NVRAM_PARTITION_TYPE_PHY_MIN, 0xff, 0, "sfc_phy_fw" },
};
+#define EF10_NVRAM_PARTITION_COUNT ARRAY_SIZE(efx_ef10_nvram_types)

static int efx_ef10_mtd_probe_partition(struct efx_nic *efx,
        struct efx_mcdi_mtd_partition *part,
-       unsigned int type)
+       unsigned int type,
+       unsigned long *found)
{
    MCDI_DECLARE_BUF(inbuf, MC_CMD_NVRAM_METADATA_IN_LEN);
    MCDI_DECLARE_BUF(outbuf, MC_CMD_NVRAM_METADATA_OUT_LENMAX);
    const struct efx_ef10_nvram_type_info *info;
    size_t size, erase_size, outlen;
    +int type_idx = 0;
    bool protected;
    int rc;

    -for (info = efx_ef10_nvram_types; ; info++) {
    -    if (info ==
-        efx_ef10_nvram_types + ARRAY_SIZE(efx_ef10_nvram_types))
+for (type_idx = 0; ; type_idx++) {
+    +if (type_idx == EF10_NVRAM_PARTITION_COUNT)
+        return -ENODEV;
+    +info = efx_ef10_nvram_types + type_idx;
+    if ((type & ~info->type_mask) == info->type)
+        break;
    }
@@ -5888,6 +6125,13 @@
    if (protected)
        return -ENODEV; /* hide it */

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/* If we've already exposed a partition of this type, hide this
duplicate. All operations on MTDs are keyed by the type anyway,
so we can't act on the duplicate.
*/
if (__test_and_set_bit(type_idx, found))
  return -EEXIST;
part->nvram_type = type;

MCDI_SET_DWORD(inbuf, NVRAM_METADATA_IN_TYPE, type);
static int efx_ef10_mtd_probe(struct efx_nic *efx)
{
  MCDI_DECLARE_BUF(outbuf, MC_CMD_NVRAM_PARTITIONS_OUT_LENMAX);
  DECLARE_BITMAP(found, EF10_NVRAM_PARTITION_COUNT) = { 0 };
  struct efx_mcdi_mtd_partition *parts;
  size_t outlen, n_parts_total, i, n_parts;
  unsigned int type;
  for (i = 0; i < n_parts_total; i++) {
    type = MCDI_ARRAY_DWORD(outbuf, NVRAM_PARTITIONS_OUT_TYPE_ID, i);
    -rc = efx_ef10_mtd_probe_partition(efx, &parts[n_parts], type);
    -if (rc == 0)
      n_parts++;
    -else if (rc != -ENODEV)
      continue;
    -if (rc)
      goto fail;
    n_parts++;
  }
  rc = efx_mtd_add(efx, &parts[0].common, n_parts, sizeof(*parts));
  efx_ef10_rx_enable_timestamping :
  efx_ef10_rx_disable_timestamping:
  -efx_for_each_channel(channel, efx) {
    channel = efx_ptp_channel(efx);
    +channel
    int rc = set(channel, temp);
    if (en && rc != 0) {
      efx_ef10_ptp_set_ts_sync_events(efx, false, temp);
    }
const struct efx_nic_type efx_hunt_a0_vf_nic_type = {
    .is_vf = true,
    .mem_bar = EFX_MEM_VF_BAR,
    .mem_map_size = efx_ef10_mem_map_size,
    .probe = efx_ef10_probe_vf,
    .remove = efx_ef10_remove,
    @@ -6500,7 +6748,7 @@
}

const struct efx_nic_type efx_hunt_a0_nic_type = {
    .is_vf = false,
    .mem_bar = EFX_MEM_BAR,
    .mem_map_size = efx_ef10_mem_map_size,
    .probe = efx_ef10_probe_pf,
    .remove = efx_ef10_remove,
    --- linux-4.15.0.orig/drivers/net/ethernet/sfc/ef10_regs.h
+++ linux-4.15.0/drivers/net/ethernet/sfc/ef10_regs.h
@@ @ -1.6 +1.6 @@
/****************************************************************************
 * Driver for Solarflare network controllers and boards
 * Copyright 2012-2015 Solarflare Communications Inc.
 + Copyright 2012-2017 Solarflare Communications Inc.
 *
 * This program is free software; you can redistribute it and/or modify it
 * under the terms of the GNU General Public License version 2 as published
 @@ -79,6 +79,8 @@
#define ER_DZ_EVQ_TMR 0x00000420
#define ER_DZ_EVQ_TMR_STEP 8192
#define ER_DZ_EVQ_TMR_ROWS 2048
+##define ERF_FZ_TC_TMR_REL_VAL_LBN 16
+##define ERF_FZ_TC_TMR_REL_VAL_WIDTH 14
#define ERF_DZ_TC_TIMER_MODE_LBN 14
#define ERF_DZ_TC_TIMER_MODE_WIDTH 2
#define ERF_DZ_TC_TIMER_VAL_LBN 0
@@ -159,16 +161,24 @@
#define ESF_DZ_RX_EV_SOFT2_WIDTH 2
#define ESF_DZ_RX_DSC_PTR_LBITS_LBN 48
#define ESF_DZ_RX_DSC_PTR_LBITS_WIDTH 4
-##define ESF_DZ_RX_L4_CLASS_LBN 45
-##define ESF_DZ_RX_L4_CLASS_WIDTH 3
-##define ESE_DZ_L4_CLASS_RSVD7 7
-##define ESE_DZ_L4_CLASS_RSVD6 6
-##define ESE_DZ_L4_CLASS_RSVD5 5
-##define ESE_DZ_L4_CLASS_RSVD4 4
-##define ESE_DZ_L4_CLASS_RSVD3 3
-##define ESE_DZ_L4_CLASS_RSVD2 2

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-#define ESE_DZ_L4_CLASS_TCP 1
-#define ESE_DZ_L4_CLASS_UNKNOWN 0
+  #define ESF_DE_RX_L4_CLASS_LBN 45
+  #define ESF_DE_RX_L4_CLASS_WIDTH 3
+  #define ESE_DE_L4_CLASS_RSVD7 7
+  #define ESE_DE_L4_CLASS_RSVD6 6
+  #define ESE_DE_L4_CLASS_RSVD5 5
+  #define ESE_DE_L4_CLASS_RSVD4 4
+  #define ESE_DE_L4_CLASS_RSVD3 3
+  #define ESE_DE_L4_CLASS_UDP 2
+  #define ESE_DE_L4_CLASS_TCP 1
+  #define ESE_DE_L4_CLASS_UNKNOWN 0
+  #define ESF_FZ_RX_L4_CLASS_LBN 45
+  #define ESF_FZ_RX_L4_CLASS_WIDTH 2
+  #define ESE_FZ_L4_CLASS_RSVD3 3
+  #define ESE_FZ_L4_CLASS_UDP 2
+  #define ESE_FZ_L4_CLASS_TCP 1
+  #define ESE_FZ_L4_CLASS_UNKNOWN 0
+  #define ESF_DZ_RX_L3_CLASS_LBN 42
+  #define ESF_DZ_RX_L3_CLASS_WIDTH 3
+  #define ESE_DZ_L3_CLASS_RSVD7 7
+  #define ESF_DZ_RX_ABORT_WIDTH 1
+  #define ESF_DZ_RX_ECC_ERR_LBN 29
+  #define ESF_DZ_RX_ECC_ERR_WIDTH 1
+  #define ESF_DZ_RX_TRUNC_ERR_LBN 29
+  #define ESF_DZ_RX_TRUNC_ERR_WIDTH 1
+  #define ESF_DZ_RX_CRC1_ERR_LBN 28
+  #define ESF_DZ_RX_CRC1_ERR_WIDTH 1
+  #define ESF_DZ_RX_CRC0_ERR_LBN 27
+  #define ESF_DZ_TX_TSO_OPTION_DESC_FATSO2B 3
+  #define ESF_DZ_TX_TSO_OPTION_DESC_FATSO2A 2
+  #define ESE_DZ_TX_TSO_OPTION_DESC_ENCAP 1
+  #define ESE_DZ_TX_TSO_OPTION_DESC_NORMAL 0
+  #define ESF_DZ_TX_TSO_TCP_FLAGS_LBN 48
+  #define ESF_DZ_TX_TSO_TCP_SEQNO_LBN 0
+  #define ESF_DZ_TX_TSO_TCP_SEQNO_WIDTH 32

-/* TX_TSO_FATSO2A_DESC */
+/* TX_TSO_V2_DESC_A */
+  #define ESF_DZ_TX_DESC_IS_OPT_LBN 63
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ef10_sriov.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ef10_sriov.c
@@ -406,12 +406,17 @@
    return rc;
 }

+ /* Disable SRIOV and remove VFs
+  * If some VFs are attached to a guest (using Xen, only) nothing is
+  * done if force=false, and vports are freed if force=true (for the non
+  * attached ones, only) but SRIOV is not disabled and VFs are not
+  * removed in either case.
+  */
+static int efx_ef10_pci_sriov_disable(struct efx_nic *efx, bool force)
+{
+    struct pci_dev *dev = efx->pci_dev;
+    unsigned int vfs_assigned = 0;
+    unsigned int vfs_assigned = pci_vfs_assigned(dev);
+    unsigned int vfs_assigned = pci_vfs_assigned(dev);
+    int rc = 0;
+
+    if (vfs_assigned && !force) {

"
if (!vfs_assigned)
    pci_disable_sriov(dev);
+else
+    rc = -EBUSY;

    efx_ef10_sriov_free_vf_vsriovf_clear(efx);
    efx->vf_count = 0;
    -return 0;
    +return rc;

int efx_ef10_sriov_configure(struct efx_nic *efx, int num_vfs)
    -for (i = 0; i < efx->vf_count; ++i) {
    -struct efx_nic *vf_efx = nic_data->vf[i].efx;
    -
    -if (vf_efx)
    -    vf_efx->pci_dev->driver->remove(vf_efx->pci_dev);
    -}
    -
    +/* Disable SRIOV and remove any VFs in the host */
    +rc = efx_ef10_pci_sriov_disable(efx, true);
    +
    if (rc)
        netif_dbg(efx, drv, efx->net_dev,
            --- linux-4.15.0.orig/drivers/net/ethernet/sfc/efx.c
            +++ linux-4.15.0/drivers/net/ethernet/sfc/efx.c
            @ @ -27,6 +27,7 @@
            #include <net/udp_tunnel.h>
            #include "efx.h"
            #include "nic.h"
            +#include "io.h"
            #include "selftest.h"
            #include "sriov.h"
if (tx_queue->channel)
    tx_queue->channel = channel;
    tx_queue->buffer = NULL;
    tx_queue->cb_page = NULL;
    memset(&tx_queue->txd, 0, sizeof(tx_queue->txd));

mod_timer(&rx_queue->slow_fill, jiffies + msecs_to_jiffies(100));

static bool efx_default_channel_want_txqs(struct efx_channel *channel)
{
    return channel->channel - channel->efx->tx_channel_offset <
        channel->efx->n_tx_channels;
}

static const struct efx_channel_type efx_default_channel_type = {
    .pre_probe = efx_channel_dummy_op_int,
    .post_remove = efx_channel_dummy_op_void,
    .get_name = efx_get_channel_name,
    .copy = efx_copy_channel,
    .want_txqs = efx_default_channel_want_txqs,
    .keep_eventq = false,
    .want_pio = true,
};

int efx_channel_dummy_op_int(struct efx_channel *channel)
netif_info(efx, link, efx->net_dev, "link down\n");

void efx_link_set_advertising(struct efx_nic *efx, u32 advertising)
    memcpy(efx->link_advertising, advertising,
+ sizeof(__ETHTOOL_DECLARE_LINK_MODE_MASK()));
+
+efx->link_advertising[0] |= ADVERTISED_Autoneg;
+if (advertising[0] & ADVERTISED_Pause)
+efx->wanted_fc |= (EFX_FC_TX | EFX_FC_RX);
+else
+efx->wanted_fc &= ~(EFX_FC_TX | EFX_FC_RX);
+if (advertising[0] & ADVERTISED_Asym_Pause)
+efx->wanted_fc ^= EFX_FC_TX;
+
+/* Equivalent to efx_link_set_advertising with all-zeroes, except does not
+ * force the Autoneg bit on.
+ */
+void efx_link_clear_advertising(struct efx_nic *efx)
+
+{ bitmap_zero(efx->link_advertising, __ETHTOOL_LINK_MODE_MASK_NBITS);
+efx->wanted_fc &= ~(EFX_FC_TX | EFX_FC_RX);
+}

void efx_link_set_wanted_fc(struct efx_nic *efx, u8 wanted_fc)
{
    efx->wanted_fc = wanted_fc;
    -if (efx->link_advertising) {
        +if (efx->link_advertising[0]) {
            if (wanted_fc & EFX_FC_RX)
                +efx->link_advertising |= (ADVERTISED_Pause |
                + ADVERTISED_Asym_Pause);
            else
                +efx->link_advertising &= ~(ADVERTISED_Pause |
                + ADVERTISED_Asym_Pause);
        } if (wanted_fc & EFX_FC_TX)
            -efx->link_advertising ^= ADVERTISED_Asym_Pause;
        +efx->link_advertising[0] ^= ADVERTISED_Asym_Pause;
    }
     else
        -efx->link_advertising &= ~(ADVERTISED_Pause |
            + ADVERTISED_Asym_Pause);
        +efx->link_advertising[0] &= ~(ADVERTISED_Pause |
            + ADVERTISED_Asym_Pause);
    }
}

netif_dbg(efx, probe, efx->net_dev, "initialising I/O\n");

-bar = efx->type->mem_bar;
+bar = efx->type->mem_bar(efx);
rc = pci_enable_device(pci_dev);
if (rc) {
    @ @ -1323,7 +1344,7 @ @
}

if (efx->membase_phys) {
    -bar = efx->type->mem_bar;
    +bar = efx->type->mem_bar(efx);
    pci_release_region(efx->pci_dev, bar);
    efx->membase_phys = 0;
}  
    @@ -1489,6 +1510,7 @@
}

/* Assign extra channels if possible */
+efx->n_extra_tx_channels = 0;
    j = efx->n_channels;
for (i = 0; i < EFX_MAX_EXTRA_CHANNELS; i++) {
    if (!efx->extra_channel_type[i])
        @ @ -1500,6 +1522,8 @@
--j;
    efx_get_channel(efx, j)->type =
    efx->extra_channel_type[i];
    +if (efx_channel_has_tx_queues(efx_get_channel(efx, j))
    +efx->n_extra_tx_channels++;
}

/* Assign extra channels if possible */
+efx->n_extra_tx_channels = 0;
    j = efx->n_channels;
for (i = 0; i < EFX_MAX_EXTRA_CHANNELS; i++) {
    if (!efx->extra_channel_type[i])
        @ @ -1500,6 +1522,8 @@
--j;
    efx_get_channel(efx, j)->type =
    efx->extra_channel_type[i];
    +if (efx_channel_has_tx_queues(efx_get_channel(efx, j))
    +efx->n_extra_tx_channels++;
}

@ @ -2909,6 +2933,10 @@
    .driver_data = (unsigned long) &efx_hunt_a0_nic_type),
    {PCI_DEVICE(PCI_VENDOR_ID_SOLARFLARE, 0x1a03),  /* SFC9220 VF */
    .driver_data = (unsigned long) &efx_hunt_a0_vf_nic_type),
    +{PCI_DEVICE(PCI_VENDOR_ID_SOLARFLARE, 0x0b03),  /* SFC9250 PF */
    + .driver_data = (unsigned long) &efx_hunt_a0_nic_type),
    +{PCI_DEVICE(PCI_VENDOR_ID_SOLARFLARE, 0x1b03),  /* SFC9250 VF */
    + .driver_data = (unsigned long) &efx_hunt_a0_vf_nic_type),
    {0} /* end of list */
    ;

@ @ -2977,6 +3005,9 @@
efx->rx_packet_ts_offset =
efx->type->rx_ts_offset - efx->type->rx_prefix_size;
    spin_lock_init(&efx->stats_lock);
+efx->vi_stride = EFX_DEFAULT_VI_STRIDE;
+efx->num_mac_stats = MC_CMD_MAC_NSTATS;
+BUILD_BUG_ON(MC_CMD_MAC_NSTATS - 1 != MC_CMD_MAC_GENERATION_END);
    mutex_init(&efx->mac_lock);
efx->phy_op = &efx_dummy_phy_operations;
efx->mdio.dev = net_dev;
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/efx.h
+++ linux-4.15.0/drivers/net/ethernet/sfc/efx.h
@@ -14,11 +14,6 @@
#include "net_driver.h"
#include "filter.h"

/* All controllers use BAR 0 for I/O space and BAR 2(&3) for memory */
/* All VFs use BAR 0/1 for memory */
#define EFX_MEM_BAR 2
#define EFX_MEM_VF_BAR 0

int efx_net_open(struct net_device *net_dev);
int efx_net_stop(struct net_device *net_dev);

@@ -263,7 +258,9 @@
}

void efx_link_status_changed(struct efx_nic *efx);
-void efx_link_set_advertising(struct efx_nic *efx, u32);
+void efx_link_set_advertising(struct efx_nic *efx, const unsigned long *advertising);
+void efx_link_clear_advertising(struct efx_nic *efx);
void efx_link_set_wanted_fc(struct efx_nic *efx, u8);

static inline void efx_device_detach_sync(struct efx_nic *efx)
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ethtool.c
@@ -720,7 -720,7 @@
out;
}

-void efx_net_open(struct net_device *net_dev);
+void efx_net_open(struct net_device *net_dev);
-void efx_net_stop(struct net_device *net_dev);
+void efx_net_stop(struct net_device *net_dev);

@@ -258,9 +253,7 @@
    goto out;
 }

-void efx_link_set_advertising(struct efx_nic *efx, u32);
+void efx_link_set_advertising(struct efx_nic *efx, const unsigned long *advertising);
+void efx_link_clear_advertising(struct efx_nic *efx);
void efx_link_set_wanted_fc(struct efx_nic *efx, u8);

static inline void efx_device_detach_sync(struct efx_nic *efx)
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ethtool.c
@@ -720,7 -720,7 @@
out;
}

(void) (efx->wanted.fc & EFX_FC_AUTO) &
+if (efx->link_advertising[0]) {
    netif_dbg(efx, drv, efx->net_dev, 
"Autonegotiation is disabled\n");
    rc = -EINVAL;
@@ -732,10 +732,10 @@
         }
         }
         goto out;
 }

static inline void efx_device_detach_sync(struct efx_nic *efx)
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ethtool.c
@@ -720,7 -720,7 @@
out;
}

-void efx_link_set_advertising(struct efx_nic *efx, u32);
+void efx_link_set_advertising(struct efx_nic *efx, const unsigned long *advertising);
+void efx_link_clear_advertising(struct efx_nic *efx);
void efx_link_set_wanted_fc(struct efx_nic *efx, u8);

static inline void efx_device_detach_sync(struct efx_nic *efx)
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ethtool.c
@@ -720,7 -720,7 @@
out;
}

-void efx_link_set_advertising(struct efx_nic *efx, u32);
+void efx_link_set_advertising(struct efx_nic *efx, const unsigned long *advertising);
+void efx_link_clear_advertising(struct efx_nic *efx);
void efx_link_set_wanted_fc(struct efx_nic *efx, u8);

static inline void efx_device_detach_sync(struct efx_nic *efx)
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ethtool.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ethtool.c
@@ -720,7 -720,7 @@
out;
}
rc = efx->phy_op->reconfigure(efx);
if (rc) {
    return ret;
}

+static int efx_ethtool_get_fecparam(struct net_device *net_dev, 
    struct ethtool_fecparam *fecparam)
+{
    struct efx_nic *efx = netdev_priv(net_dev);

    int rc;
    +
    +if (!efx->phy_op || !efx->phy_op->get_fecparam)
    +return -EOPNOTSUPP;
    +mutex_lock(&efx->mac_lock);
    +rc = efx->phy_op->get_fecparam(efx, fecparam);
    +mutex_unlock(&efx->mac_lock);
    +
    +return rc;
    +}
+
+static int efx_ethtool_set_fecparam(struct net_device *net_dev, 
    struct ethtool_fecparam *fecparam)
+{
    struct efx_nic *efx = netdev_priv(net_dev);

    int rc;
    +
    +if (!efx->phy_op || !efx->phy_op->set_fecparam)
    +return -EOPNOTSUPP;
    +mutex_lock(&efx->mac_lock);
    +rc = efx->phy_op->set_fecparam(efx, fecparam);
    +mutex_unlock(&efx->mac_lock);
    +
    +return rc;
    +}
+
const struct ethtool_ops efx_ethtool_ops = {
    .get_drvinfo = efx_ethtool_get_drvinfo,
    .get_regs_len = efx_ethtool_get_regs_len,
    @ @ -1408,4 +1438,6 @@
    .get_module_eeprom = efx_ethtool_get_module_eeprom,
    .get_link_ksettings = efx_ethtool_get_link_ksettings,
    .set_link_ksettings = efx_ethtool_set_link_ksettings,
    +.get_fecparam = efx_ethtool_get_fecparam,
    +.set_fecparam = efx_ethtool_set_fecparam,
    +};
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/falcon/farch.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/falcon/farch.c
struct ef4_channel *channel = ef4_rx_queue_channel(rx_queue);
struct ef4_nic *efx = rx_queue->efx;

// bool rx_ev_buf_owner_id_err, rx_ev_ip_hdr_chksum_err;
+bool __maybe_unused rx_ev_buf_owner_id_err, rx_ev_ip_hdr_chksum_err;
bool rx_ev_tcp_udp_chksum_err, rx_ev_eth_crc_err;
bool rx_ev_frm_trunc, rx_ev_drib_nib, rx_ev_tobe_disc;
-bool rx_ev_other_err, rx_ev_pause_frm;
-bool rx_ev_hdr_type, rx_ev_mcast_pkt;
-unsigned rx_ev_pkt_type;
+bool rx_ev_pause_frm;

-rx_ev_hdr_type = EF4_QWORD_FIELD(*event, FSF_AZ_RX_EV_HDR_TYPE);
-rx_ev_mcast_pkt = EF4_QWORD_FIELD(*event, FSF_AZ_RX_EV_MCAST_PKT);
rx_ev_tobe_disc = EF4_QWORD_FIELD(*event, FSF_AZ_RX_EV_TOBE_DISC);
-rx_ev_pkt_type = EF4_QWORD_FIELD(*event, FSF_AZ_RX_EV_PKT_TYPE);
rx_ev_buf_owner_id_err = EF4_QWORD_FIELD(*event,
                FSF_AZ_RX_EV_BUF_OWNER_ID_ERR);
rx_ev_ip_hdr_chksum_err = EF4_QWORD_FIELD(*event,
@@ -896,10 +891,6 @@
0 : EF4_QWORD_FIELD(*event, FSF_AA_RX_EV_DRIB_NIB));
rx_ev_pause_frm = EF4_QWORD_FIELD(*event, FSF_AZ_RX_EV_PAUSE_FRM_ERR);
/* Every error apart from tobe_disc and pause_frm */
-rx_ev_other_err = (rx_ev_drib_nib | rx_ev_tcp_udp_chksum_err |
   - rx_ev_buf_owner_id_err | rx_ev_eth_crc_err |
   - rx_ev_frm_trunc | rx_ev_ip_hdr_chksum_err);
/* Count errors that are not in MAC stats. Ignore expected
* checksum errors during self-test. */
@@ -919,6 +910,13 @@
/* to a FIFO overflow.
 */
#ifdef DEBUG
+{
+/* Every error apart from tobe_disc and pause_frm */
+  +
+boolexev_other_err = (rx_ev_drib_nib | rx_ev_tcp_udp_chksum_err |
+  +rx_ev_buf_owner_id_err | rx_ev_eth_crc_err |
+  +rx_ev_frm_trunc | rx_ev_ip_hdr_chksum_err);
+  +
+if (rx_ev_other_err && net_ratelimit()) {
+netif_dbg(efx, rx_err, efx->net_dev,
" RX queue %d unexpected RX event ",
@@ -935,6 +933,7 @@
rx_ev_tobe_disc ? " [TOBE_DISC]" : "",
rx_ev_pause_frm ? " [PAUSE]" : "");

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void ef4_farch_dimension_resources(struct ef4_nic *efx, unsigned sram_lim_qw)
{
  unsigned vi_count, buftbl_min;

  /* The frame must be discarded if any of these are true. */
  if ((efx->n_rx_channels * EF4_MAX_DMAQ_SIZE +
      efx->n_tx_channels * EF4_TXQ_TYPES * EF4_MAX_DMAQ_SIZE +
      efx->n_channels * EF4_MAX_EVQ_SIZE) * sizeof(ef4_qword_t) / EF4_BUF_SIZE;
  vi_count = max(efx->n_channels, efx->n_tx_channels * EF4_TXQ_TYPES);

  efx->tx_dc_base = sram_lim_qw - vi_count * TX_DC_ENTRIES;

  table_id = ef4_farch_filter_table_id(filter_id);
  filter_idx = ef4_farch_filter_id_index(filter_id);
  if (filter_idx >= table->size)
    return -ENOENT;
  spec = &table->spec[filter_idx];

  spin_lock_bh(&efx->filter_lock);
  rc = ef4_farch_filter_remove(efx, table, filter_idx, priority);

  spin_unlock_bh(&efx->filter_lock);

  /* The NIC batches TX completion events; the message we receive is of
  * the form "complete all TX events up to this index".
  */
  efx_farch_handle_tx_event(struct efx_channel *channel, efx_qword_t *event)
unsigned int tx_ev_desc_ptr;
unsigned int tx_ev_q_label;
struct efx_tx_queue *tx_queue;
struct efx_nic *efx = channel->efx;
-int tx_packets = 0;

if (unlikely(READ_ONCE(efx->reset_pending)))
-return 0;
+return;

if (likely(EFX_QWORD_FIELD(*event, FSF_AZ_TX_EV_COMP))) {
 /* Transmit completion */
 @@ -836,8 +835,6 @@
 tx_ev_q_label = EFX_QWORD_FIELD(*event, FSF_AZ_TX_EV_Q_LABEL);
 tx_queue = efx_channel_get_tx_queue(
 channel, tx_ev_q_label % EFX_TXQ_TYPES);
-tx_packets = ((tx_ev_desc_ptr - tx_queue->read_count) &
 -tx_queue->ptr_mask);
 efx_xmit_done(tx_queue, tx_ev_desc_ptr);
 } else if (EFX_QWORD_FIELD(*event, FSF_AZ_TX_EV_WQ_FF_FULL)) {
 /* Rewrite the FIFO write pointer */
 @@ -856,8 +853,6 @@
 EFX_QWORD_FMT"n", channel->channel,
 EFX_QWORD_VAL(*event));
 }
-
-return tx_packets;
}

/*@ -1090,7 +1085,7 @@
 int qid;

 qid = EFX_QWORD_FIELD(*event, FSF_AZ_DRIVER_EV_SUBDATA);
 -if (qid < EFX_TXQ_TYPES * efx->n_tx_channels) {
 +if (qid < EFX_TXQ_TYPES * (efx->n_tx_channels + efx->n_extra_tx_channels)) {
 tx_queue = efx_get_tx_queue(efx, qid / EFX_TXQ_TYPES,
 qid % EFX_TXQ_TYPES);
 if (atomic_cmpxchg(&tx_queue->flush_outstanding, 1, 0)) {
 @@ -1270,7 +1265,6 @@
 unsigned int read_ptr;
 efx_qword_t event, *p_event;
 int ev_code;
-int tx_packets = 0;
 int spent = 0;

 if (budget <= 0)
 @@ -1304,12 +1298,7 @@
goto out;
break;
case FSE_AZ_EV_CODE_TX_EV:
  -tx_packets += efx_farch_handle_tx_event(channel, &event);
  -if (tx_packets > efx->txq_entries) {
    -spent = budget;
    -goto out;
  -}
  +efx_farch_handle_tx_event(channel, &event);
break;
case FSE_AZ_EV_CODE_DRV_GEN_EV:
  efx_farch_handle_generated_event(channel, &event);
@@ -1680,20 +1669,21 @@*/
void efx_farch_dimension_resources(struct efx *efx, unsigned sram_lim_qw) {
  -unsigned vi_count, buftbl_min;
  +unsigned vi_count, buftbl_min, total_tx_channels;

#ifdef CONFIG_SFC_SRIOV
 struct siena_nic_data *nic_data = efx->nic_data;
#endif

+total_tx_channels = efx->n_tx_channels + efx->n_extra_tx_channels;
/* Account for the buffer table entries backing the datapath channels *
  * and the descriptor caches for those channels.
  */
+buftbl_min = ((efx->n_rx_channels * EFX_MAX_DMAQ_SIZE +
  - efx->n_tx_channels * EFX_TXQ_TYPES * EFX_MAX_DMAQ_SIZE +
  + total_tx_channels * EFX_TXQ_TYPES * EFX_MAX_DMAQ_SIZE +
    efx->n_channels * EFX_MAX_EVQ_SIZE)
  * sizeof(efx_qword_t) / EFX_BUF_SIZE);
-vi_count = max(efx->n_channels, efx->n_tx_channels * EFX_TXQ_TYPES);
+vi_count = max(efx->n_channels, total_tx_channels * EFX_TXQ_TYPES);

#if defined CONFIG_SFC_SRIOV
if (efx->type->sriov_wanted) {
  --- linux-4.15.0.orig/drivers/net/ethernet/sfc/io.h
  +++ linux-4.15.0/drivers/net/ethernet/sfc/io.h
  @@ -222,18 +222,21 @@
  efx_reado(efx, value, reg + index * sizeof(efx_oword_t));
}

-/* Page size used as step between per-VI registers */
-#define EFX_VI_PAGE_SIZE 0x2000
+/* default VI stride (step between per-VI registers) is 8K */
+#define EFX_DEFAULT_VI_STRIDE 0x2000

---
/* Calculate offset to page-mapped register */
#define EFX_PAGED_REG(page, reg) \
-((page) * EFX_VI_PAGE_SIZE + (reg))

static inline unsigned int efx_paged_reg(struct efx_nic *efx, unsigned int page, 
						unsigned int reg)
{
+return page * efx->vi_stride + reg;
+

/* Write the whole of RX_DESC_UPD or TX_DESC_UPD */
static inline void _efx_writeo_page(struct efx_nic *efx, efx_oword_t *value, 
						unsigned int reg, unsigned int page)
{
-reg = EFX_PAGED_REG(page, reg);
+reg = efx_paged_reg(efx, page, reg);

netif_vdbg(efx, hw, efx->net_dev, 
"writing register %x with " EFX_OWORD_FMT ", reg, 
@ @ -262.7 +265.7 @@ 
_efx_writed_page(struct efx_nic *efx, const efx_dword_t *value, 
						unsigned int reg, unsigned int page)
{
-efx_writed(efx, value, EFX_PAGED_REG(page, reg));
+efx_writed(efx, value, efx_paged_reg(efx, page, reg));
}
#define efx_writed_page(efx, value, reg, page)				\n_efx_writed_page(efx, value,					\n@@ -288,10 +291,10 @@

if (page == 0) {
spin_lock_irqsave(&efx->biu_lock, flags);
-efx_writed(efx, value, EFX_PAGED_REG(page, reg));
+efx_writed(efx, value, efx_paged_reg(efx, page, reg));
spin_unlock_irqrestore(&efx->biu_lock, flags);
} else {
-efx_writed(efx, value, EFX_PAGED_REG(page, reg));
+efx_writed(efx, value, efx_paged_reg(efx, page, reg));
}
#define efx_writed_page_locked(efx, value, reg, page)

--- linux-4.15.0.orig/drivers/net/ethernet/sfc/mcdi.h
+++ linux-4.15.0/drivers/net/ethernet/sfc/mcdi.h
@@ -208,6 +208,9 @@
#define _MCDI_DWORD(_buf, _field)					\n(_buf) + (_MCDI_CHECK_ALIGN(MC_CMD_ ## _field ## _OFST, 4) >> 2))

+#define MCDI_BYTE(_buf, _field)

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+((void)BUILD_BUG_ON_ZERO(MC_CMD_##_field##_LEN != 1),
+ *MCDI_PTR(_buf, _field))
#define MCDI_WORD(_buf, _field)						
((u16)BUILD_BUG_ON_ZERO(MC_CMD_##_field##_LEN != 2) +
  le16_to_cpu(*(__force const __le16 *)MCDI_PTR(_buf, _field)))
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/mcdi_pcol.h
+++ linux-4.15.0/drivers/net/ethernet/sfc/mcdi_pcol.h
@@ -114,6 +114,8 @@
#define MCDI_HEADER_XFLAGS_WIDTH 8
 /* Request response using event */
#define MCDI_HEADER_XFLAGS_EVREQ 0x01
+/* Request (and signal) early doorbell return */
+#define MCDI_HEADER_XFLAGS_DBRET 0x02

 /* Maximum number of payload bytes */
#define MCDI_CTL_SDU_LEN_MAX_V1 0xfc
@@ -123,7 +125,7 @@
/* The MC can generate events for two reasons:
- *   - To complete a shared memory request if XFLAGS_EVREQ was set
+ *   - To advance a shared memory request if XFLAGS_EVREQ was set
 *   - As a notification (link state, i2c event), controlled
 *     via MC_CMD_LOG_CTRL
 *
@@ -271,7 +273,8 @@
/* Returned by MC_CMD_TESTASSERT if the action that should
  * have already installed filters. See the comment at
- * MC_CMD_WORKAROUND_BUG26807. */
+ * MC_CMD_WORKAROUND_BUG26807.
+ * May also returned for other operations such as sub-variant switching. */
#define MC_CMD_ERR_FILTERS_PRESENT 0x1014
/* The clock whose frequency you've attempted to set set
 * doesn't exist on this NIC */
@@ -279,6 +282,21 @@
/* Returned by MC_CMD_TESTASSERT if the action that should
  * have caused an assertion failed to do so. */
#define MC_CMD_ERR_UNREACHABLE 0x1016
+/* This command needs to be processed in the background but there were no
+ * resources to do so. Send it again after a command has completed. */
+#define MC_CMD_ERR_QUEUE_FULL 0x1017
+/* The operation could not be completed because the PCIe link has gone
+ * away. This error code is never expected to be returned over the TLP
+ * transport. */
+#define MC_CMD_ERR_NO_PCIE 0x1018
+/* The operation could not be completed because the datapath has gone
+ * away. This is distinct from MC_CMD_ERR_DATAPATH_DISABLED in that the
+ * datapath absence may be temporary */
+ * The operation could not complete because some VIIs are allocated */
+ * The operation could not complete because some PIO buffers are allocated */

#define MC_CMD_ERR_CODE_OFST 0

@@ -299,10 +317,17 @@
#define SIENA_MC_BOOTROM_COPYCODE_VEC (0x800 - 3 * 0x4)
#define HUNT_MC_BOOTROM_COPYCODE_VEC (0x8000 - 3 * 0x4)
#define MEDFORD_MC_BOOTROM_COPYCODE_VEC (0x10000 - 3 * 0x4)
-/* Points to the recovery mode entry point. */
+/* Points to the recovery mode entry point. Misnamed but kept for compatibility. */
#define SIENA_MC_BOOTROM_NOFLASH_VEC (0x800 - 2 * 0x4)
#define HUNT_MC_BOOTROM_NOFLASH_VEC (0x8000 - 2 * 0x4)
#define MEDFORD_MC_BOOTROM_NOFLASH_VEC (0x10000 - 2 * 0x4)
+/* Points to the recovery mode entry point. Same as above, but the right name. */
+define SIENA_MC_BOOTROM_RECOVERY_VEC (0x800 - 2 * 0x4)
+define HUNT_MC_BOOTROM_RECOVERY_VEC (0x8000 - 2 * 0x4)
+define MEDFORD_MC_BOOTROM_RECOVERY_VEC (0x10000 - 2 * 0x4)
+
+/* Points to noflash mode entry point. */
+define MEDFORD_MC_BOOTROM_REAL_NOFLASH_VEC (0x10000 - 4 * 0x4)

/* The command set exported by the boot ROM (MCDI v0) */
#define MC_CMD_GET_VERSION_V0_SUPPORTED_FUNCS {
@@ -352,7 +377,7 @@
#define       MCDI_EVENT_LEVEL_LBN 33
#define       MCDI_EVENT_LEVEL_WIDTH 3
/* enum: Info. */
#define          MCDI_EVENT_LEVEL_INFO 0x0
+define          MCDI_EVENT_LEVEL_INFO 0x0
/* enum: Warning. */
#define          MCDI_EVENT_LEVEL_WARN 0x1
/* enum: Error. */
@@ -360,6 +385,7 @@
#define          MCDI_EVENT_LEVEL_FATAL 0x3
#define       MCDI_EVENT_DATA_OFST 0
#define        MCDI_EVENT_CMDDONE_SEQ_LBN 0
+define        MCDI_EVENT_CMDDONE_SEQ_LBN 0
#define        MCDI_EVENT_CMDDONE_SEQ_WIDTH 8
#define        MCDI_EVENT_CMDDONE_DATALEN_LBN 8
@@ -370,14 +396,22 @@
#define        MCDI_EVENT_LINKCHANGE_LP_CAP_WIDTH 16
#define        MCDI_EVENT_LINKCHANGE_SPEED_LBN 16
#define MCDI_EVENT_LINKCHANGE_SPEED_WIDTH 4

/* enum: Link is down or link speed could not be determined */
#define MCDI_EVENT_LINKCHANGE_SPEED_UNKNOWN 0x0

/* enum: 100Mbs */
#define MCDI_EVENT_LINKCHANGE_SPEED_100M 0x1

/* enum: 1Gbs */
#define MCDI_EVENT_LINKCHANGE_SPEED_1G 0x2

/* enum: 10Gbs */
#define MCDI_EVENT_LINKCHANGE_SPEED_10G 0x3

/* enum: 40Gbs */
#define MCDI_EVENT_LINKCHANGE_SPEED_40G 0x4

/* enum: 25Gbs */
#define MCDI_EVENT_LINKCHANGE_SPEED_25G 0x5

/* enum: 50Gbs */
#define MCDI_EVENT_LINKCHANGE_SPEED_50G 0x6

/* enum: 100Gbs */
#define MCDI_EVENT_LINKCHANGE_SPEED_100G 0x7

#define MCDI_EVENT_AOE_DDR_ECC_STATUS 0xa
/* enum: PTP status update */
#define MCDI_EVENT_AOE_PTP_STATUS 0xb

/* enum: FPGA header incorrect */
#define MCDI_EVENT_AOE_FPGA_LOAD_HEADER_ERR 0xc

/* enum: FPGA Powered Off due to error in powering up FPGA */
#define MCDI_EVENT_AOE_FPGA_POWER_OFF 0xd

/* enum: AOE FPGA load failed due to MC to MUM communication failure */
#define MCDI_EVENT_AOE_FPGA_LOAD_FAILED 0xe

/* enum: Notify that invalid flash type detected */
#define MCDI_EVENT_AOE_INVALID_FPGA_FLASH_TYPE 0xf

/* enum: Notify that the attempt to run FPGA Controller firmware timedout */
#define MCDI_EVENT_AOE_FC_RUN_TIMEDOUT 0x10

/* enum: Failure to probe one or more FPGA boot flash chips */
#define MCDI_EVENT_AOE_FPGA_BOOT_FLASH_INVALID 0x11

/* enum: FPGA boot-flash contains an invalid image header */
#define MCDI_EVENT_AOE_FPGA_BOOT_FLASH_HDR_INVALID 0x12

/* enum: Failed to program clocks required by the FPGA */
#define MCDI_EVENT_AOE_FPGA_CLOCKS_PROGRAM_FAILED 0x13

/* enum: Notify that FPGA Controller is alive to serve MCDI requests */
#define MCDI_EVENT_AOE_FC_RUNNING 0x14

#define MCDI_EVENT_AOE_ERR_DATA_LBN 8
#define MCDI_EVENT_AOE_ERR_DATA_WIDTH 8
+\#define MCDI_EVENT_AOE_ERR_FC_ASSERT_INFO_LBN 8
+\#define MCDI_EVENT_AOE_ERR_FC_ASSERT_INFO_WIDTH 8
+/* enum: FC Assert happened, but the register information is not available */
+\#define MCDI_EVENT_AOE_ERR_FC_ASSERT_SEEN 0x0
+/* enum: The register information for FC Assert is ready for reading by driver */
+/*
+\#define MCDI_EVENT_AOE_ERR_FC_ASSERT_DATA_READY 0x1
+/* enum: Reading from NV failed */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_NV_READ_FAIL 0x0
+/* enum: Invalid Magic Number if FPGA header */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_MAGIC_FAIL 0x1
+/* enum: Invalid Silicon type detected in header */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_SILICON_TYPE 0x2
+/* Unsupported VRatio */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_VRATIO 0x3
+/* Unsupported DDR Type */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_DDR_TYPE 0x4
+/* DDR Voltage out of supported range */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_DDR_VOLTAGE 0x5
+/* Unsupported DDR speed */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_DDR_SPEED 0x6
+/* Unsupported DDR size */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_DDR_SIZE 0x7
+/* Unsupported DDR rank */
+\#define MCDI_EVENT_AOE_ERR_FPGA_HEADER_DDR_RANK 0x8
+\#define MCDI_EVENT_RX_ERR_RXQ_LBN 0
+\#define MCDI_EVENT_RX_ERR_RXQ_WIDTH 12
+\#define MCDI_EVENT_RX_ERR_TYPE_LBN 12
+\#define MCDI_EVENT_MUM_WATCHDOG 0x3
+\#define MCDI_EVENT_MUM_ERR_DATA_LBN 8
+\#define MCDI_EVENT_MUM_ERR_DATA_WIDTH 8
+\#define MCDI_EVENT_DBRET_SEQ_LBN 0
+\#define MCDI_EVENT_DBRET_SEQ_WIDTH 8
+\#define MCDI_EVENT_SUC_ERR_TYPE_LBN 0
+\#define MCDI_EVENT_SUC_ERR_TYPE_WIDTH 8
/* enum: Corrupted or bad SUC application. */
#define MCDI_EVENT_SUC_BAD_APP 0x1

/* enum: SUC application reported an assert. */
#define MCDI_EVENT_SUC_ASSERT 0x2

/* enum: SUC application reported an exception. */
#define MCDI_EVENT_SUC_EXCEPTION 0x3

/* enum: SUC watchdog timer expired. */
#define MCDI_EVENT_SUC_WATCHDOG 0x4

#define MCDI_EVENT_SUC_ERR_ADDRESS_LBN 8
#define MCDI_EVENT_SUC_ERR_ADDRESS_WIDTH 24
#define MCDI_EVENT_SUC_ERR_DATA_LBN 8
#define MCDI_EVENT_SUC_ERR_DATA_WIDTH 24
#define MCDI_EVENT_DATA_LBN 0
#define MCDI_EVENT_DATA_WIDTH 32
#define MCDI_EVENT_SRC_LBN 36

/* enum: Transmit error */
#define MCDI_EVENT_CODE_TX_ERR 0xb

/* enum: Tx flush has completed */
#define MCDI_EVENT_CODE_TX_FLUSH 0xc

/* enum: PTP packet received timestamp */
#define MCDI_EVENT_CODE_PTP_RX 0xd

/* enum: PTP NIC failure */
#define MCDI_EVENT_CODE_PTP_FAULT 0xe

/* enum: PTP PPS event */
#define MCDI_EVENT_CODE_PTP_PPS 0xf

/* enum: Rx flush has completed */
#define MCDI_EVENT_CODE_RX_FLUSH 0x10

/* enum: Receive error */
#define MCDI_EVENT_CODE_RX_ERR 0x11

/* enum: AOE fault */
#define MCDI_EVENT_CODE_AOE 0x12

/* enum: Network port calibration failed (VCAL). */
#define MCDI_EVENT_CODE_VCAL_FAIL 0x13

/* enum: HW PPS event */
#define MCDI_EVENT_CODE_HW_PPS 0x14

/* enum: The MC has rebooted (huntington and later, siena uses CODE_REBOOT and */
/* a different format) */

/*@ -513,23 +618,23 @*/
* been processed and it may now resend the command
* /
#define MCDI_EVENT_CODE_PROXY_RESPONSE 0x1d
+/* enum: MCDI command accepted. New commands can be issued but this command is
+ * not done yet.
+ */
+#define MCDI_EVENT_CODE_DBRET 0x1e
+/* enum: The MC has detected a fault on the SUC */
+#define MCDI_EVENT_CODE_SUC 0x1f
//* enum: Artificial event generated by host and posted via MC for test
* purposes.
* /
-#define MCDI_EVENT_CODE_TESTGEN 0xfa
+#define MCDI_EVENT_CODE_TESTGEN 0xfa
#define MCDI_EVENT_CMDDONE_DATA_OFST 0
+#define MCDI_EVENT_CMDDONE_DATA_LEN 4
#define MCDI_EVENT_CMDDONE_DATA_LBN 0
#define MCDI_EVENT_CMDDONE_DATA_WIDTH 32
#define MCDI_EVENT_LINKCHANGE_DATA_OFST 0
+#define MCDI_EVENT_LINKCHANGE_DATA_LEN 4
#define MCDI_EVENT_LINKCHANGE_DATA_LBN 0
#define MCDI_EVENT_LINKCHANGE_DATA_WIDTH 32
#define MCDI_EVENT_SENSOREVT_DATA_OFST 0
+#define MCDI_EVENT_SENSOREVT_DATA_LEN 4
#define MCDI_EVENT_SENSOREVT_DATA_LBN 0
#define MCDI_EVENT_SENSOREVT_DATA_WIDTH 32
#define MCDI_EVENT_MAC_STATS_DMA_GENERATION_OFST 0
+#define MCDI_EVENT_MAC_STATS_DMA_GENERATION_LEN 4
#define MCDI_EVENT_MAC_STATS_DMA_GENERATION_LBN 0
#define MCDI_EVENT_MAC_STATS_DMA_GENERATION_WIDTH 32
#define MCDI_EVENT_TX_ERR_DATA_OFST 0
+#define MCDI_EVENT_TX_ERR_DATA_LEN 4
#define MCDI_EVENT_TX_ERR_DATA_LBN 0
#define MCDI_EVENT_TX_ERR_DATA_WIDTH 32
//* For CODE_PTP_RX, CODE_PTP_PPS and CODE_HW_PPS events the seconds field of
* timestamp
* /
#define MCDI_EVENT_PTP_SECONDS_OFST 0
+#define MCDI_EVENT_PTP_SECONDS_LEN 4
#define MCDI_EVENT_PTP_SECONDS_LBN 0
#define MCDI_EVENT_PTP_SECONDS_WIDTH 32
//* For CODE_PTP_RX, CODE_PTP_PPS and CODE_HW_PPS events the major field of
* timestamp
* /
#define MCDI_EVENT_PTP_MAJOR_OFST 0
+#define MCDI_EVENT_PTP_MAJOR_LEN 4
#define MCDI_EVENT_PTP_MAJOR_LBN 0
#define MCDI_EVENT_PTP_MAJOR_WIDTH 32
/* For CODE_PTP_RX, CODE_PTP_PPS and CODE_HW_PPS events the nanoseconds field of timestamp */
#define MCDI_EVENT_PTP_NANOSECONDS_OFST 0
#define MCDI_EVENT_PTP_NANOSECONDS_LEN 4
#define MCDI_EVENT_PTP_NANOSECONDS_LBN 0
#define MCDI_EVENT_PTP_NANOSECONDS_WIDTH 32
/* For CODE_PTP_RX, CODE_PTP_PPS and CODE_HW_PPS events the minor field of timestamp */
#define MCDI_EVENT_PTP_MINOR_OFST 0
#define MCDI_EVENT_PTP_MINOR_LEN 4
#define MCDI_EVENT_PTP_MINOR_LBN 0
#define MCDI_EVENT_PTP_MINOR_WIDTH 32
/* For CODE_PTP_RX events, the lowest four bytes of sourceUUID from PTP packet */
#define MCDI_EVENT_PTP_UUID_OFST 0
#define MCDI_EVENT_PTP_UUID_LEN 4
#define MCDI_EVENT_PTP_UUID_LBN 0
#define MCDI_EVENT_PTP_UUID_WIDTH 32
#define MCDI_EVENT_RX_ERR_DATA_OFST 0
#define MCDI_EVENT_RX_ERR_DATA_LEN 4
#define MCDI_EVENT_RX_ERR_DATA_LBN 0
#define MCDI_EVENT_RX_ERR_DATA_WIDTH 32
#define MCDI_EVENT_PAR_ERR_DATA_OFST 0
#define MCDI_EVENT_PAR_ERR_DATA_LEN 4
#define MCDI_EVENT_PAR_ERR_DATA_LBN 0
#define MCDI_EVENT_PAR_ERR_DATA_WIDTH 32
#define MCDI_EVENT_ECC_CORR_ERR_DATA_OFST 0
#define MCDI_EVENT_ECC_CORR_ERR_DATA_LEN 4
#define MCDI_EVENT_ECC_CORR_ERR_DATA_LBN 0
#define MCDI_EVENT_ECC_CORR_ERR_DATA_WIDTH 32
#define MCDI_EVENT_ECC_FATAL_ERR_DATA_OFST 0
#define MCDI_EVENT_ECC_FATAL_ERR_DATA_LEN 4
#define MCDI_EVENT_ECC_FATAL_ERR_DATA_LBN 0
#define MCDI_EVENT_ECC_FATAL_ERR_DATA_WIDTH 32
/* For CODE_PTP_TIME events, the major value of the PTP clock */
#define MCDI_EVENT_PTP_TIME_MAJOR_OFST 0
#define MCDI_EVENT_PTP_TIME_MAJOR_LEN 4
#define MCDI_EVENT_PTP_TIME_MAJOR_LBN 0
#define MCDI_EVENT_PTP_TIME_MAJOR_WIDTH 32
/* For CODE_PTP_TIME events, bits 19-26 of the minor value of the PTP clock */
#define MCDI_EVENT_PTP_TIME_MINOR_26_19_LBN 36
#define MCDI_EVENT_PTP_TIME_MINOR_26_19_WIDTH 8
/* For CODE_PTP_TIME events, most significant bits of the minor value of the PTP clock. This is a more generic equivalent of PTP_TIME_MINOR_26_19. */
#define MCDI_EVENT_PTP_TIME_MINOR_MS_8BITS_LBN 36
+\#define MCDI_EVENT_PTP_TIME_MINOR_MS_8BITS_WIDTH 8
/* For CODE_PTP_TIME events where report sync status is enabled, indicates
 * whether the NIC clock has ever been set
 */
@@ -634,10 +765,17 @@
*/
\#define MCDI_EVENT_PTP_TIME_MINOR_26_21_LBN 38
\#define MCDI_EVENT_PTP_TIME_MINOR_26_21_WIDTH 6
+\#define MCDI_EVENT_PTP_TIME_MINOR_MS_6BITS_LBN 38
+\#define MCDI_EVENT_PTP_TIME_MINOR_MS_6BITS_WIDTH 6
+\#define MCDI_EVENT_PROXY_REQUEST_BUFF_INDEX_OFST 0
+\#define MCDI_EVENT_PROXY_REQUEST_BUFF_INDEX_LEN 4
+\#define MCDI_EVENT_PROXY_REQUEST_BUFF_INDEX_LBN 0
+\#define MCDI_EVENT_PROXY_REQUEST_BUFF_INDEX_WIDTH 32
+\#define MCDI_EVENT_PROXY_RESPONSE_HANDLE_OFST 0
+\#define MCDI_EVENT_PROXY_RESPONSE_HANDLE_LEN 4
+\#define MCDI_EVENT_PROXY_RESPONSE_HANDLE_LBN 0
+\#define MCDI_EVENT_PROXY_RESPONSE_HANDLE_WIDTH 32
/* Zero means that the request has been completed or authorized, and the driver
 @@ -646,6 +784,10 @@
*/
\#define MCDI_EVENT_PROXY_RESPONSE_RC_LBN 36
\#define MCDI_EVENT_PROXY_RESPONSE_RC_WIDTH 8
+\#define MCDI_EVENT_DBRET_DATA_OFST 0
+\#define MCDI_EVENT_DBRET_DATA_LEN 4
+\#define MCDI_EVENT_DBRET_DATA_LBN 0
+\#define MCDI_EVENT_DBRET_DATA_WIDTH 32
/* FCDI_EVENT structuredef */
\#define FCDI_EVENT_LEN 8
@@ -654,7 +796,7 @@
\#define FCDI_EVENT_LEVEL_LBN 33
\#define FCDI_EVENT_LEVEL_WIDTH 3
/* enum: Info. */
-\#define FCDI_EVENT_LEVEL_INFO 0x0
+\#define FCDI_EVENT_LEVEL_INFO 0x0
/* enum: Warning. */
\#define FCDI_EVENT_LEVEL_WARN 0x1
/* enum: Error. */
@@ -662,6 +804,7 @@
/* enum: Fatal. */
\#define FCDI_EVENT_LEVEL_FATAL 0x3
\#define FCDI_EVENT_DATA_OFST 0
+\#define FCDI_EVENT_DATA_LEN 4
\#define FCDI_EVENT_LINK_STATE_STATUS_LBN 0

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#define FCDI_EVENT_LINK_STATE_STATUS_WIDTH 1
#define FCDI_EVENT_LINK_DOWN 0x0 /* enum */
@@ -701,6 +844,7 @@
#define FCDI_EVENT_REBOOT_FC_FW 0x0 /* enum */
#define FCDI_EVENT_REBOOT_FC_BOOTLOADER 0x1 /* enum */
+#define FCDI_EVENT_ASSERT_INSTR_ADDRESS_OFST 0
#define FCDI_EVENT_ASSERT_INSTR_ADDRESS_LEN 4
#define FCDI_EVENT_ASSERT_INSTR_ADDRESS_LBN 0
#define FCDI_EVENT_ASSERT_INSTR_ADDRESS_WIDTH 32
#define FCDI_EVENT_ASSERT_TYPE_LBN 36
@@ -708,12 +852,15 @@
#define FCDI_EVENT_DDR_TEST_RESULT_STATUS_CODE_LBN 36
#define FCDI_EVENT_DDR_TEST_RESULT_STATUS_CODE_WIDTH 8
#define FCDI_EVENT_DDR_TEST_RESULT_RESULT_OFST 0
#define FCDI_EVENT_DDR_TEST_RESULT_RESULT_LEN 4
#define FCDI_EVENT_DDR_TEST_RESULT_RESULT_LBN 0
#define FCDI_EVENT_DDR_TEST_RESULT_RESULT_WIDTH 32
#define FCDI_EVENT_LINK_STATE_DATA_OFST 0
+/#define FCDI_EVENT_LINK_STATE_DATA_LEN 4
#define FCDI_EVENT_LINK_STATE_DATA_LBN 0
#define FCDI_EVENT_LINK_STATE_DATA_WIDTH 32
#define FCDI_EVENT_PTP_STATE_OFST 0
+/#define FCDI_EVENT_PTP_STATE_LEN 4
#define FCDI_EVENT_PTP_UNDEFINED 0x0 /* enum */
#define FCDI_EVENT_PTP_SETUP_FAILED 0x1 /* enum */
#define FCDI_EVENT_PTP_OPERATIONAL 0x2 /* enum */
@@ -722,6 +869,7 @@
#define FCDI_EVENT_DDR_ECC_STATUS_BANK_ID_LBN 36
#define FCDI_EVENT_DDR_ECC_STATUS_BANK_ID_WIDTH 8
#define FCDI_EVENT_DDR_ECC_STATUS_STATUS_OFST 0
+/#define FCDI_EVENT_DDR_ECC_STATUS_STATUS_LEN 4
#define FCDI_EVENT_DDR_ECC_STATUS_STATUS_LBN 0
#define FCDI_EVENT_DDR_ECC_STATUS_STATUS_WIDTH 32
/* Index of MC port being referred to */
@@ -729,9 +877,11 @@
#define FCDI_EVENT_PORT_CONFIG_SRC_WIDTH 8
/* FC Port index that matches the MC port index in SRC */
+/#define FCDI_EVENT_PORT_CONFIG_DATA_OFST 0
#define FCDI_EVENT_PORT_CONFIG_DATA_LEN 4
#define FCDI_EVENT_PORT_CONFIG_DATA_LBN 0
#define FCDI_EVENT_PORT_CONFIG_DATA_WIDTH 32
#define FCDI_EVENT_BOOT_RESULT_OFST 0
+/#define FCDI_EVENT_BOOT_RESULT_LEN 4
/* Enum values, see field(s): */
+/* MC_CMD_AOE/MC_CMD_AOE_OUT_INFO/FC_BOOT_RESULT */
#define FCDI_EVENT_BOOT_RESULT_LBN 0
@@ -748,14 +898,17 @@
#define FCDI_EXTENDED_EVENT_PPS_LEN(num) (8+8*(num))
/* Number of timestamps following */
#define FCDI_EXTENDED_EVENT_PPS_COUNT_OFST 0
#define FCDI_EXTENDED_EVENT_PPS_COUNT_LEN 4
#define FCDI_EXTENDED_EVENT_PPS_COUNT_LBN 0
#define FCDI_EXTENDED_EVENT_PPS_COUNT_WIDTH 32
/* Seconds field of a timestamp record */
#define FCDI_EXTENDED_EVENT_PPS_SECONDS_OFST 8
#define FCDI_EXTENDED_EVENT_PPS_SECONDS_LEN 4
#define FCDI_EXTENDED_EVENT_PPS_SECONDS_LBN 64
#define FCDI_EXTENDED_EVENT_PPS_SECONDS_WIDTH 32
/* Nanoseconds field of a timestamp record */
#define FCDI_EXTENDED_EVENT_PPS_NANOSECONDS_OFST 12
#define FCDI_EXTENDED_EVENT_PPS_NANOSECONDS_LEN 4
#define FCDI_EXTENDED_EVENT_PPS_NANOSECONDS_LBN 96
#define FCDI_EXTENDED_EVENT_PPS_NANOSECONDS_WIDTH 32
/* Timestamp records comprising the event */
#define MUM_EVENT_LEVEL_LBN 33
#define MUM_EVENT_LEVEL_WIDTH 3
/* enum: Info. */
#define MUM_EVENT_LEVEL_INFO 0x0
#define MUM_EVENT_LEVEL_INFO 0x0
/* enum: Warning. */
#define MUM_EVENT_LEVEL_WARN 0x1
/* enum: Error. */
#define MUM_EVENT_LEVEL_FATAL 0x3
#define MUM_EVENT_DATA_OFST 0
#define MUM_EVENT_DATA_LEN 4
#define MUM_EVENT_SENSOR_ID_LBN 0
#define MUM_EVENT_SENSOR_ID_WIDTH 8
/*             Enum values, see field(s): */
#define MUM_EVENT_CODE_QSFP_LASI_INTERRUPT 0x4
#define MUM_EVENT_DATA_OFST 0
#define MUM_EVENT_DATA_LEN 4
#define MUM_EVENT_SENSOR_ID_LBN 0
#define MUM_EVENT_SENSOR_ID_WIDTH 8
/* Enum values, see field(s): */
#define MUM_EVENT_CODE_QSFP_LASI_INTERRUPT 0x4
#define MUM_EVENT_PORT_PHY_FLAGS_OFST 0
#define MUM_EVENT_PORT_PHY_FLAGS_LEN 4
#define MUM_EVENT_PORT_PHY_FLAGS_LBN 0
#define MUM_EVENT_PORT_PHY_FLAGS_WIDTH 32
#define MUM_EVENT_PORT_PHY_COPPER_LEN_OFST 0
#define MUM_EVENT_PORT_PHY_COPPER_LEN_LEN 4
#define MUM_EVENT_PORT_PHY_COPPER_LEN_LBN 0
#define MUM_EVENT_PORT_PHY_COPPER_LEN_WIDTH 32
```c
#define MUM_EVENT_PORT_PHY_CAPS_OFST 0
#define MUM_EVENT_PORT_PHY_CAPS_LEN 4
#define MUM_EVENT_PORT_PHY_CAPS_LBN 0
#define MUM_EVENT_PORT_PHY_CAPS_WIDTH 32
#define MUM_EVENT_PORT_PHY_TECH_OFST 0
#define MUM_EVENT_PORT_PHY_TECH_LEN 4
#define MUM_EVENT_PORT_PHY_STATE_QSFP_MODULE_TECH_UNKNOWN 0x0 /* enum */
#define MUM_EVENT_PORT_PHY_STATE_QSFP_MODULE_TECH_OPTICAL 0x1 /* enum */
#define MUM_EVENT_PORT_PHY_STATE_QSFP_MODULE_TECH_COPPER_PASSIVE 0x2 /* enum */

#define MC_CMD_READ32 0x1
#define MC_CMD_WRITE32 0x2
#define MC_CMD_READ32_IN_LEN 8
#define MC_CMD_READ32_IN_ADDR_OFST 0
#define MC_CMD_READ32_IN_ADDR_LEN 4
#define MC_CMD_READ32_IN_NUMWORDS_OFST 4
#define MC_CMD_READ32_IN_NUMWORDS_LEN 4
#define MC_CMD_WRITE32_IN_LENMIN 8
#define MC_CMD_WRITE32_IN_ADDR_OFST 0
#define MC_CMD_WRITE32_IN_ADDR_LEN 4
#define MC_CMD_WRITE32_IN_BUFFER_OFST 4
#define MC_CMD_WRITE32_IN_BUFFER_LEN 4
#define MC_CMD_WRITE32_IN_BUFFER_MINNUM 1
```

/* MC_CMD_READ32_IN msgrequest */
#define MC_CMD_WRITE32_IN_LENMIN 8
#define MC_CMD_WRITE32_IN_ADDR_OFST 0
#define MC_CMD_WRITE32_IN_ADDR_LEN 4
#define MC_CMD_WRITE32_IN_BUFFER_OFST 4
#define MC_CMD_WRITE32_IN_BUFFER_LEN 4
#define MC_CMD_WRITE32_IN_BUFFER_MINNUM 1
MC_CMD_COPYCODE

- * Copy MC code between two locations and jump.
+ * Copy MC code between two locations and jump. Note - this command really
+ * belongs to INSECURE category but is required by shmboot. The command handler
+ * has additional checks to reject insecure calls.
+ */
#define MC_CMD_COPYCODE 0x3

@ @ -915.6 +1081.7 @@
* is a bitfield, with each bit as documented below.
+ */
define MC_CMD_COPYCODE_IN_SRC_ADDR_OFST 0
+define MC_CMD_COPYCODE_IN_SRC_ADDR_LEN 4
/* enum: Deprecated; equivalent to setting BOOT_MAGIC_PRESENT (see below) */
define MC_CMD_COPYCODE_HUNT_NO_MAGIC_ADDR 0x10000
/* enum: Deprecated; equivalent to setting BOOT_MAGIC_PRESENT and
@ @ -940.9 +1107.12 @@
define MC_CMD_COPYCODE_IN_BOOT_MAGIC_DISABLE_XIP_WIDTH 1
/* Destination address */
define MC_CMD_COPYCODE_IN_DEST_ADDR_OFST 4
+define MC_CMD_COPYCODE_IN_DEST_ADDR_LEN 4
#define MC_CMD_COPYCODE_IN_NUMWORDS_OFST 8
+define MC_CMD_COPYCODE_IN_NUMWORDS_LEN 4
/* Address of where to jump after copy. */
define MC_CMD_COPYCODE_IN_JUMP_OFST 12
+define MC_CMD_COPYCODE_IN_JUMP_LEN 4
/* enum: Control should return to the caller rather than jumping */
define MC_CMD_COPYCODE_JUMP_NONE 0x1

@ @ -956.12 +1126.13 @@
*/
define MC_CMD_SET_FUNC 0x4

-#define MC_CMD_0x4_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x4_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_SET_FUNC_IN msgrequest */
define MC_CMD_SET_FUNC_IN_LEN 4
/* Set function */
define MC_CMD_SET_FUNC_IN_FUNC_OFST 0
+define MC_CMD_SET_FUNC_IN_FUNC_LEN 4

/* MC_CMD_SET_FUNC_OUT msgresponse */
define MC_CMD_SET_FUNC_OUT_LEN 0
@ @ -973.7 +1144.7 @@
*/
#define MC_CMD_GET_BOOT_STATUS 0x5

-#define MC_CMD_0x5_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x5_PRIVILEGE_CTG SRIOV_CTG_GENERAL

/* MC_CMD_GET_BOOT_STATUS_IN msgrequest */
#define    MC_CMD_GET_BOOT_STATUS_IN_LEN 0
@@ -982,9 +1153,11 @@
#define    MC_CMD_GET_BOOT_STATUS_OUT_LEN 8
/* ?? */
#define    MC_CMD_GET_BOOT_STATUS_OUT_BOOT_OFFSET_OFST 0
+#define    MC_CMD_GET_BOOT_STATUS_OUT_BOOT_OFFSET_LEN 4
/* enum: indicates that the MC wasn’t flash booted */
-#define          MC_CMD_GET_BOOT_STATUS_OUT_BOOT_OFFSET_NULL 0xdeadbeef
+#define          MC_CMD_GET_BOOT_STATUS_OUT_BOOT_OFFSET_NULL 0xdeadbeef
#define       MC_CMD_GET_BOOT_STATUS_OUT_FLAGS_OFST 4
+#define       MC_CMD_GET_BOOT_STATUS_OUT_FLAGS_LEN 4
#define        MC_CMD_GET_BOOT_STATUS_OUT_FLAGS_WATCHDOG_LBN 0
#define        MC_CMD_GET_BOOT_STATUS_OUT_FLAGS_WATCHDOG_WIDTH 1
#define        MC_CMD_GET_BOOT_STATUS_OUT_FLAGS_PRIMARY_LBN 1
@@ -1007,11 +1180,13 @@
#define    MC_CMD_GET_ASSERTS_IN_LEN 4
/* Set to clear assertion */
#define       MC_CMD_GET_ASSERTS_IN_CLEAR_OFST 0
+#define       MC_CMD_GET_ASSERTS_IN_CLEAR_LEN 4
/* MC_CMD_GET_ASSERTS_OUT msgresponse */
#define    MC_CMD_GET_ASSERTS_OUT_LEN 140
/* Assertion status flag. */
#define       MC_CMD_GET_ASSERTS_OUT_GLOBAL_FLAGS_OFST 0
+#define       MC_CMD_GET_ASSERTS_OUT_GLOBAL_FLAGS_LEN 4
/* enum: No assertions have failed. */
#define          MC_CMD_GET_ASSERTS_FLAGS_NO_FAILS 0x1
/* enum: A system-level assertion has failed. */
@@ -1024,6 +1210,7 @@
#define          MC_CMD_GET_ASSERTS_FLAGS_ADDR_TRAP 0x5
/* Failing PC value */
#define       MC_CMD_GET_ASSERTS_OUT_SAVED_PC_OFFS_OFST 4
+#define       MC_CMD_GET_ASSERTS_OUT_SAVED_PC_OFFS_LEN 4
/* Saved GP regs */
#define       MC_CMD_GET_ASSERTS_OUT_GP_REGS_OFFS_OFST 8
#define       MC_CMD_GET_ASSERTS_OUT_GP_REGS_OFFS_LEN 4
@@ -1034,7 +1210,9 @@
#define          MC_CMD_GET_ASSERTS_REG_NO_DATA 0xda7a1057
/* Failing thread address */
#define       MC_CMD_GET_ASSERTS_OUT_THREAD_OFFS_OFST 132
+#define       MC_CMD_GET_ASSERTS_OUT_THREAD_OFFS_LEN 4
#define       MC_CMD_GET_ASSERTS_OUT_RESERVED_OFFS_OFST 136
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+%define       MC_CMD_GET_ASSERTS_OUT_RESERVED_LEN 4

/*******************************************************
@@ -1050,12 +1228,14 @@*
+%define       MC_CMD_LOG_CTRL_IN_LOG_DEST_UART 0x1
+%define       MC_CMD_LOG_CTRL_IN_LOG_DEST_EVQ 0x2
+%define       MC_CMD_LOG_CTRL_IN_LOG_DEST_EVQ_OFST 4
+%define       MC_CMD_LOG_CTRL_IN_LOG_DEST_EVQ_LEN 4

/* MC_CMD_LOG_CTRL_OUT msgresponse */
+%define       MC_CMD_LOG_CTRL_OUT_LEN 0

/* placeholder, set to 0 */
+%define       MC_CMD_GET_VERSION_EXT_IN_EXT_FLAGS_OFST 0
+%define       MC_CMD_GET_VERSION_EXT_IN_EXT_FLAGS_LEN 4

/* MC_CMD_GET_VERSION_V0_OUT msgresponse: deprecated version format */
+%define       MC_CMD_GET_VERSION_OUT_PCOL_OFST 4
 %+define       MC_CMD_GET_VERSION_OUT_PCOL_LEN 4

/* 128bit mask of functions supported by the current firmware */
+%define       MC_CMD_GET_VERSION_OUT_SUPPORTED_FUNCS_OFST 8

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#define MC_CMD_GET_VERSION_OUT_SUPPORTED_FUNCS_LEN 16
@ @ -1104,9 +1290,11 @@
/* MC_CMD_GET_VERSION_EXT_OUT msgresponse */
#define MC_CMD_GET_VERSION_EXT_OUT_LEN 48
/*@ */
#define MC_CMD_GET_VERSION_EXT_OUT_FIRMWARE_OFST 0 */
+/* /* MC_CMD_GET_VERSION_EXT_OUT_FIRMWARE_LEN 4 */
+/* Enum values, see field(s): */
+/* MC_CMD_GET_VERSION_V0_OUT/MC_CMD_GET_VERSION_OUT_FIRMWARE */
#define MC_CMD_GET_VERSION_EXT_OUT_SUPPORTED_FUNCS_OFST 8
#define MC_CMD_GET_VERSION_EXT_OUT_SUPPORTED_FUNCS_LEN 16
@@ -1136,41 +1324,54 @@
#define MC_CMD_PTP_OP_ENABLE 0x1
/* enum: Disable PTP packet timestamping operation. */
#define MC_CMD_PTP_OP_DISABLE 0x2
-/* enum: Send a PTP packet. */
+/* enum: Send a PTP packet. This operation is used on Siena and Huntington.
+ * From Medford onwards it is not supported: on those platforms PTP transmit
+ * timestamping is done using the fast path.
+ */
#define MC_CMD_PTP_OP_TRANSMIT 0x3
/* enum: Read the current NIC time. */
#define MC_CMD_PTP_OP_READ_NIC_TIME 0x4
-/* enum: Get the current PTP status. */
+/* enum: Get the current PTP status. Note that the clock frequency returned (in
+ * Hz) is rounded to the nearest MHz (e.g. 666000000 for 666666666).
+ */
#define MC_CMD_PTP_OP_STATUS 0x5
/* enum: Adjust the PTP NIC's time. */
#define MC_CMD_PTP_OP_ADJUST 0x6
/* enum: Synchronize host and NIC time. */
#define MC_CMD_PTP_OP_SYNCHRONIZE 0x7
-/* enum: Basic manufacturing tests. */
+/* enum: Basic manufacturing tests. Siena PTP adapters only. */
#define MC_CMD_PTP_OP_MANFTEST_BASIC 0x8
-/* enum: Packet based manufacturing tests. */
+/* enum: Packet based manufacturing tests. Siena PTP adapters only. */
#define MC_CMD_PTP_OP_MANFTEST_PACKET 0x9
/* enum: Reset some of the PTP related statistics */
#define MC_CMD_PTP_OP_RESET_STATS 0xa
/* enum: Debug operations to MC. */
#define MC_CMD_PTP_OP_DEBUG 0xb
-/* enum: Read an FPGA register */
+/* enum: Read an FPGA register. Siena PTP adapters only. */
#define MC_CMD_PTP_OP_FPGAREAD 0xc
-/* enum: Write an FPGA register */
+#define          MC_CMD_PTP_OP_FPGAWRITE 0xd
+*/ enum: Write an FPGA register. Siena PTP adapters only. */
+/* enum: Apply an offset to the NIC clock */
+#define          MC_CMD_PTP_OP_CLOCK_OFFSET_ADJUST 0xe
-/* enum: Change Apply an offset to the NIC clock */
+#define          MC_CMD_PTP_OP_CLOCK_FREQ_ADJUST 0xf
-/* enum: Change the frequency correction applied to the NIC clock */
+#define          MC_CMD_PTP_OP_RX_SET_VLAN_FILTER 0x10
-/* enum: Set the MC packet filter VLAN tags for received PTP packets */
+#define          MC_CMD_PTP_OP_RX_SET_UUID_FILTER 0x11
-/* enum: Set the MC packet filter UUID for received PTP packets */
+#define          MC_CMD_PTP_OP_RX_SET_DOMAIN_FILTER 0x12
-/* enum: Set the clock source */
+/* enum: Set the clock source. Required for snapper tests on Huntington and Medford. Not implemented for Siena or Medford2. */
+#define          MC_CMD_PTP_OP_SET_CLK_SRC 0x13
-/* enum: Reset value of Timer Reg. */
+/* enum: Reset value of Timer Reg. Not implemented. */
+#define          MC_CMD_PTP_OP_RST_CLK 0x14
+*/ enum: Enable the forwarding of PPS events to the host */
+#define          MC_CMD_PTP_OP_PPS_ENABLE 0x15
@@ -1191,7 +1392,7 @@
 -/* Event queue for PTP events */
+#define       MC_CMD_PTP_IN_CMD_LEN 4
+*/ enum: Write an FPGA register. Siena PTP adapters only. */
+/* enum: Apply an offset to the NIC clock */
+#define       MC_CMD_PTP_IN_CMD_OFST 0
+/* enum: Change Apply an offset to the NIC clock */
+#define       MC_CMD_PTP_IN_PERIPH_ID_OFST 4
```c
#define MC_CMD_PTP_IN_PERIPH_ID_LEN 4
+/* Not used. Events are always sent to function relative queue 0. */
#define MC_CMD_PTP_IN_ENABLE_QUEUE_OFST 8
-/* PTP timestamping mode */
+#define MC_CMD_PTP_IN_ENABLE_QUEUE_LEN 4
+/* PTP timestamping mode. Not used from Huntington onwards. */
#define MC_CMD_PTP_IN_ENABLE_MODE_OFST 12
+#define MC_CMD_PTP_IN_ENABLE_MODE_LEN 4
+/* enum: PTP, version 1 */
#define MC_CMD_PTP_MODE_V1 0x0
+/* enum: PTP, version 1, with VLAN headers - deprecated */
@@ -1225,16 +1430,21 @@
-/* MC_CMD_PTP_IN_DISABLE msgrequest */
+#define MC_CMD_PTP_IN_DISABLE_LEN 8
+/* MC_CMD_PTP_IN_DISABLE_LEN 8 */
+/* MC_CMD_PTP_IN_CMD_OFST 0 */
+/* MC_CMD_PTP_IN_CMD_LEN 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
+/* Transmit packet length */
+#define MC_CMD_PTP_IN_TRANSMIT_LENGTH_OFST 8
+/* MC_CMD_PTP_IN_TRANSMIT_LENGTH_LEN 4 */
+/* Transmit packet data */
+#define MC_CMD_PTP_IN_TRANSMIT_PACKET_OFST 12
+#define MC_CMD_PTP_IN_TRANSMIT_PACKET_LEN 1
@@ -1244,17 +1454,30 @@
-/* MC_CMD_PTP_IN_READ_NIC_TIME msgrequest */
+#define MC_CMD_PTP_IN_READ_NIC_TIME_LEN 8
+/* MC_CMD_PTP_IN_READ_NIC_TIME_LEN 8 */
+/* MC_CMD_PTP_IN_CMD_OFST 0 */
+/* MC_CMD_PTP_IN_CMD_LEN 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
+/* Transmit packet data */
+#define MC_CMD_PTP_IN_READ_NIC_TIME_PACKET_OFST 12
+#define MC_CMD_PTP_IN_READ_NIC_TIME_PACKET_LEN 1
+/* MC_CMD_PTP_IN_READ_NIC_TIME_V2 msgrequest */
+#define MC_CMD_PTP_IN_READ_NIC_TIME_V2_LEN 8
+/* MC_CMD_PTP_IN_READ_NIC_TIME_V2_LEN 8 */
+/* MC_CMD_PTP_IN_CMD_OFST 0 */
+/* MC_CMD_PTP_IN_CMD_LEN 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
```
/* MC_CMD_PTP_IN_STATUS msgrequest */
#define MC_CMD_PTP_IN_STATUS_LEN 8
/* MC_CMD_PTP_IN_CMD_OFFSET 0 */
+/* MC_CMD_PTP_IN_CMD_LEN 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_OFFSET 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */

/* MC_CMD_PTP_IN_ADJUST msgrequest */
#define MC_CMD_PTP_IN_ADJUST_LEN 24
/* MC_CMD_PTP_IN_CMD_OFFSET 0 */
+/* MC_CMD_PTP_IN_CMD_LEN 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_OFFSET 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */

/* Frequency adjustment 40 bit fixed point ns */
#define MC_CMD_PTP_IN_ADJUST_FREQ_OFFSET 8
#define MC_CMD_PTP_IN_ADJUST_FREQ_LEN 8
#define MC_CMD_PTP_IN_ADJUST_FREQ_HI_OFFSET 12
/* enum: Number of fractional bits in frequency adjustment */
#define MC_CMD_PTP_IN_ADJUST_BITS 0x28
+/* enum: Number of fractional bits in frequency adjustment when FP44_FREQ_ADJ
 * is indicated in the MC_CMD_PTP_OUT_GET_ATTRIBUTES command CAPABILITIES
 * field.
 */
+/*
 +#define MC_CMD_PTP_IN_ADJUST_BITS_FP44 0x2c
 */
/* Time adjustment in seconds */
#define MC_CMD_PTP_IN_ADJUST_SECONDS_OFFSET 16
#define MC_CMD_PTP_IN_ADJUST_SECONDS_LEN 4
/* Time adjustment major value */
#define MC_CMD_PTP_IN_ADJUST_MAJOR_OFFSET 16
#define MC_CMD_PTP_IN_ADJUST_MAJOR_LEN 4
/* Time adjustment in nanoseconds */
#define MC_CMD_PTP_IN_ADJUST_NANOSECONDS_OFFSET 20
#define MC_CMD_PTP_IN_ADJUST_NANOSECONDS_LEN 4
/* Time adjustment minor value */
#define MC_CMD_PTP_IN_ADJUST_MINOR_OFFSET 20
#define MC_CMD_PTP_IN_ADJUST_MINOR_LEN 4
+
+/* MC_CMD_PTP_IN_ADJUST_V2 msgrequest */
+define MC_CMD_PTP_IN_ADJUST_V2_LEN 28
+/* MC_CMD_PTP_IN_CMD_OFFSET 0 */
+/* MC_CMD_PTP_IN_CMD_LEN 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_OFFSET 4 */
+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
+/* Frequency adjustment 40 bit fixed point ns */
+#define MC_CMD_PTP_IN_ADJUST_V2_FREQ_OFFSET 8
+#define MC_CMD_PTP_IN_ADJUST_V2_FREQ_LEN 8
+#define MC_CMD_PTP_IN_ADJUST_V2_FREQ_LO_OFFSET 8
+/#define MC_CMD_PTP_IN_ADJUST_V2_FREQ_HI_OFST 12
+/* enum: Number of fractional bits in frequency adjustment */
+/#define MC_CMD_PTP_IN_ADJUST_BITS 0x28 */
+/* enum: Number of fractional bits in frequency adjustment when FP44_FREQ_ADJ
+ * is indicated in the MC_CMD_PTP_OUT_GET_ATTRIBUTES command CAPABILITIES
+ * field.
+ */
+/*
+/#define MC_CMD_PTP_IN_ADJUST_BITS_FP44 0x2c */
+/* Time adjustment in seconds */
+/#define MC_CMD_PTP_IN_ADJUST_V2_SECONDS_OFST 16
+/#define MC_CMD_PTP_IN_ADJUST_V2_SECONDS_LEN 4
+/* Time adjustment major value */
+/#define MC_CMD_PTP_IN_ADJUST_V2_MAJOR_OFST 16
+/#define MC_CMD_PTP_IN_ADJUST_V2_MAJOR_LEN 4
+/* Time adjustment in nanoseconds */
+/#define MC_CMD_PTP_IN_ADJUST_V2_NANOSECONDS_OFST 20
+/#define MC_CMD_PTP_IN_ADJUST_V2_NANOSECONDS_LEN 4
+/* Time adjustment minor value */
+/#define MC_CMD_PTP_IN_ADJUST_V2_MINOR_OFST 20
+/#define MC_CMD_PTP_IN_ADJUST_V2_MINOR_LEN 4
+/* Upper 32bits of major time offset adjustment */
+/#define MC_CMD_PTP_IN_ADJUST_V2_MAJOR_HI_OFST 24
+/#define MC_CMD_PTP_IN_ADJUST_V2_MAJOR_HI_LEN 4

/* MC_CMD_PTP_IN_SYNCHRONIZE msgrequest */
#define MC_CMD_PTP_IN_SYNCHRONIZE_LEN 20
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
+/* Number of time readings to capture */
#define MC_CMD_PTP_IN_SYNCHRONIZE_NUMTIMESETS_OFST 8
+/* Host address in which to write ”synchronization started” indication (64
+ * bits)
+ */
+/* @ @ -1288,42 +1557,58 @ @
+/* MC_CMD_PTP_IN_MANFTEST_BASIC msgrequest */
#define MC_CMD_PTP_IN_MANFTEST_BASIC_LEN 8
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */

/* MC_CMD_PTP_IN_MANFTEST_PACKET msgrequest */
#define MC_CMD_PTP_IN_MANFTEST_PACKET_LEN 12
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
/* Enable or disable packet testing */
#define MC_CMD_PTP_IN_MANFTEST_PACKET_TEST_ENABLE_OFST 8
+#define MC_CMD_PTP_IN_MANFTEST_PACKET_TEST_ENABLE_LEN 4

-/* MC_CMD_PTP_IN_RESET_STATS msgrequest */
+/* MC_CMD_PTP_IN_RESET_STATS msgrequest: Reset PTP statistics */
#define MC_CMD_PTP_IN_RESET_STATS_LEN 8
/* Reset PTP statistics */
+/* MC_CMD_PTP_IN_RESET_STATS_LEN 4 */
/+/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
/+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */

/* Debug operations */
#define MC_CMD_PTP_IN_DEBUG_LEN 12
/* Debug operations */
+/* MC_CMD_PTP_IN_DEBUG_LEN 4 */
/+/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
/+/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */

/* MC_CMD_PTP_IN_FPGAREAD msgrequest */
#define MC_CMD_PTP_IN_FPGAREAD_LEN 16
/* MC_CMD_PTP_IN_FPGAREAD_ADDR */
+/* MC_CMD_PTP_IN_FPGAREAD_ADDR_LEN 4 */
+/* MC_CMD_PTP_IN_FPGAREAD_NUMBYTES_LEN 4 */
#define MC_CMD_PTP_IN_FPGAREAD_ADDR_OFST 8
+#define MC_CMD_PTP_IN_FPGAREAD_ADDR_LEN 4
#define MC_CMD_PTP_IN_FPGAREAD_NUMBYTES_OFST 12
+#define MC_CMD_PTP_IN_FPGAREAD_NUMBYTES_LEN 4

/* MC_CMD_PTP_IN_FPGWRITE msgrequest */
#define MC_CMD_PTP_IN_FPGWRITE_LENMIN 13
#define MC_CMD_PTP_IN_FPGWRITE_LENMAX 252
#define MC_CMD_PTP_IN_FPGWRITE_LEN(num) (12+1*(num))
/* MC_CMD_PTP_IN_FPGWRITE_ADDR */
+/* MC_CMD_PTP_IN_FPGWRITE_ADDR_LEN 4 */
+/* MC_CMD_PTP_IN_FPGWRITE_BUFFER_LEN 1 */
+#define MC_CMD_PTP_IN_FPGWRITE_ADDR_OFST 8
+#define MC_CMD_PTP_IN_FPGWRITE_ADDR_LEN 4
#define MC_CMD_PTP_IN_FPGWRITE_BUFFER_OFST 12
#define MC_CMD_PTP_IN_FPGWRITE_BUFFER_LEN 1

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#define MC_CMD_PTP_IN_FPGAWRITE_BUFFER_MINNUM 1
@@ -1332,34 +1617,67 @@
/* MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST msgrequest */
#define    MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_LEN 16
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* Time adjustment in seconds */
#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_SECONDS_OFST 8
+#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_SECONDS_LEN 4
/* Time adjustment major value */
#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_MAJOR_OFST 8
+#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_MAJOR_LEN 4
/* Time adjustment in nanoseconds */
#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_NANOSECONDS_OFST 12
+#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_NANOSECONDS_LEN 4
/* Time adjustment minor value */
#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_MINOR_OFST 12
+#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_MINOR_LEN 4
+/* MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2 msgrequest */
+#define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_LEN 20
+/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
+/* Time adjustment in seconds */
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_SECONDS_OFST 8
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_SECONDS_LEN 4
+/* Time adjustment major value */
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_MAJOR_OFST 8
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_MAJOR_LEN 4
+/* Time adjustment in nanoseconds */
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_NANOSECONDS_OFST 12
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_NANOSECONDS_LEN 4
+/* Time adjustment minor value */
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_MINOR_OFST 12
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_MINOR_LEN 4
+/* Upper 32bits of major time offset adjustment */
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_MAJOR_HI_OFST 16
+##define MC_CMD_PTP_IN_CLOCK_OFFSET_ADJUST_V2_MAJOR_HI_LEN 4
/* MC_CMD_PTP_IN_CLOCK_FREQ_ADJUST msgrequest */
#define    MC_CMD_PTP_IN_CLOCK_FREQ_ADJUST_LEN 16
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
/*            MC_CMD_PTP_IN_CMD_LEN 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* Frequency adjustment 40 bit fixed point ns */
#define MC_CMD_PTP_IN_CLOCK_FREQ_ADJUST_FREQ_OFST 8
#define MC_CMD_PTP_IN_CLOCK_FREQ_ADJUST_FREQ_LEN 8
#define MC_CMD_PTP_IN_CLOCK_FREQ_ADJUST_FREQ_LO_OFST 8
#define MC_CMD_PTP_IN_CLOCK_FREQ_ADJUST_FREQ_HI_OFST 12
-/* enum: Number of fractional bits in frequency adjustment */
-/*               MC_CMD_PTP_IN_ADJUST_BITS 0x28 */
+/*            Enum values, see field(s): */
+/*               MC_CMD_PTP/MC_CMD_PTP_IN_ADJUST/FREQ */

/* MC_CMD_PTP_IN_RX_SET_VLAN_FILTER msgrequest */
#define MC_CMD_PTP_IN_RX_SET_VLAN_FILTER_LEN 24
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* Number of VLAN tags, 0 if not VLAN */
#define MC_CMD_PTP_IN_RX_SET_VLAN_FILTER_NUM_VLAN_TAGS_OFST 8
+*#define MC_CMD_PTP_IN_RX_SET_VLAN_FILTER_NUM_VLAN_TAGS_LEN 4
/* Set of VLAN tags to filter against */
#define MC_CMD_PTP_IN_RX_SET_VLAN_FILTER_VLAN_TAG_OFST 12
#define MC_CMD_PTP_IN_RX_SET_VLAN_FILTER_VLAN_TAG_LEN 4
@@ -1368,9 +1686,12 @@
/* MC_CMD_PTP_IN_RX_SET_UUID_FILTER msgrequest */
#define MC_CMD_PTP_IN_RX_SET_UUID_FILTER_LEN 20
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* 1 to enable UUID filtering, 0 to disable */
#define MC_CMD_PTP_IN_RX_SET_UUID_FILTER_ENABLE_OFST 8
+*#define MC_CMD_PTP_IN_RX_SET_UUID_FILTER_ENABLE_LEN 4
/* UUID to filter against */
#define MC_CMD_PTP_IN_RX_SET_UUID_FILTER_UUID_OFST 12
#define MC_CMD_PTP_IN_RX_SET_UUID_FILTER_UUID_LEN 8
@@ -1380,62 +1701,82 @@
/* MC_CMD_PTP_IN_RX_SET_DOMAIN_FILTER msgrequest */
#define MC_CMD_PTP_IN_RX_SET_DOMAIN_FILTER_LEN 16
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* 1 to enable Domain filtering, 0 to disable */
#define MC_CMD_PTP_IN_RX_SET_DOMAIN_FILTER_ENABLE_OFST 8
+*#define MC_CMD_PTP_IN_RX_SET_DOMAIN_FILTER_ENABLE_LEN 4
/* UUID to filter against */
#define MC_CMD_PTP_IN_RX_SET_DOMAIN_FILTER_UUID_OFST 12
#define MC_CMD_PTP_IN_RX_SET_DOMAIN_FILTER_UUID_LEN 8
@@ -1380,62 +1701,82 @@


```c
+#define MC_CMD_PTP_IN_RX_SET_DOMAIN_FILTER_DOMAIN_LEN 4

/* MC_CMD_PTP_IN_SET_CLK_SRC msgrequest */
#define MC_CMD_PTP_IN_SET_CLK_SRC_LEN 12
/* MC_CMD_PTP_IN_CMD_OFST 0 */
/* MC_CMD_PTP_IN_CMD_LEN 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* Set the clock source. */
#define MC_CMD_PTP_IN_SET_CLK_SRC_CLK_OFST 8
#define MC_CMD_PTP_IN_SET_CLK_SRC_CLK_LEN 4
/* enum: Internal. */
#define MC_CMD_PTP_CLK_SRC_INTERNAL 0x0
/* enum: External. */
#define MC_CMD_PTP_CLK_SRC_EXTERNAL 0x1

/* MC_CMD_PTP_IN_RST_CLK msgrequest */
#define MC_CMD_PTP_IN_RST_CLK_LEN 8
/* MC_CMD_PTP_IN_CMD_OFST 0 */
/* MC_CMD_PTP_IN_CMD_LEN 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* MC_CMD_PTP_IN_RST_CLK msgrequest: Reset value of Timer Reg. */

/* MC_CMD_PTP_IN_PPS_ENABLE msgrequest */
#define MC_CMD_PTP_IN_PPS_ENABLE_LEN 12
/* MC_CMD_PTP_IN_CMD_OFST 0 */
/* MC_CMD_PTP_IN_CMD_LEN 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* Enable or disable */
#define MC_CMD_PTP_IN_PPS_ENABLE_OP_OFST 4
#define MC_CMD_PTP_IN_PPS_ENABLE_OP_LEN 4
/* enum: Enable */
#define MC_CMD_PTP_ENABLE_PPS 0x0
/* enum: Disable */
#define MC_CMD_PTP_DISABLE_PPS 0x1
/* Queue id to send events back */
#define MC_CMD_PTP_IN_PPS_ENABLE_QUEUE_ID_OFST 8
#define MC_CMD_PTP_IN_PPS_ENABLE_QUEUE_ID_LEN 4
/* Not used. Events are always sent to function relative queue 0. */

/* MC_CMD_PTP_IN_GET_TIME_FORMAT msgrequest */
#define MC_CMD_PTP_IN_GET_TIME_FORMAT_LEN 8
/* MC_CMD_PTP_IN_CMD_OFST 0 */
/* MC_CMD_PTP_IN_CMD_LEN 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
/* MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* MC_CMD_PTP_IN_GET_TIME_FORMAT msgrequest */
```

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/* MC_CMD_PTP_IN_GET_ATTRIBUTES msgrequest */
#define MC_CMD_PTP_IN_GET_ATTRIBUTES_LEN 8
/*
 MC_CMD_PTP_IN_CMD_OFST 0 */
+/*
 MC_CMD_PTP_IN_CMD_LEN 4 */
 /*
 MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*
 MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */

/* MC_CMD_PTP_IN_GET_TIMESTAMP_CORRECTIONS msgrequest */
#define MC_CMD_PTP_IN_GET_TIMESTAMP_CORRECTIONS_LEN 8
/*
 MC_CMD_PTP_IN_CMD_OFST 0 */
+/*
 MC_CMD_PTP_IN_CMD_LEN 4 */
 /*
 MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*
 MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */

/* MC_CMD_PTP_IN_TIME_EVENT_SUBSCRIBE msgrequest */
#define MC_CMD_PTP_IN_TIME_EVENT_SUBSCRIBE_LEN 12
/*
 MC_CMD_PTP_IN_CMD_OFST 0 */
+/*
 MC_CMD_PTP_IN_CMD_LEN 4 */
 /*
 MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*
 MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* Original field containing queue ID. Now extended to include flags. */
#define MC_CMD_PTP_IN_TIME_EVENT_SUBSCRIBE_QUEUE_OFST 8
#define MC_CMD_PTP_IN_TIME_EVENT_SUBSCRIBE_QUEUE_LEN 4
#define MC_CMD_PTP_IN_TIME_EVENT_SUBSCRIBE_QUEUE_ID_LBN 0
#define MC_CMD_PTP_IN_TIME_EVENT_SUBSCRIBE_QUEUE_ID_WIDTH 16
#define MC_CMD_PTP_IN_TIME_EVENT_SUBSCRIBE_REPORT_SYNC_STATUS_LBN 31
@@ -1444,29 +1785,39 @@
/* MC_CMD_PTP_IN_TIME_EVENT_UNSUBSCRIBE msgrequest */
#define MC_CMD_PTP_IN_TIME_EVENT_UNSUBSCRIBE LEN 16
/*
 MC_CMD_PTP_IN_CMD_OFST 0 */
+/*
 MC_CMD_PTP_IN_CMD_LEN 4 */
 /*
 MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*
 MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* Unsubscribe options */
#define MC_CMD_PTP_IN_TIME_EVENT_UNSUBSCRIBE_CONTROL_OFST 8
#define MC_CMD_PTP_IN_TIME_EVENT_UNSUBSCRIBE_CONTROL_LEN 4
/* enum: Unsubscribe a single queue */
/* enum: Unsubscribe all queues */
#define MC_CMD_PTP_IN_TIME_EVENT_UNSUBSCRIBE_QUEUE_OFST 12
#define MC_CMD_PTP_IN_TIME_EVENT_UNSUBSCRIBE_QUEUE_LEN 4
/*
 MC_CMD_PTP_IN_MANIFEST_PPS msgrequest */
#define MC_CMD_PTP_IN_MANIFEST_PPS_LEN 12
/*
 MC_CMD_PTP_IN_CMD_OFST 0 */
+/*
 MC_CMD_PTP_IN_CMD_LEN 4 */
#define MC_CMD_PTP_IN_MANFTEST_PPS_TEST_ENABLE_OFST 8
+#define MC_CMD_PTP_IN_MANFTEST_PPS_TEST_ENABLE_LEN 4

/* MC_CMD_PTP_IN_SET_SYNC_STATUS msgrequest */
#define MC_CMD_PTP_IN_SET_SYNC_STATUS_LEN 24
/*            MC_CMD_PTP_IN_CMD_OFST 0 */
+/*            MC_CMD_PTP_IN_CMD_LEN 4 */
/*            MC_CMD_PTP_IN_PERIPH_ID_OFST 4 */
+/*            MC_CMD_PTP_IN_PERIPH_ID_LEN 4 */
/* NIC - Host System Clock Synchronization status */
#define MC_CMD_PTP_IN_SET_SYNC_STATUS_STATUS_OFST 8
+#define MC_CMD_PTP_IN_SET_SYNC_STATUS_STATUS_LEN 4
/* enum: Host System clock and NIC clock are not in sync */
#define MC_CMD_PTP_IN_SET_SYNC_STATUS_NOT_IN_SYNC 0x0
/* enum: Host System clock and NIC clock are synchronized */
@@ -1475,8 +1826,11 @@
* no longer in sync.
*/
#define MC_CMD_PTP_IN_SET_SYNC_STATUS_TIMEOUT_OFST 12
+#define MC_CMD_PTP_IN_SET_SYNC_STATUS_TIMEOUT_LEN 4
#define MC_CMD_PTP_IN_SET_SYNC_STATUS_RESERVED0_OFST 16
+#define MC_CMD_PTP_IN_SET_SYNC_STATUS_RESERVED0_LEN 4
#define MC_CMD_PTP_IN_SET_SYNC_STATUS_RESERVED1_OFST 20
+#define MC_CMD_PTP_IN_SET_SYNC_STATUS_RESERVED1_LEN 4

/* MC_CMD_PTP_OUT msgresponse */
#define MC_CMD_PTP_OUT_LEN 0
@@ -1485,12 +1839,16 @@
#define MC_CMD_PTP_OUT_TRANSMIT_LEN 8
/* Value of seconds timestamp */
#define MC_CMD_PTP_OUT_TRANSMIT_SECONDS_OFST 0
+#define MC_CMD_PTP_OUT_TRANSMIT_SECONDS_LEN 4
/* Timestamp major value */
#define MC_CMD_PTP_OUT_TRANSMIT_MAJOR_OFST 0
+#define MC_CMD_PTP_OUT_TRANSMIT_MAJOR_LEN 4
/* Value of nanoseconds timestamp */
#define MC_CMD_PTP_OUT_TRANSMIT_NANOSECONDS_OFST 4
+#define MC_CMD_PTP_OUT_TRANSMIT_NANOSECONDS_LEN 4
/* Timestamp minor value */
#define MC_CMD_PTP_OUT_TRANSMIT_MINOR_OFST 4
+define MC_CMD_PTP_OUT_TRANSMIT_MINOR_LEN 4

/* MC_CMD_PTP_OUT_TIME_EVENT_SUBSCRIBE msgresponse */
#define MC_CMD_PTP_OUT_TIME_EVENT_SUBSCRIBE_LEN 0
@@ -1502,47 +1860,85 @@
#define MC_CMD_PTP_OUT_READ_NIC_TIME_LEN 8
/* Value of seconds timestamp */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_SECONDS_OFST 0
#define MC_CMD_PTP_OUT_READ_NIC_TIME_SECONDS_LEN 4
/* Timestamp major value */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_MAJOR_OFST 0
#define MC_CMD_PTP_OUT_READ_NIC_TIME_MAJOR_LEN 4
/* Value of nanoseconds timestamp */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_NANOSECONDS_OFST 4
#define MC_CMD_PTP_OUT_READ_NIC_TIME_NANOSECONDS_LEN 4
/* Timestamp minor value */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_MINOR_OFST 4
#define MC_CMD_PTP_OUT_READ_NIC_TIME_MINOR_LEN 4

/* MC_CMD_PTP_OUT_READ_NIC_TIME_V2 msgresponse */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_LEN 12
/* Value of seconds timestamp */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_SECONDS_OFST 0
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_SECONDS_LEN 4
/* Timestamp major value */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_MAJOR_OFST 0
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_MAJOR_LEN 4
/* Value of nanoseconds timestamp */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_NANOSECONDS_OFST 4
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_NANOSECONDS_LEN 4
/* Timestamp minor value */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_MINOR_OFST 4
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_MINOR_LEN 4
/* Upper 32bits of major timestamp value */
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_MAJOR_HI_OFST 8
#define MC_CMD_PTP_OUT_READ_NIC_TIME_V2_MAJOR_HI_LEN 4

/* MC_CMD_PTP_OUT_STATUS msgresponse */
#define MC_CMD_PTP_OUT_STATUS_LEN 64
/* Frequency of NIC's hardware clock */
#define MC_CMD_PTP_OUT_STATUS_CLOCK_FREQ_OFST 0
#define MC_CMD_PTP_OUT_STATUS_CLOCK_FREQ_LEN 4
/* Number of packets transmitted and timestamped */
#define MC_CMD_PTP_OUT_STATUS_STATS_TX_OFST 4
#define MC_CMD_PTP_OUT_STATUS_STATS_TX_LEN 4
/* Number of packets received and timestamped */
#define MC_CMD_PTP_OUT_STATUS_STATS_RX_OFST 8
#define MC_CMD_PTP_OUT_STATUS_STATS_RX_LEN 4
/* Number of packets timestamped by the FPGA */
#define MC_CMD_PTP_OUT_STATUS_STATS_TS_OFST 12
#define MC_CMD_PTP_OUT_STATUS_STATS_TS_LEN 4
/* Number of packets filter matched */
#define MC_CMD_PTP_OUT_STATUS_STATS_FM_OFST 16
#define MC_CMD_PTP_OUT_STATUS_STATS_FM_LEN 4
+#define MC_CMD_PTP_OUT_STATUS_STATS_FM_LEN 4
/* Number of packets not filter matched */
+#define MC_CMD_PTP_OUT_STATUS_STATS_NFM_OFST 20
+#define MC_CMD_PTP_OUT_STATUS_STATS_NFM_LEN 4
/* Number of PPS overflows (noise on input?) */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFLOW_OFST 24
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFLOW_LEN 4
/* Number of PPS bad periods */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_BAD_OFST 28
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_BAD_LEN 4
/* Minimum period of PPS pulse in nanoseconds */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_MIN_OFST 32
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_MIN_LEN 4
/* Maximum period of PPS pulse in nanoseconds */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_MAX_OFST 36
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_MAX_LEN 4
/* Last period of PPS pulse in nanoseconds */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_LAST_OFST 40
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_LAST_LEN 4
/* Mean period of PPS pulse in nanoseconds */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_MEAN_OFST 44
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_PER_MEAN_LEN 4
/* Minimum offset of PPS pulse in nanoseconds (signed) */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_MIN_OFST 48
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_MIN_LEN 4
/* Maximum offset of PPS pulse in nanoseconds (signed) */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_MAX_OFST 52
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_MAX_LEN 4
/* Last offset of PPS pulse in nanoseconds (signed) */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_LAST_OFST 56
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_LAST_LEN 4
/* Mean offset of PPS pulse in nanoseconds (signed) */
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_MEAN_OFST 60
+#define MC_CMD_PTP_OUT_STATUS_STATS_PPS_OFF_MEAN_LEN 4

/* MC_CMD_PTP_OUT_SYNCHRONIZE msgresponse */
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_LENMIN 20
@@ -1555,23 +1951,31 @@
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_TIMESET_MAXNUM 12
/* Host time immediately before NIC's hardware clock read */
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_HOSTSTART_OFST 0
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_HOSTSTART_LEN 4
/* Value of seconds timestamp */
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_SECONDS_OFST 4
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_SECONDS_LEN 4
/* Timestamp major value */
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_MAJOR_OFST 4
+#define MC_CMD_PTP_OUT_SYNCHRONIZE_MAJOR_LEN 4
/* Value of nanoseconds timestamp */
#define MC_CMD_PTP_OUT_SYNCHRONIZE_NANOSECONDS_OFST 8
#define MC_CMD_PTP_OUT_SYNCHRONIZE_NANOSECONDS_LEN 4
/* Timestamp minor value */
#define MC_CMD_PTP_OUT_SYNCHRONIZE_MINOR_OFST 8
#define MC_CMD_PTP_OUT_SYNCHRONIZE_MINOR_LEN 4
/* Host time immediately after NIC’s hardware clock read */
#define MC_CMD_PTP_OUT_SYNCHRONIZE_HOSTEND_OFST 12
#define MC_CMD_PTP_OUT_SYNCHRONIZE_HOSTEND_LEN 4
/* Number of nanoseconds waited after reading NIC’s hardware clock */
#define MC_CMD_PTP_OUT_SYNCHRONIZE_WAITNS_OFST 16
#define MC_CMD_PTP_OUT_SYNCHRONIZE_WAITNS_LEN 4

/* MC_CMD_PTP_OUT_MANFTEST_BASIC msgresponse */
#define MC_CMD_PTP_OUT_MANFTEST_BASIC_LEN 8
/* Results of testing */
#define MC_CMD_PTP_OUT_MANFTEST_BASIC_TEST_RESULT_OFST 0
#define MC_CMD_PTP_OUT_MANFTEST_BASIC_TEST_RESULT_LEN 4
/* enum: Successful test */
#define MC_CMD_PTP_MANF_SUCCESS 0x0
/* enum: FPGA load failed */
// Presence of external oscillator */
#define MC_CMD_PTP_OUT_MANFTEST_BASIC_TEST_EXTOSC_OFST 4
#define MC_CMD_PTP_OUT_MANFTEST_BASIC_TEST_EXTOSC_LEN 4

/* MC_CMD_PTP_OUT_MANFTEST_PACKET msgresponse */
#define MC_CMD_PTP_OUT_MANFTEST_PACKET_LEN 12
/* Results of testing */
#define MC_CMD_PTP_OUT_MANFTEST_PACKET_TEST_RESULT_OFST 0
#define MC_CMD_PTP_OUT_MANFTEST_PACKET_TEST_RESULT_LEN 4
/* Number of packets received by FPGA */
#define MC_CMD_PTP_OUT_MANFTEST_PACKET_TEST_FPGACOUNT_OFST 4
#define MC_CMD_PTP_OUT_MANFTEST_PACKET_TEST_FPGACOUNT_LEN 4
/* Number of packets received by Siena filters */
#define MC_CMD_PTP_OUT_MANFTEST_PACKET_TEST_FILTERCOUNT_OFST 8
#define MC_CMD_PTP_OUT_MANFTEST_PACKET_TEST_FILTERCOUNT_LEN 4

/* MC_CMD_PTP_OUT_FPGAREAD msgresponse */
#define MC_CMD_PTP_OUT_FPGAREAD_LENMIN 1
/* Time format required/used by for this NIC. Applies to all PTP MCDI */
* operations that pass times between the host and firmware. If this operation
* is not supported (older firmware) a format of seconds and nanoseconds should
* be assumed. Note this enum is deprecated. Do not add to it- use the
* TIME_FORMAT field in MC_CMD_PTP_OUT_GET_ATTRIBUTES instead.
#define MC_CMD_PTP_OUT_GET_TIME_FORMAT_FORMAT_OFST 0
+#define MC_CMD_PTP_OUT_GET_TIME_FORMAT_FORMAT_LEN 4
/* enum: Times are in seconds and nanoseconds */
#define MC_CMD_PTP_OUT_GET_TIME_FORMAT_SECONDS_NANOSECONDS 0x0
/* enum: Major register has units of 16 second per tick, minor 8 ns per tick */
@@ -1646,12 +2056,16 @@
 * be assumed.
 */
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_TIME_FORMAT_OFST 0
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_TIME_FORMAT_LEN 4
/* enum: Times are in seconds and nanoseconds */
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_NANOSECONDS 0x0
/* enum: Major register has units of 16 second per tick, minor 8 ns per tick */
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_16SECONDS_8NANOSECONDS 0x1
/* enum: Major register has units of seconds, minor 2^-27s per tick */
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_27FRACTION 0x2
+/* enum: Major register units are seconds, minor units are quarter nanoseconds 
 */
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_QTR_NANOSECONDS 0x3
/* Minimum acceptable value for a corrected synchronization timeset. When 
 * comparing host and NIC clock times, the MC returns a set of samples that 
 * contain the host start and end time, the MC time when the host start was 
 @@ -1660,46 +2074,66 @@
 * end and start times minus the time that the MC waited for host end. 
 */
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_SYNC_WINDOW_MIN_OFST 4
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_SYNC_WINDOW_MIN_LEN 4
/* Various PTP capabilities */
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_CAPABILITIES_OFST 8
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_CAPABILITIES_LEN 4
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_REPORT_SYNC_STATUS_LBN 0
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_REPORT_SYNC_STATUS_WIDTH 1
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RX_TSTAMP_OOB_LBN 1
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RX_TSTAMP_OOB_WIDTH 1
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_64BIT_SECONDS_LBN 2
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_64BIT_SECONDS_WIDTH 1
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_FP44_FREQ_ADJ_LBN 3
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_FP44_FREQ_ADJ_WIDTH 1
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RESERVED0_OFST 12
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RESERVED0_LEN 4
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RESERVED1_OFST 16
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RESERVED1_LEN 4
#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RESERVED2_OFST 20
+#define MC_CMD_PTP_OUT_GET_ATTRIBUTES_RESERVED2_LEN 4

/* MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS msgresponse */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_LEN 16
/* Uncorrected error on PTP transmit timestamps in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_TRANSmit_OFST 0
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_TRANSmit_LEN 4
/* Uncorrected error on PTP receive timestamps in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_RECEIVE_OFST 4
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_RECEIVE_LEN 4
/* Uncorrected error on PPS output in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_PPS_OUT_OFST 8
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_PPS_OUT_LEN 4
/* Uncorrected error on PPS input in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_PPS_IN_OFST 12
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_PPS_IN_LEN 4

/* MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2 msgresponse */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_LEN 24
/* Uncorrected error on PTP transmit timestamps in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PTP_TX_OFST 0
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PTP_TX_LEN 4
/* Uncorrected error on PTP receive timestamps in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PTP_RX_OFST 4
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PTP_RX_LEN 4
/* Uncorrected error on PPS output in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PPS_OUT_OFST 8
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PPS_OUT_LEN 4
/* Uncorrected error on PPS input in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PPS_IN_OFST 12
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_PPS_IN_LEN 4
/* Uncorrected error on non-PTP transmit timestamps in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_GENERAL_TX_OFST 16
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_GENERAL_TX_LEN 4
/* Uncorrected error on non-PTP receive timestamps in NIC clock format */
#define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_GENERAL_RX_OFST 20
+define MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_GENERAL_RX_LEN 4

/* MC_CMD_PTP_OUT_MANFTEST_PPS msgresponse */
#define MC_CMD_PTP_OUT_MANFTEST_PPS_LEN 4
/* Results of testing */
#define MC_CMD_PTP_OUT_MANFTEST_PPS_TEST_RESULT_OFST 0
+define MC_CMD_PTP_OUT_MANFTEST_PPS_TEST_RESULT_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_PTP_OUT_MANFTEST_BASIC/TTEST_RESULT */

@@ -1713,14 +2147,17 @@
*/
#define MC_CMD_CSR_READ32 0xc
#define MC_CMD_0xc_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+define MC_CMD_0xc_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_CSR_READ32_IN msgrequest */
#define MC_CMD_CSR_READ32_IN_LEN 12

/* Address */
#define MC_CMD_CSR_READ32_IN_ADDR_OFST 0
+#define MC_CMD_CSR_READ32_IN_ADDR_LEN 4
#define MC_CMD_CSR_READ32_IN_STEP_OFST 4
+#define MC_CMD_CSR_READ32_IN_STEP_LEN 4
#define MC_CMD_CSR_READ32_IN_NUMWORDS_OFST 8
+#define MC_CMD_CSR_READ32_IN_NUMWORDS_LEN 4

/* MC_CMD_CSR_READ32_OUT msgresponse */
#define MC_CMD_CSR_READ32_OUT_LENMIN 4
@@ -1739,7 +2176,7 @@
*/
#define MC_CMD_CSR_WRITE32 0xd
-#define MC_CMD_0xd_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+##define MC_CMD_0xd_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_CSR_WRITE32_IN msgrequest */
#define MC_CMD_CSR_WRITE32_IN_LENMIN 12
@@ -1747,7 +2184,9 @@
#define MC_CMD_CSR_WRITE32_IN_LEN(num) (8+4*(num))
/* Address */
#define MC_CMD_CSR_WRITE32_IN_ADDR_OFST 0
+#define MC_CMD_CSR_WRITE32_IN_ADDR_LEN 4
#define MC_CMD_CSR_WRITE32_IN_STEP_OFST 4
+#define MC_CMD_CSR_WRITE32_IN_STEP_LEN 4
#define MC_CMD_CSR_WRITE32_IN_BUFFER_OFST 8
#define MC_CMD_CSR_WRITE32_IN_BUFFER_LEN 4
#define MC_CMD_CSR_WRITE32_IN_BUFFER_MINNUM 1
@@ -1756,6 +2195,7 @@
/* MC_CMD_CSR_WRITE32_OUT msgresponse */
#define MC_CMD_CSR_WRITE32_OUT_LEN 4
+##define MC_CMD_CSR_WRITE32_OUT_STATUS_OFST 0
+##define MC_CMD_CSR_WRITE32_OUT_STATUS_LEN 4

/**********************************
@@ -1776,6 +2216,7 @@
sensors.
*/
#define MC_CMD_HP_IN_SUBCMD_OFST 0
+##define MC_CMD_HP_IN_SUBCMD_LEN 4
/* enum: OCSD (Option Card Sensor Data) sub-command. */
#define MC_CMD_HP_IN_OCSD_SUBCMD 0x0
/* enum: Last known valid HP sub-command. */
* NULL.)
*/
#define       MC_CMD_HP_IN_OCSD_INTERVAL_OFST 12
+#define       MC_CMD_HP_IN_OCSD_INTERVAL_LEN 4

/* MC_CMD_HP_OUT msgresponse */
#define    MC_CMD_HP_OUT_LEN 4
#define    MC_CMD_HP_OUT_OCSD_STATUS_OFST 0
+#define       MC_CMD_HP_OUT_OCSD_STATUS_LEN 4
/* enum: OCSD stopped for this card. */
#define          MC_CMD_HP_OUT_OCSD_STOPPED 0x1
/* enum: OCSD was successfully started with the address provided. */
@@ -1838,29 +2281,35 @@
* external devices.
*/
#define       MC_CMD_MDIO_READ_IN_BUS_OFST 0
+#define       MC_CMD_MDIO_READ_IN_BUS_LEN 4
/* enum: Internal. */
#define          MC_CMD_MDIO_BUS_INTERNAL 0x0
/* enum: External. */
#define          MC_CMD_MDIO_BUS_EXTERNAL 0x1
/* Port address */
#define       MC_CMD_MDIO_READ_IN_PRTAD_OFST 4
+#define       MC_CMD_MDIO_READ_IN_PRTAD_LEN 4
/* Device Address or clause 22. */
#define       MC_CMD_MDIO_READ_IN_DEVAD_OFST 8
+#define       MC_CMD_MDIO_READ_IN_DEVAD_LEN 4
/* enum: By default all the MCDI MDIO operations perform clause45 mode. If you */
* want to use clause22 then set DEVAD = MC_CMD_MDIO_CLAUSE22.
*/
#define          MC_CMD_MDIO_CLAUSE22 0x20
/* Address */
#define       MC_CMD_MDIO_READ_IN_ADDR_OFST 12
+#define       MC_CMD_MDIO_READ_IN_ADDR_LEN 4

/* MC_CMD_MDIO_READ_OUT msgresponse */
#define    MC_CMD_MDIO_READ_OUT_LEN 8
/* Value */
#define    MC_CMD_MDIO_READ_OUT_VALUE_OFST 0
+#define       MC_CMD_MDIO_READ_OUT_VALUE_LEN 4
/* Status the MDIO commands return the raw status bits from the MDIO block. A */
* "good" transaction should have the DONE bit set and all other bits clear.
*/
#define          MC_CMD_MDIO_STATUS_GOOD 0x8
* external devices. */
#define MC_CMD_MDIO_WRITE_IN_BUS_OFST 0
+#define MC_CMD_MDIO_WRITE_IN_BUS_LEN 4
/* enum: Internal. */
/*
 MC_CMD_MDIO_BUS_INTERNAL 0x0 */
/* enum: External. */
/*
 MC_CMD_MDIO_BUS_EXTERNAL 0x1 */
/* Port address */
#define MC_CMD_MDIO_WRITE_IN_PRTAD_OFST 4
+#define MC_CMD_MDIO_WRITE_IN_PRTAD_LEN 4
/* Device Address or clause 22. */
#define MC_CMD_MDIO_WRITE_IN_DEVAD_OFST 8
+#define MC_CMD_MDIO_WRITE_IN_DEVAD_LEN 4
/* enum: By default all the MCDI MDIO operations perform clause 45 mode. If you
* want to use clause 22 then set DEVAD = MC_CMD_MDIO_CLAUSE22. */
/*
 MC_CMD_MDIO_CLAUSE22 0x20 */
/* Address */
#define MC_CMD_MDIO_WRITE_IN_ADDR_OFST 12
+#define MC_CMD_MDIO_WRITE_IN_ADDR_LEN 4
/* Value */
#define MC_CMD_MDIO_WRITE_IN_VALUE_OFST 16
+#define MC_CMD_MDIO_WRITE_IN_VALUE_LEN 4
/* MC_CMD_MDIO_WRITE_OUT msgresponse */
#define MC_CMD_MDIO_WRITE_OUT_LEN 4
@@ -1879,22 +2328,27 @@
* "good" transaction should have the DONE bit set and all other bits clear.
*/
#define MC_CMD_MDIO_WRITE_OUT_STATUS_OFST 0
+#define MC_CMD_MDIO_WRITE_OUT_STATUS_LEN 4
/* enum: Good. */
/*
 MC_CMD_MDIO_STATUS_GOOD 0x8 */
@@ -1902,6 +2356,7 @@
#define MC_CMD_DBI_WRITE 0x12
-#define MC_CMD_0x12_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x12_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_DBI_WRITE_IN msgrequest */
#define MC_CMD_DBI_WRITE_IN_LENMIN 12
@@ -1932,9 +2387,11 @@
/* MC_CMD_DBIWROP_TYPEDEF structuredef */
#define MC_CMD_DBIWROP_TYPEDEF_LEN 12
#define MC_CMD_DBIWROP_TYPEDEF_ADDRESS_OFST 0
+#define MC_CMD_DBIWROP_TYPEDEF_ADDRESS_LEN 4
# define MC_CMD_DBIWROP_TYPEDEF_ADDRESS_LBN 0
# define MC_CMD_DBIWROP_TYPEDEF_ADDRESS_WIDTH 32
# define MC_CMD_DBIWROP_TYPEDEF_PARMS_OFST 4
+# define MC_CMD_DBIWROP_TYPEDEF_PARMS_LEN 4
# define MC_CMD_DBIWROP_TYPEDEF_VF_NUM_LBN 16
# define MC_CMD_DBIWROP_TYPEDEF_VF_NUM_WIDTH 16
# define MC_CMD_DBIWROP_TYPEDEF_VF_ACTIVE_LBN 15
@@ -1944,6 +2401,7 @@
# define MC_CMD_DBIWROP_TYPEDEF_PARMS_LBN 32
# define MC_CMD_DBIWROP_TYPEDEF_PARMS_WIDTH 32
# define MC_CMD_DBIWROP_TYPEDEF_VALUE_OFST 8
+# define MC_CMD_DBIWROP_TYPEDEF_VALUE_LEN 4
# define MC_CMD_DBIWROP_TYPEDEF_VALUE_LBN 64
# define MC_CMD_DBIWROP_TYPEDEF_VALUE_WIDTH 32
@@ -1959,13 +2417,16 @@
# define MC_CMD_PORT_READ32_IN_LEN 4
/* Address */
# define MC_CMD_PORT_READ32_IN_ADDR_OFST 0
+# define MC_CMD_PORT_READ32_IN_ADDR_LEN 4
/* MC_CMD_PORT_READ32_OUT msgresponse */
# define MC_CMD_PORT_READ32_OUT_LEN 8
/* Value */
# define MC_CMD_PORT_READ32_OUT_VALUE_OFST 0
+# define MC_CMD_PORT_READ32_OUT_VALUE_LEN 4
/* Status */
# define MC_CMD_PORT_READ32_OUT_STATUS_OFST 4
+# define MC_CMD_PORT_READ32_OUT_STATUS_LEN 4

/*****************************/
@@ -1979,13 +2440,16 @@
# define MC_CMD_PORT_WRITE32_IN_LEN 8
/* Address */
# define MC_CMD_PORT_WRITE32_IN_ADDR_OFST 0
+# define MC_CMD_PORT_WRITE32_IN_ADDR_LEN 4
/* Value */
# define MC_CMD_PORT_WRITE32_IN_VALUE_OFST 4
+# define MC_CMD_PORT_WRITE32_IN_VALUE_LEN 4
/* MC_CMD_PORT_WRITE32_OUT msgresponse */
# define MC_CMD_PORT_WRITE32_OUT_LEN 4
/* Status */
# define MC_CMD_PORT_WRITE32_OUT_STATUS_OFST 0
/****
#define MC_CMD_PORT_WRITE32_OUT_STATUS_LEN 4

/*****************************/
@@ -1999,6 +2463,7 @@
#define MC_CMD_PORT_READ128_IN_LEN 4
/* Address */
#define MC_CMD_PORT_READ128_IN_ADDR_OFST 0
+#define MC_CMD_PORT_READ128_IN_ADDR_LEN 4
/* MC_CMD_PORT_READ128_OUT msgresponse */
#define MC_CMD_PORT_READ128_OUT_LEN 20
@@ -2007,6 +2472,7 @@
#define MC_CMD_PORT_READ128_OUT_VALUE_LEN 16
/* Status */
#define MC_CMD_PORT_READ128_OUT_STATUS_OFST 16
+#define MC_CMD_PORT_READ128_OUT_STATUS_LEN 4
/*****************************/
@@ -2020,6 +2486,7 @@
#define MC_CMD_PORT_WRITE128_IN_LEN 20
/* Address */
#define MC_CMD_PORT_WRITE128_IN_ADDR_OFST 0
+#define MC_CMD_PORT_WRITE128_IN_ADDR_LEN 4
/* Value */
#define MC_CMD_PORT_WRITE128_IN_VALUE_OFST 4
#define MC_CMD_PORT_WRITE128_IN_VALUE_LEN 16
@@ -2028,6 +2495,7 @@
#define MC_CMD_PORT_WRITE128_OUT_LEN 4
/* Status */
#define MC_CMD_PORT_WRITE128_OUT_STATUS_OFST 0
+#define MC_CMD_PORT_WRITE128_OUT_STATUS_LEN 4
/* MC_CMD_CAPABILITIES structuredef */
#define MC_CMD_CAPABILITIES_LEN 4
@@ -2072,24 +2540,54 @@
#define MC_CMD_GET_BOARD_CFG_OUT_LENMAX 136
#define MC_CMD_GET_BOARD_CFG_OUT_LEN(num) (72+2*(num))
#define MC_CMD_GET_BOARD_CFG_OUT_BOARD_TYPE_OFST 0
+#define MC_CMD_GET_BOARD_CFG_OUT_BOARD_TYPE_LEN 4
#define MC_CMD_GET_BOARD_CFG_OUT_BOARD_NAME_OFST 4
#define MC_CMD_GET_BOARD_CFG_OUT_BOARD_NAME_LEN 32
-/* See MC_CMD_CAPABILITIES */
+/* Capabilities for Siena Port0 (see struct MC_CMD_CAPABILITIES). Unused on
+ * EF10 and later (use MC_CMD_GET_CAPABILITIES).
+ */
#define MC_CMD_GET_BOARD_CFG_OUT_CAPABILITIES_PORT0_OFST 36

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/* See MC_CMD_CAPABILITIES */
+#define    MC_CMD_GET_BOARD_CFG_OUT_CAPABILITIES_PORT0_LEN 4
+/* Capabilities for Siena Port1 (see struct MC_CMD_CAPABILITIES). Unused on
+ * EF10 and later (use MC_CMD_GET_CAPABILITIES).
+ */
+#define    MC_CMD_GET_BOARD_CFG_OUT_CAPABILITIES_PORT1_OFST 40
+#define    MC_CMD_GET_BOARD_CFG_OUT_CAPABILITIES_PORT1_LEN 4
+/* Size of MAC address pool for Siena Port0. Unused on EF10 and later (use
+ * MC_CMD_GET_MAC_ADDRESSES).
+ */
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_BASE_PORT0_OFST 44
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_BASE_PORT0_LEN 6
+/* Size of MAC address pool for Siena Port1. Unused on EF10 and later (use
+ * MC_CMD_GET_MAC_ADDRESSES).
+ */
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_COUNT_PORT0_OFST 56
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_COUNT_PORT0_LEN 4
+/* Increment between addresses in MAC address pool for Siena Port0. Unused on
+ * EF10 and later (use MC_CMD_GET_MAC_ADDRESSES).
+ */
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_COUNT_PORT1_OFST 60
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_COUNT_PORT1_LEN 4
+/* Increment between addresses in MAC address pool for Siena Port1. Unused on
+ * EF10 and later (use MC_CMD_GET_MAC_ADDRESSES).
+ */
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_STRIDE_PORT0_OFST 64
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_STRIDE_PORT0_LEN 4
+/* Siena only. This field contains a 16-bit value for each of the types of
+ * NVRAM area. The values are defined in the firmware/mc/platform/.c file for a
+ * specific board type, but otherwise have no meaning to the MC; they are used by the driver
+ * to manage selection of appropriate firmware updates.
+ */
+#define    MC_CMD_GET_BOARD_CFG_OUT_MAC_ADDR_STRIDE_PORT1_LEN 4
+/* This field contains a 16-bit value for each of the types of
+ * NVRAM area. The values are defined in the firmware/mc/platform/.c file for a
+ * specific board type, but otherwise have no meaning to the MC; they are used
+ * by the driver to manage selection of appropriate firmware updates. Unused on
+ * EF10 and later (use MC_CMD_NVRAM_METADATA).
*/
+#define    MC_CMD_GET_BOARD_CFG_OUT_FW_SUBTYPE_LIST_OFST 72
#define MC_CMD_GET_BOARD_CFG_OUT_FW_SUBTYPE_LIST_LEN 2
@@ -2103,7 +2601,7 @@*/
#define MC_CMD_DBI_READX 0x19

-#define MC_CMD_0x19_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x19_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_DBI_READX_IN msgrequest */
#define MC_CMD_DBI_READX_IN_LENMIN 8
@@ -2130,9 +2628,11 @@*/
/* MC_CMD_DBIROID_TYPEDEF struct typedef */
#define MC_CMD_DBIROID_TYPEDEF_LEN 8
#define MC_CMD_DBIROID_TYPEDEF_ADDRESS_OFST 0
+#define MC_CMD_DBIROID_TYPEDEF_ADDRESS_LEN 4
#define MC_CMD_DBIROID_TYPEDEF_ADDRESS_LBN 0
#define MC_CMD_DBIROID_TYPEDEF_ADDRESS_WIDTH 32
#define MC_CMD_DBIROID_TYPEDEF_PARMS_OFST 4
+define MC_CMD_DBIROID_TYPEDEF_PARMS_LEN 4
#define MC_CMD_DBIROID_TYPEDEF_VF_NUM_LBN 16
#define MC_CMD_DBIROID_TYPEDEF_VF_NUM_WIDTH 16
#define MC_CMD_DBIROID_TYPEDEF_VF_ACTIVE_LBN 15
@@ -2149,7 +2649,7 @@*/
#define MC_CMD_SET_RAND_SEED 0x1a

-#define MC_CMD_0x1a_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x1a_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_SET_RAND_SEED_IN msgrequest */
#define MC_CMD_SET_RAND_SEED_IN_LEN 16
@@ -2198,14 +2698,25 @@*/
/* new state to set if UPDATE=1 */
#define MC_CMD_DRV_ATTACH_IN_NEW_STATE_OFST 0
+define MC_CMD_DRV_ATTACH_IN_NEW_STATE_LEN 4
#define MC_CMD_DRV_ATTACH_LBN 0
#define MC_CMD_DRV_ATTACH_WIDTH 1
+define MC_CMD_DRV_ATTACH_IN_ATTACH_LBN 1
+define MC_CMD_DRV_ATTACH_IN_ATTACH_WIDTH 1
#define MC_CMD_DRV_PREBOOT_LBN 1
#define MC_CMD_DRV_PREBOOT_WIDTH 1
+define MC_CMD_DRV_ATTACH_IN_SUBVARIANT_AWARE_LBN 2
+define MC_CMD_DRV_ATTACH_IN_SUBVARIANT_AWARE_WIDTH 1
+define MC_CMD_DRV_ATTACH_IN_WANT_VI_SPREADING_LBN 3
+define MC_CMD_DRV_ATTACH_IN_WANT_VI_SPREADING_WIDTH 1
/* 1 to set new state, or 0 to just report the existing state */
#define       MC_CMD_DRV_ATTACH_IN_UPDATE_OFST 4
+#define       MC_CMD_DRV_ATTACH_IN_UPDATE_LEN 4
/* preferred datapath firmware (for Huntington; ignored for Siena) */
#define       MC_CMD_DRV_ATTACH_IN_FIRMWARE_ID_OFST 8
+#define       MC_CMD_DRV_ATTACH_IN_FIRMWARE_ID_LEN 4
/* enum: Prefer to use full featured firmware */
#define          MC_CMD_FW_FULL_FEATURED 0x0
/* enum: Prefer to use firmware with fewer features but lower latency */
#define          MC_CMD_FW_RULES_ENGINE 0x5
/* enum: Prefer to use "l3xudp" custom datapath firmware (see SF-119495-PD and *
/* * bug69716) */
+#define          MC_CMD_FW_L3XUDP 0x7
/* enum: Prefer to use firmware with additional DPDK support */
+#define          MC_CMD_FW_DPDK 0x6
/* enum: Only this option is allowed for non-admin functions */
-#define          MC_CMD_FW_DONT_CARE 0xffffffff
+#define          MC_CMD_FW_DONT_CARE 0xffffffff

/* MC_CMD_DRV_ATTACH_OUT msgresponse */
#define    MC_CMD_DRV_ATTACH_OUT_LEN 4
/* previous or existing state, see the bitmask at NEW_STATE */
#define       MC_CMD_DRV_ATTACH_OUT_OLD_STATE_OFST 0
+#define       MC_CMD_DRV_ATTACH_OUT_OLD_STATE_LEN 4

/* MC_CMD_DRV_ATTACH_EXT_OUT msgresponse */
#define    MC_CMD_DRV_ATTACH_EXT_OUT_LEN 8
/* previous or existing state, see the bitmask at NEW_STATE */
#define       MC_CMD_DRV_ATTACH_EXT_OUT_OLD_STATE_OFST 0
+#define       MC_CMD_DRV_ATTACH_EXT_OUT_OLD_STATE_LEN 4
/* Flags associated with this function */
#define       MC_CMD_DRV_ATTACH_EXT_OUT_FUNC_FLAGS_OFST 4
+#define       MC_CMD_DRV_ATTACH_EXT_OUT_FUNC_FLAGS_LEN 4
/* enum: Labels the lowest-numbered function visible to the OS */
#define          MC_CMD_DRV_ATTACH_EXT_OUT_FLAG_PRIMARY 0x0
/* enum: The function can control the link state of the physical port it is *
/* refers to the Sorrento external FPGA port. */
#define          MC_CMD_DRV_ATTACH_EXT_OUT_FLAG_NO_ACTIVE_PORT 0x3
/* enum: If set, indicates that VI spreading is currently enabled. Will always *
/* indicate the current state, regardless of the value in the WANT_VI_SPREADING *
/* input. */
#define          MC_CMD_DRV_ATTACH_EXT_OUT_FLAG_VI_SPREADING 0x3
+\#define MC_CMD_DRV_ATTACH_EXT_OUT_FLAG_VI_SPREADING_ENABLED 0x4

/***************************************************************************/
@@ -2260,6 +2785,7 @@
#define MC_CMD_SHMUART_IN_LEN 4
/* ??? */
#define MC_CMD_SHMUART_IN_FLAG_OFST 0
+\#define MC_CMD_SHMUART_IN_FLAG_LEN 4
/* MC_CMD_SHMUART_OUT msgresponse */
#define MC_CMD_SHMUART_OUT_LEN 0
@@ -2297,6 +2823,7 @@
 MC_CMD_SHMUART_OUT_LEN 0

* (TBD).
*/
#define MC_CMD_ENTITY_RESET_IN_FLAG_OFST 0
+\#define MC_CMD_ENTITY_RESET_IN_FLAG_LEN 4
#define MC_CMD_ENTITY_RESET_IN_FUNCTION_RESOURCE_RESET_LBN 0
#define MC_CMD_ENTITY_RESET_IN_FUNCTIONRESOURCE_RESET_WIDTH 1

@@ -2314,8 +2841,10 @@
#define MC_CMD_PCIE_CREDITS_IN_LEN 8
/* poll period. 0 is disabled */
#define MC_CMD_PCIE_CREDITS_IN_POLL_PERIOD_OFST 0
+\#define MC_CMD_PCIE_CREDITS_IN_POLL_PERIOD_LEN 4
/* wipe statistics */
#define MC_CMD_PCIE_CREDITS_IN_WIPE_OFST 4
+\#define MC_CMD_PCIE_CREDITS_IN_WIPE_LEN 4
/* MC_CMD_PCIE_CREDITS_OUT msgresponse */
#define MC_CMD_PCIE_CREDITS_OUT_LEN 16
@@ -2346,31 +2875,54 @@
/* MC_CMD_PCIE_CREDITS_OUT_LEN 16
/* MC_CMD_RXD_MONITOR_IN msgrequest */
#define MC_CMD_RXD_MONITOR_IN_LEN 12
#define MC_CMD_RXD_MONITOR_IN_QID_OFST 0
+\#define MC_CMD_RXD_MONITOR_IN_QID_LEN 4
#define MC_CMD_RXD_MONITOR_IN_POLL_PERIOD_OFST 4
+\#define MC_CMD_RXD_MONITOR_IN_POLL_PERIOD_LEN 4
#define MC_CMD_RXD_MONITOR_IN_WIPE_OFST 8
+\#define MC_CMD_RXD_MONITOR_IN_WIPE_LEN 4
/* MC_CMD_RXD_MONITOR_OUT msgresponse */
#define MC_CMD_RXD_MONITOR_OUT_LEN 80
#define MC_CMD_RXD_MONITOR_OUT_QID_OFST 0
+\#define MC_CMD_RXD_MONITOR_OUT_QID_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_FILL_OFST 4
+\#define MC_CMD_RXD_MONITOR_OUT_RING_FILL_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_FILL_OFST 8
```c
#define MC_CMD_RXD_MONITOR_OUT_CACHE_FILL_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_1_OFST 12
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_1_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_2_OFST 16
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_2_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_4_OFST 20
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_4_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_8_OFST 24
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_8_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_16_OFST 28
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_16_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_32_OFST 32
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_32_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_64_OFST 36
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_64_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_128_OFST 40
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_128_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_256_OFST 44
#define MC_CMD_RXD_MONITOR_OUT_RING_LT_256_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_RING_GE_256_OFST 48
#define MC_CMD_RXD_MONITOR_OUT_RING_GE_256_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_1_OFST 52
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_1_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_2_OFST 56
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_2_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_4_OFST 60
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_4_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_8_OFST 64
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_8_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_16_OFST 68
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_16_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_32_OFST 72
#define MC_CMD_RXD_MONITOR_OUT_CACHE_LT_32_LEN 4
#define MC_CMD_RXD_MONITOR_OUT_CACHE_GE_32_OFST 76
#define MC_CMD_RXD_MONITOR_OUT_CACHE_GE_32_LEN 4

/**************************************************/
@@ -2379,13 +2931,14 @@/@
*/
#define MC_CMD_PUTS 0x23

-#define MC_CMD_0x23_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x23_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_PUTS_IN msgrequest */
#define MC_CMD_PUTS_IN_LEN_MIN 13
#define MC_CMD_PUTS_IN_LEN_MAX 252
```

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```c
#define    MC_CMD_PUTS_IN_LEN(num) (12+1*(num))
#define    MC_CMD_PUTS_IN_DEST_OFST 0
+#define    MC_CMD_PUTS_IN_DEST_LEN 4
#define    MC_CMD_PUTS_IN_UART_LBN 0
#define    MC_CMD_PUTS_IN_UART_WIDTH 1
#define    MC_CMD_PUTS_IN_PORT_LBN 1
@@ -2417,6 +2970,7 @@
#define    MC_CMD_GET_PHY_CFG_OUT_LEN 72
/* flags */
#define    MC_CMD_GET_PHY_CFG_OUT_FLAGS_OFST 0
+#define    MC_CMD_GET_PHY_CFG_OUT_FLAGS_LEN 4
#define    MC_CMD_GET_PHY_CFG_OUT_PRESENT_LBN 0
#define    MC_CMD_GET_PHY_CFG_OUT_PRESENT_WIDTH 1
#define    MC_CMD_GET_PHY_CFG_OUT_BIST_CABLE_SHORT_LBN 1
@@ -2433,8 +2987,10 @@
#define    MC_CMD_GET_PHY_CFG_OUT_BIST_WIDTH 1
/* ?? */
#define    MC_CMD_GET_PHY_CFG_OUT_TYPE_OFST 4
+#define    MC_CMD_GET_PHY_CFG_OUT_TYPE_LEN 4
/** Bitmask of supported capabilities */
#define    MC_CMD_GET_PHY_CFG_OUT_SUPPORTED_CAP_OFST 8
+#define    MC_CMD_GET_PHY_CFG_OUT_SUPPORTED_CAP_LEN 4
#define    MC_CMD_PHY_CAP_10HDX_LBN 1
#define    MC_CMD_PHY_CAP_10HDX_WIDTH 1
#define    MC_CMD_PHY_CAP_10FDX_LBN 2
@@ -2459,17 +3015,39 @@
#define    MC_CMD_PHY_CAP_40000FDX_WIDTH 1
#define    MC_CMD_PHY_CAP_DDM_LBN 12
#define    MC_CMD_PHY_CAP_DDM_WIDTH 1
+#define    MC_CMD_PHY_CAP_100000FDX_LBN 13
+#define    MC_CMD_PHY_CAP_100000FDX_WIDTH 1
+#define    MC_CMD_PHY_CAP_25000FDX_LBN 14
+#define    MC_CMD_PHY_CAP_25000FDX_WIDTH 1
+#define    MC_CMD_PHY_CAP_50000FDX_LBN 15
+#define    MC_CMD_PHY_CAP_50000FDX_WIDTH 1
+#define    MC_CMD_PHY_CAP_BASER_FEC_LBN 16
+#define    MC_CMD_PHY_CAP_BASER_FEC_WIDTH 1
+#define    MC_CMD_PHY_CAP_BASER_FEC_REQUESTED_LBN 17
+#define    MC_CMD_PHY_CAP_BASER_FEC_REQUESTED_WIDTH 1
+#define    MC_CMD_PHY_CAP_RS_FEC_LBN 18
+#define    MC_CMD_PHY_CAP_RS_FEC_WIDTH 1
+#define    MC_CMD_PHY_CAP_RS_FEC_REQUESTED_LBN 19
+#define    MC_CMD_PHY_CAP_RS_FEC_REQUESTED_WIDTH 1
+#define    MC_CMD_PHY_CAP_25G_BASER_FEC_LBN 20
+#define    MC_CMD_PHY_CAP_25G_BASER_FEC_WIDTH 1
+#define    MC_CMD_PHY_CAP_25G_BASER_FEC_REQUESTED_LBN 21
+#define    MC_CMD_PHY_CAP_25G_BASER_FEC_REQUESTED_WIDTH 1
/* ?? */
```
#define MC_CMD_GET_PHY_CFG_OUT_CHANNEL_OFST 12
#define MC_CMD_GET_PHY_CFG_OUT_CHANNEL_LEN 4

/* ?? */
#define MC_CMD_GET_PHY_CFG_OUT_PRT_OFST 16
#define MC_CMD_GET_PHY_CFG_OUT_PRT_LEN 4

/* ?? */
#define MC_CMD_GET_PHY_CFG_OUT_STATS_MASK_OFST 20
#define MC_CMD_GET_PHY_CFG_OUT_STATS_MASK_LEN 4

/* ?? */
#define MC_CMD_GET_PHY_CFG_OUT_NAME_OFST 24
#define MC_CMD_GET_PHY_CFG_OUT_NAME_LEN 20

/* ?? */
#define MC_CMD_GET_PHY_CFG_OUT_MEDIA_TYPE_OFST 44
#define MC_CMD_GET_PHY_CFG_OUT_MEDIA_TYPE_LEN 4

/* enum: Xaui. */
#define MC_CMD_MEDIA_XAUI 0x1
/* enum: CX4. */
#define MC_CMD_MEDIA_CX4 0x2
/* enum: QSFP+. */
#define MC_CMD_MEDIA_QSFP_PLUS 0x7
#define MC_CMD_GET_PHY_CFG_OUT_MMD_MASK_OFST 48
#define MC_CMD_GET_PHY_CFG_OUT_MMD_MASK_LEN 4

/* enum: Native clause 22 */
#define MC_CMD_MMD_CLAUSE22 0x0
#define MC_CMD_MMD_CLAUSE45_PMAPMD 0x1 /* enum */

#define MC_CMD_START_BIST_IN_LEN 4
/* Type of test. */
#define MC_CMD_START_BIST_IN_TYPE_OFST 0
#define MC_CMD_START_BIST_IN_TYPE_LEN 4
// enum: Run the PHY’s short cable BIST. */
#define MC_CMD_PHY_BIST_CABLE_SHORT 0x1
/* enum: Run the PHY’s long cable BIST. */
#define MC_CMD_PHY_BIST_CABLE_LONG 0x2

#define MC_CMD_POLL_BIST_OUT_LEN 8
/* result */
#define MC_CMD_POLL_BIST_OUT_RESULT_OFST 0
#define MC_CMD_POLL_BIST_OUT_RESULT_LEN 4
/* enum: Running. */
#define MC_CMD_POLL_BIST_RUNNING 0x1

/* enum: Passed. */
#define MC_CMD_POLL_BIST_TIMEOUT 0x4

/* enum: Timed-out. */
#define MC_CMD_POLL_BIST_TIMEOUT 0x4
#define MC_CMD_POLL_BIST_OUT_PRIVATE_OFST 4
#define MC_CMD_POLL_BIST_OUT_PRIVATE_LEN 4

/* MC_CMD_POLL_BIST_OUT_SFT9001 msgresponse */
```c
#define MC_CMD_POLL_BIST_OUT_SFT9001_LEN 36
/* result */
*/
/* MC_CMD_POLL_BIST_OUT_RESULT_OFST 0 */
*/+
/* MC_CMD_POLL_BIST_OUT_RESULT_LEN 4 */
*/
/* Enum values, see field(s); */
*/
/* MC_CMD_POLL_BIST_OUT/MC_CMD_POLL_BIST_OUT_RESULT */
#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_A_OFST 4
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_A_LEN 4
#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_B_OFST 8
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_B_LEN 4
#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_C_OFST 12
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_C_LEN 4
#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_D_OFST 16
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_LENGTH_D_LEN 4
/* Status of each channel A */
#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_STATUS_A_OFST 20
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_STATUS_A_LEN 4
/* enum: Ok. */
#define MC_CMD_POLL_BIST_SFT9001_PAIR_OK 0x1
/* enum: Open. */
@@ -2590,14 +3178,17 @@
#define MC_CMD_POLL_BIST_SFT9001_PAIR_BUSY 0x9
/* Status of each channel B */
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_STATUS_B_OFST 24
/* enum values, see field(s); */
/* CABLE_STATUS_A */
/* Status of each channel C */
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_STATUS_C_OFST 28
/* enum values, see field(s); */
/* CABLE_STATUS_A */
/* Status of each channel D */
+#define MC_CMD_POLL_BIST_OUT_SFT9001_CABLE_STATUS_D_OFST 32
/* enum values, see field(s); */
/* CABLE_STATUS_A */
@@ -2605,9 +3196,11 @@
#define MC_CMD_POLL_BIST_OUT_MRSFP_LEN 8
/* result */
*/
/* MC_CMD_POLL_BIST_OUT_RESULT_OFST 0 */
*/+
/* MC_CMD_POLL_BIST_OUT_RESULT_LEN 4 */
*/
/* Enum values, see field(s); */
*/
/* MC_CMD_POLL_BIST_OUT/MC_CMD_POLL_BIST_OUT_RESULT */
#define MC_CMD_POLL_BIST_OUT_MRSFP_TEST_OFST 4
+#define MC_CMD_POLL_BIST_OUT_MRSFP_TEST_LEN 4
/* enum: Complete. */
```

#define MC_CMD_POLL_BIST_MRSFP_TEST_COMPLETE 0x0
/* enum: Bus switch off I2C write. */
@@ -2631,9 +3224,11 @@
#define MC_CMD_POLL_BIST_OUT_MEM_LEN 36
/* result */
/* MC_CMD_POLL_BIST_OUT_RESULT_OFST 0 */
+/* MC_CMD_POLL_BIST_OUT_RESULT_LEN 4 */
/* Enum values, see field(s): */
/* MC_CMD_POLL_BIST_OUT/MC_CMD_POLL_BIST_OUT_RESULT */
#define MC_CMD_POLL_BIST_OUT_MEM_COMPLETE 0x0
/* enum: RAM test - walk ones. */
@@ -2650,8 +3245,10 @@
#define MC_CMD_POLL_BIST_MEM_COMPLETE 0x0
/* enum: RAM test - walk ones. */
#define MC_CMD_POLL_BIST_MEM_ECC 0x6
/* Failure address, only valid if result is POLL_BIST_FAILED */
#define MC_CMD_POLL_BIST_OUT_MEM_ADDR_OFST 8
+/* Bus or address space to which the failure address corresponds */
#define MC_CMD_POLL_BIST_OUT_MEM_BUS_OFST 12
+#define MC_CMD_POLL_BIST_OUT_MEM_BUS_MC 0x0
/* enum: MC MIPS bus. */
#define MC_CMD_POLL_BIST_MEM_BUS_MC 0x0
/* enum: CSR IREG bus. */
@@ -2672,14 +3269,19 @@
#define MC_CMD_POLL_BIST_OUT_MEM_EXPECT_OFST 16
+/* Pattern written to RAM / register */
#define MC_CMD_POLL_BIST_OUT_MEM_EXPECT_LEN 4
/* Actual value read from RAM / register */
#define MC_CMD_POLL_BIST_OUT_MEM_ACTUAL_OFST 20
+/* ECC error mask */
#define MC_CMD_POLL_BIST_OUT_MEM_ECC_OFST 24
+#define MC_CMD_POLL_BIST_OUT_MEM_ECC_LEN 4
/* ECC parity error mask */
#define MC_CMD_POLL_BIST_OUT_MEM_ECC_PARITY_OFST 28
+/* ECC fatal error mask */
#define MC_CMD_POLL_BIST_OUT_MEM_ECC_FATAL_OFST 32
+#define MC_CMD_POLL_BIST_OUT_MEM_ECC_FATAL_LEN 4
/*****************************/
@@ -2725,83 +3327,83 @@
#define MC_CMD_POLL_BIST_OUT_MEM_BUS_DICPU_RX1 0x8
/* Pattern written to RAM / register */
#define MC_CMD_POLL_BIST_OUT_MEM_EXPECT_OFST 16
+/* Actual value read from RAM / register */
#define MC_CMD_POLL_BIST_OUT_MEM_ACTUAL_OFST 20
+/* ECC error mask */
#define MC_CMD_POLL_BIST_OUT_MEM_ECC_OFST 24
+#define MC_CMD_POLL_BIST_OUT_MEM_ECC_LEN 4
/* ECC parity error mask */
#define MC_CMD_POLL_BIST_OUT_MEM_ECC_PARITY_OFST 28
+/* ECC fatal error mask */
#define MC_CMD_POLL_BIST_OUT_MEM_ECC_FATAL_OFST 32
+#define MC_CMD_POLL_BIST_OUT_MEM_ECC_FATAL_LEN 4
/*****************************/
@@ -2758,3 +3354,3 @@
#define MC_CMD_GET_LOOPBACK_MODES_OUT_100M_LO_OFST 0
#define MC_CMD_GET_LOOPBACK_MODES_OUT_100M_HI_OFST 4

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/* enum: None. */
#define MC_CMD_LOOPBACK_NONE 0x0

/* enum: Data. */
#define MC_CMD_LOOPBACK_DATA 0x1

/* enum: GMAC. */
#define MC_CMD_LOOPBACK_GMAC 0x2

/* enum: XGMII. */
#define MC_CMD_LOOPBACK_XGMII 0x3

/* enum: XGXS. */
#define MC_CMD_LOOPBACK_XGXS 0x4

/* enum: XAUI. */
#define MC_CMD_LOOPBACK_XAUI 0x5

/* enum: GMII. */
#define MC_CMD_LOOPBACK_GMII 0x6

/* enum: SGMII. */
#define MC_CMD_LOOPBACK_SGMII 0x7

/* enum: XGBR. */
#define MC_CMD_LOOPBACK_XGBR 0x8

/* enum: XFI. */
#define MC_CMD_LOOPBACK_XFI 0x9

/* enum: XAUI Far. */
#define MC_CMD_LOOPBACK_XAUI_FAR 0xa

/* enum: GMII Far. */
#define MC_CMD_LOOPBACK_GMII_FAR 0xb

/* enum: SGMII Far. */
#define MC_CMD_LOOPBACK_SGMII_FAR 0xc

/* enum: XFI Far. */
#define MC_CMD_LOOPBACK_XFI_FAR 0xd

/* enum: GPhy. */
#define MC_CMD_LOOPBACK_GPHY 0xe

/* enum: PhyXS. */
#define MC_CMD_LOOPBACK_PHYXS 0xf

/* enum: PCS. */
-#define MC_CMD_LOOPBACK_PCS 0x10
+#define MC_CMD_LOOPBACK_PCS 0x10
/* enum: PMA-PMD. */
-#define MC_CMD_LOOPBACK_PMAPMD 0x11
+#define MC_CMD_LOOPBACK_PMAPMD 0x11
/* enum: Cross-Port. */
-#define MC_CMD_LOOPBACK_XPORT 0x12
+#define MC_CMD_LOOPBACK_XPORT 0x12
/* enum: XGMII-Wireside. */
-#define MC_CMD_LOOPBACK_XGMII_WS 0x13
+#define MC_CMD_LOOPBACK_XGMII_WS 0x13
/* enum: XAUI Wiresside. */
-#define MC_CMD_LOOPBACK_XAUI_WS 0x14
+#define MC_CMD_LOOPBACK_XAUI_WS 0x14
/* enum: XAUI Wiresside Far. */
-#define MC_CMD_LOOPBACK_XAUI_WS_FAR 0x15
+#define MC_CMD_LOOPBACK_XAUI_WS_FAR 0x15
/* enum: XAUI Wiresside near. */
-#define MC_CMD_LOOPBACK_XAUI_WS_NEAR 0x16
+#define MC_CMD_LOOPBACK_XAUI_WS_NEAR 0x16
/* enum: GMII Wiresside. */
-#define MC_CMD_LOOPBACK_GMII_WS 0x17
+#define MC_CMD_LOOPBACK_GMII_WS 0x17
/* enum: XFI Wiresside. */
-#define MC_CMD_LOOPBACK_XFI_WS 0x18
+#define MC_CMD_LOOPBACK_XFI_WS 0x18
/* enum: XFI Wiresside Far. */
-#define MC_CMD_LOOPBACK_XFI_WS_FAR 0x19
+#define MC_CMD_LOOPBACK_XFI_WS_FAR 0x19
/* enum: PhyXS Wiresside. */
-#define MC_CMD_LOOPBACK_PHYXS_WS 0x1a
+#define MC_CMD_LOOPBACK_PHYXS_WS 0x1a
/* enum: PMA lanes MAC-Serdes. */
-#define MC_CMD_LOOPBACK_PMA_INT 0x1b
+#define MC_CMD_LOOPBACK_PMA_INT 0x1b
/* enum: KR Serdes Parallel (Encoder). */
-#define MC_CMD_LOOPBACK_SD_NEAR 0x1c
+#define MC_CMD_LOOPBACK_SD_NEAR 0x1c
/* enum: KR Serdes Serial. */
-#define MC_CMD_LOOPBACK_SD_FAR 0x1d
+#define MC_CMD_LOOPBACK_SD_FAR 0x1d
/* enum: PMA lanes MAC-Serdes Wiresside. */
-#define MC_CMD_LOOPBACK_PMA_INT_WS 0x1e
+#define MC_CMD_LOOPBACK_PMA_INT_WS 0x1e
/* enum: KR Serdes Parallel Wiresside (Full PCS). */
-#define MC_CMD_LOOPBACK_SD_FEP2_WS 0x1f
+#define MC_CMD_LOOPBACK_SD_FEP2_WS 0x1f
/* enum: KR Serdes Parallel Wiresside (Sym Aligner to TX). */
-#define MC_CMD_LOOPBACK_SD_FEP1_5_WS 0x20
+#define MC_CMD_LOOPBACK_SD_FEP1_5_WS 0x20

/* enum: KR Serdes Parallel Wireside (Deserializer to Serializer). */
-#define MC_CMD_LOOPBACK_SD_FEP_WS 0x21
+#define MC_CMD_LOOPBACK_SD_FEP_WS 0x21

/* enum: KR Serdes Serial Wireside. */
-#define MC_CMD_LOOPBACK_SD_FES_WS 0x22
+#define MC_CMD_LOOPBACK_SD_FES_WS 0x22

/* enum: Near side of AOE Siena side port */
-#define MC_CMD_LOOPBACK_AOE_INT_NEAR 0x23
+#define MC_CMD_LOOPBACK_AOE_INT_NEAR 0x23

/* enum: Medford Wireside datapath loopback */
-#define MC_CMD_LOOPBACK_DATA_WS 0x24
+#define MC_CMD_LOOPBACK_DATA_WS 0x24

/* enum: Force link up without setting up any physical loopback (snapper use */
/* only) */
+/* only */

-#define MC_CMD_LOOPBACK_FORCE_EXT_LINK 0x25
+#define MC_CMD_LOOPBACK_FORCE_EXT_LINK 0x25

/* Supported loopbacks. */
#define MC_CMD_GET_LOOPBACK_MODES_OUT_1G_OFST 8
#define MC_CMD_GET_LOOPBACK_MODES_OUT_1G_LEN 8
@@ -2831,6 +3433,174 @@
 /*            Enum values, see field(s): */
 /*               100M */
 /* MC_CMD_GET_LOOPBACK_MODES_OUT_V2 msgresponse: Supported loopback modes for */
 /* newer NICs with 25G/50G/100G support */
+/* newer NICs with 25G/50G/100G support */
+/* */
+#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_LEN 64

/* Supported loopbacks. */
+#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100M_OFST 0
+#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100M_LEN 8
+#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100M_LO_OFST 0
+#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100M_HI_OFST 4
+/* enum: None. */
+/* */
+/* MC_CMD_LOOPBACK_NONE 0x0 */
+/* enum: Data. */
+/* */
+/* MC_CMD_LOOPBACK_DATA 0x1 */
+/* enum: GMAC. */
+/* */
+/* MC_CMD_LOOPBACK_GMAC 0x2 */
+/* enum: XGMI. */
+/* */
+/* MC_CMD_LOOPBACK_XGMI 0x3 */
+/* enum: XGXS. */
+/* */
+/* MC_CMD_LOOPBACK_XGXS 0x4 */
+/* enum: XAU. */
+/* */
+/* MC_CMD_LOOPBACK_XAU 0x5 */
+/* enum: GMII. */
+/*
** MC_CMD_LOOPBACK_GMII 0x6 */
+/* enum: SGMII. */
+/* MC_CMD_LOOPBACK_SGMII 0x7 */
+/* enum: XGBR. */
+/* MC_CMD_LOOPBACK_XGBR 0x8 */
+/* enum: XFI. */
+/* MC_CMD_LOOPBACK_XFI 0x9 */
+/* enum: XAUI Far. */
+/* MC_CMD_LOOPBACK_XAUI_FAR 0xa */
+/* enum: GMII Far. */
+/* MC_CMD_LOOPBACK_GMII_FAR 0xb */
+/* enum: SGMII Far. */
+/* MC_CMD_LOOPBACK_SGMII_FAR 0xc */
+/* enum: XFI Far. */
+/* MC_CMD_LOOPBACK_XFI_FAR 0xd */
+/* enum: PhyXS. */
+/* MC_CMD_LOOPBACK_PHYXS 0xe */
+/* enum: PCS. */
+/* MC_CMD_LOOPBACK_PCS 0x10 */
+/* enum: PMA-PMD. */
+/* MC_CMD_LOOPBACK_PMAPMD 0x11 */
+/* enum: Cross-Port. */
+/* MC_CMD_LOOPBACK_XPORT 0x12 */
+/* enum: XGMII-Wireside. */
+/* MC_CMD_LOOPBACK_XGMII_WS 0x13 */
+/* enum: XAUI Wireside. */
+/* MC_CMD_LOOPBACK_XAUI_WS 0x14 */
+/* enum: XAUI Wireside Far. */
+/* MC_CMD_LOOPBACK_XAUI_WS_FAR 0x15 */
+/* enum: XAUI Wireside near. */
+/* MC_CMD_LOOPBACK_XAUI_WS_NEAR 0x16 */
+/* enum: GMII Wireside. */
+/* MC_CMD_LOOPBACK_GMII_WS 0x17 */
+/* enum: XFI Wireside. */
+/* MC_CMD_LOOPBACK_XFI_WS 0x18 */
+/* enum: XFI Wireside Far. */
+/* MC_CMD_LOOPBACK_XFI_WS_FAR 0x19 */
+/* enum: PhyXS Wireside. */
+/* MC_CMD_LOOPBACK_PHYXS_WS 0x1a */
+/* enum: PMA lanes MAC-Serdes. */
+/* MC_CMD_LOOPBACK_PMA_INT 0x1b */
+/* enum: KR Serdes Parallel (Encoder). */
+/* MC_CMD_LOOPBACK_SD_NEAR 0x1c */
+/* enum: KR Serdes Serial. */
+/* MC_CMD_LOOPBACK_SD_FAR 0x1d */
+/* enum: PMA lanes MAC-Serdes Wireside. */

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/*
  enum: KR Serdes Parallel Wireside (Full PCS).
*/
#define MC_CMD_LOOPBACK_SD_FEP2_WS 0x1f
/*
  enum: KR Serdes Parallel Wireside (Sym Aligner to TX).
*/
#define MC_CMD_LOOPBACK_SD_FEP1_5_WS 0x20
/*
  enum: KR Serdes Parallel Wireside (Deserializer to Serializer).
*/
#define MC_CMD_LOOPBACK_SD_FEP_WS 0x21
/*
  enum: KR Serdes Serial Wireside.
*/
#define MC_CMD_LOOPBACK_SD_FES_WS 0x22
/*
  enum: Near side of AOE Siena side port
*/
#define MC_CMD_LOOPBACK_AOE_INT_NEAR 0x23
/*
  enum: Medford Wireside datapath loopback
*/
#define MC_CMD_LOOPBACK_DATA_WS 0x24
/*
  Force link up without setting up any physical loopback (snapper use
  * only)
*/
#define MC_CMD_LOOPBACK_FORCE_EXT_LINK 0x25

/*
  Supported loopbacks.
*/
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_1G_OFST 8
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_1G_LEN 8
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_1G_LO_OFST 8
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_1G_HI_OFST 12
/*
  Enum values, see field(s): *
  100M */
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_10G_OFST 16
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_10G_LEN 8
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_10G_LO_OFST 16
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_10G_HI_OFST 20
/*
  Enum values, see field(s): *
  100M */
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_SUGGESTED_OFST 24
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_SUGGESTED_LEN 8
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_SUGGESTED_LO_OFST 24
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_SUGGESTED_HI_OFST 28
/*
  Enum values, see field(s): *
  100M */
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_25G_OFST 40
#define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_25G_LEN 8
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_25G_LO_OFST 40
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_25G_HI_OFST 44
+/* Enum values, see field(s): */
+/* 100M */
+/* Supported 50 loopbacks. */
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_50G_OFST 48
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_50G_LEN 8
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_50G_LO_OFST 48
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_50G_HI_OFST 52
+/* Enum values, see field(s): */
+/* 100M */
+/* Supported 100G loopbacks. */
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100G_OFST 56
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100G_LEN 8
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100G_LO_OFST 56
+##define MC_CMD_GET_LOOPBACK_MODES_OUT_V2_100G_HI_OFST 60
+/* Enum values, see field(s): */
+/* 100M */
+
+/* AN_TYPE structuredef: Auto-negotiation types defined in IEEE802.3 */
+##define AN_TYPE_LEN 4
+##define AN_TYPE_TYPE_OFST 0
+##define AN_TYPE_TYPE_LEN 4
+/* enum: None, AN disabled or not supported */
+##define MC_CMD_AN_NONE 0x0
+/* enum: Clause 28 - BASE-T */
+##define MC_CMD_AN_CLAUSE28 0x1
+/* enum: Clause 37 - BASE-X */
+##define MC_CMD_AN_CLAUSE37 0x2
+/* enum: Clause 73 - BASE-R startup protocol for backplane and copper cable 
* assemblies. Includes Clause 72/Clause 92 link-training. 
* */
+##define MC_CMD_AN_CLAUSE73 0x3
+##define AN_TYPE_TYPE_LBN 0
+##define AN_TYPE_TYPE_WIDTH 32
+
+/* FEC_TYPE structuredef: Forward error correction types defined in IEEE802.3 */
+##define FEC_TYPE_LEN 4
+##define FEC_TYPE_TYPE_OFST 0
+##define FEC_TYPE_TYPE_LEN 4
+/* enum: No FEC */
+##define MC_CMD_FEC_NONE 0x0
+/* enum: Clause 74 BASE-R FEC (a.k.a Firecode) */
+##define MC_CMD_FEC_BASER 0x1
+/* enum: Clause 91/Clause 108 Reed-Solomon FEC */
+##define MC_CMD_FEC_RS 0x2
+##define FEC_TYPE_TYPE_LBN 0
```c
+#define FEC_TYPE_TYPE_WIDTH 32
+
/*****************************/
/* MC_CMD_GET_LINK */
@@ -2846,19 +3616,28 @@
/* MC_CMD_GET_LINK_OUT msgresponse */
#define MC_CMD_GET_LINK_OUT_LEN 28
/* near-side advertised capabilities */
+/ * Near-side advertised capabilities. Refer to
+ * MC_CMD_GET_PHY_CFG_OUT/SUPPORTED_CAP for bit definitions.
+ */
#define MC_CMD_GET_LINK_OUT_CAP_OFST 0
/* Link-partner advertised capabilities. Refer to
+ * MC_CMD_GET_PHY_CFG_OUT/SUPPORTED_CAP for bit definitions.
+ */
#define MC_CMD_GET_LINK_OUT_LP_CAP_OFST 4
#define MC_CMD_GET_LINK_OUT_LP_CAP_LEN 4
/* Autonegotiated speed in mbit/s. The link may still be down even if this
* reads non-zero.
*/
#define MC_CMD_GET_LINK_OUT_LINK_SPEED_OFST 8
#define MC_CMD_GET_LINK_OUT_LINK_SPEED_LEN 4
/* Current loopback setting. */
#define MC_CMD_GET_LINK_OUT_LOOPBACK_MODE_OFST 12
#define MC_CMD_GET_LINK_OUT_LOOPBACK_MODE_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_GET_LOOPBACK_MODES/MC_CMD_GET_LOOPBACK_MODES_OUT/100M */
#define MC_CMD_GET_LINK_OUT_LINK_UP_LBN 0
#define MC_CMD_GET_LINK_OUT_LINK_UP_WIDTH 1
#define MC_CMD_GET_LINK_OUT_FULL_DUPLEX_LBN 1
@@ -2873,9 +3652,11 @@
#define MC_CMD_GET_LINK_OUT_LINK_FAULT_TX_WIDTH 1
/* This returns the negotiated flow control value. */
#define MC_CMD_GET_LINK_OUT_FCNTL_OFST 20
#define MC_CMD_GET_LINK_OUT_FCNTL_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_SET_MAC/MC_CMD_SET_MAC_IN/FCNTL */
#define MC_CMD_GET_LINK_OUT_MAC_FAULT_XGMII_LOCAL_LBN 0
#define MC_CMD_GET_LINK_OUT_MAC_FAULT_XGMII_LOCAL_WIDTH 1
#define MC_CMD_GET_LINK_OUT_MAC_FAULT_XGMII_REMOTE_LBN 1
```
#define     MC_CMD_MAC_FAULT_PENDING_RECONFIG_LBN 3
#define     MC_CMD_MAC_FAULT_PENDING_RECONFIG_WIDTH 1

+/* MC_CMD_GET_LINK_OUT_V2 msgresponse: Extended link state information */
+#define     MC_CMD_GET_LINK_OUT_V2_LEN 44
+/* Near-side advertised capabilities. Refer to
+ * MC_CMD_GET_PHY_CFG_OUT/SUPPORTED_CAP for bit definitions.
+ */
+#define     MC_CMD_GET_LINK_OUT_V2_CAP_OFST 0
+#define     MC_CMD_GET_LINK_OUT_V2_CAP_LEN 4
+/* Link-partner advertised capabilities. Refer to
+ * MC_CMD_GET_PHY_CFG_OUT/SUPPORTED_CAP for bit definitions.
+ */
+#define     MC_CMD_GET_LINK_OUT_V2_LP_CAP_OFST 4
+#define     MC_CMD_GET_LINK_OUT_V2_LP_CAP_LEN 4
+/* Autonegotiated speed in mbit/s. The link may still be down even if this
+ * reads non-zero.
+ */
+#define     MC_CMD_GET_LINK_OUT_V2_LINK_SPEED_OFST 8
+define     MC_CMD_GET_LINK_OUT_V2_LINK_SPEED_LEN 4
+/* Current loopback setting. */
+#define     MC_CMD_GET_LINK_OUT_V2_LOOPBACK_MODE_OFST 12
+#define     MC_CMD_GET_LINK_OUT_V2_LOOPBACK_MODE_LEN 4
+/* Enum values, see field(s): */
+/* MC_CMD_GET_LOOPBACK_MODES/MC_CMD_GET_LOOPBACK_MODES_OUT/100M */
+#define     MC_CMD_GET_LINK_OUT_V2_FLAGS_OFST 16
+#define     MC_CMD_GET_LINK_OUT_V2_FLAGS_LEN 4
+/* This returns the negotiated flow control value. */
+#define     MC_CMD_GET_LINK_OUT_V2_FCNTL_OFST 20
+define     MC_CMD_GET_LINK_OUT_V2_FCNTL_LEN 4
+/* Enum values, see field(s): */
+/* MC_CMD_SET_MAC/MC_CMD_SET_MAC_IN/FCNTL */
+#define     MC_CMD_GET_LINK_OUT_V2_MAC_FAULT_OFST 24
+define     MC_CMD_GET_LINK_OUT_V2_MAC_FAULT_LEN 4
+/* MC_CMD_MAC_FAULT_XGMII_LOCAL_LBN */
True local device capabilities (taking into account currently used PMD/MDI,
  * e.g. plugged-in module). In general, subset of
  * MC_CMD_GET_PHY_CFG_OUT/SUPPORTED_CAP, but may include extra _FEC_REQUEST
  * bits, if the PMD requires FEC. 0 if unknown (e.g. module unplugged). Equal
  * to SUPPORTED_CAP for non-pluggable PMDs. Refer to
  * MC_CMD_GET_PHY_CFG_OUT/SUPPORTED_CAP for bit definitions.
  */
  */
#define       MC_CMD_GET_LINK_OUT_V2_LD_CAP_OFST 28
#define       MC_CMD_GET_LINK_OUT_V2_LD_CAP_LEN 4
  /* Auto-negotiation type used on the link */
#define       MC_CMD_GET_LINK_OUT_V2_AN_TYPE_OFST 32
#define       MC_CMD_GET_LINK_OUT_V2_AN_TYPE_LEN 4
  /* Enum values, see field(s): */
  */
#define       MC_CMD_GET_LINK_OUT_V2_FEC_TYPE_OFST 36
#define       MC_CMD_GET_LINK_OUT_V2_FEC_TYPE_LEN 4
  /* Enum values, see field(s): */
  */
#define        MC_CMD_GET_LINK_OUT_V2_PMD_MDI_CONNECTED_LBN 0
#define        MC_CMD_GET_LINK_OUT_V2_PMD_MDI_CONNECTED_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_PMD_READY_LBN 1
#define        MC_CMD_GET_LINK_OUT_V2_PMD_READY_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_PMD_LINK_UP_LBN 2
#define        MC_CMD_GET_LINK_OUT_V2_PMD_LINK_UP_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_PMA_LINK_UP_LBN 3
#define        MC_CMD_GET_LINK_OUT_V2_PMA_LINK_UP_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_PCS_LOCK_LBN 4
#define        MC_CMD_GET_LINK_OUT_V2_PCS_LOCK_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_ALIGN_LOCK_LBN 5
#define        MC_CMD_GET_LINK_OUT_V2_ALIGN_LOCK_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_HI_BER_LBN 6
#define        MC_CMD_GET_LINK_OUT_V2_HI_BER_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_FEC_LOCK_LBN 7
#define        MC_CMD_GET_LINK_OUT_V2_FEC_LOCK_WIDTH 1
#define        MC_CMD_GET_LINK_OUT_V2_AN_DONE_LBN 8
#define        MC_CMD_GET_LINK_OUT_V2_AN_DONE_WIDTH 1
+/*
/***********************************/
/* MC_CMD_SET_LINK */
@@ -2897,10 +3769,14 @@
/* ??? */
+/* Near-side advertised capabilities. Refer to */
+ * MC_CMD_GET_PHY_CFG_OUT/SUPPORTED_CAP for bit definitions.
+ */
+#define MC_CMD_SET_LINK_IN_CAP_OFST 0
+#define MC_CMD_SET_LINK_IN_CAP_LEN 4
/* Flags */
+#define MC_CMD_SET_LINK_IN_FLAGS_OFST 4
+#define MC_CMD_SET_LINK_IN_FLAGS_LEN 4
#define MC_CMD_SET_LINK_IN_LOWPOWER_LBN 0
#define MC_CMD_SET_LINK_IN_LOWPOWER_WIDTH 1
#define MC_CMD_SET_LINK_IN_POWEROFF_LBN 1
@@ -2909,12 +3785,14 @@
#define MC_CMD_SET_LINK_IN_TXDIS_WIDTH 1
/* Loopback mode. */
+#define MC_CMD_SET_LINK_IN_LOOPBACK_MODE_OFST 8
+#define MC_CMD_SET_LINK_IN_LOOPBACK_MODE_LEN 4
/* Enum values, see field(s): */
/* A loopback speed of "0" is supported, and means (choose any available */
/* speed). */
+#define MC_CMD_SET_LINK_IN_LOOPBACK_SPEED_OFST 12
+#define MC_CMD_SET_LINK_IN_LOOPBACK_SPEED_LEN 4
/* MC_CMD_SET_LINK_OUT msgresponse */
+#define MC_CMD_SET_LINK_OUT_LEN 0
@@ -2932,9 +3810,10 @@
#define MC_CMD_SET_ID_LED_IN_LEN 4
/* Set LED state. */
-#define MC_CMD_LED_OFF  0x0 /* enum */
-#define MC_CMD_LED_ON    0x1 /* enum */
-#define MC_CMD_LED_DEFAULT 0x2 /* enum */
+#define MC_CMD_SET_ID_LED_IN_STATE_LEN 4
+#define MC_CMD_LED_OFF 0x0 /* enum */
+#define MC_CMD_LED_ON 0x1 /* enum */
+#define MC_CMD_LED_DEFAULT 0x2 /* enum */
/* MC_CMD_SET_ID_LED_OUT msgresponse */
+#define MC_CMD_SET_ID_LED_OUT_LEN 0
@@ -2954,17 +3833,21 @@
*/
#define       MC_CMD_SET_MAC_IN_MTU_OFST 0
+##define   MC_CMD_SET_MAC_IN_MTU_LEN 4
#define       MC_CMD_SET_MAC_IN_DRAIN_OFST 4
+##define   MC_CMD_SET_MAC_IN_DRAIN_LEN 4
#define       MC_CMD_SET_MAC_IN_ADDR_OFST 8
#define       MC_CMD_SET_MAC_IN_ADDR_LEN 8
#define       MC_CMD_SET_MAC_IN_ADDR_LO_OFST 8
#define       MC_CMD_SET_MAC_IN_ADDR_HI_OFST 12
#define       MC_CMD_SET_MAC_IN_REJECT_OFST 16
+##define   MC_CMD_SET_MAC_IN_REJECT_LEN 4
#define       MC_CMD_SET_MAC_IN_REJECT_UNCST_LBN 0
#define       MC_CMD_SET_MAC_IN_REJECT_UNCST_WIDTH 1
#define       MC_CMD_SET_MAC_IN_REJECT_BRDCST_LBN 1
#define       MC_CMD_SET_MAC_IN_REJECT_BRDCST_WIDTH 1
#define       MC_CMD_SET_MAC_IN_FCNTL_OFST 20
+##define   MC_CMD_SET_MAC_IN_FCNTL_LEN 4
/* enum: Flow control is off. */
#define          MC_CMD_FCNTL_OFF 0x0
/* enum: Respond to flow control. */
@@ -2978,6 +3861,7 @@
/* enum: Issue flow control. */
#define          MC_CMD_FCNTL_GENERATE 0x5
#define       MC_CMD_SET_MAC_IN_FLAGS_OFST 24
+##define   MC_CMD_SET_MAC_IN_FLAGS_LEN 4
#define       MC_CMD_SET_MAC_IN_FLAG_INCLUDE_FCS_LBN 0
#define       MC_CMD_SET_MAC_IN_FLAG_INCLUDE_FCS_WIDTH 1
@@ -2987,17 +3871,21 @@
/* EtherII, VLAN, bug16011 padding).
 */
#define       MC_CMD_SET_MAC_EXT_IN_MTU_OFST 0
+##define   MC_CMD_SET_MAC_EXT_IN_MTU_LEN 4
#define       MC_CMD_SET_MAC_EXT_IN_DRAIN_OFST 4
+##define   MC_CMD_SET_MAC_EXT_IN_DRAIN_LEN 4
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_OFST 8
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_LEN 8
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_LO_OFST 8
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_HI_OFST 12
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_OFST 16
+##define   MC_CMD_SET_MAC_EXT_IN_REJECT_LEN 4
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_UNCST_LBN 0
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_UNCST_WIDTH 1
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_BRDCST_LBN 1
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_BRDCST_WIDTH 1
#define       MC_CMD_SET_MAC_EXT_IN_FCNTL_OFST 20
+##define   MC_CMD_SET_MAC_EXT_IN_FCNTL_LEN 4

@@ -2987,17 +3871,21 @@
/* EtherII, VLAN, bug16011 padding).
 */
#define       MC_CMD_SET_MAC_EXT_IN_MTU_OFST 0
+##define   MC_CMD_SET_MAC_EXT_IN_MTU_LEN 4
#define       MC_CMD_SET_MAC_EXT_IN_DRAIN_OFST 4
+##define   MC_CMD_SET_MAC_EXT_IN_DRAIN_LEN 4
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_OFST 8
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_LEN 8
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_LO_OFST 8
#define       MC_CMD_SET_MAC_EXT_IN_ADDR_HI_OFST 12
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_OFST 16
+##define   MC_CMD_SET_MAC_EXT_IN_REJECT_LEN 4
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_UNCST_LBN 0
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_UNCST_WIDTH 1
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_BRDCST_LBN 1
#define       MC_CMD_SET_MAC_EXT_IN_REJECT_BRDCST_WIDTH 1
#define       MC_CMD_SET_MAC_EXT_IN_FCNTL_OFST 20
+##define   MC_CMD_SET_MAC_EXT_IN_FCNTL_LEN 4
/* enum: Flow control is off. */
/* MC_CMD_FCNTL_OFF 0x0 */
/* enum: Respond to flow control. */
@@ -3011,6 +3899,7 @@
/* enum: Issue flow control. */
/* MC_CMD_FCNTL_GENERATE 0x5 */
#define MC_CMD_SET_MAC_EXT_IN_FLAGS_OFST 24
+#define MC_CMD_SET_MAC_EXT_IN_FLAGS_LEN 4
#define MC_CMD_SET_MAC_EXT_IN_FLAG_INCLUDE_FCS_LBN 0
#define MC_CMD_SET_MAC_EXT_IN_FLAG_INCLUDE_FCS_WIDTH 1
/* Select which parameters to configure. A parameter will only be modified if 
@@ -3019,6 +3908,7 @@
  * set). */
/* */
#define MC_CMD_SET_MAC_EXT_IN_CONTROL_OFST 28
+#define MC_CMD_SET_MAC_EXT_IN_CONTROL_LEN 4
#define MC_CMD_SET_MAC_EXT_IN_CFG_MTU_LBN 0
#define MC_CMD_SET_MAC_EXT_IN_CFG_MTU_WIDTH 1
#define MC_CMD_SET_MAC_EXT_IN_CFG_DRAIN_LBN 1
@@ -3040,6 +3930,7 @@
  * to 0. */
/* */
#define MC_CMD_SET_MAC_V2_OUT_MTU_OFST 0
+#define MC_CMD_SET_MAC_V2_OUT_MTU_LEN 4
/***********************************/
@@ -3072,53 +3963,53 @@
#define MC_CMD_PHY_STATS_OUT_NO_DMA_STATISTICS_LEN 4
#define MC_CMD_PHY_STATS_OUT_NO_DMA_STATISTICS_NUM MC_CMD_PHY_NSTATS
/* enum: OUI. */
#define MC_CMD_OUI 0x0
#define MC_CMD_PMA_PMD_LINK_UP 0x1
#define MC_CMD_PMA_PMD_RX_FAULT 0x2
#define MC_CMD_PMA_PMD_TX_FAULT 0x3
#define MC_CMD_PMA_PMD_SIGNAL 0x4
#define MC_CMD_PMA_PMD_SNR_A 0x5
*/
#define MC_CMD_OUI 0x0
#define MC_CMD_PMA_PMD_LINK_UP 0x1
#define MC_CMD_PMA_PMD_RX_FAULT 0x2
#define MC_CMD_PMA_PMD_TX_FAULT 0x3
#define MC_CMD_PMA_PMD_SIGNAL 0x4
#define MC_CMD_PMA_PMD_SNR_A 0x5
/* enum: PMA-PMD SNR B. */
#define MC_CMD_PMA_PMD_SNR_B 0x6

/* enum: PMA-PMD SNR C. */
#define MC_CMD_PMA_PMD_SNR_C 0x7

/* enum: PMA-PMD SNR D. */
#define MC_CMD_PMA_PMD_SNR_D 0x8

/* enum: PCS Link Up. */
#define MC_CMD_PCS_LINK_UP 0x9

/* enum: PCS RX Fault. */
#define MC_CMD_PCS_RX_FAULT 0xa

/* enum: PCS TX Fault. */
#define MC_CMD_PCS_TX_FAULT 0xb

/* enum: PCS BER. */
#define MC_CMD_PCS_BER 0xc

/* enum: PCS Block Errors. */
#define MC_CMD_PCS_BLOCK_ERRORS 0xd

/* enum: PhyXS Link Up. */
#define MC_CMD_PHYXS_LINK_UP 0xe

/* enum: PhyXS RX Fault. */
#define MC_CMD_PHYXS_RX_FAULT 0xf

/* enum: PhyXS TX Fault. */
#define MC_CMD_PHYXS_TX_FAULT 0x10

/* enum: PhyXS Align. */
#define MC_CMD_PHYXS_ALIGN 0x11

/* enum: PhyXS Sync. */
#define MC_CMD_PHYXS_SYNC 0x12

/* enum: AN link-up. */
#define MC_CMD_AN_LINK_UP 0x13

/* enum: AN Complete. */
#define MC_CMD_AN_COMPLETE 0x14

/* enum: AN 10GBaseT Status. */
#define MC_CMD_AN_10GBT_STATUS 0x15
/* enum: Clause 22 Link-Up. */
#define MC_CMD_CL22_LINK_UP 0x16

/* enum: (Last entry) */
#define MC_CMD_PHY_NSTATS 0x17

/***********************************/
@@ -3144,6 +4035,7 @@
#define MC_CMD_MAC_STATS_IN_DMA_ADDR_LO_OFST 0
#define MC_CMD_MAC_STATS_IN_DMA_ADDR_HI_OFST 4
#define MC_CMD_MAC_STATS_IN_CMD_LEN 0
+#define MC_CMD_MAC_STATS_IN_CMD_LEN 4
#define MC_CMD_MAC_STATS_IN_DMA_LBN 0
#define MC_CMD_MAC_STATS_IN_DMA_WIDTH 1
#define MC_CMD_MAC_STATS_IN_CLEAR_LBN 1
@@ -3158,9 +4050,16 @@
#define MC_CMD_MAC_STATS_IN_PERIODIC_NOEVENT_WIDTH 1
#define MC_CMD_MAC_STATS_IN_PERIOD_MS_LBN 16
#define MC_CMD_MAC_STATS_IN_PERIOD_MS_WIDTH 16
+/* DMA length. Should be set to MAC_STATS_NUM_STATS * sizeof(uint64_t), as
+ * returned by MC_CMD_GET_CAPABILITIES_V4_OUT. For legacy firmware not
+ * supporting MC_CMD_GET_CAPABILITIES_V4_OUT, DMA_LEN should be set to
+ * MC_CMD_MAC_NSTATS * sizeof(uint64_t)
+ */
#define MC_CMD_MAC_STATS_IN_DMA_LEN_OFST 12
+#define MC_CMD_MAC_STATS_IN_DMA_LEN_LEN 4
/* port id so vadapter stats can be provided */
#define MC_CMD_MAC_STATS_IN_PORT_ID_OFST 16
+#define MC_CMD_MAC_STATS_IN_PORT_ID_LEN 4

/***********************************/
@@ -3172,141 +4071,258 @@
#define MC_CMD_MAC_STATS_OUT_DMA_LEN 0
#define MC_CMD_MAC_STATS_OUT_NO_DMA_STATISTICS_LO_OFST 0
#define MC_CMD_MAC_STATS_OUT_NO_DMA_STATISTICS_HI_OFST 4
#define MC_CMD_MAC_STATS_OUT_NO_DMA_STATISTICS_NUM MC_CMD_MAC_NSTATS
-#define MC_CMD_MAC_GENERATION_START 0x0 /* enum */
-#define MC_CMD_MAC_DMABUF_START 0x1 /* enum */
-#define MC_CMD_MAC_TX_PKTS 0x1 /* enum */
-#define MC_CMD_MAC_TX_PAUSE_PKTS 0x2 /* enum */
-#define MC_CMD_MAC_TX_CONTROL_PKTS 0x3 /* enum */
-#define MC_CMD_MAC_TX_UNICAST_PKTS 0x6 /* enum */
-#define MC_CMD_MAC_TX_MULTICAST_PKTS 0x7 /* enum */
-#define MC_CMD_MAC_TX_BROADCAST_PKTS 0x8 /* enum */
-#define MC_CMD_MAC_TX_BAD_BYTES 0x9 /* enum */
-#define MC_CMD_MAC_TX_BYTES 0x9 /* enum */
```c
#define          MC_CMD_MAC_TX_LT64_PKTS  0x9 /* enum */
#define          MC_CMD_MAC_TX_64_PKTS  0xa /* enum */
#define          MC_CMD_MAC_TX_65_TO_127_PKTS  0xb /* enum */
#define          MC_CMD_MAC_TX_128_TO_255_PKTS  0xc /* enum */
#define          MC_CMD_MAC_TX_256_TO_511_PKTS  0xd /* enum */
#define          MC_CMD_MAC_TX_512_TO_1023_PKTS  0xe /* enum */
#define          MC_CMD_MAC_TX_1024_TO_15XX_PKTS  0xf /* enum */
#define          MC_CMD_MAC_TX_15XX_TO_JUMBO_PKTS  0x10 /* enum */
#define          MC_CMD_MAC_TX_GTJUMBO_PKTS  0x11 /* enum */
#define          MC_CMD_MAC_TX_BAD_FCS_PKTS  0x12 /* enum */
#define          MC_CMD_MAC_TX_SINGLE_COLLISION_PKTS  0x13 /* enum */
#define          MC_CMD_MAC_TX_MULTIPLE_COLLISION_PKTS  0x14 /* enum */
#define          MC_CMD_MAC_TX_EXCESSIVE_COLLISION_PKTS  0x15 /* enum */
#define          MC_CMD_MAC_TX_LATE_COLLISION_PKTS  0x16 /* enum */
#define          MC_CMD_MAC_TX_DEFERRED_PKTS  0x17 /* enum */
#define          MC_CMD_MAC_TX_EXCESSIVE_DEFERRED_PKTS  0x18 /* enum */
#define          MC_CMD_MAC_TX_NON_TCPUDP_PKTS  0x19 /* enum */
#define          MC_CMD_MAC_TX_MAC_SRC_ERR_PKTS  0x1a /* enum */
#define          MC_CMD_MAC_TX_IP_SRC_ERR_PKTS  0x1b /* enum */
#define          MC_CMD_MAC_RX_PKTS  0x1c /* enum */
#define          MC_CMD_MAC_RX_PAUSE_PKTS  0x1d /* enum */
#define          MC_CMD_MAC_RX_GOOD_PKTS  0x1e /* enum */
#define          MC_CMD_MAC_RX_CONTROL_PKTS  0x1f /* enum */
#define          MC_CMD_MAC_RX_UNICAST_PKTS  0x20 /* enum */
#define          MC_CMD_MAC_RX_MULTICAST_PKTS  0x21 /* enum */
#define          MC_CMD_MAC_RX_BROADCAST_PKTS  0x22 /* enum */
#define          MC_CMD_MAC_RX_BYTES  0x23 /* enum */
#define          MC_CMD_MAC_RX_BAD_BYTES  0x24 /* enum */
#define          MC_CMD_MAC_RX_64_PKTS  0x25 /* enum */
#define          MC_CMD_MAC_RX_65_TO_127_PKTS  0x26 /* enum */
#define          MC_CMD_MAC_RX_128_TO_255_PKTS  0x27 /* enum */
#define          MC_CMD_MAC_RX_256_TO_511_PKTS  0x28 /* enum */
#define          MC_CMD_MAC_RX_512_TO_1023_PKTS  0x29 /* enum */
#define          MC_CMD_MAC_RX_1024_TO_15XX_PKTS  0x2a /* enum */
#define          MC_CMD_MAC_RX_15XX_TO_JUMBO_PKTS  0x2b /* enum */
#define          MC_CMD_MAC_RX_GTJUMBO_PKTS  0x2c /* enum */
#define          MC_CMD_MAC_RX_UNDERSIZE_PKTS  0x2d /* enum */
#define          MC_CMD_MAC_RX_BAD_FCS_PKTS  0x2e /* enum */
#define          MC_CMD_MAC_RX_OVERFLOW_PKTS  0x2f /* enum */
#define          MC_CMD_MAC_RX_SYMBOL_ERROR_PKTS  0x30 /* enum */
#define          MC_CMD_MAC_RX_ALIGN_ERROR_PKTS  0x31 /* enum */
#define          MC_CMD_MAC_RX_LENGTH_ERROR_PKTS  0x32 /* enum */
#define          MC_CMD_MAC_RX_INTERNAL_ERROR_PKTS  0x33 /* enum */
#define          MC_CMD_MAC_RX_JABBER_PKTS  0x34 /* enum */
#define          MC_CMD_MAC_RX_NODESC_DROPS  0x35 /* enum */
#define          MC_CMD_MAC_RX_LANES01_CHAR_ERR  0x36 /* enum */
#define          MC_CMD_MAC_RX_LANES23_CHAR_ERR  0x37 /* enum */
#define          MC_CMD_MAC_RX_LANES01_CHAR_ERR  0x38 /* enum */
```
-#define MC_CMD_MAC_RX_LANES01_DISP_ERR 0x39 /* enum */
-#define MC_CMD_MAC_RX_LANES23_DISP_ERR 0x3a /* enum */
-#define MC_CMD_MAC_RX_MATCH_FAULT 0x3b /* enum */
+#define MC_CMD_MAC_GENERATION_START 0x0 /* enum */
+#define MC_CMD_MAC_DMABUF_START 0x1 /* enum */
+#define MC_CMD_MAC_TX_PKTS 0x1 /* enum */
+#define MC_CMD_MAC_TX_PAUSE_PKTS 0x2 /* enum */
+#define MC_CMD_MAC_TX_CONTROL_PKTS 0x3 /* enum */
+#define MC_CMD_MAC_TX_UNICAST_PKTS 0x4 /* enum */
+#define MC_CMD_MAC_TX_MULTICAST_PKTS 0x5 /* enum */
+#define MC_CMD_MAC_TX_BROADCAST_PKTS 0x6 /* enum */
+#define MC_CMD_MAC_TXBYTES 0x7 /* enum */
+#define MC_CMD_MAC_TX_BADBYTES 0x8 /* enum */
+#define MC_CMD_MAC_TX_LT64_PKTS 0x9 /* enum */
+#define MC_CMD_MAC_TX_64_PKTS 0xa /* enum */
+#define MC_CMD_MAC_TX_65_TO_127_PKTS 0xb /* enum */
+#define MC_CMD_MAC_TX_128_TO_255_PKTS 0xc /* enum */
+#define MC_CMD_MAC_TX_256_TO_511_PKTS 0xd /* enum */
+#define MC_CMD_MAC_TX_512_TO_1023_PKTS 0xe /* enum */
+#define MC_CMD_MAC_TX_1024_TO_15XX_PKTS 0xf /* enum */
+#define MC_CMD_MAC_TX_15XX_TO_JUMBO_PKTS 0x10 /* enum */
+#define MC_CMD_MAC_TX_GTJUMBO_PKTS 0x11 /* enum */
+#define MC_CMD_MAC_TX_BADFCS_PKTS 0x12 /* enum */
+#define MC_CMD_MAC_TX_SINGLE_COLLISION_PKTS 0x13 /* enum */
+#define MC_CMD_MAC_TX_MULTIPLE_COLLISION_PKTS 0x14 /* enum */
+#define MC_CMD_MAC_TX_EXCESSIVE_COLLISION_PKTS 0x15 /* enum */
+#define MC_CMD_MAC_TX_LATE_COLLISION_PKTS 0x16 /* enum */
+#define MC_CMD_MAC_TX_DEFERRED_PKTS 0x17 /* enum */
+#define MC_CMD_MAC_TX_EXCESSIVE_DEFERRED_PKTS 0x18 /* enum */
+#define MC_CMD_MAC_TX_NON_TCPUDP_PKTS 0x19 /* enum */
+#define MC_CMD_MAC_TX_MACSRC_ERR_PKTS 0x1a /* enum */
+#define MC_CMD_MAC_TX_IP_SRC_ERR_PKTS 0x1b /* enum */
+#define MC_CMD_MAC_RXPKTS 0x1c /* enum */
+#define MC_CMD_MAC_RX_PAUSE_PKTS 0x1d /* enum */
+#define MC_CMD_MAC_RX_GOOD_PKTS 0x1e /* enum */
+#define MC_CMD_MAC_RX_CONTROL_PKTS 0x1f /* enum */
+#define MC_CMD_MAC_RX_UNICAST_PKTS 0x20 /* enum */
+#define MC_CMD_MAC_RX_MULTICAST_PKTS 0x21 /* enum */
+#define MC_CMD_MAC_RX_BROADCAST_PKTS 0x22 /* enum */
+#define MC_CMD_MAC_RXBYTES 0x23 /* enum */
+#define MC_CMD_MAC_RX_BADBYTES 0x24 /* enum */
+#define MC_CMD_MAC_RX_LT64_PKTS 0x25 /* enum */
+#define MC_CMD_MAC_RX_64_PKTS 0x26 /* enum */
+#define MC_CMD_MAC_RX_65_TO_127_PKTS 0x27 /* enum */
+#define MC_CMD_MAC_RX_128_TO_255_PKTS 0x28 /* enum */
+#define MC_CMD_MAC_RX_256_TO_511_PKTS 0x29 /* enum */
+#define MC_CMD_MAC_RX_512_TO_1023_PKTS 0x2a /* enum */
+#define MC_CMD_MAC_RX_1024_TO_15XX_PKTS 0x2b /* enum */
+\#define MC\_CMD\_MAC\_RX\_GTJUMBO\_PKTS 0x2c /* enum */
+\#define MC\_CMD\_MAC\_RX\_UNDERSIZE\_PKTS 0x2d /* enum */
+\#define MC\_CMD\_MAC\_RX\_BAD\_FCS\_PKTS 0x2e /* enum */
+\#define MC\_CMD\_MAC\_RX\_OVERFLOW\_PKTS 0x2f /* enum */
+\#define MC\_CMD\_MAC\_RX\_FALSE\_CARRIER\_PKTS 0x30 /* enum */
+\#define MC\_CMD\_MAC\_RX\_SYMBOL\_ERROR\_PKTS 0x31 /* enum */
+\#define MC\_CMD\_MAC\_RX\_ALIGN\_ERROR\_PKTS 0x32 /* enum */
+\#define MC\_CMD\_MAC\_RX\_LENGTH\_ERROR\_PKTS 0x33 /* enum */
+\#define MC\_CMD\_MAC\_RX\_INTERNAL\_ERROR\_PKTS 0x34 /* enum */
+\#define MC\_CMD\_MAC\_RX\_JABBER\_PKTS 0x35 /* enum */
+\#define MC\_CMD\_MAC\_RX\_NODESC\_DROPS 0x36 /* enum */
+\#define MC\_CMD\_MAC\_RX\_LANES01\_CHAR\_ERR 0x37 /* enum */
+\#define MC\_CMD\_MAC\_RX\_LANES23\_CHAR\_ERR 0x38 /* enum */
+\#define MC\_CMD\_MAC\_RX\_LANES01\_DISP\_ERR 0x39 /* enum */
+\#define MC\_CMD\_MAC\_RX\_LANES23\_DISP\_ERR 0x3a /* enum */
+\#define MC\_CMD\_MAC\_RX\_MATCH\_FAULT 0x3b /* enum */
/* enum: PM trunc_bb_overflow counter. Valid for EF10 with PM\_AND\_RXDP\_COUNTERS 
* capability only. */
-\#define MC\_CMD\_MAC\_PM\_TRUNC\_BB\_OVERFLOW 0x3c
+\#define MC\_CMD\_MAC\_PM\_TRUNC\_BB\_OVERFLOW 0x3c
/* enum: PM discard_bb_overflow counter. Valid for EF10 with 
* PM\_AND\_RXDP\_COUNTERS capability only. */
-\#define MC\_CMD\_MAC\_PM\_DISCARD\_BB\_OVERFLOW 0x3d
+\#define MC\_CMD\_MAC\_PM\_DISCARD\_BB\_OVERFLOW 0x3d
/* enum: PM trunc_vfifo_full counter. Valid for EF10 with PM\_AND\_RXDP\_COUNTERS 
* capability only. */
-\#define MC\_CMD\_MAC\_PM\_TRUNC\_VFIFO\_FULL 0x3e
+\#define MC\_CMD\_MAC\_PM\_TRUNC\_VFIFO\_FULL 0x3e
/* enum: PM discard_vfifo_full counter. Valid for EF10 with 
* PM\_AND\_RXDP\_COUNTERS capability only. */
-\#define MC\_CMD\_MAC\_PM\_DISCARD\_VFIFO\_FULL 0x3f
+\#define MC\_CMD\_MAC\_PM\_DISCARD\_VFIFO\_FULL 0x3f
/* enum: PM trunc_qbb counter. Valid for EF10 with PM\_AND\_RXDP\_COUNTERS 
* capability only. */
-\#define MC\_CMD\_MAC\_PM\_TRUNC\_QBB 0x40
+\#define MC\_CMD\_MAC\_PM\_TRUNC\_QBB 0x40
/* enum: PM discard_qbb counter. Valid for EF10 with PM\_AND\_RXDP\_COUNTERS 
* capability only. */
-\#define MC\_CMD\_MAC\_PM\_DISCARD\_QBB 0x41
+\#define MC\_CMD\_MAC\_PM\_DISCARD\_QBB 0x41
/* enum: PM discard_mapping counter. Valid for EF10 with PM\_AND\_RXDP\_COUNTERS 
* capability only. */
-\#define MC\_CMD\_MAC\_PM\_DISCARD\_MAPPING 0x42
+\#define MC\_CMD\_MAC\_PM\_DISCARD\_MAPPING 0x42
#define          MC_CMD_MAC_PM_DISCARD_MAPPING  0x42

/* enum: RXDP counter: Number of packets dropped due to the queue being
* disabled. Valid for EF10 with PM_AND_RXDP_COUNTERS capability only.
*/

#define          MC_CMD_MAC_RXDP_Q_DISABLED_PKTS  0x43

/* enum: RXDP counter: Number of packets dropped by the DICPU. Valid for EF10
* with PM_AND_RXDP_COUNTERS capability only.
*/

#define          MC_CMD_MAC_RXDP_DI_DROPPED_PKTS  0x45

/* enum: RXDP counter: Number of non-host packets. Valid for EF10 with
* PM_AND_RXDP_COUNTERS capability only.
*/

#define          MC_CMD_MAC_RXDP_STREAMING_PKTS  0x46

/* enum: RXDP counter: Number of times an hlb descriptor fetch was performed.
* Valid for EF10 with PM_AND_RXDP_COUNTERS capability only.
*/

#define          MC_CMD_MAC_RXDP_HLB_FETCH_CONDITIONS 0x47

/* enum: RXDP counter: Number of times the DPCPU waited for an existing
* descriptor fetch. Valid for EF10 with PM_AND_RXDP_COUNTERS capability only.
*/

#define          MC_CMD_MAC_RXDP_HLB_WAIT_CONDITIONS 0x48

#define          MC_CMD_MAC_VADAPTER_RX_DMABUF_START 0x4c /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_UNICAST_PACKETS 0x4c /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_UNICAST_BYTES 0x4d /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_MULTICAST_PACKETS 0x4e /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_MULTICAST_BYTES 0x4f /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_BROADCAST_PACKETS 0x50 /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_BROADCAST_BYTES 0x51 /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_BAD_PACKETS 0x52 /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_BAD_BYTES 0x53 /* enum */
#define          MC_CMD_MAC_VADAPTER_RX_OVERFLOW 0x54 /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_DMABUF_START 0x57 /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_UNICAST_PACKETS 0x57 /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_UNICAST_BYTES 0x58 /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_MULTICAST_PACKETS 0x59 /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_MULTICAST_BYTES 0x5a /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_BROADCAST_PACKETS 0x5b /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_BROADCAST_BYTES 0x5c /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_BAD_PACKETS 0x5d /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_BAD_BYTES 0x5e /* enum */
#define          MC_CMD_MAC_VADAPTER_TX_OVERFLOW 0x5f /* enum */
#define          MC_CMD_MAC_RXDP_HLB_WAIT_CONDITIONS 0x48
+#define          MC_CMD_MAC_VADAPTER_RX_DMABUF_START 0x4c /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_UNICAST_PACKETS 0x4c /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_UNICAST_BYTES 0x4d /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_MULTICAST_PACKETS 0x4e /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_MULTICAST_BYTES 0x4f /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_BROADCAST_PACKETS 0x50 /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_BROADCAST_BYTES 0x51 /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_BAD_PACKETS 0x52 /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_BAD_BYTES 0x53 /* enum */
+#define          MC_CMD_MAC_VADAPTER_RX_OVERFLOW 0x54 /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_DMABUF_START 0x57 /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_UNICAST_PACKETS 0x57 /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_UNICAST_BYTES 0x58 /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_MULTICAST_PACKETS 0x59 /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_MULTICAST_BYTES 0x5a /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_BROADCAST_PACKETS 0x5b /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_BROADCAST_BYTES 0x5c /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_BAD_PACKETS 0x5d /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_BAD_BYTES 0x5e /* enum */
+#define          MC_CMD_MAC_VADAPTER_TX_OVERFLOW 0x5f /* enum */

/* enum: Start of GMAC stats buffer space, for Siena only. */
-#define          MC_CMD_GMAC_DMABUF_START  0x40
+#define          MC_CMD_GMAC_DMABUF_START 0x40
/* enum: End of GMAC stats buffer space, for Siena only. */
-#define          MC_CMD_GMAC_DMABUF_END    0x5f
-#define          MC_CMD_MAC_GENERATION_END 0x60 /* enum */
+#define          MC_CMD_GMAC_DMABUF_END 0x5f
+/#define          MC_CMD_MAC_GENERATION_END 0x60 /* enum */
+/#define          MC_CMD_MAC_NSTATS 0x61 /* enum */

/* MC_CMD_MAC_STATS_V2_OUT_DMA msgresponse */
+#define    MC_CMD_MAC_STATS_V2_OUT_DMA_LEN 0

/* MC_CMD_MAC_STATS_V2_OUT_NO_DMA msgresponse */
+define    MC_CMD_MAC_STATS_V2_OUT_NO_DMA_LEN (((MC_CMD_MAC_NSTATS_V2*64))>>3)
+define       MC_CMD_MAC_STATS_V2_OUT_NO_DMA_STATISTICS_OFST 0
+define       MC_CMD_MAC_STATS_V2_OUT_NO_DMA_STATISTICS_LEN 8

/+*/ enum: Start of GMAC stats buffer space, for Siena only. */
-#define          MC_CMD_GMAC_DMABUF_START 0x40
+#define          MC_CMD_GMAC_DMABUF_START 0x40
/* enum: End of GMAC stats buffer space, for Siena only. */
-#define          MC_CMD_GMAC_DMABUF_END 0x5f
-#define          MC_CMD_MAC_GENERATION_END 0x60 /* enum */
+/#define          MC_CMD_GMAC_DMABUF_END 0x5f
+/#define          MC_CMD_MAC_GENERATION_END 0x60 /* enum */
+/#define          MC_CMD_MAC_NSTATS 0x61 /* enum */

+*/ enum: GENERATION_END value, used together with GENERATION_START to verify
+* consistency of DMAAd data. For legacy firmware / drivers without extended
+* stats (more precisely, when DMA_LEN == MC_CMD_MAC_NSTATS *
+* sizeof(uint64_t)), this entry holds the GENERATION_END value. Otherwise,
+* this value is invalid/ reserved and GENERATION_END is written as the last
+* 64-bit word of the DMA buffer (at DMA_LEN - sizeof(uint64_t)). Note that
+* this is consistent with the legacy behaviour, in the sense that entry 96 is
+* the last 64-bit word in the buffer when DMA_LEN == MC_CMD_MAC_NSTATS *
+* sizeof(uint64_t). See SF-109306-TC, Section 9.2 for details.
+*/
+define          MC_CMD_MAC_GENERATION_END 0x60
+define          MC_CMD_MAC_NSTATS 0x61 /* enum */
+
+/* MC_CMD_MAC_STATS_V2_OUT_DMA msgresponse */
+define          MC_CMD_MAC_STATS_V2_OUT_DMA_LEN 0
+
+/* MC_CMD_MAC_STATS_V2_OUT_NO_DMA msgresponse */
+define          MC_CMD_MAC_STATS_V2_OUT_NO_DMA_LEN (((MC_CMD_MAC_NSTATS_V2*64))>>3)
+define          MC_CMD_MAC_STATS_V2_OUT_NO_DMA_STATISTICS_OFST 0
+define          MC_CMD_MAC_STATS_V2_OUT_NO_DMA_STATISTICS_LEN 8
+/* enum: Start of FEC stats buffer space, Medford2 and up */
+define MC_CMD_MAC_FEC_DMABUF_START 0x61
+/* enum: Number of uncorrected FEC codewords on link (RS-FEC only for Medford2)
 */
+define MC_CMD_MAC_FEC_UNCORRECTED_ERRORS 0x61
+/* enum: Number of corrected FEC codewords on link (RS-FEC only for Medford2)
 */
+define MC_CMD_MAC_FEC_CORRECTED_ERRORS 0x62
+/* enum: Number of corrected 10-bit symbol errors, lane 0 (RS-FEC only) */
+define MC_CMD_MAC_FEC_CORRECTED_SYMBOLS_LANE0 0x63
+/* enum: Number of corrected 10-bit symbol errors, lane 1 (RS-FEC only) */
+define MC_CMD_MAC_FEC_CORRECTED_SYMBOLS_LANE1 0x64
+/* enum: Number of corrected 10-bit symbol errors, lane 2 (RS-FEC only) */
+define MC_CMD_MAC_FEC_CORRECTED_SYMBOLS_LANE2 0x65
+/* enum: Number of corrected 10-bit symbol errors, lane 3 (RS-FEC only) */
+define MC_CMD_MAC_FEC_CORRECTED_SYMBOLS_LANE3 0x66
+/* enum: This includes the space at offset 103 which is the final
 * GENERATION_END in a MAC_STATS_V2 response and otherwise unused.
 */
+define MC_CMD_MAC_NSTATS_V2 0x68
+/* Other enum values, see field(s): */
+/* MC_CMD_MAC_STATS_OUT_NO_DMA/STATISTICS */
+/* MC_CMD_MAC_STATS_V3_OUT_DMA msgresponse */
+define MC_CMD_MAC_STATS_V3_OUT_DMA_LEN 0
+/* MC_CMD_MAC_STATS_V3_OUT_NO_DMA msgresponse */
+define MC_CMD_MAC_STATS_V3_OUT_NO_DMA_LEN (((MC_CMD_MAC_NSTATS_V3*64)>>3)
+define MC_CMD_MAC_STATS_V3_OUT_NO_DMA_STATSOFST 0
+define MC_CMD_MAC_STATS_V3_OUT_NO_DMA_STATISTICS_LEN 8
+define MC_CMD_MAC_STATS_V3_OUT_NO_DMA_STATISTICS_LOOFST 0
+define MC_CMD_MAC_STATS_V3_OUT_NO_DMA_STATISTICS_HIOFST 4
+define MC_CMD_MAC_STATS_V3_OUT_NO_DMA_STATISTICS_NUM
MC_CMD_MAC_NSTATS_V3
+/* enum: Start of CTPIO stats buffer space, Medford2 and up */
+define MC_CMD_MAC_CTPIO_DMABUF_START 0x68
+/* enum: Number of CTPIO fallbacks because a DMA packet was in progress on the
 * target VI
 */
+define MC_CMD_MAC_CTPIO_VI_BUSY_FALLBACK 0x68
+/* enum: Number of times a CTPIO send wrote beyond frame end (informational
 * only)
 */
+define MC_CMD_MAC_CTPIO_LONG_WRITE_SUCCESS 0x69
+/* enum: Number of CTPIO failures because the TX doorbell was written before
+ * the end of the frame data
+ */
+#define      MC_CMD_MAC_CTPIO_MISSING_DBELL_FAIL 0x6a
+/* enum: Number of CTPIO failures because the internal FIFO overflowed */
+#define      MC_CMD_MAC_CTPIO_OVERFLOW_FAIL 0x6b
+/* enum: Number of CTPIO failures because the host did not deliver data fast
+ * enough to avoid MAC underflow
+ */
+#define      MC_CMD_MAC_CTPIO_UNDERFLOW_FAIL 0x6c
+/* enum: Number of CTPIO failures because the host did not deliver all the
+ * frame data within the timeout
+ */
+#define      MC_CMD_MAC_CTPIO_TIMEOUT_FAIL 0x6d
+/* enum: Number of CTPIO failures because the frame data arrived out of order
+ * or with gaps
+ */
+#define      MC_CMD_MAC_CTPIO_NONCONTIG_WR_FAIL 0x6e
+/* enum: Number of CTPIO failures because the host started a new frame before
+ * completing the previous one
+ */
+#define      MC_CMD_MAC_CTPIO_FRM_CLOBBER_FAIL 0x6f
+/* enum: Number of CTPIO failures because a write was not a multiple of 32 bits
+ * or not 32-bit aligned
+ */
+#define      MC_CMD_MAC_CTPIO_INVALID_WR_FAIL 0x70
+/* enum: Number of CTPIO fallbacks because another VI on the same port was
+ * sending a CTPIO frame
+ */
+#define      MC_CMD_MAC_CTPIO_VI_CLOBBER_FALLBACK 0x71
+/* enum: Number of CTPIO fallbacks because target VI did not have CTPIO enabled
+ */
+#define      MC_CMD_MAC_CTPIO_UNQUALIFIED_FALLBACK 0x72
+/* enum: Number of CTPIO fallbacks because length in header was less than 29
+ * bytes
+ */
+#define      MC_CMD_MAC_CTPIO_RUNT_FALLBACK 0x73
+/* enum: Total number of successful CTPIO sends on this port */
+#define      MC_CMD_MAC_CTPIO_SUCCESS 0x74
+/* enum: Total number of CTPIO fallbacks on this port */
+#define      MC_CMD_MAC_CTPIO_FALLBACK 0x75
+/* enum: Total number of CTPIO poisoned frames on this port, whether erased or
+ * not
+ */
+#define      MC_CMD_MAC_CTPIO_POISON 0x76
+/* enum: Total number of CTPIO erased frames on this port */
+#define      MC_CMD_MAC_CTPIO_ERASE 0x77
+/* enum: This includes the space at offset 120 which is the final
+ * GENERATION_END in a MAC_STATS_V3 response and otherwise unused.
+ */
+#define          MC_CMD_MAC_NSTATS_V3 0x79
+/* Other enum values, see field(s): */
+#define          MC_CMD_MAC_STATS_V2_OUT_NO_DMA/STATISTICS */

/*******************************************************************************/
@@ -3318,21 +4334,28 @@
/*--------------------------------------------------------------------------------*/
/* MC_CMD_SRIOV_IN msgrequest */
#define    MC_CMD_SRIOV_IN_LEN 12
#define    MC_CMD_SRIOV_IN_ENABLE_OFST 0
+#define       MC_CMD_SRIOV_IN_ENABLE_LEN 4
#define    MC_CMD_SRIOV_IN_vi_BASE_OFST 4
+#define       MC_CMD_SRIOV_IN_vi_BASE_LEN 4
#define    MC_CMD_SRIOV_IN_VF_COUNT_OFST 8
+#define       MC_CMD_SRIOV_IN_VF_COUNT_LEN 4

/* MC_CMD_SRIOV_OUT msgresponse */
#define    MC_CMD_SRIOV_OUT_LEN 8
#define    MC_CMD_SRIOV_OUT_vi_SCALE_OFST 0
+#define       MC_CMD_SRIOV_OUT_vi_SCALE_LEN 4
#define    MC_CMD_SRIOV_OUT_VF_TOTAL_OFST 4
+#define       MC_CMD_SRIOV_OUT_VF_TOTAL_LEN 4

;/* MC_CMD_MEMCPY_RECORD_TYPEDEF structuredef */
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_LEN 32
+/* this is only used for the first record */
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_NUM_RECORDS_OFST 0
+#define       MC_CMD_MEMCPY_RECORD_TYPEDEF_NUM_RECORDS_LEN 4
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_NUM_RECORDS_LBN 0
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_NUM_RECORDS_WIDTH 32
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_TO_RID_OFST 4
+#define       MC_CMD_MEMCPY_RECORD_TYPEDEF_TO_RID_LEN 4
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_TO_RID_LBN 128
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_TO_RID_WIDTH 32
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_TO_ADDR_OFST 8
@@ @ -3342,6 +4365,7 @@
+#define       MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_RID_LEN 4
#define          MC_CMD_MEMCPY_RECORD_TYPEDEF_RID_INLINE 0x100 /* enum */
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_RID_LBN 128
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_RID_WIDTH 32
@@ @ -3352,6 +4376,7 @@
+#define       MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_ADDR_LBN 64
#define       MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_ADDR_WIDTH 64
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_RID_INLINE 0x100 /* enum */
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_RID_LBN 128
#define    MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_RID_WIDTH 32
@@ @ -3352,6 +4376,7 @@
+define       MC_CMD_MEMCPY_RECORD_TYPEDEF_FROM_ADDR_LBN 160
#define MC_CMD_MEMCPY_RECORD_TYPEDEF_LENGTH_OFST 28
+#define MC_CMD_MEMCPY_RECORD_TYPEDEF_LENGTH_LEN 4
#define MC_CMD_MEMCPY_RECORD_TYPEDEF_LENGTH_LBN 224
#define MC_CMD_MEMCPY_RECORD_TYPEDEF_LENGTH_WIDTH 32

@ @ -3403,24 +4428,26 @ @
/* MC_CMD_WOL_FILTER_SET_IN msgrequest */
#define MC_CMD_WOL_FILTER_SET_IN_LEN 192
#define MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_OFST 0
-#define MC_CMD_FILTER_MODE_SIMPLE 0x0 /* enum */
+#define MC_CMD_FILTER_MODE_SIMPLE 0x0 /* enum */
+#define MC_CMD_FILTER_MODE_STRUCTURED 0xffffffff /* enum */
/* A type value of 1 is unused. */
#define MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_OFST 4
+#define MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_LEN 4
/* enum: Magic */
-#define MC_CMD_WOL_TYPE_MAGIC 0x0
+#define MC_CMD_WOL_TYPE_MAGIC 0x0
/* enum: MS Windows Magic */
#define MC_CMD_WOL_TYPE_WIN_MAGIC 0x2
/* enum: IPv4 Syn */
-#define MC_CMD_WOL_TYPE_IPV4_SYN 0x3
+#define MC_CMD_WOL_TYPE_IPV4_SYN 0x3
/* enum: IPv6 Syn */
-#define MC_CMD_WOL_TYPE_IPV6_SYN 0x4
+#define MC_CMD_WOL_TYPE_IPV6_SYN 0x4
/* enum: Bitmap */
-#define MC_CMD_WOL_TYPE_BITMAP 0x5
+#define MC_CMD_WOL_TYPE_BITMAP 0x5
/* enum: Link */
-#define MC_CMD_WOL_TYPE_LINK 0x6
+#define MC_CMD_WOL_TYPE_LINK 0x6
/ */ enum: (Above this for future use) */
-#define MC_CMD_WOL_TYPE_MAX 0x7
+#define MC_CMD_WOL_TYPE_MAX 0x7
#define MC_CMD_WOL_FILTER_SET_IN_DATA_OFST 8
#define MC_CMD_WOL_FILTER_SET_IN_DATA_LEN 4
#define MC_CMD_WOL_FILTER_SET_IN_DATA_NUM 46

@ @ -3428,7 +4455,9 @ @
/* MC_CMD_WOL_FILTER_SET_IN_MAGIC msgrequest */
#define MC_CMD_WOL_FILTER_SET_IN_MAGIC_LEN 16
/*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_OFST 0 */
/*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_LEN 4 */
/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_OFST 4 */
/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_LEN 4 */
#define MC_CMD_WOL_FILTER_SET_IN_MAGIC_MAC_OFST 8
#define MC_CMD_WOL_FILTER_SET_IN_MAGIC_MAC_LEN 8
#define MC_CMD_WOL_FILTER_SET_IN_MAGIC_MAC_LO_OFST 8
@@ -3437,9 +4466,13 @@
 /* MC_CMD_WOL_FILTER_SET_IN_IPV4_SYN msgrequest */
 #define MC_CMD_WOL_FILTER_SET_IN_IPV4_SYN_LEN 20
 /*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_OFST 0 */
+/*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_LEN 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_OFST 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_LEN 4 */
 #define MC_CMD_WOL_FILTER_SET_IN_IPV4_SYN_SRC_IP_OFST 8
+#define MC_CMD_WOL_FILTER_SET_IN_IPV4_SYN_SRC_IP_LEN 4
 #define MC_CMD_WOL_FILTER_SET_IN_IPV4_SYN_DST_IP_OFST 12
+#define MC_CMD_WOL_FILTER_SET_IN_IPV4_SYN_DST_IP_LEN 4
 #define MC_CMD_WOL_FILTER_SET_IN_IPV4_SYN_SRC_PORT_OFST 16
@@ -3448,7 +4481,9 @@
 /* MC_CMD_WOL_FILTER_SET_IN_IPV6_SYN msgrequest */
 #define MC_CMD_WOL_FILTER_SET_IN_IPV6_SYN_LEN 44
 /*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_OFST 0 */
+/*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_LEN 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_OFST 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_LEN 4 */
 #define MC_CMD_WOL_FILTER_SET_IN_IPV6_SYN_SRC_IP_OFST 8
 #define MC_CMD_WOL_FILTER_SET_IN_IPV6_SYN_SRC_IP_LEN 16
 #define MC_CMD_WOL_FILTER_SET_IN_IPV6_SYN_DST_IP_OFST 24
@@ -3461,7 +4496,9 @@
 /* MC_CMD_WOL_FILTER_SET_IN_BITMAP msgrequest */
 #define MC_CMD_WOL_FILTER_SET_IN_BITMAP_LEN 187
 /*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_OFST 0 */
+/*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_LEN 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_OFST 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_LEN 4 */
 #define MC_CMD_WOL_FILTER_SET_IN_BITMAP_MASK_OFST 8
 #define MC_CMD_WOL_FILTER_SET_IN_BITMAP_MASK_LEN 48
 #define MC_CMD_WOL_FILTER_SET_IN_BITMAP_BITMAP_OFST 56
@@ -3476,8 +4513,11 @@
 /* MC_CMD_WOL_FILTER_SET_IN_LINK msgrequest */
 #define MC_CMD_WOL_FILTER_SET_IN_LINK_LEN 12
 /*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_OFST 0 */
+/*            MC_CMD_WOL_FILTER_SET_IN_FILTER_MODE_LEN 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_OFST 4 */
+/*            MC_CMD_WOL_FILTER_SET_IN_WOL_TYPE_LEN 4 */
 #define MC_CMD_WOL_FILTER_SET_IN_LINK_MASK_OFST 8
+#define MC_CMD_WOL_FILTER_SET_IN_LINK_MASK_LEN 4
 #define MC_CMD_WOL_FILTER_SET_IN_LINK_UP_LBN 0
 #define MC_CMD_WOL_FILTER_SET_IN_LINK_UP_WIDTH 1
 #define MC_CMD_WOL_FILTER_SET_IN_LINK_DOWN_LBN 1
@@ -3486,6 +4526,7 @@
/* MC_CMD_WOL_FILTER_SET_OUT msgresponse */
#define MC_CMD_WOL_FILTER_SET_OUT_LEN 4
#define MC_CMD_WOL_FILTER_SET_OUT_FILTER_ID_OFST 0
+#define MC_CMD_WOL_FILTER_SET_OUT_FILTER_ID_LEN 4

/*****************************/
@@ -3499,6 +4540,7 @@
/* MC_CMD_WOL_FILTER_REMOVE_IN msgrequest */
#define MC_CMD_WOL_FILTER_REMOVE_IN_LEN 4
#define MC_CMD_WOL_FILTER_REMOVE_IN_FILTER_ID_OFST 0
+#define MC_CMD_WOL_FILTER_REMOVE_IN_FILTER_ID_LEN 4
/* MC_CMD_WOL_FILTER_REMOVE_OUT msgresponse */
#define MC_CMD_WOL_FILTER_REMOVE_OUT_LEN 0
@@ -3516,6 +4558,7 @@
/* MC_CMD_WOL_FILTER_RESET_IN msgrequest */
#define MC_CMD_WOL_FILTER_RESET_IN_LEN 4
#define MC_CMD_WOL_FILTER_RESET_IN_MASK_OFST 0
+#define MC_CMD_WOL_FILTER_RESET_IN_MASK_LEN 4
#define MC_CMD_WOL_FILTER_RESET_IN_WAKE_FILTERS 0x1 /* enum */
#define MC_CMD_WOL_FILTER_RESET_IN_LIGHTSOUT_OFFLOADS 0x2 /* enum */

@@ -3556,6 +4599,7 @@
#define MC_CMD_NVRAM_TYPES_OUT_LEN 4
/* Bit mask of supported types. */
#define MC_CMD_NVRAM_TYPES_OUT_TYPES_OFST 0
+#define MC_CMD_NVRAM_TYPES_OUT_TYPES_LEN 4
/* enum: Disabled callisto. */
#define MC_CMD_NVRAM_TYPE_DISABLED_CALLISTO 0x0
/* enum: MC firmware. */
@@ -3612,54 +4656,80 @@
/* MC_CMD_NVRAM_INFO_IN msgrequest */
#define MC_CMD_NVRAM_INFO_IN_LEN 4
#define MC_CMD_NVRAM_INFO_IN_TYPE_OFST 0
+#define MC_CMD_NVRAM_INFO_IN_TYPE_LEN 4
/* enum values, see field(s): */
/* MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */

/* MC_CMD_NVRAM_INFO_OUT msgresponse */
#define MC_CMD_NVRAM_INFO_OUT_LEN 24
#define MC_CMD_NVRAM_INFO_OUT_TYPE_OFST 0
+#define MC_CMD_NVRAM_INFO_OUT_TYPE_LEN 4
/* enum values, see field(s): */
/* MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define MC_CMD_NVRAM_INFO_OUT_SIZE_OFST 8
#define MC_CMD_NVRAM_INFO_OUT_ERASESIZE_OFST 8
+\#define MC_CMD_NVRAM_INFO_OUT_ERASESIZE_LEN 4
#define MC_CMD_NVRAM_INFO_OUT_FLAGS_OFST 12
+\#define MC_CMD_NVRAM_INFO_OUT_FLAGS_LEN 4
#define MC_CMD_NVRAM_INFO_OUT_PROTECTED_LBN 0
#define MC_CMD_NVRAM_INFO_OUT_PROTECTED_WIDTH 1
#define MC_CMD_NVRAM_INFO_OUT_TLV_LBN 1
#define MC_CMD_NVRAM_INFO_OUT_TLV_WIDTH 1
+\#define MC_CMD_NVRAM_INFO_OUT_READ_ONLY_IF_TSA_BOUND_LBN 2
+\#define MC_CMD_NVRAM_INFO_OUT_READ_ONLY_IF_TSA_BOUND_WIDTH 1
+\#define MC_CMD_NVRAM_INFO_OUT_READ_ONLY_LBN 5
+\#define MC_CMD_NVRAM_INFO_OUT_READ_ONLY_WIDTH 1
#define MC_CMD_NVRAM_INFO_OUT_CMAC_LBN 6
#define MC_CMD_NVRAM_INFO_OUT_CMAC_WIDTH 1
#define MC_CMD_NVRAM_INFO_OUT_A_B_LBN 7
#define MC_CMD_NVRAM_INFO_OUT_A_B_WIDTH 1
#define MC_CMD_NVRAM_INFO_OUT_PHYSDEV_OFST 16
+\#define MC_CMD_NVRAM_INFO_OUT_PHYSDEV_LEN 4
#define MC_CMD_NVRAM_INFO_OUT_PHYSADDR_OFST 20
+\#define MC_CMD_NVRAM_INFO_OUT_PHYSADDR_LEN 4

"*/ MC_CMD_NVRAM_INFO_V2_OUT msgresponse */
#define MC_CMD_NVRAM_INFO_V2_OUT_LEN 28
#define MC_CMD_NVRAM_INFO_V2_OUT_TYPE_OFST 0
+\#define MC_CMD_NVRAM_INFO_V2_OUT_TYPE_LEN 4
"*/
/* Enum values, see field(s): */
#define MC_CMD_NVRAM_INFO_V2_OUT_SIZE_OFST 4
+\#define MC_CMD_NVRAM_INFO_V2_OUT_SIZE_LEN 4
#define MC_CMD_NVRAM_INFO_V2_OUT_ERASESIZE_OFST 8
+\#define MC_CMD_NVRAM_INFO_V2_OUT_ERASESIZE_LEN 4
#define MC_CMD_NVRAM_INFO_V2_OUT_FLAGS_OFST 12
+\#define MC_CMD_NVRAM_INFO_V2_OUT_FLAGS_LEN 4
#define MC_CMD_NVRAM_INFO_V2_OUT_PROTECTED_LBN 0
#define MC_CMD_NVRAM_INFO_V2_OUT_PROTECTED_WIDTH 1
#define MC_CMD_NVRAM_INFO_V2_OUT_TLV_LBN 1
#define MC_CMD_NVRAM_INFO_V2_OUT_TLV_WIDTH 1
+\#define MC_CMD_NVRAM_INFO_V2_OUT_READ_ONLY_IF_TSA_BOUND_LBN 2
+\#define MC_CMD_NVRAM_INFO_V2_OUT_READ_ONLY_IF_TSA_BOUND_WIDTH 1
+\#define MC_CMD_NVRAM_INFO_V2_OUT_READ_ONLY_LBN 5
+\#define MC_CMD_NVRAM_INFO_V2_OUT_READ_ONLY_WIDTH 1
#define MC_CMD_NVRAM_INFO_V2_OUT_A_B_LBN 7
#define MC_CMD_NVRAM_INFO_V2_OUT_A_B_WIDTH 1
#define MC_CMD_NVRAM_INFO_V2_OUT_PHYSDEV_OFST 16
+\#define MC_CMD_NVRAM_INFO_V2_OUT_PHYSDEV_LEN 4
#define MC_CMD_NVRAM_INFO_V2_OUT_PHYSADDR_OFST 20
+\#define MC_CMD_NVRAM_INFO_V2_OUT_PHYSADDR_LEN 4

"*/ Writes must be multiples of this size. Added to support the MUM on Sorrento.
*/
#define MC_CMD_NVRAM_INFO_V2_OUT_WRITESIZE_OFST 24
+#define MC_CMD_NVRAM_INFO_V2_OUT_WRITESIZE_LEN 4

/**********************************
/* MC_CMD_NVRAM_UPDATE_START   *
* Start a group of update operations on a virtual NVRAM partition. Locks *
* required: PHY_LOCK if type=="PHY". Returns: 0, EINVAL (bad type), EACCES (if *
* PHY_LOCK required and not held).   *
* In an adapter bound to a TSA controller, *
* MC_CMD_NVRAM_UPDATE_START can only be used on a subset of partition types *
* i.e. static config, dynamic config and expansion ROM config. Attempting to *
* perform this operation on a restricted partition will return the error *
* EPERM.   */
#define MC_CMD_NVRAM_UPDATE_START 0x38

@@ -3670,6 +4740,7 @@
*/
#define   MC_CMD_NVRAM_UPDATE_START_IN_LEN 4
#define MC_CMD_NVRAM_UPDATE_START_IN_TYPE_OFST 0
+##define MC_CMD_NVRAM_UPDATE_START_IN_TYPE_LEN 4
/*            Enum values, see field(s): */
/*               MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */

@@ -3680,9 +4751,11 @@
*/
#define   MC_CMD_NVRAM_UPDATE_START_V2_IN_LEN 8
#define MC_CMD_NVRAM_UPDATE_START_V2_IN_TYPE_OFST 0
+##define MC_CMD_NVRAM_UPDATE_START_V2_IN_TYPE_LEN 4
/*            Enum values, see field(s): */
/*               MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define       MC_CMD_NVRAM_UPDATE_START_V2_IN_FLAGS_OFST 4
+##define       MC_CMD_NVRAM_UPDATE_START_V2_IN_FLAGS_LEN 4
#define        MC_CMD_NVRAM_UPDATE_START_V2_IN_FLAG_REPORT_VERIFY_RESULT_LBN 0
#define        MC_CMD_NVRAM_UPDATE_START_V2_IN_FLAG_REPORT_VERIFY_RESULT_WIDTH 1

@@ -3703,20 +4776,26 @@
/* MC_CMD_NVRAM_READ_IN msgrequest */
#define MC_CMD_NVRAM_READ_IN_LEN 12
#define MC_CMD_NVRAM_READ_IN_TYPE_OFST 0
+##define MC_CMD_NVRAM_READ_IN_TYPE_LEN 4
/*            Enum values, see field(s): */
/*               MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define     MC_CMD_NVRAM_READ_IN_OFFSET_OFST 8
+##define     MC_CMD_NVRAM_READ_IN_OFFSET_LEN 4
/* amount to read in bytes */
define     MC_CMD_NVRAM_READ_IN_LENGTH_OFST 8
+#define MC_CMD_NVRAM_READ_IN_LENGTH_LEN 4

/* MC_CMD_NVRAM_READ_IN_V2 msgrequest */
#define MC_CMD_NVRAM_READ_IN_V2_LEN 16
#define MC_CMD_NVRAM_READ_IN_V2_TYPE_OFST 0
+#define MC_CMD_NVRAM_READ_IN_V2_TYPE_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define MC_CMD_NVRAM_READ_IN_V2_OFFSET_OFST 4
+#define MC_CMD_NVRAM_READ_IN_V2_OFFSET_LEN 4
/* amount to read in bytes */
#define MC_CMD_NVRAM_READ_IN_V2_LENGTH_OFST 8
+#define MC_CMD_NVRAM_READ_IN_V2_LENGTH_LEN 4
/* Optional control info. If a partition is stored with an A/B versioning
* scheme (i.e. in more than one physical partition in NVRAM) the host can set
* this to control which underlying physical partition is used to read data
@ @ -3726,6 +4805,7 @@
* verifying by reading with MODE=TARGET_BACKUP.
* */
#define MC_CMD_NVRAM_READ_IN_V2_MODE_OFST 12
+#define MC_CMD_NVRAM_READ_IN_V2_MODE_LEN 4
/* enum: Same as omitting MODE: caller sees data in current partition unless it
* holds the write lock in which case it sees data in the partition it is
* updating.
@ @ -3765,10 +4845,13 @@
#define MC_CMD_NVRAM_WRITE_IN_LENMAX 252
#define MC_CMD_NVRAM_WRITE_IN_LEN(num) (12+1*(num))
#define MC_CMD_NVRAM_WRITE_IN_TYPE_OFST 0
+#define MC_CMD_NVRAM_WRITE_IN_TYPE_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define MC_CMD_NVRAM_WRITE_IN_OFFSET_OFST 4
+#define MC_CMD_NVRAM_WRITE_IN_OFFSET_LEN 4
#define MC_CMD_NVRAM_WRITE_IN_LENGTH_OFST 8
+#define MC_CMD_NVRAM_WRITE_IN_LENGTH_LEN 4
#define MC_CMD_NVRAM_WRITE_IN_WRITE_BUFFER_OFST 12
#define MC_CMD_NVRAM_WRITE_IN_WRITE_BUFFER_LEN 1
#define MC_CMD_NVRAM_WRITE_IN_WRITE_BUFFER_MINNUM 1
@ @ -3791,10 +4874,13 @@
/* MC_CMD_NVRAM_ERASE_IN msgrequest */
#define MC_CMD_NVRAM_ERASE_IN_LEN 12
#define MC_CMD_NVRAM_ERASE_IN_TYPE_OFST 0
+#define MC_CMD_NVRAM_ERASE_IN_TYPE_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define MC_CMD_NVRAM_ERASE_IN_OFFSET_OFST 4
+#define MC_CMD_NVRAM_ERASE_IN_OFFSET_LEN 4
/* MC_CMD_NVRAM_ERASE_IN msgresponse */
#define    MC_CMD_NVRAM_ERASE_IN_LEN 4

/* MC_CMD_NVRAM_ERASE_OUT msgresponse */
#define    MC_CMD_NVRAM_ERASE_OUT_LEN 0
@@ -3803,8 +4889,12 @@
/*****************************/
/* MC_CMD_NVRAM_UPDATE_FINISH */
 * Finish a group of update operations on a virtual NVRam partition. Locks
 - * required: PHY_LOCK if type=*PHY*. Returns: 0, EINVAL (bad
 - * type/offset/length), EACCES (if PHY_LOCK required and not held)
 + * required: PHY_LOCK if type=*PHY*. Returns: 0, EINVAL (bad type/offset/
 + * length), EACCES (if PHY_LOCK required and not held). In an adapter bound to
 + * a TSA controller, MC_CMD_NVRAM_UPDATE_FINISH can only be used on a subset of
 + * partition types i.e. static config, dynamic config and expansion ROM config.
 + * Attempting to perform this operation on a restricted partition will return
 + * the error EPERM.
 */
#define MC_CMD_NVRAM_UPDATE_FINISH 0x3c
@@ -3815,9 +4905,11 @@
/* MC_CMD_NVRAM_UPDATE_FINISH_IN msgrequest: */
#define    MC_CMD_NVRAM_UPDATE_FINISH_IN_LEN 8
#define    MC_CMD_NVRAM_UPDATE_FINISH_IN_TYPE_OFST 0
+#define    MC_CMD_NVRAM_UPDATE_FINISH_IN_TYPE_LEN 4
/*            Enum values, see field(s): */
/*               MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define    MC_CMD_NVRAM_UPDATE_FINISH_IN_REBOOT_OFST 4
+#define    MC_CMD_NVRAM_UPDATE_FINISH_IN_REBOOT_LEN 4
#define        MC_CMD_NVRAM_UPDATE_FINISH_IN_FLAG_REPORT_VERIFY_RESULT_LBN 0
#define        MC_CMD_NVRAM_UPDATE_FINISH_IN_FLAG_REPORT_VERIFY_RESULT_WIDTH 1
@@ -3826,10 +4918,13 @@
/* MC_CMD_NVRAM_UPDATE_FINISH_V2_IN msgrequest: Extended NVRam UPDATE_FINISH */
 * request with additional flags indicating version of NVRam UPDATE commands in
@@ -3848,16 +4943,19 @@
/*            Enum values, see field(s): */
/*               MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
#define    MC_CMD_NVRAM_UPDATE_FINISH_V2_IN_REBOOT_OFST 4
+#define    MC_CMD_NVRAM_UPDATE_FINISH_V2_IN_REBOOT_LEN 4
#define        MC_CMD_NVRAM_UPDATE_FINISH_V2_IN_FLAG_REPORT_VERIFY_RESULT_LBN 0
#define        MC_CMD_NVRAM_UPDATE_FINISH_V2_IN_FLAG_REPORT_VERIFY_RESULT_WIDTH 1

* This process takes a few seconds to complete. So is likely to take more than
* the MCDI timeout. Hence signature verification is initiated when
* MC_CMD_NVRAM_UPDATE_FINISH_V2_IN is received by the firmware, however, the
  - * MCDI command returns immediately with error code EAGAIN. Subsequent
  - * NVRAM_UPDATE_FINISH_V2_IN requests also return EAGAIN if the verification is
  - * in progress. Once the verification has completed, this response payload
  - * includes the results of the signature verification. Note that the nvram lock
  - * host has read back the result code from firmware.
+ * MCDI command is run in a background MCDI processing thread. This response
+ * payload includes the results of the signature verification. Note that the
+ * per-partition nvram lock in firmware is only released after the verification
+ * has completed.
*/
#define    MC_CMD_NVRAM_UPDATE_FINISH_V2_OUT_LEN 4
/* Result of nvram update completion processing */
#define        MC_CMD_NVRAM_UPDATE_FINISH_V2_OUT_RESULT_CODE_OFST 0
+#define        MC_CMD_NVRAM_UPDATE_FINISH_V2_OUT_RESULT_CODE_LEN 4
+/* enum: Invalid return code; only non-zero values are defined. Defined as
+ * unknown for backwards compatibility with NVRAM_UPDATE_FINISH_OUT.
+ */
+#define        MC_CMD_NVRAM_VERIFY_RC_UNKNOWN 0x0
/* enum: Verify succeeded without any errors. */
#define        MC_CMD_NVRAM_VERIFY_RC_SUCCESS 0x1
/* enum: CMS format verification failed due to an internal error. */
@@ -3884,6 +4982,12 @@
* Trusted approver's list.
*/
#define        MC_CMD_NVRAM_VERIFY_RC_NO_SIGNATURE_MATCH 0xb
+/* enum: The image contains a test-signed certificate, but the adapter accepts
+ * only production signed images.
+ */
+#define        MC_CMD_NVRAM_VERIFY_RC_REJECT_TEST_SIGNED 0xc
+/* enum: The image has a lower security level than the current firmware. */
+#define        MC_CMD_NVRAM_VERIFY_RC_SECURITY_LEVEL_DOWNGRADE 0xd

/*****************************/
@@ -3911,6 +5015,7 @@
/* MC_CMD_REBOOT_IN msgrequest */
#define        MC_CMD_REBOOT_IN_LEN 4
#define        MC_CMD_REBOOT_IN_FLAGS_OFST 0
+#define        MC_CMD_REBOOT_IN_FLAGS_LEN 4
#define          MC_CMD_REBOOT_FLAGS_AFTER_ASSERTION 0x1 /* enum */
/* MC_CMD_REBOOT_OUT msgresponse */
@@ -3947,11 +5052,12 @@
/* enum */
#define        MC_CMD_REBOOT_MODE 0x3f

/*****************************/
- #define MC_CMD_0x3f_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+ #define MC_CMD_0x3f_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/\* MC_CMD_REBOOT_MODE_IN msgrequest */
#define MC_CMD_REBOOT_MODE_IN_LEN 4
#define MC_CMD_REBOOT_MODE_IN_VALUE_OFST 0
+ #define MC_CMD_REBOOT_MODE_IN_VALUE_LEN 4
/\* enum: Normal. */
#define MC_CMD_REBOOT_MODE_NORMAL 0x0
/\* enum: Power-on Reset. */
@@ -3966,6 +5072,7 @@
@@ -4001,7 +5108,7 @@
/\* MC_CMD_REBOOT_MODE_OUT msgresponse */
#define MC_CMD_REBOOT_MODE_OUT_LEN 4
#define MC_CMD_REBOOT_MODE_OUT_VALUE_OFST 0
+ #define MC_CMD_REBOOT_MODE_OUT_VALUE_LEN 4

/****************************/
@@ -4015,174 +5122,190 @@
* Page 1 contains sensors 32 to 62 (sensor 63 is the next page bit). etc.
*/
#define MC_CMD_SENSOR_INFO_EXT_IN_PAGE_OFST 0
+ #define MC_CMD_SENSOR_INFO_EXT_IN_PAGE_LEN 4

/\* MC_CMD_SENSOR_INFO_OUT msgresponse */
#define MC_CMD_SENSOR_INFO_OUT_LENMIN 4
#define MC_CMD_SENSOR_INFO_OUT_LENMAX 252
#define MC_CMD_SENSOR_INFO_OUT_LEN(num) (4+8*(num))
#define MC_CMD_SENSOR_INFO_OUT_MASK_OFST 0
+ #define MC_CMD_SENSOR_INFO_OUT_MASK_LEN 4
/\* enum: Controller temperature: degC */
-#define MC_CMD_SENSOR_CONTROLLER_TEMP 0x0
+ #define MC_CMD_SENSOR_CONTROLLER_TEMP 0x0
/\* enum: Phy common temperature: degC */
-#define MC_CMD_SENSOR_PHY_COMMON_TEMP 0x1
+ #define MC_CMD_SENSOR_PHY_COMMON_TEMP 0x1
/\* enum: Controller cooling: bool */
-#define MC_CMD_SENSOR_CONTROLLER_COOLING 0x2
+ #define MC_CMD_SENSOR_CONTROLLER_COOLING 0x2
/* enum: Phy 0 temperature: degC */
-#define          MC_CMD_SENSOR_PHY0_TEMP  0x3
+#define          MC_CMD_SENSOR_PHY0_TEMP 0x3
/* enum: Phy 0 cooling: bool */
-#define          MC_CMD_SENSOR_PHY0_COOLING  0x4
+#define          MC_CMD_SENSOR_PHY0_COOLING 0x4
/* enum: Phy 1 temperature: degC */
-#define          MC_CMD_SENSOR_PHY1_TEMP  0x5
+#define          MC_CMD_SENSOR_PHY1_TEMP 0x5
/* enum: Phy 1 cooling: bool */
-#define          MC_CMD_SENSOR_PHY1_COOLING  0x6
+#define          MC_CMD_SENSOR_PHY1_COOLING 0x6
/* enum: 1.0v power: mV */
-#define          MC_CMD_SENSOR_IN_1V0  0x7
+#define          MC_CMD_SENSOR_IN_1V0 0x7
/* enum: 1.2v power: mV */
-#define          MC_CMD_SENSOR_IN_1V2  0x8
+#define          MC_CMD_SENSOR_IN_1V2 0x8
/* enum: 1.8v power: mV */
-#define          MC_CMD_SENSOR_IN_1V8  0x9
+#define          MC_CMD_SENSOR_IN_1V8 0x9
/* enum: 2.5v power: mV */
-#define          MC_CMD_SENSOR_IN_2V5  0xa
+#define          MC_CMD_SENSOR_IN_2V5 0xa
/* enum: 3.3v power: mV */
-#define          MC_CMD_SENSOR_IN_3V3  0xb
+#define          MC_CMD_SENSOR_IN_3V3 0xb
/* enum: 12v power: mV */
-#define          MC_CMD_SENSOR_IN_12V0  0xc
+#define          MC_CMD_SENSOR_IN_12V0 0xc
/* enum: 1.2v analogue power: mV */
-#define          MC_CMD_SENSOR_IN_1V2A  0xd
+#define          MC_CMD_SENSOR_IN_1V2A 0xd
/* enum: reference voltage: mV */
-#define          MC_CMD_SENSOR_IN_VREF  0xe
+#define          MC_CMD_SENSOR_IN_VREF 0xe
/* enum: AOE FPGA power: mV */
-#define          MC_CMD_SENSOR_OUT_VAOE  0xfd
+#define          MC_CMD_SENSOR_OUT_VAOE 0xfd
/* enum: AOE FPGA temperature: degC */
-#define          MC_CMD_SENSOR_AOE_TEMP  0x10
+#define          MC_CMD_SENSOR_AOE_TEMP 0x10
/* enum: AOE PSU temperature: degC */
-#define          MC_CMD_SENSOR_PSU_AOE_TEMP  0x11
+#define          MC_CMD_SENSOR_PSU_AOE_TEMP 0x11
/* enum: PSU temperature: degC */
-#define          MC_CMD_SENSOR_PSU_TEMP  0x12
+#define          MC_CMD_SENSOR_PSU_TEMP 0x12
/* enum: Fan 0 speed: RPM */
-#define  MC_CMD_SENSOR_FAN_0  0x13
+#define  MC_CMD_SENSOR_FAN_0 0x13
/* enum: Fan 1 speed: RPM */
-#define  MC_CMD_SENSOR_FAN_1  0x14
+#define  MC_CMD_SENSOR_FAN_1 0x14
/* enum: Fan 2 speed: RPM */
-#define  MC_CMD_SENSOR_FAN_2  0x15
+#define  MC_CMD_SENSOR_FAN_2 0x15
/* enum: Fan 3 speed: RPM */
-#define  MC_CMD_SENSOR_FAN_3  0x16
+#define  MC_CMD_SENSOR_FAN_3 0x16
/* enum: Fan 4 speed: RPM */
-#define  MC_CMD_SENSOR_FAN_4  0x17
+#define  MC_CMD_SENSOR_FAN_4 0x17
/* enum: AOE FPGA input power: mV */
-#define  MC_CMD_SENSOR_IN_VAOE  0x18
+#define  MC_CMD_SENSOR_IN_VAOE 0x18
/* enum: AOE FPGA current: mA */
-#define  MC_CMD_SENSOR_OUT_IAOE  0x19
+#define  MC_CMD_SENSOR_OUT_IAOE 0x19
/* enum: AOE FPGA input current: mA */
-#define  MC_CMD_SENSOR_IN_IAOE  0x1a
+#define  MC_CMD_SENSOR_IN_IAOE 0x1a
/* enum: NIC power consumption: W */
-#define  MC_CMD_SENSOR_NIC_POWER  0x1b
+#define  MC_CMD_SENSOR_NIC_POWER 0x1b
/* enum: 0.9v power voltage: mV */
-#define  MC_CMD_SENSOR_IN_0V9  0x1c
+#define  MC_CMD_SENSOR_IN_0V9 0x1c
/* enum: 0.9v power current: mA */
-#define  MC_CMD_SENSOR_IN_I0V9  0x1d
+#define  MC_CMD_SENSOR_IN_I0V9 0x1d
/* enum: 1.2v power current: mA */
-#define  MC_CMD_SENSOR_IN_I1V2  0x1e
+#define  MC_CMD_SENSOR_IN_I1V2 0x1e
/* enum: Not a sensor: reserved for the next page flag */
-#define  MC_CMD_SENSOR_PAGE0_NEXT  0x1f
+#define  MC_CMD_SENSOR_PAGE0_NEXT 0x1f
/* enum: 0.9v power voltage (at ADC): mV */
-#define  MC_CMD_SENSOR_IN_0V9_ADC  0x20
+#define  MC_CMD_SENSOR_IN_0V9_ADC 0x20
/* enum: Controller temperature 2: degC */
-#define  MC_CMD_SENSOR_CONTROLLER_2_TEMP  0x21
+#define  MC_CMD_SENSOR_CONTROLLER_2_TEMP 0x21
/* enum: Voltage regulator internal temperature: degC */
-#define  MC_CMD_SENSOR_VREG_INTERNAL_TEMP  0x22
+#define  MC_CMD_SENSOR_VREG_INTERNAL_TEMP 0x22
/* enum: 0.9V voltage regulator temperature: degC */
#define          MC_CMD_SENSOR_VREG_0V9_TEMP 0x23

/* enum: 1.2V voltage regulator temperature: degC */
#define          MC_CMD_SENSOR_VREG_1V2_TEMP 0x24

/* enum: controller internal temperature sensor voltage (internal ADC): mV */
#define          MC_CMD_SENSOR_CONTROLLER_VPTAT 0x25
#define          MC_CMD_SENSOR_CONTROLLER_VPTAT 0x25

/* enum: controller internal temperature (internal ADC): degC */
#define          MC_CMD_SENSOR_CONTROLLER_INTERNAL_TEMP 0x26
#define          MC_CMD_SENSOR_CONTROLLER_INTERNAL_TEMP 0x26

/* enum: controller internal temperature sensor voltage (external ADC): mV */
#define          MC_CMD_SENSOR_CONTROLLER_VPTAT_EXTADC 0x27
#define          MC_CMD_SENSOR_CONTROLLER_VPTAT_EXTADC 0x27

/* enum: controller internal temperature (external ADC): degC */
#define          MC_CMD_SENSOR_CONTROLLER_INTERNAL_TEMP_EXTADC 0x28
#define          MC_CMD_SENSOR_CONTROLLER_INTERNAL_TEMP_EXTADC 0x28

/* enum: ambient temperature: degC */
#define          MC_CMD_SENSOR_AMBIENT_TEMP 0x29
#define          MC_CMD_SENSOR_AMBIENT_TEMP 0x29

/* enum: air flow: bool */
#define          MC_CMD_SENSOR_AIRFLOW 0x2a
#define          MC_CMD_SENSOR_AIRFLOW 0x2a

/* enum: voltage between VSS08D and VSS08D at CSR: mV */
#define          MC_CMD_SENSOR_VDD08D_VSS08D_CSR 0x2b
#define          MC_CMD_SENSOR_VDD08D_VSS08D_CSR 0x2b

/* enum: voltage between VSS08D and VSS08D at CSR (external ADC): mV */
#define          MC_CMD_SENSOR_VDD08D_VSS08D_CSR_EXTADC 0x2c
#define          MC_CMD_SENSOR_VDD08D_VSS08D_CSR_EXTADC 0x2c

/* enum: Hotpoint temperature: degC */
#define          MC_CMD_SENSOR_HOTPOINT_TEMP 0x2d
#define          MC_CMD_SENSOR_HOTPOINT_TEMP 0x2d

/* enum: Port 0 PHY power switch over-current: bool */
#define          MC_CMD_SENSOR_PHY_POWER_PORT0 0x2e
#define          MC_CMD_SENSOR_PHY_POWER_PORT0 0x2e

/* enum: Port 1 PHY power switch over-current: bool */
#define          MC_CMD_SENSOR_PHY_POWER_PORT1 0x2f
#define          MC_CMD_SENSOR_PHY_POWER_PORT1 0x2f

/* enum: Mop-up microcontroller reference voltage (millivolts) */
#define          MC_CMD_SENSOR_MUM_VCC 0x30
#define          MC_CMD_SENSOR_MUM_VCC 0x30

/* enum: 0.9v power phase A voltage: mV */
#define          MC_CMD_SENSOR_IN_0V9_A 0x31
#define          MC_CMD_SENSOR_IN_0V9_A 0x31

/* enum: 0.9v power phase A current: mA */
#define          MC_CMD_SENSOR_IN_10V9_A 0x32
#define          MC_CMD_SENSOR_IN_10V9_A 0x32
```c
+//define MC_CMD_SENSOR_IN_10V9_A 0x32
+// enum: 0.9V voltage regulator phase A temperature: degC */
-#define MC_CMD_SENSOR_VREG_0V9_A_TEMP 0x33
+//define MC_CMD_SENSOR_VREG_0V9_A_TEMP 0x33
+// enum: 0.9v power phase B voltage: mV */
-#define MC_CMD_SENSOR_IN_0V9_B 0x34
+//define MC_CMD_SENSOR_IN_0V9_B 0x34
+// enum: 0.9v power phase B current: mA */
-#define MC_CMD_SENSOR_IN_I0V9_B 0x35
+//define MC_CMD_SENSOR_IN_I0V9_B 0x35
+// enum: 0.9V voltage regulator phase B temperature: degC */
-#define MC_CMD_SENSOR_VREG_0V9_B_TEMP 0x36
+//define MC_CMD_SENSOR_VREG_0V9_B_TEMP 0x36
+// enum: CCOM AVREG 1v2 supply (interval ADC): mV */
-#define MC_CMD_SENSOR_CCOM_AVREG_1V2_SUPPLY 0x37
+//define MC_CMD_SENSOR_CCOM_AVREG_1V2_SUPPLY 0x37
+// enum: CCOM AVREG 1v2 supply (external ADC): mV */
-#define MC_CMD_SENSOR_CCOM_AVREG_1V2_SUPPLY_EXTADC 0x38
+//define MC_CMD_SENSOR_CCOM_AVREG_1V2_SUPPLY_EXTADC 0x38
+// enum: CCOM AVREG 1v8 supply (interval ADC): mV */
-#define MC_CMD_SENSOR_CCOM_AVREG_1V8_SUPPLY 0x39
+//define MC_CMD_SENSOR_CCOM_AVREG_1V8_SUPPLY 0x39
+// enum: CCOM AVREG 1v8 supply (external ADC): mV */
-#define MC_CMD_SENSOR_CCOM_AVREG_1V8_SUPPLY_EXTADC 0x3a
+//define MC_CMD_SENSOR_CCOM_AVREG_1V8_SUPPLY_EXTADC 0x3a
+// enum: CCOM RTS temperature: degC */
-#define MC_CMD_SENSOR_CONTROLLER_RTS 0x3b
+//define MC_CMD_SENSOR_CONTROLLER_RTS 0x3b
+// enum: Not a sensor: reserved for the next page flag */
-#define MC_CMD_SENSOR_PAGE1_NEXT 0x3f
+//define MC_CMD_SENSOR_PAGE1_NEXT 0x3f
+// enum: controller internal temperature sensor voltage on master core
* (internal ADC): mV
*/
-#define MC_CMD_SENSOR_CONTROLLER_MASTER_VPTAT 0x40
+//define MC_CMD_SENSOR_CONTROLLER_MASTER_VPTAT 0x40
+// enum: controller internal temperature on master core (internal ADC): degC */
-#define MC_CMD_SENSOR_CONTROLLER_MASTER_INTERNAL_TEMP 0x41
+//define MC_CMD_SENSOR_CONTROLLER_MASTER_INTERNAL_TEMP 0x41
+// enum: controller internal temperature sensor voltage on master core
* (external ADC): mV
*/
-#define MC_CMD_SENSOR_CONTROLLER_MASTER_VPTAT_EXTADC 0x42
+//define MC_CMD_SENSOR_CONTROLLER_MASTER_VPTAT_EXTADC 0x42
+// enum: controller internal temperature on master core (external ADC): degC */
-#define MC_CMDSENSOR_CONTROLLER_MASTER_INTERNAL_TEMP_EXTADC 0x43
+//define MC_CMDSENSOR_CONTROLLER_MASTER_INTERNAL_TEMP_EXTADC 0x43
+// enum: controller internal temperature on slave core sensor voltage (internal
```
* ADC): mV
*/
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_VPTAT 0x44
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_VPTAT 0x44
/* enum: controller internal temperature on slave core (internal ADC): degC */
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_INTERNAL_TEMP 0x45
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_INTERNAL_TEMP 0x45
/* enum: controller internal temperature on slave core sensor voltage (external ADC): mV */
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_VPTAT_EXTADC 0x46
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_VPTAT_EXTADC 0x46
/* enum: controller internal temperature on slave core (external ADC): degC */
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_INTERNAL_TEMP_EXTADC 0x47
#define MC_CMD_SENSOR_CONTROLLER_SLAVE_INTERNAL_TEMP_EXTADC 0x47
/* enum: Voltage supplied to the SODIMMs from their power supply: mV */
#define MC_CMD_SENSOR_SODIMM_VOUT 0x49
#define MC_CMD_SENSOR_SODIMM_VOUT 0x49
/* enum: Temperature of SODIMM 0 (if installed): degC */
#define MC_CMD_SENSOR_SODIMM_0_TEMP 0x4a
#define MC_CMD_SENSOR_SODIMM_0_TEMP 0x4a
/* enum: Temperature of SODIMM 1 (if installed): degC */
#define MC_CMD_SENSOR_SODIMM_1_TEMP 0x4b
#define MC_CMD_SENSOR_SODIMM_1_TEMP 0x4b
/* enum: Voltage supplied to the QSFP #0 from their power supply: mV */
#define MC_CMD_SENSOR_PHY0_VCC 0x4c
#define MC_CMDSENSOR_PHY0_VCC 0x4c
/* enum: Voltage supplied to the QSFP #1 from their power supply: mV */
#define MC_CMD_SENSOR_PHY1_VCC 0x4d
#define MC_CMD_SENSOR_PHY1_VCC 0x4d
/* enum: Controller die temperature (TDIODE): degC */
#define MC_CMD_SENSOR_CONTROLLER_TDIODE_TEMP 0x4e
#define MC_CMD_SENSOR_CONTROLLER_TDIODE_TEMP 0x4e
/* enum: Board temperature (front): degC */
#define MC_CMD_SENSOR_BOARD_FRONT_TEMP 0x4f
#define MC_CMD_SENSOR_BOARD_FRONT_TEMP 0x4f
/* enum: Board temperature (back): degC */
#define MC_CMD_SENSOR_BOARD_BACK_TEMP 0x50
#define MC_CMD_SENSOR_BOARD_BACK_TEMP 0x50
/+* enum: 1.8v power current: mA */
#define MC_CMD_SENSOR_IN_I1V8 0x51
/+* enum: 2.5v power current: mA */
#define MC_CMD_SENSOR_IN_I2V5 0x52
/+* enum: 3.3v power current: mA */
#define MC_CMD_SENSOR_IN_I3V3 0x53
/+* enum: 12v power current: mA */
#define MC_CMD_SENSOR_IN_I12V0 0x54
/+* enum: 1.3v power: mV */
`#define MC_CMD_SENSOR_IN_1V3 0x55
+/* enum: 1.3v power current: mA */
+#define MC_CMD_SENSOR_IN_11V3 0x56
+/* enum: Not a sensor: reserved for the next page flag */
+#define MC_CMD_SENSOR_PAGE2_NEXT 0x5f
/* MC_CMD_SENSOR_INFO_ENTRY_TYPEDEF */
#define MC_CMD_SENSOR_ENTRY_OFST 4
#define MC_CMD_SENSOR_ENTRY_LEN 8
@@ -4196,6 +5319,7 @@
#define MC_CMD_SENSOR_INFO_EXT_OUT_LENMAX 252
#define MC_CMD_SENSOR_INFO_EXT_OUT_LEN(num) (4+8*(num))
#define MC_CMD_SENSOR_INFO_EXT_OUT_MASK_OFST 0
+#define MC_CMD_SENSOR_INFO_EXT_OUT_MASK_LEN 4
/* Enum values, see field(s): */
+/* MC_CMD_SENSOR_INFO_OUT */
#define MC_CMD_SENSOR_INFO_EXT_OUT_NEXT_PAGE_LBN 31
@@ -4247,7 +5371,7 @@
*/
#define MC_CMD_READ_SENSORS 0x42
-#define MC_CMD_0x42_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x42_PRIVILEGE_CTG SRIOV_CTG_GENERAL
/*/ MC_CMD_READ_SENSORS_IN msgrequest */
#define MC_CMD_READ_SENSORS_IN_LEN 8
@@ -4266,6 +5390,7 @@
#define MC_CMD_READ_SENSORS_EXT_IN_DMA_ADDR_HI_OFST 4
/* Size in bytes of host buffer. */
#define MC_CMD_READ_SENSORS_EXT_IN_LENGTH_OFST 8
+#define MC_CMD_READ_SENSORS_EXT_IN_LENGTH_LEN 4
/*/ MC_CMD_READ_SENSORS_OUT msgresponse */
#define MC_CMD_READ_SENSORS_OUT_LEN 0
@@ -4282,17 +5407,17 @@
#define MC_CMD_SENSOR_VALUE_ENTRY_TYPEDEF_STATE_OFST 2
#define MC_CMD_SENSOR_VALUE_ENTRY_TYPEDEF_STATE_LEN 1
/* enum: Ok. */
-#define MC_CMD_SENSOR_STATE_OK 0x0
+#define MC_CMD_SENSOR_STATE_OK 0x0
/* enum: Breached warning threshold. */
-#define MC_CMD_SENSOR_STATE_WARNING 0x1
+#define MC_CMD_SENSOR_STATE_WARNING 0x1
/* enum: Breached fatal threshold. */
-#define MC_CMD_SENSOR_STATE_FATAL 0x2
+#define MC_CMD_SENSOR_STATE_FATAL 0x2
/* enum: Fault with sensor. */
-#define MC_CMD_SENSOR_STATE_BROKEN 0x3
+#define MC_CMD_SENSOR_STATE_BROKEN 0x3
+#define MC_CMD_SENSOR_STATE_BROKEN 0x3`
/* enum: Sensor is working but does not currently have a reading. */
#define MC_CMD_SENSOR_STATE_NO_READING 0x4

/* enum: Sensor initialisation failed. */
#define MC_CMD_SENSOR_STATE_INIT_FAILED 0x5

#define MC_CMD_SENSOR_VALUE_ENTRY_TYPEDEF_STATE_LBN 16
#define MC_CMD_SENSOR_VALUE_ENTRY_TYPEDEF_STATE_WIDTH 8
#define MC_CMD_SENSOR_VALUE_ENTRY_TYPEDEF_TYPE_OFST 3

MEM #{-4319,6}+5444,7#
/* MC_CMD_GET_PHY_STATE_OUT msgresponse */
#define MC_CMD_GET_PHY_STATE_OUT_LEN 4
#define MC_CMD_GET_PHY_STATE_OUT_STATE_OFST 0
+#define MC_CMD_GET_PHY_STATE_OUT_STATE_LEN 4
/* enum: Ok. */
#define MC_CMD_PHY_STATE_OK 0x1
/* enum: Faulty. */

MEM #{-4355,6}+5481,7#
/* MC_CMD_WOL_FILTER_GET_OUT msgresponse */
#define MC_CMD_WOL_FILTER_GET_OUT_LEN 4
#define MC_CMD_WOL_FILTER_GET_OUT_FILTER_ID_OFST 0
+#define MC_CMD_WOL_FILTER_GET_OUT_FILTER_ID_LEN 4

MEM #{-4371,8}+5498,9#
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_LENMAX 252
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_LEN(num) (4+4*(num))
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_PROTOCOL_OFST 0
+#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_PROTOCOL_LEN 4
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_DATA_OFST 4
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_DATA_LEN 4
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_DATA_MINNUM 1

MEM #{-4381,13}+5509,16#
/* MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP msgrequest */
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP_LEN 14
/* */
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP_PROTOCOL_OFST 0 */
+#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP_PROTOCOL_LEN 4 */
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP_MAC_OFST 4
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP_MAC_LEN 6
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP_IP_OFST 10
+#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_ARP_IP_LEN 4

/* MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_NS msgrequest */
#define MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_NS_LEN 42
/*            MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_PROTOCOL_OFST 0 */
+/*            MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_PROTOCOL_LEN 4 */
#define       MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_NS_MAC_OFST 4
#define       MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_NS_MAC_LEN 6
#define       MC_CMD_ADD_LIGHTSOUT_OFFLOAD_IN_NS_SNIPV6_OFST 10
@@ -4398,6 +5529,7 @@
/* MC_CMD_ADD_LIGHTSOUT_OFFLOAD_OUT msgresponse */
#define    MC_CMD_ADD_LIGHTSOUT_OFFLOAD_OUT_LEN 4
#define       MC_CMD_ADD_LIGHTSOUT_OFFLOAD_OUT_FILTER_ID_OFST 0
+#define       MC_CMD_ADD_LIGHTSOUT_OFFLOAD_OUT_FILTER_ID_LEN 4

/*****************************/
@@ -4412,7 +5544,9 @@
/* MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_IN msgrequest */
#define    MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_IN_LEN 8
#define       MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_IN_PROTOCOL_OFST 0
+#define       MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_IN_PROTOCOL_LEN 4
#define       MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_IN_FILTER_ID_OFST 4
+#define       MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_IN_FILTER_ID_LEN 4
/* MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_OUT msgresponse */
#define    MC_CMD_REMOVE_LIGHTSOUT_OFFLOAD_OUT_LEN 0
@@ -4451,20 +5585,21 @@
#define    MC_CMD_TESTASSERT_V2_IN_LEN 4
/* How to provoke the assertion */
#define       MC_CMD_TESTASSERT_V2_IN_TYPE_OFST 0
+#define       MC_CMD_TESTASSERT_V2_IN_TYPE_LEN 4
/* enum: Assert using the FAIL_ASSERTION_WITH_USEFUL_VALUES macro. Unless
 * you're testing firmware, this is what you want.
 */
-#define          MC_CMD_TESTASSERT_V2_IN_FAIL_ASSERTION_WITH_USEFUL_VALUES  0x0
+#define          MC_CMD_TESTASSERT_V2_IN_FAIL_ASSERTION_WITH_USEFUL_VALUES 0x0
/* enum: Assert using assert(0); */
-#define          MC_CMD_TESTASSERT_V2_IN_ASSERT_FALSE  0x1
+#define          MC_CMD_TESTASSERT_V2_IN_ASSERT_FALSE 0x1
/* enum: Deliberately trigger a watchdog */
-#define          MC_CMD_TESTASSERT_V2_IN_WATCHDOG  0x2
+#define          MC_CMD_TESTASSERT_V2_IN_WATCHDOG 0x2
/* enum: Deliberately trigger a trap by loading from an invalid address */
-#define          MC_CMD_TESTASSERT_V2_IN_LOAD_TRAP  0x3
+#define          MC_CMD_TESTASSERT_V2_IN_LOAD_TRAP 0x3
/* enum: Deliberately trigger a trap by storing to an invalid address */
-#define          MC_CMD_TESTASSERT_V2_IN_STORE_TRAP  0x4
+#define          MC_CMD_TESTASSERT_V2_IN_STORE_TRAP 0x4
/* enum: Jump to an invalid address */
-#define          MC_CMD_TESTASSERT_V2_IN_JUMP_TRAP  0x5
+#define          MC_CMD_TESTASSERT_V2_IN_JUMP_TRAP 0x5
/* MC_CMD_TESTASSERT_V2_OUT msgresponse */
#define MC_CMD_TESTASSERT_V2_OUT_LEN 0
@@ -4486,6 +5621,7 @@
#define MC_CMD_WORKAROUND_IN_LEN 8
/* The enums here must correspond with those in MC_CMD_GET_WORKAROUND. */
#define MC_CMD_WORKAROUND_IN_TYPE_OFST 0
+#define MC_CMD_WORKAROUND_IN_TYPE_LEN 4
/* enum: Bug 17230 work around. */
#define MC_CMD_WORKAROUND_BUG17230 0x1
/* enum: Bug 35388 work around (unsafe EVQ writes). */
@@ -4514,6 +5650,7 @@
* the workaround
*/
#define MC_CMD_WORKAROUND_IN_ENABLED_OFST 4
+define MC_CMD_WORKAROUND_IN_ENABLED_LEN 4
/* MC_CMD_WORKAROUND_OUT msgresponse */
#define MC_CMD_WORKAROUND_OUT_LEN 0
@@ -4523,6 +5660,7 @@
*/
#define MC_CMD_WORKAROUND_EXT_OUT_LEN 4
#define MC_CMD_WORKAROUND_EXT_OUT_FLAGS_OFST 0
+define MC_CMD_WORKAROUND_EXT_OUT_FLAGS_LEN 4
#define MC_CMD_WORKAROUND_EXT_OUT_FLR_DONE_LBN 0
#define MC_CMD_WORKAROUND_EXT_OUT_FLR_DONE_WIDTH 1
@@ -4543,6 +5681,7 @@
/* MC_CMD_GET_PHY_MEDIA_INFO_IN msgrequest */
#define MC_CMD_GET_PHY_MEDIA_INFO_IN_LEN 4
#define MC_CMD_GET_PHY_MEDIA_INFO_IN_PAGE_OFST 0
+define MC_CMD_GET_PHY_MEDIA_INFO_IN_PAGE_LEN 4
/* MC_CMD_GET_PHY_MEDIA_INFO_OUT msgresponse */
#define MC_CMD_GET_PHY_MEDIA_INFO_OUT_LENMIN 5
@@ -4550,6 +5689,7 @@
/* in bytes */
#define MC_CMD_GET_PHY_MEDIA_INFO_OUT_DATALEN_OFST 0
+define MC_CMD_GET_PHY_MEDIA_INFO_OUT_DATALEN_LEN 4
#define MC_CMD_GET_PHY_MEDIA_INFO_OUT_DATA_OFST 4
#define MC_CMD_GET_PHY_MEDIA_INFO_OUT_DATA_LEN 1
#define MC_CMD_GET_PHY_MEDIA_INFO_OUT_DATA_MINNUM 1
@@ -4568,12 +5708,14 @@
/* MC_CMD_NVRAM_TEST_IN msgrequest */
#define MC_CMD_NVRAM_TEST_IN_LEN 4
#define MC_CMD_NVRAM_TEST_IN_TYPE_OFST 0
+define MC_CMD_NVRAM_TEST_IN_TYPE_LEN 4
/*            Enum values, see field(s): */
/* MC_CMD_NVRAM_TYPES/MC_CMD_NVRAM_TYPES_OUT/TYPES */
/* MC_CMD_NVRAM_TEST_OUT msgresponse */
#define MC_CMD_NVRAM_TEST_OUT_LEN 4
#define MC_CMD_NVRAM_TEST_OUT_RESULT_OFST 0
+define MC_CMD_NVRAM_TEST_OUT_RESULT_LEN 4
/* enum: Passed. */
#define MC_CMD_NVRAM_TEST_PASS 0x0
/* enum: Failed. */
@@ -4594,12 +5736,16 @@
#define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_LEN 16
/* input bits */
#define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_IOEXP_INPUTS_OFST 0
+define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_IOEXP_INPUTS_LEN 4
/* output bits */
#define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_IOEXP_OUTPUTS_OFST 4
+define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_IOEXP_OUTPUTS_LEN 4
/* direction */
#define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_IOEXP_DIRECTION_OFST 8
+define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_IOEXP_DIRECTION_LEN 4
/* enum: Out. */
#define MC_CMD_MRSFP_TWEAK_IN_EQ_CONFIG_IOEXP_DIRECTION_OUT 0x0
/* enum: In. */
@@ -4626,21 +5775,26 @@
/* Mc_Cmd_Mrsfp_Tweak_In_Read_Only msgrequest */
#define MC_CMD_MRSFP_TWEAK_IN_READ_ONLY_LEN 0
@@ -4608,10 +5754,13 @@
#define MC_CMD_MRSFP_TWEAK_OUT_LEN 12
/* direction */
#define MC_CMD_MRSFP_TWEAK_OUT_IOEXP_DIRECTION_OFST 8
+define MC_CMD_MRSFP_TWEAK_OUT_IOEXP_DIRECTION_LEN 4
/* enum: Out. */
#define MC_CMD_MRSFP_TWEAK_OUT_IOEXP_DIRECTION_OUT 0x0
/* enum: In. */
@@ -4626,21 +5775,26 @@
*/
#define MC_CMD_SENSOR_SET_LIMS 0x4e
#define MC_CMD_0x4e_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+define MC_CMD_0x4e_PRIVILEGE_CTG SRIOV_CTG_INSECURE

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/* MC_CMD_SENSOR_SET_LIMS_IN msgrequest */
#define MC_CMD_SENSOR_SET_LIMS_IN_LEN 20
#define MC_CMD_SENSOR_SET_LIMS_IN_SENSOR_OFST 0
+#define MC_CMD_SENSOR_SET_LIMS_IN_SENSOR_LEN 4
/*   Enum values, see field(s): */
/* MC_CMD_SENSOR_INFO/MC_CMD_SENSOR_INFO_OUT/MASK */
/* interpretation is is sensor-specific. */
#define MC_CMD_SENSOR_SET_LIMS_IN_LOW0_OFST 4
+#define MC_CMD_SENSOR_SET_LIMS_IN_LOW0_LEN 4
/* interpretation is is sensor-specific. */
#define MC_CMD_SENSOR_SET_LIMS_IN_HI0_OFST 8
+#define MC_CMD_SENSOR_SET_LIMS_IN_HI0_LEN 4
/* interpretation is is sensor-specific. */
#define MC_CMD_SENSOR_SET_LIMS_IN_LOW1_OFST 12
+#define MC_CMD_SENSOR_SET_LIMS_IN_LOW1_LEN 4
/* interpretation is is sensor-specific. */
#define MC_CMD_SENSOR_SET_LIMS_IN_HI1_OFST 16
+#define MC_CMD_SENSOR_SET_LIMS_IN_HI1_LEN 4

/* MC_CMD_SENSOR_SET_LIMS_OUT msgresponse */
#define MC_CMD_SENSOR_SET_LIMS_OUT_LEN 0
@@ -4657,9 +5811,13 @@
/* MC_CMD_GETRESOURCELIMITS_OUT msgresponse */
#define MC_CMD_GETRESOURCELIMITS_OUT_LEN 16
#define MC_CMD_GETRESOURCELIMITS_OUT_BUFTBL_OFST 0
+#define MC_CMD_GETRESOURCELIMITS_OUT_BUFTBL_LEN 4
#define MC_CMD_GETRESOURCELIMITS_OUT_EVQ_OFST 4
+#define MC_CMD_GETRESOURCELIMITS_OUT_EVQ_LEN 4
#define MC_CMD_GETRESOURCELIMITS_OUT_RXQ_OFST 8
+#define MC_CMD_GETRESOURCELIMITS_OUT_RXQ_LEN 4
#define MC_CMD_GETRESOURCELIMITS_OUT_TXQ_OFST 12
+#define MC_CMD_GETRESOURCELIMITS_OUT_TXQ_LEN 4

/**********************************
@@ -4680,6 +5838,7 @@
#define MC_CMD_NVRAM_PARTITIONS_OUT_LEN(num) (4+4*(num))
/* total number of partitions */
#define MC_CMD_NVRAM_PARTITIONS_OUT_NUM_PARTITIONS_OFST 0
+#define MC_CMD_NVRAM_PARTITIONS_OUT_NUM_PARTITIONS_LEN 4
/* type ID code for each of NUM_PARTITIONS partitions */
#define MC_CMD_NVRAM_PARTITIONS_OUT_TYPE_ID_OFST 4
#define MC_CMD_NVRAM_PARTITIONS_OUT_TYPE_ID_LEN 4
@@ -4700,6 +5859,7 @@
#define MC_CMD_NVRAM_METADATA_IN_TYPE_OFST 0
+#define MC_CMD_NVRAM_METADATA_IN_TYPE_LEN 4
/* MC_CMD_NVRAM_METADATA_OUT msgresponse */
#define MC_CMD_NVRAM_METADATA_OUT_LENMIN 20
@@ -4707,7 +5867,9 @@
#define MC_CMD_NVRAM_METADATA_OUT_LEN(num) (20+1*(num))
/* Partition type ID code */
#define MC_CMD_NVRAM_METADATA_OUT_TYPE_OFST 0
+.enum: MC_CMD_NVRAM_METADATA_OUT_TYPE_LEN 4
#define MC_CMD_NVRAM_METADATA_OUT_FLAGS_OFST 4
+.enum: MC_CMD_NVRAM_METADATA_OUT_FLAGS_LEN 4
#define MC_CMD_NVRAM_METADATA_OUT_SUBTYPE_VALID_LBN 0
#define MC_CMD_NVRAM_METADATA_OUT_SUBTYPE_VALID_WIDTH 1
#define MC_CMD_NVRAM_METADATA_OUT_DESCRIPTION_VALID_WIDTH 1
/* Subtype ID code for content of this partition */
#define MC_CMD_NVRAM_METADATA_OUT_SUBTYPE_OFST 8
+.enum: MC_CMD_NVRAM_METADATA_OUT_SUBTYPE_LEN 4
#define MC_CMD_NVRAM_METADATA_OUT_VERSION_W_OFST 12
#define MC_CMD_NVRAM_METADATA_OUT_VERSION_W_LEN 2
@@ -4716,6 +5878,7 @@
#define MC_CMD_GET_MAC_ADDRESSES_OUT_RESERVED_LEN 2
/* Number of allocated MAC addresses */
#define MC_CMD_GET_MAC_ADDRESSES_OUT_MAC_COUNT_OFST 8
+enum: MC_CMD_GET_MAC_ADDRESSES_OUT_MAC_COUNT_LEN 4
#define MC_CMD_GET_MAC_ADDRESSES_OUT_MAC_STRIDE_OFST 12
+enum: MC_CMD_GET_MAC_ADDRESSES_OUT_MAC_STRIDE_LEN 4

 /**<*****************************/
 @@ -4772,6 +5937,7 @@
#define MC_CMD_CLP_IN_LEN 4
/* Sub operation */
#define MC_CMD_CLP_IN_OP_OFST 0
+enum: MC_CMD_CLP_IN_OP_LEN 4
#define MC_CMD_CLP_DEFAULT_len 0
/* Set MAC address */
@@ -4789,6 +5955,7 @@
/* MC_CMD_CLP_IN_DEFAULT msgrequest */
#define MC_CMD_CLP_IN_DEFAULT_LEN 4
+*/
/* MC_CMD_CLP_OUT_DEFAULT msgresponse */
#define MC_CMD_CLP_OUT_DEFAULT_LEN 0
/* MC_CMD_CLP_IN_SET_MAC msgrequest */
#define    MC_CMD_CLP_IN_SET_MAC_LEN 12
/* MC_CMD_CLP_IN_OP_OFST 0 */
+/* MC_CMD_CLP_IN_OP_LEN 4 */

/* MAC address assigned to port */
#define       MC_CMD_CLP_IN_SET_MAC_ADDR_OFST 4
#define       MC_CMD_CLP_IN_SET_MAC_ADDR_LEN 6

/* MC_CMD_CLP_IN_GET_MAC msgrequest */
#define    MC_CMD_CLP_IN_GET_MAC_LEN 4
/* MC_CMD_CLP_IN_OP_OFST 0 */
+/* MC_CMD_CLP_IN_OP_LEN 4 */

/* MC_CMD_CLP_OUT_GET_MAC msgresponse */
#define    MC_CMD_CLP_OUT_GET_MAC_LEN 8

/* MC_CMD_CLP_IN_SET_BOOT msgrequest */
#define    MC_CMD_CLP_IN_SET_BOOT_LEN 5
/* MC_CMD_CLP_IN_OP_OFST 0 */
+/* MC_CMD_CLP_IN_OP_LEN 4 */

/* Boot flag */
#define       MC_CMD_CLP_IN_SET_BOOT_FLAG_OFST 4
#define       MC_CMD_CLP_IN_SET_BOOT_FLAG_LEN 1

/* MC_CMD_CLP_IN_GET_BOOT msgrequest */
#define    MC_CMD_CLP_IN_GET_BOOT_LEN 4
/* MC_CMD_CLP_IN_OP_OFST 0 */
+/* MC_CMD_CLP_IN_OP_LEN 4 */

/* MC_CMD_CLP_OUT_GET_BOOT msgresponse */
#define    MC_CMD_CLP_OUT_GET_BOOT_LEN 4

#define MC_CMD_MUM 0x57
#define MC_CMD_0x57_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* enum: NULL MCDI command to MUM */
#define    MC_CMD_MUM_IN_LEN 4
#define    MC_CMD_MUM_IN_OP_HDR_OFST 0
#define    MC_CMD_MUM_IN_OP_HDR_LEN 4
#define    MC_CMD_MUM_IN_OP_LBN 0
#define    MC_CMD_MUM_IN_OP_WIDTH 8
/* enum: NULL MCDI command to MUM */
#define    MC_CMD_MUM_IN_NULL_LEN 4
/* MUM cmd header */
#define MC_CMD_MUM_IN_CMD_OFST 0
+#define MC_CMD_MUM_IN_CMD_LEN 4

/* MC_CMD_MUM_IN_GET_VERSION msgrequest */
#define MC_CMD_MUM_IN_GET_VERSION_LEN 4
/* MUM cmd header */
/*  MC_CMD_MUM_IN_CMD_OFST 0 */
+/*  MC_CMD_MUM_IN_CMD_LEN 4 */

/* MC_CMD_MUM_IN_READ msgrequest */
#define MC_CMD_MUM_IN_READ_LEN 16
/* MUM cmd header */
/*  MC_CMD_MUM_IN_CMD_OFST 0 */
+/*  MC_CMD_MUM_IN_CMD_LEN 4 */
/* ID of (device connected to MUM) to read from registers of */
#define MC_CMD_MUM_IN_READ_DEVICE_OFST 4
+#define MC_CMD_MUM_IN_READ_DEVICE_LEN 4
/* enum: Hittite HMC1035 clock generator on Sorrento board */
#define MC_CMD_MUM_DEV_HITTITE 0x1
/* enum: Hittite HMC1035 clock generator for NIC-side on Sorrento board */
#define MC_CMD_MUM_DEV_HITTITE_NIC 0x2
/* 32-bit address to read from */
#define MC_CMD_MUM_IN_READ_ADDR_OFST 8
+#define MC_CMD_MUM_IN_READ_ADDR_LEN 4
/* Number of words to read. */
#define MC_CMD_MUM_IN_READ_NUMWORDS_OFST 12
+#define MC_CMD_MUM_IN_READ_NUMWORDS_LEN 4

/* MC_CMD_MUM_IN_WRITE msgrequest */
#define MC_CMD_MUM_IN_WRITE_LENMIN 16
@@ -4920,12 +6098,15 @@
#define MC_CMD_MUM_IN_WRITE_LEN(num) (12+4*(num))
/* MUM cmd header */
/*  MC_CMD_MUM_IN_CMD_OFST 0 */
+/*  MC_CMD_MUM_IN_CMD_LEN 4 */
/* ID of (device connected to MUM) to write to registers of */
#define MC_CMD_MUM_IN_WRITE_DEVICE_OFST 4
+#define MC_CMD_MUM_IN_WRITE_DEVICE_LEN 4
/* enum: Hittite HMC1035 clock generator on Sorrento board */
/*  MC_CMD_MUM_DEV_HITTITE 0x1 */
/* 32-bit address to write to */
#define MC_CMD_MUM_IN_WRITE_ADDR_OFST 8
+#define MC_CMD_MUM_IN_WRITE_ADDR_LEN 4
/* Words to write */
#define MC_CMD_MUM_IN_WRITE_BUFFER_OFST 12
#define MC_CMD_MUM_IN_WRITE_BUFFER_LEN 4
@@ -4938,12 +6119,16 @@
#define MC_CMD_MUM_IN_RAW_CMD_LEN(num) (16+1*(num))
/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
+#define MC_CMD_MUM_IN_CMD_LEN 4 */
/* MUM I2C cmd code */
#define MC_CMD_MUM_IN_RAW_CMD_CMD_CODE_OFST 4
+#define MC_CMD_MUM_IN_RAW_CMD_CMD_CODE_LEN 4
/* Number of bytes to write */
#define MC_CMD_MUM_IN_RAW_CMD_NUM_WRITE_OFST 8
+#define MC_CMD_MUM_IN_RAW_CMD_NUM_WRITE_LEN 4
/* Number of bytes to read */
#define MC_CMD_MUM_IN_RAW_CMD_NUM_READ_OFST 12
+#define MC_CMD_MUM_IN_RAW_CMD_NUM_READ_LEN 4
/* Bytes to write */
#define MC_CMD_MUM_IN_RAW_CMD_WRITE_DATA_OFST 16
#define MC_CMD_MUM_IN_RAW_CMD_WRITE_DATA_LEN 1
@@ -4954,21 +6139,28 @@
#define MC_CMD_MUM_IN_LOG_LEN 8
/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
+#define MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_LOG_OP_OFST 4
-#define MC_CMD_MUM_IN_LOG_OP_UART 0x1 /* enum */
+#define MC_CMD_MUM_IN_LOG_OP_LEN 4
+#define MC_CMD_MUM_IN_LOG_OP_UART 0x1 /* enum */
/* MC_CMD_MUM_IN_LOG_OP_UART msgrequest */
#define MC_CMD_MUM_IN_LOG_OP_UART_LEN 12
/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
+#define MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_HDR_OFST 4
#define MC_CMD_MUM_IN_GPIO_OPCODE_LBN 0
#define MC_CMD_MUM_IN_GPIO_OPCODE_WIDTH 8
#define MC_CMD_MUM_IN_GPIO_IN_READ 0x0 /* enum */
@@ -4981,40 +6173,56 @@
/* MC_CMD_MUM_IN_GPIO_IN_READ msgrequest */
#define MC_CMD_MUM_IN_GPIO_LEN 8
/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
+#define MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_HDR_OFST 4
#define MC_CMD_MUM_IN_GPIO_HDR_LEN 4
#define MC_CMD_MUM_IN_GPIO_OPCODE_LBN 0
#define MC_CMD_MUM_IN_GPIO_OPCODE_WIDTH 8
#define MC_CMD_MUM_IN_GPIO_IN_READ 0x0/* enum */
@@ -4981,40 +6173,56 @@
/* MC_CMD_MUM_IN_GPIO_IN_READ msgrequest */
#define MC_CMD_MUM_IN_GPIO_IN_READ_LEN 8
/*    MC_CMD_MUM_IN_CMD_OFST 0 */
+/*    MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_IN_READ_HDR_OFST 4
+define MC_CMD_MUM_IN_GPIO_IN_READ_HDR_LEN 4

/* MC_CMD_MUM_IN_GPIO_IN_WRITE msgrequest */
#define MC_CMD_MUM_IN_GPIO_IN_WRITE_LEN 16
/*    MC_CMD_MUM_IN_CMD_OFST 0 */
+/*    MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_IN_WRITE_HDR_OFST 4
+define MC_CMD_MUM_IN_GPIO_IN_WRITE_HDR_LEN 4
/* The first 32-bit word to be written to the GPIO IN register. */
#define MC_CMD_MUM_IN_GPIO_IN_WRITE_GPIOMASK1_OFST 8
+define MC_CMD_MUM_IN_GPIO_IN_WRITE_GPIOMASK1_LEN 4
/* The second 32-bit word to be written to the GPIO IN register. */
#define MC_CMD_MUM_IN_GPIO_IN_WRITE_GPIOMASK2_OFST 12
+define MC_CMD_MUM_IN_GPIO_IN_WRITE_GPIOMASK2_LEN 4

/* MC_CMD_MUM_IN_GPIO_IN_READ msgrequest */
#define MC_CMD_MUM_IN_GPIO_IN_READ_LEN 8
/*    MC_CMD_MUM_IN_CMD_OFST 0 */
+/*    MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_IN_READ_HDR_OFST 4
+define MC_CMD_MUM_IN_GPIO_IN_READ_HDR_LEN 4

/* MC_CMD_MUM_IN_GPIO_OUT_WRITE msgrequest */
#define MC_CMD_MUM_IN_GPIO_OUT_WRITE_LEN 16
/*    MC_CMD_MUM_IN_CMD_OFST 0 */
+/*    MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OUT_WRITE_HDR_OFST 4
+define MC_CMD_MUM_IN_GPIO_OUT_WRITE_HDR_LEN 4
/* The first 32-bit word to be written to the GPIO OUT register. */
#define MC_CMD_MUM_IN_GPIO_OUT_WRITE_GPIOMASK1_OFST 8
+define MC_CMD_MUM_IN_GPIO_OUT_WRITE_GPIOMASK1_LEN 4
/* The second 32-bit word to be written to the GPIO OUT register. */
#define MC_CMD_MUM_IN_GPIO_OUT_WRITE_GPIOMASK2_OFST 12
+define MC_CMD_MUM_IN_GPIO_OUT_WRITE_GPIOMASK2_LEN 4

/* MC_CMD_MUM_IN_GPIO_OUT_READ msgrequest */
#define MC_CMD_MUM_IN_GPIO_OUT_READ_LEN 8
/*    MC_CMD_MUM_IN_CMD_OFST 0 */
+/*    MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OUT_READ_HDR_OFST 4
+define MC_CMD_MUM_IN_GPIO_OUT_READ_HDR_LEN 4

/* MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE msgrequest */
#define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE_LEN 16
/*    MC_CMD_MUM_IN_CMD_OFST 0 */
+/*    MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE_HDR_OFST 4
+define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE_HDR_LEN 4
/* The first 32-bit word to be written to the GPIO OUT ENABLE register. */
#define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE_GPIOMASK1_OFST 8
+define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE_GPIOMASK1_LEN 4
/* The second 32-bit word to be written to the GPIO OUT ENABLE register. */
#define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE_GPIOMASK2_OFST 12
+define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_WRITE_GPIOMASK2_LEN 4

/* MC_CMD_MUM_IN_GPIO_OUT_ENABLE_READ msgrequest */
#define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_READ_LEN 8
/*    MC_CMD_MUM_IN_CMD_OFST 0 */
+/*    MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_READ_HDR_OFST 4
+define MC_CMD_MUM_IN_GPIO_OUT_ENABLE_READ_HDR_LEN 4

/* MC_CMD_MUM_IN_GPIO_OP msgrequest */
#define MC_CMD_MUM_IN_GPIO_OP_LEN 8
/* MC_CMD_MUM_IN_CMD_OFST 0 */
+/* MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OP_HDR_OFST 4
+#define MC_CMD_MUM_IN_GPIO_OP_HDR_LEN 4
#define MC_CMD_MUM_IN_GPIO_OP_BITWISE_OP_LBN 8
#define MC_CMD_MUM_IN_GPIO_OP_BITWISE_OP_WIDTH 8
#define MC_CMD_MUM_IN_GPIO_OP_OUT_READ 0x0 /* enum */
@@ -5027,26 +6235,34 @@
/* MC_CMD_MUM_IN_GPIO_OP_OUT_READ msgrequest */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_READ_LEN 8
/*            MC_CMD_MUM_IN_CMD_OFST 0 */
+/*            MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_READ_HDR_OFST 4
+#define MC_CMD_MUM_IN_GPIO_OP_OUT_READ_HDR_LEN 4
/* MC_CMD_MUM_IN_GPIO_OP_OUT_WRITE msgrequest */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_WRITE_LEN 8
/*            MC_CMD_MUM_IN_CMD_OFST 0 */
+/*            MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_WRITE_HDR_OFST 4
+#define MC_CMD_MUM_IN_GPIO_OP_OUT_WRITE_HDR_LEN 4
#define MC_CMD_MUM_IN_GPIO_OP_OUT_WRITE_WRITEBIT_LBN 24
#define MC_CMD_MUM_IN_GPIO_OP_OUT_WRITE_WRITEBIT_WIDTH 8
/* MC_CMD_MUM_IN_GPIO_OP_OUT_CONFIG msgrequest */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_CONFIG_LEN 8
/*            MC_CMD_MUM_IN_CMD_OFST 0 */
+/*            MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_CONFIG_HDR_OFST 4
+#define MC_CMD_MUM_IN_GPIO_OP_OUT_CONFIG_HDR_LEN 4
#define MC_CMD_MUM_IN_GPIO_OP_OUT_CONFIG_CFG_LBN 24
#define MC_CMD_MUM_IN_GPIO_OP_OUT_CONFIG_CFG_WIDTH 8
/* MC_CMD_MUM_IN_GPIO_OP_OUT_ENABLE msgrequest */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_ENABLE_LEN 8
/*            MC_CMD_MUM_IN_CMD_OFST 0 */
+/*            MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_GPIO_OP_OUT_ENABLE_HDR_OFST 4
+#define MC_CMD_MUM_IN_GPIO_OP_OUT_ENABLE_HDR_LEN 4
#define MC_CMD_MUM_IN_GPIO_OP_OUT_ENABLE_ENABLEBIT_LBN 24
#define MC_CMD_MUM_IN_GPIO_OP_OUT_ENABLE_ENABLEBIT_WIDTH 8
@@ -5054,7 +6270,9 @@
#define MC_CMD_MUM_IN_READ_SENSORS_PARAMS_OFST 4
#define MC_CMD_MUM_IN_READ_SENSORS_PARAMS_LEN 4
#define MC_CMD_MUM_IN_READ_SENSORS_SENSOR_ID_LBN 0
#define MC_CMD_MUM_IN_READ_SENSORS_SENSOR_ID_WIDTH 8
#define MC_CMD_MUM_IN_READ_SENSORS_NUM_SENSORS_LBN 8

 //@ -5064,13 +6282,16 @@
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_LEN 12

/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
/* MC_CMD_MUM_IN_CMD_LEN 4 */
/* Bit-mask of clocks to be programmed */
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_MASK_OFST 4
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_MASK_LEN 4
#define MC_CMD_MUM_CLOCK_ID_FPGA 0x0 /* enum */
#define MC_CMD_MUM_CLOCK_ID_DDR 0x1 /* enum */
#define MC_CMD_MUM_CLOCK_ID_NIC 0x2 /* enum */
/* Control flags for clock programming */
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_FLAGS_OFST 8
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_FLAGS_LEN 4
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_OVERCLOCK_110_LBN 0
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_OVERCLOCK_110_WIDTH 1
#define MC_CMD_MUM_IN_PROGRAM_CLOCKS_CLOCK_NIC_FROM_FPGA_LBN 1

 //@ -5082,19 +6303,24 @@
#define MC_CMD_MUM_IN_FPGA_LOAD_LEN 8

/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
/* MC_CMD_MUM_IN_CMD_LEN 4 */
/* Enable/Disable FPGA config from flash */
#define MC_CMD_MUM_IN_FPGA_LOAD_ENABLE_OFST 4
#define MC_CMD_MUM_IN_FPGA_LOAD_ENABLE_LEN 4

/* MC_CMD_MUM_IN_READ_ATB_SENSOR msgrequest */
#define MC_CMD_MUM_IN_READ_ATB_SENSOR_LEN 4

/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
/* MC_CMD_MUM_IN_CMD_LEN 4 */

/* MC_CMD_MUM_IN_QSFP msgrequest */
#define MC_CMD_MUM_IN_QSFP_LEN 12

/* MUM cmd header */
/* MC_CMD_MUM_IN_CMD_OFST 0 */
/* MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_QSFP_HDR_OFST 4
#define MC_CMD_MUM_IN_QSFP_HDR_LEN 4
#define MC_CMD_MUM_IN_QSFP_OPCODE_LBN 0
#define MC_CMD_MUM_IN_QSFP_OPCODE_WIDTH 4
#define MC_CMD_MUM_IN_QSFP_INIT 0x0 /* enum */
#define MC_CMD_MUM_IN_QSFP_FILL_STATS 0x4 /* enum */

//@ -5104,52 +6330,77 @@
/* MC_CMD_MUM_IN_QSFP_INIT msgrequest */
#define MC_CMD_MUM_IN_QSFP_INIT_LEN 16
/
+/* MC_CMD_MUM_IN_CMD_OFST 0 */
+/* MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_QSFP_INIT_HDR_OFST 4
+=define MC_CMD_MUM_IN_QSFP_INIT_HDR_LEN 4
#define MC_CMD_MUM_IN_QSFP_INIT_IDX_OFST 8
+=define MC_CMD_MUM_IN_QSFP_INIT_IDX_LEN 4
#define MC_CMD_MUM_IN_QSFP_INIT_CAGE_OFST 12
+=define MC_CMD_MUM_IN_QSFP_INIT_CAGE_LEN 4
/* MC_CMD_MUM_IN_QSFP_RECONFIGURE msgrequest */
#define MC_CMD_MUM_IN_QSFP_RECONFIGURE_LEN 24
/
+/* MC_CMD_MUM_IN_CMD_OFST 0 */
+/* MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_QSFP_RECONFIGURE_HDR_OFST 4
+=define MC_CMD_MUM_IN_QSFP_RECONFIGURE_HDR_LEN 4
#define MC_CMD_MUM_IN_QSFP_RECONFIGURE_IDX_OFST 8
+=define MC_CMD_MUM_IN_QSFP_RECONFIGURE_IDX_LEN 4
#define MC_CMD_MUM_IN_QSFP_RECONFIGURE_TX_DISABLE_OFST 12
+=define MC_CMD_MUM_IN_QSFP_RECONFIGURE_TX_DISABLE_LEN 4
#define MC_CMD_MUM_IN_QSFP_RECONFIGURE_PORT_LANES_OFST 16
+=define MC_CMD_MUM_IN_QSFP_RECONFIGURE_PORT_LANES_LEN 4
#define MC_CMD_MUM_IN_QSFP_RECONFIGURE_PORT_LINK_SPEED_OFST 20
+=define MC_CMD_MUM_IN_QSFP_RECONFIGURE_PORT_LINK_SPEED_LEN 4
/* MC_CMD_MUM_IN_QSFP_GET_SUPPORTED_CAP msgrequest */
#define MC_CMD_MUM_IN_QSFP_GET_SUPPORTED_CAP_LEN 12
/
+/* MC_CMD_MUM_IN_CMD_OFST 0 */
+/* MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_QSFP_GET_SUPPORTED_CAP_HDR_OFST 4
+=define MC_CMD_MUM_IN_QSFP_GET_SUPPORTED_CAP_HDR_LEN 4
#define MC_CMD_MUM_IN_QSFP_GET_SUPPORTED_CAP_IDX_OFST 8
+=define MC_CMD_MUM_IN_QSFP_GET_SUPPORTED_CAP_IDX_LEN 4
/* MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO msgrequest */
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_LEN 16
/
+/* MC_CMD_MUM_IN_CMD_OFST 0 */
+/* MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_HDR_OFST 4
+=define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_HDR_LEN 4
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_IDX_OFST 8
+=define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_IDX_LEN 4
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_PAGE_OFST 12
/* MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO msgrequest */
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_LEN 16
/
+/* MC_CMD_MUM_IN_CMD_OFST 0 */
+/* MC_CMD_MUM_IN_CMD_LEN 4 */
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_HDR_OFST 4
+=define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_HDR_LEN 4
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_IDX_OFST 8
+=define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_IDX_LEN 4
#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_PAGE_OFST 12
+\#define MC_CMD_MUM_IN_QSFP_GET_MEDIA_INFO_PAGE_LEN 4

/* MC_CMD_MUM_IN_QSFP_FILL_STATS msgrequest */
\#define MC_CMD_MUM_IN_QSFP_FILL_STATS_LEN 12
/*            MC_CMD_MUM_IN_CMD_OFST 0 */
+/*            MC_CMD_MUM_IN_CMD_LEN 4 */
\#define MC_CMD_MUM_IN_QSFP_FILL_STATS_HDR_OFST 4
+\#define MC_CMD_MUM_IN_QSFP_FILL_STATS_HDR_LEN 4
\#define MC_CMD_MUM_IN_QSFP_FILL_STATS_IDX_OFST 8
+\#define MC_CMD_MUM_IN_QSFP_FILL_STATS_IDX_LEN 4

/* MC_CMD_MUM_IN_QSFP_POLL_BIST msgrequest */
\#define MC_CMD_MUM_IN_QSFP_POLL_BIST_LEN 12
/*            MC_CMD_MUM_IN_CMD_OFST 0 */
+/*            MC_CMD_MUM_IN_CMD_LEN 4 */
\#define MC_CMD_MUM_IN_QSFP_POLL_BIST_HDR_OFST 4
+\#define MC_CMD_MUM_IN_QSFP_POLL_BIST_HDR_LEN 4
\#define MC_CMD_MUM_IN_QSFP_POLL_BIST_IDX_OFST 8
+\#define MC_CMD_MUM_IN_QSFP_POLL_BIST_IDX_LEN 4

/* MC_CMD_MUM_IN_READ_DDR_INFO msgrequest */
\#define MC_CMD_MUM_IN_READ_DDR_INFO_LEN 4
/* MUM cmd header */
/*            MC_CMD_MUM_IN_CMD_OFST 0 */
+/*            MC_CMD_MUM_IN_CMD_LEN 4 */

/* MC_CMD_MUM_OUT msgresponse */
\#define MC_CMD_MUM_OUT_LEN 0
@@ -5160,6 +6411,7 @@
/* MC_CMD_MUM_OUT_GET_VERSION msgresponse */
\#define MC_CMD_MUM_OUT_GET_VERSION_LEN 12
\#define MC_CMD_MUM_OUT_GET_VERSION_FIRMWARE_OFST 0
+\#define MC_CMD_MUM_OUT_GET_VERSION_FIRMWARE_LEN 4
\#define MC_CMD_MUM_OUT_GET_VERSION_VERSION_OFST 4
\#define MC_CMD_MUM_OUT_GET_VERSION_VERSION_LEN 8
\#define MC_CMD_MUM_OUT_GET_VERSION_VERSION_LO_OFST 4
@@ -5197,8 +6449,10 @@
\#define MC_CMD_MUM_OUT_GPIO_IN_READ_LEN 8
/* The first 32-bit word read from the GPIO IN register. */
\#define MC_CMD_MUM_OUT_GPIO_IN_READ_GPIOMASK1_OFST 0
+\#define MC_CMD_MUM_OUT_GPIO_IN_READ_GPIOMASK1_LEN 4
/* The second 32-bit word read from the GPIO IN register. */
\#define MC_CMD_MUM_OUT_GPIO_IN_READ_GPIOMASK2_OFST 4
+\#define MC_CMD_MUM_OUT_GPIO_IN_READ_GPIOMASK2_LEN 4

/* MC_CMD_MUM_OUT_GPIO_OUT_WRITE msgresponse */
\#define MC_CMD_MUM_OUT_GPIO_OUT_WRITE_LEN 0
@@ -5207,8 +6461,10 @@
#define MC_CMD_MUM_OUT_GPIO_OUT_READ_LEN 8
/* The first 32-bit word read from the GPIO OUT register. */
#define MC_CMD_MUM_OUT_GPIO_OUT_READ_GPIOMASK1_OFST 0
+#define MC_CMD_MUM_OUT_GPIO_OUT_READ_GPIOMASK1_LEN 4
/* The second 32-bit word read from the GPIO OUT register. */
#define MC_CMD_MUM_OUT_GPIO_OUT_READ_GPIOMASK2_OFST 4
+#define MC_CMD_MUM_OUT_GPIO_OUT_READ_GPIOMASK2_LEN 4

/* MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_WRITE msgresponse */
#define MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_WRITE_LEN 0
@@ -5216,11 +6472,14 @@
/* MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_READ msgresponse */
#define MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_READ_LEN 8
#define MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_READ_GPIOMASK1_OFST 0
+#define MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_READ_GPIOMASK1_LEN 4
#define MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_READ_GPIOMASK2_OFST 4
+#define MC_CMD_MUM_OUT_GPIO_OUT_ENABLE_READ_GPIOMASK2_LEN 4

/* MC_CMD_MUM_OUT_GPIO_OP_OUT_READ msgresponse */
#define MC_CMD_MUM_OUT_GPIO_OP_OUT_READ_LEN 4
#define MC_CMD_MUM_OUT_GPIO_OP_OUT_READ_BIT_READ_OFST 0
+#define MC_CMD_MUM_OUT_GPIO_OP_OUT_READ_BIT_READ_LEN 4
/* MC_CMD_MUM_OUT_GPIO_OP_OUT_WRITE msgresponse */
#define MC_CMD_MUM_OUT_GPIO_OP_OUT_WRITE_LEN 0
@@ -5249,6 +6508,7 @@
/* MC_CMD_MUM_OUT_PROGRAM_CLOCKS msgresponse */
#define MC_CMD_MUM_OUT_PROGRAM_CLOCKS_LEN 4
#define MC_CMD_MUM_OUT_PROGRAM_CLOCKS_OK_MASK_OFST 0
+#define MC_CMD_MUM_OUT_PROGRAM_CLOCKS_OK_MASK_LEN 4
/* MC_CMD_MUM_OUT_FPGA_LOAD msgresponse */
#define MC_CMD_MUM_OUT_FPGA_LOAD_LEN 0
@@ -5256,6 +6516,7 @@
/* MC_CMD_MUM_OUT_READ_ATB_SENSOR msgresponse */
#define MC_CMD_MUM_OUT_READ_ATB_SENSOR_LEN 4
#define MC_CMD_MUM_OUT_READ_ATB_SENSOR_RESULT_OFST 0
+#define MC_CMD_MUM_OUT_READ_ATB_SENSOR_RESULT_LEN 4
/* MC_CMD_MUM_OUT_QSFP_INIT msgresponse */
#define MC_CMD_MUM_OUT_QSFP_INIT_LEN 0
@@ -5263,7 +6524,9 @@
/* MC_CMD_MUM_OUT_QSFP_RECONFIGURE msgresponse */
#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_LEN 8
#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_PORT_PHY_LP_CAP_OFST 0
+#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_PORT_PHY_LP_CAP_LEN 4
#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_PORT_PHY_FLAGS_OFST 4
+#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_PORT_PHY_FLAGS_LEN 4
#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_PORT_PHY_READY_LBN 0
#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_PORT_PHY_READY_WIDTH 1
#define MC_CMD_MUM_OUT_QSFP_RECONFIGURE_PORT_PHY_LINK_UP_LBN 1
@@ -5272,6 +6535,7 @@
 /* MC_CMD_MUM_OUT_QSFP_GET_SUPPORTED_CAP msgresponse */
 #define MC_CMD_MUM_OUT_QSFP_GET_SUPPORTED_CAP_LEN 4
 #define MC_CMD_MUM_OUT_QSFP_GET_SUPPORTED_CAP_PORT_PHY_LP_CAP_OFST 0
+#define MC_CMD_MUM_OUT_QSFP_GET_SUPPORTED_CAP_PORT_PHY_LP_CAP_LEN 4

 /* MC_CMD_MUM_OUT_QSFP_GET_MEDIA_INFO msgresponse */
 #define MC_CMD_MUM_OUT_QSFP_GET_MEDIA_INFO_LENMIN 5
@@ -5279,6 +6543,7 @@
 #define MC_CMD_MUM_OUT_QSFP_GET_MEDIA_INFO_LEN(num) (4+1*(num))
 /* in bytes */
 #define MC_CMD_MUM_OUT_QSFP_GET_MEDIA_INFO_DATALEN_OFST 0
+#define MC_CMD_MUM_OUT_QSFP_GET_MEDIA_INFO_DATALEN_LEN 4
 #define MC_CMD_MUM_OUT_QSFP_GET_MEDIA_INFO_DATA_OFST 4
 #define MC_CMD_MUM_OUT_QSFP_GET_MEDIA_INFO_DATA_LEN 1
@@ -5287,11 +6552,14 @@
 /* MC_CMD_MUM_OUT_QSFP_FILL_STATS msgresponse */
 #define MC_CMD_MUM_OUT_QSFP_FILL_STATS_LEN 8
 #define MC_CMD_MUM_OUT_QSFP_FILL_STATS_PORT_PHY_STATS_PMA_PMD_LINK_UP_OFST 0
+#define MC_CMD_MUM_OUT_QSFP_FILL_STATS_PORT_PHY_STATS_PMA_PMD_LINK_UP_LEN 4
 #define MC_CMD_MUM_OUT_QSFP_FILL_STATS_PORT_PHY_STATS_PCS_LINK_UP_OFST 4
+#define MC_CMD_MUM_OUT_QSFP_FILL_STATS_PORT_PHY_STATS_PCS_LINK_UP_LEN 4

 /* MC_CMD_MUM_OUT_QSFP_POLL_BIST msgresponse */
 #define MC_CMD_MUM_OUT_QSFP_POLL_BIST_LEN 4
+#define MC_CMD_MUM_OUT_QSFP_POLL_BIST_TEST_OFST 0
+#define MC_CMD_MUM_OUT_QSFP_POLL_BIST_TEST_LEN 4

 /* MC_CMD_MUM_OUT_READ_DDR_INFO msgresponse */
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_LENMIN 24
@@ -5299,12 +6567,14 @@
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_NUM_RECORDS_OFST 4
+#define MC_CMD_MUM_OUT_READ_DDR_INFO_NUM_RECORDS_LEN 4
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_SODIMM_INFO_RECORD_OFST 8

 /* Discrete (soldered) DDR resistor strap info */
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_DISCRETE_DDR_INFO_OFST 0
+#define MC_CMD_MUM_OUT_READ_DDR_INFO_DISCRETE_DDR_INFO_LEN 4
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_VRATIO_LBN 0
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_VRATIO_WIDTH 16
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_RESERVED1_LBN 16
 #define MC_CMD_MUM_OUT_READ_DDR_INFO_RESERVED1_WIDTH 16
/* Number of SODIMM info records */
#define MC_CMD_MUM_OUT_READ_DDR_INFO_NUM_RECORDS_OFST 4
+#define MC_CMD_MUM_OUT_READ_DDR_INFO_NUM_RECORDS_LEN 4
/* Array of SODIMM info records */
#define MC_CMD_MUM_OUT_READ_DDR_INFO_SODIMM_INFO_RECORD_OFST 8
```c
#define MC_CMD_MUM_OUT_READ_DDR_INFO_SODIMM_INFO_RECORD_LEN 8
@@ -5365,18 +6635,19 @@
/* EVB_PORT_ID structuredef */
#define EVB_PORT_ID_LEN 4
#define EVB_PORT_ID_PORT_ID_OFST 0
+#define EVB_PORT_ID_PORT_ID_LEN 4
/* enum: An invalid port handle. */
-#define EVB_PORT_ID_NULL 0x0
+-define EVB_PORT_ID_NULL 0x0
/* enum: The port assigned to this function.. */
-define EVB_PORT_ID_ASSIGNED 0x1000000
+define EVB_PORT_ID_ASSIGNED 0x1000000
/* enum: External network port 0 */
-define EVB_PORT_ID_MAC0 0x2000000
+define EVB_PORT_ID_MAC0 0x2000000
/* enum: External network port 1 */
-define EVB_PORT_ID_MAC1 0x2000001
+define EVB_PORT_ID_MAC1 0x2000001
/* enum: External network port 2 */
-define EVB_PORT_ID_MAC2 0x2000002
+define EVB_PORT_ID_MAC2 0x2000002
/* enum: External network port 3 */
-define EVB_PORT_ID_MAC3 0x2000003
+define EVB_PORT_ID_MAC3 0x2000003
#define EVB_PORT_ID_PORT_ID_LBN 0
#define EVB_PORT_ID_PORT_ID_WIDTH 32
@@ -5388,7 +6659,7 @@
#define EVB_VLAN_TAG_MODE_LBN 12
#define EVB_VLAN_TAG_MODE_WIDTH 4
/* enum: Insert the VLAN. */
-define EVB_VLAN_TAG_INSERT 0x0
+-define EVB_VLAN_TAG_INSERT 0x0
/* enum: Replace the VLAN if already present. */
#define EVB_VLAN_TAG_REPLACE 0x1
@@ -5417,115 +6688,149 @@
#define NVRAM_PARTITION_TYPE_ID_OFST 0
#define NVRAM_PARTITION_TYPE_ID_LEN 2
/* enum: Primary MC firmware partition */
-define NVRAM_PARTITION_TYPE_MC_FIRMWARE 0x100
+define NVRAM_PARTITION_TYPE_MC_FIRMWARE 0x100
/* enum: Secondary MC firmware partition */
-define NVRAM_PARTITION_TYPE_MC_FIRMWARE_BACKUP 0x200
+define NVRAM_PARTITION_TYPE_MC_FIRMWARE_BACKUP 0x200
/* enum: Expansion ROM partition */
-define NVRAM_PARTITION_TYPE_EXPANSION_ROM 0x300
+define NVRAM_PARTITION_TYPE_EXPANSION_ROM 0x300
```

/* enum: Static configuration TLV partition */
#define NVRAM_PARTITION_TYPE_STATIC_CONFIG 0x400

/* enum: Dynamic configuration TLV partition */
#define NVRAM_PARTITION_TYPE_DYNAMIC_CONFIG 0x500

/* enum: Expansion ROM configuration data for port 0 */
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT0 0x600
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT0 0x600

/* enum: Synonym for EXPROM_CONFIG_PORT0 as used in pmap files */
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG 0x600
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG 0x600

/* enum: Expansion ROM configuration data for port 1 */
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT1 0x601
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT1 0x601

/* enum: Expansion ROM configuration data for port 2 */
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT2 0x602
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT2 0x602

/* enum: Expansion ROM configuration data for port 3 */
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT3 0x603
#define NVRAM_PARTITION_TYPE_EXPROM_CONFIG_PORT3 0x603

/* enum: Non-volatile log output partition */
#define NVRAM_PARTITION_TYPE_LOG 0x700
#define NVRAM_PARTITION_TYPE_LOG 0x700

/* enum: Non-volatile log output of second core on dual-core device */
#define NVRAM_PARTITION_TYPE_LOG_SLAVE 0x701
#define NVRAM_PARTITION_TYPE_LOG_SLAVE 0x701

/* enum: Device state dump output partition */
#define NVRAM_PARTITION_TYPE_DUMP 0x800
#define NVRAM_PARTITION_TYPE_DUMP 0x800

/* enum: Application license key storage partition */
#define NVRAM_PARTITION_TYPE_LICENSE 0x900
#define NVRAM_PARTITION_TYPE_LICENSE 0x900

/* enum: Start of range used for PHY partitions (low 8 bits are the PHY ID) */
#define NVRAM_PARTITION_TYPE_PHY_MIN 0xa00
#define NVRAM_PARTITION_TYPE_PHY_MIN 0xa00

/* enum: End of range used for PHY partitions (low 8 bits are the PHY ID) */
#define NVRAM_PARTITION_TYPE_PHY_MAX 0xff
#define NVRAM_PARTITION_TYPE_PHY_MAX 0xff

/* enum: Primary FPGA partition */
#define NVRAM_PARTITION_TYPE_FPGA 0xb00
#define NVRAM_PARTITION_TYPE_FPGA 0xb00

/* enum: Secondary FPGA partition */
#define NVRAM_PARTITION_TYPE_FPGA_BACKUP 0xb01
#define NVRAM_PARTITION_TYPE_FPGA_BACKUP 0xb01

/* enum: FC firmware partition */
#define NVRAM_PARTITION_TYPE_FC_FIRMWARE 0xb02
#define NVRAM_PARTITION_TYPE_FC_FIRMWARE 0xb02
/* enum: FC License partition */
-#define NVRAM_PARTITION_TYPE_FC_LICENSE 0xb03
+#define NVRAM_PARTITION_TYPE_FC_LICENSE 0xb03
/* enum: Non-volatile log output partition for FC */
-#define NVRAM_PARTITION_TYPE_FC_LOG 0xb04
+#define NVRAM_PARTITION_TYPE_FC_LOG 0xb04
/* enum: MUM firmware partition */
-#define NVRAM_PARTITION_TYPE_MUM_FIRMWARE 0xc00
+#define NVRAM_PARTITION_TYPE_MUM_FIRMWARE 0xc00
/* enum: SUC firmware partition (this is intentionally an alias of */
+ * MUM_FIRMWARE)
+ */
+#define NVRAM_PARTITION_TYPE_SUC_FIRMWARE 0xc00
/* enum: MUM Non-volatile log output partition. */
-#define NVRAM_PARTITION_TYPE_MUM_LOG 0xc01
+#define NVRAM_PARTITION_TYPE_MUM_LOG 0xc01
/* enum: MUM Application table partition. */
-#define NVRAM_PARTITION_TYPE_MUM_APPTABLE 0xc02
+#define NVRAM_PARTITION_TYPE_MUM_APPTABLE 0xc02
/* enum: MUM boot rom partition. */
-#define NVRAM_PARTITION_TYPE_MUM_BOOT_ROM 0xc03
+#define NVRAM_PARTITION_TYPE_MUM_BOOT_ROM 0xc03
/* enum: MUM production signatures & calibration rom partition. */
-#define NVRAM_PARTITION_TYPE_MUM_PROD_ROM 0xc04
+#define NVRAM_PARTITION_TYPE_MUM_PROD_ROM 0xc04
/* enum: MUM user signatures & calibration rom partition. */
-#define NVRAM_PARTITION_TYPE_MUM_USER_ROM 0xc05
+#define NVRAM_PARTITION_TYPE_MUM_USER_ROM 0xc05
/* enum: MUM fuses and lockbits partition. */
-#define NVRAM_PARTITION_TYPE_MUM_FUSELOCK 0xc06
+#define NVRAM_PARTITION_TYPE_MUM_FUSELOCK 0xc06
/* enum: UEFI expansion ROM if separate from PXE */
-#define NVRAM_PARTITION_TYPE_EXPANSION_UEFI 0xd00
/* enum: Spare partition 0 */
-#define NVRAM_PARTITION_TYPE_SPARE_0 0x1000
+#define NVRAM_PARTITION_TYPE_EXPANSION_UEFI 0xd00
+/* enum: Used by the expansion ROM for logging */
+#define NVRAM_PARTITION_TYPE_PXE_LOG 0x1000
/* enum: Used for XIP code of shmbooted images */
-#define NVRAM_PARTITION_TYPE_XIP_SCRATCH 0x1100
+#define NVRAM_PARTITION_TYPE_XIP_SCRATCH 0x1100
/* enum: Spare partition 2 */
-#define NVRAM_PARTITION_TYPE_SPARE_2 0x1200
+#define NVRAM_PARTITION_TYPE_SPARE_2 0x1200
/* enum: Manufacturing partition. Used during manufacture to pass information */
* between XJTAG and Manftest.
*/
-#define NVRAM_PARTITION_TYPE_MANUFACTURING 0x1300
/* enum: Spare partition 4 */
#define NVRAM_PARTITION_TYPE_SPARE_4 0x1400

/* enum: Spare partition 5 */
#define NVRAM_PARTITION_TYPE_SPARE_5 0x1500

/* enum: Partition for reporting MC status. See mc_flash_layout.h */
#define NVRAM_PARTITION_TYPE_STATUS 0x1600

/* enum: Spare partition 13 */
#define NVRAM_PARTITION_TYPE_SPARE_13 0x1700

/* enum: Spare partition 14 */
#define NVRAM_PARTITION_TYPE_SPARE_14 0x1800

/* enum: Spare partition 15 */
#define NVRAM_PARTITION_TYPE_SPARE_15 0x1900

/* enum: Spare partition 16 */
#define NVRAM_PARTITION_TYPE_SPARE_16 0x1a00

/* enum: Factory defaults for dynamic configuration */
#define NVRAM_PARTITION_TYPE_DYNCONFIG_DEFAULTS 0x1b00

/* enum: Factory defaults for expansion ROM configuration */
#define NVRAM_PARTITION_TYPE_ROMCONFIG_DEFAULTS 0x1c00

/* enum: Field Replaceable Unit inventory information for use on IPMI */
#define NVRAM_PARTITION_TYPE_FRU_INFORMATION 0x1d00

/* enum: Start of reserved value range (firmware may use for any purpose) */
#define NVRAM_PARTITION_TYPE_RESERVED_VALUES_MIN 0xff00

/* enum: End of reserved value range (firmware may use for any purpose) */
#define NVRAM_PARTITION_TYPE_RESERVED_VALUES_MAX 0xfffd

/* enum: Recovery partition map (provided if real map is missing or corrupt) */
#define NVRAM_PARTITION_TYPE_RECOVERY_MAP 0xfffe

/* enum: Partition map (real map as stored in flash) */
#define NVRAM_PARTITION_TYPE_PARTITION_MAP 0xffff

/* LICENSED_APP_ID structuredef */
#define LICENSED_APP_ID_LEN 4
#define LICENSED_APP_ID_ID_OFST 0
#define LICENSED_APP_ID_ID_LEN 4

/* enum: OpenOnload */
#define LICENSED_APP_ID_ONLOAD 0x1
/* enum: PTP timestamping */
#define LICENSED_APP_ID_PTP 0x2
/* enum: SolarCapture Pro */
#define LICENSED_APP_ID_SOLARCAPTURE_PRO 0x4
/* enum: SolarSecure filter engine */
#define LICENSED_APP_ID_SOLARSECURE 0x8
/* enum: Performance monitor */
#define LICENSED_APP_ID_PERF_MONITOR 0x10
/* enum: SolarCapture Live */
#define LICENSED_APP_ID_SOLARCAPTURE_LIVE 0x20
/* enum: Capture SolarSystem */
#define LICENSED_APP_ID_CAPTURE_SOLARSYSTEM 0x40
/* enum: Network Access Control */
#define LICENSED_APP_ID_NETWORK_ACCESS_CONTROL 0x80
/* enum: TCP Direct */
#define LICENSED_APP_ID_TCP_DIRECT 0x100
/* enum: Low Latency */
#define LICENSED_APP_ID_LOW_LATENCY 0x200
/* enum: SolarCapture Tap */
#define LICENSED_APP_ID_SOLARCAPTURE_TAP 0x400
/* enum: Capture SolarSystem 40G */
#define LICENSED_APP_ID_CAPTURE_SOLARSYSTEM_40G 0x800
#define LICENSED_APP_ID_ID_LBN 0
#define LICENSED_APP_ID_ID_WIDTH 32
#define LICENSED_V3_APPS_SOLARCAPTURE_TAP_WIDTH 1
#define LICENSED_V3_APPS_CAPTURE_SOLARSYSTEM_40G_LBN 11

@@ -5590,6 +6895,14 @@
#define LICENSED_V3_APPS_SOLARCAPTURE_TAP_WIDTH 1
#define LICENSED_V3_APPS_CAPTURE_SOLARSYSTEM_40G_LBN 11

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define LICENSED_V3_APPS_CAPTURE_SOLARSYSTEM_40G_WIDTH 1
+\define LICENSED_V3_APPS_CAPTURE_SOLARSYSTEM_1G_LBN 12
+\define LICENSED_V3_APPS_CAPTURE_SOLARSYSTEM_1G_WIDTH 1
+\define LICENSED_V3_APPS_SCALEOUT_ONLOAD_LBN 13
+\define LICENSED_V3_APPS_SCALEOUT_ONLOAD_WIDTH 1
+\define LICENSED_V3_APPS_DSHBRD_LBN 14
+\define LICENSED_V3_APPS_DSHBRD_WIDTH 1
+\define LICENSED_V3_APPS_SCATRD_LBN 15
+\define LICENSED_V3_APPS_SCATRD_WIDTH 1
\define LICENSED_V3_APPS_MASK_LBN 0
\define LICENSED_V3_APPS_MASK_WIDTH 64

@@ -5635,11 +6948,23 @@
\define TX_TIMESTAMP_EVENT_TX_EV_TYPE_OFST 3
\define TX_TIMESTAMP_EVENT_TX_EV_TYPE_LEN 1
/* enum: This is a TX completion event, not a timestamp */
-\define TX_TIMESTAMP_EVENT_TX_EV_TYPE_TX_EV_COMPLETION 0x0
+\define TX_TIMESTAMP_EVENT_TX_EV_TYPE_TX_EV_COMPLETION 0x0
+/* enum: This is a TX completion event for a CTPIO transmit. The event format
+ * is the same as for TX_EV_COMPLETION.
+ */
+\define TX_TIMESTAMP_EVENT_TX_EV_TX_EV_COMPLETION 0x011
+/* enum: This is the low part of a TX timestamp for a CTPIO transmission. The
+ * event format is the same as for TX_EV_TSTAMP_LO
+ */
+\define TX_TIMESTAMP_EVENT_TX_EV_TX_EV_TSTAMP_LO 0x12
+/* enum: This is the high part of a TX timestamp for a CTPIO transmission. The
+ * event format is the same as for TX_EV_TSTAMP_HI
+ */
+\define TX_TIMESTAMP_EVENT_TX_EV_TX_EV_TSTAMP_HI 0x13
+/* enum: This is the low part of a TX timestamp event */
-\define TX_TIMESTAMP_EVENT_TX_EV_TX_EV_TSTAMP_LO 0x51
+\define TX_TIMESTAMP_EVENT_TX_EV_TX_EV_TSTAMP_LO 0x51
+/* enum: This is the high part of a TX timestamp event */
-\define TX_TIMESTAMP_EVENT_TX_EV_TX_EV_TSTAMP_HI 0x52
+\define TX_TIMESTAMP_EVENT_TX_EV_TX_EV_TSTAMP_HI 0x52
\define TX_TIMESTAMP_EVENT_TX_EV_TYPE_LBN 24
\define TX_TIMESTAMP_EVENT_TX_EV_TYPE_WIDTH 8
/* upper 16 bits of timestamp data */
@@ -5669,6 +6994,19 @@
\define RSS_MODE_HASH_SELECTOR_LBN 0
\define RSS_MODE_HASH_SELECTOR_WIDTH 8

+/* CTPIO_STATS_MAP structuredef */
+\define CTPIO_STATS_MAP_LEN 4
+/* The (function relative) VI number */
+\define CTPIO_STATS_MAP_VI_OFST 0
+\define CTPIO_STATS_MAP_VI_LEN 2
+define CTPIO_STATS_MAP_VI_LBN 0
+define CTPIO_STATS_MAP_VI_WIDTH 16
/* The target bucket for the VI */
+define CTPIO_STATS_MAP_BUCKET_OFST 2
+define CTPIO_STATS_MAP_BUCKET_LEN 2
+define CTPIO_STATS_MAP_BUCKET_LBN 16
+define CTPIO_STATS_MAP_BUCKET_WIDTH 16
+
/*****************************/
/* MC_CMD_READ_REGS*/
@@ -5676,7 +7014,7 @@
*/
#define MC_CMD_READ_REGS 0x50
#define MC_CMD_0x50_PRIVILEGE_CTG SRIOV_CTG_ADMIN
/* MC_CMD_READ_REGS_IN msgrequest */
#define MC_CMD_READ_REGS_IN_LEN 0
@@ -5709,17 +7047,22 @@
#define MC_CMD_INIT_EVQ_IN_SIZE_OFST 0
#define MC_CMD_INIT_EVQ_IN_SIZE_LEN 4
/* Desired instance. Must be set to a specific instance, which is a function */
#define MC_CMD_INIT_EVQ_IN_INSTANCE_OFST 4
#define MC_CMD_INIT_EVQ_IN_INSTANCE_LEN 4
/* The initial timer value. The load value is ignored if the timer mode is DIS. */
#define MC_CMD_INIT_EVQ_IN_TMR_LOAD_OFST 8
#define MC_CMD_INIT_EVQ_IN_TMR_LOAD_LEN 4
/* The reload value is ignored in one-shot modes */
#define MC_CMD_INIT_EVQ_IN_TMR_RELOAD_OFST 12
#define MC_CMD_INIT_EVQ_IN_TMR_RELOAD_LEN 4
/* tbd */
#define MC_CMD_INIT_EVQ_IN_FLAGS_OFST 16
#define MC_CMD_INIT_EVQ_IN_FLAGS_LEN 4
#define MC_CMD_INIT_EVQ_IN_FLAG_INTERRUPTING_LBN 0
#define MC_CMD_INIT_EVQ_IN_FLAG_INTERRUPTING_WIDTH 1
#define MC_CMD_INIT_EVQ_IN_FLAG_RPTR_DOS_LBN 1
#define MC_CMD_INIT_EVQ_IN_FLAG_RPTR_DOS_WIDTH 1
#define MC_CMD_INIT_EVQ_IN_FLAG_USE_TIMER_LBN 6
#define MC_CMD_INIT_EVQ_IN_FLAG_USE_TIMER_WIDTH 1
#define MC_CMD_INIT_EVQ_IN_TMR_MODE_OFST 20
#define MC_CMD_INIT_EVQ_IN_TMR_MODE_LEN 4
/* enum: Disabled */
#define      MC_CMD_INIT_EVQ_IN_TMR_MODE_DIS 0x0
/* enum: Immediate */
#define      MC_CMD_INIT_EVQ_IN_TMR_INT_HLDOFF 0x3
/* Target EVQ for wakeups if in wakeup mode. */
#define      MC_CMD_INIT_EVQ_IN_TARGET_EVQ_OFST 24
#define      MC_CMD_INIT_EVQ_IN_TARGET_EVQ_LEN 4
/* Target interrupt if in interrupting mode (note union with target EVQ). Use
* purposes. */
#define      MC_CMD_INIT_EVQ_IN_IRQ_NUM_OFST 24
#define      MC_CMD_INIT_EVQ_IN_IRQ_NUM_LEN 4
/* Event Counter Mode. */
#define      MC_CMD_INIT_EVQ_IN_COUNT_MODE_OFST 28
#define      MC_CMD_INIT_EVQ_IN_COUNT_MODE_LEN 4
/* enum: Disabled */
#define      MC_CMD_INIT_EVQ_IN_COUNT_MODE_RXTX 0x3
/* Event queue packet count threshold. */
#define      MC_CMD_INIT_EVQ_IN_COUNT_THRSHLD_OFST 32
#define      MC_CMD_INIT_EVQ_IN_COUNT_THRSHLD_LEN 4
/* 64-bit address of 4k of 4k-aligned host memory buffer */
#define      MC_CMD_INIT_EVQ_IN_DMA_ADDR_OFST 36
#define      MC_CMD_INIT_EVQ_IN_DMA_ADDR_LEN 8
#define    MC_CMD_INIT_EVQ_OUT_LEN 4
/* Only valid if INTRFLAG was true */
#define      MC_CMD_INIT_EVQ_OUT_IRQ_OFST 0
#define      MC_CMD_INIT_EVQ_OUT_IRQ_LEN 4

/* MC_CMD_INIT_EVQ_V2_IN msgrequest */
#define      MC_CMD_INIT_EVQ_V2_IN_LENMIN 44
#define      MC_CMD_INIT_EVQ_V2_IN_LEN(num) (36+8*(num))
/* Size, in entries */
#define      MC_CMD_INIT_EVQ_V2_IN_SIZE_OFST 0
#define      MC_CMD_INIT_EVQ_V2_IN_SIZE_LEN 4
/* Desired instance. Must be set to a specific instance, which is a function
* local queue index. */
#define      MC_CMD_INIT_EVQ_V2_IN_INSTANCE_OFST 4
#define      MC_CMD_INIT_EVQ_V2_IN_INSTANCE_LEN 4
/* The initial timer value. The load value is ignored if the timer mode is DIS. */
#define MC_CMD_INIT_EVQ_V2_IN_TMR_LOAD_OFST 8
+#define MC_CMD_INIT_EVQ_V2_IN_TMR_LOAD_LEN 4
/* The reload value is ignored in one-shot modes */
#define MC_CMD_INIT_EVQ_V2_IN_TMR_RELOAD_OFST 12
+#define MC_CMD_INIT_EVQ_V2_IN_TMR_RELOAD_LEN 4
/* tbd */
#define MC_CMD_INIT_EVQ_V2_IN_FLAGS_OFST 16
+#define MC_CMD_INIT_EVQ_V2_IN_FLAGS_LEN 4
#define MC_CMD_INIT_EVQ_V2_IN_FLAG_INTERRUPTING_LBN 0
#define MC_CMD_INIT_EVQ_V2_IN_FLAG_INTERRUPTING_WIDTH 1
#define MC_CMD_INIT_EVQ_V2_IN_FLAG_RPTR_DOS_LBN 1
@@ -5828,6 +7182,7 @@
 */
#define          MC_CMD_INIT_EVQ_V2_IN_FLAG_TYPE_AUTO 0x3
#define MC_CMD_INIT_EVQ_V2_IN_TMR_MODE_OFST 20
+#define MC_CMD_INIT_EVQ_V2_IN_TMR_MODE_LEN 4
/* enum: Disabled */
#define          MC_CMD_INIT_EVQ_V2_IN_TMR_MODE_DIS 0x0
/* enum: Immediate */
@@ -5838,13 +7193,16 @@
#define          MC_CMD_INIT_EVQ_V2_IN_TMR_INT_HLDOFF 0x3
/* Target EVQ for wakeups if in wakeup mode. */
#define MC_CMD_INIT_EVQ_V2_IN_TARGET_EVQ_OFST 24
+#define MC_CMD_INIT_EVQ_V2_IN_TARGET_EVQ_LEN 4
/* Target interrupt if in interrupting mode (note union with target EVQ). Use
* MC_CMD_RESOURCE_INSTANCE_ANY unless a specific one required for test
* purposes.
*/
#define MC_CMD_INIT_EVQ_V2_IN_IRQ_NUM_OFST 24
+#define MC_CMD_INIT_EVQ_V2_IN_IRQ_NUM_LEN 4
/* Event Counter Mode. */
#define          MC_CMD_INIT_EVQ_V2_IN_COUNT_MODE_OFST 28
+#define MC_CMD_INIT_EVQ_V2_IN_COUNT_MODE_LEN 4
/* enum: Disabled */
#define          MC_CMD_INIT_EVQ_V2_IN_COUNT_MODE_RXTX 0x3
/* Event queue packet count threshold. */
#define          MC_CMD_INIT_EVQ_V2_IN_COUNT_THRSHLD_OFST 32
+#define MC_CMD_INIT_EVQ_V2_IN_COUNT_THRSHLD_LEN 4
/* 64-bit address of 4k of 4k-aligned host memory buffer */
#define MC_CMD_INIT_EVQ_V2_IN_DMA_ADDR_OFST 36
#define       MC_CMD_INIT_EVQ_V2_IN_DMA_ADDR_LEN 8
@@ -5867,8 +7226,10 @@
#define    MC_CMD_INIT_EVQ_V2_OUT_LEN 8
/* Only valid if INTRFLAG was true */
#define       MC_CMD_INIT_EVQ_V2_OUT_IRQ_OFST 0
/* Actual configuration applied on the card */
#define MC_CMD_INIT_EVQ_V2_OUT_FLAGS_OFST 4
#define MC_CMD_INIT_EVQ_V2_OUT_FLAGS_LEN 4
#define MC_CMD_INIT_EVQ_V2_OUT_FLAG_CUT_THRU_LBN 0
#define MC_CMD_INIT_EVQ_V2_OUT_FLAG_CUT_THRU_WIDTH 1
#define MC_CMD_INIT_EVQ_V2_OUT_FLAG_RX_MERGE_LBN 1

#define QUEUE_CRC_MODE_MODE_LBN 0
#define QUEUE_CRC_MODE_MODE_WIDTH 4
/* enum: No CRC. */
-#define QUEUE_CRC_MODE_NONE 0x0
+#define QUEUE_CRC_MODE_NONE 0x0
/* enum: CRC Fiber channel over ethernet. */
-#define QUEUE_CRC_MODE_FCOE 0x1
+#define QUEUE_CRC_MODE_FCOE 0x1
/* enum: CRC (digest) iSCSI header only. */
-#define QUEUE_CRC_MODE_ISCSI_HDR 0x2
+#define QUEUE_CRC_MODE_ISCSI_HDR 0x2
/* enum: CRC (digest) iSCSI header and payload. */
-#define QUEUE_CRC_MODE_ISCSI 0x3
+#define QUEUE_CRC_MODE_ISCSI 0x3
/* enum: CRC Fiber channel over IP over ethernet. */
-#define QUEUE_CRC_MODE_FCOIPOE 0x4
+#define QUEUE_CRC_MODE_FCOIPOE 0x4
/* enum: CRC MPA. */
-#define QUEUE_CRC_MODE_MPA 0x5
+#define QUEUE_CRC_MODE_MPA 0x5
#define QUEUE_CRC_MODE_SPARE_LBN 4
#define QUEUE_CRC_MODE_SPARE_WIDTH 4

#define MC_CMD_INIT_RXQ_IN_LEN(num) (28+8*(num))
/* The EVQ to receive events. It is an index originally specified to INIT_EVQ */
#define MC_CMD_INIT_RXQ_IN_SIZE_OFST 0
#define MC_CMD_INIT_RXQ_IN_SIZE_LEN 4
/* The value to put in the event data. Check hardware spec. for valid range. */
#define MC_CMD_INIT_RXQ_IN_LABEL_OFST 8
#define MC_CMD_INIT_RXQ_IN_LABEL_LEN 4
/* Desired instance. Must be set to a specific instance, which is a function */
/* local queue index. */
#define MC_CMD_INIT_RXQ_IN_INSTANCE_OFST 12
#define MC_CMD_INIT_RXQ_IN_INSTANCE_LEN 4
/* There will be more flags here. */
#define MC_CMD_INIT_RXQ_IN_FLAGS_OFST 16
+#define MC_CMD_INIT_RXQ_IN_FLAGS_LEN 4
#define MC_CMD_INIT_RXQ_IN_FLAG_BUFF_MODE_LBN 0
#define MC_CMD_INIT_RXQ_IN_FLAG_BUFF_MODE_WIDTH 1
#define MC_CMD_INIT_RXQ_IN_FLAG_HDR_SPLIT_LBN 1
@@ -5945,8 +7311,10 @@
#define MC_CMD_INIT_RXQ_IN_UNUSED_WIDTH 1
/* Owner ID to use if in buffer mode (zero if physical) */
+#define MC_CMD_INIT_RXQ_IN_OWNER_ID_LEN 4
#define MC_CMD_INIT_RXQ_IN_OWNER_ID_OFST 20
/* The port ID associated with the v-adaptor which should contain this DMAQ. */
+#define MC_CMD_INIT_RXQ_IN_PORT_ID_LEN 4
#define MC_CMD_INIT_RXQ_IN_PORT_ID_OFST 24
/* 64-bit address of 4k of 4k-aligned host memory buffer */
#define MC_CMD_INIT_RXQ_IN_DMA_ADDR_OFST 28
#define MC_CMD_INIT_RXQ_IN_DMA_ADDR_LEN 8
@@ -5961,17 +7329,26 @@
#define MC_CMD_INIT_RXQ_EXT_IN_LEN 544
/* Size, in entries */
#define MC_CMD_INIT_RXQ_EXT_IN_SIZE_OFST 0
-/* The EVQ to send events to. This is an index originally specified to INIT_EVQ
+#define MC_CMD_INIT_RXQ_EXT_IN_SIZE_LEN 4
+/* The EVQ to send events to. This is an index originally specified to
+ * INIT_EVQ. If DMA_MODE == PACKED_STREAM this must be equal to INSTANCE.
+ */
#define MC_CMD_INIT_RXQ_EXT_IN_TARGET_EVQ_OFST 4
-/* The value to put in the event data. Check hardware spec. for valid range. */
+#define MC_CMD_INIT_RXQ_EXT_IN_TARGET_EVQ_LEN 4
+/* The value to put in the event data. Check hardware spec. for valid range.
+ * This field is ignored if DMA_MODE == EQUAL_STRIDE_PACKED_STREAM or DMA_MODE
+ * == PACKED_STREAM.
+ */
#define MC_CMD_INIT_RXQ_EXT_IN_LABEL_OFST 8
+#define MC_CMD_INIT_RXQ_EXT_IN_LABEL_LEN 4
/* Desired instance. Must be set to a specific instance, which is a function
 * local queue index.
 */
#define MC_CMD_INIT_RXQ_EXT_IN_INSTANCE_OFST 12
+#define MC_CMD_INIT_RXQ_EXT_IN_INSTANCE_LEN 4
/* There will be more flags here. */
#define MC_CMD_INIT_RXQ_EXT_IN_FLAGS_OFST 16
+#define MC_CMD_INIT_RXQ_EXT_IN_FLAGS_LEN 4
#define MC_CMD_INIT_RXQ_EXT_IN_FLAG_BUFF_MODE_LBN 0
#define MC_CMD_INIT_RXQ_EXT_IN_FLAG_BUFF_MODE_WIDTH 1
#define MC_CMD_INIT_RXQ_EXT_IN_FLAG_HDR_SPLIT_LBN 1
@@ -5989,26 +7366,35 @@
#define MC_CMD_INIT_RXQ_EXT_IN_DMA_MODE_LBN 10
#define        MC_CMD_INIT_RXQ_EXT_IN_DMA_MODE_WIDTH 4
/* define: One packet per descriptor (for normal networking) */
-#define        MC_CMD_INIT_RXQ_EXT_IN_SINGLE_PACKET 0x0
+#define        MC_CMD_INIT_RXQ_EXT_IN_SINGLE_PACKET 0x0
/* define: Pack multiple packets into large descriptors (for SolarCapture) */
-#define        MC_CMD_INIT_RXQ_EXT_IN_PACKED_STREAM 0x1
+#define        MC_CMD_INIT_RXQ_EXT_IN_PACKED_STREAM 0x1
/+* define: Pack multiple packets into large descriptors using the format designed
+/ * to maximise packet rate. This mode uses 1 "bucket" per descriptor with
+/ * multiple fixed-size packet buffers within each bucket. For a full
+/ * description see SF-119419-TC. This mode is only supported by "dpdk" datapath
+/ * firmware.
+/*
+/#define        MC_CMD_INIT_RXQ_EXT_IN_EQUAL_STRIDE_PACKED_STREAM 0x2
/#define        MC_CMD_INIT_RXQ_EXT_IN_FLAG_SNAPSHOT_MODE_LBN 14
#define        MC_CMD_INIT_RXQ_EXT_IN_FLAG_SNAPSHOT_MODE_WIDTH 1
#define        MC_CMD_INIT_RXQ_EXT_IN_PACKED_STREAM_BUFF_SIZE_LBN 15
#define        MC_CMD_INIT_RXQ_EXT_IN_PACKED_STREAM_BUFF_SIZE_WIDTH 3
-#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_1M  0x0 /* enum */
-#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_512K  0x1 /* enum */
-#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_256K  0x2 /* enum */
-#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_128K  0x3 /* enum */
-#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_64K  0x4 /* enum */
+#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_1M 0x0 /* enum */
+#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_512K 0x1 /* enum */
+#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_256K 0x2 /* enum */
+#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_128K 0x3 /* enum */
+#define          MC_CMD_INIT_RXQ_EXT_IN_PS_BUFF_64K 0x4 /* enum */
#define        MC_CMD_INIT_RXQ_EXT_IN_FLAG_WANT_OUTER_CLASSES_LBN 18
#define        MC_CMD_INIT_RXQ_EXT_IN_FLAG_WANT_OUTER_CLASSES_WIDTH 1
#define        MC_CMD_INIT_RXQ_EXT_IN_FLAG_FORCE_EV_MERGING_LBN 19
#define        MC_CMD_INIT_RXQ_EXT_IN_FLAG_FORCE_EV_MERGING_WIDTH 1
/* define: Owner ID to use if in buffer mode (zero if physical) */
+#define        MC_CMD_INIT_RXQ_EXT_IN_OWNER_ID_OFST 20
 +#define        MC_CMD_INIT_RXQ_EXT_IN_OWNER_ID_LEN 4
 /* define: The port ID associated with the v-adaptor which should contain this DMAQ. */
+#define        MC_CMD_INIT_RXQ_EXT_IN_PORT_ID_OFST 24
 +#define        MC_CMD_INIT_RXQ_EXT_IN_PORT_ID_LEN 4
 /* define: 64-bit address of 4k of 4k-aligned host memory buffer */
#define        MC_CMD_INIT_RXQ_EXT_IN_DMA_ADDR_OFST 28
#define        MC_CMD_INIT_RXQ_EXT_IN_DMA_ADDR_LEN 8
 @ @ -6017.6 +7403.114 @ @
#define        MC_CMD_INIT_RXQ_EXT_IN_DMA_ADDR_NUM 64
/* define: Maximum length of packet to receive, if SNAPSHOT_MODE flag is set */
#define        MC_CMD_INIT_RXQ_EXT_IN_SNAPSHOT_LENGTH_OFST 540
+/#define        MC_CMD_INIT_RXQ_EXT_IN_SNAPSHOT_LENGTH_OFST 540
+/* define:  */
+**define** MC_CMD_INIT_RXQ_V3_IN_LEN 560
+/** Size, in entries */
+**define** MC_CMD_INIT_RXQ_V3_IN_SIZE_OFST 0
+**define** MC_CMD_INIT_RXQ_V3_IN_SIZE_LEN 4
+/** The EVQ to send events to. This is an index originally specified to
+ * INIT_EVQ. If DMA_MODE == PACKED_STREAM this must be equal to INSTANCE.
+ */
+**define** MC_CMD_INIT_RXQ_V3_IN_TARGET_EVQ_OFST 4
+**define** MC_CMD_INIT_RXQ_V3_IN_TARGET_EVQ_LEN 4
+/** The value to put in the event data. Check hardware spec. for valid range.
+ * This field is ignored if DMA_MODE == EQUAL_STRIDE_PACKED_STREAM or DMA_MODE
+ * == PACKED_STREAM.
+ */
+**define** MC_CMD_INIT_RXQ_V3_IN_LABEL_OFST 8
+**define** MC_CMD_INIT_RXQ_V3_IN_LABEL_LEN 4
+/** Desired instance. Must be set to a specific instance, which is a function
+ * local queue index.
+ */
+**define** MC_CMD_INIT_RXQ_V3_IN_INSTANCE_OFST 12
+**define** MC_CMD_INIT_RXQ_V3_IN_INSTANCE_LEN 4
+/** There will be more flags here. */
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAGS_OFST 16
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAGS_LEN 4
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_BUFF_MODE_LBN 0
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_BUFF_MODE_WIDTH 1
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_HDR_SPLIT_LBN 1
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_HDR_SPLIT_WIDTH 1
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_TIMESTAMP_LBN 2
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_TIMESTAMP_WIDTH 1
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_CHAIN_LBN 7
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_CHAIN_WIDTH 1
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_PREFIX_LBN 8
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_PREFIX_WIDTH 1
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_DISABLE_SCATTER_LBN 9
+**define** MC_CMD_INIT_RXQ_V3_IN_FLAG_DISABLE_SCATTER_WIDTH 1
+**define** MC_CMD_INIT_RXQ_V3_IN_DMA_MODE_LBN 10
+**define** MC_CMD_INIT_RXQ_V3_IN_DMA_MODE_WIDTH 4
+/** enum: One packet per descriptor (for normal networking) */
+**define** MC_CMD_INIT_RXQ_V3_IN_SINGLE_PACKET 0x0
+/** enum: Pack multiple packets into large descriptors (for SolarCapture) */
+**define** MC_CMD_INIT_RXQ_V3_IN_PACKED_STREAM 0x1
+/** enum: Pack multiple packets into large descriptors using the format designed
+ * to maximise packet rate. This mode uses 1 "bucket" per descriptor with
+ * multiple fixed-size packet buffers within each bucket. For a full
+ * description see SF-119419-TC. This mode is only supported by "dpdk" datapath
+ * firmware.
+ */
+ #define MC_CMD_INIT_RXQ_V3_IN_EQUAL_STRIDEPACKED_STREAM 0x2
+ #define MC_CMD_INIT_RXQ_V3_IN_FLAG_SNAPSHOT_MODE_LBN 14
+ #define MC_CMD_INIT_RXQ_V3_IN_FLAG_SNAPSHOT_MODE_WIDTH 1
+ #define MC_CMD_INIT_RXQ_V3_IN_PACKED_STREAM_BUFF_SIZE_LBN 15
+ #define MC_CMD_INIT_RXQ_V3_IN_PACKED_STREAM_BUFF_SIZE_WIDTH 3
+ #define MC_CMD_INIT_RXQ_V3_IN_PS_BUFF_1M 0x0 /* enum */
+ #define MC_CMD_INIT_RXQ_V3_IN_PS_BUFF_512K 0x1 /* enum */
+ #define MC_CMD_INIT_RXQ_V3_IN_PS_BUFF_256K 0x2 /* enum */
+ #define MC_CMD_INIT_RXQ_V3_IN_PS_BUFF_128K 0x3 /* enum */
+ #define MC_CMD_INIT_RXQ_V3_IN_PS_BUFF_64K 0x4 /* enum */
+ #define MC_CMD_INIT_RXQ_V3_IN_FLAG_WANT_OUTER_CLASSES_LBN 18
+ #define MC_CMD_INIT_RXQ_V3_IN_FLAG_WANT_OUTER_CLASSES_WIDTH 1
+ #define MC_CMD_INIT_RXQ_V3_IN_FLAG_FORCE_EV_MERGING_LBN 19
+ #define MC_CMD_INIT_RXQ_V3_IN_FLAG_FORCE_EV_MERGING_WIDTH 1
+ /* Owner ID to use if in buffer mode (zero if physical) */
+ #define MC_CMD_INIT_RXQ_V3_IN_OWNER_ID_OFST 20
+ #define MC_CMD_INIT_RXQ_V3_IN_OWNER_ID_LEN 4
+ /* The port ID associated with the v-adaptor which should contain this DMAQ. */
+ #define MC_CMD_INIT_RXQ_V3_IN_PORT_ID_OFST 24
+ #define MC_CMD_INIT_RXQ_V3_IN_PORT_ID_LEN 4
+ /* 64-bit address of 4k of 4k-aligned host memory buffer */
+ #define MC_CMD_INIT_RXQ_V3_IN_DMA_ADDR_OFST 28
+ #define MC_CMD_INIT_RXQ_V3_IN_DMA_ADDR_LEN 8
+ #define MC_CMD_INIT_RXQ_V3_IN_DMA_ADDR_LO_OFST 28
+ #define MC_CMD_INIT_RXQ_V3_IN_DMA_ADDR_HI_OFST 32
+ #define MC_CMD_INIT_RXQ_V3_IN_DMA_ADDR_NUM 64
+ /* Maximum length of packet to receive, if SNAPSHOT MODE flag is set */
+ #define MC_CMD_INIT_RXQ_V3_IN_SNAPSHOT_LENGTH_OFST 540
+ #define MC_CMD_INIT_RXQ_V3_IN_SNAPSHOT_LENGTH_LEN 4
+ /* The number of packet buffers that will be contained within each
+ packet. This field is ignored unless DMA_MODE == EQUAL_STRIDE_PACKED_STREAM.
+ */
+ #define MC_CMD_INIT_RXQ_V3_IN_ES_PACKET_BUFFERS_PER_BUCKET_OFST 544
+ #define MC_CMD_INIT_RXQ_V3_IN_ES_PACKET_BUFFERS_PER_BUCKET_LEN 4
+ /* The length in bytes of the area in each packet buffer that can be written to
+ by the adapter. This is used to store the packet prefix and the packet
+ payload. This length does not include any end padding added by the driver.
+ This field is ignored unless DMA_MODE == EQUAL_STRIDE_PACKED_STREAM.
+ */
+ #define MC_CMD_INIT_RXQ_V3_IN_ES_MAX_DMA_LEN_OFST 548
+ #define MC_CMD_INIT_RXQ_V3_IN_ES_MAX_DMA_LEN_LEN 4
+ /* The length in bytes of a single packet buffer within a
+ packet. This field is ignored unless DMA_MODE == EQUAL_STRIDE_PACKED_STREAM.
+ */
+ #define MC_CMD_INIT_RXQ_V3_IN_ES_PACKET_STRIDE_OFST 552
#define MC_CMD_INIT_RXQ_V3_IN_ES_PACKET_STRIDE_LEN 4
/* The maximum time in nanoseconds that the datapath will be back pressured if
 * there are no RX descriptors available. If the timeout is reached and there
 * are still no descriptors then the packet will be dropped. A timeout of 0
 * means the datapath will never be blocked. This field is ignored unless
 * DMA_MODE == EQUAL_STRIDE_PACKED_STREAM.
 *
#define MC_CMD_INIT_RXQ_V3_IN_ES_HEAD_OF_LINE_BLOCK_TIMEOUT_OFST 556
#define MC_CMD_INIT_RXQ_V3_IN_ES_HEAD_OF_LINE_BLOCK_TIMEOUT_LEN 4
/* MC_CMD_INIT_RXQ_V3_OUT msgresponse */
#define MC_CMD_INIT_RXQ_V3_OUT_LEN 0

/**********************************************************/
/* MC_CMD_INIT_TXQ */
/**********************************************************/
#define MC_CMD_INIT_TXQ_IN_LEN(num) (28+8*(num))
/* Size, in entries */
#define MC_CMD_INIT_TXQ_IN_SIZE_OFST 0
#define MC_CMD_INIT_TXQ_IN_SIZE_LEN 4
/* The EVQ to send events to. This is an index originally specified to
 * INIT_EVQ.
 */
#define MC_CMD_INIT_TXQ_IN_TARGET_EVQ_OFST 4
#define MC_CMD_INIT_TXQ_IN_TARGET_EVQ_LEN 4
/* The value to put in the event data. Check hardware spec. for valid range. */
#define MC_CMD_INIT_TXQ_IN_LABEL_OFST 8
#define MC_CMD_INIT_TXQ_IN_LABEL_LEN 4
/* Desired instance. Must be set to a specific instance, which is a function
 * local queue index.
 */
#define MC_CMD_INIT_TXQ_IN_INSTANCE_OFST 12
#define MC_CMD_INIT_TXQ_IN_INSTANCE_LEN 4
/* There will be more flags here. */
#define MC_CMD_INIT_TXQ_IN_FLAGS_OFST 16
#define MC_CMD_INIT_TXQ_IN_FLAGS_LEN 4
#define MC_CMD_INIT_TXQ_IN_FLAG_BUFF_MODE_LBN 0
#define MC_CMD_INIT_TXQ_IN_FLAG_BUFF_MODE_WIDTH 1
#define MC_CMD_INIT_TXQ_IN_FLAG_IP_CSUM_DIS_LBN 1
#define MC_CMD_INIT_TXQ_IN_FLAG_INNER_TCP_CSUM_EN_WIDTH 1

/*@ -6024.6 +7518.9 @*/
/* MC_CMD_INIT_RXQ_OUT msgresponse */
#define MC_CMD_INIT_RXQ_OUT_LEN 0

/*@ -6040.18 +7537.23 @*/
/* MC_CMD_INIT_RXQ_EXT_OUT msgresponse */
#define MC_CMD_INIT_RXQ_EXT_OUT_LEN 0

/*@ -6072.8 +7574.10 @*/
/* MC_CMD_INIT_RXQ_V3_EXT_OUT msgresponse */
#define MC_CMD_INIT_RXQ_V3_EXT_OUT_LEN 0

/*@*/
/* Owner ID to use if in buffer mode (zero if physical) */
#define MC_CMD_INIT_TXQ_IN_OWNER_ID_OFST 20
#define MC_CMD_INIT_TXQ_IN_OWNER_ID_LEN 4
/* The port ID associated with the v-adaptor which should contain this DMAQ. */
#define MC_CMD_INIT_TXQ_IN_PORT_ID_OFST 24
#define MC_CMD_INIT_TXQ_IN_PORT_ID_LEN 4
/* 64-bit address of 4K of 4K-aligned host memory buffer */
#define MC_CMD_INIT_TXQ_IN_DMA_ADDR_OFST 28
#define MC_CMD_INIT_TXQ_IN_DMA_ADDR_LEN 8
@@ -6088,18 +7592,23 @@
#define MC_CMD_INIT_TXQ_EXT_IN_LEN 544
/* Size, in entries */
#define MC_CMD_INIT_TXQ_EXT_IN_SIZE_OFST 0
#define MC_CMD_INIT_TXQ_EXT_IN_SIZE_LEN 4
/* The EVQ to send events to. This is an index originally specified to * INIT_EVQ. */
#define MC_CMD_INIT_TXQ_EXT_IN_TARGET_EVQ_OFST 4
#define MC_CMD_INIT_TXQ_EXT_IN_TARGET_EVQ_LEN 4
/* The value to put in the event data. Check hardware spec. for valid range. */
#define MC_CMD_INIT_TXQ_EXT_IN_LABEL_OFST 8
#define MC_CMD_INIT_TXQ_EXT_IN_LABEL_LEN 4
/* Desired instance. Must be set to a specific instance, which is a function * local queue index. */
#define MC_CMD_INIT_TXQ_EXT_IN_INSTANCE_OFST 12
#define MC_CMD_INIT_TXQ_EXT_IN_INSTANCE_LEN 4
/* There will be more flags here. */
#define MC_CMD_INIT_TXQ_EXT_IN_FLAGS_OFST 16
#define MC_CMD_INIT_TXQ_EXT_IN_FLAGS_LEN 4
#define MC_CMD_INIT_TXQ_EXT_IN_FLAG_BUFF_MODE_LBN 0
#define MC_CMD_INIT_TXQ_EXT_IN_FLAG_BUFF_MODE_WIDTH 1
#define MC_CMD_INIT_TXQ_EXT_IN_FLAG_IP_CSUM_DIS_LBN 1
#define MC_CMD_INIT_TXQ_EXT_IN_FLAG_CTPIO_LBN 1
#define MC_CMD_INIT_TXQ_EXT_IN_FLAG_CTPIO_WIDTH 1
#define MC_CMD_INIT_TXQ_EXT_IN_FLAG_CTPIO_UTHRESH_LBN 1
#define MC_CMD_INIT_TXQ_EXT_IN_FLAG_CTPIO_UTHRESH_WIDTH 1
/* Owner ID to use if in buffer mode (zero if physical) */
#define MC_CMD_INIT_TXQ_EXT_IN_OWNER_ID_OFST 20
#define MC_CMD_INIT_TXQ_EXT_IN_OWNER_ID_LEN 4
/* The port ID associated with the v-adaptor which should contain this DMAQ. */
#define MC_CMD_INIT_TXQ_EXT_IN_PORT_ID_OFST 24
#define MC_CMD_INIT_TXQ_EXT_IN_PORT_ID_LEN 4
/* 64-bit address of 4K of 4K-aligned host memory buffer */
#define MC_CMD_INIT_TXQ_EXT_IN_DMA_ADDR_OFST 28
#define MC_CMD_INIT_TXQ_EXT_IN_DMA_ADDR_LEN 8
#define MC_CMD_INIT_TXQ_EXT_IN_DMA_ADDR_MAXNUM 64
/* Flags related to Qbb flow control mode. */
#define MC_CMD_INIT_TXQ_EXT_IN_QBB_FLAGS_OFST 540
#define MC_CMD_INIT_TXQ_EXT_IN_QBB_FLAGS_LEN 4
#define MC_CMD_INIT_TXQ_EXT_IN_QBB_ENABLE_LBN 0
#define MC_CMD_INIT_TXQ_EXT_IN_QBB_ENABLE_WIDTH 1
#define MC_CMD_INIT_TXQ_EXT_IN_QBB_PRIORITY_LBN 1

/* Instance of TXQ to destroy */
#define MC_CMD_FINI_RXQ_IN_INSTANCE_OFST 0
#define MC_CMD_FINI_RXQ_IN_INSTANCE_LEN 4

/* MC_CMD_FINI_TXQ_OUT msgresponse */
#define MC_CMD_FINI_TXQ_OUT_LEN 0

/* Handle of target EVQ */
#define MC_CMD_PROXY_CMD_IN_TARGET_OFST 0
#define MC_CMD_PROXY_CMD_IN_TARGET_PF_LBN 0
#define MC_CMD_PROXY_CMD_IN_TARGET_PF_WIDTH 16
#define MC_CMD_PROXY_CMD_IN_TARGET_VF_LBN 16
#define MC_CMD_PROXY_CMD_IN_TARGET_VF_WIDTH 16
-#define MC_CMD_PROXY_CMD_IN_VF_NULL 0xffff /* enum */
+#define MC_CMD_PROXY_CMD_IN_VF_NULL 0xffff /* enum */

/* MC_CMD_PROXY_CMD_OUT msgresponse */
#define MC_CMD_PROXY_CMD_OUT_LEN 0
@@ -6252,8 +7771,9 @@
#define MC_PROXY_STATUS_BUFFER_LEN 16
/* Handle allocated by the firmware for this proxy transaction */
+#define MC_PROXY_STATUS_BUFFER_HANDLE_LEN 4
-#define MC_PROXY_STATUS_BUFFER_HANDLE_INVALID 0x0
+#define MC_PROXY_STATUS_BUFFER_HANDLE_INVALID 0x0
#define MC_PROXY_STATUS_BUFFER_HANDLE_LBN 0
#define MC_PROXY_STATUS_BUFFER_HANDLE_WIDTH 32
/* The requesting physical function number */
@@ -6282,6 +7802,7 @@
* elevated privilege mask granted to the requesting function.
*/
#define MC_PROXY_STATUS_BUFFER_GRANTED_PRIVILEGES_OFST 12
+#define MC_PROXY_STATUS_BUFFER_GRANTED_PRIVILEGES_LEN 4
#define MC_PROXY_STATUS_BUFFER_GRANTED_PRIVILEGES_LBN 96
#define MC_PROXY_STATUS_BUFFER_GRANTED_PRIVILEGES_WIDTH 32
@@ -6298,6 +7819,7 @@
#define MC_CMD_PROXY_CONFIGURE_IN_STATUS_BUFF_ADDR_HI_OFST 8
/* Must be a power of 2 */
#define MC_CMD_PROXY_CONFIGURE_IN_STATUS_BLOCK_SIZE_OFST 12
+#define MC_CMD_PROXY_CONFIGURE_IN_STATUS_BLOCK_SIZE_LEN 4
/* Host provides a contiguous memory buffer that contains at least NUM_BLOCKS
* of blocks, each of the size REQUEST_BLOCK_SIZE.
*/
@@ -6309,6 +7831,7 @@
#define MC_CMD_PROXY_CONFIGURE_IN_REQUEST_BUFF_ADDR_HI_OFST 20
/* Must be a power of 2 */
#define MC_CMD_PROXY_CONFIGURE_IN_REQUEST_BLOCK_SIZE_OFST 24
+#define MC_CMD_PROXY_CONFIGURE_IN_REQUEST_BLOCK_SIZE_LEN 4
/* Host provides a contiguous memory buffer that contains at least NUM_BLOCKS
* of blocks, each of the size STATUS_BLOCK_SIZE. This buffer is only needed if
* host intends to complete proxied operations by using MC_CMD_PROXY_CMD.

#define MC_CMD_PROXY_CONFIGURE_IN_REPLY_BUFF_ADDR_HI_OFST 32
/* Must be a power of 2, or zero if this buffer is not provided */
#define MC_CMD_PROXY_CONFIGURE_IN_REPLY_BLOCK_SIZE_OFST 36
+#define MC_CMD_PROXY_CONFIGURE_IN_REPLY_BLOCK_SIZE_LEN 4
/* Applies to all three buffers */
#define MC_CMD_PROXY_CONFIGURE_IN_NUM_BLOCKS_OFST 40
+#define MC_CMD_PROXY_CONFIGURE_IN_NUM_BLOCKS_LEN 4
/* A bit mask defining which MCDI operations may be proxied */
#define MC_CMD_PROXY_CONFIGURE_IN_ALLOWED_MCDI_MASK_OFST 44
#define MC_CMD_PROXY_CONFIGURE_IN_ALLOWED_MCDI_MASK_LEN 64
@@ -6328,8 +7852,10 @@

#define MC_CMD_PROXY_CONFIGURE_EXT_IN_LEN 112
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_FLAGS_OFST 0
+#define MC_CMD_PROXY_CONFIGURE_EXT_IN_FLAGS_LEN 4
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_ENABLE_LBN 0
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_ENABLE_WIDTH 1
/* Host provides a contiguous memory buffer that contains at least NUM_BLOCKS
@@ -6348,6 +7875,7 @@ *

#define MC_CMD_PROXY_CONFIGURE_EXT_IN_STATUS_BUFF_ADDR_HI_OFST 8
/* Must be a power of 2 */
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_STATUS_BLOCK_SIZE_OFST 12
+#define MC_CMD_PROXY_CONFIGURE_EXT_IN_STATUS_BLOCK_SIZE_LEN 4
/* Host provides a contiguous memory buffer that contains at least NUM_BLOCKS
* of blocks, each of the size STATUS_BLOCK_SIZE. This buffer is only needed if
* host intends to complete proxied operations by using MC_CMD_PROXY_CMD.
@@ -6357,6 +7885,7 @@ *

#define MC_CMD_PROXY_CONFIGURE_EXT_IN_REQUEST_BUFF_ADDR_HI_OFST 20
/* Must be a power of 2 */
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_REQUEST_BLOCK_SIZE_OFST 24
+#define MC_CMD_PROXY_CONFIGURE_EXT_IN_REQUEST_BLOCK_SIZE_LEN 4
/* Host provides a contiguous memory buffer that contains at least NUM_BLOCKS
* of blocks, each of the size STATUS_BLOCK_SIZE. This buffer is only needed if
* host intends to complete proxied operations by using MC_CMD_PROXY_CMD.
@@ -6367,12 +7896,15 @@ *

#define MC_CMD_PROXY_CONFIGURE_EXT_IN_REPLY_BUFF_ADDR_HI_OFST 32
/* Must be a power of 2, or zero if this buffer is not provided */
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_REPLY_BLOCK_SIZE_OFST 36
+#define MC_CMD_PROXY_CONFIGURE_EXT_IN_REPLY_BLOCK_SIZE_LEN 4
/* Applies to all three buffers */
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_NUM_BLOCKS_OFST 40
+#define MC_CMD_PROXY_CONFIGURE_EXT_IN_NUM_BLOCKS_LEN 4
/* A bit mask defining which MCDI operations may be proxied */
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_ALLOWED_MCDI_MASK_OFST 44
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_ALLOWED_MCDI_MASK_LEN 64
#define MC_CMD_PROXY_CONFIGURE_EXT_IN_RESERVED_OFST 108
+#define       MC_CMD_PROXY_CONFIGURE_EXT_IN_RESERVED_LEN 4

/* MC_CMD_PROXY_CONFIGURE_OUT msgresponse */
#define       MC_CMD_PROXY_CONFIGURE_OUT_LEN 0
@@ -6392,7 +7924,9 @@

/* MC_CMD_PROXY_COMPLETE_IN msgrequest */
#define       MC_CMD_PROXY_COMPLETE_IN_LEN 12
#define       MC_CMD_PROXY_COMPLETE_IN_BLOCK_INDEX_OFST 0
+##define       MC_CMD_PROXY_COMPLETE_IN_BLOCK_INDEX_LEN 4
#define       MC_CMD_PROXY_COMPLETE_IN_STATUS_OFST 4
+##define       MC_CMD_PROXY_COMPLETE_IN_STATUS_LEN 4
/* enum: The operation has been completed by using MC_CMD_PROXY_CMD, the reply
 * is stored in the REPLY_BUFF.
 */
@@ -6408,6 +7942,7 @@
#define          MC_CMD_PROXY_COMPLETE_IN_TIMEDOUT 0x3
#define       MC_CMD_PROXY_COMPLETE_IN_HANDLE_OFST 8
+##define       MC_CMD_PROXY_COMPLETE_IN_HANDLE_LEN 4

/* MC_CMD_PROXY_COMPLETE_OUT msgresponse */
#define       MC_CMD_PROXY_COMPLETE_OUT_LEN 0
@@ -6427,17 +7962,22 @@
#define    MC_CMD_ALLOC_BUFTBL_CHUNK_IN_LEN 8
/* Owner ID to use */
#define       MC_CMD_ALLOC_BUFTBL_CHUNK_IN_OWNER_OFST 0
+##define       MC_CMD_ALLOC_BUFTBL_CHUNK_IN_OWNER_LEN 4
/* Size of buffer table pages to use, in bytes (note that only a few values are
 * legal on any specific hardware). */
@@ -6453,10 +7993,13 @@
#define    MC_CMD_ALLOC_BUFTBL_CHUNK_OUT_LENMAX 268
#define    MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_LEN(num) (12+8*(num))

#ifndef MC_CONF_5GASSENGINE_H
#define MC_CONF_5GASSENGINE_H

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#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_HANDLE_OFST 0
+#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_HANDLE_LEN 4
/* ID */
#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_FIRSTID_OFST 4
+#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_FIRSTID_LEN 4
/* Num entries */
#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_NUMENTRIES_OFST 8
+#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_NUMENTRIES_LEN 4
/* Buffer table entry address */
#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_ENTRY_OFST 12
#define MC_CMD_PROGRAM_BUFTBL_ENTRIES_IN_ENTRY_LEN 8
@@@ -6479,48 +8022,11 @@
/* MC_CMD_FREE_BUFTBL_CHUNK_IN msgrequest */
#define MC_CMD_FREE_BUFTBL_CHUNK_IN_LEN 4
#define MC_CMD_FREE_BUFTBL_CHUNK_IN_HANDLE_OFST 0
+#define MC_CMD_FREE_BUFTBL_CHUNK_IN_HANDLE_LEN 4
/* MC_CMD_FREE_BUFTBL_CHUNK_OUT msgresponse */
#define MC_CMD_FREE_BUFTBL_CHUNK_OUT_LEN 0
#define MC_CMD_FREE_BUFTBL_CHUNK_OUT_MSGRESPONSE_LEN 0
#define MC_CMD_FREE_BUFTBL_CHUNK_OUT_MESSAGE_LEN 0
#define MC_CMD_FREE_BUFTBL_CHUNK_OUT_MSGID_LEN 0
#define MC_CMD_FREE_BUFTBL_CHUNK_OUT_MSGID_OFFSET 0
#define MC_CMD_FREE_BUFTBL_CHUNK_OUT_HANDLE_LEN 4
+define MC_CMD_FREE_BUFTBL_CHUNK_OUT_HANDLE_LEN 4
/* PORT_CONFIG_ENTRY structuredef */
#define PORT_CONFIG_ENTRY_LEN 16
-/* External port number (label) */
-define PORT_CONFIG_ENTRY_EXT_NUMBER_OFST 0
-define PORT_CONFIG_ENTRY_EXT_NUMBER_LEN 1
-define PORT_CONFIG_ENTRY_EXT_NUMBER_LBN 0
-define PORT_CONFIG_ENTRY_EXT_NUMBER_WIDTH 8
-/* Port core location */
-define PORT_CONFIG_ENTRY_CORE_OFST 1
-define PORT_CONFIG_ENTRY_CORE_LEN 1
-define PORT_CONFIG_ENTRY_STANDALONE 0x0 /* enum */
-define PORT_CONFIG_ENTRY_MASTER 0x1 /* enum */
-define PORT_CONFIG_ENTRY_SLAVE 0x2 /* enum */
-define PORT_CONFIG_ENTRY_CORE_LBN 8
-define PORT_CONFIG_ENTRY_CORE_WIDTH 8
-/* Internal number (HW resource) relative to the core */
-define PORT_CONFIG_ENTRY_INT_NUMBER_OFST 2
-define PORT_CONFIG_ENTRY_INT_NUMBER_LEN 1
-define PORT_CONFIG_ENTRY_INT_NUMBER_LBN 16
-define PORT_CONFIG_ENTRY_INT_NUMBER_WIDTH 8
-/* Reserved */
-define PORT_CONFIG_ENTRY_RSVD_OFST 3
-define PORT_CONFIG_ENTRY_RSVD_LEN 1
-define PORT_CONFIG_ENTRY_RSVD_LBN 24
-define PORT_CONFIG_ENTRY_RSVD_WIDTH 8
-/* Bitmask of KR lanes used by the port */
-define PORT_CONFIG_ENTRY_LANES_OFST 4
-define PORT_CONFIG_ENTRY_LANES_LBN 32
#define PORT_CONFIG_ENTRY_LANES_WIDTH 32
/* Port capabilities (MC_CMD_PHY_CAP_*) */
#define PORT_CONFIG_ENTRY_SUPPORTED_CAPS_OFST 8
#define PORT_CONFIG_ENTRY_SUPPORTED_CAPS_LBN 64
#define PORT_CONFIG_ENTRY_SUPPORTED_CAPS_WIDTH 32
/* Reserved (align to 16 bytes) */
#define PORT_CONFIG_ENTRY_RSVD2_OFST 12
#define PORT_CONFIG_ENTRY_RSVD2_LBN 96
#define PORT_CONFIG_ENTRY_RSVD2_WIDTH 32

/**********************************
/* MC_CMD_FILTER_OP
@@ -6534,18 +8040,19 @@
#define MC_CMD_FILTER_OP_IN_LEN 108
/* identifies the type of operation requested */
#define MC_CMD_FILTER_OP_IN_OP_OFST 0
+#define MC_CMD_FILTER_OP_IN_OP_LEN 4
/* enum: single-recipient filter insert */
-#define MC_CMD_FILTER_OP_IN_OP_INSERT  0x0
+#define MC_CMD_FILTER_OP_IN_OP_INSERT 0x0
/* enum: single-recipient filter remove */
-#define MC_CMD_FILTER_OP_IN_OP_REMOVE  0x1
+#define MC_CMD_FILTER_OP_IN_OP_REMOVE 0x1
/* enum: multi-recipient filter subscribe */
-#define MC_CMD_FILTER_OP_IN_OP_SUBSCRIBE  0x2
+#define MC_CMD_FILTER_OP_IN_OP_SUBSCRIBE 0x2
/* enum: multi-recipient filter unsubscribe */
-#define MC_CMD_FILTER_OP_IN_OP_UNSUBSCRIBE  0x3
+#define MC_CMD_FILTER_OP_IN_OP_UNSUBSCRIBE 0x3
/* enum: replace one recipient with another (warning - the filter handle may * change)
 */
-#define MC_CMD_FILTER_OP_IN_OP_REPLACE  0x4
+#define MC_CMD_FILTER_OP_IN_OP_REPLACE 0x4
/* filter handle (for remove / unsubscribe operations) */
#define MC_CMD_FILTER_OP_IN_HANDLE_OFST 4
#define MC_CMD_FILTER_OP_IN_HANDLE_LEN 8
@@ -6554,8 +8061,10 @@
/* The port ID associated with the v-adaptor which should contain this filter. */
#define MC_CMD_FILTER_OP_IN_PORT_ID_OFST 12
#define MC_CMD_FILTER_OP_IN_PORT_ID_LEN 4
/* fields to include in match criteria */
#define MC_CMD_FILTER_OP_IN_MATCH_FIELDS_OFST 16
#define MC_CMD_FILTER_OP_IN_MATCH_FIELDS_LEN 4
#define MC_CMD_FILTER_OP_IN_MATCH_SRC_IP_LBN 0
#define MC_CMD_FILTER_OP_IN_MATCH_SRC_IP_WIDTH 1
```c
#define        MC_CMD_FILTER_OP_IN_MATCH_DST_IP_LBN 1
#define        MC_CMD_FILTER_OP_IN_MATCH_UNKNOWN_UCAST_DST_WIDTH 1
/* receive destination */
#define        MC_CMD_FILTER_OP_IN_RX_DEST_OFST 20
+#define       MC_CMD_FILTER_OP_IN_RX_DEST_LEN 4
/* enum: drop packets */
-#define        MC_CMD_FILTER_OP_IN_RX_DEST.Drop 0x0
+#define        MC_CMD_FILTER_OP_IN_RX_DEST_DROP 0x0
/* enum: receive to host */
-#define        MC_CMD_FILTER_OP_IN_RX_DEST_HOST 0x1
+#define        MC_CMD_FILTER_OP_IN_RX_DEST_HOST 0x1
/* enum: receive to MC */
-#define        MC_CMD_FILTER_OP_IN_RX_DEST_MC 0x2
+#define        MC_CMD_FILTER_OP_IN_RX_DEST_MC 0x2
/* enum: loop back to TXDP 0 */
-#define        MC_CMD_FILTER_OP_IN_RX_DEST_TX0 0x3
+#define        MC_CMD_FILTER_OP_IN_RX_DEST_TX0 0x3
/* enum: loop back to TXDP 1 */
-#define        MC_CMD_FILTER_OP_IN_RX_DEST_TX1 0x4
+#define        MC_CMD_FILTER_OP_IN_RX_DEST_TX1 0x4
/* receive queue handle (for multiple queue modes, this is the base queue) */
#define        MC_CMD_FILTER_OP_IN_RX_CONTEXT_OFST 32
+#define       MC_CMD_FILTER_OP_IN_RX_CONTEXT_LEN 4
/* transmit domain (reserved; set to 0) */
#define        MC_CMD_FILTER_OP_IN_TX_DOMAIN_OFST 36
```

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+`define   MC_CMD_FILTER_OP_IN_TX_DOMAIN_LEN 4
/* transmit destination (either set the MAC and/or PM bits for explicit
* control, or set this field to TX_DEST_DEFAULT for sensible default
* behaviour)
*/
+`define   MC_CMD_FILTER_OP_IN_TX_DEST_OFST 40
+`define   MC_CMD_FILTER_OP_IN_TX_DEST_LEN 4
/* enum: request default behaviour (based on filter type) */
-`define   MC_CMD_FILTER_OP_IN_TX_DEST_DEFAULT 0xffffffff
+`define   MC_CMD_FILTER_OP_IN_TX_DEST_DEFAULT 0xffffffff
`define   MC_CMD_FILTER_OP_IN_TX_DEST_MAC_LBN 0
`define   MC_CMD_FILTER_OP_IN_TX_DEST_MAC_WIDTH 1
@@ -6653,8 +8168,10 @@
`define   MC_CMD_FILTER_OP_IN_IP_PROTO_LEN 2
/* Firmware defined register 0 to match (reserved; set to 0) */
+`define   MC_CMD_FILTER_OP_IN_FWDEF0_OFST 68
+`define   MC_CMD_FILTER_OP_IN_FWDEF0_LEN 4
/* Firmware defined register 1 to match (reserved; set to 0) */
+`define   MC_CMD_FILTER_OP_IN_FWDEF1_OFST 72
+`define   MC_CMD_FILTER_OP_IN_FWDEF1_LEN 4
/* source IP address to match (as bytes in network order; set last 12 bytes to
* 0 for IPv4 address)
*/
@@ -6673,6 +8190,7 @@
`define   MC_CMD_FILTER_OP_EXT_IN_LEN 172
/* identifies the type of operation requested */
+`define   MC_CMD_FILTER_OP_EXT_IN_OP_OFST 0
+`define   MC_CMD_FILTER_OP_EXT_IN_OP_LEN 4
/* Enum values, see field(s): */
/*     MC_CMD_FILTER_OP_IN/OP */
/* filter handle (for remove / unsubscribe operations) */
@@ -6683,8 +8201,10 @@
`define   MC_CMD_FILTER_OP_EXT_IN_PORT_ID_OFST 12
+`define   MC_CMD_FILTER_OP_EXT_IN_PORT_ID_LEN 4
/* fields to include in match criteria */
+`define   MC_CMD_FILTER_OP_EXT_IN_MATCHFIELDS_OFST 16
+`define   MC_CMD_FILTER_OP_EXT_IN_MATCHFIELDS_LEN 4
`define   MC_CMD_FILTER_OP_EXT_IN_MATCH_SRC_IP_LBN 0
+`define   MC_CMD_FILTER_OP_EXT_IN_MATCH_SRC_IP_WIDTH 1
`define   MC_CMD_FILTER_OP_EXT_IN_MATCH_DST_IP_LBN 1
@@ -6743,43 +8263,49 @@
`define   MC_CMD_FILTER_OP_EXT_IN_MATCH_UNKNOWN_UCAST_DST_WIDTH 1
/* receive destination */
+`define   MC_CMD_FILTER_OP_EXT_IN_RX_DEST_OFST 20
+`define   MC_CMD_FILTER_OP_EXT_IN_RX_DEST_LEN 4
/* enum: drop packets */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_DROP  0x0
+#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_DROP 0x0
/* enum: receive to host */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_HOST  0x1
+#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_HOST 0x1
/* enum: receive to MC */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_MC   0x2
+#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_MC 0x2
/* enum: loop back to TXDP 0 */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_TX0  0x3
+#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_TX0 0x3
/* enum: loop back to TXDP 1 */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_TX1  0x4
+#define MC_CMD_FILTER_OP_EXT_IN_RX_DEST_TX1 0x4
/* receive queue handle (for multiple queue modes, this is the base queue) */
#define MC_CMD_FILTER_OP_EXT_IN_RX_QUEUE_OFST 24
#define MC_CMD_FILTER_OP_EXT_IN_RX_QUEUE_LEN 4
/* receive mode */
#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_OFST 28
#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_LEN 4
/* enum: receive to just the specified queue */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_SIMPLE  0x0
+#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_SIMPLE 0x0
/* enum: receive to multiple queues using RSS context */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_RSS   0x1
+#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_RSS 0x1
/* enum: receive to multiple queues using .1p mapping */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_DOT1P_MAPPING  0x2
+#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_DOT1P_MAPPING 0x2
/* enum: install a filter entry that will never match; for test purposes only */
-#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_TEST_NEVER_MATCH  0x80000000
+#define MC_CMD_FILTER_OP_EXT_IN_RX_MODE_TEST_NEVER_MATCH 0x80000000
/* RSS context (for RX_MODE_RSS) or .1p mapping handle (for RX_MODE_DOT1P_MAPPING), as returned by MC_CMD_RSS_CONTEXT_ALLOC or MC_CMD_DOT1P_MAPPING_ALLOC. */
#define MC_CMD_FILTER_OP_EXT_IN_RX_CONTEXT_OFST 32
#define MC_CMD_FILTER_OP_EXT_IN_RX_CONTEXT_LEN 4
/* transmit domain (reserved; set to 0) */
#define MC_CMD_FILTER_OP_EXT_IN_TX_DOMAIN_OFST 36
#define MC_CMD_FILTER_OP_EXT_IN_TX_DOMAIN_LEN 4
/* transmit destination (either set the MAC and/or PM bits for explicit * control, or set this field to TX_DEST_DEFAULT for sensible default * behaviour) */
#define MC_CMD_FILTER_OP_EXT_IN_TX_DEST_OFST 40


+\#define MC_CMD_FILTER_OP_EXT_IN_TX_DEST_LEN 4
/* enum: request default behaviour (based on filter type) */
-\#define MC_CMD_FILTER_OP_EXT_IN_TX_DEST_DEFAULT 0xffffffff
+\#define MC_CMD_FILTER_OP_EXT_IN_TX_DEST_DEFAULT 0xffffffff
\#define MC_CMD_FILTER_OP_EXT_IN_TX_DEST_MAC_LBN 0
\#define MC_CMD_FILTER_OP_EXT_IN_TX_DEST_MAC_WIDTH 1
\#define MC_CMD_FILTER_OP_EXT_IN_TX_DEST_PM_LBN 1
@@ -6810,27 +8336,29 @@
\#define MC_CMD_FILTER_OP_EXT_IN_IPPROTO_LEN 2
/* Firmware defined register 0 to match (reserved; set to 0) */
-\#define MC_CMD_FILTER_OP_EXT_IN_FWDEF0_OFST 68
+\#define MC_CMD_FILTER_OP_EXT_IN_FWDEF0_OFST 68
+\#define MC_CMD_FILTER_OP_EXT_IN_FWDEF0_LEN 4
/* VNI (for VXLAN/Geneve, when IP protocol is UDP) or VSID (for NVGRE, when IP
* protocol is GRE) to match (as bytes in network order; set last byte to 0 for
* VXLAN/NVGRE, or 1 for Geneve)
*/
\#define MC_CMD_FILTER_OP_EXT_IN_VNI_OR_VSID_OFST 72
+\#define MC_CMD_FILTER_OP_EXT_IN_VNI_OR_VSID_LEN 4
\#define MC_CMD_FILTER_OP_EXT_IN_VNI_VALUE_LBN 0
\#define MC_CMD_FILTER_OP_EXT_IN_VNI_VALUE_WIDTH 24
\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_LBN 24
\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_WIDTH 8
/* enum: Match VXLAN traffic with this VNI */
-\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_VXLAN 0x0
+\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_VXLAN 0x0
/* enum: Match Geneve traffic with this VNI */
-\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_GENEVE 0x1
+\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_GENEVE 0x1
/* enum: Reserved for experimental development use */
-\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_EXPERIMENTAL 0xfe
+\#define MC_CMD_FILTER_OP_EXT_IN_VNI_TYPE_EXPERIMENTAL 0xfe
\#define MC_CMD_FILTER_OP_EXT_IN_VSID_OFST 72
\#define MC_CMD_FILTER_OP_EXT_IN_VSID_VALUE_LBN 0
\#define MC_CMD_FILTER_OP_EXT_IN_VSID_VALUE_WIDTH 24
\#define MC_CMD_FILTER_OP_EXT_IN_VSID_TYPE_LBN 24
\#define MC_CMD_FILTER_OP_EXT_IN_VSID_TYPE_WIDTH 8
/* enum: Match NVGRE traffic with this VSID */
-\#define MC_CMD_FILTER_OP_EXT_IN_VSID_TYPE_NVGRE 0x0
+\#define MC_CMD_FILTER_OP_EXT_IN_VSID_TYPE_NVGRE 0x0
/* source IP address to match (as bytes in network order; set last 12 bytes to
* 0 for IPv4 address)
*/
@@ -6880,10 +8408,12 @@
* to 0)
*/
\#define MC_CMD_FILTER_OP_EXT_IN_IFRM_FWDEF0_OFST 132
+\#define MC_CMD_FILTER_OP_EXT_IN_IFRM_FWDEF0_LEN 4
/* VXLAN/NVGRE inner frame Firmware defined register 1 to match (reserved; set
* to 0) */
/*
#define       MC_CMD_FILTER_OP_EXT_IN_IFRM_FWDEF1_OFST 136
#define       MC_CMD_FILTER_OP_EXT_IN_IFRM_FWDEF1_LEN 4
/* VXLAN/NVGRE inner frame source IP address to match (as bytes in network order; set last 12 bytes to 0 for IPv4 address)
*/
@@ -6895,10 +8425,278 @@
#define       MC_CMD_FILTER_OP_EXT_IN_IFRM_DST_IP_OFST 156
#define       MC_CMD_FILTER_OP_EXT_IN_IFRM_DST_IP_LEN 16
+/* MC_CMD_FILTER_OP_V3_IN msgrequest: FILTER_OP extension to support additional filter actions for Intel's DPDK (Data Plane Development Kit, dpdk.org) via its rte_flow API. This extension is only useful with the sfc_efx driver included as part of DPDK, used in conjunction with the dpdk datapath firmware variant.
+*/
+define     MC_CMD_FILTER_OP_V3_IN_LEN 180
+/* identifies the type of operation requested */
+define     MC_CMD_FILTER_OP_V3_IN_OP_OFST 0
+define     MC_CMD_FILTER_OP_V3_IN_OP_LEN 4
+/* Enum values, see field(s): */
+/* MC_CMD_FILTER_OP_IN/OP */
+/* filter handle (for remove / unsubscribe operations) */
+define     MC_CMD_FILTER_OP_V3_IN_HANDLE_OFST 4
+define     MC_CMD_FILTER_OP_V3_IN_HANDLE_LEN 8
+define     MC_CMD_FILTER_OP_V3_IN_HANDLE_LO_OFST 4
+define     MC_CMD_FILTER_OP_V3_IN_HANDLE_HI_OFST 8
+/* The port ID associated with the v-adaptor which should contain this filter.
+*/
+define     MC_CMD_FILTER_OP_V3_IN_PORT_ID_OFST 12
+define     MC_CMD_FILTER_OP_V3_IN_PORT_ID_LEN 4
+/* fields to include in match criteria */
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_FIELDS_OFST 16
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_FIELDS_LEN 4
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_SRC_IP_LBN 0
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_SRC_IP_WIDTH 1
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_DST_IP_LBN 0
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_DST_IP_WIDTH 1
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_SRC_MAC_LBN 2
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_SRC_MAC_WIDTH 1
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_DST_MAC_LBN 2
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_DST_MAC_WIDTH 1
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_SRC_PORT_LBN 3
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_SRC_PORT_WIDTH 1
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_DST_PORT_LBN 3
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_DST_PORT_WIDTH 1
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_ETHER_TYPE_LBN 6
+define     MC_CMD_FILTER_OP_V3_IN_MATCH_ETHER_TYPE_WIDTH 1
*/

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+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_OUTER_VLAN_LBN 8
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_OUTER_VLAN_WIDTH 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IP_PROTO_LBN 9
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IP_PROTO_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_FWDEF0_LBN 10
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_FWDEF0_WIDTH 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_VNI_OR_VSID_LBN 11
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_VNI_OR_VSID_WIDTH 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_SRC_IP_LBN 12
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_SRC_IP_WIDTH 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_DST_IP_LBN 13
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_DST_IP_WIDTH 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_SRC_MAC_LBN 14
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_SRC_MAC_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_SRC_PORT_LBN 15
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_SRC_PORT_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_DST_MAC_LBN 16
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_DST_MAC_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_DST_PORT_LBN 17
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_DST_PORT_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_ETHER_TYPE_LBN 18
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_ETHER_TYPE_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_INNER_VLAN_LBN 19
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_INNER_VLAN_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_OUTER_VLAN_LBN 20
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_OUTER_VLAN_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_IP_PROTO_LBN 21
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_IP_PROTO_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_FWDEF0_LBN 22
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_FWDEF0_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_FWDEF1_LBN 23
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_FWDEF1_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_UNKNOWN_MCAST_DST_LBN 24
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_UNKNOWN_MCAST_DST_Width 1
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_UNKNOWN_UCAST_DST_LBN 25
+#define        MC_CMD_FILTER_OP_V3_IN_MATCH_IFRM_UNKNOWN_UCAST_DST_Width 1
+/* receive destination */
+##define        MC_CMD_FILTER_OP_V3_IN_RX_DEST_OFST 20
+##define        MC_CMD_FILTER_OP_V3_IN_RX_DEST_LEN 4
+/* enum: drop packets */
+##define        MC_CMD_FILTER_OP_V3_IN_RX_DEST_DROP 0x0
+/* enum: receive to host */
```c
#define MC_CMD_FILTER_OP_V3_IN_RX_DEST_HOST 0x1
#define MC_CMD_FILTER_OP_V3_IN_RX_DEST_MC 0x2
#define MC_CMD_FILTER_OP_V3_IN_RX_DEST_TX0 0x3
#define MC_CMD_FILTER_OP_V3_IN_RX_DEST_TX1 0x4
#define MC_CMD_FILTER_OP_V3_IN_RX_QUEUE_OFST 24
#define MC_CMD_FILTER_OP_V3_IN_RX_QUEUE_LEN 4
#define MC_CMD_FILTER_OP_V3_IN_RX_MODE_OFST 28
#define MC_CMD_FILTER_OP_V3_IN_RX_MODE_LEN 4
#define MC_CMD_FILTER_OP_V3_IN_RX_MODE_SIMPLE 0x0
#define MC_CMD_FILTER_OP_V3_IN_RX_MODE_RSS 0x1
#define MC_CMD_FILTER_OP_V3_IN_RX_MODE_DOT1P_MAPPING 0x2
#define MC_CMD_FILTER_OP_V3_IN_RX_MODE_TEST_NEVER_MATCH 0x80000000
#define MC_CMD_FILTER_OP_V3_IN_RX_CONTEXT_OFST 32
#define MC_CMD_FILTER_OP_V3_IN_RX_CONTEXT_LEN 4
#define MC_CMD_FILTER_OP_V3_IN_TX_DOMAIN_OFST 36
#define MC_CMD_FILTER_OP_V3_IN_TX_DOMAIN_LEN 4
#define MC_CMD_FILTER_OP_V3_IN_TX_DEST_OFST 40
#define MC_CMD_FILTER_OP_V3_IN_TX_DEST_LEN 4
#define MC_CMD_FILTER_OP_V3_IN_SRC_MAC_OFST 44
#define MC_CMD_FILTER_OP_V3_IN_SRC_MAC_LEN 6
#define MC_CMD_FILTER_OP_V3_IN_SRC_PORT_OFST 50
```
+/* destination MAC address to match (as bytes in network order) */
+#define MC_CMD_FILTER_OP_V3_IN_DST_MAC_OFST 52
+#define MC_CMD_FILTER_OP_V3_IN_DST_MAC_LEN 6
+/* destination port to match (as bytes in network order) */
+#define MC_CMD_FILTER_OP_V3_IN_DST_PORT_OFST 58
+#define MC_CMD_FILTER_OP_V3_IN_DST_PORT_LEN 2
+/* Ethernet type to match (as bytes in network order) */
+#define MC_CMD_FILTER_OP_V3_IN_ETHER_TYPE_OFST 60
+#define MC_CMD_FILTER_OP_V3_IN_ETHER_TYPE_LEN 2
+/* Inner VLAN tag to match (as bytes in network order) */
+#define MC_CMD_FILTER_OP_V3_IN_INNER_VLAN_OFST 62
+#define MC_CMD_FILTER_OP_V3_IN_INNER_VLAN_LEN 2
+/* Outer VLAN tag to match (as bytes in network order) */
+#define MC_CMD_FILTER_OP_V3_IN_OUTER_VLAN_OFST 64
+#define MC_CMD_FILTER_OP_V3_IN_OUTER_VLAN_LEN 2
+/* IP protocol to match (in low byte; set high byte to 0) */
+#define MC_CMD_FILTER_OP_V3_IN_IP_PROTO_OFST 66
+#define MC_CMD_FILTER_OP_V3_IN_IP_PROTO_LEN 2
+/* Firmware defined register 0 to match (reserved; set to 0) */
+#define MC_CMD_FILTER_OP_V3_IN_FWDEF0_OFST 68
+#define MC_CMD_FILTER_OP_V3_IN_FWDEF0_LEN 4
+/* VNI (for VXLAN/Geneve, when IP protocol is UDP) or VSID (for NVGRE, when IP */
+* protocol is GRE) to match (as bytes in network order; set last byte to 0 for */
+* VXLAN/NVGRE, or 1 for Geneve)
+*/
+#define MC_CMD_FILTER_OP_V3_IN_VNI_OR_VSID_OFST 72
+#define MC_CMD_FILTER_OP_V3_IN_VNI_OR_VSID_LEN 4
+#define MC_CMD_FILTER_OP_V3_IN_VNI_VALUE_LBN 0
+#define MC_CMD_FILTER_OP_V3_IN_VNI_VALUE_WIDTH 24
+#define MC_CMD_FILTER_OP_V3_IN_VNI_TYPE_LBN 24
+#define MC_CMD_FILTER_OP_V3_IN_VNI_TYPE_WIDTH 8
+/* enum: Match VXLAN traffic with this VNI */
+#define MC_CMD_FILTER_OP_V3_IN_VNI_TYPE_VXLAN 0x0
+#define MC_CMD_FILTER_OP_V3_IN_VNI_TYPE_GENEVE 0x1
+#define MC_CMD_FILTER_OP_V3_IN_VNI_TYPE_EXPERIMENTAL 0xfe
+#define MC_CMD_FILTER_OP_V3_IN_VSID_VALUE_LBN 0
+#define MC_CMD_FILTER_OP_V3_IN_VSID_VALUE_WIDTH 24
+#define MC_CMD_FILTER_OP_V3_IN_VSID_TYPE_LBN 24
+#define MC_CMD_FILTER_OP_V3_IN_VSID_TYPE_WIDTH 8
+/* enum: Match NVGRE traffic with this VSID */
+#define MC_CMD_FILTER_OP_V3_IN_VSID_TYPE_NVGRE 0x0
+/* source IP address to match (as bytes in network order; set last 12 bytes to */
+* 0 for IPv4 address)
+*/
+#define MC_CMD_FILTER_OP_V3_IN_SRC_IP_OFST 76
+#define       MC_CMD_FILTER_OP_V3_IN_SRC_IP_LEN 16
+/* destination IP address to match (as bytes in network order; set last 12
 + * bytes to 0 for IPv4 address)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_DST_IP_OFST 92
+#define       MC_CMD_FILTER_OP_V3_IN_DST_IP_LEN 16
+/* VXLAN/NVGRE inner frame source MAC address to match (as bytes in network
 + * order)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_SRC_MAC_OFST 108
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_SRC_MAC_LEN 6
+/* VXLAN/NVGRE inner frame source port to match (as bytes in network order) */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_SRC_PORT_OFST 114
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_SRC_PORT_LEN 2
+/* VXLAN/NVGRE inner frame destination MAC address to match (as bytes in
 + * network order)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_DST_MAC_OFST 116
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_DST_MAC_LEN 6
+/* VXLAN/NVGRE inner frame destination port to match (as bytes in network
 + * order)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_DST_PORT_OFST 122
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_DST_PORT_LEN 2
+/* VXLAN/NVGRE inner frame Ethernet type to match (as bytes in network order)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_ETHER_TYPE_OFST 124
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_ETHER_TYPE_LEN 2
+/* VXLAN/NVGRE inner frame Inner VLAN tag to match (as bytes in network order)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_INNER_VLAN_OFST 126
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_INNER_VLAN_LEN 2
+/* VXLAN/NVGRE inner frame Outer VLAN tag to match (as bytes in network order)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_OUTER_VLAN_OFST 128
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_OUTER_VLAN_LEN 2
+/* VXLAN/NVGRE inner frame IP protocol to match (in low byte; set high byte to
 + * 0)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_IP_PROTO_OFST 130
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_IP_PROTO_LEN 2
+/* VXLAN/NVGRE inner frame Firmware defined register 0 to match (reserved; set
 + * to 0)
 + */
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_FWDEF0_OFST 132
+#define       MC_CMD_FILTER_OP_V3_IN_IFRM_FWDEF0_LEN 4
+/* VXLAN/NVGRE inner frame Firmware defined register 1 to match (reserved; set
 + * to 0)
+ */
+#define MC_CMD_FILTER_OP_V3_IN_IFRM_FWDEF1_OFST 136
+#define MC_CMD_FILTER_OP_V3_IN_IFRM_FWDEF1_LEN 4
+/* VXLAN/NVGRE inner frame source IP address to match (as bytes in network
+ * order; set last 12 bytes to 0 for IPv4 address)
+ */
+#define MC_CMD_FILTER_OP_V3_IN_IFRM_SRC_IP_OFST 140
+#define MC_CMD_FILTER_OP_V3_IN_IFRM_SRC_IP_LEN 16
+/* VXLAN/NVGRE inner frame destination IP address to match (as bytes in network
+ * order; set last 12 bytes to 0 for IPv4 address)
+ */
+#define MC_CMD_FILTER_OP_V3_IN_IFRM_DST_IP_OFST 156
+#define MC_CMD_FILTER_OP_V3_IN_IFRM_DST_IP_LEN 16
+/* Set an action for all packets matching this filter. The DPDK driver and dpdk
+ * f/w variant use their own specific delivery structures, which are documented
+ * in the DPDK Firmware Driver Interface (SF-119419-TC). Requesting anything
+ * other than MATCH_ACTION_NONE when the NIC is running another f/w variant
+ * will cause the filter insertion to fail with ENOTSUP.
+ */
+#define MC_CMD_FILTER_OP_V3_IN_MATCH_ACTION_OFST 172
+#define MC_CMD_FILTER_OP_V3_IN_MATCH_ACTION_LEN 4
+/* enum: do nothing extra */
+#define MC_CMD_FILTER_OP_V3_IN_MATCH_ACTION_NONE 0x0
+/* enum: Set the match flag in the packet prefix for packets matching the
+ * filter (only with dpdk firmware, otherwise fails with ENOTSUP). Used to
+ * support the DPDK rte_flow "FLAG" action.
+ */
+#define MC_CMD_FILTER_OP_V3_IN_MATCH_ACTION_FLAG 0x1
+/* enum: Insert MATCH_MARK_VALUE into the packet prefix for packets matching
+ * the filter (only with dpdk firmware, otherwise fails with ENOTSUP). Used to
+ * support the DPDK rte_flow "MARK" action.
+ */
+#define MC_CMD_FILTER_OP_V3_IN_MATCH_ACTION_MARK 0x2
+/* the mark value for MATCH_ACTION_MARK */
+#define MC_CMD_FILTER_OP_V3_IN_MATCH_MARK_VALUE_OFST 176
+#define MC_CMD_FILTER_OP_V3_IN_MATCH_MARK_VALUE_LEN 4
+

/* MC_CMD_FILTER_OP_OUT msgresponse */
#define MC_CMD_FILTER_OP_OUT_LEN 12
/* identifies the type of operation requested */
#define MC_CMD_FILTER_OP_OUT_OP_OFST 0
#define MC_CMD_FILTER_OP_OUT_OP_LEN 4
/* Enum values, see field(s): */
#define MC_CMD_FILTER_OP_INOP */
/* Returned filter handle (for insert / subscribe operations). Note that these

@ @ -6910,14 +8708,15 @@
#define MC_CMD_FILTER_OP_OUT_HANDLE_LO_OFST 4
#define MC_CMD_FILTER_OP_OUT_HANDLE_HI_OFST 8
enum: guaranteed invalid filter handle (low 32 bits)
#define MC_CMD_FILTER_OP_OUT_HANDLE_LO_INVALID 0xffffffff
enum: guaranteed invalid filter handle (high 32 bits)
#define MC_CMD_FILTER_OP_OUT_HANDLE_HI_INVALID 0xffffffff

/* MC_CMD_FILTER_OP_EXT_OUT msgresponse */
#define MC_CMD_FILTER_OP_EXT_OUT_LEN 12
/* identifies the type of operation requested */
#define MC_CMD_FILTER_OP_EXT_OUT_OP_OFST 0
#define MC_CMD_FILTER_OP_EXT_OUT_OP_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_FILTER_OP_EXT_IN/OP */
/* Returned filter handle (for insert / subscribe operations). Note that these
* identifiers are exclusive to the second, MC_CMD_FILTER_OP_EXT_OUT, message in a
* series of messages (first, MC_CMD_FILTER_OP_EXT_IN, and then MC_CMD_FILTER_OP_EXT_OUT)
* for the same operation. */
#define MC_CMD_FILTER_OP_EXT_OUT_LEN_MIN 12
#define MC_CMD_FILTER_OP_EXT_OUT_LEN(num) (8+4*(num))
/* Identifies the type of operation requested */
#define MC_CMD_FILTER_OP_EXT_OUT_OP_OFST 0
#define MC_CMD_FILTER_OP_EXT_OUT_OP_LEN 4

/* MC_CMD_GET_PARSER_DISP_INFO_IN msgresponse */
#define MC_CMD_GET_PARSER_DISP_INFO_IN_LEN 4
/* identifies the type of operation requested */
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_OFST 0
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_LEN 4
/* enum: read the list of supported RX filter matches */
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_GET_SUPPORTED_RX_MATCHES 0x1
/* enum: read flags indicating restrictions on filter insertion for the calling
* client */
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_GET_RESTRICTIONS 0x2
/* enum: read properties relating to security rules (Medford-only; for use by
* SolarSecure apps, not directly by drivers. See SF-114946-SW.) */
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_GET_SECURITY_RULE_INFO 0x3
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_GET_SECURITY_RULE_INFO 0x3
/* enum: read the list of supported RX filter matches for VXLAN/NVGRE
* encapsulated frames, which follow a different match sequence to normal
* frames (Medford only) */
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_GET_SUPPORTED_ENCAP_RX_MATCHES 0x4
#define MC_CMD_GET_PARSER_DISP_INFO_IN_OP_GET_SUPPORTED_ENCAP_RX_MATCHES 0x4

/* MC_CMD_GET_PARSER_DISP_INFO_OUT msgresponse */
#define MC_CMD_GET_PARSER_DISP_INFO_OUT_LEN_MIN 8
#define MC_CMD_GET_PARSER_DISP_INFO_OUT_LEN(num) (8+4*(num))
/* identifies the type of operation requested */
#define MC_CMD_GET_PARSER_DISP_INFO_OUT_OP_OFST 0
+\#define       MC_CMD_GET_PARSER_DISP_INFO_OUT_OP_LEN 4
/*    Enum values, see field(s): */
/* number of supported match types */
#define MC_CMD_GET_PARSER_DISP_INFO_OUT_NUM_SUPPORTED_MATCHES_OFST 4
#define MC_CMD_GET_PARSER_DISP_INFO_OUT_NUM_SUPPORTED_MATCHES_LEN 4
/* array of supported match types (valid MATCH_FIELDS values for
 * 
 */
@@ -6982,10 +8784,12 @@
#define    MC_CMD_GET_PARSER_DISP_RESTRICTIONS_OUT_LEN 8
/* identifies the type of operation requested */
#define    MC_CMD_GET_PARSER_DISP_RESTRICTIONS_OUT_OP_OFST 0
+#define    MC_CMD_GET_PARSER_DISP_RESTRICTIONS_OUT_OP_LEN 4
/*    Enum values, see field(s): */
/* bitfield of filter insertion restrictions */
#define    MC_CMD_GET_PARSER_DISP_RESTRICTIONS_OUT_RESTRICTION_FLAGS_OFST 4
+#define    MC_CMD_GET_PARSER_DISP_RESTRICTIONS_OUT_RESTRICTION_FLAGS_LEN 4
#define        MC_CMD_GET_PARSER_DISP_RESTRICTIONS_OUT_DST_IP_MCAST_ONLY_LBN 0
#define        MC_CMD_GET_PARSER_DISP_RESTRICTIONS_OUT_DST_IP_MCAST_ONLY_WIDTH 1
@@ -6995,7 +8799,9 @@
* Direct read/write of parser-dispatcher state (DICPs and LUE) for debugging.
* Please note that this interface is only of use to debug tools which have
* knowledge of firmware and hardware data structures; nothing here is intended
- * for use by normal driver code.
+ * for use by normal driver code. Note that although this command is in the
+ * Admin privilege group, in tamperproof adapters, only read operations are
+ * permitted.
*/
#define MC_CMD_PARSER_DISP_RW 0xe5
@@ -7005,42 +8811,58 @@
#define    MC_CMD_PARSER_DISP_RW_IN_LEN 32
/* identifies the target of the operation */
#define    MC_CMD_PARSER_DISP_RW_IN_TARGET_OFST 0
+#define    MC_CMD_PARSER_DISP_RW_IN_TARGET_LEN 4
/* enum: RX dispatcher CPU */
-#define          MC_CMD_PARSER_DISP_RW_IN_RX_DICPU  0x0
+#define          MC_CMD_PARSER_DISP_RW_IN_RX_DICPU 0x0
/* enum: TX dispatcher CPU */
-#define          MC_CMD_PARSER_DISP_RW_IN_TX_DICPU  0x1
-/* enum: Lookup engine (with original metadata format) */
-#define          MC_CMD_PARSER_DISP_RW_IN_LUE  0x2
+/* enum: Lookup engine (with original metadata format). Deprecated; used only
+ * by cmdclient as a fallback for very old Huntington firmware, and not
+ *
+ * supported in firmware beyond v6.4.0.1005. Use LUE_VERSIONED_METADATA instead.
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+ /* Open Source Used In 5GaaS Edge AC-4  25805 */
#define MC_CMD_PARSER_DISP_RW_IN_DMEM_RMW_XOR_VALUE_OFST 12
+#define MC_CMD_PARSER_DISP_RW_IN_DMEM_RMW_XOR_VALUE_LEN 4
/* AND mask (for DMEM read-modify-writes: new = (old & mask) ^ value) */
#define MC_CMD_PARSER_DISP_RW_IN_DMEM_RMW_AND_MASK_OFST 16
+#define MC_CMD_PARSER_DISP_RW_IN_DMEM_RMW_AND_MASK_LEN 4
/* metadata format (for LUE reads using LUE_VERSIONED_METADATA) */
#define MC_CMD_PARSER_DISP_RW_IN_LUE_READ_METADATA_VERSION_OFST 12
+#define MC_CMD_PARSER_DISP_RW_IN_LUE_READ_METADATA_VERSION_LEN 4
/* value to write (for LUE writes) */
#define MC_CMD_PARSER_DISP_RW_IN_LUE_WRITE_VALUE_OFST 12
#define MC_CMD_PARSER_DISP_RW_IN_LUE_WRITE_VALUE_LEN 20
@@ -7049,6 +8871,7 @@
#define MC_CMD_PARSER_DISP_RW_OUT_LEN 52
/* value read (for DMEM reads) */
#define MC_CMD_PARSER_DISP_RW_OUT_DMEM_READ_VALUE_OFST 0
+#define MC_CMD_PARSER_DISP_RW_OUT_DMEM_READ_VALUE_LEN 4
/* value read (for LUE reads) */
#define MC_CMD_PARSER_DISP_RW_OUT_LUE_READ_VALUE_OFST 0
#define MC_CMD_PARSER_DISP_RW_OUT_LUE_READ_VALUE_LEN 20
@@ -7061,8 +8884,8 @@
#define MC_CMD_PARSER_DISP_RW_OUT_PORT_DP_MAPPING_OFST 0
#define MC_CMD_PARSER_DISP_RW_OUT_PORT_DP_MAPPING_LEN 4
#define MC_CMD_PARSER_DISP_RW_OUT_PORT_DP_MAPPING_NUM 4
-#define MC_CMD_PARSER_DISP_RW_OUT_DP0 0x1 /* enum */
-#define MC_CMD_PARSER_DISP_RW_OUT_DP1 0x2 /* enum */
+#define MC_CMD_PARSER_DISP_RW_OUT_DP0 0x1 /* enum */
+#define MC_CMD_PARSER_DISP_RW_OUT_DP1 0x2 /* enum */

/*****************************/
@@ -7093,6 +8916,7 @@
#define MC_CMD_SET_PF_COUNT_IN_LEN 4
/* New number of PFs on the device. */
#define MC_CMD_SET_PF_COUNT_IN_PF_COUNT_OFST 0
+#define MC_CMD_SET_PF_COUNT_IN_PF_COUNT_LEN 4
/* MC_CMD_SET_PF_COUNT_OUT msgresponse */
#define MC_CMD_SET_PF_COUNT_OUT_LEN 0
@@ -7113,6 +8937,7 @@
#define MC_CMD_GET_PORT_ASSIGNMENT_OUT_LEN 4
/* Identifies the port assignment for this function. */
#define MC_CMD_GET_PORT_ASSIGNMENT_OUT_LEN 4
@@ -7127,6 +8952,7 @@
#define MC_CMD_SET_PORT_ASSIGNMENT_IN_LEN 4

/*********************/
@@ -7093,6 +8916,7 @@
#define MC_CMD_SET_PF_COUNT_IN_LEN 4
/* New number of PFs on the device. */
#define MC_CMD_SET_PF_COUNT_IN_PF_COUNT_OFST 0
+#define MC_CMD_SET_PF_COUNT_IN_PF_COUNT_LEN 4
/* MC_CMD_SET_PF_COUNT_OUT msgresponse */
#define MC_CMD_SET_PF_COUNT_OUT_LEN 0
@@ -7113,6 +8937,7 @@
#define MC_CMD_GET_PORT_ASSIGNMENT_OUT_LEN 4
/* Identifies the port assignment for this function. */
#define MC_CMD_GET_PORT_ASSIGNMENT_OUT_LEN 4
@@ -7127,6 +8952,7 @@
#define MC_CMD_SET_PORT_ASSIGNMENT_IN_LEN 4

/*********************/
/* Identifies the port assignment for this function. */
#define MC_CMD_SET_PORT_ASSIGNMENT_IN_PORT_OFST 0
#define MC_CMD_SET_PORT_ASSIGNMENT_IN_PORT_LEN 4

/* MC_CMD_SET_PORT_ASSIGNMENT_OUT msgresponse */
#define MC_CMD_SET_PORT_ASSIGNMENT_OUT_LEN 0
#define MC_CMD_ALLOC_VIS_IN_LEN 8
/* The minimum number of VIs that is acceptable */
#define MC_CMD_ALLOC_VIS_IN_MIN_VI_COUNT_OFST 0
#define MC_CMD_ALLOC_VIS_IN_MIN_VI_COUNT_LEN 4
/* The maximum number of VIs that would be useful */
#define MC_CMD_ALLOC_VIS_IN_MAX_VI_COUNT_OFST 4
#define MC_CMD_ALLOC_VIS_IN_MAX_VI_COUNT_LEN 4

/* MC_CMD_ALLOC_VIS_OUT msgresponse: Huntington-compatible VI_ALLOC request. */
#define MC_CMD_ALLOC_VIS_OUT_LEN 8
/* The number of VIs allocated on this function */
#define MC_CMD_ALLOC_VIS_OUT_VI_COUNT_OFST 0
#define MC_CMD_ALLOC_VIS_OUT_VI_COUNT_LEN 4
/* The base absolute VI number allocated to this function. Required to */
/* correctly interpret wakeup events. */
#define MC_CMD_ALLOC_VIS_OUT_VI_BASE_OFST 4
#define MC_CMD_ALLOC_VIS_OUT_VI_BASE_LEN 4

/* MC_CMD_ALLOC_VIS_EXT_OUT msgresponse */
#define MC_CMD_ALLOC_VIS_EXT_OUT_LEN 12
/* The number of VIs allocated on this function */
#define MC_CMD_ALLOC_VIS_EXT_OUT_VI_COUNT_OFST 0
#define MC_CMD_ALLOC_VIS_EXT_OUT_VI_COUNT_LEN 4
/* The base absolute VI number allocated to this function. Required to */
/* correctly interpret wakeup events. */
#define MC_CMD_ALLOC_VIS_EXT_OUT_VI_BASE_OFST 4
#define MC_CMD_ALLOC_VIS_EXT_OUT_VI_BASE_LEN 4
/* Function's port vi_shift value (always 0 on Huntington) */
#define MC_CMD_ALLOC_VIS_EXT_OUT_VI_SHIFT_OFST 8
#define MC_CMD_ALLOC_VIS_EXT_OUT_VI_SHIFT_LEN 4

/**************************************************************/
#define MC_CMD_GET_SRIOV_CFG_OUT_LEN 20
/* Number of VFs currently enabled. */
#define MC_CMD_GET_SRIOV_CFG_OUT_VF_CURRENT_OFST 0
+\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_CURRENT_LEN 4
/* Max number of VFs before sriov stride and offset may need to be changed. */
\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_MAX_OFST 4
+\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_MAX_LEN 4
\#define  MC_CMD_GET_SRIOV_CFG_OUT_FLAGS_OFST 8
+\#define  MC_CMD_GET_SRIOV_CFG_OUT_FLAGS_LEN 4
\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_ENABLED_LBN 0
\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_ENABLED_WIDTH 1
/* RID offset of first VF from PF. */
\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_OFFSET_OFST 12
+\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_OFFSET_LEN 4
/* RID offset of each subsequent VF from the previous. */
\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_STRIDE_OFST 16
+\#define  MC_CMD_GET_SRIOV_CFG_OUT_VF_STRIDE_LEN 4

/**********************************
@@ -7224,19 +9062,24 @@
\#define  MC_CMD_SET_SRIOV_CFG_IN_LEN 20
/* Number of VFs currently enabled. */
+\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_CURRENT_LEN 4
/* Max number of VFs before sriov stride and offset may need to be changed. */
\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_MAX_OFST 4
+\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_MAX_LEN 4
\#define  MC_CMD_SET_SRIOV_CFG_IN_FLAGS_OFST 8
+\#define  MC_CMD_SET_SRIOV_CFG_IN_FLAGS_LEN 4
\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_ENABLED_LBN 0
\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_ENABLED_WIDTH 1
/* RID offset of firstVF from PF, or 0 for no change, or
* MC_CMD_RESOURCE_INSTANCE_ANY to allow the system to allocate an offset.
*/
\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_OFFSET_OFST 12
+\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_OFFSET_LEN 4
/* RID offset of each subsequent VF from the previous, 0 for no change, or
* MC_CMD_RESOURCE_INSTANCE_ANY to allow the system to allocate a stride.
*/
\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_STRIDE_OFST 16
+\#define  MC_CMD_SET_SRIOV_CFG_IN_VF_STRIDE_LEN 4

/******%%%%%%%%%%%%%%%%%%%%%%%%
@@ -7258,12 +9101,15 @@
\#define  MC_CMD_GET_VI_ALLOC_INFO_OUT_LEN 12
/* The number of VIs allocated on this function */
\#define  MC_CMD_GET_VI_ALLOC_INFO_OUT_VI_COUNT_OFST 0
+\#define  MC_CMD_GET_VI_ALLOC_INFO_OUT_VI_COUNT_LEN 4
/* The base absolute VI number allocated to this function. Required to

Open Source Used In 5GaaS Edge AC-4  25808
* correctly interpret wakeup events.
*/
#define MC_CMD_GET_VI_ALLOC_INFO_OUT_VI_BASE_OFST 4
+#define MC_CMD_GET_VI_ALLOC_INFO_OUT_VI_BASE_LEN 4
/* Function's port vi_shift value (always 0 on Huntington) */
#define MC_CMD_GET_VI_ALLOC_INFO_OUT_VI_SHIFT_OFST 8
+#define MC_CMD_GET_VI_ALLOC_INFO_OUT_VI_SHIFT_LEN 4

/***********************************/
@@ -7278,6 +9124,7 @@
#define MC_CMD_DUMP_VI_STATE_IN_VI_NUMBER_OFST 0
+##define MC_CMD_DUMP_VI_STATE_IN_VI_NUMBER_LEN 4
/*****************************/
#define MC_CMD_DUMP_VI_STATE_OUT_LEN 96
/* The VI number to query. */
#define MC_CMD_DUMP_VI_STATE_OUT_VI_NUMBER_OFST 0
+##define MC_CMD_DUMP_VI_STATE_OUT_VI_NUMBER_LEN 4
/* MC_CMD_DUMP_VI_STATE_OUT msgresponse */
#define MC_CMD_DUMP_VI_STATE_OUT_LEN 96
@@ -7311,6 +9158,7 @@
#define MC_CMD_DUMP_VI_STATE_OUT_VI_EV_TIMER_RAW_HI_OFST 24
/* Combined metadata field. */
#define MC_CMD_DUMP_VI_STATE_OUT_VI_EV_META_OFST 28
+#define MC_CMD_DUMP_VI_STATE_OUT_VI_EV_META_LEN 4
#define MC_CMD_DUMP_VI_STATE_OUT_VI_EV_META_BUFS_BASE_LBN 0
#define MC_CMD_DUMP_VI_STATE_OUT_VI_EV_META_BUFS_BASE_WIDTH 16
#define MC_CMD_DUMP_VI_STATE_OUT_VI_EV_META_BUFS_NPAGES_LBN 16
@@ -7392,6 +9240,7 @@
#define MC_CMD_ALLOC_PIOBUF_OUT_LEN 4
/* Handle for allocated push I/O buffer. */
#define MC_CMD_ALLOC_PIOBUF_OUT_PIOBUF_HANDLE_OFST 0
+##define MC_CMD_ALLOC_PIOBUF_OUT_PIOBUF_HANDLE_LEN 4
/*****************************/
@@ -7406,6 +9255,7 @@
#define MC_CMD_FREE_PIOBUF_IN_LEN 4
/* Handle for allocated push I/O buffer. */
#define MC_CMD_FREE_PIOBUF_IN_PIOBUF_HANDLE_OFST 0
+##define MC_CMD_FREE_PIOBUF_IN_PIOBUF_HANDLE_LEN 4
/* MC_CMD_FREE_PIOBUF_OUT msgresponse */
#define MC_CMD_FREE_PIOBUF_OUT_LEN 0
@@ -7423,6 +9273,7 @@
#define MC_CMD_GET_VI_TLP_PROCESSING_IN_LEN 4
/* VI number to get information for. */
#define MC_CMD_GET_VI_TLP_PROCESSING_IN_INSTANCE_OFST 0
+##define MC_CMD_GET_VI_TLP_PROCESSING_IN_INSTANCE_LEN 4
/* MC_CMD_GET_VI_TLP_PROCESSING_OUT msgresponse */
#define MC_CMD_GET_VI_TLP_PROCESSING_OUT_LEN 4
@@ -7445,6 +9296,7 @@
#define MC_CMD_GET_VI_TLP_PROCESSING_OUT_TPH_ON_LBN 19
#define MC_CMD_GET_VI_TLP_PROCESSING_OUT_TPH_ON_WIDTH 1
#define MC_CMD_GET_VI_TLP_PROCESSING_OUT_DATA_OFST 0
+#define MC_CMD_GET_VI_TLP_PROCESSING_OUT_DATA_LEN 4
/*********************/
@@ -7459,6 +9311,7 @@
#define MC_CMD_SET_VI_TLP_PROCESSING_IN_LEN 8
/* VI number to set information for. */
#define MC_CMD_SET_VI_TLP_PROCESSING_IN_INSTANCE_OFST 0
+#define MC_CMD_SET_VI_TLP_PROCESSING_IN_INSTANCE_LEN 4
/* Transaction processing steering hint 1 for use with the Rx Queue. */
#define MC_CMD_SET_VI_TLP_PROCESSING_IN_TPH_TAG1_RX_OFST 4
#define MC_CMD_SET_VI_TLP_PROCESSING_IN_TPH_TAG1_RX_LEN 1
@@ -7478,6 +9331,7 @@
#define MC_CMD_SET_VI_TLP_PROCESSING_IN_TPH_ON_LBN 51
#define MC_CMD_SET_VI_TLP_PROCESSING_IN_TPH_ON_WIDTH 1
#define MC_CMD_SET_VI_TLP_PROCESSING_IN_DATA_OFST 4
+#define MC_CMD_SET_VI_TLP_PROCESSING_IN_DATA_LEN 4
/* MC_CMD_SET_VI_TLP_PROCESSING_OUT msgresponse */
#define MC_CMD_SET_VI_TLP_PROCESSING_OUT_LEN 0
/** */
/* MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN msgrequest */
#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_LEN 4
#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_OFST 0
+#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_LEN 4
/* enum: MISC. */
-#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_MISC 0x0
+#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_MISC 0x0
/* enum: IDO. */
-#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_IDO 0x1
+#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_IDO 0x1
/* enum: RO. */
-#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_RO 0x2
+#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_RO 0x2
/* enum: TPH Type. */
-#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_TPH_TYPE 0x3
+#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_IN_TLP_GLOBAL_CATEGORY_TPH_TYPE 0x3
/* MC_CMD_GET_TLP_PROCESSINGGLOBALS_OUT msgresponse */
#define MC_CMD_GET_TLP_PROCESSINGGLOBALS_OUT_LEN 8
# define MC_CMD_GET_TLP_PROCESSING_GLOBALS_OUT_TLP_GLOBAL_CATEGORY_OFST 0
+ # define MC_CMD_GET_TLP_PROCESSING_GLOBALS_OUT_TLP_GLOBALCATEGORY_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_GET_TLP_PROCESSING_GLOBALS_IN/TLPGLOBAL_CATEGORY */
/* Amalgamated TLP info word. */
# define MC_CMD_GET_TLP_PROCESSING_GLOBALS_OUT_TLP_INFO_WORD_OFST 4
+ # define MC_CMD_GET_TLP_PROCESSING_GLOBALS_OUT_TLP_INFO_WORD_LEN 4
# define MC_CMD_GET_TLP_PROCESSING_GLOBALS_OUT_TLP_INFO_MISC_WTAG_EN_LBN 0
# define MC_CMD_GET_TLP_PROCESSING_GLOBALS_OUT_TLP_INFO_MISC_WTAG_EN_WIDTH 1
# define MC_CMD_GET_TLP_PROCESSING_GLOBALS_OUT_TLP_INFO_MISC_SPARE_LBN 1
@@ -7557,10 +9414,12 @@
/* MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN msgrequest */
# define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_LEN 8
# define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_TLPGLOBAL_CATEGORY_OFST 0
+ # define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_TLPGLOBALCATEGORY_LEN 4
/* Enum values, see field(s): */
/* MC_CMD_GET_TLP_PROCESSING_GLOBALS/MC_CMD_GET_TLP_PROCESSING_GLOBALS_IN/TLPGLOBAL_CATEGORY */
/* Amalgamated TLP info word. */
# define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_TLP_INFO_WORD_OFST 4
+ # define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_TLP_INFO_WORD_LEN 4
# define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_TLP_INFO_MISC_WTAG_EN_LBN 0
# define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_TLP_INFO_MISC_WTAG_EN_WIDTH 1
# define MC_CMD_SET_TLP_PROCESSING_GLOBALS_IN_TLP_INFO_IDO_DL_EN_LBN 0
@@ -7627,57 +9486,61 @@
in a command from the host.)
*/
/* in a command from the host.)
*/
# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_OFST 0
-# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_IDLE 0x0 /* enum */
-# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_RESET 0x1 /* enum */
-# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_IMEMS 0x2 /* enum */
-# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_VECTORS 0x3 /* enum */
-# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_READY 0x4 /* enum */
+# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_LEN 4
+# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_IDLE 0x0 /* enum */
+# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_RESET 0x1 /* enum */
+# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_IMEMS 0x2 /* enum */
+# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_VECTORS 0x3 /* enum */
+# define MC_CMD_SATELLITE_DOWNLOAD_IN_PHASE_READY 0x4 /* enum */
/* Target for download. (These match the blob numbers defined in
* mc_flash_layout.h.)
*/
/* Target for download. (These match the blob numbers defined in
* mc_flash_layout.h.)
*/
# define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_OFST 4
+ # define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_LEN 4
/* enum: Valid in phase 2 (PHASE IMEMS) only */
-# define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_TXDI_TEXT 0x0
+ # define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_TXDI_TEXT 0x0
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDI_TEXT 0x1
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDI_TEXT 0x1
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDP_TEXT 0x2
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDP_TEXT 0x2
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXHRSL_HR_LUT 0x3
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXHRSL_HR_LUT 0x3
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXHRSL_HR_LUT_CFG 0x4
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXHRSL_HR_LUT_CFG 0x4
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_TXHRSL_HR_LUT 0x5
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_TXHRSL_HR_LUT 0x5
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_TXHRSL_HR_LUT_CFG 0x6
/* enum: Valid in phase 2 (PHASE_IMEMS) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_TXHRSL_HR_LUT_CFG 0x6
/* enum: Valid in phase 3 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_ALL 0xffffffff
/* enum: Valid in phase 3 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_ALL 0xffffffff
/* enum: Valid in phase 3 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDI_VTBL0 0xc
/* enum: Valid in phase 3 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDI_VTBL0 0xc
/* enum: Valid in phase 3 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDI_VTBL1 0xd
/* enum: Valid in phase 3 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_RXDI_VTBL1 0xd
/* enum: Valid in phases 1 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_ALL 0xffffffff
/* enum: Valid in phases 1 (PHASE_RESET) and 4 (PHASE_READY) only */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_TARGET_ALL 0xffffffff
/* Chunk ID, or CHUNK_ID_LAST or CHUNK_ID_ABORT */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_ID_OFST 8
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_ID_LEN 4

/* enum: Last chunk, containing checksum rather than data */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_ID_LAST 0xffffffff
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_ID_ABORT 0xfffffffe

/* Length of this chunk in bytes */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_LEN_OFST 12
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_LEN_LEN 4

/* Data for this chunk */
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_DATA_OFST 16
#define MC_CMD_SATELLITE_DOWNLOAD_IN_CHUNK_DATA_LEN 4

#define MC_CMD_SATELLITE_DOWNLOAD_OUT_LEN 8
/* Same as MC_CMD_ERR field, but included as 0 in success cases */
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_RESULT_OFST 0
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_RESULT_LEN 4
/* Extra status information */
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_INFO_OFST 4
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_INFO_LEN 4

/* enum: Code download OK, completed. */
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_OK_COMPLETE 0x0
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_OK_ABORTED 0x1
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_OK_NEXT_CHUNK 0x2
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_ERR_BAD_PHASE 0x100
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_ERR_BAD_TARGET 0x101
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_ERR_BAD_CHUNK_ID 0x200
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_ERR_BAD_CHUNK_LEN 0x201
#define MC_CMD_SATELLITE_DOWNLOAD_OUT_ERR_BAD_CHECKSUM 0x300
/**
@@ -7726,6 +9591,7 @@
     #define MC_CMD_GET_CAPABILITIES_OUT_FLAGS1_LEN 4
     #define MC_CMD_GET_CAPABILITIES_OUT_VPORT_RECONFIGURE_LBN 3
     #define MC_CMD_GET_CAPABILITIES_OUT_VPORT_RECONFIGURE_WIDTH 1
+    #define MC_CMD_GET_CAPABILITIES_OUT_RX_DPCPU_FW_ID_OFST 4
+    #define MC_CMD_GET_CAPABILITIES_OUT_RX_DPCPU_FW_ID_LEN 2
     /* enum: Standard RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP 0x0
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP 0x0
     /* enum: Low latency RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_LOW_LATENCY 0x1
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_LOW_LATENCY 0x1
     /* enum: Packed stream RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_PACKED_STREAM 0x2
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_PACKED_STREAM 0x2
+    /* enum: Rules engine RXDP firmware */
+    #define MC_CMD_GET_CAPABILITIES_OUT_RXDP_RULES_ENGINE 0x5
+    /* enum: DPDK RXDP firmware */
+    #define MC_CMD_GET_CAPABILITIES_OUT_RXDP_DPDK 0x6
     /* enum: BIST RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_BIST 0x10a
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_BIST 0x10a
     /* enum: RXDP Test firmware image 1 */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_TO_MC_CUT_THROUGH 0x101
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_TO_MC_CUT_THROUGH 0x101
     /* enum: RXDP Test firmware image 2 */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD 0x102
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD 0x102
     /* enum: RXDP Test firmware image 3 */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD_FIRST 0x103
     /* enum: RXDP Test firmware image 4 */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_EVERY_EVENT_BATCHABLE 0x104
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_EVERY_EVENT_BATCHABLE 0x104
     /* enum: RXDP Test firmware image 5 */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_BACKPRESSURE 0x105
+#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_BACKPRESSURE 0x105
     /* enum: RXDP Test firmware image 6 */
-#define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
+    #define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
     */
 */
*/
*/
*/
*/
*/
*/
*/
*/
*/
*/
+define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
/* enum: RXDP Test firmware image 7 */
-define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_RX_HDR_SPLIT 0x107
+define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_RX_HDR_SPLIT 0x107
/* enum: RXDP Test firmware image 8 */
-define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_DISABLE_DL 0x108
+define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_DISABLE_DL 0x108
/* enum: RXDP Test firmware image 9 */
-define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_DOORBELL_DELAY 0x10b
+define MC_CMD_GET_CAPABILITIES_OUT_RXDP_TEST_FW_DOORBELL_DELAY 0x10b
/* enum: RXDP Test firmware image 10 */
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_TEST_FW_SLOW 0x10c
/* TxDPCPU firmware id. */
#define MC_CMD_GET_CAPABILITIES_OUT_TX_DPCPU_FW_ID_OFST 6
#define MC_CMD_GET_CAPABILITIES_OUT_TX_DPCPU_FW_ID_LEN 2
/* enum: Standard TXDP firmware */
-define MC_CMD_GET_CAPABILITIES_OUT_TXDP 0x0
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP 0x0
/* enum: Low latency TXDP firmware */
-define MC_CMD_GET_CAPABILITIES_OUT_TXDP_LOW_LATENCY 0x1
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_LOW_LATENCY 0x1
/* enum: High packet rate TXDP firmware */
-define MC_CMD_GET_CAPABILITIES_OUT_TXDP_HIGH_PACKET_RATE 0x3
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_HIGH_PACKET_RATE 0x3
/* enum: Rules engine TXDP firmware */
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_RULES_ENGINE 0x5
/+* enum: DPDK TXDP firmware */
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_DPDK 0x6
/* enum: BIST TXDP firmware */
-define MC_CMD_GET_CAPABILITIES_OUT_TXDP_BIST 0x12d
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_BIST 0x12d
/* enum: TXDP Test firmware image 1 */
-define MC_CMD_GET_CAPABILITIES_OUT_TXDP_TEST_FW_TSO_EDIT 0x101
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_TEST_FW_TSO_EDIT 0x101
/* enum: TXDP Test firmware image 2 */
-define MC_CMD_GET_CAPABILITIES_OUT_TXDP_TEST_FW_PACKET_EDITS 0x102
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_TEST_FW_PACKET_EDITS 0x102
/* enum: TXDP CSR bus test firmware */
-define MC_CMD_GET_CAPABILITIES_OUT_TXDP_TEST_FW_CSR 0x103
+define MC_CMD_GET_CAPABILITIES_OUT_TXDP_TEST_FW_CSR 0x103
#define MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_VERSION_OFST 8
#define MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_VERSION_LEN 2
#define MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_VERSION_REV_LBN 0
@@ -7839,37 +9715,43 @@
/* enum: reserved value - do not use (may indicate alternative interpretation */
/* of REV field in future */
*/
-define MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_RESERVED 0x0
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_RESERVED 0x0
/* enum: Trivial RX PD firmware for early Huntington development (Huntington
* development only)
*/

-\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_FIRST_PKT 0x1
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_FIRST_PKT 0x1
/* enum: RX PD firmware with approximately Siena-compatible behaviour
* (Huntington development only)
*/

-\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_SIENA_COMPAT 0x2
-/* enum: Virtual switching (full feature) RX PD production firmware */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Full featured RX PD production firmware */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+/* (deprecated original name for the FULL_FEATURED variant) */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_VSWITCH 0x3
+/* enum: Low latency RX PD production firmware */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_LOW_LATENCY 0x5
+/* enum: Packed stream RX PD production firmware */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_PACKED_STREAM 0x6
+/* enum: RX PD firmware handling layer 2 only for high packet rate performance
* tests (Medford development only)
*/

-\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_LAYER2_PERF 0x7
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_LAYER2_PERF 0x7
+/* enum: Rules engine RX PD production firmware */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_RULES_ENGINE 0x8
+/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_L3XUDP 0x9
+/* enum: DPDK RX PD production firmware */
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_DPDK 0xa
+/* enum: RX PD firmware for GUE parsing prototype (Medford development only) */
-\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+/* enum: RX PD firmware parsing but not filtering network overlay tunnel
* encapsulations (Medford development only)
*/

-\#define          MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_TESTFW_ENCAP_PARSING_ONLY 0xf
+#define
MC_CMD_GET_CAPABILITIES_OUT_RXPD_FW_TYPE_TESTFW_ENCAP_PARSING_ONLY 0xf
#define MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_VERSION_OFST 10
#define MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_VERSION_LEN 2
#define MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_VERSION_REV_LBN 0
@@ -7879,34 +9761,42 @@
/* enum: reserved value - do not use (may indicate alternative interpretation */
* of REV field in future)
*/
-#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_RESERVED  0x0
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_RESERVED 0x0
/* enum: Trivial TX PD firmware for early Huntington development (Huntington */
* development only)
*/
-#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_FIRST_PKT  0x1
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_FIRST_PKT 0x1
/* enum: TX PD firmware with approximately Siena-compatible behaviour */
* (Huntington development only)
*/
-#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_SIENA_COMPAT  0x2
-/* enum: Virtual switching (full feature) TX PD production firmware */
+/* enum: Full featured TX PD production firmware */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Full featured TX PD production firmware */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+/* enum: TX PD firmware handling layer 2 only for high packet rate performance /* enum: TX PD firmware handling layer 2 only for high packet rate performance */
* tests (Medford development only)
*/
-#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_LAYER2_PERF 0x7
+/* enum: Rules engine TX PD production firmware */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_LAYER2_PERF 0x7
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_LAYER2_PERF 0x7
+/* enum: Rules engine TX PD production firmware */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_RULES_ENGINE 0x8
+/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_RULES_ENGINE 0x8
+/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_L3XUDP 0x9
+/* enum: DPDK TX PD production firmware */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_L3XUDP 0x9
+/* enum: DPDK TX PD production firmware */
+#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_DPDK 0xa
+/* enum: RX PD firmware for GUE parsing prototype (Medford development only) */
-#define          MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
#define MC_CMD_GET_CAPABILITIES_OUT_TXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
/* Hardware capabilities of NIC */
#define MC_CMD_GET_CAPABILITIES_OUT_HW_CAPABILITIES_OFST 12
#define MC_CMD_GET_CAPABILITIES_OUT_HW_CAPABILITIES_LEN 4
/* Licensed capabilities */
#define MC_CMD_GET_CAPABILITIES_OUT_LICENSE_CAPABILITIES_OFST 16
#define MC_CMD_GET_CAPABILITIES_OUT_LICENSE_CAPABILITIES_LEN 4

/* MC_CMD_GET_CAPABILITIES_V2_IN msgrequest */
#define MC_CMD_GET_CAPABILITIES_V2_IN_LEN 0
@@ -7915,6 +9805,7 @@
#define MC_CMD_GET_CAPABILITIES_V2_OUT_LEN 72
/* First word of flags. */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FLAGS1_OFST 0
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FLAGS1_LEN 4
#define MC_CMD_GET_CAPABILITIES_V2_OUT_VPORT_RECONFIGURE_LBN 3
#define MC_CMD_GET_CAPABILITIES_V2_OUT_VPORT_RECONFIGURE_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_TX_STRIPING_LBN 4
@@ -7977,48 +9868,58 @@
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RX_DPCPU_FW_ID_OFST 4
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RX_DPCPU_FW_ID_LEN 2
/* enum: Standard RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP 0x0
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP 0x0
/* enum: Low latency RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_LOW_LATENCY 0x1
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_LOW_LATENCY 0x1
/* enum: Packed stream RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_PACKED_STREAM 0x2
+/* enum: Rules engine RXDP firmware */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_RULES_ENGINE 0x5
+/* enum: DPDK RXDP firmware */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_DPDK 0x6
/* enum: BIST RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_BIST 0x10a
+/* enum: RXDP Test firmware image 1 */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_TO_MC_CUT THROUGH 0x101
+/* enum: RXDP Test firmware image 2 */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_TO_MC_STORE FORWARD 0x102
+/* enum: RXDP Test firmware image 3 */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_TO_MC_STORE FORWARD 0x102
/* enum: RXDP Test firmware image 3 */
-#define
MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD_FIRST 0x103
+#define
MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD_FIRST 0x103
/* enum: RXDP Test firmware image 4 */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_EVERY_EVENT_BATCHABLE 0x104
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_EVERY_EVENT_BATCHABLE 0x104
/* enum: RXDP Test firmware image 5 */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
/* enum: RXDP Test firmware image 6 */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_RX_HDR_SPLIT 0x107
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_RX_HDR_SPLIT 0x107
/* enum: RXDP Test firmware image 7 */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_DISABLE_DL 0x108
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_DISABLE_DL 0x108
/* enum: RXDP Test firmware image 8 */
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_DOORBELL_DELAY 0x10b
+/* enum: RXDP Test firmware image 10 */
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_RXDP_TEST_FW_SLOW 0x10c
/* TxDPCPU firmware id. */
#define       MC_CMD_GET_CAPABILITIES_V2_OUT_TX_DPCPU_FW_ID_OFST 6
#define       MC_CMD_GET_CAPABILITIES_V2_OUT_TX_DPCPU_FW_ID_LEN 2
/* enum: Standard TXDP firmware */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP 0x0
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP 0x0
/* enum: Low latency TXDP firmware */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_LOW_LATENCY 0x1
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_LOW_LATENCY 0x1
/* enum: High packet rate TXDP firmware */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_HIGH_PACKET_RATE 0x3
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_HIGH_PACKET_RATE 0x3
+/* enum: Rules engine TXDP firmware */
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_RULES_ENGINE 0x5
+/* enum: DPDK TXDP firmware */
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_DPDK 0x6
/* enum: BIST TXDP firmware */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_BIST 0x12d
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_BIST 0x12d
/* enum: TXDP Test firmware image 1 */
-#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_TEST_FW_TSO_EDIT 0x101
+#define          MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_TEST_FW_TSO_EDIT 0x101
/* enum: TXDP Test firmware image 2 */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_TEST_FW_PACKET_EDITS 0x102
/* enum: TXDP CSR bus test firmware */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXDP_TEST_FW_CSR 0x103
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_VERSION_OFST 8
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_VERSION_LEN 2
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_VERSION_REV_LBN 0
@@ -8028,37 +9929,43 @@
 /* enum: reserved value - do not use (may indicate alternative interpretation
 * of REV field in future)
 */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_RESERVED 0x0
/* enum: Trivial RX PD firmware for early Huntington development (Huntington
 * development only)
 */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_FIRST_PKT 0x1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT 0x2
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_VSWITCH 0x3
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_LOW_LATENCY 0x5
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_PACKED_STREAM 0x6
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_LAYER2_PERF 0x7
/* enum: siena_compat variant RX PD firmware using PM rather than MAC
 * (Huntington development only)
 */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
/* enum: Virtual switching (full feature) RX PD production firmware */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SVSWITCH 0x3
/* enum: Full featured RX PD production firmware */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
/* enum: (deprecated original name for the FULL_FEATURED variant) */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_VSWITCH 0x3
/* enum: Low latency RX PD production firmware */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
/* enum: Low latency RX PD production firmware */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
/* enum: Packed stream RX PD production firmware */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_PACKED_STREAM 0x6
/* enum: RX PD firmware handling layer 2 only for high packet rate performance
 * tests (Medford development only)
 */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
/* enum: Rules engine RX PD production firmware */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_RULES_ENGINE 0x8
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_RULES_ENGINE 0x8
+/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_L3XUDP 0x9
+/* enum: DPDK RX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_DPDK 0xa
+/* enum: RX PD firmware for GUE parsing prototype (Medford development only) */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+/* enum: RX PD firmware parsing but not filtering network overlay tunnel
* encapsulations (Medford development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_TESTFW_ENCAP_PARSING_ONLY 0xf
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_RXPD_FW_TYPE_TESTFW_ENCAP_PARSING_ONLY 0xf

#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_VERSION_OFST 10
#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_VERSION_LEN 2
#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_VERSION_REV_LBN 0
@@ -8068,36 +9975,45 @@
+/* enum: reserved value - do not use (may indicate alternative interpretation
* of REV field in future)
*/
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_RESERVED 0x0
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_RESERVED 0x0
+/* enum: Trivial TX PD firmware for early Huntington development (Huntington
* development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_FIRST_PKT 0x1
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_FIRST_PKT 0x1
+/* enum: Full featured TX PD production firmware
* (deprecated original name for the FULL_FEATURED variant) */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x3
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+/* enum: Siena_compat variant TX PD firmware using PM rather than MAC
* (Huntington development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
-/* enum: Virtual switching (full feature) TX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Full featured TX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Virtual switching (full feature) TX PD production firmware */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: siena_compat variant TX PD firmware using PM rather than MAC
* (Huntington development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
-/* enum: Virtual switching (full feature) TX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Full featured TX PD production firmware */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Virtual switching (full feature) TX PD production firmware */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: siena_compat variant TX PD firmware using PM rather than MAC
* (Huntington development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
-/* enum: Virtual switching (full feature) TX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Full featured TX PD production firmware */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Virtual switching (full feature) TX PD production firmware */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: siena_compat variant TX PD firmware using PM rather than MAC
* (Huntington development only)
*/
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_LOW_LATENCY 0x5 /* enum */
/* enum: TX PD firmware handling layer 2 only for high packet rate performance */
* tests (Medford development only) */

-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_LAYER2_PERF 0x7
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_LAYER2_PERF 0x7
/* enum: Rules engine TX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_RULES_ENGINE 0x8
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_RULES_ENGINE 0x8
/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_L3UDP 0x9
+/* enum: DPDK TX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_TXPD_FW_TYPE_DPDK 0xa
/* Licensed capabilities */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_LICENSE_CAPABILITIES_OFST 12
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_LICENSE_CAPABILITIES_LEN 4
/* Second word of flags. Not present on older firmware (check the length). */
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_FLAGS2_OFST 20
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_FLAGS2_LEN 4
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TX_TSO_V2_LBN 0
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TX_TSO_V2_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_MCDI_BACKGROUND_LBN 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_MCDI_BACKGROUND_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_MCDI_DB_RETURN_LBN 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_MCDI_DB_RETURN_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_CTPIO_LBN 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_CTPIO_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TSA_SUPPORT_LBN 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TSA_BOUND_LBN 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_TSA_BOUND_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V2_OUT_SF_ADAPTER_AUTHENTICATION_LBN 1

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#define MC_CMD_GET_CAPABILITIES_V2_OUT_SF_ADAPTER_AUTHENTICATION_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FILTER_ACTION_FLAG_LBN 19
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FILTER_ACTION_FLAG_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FILTER_ACTION_MARK_LBN 20
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FILTER_ACTION_MARK_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_EQUAL_STRIDE_PACKED_STREAM_LBN 21
#define MC_CMD_GET_CAPABILITIES_V2_OUT_EQUAL_STRIDE_PACKED_STREAM_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_L3XUDP_SUPPORT_LBN 22
#define MC_CMD_GET_CAPABILITIES_V2_OUT_L3XUDP_SUPPORT_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FW_SUBVARIANT_NO_TX_CSUM_LBN 23
#define MC_CMD_GET_CAPABILITIES_V2_OUT_FW_SUBVARIANT_NO_TX_CSUM_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_VI_SPREADING_LBN 24
#define MC_CMD_GET_CAPABILITIES_V2_OUT_VI_SPREADING_WIDTH 1

/* Number of FATSOv2 contexts per datapath supported by this NIC. Not present
 * on older firmware (check the length).
 */
@@ -8137,18 +10077,18 @@
#define MC_CMD_GET_CAPABILITIES_V2_OUT_PFS_TO_PORTS_ASSIGNMENT_LEN 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_PFS_TO_PORTS_ASSIGNMENT_NUM 16
/* enum: The caller is not permitted to access information on this PF. */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_ACCESS_NOT_PERMITTED 0xff
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_ACCESS_NOT_PERMITTED 0xff
/* enum: PF does not exist. */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_PRESENT 0xfe
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_PRESENT 0xfe
/* enum: PF does exist but is not assigned to any external port. */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_ASSIGNED 0xfd
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_ASSIGNED 0xfd
/* enum: This value indicates that PF is assigned, but it cannot be expressed
 * in this field. It is intended for a possible future situation where a more
 * complex scheme of PFs to ports mapping is being used. The future driver
 * should look for a new field supporting the new scheme. The current/old
 * driver should treat this value as PF_NOT_ASSIGNED.
 */
-#define MC_CMD_GET_CAPABILITIES_V2_OUT_INCOMPATIBLE_ASSIGNMENT 0xfc
+#define MC_CMD_GET_CAPABILITIES_V2_OUT_INCOMPATIBLE_ASSIGNMENT 0xfc
/* One byte per PF containing the number of its VFs, indexed by PF number. A
 * special value indicates that a PF is not present.
 */
@@ -8156,9 +10096,9 @@
#define MC_CMD_GET_CAPABILITIES_V2_OUT_NUM_VFS_PER_PF_LEN 1
#define MC_CMD_GET_CAPABILITIES_V2_OUT_NUM_VFS_PER_PF_NUM 16
/* enum: The caller is not permitted to access information on this PF. */
-/* MC_CMD_GET_CAPABILITIES_V2_OUT_ACCESS_NOT_PERMITTED 0xff */
+/* MC_CMD_GET_CAPABILITIES_V2_OUT_ACCESS_NOT_PERMITTED 0xff */
/* enum: PF does not exist. */
-/* MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_PRESENT 0xfe */
+/* MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_PRESENT 0xfe */
/* enum: PF does exist but is not assigned to any external port. */
-/* MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_ASSIGNED 0xfd */
+/* MC_CMD_GET_CAPABILITIES_V2_OUT_PF_NOT_ASSIGNED 0xfd */
/* enum: This value indicates that PF is assigned, but it cannot be expressed
 * in this field. It is intended for a possible future situation where a more
 * complex scheme of PFs to ports mapping is being used. The future driver
 * should look for a new field supporting the new scheme. The current/old
 * driver should treat this value as PF_NOT_ASSIGNED.
 */
-/* MC_CMD_GET_CAPABILITIES_V2_OUT_INCOMPATIBLE_ASSIGNMENT 0xfc */
+/* MC_CMD_GET_CAPABILITIES_V2_OUT_INCOMPATIBLE_ASSIGNMENT 0xfc */
/* One byte per PF containing the number of its VFs, indexed by PF number. A
 * special value indicates that a PF is not present.
 */
/* Number of VIs available for each external port */
#define MC_CMD_GET_CAPABILITIES_V2_OUT_NUM_VIS_PER_PORT_OFST 58
#define MC_CMD_GET_CAPABILITIES_V2_OUT_NUM_VIS_PER_PORT_LEN 2
@@ -8181,9 +10121,10 @@
#define MC_CMD_GET_CAPABILITIES_V2_OUT_SIZEPIO_BUFF_LEN 2
/* MC_CMD_GET_CAPABILITIES_V3_OUT msgresponse */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_LEN 73
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_LEN 76
/* First word of flags. */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_FLAGS1_OFST 0
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_FLAGS1_LEN 4
#define MC_CMD_GET_CAPABILITIES_V3_OUT_VPORT_RECONFIGURE_LBN 3
#define MC_CMD_GET_CAPABILITIES_V3_OUT_VPORT_RECONFIGURE_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TX_STRIPING_LBN 4
@@ -8246,48 +10187,58 @@
#define MC_CMD_GET_CAPABILITIES_V3_OUT_RX_DPCPU_FW_ID_OFST 4
#define MC_CMD_GET_CAPABILITIES_V3_OUT_RX_DPCPU_FW_ID_LEN 2
/* enum: Standard RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP  0x0
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_LOW_LATENCY  0x1
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_PACKED_STREAM  0x2
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP 0x0
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_LOW_LATENCY 0x1
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_PACKED_STREAM 0x2
+/* enum: Rules engine RXDP firmware */
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_RULES_ENGINE 0x5
+/* enum: DPDK RXDP firmware */
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_DPDK 0x6
/* enum: BIST RXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_BIST  0x10a
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_BIST 0x10a
/* enum: RXDP Test firmware image 1 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_TO_MC_CUT_THROUGH 0x101
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_TO_MC_CUT_THROUGH 0x101
/* enum: RXDP Test firmware image 2 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD 0x102
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD 0x102
/* enum: RXDP Test firmware image 3 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD_FIRST 0x103
+#define
MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD_FIRST 0x103
/* enum: RXDP Test firmware image 4 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_EVERY_EVENT_BATCHABLE 0x104
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_EVERY_EVENT_BATCHABLE 0x104
/* enum: RXDP Test firmware image 5 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_BACKPRESSURE 0x105
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_BACKPRESSURE 0x105
/* enum: RXDP Test firmware image 6 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
/* enum: RXDP Test firmware image 7 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_RX_HDR_SPLIT 0x107
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_RX_HDR_SPLIT 0x107
/* enum: RXDP Test firmware image 8 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_DISABLE_DL 0x108
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_DISABLE_DL 0x108
/* enum: RXDP Test firmware image 9 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_DOORBELL_DELAY 0x10b
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_DOORBELL_DELAY 0x10b
/* enum: RXDP Test firmware image 10 */
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXDP_TEST_FW_SLOW 0x10c

/* TxDPCPU firmware id. */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TX_DPCPU_FW_ID_OFST 6
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TX_DPCPU_FW_ID_LEN 2
/* enum: Standard TXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP 0x0
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP 0x0
/* enum: Low latency TXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_LOW_LATENCY 0x1
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_LOW_LATENCY 0x1
/* enum: High packet rate TXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_HIGH_PACKET_RATE 0x3
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_HIGH_PACKET_RATE 0x3
/* enum: Rules engine TXDP firmware */
/*#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_RULES_ENGINE 0x5
*/
/* enum: DPDK TXDP firmware */
+&#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_DPDK 0x6
/* enum: BIST TXDP firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_BIST 0x12d
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_BIST 0x12d
/* enum: TXDP Test firmware image 1 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_TEST_FW_TSO_EDIT 0x101
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_TEST_FW_TSO_EDIT 0x101
/* enum: TXDP Test firmware image 2 */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_TEST_FW_PACKET_EDITS 0x102
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_TEST_FW_PACKET_EDITS 0x102
/* enum: TXDP CSR bus test firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_TEST_FW_CSR 0x103
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXDP_TEST_FW_CSR 0x103

#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_VERSION_OFFSET 8
#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_VERSION_LENGTH 2
#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_VERSION_REV_LSB 0
@ @ -8297,37 +10248,43 @@
/* enum: reserved value - do not use (may indicate alternative interpretation */
* of REV field in future)
*/
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_RESERVED 0x0
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_RESERVED 0x0

/* enum: Trivial RX PD firmware for early Huntington development (Huntington development only) */
*/
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_FIRST_PKT 0x1
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_FIRST_PKT 0x1

/* enum: RX PD firmware with approximately Siena-compatible behaviour */
* (Huntington development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_SIENA_COMPAT 0x2
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_SIENA_COMPAT 0x2

/* enum: Virtual switching (full feature) RX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_VSWITCH 0x3
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_VSWITCH 0x3

/* enum: Full featured RX PD production firmware */
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_VSWITCH 0x3

/* enum: siena_compat variant RX PD firmware using PM rather than MAC */
* (Huntington development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4

/* enum: Low latency RX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_LOW_LATENCY 0x5
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_LOW_LATENCY 0x5

/* enum: Packed stream RX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_PACKED_STREAM 0x6
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_PACKED_STREAM 0x6

/* enum: RX PD firmware handling layer 2 only for high packet rate performance */
* tests (Medford development only)
*/
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_LAYER2_PERF 0x7
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_LAYER2_PERF 0x7

/* enum: Rules engine RX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_RULES_ENGINE 0x8
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_RULES_ENGINE 0x8
+/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_L3XUDP 0x9
+/* enum: DPDK RX PD production firmware */
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_DPDK 0xa
+/* enum: RX PD firmware for GUE parsing prototype (Medford development only) */
-\#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_RXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+/* enum: RX PD firmware parsing but not filtering network overlay tunnel * encapsulations (Medford development only) */
+/
-
-\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_RESERVED 0x0
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_RESERVED 0x0
+/* enum: Trivial TX PD firmware for early Huntington development (Huntington development only) */
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_FIRST_PKT 0x1
+/* enum: TX PD firmware with approximately Siena-compatible behaviour */
+/* of REV field in future */
+/
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_SIENA_COMPAT 0x2
+/* enum: Virtual switching (full feature) TX PD production firmware */
-\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_VSWITCH 0x3
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
-\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+/* enum: TX PD firmware handling layer 2 only for high packet rate performance */
* tests (Medford development only) */

-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_LAYER2_PERF 0x7
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_LAYER2_PERF 0x7

/* enum: Rules engine TX PD production firmware */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_RULES_ENGINE 0x8
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_RULES_ENGINE 0x8
+/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_L3UDP 0x9
+/* enum: DPDK TX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_DPDK 0xa
+/* enum: RX PD firmware for GUE parsing prototype (Medford development only) */
-#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_TXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe

/* Hardware capabilities of NIC */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_HW_CAPABILITIES_OFST 12
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_HW_CAPABILITIES_LEN 4

/* Licensed capabilities */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_LICENSE_CAPABILITIES_OFST 16
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_LICENSE_CAPABILITIES_LEN 4

/* Second word of flags. Not present on older firmware (check the length). */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_FLAGS2_OFST 20
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_FLAGS2_LEN 4
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TX_TSO_V2_LBN 0
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TX_TSO_V2_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TX_TSO_V2_ENCAP_LBN 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_NVRAM_UPDATE_REPORT_VERIFY_RESULT_LBN 12
#define MC_CMD_GET_CAPABILITIES_V3_OUT_NVRAM_UPDATE_REPORT_VERIFY_RESULT_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_MCDI_BACKGROUND_LBN 13
#define MC_CMD_GET_CAPABILITIES_V3_OUT_MCDI_BACKGROUND_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_MCDI_DB_RETURN_LBN 14
#define MC_CMD_GET_CAPABILITIES_V3_OUT_MCDI_DB_RETURN_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_CTPIO_LBN 15
#define MC_CMD_GET_CAPABILITIES_V3_OUT_CTPIO_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TSA_SUPPORT_LBN 16
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TSA_SUPPORT_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TSA_BOUND_LBN 17
#define MC_CMD_GET_CAPABILITIES_V3_OUT_TSA_BOUND_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_SF_ADAPTER_AUTHENTICATION_LBN 18
#define MC_CMD_GET_CAPABILITIES_V3_OUT_SF_ADAPTER_AUTHENTICATION_WIDTH 1
#define MC_CMD_GET_CAPABILITIES_V3_OUT_FILTER_ACTION_FLAG_LBN 19
#define MC_CMD_GET_CAPABILITIES_V3_OUT_FILTER_ACTION_FLAG_WIDTH 1

+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_FILTER_ACTION_MARK_LBN 20
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_FILTER_ACTION_MARK_WIDTH 1
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_EQUAL_STRIDE_PACKED_STREAM_LBN 21
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_EQUAL_STRIDE_PACKED_STREAM_WIDTH 1
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_L3XUDP_SUPPORT_LBN 22
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_L3XUDP_SUPPORT_WIDTH 1
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_FW_SUBVARIANT_NO_TX_CSUM_LBN 23
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_FW_SUBVARIANT_NO_TX_CSUM_WIDTH 1
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_VI_SPREADING_LBN 24
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_VI_SPREADING_WIDTH 1

/* Number of FATSOv2 contexts per datapath supported by this NIC. Not present 
* on older firmware (check the length). */
@@ -8406,18 +10396,18 @@
  
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_PFS_TO_PORTS_ASSIGNMENT_LEN 1
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_PFS_TO_PORTS_ASSIGNMENT_NUM 16
/* enum: The caller is not permitted to access information on this PF. */
-\#define MC_CMD_GET_CAPABILITIES_V3_OUT_ACCESS_NOT_PERMITTED 0xff
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_ACCESS_NOT_PERMITTED 0xff
/* enum: PF does not exist but is not assigned to any external port. */
-\#define MC_CMD_GET_CAPABILITIES_V3_OUT_PF_NOT_PRESENT 0xfe
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_PF_NOT_PRESENT 0xfe
/* One byte per PF containing the number of its VFs, indexed by PF number. A 
* special value indicates that a PF is not present. */
@@ -8425,9 +10415,9 @@
  
-\#define MC_CMD_GET_CAPABILITIES_V3_OUT_INCOMPATIBLE_ASSIGNMENT 0xfc
+\#define MC_CMD_GET_CAPABILITIES_V3_OUT_INCOMPATIBLE_ASSIGNMENT 0xfc
/* Number of VIs available for each external port */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_NUM_VIS_PER_PORT_OFST 58
#define MC_CMD_GET_CAPABILITIES_V3_OUT_NUM_VIS_PER_PORT_LEN 2
/* enum: Each VI occupies 8k as on Huntington and Medford. PIO is at offset 4k. * CTPIO is not mapped. */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_VI_WINDOW_MODE_8K 0x0
/* enum: Each VI occupies 16k. PIO is at offset 4k. CTPIO is at offset 12k. */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_VI_WINDOW_MODE_16K 0x1
/* enum: Each VI occupies 64k. PIO is at offset 4k. CTPIO is at offset 12k. */
#define MC_CMD_GET_CAPABILITIES_V3_OUT_VI_WINDOW_MODE_64K 0x2

+/* Number of vFIFOs per adapter that can be used for VFIFO Stuffing */
+/* (SF-115995-SW) in the present configuration of firmware and port mode. */
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_VFIFO_STUFFING_NUM_VFIFOS_OFST 73
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_VFIFO_STUFFING_NUM_VFIFOS_LEN 1
+/* Number of buffers per adapter that can be used for VFIFO Stuffing */
+/* (SF-115995-SW) in the present configuration of firmware and port mode. */
+/
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_VFIFO_STUFFING_NUM_CP_BUFFERS_OFST 74
+#define MC_CMD_GET_CAPABILITIES_V3_OUT_VFIFO_STUFFING_NUM_CP_BUFFERS_LEN 2

+/* MC_CMD_GET_CAPABILITIES_V4_OUT msgresponse */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_LEN 78
+/* First word of flags. */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_FLAGS1_OFST 0
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_FLAGS1_LEN 4
+/* VPORT RECONFIGURE LBN */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VPORT_RECONFIGURE_LBN 3
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VPORT_RECONFIGURE_WIDTH 1
+/* TX STRIPPING LBN */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_STRIPING_LBN 4
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_STRIPING_WIDTH 1
+/* VADAPTOR QUERY LBN */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VADAPTOR_QUERY_LBN 5
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VADAPTOR_QUERY_WIDTH 1
+/* DRV ATTACH PREBOOT LBN */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_DRV_ATTACH_PREBOOT_LBN 6
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_DRV_ATTACH_PREBOOT_WIDTH 1
+/* RX FORCE EVENT Merging LBN */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_FORCE_EVENT_MERGING_LBN 8
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_FORCE_EVENT_MERGING_WIDTH 1
+/* Set MAC ENHANCED LBN */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_SET_MAC_ENHANCED_LBN 9
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_SET_MAC_ENHANCED_WIDTH 1
+/
MC_CMD_GET_CAPABILITIES_V4_OUT_UNKNOWN_UCAST_DST_FILTER_ALWAYS_MULTI_RECIPI
ENT_LBN 10
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_UNKNOWN_UCAST_DST_FILTER_ALWAYS_MULTI_RECIPI
ENT_WIDTH 1

+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_VADAPTOR_PERMIT_SET_MAC_WHEN_FILTERS_INSTALLED_LBN 11
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_VADAPTOR_PERMIT_SET_MAC_WHEN_FILTERS_INSTALLED
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_MAC_SECURITY_FILTERING_LBN 12
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_MAC_SECURITY_FILTERING_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_ADDITIONAL_RSS_MODES_LBN 13
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_ADDITIONAL_RSS_MODES_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_QBB_LBN 14
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_QBB_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PACKED_STREAM_VAR_BUFFERS_LBN 15
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PACKED_STREAM_VAR_BUFFERS_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_RSS_LIMITED_LBN 16
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_RSS_LIMITED_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PACKED_STREAM_LBN 17
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PACKED_STREAM_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_INCLUDE_FCS_LBN 18
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_INCLUDE_FCS_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_VLAN_INSERTION_LBN 19
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_VLAN_INSERTION_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_VLAN_STRIPPING_LBN 20
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_VLAN_STRIPPING_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_LBN 21
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PREFIX_LEN_0_LBN 22
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PREFIX_LEN_0_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PREFIX_LEN_14_LBN 23
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_PREFIX_LEN_14_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_TIMESTAMP_LBN 24
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_TIMESTAMP_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_BATCHING_LBN 25
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_BATCHING_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_MCAST_FILTER_CHAINING_LBN 26
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_MCAST_FILTER_CHAINING_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_PM_AND_RXDP_COUNTERS_LBN 27
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_PM_AND_RXDP_COUNTERS_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_DISABLE_SCATTER_LBN 28
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_RX_DISABLE_SCATTER_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_MCAST_UDP_LOOPBACK_LBN 29
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_TX_MCAST_UDP_LOOPBACK_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_EVBP_LBN 30
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_EVBP_WIDTH 1
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_VXLAN_NVGRE_LBN 31
+\#define
MC_CMD_GET_CAPABILITIES_V4_OUT_VXLAN_NVGRE_WIDTH 1
+/* RxDP CPU firmware id. */
/* enum: Standard RXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP 0x0
/* enum: Low latency RXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_LOW_LATENCY 0x1
/* enum: Packed stream RXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_PACKED_STREAM 0x2
/* enum: Rules engine RXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_RULES_ENGINE 0x5
/* enum: DPDK RXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_DPDK 0x6
/* enum: BIST RXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_BIST 0x10a
/* enum: RXDP Test firmware image 1 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_TO_MC_CUT_THROUGH 0x101
/* enum: RXDP Test firmware image 2 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD 0x102
/* enum: RXDP Test firmware image 3 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_TO_MC_STORE_FORWARD_FIRST 0x103
/* enum: RXDP Test firmware image 4 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_EVERY_EVENT_BATCHABLE 0x104
/* enum: RXDP Test firmware image 5 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_BACKPRESSURE 0x105
/* enum: RXDP Test firmware image 6 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_PACKET_EDITS 0x106
/* enum: RXDP Test firmware image 7 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_RX_HDR_SPLIT 0x107
/* enum: RXDP Test firmware image 8 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_DISABLE_DL 0x108
/* enum: RXDP Test firmware image 9 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_DOORBELL_DELAY 0x109
/* enum: RXDP Test firmware image 10 */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXDP_TEST_FW_SLOW 0x10a
/* enum: TDPCPU firmware id. */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_DPCPU_FW_ID_OFST 6
/* enum: Standard TXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXD 0x0
/* enum: Low latency TXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_LOW_LATENCY 0x1
/* enum: High packet rate TXDP firmware */
#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_HIGH_PACKET_RATE 0x3
/* enum: Rules engine TXDP firmware */
```c
#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_RULES_ENGINE 0x5
+# enum: DPDK TXDP firmware */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_DPDK 0x6
+# enum: BIST TXDP firmware */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_BIST 0x12d
+# enum: TXDP Test firmware image 1 */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_TEST_FW_TSO_EDIT 0x101
+# enum: TXDP Test firmware image 2 */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_TEST_FW_PACKET_EDITS 0x102
+# enum: TXDP CSR bus test firmware */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TXDP_TEST_FW_CSR 0x103
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_VERSION_OFST 8
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_VERSION_LEN 2
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_VERSION_REV_LBN 0
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_VERSION_REV_WIDTH 12
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_VERSION_TYPE_LBN 12
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_VERSION_TYPE_WIDTH 4
+# enum: reserved value - do not use (may indicate alternative interpretation
+ * of REV field in future)
+ */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_RESERVED 0x0
+# enum: Trivial RX PD firmware for early Huntington development (Huntington
+ * development only)
+ */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_FIRST_PKT 0x1
+# enum: RX PD firmware with approximately Siena-compatible behaviour
+ * (Huntington development only)
+ */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_SIENA_COMPAT 0x2
+# enum: Full featured RX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_FULL_FEATURED 0x3
+# enum: (deprecated original name for the FULL_FEATURED variant) */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_VSWITCH 0x3
+# enum: siena_compat variant RX PD firmware using PM rather than MAC
+ * (Huntington development only)
+ */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_SIENA_COMPAT_PM 0x4
+# enum: Low latency RX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_LOW_LATENCY 0x5
+# enum: Packed stream RX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_PACKED_STREAM 0x6
+# enum: RX PD firmware handling layer 2 only for high packet rate performance
+ * tests (Medford development only)
+ */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_LAYER2_PERF 0x7
+# enum: Rules engine RX PD production firmware */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RXPD_FW_TYPE_RULES_ENGINE 0x8
+# enum: Custom firmware variant (see SF-119495-PD and bug69716) */
```
+/* enum: DPK RX PD production firmware */
+/ * enum: RX PD firmware for GUE parsing prototype (Medford development only) */
+/* enum: RX PD firmware parsing but not filtering network overlay tunnel
+ * encapsulations (Medford development only)
+ */
+/* of REV field in future)
+ */
+/* enum: Trivial TX PD firmware for early Huntington development (Huntington
+ * development only)
+ */
+/* enum: TX PD firmware with approximately Siena-compatible behaviour
+ * (Huntington development only)
+ */
+/* enum: Full featured TX PD production firmware */
+/* enum: (deprecated original name for the FULL_FEATURED variant) */
+/* enum: siena_compat variant TX PD firmware using PM rather than MAC
+ * (Huntington development only)
+ */
+/* enum: TX PD firmware handling layer 2 only for high packet rate performance
+ * tests (Medford development only)
+ */
+/* enum: Rules engine TX PD production firmware */
+/* enum: Custom firmware variant (see SF-119495-PD and bug69716) */
+/* enum: DPK TX PD production firmware */
+/* enum: DPDK RX PD production firmware */
+/* enum: DPDK TX PD production firmware */

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+/* enum: RX PD firmware for GUE parsing prototype (Medford development only) */
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TXPD_FW_TYPE_TESTFW_GUE_PROTOTYPE 0xe
+/* Hardware capabilities of NIC */
+define MC_CMD_GET_CAPABILITIES_V4_OUT_HW_CAPABILITIES_OFST 12
+define MC_CMD_GET_CAPABILITIES_V4_OUT_HW_CAPABILITIES_LEN 4
+/* Licensed capabilities */
+define MC_CMD_GET_CAPABILITIES_V4_OUT_LICENSE_CAPABILITIES_OFST 16
+define MC_CMD_GET_CAPABILITIES_V4_OUT_LICENSE_CAPABILITIES_LEN 4
+/* Second word of flags. Not present on older firmware (check the length). */
+define MC_CMD_GET_CAPABILITIES_V4_OUT_FLAGS2_OFST 20
+define MC_CMD_GET_CAPABILITIES_V4_OUT_FLAGS2_LEN 4
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_V2_LBN 0
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_V2_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_V2_ENCAP_LBN 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_V2_ENCAP_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_EVQ_TIMER_CTRL_LBN 2
+define MC_CMD_GET_CAPABILITIES_V4_OUT_EVQ_TIMER_CTRL_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_EVENT_CUT_THROUGH_LBN 3
+define MC_CMD_GET_CAPABILITIES_V4_OUT_EVENT_CUT_THROUGH_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_CUT_THROUGH_LBN 4
+define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_CUT_THROUGH_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_VFIFO_ULL_MODE_LBN 5
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_VFIFO_ULL_MODE_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_MAC_STATS_40G_TX_SIZE_BINS_LBN 6
+define MC_CMD_GET_CAPABILITIES_V4_OUT_MAC_STATS_40G_TX_SIZE_BINS_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_INIT_EVQ_V2_LBN 7
+define MC_CMD_GET_CAPABILITIES_V4_OUT_INIT_EVQ_V2_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_MAC_TIMESTAMPING_LBN 8
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_MAC_TIMESTAMPING_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TIMESTAMP_LBN 9
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TIMESTAMP_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_SNIFF_LBN 10
+define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_SNIFF_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_SNIFF_LBN 11
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_SNIFF_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_NVRAM_UPDATE_REPORT_VERIFY_RESULT_LBN 12
+define MC_CMD_GET_CAPABILITIES_V4_OUT_NVRAM_UPDATE_REPORT_VERIFY_RESULT_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_MCDI_BACKGROUND_LBN 13
+define MC_CMD_GET_CAPABILITIES_V4_OUT_MCDI_BACKGROUND_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_MCDI_DB_RETURN_LBN 14
+define MC_CMD_GET_CAPABILITIES_V4_OUT_MCDI_DB_RETURN_WIDTH 1
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TSA_SUPPORT_LBN 15
+define MC_CMD_GET_CAPABILITIES_V4_OUT_TSA_SUPPORT_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_TSA_BOUND_LBN 17
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_TSA_BOUND_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_SF_ADAPTER_AUTHENTICATION_LBN 18
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_SF_ADAPTER_AUTHENTICATION_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_FILTER_ACTION_FLAG_LBN 19
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_FILTER_ACTION_FLAG_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_FILTER_ACTION_MARK_LBN 20
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_FILTER_ACTION_MARK_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_EQUAL_STRIDE_PACKED_STREAM_LBN 21
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_EQUAL_STRIDE_PACKED_STREAM_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_L3XUDP_SUPPORT_LBN 22
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_L3XUDP_SUPPORT_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_FW_SUBVARIANT_NO_TX_CSUM_LBN 23
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_FW_SUBVARIANT_NO_TX_CSUM_WIDTH 1
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_VI_SPREADING_LBN 24
+\#define  MC_CMD_GET_CAPABILITIES_V4_OUT_VI_SPREADING_WIDTH 1
+\/* Number of FATSOv2 contexts per datapath supported by this NIC. Not present
+ * on older firmware (check the length).
+ */
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_V2_N_CONTEXTS_OFST 24
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_TX_TSO_V2_N_CONTEXTS_LEN 2
+\/* One byte per PF containing the number of the external port assigned to this
+ * PF, indexed by PF number. Special values indicate that a PF is either not
+ * present or not assigned.
+ */
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_PFS_TO_PORTS_ASSIGNMENT_OFST 26
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_PFS_TO_PORTS_ASSIGNMENT_LEN 1
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_PFS_TO_PORTS_ASSIGNMENT_NUM 16
+\/* enum: The caller is not permitted to access information on this PF. */
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_ACCESS_NOT_PERMITTED 0xff
+\/* enum: PF does not exist. */
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_PF_NOT_PRESENT 0xfe
+\/* enum: PF does exist but is not assigned to any external port. */
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_PF_NOT_ASSIGNED 0xfd
+\/* enum: This value indicates that PF is assigned, but it cannot be expressed
+ * in this field. It is intended for a possible future situation where a more
+ * complex scheme of PFs to ports mapping is being used. The future driver
+ * should look for a new field supporting the new scheme. The current/old
+ * driver should treat this value as PF_NOT_ASSIGNED.
+ */
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_INCOMPATIBLE_ASSIGNMENT 0xfc
+\/* One byte per PF containing the number of its VFs, indexed by PF number. A
+ * special value indicates that a PF is not present.
+ */
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_VFS_PER_PF_OFST 42
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_VFS_PER_PF_LEN 1
+\#define       MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_VFS_PER_PF_NUM 16
+\/* enum: The caller is not permitted to access information on this PF. */
+/*  MC_CMD_GET_CAPABILITIES_V4_OUT_ACCESS_NOT_PERMITTED 0xff */
+/* enum: PF does not exist. */
+/*  MC_CMD_GET_CAPABILITIES_V4_OUT_PF_NOT_PRESENT 0xfe */
+/* Number of VIs available for each external port */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_VIS_PER_PORT_OFST 58
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_VIS_PER_PORT_LEN 2
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_VIS_PER_PORT_NUM 4
+/* Size of RX descriptor cache expressed as binary logarithm The actual size
 + * equals (2 ^ RX_DESC_CACHE_SIZE)
 + */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_DESC_CACHE_SIZE_OFST 66
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_RX_DESC_CACHE_SIZE_LEN 1
+/* Size of TX descriptor cache expressed as binary logarithm The actual size
 + * equals (2 ^ TX_DESC_CACHE_SIZE)
 + */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_DESC_CACHE_SIZE_OFST 67
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_TX_DESC_CACHE_SIZE_LEN 1
+/* Total number of available PIO buffers */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_PIO_BUFFS_OFST 68
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_NUM_PIO_BUFFS_LEN 2
+/* Size of a single PIO buffer */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_SIZE_PIO_BUFF_OFST 70
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_SIZE_PIO_BUFF_LEN 2
+/* On chips later than Medford the amount of address space assigned to each VI
 + * is configurable. This is a global setting that the driver must query to
 + * discover the VI to address mapping. Cut-through PIO (CTPIO) is not available
 + * with 8k VI windows.
 + */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VI_WINDOW_MODE_OFST 72
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VI_WINDOW_MODE_LEN 1
+ /* enum: Each VI occupies 8k as on Huntington and Medford. PIO is at offset 4k.
 + * CTPIO is not mapped.
 + */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VI_WINDOW_MODE_8K 0x0
+/* enum: Each VI occupies 16k. PIO is at offset 4k. CTPIO is at offset 12k. */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VI_WINDOW_MODE_16K 0x1
+/* enum: Each VI occupies 64k. PIO is at offset 4k. CTPIO is at offset 12k. */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VI_WINDOW_MODE_64K 0x2
+/* Number of vFIFOs per adapter that can be used for VFIFO Stuffing
 + * (SF-115995-SW) in the present configuration of firmware and port mode.
 + */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VFIFO_STUFFING_NUM_VFIFOS_OFST 73
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VFIFO_STUFFING_NUM_VFIFOS_LEN 1
+/* Number of buffers per adapter that can be used for VFIFO Stuffing
 + * (SF-115995-SW) in the present configuration of firmware and port mode.
 + */
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VFIFO_STUFFING_NUM_CP_BUFFERS_OFST 74
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_VFIFO_STUFFING_NUM_CP_BUFFERS_LEN 2
 Entry count in the MAC stats array, including the final
* entry. For MAC stats DMA, drivers should allocate a buffer large enough to
* hold at least this many 64-bit stats values, if they wish to receive all
* available stats. If the buffer is shorter than MAC_STATS_NUM_STATS * 8, the
* stats array returned will be truncated.
* /
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_MAC_STATS_NUM_STATS_OFST 76
+#define MC_CMD_GET_CAPABILITIES_V4_OUT_MAC_STATS_NUM_STATS_LEN 2

/*********************/
#define MC_CMD_V2_EXTN_IN_ACTUAL_LEN_LBN 16
#define MC_CMD_V2_EXTN_IN_ACTUAL_LEN_WIDTH 10
#define MC_CMD_V2_EXTN_IN_UNUSED2_LBN 26
-#define MC_CMD_V2_EXTN_IN_UNUSED2_WIDTH 6
+#define MC_CMD_V2_EXTN_IN_UNUSED2_WIDTH 2
/+ Type of command/response */
+#define MC_CMD_V2_EXTN_IN_MESSAGE_TYPE_LBN 28
+#define MC_CMD_V2_EXTN_IN_MESSAGE_TYPE_WIDTH 4
/+ enum: MCDI command directed to or response originating from the MC. */
+#define MC_CMD_V2_EXTN_IN_MCDI_MESSAGE_TYPE_MC 0x0
/+ enum: MCDI command directed to a TSA controller. MCDI responses of this type
* are not defined.
+*/
+#define MC_CMD_V2_EXTN_IN_MCDI_MESSAGE_TYPE_TSA 0x1

/*********************/
#define MC_CMD_TCM_BUCKET_ALLOC_OUT_LEN 4
/* the bucket id */
#define MC_CMD_TCM_BUCKET_ALLOC_OUT_BUCKET_OFST 0
+#define MC_CMD_TCM_BUCKET_ALLOC_OUT_BUCKET_LEN 4

/*********************/
#define MC_CMD_TCM_BUCKET_FREE_IN_LEN 4
/* the bucket id */
#define MC_CMD_TCM_BUCKET_FREE_IN_BUCKET_OFST 0
+#define MC_CMD_TCM_BUCKET_FREE_IN_BUCKET_LEN 4
/* MC_CMD_TCM_BUCKET_FREE_OUT msgresponse */
#define MC_CMD_TCM_BUCKET_FREE_OUT_LEN 0
#define MC_CMD_TCM_BUCKET_FREE_OUT_BUCKET_LEN 4
/* MC_CMD_TCM_BUCKET_FREE_OUT */
#define MC_CMD_TCM_BUCKET_INIT_IN_LEN 8
/* the bucket id */
```c
#define       MC_CMD_TCM_BUCKET_INIT_IN_BUCKET_OFST 0
#define       MC_CMD_TCM_BUCKET_INIT_IN_BUCKET_LEN 4
/* the rate in mbps */
#define       MC_CMD_TCM_BUCKET_INIT_IN_RATE_OFST 4
#define       MC_CMD_TCM_BUCKET_INIT_IN_RATE_LEN 4

/* MC_CMD_TCM_BUCKET_INIT_EXT_IN msgrequest */
#define    MC_CMD_TCM_BUCKET_INIT_EXT_IN_LEN 12
/* the bucket id */
#define       MC_CMD_TCM_BUCKET_INIT_EXT_IN_BUCKET_OFST 0
#define       MC_CMD_TCM_BUCKET_INIT_EXT_IN_BUCKET_LEN 4
/* the rate in mbps */
#define       MC_CMD_TCM_BUCKET_INIT_EXT_IN_RATE_OFST 4
#define       MC_CMD_TCM_BUCKET_INIT_EXT_IN_RATE_LEN 4
/* the desired maximum fill level */
#define       MC_CMD_TCM_BUCKET_INIT_EXT_IN_MAX_FILL_OFST 8
#define       MC_CMD_TCM_BUCKET_INIT_EXT_IN_MAX_FILL_LEN 4

/* MC_CMD_TCM_BUCKET_INIT_OUT msgresponse */
#define    MC_CMD_TCM_BUCKET_INIT_OUT_LEN 0
#define    MC_CMD_TCM_TXQ_INIT_IN_LEN 28
/* the txq id */
#define       MC_CMD_TCM_TXQ_INIT_IN_QID_OFST 0
#define       MC_CMD_TCM_TXQ_INIT_IN_QID_LEN 4
/* the static priority associated with the txq */
#define       MC_CMD_TCM_TXQ_INIT_IN_LABEL_OFST 4
#define       MC_CMD_TCM_TXQ_INIT_IN_LABEL_LEN 4
/* bitmask of the priority queues this txq is inserted into when inserted. */
#define       MC_CMD_TCM_TXQ_INIT_IN_PQ_FLAGS_OFST 8
#define       MC_CMD_TCM_TXQ_INIT_IN_PQ_FLAGS_LEN 4
#define        MC_CMD_TCM_TXQ_INIT_IN_PQ_FLAG_GUARANTEED_LBN 0
#define        MC_CMD_TCM_TXQ_INIT_IN_PQ_FLAG_GUARANTEED_WIDTH 1
#define        MC_CMD_TCM_TXQ_INIT_IN_PQ_FLAG_NORMAL_LBN 1
#define        MC_CMD_TCM_TXQ_INIT_IN_PQ_FLAG_LOW_WIDTH 1
/* the reaction point (RP) bucket */
#define       MC_CMD_TCM_TXQ_INIT_IN_RP_BKT_OFST 12
#define       MC_CMD_TCM_TXQ_INIT_IN_RP_BKT_LEN 4
/* an already reserved bucket (typically set to bucket associated with outer * vswitch) */
#define       MC_CMD_TCM_TXQ_INIT_IN_MAX_BKT1_OFST 16
#define       MC_CMD_TCM_TXQ_INIT_IN_MAX_BKT1_LEN 4
/* an already reserved bucket (typically set to bucket associated with inner * vswitch) */
```

/* MC_CMD_TCM_TXQ_INIT_EXT_IN msgrequest */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_QID_OFST 0
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_QID_LEN 4
/* the static priority associated with the txq */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_LABEL_NORMAL_OFST 4
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_LABEL_NORMAL_LEN 4
/* bitmask of the priority queues this txq is inserted into when inserted. */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_PQ_FLAGS_OFST 8
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_PQ_FLAGS_LEN 4
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_PQ_FLAG_GUARANTEED_LBN 0
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_PQ_FLAG_GUARANTEED_WIDTH 1
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_PQ_FLAG_NORMAL_LBN 1
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_PQ_FLAG_LOW_WIDTH 1
/* the reaction point (RP) bucket */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_RP_BKT_OFST 12
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_RP_BKT_LEN 4
/* an already reserved bucket (typically set to bucket associated with outer * vswitch) */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_MAX_BKT1_OFST 16
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_MAX_BKT1_LEN 4
/* an already reserved bucket (typically set to bucket associated with inner * vswitch) */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_MAX_BKT2_OFST 20
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_MAX_BKT2_LEN 4
/* the min bucket (typically for ETS/minimum bandwidth) */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_MIN_BKT_OFST 24
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_MIN_BKT_LEN 4
/* the static priority associated with the txq */
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_LABEL_GUARANTEED_OFST 28
#define MC_CMD_TCM_TXQ_INIT_EXT_IN_LABEL_GUARANTEED_LEN 4

/* MC_CMD_TCM_TXQ_INIT_OUT msgresponse */
#define MC_CMD_TCM_TXQ_INIT_OUT_LEN 0
#define MC_CMD_LINK_PIOBUF_OUT_LEN 8
/* Handle for allocated push I/O buffer. */
#define MC_CMD_LINK_PIOBUF_HANDLE_LEN 4
/* Function Local Instance (VI) number. */
#define MC_CMD_LINK_PIOBUF_IN_TXQ_INSTANCE_OFST 4
#define MC_CMD_LINK_PIOBUF_IN_TXQ_INSTANCE_LEN 4

/* MC_CMD_LINK_PIOBUF_OUT msgresponse */
#define MC_CMD_LINK_PIOBUF_OUT_LEN 0
#define MC_CMD_UNLINK_PIOBUF_IN_LEN 4
/* Function Local Instance (VI) number. */
#define MC_CMD_UNLINK_PIOBUF_IN_TXQ_INSTANCE_OFST 0
#define MC_CMD_UNLINK_PIOBUF_IN_TXQ_INSTANCE_LEN 4
/* MC_CMD_UNLINK_PIOBUF_OUT msgresponse */
#define MC_CMD_UNLINK_PIOBUF_OUT_LEN 0
#define MC_CMD_VSWITCH_ALLOC_IN_LEN 16
/* The port to connect to the v-switch's upstream port. */
#define MC_CMD_VSWITCH_ALLOC_IN_UPSTREAM_PORT_ID_OFST 0
#define MC_CMD_VSWITCH_ALLOC_IN_UPSTREAM_PORT_ID_LEN 4
/* The type of v-switch to create. */
#define MC_CMD_VSWITCH_ALLOC_IN_TYPE_OFST 4
#define MC_CMD_VSWITCH_ALLOC_IN_TYPE_LEN 4
#define MC_CMD_VSWITCH_ALLOC_IN_VSWITCH_TYPE_VLAN 0x1
#define MC_CMD_VSWITCH_ALLOC_IN_VSWITCH_TYPE_VEB 0x2
#define MC_CMD_VSWITCH_ALLOC_IN_VSWITCH_TYPE_VEPA 0x3
#define MC_CMD_VSWITCH_ALLOC_IN_VSWITCH_TYPE_MUX 0x4
#define MC_CMD_VSWITCH_ALLOC_IN_VSWITCH_TYPE_TEST 0x5
/* Flags controlling v-port creation */
#define MC_CMD_VSWITCH_ALLOC_IN_FLAGS_OFST 8
#define MC_CMD_VSWITCH_ALLOC_IN_FLAGS_LEN 4
#define MC_CMD_VSWITCH_ALLOC_IN_FLAG_AUTO_PORT_LBN 0
#define MC_CMD_VSWITCH_ALLOC_IN_FLAG_AUTO_PORT_WIDTH 1
/* The number of VLAN tags to allow for attached v-ports. For VLAN aggregators,
* v-ports with this number of tags. */
#define MC_CMD_VSWITCH_ALLOC_IN_NUM_VLAN_TAGS_OFST 12
#define MC_CMD_VSWITCH_ALLOC_IN_NUM_VLAN_TAGS_LEN 4
/* MC_CMD_VSWITCH_ALLOC_OUT msgresponse */
#define MC_CMD_VSWITCH_ALLOC_OUT_LEN 0
@@ -8706,6 +11096,7 @@
#define MC_CMD_VSWITCH_FREE_IN_UPSTREAM_PORT_ID_OFST 0
+#define MC_CMD_VSWITCH_FREE_IN_UPSTREAM_PORT_ID_LEN 4

/* MC_CMD_VSWITCH_FREE_OUT msgresponse */
#define MC_CMD_VSWITCH_FREE_OUT_LEN 0
@@ -8725,6 +11116,7 @@
#define MC_CMD_VSWITCH_QUERY_IN_UPSTREAM_PORT_ID_OFST 0
+#define MC_CMD_VSWITCH_QUERY_IN_UPSTREAM_PORT_ID_LEN 4

/* MC_CMD_VSWITCH_QUERY_OUT msgresponse */
#define MC_CMD_VSWITCH_QUERY_OUT_LEN 0
@@ -8742,28 +11134,31 @@
#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VLAN 0x1
#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VEB 0x2
#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VEPA 0x3
#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_NORMAL 0x4
#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_EXPANSION 0x5
#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_TEST 0x6

/* enum: VLAN (obsolete) */
-#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VLAN 0x1
+#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VLAN 0x1

/* enum: VEB (obsolete) */
-#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VEB 0x2
+#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VEB 0x2

/* enum: VEPA (obsolete) */
-#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VEPA 0x3
+#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_VEPA 0x3

/* enum: A normal v-port receives packets which match a specified MAC and/or
 * VLAN. */
-#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_NORMAL 0x4
+#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_NORMAL 0x4

/* enum: An expansion v-port packets traffic which don't match any other
 * v-port. */
-#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_EXPANSION 0x5
+#define MC_CMD_VPORT_ALLOC_IN_VPORT_TYPE_EXPANSION 0x5

/* enum: An test v-port receives packets which match any filters installed by
 * its downstream components.
/* Flags controlling v-port creation */
#define MC_CMD_VPORT_ALLOC_IN_FLAGS_OFST 8
#define MC_CMD_VPORT_ALLOC_IN_FLAGS_LEN 4
#define MC_CMD_VPORT_ALLOC_IN_FLAG_AUTO_PORT_LBN 0
#define MC_CMD_VPORT_ALLOC_IN_FLAG_AUTO_PORT_WIDTH 1
#define MC_CMD_VPORT_ALLOC_IN_FLAG_VLAN_RESTRICT_LBN 1
@@ -8773,8 +11168,10 @@
 /* The actual VLAN tags to insert/remove */
#define MC_CMD_VPORT_ALLOC_IN_NUM_VLAN_TAGS_OFST 12
#define MC_CMD_VPORT_ALLOC_IN_NUM_VLAN_TAGS_LEN 4
);// * The handle of the new v-port */
#define MC_CMD_VPORT_ALLOC_OUT_LEN 4
#define MC_CMD_VPORT_ALLOC_OUT_VPORT_ID_OFST 0
#define MC_CMD_VPORT_ALLOC_OUT_VPORT_ID_LEN 4

/*****-----------------------------------------------------------*/
@@ -8798,6 +11196,7 @@
#define MC_CMD_VPORT_FREE_IN_LEN 4
/* The handle of the v-port */
#define MC_CMD_VPORT_FREE_IN_VPORT_ID_OFST 0
#define MC_CMD_VPORT_FREE_IN_VPORT_ID_LEN 4

/* MC_CMD_VPORT_FREE_OUT msgresponse */
#define MC_CMD_VPORT_FREE_OUT_LEN 0
@@ -8815,18 +11214,23 @@
#define MC_CMD_VADAPTOR_ALLOC_IN_UPSTREAM_PORT_ID_OFST 0
#define MC_CMD_VADAPTOR_ALLOC_IN_UPSTREAM_PORT_ID_LEN 4
/* Flags controlling v-adaptor creation */
#define MC_CMD_VADAPTOR_ALLOC_IN_FLAGS_OFST 8
#define MC_CMD_VADAPTOR_ALLOC_IN_FLAGS_LEN 4
#define MC_CMD_VADAPTOR_ALLOC_IN_FLAG_AUTO_VADAPTOR_LBN 0
#define MC_CMD_VADAPTOR_ALLOC_IN_FLAG_AUTO_VADAPTOR_WIDTH 1
#define MC_CMD_VADAPTOR_ALLOC_IN_FLAG_PERMIT_SET_MAC_WHEN_FILTERS_INSTALLED_LBN 1
#define MC_CMD_VADAPTOR_ALLOC_IN_FLAG_PERMIT_SET_MAC_WHEN_FILTERS_INSTALLED_WIDTH 1
/* The number of VLAN tags to strip on receive */
#define MC_CMD_VADAPTOR_ALLOC_IN_NUM_VLANS_OFST 12
+define MC_CMD_VADAPTOR_ALLOC_IN_NUM_VLANS_LEN 4
/* The number of VLAN tags to transparently insert/remove. */
#define MC_CMD_VADAPTOR_ALLOC_IN_NUM_VLAN_TAGS_OFST 16
+define MC_CMD_VADAPTOR_ALLOC_IN_NUM_VLAN_TAGS_LEN 4
/* The actual VLAN tags to insert/remove */
#define MC_CMD_VADAPTOR_ALLOC_IN_VLAN_TAGS_OFST 20
+define MC_CMD_VADAPTOR_ALLOC_IN_VLAN_TAGS_LEN 4
#define MC_CMD_VADAPTOR_ALLOC_IN_VLAN_TAG_0_LBN 0
#define MC_CMD_VADAPTOR_ALLOC_IN_VLAN_TAG_0_WIDTH 16
#define MC_CMD_VADAPTOR_ALLOC_IN_VLAN_TAG_1_LBN 16
#define MC_CMD_VADAPTOR_ALLOC_IN_MACADDR_OFST 24
#define MC_CMD_VADAPTOR_ALLOC_IN_MACADDR_LEN 6
/* enum: Derive the MAC address from the upstream port */
-define MC_CMD_VADAPTOR_ALLOC_IN_AUTO_MAC 0x0
+define MC_CMD_VADAPTOR_ALLOC_IN_AUTO_MAC 0x0

/* MC_CMD_VADAPTOR_ALLOC_OUT msgresponse */
#define MC_CMD_VADAPTOR_ALLOC_OUT_LEN 0
#define MC_CMD_VADAPTOR_FREE_IN_LEN 4
/* The port to which the v-adaptor is connected. */
#define MC_CMD_VADAPTOR_FREE_IN_UPSTREAM_PORT_ID_OFST 0
+define MC_CMD_VADAPTOR_FREE_IN_UPSTREAM_PORT_ID_LEN 4

/* MC_CMD_VADAPTOR_ALLOC_OUT msgresponse */
#define MC_CMD_VADAPTOR_ALLOC_OUT_LEN 0
#define MC_CMD_VADAPTOR_FREE_OUT_LEN 0
/* The port to which the v-adaptor is connected. */
#define MC_CMD_VADAPTOR_FREE_OUT_UPSTREAM_PORT_ID_OFST 0
+define MC_CMD_VADAPTOR_FREE_OUT_UPSTREAM_PORT_ID_LEN 4

/* MC_CMD_VADAPTOR_ALLOC_OUT msgresponse */
#define MC_CMD_VADAPTOR_ALLOC_OUT_LEN 0
#define MC_CMD_VADAPTOR_GET_MAC_IN_LEN 4
/* The port to which the v-adaptor is connected. */
#define MC_CMD_VADAPTOR_GET_MAC_IN_UPSTREAM_PORT_ID_OFST 0
+define MC_CMD_VADAPTOR_GET_MAC_IN_UPSTREAM_PORT_ID_LEN 4

/* MC_CMD_VADAPTOR_ALLOC_OUT msgresponse */
#define MC_CMD_VADAPTOR_ALLOC_OUT_LEN 0
#define MC_CMD_VADAPTOR_GET_MAC_OUT_LEN 6
/* The port to which the v-adaptor is connected. */
#define MC_CMD_VADAPTOR_GET_MAC_OUT_UPSTREAM_PORT_ID_OFST 0
+define MC_CMD_VADAPTOR_GET_MAC_OUT_UPSTREAM_PORT_ID_LEN 4

/* MC_CMD_VADAPTOR_ALLOC_OUT msgresponse */
#define MC_CMD_VADAPTOR_ALLOC_OUT_LEN 0
#define MC_CMD_VADAPTOR_GET_MAC_OUT_LEN 6
/* The port to which the v-adaptor is connected. */
#define MC_CMD_VADAPTOR_GET_MAC_OUT_UPSTREAM_PORT_ID_OFST 0
+define MC_CMD_VADAPTOR_GET_MAC_OUT_UPSTREAM_PORT_ID_LEN 4
#define MC_CMD_VADAPTOR_QUERY_IN_LEN 4
/* The port to which the v-adaptor is connected. */
#define MC_CMD_VADAPTOR_QUERY_IN_UPSTREAM_PORT_ID_OFST 0
+#define MC_CMD_VADAPTOR_QUERY_IN_UPSTREAM_PORT_ID_LEN 4

/* MC_CMD_VADAPTOR_QUERY_OUT msgresponse */
#define MC_CMD_VADAPTOR_QUERY_OUT_LEN 12
/* The EVB port flags as defined at MC_CMD_VPORT_ALLOC. */
+#define MC_CMD_VADAPTOR_QUERY_OUT_PORT_FLAGS_OFST 0
#define MC_CMD_VADAPTOR_QUERY_OUT_PORT_FLAGS_LEN 4
/* The v-adaptor flags as defined at MC_CMD_VADAPTOR_ALLOC. */
+#define MC_CMD_VADAPTOR_QUERY_OUT_VADAPTOR_FLAGS_OFST 4
#define MC_CMD_VADAPTOR_QUERY_OUT_VADAPTOR_FLAGS_LEN 4
/* The number of VLAN tags that may still be added */
+#define MC_CMD_VADAPTOR_QUERY_OUT_NUM_AVAILABLE_VLAN_TAGS_OFST 8
#define MC_CMD_VADAPTOR_QUERY_OUT_NUM_AVAILABLE_VLAN_TAGS_LEN 4

/*****************************/
@@ -8933,8 +11344,10 @@
#define MC_CMD_EVB_PORT_ASSIGN_IN_LEN 8
/* The port to assign. */
#define MC_CMD_EVB_PORT_ASSIGN_IN_PORT_ID_OFST 0
+#define MC_CMD_EVB_PORT_ASSIGN_IN_PORT_ID_LEN 4
/* The target function to modify. */
+#define MC_CMD_EVB_PORT_ASSIGN_IN_FUNCTION_OFST 4
#define MC_CMD_EVB_PORT_ASSIGN_IN_FUNCTION_LEN 4
#define MC_CMD_EVB_PORT_ASSIGN_IN_PF_LBN 0
#define MC_CMD_EVB_PORT_ASSIGN_IN_VF_LBN 16
#define MC_CMD_EVB_PORT_ASSIGN_IN_VF_LBN 16
@@ -8955,9 +11368,13 @@
/* MC_CMD_RDWR_A64_REGIONS_IN msgrequest */
#define MC_CMD_RDWR_A64_REGIONS_IN_LEN 17
#define MC_CMD_RDWR_A64_REGIONS_IN_REGION0_OFST 0
+#define MC_CMD_RDWR_A64_REGIONS_IN_REGION0_LEN 4
#define MC_CMD_RDWR_A64_REGIONS_IN_REGION1_OFST 4
+#define MC_CMD_RDWR_A64_REGIONS_IN_REGION1_LEN 4
#define MC_CMD_RDWR_A64_REGIONS_IN_REGION2_OFST 8
+#define MC_CMD_RDWR_A64_REGIONS_IN_REGION2_LEN 4
#define MC_CMD_RDWR_A64_REGIONS_IN_REGION3_OFST 12
+#define MC_CMD_RDWR_A64_REGIONS_IN_REGION3_LEN 4
/* Write enable bits 0-3, set to write, clear to read. */
#define MC_CMD_RDWR_A64_REGIONS_IN_WRITE_MASK_LBN 128
#define MC_CMD_RDWR_A64_REGIONS_IN_WRITE_MASK_WIDTH 4
@@ -8969,9 +11386,13 @@
*/
#define MC_CMD_RDWR_A64_REGIONS_OUT_LEN 16
#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION0_OFST 0
+\#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION0_LEN 4
#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION1_OFST 4
+\#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION1_LEN 4
#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION2_OFST 8
+\#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION2_LEN 4
#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION3_OFST 12
+\#define MC_CMD_RDWR_A64_REGIONS_OUT_REGION3_LEN 4

/*****************************/
@@ -8986,11 +11407,13 @@
#define MC_CMD_ONLOAD_STACK_ALLOC_IN.Len 4
 /* The handle of the owning upstream port */
#define MC_CMD_ONLOAD_STACK_ALLOC_IN_UPSTREAM_PORT_ID_OFST 0
+\#define MC_CMD_ONLOAD_STACK_ALLOC_IN_UPSTREAM_PORT_ID_LEN 4

 /* MC_CMD_ONLOAD_STACK_ALLOC_OUT msgresponse */
#define MC_CMD_ONLOAD_STACK_ALLOC_OUT_LEN 4
 /* The handle of the new Onload stack */
#define MC_CMD_ONLOAD_STACK_ALLOC_OUT_ONLOAD_STACK_ID_OFST 0
+\#define MC_CMD_ONLOAD_STACK_ALLOC_OUT_ONLOAD_STACK_ID_LEN 4

/*****************************/
@@ -9005,6 +11428,7 @@
#define MC_CMD_ONLOAD_STACK_FREE_IN_LEN 4
 /* The handle of the Onload stack */
#define MC_CMD_ONLOAD_STACK_FREE_IN_ONLOAD_STACK_ID_OFST 0
+\#define MC_CMD_ONLOAD_STACK_FREE_IN_ONLOAD_STACK_ID_LEN 4

 /* MC_CMD_ONLOAD_STACK_FREE_OUT msgresponse */
#define MC_CMD_ONLOAD_STACK_FREE_OUT_LEN 0
 @@ -9022,21 +11446,24 @@
#define MC_CMD_RSS_CONTEXT_ALLOC_IN_LEN 12
 /* The handle of the owning upstream port */
#define MC_CMD_RSS_CONTEXT_ALLOC_IN_UPSTREAM_PORT_ID_OFST 0
+\#define MC_CMD_RSS_CONTEXT_ALLOC_IN_UPSTREAM_PORT_ID_LEN 4

 /* The type of context to allocate */
#define MC_CMD_RSS_CONTEXT_ALLOC_IN_TYPE_OFST 4
+\#define MC_CMD_RSS_CONTEXT_ALLOC_IN_TYPE_LEN 4
/* enum: Allocate a context for exclusive use. The key and indirection table
 * must be explicitly configured.
 */
-\#define MC_CMD_RSS_CONTEXT_ALLOC_IN_TYPE_EXCLUSIVE 0x0
+\#define MC_CMD_RSS_CONTEXT_ALLOC_IN_TYPE_EXCLUSIVE 0x0
 /* enum: Allocate a context for shared use; this will spread across a range of
 * queues, but the key and indirection table are pre-configured and may not be
 * changed. For this mode, NUM_QUEUES must 2, 4, 8, 16, 32 or 64.
/*
#define    MC_CMD_RSS_CONTEXT_ALLOC_IN_TYPE_SHARED 0x1
+#define    MC_CMD_RSS_CONTEXT_ALLOC_IN_TYPE_SHARED 0x1
/* Number of queues spanned by this context, in the range 1-64; valid offsets
 * in the indirection table will be in the range 0 to NUM_QUEUES-1.
 */
#define    MC_CMD_RSS_CONTEXT_ALLOC_IN_NUM_QUEUES_OFST 8
+#define    MC_CMD_RSS_CONTEXT_ALLOC_IN_NUM_QUEUES_LEN 4

/* MC_CMD_RSS_CONTEXT_ALLOC_OUT msgresponse */
#define    MC_CMD_RSS_CONTEXT_ALLOC_OUT_LEN 4
@@ -9045,8 +11472,9 @@
    * handle.
 */
#define    MC_CMD_RSS_CONTEXT_ALLOC_OUT_RSS_CONTEXT_ID_OFST 0
+#define    MC_CMD_RSS_CONTEXT_ALLOC_OUT_RSS_CONTEXT_ID_LEN 4
/* enum: guaranteed invalid RSS context handle value */
#define    MC_CMD_RSS_CONTEXT_ALLOC_OUT_RSS_CONTEXT_ID_INVALID 0xffffffff
+#define    MC_CMD_RSS_CONTEXT_ALLOC_OUT_RSS_CONTEXT_ID_INVALID 0xffffffff

/****************************/
#define    MC_CMD_RSS_CONTEXT_FREE_IN_LEN 4
/* The handle of the RSS context */
#define    MC_CMD_RSS_CONTEXT_FREE_IN_RSS_CONTEXT_ID_OFST 0
+#define    MC_CMD_RSS_CONTEXT_FREE_IN_RSS_CONTEXT_ID_LEN 4
/* MC_CMD_RSS_CONTEXT_FREE_OUT msgresponse */
#define    MC_CMD_RSS_CONTEXT_FREE_OUT_LEN 0
@@ -9078,6 +11507,7 @@
    /* The handle of the RSS context */
#define    MC_CMD_RSS_CONTEXT_SET_KEY_IN_LEN 44
/* The 40-byte Toeplitz hash key (TBD endianness issues?) */
#define    MC_CMD_RSS_CONTEXT_SET_KEY_IN_TOEPLITZ_KEY_OFST 4
#define    MC_CMD_RSS_CONTEXT_SET_KEY_IN_TOEPLITZ_KEY_LEN 40
@@ -9098,6 +11528,7 @@
    /* The handle of the RSS context */
#define    MC_CMD_RSS_CONTEXT_GET_KEY_IN_LEN 4
/* MC_CMD_RSS_CONTEXT_GET_KEY_OUT msgresponse */
#define    MC_CMD_RSS_CONTEXT_GET_KEY_OUT_LEN 44
@@ -9118,6 +11549,7 @@
    /* The handle of the RSS context */
#define    MC_CMD_RSS_CONTEXT_SET_TABLE_IN_LEN 132

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/* The handle of the RSS context */
#define MC_CMD_RSS_CONTEXT_SET_TABLE_IN_RSS_CONTEXT_ID_OFST 0
+#define MC_CMD_RSS_CONTEXT_SET_TABLE_IN_RSS_CONTEXT_ID_LEN 4
/*@ The 128-byte indirection table (1 byte per entry) */
#define MC_CMD_RSS_CONTEXT_SET_TABLE_IN_INDIRECTION_TABLE_OFST 4
#define MC_CMD_RSS_CONTEXT_SET_TABLE_IN_INDIRECTION_TABLE_LEN 128
#undef -9138,6 +11570,7 @@
#define MC_CMD_RSS_CONTEXT_GET_TABLE_IN_RSS_CONTEXT_ID_OFST 0
+#define MC_CMD_RSS_CONTEXT_GET_TABLE_IN_RSS_CONTEXT_ID_LEN 4
/*@ Hash control flags. The _EN bits are always supported, but new modes are 
* available when ADDITIONAL_RSS_MODES is reported by MC_CMD_GET_CAPABILITIES: 
* in this case, the MODE fields may be set to non-zero values, and will take 
@ @ -9171,6 +11605,7 @@ 
* particular packet type.) 
*/
#define MC_CMD_RSS_CONTEXT_SET_FLAGS_IN_FLAGS_OFST 4
+#define MC_CMD_RSS_CONTEXT_SET_FLAGS_IN_FLAGS_LEN 4
#define MC_CMD_RSS_CONTEXT_SET_FLAGS_IN_TOEPLITZ_IPV4_EN_LBN 0
#define MC_CMD_RSS_CONTEXT_SET_FLAGS_IN_TOEPLITZ_IPV4_EN_WIDTH 1
#undef -9106,6 +11045,7 @@
#define MC_CMD_RSS_CONTEXT_GET_FLAGS_IN_RSS_CONTEXT_ID_OFST 0
+#define MC_CMD_RSS_CONTEXT_GET_FLAGS_IN_RSS_CONTEXT_ID_LEN 4
/*@ MC_CMD_RSS_CONTEXT_GET_FLAGS_OUT msgresponse */
#define MC_CMD_RSS_CONTEXT_GET_FLAGS_OUT_FLAGS_OFST 4
+#define MC_CMD_RSS_CONTEXT_GET_FLAGS_OUT_FLAGS_LEN 4
#define MC_CMD_RSS_CONTEXT_GET_FLAGS_OUT_TOEPLITZ_IPV4_EN_LBN 0
#define MC_CMD_RSS_CONTEXT_GET_FLAGS_OUT_TOEPLITZ_TCPV4_EN_LBN 1
#undef -9227,6 +11663,7 @@ 
* always be used for a SET regardless of old/new driver vs. old/new firmware. 
*/
#define MC_CMD_RSS_CONTEXT_GET_FLAGS_OUT_TOEPLITZ_TCPV4_EN_WIDTH 1
#define MC_CMD_RSS_CONTEXT_GET_FLAGS_OUT_TOEPLITZ_IPV4_EN_WIDTH 1
#undef -9263,11 +11700,13 @@
#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_FLAGS_OFST 4
+#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_FLAGS_LEN 4
#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_TOEPLITZ_IPV4_EN_LBN 0
#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_TOEPLITZ_TCPV4_EN_LBN 1
#undef -9263,11 +11700,13 @@
#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_LEN 8
/* The handle of the owning upstream port */
#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_UPSTREAM_PORT_ID_OFST 0
+#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_UPSTREAM_PORT_ID_LEN 4
/* Number of queues spanned by this mapping, in the range 1-64; valid fixed
* offsets in the mapping table will be in the range 0 to NUM_QUEUES-1, and
* referenced RSS contexts must span no more than this number.
*/
#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_NUM_QUEUES_OFST 4
+#define MC_CMD_DOT1P_MAPPING_ALLOC_IN_NUM_QUEUES_LEN 4

/* MC_CMD_DOT1P_MAPPING_ALLOC_OUT msgresponse */
#define MC_CMD_DOT1P_MAPPING_ALLOC_OUT_LEN 4
@@ -9276,8 +11715,9 @@
    * handle.
    */
#define MC_CMD_DOT1P_MAPPING_ALLOC_OUT_DOT1P_MAPPING_ID_OFST 0
+#define MC_CMD_DOT1P_MAPPING_ALLOC_OUT_DOT1P_MAPPING_ID_LEN 4
/* enum: guaranteed invalid .1p mapping handle value */
-#define MC_CMD_DOT1P_MAPPING_ALLOC_OUT_DOT1P_MAPPING_ID_INVALID 0xffffffff
+#define MC_CMD_DOT1P_MAPPING_ALLOC_OUT_DOT1P_MAPPING_ID_INVALID 0xffffffff

/*****************************/
@@ -9292,6 +11732,7 @@
    #define MC_CMD_DOT1P_MAPPING_FREE_IN_DOT1P_MAPPING_ID_OFST 0
    +#define MC_CMD_DOT1P_MAPPING_FREE_IN_DOT1P_MAPPING_ID_LEN 4
    /* The handle of the .1p mapping */
#define MC_CMD_DOT1P_MAPPING_FREE_IN_DOT1P_MAPPING_ID_OFST 0
    +#define MC_CMD_DOT1P_MAPPING_FREE_IN_DOT1P_MAPPING_ID_LEN 4

    /* MC_CMD_DOT1P_MAPPING_FREE_OUT msgresponse */
#define MC_CMD_DOT1P_MAPPING_FREE_OUT_LEN 0
@@ -9309,6 +11750,7 @@
    /* The handle of the .1p mapping */
#define MC_CMD_DOT1P_MAPPING_SET_TABLE_IN_DOT1P_MAPPING_ID_OFST 0
    +#define MC_CMD_DOT1P_MAPPING_SET_TABLE_IN_DOT1P_MAPPING_ID_LEN 4
    /* Per-priority mappings (1 32-bit word per entry - an offset or RSS context
    * handle)
    */
@@ -9331,6 +11773,7 @@
    /* MC_CMD_DOT1P_MAPPING_GET_TABLE_IN_LEN 4
    */
#define MC_CMD_DOT1P_MAPPING_GET_TABLE_IN_DOT1P_MAPPING_ID_OFST 0
    +#define MC_CMD_DOT1P_MAPPING_GET_TABLE_IN_DOT1P_MAPPING_ID_LEN 4
    /* MC_CMD_DOT1P_MAPPING_GET_TABLE_OUT msgresponse */
#define MC_CMD_DOT1P_MAPPING_GET_TABLE_OUT_LEN 36
@@ -9356,10 +11799,13 @@

# define MC_CMD_GET_VECTOR_CFG_OUT_LEN 12
/* Base absolute interrupt vector number. */
# define MC_CMD_GET_VECTOR_CFG_OUT_VEC_BASE_OFST 0
+# define MC_CMD_GET_VECTOR_CFG_OUT_VEC_BASE_LEN 4
/* Number of interrupt vectors allocate to this PF. */
# define MC_CMD_GET_VECTOR_CFG_OUT_VECS_PER_PF_OFST 4
+# define MC_CMD_GET_VECTOR_CFG_OUT_VECS_PER_PF_LEN 4
/* Number of interrupt vectors to allocate per VF. */
# define MC_CMD_GET_VECTOR_CFG_OUT_VECS_PER_VF_OFST 8
+# define MC_CMD_GET_VECTOR_CFG_OUT_VECS_PER_VF_LEN 4

/*****************************/
@@ -9376,10 +11822,13 @@
    * let the system find a suitable base.
    */
# define MC_CMD_SET_VECTOR_CFG_IN_VEC_BASE_OFST 0
+# define MC_CMD_SET_VECTOR_CFG_IN_VEC_BASE_LEN 4
/* Number of interrupt vectors allocate to this PF. */
# define MC_CMD_SET_VECTOR_CFG_IN_VECS_PER_PF_OFST 4
+# define MC_CMD_SET_VECTOR_CFG_IN_VECS_PER_PF_LEN 4
/* Number of interrupt vectors to allocate per VF. */
# define MC_CMD_SET_VECTOR_CFG_IN_VECS_PER_VF_OFST 8
+# define MC_CMD_SET_VECTOR_CFG_IN_VECS_PER_VF_LEN 4
/* MC_CMD_SET_VECTOR_CFG_OUT msgresponse */
# define MC_CMD_SET_VECTOR_CFG_OUT_LEN 0
@@ -9397,6 +11846,7 @@
# define MC_CMD_VPORT_ADD_MAC_ADDRESS_IN_LEN 10
/* The handle of the v-port */
# define MC_CMD_VPORT_ADD_MAC_ADDRESS_IN_VPORT_ID_OFST 0
+# define MC_CMD_VPORT_ADD_MAC_ADDRESS_IN_VPORT_ID_LEN 4
/* MAC address to add */
# define MC_CMD_VPORT_ADD_MAC_ADDRESS_IN_MACADDR_OFST 4
# define MC_CMD_VPORT_ADD_MAC_ADDRESS_IN_MACADDR_LEN 6
@@ -9417,6 +11867,7 @@
# define MC_CMD_VPORT_DEL_MAC_ADDRESS_IN_LEN 10
/* The handle of the v-port */
# define MC_CMD_VPORT_DEL_MAC_ADDRESS_IN_VPORT_ID_OFST 0
+# define MC_CMD_VPORT_DEL_MAC_ADDRESS_IN_VPORT_ID_LEN 4
/* MAC address to add */
# define MC_CMD_VPORT_DEL_MAC_ADDRESS_IN_MACADDR_OFST 4
# define MC_CMD_VPORT_DEL_MAC_ADDRESS_IN_MACADDR_LEN 6
@@ -9437,6 +11888,7 @@
# define MC_CMD_VPORT_GET_MAC_ADDRESSES_IN_LEN 4
/* The handle of the v-port */
# define MC_CMD_VPORT_GET_MAC_ADDRESSES_IN_VPORT_ID_OFST 0
+# define MC_CMD_VPORT_GET_MAC_ADDRESSES_IN_VPORT_ID_LEN 4
/* The handle of the v-port */
# define MC_CMD_VPORT_GET_MAC_ADDRESSES_IN_VPORT_ID_OFST 0
+# define MC_CMD_VPORT_GET_MAC_ADDRESSES_IN_VPORT_ID_LEN 4

---
#define MC_CMD_VPORT_GET_MAC_ADDRESSES_OUT_LEN(num) (4+6*(num))
/* The number of MAC addresses returned */
#define MC_CMD_VPORT_GET_MAC_ADDRESSES_OUT_MACADDR_COUNT_OFST 0
#define MC_CMD_VPORT_GET_MAC_ADDRESSES_OUT_MACADDR_COUNT_LEN 4
/* Array of MAC addresses */
#define MC_CMD_VPORT_GET_MAC_ADDRESSES_OUT_MACADDR_OFST 4
#define MC_CMD_VPORT_GET_MAC_ADDRESSES_OUT_MACADDR_LEN 6

#define MC_CMD_VPORT_RECONFIGURE_IN_LEN 44
/* The handle of the v-port */
#define MC_CMD_VPORT_RECONFIGURE_IN_VPORT_ID_OFST 0
#define MC_CMD_VPORT_RECONFIGURE_IN_VPORT_ID_LEN 4
/* Flags requesting what should be changed. */
#define MC_CMD_VPORT_RECONFIGURE_IN_FLAGS_OFST 4
#define MC_CMD_VPORT_RECONFIGURE_IN_FLAGS_LEN 4
#define MC_CMD_VPORT_RECONFIGURE_IN_REPLACE_VLAN_TAGS_LBN 0
#define MC_CMD_VPORT_RECONFIGURE_IN_REPLACE_VLAN_TAGS_WIDTH 1
#define MC_CMD_VPORT_RECONFIGURE_IN_REPLACE_VLAN_TAGS_LBN 1
#define MC_CMD_VPORT_RECONFIGURE_IN_REPLACE_VLAN_TAGS_WIDTH 1
#define MC_CMD_VPORT_RECONFIGURE_IN_NUM_VLAN_TAGS_OFST 8
#define MC_CMD_VPORT_RECONFIGURE_IN_NUM_VLAN_TAGS_LEN 4
/* The actual VLAN tags to insert/remove */
#define MC_CMD_VPORT_RECONFIGURE_IN_VLAN_TAGS_OFST 12
#define MC_CMD_VPORT_RECONFIGURE_IN_VLAN_TAGS_LEN 4
#define MC_CMD_VPORT_RECONFIGURE_IN_VLAN_TAG_0_LBN 0
#define MC_CMD_VPORT_RECONFIGURE_IN_VLAN_TAG_0_WIDTH 16
#define MC_CMD_VPORT_RECONFIGURE_IN_VLAN_TAG_1_LBN 16
#define MC_CMD_VPORT_RECONFIGURE_IN_VLAN_TAG_1_WIDTH 16
/* The number of MAC addresses to add */
#define MC_CMD_VPORT_RECONFIGURE_IN_NUM_MACADDRES_OFST 16
#define MC_CMD_VPORT_RECONFIGURE_IN_NUM_MACADDRES_LEN 4
/* MAC addresses to add */
#define MC_CMD_VPORT_RECONFIGURE_IN_MACADDRES_OFST 20
#define MC_CMD_VPORT_RECONFIGURE_IN_MACADDRES_LEN 4
#define MC_CMD_VPORT_RECONFIGURE_OUT_LEN 4
#define MC_CMD_VPORT_RECONFIGURE_OUT_FLAGS_OFST 0
#define MC_CMD_VPORT_RECONFIGURE_OUT_FLAGS_LEN 4
#define MC_CMD_VPORT_RECONFIGURE_OUT_RESET_DONE_LBN 0
#define MC_CMD_VPORT_RECONFIGURE_OUT_RESET_DONE_WIDTH 1
#define MC_CMD_EVB_PORT_QUERY_IN_LEN 4
/* The handle of the v-port */
#define MC_CMD_EVB_PORT_QUERY_IN_PORT_ID_OFST 0
+#define MC_CMD_EVB_PORT_QUERY_IN_PORT_ID_LEN 4

/* MC_CMD_EVB_PORT_QUERY_OUT msgresponse */
#define MC_CMD_EVB_PORT_QUERY_OUT_LEN 8
/* The EVB port flags as defined at MC_CMD_VPORTALLOC. */
#define MC_CMD_EVB_PORT_QUERY_OUT_PORT_FLAGS_OFST 0
+#define MC_CMD_EVB_PORT_QUERY_OUT_PORT_FLAGS_LEN 4
/* The number of VLAN tags that may be used on a v-adaptor connected to this
* EVB port. */
+#define MC_CMD_EVB_PORT_QUERY_OUT_NUM_AVAILABLE_VLAN_TAGS_OFST 4
+#define MC_CMD_EVB_PORT_QUERY_OUT_NUM_AVAILABLE_VLAN_TAGS_LEN 4

/**********************************
@@ -9528,14 +12023,17 @@
 MC_CMD_DUMP_BUFTBL_ENTRIES_IN msgrequest */
#define MC_CMD_DUMP_BUFTBL_ENTRIES_IN_LEN 8
/* Index of the first buffer table entry. */
#define MC_CMD_DUMP_BUFTBL_ENTRIES_IN_FIRSTID_OFST 0
+#define MC_CMD_DUMP_BUFTBL_ENTRIES_IN_FIRSTID_LEN 4
/* Number of buffer table entries to dump. */
#define MC_CMD_DUMP_BUFTBL_ENTRIES_IN_NUMENTRIES_OFST 4
+#define MC_CMD_DUMP_BUFTBL_ENTRIES_IN_NUMENTRIES_LEN 4

/**********************************
@@ -9559,16 +12023,17 @@
 MC_CMD_SET_RXDP_CONFIG_IN msgrequest */
#define MC_CMD_SET_RXDP_CONFIG_IN_LEN 4
#define MC_CMD_SET_RXDP_CONFIG_IN_DATA_OFST 0
+#define MC_CMD_SET_RXDP_CONFIG_IN_DATA_LEN 4
#define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_DMA_LBN 0
#define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_DMA_WIDTH 1
#define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_LEN_LBN 1
#define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_LEN_WIDTH 2
/* enum: pad to 64 bytes */
-define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_64 0x0
+)
+define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_64 0x0
/* enum: pad to 128 bytes (Medford only) */
-
-define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_128 0x1
+
+define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_128 0x1
/* enum: pad to 256 bytes (Medford only) */
-
-define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_256 0x2
+
+define MC_CMD_SET_RXDP_CONFIG_IN_PAD_HOST_256 0x2
/* MC_CMD_SET_RXDP_CONFIG_OUT msgresponse */
#define MC_CMD_SET_RXDP_CONFIG_OUT_LEN 0
@@ -9588,6 +12053,7 @@
/* MC_CMD_GET_RXDP_CONFIG_OUT msgresponse */
#define MC_CMD_GET_RXDP_CONFIG_OUT_LEN 4
#define MC_CMD_GET_RXDP_CONFIG_OUT_DATA_OFST 0
+
define MC_CMD_GET_RXDP_CONFIG_OUT_DATA_LEN 4
#define MC_CMD_GET_RXDP_CONFIG_OUT_PAD_HOST_DMA_LBN 0
#define MC_CMD_GET_RXDP_CONFIG_OUT_PAD_HOST_DMA_WIDTH 1
#define MC_CMD_GET_RXDP_CONFIG_OUT_PAD_HOST_LEN_LBN 1
@@ -9611,8 +12077,10 @@
#define MC_CMD_GET_CLOCK_OUT_LEN 8
/* System frequency, MHz */
#define MC_CMD_GET_CLOCK_OUT_SYS_FREQ_OFST 0
+
define MC_CMD_GET_CLOCK_OUT_SYS_FREQ_LEN 4
/* DPCPU frequency, MHz */
#define MC_CMD_GET_CLOCK_OUT_DPCPU_FREQ_OFST 4
+
define MC_CMD_GET_CLOCK_OUT_DPCPU_FREQ_LEN 4
/*****************************/
@@ -9621,69 +12089,83 @@
*
###define MC_CMD_SET_CLOCK 0xad
-
define MC_CMD_0xad_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+###define MC_CMD_0xad_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_SET_CLOCK_IN msgrequest */
#define MC_CMD_SET_CLOCK_IN_LEN 28
/* Requested frequency in MHz for system clock domain */
#define MC_CMD_SET_CLOCK_IN_SYS_FREQ_OFST 0
+###define MC_CMD_SET_CLOCK_IN_SYS_FREQ_LEN 4
/* enum: Leave the system clock domain frequency unchanged */
-###define MC_CMD_SET_CLOCK_IN_SYS_DOMAIN_DONT_CHANGE 0x0
+###define MC_CMD_SET_CLOCK_IN_SYS_DOMAIN_DONT_CHANGE 0x0
/* Requested frequency in MHz for inter-core clock domain */
#define MC_CMD_SET_CLOCK_IN_ICORE_FREQ_OFST 4
+###define MC_CMD_SET_CLOCK_IN_ICORE_FREQ_LEN 4
/* enum: Leave the inter-core clock domain frequency unchanged */
-#define MC_CMD_SET_CLOCK_IN_ICORE_DOMAIN_DONT_CHANGE 0x0
+#define MC_CMD_SET_CLOCK_IN_ICORE_DOMAIN_DONT_CHANGE 0x0
/* Requested frequency in MHz for DPCPU clock domain */
#define MC_CMD_SET_CLOCK_IN_DPCPU_FREQ_OFST 8
+#define MC_CMD_SET_CLOCK_IN_DPCPU_FREQ_OFST 8
/* enum: Leave the DPCPU clock domain frequency unchanged */
-#define MC_CMD_SET_CLOCK_IN_DPCPU_DOMAIN_DONT_CHANGE 0x0
+#define MC_CMD_SET_CLOCK_IN_DPCPU_DOMAIN_DONT_CHANGE 0x0
/* Requested frequency in MHz for PCS clock domain */
#define MC_CMD_SET_CLOCK_IN_PCS_FREQ_OFST 12
+#define MC_CMD_SET_CLOCK_IN_PCS_FREQ_OFST 12
/* enum: Leave the PCS clock domain frequency unchanged */
-#define MC_CMD_SET_CLOCK_IN_PCS_DOMAIN_DONT_CHANGE 0x0
+#define MC_CMD_SET_CLOCK_IN_PCS_DOMAIN_DONT_CHANGE 0x0
/* Requested frequency in MHz for MC clock domain */
#define MC_CMD_SET_CLOCK_IN_MC_FREQ_OFST 16
+#define MC_CMD_SET_CLOCK_IN_MC_FREQ_OFST 16
/* enum: Leave the MC clock domain frequency unchanged */
-#define MC_CMD_SET_CLOCK_IN_MC_DOMAIN_DONT_CHANGE 0x0
+#define MC_CMD_SET_CLOCK_IN_MC_DOMAIN_DONT_CHANGE 0x0
/* Requested frequency in MHz for rmon clock domain */
#define MC_CMD_SET_CLOCK_IN_RMON_FREQ_OFST 20
+#define MC_CMD_SET_CLOCK_IN_RMON_FREQ_OFST 20
/* enum: Leave the rmon clock domain frequency unchanged */
-#define MC_CMD_SET_CLOCK_IN_RMON_DOMAIN_DONT_CHANGE 0x0
+#define MC_CMD_SET_CLOCK_IN_RMON_DOMAIN_DONT_CHANGE 0x0
/* Requested frequency in MHz for vswitch clock domain */
#define MC_CMD_SET_CLOCK_IN_VSWITCH_FREQ_OFST 24
+#define MC_CMD_SET_CLOCK_IN_VSWITCH_FREQ_OFST 24
/* enum: Leave the vswitch clock domain frequency unchanged */
-#define MC_CMD_SET_CLOCK_IN_VSWITCH_DOMAIN_DONT_CHANGE 0x0
+#define MC_CMD_SET_CLOCK_IN_VSWITCH_DOMAIN_DONT_CHANGE 0x0
/* MC_CMD_SET_CLOCK_OUT msgresponse */
#define MC_CMD_SET_CLOCK_OUT_LEN 28
/* Resulting system frequency in MHz */
#define MC_CMD_SET_CLOCK_OUT_SYS_FREQ_OFST 0
+#define MC_CMD_SET_CLOCK_OUT_SYS_FREQ_OFST 0
/* enum: The system clock domain doesn't exist */
-#define MC_CMD_SET_CLOCK_OUT_SYS_DOMAIN_UNSUPPORTED 0x0
+#define MC_CMD_SET_CLOCK_OUT_SYS_DOMAIN_UNSUPPORTED 0x0
/* Resulting inter-core frequency in MHz */
#define MC_CMD_SET_CLOCK_OUT_ICORE_FREQ_OFST 4
+#define MC_CMD_SET_CLOCK_OUT_ICORE_FREQ_OFST 4
/* enum: The inter-core clock domain doesn't exist / isn't used */
-#define MC_CMD_SET_CLOCK_OUT_ICORE_DOMAIN_UNSUPPORTED 0x0
+#define MC_CMD_SET_CLOCK_OUT_ICORE_DOMAIN_UNSUPPORTED 0x0
/* Resulting DPCPU frequency in MHz */
#define MC_CMD_SET_CLOCK_OUT_DPCPU_FREQ_OFST 8
+#define MC_CMD_SET_CLOCK_OUT_DPCPU_FREQ_LEN 4
/* enum: The dpcpu clock domain doesn't exist */
-#define MC_CMD_SET_CLOCK_OUT_DPCPU_DOMAIN_UNSUPPORTED 0x0
+#define MC_CMD_SET_CLOCK_OUT_DPCPU_DOMAIN_UNSUPPORTED 0x0
/* Resulting PCS frequency in MHz */
#define MC_CMD_SET_CLOCK_OUT_PCS_FREQ_OFST 12
+#define MC_CMD_SET_CLOCK_OUT_PCS_FREQ_LEN 4
/* enum: The PCS clock domain doesn't exist / isn't controlled */
-#define MC_CMD_SET_CLOCK_OUT_PCS_DOMAIN_UNSUPPORTED 0x0
+#define MC_CMD_SET_CLOCK_OUT_PCS_DOMAIN_UNSUPPORTED 0x0
/* Resulting MC frequency in MHz */
#define MC_CMD_SET_CLOCK_OUT_MC_FREQ_OFST 16
+#define MC_CMD_SET_CLOCK_OUT_MC_FREQ_LEN 4
/* enum: The MC clock domain doesn't exist / isn't controlled */
-#define MC_CMD_SET_CLOCK_OUT_MC_DOMAIN_UNSUPPORTED 0x0
+#define MC_CMD_SET_CLOCK_OUT_MC_DOMAIN_UNSUPPORTED 0x0
/* Resulting rmon frequency in MHz */
#define MC_CMD_SET_CLOCK_OUT_RMON_FREQ_OFST 20
+#define MC_CMD_SET_CLOCK_OUT_RMON_FREQ_LEN 4
/* enum: The rmon clock domain doesn't exist / isn't controlled */
-#define MC_CMD_SET_CLOCK_OUT_RMON_DOMAIN_UNSUPPORTED 0x0
+#define MC_CMD_SET_CLOCK_OUT_RMON_DOMAIN_UNSUPPORTED 0x0
/* Resulting vswitch frequency in MHz */
#define MC_CMD_SET_CLOCK_OUT_VSWITCH_FREQ_OFST 24
+#define MC_CMD_SET_CLOCK_OUT_VSWITCH_FREQ_LEN 4
/* enum: The vswitch clock domain doesn't exist / isn't controlled */
-#define MC_CMD_SET_CLOCK_OUT_VSWITCH_DOMAIN_UNSUPPORTED 0x0
+#define MC_CMD_SET_CLOCK_OUT_VSWITCH_DOMAIN_UNSUPPORTED 0x0

/****************************/
@@ -9692,27 +12174,28 @@
*/
#define MC_CMD_DPCPU_RPC 0xae
-#define MC_CMD_0xae_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0xae_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_DPCPU_RPC_IN msgrequest */
#define MC_CMD_DPCPU_RPC_IN_LEN 36
#define MC_CMD_DPCPU_RPC_IN_CPU_OFST 0
+#define MC_CMD_DPCPU_RPC_IN_CPU_LEN 4
/* enum: RxDPCPU0 */
-#define MC_CMD_DPCPU_RPC_IN_DPCPU_RX0 0x0
+#define MC_CMD_DPCPU_RPC_IN_DPCPU_RX0 0x0
/* enum: TxDPCPU0 */
-#define MC_CMD_DPCPU_RPC_IN_DPCPU_TX0 0x1
+#define MC_CMD_DPCPU_RPC_IN_DPCPU_TX0 0x1
+#define MC_CMD_DPCPU_RPC_IN_DPCPU_TX0 0x1
/* enum: TxDPCPU */
-#define MC_CMD_DPCPU_RPC_IN_DPCPU_TX1 0x2
+#define MC_CMD_DPCPU_RPC_IN_DPCPU_TX1 0x2
/* enum: RxDPCPU1 (Medford only) */
-#define MC_CMD_DPCPU_RPC_IN_DPCPU_RX1 0x3
+#define MC_CMD_DPCPU_RPC_IN_DPCPU_RX1 0x3
/* enum: RxDPCPU (will be for the calling function; for now, just an alias of
* DPCPU_RX0) */
-#define MC_CMD_DPCPU_RPC_IN_DPCPU_RX 0x80
+#define MC_CMD_DPCPU_RPC_IN_DPCPU_RX 0x80
/* enum: TxDPCPU (will be for the calling function; for now, just an alias of
* DPCPU_TX0) */
-#define MC_CMD_DPCPU_RPC_IN_DPCPU_TX 0x81
+#define MC_CMD_DPCPU_RPC_IN_DPCPU_TX 0x81
/* First 8 bits [39:32] of DATA are consumed by MC-DPCPU protocol and must be
* initialised to zero */
@@ -9720,15 +12203,15 @@
#define MC_CMD_DPCPU_RPC_IN_DATA_LEN 32
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_CMDNUM_LBN 8
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_CMDNUM_WIDTH 8
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_READ 0x6 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_WRITE 0x7 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_SELF_TEST 0xc /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_CSR_ACCESS 0xe /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_READ 0x46 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_WRITE 0x47 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_SELF_TEST 0x4a /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_CSR_ACCESS 0x4c /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_READ 0x6 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_WRITE 0x7 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_SELF_TEST 0xc /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_CSR_ACCESS 0xe /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_READ 0x46 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_WRITE 0x47 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_SELF_TEST 0x4a /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_CSR_ACCESS 0x4c /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_SET_MC_REPLAY_CNTL 0x4d /* enum */
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_REQ_OBJID_LBN 16
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_REQ_OBJID_WIDTH 16
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_REQ_ADDR_LBN 16
@@ -9739,11 +12222,11 @@
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_READ 0x6 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_WRITE 0x7 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_SELF_TEST 0xc /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_TXDPCPU_CSR_ACCESS 0xe /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_READ 0x46 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_WRITE 0x47 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_SELF_TEST 0x4a /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_CSR_ACCESS 0x4c /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_SET_MC_REPLAY_CNTL 0x4d /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CMDNUM_RXDPCPU_SET_MC_REPLAY_CNTL 0x4d /* enum */
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_REQ_OBJID_LBN 16
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_REQ_OBJID_WIDTH 16
#define MC_CMD_DPCPU_RPC_IN_HDR_CMD_REQ_ADDR_LBN 16
@@ -9739,11 +12222,11 @@
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_INFO_WIDTH 240
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_LBN 16
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_WIDTH 16
-#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_STOP_RETURN_RESULT 0x0 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_READ 0x1 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_WRITE 0x2 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_WRITE_READ 0x3 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_PIPELINED_READ 0x4 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_STOP_RETURN_RESULT 0x0 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_READ 0x1 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_WRITE 0x2 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_WRITE_READ 0x3 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_CMD_START_PIPELINED_READ 0x4 /* enum */
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_START_DELAY_LBN 48
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_START_DELAY_WIDTH 16
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_RPT_COUNT_LBN 64
@@ -9752,21 +12235,24 @@
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_GAP_DELAY_WIDTH 16
#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_LBN 16
#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_WIDTH 16
-#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_CUT_THROUGH 0x1 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_STORE_FORWARD 0x2 /* enum */
-#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_STORE_FORWARD_FIRST 0x3 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_CUT_THROUGH 0x1 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_STORE_FORWARD 0x2 /* enum */
+#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_MODE_STORE_FORWARD_FIRST 0x3 /* enum */
#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_CNTXT_LBN 64
#define MC_CMD_DPCPU_RPC_IN_MC_REPLAY_CNTXT_WIDTH 16
#define MC_CMD_DPCPU_RPC_IN_WDATA_OFST 12
#define MC_CMD_DPCPU_RPC_IN_WDATA_LEN 24
/* Register data to write. Only valid in write/write-read. */
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_DATA_OFST 16
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_DATA_LEN 4
/* Register address. */
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_ADDRESS_OFST 20
#define MC_CMD_DPCPU_RPC_IN_CSR_ACCESS_ADDRESS_LEN 4

/* MC_CMD_DPCPU_RPC_OUT msgresponse */
#define MC_CMD_DPCPU_RPC_OUT_LEN 36
#define MC_CMD_DPCPU_RPC_OUT_RC_OFST 0
#pragma define MC_CMD_DPCPU_RPC_OUT_RC_LEN 4
/* DATA */
#define MC_CMD_DPCPU_RPC_OUT_DATA_OFST 4
#define MC_CMD_DPCPU_RPC_OUT_DATA_LEN 32
 @@ -9777,9 +12263,13 @@
#define MC_CMD_DPCPU_RPC_OUT_RDATA_OFST 12
#define MC_CMD_DPCPU_RPC_OUT_RDATA_LEN 24
#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_1_OFST 12
+\#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_1_LEN 4
#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_2_OFST 16
+\#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_2_LEN 4
#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_3_OFST 20
+\#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_3_LEN 4
#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_4_OFST 24
+\#define MC_CMD_DPCPU_RPC_OUT_CSR_ACCESS_READ_VAL_4_LEN 4

/****

@@ -9794,6 +12284,7 @@
#define MC_CMD_TRIGGER_INTERRUPT_IN_LEN 4
/* Interrupt level relative to base for function. */
#define MC_CMD_TRIGGER_INTERRUPT_IN_INTR_LEVEL_OFST 0
+\#define MC_CMD_TRIGGER_INTERRUPT_IN_INTR_LEVEL_LEN 4

/* MC_CMD_TRIGGER_INTERRUPT_OUT msgresponse */
#define MC_CMD_TRIGGER_INTERRUPT_OUT_LEN 0
@@ -9811,8 +12302,9 @@
#define MC_CMD_SHMBOOT_OP_IN_LEN 4
/* Identifies the operation to perform */
+\#define MC_CMD_SHMBOOT_OP_IN_SHMBOOT_OP_LEN 4
/* enum: Copy slave_data section to the slave core. (Greenport only) */
-\#define MC_CMD_SHMBOOT_OP_IN_PUSH_SLAVE_DATA 0x0
+\#define MC_CMD_SHMBOOT_OP_IN_PUSH_SLAVE_DATA 0x0

/* MC_CMD_SHMBOOT_OP_OUT msgresponse */
#define MC_CMD_SHMBOOT_OP_OUT_LENMIN 8
@@ -9850,53 +12345,77 @@
/* MC_CMD_DUMP_DO_IN msgrequest */
#define MC_CMD_DUMP_DO_IN_LEN 52
#define MC_CMD_DUMP_DO_IN_PADDING_OFST 0
+=#define MC_CMD_DUMP_DO_IN_PADDING_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_OFST 4
-=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM 0x0 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM 0x0 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_LEN 4
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_TYPE_OFST 8
-=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_NVRAM 0x1 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_NVRAM 0x1 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_HOST_MEMORY 0x2 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_HOST_MEMORY_MLI 0x3 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_UART 0x4 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_TYPE_LEN 4
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_NVRAM 0x1 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_HOST_MEMORY 0x2 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_HOST_MEMORY_MLI 0x3 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMP_LOCATION_UART 0x4 /* enum */
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_PARTITION_TYPE_ID_OFST 12
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_PARTITION_TYPE_ID_LEN 4
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_OFFSET_OFST 16
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_OFFSET_LEN 4
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_ADDR_LO_OFST 12
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_ADDR_HI_OFST 16
+=#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_LO_OFST 12
+=#define MC_CMD_DUMP_DO_IN_HOST_MEMORY_MLI_PAGE_SIZE 0x1000 /* enum */
+=#define MC_CMD_DUMP_DO_IN_HOST_MEMORY_MLI_ROOT_ADDR_LO_LEN 4
+=#define MC_CMD_DUMP_DO_IN_HOST_MEMORY_MLI_ROOT_ADDR_HI_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_LO 0x1000
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_HI 0x1000
+=#define MC_CMD_DUMP_DO_IN_HOST_MEMORY_MLI_PAGE_SIZE 0x1000 /* enum */
+=#define MC_CMD_DUMP_DO_IN_HOST_MEMORY_MLI_ROOT_ADDR_LO_LEN 4
+=#define MC_CMD_DUMP_DO_IN_HOST_MEMORY_MLI_ROOT_ADDR_HI_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_DEPTH_OFST 20
#endif
#define MC_CMD_DUMP_DO_IN_HOST_MEMORY_MLI_MAX_DEPTH 0x2 /* enum */
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_MAX_DEPTH 0x2 /* enum */
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_UART_PORT_OFST 12
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_UART_PORT_LEN 4

/* enum: The uart port this command was received over (if using a uart
 * transport)
 */
#endif
#define MC_CMD_DUMP_DO_IN_UART_PORT_SRC 0xff
#define MC_CMD_DUMP_DO_IN_UART_PORT_SRC 0xff
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_SIZE_OFST 24
#define MC_CMD_DUMP_DO_IN_DUMPSPEC_SRC_CUSTOM_SIZE_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_OFST 28
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM 0x0 /* enum */
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_NVRAM_DUMP_PARTITION 0x1 /* enum */
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM 0x0 /* enum */
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_NVRAM_DUMP_PARTITION 0x1 /* enum */
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_TYPE_OFST 32
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_TYPE_LEN 4
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_NVRAM_PARTITION_TYPE_ID_OFST 36
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_NVRAM_PARTITION_TYPE_ID_LEN 4
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_LO_OFST 36
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_LO_LEN 4
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_HI_OFST 40
	#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_HI_LEN 4
#endif
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_OFST 36
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_HI_OFST 40
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_HI_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_DEPTH_OFST 44
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_DEPTH_LEN 4
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_UART_PORT_OFST 36
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_UART_PORT_LEN 4

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#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_SIZE_OFST 48
#define MC_CMD_DUMP_DO_IN_DUMPFILE_DST_CUSTOM_SIZE_LEN 4

/* MC_CMD_DUMP_DO_OUT msgresponse */
#define MC_CMD_DUMP_DO_OUT_LEN 4
#define MC_CMD_DUMP_DO_OUT_DUMPFILE_SIZE_OFST 0
#define MC_CMD_DUMP_DO_OUT_DUMPFILE_SIZE_LEN 4

/*******************************/

#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED 0xe9

#define MC_CMD_0xe9_PRIVILEGE_CTG SRIOV_CTG_ADMIN
#define MC_CMD_0xe9_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN msgrequest */
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_LEN 52
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_ENABLE_OFST 0
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_ENABLE_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_OFST 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_TYPE_OFST 8
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_TYPE_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_PARTITION_TYPE_ID_OFST 12
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_PARTITION_TYPE_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_OFFSET_OFST 16
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_NVRAM_OFFSET_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_ADDR_LO_OFST 12
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_ADDR_LEN 4
```
R_LO_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_ADD R_HI_OFST 16
+#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_ADD R_HI_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ ROOT_ADDR_LO_OFST 12
+#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ ROOT_ADDR_LO_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ ROOT_ADDR_HI_OFST 16
+#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ ROOT_ADDR_HI_LEN 4
#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ DEPTH_OFST 20
+#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_HOST_MEMORY_MLI_ DEPTH_LEN 4
#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_UART_PORT_OFST 12
+#define MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_UART_PORT_LEN 4
#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_SIZE_OFST 24
+#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPSPEC_SRC_CUSTOM_SIZE_LEN 4
#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_OFST 28
+#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_LEN 4
  /*            Enum values, see field(s): */
  /*               MC_CMD_DUMP_DO/MC_CMD_DUMP_DO_IN/DUMPFILE_DST */
#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_TYPE_OFST 32
+#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_TYPE_LEN 4
  /*            Enum values, see field(s): */
  /*               MC_CMD_DUMP_DO/MC_CMD_DUMP_DO_IN/DUMPSPEC_SRC_CUSTOM_TYPE */
#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_NVRAM_PARTITION_T YPE_ID_OFST 36
+#define       MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_NVRAM_PARTITION_T YPE_ID_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_NVRAM_OFFSET_OFST 40
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_NVRAM_OFFSET_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_LO_OFST 36
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_LO_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_HI_OFST 40
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_ADDR_HI_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_LO_OFST 36
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_LO_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_HI_OFST 40
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_ROOT_ADDR_HI_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_DEPTH_OFST 44
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_HOST_MEMORY_MLI_DEPTH_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_UART_PORT_OFST 36
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_UART_PORT_LEN 4
#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_SIZE_OFST 48
+#define
MC_CMD_DUMP_CONFIGURE_UNSOLICITED_IN_DUMPFILE_DST_CUSTOM_SIZE_LEN 4

/*******************************/
@ @ -9950,17 +12492,20 @ @
*/
#define MC_CMD_SET_PSU 0xea

-#define MC_CMD_0xea_PRIVILEGE_CTG SRIOV_CTG_ADMIN

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#define MC_CMD_0xea_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_SET_PSU_IN msgrequest */
#define MC_CMD_SET_PSU_IN_LEN 12
#define MC_CMD_SET_PSU_IN_PARAM_OFST 0
#define MC_CMD_SET_PSU_IN_PARAM_SUPPLY_VOLTAGE 0x0 /* enum */
#define MC_CMD_SET_PSU_IN_PARAM_LEN 4
#define MC_CMD_SET_PSU_IN_RAIL_OFST 4
#define MC_CMD_SET_PSU_IN_RAIL_0V9 0x0 /* enum */
#define MC_CMD_SET_PSU_IN_RAIL_1V2 0x1 /* enum */
#define MC_CMD_SET_PSU_IN_VALUE_OFST 8
#define MC_CMD_SET_PSU_IN_VALUE_LEN 4

/* MC_CMD_SET_PSU_OUT msgresponse */
#define MC_CMD_SET_PSU_OUT_LEN 0

/* MC_CMD_GET_FUNCTION_INFO_OUT msgresponse */
#define MC_CMD_GET_FUNCTION_INFO_OUT_LEN 8
#define MC_CMD_GET_FUNCTION_INFO_OUT_PF_OFST 0
#define MC_CMD_GET_FUNCTION_INFO_OUT_VF_OFST 4

/**************************************************
*/

#define MC_CMD_UART_SEND_DATA_OUT_LEN(num) (16+1*(num))
/* CRC32 over OFFSET, LENGTH, RESERVED, DATA */
#define MC_CMD_UART_SEND_DATA_OUT_CHECKSUM_OFST 0
#define MC_CMD_UART_SEND_DATA_OUT_OFFSET_OFST 4
#define MC_CMD_UART_SEND_DATA_OUT_LENGTH_OFST 8
#define MC_CMD_UART_SEND_DATA_OUT_RESERVED_OFST 12
#define MC_CMD_UART_SEND_DATA_OUT_DATA_OFST 16
#define MC_CMD_UART_SEND_DATA_OUT_DATA_MINNUM 0
```
#define MC_CMD_UART_RECV_DATA_OUT_LEN 16
/* CRC32 over OFFSET, LENGTH, RESERVED */
#define MC_CMD_UART_RECV_DATA_OUT_CHECKSUM_OFST 0
+#define MC_CMD_UART_RECV_DATA_OUT_CHECKSUM_LEN 4
/* Offset from which to read the data */
#define MC_CMD_UART_RECV_DATA_OUT_OFFSET_OFST 4
+#define MC_CMD_UART_RECV_DATA_OUT_OFFSET_LEN 4
/* Length of data */
#define MC_CMD_UART_RECV_DATA_OUT_LENGTH_OFST 8
+#define MC_CMD_UART_RECV_DATA_OUT_LENGTH_LEN 4
/* Reserved for future use */
#define MC_CMD_UART_RECV_DATA_OUT_RESERVED_OFST 12
+#define MC_CMD_UART_RECV_DATA_OUT_RESERVED_LEN 4

/* MC_CMD_UART_RECV_DATA_IN msgresponse */
#define MC_CMD_UART_RECV_DATA_IN_LENMIN 16
@@ -10057,12 +12612,16 @@ @ @ -10057.12 +12612.16 @@
 #define MC_CMD_UART_RECV_DATA_IN_LEN(num) (16+1*(num))
 /* CRC32 over RESERVED1, RESERVED2, RESERVED3, DATA */
 +#define MC_CMD_UART_RECV_DATA_IN_CHECKSUM_LEN 4
 /* Offset at which to write the data */
 #define MC_CMD_UART_RECV_DATA_IN_RESERVED1_OFST 4
 +#define MC_CMD_UART_RECV_DATA_IN_RESERVED1_LEN 4
 /* Length of data */
 #define MC_CMD_UART_RECV_DATA_IN_RESERVED2_OFST 8
 +#define MC_CMD_UART_RECV_DATA_IN_RESERVED2_LEN 4
 /* Reserved for future use */
 #define MC_CMD_UART_RECV_DATA_IN_RESERVED3_OFST 12
 +#define MC_CMD_UART_RECV_DATA_IN_RESERVED3_LEN 4
 #define MC_CMD_UART_RECV_DATA_IN_DATA_OFST 16
 #define MC_CMD_UART_RECV_DATA_IN_DATA_LEN 1
 @@ -10075,14 +12634,16 @@ @ @ -10075.14 +12634.16 @@
 */
 #define MC_CMD_READ_FUSES 0xf0

-#define MC_CMD_0xf0_PRIVILEGE_CTG SRIOV_CTG_ADMIN
 +#define MC_CMD_0xf0_PRIVILEGE_CTG SRIOV_CTG_INSECURE

 /* MC_CMD_READ_FUSES_IN msgrequest */
 #define MC_CMD_READ_FUSES_IN_LEN 8
 /* Offset in OTP to read */
 #define MC_CMD_READ_FUSES_IN_OFFSET_OFST 0
 +#define MC_CMD_READ_FUSES_IN_OFFSET_LEN 4
 /* Length of data to read in bytes */
 #define MC_CMD_READ_FUSES_IN_LENGTH_OFST 4
 +#define MC_CMD_READ_FUSES_IN_LENGTH_LEN 4
/* MC_CMD_READ_FUSES_OUT msgresponse */
#define MC_CMD_READ_FUSES_OUT_LENMIN 4
@@ -10090,6 +12651,7 @@
#define MC_CMD_READ_FUSES_OUT_LEN(num) (4+1*(num))
/* Length of returned OTP data in bytes */
#define MC_CMD_READ_FUSES_OUT_LENGTH_OFST 0
+#define MC_CMD_READ_FUSES_OUT_LENGTH_LEN 4
/* Returned data */
#define MC_CMD_READ_FUSES_OUT_DATA_OFST 4
#define MC_CMD_READ_FUSES_OUT_DATA_LEN 1
@@ -10113,26 +12675,30 @@
#define MC_CMD_KR_TUNE_IN_KR_TUNE_OP_OFST 0
#define MC_CMD_KR_TUNE_IN_KR_TUNE_OP_LEN 1
/* enum: Get current RXEQ settings */
-#define MC_CMD_KR_TUNE_IN_RXEQ_GET 0x0
+#define MC_CMD_KR_TUNE_IN_RXEQ_GET 0x0
/* enum: Override RXEQ settings */
-#define MC_CMD_KR_TUNE_IN_RXEQ_SET 0x1
+#define MC_CMD_KR_TUNE_IN_RXEQ_SET 0x1
/* enum: Get current TX Driver settings */
-#define MC_CMD_KR_TUNE_IN_TXEQ_GET 0x2
+#define MC_CMD_KR_TUNE_IN_TXEQ_GET 0x2
/* enum: Override TX Driver settings */
-#define MC_CMD_KR_TUNE_IN_TXEQ_SET 0x3
+#define MC_CMD_KR_TUNE_IN_TXEQ_SET 0x3
/* enum: Force KR Serdes reset / recalibration */
-#define MC_CMD_KR_TUNE_IN_RECAL 0x4
+#define MC_CMD_KR_TUNE_IN_RECAL 0x4
/* enum: Start KR Serdes Eye diagram plot on a given lane. Lane must have valid
* signal. */
-#define MC_CMD_KR_TUNE_IN_START_EYE_PLOT 0x5
+#define MC_CMD_KR_TUNE_IN_START_EYE_PLOT 0x5
/* enum: Poll KR Serdes Eye diagram plot. Returns one row of BER data. The
* caller should call this command repeatedly after starting eye plot, until no
* more data is returned. */
-#define MC_CMD_KR_TUNE_IN_POLL_EYE_PLOT 0x6
+#define MC_CMD_KR_TUNE_IN_POLL_EYE_PLOT 0x6
/* enum: Read Figure Of Merit (eye quality, higher is better). */
-#define MC_CMD_KR_TUNE_IN_READ_FOM 0x7
+#define MC_CMD_KR_TUNE_IN_READ_FOM 0x7
+/* enum: Start/stop link training frames */
+#define MC_CMD_KR_TUNE_IN_LINK_TRAIN_RUN 0x8
+/* enum: Issue KR link training command (control training coefficients) */
+#define MC_CMD_KR_TUNE_IN_LINK_TRAIN_CMD 0x9
/* Align the arguments to 32 bits */
#define MC_CMD_KR_TUNE_IN_KR_TUNE_RSVD_OFST 1
#define MC_CMD_KR_TUNE_IN_KR_TUNE_RSVD_LEN 3
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_PARAM_ID_LBN 0
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_PARAM_ID_WIDTH 8
/* enum: Attenuation (0-15, Huntington) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_ATT 0x0
/* enum: CTLE Boost (0-15, Huntington) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_BOOST 0x1
/* enum: Edge DFE Tap1 (Huntington - 0 - max negative, 64 - zero, 127 - max * positive, Medford - 0-31) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_EDFE_TAP1 0x2
/* enum: Edge DFE Tap2 (Huntington - 0 - max negative, 32 - zero, 63 - max * positive, Medford - 0-31) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_EDFE_TAP2 0x3
/* enum: Edge DFE Tap3 (Huntington - 0 - max negative, 32 - zero, 63 - max * positive, Medford - 0-16) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_EDFE_TAP3 0x4
/* enum: Edge DFE Tap4 (Huntington - 0 - max negative, 32 - zero, 63 - max * positive, Medford - 0-16) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_EDFE_TAP4 0x5
/* enum: Edge DFE Tap5 (Huntington - 0 - max negative, 32 - zero, 63 - max * positive, Medford - 0-16) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_EDFE_TAP5 0x6
/* enum: Variable Gain Amplifier (0-15, Medford) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_VGA 0x8
/* enum: CTLE EQ Capacitor (0-15, Medford) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_CTLE_EQC 0x9
/* enum: CTLE EQ Resistor (0-7, Medford) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_CTLE_EQRES 0xa
/* enum: CTLE gain (0-31, Medford2) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_CTLE_GAIN 0xb
/* enum: CTLE pole (0-31, Medford2) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_CTLE_POLE 0xc
/* enum: CTLE peaking (0-31, Medford2) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_CTLE_PEAK 0xd
/* enum: DFE Tap1 - even path (Medford2 - 6 bit signed (-29 - +29)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP1_EVEN 0xe
/* enum: DFE Tap1 - odd path (Medford2 - 6 bit signed (-29 - +29)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP1_ODD 0xf
/* enum: DFE Tap2 (Medford2 - 6 bit signed (-20 - +20)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP2 0x10
/* enum: DFE Tap3 (Medford2 - 6 bit signed (-20 - +20)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP3 0x11
/* enum: DFE Tap4 (Medford2 - 6 bit signed (-24 - +24)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP4 0x12
/* enum: DFE Tap5 (Medford2 - 6 bit signed (-24 - +24)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP5 0x13
/* enum: DFE Tap6 (Medford2 - 6 bit signed (-24 - +24)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP6 0x14
/* enum: DFE Tap7 (Medford2 - 6 bit signed (-24 - +24)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP7 0x15
/* enum: DFE Tap8 (Medford2 - 6 bit signed (-24 - +24)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP8 0x16
/* enum: DFE Tap9 (Medford2 - 6 bit signed (-24 - +24)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP9 0x17
/* enum: DFE Tap10 (Medford2 - 6 bit signed (-24 - +24)) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_DFE_TAP10 0x18
/* enum: I/Q clk offset (Medford2 - 4 bit signed (-5 - +5))) */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_IQ_OFF 0x1b
/* enum: Negative h1 polarity data sampler offset calibration code, even path */  
*   (Medford2 - 6 bit signed (-29 - +29)))
+ * (Medford2 - 6 bit signed (-29 - +29)))
+ */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_H1N_OFF_EVEN 0x1c
/* enum: Negative h1 polarity data sampler offset calibration code, odd path */  
*   (Medford2 - 6 bit signed (-29 - +29)))
+ * (Medford2 - 6 bit signed (-29 - +29)))
+ */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_H1N_OFF_ODD 0x1d
/* enum: Positive h1 polarity data sampler offset calibration code, even path */  
*   (Medford2 - 6 bit signed (-29 - +29)))
+ * (Medford2 - 6 bit signed (-29 - +29)))
+ */
#define MC_CMD_KR_TUNE_RXEQ_GET_OUT_H1P_OFF_EVEN 0x1e
/* enum: Positive h1 polarity data sampler offset calibration code, odd path */  
*   (Medford2 - 6 bit signed (-29 - +29)))
+ * (Medford2 - 6 bit signed (-29 - +29)))
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_0  0x0 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_1  0x1 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_2  0x2 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_3  0x3 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_ALL  0x4 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_0 0x0 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_1 0x1 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_2 0x2 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_3 0x3 /* enum */
+#define          MC_CMD_KR_TUNE_RXEQ_GET_OUT_LANE_ALL 0x4 /* enum */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_TX_PREDRV_DLY 0x7
/* enum: TX Slew Rate Fine control (Huntington) */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_TX_SR_SET 0x8
/* enum: TX Termination Impedance control (Huntington) */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_TX_RT_SET 0x9
/* enum: TX Amplitude Fine control (Medford) */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_TX_LEV_FINE 0xa
/* enum: Pre-shoot Tap (Medford) */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_TAP_ADV 0xb
/* enum: De-emphasis Tap (Medford) */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_LANE_0 0x0 /* enum */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_LANE_1 0x1 /* enum */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_LANE_2 0x2 /* enum */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_LANE_3 0x3 /* enum */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_LANE_ALL 0x4 /* enum */
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_RESERVED_LBN 11
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_RESERVED_WIDTH 5
#define MC_CMD_KR_TUNE_TXEQ_GET_OUT_PARAM_INITIAL_LBN 16
@@ -10361,7 +12981,27 @@
 /* Align the arguments to 32 bits */
 #define MC_CMD_KR_TUNE_START_EYE_PLOT_IN_KR_TUNE_RSVD_OFST 1
 #define MC_CMD_KR_TUNE_START_EYE_PLOT_IN_KR_TUNE_RSVD_LEN 3
 +/* Port-relative lane to scan eye on */
 +#define MC_CMD_KR_TUNE_START_EYE_PLOT_IN_LANE_OFST 4
 +#define MC_CMD_KR_TUNE_START_EYE_PLOT_IN_LANE_LEN 4
 +
 +/* MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN msgrequest */
 +#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_LEN 12
 +/* Requested operation */
 +#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_KR_TUNE_OP_OFST 0
 +#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_KR_TUNE_OP_LEN 1
 +/* Align the arguments to 32 bits */
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_KR_TUNE_RSVD_OFST 1
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_KR_TUNE_RSVD_LEN 3
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_LANE_OFST 4
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_LANE_LEN 4
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_LANE_NUM_LBN 0
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_LANE_NUM_WIDTH 8
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_LANE_ABS_REL_LBN 31
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_LANE_ABS_REL_WIDTH 1
+\/* Scan duration / cycle count */
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_BER_OFST 8
+\#define MC_CMD_KR_TUNE_START_EYE_PLOT_V2_IN_BER_LEN 4

\/* MC_CMD_KR_TUNE_START_EYE_PLOT_OUT msgresponse */
\#define MC_CMD_KR_TUNE_START_EYE_PLOT_OUT_LEN 0
\@ @ -10393,10 +13033,91 @@
\#define MC_CMD_KR_TUNE_READ_FOM_IN_KR_TUNE_RSVD_OFST 1
\#define MC_CMD_KR_TUNE_READ_FOM_IN_KR_TUNE_RSVD_LEN 3
\#define MC_CMD_KR_TUNE_READ_FOM_IN_LANE_OFST 4
+\#define MC_CMD_KR_TUNE_READ_FOM_IN_LANE_LEN 4
+\#define MC_CMD_KR_TUNE_READ_FOM_IN_LANE_NUM_LBN 0
+\#define MC_CMD_KR_TUNE_READ_FOM_IN_LANE_NUM_WIDTH 8
+\#define MC_CMD_KR_TUNE_READ_FOM_IN_LANE_ABS_REL_LBN 31
+\#define MC_CMD_KR_TUNE_READ_FOM_IN_LANE_ABS_REL_WIDTH 1
+\/* MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN msgrequest */
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_LEN 8
+\/* Requested operation */
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_KR_TUNE_OP_OFST 0
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_KR_TUNE_OP_LEN 1
+\/* Align the arguments to 32 bits */
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_KR_TUNE_RSVD_OFST 1
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_KR_TUNE_RSVD_LEN 3
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_RUN_OFST 4
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_RUN_LEN 4
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_STOP 0x0 /* enum */
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_RUN_IN_START 0x1 /* enum */
+\/* MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN msgrequest */
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_LEN 28
+\/* Requested operation */
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_KR_TUNE_OP_OFST 0
+\#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_KR_TUNE_OP_LEN 1
+\/* Align the arguments to 32 bits */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_KR_TUNE_RSVD_OFST 1
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_KR_TUNE_RSVD_LEN 3
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_LANE_OFST 4
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_LANE_LEN 4
+\*/ Set INITIALIZE state */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_INITIALIZATION_OFST 8
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_INITIALIZATION_LEN 4
+\*/ Set PRESET state */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_PRESET_OFST 12
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_PRESET_LEN 4
+\*/ C(-1) request */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CM1_OFST 16
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CM1_LEN 4
+\#define          MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_REQ_HOLD 0x0 /* enum */
+\#define          MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_REQ_INCREMENT 0x1 /* enum */
+\#define          MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_REQ_DECREMENT 0x2 /* enum */
+\*/ C(0) request */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_C0_OFST 20
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_C0_LEN 4
+\*/ C(+1) request */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CP1_OFST 24
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CP1_LEN 4
+\*/ C(-1) status */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CM1_STATUS_OFST 0
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CM1_STATUS_LEN 4
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_STATUS_NOT_UPDATED 0x0 /* enum */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_STATUS_UPDATED 0x1 /* enum */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_STATUS_MINIMUM 0x2 /* enum */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_STATUS_MAXIMUM 0x3 /* enum */
+\*/ C(0) status */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_C0_STATUS_OFST 4
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_C0_STATUS_LEN 4
+\*/ C(+1) status */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CP1_STATUS_OFST 8
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CP1_STATUS_LEN 4
+\*/ C(-1) value */
+\#define     MC_CMD_KR_TUNE_LINK_TRAIN_CMD_IN_CM1_VALUE_OFST 12

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```c
#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_OUT_CM1_VALUE_LEN 4
/** C(0) value */
#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_OUT_C0_VALUE_OFST 16
#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_OUT_C0_VALUE_LEN 4
/** C(+1) status */
#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_OUT_CP1_VALUE_OFST 20
#define MC_CMD_KR_TUNE_LINK_TRAIN_CMD_OUT_CP1_VALUE_LEN 4

/***********************************/
@@ -10415,22 +13136,22 @@
#define MC_CMD_PCIE_TUNE_IN_PCIE_TUNE_OP_OFST 0
#define MC_CMD_PCIE_TUNE_IN_PCIE_TUNE_OP_LEN 1
/* enum: Get current RXEQ settings */
-#define MC_CMD_PCIE_TUNE_IN_RXEQ_GET 0x0
+#define MC_CMD_PCIE_TUNE_IN_RXEQ_GET 0x0
/* enum: Override RXEQ settings */
-#define MC_CMD_PCIE_TUNE_IN_RXEQ_SET 0x1
+#define MC_CMD_PCIE_TUNE_IN_RXEQ_SET 0x1
/* enum: Get current TX Driver settings */
-#define MC_CMD_PCIE_TUNE_IN_TXEQ_GET 0x2
+#define MC_CMD_PCIE_TUNE_IN_TXEQ_GET 0x2
/* enum: Override TX Driver settings */
-#define MC_CMD_PCIE_TUNE_IN_TXEQ_SET 0x3
+#define MC_CMD_PCIE_TUNE_IN_TXEQ_SET 0x3
/* enum: Start PCIe Serdes Eye diagram plot on a given lane. */
-#define MC_CMD_PCIE_TUNE_IN_START_EYE_PLOT 0x5
+#define MC_CMD_PCIE_TUNE_IN_START_EYE_PLOT 0x5
/* enum: Poll PCIe Serdes Eye diagram plot. Returns one row of BER data. The
 * caller should call this command repeatedly after starting eye plot, until no
 * more data is returned.
 */
-#define MC_CMD_PCIE_TUNE_IN_POLL_EYE_PLOT 0x6
+#define MC_CMD_PCIE_TUNE_IN_POLL_EYE_PLOT 0x6
/* enum: Enable the SERDES BIST and set it to generate a 200MHz square wave */
-#define MC_CMD_PCIE_TUNE_IN_BIST_SQUARE_WAVE 0x7
+#define MC_CMD_PCIE_TUNE_IN_BIST_SQUARE_WAVE 0x7
/* Align the arguments to 32 bits */
#define MC_CMD_PCIE_TUNE_IN_PCIE_TUNE_RSVD_OFST 1
#define MC_CMD_PCIE_TUNE_IN_PCIE_TUNE_RSVD_LEN 3
@@ -10464,46 +13185,46 @@
#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_PARAM_ID_LBN 0
#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_PARAM_ID_WIDTH 8
/* enum: Attenuation (0-15) */
-#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_ATT 0x0
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_ATT 0x0
/* enum: CTLE Boost (0-15) */
-#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_BOOST 0x1
+*/
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+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_BOOST 0x1
/* enum: DFE Tap1 (0 - max negative, 64 - zero, 127 - max positive) */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP1 0x2
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP1 0x2
/* enum: DFE Tap2 (0 - max negative, 32 - zero, 63 - max positive) */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP2 0x3
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP2 0x3
/* enum: DFE Tap3 (0 - max negative, 32 - zero, 63 - max positive) */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP3 0x4
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP3 0x4
/* enum: DFE Tap4 (0 - max negative, 32 - zero, 63 - max positive) */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP4 0x5
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP4 0x5
/* enum: DFE Tap5 (0 - max negative, 32 - zero, 63 - max positive) */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP5 0x6
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_TAP5 0x6
/* enum: DFE DLev */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_DLEV 0x7
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_DFE_DLEV 0x7
/* enum: Figure of Merit */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_FOM 0x8
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_FOM 0x8
/* enum: CTLE EQ Capacitor (HF Gain) */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_CTLE_EQC 0x9
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_CTLE_EQC 0x9
/* enum: CTLE EQ Resistor (DC Gain) */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_CTLE_EQRES 0xa
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_CTLE_EQRES 0xa
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_PARAM_LANE_LBN 8
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_PARAM_LANE_WIDTH 5
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_0 0x0 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_1 0x1 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_2 0x2 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_3 0x3 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_4 0x4 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_5 0x5 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_6 0x6 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_7 0x7 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_8 0x8 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_9 0x9 /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_10 0xa /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_11 0xb /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_12 0xc /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_13 0xd /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_14 0xe /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_15 0xf /* enum */
#define        MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_ALL 0x10 /* enum */
+#define          MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_0 0x0 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_1 0x1 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_2 0x2 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_3 0x3 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_4 0x4 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_5 0x5 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_6 0x6 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_7 0x7 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_8 0x8 /* enum */
+#define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_9 0x9 /* enum */
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_10 0xa /* enum */
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_11 0xb /* enum */
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_12 0xc /* enum */
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_13 0xd /* enum */
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_14 0xe /* enum */
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_LANE_ALL 0x10 /* enum */
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_PARAM_AUTOCAL_LBN 13
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_PARAM_AUTOCAL_WIDTH 1
+define MC_CMD_PCIE_TUNE_RXEQ_GET_OUT_RESERVED_LBN 14
@ @ -10567,15 +13288,15 @ @
#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_PARAM_ID_LBN 0
#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_PARAM_ID_WIDTH 8
/* enum: TxMargin (PIPE) */
-#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_TXMARGIN  0x0
+#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_TXMARGIN 0x0
/* enum: TxSwing (PIPE) */
-#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_TXSWING  0x1
+#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_TXSWING 0x1
/* enum: De-emphasis coefficient C(-1) (PIPE) */
-#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_CP1   0x4
+#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_CP1   0x4
/* enum: De-emphasis coefficient C(0) (PIPE) */
-#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_C0    0x3
+#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_C0    0x3
/* enum: De-emphasis coefficient C(+1) (PIPE) */
-#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_CM1   0x2
+#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_CM1   0x2
#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_PARAM_LANE_LBN 8
#define MC_CMD_PCIE_TUNE_TXEQ_GET_OUT_PARAM_LANE_WIDTH 4
/* Enum values, see field(s): */
@ @ -10594,6 +13315,7 @ @
#define MC_CMD_PCIE_TUNE_START_EYE_PLOT_IN_PCIE_TUNE_RSVD_OFST 1
#define MC_CMD_PCIE_TUNE_START_EYE_PLOT_IN_PCIE_TUNE_RSVD_LEN 3
#define MC_CMD_PCIE_TUNE_START_EYE_PLOT_IN_LANE_OFST 4
+#define MC_CMD_PCIE_TUNE_START_EYE_PLOT_IN_LANE_LEN 4

/* MC_CMD_PCIE_TUNE_START_EYE_PLOT_OUT msgresponse */
#define MC_CMD_PCIE_TUNE_START_EYE_PLOT_OUT_LEN 0
#define MC_CMD_LICENSING_IN_LEN 4
/* identifies the type of operation requested */
#define MC_CMD_LICENSING_IN_OP_OFST 0
#define MC_CMD_LICENSING_IN_OP_LEN 4
/* enum: re-read and apply licenses after a license key partition update; note
* that this operation returns a zero-length response */
-#define MC_CMD_LICENSING_IN_OP_UPDATE_LICENSE 0x0
+#define MC_CMD_LICENSING_IN_OP_UPDATE_LICENSE 0x0
-#define MC_CMD_LICENSING_IN_OP_GET_KEY_STATS 0x1
+#define MC_CMD_LICENSING_IN_OP_GET_KEY_STATS 0x1
/* MC_CMD_LICENSING_OUT msgresponse */
#define MC_CMD_LICENSING_OUT_LEN 28
/* count of application keys which are valid */
#define MC_CMD_LICENSING_OUT_VALID_APP_KEYS_OFST 0
#define MC_CMD_LICENSING_OUT_VALID_APP_KEYS_LEN 4
/* sum of UNVERIFIABLE_APP_KEYS + WRONG_NODE_APP_KEYS (for compatibility with
* MC_CMD_FC_OP_LICENSE) */
/* count of application keys which are invalid due to being blacklisted */
#define MC_CMD_LICENSING_OUT_BLACKLISTED_APP_KEYS_OFST 8
#define MC_CMD_LICENSING_OUT_BLACKLISTED_APP_KEYS_LEN 4
/* count of application keys which are invalid due to being unverifiable */
#define MC_CMD_LICENSING_OUT_UNVERIFIABLE_APP_KEYS_OFST 12
#define MC_CMD_LICENSING_OUT_UNVERIFIABLE_APP_KEYS_LEN 4
/* count of application keys which are invalid due to being for the wrong node */
#define MC_CMD_LICENSING_OUT_WRONG_NODE_APP_KEYS_OFST 16
#define MC_CMD_LICENSING_OUT_WRONG_NODE_APP_KEYS_LEN 4
/* licensing state (for diagnostics; the exact meaning of the bits in this
* field are private to the firmware) */
#define MC_CMD_LICENSING_OUT_LICENSING_STATE_OFST 20
#define MC_CMD_LICENSING_OUT_LICENSING_STATE_LEN 4
/* licensing subsystem self-test report (for manftest) */
#define MC_CMD_LICENSING_OUT_LICENSING_SELF_TEST_OFST 24
#define MC_CMD_LICENSING_OUT_LICENSING_SELF_TEST_LEN 4
/* enum: licensing subsystem self-test failed */
-#define MC_CMD_LICENSING_OUT_SELF_TEST_FAIL 0x0
+#define MC_CMD_LICENSING_OUT_SELF_TEST_FAIL 0x0
/* enum: licensing subsystem self-test passed */
-#define MC_CMD_LICENSING_OUT_SELF_TEST_PASS 0x1
+#define MC_CMD_LICENSING_OUT_SELF_TEST_PASS 0x1
/***********************************/
@@ -10683,37 +13413,44 @@
#define    MC_CMD_LICENSING_V3_IN_LEN 4
/* identifies the type of operation requested */
#define       MC_CMD_LICENSING_V3_IN_OP_OFST 0
+#define       MC_CMD_LICENSING_V3_IN_OP_LEN 4
/* enum: re-read and apply licenses after a license key partition update; note
 * that this operation returns a zero-length response
 */
-#define          MC_CMD_LICENSING_V3_IN_OP_UPDATE_LICENSE 0x0
+#define          MC_CMD_LICENSING_V3_IN_OP_UPDATE_LICENSE 0x0
/* enum: report counts of installed licenses Returns EAGAIN if license
 * processing (updating) has been started but not yet completed.
 */
-#define          MC_CMD_LICENSING_V3_IN_OP_REPORT_LICENSE 0x1
+#define          MC_CMD_LICENSING_V3_IN_OP_REPORT_LICENSE 0x1

/* MC_CMD_LICENSING_V3_OUT msgresponse */
#define    MC_CMD_LICENSING_V3_OUT_LEN 88
/* count of keys which are valid */
#define       MC_CMD_LICENSING_V3_OUT_VALID_KEYS_OFST 0
+#define       MC_CMD_LICENSING_V3_OUT_VALID_KEYS_LEN 4
/* sum of UNVERIFIABLE_KEYS + WRONG_NODE_KEYS (for compatibility with
 * MC_CMD_FC_OP_LICENSE)
 */
+#define       MC_CMD_LICENSING_V3_OUTVALID_KEYS_LEN 4
+#define       MC_CMD_LICENSING_V3_OUT_INVALID_KEYS_LEN 4
+#define       MC_CMD_LICENSING_V3_OUT_UNVERIFIABLE_KEYS_OFST 8
+#define       MC_CMD_LICENSING_V3_OUT_UNVERIFIABLE_KEYS_LEN 4
/* count of keys which are invalid due to being unverifiable */
+#define       MC_CMD_LICENSING_V3_OUT_INVALID_KEYS_LEN 4
+#define       MC_CMD_LICENSING_V3_OUT WRONG_NODE_KEYS_OFST 12
+#define       MC_CMD_LICENSING_V3_OUT_WRONG_NODE_KEYS_LEN 4
/* licensing state (for diagnostics; the exact meaning of the bits in this
 * field are private to the firmware)
 */
+#define       MC_CMD_LICENSING_V3_OUT_LICENSING_STATE_LEN 4
+#define       MC_CMD_LICENSING_V3_OUT_LICENSING_STATE_OFST 16
/* licensing subsystem self-test report (for manftest) */
#define    MC_CMD_LICENSING_V3_OUT_LICENSING_SELF_TEST_LEN 4
/* enum: licensing subsystem self-test failed */
-#define          MC_CMD_LICENSING_V3_OUT_SELF_TEST_FAIL 0x0
+#define          MC_CMD_LICENSING_V3_OUT_SELF_TEST_FAIL 0x0
/* enum: licensing subsystem self-test passed */
-#define          MC_CMD_LICENSING_V3_OUT_SELF_TEST_PASS 0x1
+#define          MC_CMD_LICENSING_V3_OUT_SELF_TEST_PASS 0x1

#define MC_CMD_LICENSING_V3_OUT_SELF_TEST_PASS 0x1
/* bitmask of licensed applications */
#define MC_CMD_LICENSING_V3_OUT_LICENSED_APPS_OFST 24
#define MC_CMD_LICENSING_V3_OUT_LICENSED_APPS_LEN 8
@@ -10750,8 +13487,10 @@
#define    MC_CMD_LICENSING_GET_ID_V3_OUT_LEN(num) (8+1*(num))
/* type of license (eg 3) */
#define MC_CMD_LICENSING_GET_ID_V3_OUT_LICENSE_TYPE_OFST 0
+#define MC_CMD_LICENSING_GET_ID_V3_OUT_LICENSE_TYPE_LEN 4
/* length of the license ID (in bytes) */
#define MC_CMD_LICENSING_GET_ID_V3_OUT_LICENSE_ID_LENGTH_OFST 4
+#define MC_CMD_LICENSING_GET_ID_V3_OUT_LICENSE_ID_LENGTH_LEN 4
/* the unique license ID of the adapter */
#define MC_CMD_LICENSING_GET_ID_V3_OUT_LICENSE_ID_OFST 8
#define MC_CMD_LICENSING_GET_ID_V3_OUT_LICENSE_ID_LEN 1
@@ -10789,15 +13528,17 @@
#define    MC_CMD_GET_LICENSED_APP_STATE_IN_LEN 4
/* application ID to query (LICENSED_APP_ID_xxx) */
#define       MC_CMD_GET_LICENSED_APP_STATE_IN_APP_ID_OFST 0
+#define       MC_CMD_GET_LICENSED_APP_STATE_IN_APP_ID_LEN 4
/* MC_CMD_GET_LICENSED_APP_STATE_OUT msgresponse */
#define    MC_CMD_GET_LICENSED_APP_STATE_OUT_LEN 4
/* state of this application */
#define       MC_CMD_GET_LICENSED_APP_STATE_OUT_STATE_OFST 0
+#define       MC_CMD_GET_LICENSED_APP_STATE_OUT_STATE_LEN 4
/* enum: no (or invalid) license is present for the application */
-#define          MC_CMD_GET_LICENSED_APP_STATE_OUT_NOT_LICENSED  0x0
+#define          MC_CMD_GET_LICENSED_APP_STATE_OUT_NOT_LICENSED 0x0
/* enum: a valid license is present for the application */
-#define          MC_CMD_GET_LICENSED_APP_STATE_OUT_LICENSED  0x1
+#define          MC_CMD_GET_LICENSED_APP_STATE_OUT_LICENSED 0x1

/*****************************/
@@ -10824,10 +13565,11 @@
#define    MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_LEN 4
/* state of this application */
#define       MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_STATE_OFST 0
+#define       MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_STATE_LEN 4
/* enum: no (or invalid) license is present for the application */
-#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_NOT_LICENSED  0x0
+#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_NOT_LICENSED 0x0
/* enum: a valid license is present for the application */
-#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_LICENSED  0x1
+#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_LICENSED 0x1

/*****************************/
@@ -10842,10 +13565,11 @@
#define    MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_LEN 4
/* state of this application */
#define       MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_STATE_OFST 0
+#define       MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_STATE_LEN 4
/* enum: no (or invalid) license is present for the application */
-#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_NOT_LICENSED  0x0
+#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_NOT_LICENSED 0x0
/* enum: a valid license is present for the application */
-#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_LICENSED  0x1
+#define MC_CMD_GET_LICENSED_V3_APP_STATE_OUT_LICENSED 0x1

/*****************************/
#define MC_CMD_LICENSED_APP_OP_IN_LEN(num) (8+4*(num))
/* application ID */
#define MC_CMD_LICENSED_APP_OP_IN_APP_ID_OFST 0
#define MC_CMD_LICENSED_APP_OP_IN_APP_ID_LEN 4
/* the type of operation requested */
#define MC_CMD_LICENSED_APP_OP_IN_OP_OFST 4
#define MC_CMD_LICENSED_APP_OP_IN_OP_LEN 4
/* enum: validate application */
#define MC_CMD_LICENSED_APP_OP_IN_VALIDATE_APP_ID_LEN 4
#define MC_CMD_LICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMD_LICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMD_LICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMD_LICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMD_LICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMDLICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMDLICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMDLICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
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#define MC_CMDLICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
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#define MC_CMDLICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMDLICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMDLICENSED_APP_OP_VALIDATE_APP_ID_LEN 4
#define MC_CMDLICENSED_APP_O
/* MC_CMD_LICENSED_APP_OP_MASK_OUT msgresponse */
#define MC_CMD_LICENSED_APP_OP_MASK_OUT_LEN 0
@@ -10959,12 +13709,14 @@
#define MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_RESPONSE_LEN 96
/* application expiry time */
#define       MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_TIME_OFST 96
+#define       MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_TIME_LEN 4
/* application expiry units */
#define       MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_UNITS_OFST 100
+#define       MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_UNITS_LEN 4
/* enum: expiry units are accounting units */
-#define          MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_UNIT_ACC 0x0
+#define          MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_UNIT_ACC 0x0
/* enum: expiry units are calendar days */
-#define          MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_UNIT_DAYS 0x1
+#define          MC_CMD_LICENSED_V3_VALIDATE_APP_OUT_EXPIRY_UNIT_DAYS 0x1
/* base MAC address of the NIC stored in NVRAM (note that this is a constant
* value for a given NIC regardless which function is calling, effectively this
* is PF0 base MAC address)
@@ -10984,7 +13736,7 @@
*/
#define MC_CMD_LICENSED_V3_MASK_FEATURES 0xd5
-#define MC_CMD_0xd5_PRIVILEGE_CTG SRIOV_CTG_GENERAL
+#define MC_CMD_0xd5_PRIVILEGE_CTG SRIOV_CTG_ADMIN
/* MC_CMD_LICENSED_V3_MASK_FEATURES_IN msgrequest */
#define    MC_CMD_LICENSED_V3_MASK_FEATURES_IN_LEN 12
@@ -10995,10 +13747,11 @@
#define       MC_CMD_LICENSED_V3_MASK_FEATURES_IN_FLAG_OFST 8
/* enum: turn the features off */
-#define          MC_CMD_LICENSED_V3_MASK_FEATURES_IN_OFF 0x0
+#define          MC_CMD_LICENSED_V3_MASK_FEATURES_IN_OFF 0x0
/* enum: turn the features back on */
-#define          MC_CMD_LICENSED_V3_MASK_FEATURES_IN_ON 0x1
+#define          MC_CMD_LICENSED_V3_MASK_FEATURES_IN_ON 0x1
/* MC_CMD_LICENSED_V3_MASK_FEATURES_OUT msgresponse */
#define    MC_CMD_LICENSED_V3_MASK_FEATURES_OUT_LEN 0
@@ -11014,29 +13767,31 @@
*/
#define MC_CMD_LICENSING_V3_TEMPORARY 0xd6
-#define MC_CMD_0xd6_PRIVILEGE_CTG SRIOV_CTG_GENERAL
+#define MC_CMD_0xd6_PRIVILEGE_CTG SRIOV_CTG_ADMIN

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# define MC_CMD_0xd6_PRIVILEGE_CTG SRIOV_CTG_ADMIN

/* MC_CMD_LICENSING_V3_TEMPORARY_IN msgrequest */
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_LEN 4
/* operation code */
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_OP_OFST 0
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_OP_LEN 4
/* enum: install a new license, overwriting any existing temporary license.
* This is an asynchronous operation owing to the time taken to validate an
* ECDSA license */
#define MC_CMD_LICENSING_V3_TEMPORARY_SET 0x0
#define MC_CMD_LICENSING_V3_TEMPORARY_SET 0x0
/* enum: clear the license immediately rather than waiting for the next power
cycle */
#define MC_CMD_LICENSING_V3_TEMPORARY_CLEAR 0x1
#define MC_CMD_LICENSING_V3_TEMPORARY_CLEAR 0x1
/* enum: get the status of the asynchronous MC_CMD_LICENSING_V3_TEMPORARY_SET
* operation */
#define MC_CMD_LICENSING_V3_TEMPORARY_STATUS 0x2
#define MC_CMD_LICENSING_V3_TEMPORARY_STATUS 0x2

/* MC_CMD_LICENSING_V3_TEMPORARY_IN_SET msgrequest */
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_SET_LEN 164
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_SET_OP_OFST 0
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_SET_OP_LEN 4
/* ECDSA license and signature */
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_SET_LICENSE_OFST 4
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_SET_LICENSE_LEN 160
@@ -11044,23 +13799,26 @@
/* MC_CMD_LICENSING_V3_TEMPORARY_IN_CLEAR msgrequest */
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_CLEAR_LEN 4
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_CLEAR_OP_OFST 0
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_CLEAR_OP_LEN 4
/* MC_CMD_LICENSING_V3_TEMPORARY_IN_STATUS msgrequest */
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_STATUS_LEN 4
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_STATUS_OP_OFST 0
#define MC_CMD_LICENSING_V3_TEMPORARY_IN_STATUS_OP_LEN 4

/* MC_CMD_LICENSING_V3_TEMPORARY_OUT_STATUS msgresponse */
#define MC_CMD_LICENSING_V3_TEMPORARY_OUT_STATUS_LEN 12
/* status code */
#define MC_CMD_LICENSING_V3_TEMPORARY_OUT_STATUS_STATUS_OFST 0
#define MC_CMD_LICENSING_V3_TEMPORARY_OUT_STATUS_STATUS_LEN 4
/* enum: finished validating and installing license */
#define  MC_CMD_LICENSING_V3_TEMPORARY_STATUS_OK  0x0
/* enum: license validation and installation in progress */
+#define  MC_CMD_LICENSING_V3_TEMPORARY_STATUS_IN_PROGRESS 0x1
/* enum: licensing error. More specific error messages are not provided to
 * avoid exposing details of the licensing system to the client */
-#define  MC_CMD_LICENSING_V3_TEMPORARY_STATUS_ERROR  0x2
/* bitmask of licensed features */
#define       MC_CMD_LICENSING_V3_TEMPORARY_OUT_STATUS_LICENSED_FEATURES_OFST 4
#define       MC_CMD_LICENSING_V3_TEMPORARY_OUT_STATUS_LICENSED_FEATURES_LEN 8
@@ -11084,23 +13842,27 @@
#define    MC_CMD_SET_PORT_SNIFF_CONFIG_IN_LEN 16
/* configuration flags */
#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_FLAGS_OFST 0
+#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_FLAGS_LEN 4
#define        MC_CMD_SET_PORT_SNIFF_CONFIG_IN_ENABLE_LBN 0
#define        MC_CMD_SET_PORT_SNIFF_CONFIG_IN_ENABLE_WIDTH 1
#define        MC_CMD_SET_PORT_SNIFF_CONFIG_IN_PROMISCUOUS_LBN 1
#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_PROMISCUOUS_WIDTH 1
/* receive queue handle (for RSS mode, this is the base queue) */
#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_QUEUE_OFST 4
+#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_QUEUE_LEN 4
/* receive mode */
#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_MODE_OFST 8
+#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_MODE_LEN 4
/* enum: receive to just the specified queue */
-#define  MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_MODE_SIMPLE    0x0
+#define  MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_MODE_SIMPLE    0x0
/* enum: receive to multiple queues using RSS context */
-#define  MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_MODE_RSS    0x1
+#define  MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_MODE_RSS    0x1
/* RSS context (for RX_MODE_RSS) as returned by MC_CMD_RSS_CONTEXT_ALLOC. Note
 * that these handles should be considered opaque to the host, although a value
 * of 0xFFFFFFFF is guaranteed never to be a valid handle. */
#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_CONTEXT_OFST 12
+#define       MC_CMD_SET_PORT_SNIFF_CONFIG_IN_RX_CONTEXT_LEN 4
/* MC_CMD_SET_PORT_SNIFF_CONFIG_OUT msgresponse */
#define    MC_CMD_SET_PORT_SNIFF_CONFIG_OUT_LEN 0
@@ -11114,7 +13876,7 @@
#define MC_CMD_GET_PORT_SNIFF_CONFIG 0xf8
#define MC_CMD_0xf8_PRIVILEGE_CTG SRIOV_CTG_ADMIN
#define MC_CMD_0xf8_PRIVILEGE_CTG SRIOV_CTG_GENERAL

/* MC_CMD_GET_PORT_SNIFF_CONFIG_IN msgrequest */
#define MC_CMD_GET_PORT_SNIFF_CONFIG_IN_LEN 0
@@ -11123,20 +13885,24 @@
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_LEN 16
/* configuration flags */
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_FLAGS_OFST 0
+Injected
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_FLAGS_LEN 4
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_ENABLE_LBN 0
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_ENABLE_WIDTH 1
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_PROMISCUOUS_LBN 1
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_PROMISCUOUS_WIDTH 1
/* receiving queue handle (for RSS mode, this is the base queue) */
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_QUEUE_OFST 4
+Injected
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_QUEUE_LEN 4
/* receive mode */
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_MODE_OFST 8
+Injected
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_MODE_LEN 4
/* enum: receiving to just the specified queue */
-#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_MODE_SIMPLE 0x0
+#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_MODE_SIMPLE 0x0
/* enum: receiving to multiple queues using RSS context */
-#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_MODE_RSS 0x1
+#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_MODE_RSS 0x1
/* RSS context (for RX_MODE_RSS) */
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_CONTEXT_OFST 12
+Injected
#define MC_CMD_GET_PORT_SNIFF_CONFIG_OUT_RX_CONTEXT_LEN 4

/*@ -11153,19 +13919,21 @@
#define MC_CMD_SET_PARSER_DISP_CONFIG_IN_LEN(num) (8+4*(num))
/* the type of configuration setting to change */
#define MC_CMD_SET_PARSER_DISP_CONFIG_IN_TYPE_OFST 0
+#define MC_CMD_SET_PARSER_DISP_CONFIG_IN_TYPE_LEN 4
/* enum: Per-TXQ enable for multicast UDP destination lookup for possible
 * internal loopback. (ENTITY is a queue handle, VALUE is a single boolean.)
 */
-#define MC_CMD_SET_PARSER_DISP_CONFIG_IN_TXQ_MCAST_UDP_DST_LOOKUP_EN 0x0
+#define MC_CMD_SET_PARSER_DISP_CONFIG_IN_TXQ_MCAST_UDP_DST_LOOKUP_EN 0x0
/* enum: Per-v-adaptor enable for suppression of self-transmissions on the
 * internal loopback path. (ENTITY is an EVB_PORT_ID, VALUE is a single
 * boolean.)
 */
-#define MC_CMD_SET_PARSER_DISP_CONFIG_IN_VADAPTOR_SUPPRESS_SELF_TX 0x1
+#define MC_CMD_SET_PARSER_DISP_CONFIG_IN_VADAPTOR_SUPPRESS_SELF_TX 0x1
/* handle for the entity to update: queue handle, EVB port ID, etc. depending
/* on the type of configuration setting being changed */

#define       MC_CMD_SET_PARSER_DISP_CONFIG_INENTITYOFST 4
+#define       MC_CMD_SET_PARSER_DISP_CONFIG_INENTITYLEN 4
/* new value: the details depend on the type of configuration setting being changed */

@@ -11190,12 +13958,14 @@
#define    MC_CMD_GET_PARSER_DISP_CONFIG_INLEN 8
/* the type of configuration setting to read */
#define       MC_CMD_GET_PARSER_DISP_CONFIG_INENTITYOFST 4
+#define       MC_CMD_GET_PARSER_DISP_CONFIG_INENTITYLEN 4
/*            Enum values, see field(s): */
/*               MC_CMD_SET_PARSER_DISP_CONFIG/MC_CMD_SET_PARSER_DISP_CONFIG_IN/TYP */
/* handle for the entity to query: queue handle, EVB port ID, etc. depending on */
/* the type of configuration setting read */

#define       MC_CMD_GET_PARSER_DISP_CONFIG_INENTITYOFST 4
+#define       MC_CMD_GET_PARSER_DISP_CONFIG_INENTITYLEN 4
/* MC_CMD_GET_PARSER_DISP_CONFIG_OUT msgresponse */
#define    MC_CMD_GET_PARSER_DISP_CONFIG_OUTLENMIN 4
@@ -11228,21 +13998,25 @@
#define    MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INLEN 16
/* configuration flags */
#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INFLAGSOFST 0
+#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INFLAGSLEN 4
#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INENABLELBN 0
#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INENABLEWIDTH 1
/* receive queue handle (for RSS mode, this is the base queue) */
#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXQUEUEOFST 4
+#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXQUEUELLEN 4
/* receive mode */
#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXMODEOFST 8
+#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXMODELEN 4
/* enum: receive to just the specified queue */
-#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXMODESIMPLE 0x0
+#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXMODESIMPLE 0x0
/* enum: receive to multiple queues using RSS context */
-#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXMODERSS 0x1
+#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXMODERSS 0x1
/* RSS context (for RX_MODE_RSS) as returned by MC_CMD_RSS_CONTEXT_ALLOC. Note */
/* that these handles should be considered opaque to the host, although a value */
/* of 0xFFFFFFFF is guaranteed never to be a valid handle. */

#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXCONTEXTOFST 12
+#define       MC_CMD_SET_TX_PORT_SNIFF_CONFIG_INRXCONTEXTLEN 4
/* MC_CMD_SET_TX_PORT_SNIFF_CONFIG_OUT msgresponse */
#define MC_CMD_SET_TX_PORT_SNIFF_CONFIG_OUT_LEN 0
@@ -11256,7 +14030,7 @@
 */
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG 0xfc

-#define MC_CMD_0xfc_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0xfc_PRIVILEGE_CTG SRIOV_CTG_GENERAL

/* MC_CMD_GET_TX_PORT_SNIFF_CONFIG_IN msgrequest */
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_IN_LEN 0
@@ -11265,18 +14039,22 @@
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_LEN 16
/* configuration flags */
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_FLAGS_OFST 0
+#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_FLAGS_LEN 4
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_ENABLE_LBN 0
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_ENABLE_WIDTH 1
/* receiving queue handle (for RSS mode, this is the base queue) */
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_QUEUE_OFST 4
+#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_QUEUE_LEN 4
/* receive mode */
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_MODE_OFST 8
+#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_MODE_LEN 4
/* enum: receiving to just the specified queue */
-#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_MODE_SIMPLE 0x0
+#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_MODE_SIMPLE 0x0
/* enum: receiving to multiple queues using RSS context */
-#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_MODE_RSS 0x1
+#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_MODE_RSS 0x1
/* RSS context (for RX_MODE_RSS) */
#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_CONTEXT_OFST 12
+#define MC_CMD_GET_TX_PORT_SNIFF_CONFIG_OUT_RX_CONTEXT_LEN 4

/***********************************/
@@ -11291,16 +14069,22 @@
#define MC_CMD_RMON_STATS_RX_ERRORS_IN_LEN 8
/* The rx queue to get stats for. */
#define MC_CMD_RMON_STATS_RX_ERRORS_IN_RX_QUEUE_OFST 0
+#define MC_CMD_RMON_STATS_RX_ERRORS_IN_RX_QUEUE_LEN 4
#define MC_CMD_RMON_STATS_RX_ERRORS_IN_FLAGS_OFST 4
+#define MC_CMD_RMON_STATS_RX_ERRORS_IN_FLAGS_LEN 4
#define MC_CMD_RMON_STATS_RX_ERRORS_IN_RST_LBN 0
#define MC_CMD_RMON_STATS_RX_ERRORS_IN_RST_WIDTH 1

/* MC_CMD_RMON_STATS_RX_ERRORS_OUT msgresponse */
#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_LEN 16

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#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_CRC_ERRORS_OFST 0
+#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_CRC_ERRORS_LEN 4
#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_TRUNC_ERRORS_OFST 4
+#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_TRUNC_ERRORS_LEN 4
#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_RX_NO_DESC_DROPS_OFST 8
+#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_RX_NO_DESC_DROPS_LEN 4
#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_RX_ABORT_OFST 12
+#define MC_CMD_RMON_STATS_RX_ERRORS_OUT_RX_ABORT_LEN 4

/**********************************
@@ -11309,6 +14093,8 @@
*/
#define MC_CMD_GET_PCIERESOURCEINFO 0xfd
+#define MC_CMD_0xfd_PRIVILEGE_CTG SRIOV_CTG_GENERAL
+ /* MC_CMD_GET_PCIE_RESOURCE_INFO_IN msgrequest */
#define MC_CMD_GET_PCIERESOURCEINFO_IN LEN 0
@@ -11316,20 +14102,27 @@
#define MC_CMD_GET_PCIERESOURCEINFO_OUT LEN 28
 /* The maximum number of PFs the device can expose */
#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_PFS_OFST 0
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_PFS_LEN 4
 /* The maximum number of VFs the device can expose in total */
#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_VFS_OFST 4
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_VFS_LEN 4
 /* The maximum number of MSI-X vectors the device can provide in total */
#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_VECTORS_OFST 8
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_VECTORS_LEN 4
 /* the number of MSI-X vectors the device will allocate by default to each PF */
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_DEFAULT_PF_VECTORS_OFST 12
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_DEFAULT_PF_VECTORS_LEN 4
 /* the number of MSI-X vectors the device will allocate by default to each VF */
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_DEFAULT_VF_VECTORS_OFST 16
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_DEFAULT_VF_VECTORS_LEN 4
 /* the maximum number of MSI-X vectors the device can allocate to any one PF */
#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_PF_VECTORS_OFST 20
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_PF_VECTORS_LEN 4
 /* the maximum number of MSI-X vectors the device can allocate to any one VF */
#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_VF_VECTORS_OFST 24
+#define MC_CMD_GET_PCIERESOURCEINFO_OUT_MAX_VF_VECTORS_LEN 4

/*****************************************/
#define MC_CMD_GET_PORT_MODES_OUT_LEN 12
/* Bitmask of port modes available on the board (indexed by TLV_PORT_MODE_*) */
#define MC_CMD_GET_PORT_MODES_OUT_MODES_OFST 0
/* Default (canonical) board mode */
#define MC_CMD_GET_PORT_MODES_OUT_DEFAULT_MODE_OFST 4
/* Current board mode */
#define MC_CMD_GET_PORT_MODES_OUT_CURRENT_MODE_OFST 8

/***********************************/
#define MC_CMD_READ_ATB 0x100
-#define MC_CMD_0x100_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x100_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_READ_ATB_IN msgrequest */
#define MC_CMD_READ_ATB_IN_LEN 16
#define MC_CMD_READ_ATB_IN_SIGNAL_BUS_OFST 0
#define MC_CMD_READ_ATB_IN_BUS_CCOM 0x0 /* enum */
#define MC_CMD_READ_ATB_IN_BUS_CKR 0x1 /* enum */
#define MC_CMD_READ_ATB_IN_BUS_CPCIE 0x8 /* enum */
+#define MC_CMD_READ_ATB_IN_SIGNAL_BUS_LEN 4
+#define MC_CMD_READ_ATB_IN_BUS_CCOM 0x0 /* enum */
+#define MC_CMD_READ_ATB_IN_BUS_CKR 0x1 /* enum */
+#define MC_CMD_READ_ATB_IN_BUS_CPCIE 0x8 /* enum */
+#define MC_CMD_READ_ATB_IN_SIGNAL_EN_BITNO_OFST 4
+#define MC_CMD_READ_ATB_IN_SIGNAL_EN_BITNO_LEN 4
+#define MC_CMD_READ_ATB_IN_SIGNAL_SEL_OFST 8
+#define MC_CMD_READ_ATB_IN_SIGNAL_SEL_LEN 4
+#define MC_CMD_READ_ATB_IN_SETTLING_TIME_US_OFST 12
+#define MC_CMD_READ_ATB_IN_SETTLING_TIME_US_LEN 4

/***********************************/
/* Each workaround is represented by a single bit according to the enums below.
*/
```c
#define MC_CMD_GET_WORKAROUNDS_OUT_IMPLEMENTED_OFST 0
#define MC_CMD_GET_WORKAROUNDS_OUT_IMPLEMENTED_LEN 4
#define MC_CMD_GET_WORKAROUNDS_OUT_ENABLED_OFST 4
#define MC_CMD_GET_WORKAROUNDS_OUT_ENABLED_LEN 4
/* enum: Bug 17230 work around. */
#define MC_CMD_GET_WORKAROUNDS_OUT_BUG17230 0x2
/* enum: Bug 35388 work around (unsafe EVQ writes). */
@@ -11425,50 +14228,57 @@
    * 1,3 = 0x00030001
 */
#define MC_CMD_PRIVILEGE_MASK_IN_FUNCTION_OFST 0
#define MC_CMD_PRIVILEGE_MASK_IN_FUNCTION_LEN 4
#define MC_CMD_PRIVILEGE_MASK_IN_FUNCTION_PF_LBN 0
#define MC_CMD_PRIVILEGE_MASK_IN_FUNCTION_PF_WIDTH 16
#define MC_CMD_PRIVILEGE_MASK_IN_FUNCTION_VF_LBN 16
#define MC_CMD_PRIVILEGE_MASK_IN_FUNCTION_VF_WIDTH 16
-#define MC_CMD_PRIVILEGE_MASK_IN_VF_NULL 0xffff /* enum */
+#define MC_CMD_PRIVILEGE_MASK_IN_VF_NULL 0xffff /* enum */
/* New privilege mask to be set. The mask will only be changed if the MSB is
 * set to 1.
 */
#define MC_CMD_PRIVILEGE_MASK_IN_NEW_MASK_OFST 4
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_ADMIN 0x1 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_LINK 0x2 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_ONLOAD 0x4 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_PTP 0x8 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_INSECURE.Filters 0x10 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_MAC_SPOOFING 0x20 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_UNICAST 0x40 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_MULTICAST 0x80 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_BROADCAST 0x100 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_ALL_MULTICAST 0x200 /* enum */
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_PROMISCUOUS 0x400 /* enum */
/* enum: Allows to set the TX packets' source MAC address to any arbitrary MAC
 * adress.
 */
```
#define MC_CMD_PRIVILEGE_MASK_IN_GRP_MAC_SPOOFING_TX 0x800

/* enum: Privilege that allows a Function to change the MAC address configured * in its associated vAdapter/vPort. */

#define MC_CMD_PRIVILEGE_MASK_IN_GRP_CHANGE_MAC 0x1000

/* enum: Privilege that allows a Function to install filters that specify VLANs * that are not in the permit list for the associated vPort. This privilege is * primarily to support ESX where vPorts are created that restrict traffic to * only a set of permitted VLANs. See the vPort flag FLAG_VLAN_RESTRICT. */

#define MC_CMD_PRIVILEGE_MASK_IN_GRP_UNRESTRICTED_VLAN 0x2000

/* enum: Privilege for insecure commands. Commands that belong to this group + are not permitted on secure adapters regardless of the privilege mask. + */

#define MC_CMD_PRIVILEGE_MASK_IN_GRP_INSECURE 0x4000

/* enum: Set this bit to indicate that a new privilege mask is to be set, * otherwise the command will only read the existing mask. */

#define MC_CMD_PRIVILEGE_MASK_IN_DO_CHANGE 0x80000000

/* MC_CMD_PRIVILEGE_MASK_OUT msgresponse */
#define MC_CMD_PRIVILEGE_MASK_OUT_LEN 4

/* For an admin function, always all the privileges are reported. */
#define MC_CMD_PRIVILEGE_MASK_OUT_OLD_MASK_OFST 0

#define MC_CMD_LINK_STATE_MODE_IN_FUNCTION_OFST 0

#define MC_CMD_LINK_STATE_MODE_IN_FUNCTION_PF_LBN 0
#define MC_CMD_LINK_STATE_MODE_IN_FUNCTION_PF_WIDTH 16
#define MC_CMD_LINK_STATE_MODE_IN_FUNCTION_VF_LBN 16
#define MC_CMD_LINK_STATE_MODE_IN_FUNCTION_VF_WIDTH 16

/* New link state mode to be set */

#define MC_CMD_LINK_STATE_MODE_IN_NEW_MODE_OFST 4

#define MC_CMD_LINK_STATE_MODE_IN_LINK_STATE_AUTO 0x0 /* enum */

#define MC_CMD_LINK_STATE_MODE_IN_LINK_STATE_UP 0x1 /* enum */

#define MC_CMD_LINK_STATE_MODE_IN_LINK_STATE_DOWN 0x2 /* enum */

*/
+#define MC_CMD_LINK_STATE_MODE_IN_LINK_STATE_AUTO 0x0 /* enum */
+#define MC_CMD_LINK_STATE_MODE_IN_LINK_STATE_UP 0x1 /* enum */
+#define MC_CMD_LINK_STATE_MODE_IN_LINK_STATE_DOWN 0x2 /* enum */
/* enum: Use this value to just read the existing setting without modifying it. */
-#define MC_CMD_LINK_STATE_MODE_IN_DO_NOT_CHANGE 0xffffffff
+#define MC_CMD_LINK_STATE_MODE_IN_DO_NOT_CHANGE 0xffffffff

/* MC_CMD_LINK_STATE_MODE_OUT msgresponse */
#define MC_CMD_LINK_STATE_MODE_OUT_LEN 4
#define MC_CMD_LINK_STATE_MODE_OUT_OLD_MODE_OFST 0
+#define MC_CMD_LINK_STATE_MODE_OUT_OLD_MODE_LEN 4

/**********************************
/* MC_CMD_GET_SNAPSHOT_LENGTH
- * Obtain the current range of allowable values for the SNAPSHOT_LENGTH
+ * Obtain the current range of allowable values for the SNAPSHOT_LENGTH
* parameter to MC_CMD_INIT_RXQ.
 */
#define MC_CMD_GET_SNAPSHOT_LENGTH 0x101
@@ -11519,8 +14332,10 @@
#define MC_CMD_GET_SNAPSHOT_LENGTH_OUT_LEN 8
/* Minimum acceptable snapshot length. */
#define MC_CMD_GET_SNAPSHOT_LENGTH_OUT_RX_SNAPLEN_MIN_OFST 0
+#define MC_CMD_GET_SNAPSHOT_LENGTH_OUT_RX_SNAPLEN_MIN_LEN 4
/* Maximum acceptable snapshot length. */
#define MC_CMD_GET_SNAPSHOT_LENGTH_OUT_RX_SNAPLEN_MAX_OFST 4
+#define MC_CMD_GET_SNAPSHOT_LENGTH_OUT_RX_SNAPLEN_MAX_LEN 4

/**********************************
@@ -11529,7 +14344,7 @@
*/
#define MC_CMD_FUSE_DIAGS 0x102
-#define MC_CMD_0x102_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x102_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_FUSE_DIAGS_IN msgrequest */
#define MC_CMD_FUSE_DIAGS_IN_LEN 0
@@ -11538,28 +14353,40 @@
/* Total number of mismatched bits between pairs in area 0 */
#define MC_CMD_FUSE_DIAGS_OUT_AREA0_MISMATCH_BITS_OFST 0
+#define MC_CMD_FUSE_DIAGS_OUT_AREA0_MISMATCH_BITS_LEN 4
/* Total number of unexpectedly clear (set in B but not A) bits in area 0 */
#define MC_CMD_FUSE_DIAGS_OUT_AREA0_PAIR_A_BAD_BITS_OFST 4
*/
+#define MC_CMD_FUSE_DIAGS_OUT_AREA0_PAIR_A_BAD_BITS_LEN 4
/* Total number of unexpectedly clear (set in A but not B) bits in area 0 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA0_PAIR_B_BAD_BITS_OFST 8
+#define MC_CMD_FUSE_DIAGS_OUT_AREA0_PAIR_B_BAD_BITS_LEN 4
/* Checksum of data after logical OR of pairs in area 0 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA0_CHECKSUM_OFST 12
+#define MC_CMD_FUSE_DIAGS_OUT_AREA0_CHECKSUM_LEN 4
/* Total number of mismatched bits between pairs in area 1 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_MISMATCH_BITS_OFST 16
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_MISMATCH_BITS_LEN 4
/* Total number of unexpectedly clear (set in B but not A) bits in area 1 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_PAIR_A_BAD_BITS_OFST 20
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_PAIR_A_BAD_BITS_LEN 4
/* Total number of unexpectedly clear (set in A but not B) bits in area 1 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_PAIR_B_BAD_BITS_OFST 24
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_PAIR_B_BAD_BITS_LEN 4
/* Checksum of data after logical OR of pairs in area 1 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_CHECKSUM_OFST 28
+#define MC_CMD_FUSE_DIAGS_OUT_AREA1_CHECKSUM_LEN 4
/* Total number of mismatched bits between pairs in area 2 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_MISMATCH_BITS_OFST 32
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_MISMATCH_BITS_LEN 4
/* Total number of unexpectedly clear (set in B but not A) bits in area 2 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_PAIR_A_BAD_BITS_OFST 36
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_PAIR_A_BAD_BITS_LEN 4
/* Total number of unexpectedly clear (set in A but not B) bits in area 2 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_PAIR_B_BAD_BITS_OFST 40
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_PAIR_B_BAD_BITS_LEN 4
/* Checksum of data after logical OR of pairs in area 2 */
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_CHECKSUM_OFST 44
+#define MC_CMD_FUSE_DIAGS_OUT_AREA2_CHECKSUM_LEN 4

/***********************************/
@@ -11576,14 +14403,16 @@
#define MC_CMD_PRIVILEGE_MODIFY_IN_LEN 16
/* The groups of functions to have their privilege masks modified. */
#define MC_CMD_PRIVILEGE_MODIFY_IN_FN_GROUP_OFST 0
-#define MC_CMD_PRIVILEGE_MODIFY_IN_NONE 0x0 /* enum */
-#define MC_CMD_PRIVILEGE_MODIFY_IN_ALL 0x1 /* enum */
-#define MC_CMD_PRIVILEGE_MODIFY_IN_PFS_ONLY 0x2 /* enum */
-#define MC_CMD_PRIVILEGE_MODIFY_IN_VFS_ONLY 0x3 /* enum */
-#define MC_CMD_PRIVILEGE_MODIFY_IN_VFS_OF_PF 0x4 /* enum */
-#define MC_CMD_PRIVILEGE_MODIFY_IN_ONE 0x5 /* enum */
+#define MC_CMD_PRIVILEGE_MODIFY_IN_FN_GROUP_LEN 4
+##define MC_CMD_PRIVILEGE_MODIFY_IN_NONE 0x0 /* enum */
+##define MC_CMD_PRIVILEGE_MODIFY_IN_ALL 0x1 /* enum */
+##define MC_CMD_PRIVILEGE_MODIFY_IN_PFS_ONLY 0x2 /* enum */
+##define MC_CMD_PRIVILEGE_MODIFY_IN_VFS_ONLY 0x3 /* enum */
+##define MC_CMD_PRIVILEGE_MODIFY_IN_VFS_OF_PF 0x4 /* enum */
+##define MC_CMD_PRIVILEGE_MODIFY_IN_ONE 0x5 /* enum */
-#define MC_CMD_PRIVILEGE_MODIFY_IN_FN_GROUP_LEN 4
+##define MC_CMD_PRIVILEGE_MODIFY_IN_NONE 0x0 /* enum */
+##define MC_CMD_PRIVILEGE_MODIFY_IN_ALL 0x1 /* enum */
+##define MC_CMD_PRIVILEGE_MODIFY_IN_PFS_ONLY 0x2 /* enum */
+define MC_CMD_PRIVILEGE_MODIFY_IN_VFS_ONLY 0x3 /* enum */
+define MC_CMD_PRIVILEGE_MODIFY_IN_VFS_OF_PF 0x4 /* enum */
+define MC_CMD_PRIVILEGE_MODIFY_IN_ONE 0x5 /* enum */
/* For VFS_OF_PF specify the PF, for ONE specify the target function */
define MC_CMD_PRIVILEGE_MODIFY_IN_FUNCTION_OFFSET 4
+define MC_CMD_PRIVILEGE_MODIFY_IN_FUNCTION_LENGTH 4
#define MC_CMD_PRIVILEGE_MODIFY_IN_FUNCTION_PF_OFFSET 0
#define MC_CMD_PRIVILEGE_MODIFY_IN_FUNCTION_PF_WIDTH 16
#define MC_CMD_PRIVILEGE_MODIFY_IN_FUNCTION_VF_OFFSET 16
@@ -11592,10 +14421,12 @@
 * refer to the command MC_CMD_PRIVILEGE_MASK
 */
define MC_CMD_PRIVILEGE_MODIFY_IN_ADD_MASK_OFFSET 8
+define MC_CMD_PRIVILEGE_MODIFY_IN_ADD_MASK_LENGTH 4
/* Privileges to be removed from the target functions. For privilege
 * definitions refer to the command MC_CMD_PRIVILEGE_MASK
 */
define MC_CMD_PRIVILEGE_MODIFY_IN_REMOVE_MASK_OFFSET 12
+define MC_CMD_PRIVILEGE_MODIFY_IN_REMOVE_MASK_LENGTH 4

/* MC_CMD_PRIVILEGE_MODIFY_OUT msgresponse */
define MC_CMD_PRIVILEGE_MODIFY_OUT_LENGTH 0
@@ -11613,8 +14444,10 @@
define MC_CMD_XPM_READ_BYTES_IN_LENGTH 8
/* Start address (byte) */
define MC_CMD_XPM_READ_BYTES_IN_ADDR_OFFSET 0
+define MC_CMD_XPM_READ_BYTES_IN_ADDR_LENGTH 4
/* Count (bytes) */
define MC_CMD_XPM_READ_BYTES_IN_COUNT_OFFSET 4
+define MC_CMD_XPM_READ_BYTES_IN_COUNT_LENGTH 4

/* MC_CMD_XPM_READ_BYTES_OUT msgresponse */
define MC_CMD_XPM_READ_BYTES_OUT_LENGTH_MIN 0
@@ -11633,7 +14466,7 @@
define MC_CMD_XPM_WRITE_BYTES 0x104
-define MC_CMD_0x104_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+define MC_CMD_0x104_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_XPM_WRITE_BYTES_IN msgrequest */
define MC_CMD_XPM_WRITE_BYTES_IN_LENGTH_MIN 8
@@ -11641,8 +14474,10 @@
define MC_CMD_XPM_WRITE_BYTES_IN_LENGTH(num) (8+1*(num))
/* Start address (byte) */
define MC_CMD_XPM_WRITE_BYTES_IN_ADDR_OFFSET 0
+define MC_CMD_XPM_WRITE_BYTES_IN_ADDR_LENGTH 4
/* Count (bytes) */
define MC_CMD_XPM_WRITE_BYTES_IN_COUNT_OFFSET 4
+define MC_CMD_XPM_WRITE_BYTES_IN_COUNT_LENGTH 4

/* MC_CMD_XPM_WRITE_BYTES_IN msgrequest */
define MC_CMD_XPM_WRITE_BYTES_IN_LENGTH_MIN 8
@@ -11641,8 +14474,10 @@
define MC_CMD_XPM_WRITE_BYTES_IN_LENGTH(num) (8+1*(num))
/* Start address (byte) */
define MC_CMD_XPM_WRITE_BYTES_IN_ADDR_OFFSET 0
+define MC_CMD_XPM_WRITE_BYTES_IN_ADDR_LENGTH 4
/* Count (bytes) */
/* Data */
#define MC_CMD_XPM_WRITE_BYTES_IN_DATA_OFST 8
#define MC_CMD_XPM_WRITE_BYTES_IN_DATA_LEN 1

#define MC_CMD_XPM_READ_SECTOR 0x105
#define MC_CMD_0x105_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_XPM_READ_SECTOR_IN msgrequest */
#define MC_CMD_XPM_READ_SECTOR_IN_LEN 8
#define MC_CMD_XPM_READ_SECTOR_IN_INDEX_OFST 0
#define MC_CMD_XPM_READ_SECTOR_IN_INDEX_LEN 4
#define MC_CMD_XPM_READ_SECTOR_IN_SIZE_OFST 4
#define MC_CMD_XPM_READ_SECTOR_IN_SIZE_LEN 4

#define MC_CMD_XPM_WRITE_SECTOR 0x106
#define MC_CMD_0x106_PRIVILEGE_CTG SRIOV_CTG_INSECURE

/* MC_CMD_XPM_WRITE_SECTOR_IN msgrequest */
#define MC_CMD_XPM_WRITE_SECTOR_IN_COUNT_OFST 4
#define MC_CMD_XPM_WRITE_SECTOR_IN_COUNT_LEN 4

/* MC_CMD_XPM_WRITE_SECTOR_OUT msgresponse */
#define MC_CMD_XPM_READ_SECTOR_OUT_LENMIN 4
#define MC_CMD_XPM_READ_SECTOR_OUT_LEN(num) (4+1*(num))
#define MC_CMD_XPM_READ_SECTOR_OUT_INDEX_OFST 0
#define MC_CMD_XPM_READ_SECTOR_OUT_INDEX_LEN 4
#define MC_CMD_XPM_READ_SECTOR_OUT_SIZE_OFST 4
#define MC_CMD_XPM_READ_SECTOR_OUT_SIZE_LEN 4
#define MC_CMD_XPM_READ_SECTOR_OUT_TYPE_OFST 0
#define MC_CMD_XPM_READ_SECTOR_OUT_TYPE_LEN 4
#define MC_CMD_XPM_READ_SECTOR_OUT_BLANK 0x0 /* enum */
#define MC_CMD_XPM_READ_SECTOR_OUT_CRYPTO_KEY_128 0x1 /* enum */
#define MC_CMD_XPM_READ_SECTOR_OUT_CRYPTO_KEY_256 0x2 /* enum */
#define MC_CMD_XPM_READ_SECTOR_OUT_INVALID 0xff /* enum */
#define MC_CMD_XPM_READ_SECTOR_OUT_DATA_OFST 4
#define MC_CMD_XPM_READ_SECTOR_OUT_DATA_LEN 1

```c
#define MC_CMD_XPM_WRITE_SECTOR_IN_LEN_MIN 12
#define MC_CMD_XPM_WRITE_SECTOR_IN_RESERVED_LEN 3

#define MC_CMD_XPM_WRITE_SECTOR_IN_TYPE_OFST 4
#define MC_CMD_XPM_WRITE_SECTOR_IN_TYPE_LEN 4

#define MC_CMD_XPM_WRITE_SECTOR_IN_DATA_OFST 12
#define MC_CMD_XPM_WRITE_SECTOR_IN_DATA_LEN 1

#define MC_CMD_XPM_WRITE_SECTOR_OUT_LEN 4
#define MC_CMD_XPM_WRITE_SECTOR_OUT_INDEX_OFST 0
#define MC_CMD_XPM_WRITE_SECTOR_OUT_INDEX_LEN 4

#define MC_CMD_XPM_INVALIDATE_SECTOR 0x107
#define MC_CMD_XPM_INVALIDATE_SECTOR_IN_LEN 4
#define MC_CMD_XPM_INVALIDATE_SECTOR_IN_INDEX_OFST 0
#define MC_CMD_XPM_INVALIDATE_SECTOR_IN_INDEX_LEN 4

#define MC_CMD_XPM_INVALIDATE_SECTOR_OUT_LEN 0
#define MC_CMD_XPM_INVALIDATE_SECTOR_OUT_INDEX_OFST 0
#define MC_CMD_XPM_INVALIDATE_SECTOR_OUT_INDEX_LEN 4

#define MC_CMD_XPM_INVALIDATE_SECTOR_IN msgrequest */
#define MC_CMD_XPM_INVALIDATE_SECTOR_IN_LEN 4
#define MC_CMD_XPM_INVALIDATE_SECTOR_INDEX_OFST 0
#define MC_CMD_XPM_INVALIDATE_SECTOR_INDEX_LEN 4

#define MC_CMD_XPM_BLANK_CHECK 0x108
#define MC_CMD_XPM_BLANK_CHECK_IN_LEN 8
#define MC_CMD_XPM_BLANK_CHECK_IN_ADDR_OFST 0
#define MC_CMD_XPM_BLANK_CHECK_IN_ADDR_LEN 1
```
+define MC_CMD_XPM_BLANK_CHECK_IN_ADDR_LEN 4
/* Count (bytes) * /
#define MC_CMD_XPM_BLANK_CHECK_IN_COUNT_OFST 4
+#define MC_CMD_XPM_BLANK_CHECK_IN_COUNT_LEN 4
/* MC_CMD_XPM_BLANK_CHECK_OUT msgresponse */
#define MC_CMD_XPM_BLANK_CHECK_OUT_LENMIN 4
@@ -11762,6 +14607,7 @@
#define MC_CMD_XPM_BLANK_CHECK_OUT_LEN(num) (4+2*(num))
/* Total number of bad (non-blank) locations */
#define MC_CMD_XPM_BLANK_CHECK_OUT_BAD_COUNT_OFST 0
+#define MC_CMD_XPM_BLANK_CHECK_OUT_BAD_COUNT_LEN 4
/* Addresses of bad locations (may be less than BAD_COUNT, if all cannot fit */
* into MCDI response)
*/
@@ -11777,14 +14623,16 @@
*/
#define MC_CMD_XPM_REPAIR 0x109
-#define MC_CMD_0x109_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x109_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_XPM_REPAIR_IN msgrequest */
#define MC_CMD_XPM_REPAIR_IN_ADDR_OFST 0
/* MC_CMD_XPM_REPAIR_OUT msgresponse */
#define MC_CMD_XPM_REPAIR_OUT_LEN 0
@@ -11797,7 +14664,7 @@
*/
#define MC_CMD_XPM_DECODER_TEST 0x10a
-#define MC_CMD_0x10a_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x10a_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_XPM_DECODER_TEST_IN msgrequest */
#define MC_CMD_XPM_DECODER_TEST_IN_LEN 0
@@ -11816,7 +14664,7 @@
*/
#define MC_CMD_XPM_WRITE_TEST 0x10b
-#define MC_CMD_0x10b_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x10b_PRIVILEGE_CTG SRIOV_CTG_INSECURE
/* MC_CMD_XPM_WRITE_TEST_IN msgrequest */
#define MC_CMD_XPM_WRITE_TEST_IN_LEN 0
@@ -11842,10 +14690,13 @@
#define MC_CMD_EXEC_SIGNED_IN_LEN 28
/* the length of code to include in the CMAC */
#define MC_CMD_EXEC_SIGNED_IN_CODELEN_LEN 0
+#define MC_CMD_EXEC_SIGNED_IN_CODELEN_LEN 4
/* the length of date to include in the CMAC */
#define MC_CMD_EXEC_SIGNED_IN_DATALEN_LEN 4
/* the XPM sector containing the key to use */
#define MC_CMD_EXEC_SIGNED_IN_KEYSECTOR_LEN 8
+#define MC_CMD_EXEC_SIGNED_IN_KEYSECTOR_LEN 4
/* the expected CMAC value */
#define MC_CMD_EXEC_SIGNED_IN_CMAC_LEN 16
@@ -11868,11 +14719,34 @@
#define MC_CMD_PREPARE_SIGNED_IN_LEN 4
/* the length of data area to clear */
#define MC_CMD_PREPARE_SIGNED_IN_DATALEN_LEN 4
/* MC_CMD_PREPARE_SIGNED_OUT msgresponse */
#define MC_CMD_PREPARE_SIGNED_OUT_LEN 0

+/* TUNNEL_ENCAP_UDP_PORT_ENTRY structuredef */
+#define TUNNEL_ENCAP_UDP_PORT_ENTRY_LEN 4
+/* UDP port (the standard ports are named below but any port may be used) */
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_UDP_PORT_LEN 2
+/* enum: the IANA allocated UDP port for VXLAN */
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_IANA_VXLAN_UDP_PORT 0x12b5
+/* enum: the IANA allocated UDP port for Geneve */
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_IANA_GENEVE_UDP_PORT 0x17c1
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_IANA_GENEVE_UDP_PORT_LBN 0
+/* tunnel encapsulation protocol (only those named below are supported) */
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_PROTOCOL_LEN 2
+/* enum: This port will be used for VXLAN on both IPv4 and IPv6 */
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_VXLAN 0x0
+/* enum: This port will be used for Geneve on both IPv4 and IPv6 */
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_GENEVE 0x1
+define TUNNEL_ENCAP_UDP_PORT_ENTRY_GENEVE_LSBN 16
##MC_CMD_SET_TUNNEL_ENCAP_UDP_PORTS

* Configure UDP ports for tunnel encapsulation hardware acceleration. The
  
  @@ -11913,27 +14787,6 @@
  
  #define MC_CMD_SET_TUNNEL_ENCAP_UDP_PORTS_OUT_RESETTING_LBN 0
  #define MC_CMD_SET_TUNNEL_ENCAP_UDP_PORTS_OUT_RESETTING_WIDTH 1

  -/* TUNNEL_ENCAP_UDP_PORT_ENTRY struct */
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_LEN 4
  -/* UDP port (the standard ports are named below but any port may be used) */
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_UDP_PORT_OFST 0
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_UDP_PORT_LEN 2
  -/* enum: the IANA allocated UDP port for VXLAN */
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_IANA_VXLAN_UDP_PORT 0x12b5
  -/* enum: the IANA allocated UDP port for Geneve */
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_IANA_GENEVE_UDP_PORT 0x17c1
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_UDP_PORT_LBN 0
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_UDP_PORT_WIDTH 16
  -/* tunnel encapsulation protocol (only those named below are supported) */
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_PROTOCOL_OFST 2
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_PROTOCOL_LEN 2
  -/* enum: VXLAN */
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_VXLAN 0x0
  -/* enum: Geneve */
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_GENEVE 0x1
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_PROTOCOL_LBN 16
  -#define TUNNEL_ENCAP_UDP_PORT_ENTRY_PROTOCOL_WIDTH 16

  */

##MC_CMD_RX_BALANCING

/* The RX port whose upconverter table will be modified */
#define MC_CMD_RX_BALANCING_IN_LEN 16
/* The VLAN priority associated to the table index and vFIFO */
#define MC_CMD_RX_BALANCING_IN_PRIORITY_OFST 0
#define MC_CMD_RX_BALANCING_IN_PRIORITY_LEN 4
/* The resulting bit of SRC^DST for indexing the table */
#define MC_CMD_RX_BALANCING_IN_SRC_DST_OFST 8
#define MC_CMD_RX_BALANCING_IN_SRC_DST_LEN 4
/* The RX engine to which the vFIFO in the table entry will point to */
#define MC_CMD_RX_BALANCING_IN_ENG_OFST 12
#define MC_CMD_RX_BALANCING_IN_ENG_LEN 4

/* MC_CMD_RX_BALANCING_OUT msgresponse */
#define MC_CMD_RX_BALANCING_OUT_LEN 0
@@ -11976,8 +14833,10 @@
#define MC_CMD_NVRAM_PRIVATE_APPEND_IN_LEN(num) (8+1*(num))
/* The tag to be appended */
+#define MC_CMD_NVRAM_PRIVATE_APPEND_IN_TAG_LEN 4
/* The length of the data */
#define MC_CMD_NVRAM_PRIVATE_APPEND_IN_LENGTH_OFST 4
+#define MC_CMD_NVRAM_PRIVATE_APPEND_IN_LENGTH_LEN 4
/* The data to be contained in the TLV structure */
#define MC_CMD_NVRAM_PRIVATE_APPEND_IN_DATA_BUFFER_OFST 8
#define MC_CMD_NVRAM_PRIVATE_APPEND_IN_DATA_BUFFER_LEN 1
@@ -12002,6 +14861,7 @@
#define MC_CMD_XPM_VERIFY_CONTENTS_IN_LEN 4
/* Data type to be checked */
#define MC_CMD_XPM_VERIFY_CONTENTS_IN_DATA_TYPE_OFST 0
+#define MC_CMD_XPM_VERIFY_CONTENTS_IN_DATA_TYPE_LEN 4
/* MC_CMD_XPM_VERIFY_CONTENTS_OUT msgresponse */
#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_LENMIN 12
@@ -12009,10 +14869,13 @@
#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_LEN(num) (12+1*(num))
/* Number of sectors found (test builds only) */
#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_NUM_SECTORS_OFST 0
+#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_NUM_SECTORS_LEN 4
/* Number of bytes found (test builds only) */
#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_NUM_BYTES_OFST 4
+#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_NUM_BYTES_LEN 4
/* Length of signature */
#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_SIG_LENGTH_OFST 8
+#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_SIG_LENGTH_LEN 4
/* Signature */
#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_SIGNATURE_OFST 12
#define MC_CMD_XPM_VERIFY_CONTENTS_OUT_SIGNATURE_LEN 1
@@ -12037,23 +14900,29 @@
#define MC_CMD_SET_EVQ_TMR_IN_LEN 16
/* Function-relative queue instance */
#define MC_CMD_SET_EVQ_TMR_IN_INSTANCE_OFST 0
+#define MC_CMD_SET_EVQ_TMR_IN_INSTANCE_LEN 4
/* Requested value for timer load (in nanoseconds) */
#define MC_CMD_SET_EVQ_TMR_IN_TMR_LOAD_REQ_NS_OFST 4
+#define MC_CMD_SET_EVQ_TMR_IN_TMR_LOAD_REQ_NS_LEN 4
/* Requested value for timer reload (in nanoseconds) */
#define MC_CMD_SET_EVQ_TMR_IN_TMR_RELOAD_REQ_NS_OFST 8
+#define MC_CMD_SET_EVQ_TMR_IN_TMR_RELOAD_REQ_NS_LEN 4
/* Timer mode. Meanings as per EVQ_TMR_REG.TC_TIMER_VAL */
#define MC_CMD_SET_EVQ_TMR_IN_TMR_MODE_OFST 12
-#define MC_CMD_SET_EVQ_TMR_IN_TMR_MODE_DIS 0x0 /* enum */
#define MC_CMD_SET_EVQ_TMR_IN_TIMER_MODE_IMMED_START 0x1 /* enum */
#define MC_CMD_SET_EVQ_TMR_IN_TIMER_MODE_TRIG_START 0x2 /* enum */
#define MC_CMD_SET_EVQ_TMR_IN_TIMER_MODE_INT_HLDOFF 0x3 /* enum */
#define MC_CMD_SET_EVQ_TMR_IN_TMR_MODE_LEN 4
#define MC_CMD_SET_EVQ_TMR_IN_TIMER_MODE_DIS 0x0 /* enum */
#define MC_CMD_SET_EVQ_TMR_IN_TIMER_MODE_IMMED_START 0x1 /* enum */
#define MC_CMD_SET_EVQ_TMR_IN_TIMER_MODE_TRIG_START 0x2 /* enum */
#define MC_CMD_SET_EVQ_TMR_IN_TIMER_MODE_INT_HLDOFF 0x3 /* enum */

/* MC_CMD_SET_EVQ_TMR_OUT msgresponse */
#define MC_CMD_SET_EVQ_TMR_OUT_LEN 8
/* Actual value for timer load (in nanoseconds) */
#define MC_CMD_SET_EVQ_TMR_OUT_TMR_LOAD_ACT_NS_OFST 0
#define MC_CMD_SET_EVQ_TMR_OUT_TMR_LOAD_ACT_NS_LEN 4
/* Actual value for timer reload (in nanoseconds) */
#define MC_CMD_SET_EVQ_TMR_OUT_TMR_RELOAD_ACT_NS_OFST 4
#define MC_CMD_SET_EVQ_TMR_OUT_TMR_RELOAD_ACT_NS_LEN 4

/**********************************
@@ -12071,29 +14940,35 @@ */
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_LEN 36
/* Reserved for future use. */
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_FLAGS_OFST 0
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_FLAGS_LEN 4
/* For timers updated via writes to EVQ_TMR_REG, this is the time interval (in
 * nanoseconds) for each increment of the timer load/reload count. The
 * requested duration of a timer is this value multiplied by the timer
 * load/reload count. */
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_TMR_REG_NS_PER_COUNT_OFST 4
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_TMR_REG_NS_PER_COUNT_LEN 4
/* For timers updated via writes to EVQ_TMR_REG, this is the maximum value
 * allowed for timer load/reload counts. */
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_TMR_REG_MAX_COUNT_OFST 8
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_TMR_REG_MAX_COUNT_LEN 4
/* For timers updated via writes to EVQ_TMR_REG, timer load/reload counts not a
 * multiple of this step size will be rounded in an implementation defined
 * manner. */
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_TMR_REG_STEP_OFST 12
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_TMR_REG_STEP_LEN 4
/* Maximum timer duration (in nanoseconds) for timers updated via MCDI. Only
 * meaningful if MC_CMD_SET_EVQ_TMR is implemented. */
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_MCDI_TMR_MAX_NS_OFST 16
#define MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_MCDI_TMR_MAX_NS_LEN 4
/* Timer durations requested via MCDI that are not a multiple of this step size
 * will be rounded up. Only meaningful if MC_CMD_SET_EVQ_TMR is implemented.
 */
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_MCDI_TMR_STEP_NS_OFST 20
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_MCDI_TMR_STEP_NS_LEN 4

/* For timers updated using the bug35388 workaround, this is the time interval
 * (in nanoseconds) for each increment of the timer load/reload count. The
 * requested duration of a timer is this value multiplied by the timer
 * is enabled.
 */
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_BUG35388_TMR_NS_PER_COUNT_OFST 24
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_BUG35388_TMR_NS_PER_COUNT_LEN 4

/* For timers updated using the bug35388 workaround, this is the maximum value
 * allowed for timer load/reload counts. This field is only meaningful if the
 * bug35388 workaround is enabled.
 */
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_BUG35388_TMR_MAX_COUNT_OFST 28
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_BUG35388_TMR_MAX_COUNT_LEN 4

/* For timers updated using the bug35388 workaround, timer load/reload counts
 * not a multiple of this step size will be rounded in an implementation
 * defined manner. This field is only meaningful if the bug35388 workaround is
 * enabled.
 */
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_BUG35388_TMR_STEP_OFST 32
#define       MC_CMD_GET_EVQ_TMR_PROPERTIES_OUT_BUG35388_TMR_STEP_LEN 4

/***********************************/
#define MC_CMD_ALLOCATE_TX_VFIFO_CP 0x11d
#define MC_CMD_0x11d_PRIVILEGE_CTG SRIOV_CTG_GENERAL

/* MC_CMD_ALLOCATE_TX_VFIFO_CP_IN msgrequest */
#define    MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_LEN 20
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_INSTANCE_OFST 0
#define          MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_ENABLED       0x1 /* enum */
#define          MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_ENABLED 0x1 /* enum */

#ifdef USE_SRIOV
#define USE_SRIOV CTG ADMIN
#endif
*/
/* enum: Using this interface without TX_vFIFO_ULL is not supported for now */
-#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_DISABLED 0x0
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_DISABLED 0x0
/* Number of buffers to reserve for the common pool */
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_SIZE_OFST 8
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_SIZE_LEN 4
/* TX datapath to which the Common Pool is connected. */
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_INGRESS_OFST 12
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_INGRESS_LEN 4
/* enum: Extracts information from function */
-#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_USE_FUNCTION_VALUE -0x1
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_USE_FUNCTION_VALUE -0x1
/* Network port or RX Engine to which the common pool connects. */
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_EGRESS_OFST 16
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_EGRESS_LEN 4
/* enum: Extracts information from function */
-/*               MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_USE_FUNCTION_VALUE -0x1 */
+/*               MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_USE_FUNCTION_VALUE -0x1 */
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_PORT0 0x0 /* enum */
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_PORT1 0x1 /* enum */
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_PORT2 0x2 /* enum */
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_PORT3 0x3 /* enum */
+/* MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_USE_FUNCTION_VALUE -0x1 */
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_USE_FUNCTION_VALUE -0x1 */
/* enum: To enable Switch loopback with Rx engine 0 */
-#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_RX_ENGINE0 0x4
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_RX_ENGINE0 0x4
/* enum: To enable Switch loopback with Rx engine 1 */
-#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_RX_ENGINE1 0x5
+#define MC_CMD_ALLOCATE_TX_VFIFO_CP_IN_RX_ENGINE1 0x5

/* MC_CMD_ALLOCATE_TX_VFIFO_CP_OUT msgresponse */
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_OUT_LEN 4
/* ID of the common pool allocated */
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_OUT_CP_ID_OFST 0
#define MC_CMD_ALLOCATE_TX_VFIFO_CP_OUT_CP_ID_LEN 4

/*********************/
@ @ -12166.42 +15050.49 @ @
*/
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO 0x11e
-#define MC_CMD_0x11e_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x11e_PRIVILEGE_CTG SRIOV_CTG_GENERAL

-#define MC_CMD_0x11e_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x11e_PRIVILEGE_CTG SRIOV_CTG_GENERAL
/* MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN msgrequest */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_LEN 20
/* Common pool previously allocated to which the new vFIFO will be associated */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_CP_OFST 0
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_CP_LEN 4
/* Port or RX engine to associate the vFIFO egress */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_EGRESS_OFST 4
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_EGRESS_LEN 4
/* enum: Extracts information from common pool */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_USE_CP_VALUE -0x1
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_PORT0 0x0 /* enum */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_PORT1 0x1 /* enum */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_PORT2 0x2 /* enum */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_PORT3 0x3 /* enum */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_RX_ENGINE0 0x4
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_RX_ENGINE1 0x5
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_SIZE_OFST 8
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_SIZE_LEN 4
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_NO_MINIMUM 0x0
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_IN_LOWEST_AVAILABLE -0x1
/* MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_OUT msgresponse */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_OUT_LEN 8
/* Short vFIFO ID */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_OUT_VID_OFST 0
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_OUT_VID_LEN 4
/* Network priority of the vFIFO */
#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_OUT_PRIORITY_OFST 4
+#define MC_CMD_ALLOCATE_TX_VFIFO_VFIFO_OUT_PRIORITY_LEN 4

/**************************
@@ -12211,12 +15102,13 @@
*/
#define MC_CMD_TEARDOWN_TX_VFIFO_VF 0x11f

-#define MC_CMD_0x11f_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x11f_PRIVILEGE_CTG SRIOV_CTG_GENERAL

/* MC_CMD_TEARDOWN_TX_VFIFO_VF_IN msgrequest */
#define MC_CMD_TEARDOWN_TX_VFIFO_VF_IN_LEN 4
/* Short vFIFO ID */
#define MC_CMD_TEARDOWN_TX_VFIFO_VF_IN_VFIFO_OFST 0
+#define MC_CMD_TEARDOWN_TX_VFIFO_VF_IN_VFIFO_LEN 4

/* MC_CMD_TEARDOWN_TX_VFIFO_VF_OUT msgresponse */
#define MC_CMD_TEARDOWN_TX_VFIFO_VF_OUT_LEN 0
@@ -12229,12 +15121,13 @@
*/
#define MC_CMD_DEALLOCATE_TX_VFIFO_CP 0x121

-#define MC_CMD_0x121_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x121_PRIVILEGE_CTG SRIOV_CTG_GENERAL

/* MC_CMD_DEALLOCATE_TX_VFIFO_CP_IN msgrequest */
#define MC_CMD_DEALLOCATE_TX_VFIFO_CP_IN_LEN 4
/* Common pool ID given when pool allocated */
#define MC_CMD_DEALLOCATE_TX_VFIFO_CP_IN_POOL_ID_OFST 0
+#define MC_CMD_DEALLOCATE_TX_VFIFO_CP_IN_POOL_ID_LEN 4

/* MC_CMD_DEALLOCATE_TX_VFIFO_CP_OUT msgresponse */
#define MC_CMD_DEALLOCATE_TX_VFIFO_CP_OUT_LEN 0
@@ -12247,7 +15140,7 @@
*/
#define MC_CMD_SWITCH_GET_UNASSIGNED_BUFFERS 0x124

-#define MC_CMD_0x124_PRIVILEGE_CTG SRIOV_CTG_ADMIN
+#define MC_CMD_0x124_PRIVILEGE_CTG SRIOV_CTG_GENERAL

/* MC_CMD_SWITCH_GET_UNASSIGNED_BUFFERS_IN msgrequest */
#define MC_CMD_SWITCH_GET_UNASSIGNED_BUFFERS_IN_LEN 0
/* Available buffers for the ENG to NET vFIFOs */
#define MC_CMD_SWITCH_GET_UNASSIGNED_BUFFERS_OUT_NET_OFST 0

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#define MC_CMD_SWITCH_GET_UNASSIGNED_BUFFERS_OUT_NET_LEN 4
/* Available buffers for the ENG to ENG and NET to ENG vFIFOs. */
#define MC_CMD_SWITCH_GET_UNASSIGNED_BUFFERS_OUT_ENG_OFST 4
+#define MC_CMD_SWITCH_GET_UNASSIGNED_BUFFERS_OUT_ENG_LEN 4

@endef /* MCDI_PCOL_H */
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/mcdi_port.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/mcdi_port.c
@@ -171,89 +171,108 @@
return 0;
}

-static u32 mcdi_to_ethtool_cap(u32 media, u32 cap)
+static void mcdi_to_ethtool_linkset(u32 media, u32 cap, unsigned long *linkset)
{
-u32 result = 0;
+#define SET_BIT(name) __set_bit(ETHTOOL_LINK_MODE_ ## name ## _BIT, 
					  linkset)
+ bitmap_zero(linkset, __ETHTOOL_LINK_MODE_MASK_NBITS);

switch (media) {
   case MC_CMD_MEDIA_KX4:
      -result |= SUPPORTED_Backplane;
+ SET_BIT(Backplane);
      if (cap & (1 << MC_CMD_PHY_CAP_1000FDX_LBN))
         -result |= SUPPORTED_1000baseKX_Full;
+ SET_BIT(1000baseKX_Full);
      if (cap & (1 << MC_CMD_PHY_CAP_10000FDX_LBN))
         -result |= SUPPORTED_10000baseKX4_Full;
+ SET_BIT(10000baseKX4_Full);
      if (cap & (1 << MC_CMD_PHY_CAP_40000FDX_LBN))
         -result |= SUPPORTED_40000baseKR4_Full;
+ SET_BIT(40000baseKR4_Full);
      break;

   case MC_CMD_MEDIA_XFP:
   case MC_CMD_MEDIA_SFP_PLUS:
   case MC_CMD_MEDIA_QSFP_PLUS:
      -result |= SUPPORTED_FIBRE;
+ SET_BIT(FIBRE);
      if (cap & (1 << MC_CMD_PHY_CAP_1000FDX_LBN))
         -result |= SUPPORTED_1000baseT_Full;
+ SET_BIT(1000baseT_Full);
      if (cap & (1 << MC_CMD_PHY_CAP_10000FDX_LBN))
         -result |= SUPPORTED_10000baseT_Full;
+ SET_BIT(10000baseT_Full);
      if (cap & (1 << MC_CMD_PHY_CAP_40000FDX_LBN))
         -result |= SUPPORTED_40000baseT_Full;
+ SET_BIT(40000baseT_Full);
      break;
-result |= SUPPORTED_40000baseCR4_Full;
+SET_BIT(40000baseCR4_Full);
+if (cap & (1 << MC_CMD_PHY_CAP_100000FDX_LBN))
+SET_BIT(100000baseCR4_Full);
+if (cap & (1 << MC_CMD_PHY_CAP_25000FDX_LBN))
+SET_BIT(25000baseCR_Full);
+if (cap & (1 << MC_CMD_PHY_CAP_50000FDX_LBN))
+SET_BIT(50000baseCR2_Full);
break;

case MC_CMD_MEDIA_BASE_T:
-result |= SUPPORTED_TP;
+SET_BIT(TP);
if (cap & (1 << MC_CMD_PHY_CAP_10HDX_LBN))
-result |= SUPPORTED_10baseT_Half;
+SET_BIT(10baseT_Half);
if (cap & (1 << MC_CMD_PHY_CAP_10FDX_LBN))
-result |= SUPPORTED_10baseT_Full;
+SET_BIT(10baseT_Full);
if (cap & (1 << MC_CMD_PHY_CAP_100HDX_LBN))
-result |= SUPPORTED_100baseT_Half;
+SET_BIT(100baseT_Half);
if (cap & (1 << MC_CMD_PHY_CAP_100FDX_LBN))
-result |= SUPPORTED_100baseT_Full;
+SET_BIT(100baseT_Full);
if (cap & (1 << MC_CMD_PHY_CAP_1000HDX_LBN))
-result |= SUPPORTED_1000baseT_Half;
+SET_BIT(1000baseT_Half);
if (cap & (1 << MC_CMD_PHY_CAP_1000FDX_LBN))
-result |= SUPPORTED_1000baseT_Full;
+SET_BIT(1000baseT_Full);
break;
}

if (cap & (1 << MC_CMD_PHY_CAP_PAUSE_LBN))
-result |= SUPPORTED_Pause;
+SET_BIT(Pause);
if (cap & (1 << MC_CMD_PHY_CAP_ASYM_LBN))
-result |= SUPPORTED_Asym_Pause;
+SET_BIT(Asym_Pause);
if (cap & (1 << MC_CMD_PHY_CAP_AN_LBN))
-result |= SUPPORTED_Autoneg;
+SET_BIT(Autoneg);

-return result;
+

#define SET_BIT

- static u32 ethtool_to_mcdi_cap(u32 cap)
+ static u32 ethtool_linkset_to_mcdi_cap(const unsigned long *linkset)
{
    u32 result = 0;

    - if (cap & SUPPORTED_10baseT_Half)
+ if (TEST_BIT(10baseT_Half))
        result |= (1 << MC_CMD_PHY_CAP_10HDX_LBN);
    - if (cap & SUPPORTED_10baseT_Full)
+ if (TEST_BIT(10baseT_Full))
        result |= (1 << MC_CMD_PHY_CAP_10FDX_LBN);
    - if (cap & SUPPORTED_100baseT_Half)
+ if (TEST_BIT(100baseT_Half))
        result |= (1 << MC_CMD_PHY_CAP_100HDX_LBN);
    - if (cap & SUPPORTED_100baseT_Full)
+ if (TEST_BIT(100baseT_Full))
        result |= (1 << MC_CMD_PHY_CAP_100FDX_LBN);
    - if (cap & SUPPORTED_1000baseT_Half)
+ if (TEST_BIT(1000baseT_Half))
        result |= (1 << MC_CMD_PHY_CAP_1000HDX_LBN);
    - if (cap & (SUPPORTED_1000baseT_Full | SUPPORTED_1000baseKX_Full))
+ if (TEST_BIT(1000baseT_Full) || TEST_BIT(1000baseKX_Full))
        result |= (1 << MC_CMD_PHY_CAP_1000FDX_LBN);
    - if (cap & (SUPPORTED_40000baseCR4_Full | SUPPORTED_40000baseKR4_Full))
+ if (TEST_BIT(40000baseCR4_Full) || TEST_BIT(40000baseKR4_Full))
        result |= (1 << MC_CMD_PHY_CAP_40000FDX_LBN);
    - if (cap & SUPPORTED_Pause)
+ if (TEST_BIT(100000baseCR4_Full))
        result |= (1 << MC_CMD_PHY_CAP_100000FDX_LBN);
    + if (TEST_BIT(25000baseCR_Full))
        result |= (1 << MC_CMD_PHY_CAP_25000FDX_LBN);
    + if (TEST_BIT(50000baseCR2_Full))
        result |= (1 << MC_CMD_PHY_CAP_50000FDX_LBN);
    + if (TEST_BIT(Pause))
        result |= (1 << MC_CMD_PHY_CAP_PAUSE_LBN);
    - if (cap & SUPPORTED_Asym_Pause)
+ if (TEST_BIT(Asym_Pause))
        result |= (1 << MC_CMD_PHY_CAPASYM_LBN);
    - if (cap & SUPPORTED_Autoneg)
+if (TEST_BIT(Autoneg))
result |= (1 << MC_CMD_PHY_CAP_AN_LBN);

+#undef TEST_BIT
+
return result;
}

@@ -285,7 +304,7 @@
return flags;
}

-static u32 mcdi_to_ethtool_media(u32 media)
+static u8 mcdi_to_ethtool_media(u32 media)
{
    switch (media) {
    case MC_CMD_MEDIA_XAUI:
@@ -333,6 +352,64 @@
        link_state->speed = speed;
    }

+/* The semantics of the ethtool FEC mode bitmask are not well defined,
+ * particularly the meaning of combinations of bits. Which means we get to
+ * define our own semantics, as follows:
+ * OFF overrides any other bits, and means "disable all FEC" (with the
+ * exception of 25G KR4/CR4, where it is not possible to reject it if AN
+ * partner requests it).
+ * AUTO on its own means use cable requirements and link partner autoneg with
+ * fw-default preferences for the cable type.
+ * AUTO and either RS or BASER means use the specified FEC type if cable and
+ * link partner support it, otherwise autoneg/fw-default.
+ * RS or BASER alone means use the specified FEC type if cable and link partner
+ * support it and either requests it, otherwise no FEC.
+ * Both RS and BASER (whether AUTO or not) means use FEC if cable and link
+ * partner support it, preferring RS to BASER.
+ */
+static u32 ethtool_fec_caps_to_mcdi(u32 ethtool_cap)
+{
+    u32 ret = 0;
+
+    +if (ethtool_cap & ETHTOOL_FEC_OFF)
+        return 0;
+
+    +if (ethtool_cap & ETHTOOL_FEC_AUTO)
+        ret |= (1 << MC_CMD_PHY_CAP_BASER_FEC_LBN) |
+            (1 << MC_CMD_PHY_CAP_25G_BASER_FEC_LBN) |
+            (1 << MC_CMD_PHY_CAP_RS_FEC_LBN);
+    +if (ethtool_cap & ETHTOOL_FEC_RS)
ret |= (1 << MC_CMD_PHY_CAP_RS_FEC_LBN) |
+ (1 << MC_CMD_PHY_CAP_RS_FEC_REQUESTED_LBN);
if (ethtool_cap & ETHTOOL_FEC_BASER)
ret |= (1 << MC_CMD_PHY_CAP_BASER_FEC_LBN) |
+ (1 << MC_CMD_PHY_CAP_25G_BASER_FEC_LBN) |
+ (1 << MC_CMD_PHY_CAP_BASER_FEC_REQUESTED_LBN) |
+ (1 << MC_CMD_PHY_CAP_25G_BASER_FEC_REQUESTED_LBN);
return ret;
+
+ /* Invert ethtool_fec_caps_to_mcdi. There are two combinations that function
+ * can never produce, (baser xor rs) and neither req; the implementation below
+ * maps both of those to AUTO. This should never matter, and it's not clear
+ * what a better mapping would be anyway.
+ */
+static u32 mcdi_fec_caps_to_ethtool(u32 caps, bool is_25g)
+{
+ bool rs = caps & (1 << MC_CMD_PHY_CAP_RS_FEC_LBN),
+ rs_req = caps & (1 << MC_CMD_PHY_CAP_RS_FEC_REQUESTED_LBN),
+ baser = is_25g ? caps & (1 << MC_CMD_PHY_CAP_25G_BASER_FEC_LBN)
+ : caps & (1 << MC_CMD_PHY_CAP_BASER_FEC_LBN),
+ baser_req = is_25g ? caps & (1 << MC_CMD_PHY_CAP_25G_BASER_FEC_REQUESTED_LBN)
+ : caps & (1 << MC_CMD_PHY_CAP_BASER_FEC_REQUESTED_LBN);
+}
+if (!baser && !rs)
+ return ETHTOOL_FEC_OFF;
+return (rs_req ? ETHTOOL_FEC_RS : 0) |
+ (baser_req ? ETHTOOL_FEC_BASER : 0) |
+ (baser == baser_req && rs == rs_req ? 0 : ETHTOOL_FEC_AUTO);
+}
+
+ static int efx_mcdi_phy_probe(struct efx_nic *efx)
{ struct efx_mcdi_phy_data *phy_data;
@@ -371,8 +448,8 @@
caps = MCDI_DWORD(outbuf, GET_LINK_OUT_CAP);
if (caps & (1 << MC_CMD_PHY_CAP_AN_LBN))
egfx->link_advertising =
  mcdi_to_ethtool_cap(phy_data->media, caps);
+  mcdi_to_ethtool_linkset(phy_data->media, caps,
+  efx->link_advertising);
else
  phy_data->forced_cap = caps;
@@ -419,6 +496,13 @@
MCDI_DWORD(outbuf, GET_LINK_OUT_FLAGS),
MCDI_DWORD(outbuf, GET_LINK_OUT_FCNTL));
Record the initial FEC configuration (or nearest approximation
representable in the ethtool configuration space)
+ /*
+ efx->fec_config = mcdi_fec_caps_to_ethtool(caps,
+ efx->link_state.speed == 25000 ||
+ efx->link_state.speed == 50000);
+ */
+ /* Default to Autonegotiated flow control if the PHY supports it */
efx->wanted_fc = EFX.FC_RX | EFX.FC_TX;
if (phy_data->supported_cap & (1 << MC_CMD_PHY_CAP_AN_LBN))
@@ -435,10 +519,12 @@ int efx_mcdi_port_reconfigure(struct efx_nic *efx)
 {
 struct efx_mcdi_phy_data *phy_cfg = efx->phy_data;
-u32 caps = (efx->link_advertising ?
+u32 caps = (efx->link_advertising[0] ?
    ethtool_to_mcdi_cap(efx->link_advertising) :
    ethtool_linkset_to_mcdi_cap(efx->link_advertising) :
    phy_cfg->forced_cap);
+caps |= ethtool_fec_caps_to_mcdi(efx->fec_config);
+return efx_mcdi_set_link(efx, caps, efx_get_mcdi_phy_flags(efx),
efx->loopback_mode, 0);
}@@ -509,34 +595,28 @@
struct efx_mcdi_phy_data *phy_cfg = efx->phy_data;
MCDI_DECLARE_BUF(outbuf, MC_CMD_GET_LINK_OUT_LEN);
int rc;
-u32 supported, advertising, lp_advertising;
-tethtool_convert_legacy_u32_to_link_mode(cmd->link_modes.supported,
-tethtool_convert_legacy_u32_to_link_mode(cmd->link_modes.advertising,
+MCDI_DECLARE_BUF(outbuf, MC_CMD_GET_LINK_OUT_LEN);
+int rc;
-u32 supported, advertising, lp_advertising;
-supported = mcdi_to_ethtool_cap(phy_cfg->media, phy_cfg->supported_cap);
-Advertising = efx->link_advertising;
-cmd->base.speed = efx->link_state.speed;
-cmd->base.duplex = efx->link_state.fd;
-cmd->base.port = mcdi_to_ethtool_media(phy_cfg->media);
-cmd->base.phy_address = phy_cfg->port;
-cmd->base.autoneg = !!(efx->link_advertising & ADVERTISED_Autoneg);
+cmd->base.autoneg = !!(efx->link_advertising[0] & ADVERTISED_Autoneg);
+cmd->base.mdio_support = (efx->mdio.mode_support &
+ (MDIO_SUPPORTS_C45 | MDIO_SUPPORTS_C22));
-ethtool_convert_legacy_u32_to_link_mode(cmd->link_modes.supported,
-supported);
-ethtool_convert_legacy_u32_to_link_mode(cmd->link_modes.advertising,
-Advertising);
+mdci_to_ethtool_linkset(phy_cfg->media, phy_cfg->supported_cap,
+
+cmd->link_modes.supported);
+memcpy(cmd->link_modes.advertising, efx->link_advertising,
+    sizeof(__ETHTOOL_DECLARE_LINK_MODE_MASK()));

BUILD_BUG_ON(MC_CMD_GET_LINK_IN_LEN != 0);
rc = efx_mcdi_rpc(efx, MC_CMD_GET_LINK, NULL, 0,
    outbuf, sizeof(outbuf), NULL);
if (rc)
    return;
-    lp_advertising =
-        mcdi_to_ethtool_cap(phy_cfg->media,
-           MCDI_DWORD(outbuf, GET_LINK_OUT_LP_CAP));
-
-ethtool_convert_legacy_u32_to_link_mode(cmd->link_modes.lp_advertising,
-   lp_advertising);
+    mcdi_to_ethtool_linkset(phy_cfg->media,
+       MCDI_DWORD(outbuf, GET_LINK_OUT_LP_CAP),
+       cmd->link_modes.lp_advertising);
}

static int
@@ -546,48 +626,127 @@
struct efx_mcdi_phy_data *phy_cfg = efx->phy_data;
 u32 caps;
 int rc;
-    u32 advertising;
-    
-ethtool_convert_link_mode_to_legacy_u32(&advertising,
-       cmd->link_modes.advertising);
+    -ethtool_convert_legacy_u32_to_link_mode(cmd->link_modes.lp_advertising,
+       -lp_advertising);
+    +mcdi_to_ethtool_linkset(phy_cfg->media,
+       +MCDI_DWORD(outbuf, GET_LINK_OUT_LP_CAP),
+       +cmd->link_modes.lp_advertising);
}

static int
@@ -546,48 +626,127 @@
struct efx_mcdi_phy_data *phy_cfg = efx->phy_data;
 u32 caps;
 int rc;
-    u32 advertising;
-    
-ethtool_convert_link_mode_to_legacy_u32(&advertising,
-       cmd->link_modes.advertising);
+    -ethtool_convert_legacy_u32_to_link_mode(cmd->link_modes.lp_advertising,
+       -lp_advertising);
+    +mcdi_to_ethtool_linkset(phy_cfg->media,
+       +MCDI_DWORD(outbuf, GET_LINK_OUT_LP_CAP),
+       +cmd->link_modes.lp_advertising);
}

if (cmd->base.autoneg) {
    -caps = (ethtool_to_mcdi_cap(advertising) |
-        1 << MC_CMD_PHY_CAP_AN_LBN);
-    +caps = (ethtool_to_mcdi_cap(cmd->link_modes.advertising) |
-        +1 << MC_CMD_PHY_CAP_AN_LBN);
    } else if (cmd->base.duplex) {
        switch (cmd->base.speed) {
            -case 10:    caps = 1 << MC_CMD_PHY_CAP_10FDX_LBN;    break;
            -case 100:   caps = 1 << MC_CMD_PHY_CAP_100FDX_LBN;   break;
            -case 1000:  caps = 1 << MC_CMD_PHY_CAP_1000FDX_LBN;  break;
            -case 10000: caps = 1 << MC_CMD_PHY_CAP_10000FDX_LBN; break;
            -case 40000: caps = 1 << MC_CMD_PHY_CAP_40000FDX_LBN; break;
            -default:    return -EINVAL;
            +case 10:     caps = 1 << MC_CMD_PHY_CAP_10FDX_LBN;     break;
            +case 100:    caps = 1 << MC_CMD_PHY_CAP_100FDX_LBN;    break;
            +case 1000:   caps = 1 << MC_CMD_PHY_CAP_1000FDX_LBN;   break;
            +case 10000:  caps = 1 << MC_CMD_PHY_CAP_10000FDX_LBN; break;
            +case 40000:  caps = 1 << MC_CMD_PHY_CAP_40000FDX_LBN; break;
        }
case 100000: caps = 1 << MC_CMD_PHY_CAP_100000FDX_LBN; break;
case 25000:  caps = 1 << MC_CMD_PHY_CAP_25000FDX_LBN;  break;
case 50000:  caps = 1 << MC_CMD_PHY_CAP_50000FDX_LBN;  break;
default:     return -EINVAL;
}
} else {
    switch (cmd->base.speed) {
-case 10:    caps = 1 << MC_CMD_PHY_CAP_10HDX_LBN;    break;
-case 100:   caps = 1 << MC_CMD_PHY_CAP_100HDX_LBN;   break;
-case 1000:  caps = 1 << MC_CMD_PHY_CAP_1000HDX_LBN;  break;
-default:    return -EINVAL;
-case 10:     caps = 1 << MC_CMD_PHY_CAP_10HDX_LBN;     break;
-case 100:    caps = 1 << MC_CMD_PHY_CAP_100HDX_LBN;    break;
-case 1000:   caps = 1 << MC_CMD_PHY_CAP_1000HDX_LBN;   break;
-default:     return -EINVAL;
}
}
caps |= ethtool_fec_caps_to_mcdi(efx->fec_config);
rc = efx_mcdi_set_link(efx, caps, efx_get_mcdi_phy_flags(efx),

    efx->loopback_mode, 0);
if (rc)
    return rc;
if (cmd->base.autoneg) {
    -efx_link_set_advertising(
    -efx, advertising | ADVERTISED_Autoneg);
    +efx_link_set_advertising(efx, cmd->link_modes.advertising);
    phy_cfg->forced_cap = 0;
} else {
    -efx_link_set_advertising(efx, 0);
    +efx_link_clear_advertising(efx);
    phy_cfg->forced_cap = caps;
}
return 0;

+static int efx_mcdi_phy_get_fecparam(struct efx_nic *efx,
    +struct ethtool_fecparam *fec)
+{
+    MCDI_DECLARE_BUF(outbuf, MC_CMD_GET_LINK_OUT_V2_LEN);
+    u32 caps, active, speed; /* MCDI format */
+    bool is_25g = false;
+    size_t outlen;
+    int rc;
+    +BUILD_BUG_ON(MC_CMD_GET_LINK_IN_LEN != 0);
+rc = efx_mcdi_rpc(efx, MC_CMD_GET_LINK, NULL, 0,
+ outbuf, sizeof(outbuf), &outlen);
+if (rc)
+return rc;
+if (outlen < MC_CMD_GET_LINK_OUT_V2_LEN)
+return -EOPNOTSUPP;
+
+/* behaviour for 25G/50G links depends on 25G BASER bit */
+speed = MCDI_DWORD(outbuf, GET_LINK_OUT_V2_LINK_SPEED);
+is_25g = speed == 25000 || speed == 50000;
+
+caps = MCDI_DWORD(outbuf, GET_LINK_OUT_V2_CAP);
+fec->fec = mcdi_fec_caps_to_ethtool(caps, is_25g);
+/* BASER is never supported on 100G */
+if (speed == 100000)
+fec->fec &= ~ETHTOOL_FEC_BASER;
+
+active = MCDI_DWORD(outbuf, GET_LINK_OUT_V2_FEC_TYPE);
+switch (active) {
+case MC_CMD_FEC_NONE:
+fec->active_fec = ETHTOOL_FEC_OFF;
+break;
+case MC_CMD_FEC_BASER:
+fec->active_fec = ETHTOOL_FEC_BASER;
+break;
+case MC_CMD_FEC_RS:
+fec->active_fec = ETHTOOL_FEC_RS;
+break;
+default:
+netif_warn(efx, hw, efx->net_dev,
+ "Firmware reports unrecognised FEC_TYPE %u\n",
+ active);
+ /* We don't know what firmware has picked. AUTO is as good a
+ * "can't happen" value as any other.
+ */
+fec->active_fec = ETHTOOL_FEC_AUTO;
+break;
+
+return 0;
+
+static int efx_mcdi_phy_set_fecparam(struct efx_nic *efx,
+     const struct ethtool_fecparam *fec)
+{                      
+struct efx_mcdi_phy_data *phy_cfg = efx->phy_data;
+u32 caps;
+int rc;
/* Work out what efx_mcdi_phy_set_link_ksettings() would produce from
 * saved advertising bits
 */

if (test_bit(ETHTOOL_LINK_MODE_Autoneg_BIT, efx->link_advertising))

caps = (ethtool_linkset_to_mcdi_cap(efx->link_advertising) |
+ 1 << MC_CMD_PHY_CAP_AN_LBN);
else

caps = phy_cfg->forced_cap;
+
caps |= ethtool_fec_caps_to_mcdi(fec->fec);
+rc = efx_mcdi_set_link(efx, caps, efx_get_mcdi_phy_flags(efx),
+  efx->loopback_mode, 0);
+if (rc)
+return rc;
+
/* Record the new FEC setting for subsequent set_link calls */
+efx->fec_config = fec->fec;
+return 0;
+

static int efx_mcdi_phy_test_alive(struct efx_nic *efx)
{
MCDI_DECLARE_BUF(outbuf, MC_CMD_GET_PHY_STATE_OUT_LEN);
@@ -966,6 +1125,8 @@
 .remove	= efx_mcdi_phy_remove,
 .get_link_ksettings = efx_mcdi_phy_get_link_ksettings,
 .set_link_ksettings = efx_mcdi_phy_set_link_ksettings,
+ .get_fecparam	= efx_mcdi_phy_get_fecparam,
+ .set_fecparam	= efx_mcdi_phy_set_fecparam,
 .test_alive	= efx_mcdi_phy_test_alive,
 .run_tests	= efx_mcdi_phy_run_tests,
 .test_name	= efx_mcdi_phy_test_name,
@@ -985,6 +1146,9 @@
 [MCDI_EVENT_LINKCHANGE_SPEED_1G] = 1000,
 [MCDI_EVENT_LINKCHANGE_SPEED_10G] = 10000,
 [MCDI_EVENT_LINKCHANGE_SPEED_40G] = 40000,
+ [MCDI_EVENT_LINKCHANGE_SPEED_25G] = 25000,
+ [MCDI_EVENT_LINKCHANGE_SPEED_50G] = 50000,
+ [MCDI_EVENT_LINKCHANGE_SPEED_100G] = 100000,
};

void efx_mcdi_process_link_change(struct efx_nic *efx, efx_qword_t *ev)
@@ -1087,7 +1251,7 @@
 int period = action == EFX_STATS_ENABLE ? 1000 : 0;
dma_addr_t dma_addr = efx->stats_buffer.dma_addr;
u32 dma_len = action != EFX_STATS_DISABLE ?
-MC_CMD_MAC_NSTATS * sizeof(u64) : 0;

+efx->num_mac_stats * sizeof(u64) : 0;

BUILD_BUG_ON(MC_CMD_MAC_STATS_OUT_DMA_LEN != 0);

@@ -1121,7 +1285,7 @@
 {
   __le64 *dma_stats = efx->stats_buffer.addr;

-dma_stats[MC_CMD_MAC_GENERATION_END] = EFX_MC_STATS_GENERATION_INVALID;
+dma_stats[efx->num_mac_stats - 1] = EFX_MC_STATS_GENERATION_INVALID;

efx_mcdi_mac_stats(efx, EFX_STATS_ENABLE, 0);
}
@@ -1139,10 +1303,10 @@
 __le64 *dma_stats = efx->stats_buffer.addr;
 int attempts = EFX_MAC_STATS_WAIT_ATTEMPTS;

-dma_stats[MC_CMD_MAC_GENERATION_END] = EFX_MC_STATS_GENERATION_INVALID;
+dma_stats[efx->num_mac_stats - 1] = EFX_MC_STATS_GENERATION_INVALID;

efx_mcdi_mac_stats(efx, EFX_STATS_PULL, 0);

-while (dma_stats[MC_CMD_MAC_GENERATION_END] ==
+while (dma_stats[efx->num_mac_stats - 1] ==
 EFX_MC_STATS_GENERATION_INVALID &&
 attempts-- != 0)
 udelay(EFX_MAC_STATS_WAIT_US);
@@ -1167,7 +1331,7 @@
 /* Allocate buffer for stats */
 rc = efx_nic_alloc_buffer(efx, &efx->stats_buffer,
 - MC_CMD_MAC_NSTATS * sizeof(u64), GFP_KERNEL);
+ efx->num_mac_stats * sizeof(u64), GFP_KERNEL);
 if (rc)
   return rc;

netif_dbg(efx, probe, efx->net_dev,
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/net_driver.h
+++ linux-4.15.0/drivers/net/ethernet/sfc/net_driver.h
@@ -191,6 +191,7 @@
 * @piobuf_offset: Buffer offset to be specified in PIO descriptors
 * @initialised: Has hardware queue been initialised?
 * @handle_tso: TSO xmit preparation handler. Sets up the TSO metadata and
+ * @timestamping: Is timestamping enabled for this channel?
 * @read_count: Current read pointer.
@@ -202,6 +203,10 @@
 * avoid cache-line ping-pong between the xmit path and the
 * completion path.
* @merge_events: Number of TX merged completion events
+
* @completed_desc_ptr: Most recent completed pointer - only used with
+
* timestamping.
+
* @completed_timestamp_major: Top part of the most recent tx timestamp.
+
* @completed_timestamp_minor: Low part of the most recent tx timestamp.
+
* @insert_count: Current insert pointer

*This is the number of buffers that have been added to the
*software ring.

```
void __iomem *piobuf;
unsigned int piobuf_offset;
bool initialised;
```
+

```
bool timestamping;
```

/* Function pointers used in the fast path. */
int (*handle_tso)(struct efx_tx_queue*, struct sk_buff*, bool *);
unsigned int merge_events;
unsigned int bytes_compl;
unsigned int pkts_compl;
unsigned int completed_desc_ptr;
+u32 completed_timestamp_major;
+u32 completed_timestamp_minor;

/* Members used only on the xmit path */
unsigned int insert_count __ cacheline_aligned_in_smp;
*
*
@ copy: Copy the channel state prior to reallocation. May be %NULL if
*reallocation is not supported.
+
* @receive_skb: Handle an skb ready to be passed to netif_receive_skb()
+
* @want_txqs: Determine whether this channel should have TX queues
+ *created. If %NULL, TX queues are not created.
+
* @keep_eventq: Flag for whether event queue should be kept initialised
+ *while the device is stopped
+
* @want_pio: Flag for whether PIO buffers should be linked to this
+ *channel's TX queues.
*/
struct efx_channel_type {
void (*handle_no_channel)(struct efx_nic *);
void (*get_name)(struct efx_channel *, char *buf, size_t len);
struct efx_channel *(*copy)(const struct efx_channel *);
bool (*receive_skb)(struct efx_channel *, struct sk_buff *);
+bool (*want_txqs)(struct efx_channel *);
bool keep_eventq;
+bool want_pio;
};
enum efx_led_mode {
    Serialised by the mac_lock.

    @get_link_ksettings: Get ethtool settings. Serialised by the mac_lock.
    @set_link_ksettings: Set ethtool settings. Serialised by the mac_lock.
    @get_fecparam: Get Forward Error Correction settings. Serialised by mac_lock.
    @set_fecparam: Set Forward Error Correction settings. Serialised by mac_lock.
    @set_npage_adv: Set abilities advertised in (Extended) Next Page
    *(only needed where AN bit is set in mmds)
    @test_alive: Test that PHY is 'alive' (online)

    struct ethtool_link_ksettings *cmd);

    int (*set_link_ksettings)(struct efx_nic *efx,
                                const struct ethtool_link_ksettings *cmd);
    +int (*get_fecparam)(struct efx_nic *efx, struct ethtool_fecparam *fec);
    +int (*set_fecparam)(struct efx_nic *efx,
                                const struct ethtool_fecparam *fec);
    void (*set_npage_adv) (struct efx_nic *efx, u32);
    int (*test_alive) (struct efx_nic *efx);
    const char *(*test_name) (struct efx_nic *efx, unsigned int index);

    @reset_work: Scheduled reset workitem
    @membase_phys: Memory BAR value as physical address
    @membase: Memory BAR value
    @vi_stride: step between per-VI registers / memory regions
    @interrupt_mode: Interrupt mode
    @timer_quantum_ns: Interrupt timer quantum, in nanoseconds
    @timer_max_ns: Interrupt timer maximum value, in nanoseconds

    @port_initialized: Port initialized?
    @net_dev: Operating system network device. Consider holding the rtnl lock
    @fixed_features: Features which cannot be turned off
    @num_mac_stats: Number of MAC stats reported by firmware (MAC_STATS_NUM_STATS
                   field of %MC_CMD_GET_CAPABILITIES_V4 response, or %MC_CMD_MAC_NSTATS)
    @stats_buffer: DMA buffer for statistics
    @phy_type: PHY type
    @phy_op: PHY interface
    @mdio_bus: PHY MDIO bus ID (only used by Siena)
    @phy_mode: PHY operating mode. Serialised by @mac_lock.
* @link_advertising: Autonegotiation advertising flags
+ * @fec_config: Forward Error Correction configuration flags. For bit positions
+ *see &enum ethtool_fec_config_bits.
 * @link_state: Current state of the link
 * @n_link_state_changes: Number of times the link has changed state
 * @unicast_filter: Flag for Falcon-arch simple unicast filter.
* @vi_init_count: Number of VFs that have been fully initialised.
 * @vi_scale: log2 number of vnics per VF.
 * @ptp_data: PTP state data
+ * @ptp_warned: has this NIC seen and warned about unexpected PTP events?
 * @vpd_sn: Serial number read from VPD
 * @monitor_work: Hardware monitor workitem
 * @biu_lock: BIU (bus interface unit) lock
@@ -812,6 +838,7 @@
    resource_size_t membase_phys;
    void __iomem *membase;

+unsigned int vi_stride;
+
enum efx_int_mode interrupt_mode;
unsigned int timer_quantum_ns;
unsigned int timer_max_ns;
@@ -875,6 +904,7 @@
    unsigned rss_spread;
    unsigned tx_channel_offset;
    unsigned n_tx_channels;
+unsigned n_extra_tx_channels;
    unsigned int rx_ip_align;
    unsigned int rx_dma_len;
    unsigned int rx_buffer_order;
@@ -918,6 +948,7 @@
    netdev_features_t fixed_features;

+u16 num_mac_stats;
struct efx_buffer stats_buffer;
u64 rx_nodesc_drops_total;
u64 rx_nodesc_drops_while_down;
@@ -930,7 +961,8 @@
    unsigned int mdio_bus;
    enum efx_phy_mode phy_mode;

-u32 link_advertising;
+__ETHTOOL_DECLARE_LINK_MODE_MASK(link_advertising);
+u32 fec_config;
struct efx_link_state link_state;
unsigned int n_link_state_changes;
struct efx_ptp_data *ptp_data;
+bool ptp_warned;

char *vpd_sn;

static inline bool efx_channel_has_tx_queues(struct efx_channel *channel)
{
-return channel->channel - channel->efx->tx_channel_offset <
-channel->efx->n_tx_channels;
+return channel->type && channel->type->want_txqs &&
+channel->type->want_txqs(channel);
}

static inline struct efx_tx_queue *
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/nic.h
+++ linux-4.15.0/drivers/net/ethernet/sfc/nic.h
@@ -325,6 +325,29 @@
EF10_STAT_tx_bad,
EF10_STAT_tx_bad_bytes,
EF10_STAT_tx_overflow,
+EF10_STAT_V1_COUNT,
+EF10_STAT_fec_uncorrected_errors = EF10_STAT_V1_COUNT,
+EF10_STAT_fec_corrected_errors,
+EF10_STAT_fec_corrected_symbols_lane0,
+EF10_STAT_fec_corrected_symbols_lane1,
+EF10_STAT_fec_corrected_symbols_lane2,
+EF10_STAT_fec_corrected_symbols_lane3,
+EF10_STAT_ctpio_v1_busy_fallback,
+EF10_STAT_ctpio_long_write_success,
+EF10_STAT_ctpio_missing_dbell_fail,
+EF10_STAT_ctpio_overflow_fail,
+EF10_STAT_ctpio_underflow_fail,
+EF10_STAT_ctpio_timeout_fail,
EF10_STAT_ctpio_noncontig_wr_fail,
EF10_STAT_ctpio_frm_clobber_fail,
EF10_STAT_ctpio_invalid_wr_fail,
EF10_STAT_ctpio_vi_clobber_fallback,
EF10_STAT_ctpio_unqualified_fallback,
EF10_STAT_ctpio_runt_fallback,
EF10_STAT_ctpio_success,
EF10_STAT_ctpio_fallback,
EF10_STAT_ctpio_poison,
EF10_STAT_ctpio_erase,
EF10_STAT_COUNT
};
@@ -416,6 +439,7 @@
struct efx_udp_tunnel udp_tunnels[16];
bool udp_tunnels_dirty;
struct mutex udp_tunnels_lock;
+u64 licensed_features;
};

int efx_init_sriov(void);
@@ -424,6 +448,7 @@
struct ethtool_ts_info;
int efx_ptp_probe(struct efx_nic *efx, struct efx_channel *channel);
void efx_ptp_defer_probe_with_channel(struct efx_nic *efx);
+struct efx_channel *efx_ptp_channel(struct efx_nic *efx);
void efx_ptp_remove(struct efx_nic *efx);
int efx_ptp_set_ts_config(struct efx_nic *efx, struct ifreq *ifr);
int efx_ptp_get_ts_config(struct efx_nic *efx, struct ifreq *ifr);
@@ -447,6 +472,8 @@
}
void efx_ptp_start_datapath(struct efx_nic *efx);
void efx_ptp_stop_datapath(struct efx_nic *efx);
+bool efx_ptp_use_mac_tx_timestamps(struct efx_nic *efx);
+ktime_t efx_ptp_nic_to_kernel_time(struct efx_tx_queue *tx_queue);

extern const struct efx_nic_type falcon_a1_nic_type;
extern const struct efx_nic_type falcon_b0_nic_type;
--- linux-4.15.0.orig/drivers/net/ethernet/sfc/ptp.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/ptp.c
@@ -149,18 +149,14 @@
/* Maximum parts-per-billion adjustment that is acceptable */
#define MAX_PPB 1000000

-/* Number of bits required to hold the above */
-#define MAX_PPB_BITS 20
-
-* Number of extra bits allowed when calculating fractional ns.
- * EXTRA_BITS + MC_CMD_PTP_IN_ADJUST_BITS + MAX_PPB_BITS should
- * be less than 63.
- */
#define PPB_EXTRA_BITS		2

/* Precalculate scale word to avoid long long division at runtime */
#define PPB_SCALE_WORD	((1LL << (PPB_EXTRA_BITS + MC_CMD_PTP_IN_ADJUST_BITS +
-MAX_PPB_BITS))) / 1000000000LL)
+/* This is equivalent to 2^66 / 10^9. */
#define PPB_SCALE_WORD	((1LL << (57)) / 1953125LL)
+
+/* How much to shift down after scaling to convert to FP40 */
#define PPB_SHIFT_FP40		26
+/* ... and FP44. */
#define PPB_SHIFT_FP44		22

#define PTP_SYNC_ATTEMPTS	4

@@ -218,8 +214,8 @@
 *@rxq: Receive queue (awaiting timestamps)
 -* @txq: Transmit queue
+ * @rxq: Receive SKB queue (awaiting timestamps)
+ * @txq: Transmit SKB queue
 * @evt_list: List of MC receive events awaiting packets
 * @evt_free_list: List of free events
 * @evt_lock: Lock for manipulating evt_list and evt_free_list
@@ -233,19 +229,36 @@
 * @config: Current timestamp configuration
 * @enabled: PTP operation enabled
 * @mode: Mode in which PTP operating (PTP version)
- * @time_format: Time format supported by this NIC
+ * @nic_time.minor_max: Wrap point for NIC minor times
+ * @nic_time.sync_event_diff_min: Minimum acceptable difference between time
+ * in packet prefix and last MCDI time sync event i.e. how much earlier than
+ * the last sync event time a packet timestamp can be.
+ * @nic_time.sync_event_diff_max: Maximum acceptable difference between time
+ * in packet prefix and last MCDI time sync event i.e. how much later than
+ * the last sync event time a packet timestamp can be.
+ * @nic_time.sync_event_minor_shift: Shift required to make minor time from
+ * field in MCDI time sync event.
+ * @min_synchronisation_ns: Minimum acceptable corrected sync window
-* @ts_corrections.tx: Required driver correction of transmit timestamps
-* @ts_corrections.rx: Required driver correction of receive timestamps
+ * @capabilities: Capabilities flags from the NIC
+ * @ts_corrections.ptp_tx: Required driver correction of PTP packet transmit
+ * timestamps
+ * @ts_corrections.ptp_rx: Required driver correction of PTP packet receive
+ * timestamps
+ * @ts_corrections.pps_out: PPS output error (information only)
+ * @ts_corrections.pps_in: Required driver correction of PPS input timestamps
+ * @ts_corrections.general_tx: Required driver correction of general packet
+ * transmit timestamps
+ * @ts_corrections.general_rx: Required driver correction of general packet
+ * receive timestamps
+ * @evt_frags: Partly assembled PTP events
+ * @evt_frag_idx: Current fragment number
+ * @evt_code: Last event code
+ * @start: Address at which MC indicates ready for synchronisation
+ * @host_time_pps: Host time at last PPS
+ * @adjfreq_ppb_shift: Shift required to convert scaled parts-per-billion
+ * frequency adjustment into a fixed point fractional nanosecond format.
+ * @current_adjfreq: Current ppb adjustment.
+ * @phc_clock: Pointer to registered phc device (if primary function)
+ * @phc_clock_info: Registration structure for phc device
+ * @oversize_sync_windows: Number of corrected sync windows that are too large
+ * @rx_no_timestamp: Number of packets received without a timestamp.
+ * @timeset: Last set of synchronisation statistics.
+ * @xmit_skb: Transmit SKB function.
*/
struct efx_ptp_data {
  struct efx_nic *efx;
  struct hwtstamp_config config;
  bool enabled;
  unsigned int mode;
  unsigned int min_synchronisation_ns;
  struct {
    unsigned int capabilities;
    struct {
      u32 minor_max;
      u32 sync_event_diff_min;
      u32 sync_event_diff_max;
      unsigned int sync_event_minor_shift;
    } nic_time;
    unsigned int sync_windows;
  } nic;
  unsigned int time_format;
  void (*ns_to_nic_time)(s64 ns, u32 *nic_major, u32 *nic_minor);
  ktime_t (*nic_to_kernel_time)(u32 nic_major, u32 nic_minor,
                                s32 correction);
  struct {
    +struct {
      +u32 minor_max;
      +u32 sync_event_diff_min;
      +u32 sync_event_diff_max;
      +unsigned int sync_event_minor_shift;
    } nic_time;
    unsigned int min_synchronisation_ns;
    unsigned int capabilities;
    struct {
      -s32 tx;
      -s32 rx;
  
```
s32 ptp_tx;
s32 ptp_rx;
s32 pps_out;
s32 pps_in;
s32 general_tx;
s32 general_rx;
} ts_corrections;
efx_qword_t evt_frags[MAX_EVENT_FRAGS];
int evt_frag_idx;
int evt_code;
struct efx_buffer start;
struct pps_event_time host_time_pps;
unsigned int adjfreq_ppb_shift;
s64 current_adjfreq;
struct ptp_clock *phc_clock;
struct ptp_clock_info phc_clock_info;

unsigned int rx_no_timestamp;
timeset[MC_CMD_PTP_OUT_SYNCHRONIZE_TIMESET_MAXNUM];
void (*xmit_skb)(struct efx_nic *efx, struct sk_buff *skb);

static int efx_phc_adjfreq(struct ptp_clock_info *ptp, s32 delta);
static int efx_phc_enable(struct ptp_clock_info *ptp, struct ptp_clock_request *request, int on);

bool efx_ptp_use_mac_tx_timestamps(struct efx_nic *efx)
{
struct efx_ef10_nic_data *nic_data = efx->nic_data;
+
+return ((efx_nic_rev(efx) >= EFX_REV_HUNT_A0) &&
+(nic_data->datapath_caps2 &
+ (1 << MC_CMD_GET_CAPABILITIES_V2_OUT_TX_MAC_TIMESTAMPING_LBN)
+));
+
+/* PTP 'extra' channel is still a traffic channel, but we only create TX queues
+ * if PTP uses MAC TX timestamps, not if PTP uses the MC directly to transmit.
+ */
+static bool efx_ptp_want_txqs(struct efx_channel *channel)
+{
+return efx_ptp_use_mac_tx_timestamps(channel->efx);
+}
+
#define PTP_SW_STAT(ext_name, field_name)				
    { #ext_name, 0, offsetof(struct efx_ptp_data, field_name) }

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#define PTP_MC_STAT(ext_name, mcdi_name)  
@@ -471,6 +513,121 @@  
return efx_ptp_s27_to_ktime(nic_major, nic_minor);
}

+/* For Medford2 platforms the time is in seconds and quarter nanoseconds. */
+static void efx_ptp_ns_to_s_qns(s64 ns, u32 *nic_major, u32 *nic_minor)
+{
+struct timespec64 ts = ns_to_timespec64(ns);
+
+*nic_major = (u32)ts.tv_sec;
+*nic_minor = ts.tv_nsec * 4;
+
+
+static ktime_t efx_ptp_s_qns_to_ktime_correction(u32 nic_major, u32 nic_minor,
+ s32 correction)
+{
+ktimc_t kt;
+
+nic_minor = DIV_ROUND_CLOSEST(nic_minor, 4);
+correction = DIV_ROUND_CLOSEST(correction, 4);
+
+kt = ktime_set(nic_major, nic_minor);
+
+if (correction >= 0)
+kt = ktime_add_ns(kt, (u64)correction);
+else
+kt = ktime_sub_ns(kt, (u64)-correction);
+return kt;
+}
+
+struct efx_channel *efx_ptp_channel(struct efx_nic *efx)
+{
+return efx->ptp_data ? efx->ptp_data->channel : NULL;
+}
+
+static u32 last_sync_timestamp_major(struct efx_nic *efx)
+{
+struct efx_channel *channel = efx_ptp_channel(efx);
+u32 major = 0;
+
+if (channel)
+major = channel->sync_timestamp_major;
+return major;
+}
+
+/* The 8000 series and later can provide the time from the MAC, which is only
+ * 48 bits long and provides meta-information in the top 2 bits.
static ktime_t
efx_ptp_mac_nic_to_ktime_correction(struct efx_nic *efx,
    struct efx_ptp_data *ptp,
    u32 nic_major, u32 nic_minor,
    s32 correction)
{
    u32 sync_timestamp;
    ktime_t kt = { 0 };
s16 delta;

    if (!(nic_major & 0x80000000)) {
        WARN_ON_ONCE(nic_major >> 16);
    } else {
        WARN_ON_ONCE(nic_major >> 16);
    }

    /* Medford provides 48 bits of timestamp, so we must get the top
     * 16 bits from the timesync event state.
     * We only have the lower 16 bits of the time now, but we do
     * have a full resolution timestamp at some point in past. As
     * long as the difference between the (real) now and the sync
     * is less than 2^15, then we can reconstruct the difference
     * between those two numbers using only the lower 16 bits of
     * each.
     * Put another way
     * a - b = ((a mod k) - b) mod k
     * when -k/2 < (a-b) < k/2. In our case k is 2^16. We know
     * (a mod k) and b, so can calculate the delta, a - b.
     */
    sync_timestamp = last_sync_timestamp_major(efx);
    delta = nic_major - sync_timestamp;

    /* Because delta is s16 this does an implicit mask down to
     * 16 bits which is what we need, assuming
     * MEDFORD_TX_SECS_EVENT_BITS is 16. delta is signed so that
     * we can deal with the (unlikely) case of sync timestamps
     * arriving from the future.
     */
    nic_major = sync_timestamp + delta;
    kt = ptp->nic_to_kernel_time(nic_major, nic_minor,
+ correction);
+}
+return kt;
+
+ktime_t efx_ptp_nic_to_kernel_time(struct efx_tx_queue *tx_queue)
+
+{
+struct efx_nic *efx = tx_queue->efx;
+struct efx_ptp_data *ptp = efx->ptp_data;
+ktime_t kt;
+
+if (efx_ptp_use_mac_tx_timestamps(efx))
+kt = efx_ptp_mac_nic_to_ktime_correction(efx, ptp,
+tx_queue->completed_timestamp_major,
+tx_queue->completed_timestamp_minor,
+ptp->ts_corrections.general_tx);
+else
+kt = ptp->nic_to_kernel_time(
+tx_queue->completed_timestamp_major,
+tx_queue->completed_timestamp_minor,
+ptp->ts_corrections.general_tx);
+return kt;
+}
+
/*/ Get PTP attributes and set up time conversions */
static int efx_ptp_get_attributes(struct efx_nic *efx)
{
@@ -502,31 +659,71 @@
return rc;
}
-	if (fmt == MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_27FRACTION) {
+-switch (fmt) {
++case MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_27FRACTION:
+ptp->ns_to_nic_time = efx_ptp_ns_to_s27;
+ptp->nic_to_kernel_time = efx_ptp_s27_to_ktime_correction;
-} else if (fmt == MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_NANOSECONDS) {
++ptp->nic_time.minor_max = 1 << 27;
++ptp->nic_time.sync_event_minor_shift = 19;
+break;
++case MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_NANOSECONDS:
+ptp->ns_to_nic_time = efx_ptp_ns_to_s_ns;
+ptp->nic_to_kernel_time = efx_ptp_s_ns_to_ktime_correction;
-} else {
++ptp->nic_time.minor_max = 1000000000;
++ptp->nic_time.sync_event_minor_shift = 22;
+break;
++case MC_CMD_PTP_OUT_GET_ATTRIBUTES_SECONDS_QTR_NANOSECONDS:
+ptp->ns_to_nic_time = efx_ptp_ns_to_s_qns;
+ptp->nic_to_kernel_time = efx_ptp_s_qns_to_ktime_correction;
+ptp->nic_time.minor_max = 4000000000UL;
+ptp->nic_time.sync_event_minor_shift = 24;
+break;
+default:
return -ERANGE;
}

-ptp->time_format = fmt;
-
-/* MC_CMD_PTP_OP_GET_ATTRIBUTES is an extended version of an older
- * operation MC_CMD_PTP_OP_GET_TIME_FORMAT that also returns a value
- * to use for the minimum acceptable corrected synchronization window.
+/* Precalculate acceptable difference between the minor time in the
+ * packet prefix and the last MCDI time sync event. We expect the
+ * packet prefix timestamp to be after of sync event by up to one
+ * sync event interval (0.25s) but we allow it to exceed this by a
+ * fuzz factor of (0.1s)
+ */

+ptp->nic_time.sync_event_diff_min = ptp->nic_time.minor_max
+- (ptp->nic_time.minor_max / 10);
+ptp->nic_time.sync_event_diff_max = (ptp->nic_time.minor_max / 4)
++ (ptp->nic_time.minor_max / 10);
+
+/* MC_CMD_PTP_OP_GET_ATTRIBUTES has been extended twice from an older
+ * operation MC_CMD_PTP_OP_GET_TIME_FORMAT. The function now may return
+ * a value to use for the minimum acceptable corrected synchronization
+ * window and may return further capabilities.
* If we have the extra information store it. For older firmware that
* does not implement the extended command use the default value.
 */
-if (rc == 0 && out_len >= MC_CMD_PTP_OUT_GET_ATTRIBUTES_LEN)
+if (rc == 0 &&
+ out_len >= MC_CMD_PTP_OUT_GET_ATTRIBUTES_CAPABILITIES_OFST)
ptp->min_synchronisation_ns =
MCDI_DWORD(outbuf,
 PTP_OUT_GET_ATTRIBUTES_SYNC_WINDOW_MIN);
else
ptp->min_synchronisation_ns = DEFAULT_MIN_SYNCHRONISATION_NS;
+
+if (rc == 0 &&
+ out_len >= MC_CMD_PTP_OUT_GET_ATTRIBUTES_LEN)
+ptp->capabilities = MCDI_DWORD(outbuf,
+PTP_OUT_GET_ATTRIBUTES_CAPABILITIES);
+else
+ptp->capabilities = 0;
+
Set up the shift for conversion between frequency adjustments in parts-per-billion and the fixed-point fractional as format that the adapter uses.

```c
if (ptp->capabilities & (1 << MC_CMD_PTP_OUT_GET_ATTRIBUTES_FP44_FREQ_ADJ_LBN))
    ptp->adjfreq_ppb_shift = PPB_SHIFT_FP44;
else
    ptp->adjfreq_ppb_shift = PPB_SHIFT_FP40;
```

Get the timestamp corrections from the NIC. If this operation is not supported (older NICs) then no correction is required.

```c
MCDI_SET_DWORD(inbuf, PTP_IN_PERIPH_ID, 0);
rc = efx_mcdi_rpc_quiet(efx, MC_CMD_PTP, inbuf, sizeof(inbuf),
              -outbuf, sizeof(outbuf), NULL);
+outbuf, sizeof(outbuf), &out_len);
if (rc == 0) {
    -efx->ptp_data->ts_corrections.tx = MCDI_DWORD(outbuf,
    +efx->ptp_data->ts_corrections.ptp_tx = MCDI_DWORD(outbuf,
    PTP_OUT_GET_TIMESTAMP_CORRECTIONS_TRANSMIT);
    -efx->ptp_data->ts_corrections.rx = MCDI_DWORD(outbuf,
    +efx->ptp_data->ts_corrections.ptp_rx = MCDI_DWORD(outbuf,
    PTP_OUT_GET_TIMESTAMP_CORRECTIONS_RECEIVE);
    efx->ptp_data->ts_corrections.pps_out = MCDI_DWORD(outbuf,
    PTP_OUT_GET_TIMESTAMP_CORRECTIONS_PPS_OUT);
    efx->ptp_data->ts_corrections.pps_in = MCDI_DWORD(outbuf,
    PTP_OUT_GET_TIMESTAMP_CORRECTIONS_PPS_IN);
    +
    +if (out_len >= MC_CMD_PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_LEN) {
        -efx->ptp_data->ts_corrections.general_tx = MCDI_DWORD(outbuf,
        +PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_GENERAL_TX);
        +efx->ptp_data->ts_corrections.general_rx = MCDI_DWORD(outbuf,
        +PTP_OUT_GET_TIMESTAMP_CORRECTIONS_V2_GENERAL_RX);
```
+} else {
  
  efx->ptp_data->ts_corrections.general_tx =
  efx->ptp_data->ts_corrections.ptp_tx;
  efx->ptp_data->ts_corrections.ptp_rx =
  efx->ptp_data->ts_corrections.general_rx;
  +} } else if (rc == -EINVAL) {
-  efx->ptp_data->ts_corrections.tx = 0;
-  efx->ptp_data->ts_corrections.rx = 0;
+  efx->ptp_data->ts_corrections.ptp_tx = 0;
+  efx->ptp_data->ts_corrections.ptp_rx = 0;
  efx->ptp_data->ts_corrections.pps_out = 0;
  efx->ptp_data->ts_corrections.pps_in = 0;
  +efx->ptp_data->ts_corrections.general_tx = 0;
  +efx->ptp_data->ts_corrections.general_rx = 0;
} else {  
  efx_mcdi_display_error(efx, MC_CMD_PTP, sizeof(inbuf), outbuf,
  sizeof(outbuf), rc);
  @@ -873,8 +1087,24 @@
  return rc;
  }

+ /* Transmit a PTP packet via the dedicated hardware timestamped queue. */
+ static void efx_ptp_xmit_skb_queue(struct efx_nic *efx, struct sk_buff *skb)
+ {
+ struct efx_ptp_data *ptp_data = efx->ptp_data;
+ struct efx_tx_queue *tx_queue;
+ u8 type = skb->ip_summed == CHECKSUM_PARTIAL ? EFX_TXQ_TYPE_OFFLOAD : 0;
+ 
+ tx_queue = &ptp_data->channel->tx_queue[type];
+ if (tx_queue && tx_queue->timestamping) {
+ efx_enqueue_skb(tx_queue, skb);
+ } else {
+ WARN_ONCE(1, "PTP channel has no timestamped tx queue\n");
+ dev_kfree_skb_any(skb);
+ }
+ }
+ 
+ /* Transmit a PTP packet via the MCDI interface, to the wire. */
- static int efx_ptp_xmit_skb(struct efx_nic *efx, struct sk_buff *skb)
+ static void efx_ptp_xmit_skb_mc(struct efx_nic *efx, struct sk_buff *skb)
+ {
 struct efx_ptp_data *ptp_data = efx->ptp_data;
 struct skb_shared_hwtstamps timestamps;
 @@ -910,16 +1140,16 @@
 timestamps.hwtstamp = ptp_data->nic_to_kernel_time(
 MCDI_DWORD(txtime, PTP_OUT_TRANSMIT_MAJOR),
 MCDI_DWORD(txtime, PTP_OUT_TRANSMIT_MINOR),

-ptp_data->ts_corrections.tx);
+ptp_data->ts_corrections.ptp.tx);

skb_tstamp_tx(skb, &timestamps);

rc = 0;

fail:
-dev_kfree_skb(skb);
+dev_kfree_skb_any(skb);

-return rc;
+return;
}

static void efx_ptp_drop_time_expired_events(struct efx_nic *efx)
@@ -1189,7 +1419,7 @@
efx_ptp_process_events(efx, &tempq);

while ((skb = skb_dequeue(&ptp_data->txq)))
-efx_ptp_xmit_skb(efx, skb);
+%tp_data->xmit_skb(efx, skb);

while ((skb = __skb_dequeue(&tempq)))
efx_ptp_process_rx(efx, skb);
@@ -1239,6 +1469,14 @@
goto fail2;
}

+if (efx_ptp_use_mac_tx_timestamps(efx)) {
+ptp->xmit_skb = efx_ptp_xmit_skb_queue;
+/* Request sync events on this channel. */
+channel->sync_events_state = SYNC_EVENTS QUIESCENT;
+} else {
+ptp->xmit_skb = efx_ptp_xmit_skb_mc;
+
+INIT_WORK(&ptp->work, efx_ptp_worker);
+ptp->config.flags = 0;
+ptp->config.tx_type = HWTSTAMP_TX_OFF;
@@ -1303,11 +1541,21 @@
static int efx_ptp_probe_channel(struct efx_channel *channel)
{
 struct efx_nic *efx = channel->efx;
+int rc;

channel->irq_moderation_us = 0;
channel->rx_queue.core_index = 0;
-return efx_ptp_probe(efx, channel);
+rc = efx_ptp_probe(efx, channel);
+/* Failure to probe PTP is not fatal; this channel will just not be
+ * used for anything.
+ * In the case of EPERM, efx_ptp_probe will print its own message (in
+ * efx_ptp_get_attributes()), so we don't need to.
+ */
+if (rc && rc != -EPERM)
+netif_warn(efx, drv, efx->net_dev, 
+ "Failed to probe PTP, rc=%d", rc);
+return 0;
}

void efx_ptp_remove_channel(struct efx_channel *channel)
@@ -1548,6 +1798,17 @@

ts_info->so_timestamping |= (SOF_TIMESTAMPING_TX_HARDWARE |
+SOF_TIMESTAMPING_RX_HARDWARE |
+SOF_TIMESTAMPING_RAW_HARDWARE);
+/* Check licensed features. If we don't have the license for TX
+ * timestamps, the NIC will not support them.
+ */
+if (efx_ptp_use_mac_tx_timestamps(efx)) {
+struct efx_ef10_nic_data *nic_data = efx->nic_data;
+
+if (!(nic_data->licensed_features &
+ (1 << LICENSED_V3_FEATURES_TX_TIMESTAMPS_LBN)))
+ts_info->so_timestamping &=
+-SOF_TIMESTAMPING_TX_HARDWARE;
+}
if (primary && primary->ptp_data && primary->ptp_data->phc_clock)
  ptp_clock_index =
  ptp_clock_index(primary->ptp_data->phc_clock);
@@ -1627,7 +1888,7 @@
  evt->hwtimestamp = efx->ptp_data->nic_to_kernel_time(
    EFX_QWORD_FIELD(ptp->evt_frags[0], MCDI_EVENT_DATA),
    EFX_QWORD_FIELD(ptp->evt_frags[1], MCDI_EVENT_DATA),
-    ptp->ts_corrections.rx);
+    ptp->ts_corrections.ptp_rx);
  evt->expiry = jiffies + msecs_to_jiffies(PKT_EVENT_LIFETIME_MS);
  list_add_tail(&evt->link, &ptp->evt_list);

@@ -1662,9 +1923,11 @@
 int code = EFX_QWORD_FIELD(*ev, MCDI_EVENT_CODE);

 if (!ptp) {
-  if (net_ratelimit())
+  if (!efx->ptp_warned) {
    netif_warn(efx, drv, efx->net_dev,
       "Received PTP event but PTP not set up\n");
+    efx->ptp_warned = true;
+  }
  return;
 }

@@ -1707,9 +1970,20 @@
 void efx_time_sync_event(struct efx_channel *channel, efx_qword_t *ev)
 {
  +struct efx_nic *efx = channel->efx;
  +struct efx_ptp_data *ptp = efx->ptp_data;
  +
  +/* When extracting the sync timestamp minor value, we should discard
  + the least significant two bits. These are not required in order
  + to reconstruct full-range timestamps and they are optionally used
  + to report status depending on the options supplied when subscribing
  + for sync events.
  + */
  channel->sync_timestamp_major = MCDI_EVENT_FIELD(*ev, PTP_TIME_MAJOR);
  channel->sync_timestamp_minor =
-  MCDI_EVENT_FIELD(*ev, PTP_TIME_MINOR_26_19) << 19;
+  (MCDI_EVENT_FIELD(*ev, PTP_TIME_MINOR_MS_8BITS) & 0xFC)
  +<< ptp->nic_time.sync_event_minor_shift;
  +
  /* if sync events have been disabled then we want to silently ignore
  * this event, so throw away result.
  */
-  @@ -1717,15 +1991,6 @@
SYNC_EVENTS_VALID);
}

-/* make some assumptions about the time representation rather than abstract it,
- * since we currently only support one type of inline timestamping and only on
- * EF10.
- */
-#define MINOR.Ticks_PER_SECOND 0x8000000
-/* Fuzz factor for sync events to be out of order with RX events */
-#define FUZZ (MINOR.Ticks_PER_SECOND / 10)
-#define EXPECTED_SYNC_EVENTS_PER_SECOND 4
-
static inline u32 efx_rx_buf_timestamp_minor(struct efx_nic *efx, const u8 *eh)
{
#if defined(CONFIG_HAVE_EFFICIENT_UNALIGNED_ACCESS)
@@ -1743,31 +2008,33 @@
 struct sk_buff *skb)
 {
 struct efx_nic *efx = channel->efx;
 +struct efx_ptp_data *ptp = efx->ptp_data;
 u32 pkt_timestamp_major, pkt_timestamp_minor;
 u32 diff, carry;
 struct skb_shared_hwtstamps *timestamps;

-pkt_timestamp_minor = (efx_rx_buf_timestamp_minor(efx,
- skb_mac_header(skb)) +
- (u32) efx->ptp_data->ts_corrections.rx) &
- (MINOR.Ticks_PER_SECOND - 1);
+if (channel->sync_events_state != SYNC_EVENTS_VALID)
+ return;
+ pkt_timestamp_minor = efx_rx_buf_timestamp_minor(efx, skb_mac_header(skb));

 /* get the difference between the packet and sync timestamps,
 * modulo one second
 */
-diff = (pkt_timestamp_minor - channel->sync_timestamp_minor) &
-(MINOR.Ticks_PER_SECOND - 1);
+if (pkt_timestamp_minor < channel->sync_timestamp_minor)
+diff += ptp->nic_time.minor_max;
+ pkt_timestamp_minor = efx_rx_buf_timestamp_minor(efx, skb_mac_header(skb));

 /* do we roll over a second boundary and need to carry the one? */
-carry = channel->sync_timestamp_minor + diff > MINOR.Ticks_PER_SECOND ?
+carry = (channel->sync_timestamp_minor > ptp->nic_time.minor_max - diff) ?
 1 : 0;

-if (diff <= MINOR.Ticks_PER_SECOND / EXPECTED_SYNC_EVENTS_PER_SECOND +
    FUZZ)
- FUZZ) {
+if (diff <= ptp->nic_time.sync_event_diff_max) {
 /* packet is ahead of the sync event by a quarter of a second or
 * less (allowing for fuzz)
 */
 pkt_timestamp_major = channel->sync_timestamp_major + carry;
-} else if (diff >= MINOR_TICKS_PER_SECOND - FUZZ) {
+} else if (diff >= ptp->nic_time.sync_event_diff_min) {
 /* packet is behind the sync event but within the fuzz factor.
 * This means the RX packet and sync event crossed as they were
 * placed on the event queue, which can sometimes happen.
@@ -1789,7 +2056,9 @@
 /* attach the timestamps to the skb */
 timestamps = skb_hwtstamps(skb);
 timestamps->hwtstamp =
-efx_ptp_s27_to_ktime(pkt_timestamp_major, pkt_timestamp_minor);
+ptp->nic_to_kernel_time(pkt_timestamp_major,
+ptp->nic_to_kernel_time(pkt_timestamp_major,
+ptp->ts_corrections.general_rx);
}

static int efx_phc_adjfreq(struct ptp_clock_info *ptp, s32 delta)
@@ -1807,9 +2076,10 @@
 else if (delta < -MAX_PPB)
 delta = -MAX_PPB;

-/* Convert ppb to fixed point ns. */
-adj adjustment ns = (((s64)delta * PPB_SCALE_WORD) >>
- (PPB_EXTRA_BITS + MAX_PPB_BITS));
+/* Convert ppb to fixed point ns taking care to round correctly. */
+adj adjustment ns = ((s64)delta * PPB_SCALE_WORD +
+ (1 << (ptp_data->adjfreq_ppb_shift - 1))) >>
+ptp_data->adjfreq_ppb_shift;

MCDI_SET_DWORD(inadj, PTP_IN_OP, MC_CMD_PTP_OP_ADJUST);
MCDI_SET_DWORD(inadj, PTP_IN_PERIPH_ID, 0);
"t @ -1916,6 +2186,7 @@
get_name= efx_ptp_get_channel_name,
/* no copy operation; there is no need to reallocate this channel */
.receive_skb= efx_ptp_rx,
.want_txqs= efx_ptp_want_txqs,
.keep_eventq= false,
};

--- linux-4.15.0.orig/drivers/net/ethernet/sfc/siena.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/siena.c
@@ -242,6 +242,14 @@
return 0;
*/
+ * On all Falcon-architecture NICs, PFs use BAR 0 for I/O space and BAR 2(&3)
+ * for memory.
+ */
+static unsigned int siena_mem_bar(struct efx_nic *efx)
+ {
+ return 2;
+ }
+
+static unsigned int siena_mem_map_size(struct efx_nic *efx)
+ {
+ return FR_CZ_MC_TREG_SMEM +
+ @ @ -547,7 +555,7 @ @
+
+ dma_stats = efx->stats_buffer.addr;
+
+ generation_end = dma_stats[MC_CMD_MAC_GENERATION_END];
+ generation_end = dma_stats[efx->num_mac_stats - 1];
+ if (generation_end == EFX_MC_STATS_GENERATION_INVALID)
+ return 0;
+ rmb();
+ @ @ -950,7 +958,7 @ @
+
+ const struct efx_nic_type siena_a0_nic_type = {
+ .is_vf = false,
+ .mem_bar = EFX_MEM_BAR,
+ .mem_bar = siena_mem_bar,
+ .mem_map_size = siena_mem_map_size,
+ .probe = siena_probe_nic,
+ .remove = siena_remove_nic,
+ --- linux-4.15.0.orig/drivers/net/ethernet/sfc/tx.c
+++ linux-4.15.0/drivers/net/ethernet/sfc/tx.c
@@ -77,9 +77,23 @@
}
}

if (buffer->flags & EFX_TX_BUF_SKB) {
+ struct sk_buff *skb = (struct sk_buff *)buffer->skb;
+ EFX_WARN_ON_PARANOID(!pkts_compl || !bytes_compl);
+ (*pkts_compl)++;
+ (*bytes_compl) += buffer->skb->len;
+ (*bytes_compl) += skb->len;
+ if (tx_queue->timestamping &&
+ (tx_queue->completed_timestamp_major ||
+ tx_queue->completed_timestamp_minor)) {
+ struct skb_shared_hwtstamps hwtstamp;
+ +
hwtstamp.
hwtstamp =
efx_ptp_nic_to_kernel_time(tx_queue);
skb_tstamp_tx(skb, &hwtstamp);
+
tx_queue->completed_timestamp_major = 0;
tx_queue->completed_timestamp_minor = 0;
+
dev_consume_skb_any((struct sk_buff *)buffer->skb);
netif_vdbg(tx_queue->efx, tx_done, tx_queue->efx->net_dev,
"TX queue %d transmission id %x complete\n",
@@ -421,17 +435,18 @@
} while (1);
}

-/* Remove buffers put into a tx_queue. None of the buffers must have
-* an skb attached.
+/* Remove buffers put into a tx_queue for the current packet.
+ * None of the buffers must have an skb attached.
 */
-static void efx_enqueue_unwind(struct efx_tx_queue *tx_queue)
+static void efx_enqueue_unwind(struct efx_tx_queue *tx_queue,
+      unsigned int insert_count)
{
struct efx_tx_buffer *buffer;
unsigned int bytes_compl = 0;
unsigned int pkts_compl = 0;

-/* Work backwards until we hit the original insert pointer value */
-while (tx_queue->insert_count != tx_queue->write_count) {
+while (tx_queue->insert_count != insert_count) {
--tx_queue->insert_count;
buffer = __efx_tx_queue_get_insert_buffer(tx_queue);
efx_dequeue_buffer(tx_queue, buffer, &pkts_compl, &bytes_compl);
@@ -490,6 +505,8 @@
*/
netdev_tx_t efx_enqueue_skb(struct efx_tx_queue *tx_queue, struct sk_buff *skb)
{
+unsigned int old_insert_count = tx_queue->insert_count;
+bool xmit_more = skb->xmit_more;
bool data_mapped = false;
unsigned int segments;
unsigned int skb_len;
@@ -539,8 +556,10 @@
/* Update BQL */
netdev_tx_sent_queue(tx_queue->core_txq, skb_len);
+
efx_tx_maybe_stop_queue(tx_queue);
/* Pass off to hardware */
-if (!skb->xmit_more || netif_xmit_stopped(tx_queue->core_txq)) {
+if (!xmit_more || netif_xmit_stopped(tx_queue->core_txq)) {
  struct efx_tx_queue *txq2 = efx_tx_queue_partner(tx_queue);

  /* There could be packets left on the partner queue if those
   * There could be packets left on the partner queue if those
   * @ @ -563.14 +582.26 @@
   * tx_queue->tx_packets++;
   */
  -efx_tx_maybe_stop_queue(tx_queue);
  -
  return NETDEV_TX_OK;
}

  -efx_tx_maybe_stop_queue(tx_queue);
  -
  return NETDEV_TX_OK;

err:
  -efx_enqueue_unwind(tx_queue);
+  +efx_enqueue_unwind(tx_queue, old_insert_count);
  dev_kfree_skb_any(skb);
+  +
+  */ If we're not expecting another transmit and we had something to push
+  * on this queue or a partner queue then we need to push here to get the
+  * previous packets out.
+  */
  +if (!xmit_more) {
    struct efx_tx_queue *txq2 = efx_tx_queue_partner(tx_queue);
    +
    +if (txq2->xmit_more_available)
      +efx_nic_pushBuffers(txq2);
      +
      +efx_nic_pushBuffers(tx_queue);
      +}
    +
    return NETDEV_TX_OK;
  }

  @@ -828,6 +859,11 @@
  tx_queue->old_read_count = 0;
  tx_queue->empty_read_count = 0 | EFX_EMPTY_COUNT_VALID;
  tx_queue->xmit_more_available = false;
+t+tx_queue->timestamping = (efx_ptp_use_mac_tx_timestamps(efx) &&
+  +tx_queue->channel == efx_ptp_channel(efx));
+t+tx_queue->completed_desc_ptr = tx_queue->ptr_mask;
+t+tx_queue->completed_timestamp_major = 0;
+t+tx_queue->completed_timestamp_minor = 0;

  /* Set up default function pointers. These may get replaced by
  * efx_nic_init_tx() based off NIC/queue capabilities.
/* setup various bits in PCI command register */
- ret = pci_enable_device(pci_dev);
+ ret = pcim_enable_device(pci_dev);
if(ret) return ret;

i = pci_set_dma_mask(pci_dev, DMA_BIT_MASK(32));
@ @ -467,7 +467,7 @@
ioaddr = pci_iomap(pci_dev, 0, 0);
if (!ioaddr) {
 ret = -ENOMEM;
 -goto err_out_cleardev;
+goto err_out;
 }

sis_priv = netdev_priv(net_dev);
@ @ -575,8 +575,6 @@
sis_priv->tx_ring_dma);
err_out_unmap:
pci_iounmap(pci_dev, ioaddr);
-err_out_cleardev:
-pci_release_regions(pci_dev);
err_out:
free_netdev(net_dev);
return ret;
@ @ -783,10 +781,9 @@
static void sis900_set_capability(struct net_device *net_dev, struct mii_phy *phy)
{
 u16 cap;
-u16 status;

-status = mii_read(net_dev, phy->phy_addr, MII_STATUS);
-status = mii_read(net_dev, phy->phy_addr, MII_STATUS);
+mdio_read(net_dev, phy->phy_addr, MII_STATUS);
+mdio_read(net_dev, phy->phy_addr, MII_STATUS);

cap = MII_NWAY_CSMA_CD |
((phy->status & MII_STAT_CAN_TX_FDX)? MII_NWAY_TX_FDX:0) |
@ @ -1057,7 +1054,7 @@
sis900_set_mode(sis_priv, HW_SPEED_10_MBPS, FDX_CAPABLE_HALF_SELECTED);

/* Enable all known interrupts by setting the interrupt mask. */
-sw32(imr, RxSOVR | RxORN | RxERR | TxURN | TxERR | TxIDLE);
+sw32(imr, RxSOVR | RxORN | RxERR | RxOK | TxURN | TxERR | TxIDLE | TxDESC);
sw32(cr, RxENA | sr32(cr));
sw32(ier, IE);

@@ -1578,7 +1575,7 @@
sw32(txdp, sis_priv->tx_ring_dma);

/* Enable all known interrupts by setting the interrupt mask. */
-sw32(imr, RxSOVR | RxORN | RxERR | RxOK | TxURN | TxERR | TxIDLE);
+sw32(imr, RxSOVR | RxORN | RxERR | RxOK | TxURN | TxERR | TxIDLE | TxDESC);
}

/**
 @@ -1618,7 +1615,7 @@
 spin_unlock_irqrestore(&sis_priv->lock, flags);
 return NETDEV_TX_OK;
 }
-sis_priv->tx_ring[entry].cmdsts = (OWN | skb->len);
+sis_priv->tx_ring[entry].cmdsts = (OWN | INTR | skb->len);
sw32(cr, TxEPA | sr32(cr));

sis_priv->cur_tx ++;
@@ -1674,7 +1671,7 @@
do {
    status = sr32(isr);

-if ((status & (HIBERR|TxURN|TxERR|TxIDLE|RxORN|RxERR|RxOK)) == 0)
+if ((status & (HIBERR|TxURN|TxERR|TxIDLE|TxDESC|RxORN|RxERR|RxOK)) == 0)
    /* nothing interesting happened */
    break;
    handled = 1;
@@ -1684,7 +1681,7 @@
/* Rx interrupt */
sis900_rx(net_dev);

-if (status & (TxURN | TxERR | TxIDLE))
+if (status & (TxURN | TxERR | TxIDLE | TxDESC))
    /* Tx interrupt */
sis900_finish_xmit(net_dev);

@@ -1896,8 +1893,8 @@

if (tx_status & OWN) {
    /* The packet is not transmitted yet (owned by hardware)!
    - * Note: the interrupt is generated only when Tx Machine
    - * is idle, so this is an almost impossible case */
    + * Note: this is an almost impossible condition
    + * in case of TxDESC ('descriptor interrupt') */
    break;
@@ -2422,7 +2419,6 @@
sis_priv->tx_ring_dma);
pci_iounmap(pci_dev, sis_priv->ioaddr);
free_netdev(net_dev);
-pci_release_regions(pci_dev);
}

#ifdef CONFIG_PM
@@ -2473,7 +2469,7 @@
sis900_set_mode(sis_priv, HW_SPEED_10_MBPS, FDX_CAPABLE_HALF_SELECTED);

/* Enable all known interrupts by setting the interrupt mask. */
-sw32(imr, RxSOVR | RxORN | RxERR | RxOK | TxURN | TxERR | TxIDLE);
+sw32(imr, RxSOVR | RxORN | RxERR | RxOK | TxURN | TxERR | TxIDLE | TxDESC);
sw32(cr, RxENA | sr32(cr));
sw32(ier, IE);

--- linux-4.15.0.orig/drivers/net/ethernet/smsc/smc911x.c
+++ linux-4.15.0/drivers/net/ethernet/smsc/smc911x.c
@@ -514,7 +514,8 @@
 now, or set the card to generates an interrupt when ready
 * for the packet.
 */
-static int smc911x_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+smc911x_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
 struct smc911x_local *lp = netdev_priv(dev);
 unsigned int free;
@@ -947,7 +948,7 @@
 if (lp->ctl_rspeed != 100)
 my_ad_caps &= ~(ADVERTISE_100BASE4|ADVERTISE_100FULL|ADVERTISE_100HALF);

- if (!lp->ctl_rfduplx)
+if (!lp->ctl_rfduplx)
 my_ad_caps &= ~(ADVERTISE_100FULL|ADVERTISE_10FULL);

 /* Update our Auto-Neg Advertisement Register */
--- linux-4.15.0.orig/drivers/net/ethernet/smsc/smc91x.c
+++ linux-4.15.0/drivers/net/ethernet/smsc/smc91x.c
@@ -638,7 +638,8 @@
 now, or set the card to generates an interrupt when ready
 * for the packet.
 */
-static int smc_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+smc_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
+smc_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
struct smc_local *lp = netdev_priv(dev);
void __iomem *ioaddr = lp->base;
@@ -2293,7 +2294,7 @@
ret = try_toggle_control_gpio(&pdev->dev, &lp->power_gpio,
    "power", 0, 0, 100);
if (ret)
    -return ret;
    +goto out_free_netdev;
/*
 * Optional reset GPIO configured? Minimum 100 ns reset needed
@@ -2302,7 +2303,7 @@
ret = try_toggle_control_gpio(&pdev->dev, &lp->reset_gpio,
    "reset", 0, 0, 100);
if (ret)
    -return ret;
    +goto out_free_netdev;
*/
    /*
 * Need to wait for optional EEPROM to load, max 750 us according
--- linux-4.15.0.orig/drivers/net/ethernet/smsc/smsc911x.c
+++ linux-4.15.0/drivers/net/ethernet/smsc/smsc911x.c
@@ -1786,7 +1786,8 @@
}
/* Entry point for transmitting a packet */
-static int smsc911x_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+smsc911x_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
struct smsc911x_data *pdata = netdev_priv(dev);
unsigned int freespace;
@@ -2335,14 +2336,14 @@
pdata = netdev_priv(dev);
BUG_ON(!pdata);
BUG_ON(!pdata->ioaddr);
-WARN_ON(dev->phydev);
    +unregister_netdev(dev);
    +
    mdiobus_unregister(pdata->mii_bus);
    mdiobus_free(pdata->mii_bus);
    -unregister_netdev(dev);

SMSC_TRACE(pdata, ifdown, "Stopping driver");
res = platform_get_resource_byname(pdev, IORESOURCE_MEM,  
    "smsc911x-memory");
if (!res)
@@ -2514,20 +2515,20 @@
    retval = smsc911x_init(dev);
    if (retval < 0)
        goto out_disable_resources;
    +goto out_init_fail;

    netif_carrier_off(dev);
    retval = smsc911x_mii_init(pdev, dev);
    if (retval) {
        SMSC_WARN(pdata, probe, "Error %i initialising mii", retval);
        -goto out_disable_resources;
        +goto out_init_fail;
    }  
   (retval = register_netdev(dev);
    if (retval) {
        SMSC_WARN(pdata, probe, "Error %i registering device", retval);
        -goto out_disable_resources;
        +goto out_init_fail;
    } else {
        SMSC_TRACE(pdata, probe,
            "Network interface: \"%s\", dev->name);
        @@ -2568,9 +2569,10 @@

    return 0;

    -out_disable_resources:
    +out_init_fail:
        pm_runtime_put(&pdev->dev);
        pm_runtime_disable(&pdev->dev);
        +out_disable_resources:
        (void)smsc911x_disable_resources(pdev);
        out_enable_resources_fail:
        smsc911x_free_resources(pdev);
        --- linux-4.15.0.orig/drivers/net/ethernet/socionext/Kconfig
        +++ linux-4.15.0/drivers/net/ethernet/socionext/Kconfig
        @@ -0,0 +1,26 @@
        +config NET_VENDOR_SOCIONEXT
        +bool "Socionext ethernet drivers"
        +default y
        +---help---
        + Option to select ethernet drivers for Socionext platforms.
        +
Note that the answer to this question doesn't directly affect the kernel: saying N will just cause the configurator to skip all the questions about Socionext devices. If you say Y, you will be asked for your specific card in the following questions.

```bash
if NET_VENDOR_SOCIONEXT
+config SNI_NETSEC
+tristate "Socionext NETSEC ethernet support"
+depends on (ARCH_SYNQUACER || COMPILE_TEST) && OF
+select PHYLIB
+select MII
+---help---
+ Enable to add support for the SocioNext NetSec Gigabit Ethernet controller + PHY, as found on the Synquacer SC2A11 SoC
+ To compile this driver as a module, choose M here: the module will be called netsec. If unsure, say N.
+
+endif #NET_VENDOR_SOCIONEXT
--- linux-4.15.0.orig/drivers/net/ethernet/socionext/Makefile
+++ linux-4.15.0/drivers/net/ethernet/socionext/Makefile
@@ -0,0 +1,5 @@
+# SPDX-License-Identifier: GPL-2.0
+#
+# Makefile for all ethernet ip drivers on Socionext platforms
+#
+obj-$(CONFIG_SNI_NETSEC) += netsec.o
--- linux-4.15.0.orig/drivers/net/ethernet/socionext/netsec.c
+++ linux-4.15.0/drivers/net/ethernet/socionext/netsec.c
@@ -0,0 +1,1815 @@
+# SPDX-License-Identifier: GPL-2.0+
+
+#include <linux/types.h>
+#include <linux/clk.h>
+#include <linux/platform_device.h>
+#include <linux/pm_runtime.h>
+#include <linux/acpi.h>
+#include <linux/of_mdio.h>
+#include <linux/etherdevice.h>
+#include <linux/interrupt.h>
+#include <linux/io.h>
+
+#include <net/tcp.h>
+#include <net/ip6_checksum.h>
+
+#define NETSEC_REG_SOFT_RST 0x104
+#define NETSEC_REG_COM_INIT 0x120
```
+ #define NETSEC_REG_TOP_STATUS 0x200
+ #define NETSEC_IRQ_RXBIT(1)
+ #define NETSEC_IRQ_TXBIT(0)
+
+ #define NETSEC_REG_TOP_INTEN 0x204
+ #define NETSEC_REG_INTEN_SET 0x234
+ #define NETSEC_REG_INTEN_CLR 0x238
+
+ #define NETSEC_REG_NRM_TX_STATUS 0x400
+ #define NETSEC_REG_NRM_TX_INTEN 0x404
+ #define NETSEC_REG_NRM_TX_INTEN_SET 0x428
+ #define NETSEC_REG_NRM_TX_INTEN_CLR 0x42c
+ #define NRM_TX_ST_NTOWNRBIT(17)
+ #define NRM_TX_ST_TR_ERRBIT(16)
+ #define NRM_TX_ST_TXDONEBIT(15)
+ #define NRM_TX_ST_TMREXPBIT(14)
+
+ #define NETSEC_REG_NRM_RX_STATUS 0x440
+ #define NETSEC_REG_NRM_RX_INTEN 0x444
+ #define NETSEC_REG_NRM_RX_INTEN_SET 0x468
+ #define NETSEC_REG_NRM_RX_INTEN_CLR 0x46c
+ #define NRM_RX_ST_RC_ERRBIT(16)
+ #define NRM_RX_ST_PKTNCNTBIT(15)
+ #define NRM_RX_ST_TMREXPBIT(14)
+
+ #define NETSEC_REG_PKT_CMD_BUF 0xd0
+
+ #define NETSEC_REG_CLK_EN 0x100
+
+ #define NETSEC_REG_PKT_CTRL 0x140
+
+ #define NETSEC_REG_DMA_TMR_CTRL 0x20c
+ #define NETSEC_REG_F_TAIKI_MC_VER 0x22c
+ #define NETSEC_REG_F_TAIKI_VER 0x230
+ #define NETSEC_REG_DMA_HM_CTRL 0x214
+ #define NETSEC_REG_DMA_MH_CTRL 0x220
+ #define NETSEC_REG_ADDR_DIS_CORE 0x218
+ #define NETSEC_REG_DMAC_HM_CMD_BUF 0x210
+ #define NETSEC_REG_DMAC_MH_CMD_BUF 0x21c
+
+ #define NETSEC_REG_NRM_TX_PKTNCNT 0x410
+
+ #define NETSEC_REG_NRM_TX_DONE_PKTNCNT 0x414
+ #define NETSEC_REG_NRM_TX_DONE_TXINT_PKTNCNT 0x418
+
+ #define NETSEC_REG_NRM_TX_TMR 0x41c
+
+#define NETSEC_REG_NRM_RX_PKTCNT0x454
+define NETSEC_REG_NRM_RX_RXINT_PKTCNT0x458
+define NETSEC_REG_NRM_TX_TXINT_TMR0x420
+define NETSEC_REG_NRM_RX_RXINT_TMR0x460
+
+define NETSEC_REG_NRM_RX_TMR0x45c
+
+define NETSEC_REG_NRM_TX_DESC_START_UP0x434
+define NETSEC_REG_NRM_TX_DESC_START_LW0x408
+define NETSEC_REG_NRM_RX_DESC_START_UP0x474
+define NETSEC_REG_NRM_RX_DESC_START_LW0x448
+
+define NETSEC_REG_NRM_TX_CONFIG0x430
+define NETSEC_REG_NRM_RX_CONFIG0x470
+
+define MAC_REG_STATUS0x1024
+define MAC_REG_DATA0x11c0
+define MAC_REG_CMD0x11c4
+define MAC_REG_FLOW_TH0x11cc
+define MAC_REG_INTF_SEL0x11d4
+define MAC_REG_DESC_INIT0x11fc
+define MAC_REG_DESC_SOFT_RST0x1204
+define NETSEC_REG_MODE_TRANS_COMP_STATUS0x500
+
+define GMAC_REG_MCR0x0000
+define GMAC_REG_MFFR0x0004
+define GMAC_REG_GAR0x0010
+define GMAC_REG_GDR0x0014
+define GMAC_REG_FCR0x0018
+define GMAC_REG_BMR0x1000
+define GMAC_REG_RDLAR0x100c
+define GMAC_REG_TDLAR0x1010
+define GMAC_REG_OMR0x1018
+
+define MHZ(n)((n) * 1000 * 1000)
+
+define NETSEC_TX_SHIFT_OWN_FIELD31
+define NETSEC_TX_SHIFT_LD_FIELD30
+define NETSEC_TX_SHIFT_DRID_FIELD24
+define NETSEC_TX_SHIFT_PT_FIELD21
+define NETSEC_TXSHIFT_TDRID_FIELD16
+define NETSEC_TX_SHIFT_CC_FIELD15
+define NETSEC_TX_SHIFT_FS_FIELD9
+define NETSEC_TX_LAST8
+define NETSEC_TX_SHIFT_CO7
+define NETSEC_TX_SHIFT_SO6
+define NETSEC_TX_SHIFT_TRS_FIELD4
+

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#define NETSEC_RX_PKT_OWN_FIELD 31
#define NETSEC_RX_PKT_LD_FIELD 30
#define NETSEC_RX_PKT_SDRID_FIELD 24
#define NETSEC_RX_PKT_FR_FIELD 23
#define NETSEC_RX_PKT_ER_FIELD 21
#define NETSEC_RX_PKT_ERR_FIELD 16
#define NETSEC_RX_PKT_TDRID_FIELD 12
#define NETSEC_RX_PKT_FS_FIELD 9
#define NETSEC_RX_PKT_LS_FIELD 8
#define NETSEC_RX_PKT_CO_FIELD 6

#define NETSEC_RX_PKT_ERR_MASK 3

#define NETSEC_MAX_TX_PKT_LEN 1518
#define NETSEC_MAX_TX_JUMBO_PKT_LEN 9018

#define NETSEC_RING_GMAC 15
#define NETSEC_RING_MAX 2

#define NETSEC_TCP_SEG_LEN_MAX 1460
#define NETSEC_TCP_JUMBO_SEG_LEN_MAX 8960

#define NETSEC_RX_CKSUM_NOTAVAIL 0
#define NETSEC_RX_CKSUM_OK 1
#define NETSEC_RX_CKSUM_NG 2

#define NETSEC_TOP_IRQ_REG_CODE_LOAD_END BIT(20)
#define NETSEC_IRQ_TRANSITION_COMPLETE BIT(4)

#define NETSEC_MODE_TRANS_COMP_IRQ_N2T BIT(20)
#define NETSEC_MODE_TRANS_COMP_IRQ_T2N BIT(19)

#define NETSEC_INT_PKTCNT_MAX 2047

#define NETSEC_FLOW_START_TH_MAX 95
#define NETSEC_FLOW_STOP_TH_MAX 95
#define NETSEC_FLOW_PAUSE_TIME_MIN 5

#define NETSEC_CLK_EN_REG_DOM_ALL 0x3f

#define NETSEC_PKT_CTRL_REG_MODE_NRM BIT(28)
#define NETSEC_PKT_CTRL_REG_EN_JUMBO BIT(27)
#define NETSEC_PKT_CTRL_REG_LOG_CHKSUM_ER BIT(3)
#define NETSEC_PKT_CTRL_REG_LOG_HD_INCOMPLETE BIT(2)
#define NETSEC_PKT_CTRL_REG_DRP_NO_MATCH BIT(0)

#define NETSEC_CLK_EN_REG_DOM_G BIT(5)

#define NETSEC_GMAC_GAR_REG_CR_250_300_MHZ5
+
#define NETSEC_GMAC_RDLAR_REG_COMMON0x18000
+
#define NETSEC_GMAC_TDLAR_REG_COMMON0x1C000
+
#define NETSEC_REG_NETSEC_VER_F_TAIKI0x50000
+
#define NETSEC_REG_DESC_RING_CONFIG_CFG_UPBIT(31)
+
#define NETSEC_REG_DESC_RING_CONFIG_CH_RSTBIT(30)
+
#define NETSEC_REG_DESC_TMR_MODE4
+
#define NETSEC_REG_DESC_ENDIAN0
+
#define NETSEC_MAC_DESC_SOFT_RST_SOFT_RST1
+
#define NETSEC_MAC_DESC_INIT_REG_INIT1
+
#define NETSEC_MAC_DESC_SOFT_RST_SOFT_RST1
+
#define NETSEC_MAC_DESC_INIT_REG_INIT1
+
#define DESC_NUM128
+
#define NAPI_BUDGET(DESC_NUM / 2)
+
#define DESC_SZsizeof(struct netsec_de)
+
#define NETSEC_F_NETSEC_VER_MAJOR_NUM(x)((x) & 0xffff0000)
+
+enum ring_id {
+    NETSEC_RING_TX = 0,
+    NETSEC_RING_RX
+};
+
+struct netsec_desc {
+    struct sk_buff *skb;
+    dma_addr_t dma_addr;
+    void *addr;
+    u16 len;
+};
+
+struct netsec_desc_ring {
+    phys_addr_t desc_phys;
+    struct netsec_desc *desc;
+    void *vaddr;
+}
+u16 pkt_cnt;
+u16 head, tail;
+);
+
+struct netsec_priv {
+struct netsec_desc_ring desc_ring[NETSEC_RING_MAX];
+struct ethtool_coalesce et_coalesce;
+spinlock_t reglock; /* protect reg access */
+struct napi_struct napi;
+phy_interface_t phy_interface;
+struct net_device *ndev;
+struct device_node *phy_np;
+struct phy_device *phydev;
+struct mii_bus *mii_bus;
+void __iomem *ioaddr;
+void __iomem *eeprom_base;
+struct device *dev;
+struct clk *clk;
+u32 msg_enable;
+u32 freq;
+u32 phy_addr;
+bool rx_cksum_offload_flag;
+};
+
+struct netsec_de { /* Netsec Descriptor layout */
+u32 attr;
+u32 data_buf_addr_up;
+u32 data_buf_addr_lw;
+u32 buf_len_info;
+};
+
+struct netsec_tx_pkt_ctrl {
+u16 tcp_seg_len;
+bool tcp_seg_offload_flag;
+bool cksum_offload_flag;
+};
+
+struct netsec_rx_pkt_info {
+int rx_cksum_result;
+int err_code;
+bool err_flag;
+};
+
+static void netsec_write(struct netsec_priv *priv, u32 reg_addr, u32 val)
+{
+writel(val, priv->ioaddr + reg_addr);
+}
+
+static u32 netsec_read(struct netsec_priv *priv, u32 reg_addr)
+{
+    return readl(priv->ioaddr + reg_addr);
+}
+
+/***************************************************************************/
+
+/** MDIO BUS OPS FOLLOW *************/
+
+/*
+ * define TIMEOUT_SPINS_MAC1000
+ * define TIMEOUT_SECONDARY_MS_MAC1000
+ */
+
+static u32 netsec_clk_type(u32 freq)
+{
+    if (freq < MHZ(35))
+        return NETSEC_GMAC_GAR_REG_CR_25_35_MHZ;
+    if (freq < MHZ(60))
+        return NETSEC_GMAC_GAR_REG_CR_35_60_MHZ;
+    if (freq < MHZ(100))
+        return NETSEC_GMAC_GAR_REG_CR_60_100_MHZ;
+    if (freq < MHZ(150))
+        return NETSEC_GMAC_GAR_REG_CR_100_150_MHZ;
+    if (freq < MHZ(250))
+        return NETSEC_GMAC_GAR_REG_CR_150_250_MHZ;
+    return NETSEC_GMAC_GAR_REG_CR_250_300_MHZ;
+}
+
+static int netsec_wait_while_busy(struct netsec_priv *priv, u32 addr, u32 mask)
+{
+    u32 timeout = TIMEOUT_SPINS_MAC;
+    while (--timeout && netsec_read(priv, addr) & mask)
+        cpu_relax();
+    if (timeout)
+        return 0;
+
+    timeout = TIMEOUT_SECONDARY_MS_MAC;
+    while (--timeout && netsec_read(priv, addr) & mask)
+        usleep_range(1000, 2000);
+    if (timeout)
+        return 0;
+    netdev_WARN(priv->ndev, "%s: timeout\n", __func__);
+    return -ETIMEDOUT;
+}
+
+static int netsec_mac_write(struct netsec_priv *priv, u32 addr, u32 value)
+{  
+netsec_write(priv, MAC_REG_DATA, value);  
+netsec_write(priv, MAC_REG_CMD, addr | NETSEC_GMAC_CMD_ST_WRITE);  
+return netsec_wait_while_busy(priv,  
+  MAC_REG_CMD, NETSEC_GMAC_CMD_ST_BUSY);  
+}  
+
+static int netsec_mac_read(struct netsec_priv *priv, u32 addr, u32 *read)  
+{  
+int ret;  
+
+netsec_write(priv, MAC_REG_CMD, addr | NETSEC_GMAC_CMD_ST_READ);  
+ret = netsec_wait_while_busy(priv,  
+  MAC_REG_CMD, NETSEC_GMAC_CMD_ST_BUSY);  
+if (ret)  
+return ret;  
+
+*read = netsec_read(priv, MAC_REG_DATA);  
+
+return 0;  
+}  
+
+static int netsec_mac_wait_while_busy(struct netsec_priv *priv,  
+  u32 addr, u32 mask)  
+{  
+u32 timeout = TIMEOUT_SPINS_MAC;  
+int ret, data;  
+
+do {  
+ret = netsec_mac_read(priv, addr, &data);  
+if (ret)  
+break;  
+cpu_relax();  
+} while (--timeout && (data & mask));  
+
+if (timeout)  
+return 0;  
+
+timeout = TIMEOUT_SECONDARY_MS_MAC;  
+do {  
+usleep_range(1000, 2000);  
+
+ret = netsec_mac_read(priv, addr, &data);  
+if (ret)  
+break;  
+cpu_relax();  
+} while (--timeout && (data & mask));  
+}
+if (timeout && !ret)
+return 0;
+
+netdev_WARN(priv->ndev, "%s: timeout\n", __func__);
+
+return -ETIMEDOUT;
+
+
+static int netsec_mac_update_to_phy_state(struct netsec_priv *priv)
+{
+struct phy_device *phydev = priv->ndev->phydev;
+u32 value = 0;
+
+value = phydev->duplex ? NETSEC_GMAC_MCR_REG_FULL_DUPLEX_COMMON :
+ NETSEC_GMAC_MCR_REG_HALF_DUPLEX_COMMON;
+
+if (phydev->speed != SPEED_1000)
+value |= NETSEC_MCR_PS;
+
+if (phydev->speed != SPEED_1000)
+value |= NETSEC_GMAC_MCR_REG_FES;
+
+value |= NETSEC_GMAC_MCR_REG_CST | NETSEC_GMAC_MCR_REG_JE;
+
+if (phy_interface_mode_is_rgmii(priv->phy_interface))
+value |= NETSEC_GMAC_MCR_REG_IBN;
+
+if (netsec_mac_write(priv, GMAC_REG_MCR, value))
+return -ETIMEDOUT;
+
+return 0;
+
+
+static int netsec_phy_read(struct mii_bus *bus, int phy_addr, int reg_addr);
+
+static int netsec_phy_write(struct mii_bus *bus,
+    int phy_addr, int reg, u16 val)
+{
+int status;
+struct netsec_priv *priv = bus->priv;
+
+if (netsec_mac_write(priv, GMAC_REG_GDR, val))
+return -ETIMEDOUT;
+
+if (netsec_mac_write(priv, GMAC_REG_GAR,
+    phy_addr << NETSEC_GMAC_GAR_REG_SHIFT_PA |
+    reg << NETSEC_GMAC_GAR_REG_SHIFT_GR |
+    NETSEC_GMAC_GAR_REG_GW | NETSEC_GMAC_GAR_REG_GB |
+ (netsec_clk_type(priv->freq) <<
+ GMAC_REG_SHIFT_CR_GAR))}
+return -ETIMEDOUT;
+
+status = netsec_mac_wait_while_busy(priv, GMAC_REG_GAR, 
+ NETSEC_GMAC_GAR_REG_GB);
+
+/* Developerbox implements RTL8211E PHY and there is 
+ * a compatibility problem with F_GMAC4.
+ * RTL8211E expects MDC clock must be kept toggling for several 
+ * clock cycle with MDIO high before entering the IDLE state.
+ * To meet this requirement, netsec driver needs to issue dummy 
+ * read(e.g. read PHYID1(offset 0x2) register) right after write. 
+ */
+netsec_phy_read(bus, phy_addr, MII_PHYSID1);
+
+return status;
+}
+
+static int netsec_phy_read(struct mii_bus *bus, int phy_addr, int reg_addr)
+{
+struct netsec_priv *priv = bus->priv;
+u32 data;
+int ret;
+
+if (netsec_mac_write(priv, GMAC_REG_GAR, NETSEC_GMAC_GAR_REG_GB |
+ phy_addr << NETSEC_GMAC_GAR_REG_SHIFT_PA |
+ reg_addr << NETSEC_GMAC_GAR_REG_SHIFT_GR |
+ (netsec_clk_type(priv->freq) <<
+ GMAC_REG_SHIFT_CR_GAR))}
+return -ETIMEDOUT;
+
+ret = netsec_mac_wait_while_busy(priv, GMAC_REG_GAR, 
+ NETSEC_GMAC_GAR_REG_GB);
+if (ret)
+return ret;
+
+ret = netsec_mac_read(priv, GMAC_REG_GDR, &data);
+if (ret)
+return ret;
+
+return data;
+}
+
+*************** ETHTOOL_OPS FOLLOW ***************
+
+static void netsec_et_get_drvinfo(struct net_device *net_device, 
+ struct ethtool_drvdinfo *info)
+{ 
+strlcpy(info->driver, "netsec", sizeof(info->driver));
+strlcpy(info->bus_info, dev_name(net_device->dev.parent),
+sizeof(info->bus_info));
+
+static int netsec_et_get_coalesce(struct net_device *net_device,
+ struct ethtool_coalesce *et_coalesce)
+{
+struct netsec_priv *priv = netdev_priv(net_device);
+
+*et_coalesce = priv->et_coalesce;
+
+return 0;
+}
+
+static int netsec_et_set_coalesce(struct net_device *net_device,
+ struct ethtool_coalesce *et_coalesce)
+{
+struct netsec_priv *priv = netdev_priv(net_device);
+
+priv->et_coalesce = *et_coalesce;
+
+if (priv->et_coalesce.tx_coalesce_usecs < 50)
+priv->et_coalesce.tx_coalesce_usecs = 50;
+if (priv->et_coalesce.tx_max_coalesced_frames < 1)
+priv->et_coalesce.tx_max_coalesced_frames = 1;
+
+netsec_write(priv, NETSEC_REG_NRM_TX_DONE_TXINT_PKTCNT,
+     priv->et_coalesce.tx_max_coalesced_frames);
+netsec_write(priv, NETSEC_REG_NRM_TX_TXINT_TMR,
+     priv->et_coalesce.tx_coalesce_usecs);
+netsec_write(priv, NETSEC_REG_NRM_TX_INTEN_SET, NRM_TX_ST_TXDONE);
+netsec_write(priv, NETSEC_REG_NRM_TX_INTEN_SET, NRM_TX_ST_TMREXP);
+
+if (priv->et_coalesce.rx_coalesce_usecs < 50)
+priv->et_coalesce.rx_coalesce_usecs = 50;
+if (priv->et_coalesce.rx_max_coalesced_frames < 1)
+priv->et_coalesce.rx_max_coalesced_frames = 1;
+
+netsec_write(priv, NETSEC_REG_NRM_RX_RXINT_PKTCNT,
+     priv->et_coalesce.rx_max_coalesced_frames);
+netsec_write(priv, NETSEC_REG_NRM_RX_RXINT_TMR,
+     priv->et_coalesce.rx_coalesce_usecs);
+netsec_write(priv, NETSEC_REG_NRM_RX_INTEN_SET, NRM_RX_ST_PKTDONE);
+netsec_write(priv, NETSEC_REG_NRM_RX_INTEN_SET, NRM_RX_ST_TMREXP);
+
+return 0;
+static u32 netsec_et_get_msglevel(struct net_device *dev)
{    
struct netsec_priv *priv = netdev_priv(dev);
    
return priv->msg_enable;
}    

+static void netsec_et_set_msglevel(struct net_device *dev, u32 datum)
{    
struct netsec_priv *priv = netdev_priv(dev);
    
priv->msg_enable = datum;
}    

+static const struct ethtool_ops netsec_ethtool_ops = {
    .get_drvinfo = netsec_et_get_drvinfo,
    .get_link_ksettings = phy_ethtool_get_link_ksettings,
    .set_link_ksettings = phy_ethtool_set_link_ksettings,
    .get_link = ethtool_op_get_link,
    .get_coalesce = netsec_et_get_coalesce,
    .set_coalesce = netsec_et_set_coalesce,
    .get_msglevel = netsec_et_get_msglevel,
    .set_msglevel = netsec_et_set_msglevel,
};    

+static struct sk_buff *netsec_alloc_skb(struct netsec_priv *priv,    
struct netsec_desc *desc)
{    
struct sk_buff *skb;
    
+if (device_get_dma_attr(priv->dev) == DEV_DMA_COHERENT) {
    skb = netdev_alloc_skb_ip_align(priv->ndev, desc->len);
+} else {
    desc->len = L1_CACHE_ALIGN(desc->len);
    skb = netdev_alloc_skb(priv->ndev, desc->len);
+}

+if (!skb)
    return NULL;

+desc->addr = skb->data;
+desc->dma_addr = dma_map_single(priv->dev, desc->addr, desc->len, 
DMA_FROM_DEVICE);
+if (dma_mapping_error(priv->dev, desc->dma_addr)) {
    dev_kfree_skb_any(skb);
}
return NULL;
+
return skb;
+
static void netsec_set_rx_de(struct netsec_priv *priv,
    struct netsec_desc_ring *dring, u16 idx,
    const struct netsec_desc *desc,
    struct sk_buff *skb)
{
    struct netsec_de *de = dring->vaddr + DESC_SZ * idx;
    u32 attr = (1 << NETSEC_RX_PKT_OWN_FIELD) |
            (1 << NETSEC_RX_PKT_FS_FIELD) |
            (1 << NETSEC_RX_PKT_LS_FIELD);
    
    if (idx == DESC_NUM - 1)
        attr |= (1 << NETSEC_RX_PKT_LD_FIELD);
    
    de->data_buf_addr_up = upper_32_bits(desc->dma_addr);
    de->data_buf_addr_lw = lower_32_bits(desc->dma_addr);
    de->buf_len_info = desc->len;
    de->attr = attr;
    dma_wmb();
    
    dring->desc[idx].dma_addr = desc->dma_addr;
    dring->desc[idx].addr = desc->addr;
    dring->desc[idx].len = desc->len;
    dring->desc[idx].skb = skb;
+
static struct sk_buff *netsec_get_rx_de(struct netsec_priv *priv,
    struct netsec_desc_ring *dring,
    u16 idx,
    struct netsec_rx_pkt_info *rxpi,
    struct netsec_desc *desc, u16 *len)
{
    struct netsec_de de = {};
    
    memcpy(&de, dring->vaddr + DESC_SZ * idx, DESC_SZ);
    
    *len = de.buf_len_info >> 16;
    
    rxpi->err_flag = (de.attr >> NETSEC_RX_PKT_ER_FIELD) & 1;
    rxpi->rx_cksum_result = (de.attr >> NETSEC_RX_PKT_CO_FIELD) & 3;
    rxpi->err_code = (de.attr >> NETSEC_RX_PKT_ERR_FIELD) &
            NETSEC_RX_PKT_ERR_MASK;
    
    desc = dring->desc[idx];
    return desc->skb;
static struct sk_buff *netsec_get_rx_pkt_data(struct netsec_priv *priv,
    struct netsec_rx_pkt_info *rxpi,
    struct netsec_desc *desc,
    u16 *len)
{
    struct netsec_desc_ring *dring = &priv->desc_ring[NETSEC_RING_RX];
    struct sk_buff *tmp_skb, *skb = NULL;
    struct netsec_desc td;
    int tail;
    *
    *rxpi = (struct netsec_rx_pkt_info){};
    *
    td.len = priv->ndev->mtu + 22;
    *
    tmp_skb = netsec_alloc_skb(priv, &td);
    *
    dma_rmb();
    *
    tail = dring->tail;
    *
    if (!tmp_skb) {
        netsec_set_rx_de(priv, dring, tail, &dring->desc[tail],
            dring->desc[tail].skb);
    } else {
        skb = netsec_get_rx_de(priv, dring, tail, rxpi, desc, len);
        netsec_set_rx_de(priv, dring, tail, &td, tmp_skb);
    }
    *
    /* move tail ahead */
    dring->tail = (dring->tail + 1) % DESC_NUM;
    *
    return skb;
}

static int netsec_clean_tx_dring(struct netsec_priv *priv, int budget)
{
    struct netsec_desc_ring *dring = &priv->desc_ring[NETSEC_RING_TX];
    unsigned int pkts, bytes;
    *
    pkts = netsec_read(priv, NETSEC_REG_NRM_TX_DONE(PacketCount));
    *
    if (pkts < budget)
        budget = pkts;
    *
    return budget;
}
pkts = 0;
bytes = 0;

while (pkts < budget) {
    struct netsec_desc *desc;
    struct netsec_de *entry;
    int tail, eop;
    
    tail = dring->tail;
    
    /* move tail ahead */
    dring->tail = (tail + 1) % DESC_NUM;
    
    desc = &dring->desc[tail];
    entry = dring->vaddr + DESC_SZ * tail;
    
    eop = (entry->attr >> NETSEC_TX_LAST) & 1;
    
    dma_unmap_single(priv->dev, desc->dma_addr, desc->len, DMA_TO_DEVICE);
    if (eop) {
        pkts++;
        bytes += desc->skb->len;
        dev_kfree_skb(desc->skb);
    }
    *desc = (struct netsec_desc){};
}

dring->pkt_cnt -= budget;

priv->ndev->stats.tx_packets += budget;
priv->ndev->stats.tx_bytes += bytes;

netdev_completed_queue(priv->ndev, budget, bytes);
return budget;
}

static int netsec_process_tx(struct netsec_priv *priv, int budget)
{
    struct net_device *ndev = priv->ndev;
    int new, done = 0;
    
do {
    new = netsec_clean_tx_dring(priv, budget);
    done += new;
    budget -= new;
    }
    while (new);

    static int netsec_process_tx(struct netsec_priv *priv, int budget)
    {
    struct net_device *ndev = priv->ndev;
    int new, done = 0;
    
do {
    new = netsec_clean_tx_dring(priv, budget);
    done += new;
    budget -= new;
    } while (new);
+if (done && netif_queue_stopped(ndev))
+ netif_wake_queue(ndev);
+
+ return done;
+
}
+
+ static int netsec_process_rx(struct netsec_priv *priv, int budget)
+ {
+ struct netsec_desc_ring *dring = &priv->desc_ring[NETSEC_RING_RX];
+ struct net_device *ndev = priv->ndev;
+ struct netsec_rx_pkt_info rx_info;
+ int done = 0, rx_num = 0;
+ struct netsec_desc desc;
+ struct sk_buff *skb;
+ u16 len;
+ 
+ while (done < budget) {
+ if (!rx_num) {
+ rx_num = netsec_read(priv, NETSEC_REG_NRM_RX_PKT_CNT);
+ dring->pkt_cnt += rx_num;
+ /* move head 'rx_num' */
+ dring->head = (dring->head + rx_num) % DESC_NUM;
+ +
+ rx_num = dring->pkt_cnt;
+ if (!rx_num)
+ break;
+ }
+ done++;
+ rx_num--;
+ skb = netsec_get_rx_pkt_data(priv, &rx_info, &desc, &len);
+ if (unlikely(!skb || rx_info.err_flag)) {
+ netif_err(priv, drv, priv->ndev,
+ "%s: rx fail err(%d)\n",
+ __func__, rx_info.err_code);
+ ndev->stats.rx_dropped++;
+ continue;
+ }
+ 
+ dma_unmap_single(priv->dev, desc.dma_addr, desc.len,
+ DMA_FROM_DEVICE);
+ skb->put(skb, len);
+ skb->protocol = eth_type_trans(skb, priv->ndev);
+ +
+ if (priv->rx_cksum_offload_flag &&
+ rx_info.rx_cksum_result == NETSEC_RX_CKSUM_OK)
+ skb->ip_summed = CHECKSUM_UNNECESSARY;
+ +
if (napi_gro_receive(&priv->napi, skb) != GRO_DROP) {
    ndev->stats.rx_packets++;
    ndev->stats.rx_bytes += len;
}

return done;
}

static int netsec_napi_poll(struct napi_struct *napi, int budget) {
    struct netsec_priv *priv;
    struct net_device *ndev;

    todo = budget;
    do {
        if (!todo)
            break;

        tx = netsec_process_tx(priv, todo);
        todo -= tx;
        if (!todo)
            break;

        rx = netsec_process_rx(priv, todo);
        todo -= rx;
    } while (rx || tx);

done = budget - todo;

if (done < budget && napi_complete_done(napi, done)) {
    unsigned long flags;
    spin_lock_irqsave(&priv->reglock, flags);
    netsec_write(priv, NETSEC_REG_INTEN_SET, NETSEC_IRQ_RX | NETSEC_IRQ_TX);
    spin_unlock_irqrestore(&priv->reglock, flags);
}

return done;
}

static void netsec_set_tx_de(struct netsec_priv *priv,
struct netsec_desc_ring *dring,
const struct netsec_tx_pkt_ctrl *tx_ctrl,
const struct netsec_desc *desc,
struct sk_buff *skb)
{
    int idx = dring->head;
    struct netsec_de *de;
    u32 attr;
    de = dring->vaddr + (DESC_SZ * idx);
    attr = (1 << NETSEC_TX_SHIFT_OWN_FIELD) |
             (1 << NETSEC_TX_SHIFT_PT_FIELD) |
             (NETSEC_RING_GMAC << NETSEC_TX_SHIFT_TDRID_FIELD) |
             (1 << NETSEC_TX_SHIFT_FS_FIELD) |
             (1 << NETSEC_TX_LAST) |
             (tx_ctrl->cksum_offload_flag << NETSEC_TX_SHIFT_CO) |
             (tx_ctrl->tcp_seg_offload_flag << NETSEC_TX_SHIFT_SO) |
             (1 << NETSEC_TX_SHIFT_TRS_FIELD);
    if (idx == DESC_NUM - 1)
        attr |= (1 << NETSEC_TX_SHIFT_LD_FIELD);
    de->data_buf_addr_up = upper_32_bits(desc->dma_addr);
    de->data_buf_addr_lw = lower_32_bits(desc->dma_addr);
    de->buf_len_info = (tx_ctrl->tcp_seg_len << 16) | desc->len;
    de->attr = attr;
    dma_wmb();
    dring->desc[idx] = *desc;
    dring->desc[idx].skb = skb;
    /* move head ahead */
    dring->head = (dring->head + 1) % DESC_NUM;
}

static netdev_tx_t netsec_netdev_start_xmit(struct sk_buff *skb,
    struct net_device *ndev)
{
    struct netsec_priv *priv = netdev_priv(ndev);
    struct netsec_desc_ring *dring = &priv->desc_ring[NETSEC_RING_TX];
    struct netsec_tx_pkt_ctrl tx_ctrl = { };
    struct netsec_desc tx_desc;
    u16 tso_seg_len = 0;
    int filled;
    /* differentiate between full/empty ring */
    if (dring->head >= dring->tail) filled = dring->head - dring->tail;
+else
+ +filled = dring->head + DESC_NUM - dring->tail;
+ +
+ +if (DESC_NUM - filled < 2) { /* if less than 2 available */
+ +netif_err(priv, drv, priv->ndev, "%s: TxQFull!\n", __func__);
+ +netif_stop_queue(priv->ndev);
+ +dma_wmb();
+ +return NETDEV_TX_BUSY;
+ +}
+ +
+ +if (skb->ip_summed == CHECKSUM_PARTIAL)
+ +tx_ctrl.cksum_offload_flag = true;
+ +
+ +if (skb_is_gso(skb))
+ +tso_seg_len = skb_shinfo(skb)->gso_size;
+ +
+ +if (tso_seg_len > 0) {
+ +if (skb->protocol == htons(ETH_P_IP)) {
+ +ip_hdr(skb)->tot_len = 0;
+ +tcp_hdr(skb)->check =
+ +~tcp_v4_check(0, ip_hdr(skb)->saddr,
+ +      ip_hdr(skb)->daddr, 0);
+ +} else {
+ +ipv6_hdr(skb)->payload_len = 0;
+ +tcp_hdr(skb)->check =
+ +~csum_ipv6_magic(&ipv6_hdr(skb)->saddr,
+ +      &ipv6_hdr(skb)->daddr,
+ +      0, IPPROTO_TCP, 0);
+ +}
+ +}
+ +
+ +tx_ctrl.tcp_seg_offload_flag = true;
+ +tx_ctrl.tcp_seg_len = tso_seg_len;
+ +}
+ +
+ +tx_desc.dma_addr = dma_map_single(priv->dev, skb->data,
+ + skb_headlen(skb), DMA_TO_DEVICE);
+ +if (dma_mapping_error(priv->dev, tx_desc.dma_addr)) {
+ +netif_err(priv, drv, priv->ndev,
+ + "%s: DMA mapping failed\n", __func__);
+ +ndev->stats.tx_dropped++;
+ +dev_kfree_skb_any(skb);
+ +return NETDEV_TX_OK;
+ +}
+ +tx_desc.addr = skb->data;
+ +tx_desc.len = skb_headlen(skb);
+ +
+ +skb->tx_timestamp(skb);
+ +netdev_sent_queue(priv->ndev, skb->len);
+netsec_set_tx_de(priv, dring, &tx_ctrl, &tx_desc, skb);
+netsec_write(priv, NETSEC_REG_NRM_TX_PKTCNT, 1); /* submit another tx */
+
+return NETDEV_TX_OK;
+
+
+static void netsec_uninit_pkt_dring(struct netsec_priv *priv, int id)
+
{+
+struct netsec_desc_ring *dring = &priv->desc_ring[id];
+struct netsec_desc *desc;
+u16 idx;
+
+if (!dring->vaddr || !dring->desc)
++return;
+
+for (idx = 0; idx < DESC_NUM; idx++) {
++desc = &dring->desc[idx];
++if (!desc->addr)
++continue;
+
++dma_unmap_single(priv->dev, desc->dma_addr, desc->len,
++ id == NETSEC_RING_RX ? DMA_FROM_DEVICE :
++ DMA_TO_DEVICE);
++dev_kfree_skb(desc->skb);
++}
+
++memset(dring->desc, 0, sizeof(struct netsec_desc) * DESC_NUM);
++memset(dring->vaddr, 0, DESC_SZ * DESC_NUM);
+
++dring->head = 0;
++dring->tail = 0;
++dring->pkt_cnt = 0;
+
++if (id == NETSEC_RING_TX)
++netdev_reset_queue(priv->ndev);
++}
+
+
+static void netsec_free_dring(struct netsec_priv *priv, int id)

{+
+struct netsec_desc_ring *dring = &priv->desc_ring[id];
+
+if (dring->vaddr) {
++dma_free_coherent(priv->dev, DESC_SZ * DESC_NUM,
++ dring->vaddr, dring->desc_phys);
++dring->vaddr = NULL;
++}
+}
+kfree(dring->desc);
+dring->desc = NULL;
+
+static int netsec_alloc_dring(struct netsec_priv *priv, enum ring_id id)
+{
+struct netsec_desc_ring *dring = &priv->desc_ring[id];
+int ret = 0;
+
+dring->vaddr = dma_zalloc_coherent(priv->dev, DESC_SZ * DESC_NUM,
+    &dring->desc_phys, GFP_KERNEL);
+if (!dring->vaddr) {
+    ret = -ENOMEM;
+    goto err;
+}
+
+dring->desc = kzalloc(DESC_NUM * sizeof(*dring->desc), GFP_KERNEL);
+if (!dring->desc) {
+    ret = -ENOMEM;
+    goto err;
+}
+
+return 0;
+err:
+netsec_free_dring(priv, id);
+
+return ret;
+}
+
+static int netsec_setup_rx_dring(struct netsec_priv *priv)
+{
+struct netsec_desc_ring *dring = &priv->desc_ring[NETSEC_RING_RX];
+struct netsec_desc desc;
+struct sk_buff *skb;
+int n;
+
+desc.len = priv->ndev->mtu + 22;
+
+for (n = 0; n < DESC_NUM; n++) {
+    skb = netsec_alloc_skb(priv, &desc);
+    if (!skb) {
+        netsec_uninit_pkt_dring(priv, NETSEC_RING_RX);
+        return -ENOMEM;
+    }
+    netsec_set_rx_de(priv, dring, n, &desc, skb);
+}
+
+return 0;
+}
+
+static int netsec_netdev_load_ucode_region(struct netsec_priv *priv, u32 reg,
+  u32 addr_h, u32 addr_l, u32 size)
+{
+  u64 base = (u64)addr_h << 32 | addr_l;
+  void __iomem *ucode;
+  u32 i;
+
+  ucode = ioremap(base, size * sizeof(u32));
+  if (!ucode)
+    return -ENOMEM;
+
+  for (i = 0; i < size; i++)
+    netsec_write(priv, reg, readl(ucode + i * 4));
+
+  iounmap(ucode);
+  return 0;
+}
+
+static int netsec_netdev_load_microcode(struct netsec_priv *priv)
+{
+  u32 addr_h, addr_l, size;
+  int err;
+
+  addr_h = readl(priv->eeprom_base + NETSEC_EEPROM_HM_ME_ADDRESS_H);
+  addr_l = readl(priv->eeprom_base + NETSEC_EEPROM_HM_ME_ADDRESS_L);
+  size = readl(priv->eeprom_base + NETSEC_EEPROM_HM_ME_SIZE);
+  err = netsec_netdev_load_ucode_region(priv, NETSEC_REG_DMAC_HM_CMD_BUF,
+    addr_h, addr_l, size);
+  if (err)
+    return err;
+
+  addr_h = readl(priv->eeprom_base + NETSEC_EEPROM_MH_ME_ADDRESS_H);
+  addr_l = readl(priv->eeprom_base + NETSEC_EEPROM_MH_ME_ADDRESS_L);
+  size = readl(priv->eeprom_base + NETSEC_EEPROM_MH_ME_SIZE);
+  err = netsec_netdev_load_ucode_region(priv, NETSEC_REG_DMAC_MH_CMD_BUF,
+    addr_h, addr_l, size);
+  if (err)
+    return err;
+
+  addr_h = 0;
+  addr_l = readl(priv->eeprom_base + NETSEC_EEPROM_PKT_ME_ADDRESS);
+  size = readl(priv->eeprom_base + NETSEC_EEPROM_PKT_ME_SIZE);
+  err = netsec_netdev_load_ucode_region(priv, NETSEC_REG_PKT_CMD_BUF,
+    addr_h, addr_l, size);
+  if (err)
+    return err;
+}
+return 0;
+
+static int netsec_reset_hardware(struct netsec_priv *priv,
+    bool load_ucode)
+{
+    u32 value;
+    int err;
+
+    /* stop DMA engines */
+    if (!netsec_read(priv, NETSEC_REG_ADDR_DIS_CORE)) {
+        netsec_write(priv, NETSEC_REG_DMA_HM_CTRL,
+            NETSEC_DMA_CTRL_REG_STOP);
+        netsec_write(priv, NETSEC_REG_DMA_MH_CTRL,
+            NETSEC_DMA_CTRL_REG_STOP);
+        while (netsec_read(priv, NETSEC_REG_DMA_HM_CTRL) &
+            NETSEC_DMA_CTRL_REG_STOP)
+            cpu_relax();
+        while (netsec_read(priv, NETSEC_REG_DMA_MH_CTRL) &
+            NETSEC_DMA_CTRL_REG_STOP)
+            cpu_relax();
+    }
+
+    netsec_write(priv, NETSEC_REG_SOFT_RST, NETSEC_SOFT_RST_REG_RESET);
+    netsec_write(priv, NETSEC_REG_SOFT_RST, NETSEC_SOFT_RST_REG_RUN);
+    netsec_write(priv, NETSEC_REG_COM_INIT, NETSEC_COM_INIT_REG_ALL);
+    while (netsec_read(priv, NETSEC_REG_COM_INIT) != 0)
+        cpu_relax();
+
+    /* set desc_start addr */
+    netsec_write(priv, NETSEC_REG_NRM_RX_DESC_START_UP,
+        upper_32_bits(priv->desc_ring[NETSEC_RING_RX].desc_phys));
+    netsec_write(priv, NETSEC_REG_NRM_RX_DESC_START_LW,
+        lower_32_bits(priv->desc_ring[NETSEC_RING_RX].desc_phys));
+    netsec_write(priv, NETSEC_REG_NRM_TX_DESC_START_UP,
+        upper_32_bits(priv->desc_ring[NETSEC_RING_TX].desc_phys));
+    netsec_write(priv, NETSEC_REG_NRM_TX_DESC_START_LW,
+        lower_32_bits(priv->desc_ring[NETSEC_RING_TX].desc_phys));
+
+    /* set normal tx dring ring config */
+    netsec_write(priv, NETSEC_REG_NRM_TX_CONFIG,
+        1 << NETSEC_REG_DESC_ENDIAN);
+    netsec_write(priv, NETSEC_REG_NRM_RX_CONFIG,
1 << NETSEC_REG_DESC_ENDIAN);
+
+if (load_ucode) {
+    err = netsec_netdev_load_microcode(priv);
+    if (err) {
+        netif_err(priv, probe, priv->ndev,
+            "%s: failed to load microcode (%d)\n",
+            __func__, err);
+        return err;
+    }
+}
+
+/* start DMA engines */
+    netsec_write(priv, NETSEC_REG_DMA_TMR_CTRL, priv->freq / 1000000 - 1);
+    netsec_write(priv, NETSEC_REG_ADDR_DIS_CORE, 0);
+
+    usleep_range(1000, 2000);
+
+    if (!(netsec_read(priv, NETSEC_REG_TOP_STATUS) &
+            NETSEC_TOP_IRQ_REG_CODE_LOAD_END)) {
+        netif_err(priv, probe, priv->ndev,
+            "microengine start failed\n");
+        return -ENXIO;
+    }
+    netsec_write(priv, NETSEC_REG_TOP_STATUS,
+            NETSEC_TOP_IRQ_REG_CODE_LOAD_END);
+
+    value = NETSEC_PKT_CTRL_REG_MODE_NRM;
+    if (priv->ndev->mtu > ETH_DATA_LEN)
+        value |= NETSEC_PKT_CTRL_REG_EN_JUMBO;
+
+    /* change to normal mode */
+    netsec_write(priv, NETSEC_REG_DMA_MH_CTRL, MH_CTRL__MODE_TRANS);
+    netsec_write(priv, NETSEC_REG_PKT_CTRL, value);
+
+    while ((netsec_read(priv, NETSEC_REG_MODE_TRANS_COMP_STATUS) &
+            NETSEC_MODE_TRANS_COMP_IRQ_T2N) == 0)
+        cpu_relax();
+
+    /* clear any pending EMPTY/ERR irq status */
+    netsec_write(priv, NETSEC_REG_NRM_TX_STATUS, ~0);
+
+    /* Disable TX & RX intr */
+    netsec_write(priv, NETSEC_REG_INTEN_CLR, ~0);
+
+        return 0;
+}
+static int netsec_start_gmac(struct netsec_priv *priv)
{  
+struct phy_device *phydev = priv->ndev->phydev;
+u32 value = 0;
+int ret;
+
+if (phydev->speed != SPEED_1000)
+value = (NETSEC_GMAC_MCR_REG_CST |  
+ NETSEC_GMAC_MCR_REG_HALF_DUPLEX_COMMON);
+
+if (netsec_mac_write(priv, GMAC_REG_MCR, value))
+return -ETIMEDOUT;
+if (netsec_mac_write(priv, GMAC_REG_BMR,  
+ NETSEC_GMAC_BMR_REG_RESET))
+return -ETIMEDOUT;
+
+/* Wait soft reset */
+usleep_range(1000, 5000);
+
+ret = netsec_mac_read(priv, GMAC_REG_BMR, &value);
+if (ret)
+return ret;
+if (value & NETSEC_GMAC_BMR_REG_SWR)
+return -EAGAIN;
+
+netsec_write(priv, MAC_REG_DESC_SOFT_RST, 1);
+if (netsec_wait_while_busy(priv, MAC_REG_DESC_SOFT_RST, 1))
+return -ETIMEDOUT;
+
+netsec_write(priv, MAC_REG_DESC_INIT, 1);
+if (netsec_wait_while_busy(priv, MAC_REG_DESC_INIT, 1))
+return -ETIMEDOUT;
+
+if (netsec_mac_write(priv, GMAC_REG_BMR,  
+ NETSEC_GMAC_BMR_REG_COMMON))
+return -ETIMEDOUT;
+if (netsec_mac_write(priv, GMAC_REG_RDLAR,  
+ NETSEC_GMAC_RDLAR_REG_COMMON))
+return -ETIMEDOUT;
+if (netsec_mac_write(priv, GMAC_REG_TDLAR,  
+ NETSEC_GMAC_TDLAR_REG_COMMON))
+return -ETIMEDOUT;
+if (netsec_mac_write(priv, GMAC_REG_MFFR, 0x80000001))
+return -ETIMEDOUT;
+
+ret = netsec_mac_update_to_phy_state(priv);
+if (ret)
+return ret;
ret = netsec_mac_read(priv, GMAC_REG_OMR, &value);
if (ret)
    return ret;

value |= NETSEC_GMAC_OMR_REG_SR;
value |= NETSEC_GMAC_OMR_REG_ST;

netsec_write(priv, NETSEC_REG_NRM_RX_INTEN_CLR, ~0);
netsec_write(priv, NETSEC_REG_NRM_TX_INTEN_CLR, ~0);

netsec_et_set_coalesce(priv->ndev, &priv->et_coalesce);

if (netsec_mac_write(priv, GMAC_REG_OMR, value))
    return -ETIMEDOUT;

return 0;

}

static int netsec_stop_gmac(struct netsec_priv *priv)
{
    u32 value;
    int ret;

    ret = netsec_mac_read(priv, GMAC_REG_OMR, &value);
    if (ret)
        return ret;

    value &= ~NETSEC_GMAC_OMR_REG_SR;
    value &= ~NETSEC_GMAC_OMR_REG_ST;

    /* disable all interrupts */
    netsec_write(priv, NETSEC_REG_NRM_RX_INTEN_CLR, ~0);
    netsec_write(priv, NETSEC_REG_NRM_TX_INTEN_CLR, ~0);

    return netsec_mac_write(priv, GMAC_REG_OMR, value);
}

static void netsec_phy_adjust_link(struct net_device *ndev)
{
    struct netsec_priv *priv = netdev_priv(ndev);

    if (ndev->phydev->link)
        netsec_start_gmac(priv);
    else
        netsec_stop_gmac(priv);

    phy_print_status(ndev->phydev);
}
static irqreturn_t netsec_irq_handler(int irq, void *dev_id) {
    struct netsec_priv *priv = dev_id;
    u32 val, status = netsec_read(priv, NETSEC_REG_TOP_STATUS);
    unsigned long flags;

    /* Disable interrupts */
    if (status & NETSEC_IRQ_TX) {
        val = netsec_read(priv, NETSEC_REG_NRM_TX_STATUS);
        netsec_write(priv, NETSEC_REG_NRM_TX_STATUS, val);
    }
    if (status & NETSEC_IRQ_RX) {
        val = netsec_read(priv, NETSEC_REG_NRM_RX_STATUS);
        netsec_write(priv, NETSEC_REG_NRM_RX_STATUS, val);
    }

    spin_lock_irqsave(&priv->reglock, flags);
    netsec_write(priv, NETSEC_REG_INTEN_CLR, NETSEC_IRQ_RX | NETSEC_IRQ_TX);
    spin_unlock_irqrestore(&priv->reglock, flags);

    napi_schedule(&priv->napi);
    return IRQ_HANDLED;
}

static int netsec_netdev_open(struct net_device *ndev) {
    struct netsec_priv *priv = netdev_priv(ndev);
    int ret;

    pm_runtime_get_sync(priv->dev);

    ret = netsec_setup_rx_dring(priv);
    if (ret) {
        netif_err(priv, probe, priv->ndev, "%s: fail setup ring\n", __func__);
        goto err1;
    }

    ret = request_irq(priv->ndev->irq, netsec_irq_handler, IRQF_SHARED, "netsec", priv);
    if (ret) {
        netif_err(priv, drv, priv->ndev, "request_irq failed\n");
        goto err2;
    }

    if (dev_of_node(priv->dev)) {

    }
if (!of_phy_connect(priv->ndev, priv->phy_np, netsec_phy_adjust_link, 0, priv->phy_interface)) {
    netif_err(priv, link, priv->ndev, "missing PHY\n");
    ret = -ENODEV;
    goto err3;
} else {
    ret = phy_connect_direct(priv->ndev, priv->phydev, netsec_phy_adjust_link, priv->phy_interface);
    if (ret) {
        netif_err(priv, link, priv->ndev, "phy_connect_direct() failed (%d)\n", ret);
        goto err3;
    }
    /* Enable TX+RX intr. */
    netsec_start_gmac(priv);
    napi_enable(&priv->napi);
    netsec_start_queue(ndev);
    +/* Enable TX+RX intr. */
    netsec_write(priv, NETSEC_REG_INTEN_SET, NETSEC_IRQ_RX | NETSEC_IRQ_TX);
    +
    return 0;
}
err3:
    free_irq(priv->ndev->irq, priv);
err2:
    netsec_uninit_pkt_dring(priv, NETSEC_RING_RX);
err1:
    pm_runtime_put_sync(priv->dev);
    return ret;
+
+static int netsec_netdev_stop(struct net_device *ndev) {
    int ret;
    struct netsec_priv *priv = netdev_priv(ndev);
    +
    struct netsec_priv *priv = netdev_priv(ndev);
    +
    +netif_stop_queue(priv->ndev);
    +dma_wmb();
    +
    +napi_disable(&priv->napi);
    +
    +netsec_write(priv, NETSEC_REG_INTEN_CLR, ~0);
+netsec_stop_gmac(priv);
+
+free_irq(priv->ndev->irq, priv);
+
+netsec_uninit_pkt_dring(priv, NETSEC_RING_TX);
+netsec_uninit_pkt_dring(priv, NETSEC_RING_RX);
+
+phy_stop(ndev->phydev);
+phy_disconnect(ndev->phydev);
+
+ret = netsec_reset_hardware(priv, false);
+
+pm_runtime_put_sync(priv->dev);
+
+return ret;
+
+
+static int netsec_netdev_init(struct net_device *ndev)
+{
+    struct netsec_priv *priv = netdev_priv(ndev);
+    int ret;
+    u16 data;
+    
+    ret = netsec_alloc_dring(priv, NETSEC_RING_TX);
+    if (ret)
+        return ret;
+    ret = netsec_alloc_dring(priv, NETSEC_RING_RX);
+    if (ret)
+        goto err1;
+    /* set phy power down */
+    data = netsec_phy_read(priv->mii_bus, priv->phy_addr, MII_BMCR);
+    netsec_phy_write(priv->mii_bus, priv->phy_addr, MII_BMCR,
+                     data | BMCR_PDOWN);
+    ret = netsec_reset_hardware(priv, true);
+    if (ret)
+        goto err2;
+    /* Restore phy power state */
+    netsec_phy_write(priv->mii_bus, priv->phy_addr, MII_BMCR, data);
+    
+    ret = netsec_reset_hardware(priv, false);
+    if (ret)
+        goto err2;
+    /* Restore phy power state */
+    netsec_phy_write(priv->mii_bus, priv->phy_addr, MII_BMCR, data);
+    
+    return 0;
+err2:
+    netsec_free_dring(priv, NETSEC_RING_RX);
+err1:
+    netsec_free_dring(priv, NETSEC_RING_TX);
+return ret;
+
+static void netsec_netdev_uninit(struct net_device *ndev)
+{
+    struct netsec_priv *priv = netdev_priv(ndev);
+
+    netsec_free_dring(priv, NETSEC_RING_RX);
+    netsec_free_dring(priv, NETSEC_RING_TX);
+}
+
+static int netsec_netdev_set_features(struct net_device *ndev,
+    netdev_features_t features)
+{
+    struct netsec_priv *priv = netdev_priv(ndev);
+
+    priv->rx_cksum_offload_flag = !(features & NETIF_F_RXCSUM);
+
+    return 0;
+}
+
+static int netsec_netdev_ioctl(struct net_device *ndev, struct ifreq *ifr,
+    int cmd)
+{
+    return phy_mii_ioctl(ndev->phydev, ifr, cmd);
+}
+
+static const struct net_device_ops netsec_netdev_ops = {
+    .ndo_init = netsec_netdev_init,
+    .ndo_uninit = netsec_netdev_uninit,
+    .ndo_open = netsec_netdev_open,
+    .ndo_stop = netsec_netdev_stop,
+    .ndo_start_xmit = netsec_netdev_start_xmit,
+    .ndo_set_features = netsec_netdev_set_features,
+    .ndo_set_mac_address = eth_mac_addr,
+    .ndo_validate_addr = eth_validate_addr,
+    .ndo_do_ioctl = netsec_netdev_ioctl,
+};
+
+static int netsec_of_probe(struct platform_device *pdev,
+    struct netsec_priv *priv, u32 *phy_addr)
+{
+    priv->phy_np = of_parse_phandle(pdev->dev.of_node, "phy-handle", 0);
+    if (!priv->phy_np)
+    {
+        dev_err(&pdev->dev, "missing required property 'phy-handle'");
+        return -EINVAL;
+    }
+}
phy_addr = of_mdio_parse_addr(&pdev->dev, priv->phy_np);
+ priv->clk = devm_clk_get(&pdev->dev, NULL); /* get by 'phy_ref_clk' */
+ if (IS_ERR(priv->clk)) {
+ dev_err(&pdev->dev, "phy_ref_clk not found
");
+ return PTR_ERR(priv->clk);
+ }
+ priv->freq = clk_get_rate(priv->clk);
+ return 0;
+
+static int netsec_acpi_probe(struct platform_device *pdev,
+ struct netsec_priv *priv, u32 *phy_addr)
+{
+ int ret;
+ 
+ if (!IS_ENABLED(CONFIG_ACPI))
+ return -ENODEV;
+ 
+ ret = device_property_read_u32(&pdev->dev, "phy-channel", phy_addr);
+ if (ret) {
+ dev_err(&pdev->dev,
+ "missing required property 'phy-channel'\n");
+ return ret;
+ }
+ 
+ ret = device_property_read_u32(&pdev->dev,
+ "socionext,phy-clock-frequency",
+ &priv->freq);
+ if (ret)
+ dev_err(&pdev->dev,
+ "missing required property 'socionext,phy-clock-frequency'\n");
+ return ret;
+ }
+ 
+static void netsec_unregister_mdio(struct netsec_priv *priv)
+{
+ struct phy_device *phydev = priv->phydev;
+ 
+ if (!dev_of_node(priv->dev) && phydev) {
+ phy_device_remove(phydev);
+ phy_device_free(phydev);
+ }
+ 
+ mdiobus_unregister(priv->mii_bus);
+ }
+static int netsec_register_mdio(struct netsec_priv *priv, u32 phy_addr) 
+
+struct mii_bus *bus;
+int ret;
+
+bus = devm_mdiobus_alloc(priv->dev);
+if (!bus)
+return -ENOMEM;
+
+snprintf(bus->id, MII_BUS_ID_SIZE, "%s", dev_name(priv->dev));
+bus->priv = priv;
+bus->name = "SNI NETSEC MDIO";
+bus->read = netsec_phy_read;
+bus->write = netsec_phy_write;
+bus->parent = priv->dev;
+priv->mii_bus = bus;
+
+if (dev_of_node(priv->dev)) {
+struct device_node *mdio_node, *parent = dev_of_node(priv->dev);
+
+mdio_node = of_get_child_by_name(parent, "mdio");
+if (mdio_node) {
+parent = mdio_node;
+} else {
+/* older f/w doesn't populate the mdio subnode,
+ * allow relaxed upgrade of f/w in due time.
+ */
+dev_info(priv->dev, "Upgrade f/w for mdio subnode!\n");
+}
+
+ret = of_mdiobus_register(bus, parent);
+of_node_put(mdio_node);
+
+if (ret) {
+dev_err(priv->dev, "mdiobus register err(%d)\n", ret);
+return ret;
+} else {
+/* Mask out all PHYs from auto probing. */
+bus->phy_mask = ~0;
+ret = mdiobus_register(bus);
+if (ret) {
+dev_err(priv->dev, "mdiobus register err(%d)\n", ret);
+return ret;
+}
+
+priv->phydev = get_phy_device(bus, phy_addr, false);
+if (IS_ERR(priv->phydev)) {
+
}
ret = PTR_ERR(priv->phydev);
+dev_err(priv->dev, "get_phy_device err(%d)\n", ret);
+priv->phydev = NULL;
+return -ENODEV;
+
+ret = phy_device_register(priv->phydev);
+if (ret) {
+mdiobus_unregister(bus);
+dev_err(priv->dev,
+"phy_device_register err(%d)\n", ret);
+}
+
+return ret;
+
+static int netsec_probe(struct platform_device *pdev)
+{
+struct resource *mmio_res, *eeprom_res, *irq_res;
+u8 *mac, macbuf[ETH_ALEN];
+struct netsec_priv *priv;
+u32 hw_ver, phy_addr = 0;
+struct net_device *ndev;
+int ret;
+
+mmio_res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+if (!mmio_res) {
+dev_err(&pdev->dev, "No MMIO resource found.\n");
+return -ENODEV;
+}
+
+eeprom_res = platform_get_resource(pdev, IORESOURCE_MEM, 1);
+if (!eeprom_res) {
+dev_info(&pdev->dev, "No EEPROM resource found.\n");
+return -ENODEV;
+}
+
+irq_res = platform_get_resource(pdev, IORESOURCE_IRQ, 0);
+if (!irq_res) {
+dev_err(&pdev->dev, "No IRQ resource found.\n");
+return -ENODEV;
+}
+
+ndev = alloc_etherdev(sizeof(*priv));
+if (!ndev)
+return -ENOMEM;
+
+priv = netdev_priv(ndev);
+
+spin_lock_init(&priv->reglock);
+SET_NETDEV_DEV(ndev, &pdev->dev);
+platform_set_drvdata(pdev, priv);
+ndev->irq = irq_res->start;
+priv->dev = &pdev->dev;
+priv->ndev = ndev;
+
+priv->msg_enable = NETIF_MSG_TX_ERR | NETIF_MSG_HW | NETIF_MSG_DRV |
+ NETIF_MSG_LINK | NETIF_MSG_PROBE;
+
+priv->phy_interface = device_get_phy_mode(&pdev->dev);
+if ((int)priv->phy_interface < 0) {
+dev_err(&pdev->dev, "missing required property 'phy-mode'
");
+ret = -ENODEV;
+goto free_ndev;
+}
+
+priv->ioaddr = devm_ioremap(&pdev->dev, mmio_res->start,
+ resource_size(mmio_res));
+if (!priv->ioaddr) {
+dev_err(&pdev->dev, "devm_ioremap() failed"
");
+ret = -ENXIO;
+goto free_ndev;
+}
+
+priv->eeprom_base = devm_ioremap(&pdev->dev, eeprom_res->start,
+ resource_size(eeprom_res));
+if (!priv->eeprom_base) {
+dev_err(&pdev->dev, "devm_ioremap() failed for EEPROM"
");
+ret = -ENXIO;
+goto free_ndev;
+}
+
+mac = device_get_mac_address(&pdev->dev, macbuf, sizeof(macbuf));
+if (mac)
+ether_addr_copy(ndev->dev_addr, mac);
+
+if (priv->eeprom_base &&
+ (!mac || !is_valid_ether_addr(ndev->dev_addr))) {
+void __iomem *macp = priv->eeprom_base +
+NETSEC_EEPROM_MAC_ADDRESS;
+
+ndev->dev_addr[0] = readb(macp + 3);
+ndev->dev_addr[1] = readb(macp + 2);
+ndev->dev_addr[2] = readb(macp + 1);
+ndev->dev_addr[3] = readb(macp + 0);
+ndev->dev_addr[4] = readb(macp + 7);
+ndev->dev_addr[5] = readb(macp + 6);
+
+if (!is_valid_ether_addr(ndev->dev_addr)) {
+dev_warn(&pdev->dev, "No MAC address found, using random\n");
+eth_hw_addr_random(ndev);
+
+}
+
+if (dev_of_node(&pdev->dev))
+ret = netsec_of_probe(pdev, priv, &phy_addr);
+else
+ret = netsec_acpi_probe(pdev, priv, &phy_addr);
+
+if (ret)
+goto free_ndev;
+
+priv->phy_addr = phy_addr;
+
+if (!priv->freq) {
+dev_err(&pdev->dev, "missing PHY reference clock frequency\n");
+ret = -ENODEV;
+goto free_ndev;
+
++/
+% default for throughput */
+priv->et_coalesce.rx_coalesce_usecs = 500;
+priv->et_coalesce.tx_coalesce_usecs = 500;
+
+ret = device_property_read_u32(&pdev->dev, "max-frame-size",
+&ndev->max_mtu);
+if (ret < 0)
+ndev->max_mtu = ETH_DATA_LEN;
+
+/* runtime_pm coverage just for probe, open/close also cover it */
+pm_runtime_enable(&pdev->dev);
+pm_runtime_get_sync(&pdev->dev);
+
+hw_ver = netsec_read(priv, NETSEC_REG_F_TAIKI_VER);
+/* this driver only supports F_TAIKI style NETSEC */
+if (NETSEC_F_NETSEC_VER_MAJOR_NUM(hw_ver) !=
+ NETSEC_F_NETSEC_VER_MAJOR_NUM(NETSEC_REG_NETSEC_VER_F_TAIKI)) {
+ret = -ENODEV;
+goto pm_disable;
+
++dev_info(&pdev->dev, "hardware revision %d.%d\n",
hw_ver >> 16, hw_ver & 0xffff);
+ netif_napi_add(ndev, &priv->napi, netsec_napi_poll, NAPI_BUDGET);
+ ndev->netdev_ops = &netsec_netdev_ops;
+ ndev->ethtool_ops = &netsec_ethtool_ops;
+ ndev->features |= NETIF_F_HIGHDMA | NETIF_F_RXCSUM | NETIF_F_GSO |
+ NETIF_F_IP_CSUM | NETIF_F_IPV6_CSUM;
+ ndev->hw_features = ndev->features;
+ priv->rx_cksum_offload_flag = true;
+ ret = netsec_register_mdio(priv, phy_addr);
+ if (ret)
  + goto unreg_napi;
  +
  + if (dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(40)))
  + dev_warn(&pdev->dev, "Failed to set DMA mask\n");
  +
  + ret = register_netdev(ndev);
  + if (ret) {
    + netif_err(priv, probe, ndev, "register_netdev() failed\n");
    + goto unreg_mii;
    + }
  +
  + pm_runtime_put_sync(&pdev->dev);
  + return 0;
  +
  + unreg_mii:
  + netsec_unregister_mdio(priv);
  + unreg_napi:
  + netif_napi_del(&priv->napi);
  + pm_disable:
  + pm_runtime_put_sync(&pdev->dev);
  + pm_runtime_disable(&pdev->dev);
  + free_ndev:
  + free_netdev(ndev);
  + dev_err(&pdev->dev, "init failed\n");
  +
  + return ret;
  +}
  +
  + static int netsec_remove(struct platform_device *pdev)
  +{
    + struct netsec_priv *priv = platform_get_drvdata(pdev);
    +
    + unregister_netdev(priv->ndev);
+netsec_unregister_mdio(priv);
+
+netif_napi_del(&priv->napi);
+
+pm_runtime_disable(&pdev->dev);
+free_netdev(priv->ndev);
+
+return 0;
+
+#ifdef CONFIG_PM
+
+static int netsec_runtime_suspend(struct device *dev)
+{
+    struct netsec_priv *priv = dev_get_drvdata(dev);
+    netsec_write(priv, NETSEC_REG_CLK_EN, 0);
+    clk_disable_unprepare(priv->clk);
+    return 0;
+}
+
+static int netsec_runtime_resume(struct device *dev)
+{
+    struct netsec_priv *priv = dev_get_drvdata(dev);
+    clk_prepare_enable(priv->clk);
+    netsec_write(priv, NETSEC_REG_CLK_EN, NETSEC_CLK_EN_REG_DOM_D | NETSEC_CLK_EN_REG_DOM_C | NETSEC_CLK_EN_REG_DOM_G);
+    return 0;
+}
+#endif
+
+static const struct dev_pm_ops netsec_pm_ops = {
+    SET_RUNTIME_PM_OPS(netsec_runtime_suspend, netsec_runtime_resume, NULL)
+};
+
+static const struct of_device_id netsec_dt_ids[] = {
+    { .compatible = "socionext,synquacer-netsec" },
+};
+
+MODULE_DEVICE_TABLE(of, netsec_dt_ids);
+
+#ifdef CONFIG_ACPI
+
+static const struct acpi_device_id netsec_acpi_ids[] = {
+    { ..
+};

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+
+{ "SCX0001" },
+{ }
+};
+MODULE_DEVICE_TABLE(acpi, netsec_acpi_ids);
+}
+
+static struct platform_driver netsec_driver = {
+.probe= netsec_probe,
+.remove= netsec_remove,
+.driver = {
+.name = "netsec",
+.pm = &netsec_pm_ops,
+.of_match_table = netsec_dt_ids,
+.acpi_match_table = ACPI_PTR(netsec_acpi_ids),
+ },
+};
+}
+module_platform_driver(netsec_driver);
+
+MODULE_AUTHOR("Jassi Brar <jaswinder.singh@linaro.org>");
+MODULE_AUTHOR("Ard Biesheuvel <ard.biesheuvel@linaro.org>");
+MODULE_DESCRIPTION("NETSEC Ethernet driver");
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/Kconfig
@@ -111,7 +111,7 @@
cfg-DW MAC_SOCFPGA
tristate "SOCFPGA dwmac support"
default ARCH_SOCFPGA
 -depends on OF && (ARCH_SOCFPGA || COMPIL E_TEST)
+depends on OF && (ARCH_SOCFPGA || ARCH_STRATIX10 || COMPIL E_TEST)
select MFD_SYSCON
help
 Support for ethernet controller on Altera SOC FPGA
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/common.h
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/common.h
@@ -338,9 +338,9 @@
 unsigned int rx_fifo_size;
};
/* GMAC TX FIFO is 8K, Rx FIFO is 16K */
-#define BUF_SIZE_16KiB 16384
-#define BUF_SIZE_8KiB 8192
+/* RX Buffer size must be multiple of 4/8/16 bytes */
+#define BUF_SIZE_16KiB 16368
+#define BUF_SIZE_8KiB 8188
#define BUF_SIZE_4KiB 4096
#define BUF_SIZE_2KiB 2048
struct stmmac_desc_ops {
/* DMA RX descriptor ring initialization */
void (*init_rx_desc) (struct dma_desc *p, int disable_rx_ic, int mode,
-      int end);
+    int end, int bfsize);
/* DMA TX descriptor ring initialization */
void (*init_tx_desc) (struct dma_desc *p, int mode, int end);
}
/* Helpers to program the MAC core */
struct stmmac_ops {
/* MAC core initialization */
-void (*core_init)(struct mac_device_info *hw, int mtu);
+void (*core_init)(struct mac_device_info *hw, struct net_device *dev);
/* Enable the MAC RX/TX */
void (*set_mac)(void __iomem *ioaddr, bool enable);
/* Enable and verify that the IPC module is supported */
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/descs_com.h
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/descs_com.h
@@ -29,11 +29,13 @@
/* Specific functions used for Ring mode */

/* Enhanced descriptors */
-static inline void ehn_desc_rx_set_on_ring(struct dma_desc *p, int end)
+static inline void ehn_desc_rx_set_on_ring(struct dma_desc *p, int end, int bfsize)
{ 
-  p->des1 |= cpu_to_le32(((BUF_SIZE_8KiB - 1)
-      << ERDES1_BUFFER2_SIZE_SHIFT)
-    & ERDES1_BUFFER2_SIZE_MASK);
+  if (bfsize == BUF_SIZE_16KiB)
+    p->des1 |= cpu_to_le32((BUF_SIZE_8KiB
+      << ERDES1_BUFFER2_SIZE_SHIFT)
+    & ERDES1_BUFFER2_SIZE_MASK);

  if (end)
    p->des1 |= cpu_to_le32(ERDES1_END_RING);
@@ -59,11 +61,15 @@

/* Normal descriptors */
-static inline void ndesc_rx_set_on_ring(struct dma_desc *p, int end)
+static inline void ndesc_rx_set_on_ring(struct dma_desc *p, int end, int bfsize)
{ 
-  p->des1 |= cpu_to_le32(((BUF_SIZE_2KiB - 1)
-      << RDES1_BUFFER2_SIZE_SHIFT)
-    & RDES1_BUFFER2_SIZE_MASK);
if (bfsize >= BUF_SIZE_2KiB) {
  int bfsize2;
  bfsize2 = min(bfsize - BUF_SIZE_2KiB + 1, BUF_SIZE_2KiB - 1);
  p->des1 |= cpu_to_le32((bfsize2 << RDES1_BUFFER2_SIZE_SHIFT)
    & RDES1_BUFFER2_SIZE_MASK);
}

if (end)
  p->des1 |= cpu_to_le32(RDES1_END_RING);

static const struct of_device_id dwmac_generic_match[] = {
  { .compatible = "st,spear600-gmac"},
  { .compatible = "snps,dwmac-3.40a"},
  { .compatible = "snps,dwmac-3.50a"},
  { .compatible = "snps,dwmac-3.610"},
  { .compatible = "snps,dwmac-3.70a"},
  ...
  ...
};

struct device *dev = &gmac->pdev->dev;

if (gmac->phy_mode < 0) {
  dev_err(&pdev->dev, "missing phy mode property\n");
  return -EINVAL;
}

regmap_write(gmac->nss_common, NSS_COMMON_GMAC_CTL(gmac->id), val);

regmap_write(gmac->nss_common, NSS_COMMON_CLK_SRC_CTRL_OFFSET(gmac->id), val);

if (end)
  p->des1 |= cpu_to_le32(RDES1_END_RING);

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-generic.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-generic.c
@@ -71,6 +71,7 @@
static const struct of_device_id dwmac_generic_match[,] = {
  { .compatible = "st,spear600-gmac"},
  { .compatible = "snps,dwmac-3.40a"},
  { .compatible = "snps,dwmac-3.50a"},
  { .compatible = "snps,dwmac-3.610"},
  { .compatible = "snps,dwmac-3.70a"},
  ...
  ...
};

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
@@ -191,7 +191,7 @@
struct device *dev = &gmac->pdev->dev;

gmac->phy_mode = of_get_phy_mode(dev->of_node);
- if (gmac->phy_mode < 0) {
+ if ((int)gmac->phy_mode < 0) {
    dev_err(dev, "missing phy mode property\n");
    return -EINVAL;
  }

val &= ~NSS_COMMON_GMAC_CTL_PHY_IFACE_SEL;

regmap_write(gmac->nss_common, NSS_COMMON_CLK_SRC_CTRL_OFFSET(gmac->id), val);

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
@@ -308,16 +305,25 @@
  
  if (gmac->phy_mode < 0) {
    dev_err(dev, "Unsupported PHY mode: \n",
-     phy_modes(gmac->phy_mode));
-    err = -EINVAL;
-    goto err_remove_config_dt;
-    goto err_unsupported_phy;
  }

regmap_write(gmac->nss_common, NSS_COMMON_GMAC_CTL(gmac->id), val);

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
@@ -308,16 +305,25 @@
  
  if (gmac->phy_mode < 0) {
    dev_err(dev, "Unsupported PHY mode: \n",
-     phy_modes(gmac->phy_mode));
-    err = -EINVAL;
-    goto err_remove_config_dt;
-    goto err_unsupported_phy;
  }

regmap_write(gmac->nss_common, NSS_COMMON_GMAC_CTL(gmac->id), val);

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
@@ -308,16 +305,25 @@
  
  if (gmac->phy_mode < 0) {
    dev_err(dev, "Unsupported PHY mode: \n",
-     phy_modes(gmac->phy_mode));
-    err = -EINVAL;
-    goto err_remove_config_dt;
-    goto err_unsupported_phy;
  }

regmap_write(gmac->nss_common, NSS_COMMON_GMAC_CTL(gmac->id), val);

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-ipq806x.c
@@ -308,16 +305,25 @@
  
  if (gmac->phy_mode < 0) {
    dev_err(dev, "Unsupported PHY mode: \n",
-     phy_modes(gmac->phy_mode));
-    err = -EINVAL;
-    goto err_remove_config_dt;
-    goto err_unsupported_phy;
  }

regmap_write(gmac->nss_common, NSS_COMMON_GMAC_CTL(gmac->id), val);
-phy_modes(gmac->phy_mode));
-err = -EINVAL;
-goto err_remove_config_dt;
+goto err_unsupported_phy;
}

regmap_write(gmac->nss_common, NSS_COMMON_CLK_SRC_CTRL, val);

/* Enable PTP clock */
regmap_read(gmac->nss_common, NSS_COMMON_CLK_GATE, &val);
val |= NSS_COMMON_CLK_GATE_PTP_EN(gmac->id);
+switch (gmac->phy_mode) {
+case PHY_INTERFACE_MODE_RGMII:
+val |= NSS_COMMON_CLK_GATE_RGMII_RX_EN(gmac->id) |
+NSS_COMMON_CLK_GATE_RGMII_TX_EN(gmac->id);
+break;
+case PHY_INTERFACE_MODE_SGMII:
+val |= NSS_COMMON_CLK_GATE_GMII_RX_EN(gmac->id) |
+NSS_COMMON_CLK_GATE_GMII_TX_EN(gmac->id);
+break;
+default:
+goto err_unsupported_phy;
+
} regmap_write(gmac->nss_common, NSS_COMMON_CLK_GATE, val);

if (gmac->phy_mode == PHY_INTERFACE_MODE_SGMII) {
@@ -337,6 +343,9 @@
plat_dat->has_gmac = true;
plat_dat->bsp_priv = gmac;
plat_dat->fix_mac_speed = ipq806x_gmac_fix_mac_speed;
+plat_dat->multicast_filter_bins = 0;
+plat_dat->tx_fifo_size = 8192;
+plat_dat->rx_fifo_size = 8192;

er = stmmac_dvr_probe(&pdev->dev, plat_dat, &stmmac_res);
if (err)
@@ -344,6 +353,11 @@
return 0;

+err_unsupported_phy:
+dev_err(&pdev->dev, "Unsupported PHY mode: \"%s\"\n",
+phy_modes(gmac->phy_mode));
+err = -EINVAL;
+
err_remove_config_dt:
stmmac_remove_config_dt(pdev, plat_dat);

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-meson8b.c
/* mux to choose between fclk_div2 (bit unset) and mpll2 (bit set) */
#define PRG_ETH0_CLK_M250_SEL_SHIFT4
#define PRG_ETH0_CLK_M250_SEL_MASKGENMASK(4, 4)

#define PRG_ETH0_TXDLY_SHIFT5

snprintf(clk_name, sizeof(clk_name), ""%s#m250_sel", dev_name(dev));
init.name = clk_name;
init.ops = &clk_mux_ops;
-init.flags = 0;
+init.flags = CLK_SET_RATE_PARENT;
init.parent_names = mux_parent_names;
init.num_parents = MUX_CLK_NUM_PARENTS;

#define PRG_ETH0_RGMII_MODEBIT(0)

if (WARN_ON(IS_ERR(dwmac->m250_div_clk)))
@@ -283,7 +285,7 @@
dwmac->pdev = pdev;
dwmac->phy_mode = of_get_phy_mode(pdev->dev.of_node);
-if (dwmac->phy_mode < 0) {
+if ((int)dwmac->phy_mode < 0) {
   dev_err(&pdev->dev, "missing phy-mode property\n");
   ret = -EINVAL;
   goto err_remove_config_dt;
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-rk.c

--- linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-rk.c
int ret;
struct device *dev = &bsp_priv->pdev->dev;

-if (!ldo) {
-dev_err(dev, "no regulator found\n");
-return -1;
-
+if (!ldo)
+return 0;

if (enable) {
ret = regulator_enable(ldo);
@@ -1284,8 +1282,10 @@
}

ret = phy_power_on(bsp_priv, true);
-if (ret)
+if (ret) {
+gmac_clk_enable(bsp_priv, false);
return ret;
+
pm_runtime_enable(dev);
pm_runtime_get_sync(dev);
@@ -1362,7 +1362,7 @@
}

ret = rk_gmac_clk_init(plat_dat);
if (ret)
-return ret;
+goto err_remove_config_dt;

ret = rk_gmac_powerup(plat_dat->bsp_priv);
if (ret)
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac-socfpga.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac-socfpga.c
@@ -55,6 +55,7 @@
struct	device *dev;
struct regmap *sys_mgr_base_addr;
struct reset_control *stmmac_rst;
+struct reset_control *stmmac_ocp_rst;
void __iomem *splitter_base;
bool f2h_ptp_ref_clk;
struct tse_pcs pcs;
@@ -262,8 +263,8 @@
val = SYSMGR_EMACGRP_CTRL_PHYSEL_ENUM_GMII_MII;
/* Assert reset to the enet controller before changing the phy mode */
-if (dwmac->stmmac_rst)
reset_control_assert(dwmac->stmmac_rst);
+reset_control_assert(dwmac->stmmac_ocp_rst);
+reset_control_assert(dwmac->stmmac_rst);

regmap_read(sys_mgr_base_addr, reg_offset, &ctrl);
ctrl &= ~(SYSMGR_EMACGRP_CTRL_PHYSEL_MASK << reg_shift);
@@ -273,23 +274,26 @@
       phymode == PHY_INTERFACE_MODE_GMII ||
       phymode == PHY_INTERFACE_MODE_SGMII) {
-ctrl |= SYSMGR_EMACGRP_CTRL_PTP_REF_CLK_MASK << (reg_shift / 2);
-regmap_read(sys_mgr_base_addr, SYSMGR_FPGAGRP_MODULE_REG,
   &module);
-module |= (SYSMGR_FPGAGRP_MODULE_EMAC << (reg_shift / 2));
-regmap_write(sys_mgr_base_addr, SYSMGR_FPGAGRP_MODULE_REG,
   module);
-} else {
-ctrl &= ~(SYSMGR_EMACGRP_CTRL_PTP_REF_CLK_MASK << (reg_shift / 2));
}

+if (dwmac->f2h_ptp_ref_clk)
+ctrl |= SYSMGR_EMACGRP_CTRL_PTP_REF_CLK_MASK << (reg_shift / 2);
+else
+ctrl &= ~(SYSMGR_EMACGRP_CTRL_PTP_REF_CLK_MASK <<
+    (reg_shift / 2));
+regmap_write(sys_mgr_base_addr, reg_offset, ctrl);

/* Deassert reset for the phy configuration to be sampled by
 * the enet controller, and operation to start in requested mode */
-if (dwmac->stmmac_rst)
reset_control_deassert(dwmac->stmmac_rst);
+reset_control_deassert(dwmac->stmmac_ocp_rst);
+reset_control_deassert(dwmac->stmmac_rst);
if (phymode == PHY_INTERFACE_MODE_SGMII) {
if (tse_pcs_init(dwmac->pcs.tse_pcs_base, &dwmac->pcs) != 0) {
-dev_err(dmac->dev, "Unable to initialize TSE PCS");
@@ -324,6 +328,15 @@
goto err_remove_config_dt;
}

+dmac->stmmac_ocp_rst = devm_reset_control_get_optional(dmac, "stmmaceth-ocp");
+if (IS_ERR(dmac->stmmac_ocp_rst)) {
+ret = PTR_ERR(dmac->stmmac_ocp_rst);
+dev_err(dmac, "error getting reset control of ocp %d\n", ret);
goto err_remove_config_dt;
+
+reset_control_deassert(dwmac->stmmac_ocp_rst);
+
ret = socfpga_dwmac_parse_data(dwmac, dev);
if (ret) {
  dev_err(dev, "Unable to parse OF data\n");
  goto err_remove_config_dt;
  
  reset_control_deassert(dwmac->stmmac_ocp_rst);
  ret = socfpga_dwmac_parse_data(dwmac, dev);
  if (ret) {
    dev_err(dev, "Unable to parse OF data\n");
    goto err_remove_config_dt;
  }

  if (gmac->regulator)
    regulator_disable(gmac->regulator);
  dev_err(&pdev->dev, "Could not enable AHB clock\n");
  return ret;
  
  goto err_disable_regulator;
} else {
  /*
   * @variant: reference to the current board variant
   * @regmap: regmap for using the syscon
   * @internal_phy_powered: Does the internal PHY is enabled
   * @use_internal_phy: Is the internal PHY selected for use
   * @mux_handle: Internal pointer used by mdio-mux lib
   */

  struct sunxi_priv_data {
    const struct emac_variant *variant;
    struct regmap *regmap;
    bool internal_phy_powered;
    bool use_internal_phy;
    void *mux_handle;
  };

  .dma_interrupt = sun8i_dwmac_dma_interrupt,
  
  static int sun8i_dwmac_power_internal_phy(struct stmmac_priv *priv);
  
  static int sun8i_dwmac_init(struct platform_device *pdev, void *priv)
  {
    struct net_device *ndev = platform_get_drvdata(pdev);
    struct sunxi_priv_data *gmac = priv;
    int ret;

    ret = clk_prepare_enable(gmac->tx_clk);
    if (ret) {
-      -if (gmac->regulator)
-        -regulator_disable(gmac->regulator);
-      dev_err(&pdev->dev, "Could not enable AHB clock\n");
-      -return ret;
-      +goto err_disable_regulator;
-      +
-    }
+if (gmac->use_internal_phy) {
+  ret = sun8i_dmac_power_internal_phy(netdev_priv(ndev));
+  if (ret)
+    goto err_disable_clk;
+
+  return 0;
+
+err_disable_clk:
+  clk_disable_unprepare(gmac->tx_clk);
+err_disable_regulator:
+  if (gmac->regulator)
+    regulator_disable(gmac->regulator);
+  return ret;
}

-static void sun8i_dwmac_core_init(struct mac_device_info *hw, int mtu)
+static void sun8i_dwmac_core_init(struct mac_device_info *hw,
+                                  struct net_device *dev)
{
  void __iomem *ioaddr = hw->pcsr;
  u32 v;
@@ -654,8 +672,9 @@
return -ENODEV;
}

-mdio_internal = of_find_compatible_node(mdio_mux, NULL,
+mdio_internal = of_get_compatible_child(mdio_mux,
   "allwinner,sun8i-h3-mdio-internal");
+of_node_put(mdio_mux);
if (!mdio_internal) {
  dev_err(priv->device, "Cannot get internal_mdio node\n");
  return -ENODEV;
@@ -669,13 +688,20 @@
  gmac->rst_ephy = of_reset_control_get_exclusive(iphynode, NULL);
if (IS_ERR(gmac->rst_ephy)) {
  ret = PTR_ERR(gmac->rst_ephy);
-  if (ret == -EPROBE_DEFER)
+  if (ret == -EPROBE_DEFER) {
+    of_node_put(iphynode);
+    of_node_put(mdio_internal);
+  return ret;
+  }
  continue;
  }
  dev_info(priv->device, "Found internal PHY node\n");
+of_node_put(iphynode);
+of_node_put(mdio_internal);
return 0;
}
+
+of_node_put(mdio_internal);
return -ENODEV;
}

@@ -741,7 +767,6 @@
struct sunxi_priv_data *gmac = priv->plat->bsp_priv;
u32 reg, val;
int ret = 0;
-bool need_power_ephy = false;
+
if (current_child ^ desired_child) {
regmap_read(gmac->regmap, SYSCON_EMAC_REG, &reg);
@@ -749,13 +774,12 @@
case DWMAC_SUN8I_MDIO_MUX_INTERNAL_ID:
dev_info(priv->device, "Switch mux to internal PHY");
val = (reg & ~H3_EPHY_MUX_MASK) | H3_EPHY_SELECT;
-need_power_ephy = true;
-+gmac->use_internal_phy = true;
break;
case DWMAC_SUN8I_MDIO_MUX_EXTERNAL_ID:
dev_info(priv->device, "Switch mux to external PHY");
val = (reg & ~H3_EPHY_MUX_MASK) | H3_EPHY_SHUTDOWN;
-need_power_ephy = false;
+gmac->use_internal_phy = false;
break;
default:
dev_err(priv->device, "Invalid child ID %x\n",
@@ -763,7 +787,7 @@
return -EINVAL;
}
regmap_write(gmac->regmap, SYSCON_EMAC_REG, val);
-if (need_power_ephy) {
+if (gmac->use_internal_phy) {
ret = sun8i_dwmac_power_internal_phy(priv);
if (ret)
return ret;
@@ -825,6 +849,11 @@
/* address. No need to mask it again.
 */
reg |= 1 << H3_EPHY_ADDR_SHIFT;
+} else {
+/* For SoCs without internal PHY the PHY selection bit should be
+ * set to 0 (external PHY).
+ */
+ reg &= ~H3_EPHY_SELECT;
+
if (of_property_read_u32(node, "allwinner.tx-delay-ps", &val)) {
    @ @ -871.6 +900.9 @ @
    /* default */
    break;
    
    case PHY_INTERFACE_MODE_RGMII:
    +case PHY_INTERFACE_MODE_RGMII_ID:
    +case PHY_INTERFACE_MODE_RGMII_RXID:
    +case PHY_INTERFACE_MODE_RGMII_TXID:
    reg |= SYSCON_EPIT | SYSCON_ETCS_INT_GMII;
    break;
    
    case PHY_INTERFACE_MODE_RMII:
    @ @ -899.17 +931.12 @ @
    struct sunxi_priv_data *gmac = priv;

    if (gmac->variant->soc_has_internal_phy) {
        /* sun8i_dmac_exit could be called with mdiomux uninit */
        -if (gmac->mux_handle)
        -mdio_mux_uninit(gmac->mux_handle);
        if (gmac->internal_phy_powered)
        sun8i_dmac_unpower_internal_phy(gmac);
    }

    sun8i_dmac_unset_syscon(gmac);

    -reset_control_put(gmac->rst_ephy);
    -
    clk_disable_unprepare(gmac->tx_clk);

    if (gmac->regulator)
    @ @ -945.6 +972.8 @ @
    mac->mac = &sun8i_dmac_ops;
    mac->dma = &sun8i_dmac_dma_ops;

    +priv->dev->priv_flags |= IFF_UNICAST_FLT;
    +
    /* The loopback bit seems to be re-set when link change
    * Simply mask it each time
    * Speed 10/100/1000 are set in BIT(2)/BIT(3)
    @ @ -1033.6 +1062.8 @ @
    plat_dat->init = sun8i_dmac_init;
    plat_dat->exit = sun8i_dmac_exit;
    plat_dat->setup = sun8i_dmac_setup;
    +plat_dat->tx_fifo_size = 4096;


plat_dat->rx_fifo_size = 16384;

ret = sun8i_dwmac_init(pdev, plat_dat->bsp_priv);
if (ret)
@@ -1064,12 +1095,32 @@
 return ret;
dmac_mux:
+reset_control_put(gmac->rst_ephy);
+clk_put(gmac->ephy_clk);
sun8i_dwmac_unset_syscon(gmac);
dmac_exit:
- sun8i_dwmac_exit(pdev, plat_dat->bsp_priv);
+ stmmac_pltfr_remove(pdev);
 return ret;
}

+static int sun8i_dwmac_remove(struct platform_device *pdev)
+{  
+ struct net_device *ndev = platform_get_drvdata(pdev);
+ struct stmmac_priv *priv = netdev_priv(ndev);
+ struct sunxi_priv_data *gmac = priv->plat->bsp_priv;
+ + if (gmac->variant->soc_has_internal_phy) {
+ mdio_mux_uninit(gmac->mux_handle);
+ sun8i_dwmac_unpower_internal_phy(gmac);
+ reset_control_put(gmac->rst_ephy);
+ clk_put(gmac->ephy_clk);
+ + }
+ + stmmac_pltfr_remove(pdev);
+ +
+ return 0;
+ +}
+ +
static const struct of_device_id sun8i_dwmac_match[] = {
+ 
+ .compatible = "allwinner,sun8i-h3-emac",
+ .data = &emac_variant_h3 },
@@ -1085,7 +1136,7 @@
 static struct platform_driver sun8i_dwmac_driver = {
 .probe = sun8i_dwmac_probe,
 -.remove = stmmac_pltfr_remove,
+ .remove = sun8i_dwmac_remove,
 .driver = {
 .name = "dwmac-sun8i",
 .pm = &stmmac_pltfr_pm_ops,
--- linux-4.15.0.orig/drivers/net/ethernet/stmci/stmmac/dwmac-sunxi.c
static int sun7i_gmac_init(struct platform_device *pdev, void *priv)
{
    struct sunxi_priv_data *gmac = priv;
    int ret = 0;

    if (gmac->regulator) {
        ret = regulator_enable(gmac->regulator);
        * rate, which then uses the auto-reparenting feature of the
        * clock driver, and enabling/disabling the clock.
        */
        if (phy_interface_mode_is_rgmii(gmac->interface)) {
            clk_set_rate(gmac->tx_clk, SUN7I_GMAC_GMII_RGMII_RATE);
            clk_prepare_enable(gmac->tx_clk);
            gmac->clk_enabled = 1;
        } else {
            clk_set_rate(gmac->tx_clk, SUN7I_GMAC_MII_RATE);
            clk_prepare(gmac->tx_clk);
            ret = clk_prepare(gmac->tx_clk);
        }
        if (ret && gmac->regulator)
            regulator_disable(gmac->regulator);
    }
    return ret;
}

static void sun7i_gmac_exit(struct platform_device *pdev, void *priv)
{
    plat_dat->init = sun7i_gmac_init;
    plat_dat->exit = sun7i_gmac_exit;
    plat_dat->fix_mac_speed = sun7i_fix_speed;
    plat_dat->tx_fifo_size = 4096;
    plat_dat->rx_fifo_size = 16384;

    ret = sun7i_gmac_init(pdev, plat_dat->bsp_priv);
    if (ret)
        /* GMAC HW ADDR regs */
        #define LPI_CTRL_STATUS_TLPIEN0x00000001/* Transmit LPI Entry */

        /* GMAC ADDR HIGH(reg)*/
        #define GMAC_ADDR_HIGH(reg)(((reg > 15) ? 0x00000800 : 0x00000040) +

- #define GMAC_ADDR_LOW(reg)((reg > 15) ? 0x00000804 : 0x00000044) +
- (reg * 8))
+#define GMAC_ADDR_HIGH(reg)((reg > 15) ? 0x00000800 + (reg - 16) * 8 :
+ 0x00000040 + (reg * 8))
+#define GMAC_ADDR_LOW(reg)((reg > 15) ? 0x00000804 + (reg - 16) * 8 :
+ 0x00000044 + (reg * 8))
#define GMAC_MAX_PERFECT_ADDRESSES1

#define GMAC_PCS_BASE 0x000000c0 /* PCS register base */
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac1000_core.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac1000_core.c
@@ -25,18 +25,28 @@
#include <linux/crc32.h>
#include <linux/slab.h>
#include <linux/ethtool.h>
+#include <net/dsa.h>
#include <asm/io.h>
#include "stmmac_pcs.h"
#include "dwmac1000.h"

- static void dwmac1000_core_init(struct mac_device_info *hw, int mtu)
+ static void dwmac1000_core_init(struct mac_device_info *hw,
+ struct net_device *dev)
{    
    void __iomem *ioaddr = hw->pcsr;
    u32 value = readl(ioaddr + GMAC_CONTROL);
+    int mtu = dev->mtu;

    /* Configure GMAC core */
    value |= GMAC_CORE_INIT;

    /* Clear ACS bit because Ethernet switch tagging formats such as
    * Broadcom tags can look like invalid LLC/SNAP packets and cause the
    * hardware to truncate packets on reception.
    */
    + if (netdev_uses_dsa(dev))
      + value &= ~GMAC_CONTROL_ACS;
    +
    if (mtu > 1500)
      value |= GMAC_CONTROL_2K;
    if (mtu > 2000)
    @@ -166,6 +176,9 @@
    } else if (dev->flags & IFF_ALLMULTI) {
      value = GMAC_FRAME_FILTER_PM;/* pass all multi */
+    } else if (!netdev_mc_empty(dev) && (mcbitslog2 == 0)) {
+      /* Fall back to all multicast if we've no filter */
value = GMAC_FRAME_FILTER_PM;
} else if (!netdev_mc_empty(dev)) {
    struct netdev_hw_addr *ha;

    GMAC_ADDR_LOW(reg));
    reg++;
}
+
+while (reg < perfect_addr_number) {
+    writel(0, ioaddr + GMAC_ADDR_HIGH(reg));
+    writel(0, ioaddr + GMAC_ADDR_LOW(reg));
+    reg++;
+}
+
#endif FRAME_FILTER_DEBUG
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac100_core.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac100_core.c
@@ -25,15 +25,26 @@

test mac_device_info *hw, int mtu)
+static void dwmac100_core_init(struct mac_device_info *hw,
+struct net_device *dev)
{
    void __iomem *ioaddr = hw->pcsr;
    u32 value = readl(ioaddr + MAC_CONTROL);
-
+value |= MAC_CORE_INIT;
+/* Clear ASTP bit because Ethernet switch tagging formats such as
+ * Broadcom tags can look like invalid LLC/SNAP packets and cause the
+ * hardware to truncate packets on reception.
+ */
+if (netdev_uses_dsa(dev))
+value &= ~MAC_CONTROL_ASTP;
+writel(value, ioaddr + MAC_CONTROL);

#ifndef STMMAC_VLAN_TAG_USED
writel(ETH_P_8021Q, ioaddr + MAC_VLAN1);
#define MTL_RX_OVERFLOW_INT BIT(16)

/* Default operating mode of the MAC */
#define GMAC_CORE_INIT (GMAC_CONFIG_JD | GMAC_CONFIG_PS | GMAC_CONFIG_ACS | GMAC_CONFIG_BE | GMAC_CONFIG_DCRS)

/* To dump the core regs excluding the Address Registers */
#define GMAC_CORE_INIT (GMAC_CONFIG_JD | GMAC_CONFIG_PS | GMAC_CONFIG_ACS | GMAC_CONFIG_BE | GMAC_CONFIG_DCRS)

/* Clear ACS bit because Ethernet switch tagging formats such as Broadcom tags can look like invalid LLC/SNAP packets and cause the hardware to truncate packets on reception. */

if (netdev_uses_dsa(dev))
    value &= ~GMAC_CONFIG_ACS;

if (mtu > 1500)
    value |= GMAC_CONFIG_2K;
if (mtu > 2000)
    value |= GMAC_CONFIG_DCRS;

base_register = (queue < 4) ? GMAC_RXQ_CTRL2 : GMAC_RXQ_CTRL3;
if (queue >= 4)
    queue -= 4;
value = readl(ioaddr + base_register);

@@ -101,6 +113,8 @@
 u32 value;

 base_register = (queue < 4) ? GMAC_TXQ_PRTY_MAP0 : GMAC_TXQ_PRTY_MAP1;
+if (queue >= 4)
+queue -= 4;

 value = readl(ioaddr + base_register);

@@ -435,19 +449,25 @@
 */ Handle multiple unicast addresses */
-!if (netdev_uc_count(dev) > GMAC_MAX_PERFECT_ADDRESSES) {
+!if (netdev_uc_count(dev) > hw->unicast_filter_entries) {
 /* Switch to promiscuous mode if more than 128 addrs
 * are required
 */
 value |= GMAC_PACKET_FILTER_PR;
-!} else if (!netdev_uc_empty(dev)) {
-!int reg = 1;
+!} else {
 struct netdev_hw_addr *ha;
+!int reg = 1;

 netdev_for_each_uc_addr(ha, dev) {
  dwmac4_set_umac_addr(hw, ha->addr, reg);
  reg++;
  }
+  while (reg <= GMAC_MAX_PERFECT_ADDRESSES) {
+    writel(0, ioaddr + GMAC_ADDR_HIGH(reg));
+    writel(0, ioaddr + GMAC_ADDR_LOW(reg));
+    reg++;
+  }
 }

 writel(value, ioaddr + GMAC_PACKET_FILTER);
@@ -465,8 +485,9 @@
 if (fc & FLOW_RX) {
  pr_debug("Receive Flow-Control ON\n");
  flow |= GMAC_RX_FLOW_CTRL_RFE;
+  writel(flow, ioaddr + GMAC_RX_FLOW_CTRL);
  }
+  writel(flow, ioaddr + GMAC_RX_FLOW_CTRL);
+  

if (fc & FLOW_TX) {
    pr_debug("Transmit Flow-Control ON\n");
}

@@ -474,7 +495,7 @@
    pr_debug("duplex mode: PAUSE %d\n", pause_time);

    for (queue = 0; queue < tx_cnt; queue++) {
        flow |= GMAC_TX_FLOW_CTRL_TFE;
        +flow = GMAC_TX_FLOW_CTRL_TFE;
    }

    if (duplex)
        flow |=
@@ -482,6 +503,9 @@
    writeln(flow, ioaddr + GMAC_QX_TX_FLOW_CTRL(queue));

+    } else {
+        for (queue = 0; queue < tx_cnt; queue++)
+            writeln(0, ioaddr + GMAC_QX_TX_FLOW_CTRL(queue));
+    }
+
@@ -562,10 +586,12 @@
struct stmmac_extra_stats *x)
{
    void __iomem *ioaddr = hw->pcsr;
    -u32 intr_status;
    +u32 intr_status = readl(ioaddr + GMAC_INT_STATUS);
    +u32 intr_enable = readl(ioaddr + GMAC_INT_EN);
    int ret = 0;

    -intr_status = readl(ioaddr + GMAC_INT_STATUS);
    +/* Discard disabled bits */
    +intr_status &= intr_enable;

    /* Not used events (e.g. MMC interrupts) are not handled. */
    if ((intr_status & mmc_tx_irq))
        --- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac4_descs.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac4_descs.c
@@ -238,15 +238,18 @@

    int ret = 1;

    struct dma_desc *p = (struct dma_desc *)desc;
    +unsigned int rdes0 = le32_to_cpu(p->des0);
    +unsigned int rdes1 = le32_to_cpu(p->des1);
    +unsigned int rdes3 = le32_to_cpu(p->des3);
    u32 own, ctxt;
    int ret = 1;
-own = p->des3 & RDES3_OWN;
-ctxt = ((p->des3 & RDES3_CONTEXT_DESCRIPTOR)
+own = rdes3 & RDES3_OWN;
+ctxt = ((rdes3 & RDES3_CONTEXT_DESCRIPTOR)
  >> RDES3_CONTEXT_DESCRIPTOR_SHIFT);

if (likely(!own && ctxt)) {
  if ((p->des0 == 0xffffffff) && (p->des1 == 0xffffffff))
    if ((rdes0 == 0xffffffff) && (rdes1 == 0xffffffff))
      /* Corrupted value */
      ret = -EINVAL;
  else
    @ @ -290,7 +293,7 @ @
}

static void dwmac4_rd_init_rx_desc(struct dma_desc *p, int disable_rx_ic,
  int mode, int end)
{
  p->des3 = cpu_to_le32(RDES3_OWN | RDES3_BUFFER1_VALID_ADDR);

++- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/dwmac4_dma.c
+++/ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/dwmac4_dma.c
@@ -115,6 +115,23 @@
    ioaddr + DMA_CHAN_INTR_ENA(chan));
}

+static void dwmac410_dma_init_channel(void __iomem *ioaddr,
+  struct stmmac_dma_cfg *dma_cfg, u32 chan)
+{
+  u32 value;
+  */ common channel control register config */
+  value = readl(ioaddr + DMA_CHAN_CONTROL(chan));
+  if (dma_cfg->pblx8)
+    value = value | DMA_BUS_MODE_PBL;
+  writeln(value, ioaddr + DMA_CHAN_CONTROL(chan));
+  */ Mask interrupts by writing to CSR7 */
+  writeln(DMA_CHAN_INTR_DEFAULT_MASK_4_10,
+    ioaddr + DMA_CHAN_INTR_ENA(chan));
+}
+
+static void dwmac4_dma_init(void __iomem *ioaddr,
  struct stmmac_dma_cfg *dma_cfg,
  u32 dma_tx, u32 dma_rx, int atds)
const struct stmmac_dma_ops dwmac410_dma_ops = {
    .reset = dwmac4_dma_reset,
    .init = dwmac4_dma_init,
    -.init_chan = dwmac4_dma_init_channel,
    +.init_chan = dwmac410_dma_init_channel,
    .init_rx_chan = dwmac4_dma_init_rx_chan,
    .init_tx_chan = dwmac4_dma_init_tx_chan,
    .axi = dwmac4_dma_axi,
};

void dwmac4_dma_start_rx(void __iomem *ioaddr, u32 chan)
{
    if (unlikely(!rdes0 & RDES0_LAST_DESCRIPTOR)) {
        stats->rx_length_errors++;
        return discard_frame;
    }
    if (unlikely(rdes0 & RDES0_ERROR_SUMMARY)) {
        return;
    }
    if (unlikely(rdes0 & RDES0_DESCRIPTOR_ERROR)) {
        x->rx_desc++;
    }
    if (unlikely(!rdes0 & RDES0_FRAME_TYPE)) {
        return;
    }
    if (unlikely(!rdes0 & RDES0_IPC_CSUM_ERROR)) {
        return;
    }
    if (likely(ret == good_frame)) {
        return;
    }
    ret = enh_desc_coe_rdes0(!!(rdes0 & RDES0_IPC_CSUM_ERROR),
        !(!(rdes0 & RDES0_FRAME_TYPE),
        !(!(rdes0 & ERDES0_RX_MAC_ADDR));
    if (likely(ret == good_frame)) {
        return;
    }
}
if (unlikely(rdes0 & RDES0_DRIBBLING))
    x->dribbling_bit++;
@@ -259,15 +265,19 @@
}

static void enh_desc_init_rx_desc(struct dma_desc *p, int disable_rx_ic,
    - int mode, int end)
    + int mode, int end, int bfsize)
    {
    +int bfsize1;
    +
p->des0 |= cpu_to_le32(RDES0_OWN);
    -p->des1 |= cpu_to_le32((BUF_SIZE_8KiB - 1) & ERDES1_BUFFER1_SIZE_MASK);
    +
    +bfsize1 = min(bfsize, BUF_SIZE_8KiB);
    +p->des1 |= cpu_to_le32(bfsize1 & ERDES1_BUFFER1_SIZE_MASK);

    if (mode == STMMAC_CHAIN_MODE)
        ehn_desc_rx_set_on_chain(p);
    else
        -ehn_desc_rx_set_on_ring(p, end);
        +ehn_desc_rx_set_on_ring(p, end, bfsize);

    if (disable_rx_ic)
        p->des1 |= cpu_to_le32(ERDES1_DISABLE_IC);
    --- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/norm_desc.c
    +++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/norm_desc.c
    @@ -91,8 +91,6 @@
    return dma_own;

    if (unlikely(!(rdes0 & RDES0_LAST_DESCRIPTOR))) {
        -pr_warn("%s: Oversized frame spanned multiple buffers\n",
            -__func__);  
        stats->rx_length_errors++;
        return discard_frame;
    }  
    @@ -135,15 +133,19 @@
    }

static void ndesc_init_rx_desc(struct dma_desc *p, int disable_rx_ic, int mode,
    - int end)
    + int end, int bfsize)
    {
    +int bfsize1;
    +
p->des0 |= cpu_to_le32(RDES0_OWN);
    -p->des1 |= cpu_to_le32((BUF_SIZE_2KiB - 1) & RDES1_BUFFER1_SIZE_MASK);
    +
+bfsize1 = min(bfsize, BUF_SIZE_2KiB - 1);
+p->des1 |= cpu_to_le32(bfsize1 & RDES1_BUFFER1_SIZE_MASK);

if (mode == STMMAC_CHAIN_MODE)
ndesc_rx_set_on_chain(p, end);
else
-ndesc_rx_set_on_ring(p, end);
+ndesc_rx_set_on_ring(p, end, bfsize);

if (disable_rx_ic)
p->des1 |= cpu_to_le32(RDES1_DISABLE_IC);
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/ring_mode.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/ring_mode.c
@@ -114,10 +114,11 @@
static void stmmac_refill_desc3(void *priv_ptr, struct dma_desc *p)
{
-struct stmmac_priv *priv = (struct stmmac_priv *)priv_ptr;
+struct stmmac_rx_queue *rx_q = priv_ptr;
+struct stmmac_priv *priv = rx_q->priv_data;

/* Fill DES3 in case of RING mode */
-if (priv->dma_buf_sz >= BUF_SIZE_8KiB)
+if (priv->dma_buf_sz == BUF_SIZE_16KiB)
p->des3 = cpu_to_le32(le32_to_cpu(p->des2) + BUF_SIZE_8KiB);
}

static int stmmac_set_16kib_bfsize(int mtu)
{
    int ret = 0;
-    if (unlikely(mtu >= BUF_SIZE_8KiB))
+    if (unlikely(mtu > BUF_SIZE_8KiB))
        ret = BUF_SIZE_16KiB;
    return ret;
}
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/stmmac.h
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/stmmac.h
@@ -96,7 +96,7 @@
struct net_device *dev;
struct device *device;
struct mac_device_info *hw;
-    spinlock_t lock;
+    struct mutex lock;
/* RX Queue */
struct stmmac_rx_queue rx_queue[MTL_MAX_RX_QUEUES];
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/stmmac_ethtool.c
@@ -392,13 +392,13 @@
-ADVERTISED_10baseT_Half |
+ADVERTISED_10baseT_Full);

-spin_lock(&priv->lock);
+mutex_lock(&priv->lock);

if (priv->hw->mac->pcs_ctrl_ane)
priv->hw->mac->pcs_ctrl_ane(priv->ioaddr, 1,
-priv->hw->ps, 0);
+
-spin_unlock(&priv->lock);
+mutex_unlock(&priv->lock);

return 0;
}
@@ -615,12 +615,12 @@
{
 struct stmmac_priv *priv = netdev_priv(dev);

-spin_lock_irq(&priv->lock);
+mutex_lock(&priv->lock);
if (device_can_wakeup(priv->device)) {
 w提醒->supported = WAKE_MAGIC | WAKE_UCAST;
 w提醒->wolopts = priv->wolopts;
}
-spin_unlock_irq(&priv->lock);
+mutex_unlock(&priv->lock);
}

static int stmmac_set_wol(struct net_device *dev, struct ethtool_wolinfo *wol)
@@ -649,9 +649,9 @@
disable_irq_wake(priv->wol_irq);
}

-spin_lock_irq(&priv->lock);
+mutex_lock(&priv->lock);
priv->wolopts = wol->wolopts;
-spin_unlock_irq(&priv->lock);
+mutex_unlock(&priv->lock);
}

static int stmmac_set_eee(struct net_device *dev, struct ethtool_eee *edata)
@@ -675,33 +675,31 @@
 struct ethtool_eee *edata)
 {
 struct stmmac_priv *priv = netdev_priv(dev);

-spin_lock_irq(&priv->lock);
+mutex_lock(&priv->lock);
return 0;
}
@@ -675,33 +675,31 @@
 struct ethtool_eee *edata)
 {
 struct stmmac_priv *priv = netdev_priv(dev);

int ret;

if (!priv->dma_cap.eee)
    return -EOPNOTSUPP;

if (!edata->eee_enabled)
stmmac_disable_eee_mode(priv);
-else {
    /* We are asking for enabling the EEE but it is safe
     * to verify all by invoking the eee_init function.
     * In case of failure it will return an error.
     * /
    -priv->eee_enabled = stmmac_eee_init(priv);
    -if (!priv->eee_enabled)
        -return -EOPNOTSUPP;
    -
    /* Do not change tx_lpi_timer in case of failure */
    -priv->tx_lpi_timer = edata->tx_lpi_timer;
    -}
    +ret = phy_ethtool_set_eee(dev->phydev, edata);
    +if (ret)
        +return ret;
    +return ret;

    -return phy_ethtool_set_eee(dev->phydev, edata);
    +priv->tx_lpi_timer = edata->tx_lpi_timer;
    +return 0;
    }

static u32 stmmac_usec2riwt(u32 usec, struct stmmac_priv *priv)
{
    unsigned long clk = clk_get_rate(priv->plat->stmmac_clk);

    -if (!clk)
        -return 0;
    -}
    +if (!clk) {
        +clk = priv->plat->clk_ref_rate;
        +if (!clk)
            +return 0;
        +}

    return (usec * (clk / 1000000)) / 256;
}

unsigned long clk = clk_get_rate(priv->plat->stmmac_clk);

//@ -710,8 +708,11 //@
{ unsigned long clk = clk_get_rate(priv->plat->stmmac_clk);
if (!clk)
    return 0;
+if (!clk) {
+    clk = priv->plat->clk_ref_rate;
+    if (!clk)
+        return 0;
+}
}

return (riwt * 256) / (clk / 1000000);
}
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/stmmac_hwtstamp.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/stmmac_hwtstamp.c
@@ -36,12 +36,16 @@
    u32 reg_value;

-/* For GMAC3.x, 4.x versions, convert the ptp_clock to nano second
- * formula = (1/ptp_clock) * 1000000000
- * where ptp_clock is 50MHz if fine method is used to update system
+/* For GMAC3.x, 4.x versions, in "fine adjustment mode" set sub-second
+ * increment to twice the number of nanoseconds of a clock cycle.
+ * The calculation of the default_addend value by the caller will set it
+ * to mid-range = 2^31 when the remainder of this division is zero,
+ * which will make the accumulator overflow once every 2 ptp_clock
+ * cycles, adding twice the number of nanoseconds of a clock cycle :
+ * 2000000000ULL / ptp_clock.
+ */
if (value & PTP_TCR_TSCFUPDT)
    data = (100000000ULL / 50000000);
else
    data = (100000000ULL / ptp_clock);
@@ -121,7 +125,7 @@
     * programmed with (2^32 <new_sec_value>)
+ */
    if (gmac4)
        sec = (100000000ULL - sec);
    +sec = -sec;

    value = readl(ioaddr + PTP_TCR);
    if (value & PTP_TCR_TSCTRLSSR)
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/stmmac_main.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/stmmac_main.c
@@ -51,7 +51,7 @@
 #include <linux/of_mdio.h>
 #include "dwmac1000.h"
/* Module parameters */
@@ -171,32 +171,6 @@ }

/* Module parameters */
@@ -232,7 +206,7 @@

/* stmmac_clk_csr_set - dynamically set the MDC clock */
@@ -365,7 +339,6 @@


{
struct net_device *ndev = priv->dev;
int interface = priv->plat->interface;
unsigned long flags;
bool ret = false;

if ((interface != PHY_INTERFACE_MODE_MII) &&
@@ -392,7 +365,7 @@
* changed).
* In that case the driver disable own timers.
*/
-spin_lock_irqsave(&priv->lock, flags);
+mutex_lock(&priv->lock);
if (priv->eee_active) {
netdev_dbg(priv->dev, "disable EEE\n");
del_timer_sync(&priv->eee_ctrl_timer);
@@ -400,11 +373,11 @@
+tx_lpi_timer);
}priv->eee_active = 0;
-spin_unlock_irqrestore(&priv->lock, flags);
+mutex_unlock(&priv->lock);
goto out;
}
/* Activate the EEE and start timers */
-spin_lock_irqsave(&priv->lock, flags);
+mutex_lock(&priv->lock);
if (!priv->eee_active) {
priv->eee_active = 1;
timer_setup(&priv->eee_ctrl_timer,
@@ -420,7 +393,7 @@
priv->hw->mac->set_eee_pls(priv->hw, ndev->phydev->link);
ret = true;
-spin_unlock_irqrestore(&priv->lock, flags);
+mutex_unlock(&priv->lock);

netdev_dbg(priv->dev, "Energy-Efficient Ethernet initialized\n");
}@@ -440,7 +413,7 @@
struct dma_desc *p, struct sk_buff *skb)
{struct skb_shared_hwtstamps shhwtstamp;
-u64 ns;
+u64 ns = 0;

if (!priv->hwts_tx_en)
return;
}
struct skb_shared_hwtstamps *shhwtstamp = NULL;
struct dma_desc *desc = p;

@ -u64 ns;
+u64 ns = 0;

if (!priv->hwts_rx_en)
return;

if (!(priv->dma_cap.time_stamp || priv->adv_ts)) {
netdev_alert(priv->dev, "No support for HW time stamping\n");
}
struct stmmac_priv *priv = netdev_priv(dev);
struct phy_device *phydev = dev->phydev;

@ unsigned long flags;
bool new_state = false;

if (!phydev)
return;

-spin_lock_irqsave(&priv->lock, flags);
+mutex_lock(&priv->lock);

if (phydev->link) {

u32 ctrl = readl(priv->ioaddr + MAC_CTRL_REG);

if (new_state && netif_msg_link(priv))
phy_print_status(phydev);

-spin_unlock_irqrestore(&priv->lock, flags);
+mutex_unlock(&priv->lock);

if (phydev->is_pseudo_fixed_link)
/* Stop PHY layer to call the hook to adjust the link in case
*/
static int stmmac_init_phy(struct net_device *dev)
{
struct stmmac_priv *priv = netdev_priv(dev);
+u32 tx_cnt = priv->plat->tx_queues_to_use;
struct phy_device *phydev;
char phy_id_fmt[MII_BUS_ID_SIZE + 3];
char bus_id[MII_BUS_ID_SIZE];
@@ -954,6 +927,15 @@
SUPPORTED_1000baseT_Full);

/*
 + * Half-duplex mode not supported with multiqueue
 + * half-duplex can only works with single queue
 + */
+if (tx_cnt > 1)
+phydev->supported &= ~(SUPPORTED_1000baseT_Half |
+ SUPPORTED_100baseT_Half |
+ SUPPORTED_10baseT_Half);
+
+/*
 * Broken HW is sometimes missing the pull-up resistor on the
 * MDIO line, which results in reads to non-existent devices returning
 * 0 rather than 0xffff. Catch this here and treat 0 as a non-existent
 @ @ -1032,7 +1014,9 @@
 {
 int ret = bufsize;

@if (mtu >= BUF_SIZE_4KiB)
+if (mtu >= BUF_SIZE_8KiB)
 +ret = BUF_SIZE_16KiB;
+else if (mtu >= BUF_SIZE_4KiB)
 ret = BUF_SIZE_8KiB;
 else if (mtu >= BUF_SIZE_2KiB)
 ret = BUF_SIZE_4KiB;
@@ -1061,11 +1045,13 @@
 if (priv->extend_desc)
 priv->hw->desc->init_rx_desc(&rx_q->dma_erx[i].basic,
 priv->use_rwt, priv->mode,
 - (i == DMA_RX_SIZE - 1));
 + (i == DMA_RX_SIZE - 1),
 + priv->dma Buf_sz);
 else
 priv->hw->desc->init_rx_desc(&rx_q->dma_rx[i],
 priv->use_rwt, priv->mode,
 - (i == DMA_RX_SIZE - 1));
 + (i == DMA_RX_SIZE - 1),
 + priv->dma Buf_sz);
 }

/**
 @ @ -1416,6 +1402,19 @@
 

/**
+ * stmmac_free_tx_skbufs - free TX skb buffers
+ * @priv: private structure
+ */
+static void stmmac_free_tx_skbufs(struct stmmac_priv *priv)
+{
+u32 tx_queue_cnt = priv->plat->tx_queues_to_use;
+u32 queue;
+
+for (queue = 0; queue < tx_queue_cnt; queue++)
+dma_free_tx_skbufs(priv, queue);
+
+/**
+ * free_dma_rx_desc_resources - free RX dma desc resources
+ * @priv: private structure
+ */
+@@ -1843,6 +1842,11 @@
+if (unlikely(status & tx_dma_own))
+break;
+
+/** Make sure descriptor fields are read after reading
+ * the own bit.
+ */
++dma_rmb();
+
+/* Just consider the last segment and */
+if (likely(!((status & tx_not_ls)))) {
+/* ... verify the status error condition */
+@@ -2201,8 +2205,7 @@
+ priv->plat->dma_cfg,
+     tx_q->dma_tx_phy, chan);
+
-tx_q->tx_tail_addr = tx_q->dma_tx_phy +
- (DMA_TX_SIZE * sizeof(struct dma_desc));
+tx_q->tx_tail_addr = tx_q->dma_tx_phy;
+priv->hw->dma->set_tx_tail_ptr(priv->ioaddr,
+     tx_q->tx_tail_addr,
+     chan);
+@@ -2392,7 +2395,7 @@
+ continue;
+packet = priv->plat->rx_queues_cfg[queue].pkt_route;
+priv->hw->mac->rx_queue_prio(priv->hw, packet, queue);
+priv->hw->mac->rx_queue_routing(priv->hw, packet, queue);
+}
+}
/* Initialize the MAC Core */
-priv->hw->mac->core_init(priv->hw, dev->mtu);
+priv->hw->mac->core_init(priv->hw, dev);

/* Initialize MTL*/
if (priv->synopsys_id >= DWMAC_CORE_4_00)
{
    netdev_warn(priv->dev, "PTP init failed\n");
}

#ifndef CONFIG_DEBUG_FS
-ret = stmmac_init_fs(dev);
-if (ret < 0)
-netdev_warn(priv->dev, "%s: failed debugFS registration\n",
-    __func__);  
#endif

/* Start the ball rolling... */
-stmmac_start_all_dma(priv);
-
priv->tx_lpi_timer = STMMAC_DEFAULT_TWT_LS;

if ((priv->use_riwt) && (priv->hw->dma->rx_watchdog))
{
    priv->hw->dma->enable_tso(priv->ioaddr, 1, chan);
}

/* Start the ball rolling... */
+stmmac_start_all_dma(priv);
+
return 0;
}

struct stmmac_priv *priv = netdev_priv(dev);
int ret;

-stmmac_check_ether_addr(priv);
-
if (priv->hw->pcs != STMMAC_PCS_RGMII &&
    priv->hw->pcs != STMMAC_PCS_TBI &&
    priv->hw->pcs != STMMAC_PCS_RTBI)
{ 
    
}
stmmac_enable_all_queues(priv);
-stmmac_start_all_queues(priv);
+netif_tx_start_all_queues(priv->dev);

return 0;

@@ -2690,17 +2685,12 @@
{
 struct stmmac_priv *priv = netdev_priv(dev);

-if (priv->eee_enabled)
-del_timer_sync(&priv->eee_ctrl_timer);
-
-/* Stop and disconnect the PHY */
-if (dev->phydev) {
-phy_stop(dev->phydev);
-phy_disconnect(dev->phydev);
-}
-
-stmmac_stop_all_queues(priv);
-
-stmmac_disable_all_queues(priv);

del_timer_sync(&priv->txtimer);
@@ -2712,6 +2702,11 @@
-if (priv->lpi_irq > 0)
-free_irq(priv->lpi_irq, dev);
+
+if (priv->eee_enabled) {
+priv->tx_path_in_lpi_mode = false;
+-del_timer_sync(&priv->eee_ctrl_timer);
+}
+-
-/* Stop TX/RX DMA and clear the descriptors */
-stmmac_stop_all_dma(priv);

@@ -2723,10 +2718,6 @@

netif_carrier_off(dev);

-#ifdef CONFIG_DEBUG_FS
-stmmac_exit_fs(dev);
-#endif
-
-stmmac_release_ptp(priv);

return 0;
@@ -2942,8 +2933,15 @@
tcp_hdr(len(skb) / 4, skb->len - proto_hdr_len));

/* If context desc is used to change MSS */
@if (mss_desc)
+if (mss_desc) {
+/* Make sure that first descriptor has been completely
+ * written, including its own bit. This is because MSS is
+ * actually before first descriptor, so we need to make
+ * sure that MSS's own bit is the last thing written.
+ */
+dma_wmb();
priv->hw->desc->set_tx_owner(mss_desc);
+}

/* The own bit must be the latest setting done when prepare the
 * descriptor and then barrier is needed to make sure that
@@ -2965,6 +2963,7 @@
netdev_tx_sent_queue(netdev_get_tx_queue(dev, queue), skb->len);

+tx_q->tx_tail_addr = tx_q->dma_tx_phy + (tx_q->cur_tx * sizeof(*desc));
priv->hw->dma->set_tx_tail_ptr(priv->ioaddr, tx_q->tx_tail_addr,
@@ -3001,10 +3000,22 @@
tx_q = &priv->tx_queue[queue];

+if (priv->tx_path_in_lpi_mode)
+stmmac_disable_eee_mode(priv);
+
+/* Manage oversized TCP frames for GMAC4 device */
+if (skb_is_gso(skb) && priv->tso) {
+if (skb_shinfo(skb)->gso_type & (SKB_GSO_TCPV4 | SKB_GSO_TCPV6))
+stmmac_set_queue_mapping(skb, 0);
+return stmmac_tso_xmit(skb, dev);
+}

if (unlikely(stmmac_tx_avail(priv, queue) < nfrags + 1)) {
@@ -3019,9 +3030,6 @@
    return NETDEV_TX_BUSY;
 }

-if (priv->tx_path_in_lpi_mode)
-  stmmac_disable_eee_mode(priv);
-
  entry = tx_q->cur_tx;
  first_entry = entry;

@@ -3180,9 +3188,11 @@
 if (priv->synopsys_id < DWMAC_CORE_4_00)
   priv->hw->dma->enable_dma_transmission(priv->ioaddr);
 else
+  else {
+    tx_q->tx_tail_addr = tx_q->dma_tx_phy + (tx_q->cur_tx * sizeof(*desc));
+    priv->hw->dma->set_tx_tail_ptr(priv->ioaddr, tx_q->tx_tail_addr, queue);
+  }

 return NETDEV_TX_OK;

@@ -3284,7 +3294,7 @@
 dma_wmb();

 if (unlikely(priv->synopsys_id >= DWMAC_CORE_4_00))
-  priv->hw->desc->init_rx_desc(p, priv->use_riwt, 0, 0);
+  priv->hw->desc->init_rx_desc(p, priv->use_riwt, 0, 0, priv->dma_buf_sz);
 else
   priv->hw->desc->set_rx_owner(p);

@@ -3306,9 +3316,8 @@
 static int stmmac_rx(struct stmmac_priv *priv, int limit, u32 queue)
 {
   struct stmmac_rx_queue *rx_q = &priv->rx_queue[queue];
-  unsigned int entry = rx_q->cur_rx;
+  unsigned int next_entry = rx_q->cur_rx;
   int coe = priv->hw->rx_csum;
-  unsigned int next_entry;
-  unsigned int count = 0;

   if (netif_msg_rx_status(priv)) {
     @@ -3323,10 +3332,12 @@
       priv->hw->desc->display_ring(rx_head, DMA_RX_SIZE, true);
     }
     while (count < limit) {
       -int status;

+int entry, status;
struct dma_desc *p;
struct dma_desc *np;

+entry = next_entry;
+
if (priv->extend_desc)
p = (struct dma_desc *)(rx_q->dma_erx + entry);
else
@@ -3388,17 +3399,23 @@
* ignored
*/
if (frame_len > priv->dma_buf_sz) {
    -netdev_err(priv->dev,
    -"len %d larger than size (%d)\n",
    -frame_len, priv->dma_buf_sz);
+if (net_ratelimit())
+netdev_err(priv->dev,
+"len %d larger than size (%d)\n",
+frame_len, priv->dma_buf_sz);
priv->dev->stats.rx_length_errors++;
-continue;
+break;
+continue;
}

/* ACS is set; GMAC core strips PAD/FCS for IEEE 802.3
 * Type frames (LLC/LLC-SNAP)
 + *
 + * llc_snap is never checked in GMAC >= 4, so this ACS
 + * feature is always disabled and packets need to be
 + * stripped manually.
 */
-if (unlikely(status != llc_snap))
+if (unlikely(priv->synopsys_id >= DWMAC_CORE_4_00) ||
    unlikely(status != llc_snap))
frame_len -= ETH_FCS_LEN;

if (netif_msg_rx_status(priv)) {
@@ -3423,7 +3440,7 @@
    dev_warn(priv->device,
    "packet dropped\n");
    priv->dev->stats.rx_dropped++;
-continue;
+break;
+continue;
}

dma_sync_single_for_cpu(priv->device,
@@ -3443,11 +3460,12 @@
} else {
    skb = rx_q->rx_skbuff[entry];
    if (unlikely(!skb)) {
        -netdev_err(priv->dev,
            -"%s: Inconsistent Rx chain\n",
            -priv->dev->name);
        +if (net_ratelimit())
            +netdev_err(priv->dev,
                +"%s: Inconsistent Rx chain\n",
                +priv->dev->name);
        priv->dev->stats.rx_dropped++;
        -break;
        +continue;
    }
    prefetch(skb->data - NET_IP_ALIGN);
    rx_q->rx_skbuff[entry] = NULL;
}

static int stmmac_change_mtu(struct net_device *dev, int new_mtu)
{
    struct stmmac_priv *priv = netdev_priv(dev);
    +int txfifosz = priv->plat->tx_fifo_size;
    +const int mtu = new_mtu;
    +
    +if (txfifosz == 0)
        +txfifosz = priv->dma_cap.tx_fifo_size;
    +txfifosz /= priv->plat->tx_queues_to_use;

    if (netif_running(dev)) {
        netdev_err(priv->dev, "must be stopped to change its MTU\n");
        return -EBUSY;
    }

    -dev->mtu = new_mtu;
    +new_mtu = STMMAC_ALIGN(new_mtu);
    +/* If condition true, FIFO is too small or MTU too large */
    +if ((txfifosz < new_mtu) || (new_mtu > BUF_SIZE_16KiB))
        +return -EINVAL;

    stmmac_rx_refill(priv, queue);
}
+dev->mtu = mtu;

netdev_update_features(dev);

@@ -3637,7 +3667,7 @@
 /**
  * stmmac_interrupt - main ISR
  * @irq: interrupt number.
- * @dev_id: to pass the net device pointer.
+ * @dev_id: to pass the net device pointer (must be valid).
  * Description: this is the main driver interrupt service routine.
  * It can call:
  * o DMA service routine (to manage incoming frame reception and transmission
@@ -3659,11 +3689,6 @@
   if (priv->irq_wake)
   pm_wakeup_event(priv->device, 0);
   
-    if (unlikely(!dev)) {
-        netdev_err(priv->dev, "%s: invalid dev pointer\n", __func__);
-        return IRQ_NONE;
-    }
-    
-    /* To handle GMAC own interrupts */
    if ((priv->plat->has_gmac) || (priv->plat->has_gmac4)) {
      int status = priv->hw->mac->host_irq_status(priv->hw,
@@ -3807,6 +3832,9 @@
       u32 tx_count = priv->plat->tx_queues_to_use;
       u32 queue;

+      if ((dev->flags & IFF_UP) == 0)
+          return 0;
+      
+      for (queue = 0; queue < rx_count; queue++) {
+        struct stmmac_rx_queue *rx_q = &priv->rx_queue[queue];

@@ -4108,6 +4136,17 @@
     } 
     
     /* Rx Watchdog is available in the COREs newer than the 3.40.
+     * In some case, for example on bugged HW this feature
+     * has to be disable and this can be done by passing the
+     * riwt_off field from the platform.
+     */
+     if ((priv->synopsys_id >= DWMAC_CORE_3_50) && (!priv->plat->riwt_off)) {
+       priv->use_riwt = 1;
+       dev_info(priv->device,
+         "Enable RX Mitigation via HW Watchdog Timer\n\n");

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+}  
+  return 0;  
+}  
  
@@ -4181,6 +4220,8 @@  
if (ret)  
goto error_hw_init;  
+stmmac_check_ether_addr(priv);  
+  /* Configure real RX and TX queues */  
netif_set_real_num_rx_queues(ndev, priv->plat->rx_queues_to_use);  
netif_set_real_num_tx_queues(ndev, priv->plat->tx_queues_to_use);  
@@ -4223,17 +4264,6 @@  
if (flow_ctrl)  
priv->flow_ctrl = FLOW_AUTO; /* RX/TX pause on */  
  
-/* Rx Watchdog is available in the COREs newer than the 3.40.  
- * In some case, for example on bugged HW this feature  
- * has to be disable and this can be done by passing the  
- * riwt_off field from the platform.  
- */  
-if ((priv->synopsys_id >= DWMAC_CORE_3_50) && (!priv->plat->riwt_off)) {  
-priv->use_riwt = 1;  
-dev_info(priv->device,  
- "Enable RX Mitigation via HW Watchdog Timer\n");  
-}  
-  
- for (queue = 0; queue < priv->plat->rx_queues_to_use; queue++) {  
struct stmmac_rx_queue *rx_q = &priv->rx_queue[queue];  
@@ -4241,7 +4271,7 @@  
(8 * priv->plat->rx_queues_to_use));  
}  
-spin_lock_init(&priv->lock);  
+mutex_init(&priv->lock);  
  
 /* If a specific clk_csr value is passed from the platform  
 * this means that the CSR Clock Range selection cannot be  
@@ -4276,6 +4306,13 @@  
goto error_netdev_register;  
}  
+ifdef CONFIG_DEBUG_FS  
+ret = stmmac_init_fs(ndev);  
+if (ret < 0)
netdev_warn(priv->dev, "%s: failed debugFS registration\n", __func__); +
  #endif
+
  return ret;

error_netdev_register:
@@ -4309,6 +4346,9 @@
    netdev_info(priv->dev, "%s: removing driver", __func__);

+ifdef CONFIG_DEBUG_FS
+stmmac_exit_fs(ndev);
+endif
  stmmac_stop_all_dma(priv);

  priv->hw->mac->set_mac(priv->ioaddr, false);
@@ -4322,6 +4362,7 @@
  priv->hw->pcs != STMMAC_PCS_TBI &&
  priv->hw->pcs != STMMAC_PCS_RTBI)
  stmmac_mdio_unregister(ndev);
+mutex_destroy(&priv->lock);
  free_netdev(ndev);

  return 0;
@@ -4339,7 +4380,6 @@
  {
    struct net_device *ndev = dev_get_drvdata(dev);
    struct stmmac_priv *priv = netdev_priv(ndev);
-  unsigned long flags;
  if (!ndev || !netif_running(ndev))
    return 0;
@@ -4347,13 +4387,17 @@
    if (ndev->phydev)
      phy_stop(ndev->phydev);
-  spin_lock_irqsave(&priv->lock, flags);
+  mutex_lock(&priv->lock);
    netif_device_detach(ndev);
    stmmac_stop_all_queues(priv);
  
stmmac_disable_all_queues(priv);
+  if (priv->eee_enabled) {
+    priv->tx_path_in_lpi_mode = false;
+    del_timer_sync(&priv->eee_ctrl_timer);
   

/* Stop TX/RX DMA */
stmmac_stop_all_dma(priv);

@@ -4365,10 +4409,12 @@
priv->hw->mac->set_mac(priv->ioaddr, false);
pinctrl_pm_select_sleep_state(priv->device);
/* Disable clock in case of PWM is off */
-clk_disable(priv->plat->pclk);
-clk_disable(priv->plat->stmmac_clk);
+if (priv->plat->clk_ptp_ref)
+clk_disable_unprepare(priv->plat->clk_ptp_ref);
+clk_disable_unprepare(priv->plat->pclk);
+clk_disable_unprepare(priv->plat->stmmac_clk);
}

- spin_unlock_irqrestore(&priv->lock, flags);
+ mutex_unlock(&priv->lock);

priv->oldlink = false;
priv->speed = SPEED_UNKNOWN;
@@ -4399,6 +4445,8 @@
 tx_q->cur_tx = 0;
 tx_q->dirty_tx = 0;
+
+ netdev_tx_reset_queue(netdev_get_tx_queue(priv->dev, queue));
}
}

@@ -4412,7 +4460,6 @@
{
 struct net_device *ndev = dev_get_drvdata(dev);
 struct stmmac_priv *priv = netdev_priv(ndev);
-unsigned long flags;

 if (!netif_running(ndev))
 return 0;
@@ -4424,15 +4471,17 @@
 * from another devices (e.g. serial console).
 */
 if (device_may_wakeup(priv->device)) {
- spin_lock_irqsave(&priv->lock, flags);
+ mutex_lock(&priv->lock);
 priv->hw->mac->pmt(priv->hw, 0);
- spin_unlock_irqrestore(&priv->lock, flags);
+ mutex_unlock(&priv->lock);
 priv->irq_wake = 0;

} else {
pinctrl_pm_select_default_state(priv->device);
/* enable the clk previously disabled */
- clk_enable(priv->plat->stmmac_clk);
- clk_enable(priv->plat->pclk);
+ clk_prepare_enable(priv->plat->stmmac_clk);
+ clk_prepare_enable(priv->plat->pclk);
+ if (priv->plat->clk_ptp_ref)
+ clk_prepare_enable(priv->plat->clk_ptp_ref);
/* reset the phy so that it's ready */
if (priv->mii)
    stmmac_mdio_reset(priv->mii);
@@ -4440,7 +4489,7 @@
netif_device_attach(ndev);

- spin_lock_irqsave(&priv->lock, flags);
+ mutex_lock(&priv->lock);

 stmmac_reset_queues_param(priv);

 @@ -4449,6 +4498,7 @@
 priv->mss = 0;

 + stmmac_free_tx_skbufs(priv);
 stmmac_clear_descriptors(priv);

 stmmac_hw_setup(ndev, false);
@@ -4457,9 +4507,7 @@
 stmmac_enable_all_queues(priv);

- stmmac_start_all_queues(priv);
-
- spin_unlock_irqrestore(&priv->lock, flags);
+ mutex_unlock(&priv->lock);

 if (ndev->phydev)
    phy_start(ndev->phydev);
--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/stmmac_mdio.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/stmmac_mdio.c
@@ -133,7 +133,7 @@
*/
int stmmac_mdio_reset(struct mii_bus *bus)
{
- #if defined(CONFIG_STMMAC_PLATFORM)
+ #if IS_ENABLED(CONFIG_STMMAC_PLATFORM)
struct net_device *ndev = bus->priv;
struct stmmac_priv *priv = netdev_priv(ndev);
unsigned int mii_address = priv->hw->mii.addr;
@@ -157,7 +157,8 @@
of_property_read_u32_array(np, "snps,reset-delays-us", data->delays, 3);

- if (gpio_request(data->reset_gpio, "mdio-reset"))
+ if (devm_gpio_request(priv->device, data->reset_gpio,
   + "mdio-reset")
return 0;
}

--- linux-4.15.0.orig/drivers/net/ethernet/stmicro/stmmac/stmmac_pci.c
+++ linux-4.15.0/drivers/net/ethernet/stmicro/stmmac/stmmac_pci.c
@@ -159,6 +159,12 @@
    },
    .driver_data = (void *)&galileo_stmmac_dmi_data,
},
+/*
+ * There are 2 types of SIMATIC IOT2000: IOT20202 and IOT2040.
+ * The asset tag "6ES7647-0AA00-0YA2" is only for IOT2020 which
+ * has only one pci network device while other asset tags are
+ * for IOT2040 which has two.
+ */
+{
+    .matches = {
+        DMI_EXACT_MATCH(DMI_BOARD_NAME, "SIMATIC IOT2000"),
+        @ @ -170,8 +176,6 @@
+        }
+    .matches = {
+        DMI_EXACT_MATCH(DMI_BOARD_NAME, "SIMATIC IOT2000"),
+        DMI_EXACT_MATCH(DMI_BOARD_ASSET_TAG, "6ES7647-0AA00-1YA2"),
+    },
+    .driver_data = (void *)&iot2040_stmmac_dmi_data,
+    @ @ -257,7 +261,7 @@
+return -ENOMEM;
+*/
+/* Enable pci device */
- ret = pcim_enable_device(pdev);
+ ret = pci_enable_device(pdev);
if (ret) {
    dev_err(&pdev->dev, "%s: ERROR: failed to enable device\n", __func__);
    @ @ -299,10 +303,56 @@
*/
static void stmmac_pci_remove(struct pci_dev *pdev)
{
    int i;
    stmmac_dvr_remove(&pdev->dev);
    for (i = 0; i < PCI_STD_Resource_END; i++) {
        if (pci_resource_len(pdev, i) == 0)
            continue;
        pcim_iounmap_regions(pdev, BIT(i));
        break;
    }
    pci_disable_device(pdev);
}

static int __maybe_unused stmmac_pci_suspend(struct device *dev)
{
    struct pci_dev *pdev = to_pci_dev(dev);
    int ret;
    ret = stmmac_suspend(dev);
    if (ret)
        return ret;
    ret = pci_save_state(pdev);
    if (ret)
        return ret;
    pci_disable_device(pdev);
    pci_wake_from_d3(pdev, true);
    return 0;
}

static int __maybe_unused stmmac_pci_resume(struct device *dev)
{
    struct pci_dev *pdev = to_pci_dev(dev);
    int ret;
    pci_restore_state(pdev);
    pci_set_power_state(pdev, PCI_D0);
    ret = pci_enable_device(pdev);
    if (ret)
        return ret;
    pci_set_master(pdev);
    +
}
return stmmac_resume(dev);
}

if (of_device_is_compatible(np, "snps,dwmac-3.40a")) {

if (of_device_is_compatible(np, "snps,dwmac-4.00") ||
    of_device_is_compatible(np, "snps,dwmac-4.10a")) {

 struct stmmac_priv *priv =

container_of(ptp, struct stmmac_priv, ptp_clock_ops);
unsigned long flags;
 /* @u64 ns; +u64 ns = 0; */

spin_lock_irqsave(&priv->ptp_lock, flags);

/* structure describing a PTP hardware clock */
static const struct ptp_clock_info stmmac_ptp_clock_ops = {
    .owner = THIS_MODULE,
    .name = "stmmac_ptp_clock",
    .max_adj = 6250000,
    .n_alarm = 0,
    .n_ext_ts = 0,
    ... linux-4.15.0.orig/drivers/net/ethernet/sun/Kconfig
    +++ linux-4.15.0/drivers/net/ethernet/sun/Kconfig
    @@ -72,6 +72,7 @@
    config SUNVNET_COMMON
    tristate "Common routines to support Sun Virtual Networking"
    depends on SUN_LDOMS
    +depends on INET
    default m

    config SUNVNET
    ... linux-4.15.0.orig/drivers/net/ethernet/sun/cassini.c
    +++ linux-4.15.0/drivers/net/ethernet/sun/cassini.c
    @@ -4983,7 +4983,7 @@
       cas_cacheline_size))
    { dev_errno(pdev->dev, "Could not set PCI cache "
       "line size
")};
    -goto err_write_cacheline;
    +goto err_out_free_res;
    }
    }
    #endif
    @@ -5156,7 +5156,6 @@
    err_out_free_res:
    pci_release_regions(pdev);

    -err_write_cacheline:
    /* Try to restore it in case the error occurred after we
     * set it.
     */
    ... linux-4.15.0.orig/drivers/net/ethernet/sun/ldmvsw.c
    +++ linux-4.15.0/drivers/net/ethernet/sun/ldmvsw.c
    @@ -111,7 +111,7 @@
/* Wrappers to common functions */

-static int vsw_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t vsw_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
    return sunvnet_start_xmit_common(skb, dev, vsw_tx_port_find);
}

--- linux-4.15.0.orig/drivers/net/ethernet/sun/niu.c
+++ linux-4.15.0/drivers/net/ethernet/sun/niu.c
@@ -3442,7 +3442,7 @@
    len = (val & RCR_ENTRY_L2_LEN) >>
    RCR_ENTRY_L2_LEN_SHIFT;
    -len -= ETH_FCS_LEN;
+    append_size = len + ETH_HLEN + ETH_FCS_LEN;

    addr = (val & RCR_ENTRY_PKT_BUF_ADDR) <<
    RCR_ENTRY_PKT_BUF_ADDR_SHIFT;
@@ -3452,7 +3452,6 @@
    -append_size = rcr_size;
    if (num_rcr == 1) {
        int ptype;
@@ -3465,7 +3464,7 @@
    } else if (!(val & RCR_ENTRY_MULTI))
        -append_size = len - skb->len;
+        append_size = append_size - skb->len;
    niu_rx_skb_append(skb, page, off, append_size, rcr_size);
    if ((page->index + rp->rbr_block_size) - rcr_size == addr) {
        mp->rx_mcasts += RXMAC_MC_FRM_CNT_COUNT;
@@ -8116,6 +8113,8 @@
        start += 3;

prop_len = niu_pci_eeprom_read(np, start + 4);
+if (prop_len < 0)
+return prop_len;
err = niu_pci_vpd_get_propname(np, start + 5, namebuf, 64);
if (err < 0)
return err;
@@ -8160,8 +8159,12 @@
etif_printk(np, probe, KERN_DEBUG, np->dev,
        "VPD_SCAN: Reading in property [%s] len[%d]n",
        namebuf, prop_len);
-    for (i = 0; i < prop_len; i++)
-        *prop_buf++ = niu_pci_eeprom_read(np, off + i);
+    for (i = 0; i < prop_len; i++) {
+        err = niu_pci_eeprom_read(np, off + i);
+        if (err < 0)
+            return err;
+        *prop_buf++ = err;
+    }
}

start += len;
@@ -8171,14 +8174,14 @@

/* ESPC_PIO_EN_ENABLE must be set */
-static void niu_pci_vpd_fetch(struct niu *np, u32 start)
+static int niu_pci_vpd_fetch(struct niu *np, u32 start)
{
    u32 offset;
    int err;

    err = niu_pci_eeprom_read16_swp(np, start + 1);
    if (err < 0)
        -return;
        +return err;

    offset = err + 3;

    @@ -8187,12 +8190,14 @@
    u32 end;

    err = niu_pci_eeprom_read(np, here);
    +if (err < 0)
    +return err;
    if (err != 0x90)
        -return;
        +return -EINVAL;
err = niu_pci_eeprom_read16_swp(np, here + 1);
if (err < 0)
-    return;
+    return err;

here = start + offset + 3;
end = start + offset + err;
@@ -8200,9 +8205,13 @@
offset += err;

err = niu_pci_vpd_scan_props(np, here, end);
-    if (err < 0 || err == 1)
-        return;
+    if (err < 0)
+        return err;
+    /* ret == 1 is not an error */
+    if (err == 1)
+        return 0;
+    }
+    return 0;
    }

/* ESPC_PIO_EN_ENABLE must be set */
@@ -9293,8 +9302,11 @@
offset = niu_pci_vpd_offset(np);
netif_printk(np, probe, KERN_DEBUG, np->dev,
    "%s() VPD offset [%08x]n", __func__, offset);
-    if (offset)
-        niu_pci_vpd_fetch(np, offset);
+    if (offset) {
+        err = niu_pci_vpd_fetch(np, offset);
+        if (err < 0)
+            return err;
+    }

nw64(ESPC_PIO_EN, 0);

if (np->flags & NIU_FLAGS_VPD_VALID) {
    --- linux-4.15.0.orig/drivers/net/ethernet/sun/sunbmac.c
    +++ linux-4.15.0/drivers/net/ethernet/sun/sunbmac.c
    @ @ -949,7 +949,8 @@
    }

    /* Put a packet on the wire. */
-    static int bigmac_start_xmit(struct sk_buff *skb, struct net_device *dev)
+    static netdev_tx_t
+    bigmac_start_xmit(struct sk_buff *skb, struct net_device *dev)
    {
        struct bigmac *bp = netdev_priv(dev);
    }
int len, entry;
--- linux-4.15.0.orig/drivers/net/ethernet/sun/sungem.c
+++ linux-4.15.0/drivers/net/ethernet/sun/sungem.c
@@ -59,8 +59,7 @@
 #include <linux/sungem_phy.h>
 #include "sungem.h"

 /* Stripping FCS is causing problems, disabled for now */
-#undef STRIP_FCS
+#define STRIP_FCS

 #define DEFAULT_MSG	(NETIF_MSG_DRV		| 
-NETIF_MSG_PROBE	| 
@@ -434,7 +433,7 @@
            RXDMA_CFG_FTHRESH_128); 
        } else { 
            val = (ETH_HLEN << 13) | RXDMA_CFG_FTHRESH_128); 
-            writel(val, gp->regs + RXDMA_CFG);
+            writel(val, gp->regs + RXDMA_CFG);
        }
        if (readl(gp->regs + GREG_BIFCFG) & GREG_BIFCFG_M66EN)
            writel(((5 & RXDMA_BLANK_IPKTS) |
@@ -759,7 +758,6 @@
 struct net_device *dev = gp->dev;
 int entry, drops, work_done = 0;
 u32 done;
-__sum16 csum;

 if (netif_msg_rx_status(gp))
    printk(KERN_DEBUG "%s: rx interrupt, done: %d, rx_new: %d\n",
@@ -854,9 +852,13 @@
 skb = copy_skb;
 }

-csum = (__force __sum16)htons((status & RXDCTRL_TCPCSUM) ^ 0xffff);
-skbo->csum = csum_unfold(csum);
-skbo->ip_summed = CHECKSUM_COMPLETE;
+if (likely(dev->features & NETIF_F_RXCSUM)) {
+    __sum16 csum;
+    csum = (__force __sum16)htons((status & RXDCTRL_TCPCSUM) ^ 0xffff);
+    skb->csum = csum_unfold(csum);
+    skb->ip_summed = CHECKSUM_COMPLETE;
+}
 skb->protocol = eth_type_trans(skb, gp->dev);

 napi_gro_receive(&gp->napi, skb);
@@ -1760,7 +1762,7 @@
writel(0, gp->regs + TXDMA_KICK);

val = (RXDMA_CFG_BASE | (RX_OFFSET << 10) |
  - (14 / 2) << 13) | RXDMA_CFG_FTHRESH_128);
+ (ETH_HLEN << 13) | RXDMA_CFG_FTHRESH_128);
writel(val, gp->regs + RXDMA_CFG);

writel(desc_dma >> 32, gp->regs + RXDMA_DBHI);
@@ -2984,8 +2986,8 @@
pci_set_drvdata(pdev, dev);
/* We can do scatter/gather and HW checksum */
-dev->hw_features = NETIF_F_SG | NETIF_F_HW_CSUM;
-dev->features |= dev->hw_features | NETIF_F_RXCSUM;
+dev->hw_features = NETIF_F_SG | NETIF_F_HW_CSUM | NETIF_F_RXCSUM;
+dev->features = dev->hw_features;
if (pci_using_dac)
  dev->features |= NETIF_F_HIGHDMA;

--- linux-4.15.0.orig/drivers/net/ethernet/sun/sunqe.c
+++ linux-4.15.0/drivers/net/ethernet/sun/sunqe.c
@@ -569,7 +569,7 @@
}
/* Get a packet queued to go onto the wire. */
-static int qe_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t qe_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
  struct sunqe *qep = netdev_priv(dev);
  struct sunqe_buffers *qbufs = qep->buffers;
--- linux-4.15.0.orig/drivers/net/ethernet/sun/sunvnet.c
+++ linux-4.15.0/drivers/net/ethernet/sun/sunvnet.c
@@ -245,7 +245,7 @@
}
/* Wrappers to common functions */
-static int vnet_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t vnet_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
  return sunvnet_start_xmit_common(skb, dev, vnet_tx_port_find);
}
/* We can do scatter/gather and HW checksum */
-dev->hw_features = NETIF_F_TSO | NETIF_F_GSO | NETIF_F_GSO_SOFTWARE |
+dev->hw_features = NETIF_F_TSO | NETIF_F_GSO | NETIF_F_ALL_TSO |
  NETIF_F_HW_CSUM | NETIF_F_SG;
dev->features = dev->hw_features;

--- linux-4.15.0.orig/drivers/net/ethernet/sun/sunvnet_common.c
+++ linux-4.15.0/drivers/net/ethernet/sun/sunvnet_common.c
@@ -1215,9 +1215,10 @@
    return skb;
 }

-static int vnet_handle_offloads(struct vnet_port *port, struct sk_buff *skb,
-        struct vnet_port *(*vnet_tx_port)
-        (struct sk_buff *, struct net_device *))
+static netdev_tx_t
+vnet_handle_offloads(struct vnet_port *port, struct sk_buff *skb,
+    struct vnet_port *(*vnet_tx_port)
+    (struct sk_buff *, struct net_device *))
{
    struct net_device *dev = VNET_PORT_TO_NET_DEVICE(port);
    struct vio_dring_state *dr = &port->vio.drings[VIO_DRIVER_TX_RING];
@@ -1320,9 +1321,10 @@
    return NETDEV_TX_OK;
 }

-int sunvnet_start_xmit_common(struct sk_buff *skb, struct net_device *dev,
-        struct vnet_port *(*vnet_tx_port)
-        (struct sk_buff *, struct net_device *))
+netdev_tx_t
+sunvnet_start_xmit_common(struct sk_buff *skb, struct net_device *dev,
+    struct vnet_port *(*vnet_tx_port)
+    (struct sk_buff *, struct net_device *))
{
    struct vnet_port *port = NULL;
    struct vio_dring_state *dr;
@@ -1350,27 +1352,12 @@
    localmtu -= VLAN_HLEN;

-if (skb->protocol == htons(ETH_P_IP)) {
+    struct flowi4 fl4;
+    struct rtable *rt = NULL;
+    -memset(&fl4, 0, sizeof(fl4));
+    -fl4.flowi4_oif = dev->ifindex;
+    -fl4.flowi4_tos = RT_TOS(ip_hdr(skb)->tos);
+    -fl4.daddr = ip_hdr(skb)->daddr;
+    -fl4.saddr = ip_hdr(skb)->saddr;
+    -
+    -rt = ip_route_output_key(dev_net(dev), &fl4);
+    -if (!IS_ERR(rt)) {

skb_dst_set(skb, &rt->dst);
-icmp_send(skb, ICMP_DEST_UNREACH,
- ICMP_FRAG_NEEDED,
- htonl(localmtu));
-
-}
-}
+if (skb->protocol == htons(ETH_P_IP))
+icmp_ndo_send(skb, ICMP_DEST_UNREACH, ICMP_FRAG_NEEDED,
+ htonl(localmtu));

#if IS_ENABLED(CONFIG_IPV6)
else if (skb->protocol == htons(ETH_P_IPV6))
-icmpv6_send(skb, ICMPV6_PKT_TOOBIG, 0, localmtu);
+icmpv6_ndo_send(skb, ICMPV6_PKT_TOOBIG, 0, localmtu);
#endif

go to out_dropped;
}

--- linux-4.15.0.orig/drivers/net/ethernet/sun/sunvnet_common.h
+++ linux-4.15.0/drivers/net/ethernet/sun/sunvnet_common.h
@@ -136,9 +136,10 @@
void sunvnet_set_rx_mode_common(struct net_device *dev, struct vnet *vp);
int sunvnet_set_mac_addr_common(struct net_device *dev, void *p);
void sunvnet_tx_timeout_common(struct net_device *dev);
-int sunvnet_start_xmit_common(struct sk_buff *skb, struct net_device *dev,
- struct vnet_port *(*vnet_tx_port)(struct sk_buff *, struct net_device *);
- (struct sk_buff *, struct net_device *));
+netdev_tx_t
+sunvnet_start_xmit_common(struct sk_buff *skb, struct net_device *dev,
+ struct vnet_port *(*vnet_tx_port)(struct sk_buff *, struct net_device *);
+ (struct sk_buff *, struct net_device *));

#ifdef CONFIG_NET_POLL_CONTROLLER
void sunvnet_poll_controller_common(struct net_device *dev, struct vnet *vp);
#endif

--- linux-4.15.0.orig/drivers/net/ethernet/synopsys/dwc-xlgmac-common.c
+++ linux-4.15.0/drivers/net/ethernet/synopsys/dwc-xlgmac-common.c
@@ -523,7 +523,7 @@
void xlgmac_print_all_hw_features(struct xlgmac_pdata *pdata)
{
- char *str = NULL;
+ char __maybe_unused *str = NULL;

 XLGMAC_PR("\n");
 XLGMAC_PR("==================================================================\n");

--- linux-4.15.0.orig/drivers/net/ethernet/tehuti/tehuti.c
+++ linux-4.15.0/drivers/net/ethernet/tehuti/tehuti.c
@@ -2058,6 +2058,7 @@
 /*bdx_hw_reset(priv); */
 if (bdx_read_mac(priv)) {
pr_err("load MAC address failed\n");
+err = -EFAULT;
goto err_out_iomap;
}
SET_NETDEV_DEV(ndev, &pdev->dev);
--- linux-4.15.0.org/drivers/net/ethernet/ti/Kconfig
+++ linux-4.15.0/drivers/net/ethernet/ti/Kconfig
@@ -41,6 +41,7 @@
config TI_DAVINCI_CPDMA
tristate "TI DaVinci CPDMA Support"
depends on ARCH_DAVINCI || ARCH_OMAP2PLUS
+select GENERIC_ALLOCATOR
---help---
This driver supports TI's DaVinci CPDMA dma engine.

--- linux-4.15.0.org/drivers/net/ethernet/ti/cpsw-phy-sel.c
+++ linux-4.15.0/drivers/net/ethernet/ti/cpsw-phy-sel.c
@@ -177,12 +177,18 @@
} dev = bus_find_device(&platform_bus_type, NULL, node, match);
-    of_node_put(node);
+    if (!dev) {
+        dev_err(dev, "unable to find platform device for %pOF\n", node);
+        goto out;
+    }
+    priv = dev_get_drvdata(dev);
+    priv->cpsw_phy_sel(priv, phy_mode, slave);
+    put_device(dev);
+    out:
+    of_node_put(node);
} EXPORT_SYMBOL_GPL(cpsw_phy_sel);

--- linux-4.15.0.org/drivers/net/ethernet/ti/cpsw.c
+++ linux-4.15.0/drivers/net/ethernet/ti/cpsw.c
@@ -124,7 +124,7 @@
#define RX_PRIORITY_MAPPING 0x76543210
#define TX_PRIORITY_MAPPING 0x33221100
-#define CPDMA_TX_PRIORITY_MAP 0x01234567
+#define CPDMA_TX_PRIORITY_MAP 0x76543210

#define CPSW_VLAN_AWARE BIT(1)
#define CPSW_ALE_VLAN_AWARE 1

/* Clear all mcast from ALE */
cpsw_ale_flush_multicast(ale, ALE_ALL_PORTS, -1);
+__dev_mc_unsync(ndev, NULL);

/* Flood All Unicast Packets to Host port */
cpsw_ale_control_set(ale, 0, ALE_P0_UNI_FLOOD, 1);

if (cpsw->quirk_irq) {
    disable_irq_nosync(cpsw->irqs_table[0]);
    -996,7 +997,8 @@
/* set speed_in input in case RMII mode is used in 100Mbps */
if (phy->speed == 100)
    mac_control |= BIT(15);
-else if (phy->speed == 10)
+/* in band mode only works in 10Mbps RGMII mode */
+else if ((phy->speed == 10) && phy_interface_is_rgmii(phy))
    mac_control |= BIT(18); /* In Band mode */

if (priv->rx_pause)
    -1259,6 +1261,8 @@
cpsw_ale_add_ucast(cpsw->ale, priv->mac_addr,
        HOST_PORT_NUM, ALE_VLAN | ALE_SECURE, slave->port_vlan);
+cpsw_ale_control_set(cpsw->ale, slave_port,
    +ALE_PORT_DROP_UNKNOWN_VLAN, 1);
}

static void soft_reset_slave(struct cpsw_slave *slave)
    -1618,6 +1622,7 @@
q_idx = q_idx % cpsw->tx_ch_num;

    txch = cpsw->txv[q_idx].ch;
+txq = netdev_get_tx_queue(ndev, q_idx);
    ret = cpsw_tx_packet_submit(priv, skb, txch);
if (unlikely(ret != 0)) {
    cpsw_err(priv, tx_err, "desc submit failed\u000a");
    -1628,15 +1633,26 @@
* tell the kernel to stop sending us tx frames.
*/
if (unlikely(!cpdma_check_free_tx_desc(txch))) {
- txq = netdev_get_tx_queue(ndev, q_idx);
  netif_tx_stop_queue(txq);
  + /* Barrier, so that stop_queue visible to other cpus */
  + smp_mb__after_atomic();
  +
  + if (cpdma_check_free_tx_desc(txch))
  + netif_tx_wake_queue(txq);
}

return NETDEV_TX_OK;

fail:
ndev->stats.tx_dropped++;
- txq = netdev_get_tx_queue(ndev, skb_get_queue_mapping(skb));
  netif_tx_stop_queue(txq);
  + /* Barrier, so that stop_queue visible to other cpus */
  + smp_mb__after_atomic();
  +
  + if (cpdma_check_free_tx_desc(txch))
  + netif_tx_wake_queue(txq);
  +
  return NETDEV_TX_BUSY;
}

@@ -2509,7 +2525,7 @@
struct cpsw_common *cpsw = priv->cpsw;

/* not supported */
- ering->tx_max_pending = 0;
+ ering->tx_max_pending = descs_pool_size - CPSW_MAX_QUEUES;
 ering->tx_pending = cpdma_get_num_tx_descs(cpsw->dma);
 ering->rx_max_pending = descs_pool_size - CPSW_MAX_QUEUES;
 ering->rx_pending = cpdma_get_num_rx_descs(cpsw->dma);
@@ -3050,10 +3066,16 @@
}

cpsw->txv[0].ch = cpdma_chan_create(cpsw->dma, 0, cpsw_tx_handler, 0);
+ if (IS_ERR(cpsw->txv[0].ch)) {
+ dev_err(priv->dev, "error initializing tx dma channel\n");
+ ret = PTR_ERR(cpsw->txv[0].ch);
+ goto clean_dma_ret;
+ }
+ cpanels->txv[0].ch = cpdma_chan_create(cpsw->dma, 0, cpsw_rx_handler, 1);
- if (WARN_ON(!cpsw->txv[0].ch || !cpsw->txv[0].ch)) {
- dev_err(priv->dev, "error initializing dma channels\n");
-ret = -ENOMEM;
+if (IS_ERR(cpsw->rxv[0].ch)) {
+dev_err(priv->dev, "error initializing rx dma channel\n");
+ret = PTR_ERR(cpsw->rxv[0].ch);
goto clean_dma_ret;
}

--- linux-4.15.0.orig/drivers/net/ethernet/ti/cpsw_ale.c
+++ linux-4.15.0/drivers/net/ethernet/ti/cpsw_ale.c
@@ -870,6 +870,8 @@
void cpsw_ale_stop(struct cpsw_ale *ale)
{
    del_timer_sync(&ale->timer);
+    cpsw_ale_control_set(ale, 0, ALE_CLEAR, 1);
+    cpsw_ale_control_set(ale, 0, ALE_ENABLE, 0);
}
EXPORT_SYMBOL_GPL(cpsw_ale_stop);

@@ -884,6 +886,7 @@
ale->ageout = ale->params.ale_ageout * HZ;

+    cpsw_ale_control_set(ale, 0, ALE_CLEAR, 1);
    return ale;
}
EXPORT_SYMBOL_GPL(cpsw_ale_create);
@@ -892,7 +895,6 @@
    if (!ale)
        return -EINVAL;
    -cpsw_ale_control_set(ale, 0, ALE_ENABLE, 0);
-    kfree(ale);
    return 0;
}
--- linux-4.15.0.orig/drivers/net/ethernet/ti/cpts.c
+++ linux-4.15.0/drivers/net/ethernet/ti/cpts.c
@@ -116,9 +116,7 @@

    /* timeout any expired skbs over 1s */
    -dev_dbg(cpts->dev, "expiring tx timestamp mtype %u seqid %04x\n",
-        mtype, seqid);
    } else if (time_after(jiffies, skb_cb->tmo)) {
        __skb_unlink(skb, &cpts->txq);
        dev_consume_skb_any(skb);
    }
@@ -473,6 +471,7 @@

--- linux-4.15.0.orig/d...
ptp_clock_unregister(cpts->clock);
cpts->clock = NULL;
+cpts->phc_index = -1;

cpts_write32(cpts, 0, int_enable);
cpts_write32(cpts, 0, control);
@@ -567,11 +566,14 @@
return ERR_PTR(PTR_ERR(cpts->refclk));
}

-clk_prepare(cpts->refclk);
+ret = clk_prepare(cpts->refclk);
+if (ret)
++return ERR_PTR(ret);

cpts->cc.read = cpts_systim_read;
cpts->cc.mask = CLOCKSOURCE_MASK(32);
cpts->info = cpts_info;
+cpts->phc_index = -1;

cpts_calc_mult_shift(cpts);
/* save cc.mult original value as it can be modified
--- linux-4.15.0.orig/drivers/net/ethernet/ti/davinci_cpdma.c
+++ linux-4.15.0/drivers/net/ethernet/ti/davinci_cpdma.c
@@ -893,7 +893,7 @@
chan_num = rx_type ? rx_chan_num(chan_num) : tx_chan_num(chan_num);

if (__chan_linear(chan_num) >= ctrlr->num_chan)
-return NULL;
+return ERR_PTR(-EINVAL);

chan = devm_kzalloc(ctrlr->dev, sizeof(*chan), GFP_KERNEL);
if (!chan)
--- linux-4.15.0.orig/drivers/net/ethernet/ti/davinci_emac.c
+++ linux-4.15.0/drivers/net/ethernet/ti/davinci_emac.c
@@ -183,11 +183,11 @@
/* EMAC mac_status register */
#define EMAC_MACSTATUS_TXERRCODE_MASK(0xF00000)
#define EMAC_MACSTATUS_TXERRCODE_SHIFT(20)
-#define EMAC_MACSTATUS_TXERRCH_MASK(0x7)
+#define EMAC_MACSTATUS_TXERRCH_MASK(0x700)
#define EMAC_MACSTATUS_RXERRCODE_MASK(0xF000)
#define EMAC_MACSTATUS_RXERRCODE_SHIFT(12)
-#define EMAC_MACSTATUS_RXERRCH_MASK(0x7)
+#define EMAC_MACSTATUS_RXERRCH_MASK(0x700)
#define EMAC_MACSTATUS_RXERRCH_SHIFT(8)
struct net_device *ndev = priv->ndev;
struct device *emac_dev = &ndev->dev;

u32 status = 0;
-u32 num_tx_pkts = 0, num_rx_pkts = 0;
+u32 num_rx_pkts = 0;

/* Check interrupt vectors and call packet processing */
status = emac_read(EMAC_MACINVECTOR);

if (status & mask) {
    -num_tx_pkts = cpdma_chan_process(priv->txchan,
    -       EMAC_DEF_TX_MAX_SERVICE);
    +cpdma_chan_process(priv->txchan, EMAC_DEF_TX_MAX_SERVICE);
} /* TX processing */

static int match_first_device(struct device *dev, void *data)
{
    +if (dev->parent && dev->parent->of_node)
    +    return of_device_is_compatible(dev->parent->of_node,
    +           "ti,davinci_mdio");
    +
    return !strncmp(dev_name(dev), "davinci_mdio", 12);
}

priv->txchan = cpdma_chan_create(priv->dma, EMAC_DEF_TX_CH,
emac_tx_handler, 0);
+if (IS_ERR(priv->txchan)) {
    +dev_err(&pdev->dev, "error initializing tx dma channel\n");
    +rc = PTR_ERR(priv->txchan);
    +goto err_free_dma;
    +}

priv->rxchan = cpdma_chan_create(priv->dma, EMAC_DEF_RX_CH,
emac_rx_handler, 1);
-if (WARN_ON(!priv->txchan || !priv->rxchan)) {  
    -rc = -ENOMEM;
    -goto no_cpdma_chan;
    +if (IS_ERR(priv->rxchan)) {

dev_err(&pdev->dev, "error initializing rx dma channel\n");
rc = PTR_ERR(priv->rxchan);
goto err_free_rxchan;
}

res = platform_get_resource(pdev, IORESOURCE_IRQ, 0);
if (!res) {
    dev_err(&pdev->dev, "error getting irq res\n");
    rc = -ENOENT;
    goto no_cpdma_chan;
    goto err_free_rxchan;
}
ndev->irq = res->start;

/* register the network device */
 //@ -1912,7 +1922,7 @@
pm_runtime_put_noidle(&pdev->dev);
dev_err(&pdev->dev, "failed to get_sync(%d)/\n",
    __func__, rc);
    goto no_cpdma_chan;
    goto err_napi_del;
}

@@ -1935,11 +1945,13 @@
return 0;

    -no_cpdma_chan:
    -if (priv->txchan)
    -cpdma_chan_destroy(priv->txchan);
    -if (priv->rxchan)
    -cpdma_chan_destroy(priv->rxchan);
    +err_napi_del:
    +netif_napi_del(&priv->napi);
    +err_free_rxchan:
    +cpdma_chan_destroy(priv->rxchan);
    +err_free_txchan:
    +cpdma_chan_destroy(priv->txchan);
    +err_free_dma:
cpdma_ctlr_destroy(priv->dma);

no_pdata:
if (of_phy_is_fixed_link(np))
--- linux-4.15.0.orig/drivers/net/ethernet/ti/netcp_core.c
+++ linux-4.15.0/drivers/net/ethernet/ti/netcp_core.c
@@ -1364,9 +1364,9 @@
tx_pipe->dma_queue = knav_queue_open(name, tx_pipe->dma_queue_id,
    KNAV_QUEUE_SHARED);
if (IS_ERR(tx_pipe->dma_queue)) {
+    ret = PTR_ERR(tx_pipe->dma_queue);
    dev_err(dev, "Could not open DMA queue for channel \"%s\": \%d\n",
        name, ret);
    -ret = PTR_ERR(tx_pipe->dma_queue);
go_to err;
}

--- linux-4.15.0.orig/drivers/net/ethernet/ti/netcp_ethss.c
+++ linux-4.15.0/drivers/net/ethernet/ti/netcp_ethss.c
@@ -3538,12 +3538,16 @@
ret = netcp_txpipe_init(&gbe_dev->tx_pipe, netcp_device,
gbe_dev->dma_chan_name, gbe_dev->tx_queue_id);
-if (ret)
+if (ret) {
    of_node_put(interfaces);
    return ret;
+}

ret = netcp_txpipe_open(&gbe_dev->tx_pipe);
-if (ret)
+if (ret) {
    of_node_put(interfaces);
    return ret;
+}

/* Create network interfaces */
INIT_LIST_HEAD(&gbe_dev->gbe_intf_head);
--- linux-4.15.0.orig/drivers/net/ethernet/ti/tlan.c
+++ linux-4.15.0/drivers/net/ethernet/ti/tlan.c
@@ -312,9 +312,8 @@
pci_release_regions(pdev);
#endif
-free_netdev(dev);
-
cancel_work_sync(&priv->tlan_tqueue);
+free_netdev(dev);
}
static void tlan_start(struct net_device *dev)
@@ -671,7 +670,6 @@
static void __init tlan_eisa_probe(void)
{
    long ioaddr;
    -int rc = -ENODEV;
@@ -736,8 +734,7 @@
    /* Setup the newly found eisa adapter */
    -rc = tlan_probe1(NULL, ioaddr, irq,
    - 12, NULL);
@@ -845,9 +845,9 @@
    * skb: packet to send out
    * netdev: interface device structure
    *
    - * returns 0 on success, <0 on failure
    + * returns NETDEV_TX_OK on success, NETDEV_TX_BUSY on failure
    */
    -int gelic_net_xmit(struct sk_buff *skb, struct net_device *netdev)
    +netdev_tx_t gelic_net_xmit(struct sk_buff *skb, struct net_device *netdev)
    {
    struct gelic_card *card = netdev_card(netdev);
    struct gelic_descr *descr;
    void gelic_card_down(struct gelic_card *card);
    int gelic_net_open(struct net_device *netdev);
    int gelic_net_stop(struct net_device *netdev);
    -int gelic_net_xmit(struct sk_buff *skb, struct net_device *netdev);
    +netdev_tx_t gelic_net_xmit(struct sk_buff *skb, struct net_device *netdev);
    void gelic_net_set_multi(struct net_device *netdev);
    void gelic_net_tx_timeout(struct net_device *netdev);
    int gelic_net_setup_netdev(struct net_device *netdev, struct gelic_card *card);
    --- linux-4.15.0.orig/drivers/net/ethernet/toshiba/spider_net.c
    +++ linux-4.15.0/drivers/net/ethernet/toshiba/spider_net.c
    @@ -296,8 +296,8 @@
descr = descr->next;
} while (descr != chain->ring);

-dma_free_coherent(&card->pdev->dev, chain->num_desc,
- chain->hwring, chain->dma_addr);
+dma_free_coherent(&card->pdev->dev, chain->num_desc * sizeof(struct spider_net_hw_descr),
+ chain->hwring, chain->dma_addr);
}

/**
@@ -880,9 +880,9 @@
* @skb: packet to send out
* @netdev: interface device structure
* - returns 0 on success, !0 on failure
+ * returns NETDEV_TX_OK on success, NETDEV_TX_BUSY on failure
 */
-static int
+static netdev_tx_t
spider_net_xmit(struct sk_buff *skb, struct net_device *netdev)
{
    int cnt;
    --- linux-4.15.0.orig/drivers/net/ethernet/toshiba/tc35815.c
+++ linux-4.15.0/drivers/net/ethernet/toshiba/tc35815.c
@@ -474,7 +474,8 @@
 /* Index to functions, as function prototypes. */

 static int tc35815_open(struct net_device *dev);
-static int tc35815_send_packet(struct sk_buff *skb, struct net_device *dev);
+static netdev_tx_t tc35815_send_packet(struct sk_buff *skb,
+    struct net_device *dev);
 static irqreturn_t tc35815_interrupt(int irq, void *dev_id);
 static int tc35815_rx(struct net_device *dev, int limit);
 static int tc35815_poll(struct napi_struct *napi, int budget);
@@ -1248,7 +1249,8 @@
 * invariant will hold if you make sure that the netif_*_queue()
 * calls are done at the proper times.
 */
-static int tc35815_send_packet(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+tc35815_send_packet(struct sk_buff *skb, struct net_device *dev)
{
    struct tc35815_local *lp = netdev_priv(dev);
    struct TxFD *txfd;
@@ -1497,7 +1499,7 @@
pci_unmap_single lp->pci_dev,
    lp->rx_skb[CUR_BD].skb_dma,
    RX_BUF_SIZE, PCI_DMA_FROMDEVICE);
if (!HAVE_DMA_RXALIGN(lp) && NET_IP_ALIGN)
+if (!HAVE_DMA_RXALIGN(lp) && NET_IP_ALIGN != 0)
memmove(skb->data, skb->data - NET_IP_ALIGN,
pkt_len);
data = skb_put(skb, pkt_len);
--- linux-4.15.0.orig/drivers/net/ethernet/tundra/tsi108_eth.c
+++ linux-4.15.0/drivers/net/ethernet/tundra/tsi108_eth.c
@@ -381,9 +381,10 @@
static void tsi108_stat_carry(struct net_device *dev)
{
struct tsi108_prv_data *data = netdev_priv(dev);
+unsigned long flags;
    u32 carry1, carry2;

-spin_lock_irq(&data->misclock);
+spin_lock_irqsave(&data->misclock, flags);

carry1 = TSI_READ(TSI108_STAT_CARRY1);
carry2 = TSI_READ(TSI108_STAT_CARRY2);
@@ -451,7 +452,7 @@
TSI108_STAT_TXPAUSEDROP_CARRY,
    &data->tx_pause_drop);

-spin_unlock_irq(&data->misclock);
+spin_unlock_irqrestore(&data->misclock, flags);
}

/* Read a stat counter atomically with respect to carries.
--- linux-4.15.0.orig/drivers/net/ethernet/via/via-velocity.c
+++ linux-4.15.0/drivers/net/ethernet/via/via-velocity.c
@@ -875,26 +875,13 @@*/
static int velocity_set_media_mode(struct velocity_info *vptr, u32 mii_status)
{
    u32 curr_status;
    struct mac_regs __iomem *regs = vptr->mac_regs;

    vptr->mii_status = mii_check_media_mode(vptr->mac_regs);
    curr_status = vptr->mii_status & (~VELOCITY_LINK_FAIL);

-    /* Set mii link status */
    set_mii_flow_control(vptr);

    /*
-     * Check if new status is consistent with current status
-     * if (((mii_status & curr_status) & VELOCITY_AUTONEG_ENABLE) ||
-         (mii_status==curr_status)) {
-             vptr->mii_status=mii_check_media_mode(vptr->mac_regs);
-     */

- vptr->mii_status=check_connection_type(vptr->mac_regs);
- VELOCITY_PRT(MSG_LEVEL_INFO, "Velocity link no change\n");
- return 0;
- }
- */
-
- if (PHYID_GET_PHY_ID(vptr->phy_id) == PHYID_CICADA_CS8201)
MII_REG_BITS_ON(AUXCR_MDPPS, MII_NCONFIG, vptr->mac_regs);

--- linux-4.15.0.orig/drivers/net/ethernet/wiznet/w5100.c
+++ linux-4.15.0/drivers/net/ethernet/wiznet/w5100.c
@@ -1059,6 +1059,8 @@
mac_addr = data->mac_addr;
mem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+if (!mem)
+return -EINVAL;
if (resource_size(mem) < W5100_BUS_DIRECT_SIZE)
ops = &w5100_mmio_indirect_ops;
else
--- linux-4.15.0.orig/drivers/net/ethernet/xilinx/ll_temac_main.c
+++ linux-4.15.0/drivers/net/ethernet/xilinx/ll_temac_main.c
@@ -674,7 +674,8 @@
        return 0;
    } 

-static int temac_start_xmit(struct sk_buff *skb, struct net_device *ndev) 
+static netdev_tx_t 
+temac_start_xmit(struct sk_buff *skb, struct net_device *ndev) 
{ 
    struct temac_local *lp = netdev_priv(ndev);
    struct cdmac_bd *cur_p;
    @ @ -735.6 +736.9 @ @
    /* Kick off the transfer */
    lp->dma_out(lp, TX_TAILDESC_PTR, tail_p); /* DMA start */

    +if (temac_check_tx_bd_space(lp, MAX_SKB_FRAGS + 1))
    +netif_stop_queue(ndev);
+    
    return NETDEV_TX_OK;
} 

--- linux-4.15.0.orig/drivers/net/ethernet/xilinx/xilinx_axienet_main.c
+++ linux-4.15.0/drivers/net/ethernet/xilinx/xilinx_axienet_main.c
@@ -614,6 +614,10 @@
    ndev->stats.tx_packets += packets;
    ndev->stats.tx_bytes += size;

/* Matches barrier in axienet_start_xmit */
smp_mb();
+
netif_wake_queue(ndev);
}

@@ -653,7 +657,8 @@
* start the transmission. Additionally if checksum offloading is supported,
* it populates AXI Stream Control fields with appropriate values.
*/
-static int axienet_start_xmit(struct sk_buff *skb, struct net_device *ndev)
+static netdev_tx_t
+axienet_start_xmit(struct sk_buff *skb, struct net_device *ndev)
{
  u32 ii;
  u32 num_frag;
@@ -668,9 +673,19 @@
cur_p = &lp->tx_bd_v[lp->tx_bd_tail];

  if (axienet_check_tx_bd_space(lp, num_frag)) {
-    if (!netif_queue_stopped(ndev))
-      netif_stop_queue(ndev);
-      return NETDEV_TX_BUSY;
+    if (netif_queue_stopped(ndev))
+      netif_stop_queue(ndev);
+    /* Matches barrier in axienet_start_xmit_done */
+    smp_mb();
+  }
+  /* Space might have just been freed - check again */
+  if (axienet_check_tx_bd_space(lp, num_frag))
+    return NETDEV_TX_BUSY;
+  +netif_wake_queue(ndev);
  }

  if (skb->ip_summed == CHECKSUM_PARTIAL) {
@@ -1559,7 +1574,7 @@
  }
 } else {
  lp->phy_mode = of_get_phy_mode(pdev->dev.of_node);
-    if (lp->phy_mode < 0) {
-      if ((int)lp->phy_mode < 0) {
+      ret = -EINVAL;
+      goto free_netdev;
  
  Open Source Used In 5GasS Edge AC-4  26044
```c
ret = of_address_to_resource(np, 0, &dmares);
if (ret) {
    dev_err(&pdev->dev, "unable to get DMA resource\n");
    +of_node_put(np);
    goto free_netdev;
}
lp->dma_regs = devm_ioremap_resource(&pdev->dev, &dmares);
if (IS_ERR(lp->dma_regs)) {
    dev_err(&pdev->dev, "could not map DMA regs\n");
    ret = PTR_ERR(lp->dma_regs);
    +of_node_put(np);
    goto free_netdev;
}
lp->rx_irq = irq_of_parse_and_map(np, 1);
--- linux-4.15.0.orig/drivers/net/ethernet/xilinx/xilinx_axienet_mdio.c
+++ linux-4.15.0/drivers/net/ethernet/xilinx/xilinx_axienet_mdio.c
@@ -218,6 +218,7 @@
    ret = of_mdiobus_register(bus, np1);
    if (ret) {
        mdiobus_free(bus);
    +lp->mii_bus = NULL;
        return ret;
    }
    return 0;
--- linux-4.15.0.orig/drivers/net/ethernet/xilinx/xilinx_emaclite.c
+++ linux-4.15.0/drivers/net/ethernet/xilinx/xilinx_emaclite.c
@@ -1005,9 +1005,10 @@
     deferred and the Tx queue is stopped so that the deferred socket buffer can
     be transmitted when the Emaclite device is free to transmit data.
 *
- * Return:	0, always.
+ * Return:	NETDEV_TX_OK, always.
 */
-static int xemaclite_send(struct sk_buff *orig_skb, struct net_device *dev)
+static netdev_tx_t
+xemaclite_send(struct sk_buff *orig_skb, struct net_device *dev)
{
    struct net_local *lp = netdev_priv(dev);
    struct sk_buff *new_skb;
```
spin_unlock_irqrestore(&lp->reset_lock, flags);

@@ -1037,7 +1038,7 @@
 dev->stats.tx_bytes += len;
 dev_consume_skb_any(new_skb);

-    return 0;
 +    return NETDEV_TX_OK;
 }

/**
 @@ -1164,9 +1165,8 @@
 }

dev_info(dev,
-    "Xilinx EmacLite at 0x%08X mapped to 0x%08X, irq=%d\n",
-    (unsigned int __force)ndev->mem_start,
-    (unsigned int __force)lp->base_addr, ndev->irq);
+    "Xilinx EmacLite at 0x%08X mapped to 0x%p, irq=%d\n",
+    (unsigned int __force)ndev->mem_start, lp->base_addr, ndev->irq);
 return 0;

error:
--- linux-4.15.0.orig/drivers/net/fddi/Kconfig
+++ linux-4.15.0/drivers/net/fddi/Kconfig
@@ -28,17 +28,20 @@
 config DEFXX_MMIO
 bool
-    "Use MMIO instead of PIO" if PCI || EISA
+    "Use MMIO instead of IOP" if PCI || EISA
 depends on DEFXX
-    default n if PCI || EISA
+    default n if EISA
+    default y
---help---
 This instructs the driver to use EISA or PCI memory-mapped I/O
-    (MMIO) as appropriate instead of programmed I/O ports (PIO).
+    (MMIO) as appropriate instead of programmed I/O ports (IOP).
   Enabling this gives an improvement in processing time in parts
   of the driver, but it may cause problems with EISA (DEFEA)
-    adapters. TURBOchannel does not have the concept of I/O ports,
-    so MMIO is always used for these (DEFTA) adapters.
+    of the driver, but it requires a memory window to be configured
+    for EISA (DEFEA) adapters that may not always be available.
+    Conversely some PCIe host bridges do not support IOP, so MMIO
+    may be required to access PCI (DEFPA) adapters on downstream PCI
+    buses with some systems. TURBOchannel does not have the concept
+ of I/O ports, so MMIO is always used for these (DEFTA) adapters.

If unsure, say N.

--- linux-4.15.0.orig/drivers/net/fddi/defxx.c
+++ linux-4.15.0/drivers/net/fddi/defxx.c
@@ -495,6 +495,25 @@
ndo_set_mac_address = dfx_ctl_set_mac_address,
 }

+static void dfx_register_res_alloc_err(const char *print_name, bool mmio,
+    bool eisa)
+    {
+    +pr_err("%s: Cannot use %s, no address set, aborting\n",
+        +print_name, mmio ? "MMIO" : "I/O");
+    +pr_err("%s: Recompile driver with "CONFIG_DEFXX_MMIO=%c\n",
+        +print_name, mmio ? 'n' : 'y');
+    +if (eisa && mmio)
+    +pr_err("%s: Or run ECU and set adapter's MMIO location\n",
+        +print_name);
+    }
+
+static void dfx_register_res_err(const char *print_name, bool mmio,
+    unsigned long start, unsigned long len)
+    {
+    +pr_err("%s: Cannot reserve %s resource 0x%lx @ 0x%lx, aborting\n",
+        +print_name, mmio ? "MMIO" : "I/O", len, start);
+    }
+
/*
 * ================
 * = dfx_register =
@@ -568,15 +587,12 @@
dev_set_drvdata(bdev, dev);

dfx_get_bars(bdev, bar_start, bar_len);
-if (dfx_bus_eisa && dfx_use_mmio && bar_start[0] == 0) {
-    -pr_err("%s: Cannot use MMIO, no address set, aborting\n",
-        -print_name);
-    -pr_err("%s: Run ECU and set adapter's MMIO location\n",
-        -print_name);
-    -pr_err("%s: Or recompile driver with "CONFIG_DEFXX_MMIO=\n"
-        -"\n", print_name);
-    +if (bar_len[0] == 0 ||
+    +    (dfx_bus_eisa && dfx_use_mmio && bar_start[0] == 0)) {
+    +    dfx_register_res_alloc_err(print_name, dfx_use_mmio,
+    +    +    dfx_bus_eisa);
err = -ENXIO;
goto err_out;
+goto err_out_disable;
}

if (dfx_use_mmio)
@@ -585,18 +601,16 @@
else
.region = request_region(bar_start[0], bar_len[0], print_name);
if (!region) {
-prite_err("%s: Cannot reserve %s resource 0x%lx @ 0x%lx, "
-"aborting\n", dfx_use_mmio ? "MMIO" : "I/O", print_name,
-(long)bar_len[0], (long)bar_start[0]);
+dfx_register_res_err(print_name, dfx_use_mmio,
+bar_start[0], bar_len[0]);
err = -EBUSY;
goto err_out_disable;
}
if (bar_start[1] != 0) {
.region = request_region(bar_start[1], bar_len[1], print_name);
if (!region) {
-prite_err("%s: Cannot reserve I/O resource 
-"0x%lx @ 0x%lx, aborting\n", print_name,
-(long)bar_len[1], (long)bar_start[1]);
+dfx_register_res_err(print_name, 0,
+bar_start[1], bar_len[1]);
err = -EBUSY;
goto err_out_csr_region;
}
 @@ -604,9 +618,8 @@
if (bar_start[2] != 0) {
.region = request_region(bar_start[2], bar_len[2], print_name);
if (!region) {
-prite_err("%s: Cannot reserve I/O resource 
-"0x%lx @ 0x%lx, aborting\n", print_name,
-(long)bar_len[2], (long)bar_start[2]);
+dfx_register_res_err(print_name, 0,
+bar_start[2], bar_len[2]);
err = -EBUSY;
goto err_out_bh_region;
}
 --- linux-4.15.0.orig/drivers/net/fjes/fjes_main.c
+++ linux-4.15.0/drivers/net/fjes/fjes_main.c
@@ -181,6 +181,9 @@
/* create platform_device */
plat_dev = platform_device_register_simple(DRV_NAME, 0, fjes_resource,
ARRAY_SIZE(fjes_resource));
+if (IS_ERR(plat_dev))
+return PTR_ERR(plat_dev);
device->driver_data = plat_dev;

return 0;
@@ -1252,8 +1255,17 @@
adapter->open.guard = false;

adapter->txrx.wq = alloc_workqueue(DRV_NAME "/txrx", WQ_MEM_RECLAIM, 0);
+if (unlikely(!adapter->txrx.wq)) {
+ err = -ENOMEM;
+ goto err_free_netdev;
+}
+
+ adapter->control.wq = alloc_workqueue(DRV_NAME "/control",
+ WQ_MEM_RECLAIM, 0);
+if (unlikely(!adapter->control.wq)) {
+ err = -ENOMEM;
+ goto err_free_txrx_wq;
+}

INIT_WORK(&adapter->tx_stall_task, fjes_tx_stall_task);
INIT_WORK(&adapter->raise_intr_rxdata_task,
@@ -1265,12 +1277,16 @@
adapter->interrupt_watch_enable = false;

res = platform_get_resource(plat_dev, IORESOURCE_MEM, 0);
+if (!res) {
+ err = -EINVAL;
+ goto err_free_control_wq;
+}

hw->hw_res.start = res->start;
hw->hw_res.size = resource_size(res);
hw->hw_res.irq = platform_get_irq(plat_dev, 0);
err = fjes_hw_init(&adapter->hw);
if (err)
- goto err_free_netdev;
+ goto err_free_control_wq;

err_hws_exit:
 fjes_hw_exit(&adapter->hw);
+err_free_control_wq:
+destroy_workqueue(adapter->control_wq);
+err_free_txrx_wq:
+destroy_workqueue(adapter->txrx_wq);

/* setup MAC address (02:00:00:00:00:[epid])*/
netdev->dev_addr[0] = 2;
@@ -1292,6 +1308,10 @@
err_hws_exit:
 fjes_hw_exit(&adapter->hw);
+err_free_control_wq:
+destroy_workqueue(adapter->control_wq);
+err_free_txrx_wq:
+destroy_workqueue(adapter->txrx_wq);
err_free_netdev:
free_netdev(netdev);
err_out:
--- linux-4.15.0.orig/drivers/net/geneve.c
+++ linux-4.15.0/drivers/net/geneve.c
@@ -474,7 +474,7 @@
 out_unlock:
 rcu_read_unlock();
 out:
- NAPI_GRO_CB(skb)->flush |= flush;
+ skb_gro_flush_final(skb, pp, flush);

 return pp;
 }
@@ -632,15 +632,20 @@
 static int geneve_open(struct net_device *dev)
 {
 struct geneve_dev *geneve = netdev_priv(dev);
- bool ipv6 = !!(geneve->info.mode & IP_TUNNEL_INFO_IPV6);
+ bool ipv4, ipv6;
 bool metadata = geneve->collect_md;
 + bool ipv4, ipv6;
 int ret = 0;

 +ipv6 = geneve->info.mode & IP_TUNNEL_INFO_IPV6 || metadata;
 +ipv4 = !ipv6 || metadata;
 #if IS_ENABLED(CONFIG_IPV6)
- if (ipv6 || metadata)
+ if (ipv6) {
 ret = geneve_sock_add(geneve, true);
+ if (ret < 0 && ret != -EAFNOSUPPORT)
+ ipv4 = false;
+ }
 #endif
- if (!ret && (!ipv6 || metadata))
+ if (ipv4)
 ret = geneve_sock_add(geneve, false);
 if (ret < 0)
 geneve_sock_release(geneve);
@@ -711,7 +716,8 @@
 struct net_device *dev,
 struct geneve_sock *gs4,
 struct flowi4 *fl4,
- const struct ip_tunnel_info *info)
+ const struct ip_tunnel_info *info,
+ __be16 dport, __be16 sport)
 {
 bool use_cache = ip_tunnel_dst_cache_usable(skb, info);
 struct geneve_dev *geneve = netdev_priv(dev);
@@ -727,6 +733,8 @@
    fl4->daddr = info->key.u.ipv4.dst;
    fl4->saddr = info->key.u.ipv4.src;
    +fl4->fl4_dport = dport;
    +fl4->fl4_sport = sport;

    tos = info->key.tos;
    if ((tos == 1) && !geneve->collect_md) {
        @ @ -761,7 +769,8 @@
            struct net_device *dev,
            struct geneve_sock *gs6,
            struct flowi6 *fl6,
-        const struct ip_tunnel_info *info)
+        const struct ip_tunnel_info *info,
+        __be16 dport, __be16 sport)
        {
            bool use_cache = ip_tunnel_dst_cache_usable(skb, info);
            struct geneve_dev *geneve = netdev_priv(dev);
            @ @ -777,6 +786,9 @@
            fl6->flowi6_proto = IPPROTO_UDP;
            fl6->daddr = info->key.u.ipv6.dst;
            fl6->saddr = info->key.u.ipv6.src;
            +fl6->fl6_dport = dport;
            +fl6->fl6_sport = sport;
            +
            prio = info->key.tos;
            if ((prio == 1) && !geneve->collect_md) {
                prio = ip_tunnel_get_dsfield(ip_hdr(skb), skb);
                @ @ -791,7 +803,9 @@
                if (dst)
                    return dst;
            }
+sport = udp_flow_src_port(geneve->net, skb, 1, USHRT_MAX, true);
+rt = geneve_get_v4_rt(skb, dev, gs4, &fl4, info,
+    geneve->info.key.tp_dst, sport);
if (IS_ERR(rt))
  return PTR_ERR(rt);

@@ -832,7 +851,6 @@
 skb_dst_update_pmtu(skb, mtu);
 }

-sport = udp_flow_src_port(geneve->net, skb, 1, USHRT_MAX, true);
if (geneve->collect_md) {
  tos = ip_tunnel_ecn_encap(key->tos, ip_hdr(skb), skb);
  ttl = key->ttl;
@@ -867,7 +885,12 @@
 __be16 sport;
 int err;

-dst = geneve_get_v6_dst(skb, dev, gs6, &fl6, info);
+if (!pskb_inet_may_pull(skb))
+  return -EINVAL;
+
+sport = udp_flow_src_port(geneve->net, skb, 1, USHRT_MAX, true);
+dst = geneve_get_v6_dst(skb, dev, gs6, &fl6, info,
+    geneve->info.key.tp_dst, sport);
if (IS_ERR(dst))
  return PTR_ERR(dst);

@@ -878,7 +901,6 @@
 skb_dst_update_pmtu(skb, mtu);
 }

-sport = udp_flow_src_port(geneve->net, skb, 1, USHRT_MAX, true);
if (geneve->collect_md) {
  prio = ip_tunnel_ecn_encap(key->tos, ip_hdr(skb), skb);
  ttl = key->ttl;
@@ -908,9 +930,10 @@
 if (geneve->collect_md) {
   info = skb_tunnel_info(skb);
   if (unlikely(!info || !(info->mode & IP_TUNNEL_INFO_TX))) {
     -err = -EINVAL;
     goto tx_error;
+    dev_kfree_skb(skb);
+    dev->stats.tx_dropped++;
+    return NETDEV_TX_OK;
   }
 } else {
   

info = &geneve->info;
@@ -927,7 +950,7 @@
if (likely(!err))
    return NETDEV_TX_OK;
-tx_error:
+    dev_kfree_skb(skb);

if (err == -ELOOP)
    tx_error:
@@ -955,13 +978,18 @@
    { 
        struct ip_tunnel_info *info = skb_tunnel_info(skb);
        struct geneve_dev *geneve = netdev_priv(dev);
        __be16 sport;

        if (ip_tunnel_info_af(info) == AF_INET) {
            struct rtable *rt;
            struct flowi4 fl4;
            + struct geneve_sock *gs4 = rcu_dereference(geneve->sock4);
            + sport = udp_flow_src_port(geneve->net, skb,
            + 1, USHRT_MAX, true);

            -rt = geneve_get_v4_rt(skb, dev, gs4, &fl4, info);
            +rt = geneve_get_v4_rt(skb, dev, gs4, &fl4, info,
            +   geneve->info.key.tp_dst, sport);
            if (IS_ERR(rt))
                return PTR_ERR(rt);
@@ -971,9 +1016,7 @@
        } else if (ip_tunnel_info_af(info) == AF_INET6) {
            struct dst_entry *dst;
            struct flowi6 fl6;
    + struct geneve_sock *gs6 = rcu_dereference(geneve->sock6);
            + sport = udp_flow_src_port(geneve->net, skb,
            +   1, USHRT_MAX, true);

            -dst = geneve_get_v6_dst(skb, dev, gs6, &fl6, info);
            +dst = geneve_get_v6_dst(skb, dev, gs6, &fl6, info,
            +   geneve->info.key.tp_dst, sport);
            if (IS_ERR(dst))
                return PTR_ERR(dst);
@@ -984,8 +1016,7 @@
        return -EINVAL;
    }

info->key.tp_src = udp_flow_src_port(geneve->net, skb,
- 1, USHRT_MAX, true);
+info->key.tp_src = sport;
info->key.tp_dst = geneve->info.key.tp_dst;
return 0;
}
--- linux-4.15.0.orig/drivers/net/gtp.c
+++ linux-4.15.0/drivers/net/gtp.c
@@ -42,7 +42,6 @@
 struct hlist_node hlist_addr;
 union {
    u64 tid;
-   struct {
   u64 tid;
   u16 flow;
@@ -289,16 +288,29 @@
 return gtp_rx(pctx, skb, hdrlen, gtp->role);
 }

-static void gtp_encap_destroy(struct sock *sk)
+static void __gtp_encap_destroy(struct sock *sk)
{
 struct gtp_dev *gtp;

- gtp = rcu_dereference_sk_user_data(sk);
+ lock_sock(sk);
+ gtp = sk->sk_user_data;
 if (gtp) {
+ if (gtp->sk0 == sk)
+ gtp->sk0 = NULL;
+ else
+ gtp->sk1u = NULL;
 udp_sk(sk)->encap_type = 0;
 rcu_assign_sk_user_data(sk, NULL);
 sock_put(sk);
 }
static void gtp_encap_disable_sock(struct sock *sk)
@@ -306,7 +318,7 @@
    if (!sk)
        return;

    -gtp_encap_destroy(sk);
    +__gtp_encap_destroy(sk);
    }

static void gtp_encap_disable(struct gtp_dev *gtp)
@@ -532,14 +544,13 @@
    mtu = dst_mtu(&rt->dst);
    }

    -rt->dst.ops->update_pmtu(&rt->dst, NULL, skb, mtu);
    +rt->dst.ops->update_pmtu(&rt->dst, NULL, skb, mtu, false);

    if (!(skb_is_gso(skb) && (iph->frag_off & htons(IP_DF)) &&
          mtu < ntohs(iph->tot_len))
        {
        netdev_dbg(dev, "packet too big, fragmentation needed\n");
        -memset(IPCB(skb), 0, sizeof(*IPCB(skb)));
        -icmp_send(skb, ICMP_DEST_UNREACH, ICMP_FRAG_NEEDED,
               -htonl(mtu));
        +icmp_ndo_send(skb, ICMP_DEST_UNREACH, ICMP_FRAG_NEEDED,
               +htonl(mtu));
        goto err_rt;
        }

@@ -632,9 +643,16 @@
    }

static int gtp_hashtable_new(struct gtp_dev *gtp, int hsize);
    -static void gtp_hashtable_free(struct gtp_dev *gtp);
static int gtp_encap_enable(struct gtp_dev *gtp, struct nlattr *data[]);

    +static void gtp_destructor(struct net_device *dev)
    +{
    +struct gtp_dev *gtp = netdev_priv(dev);
    + kfree(gtp->addr_hash);
    + kfree(gtp->tid_hash);
    +}
    +
    +static int gtp_newlink(struct net *src_net, struct net_device *dev,
    struct nlattr *tb[], struct nlattr *data[],
    struct netlink_ext_ack *extack)
@@ -648,45 +666,55 @@
gtp = netdev_priv(dev);

-err = gtp_encap_enable(gtp, data);
-if (err < 0)
 -return err;
-
-if (!data[IFLA_GTP_PDP_HASHSIZE])
+if (!data[IFLA_GTP_PDP_HASHSIZE]) {
 hashsize = 1024;
-else
 +} else {
 hashsize = nla_get_u32(data[IFLA_GTP_PDP_HASHSIZE]);
+if (!hashsize)
 +hashsize = 1024;
 +}

err = gtp_hashtable_new(gtp, hashsize);
if (err < 0)
-goto out_encap;
+return err;
+
+err = gtp_encap_enable(gtp, data);
+if (err < 0)
 +goto out_hashtable;

err = register_netdevice(dev);
if (err < 0) {
 netdev_dbg(dev, "failed to register new netdev \%d\n", err);
-goto out_hashtable;
+goto out_encap;
}

gn = net_generic(dev_net(dev), gtp_net_id);
list_add_rcu(&gtp->list, &gn->gtp_dev_list);
+dev->priv_destructor = gtp_destructor;

netdev_dbg(dev, "registered new GTP interface\n");

return 0;

-out_hashtable:
-gtp_hashtable_free(gtp);
-out_encap:
gtp_encap_disable(gtp);
+out_hashtable:
+kfree(gtp->addr_hash);
+kfree(gtp->tid_hash);
return err;
static void gtp_dellink(struct net_device *dev, struct list_head *head) {
    struct gtp_dev *gtp = netdev_priv(dev);
    +struct pdp_ctx *pctx;
    +int i;
    +
    +for (i = 0; i < gtp->hash_size; i++)
    +hlist_for_each_entry_rcu(pctx, &gtp->tid_hash[i], hlist_tid)
    +pdp_context_delete(pctx);

gtp_encap_disable(gtp);
-gtp_hashtable_free(gtp);
list_del_rcu(&gtp->list);
unregister_netdevice_queue(dev, head);
}

@@ -742,11 +770,13 @@
{
    int i;

    -gtp->addr_hash = kmalloc(sizeof(struct hlist_head) * hsize, GFP_KERNEL);
    +gtp->addr_hash = kmalloc(sizeof(struct hlist_head) * hsize,
    +GFP_KERNEL | __GFP_NOWARN);
    if (gtp->addr_hash == NULL)
        return -ENOMEM;
    goto err1;
    
    @ @ -762,20 +792,6 @@
    return -ENOMEM;
}

-@ @ -762,20 +792,6 @@
    return -ENOMEM;
} 

-static void gtp_hashtable_free(struct gtp_dev *gtp)
-{
-    +struct pdp_ctx *pctx;
-    -int i;
-    -
-    -for (i = 0; i < gtp->hash_size; i++)
-    -hlist_for_each_entry_rcu(pctx, &gtp->tid_hash[i], hlist_tid)
-    -pdp_context_delete(pctx);
-    -
-    -synchronize_rcu();
-    -kfree(gtp->addr_hash);
static struct sock *gtp_encap_enable_socket(int fd, int type, 
    struct gtp_dev *gtp)
{
    return NULL;
}

if (rcu_dereference_sk_user_data(sock->sk)) {
    lock_sock(sk);
    if (sk->sk_user_data) {
        sk = ERR_PTR(-EBUSY);
        goto out_sock;
    }
    goto out_rel_sock;
}

-sk = sock->sk;
sock_hold(sk);

tuncfg.sk_user_data = gtp;

setup_udp_tunnel_sock(sock_net(sock->sk), sock, &tuncfg);

+out_rel_sock:
+release_sock(sock->sk);
out_sock:
sockfd_put(sock);
return sk;

if (data[IFLA_GTP_ROLE]) {
    role = nla_get_u32(data[IFLA_GTP_ROLE]);
    if (role > GTP_ROLE_SGSN) {
        if (sk0)
+gtp_encap_disable_sock(sk0);
+if (sk1u)
+gtp_encap_disable_sock(sk1u);
return -EINVAL;
+
}
}

gtp->sk0 = sk0;
@@ -909,24 +935,31 @@
}
}
}

-static int ipv4_pdp_add(struct gtp_dev *gtp, struct sock *sk,
-struct genl_info *info)
+static int gtp_pdp_add(struct gtp_dev *gtp, struct sock *sk,
+ struct genl_info *info)
{
+struct pdp_ctx *pctx, *pctx_tid = NULL;
struct net_device *dev = gtp->dev;
u32 hash_ms, hash_tid = 0;
-struct pdp_ctx *pctx;
+unsigned int version;
bool found = false;
__be32 ms_addr;

ms_addr = nla_get_be32(info->attrs[GTPA_MS_ADDRESS]);
hash_ms = ipv4_hashfn(ms_addr) % gtp->hash_size;
+version = nla_get_u32(info->attrs[GTPA_VERSION]);

-hlist_for_each_entry_rcu(pctx, &gtp->addr_hash[hash_ms], hlist_addr) {
-if (pctx->ms_addr_ip4.s_addr == ms_addr) {
- found = true;
- break;
- }
- }
+foreach (pctx = ipv4_pdp_find(gtp, ms_addr);
+if (pctx)
+found = true;
+if (version == GTP_V0)
+pctx_tid = gtp0_pdp_find(gtp, 
+ nla_get_u64(info->attrs[GTPA_TID]));
+else if (version == GTP_V1)
+pctx_tid = gtp1_pdp_find(gtp, 
+ nla_get_u32(info->attrs[GTPA_I_TEI]));
+if (pctx_tid)
+found = true;

if (found) {

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if (info->nlhdr->nlmsg_flags & NLM_F_EXCL)
@@ -934,6 +967,11 @@
if (info->nlhdr->nlmsg_flags & NLM_F_REPLACE)
    return -EOPNOTSUPP;
+    if (pctx && pctx_tid)
+        return -EEXIST;
+    if (!pctx)
+        pctx = pctx_tid;
+    ipv4_pdp_fill(pctx, info);

if (pctx->gtp_version == GTP_V0)
@@ -947,7 +985,7 @@
}

-pctx = kmalloc(sizeof(struct pdp_ctx), GFP_KERNEL);
+pctx = kmalloc(sizeof(*pctx), GFP_ATOMIC);
if (pctx == NULL)
    return -ENOMEM;
@@ -1036,6 +1074,7 @@
return -EINVAL;
}

+rtnl_lock();
rcu_read_lock();

gtp = gtp_find_dev(sock_net(skb->sk), info->attrs);
@@ -1056,10 +1095,11 @@
goto out_unlock;
}

-err = ipv4_pdp_add(gtp, sk, info);
+err = gtp_pdp_add(gtp, sk, info);

out_unlock:
rcu_read_unlock();
+rtnl_unlock();
return err;
}

@@ -1136,16 +1176,17 @@
static struct genl_family gtp_genl_family;

static int gtp_genl_fill_info(struct sk_buff *skb, u32 snd_portid, u32 snd_seq,
    u32 type, struct pdp_ctx *pctx)
int flags, u32 type, struct pdp_ctx *pctx)
{
    void *genlh;

    -genlh = genlmsg_put(skb, snd_portid, snd_seq, &gtp_genl_family, 0,
    +genlh = genlmsg_put(skb, snd_portid, snd_seq, &gtp_genl_family, flags,
        type);
    if (genlh == NULL)
        goto nmsg_failure;

    if (nla_put_u32(skb, GTPA_VERSION, pctx->gtp_version) ||
        nla_put_u32(skb, GTPA_LINK, pctx->dev->ifindex) ||
        nla_put_be32(skb, GTPA_PEER_ADDRESS, pctx->peer_addr_ip4.s_addr) ||
        nla_put_be32(skb, GTPA_MS_ADDRESS, pctx->ms_addr_ip4.s_addr))
        goto nla_put_failure;
    goto err_unlock;
}

err = gtp_genl_fill_info(skb2, NETLINK_CB(skb).portid,
    - info->snd_seq, info->nlhdr->nlmsg_type, pctx);
    + err = gtp_genl_fill_info(skb2, NETLINK_CB(skb).portid, info->snd_seq,
        0, info->nlhdr->nlmsg_type, pctx);
    if (err < 0)
        goto err_unlock_free;

    struct netlink_callback *cb)
    {
        struct gtp_dev *last_gtp = (struct gtp_dev *)cb->args[2], *gtp;
        +int i, j, bucket = cb->args[0], skip = cb->args[1];
        struct net *net = sock_net(skb->sk);
        -struct gtp_net *gn = net_generic(net, gtp_net_id);
        -unsigned long tid = cb->args[1];
        -int i, k = cb->args[0], ret;
        struct pdp_ctx *pctx;
        +struct gtp_net *gn;
        +
        +gn = net_generic(net, gtp_net_id);

        if (cb->args[4])
            return 0;

    +rcu_read_lock();
    list_for_each_entry_rcu(gtp, &gn->gtp_dev_list, list) {
        if (last_gtp && last_gtp != gtp)
            continue;
        else
last_gtp = NULL;

-for (i = k; i < gtp->hash_size; i++) {
  -hlist_for_each_entry_rcu(pctx, &gtp->tid_hash[i], hlist_tid) {
    -if (tid & tid != pctx->u.tid)
      -continue;
    -else
      -tid = 0;
      -
      -ret = gtp_genl_fill_info(skb,
        - NETLINK_CB(cb->skb).portid,
        - cb->nlh->nlmsg_seq,
        - cb->nlh->nlmsg_type, pctx);
      -if (ret < 0) {
        +for (i = bucket; i < gtp->hash_size; i++) {
          +j = 0;
          +hlist_for_each_entry_rcu(pctx, &gtp->tid_hash[i],
            +hlist_tid) {
            +if (j >= skip &&
              + gtp_genl_fill_info(skb,
                + NETLINK_CB(cb->skb).portid,
                + cb->nlh->nlmsg_seq,
                + NLM_F_MULTI,
                + cb->nlh->nlmsg_type, pctx)) {
                cb->args[0] = i;
                -cb->args[1] = pctx->u.tid;
                +cb->args[1] = j;
                cb->args[2] = (unsigned long)gtp;
                goto out;
              }
            +} else
              +skip = 0;
            }
          } else
            +bucket = 0;
          }
        } else
          cb->args[4] = 1;
      out:
      +rcu_read_unlock();
      return skb->len;
  }

static void __exit gtp_fini(void) {
  -unregister_pernet_subsys(&gtp_net_ops);
  genl_unregister_family(&gtp_genl_family);
rtnl_link_unregister(&gtp_link_ops);
+unregister_pernet_subsys(&gtp_net_ops);

pr_info("GTP module unloaded\n");
}
--- linux-4.15.0.orig/drivers/net/hamradio/6pack.c
+++ linux-4.15.0/drivers/net/hamradio/6pack.c
@@ -68,9 +68,9 @@
#define SIXP_DAMA_OFF		0
/* default level 2 parameters */
-#define SIXP_TXDELAY		(HZ/4)	/* in 1 s */
+#define SIXP_TXDELAY		25	/* 250 ms */
#define SIXP_PERSIST50/* in 256ths */
-#define SIXP_SLOTTIME		(HZ/10)	/* in 1 s */
+#define SIXP_SLOTTIME		10	/* 100 ms */
#define SIXP_INIT_RESYNC_TIMEOUT	(3*HZ/2) /* in 1 s */
#define SIXP_RESYNC_TIMEOUT5*HZ/* in 1 s */
@@ -524,10 +524,7 @@
 /* Start resync timer again -- the TNC might be still absent */
 -
-#del_timer(&sp->resync_t);
-#sp->resync_t.expires = jiffies + SIXP_RESYNC_TIMEOUT;
-#add_timer(&sp->resync_t);
+#mod_timer(&sp->resync_t, jiffies + SIXP_RESYNC_TIMEOUT);
}

static inline int tnc_init(struct sixpack *sp)
@@ -659,10 +654,10 @@
{
 struct sixpack *sp;

-#del_timer(&sp->resync_t);
-#sp->resync_t.expires = jiffies + SIXP_RESYNC_TIMEOUT;
-#add_timer(&sp->resync_t);
+#mod_timer(&sp->resync_t, jiffies + SIXP_RESYNC_TIMEOUT);

 return 0;
 }
@@ -659,10 +654,7 @@

 struct sixpack *sp;

-#write_lock_bh(&disc_data_lock);
+#write_lock_irq(&disc_data_lock);
sp = tty->disc_data;
tty->disc_data = NULL;
-write_unlock_bh(&disc_data_lock);
+write_unlock_irq(&disc_data_lock);
if (!sp)
return;
@@ -864,6 +859,12 @@
return;
}
+if (sp->rx_countcooked + 2 >= sizeofs promin sp->cooked_buf)) {}
+pr_err("6pack: cooked buffer overrun, data loss\n");
+sp->rx_count = 0;
+return;
+}
+
buf = sp->raw_buf;
sp->cooked_buf[sp->rx_countcooked++] =
buf[0] | ((buf[1] << 2) & 0xc0);
@@ -920,11 +921,8 @@
/* if the state byte has been received, the TNC is present,
so the resync timer can be reset. */

-if (sp->tnc_state == TNC_IN_SYNC) {
- del_timer(&sp->resync_t);
- sp->resync_t.expires = jiffies + SIXP_INIT_RESYNC_TIMEOUT;
- add_timer(&sp->resync_t);
-}
+if (sp->tnc_state == TNC_IN_SYNC)
+ mod_timer(&sp->resync_t, jiffies + SIXP_INIT_RESYNC_TIMEOUT);

sp->status1 = cmd & SIXP_PRIO_DATA_MASK;
}
--- linux-4.15.0.orig/drivers/net/hamradio/bpqether.c
+++ linux-4.15.0/drivers/net/hamradio/bpqether.c
@@ -515,8 +511,8 @@
static const char banner[] __initconst = KERN_INFO \\
"AX.25: bpqether driver version 004\n
-static char bcast_addr[6]={0xFF,0xFF,0xFF,0xFF,0xFF,0xFF};
- static char bpq_eth_addr[6];
- static int bpq_rcv(struct sk_buff *, struct net_device *, struct packet_type *, struct net_device *);
static int bpq_device_event(struct notifier_block *, unsigned long, void *);
@@ -515,8 +511,8 @@
bpq->ethdev = edev;
bpq->axdev = ndev;

-memcpy(bpq->dest_addr, bcast_addr, sizeof(bpq_eth_addr));
-memcpy(bpq->acpt_addr, bcast_addr, sizeof(bpq_eth_addr));
+eth_broadcast_addr(bpq->dest_addr);
+eth_broadcast_addr(bpq->acpt_addr);

err = register_netdevice(ndev);
if (err)
--- linux-4.15.0.orig/drivers/net/hamradio/mkiss.c
+++ linux-4.15.0/drivers/net/hamradio/mkiss.c
@@ -783,10 +783,10 @@
{
    struct mkiss *ax;

    -write_lock_bh(&disc_data_lock);
    +write_lock_irq(&disc_data_lock);
    ax = tty->disc_data;
    tty->disc_data = NULL;
    -write_unlock_bh(&disc_data_lock);
    +write_unlock_irq(&disc_data_lock);

    if (!ax)
        return;
    @ @ -810,6 +810,7 @ @
    ax->tty = NULL;

    unregister_netdev(ax->dev);
    +free_netdev(ax->dev);
}

/* Perform I/O control on an active ax25 channel. */
--- linux-4.15.0.orig/drivers/net/hamradio/yam.c
+++ linux-4.15.0/drivers/net/hamradio/yam.c
@@ -980,6 +980,8 @@
    sizeof(struct yamdrv_ioctl_mcs));
    if (IS_ERR(ym))
        return PTR_ERR(ym);
    +if (ym->cmd != SIOCYAMSMCS)
    +return -EINVAL;
    if (ym->bitrate > YAM_MAXBITRATE) {
        kfree(ym);
        return -EINVAL;
    @ @ -980,6 +980,8 @ @
    if (copy_from_user(&yi, ifr->ifr_data, sizeof(struct yamdrv_ioctl_cfg)))
        return -EFAULT;

    */
+if (yi.cmd != SIOCYAMSCFG)
+return -EINVAL;

if ((yi.cfg.mask & YAM_IOBASE) && netif_running(dev))
return -EINVAL;/* Cannot change this parameter when up */
if ((yi.cfg.mask & YAM_IRQ) && netif_running(dev))
@@ -1158,6 +1162,7 @@
err = register_netdev(dev);
if (err) {
printk(KERN_WARNING "yam: cannot register net device %s\n", dev->name);
+free_netdev(dev);
goto error;
}

yam_devs[i] = dev;
--- linux-4.15.0.orig/drivers/net/hippi/rrunner.c
+++ linux-4.15.0/drivers/net/hippi/rrunner.c
@@ -1248,7 +1248,7 @@
rrpriv->info = NULL;
}
if (rrpriv->rx_ctrl) {
-pci_free_consistent(pdev, sizeof(struct ring_ctrl),
+pci_free_consistent(pdev, 256 * sizeof(struct ring_ctrl),
     rrpriv->rx_ctrl, rrpriv->rx_ctrl_dma);
rrpriv->rx_ctrl = NULL;
}
--- linux-4.15.0.orig/drivers/net/hyperv/hyperv_net.h
+++ linux-4.15.0/drivers/net/hyperv/hyperv_net.h
@@ -179,7 +179,6 @@
u8 hw_mac_adr[ETH_ALEN];
 u8 rss_key[NETVSC_HASH_KEYLEN];
- u16 rx_table[ITAB_NUM];
};

@@ -192,7 +191,7 @@
const struct netvsc_device_info *info);
int netvsc_alloc_recv_comp_ring(struct netvsc_device *net_device, u32 q_idx);
void netvsc_device_remove(struct hv_device *device);
-int netvsc_send(struct net_device_context *ndc,
+int netvsc_send(struct net_device *net,
     struct hv_netvsc_packet *packet,
     struct rndis_message *rndis_msg,
     struct hv_page_buffer *page_buffer,
@@ -207,8 +206,7 @@
void netvsc_channel_cb(void *context);
int netvsc_poll(struct napi_struct *napi, int budget);

-void rndis_set_subchannel(struct work_struct *w);
-bool rndis_filter_opened(const struct netvsc_device *nvdev);
+int rndis_set_subchannel(struct net_device *ndev, struct netvsc_device *nvdev);
int rndis_filter_open(struct netvsc_device *nvdev);
int rndis_filter_close(struct netvsc_device *nvdev);
struct netvsc_device *rndis_filter_device_add(struct hv_device *dev,
@@ -635,14 +633,27 @@
+#define NETVSC_MTU 65535
+#define NETVSC_MTU_MIN ETH_MIN_MTU

-#define NETVSC_RECEIVE_BUFFER_SIZE		(1024*1024*16) /* 16MB */
-#define NETVSC_RECEIVE_BUFFER_SIZE_LEGACY	(1024*1024*15) /* 15MB */
-#define NETVSC_SEND_BUFFER_SIZE		(1024 * 1024 * 15) /* 15MB */
+#/* Max buffer sizes allowed by a host */
+#define NETVSC_RECEIVE_BUFFER_SIZE		(1024 * 1024 * 31) /* 31MB */
+#define NETVSC_RECEIVE_BUFFER_SIZE_LEGACY	(1024 * 1024 * 15) /* 15MB */
+#define NETVSC_RECEIVE_BUFFER_DEFAULT(1024 * 1024 * 16)
+
+#define NETVSC_SEND_BUFFER_SIZE		(1024 * 1024 * 15) /* 15MB */
+#define NETVSC_SEND_BUFFER_DEFAULT		(1024 * 1024)
+
+#define NETVSC_INVALID_INDEX		-1

+#define NETVSC_SEND_SECTION_SIZE		6144
+#define NETVSC_RECV_SECTION_SIZE		1728

+/* Default size of TX buf: 1MB, RX buf: 16MB */
+#define NETVSC_MIN_TX_SECTIONS10
+#define NETVSC_DEFAULT_TX(NETVSC_SEND_BUFFER_DEFAULT
+ / NETVSC_SEND_SECTION_SIZE)
+#define NETVSC_MIN_RX_SECTIONS10
+#define NETVSC_DEFAULT_RX(NETVSC_RECEIVE_BUFFER_DEFAULT
+ / NETVSC_RECV_SECTION_SIZE)
+
+#define NETVSC_RECEIVE_BUFFER_ID		0xcafe
+#define NETVSC_SEND_BUFFER_ID		0

@@ -722,6 +733,8 @@
struct hv_device *device_ctx;
/* netvsc_device */
struct netvsc_device __rcu *nvdev;
+/* list of netvsc net_devices */
+struct list_head list;
/* reconfigure work */
struct delayed_work dwork;
/* last reconfig time */
@@ -737,6 +750,8 @@
 u32 tx_table[VRSS_SEND_TAB_SIZE];
```c
+u16 rx_table[ITAB_NUM];
+
/* Ethtool settings */
u8 duplex;
u32 speed;
@@ -774,6 +789,7 @@
wait_queue_head_t wait_drain;
bool destroy;
+bool tx_disable; /* if true, do not wake up queue again */

/* Receive buffer allocated by us but manages by NetVSP */
void *recv_buf;
--- linux-4.15.0.orig/drivers/net/hyperv/netvsc.c
+++ linux-4.15.0/drivers/net/hyperv/netvsc.c
@@ -62,6 +62,41 @@
VM_PKT_DATA_INBAND, 0);
}

+/* Worker to setup sub channels on initial setup
+ * Initial hotplug event occurs in softirq context
+ * and can't wait for channels.
+ */
+static void netvsc_subchan_work(struct work_struct *w)
+{
+struct netvsc_device *nvdev =
+container_of(w, struct netvsc_device, subchan_work);
+struct rndis_device *rdev;
+int i, ret;
+
+/* Avoid deadlock with device removal already under RTNL */
+if (!rtnl_trylock()) {
+     schedule_work(w);
+     return;
+ }
+
+rdev = nvdev->extension;
+if (rdev) {
+ret = rndis_set_subchannel(rdev->ndev, nvdev);
+if (ret == 0) {
+     netif_device_attach(rdev->ndev);
+ } else {
+     /* fallback to only primary channel */
+     for (i = 1; i < nvdev->num_chn; i++)
+     netif_napi_del(&nvdev->chan_table[i].napi);
+     nvdev->max_chn = 1;
```
static struct netvsc_device *alloc_net_device(void)
{
    struct netvsc_device *net_device;
    init_waitqueue_head(&net_device->wait_drain);
    net_device->destroy = false;
    atomic_set(&net_device->tx_disable, true);
    net_device->max_pkt = RNDIS_MAX_PKT_DEFAULT;
    net_device->pkt_align = RNDIS_PKT_ALIGN_DEFAULT;

    init_completion(&net_device->channel_init_wait);
    init_waitqueue_head(&net_device->subchan_open);
    INIT_WORK(&net_device->subchan_work, netvsc_subchan_work);
    return net_device;
}

= container_of(head, struct netvsc_device, rcu);
int i;

+kfree(nvdev->extension);
+vfree(nvdev->recv_buf);
+vfree(nvdev->send_buf);
+kfree(nvdev->send_section_map);
+
    for (i = 0; i < VRSS_CHANNEL_MAX; i++)
        vfree(nvdev->chan_table[i].mrc.slots);

+call_rcu(&nvdev->rcu, free_netvsc_device);
}

-static void netvsc_revoke_buf(struct hv_device *device,
    struct netvsc_device *net_device)
+static void netvsc_revoke_recv_buf(struct hv_device *device,
    struct netvsc_device *net_device)
struct net_device *ndev = hv_get_drvdata(device);
+struct nvsp_message *revoke_packet;
int ret;

/*
@@ -146,6 +187,14 @@
}
net_device->recv_section_cnt = 0;
} +}
+
+static void netvsc_revoke_send_buf(struct hv_device *device,
+    struct netvsc_device *net_device)
+{
+    struct net_device *ndev = hv_get_drvdata(device);
+    struct nvsp_message *revoke_packet;
+    int ret;

/* Deal with the send buffer we may have setup.
 * If we got a send section size, it means we received a
@@ -189,8 +238,8 @@
}
}
}

-static void netvsc_teardown_gpadl(struct hv_device *device,
-    struct netvsc_device *net_device)
+static void netvsc_teardown_recv_gpadl(struct hv_device *device,
+    struct netvsc_device *net_device)
{
    struct net_device *ndev = hv_get_drvdata(device);
    int ret;
    @@ -209,12 +258,13 @@
}
net_device->recv_buf_gpadl_handle = 0;
} +}

-static void netvsc_teardown_send_gpadl(struct hv_device *device,
-    struct netvsc_device *net_device)
+static void netvsc_teardown_send_gpadl(struct hv_device *device,
+    struct netvsc_device *net_device)
    {
    struct net_device *ndev = hv_get_drvdata(device);
    int ret;
    @@ -209,12 +258,13 @@
}
net_device->recv_buf_gpadl_handle = 0;
} +}

-if (net_device->recv_buf) {
    /* Free up the receive buffer */
    vfree(net_device->recv_buf);
    -net_device->recv_buf = NULL;
    -}
+static void netvsc_teardown_send_gpadl(struct hv_device *device,
+    struct netvsc_device *net_device)
+    {
+    struct net_device *ndev = hv_get_drvdata(device);
+    int ret;
+    /*
if (net_device->send_buf_gpadl_handle) {
    ret = vmbus_teardown_gpadl(device->channel,
    @ @ -230,12 +280,6 @ @
}
net_device->send_buf_gpadl_handle = 0;
}
-if (net_device->send_buf) {
-/* Free up the send buffer */
-vfree(net_device->send_buf);
-net_device->send_buf = NULL;
-}
-kfree(net_device->send_section_map);
}

int netvsc_alloc_recv_comp_ring(struct netvsc_device *net_device, u32 q_idx)
@@ -267,6 +311,11 @@
    buf_size = device_info->recv_sections * device_info->recv_section_size;
    buf_size = roundup(buf_size, PAGE_SIZE);

    /* Legacy hosts only allow smaller receive buffer */
    if (net_device->nvsp_version <= NVSP_PROTOCOL_VERSION_2)
        buf_size = min_t(unsigned int, buf_size,
        + NETVSC_RECEIVE_BUFFER_SIZE_LEGACY);
    +
    net_device->recv_buf = vzalloc(buf_size);
    if (!net_device->recv_buf) {
        netdev_err(ndev,
        @ @ -425,8 +474,10 @ @
goto exit;

    cleanup:
    -netvsc_revoke_buf(device, net_device);
    -netvsc_teardown_gpadl(device, net_device);
    +netvsc_revoke_recv_buf(device, net_device);
    +netvsc_revoke_send_buf(device, net_device);
    +netvsc_teardown_recv_gpadl(device, net_device);
    +netvsc_teardown_send_gpadl(device, net_device);

    exit:
    return ret;
    @@ -556,12 +607,24 @@
    = rtnl_dereference(net_device_ctx->nvdev);
    int i:

    -cancel_work_sync(&net_device->subchan_work);
    -
    -netvsc_revoke_buf(device, net_device);
    */
+ * Revoke receive buffer. If host is pre-Win2016 then tear down
+ * receive buffer GPADL. Do the same for send buffer.
+ */
+netvsc_revoke_recv_buf(device, net_device);
+if (vmbus_proto_version < VERSION_WIN10)
+netvsc_teardown_recv_gpadl(device, net_device);
+
+netvsc_revoke_send_buf(device, net_device);
+if (vmbus_proto_version < VERSION_WIN10)
+netvsc_teardown_send_gpadl(device, net_device);

RCU_INIT_POINTER(net_device_ctx->nvdev, NULL);

+/* And disassociate NAPI context from device */
+for (i = 0; i < net_device->num_chn; i++)
+netif_napi_del(&net_device->chan_table[i].napi);
+
+/*
+ * At this point, no one should be accessing net_device
+ * except in here
+@@ -571,11 +634,14 @@
+ * Now, we can close the channel safely */
+vmbus_close(device->channel);

-netvsc_teardown_gpadl(device, net_device);
-
-/* And disassociate NAPI context from device */
-for (i = 0; i < net_device->num_chn; i++)
-netif_napi_del(&net_device->chan_table[i].napi);
+
+/*
+ * If host is Win2016 or higher then we do the GPADL tear down
+ * here after VMBus is closed.
+ */
+if (vmbus_proto_version >= VERSION_WIN10) {
+netvsc_teardown_recv_gpadl(device, net_device);
+netvsc_teardown_send_gpadl(device, net_device);
+}

/* Release all resources */
free_netvsc_device_rcu(net_device);
@@ -642,14 +708,18 @@
queue_sends =
atomic_dec_return(&net_device->chan_table[q_idx].queue_sends);

-if (net_device->destroy && queue_sends == 0)
-wake_up(&net_device->wait_drain);
+if (unlikely(net_device->destroy)) {
+if (queue_sends == 0)
+wake_up(&net_device->wait_drain);
+} else {
+struct netdev_queue *txq = netdev_get_tx_queue(ndev, q_idx);
+
-if (netif_tx_queue_stopped(netdev_get_tx_queue(ndev, q_idx)) &&
- (hv_ringbuf_avail_percent(&channel->outbound) > RING_AVAIL_PERCENT_HIWATER ||
- queue Sends < 1)) {
-netif_tx_wake_queue(netdev_get_tx_queue(ndev, q_idx));
-ndev_ctx->eth_stats.wake_queue++;
+if (netif_tx_queue_stopped(txq) && !net_device->tx_disable &&
+ (hv_ringbuf_avail_percent(&channel->outbound) > RING_AVAIL_PERCENT_HIWATER ||
+ queue Sends < 1)) {
+netif_tx_wake_queue(txq);
+ndev_ctx->eth_stats.wake_queue++;
+}
}
}

@@ -698,13 +768,13 @@
return NETVSC_INVALID_INDEX;
}

-static u32 netvsc_copy_to_send_buf(struct netvsc_device *net_device,
- unsigned int section_index,
- u32 pend_size,
- struct hv_netvsc_packet *packet,
- struct rndis_message *rndis_msg,
- struct hv_page_buffer *pb,
- struct sk_buff *skb)
+static void netvsc_copy_to_send_buf(struct netvsc_device *net_device,
+ unsigned int section_index,
+ u32 pend_size,
+ struct hv_netvsc_packet *packet,
+ struct rndis_message *rndis_msg,
+ struct hv_page_buffer *pb,
+ bool xmit_more)
{
 char *start = net_device->send_buf;
 char *dest = start + (section_index * net_device->send_section_size)
@@ -717,7 +787,8 @@
 packet->page_buf_cnt;

 /* Add padding */
- if (skb->xmit_more && & remain && !packet->cp_partial) {
+ remain = packet->total_data_buflen & (net_device->pkt_align - 1);
+ if (xmit_more && & remain) {
+ padding = net_device->pkt_align - remain;
+ rndis_msg->msg_len += padding;

packet->total_data_buflen += padding;
@@ -737,8 +808,6 @@
 memset(dest, 0, padding);
 msg_size += padding;
 }
-
-return msg_size;
 }

static inline int netvsc_send_pkt(
@@ -803,11 +872,6 @@
 } else if (ret == -EAGAIN) {
 netif_tx_stop_queue(txq);
 ndev_ctx->eth_stats.stop_queue++;
-  if (atomic_read(&nvchan->queue_sends) < 1) {
-    netif_tx_wake_queue(txq);
-    ndev_ctx->eth_stats.wake_queue++;
-    ret = -ENOSPC;
-  }
 } else {
    netdev_err(ndev,
           "Unable to send packet pages %u len %u, ret %d\n",
@@ -815,6 +879,15 @@
      ret);
 }
+
+  if (netif_tx_queue_stopped(txq) &&
+      atomic_read(&nvchan->queue_sends) < 1 &&
+      !net_device->tx_disable) {
+    netif_tx_wake_queue(txq);
+    ndev_ctx->eth_stats.wake_queue++;
+    if (ret == -EAGAIN)
+      ret = -ENOSPC;
+  }
+
  return ret;
}

@@ -831,12 +904,13 @@
 */ RCU already held by caller */
-int netvsc_send(struct net_device_context *ndev_ctx,
+int netvsc_send(struct net_device *ndev,
     struct hv_netvsc_packet *packet,
     struct rndis_message *msg,
     struct hv_page_buffer *pb,
     struct sk_buff *skb)
struct net_device_context *ndev_ctx = netdev_priv(ndev);
struct netvsc_device *net_device
= rcu_dereference_bh(ndev_ctx->nvdev);
struct hv_device *device = ndev_ctx->device_ctx;
@@ -847,20 +921,12 @@
struct multi_send_data *msdp;
struct hv_netvsc_packet *msd_send = NULL, *cur_send = NULL;
struct sk_buff *msd_skb = NULL;
-bool try_batch;
-bool xmit_more = (skb != NULL) ? skb->xmit_more : false;
+bool try_batch, xmit_more;

/* If device is rescinded, return error and packet will get dropped. */
if (unlikely(!net_device || net_device->destroy))
  return -ENODEV;

-/* We may race with netvsc_connect_vsp()/netvsc_init_buf() and get
- * here before the negotiation with the host is finished and
- * send_section_map may not be allocated yet.
- */
-if (unlikely(!net_device->send_section_map))
-  return -EAGAIN;
-
  nvchan = &net_device->chan_table[packet->q_idx];
  packet->send_buf_index = NETVSC_INVALID_INDEX;
  packet->cp_partial = false;
  @@ -868,10 +934,17 @@
/* Send control message directly without accessing msd (Multi-Send
 * Data) field which may be changed during data packet processing.
 */
-  if (!skb) {
-    cur_send = packet;
-    goto send_now;
-  }
+  if (!skb)
+    return netvsc_send_pkt(device, packet, net_device, pb, skb);
+
/* batch packets in send buffer if possible */
msdp = &nvchan->msd;
@@ -899,10 +963,17 @@
}
}

+/* Keep aggregating only if stack says more data is coming
+ * and not doing mixed modes send and not flow blocked
+ */
+xmit_more = skb->xmit_more &&

Open Source Used In 5GaaS Edge AC-4 26075
!packet->cp_partial &&
!netif_xmit_stopped(netdev_get_tx_queue(ndev, packet->q_idx));
+
if (section_index != NETVSC_INVALID_INDEX) {
netvsc_copy_to_send_buf(net_device, 
section_index, msd_len, 
-packet, rndis_msg, pb, skb):
+packet, rndis_msg, pb, xmit_more):

packet->send_buf_index = section_index;

@@ -922,7 +993,7 @@
if (msdp->skb)
dev_consume_skb_any(msdp->skb);

-if (xmit_more && !packet->cp_partial) {
 +if (xmit_more) {
 msdp->skb = skb;
 msdp->pkt = packet;
 msdp->count++;
 @@ -948,7 +1019,6 @@
 }
 }

-send_now:
 if (cur_send)
 ret = netvsc_send_pkt(device, cur_send, net_device, pb, skb);

@@ -1083,10 +1153,14 @@
void *data = recv_buf 
+vmxferpage_packet->ranges[i].byte_offset;
 u32 buflen = vmxferpage_packet->ranges[i].byte_count;
+int ret;

/* Pass it to the upper layer */
-status = rndis_filter_receive(ndev, net_device, device,
+ret = rndis_filter_receive(ndev, net_device, device,
 channel, data, buflen);
+
+if (unlikely(ret != NVSP_STAT_SUCCESS))
+status = NVSP_STAT_FAIL;
}

enq_receive_complete(ndev, net_device, q_idx,
@@ -1192,6 +1266,7 @@
struct hv_device *device = netvsc_channel_to_device(channel);
 struct net_device *ndev = hv_get_drvdata(device);
 int work_done = 0;

+int ret;

/* If starting a new interval */
if (!nvchan->desc)
@@ -1203,18 +1278,21 @@
    nvchan->desc = hv_pkt_iter_next(channel, nvchan->desc);
}

/* If send of pending receive completions succeeded
- * and did not exhaust NAPI budget this time
- * and not doing busy poll
+/* Send any pending receive completions */
+ret = send_recv_completions(ndev, net_device, nvchan);
+
+/* If it did not exhaust NAPI budget this time
+ * and not doing busy poll
+ * then re-enable host interrupts
+ * and reschedule if ring is not empty.
+ * and reschedule if ring is not empty
+ * or sending receive completion failed.
+*/
-if (send_recv_completions(ndev, net_device, nvchan) == 0 &&
-    work_done < budget &&
+if (work_done < budget &&
    napi_complete_done(napi, work_done) &&
    hv_end_read(&channel->inbound)) {
    (ret || hv_end_read(&channel->inbound)) &&
+    napi_schedule_prep(napi)) {
    hv_begin_read(&channel->inbound);
    -napi_reschedule(napi);
+    __napi_schedule(napi);
}

/* Driver may overshoot since multiple packets per descriptor */
@@ -1237,7 +1315,7 @@
/* disable interrupts from host */
hv_begin_read(rbi);

-__napi_schedule(&nvchan->napi);
+__napi_schedule_irqoff(&nvchan->napi);
}
}

@@ -1295,7 +1373,6 @@
net_device->chan_table);

if (ret != 0) {
    -netif_napi_del(&net_device->chan_table[0].napi);
netdev_err(ndev, "unable to open channel: %d\n", ret);
goto cleanup;
}
@@ -1305,11 +1382,6 @@
napi_enable(&net_device->chan_table[0].napi);

-/* Writing nvdev pointer unlocks netvsc_send(), make sure chn_table is
- * populated.
- */
-rcu_assign_pointer(net_device_ctx->nvdev, net_device);
-
/*/ Connect with the NetVsp */
ret = netvsc_connect_vsp(device, net_device, device_info);
if (ret != 0) {
@@ -1318,6 +1390,11 @@
goto close;
}

+/* Writing nvdev pointer unlocks netvsc_send(), make sure chn_table is
+ * populated.
+ */
+rcu_assign_pointer(net_device_ctx->nvdev, net_device);
+
return net_device;

close:
@@ -1328,6 +1405,7 @@
vmbus_close(device->channel);

cleanup:
+netif_napi_del(&net_device->chan_table[0].napi);
free_netvsc_device(&net_device->rcu);

return ERR_PTR(ret);
--- linux-4.15.0.orig/drivers/net/hyperv/netvsc_drv.c
+++ linux-4.15.0/drivers/net/hyperv/netvsc_drv.c
@@ -29,6 +29,7 @@
#include <linux/inetdevice.h>
#include <linux/etherdevice.h>
+include <linux/pci.h>
#include <linux/skbuff.h>
#include <linux/if_vlan.h>
#include <linux/in.h>
@@ -45,11 +46,10 @@

#include "hyperv_net.h"
-#define RING_SIZE_MIN	64
-#define NETVSC_MIN_TX_SECTIONS10
-#define NETVSC_DEFAULT_TX192/* ~1M */
-#define NETVSC_MIN_RX_SECTIONS10/* ~64K */
-#define NETVSC_DEFAULT_RX10485 /* Max ~16M */
+#define RING_SIZE_MIN	64
+#define RETRY_US_LO	5000
+#define RETRY_US_HI	10000
+#define RETRY_MAX	2000 /* >10 sec */

#define LINKCHANGE_INT (2 * HZ)
define VF_TAKEOVER_INT (HZ / 10)
@@ -67,12 +67,54 @@
module_param(debug, int, S_IRUGO);
MODULE_PARM_DESC(debug, "Debug level (0=none,...,16=all)");

-static void netvsc_set_multicast_list(struct net_device *net)
+static LIST_HEAD(netvsc_dev_list);
 +
+static void netvsc_change_rx_flags(struct net_device *net, int change)
{
- struct net_device_context *net_device_ctx = netdev_priv(net);
- struct netvsc_device *nvdev = rtnl_dereference(net_device_ctx->nvdev);
+ struct net_device_context *ndev_ctx = netdev_priv(net);
+ struct net_device *vf_netdev = rtnl_dereference(ndev_ctx->vf_netdev);
+ int inc;
 +
+ if (!vf_netdev)
+ return;
 +
+ if (change & IFF_PROMISC) {
+ inc = (net->flags & IFF_PROMISC) ? 1 : -1;
+ dev_set_promiscuity(vf_netdev, inc);
+ }
+ +
+ if (change & IFF_ALLMULTI) {
+ inc = (net->flags & IFF_ALLMULTI) ? 1 : -1;
+ dev_set_allmulti(vf_netdev, inc);
+ }
+
+static void netvsc_set_rx_mode(struct net_device *net)
+{
+ struct net_device_context *ndev_ctx = netdev_priv(net);
+ struct net_device *vf_netdev;
+ struct netvsc_device *nvdev;
+
+rcu_read_lock();
+vf_netdev = rcu_dereference(ndev_ctx->vf_netdev);
+if (vf_netdev) {
+dev_uc_sync(vf_netdev, net);
+dev_mc_sync(vf_netdev, net);
+} 

-rndis_filter_update(nvdev);
+nvdev = rcu_dereference(ndev_ctx->nvdev);
+if (nvdev) 
+rndis_filter_update(nvdev);
+rcu_read_unlock();
+
+
+static void netvsc_tx_enable(struct netvsc_device *nvscdev,
+    struct net_device *ndev)
+{
+nvscdev->tx_disable = false;
+virt_wmb(); // ensure queue wake up mechanism is on */
+
+netif_tx_wake_all_queues(ndev);
}

static int netvsc_open(struct net_device *net)
@@ -92,12 +134,11 @@
return ret;
}

-netif_tx_wake_all_queues(net);
-
rdev = nvdev->extension;
-
-if (!rdev->link_state)
+if (!rdev->link_state) {
netif_carrier_on(net);
+netvsc_tx_enable(nvdev, net);
+}

if (vf_netdev) {
/* Setting synthetic device up transparently sets
@@ -113,36 +154,25 @@
return 0;
}

-static int netvsc_close(struct net_device *net)
+static int netvsc_wait_until_empty(struct netvsc_device *nvdev)
{
-struct net_device_context *net_device_ctx = netdev_priv(net);
-
-else
+return 0;

-
-else
-
-else
-
-else
-netif_tx_wake_all_queues(net);
-
rdev = nvdev->extension;
-
-if (!rdev->link_state)
+if (!rdev->link_state) {
netif_carrier_on(net);
+netvsc_tx_enable(nvdev, net);
+}

if (vf_netdev) {
/* Setting synthetic device up transparently sets
@@ -113,36 +154,25 @@
return 0;
}

-static int netvsc_close(struct net_device *net)
+static int netvsc_wait_until_empty(struct netvsc_device *nvdev)
{
-struct net_device_context *net_device_ctx = netdev_priv(net);
struct net_device *vf_netdev = rtnl_dereference(net_device_ctx->vf_netdev);
struct netvsc_device *nvdev = rtnl_dereference(net_device_ctx->nvdev);

int ret = 0;
u32 aread, i, msec = 10, retry = 0, retry_max = 20;
struct vmbus_channel *chn;

-netif_tx_disable(net);

-/* No need to close rndis filter if it is removed already */
-if (!nvdev)
-goto out;

-ret = rndis_filter_close(nvdev);
-if (ret != 0) {
-netdev_err(net, "unable to close device (ret %d).\n", ret);
-return ret;
}

unsigned int retry = 0;

/* Ensure pending bytes in ring are read */
-while (true) {
-aread = 0;
+for (;;) {
+u32 aread = 0;
+
+for (i = 0; i < nvdev->num_chn; i++) {
+chn = nvdev->chan_table[i].channel;
+struct vmbus_channel *chn
+= nvdev->chan_table[i].channel;
+
+if (!chn)
+continue;

+/* make sure receive not running now */
+napi_synchronize(&nvdev->chan_table[i].napi);
+
+aread = hv_get_bytes_to_read(&chn->inbound);
+if (aread)
+break;
+}

-retry++;
-if (retry > retry_max || aread == 0)
-break;
+if (aread == 0)
+return 0;

-msleep(msec);
+if (++retry > RETRY_MAX)
+return -ETIMEDOUT;

-if (msec < 1000)
-msec *= 2;
+usleep_range(RETRY_US_LO, RETRY_US_HI);
}
+

-if (aread) {
-netdev_err(net, "Ring buffer not empty after closing rndis\n");
-ret = -ETIMEDOUT;
+static void netvsc_tx_disable(struct netvsc_device *nvscdev,
+    struct net_device *ndev)
+{
+    if (nvscdev) {
+        nvscdev->tx_disable = true;
+        virt_wmb(); /* ensure txq will not wake up after stop */
+    }

-out:
+netif_tx_disable(ndev);
++}
+
+static int netvsc_close(struct net_device *net)
+{
+    struct net_device_context *net_device_ctx = netdev_priv(net);
+    struct net_device *vf_netdev
+        = rtnl_dereference(net_device_ctx->vf_netdev);
+    struct netvsc_device *nvdev = rtnl_dereference(net_device_ctx->nvdev);
+    int ret;
+    +
+    +netvsc_tx_disable(nvdev, net);
+    +/* No need to close rndis filter if it is removed already */
+    +if (!nvdev)
+        +return 0;
+        +
+        +ret = rndis_filter_close(nvdev);
+        +if (ret != 0) {
+            +netdev_err(net, "unable to close device (ret %d)\n", ret);
+            +return ret;
+        }
+        +
ret = netvsc_wait_until_empty(nvdev);
if (ret)
+netdev_err(net, "Ring buffer not empty after closing rndis\n");
+
if (vf_netdev)
dev_close(vf_netdev);

@@ -237,9 +296,9 @@
else if (flow.basic.n_proto == htons(ETH_P_IPV6))
hash = jhash2((u32 *)&flow.addrs.v6addrs, 8, hashrnd);
else
- hash = 0;
+ return 0;

-skb_set_hash(skb, hash, PKT_HASH_TYPE_L3);
+__skb_set_sw_hash(skb, hash, false);
}

return hash;
@@ -302,14 +361,25 @@
rcu_read_lock();
vf_netdev = rcu_dereference(ndc->vf_netdev);
if (vf_netdev) {
- txq = skb_rx_queue_recorded(skb) ? skb_get_rx_queue(skb) : 0;
- qdisc_skb_cb(skb)->slave_dev_queue_mapping = skb->queue_mapping;
+ const struct net_device_ops *vf_ops = vf_netdev->netdev_ops;
+ if (vf_ops->ndo_select_queue)
+ txq = vf_ops->ndo_select_queue(vf_netdev, skb,
+ accel_priv, fallback);
+ else
+ txq = fallback(vf_netdev, skb);
+ /* Record the queue selected by VF so that it can be
+ * used for common case where VF has more queues than
+ * the synthetic device.
+ */
+ qdisc_skb_cb(skb)->slave_dev_queue_mapping = txq;
} else {
 txq = netvsc_pick_tx(ndev, skb);
}
rcu_read_unlock();

-while (unlikely(txq >= ndev->real_num_tx_queues))
+while (txq >= ndev->real_num_tx_queues)
 txq -= ndev->real_num_tx_queues;

return txq;
int rc;

skb->dev = vf_netdev;
skb->queue_mapping = qdisc_skb_cb(skb)->slave_dev_queue_mapping;
+skb_record_rx_queue(skb, qdisc_skb_cb(skb)->slave_dev_queue_mapping);
rc = dev_queue_xmit(skb);
if (likely(rc == NET_XMIT_SUCCESS || rc == NET_XMIT_CN)) {
    u32 hash;
    struct hv_page_buffer pb[MAX_PAGE_BUFFER_COUNT];

    /* if VF is present and up then redirect packets
    - already called with rcu_read_lock_bh
    */
    if (vf_netdev && netif_running(vf_netdev) &&
        !netpoll_tx_running(net))
        return netvsc_vf_xmit(net, vf_netdev, skb);

    /* We will atmost need two pages to describe the rndis
    */
    skb_tx_timestamp(skb);

    -ret = netvsc_send(net_device_ctx, packet, rndis_msg, pb, skb);
    +ret = netvsc_send(net, packet, rndis_msg, pb, skb);
    if (likely(ret == 0))
        return NETDEV_TX_OK;
}

+static void netvsc_comp_ipcsum(struct sk_buff *skb)
+
+{ +
+    struct iphdr *iph = (struct iphdr *)skb->data;
+    +iph->check = 0;
+    +iph->check = ip_fast_csum(iph, iph->ihl);
+}
+
+static struct sk_buff *netvsc_alloc_recv_skb(struct net_device *net,
struct napi_struct *napi,
const struct ndis_tcp_ip_checksum_info *csum_info,
@@ -728,10 +807,17 @@
/* skb is already created with CHECKSUM_NONE */
skb_checksum_none_assert(skb);

-/*
 - * In Linux, the IP checksum is always checked.
- */
-/* Do L4 checksum offload if enabled and present.
+/* Incoming packets may have IP header checksum verified by the host.
+ * They may not have IP header checksum computed after coalescing.
+ * We compute it here if the flags are set, because on Linux, the IP
+ * checksum is always checked.
+ */
+if (csum_info && csum_info->receive.ip_checksum_value_invalid &&
+ csum_info->receive.ip_checksum_succeeded &&
+ skb->protocol == htons(ETH_P_IP))
+ netvsc_comp_ipcsum(skb);
+
+/* Do L4 checksum offload if enabled and present */
if (csum_info && (net->features & NETIF_F_RXCSUM)) {
  if (csum_info->receive.tcp_checksum_succeeded ||
      csum_info->receive.udp_checksum_succeeded)
@@ -806,7 +892,7 @@
napi_gro_receive(&nvchan->napi, skb);
rcu_read_unlock();

-return 0;
+return NVSP_STAT_SUCCESS;
}

static void netvsc_get_drvinfo(struct net_device *net,
@@ -828,16 +914,101 @@
}

+static int netvsc_detach(struct net_device *ndev,
+ struct netvsc_device *nvdev)
+{
+ struct net_device_context *ndev_ctx = netdev_priv(ndev);
+ struct hv_device *hdev = ndev_ctx->device_ctx;
+ int ret;
+ +/* Don't try continuing to try and setup sub channels */
+ if (cancel_work_sync(&nvdev->subchan_work))
+ nvdev->num_chn = 1;
+ +/* If device was up (receiving) then shutdown */

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+if (netif_running(ndev)) {
+    netvsc_tx_disable(nvdev, ndev);
+    ret = rndis_filter_close(nvdev);
+    if (ret) {
+        netdev_err(ndev,
+            "unable to close device (ret %d).
+            ", ret);
+        return ret;
+    }
+    ret = netvsc_wait_until_empty(nvdev);
+    if (ret) {
+        netdev_err(ndev,
+            "Ring buffer not empty after closing rndis
+            ");
+        return ret;
+    }
+    netif_device_detach(ndev);
+    rndis_filter_device_remove(hdev, nvdev);
+    return 0;
+}
/* In any case device is now ready */
+nvdev->tx_disable = false;
+netif_device_attach(ndev);
+
+/* Note: enable and attach happen when sub-channels setup */
+netif_carrier_off(ndev);
+
+if (netif_running(ndev)) {
+    ret = rndis_filter_open(nvdev);
+    if (ret)
+        goto err;
+
+rdev = nvdev->extension;
+if (!rdev->link_state)
+    netif_carrier_on(ndev);
+
+return 0;
+
+err:
+    netif_device_detach(ndev);
+
+    rndis_filter_device_remove(hdev, nvdev);
+    return ret;
+
} else {
static int netvsc_set_channels(struct net_device *net,
                                  struct ethtool_channels *channels)
{
    struct net_device_context *net_device_ctx = netdev_priv(net);
    -struct hv_device *dev = net_device_ctx->device_ctx;
    struct netvsc_device *nvdev = rtnl_dereference(net_device_ctx->nvdev);
    unsigned int orig, count = channels->combined_count;
    struct netvsc_device_info device_info;
    -bool was_opened;
    -int ret = 0;
    +int ret;

    /* We do not support separate count for rx, tx, or other */
    if (count == 0 ||
        returns -EINVAL;
    orig = nvdev->num_chn;
    -was_opened = rndis_filter_opened(nvdev);
    -if (was_opened)
    -rndis_filter_close(nvdev);

    return orig;
}

    -struct hv_device *dev = net_device_ctx->device_ctx;
    struct netvsc_device *nvdev = rtnl_dereference(net_device_ctx->nvdev);
    unsigned int orig, count = channels->combined_count;
    struct netvsc_device_info device_info;
    -bool was_opened;
    -int ret = 0;
    +int ret;

    /* We do not support separate count for rx, tx, or other */
    if (count == 0 ||
        returns -EINVAL;
    return orig;
}
memset(&device_info, 0, sizeof(device_info));
device_info.num_chn = count;
memset(&device_info, 0, sizeof(device_info));
device_info.recv_sections = nvdev->recv_section_cnt;
device_info.recv_section_size = nvdev->recv_section_size;

-rndis_filter_device_remove(dev, nvdev);
+ret = netvsc_detach(net, nvdev);
@if (ret)
+return ret;

-nvdev = rndis_filter_device_add(dev, &device_info);
-if (IS_ERR(nvdev)) {
-    ret = PTR_ERR(nvdev);
+    ret = netvsc_attach(net, &device_info);
+    if (ret)
+        device_info.num_chn = orig;
-    nvdev = rndis_filter_device_add(dev, &device_info);
-
-    if (IS_ERR(nvdev)) {
-        netdev_err(net, "restoring channel setting failed: %ld\n",
-        PTR_ERR(nvdev));
-    }
+    if (netvsc_attach(net, &device_info))
+        netdev_err(net, "restoring channel setting failed\n");
+
-if (was_opened)
-rndis_filter_open(nvdev);
-
-/* We may have missed link change notifications */
-net_device_ctx->last_reconfig = 0;
-schedule_delayed_work(&net_device_ctx->dwork, 0);
-
-return ret;
}

@@ -953,10 +1110,8 @@
struct net_device_context *ndevctx = netdev_priv(ndev);
struct net_device *vf_netdev = rtnl_dereference(ndevctx->vf_netdev);
struct netvsc_device *nvdev = rtnl_dereference(ndevctx->nvdev);
-struct hv_device *hdev = ndevctx->device_ctx;
-int orig_mtu = ndev->mtu;
-struct netvsc_device_info device_info;
-int orig_mtu = ndev->mtu;
-struct netvsc_device_info device_info;
+bool was_opened;
+int ret = 0;
if (!nvdev || nvdev->destroy)
@@ -969,11 +1124,6 @@
    return ret;
 }

-    netif_device_detach(ndev);
-    was_opened = rndis_filter_opened(nvdev);
-    if (was_opened)
-        rndis_filter_close(nvdev);
-
    memset(&device_info, 0, sizeof(device_info));
    device_info.ring_size = ring_size;
    device_info.num_chn = nvdev->num_chn;
@@ -982,35 +1132,27 @@
    device_info.recv_sections = nvdev->recv_section_cnt;
    device_info.recv_section_size = nvdev->recv_section_size;

-    rndis_filter_device_remove(hdev, nvdev);
+    ret = netvsc_detach(ndev, nvdev);
+    if (ret)
+        goto rollback_vf;

    ndev->mtu = mtu;

-    nvdev = rndis_filter_device_add(hdev, &device_info);
-    if (IS_ERR(nvdev)) {
-        ret = PTR_ERR(nvdev);
-        /* Attempt rollback to original MTU */
-        ndev->mtu = orig_mtu;
-        nvdev = rndis_filter_device_add(hdev, &device_info);
-    }
-    if (vf_netdev)
-        dev_set_mtu(vf_netdev, orig_mtu);
-
-    if (IS_ERR(nvdev)) {
-        netdev_err(ndev, "restoring mtu failed: %ld\n",
-            PTR_ERR(nvdev));
-        return ret;
-    }
-    if (was_opened)
-        rndis_filter_open(nvdev);
+    ret = netvsc_attach(ndev, &device_info);
+    if (ret)
+        goto rollback;
- netif_device_attach(ndev);
+ return 0;

-/* We may have missed link change notifications */
- schedule_delayed_work(&ndevctx->dwork, 0);
+ rollback:
+ /* Attempt rollback to original MTU */
+ ndev->mtu = orig_mtu;
+ if (netvsc_attach(ndev, &device_info))
+ netdev_err(ndev, "restoring mtu failed\n");
+ rollback_vf:
+ if (vf_netdev)
+ dev_set_mtu(vf_netdev, orig_mtu);

    return ret;
}
@@ -1049,12 +1191,15 @@
    struct rtnl_link_stats64 *t)
 {  
    struct net_device_context *ndev_ctx = netdev_priv(net);
-    struct netvsc_device *nvdev = rcu_dereference_rtnl(ndev_ctx->nvdev);
+    struct netvsc_device *nvdev;
    struct netvsc_vf_pcpu_stats vf_tot;
    int i;

-    rcu_read_lock();
-    +nvdev = rcu_dereference(ndev_ctx->nvdev);
+    if (!nvdev)
+        return;
+    goto out;

    netdev_stats_to_stats64(t, &net->stats);

    +out:
    +rcu_read_unlock();
    }

 static int netvsc_set_mac_addr(struct net_device *ndev, void *p)
@@ -1434,7 +1581,7 @@
     rndis_dev = ndev->extension;
     if (indir) {  


for (i = 0; i < ITAB_NUM; i++)
- indir[i] = rndis_dev->rx_table[i];
+ indir[i] = ndc->rx_table[i];
}

if (key)
@@ -1464,7 +1611,7 @@
    return -EINVAL;

for (i = 0; i < ITAB_NUM; i++)
- rndis_dev->rx_table[i] = indir[i];
+ ndc->rx_table[i] = indir[i];
}

if (!key) {
@@ -1515,11 +1662,9 @@
{
    struct net_device_context *ndevctx = netdev_priv(ndev);
    struct netvsc_device *nvdev = rtnl_dereference(ndevctx->nvdev);
-    struct hv_device *hdev = ndevctx->device_ctx;
    struct netvsc_device_info device_info;
    struct ethtool_ringparam orig;
    u32 new_tx, new_rx;
-    bool was_opened;
    int ret = 0;

    if (!nvdev || nvdev->destroy)
@@ -1545,34 +1690,18 @@
        device_info.recv_sections = new_rx;
        device_info.recv_section_size = nvdev->recv_section_size;

        - netif_device_detach(ndev);
        - was_opened = rndis_filter_opened(nvdev);
        - if (was_opened)
        - rndis_filter_close(nvdev);
-        - rndis_filter_device_remove(hdev, nvdev);
-        -
-        - nvdev = rndis_filter_device_add(hdev, &device_info);
-        - if (IS_ERR(nvdev)) {
-            - ret = PTR_ERR(nvdev);
+ ret = netvsc_detach(ndev, nvdev);
+    if (ret)
+        return ret;
+    ret = netvsc_attach(ndev, &device_info);
+    if (ret) {
        device_info.send_sections = orig.tx_pending;
device_info.recv_sections = orig.rx_pending;
-hdev = rndis_filter_device_add(hdev, &device_info);
-\if (IS_ERR(hdev)) {
-\netdev_err(ndev, "restoring ringparam failed: %ld\n",
- \ PTR_ERR(hdev));
-\return ret;
-\}
-\}
-\}
-\}
-\if (was_opened)
-\rndis_filter_open(hdev);
-\netif_device_attach(ndev);
-
-/* We may have missed link change notifications */
-\ndevctx->last_reconfig = 0;
-\schedule_delayed_work(&devctx->dwork, 0);
+\if (netvsc_attach(ndev, &device_info))
+\netdev_err(ndev, "restoring ringparam failed");
+}

\return ret;
}
@@ -1602,7 +1731,8 @@
 .ndo_open =\netvsc_open,
 .ndo_stop =netvsc_close,
 .ndo_start_xmit =netvsc_start_xmit,
- .ndo_set_rx_mode =netvsc_set_multicast_list,
+ .ndo_set_rx_mode =netvsc_set_rx_mode,
+ .ndo_change_rx_flags =netvsc_change_rx_flags,
 .ndo_change_mtu =netvsc_change_mtu,
 .ndo_validate_addr =eth_validate_addr,
 .ndo_set_mac_address =netvsc_set_mac_addr,
 @ @ -1675,7 +1805,7 @@
 if (rdev->link_state) {
 rdev->link_state = false;
 netif_carrier_on(net);
- \netif_tx_wake_all_queues(net);
+ \netvsc_tx_enable(net_device, net);
 } else {
 notify = true;
 }
@@ -1685,7 +1815,7 @@
 if (!rdev->link_state) {
 rdev->link_state = true;
 netif_carrier_off(net);
- \netif_tx_stop_all_queues(net);
+ \netvsc_tx_disable(net_device, net);
 }
static struct net_device *get_netvsc_bymac(const u8 *mac)
{
    struct net_device *dev;
    
    -ASSERT_RTNL();
    +struct net_device_context *ndev_ctx;

    -for_each_netdev(&init_net, dev) {
        -if (dev->netdev_ops != &device_ops)
        -continue;/* not a netvsc device */
        +list_for_each_entry(ndev_ctx, &netvsc_dev_list, list) {
            +struct net_device *dev = hv_get_drvdata(ndev_ctx->device_ctx);
            if (ether_addr_equal(mac, dev->perm_addr))
                return dev;
    }
    @ @ -1740,25 +1867,18 @ @

    static struct net_device *get_netvsc_byref(struct net_device *vf_netdev)
    {
        +struct net_device_context *net_device_ctx;
        struct net_device *dev;

        -ASSERT_RTNL();
        -
        -for_each_netdev(&init_net, dev) {
            -struct net_device_context *net_device_ctx;
            -
            -if (dev->netdev_ops != &device_ops)
            -continue;/* not a netvsc device */
            +dev = netdev_master_upper_dev_get(vf_netdev);
            +if (dev || dev->netdev_ops != &device_ops)
                return NULL;/* not a netvsc device */
            +
            +net_device_ctx = netdev_priv(dev);
            +if (!rtnl_dereference(net_device_ctx->nvdev))
            -if (ether_addr_equal(mac, dev->perm_addr))
                return dev;
    }
    @@ -1694,7 +1824,7 @@
    if (!rdev->link_state) {
        rdev->link_state = true;
        netif_carrier_off(net);
        -netif_tx_stop_all_queues(net);
        +netvsc_tx_disable(net_device, net);
        event->event = RNDIS_STATUS_MEDIA_CONNECT;
        spin_lock_irqsave(&ndev_ctx->lock, flags);
        list_add(&event->list, &ndev_ctx->reconfig_events);
    }
    @ @ -1723,13 +1853,10 @@
+return NULL; /* device is removed */

-net_device_ctx = netdev_priv(dev);
- if (!rtnl_dereference(net_device_ctx->nvdev))
- continue; /* device is removed */
-
- if (rtnl_dereference(net_device_ctx->vf_netdev) == vf_netdev)
- return dev; /* a match */
-}
-
- return NULL;
+ return dev;
}

/* Called when VF is injecting data into network stack.
@@ -1773,6 +1893,12 @@
 struct netvsc_vf_pcpu_stats *pcpu_stats
 = this_cpu_ptr(ndev_ctx->vf_stats);

 + skb = skb_share_check(skb, GFP_ATOMIC);
 + if (unlikely(!skb))
 + return RX_HANDLER_CONSUMED;
 +
 + *pskb = skb;
 +
 skb->dev = ndev;

 u64_stats_update_begin(&pcpu_stats->syncp);
@@ -1798,7 +1924,8 @@
goto rx_handler_failed;
}

-ret = netdev_upper_dev_link(vf_netdev, ndev, NULL);
+ret = netdev_master_upper_dev_link(vf_netdev, ndev,
+ NULL, NULL, NULL);
 if (ret != 0) {
    netdev_err(vf_netdev,
    "can not set master device %s (err = %d)\n",
@@ -1833,6 +1960,15 @@
 netdev_warn(vf_netdev,
    "unable to change mtu to %u\n", ndev->mtu);

+ /* set multicast etc flags on VF */
+ dev_change_flags(vf_netdev, ndev->flags | IFF_SLAVE);
+ 
+ /* sync address list from ndev to VF */
+ netif_addr_lock_bh(ndev);
+ dev_uc_sync(vf_netdev, ndev);
+dev_mc_sync(vf_netdev, ndev);
+netif_addr_unlock_bh(ndev);
+
+if (netif_running(ndev)) {
+  ret = dev_open(vf_netdev);
+  if (ret)
+    
+
+    }
+  struct net_device *ndev;
+  struct net_device_context *net_device_ctx;
+  struct device *pdev = vf_netdev->dev.parent;
+  struct netvsc_device *netvsc_dev;
+
+  if (vf_netdev->addr_len != ETH_ALEN)
+    return NOTIFY_DONE;
+
+  if (!pdev || !dev_is_pci(pdev) || dev_is_pf(pdev))
+    return NOTIFY_DONE;
+  
+  /*
+   * We will use the MAC address to locate the synthetic interface to
+   * associate with the VF interface. If we don't find a matching
+   * @ @ -2011,6 +2151,19 @ @
+   * @ @ -1867,11 +2003,15 @ @
+   */
+  * We must get rtnl lock before scheduling nvdev->subchan_work,
+  * otherwise netvsc_subchan_work() can get rtnl lock first and wait
+  * all subchannels to show up, but that may not happen because
+  * netvsc_probe() can't get rtnl lock and as a result vmhbus_onoffer()
+  * -> -> -> device_add() -> ... -> _device_attach() can't get
+  * the device lock, so all the subchannels can't be processed --
+  * finally netvsc_subchan_work() hangs for ever.
+  */
+  rtnl_lock();
+
+  if (nvdev->num_chn > 1)
+    schedule_work(&nvdev->subchan_work);
+  
+  /* hw_features computed in rndis_netdev_set_hwcaps() */
+  net->features = net->hw_features | NETIF_F_HIGHDMA | NETIF_F_SG |
+  @ @ -2026,15 +2179,20 @ @
+  else
+  net->max_mtu = ETH_DATA_LEN;
+
+  -ret = register_netdev(net);
+  +nvdev->tx_disable = false;
+ret = register_netdevice(net);
if (ret != 0) {
    pr_err("Unable to register netdev.
");
goto register_failed;
}

-return ret;
+list_add(&net_device_ctx->list, &netvsc_dev_list);
+rtnl_unlock();
+return 0;

register_failed:
+rtnl_unlock();
rndis_filter_device_remove(dev, nvdev);
rndis_failed:
free_percpu(net_device_ctx->vf_stats);
@@ -2048,8 +2206,8 @@
static int netvsc_remove(struct hv_device *dev)
{
    struct net_device_context *ndev_ctx;
    -struct net_device *vf_netdev;
-    struct net_device *net;
+    struct net_device *vf_netdev, *net;
+    struct netvsc_device *nvdev;

    net = hv_get_drvdata(dev);
    if (net == NULL) {
@@ -2059,23 +2217,27 @@
        ndev_ctx = netdev_priv(net);

        -netif_device_detach(net);
-        cancel_delayed_work_sync(&ndev_ctx->dwork);

+        rtnl_lock();
+        nvdev = rtnl_dereference(ndev_ctx->nvdev);
+        if (nvdev)
+            cancel_work_sync(&nvdev->subchan_work);
+
/*
 * Call to the vsc driver to let it know that the device is being
 * removed. Also blocks mtu and channel changes.
 */
-rtnl_lock();
    vf_netdev = rtnl_dereference(ndev_ctx->vf_netdev);
    if (vf_netdev)

netvsc_unregister_vf(vf_netdev);

if (nvdev)
+rndis_filter_device_remove(dev, nvdev);
+unregister_netdevice(net);
+list_del(&ndev_ctx->list);

-rndis_filter_device_remove(dev,
-   rtndl_dereference(ndev_ctx->nvdev));
rtndl_unlock();

hv_set_drvdata(dev, NULL);
--- linux-4.15.0.orig/drivers/net/hyperv/rndis_filter.c
+++ linux-4.15.0/drivers/net/hyperv/rndis_filter.c
@@ -217,7 +217,6 @@
struct hv_netvsc_packet *packet;
struct hv_page_buffer page_buf[2];
struct hv_page_buffer *pb = page_buf;
-struct net_device_context *net_device_ctx = netdev_priv(dev->ndev);
int ret;

/* Setup the packet to send it */
@@ -245,7 +244,7 @@
{       
rcu_read_lock_bh();
-netvsc_send(net_device_ctx, packet, NULL, pb, NULL);
+ret = netvsc_send(dev->ndev, packet, NULL, pb, NULL);
rcu_read_unlock_bh();

return ret;
@@ -267,13 +266,23 @@
}

-static void rndis_filter_receive_response(struct rndis_device *dev,
-    struct rndis_message *resp)
+static void rndis_filter_receive_response(struct net_device *ndev,
+    struct netvsc_device *nvdev,
+    const struct rndis_message *resp)
{
+struct rndis_device *dev = nvdev->extension;
struct rndis_request *request = NULL;
bool found = false;
unsigned long flags;
-struct net_device *ndev = dev->ndev;
+struct
/* This should never happen, it means control message response received after device removed. */

if (dev->state == RNDIS_DEV_UNINITIALIZED) {
    netdev_err(ndev, "got rndis message uninitialized\n");
    return;
}

spin_lock_irqsave(&dev->request_lock, flags);
list_for_each_entry(request, &dev->req_list, list_ent) {
    ...
}

static int rndis_filter_receive_data(struct net_device *ndev,
    struct rndis_device *dev,
    struct rndis_message *msg,
    struct vmbus_channel *channel,
    void *data, u32 data_buflen)
{
    * should be the data packet size plus the trailer padding size */

if (unlikely(data_buflen < rndis_pkt->data_len)) {
    netdev_err(dev->ndev, "rndis message buffer ",
    "overflow detected (got %u, min %u)!",
    "...dropping this message!\n",
    data_buflen, rndis_pkt->data_len);
    @ @ -374.7 +383.7 @@
    void *data, u32 buflen)
{
    struct net_device_context *net_device_ctx = netdev_priv(ndev);
    struct rndis_device *rndis_dev = net_dev->extension;
    struct rndis_message *rndis_msg = data;

    /* Make sure the rndis device state is initialized */
    if (unlikely(!rndis_dev)) {
        netif_dbg(net_device_ctx, rx_err, ndev,
            "got rndis message but no rndis device!\n");
        return NVSP_STAT_FAIL;
    }

    if (unlikely(rndis_dev->state == RNDIS_DEV_UNINITIALIZED)) {
        netif_dbg(net_device_ctx, rx_err, ndev,
            "got rndis message uninitialized\n");
        return NVSP_STAT_FAIL;
    }
}
if (netif_msg_rx_status(net_device_ctx))
dump_rndis_message(dev, rndis_msg);

switch (rndis_msg->ndis_msg_type) {
case RNDIS_MSG_PACKET:
+return rndis_filter_receive_data(ndev, net_dev, rndis_msg,
channel, data, buflen);
case RNDIS_MSG_INIT_C:
case RNDIS_MSG_QUERY_C:
case RNDIS_MSG_SET_C:
    /* completion msgs */
    -rndis_filter_receive_response(rndis_dev, rndis_msg);
    +rndis_filter_receive_response(ndev, net_dev, rndis_msg);
    break;

case RNDIS_MSG_INDICATE:
    @@ -441,10 +436,10 @@
    "unhandled rndis message (type %u len %u)\n",
     rndis_msg->ndis_msg_type,
     rndis_msg->msg_len);
+break;
    +return NVSP_STAT_FAIL;
 }
-return 0;
+return NVSP_STAT_SUCCESS;
}

static int rndis_filter_query_device(struct rndis_device *dev,
@@ -716,10 +711,11 @@
        return ret;
 }

-int rndis_filter_set_rss_param(struct rndis_device *rdev,
    -    const u8 *rss_key)
+static int rndis_set_rss_param_msg(struct rndis_device *rdev,
+    + const u8 *rss_key, u16 flag)
{ 
struct net_device *ndev = rdev->ndev;
+struct net_device_context *ndc = netdev_priv(ndev);
struct rndis_request *request;
struct rndis_set_request *set;
struct rndis_set_complete *set_complete;
@@ -746,7 +742,7 @@
rssp->hdr.type = NDIS_OBJECT_TYPE_RSS_PARAMETERS;
rssp->hdr.rev = NDIS_RECEIVE_SCALE_PARAMETERS_REVISION_2;
rssp->hdr.size = sizeof(struct ndis_recv_scale_param);
-rssp->flag = 0;
+rssp->flag = flag;
/rssp->hashinfo = NDIS_HASH_FUNC_TOEPLITZ | NDIS_HASH_IPV4 |
NDIS_HASH_TCP_IPV4 | NDIS_HASH_IPV6 |
NDIS_HASH_TCP_IPV6;
@@ -759,7 +755,7 @@
/* Set indirection table entries */
 itab = (u32 *)(rssp + 1);
for (i = 0; i < ITAB_NUM; i++)
 -itab[i] = rdev->rx_table[i];
+itab[i] = ndc->rx_table[i];

/* Set hask key values */
keyp = (u8 *)((unsigned long)rssp + rssp->kashkey_offset);
@@ -771,9 +767,12 @@

wait_for_completion(&request->wait_event);
set_complete = &request->response_msg.msg.set_complete;
-if (set_complete->status == RNDIS_STATUS_SUCCESS)
-memcpy(rdev->rss_key, rss_key, NETVSC_HASH_KEYLEN);
-else {
+if (set_complete->status == RNDIS_STATUS_SUCCESS) {
+if (!(flag & NDIS_RSS_PARAM_FLAG_DISABLE_RSS) &&
+ !(!(flag & NDIS_RSS_PARAM_FLAG_HASH_KEY_UNCHANGED))
+memcpy(rdev->rss_key, rss_key, NETVSC_HASH_KEYLEN);
+}
+} else {
netdev_err(ndev, "Fail to set RSS parameters:0x%x\n",
    set_complete->status);
ret = -EINVAL;
@@ -784,6 +783,16 @@
return ret;
}

+int rndis_filter_set_rss_param(struct rndis_device *rdev,
+    const u8 *rss_key)
+{ }
+/* Disable RSS before change */
+rndis_set_rss_param_msg(rdev, rss_key,
+NDIS_RSS_PARAM_FLAG_DISABLE_RSS);
+return rndis_set_rss_param_msg(rdev, rss_key, 0);
+
+}
+static int rndis_filter_query_device_link_status(struct rndis_device *dev,
    struct netvsc_device *net_device)
@@ -855,15 +864,19 @@
{
    struct rndis_device *rdev
    = container_of(w, struct rndis_device, mcast_work);
+    u32 filter = NDIS_PACKET_TYPE_DIRECTED;
    unsigned int flags = rdev->ndev->flags;

-    if (rdev->ndev->flags & IFF_PROMISC)
-        rndis_filter_set_packet_filter(rdev,
-            NDIS_PACKET_TYPE_PROMISCUOUS);
-    else
-        rndis_filter_set_packet_filter(rdev,
-            NDIS_PACKET_TYPE_BROADCAST |
-            NDIS_PACKET_TYPE_ALL_MULTICAST |
-            NDIS_PACKET_TYPE_DIRECTED);
+    if (flags & IFF_PROMISC) {
+        filter = NDIS_PACKET_TYPE_PROMISCUOUS;
+    } else {
+        if (!netdev_mc_empty(rdev->ndev) || (flags & IFF_ALLMULTI))
+            filter |= NDIS_PACKET_TYPE_ALL_MULTICAST;
+        if (flags & IFF_BROADCAST)
+            filter |= NDIS_PACKET_TYPE_BROADCAST;
+    }
+    
+    rndis_filter_set_packet_filter(rdev, filter);
}

void rndis_filter_update(struct netvsc_device *nvdev)
@@ -1056,29 +1069,15 @@
    */
-void rndis_set_subchannel(struct work_struct *w)
+int rndis_set_subchannel(struct net_device *ndev, struct netvsc_device *nvdev)
{
    struct netvsc_device *nvdev
    = container_of(w, struct netvsc_device, subchan_work);
    struct nvsp_message *init_packet = &nvdev->channel_init_pkt;
    struct net_device_context *ndev_ctx;
    struct rndis_device *rdev;
    struct net_device *ndev;
    struct hv_device *hv_dev;
+    struct net_device_context *ndev_ctx = netdev_priv(ndev);
+    struct hv_device *hv_dev = ndev_ctx->device_ctx;
+    struct rndis_device *rdev = nvdev->extension;
    int i, ret;

    -if (!rtnl_trylock()) {
-schedule_work(w);
-return;
-
-rdev = nvdev->extension;
-if (!rdev)
-goto unlock;/* device was removed */
-
-ndev = rdev->ndev;
-ndev_ctx = netdev_priv(ndev);
-hv_dev = ndev_ctx->device_ctx;
+ASSERT_RTNL();

memset(init_packet, 0, sizeof(struct nvsp_message));
init_packet->hdr.msg_type = NVSP_MSG5_TYPE_SUBCHANNEL;
@@ -1092,13 +1091,13 @@
     VMBUS_DATA_PACKET_FLAG_COMPLETION_REQUESTED);
 if (ret) {
     netdev_err(ndev, "sub channel allocate send failed: %d\n", ret);
     -goto failed;
     +return ret;
 }

wait_for_completion(&nvdev->channel_init_wait);
if (init_packet->msg.v5_msg.subchn_comp.status != NVSP_STAT_SUCCESS) {
    netdev_err(ndev, "sub channel request failed\n");
    -goto failed;
    +return -EIO;
 }

nvdev->num_chn = 1 +
@@ -1117,18 +1116,7 @@
 for (i = 0; i < VRSS_SEND_TAB_SIZE; i++)
     ndev_ctx->tx_table[i] = i % nvdev->num_chn;

-rtnl_unlock();
-return;
-
-failed:
-/* fallback to only primary channel */
-for (i = 1; i < nvdev->num_chn; i++)
-    netif_napi_del(&nvdev->chan_table[i].napi);
-
-nvdev->max_chn = 1;
-nvdev->num_chn = 1;
unlock:
-rtnl_unlock();
+return 0;
static int rndis_netdev_set_hwcapsp(struct rndis_device *rndis_device,  
+struct netvsc_device_info *device_info)
{
    struct net_device *net = hv_get_drvdata(dev);
    struct net_device_context *ndc = netdev_priv(net);
    struct rndis_device *rndis_device;
    struct ndis_recv_scale_cap rsscap;
    u32 rsscap_size = sizeof(struct ndis_recv_scale_cap);
    u32 mtu, size;
    -const struct cpumask *node_cpu_mask;
    u32 num_possible_rss_qs;
    int i, ret;

    rndis_device->link_state ? "down" : "up";  

    if (net_device->nvsp_version < NVSP_PROTOCOL_VERSION_5)
        return net_device;
    goto out;

    rndis_filter_query_link_speed(rndis_device, net_device);

    if (ret || rsscap.num_recv_que < 2)
        goto out;

    -/*
    - * We will limit the VRSS channels to the number CPUs in the NUMA node
    - * the primary channel is currently bound to.
    - *
    - * This also guarantees that num_possible_rss_qs <= num_online_cpus
    - */
    -node_cpu_mask = cpumask_of_node(cpu_to_node(dev->channel->target_cpu));
    -num_possible_rss_qs = min_t(u32, cpumask_weight(node_cpu_mask),
    +/* This guarantees that num_possible_rss_qs <= num_online_cpus */
    +num_possible_rss qs = min_t(u32, num_possible_rss_qs,  
        rsscap.num_recv_que);
    net_device->max_chn = min_t(u32, VRSS_CHANNEL_MAX, num_possible_rss_qs);
    /* We will use the given number of channels if available. */
    net_device->num_chn = min(net_device->max_chn, device_info->num_chn);
    -for (i = 0; i < ITAB_NUM; i++)
- rndis_device->rx_table[i] = ethtool_rxfh_indir_default(i, net_device->num_chn);
+
atomic_set(&net_device->open_chn, 1);

vmbus_set_sc_create_callback(dev->channel, netvsc_sc_open);
@@ -1326,16 +1310,12 @@
-netif_napi_add(net, &net_device->chan_table[i].napi,
               netvsc_poll, NAPI_POLL_WEIGHT);

-out:
-/* if unavailable, just proceed with one queue */
- if (ret) {
-        net_device->max_chn = 1;
-        net_device->num_chn = 1;
-    }
-
+/* setting up multiple channels failed */
+ net_device->max_chn = 1;
+ net_device->num_chn = 1;

return net_device;

err_dev_remv:
@@ -1351,10 +1331,7 @@
    /* Halt and release the rndis device */
    rndis_filter_halt_device(rndis_dev);

-net_dev->extension = NULL;
-
-netvsc_device_remove(dev);
-kfree(rndis_dev);
} }

int rndis_filter_open(struct netvsc_device *nvdev)
@@ -1378,8 +1355,3 @@
    return rndis_filter_close_device(nvdev->extension);
    }
-
-bool rndis_filter_opened(const struct netvsc_device *nvdev)
-return atomic_read(&nvdev->open_cnt) > 0;
-
--- linux-4.15.0.orig/drivers/net/ieee802154/adf7242.c
+++ linux-4.15.0/drivers/net/ieee802154/adf7242.c
@@ -834,7 +834,9 @@
 int ret;
 u8 lqi, len_u8, *data;

-adf7242_read_reg(lp, 0, &len_u8);
+ret = adf7242_read_reg(lp, 0, &len_u8);
+if (ret)
+return ret;

 len = len_u8;

@@ -888,7 +890,7 @@
 .set_cca_ed_level = adf7242_set_cca_ed_level,
 }

-static void adf7242_debug(u8 irq1)
+static void adf7242_debug(struct adf7242_local *lp, u8 irq1)
 {
 #ifdef DEBUG
  u8 stat;
@@ -932,7 +934,7 @@
 dev_err(&lp->spi->dev, "%s:ERROR IRQ1 = 0x%X
 __func__, irq1);

 -adf7242_debug(irq1);
+adf7242_debug(lp, irq1);

 xmit = test_bit(FLAG_XMIT, &lp->flags);

--- linux-4.15.0.orig/drivers/net/ieee802154/at86rf230.c
+++ linux-4.15.0/drivers/net/ieee802154/at86rf230.c
@@ -940,7 +940,7 @@
 static int
 at86rf230_ed(struct ieee802154_hw *hw, u8 *level)
 {
-BUG_ON(!level);
+WARN_ON(!level);
 *level = 0xbe;
 return 0;
 }
@@ -1121,8 +1121,7 @@
 if (changed & IEEE802154_AFILT_SADDR_CHANGED) {
 u16 addr = le16_to_cpu(filt->short_addr);
dev_vdbg(&lp->spi->dev, "at86rf230_set_hw_addr_filt called for saddr\n");
+dev_vdbg(&lp->spi->dev, "%s called for saddr\n", __func__);  
@@ -1130,8 +1129,7 @@
__at86rf230_write(lp, RG_SHORT_ADDR_0, addr);
__at86rf230_write(lp, RG_SHORT_ADDR_1, addr >> 8);
}
@@ -1140,15 +1138,13 @@
memcpy(addr, &filt->ieee_addr, 8);
-dev_vdbg(&lp->spi->dev, "at86rf230_set_hw_addr_filt called for IEEE addr\n");
+dev_vdbg(&lp->spi->dev, "%s called for IEEE addr\n", __func__);  
for (i = 0; i < 8; i++)
__at86rf230_write(lp, RG_IEEE_ADDR_0 + i, addr[i]);
}

if (changed & IEEE802154_AFILT_PANID_CHANGED) {
    u16 pan = le16_to_cpu(filt->pan_id);
-dev_vdbg(&lp->spi->dev, "at86rf230_set_hw_addr_filt called for pan id\n");
+dev_vdbg(&lp->spi->dev, "%s called for pan id\n", __func__);  
    __at86rf230_write(lp, RG_PAN_ID_0, pan);
    __at86rf230_write(lp, RG_PAN_ID_1, pan >> 8);
}
@@ -1252,7 +1248,6 @@
    return at86rf230_write_subreg(lp, SR_CCA_MODE, val);
}
-
static int
at86rf230_set_cca_ed_level(struct ieee802154_hw *hw, s32 mbm)
{
-    --- linux-4.15.0.orig/drivers/net/ieee802154/atusb.c
+++ linux-4.15.0/drivers/net/ieee802154/atusb.c
@@ -368,6 +368,7 @@
    return -ENOMEM;
}
usb_anchor_urb(urb, &atusb->idle_urbs);
+usb_free_urb(urb);
n--;  
}  
return 0;  
@@ -1140,10 +1141,11 @@
ieee802154_unregister_hw(atusb->hw);
+
+usb_put_dev(atusb->usb_dev);
+
 ieee802154_free_hw(atusb->hw);

usb_set_intfdata(interface, NULL);
-usb_put_dev(atusb->usb_dev);

pr_debug("%s done", __func__);
}  
--- linux-4.15.0.orig/drivers/net/ieee802154/ca8210.c  
+++ linux-4.15.0/drivers/net/ieee802154/ca8210.c  
@@ -722,7 +722,7 @@
static void ca8210_rx_done(struct cas_control *cas_ctl)
{
  u8 *buf;
-  u8 len;
+  unsigned int len;
  struct work_priv_container *mlme_reset_wpc;
  struct ca8210_priv *priv = cas_ctl->priv;

@@ -731,7 +731,7 @@
       }

     if (len > CA8210_SPI_BUF_SIZE) {
       dev_crit(&priv->spi->dev,
-      "Received packet len (%d) erroneously long\n",  
+      "Received packet len (%u) erroneously long\n",  
                 len  
      );  
     goto finish;
@@ -2493,13 +2493,14 @@
struct ca8210_priv *priv = filp->private_data;
 u8 command[CA8210_SPI_BUF_SIZE];
-
-if (len > CA8210_SPI_BUF_SIZE) {
+memset(command, SPI_IDLE, 6);
+if (len > CA8210_SPI_BUF_SIZE || len < 2) {
  dev_warn(&priv->spi->dev,
-"userspace requested erroneously long write (%zu)\n",  
+-"userspace requested erroneous write length (%zu)\n",  
                 len  
       );  
}
len
);  
return -EMSGSIZE;
+return -EBADE;
}

ret = copy_from_user(command, in_buf, len);
@@ -2511,6 +2512,13 @@
)
return -EIO;
}
+if (len != command[1] + 2) {
+dev_err(
+&priv->spi->dev,
+"write len does not match packet length field\n"
+);
+return -EBADE;
+}

ret = ca8210_test_check_upstream(command, priv->spi);
if (ret == 0) {
@@ -2916,6 +2924,7 @@
)
if (!priv->irq_workqueue) {

dev_crit(&priv->spi->dev, "alloc of irq_workqueue failed\n");
+destroy_workqueue(priv->mlme_workqueue);
return -ENOMEM;
}
@@ -3145,12 +3154,12 @@
goto error;
}

+priv->spi->dev.platform_data = pdata;
ret = ca8210_get_platform_data(priv->spi, pdata);
if (ret) {

dev_crit(&spi_device->dev, "ca8210_get_platform_data failed\n");
goto error;
}
-priv->spi->dev.platform_data = pdata;

ret = ca8210_dev_com_init(priv);
if (ret) {
--- linux-4.15.0.orig/drivers/net/ieee802154/fakelb.c
+++ linux-4.15.0/drivers/net/ieee802154/fakelb.c
@@ -49,7 +49,7 @@
static int fakelb_hw_ed(struct ieee802154_hw *hw, u8 *level)
BUG_ON(!level);
+WARN_ON(!level);
*level = 0xbe;
return 0;
--- linux-4.15.0.orig/drivers/net/ipvlan/ipvlan.h
+++ linux-4.15.0/drivers/net/ipvlan/ipvlan.h
@@ -74,6 +74,7 @@
 DECLARE_BITMAP(mac_filters, IPVLAN_MAC_FILTER_SIZE);
 netdev_features_tfsfeatures;
 u32msg_enable;
+spinlock_taddrs_lock;
};

struct ipvl_addr {
--- linux-4.15.0.orig/drivers/net/ipvlan/ipvlan_core.c
+++ linux-4.15.0/drivers/net/ipvlan/ipvlan_core.c
@@ -35,6 +35,7 @@
 }
 EXPORT_SYMBOL_GPL(ipvlan_count_rx);

+#if IS_ENABLED(CONFIG_IPV6)
 static u8 ipvlan_get_v6_hash(const void *iaddr)
 { 
 const struct in6_addr *ip6_addr = iaddr;
@@ -42,6 +43,12 @@
 return __ipv6_addr_jhash(ip6_addr, ipvlan_jhash_secret) &
 IPVLAN_HASH_MASK;
 }
+#else
+static u8 ipvlan_get_v6_hash(const void *iaddr)
+{
+return 0;
+}
+#endif

static u8 ipvlan_get_v4_hash(const void *iaddr)
{
@@ -51,6 +58,23 @@
 IPVLAN_HASH_MASK;
 }

+static bool addr_equal(bool is_v6, struct ipvl_addr *addr, const void *iaddr)
+{
+if (!is_v6 && addr->atype == IPVL_IPV4) {
+struct in_addr *i4addr = (struct in_addr *)iaddr;
+}
+return addr->ip4addr.s_addr == i4addr->s_addr;
+} else if (is_v6 && addr->atype == IPVL_IPV6) {
+struct in6_addr *i6addr = (struct in6_addr *)iaddr;
+return ipv6_addr_equal(&addr->ip6addr, i6addr);
+#endif
+
+return false;
+
+static struct ipvl_addr *ipvlan_ht_addr_lookup(const struct ipvl_port *port,
+                                                const void *iaddr, bool is_v6)
+{
+    hash = is_v6 ? ipvlan_get_v6_hash(iaddr) :
+                 ipvlan_get_v4_hash(iaddr);
+hlist_for_each_entry_rcu(addr, &port->hlhead[hash], hlnode) {
+    if (is_v6 && addr->atype == IPVL_IPV6 &&
+        ipv6_addr_equal(&addr->ip6addr, iaddr))
+        return addr;
+    else if (!is_v6 && addr->atype == IPVL_IPV4 &&
+             addr->ip4addr.s_addr ==
+             ((struct in_addr *)iaddr)->s_addr)
+        +rcu_read_lock();
+        list_for_each_entry_rcu(addr, &ipvlan->addrs, anode) {
+            if (addr_equal(is_v6, addr, iaddr))
+                return addr;
+        } else {
+            return NULL;
+        }
+}
+
+struct ipvl_addr *ipvlan_find_addr(const struct ipvl_dev *ipvlan,
+                                   const void *iaddr, bool is_v6)
+{
+    struct ipvl_addr *addr;
+    struct ipvl_addr *addr, *ret = NULL;
+hlist_for_each_entry(addr, &ipvlan->addrs, anode) {
+    if ((is_v6 && addr->atype == IPVL_IPV6 &&
+         ipv6_addr_equal(&addr->ip6addr, iaddr)) ||
+        (!is_v6 && addr->atype == IPVL_IPV4 &&
+         addr->ip4addr.s_addr == ((struct in_addr *)iaddr)->s_addr))
+        +rcu_read_lock();
+        list_for_each_entry_rcu(addr, &ipvlan->addrs, anode) {
if (addr_equal(is_v6, addr, iaddr)) {
    ret = addr;
    break;
} 
}-return NULL;
+rcu_read_unlock();
+return ret;
}

bool ipvlan_addr_busy(struct ipvl_port *port, void *iaddr, bool is_v6)
{
    struct ipvl_dev *ipvlan;
    bool ret = false;

    -ASSERT_RTNL();
    -list_for_each_entry(ipvlan, &port->ipvlans, pnode) {
        -if (ipvlan_find_addr(ipvlan, iaddr, is_v6))
            -return true;
        +rcu_read_lock();
        +list_for_each_entry_rcu(ipvlan, &port->ipvlans, pnode) {
            +if (ipvlan_find_addr(ipvlan, iaddr, is_v6)) {
                +ret = true;
                +break;
            } 
        } 
        -return false;
    } 
    +rcu_read_unlock();
    +return ret;
}

static void *ipvlan_get_L3_hdr(struct ipvl_port *port, struct sk_buff *skb, int *type)
{
    if (is_ipv4(skb)) {
        lyr3h = ip4h;
        break;
    } 
    +#if IS_ENABLED(CONFIG_IPV6)
    case htons(ETH_P_IPV6): {
        struct ipv6hdr *ip6h;
        @ -150,6 +172,7 @@
        lyr3h = ip6h;
        break;
    } 
    +#endif
    default:
        return NULL;
if (dev)
    dev_put(dev);
+    cond_resched();
} }

if (dev_forward_skb(ipvlan->dev, skb) == NET_RX_SUCCESS)
success = true;
} else { 
+    if (!ether_addr_equal_64bits(eth_hdr(skb)->h_dest,
+       ipvlan->phy_dev->dev_addr))
+        skb->pkt_type = PACKET_OTHERHOST;
+    ret = RX_HANDLER_ANOTHER;
    success = true;
} 
@@ -337,14 +366,19 @@
    {
        struct ipvl_addr *addr = NULL;

-    if (addr_type == IPVL_IPV6) {
-+        switch (addr_type) {
-+            
-+                #if IS_ENABLED(CONFIG_IPV6)
-+                    case IPVL_IPV6: {
-+                        struct ipv6hdr *ip6h;
-+                        struct in6_addr *i6addr;
-+                        ip6h = (struct ipv6hdr *)lyr3h;
-+                        i6addr = use_dest ? &ip6h->daddr &ip6h->saddr;
-+                        addr = ipvlan_ht_addr_lookup(port, i6addr, true);
-+                    } else if (addr_type == IPVL_ICMPV6) {
-+                        break;
-+                    } 
-+                
-+                case IPVL_ICMPV6: {
-+                    struct nd_msg *ndmh;
-+                    struct in6_addr *i6addr;
-+                    i6addr = &ndmh->target;
-+                    addr = ipvlan_ht_addr_lookup(port, i6addr, true);
-+                } else if (addr_type == IPVL_IPV4) {
-+                    break;
-+                } 
-+            
-+        }
-    
-} else if (addr_type == IPVL_ICMPV6) {
+    
+    case IPVL_ICMPV6: {
+        struct nd_msg *ndmh;
+        struct in6_addr *i6addr;
+        i6addr = &ndmh->target;
+        addr = ipvlan_ht_addr_lookup(port, i6addr, true);
+    } 
+} else if (addr_type == IPVL_IPV4) {
+    break;
+}
+endif
+case IPVL_IPV4: {
  struct iphdr *ip4h;
  __be32 *i4addr;

  ip4h = (struct iphdr *)lyr3h;
  i4addr = use_dest ? &ip4h->daddr : &ip4h->saddr;
  addr = ipvlan_ht_addr_lookup(port, i4addr, false);
  } else if (addr_type == IPVL_ARP) {
    +break;
  +}
+case IPVL_ARP: {
  struct arphdr *arph;
  unsigned char *arp_ptr;
  __be32 dip;
  @@ -377,6 +415,8 @@
    memcpy(&dip, arp_ptr, 4);
    addr = ipvlan_ht_addr_lookup(port, &dip, false);
    +break;
    +}
  }
}

return addr;
@@ -420,6 +460,7 @@
return ret;
}

+#if IS_ENABLED(CONFIG_IPV6)
static int ipvlan_process_v6_outbound(struct skb *skb)
{
  const struct ipv6hdr *ip6h = ipv6_hdr(skb);
  @@ -456,25 +497,33 @@
  out:
  return ret;
  }
+#else
+static int ipvlan_process_v6_outbound(struct skb *skb)
+{
+  +return NET_XMIT_DROP;
+  +}
+ENDIF

static int ipvlan_process_outbound(struct skb *skb)
{
  struct ethhdr *ethh = eth_hdr(skb);
  int ret = NET_XMIT_DROP;

/* In this mode we don't care about multicast and broadcast traffic */
- if (is_multicast_ether_addr(ethh->h_dest)) {
  - pr_warn_ratelimited("Dropped \{multi\|broad\}cast of type= [\%x]\n",
    _ ntohs(skb->protocol));
  - kfree_skb(skb);
  - goto out;
- }

/* The ipvlan is a pseudo-L2 device, so the packets that we receive
 * will have L2; which need to discarded and processed further
 * in the net-ns of the main-device.
 */
if (skb_mac_header_was_set(skb)) {
  /* In this mode we don't care about
   * multicast and broadcast traffic */
  + if (is_multicast_ether_addr(ethh->h_dest)) {
    + pr_debug_ratelimited("Dropped \{multi\|broad\}cast of type= [\%x]\n",
      + ntohs(skb->protocol));
    + kfree_skb(skb);
    + goto out;
  + }
  +
  + skb_pull(skb, sizeof(*ethh));
  skb->mac_header = (typeof(skb->mac_header))~0U;
  skb_reset_network_header(skb);
  @ @ -768,6 +817,7 @@
  goto out;
  break;
}
+#if IS_ENABLED(CONFIG_IPV6)
case AF_INET6:
{  
  struct dst_entry *dst;
  @ @ -787,6 +837,7 @@
  skb_dst_set(skb, dst);
  break;
}
+#endif
default:
break;
}
+#if IS_ENABLED(CONFIG_IPV6)
{
    .hook     = ipvlan_nf_input,
    .pf       = NFPROTO_IPV6,
    .hooknum  = NF_INET_LOCAL_IN,
    .priority = INT_MAX,
},
+#endif
;

static const struct l3mdev_ops ipvl_l3mdev_ops = {
    struct ipvl_dev *ipvlan;
    struct net_device *mdev = port->dev;
    -int err = 0;
    +unsigned int flags;
    +int err;

    ASSERT_RTNL();
    if (port->mode != nval) {
        +list_for_each_entry(ipvlan, &port->ipvlans, pnode) {
            +flags = ipvlan->dev->flags;
            +if (nval == IPVLAN_MODE_L3 || nval == IPVLAN_MODE_L3S) {
                +err = dev_change_flags(ipvlan->dev,
                +    flags | IFF_NOARP);
            } else {
                +err = dev_change_flags(ipvlan->dev,
                +    flags & ~IFF_NOARP);
            }
            +if (unlikely(err))
                +goto fail;
        }
        if (nval == IPVLAN_MODE_L3S) {
            /* New mode is L3S */
            err = ipvlan_register_nf_hook(read_pnet(&port->pnet));
            if (err) {
                mdev->l3mdev_ops = &ipvl_l3mdev_ops;
                -mdev->priv_flags |= IFF_L3MDEV_MASTER;
                +mdev->priv_flags |= IFF_L3MDEV_RX_HANDLER;
            } else
                -return err;
        } else if (port->mode == IPVLAN_MODE_L3S) {
            /* Old mode was L3S */
            -mdev->priv_flags &= ~IFF_L3MDEV_MASTER;
            +mdev->priv_flags &= ~IFF_L3MDEV_RX_HANDLER;
            ipvlan_unregister_nf_hook(read_pnet(&port->pnet));
        }
    } else
        +goto fail;
    +}
/* Old mode was L3 */
/* New mode is L3 */

mdev->l3mdev_ops = NULL;
}
-list_for_each_entry(ipvlan, &port->ipvlans, pnode) {
-if (nval == IPVLAN_MODE_L3 || nval == IPVLAN_MODE_L3S)
-ipvlan->dev->flags |= IFF_NOARP;
-else
-ipvlan->dev->flags &= ~IFF_NOARP;
-}
port->mode = nval;
+
+fail:
+/* Undo the flags changes that have been done so far. */
+list_for_each_entry_continue_reverse(ipvlan, &port->ipvlans, pnode) {
+flags = ipvlan->dev->flags;
+if (port->mode == IPVLAN_MODE_L3 ||
+ port->mode == IPVLAN_MODE_L3S)
+dev_change_flags(ipvlan->dev, flags | IFF_NOARP);
+else
+dev_change_flags(ipvlan->dev, flags & ~IFF_NOARP);
+}
+
+return err;
}

dev->priv_flags &= ~IFF_IPVLAN_MASTER;
if (port->mode == IPVLAN_MODE_L3S) {
-dev->priv_flags &= ~IFF_L3MDEV_MASTER;
+dev->priv_flags &= ~IFF_L3MDEV_RX_HANDLER;
ipvlan_unregister_nf_hook(dev_net(dev));
-dev->l3mdev_ops = NULL;
}
@@ -157,12 +179,21 @@
kfree(port);
}

+#define IPVLAN_ALWAYS_ON_OFLOADS
+ (NETIF_F_SG | NETIF_F_HW_CSUM |
+ NETIF_F_GSO_ROBUST | NETIF_F_GSO_SOFTWARE | NETIF_F_GSO_ENCAP_ALL)
+
+#define IPVLAN_ALWAYS
+(IPVLAN_ALWAYS_ON_OFLOADS | NETIF_F_LLTX | NETIF_F_VLAN_CHALLENGED)
+
#define IPVLAN_FEATURES
 (NETIF_F_SG | NETIF_F_HW_CSUM | NETIF_F_HIGHDMA | NETIF_F_FRAGLIST | 

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#define IPVLAN_STATE_MASK  
((1<<_LINK_STATE_NOCARRIER) | (1<<_LINK_STATE_DORMANT))

dev->state = (dev->state & ~IPVLAN_STATE_MASK) | 
(phy_dev->state & IPVLAN_STATE_MASK);
dev->features = phy_dev->features & IPVLAN_FEATURES;
-dev->features |= NETIF_F_LLTX;
+dev->features |= IPVLAN_ALWAYS_ON;
+dev->vlan_features = phy_dev->vlan_features & IPVLAN_FEATURES;
+dev->vlan_features |= IPVLAN_ALWAYS_ON_OFLOADS;
dev->gso_max_size = phy_dev->gso_max_size;
dev->gso_max_segs = phy_dev->gso_max_segs;
dev->hard_header_len = phy_dev->hard_header_len;

static int ipvlan_open(struct net_device *dev) 
{  
struct ipvl_dev *ipvlan = netdev_priv(dev);  
-struct net_device *phy_dev = ipvlan->phy_dev;  
struct ipvl_addr *addr;

if (ipvlan->port->mode == IPVLAN_MODE_L3 || 
@@ -225,10 +257,12 @@
else
  dev->flags &= ~IFF_NOARP;

-list_for_each_entry(addr, &ipvlan->addrs, anode) 
+rcu_read_lock();
+list_for_each_entry_rcu(addr, &ipvlan->addrs, anode)
ipvlan_ht_addr_add(ipvlan, addr);
+rcu_read_unlock();

-return dev_uc_add(phy_dev, phy_dev->dev_addr);
+return 0;
}

static int ipvlan_stop(struct net_device *dev) 
@@ -240,10 +274,10 @@
dev_uc_unsync(phy_dev, dev);
dev_mc_unsync(phy_dev, dev);

-dev_uc_del(phy_dev, phy_dev->dev_addr);
list_for_each_entry(addr, &ipvlan->addrs, anode)
+rcu_read_lock();
+list_for_each_entry_rcu(addr, &ipvlan->addrs, anode)
ipvlan_ht_addr_del(addr);
+rcu_read_unlock();

return 0;
}

struct ipvl_dev *ipvlan = netdev_priv(dev);

-return features & (ipvlan->sfeatures | ~IPVLAN_FEATURES);
+features |= NETIF_F_ALL_FOR_ALL;
+features &= (ipvlan->sfeatures | ~IPVLAN_FEATURES);
+features = netdev_increment_features(ipvlan->phy_dev->features,
 + features, features);
+features |= IPVLAN_ALWAYS_ON;
+features &= (IPVLAN_FEATURES | IPVLAN_ALWAYS_ON);
 +
+return features;
}

static void ipvlan_change_rx_flags(struct net_device *dev, int change)
@@ -464,6 +505,8 @@
if (!data)
    return 0;
+if (!ns_capable(dev_net(ipvlan->phy_dev)->user_ns, CAP_NET_ADMIN))
    +return -EPERM;

if (data[IFLA_IPVLAN_MODE]) {
    u16 nmode = nla_get_u16(data[IFLA_IPVLAN_MODE]);
    @@ -566,6 +609,8 @@
struct ipvl_dev *tmp = netdev_priv(phy_dev);

    phy_dev = tmp->phy_dev;
+if (!ns_capable(dev_net(phy_dev)->user_ns, CAP_NET_ADMIN))
    +return -EPERM;
} else if (!netif_is_ipvlan_port(phy_dev)) {
/* Exit early if the underlying link is invalid or busy */
if (phy_dev->type != ARPHRD_ETHER ||
    @@ -584,8 +629,10 @@
ipvlan->phy_dev = phy_dev;
ipvlan->dev = dev;
ipvlan->sfeatures = IPVLAN_FEATURES;
-iplan_adjust_mtu(ipvlan, phy_dev);
+if (!tb[IFLA_MTU])
+ipvlan_adjust_mtu(ipvlan, phy_dev);
INIT_LIST_HEAD(&ipvlan->addrs);
+spin_lock_init(&ipvlan->addr_lock);

/* TODO Probably put random address here to be presented to the
 * world but keep using the physical-dev address for the outgoing
@@ -663,11 +710,13 @@
 struct ipvl_dev *ipvlan = netdev_priv(dev);
 struct ipvl_addr *addr, *next;

+spin_lock_bh(&ipvlan->addr_lock);
list_for_each_entry_safe(addr, next, &ipvlan->addrs, anode) {
 ipvlan_ht_addr_del(addr);
-list_del(&addr->anode);
+list_del_rcu(&addr->anode);
kfree_rcu(addr, rcu);
}
+spin_unlock_bh(&ipvlan->addr_lock);

ida_simple_remove(&ipvlan->port->ida, dev->dev_id);
list_del_rcu(&ipvlan->pnode);
@@ -680,6 +729,7 @@
 {
 ether_setup(dev);

+dev->max_mtu = ETH_MAX_MTU;
dev->priv_flags &= ~(IFF_XMIT_DST_RELEASE | IFF_TX_SKB_SHARING);
dev->priv_flags |= IFF_UNICAST_FLT | IFF_NO_QUEUE;
dev->netdev_ops = &ipvlan_netdev_ops;
@@ -758,8 +808,7 @@
 if (dev->reg_state != NETREG_UNREGISTERING)
 break;

-list_for_each_entry_safe(ipvlan, next, &port->ipvlans, -
-pnode)
+list_for_each_entry_safe(ipvlan, next, &port->ipvlans, pnode)
ipvlan->dev->rtnl_link_ops->dellink(ipvlan->dev,
 &lst_kill);
unregister_netdevice_many(&lst_kill);
@@ -767,10 +816,9 @@
case NETDEV_FEAT_CHANGE:
list_for_each_entry(ipvlan, &port->ipvlans, pnode) {
-ipvlan->dev->features = dev->features & IPVLAN_FEATURES;
ipvlan->dev->gso_max_size = dev->gso_max_size;
ipvlan->dev->gso_max_segs = dev->gso_max_segs;
-netdev_features_change(ipvlan->dev);

Open Source Used In 5GaaS Edge AC-4 26119
+netdev_update_features(ipvlan->dev);
}
break;

@@ -791,6 +839,7 @@
return NOTIFY_DONE;
}

+/* the caller must held the addrs lock */
static int ipvlan_add_addr(struct ipvl_dev *ipvlan, void *iaddr, bool is_v6)
{
 struct ipvl_addr *addr;
@@ -800,14 +849,17 @@
 return -ENOMEM;
 addr->master = ipvlan;
-if (is_v6) {
-    memcpy(&addr->ip6addr, iaddr, sizeof(struct in6_addr));
-    addr->atype = IPVL_IPV6;
-} else {
+if (!is_v6) {
+    memcpy(&addr->ip4addr, iaddr, sizeof(struct in_addr));
+    addr->atype = IPVL_IPV4;
+} else {
+    #if IS_ENABLED(CONFIG_IPV6)
+        memcpy(&addr->ip6addr, iaddr, sizeof(struct in6_addr));
+        addr->atype = IPVL_IPV6;
+    #endif
-    list_add_tail(&addr->anode, &ipvlan->addrs);
+    list_add_tail_rcu(&addr->anode, &ipvlan->addrs);
/* If the interface is not up, the address will be added to the hash */
@@ -822,27 +874,33 @@
{
 struct ipvl_addr *addr;
+    spin_lock_bh(&ipvlan->addrs_lock);
 addr = ipvlan_find_addr(ipvlan, iaddr, is_v6);
-    if (!addr)
+    if (!addr) {
+        spin_unlock_bh(&ipvlan->addrs_lock);
 return;
+    }
 ipvlan_ht_addr_del(addr);
- list_del(&addr->anode);
+ list_del_rcu(&addr->anode);
+ spin_unlock_bh(&ipvlan->addrs_lock);
  kfree_rcu(addr, rcu);
-
- return;
}

+ if IS_ENABLED(CONFIG_IPV6)
static int ipvlan_add_addr6(struct ipvl_dev *ipvlan, struct in6_addr *ip6_addr)
{
  - if (ipvlan_addr_busy(ipvlan->port, ip6_addr, true)) {
  + int ret = -EINVAL;
    +
    + spin_lock_bh(&ipvlan->addrs_lock);
    + if (ipvlan_addr_busy(ipvlan->port, ip6_addr, true))
      netif_err(ipvlan, ifup, ipvlan->dev,
        "Failed to add IPv6=%pI6c addr for %s intf\n",
        ip6_addr, ipvlan->dev->name);
  - return -EINVAL;
  -
  - return ipvlan_add_addr(ipvlan, ip6_addr, true);
  + else
  + ret = ipvlan_add_addr(ipvlan, ip6_addr, true);
  + spin_unlock_bh(&ipvlan->addrs_lock);
  + return ret;
}

static void ipvlan_del_addr6(struct ipvl_dev *ipvlan, struct in6_addr *ip6_addr)
@@ -884,10 +942,6 @@
  netdevice *dev = (netdevice *)i6vi->i6vi_dev->dev;
  struct ipvl_dev *ipvlan = netdev_priv(dev);

-/* FIXME IPv6 autoconf calls us from bh without RTNL */
- if (in_softirq())
- return NOTIFY_DONE;
-
- if (!netif_is_ipvlan(dev))
  return NOTIFY_DONE;

@@ -906,17 +960,21 @@

  return NOTIFY_OK;
 }
+endif

static int ipvlan_add_addr4(struct ipvl_dev *ipvlan, struct in_addr *ip4_addr)
{  
  -if (ipvlan_addr_busy(ipvlan->port, ip4_addr, false)) {  
+int ret = -EINVAL;
+  
+spin_lock_bh(&ipvlan->addrs_lock);
+if (ipvlan_addr_busy(ipvlan->port, ip4_addr, false))
netif_err(ipvlan, ifup, ipvlan->dev,  
    "Failed to add IPv4=%pI4 on %s intf:\n",  
    ip4_addr, ipvlan->dev->name);
  -return -EINVAL;
  -}
  
-return ipvlan_add_addr(ipvlan, ip4_addr, false);  
+else
+  ret = ipvlan_add_addr(ipvlan, ip4_addr, false);
+spin_unlock_bh(&ipvlan->addrs_lock);
+return ret;
}  

static void ipvlan_del_addr4(struct ipvl_dev *ipvlan, struct in_addr *ip4_addr)  
@@ -992,6 +1050,7 @@
      .notifier_call = ipvlan_device_event,  
    };
  
+#if IS_ENABLED(CONFIG_IPV6)
static struct notifier_block ipvlan_addr6_notifier_block __read_mostly = {  
      .notifier_call = ipvlan_addr6_event,  
    };
@@ -999,6 +1058,7 @@
static struct notifier_block ipvlan_addr6_vtor_notifier_block __read_mostly = {  
      .notifier_call = ipvlan_addr6_validator_event,  
    };
+#endif

static void ipvlan_ns_exit(struct net *net)  
@@ -1023,9 +1083,11 @@
ipvlan_init_secret();
register_netdevice_notifier(&ipvlan_notifier_block);
  
+#if IS_ENABLED(CONFIG_IPV6)
register_inet6addr_notifier(&ipvlan_addr6_notifier_block);
register_inet6addr_validator_notifier(  
    &ipvlan_addr6_vtor_notifier_block);
+#endif
register_inetaddr_notifier(&ipvlan_addr4_notifier_block);
register_inetaddr_validator_notifier(&ipvlan_addr4_vtor_notifier_block);
unregister_inetaddr_notifier(&ipvlan_addr4_notifier_block);
unregister_inetaddr_validator_notifier(
    &ipvlan_addr4_vtor_notifier_block);
+#if IS_ENABLED(CONFIG_IPV6)
unregister_inet6addr_notifier(&ipvlan_addr6_notifier_block);
unregister_inet6addr_validator_notifier(
    &ipvlan_addr6_vtor_notifier_block);
+#endif
unregister_netdevice_notifier(&ipvlan_notifier_block);
retv;err;
}
@@ -1059,9 +1123,11 @@
unregister_inetaddr_notifier(&ipvlan_addr4_notifier_block);
unregister_inetaddr_validator_notifier(
    &ipvlan_addr4_vtor_notifier_block);
+#if IS_ENABLED(CONFIG_IPV6)
unregister_inet6addr_notifier(&ipvlan_addr6_notifier_block);
unregister_inet6addr_validator_notifier(
    &ipvlan_addr6_vtor_notifier_block);
+#endif
}
module_init(ipvlan_init_module);
--- linux-4.15.0.orig/drivers/net/macsec.c
+++ linux-4.15.0/drivers/net/macsec.c
@@ -20,6 +20,7 @@
#include <net/genetlink.h>
#include <net/sock.h>
#include <net/gro_cells.h>
+#include <linux/if_arp.h>
#include <uapi/linux/if_macsec.h>

#include <uapi/linux/if_macsec.h>

@@ -866,6 +867,7 @@
static void macsec_finalize_skb(struct sk_buff *skb, u8 icv_len, u8 hdr_len)
{
    skb->ip_summed = CHECKSUM_NONE;
    memmove(skb->data + hdr_len, skb->data, 2 * ETH_ALEN);
    skb_pull(skb, hdr_len);
    pskb_trim_unique(skb, skb->len - icv_len);
@@ -1080,6 +1082,7 @@
    struct macsec_rxh_data *rxd;
    struct macsec_dev *macsec;
    unsigned int len;
    sci_t sci;
u32 pn;
bool cbit;
@@ -1100,10 +1103,9 @@
}

skb = skb_unshare(skb, GFP_ATOMIC);
-if (!skb) {
-*pskb = NULL;
+*pskb = skb;
+if (!skb)
return RX_HANDLER_CONSUMED;
-
}

pulled_sci = pskb_may_pull(skb, macsec_extra_len(true));
if (!pulled_sci) {
@@ -1235,9 +1237,11 @@
macsec_rxsa_put(rx_sa);
macsec_rxsc_put(rx_sc);

+skb_orphan(skb);
+len = skb->len;
ret = gro_cells_receive(&macsec->gro_cells, skb);
if (ret == NET_RX_SUCCESS)
-+count_rx(dev, skb->len);
++count_rx(dev, len);
else
macsec->secy.netdev->stats.rx_dropped++;

@@ -1308,7 +1312,8 @@
struct crypto_aead *tfm;
int ret;

-tfm = crypto_alloc_aead("gcm(aes)", 0, 0);
+/* Pick a sync gcm(aes) cipher to ensure order is preserved. */
+tfm = crypto_alloc_aead("gcm(aes)", 0, CRYPTO_ALG_ASYNC);

if (IS_ERR(tfm))
return tfm;
@@ -2798,9 +2803,6 @@
struct net_device *real_dev = macsec->real_dev;
int err;

-+if (!(real_dev->flags & IFF_UP))
-return -ENETDOWN;
-
+err = dev_uc_add(real_dev, dev->dev_addr);
+if (err < 0)
return err;
@@ -2874,6 +2876,11 @@
   dev_uc_sync(real_dev, dev);
 }

+static sci_t dev_to_sci(struct net_device *dev, __be16 port)
+{
+return make_sci(dev->dev_addr, port);
+}
+
static int macsec_set_mac_address(struct net_device *dev, void *p)
{
struct macsec_dev *macsec = macsec_priv(dev);
@@ -2895,6 +2902,7 @@
}

out:
ether_addr_copy(dev->dev_addr, addr->sa_data);
+macsec->secy.sci = dev_to_sci(dev, MACSEC_PORT_ES);
return 0;
}

@@ -2977,6 +2985,7 @@

static const struct nla_policy macsec_rtnl_policy[IFLA_MACSEC_MAX + 1] = {
    [IFLA_MACSEC_SCI] = { .type = NLA_U64 },
    [IFLA_MACSEC_PORT] = { .type = NLA_U16 },
    [IFLA_MACSEC_ICV_LEN] = { .type = NLA_U8 },
    [IFLA_MACSEC_CIPHER_SUITE] = { .type = NLA_U64 },
    [IFLA_MACSEC_WINDOW] = { .type = NLA_U32 },
@@ -2993,12 +3002,10 @@
static void macsec_free_netdev(struct net_device *dev)
{
struct macsec_dev *macsec = macsec_priv(dev);
-struct net_device *real_dev = macsec->real_dev;

    free_percpu(macsec->stats);
    free_percpu(macsec->secy.tx_sc.stats);

    -dev_put(real_dev);
    }

static void macsec_setup(struct net_device *dev)
@@ -3164,11 +3171,6 @@
            return false;
 }

            -static sci_t dev_to_sci(struct net_device *dev, __be16 port)
            -{
            -return make_sci(dev->dev_addr, port);
            }
static int macsec_add_dev(struct net_device *dev, sci_t sci, u8 icv_len)
{
    struct macsec_dev *macsec = macsec_priv(dev);
    struct netlink_ext_ack *extack)
    {
    struct macsec_dev *macsec = macsec_priv(dev);
    +rx_handler_func_t *rx_handler;
    +u8 icv_len = DEFAULT_ICV_LEN;
    struct net_device *real_dev;
    -int err;
    +int err, mtu;
    sci_t sci;
    -u8 icv_len = DEFAULT_ICV_LEN;
    -rx_handler_func_t *rx_handler;

    if (!tb[IFLA_LINK])
        return -EINVAL;
    real_dev = __dev_get_by_index(net, nla_get_u32(tb[IFLA_LINK]));
    if (!real_dev)
        return -ENODEV;
    +if (real_dev->type != ARPHRD_ETHER)
        return -EINVAL;
    dev->priv_flags |= IFF_MACSEC;
    
    if (data && data[IFLA_MACSEC_ICV_LEN])
        icv_len = nla_get_u8(data[IFLA_MACSEC_ICV_LEN]);
    -dev->mtu = real_dev->mtu - icv_len - macsec_extra_len(true);
    +mtu = real_dev->mtu - icv_len - macsec_extra_len(true);
    +if (mtu < 0)
        dev->mtu = 0;
    +else
        dev->mtu = mtu;

    rx_handler = rtnl_dereference(real_dev->rx_handler);
    if (rx_handler && rx_handler != macsec_handle_frame)
        if (err < 0)
            return err;
    -dev_hold(real_dev);

    macsec->nest_level = dev_get_nest_level(real_dev) + 1;
netdev_lockdep_set_classes(dev);
lockdep_set_class_and_subclass(&dev->addr_list_lock,
@@ -3277,6 +3283,9 @@
if (err < 0)
goto del_dev;

+netif_stacked_transfer_operstate(real_dev, dev);
+linkwatch_fire_event(dev);
+
macsec_generation++;

return 0;
@@ -3448,6 +3457,20 @@
switch (event) {
+case NETDEV_DOWN:
+case NETDEV_UP:
+case NETDEV_CHANGE: {
+struct macsec_dev *m, *n;
+struct macsec_rxh_data *rxd;
+
+rxd = macsec_data_rtnl(real_dev);
+list_for_each_entry_safe(m, n, &rxd->secys, secys) {
+struct net_device *dev = m->secy.netdev;
+
+netif_stacked_transfer_operstate(real_dev, dev);
+}
+break;
+}
+case NETDEV_UNREGISTER: {
 struct macsec_dev *m, *n;
 struct macsec_rxh_data *rxd;
 --- linux-4.15.0.orig/drivers/net/macvlan.c
+++ linux-4.15.0/drivers/net/macvlan.c
@@ -338,6 +338,8 @@
if (src)
 dev_put(src->dev);
kfree_skb(skb);
+
+cond_resched();
}

@@ -363,10 +365,11 @@
}
spin_unlock(&port->bc_queue.lock);
+schedule_work(&port->bc_work);
+
+if (err)
goto free_nskb;

-schedule_work(&port->bc_work);

return;

free_nskb:
@@ -448,6 +451,10 @@
int ret;
rx_handler_result_t handle_res;

+/* Packets from dev_loopback_xmit() do not have L2 header, bail out */
+if (unlikely(skb->pkt_type == PACKET_LOOPBACK))
+return RX_HANDLER_PASS;
+
+port = macvlan_port_get_rcu(skb->dev);
if (is_multicast_ether_addr(eth->h_dest)) {
unsigned int hash;
@@ -516,10 +523,11 @@
const struct macvlan_dev *dest;

if (vlan->mode == MACVLAN_MODE_BRIDGE) {
-const struct ethhdr *eth = (void *)skb->data;
+const struct ethhdr *eth = skb_eth_hdr(skb);

/* send to other bridge ports directly */
if (is_multicast_ether_addr(eth->h_dest)) {
+skb_reset_mac_header(skb);
    macvlan_broadcast(skb, port, dev, MACVLAN_MODE_BRIDGE);
    goto xmit_world;
}@@ -626,7 +634,7 @@
    return 0;
}

-err = -EBUSY;
+err = -EADDRINUSE;
if (macvlan_addr_busy(vlan->port, dev->dev_addr))
goto out;

@@ -710,7 +718,7 @@
    goto out;
    }
    /* Rehash and update the device filters */
    if (macvlan_addr_busy(vlan->port, addr))
        -return -EBUSY;
        +return -EADDRINUSE;
    }
if (!macvlan_passthru(port)) {
    err = dev_uc_add(lowerdev, addr);
    return dev_set_mac_address(vlan->lowerdev, addr);
}

@if (macvlan_addr_busy(vlan->port, addr->sa_data))
+return -EADDRINUSE;
+
return macvlan_sync_address(dev, addr->sa_data);
}

lowerdev_features &= (features | ~NETIF_F_LRO);
features = netdev_increment_features(lowerdev_features, features, mask);
features |= ALWAYS_ON_FEATURES;
eatures &= ~NETIF_F_NETNS_LOCAL;
features &= (ALWAYS_ON_FEATURES | MACVLAN_FEATURES);

return features;
}

static int macvlan_validate(struct nlattr *tb[], struct nlattr *data[],
    struct netlink_ext_ack *extack)
{
    struct nlattr *nla, *head;
    int rem, len;
+
    if (tb[IFLA_ADDRESS]) {
+        @
+        if (nla_len(tb[IFLA_ADDRESS]) != ETH_ALEN)
+            return -EINVAL;

    if (data[IFLA_MACVLAN_MACADDR_DATA]) {
        @
        if (nla_len(data[IFLA_MACVLAN_MACADDR_DATA]) != ETH_ALEN)
            return -EADDRNOTAVAIL;
+
        @
        if (!macvlan_validate(nla, head, len) ||
            !is_valid_ether_addr(nla_data(nla)))
            return -EADDRNOTAVAIL;
+
}
if (data[IFLA_MACVLAN_MACADDR_COUNT])
return -EINVAL;

len = nla_len(data[IFLA_MACVLAN_MACADDR_DATA]);

nla_for_each_attr(nla, head, len, rem) {
  if (nla_type(nla) != IFLA_MACVLAN_MACADDR ||
      nla_len(nla) != ETH_ALEN)
    continue;
  addr = nla_data(nla);
  ret = macvlan_hash_add_source(vlan, addr);
  if (ret)
    /* the macvlan port may be freed by macvlan_uninit when fail to register.
     * so we destroy the macvlan port only when it's valid.
     */
    if (create && macvlan_port_get_rtnl(dev))
      macvlan_port_destroy(port->dev);
    return err;
}

if (macvlan_sync_address(vlan->dev, dev->dev_addr))
  return NOTIFY_BAD;

break;

struct net_device *ndev = dev->ndev;

if (ntb_transport_tx_free_entry(dev->qp) < tx_stop) {
  mod_timer(&dev->tx_timer, jiffies + msecs_to_jiffies(tx_time));
} else {
  /* Make sure anybody stopping the queue after this sees the new
   * value of ntb_transport_tx_free_entry()
   */
  ntb_transport_tx_free_entry()

--- linux-4.15.0.orig/drivers/net/ntb_netdev.c
+++ linux-4.15.0/drivers/net/ntb_netdev.c
@@ -236,7 +236,7 @@
struct net_device *ndev = dev->ndev;

if (ntb_transport_tx_free_entry(dev->qp) < tx_stop) {
  -mod_timer(&dev->tx_timer, jiffies + msecs_to_jiffies(tx_time));
  +mod_timer(&dev->tx_timer, jiffies + usecs_to_jiffies(tx_time));
} else {
  /* Make sure anybody stopping the queue after this sees the new
   * value of ntb_transport_tx_free_entry()
   */
  ntb_transport_tx_free_entry()
depends on 64BIT
depends on PCI
select MDIO_CAVIUM
+select MDIO_DEVRES
help
This driver supports the MDIO interfaces found on Cavium
ThunderX SoCs when the MDIO bus device appears as a PCI
--- linux-4.15.0.orig/drivers/net/phy/bcm-cygnus.c
+++ linux-4.15.0/drivers/net/phy/bcm-cygnus.c
@@ -61,17 +61,17 @@
    return rc;
/* make rcal=100, since rdb default is 000 */
-rc = bcm_phy_write_exp(phydev, MII_BRCM_CORE_EXPB1, 0x10);
+rc = bcm_phy_write_exp_sel(phydev, MII_BRCM_CORE_EXPB1, 0x10);
    if (rc < 0)
        return rc;

/* CORE_EXPB0, Reset R_CAL/RC_CAL Engine */
-rc = bcm_phy_write_exp(phydev, MII_BRCM_CORE_EXPB0, 0x10);
+rc = bcm_phy_write_exp_sel(phydev, MII_BRCM_CORE_EXPB0, 0x10);
    if (rc < 0)
        return rc;

/* CORE_EXPB0, Disable Reset R_CAL/RC_CAL Engine */
-rc = bcm_phy_write_exp(phydev, MII_BRCM_CORE_EXPB0, 0x00);
+rc = bcm_phy_write_exp_sel(phydev, MII_BRCM_CORE_EXPB0, 0x00);
    return 0;
}
/* Enable EEE at PHY level */
val = phy_read_mmd(phydev, MDIO_MMD_AN, BRCM_CL45VEN_EEE_CONTROL);
@@ -217,10 +217,15 @@
if (val < 0)
    return val;

+if (phydev->supported & SUPPORTED_1000baseT_Full)
+    mask |= MDIO_EEE_1000T;
+if (phydev->supported & SUPPORTED_100baseT_Full)
+    mask |= MDIO_EEE_100TX;
+
if (enable)
    -val |= (MDIO_EEE_100TX | MDIO_EEE_1000T);
    +val |= mask;
else
    -val &= ~(MDIO_EEE_100TX | MDIO_EEE_1000T);
    +val &= ~mask;

phy_write_mmd(phydev, MDIO_MMD_AN, BCM_CL45VEN_EEE_ADV, (u32)val);
@@ -341,8 +346,8 @@
unsigned int i;
for (i = 0; i < ARRAY_SIZE(bcm_phy_hw_stats); i++)
    -memcpy(data + i * ETH_GSTRING_LEN,
    -    bcm_phy_hw_stats[i].string, ETH_GSTRING_LEN);
    +strlcpy(data + i * ETH_GSTRING_LEN,
    +    bcm_phy_hw_stats[i].string, ETH_GSTRING_LEN);
}
EXPORT_SYMBOL_GPL(bcm_phy_get_strings);
--- linux-4.15.0.orig/drivers/net/phy/bcm-phy-lib.h
+++ linux-4.15.0/drivers/net/phy/bcm-phy-lib.h
@@ -14,11 +14,18 @@
#ifndef _LINUX_BCM_PHY_LIB_H
#define _LINUX_BCM_PHY_LIB_H
#include <linux/brcmphy.h>
#include <linux/phy.h>

int bcm_phy_write_exp(struct phy_device *phydev, u16 reg, u16 val);
int bcm_phy_read_exp(struct phy_device *phydev, u16 reg);
+
+static inline int bcm_phy_write_exp_sel(struct phy_device *phydev,
+    +u16 reg, u16 val)
+{
+    +return bcm_phy_write_exp(phydev, reg | MII_BCM54XX_EXP_SEL_ER, val);
+}
int bcm54xx_auxctl_write(struct phy_device *phydev, u16 regnum, u16 val);
int bcm54xx_auxctl_read(struct phy_device *phydev, u16 regnum);

--- linux-4.15.0.orig/drivers/net/phy/bcm7xxx.c
+++ linux-4.15.0/drivers/net/phy/bcm7xxx.c
@@ -30,7 +30,12 @@
#define MII_BCM7XXX_SHD_2_ADDR_CTRL	0xe
#define MII_BCM7XXX_SHD_2_CTRL_STAT	0xf
#define MII_BCM7XXX_SHD_2_BIAS_TRIM	0x1a
+#define MII_BCM7XXX_SHD_3_PCS_CTRL	0x0
+#define MII_BCM7XXX_SHD_3_PCS_STATUS	0x1
+#define MII_BCM7XXX_SHD_3_EEE_CAP	0x2
+#define MII_BCM7XXX_SHD_3_AN_EEE_ADV	0x3
+#define MII_BCM7XXX_SHD_3_EEE_LP	0x4
+#define MII_BCM7XXX_SHD_3_EEE_WK_ERR	0x5
#define MII_BCM7XXX_SHD_3_AN_STAT	0xb
#define MII_BCM7XXX_REG_INVALID	0xff

static void r_rc_cal_reset(struct phy_device *phydev)
{
    /* Reset R_CAL/RC_CAL Engine */
    -bcm_phy_write_exp(phydev, 0x00b0, 0x0010);
    +bcm_phy_write_exp_sel(phydev, 0x00b0, 0x0010);
    /* Disable Reset R_AL/RC_CAL Engine */
    -bcm_phy_write_exp(phydev, 0x00b0, 0x0000);
    +bcm_phy_write_exp_sel(phydev, 0x00b0, 0x0000);
}

static int bcm7xxx_28nm_b0_afe_config_init(struct phy_device *phydev)
{
    /* Reset R_CAL/RC_CAL Engine */
    -bcm_phy_write_exp(phydev, 0x00b0, 0x0010);
    +bcm_phy_write_exp_sel(phydev, 0x00b0, 0x0010);
    /* Disable Reset R_AL/RC_CAL Engine */
    -bcm_phy_write_exp(phydev, 0x00b0, 0x0000);
    +bcm_phy_write_exp_sel(phydev, 0x00b0, 0x0000);
}

#define MII_BCM7XXX_REG_INVALID	0xff
+
+static u8 bcm7xxx_28nm_ephy_regnum_to_shd(u16 regnum)
+{
+    switch (regnum) {
+        case MDIO_CTRL1:
+            return MII_BCM7XXX_SHD_3_PCS_CTRL;
+        case MDIO_STAT1:
+            return MII_BCM7XXX_SHD_3_PCS_STATUS;
+        case MDIO_PCS_EEE_ABLE:
+            return MII_BCM7XXX_SHD_3_EEE_CAP;
+        case MDIO_AN_EEE_ADV:
+            return MII_BCM7XXX_SHD_3_AN_STAT;
+    }
}
+return MII_BCM7XXX_SHD_3_AN_EEE_ADV;
+case MDIO_AN_EEE_LPABLE:
+return MII_BCM7XXX_SHD_3_EEE_LP;
+case MDIO_PCS_EEE_WK_ERR:
+return MII_BCM7XXX_SHD_3_EEE_WK_ERR;
+default:
+return MII_BCM7XXX_REG_INVALID;
+
+static bool bcm7xxx_28nm_ephy_dev_valid(int devnum)
+{
+    return devnum == MDIO_MMD_AN || devnum == MDIO_MMD_PCS;
+}
+
+static int bcm7xxx_28nm_ephy_read_mmd(struct phy_device *phydev,
+    int devnum, u16 regnum)
+{
+    u8 shd = bcm7xxx_28nm_ephy_regnum_to_shd(regnum);
+    int ret;
+    +
+    if (!bcm7xxx_28nm_ephy_dev_valid(devnum) ||
+        shd == MII_BCM7XXX_REG_INVALID)
+        return -EOPNOTSUPP;
+    /* set shadow mode 2 */
+    ret = phy_set_clr_bits(phydev, MII_BCM7XXX_TEST,
+        MII_BCM7XXX_SHD_MODE_2, 0);
+    if (ret < 0)
+        return ret;
+    /* Access the desired shadow register address */
+    ret = phy_write(phydev, MII_BCM7XXX_SHD_2_ADDR_CTRL, shd);
+    if (ret < 0)
+        goto reset_shadow_mode;
+    +ret = phy_read(phydev, MII_BCM7XXX_SHD_2_CTRL_STAT);
+    +reset_shadow_mode:
+    /* reset shadow mode 2 */
+    phy_set_clr_bits(phydev, MII_BCM7XXX_TEST, 0,
+        MII_BCM7XXX_SHD_MODE_2);
+    return ret;
+}
+
+static int bcm7xxx_28nm_ephy_write_mmd(struct phy_device *phydev,
+    int devnum, u16 regnum, u16 val)
+{
+u8 shd = bcm7xxx_28nm_ephy_regnum_to_shd(regnum);
+int ret;
+
+if (!bcm7xxx_28nm_ephy_dev_valid(devnum) ||
+   shd == MII_BCM7XXX_REG_INVALID)
+return -EOPNOTSUPP;
+
+/* set shadow mode 2 */
+ret = phy_set_clr_bits(phydev, MII_BCM7XXX_TEST,
+        MII_BCM7XXX_SHD_MODE_2, 0);
+if (ret < 0)
+return ret;
+
+/* Access the desired shadow register address */
+ret = phy_write(phydev, MII_BCM7XXX_SHD_2_ADDR_CTRL, shd);
+if (ret < 0)
+goto reset_shadow_mode;
+
+/* Write the desired value in the shadow register */
+phy_write(phydev, MII_BCM7XXX_SHD_2_CTRL_STAT, val);
+
+reset_shadow_mode:
+/* reset shadow mode 2 */
+return phy_set_clr_bits(phydev, MII_BCM7XXX_TEST, 0,
+        MII_BCM7XXX_SHD_MODE_2);
+}
+
+static int bcm7xxx_28nm_ephy_resume(struct phy_device *phydev)
+{ int ret;
+  ...
u8 overflow;
+u64 ns;

/* We must already have the skb that triggered this. */
-
+again:
skb = skb_dequeue(&dp83640->tx_queue);
-
if (!skb) {
    pr_debug("have timestamp but tx_queue empty\n");
    return;
@@ -915,6 +915,11 @@
    }
    return;
    }
+skb_info = (struct dp83640_skb_info *)skb->cb;
+if (time_after(jiffies, skb_info->tmo)) {
+kfree_skb(skb);
+goto again;
+
ns = phy2txts(phy_txts);
memset(&shhwtstamps, 0, sizeof(shhwtstamps));
@@ -1105,7 +1110,7 @@
goto out;
    }
    dp83640_clock_init(clock, bus);
-    list_add_tail(&phyter_clocks, &clock->list);
+    list_add_tail(&clock->list, &phyter_clocks);
    out:
    mutex_unlock(&phyter_clocks_lock);

@@ -1207,6 +1212,23 @@
kfree(dp83640);
    }

+static int dp83640_soft_reset(struct phy_device *phydev)
+{
+    int ret;
+    +ret = genphy_soft_reset(phydev);
+    +if (ret < 0)
+        +return ret;
+    +/* From DP83640 datasheet: "Software driver code must wait 3 us
+       * following a software reset before allowing further serial MII
+       * operations with the DP83640."
+       */
+udelay(10); /* Taking udelay inaccuracy into account */
+
+return 0;
+
}

static int dp83640_config_init(struct phy_device *phydev)
{
    struct dp83640_private *dp83640 = phydev->priv;
   @@ -1317,6 +1339,7 @@
    dp83640->hwts_rx_en = 1;
    dp83640->layer = PTP_CLASS_L4;
    dp83640->version = PTP_CLASS_V1;
+    cfg.rx_filter = HWTSTAMP_FILTER_PTP_V1_L4_EVENT;
    break;
    case HWTSTAMP_FILTER_PTP_V2_L4_EVENT:
    case HWTSTAMP_FILTER_PTP_V2_L4_SYNC:
    @@ -1324,6 +1347,7 @@
    dp83640->hwts_rx_en = 1;
    dp83640->layer = PTP_CLASS_L4;
    dp83640->version = PTP_CLASS_V2;
+    cfg.rx_filter = HWTSTAMP_FILTER_PTP_V2_L4_EVENT;
    break;
    case HWTSTAMP_FILTER_PTP_V2_L2_EVENT:
    case HWTSTAMP_FILTER_PTP_V2_L2_SYNC:
    @@ -1331,6 +1355,7 @@
    dp83640->hwts_rx_en = 1;
    dp83640->layer = PTP_CLASS_L2;
    dp83640->version = PTP_CLASS_V2;
+    cfg.rx_filter = HWTSTAMP_FILTER_PTP_V2_L2_EVENT;
    break;
    case HWTSTAMP_FILTER_PTP_V2_EVENT:
    case HWTSTAMP_FILTER_PTP_V2_SYNC:
    @@ -1338,6 +1363,7 @@
    dp83640->hwts_rx_en = 1;
    dp83640->layer = PTP_CLASS_L4 | PTP_CLASS_L2;
    dp83640->version = PTP_CLASS_V2;
+    cfg.rx_filter = HWTSTAMP_FILTER_PTP_V2_EVENT;
    break;
    default:
    return -ERANGE;
    @@ -1449,6 +1475,7 @@
 static void dp83640_txtstamp(struct phy_device *phydev,
     struct sk_buff *skb, int type)
{
+    struct dp83640_skb_info *skb_info = (struct dp83640_skb_info *)skb->cb;
    struct dp83640_private *dp83640 = phydev->priv;

    switch (dp83640->hwts_tx_en) {


case HWTSTAMP_TX_ON:
    skb_shinfo(skb)->tx_flags |= SKBTX_IN_PROGRESS;
    skb_info(skb)->tmo = jiffies + skb_TIMESTAMP_TIMEOUT;
    skb_queue_tail(&dp83640->tx_queue, skb);
break;

.flags= PHY_HAS_INTERRUPT,
.probe= dp83640_probe,
.remove= dp83640_remove,
+ .soft_reset= dp83640_soft_reset,
.config_init= dp83640_config_init,
.config_aneg= genphy_config_aneg,
.read_status= genphy_read_status,
--- linux-4.15.0.orig/drivers/net/phy/dp83640_reg.h
+++ linux-4.15.0/drivers/net/phy/dp83640_reg.h
@@ -5,7 +5,7 @@
#ifndef HAVE_DP83640_REGISTERS
#define HAVE_DP83640_REGISTERS
#endif

+#define PAGE0 0x0000
+/* #define PAGE0 0x0000 */
#define PHYCR2 0x001c /* PHY Control Register 2 */

#define PAGE4 0x0004
--- linux-4.15.0.orig/drivers/net/phy/dp83848.c
+++ linux-4.15.0/drivers/net/phy/dp83848.c
@@ -74,6 +74,25 @@
        return phy_write(phydev, DP83848_MICR, control);
    }

+static int dp83848_config_init(struct phy_device *phydev)
+{
+    int err;
+    int val;
+    
+    err = genphy_config_init(phydev);
+    if (err < 0)
+        return err;
+    
+    /* DP83620 always reports Auto Negotiation Ability on BMSR. Instead,
+     * we check initial value of BMCR Auto negotiation enable bit
+     */
+    val = phy_read(phydev, MII_BMCR);
+    if (!((val & BMCR_ANENABLE)))
+        phydev->autoneg = AUTONEG_DISABLE;
+ return 0;
+
+ static struct mdio_device_id __maybe_unused dp83848_tbl[] = {
+    { TI_DP83848C_PHY_ID, 0xffffffff },
+    { NS_DP83848C_PHY_ID, 0xffffffff },
+    @ @ -83.7 +102.7 @ @
+};
+ MODULE_DEVICE_TABLE(mdio, dp83848_tbl);
+
-#define DP83848_PHY_DRIVER(_id, _name)				   
+#define DP83848_PHY_DRIVER(_id, _name, _config_init)				
{    .phy_id		= _id,
    .phy_id_mask	= 0xffffffff,
    @ @ -92.7 +111.7 @ @
    .flags	= PHY_HAS_INTERRUPT,
    .soft_reset	= genphy_soft_reset,
    .config_init= _config_init,
    .suspend	= genphy_suspend,
    .resume	= genphy_resume,
    .config_aneg	= genphy_config_aneg,
    @ @ -104,10 +123,14 @ @
}

static struct phy_driver dp83848_driver[] = {
    -DP83848_PHY_DRIVER(TI_DP83848C_PHY_ID, "TI DP83848C 10/100 Mbps PHY"),
    -DP83848_PHY_DRIVER(NS_DP83848C_PHY_ID, "NS DP83848C 10/100 Mbps PHY"),
    -DP83848_PHY_DRIVER(TLK10X_PHY_ID, "TI TLK10X 10/100 Mbps PHY"),
    +DP83848_PHY_DRIVER(TI_DP83620_PHY_ID, "TI DP83620 10/100 Mbps PHY"),
    +DP83848_PHY_DRIVER(TI_DP83848C_PHY_ID, "TI DP83848C 10/100 Mbps PHY", +
        genphy_config_init),
    +DP83848_PHY_DRIVER(NS_DP83848C_PHY_ID, "NS DP83848C 10/100 Mbps PHY", +
        genphy_config_init),
    +DP83848_PHY_DRIVER(TI_DP83620_PHY_ID, "TI DP83620 10/100 Mbps PHY", +
        dp83848_config_init),
    +DP83848_PHY_DRIVER(TLK10X_PHY_ID, "TI TLK10X 10/100 Mbps PHY", +
        genphy_config_init),
};
module_phy_driver(dp83848_driver);

--- linux-4.15.0.orig/drivers/net/phy/dp83867.c
+++ linux-4.15.0/drivers/net/phy/dp83867.c
@@ -33,10 +33,18 @@
/* Extended Registers */
#define DP83867_CFG4            0x0031
+#define DP83867_CFG4_SGMII_ANEG_MASK (BIT(5) | BIT(6))
+#define DP83867_CFG4_SGMII_ANEG_TIMER_11MS   (3 << 5)
+#define DP83867_CFG4_SGMII_ANEG_TIMER_800US  (2 << 5)
+#define DP83867_CFG4_SGMII_ANEG_TIMER_2US    (1 << 5)
+#define DP83867_CFG4_SGMII_ANEG_TIMER_16MS   (0 << 5)
+
#define DP83867_RGMIICTL0x0032
#define DP83867_STRAP_STS10x006E
#define DP83867_RGMIIDCTL0x0086
#define DP83867_IO_MUX_CFG0x0170
+#define DP83867_10M_SGMII_CFG   0x016F
+#define DP83867_10M_SGMII_RATE_ADAPT_MASK BIT(7)

#define DP83867_SW_RESET  BIT(15)
#define DP83867_SW_RESTART  BIT(14)
@ @ -76,6 +84,10 @ @
#define DP83867_IO_MUX_CFG_IO_IMPEDANCE_MAX0x0
#define DP83867_IO_MUX_CFG_IO_IMPEDANCE_MIN0x1f

+/* CFG3 bits */
+#define DP83867_CFG3_INT_OE  BIT(7)
+#define DP83867_CFG3_ROBUST_AUTO_MDIXBIT(9)
+
+/* CFG4 bits */
#define DP83867_CFG4_PORT_MIRROR_EN  BIT(0)

@ @ -249,10 +261,8 @ @
ret = phy_write(phydev, MII_DP83867_PHYCTRL, val);
if (ret)
    return ret;
-
-if ((phydev->interface >= PHY_INTERFACE_MODE_RGMII_ID) &&
-    (phydev->interface <= PHY_INTERFACE_MODE_RGMII_RXID)) {
+/* Set up RGMII delays */
    val = phy_read_mmd(phydev, DP83867_DEVADDR, DP83867_RGMIICTL);

if (phydev->interface == PHY_INTERFACE_MODE_RGMII_ID)
    go -285,13 +295,43 go

/* Enable Interrupt output INT_OE in CFG3 register */
-if (phy_interrupt_is_valid(phydev)) {
    -val = phy_read(phydev, DP83867_CFG3);
    -val |= BIT(7);
phy_write(phydev, DP83867_CFG3, val);
if (phydev->interface == PHY_INTERFACE_MODE_SGMII) {
    /* For support SPEED_10 in SGMII mode */
    + * DP83867_10M_SGMII_RATE_ADAPT bit
    + * has to be cleared by software. That
    + * does not affect SPEED_100 and
    + * SPEED_1000.
    + */
    + val = phy_read_mmd(phydev, DP83867_DEVADDR,
                       + DP83867_10M_SGMII_CFG);
    + val &= ~DP83867_10M_SGMII_RATE_ADAPT_MASK;
    + ret = phy_write_mmd(phydev, DP83867_DEVADDR,
                         + DP83867_10M_SGMII_CFG, val);
    +
    + if (ret)
    + return ret;
    +
    + /* After reset SGMII Autoneg timer is set to 2us (bits 6 and 5
    + are 01). That is not enough to finalize autoneg on some
    + devices. Increase this timer duration to maximum 16ms.
    + */
    + val = phy_read_mmd(phydev, DP83867_DEVADDR, DP83867_CFG4);
    + val &= ~DP83867_CFG4_SGMII_ANEG_MASK;
    + val |= DP83867_CFG4_SGMII_ANEG_TIMER_16MS;
    + ret = phy_write_mmd(phydev, DP83867_DEVADDR, DP83867_CFG4, val);
    +
    + if (ret)
    + return ret;
}

val = phy_read(phydev, DP83867_CFG3);
/* Enable Interrupt output INT_OE in CFG3 register */
if (phy_interrupt_is_valid(phydev))
    + val |= DP83867_CFG3_INT_OE;
    +
    + val |= DP83867_CFG3_ROBUST_AUTO_MDIX;
    + phy_write(phydev, DP83867_CFG3, val);
+
    if (dp83867->port_mirroring != DP83867_PORT_MIRROING_KEEP)
    dp83867_config_port_mirroring(phydev);

--- linux-4.15.0.orig/drivers/net/phy/fixed_phy.c
+++ linux-4.15.0/drivers/net/phy/fixed_phy.c
@@ -67,11 +67,11 @@
do {
    s = read_seqcount_begin(&fp->seqcount);
    /* Issue callback if user registered it. */
    -if (fp->link_update) {
    +if (fp->link_update) {  

+if (fp->link_update)
  fp->link_update(fp->phydev->attached_dev, &fp->status);
-fixed_phy_update(fp);
-
+/* Check the GPIO for change in status */
fixed_phy_update(fp);
state = fp->status;
} while (read_seqcount_retry(&fp->seqcount, s));

--- linux-4.15.0.orig/drivers/net/phy/marvell.c
+++ linux-4.15.0/drivers/net/phy/marvell.c
@@ -879,8 +879,6 @@
/* SGMII-to-Copper mode initialization */
if (phydev->interface == PHY_INTERFACE_MODE_SGMII) {
-  u32 pause;
-
-  /* Select page 18 */
  err = marvell_set_page(phydev, 18);
  if (err < 0)
@@ -904,16 +902,6 @@
err = marvell_set_page(phydev, MII_MARVELL_COPPER_PAGE);
  if (err < 0)
    return err;
-
-  /* There appears to be a bug in the 88e1512 when used in
-   * SGMII to copper mode, where the AN advertisment register
-   * clears the pause bits each time a negotiation occurs.
-   * This means we can never be truely sure what was advertised,
-   * so disable Pause support.
-   */
-  pause = SUPPORTED_Pause | SUPPORTED_Asym_Pause;
-  phydev->supported &= ~pause;
-  phydev->advertising &= ~pause;
}

return m88e1121_config_init(phydev);
@@ -1425,6 +1413,15 @@
if (err < 0)
  return err;
+
+/* If WOL event happened once, the LED[2] interrupt pin
+ will not be cleared unless we reading the interrupt status
+ register. If interrupts are in use, the normal interrupt
+ handling will clear the WOL event. Clear the WOL event
+ before enabling it if `phy_interrupt_is_valid()
+ */


if (!phy_interrupt_is_valid(phydev))
    phy_read(phydev, MII_M1011_IEVENT);

/* Enable the WOL interrupt */
temp = phy_read(phydev, MII_88E1318S_PHY_CSIER);
temp |= MII_88E1318S_PHY_CSIER_WOL_EIE;
@@ -1504,9 +1501,10 @@

static void marvell_get_strings(struct phy_device *phydev, u8 *data)
{
    int count = marvell_get_sset_count(phydev);
    int i;

    -for (i = 0; i < ARRAY_SIZE(marvell_hw_stats); i++) {
        +for (i = 0; i < count; i++) {
            memcpy(data + i * ETH_GSTRING_LEN,
                   marvell_hw_stats[i].string, ETH_GSTRING_LEN);
        }
    }
    @@ -1534,9 +1541,10 @@

static void marvell_get_stats(struct phy_device *phydev,
                               struct ethtool_stats *stats, u64 *data)
{
    int count = marvell_get_sset_count(phydev);
    int i;

    -for (i = 0; i < ARRAY_SIZE(marvell_hw_stats); i++) {
        +for (i = 0; i < count; i++)
            data[i] = marvell_get_stat(phydev, i);
    }

--- linux-4.15.0.orig/drivers/net/phy/marvell10g.c
+++ linux-4.15.0/drivers/net/phy/marvell10g.c
@@ -19,6 +19,9 @@
#define MV_PMA_BOOT		0xc050,
#define MV_PMA_BOOT_FATAL	BIT(0),
+ MV_PCS_BASE_T		0x0000,
 MV_PCS_BASE_R		0x1000,
 MV_PCS_1000BASEX	= 0x2000,
@@ -59,11 +62,22 @@

static int mv3310_probe(struct phy_device *phydev)
{
    u32 mmd_mask = MDIO_DEVS_PMAPMD | MDIO_DEVS_AN;
    +int ret;
if (!phydev->is_c45 ||
    (phydev->c45_ids.devices_in_package & mmd_mask) != mmd_mask)
return -ENODEV;

+ret = phy_read_mmd(phydev, MDIO_MMD_PMAPMD, MV_PMA_BOOT);
+if (ret < 0)
+return ret;
+
+if (ret & MV_PMA_BOOT_FATAL) {
+dev_warn(&phydev->mdio.dev,
 "PHY failed to boot firmware, status=%04x\n", ret);
+return -ENODEV;
+
+
return 0;
}

--- linux-4.15.0.orig/drivers/net/phy/mdio-bcm-iproc.c
+++ linux-4.15.0/drivers/net/phy/mdio-bcm-iproc.c
@@ -188,6 +188,23 @@
return 0;
}

+#ifdef CONFIG_PM_SLEEP
+int iproc_mdio_resume(struct device *dev)
+{
+struct platform_device *pdev = to_platform_device(dev);
+struct iproc_mdio_priv *priv = platform_get_drvdata(pdev);
+
+/* restore the mii clock configuration */
+iproc_mdio_config_clk(priv->base);
+
+return 0;
+}
+
+static const struct dev_pm_ops iproc_mdio_pm_ops = {
+resume = iproc_mdio_resume
+};
+#endif /* CONFIG_PM_SLEEP */

static const struct of_device_id iproc_mdio_of_match[] = {
    .compatible = "brcm,iproc-mdio",
    /* sentinel */ },
@@ -198,6 +215,9 @@
 .driver = {
 .name = "iproc-mdio",
 .of_match_table = iproc_mdio_of_match,
+#ifdef CONFIG_PM_SLEEP

static inline u32 unimac_mdio_readl(struct unimac_mdio_priv *priv, u32 offset)
@@ -189,6 +192,35 @@
  return 0;
 }

+static void unimac_mdio_clk_set(struct unimac_mdio_priv *priv)
+{
+  unsigned long rate;
+  u32 reg, div;
+  
+  /* Keep the hardware default values */
+  if (!priv->clk_freq)
+    return;
+  
+  if (!priv->clk)
+    rate = 250000000;
+  else
+    rate = clk_get_rate(priv->clk);
+  else
+    rate = clk_get_rate(priv->clk);
+  
+  div = (rate / (2 * priv->clk_freq)) - 1;
+  if (div & ~MDIO_CLK_DIV_MASK) {
+    pr_warn("Incorrect MDIO clock frequency, ignoring\n");
+    return;
+  }
+}
+
/* The MDIO clock is the reference clock (typically 250Mhz) divided by 
 * 2 x (MDIO_CLK_DIV + 1)
 */
reg = unimac_mdio_readl(priv, MDIO_CFG);
reg &= ~(MDIO_CLK_DIV_MASK << MDIO_CLK_DIV_SHIFT);
reg |= div << MDIO_CLK_DIV_SHIFT;
unimac_mdio_writel(priv, reg, MDIO_CFG);
}

static int unimac_mdio_probe(struct platform_device *pdev)
{
struct unimac_mdio_pdata *pdata = pdev->dev.platform_data;

/* Just ioremap, as this MDIO block is usually integrated into an 
 * Ethernet MAC controller register range
 */

r = platform_get_resource(pdev, IORESOURCE_MEM, 0);
if (!r)
	return -EINVAL;

/* The MDIO clock is the reference clock (typically 250Mhz) divided by 
 * 2 x (MDIO_CLK_DIV + 1) */
priv->clk = devm_clk_get(&pdev->dev, NULL);
if (PTR_ERR(priv->clk) == -EPROBE_DEFER)
	return PTR_ERR(priv->clk);
else
	priv->clk = NULL;

ret = clk_prepare_enable(priv->clk);
if (ret)
	return ret;

if (of_property_read_u32(np, "clock-frequency", &priv->clk_freq))
	priv->clk_freq = 0;

unimac_mdio_clk_set(priv);

priv->mii_bus = mdiobus_alloc();
if (!priv->mii_bus)
	return -ENOMEM;

ret = -ENOMEM;
goto out_clk_disable;
+
}
bus = priv->mii_bus;
bus->priv = priv;
@@ -251,6 +302,8 @@

out_mdio_free:
mdiobus_free(bus);
+out_clk_disable:
+clk_disable_unprepare(priv->clk);
return ret;
}
@@ -260,10 +313,37 @@
mdiobus_unregister(priv->mii_bus);
mdiobus_free(priv->mii_bus);
+clk_disable_unprepare(priv->clk);
+
+return 0;
+}
+
+static int __maybe_unused unimac_mdio_suspend(struct device *d)
+{
+struct unimac_mdio_priv *priv = dev_get_drvdata(d);
+
+clk_disable_unprepare(priv->clk);
+
+return 0;
+}
+
+static int __maybe_unused unimac_mdio_resume(struct device *d)
+{
+struct unimac_mdio_priv *priv = dev_get_drvdata(d);
+int ret;
+
+ret = clk_prepare_enable(priv->clk);
+if (ret)
+return ret;
+
+unimac_mdio_clk_set(priv);

return 0;
}

+static SIMPLE_DEV_PM_OPS(unimac_mdio_pm_ops,
+ unimac_mdio_suspend, unimac_mdio_resume);
+
static const struct of_device_id unimac_mdio_ids[] = {
    {.compatible = "brcm,genet-mdio-v5"},
};
{
  .compatible = "brcm,genet-mdio-v4",
},

@ @ -279,6 +359,7 @@
.driver = {
  .name = UNIMAC_MDIO_DRV_NAME,
  .of_match_table = unimac_mdio_ids,
+  .pm = &unimac_mdio_pm_ops,
},
  .probe= unimac_mdio_probe,
  .remove= unimac_mdio_remove,
--- linux-4.15.0.orig/drivers/net/phy/mdio-gpio.c
+++ linux-4.15.0/drivers/net/phy/mdio-gpio.c
@ @ -79,7 +79,7 @@
  * assume the pin serves as pull-up. If direction is
  * output, the default value is high.
  */
-gpiod_set_value(bitbang->mdo, 1);
+gpiod_set_value_cansleep(bitbang->mdio, 1);
return;
}

@ @ -94,7 +94,7 @@
struct mdio_gpio_info *bitbang =
container_of(ctrl, struct mdio_gpio_info, ctrl);

-return gpiod_get_value(bitbang->mdio);
+return gpiod_get_value_cansleep(bitbang->mdio);
}

static void mdio_set(struct mdiobb_ctrl *ctrl, int what)
@ @ -103,9 +103,9 @@
container_of(ctrl, struct mdio_gpio_info, ctrl);

if (bitbang->mdo)
-gpiod_set_value(bitbang->mdo, what);
+gpiod_set_value_cansleep(bitbang->mdo, what);
else
-gpiod_set_value(bitbang->mdio, what);
+gpiod_set_value_cansleep(bitbang->mdio, what);
}

static void mdc_set(struct mdiobb_ctrl *ctrl, int what)
@ @ -113,7 +113,7 @@
struct mdio_gpio_info *bitbang =
container_of(ctrl, struct mdio_gpio_info, ctrl);

-gpiod_set_value(bitbang->mdc, what);
+gpiod_set_value_cansleep(bitbang->mdc, what);
}
static const struct mdiobb_ops mdio_gpio_ops = {

--- linux-4.15.0.orig/drivers/net/phy/mdio-mux-bcm-iproc.c
+++ linux-4.15.0/drivers/net/phy/mdio-mux-bcm-iproc.c
@@ -22,7 +22,7 @@
 #include <linux/mdio-mux.h>
 #include <linux/delay.h>

-#define MDIO_PARAM_OFFSET		0x00
+#define MDIO_PARAM_OFFSET		0x23c
#define MDIO_PARAM_MIIM_CYCLE		29
#define MDIO_PARAM_INTERNAL_SEL		25
#define MDIO_PARAM_BUS_ID		22
@@ -30,20 +30,22 @@
#define MDIO_PARAM_PHY_ID		16
#define MDIO_PARAM_PHY_DATA		0
-#define MDIO_READ_OFFSET		0x04
+#define MDIO_READ_OFFSET		0x240
#define MDIO_READ_DATA_MASK		0xffff
-#define MDIO_ADDR_OFFSET		0x08
+#define MDIO_ADDR_OFFSET		0x244
-#define MDIO_CTRL_OFFSET		0x0C
+#define MDIO_CTRL_OFFSET		0x248
#define MDIO_CTRL_WRITE_OP		0x1
#define MDIO_CTRL_READ_OP		0x2
-#define MDIO_STAT_OFFSET		0x10
+#define MDIO_STAT_OFFSET		0x24c
#define MDIO_STAT_DONE			1
#define BUS_MAX_ADDR			32
#define EXT_BUS_START_ADDR		16
+#define MDIO_REG_ADDR_SPACE_SIZE	0x250

struct iproc_mdiomux_desc {
    void *mux_handle;
    void __iomem *base;
    @@ -169,6 +171,14 @@
    md->dev = &pdev->dev;
    res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+	if (res->start & 0xfff) {
+	    /* For backward compatibility in case the
+	     * base address is specified with an offset.
+	     */
+    

+dev_info(&pdev->dev, "fix base address in dt-blob\n");
+res->start &= ~0xfff;
+res->end = res->start + MDIO_REG_ADDR_SPACE_SIZE - 1;
+
md->base = devm_ioremap_resource(&pdev->dev, res);
if (IS_ERR(md->base)) {
  dev_err(&pdev->dev, "failed to ioremap register\n");
@@ -218,7 +228,7 @@
static int mdio_mux_iproc_remove(struct platform_device *pdev)
{
  -struct iproc_mdiomux_desc *md = dev_get_platdata(&pdev->dev);
  +struct iproc_mdiomux_desc *md = platform_get_drvdata(pdev);

  mdio_mux_uninit(md->mux_handle);
  mdiobus_unregister(md->mii_bus);
--- linux-4.15.0.orig/drivers/net/phy/mdio-mux.c
+++ linux-4.15.0/drivers/net/phy/mdio-mux.c
@@ -85,6 +85,17 @@
  static void mdio_mux_uninit_children(struct mdio_mux_parent_bus *pb)
  {
    struct mdio_mux_child_bus *cb = pb->children;
+    
    +while (cb) {
    +  mdiobus_unregister(cb->mii_bus);
    +  mdiobus_free(cb->mii_bus);
    +  cb = cb->next;
    +}
    +
    +int mdio_mux_init(struct device *dev,
           struct device_node *mux_node,
           int (*switch_fn)(int cur, int desired, void *data),
@@ -147,7 +158,7 @@
  cb = devm_kzalloc(dev, sizeof(*cb), GFP_KERNEL);
  if (!cb) {
    ret_val = -ENOMEM;
@@ -155,8 +166,7 @@
  cb = devm_ioremap_resource(dev, sizeof(*cb), GFP_KERNEL);
  if (!cb) {
    ret_val = -ENOMEM;
    -continue;
    +goto err_loop;
  }
  cb->bus_number = v;
  cb->parent = pb;
@@ -155,8 +166,7 @@
  cb->mii_bus = mdiobus_alloc();
  if (!cb->mii_bus) {
ret_val = -ENOMEM;
-devm_kfree(dev, cb);
-continue;
+goto err_loop;
}

/** @ -168,11 +178,15 @@
 * 
 * cb->mii_bus->write = mdio_mux_write;
 * r = of_mdiobus_register(cb->mii_bus, child_bus_node);
 * if (r) {
 * +mdiobus_free(cb->mii_bus);
 * +if (r == -EPROBE_DEFER) {
 * +ret_val = r;
 * +goto err_loop;
 * +}
 * +devm_kfree(dev, cb);
 * dev_err(dev,
 * "Error: Failed to register MDIO bus for child %pOF\n",
 * child_bus_node);
 * -mdiobus_free(cb->mii_bus);
 * -devm_kfree(dev, cb);
 * } else {
 * cb->next = pb->children;
 * pb->children = cb;
 * @@ -185,6 +199,10 @@
 * dev_err(dev, "Error: No acceptable child buses found\n");
 * devm_kfree(dev, pb);
 * +
 * +err_loop:
 * +mdio_mux_uninit_children(pb);
 * +of_node_put(child_bus_node);
 * err_pb_kz:
 * put_device(&parent_bus->dev);
 * err_parent_bus:
 * @@ -196,14 +214,8 @@
 * void mdio_mux_uninit(void *mux_handle)
 * {
 * struct mdio_mux_parent_bus *pb = mux_handle;
 * -struct mdio_mux_child_bus *cb = pb->children;
 * -
 * -while (cb) {
 * -mdiobus_unregister(cb->mii_bus);
 * -mdiobus_free(cb->mii_bus);
 * -cb = cb->next;
 * -}
+mdio_mux_uninit_children(pb);
+ put_device(&pb->mii_bus->dev);
+}
+EXPORT_SYMBOL_GPL(mdio_mux_uninit);
--- linux-4.15.0.orig/drivers/net/phy/mdio-octeon.c
+++ linux-4.15.0/drivers/net/phy/mdio-octeon.c
@@ -75,7 +75,6 @@
 return 0;
 fail_register:
 -mdiobus_free(bus->mii_bus);
-smi_en.u64 = 0;
 oct_mdio_writeq(smi_en.u64, bus->register_base + SMI_EN);
 return err;
@ @ -89,7 +88,6 @@
 bus = platform_get_drvdata(pdev);

 mdiobus_unregister(bus->mii_bus);
-mdiobus_free(bus->mii_bus);
-smi_en.u64 = 0;
 oct_mdio_writeq(smi_en.u64, bus->register_base + SMI_EN);
 return 0;
--- linux-4.15.0.orig/drivers/net/phy/mdio-thunder.c
+++ linux-4.15.0/drivers/net/phy/mdio-thunder.c
@@ -129,7 +129,6 @@
 continue;
 mdiobus_unregister(bus->mii_bus);
-mdiobus_free(bus->mii_bus);
 oct_mdio_writeq(0, bus->register_base + SMI_EN);
 }
pci_set_drvdata(pdev, NULL);
--- linux-4.15.0.orig/drivers/net/phy/mdio_bus.c
+++ linux-4.15.0/drivers/net/phy/mdio_bus.c
@@ -345,10 +345,16 @@
 bus->dev.groups = NULL;
 dev_set_name(&bus->dev, "%s", bus->id);
+/*
+ * We need to set state to MDIOBUS_UNREGISTERED to correctly release
+ * the device in mdiobus_free()
+ */
+bus->state = MDIOBUS_UNREGISTERED;
+err = device_register(&bus->dev);
+if (err) {
+ pr_err("mii_bus %s failed to register\n", bus->id);
-put_device(&bus->dev);
return -EINVAL;
}

@@ -359,6 +365,7 @@
if (IS_ERR(gpiod)) {
  dev_err(&bus->dev, "mii_bus %s couldn't get reset GPIO\n", 
        bus->id);
+  device_del(&bus->dev);
  return PTR_ERR(gpiod);
} elseif (gpiod) {
  bus->reset_gpiod = gpiod;
@@ -413,7 +420,8 @@
struct mdio_device *mdiodev;
int i;

-BUG_ON(bus->state != MDIOBUS_REGISTERED);
+if (WARN_ON_ONCE(bus->state != MDIOBUS_REGISTERED))
+return;
bus->state = MDIOBUS_UNREGISTERED;

for (i = 0; i < PHY_MAX_ADDR; i++) {
  --- linux-4.15.0.orig/drivers/net/phy/mdio_device.c
  +++ linux-4.15.0/drivers/net/phy/mdio_device.c
@@ -146,6 +146,16 @@
      return 0;
  }

+static void mdio_shutdown(struct device *dev)
+{ 
+struct mdio_device *mdiodev = to_mdio_device(dev);
+struct device_driver *drv = mdiodev->dev.driver;
+struct mdio_driver *mdiodrv = to_mdio_driver(drv);
+  +
+  +if (mdiodrv->shutdown)
+    mdiodrv->shutdown(mdiodev);
+  extra_dev_close(mdiodrv);
+
+  return 0;
+
+  
+  
+} /*
+ * mdio_driver_register - register an mdio_driver with the MDIO layer
+ * @new_driver: new mdio_driver to register
+@@ -160,6 +170,7 @@
+  mdiodrv->driver.bus = &mdio_bus_type;
+  mdiodrv->driver.probe = mdioc_probe;
+  mdiodrv->driver.remove = mdioc_remove;
+  +mdiodrv->driver.shutdown = mdioc_shutdown;
  retval = driver_register(&mdiodrv->driver);

---
if (retval) {
--- linux-4.15.0.orig/drivers/net/phy/meson-gxl.c
+++ linux-4.15.0/drivers/net/phy/meson-gxl.c
@@ -26,27 +26,53 @@
static int meson_gxl_config_init(struct phy_device *phydev)
{
+int ret;
+
/* Enable Analog and DSP register Bank access by */
-phy_write(phydev, 0x14, 0x0000);
-phy_write(phydev, 0x14, 0x0400);
-phy_write(phydev, 0x14, 0x0000);
-phy_write(phydev, 0x14, 0x0400);
+ret = phy_write(phydev, 0x14, 0x0000);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x0400);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x0000);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x0400);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x17, 0x8E0D);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x4417);
+if (ret)
+return ret;
/* Write Analog register 23 */
-phy_write(phydev, 0x17, 0x8E0D);
-phy_write(phydev, 0x14, 0x4417);
+ret = phy_write(phydev, 0x17, 0x8E0D);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x4417);
+if (ret)
+return ret;
/* Enable fractional PLL */
-phy_write(phydev, 0x17, 0x0005);
-phy_write(phydev, 0x14, 0x5C1B);
+ret = phy_write(phydev, 0x17, 0x0005);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x5C1B);
+if (ret)
+return ret;
/* Program fraction FR_PLL_DIV1 */
-phy_write(phydev, 0x17, 0x029A);
-phy_write(phydev, 0x14, 0x5C1D);
+ret = phy_write(phydev, 0x17, 0x029A);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x5C1D);
+if (ret)
+return ret;

/* Program fraction FR_PLL_DIV1 */
-phy_write(phydev, 0x17, 0xAABB);
-phy_write(phydev, 0x14, 0x5C1C);
+ret = phy_write(phydev, 0x17, 0xAABB);
+if (ret)
+return ret;
+ret = phy_write(phydev, 0x14, 0x5C1C);
+if (ret)
+return ret;

return 0;
}
--- linux-4.15.0.orig/drivers/net/phy/micrel.c
+++ linux-4.15.0/drivers/net/phy/micrel.c
@@ -29,6 +29,7 @@
#include <linux/micrel_phy.h>
#include <linux/clk.h>
+include <linux/delay.h>
/* Operation Mode Strap Override */
#define MII_KSZPHY_OMSO				0x16
@@ -339,6 +340,17 @@
return genphy_config_aneg(phydev);
}

+static int ksz8061_config_init(struct phy_device *phydev)
+{
+int ret;
+
+ret = phy_write_mmd(phydev, MDIO_MMD_PMAPMD, MDIO_DEVID1, 0xB61A);
+if (ret)
+return ret;
+
+return kszphy_config_init(phydev);
+
+}

static int ksz9021_load_values_from_of(struct phy_device *phydev, const struct device_node *of_node,

---
u16 reg, 
@@ -664,8 +676,8 @@
int i;

for (i = 0; i < ARRAY_SIZE(kszphy_hw_stats); i++) {
    -memcpy(data + i * ETH_GSTRING_LEN,
    -    kszphy_hw_stats[i].string, ETH_GSTRING_LEN);
    +strlcpy(data + i * ETH_GSTRING_LEN,
    +    kszphy_hw_stats[i].string, ETH_GSTRING_LEN);
    }
}

@@ -718,6 +730,12 @@
genphy_resume(phydev);

+/* After switching from power-down to normal mode, an internal global
+ * reset is automatically generated. Wait a minimum of 1 ms before
+ * read/write access to the PHY registers.
+ */
+usleep_range(1000, 2000);
+
ret = kszphy_config_reset(phydev);
if (ret)
    return ret;
@@ -801,7 +819,7 @@
    .features= PHY_BASIC_FEATURES,
    .flags= PHY_HAS_INTERRUPT,
    .driver_data= &ks8737_type,
-    .config_init= kszphy_config_init,
+    .config_init= ksz8061_config_init,
    .config_aneg= genphy_config_aneg,
    .read_status= genphy_read_status,
    .ack_interrupt= kszphy_ack_interrupt,
--- linux-4.15.0.orig/drivers/net/phy/mscc.c
+++ linux-4.15.0/drivers/net/phy/mscc.c
@@ -111,8 +111,8 @@
#ifdef CONFIG_OF_MDIO
struct vsc8531_edge_rate_table {
    -u16 vddmac;
    -u8 slowdown[8];
    +u32 vddmac;
    +u32 slowdown[8];
};

static const struct vsc8531_edge_rate_table edge_table[] = {
@@ -375,8 +375,7 @@
```c
#ifdef CONFIG_OF_MDIO
static int vsc85xx_edge_rate_magic_get(struct phy_device *phydev)
{
    u8 sd;
    u16 vdd;
    +u32 vdd, sd;
    int rc, i, j;
    struct device *dev = &phydev->mdio.dev;
    struct device_node *of_node = dev->of_node;
    if (!of_node)
        return -ENODEV;
    -rc = of_property_read_u16(of_node, "vsc8531,vddmac", &vdd);
    +rc = of_property_read_u32(of_node, "vsc8531,vddmac", &vdd);
    if (rc != 0)
        vdd = MSCC_VDDMAC_3300;
    -rc = of_property_read_u8(of_node, "vsc8531,edge-slowdown", &sd);
    +rc = of_property_read_u32(of_node, "vsc8531,edge-slowdown", &sd);
    if (rc != 0)
        sd = 0;
    --- linux-4.15.0.orig/drivers/net/phy/national.c
    ++ linux-4.15.0/drivers/net/phy/national.c
    @@ -385,11 +384,11 @@
    if (!of_node)
        return -ENODEV;
    -rc = of_property_read_u16(of_node, "vsc8531,vddmac", &vdd);
    +rc = of_property_read_u32(of_node, "vsc8531,vddmac", &vdd);
    if (rc != 0)
        vdd = MSCC_VDDMAC_3300;
    -rc = of_property_read_u8(of_node, "vsc8531,edge-slowdown", &sd);
    +rc = of_property_read_u32(of_node, "vsc8531,edge-slowdown", &sd);
    if (rc != 0)
        sd = 0;

    --- linux-4.15.0.orig/drivers/net/phy/national.c
    +++ linux-4.15.0/drivers/net/phy/national.c
    @@ -110,14 +110,17 @@
    static void ns_10_base_t_hdx_loopack(struct phy_device *phydev, int disable)
    {
        +u16 lb_dis = BIT(1);
        +
        if (disable)
            -ns_exp_write(phydev, 0x1c0, ns_exp_read(phydev, 0x1c0) | 1);
            +ns_exp_write(phydev, 0x1c0, ns_exp_read(phydev, 0x1c0) | lb_dis);
        else
            ns_exp_write(phydev, 0x1c0, ns_exp_read(phydev, 0x1c0) & ~lb_dis);
        pr_debug("10BASE-T HDX loopback %s\n",
            - (ns_exp_read(phydev, 0x1c0) & 0xfffe) ? "off" : "on");
            + (ns_exp_read(phydev, 0x1c0) & lb_dis) ? "off" : "on");
    }

    static int ns_config_init(struct phy_device *phydev)
    --- linux-4.15.0.orig/drivers/net/phy/phy.c
    +++ linux-4.15.0/drivers/net/phy/phy.c
```
phydev->autoneg = autoneg;

-phydev->speed = speed;
+if (autoneg == AUTONEG_DISABLE) {
+phydev->speed = speed;
+phydev->duplex = duplex;
+
} phydev->advertising = advertising;

phydev->advertising &= ~ADVERTISED_Autoneg;

-phydev->duplex = duplex;
-
phydev->mdix_ctrl = cmd->base.eth_tp_mdix_ctrl;

/* Restart the PHY */
phy_interrupt_is_valid(phydev) && (phydev->state == PHY_AN)) {
+if (phydev->irq != PHY_POLL && phydev->state == PHY_AN) {
err = phy_aneg_done(phydev);
if (err > 0) {
	trigger = true;
	phy_err:
}

/**
+ * phy_disable_interrupts - Disable the PHY interrupts from the PHY side
+ * @phydev: target phy_device struct
+ */
+static int phy_disable_interrupts(struct phy_device *phydev)
+{
+int err;
+
+/* Disable PHY interrupts */
+err = phy_config_interrupt(phydev, PHY_INTERRUPT_DISABLED);
+if (err)
+goto phy_err;
+
+/* Clear the interrupt */
+err = phy_clear_interrupt(phydev);
+if (err)
+goto phy_err;
+
+return 0;
+
+phy_err:
+phy_error(phydev);
+
+return err;
+
+/**
+ * phy_change - Called by the phy_interrupt to handle PHY changes
+ * @phydev: phy_device struct that interrupted
+ */
+static irqreturn_t phy_change(struct phy_device *phydev)
+{
+if (phy_interrupt_is_valid(phydev)) {
+if (phydev->drv->did_interrupt &&
+ !phydev->drv->did_interrupt(phydev))
+return IRQ_NONE;
+
+if (phy_disable_interrupts(phydev))
+goto phy_err;
+
+mutex_lock(&phydev->lock);
+if ((PHY_RUNNING == phydev->state) || (PHY_NOLINK == phydev->state))
+protocol->state = PHY_CHANGELINK;
+mutex_unlock(&phydev->lock);
+
+if (phy_interrupt_is_valid(phydev)) {
+/* Reenable interrupts */
+if (PHY_HALTED != phydev->state &&
+ phy_config_interrupt(phydev, PHY_INTERRUPT_ENABLED))
+goto phy_err;
+
+/* reschedule state queue work to run as soon as possible */
+phy_trigger_machine(phydev, true);
+return IRQ_HANDLED;
+
+phy_err:
+phy_error(phydev);
+return IRQ_NONE;
+
+/**
+ * phy_change_work - Scheduled by the phy_mac_interrupt to handle PHY changes
+ * @work: work_struct that describes the work to be done
+ */
+void phy_change_work(struct work_struct *work)
+{
+struct phy_device *phydev =
+container_of(work, struct phy_device, phy_queue);
+
+phy_change(phydev);
+}
+
+/**
+ * phy_interrupt - PHY interrupt handler
+ * @irq: interrupt line
+ * @phy_dat: phy_device pointer
+ @@ -629,12 +704,7 @@
+ if (PHY_HALTED == phydev->state)
+ return IRQ_NONE; /* It can't be ours. */
+
+disable_irq_nosync(irq);
+atomic_inc(&phydev->irq_disable);
+
+phy_change(phydev);
+
+return IRQ_HANDLED;
+return phy_change(phydev);
+}
+
+/**
+ @@ -652,32 +722,6 @@
+ }
+
+/**
+ - * phy_disable_interrupts - Disable the PHY interrupts from the PHY side
+ - * @phydev: target phy_device struct
+ - */
+ -static int phy_disable_interrupts(struct phy_device *phydev)
+ -{
+ -int err;
+ -
+ -/* Disable PHY interrupts */
+ -err = phy_config_interrupt(phydev, PHY_INTERRUPT_DISABLED);
+ -if (err)
+ -    goto phy_err;
+ -
+ -/* Clear the interrupt */
+ -err = phy_clear_interrupt(phydev);
+ -if (err)
-goto phy_err;
-
-return 0;
-
-phy_err:
-phy_error(phydev);
-
-return err;
-
/**
 * phy_start_interrupts - request and enable interrupts for a PHY device
 * @phydev: target phy_device struct
 *
 @@ -689,7 +733,6 @@
 */

 int phy_start_interrupts(struct phy_device *phydev)
 {
 atomic_set(&phydev->irq_disable, 0);
 if (request_threaded_irq(phydev->irq, NULL, phy_interrupt,
 IRQF_ONESHOT | IRQF_SHARED,
 phydev_name(phydev), phydev) < 0) {
 @@ -716,76 +759,11 @@
 }
 free_irq(phydev->irq, phydev);
-
*/ If work indeed has been cancelled, disable_irq() will have
- * been left unbalanced from phy_interrupt() and enable_irq()
- * has to be called so that other devices on the line work.
- */
-while (atomic_dec_return(&phydev->irq_disable) >= 0)
-enable_irq(phydev->irq);
-
-return err;
}
EXPORT_SYMBOL(phy_stop_interrupts);

/ *
 * phy_change - Called by the phy_interrupt to handle PHY changes
 * @phydev: phy_device struct that interrupted
 */

-void phy_change(struct phy_device *phydev)
 {
-if (phy_interrupt_is_valid(phydev)) {
-if (phydev->drv->did_interrupt &&
- !phydev->drv->did_interrupt(phydev))
-goto ignore;
-
if (phy_disable_interrupts(phydev))
    goto phy_err;
-
mutex_lock(&phydev->lock);
if ((PHY_RUNNING == phydev->state) || (PHY_NOLINK == phydev->state))
    phydev->state = PHY_CHANGE_LINK;
mutex_unlock(&phydev->lock);
-
if (phy_interrupt_is_valid(phydev)) {
    atomic_dec(&phydev->irq_disable);
    enable_irq(phydev->irq);
    /* Reenable interrupts */
    if (PHY_HALTED != phydev->state &&
        phy_config_interrupt(phydev, PHY_INTERRUPT_ENABLED))
        goto irq_enable_err;
}
-
/* reschedule state queue work to run as soon as possible */
phy_trigger_machine(phydev, true);
return;
-
ignore:
atomic_dec(&phydev->irq_disable);
enable_irq(phydev->irq);
return;
-
irq_enable_err:
disable_irq(phydev->irq);
atomic_inc(&phydev->irq_disable);
phy_err:
phy_error(phydev);
}
* phy_stop - Bring down the PHY link, and stop checking the status
* @phydev: target phy_device struct
*/
@@ -841,10 +819,10 @@
break;
case PHY_HALTED:
/* if phy was suspended, bring the physical link up again */
-phy_resume(phydev);
+__phy_resume(phydev);

/*@ -819,10 +841,10 @@ *
/* make sure interrupts are re-enabled for the PHY */
-if (phydev->irq != PHY_POLL) {
+if (phy_interrupt_is_valid(phydev)) {
    err = phy_enable_interrupts(phydev);
    if (err < 0)
        break;
@@ -1258,9 +1236,11 @@
/* Restart autonegotiation so the new modes get sent to the */
* link partner.
*/
-ret = phy_restart_aneg(phydev);
-if (ret < 0)
-    return ret;
+ret = phy_restart_aneg(phydev);
+if (ret < 0)
+    return ret;
+
} return 0;
--- linux-4.15.0.orig/drivers/net/phy/phy_device.c
+++ linux-4.15.0/drivers/net/phy/phy_device.c
@@ -91,7 +91,7 @@
* MDIO bus driver and clock gated at this point.
*/
if (!netdev)
-    return !phydev->suspended;
+    goto out;
/* Don't suspend PHY if the attached netdev parent may wakeup. */
* The parent may point to a PCI device, as in tg3 driver.
@@ -106,7 +106,8 @@
if (device_may_wakeup(&netdev->dev))
    return false;
-
-    return true;
+out:
static int mdio_bus_phy_suspend(struct device *dev)
{
    if (!mdio_bus_phy_may_suspend(phydev))
        return 0;

    if (!phydev->suspended)
        return phy_suspend(phydev);

    phydev->suspended_by_mdio_bus = true;
    return phy_suspend(phydev);
}

struct phy_device *phydev = to_phy_device(dev);
int ret;

if (!mdio_bus_phy_may_suspend(phydev))
    if (!phydev->suspended_by_mdio_bus)
        goto no_resume;

mutex_lock(&phydev->lock);
    phydev->suspended_by_mdio_bus = false;
    ret = phy_resume(phydev);
mutex_unlock(&phydev->lock);
if (ret < 0)
    return ret;

@ -161,11 +164,8 @@
if (ret < 0)
    return ret;

/* The PHY needs to renegotiate. */
-phydev->link = 0;
-phydev->state = PHY_UP;
-phy_start_machine(phydev);
+if (phydev->attached_dev && phydev->adjust_link)
    phy_start_machine(phydev);

return 0;
}

mdiodev->device_free = phy_mdio_device_free;
mdiodev->device_remove = phy_mdio_device_remove;
-dev->speed = 0;
-dev->duplex = -1;
+dev->speed = SPEED_UNKNOWN;
+dev->duplex = DUPLEX_UNKNOWN;
dev->pause = 0;
dev->asym_pause = 0;
dev->link = 1;
@@ -544,8 +544,10 @@

/* Grab the bits from PHYIR2, and put them in the lower half */
phy_reg = mdiobus_read(bus, addr, MI_PHYSID2);
-if (phy_reg < 0)
-return -EIO;
+if (phy_reg < 0) {
+/* returning -ENODEV doesn't stop bus scanning */
+return (phy_reg == -EIO || phy_reg == -ENODEV) ? -ENODEV : -EIO;
+
*phy_id |= (phy_reg & 0xffff);

@@ -734,6 +736,9 @@
{
 int rc;

+if (!dev)
+return -EINVAL;
 +
 rc = phy_attach_direct(dev, phydev, phydev->dev_flags, interface);
 if (rc)
 return rc;
@@ -1001,10 +1006,17 @@
err = sysfs_create_link(&phydev->mdio.dev.kobj, &dev->dev.kobj,
 "attached_dev");
 if (!err) {
-err = sysfs_create_link(&dev->dev.kobj, &phydev->mdio.dev.kobj,
- "phydev");
-if (err)
-goto error;
+err = sysfs_create_link_nowarn(&dev->dev.kobj, &phydev->mdio.dev.kobj,
+ &phydev->mdio.dev.kobj,
+ "phydev");
+if (err) {
+dev_err(&dev->dev, "could not add device link to %s err %d\n", 
+kobject_name(&phydev->mdio.dev.kobj), 
+err);
+/* non-fatal - some net drivers can use one netdevice
 + * with more then one phy
 + */
+}
phydev->sysfs_links = true;
}
@@ -1028,9 +1040,7 @@
if (err)
goto error;

.mutex_lock(&phydev->lock);
phy_resume(phydev);
.mutex_unlock(&phydev->lock);
phy_led_triggers_register(phydev);

return err;
@@ -1067,6 +1077,9 @@
struct device *d;
int rc;

+if (!dev)
+return ERR_PTR(-EINVAL);
+
/* Search the list of PHY devices on the mdio bus for the
 * PHY with the requested name
 */
@@ -1110,7 +1123,8 @@
phy_led_triggers_unregister(phydev);

-module_put(phydev->mdio.dev.driver->owner);
+if (phydev->mdio.dev.driver)
+module_put(phydev->mdio.dev.driver->owner);

/* If the device had no specific driver before (i.e. - it
 * was using the generic driver), we unbind the device
@@ -1156,7 +1170,7 @@
}    
EXPORT_SYMBOL(phy_suspend);

-int phy_resume(struct phy_device *phydev)
+int __phy_resume(struct phy_device *phydev)
{
 struct phy_driver *phydrv = to_phy_driver(phydev->mdio.dev.driver);
 int ret = 0;
@@ -1173,6 +1187,18 @@

 return ret;
 }
+EXPORT_SYMBOL(__phy_resume);
 +
int phy_resume(struct phy_device *phydev)
{
  int ret;
  
  mutex_lock(&phydev->lock);
  ret = __phy_resume(phydev);
  mutex_unlock(&phydev->lock);
  
  return ret;
}

EXPORT_SYMBOL(phy_resume);

int phy_loopback(struct phy_device *phydev, bool enable)
@@ -1626,6 +1652,23 @@
} 

EXPORT_SYMBOL(genphy_config_init);

+/* This is used for the phy device which doesn't support the MMD extended 
+ * register access, but it does have side effect when we are trying to access 
+ * the MMD register via indirect method. 
+ */
+int genphy_read_mmd_unsupported(struct phy_device *phdev, int devad, u16 regnum)
+{
+  return -EOPNOTSUPP;
+}
+EXPORT_SYMBOL(genphy_read_mmd_unsupported);
+
+int genphy_write_mmd_unsupported(struct phy_device *phdev, int devnum,
+  u16 regnum, u16 val)
+{
+  return -EOPNOTSUPP;
+}
+EXPORT_SYMBOL(genphy_write_mmd_unsupported);

int genphy_suspend(struct phy_device *phydev)
{
  int value;
  @@ -1671,23 +1714,17 @@

static int __set_phy_supported(struct phy_device *phydev, u32 max_speed)
{
  /* The default values for phydev->supported are provided by the PHY 
  - * driver "features" member, we want to reset to sane defaults first 
  - * before supporting higher speeds. 
  - */
  -phydev->supported &= PHY_DEFAULT_FEATURES;
  switch (max_speed) {
default:
return -ENOTSUPP;
case SPEED_1000:
phydev->supported |= PHY_1000BT_FEATURES;
+case SPEED_10:
+phydev->supported &= ~PHY_100BT_FEATURES;
/* fall through */
case SPEED_100:
phydev->supported |= PHY_100BT_FEATURES;
/* fall through */
case SPEED_10:
phydev->supported |= PHY_10BT_FEATURES;
+phydev->supported &= ~PHY_1000BT_FEATURES;
+break;
+case SPEED_1000:
+break;
+default:
+return -ENOTSUPP;
}

return 0;
@@ -1854,6 +1891,14 @@
new_driver->mdiodrv.driver.remove = phy_remove;
new_driver->mdiodrv.driver.owner = owner;

+/* The following works around an issue where the PHY driver doesn't bind
+ * to the device, resulting in the genphy driver being used instead of
+ * the dedicated driver. The root cause of the issue isn't known yet
+ * and seems to be in the base driver core. Once this is fixed we may
+ * remove this workaround.
+ */
+new_driver->mdiodrv.driver.probe_type = PROBE_FORCE_SYNCHRONOUS;
+
+retval = driver_register(&new_driver->mdiodrv.driver);
if (retval) {
  pr_err("%s: Error %d in registering driver\n",
              linux-4.15.0.orig/drivers/net/phy/phyLed_triggers.c
+++ linux-4.15.0/drivers/net/phy/phyLed_triggers.c
@@ -58,8 +58,9 @@
if (!phy->last_triggered)
  led_trigger_event(&phy->led_link_trigger->trigger,
          LED_FULL);
+else
+  led_trigger_event(&phy->last_triggered->trigger, LED_OFF);

  led_trigger_event(&plt->trigger, LED_OFF);
  led_trigger_event(&plt->trigger, LED_FULL);
phy->last_triggered = plt;
--- linux-4.15.0.orig/drivers/net/phy/phylink.c
+++ linux-4.15.0/drivers/net/phy/phylink.c
@@ -203,6 +203,8 @@
 __ETHTOOL_LINK_MODE_MASK_NBITS, true);
 linkmode_zero(pl->supported);
 phylink_set(pl->supported, MII);
+phylink_set(pl->supported, Pause);
+phylink_set(pl->supported, Asym_Pause);
 if (s) {
     __set_bit(s->bit, pl->supported);
 } else {
@@ -333,6 +335,10 @@
 linkmode_zero(state->lp_advertising);
 state->interface = pl->link_config.interface;
 state->an_enabled = pl->link_config.an_enabled;
+state->speed = SPEED_UNKNOWN;
+state->duplex = DUPLEX_UNKNOWN;
+state->pause = MLO_PAUSE_NONE;
+state->an_complete = 0;
 state->link = 1;

 return pl->ops->mac_link_state(ndev, state);
@@ -353,8 +359,8 @@
 *  Local device  Link partner
 *  Pause AsymDir Pause AsymDir Result
 *  1     X       1     X     TX+RX
- *  0     1       1     1     RX
- *  1     1       0     1     TX
+ *  0     1       1     1     TX
+ *  1     1       0     1     RX
 */
 static void phylink_resolve_flow(struct phylink *pl,
  struct phylink_link_state *state)
@@ -375,7 +381,7 @@
 new_pause = pl->link_config.pause & MLO_PAUSE_TXRX_MASK;
 } else { /* Enable Auto-Negotiation */
     new_pause = state->pause & MLO_PAUSE_SYM ?
-        MLO_PAUSE_RX : MLO_PAUSE_TX;
+        MLO_PAUSE_TX : MLO_PAUSE_RX;
 } else {
     new_pause = MLO_PAUSE_TX | MLO_PAUSE_RX;
 }
@@ -487,6 +493,17 @@
 queue_work(system_power_efficient_wq, &pl->resolve);
 }

+static void phylink_run_resolve_and_disable(struct phylink *pl, int bit)
unsigned long state = pl->phylink_disable_state;

set_bit(bit, &pl->phylink_disable_state);
if (state == 0) {
    queue_work(system_power_efficient_wq, &pl->resolve);
    flush_work(&pl->resolve);
}

static const struct sfp_upstream_ops sfp_phylink_ops;

static int phylink_register_sfp(struct phylink *pl, struct device_node *np)
@@ -562,6 +579,8 @@
{
    if (pl->sfp_bus)
sfp_unregister_upstream(pl->sfp_bus);
+    if (!IS_ERR_OR_NULL(pl->link_gpio))
+        gpiod_put(pl->link_gpio);

cancel_work_sync(&pl->resolve);
kfree(pl);
@@ -747,6 +766,9 @@
    phylink_an_mode_str(pl->link_an_mode),
    phy_modes(pl->link_config.interface));

/+* Always set the carrier off */
+netif_carrier_off(pl->netdev);
+
+/* Apply the link configuration to the MAC when starting. This allows
 * a fixed-link to start with the correct parameters, and also
 * ensures that we set the appropriate advertisement for Serdes links.
@@ -773,9 +795,7 @@
    if (pl->sfp_bus)
sfp_upstream_stop(pl->sfp_bus);

    -set_bit(PHYLINK_DISABLE_STOPPED, &pl->phylink_disable_state);
    -queue_work(system_power_efficient_wq, &pl->resolve);
    -flush_work(&pl->resolve);
    +phylink_run_resolve_and_disable(pl, PHYLINK_DISABLE_STOPPED);

} EXPORT_SYMBOL_GPL(phylink_stop);
@@ -1430,9 +1450,7 @@
WARN_ON(!lockdep_rtnl_is_held());

    -set_bit(PHYLINK_DISABLE_LINK, &pl->phylink_disable_state);
-queue_work(system_power_efficient_wq, &pl->resolve);
-flush_work(&pl->resolve);
+phylink_run_resolve_and_disable(pl, PHYLINK_DISABLE_LINK);
}

static void phylink_sfp_link_up(void *upstream)
--- linux-4.15.0.orig/drivers/net/phy/realtek.c
+++ linux-4.15.0/drivers/net/phy/realtek.c
@@ -163,7 +163,7 @@
         .read_status    = &genphy_read_status,
         }, {
         .phy_id= 0x001cc816,
-.name= "RTL8201F 10/100Mbps Ethernet",
+.name= "RTL8201F Fast Ethernet",
         .phy_id_mask= 0x001fffff,
         .features= PHY_BASIC_FEATURES,
         .flags= PHY_HAS_INTERRUPT,
@@ -183,6 +183,8 @@
         .read_status= &genphy_read_status,
         .ack_interrupt= &rtl821x_ack_interrupt,
         .config_intr= &rtl8211b_config_intr,
+         .read_mmd= &genphy_read_mmd_unsupported,
+         .write_mmd= &genphy_write_mmd_unsupported,
         }, {
         .phy_id= 0x001cc914,
-.name= "RTL8211DN Gigabit Ethernet",
--- linux-4.15.0.orig/drivers/net/phy/sfp-bus.c
+++ linux-4.15.0/drivers/net/phy/sfp-bus.c
@@ -274,6 +274,7 @@
         if (bus->started) {
         bus->socket_ops->attach(bus->sfp);
         bus->socket_ops->start(bus->sfp);
@@ -287,6 +288,7 @@
         if (bus->registered) {
         if (bus->started) {
         bus->socket_ops->stop(bus->sfp);
+         bus->socket_ops->detach(bus->sfp);
         if (bus->phydev & ops & & ops->disconnect_phy) {
         ops->disconnect_phy(bus->upstream);
@@ -326,6 +328,13 @@
         EXPORT_SYMBOL_GPL(sfp_upstream_stop);
+static void sfp_upstream_clear(struct sfp_bus *bus)
+
+bus->upstream_ops = NULL;
+bus->upstream = NULL;
+bus->netdev = NULL;
+
+
define sfp_register_upstream(struct device_node *np,
    struct net_device *ndev, void *upstream,
    const struct sfp_upstream_ops *ops)
@@ -339,8 +348,11 @@
    bus->upstream = upstream;
    bus->netdev = ndev;

-if (bus->sfp)
+if (bus->sfp) {
    ret = sfp_register_bus(bus);
+    if (ret)
+        sfp_upstream_clear(bus);
+
    rtnl_unlock();
}

@@ -358,8 +370,7 @@
    rtnl_lock();
    if (bus->sfp)
        sfp_unregister_bus(bus);
    -bus->upstream = NULL;
    -bus->netdev = NULL;
    +sfp_upstream_clear(bus);
    rtnl_unlock();

    sfp_bus_put(bus);
@@ -431,6 +461,13 @@
}

EXPORT_SYMBOL_GPL(sfp_module_remove);

+static void sfp_socket_clear(struct sfp_bus *bus)
+
+bus->sfp_dev = NULL;
+bus->sfp = NULL;
+bus->socket_ops = NULL;
+
+
define sfp_register_socket(struct device *dev, struct sfp *sfp,
    const struct sfp_socket_ops *ops)
{
@@ -443,8 +461,11 @@
bus->sfp = sfp;
bus->socket_ops = ops;

-if (bus->netdev)
+if (bus->netdev) {
    ret = sfp_register_bus(bus);
+    if (ret)
    +    sfp_socket_clear(bus);
  }
  rtnl_unlock();
}

@@ -462,9 +483,7 @@
  rtnl_lock();
  if (bus->netdev)
  sfp_unregister_bus(bus);
-bus->sfp_dev = NULL;
-bus->sfp = NULL;
-bus->socket_ops = NULL;
+  sfp_socket_clear(bus);
  rtnl_unlock();

  sfp_bus_put(bus);
--- linux-4.15.0.orig/drivers/net/phy/sfp.c
+++ linux-4.15.0/drivers/net/phy/sfp.c
@@ -111,10 +111,12 @@

 struct gpio_desc *gpio[GPIO_MAX];

+bool attached;
+struct mutex st_mutex;/* Protects state */
unsigned int state;
struct delayed_work poll;
struct delayed_work timeout;
-struct mutex sm_mutex;
+struct mutex sm_mutex;/* Protects state machine */
unsigned char sm_mod_state;
unsigned char sm_dev_state;
unsigned short sm_state;
@@ -164,6 +166,7 @@

 void *buf, size_t len)
 {
 struct i2c_msg msgs[2];
-size_t this_len;
 int ret;

  msgs[0].addr = bus_addr;
@@ -175,11 +178,26 @@
msgs[1].len = len;
msgs[1].buf = buf;

- ret = i2c_transfer(i2c, msgs, ARRAY_SIZE(msgs));
- if (ret < 0)
- return ret;
+ while (len) {
+ this_len = len;
+ if (this_len > 16)
+ this_len = 16;
+ + msgs[1].len = this_len;
+ + ret = i2c_transfer(i2c, msgs, ARRAY_SIZE(msgs));
+ if (ret < 0)
+ return ret;

- return ret == ARRAY_SIZE(msgs) ? len : 0;
+ if (ret != ARRAY_SIZE(msgs))
+ break;
+
+ msgs[1].buf += this_len;
+ dev_addr += this_len;
+ len -= this_len;
+ }
+
+ return msgs[1].buf - (u8 *)buf;

static int sfp_i2c_read(struct sfp *sfp, bool a2, u8 addr, void *buf,
@@ -315,12 +333,12 @@
msleep(T_PHY_RESET_MS);

phy = mdiobus_scan(sfp->i2c_mii, SFP_PHY_ADDR);
- if (IS_ERR(phy)) {
- dev_err(sfp->dev, "mdiobus scan returned %ld\n", PTR_ERR(phy));
+ if (phy == ERR_PTR(-ENODEV)) {
+ dev_info(sfp->dev, "no PHY detected\n");
 return;
 } 
- if (!phy) {
- dev_info(sfp->dev, "no PHY detected\n");
+ if (IS_ERR(phy)) {
+ dev_error(sfp->dev, "mdiobus scan returned %ld\n", PTR_ERR(phy));
 return;
 } 

@@ -521,7 +539,7 @@
switch (sfp->sm_mod_state) {
    default:
    - if (event == SFP_E_INSERT) {
    + if (event == SFP_E_INSERT && sfp->attached) {
        sfp_module_tx_disable(sfp);
        sfp_sm_ins_next(sfp, SFP_MOD_PROBE, T_PROBE_INIT);
    }
    } @ @ -643,6 +661,19 @@
    mutex_unlock(&sfp->sm_mutex);
}

+static void sfp_attach(struct sfp *sfp) {
  +sfp->attached = true;
  +if (sfp->state & SFP_F_PRESENT)
      +sfp_sm_event(sfp, SFP_E_INSERT);
  +}
+
+static void sfp_detach(struct sfp *sfp) {
  +sfp->attached = false;
  +sfp_sm_event(sfp, SFP_E_REMOVE);
  +}
+
static void sfp_start(struct sfp *sfp) {
  sfp_sm_event(sfp, SFP_E_DEV_UP);
  @@ -683,20 +714,19 @@
  len = min_t(unsigned int, last, ETH_MODULE_SFF_8079_LEN);
  len -= first;

  -ret = sfp->read(sfp, false, first, data, len);
  +ret = sfp_read(sfp, false, first, data, len);
  if (ret < 0)
      return ret;

  first += len;
  data += len;
} @ @ -683,20 +714,19 @@

- if (first >= ETH_MODULE_SFF_8079_LEN &&
-     first < ETH_MODULE_SFF_8472_LEN) {
+ if (first < ETH_MODULE_SFF_8472_LEN && last > ETH_MODULE_SFF_8079_LEN) {
    len = min_t(unsigned int, last, ETH_MODULE_SFF_8472_LEN);
    len -= first;
    first -= ETH_MODULE_SFF_8079_LEN;

    -ret = sfp->read(sfp, true, first, data, len);
+ret = sfp_read(sfp, true, first, data, len);
if (ret < 0)
    return ret;
}
@@ -704,6 +734,8 @@
}
static const struct sfp_socket_ops sfp_module_ops = {
    .attach = sfp_attach,
    .detach = sfp_detach,
    .start = sfp_start,
    .stop = sfp_stop,
    .module_info = sfp_module_info,
@@ -723,6 +755,7 @@
{
    unsigned int state, i, changed;

+mutex_lock(&sfp->st_mutex);
    state = sfp_get_state(sfp);
    changed = state ^ sfp->state;
    changed &= SFP_F_PRESENT | SFP_F_LOS | SFP_F_TX_FAULT;
@@ -748,6 +781,7 @@
sfp_sm_event(sfp, state & SFP_F_LOS ?
            SFP_F_LOS_HIGH : SFP_F_LOS_LOW);
            rtnl_unlock();
+mutex_unlock(&sfp->st_mutex);
}
static irqreturn_t sfp_irq(int irq, void *data)
@@ -778,6 +812,7 @@
sfp->dev = dev;
mutex_init(&sfp->sm_mutex);
+mutex_init(&sfp->st_mutex);
INIT_DELAYED_WORK(&sfp->poll, sfp_poll);
INIT_DELAYED_WORK(&sfp->timeout, sfp_timeout);
@@ -846,10 +881,6 @@
sfp->set_state = sfp_gpio_set_state;
    }

-sfp->sfp_bus = sfp_register_socket(sfp->dev, sfp, &sfp_module_ops);
-if (!sfp->sfp_bus)
-return -ENOMEM;
-
/* Get the initial state, and always signal TX disable,
 * since the network interface will not be up.
*/
@@ -860,17 +891,14 @@
sfp->state |= SFP_F_RATE_SELECT;
sfp_set_state(sfp, sfp->state);
sfp_module_tx_disable(sfp);
-rtwl_lock();
-if (sfp->state & SFP_F_PRESENT)
-sfp_sm_event(sfp, SFP_F_INSERT);
-rtwl_unlock();

for (i = 0; i < GPIO_MAX; i++) {
if (gpio_flags[i] != GPIOD_IN || !sfp->gpio[i])
continue;

irq = gpiod_to_irq(sfp-&gt;gpio[i]);
-if (!irq) {
+if (irq < 0) {
+ irq = 0;
 po11 = true;
 continue;
 }
@@ -887,6 +915,10 @@
 if (poll)
 mod_delayed_work(system_wq, &amp;sfp-&gt;poll, poll_jiffies);

+sfp-&gt;sfp_bus = sfp_register_socket(sfp-&gt;dev, sfp, &amp;sfp_module_ops);
+if (!sfp-&gt;sfp_bus)
+return -ENOMEM;
 +
 return 0;
 }

--- linux-4.15.0.orig/drivers/net/phy/sfp.h
+++ linux-4.15.0/drivers/net/phy/sfp.h
 @ @ -7,6 +7,8 @@
 struct sfp;

 struct sfp_socket_ops {
+void (*attach)(struct sfp *sfp);
+void (*detach)(struct sfp *sfp);
 void (*start)(struct sfp *sfp);
 void (*stop)(struct sfp *sfp);
 int (*module_info)(struct sfp *sfp, struct ethtool_modinfo *modinfo);
--- linux-4.15.0.orig/drivers/net/phy/spi_ks8995.c
+++ linux-4.15.0/drivers/net/phy/spi_ks8995.c
 @ @ -162,6 +162,14 @@
 ];
 MODULE_DEVICE_TABLE(spi, ks8995_id);
static const struct of_device_id ks8995_spi_of_match[] = {
    { .compatible = "micrel,ks8995" },
    { .compatible = "micrel,ksz8864" },
    { .compatible = "micrel,ksz8795" },
    { },
};
MODULE_DEVICE_TABLE(of, ks8995_spi_of_match);

static inline u8 get_chip_id(u8 val)
{
    return (val >> ID1_CHIPID_S) & ID1_CHIPID_M;
}

static struct spi_driver ks8995_driver = {
    .driver = {
        .name = "spi-ks8995",
        .of_match_table = of_match_ptr(ks8895_spi_of_match),
    },
    .probe = ks8995_probe,
    .remove = ks8995_remove,

--- linux-4.15.0.orig/drivers/net/phy/xilinx_gmii2rgmii.c
+++ linux-4.15.0/drivers/net/phy/xilinx_gmii2rgmii.c
@@ -40,8 +40,14 @@
{
    struct gmii2rgmii *priv = phydev->priv;
    u16 val = 0;
    int err;

-    priv->phyDrv->read_status(phydev);
+    if (priv->phyDrv->read_status)
+        err = priv->phyDrv->read_status(phydev);
+    else
+        err = genphy_read_status(phydev);
+    if (err < 0)
+        return err;

    val = mdiobus_read(phydev->mdio.bus, priv->addr, XILINX_GMII2RGMII_REG);
    val &= ~XILINX_GMII2RGMII_SPEED_MASK;
    if (!priv->phyDev->drv) {
        dev_info(dev, "Attached phy not ready\n");
        return -EPROBE_DEFER;
    }

+    priv->addr = mdiodev->addr;
   (priv->phyDrv = priv->phyDev->drv);

+    if (!priv->phyDev->drv) {
+        dev_info(dev, "Attached phy not ready\n");
+        return -EPROBE_DEFER;
+    }

    priv->addr = mdiodev->addr;
    priv->phyDrv = priv->phyDev->drv;

memcpy(priv->conv_phy_drv, priv->phy_dev->drv, skb = dev_alloc_skb(ap->mru + PPP_HDRLEN + 2);
if (!skb)
goto nomem;
- ap->rpkt = skb;
- }
- if (skb->len == 0) {
- /* Try to get the payload 4-byte aligned.
- * This should match the
- * PPP_ALLSTATIONS/PPP_UI/compressed tests in
- * process_input_packet, but we do not have
- * enough chars here to test buf[1] and buf[2].
- */
+ ap->rpkt = skb;
+ }
+ if (skb->len == 0) {
+ /* Try to get the payload 4-byte aligned.
+ * This should match the
+ * PPP_ALLSTATIONS/PPP_UI/compressed tests in
+ * process_input_packet, but we do not have
+ * enough chars here to test buf[1] and buf[2].
+ */
if (buf[0] != PPP_ALLSTATIONS)
skb_reserve(skb, 2 + (buf[0] & 1));
}
static int __init deflate_init(void)
{
- int answer = ppp_register_compressor(&ppp_deflate);
- if (answer == 0)
- printk(KERN_INFO
- "PPP Deflate Compression module registered\n");
- ppp_register_compressor(&ppp_deflate_draft);
- return answer;
+ int rc;
+
+ rc = ppp_register_compressor(&ppp_deflate);
+ if (rc)
+ return rc;
+
+ rc = ppp_register_compressor(&ppp_deflate_draft);
+ if (rc) {
+ppp_unregister_compressor(&ppp_deflate);
+return rc;
+
+pr_info("PPP Deflate Compression module registered\n");
+return 0;
}

static void __exit deflate_cleanup(void)
--- linux-4.15.0.orig/drivers/net/ppp/ppp_generic.c
+++ linux-4.15.0/drivers/net/ppp/ppp_generic.c
@@ -257,7 +257,7 @@
/* Prototypes. */
 static int ppp_unattached_ioctl(struct net *net, struct ppp_file *pf,
 struct file *file, unsigned int cmd, unsigned long arg);
- static void ppp_xmit_process(struct ppp *ppp);
+ static void ppp_xmit_process(struct ppp *ppp, struct sk_buff *skb);
 static void ppp_send_frame(struct ppp *ppp, struct sk_buff *skb);
 static void ppp_push(struct ppp *ppp);
 static void ppp_channel_push(struct channel *pch);
@@ -287,7 +287,7 @@
 static int ppp_connect_channel(struct channel *pch, int unit);
 static int ppp_disconnect_channel(struct channel *pch);
 static void ppp_destroy_channel(struct channel *pch);
- static int unit_get(struct idr *p, void *ptr);
+ static int unit_get(struct idr *p, void *ptr, int min);
 static int unit_set(struct idr *p, void *ptr, int n);
 static void unit_put(struct idr *p, int n);
 static void *unit_find(struct idr *p, int n);
@@ -513,13 +513,12 @@
 goto out;
 }

skb_queue_tail(&pf->xq, skb);
-
 switch (pf->kind) {
 case INTERFACE:
-++ppp_xmit_process(PF_TO_PPP(pf));
+ppp_xmit_process(PF_TO_PPP(pf), skb);
 break;
 case CHANNEL:
+skb_queue_tail(&pf->xq, skb);
 ppp_channel_push(PF_TO_CHANNEL(pf));
 break;
 }
if (unit < 0) {
    ret = unit_get(&pn->units_idr, ppp);
    ret = unit_get(&pn->units_idr, ppp, 0);
    if (ret < 0)
        goto err;
    if (!ifname_is_set) {
        while (1) {
            snprintf(ppp->dev->name, IFNAMSIZ, "ppp%i", ret);
            if (!__dev_get_by_name(ppp->ppp_net, ppp->dev->name))
                break;
            unit_put(&pn->units_idr, ret);
            ret = unit_get(&pn->units_idr, ppp, ret + 1);
            if (ret < 0)
                goto err;
        }
    } else {
        /* Caller asked for a specific unit number. Fail with -EEXIST
         * if unavailable. For backward compatibility, return -EEXIST
         * @@ -1132,7 +1142,7 @@
         * the PPP unit identifier as suffix (i.e. ppp<unit_id>). This allows
         * userspace to infer the device name using to the PPPIOCGUNIT ioctl.
         * @@
         * @@ -1267,8 +1277,8 @@
         *
         * Called to do any work queued up on the transmit side that can now be done */
         static void __ppp_xmit_process(struct ppp *ppp, struct sk_buff *skb)
         {
             struct sk_buff *skb;
             skb_scrub_packet(skb, !net_eq(ppp->ppp_net, dev_net(dev)));
             skb_queue_tail(&ppp->file.xq, skb);
             ppp_xmit_process(ppp);
             ppp_xmit_process(ppp, skb);
             return NETDEV_TX_OK;
         }
         outf:
         @@ -1420,13 +1430,14 @@
         */
ppp_xmit_lock(ppp);
if (!ppp->closing) {
    ppp_push(ppp);
    +
    +if (skb)
    +skb_queue_tail(&ppp->file.xq, skb);
    while (!ppp->xmit_pending &&
        (skb = skb_dequeue(&ppp->file.xq)))
    ppp_send_frame(ppp, skb);
    @@ -1436,11 +1447,13 @@
              netif_wake_queue(ppp->dev);
    else
    netif_stop_queue(ppp->dev);
    +} else {
    +kfree_skb(skb);
    }
    ppp_xmit_unlock(ppp);
}

-static void ppp_xmit_process(struct ppp *ppp)
+static void ppp_xmit_process(struct ppp *ppp, struct sk_buff *skb)
{
    local_bh_disable();
    @@ -1448,7 +1461,7 @@
               goto err;

    (*this_cpu_ptr(ppp->xmit_recursion))++;
    -__ppp_xmit_process(ppp);
    +__ppp_xmit_process(ppp, skb);
    (*this_cpu_ptr(ppp->xmit_recursion))--;

    local_bh_enable();
    @@ -1458,6 +1471,8 @@
    err:
    local_bh_enable();
+
    kfree_skb(skb);
    +
    if (net_ratelimit())
    netdev_err(ppp->dev, "recursion detected\n");
    }@
    -1942,7 +1957,7 @@
    if (skb_queue_empty(&pch->file.xq)) {
    ppp = pch->ppp;
    if (ppp)
    -__ppp_xmit_process(ppp);
    +__ppp_xmit_process(ppp, NULL);
}}

@@ -3161,6 +3176,15 @@

goto outl;

ppp_lock(ppp);
+spin_lock_bh(&pch->downl);
+if (!pch->chan) {
+  /* Don't connect unregistered channels */
+  spin_unlock_bh(&pch->downl);
+  ppp_unlock(ppp);
+  ret = -ENOTCONN;
+  goto outl;
+} 
+spin_unlock_bh(&pch->downl);
if (pch->file.hdrlen > ppp->file.hdrlen)
  ppp->file.hdrlen = pch->file.hdrlen;
hdrlen = pch->file.hdrlen + 2; /* for protocol bytes */
@@ -3256,9 +3280,9 @@

/* get new free unit number and associate pointer with it */
-static int unit_get(struct idr *p, void *ptr)
-static int unit_get(struct idr *p, void *ptr, int min)
{
-  return idr_alloc(p, ptr, 0, 0, GFP_KERNEL);
+  return idr_alloc(p, ptr, min, 0, GFP_KERNEL);
+}
/* put unit number back to a pool */
--- linux-4.15.0.orig/drivers/net/ppp/ppp_mppe.c
+++ linux-4.15.0/drivers/net/ppp/ppp_mppe.c
@@ -63,6 +63,7 @@
 MODULE_DESCRIPTION("Point-to-Point Protocol Microsoft Point-to-Point Encryption support");
 MODULE_LICENSE("Dual BSD/GPL");
 MODULE_ALIAS("ppp-compress-" __stringify(CI_MPPE));
+MODULE_SOFTDEP("pre: arc4");
 MODULE_VERSION("1.0.2");

static unsigned int
--- linux-4.15.0.orig/drivers/net/ppp/pppoe.c
+++ linux-4.15.0/drivers/net/ppp/pppoe.c
@@ -429,6 +429,9 @@

if (!skb)
  goto out;

+if (skb_mac_header_len(skb) < ETH_HLEN)
goto drop;
+
if (!pskb_may_pull(skb, sizeof(struct pppoe_hdr)))
goto drop;

@@ -442,6 +445,7 @@
if (pskb_trim_rcsum(skb, len))
goto drop;

+ph = pppoe_hdr(skb);
pn = pppoe_pernet(dev_net(dev));

// Note that get_item does a sock_hold(), so sk_pppox(po)
@@ -493,6 +497,9 @@
if (!skb)
goto out;
+
@if (skb->pkt_type != PACKET_HOST)
+goto abort;
+ if (!pskb_may_pull(skb, sizeof(struct pppoe_hdr)))
goto abort;

@@ -620,6 +627,10 @@
lock_sock(sk);

error = -EINVAL;
+
+if (sockaddr_len != sizeof(struct sockaddr_pppox))
+goto end;
+ if (sp->sa_protocol != PX_PROTO_OE)
goto end;

@@ -1129,6 +1140,9 @@
 .recvmsg = pppoe_recvmsg,
 .mmap = sock_no_mmap,
 .ioctl = pppox_ioctl,
+#ifdef CONFIG_COMPAT
 +compat_ioctl = pppox_compat_ioctl,
+#endif
};

static const struct pppox_proto pppoe_proto = {
--- linux-4.15.0.orig/drivers/net/ppp/pppox.c
+++ linux-4.15.0/drivers/net/ppp/pppox.c
@@ -22,6 +22,7 @@
 .recvmsg = pppoe_recvmsg,
 .mmap = sock_no_mmap,
 .ioctl = pppox_ioctl,
+#ifdef CONFIG_COMPAT
 +compat_ioctl = pppox_compat_ioctl,
+#endif
};

#include <linux/string.h>
```c
#include <linux/module.h>
#include <linux/kernel.h>
#include <linux/compat.h>
#include <linux/errno.h>
#include <linux/netdevice.h>
#include <linux/net.h>

EXPORT_SYMBOL(pppox_ioctl);

#ifdef CONFIG_COMPAT
int pppox_compat_ioctl(struct socket *sock, unsigned int cmd, unsigned long arg)
{
  if (cmd == PPPOEIOCSFWD32)
    cmd = PPPOEIOCSFWD;
  return pppox_ioctl(sock, cmd, (unsigned long)compat_ptr(arg));
}

EXPORT_SYMBOL(pppox_compat_ioctl);
#endif

static int pppox_create(struct net *net, struct socket *sock, int protocol, int kern)
{
  --- linux-4.15.0.orig/drivers/net/ppp/pptp.c
  +++ linux-4.15.0/drivers/net/ppp/pptp.c
  @@ -464,7 +464,6 @@
    po->chan.mtu = dst_mtu(&rt->dst);
    if (!po->chan.mtu)
      -ip_rt_put(rt);
++ po->chan.mtu = PPP_MRU;
    -ip_rt_put(rt);
    po->chan.mtu -= PPTP_HEADER_OVERHEAD;

    po->chanhdrlen = 2 + sizeof(struct pptp_gre_header);
    @@ -540,6 +539,7 @@
    skb_queue_purge(&sk->sk_receive_queue);
    +dst_release(rcu_dereference_protected(sk->sk_dst_cache, 1));
  }

  static int pptp_create(struct net *net, struct socket *sock, int kern)
  @@ -636,6 +636,9 @@
    .recvmsg    = sock_no_recvmsg,
    .mmap       = sock_no_mmap,
    .ioctl      = pppox_ioctl,
+ifdef CONFIG_COMPAT
```
.+compat_ioctl = pppox_compat_ioctl,
+#elifendif

static const struct pppox_proto pppox_pptp_proto = {
--- linux-4.15.0.orig/drivers/net/rionet.c
+++ linux-4.15.0/drivers/net/rionet.c
@@ -216,9 +216,9 @@
  * it just report sending a packet to the target
  * (without actual packet transfer).
  */
-dev_kfree_skb_any(skb);
+dev_kfree_skb_any(skb);
  ndev->stats.tx_packets++;
  ndev->stats.tx_bytes += skb->len;
  +dev_kfree_skb_any(skb);
}
}

--- linux-4.15.0.orig/drivers/net/slip/slhc.c
+++ linux-4.15.0/drivers/net/slip/slhc.c
@@ -153,7 +153,7 @@
 void
 slhc_free(struct slcompress *comp)
 {
+if ( IS_ERR_OR_NULL(comp) )
+if ( IS_ERR_OR_NULL(comp) )
   return;

   if ( comp->tstate != NULLSLSTATE )
@@ -232,7 +232,7 @@

   if (ip->version != 4 || ip->ihl < 5)
   /* Bail if this packet isn’t TCP, or is an IP fragment */
+return isize;

comp->sls_o_tcp++;
return isize;
}
/* Extract TCP header */
+nlen = ip->ihl * 4;
+if (isize < nlen + sizeof(*th))
+return isize;

-th = (struct tcphdr *)(((unsigned char *)ip) + ip->ihl*4);
-hlen = ip->ihl*4 + th->doff*4;
+th = (struct tcphdr *)(icp + nlen);
+if (th->doff < sizeof(struct tcphdr) / 4)
+return isize;
+hlen = nlen + th->doff * 4;

/* Bail if the TCP packet isn't `compressible' (i.e., ACK isn't set or
 * some other control bit is set). Also uncompressible if
@@ -509,6 +515,10 @@
if(x < 0 || x > comp->rslot_limit)
go to bad;

+/* Check if the cstate is initialized */
+if (!comp->rstate[x].initialized)
+goto bad;
+
comp->flags &=- SLF_TOSS;
comp->recv_current = x;
} else {
@@ -573,6 +583,7 @@
if (cs->cs_tcp.doff > 5)
    memcpy(cs->cs_tcpopt, icp + ihl*4 + sizeof(struct tcphdr), (cs->cs_tcp.doff - 5) * 4);
cs->cs_hsize = ihl*2 + cs->cs_tcp.doff*2;
+cs->initialized = true;
/* Put headers back on packet
 * Neither header checksum is recalculated
 */
--- linux-4.15.0.orig/drivers/net/slip/slip.c
+++ linux-4.15.0/drivers/net/slip/slip.c
@@ -452,9 +452,16 @@
*/
static void slip_write_wakeup(struct tty_struct *tty)
{
-struct slip *sl = tty->disc_data;
+struct slip *sl;
+rcu_read_lock();
+sl = rcu_dereference(tty->disc_data);
+if (!sl)
schedule_work(&sl->tx_work);
+out:
+rcu_read_unlock();
}

static void sl_tx_timeout(struct net_device *dev)
@@ -855,6 +862,11 @@
sl->tty = NULL;
tty->disc_data = NULL;
clear_bit(SLF_INUSE, &sl->flags);
+sl_free_netdev(sl->dev);
+/* do not call free_netdev before rtnl_unlock */
+rtnl_unlock();
+free_netdev(sl->dev);
+return err;

err_exit:
    rtnl_unlock();
@@ -880,10 +892,11 @@
    return;

spin_lock_bh(&sl->lock);
    tty->disc_data = NULL;
+    rcu_assign_pointer(tty->disc_data, NULL);
    sl->tty = NULL;
spin_unlock_bh(&sl->lock);

+synchronize_rcu();
flush_work(&sl->tx_work);

/* VSV = very important to remove timers */
--- linux-4.15.0.orig/drivers/net/tap.c
+++ linux-4.15.0/drivers/net/tap.c
@@ -330,9 +330,6 @@
if (!q)
    return RX_HANDLER_PASS;
-if (__skb_array_full(&q->skb_array))
    goto drop;
-
skb_push(skb, ETH_HLEN);

/* Apply the forward feature mask so that we perform segmentation
@@ -777,13 +774,16 @@
int total;
if (q->flags & IFF_VNET_HDR) {
    int vlan_hlen = skb_vlan_tag_present(skb) ? VLAN_HLEN : 0;
    struct virtio_net_hdr vnet_hdr;

    vnet_hdr_len = READ_ONCE(q->vnet_hdr_sz);
    if (iov_iter_count(iter) < vnet_hdr_len)
        return -EINVAL;

    if (virtio_net_hdr_from_skb(skb, &vnet_hdr,
        - tap_is_little_endian(q), true))
        + tap_is_little_endian(q), true,
        + vlan_hlen))
        BUG();

    if (copy_to_iter(&vnet_hdr, sizeof(vnet_hdr), iter) !=
        --- linux-4.15.0.orig/drivers/net/team/team.c
        +++ linux-4.15.0/drivers/net/team/team.c
        @ @ -299,7 +299,7 @@
        for (i--; i >= 0; i--)
            __team_option_inst_del_option(team, dst_opts[i]);

        -i = option_count - 1;
        +i = option_count;
        alloc_rollback:
        for (i--; i >= 0; i--)
            kfree(dst_opts[i]);
        @ @ -480,6 +480,9 @@
        struct team_mode_item *mitem;
        const struct team_mode *mode = NULL;

        +if (!try_module_get(THIS_MODULE))
            +return NULL;
            + spin_lock(&mode_list_lock);
            mitem = __find_mode(kind);
            if (!mitem) {
                @ @ -495,6 +498,7 @@
            }

        spin_unlock(&mode_list_lock);
        +module_put(THIS_MODULE);
        return mode;
    }

    @ @ -978,8 +982,6 @@
    team->en_port_count--;
    team_queue_override_port_del(team, port);
    team_adjust_ops(team);


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static void __team_compute_features(struct team *team)
{
    struct team_port *port;

    u32 vlan_features = TEAM_VLAN_FEATURES & NETIF_F_ALL_FOR_ALL;
    netdev_features_t vlan_features = TEAM_VLAN_FEATURES &
            NETIF_F_ALL_FOR_ALL;
    netdev_features_t enc_features = TEAM_ENC_FEATURES;
    unsigned short max_hard_header_len = ETH_HLEN;
    unsigned int dst_release_flag = IFF_XMIT_DST_RELEASE |
            IFF_XMIT_DST_RELEASE_PERM;

    list_for_each_entry(port, &team->port_list, list) {
        list_for_each_entry_rcu(port, &team->port_list, list) {

            vlan_features = netdev_increment_features(vlan_features,
                    port->dev->vlan_features,
                    TEAM_VLAN_FEATURES);
            if (port->dev->hard_header_len > max_hard_header_len)
                max_hard_header_len = port->dev->hard_header_len;
        }
    }

    team->dev->vlan_features = vlan_features;
    -team->dev->hw_enc_features = enc_features | NETIF_F_GSO_ENCAP_ALL;
    +team->dev->hw_enc_features = enc_features | NETIF_F_GSO_ENCAP_ALL |
        NETIF_F_HW_VLAN_CTAG_TX |
        NETIF_F_HW_VLAN_STAG_TX;
    team->dev->hard_header_len = max_hard_header_len;

    team->dev->priv_flags &= ~IFF_XMIT_DST_RELEASE;

static void team_compute_features(struct team *team)
{
    mutex_lock(&team->lock);
    __team_compute_features(team);
    mutex_unlock(&team->lock);
    netdev_change_features(team->dev);
}

@@ -993,13 +995,15 @@
#ifdef CONFIG_NET_POLL_CONTROLLER
- static int team_port_enable_netpoll(struct team *team, struct team_port *port)  
+ static int __team_port_enable_netpoll(struct team_port *port)  
{  
    struct netpoll *np;  
    int err;  
    
    - if (!team->dev->npinfo)  
    - return 0;  
    -  
    np = kzalloc(sizeof(*np), GFP_KERNEL);  
    if (!np)  
        return -ENOMEM;  
@@ -1082,6 +1084,14 @@  
        return err;  
    }  
+ static int team_port_enable_netpoll(struct team_port *port)  
+ {  
+     if (!port->team->dev->npinfo)  
+        return 0;  
+     +  
+     +     return __team_port_enable_netpoll(port);  
+     +  
+     +     static void team_port_disable_netpoll(struct team_port *port)  
+     {  
+         struct netpoll *np = port->np;  
@@ -1096,7 +1106,7 @@  
+             kfree(np);  
+         }  
+         #else  
- static int team_port_enable_netpoll(struct team *team, struct team_port *port)  
+ static int team_port_enable_netpoll(struct team_port *port)  
+ {  
+     return 0;  
+ }  
@@ -1148,6 +1158,17 @@  
        return -EBUSY;  
    }  
+ if (dev == port_dev) {  
+     netdev_err(dev, "Cannot enslave team device to itself\n");  
+     return -EINVAL;  
+ }  
+ 
+ 
```
if (netdev_has_upper_dev(dev, port_dev)) {
    netdev_err(dev, "Device %s is already an upper device of the team interface\n", portname);
    return -EBUSY;
}

if (port_dev->features & NETIF_F_VLAN_CHALLENGED && vlan_uses_dev(dev)) {
    netdev_err(dev, "Device %s is VLAN challenged and team device has VLAN set up\n", portname);
    goto err_dev_open;
}

-netif_addr_lock_bh(dev);
-dev_uc_sync_multiple(port_dev, dev);
-dev_mc_sync_multiple(port_dev, dev);
-netif_addr_unlock_bh(dev);

err = vlan_vids_add_by_dev(port_dev, dev);
if (err) {
    netdev_err(dev, "Failed to add vlan ids to device %s\n", portname);
    goto err_vids_add;
}

-err = team_port_enable_netpoll(team, port);
+err = team_port_enable_netpoll(port);
if (err) {
    netdev_err(dev, "Failed to enable netpoll on device %s\n", portname);
    goto err_option_port_add;
}

+/* set promiscuity level to new slave */
+if (dev->flags & IFF_PROMISC) {
    +err = dev_set_promiscuity(port_dev, 1);
    +if (err)
    +goto err_set_slave_promisc;
+}
+
+/* set allmulti level to new slave */
+if (dev->flags & IFF_ALLMULTI) {
    +err = dev_set_allmulti(port_dev, 1);
    +if (err) {
        +if (dev->flags & IFF_PROMISC)
            +dev_set_promiscuity(port_dev, -1);
        +goto err_set_slave_promisc;
    }
port->index = -1;
list_add_tail_rcu(&port->list, &team->port_list);
team_port_enable(team, port);
__team_compute_features(team);
-__team_port_change_port_added(port, !!netif_carrier_ok(port_dev));
+__team_port_change_port_added(port, !!netif_oper_up(port_dev));
__team_options_change_check(team);

netdev_info(dev, "Port device %s added\n", portname);

return 0;

+err_set_slave_promisc:
+__team_option_inst_del_port(team, port);
+
err_option_port_add:
team_upper_dev_unlink(team, port);

@@ -1265,8 +1306,6 @@
vlan_vids_del_by_dev(port_dev, dev);

err_vids_add:
-dev_uc_unsync(port_dev, dev);
-dev_mc_unsync(port_dev, dev);
dev_close(port_dev);

err_dev_open:
@@ -1299,6 +1338,12 @@
team_port_disable(team, port);
list_del_rcu(&port->list);
+
+if (dev->flags & IFF_PROMISC)
+dev_set_promiscuity(port_dev, -1);
+if (dev->flags & IFF_ALLMULTI)
+dev_set_allmulti(port_dev, -1);
+team_upper_dev_unlink(team, port);
etdev_rx_handler_unregister(port_dev);
team_port_disable_netpoll(port);
mutex_lock(&team->lock);
list_for_each_entry(port, &team->port_list, list) {
    -err = team_port_enable_netpoll(team, port);
    +err = __team_port_enable_netpoll(port);
    if (err) {
        __team_netpoll_cleanup(team);
        break;
    }
    dev->header_ops = port_dev->header_ops;
    dev->type = port_dev->type;
    dev->hard_header_len = port_dev->hard_header_len;
    +dev->needed_headroom = port_dev->needed_headroom;
    dev->addr_len = port_dev->addr_len;
    dev->mtu = port_dev->mtu;
    memcpy(dev->broadcast, port_dev->broadcast, port_dev->addr_len);
    @ @ -2093,12 +2139,12 @@
    dev->features |= NETIF_F_NETNS_LOCAL;

    dev->hw_features = TEAM_VLAN_FEATURES |
    - NETIF_F_HW_VLAN_CTAG_TX |
    NETIF_F_HW_VLAN_CTAG_RX |
    NETIF_F_HW_VLAN_CTAG_FILTER;

    dev->hw_features |= NETIF_F_GSO_ENCAP_ALL;
    dev->features |= dev->hw_features;
    +dev->features |= NETIF_F_HW_VLAN_CTAG_TX;
}

static int team_newlink(struct net *src_net, struct net_device *dev,
@@ -2167,6 +2213,8 @@
    [TEAM_ATTR_OPTION_CHANGED]= { .type = NLA_FLAG },
    [TEAM_ATTR_OPTION_TYPE]= { .type = NLA_U8 },
    [TEAM_ATTR_OPTION_DATA]= { .type = NLA_BINARY },
    +[TEAM_ATTR_OPTION_PORT_IFINDEX]= { .type = NLA_U32 },
    +[TEAM_ATTR_OPTION_ARRAY_INDEX]= { .type = NLA_U32 },
};

static int team_nl_cmd_noop(struct sk_buff *skb, struct genl_info *info)
@@ -2395,7 +2443,7 @@
    if (!nlh) {
        err = __send_and_alloc_skb(&skb, team, portid, send_func);
        if (err) {
            -goto errout;
            +return err;
            goto send_done;
        }
    }

@@ -2440,7 +2488,6 @@
 int err = 0;
 int i;
 struct nlattr *nl_option;
-\tLIST_HEAD(opt_inst_list);
 struct nlattr *nl_option;
-\tLIST_HEAD(opt_inst_list);
 rtnd_lock();

@@ -2460,6 +2507,7 @@
 struct nlattr *opt_attrs[TEAM_ATTR_OPTION_MAX + 1];
 struct nlattr *attr;
 struct nlattr *attr_data;
+\tLIST_HEAD(opt_inst_list);
 enum team_option_type opt_type;
 int opt_port_ifindex = 0; /* != 0 for per-port options */
 u32 opt_array_index = 0;
+@@ -2570,9 +2618,11 @@
 err = -ENOENT;
 goto team_put;
 }
-}

-err = team_nl_send_event_options_get(team, &opt_inst_list);
+err = team_nl_send_event_options_get(team, &opt_inst_list);
+if (err)
+break;
+
 team_put:
 team_nl_team_put(team);
@@ -2681,7 +2731,7 @@
 if (!nlh) {
 err = __send_and_alloc_skb(&skb, team, portid, send_func);
 if (err)
-\t-goto errout;
+\t{return err;
 send_done:
 goto send_done;
 }

@@ -2905,7 +2955,7 @@
 switch (event) {
 case NETDEV_UP:
-\t-if (netif_carrier_ok(dev))
+\t-if (netif_oper_up(dev))
 \tteam_port_change_check(port, true);
 break;

case NETDEV_DOWN:
    --- linux-4.15.0.orig/drivers/net/team/team_mode_loadbalance.c
    +++ linux-4.15.0/drivers/net/team/team_mode_loadbalance.c
    @@ -325,6 +325,20 @@
    return 0;
}

+static void lb_bpf_func_free(struct team *team)
+{
+    struct lb_priv *lb_priv = get_lb_priv(team);
+    struct bpf_prog *fp;
+    
+    if (!lb_priv->ex->orig_fprog)
+        return;
+    
+    __fprog_destroy(lb_priv->ex->orig_fprog);
+    fp = rcu_dereference_protected(lb_priv->fp,
+        lockdep_is_held(&team->lock));
+    bpf_prog_destroy(fp);
+}
+
+static int lb_tx_method_get(struct team *team, struct team_gsetter_ctx *ctx)
+{
    struct lb_priv *lb_priv = get_lb_priv(team);
    @@ -639,6 +653,7 @@
    team_options_unregister(team, lb_options,
        ARRAY_SIZE(lb_options));
    +lb_bpf_func_free(team);
    cancel_delayed_work_sync(&lb_priv->ex->stats.refresh_dw);
    free_percpu(lb_priv->pcpu_stats);
    kfree(lb_priv->ex);
    --- linux-4.15.0.orig/drivers/net/thunderbolt.c
    +++ linux-4.15.0/drivers/net/thunderbolt.c
    @@ -166,6 +166,8 @@
    * @connected_work: Worker that finalizes the ThunderboltIP connection
    * setup and enables DMA paths for high speed data
    * transfers
    + @disconnect_work: Worker that handles tearing down the ThunderboltIP
    + * connection
    * @rx_hdr: Copy of the currently processed Rx frame. Used when a
    * network packet consists of multiple Thunderbolt frames.
    * In host byte order.
    @@ -190,6 +192,7 @@
    int login_retries;
    struct delayed_work login_work;
    struct work_struct connected_work;
    +struct work_struct disconnect_work;
struct thunderbolt_ip_frame_header rx_hdr;
struct tbnet_ring rx_ring;
atomic_t frame_id;

@@ -445,7 +448,7 @@
case TBIP_LOGOUT:
    ret = tbnet_logout_response(net, route, sequence, command_id);
    if (!ret)
        -tbnet_tear_down(net, false);
+    queue_work(system_long_wq, &net->disconnect_work);
    break;

default:
@@ -659,6 +662,13 @@
 }
 }

+static void tbnet_disconnect_work(struct work_struct *work)
+{
+    struct tbnet *net = container_of(work, typeof(*net), disconnect_work);
+    +tbnet_tear_down(net, false);
+}
+
static bool tbnet_check_frame(struct tbnet *net, const struct tbnet_frame *tf,
    const struct thunderbolt_ip_frame_header *hdr)
{
@@ -881,6 +891,7 @@
napi_disable(&net->napi);

+cancel_work_sync(&net->disconnect_work);
    tbnet_tear_down(net, true);

    tb_ring_free(&net->rx_ring.ring);
@@ -1195,6 +1206,7 @@
    net = netdev_priv(dev);
    INIT_DELAYED_WORK(&net->login_work, tbnet_login_work);
    INIT_WORK(&net->connected_work, tbnet_connected_work);
+    INIT_WORK(&net->disconnect_work, tbnet_disconnect_work);
    mutex_init(&net->connection_lock);
    atomic_set(&net->command_id, 0);
    atomic_set(&net->frame_id, 0);
@@ -1270,12 +1282,10 @@
    stop_login(net);
    if (netif_running(net->dev)) {
        netif_device_detach(net->dev);
        -tb_ring_stop(&net->rx_ring.ring);
        -tb_ring_stop(&net->tx_ring.ring);

}
-tbnet_free_buffers(&net->rx_ring);
-tbnet_free_buffers(&net->tx_ring);
+tbnet_tear_down(net, true);
}
+tb_unregister_protocol_handler(&net->handler);
return 0;
}

@@ -1284,6 +1294,8 @@
struct tb_service *svc = tb_to_service(dev);
struct tbnet *net = tb_service_get_drvdata(svc);

+tb_register_protocol_handler(&net->handler);
+
netif_carrier_off(net->dev);
if (netif_running(net->dev)) {
    netif_device_attach(net->dev);
--- linux-4.15.0.orig/drivers/net/tun.c
+++ linux-4.15.0/drivers/net/tun.c
@@ -76,6 +76,14 @@
#include <linux/bpf.h>
#include <linux/bpf_trace.h>
#include <linux/mutex.h>
+#include <linux/ieee802154.h>
+#include <linux/if_ltalk.h>
+#include <uapi/linux/if_fddi.h>
+#include <uapi/linux/if_hippi.h>
+#include <uapi/linux/if_fc.h>
+#include <net/ax25.h>
+#include <net/rose.h>
+#include <net/6lowpan.h>

#include <linux/uaccess.h>

@@ -176,6 +184,7 @@
};
struct napi_struct napi;
bool napi_enabled;
+bool napi_frags_enabled;
struct mutex napi_mutex;/* Protects access to the above napi */
struct list_head next;
struct tun_struct *detached;
@@ -275,32 +284,32 @@
}

static void tun_napi_init(struct tun_struct *tun, struct tun_file *tfile,
-    bool napi_en)
bool napi_en, bool napi_frags)
{
    tfile->napi_enabled = napi_en;
    tfile->napi_frags_enabled = napi_en && napi_frags;
    if (napi_en) {
        netif_napi_add(tun->dev, &tfile->napi, tun_napi_poll,
          NAPI_POLL_WEIGHT);
        netif_tx_napi_add(tun->dev, &tfile->napi, tun_napi_poll,
          NAPI_POLL_WEIGHT);
        napi_enable(&tfile->napi);
        mutex_init(&tfile->napi_mutex);
    }
}

static void tun_napi_disable(struct tun_struct *tun, struct tun_file *tfile)
{  
 if (tfile->napi_enabled)
    napi_disable(&tfile->napi);
}

static void tun_napi_del(struct tun_struct *tun, struct tun_file *tfile)
{  
 if (tfile->napi_enabled)
    netif_napi_del(&tfile->napi);
}

static bool tun_napi_frags_enabled(const struct tun_struct *tun)
{  
 return READ_ONCE(tun->flags) & IFF_NAPI_FRAGS;
}

@ifdef CONFIG_TUN_VNET_CROSS_LE
@@ -611,14 +620,6 @@
    skb_queue_purge(&tfile->sk.sk_error_queue);
}

static void tun_cleanup_tx_array(struct tun_file *tfile)
{  
    -if (tfile->tx_array.ring.queue) {
        skb_array_cleanup(&tfile->tx_array);
        memset(&tfile->tx_array, 0, sizeof(tfile->tx_array));
    -}
    -}
-}
static void __tun_detach(struct tun_file *tfile, bool clean)
{
    struct tun_file *ntfile;
    tun = rtnl_dereference(tfile->tun);

    if (tun && clean) {
        -tun_napi_disable(tun, tfile);
        -tun_napi_del(tun, tfile);
        +tun_napi_disable(tfile);
        +tun_napi_del(tfile);
    }

    if (tun && !tfile->detached) {
        -tun_cleanup_tx_array(tfile);
        +skb_array_cleanup(&tfile->tx_array);
        sock_put(&tfile->sk);
    }

    for (i = 0; i < n; i++) {
        tfile = rtnl_dereference(tun->tfiles[i]);
        BUG_ON(!tfile);
         -tun_napi_disable(tun, tfile);
        +tun_napi_disable(tfile);
        tfile->socket.sk->sk_shutdown = RCV_SHUTDOWN;
        tfile->socket.sk->sk_data_ready(tfile->socket.sk);
        RCU_INIT_POINTER(tfile->tun, NULL);
        @ @ -703,17 +704,15 @@
        synchronize_net();
        for (i = 0; i < n; i++) {
            tfile = rtnl_dereference(tun->tfiles[i]);
            -tun_napi_del(tun, tfile);
            +tun_napi_del(tfile);
            /* Drop read queue */
            tun_queue_purge(tfile);
            sock_put(&tfile->sk);
            -tun_cleanup_tx_array(tfile);
        }

        list_for_each_entry_safe(tfile, tmp, &tun->disabled, next) {
            tun_enable_queue(tfile);
            tun_queue_purge(tfile);
            sock_put(&tfile->sk);
            -tun_cleanup_tx_array(tfile);
        }
    }
}
BUG_ON(tun->numdisabled != 0);

@@ -725,7 +724,8 @@
}

static int tun_attach(struct tun_struct *tun, struct file *file,
-      bool skip_filter, bool napi)
+      bool skip_filter, bool napi, bool napi_frags,
+      bool publish_tun)
{
    struct tun_file *tfile = file->private_data;
    struct net_device *dev = tun->dev;
@@ -760,30 +760,33 @@
    if (!tfile->detached &&
        skb_array_init(&tfile->tx_array, dev->tx_queue_len, GFP_KERNEL)) { 
+    skb_array_resize(&tfile->tx_array, dev->tx_queue_len, GFP_KERNEL)) {
        err = -ENOMEM;
        goto out;
    }

    tfile->queue_index = tun->numqueues;
    tfile->socket.sk->sk_shutdown &= ~RCV_SHUTDOWN;
-    rcu_assign_pointer(tfile->tun, tun);
-    rcu_assign_pointer(tun->tfiles[tun->numqueues], tfile);
-    tun->numqueues++;
-    if (tfile->detached) {
-      tun_enable_queue(tfile);
-    } else {
-      sock_hold(&tfile->sk);
-      -tun_napi_init(tun, tfile, napi);
+      tun_napi_init(tun, tfile, napi, napi_frags);
+    }
+
+    -tun_set_real_num_queues(tun);
     
+// device is allowed to go away first, so no need to hold extra
+  * refcnt.
+  */
+  +/*
+  * Publish tfile->tun and tun->tfiles only after we've fully
+  * initialized tfile; otherwise we risk using half-initialized
+  * object.
+  */
+  +if (publish_tun)
rcu_assign_pointer(tfile->tun, tun);
rcu_assign_pointer(tun->tfiles[tun->numqueues], tfile);
+tun->numqueues++;
+tun_set_real_num_queues(tun);
out:
return err;
}
@brief -923,18 +926,8 @@
/* Net device open. */
static int tun_net_open(struct net_device *dev)
{
-struct tun_struct *tun = netdev_priv(dev);
-int i;
-
-netif_tx_start_all_queues(dev);

-for (i = 0; i < tun->numqueues; i++) {
-struct tun_file *tfile;
-
-tfile = rtnl_dereference(tun->tfiles[i]);
-tfile->socket.sk->sk_write_space(tfile->socket.sk);
-
-}
-return 0;
}
@brief -1063,13 +1056,11 @@
struct tun_file *tfile;
int i;

-if (tun_napi_frags_enabled(tun))
-return;
-
rcu_read_lock();
for (i = 0; i < tun->numqueues; i++) {
  tfile = rcu_dereference(tun->tfiles[i]);
  -if (tfile->napi_enabled)
  +if (!tun_napi_frags_enabled(tfile) &&
    +  tfile->napi_enabled)
    napi_schedule(&tfile->napi);
  }
rcu_read_unlock();
@brief -1164,6 +1155,21 @@
}
+if (new_carrier) {
+  struct tun_struct *tun = netdev_priv(dev);
+  +if (!tun->numqueues)
+    return -EPERM;
+  +netif_carrier_on(dev);
+  +} else {
+    +netif_carrier_off(dev);
+  +}
+  +return 0;
+}
+
+static const struct net_device_ops tun_netdev_ops = {
+  .ndo_uninit= tun_net_uninit,
+  .ndo_open= tun_net_open,
+  .ndo_set_rx_headroom= tun_set_headroom,
+  .ndo_get_stats64= tun_net_get_stats64,
+  .ndo_change_carrier= tun_net_change_carrier,
+};
+
+static const struct net_device_ops tap_netdev_ops = {
+  .ndo_set_rx_headroom= tun_set_headroom,
+  .ndo_get_stats64= tun_net_get_stats64,
+  .ndo_bpf= tun_xdp,
+  .ndo_change_carrier= tun_net_change_carrier,
+};
+
+static void tun_flow_init(struct tun_struct *tun)
+{
+  dev->max_mtu = MAX_MTU - dev->hard_header_len;
+}
+
+static bool tun_sock_writeable(struct tun_struct *tun, struct tun_file *tfile)
+{
+  struct sock *sk = tfile->socket.sk;
+  +return (tun->dev->flags & IFF_UP) && sock_writeable(sk);
+}
+
+/* Character device part */
+
+/* Poll */
+if (!skb_array_empty(&tfile->tx_array))
mask |= POLLIN | POLLRDNORM;

- if (tun->dev->flags & IFF_UP &&
  - (sock_writeable(sk) ||
  - (!test_and_set_bit(SOCKWQ_ASYNC_NOSPACE, &sk->sk_socket->flags) &&
  - sock_writeable(sk))))
+ /* Make sure SOCKWQ_ASYNC_NOSPACE is set if not writable to
+ * guarantee EPOLLOUT to be raised by either here or
+ * tun_sock_write_space(). Then process could get notification
+ * after it writes to a down device and meets -EIO.
+ */
+ if (tun_sock_writeable(tun, tfile))
+   - (!test_and_set_bit(SOCKWQ_ASYNC_NOSPACE, &sk->sk_socket->flags) &&
+   + tun_sock_writeable(tun, tfile)))
mask |= POLLOUT | POLLWRNORM;

if (tun->dev->reg_state != NETREG_REGISTERED)
  @ @ -1299,7 +1318,7 @@
int i;

if (it->nr_segs > MAX_SKB_FRAGS + 1)
  -return ERR_PTR(-ENOMEM);
+return ERR_PTR(-EMSGSIZE);

local_bh_disable();
skb = napi_get_frags(&tfile->napi);
@@ -1317,27 +1336,23 @@
skb->truesize += skb->data_len;

for (i = 1; i < it->nr_segs; i++) {
  +struct page_frag *pfrag = &current->task_frag;
  size_t fragsz = it->iov[i].iov_len;
  -unsigned long offset;
  -struct page *page;
  -void *data;

  if (fragsz == 0 || fragsz > PAGE_SIZE) {
    err = -EINVAL;
    goto free;
  }

  -local_bh_disable();
  -data = napi_alloc_frag(fragsz);
  -local_bh_enable();
  -if (!data) {
  +if (!$skb_page_frag_refill(fragsz, pfrag, GFP_KERNEL)) {
    err = -ENOMEM;
    goto free;
  }
-page = virt_to_head_page(data);
-offset = data - page_address(page);
-skb_fill_page_desc(skb, i - 1, page, offset, fragsz);
+skb_fill_page_desc(skb, i - 1, pfrag->page,
+ pfrag->offset, fragsz);
+page_ref_inc(pfrag->page);
+pfrag->offset += fragsz;
}

return skb;

@@ -1384,6 +1399,7 @@
if (!rx_batched || (!(more && skb_queue_empty(queue)))) {
local_bh_disable();
+skb_record_rx_queue(skb, tfile->queue_index);
netif_receive_skb(skb);
local_bh_enable();
return;
@@ -1403,8 +1419,11 @@
struct sk_buff *nskb;

local_bh_disable();
-while ((nskb = __skb_dequeue(&process_queue)))
+while ((nskb = __skb_dequeue(&process_queue))) {
++skb_record_rx_queue(nskb, tfile->queue_index);
netif_receive_skb(nskb);
}
+skb_record_rx_queue(skb, tfile->queue_index);
netif_receive_skb(skb);
local_bh_enable();
}
@@ -1475,6 +1494,7 @@
else
*skb_xdp = 0;

+local_bh_disable();
rcu_read_lock();
xdp_prog = rcu_dereference(tun->xdp_prog);
if (xdp_prog && !*skb_xdp) {
@@ -1494,9 +1514,11 @@
get_page(alloc_frag->page);
alloc_frag->offset += buflen;
err = xdp_do_redirect(tun->dev, &xdp, xdp_prog);
+xdp_do_flush_map();
if (err)
goto err_redirect;
rcu_read_unlock();
+local_bh_enable();
return NULL;
case XDP_TX:
    skb = build_skb(buf, buflen);
    if (!skb) {
        rcu_read_unlock();
        +local_bh_enable();
        return ERR_PTR(-ENOMEM);
    }
    skb_reserve(skb, pad - delta);
    skb_put(skb, len + delta);
    +skb_set_owner_w(skb, tfile->socket.sk);
    get_page(alloc_frag->page);
    alloc_frag->offset += buflen;
    skb->dev = tun->dev;
    generic_xdp_tx(skb, xdp_prog);
    rcu_read_unlock();
    +local_bh_enable();
    return NULL;
}
return skb;

put_page(alloc_frag->page);
err_xdp:
rcu_read_unlock();
+local_bh_enable();
this_cpu_inc(tun->pcpu_stats->rx_dropped);
return NULL;

int err;
int skb_xdp = 1;
-booth frac = tun_napi_frags_enabled(tun);
-if (!(tun->dev->flags & IFF_UP))
    return -EIO;
bool frags = tun_napi_frags_enabled(tfile);

if (!((tun->flags & IFF_NO_PI)) {
    if (len < sizeof(pi))
        @@ -1668,6 +1692,8 @@
        err = skb_copy_datagram_from_iter(skb, 0, from, len);

        if (err) {
            +err = -EFAULT;
            +drop:
            this_cpu_inc(tun->pcpu_stats->rx_dropped);
            kfree_skb(skb);
            if (frags) {
                @@ -1675,7 +1701,7 @@
                mutex_unlock(&tfile->napi_mutex);
            }

            -return -EFAULT;
            +return err;
            }
    }
}

 @@ -1714,8 +1740,11 @@
skb->dev = tun->dev;
 break;
 case IFF_TAP:
     -if (!frags)
     -skb->protocol = eth_type_trans(skb, tun->dev);
     +if (frags && !pskb_may_pull(skb, ETH_HLEN)) {
     +err = -ENOMEM;
     +goto drop;
     +}
     +skb->protocol = eth_type_trans(skb, tun->dev);
     break;
 }

 @@ -1736,27 +1765,45 @@
 struct bpf_prog *xdp_prog;
 int ret;

 +local_bh_disable();
 rcu_read_lock();
 xdp_prog = rcu_dereference(tun->xdp_prog);
 if (xdp_prog) {
     ret = do_xdp_generic(xdp_prog, skb);
     if (ret != XDP_PASS) {
        rcu_read_unlock();
        +local_bh_enable();
    }
+if (frags) {
+    tfile->napi skb = NULL;
+    mutex_unlock(&tfile->napi_mutex);
+}
+return total_len;
+
+rcu_read_unlock();
+local_bh_enable();
}

rxhash = __skb_get_hash_symmetric(skb);

+rcu_read_lock();
+if (unlikely(!(tun->dev->flags & IFF_UP))) {
+    err = -EIO;
+    rcu_read_unlock();
+    goto drop;
+}
+
+if (frags) {
+    u32 headlen;
+
+    /* Exercise flow dissector code path. */
+    -u32 headlen = eth_get_headlen(skb->data, skb_headlen(skb));
+    skb_push(skb, ETH_HLEN);
+    headlen = eth_get_headlen(skb->data, skb_headlen(skb));
+
+    if (unlikely(headlen > skb_headlen(skb))) {
+        this_cpu inc(tun->pcpu_stats->rx_dropped);
+        napi_free_frags(&tfile->napi);
+        rcu_read_unlock();
+        mutex_unlock(&tfile->napi_mutex);
+        WARN ON(1);
+        return -ENOMEM;
+    } else {
+        netif rx ni(skb);
+    }
+    rcu_read_unlock();
+
+    stats = get cpu ptr(tun->pcpu stats);
+    u64 stats update begin(&stats->syncp);
+    @ @ -1784,6 +1831,7 @@
+    } else {
+        netif rx ni(skb);
+    }
+    rcu_read_unlock();
+
+    result = netif rx ni(skb);
+    int noblock = 0;
+    int frags = 0;
if (!tun)
return -EBADF;

result = tun_get_user(tun, tfile, NULL, from,
- file->f_flags & O_NONBLOCK, false);
+ if ((file->f_flags & O_NONBLOCK) || (iocb->ki_flags & IOCB_NOWAIT))
  noblock = 1;
+
+result = tun_get_user(tun, tfile, NULL, from, noblock, false);

tun_put(tun);
return result;
@@ -1855,7 +1906,8 @@
return -EINVAL;

if (virtio_net_hdr_from_skb(skb, &gso,
  - tun_is_little_endian(tun), true)) {  
  + tun_is_little_endian(tun), true,
  + vlan_hlen)) {
struct skb_shared_info *sinfo = skb_shinfo(skb);
pr_err("unexpected GSO type: ",
  "0x%x, gso_size %d, hdr_len %d\n",
@@ -1926,9 +1978,9 @@
}
add_wait_queue(&tfile->wq.wait, &wait);
-current->state = TASK_INTERRUPTIBLE;

while (1) {
+__set_current_state(TASK_INTERRUPTIBLE);
  skb = skb_array_consume(&tfile->tx_array);
  if (skb)
    break;
@@ -1944,7 +1996,7 @@
schedule();
  }
-
-current->state = TASK_RUNNING;
+__set_current_state(TASK_RUNNING);
remove_wait_queue(&tfile->wq.wait, &wait);

out:
@@ -1989,10 +2041,15 @@
struct tun_file *tfile = file->private_data;
struct tun_struct *tun = tun_get(tfile);
ssize_t len = iov_iter_count(to), ret;
+int noblock = 0;
if (!tun)
return -EBADFD;
-ret = tun_do_read(tun, tfile, to, file->f_flags & O_NONBLOCK, NULL);
+
+if (((file->f_flags & O_NONBLOCK) || (iocb->ki_flags & IOCB_NOWAIT))
+noblock = 1;
+
+ret = tun_do_read(tun, tfile, to, noblock, NULL);
ret = min_t(ssize_t, ret, len);
if (ret > 0)
iocb->ki_pos = ret;
@@ -2030,7 +2087,9 @@
static int tun_validate(struct nlattr *tb[], struct nlattr *data[],
struct netlink_ext_ack *extack)
{
 -return -EINVAL;
+NL_SET_ERR_MSG(extack,
 + "tun/tap creation via rtnetlink is not supported.");
+return -EOPNOTSUPP;
}

static struct rtnl_link_ops tun_link_ops __read_mostly = {
@@ -2232,7 +2291,8 @@
err = tun_attach(tun, file, ifr->ifr_flags & IFF_NOFILTER,
 - ifr->ifr_flags & IFF_NAPI);
+ ifr->ifr_flags & IFF_NAPI,
+ ifr->ifr_flags & IFF_NAPI_FRAGS, true);
if (err < 0)
return err;

@@ -2321,13 +2381,18 @@
NETIF_F_HW_VLAN_STAG_TX);

INIT_LIST_HEAD(&tun->disabled);
-err = tun_attach(tun, file, false, ifr->ifr_flags & IFF_NAPI);
+err = tun_attach(tun, file, false, ifr->ifr_flags & IFF_NAPI,
+ ifr->ifr_flags & IFF_NAPI_FRAGS, false);
if (err < 0)
goto err_free_flow;

err = register_netdevice(tun->dev);
if (err < 0)
goto err_detach;
+/* free_netdev() won't check refcnt, to aovid race
+ * with dev_put() we need publish tun after registration.
+ */
+rca_assign_pointer(tfile->tun, tun);
}

netif_carrier_on(tun->dev);
@@ -2473,7 +2538,8 @@
ret = security_tun_dev_attach_queue(tun->security);
if (ret < 0)
goto unlock;
-ret = tun_attach(tun, file, false, tun->flags & IFF_NAPI);
+ret = tun_attach(tun, file, false, tun->flags & IFF_NAPI,
+ t->flags & IFF_NAPI_FRAGS, true);
} else if (ifr->ifr_flags & IFF_DETACH_QUEUE) {

tun = rtnl_dereference(tfile->tun);
if (!tun || !(tun->flags & IFF_MULTI_QUEUE) || tfile->detached)
@@ -2488,18 +2554,57 @@
return ret;
}

+/* Return correct value for tun->dev->addr_len based on tun->dev->type. */
+static unsigned char tun_get_addr_len(unsigned short type) {
+	switch (type) {
+case ARPHRD_IP6GRE:
+case ARPHRD_TUNNEL6:
+return sizeof(struct in6_addr);
+case ARPHRD_IPGRE:
+case ARPHRD_TUNNEL:
+case ARPHRD_SIT:
+return 4;
+case ARPHRDEther:
+return ETH_ALEN;
+case ARCHRD_IEEE802154:
+case ARCHRD_IEEE802154_MONITOR:
+return IEEE802154_EXTENDED_ADDR_LEN;
+case ARCHRD_PHONE PIPE:
+case ARCHRD_PPP:
+case ARCHRD_NONE:
+return 0;
+case ARCHRD_6LOWPAN:
+return EU164_ADDR_LEN;
+case ARCHRD_FDDI:
+return FDDI_K_ALEN;
+case ARCHRD_HIPPI:
+return HIPPI_ALEN;
+case ARCHRD_IEEE802:
+return FC_ALEN;
+case ARCHRD ROSE:
static long __tun_chr_ioctl(struct file *file, unsigned int cmd, 
    unsigned long arg, int ifreq_len)
{
    struct tun_file *tfile = file->private_data;
    struct tun_struct *tun;
    void __user* argp = (void __user*)arg;
+    unsigned int ifindex, carrier;
    struct ifreq ifr;
    kuid_t owner;
    kgid_t group;
    int sndbuf;
    int vnet_hdr_sz;
    -unsigned int ifindex;
    int le;
    int ret;

    ret = -EBUSY;
} else {
    tun->dev->type = (int) arg;
+    tun->dev->addr_len = tun_get_addr_len(tun->dev->type);
    tun_debug(KERN_INFO, tun, "linktype set to %d\n",
        tun->dev->type);
    ret = 0;
    ret = -EFAULT;
    if (copy_from_user(&carrier, argp, sizeof(carrier)))
        goto unlock;
    ret = tun_net_change_carrier(tun->dev, (bool)carrier);
    default:
    ret = -EINVAL;
}
break;
@@ -2840,6 +2954,12 @@
 &tun_proto, 0);
if (!tfile)
 return -ENOMEM;
+if (skb_array_init(&tfile->tx_array, 0, GFP_KERNEL)) {
+ skb_free(&tfile->sk);
+ return -ENOMEM;
+ }
+
+mutex_init(&tfile->napi_mutex);
RCU_INIT_POINTER(tfile->tun, NULL);
tfile->flags = 0;
tfile->ifindex = 0;
@@ -2860,8 +2980,6 @@

 sock_set_flag(&tfile->sk, SOCK_ZEROCOPY);

memset(&tfile->tx_array, 0, sizeof(tfile->tx_array));
-
 return 0;
}

@@ -3036,6 +3154,7 @@
{
 struct net_device *dev = netdev_notifier_info_to_dev(ptr);
 struct tun_struct *tun = netdev_priv(dev);
+int i;

 if (dev->rtnl_link_ops != &tun_link_ops)
 return NOTIFY_DONE;
@@ -3045,6 +3164,14 @@
 if (tun_queue_resize(tun))
 return NOTIFY_BAD;
 break;
+case NETDEV_UP:
+for (i = 0; i < tun->numqueues; i++) {
+ struct tun_file *tfile;
+ tfile = rtnl_dereference(tun->tfiles[i]);
+ tfile->socket.sk->sk_write_space(tfile->socket.sk);
+ }
+break;
 default:
 break;
}
--- linux-4.15.0.orig/drivers/net/usb/Kconfig
+++ linux-4.15.0/drivers/net/usb/Kconfig
@@ -98,6 +98,10 @@
 config USB_RTL8152
 tristate "Realtek RTL8152/RTL8153 Based USB Ethernet Adapters"
 select MII
+select CRC32
+select CRYPTO
+select CRYPTO_HASH
+select CRYPTO_SHA256
 help
 This option adds support for Realtek RTL8152 based USB 2.0
 10/100 Ethernet adapters and RTL8153 based USB 3.0 10/100/1000
@@ -111,6 +115,7 @@
 select MII
 select PHYLIB
 select MICROCHIP_PHY
+select CRC32
 help
 This option adds support for Microchip LAN78XX based USB 2
 & USB 3 10/100/1000 Ethernet adapters.
--- linux-4.15.0.orig/drivers/net/usb/asix_common.c
+++ linux-4.15.0/drivers/net/usb/asix_common.c
@@ -309,7 +309,7 @@
 netdev_dbg(dev->net, "asix_get_phy_addr()\n");

 -if (ret < 0) {  
 +if (ret < 2) { 
   netdev_err(dev->net, "Error reading PHYID register: %02x\n", ret);  
   goto out;
   }
@@ -607,6 +607,9 @@
 u8 opt = 0;

 +if (wolinfo->wolopts & ~(WAKE_PHY | WAKE_MAGIC))
+return -EINVAL;
+  
 if (wolinfo->wolopts & WAKE_PHY)
   opt |= AX_MONITOR_LINK;
 if (wolinfo->wolopts & WAKE_MAGIC)
--- linux-4.15.0.orig/drivers/net/usb/asix_devices.c
+++ linux-4.15.0/drivers/net/usb/asix_devices.c
@@ -238,7 +238,7 @@
 static int ax88172_bind(struct usbnet *dev, struct usb_interface *intf)
 {
 int ret = 0;
- u8 buf[ETH_ALEN];
+ u8 buf[ETH_ALEN] = {0};
int i;
unsigned long gpio_bits = dev->driver_info->data;

/* Restore BMCR */
@if (priv->presvd_phy_bmcr & BMCR_ANENABLE)
+priv->presvd_phy_bmcr |= BMCR_ANRESTART;
+
asix_mdio_write_nopm(dev->net, dev->mii.phy_id, MII_BMCR,
    priv->presvd_phy_bmcr);

-mii_nway_restart(&dev->mii);
priv->presvd_phy_advertise = 0;
priv->presvd_phy_bmcr = 0;
}

static int ax88772_bind(struct usbnet *dev, struct usb_interface *intf)
{
    int ret, i;
-u8 buf[ETH_ALEN], chipcode = 0;
+u8 buf[ETH_ALEN] = {0}, chipcode = 0;
    u32 phyid;
    struct asix_common_private *priv;

    asix_read_cmd(dev, AX_CMD_STATMNGSTS_REG, 0, 0, 1, &chipcode, 0);
    chipcode &= AX_CHIPCODE_MASK;

-(chipcode == AX_AX88772_CHIPCODE) ? ax88772_hw_reset(dev, 0) :
    - ax88772a_hw_reset(dev, 0);
+ret = (chipcode == AX_AX88772_CHIPCODE) ? ax88772_hw_reset(dev, 0) :
+    ax88772a_hw_reset(dev, 0);
+
+if (ret < 0) {
+    netdev_dbg(dev->net, "Failed to reset AX88772: %d\n", ret);
+    return ret;
+}

/* Read PHYID register *AFTER* the PHY was reset properly */
phyid = asix_get_phyid(dev);

static int ax88178_bind(struct usbnet *dev, struct usb_interface *intf)
{
    int ret;
-u8 buf[ETH_ALEN];
+u8 buf[ETH_ALEN] = {0};
usbnet_get_endpoints(dev, intf);

/* Get the MAC address */
ret = asix_read_cmd(dev, AX_CMD_READ_NODE_ID, 0, 0, ETH_ALEN, buf, 0);
-if (ret < 0) {
+if (ret < ETH_ALEN) {
netdev_err(dev->net, "Failed to read MAC address: %d\n", ret);
+ret = -EIO;
goto free;
} 
memcpy(dev->net->dev_addr, buf, ETH_ALEN);

int ret;

if (2 == size) {
-u16 buf;
+u16 buf = 0;
ret = __ax88179_read_cmd(dev, cmd, value, index, size, &buf, 0);
le16_to_cpus(&buf);
*((u16 *)data) = buf;
} else if (4 == size) {
-u32 buf;
+u32 buf = 0;
ret = __ax88179_read_cmd(dev, cmd, value, index, size, &buf, 0);
le32_to_cpus(&buf);
*((u32 *)data) = buf;
}@ @ -566,6 +566,9 @ @
struct usbnet *dev = netdev_priv(net);
u8 opt = 0;

+if (wolinfo->wolopts & ~(WAKE_PHY | WAKE_MAGIC))
+return -EINVAL;
+
if (wolinfo->wolopts & WAKE_PHY)
opt |= AX_MONITOR_MODE_RWLC;
if (wolinfo->wolopts & WAKE_MAGIC)
}@ @ -1397,10 +1400,10 @ @
}

if (pkt_cnt == 0) {
-/* Skip IP alignment psudo header */
- skb_pull(skb, 2);
skb->len = pkt_len;
-skb_set_tail_pointer(skb, pkt_len);
+/* Skip IP alignment pseudo header */
+skb_pull(skb, 2);
+skb_set_tail_pointer(skb, skb->len);
skb->truesize = pkt_len + sizeof(struct sk_buff);
ax88179_rx_checksum(skb, pkt_hdr);
return 1;
@@ -1409,8 +1412,9 @@
ax_skb = skb_clone(skb, GFP_ATOMIC);
    if (ax_skb) {
        ax_skb->len = pkt_len;
-ax_skb->data = skb->data + 2;
-skb_set_tail_pointer(ax_skb, pkt_len);
+/* Skip IP alignment pseudo header */
+skb_pull(ax_skb, 2);
+skb_set_tail_pointer(ax_skb, ax_skb->len);
ax_skb->truesize = pkt_len + sizeof(struct sk_buff);
ax88179_rx_checksum(ax_skb, pkt_hdr);
usbnet_skb_return(dev, ax_skb);
@@ -1732,6 +1736,7 @@
        .status = ax88179_status,
        .link_reset = ax88179_link_reset,
        .reset = ax88179_reset,
        .stop = ax88179_stop,
        .flags = FLAG_ETHER | FLAG_FRAMING_AX,
        .rx_fixup = ax88179_rx_fixup,
        .tx_fixup = ax88179_tx_fixup,
--- linux-4.15.0.orig/drivers/net/usb/cdc-phonet.c
+++ linux-4.15.0/drivers/net/usb/cdc-phonet.c
@@ -398,6 +398,8 @@
err = register_netdev(dev);
    if (err) {
        /* Set disconnected flag so that disconnect() returns early. */
+        pnd->disconnected = 1;
usb_driver_release_interface(&usbpn_driver, data_intf);
goto out;
    }
--- linux-4.15.0.orig/drivers/net/usb/cdc_eem.c
+++ linux-4.15.0/drivers/net/usb/cdc_eem.c
@@ -138,10 +138,10 @@
skb2 = skb_copy_expand(skb, EEM_HEAD, ETH_FCS_LEN + padlen, flags);
+dev_kfree_skb_any(skb);
if (!skb2)
return NULL;

-dev_kfree_skb_any(skb);
skb = skb2;

done:
--- linux-4.15.0.orig/drivers/net/usb/cdc_ether.c
+++ linux-4.15.0/drivers/net/usb/cdc_ether.c
@@ -221,9 +221,16 @@
goto bad_desc;
}

skip:
-if (rndis &&
 -header.usb_cdc_acm_descriptor &&
- header.usb_cdc_acm_descriptor->bmCapabilities) {
+/* Communication class functions with bmCapabilities are not
+ * RNDIS. But some Wireless class RNDIS functions use
+ * bmCapabilities for their own purpose. The failsafe is
+ * therefore applied only to Communication class RNDIS
+ * functions. The rndis test is redundant, but a cheap
+ * optimization.
+ */
+if (rndis && is_rndis(&intf->cur_altsetting->desc) &&
+ header.usb_cdc_acm_descriptor &&
+ header.usb_cdc_acm_descriptor->bmCapabilities) {
 dev_dbg(&intf->dev, 
 "ACM capabilities %02x, not really RNDIS?\n",
 header.usb_cdc_acm_descriptor->bmCapabilities);
@@ -772,6 +779,13 @@
 .driver_info = 0,
 },

+/* ThinkPad Thunderbolt 3 Dock Gen 2 (based on Realtek RTL8153) */
+
+USB_DEVICE_AND_INTERFACE_INFO(LENOVO_VENDOR_ID, 0x3082, USB_CLASS_COMM,
+USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
+.driver_info = 0,
+},
+ /* Lenovo Thinkpad USB 3.0 Ethernet Adapters (based on Realtek RTL8153) */
+
+USB_DEVICE_AND_INTERFACE_INFO(LENOVO_VENDOR_ID, 0x7205, USB_CLASS_COMM,
+USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
+.driver_info = 0,
+},
+ /* Lenovo Powered USB-C Travel Hub (4X90S92381, based on Realtek RTL8153) */
+
+}
+USB_DEVICE_AND_INTERFACE_INFO(LENOVO_VENDOR_ID, 0x721e, USB_CLASS_COMM,
+USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
+.driver_info = 0,
+},
+
+/* ThinkPad USB-C Dock Gen 2 (based on Realtek RTL8153) */
+{,
+USB_DEVICE_AND_INTERFACE_INFO(LENOVO_VENDOR_ID, 0xa387, USB_CLASS_COMM,
+USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
+.driver_info = 0,
+},
+
+/* NVIDIA Tegra USB 3.0 Ethernet Adapters (based on Realtek RTL8153) */
{,
USB_DEVICE_AND_INTERFACE_INFO(NVIDIA_VENDOR_ID, 0x09ff, USB_CLASS_COMM,
USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
+.driver_info = 0,
},
-
+/* Microsoft Surface 3 dock (based on Realtek RTL8153) */
+/* Microsoft Surface Ethernet Adapter (based on Realtek RTL8153) */
{,
USB_DEVICE_AND_INTERFACE_INFO(MICROSOFT_VENDOR_ID, 0x07c6, USB_CLASS_COMM,
USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
+.driver_info = 0,
},
-
+/* TP-LINK UE300 USB 3.0 Ethernet Adapters (based on Realtek RTL8153) */
+/* Microsoft Surface Ethernet Adapter (based on Realtek RTL8153B) */
{,
USB_DEVICE_AND_INTERFACE_INFO(MICROSOFT_VENDOR_ID, 0x0927, USB_CLASS_COMM,
USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
+.driver_info = 0,
+},
+
+/* TP-LINK UE300 USB 3.0 Ethernet Adapters (based on Realtek RTL8153) */
{,
USBDEVICEANDINTERFACEINFO(TPLINK_VENDOR_ID, 0x0601, USB_CLASS_COMM,
USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
@@ -895,6 +930,12 @@
USB_CDC_SUBCLASS_ETHERNET,
USB_CDC_PROTO_NONE),
+.driver_info = (unsigned long)&wwan_info,
+},
+/* Cinterion AHS3 modem by GEMALTO */
+USBDEVICEANDINTERFACEINFO(0x1e2d, 0x0055, USB_CLASS_COMM,
+USB_CDC_SUBCLASS_ETHERNET, USB_CDC_PROTO_NONE),
}


static const struct driver_info cdc_mbim_info_avoid_altsetting_toggle = {
    .description = "CDC MBIM",
    .flags = FLAG_NO_SETINT | FLAG_MULTI_PACKET | FLAG_WWAN,
    .bind = cdc_mbim_bind,
    .unbind = cdc_mbim_unbind,
    .manage_power = cdc_mbim_manage_power,
    .driver_info = (unsigned long)&cdc_mbim_info_avoid_altsetting_toggle,
};

/* Telit LN920 */
+	{ USB_DEVICE_AND_INTERFACE_INFO(0x1bc7, 0x1061, USB_CLASS_COMM, USB_CDC_SUBCLASS_MBIM, USB_CDC_PROTO_NONE),
  .driver_info = (unsigned long)&cdc_mbim_info_avoid_altsetting_toggle,
};
+
/* default entry */
{ USB_INTERFACE_INFO(USB_CLASS_COMM, USB_CDC_SUBCLASS_MBIM, USB_CDCPROTO_NONE),
  .driver_info = (unsigned long)&cdc_mbim_info_zlp,
};

/* read current mtu value from device */
err = usbnet_read_cmd(dev, USB_CDC_GET_MAX_DATAGRAM_SIZE,
    USB_TYPE_CLASS | USB_DIR_IN | USB_RECIP_INTERFACE,
    0, iface_no, &max_datagram_size, 2);
-if (err < 0) {
  + 0, iface_no, &max_datagram_size, sizeof(max_datagram_size));
  +if (err != sizeof(max_datagram_size)) {
    dev_dbg(&dev->intf->dev, "GET_MAX_DATAGRAM_SIZE failed\n");
    goto out;
  }
}
if (err < 0)
dev_dbg(&dev->intf->dev, "SET_MAX_DATAGRAM_SIZE failed\n");

@@ -681,8 +681,12 @@
 u8 ep;

for (ep = 0; ep < intf->cur_altsetting->desc.bNumEndpoints; ep++) {
-    e = intf->cur_altsetting->endpoint + ep;
+    /* ignore endpoints which cannot transfer data */
+    if (!usb_endpoint_maxp(&e->desc))
+        continue;
+    switch (e->desc.bmAttributes & USB_ENDPOINT_XFERTYPE_MASK) {
    case USB_ENDPOINT_XFER_INT:
        if (usb_endpoint_dir_in(&e->desc))
            ...
uint32_t rx_speed = le32_to_cpu(data->DLBitRRate);
uint32_t tx_speed = le32_to_cpu(data->ULBitRate);

+#* if the speed hasn't changed, don't report it.
+ * RTL8156 shipped before 2021 sends notification about every 32ms.
+ */
+if (dev->rx_speed == rx_speed && dev->tx_speed == tx_speed)
+return;
+
+dev->rx_speed = rx_speed;
+dev->tx_speed = tx_speed;
+
+/*
+ * Currently the USB-NET API does not support reporting the actual
+ * device speed. Do print it instead.
+ */
- netif_info(dev, link, dev->net,
- "network connection: %sconnected\n",
- " !event->wValue ? "" : "dis");
-usbnet_link_change(dev, !!event->wValue, 0);
+if (netif_carrier_ok(dev->net) != !!event->wValue)
+usbnet_link_change(dev, !!event->wValue, 0);
better;
/* enable ethernet mode (?) */
--- linux-4.15.0.orig/drivers/net/usb/dm9601.c
+++ linux-4.15.0/drivers/net/usb/dm9601.c
@@ -625,6 +625,10 @@
 USB_DEVICE(0x0a46, 0x1269), /* DM9621A USB to Fast Ethernet Adapter */
 .driver_info = (unsigned long)&dm9601_info,
 },
+{
+USB_DEVICE(0x0586, 0x3427), /* ZyXEL Keenetic Plus DSL xDSL modem */
+.driver_info = (unsigned long)&dm9601_info,
+}

};

--- linux-4.15.0.orig/drivers/net/usb/hso.c
+++ linux-4.15.0/drivers/net/usb/hso.c
@@ -625,7 +625,7 @@
 return serial;
 }

-static int get_free_serial_index(void)
-static int obtain_minor(struct hso_serial *serial)
 {
 int index;
 unsigned long flags;
-@@ -633,8 +633,10 @@
 spin_lock_irqsave(&serial_table_lock, flags);
 for (index = 0; index < HSO_SERIAL_TTY_MINORS; index++) {
 if (serial_table[index] == NULL) {
-+serial_table[index] = serial->parent;
 +serial->minor = index;
 spin_unlock_irqrestore(&serial_table_lock, flags);
 -return index;
 +return 0;
 }
 }
 spin_unlock_irqrestore(&serial_table_lock, flags);
@@ -643,15 +645,12 @@
 return -1;
 }

-void set_serial_by_index(unsigned index, struct hso_serial *serial)
-void release_minor(struct hso_serial *serial)
 {
 unsigned long flags;

 spin_lock_irqsave(&serial_table_lock, flags);
@@ -643,15 +645,12 @@
 return -1;
 }

-void set_serial_by_index(unsigned index, struct hso_serial *serial)
-void release_minor(struct hso_serial *serial)
 {
 unsigned long flags;

 spin_lock_irqsave(&serial_table_lock, flags);

if (serial)
    serial_table[index] = serial->parent;
else
    serial_table[index] = NULL;
+serial_table[serial->minor] = NULL;
spin_unlock_irqrestore(&serial_table_lock, flags);
}

unsigned long flags;
if (old)
    -hso_dbg(0x16, "Termios called with: cflags new[%d] - old[%d]n",
            tty->termios.c_cflag, old->c_cflag);
    +hso_dbg(0x16, "Termios called with: cflags new[%u] - old[%u]n",
             (unsigned int)tty->termios.c_cflag,
             (unsigned int)old->c_cflag);
/* the actual setup */
spin_lock_irqsave(&serial->serial_lock, flags);
spin_unlock_irqrestore(&serial->serial_lock, flags);

return usb_control_msg(serial->parent->usb,
                      -usb_rcvctrlpipe(serial->parent->usb, 0), 0x22,
                      +usb_sndctrlpipe(serial->parent->usb, 0), 0x22,
                      0x21, val, if_num, NULL, 0,
                      USB_CTRL_SET_TIMEOUT);
}

static void hso_serial_tty_unregister(struct hso_serial *serial)
{
    tty_unregister_device(tty_drv, serial->minor);
    +release_minor(serial);
}

static void hso_serial_common_free(struct hso_serial *serial)
{
    @ @ -2262,22 +2263,22 @ @
    static int hso_serial_common_create(struct hso_serial *serial, int num_urbs,
                                          int rx_size, int tx_size)
    {
        -int minor;
        int i;

        tty_port_init(&serial->port);

        -minor = get_free_serial_index();
        -if (minor < 0)
goto exit;
+if (obtain_minor(serial))
+goto exit2;

/* register our minor number */
serial->parent->dev = tty_port_register_device_attr(&serial->port,
tty_drv, minor, &serial->parent->interface->dev,
tty_drv, serial->minor, &serial->parent->interface->dev,
serial->parent, hso_serial_dev_groups);
+if (IS_ERR(serial->parent->dev)) {
+release_minor(serial);
+goto exit2;
+}

/* fill in specific data for later use */
-serial->minor = minor;
serial->magic = HSO_SERIAL_MAGIC;
spin_lock_init(&serial->serial_lock);
serial->num_rx_urbs = num_urbs;
@@ -2319,6 +2320,7 @@
return 0;
exit:
hso_serial_tty_unregister(serial);
+exit2:
hso_serial_common_free(serial);
return -1;
}
@@ -2444,7 +2446,7 @@
if (hso_dev->usb_gone)
rv = 0;
else
-rv = usb_control_msg(hso_dev->usb, usb_rcvctrlpipe(hso_dev->usb, 0),
+rv = usb_control_msg(hso_dev->usb, usb_sndctrlpipe(hso_dev->usb, 0),
enabled ? 0x82 : 0x81, 0x40, 0, 0, NULL, 0,
USB_CTRL_SET_TIMEOUT);
mutex_unlock(&hso_dev->mutex);
@@ -2505,7 +2507,7 @@
hso_net_init);
if (!net) {
    dev_err(&interface->dev, "Unable to create ethernet device\n
goto exit;
+goto err_hso_dev;
}

hso_net = netdev_priv(net);
@@ -2518,13 +2520,13 @@
    if (!hso_net->in_endp) {
        USB_DIR_IN);
        if (!hso_net->in_endp) {
dev_err(&interface->dev, "Can't find BULK IN endpoint\n");
-goto exit;
+goto err_net;
}

hso_net->out_endp = hso_get_ep(interface, USB_ENDPOINT_XFER_BULK,
    USB_DIR_OUT);
if (!hso_net->out_endp) {
    dev_err(&interface->dev, "Can't find BULK OUT endpoint\n");
    -goto exit;
    +goto err_net;
}

hso_net->out_endp = hso_get_ep(interface, USB_ENDPOINT_XFER_BULK,
    USB_DIR_OUT);
for (i = 0; i < MUX_BULK_RX_BUF_COUNT; i++) {
    hso_net->mux_bulk_rx_urb_pool[i] = usb_alloc_urb(0, GFP_KERNEL);
    if (!hso_net->mux_bulk_rx_urb_pool[i])
        -goto exit;
        +goto err_mux_bulk_rx;
    hso_net->mux_bulk_rx_buf_pool[i] = kzalloc(MUX_BULK_RX_BUF_SIZE,
        GFP_KERNEL);
    if (!hso_net->mux_bulk_rx_buf_pool[i])
        -goto exit;
        +goto err_mux_bulk_rx;
}

hso_net->mux_bulk_tx_urb = usb_alloc_urb(0, GFP_KERNEL);
if (!hso_net->mux_bulk_tx_urb)
    -goto exit;
    +goto err_mux_bulk_tx;

hso_net->mux_bulk_tx_buf = kzalloc(MUX_BULK_TX_BUF_SIZE, GFP_KERNEL);
if (!hso_net->mux_bulk_tx_buf)
    -goto exit;
    +goto err_free_tx_urb;

add_net_device(hso_dev);

result = register_netdev(net);
if (result) {
    dev_err(&interface->dev, "Failed to register device\n");
    -goto exit;
    +goto err_free_tx_buf;
}

hso_log_port(hso_dev);

hso_create_rfkill(hso_dev, interface);
return hso_dev;
-exit:
-hso_free_net_device(hso_dev);
+
+err_free_tx_buf:
+remove_net_device(hso_dev);
+kfree(hso_net->mux_bulk_tx_buf);
+err_free_tx_urb:
+usb_free_urb(hso_net->mux_bulk_tx_urb);
+err_mux_bulk_rx:
+for (i = 0; i < MUX_BULK_RX_BUF_COUNT; i++) {
+usb_free_urb(hso_net->mux_bulk_rx_urb_pool[i]);
+kfree(hso_net->mux_bulk_rx_buf_pool[i]);
+
+err_net:
+free_netdev(net);
+err_hso_dev:
+kfree(hso_dev);
return NULL;
}

@@ -2630,14 +2645,18 @@
*/
if (serial->tiocmget) {
    tiocmget = serial->tiocmget;
    +tiocmget->endp = hso_get_ep(interface,
    +    USB_ENDPOINT_XFER_INT,
    +    USB_DIR_IN);
    +if (!tiocmget->endp) {
    +dev_err(&interface->dev, "Failed to find INT IN ep\n");
    +goto exit;
    +}
    +
    tiocmget->urb = usb_alloc_urb(0, GFP_KERNEL);
    if (tiocmget->urb) {
        mutex_init(&tiocmget->mutex);
        init_waitqueue_head(&tiocmget->waitq);
        -tiocmget->endp = hso_get_ep(
        -interface,
        -USB_ENDPOINT_XFER_INT,
        -USB_DIR_IN);
        } else
        hso_free_tiomget(serial);
    }
@@ -2665,9 +2684,6 @@
    serial->write_data = hso_std_serial_write_data;
-/* and record this serial */
-set_serial_by_index(serial->minor, serial);
-
-/* setup the proc dirs and files if needed */
-hso_log_port(hso_dev);

@@ -2707,14 +2723,14 @@

serial = kzalloc(sizeof(*serial), GFP_KERNEL);
if (!serial)
-goto exit;
+goto err_free_dev;

hso_dev->port_data.dev_serial = serial;
serial->parent = hso_dev;

if (hso_serial_common_create
    (serial, 1, CTRL_URB_RX_SIZE, CTRL_URB_TX_SIZE))
-goto exit;
+goto err_free_serial;

serial->tx_data_length--; 
serial->write_data = hso_mux_serial_write_data;
@@ -2724,20 +2740,15 @@
serial->shared_int->ref_count++;
mutex_unlock(&serial->shared_int->shared_int_lock);

-/* and record this serial */
-set_serial_by_index(serial->minor, serial);
-
-/* setup the proc dirs and files if needed */
-hso_log_port(hso_dev);

/* done, return it */
return hso_dev;

-exit:
-if (serial) {
-tty_unregister_device(tty_drv, serial->minor);
-kfree(serial);
-}
+err_free_serial:
+kfree(serial);
+err_free_dev:
kfree(hso_dev);
return NULL;

@@ -2803,6 +2814,12 @@
return -EIO;
}

/* check if we have a valid interface */
+if (if_num > 16) {
+kfree(config_data);
+return -EINVAL;
+}
+
+switch (config_data[if_num]) {
+case 0x0:
+result = 0;
+@@ -2873,10 +2890,18 @@
+/* Get the interface/port specification from either driver_info or from
+ * the device itself */
+if (id->driver_info)
+if (id->driver_info) {
+/* if_num is controlled by the device, driver_info is a 0 terminated
+ * array. Make sure, the access is in bounds! */
+for (i = 0; i <= if_num; ++i)
+if (((u32 *)(id->driver_info))[i] == 0)
+goto exit;
+port_spec = ((u32 *)(id->driver_info))[if_num];
+} else {
+port_spec = hso_get_config_data(interface);
+if (port_spec < 0)
+goto exit;
+}
+
+/* Check if we need to switch to alt interfaces prior to port
+ * configuration */
+@@ -3096,8 +3121,7 @@
cancel_work_sync(&serial_table[i]->async_put_intf);
cancel_work_sync(&serial_table[i]->async_get_intf);
hso_serialtty_unregister(serial);
-kref_put(&serial_table[i]->ref, hso_serial_ref_free);
-set_serial_by_index(i, NULL);
+kref_put(&serial->parent->ref, hso_serial_ref_free);
}
}

--- linux-4.15.0.orig/drivers/net/usb/ipheth.c
+++ linux-4.15.0/drivers/net/usb/ipheth.c
@@ -70,7 +70,7 @@
#define IPHETH_USBINTF_SUBCLASS 253
#define IPHETH_USBINTF_PROTO 1
#define IPHETH_BUF_SIZE 1516
+#define IPHETH_BUF_SIZE 1514
#define IPHETH_IP_ALIGN 2 /* padding at front of URB */
#define IPHETH_TX_TIMEOUT (5 * HZ)

@@ -140,7 +140,6 @@
struct usb_device *udev;
struct usb_interface *intf;
struct net_device *net;
-struct sk_buff *tx_skb;
struct urb *tx_urb;
struct urb *rx_urb;
unsigned char *tx_buf;
@@ -230,6 +229,7 @@
case -ENOENT:
case -ECONNRESET:
case -ESHUTDOWN:
+case -EPROTO:
    return;
case 0:
    break;
@@ -281,7 +281,6 @@
dev_err(&dev->intf->dev, "%s: urb status: %d\n", __func__, status);
-dev_kfree_skb_irq(dev->tx_skb);
if (status == 0)
    netif_wake_queue(dev->net);
else
@@ -423,7 +422,7 @@
    if (skb->len > IPHETH_BUF_SIZE) {
        WARN(1, "%s: skb too large: %d bytes\n", __func__, skb->len);
        dev->net->stats.tx_dropped++;
-dev_kfree_skb_irq(skb);
+dev_kfree_skb_any(skb);
        return NETDEV_TX_OK;
    }
@@ -438,18 +437,18 @@
    dev);    
dev->tx_urb->transfer_flags |= URB_NO_TRANSFER_DMA_MAP;

+netif_stop_queue(net);
retval = usb_submit_urb(dev->tx_urb, GFP_ATOMIC);
if (retval) {
    dev_err(&dev->intf->dev, "%s: usb_submit_urb: %d\n", __func__, retval);
dev->net->stats.tx_errors++;  
-dev_kfree_skb_irq(skb);  
+dev_kfree_skb_any(skb);  
+netif_wake_queue(net);  
} else {  
-dev->tx_skb = skb;  
-dev->net->stats.tx_packets++;  
-dev->net->stats.tx_bytes += skb->len;  
-netif_stop_queue(net);  
+dev_consume_skb_any(skb);  
}

return NETDEV_TX_OK;
--- linux-4.15.0.orig/drivers/net/usb/kalmia.c  
+++ linux-4.15.0/drivers/net/usb/kalmia.c  
@@ -117,16 +117,16 @@
 status = kalmia_send_init_packet(dev, usb_buf, sizeof(init_msg_1)  
 / sizeof(init_msg_1[0]), usb_buf, 24);  
 if (status != 0)  
-return status;
+goto out;

 memcpy(usb_buf, init_msg_2, 12);  
 status = kalmia_send_init_packet(dev, usb_buf, sizeof(init_msg_2)  
 / sizeof(init_msg_2[0]), usb_buf, 28);  
 if (status != 0)  
 -return status;
+goto out;

 memcpy(ethernet_addr, usb_buf + 10, ETH_ALEN);
-
+out:
 kfree(usb_buf);  
 return status;
 }
--- linux-4.15.0.orig/drivers/net/usb/lan78xx.c  
+++ linux-4.15.0/drivers/net/usb/lan78xx.c  
@@ -31,12 +31,14 @@
 #include <linux/mdio.h>  
 #include <linux/phy.h>  
 #include <net/ip6_checksum.h>  
+#include <net/vxlan.h>  
 #include <linux/interrupt.h>  
 #include <linux/irqdomain.h>  
 #include <linux/irq.h>  
 #include <linux/irqchip/chained_irq.h>  
 #include <linux/microchipphy.h>  

#include <linux/phy.h>
+#include <linux/of_net.h>
#include "lan78xx.h"

#define DRIVER_AUTHOR"WOOJUNG HUH <woojung.huh@microchip.com>"
@@ -361,10 +363,6 @@
 struct tasklet_struct bh;
 struct delayed_work wq;

-struct usb_host_endpoint *ep_blkin;
-struct usb_host_endpoint *ep_blkout;
-struct usb_host_endpoint *ep_intr;
-
 int msg_enable;

 struct urb*urb_intr;
@@ -496,7 +494,7 @@
 } else {
 netdev_warn(dev->net,
- "Failed to read stat ret = 0x%x", ret);
+ "Failed to read stat ret = %d", ret);
 }

 kfree(stats);
@@ -928,7 +926,8 @@
 offset += 0x100;
 else
 ret = -EINVAL;
- ret = lan78xx_read_raw_otp(dev, offset, length, data);
+ if (!ret)
+ ret = lan78xx_read_raw_otp(dev, offset, length, data);
 }

 return ret;
@@ -1148,7 +1147,7 @@
 {
 struct phy_device *phydev = dev->net->phydev;
 struct ethtool_link_ksettings ecmd;
- int ladv, radv, ret;
+ int ladv, radv, ret, link;
 u32 buf;

 /* clear LAN78xx interrupt status */
@@ -1156,9 +1155,12 @@
 if (unlikely(ret < 0))
 return -EIO;
mutex_lock(&phydev->lock);
phy_read_status(phydev);
+ link = phydev->link;
+ mutex_unlock(&phydev->lock);

-if (!phydev->link && &dev->link_on) {
+ if (!link && &dev->link_on) {
 dev->link_on = false;

/* reset MAC */
@@ -1171,7 +1173,7 @@
 return -EIO;

del_timer(&dev->stat_monitor);
-} else if (phydev->link && !dev->link_on) {
+} else if (link && !dev->link_on) {
 dev->link_on = true;

phy_ethtool_ksettings_get(phydev, &ecmd);
@@ -1215,6 +1217,8 @@
 mod_timer(&dev->stat_monitor,
 jiffies + STAT_UPDATE_TIMER);
 }
+
+tasklet_schedule(&dev->bh);
 }

return ret;
@@ -1249,8 +1253,11 @@
 netif_dbg(dev, link, dev->net, "PHY INTR: 0x%08x\n", intdata);
 lan78xx_defer_kevent(dev, EVENT_LINK_RESET);

-if (dev->domain_data.phyirq > 0)
+if (dev->domain_data.phyirq > 0) {
+local_irq_disable();
generic_handle_irq(dev->domain_data.phyirq);
+local_irq_enable();
+}
} else
 netdev_warn(dev->net,
 "unexpected interrupt: 0x%08x\n", intdata);
@@ -1372,19 +1379,10 @@
 if (ret < 0)
 return ret;

-pdata->wol = 0;
-if (wol->wolopts & WAKE_UCAST)
-pdata->wol |= WAKE_UCAST;
if (wol->wolopts & WAKE_MCAST)
  pdata->wol |= WAKE_MCAST;
if (wol->wolopts & WAKE_BCAST)
  pdata->wol |= WAKE_BCAST;
if (wol->wolopts & WAKE_MAGIC)
  pdata->wol |= WAKE_MAGIC;
if (wol->wolopts & WAKE_PHY)
  pdata->wol |= WAKE_PHY;
if (wol->wolopts & WAKE_ARP)
  pdata->wol |= WAKE_ARP;
+if (wol->wolopts & ~WAKE_ALL)
  +return -EINVAL;
+
  pdata->wol = wol->wolopts;

device_set_wakeup_enable(&dev->udev->dev, (bool)wol->wolopts);

static u32 lan78xx_get_link(struct net_device *net)
{
  u32 link;
  +mutex_lock(&net->phydev->lock);
  phy_read_status(net->phydev);
  +link = net->phydev->link;
  +mutex_unlock(&net->phydev->lock);

  -return net->phydev->link;
  +return link;
}

static void lan78xx_get_drvinfo(struct net_device *net,
addr[5] = (addr_hi >> 8) & 0xFF;

if (!is_valid_ether_addr(addr)) {
  /* reading mac address from EEPROM or OTP */
  -if (!(lan78xx_read_eeprom(dev, EEPROM_MAC_OFFSET, ETH_ALEN,
             addr) == 0)) ||
  -  (lan78xx_read_otp(dev, EEPROM_MAC_OFFSET, ETH_ALEN,
             addr) == 0))
  -if (is_valid_ether_addr(addr)) {
  -  /* eeprom values are valid so use them */
  -netif_dbg(dev, ifup, dev->net,
  -  "MAC address read from EEPROM");
  -} else {
  -  /* generate random MAC */

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- random_ether_addr(addr);
- netif_dbg(dev, ifup, dev->net,
- "MAC address set to random addr");
-
- addr_lo = addr[0] | (addr[1] << 8) |
- addr_hi = addr[4] | (addr[5] << 8);
-
- ret = lan78xx_write_reg(dev, RX_ADDRH, addr_hi);
+ if (!eth_platform_get_mac_address(&dev->udev->dev, addr)) {
+ netif_dbg(dev, ifup, dev->net,
+ "MAC address present in Device Tree");
+ } else if (((lan78xx_read_eeprom(dev, EEPROM_MAC_OFFSET,
+ ETH_ALEN, addr) == 0) ||
+ (lan78xx_read_otp(dev, EEPROM_MAC_OFFSET,
+ ETH_ALEN, addr) == 0)) &&
+ is_valid_ether_addr(addr)) {
+ /* eeprom values are valid so use them */
+ netif_dbg(dev, ifup, dev->net,
+ "MAC address read from EEPROM");
} else {
/* generate random MAC */
random_ether_addr(addr);
netif_dbg(dev, ifup, dev->net,
"MAC address set to random addr");
}
+
+ addr_lo = addr[0] | (addr[1] << 8) |
+ addr_hi = addr[4] | (addr[5] << 8);
+
+ ret = lan78xx_write_reg(dev, RX_ADDRH, addr_hi);
+ ret = lan78xx_write_reg(dev, RX_ADDRH, addr_hi);
} 

ret = lan78xx_write_reg(dev, MAF_LO(0), addr_lo);
@@ -1773,6 +1773,7 @@
dev->mdiobus->read = lan78xx_mdiobus_read;
dev->mdiobus->write = lan78xx_mdiobus_write;
dev->mdiobus->name = "lan78xx-mdiobus";
+dev->mdiobus->parent = &dev->udev->dev;

snprintf(dev->mdiobus->id, MII_BUS_ID_SIZE, "usb-%03d:%03d",
dev->udev->bus->busnum, dev->udev->devnum);
@@ -2082,10 +2083,6 @@
dev->fc_autoneg = phydev->autoneg;

-phy_start(phydev);
-
-netif_dbg(dev, ifup, dev->net, "phy initialised successfully");
-
return 0;

error:
@@ -2224,6 +2221,10 @@
ret = lan78xx_write_reg(dev, RX_ADDRL, addr_lo);
ret = lan78xx_write_reg(dev, RX_ADDRH, addr_hi);

+/* Added to support MAC address changes */
+ret = lan78xx_write_reg(dev, MAF_LO(0), addr_lo);
+ret = lan78xx_write_reg(dev, MAF_HI(0), addr_hi | MAF_HI_VALID_);
+return 0;
}

@@ -2351,6 +2352,7 @@
unsigned long timeout;
+u8 sig;
ret = lan78xx_read_reg(dev, HW_CFG, &buf);
buf |= HW_CFG_LRST_;
@@ -2450,6 +2452,15 @@
    /* LAN7801 only has RGMII mode */
    if (dev->chipid == ID_REV_CHIP_ID_7801_)
    buf &= ~MAC_CR_GMII_EN_;
    +
    +if (dev->chipid == ID_REV_CHIP_ID_7800_)
    +
    +    ret = lan78xx_read_raw_eeprom(dev, 0, 1, &sig);
    +    if (ret &amp; sig != EEPROM_INDICATOR) {
    +        /* Implies there is no external eeprom. Set mac speed */
    +        netdev_info(dev-&gt;net, "No External EEPROM. Setting MAC Speed\n");
    +        buf |= MAC_CR_AUTO_DUPLEX_ | MAC_CR_AUTO_SPEED_;
    +    }
    +}
    ret = lan78xx_write_reg(dev, MAC_CR, buf);

    ret = lan78xx_read_reg(dev, MAC_TX, &buf);
    @@ -2508,13 +2519,9 @@
    if (ret &lt; 0)
goto out;

---
ret = lan78xx_reset(dev);
-if (ret < 0)
-goto done;
+phy_start(net->phydev);

-ret = lan78xx_phy_init(dev);
-if (ret < 0)
-goto done;
+netif_dbg(dev, ifup, dev->net, "phy initialised successfully");

/* for Link Check */
if (dev->urb_intr) {
  @@ -2575,13 +2582,8 @@
  if (timer_pending(&dev->stat_monitor))
    del_timer_sync(&dev->stat_monitor);

-phy_unregister_fixup_for_uid(PHY_KSZ9031RNX, 0xfffffff0);
-phy_unregister_fixup_for_uid(PHY_LAN8835, 0xfffffff0);
-
-phy_stop(net->phydev);
-phy_disconnect(net->phydev);
-
-net->phydev = NULL;
+if (net->phydev)
+  phy_stop(net->phydev);

clear_bit(EVENT_DEV_OPEN, &dev->flags);
netif_stop_queue(net);
@@ -2610,11 +2612,6 @@
return 0;
}

-static int lan78xx_linearize(struct sk_buff *skb)
-{
-  return skb_linearize(skb);
-}
-
-static struct sk_buff *lan78xx_tx_prep(struct lan78xx_net *dev,
  struct sk_buff *skb, gfp_t flags)
  {
    @@ -2625,8 +2622,10 @@
    return NULL;
  }

-if (lan78xx_linearize(skb) < 0)
+if (skb_linearize(skb)) {
+  dev_kfree_skb_any(skb);
return NULL;
+

tx_cmd_a = (u32)(skb->len & TX_CMD_A_LEN_MASK_) | TX_CMD_A_FCS_;

@@ -2759,73 +2758,12 @@
return NETDEV_TX_OK;
}

-static int
-lan78xx_get_endpoints(struct lan78xx_net *dev, struct usb_interface *intf)
-{
-    int tmp;
-    struct usb_host_interface *alt = NULL;
-    struct usb_host_endpoint *in = NULL, *out = NULL;
-    struct usb_host_endpoint *status = NULL;
-    
-    for (tmp = 0; tmp < intf->num_altsetting; tmp++) {
-        unsigned ep;
-        
-        in = NULL;
-        out = NULL;
-        status = NULL;
-        alt = intf->altsetting + tmp;
-        
-        for (ep = 0; ep < alt->desc.bNumEndpoints; ep++) {
-            struct usb_host_endpoint *e;
-            int intr = 0;
-            
-            e = alt->endpoint + ep;
-            switch (e->desc.bmAttributes) {
-                case USB_ENDPOINT_XFER_INT:
-                    if (!usb_endpoint_dir_in(&e->desc))
-                        continue;
-                    
-                    /* FALLTHROUGH */
-                case USB_ENDPOINT_XFER_BULK:
-                    break;
-                default:
-                    continue;
-                }
-                
-                if (usb_endpoint_dir_in(&e->desc)) {
-                    if (!intr && !in)
-                        in = e;
-                    else if (intr && !status)
-                        status = e;
-                } else {
-                    if (!out)
- out = e;
- }
- }
- if (in && out)
- break;
- }
- if (!alt || !in || !out)
  return -EINVAL;

- dev->pipe_in = usb_rcvbulkpipe(dev->udev,
  - in->desc.bEndpointAddress &
  - USB_ENDPOINT_NUMBER_MASK);
- dev->pipe_out = usb_sndbulkpipe(dev->udev,
  - out->desc.bEndpointAddress &
  - USB_ENDPOINT_NUMBER_MASK);
- dev->ep_intr = status;
- }
- return 0;
- }
- }

static int lan78xx_bind(struct lan78xx_net *dev, struct usb_interface *intf)
{
  struct lan78xx_priv *pdata = NULL;
  int ret;
  int i;

  - ret = lan78xx_get_endpoints(dev, intf);
    -
    dev->data[0] = (unsigned long)kzalloc(sizeof(*pdata), GFP_KERNEL);

  pdata = (struct lan78xx_priv *)(dev->data[0]);
  @@ -2863,8 +2801,7 @@
  if (ret < 0) {
    netdev_warn(dev->net,
      "lan78xx_setup_irq_domain() failed : %d", ret);
       -kfree(pdata);
 -return ret;
 +goto out1;
  }

  dev->net->hard_header_len += TX_OVERHEAD;
  @@ -2872,14 +2809,32 @@

  /* Init all registers */
  ret = lan78xx_reset(dev);
  +if (ret) {
  +netdev_warn(dev->net, "Registers INIT FAILED....");
  +goto out2;
ret = lan78xx_mdio_init(dev);
+if (ret) {
    +netdev_warn(dev->net, "MDIO INIT FAILED.....");
    +goto out2;
+}

dev->net->flags |= IFF_MULTICAST;

pdata->wol = WAKE_MAGIC;

return ret;
+
+out2:
+lan78xx_remove_irq_domain(dev);
+
+out1:
+netdev_warn(dev->net, "Bind routine FAILED");
+cancel_work_sync(&pdata->set_multicast);
+cancel_work_sync(&pdata->set_vlan);
+kfree(pdata);
+return ret;
}

static void lan78xx_unbind(struct lan78xx_net *dev, struct usb_interface *intf)
@@ -2891,6 +2846,8 @@
lan78xx_remove_mdio(dev);

if (pdata) {
    +cancel_work_sync(&pdata->set_multicast);
    +cancel_work_sync(&pdata->set_vlan);
    netif_dbg(dev, ifdown, dev->net, "free pdata");
    kfree(pdata);
    pdata = NULL;
@@ -3176,6 +3133,7 @@
    pkt_cnt = 0;
    count = 0;
    length = 0;
    +spin_lock_irqsave(&tqp->lock, flags);
    for (skb = tqp->next; pkt_cnt < tqp->qlen; skb = skb->next) {
        if (skb_is_gso(skb)) {
            if (pkt_cnt) {
                @@ -3184,7 +3142,8 @@
            }
            count = 1;
            length = skb->len - TX_OVERHEAD;
            skb2 = skb_dequeue(tqp);
            skb = skb2;
skb->unlink(skb, tqp);
+spin_unlock_irqrestore(&tqp->lock, flags);
goto gso_skb;
}

skb_totallen = skb->len + roundup(skb_totallen, sizeof(u32));
pkt_cnt++;
} +spin_unlock_irqrestore(&tqp->lock, flags);

skb = alloc_skb(skb_totallen, GFP_ATOMIC);
/* copy to a single skb */
+phy_unregister_fixup_for_uid(PHY_KSZ9031RNX, 0xffffffff);
+phy_unregister_fixup_for_uid(PHY_LAN8835, 0xffffffff);
+phy_disconnect(net->phydev);
+unregister_netdev(net);
cancel_delayed_work_sync(&dev->wq);
udev = interface_to_usbdev(intf);
-
net = dev->net;
+
+phy_unregister_fixup_for_uid(PHY_KSZ9031RNX, 0xffffffff);
+phy_unregister_fixup_for_uid(PHY_LAN8835, 0xffffffff);
+
+phy_disconnect(net->phydev);
+unregister_netdev(net);
cancel_delayed_work_sync(&dev->wq);

static netdev_features_t lan78xx_features_check(struct sk_buff *skb,
t					struct net_device *netdev,
t					netdev_features_t features)
+
+if (skb->len + TX_OVERHEAD > MAX_SINGLE_PACKET_SIZE)
+features &= ~NETIF_F_GSO_MASK;
+
+features = vlan_features_check(skb, features);
+features = vxlan_features_check(skb, features);
+
+return features;
+
static const struct net_device_ops lan78xx_netdev_ops = {

    .ndo_open = lan78xx_open,
    .ndo_stop = lan78xx_stop,
static void lan78xx_stat_monitor(struct timer_list *t)
static int lan78xx_probe(struct usb_interface *intf,
               const struct usb_device_id *id)
{
  struct usb_host_endpoint *ep_blkin, *ep_blkout, *ep_intr;
  struct lan78xx_net *dev;
  struct net_device *netdev;
  struct usb_device *udev;

  mutex_init(&dev->stats.access_lock);

  if (intf->cur_altsetting->desc.bNumEndpoints < 3) {
    ret = -ENODEV;
    goto out2;
  }
  +
  +dev->pipe_in = usb_rcvbulkpipe(udev, BULK_IN_PIPE);
  +ep_blkin = usb_pipe_endpoint(udev, dev->pipe_in);
  +if (!ep_blkin || !usb_endpoint_is_bulk_in(&ep_blkin->desc)) {
    +ret = -ENODEV;
    +goto out2;
  }
  +
  +dev->pipe_out = usb_sndbulkpipe(udev, BULK_OUT_PIPE);
  +ep_blkout = usb_pipe_endpoint(udev, dev->pipe_out);
  +if (!ep_blkout || !usb_endpoint_is_bulk_out(&ep_blkout->desc)) {
    +ret = -ENODEV;
    +goto out2;
  }
  +
  +ep_intr = intf->cur_altsetting->endpoint[2];
  +if (!usb_endpoint_is_int_in(&ep_intr->desc)) {
    +ret = -ENODEV;
    +goto out2;
  }
  +
  +dev->pipe_intr = usb_rcvintpipe(dev->udev,
+usb_endpoint_num(&ep_intr->desc));
  +
  +ndo_set_features = lan78xx_set_features,
  +ndo_vlan_rx_add_vid = lan78xx_vlan_rx_add_vid,
  +ndo_vlan_rx_kill_vid = lan78xx_vlan_rx_kill_vid,
  +ndo_features_check = lan78xx_features_check,
  +
};
ret = lan78xx_bind(dev, intf);
if (ret < 0)
goto out2;
@@ -3585,19 +3593,9 @@
/* MTU range: 68 - 9000 */
etdev->max_mtu = MAX_SINGLE_PACKET_SIZE;
+netif_set_gso_max_size(netdev, MAX_SINGLE_PACKET_SIZE - MAX_HEADER);
-dev->ep_blkin = (intf->cur_altsetting)->endpoint + 0;
-dev->ep_blkout = (intf->cur_altsetting)->endpoint + 1;
-dev->ep_intr = (intf->cur_altsetting)->endpoint + 2;
-
-dev->pipe_in = usb_rcvbulkpipe(udev, BULK_IN_PIPE);
-dev->pipe_out = usb_sndbulkpipe(udev, BULK_OUT_PIPE);
-
-dev->pipe_intr = usb_rcvintpipe(dev->udev,
-dev->ep_intr->desc.bEndpointAddress &
-USB_ENDPOINT_NUMBER_MASK);
-period = dev->ep_intr->desc.bInterval;
-
+period = ep_intr->desc.bInterval;
maxp = usb_maxpacket(dev->udev, dev->pipe_intr, 0);
buf = kmalloc(maxp, GFP_KERNEL);
if (buf) {
@@ -3610,6 +3608,7 @@
usb_fill_int_urb(dev->urb_intr, dev->udev,
-dev->pipe_intr, buf, maxp,
-intr_complete, dev, period);
+dev->urb_intr->transfer_flags |= URB_FREE_BUFFER;
} }

@@ -3618,10 +3617,14 @@
/* driver requires remote-wakeup capability during autosuspend. */
intf->needs_remote_wakeup = 1;
+
+ret = lan78xx_phy_init(dev);
+if (ret < 0)
+goto out4;
+
+ret = register_netdev(netdev);
+if (ret != 0) {
+netif_err(dev, probe, netdev, "couldn’t register the device\n");
-goto out3;
+goto out5;
}
usb_set_intfdata(intf, dev);
@@ -3636,6 +3639,10 @@
    return 0;
+out5:
+    phy_disconnect(netdev->phydev);
+out4:
+    usb_free_urb(dev->urb_intr);
out3:
    lan78xx_unbind(dev, intf);
out2:
    @@ -3983,7 +3990,7 @@
    lan78xx_reset(dev);

-lan78xx_phy_init(dev);
+phy_start(dev->net->phydev);

    return lan78xx_resume(intf);
 } --- linux-4.15.0.orig/drivers/net/usb/pegasus.c
+++ linux-4.15.0/drivers/net/usb/pegasus.c
@@ -285,7 +285,7 @@
     static int read_eprom_word(pegasus_t *pegasus, __u8 index, __u16 *retdata)
     {
         int i;
-        __u8 tmp;
+        __u8 tmp = 0;
         __le16 retdatai;
         int ret;

         @@ -750,12 +750,16 @@
         set_registers(pegasus, EthCtrl0, sizeof(tmp), &tmp);
     }

-static inline void get_interrupt_interval(pegasus_t *pegasus)
+static inline int get_interrupt_interval(pegasus_t *pegasus)
{
    u16 data;
    u8 interval;
    +int ret;
    +
    +ret = read_eprom_word(pegasus, 4, &data);
    +if (ret < 0)
    +return ret;

    -read_eprom_word(pegasus, 4, &data);
interval = data >> 8;
if (pegasus->usb->speed != USB_SPEED_HIGH) {
    if (interval < 0x80) {
@@ -770,6 +774,8 @@
    }
}
pegasus->intr_interval = interval;
+
+return 0;
}

static void set_carrier(struct net_device *net)
@@ -1188,7 +1194,9 @@
    pegasus->features = usb_dev_id[dev_index].private;
    -get_interrupt_interval(pegasus);
    +res = get_interrupt_interval(pegasus);
    +if (res)
    +goto out2;
    if (reset_mac(pegasus)) {
        dev_err(&intf->dev, "can't reset MAC\n");
        res = -EIO;
--- linux-4.15.0.orig/drivers/net/usb/qmi_wwan.c
+++ linux-4.15.0/drivers/net/usb/qmi_wwan.c
@@ -22,6 +22,7 @@
#include <linux/usb/cdc.h>
#include <linux/usb/usbnet.h>
#include <linux/usb/cdc-wdm.h>
+#include <linux/u64_stats_sync.h>
*/
/* This driver supports wwan (3G/LTE/?) devices using a vendor
 * specific management protocol called Qualcomm MSM Interface (QMI) -
@@ -74,6 +75,7 @@
 struct qmimux_priv {
     struct net_device *real_dev;
     u8 mux_id;
@@ -100,19 +102,65 @@
             skb_push(skb, sizeof(struct qmimux_hdr));

 static int qmimux_open(struct net_device *dev)
@@ -100,19 +102,65 @@
             struct qmimux_priv *priv = netdev_priv(dev);
             unsigned int len = skb->len;
             struct qmimux_hdr *hdr;
             +netdev_tx_t ret;
             hdr = skb_push(skb, sizeof(struct qmimux_hdr));


hdr->pad = 0;
hdr->mux_id = priv->mux_id;
hdr->pkt_len = cpu_to_be16(len);
skb->dev = priv->real_dev;
return dev_queue_xmit(skb);
+ret = dev_queue_xmit(skb);
+
+if (likely(ret == NET_XMIT_SUCCESS || ret == NET_XMIT_CN)) {
+struct pcpu_sw_netstats *stats64 = this_cpu_ptr(priv->stats64);
+
+u64_stats_update_begin(&stats64->syncp);
+stats64->tx_packets++;
+stats64->tx_bytes += len;
+u64_stats_update_end(&stats64->syncp);
+} else {
+dev->stats.tx_dropped++;
+
+return ret;
+
+static void qmimux_get_stats64(struct net_device *net,
+    struct rtnl_link_stats64 *stats)
+{
+    struct qmimux_priv *priv = netdev_priv(net);
+    unsigned int start;
+    int cpu;
+
+    netdev_stats_to_stats64(stats, &net->stats);
+
+    for_each_possible_cpu(cpu) {
+        struct pcpu_sw_netstats *stats64;
+        u64 rx_packets, rx_bytes;
+        u64 tx_packets, tx_bytes;
+        
+        stats64 = per_cpu_ptr(priv->stats64, cpu);
+        do {
+            start = u64_stats_fetch_begin_irq(&stats64->syncp);
+            rx_packets = stats64->rx_packets;
+            rx_bytes = stats64->rx_bytes;
+            tx_packets = stats64->tx_packets;
+            tx_bytes = stats64->tx_bytes;
+        } while (u64_stats_fetch_retry_irq(&stats64->syncp, start));
+        
+        stats->rx_packets += rx_packets;
+        stats->rx_bytes += rx_bytes;
+        stats->tx_packets += tx_packets;
+        
+    }
+}

---
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static int qmimux_rx_fixup(struct usbnet *dev, struct sk_buff *skb)
{
    int len, offset = sizeof(struct qmimux_hdr);
    unsigned int offset = 0, pad_len, pkt_len;
    struct qmimux_hdr *hdr;
    struct net_device *net;
    struct sk_buff *skbn;
    u8 qmimux_hdr_sz = sizeof(*hdr);

    while (offset < skb->len) {
        hdr = (struct qmimux_hdr *)skb->data;
        while (offset + qmimux_hdr_sz < skb->len) {
            hdr = (struct qmimux_hdr *)(skb->data + offset);
            len = be16_to_cpu(hdr->pkt_len);
            /* drop the packet, bogus length */
            if (offset + len > skb->len)
                return 0;
            pkt_len = skb->len - offset - qmimux_hdr_sz;
            /* control packet, we do not know what to do */
            if (hdr->pad & 0x80)
                goto skip;
        }
        offset = skb->data_len;
    }

    /* control packet, we do not know what to do */
    if (hdr->pad & 0x80)
        goto skip;

    return skb->data_len - sizeof(struct qmimux_hdr);
}

static void qmimux_setup(struct net_device *dev)
{
    dev->addr_len = 0;
    dev->flags = IFF_POINTOPOINT | IFF_NOARP | IFF_MULTICAST;
    dev->netdev_ops = &qmimux_netdev_ops;
    dev->mtu = 1500;
    dev->needs_free_netdev = true;
}

static const struct net_device_ops qmimux_netdev_ops = {
    .ndo_open = qmimux_open,
    .ndo_stop = qmimux_stop,
    .ndo_start_xmit = qmimux_start_xmit,
    .ndo_get_stats64 = qmimux_get_stats64,
};
/* extract padding length and check for valid length info */
+pad_len = hdr->pad & 0x3f;
+if (len == 0 || pad_len >= len)
+goto skip;
+pkt_len = len - pad_len;
+
net = qmimux_find_dev(dev, hdr->mux_id);
if (!net)
    goto skip;
-skb = netdev_alloc_skb(net, len);
+skb = netdev_alloc_skb(net, pkt_len);
if (!skb)
    return 0;
skb->dev = net;

+switch (skb->data[offset] & 0xf0) {
+    switch (skb->data[offset + qmimux_hdr_sz] & 0xf0) {
+case 0x40:
+    skb->protocol = htons(ETH_P_IP);
+    break;
+    @ -188,12 +244,23 @@
+    goto skip;
+}
+    skb_put_data(skb, skb->data + offset, len);
+    if (netif_rx(skb) != NET_RX_SUCCESS)
+        return 0;
+    } else {
+    struct pcpu_sw_netstats *stats64;
+    struct qmimux_priv *priv = netdev_priv(net);
+    +stats64 = this_cpu_ptr(priv->stats64);
+    +u64_stats_update_begin(&stats64->syncp);
+    +stats64->rx_packets++;
+    +stats64->rx_bytes += pkt_len;
+    +u64_stats_update_end(&stats64->syncp);
+    +}
+}
+
skip:
    offset += len + sizeof(struct qmimux_hdr);
    offset += len + qmimux_hdr_sz;
}
return 1;
}
priv->mux_id = mux_id;
priv->real_dev = real_dev;

+priv->stats64 = netdev_alloc_pcpu_stats(struct pcpu_sw_netstats);
+if (!priv->stats64) {
+    err = -ENOBUFS;
+    goto out_free_newdev;
+
+} +
err = register_netdevice(new_dev);
if (err < 0)
goto out_free_newdev;
@@ -238,13 +311,15 @@
return err;
}

-static void qmimux_unregister_device(struct net_device *dev)
+static void qmimux_unregister_device(struct net_device *dev,
+    struct list_head *head)
{
    struct qmimux_priv *priv = netdev_priv(dev);
    struct net_device *real_dev = priv->real_dev;

    +free_percpu(priv->stats64);
    netdev_upper_dev_unlink(real_dev, dev);
    -unregister_netdevice(dev);
    +unregister_netdevice_queue(dev, head);

    /* Get rid of the reference to real_dev */
    dev_put(real_dev);
    @@ -265,6 +340,9 @@
    netdev_dbg(net, "mode: raw IPn");
 } else if (!net->header_ops) { /* don't bother if already set */
    ether_setup(net);
    +/* Restoring min/max mtu values set originally by usbnet */
    +net->min_mtu = 0;
    +net->max_mtu = ETH_MAX_MTU;
    clear_bit(EVENT_NO_IP_ALIGN, &dev->flags);
    netdev_dbg(net, "mode: Ethernet\n");
    }
@@ -353,8 +431,8 @@
    if (kstrtou8(buf, 0, &mux_id))
        return -EINVAL;

    -/* mux_id [1 - 0x7f] range empirically found */
    -if (mux_id < 1 || mux_id > 0x7f)
    +/* mux_id [1 - 254] for compatibility with ip(8) and the rmnet driver */
+if (mux_id < 1 || mux_id > 254)
 return -EINVAL;

if (!rtnl_trylock())
  @@ -366,13 +444,6 @@
goto err;
}

-/* we don't want to modify a running netdev */
-if (netif_running(dev->net)) {
- netdev_err(dev->net, "Cannot change a running device\n");
- ret = -EBUSY;
- goto err;
- }

 ret = qmimux_register_device(dev->net, mux_id);
if (!ret) {
info->flags |= QMI_WWAN_FLAG_MUX;
 @@ -402,20 +473,13 @@
if (!rtnl_trylock())
 return restart_syscall();

-/* we don't want to modify a running netdev */
-if (netif_running(dev->net)) {
- netdev_err(dev->net, "Cannot change a running device\n");
- ret = -EBUSY;
- goto err;
- }

 del_dev = qmimux_find_dev(dev, mux_id);
if (!del_dev) {
 netdev_err(dev->net, "mux_id not present\n");
 ret = -EINVAL;
 goto err;
 }
-qmimux_unregister_device(del_dev);
+qmimux_unregister_device(del_dev, NULL);

if (!qmimux_has_slaves(dev))
 info->flags &= ~QMI_WWAN_FLAG_MUX;
 @@ -826,7 +890,7 @@

static const struct driver_info	qmi_wwan_info = {
 .description = "WWAN/QMI device",
-.flags = FLAG_WWAN,
+flags = FLAG_WWAN | FLAG_SEND_ZLP,
 .bind = qmi_wwan_bind,
 .unbind = qmi_wwan_unbind,
.manage_power = qmi_wwan_manage_power,
@@ -26251,6 +26251,7 @@
 .flags = FLAG_WWAN, 
 .bind = qmi_wwan_bind, 
 .unbind = qmi_wwan_unbind, 
@@ -835,7 +899,7 @@
 static const struct driver_info qmi_wwan_info_quirk_dtr = {
 .description = "WWAN/QMI device", 
 .flags = FLAG_WWAN |
 static const struct driver_info qmi_wwan_info_quirk_dtr = {
 .description = "WWAN/QMI device", 
 .flags = FLAG_WWAN | FLAG_SEND_ZLP, 
 .bind = qmi_wwan_bind, 
 .unbind = qmi_wwan_unbind, 
 .manage_power = qmi_wwan_manage_power, 
@@ -863,6 +927,19 @@
 #define QMI_GOBI_DEVICE(vend, prod) \
 QMI_FIXED_INTF(vend, prod, 0)
 +/* Many devices have QMI and DIAG functions which are distinguishable
 + * from other vendor specific functions by class, subclass and
 + * protocol all being 0xff. The DIAG function has exactly 2 endpoints
 + * and is silently rejected when probed.
 + * 
 + * This makes it possible to match dynamically numbered QMI functions
 + * as seen on e.g. many Quectel modems.
 + */
 +#define QMI_MATCH_FF_FF_FF(vend, prod) \
 +USB_DEVICE_AND_INTERFACE_INFO(vend, prod, USB_CLASS_VENDOR_SPEC, \
 + USB_SUBCLASS_VENDOR_SPEC, 0xff), \
 +.driver_info = (unsigned long)&qmi_wwan_info_quirk_dtr
 +
 static const struct usb_device_id products[] = {
 /* 1. CDC ECM like devices match on the control interface */
 /* Huawei E392, E398 and possibly others sharing both device id and more... */
 @ @ -835,7 +899,7 @@
 USB_DEVICE_AND_INTERFACE_INFO(0x03f0, 0x581d, USB_CLASS_VENDOR_SPEC, 1, 7),
 .driver_info = (unsigned long)&qmi_wwan_info,
 },
 +{QMI_MATCH_FF_FF_FF(0x03f0, 0x0306)},
 +{QMI_MATCH_FF_FF_FF(0x03f0, 0x0512)},
 +{QMI_MATCH_FF_FF_FF(0x03f0, 0x0800)},
 /* 3. Combined interface devices matching on interface number */
 {QMI_FIXED_INTF(0x0408, 0xea42, 4)}, /* Yota / Megafon M100-1 */
 @ @ -1000,7 +1082,7 @@
 {QMI_FIXED_INTF(0x05c6, 0x9011, 4)},
 {QMI_FIXED_INTF(0x05c6, 0x9021, 1)},
 {QMI_FIXED_INTF(0x05c6, 0x9022, 2)},
 -{QMI_FIXED_INTF(0x05c6, 0x9025, 4)}}, /* Alcatel-sbell ASB TL131 TDD LTE (China Mobile) */
 +{QMI_QUIRK_SET_DTR(0x05c6, 0x9025, 4)}}, /* Alcatel-sbell ASB TL131 TDD LTE (China Mobile) */

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{QMI_FIXED_INTF(0x05c6, 0x9026, 3)},
{QMI_FIXED_INTF(0x05c6, 0x902e, 5)},
{QMI_FIXED_INTF(0x05c6, 0x9031, 5)},
}@ -1098.12 +1180.26 @@
{QMI_FIXED_INTF(0x05c6, 0x9080, 8)},
{QMI_FIXED_INTF(0x05c6, 0x9083, 3)},
{QMI_FIXED_INTF(0x05c6, 0x9084, 4)},
+{QMI_FIXED_INTF(0x05c6, 0x90b2, 3)}, /* ublox R410M */
{QMI_FIXED_INTF(0x05c6, 0x920d, 0)},
{QMI_FIXED_INTF(0x05c6, 0x920d, 5)},
{QMI_QUIRK_SET_DTR(0x05c6, 0x9625, 4)}, /* YUGA CLM920-NC5 */
{QMI_FIXED_INTF(0x0846, 0x68a2, 8)},
+{QMI_FIXED_INTF(0x0846, 0x68d3, 8)}, /* Netgear Aircard 779S */
{QMI_FIXED_INTF(0x12d1, 0x140c, 1)}, /* Huawei E173 */
{QMI_FIXED_INTF(0x12d1, 0x14ac, 1)}, /* Huawei E1820 */
+{QMI_FIXED_INTF(0x1435, 0x0918, 3)}, /* Wistron NeWeb D16Q1 */
+{QMI_FIXED_INTF(0x1435, 0x0918, 4)}, /* Wistron NeWeb D16Q1 */
+{QMI_FIXED_INTF(0x1435, 0x0918, 5)}, /* Wistron NeWeb D16Q1 */
+{QMI_FIXED_INTF(0x1435, 0x3185, 4)}, /* M9615A DMI1-1 D51QC */
+{QMI_FIXED_INTF(0x1435, 0x12d1, 0x141c, 3)}, /* Wistron NeWeb D18 */
+{QMI_FIXED_INTF(0x19d2, 0x0265, 4)}, /* ONDA MT8205 4G LTE */
{QMI_FIXED_INTF(0x19d2, 0x0284, 4)}, /* ASKEY WWHC050 */
{QMI_FIXED_INTF(0x19d2, 0x0326, 4)}, /* Telewell TW-LTE 4G */
{QMI_FIXED_INTF(0x19d2, 0x1008, 4)}, /* ZTE (Vodafone) K3570-Z */
{QMI_FIXED_INTF(0x19d2, 0x1255, 4)}, /* ZTE (Vodafone) K3571-Z */
}@ -1157.6 +1253.7 @@
{QMI_FIXED_INTF(0x19d2, 0x0265, 4)}, /* ONDA MT8205 4G LTE */
{QMI_FIXED_INTF(0x19d2, 0x0284, 4)}, /* ZTE MF880 */
{QMI_FIXED_INTF(0x19d2, 0x0326, 4)}, /* ZTE MF821D */
+{QMI_FIXED_INTF(0x19d2, 0x0396, 3)}, /* ZTE ZM8620 */
{QMI_FIXED_INTF(0x19d2, 0x0412, 4)}, /* Telewell TW-LTE 4G */
{QMI_FIXED_INTF(0x19d2, 0x1008, 4)}, /* ZTE (Vodafone) K3570-Z */
{QMI_FIXED_INTF(0x19d2, 0x1255, 4)}, /* ZTE (Vodafone) K3571-Z */
}@ -1171.21 +1268.28 @@
{QMI_FIXED_INTF(0x19d2, 0x1255, 4)},
{QMI_FIXED_INTF(0x19d2, 0x1256, 4)},
{QMI_FIXED_INTF(0x19d2, 0x1270, 5)}, /* ZTE MF667 */
+{QMI_FIXED_INTF(0x19d2, 0x1275, 3)}, /* ZTE P685M */
{QMI_FIXED_INTF(0x19d2, 0x1401, 2)},
{QMI_FIXED_INTF(0x19d2, 0x1402, 2)}, /* ZTE MF60 */
{QMI_FIXED_INTF(0x19d2, 0x1424, 2)},
{QMI_FIXED_INTF(0x19d2, 0x1425, 2)},
{QMI_FIXED_INTF(0x19d2, 0x1426, 2)}, /* ZTE MF91 */
{QMI_FIXED_INTF(0x19d2, 0x1428, 2)}, /* Telewell TW-LTE 4G v2 */
+{QMI_FIXED_INTF(0x19d2, 0x1432, 3)}, /* ZTE ME3620 */
{QMI_FIXED_INTF(0x2001, 0x7e16, 4)}, /* D-Link DWM-221A */
{QMI_FIXED_INTF(0x2001, 0x7e19, 4)}, /* D-Link DWM-221 B1 */
{QMI_FIXED_INTF(0x2001, 0x7e35, 4)}, /* D-Link DWM-222A */
+{QMI_FIXED_INTF(0x2001, 0x7e3d, 4)}, /* D-Link DWM-222B */
+{QMI_FIXED_INTF(0x0f3d, 0x68a2, 8)}, /* Sierra Wireless MC7700 */
{QMI_FIXED_INTF(0x1199, 0x68c0, 8)}, /* Sierra Wireless MC7304/MC7354 */
-{QMI_FIXED_INTF(0x1199, 0x907b, 8)}, /* Sierra Wireless EM74xx */
-{QMI_FIXED_INTF(0x1199, 0x907b, 10)}, /* Sierra Wireless EM74xx */
-{QMI_FIXED_INTF(0x1199, 0x9079, 8)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x907b, 8)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x907b, 10)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9091, 8)}, /* Sierra Wireless EM7565 */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9071, 8)}, /* Sierra Wireless MC74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9071, 10)}, /* Sierra Wireless MC74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9079, 8)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9079, 10)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9091, 8)}, /* Sierra Wireless EM7565 */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9071, 8)}, /* Sierra Wireless MC74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9071, 10)}, /* Sierra Wireless MC74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9079, 8)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9079, 10)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9091, 8)}, /* Sierra Wireless EM7565 */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9071, 8)}, /* Sierra Wireless MC74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9071, 10)}, /* Sierra Wireless MC74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9079, 8)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9079, 10)}, /* Sierra Wireless EM74xx */
+{QMI_QUIRK_SET_DTR(0x1199, 0x9091, 8)}, /* Sierra Wireless EM7565 */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x011e, 4)}, /* Telekom Speedstick LTE II (Alcatel One Touch L100V LTE) */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x011e, 4)}, /* Alcatel L800MA */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x0203, 2)}, /* Alcatel L800MA */
{QMI_FIXED_INTF(0x2357, 0x9000, 4)}, /* TP-LINK HSUPA Modem MA180 */
{QMI_FIXED_INTF(0x2357, 0x9000, 4)}, /* TP-LINK MA260 */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x011e, 4)}, /* Telit LE910C1-EUX */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x011e, 4)}, /* Telit LE922A */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x011e, 4)}, /* Telit FN980 */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x011e, 4)}, /* Telit ME910 */
+{QMI_QUIRK_SET_DTR(0x1bb, 0x011e, 4)}, /* Telit ME910 dual modem */

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{QMI_FIXED_INTF(0x1bc7, 0x1200, 5)}, /* Telit LE920 */
{QMI_QUICK_SET_DTR(0x1bc7, 0x1201, 2)}, /* Telit LE920, LE920A4 */
+{QMI_QUICK_SET_DTR(0x1bc7, 0x1230, 2)}, /* Telit LE910Cx */
+{QMI_QUICK_SET_DTR(0x1bc7, 0x1260, 2)}, /* Telit LE910Cx */
+{QMI_QUICK_SET_DTR(0x1bc7, 0x1261, 2)}, /* Telit LE910Cx */
+{QMI_QUICK_SET_DTR(0x1bc7, 0x1900, 1)}, /* Telit LN940 series */
{QMI_FIXED_INTF(0x1c9e, 0x9801, 3)}, /* Telewell TW-3G HSPA+ */
{QMI_FIXED_INTF(0x1c9e, 0x9803, 4)}, /* Telewell TW-3G HSPA+ */
{QMI_FIXED_INTF(0x1c9e, 0x9b01, 3)}, /* XS Stick W100-2 from 4G Systems */
@@ -1226,10 +1336,14 @@
{QMI_FIXED_INTF(0x0b3c, 0xc00a, 6)}, /* Olivetti Olicard 160 */
{QMI_FIXED_INTF(0x0b3c, 0xc00b, 4)}, /* Olivetti Olicard 500 */
{QMI_FIXED_INTF(0x1e2d, 0x006d, 4)}, /* Cinterion PLxx */
+{QMI_QUICK_SET_DTR(0x1e2d, 0x006f, 8)}, /* Cinterion PLS83/PLS63 */
{QMI_FIXED_INTF(0x1e2d, 0x0053, 4)}, /* Cinterion PHxx,PXxx */
+{QMI_FIXED_INTF(0x1e2d, 0x0063, 10)}, /* Cinterion ALASxx (1 RmNet) */
{QMI_FIXED_INTF(0x1e2d, 0x0082, 4)}, /* Cinterion PHxx,PXxx (2 RmNet) */
{QMI_FIXED_INTF(0x1e2d, 0x0082, 5)}, /* Cinterion PHxx,PXxx (2 RmNet) */
{QMI_FIXED_INTF(0x1e2d, 0x0083, 4)}, /* Cinterion PHxx,PXxx (1 RmNet + USB Audio) */
+{QMI_QUICK_SET_DTR(0x1e2d, 0x00b0, 4)}, /* Cinterion CLS8 */
+{QMI_FIXED_INTF(0x1e2d, 0x00b7, 0)}, /* Cinterion MV3I RmNet */
{QMI_FIXED_INTF(0x413c, 0x81a2, 8)}, /* Dell Wireless 5806 Gobi(TM) 4G LTE Mobile Broadband Card */
{QMI_FIXED_INTF(0x413c, 0x81a3, 8)}, /* Dell Wireless 5570 HSPA+ (42Mbps) Mobile Broadband Card */
{QMI_FIXED_INTF(0x413c, 0x81a4, 8)}, /* Dell Wireless 5570e HSPA+ (42Mbps) Mobile Broadband Card */
@@ -1239,12 +1353,22 @@
{QMI_FIXED_INTF(0x413c, 0x81b3, 8)}, /* Dell Wireless 5809e Gobi(TM) 4G LTE Mobile Broadband Card (rev3) */
{QMI_FIXED_INTF(0x413c, 0x81b6, 8)}, /* Dell Wireless 5811e */
{QMI_FIXED_INTF(0x413c, 0x81b6, 10)}, /* Dell Wireless 5811e */
+{QMI_FIXED_INTF(0x413c, 0x81cc, 8)}, /* Dell Wireless 5816e */
+{QMI_FIXED_INTF(0x413c, 0x81d7, 0)}, /* Dell Wireless 5821e */
+{QMI_FIXED_INTF(0x413c, 0x81d7, 1)}, /* Dell Wireless 5821e preproduction config */
+{QMI_FIXED_INTF(0x413c, 0x81e0, 0)}, /* Dell Wireless 5821e with eSIM support */
{QMI_FIXED_INTF(0x03f0, 0x4e1d, 8)}, /* HP lt4111 LTE/EV-DO/HSPA+ Gobi 4G Module */
+{QMI_FIXED_INTF(0x03f0, 0x9d1d, 1)}, /* HP lt4120 Snapdragon X5 LTE */
{QMI_FIXED_INTF(0x022d, 0x9061, 3)}, /* WeTelecom WPD-600N */
-{QMI_FIXED_INTF(0x01ec, 0x9001, 5)}, /* SIMCom 7230E */
-{QMI_QUICK_SET_DTR(0x02c7, 0x0125, 4)}, /* Quectel EC25, EC20 R2.0 Mini PCIe */
+{QMI_QUICK_SET_DTR(0x01e0, 0x9001, 5)}, /* SIMCom 7100E, 7230E, 7600E ++ */
+{QMI_QUICK_SET_DTR(0x02c7, 0x0121, 4)}, /* Quectel EC21 Mini PCIe */
+{QMI_QUICK_SET_DTR(0x02c7, 0x0191, 4)}, /* Quectel EG91 */
+{QMI_QUICK_SET_DTR(0x02c7, 0x0195, 4)}, /* Quectel EG95 */
+{QMI_FIXED_INTF(0x02c7, 0x0296, 4)}, /* Quectel BG96 */
+{QMI_QUICK_SET_DTR(0x02cb7, 0x0104, 4)}, /* Fibocom NL678 series */
+{QMI_FIXED_INTF(0x0489, 0xe0b4, 0)}, /* Foxconn T77W968 LTE */
+{QMI_FIXED_INTF(0x0489, 0xe0b5, 0)}, /* Foxconn T77W968 LTE with eSIM support */
+{QMI_FIXED_INTF(0x2692, 0x9025, 4)}, /* Cellient MPL200 (rebranded Qualcomm 05c6:9025) */
/* 4. Gobi 1000 devices */
{QMI_GOBI1K_DEVICE(0x05c6, 0x9212)},/* Acer Gobi Modem Device */
@@ -1336,12 +1460,33 @@
id->driver_info = (unsigned long)&qmi_wwan_info;
}

/* There are devices where the same interface number can be
+* configured as different functions. We should only bind to
+* vendor specific functions when matching on interface number
+*/
+if (id->match_flags & USB_DEVICE_ID_MATCH_INT_NUMBER &&
+    desc->bInterfaceClass != USB_CLASS_VENDOR_SPEC)
+    dev_dbg(&intf->dev,
+    "Rejecting interface number match for class %02x\n",
+    desc->bInterfaceClass);
+return -ENODEV;
+
/* Quectel EC20 quirk where we've QMI on interface 4 instead of 0 */
if (quectel_ec20_detected(intf) && desc->bInterfaceNumber == 0) {
    dev_dbg(&intf->dev, "Quectel EC20 quirk, skipping interface 0\n");
    return -ENODEV;
}

/* Several Quectel modems supports dynamic interface configuration, so
+* we need to match on class/subclass/protocol. These values are
+* identical for the diagnostic- and QMI-interface, but bNumEndpoints is
+* different. Ignore the current interface if the number of endpoints
+* equals the number for the diag interface (two).
+*/
+if (desc->bNumEndpoints == 2)
+return -ENODEV;
+
return usbnet_probe(intf, id);
}
@@ -1351,6 +1496,7 @@
struct qmi_wwan_state *info;
struct list_head *iter;
struct net_device *ldev;
+LIST_HEAD(list);
/* called twice if separate control and data intf */
if (!dev)
@@ -1363,8 +1509,9 @@
rcu_read_lock();
netdev_for_each_upper_dev_rcu(dev->net, ldev, iter)
qmimux_unregister_device(ldev);
+qmimux_unregister_device(ldev, &list);
rcu_read_unlock();
+unregister_netdevice_many(&list);
rtnl_unlock();
info->flags &= ~QMI_WWAN_FLAG_MUX;
}
--- linux-4.15.0.orig/drivers/net/usb/r8152.c
+++ linux-4.15.0/drivers/net/usb/r8152.c
@@ -129,6 +129,7 @@
#define USB_UPS_CTRL		0xd800
#define USB_POWER_CUT	0xd80a
#define USB_MISC_00xd81a
+#define USB_MISC_10xd81f
#define USB_AFE_CTRL20xd824
#define USB_UPS_CFG0xd842
#define USB_UPS_FLAGS0xd848
@@ -555,6 +556,8 @@
/* MAC PASSTHRU */
#define AD_MASK		0xfee0
+#define BND_MASK0x0004
+#define BD_MASK0x0001
#define EFUSE0xcfdb
#define PASS_THRU_MASK0x1

@@ -607,6 +610,7 @@
SCHEDULE_NAPI,
GREEN_ETHERNET,
DELL_TB_RX_AGG_BUG,
+LENOVO_MACPASSTHRU,
};
/* Define these values to match your device */
@@ -788,8 +792,11 @@
ret = usb_control_msg(tp->udev, usb_rcvctrlpipe(tp->udev, 0),
RTL8152_REQ_GET_REGS, RTL8152_REQT_READ,
value, index, tmp, size, 500);
+if (ret < 0)
+memset(data, 0xff, size);
+else
+memcpy(data, tmp, size);
-memcpy(data, tmp, size);
kfree(tmp);

return ret;
@@ -1150,7 +1157,7 @@
/* Devices containing RTL8153-AD can support a persistent host system provided MAC address.*
 * Examples of this are Dell TB15 and Dell WD15 docks */

@@ -1162,28 +1169,52 @@
 int ret = -EINVAL;
 u32 ocp_data;
 unsigned char buf[6];
+char *mac_obj_name;
+acpi_object_type mac_obj_type;
+int mac_strlen;
+
+if (test_bit(LENOVO_MACPASSTHRU, &tp->flags)) {
+    mac_obj_name = "\MACA";
+    mac_obj_type = ACPI_TYPE_STRING;
+    mac_strlen = 0x16;
+} else {
+    /* test for -AD variant of RTL8153 */
+    ocp_data = ocp_read_word(tp, MCU_TYPE_USB, USB_MISC_0);
+    if (((ocp_data & AD_MASK) == 0x1000) {
+        /* test for MAC address pass-through bit */
+        ocp_data = ocp_read_byte(tp, MCU_TYPE_USB, EFUSE);
+        if (((ocp_data & PASS_THRU_MASK) != 1) {
+            netif_dbg(tp, probe, tp->netdev,
+                      "No efuse for RTL8153-AD MAC pass through\n");
+            return -ENODEV;
+        } else {
+            /* test for RTL8153-BND and RTL8153-BD */
+            ocp_data = ocp_read_byte(tp, MCU_TYPE_USB, USB_MISC_1);
+            if (((ocp_data & BND_MASK) == 0 && (ocp_data & BD_MASK) == 0) {
+                netif_dbg(tp, probe, tp->netdev,
+                          "Invalid variant for MAC pass through\n");
+                return -ENODEV;
+            }
+        }
+    }
+    /* test for -AD variant of RTL8153 */
-    ocp_data = ocp_read_word(tp, MCU_TYPE_USB, USB_MISC_0);
-    if ((ocp_data & AD_MASK) != 0x1000)
-        return -ENODEV;
-    /* test for MAC address pass-through bit */
-    ocp_data = ocp_read_byte(tp, MCU_TYPE_USB, EFUSE);

 return ret;
}
-if ( (ocp_data & PASS_THRU_MASK) != 1 )
-return -ENODEV;
+mac_obj_name = "\_SB.AMAC";
+mac_obj_type = ACPI_TYPE_BUFFER;
+mac_strlen = 0x17;
+
+}

/* returns _AUXMAC_#AABBCCDEEFF# */

-status = acpi_evaluate_object(NULL, "\_SB.AMAC", NULL, &buffer);
+status = acpi_evaluate_object(NULL, mac_obj_name, NULL, &buffer);
-obj = (union acpi_object *)buffer.pointer;
+obj = (union acpi_object *)buffer.pointer;
-if (!ACPI_SUCCESS(status))
-return -ENODEV;

-if (obj->type != ACPI_TYPE_BUFFER || obj->string.length != 0x17) {
+if (obj->type != mac_obj_type || obj->string.length != mac_strlen) {
-netif_warn(tp, probe, tp->netdev,
"Invalid buffer for pass-thru MAC addr: (%d, %d)\n",
-obj->type, obj->string.length);
-goto amacout;
+}
   +
   if (strncmp(obj->string.pointer, "_AUXMAC_", 9) != 0 ||
   strncmp(obj->string.pointer + 0x15, "#", 1) != 0) {
-netif_warn(tp, probe, tp->netdev,
"Invalid buffer for pass-thru MAC addr: (%d, %d)\n",
-obj->type, obj->string.length);
-goto amacout;
   }
   
   memcpy(sa->sa_data, buf, 6);
-ether_addr_copy(tp->netdev->dev_addr, sa->sa_data);
-netif_info(tp, probe, tp->netdev,
"Using pass-thru MAC addr %pM\n", sa->sa_data);

@@ -1208,44 +1238,55 @@
-return ret;
}

-static int set_ethernet_addr(struct r8152 *tp)
+static int determine_ethernet_addr(struct r8152 *tp, struct sockaddr *sa)
{
   struct net_device *dev = tp->netdev;
-ether_addr_copy(tp->netdev->dev_addr, sa->sa_data);
-netif_info(tp, probe, tp->netdev,
"Using pass-thru MAC addr %pM\n", sa->sa_data);

@@ -1208,44 +1238,55 @@
-return ret;
}

-static int set_ethernet_addr(struct r8152 *tp)
+static int determine_ethernet_addr(struct r8152 *tp, struct sockaddr *sa)
{
   struct net_device *dev = tp->netdev;
-struct sockaddr sa;
-int ret;

   if (tp->version == RTL_VER_01) {
-   ret = pla_ocp_read(tp, PLA_IDR, 8, sa.sa_data);
+   ret = pla_ocp_read(tp, PLA_IDR, 8, sa->sa_data);
   } else {
-/* if this is not an RTL8153-AD, no eFuse mac pass thru set,
- * or system doesn't provide valid _SB.AMAC this will be
- * be expected to non-zero
+/* if device doesn't support MAC pass through this will
+ * be expected to be non-zero
 */
-ret = vendor_mac_passthru_addr_read(tp, &sa);
+ret = vendor_mac_passthru_addr_read(tp, sa);
if (ret < 0)
-ret = pla_ocp_read(tp, PLA_BACKUP, 8, sa.sa_data);
+ret = pla_ocp_read(tp, PLA_BACKUP, 8, sa->sa_data);
}

if (ret < 0) {
 netif_err(tp, probe, dev, "Get ether addr fail\n");
-} else if (!is_valid_ether_addr(sa.sa_data)) {
+} else if (!is_valid_ether_addr(sa->sa_data)) {
 netif_err(tp, probe, dev, "Invalid ether addr %pM\n",
- sa.sa_data);
+ sa->sa_data);
 eth_hw_addr_random(dev);
-ether_addr_copy(sa.sa_data, dev->dev_addr);
-ret = rtl8152_set_mac_address(dev, &sa);
+ether_addr_copy(sa->sa_data, dev->dev_addr);
netif_info(tp, probe, dev, "Random ether addr %pM\n",
- sa.sa_data);
-} else {
-if (tp->version == RTL_VER_01)
-ether_addr_copy(dev->dev_addr, sa.sa_data);
-else
-ret = rtl8152_set_mac_address(dev, &sa);
+ sa->sa_data);
+return 0;
}

return ret;
}

+static int set_ethernet_addr(struct r8152 *tp)
+{
+struct net_device *dev = tp->netdev;
+struct sockaddr sa;
+int ret;
+
+ret = determine_ethernet_addr(tp, &sa);
+if (ret < 0)
+return ret;
+
+if (tp->version == RTL_VER_01)
ether_addr_copy(dev->dev_addr, sa.sa_data);
+ret = rtl8152_set_mac_address(dev, &sa);
+
+return ret;
+
static void read_bulk_callback(struct urb *urb)
{
    ...
}

struct net_device *netdev;
@@ -1794,7 +1835,7 @@
    tx_data += len;
    agg->skb_len += len;
    -agg->skb_num++;
+agg->skb_num += skb_shinfo(skb)->gso_segs ?: 1;

dev_kfree_skb_any(skb);

@@ -2589,29 +2630,6 @@
    device_set_wakeup_enable(&tp->udev->dev, false);
 }

-/* MAC clock speed down */
-if (enable) {
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL, ALDPS_SPDWN_RATIO);
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL2, EEE_SPDWN_RATIO);
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL3, PKT_AVAIL_SPDWN_EN | SUSPEND_SPDWN_EN |
-        -U1U2_SPDWN_EN | L1_SPDWN_EN);
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL4, PWRSAVE_SPDWN_EN | RXDV_SPDWN_EN | TX10MIDDLE_EN |
-        -TP100_SPDWN_EN | TP500_SPDWN_EN | EEE_SPDWN_EN |
-        -TP1000_SPDWN_EN);
-} else {
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL, 0);
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL2, 0);
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL3, 0);
-    -o cp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL4, 0);
-}
-}
-
-static void r8153_u1u2en(struct r8152 *tp, bool enable)
{

u8 u1u2[8];
@@ -2697,6 +2715,8 @@
 }

 msleep(20);
+if (test_bit(RTL8152_UNPLUG, &tp->flags))
+break;
 }

 return data;
@@ -2840,11 +2860,9 @@
 if (enable) {
 r8153_u1u2en(tp, false);
 r8153_u2p3en(tp, false);
-+r8153_mac_clk_spd(tp, true);
 rtl_runtime_suspend_enable(tp, true);
 } else {
 rtl_runtime_suspend_enable(tp, false);
-+r8153_mac_clk_spd(tp, false);

 switch (tp->version) {
 case RTL_VER_03:
@@ -3406,7 +3424,6 @@
 r8153_mac_clk_spd(tp, false);
 rxdy_gated_en(tp, true);
 r8153_teredo_off(tp);
@@ -3468,8 +3485,6 @@
 r8153_mac_clk_spd(tp, true);
 -
 ocp_data = ocp_read_byte(tp, MCU_TYPE_PLA, PLA_OOB_CTRL);
 ocp_data &= ~NOW_IS_OOB;
 ocp_write_byte(tp, MCU_TYPE_PLA, PLA_OOB_CTRL, ocp_data);
-+r8153_mac_clk_spd(tp, true);

#ifdef CONFIG_PM_SLEEP
 unregister_pm_notifier(&tp->pm_notifier);
#endif
-+napi_disable(&tp->napi);
+if (!test_bit(RTL8152_UNPLUG, &tp->flags))
+napi_disable(&tp->napi);
 clear_bit(WORK_ENABLE, &tp->flags);
 usb_kill_urb(tp->intr_urb);
cancel_delayed_work_sync(&tp->schedule);
@@ -3979,9 +3995,10 @@
    tp->rtl_ops.down(tp);

    mutex_unlock(&tp->control);
+}
    +if (!res)
    usb_autopm_put_interface(tp->intf);
-}

    free_all_mem(tp);

    @@ -4055,7 +4072,10 @@
    if (ocp_read_word(tp, MCU_TYPE_PLA, PLA_BOOT_CTRL) &
         AUTOLOAD_DONE)
        break;
    +
    +msleep(20);
    +if (test_bit(RTL8152_UNPLUG, &tp->flags))
        +break;
    }

    data = r8153_phy_status(tp, 0);
    @@ -4129,9 +4149,14 @@
    ocp_write_word(tp, MCU_TYPE_USB, USB_CONNECT_TIMER, 0x0001);

        /* MAC clock speed down */
    +ocp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL, 0);
    +ocp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL2, 0);
    +ocp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL3, 0);
    +ocp_write_word(tp, MCU_TYPE_PLA, PLA_MAC_PWR_CTRL4, 0);
    +r8153_power_cut_en(tp, false);
    r8153_u1u2en(tp, true);
    -r8153_mac_clk_spd(tp, false);
    usb_enable_lpm(tp->udev);

    /* rx aggregation */
    @@ -4173,7 +4198,10 @@
    if (ocp_read_word(tp, MCU_TYPE_PLA, PLA_BOOT_CTRL) &
         AUTOLOAD_DONE)
        break;
    +
    +msleep(20);
    +if (test_bit(RTL8152_UNPLUG, &tp->flags))
        +break;
struct r8152 *tp = usb_get_intfdata(intf);
struct net_device *netdev;
+struct sockaddr sa;

if (!tp)
    return 0;
+	/* reset the MAC address in case of policy change */
+if (determine_ethernet_addr(tp, &sa) >= 0) {
+    rtnl_lock();
+    dev_set_mac_address (tp->netdev, &sa);
+    rtnl_unlock();
+}
+
    netdev = tp->netdev;

if (!netif_running(netdev))
    return 0;
@@ -4468,10 +4504,9 @@
struct r8152 *tp = usb_get_intfdata(intf);

clear_bit(SELECTIVE_SUSPEND, &tp->flags);
-mutex_lock(&tp->control);
    tp->rtl_ops.init(tp);
 queue_delayed_work(system_long_wq, &tp->hw_phy_work, 0);
-mutex_unlock(&tp->control);
+set_ethernet_addr(tp);
    return rtl8152_resume(intf);
 } 
@@ -4503,6 +4538,9 @@

if (!rtl_can_wakeup(tp))
    return -EOPNOTSUPP;

+if (wol->wolopts & ~WAKE_ANY)
+    return -EINVAL;
+
    ret = usb_autopm_get_interface(tp->intf);
    if (ret < 0)
        goto out_set_wol;
@@ -4656,7 +4694,7 @@

    switch (stringset) {
        case ETH_SS_STATS: 

memcpy(data, *rtl8152_gstrings, sizeof(rtl8152_gstrings));
break;
}
@@ -5159,6 +5197,9 @@
return -ENODEV;
}

+if (intf->cur_altsetting->desc.bNumEndpoints < 3)
+return -ENODEV;
+
usb_reset_device(udev);
netdev = alloc_etherdev(sizeof(struct r8152));
if (!netdev) {
@@ -5214,8 +5255,12 @@
netdev->hw_features &= ~NETIF_F_RXCSUM;
}

-if (le16_to_cpu(udev->descriptor.bcdDevice) == 0x3011 &&
- udev->serial && !strcmp(udev->serial, "000001000000")) {
+if (le16_to_cpu(udev->descriptor.idVendor) == VENDOR_ID_LENOVO &&
+ le16_to_cpu(udev->descriptor.idProduct) == 0x3082)
+set_bit(LENOVO_MACPASSTHRU, &tp->flags);
+
+if (le16_to_cpu(udev->descriptor.bcdDevice) == 0x3011 && udev->serial &&
+ !(strcmp(udev->serial, "000001000000") || strcmp(udev->serial, "000002000000"))) {
    dev_info(&udev->dev, "Dell TB16 Dock, disable RX aggregation");
    set_bit(DELL_TB_RX_AGG_BUG, &tp->flags);
}
@@ -5248,6 +5311,11 @@
intf->needs_remote_wakeup = 1;

+if (!rtl_can_wakeup(tp))
+__rtl_set_wol(tp, 0);
+else
+tp->saved_wolopts = __rtl_get_wol(tp);
+
tp->rtl_ops.init(tp);
queue_delayed_work(system_long_wq, &tp->hw_phy_work, 0);
set_ethernet_addr(tp);
@@ -5261,10 +5311,6 @@
goto out1;
}

-if (!rtl_can_wakeup(tp))
-__rtl_set_wol(tp, 0);
if (tp->saved_wolopts)
    device_set_wakeup_enable(&udev->dev, true);
else
    \@\@ -5324,13 +5370,17 @@
    \{REALTEK_USB_DEVICE(VENDOR_ID_REALTEK, 0x8153)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_MICROSOFT, 0x07ab)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_MICROSOFT, 0x07c6)},
    +\{REALTEK_USB_DEVICE(VENDOR_ID_MICROSOFT, 0x0927)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_SAMSUNG, 0xa101)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x304f)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x3062)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x3069)},
    +\{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x3082)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x7205)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x720c)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x7214)},
    +\{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0x721e)},
    +\{REALTEK_USB_DEVICE(VENDOR_ID_LENOVO, 0xa387)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_LINKSYS, 0x0041)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_NVIDIA, 0x09ff)},
    \{REALTEK_USB_DEVICE(VENDOR_ID_TPLINK, 0x0601)},
-static inline void set_ethernet_addr(rtl8150_t * dev)
+static void set_ethernet_addr(rtl8150_t *dev)
{
  -u8 node_id[6];
  +u8 node_id[ETH_ALEN];
  +int ret;

  -get_registers(dev, IDR, sizeof(node_id), node_id);
  -memcpy(dev->netdev->dev_addr, node_id, sizeof(node_id));
  +ret = get_registers(dev, IDR, sizeof(node_id), node_id);
  +
  +if (ret == sizeof(node_id)) {
  +ether_addr_copy(dev->netdev->dev_addr, node_id);
  +} else {
  +eth_hw_addr_random(dev->netdev);
  +netdev_notice(dev->netdev, "Assigned a random MAC address: %pM\n",
  +    dev->netdev->dev_addr);
  +}
}

static int rtl8150_set_mac_address(struct net_device *netdev, void *p)
@@ -681,7 +689,7 @@
    (netdev->flags & IFF_ALLMULTI)) {
        rx_creg &= 0xfffe;
        rx_creg |= 0x0002;
-      dev_info(&netdev->dev, "%s: allmulti set\n", netdev->name);
+      dev_dbg(&netdev->dev, "%s: allmulti set\n", netdev->name);
    } else {
        /* ~RX_MULTICAST, ~RX_PROMISCUOUS */
        rx_creg &= 0x00fc;
--- linux-4.15.0.orig/drivers/net/usb/smsc75xx.c
+++ linux-4.15.0/drivers/net/usb/smsc75xx.c
@@ -82,6 +82,9 @@
module_param(turbo_mode, bool, 0644);
 MODULE_PARM_DESC(turbo_mode, "Enable multiple frames per Rx transaction");

+static int smsc75xx_link_ok_nopm(struct usbnet *dev);
+static int smsc75xx_phy_gig_workaround(struct usbnet *dev);

+static int __must_check __smsc75xx_read_reg(struct usbnet *dev, u32 index,
   u32 *data, int in_pm)
{
@ @ -728,6 +731,9 @@
    struct smsc75xx_priv *pdata = (struct smsc75xx_priv *)(dev->data[0]);
    int ret;

+if (wolinfo->wolopts & ~SUPPORTED_WAKE)
return -EINVAL;

pdata->wolopts = wolinfo->wolopts & SUPPORTED_WAKE;

ret = device_set_wakeup_enable(&dev->udev->dev, pdata->wolopts);
@@ -852,6 +858,9 @@
return -EIO;
}

/* phy workaround for gig link */
+smc75xx_phy_gig_workaround(dev);
+
+ smc75xx_mdio_write(dev->net, dev->mii.phy_id, MII_ADVERTISE,
+ ADVERTISE_ALL | ADVERTISE_CSMA | ADVERTISE_PAUSE_CAP |
+ ADVERTISE_PAUSEASYM);
@@ -954,10 +963,11 @@
/* it's racing here! */

ret = smc75xx_write_reg(dev, RFE_CTL, pdata->rfe_ctl);
-if (ret < 0)
+if (ret < 0) {
  netdev_warn(dev->net, "Error writing RFE_CTL\n");
-
-return ret;
+return ret;
+
+return 0;
} 

static int smc75xx_wait_ready(struct usbnet *dev, int in_pm)
@@ -986,6 +996,62 @@
return -EIO;
}

+static int smc75xx_phy_gig_workaround(struct usbnet *dev)
+{ 
+struct mii_if_info *mii = &dev->mii;
+int ret = 0, timeout = 0;
+u32 buf, link_up = 0;
+
+/* Set the phy in Gig loopback */
+smc75xx_mdio_write(dev->net, mii->phy_id, MII_BMCR, 0x4040);
+
+/* Wait for the link up */
+do {
+link_up = smc75xx_link_ok_nopm(dev);
+usleep_range(10000, 20000);
+timeout++;
+} while ((!link_up) && (timeout < 1000));
+
+if (timeout >= 1000) {
+    netdev_warn(dev->net, "Timeout waiting for PHY link up\n");
+    return -EIO;
+
+}
+
+/* phy reset */
+ret = smsc75xx_read_reg(dev, PMT_CTL, &buf);
+if (ret < 0) {
+    netdev_warn(dev->net, "Failed to read PMT_CTL: %d\n", ret);
+    return ret;
+
+}
+
+buf |= PMT_CTL_PHY_RST;
+
+ret = smsc75xx_write_reg(dev, PMT_CTL, buf);
+if (ret < 0) {
+    netdev_warn(dev->net, "Failed to write PMT_CTL: %d\n", ret);
+    return ret;
+
+}
+
+timeout = 0;
+do {
+    usleep_range(10000, 20000);
+    ret = smsc75xx_read_reg(dev, PMT_CTL, &buf);
+    if (ret < 0) {
+        netdev_warn(dev->net, "Failed to read PMT_CTL: %d\n", ret);
+        return ret;
+    }
+    timeout++;
+} while ((buf & PMT_CTL_PHY_RST) && (timeout < 100));
+
+if (timeout >= 100) {
+    netdev_warn(dev->net, "timeout waiting for PHY Reset\n");
+    return -EIO;
+
+}
+
+return 0;
+
+}
+
+static int smsc75xx_reset(struct usbnet *dev)
+{
+    struct smsc75xx_priv *pdata = (struct smsc75xx_priv *) (dev->data[0]);
+    ret = smsc75xx_wait_ready(dev, 0);
+    if (ret < 0) {
netdev_warn(dev->net, "device not ready in smsc75xx_bind\n");
-return ret;
+goto free_pdata;
}

smsc75xx_init_mac_address(dev);
@@ -1438,7 +1504,7 @@
ret = smsc75xx_reset(dev);
if (ret < 0) {
    netdev_warn(dev->net, "smsc75xx_reset error %d\n", ret);
    -return ret;
    +goto cancel_work;
}

dev->net->netdev_ops = &smsc75xx_netdev_ops;
@@ -1448,15 +1514,22 @@
dev->hard_mtu = dev->net->mtu + dev->net->hard_header_len;
dev->net->max_mtu = MAX_SINGLE_PACKET_SIZE;
return 0;
+
+cancel_work:
+kfree(pdata);
+dev->data[0] = 0;
+return ret;
}

static void smsc75xx_unbind(struct usbnet *dev, struct usb_interface *intf)
{
    struct smsc75xx_priv *pdata = (struct smsc75xx_priv *)(dev->data[0]);
    if (pdata) {
        +cancel_work_sync(&pdata->set_multicast);
        +free_pdata:
        +kfree(pdata);
        +dev->data[0] = 0;
        +return ret;
    }
}

--- linux-4.15.0.orig/drivers/net/usb/smsc95xx.c
+++ linux-4.15.0/drivers/net/usb/smsc95xx.c
@@ -774,6 +774,9 @@
struct smsc95xx_priv *pdata = (struct smsc95xx_priv *)(dev->data[0]);
    if (pdata) {
        +cancel_work_sync(&pdata->set_multicast);
        netif_dbg(dev, ifdown, dev->net, "free pdata\n");
        kfree(pdata);
        -pdata = NULL;
        dev->data[0] = 0;
    }
}

--- linux-4.15.0.orig/drivers/net/usb/smsc95xx.c
+++ linux-4.15.0/drivers/net/usb/smsc95xx.c
@@ -774,6 +774,9 @@
struct smsc95xx_priv *pdata = (struct smsc95xx_priv *)(dev->data[0]);
    int ret;
+
+if (wolinfo->wolopts & ~SUPPORTED_WAKE)
    +return -EINVAL;
+  

pdata->wolopts = wolinfo->wolopts & SUPPORTED_WAKE;

ret = device_set_wakeup_enable(&dev->udev->dev, pdata->wolopts);
@@ -1292,16 +1295,20 @@
dev->net->features |= NETIF_F_RXCSUM;

dev->net->hw_features = NETIF_F_IP_CSUM | NETIF_F_RXCSUM;
+set_bit(EVENT_NO_IP_ALIGN, &dev->flags);

smc95xx_init_mac_address(dev);

/* Init all registers */
ret = smc95xx_reset(dev);
+if (ret)
+goto free_pdata;

/* detect device revision as different features may be available */
ret = smc95xx_read_reg(dev, ID_REV, &val);
if (ret < 0)
-return ret;
+goto free_pdata;
+
val >>= 16;
pdata->chip_id = val;
pdata->mdix_ctrl = get_mdix_status(dev->net);
@@ -1318,6 +1325,8 @@
dev->net->ethtool_ops = &smsc95xx_ethtool_ops;
dev->net->flags |= IFF_MULTICAST;
dev->net->hard_header_len += SMSC95XX_TX_OVERHEAD_CSUM;
+dev->net->min_mtu = ETH_MIN_MTU;
+dev->net->max_mtu = ETH_DATA_LEN;
dev->hard_mtu = dev->net->mtu + dev->net->hard_header_len;

pdata->dev = dev;
@@ -1325,6 +1334,10 @@
schedule_delayed_work(&pdata->carrier_check, CARRIER_CHECK_DELAY);

return 0;
+
+free_pdata:
+kfree(pdata);
+return ret;
}

static void smc95xx_unbind(struct usbnet *dev, struct usb_interface *intf)
@@ -1332,7 +1345,7 @@
 struct smc95xx_priv *pdata = (struct smc95xx_priv *)(dev->data[0]);

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if (pdata) {
- cancel_delayed_work(&pdata->carrier_check);
+ cancel_delayed_work_sync(&pdata->carrier_check);
 netif_dbg(dev, ifdown, dev->net, "free pdata\n");
kfree(pdata);
pdata = NULL;
@@ -1595,6 +1608,8 @@
 return ret;
 }

+cancel_delayed_work_sync(&pdata->carrier_check);
 +
 if (pdata->suspend_flags) {
 netdev_warn(dev->net, "error during last resume\n");
pdata->suspend_flags = 0;
@@ -1837,6 +1852,11 @@
 */
 if (ret && PMSG_IS_AUTO(message))
 usbnet_resume(intf);
 +
+ if (ret)
+ schedule_delayed_work(&pdata->carrier_check,
+ CARRIER_CHECK_DELAY);
+ 
 return ret;
 }

--- linux-4.15.0.orig/drivers/net/usb/sr9800.c
+++ linux-4.15.0/drivers/net/usb/sr9800.c
@@ -336,7 +336,7 @@
 static int sr_mdio_read(struct net_device *net, int phy_id, int loc)
 { 
 struct usbnet *dev = netdev_priv(net);
-__le16 res;
+__le16 res = 0;
 mutex_lock(&dev->phy_mutex);
sr_set_sw_mii(dev);
@@ -421,6 +421,9 @@
 struct usbnet *dev = netdev_priv(net);
 u8 opt = 0;

+if (wolinfo->wolopts & ~(WAKE_PHY | WAKE_MAGIC))
+return -EINVAL;
 +
 if (wolinfo->wolopts & WAKE_PHY)
 opt |= SR_MONITOR_LINK;
 if (wolinfo->wolopts & WAKE_MAGIC)
--- linux-4.15.0.orig/drivers/net/usb/usbnet.c
+++ linux-4.15.0/drivers/net/usb/usbnet.c
@@ -112,6 +112,11 @@
   intr = 0;

e = alt->endpoint + ep;
+
+
+ /* ignore endpoints which cannot transfer data */
+ if (!usb_endpoint_maxp(&e->desc))
+ continue;
+
switch (e->desc.bmAttributes) {
    case USB_ENDPOINT_XFER_INT:
        if (!usb_endpoint_dir_in(&e->desc))
@@ -315,6 +320,7 @@

void usbnet_skb_return (struct usbnet *dev, struct sk_buff *skb)
{
    struct pcpu_sw_netstats *stats64 = this_cpu_ptr(dev->stats64);
+    unsigned long flags;

    int status;
    if (test_bit(EVENT_RX_PAUSED, &dev->flags)) {
@@ -326,10 +332,10 @@

    if (skb->protocol == 0)
        skb->protocol = eth_type_trans (skb, dev->net);

-u64_stats_update_begin(&stats64->syncp);
+flags = u64_stats_update_begin_irqsave(&stats64->syncp);
    stats64->rx_packets++;
    stats64->rx_bytes += skb->len;
-u64_stats_update_end(&stats64->syncp);
+u64_stats_update_end_irqrestore(&stats64->syncp, flags);

netif_dbg(dev, rx_status, dev->net, "< rx, len %zu, type 0x%x\n",
    skb->len + sizeof (struct ethhdr), skb->protocol);
@@ -350,6 +356,7 @@
{
    enum usb_device_speed speed = dev->udev->speed;
+
    if (!dev->rx_urb_size || !dev->hard_mtu)
        goto insanity;

    switch (speed) {
        case USB_SPEED_HIGH:
-dev->rx_qlen = MAX_QUEUE_MEMORY / dev->rx_urb_size;
+dev->rx_qlen = MAX_QUEUE_MEMORY / dev->hard_mtu;
        break;
    default:
dev->rx_qlen = dev->tx_qlen = 4;
}

if (netif_running (dev->net) &&
    netif_device_present (dev->net) &&
    !test_bit(EVENT_DEV_OPEN, &dev->flags) &&
    !test_bit (EVENT_RX_HALT, &dev->flags) &&
    !test_bit (EVENT_DEV_ASLEEP, &dev->flags)) {
    switch (retval = usb_submit_urb (urb, GFP_ATOMIC)) {
    ...

    if (urb->status == 0) {
        struct pcpu_sw_netstats *stats64 = this_cpu_ptr(dev->stats64);
        unsigned long flags;

        u64_stats_update_begin(&stats64->syncp);
        flags = u64_stats_update_begin_irqsave(&stats64->syncp);
        stats64->tx_packets += entry->packets;
        stats64->tx_bytes += entry->length;
        u64_stats_update_end_irqrestore(&stats64->syncp, flags);
    } else {
        dev->net->stats.tx_errors++;
    }

    spin_unlock_irqrestore(&dev->txq.lock, flags);
    goto drop;
}

if (netif_queue_stopped(net)) {
    usb_autopm_put_interface_async(dev->intf);
    spin_unlock_irqrestore(&dev->txq.lock, flags);
    goto drop;
} else {
    ...
}

#endif CONFIG_PM
/* if this triggers the device is still a sleep */
--- linux-4.15.0.orig/drivers/net/veth.c
+++ linux-4.15.0/drivers/net/veth.c
@@ -410,6 +410,9 @@
    if (ifmp && (dev->ifindex != 0))
    peer->ifindex = ifmp->ifi_index;
    +peer->gso_max_size = dev->gso_max_size;
    +peer->gso_max_segs = dev->gso_max_segs;
    +
err = register_netdevice(peer);
pud_net(net);
net = NULL;
--- linux-4.15.0.orig/drivers/net/virtio_net.c
+++ linux-4.15.0/drivers/net/virtio_net.c
@@ -62,7 +62,8 @@
   VIRTIO_NET_F_GUEST_TSO4,
   VIRTIO_NET_F_GUEST_TSO6,
   VIRTIO_NET_F_GUEST_ECN,
-VIRTIO_NET_F_GUEST_UFO
+VIRTIO_NET_F_GUEST_UFO,
+VIRTIO_NET_F_GUEST_CSUM
};

struct virtnet_stats {
@@ -117,6 +118,17 @@
   char name[40];
};

+/* Control VQ buffers: protected by the rtnl lock */
+struct control_buf {
+   struct virtio_net_ctrl_hdr hdr;
+   struct virtio_net_ctrl_ack status;
+   struct virtio_net_ctrl_mq mq;
+   __u8 promisc;
+   __u8 allmulti;
+   __virtio16 vid;
+   __u64 offloads;
+};
+
+struct virtnet_info {
   struct virtio_device *vdev;
   struct virtqueue *cvq;
@@ -165,14 +177,7 @@
   struct hlist_node node;
   struct hlist_node node_dead;
-VIRTIO_NET_F_GUEST_UFO
+VIRTIO_NET_F_GUEST_UFO,
+VIRTIO_NET_F_GUEST_CSUM
};

-/* Control VQ buffers: protected by the rtnl lock */
-struct virtio_net_ctrl_hdr ctrl_hdr;
-struct virtio_net_ctrl_ack ctrl_status;
-struct virtio_net_ctrl_mq ctrl_mq;
-__u8 ctrl_promisc;
-__u8 ctrl_allmulti;
-__u16 ctrl_vid;
-__u64 ctrl_offloads;
+struct control_buf *ctrl;

/* Ethtool settings */
opaque = virtqueue_enable_cb_prepare(vq);
- if (napi_complete_done(napi, processed) &&
    unlikely(virtqueue_poll(vq, opaque)))
- virtqueue_napi_schedule(napi, vq);
+ if (napi_complete_done(napi, processed)) {
+ if (unlikely(virtqueue_poll(vq, opaque)))
+ virtqueue_napi_schedule(napi, vq);
+ } else {
+ virtqueue_disable_cb(vq);
+ }
}

static void skb_xmit_done(struct virtqueue *vq)
@@ -302,7 +310,8 @@
    struct receive_queue *rq,
    struct page *page, unsigned int offset,
    unsigned int len, unsigned int truesize)
+   bool hdr_valid)
{
    struct sk_buff *skb;
    struct virtio_net_hdr_mrg_rxbuf *hdr;
@@ -324,15 +333,20 @@
else
    hdr_padded_len = sizeof(struct padded_vnet_hdr);

    - memcpy(hdr, p, hdr_len);
    + if (hdr_valid)
    + memcpy(hdr, p, hdr_len);

    len -= hdr_len;
    offset += hdr_padded_len;
    p += hdr_padded_len;

    - copy = len;
    - if (copy > skb_tailroom(skb))
    - copy = skb_tailroom(skb);
    +/* Copy all frame if it fits skb->head, otherwise
    + * we let virtio_net_hdr_to_skb() and GRO pull headers as needed.
    + */
    + if (len <= skb_tailroom(skb))
    + copy = len;
    + else


copy = ETH_HLEN;
skb_put_data(skb, p, copy);

len -= copy;
@@ -413,12 +427,8 @@
sg_init_one(sq->sg, xdp->data, xdp->data_end - xdp->data);

err = virtqueue_add_outbuf(sq->vq, sq->sg, 1, xdp->data, GFP_ATOMIC);
-if (unlikely(err)) {
-struct page *page = virt_to_head_page(xdp->data);
-
-put_page(page);
-return false;
-}
+if (unlikely(err))
+return false; /* Caller handle free/refcnt */

return true;
}
@@ -516,8 +526,11 @@
unsigned int buflen = SKB_DATA_ALIGN(GOOD_PACKET_LEN + headroom) +
        SKB_DATA_ALIGN(sizeof(struct skb_shared_info));
struct *page = virt_to_head_page(buf);
-unsigned int delta = 0, err;
+unsigned int delta = 0;
struct *xdp_page;
+bool sent;
+int err;
+
len -= vi->hdr_len;

rcu_read_lock();
@@ -528,7 +541,7 @@
void *orig_data;
u32 act;

-if (unlikely(hdr->hdr.gso_type || hdr->hdr.flags))
+if (unlikely(!__virtnet_xdp_xmit(vi, &xdp)))
    goto err_xdp;

if (unlikely(xdp_headroom < virtnet_get_headroom(vi))) {
@@ -565,16 +578,19 @@
delta = orig_data - xdp.data;
        break;
    case XDP_TX:
        -if (unlikely(!__virtnet_xdp_xmit(vi, &xdp)))
+sent = __virtnet_xdp_xmit(vi, &xdp);
+if (unlikely(!sent)) {
trace_xdp_exception(vi->dev, xdp_prog, act);
-else
-*xdp_xmit = true;
+*xdp_xmit = true;
rcu_read_unlock();
goto xdp_xmit;

case XDP_REDIRECT:
err = xdp_do_redirect(dev, &xdp, xdp_prog);
-if (!err)
-*xdp_xmit = true;
+*xdp_xmit = true;
rcu_read_unlock();
goto xdp_xmit;
default:
@@ -617,7 +633,8 @@
unsigned int len)
{
 struct page *page = buf;
-struct sk_buff *skb = page_to_skb(vi, rq, page, 0, len, PAGE_SIZE);
+struct sk_buff *skb = page_to_skb(vi, rq, page, 0, len, 
+    PAGE_SIZE, true);
if (unlikely(!skb))
goto err;
@@ -647,6 +664,7 @@
unsigned int truesize;
unsigned int headroom = mergeable_ctx_to_headroom(ctx);
int err;
+bool sent;

head_skb = NULL;

@@ -658,6 +676,13 @@
void *data;
u32 act;

+/* Transient failure which in theory could occur if
+ * in-flight packets from before XDP was enabled reach
+ * the receive path after XDP is loaded.
+ */
+if (unlikely(hdr->hdr.gso_type))
+goto err_xdp;
+
/* This happens when rx buffer size is underestimated */
if (unlikely(num_buf > 1 ||
    headroom < virtnet_get_headroom(vi))) {
    @@ -673,14 +698,6 @@
    xdp_page = page;
}

-/* Transient failure which in theory could occur if
- * in-flight packets from before XDP was enabled reach
- * the receive path after XDP is loaded. In practice I
- * was not able to create this condition.
- */
- if (unlikely(hdr->hdr.gso_type))
- goto err_xdp;
-
- /* Allow consuming headroom but reserve enough space to push
- * the descriptor on if we get an XDP_TX return code.
- */
- @@ -708,17 +725,22 @@
- rcu_read_unlock();
- put_page(page);
- head_skb = page_to_skb(vi, rq, xdp_page,
- -    offset, len, PAGE_SIZE);
- +    offset, len,
- +    PAGE_SIZE, false);
- return head_skb;
- }
- break;
-case XDP_TX:
- -if (unlikely(!__virtnet_xdp_xmit(vi, &xdp)))
- +sent = __virtnet_xdp_xmit(vi, &xdp);
- +if (unlikely(!sent)) {
-     trace_xdp_exception(vi->dev, xdp_prog, act);
- -else
- -*xdp_xmit = true;
- -if (unlikely(xdp_page != page))
- +if (unlikely(xdp_page != page))
- +put_page(xdp_page);
- goto err_xdp;
- +}
- +*xdp_xmit = true;
- +if (unlikely(xdp_page != page))
- +put_page(page);
- rcu_read_unlock();
- goto xdp_xmit;
- case XDP_REDIRECT:
- @@ -747,7 +769,7 @@
- goto err_skb;
- }

head_skb = page_to_skb(vi, rq, page, offset, len, truesize);

head_skb = page_to_skb(vi, rq, page, offset, len, truesize, !xdp_prog);
curr_skb = head_skb;

if (unlikely(!curr_skb))
rcu_read_unlock();
err_skb:
put_page(page);
while (--num_buf) {
while (num_buf-- > 1) {
buf = virtqueue_get_buf(rq->vq, &len);
if (unlikely(!buf)) {
pr_debug("%s: rx error: %d buffers missing\n", 
	@@ -1179,6 +1201,16 @@
u64_stats_update_end(&stats->tx_syncp);
 }
static bool is_xdp_raw_buffer_queue(struct virtnet_info *vi, int q)
+
+{
+if (q < (vi->curr_queue_pairs - vi->xdp_queue_pairs))
+return false;
+else if (q < vi->curr_queue_pairs)
+return true;
+else
+return false;
+}
+static void virtnet_poll_cleantx(struct receive_queue *rq)
{
struct virtnet_info *vi = rq->vq->vdev->priv;
@@ -1186,7 +1218,7 @@
struct send_queue *sq = &vi->sq[index];
struct netdev_queue *txq = netdev_get_tx_queue(vi->dev, index);

-if (!sq->napi.weight)
+if (!sq->napi.weight || is_xdp_raw_buffer_queue(vi, index))
return;

if (__netif_tx_trylock(txq)) {
@@ -1202,7 +1234,9 @@
{
struct receive_queue *rq =
container_of(napi, struct receive_queue, napi);
-unsigned int received;
+struct virtnet_info *vi = rq->vq->vdev->priv;
+struct send_queue *sq;
unsigned int received, qp;
bool xdp_xmit = false;

virtnet_poll_clean_tx(rq);
if (received < budget)
virtqueue_napi_complete(napi, rq->vq, received);

if (xdp_xmit)
+if (xdp_xmit) {
+qp = vi->curr_queue_pairs - vi->xdp_queue_pairs +
+     smp_processor_id();
+sq = &vi->sq[qp];
+virtqueue_kick(sq->vq);
xdp_do_flush_map();
+}
return received;
}

struct send_queue *sq = container_of(napi, struct send_queue, napi);
struct virtnet_info *vi = sq->vq->vdev->priv;
-struct netdev_queue *txq = netdev_get_tx_queue(vi->dev, vq2txq(sq->vq));
+unsigned int index = vq2txq(sq->vq);
+struct netdev_queue *txq;
+int opaque;
+bool done;
+
+if (unlikely(is_xdp_raw_buffer_queue(vi, index))) {
+/* We don’t need to enable cb for XDP */
+napi_complete_done(napi, 0);
+return 0;
+}
+txq = netdev_get_tx_queue(vi->dev, index);
__netif_tx_lock(txq, raw_smp_processor_id());
+virtqueue_disable_cb(sq->vq);
free_old_xmit_skb(sq);
+
+opaque = virtqueue_enable_cb_prepare(sq->vq);
+
+done = napi_complete_done(napi, 0);
+
+if (!done)
+virtqueue_disable_cb(sq->vq);
+
__netif_tx_unlock(txq);
if (done) {
+if (unlikely(virtqueue_poll(square->vq, opaque))) {
+if (napi_schedule_prep(napi)) {
+__netif_tx_lock(txq, raw_smp_processor_id());
+virtqueue_disable_cb(square->vq);
+__netif_tx_unlock(txq);
+__napi_schedule(napi);
+}
+}
+
+
+if (square->vq->num_free >= 2 + MAX_SKB_FRAGS)
+netif_tx_wake_queue(txq);
+@
-hdr = skb_vnet_hdr(skb);

if (virtio_net_hdr_from_skb(skb, &hdr->hdr,
- virtio_is_little_endian(vi->vdev), false))
-BUG();
+ virtio_is_little_endian(vi->vdev), false,
+ 0))
+return -EPROTO;

if (vi->mergeable_rx_bufs)
hdr->num_buffers = 0;
@ -1382.25 +1450.25 @
/* Caller should know better */
BUG_ON(!virtio_has_feature(vi->vdev, VIRTIO_NET_F_CTRL_VQ));

-vi->ctrl_status = ~0;
-vi->ctrl_hdr.class = class;
-vi->ctrl_hdr.cmd = cmd;
+vi->ctrl->status = ~0;
+vi->ctrl->hdr.class = class;
+vi->ctrl->hdr.cmd = cmd;
/* Add header */
-sg_init_one(&hdr, &vi->ctrl_hdr, sizeof(vi->ctrl_hdr));
+sg_init_one(&hdr, &vi->ctrl->hdr, sizeof(vi->ctrl->hdr));
sgs[out_num++] = &hdr;

if (out)
sgs[out_num++] = out;
/* Add return status. */
-sg_init_one(&stat, &vi->ctrl_status, sizeof(vi->ctrl_status));
+sg_init_one(&stat, &vi->ctrl->status, sizeof(vi->ctrl->status));
sgs[out_num] = &stat;

BUG_ON(out_num + 1 > ARRAY_SIZE(sgs));
virtqueue_add_sgs(vi->cvq, sgs, out_num, 1, vi, GFP_ATOMIC);

if (unlikely(!virtqueue_kick(vi->cvq)))
-    return vi->ctrl_status == VIRTIO_NET_OK;
+    return vi->ctrl->status == VIRTIO_NET_OK;

    /* Spin for a response, the kick causes an ioport write, trapping
     * into the hypervisor, so the request should be handled immediately.
     * @ @ -1409.7 +1477.7 @@
     *   !virtqueue_is_broken(vi->cvq))
    cpu_relax();

-    return vi->ctrl_status == VIRTIO_NET_OK;
+    return vi->ctrl->status == VIRTIO_NET_OK;
}

static int virtnet_set_mac_address(struct net_device *dev, void *p)
@@ -1409,7 +1477,7 @@
    !virtqueue_is_broken(vi->cvq))
    cpu_relax();

-    return vi->ctrl_status == VIRTIO_NET_OK;
+    return vi->ctrl->status == VIRTIO_NET_OK;
}

static int virtnet_set_mac_address(struct net_device *dev, void *p)
@@ -1520,8 +1588,8 @@
    if (!vi->has_cvq || !virtio_has_feature(vi->vdev, VIRTIO_NET_F_MQ))
        return 0;

-    vi->ctrl_mq.virtqueue_pairs = cpu_to_virtio16(vi->vdev, queue_pairs);
-    sg_init_one(&sg, &vi->ctrl_mq, sizeof(vi->ctrl_mq));
+    vi->ctrl->mq.virtqueue_pairs = cpu_to_virtio16(vi->vdev, queue_pairs);
+    sg_init_one(&sg, &vi->ctrl->mq, sizeof(vi->ctrl->mq));

    if (!virtnet_send_command(vi, VIRTIO_NET_CTRL_MQ,
        VIRTIO_NET_CTRL_MQ_VQ_PAIRS_SET, &sg)) {
        @@ -1579,22 +1647,22 @@
        if (!virtio_has_feature(vi->vdev, VIRTIO_NET_F_CTRL_RX))
            return;

-        vi->ctrl_promisc = ((dev->flags & IFF_PROMISC) != 0);
-        vi->ctrl_allmulti = ((dev->flags & IFF_ALLMULTI) != 0);
+        vi->ctrl->promisc = ((dev->flags & IFF_PROMISC) != 0);
+        vi->ctrl->allmulti = ((dev->flags & IFF_ALLMULTI) != 0);

-        sg_init_one(sg, &vi->ctrl_promisc, sizeof(vi->ctrl_promisc));
+        sg_init_one(sg, &vi->ctrl->promisc, sizeof(vi->ctrl->promisc));

        if (!virtnet_send_command(vi, VIRTIO_NET_CTRL_RX,
            VIRTIO_NET_CTRL_RX_PROMISC, sg))
            dev_warn(&dev->dev, "Failed to %sable promisc mode.
-            vi->ctrl_promisc ? "en" : "dis");
+            vi->ctrl->promisc ? "en" : "dis");
sg_init_one(sg, &vi->ctrl_allmulti, sizeof(vi->ctrl_allmulti));
+sg_init_one(sg, &vi->ctrl->allmulti, sizeof(vi->ctrl->allmulti));

if (!virtnet_send_command(vi, VIRTIO_NET_CTRL_RX,
    VIRTIO_NET_CTRL_RX_ALLMULTI, sg))
    dev_warn(&dev->dev, "Failed to %sable allmulti mode.\n",
    - vi->ctrl_allmulti ? "en" : "dis");
+    vi->ctrl->allmulti ? "en" : "dis");

uc_count = netdev_uc_count(dev);
mc_count = netdev_mc_count(dev);
@@ -1640,8 +1708,8 @@
struct virtnet_info *vi = netdev_priv(dev);
struct scatterlist sg;

-vi->ctrl_vid = vid;
-sg_init_one(&sg, &vi->ctrl_vid, sizeof(vi->ctrl_vid));
+vi->ctrl->vid = cpu_to_virtio16(vi->vdev, vid);
+sg_init_one(&sg, &vi->ctrl->vid, sizeof(vi->ctrl->vid));

if (!virtnet_send_command(vi, VIRTIO_NET_CTRL_VLAN,
    VIRTIO_NET_CTRL_VLAN_ADD, &sg))
@@ -1655,8 +1723,8 @@
struct virtnet_info *vi = netdev_priv(dev);
struct scatterlist sg;

-vi->ctrl_vid = vid;
-sg_init_one(&sg, &vi->ctrl_vid, sizeof(vi->ctrl_vid));
+vi->ctrl->vid = cpu_to_virtio16(vi->vdev, vid);
+sg_init_one(&sg, &vi->ctrl->vid, sizeof(vi->ctrl->vid));

if (!virtnet_send_command(vi, VIRTIO_NET_CTRL_VLAN,
    VIRTIO_NET_CTRL_VLAN_DEL, &sg))
@@ -1803,14 +1871,16 @@
get_online_cpus();
err = _virtnet_set_queues(vi, queue_pairs);
-    if (!err) {
-        netif_set_real_num_tx_queues(dev, queue_pairs);
-        netif_set_real_num_rx_queues(dev, queue_pairs);
-        virtnet_set_affinity(vi);
-    } else {
-        put_online_cpus();
-        goto err;
+    if (err) {
+        virtnet_set_affinity(vi);
+    } else {
+        put_online_cpus();
+        goto err;
put_online_cpus();

+netif_set_real_num_tx_queues(dev, queue_pairs);
+netif_set_real_num_rx_queues(dev, queue_pairs);
+ err:
return err;
}

@@ -1910,8 +1980,9 @@
/* Make sure no work handler is accessing the device */
flush_work(&vi->config_work);

+netif_tx_lock_bh(vi->dev);
netif_device_detach(vi->dev);
-netif_tx_disable(vi->dev);
+netif_tx_unlock_bh(vi->dev);
cancel_delayed_work_sync(&vi->refill);

if (netif_running(vi->dev)) {
@@ -1947,16 +2018,18 @@
}
}
}

+netif_tx_lock_bh(vi->dev);
netif_device_attach(vi->dev);
+netif_tx_unlock_bh(vi->dev);
return err;
}

static int virtnet_set_guest_offloads(struct virtnet_info *vi, u64 offloads)
{
struct scatterlist sg;
-vi->ctrl_offloads = cpu_to_virtio64(vi->vdev, offloads);
+vi->ctrl->offloads = cpu_to_virtio64(vi->vdev, offloads);

-sg_init_one(&sg, &vi->ctrl_offloads, sizeof(vi->ctrl_offloads));
+sg_init_one(&sg, &vi->ctrl->offloads, sizeof(vi->ctrl->offloads));

if (!virtnet_send_command(vi, VIRTIO_NET_CTRL_GUEST_OFFLOADS,
VIRTIO_NET_CTRL_GUEST_OFFLOADS_SET, &sg)) {
@@ -1974,9 +2047,6 @@
if (!vi->guest_offloads)
return 0;

-if (virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_CSUM))
-offloads = 1ULL << VIRTIO_NET_F_GUEST_CSUM;
- return virtnet_set_guest_offloads(vi, offloads);
if (!vi->guest_offloads)
    return 0;
-    if (virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_CSUM))
-        offloads |= 1ULL << VIRTIO_NET_F_GUEST_CSUM;

return virtnet_set_guest_offloads(vi, offloads);
}

&& (virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_TSO4) ||
    virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_TSO6) ||
    virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_ECN) ||
-virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_UFO))) {
    NL_SET_ERR_MSG_MOD(extack, "Can't set XDP while host is implementing LRO, disable LRO first");

    +virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_UFO) ||
    +virtio_has_feature(vi->vdev, VIRTIO_NET_F_GUEST_CSUM))) {
    +NL_SET_ERR_MSG_MOD(extack, "Can't set XDP while host is implementing LRO/CSUM, disable LRO/CSUM first");
return -EOPNOTSUPP;
}

+old_prog = rtnl_dereference(vi->rq[0].xdp_prog);
+if (!prog && !old_prog)
    +return 0;
+    if (prog) {
        prog = bpf_prog_add(prog, vi->max_queue_pairs - 1);
        if (IS_ERR(prog))
            return -ENOMEM;
    }
/* Make sure NAPI is not using any XDP TX queues for RX. */
-    for (i = 0; i < vi->max_queue_pairs; i++)
-        napi_disable(&vi->rq[i].napi);
+    if (netif_running(dev)) {
+        for (i = 0; i < vi->max_queue_pairs; i++) {
+            napi_disable(&vi->rq[i].napi);
+            virtnet_napi_tx_disable(&vi->sq[i].napi);
+        }
+    }
+}
+if (!prog) {
+for (i = 0; i < vi->max_queue_pairs; i++) {
+rcu_assign_pointer(vi->rq[i].xdp_prog, prog);
+if (i == 0)
+virtnet_restore_guest_offloads(vi);
+}
+synchronize_net();
+
-
etif_set_real_num_rx_queues(dev, curr_qp + xdp_qp);
err = _virtnet_set_queues(vi, curr_qp + xdp_qp);
if (err)
goto err;
+netif_set_real_num_rx_queues(dev, curr_qp + xdp_qp);
vi->xdp_queue_pairs = xdp_qp;

-for (i = 0; i < vi->max_queue_pairs; i++) {
-old_prog = rtnl_dereference(vi->rq[i].xdp_prog);
-rcu_assign_pointer(vi->rq[i].xdp_prog, prog);
-if (i == 0) {
-if (!old_prog)
+if (prog) {
+for (i = 0; i < vi->max_queue_pairs; i++) {
+rcu_assign_pointer(vi->rq[i].xdp_prog, prog);
+if (i == 0 && !old_prog)
virtnet_clear_guest_offloads(vi);
-if (!prog)
-virtnet_restore_guest_offloads(vi);
}
+
+for (i = 0; i < vi->max_queue_pairs; i++) {
if (old_prog)
bpf_prog_put(old_prog);
-virtnet_napi_enable(vi->rq[i].vq, &vi->rq[i].napi);
+if (netif_running(dev)) {
+virtnet_napi_enable(vi->rq[i].vq, &vi->rq[i].napi);
+virtnet_napi_tx_enable(vi, vi->sq[i].vq,
+ &vi->sq[i].napi);
+}
+
}
}

return 0;

err:
-for (i = 0; i < vi->max_queue_pairs; i++)
-virtnet_napi_enable(vi->rq[i].vq, &vi->rq[i].napi);
+if (!prog) {
+virtnet_clear_guest_offloads(vi);
+for (i = 0; i < vi->max_queue_pairs; i++)
+rcu_assign_pointer(vi->rq[i], xdp_prog, old_prog);
+
+if (netif_running(dev)) {
+for (i = 0; i < vi->max_queue_pairs; i++) {
+virtnet_napi_enable(vi->rq[i].vq, &vi->rq[i].napi);
+virtnet_napi_tx_enable(vi, vi->sq[i].vq, &vi->sq[i].napi);
+}
+}
+
+if (prog)
+bpf_prog_sub(prog, vi->max_queue_pairs - 1);
+return err;
@@ -2176,6 +2277,7 @@
+kfree(vi->rq);
+kfree(vi->sq);
+*kfree(vi->ctrl);
+}
+
+static void _free_receive_bufs(struct virtnet_info *vi)
+{ put_page(vi->rq[i].alloc_frag.page);
+
-static bool is_xdp_raw_buffer_queue(struct virtnet_info *vi, int q)
-{
- if (q < (vi->curr_queue_pairs - vi->xdp_queue_pairs))
- return false;
- else if (q < vi->curr_queue_pairs)
- return true;
- else
- return false;
-}
-
-static void free_unused_bufs(struct virtnet_info *vi)
-{
- void *buf;
- int i:
+vi->ctrl = kzalloc(sizeof(vi->ctrl), GFP_KERNEL);
+if (!vi->ctrl)
+goto err_ctrl;
+vi->sq = kzalloc(sizeof(*vi->sq) * vi->max_queue_pairs, GFP_KERNEL);

@@ -2209,16 +2311,6 @@

@ @ -2209,16 +2311,6 @@

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if (!vi->sq)
goto err_sq;
@@ -2393,6 +2488,8 @@
err_rq:
kfree(vi->sq);
err_sq:
+kfree(vi->ctrl);
+err_ctrl:
return -ENOMEM;
}
@@ -2687,8 +2784,8 @@
/* Assume link up if device can't report link status,
   otherwise get link status from config. */
+netif_carrier_off(dev);
if (virtio_has_feature(vi->vdev, VIRTIO_NET_F_STATUS)) {
-+netif_carrier_off(dev);
schedule_work(&vi->config_work);
} else {
  vi->status = VIRTIO_NET_S_LINK_UP;
@@ -2772,8 +2869,11 @@
virtnet_set_queues(vi, vi->curr_queue_pairs);

er = virtnet_cpu_notif_add(vi);
-if (err)
+if (err) {
+  virtnet_freeze_down(vdev);
+  remove_vq_common(vi);
return err;
+}
return 0;
}
--- linux-4.15.0.orig/drivers/net/vmxnet3/vmxnet3_drv.c
+++ linux-4.15.0/drivers/net/vmxnet3/vmxnet3_drv.c
@@ -369,6 +369,11 @@
gdesc = tq->comp_ring.base + tq->comp_ring.next2proc;
while (VMXNET3_TCD_GET_GEN(&gdesc->tcd) == tq->comp_ring.gen) {
+/* Prevent any &gdesc->tcd field from being (speculatively)
+ * read before (&gdesc->tcd)->gen is read.
+ */
+dma_rmb();
+completed += vmxnet3_unmap_pkt(VMXNET3_TCD_GET_TXIDX(
     &gdesc->tcd), tq, adapter->pdev,
     adapter);
int ret;
unsigned long flags;

unsigned long flags;

struct vmxnet3_tx_ctxt ctx;
union Vmxnet3_GenericDesc *gdesc;

tx_num_deferred = le32_to_cpu(tq->shared->txNumDeferred);
if (ctx.mss) {
    gdesc->txd.hlen = ctx.eth_ip_hdr_size + ctx.l4_hdr_size;
    gdesc->txd.om = VMXNET3_OM_TSO;
    gdesc->txd.msscof = ctx.mss;
    -le32_add_cpu(&tq->shared->txNumDeferred, skb->len -
    - gdesc->txd.hlen + ctx.mss - 1) / ctx.mss);
    num_pkts = (skb->len - gdesc->txd.hlen + ctx.mss - 1) / ctx.mss;
} else {
    if (skb->ip_summed == CHECKSUM_PARTIAL) {
        gdesc->txd.hlen = ctx.eth_ip_hdr_size;
        gdesc->txd.om = 0;
        gdesc->txd.msscof = 0;
    }
    -le32_add_cpu(&tq->shared->txNumDeferred, 1);
    num_pkts = 1;
} +le32_add_cpu(&tq->shared->txNumDeferred, num_pkts);
tx_num_deferred += num_pkts;

if (skb_vlan_tag_present(skb)) {
    gdesc->txd.ti = 1;
    gdesc->txd.tci = skb_vlan_tag_get(skb);
}

/* Ensure that the write to (&gdesc->txd)->gen will be observed after
 * all other writes to &gdesc->txd.
 * */
+ dma_wmb();
+
/* finally flips the GEN bit of the SOP desc. */
gdesc->dword[2] = cpu_to_le32(le32_to_cpu(gdesc->dword[2]) ^
    VMXNET3_TXD_GEN);
@ @ -1118,8 +1132,7 @@
spin_unlock_irqrestore(&tq->tx_lock, flags);

- if (le32_to_cpu(tq->shared->txNumDeferred) >=
  -le32_to_cpu(tq->shared->txThreshold)) {
  +if (tx_num_deferred >= le32_to_cpu(tq->shared->txThreshold)) {
    tq->shared->txNumDeferred = 0;
    VMXNET3_WRITE_BAR0_REG(adapter,
      VMXNET3_REG_TXPROD + tq->qid * 8,
      @@ -1215,6 +1228,7 @@
      union {
        void *ptr;
        struct ethhdr *eth;
        +struct vlan_ethhdr *veth;
        struct iphdr *ipv4;
        struct ipv6hdr *ipv6;
        struct tcphdr *tcp;
        @@ -1225,16 +1239,24 @@
        if (unlikely(sizeof(struct iphdr) + sizeof(struct tcphdr) > maplen))
          return 0;

        +if (skb->protocol == cpu_to_be16(ETH_P_8021Q) ||
          skb->protocol == cpu_to_be16(ETH_P_8021AD))
          +hlen = sizeof(struct vlan_ethhdr);
        +else
          +hlen = sizeof(struct ethhdr);
          +
          hdr.eth = eth_hdr(skb);
        if (gdesc->rcd.v4) {
          -BUG_ON(hdr.eth->h_proto != htons(ETH_P_IP));
          -hdr.ptr += sizeof(struct ethhdr);
          +BUG_ON(hdr.eth->h_proto != htons(ETH_P_IP) &&
            +hdr.veth->h_vlan_encapsulated_proto != htons(ETH_P_IP));
          +hdr.ptr += hlen;
          BUG_ON(hdr.ipv4->protocol != IPPROTO_TCP);
          hlen = hdr.ipv4->ihl << 2;
          hdr.ptr += hdr.ipv4->ihl << 2;
        } else if (gdesc->rcd.v6) {
          -BUG_ON(hdr.eth->h_proto != htons(ETH_P_IPV6));
          -hdr.ptr += sizeof(struct ethhdr);
          +BUG_ON(hdr.eth->h_proto != htons(ETH_P_IPV6) &&
            +hdr.veth->h_vlan_encapsulated_proto != htons(ETH_P_IPV6));
          +hdr.ptr += hlen;
          /* Use an estimated value, since we also need to handle
           * TSO case.
           */
          */
          @@ -1286,6 +1308,12 @@
          */
          /*
break;
}
+
+/* Prevent any rcd field from being (speculatively) read before
+ * rcd->gen is read.
+ */
+dma_rmb();
+
+BUG_ON(rcd->rqID != rq->qid && rcd->rqID != rq->qid2 &&
+       rcd->rqID != rq->dataRingQid);
idx = rcd->rxdIdx;
@@ -1470,7 +1498,8 @@
vmxnet3_rx_csum(adapter, skb,
(union Vmxnet3_GenericDesc *)rcd);
skb->protocol = eth_type_trans(skb, adapter->netdev);
-     if (!rcd->tcp || !adapter->lro)
+     if (!rcd->tcp ||
+         !(adapter->netdev->features & NETIF_F_LRO))
goto not_lro;
if (segCnt != 0 && mss != 0) {
@@ -1515,6 +1544,12 @@
ring->next2comp = idx;
num_to_alloc = vmxnet3_cmd_ring_desc_avail(ring);
ring = rq->rx_ring + ring_idx;
+
+/* Ensure that the writes to rxd->gen bits will be observed
+ * after all other writes to rxd objects.
+ */
+dma_wmb();
+
+while (num_to_alloc) {
vmxnet3_getRxDesc(rxd, &ring->base[ring->next2fill].rxd,
    &rxCmdDesc);
@@ -2675,7 +2710,7 @@
 /* ============== initialization and cleanup routines ============== */

static int
-vmxnet3_alloc_pci_resources(struct vmxnet3_adapter *adapter, bool *dma64)
+vmxnet3_alloc_pci_resources(struct vmxnet3_adapter *adapter)
{
int err;
unsigned long mmio_start, mmio_len;
@@ -2687,30 +2722,12 @@
return err;
}
-
-if (pci_set_dma_mask(pdev, DMA_BIT_MASK(64)) == 0) {


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-if (pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(64)) != 0) {
-dev_err(&pdev->dev,
-"pci_set_consistent_dma_mask failed\n");
-err = -EIO;
-goto err_set_mask;
-
-dma64 = true;
-} else {
-if (pci_set_dma_mask(pdev, DMA_BIT_MASK(32)) != 0) {
-dev_err(&pdev->dev,
-"pci_set_dma_mask failed\n");
-err = -EIO;
-goto err_set_mask;
-
-*dma64 = false;
-}
-
-err = pci_request_selected_regions(pdev, (1 << 2) - 1,
vmxnet3_driver_name);
if (err) {
-dev_err(&pdev->dev,
"Failed to request region for adapter: error %d\n", err);
-goto err_set_mask;
+goto err_enable_device;
}

pci_set_master(pdev);
@@ -2738,7 +2755,7 @@
iounmap(adapter->hw_addr0);
err_ioremap:
pci_release_selected_regions(pdev, (1 << 2) - 1);
-err_set_mask:
+err_enable_device:
pci_disable_device(pdev);
return err;
}
@@ -3243,7 +3260,7 @@
#endif
};

int err;
-bool dma64 = false; /* stupid gcc */
+bool dma64;

u32 ver;
struct net_device *netdev;
struct vmxnet3_adapter *adapter;
@@ -3289,6 +3306,24 @@
adapter->rx_ring_size = VMXNET3_DEF_RX_RING_SIZE;
adapter->rx_ring2_size = VMXNET3_DEF_RX_RING2_SIZE;

+if (pci_set_dma_mask(pdev, DMA_BIT_MASK(64)) == 0) {
+  if (pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(64)) != 0) {
+    dev_err(&pdev->dev, "pci_set_consistent_dma_mask failed\n");
+    err = -EIO;
+    goto err_set_mask;
+  }
+  dma64 = true;
+} else {
+  if (pci_set_dma_mask(pdev, DMA_BIT_MASK(32)) != 0) {
+    dev_err(&pdev->dev, "pci_set_dma_mask failed\n");
+    err = -EIO;
+    goto err_set_mask;
+  }
+  dma64 = false;
+}
+
+spin_lock_init(&adapter->cmd_lock);
+adapter->adapter_pa = dma_map_single(&adapter->pdev->dev, adapter,
+  sizeof(struct vmxnet3_adapter),
@@ -3296,7 +3331,7 @@
  if (dma_mapping_error(&adapter->pdev->dev, adapter->adapter_pa)) {
    dev_err(&pdev->dev, "Failed to map dma\n");
    err = -EFAULT;
-err_dma_map:
  goto err_set_mask;
+
  adapter->shared = dma_alloc_coherent(
    &adapter->pdev->dev,
@@ -3347,7 +3382,7 @@
  }
#endif /* VMXNET3_RSS */

-err = vmxnet3_alloc_pci_resources(adapter, &dma64);
+err = vmxnet3_alloc_pci_resources(adapter);
if (err < 0)
goto err_alloc_pci;

@@ -3493,7 +3528,7 @@
err_alloc_shared:
  dma_unmap_single(&adapter->pdev->dev, adapter->adapter_pa, sizeof(struct vmxnet3_adapter), PCI_DMA_TODEVICE);
-err_dma_map:
+err_set_mask:
  free_netdev(netdev);
return err;
--- linux-4.15.0.orig/drivers/net/vmxnet3/vmxnet3_ethtool.c
+++ linux-4.15.0/drivers/net/vmxnet3/vmxnet3_ethtool.c
@@ -692,6 +692,8 @@
 *hfunc = ETH_RSS_HASH_TOP;
 if (!p)
  return 0;
+if (n > UPT1_RSS_MAX_IND_TABLE_SIZE)
+  return 0;
 while (n--)
  p[n] = rssConf->indTable[n];
 return 0;
--- linux-4.15.0.orig/drivers/net/vmxnet3/vmxnet3_int.h
+++ linux-4.15.0/drivers/net/vmxnet3/vmxnet3_int.h
@@ -69,10 +69,10 @@
 /*
 * Version numbers
 */
-#define VMXNET3_DRIVER_VERSION_STRING   "1.4.a.0-k"
+#define VMXNET3_DRIVER_VERSION_STRING   "1.4.14.0-k"

 /* a 32-bit int, each byte encode a version number in VMXNET3_DRIVER_VERSION */
-#define VMXNET3_DRIVER_VERSION_NUM      0x01040a00
+#define VMXNET3_DRIVER_VERSION_NUM      0x01040e00

#if defined(CONFIG_PCI_MSI)
 /* RSS only makes sense if MSI-X is supported. */
 @@ -343,7 +343,6 @@
 u8		version;
 bool		lro;

#endif VMXNET3_RSS
 struct UPT1_RSSConf*rss_conf;
--- linux-4.15.0.orig/drivers/net/vrf.c
+++ linux-4.15.0/drivers/net/vrf.c
@@ -166,25 +166,31 @@
 static netdev_tx_t vrf_process_v6_outbound(struct sk_buff *skb,
 struct net_device *dev)
 { 
-const struct ipv6hdr *iph = ipv6_hdr(skb);
+const struct ipv6hdr *iph;
 struct net *net = dev->net(skb->dev);
-struct flowi6 fl6 = { 
-/* needed to match OIF rule */
-.flowi6_oif = dev->ifindex,
-.flowi6_iif = LOOPBACK_IFINDEX,
struct flowi6 fl6;
int ret = NET_XMIT_DROP;
struct dst_entry *dst = ip6_route_output(net, NULL, &fl6);
if (dst == ip6_null_entry)
    goto err;

iph = ipv6_hdr(skb);
memset(&fl6, 0, sizeof(fl6));
/* needed to match OIF rule */
fl6.flowi6_oif = dev->ifindex;
fl6.flowi6_iif = LOOPBACK_IFINDEX;
fl6.daddr = iph->daddr;
fl6.saddr = iph->saddr;
fl6.flowlabel = ip6_flowinfo(iph);
fl6.flowi6_mark = skb->mark;
fl6.flowi6_proto = iph->nexthdr;
fl6.flowi6_flags = FLOWI_FLAG_SKIP_NH_OIF;

dst = ip6_dst_lookup_flow(net, NULL, &fl6, NULL);
if (IS_ERR(dst) || dst == ip6_null_entry)
    goto err;

skb_dst_drop(skb);

static netdev_tx_t vrf_process_v4_outbound(struct sk_buff *skb,
struct net_device *vrf_dev)
{
    struct iphdr *ip4h = ip_hdr(skb);
    struct iphdr *ip4h;
    int ret = NET_XMIT_DROP;
    struct flowi4 fl4 = {
    /* needed to match OIF rule */
    .flowi4_oif = vrf_dev->ifindex,
    .flowi4_iif = LOOPBACK_IFINDEX,
    .flowi4_tos = RT_TOS(ip4h->tos),
    .flowi4_flags = FLOWI_FLAG_ANYSRC | FLOWI_FLAG_SKIP_NH_OIF,
struct flowi4 fl4;
struct net *net = dev_net(vrf_dev);
struct rtable *rt;

if (!pskb_may_pull(skb, ETH_HLEN + sizeof(struct iphdr)))
  goto err;
+
  ip4h = ip_hdr(skb);
+
  memset(&fl4, 0, sizeof(fl4));
+/* needed to match OIF rule */
  fl4.flowi4_oif = vrf_dev->ifindex;
  fl4.flowi4_iif = LOOPBACK_IFINDEX;
  fl4.flowi4_tos = RT_TOS(ip4h->tos);
  fl4.flowi4_flags = FLOWI_FLAG_ANYSRC | FLOWI_FLAG_SKIP_NH_OIF;
  fl4.flowi4_proto = ip4h->protocol;
  fl4.daddr = ip4h->daddr;
  fl4.saddr = ip4h->saddr;
+
  rt = ip_route_output_flow(net, &fl4, NULL);
  if (IS_ERR(rt))
    goto err;
@end -321,8 +333,7 @@
return ret;
}

-static int vrf_finish_direct(struct net *net, struct sock *sk,
  struct sk_buff *skb)
+static void vrf_finish_direct(struct sk_buff *skb)
{
  struct net_device *vrf_dev = skb->dev;

@end -341,7 +352,8 @@
  skb_pull(skb, ETH_HLEN);
}

-return 1;
+/* reset skb device */
+nf_reset(skb);
}

#if IS_ENABLED(CONFIG_IPV6)
@end -351,8 +363,8 @@

struct dst_entry *dst = skb_dst(skb);
struct net_device *dev = dst->dev;
+const struct in6_addr *nexthop;
struct neighbour *neigh;
-struct in6_addr *nexthop;
int ret;

nf_reset(skb);
@@ -420,15 +432,41 @@
return skb;
}

+static int vrf_output6_direct_finish(struct net *net, struct sock *sk,
+ struct sk_buff *skb)
+{
+vrf_finish_direct(skb);
+
+return vrf_ip6_local_out(net, sk, skb);
+}
+
+static int vrf_output6_direct(struct net *net, struct sock *sk,
+ struct sk_buff *skb)
{
+int err = 1;
+
skb->protocol = htons(ETH_P_IPV6);

-return NF_HOOK_COND(NFPROTO_IPV6, NF_INET_POST_ROUTING,
- net, sk, skb, NULL, skb->dev,
- vrf_finish_direct,
- !(IPCB(skb)->flags & IPSKB_REROUTED));
+if (!(IPCB(skb)->flags & IPSKB_REROUTED))
+err = nf_hook(NFPROTO_IPV6, NF_INET_POST_ROUTING, net, sk, skb,
+ NULL, skb->dev, vrf_output6_direct_finish);
+
+if (likely(err == 1))
+vrf_finish_direct(skb);
+
+return err;
+}
+
+static int vrf_ip6_out_direct_finish(struct net *net, struct sock *sk,
+ struct sk_buff *skb)
+{
+int err;
+
+err = vrf_output6_direct(net, sk, skb);
+
+if (likely(err == 1))
+}
err = vrf_ip6_local_out(net, sk, skb);
+
+return err;
}

static struct sk_buff *vrf_ip6_out_direct(struct net_device *vrf_dev,
@@ -441,18 +479,15 @@
skb->dev = vrf_dev;

err = nf_hook(NFPROTO_IPV6, NF_INET_LOCAL_OUT, net, sk,
- skb, NULL, vrf_dev, vrf_output6_direct);
+ skb, NULL, vrf_dev, vrf_ip6_out_direct_finish);

if (likely(err == 1))
err = vrf_output6_direct(net, sk, skb);

-/* reset skb device */
+/* reset skb device */
if (likely(err == 1))
-nf_reset(skb);
-else
- skb = NULL;
+return skb;
+return NULL;
}

static struct sk_buff *vrf_ip6_out(struct net_device *vrf_dev,
@@ -463,7 +498,8 @@
if (rt6_need_strict(&ipv6_hdr(skb)->daddr))
 return skb;

-if (qdisc_tx_is_default(vrf_dev))
+if (qdisc_tx_is_default(vrf_dev) ||
 + IP6CB(skb)->flags & IP6SKB_XFRM_TRANSFORMED)
 return vrf_ip6_out_direct(vrf_dev, sk, skb);

return vrf_ip6_out_redirect(vrf_dev, skb);
@@ -578,12 +614,13 @@
if (!IS_ERR(neigh)) {
 sock_confirm_neigh(skb, neigh);
 ret = neigh_output(neigh, skb);
+rcu_read_unlock_bh();
+return ret;
 }

rcu_read_unlock_bh();
err:
- if (unlikely(ret < 0))
  - vrf_tx_error(skb->dev, skb);
  + vrf_tx_error(skb->dev, skb);
  return ret;
 }

@@ -634,15 +671,41 @@
 return skb;
 }

+static int vrf_output_direct_finish(struct net *net, struct sock *sk,
+     struct sk_buff *skb)
+{
+  +vrf_finish_direct(skb);
+  +return vrf_ip_local_out(net, sk, skb);
+}
+}

+static int vrf_output_direct(struct net *net, struct sock *sk,
+     struct sk_buff *skb)
+{
+  int err = 1;
+  skb->protocol = htons(ETH_P_IP);

- return NF_HOOK_COND(NFPROTO_IPV4, NF_INET_POST_ROUTING,
-     net, sk, skb, NULL, skb->dev,
-     vrf_finish_direct,
-     !(IPCB(skb)->flags & IPSKB_REROUTED));
+ if (!(IPCB(skb)->flags & IPSKB_REROUTED))
+   err = nf_hook(NFPROTO_IPV4, NF_INET_POST_ROUTING, net, sk, skb,
+     NULL, skb->dev, vrf_output_direct_finish);
+ if (likely(err == 1))
+   vrf_finish_direct(skb);
+ return err;
+
+static int vrf_ip_out_direct_finish(struct net *net, struct sock *sk,
+     struct sk_buff *skb)
+{
+  int err;
+  +err = vrf_output_direct(net, sk, skb);
+  +if (likely(err == 1))
+    err = vrf_ip_local_out(net, sk, skb);
+return err;
}

static struct sk_buff *vrf_ip_out_direct(struct net_device *vrf_dev,  
@@ -655,18 +718,15 @@
 skb->dev = vrf_dev;

 err = nf_hook(NFPROTO_IPV4, NF_INET_LOCAL_OUT, net, sk,  
- skb, NULL, vrf_dev, vrf_output_direct);  
+ skb, NULL, vrf_dev, vrf_ip_out_direct_finish);

 if (likely(err == 1))
 err = vrf_output_direct(net, sk, skb);  
-/* reset skb device */
+/* reset skb device */
 if (likely(err == 1))
- nf_reset(skb);
-else
- skb = NULL;
+ return skb;
+return NULL;
 }

 static struct sk_buff *vrf_ip_out(struct net_device *vrf_dev,  
@@ -678,7 +738,167 @@
 ipv4_is_lbcast(ip_hdr(skb)->daddr))
 return skb;

- if (qdisc_tx_is_default(vrf_dev))
+ if (qdisc_tx_is_default(vrf_dev) ||
+ IPCB(skb)->flags & IPSKB_XFRM_TRANSFORMED)
 return vrf_ip_out_direct(vrf_dev, sk, skb);

 return vrf_ip_out_redirect(vrf_dev, skb);
--- linux-4.15.0.orig/drivers/net/vxlan.c
+++ linux-4.15.0/drivers/net/vxlan.c
@@ -91,6 +92,167 @@

 #include <linux/igmp.h>
 #include <linux/inetdevice.h>
+##include <linux/netdevice.h>
 #include <linux/if_ether.h>
 #include <net/arp.h>
 @ -91,6 +92,167 @@
 ip_tunnel_collect_metadata();
+static struct ip_fan_map *vxlan_fan_find_map(struct vxlan_dev *vxlan, __be32 daddr) {
+struct ip_fan_map *fan_map;
+rcu_read_lock();
+list_for_each_entry_rcu(fan_map, &vxlan->fan.fan_maps, list) {
+if (fan_map->overlay ==
+ (daddr & inet_make_mask(fan_map->overlay_prefix))) {
+rcu_read_unlock();
+return fan_map;
+}
+}
+rcu_read_unlock();
+
+static void vxlan_fan_flush_map(struct vxlan_dev *vxlan) {
+struct ip_fan_map *fan_map;
+
+list_for_each_entry_rcu(fan_map, &vxlan->fan.fan_maps, list) {
+list_del_rcu(&fan_map->list);
+kfree_rcu(fan_map, rcu);
+}
+
+static int vxlan_fan_del_map(struct vxlan_dev *vxlan, __be32 overlay) {
+struct ip_fan_map *fan_map;
+
+fan_map = vxlan_fan_find_map(vxlan, overlay);
+if (!fan_map)
+return -ENOENT;
+
+list_del_rcu(&fan_map->list);
+kfree_rcu(fan_map, rcu);
+
+return 0;
+}
+
+static int vxlan_fan_add_map(struct vxlan_dev *vxlan, struct ifla_fan_map *map) {
+__be32 overlay_mask, underlay_mask;
+struct ip_fan_map *fan_map;
.overlay_mask = inet_make_mask(map->overlay_prefix);
+underlay_mask = inet_make_mask(map->underlay_prefix);
+
+netdev_dbg(vxlan->dev, "vfam: map: o %x/%d u %x/%d om %x um %x\n", 
+ map->overlay, map->overlay_prefix,
+ map->underlay, map->underlay_prefix,
+ overlay_mask, underlay_mask);
+
+if ((map->overlay & ~overlay_mask) || (map->underlay & ~underlay_mask))
+return -EINVAL;
+
+if (!(map->overlay & overlay_mask) && (map->underlay & underlay_mask))
+return -EINVAL;
+
+/* Special case: overlay 0 and underlay 0: flush all mappings */
+if (!map->overlay && !map->underlay) {
+vxlans_fan_flush_map(vxlan);
+return 0;
+}
+
+/* Special case: overlay set and underlay 0: clear map for overlay */
+if (!map->underlay)
+return vxlan_fan_del_map(vxlan, map->overlay);
+
+if (vxlan_fan_find_map(vxlan, map->overlay))
+return -EEXIST;
+
+fan_map = kmalloc(sizeof(*fan_map), GFP_KERNEL);
+fan_map->underlay = map->underlay;
+fan_map->overlay = map->overlay;
+fan_map->overlay_prefix = map->overlay_prefix;
+fan_map->overlay_mask = ntohl(overlay_mask); 
+fan_map->overlay_prefix = map->overlay_prefix;
+
+list_add_tail_rcu(&fan_map->list, &vxlan->fan.fan_maps);
+
+return 0;
+}
+
+static int vxlan_parse_fan_map(struct nlattr *data[], struct vxlan_dev *vxlan)
+{
+struct ifla_fan_map *map;
+struct nlattr *attr;
+int rem, rv;
+
+nla_for_each_nested(attr, data[IFLA_IPTUN_FAN_MAP], rem) { 
+map = nla_data(attr);
+rv = vxlan_fan_add_map(vxlan, map); 
+}
if (rv)
+ return rv;
+
+ }
+
+ return 0;
+
+ }
+
+static int vxlan_fan_build_rdst(struct vxlan_dev *vxlan, struct sk_buff *skb,
+ struct vxlan_rdst *fan_rdst)
+{
+ struct ip_fan_map *f_map;
+ union vxlan_addr *va;
+ u32 daddr, underlay;
+ struct arphdr *arp;
+ void *arp_ptr;
+ struct ethhdr *eth;
+ struct iphdr *iph;
+
+ eth = eth_hdr(skb);
+ switch (eth->h_proto) {
+ case htons(ETH_P_IP):
+ iph = ip_hdr(skb);
+ if (!iph)
+ return -EINVAL;
+ daddr = iph->daddr;
+ break;
+ case htons(ETH_P_ARP):
+ arp = arp_hdr(skb);
+ if (!arp)
+ return -EINVAL;
+ daddr = iph->daddr;
+ break;
+ case htons(ETH_P_IPV6):
+ iph = ip_hdr(skb);
+ if (!iph)
+ return -EINVAL;
+ break;
+ default:
+ netdev_dbg(vxlan->dev, "vfbr: unknown eth p %x\n", eth->h_proto);
+ return -EINVAL;
+ }
+
+ f_map = vxlan_fan_find_map(vxlan, daddr);
+ if (!f_map)
+ return -EINVAL;
+
+daddr = ntohl(daddr);
+underlay = ntohl(f_map->underlay);
+if (!underlay)
+    return -EINVAL;
+
+memset(fan_rdst, 0, sizeof(*fan_rdst));
+va = &fan_rdst->remote_ip;
+va->sa.sa_family = AF_INET;
+fan_rdst->remote_vni = vxlan->default_dst.remote_vni;
+va->sin.sin_addr.s_addr = htonl(underlay |
+((daddr & ~f_map->overlay_mask) >>
+(32 - f_map->overlay_prefix -
+ (32 - f_map->underlay_prefix))));
+netdev_dbg(vxlan->dev, "vfbr: daddr %x ul %x dst %x\n",
+   daddr, underlay, va->sin.sin_addr.s_addr);
+
+return 0;
+
#elif IS_ENABLED(CONFIG_IPV6)
static inline
bool vxlan_addr_equal(const union vxlan_addr *a, const union vxlan_addr *b)
@@ -623,9 +785,7 @@
flush = 0;
out:
-skb_gro_remcsum_cleanup(skb, &grc);
-skb->remcsum_offload = 0;
-NAPI_GRO_CB(skb)->flush |= flush;
+skb_gro_flush_final_remcsum(skb, pp, flush, &grc);

return pp;
}
@@ -638,9 +798,62 @@
return eth_gro_complete(skb, nhoff + sizeof(struct vxlanhdr));
}

/* Add new entry to forwarding table -- assumes lock held */
+static struct vxlan_fdb *vxlan_fdb_alloc(struct vxlan_dev *vxlan,
+    const u8 *mac, __u16 state,
+    __be32 src_vni, __u8 ndm_flags)
+{
+    struct vxlan_fdb *f;
+
+    f = kmalloc(sizeof(*f), GFP_ATOMIC);
+    if (!f)
+        return NULL;
+    f->state = state;


```c
void f->flags = ndm_flags;
+f->updated = f->used = jiffies;
+f->vni = src_vni;
+INIT_LIST_HEAD(&f->remotes);
+memcpy(f->eth_addr, mac, ETH_ALEN);
+
+return f;
+}
+
static int vxlan_fdb_create(struct vxlan_dev *vxlan,
    const u8 *mac, union vxlan_addr *ip,
    __u16 state, __be16 port, __be32 src_vni,
    __be32 vni, __u32 ifindex, __u8 ndm_flags,
    struct vxlan_fdb **fdb)
+
+struct vxlan_rdst *rd = NULL;
+struct vxlan_fdb *f;
+int rc;
+
+if (vxlan->cfg.addrmx &&
    vxlan->addrcnt >= vxlan->cfg.addrmx)
    return -ENOSPC;
+
+netdev_dbg(vxlan->dev, "add %pM -> %pIS\n", mac, ip);
+f = vxlan_fdb_alloc(vxlan, mac, state, src_vni, ndm_flags);
+if (!f)
    return -ENOMEM;
+
+rc = vxlan_fdb_append(f, ip, port, vni, ifindex, &rd);
+if (rc < 0) {
    kfree(f);
    return rc;
+}
+
++vxlan->addrcnt;
+hlist_add_head_rcu(&f->hlist,
    vxlan_fdb_head(vxlan, mac, src_vni));
+
+*fdb = f;
+
+return 0;
+}

+/* Add new entry to forwarding table -- assumes lock held */
+static int vxlan_fdb_update(struct vxlan_dev *vxlan,
    const u8 *mac, union vxlan_addr *ip,
    __u16 state, __u16 flags,
    __be16 port, __be32 src_vni, __be32 vni,

```

__u32 ifindex, __u8 ndm_flags)
@@ -689,37 +902,17 @@
if (!(flags & NLM_F_CREATE))
    return -ENOENT;
-		if (vxlan->cfg.addrmax &&
    - vxlan->addrcnt >= vxlan->cfg.addrmax)
    -return -ENOSPC;
-
/* Disallow replace to add a multicast entry */
if ((flags & NLM_F_REPLACE) &&
    (is_multicast_ether_addr(mac) || is_zero_ether_addr(mac)))
    return -EOPNOTSUPP;

netdev_dbg(vxlan->dev, "add %pM -> %pIS\n", mac, ip);
-f = kmalloc(sizeof(*f), GFP_ATOMIC);
-if (!f)
    -return -ENOMEM;
-
    notify = 1;
    -f->state = state;
    -f->flags = ndm_flags;
    -f->updated = f->used = jiffies;
    -f->vni = src_vni;
    -INIT_LIST_HEAD(&f->remotes);
    -memcpy(f->eth_addr, mac, ETH_ALEN);
    -
    -rc = vxlan_fdb_append(f, ip, port, vni, ifindex, &rd);
    -if (rc < 0) {
        -kfree(f);
        +rc = vxlan_fdb_create(vxlan, mac, ip, state, port, src_vni,
        + vni, ifindex, ndm_flags, &f);
        +if (rc < 0)
            return rc;
    -}
    -
    -++vxlan->addrcnt;
    -hlist_add_head_rcu(&f->hlist,
    - vxlan_fdb_head(vxlan, mac, src_vni));
    +notify = 1;
}

if (notify) {
    @@ -743,13 +936,15 @@
kfree(f);
    }
}

-static void vxlan_fdb_destroy(struct vxlan_dev *vxlan, struct vxlan_fdb *f)
static void vxlan_fdb_destroy(struct vxlan_dev *vxlan, struct vxlan_fdb *f, bool do_notify)
{
    netdev_dbg(vxlan->dev, "delete %pM\n", f->eth_addr);
    --vxlan->addrcnt;
    -vxlan_fdb_notify(vxlan, f, first_remote_rtnl(f), RTM_DELNEIGH);
    +if (do_notify)
    +vxlan_fdb_notify(vxlan, f, first_remote_rtnl(f), RTM_DELNEIGH);
    hlist_del_rcu(&f->hlist);
    call_rcu(&f->rcu, vxlan_fdb_free);
}

return -EAFNOSUPPORT;

spin_lock_bh(&vxlan->hash_lock);
-err = vxlan_fdb_create(vxlan, addr, &ip, ndm->ndm_state, flags,
+err = vxlan_fdb_update(vxlan, addr, &ip, ndm->ndm_state, flags,
    port, src_vni, vni, ifindex, ndm->ndm_flags);
spin_unlock_bh(&vxlan->hash_lock);

out: return 0;
for (h = 0; h < FDB_HASH_SIZE; ++h) {
    struct vxlan_fdb *f;
    +rcu_read_lock();
    hlist_for_each_entry_rcu(f, &vxlan->fdb_head[h], hlist) {
        struct vxlan_rdst *rd;
            cb->nh->nlmsg_seq,
            RTM_NEWNEIGH,
            NLM_F_MULTI, rd);
        -if (err < 0)
        +if (err < 0) {
            +rcu_read_unlock();
            goto out;
        }
    }
}

out: return 0;
for (h = 0; h < FDB_HASH_SIZE; ++h) {
    struct vxlan_fdb *f;
    +rcu_read_lock();
    hlist_for_each_entry_rcu(f, &vxlan->fdb_head[h], hlist) {
        struct vxlan_rdst *rd;
            cb->nh->nlmsg_seq,
            RTM_NEWNEIGH,
            NLM_F_MULTI, rd);
        -if (err < 0)
        +if (err < 0) {
            +rcu_read_unlock();
            goto out;
        }
    }
}
skip:
*idx += 1;
}
}
+rcu_read_unlock();
}
out:
return err;
@@ -1008,7 +1207,7 @@
/* close off race between vxlan_flush and incoming packets */
if (netif_running(dev))
-   vxlan_fdb_create(vxlan, src_mac, src_ip,
+   vxlan_fdb_update(vxlan, src_mac, src_ip,
   NUD_REACHABLE,
   NLM_F_EXCL|NLM_F_CREATE,
   vxlan->cfg.dst_port,
@@ -1435,6 +1634,14 @@
goto drop;
}
+rcu_read_lock();
+
+if (unlikely(!(vxlan->dev->flags & IFF_UP))) {
+   rcu_read_unlock();
+   atomic_long_inc(&vxlan->dev->rx_dropped);
+   goto drop;
+
+}
+
+stats = this_cpu_ptr(vxlan->dev->tstats);
+u64_stats_update_begin(&stats->syncp);
+stats->rx_packets++;
@@ -1442,6 +1649,9 @@
+gro_cells_receive(&vxlan->gro_cells, skb);
+
+return 0;

drop:
@@ -1566,6 +1776,10 @@
ns_olen = request->len - skb_network_offset(request) -
 sizeof(struct ipv6hdr) - sizeof(*ns);
for (i = 0; i < ns_olen-1; i += (ns->opt[i+1]<<3)) {
+if (!ns->opt[i+1]) {
+kfree_skb(reply);
+return NULL;
+
if (ns->opt[i] == ND_OPT_SOURCE_LL_ADDR) {
    daddr = ns->opt + i + sizeof(struct nd_opt_hdr);
    break;
}
@@ -1629,6 +1843,7 @@
struct neighbour *n;
struct nd_msg *msg;

+rcu_read_lock();
in6_dev = __in6_dev_get(dev);
if (!in6_dev)
goto out;
@@ -1680,6 +1895,7 @@
}
out:
+rcu_read_unlock();
consume_skb(skb);
return NETDEV_TX_OK;
}
@@ -1918,7 +2134,6 @@
bool use_cache = ip_tunnel_dst_cache_usable(skb, info);
struct dst_entry *ndst;
struct flowi6 fl6;
-int err;

if (!sock6)
return ERR_PTR(-EIO);
@@ -1941,10 +2156,9 @@
fl6.fl6_dport = dport;
fl6.fl6_sport = sport;
-err = ipv6_stub->ipv6_dst_lookup(vxlan->net,
-sock6->sock->sk,
-&ndst, &fl6);
-if (unlikely(err < 0)) {
+ndst = ipv6_stub->ipv6_dst_lookup_flow(vxlan->net, sock6->sock->sk,
+&fl6, NULL);
+if (unlikely(IS_ERR(ndst))) {
    netdev_dbg(dev, "no route to %pI6n", daddr);
    return ERR_PTR(-ENETUNREACH);
    }
@@ -1969,7 +2183,7 @@
struct pcpu_sw_netstats *tx_stats, *rx_stats;
union vxlan_addr loopback;
union vxlan_addr *remote_ip = &dst_vxlan->default_dst.remote_ip;
-struct net_device *dev = skb->dev;

+struct net_device *dev;
int len = skb->len;

tx_stats = this_cpu_ptr(src_vxlan->dev->tstats);
#endif
}
+rcu_read_lock();
+dev = skb->dev;
+if (unlikely(!(dev->flags & IFF_UP))) {
+kfree_skb(skb);
+goto drop;
+}
+
if (dst_vxlan->cfg.flags & VXLAN_F_LEARN)
-vxlan_snoop(skb->dev, &loopback, eth_hdr(skb)->h_source, 0,
-    vni);
+vxlan_snoop(dev, &loopback, eth_hdr(skb)->h_source, 0, vni);

u64_stats_update_begin(&tx_stats->syncp);
    tx_stats->tx_packets++;
@@ -2004,8 +2224,10 @@
rx_stats->rx_bytes += len;
    u64_stats_update_end(&rx_stats->syncp);
} else {
+drop:
    dev->stats.rx_dropped++;
    }
+rcu_read_unlock();

static int encap_bypass_if_local(struct sk_buff *skb, struct net_device *dev,
@@ -2117,8 +2339,11 @@
vni = tunnel_id_to_key32(info->key.tun_id);
    ifindex = 0;
dst_cache = &info->dst_cache;
-    if (info->options_len)
-        if (info->options_len < sizeof(*md))
+    }
+    if (info->options_len < sizeof(*md))
+        goto drop;
    md = ip_tunnel_info_opts(info);
+}
ttl = info->key.ttl;
tos = info->key.tos;
label = info->key.label;
@@ -2143,6 +2368,13 @@
goto tx_error;
if (fan_has_map(&vxlan->fan) && rt->rt_flags & RTCF_LOCAL) {
    netdev_dbg(dev, "discard fan to localhost %pI4\n",
               &dst->sin.sin_addr.s_addr);
    ip_rt_put(rt);
    goto tx_free;
} +
/* Bypass encapsulation if the destination is local */
if (!info) {
    err = encap_bypass_if_local(skb, dev, vxlan, dst,
                               dev->stats.tx_carrier_errors++;
    dst_release(ndst);
    dev->stats.tx_errors++;
    tx_free:
    kfree_skb(skb);
}

if (fan_has_map(&vxlan->fan)) {
    struct vxlan_rdst fan_rdst;
    netdev_dbg(vxlan->dev, "vxlan_xmit p %x d %pM\n",
                eth->h_proto, eth->h_dest);
    if (vxlan_fan_build_rdst(vxlan, skb, &fan_rdst)) {
        dev->stats.tx_dropped++;
        kfree_skb(skb);
    } +
    vxlan_xmit_one(skb, dev, vni, &fan_rdst, 0);
    +
    eth = eth_hdr(skb);
    f = vxlan_find_mac(vxlan, eth->h_dest, vni);
    did_rsc = false;
    "garbage collect %pM\n",
    f->eth_addr);
    f->state = NUD_STALE;
    vxlan_fdb_destroy(vxlan, f, true);
} else if (time_before(timeout, next_timer))
next_timer = timeout;
}
@@ -2399,10 +2646,19 @@
/* Setup stats when device is created */
static int vxlan_init(struct net_device *dev)
{
+struct vxlan_dev *vxlan = netdev_priv(dev);
+int err;
+dev->tstats = netdev_alloc_pcpu_stats(struct pcpu_sw_netstats);
if (!dev->tstats)
+err = gro_cells_init(&vxlan->gro_cells, dev);
+if (err) {
+free_percpu(dev->tstats);
+return err;
+
+return 0;
}

@@ -2413,7 +2669,7 @@
spin_lock_bh(&vxlan->hash_lock);
 f = __vxlan_find_mac(vxlan, all_zeros_mac, vni);
 if (f)
 -vxlan_fdb_destroy(vxlan, f);
+vxlan_fdb_destroy(vxlan, f, true);
 spin_unlock_bh(&vxlan->hash_lock);
 }

@@ -2421,6 +2677,8 @@
 {
 struct vxlan_dev *vxlan = netdev_priv(dev);

+gro_cells_destroy(&vxlan->gro_cells);
+vxlan_fdb_delete_default(vxlan, vxlan->cfg.vni);

 free_percpu(dev->tstats);
@@ -2467,7 +2725,7 @@
 continue;
 /* the all_zeros_mac entry is deleted at vxlan_uninit */
 if (!is_zero_ether_addr(f->eth_addr))
 -vxlan_fdb_destroy(vxlan, f);
+vxlan_fdb_destroy(vxlan, f, true);
 }


spin_unlock_bh(&vxlan->hash_lock);
@@ -2658,10 +2916,10 @@
 vxlan->dev = dev;

 -gro_cells_init(&vxlan->gro_cells, dev);
- for (h = 0; h < FDB_HASH_SIZE; ++h)
+ for (h = 0; h < FDB_HASH_SIZE; ++h)
 INIT_HLIST_HEAD(&vxlan->fdb_head[h]);
 +INIT_LIST_HEAD(&vxlan->fan.fan_maps);
 }

 static void vxlan_ether_setup(struct net_device *dev)
@@ -3112,6 +3370,9 @@
 dev->gso_max_segs = lowerdev->gso_max_segs;

 needed_headroom = lowerdev->hard_header_len;
+ needed_headroom += lowerdev->needed_headroom;
 +dev->needed_tailroom = lowerdev->needed_tailroom;

 max_mtu = lowerdev->mtu - (use_ipv6 ? VXLAN6_HEADROOM : VXLAN_HEADROOM);
@@ -3157,6 +3418,8 @@
 { struct vxlan_net *vn = net_generic(net, vxlan_net_id);
 struct vxlan_dev *vxlan = netdev_priv(dev);
+struct vxlan_fdb *f = NULL;
+bool unregister = false;
 int err;

 err = vxlan_dev_configure(net, dev, conf, false, extack);
@@ -3170,24 +3433,41 @@
 err = vxlan_fdb_create(vxlan, all_zeros_mac, 
 &vxlan->default_dst.remote_ip, 
 NUD_REACHABLE | NUD_PERMANENT, 
- NLM_F_EXCL | NLM_F_CREATE, 
+ NLM_F_EXCL | NLM_F_CREATE, 
 vxlan->cfg.dst_port, 
 vxlan->default_dst.remote_vni, 
 vxlan->default_dst.remote_ifindex,
- NTF_SELF);
+ NTF_SELF, &f);
 if (err)
 return err;
 }
err = register_netdevice(dev);
-if (err) {
-    vxlan_fdb_delete_default(vxlan, vxlan->default_dst.remote_vni);
-    return err;
-
+    if (err)
+        goto errout;
+    unregister = true;
+    
+    err = rtnl_configure_link(dev, NULL);
+    if (err)
+        goto errout;
+    
+    /* notify default fdb entry */
+    if (f)
+        vxlan_fdb_notify(vxlan, f, first_remote_rtnl(f), RTM_NEWNEIGH);
+
+    list_add(&vxlan->next, &vn->vxlan_list);
+    return 0;
+
+errout:
+    /* unregister_netdevice() destroys the default FDB entry with deletion
+     * notification. But the addition notification was not sent yet, so
+     * destroy the entry by hand here.
+     */
+    if (f)
+        vxlan_fdb_destroy(vxlan, f, false);
+    if (unregister)
+        unregister_netdevice(dev);
+    return err;
}

static int vxlan_nl2conf(struct nlattr *tb[], struct nlattr *data[],
@@ -3195,6 +3475,7 @@
bool changelink)
{
    struct vxlan_dev *vxlan = netdev_priv(dev);
    int err;

    memset(conf, 0, sizeof(*conf));

@@ -3227,6 +3508,12 @@
    conf->remote_ip.sa.sa_family = AF_INET6;
 }

+if (data[IFLA_VXLAN_FAN_MAP]) {
+    err = vxlan_parse_fan_map(data, vxlan);
+    if (err)


+return err;
+
+}
+
if (data[IFLA_VXLAN_LOCAL]) {
    if (changelink && (conf->saddr.sa.sa_family != AF_INET))
        return -EOPNOTSUPP;
@@ -3441,10 +3728,10 @@
     old_dst.remote_ifindex, 0);

if (!vxlan_addr_any(&dst->remote_ip)) {
-    err = vxlan_fdb_create(vxlan, all_zeros_mac,
+    err = vxlan_fdb_update(vxlan, all_zeros_mac,
         &dst->remote_ip,
         NUD_REACHABLE | NUD_PERMANENT,
-       NLM_F_CREATE | NLM_F_APPEND,
+       NLM_F_APPEND | NLM_F_CREATE,
         vxlan->cfg.dst_port,
         dst->remote_vni,
         dst->remote_vni,
@@ -3467,7 +3754,6 @@
    vxlan_flush(vxlan, true);

-    gro_cells_destroy(&vxlan->gro_cells);
    list_del(&vxlan->next);
    unregister_netdevice_queue(dev, head);
}
@@ -3497,6 +3783,7 @@
    nla_total_size(sizeof(__u8)) + /* IFLA_VXLAN_UDP_ZERO_CSUM6_RX */
    nla_total_size(sizeof(__u8)) + /* IFLA_VXLAN_REMCSUM_TX */
    nla_total_size(sizeof(__u8)) + /* IFLA_VXLAN_REMCSUM_RX */
+    nla_total_size(sizeof(struct ip_fan_map) * 256) +
    0;
}
@@ -3543,6 +3830,26 @@

@if (fan_has_map(&vxlan->fan)) {
    @+struct nlattr *fan_nest;
    +struct ip_fan_map *fan_map;
+    
+    @+fan_nest = nla_nest_start(skb, IFLA_VXLAN_FAN_MAP);
+    @+if (!fan_nest)
+        goto nla_put_failure;
+    @+list_for_each_entry_rcu(fan_map, &vxlan->fan.fan_maps, list) {
+        @+struct ifla_fan_map map;
+map.underlay = fan_map->underlay;
+map.underlay_prefix = fan_map->underlay_prefix;
+map.overlay = fan_map->overlay;
+map.overlay_prefix = fan_map->overlay_prefix;
+if (nla_put(skb, IFLA_FAN_MAPPING, sizeof(map), &map))
+goto nla_put_failure;
+
+nla_nested_end(skb, fan_nest);
+
+if (nla_put_u8(skb, IFLA_VXLAN_TTL, vxlan->cfg.ttl) ||
    nla_put_u8(skb, IFLA_VXLAN_TOS, vxlan->cfg.tos) ||
    nla_put_be32(skb, IFLA_VXLAN_LABEL, vxlan->cfg.label))
@@ -3709,6 +4016,22 @@
    return 0;
}

+#ifndef CONFIG_SYSCTL
+static struct ctl_table_header *vxlan_fan_header;
+static unsigned int vxlan_fan_version = 4;
+
+static struct ctl_table vxlan_fan_sysctls[] = {
+    {
+        .procname = "vxlan",
+        .data = &vxlan_fan_version,
+        .maxlen = sizeof(vxlan_fan_version),
+        .mode = 0444,
+        .proc_handler = proc_dointvec,
+    },
+    {};
+
+#endif /* CONFIG_SYSCTL */
+
+static void __net_exit vxlan_exit_net(struct net *net)
{  
    struct vxlan_net *vn = net_generic(net, vxlan_net_id);
    @@ -3726,10 +4049,8 @@
    /* If vxlan->dev is in the same netns, it has already been added
     * to the list by the previous loop.
     */
-    if (!net_eq(dev_net(vxlan->dev), net)) {
-        gro_cells_destroy(&vxlan->gro_cells);
+    if (!net_eq(dev_net(vxlan->dev), net))
        unregister_netdevice_queue(vxlan->dev, &list);
    }
    
}
unregister_netdevice_many(&list);
@@ -3764,7 +4085,20 @@
 if (rc)
 goto out3;

+#ifdef CONFIG_SYSCTL
+vxlan_fan_header = register_net_sysctl(&init_net, "net/fan",
+  vxlan_fan_sysctls);
+if (!vxlan_fan_header) {
+    rc = -ENOMEM;
+    goto syscall_failed;
+}
+#endif /* CONFIG_SYSCTL */
+
 return 0;
+#ifdef CONFIG_SYSCTL
 sysctl_failed:
+    rtnl_link_unregister(&vxlan_link_ops);
+#endif /* CONFIG_SYSCTL */
 out3:
 unregister_netdevice_notifier(&vxlan_notifier_block);
 out2:
@@ -3776,6 +4110,9 @@
 static void __exit vxlan_cleanup_module(void)
 {
+    #ifdef CONFIG_SYSCTL
 unregister_net_sysctl_table(vxlan_fan_header);
+    #endif /* CONFIG_SYSCTL */
    rtnl_link_unregister(&vxlan_link_ops);
    unregister_netdevice_notifier(&vxlan_notifier_block);
    unregister_pernet_subsys(&vxlan_net_ops);
--- linux-4.15.0.orig/drivers/net/wan/Kconfig
+++ linux-4.15.0/drivers/net/wan/Kconfig
 @@ -199,7 +199,7 @@
 depends on WANXL && !PREVENT_FIRMWARE_BUILD
 help
     Allows you to rebuild firmware run by the QUICC processor.
-    It requires as68k, ld68k and hexdump programs.
+    It requires m68k toolchains and hexdump programs.

     You should never need this option, say N.

@@ -295,6 +295,7 @@
 tristate "Slic Maxim ds26522 card support"
 depends on SPI
 depends on FSL_SOC || ARCH_MXC || ARCH_LAYERSCAPE || COMPILE_TEST
+select BITREVERSE
help
This module initializes and configures the slic maxim card
in T1 or E1 mode.
--- linux-4.15.0.orig/drivers/net/wan/Makefile
+++ linux-4.15.0/drivers/net/wan/Makefile
@@ -41,17 +41,17 @@
ifeq ($(CONFIG_WANXL_BUILD_FIRMWARE),y)
ifeq ($(ARCH),m68k)
  AS68K = $(AS)
-  LD68K = $(LD)
+  M68KCC = $(CC)
+  M68KLD = $(LD)
endif
else
-  AS68K = as68k
-  LD68K = ld68k
+  M68KCC = $(CROSS_COMPILE_M68K)gcc
+  M68KLD = $(CROSS_COMPILE_M68K)ld
endif

quiet_cmd_build_wanxlfw = BLD FW  $@
  cmd_build_wanxlfw = 
- $(CPP) -D__ASSEMBLY__ -Wp,-MD,$(depfile) -I$(srctree)/include/uapi $< | $(AS68K) -m68360 -o $(obj)/wanxlfw.o; 
- $(LD68K) --oformat binary -Ttext 0x1000 $(obj)/wanxlfw.o -o $(obj)/wanxlfw.bin; 
+ $(M68KCC) -D__ASSEMBLY__ -Wp,-MD,$(depfile) -I$(srctree)/include/uapi -c -o $(obj)/wanxlfw.o $<; 
+ $(M68KLD) --oformat binary -Ttext 0x1000 $(obj)/wanxlfw.o -o $(obj)/wanxlfw.bin; 
hexdump -ve ""n"" 16/1 "0x%02X,\"" $(obj)/wanxlfw.bin | sed 's/0x \$/static const u8
firmware[]={/;$$s/,$$/
};
rm -f $(obj)/wanxlfw.bin $(obj)/wanxlfw.o

--- linux-4.15.0.orig/drivers/net/wan/cosa.c
+++ linux-4.15.0/drivers/net/wan/cosa.c
@@ -902,6 +902,7 @@
  chan->tx_status = 1;
  spin_unlock_irqrestore(&cosa->lock, flags);
  up(&chan->wsem);
+kfree(kbuf);
  return -ERESTARTSYS;
}
}
--- linux-4.15.0.orig/drivers/net/wan/fsl_ucc_hdlc.c
+++ linux-4.15.0/drivers/net/wan/fsl_ucc_hdlc.c
@@ -76,7 +76,7 @@
                                  }
                      }
        }
-        -static struct ucc_tdm_info utdm_info[MAX_HDLC_NUM];
+        -static struct ucc_tdm_info utdm_info[MAX_HDLC_NUM];
+static struct ucc_tdm_info utdm_info[UCC_MAX_NUM];

static int uhdlc_init(struct ucc_hdlc_private *priv)
{
    priv->ucc_pram_offset = qe_muram_alloc(sizeof(struct ucc_hdlc_param),
        ALIGNMENT_OF_UCC_HDLC_PRAM);
    if (priv->ucc_pram_offset < 0) {
        if (IS_ERR_VALUE(priv->ucc_pram_offset)) {
            dev_err(priv->dev, "Can not allocate MURAM for hdlc parameter\n");
            ret = -ENOMEM;
            goto free_tx_bd;
        }
        priv->ucc_pram_offset = qe_muram_alloc(sizeof(struct ucc_hdlc_param),
            ALIGNMENT_OF_UCC_HDLC_PRAM);
    }
    priv->rx_skbuff = kzalloc(priv->rx_ring_size * sizeof(*priv->rx_skbuff),
        GFP_KERNEL);
    if (!priv->rx_skbuff) {
        ret = -ENOMEM;
        goto free_ucc_pram;
    }
    priv->tx_skbuff = kzalloc(priv->tx_ring_size * sizeof(*priv->tx_skbuff),
        GFP_KERNEL);
    if (!priv->tx_skbuff) {
        ret = -ENOMEM;
        goto free_rx_skbuff;
    }
    priv->skb_curtx = 0;
    priv->skb_dirtytx = 0;
    /* Alloc riptr, tiptr */
    riptr = qe_muram_alloc(32, 32);
    if (riptr < 0) {
        if (IS_ERR_VALUE(riptr)) {
            dev_err(priv->dev, "Cannot allocate MURAM mem for Receive internal temp data pointer\n");
            ret = -ENOMEM;
            goto free_tx_skbuff;
        }
        riptr = qe_muram_alloc(32, 32);
    }
    tiptr = qe_muram_alloc(32, 32);
    if (tiptr < 0) {
        if (IS_ERR_VALUE(tiptr)) {
            dev_err(priv->dev, "Cannot allocate MURAM mem for Transmit internal temp data pointer\n");
        }
    }
ret = -ENOMEM;
go to free_riptr;
}
+if (riptr != (u16)&riptr || tiptr != (u16)&tiptr) {
+dev_err(priv->dev, "MURAM allocation out of addressable range\n");
+ret = -ENOMEM;
+goto free_tiptr;
+
/* Set RIPTR, TIPTR */
iowrite16be(riptr, &priv->ucc_pram->riptr);
@@ -1114,7 +1123,6 @@
if (register_hdlc_device(dev)) {
    ret = -ENOBUFS;
    pr_err("ucc_hdlc: unable to register hdlc device\n");
-free_netdev(dev);
go to free_dev;
}

--- linux-4.15.0.orig/drivers/net/wan/hdlc.c
+++ linux-4.15.0/drivers/net/wan/hdlc.c
@@ -49,7 +49,15 @@
     struct packet_type *p, struct net_device *orig_dev)
 {
     struct hdlc_device *hdlc = dev_to_hdlc(dev);
+     struct hdlc_device *hdlc;
+     +/* First make sure "dev" is an HDLC device */
+     +if (!(dev->priv_flags & IFF_WAN_HDLC)) {
+         kfree_skb(skb);
+         return NET_RX_SUCCESS;
+     }
+     +hdlc = dev_to_hdlc(dev);

     skb_put(skb, sizeof(struct cisco_packet));
     skb->priority = TC_PRIO_CONTROL;
+)
++*/
     skb->dev = dev;
     skb->protocol = htons(ETH_P_HDLC);
     skb_reset_network_header(skb);
     dev_queue_xmit(skb);
memcpy(&state(hdlc)->settings, &new_settings, size);
spin_lock_init(&state(hdlc)->lock);
dev->header_ops = &cisco_header_ops;
+dev->hard_header_len = sizeof(struct hdlc_header);
dev->type = ARPHRD_CISCO;
call_netdevice_notifiers(NETDEV_POST_TYPE_CHANGE, dev);
netif_dormant_on(dev);
--- linux-4.15.0.orig/drivers/net/wan/hdlc_fr.c
+++ linux-4.15.0/drivers/net/wan/hdlc_fr.c
@@ -276,63 +276,69 @@

static int fr_hard_header(struct sk_buff **skb_p, u16 dlci)
{
   -u16 head_len;
   struct sk_buff *skb = *skb_p;
   
   -switch (skb->protocol) {
   -case cpu_to_be16(NLPID_CCITT_ANSI_LMI):
       -head_len = 4;
       -skb_push(skb, head_len);
       -break;
       -
   -case cpu_to_be16(NLPID_CISCO_LMI):
       -head_len = 4;
       -skb_push(skb, head_len);
       -break;
       -
   -case cpu_to_be16(ETH_P_IP):
       -head_len = 4;
       -skb_push(skb, head_len);
       -break;
       -
   -case cpu_to_be16(ETH_P_IPV6):
       -head_len = 4;
       -skb_push(skb, head_len);
       -break;
       -
   -case cpu_to_be16(ETH_P_802_3):
       -head_len = 10;
       -if (skb_headroom(skb) < head_len) {
           -struct sk_buff *skb2 = skbrealloc_headroom(skb,
           -    head_len);
       +if (!skb->dev) { /* Control packets */

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+switch (dlci) {
+  case LMI_CCITT_ANSI_DLCI:
+    skb_push(skb, 4);
+    skb->data[3] = NLPID_CCITT_ANSI_LMI;
+    break;
+  
+  case LMI_CISCO_DLCI:
+    skb_push(skb, 4);
+    skb->data[3] = NLPID_CISCO_LMI;
+    break;
+  
+  default:
+    return -EINVAL;
+  }
+}
+
+} else if (skb->dev->type == ARPHRD_DLCI) {
+  switch (skb->protocol) {
+    case htons(ETH_P_IP):
+      skb_push(skb, 4);
+      skb->data[3] = NLPID_IP;
+      break;
+    
+    case htons(ETH_P_IPV6):
+      skb_push(skb, 4);
+      skb->data[3] = NLPID_IPV6;
+      break;
+    
+    default:
+      skb_push(skb, 10);
+      skb->data[4] = NLPID_SNAP;
+      /* OUI 00-00-00 indicates an Ethertype follows */
+      skb->data[5] = 0x00;
+      skb->data[6] = 0x00;
+      skb->data[7] = 0x00;
+      /* This should be an Ethertype: */
+      *(__be16 *)(skb->data + 8) = skb->protocol;
+  }
+}
+
+} else if (skb->dev->type == ARPHRD_ETHER) {
+  if (skb_headroom(skb) < 10) {
+    struct sk_buff *skb2 = skb_realloc_headroom(skb, 10);
+    if (!skb2)
+      return -ENOBUFS;
+    dev_kfree_skb(skb);
+    skb = skb_p = skb2;
+  }
-    skb_push(skb, head_len);
skb_push(skb, 10);
skb->data[4] = NLPID_SNAP;
+ /* OUI 00-80-C2 stands for the 802.1 organization */
+ skb->data[5] = 0x00;
skb->data[6] = 0x80;
skb->data[7] = 0xC2;
+ /* PID 00-07 stands for Ethernet frames without FCS */
 skb->data[8] = 0x00;
 skb->data[9] = 0x07; /* bridged Ethernet frame w/out FCS */
- break;
+ skb->data[9] = 0x07;

default:
- head_len = 10;
- skb_push(skb, head_len);
- *__be16__(skb->data + 8) = skb->protocol;
+ } else {
+ return -EINVAL;
}
dlci_to_q922(skb->data, dlci);
@@ -428,14 +434,16 @@
skb_put(skb, pad);
 memset(skb->data + len, 0, pad);
 }
- skb->protocol = cpu_to_be16(ETH_P_802_3);
+ skb->protocol = htons(ETH_P_HDLC);
+ skb_reset_network_header(skb);
dev_queue_xmit(skb);
return NETDEV_TX_OK;
@@ -495,10 +503,8 @@
 memset(skb->data, 0, len);
skb_reserve(skb, 4);
if (lmi == LMI_CISCO) {
    skb->protocol = cpu_to_be16(NLPID_CISCO_LMI);
fr_hard_header(skb, LMI_CISCO_DLCI);
} else {
    skb->protocol = cpu_to_be16(NLPID_CCITT_ANSI_LMI);
fr_hard_header(skb, LMI_CCITT_ANSI_DLCI);
}
data = skb_tail_pointer(skb);
@@ -558,6 +564,7 @@
    skb_put(skb, i);
    skb->priority = TC_PRIO_CONTROL;
    skb->dev = dev;
+    skb->protocol = htons(ETH_P_HDLC);
    skb_reset_network_header(skb);
    dev_queue_xmit(skb);
    // -558.6 +564.7 @@
    skb->protocol = htons(ETH_P_HDLC);
    skb_reset_network_header(skb);
    dev_queue_xmit(skb);
    // -1044.7 +1051.7 @@
    }
    dev->type = ARPHRD_DLCI;
    dev->flags = IFF_POINTOPOINT;
    dev->hard_header_len = 10;
    dev->hard_header_len = 0;
    dev->addr_len = 2;
    netif_keep_dst(dev);
    // -1096.6 +1103.7 @@
    dev->mtu = HDLC_MAX_MTU;
    dev->min_mtu = 68;
    dev->max_mtu = HDLC_MAX_MTU;
    +dev->needed_headroom = 10;
    dev->priv_flags |= IFF_NO_QUEUE;
    dev->ml_priv = pvc;

--- linux-4.15.0.orig/drivers/net/wan/hdlc_ppp.c
+++ linux-4.15.0/drivers/net/wan/hdlc_ppp.c
@@ -254,6 +254,7 @@
    skb->priority = TC_PRIO_CONTROL;
    skb->dev = dev;
+    skb->protocol = htons(ETH_P_HDLC);
    skb_reset_network_header(skb);
    skb_queue_tail(&tx_queue, skb);
    // -386.11 +387.8 @@
    }
    @ @ -386.11 +387.8 @@
}

for (opt = data; len; len -= opt[1], opt += opt[1]) {

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-if (len < 2 || len < opt[1]) {
-dev->stats.rx_errors++;
-kfree(out);
-return; /* bad packet, drop silently */
-}
+if (len < 2 || opt[1] < 2 || len < opt[1])
+goto err_out;

if (pid == PID_LCP)
switch (opt[0]) {
@@ -398,6 +396,8 @@
continue; /* MRU always OK and > 1500 bytes */

case LCP_OPTION_ACCM: /* async control character map */
+if (opt[1] < sizeof(valid_accm))
+goto err_out;
if (!memcmp(opt, valid_accm,
    sizeof(valid_accm)))
continue;
@@ -409,6 +409,8 @@
} 
break;
case LCP_OPTION_MAGIC:
+if (len < 6)
+goto err_out;
    !opt[4] && !opt[5]))
break; /* reject invalid magic number */
@@ -427,6 +429,11 @@
ppp_cp_event(dev, pid, RCR_GOOD, CP_CONF_ACK, id, req_len, data);

kfree(out);
+return;
+
+err_out:
+dev->stats.rx_errors++;
+kfree(out);
}

static int ppp_rx(struct sk_buff *skb)
@@ -565,6 +572,13 @@
unsigned long flags;

spin_lock_irqsave(&proto->lock, flags);
+/* mod_timer could be called after we entered this function but
+ * before we got the lock.
+ */
+if (timer_pending(&proto->timer)) {

spin_unlock_irqrestore(&ppp->lock, flags);
+return;
+
switch (proto->state) {
    case STOPPING:
        case REQ_SENT:
            @ @ -574,7 +588,10 @ @
            ppp_cp_event(proto->dev, proto->pid, TO_GOOD, 0, 0,
                        0, NULL);
            proto->restart_counter--;
            -} else +} else if (netif_carrier_ok(proto->dev))
            +ppp_cp_event(proto->dev, proto->pid, TO_GOOD, 0, 0,
            +    0, NULL);
            +else
            ppp_cp_event(proto->dev, proto->pid, TO_BAD, 0, 0,
                        0, NULL);
            break;

--- linux-4.15.0.orig/drivers/net/wan/hdlc_raw_eth.c
+++ linux-4.15.0/drivers/net/wan/hdlc_raw_eth.c
@@ -102,6 +102,7 @@
old_qlen = dev->tx_queue_len;
ether_setup(dev);
    dev->tx_queue_len = old_qlen;
+    dev->priv_flags &= ~IFF_TX_SKB_SHARING;
    eth_hw_addr_random(dev);
call_netdevice_notifiers(NETDEV_POST_TYPE_CHANGE, dev);
netif_dormant_off(dev);
--- linux-4.15.0.orig/drivers/net/wan/ixp4xx_hss.c
+++ linux-4.15.0/drivers/net/wan/ixp4xx_hss.c
@@ -261,7 +261,7 @@
struct hss_plat_info *plat;
buffer_t *rx_buff_tab[RX_DESCS], *tx_buff_tab[TX_DESCS];
struct desc *desc_tab;/* coherent */
-    u32 desc_tab_phys;
+    dma_addr_t desc_tab_phys;
    +unsigned int id;
    unsigned int clock_type, clock_rate, loopback;
    unsigned int initialized, carrier;
    @ @ -861,7 +861,7 @ @
    dev->stats.tx_dropped++;
    return NETDEV_TX_OK;
+
        -memcpy_swab32(mem, (u32 *)((int)skb->data & ~3), bytes / 4);
        +memcpy_swab32(mem, (u32 *)((uintptr_t)skb->data & ~3), bytes / 4);
        dev_kfree_skb(skb);
        #endif
--- linux-4.15.0.orig/drivers/net/wan/lapbether.c
+++ linux-4.15.0/drivers/net/wan/lapbether.c
@@ -56,6 +56,8 @@
   struct list_head	 node;
   struct net_device	*ethdev; /* link to ethernet device */
   struct net_device	*axdev; /* lapbeth device (lapb#) */
+   bool		 up;
+   spinlock_t	 up_lock; /* Protects "up" */

 static LIST_HEAD(lapbeth_devices);
@@ -103,8 +105,9 @@
 rcu_read_lock();
 lapbeth = lapbeth_get_x25_dev(dev);
 if (!lapbeth)
-   goto drop_unlock;
-   if (!netif_running(lapbeth->axdev))
+   goto drop_unlock_rcu;
+   spin_lock_bh(&lapbeth->up_lock);
+   if (!lapbeth->up)
   goto drop_unlock;

   len = skb->data[0] + skb->data[1] * 256;
@@ -119,11 +122,14 @@
  goto drop_unlock;
 out:
+   spin_unlock_bh(&lapbeth->up_lock);
   rcu_read_unlock();
   return 0;
   drop_unlock:
   kfree_skb(skb);
   goto out;
+  drop_unlock_rcu:
+   rcu_read_unlock();
   drop:
   kfree_skb(skb);
   return 0;
@@ -151,13 +157,17 @@
 static netdev_tx_t lapbeth_xmit(struct sk_buff *skb,
   struct net_device *dev)
 {
+   struct lapbethdev *lapbeth = netdev_priv(dev);
   int err;

 /*
 - * Just to be *really* sure not to send anything if the interface
 - * is down, the ethernet device may have gone.
 */
spin_lock_bh(&lapbeth->up_lock);
if (!lapbeth->up)
goto drop;

/* There should be a pseudo header of 1 byte added by upper layers.
 * Check to make sure it is there before reading it.
 */
- if (!netif_running(dev))
+ if (skb->len < 1)
goto drop;

switch (skb->data[0]) {
@@ -182,6 +192,7 @@
goto drop;
}
out:
spin_unlock_bh(&lapbeth->up_lock);
return NETDEV_TX_OK;
drop:
kfree_skb(skb);
@@ -195,8 +206,10 @@
struct net_device *dev;
int size = skb->len;

-skb->protocol = htons(ETH_P_X25);
-
ptr = skb_push(skb, 2);

*ptr++ = size % 256;
@@ -207,6 +216,10 @@
skb->dev = dev = lapbeth->ethdev;

+skb->protocol = htons(ETH_P_DEC);
+
+skb_reset_network_header(skb);
+
dev_hard_header(skb, dev, ETH_P_DEC, bcast_addr, NULL, 0);

dev_queue_xmit(skb);
@@ -271,6 +284,7 @@
*/

static int lapbeth_open(struct net_device *dev)
{
+struct lapbethdev *lapbeth = netdev_priv(dev);
int err;

if ((err = lapb_register(dev, &lapbeth_callbacks)) != LAPB_OK) {

@@ -278,15 +292,21 @@
 return -ENODEV;
 }

-netif_start_queue(dev);
+spin_lock_bh(&lapbeth->up_lock);
+lapbeth->up = true;
+spin_unlock_bh(&lapbeth->up_lock);
+
 return 0;
 }

static int lapbeth_close(struct net_device *dev)
{
+struct lapbethdev *lapbeth = netdev_priv(dev);
 int err;

-netif_stop_queue(dev);
+spin_lock_bh(&lapbeth->up_lock);
+lapbeth->up = false;
+spin_unlock_bh(&lapbeth->up_lock);

 if ((err = lapb_unregister(dev)) != LAPB_OK)
 pr_err("lapb_unregister error: %d\n", err);
@@ -308,7 +328,7 @@
 dev->netdev_ops = &lapbeth_netdev_ops;
 dev->needs_free_netdev = true;
 dev->type = ARPHRD_X25;
-dev->hard_header_len = 3;
+dev->hard_header_len = 0;
 dev->mtu = 1000;
 dev->addr_len = 0;
 }
@@ -329,12 +349,25 @@
 if (!ndev)
 goto out;

 /* When transmitting data:
 + * first this driver removes a pseudo header of 1 byte,
 + * then the lapb module prepends an LAPB header of at most 3 bytes,
 + * then this driver prepends a length field of 2 bytes,
 + * then the underlying Ethernet device prepends its own header.
 + */
+ndev->needed_headroom = -1 + 3 + 2 + dev->hard_header_len
+ + dev->needed_headroom;
+ndev->needed_tailroom = dev->needed_tailroom;
+ lapbeth = netdev_priv(ndev);
lapbeth->axdev = ndev;

dev_hold(dev);
lapbeth->ethdev = dev;

+lapbeth->up = false;
+spin_lock_init(&lapbeth->up_lock);
+
rc = -EIO;
if (register_netdevice(ndev))
goto fail;
--- linux-4.15.0.orig/drivers/net/wan/lmc/lmc_main.c
+++ linux-4.15.0/drivers/net/wan/lmc/lmc_main.c
@@ -915,6 +915,8 @@
break;
default:
printk(KERN_WARNING "%s: LMC UNKNOWN CARD!\n", dev->name);
+unregister_hdlc_device(dev);
+return -EIO;
break;
}

@@ -1362,7 +1364,7 @@
case 0x001:
    printk(KERN_WARNING "%s: Master Abort (naughty)\n", dev->name);
    break;
-    case 0x010:
+    case 0x002:
    printk(KERN_WARNING "%s: Target Abort (not so naughty)\n", dev->name);
    break;
default:
--- linux-4.15.0.orig/drivers/net/wan/sdla.c
+++ linux-4.15.0/drivers/net/wan/sdla.c
@@ -711,7 +711,7 @@
spin_lock_irqsave(&sdla_lock, flags);
SDLA_WINDOW(dev, addr);
-pbuf = (void *)((int) dev->mem_start) + (addr & SDLA_ADDR_MASK));
+pbuf = (void *)(dev->mem_start + (addr & SDLA_ADDR_MASK));
SDLA_WINDOW(dev, addr);
pbuf->opp_flag = 1;
--- linux-4.15.0.orig/drivers/net/wan/x25_asy.c
+++ linux-4.15.0/drivers/net/wan/x25_asy.c
@@ -183,7 +183,7 @@
netif_wake_queue(sl->dev);
-/* Send one completely decapsulated IP datagram to the IP layer. */
+/* Send an LAPB frame to the LAPB module to process. */

static void x25_asy_bump(struct x25 *sl)
{
    count = sl->rcount;
    dev->stats.rx_bytes += count;

    skb = dev_alloc_skb(count);
    skb = dev_alloc_skb(count);
    if (skb == NULL) {
        netdev_warn(sl->dev, "memory squeeze, dropping packet\n");
        dev->stats.rx_dropped++;
        return;
    }

    skb_push(skb, 1); /* LAPB internal control */
    skb_put_data(skb, sl->rbuff, count);
    skb->protocol = x25_type_trans(skb, sl->dev);
    err = lapb_data_received(skb->dev, skb);
    netif_rx(skb);
    dev->stats.rx_packets++;
}

static int x25_asy_data_indication(struct net_device *dev, struct sk_buff *skb)
{
    if (skb_cow(skb, 1)) {
        kfree_skb(skb);
        return NET_RX_DROP;
    }

    skb_push(skb, 1);
    skb->data[0] = X25_IFACE_DATA;
    skb->protocol = x25_type_trans(skb, dev);
return netif_rx(skb);
}

/* Cleanup */
kfree(sl->xbuff);
+sl->xbuff = NULL;
noxbuff:
kfree(sl->rbuff);
+sl->rbuff = NULL;
norbuff:
return -ENOMEM;
}

switch (s) {
case X25_END:
if (!test_and_clear_bit(SLF_ERROR, &sl->flags) &&
-    sl->rcount > 2)
+    sl->rcount >= 2)
x25_asy_bump(sl);
clear_bit(SLF_ESCAPE, &sl->flags);
sl->rcount = 0;
--- linux-4.15.0.orig/drivers/net/wimax/i2400m/fw.c
+++ linux-4.15.0/drivers/net/wimax/i2400m/fw.c
@@ -351,13 +351,15 @@
        
        result = i2400m_barker_db_add(barker);
        if (result < 0)
-            goto error_add;
+            goto error_parse_add;
        }
        kfree(options_orig);
    }
    
    +error_parse_add:
    error_parse:
    +kfree(options_orig);
    error_add:
    kfree(i2400m_barker_db);
    return result;
--- linux-4.15.0.orig/drivers/net/wimax/i2400m/op-rfkill.c
+++ linux-4.15.0/drivers/net/wimax/i2400m/op-rfkill.c
@@ -101,7 +101,7 @@
         
         if (cmd == NULL)
         goto error_alloc;
         return 0;

+error_parse_add:
cmd->hdr.type = cpu_to_le16(I2400M_MT_CMD_RF_CONTROL);
-cmd->hdr.length = sizeof(cmd->sw_rf);
+cmd->hdr.length = cpu_to_le16(sizeof(cmd->sw_rf));
cmd->hdr.version = cpu_to_le16(I2400M_L3L4_VERSION);
cmd->sw_rf.hdr.type = cpu_to_le16(I2400M_TLV_RF_OPERATION);
cmd->sw_rf.hdr.length = cpu_to_le16(sizeof(cmd->sw_rf.status));

error_alloc:
d_fnend(4, dev, "(wimax_dev %p state %d) = %d\n",
      wimax_dev, state, result);
+kfree(cmd);
return result;
}

--- linux-4.15.0.orig/drivers/net/wimax/i2400m/sysfs.c
+++ linux-4.15.0/drivers/net/wimax/i2400m/sysfs.c
@@ -65,8 +65,7 @@
}

static
-DEVICE_ATTR(i2400m_idle_timeout, S_IWUSR,
-	    NULL, i2400m_idle_timeout_store);
+DEVICE_ATTR_WO(i2400m_idle_timeout);

static
struct attribute *i2400m_dev_attrs[] = {
- --- linux-4.15.0.orig/drivers/net/wimax/i2400m/usb-fw.c
- +++ linux-4.15.0/drivers/net/wimax/i2400m/usb-fw.c
-@@ -354,6 +354,7 @@
-      usb_autopm_put_interface(i2400mu->usb_iface);
-d_fnend(8, dev, "(i2400m %p ack %p size %zu) = %ld\n",
-i2400m, ack, ack_size, (long) result);
+        usb_put_urb(&notif_urb);
        return result;

error_exceeded:
- --- linux-4.15.0.orig/drivers/net/wireless/ath/ar5523/ar5523.c
+++ linux-4.15.0/drivers/net/wireless/ath/ar5523/ar5523.c
@@ -255,7 +255,8 @@
    if (flags & AR5523_CMD_FLAG_MAGIC)
        hdr->magic = cpu_to_be32(1 << 24);
-    memcpy(hdr + 1, idata, ilen);
+    if (ilen)
+        memcpy(hdr + 1, idata, ilen);
    cmd->odata = odata;
    cmd->olen = olen;

---
bool ath_is_mybeacon(struct ath_common *common, struct ieee80211_hdr *hdr);

void ath_hw_setbssidmask(struct ath_common *common);
void ath_key_delete(struct ath_common *common, struct ieee80211_key_conf *key);
void ath_key_delete(struct ath_common *common, u8 hw_key_idx);
int ath_key_config(struct ath_common *common, struct ieee80211_vif *vif, struct ieee80211_sta *sta, struct ieee80211_key_conf *key);
bool ath_hw_keyreset(struct ath_common *common, u16 entry);
bool ath_hw_keysetmac(struct ath_common *common, u16 entry, const u8 *mac);
void ath_hw_cycle_counters_update(struct ath_common *common);
int32_t ath_hw_get_listen_time(struct ath_common *common);

bool ath_is_mybeacon(struct ath_common *common, struct ieee80211_hdr *hdr);

-ath10k_pci_flush(ar);
-napi_synchronize(&_ar->napi);
napi_disable(&_ar->napi);
+ath10k_pci_flush(ar);
}

static int ath10k_ahb_hif_power_up(struct ath10k *ar)
static int ath10k_ahb_hif_power_up(struct ath10k *ar)

static int ath10k_core_search_bd(struct ath10k *ar, struct ieee80211_vif *vif, struct ieee80211_sta *sta, struct ieee80211_key_conf *key);
+ const char *boardname,
+ const u8 *data,
+ size_t len)
+
+size_t ie_len;
+struct ath10k_fw_ie *hdr;
+int ret = -ENOENT, ie_id;
+
+while (len > sizeof(struct ath10k_fw_ie)) {
+hdr = (struct ath10k_fw_ie *)data;
+ie_id = le32_to_cpu(hdr->id);
+ie_len = le32_to_cpu(hdr->len);
+
+len -= sizeof(*hdr);
+data = hdr->data;
+
+if (len < ALIGN(ie_len, 4)) {
+ath10k_err(ar, "invalid length for board ie_id %d ie_len %zu len %zu\n",
+ ie_id, ie_len, len);
+return -EINVAL;
+
+}
+
+switch (ie_id) {
+case ATH10K_BD_IE_BOARD:
+ret = ath10k_core_parse_bd_ie_board(ar, data, ie_len,
+ boardname);
+if (ret == -ENOENT)
+/* no match found, continue */
+break;
+
+*/ either found or error, so stop searching */
+goto out;
+
+} /* jump over the padding */
+ie_len = ALIGN(ie_len, 4);
+
+len -= ie_len;
+data += ie_len;
+
+out:
+*/ return result of parse_bd_ie_board() or -ENOENT */
+return ret;
+
+
static int ath10k_core_fetch_board_data_api_n(struct ath10k *ar,
    const char *boardname,
const char *fallback_boardname,
    const char *filename)
{
    size_t len, magic_len, ie_len;
    struct ath10k_fw_ie *hdr;
    size_t len, magic_len;
    const u8 *data;
    int ret, ie_id;
    int ret;

    ar->normal_mode_fw.board = ath10k_fetch_fw_file(ar,
        ar->hw_params.fw.dir,
        @ @ -1155,69 +1202,23 @ @
        data += magic_len;
        len -= magic_len;

        while (len > sizeof(struct ath10k_fw_ie)) {
            hdr = (struct ath10k_fw_ie *)data;
            ie_id = le32_to_cpu(hdr->id);
            ie_len = le32_to_cpu(hdr->len);
            -
            -len -= sizeof(*hdr);
            -data = hdr->data;
            -
            -if (len < ALIGN(ie_len, 4)) {
                ath10k_err(ar, "invalid length for board ie_id %d ie_len %zu len %zu\n",
                    - ie_id, ie_len, len);
                -ret = -EINVAL;
                -goto err;
            }
            /* attempt to find boardname in the IE list */
            ret = ath10k_core_search_bd(ar, boardname, data, len);

            switch (ie_id) {
                case ATH10K_BD_IE_BOARD:
                    ret = ath10k_core_parse_bd_ie_board(ar, data, ie_len,
                        boardname);
                    -
                    -if (ret == -ENOENT && ar->id.bdf_ext[0] != '\0') {
                        /* try default bdf if variant was not found */
                        char *s, *v = ",variant=";
                        -
                        -strcpy(boardname2[100]);
                        -
                        -strlcpy(boardname2, boardname,
                            -sizeof(boardname2));
                        -
                        -s = strstr(boardname2, v);
                        -
                        -if (s)
                            -*s = '\0'; /* strip ",variant=\%s" */
-ret = ath10k_core_parse_bd_ie_board(ar, data,
-  ie_len,
-  boardname2);
-}

/* if we didn't find it and have a fallback name, try that */
+if (ret == -ENOENT && fallback_boardname)
+ret = ath10k_core_search_bd(ar, fallback_boardname, data, len);

-if (ret == -ENOENT)
-J/* no match found, continue */
-break;
-else if (ret)
-J/* there was an error, bail out */
-goto err;
-
-J/* board data found */
-goto out;
-}
-
-J/* jump over the padding */
-ie_len = ALIGN(ie_len, 4);
-
-len -= ie_len;
-data += ie_len;
-}
-
-out:
-if (!ar->normal_mode_fw.board_data || !ar->normal_mode_fw.board_len) {
+if (ret == -ENOENT) {
ath10k_err(ar,
   "failed to fetch board data for %s from %s/%s\n",
   boardname, ar->hw_params.fw.dir, filename);
ret = -ENODATA;
-goto err;
}

+if (ret)
+goto err;
+
return 0;

err:
@@ -1226,7 +1227,7 @@
}

static int ath10k_core_create_board_name(struct ath10k *ar, char *name,
-  size_t name_len)
+ size_t name_len, bool with_variant)
{
/* strlen(',') + strlen(ar->id.bdf_ext) */
char variant[9 + ATH10K_SMBIOS_BDF_EXT_STR_LENGTH] = { 0 }; 
@@ -1240,7 +1241,7 @@
goto out;
}

@if (ar->id.bdf_ext[0] != '\0')
+if (with_variant && ar->id.bdf_ext[0] != '\0')
scnprintf(variant, sizeof(variant), ",variant=%s",
    ar->id.bdf_ext);

@@ -1257,17 +1258,26 @@
static int ath10k_core_fetch_board_file(struct ath10k *ar)
{
-    char boardname[100];
+    char boardname[100], fallback_boardname[100];
    int ret;

    -ret = ath10k_core_create_board_name(ar, boardname, sizeof(boardname));
+ret = ath10k_core_create_board_name(ar, boardname,
+    sizeof(boardname), true);
    if (ret) {
        ath10k_err(ar, "failed to create board name: %d", ret);
        return ret;
    }

    +ret = ath10k_core_create_board_name(ar, fallback_boardname,
        sizeof(boardname), false);
    +if (ret) {
        +ath10k_err(ar, "failed to create fallback board name: %d", ret);
        +return ret;
    +}
    +
    +ar->bd_api = 2; 
    ret = ath10k_core_fetch_board_data_api_n(ar, boardname,
        fallback_boardname,
        ATH10K_BOARD_API2_FILE);
    if (!ret)
        goto success;
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/core.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/core.h
@@ -884,6 +884,7 @@
struct completion install_key_done;
+int last_wmi_vdev_start_status;
struct completion vdev_setup_done;

struct workqueue_struct *workqueue;
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/debug.c
+++ linux-4.15.0/drivers/net/wireless/ath10k/debug.c
@@ -1,6 +1,7 @@
/*
 * Copyright (c) 2005-2011 Atheros Communications Inc.
 * Copyright (c) 2011-2013 Qualcomm Atheros, Inc.
+ * Copyright (c) 2018, The Linux Foundation. All rights reserved.
 * 
 * Permission to use, copy, modify, and/or distribute this software for any
 * purpose with or without fee is hereby granted, provided that the above
@@ -163,6 +164,8 @@
 
 void ath10k_debug_print_board_info(struct ath10k *ar)
 {
+const struct firmware *board;
+u32 crc;

 if (ar->id.bmi_ids_valid)
  scnprintf(boardinfo, sizeof(boardinfo), "%d:%d",
@@ -170,11 +173,16 @@
 else
  scnprintf(boardinfo, sizeof(boardinfo), "N/A");

+board = ar->normal_mode_fw.board;
+if (!IS_ERR_OR_NULL(board))
+crc = crc32_le(0, board->data, board->size);
+else
+crc = 0;
+
+ath10k_info(ar, "board_file api %d bmi_id %s crc32 %08x",
+    ar->bd_api,
+    boardinfo,
+    crc32_le(0, ar->normal_mode_fw.board->data,
+    ar->normal_mode_fw.board->size));
+

 void ath10k_debug_print_boot_info(struct ath10k *ar)
 {
+len += snprintf(buf + *len, buf_len - *len,
+    "No.  Preamble Rate_code tpc_value1 tpc_value2 tpc_value3\n");
+    "No.  Preamble Rate_code ");

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for (i = 0; i < WMI_TPC_TX_N_CHAIN; i++)
*len += scnprintf(buf + *len, buf_len - *len,
   %"tpc_value%d ", i);
*len += scnprintf(buf + *len, buf_len - *len, 
   "%n")

for (i = 0; i < tpc_stats->rate_max; i++) {
*len += scnprintf(buf + *len, buf_len - *len,
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/htt_rx.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/htt_rx.c
@@ -100,6 +100,14 @@
BUILD_BUG_ON(HTT_RX_RING_FILL_LEVEL >= HTT_RX_RING_SIZE / 2);

idx = __le32_to_cpu(htt->rx_ring.alloc_idx.vaddr);
+
+if (idx < 0 || idx >= htt->rx_ring.size) {
+ath10k_err(htt->ar, "rx ring index is not valid, firmware malfunctioning?n");
+idx &= htt->rx_ring.size_mask;
+ret = -ENOMEM;
+goto fail;
+}
+
while (num > 0) {
skb = dev_alloc_skb(HTT_RX_BUF_SIZE + HTT_RX_DESC_ALIGN);
if (!skb) {
@@ -215,11 +223,12 @@
spin_lock_bh(&htt->rx_ring.lock);
ret = ath10k_htt_rx_ring_fill_n(htt, (htt->rx_ring.fill_level -
htt->rx_ring.fill_cnt));
-spin_unlock_bh(&htt->rx_ring.lock);
if (ret)
ath10k_htt_rx_ring_free(htt);
+
spin_lock_bh(&htt->rx_ring.lock);
+
return ret;
}

@@ -231,7 +240,9 @@
skb_queue_purge(&htt->rx_in_ord_compl_q);
skb_queue_purge(&htt->tx_fetch_ind_q);

+spin_lock_bh(&htt->rx_ring.lock);
ath10k_htt_rx_ring_free(htt);
+spin_unlock_bh(&htt->rx_ring.lock);
dma_free_coherent(htt->ar->dev, 
(htt->rx_ring.size * 
@@ -625,6 +636,28 @@
#define GROUP_ID_IS_SU_MIMO(x) ((x) == 0 || (x) == 63)

+static inline u8 ath10k_bw_to_mac80211_bw(u8 bw) 
+{
+ +u8 ret = 0;
+ +
+ +switch (bw) {
+ +case 0:
+ +ret = RATE_INFO_BW_20;
+ +break;
+ +case 1:
+ +ret = RATE_INFO_BW_40;
+ +break;
+ +case 2:
+ +ret = RATE_INFO_BW_80;
+ +break;
+ +case 3:
+ +ret = RATE_INFO_BW_160;
+ +break;
+ +}
+ +
+ +return ret;
+ +}
+
+static void ath10k_h tt_rx_h_rates(struct ath10k *ar, 
+ struct ieee80211_rx_status *status, 
+ struct htt_rx_desc *rxd)
@@ -634,6 +667,7 @@
+u8 preamble = 0;
+u8 group_id;
+u32 info1, info2, info3;
+u32 stbc, nsts_su;
+
+info1 = __le32_to_cpu(rxd->ppdu_start.info1);
+info2 = __le32_to_cpu(rxd->ppdu_start.info2);
@@ -678,11 +712,16 @@
+ bw = info2 & 3;
+ sgi = info3 & 1;
+ +stbc = (info2 >> 3) & 1;
+ group_id = (info2 >> 4) & 0x3F;
+
+ if (GROUP_ID_IS_SU_MIMO(group_id)) {
+mcs = (info3 >> 4) & 0x0F;
nss = ((info2 >> 10) & 0x07) + 1;
+nstsu = ((info2 >> 10) & 0x07);
+if (stbc)
+  nss = (nstsu >> 2) + 1;
+else
+  nss = (nstsu + 1);
} else {
  /* Hardware doesn't decode VHT-SIG-B into Rx descriptor
   * so it's impossible to decode MCS. Also since
   @@ -727,23 +766,7 @@
   if (sgi)
   status->enc_flags |= RX_ENC_FLAG_SHORT_GI;

   switch (bw) {
   /* 20MHZ */
   -case 0:
   -break;
   /* 40MHZ */
   -case 1:
   -status->bw = RATE_INFO_BW_40;
   -break;
   /* 80MHZ */
   -case 2:
   -status->bw = RATE_INFO_BW_80;
   -break;
   -case 3:
   -status->bw = RATE_INFO_BW_160;
   -break;
   -}

   status->bw = ath10k_bw_to_mac80211_bw(bw);
   status->encoding = RX_ENC_VHT;
   break;
   default:
   @@ -1613,14 +1636,62 @@
   ath10k_unchain_msdu(amsdu);
   }

+static bool ath10k_htt_rx_validate_amsdu(struct ath10k *ar,
+        struct sk_buff_head *amsdu)
+{
+  u8 *subframe_hdr;
+  struct sk_buff *first;
+  bool is_first, is_last;
+  struct htt_rx_desc *rxd;
+  struct ieee80211_hdr *hdr;
+  size_t hdr_len, crypto_len;
+  enum htt_rx_mpdu_encrypt_type enctype;

int bytes_aligned = ar->hw_params.decap_align_bytes;
+first = skb_peek(amsdu);
+rxd = (void *)first->data - sizeof(*rxd);
+hdr = (void *)rxd->rx_hdr_status;
+is_first = !(rxd->msdu_end.common.info0 &
+  __cpu_to_le32(RX_MSDU_END_INFO0_FIRST_MSDU));
+is_last = !(rxd->msdu_end.common.info0 &
+  __cpu_to_le32(RX_MSDU_END_INFO0_LAST_MSDU));
+/* Return in case of non-aggregated msdu */
+if (is_first &&& is_last)
+  return true;
+
+/* First msdu flag is not set for the first msdu of the list */
+if (!is_first)
+  return false;
+
tenctype = MS(__le32_to_cpu(rxd->mpdu_start.info0),
+  RX_MPDU_START_INFO0_ENCRYPT_TYPE);
+
+hdr_len = ieee80211_hdrlen(hdr->frame_control);
+crypto_len = ath10k htt rx_crypto_param_len(ar, enctype);
+
+subframe_hdr = (u8 *)hdr + round_up(hdr_len, bytes_aligned) +
+  crypto_len;
+
+/* Validate if the amsdu has a proper first subframe.
+ There are chances a single msdu can be received as amsdu when
+ the unauthenticated amsdu flag of a QoS header
+ gets flipped in non-SPP AMSDU's, in such cases the first
+ subframe has llc/snap header in place of a valid da.
+ return false if the da matches rfc1042 pattern
+ */
+if (ether_addr_equal(subframe_hdr, rfc1042_header))
+  return false;
+
+return true;
}

static bool ath10k htt rx_amsdu_allowed(struct ath10k *ar,
struct sk_buff_head *amsdu,
struct ieee80211_rx_status *rx_status)
{
-/* FIXME: It might be a good idea to do some fuzzy-testing to drop
- invalid/dangerous frames.
if (!rx_status->freq) {
    ath10k_dbg(ar, ATH10K_DBG_HTT, "no channel configured; ignoring frame(s)!
"); return false;
}

+if (!ath10k_htt_rx_validate_amsdu(ar, amsdu)) {
    +ath10k_dbg(ar, ATH10K_DBG_HTT, "invalid amsdu received\n"); return false;
+}
+
    return true;
}

arsta->txrate.flags |= RATE_INFO_FLAGS_SHORT_GI;

arsta->txrate.nss = txrate.nss;
-arsta->txrate.bw = txrate.bw + RATE_INFO_BW_20;
+arsta->txrate.bw = ath10k_bw_to_mac80211_bw(txrate.bw);
}

static void ath10k_htt_fetch_peer_stats(struct ath10k *ar,
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/htt_tx.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/htt_tx.c
@@ -1089,7 +1089,9 @@
    err_unmap_msdu:
    dma_unmap_single(dev, skb_cb->paddr, msdu->len, DMA_TO_DEVICE);
    err_free_msdu_id:
+    spin_lock_bh(&htt->tx_lock);
    ath10k htt Tx free_msdu_id(htt, msdu_id);
+    spin_unlock_bh(&htt->tx_lock);
    err:
    return res;
}--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/hw.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/hw.c
@@ -168,7 +168,7 @@

const struct ath10k_hw_values qca99x0_values = {
    .rtc_state_val_on= 5,
+    .rtc_state_val_on= 7,
    .ce_count= 12,
    .msi_assign_ce_max= 12,
.num_target_ce_config_wlan = 10,
--- linux-4.15.0.orig/drivers/net/wireless/ath10k/hw.h
+++ linux-4.15.0/drivers/net/wireless/ath10k/hw.h
@@ -705,7 +705,7 @@
#define TARGET_10_4_TX_DBG_LOG_SIZE 1024
#define TARGET_10_4_NUM_WDS_ENTRIES 32
-#define TARGET_10_4_DMA_BURST_SIZE 0
+#define TARGET_10_4_DMA_BURST_SIZE 1
#define TARGET_10_4_MAC_AGGR_DELIM 0
#define TARGET_10_4_RX_SKIP_DEFRAG_TIMEOUT_DUP_DETECTION_CHECK 1
#define TARGET_10_4_VOW_CONFIG 0
--- linux-4.15.0.orig/drivers/net/wireless/ath10k/mac.c
+++ linux-4.15.0/drivers/net/wireless/ath10k/mac.c
@@ -17,6 +17,7 @@
 #include "mac.h"
 +#include <net/cfg80211.h>
 #include <net/mac80211.h>
 #include <linux/etherdevice.h>
 #include <linux/acpi.h>
@@ -964,7 +965,7 @@
 if (time_left == 0)
 return -ETIMEDOUT;
 }

 -return 0;
+return ar->last_wmi_vdev_start_status;
 }

 static int ath10k_monitor_vdev_start(struct ath10k *ar, int vdev_id)
@@ -1621,6 +1622,10 @@
 if (arvif->vdev_type != WMI_VDEV_TYPE_AP)
 return 0;
+/* For mesh, probe response and beacon share the same template */
+if (ieee80211_vif_is_mesh(vif))
+return 0;
+ prb = ieee80211_proberesp_get(hw, vif);
 if (!prb) {
 ath10k_warn(ar, "failed to get probe resp template from mac80211\n");
@@ -2563,7 +2568,7 @@
 case WMI_VDEV_TYPE_STA:
- if (vif->bss_conf.qos)
+ if (sta->wme)
arg->peer_flags |= arvif->ar->wmi.peer_flags->qos;
break;
case WMI_VDEV_TYPE_IBSS:
    passive = channel->flags & IEEE80211_CHAN_NO_IR;
ch->passive = passive;

/* the firmware is ignoring the "radar" flag of the
+ * channel and is scanning actively using Probe Requests
+ * on "Radar detection"/DFS channels which are not
+ * marked as "available"
+ */
+ch->passive |= ch->chan_radar;
+
ch->freq = channel->center_freq;
ch->band_center_freq1 = channel->center_freq;
ch->min_power = 0;
static int ath10k_mac_tx_wmi_mgmt(struct ath10k *ar, struct sk_buff *skb)
{
    struct sk_buff_head *q = &ar->wmi_mgmt_tx_queue;
    -int ret = 0;
    -
    -spin_lock_bh(&ar->data_lock);

    -if (skb_queue_len(q) == ATH10K_MAX_NUM_MGMT_PENDING) {
        +if (skb_queue_len_lockless(q) >= ATH10K_MAX_NUM_MGMT_PENDING) {
            ath10k_warn(ar, "wmi mgmt tx queue is full\n");
            -ret = -ENOSPC;
            -goto unlock;
            +return -ENOSPC;
        }
    }
    -skb_queue_tail(q, skb);
    +skb_queue_tail(q, skb);
    ieee80211_queue_work(ar->hw, &ar->wmi_mgmt_tx_queue);
    -unlock:
    -spin_unlock_bh(&ar->data_lock);
    -
    -return ret;
    +return 0;
}

static enum ath10k_mac_tx_path
    @ @ -.3625.7 +3630.7 @@
struct ieee80211_vif *vif,
    enum ath10k_hw_txrx_mode txmode,
enum ath10k_mac_tx_path txpath,
- struct sk_buff *skb)
+ struct sk_buff *skb, bool noque_offchan)
{
    struct ieee80211_hw *hw = ar->hw;
    struct ieee80211_tx_info *info = IEEE80211_SKB_CB(skb);
    if (!info->flags & IEEE80211_TX_CTL_TX_OFFCHAN) {
        if (!noque_offchan && info->flags & IEEE80211_TX_CTL_TX_OFFCHAN) {
            if (!ath10k_mac_tx_frm_has_freq(ar)) {
                ath10k_dbg(ar, ATH10K_DBG_MAC, "queued offchannel skb %pK\n",
                skb);
                ath10k_dbg(ar, ATH10K_DBG_MAC, "mac queued offchannel skb %pK len %d\n",
                skb, skb->len);
                skb_queue_tail(&ar->offchan_tx_queue, skb);
                ieee80211_queue_work(hw, &ar->offchan_tx_work);
            }
        }
    }
    mutex_lock(&ar->conf_mutex);

    ATH10K_DBG_MAC, "mac offchannel skb %pK",
    skb);
    ath10k_dbg(ar, ATH10K_DBG_MAC, "mac offchannel skb %pK len %d\n",
    skb, skb->len);
    hdr = (struct ieee80211_hdr *)skb->data;
    peer_addr = ieee80211_get_DA(hdr);
    txmode = ath10k_mac_tx_h_get_txmode(ar, vif, sta, skb);
    txpath = ath10k_mac_tx_h_get_txpath(ar, skb, txmode);

    ret = ath10k_mac_tx(ar, vif, txmode, txpath, skb);
    +ret = ath10k_mac_tx(ar, vif, txmode, txpath, skb, true);
    if (ret) {
        ath10k_warn(ar, "failed to transmit offchannel frame: %d\n",
            ret);
        time_left =
            wait_for_completion_timeout(&ar->offchan_tx_completed, 3 * HZ);
        if (time_left == 0)
            ath10k_warn(ar, "timed out waiting for offchannel skb %pK\n",
            skb);
    +ath10k_warn(ar, "timed out waiting for offchannel skb %pK, len: %d\n",
    skb, skb->len);
if (!peer && tmp_peer_created) {
    ret = ath10k_peer_delete(ar, vdev_id, peer_addr);
    spin_unlock_bh(&ar->htt.tx_lock);
}

-ret = ath10k_mac_tx(ar, vif, txmode, txpath, skb);
+ret = ath10k_mac_tx(ar, vif, txmode, txpath, skb, false);
if (unlikely(ret)) {
    ath10k_warn(ar, "failed to push frame: %d\n", ret);
    rcu_read_unlock();
    spin_unlock_bh(&ar->txqs_lock);
} +EXPORT_SYMBOL(ath10k_mac_tx_push_pending);

/**************/
/* Scanning */
@@ -4316,7 +4322,7 @@
    spin_unlock_bh(&ar->htt.tx_lock);
}

-ret = ath10k_mac_tx(ar, vif, txmode, txpath, skb);
+ret = ath10k_mac_tx(ar, vif, txmode, txpath, skb, false);
if (ret) {
    ath10k_warn(ar, "failed to transmit frame: %d\n", ret);
    if (is htt) {
@@ -5056,6 +5063,7 @@
        ret = -EINVAL;
        ath10k_warn(ar, "cryptmode module param needed for sw crypto\n");
        goto err;
    }
        ath10k_mac_max_vht_nss(vht_mcs_mask));

if (arvif->nohwcrypt &&
    !test_bit(ATH10K_FLAG_RAW_MODE, &ar->dev_flags)) {
    +ret = -EINVAL;
    ath10k_warn(ar, "cryptmode module param needed for sw crypto\n");
    goto err;
} +EXPORT_SYMBOL(ath10k_mac_tx_push_pending);

if (changed & IEEE80211_RC_BW_CHANGED) {
    -ath10k_dbg(ar, ATH10K_DBG_MAC, "mac update sta %pM peer bw %d\n",
        +enum wmi_phy_mode mode;
        +mode = chan_to_phymode(&def);
        +ath10k_dbg(ar, ATH10K_DBG_MAC, "mac update sta %pM peer bw %d phymode %d\n",
        +sta->addr, bw, mode);
+err = ath10k_wmi_peer_set_param(ar, arvif->vdev_id, sta->addr,
+WMI_PEER_PHYMODE, mode);
+if (err) {
+ath10k_warn(ar, "failed to update STA %pM peer phymode %d: %d\n",
+sta->addr, mode, err);
+goto exit;
+
+}

err = ath10k_wmi_peer_set_param(ar, arvif->vdev_id, sta->addr,
WMI_PEER_CHAN_WIDTH, bw);

@if (changed & IEEE80211_RC_SUPP_RATES_CHANGED ||
- changed & IEEE80211_RC_NSS_CHANGED) {
-ath10k_dbg(ar, ATH10K_DBG_MAC, "mac update sta %pM supp rates/nss\n",
+if (changed & IEEE80211_RC_SUPP_RATES_CHANGED) {
+ath10k_dbg(ar, ATH10K_DBG_MAC, "mac update sta %pM supp rates\n",
sta->addr);

err = ath10k_station_assoc(ar, arvif->vif, sta, true);

+exit:
mutex_unlock(&ar->conf_mutex);
}

@if (changed & IEEE80211_RC_SUPP_RATES_CHANGED)
+if (sta->tdls) {
+ret = ath10k_mac_tdls_peer_update(ar, arvif->vdev_id,
+ sta,
+ WMI_TDLS_PEER_STATE_TEARDOWN);
+if (ret)
+ath10k_warn(ar, "failed to update tdls peer state for %pM state %d: %d\n",
+ sta->addr,
+ WMI_TDLS_PEER_STATE_TEARDOWN, ret);
+
+ ret = ath10k_peer_delete(ar, arvif->vdev_id, sta->addr);
if (ret)
ath10k_warn(ar, "failed to delete peer %pM for vdev %d: %d\n",}
@@ -6707,7 +6735,7 @@
  }
  int ret;
-enum wmi_bss_survey_req_type type = WMI_BSS_survey_REQ_TYPE_READ_CLEAR;
+enum wmi_bss_survey_req_type type = WMI_BSS_survey_REQ_TYPE_READ;

  lockdep_assert_held(&ar->conf_mutex);

@@ -7073,10 +7101,20 @@
  {
    struct ath10k *ar = hw->priv;
    struct ath10k_sta *arsta = (struct ath10k_sta *)sta->drv_priv;
+    struct ath10k_vif *arvif = (void *)vif->drv_priv;
+    struct ath10k_peer *peer;
    u32 bw, smps;

    spin_lock_bh(&ar->data_lock);

+    peer = ath10k_peer_find(ar, arvif->vdev_id, sta->addr);
+    if (!peer) {
+      spin_unlock_bh(&ar->data_lock);
+      ath10k_warn(ar, "mac sta rc update failed to find peer %pM on vdev %i
+			    sta->addr, arvif->vdev_id);
+      return;
+    }
+    ath10k_dbg(ar, ATH10K_DBG_MAC,
+      "mac sta rc update for %pM changed %08x bw %d nss %d smps %d\n",
      sta->addr, changed, sta->bandwidth, sta->rx_nss,
@@ -7824,6 +7862,7 @@
    .num_different_channels = 1,
    .beacon_int_infra_match = true,
    +.beacon_int_min_gcd = 1,
+ifdef CONFIG_ATH10K_DFS_CERTIFIED
      .radar_detect_widths =BIT(NL80211_CHAN_WIDTH_20_NOHT) |
      BIT(NL80211_CHAN_WIDTH_20) |
@@ -7947,6 +7986,7 @@
    .num_different_channels = 1,
    .beacon_int_infra_match = true,
    +.beacon_int_min_gcd = 1,
+ifdef CONFIG_ATH10K_DFS_CERTIFIED
      .radar_detect_widths =BIT(NL80211_CHAN_WIDTH_20_NOHT) |
      BIT(NL80211_CHAN_WIDTH_20) |
@@ -8167,6 +8207,7 @@
    ar->hw->wiphy->bands[NL80211_BAND_5GHZ] = band;

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+wiphy_read_of_freq_limits(ar->hw->wiphy);

ath10k_mac_setup_ht_vht_cap(ar);

ar->hw->wiphy->interface_modes =
--- linux-4.15.0.orig/drivers/net/wireless/ath10k/pci.c
+++ linux-4.15.0/drivers/net/wireless/ath10k/pci.c
@@ -1040,10 +1040,9 @@
 struct ath10k_ce *ce = ath10k_ce_priv(ar);
 int ret = 0;
 u32 *buf;
-unsigned int completed_nbytes, orig_nbytes, remaining_bytes;
+unsigned int completed_nbytes, alloc_nbytes, remaining_bytes;
 struct ath10k_ce_pipe *ce_diag;
 void *data_buf = NULL;
-unsigned int completed_nbytes, orig_nbytes, remaining_bytes;
+unsigned int completed_nbytes, alloc_nbytes, remaining_bytes;
 struct ath10k_ce_pipe *ce_diag;
 void *data_buf = NULL;
-dma_addr_t ce_data_base = 0;

int i;

@@ -1057,9 +1056,10 @@
 * 1) 4-byte alignment
 * 2) Buffer in DMA-able space
 */
-orig_nbytes = nbytes;
+alloc_nbytes = min_t(unsigned int, nbytes, DIAG_TRANSFER_LIMIT);
 +
data_buf = (unsigned char *)dma_alloc_coherent(ar->dev,
 - orig_nbytes,
 + alloc_nbytes,
 &ce_data_base,
  GFP_ATOMIC);
if (!data_buf) {
@@ -1067,9 +1067,6 @@
goto done;
}

/* Copy caller's data to allocated DMA buf */
-memcpy(data_buf, data, orig_nbytes);
-
/*
 * The address supplied by the caller is in the
 * Target CPU virtual address space.
@@ -1082,12 +1079,14 @@
 */
address = ath10k_pci_targ_cpu_to_ce_addr(ar, address);

-remaining_bytes = orig_nbytes;
- ce_data = ce_data_base;
+remaining_bytes = nbytes;
while (remaining_bytes) {
    /* FIXME: check cast */
    nbytes = min_t(int, remaining_bytes, DIAG_TRANSFER_LIMIT);

    /* Copy caller's data to allocated DMA buf */
    +memcpy(data_buf, data, nbytes);
    +
    /* Set up to receive directly into Target(!) address */
    ret = __ath10k_ce_rx_post_buf(ce_diag, &address, address);
    if (ret != 0)
        @@ -1097,7 +1096,7 @@
        * Request CE to send caller-supplied data that
        * was copied to bounce buffer to Target(!) address.
        */
- ret = ath10k_ce_send_nolock(ce_diag, NULL, (u32)ce_data,
+ ret = ath10k_ce_send_nolock(ce_diag, NULL, ce_data_base,
    nbytes, 0, 0);
    if (ret != 0)
        goto done;
@@ -1138,12 +1137,12 @@
    remaining_bytes -= nbytes;
    address += nbytes;
    -ce_data += nbytes;
+data += nbytes;
    }

done:
    if (data_buf) {
        -dma_free_coherent(ar->dev, orig_nbytes, data_buf,
+dma_free_coherent(ar->dev, alloc_nbytes, data_buf,
            ce_data_base);
    }

@@ -1773,6 +1772,11 @@

ath10k_dbg(ar, ATH10K_DBG_BOOT, "boot hif stop\n");

+ath10k_pci_irq_disable(ar);
+ath10k_pci_irq_sync(ar);
+napi_syncronize(&ar->napi);
+napi_disable(&ar->napi);
+/*
    Most likely the device has HTT Rx ring configured. The only way to
    * prevent the device from accessing (and possible corrupting) host
    * memory is to reset the chip now.
"
ath10k_pci_safe_chip_reset(ar);

-ath10k_pci_irq_disable(ar);
-ath10k_pci_irq_sync(ar);
ath10k_pci_flush(ar);
-napi_synchronize(&ar->napi);
-napi_disable(&ar->napi);

spin_lock_irqssave(&ar_pci->ps_lock, flags);
WARN_ON(ar_pci->ps_wake_refcount > 0);
ath10k_warn(ar, "unknown number of banks, assuming 1
");
case QCA9377_1_0_DEVICE_ID:
  return 4;
  return 9;
}

ath10k_warn(ar, "unknown number of banks, assuming 1
");
case QCA9377_1_0_DEVICE_ID:
  hw_rev = ATH10K_HW_QCA9377;
  pci_ps = true;
  pci_soft_reset = NULL;
  +pci_soft_reset = ath10k_pci_warm_reset;
  pci_hard_reset = ath10k_pci_qca6174_chip_reset;
  targ_cpu_to_ce_addr = ath10k_pci_qca988x_targ_cpu_to_ce_addr;
break;
--- linux-4.15.0.orig/drivers/net/wireless/ath10k/sdio.c
+++ linux-4.15.0/drivers/net/wireless/ath10k/sdio.c
@@ -30,6 +30,7 @@
 #include "debug.h"
 #include "hif.h"
 #include "htc.h"
+##include "mac.h"
 #include "targaddr.h"
 #include "trace.h"
 #include "sdio.h"
@@ -391,15 +392,11 @@
 struct ath10k_htc_hdr *htc_hdr = (struct ath10k_htc_hdr *)skb->data;
 bool trailer_present = htc_hdr->flags & ATH10K_HTC_FLAG_TRAILER_PRESENT;
 enum ath10k_htc_ep_id eid;
-16 payload_len;
 u8 *trailer;
 int ret;
payload_len = le16_to_cpu(htc_hdr->len);
if (trailer_present) {
  trailer = skb->data + sizeof(*htc_hdr) +
    payload_len - htc_hdr->trailer_len;
  trailer = skb->data + skb->len - htc_hdr->trailer_len;
}

eid = pipe_id_to_eid(htc_hdr->eid);

.enum ath10k_htc_ep_id id;
int ret, i, *n_lookahead_local;
u32 *lookaheads_local;

for (i = 0; i < ar_sdio->n_rx_pkts; i++) {
  lookaheads_local = lookaheads;
  n_lookahead_local = n_lookahead;

  id = ((struct ath10k_htc_hdr *)&lookaheads[i])->eid;
  id = ((struct ath10k_htc_hdr *)
    &lookaheads[lookahead_idx++])->eid;

  if (id >= ATH10K_HTC_EP_COUNT) {
    ath10k_warn(ar, "invalid endpoint in look-ahead: %d\n",
      @ @ -462.6 +461.7 @ @
      /* Only read lookahead's from RX trailers
       * for the last packet in a bundle.
       */
      +lookahead_idx--;
      lookaheads_local = NULL;
      n_lookahead_local = NULL;
    }
    @ @ -561.6 +561.10 @ @
    le16_to_cpu(htc_hdr->len),
    ATH10K_HTC_MBOX_MAX_PAYLOAD_LENGTH);
    ret = -ENOMEM;
    +queue_work(ar->workqueue, &ar->restart_work);
    +ath10k_warn(ar, "exceeds length, start recovery\n");
    +goto err;
  }

full_len,
  last_in_bundle,
  last_in_bundle);
+if (ret) {
+ath10k_warn(ar, "alloc_rx_pkt error %d\n", ret);
+goto err;
+}
+
ar_sdio->n_rx_pkts = i;
@@ -626,13 +634,31 @@
{
struct ath10k_sdio *ar_sdio = ath10k_sdio_priv(ar);
struct sk_buff *skb = pkt->skb;
+struct ath10k_htc_hdr *htc_hdr;
int ret;

ret = ath10k_sdio_readsb(ar, ar_sdio->mbox_info.htc_addr,
    skb->data, pkt->alloc_len);
+if (ret)
+    goto out;
+
+/* Update actual length. The original length may be incorrect,
+ * as the FW will bundle multiple packets as long as their sizes
+ * fit within the same aligned length (pkt->alloc_len).
+ */
+htc_hdr = (struct ath10k_htc_hdr *)skb->data;
+pkt->act_len = le16_to_cpu(htc_hdr->len) + sizeof(*htc_hdr);
+if (pkt->act_len > pkt->alloc_len) {
+    ath10k_warn(ar, "rx packet too large (%zu > %zu)\n",
+        pkt->act_len, pkt->alloc_len);
+    +ret = -EMSGSIZE;
+    goto out;
+}
+
skb_put(skb, pkt->act_len);
+out:

pkt->status = ret;
-if (!ret)
-skb_put(skb, pkt->act_len);

return ret;
}
@@ -1342,6 +1368,8 @@
break;
} while (time_before(jiffies, timeout) && !done);

+ath10k_mac_tx_push_pending(ar);
+sdio_claim_host(ar_sdio->func);
if (ret && ret != -ECANCELED)
@@ -1540,23 +1568,33 @@
    size_t buf_len)
 {
    int ret;
+    void *mem;
+    +mem = kzalloc(buf_len, GFP_KERNEL);
+    +if (!mem)
+    +return -ENOMEM;

/* set window register to start read cycle */
ret = ath10k_sdio_write32(ar, MBOX_WINDOW_READ_ADDR_ADDRESS, address);
if (ret) {
    ath10k_warn(ar, "failed to set mbox window read address: %d", ret);
    -return ret;
    +goto out;
}

/* read the data */
-    ret = ath10k_sdio_read(ar, MBOX_WINDOW_DATA_ADDRESS, buf, buf_len);
+    ret = ath10k_sdio_read(ar, MBOX_WINDOW_DATA_ADDRESS, mem, buf_len);
if (ret) {
    ath10k_warn(ar, "failed to read from mbox window data address: %d\n", ret);
    -return ret;
    +goto out;
}

    -return 0;
    +memcpy(buf, mem, buf_len);
    +out:
    +kfree(mem);
    +
    +return ret;
}

static int ath10k_sdio_hif_diag_read32(struct ath10k *ar, u32 address,
@@ -2065,6 +2103,9 @@
cancel_work_sync(&ar_sdio->wr_async_work);
ath10k_core_unregister(ar);
ath10k_core_destroy(ar);
+    +flush_workqueue(ar_sdio->workqueue);
+    +destroy_workqueue(ar_sdio->workqueue);
}
static const struct sdio_device_id ath10k_sdio_devices[] = {
    --- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/trace.h
    +++ linux-4.15.0/drivers/net/wireless/ath/ath10k/trace.h
    @ @ -152,10 +152,9 @@
    
    TRACE_EVENT(ath10k_wmi_cmd,
               -TP_PROTO(struct ath10k *ar, int id, const void *buf, size_t buf_len,
               - int ret),
               +TP_PROTO(struct ath10k *ar, int id, const void *buf, size_t buf_len),

               -TP_ARGS(ar, id, buf, buf_len, ret),
               +TP_ARGS(ar, id, buf, buf_len),

               TP_STRUCT__entry(
                   __string(device, dev_name(ar->dev))
               @ @ -163,7 +162,6 @@
                   __field(unsigned int, id)
                   __field(size_t, buf_len)
                   __dynamic_array(u8, buf, buf_len)
               -__field(int, ret)
               ),

               TP_fast_assign(
                   @ @ -171,17 +169,15 @@
                   __assign_str(driver, dev_driver_string(ar->dev));
                   __entry->id = id;
                   __entry->buf_len = buf_len;
                   -__entry->ret = ret;
                   memcpy(__get_dynamic_array(buf), buf, buf_len);
               ),

               TP_printk(
                   -"%s %s id %d len %zu ret %d",
                   +%"%s %s id %d len %zu",
                   __get_str(driver),
                   __get_str(device),
                   __entry->id,
                   -__entry->buf_len,
                   -__entry->ret
                   +__entry->buf_len
               )
               )

               --- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/txrx.c
               +++ linux-4.15.0/drivers/net/wireless/ath/ath10k/txrx.c
               @ @ -100,6 +100,8 @@
info = IEEE80211_SKB_CB(msdu);
memset(&info->status, 0, sizeof(info->status));
info->status.rates[0].idx = -1;

trace_ath10k_ttxrx_tx_unref(ar, tx_done->msdu_id);

if (tx_done->status == HTT_TX_COMPL_STATE_DISCARD) {
    /* bail if this pipe is not initialized */
    if (!pipe->ar_usb)
        return NULL;
    spin_lock_irqsave(&pipe->ar_usb->cs_lock, flags);
    if (!list_empty(&pipe->urb_list_head)) {
        urb_context = list_first_entry(&pipe->urb_list_head,
        struct ath10k_urb_context *urb_context = NULL;
        unsigned long flags;

        /* bail if this pipe is not initialized */
        if (!pipe->ar_usb)
            return;
        spin_lock_irqsave(&pipe->ar_usb->cs_lock, flags);
        pipe->urb_cnt++;
        ath10k_dbg(ar, ATH10K_DBG_USB_BULK,
            "usb bulk transmit failed: %d\n", ret);
        usb_unanchor_urb(urb);
        +usb_free_urb(urb);
        ret = -EINVAL;
        goto err_free_urb_to_pipe;
    }
    ar_usb = ath10k_usb_priv(ar);
    ret = ath10k_usb_create(ar, interface);
    if (ret)
        goto err;
    ar_usb->ar = ar;
ar->dev_id = product_id;
@@ -1021,14 +1032,17 @@
 ret = ath10k_core_register(ar, chip_id);
 if (ret) {
  ath10k_warn(ar, "failed to register driver core: %d\n", ret);
- goto err;
+ goto err_usb_destroy;
 } 

 /* TODO: remove this once USB support is fully implemented */
-ath10k_warn(ar, "WARNING: ath10k USB support is incomplete, don't expect anything to work!\n");
+ath10k_warn(ar, "Warning: ath10k USB support is incomplete, don't expect anything to work!\n");

 return 0;
+
+err_usb_destroy:
+ath10k_usb_destroy(ar);
+
+err:
+ath10k_core_destroy(ar);

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/wmi-tlv.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/wmi-tlv.c
@@ -1451,6 +1451,11 @@
   cfg->keep_alive_pattern_size = __cpu_to_le32(0);
   cfg->max_tdls_concurrent_sleep_sta = __cpu_to_le32(1);
   cfg->max_tdls_concurrent_buffer_sta = __cpu_to_le32(1);
+  cfg->wmi_send_separate = __cpu_to_le32(0);
+  cfg->num_ocb_vdevs = __cpu_to_le32(0);
+  cfg->num_ocb_channels = __cpu_to_le32(0);
+  cfg->num_ocb_schedules = __cpu_to_le32(0);
+  cfg->host_capab = __cpu_to_le32(0);

 ath10k_wmi_put_host_mem_chunks(ar, chunks);
@@ -1481,10 +1486,10 @@
 bssid_len = arg->n_bssids * sizeof(struct wmi_mac_addr);
 ie_len = roundup(arg->ie_len, 4);
 len = (sizeof(*tlv) + sizeof(*cmd)) +
-  (arg->n_channels ? sizeof(*tlv) + chan_len : 0) +
-  (arg->n_ssids ? sizeof(*tlv) + ssid_len : 0) +
-  (arg->n_bssids ? sizeof(*tlv) + bssid_len : 0) +
-  (arg->ie_len ? sizeof(*tlv) + ie_len : 0);
+  sizeof(*tlv) + chan_len +
+  sizeof(*tlv) + ssid_len +
+  sizeof(*tlv) + bssid_len +
+  sizeof(*tlv) + ie_len;
skb = ath10k_wmi_alloc_skb(ar, len);
if (!skb)
    skb = NULL;

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/wmi-tlv.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/wmi-tlv.h
@@ -1228,6 +1228,11 @@
__le32 keep_alive_pattern_size;
__le32 max_tdlss_concurrent_sleep_sta;
__le32 max_tdlss_concurrent_buffer_sta;
+__le32 wmi_send_separate;
+__le32 num_ocb_vdevs;
+__le32 num_ocb_channels;
+__le32 num_ocb_schedules;
+__le32 host_capab;
} __packed;

struct wmi_tlv_init_cmd {
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/wmi.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/wmi.c
@@ -1741,8 +1741,8 @@
    cmd_hdr->cmd_id = __cpu_to_le32(cmd);
    memset(skb_cb, 0, sizeof(*skb_cb));
    +trace_ath10k_wmi_cmd(ar, cmd_id, skb->data, skb->len);
    ret = ath10k_htc_send(&ar->htc, ar->wmi.eid, skb);
-    +trace_ath10k_wmi_cmd(ar, cmd_id, skb->data, skb->len, ret);
    if (ret)
        goto err_pull;
@@ -1852,6 +1852,12 @@
    if (ret)
        dev_kfree_skb_any(skb);
    }
+if (ret == -EAGAIN) {
+    ath10k_warn(ar, "wmi command %d timeout, restarting hardware\n",
+        cmd_id);
+    +queue_work(ar->workqueue, &ar->restart_work);
+    +}
+    +
+    return ret;
    }

@@ -2408,7 +2414,8 @@
    
    +ieee80211_rx(ar->hw, skb);
+    ieee80211_rx_ni(ar->hw, skb);
+    }
return 0;
}

@@ -3126,18 +3133,31 @@
{
    struct wmi_vdev_start_ev_arg arg = {};
    int ret;
    +u32 status;

    ath10k_dbg(ar, ATH10K_DBG_WMI, "WMI_VDEV_START_RESP_EVENTID\n");

    +ar->last_wmi_vdev_start_status = 0;
    +
    ret = ath10k_wmi_pull_vdev_start(ar, skb, &arg);
    if (ret) {
        ath10k_warn(ar, "failed to parse vdev start event: %d\n", ret);
        -return;
        +ar->last_wmi_vdev_start_status = ret;
        +goto out;
    }

    -if (WARN_ON(__le32_to_cpu(arg.status)))
    -return;
    +status = __le32_to_cpu(arg.status);
    +if (WARN_ON_ONCE(status)) {
        +ath10k_warn(ar, "vdev-start-response reports status error: %d (%s)\n",
                      +status, (status == WMI_VDEV_START_CHAN_INVALID) ?
                      +"chan-invalid" : "unknown");
        +/* Setup is done one way or another though, so we should still
        + do the completion, so don't return here.
        +*/
        +ar->last_wmi_vdev_start_status = -EINVAL;
        +}

    +out:
    complete(&ar->vdev_setup_done);
    }

@@ -4303,7 +4323,7 @@
rate_code[i],
    type);
    snprintf(buff, sizeof(buff), "%8d", tpc[j]);
    -strncat(tpc_value, buff, strlen(buff));
    +strlcat(tpc_value, buff, sizeof(tpc_value));
}

    tpc_stats->tpc_table[type].pream_idx[i] = pream_idx;
    tpc_stats->tpc_table[type].rate_code[i] = rate_code[i];
@@ -4350,6 +4370,12 @@

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num_tx_chain = __le32_to_cpu(ev->num_tx_chain);

+if (num_tx_chain > WMI_TPC_TX_N_CHAIN) {
+    ath10k_warn(ar, "number of tx chain is %d greater than TPC configured tx chain %d\n",
+             num_tx_chain, WMI_TPC_TX_N_CHAIN);
+    return;
+}
+
+/* Fill HT20 rate code */
for (i = 0; i < num_tx_chain; i++) {
    for (j = 0; j < 8; j++) {
        --- linux-4.15.0.orig/drivers/net/wireless/ath/ath10k/wmi.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath10k/wmi.h
@@ -3985,8 +3985,8 @@
     @ @ -3985,8 +3985,8 @ @
 } __packed;

#define WMI_TPC_CONFIG_PARAM1
#define WMI_TPC_RATE_MAX160
#define WMI_TPC_TX_N_CHAIN4
+#define WMI_TPC_RATE_MAX (WMI_TPC_TX_N_CHAIN * 65)
#define WMI_TPC_PREAM_TABLE_MAX10
#define WMI_TPC_FLAG3
#define WMI_TPC_BUF_SIZE10
@@ -5236,7 +5236,8 @@
     @ @ -5236,7 +5236,8 @ @
#define WMI_VDEV_PARAM_TXBF_MU_TX_BFER BIT(3)

#define WMI_TXBF_STS_CAP_OFFSET_LSB
#define WMI_TXBF_STS_CAP_OFFSET_MASK 0xf0
+#define WMI_TXBF_STS_CAP_OFFSET_MASK 0x70
+#define WMI_TXBF_CONF_IMPLICIT_BF BIT(7)
#define WMI_BF_SOUND_DIM_OFFSET_LSB
#define WMI_BF_SOUND_DIM_OFFSET_MASK 0xf00
@@ -6002,6 +6003,7 @@
 WMI_PEER_NSS        = 0x5,
 WMI_PEER_USE_4ADDR   = 0x6,
 WMI_PEER_DEBUG      = 0xa,
+#define WMI_PEER_PHYMODE    = 0xd,
 WMI_PEER_DUMMY_VAR  = 0xff, /* dummy parameter for STA PS workaround */
};
@@ -6479,11 +6481,17 @@
 __le32 rx_frame_count;
};

+/* From 10.4 firmware, not sure all have the same values. */
+enum wmi_vdev_start_status {


+WMI_VDEV_START_OK = 0,
+WMI_VDEV_START_CHAN_INVALID,
+};
+
+struct wmi_vdev_start_ev_arg {
+__le32 vdev_id;
+__le32 req_id;
+__le32 resp_type; /* %WMI_VDEV_RESP_ */
-__le32 status;
+__le32 status; /* See wmi_vdev_start_status enum above */
+};

struct wmi_peer_kick_ev_arg {
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath5k/mac80211-ops.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath5k/mac80211-ops.c
@@ -522,7 +522,7 @@
} break;
case DISABLE_KEY:
-ath_key_delete(common, key);
+ath_key_delete(common, key->hw_key_idx);
break;
default:
ret = -EINVAL;
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath6kl/cfg80211.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath6kl/cfg80211.c
@@ -939,7 +939,7 @@
else
ssid_list[i].flag = ANY_SSID_FLAG;

@if (n_match_ssid == 0)
+if (ar->wiphy->max_match_sets != 0 && n_match_ssid == 0)
ssid_list[i].flag |= MATCH_SSID_FLAG;
} 

@@ -1093,7 +1093,7 @@
if (vif->scan_req->n_ssids &&& vif->scan_req->ssids[0].ssid_len) {
for (i = 0; i < vif->scan_req->n_ssids; i++) {
ath6kl_wmi_probedssid_cmd(ar->wmi, vif->fw_vif_idx,
- i + 1, DISABLE_SSID_FLAG,
+ i, DISABLE_SSID_FLAG,
0, NULL);
} 
}
}
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath6kl/main.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath6kl/main.c
@@ -430,6 +430,9 @@
ath6kl_dbg(ATH6KL_DBG_TRC, "new station %pM aid=%d
", mac_addr, aid);

+if (aid < 1 || aid > AP_MAX_NUM_STA)
+return;
+
if (assoc_req_len > sizeof(struct ieee80211_hdr_3addr)) {
struct ieee80211_mgmt *mgmt =
(struct ieee80211_mgmt *) assoc_info;
--- linux-4.15.0.orig/drivers/net/wireless/ath6kl/usb.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath6kl/usb.c
@@ -132,6 +132,10 @@
struct ath6kl_urb_context *urb_context = NULL;
unsigned long flags;

+/* bail if this pipe is not initialized */
+if (!pipe->ar_usb)
+return NULL;
+
spin_lock_irqsave(&pipe->ar_usb->cs_lock, flags);
if (!list_empty(&pipe->urb_list_head)) {
    urb_context =
@@ -150,6 +154,10 @@
}

unsigned long flags;

+/* bail if this pipe is not initialized */
+if (!pipe->ar_usb)
+return;
+
spin_lock_irqsave(&pipe->ar_usb->cs_lock, flags);

--- linux-4.15.0.orig/drivers/net/wireless/ath6kl/wmi.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath6kl/wmi.c
@@ -1178,6 +1178,10 @@
return -EINVAL;

ev = (struct wmi_pstream_timeout_event *) datap;
+if (ev->traffic_class >= WMM_NUM_AC) {
+ath6kl_err("invalid traffic class: %d\n", ev->traffic_class);
+return -EINVAL;
+}

/*
* When the pstream (fat pipe == AC) timesout, it means there were
@@ -1519,6 +1523,10 @@
return -EINVAL;

reply = (struct wmi_cac_event *) datap;
+if (reply->ac >= WMM_NUM_AC) {
+ath6kl_err("invalid AC: %d\n", reply->ac);
+return -EINVAL;
+}

if ((reply->cac_indication == CAC_INDICATION_ADMISSION_RESP) &&
(reply->status_code != IEEE80211_TSPEC_STATUS_ADMISS_ACCEPTED)) {
@@ -2505,8 +2513,10 @@
goto free_data_skb;
for (index = 0; index < num_pri_streams; index++) {
- if (WARN_ON(!data_sync_bufs[index].skb))
+ if (WARN_ON(!data_sync_bufs[index].skb)) {
+ ret = -ENOMEM;
+ goto free_data_skb;
+ }

ep_id = ath6kl_ac2_endpoint_id(wmi->parent_dev,
        data_sync_bufs[index].
@@ -2635,11 +2645,16 @@
u16 active_tsids = 0;
 int ret;

- if (traffic_class > 3) {
+ if (traffic_class >= WMM_NUM_AC) {
+ ath6kl_err("invalid traffic class: %d\n", traffic_class);
  return -EINVAL;
  }

+ if (tsid >= 16) {
+ ath6kl_err("invalid tsid: %d\n", tsid);
  +return -EINVAL;
+ }
+ skb = ath6kl_wmi_get_new_buf(sizeof(*cmd));
 if (!skb)
 return -ENOMEM;
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/ar9003_eeprom.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/ar9003_eeprom.c
@@ -3345,7 +3345,8 @@
 "Found block at %x: code=%d ref=%d length=%d major=%d minor=%d\n",
 cptr, code, reference, length, major, minor);
if (!AR_SREV_9485(ah) && length >= 1024) ||
- (AR_SREV_9485(ah) && length > EEPROM_DATA_LEN_9485)) {
+ (AR_SREV_9485(ah) && length > EEPROM_DATA_LEN_9485)) ||
  + (length > cptr)) {
  ath_dbg(common, EEPROM, "Skipping bad header\n");
cptr -= COMP_HDR_LEN;
continue;
@@ -4115,7 +4116,7 @@

static void ar9003_hw_thermo_cal_apply(struct ath_hw *ah)
{
    -u32 data, ko, kg;
    +u32 data = 0, ko, kg;

    if (!AR_SREV_9462_20_OR_LATER(ah))
        return;
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/ath9k.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/ath9k.h
@@ -179,7 +179,8 @@
         s8 txq;
         u8 keyix;
         u8 rtscts_rate;
         -u8 retries : 7;
         +u8 retries : 6;
         +u8 dyn_smps : 1;
         u8 baw_tracked : 1;
         u8 tx_power;
         enum ath9k_key_type keytype:2;
@@ -272,7 +273,7 @@
         endif
         u8 key_idx[4];

         -u32 ackto;
         +int ackto;
         struct list_head list;
   }

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/common-spectral.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/common-spectral.c
@@ -411,7 +411,7 @@
         ath_dbg(common, SPECTRAL_SCAN,
             "Calculated new upper max 0x%X at %d\n",
             -tmp_mag, i);
         +tmp_mag, fft_sample_40.upper_max_index);
     } else
         for (i = dc_pos; i < SPECTRAL_HT20_40_NUM_BINS; i++) {
             if (fft_sample_40.data[i] == (upper_mag >> max_exp))
@@ -479,14 +479,16 @@
             {
                 int i = 0;
                 int ret = 0;
                 +struct rchan_buf *buf;

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struct rchan *rc = spec_priv->rfs_chan_spec_scan;

-for_each_online_cpu(i)
-ret += relay_buf_full(*per_cpu_ptr(rc->buf, i));
-
i = num_online_cpus();
+for_each_possible_cpu(i) {
+ if ((buf = *per_cpu_ptr(rc->buf, i))) {
+ ret += relay_buf_full(buf);
+ }
+ }

-if (ret == i)
+if (ret)
 return 1;
 else
 return 0;

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/debug.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/debug.c
@@ -1236,8 +1236,11 @@
 ah->nf_override = val;

-if (ah->curchan)
+if (ah->curchan) {
+ ath9k_ps_wakeup(sc);
+ ath9k_hw_loadnf(ah, ah->curchan);
+ ath9k_ps_restore(sc);
+ }

 return count;
 }

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/dynack.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/dynack.c
@@ -29,9 +29,13 @@
 /*
 */
-static inline u32 ath_dynack_ewma(u32 old, u32 new)
+static inline int ath_dynack_ewma(int old, int new)
 { 
-return (new * (EWMA_DIV - EWMA_LEVEL) + old * EWMA_LEVEL) / EWMA_DIV;
+if (old > 0)
+ return (new * (EWMA_DIV - EWMA_LEVEL) +
+ old * EWMA_LEVEL) / EWMA_DIV;
+else
+ return new;
 }
static void ath_dynack_compute_ackto(struct ath_hw *ah) {
    struct ath_node *an;
    u32 to = 0;
    struct ath_dynack *da = &ah->dynack;
    struct ath_common *common = ath9k_hw_common(ah);
    if (an->ackto > to)
        an->ackto = ath_dynack_ewma(an->ackto,
                                     ackto);
    ath_dbg(ath9k_hw_common(ah), DYNACK,
            "%pM to %u\n", dst, an->ackto);
    if (time_is_before_jiffies(da->lto)) {
        ath_dynack_compute_ackto(ah);
        da->lto = jiffies + COMPUTE_TO;
    }
}

void ath_dynack_sample_tx_ts(struct ath_hw *ah, struct sk_buff *skb, struct ath_tx_status *ts)
    struct ieee80211_sta *sta)
{
    u8 ridx;
    struct ieee80211_hdr *hdr;
    struct ath_common *common = ath9k_hw_common(ah);
    struct ieee80211_tx_info *info = IEEE80211_SKB_CB(skb);

    if ((info->flags & IEEE80211_TX_CTL_NO_ACK) || !da->enabled)
        return;
}
spin_lock_bh(&da->qlock);

/* late ACK */
if (ts->ts_status & ATH9K_TXERR_XRETRY) {
if (ieee80211_is_assoc_req(hdr->frame_control) ||
    ieee80211_is_assoc_resp(hdr->frame_control)) {
    ieee80211_is_auth(hdr->frame_control)) {
    spin_lock_bh(&da->qlock);
    ath_dbg(common, DYNACK, "late ack\n");
    +ath9k_hw_setslottime(ah, (LATEACK_TO - 3) / 2);
    ath9k_hw_set_ack_timeout(ah, LATEACK_TO);
    ath9k_hw_set_cts_timeout(ah, LATEACK_TO);
    +if (sta) {
    +struct ath_node *an;
    +an = (struct ath_node *)sta->drv_priv;
    +an->ackto = -1;
    +}
    da->lto = jiffies + LATEACK_DELAY;
}
}

spin_lock_bh(&da->qlock);

spin_lock(&da->qlock);

spin_lock_bh(&da->qlock);

spin_lock(&da->qlock);

list_add_tail(&an->list, &da->nodes);

spin_unlock(&da->qlock);

spin_unlock_bh(&da->qlock);

EXPORT_SYMBOL(ath_dynack_node_init);

spin_lock_bh(&da->qlock);

spin_lock(&da->qlock);

spin_lock_bh(&da->qlock);

spin_lock(&da->qlock);
+spin_lock_bh(&da->qlock);
list_del(&an->list);
-spin_unlock(&da->qlock);
+spin_unlock_bh(&da->qlock);
}
EXPORT_SYMBOL(ath_dynack_node_deinit);

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/dynack.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/dynack.h
@@ -86,7 +86,8 @@
        struct ath_hw *ah);
 void ath_dynack_sample_ack_ts(struct ath_hw *ah, struct sk_buff *skb, u32 ts);
 void ath_dynack_sample_tx_ts(struct ath_hw *ah, struct sk_buff *skb,
-   struct ath_tx_status *ts);
+   struct ath_tx_status *ts,
+   struct ieee80211_sta *sta);
#else
static inline void ath_dynack_init(struct ath_hw *ah) {} 
static inline void ath_dynack_node_init(struct ath_hw *ah,
@@ -97,7 +98,8 @@
        struct sk_buff *skb) {} 
static inline void ath_dynack_sample_tx_ts(struct ath_hw *ah,
        struct sk_buff *skb,
-   struct ath_tx_status *ts) {} 
+   struct ath_tx_status *ts,
+   struct ieee80211_sta *sta) {} 
#endif
#endif /* DYNACK_H */

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/hif_usb.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/hif_usb.c
@@ -447,10 +447,19 @@
    spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);

    /* The pending URBs have to be canceled. */
+spin_lock_irqsave(&hif_dev->tx.tx_lock, flags);
    list_for_each_entry_safe(tx_buf, tx_buf_tmp,
        &hif_dev->tx.tx_pending, list) {
    +usb_get_urb(tx_buf->urb);
    +spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);
    usb_kill_urb(tx_buf->urb);
+    list_del(&tx_buf->list);
+    usb_free_urb(tx_buf->urb);
+    kfree(tx_buf->buf);
+    kfree(tx_buf);
+    spin_lock_irqsave(&hif_dev->tx.tx_lock, flags);
    }
+spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);
static void ath9k_hif_usb_rx_cb(struct urb *urb) {
    struct sk_buff *skb = (struct sk_buff *) urb->context;
    struct hif_device_usb *hif_dev =
        usb_get_intfdata(usb_ifnum_to_if(urb->dev, 0));
    struct rx_buf *rx_buf = (struct rx_buf *)urb->context;
    struct hif_device_usb *hif_dev = rx_buf->hif_dev;
    struct sk_buff *skb = rx_buf->skb;
    int ret;

    if (!skb)
        return;
    free_skb(skb);
    kfree(rx_buf);
}

static void ath9k_hif_usb_reg_in_cb(struct urb *urb) {
    struct sk_buff *skb = (struct sk_buff *) urb->context;
    struct rx_buf *rx_buf = (struct rx_buf *)urb->context;
    struct hif_device_usb *hif_dev = rx_buf->hif_dev;
    struct sk_buff *skb = rx_buf->skb;
    struct sk_buff *nskb;
    -结构 sk_buff *skb = (struct sk_buff *) urb->context;
    -结构 hif_device_usb *hif_dev =
        usb_get_intfdata(usb_ifnum_to_if(urb->dev, 0));
    +结构 rx_buf *rx_buf = (struct rx_buf *)urb->context;
    +结构 hif_device_usb *hif_dev = rx_buf->hif_dev;
    +结构 sk_buff *skb = rx_buf->skb;
    if (!skb)
        return;
    free_skb(skb);
    kfree(rx_buf);
}
return;
}

+rx_buf->skb = skb;
+
usb_fill_int_urb(urb, hif_dev->udev,
usb_rcvintpipe(hif_dev->udev,
USB_REG_IN_PIPE),
skb->data, MAX_REG_IN_BUF_SIZE,
- ath9k_hif_usb_reg_in_cb, skb, 1);
+ ath9k_hif_usb_reg_in_cb, rx_buf, 1);
}

resubmit:
@@ -743,6 +760,7 @@
return;
free:
    kfree_skb(skb);
    kfree(rx_buf);
    urb->context = NULL;
}

@@ -751,27 +769,37 @@

struct tx_buf *tx_buf = NULL, *tx_buf_tmp = NULL;
unsigned long flags;

+spin_lock_irqsave(&hif_dev->tx.tx_lock, flags);
list_for_each_entry_safe(tx_buf, tx_buf_tmp,
 &hif_dev->tx.tx_buf, list) {
    usb_get_urb(tx_buf->urb);
+spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);
    usb_kill_urb(tx_buf->urb);
    list_del(&tx_buf->list);
    usb_free_urb(tx_buf->urb);
    kfree(tx_buf->buf);
    kfree(tx_buf);
+spin_lock_irqsave(&hif_dev->tx.tx_lock, flags);
} +spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);

spin_lock_irqsave(&hif_dev->tx.tx_lock, flags);
hif_dev->tx.flags |= HIF_USB_TX_FLUSH;
spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);

+spin_lock_irqsave(&hif_dev->tx.tx_lock, flags);
list_for_each_entry_safe(tx_buf, tx_buf_tmp,
 &hif_dev->tx.tx_pending, list) {
    +usb_get_urb(tx_buf->urb);
spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);
usb_kill_urb(tx_buf->urb);
list_del(&tx_buf->list);
usb_free_urb(tx_buf->urb);
kfree(tx_buf->buf);
kfree(tx_buf);
spin_lock_irqsave(&hif_dev->tx.tx_lock, flags);
}
spin_unlock_irqrestore(&hif_dev->tx.tx_lock, flags);

usb_kill_anchored_urbs(&hif_dev->mgmt_submitted);

for (i = 0; i < MAX_TX_URB_NUM; i++) {
    tx_buf = kzalloc(sizeof(struct tx_buf), GFP_KERNEL);
    if (!tx_buf)
        goto err;
}

static int ath9k_hif_usb_alloc_rx_urbs(struct hif_device_usb *hif_dev)
{
    struct urb *urb = NULL;
    struct rx_buf *rx_buf = NULL;
    struct sk_buff *skb = NULL;
    struct urb *urb = NULL;
    int i, ret;

    init_usb_anchor(&hif_dev->rx_submitted);

    for (i = 0; i < MAX_RX_URB_NUM; i++) {
        rx_buf = kzalloc(sizeof(*rx_buf), GFP_KERNEL);
        if (!rx_buf) {
            ret = -ENOMEM;
            goto err_rxb;
        }

        /* Allocate URB */
        urb = usb_alloc_urb(0, GFP_KERNEL);
        if (urb == NULL) {
            goto err_skb;
        }
    }

    /* Allocate URB */
    urb = usb_alloc_urb(0, GFP_KERNEL);
    if (urb == NULL) {
        goto err_skb;
    }
}
+rx_buf->hif_dev = hif_dev;
+rx_buf->skb = skb;
+
usb_fill_bulk_urb(urb, hif_dev->udev, 
  usb_rcvbulkpipe(hif_dev->udev, 
    USB_WLAN_RX_PIPE),
  skb->data, MAX_RX_BUF_SIZE,
  ath9k_hif_usb_rx_cb, skb);
+  ath9k_hif_usb_rx_cb, rx_buf);

/* Anchor URB */
usb_anchor_urb(urb, &hif_dev->rx_submitted);
@@ -878,6 +916,8 @@
er_skpb:
   usb_free_urb(urb);
   err_urb:
+  kfree(rx_buf);
+err_rxb:
   ath9k_hif_usb_dealloc_rx_urbs(hif_dev);
   return ret;
}
@@ -889,14 +929,21 @@
static int ath9k_hif_usb_alloc_reg_in_urbs(struct hif_device_usb *hif_dev)
{
  struct urb *urb = NULL;
  struct rx_buf *rx_buf = NULL;
  struct sk_buff *skb = NULL;
  int i, ret;

  init_usb_anchor(&hif_dev->reg_in_submitted);

  for (i = 0; i < MAX_REG_IN_URB_NUM; i++) {
    +rx_buf = kzalloc(sizeof(*rx_buf), GFP_KERNEL);
    +if (!rx_buf) {
    +  ret = -ENOMEM;
    +  goto err_rxb;
    }
    +/* Allocate URB */
    urb = usb_alloc_urb(0, GFP_KERNEL);
    if (urb == NULL) {
@@ -911,11 +958,14 @@
        goto err_skb;
    }

rx_buf->hif_dev = hif_dev;
rx_buf->skb = skb;

usb_fill_int_urb(urb, hif_dev->udev, usb_rcvintpipe(hif_dev->udev, USB_REG_INPIPE), skb->data, MAX_REG_IN_BUF_SIZE,

ath9k_hif_usb_reg_in_cb, skb, 1);

ath9k_hif_usb_reg_in_cb, rx_buf, 1);

/* Anchor URB */
usb_anchor_urb(urb, &hif_dev->reg_in_submitted);

err_skb:
usb_free_urb(urb);
err_urb:
+kfree(rx_buf);
+err_rxb:
ath9k_hif_usb_dealloc_reg_in_urbs(hif_dev);
return ret;
}

return -ENOMEM;
}

void ath9k_hif_usb_dealloc_urbs(struct hif_device_usb *hif_dev)
{

usb_kill_anchored_urbs(&hif_dev->regout_submitted);
ath9k_hif_usb_dealloc_reg_in_urbs(hif_dev);

static int send_eject_command(struct usb_interface *interface)
{

struct usb_device *udev = interface_to_usbdev(interface);
-struct usb_host_interface *iface_desc = &interface->altsetting[0];
+struct usb_host_interface *iface_desc = interface->cur_altsetting;
struct usb_endpoint_descriptor *endpoint;
unsigned char *cmd;
u8 bulk_out_ep;

if (hif_dev->flags & HIF_USB_READY) {

ath9k_htc_hw_deinit(hif_dev->htc_handle, unplugged);
-ath9k_htc_hw_free(hif_dev->htc_handle);

+ath9k_destroy_wmi(hif_dev->htc_handle->drv_priv);
+ath9k_htc_hw_free(hif_dev->htc_handle);
usb_set_intfdata(interface, NULL);
--- linux-4.15.0.orig/drivers/net/wireless/ath9k/hif_usb.h
+++ linux-4.15.0/drivers/net/wireless/ath9k/hif_usb.h
@@ -86,6 +86,11 @@
 struct list_head list;
 }

+struct rx_buf {
+ struct sk_buff *skb;
+ struct hif_device_usb *hif_dev;
+ };
+
#define HIF_USB_TX_STOP BIT(0)
#define HIF_USB_TX_FLUSH BIT(1)

@@ -133,5 +138,6 @@
 int ath9k_hif_usb_init(void);
 void ath9k_hif_usb_exit(void);
+ void ath9k_hif_usb_dealloc_urbs(struct hif_device_usb *hif_dev);

#else /* HTC_USB_H */
--- linux-4.15.0.orig/drivers/net/wireless/ath9k/htc_drv_init.c
+++ linux-4.15.0/drivers/net/wireless/ath9k/htc_drv_init.c
@@ -246,7 +246,7 @@
 if (unlikely(r)) {
     ath_dbg(common, WMI, "REGISTER READ FAILED: (0x%04x, %d)\n",
           reg_offset, r);
-    return -EIO;
+    return -1;
 }

 return be32_to_cpu(val);
@@ -932,8 +932,9 @@
 int ath9k_htc_probe_device(struct htc_target *htc_handle, struct device *dev,
 u16 devid, char *product, u32 drv_info)
 {
- struct ieee80211_hw *hw;
+ struct hif_device_usb *hif_dev;
 struct ath9k_htc_priv *priv;
+ struct ieee80211_hw *hw;
 int ret;

     hw = ieee80211_alloc_hw(sizeof(struct ath9k_htc_priv), &ath9k_htc_ops);
@@ -968,7 +969,10 @@
 return 0;

err_init:
-ath9k_deinit_wmi(priv);
+ath9k_stop_wmi(priv);
+htf_dev = (struct hif_device_usb *)htc_handle->hif_dev;
+ath9k_hif_usb_dealloc_urbs(hif_dev);
+ath9k_destoy_wmi(priv);
err_free:
ieee80211_free_hw(hw);
return ret;
@@ -983,7 +987,7 @@
htc_handle->drv_priv->ah->ah_flags |= AH_UNPLUGGED;

ath9k_deinit_device(htc_handle->drv_priv);
-ath9k_deinit_wmi(htc_handle->drv_priv);
+ath9k_stop_wmi(htc_handle->drv_priv);
ieee80211_free_hw(htc_handle->drv_priv->hw); }

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/htc_drv_main.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/htc_drv_main.c
@@ -1460,7 +1460,7 @@
struct ath_htc_rx_status *rxstatus;
struct ath_rx_status rx_stats;
bool decrypt_error = false;
+u16 rs_datalen;
+bool is_phyerr;

if (skb->len < HTC_RX_FRAME_HEADER_SIZE) {
  ath_err(common, "Corrupted RX frame, dropping (len: %d)\n",
@@ -982,11 +984,24 @@
rxstatus = (struct ath_htc_rx_status *)skb->data;

  -if (be16_to_cpu(rxstatus->rs_datalen) -
  - (skb->len - HTC_RX_FRAME_HEADER_SIZE) != 0) {
  +rs_datalen = be16_to_cpu(rxstatus->rs_datalen);


+if (unlikely(rs_datalen -
+ (skb->len - HTC_RX_FRAME_HEADER_SIZE) != 0)) {
+  ath_err(common,
+  "Corrupted RX data len, dropping (dlen: %d, skblen: %d)n",
+  -rxstatus->rs_datalen, skb->len);
+  goto rx_next;
+}
+
+is_phyerr = rxstatus->rs_status & ATH9K_RXERR_PHY;
+/*
+ * Discard zero-length packets and packets smaller than an ACK
+ * which are not PHY_ERROR (short radar pulses have a length of 3)
+ */
+if (unlikely(!rs_datalen || (rs_datalen < 10 && !is_phyerr))) {
+  ath_dbg(common, ANY,
+  "Short RX data len, dropping (dlen: %d)n",
+  -rs_datalen);
+  goto rx_next;
+}

@@ -1011,7 +1026,7 @@
*/
@if (rx_stats.rs_status & ATH9K_RXERR_PHY) {
+  if (unlikely(is_phyerr)) {
+    /* TODO: Not using DFS processing now. */
+    if (ath_cmn_process_fft(&priv->spec_priv, hdr,
+      &rx_stats, rx_status->mactime)) {
+      --- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/htc_hst.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/htc_hst.c
@@ -113,6 +113,9 @@
if (svc_rspmsg->status == HTC_SERVICE_SUCCESS) {
+    epid = svc_rspmsg->endpoint_id;
+    if (epid < 0 || epid >= ENDPOINT_MAX)
+      return;
+    service_id = be16_to_cpu(svc_rspmsg->service_id);
+    max_msglen = be16_to_cpu(svc_rspmsg->max_msg_len);
+    endpoint = &target->endpoint[epid];
+    @ @ -170,6 +173,7 @@
    time_left = wait_for_completion_timeout(&target->cmd_wait, HZ);
    if (!time_left) {
      dev_err(target->dev, "HTC credit config timeout\n");
+      kfree_skb(skb);
      return -ETIMEDOUT;
    }
    epid = svc_rspmsg->endpoint_id;
    if (epid < 0 || epid >= ENDPOINT_MAX)
+      return;
+    service_id = be16_to_cpu(svc_rspmsg->service_id);
+    max_msglen = be16_to_cpu(svc_rspmsg->max_msg_len);
+    endpoint = &target->endpoint[epid];
+    @ @ -170,6 +173,7 @@
    time_left = wait_for_completion_timeout(&target->cmd_wait, HZ);
    if (!time_left) {
      dev_err(target->dev, "HTC credit config timeout\n");
+      kfree_skb(skb);
      return -ETIMEDOUT;
    }
time_left = wait_for_completion_timeout(&target->cmd_wait, HZ);
if (!time_left) {
    dev_err(target->dev, "HTC start timeout\n");
    kfree_skb(skb);
    return -ETIMEDOUT;
}

if (!time_left) {
    dev_err(target->dev, "Service connection timeout for: %d\n", 
            service_connreq->service_id);
    kfree_skb(skb);
    return -ETIMEDOUT;
}

if (skb) {
    htc_hdr = (struct htc_frame_hdr *) skb->data;
    if (htc_hdr->endpoint_id >= ARRAY_SIZE(htc_handle->endpoint))
        goto ret;
    endpoint = &htc_handle->endpoint[htc_hdr->endpoint_id];
    skb_pull(skb, sizeof(struct htc_frame_hdr));
    --- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/hw.c
    +++ linux-4.15.0/drivers/net/wireless/ath/ath9k/hw.c
    @@ -250,8 +250,9 @@
    /* Chip Revisions */
    /******************************/

    -static void ath9k_hw_read_revisions(struct ath_hw *ah)
    +static bool ath9k_hw_read_revisions(struct ath_hw *ah)
    {
        u32 srev;
        u32 val;

        if (ah->get_mac_revision)
            val = REG_READ(ah, AR_SREV);
        ah->hw_version.macRev = MS(val, AR_SREV_REVISION2);
    }
    -return;
    +return true;
    case AR9300_DEVID_AR9340:
        ah->hw_version.macVersion = AR_SREV_VERSION_9340;
case AR9300_DEVID_QCA955X:
    ah->hw_version.macVersion = AR_SREV_VERSION_9550;
    return;
+    return true;

case AR9300_DEVID_AR953X:
    ah->hw_version.macVersion = AR_SREV_VERSION_9531;
    return;
+    return true;

case AR9300_DEVID_QCA956X:
    ah->hw_version.macVersion = AR_SREV_VERSION_9561;
    return;
+    return true;
}

-    val = REG_READ(ah, AR_SREV) & AR_SREV_ID;
+    srev = REG_READ(ah, AR_SREV);
+    if (srev == -1) {
+        ath_err(ath9k_hw_common(ah),
+            "Failed to read SREV register");
+        return false;
+    }
+    val = srev & AR_SREV_ID;

if (val == 0xFF) {
    -    val = REG_READ(ah, AR_SREV);
+    val = srev;
    ah->hw_version.macVersion =
        (val & AR_SREV_VERSION2) >> AR_SREV_TYPE2_S;
    ah->hw_version.macRev = MS(val, AR_SREV_REVISION2);
    r = -304,6 +313,8 @ @
if (ah->hw_version.macVersion == AR_SREV_VERSION_5416_PCIE)
    ah->is_pciexpress = true;
    +    return true;
+    
/**
 @ @ -.557,7 +568,10 @ @
struct ath_common *common = ath9k_hw_common(ah);
int r = 0;

-ath9k_hw_read_revisions(ah);
+if (!ath9k_hw_read_revisions(ah)) {

+ath_err(common, "Could not read hardware revisions");
+return -EOPNOTSUPP;
+
switch (ah->hw_version.macVersion) {
    case AR_SREV_VERSION_5416_PCI:
        AR_IMR_RXERR |
    AR_IMR_RXORN |
    AR_IMR_BCNMISC;
    +u32 msi_cfg = 0;

    if (AR_SREV_9340(ah) || AR_SREV_9550(ah) || AR_SREV_9531(ah) ||
        AR_SREV_9561(ah))
        AR_SREV_9561(ah))
        @ @ -929,22 +944,30 @@

    if (AR_SREV_9300_20_OR_LATER(ah)) {
        imr_reg |= AR_IMR_RXOK_HP;
        -if (ah->config.rx_intr_mitigation)
        +if (ah->config.rx_intr_mitigation) {
            imr_reg |= AR_IMR_RXINTM | AR_IMR_RXMINTR;
        } else {
            +msi_cfg |= AR_INTCFG_MSI_RXINTM | AR_INTCFG_MSI_RXMINTR;
            +} else {
                imr_reg |= AR_IMR_RXOK_LP;
                -
                +msi_cfg |= AR_INTCFG_MSI_RXOK;
                +}
        } else {
            -if (ah->config.rx_intr_mitigation)
            +if (ah->config.rx_intr_mitigation) {
                imr_reg |= AR_IMR_RXINTM | AR_IMR_RXMINTR;
            } else {
                +msi_cfg |= AR_INTCFG_MSI_RXINTM | AR_INTCFG_MSI_RXMINTR;
                +} else {
                    imr_reg |= AR_IMR_RXOK;
                    +msi_cfg |= AR_INTCFG_MSI_RXOK;
                    +}
        }
    } else {
        -if (ah->config.tx_intr_mitigation)
        +if (ah->config.tx_intr_mitigation) {
            imr_reg |= AR_IMR_TXINTM | AR_IMR_TXMINTR;
        } else {
            +msi_cfg |= AR_INTCFG_MSI_TXINTM | AR_INTCFG_MSI_TXMINTR;
            +} else {
                imr_reg |= AR_IMR_TXOK;
                +msi_cfg |= AR_INTCFG_MSI_TXOK;
                +}
ENABLE_REGWRITE_BUFFER(ah);
@@ -952,6 +975,16 @@
ah->imrs2_reg |= AR_IMR_S2_GTT;
REG_WRITE(ah, AR_IMR_S2, ah->imrs2_reg);

+if (ah->msi_enabled) {
+   ah->msi_reg = REG_READ(ah, AR_PCIE_MSI);
+   ah->msi_reg |= AR_PCIE_MSI_HW_DBI_WR_EN;
+   ah->msi_reg &= AR_PCIE_MSI_HW_INT_PENDING_ADDR_MSI_64;
+   REG_WRITE(ah, AR_INTCFG, msi_cfg);
+   ath_dbg(ath9k_hw_common(ah), ANY,
+      +"value of AR_INTCFG=0x%X, msi_cfg=0x%X
",
+   +REG_READ(ah, AR_INTCFG), msi_cfg);
+}
+
+if (!AR_SREV_9100(ah)) {
   REG_WRITE(ah, AR_INTR_SYNC_CAUSE, 0xFFFFFFFF);
   REG_WRITE(ah, AR_INTR_SYNC_ENABLE, sync_default);
   @@ -1581,7 +1614,6 @@
   ath9k_hw_gpio_request_out(ah, i, NULL,
      AR_GPIO_OUTPUT_MUX_AS_OUTPUT);
   ath9k_hw_set_gpio(ah, i, !!(ah->gpio_val & BIT(i)));
-   ath9k_hw_gpio_free(ah, i);
   }
} }
@@ -2688,14 +2720,17 @@
static void ath9k_hw_gpio_cfg_soc(struct ath_hw *ah, u32 gpio, bool out,
   const char *label)
{
  +int err;
  +
  if (ah->capsgpio_requested & BIT(gpio))
  return;

-/* may be requested by BSP, free anyway */
-gpio_free(gpio);
- 
-  -if (gpio_request_one(gpio, out ? GPIOF_OUT_INIT_LOW : GPIOF_IN, label))
+  +err = gpio_request_one(gpio, out ? GPIOF_OUT_INIT_LOW : GPIOF_IN, label);
+  +if (err) {
+     ath_err(ath9k_hw_common(ah), "request GPIO%d failed:%d\n",
+        +gpio, err);
+     return;
+  }
ah->caps.gpio_requested |= BIT(gpio);
}
@@ -2915,16 +2950,19 @@
struct ath_regulatory *reg = ath9k_hw_regulatory(ah);
struct ieee80211_channel *channel;
int chan_pwr, new_pwr;
+u16 ctl = NO_CTL;

if (!chan)
    return;

+if (!test)
    +ctl = ath9k_regd_get_ctl(reg, chan);
    +channel = chan->chan;
    chan_pwr = min_t(int, channel->max_power * 2, MAX_RATE_POWER);
    new_pwr = min_t(int, chan_pwr, reg->power_limit);

-ah->eep_ops->set_txpower(ah, chan,
-    ath9k_regd_get_ctl(reg, chan),
-ah->eep_ops->set_txpower(ah, chan, ctl,
    get_antenna_gain(ah, chan), new_pwr, test);
}

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/hw.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/hw.h
@@ -816,6 +816,7 @@
    struct ath9k_pacal_info pacal_info;
    struct ar5416Stats stats;
    struct ath9k_tx_queue_info txq[ATH9K_NUM_TX_QUEUES];
+DECLARE_BITMAP(pending_del_keymap, ATH_KEYMAX);
    enum ath9k_int imask;
    u32 imrs2_reg;
    @@ -977,6 +978,9 @@
    bool tpc_enabled;
    u8 tx_power[Ar5416RateSize];
    u8 tx_power_stbc[Ar5416RateSize];
+    bool msi_enabled;
+    u32 msi_mask;
+    u32 msi_reg;
    
};

struct ath_bus_ops {
#include <linux/of.h>
#include <linux/of_net.h>
#include <linux/relay.h>
+#include <linux/dmi.h>
#include <net/ieee80211_radiotap.h>

#include "ath9k.h"
@@ -75,6 +76,10 @@

#define CONFIG_ATH9K_CHANNEL_CONTEXT */

+int ath9k_use_msi;
+module_param_named(use_msi, ath9k_use_msi, int, 0444);
+MODULE_PARM_DESC(use_msi, "Use MSI instead of INTx if possible");
+
bool is_ath9k_unloaded;

#ifdef CONFIG_MAC80211_LEDS
@@ -92,6 +97,56 @@
};
#endif

+static int __init set_use_msi(const struct dmi_system_id *dmi)
+{
+ath9k_use_msi = 1;
+return 1;
+}
+
+static const struct dmi_system_id ath9k_quirks[] __initconst = {
+{
+.callback = set_use_msi,
+.ident = "Dell Inspiron 24-3460",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 24-3460"),
+},
+},
+{
+.callback = set_use_msi,
+.ident = "Dell Vostro 3262",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Vostro 3262"),
+},
+{
+.callback = set_use_msi,
+.ident = "Dell Inspiron 3472",
+}}
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 3472"),
+},
+
+{  
+.callback = set_use_msi,
+.ident = "Dell Vostro 15-3572",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Vostro 15-3572"),
+},
+},
+
+{  
+.callback = set_use_msi,
+.ident = "Dell Inspiron 14-3473",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 14-3473"),
+},
+},
+
+};
+
+static void ath9k_deinit_softc(struct ath_softc *sc);
+
+static void ath9k_op_ps_wakeup(struct ath_common *common)
@@ -580,15 +635,15 @@
 ret = ath9k_eeprom_request(sc, eeprom_name);
 if (ret)
 return ret;
+  
+ah->ah_flags &= ~AH_USE_EEPROM;
+ah->ah_flags |= AH_NO_EEP_SWAP;
 }  
  
 mac = of_get_mac_address(np);
 if (mac)
 ether_addr_copy(common->macaddr, mac);
-
-ah->ah_flags &= ~AH_USE_EEPROM;
-ah->ah_flags |= AH_NO_EEP_SWAP;
-
 return 0;
}

@@ -1100,6 +1155,8 @@
 goto err_pci_exit;


err_pci_exit:
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/mac.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/mac.c
@@ -832,6 +832,43 @@
        }
    
    if (ah->msi_enabled) {
+        u32 _msi_reg = 0;
+        u32 i = 0;
+        u32 msi_pend_addr_mask = AR_PCIE_MSI_HW_INT_PENDING_ADDR_MSI_64;
+        
+        ath_dbg(ath9k_hw_common(ah), INTERRUPT,
+                "Enabling MSI, msi_mask=0x%X
                ah->msi_mask);
+        
+        REG_WRITE(ah, AR_INTR_PRIO_ASYNC_ENABLE, ah->msi_mask);
+        REG_WRITE(ah, AR_INTR_PRIO_ASYNC_MASK, ah->msi_mask);
+        ath_dbg(ath9k_hw_common(ah), INTERRUPT,
+                "ARINTRPRIOASYNCENABLE=0x%X, ARINTRPRIOASYNCMASK=0x%X
                ah->msi_mask);          
+        
+        if (ah->msi_reg == 0)
+            ah->msi_reg = REG_READ(ah, AR_PCIE_MSI);
+        
+        ath_dbg(ath9k_hw_common(ah), INTERRUPT,
+                "AR_PCIE_MSI=0x%X, ah->msi_reg = 0x%X
                ah->msi_reg);          
+        
+        i = 0;
+        do {
+            REG_WRITE(ah, AR_PCIE_MSI,
+                        (ah->msi_reg | AR_PCIE_MSI_ENABLE) & msi_pend_addr_mask);
+            _msi_reg = REG_READ(ah, AR_PCIE_MSI);
+            if (i >= 200)
+            ath_err(ath9k_hw_common(ah),
+                
+            +            } while ((_msi_reg & AR_PCIE_MSI_ENABLE) == 0 && i < 200);
void ath9k_hw_resume_interrupts(struct ath_hw *ah) {
    if (!(ints & ATH9K_INT_GLOBAL))
        ath9k_hw_disable_interrupts(ah);

    if (ah->msi_enabled) {
        ath_dbg(common, INTERRUPT, "Clearing AR_INTR_PRIO_ASYNC_ENABLE\n");
        REG_WRITE(ah, AR_INTR_PRIO_ASYNC_ENABLE, 0);
        REG_READ(ah, AR_INTR_PRIO_ASYNC_ENABLE);
    }
    ath_dbg(common, INTERRUPT, "New interrupt mask 0x%lx\n", ints);

    mask = ints & ATH9K_INT_COMMON;
    mask2 = 0;

    ah->msi_mask = 0;
    if (ints & ATH9K_INT_TX) {
        ah->msi_mask |= AR_INTR_PRIO_TX;
        if (ah->config.tx_intr_mitigation)
            mask |= AR_IMR_TXMINTR | AR_IMR_TXINTM;
        else {
            mask |= AR_IMR_TXEOL;
        }
    }
    if (ints & ATH9K_INT_RX) {
        ah->msi_mask |= AR_INTR_PRIO_RXLP | AR_INTR_PRIO_RXHP;
        if (AR_SREV_9300_20_OR_LATER(ah)) {
            mask |= AR_IMR_RXERR | AR_IMR_RXOK_HP;
        } else { /* multiprotocol */
            mask |= AR_IMR_RXERR; /* temp hack wait for final compile */
        }
    }
    if (!hchan) {
        fastcc = false;
        hchan = ath9k_cmn_get_channel(sc->hw, ah, &sc->cur_chan->chandef);
    }
    if (!fastcc)
        fastcc = false;

    if (ath_prepare_reset(sc))
        ath_dbg(common, INTERRUPT, "Failed to reset\n");
}

--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/main.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/main.c
@@ -898,7 +944,7 @@
    mask |= AR_IMR_TXEOL;
 }

hchan = ah->curchan;
}

+if (!fastcc)
+    fastcc = false;
static bool ath9k_txq_list_has_key(struct list_head *txq_list, u32 keyix)
{
    struct ath_buf *bf;
    struct ieee80211_tx_info *txinfo;
    struct ath_frame_info *fi;

    list_for_each_entry(bf, txq_list, list) {
        if (bf->bf_state.stale || !bf->bf_mpdu)
            continue;
        txinfo = IEEE80211_SKB_CB(bf->bf_mpdu);
        fi = (struct ath_frame_info *)&txinfo->rate_driver_data[0];
        if (fi->keyix == keyix)
            return true;
    }
    return false;
}

static bool ath9k_txq_has_key(struct ath_softc *sc, u32 keyix)
{
    struct ath_hw *ah = sc->sc_ah;
    int i;
    struct ath_txq *txq;
    bool key_in_use = false;

    for (i = 0; !key_in_use && i < ATH9K_NUM_TX_QUEUES; i++) {
        if (!ATH_TXQ_SETUP(sc, i))
            continue;
        txq = &sc->tx.txq[i];
        if (!txq->axq_depth)
            continue;
        if (!ath9k_hw_numtxpending(ah, txq->axq_qnum))
            continue;
        ath_txq_lock(sc, txq);
        key_in_use = ath9k_txq_list_has_key(&txq->axq_q, keyix);
        if (sc->sc_ah->caps.hw_caps & ATH9K_HW_CAP_EDMA) {
            int idx = txq->txq_tailidx;
            while (!key_in_use &&
                !list_empty(&txq->txq_fifo[idx])) {  
                key_in_use = ath9k_txq_list_has_key(  

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+&txq->txq_fifo[idx], keyix);
+INCR(idx, ATH_TXFIFO_DEPTH);
+
+ath_txq_unlock(sc, txq);
+
+return key_in_use;
+
+static void ath9k_pending_key_del(struct ath_softc *sc, u8 keyix)
+
+struct ath_hw *ah = sc->sc_ah;
+struct ath_common *common = ath9k_hw_common(ah);
+
+if (!test_bit(keyix, ah->pending_del_keymap) ||
+    ath9k_txq_has_key(sc, keyix))
+    return;
+
+/* No more TXQ frames point to this key cache entry, so delete it. */
+clear_bit(keyix, ah->pending_del_keymap);
+ath_key_delete(common, keyix);
+
+static void ath9k_stop(struct ieee80211_hw *hw)
+
+struct ath_softc *sc = hw->priv;
+struct ath_hw *ah = sc->sc_ah;
+struct ath_common *common = ath9k_hw_common(ah);
+bool prev_idle;
+int i;

    ath9k_deinit_channel_context(sc);

    spin_unlock_bh(&sc->sc_pcu_lock);

    for (i = 0; i < ATH_KEYMAX; i++)
        ath9k_pending_key_del(sc, i);
+
+/* Clear key cache entries explicitly to get rid of any potentially
+ * remaining keys.
+ */
+ath9k_cmn_init_crypto(sc->sc_ah);
+
+ath9k_ps_restore(sc);
sc->ps_idle = prev_idle;
@@ -1252,7 +1333,6 @@
struct ath_node *an = &avp->mcast_node;

mutex_lock(&sc->mutex);
-
if (IS_ENABLED(CONFIG_ATH9K_TX99)) {
if (sc->cur_chan->nvifs >= 1) {
    mutex_unlock(&sc->mutex);
@@ -1458,6 +1538,9 @@
    ath_chanctx_set_channel(sc, ctx, &hw->conf.chandef);
}

+if (changed & IEEE80211_CONF_CHANGE_POWER)
+ath9k_set_txpower(sc, NULL);
+
mutex_unlock(&sc->mutex);
ath9k_ps_restore(sc);

@@ -1534,12 +1617,11 @@
{
    struct ath_common *common = ath9k_hw_common(sc->sc_ah);
    struct ath_node *an = (struct ath_node *) sta->drv_priv;
-struct ieee80211_key_conf ps_key = { .hw_key_idx = an->ps_key };
+
    if (!an->ps_key)
        return;
-
-ath_key_delete(common, &ps_key);
+ath_key_delete(common, an->ps_key);
    an->ps_key = 0;
    an->key_idx[0] = 0;
}
@@ -1701,6 +1783,12 @@
if (sta)
    an = (struct ath_node *)sta->drv_priv;

+#* Delete pending key cache entries if no more frames are pointing to
+ * them in TXQs.
+ */
+for (i = 0; i < ATH_KEYMAX; i++)
+ath9k_pending_key_del(sc, i);
+
switch (cmd) {
case SET_KEY:
    if (sta)
@@ -1730,7 +1818,15 @@
}
case DISABLE_KEY:
-ath_key_delete(common, key);
+if (ath9k_txq_has_key(sc, key->hw_key_idx)) {
+ /* Delay key cache entry deletion until there are no
+ * remaining TXQ frames pointing to this entry.
+ */
+ set_bit(key->hw_key_idx, sc->sc_ah->pending_del_keymap);
+ ath_hw_keysetmac(common, key->hw_key_idx, NULL);
+} else {
+ath_key_delete(common, key->hw_key_idx);
+}
if (an) {
for (i = 0; i < ARRAY_SIZE(an->key_idx); i++) {
if (an->key_idx[i] != key->hw_key_idx)
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/pci.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/pci.c
@@ -22,6 +22,8 @@
#include <linux/module.h>
#include "ath9k.h"
+extern int ath9k_use_msi;
+
static const struct pci_device_id ath_pci_id_table[] = {
 { PCI_VDEVICE(ATHEROS, 0x0023) }, /* PCI   */
 { PCI_VDEVICE(ATHEROS, 0x0024) }, /* PCI-E */
@@ -889,6 +891,7 @@
    u32 val;
    int ret = 0;
    char hw_name[64];
    +int msi_enabled = 0;

if (pcim_enable_device(pdev))
    return -EIO;
@@ -960,7 +963,20 @@
    sc->mem = pcim_iomap_table(pdev)[0];
    sc->driver_data = id->driver_data;

    -ret = request_irq(pdev->irq, ath_isr, IRQF_SHARED, "ath9k", sc);
    +if (ath9k_use_msi) {
    +if (pci_enable_msi(pdev) == 0) {
    +msi_enabled = 1;
    +dev_err(&pdev->dev, "Using MSI\n");
    +} else {
    +dev_err(&pdev->dev, "Using INTx\n");
    +}
    +}
    +}

+if (!msi_enabled)
+ret = request_irq(pdev->irq, ath_isr, IRQF_SHARED, "ath9k", sc);
+else
+ret = request_irq(pdev->irq, ath_isr, 0, "ath9k", sc);
+
+if (ret) {
+dev_err(&pdev->dev, "request_irq failed");
+goto err_irq;
+}
+
+sc->sc_ah->msi_enabled = msi_enabled;
+sc->sc_ah->msi_reg = 0;
+
+ath9k_hw_name(sc->sc_ah, hw_name, sizeof(hw_name));
+wiphy_info(hw->wiphy, "%s mem=0x%lx, irq=%d\n", 
+hw_name, (unsigned long)sc->mem, pdev->irq);
+}
+
+Informe Used In 5GaaS Edge AC-4  26392
+--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/reg.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/reg.h
@@ -146,6 +146,14 @@
#define AR_MACMISC_MISC_OBS_BUS_MSB_S   15
#define AR_MACMISC_MISC_OBS_BUS_L     1

+#define AR_INTCFG               0x005C
+#define AR_INTCFG_MSI_RXOK      0x00000000
+#define AR_INTCFG_MSI_RXINTM    0x00000004
+#define AR_INTCFG_MSI_RXMINTR   0x00000006
+#define AR_INTCFG_MSI_TXOK      0x00000000
+#define AR_INTCFG_MSI_TXINTM    0x00000010
+#define AR_INTCFG_MSI_TXMINTR   0x00000018
+
+#define AR_INTR_PRIO_TX               0x00000001
+#define AR_INTR_PRIO_RXLP             0x00000002
+#define AR_INTR_PRIO_RXHP             0x00000004
+
@@ -1256,6 +1264,13 @@
#define AR_PCIE_MSI                             (AR_SREV_9340(ah) ? 0x40d8 : 
(AR_SREV_9300_20_OR_LATER(ah) ? 0x40a4 : 0x4094))
#define AR_PCIE_MSI_ENABLE                    0x00000001
+
#define AR_PCIE_MSI_HW_DBI_WR_EN            0x02000000
+
#define AR_PCIE_MSI_HW_INT_PENDING_ADDR     0xFFA0C1FF /* bits 8..11: value must be 0x5060 */
+#define AR_PCIE_MSI_HW_INT_PENDING_ADDR_MSI_64 0xFFA0C9FF /* bits 8..11: value must be 0x5064 */
+
+#define AR_INTR_PRIO_TX               0x00000001
+#define AR_INTR_PRIO_RXLP             0x00000002
+#define AR_INTR_PRIO_RXHP             0x00000004
#define AR_INTR_PRIO_SYNC_ENABLE (AR_SREV_9340(ah) ? 0x4088 : 0x40c4)
#define AR_INTR_PRIO_ASYNC_MASK (AR_SREV_9340(ah) ? 0x408c : 0x40c8)

--- linux-4.15.0.orig/drivers/net/wireless/ath9k/tx99.c
+++ linux-4.15.0/drivers/net/wireless/ath9k/tx99.c
@@ -56,11 +56,6 @@
 struct sk_buff *skb;
 struct ath_vif *avp;

-if (!sc->tx99_vif)
-    return NULL;
-
-    avp = (struct ath_vif *)sc->tx99_vif->drv_priv;
-
    skb = alloc_skb(len, GFP_KERNEL);
    if (!skb)
        return NULL;
@@ -77,7 +72,10 @@
 memcpy(hdr->addr2, hw->wiphy->perm_addr, ETH_ALEN);
 memcpy(hdr->addr3, hw->wiphy->perm_addr, ETH_ALEN);

-    hdr->seq_ctrl |= cpu_to_le16(avp->seq_no);
+    if (sc->tx99_vif) {
+        avp = (struct ath_vif *) sc->tx99_vif->drv_priv;
+        hdr->seq_ctrl |= cpu_to_le16(avp->seq_no);
+    }

    tx_info = IEEE80211_SKB_CB(skb);
    memset(tx_info, 0, sizeof(*tx_info));
--- linux-4.15.0.orig/drivers/net/wireless/ath9k/wmi.c
+++ linux-4.15.0/drivers/net/wireless/ath9k/wmi.c
@@ -112,14 +112,17 @@
 return wmi;
}

-void ath9k_deinit_wmi(struct ath9k_htc_priv *priv)
+void ath9k_stop_wmi(struct ath9k_htc_priv *priv)
{
    struct wmi *wmi = priv->wmi;
    mutex_lock(&wmi->op_mutex);
    wmi->stopped = true;
    mutex_unlock(&wmi->op_mutex);
+}
+void ath9k_destoy_wmi(struct ath9k_htc_priv *priv)
+{
    kfree(priv->wmi);

ath_dbg(common, WMI, "Timeout waiting for WMI command: %s\n", wmi_cmd_to_name(cmd_id));
mutex_unlock(&wmi->op_mutex);
+kfree_skb(skb);
return -ETIMEDOUT;
}
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/wmi.h
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/wmi.h
@@ -179,7 +179,6 @@
     enum ht_endpoint_id *wmi_ctrl_epid);
 int ath9k_wmi_cmd(struct wmi *wmi, enum wmi_cmd_id cmd_id,
     enum ht_endpoint_id *wmi_ctrl_epid);
-void ath9k_deinit_wmi(struct ath9k_htc_priv *priv);
 int ath9k_wmi_connect(struct htc_target *htc, struct wmi *wmi,
     enum ht_endpoint_id *wmi_ctrl_epid);
 int ath9k_wmi_cmd(struct wmi *wmi, enum wmi_cmd_id cmd_id,
     void ath9k_wmi_event_tasklet(unsigned long data);
 void ath9k_fatal_work(struct work_struct *work);
 void ath9k_wmi_event_drain(struct ath9k_htc_priv *priv);
+void ath9k_stop_wmi(struct ath9k_htc_priv *priv);
+void ath9k_destroy_wmi(struct ath9k_htc_priv *priv);

#define WMI_CMD(_wmi_cmd) do {
--- linux-4.15.0.orig/drivers/net/wireless/ath/ath9k/xmit.c
+++ linux-4.15.0/drivers/net/wireless/ath/ath9k/xmit.c
@@ -86,7 +86,8 @@
     struct ieee80211_tx_info *info = IEEE80211_SKB_CB(skb);
     struct ieee80211_sta *sta = info->status.status_driver_data[0];
-
-if (info->flags & IEEE80211_TX_CTL_REQ_TX_STATUS) {
+if (info->flags & (IEEE80211_TX_CTL_REQ_TX_STATUS |
+IEEE80211_TX_STATUS_EOSP)) {
     ieee80211_tx_status(hw, skb);
     return;
 }
@@ -620,7 +621,7 @@
     if (bf == bf->bf_lastbf)
     ath_dynack_sample_tx_ts(sc->sc_ah,
     bf->bf_mpdu,
-tt);
+ts, sta);
ath_tx_complete_buf(sc, bf, txq, &bf_head, sta, ts,
@ @ -764,7 +765,8 @@
memcpy(info->control.rates, bf->rates,
    sizeof(info->control.rates));
ath_tx_re_status(sc, bf, ts, 1, txok ? 0 : 1, txok);
-athDynack_sample_tx_ts(sc->sc_ah, bf->bf_mpdu, ts);
+athDynack_sample_tx_ts(sc->sc_ah, bf->bf_mpdu, ts,
   +sta);
}
ath_tx_complete_buf(sc, bf, txq, bf_head, sta, ts, txok);
} else
@ @ -1312,6 +1314,11 @@
is_40, issgi, is_sp);
if (rix < 8 && (tx_info->flags & IEEE80211_TX_CTL_STBC))
info->rates[i].RateFlags |= ATH9K_RATESERIES_STBC;
+if (rix >= 8 && fi->dyn_smps) {
   +info->rates[i].RateFlags |=
   +ATH9K_RATESERIES_RTS_CTS;
+info->flags |= ATH9K_TXDESC_CTSENA;
+}

info->txpower[i] = ath_get_rate_txpower(sc, bf, rix,
is_40, false);
@ @ -2176,6 +2183,7 @@
fi->keyix = an->ps_key;
else
fi->keyix = ATH9K_TXKEYIX_INVALID;
+fi->dyn_smps = sta && sta->smpls_mode == IEEE80211_SMPS_DYNAMIC;
fi->keytype = keytype;
fi->framelen = framelen;
fi->tx_power = txpower;
@ @ -2892,6 +2900,8 @@
struct ath_txq *txq;
int tidno;
+rcu_read_lock();
+
for (tidno = 0; tidno < IEEE80211_NUM_TIDS; tidno++) {
  tid = ath_node_to_tid(an, tidno);
  txq = tid->txq;
@ @ -2909,6 +2919,8 @@
  if (!an->sta)
    break; /* just one multicast ath_atx_tid */
 }
+
+rcu_read_unlock();
}
#ifdef CONFIG_ATH9K_TX99
--- linux-4.15.0.orig/drivers/net/wireless/ath/carl9170/Kconfig
+++ linux-4.15.0/drivers/net/wireless/ath/carl9170/Kconfig
@@ -15,13 +15,11 @@
cfg CARL9170_LEDS
bool "SoftLED Support"
-depends on CARL9170
-select MAC80211_LEDS
-select LEDS_CLASS
-select NEW_LEDS
default y
+depends on CARL9170
+depends on MAC80211_LEDS
help
- This option is necessary, if you want your device' LEDs to blink
+ This option is necessary, if you want your device’s LEDs to blink.

Say Y, unless you need the LEDs for firmware debugging.

--- linux-4.15.0.orig/drivers/net/wireless/ath/carl9170/fw.c
+++ linux-4.15.0/drivers/net/wireless/ath/carl9170/fw.c
@@ -351,9 +351,7 @@
ar->hw->wiphy->interface_modes |= BIT(NL80211_IFTYPE_ADHOC);

if (SUPP(CARL9170FW_WLANTX_CAB)) {
  -if_comb_types |=
  -BIT(NL80211_IFTYPE_AP) |
  -BIT(NL80211_IFTYPE_P2P_GO);
  +if_comb_types |= BIT(NL80211_IFTYPE_AP);

#ifdef CONFIG_MAC80211_MESH
  if_comb_types |=
--- linux-4.15.0.orig/drivers/net/wireless/ath/carl9170/main.c
+++ linux-4.15.0/drivers/net/wireless/ath/carl9170/main.c
@@ -582,11 +582,10 @@
ar->disable_offload |= ((vif->type != NL80211_IFTYPE_STATION) &&
 /* While the driver supports HW offload in a single
 /* P2P client configuration, it doesn't support HW
 /* offload in the favourit, concurrent P2P GO+CLIENT
 /* configuration. Hence, HW offload will always be
 /* disabled for P2P.
+/* The driver used to have P2P GO+CLIENT support,
+ * but since this was dropped and we don't know if
+ * there are any gremlins lurking in the shadows,
+ * so best we keep HW offload disabled for P2P.

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ar->disable_offload |= vif->p2p;

@@ -639,18 +638,6 @@
if (vif->type == NL80211_IFTYPE_STATION)
break;

-/* P2P GO [master] use-case
- * Because the P2P GO station is selected dynamically
- * by all participating peers of a WIFI Direct network,
- * the driver has be able to change the main interface
- * operating mode on the fly.
- */
-if (main_vif->p2p && vif->p2p &&
  - vif->type == NL80211_IFTYPE_AP) {
  -old_main = main_vif;
  -break;
  -}
-
err = -EBUSY;
rcu_read_unlock();

--- linux-4.15.0.orig/drivers/net/wireless/ath/carl9170/usb.c
+++ linux-4.15.0/drivers/net/wireless/ath/carl9170/usb.c
@@ -128,6 +128,8 @@
    }

+static struct usb_driver carl9170_driver;
+
static void carl9170_usb_submit_data_urb(struct ar9170 *ar)
{
  struct urb *urb;
@@ -966,32 +968,28 @@

static void carl9170_usb_firmware_failed(struct ar9170 *ar)
{
-struct device *parent = ar->udev->dev.parent;
-struct usb_device *udev;
-
-/*
- * Store a copy of the usb_device pointer locally.
- * This is because device_release_driver initiates
- * carl9170_usb_disconnect, which in turn frees our
- * driver context (ar).
- */
-/+* Store a copies of the usb_interface and usb_device pointer locally.
+* This is because release_driver initiates carl9170_usb_disconnect,
+* which in turn frees our driver context (ar).
-udev = ar->udev;
+struct usb_interface *intf = ar->intf;
+struct usb_device *udev = ar->udev;

complete(&ar->fw_load_wait);
+/* at this point 'ar' could be already freed. Don't use it anymore */
+ar = NULL;

/* unbind anything failed */
-if (parent)
-device_lock(parent);
-
-device_release_driver(&udev->dev);
-if (parent)
-device_unlock(parent);
+usb_lock_device(udev);
+usb_driver_release_interface(&carl9170_driver, intf);
+usb_unlock_device(udev);

-usb_put_dev(udev);
+usb_put_intf(intf);
}

static void carl9170_usb_firmware_finish(struct ar9170 *ar)
{
+struct usb_interface *intf = ar->intf;
int err;

er = carl9170_parse_firmware(ar);
@@ -1009,7 +1007,7 @@
goto err_unrx;
complete(&ar->fw_load_wait);
-usb_put_dev(ar->udev);
+usb_put_intf(intf);
return;

err_unrx:
@@ -1052,7 +1050,6 @@
return PTR_ERR(ar);
udev = interface_to_usbdev(intf);
-usb_get_dev(udev);
ar->udev = udev;
ar->intf = intf;
ar->features = id->driver_info;
@@ -1094,15 +1091,14 @@
atomic_set(&ar->rx_anch_urbs, 0);
atomic_set(&ar->rx_pool_urbs, 0);

-usb_get_dev(ar->udev);
+usb_get_intf(intf);

carl9170_set_state(ar, CARL9170_STOPPED);

err = request_firmware_nowait(TTHIS_MODULE, 1, CARL9170FW_NAME,
&ar->udev->dev, GFP_KERNEL, ar, carl9170_usb_firmware_step2);
if (err) {
-usb_put_dev(udev);
-usb_put_dev(udev);
+usb_put_intf(intf);
+carl9170_free(ar);
}
return err;

@@ -1131,7 +1127,6 @@
carl9170_release_firmware(ar);
carl9170_free(ar);
-usb_put_dev(udev);
}

#ifdef CONFIG_PM
--- linux-4.15.0.orig/drivers/net/wireless/ath/dfs_pattern_detector.c
+++ linux-4.15.0/drivers/net/wireless/ath/dfs_pattern_detector.c
@@ -111,7 +111,7 @@
JP_PATTERN(0, 0, 1, 1428, 1428, 1, 18, 29, false),
JP_PATTERN(1, 2, 3, 3846, 3846, 1, 18, 29, false),
JP_PATTERN(2, 0, 1, 1388, 1388, 1, 18, 50, false),
-JP_PATTERN(3, 1, 2, 4000, 4000, 1, 18, 50, false),
+JP_PATTERN(3, 0, 4, 4000, 4000, 1, 18, 50, false),
JP_PATTERN(4, 0, 5, 150, 230, 1, 23, 50, false),
JP_PATTERN(5, 6, 10, 200, 500, 1, 16, 50, false),
JP_PATTERN(6, 11, 20, 200, 500, 1, 12, 50, false),
--- linux-4.15.0.orig/drivers/net/wireless/ath/key.c
+++ linux-4.15.0/drivers/net/wireless/ath/key.c
@@ -84,8 +84,7 @@
}
EXPORT_SYMBOL(ath_hw_keyreset);

-static bool ath_hw_keysetmac(struct ath_common *common,
-     u16 entry, const u8 *mac)
+bool ath_hw_keysetmac(struct ath_common *common, u16 entry, const u8 *mac)
{
    u32 macHi, macLo;
    u32 unicast_flag = AR_KEYTABLE_VALID;
return true;
}
+EXPORT_SYMBOL(ath_hw_keysetmac);

static bool ath_hw_set_keycache_entry(struct ath_common *common, u16 entry,
        const struct ath_keyval *k,
@@ -125,6 +124,7 @@
/*
 * Delete Key.
 */
void ath_key_delete(struct ath_common *common, u8 hw_key_idx)
+void ath_key_delete(struct ath_common *common, struct ieee80211_key_conf *key) {
-ath_hw_keyreset(common, key->hw_key_idx);
-if (key->hw_key_idx < IEEE80211_WEP_NKID)
+
+ /* Leave CCMP and TKIP (main key) configured to avoid disabling
+ encryption for potentially pending frames already in a TXQ with the
+ keyix pointing to this key entry. Instead, only clear the MAC address
+ to prevent RX processing from using this key cache entry.
+ */
+if (test_bit(hw_key_idx, common->ccmp_keymap) ||
+    test_bit(hw_key_idx, common->tkip_keymap))
+    ath_hw_keysetmac(common, hw_key_idx, NULL);
+else
+    ath_hw_keyreset(common, hw_key_idx);
+if (hw_key_idx < IEEE80211_WEP_NKID)
+    return;
+
-clear_bit(key->hw_key_idx, common->ccmp_keymap);
-clear_bit(key->hw_key_idx, common->ccmp_keymap);
-if (key->cipher != WLAN_CIPHER_SUITE_TKIP)
+clear_bit(hw_key_idx, common->keymap);
+clear_bit(hw_key_idx, common->ccmp_keymap);
+if (!test_bit(hw_key_idx, common->tkip_keymap))
+    return;
+
-clear_bit(key->hw_key_idx + 64, common->keymap);
+clear_bit(hw_key_idx + 64, common->keymap);
+
-clear_bit(key->hw_key_idx, common->tkip_keymap);
-clear_bit(key->hw_key_idx + 64, common->tkip_keymap);
+clear_bit(hw_key_idx, common->tkip_keymap);
+clear_bit(hw_key_idx + 64, common->tkip_keymap);
+if (!(common->crypt_caps & ATH_CRYPT_CAP_MIC_COMBINED))
      return;
-ath_hw_keyreset(common, key->hw_key_idx + 32);
-clear_bit(key->hw_key_idx + 32, common->keymap);
-clear_bit(key->hw_key_idx + 64 + 32, common->keymap);
+ath_hw_keyreset(common, hw_key_idx + 32);
+clear_bit(hw_key_idx + 32, common->keymap);
+clear_bit(hw_key_idx + 64 + 32, common->keymap);

-clear_bit(key->hw_key_idx + 32, common->tkip_keymap);
-clear_bit(key->hw_key_idx + 64 + 32, common->tkip_keymap);
+clear_bit(hw_key_idx + 32, common->tkip_keymap);
+clear_bit(hw_key_idx + 64 + 32, common->tkip_keymap);
}
}

EXPORT_SYMBOL(ath_key_delete);

--- linux-4.15.0.orig/drivers/net/wireless/ath/regd.h
+++ linux-4.15.0/drivers/net/wireless/ath/regd.h
@@ -68,12 +68,14 @@
CTRY_AUSTRALIA = 36,
CTRY_AUSTRIA = 40,
CTRY_AZERBAIJAN = 31,
+CTRY_BAHAMAS = 44,
CTRY_BAHRAIN = 48,
CTRY_BANGLADESH = 50,
CTRY_BARBADOS = 52,
CTRY_BELARUS = 112,
CTRY_BELGIUM = 56,
CTRY_BELIZE = 84,
+CTRY_BERMUDA = 60,
CTRY_BOLIVIA = 68,
CTRY_BOSNIA_HERZ = 70,
CTRY_BRAZIL = 76,
@@ -159,6 +161,7 @@
CTRY_ROMANIA = 642,
CTRY_RUSSIA = 643,
CTRY_SAUDI_ARABIA = 682,
+CTRY_SERBIA = 688,
CTRY_SERBIA_MONTENEGRO = 891,
CTRY_SINGAPORE = 702,
CTRY_SLOVAKIA = 703,
@@ -170,11 +173,13 @@
CTRY_SWITZERLAND = 756,
CTRY_SYRIA = 760,
CTRY_TAIWAN = 158,
+CTRY_TANZANIA = 834,
CTRY_THAILAND = 764,
CTRY_TRINIDAD_Y_TOBAGO = 780,
CTRY_TUNISIA = 788,
CTRY_TURKEY = 792,
CTRY_UAE = 784,
+CTRY_UGANDA = 800,
CTRY_UKRAINE = 804,
CTRY_UNITED_KINGDOM = 826,
CTRY_UNITED_STATES = 840,
--- linux-4.15.0.orig/drivers/net/wireless/ath/regd_common.h
+++ linux-4.15.0/drivers/net/wireless/ath/regd_common.h
@@ -35,6 +35,7 @@
FRANCE_RES = 0x31,
FCC3_FCCA = 0x3A,
FCC3_WORLD = 0x3B,
+FCC3_ETSIC = 0x3F,

ETSI1_WORLD = 0x37,
ETSI3_ETSIA = 0x32,
@@ -44,6 +45,7 @@
ETSI4_ETSIC = 0x38,
ETSI5_WORLD = 0x39,
ETSI6_WORLD = 0x34,
+ETSI8_WORLD = 0x3D,
ETSI_RESERVED = 0x33,

MKK1_MKKA = 0x40,
@@ -59,6 +61,7 @@
MKK1_MKKA1 = 0x4A,
MKK1_MKKA2 = 0x4B,
MKK1_MKKC = 0x4C,
+AFL2_FCCA = 0x4D,

APL3_FCCA = 0x50,
APL1_WORLD = 0x52,
@@ -67,6 +70,7 @@
APL1_ETSIC = 0x55,
APL2_ETSIC = 0x56,
APL5_WORLD = 0x58,
+APL13_WORLD = 0x5A,
APL6_WORLD = 0x5B,
APL7_FCCA = 0x5C,
APL8_WORLD = 0x5D,
@@ -168,6 +172,7 @@
{FCC2_ETSIC, CTL_FCC, CTL_ETS1},
{FCC3_FCCA, CTL_FCC, CTL_FCC},
{FCC3_WORLD, CTL_FCC, CTL_ETS1},
+FCC3_ETSIC, CTL_FCC, CTL_ETS1],
{FCC4_FCCA, CTL_FCC, CTL_FCC},
{FCC5_FCCA, CTL_FCC, CTL_FCC},
{FCC6_FCCA, CTL_FCC, CTL_FCC},
@@ -179,6 +184,7 @@
{ETSI4_WORLD, CTL_ETS1, CTL_ETS1},

--- linux-4.15.0.orig/drivers/net/wireless/ath/regd_common.h
+++ linux-4.15.0/drivers/net/wireless/ath/regd_common.h
@@ -35,6 +35,7 @@
FRANCE_RES = 0x31,
FCC3_FCCA = 0x3A,
FCC3_WORLD = 0x3B,
+FCC3_ETSIC = 0x3F,

ETSI1_WORLD = 0x37,
ETSI3_ETSIA = 0x32,
@@ -44,6 +45,7 @@
ETSI4_ETSIC = 0x38,
ETSI5_WORLD = 0x39,
ETSI6_WORLD = 0x34,
+ETSI8_WORLD = 0x3D,
ETSI_RESERVED = 0x33,

MKK1_MKKA = 0x40,
@@ -59,6 +61,7 @@
MKK1_MKKA1 = 0x4A,
MKK1_MKKA2 = 0x4B,
MKK1_MKKC = 0x4C,
+AFL2_FCCA = 0x4D,

APL3_FCCA = 0x50,
APL1_WORLD = 0x52,
@@ -67,6 +70,7 @@
APL1_ETSIC = 0x55,
APL2_ETSIC = 0x56,
APL5_WORLD = 0x58,
+APL13_WORLD = 0x5A,
APL6_WORLD = 0x5B,
APL7_FCCA = 0x5C,
APL8_WORLD = 0x5D,
@@ -168,6 +172,7 @@
{FCC2_ETSIC, CTL_FCC, CTL_ETS1},
{FCC3_FCCA, CTL_FCC, CTL_FCC},
{FCC3_WORLD, CTL_FCC, CTL_ETS1},
+FCC3_ETSIC, CTL_FCC, CTL_ETS1],
{FCC4_FCCA, CTL_FCC, CTL_FCC},
{FCC5_FCCA, CTL_FCC, CTL_FCC},
{FCC6_FCCA, CTL_FCC, CTL_FCC},
@@ -179,6 +184,7 @@
{ETSI4_WORLD, CTL_ETS1, CTL_ETS1},

--- linux-4.15.0.orig/drivers/net/wireless/ath/regd_common.h
+++ linux-4.15.0/drivers/net/wireless/ath/regd_common.h
@@ -35,6 +35,7 @@
FRANCE_RES = 0x31,
FCC3_FCCA = 0x3A,
FCC3_WORLD = 0x3B,
+FCC3_ETSIC = 0x3F,

ETSI1_WORLD = 0x37,
ETSI3_ETSIA = 0x32,
@@ -44,6 +45,7 @@
ETSI4_ETSIC = 0x38,
ETSI5_WORLD = 0x39,
ETSI6_WORLD = 0x34,
+ETSI8_WORLD = 0x3D,
ETSI_RESERVED = 0x33,

MKK1_MKKA = 0x40,
@@ -59,6 +61,7 @@
MKK1_MKKA1 = 0x4A,
MKK1_MKKA2 = 0x4B,
MKK1_MKKC = 0x4C,
+AFL2_FCCA = 0x4D,

APL3_FCCA = 0x50,
APL1_WORLD = 0x52,
@@ -67,6 +70,7 @@
APL1_ETSIC = 0x55,
APL2_ETSIC = 0x56,
APL5_WORLD = 0x58,
+APL13_WORLD = 0x5A,
APL6_WORLD = 0x5B,
APL7_FCCA = 0x5C,
APL8_WORLD = 0x5D,
@@ -168,6 +172,7 @@
{FCC2_ETSIC, CTL_FCC, CTL_ETS1},
{FCC3_FCCA, CTL_FCC, CTL_FCC},
{FCC3_WORLD, CTL_FCC, CTL_ETS1},
+FCC3_ETSIC, CTL_FCC, CTL_ETS1],
{FCC4_FCCA, CTL_FCC, CTL_FCC},
{FCC5_FCCA, CTL_FCC, CTL_FCC},
{FCC6_FCCA, CTL_FCC, CTL_FCC},
@@ -179,6 +184,7 @@
{ETSI4_WORLD, CTL_ETS1, CTL_ETS1},

--- linux-4.15.0.orig/drivers/net/wireless/ath/regd_common.h
+++ linux-4.15.0/drivers/net/wireless/ath/regd_common.h
@@ -35,6 +35,7 @@
FRANCE_RES = 0x31,
FCC3_FCCA = 0x3A,
FCC3_WORLD = 0x3B,
+FCC3_ETSIC = 0x3F,

ETSI1_WORLD = 0x37,
ETSI3_ETSIA = 0x32,
@@ -44,6 +45,7 @@
ETSI4_ETSIC = 0x38,
ETSI5_WORLD = 0x39,
ETSI6_WORLD = 0x34,
+ETSI8_WORLD = 0x3D,
ETSI_RESERVED = 0x33,

MKK1_MKKA = 0x40,
@@ -59,6 +61,7 @@
MKK1_MKKA1 = 0x4A,
MKK1_MKKA2 = 0x4B,
MKK1_MKKC = 0x4C,
+AFL2_FCCA = 0x4D,

APL3_FCCA = 0x50,
APL1_WORLD = 0x52,
@@ -67,6 +70,7 @@
APL1_ETSIC = 0x55,
APL2_ETSIC = 0x56,
APL5_WORLD = 0x58,
+APL13_WORLD = 0x5A,
APL6_WORLD = 0x5B,
APL7_FCCA = 0x5C,
APL8_WORLD = 0x5D,
@@ -168,6 +172,7 @@
{FCC2_ETSIC, CTL_FCC, CTL_ETS1},
{FCC3_FCCA, CTL_FCC, CTL_FCC},
{FCC3_WORLD, CTL_FCC, CTL_ETS1},
+FCC3_ETSIC, CTL_FCC, CTL_ETS1],
{FCC4_FCCA, CTL_FCC, CTL_FCC},
{FCC5_FCCA, CTL_FCC, CTL_FCC},
{FCC6_FCCA, CTL_FCC, CTL_FCC},
@@ -179,6 +184,7 @@
{ETSI4_WORLD, CTL_ETS1, CTL_ETS1},

--- linux-4.15.0.orig/drivers/net/wireless/ath/regd_common.h
+++ linux-4.15.0/drivers/net/wireless/ath/regd_common.h
@@ -35,6 +35,7 @@
FRANCE_RES = 0x31,
FCC3_FCCA = 0x3A,
FCC3_WORLD = 0x3B,
+FCC3_ETSIC = 0x3F,

ETSI1_WORLD = 0x37,
ETSI3_ETSIA = 0x32,
@@ -44,6 +45,7 @@
ETSI4_ETSIC = 0x38,
ETSI5_WORLD = 0x39,
ETSI6_WORLD = 0x34,
+ETSI8_WORLD = 0x3D,
ETSI_RESERVED = 0x33,

MKK1_MKKA = 0x40,
@@ -59,6 +61,7 @@
MKK1_MKKA1 = 0x4A,
MKK1_MKKA2 = 0x4B,
MKK1_MKKC = 0x4C,
+AFL2_FCCA = 0x4D,

APL3_FCCA = 0x50,
APL1_WORLD = 0x52,
@@ -67,6 +70,7 @@
APL1_ETSIC = 0x55,
APL2_ETSIC = 0x56,
/* XXX: For ETSI3_ETSIA, Was NO_CTL meant for the 2 GHz band? */

{ETSI3_ETSIA, CTL_ETSI, CTL_ETSI},
@@ -188,9 +194,11 @@
    {ETSI8_WORLD, CTL_ETSI, CTL_ETSI},
/* XXX: For ETSI3_ETSIA, Was NO_CTL meant for the 2 GHz band? */
    {ETSI3_ETSIA, CTL_ETSI, CTL_ETSI},
@@ -188,9 +194,11 @@
    {FCC1_FCCA, CTL_FCC, CTL_FCC},
    {APL1_WORLD, CTL_FCC, CTL_ETSI},
    {APL2_WORLD, CTL_FCC, CTL_ETSI},
    +{APL2_FCCA, CTL_FCC, CTL_FCC},
    {APL3_WORLD, CTL_FCC, CTL_ETSI},
    {APL4_WORLD, CTL_FCC, CTL_ETSI},
    {APL5_WORLD, CTL_FCC, CTL_ETSI},
    +{APL13_WORLD, CTL_ETSI, CTL_ETSI},
    {APL6_WORLD, CTL_ETSI, CTL_ETSI},
    {APL8_WORLD, CTL_ETSI, CTL_ETSI},
    {APL9_WORLD, CTL_ETSI, CTL_ETSI},
@@ -289,6 +306,7 @@
    {CTRY_AUSTRALIA2, FCC6_WORLD, "AU"},
    {CTRY_AUSTRIA, ETSI1_WORLD, "AT"},
    {CTRY_AZERBAIJAN, ETSI4_WORLD, "AZ"},
    +{CTRY_BAHAMAS, FCC3_WORLD, "BS"},
    {CTRY_BAHRAIN, APL6_WORLD, "BH"},
    {CTRY_BANGLADESH, NULL1_WORLD, "BD"},
    {CTRY_BARBADOS, FCC2_WORLD, "BB"},
@@ -305,6 +314,7 @@
    {CTRY_BELGIUM, ETSI1_WORLD, "BE"},
    {CTRY_BELGIUM2, ETSI4_WORLD, "BL"},
    {CTRY_BELIZE, APL1_ETSIC, "BZ"},
    +{CTRY_BERMUDA, FCC3_FCCA, "BM"},
    {CTRY_BOLIVIA, APL1_ETSIC, "BO"},
    {CTRY_BOSNIA_HERZ, ETSI1_WORLD, "BA"},
    {CTRY_BRAZIL, FCC3_WORLD, "BR"},
@@ -444,6 +454,7 @@
    {CTRY_ROMANIA, NULL1_WORLD, "RO"},
    {CTRY_RUSSIA, NULL1_WORLD, "RU"},
    {CTRY SAUDI_ARABIA, NULL1_WORLD, "SA"},
    +{CTRY_SERBIA, ETSI1_WORLD, "RS"},
    {CTRY_SERBIA_MONTENEGRO, ETSI1_WORLD, "CS"},
    {CTRY_SINGAPORE, APL6_WORLD, "SG"},
    {CTRY_SLOVAKIA, ETSI1_WORLD, "SK"},
@@ -455,10 +466,12 @@
    {CTRY_SWITZERLAND, ETSI1_WORLD, "CH"},
    {CTRY_SYRIA, NULL1_WORLD, "SY"},
    {CTRY_TAIWAN, APL3_FCCA, "TW"},
    +{CTRY_TANZANIA, APL1_WORLD, "TZ"},
    {CTRY_THAILAND, FCC3_WORLD, "TH"},

If unsure, say Y to make it easier to debug problems.

+ config WCN36XX_SNAPDRAGON_HACKS
+ bool "Dragonboard 410c WCN36XX MAC address generation hacks"
+ default n
+ depends on WCN36XX
+---help---
+ Upon probe, WCN36XX will try to read its MAC address from
+ a file located at /lib/firmware/wlan/macaddr0. If the file
+ is not present, it will randomly generate a new MAC address.

--- linux-4.15.0.orig/drivers/net/wireless/ath/wcn36xx/dxe.c
+++ linux-4.15.0/drivers/net/wireless/ath/wcn36xx/dxe.c
@@ -236,6 +236,14 @@
     return 0;
 }

+static void wcnx_dxe_deinit_descs(struct device *dev, struct wcnx_dxe_ch *wcnx_ch)
+{
+    size_t size;
+    +size = wcnx_ch->desc_num*sizeof(struct wcnx_dxe_desc);
+    +dma_free_coherent(dev, size, wcnx_ch->cpu_addr, wcnx_ch->dma_addr);
+}
+
+static void wcnx_dxe_init_tx_bd(struct wcnx_dxe_mem_pool *pool)
+{
+    struct wcnx_dxe_mem_pool *pool
+    {
+        @ @ -722,7 +730,11 @@
+        /***************************************/
+        /* Init descriptors for TX LOW channel */
+        /***************************************/
+        -wcnx_dxe_init_descs(wcn->dev, &wcnx->dxe_tx_l_ch);
+        +ret = wcnx_dxe_init_descs(wcn->dev, &wcnx->dxe_tx_l_ch);
+        +if (ret) {
+            dev_err(wcn->dev, "Error allocating descriptor\n");
+            return ret;
+        }
wcn36xx_dxe_init_tx_bd(&wcn->dxe_tx_l_ch, &wcn->data_mem_pool);

/* Write channel head to a NEXT register */
@@ -740,7 +752,12 @@
+wcn36xx_dxe_init_tx_bd(&wcn->dxe_tx_l_ch, &wcn->data_mem_pool);
 /* Write channel head to a NEXT register */
@@ -760,7 +777,12 @@
+ret = wcn36xx_dxe_init_descs(wcn->dev, &wcn->dxe_tx_h_ch);
+if (ret) {
+dev_err(wcn->dev, "Error allocating descriptor\n");
+goto out_err_txh_ch;
+}
+wcn36xx_dxe_init_tx_bd(&wcn->dxe_tx_h_ch, &wcn->mgmt_mem_pool);

/* Write channel head to a NEXT register */
@@ -790,7 +812,11 @@
+ret = wcn36xx_dxe_init_descs(wcn->dev, &wcn->dxe_rx_l_ch);
+if (ret) {
+dev_err(wcn->dev, "Error allocating descriptor\n");
+goto out_err_rxl_ch;
+}
+wcn36xx_dxe_init_tx_bd(&wcn->dxe_rx_h_ch, &wcn->mgmt_mem_pool);

/* For RX we need to preallocated buffers */
wcn36xx_dxe梠ct_skb(wcn, &wcn->dxe_rx_l_ch);
@@ -790,7 +812,11 @@
/* For RX we need to preallocated buffers */
wcn36xx_dxe梠ct_skb(wcn, &wcn->dxe_rx_l_ch);
/* For RX we need to preallocated buffers */
wcn36xx_dxe梠ct_skb(wcn, &wcn->dxe_rx_l_ch);
/* For RX we need to preallocated buffers */
wcn36xx_dxe梠ct_skb(wcn, &wcn->dxe_rx_l_ch);
/* For RX we need to preallocated buffers */
wcn36xx_dxe梠ct_skb(wcn, &wcn->dxe_rx_l_ch);
/* For RX we need to preallocated buffers */
wcn36xx_dxe梠ct_skb(wcn, &wcn->dxe_rx_l_ch);
/* For RX we need to preallocated buffers */
ret = wcn36xx_dxe_request_irqs(wcn);
if (ret < 0)
-goto out_err;
+goto out_err_irq;

return 0;

-out_err:
+out_err_irq:
+wcn36xx_dxe_deinit_descs(wcn->dev, &wcn->dxe_rx_h_ch);
+out_err_rxl_ch:
+wcn36xx_dxe_deinit_descs(wcn->dev, &wcn->dxe_rx_l_ch);
+out_err_rxl_ch:
+wcn36xx_dxe_deinit_descs(wcn->dev, &wcn->dxe_tx_h_ch);
+out_err_txh_ch:
+wcn36xx_dxe_deinit_descs(wcn->dev, &wcn->dxe_tx_l_ch);
+
+return ret;

--- linux-4.15.0.orig/drivers/net/wireless/ath/wcn36xx/hal.h
+++ linux-4.15.0/drivers/net/wireless/ath/wcn36xx/hal.h
@@ -348,6 +348,13 @@
 WCN36XX_HAL_DHCP_START_IND = 189,
 WCN36XX_HAL_DHCP_STOP_IND = 190,

 /* Scan Offload(hw) APIs */
+WCN36XX_HAL_START_SCAN_OFFLOAD_REQ = 204,
+WCN36XX_HAL_START_SCAN_OFFLOAD_RSP = 205,
+WCN36XX_HAL_STOP_SCAN_OFFLOAD_REQ = 206,
+WCN36XX_HAL_STOP_SCAN_OFFLOAD_RSP = 207,
+WCN36XX_HAL_SCAN_OFFLOAD_IND = 210,
+
+WCN36XX_HAL_AVOID_FREQ_RANGE_IND = 233,

 WCN36XX_HAL_PRINT_REG_INFO_IND = 259,
@@ -1115,6 +1122,101 @@
 } __packed;

+enum wcn36xx_hal_scan_type {
+WCN36XX_HAL_SCAN_TYPE_PASSIVE = 0x00,
+WCN36XX_HAL_SCAN_TYPE_ACTIVE = WCN36XX_HAL_MAX_ENUM_SIZE
+};
+
+struct wcn36xx_hal_mac_ssid {
+u8 length;
+u8 ssid[32];
+} __packed;


struct wcn36xx_hal_start_scan_offload_req_msg {
    struct wcn36xx_hal_msg_header header;

    /* BSSIDs hot list */
    u8 num_bssid;
    u8 bssids[4][ETH_ALEN];

    /* Directed probe-requests will be sent for listed SSIDs (max 10)*/
    u8 num_ssid;
    struct wcn36xx_hal_mac_ssid ssids[10];

    /* Report AP with hidden ssid */
    u8 scan_hidden;

    /* Self MAC address */
    u8 mac[ETH_ALEN];

    /* BSS type */
    enum wcn36xx_hal_bss_type bss_type;

    /* Scan type */
    enum wcn36xx_hal_scan_type scan_type;

    /* Minimum scanning time on each channel (ms) */
    u32 min_ch_time;

    /* Maximum scanning time on each channel */
    u32 max_ch_time;

    /* Is a p2p search */
    u8 p2p_search;

    /* Channels to scan */
    u8 num_channel;
    u8 channels[80];

    /* IE field */
    u16 ie_len;
    u8 ie[0];
} __packed;

struct wcn36xx_hal_start_scan_offload_rsp_msg {
    struct wcn36xx_hal_msg_header header;

    /* success or failure */
    u32 status;
} __packed;
+enum wcn36xx_hal_scan_offload_ind_type {
+  /* Scan has been started */
+  WCN36XX_HAL_SCAN_IND_STARTED = 0x01,
+  /* Scan has been completed */
+  WCN36XX_HAL_SCAN_IND_COMPLETED = 0x02,
+  /* Moved to foreign channel */
+  WCN36XX_HAL_SCAN_IND_FOREIGN_CHANNEL = 0x08,
+  /* scan request has been dequeued */
+  WCN36XX_HAL_SCAN_IND_DEQUEUED = 0x10,
+  /* preempted by other high priority scan */
+  WCN36XX_HAL_SCAN_IND_PREEMPTED = 0x20,
+  /* scan start failed */
+  WCN36XX_HAL_SCAN_IND_FAILED = 0x40,
+  /* scan restarted */
+  WCN36XX_HAL_SCAN_IND_RESTARTED = 0x80,
+  WCN36XX_HAL_SCAN_IND_MAX = WCN36XX_HAL_MAX_ENUM_SIZE
+};
+
+struct wcn36xx_hal_scan_offload_ind {
+  struct wcn36xx_hal_msg_header header;
+  u32 type;
+  u32 channel_mhz;
+  u32 scan_id;
+} __packed;
+
+struct wcn36xx_hal_stop_scan_offload_req_msg {
+  struct wcn36xx_hal_msg_header header;
+} __packed;
+
+struct wcn36xx_hal_stop_scan_offload_rsp_msg {
+  struct wcn36xx_hal_msg_header header;
+  u32 status;
+} __packed;
+
+enum wcn36xx_hal_rate_index {
+  HW_RATE_INDEX_1MBPS = 0x82,
+  HW_RATE_INDEX_2MBPS = 0x84,
+  u16 txop_limit;
+} __packed;
+
-struct wcn36xx_hal_mac_ssid {
-  u8 length;
-  u8 ssid[32];
out_free_dxe_ctl:
wcn36xx_dxe_free_ctl_blks(wcn);
out_free_dxe_pool:
@@ -360,8 +351,6 @@
wcn36xx_dxe_free_mem_pools(wcn);
wcn36xx_dxe_free_ctl_blks(wcn);
-
-kfree(wcn->hal_buf);
}

static int wcn36xx_config(struct ieee80211_hw *hw, u32 changed)
@@ -641,7 +630,6 @@
    struct ieee80211_scan_request *hw_req)
{
    struct wcn36xx *wcn = hw->priv;
-
    mutex_lock(&wcn->scan_lock);
    if (wcn->scan_req) {
        mutex_unlock(&wcn->scan_lock);
@@ -650,11 +638,16 @@
            wcn->scan_aborted = false;
            wcn->scan_req = &hw_req->req;
            +
            mutex_unlock(&wcn->scan_lock);

            -schedule_work(&wcn->scan_work);
            +if (!get_feat_caps(wcn->fw_feat_caps, SCAN_OFFLOAD)) {
            +/* legacy manual/sw scan */
            +schedule_work(&wcn->scan_work);
            +return 0;
            +}

            -return 0;
            +return wcn36xx_smd_start_hw_scan(wcn, vif, &hw_req->req);
    }

static void wcn36xx_cancel_hw_scan(struct ieee80211_hw *hw, 
@@ -666,6 +659,9 @@
    wc->scan_aborted = true;
    mutex_unlock(&wc->scan_lock);

    +/* ieee80211_scan_completed will be called on FW scan indication */
    +wcn36xx_smd_stop_hw_scan(wcn);
    +
    cancel_work_sync(&wcn->scan_work);
}
void *wcns;
int ret;
const u8 *addr;

#define CONFIG_WCN36XX_SNAPDRAGON_HACKS
int status;
const struct firmware *addr_file = NULL;
static const u8 tmp[18], _addr[ETH_ALEN];
static const u8 qcom_oui[3] = {0x00, 0x0A, 0xF5};
static const char *files = {"wlan/macaddr0"};
#endif

wcn36xx_dbg(WCN36XX_DBG_MAC, "platform probe\n");

mutex_init(&wcn->hal_mutex);
mutex_init(&wcn->scan_lock);

wcn->hal_buf = devm_kmalloc(wcn->dev, WCN36XX_HAL_BUF_SIZE, GFP_KERNEL);
if (!wcn->hal_buf) {
    ret = -ENOMEM;
    goto out_wq;
}

INIT_WORK(&wcn->scan_work, wcn36xx_hw_scan_worker);

wcn->smd_channel = qcom_wcnss_open_channel(wcns, "WLAN_CTRL", wcn36xx_smd_rsp_process, hw);
if (addr && ret != ETH_ALEN) {
    wcn36xx_err("invalid local-mac-address
    ret = -EINVAL;
    goto out_wq;
} else if (addr) {
    goto out_destroy_ept;
}
#endif
else if (addr == NULL) {
    addr = _addr;
    status = request_firmware(&addr_file, files, &pdev->dev);
    if (status < 0) {
        dev_err(&pdev->dev, "Failed (%d) to read macaddress\n        memcpy(addr, qcom_oui, 3);
        memset(addr + 3, 0, 3);
else {
    memset(tmp, 0, sizeof(tmp));
    memcpy(tmp, addr_file->data, sizeof(tmp) - 1);
    sscanf(tmp, "%hhx:%hhx:%hhx:%hhx:%hhx:%hhx",
           &addr[0],
           &addr[1],
           &addr[2],
           &addr[3],
           &addr[4],
           &addr[5]);
    +release_firmware(addr_file);
}
#endif

if (addr) {
    wcn36xx_info("mac address: %pM\n", addr);
    SET_IEEE80211_PERM_ADDR(wcn->hw, addr);
}

ret = wcn36xx_platform_get_resources(wcn, pdev);
if (ret)
    -goto out_wq;
    +goto out_destroy_ept;

wcn36xx_init_ieee80211(wcn);
ret = ieee80211_register_hw(wcn->hw);
@@ -1310,6 +1348,8 @@
out_unmap:
    iounmap(wcn->ccu_base);
    iounmap(wcn->dxe_base);
    +out_destroy_ept:
    +rpmmsg_destroy_ept(wcn->smd_channel);
out_wq:
    ieee80211_free_hw(hw);
out_err:
--- linux-4.15.0.orig/drivers/net/wireless/ath/wcn36xx/smd.c
+++ linux-4.15.0/drivers/net/wireless/ath/wcn36xx/smd.c
@@ -73,6 +73,8 @@
    WCN36XX_CFG_VAL(BTC_STATIC_LEN_LE_BT, 120000),
    WCN36XX_CFG_VAL(BTC_STATIC_LEN_LE_WLAN, 30000),
    WCN36XX_CFG_VAL(MAX_ASSOC_LIMIT, 10),
    WCN36XX_CFG_VAL(ENABLE_MCC_ADAPTIVE_SCHEDULER, 0),
};
+int wcn36xx_smd_start_hw_scan(struct wcn36xx *wcn, struct ieee80211_vif *vif,
+    struct cfg80211_scan_request *req)
+
+struct wcn36xx_hal_start_scan_offload_req_msg msg_body;
+int ret, i;
+
+mutex_lock(&wcn->hal_mutex);
+
+INIT_HAL_MSG(msg_body, WCN36XX_HAL_START_SCAN_OFFLOAD_REQ);
+
+msg_body.scan_type = WCN36XX_HAL_SCAN_TYPE_ACTIVE;
+msg_body.min_ch_time = 30;
+msg_body.max_ch_time = 100;
+msg_body.scan_hidden = 1;
+memcpy(msg_body.mac, vif->addr, ETH_ALEN);
+msg_body.p2p_search = vif->p2p;
+
+msg_body.num_ssid = min_t(u8, req->n_ssids, ARRAY_SIZE(msg_body.ssids));
+for (i = 0; i < msg_body.num_ssid; i++) {
    msg_body.ssids[i].length = min_t(u8, req->ssids[i].ssid_len,
        sizeof(msg_body.ssids[i].ssid));
    memcpy(msg_body.ssids[i].ssid, req->ssids[i].ssid,
        msg_body.ssids[i].length);
}
+
+msg_body.num_channel = min_t(u8, req->n_channels,
    sizeof(msg_body.channels));
+for (i = 0; i < msg_body.num_channel; i++)
    msg_body.channels[i] = req->channels[i]->hw_value;
+
+PREPARE_HAL_BUF(wcn->hal_buf, msg_body);
+
+wcn36xx_dbg(WCN36XX_DBG_HAL,
    "hal start hw-scan (channels: %u; ssids: %u; p2p: %s)\n",
    msg_body.num_channel, msg_body.num_ssid,
    msg_body.p2p_search ? "yes" : "no");
+
+ret = wcn36xx_smd_send_and_wait(wcn, msg_body.header.len);
+if (ret) {
    wcn36xx_err("Sending hal_start_scan_offload failed\n");
    goto out;
    +}
+
+ret = wcn36xx_smd_rsp_status_check(wcn->hal_buf, wcn->hal_rsp_len);
+if (ret) {
    wcn36xx_err("hal_start_scan_offload response failed err=%d\n",
+ ret);
+goto out;
+
+mutex_unlock(&wcn->hal_mutex);
+return ret;
+
+int wcn36xx_smd_stop_hw_scan(struct wcn36xx *wcn)
+{
+struct wcn36xx_hal_stop_scan_offload_req_msg msg_body;
+int ret;
+
+mutex_lock(&wcn->hal_mutex);
+INIT_HAL_MSG(msg_body, WCN36XX_HAL_STOP_SCAN_OFFLOAD_REQ);
+PREPARE_HAL_BUF(wcn->hal_buf, msg_body);
+
+wcn36xx_dbg(WCN36XX_DBG_HAL, "hal stop hw-scan\n");
+
+ret = wcn36xx_smd_send_and_wait(wcn, msg_body.header.len);
+if (ret) {
+wcn36xx_err("Sending hal_stop_scan_offload failed\n");
+goto out;
+
+ret = wcn36xx_smd_rsp_status_check(wcn->hal_buf, wcn->hal_rsp_len);
+if (ret) {
+wcn36xx_err("hal_stop_scan_offload response failed err=%d\n",
+ ret);
+goto out;
+
+out:
+mutex_unlock(&wcn->hal_mutex);
+return ret;
+
+static int wcn36xx_smd_switch_channel_rsp(void *buf, size_t len)
+{
+struct wcn36xx_hal_switch_channel_rsp_msg *rsp;
+@ @ -2039,6 +2120,42 @@
+return 0;
+}
+
+static int wcn36xx_smd_hw_scan_ind(struct wcn36xx *wcn, void *buf, size_t len)
+{
+struct wcn36xx_hal_scan_offload_ind *rsp = buf;
+struct cfg80211_scan_info scan_info = {};
+
+if (len != sizeof(*rsp)) {
+}
+wcn36xx_warn("Corrupted delete scan indication\n");
+return -EIO;
+
+wcn36xx_dbg(WCN36XX_DBG_HAL, "scan indication (type %x)", rsp->type);
+
+switch (rsp->type) {
+case WCN36XX_HAL_SCAN_IND_FAILED:
+scan_info.aborted = true;
+case WCN36XX_HAL_SCAN_IND_COMPLETED:
+mutex_lock(&wcn->scan_lock);
+wcn->scan_req = NULL;
+if (wcn->scan_aborted)
+scan_info.aborted = true;
+mutex_unlock(&wcn->scan_lock);
+ieee80211_scan_completed(wcn->hw, &scan_info);
+break;
+case WCN36XX_HAL_SCAN_IND_STARTED:
+case WCN36XX_HAL_SCAN_IND_FOREIGN_CHANNEL:
+case WCN36XX_HAL_SCAN_IND_DEQUEUED:
+case WCN36XX_HAL_SCAN_IND_PREEMPTED:
+case WCN36XX_HAL_SCAN_IND_RESTARTED:
+break;
+default:
+wcn36xx_warn("Unknown scan indication type %x\n", rsp->type);
+}
+
+return 0;
+
+static int wcn36xx_smd_missed_beacon_ind(struct wcn36xx *wcn,
+void *buf,
+size_t len)
@@ -2250,6 +2367,8 @@
case WCN36XX_HAL_CH_SWITCH_RSP:
case WCN36XX_HAL_FEATURE_CAPS_EXCHANGE_RSP:
case WCN36XX_HAL_8023_MULTICAST_LIST_RSP:
+case WCN36XX_HAL_START_SCAN_OFFLOAD_RSP:
+case WCN36XX_HAL_STOP_SCAN_OFFLOAD_RSP:
memcpy(wcn->hal_buf, buf, len);
wcn->hal_rsp_len = len;
complete(&wcn->hal_rsp_compl);
@@ -2262,6 +2381,7 @@
case WCN36XX_HAL_MISSED_BEACON_IND:
case WCN36XX_HAL_DELETE_STA_CONTEXT_IND:
case WCN36XX_HAL_PRINT_REG_INFO_IND:
+case WCN36XX_HAL_SCAN_OFFLOAD_IND:
msg_ind = kmalloc(sizeof(*msg_ind) + len, GFP_ATOMIC);
if (!msg_ind) {
    wcn36xx_err("Run out of memory while handling SMD_EVENT (%d)\n", 
    @ @ -2298,6 +2418,8 @ @
    hal_ind_msg = list_first_entry(&wcn->hal_ind_queue,  
        struct wcn36xx_hal_ind_msg,  
        list);
+    list_del(wcn->hal_ind_queue.next);
+    spin_unlock_irqrestore(&wcn->hal_ind_lock, flags);

    msg_header = (struct wcn36xx_hal_msg_header *)hal_ind_msg->msg;

@@ -2298,6 +2418,8 @@
    @ @ -2326,12 +2448,14 @ @
    hal_ind_msg->msg,  
    hal_ind_msg->msg_len);
   break;
+    case WCN36XX_HAL_SCAN_OFFLOAD_IND:
+        wcn36xx_smd_hw_scan_ind(wcn, hal_ind_msg->msg,  
+                            hal_ind_msg->msg_len);
+        break;
    default:
        wcn36xx_err("SMD_EVENT (%d) not supported\n",  
            msg_header->msg_type);
    }
+    list_del(wcn->hal_ind_queue.next);
+    spin_unlock_irqrestore(&wcn->hal_ind_lock, flags);
    kfree(hal_ind_msg);
}
int wcn36xx_smd_open(struct wcn36xx *wcn)
--- linux-4.15.0.orig/drivers/net/wireless/ath/wcn36xx/smd.h
+++ linux-4.15.0/drivers/net/wireless/ath/wcn36xx/smd.h
@@ -65,6 +65,9 @@
    int wcn36xx_smd_finish_scan(struct wcn36xx *wcn,
        enum wcn36xx_hal_sys_mode mode);
    int wcn36xx_smd_update_scan_params(struct wcn36xx *wcn, u8 *channels, size_t channel_count);  
+    int wcn36xx_smd_start_hw_scan(struct wcn36xx *wcn, struct ieee80211_vif *vif,  
+        struct cfg80211_scan_request *req);  
+    int wcn36xx_smd_stop_hw_scan(struct wcn36xx *wcn);  
    int wcn36xx_smd_add_sta_self(struct wcn36xx *wcn, struct ieee80211_vif *vif);  
    int wcn36xx_smd_delete_sta_self(struct wcn36xx *wcn, u8 *addr);  
    int wcn36xx_smd_delete_sta(struct wcn36xx *wcn, u8 sta_index);  
--- linux-4.15.0.orig/drivers/net/wireless/ath/wif6210/Kconfig
+++ linux-4.15.0/drivers/net/wireless/ath/wif6210/Kconfig
@@ -1,6 +1,7 @@
 tristate "Wilocity 60g WiFi card wil6210 support"
 select WANT_DEV_COREDUMP  
+select CRC32
 depends on CFG80211

depends on PCI
default n
--- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/cfg80211.c
+++ linux-4.15.0/drivers/net/wireless/ath/wil6210/cfg80211.c
@@ -1224,6 +1224,12 @@
 u8 *buf, *dpos;
 const u8 *spos;

+if (!ies1)
+ies1_len = 0;
+
+if (!ies2)
+ies2_len = 0;
+
if (ies1_len == 0 && ies2_len == 0) {
  *merged_ies = NULL;
  *merged_len = 0;
@@ -1233,17 +1239,19 @@
  buf = kmalloc(ies1_len + ies2_len, GFP_KERNEL);
  if (!buf)
    return -ENOMEM;
-memcpy(buf, ies1, ies1_len);  
+if (ies1)
+  memcpy(buf, ies1, ies1_len);
  dpos = buf + ies1_len;
  spos = ies2;
-while (spos + 1 < ies2 + ies2_len) {
-while (spos && (spos + 1 < ies2 + ies2_len)) {

/* IE tag at offset 0, length at offset 1 */
  u16 ielen = 2 + spos[1];

if (spos + ielen > ies2 + ies2_len)
  break;
if (spos[0] == WLAN_EID_VENDOR_SPECIFIC &&
-     !_wil_cfg80211_find_ie(ies1, ies1_len, spos, ielen)) {
+     (!_ies1 || !_wil_cfg80211_find_ie(ies1, ies1_len,
+         spos, ielen))) {
  memcpy(dpos, spos, ielen);
  dpos += ielen;
}
@@ -1727,9 +1735,12 @@

wil_dbg_pm(wil, "suspending\n");
-\mil_p2p_stop_discovery(wil);
-\mutex_lock(&wil->mutex);
+mutex_lock(&wil->mutex);
+mutex_lock(&wil->p2p_wdev_mutex);
wil_p2p_stop_radio_operations(wil);
wil_abort_scan(wil, true);
mutex_unlock(&wil->p2p_wdev_mutex);
mutex_unlock(&wil->mutex);

out:
return rc;

--- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/debugfs.c
+++ linux-4.15.0/drivers/net/wireless/ath/wil6210/debugfs.c
@@ -502,10 +502,10 @@
{
enum { max_count = 4096 };
struct wil_blob_wrapper *wil_blob = file->private_data;
-loff_t pos = *ppos;
+loff_t aligned_pos, pos = *ppos;
-size_t available = wil_blob->blob.size;
+size_t ret;
-size_t unaligned_bytes, aligned_count, count;
-size_t unaligned_bytes, aligned_count, ret;

if (test_bit(wil_status_suspending, wil_blob->wil->status) ||
    test_bit(wil_status_suspended, wil_blob->wil->status))
@@ -522,14 +522,19 @@
    count = max_count;

    buf = kmalloc(count, GFP_KERNEL);
+/* set pos to 4 bytes aligned */
+unaligned_bytes = pos % 4;
+aligned_pos = pos - unaligned_bytes;
+aligned_count = count + unaligned_bytes;
+
    buf = kmalloc(aligned_count, GFP_KERNEL);
    if (!buf)
        return -ENOMEM;
-wil_memcpy_fromio_32(buf, (const void __iomem *)
-wil_blob->blob.data + pos, count);
+wil_blob->blob.data + aligned_pos, aligned_count);

    ret = copy_to_user(user_buf, buf, count);
    +ret = copy_to_user(user_buf, buf + unaligned_bytes, count);
    kfree(buf);
    if (ret == count)
        return -EFAULT;
@@ -555,32 +560,6 @@
    return debugfs_create_file(name, mode, parent, wil_blob, &fops_ioblob);
    }
-/*---reset---*/
- static ssize_t wil_write_file_reset(struct file *file, const char __user *buf,
-    size_t len, loff_t *ppos)
- {
- struct wil6210_priv *wil = file->private_data;
- struct net_device *ndev = wil_to_ndev(wil);
- 
- /*
- * BUG:
- * this code does NOT sync device state with the rest of system
- * use with care, debug only!!!
- */
- rtnl_lock();
- dev_close(ndev);
- ndev->flags &= ~IFF_UP;
- rtnl_unlock();
- wil_reset(wil, true);
- 
- return len;
- }
-
- static const struct file_operations fops_reset = {
- .write = wil_write_file_reset,
- .open  = simple_open,
- .};
-
- /*---write channel 1..4 to rxon for it, 0 to rxoff---*/
static ssize_t wil_write_file_rxon(struct file *file, const char __user *buf,
    size_t len, loff_t *ppos)
{ @ @ -1049,7 +1028,7 @ @
}

/*/--------temp-----------*/
- static void print_temp(struct seq_file *s, const char *prefix, u32 t)
+ static void print_temp(struct seq_file *s, const char *prefix, s32 t)
{ switch (t) {
    case 0:
        @ @ -1057,7 +1036,8 @ @
        seq_printf(s, "%s N/A\n", prefix);
        break;
    default:
        @ @ -1057,7 +1036,8 @ @
        seq_printf(s, "%s %d.%03d\n", prefix, t / 1000, t % 1000);
        break;
}
static int wil_temp_debugfs_show(struct seq_file *s, void *data)
{
    struct wil6210_priv *wil = s->private;
    u32 t_m, t_r;
    int rc = wmi_get_temperature(wil, &t_m, &t_r);

    if (rc) {
        int err = -EINVAL;
        crash_write_stack(s); // write stack trace
        return err;
    }

    return 0;
}

#define FW_ADDR_CHECK(ioaddr, val, msg) do { \
    ioaddr = wmi_buffer(wil, val); \ 
    if (!ioaddr) \ 
    { \ 
        wil_err_fw(wil, "bad " msg ": 0x%08x\n", \ 
               le32_to_cpu(val)); \ 
        return -EINVAL; \ 
    } \ 
    } while (0)

static bool wil_fw_addr_check(struct wil6210_priv *wil, \ 
    void __iomem **ioaddr, __le32 val, \ 
    u32 size, const char *msg) \{
    *ioaddr = wmi_buffer_block(wil, val, size); \ 
    if (!(*ioaddr)) \ 
    { \ 
        wil_err_fw(wil, "bad %s: 0x%08x\n", msg, le32_to_cpu(val)); \ 
        return false; \ 
    } \ 
    return true; \ 
} \ 
/**
 * wil_fw_verify - verify firmware file validity
 @ @ -165,7 +168,8 @@
 return -EINVAL;


-FW_ADDR_CHECK(dst, d->addr, "address");
+if (!wil_fw_addr_check(wil, &dst, d->addr, s, "address"))
+return -EINVAL;

wil_dbg_fw(wil, "write [0x%08x] <= %zu bytes\n", le32_to_cpu(d->addr), s);
wil_memcpy_toio_32(dst, d->data, s);
@@ -197,7 +201,8 @@
return -EINVAL;
}

-FW_ADDR_CHECK(dst, d->addr, "address");
+if (!wil_fw_addr_check(wil, &dst, d->addr, s, "address"))
+return -EINVAL;

v = le32_to_cpu(d->value);
wil_dbg_fw(wil, "fill [0x%08x] <= 0x%08x, %zu bytes\n", @@ -253,7 +258,8 @@
u32 v = le32_to_cpu(block[i].value);
u32 x, y;

-FW_ADDR_CHECK(dst, block[i].addr, "address");
+if (!wil_fw_addr_check(wil, &dst, block[i].addr, 0, "address"))
+return -EINVAL;

x = readl(dst);
y = (x & m) | (v & ~m); @ @ -319,10 +325,15 @@
wil_dbg_fw(wil, "gw write record [%3d] blocks, cmd 0x%08x\n", n, gw_cmd);

-FW_ADDR_CHECK(gwa_addr, d->gateway_addr_addr, "gateway_addr_addr");
-FW_ADDR_CHECK(gwa_val, d->gateway_value_addr, "gateway_value_addr");
-FW_ADDR_CHECK(gwa_cmd, d->gateway_cmd_addr, "gateway_cmd_addr");
-FW_ADDR_CHECK(gwa_ctl, d->gateway_ctrl_address, "gateway_ctrl_address");
+if (!wil_fw_addr_check(wil, &gwa_addr, d->gateway_addr_addr, 0, + "gateway_addr_addr") ||
+ !wil_fw_addr_check(wil, &gwa_val, d->gateway_value_addr, 0, + "gateway_value_addr") ||
+ !wil_fw_addr_check(wil, &gwa_cmd, d->gateway_cmd_addr, 0, + "gateway_cmd_addr") ||
+ !wil_fw_addr_check(wil, &gwa_ctl, d->gateway_ctrl_address, 0, + "gateway_ctrl_address"))
+return -EINVAL;

wil_dbg_fw(wil, "gw addresses: addr 0x%08x val 0x%08x\n" " cmd 0x%08x ctrl 0x%08x\n",
wil_dbg_fw(wil, "gw4 write record [%3d] blocks, cmd 0x%08x\n", n, gw_cmd);

-FW_ADDR_CHECK(gwa_addr, d->gateway_addr_addr, "gateway_addr_addr");
+if (!wil_fw_addr_check(wil, &gwa_addr, d->gateway_addr_addr, 0,
+    "gateway_addr_addr"))
+    return -EINVAL;
for (k = 0; k < ARRAY_SIZE(block->value); k++)
    -FW_ADDR_CHECK(gwa_val[k], d->gateway_value_addr[k],
    -    "gateway_value_addr");
    FW_ADDR_CHECK(gwa_val[k], d->gateway_value_addr[k], 0,
    "gateway_value_addr")
    return -EINVAL;
+if (!wil_fw_addr_check(wil, &gwa_val[k],
+    d->gateway_value_addr[k],
+    0, "gateway_value_addr")
+    return -EINVAL;
    if (!wil_fw_addr_check(wil, &gwa_cmd, d->gateway_cmd_addr, 0,
    "gateway_cmd_addr") ||
    !wil_fw_addr_check(wil, &gwa_ctl, d->gateway_ctrl_address, 0,
    "gateway_ctrl_address")
    return -EINVAL;
+wil_dbg_fw(wil, "gw4 addresses: addr 0x%08x cmd 0x%08x ctl 0x%08x\n",
    le32_to_cpu(d->gateway_addr_addr),
--- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/interrupt.c
+++ linux-4.15.0/drivers/net/wireless/ath/wil6210/interrupt.c
@@ -1,5 +1,6 @@
/*
 * Copyright (c) 2012-2017 Qualcomm Atheros, Inc.
+ * Copyright (c) 2018-2019, The Linux Foundation. All rights reserved.
 * *
 * Permission to use, copy, modify, and/or distribute this software for any
 * purpose with or without fee is hereby granted, provided that the above
@@ -358,6 +359,25 @@
    wil_mbox_ring_le2cpus(&wil->mbox_ctl.tx);
 }

+static bool wil_validate_mbox_regs(struct wil6210_priv *wil)
+{
+    size_t min_size = sizeof(struct wil6210_mbox_hdr) +
+        sizeof(struct wmi_cmd_hdr);
+    +if (wil->mbox_ctl.rx.entry_size < min_size) {
+        wil_err(wil, "rx mbox entry too small (%d)\n",
+            wil->mbox_ctl.rx.entry_size);
+        return false;
+    }
+*/
if (wil->mbox_ctl.tx.entry_size < min_size) {
    wil_err(wil, "tx mbox entry too small (%d)\n",
           wil->mbox_ctl.tx.entry_size);
    return false;
} +
+return true;
+
static irqreturn_t wil6210_irq_misc(int irq, void *cookie) {
    struct wil6210_priv *wil = cookie;
@@ -393,7 +413,8 @@
    if (isr & ISR_MISC_FW_READY) {
        wil_dbg_irq(wil, "IRQ: FW ready\n");
        wil_cache_mbox_regs(wil);
@@ -402,10 +423,14 @@
    }/**
     * Actual FW ready indicated by the
     * WMI_FW_READY_EVENTID
@@ -423,14 +446,14 @@
    }
}
if (isr & BIT_DMA_EP_MISC_ICR_HALP) {
@@ -446,10 +469,14 @@
        wil_dbg_irq(wil, "irq_misc: HALP IRQ invoked\n");
        wil6210_mask_halp(wil);
    } */ no need to handle HALP ICRs until next vote */
    wil->halp.handle_icr = false;
    wil_dbg_irq(wil, "irq_misc: HALP IRQ invoked\n");
    wil6210_mask_halp(wil);
    complete(&wil->halp.comp);
+}
}

wil->isr_misc = isr;
--- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/main.c
+++ linux-4.15.0/drivers/net/wireless/ath/wil6210/main.c
@@ -870,7 +870,7 @@
    static int wil_wait_for_fw_ready(struct wil6210_priv *wil) {
    ulong to = msecs_to_jiffies(1000);
    ulong to = msecs_to_jiffies(2000);
ulong left = wait_for_completion_timeout(&wil->wmi_ready, to);

if (0 == left) {
    @ @ -1240,11 +1240,14 @@

    if (++wil->halp.ref_cnt == 1) {
        reinit_completion(&wil->halp.comp);
        /* mark to IRQ context to handle HALP ICR */
        wil->halp.handle_icr = true;
        wil6210_set_halp(wil);
        rc = wait_for_completion_timeout(&wil->halp.comp, to_jiffies);
        if (!rc) {
            wil_err(wil, "HALP vote timed out\n\n";
            /* Mask HALP as done in case the interrupt is raised */
            wil->halp.handle_icr = false;
            wil6210_mask_halp(wil);
        } else {
            wil_dbg_irq(wil,
--- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/pcie_bus.c
+++ linux-4.15.0/drivers/net/wireless/ath/wil6210/pcie_bus.c
@@ -393,6 +393,9 @@
    int rc = 0;
    struct pci_dev *pdev = to_pci_dev(dev);
    struct wil6210_priv *wil = pci_get_drvdata(pdev);
+    struct net_device *ndev = wil_to_ndev(wil);
+    bool keep_radio_on = ndev->flags & IFF_UP &&
+        wil->keep_radio_on_during_sleep;
    wil_dbg_pm(wil, "suspend: %s\n", is_runtime ? "runtime" : "system");

    @ @ -400,14 +403,14 @@
    if (rc)
    goto out;

    -rc = wil_suspend(wil, is_runtime);
+rc = wil_suspend(wil, is_runtime, keep_radio_on);
    if (!rc) {
        wil->suspend_stats.successful_suspends++;

        /* If platform device supports keep_radio_on_during_sleep */
        /* it will control PCIe master */
        /* In case radio stays on, platform device will control */
        /* PCIe master */
        -if (!wil->keep_radio_on_during_sleep)
+if (!keep_radio_on)
            /* disable bus mastering */
            pci_clear_master(pdev);
int rc = 0;
struct pci_dev *pdev = to_pci_dev(dev);
struct wil6210_priv *wil = pci_get_drvdata(pdev);
struct net_device *ndev = wil_to_ndev(wil);
bool keep_radio_on = ndev->flags & IFF_UP &&
    wil->keep_radio_on_during_sleep;

wil_dbg_pm(wil, "resume: %s\n", is_runtime ? "runtime" : "system");

/* If platform device supports keep_radio_on_during_sleep it will
 * control PCIe master
*/
// In case radio stays on, platform device will control
/* PCIe master */
if (!wil->keep_radio_on_during_sleep)
    /* allow master */
pci_set_master(pdev);
else { // allow master */
    rc = wil_resume(wil, is_runtime);
    if (rc) {
        wil_err(wil, "device failed to resume (%d)\n", rc);
        wil->suspend_stats.failed_resumes++;
    } else {
        wil->suspend_stats.successful_resumes++;
    }
}

-int wil_suspend(struct wil6210_priv *wil, bool is_runtime)
+int wil_suspend(struct wil6210_priv *wil, bool is_runtime, bool keep_radio_on)
    
    int rc = 0;
    struct net_device *ndev = wil_to_ndev(wil);
    bool keep_radio_on = ndev->flags & IFF_UP &&
        wil->keep_radio_on_during_sleep;

    wil_dbg_pm(wil, "suspend: %s\n", is_runtime ? "runtime" : "system");

    return rc;
int wil_resume(struct wil6210_priv *wil, bool is_runtime)
+
int wil_resume(struct wil6210_priv *wil, bool is_runtime, bool keep_radio_on)
{
    int rc = 0;
    -struct net_device *ndev = wil_to_ndev(wil);
    -bool keep_radio_on = ndev->flags & IFF_UP &&
      wil->keep_radio_on_during_sleep;
    unsigned long long suspend_time_usec = 0;
    
    wil_dbg_pm(wil, "resume: %s", is_runtime ? "runtime" : "system");
    
    --- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/txrx.c
    +++ linux-4.15.0/drivers/net/wireless/ath/wil6210/txrx.c
    @@ -636,8 +636,8 @@
    v->swtail = next_tail) {
        rc = wil_vring_alloc_skb(wil, v, v->swtail, headroom);
        if (unlikely(rc)) {
            -wil_err(wil, "Error %d in wil_rx_refill[%d]\n",
                      rc, v->swtail);
            +wil_err_ratelimited(wil, "Error %d in rx refill[%d]\n",
                              rc, v->swtail);
            +rc, v->swtail);
            break;
        }
    }

    @@ -732,6 +732,7 @@
    
    [GRO_HELD]= "GRO_HELD",
    [GRO_NORMAL]= "GRO_NORMAL",
    [GRO_DROP]= "GRO_DROP",
    +[GRO_CONSUMED]= "GRO_CONSUMED",
    );

    if (ndev->features & NETIF_F_RXHASH)
    @ @ -1281,6 +1282,8 @@
    wil_dbg_txrx(wil, "BCAST DUP -> ring %d\n", i);
    wil_set_da_for_vring(wil, skb2, i);
    wil_tx_vring(wil, v2, skb2);
    +/* successful call to wil_tx_ring takes skb2 ref */
    +dev_kfree_skb_any(skb2);
    } else {
        wil_err(wil, "skb_copy failed\n");
    }

    --- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/wil6210.h
    +++ linux-4.15.0/drivers/net/wireless/ath/wil6210/wil6210.h
    @@ -589,6 +589,7 @@
    struct mutex		lock; /* protect halp ref_cnt */
    unsigned int		ref_cnt;
    struct completion	comp;

struct wil_blob_wrapper {
    handle_icr;
};

int wil_find_cid(struct wil6210_priv *wil, const u8 *mac);
void wil_set_ethtoolops(struct net_device *ndev);

int wil_can_suspend(struct wil6210_priv *wil, bool is_runtime);
-int wil_suspend(struct wil6210_priv *wil, bool is_runtime);
-int wil_resume(struct wil6210_priv *wil, bool is_runtime);
+int wil_suspend(struct wil6210_priv *wil, bool is_runtime, bool keep_radio_on);
+int wil_resume(struct wil6210_priv *wil, bool is_runtime, bool keep_radio_on);
bool wil_is_wmi_idle(struct wil6210_priv *wil);
int wmi_resume(struct wil6210_priv *wil);
int wmi_suspend(struct wil6210_priv *wil);

--- linux-4.15.0.orig/drivers/net/wireless/ath/wil6210/wmi.c
+++ linux-4.15.0/drivers/net/wireless/ath/wil6210/wmi.c
@@ -140,13 +140,15 @@
/**
 * Check address validity for WMI buffer; remap if needed
 * @ptr - internal (linker) fw/ucode address
+ * @size - if non zero, validate the block does not
+ * exceed the device memory (bar)
 *
 * Valid buffer should be DWORD aligned
 *
@@ -161,10 +163,17 @@
off = HOSTADDR(ptr);
if (off > wil->bar_size - 4)
return NULL;
+if (size && ((off + size > wil->bar_size) || (off + size < off)))
+return NULL;
return wil->csr + off;
}

+void __iomem *wmi_buffer(struct wil6210_priv *wil, __le32 ptr_)
+{
+return wmi_buffer_block(wil, ptr_, 0);
+}
+
/**
 * Check address validity
 */
@@ -222,7 +231,7 @@
 uint retry;
 int rc = 0;

- if (sizeof(cmd) + len > r->entry_size) {
+ if (len > r->entry_size - sizeof(cmd)) {
    wil_err(wil, "WMI size too large: %d bytes, max is %d\n",
            (int)(sizeof(cmd) + len), r->entry_size);
    return -ERANGE;
@@ -1002,15 +1011,16 @@
 {
 int rc;
 unsigned long remain;
+ulong flags;

 mutex_lock(&wil->wmi_mutex);

- spin_lock(&wil->wmi_ev_lock);
+ spin_lock_irqsave(&wil->wmi_ev_lock, flags);
 wil->reply_id = reply_id;
 wil->reply_buf = reply;
 wil->reply_size = reply_size;
 reinit_completion(&wil->wmi_call);
- spin_unlock(&wil->wmi_ev_lock);
+ spin_unlock_irqrestore(&wil->wmi_ev_lock, flags);

 rc = __wmi_send(wil, cmdid, buf, len);
 if (rc)
@@ -1030,11 +1040,11 @@
 }

 out:
- spin_lock(&wil->wmi_ev_lock);
+ spin_lock_irqsave(&wil->wmi_ev_lock, flags);
 wil->reply_id = 0;
 wil->reply_buf = NULL;
wil->reply_size = 0;
-spin_unlock(&wil->wmi_ev_lock);
+spin_unlock_irqrestore(&wil->wmi_ev_lock, flags);

mutex_unlock(&wil->wmi_mutex);

@@ -1380,8 +1390,14 @@
 };
 int rc;
 u16 len = sizeof(struct wmi_set_appie_cmd) + ie_len;
-struct wmi_set_appie_cmd *cmd = kzalloc(len, GFP_KERNEL);
+struct wmi_set_appie_cmd *cmd = kzalloc(len, GFP_KERNEL);
+if (len < ie_len) {
+ rc = -EINVAL;
+ goto out;
+ }
+if (!cmd) {
+ rc = -ENOMEM;
+ goto out;
+ }

+cmd = kzalloc(len, GFP_KERNEL);
if (!cmd) {
 rc = -ENOMEM;
 go out;
--- linux-4.15.0.orig/drivers/net/wireless/atmel/at76c50x-usb.c
+++ linux-4.15.0/drivers/net/wireless/atmel/at76c50x-usb.c
@@ -2585,8 +2585,8 @@
 if (result < 0)
 printk(KERN_ERR DRIVER_NAME
 : usb_register failed (status %d)/u", result);
-
-#led_trigger_register_simple("at76_usb-tx", &ledtrig_tx);
+else
 +led_trigger_register_simple("at76_usb-tx", &ledtrig_tx);
 return result;
 }

--- linux-4.15.0.orig/drivers/net/wireless/broadcom/b43/leds.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/b43/leds.c
@@ -131,7 +131,7 @@
 led->wl = dev->wl;
 led->index = led_index;
 led->activelow = activelow;
-#strncpy(led->name, name, sizeof(led->name));
+#strlcpy(led->name, name, sizeof(led->name));
 atomic_set(&led->state, 0);

 led->led_dev.name = led->name;
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/b43/main.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/b43/main.c
@@ -5596,7 +5596,7 @@ /* fill hw info */
    ieee80211_hw_set(hw, RX_INCLUDES_FCS);
    ieee80211_hw_set(hw, SIGNAL_DBM);
    
+    ieee80211_hw_set(hw, MFP_CAPABLE);
    hw->wiphy->interface_modes =
    BIT(NL80211_IFTYPE_AP) |
    BIT(NL80211_IFTYPE_MESH_POINT) |
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/b43/phy_common.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/b43/phy_common.c
@@ -616,7 +616,7 @@
    u8 i;
    s32 tmp;
    s8 signx = 1;
-    u32 angle = 0;
+    s32 angle = 0;
    struct b43_c32 ret = { .i = 39797, .q = 0, };

    while (theta > (180 << 16))
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/b43/phy_lp.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/b43/phy_lp.c
@@ -1834,7 +1834,7 @@
 static void lpphy_papd_cal_txpwr(struct b43_wldev *dev)
 {
    struct b43_phy_lp *lpphy = dev->phy.lp;
-    struct lpphy_tx_gains gains, oldgains;
+    struct lpphy_tx_gains oldgains;
    int old_txpctl, old_afe_ovr, old_rf, old_bbmult;
    
    lpphy_read_tx_pctl_mode_from_hardware(dev);
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/b43/phy_n.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/b43/phy_n.c
@@ -5320,7 +5320,7 @@
    for (i = 0; i < 4; i++) {
if (dev->phy.rev >= 3)
+coef[i] = table[i];
else
+coef[i] = 0;
}
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/b43legacy/leds.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/b43legacy/leds.c
@@ -101,7 +101,7 @@
led->dev = dev;
led->index = led_index;
led->activelow = activelow;
-strncpy(led->name, name, sizeof(led->name));
+strlcpy(led->name, name, sizeof(led->name));
led->led_dev.name = led->name;
led->led_dev.default_trigger = default_trigger;
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/b43legacy/main.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/b43legacy/main.c
@@ -1304,8 +1304,9 @@
}
/* Interrupt handler bottom-half */
-static void b43legacy_interrupt_tasklet(struct b43legacy wldev *dev)
+static void b43legacy_interrupt_tasklet(unsigned long data)
{
+struct b43legacy wldev *dev = (struct b43legacy wldev *)data;
u32 reason;
+u32 dma_reason[ARRAY_SIZE(dev->dma_reason)];
u32 merged_dma_reason = 0;
@@ -3775,7 +3776,7 @@
b43legacy_set_status(wldev, B43legacy_STAT_UNINIT);
wdev->bad_frames_preempt = modparam_bad_frames_preempt;
tasklet_init(&wldev-> isr_tasklet,
- (void (*)(unsigned long))b43legacy_interrupt_tasklet,
+ b43legacy_interrupt_tasklet,
( unsigned long)wldev);
if (modparam_pio)
wdev->_using_pio = true;
@@ -3834,6 +3835,7 @@
/* fill hw info */
 ieee80211_hw_set(hw, RX_INCLUDES_FCS);
 ieee80211_hw_set(hw, SIGNAL_DBM);
+ieee80211_hw_set(hw, MFP_CAPABLE); /* Allow WPA3 in software */

hw->wiphy->interface_modes =
BIT(NL80211_IFTYPE_AP) |
default:
b43legacywarn(dev->wl, "Unexpected value for chanstat (0x%X)\n", chanstat);
+goto drop;
}

memcpy(IEEE80211_SKB_RXCB(skb), &status, sizeof(status));

void brcmf_proto_bcdc_detach_pre_delif(struct brcmf_pub *drvr)
+{
+struct brcmf_bcdc *bcdc = drvr->proto->pd;
+  +brcmf_fws_detach_pre_delif(bcdc->fws);
+}
  +void brcmf_proto_bcdc_detach_post_delif(struct brcmf_pub *drvr)
+{
  struct brcmf_bcdc *bcdc = drvr->proto->pd;

  if (bcdc)
    brcmf_fws_detach(bcdc->fws);
  +brcmf_fws_detach_post_delif(bcdc->fws);
    kfree(bcdc);
  }

#define CONFIG_BRCMFMACPROTO_BCDC

int brcmf_proto_bcdc_attach(struct brcmf_pub *drvr);
+-void brcmf_proto_bcdc_detach(struct brcmf_pub *drvr);
+void brcmf_proto_bcdc_detach_pre_delif(struct brcmf_pub *drvr);
+void brcmf_proto_bcdc_detach_post_delif(struct brcmf_pub *drvr);
void brcmf_proto_bcdc_txflowblock(struct device *dev, bool state);
void brcmf_proto_bcdc_txcomplete(struct device *dev, struct sk_buff *txp,
    bool success);

struct brcmf_fws_info *drvr_to_fws(struct brcmf_pub *drvr);
else
+static inline int brcmf_proto_bcdc_attach(struct brcmf_pub *drvr) { return 0; }
-else
+static inline void brcmf_proto_bcdc_detach(struct brcmf_pub *drvr) {}
+static void brcmf_proto_bcde_detach_pre_delif(struct brcmf_pub *drvr) {}
+static inline void brcmf_proto_bcde_detach_post_delif(struct brcmf_pub *drvr) {}
#endif
#endif /* BRCMF_MAC_BCDC_H */
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/bcmsdh.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/bcmsdh.c
@@ -1098,6 +1098,7 @@
+BRCMF_SDIO_DEVICE(SDIO_DEVICE_ID_BROADCOM_43340),
+BRCMF_SDIO_DEVICE(SDIO_DEVICE_ID_BROADCOM_43341),
+BRCMF_SDIO_DEVICE(SDIO_DEVICE_ID_BROADCOM_43362),
+ BRCMF_SDIO_DEVICE(SDIO_DEVICE_ID_BROADCOM_43364),
+BRCMF_SDIO_DEVICE(SDIO_DEVICE_ID_BROADCOM_4335_4339),
+BRCMF_SDIO_DEVICE(SDIO_DEVICE_ID_BROADCOM_4339),
+BRCMF_SDIO_DEVICE(SDIO_DEVICE_ID_BROADCOM_43430),
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/cfg80211.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/cfg80211.c
@@ -2616,6 +2616,7 @@
+          count_rssi = 0;
 for (i = 0; i < BRCMF_ANT_MAX; i++) {
 if (sta_info_le.rssi[i]) {
+            sinfo->chains |= BIT(count_rssi);
 sinfo->chain_signal_avg[count_rssi] =
 sta_info_le.rssi[i];
 sinfo->chain_signal[count_rssi] =
@@ -2626,8 +2627,6 @@
 } if (count_rssi) {
 sinfo->filled |= BIT(NL80211_STA_INFO_CHAIN_SIGNAL);
 -sinfo->chains = count_rssi;
- sinfo->filled |= BIT(NL80211_STA_INFO_SIGNAL);
 total_rssi /= count_rssi;
 sinfo->signal = total_rssi;
@@ -3468,6 +3467,8 @@
 }
 netinfo = brcmf_get_netinfo_array(pfn_result);
 +if (netinfo->SSID_len > IEEE80211_MAX_SSID_LEN)
+    netinfo->SSID_len = IEEE80211_MAX_SSID_LEN;
 memcpy(cfg->wowl.nd->ssid.ssid, netinfo->SSID, netinfo->SSID_len);
 cfg->wowl.nd->ssid.ssid_len = netinfo->SSID_len;
 cfg->wowl.nd->n_channels = 1;
@@ -5266,7 +5267,8 @@
 return false;
 }

 -static bool brcmf_is_linkdown(const struct brcmf_event_msg *e)
+static bool brcmf_is_linkdown(struct brcmf_cfg80211_vif *vif,
+    const struct brcmf_event_msg *e)
+
+    {  
+        u32 event = e->event_code;
+        u16 flags = e->flags;
+        @@ -5275,6 +5277,8 @@
+            (event == BRCMF_E_DISASSOC_IND) ||
+                ((event == BRCMF_E_LINK) && (!(flags & BRCMF_EVENT_MSG_LINK)))) {  
+                brcmf_dbg(CONN, "Processing link down\n");
+                clear_bit(BRCMF_VIF_STATUS_EAP_SUCCESS, &vif->sme_state);
+                clear_bit(BRCMF_VIF_STATUS_ASSOC_SUCCESS, &vif->sme_state);
+                return true;
+            }
+            return false;
+       @@ -5352,6 +5356,8 @@
+                conn_info->req_ie =
+                    kmemdup(cfg->extra_buf, conn_info->req_ie_len,
+                        GFP_KERNEL);
+                +if (!conn_info->req_ie)
+                    +conn_info->req_ie_len = 0;
+            } else {
+                conn_info->req_ie_len = 0;
+                conn_info->req_ie = NULL;
+       @@ -5368,6 +5374,8 @@
+                conn_info->resp_ie =
+                    kmemdup(cfg->extra_buf, conn_info->resp_ie_len,
+                        GFP_KERNEL);
+                +if (!conn_info->resp_ie)
+                    +conn_info->resp_ie_len = 0;
+            } else {
+                conn_info->resp_ie_len = 0;
+                conn_info->resp_ie = NULL;
+       @@ -5555,7 +5563,7 @@
+            } else
+                brcmf_bss_connect_done(cfg, ndev, e, true);
+                brcmf_net_setcarrier(ifp, true);
+        -} else if (brcmf_is_linkdown(e)) {
+        +} else if (brcmf_is_linkdown(ifp->vif, e)) {
+                brcmf_dbg(CONN, "Linkdown\n");
+                if (!brcmf_is_ibssmode(ifp->vif)) {
+                    brcmf_bss_connect_done(cfg, ndev, e, false);
+        @@ -5984,7 +5992,8 @@
+            */
+    channel->flags = IEEE80211_CHAN_NO_HT40 |
+        - IEEE80211_CHAN_NO_80MHZ;
+        + IEEE80211_CHAN_NO_80MHZ |
+        + IEEE80211_CHAN_NO_160MHZ;
ch.bw = BRCMU_CHAN_BW_20;
cfg->d11inf.encchspec(&ch);
chaninfo = ch.chspec;
@@ -6287,6 +6296,16 @@
 .tx = 0xffff,
 .rx = BIT(IEEE80211_STYPE_ACTION >> 4) |
      BIT(IEEE80211_STYPE_PROBE_REQ >> 4)
+},
+[NL80211_IFTYPE_AP] = {
  .tx = 0xffff,
  .rx = BIT(IEEE80211_STYPE_ASSOC_REQ >> 4) |
+    BIT(IEEE80211_STYPE_REASSOC_REQ >> 4) |
+    BIT(IEEE80211_STYPE_DISASSOC >> 4) |
+    BIT(IEEE80211_STYPE_AUTH >> 4) |
+    BIT(IEEE80211_STYPE_DEAUTH >> 4) |
+    BIT(IEEE80211_STYPE_ACTION >> 4)
  }
};
@@ -6802,7 +6821,7 @@
 return;

/* ignore non-ISO3166 country codes */
-for (i = 0; i < sizeof(req->alpha2); i++)
+for (i = 0; i < 2; i++)
  if (req->alpha2[i] < 'A' || req->alpha2[i] > 'Z') {
    brcmf_err("not an ISO3166 code (0x%02x 0x%02x)\n",
             req->alpha2[0], req->alpha2[1]);
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/common.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/common.c
@@ -314,9 +314,7 @@
    /* Replace all newline/linefeed characters with space */
    * character
    */
-  ptr = clmver;
-while ((ptr = strnchr(ptr, '\n', sizeof(buf))) != NULL)
-    *ptr = ' ';
+  strreplace(clmver, '\n', '');

  brcmf_dbg(INFO, "CLM version = %s\n", clmver);
}
-if (ret != -ENODATA && *ifp)
+if (ret != -ENODATA && *ifp && (*ifp)->ndev)
 (*ifp)->ndev->stats.rx_errors++;
brcmu_pkt_buf_free_skb(skb);
return -ENODATA;
@@ -382,7 +382,8 @@
 } else {
 /* Process special event packets */
 if (handle_event)
-brcmf_fweh_process_skb(ifp->drvr, skb);
+brcmf_fweh_process_skb(ifp->drvr, skb,
-BCMILCP_SUBTYPE_VENDOR_LONG);
+brcmf_netif_rx(ifp, skb);
 }
@@ -399,7 +400,7 @@
 if (brcmf_rx_hdrpull(drvr, skb, &ifp))
 return;

-brcmf_fweh_process_skb(ifp->drvr, skb);
+brcmf_fweh_process_skb(ifp->drvr, skb, 0);
brcmu_pkt_buf_free_skb(skb);
}

@@ -701,17 +702,17 @@
 bool rtnl_locked)
{
 struct brcmf_if *ifp;
+int ifidx;

 ifp = drvr->iflist[bsscfgidx];
-drvr->iflist[bsscfgidx] = NULL;
 if (!ifp) {
 brcmf_err("Null interface, bsscfgidx=%d\n", bsscfgidx);
 return;
 }
 brcmf_dbg(TRACE, "Enter, bsscfgidx=%d, ifidx=%d\n", bsscfgidx,
+ifp->ifidx);
-if (drvr->if2bss[ifp->ifidx] == bsscfgidx)
-+brcmf_ifp_removed(ifp, rtnl_locked);
kfree(ifp);
void brcmf_remove_interface(struct brcmf_if *ifp, bool rtnl_locked)

brcmf_bus_change_state(bus_if, BRCMF_BUS_DOWN);

/* make sure primary interface removed last */
for (i = BRCMF_MAX_IFS-1; i > -1; i--)
    brcmf_remove_interface(drvr->iflist[i], false);

brcmf_bus_stop(drvr->bus_if);

/* set chip related quirks */
switch (drvr->bus_if->chip) {
    --- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fweh.h
    +++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fweh.h
    @ @ -211,7 +211,7 @@
    */
typedef BRCM_OUI "\x00\x10\x18"
#define BCMIFP_SUBTYPE_EVENT 1
#define BCMIFP_SUBTYPE_VENDOR_LONG 32769

/**
 * struct brcm_ethhdr - broadcom specific ether header.
 @ @ -334,10 +334,10 @@
 void brcmf_fweh_p2pdev_setup(struct brcmf_if *ifp, bool ongoing);

static inline void brcmf_fweh_process_skb(struct brcmf_pub *drvr,
- struct sk_buff *skb
+ struct sk_buff *skb, u16 stype)
 {
 struct brcmf_event *event_packet;
 -u16 usr_stype;
 +u16 subtype, usr_stype;

 /* only process events when protocol matches */
 if (skb->protocol != cpu_to_be16(ETH_P_LINK_CTL))
 @ @ -346,8 +346,16 @@
 if ((skb->len + ETH_HLEN) < sizeof(*event_packet))
 return;

-/* check for BRCM oui match */
event_packet = (struct brcmf_event *)skb_mac_header(skb);
+
+/* check subtype if needed */
+if (unlikely(stype)) {
+subtype = get_unaligned_be16(&event_packet->hdr.subtype);
+if (subtype != stype)
+return;
+}
+
+/* check for BRCM oui match */
if (memcmp(BRCM_OUI, &event_packet->hdr.oui[0],
 sizeof(event_packet->hdr.oui)))
return;
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fwil_types.h
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fwil_types.h
@@ -30,7 +30,7 @@
#define BRCMF_ARP_OL_PEER_AUTO_REPLY 0x00000008

#define BRCMF_BSS_INFO_VERSION109 /* curr ver of brcmf_bss_info_le struct */
-#define BRCMF_BSS_RSSI_ON_CHANNEL 0x0002
+#define BRCMF_BSS_RSSI_ON_CHANNEL 0x0004

#define BRCMF_STA_WME 0x00000002 /* WMM association */
```
#define BRCMF_STA_AUTHE 0x00000008 /* Authenticated */

--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fwsignal.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fwsignal.c
@@ -579,24 +579,6 @@
 return ifidx == *(int *)arg;
 }

-static void brcmf_fws_psq_flush(struct brcmf_fws_info *fws, struct pktq *q,
-int ifidx)
-{
-bool (*matchfn)(struct sk_buff *, void *) = NULL;
-struct sk_buff *skb;
-int prec;
-
-if (ifidx != -1)
-matchfn = brcmf_fws_ifidx_match;
-for (prec = 0; prec < q->num_prec; prec++) {
-skb = brcmu_pktq_pdeq_match(q, prec, matchfn, &ifidx);
-while (skb) {
-brcmu_pkt_buf_free_skb(skb);
-skb = brcmu_pktq_pdeq_match(q, prec, matchfn, &ifidx);
-}
-}
-}
-}
-}
-
-static void brcmf_fws_hanger_init(struct brcmf_fws_hanger *hanger)
{
 int i;
@@ -668,6 +650,32 @@
 return 0;
 }

+static void brcmf_fws_psq_flush(struct brcmf_fws_info *fws, struct pktq *q,
+int ifidx)
+{
+struct brcmf_fws_hanger_item *hi;
+bool (*matchfn)(struct sk_buff *, void *) = NULL;
+struct sk_buff *skb;
+int prec;
+u32 hslot;
+
+if (ifidx != -1)
+matchfn = brcmf_fws_ifidx_match;
+for (prec = 0; prec < q->num_prec; prec++) {
+skb = brcmu_pktq_pdeq_match(q, prec, matchfn, &ifidx);
+while (skb) {
+hslot = brcmf_skb_htod_tag_get_field(skb, HSLOT);
+hi = &fws->hanger.items[hslot];
```
WARN_ON(skb != hi->pkt);
hi->state = BRCMF_FWS_HANGER_ITEM_STATE_FREE;
brcmf_fws_hanger_poppkt(&fws->hanger, hslot, &skb, true);
brcmu_pkt_buf_free_skb(skb);
skb = brcmu_pktq_pdeq_match(q, prec, matchfn, &ifidx);
+
static int brcmf_fws_hanger_mark_suppressed(struct brcmf_fws_hanger *h, u32 slot_id)
{
    brcmf_fws_lock(fws);
    ifp->fws_desc = NULL;
brcmf_dbg(TRACE, "deleting %s
", entry->name);
brcmf_fws_macdesc_cleanup(fws, &fws->desc.iface[ifp->ifidx],
    ifp->ifidx);
brcmf_fws_macdesc_deinit(entry);
brcmf_fws_cleanup(fws, ifp->ifidx);
brcmf_fws_unlock(fws);
    return fws;

    fail:
    brcmf_fws_detach(fws);
    brcmf_fws_detach_pre_delif(fws);
brcmf_fws_detach_post_delif(fws);
    return ERR_PTR(rc);
}

void brcmf_fws_detach(struct brcmf_fws_info *fws)
+void brcmf_fws_detach_pre_delif(struct brcmf_fws_info *fws)
{
    if (!fws)
        return;
    -if (fws->fws_wq)
brcmf_fws_detach_post_delif(fws);
    return ERR_PTR(rc);
}
+return;
/* cleanup */
brcmf_fws_lock(fws);
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fwsignal.h
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/fwsignal.h
@@ -19,7 +19,8 @@
#define FWSIGNAL_H_
struct brcmf_fws_info *brcmf_fws_attach(struct brcmf_pub *drvr);
-void brcmf_fws_detach(struct brcmf_fws_info *fws);
+void brcmf_fws_detach_pre_delif(struct brcmf_fws_info *fws);
+void brcmf_fws_detach_post_delif(struct brcmf_fws_info *fws);
bool brcmf_fws_queue_skbs(struct brcmf_fws_info *fws);
bool brcmf_fws_fc_active(struct brcmf_fws_info *fws);
void brcmf_fws_hdrpull(struct brcmf_if *ifp, s16 siglen, struct sk_buff *skb);
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/msgbuf.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/msgbuf.c
@@ -1112,7 +1112,7 @@
 skb->protocol = eth_type_trans(skb, ifp->ndev);

-brcmf_fweh_process_skb(ifp->drvr, skb);
+brcmf_fweh_process_skb(ifp->drvr, skb, 0);
 exit:
 brcmu_pkt_buf_free_skb(skb);
@@ -1538,6 +1538,8 @@
 BRCMF_TX_IOCTL_MAX_MSG_SIZE,
 msgbuf->ioctlbuf,
 msgbuf->ioctlbuf_handle);
+if (msgbuf->txflow_wq)
+destroy_workqueue(msgbuf->txflow_wq);
 kfree(msgbuf);
 }
return -ENOMEM;
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/p2p.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/p2p.c
@@ -74,7 +74,7 @@
#define P2P_AF_MAX_WAIT_TIMEEmsecs_to_jiffies(2000)
#define P2P_INVALID_CHANNEL-1
#define P2P_CHANNEL_SYNC_RETRY5
-#define P2P_AF_FRM_SCAN_MAX_WAITmsecs_to_jiffies(1500)
+#define P2P_AF_FRM_SCAN_MAX_WAITmsecs_to_jiffies(450)
#define P2P_DEFAULT_SLEEP_TIME_VSDB200
/* WiFi P2P Public Action Frame OUI Subtypes */
@@ -462,25 +462,23 @@
static void brcmf_p2p_generate_bss_mac(struct brcmf_p2p_info *p2p, u8 *dev_addr)
{
    struct brcmf_if *pri_ifp = p2p->bss_idx[P2PAPI_BSSCFG_PRIMARY].vif->ifp;
    bool local_admin = false;
    bool random_addr = false;

    if (!dev_addr || is_zero_ether_addr(dev_addr)) {
        dev_addr = pri_ifp->mac_addr;
        local_admin = true;
    }
    if (!dev_addr || is_zero_ether_addr(dev_addr))
        random_addr = true;
    memcpy(p2p->dev_addr, dev_addr, ETH_ALEN);
    if (local_admin)
        p2p->dev_addr[0] |= 0x02;
    else
        memcpy(p2p->dev_addr, dev_addr, ETH_ALEN);

    /* Generate the P2P Device Address. This consists of the device's
     * primary MAC address with the locally administered bit set.
     */
    -memcpy(p2p->dev_addr, dev_addr, ETH_ALEN);
    -if (local_admin)
        p2p->dev_addr[0] |= 0x02;
    -else
        memcpy(p2p->dev_addr, dev_addr, ETH_ALEN);

    /* Generate the P2P Interface Address. If the discovery and connection
     * BSSCFGs need to simultaneously co-exist, then this address must be
     */
    struct afx_hdl *afx_hdl = &p2p->afx_hdl;
    struct brcmf_cfg80211_vif *pri_vif;
    -unsigned long duration;
    s32 retry;

    brcmf_dbg(TRACE, "Enter\n");
    @ @ -1136,7 +1134,6 @@
    
    }
-duration = msecs_to_jiffies(P2P_AF_FRM_SCAN_MAX_WAIT);
while ((retry < P2P_CHANNEL_SYNC_RETRY) &&
   (afx_hdl->peer_chan == P2P_INVALID_CHANNEL)) {
  afx_hdl->is_listen = false;
  @ @ -1160,7 +1156,8 @@
  retry);
/* search peer on peer's listen channel */
schedule_work(&afx_hdl->afx_work);
-wait_for_completion_timeout(&afx_hdl->act_frm_scan, duration);
+wait_for_completion_timeout(&afx_hdl->act_frm_scan,
   +P2P_AF_FRM_SCAN_MAX_WAIT);
if ((afx_hdl->peer_chan != P2P_INVALID_CHANNEL) ||
   (!test_bit(BRCMF_P2P_STATUS_FINDING_COMMON_CHANNEL,
      &p2p->status)))
  @ @ -1173,7 +1170,7 @@
afx_hdl->is_listen = true;
schedule_work(&afx_hdl->afx_work);
-wait_for_completion_timeout(&afx_hdl->act_frm_scan,
  -duration);
+P2P_AF_FRM_SCAN_MAX_WAIT);
}
if ((afx_hdl->peer_chan != P2P_INVALID_CHANNEL) ||
   (!test_bit(BRCMF_P2P_STATUS_FINDING_COMMON_CHANNEL,
      &p2p->status)))
  @ @ -1460,10 +1457,12 @@
return 0;

if (e->event_code == BRCMF_E_ACTION_FRAME_COMPLETE) {
  -if (e->status == BRCMF_E_STATUS_SUCCESS)
+if (e->status == BRCMF_E_STATUS_SUCCESS) {
    set_bit(BRCMF_P2P_STATUS_ACTION_TX_COMPLETED,
      &p2p->status);
  -else {
+    if (!p2p->wait_for_offchan_complete)
+      complete(&p2p->send_af_done);
+  } else {
    set_bit(BRCMF_P2P_STATUS_ACTION_TX_NOACK, &p2p->status);
/* If there is no ack, we don't need to wait for
 * WLC_E_ACTION_FRAME_OFFCHAN_COMPLETE event
  @ @ -1514,6 +1513,17 @@
p2p->af_sent_channel = le32_to_cpu(af_params->channel);
p2p->af_tx_sent_jiffies = jiffies;
+if (test_bit(BRCMF_P2P_STATUS_DISCOVER_LISTEN, &p2p->status) &&
+    p2p->af_sent_channel ==
+    ieee80211_frequency_to_channel(p2p->remain_on_channel.center_freq))
  +p2p->wait_for_offchan_complete = false;
+else
  +p2p->wait_for_offchan_complete = true;
timeout = wait_for_completion_timeout(&p2p->send_af_done, P2P_AF_MAX_WAIT_Time);

--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/p2p.h
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/p2p.h
@@ -124,6 +124,7 @@
 *
 * @gon_req_action: about to send go negotiation requests frame.
 * @block_gon_req_tx: drop tx go negotiation requests frame.
+ * @wait_for_offchan_complete: wait for off-channel tx completion event.
 */
 struct brcmf_p2p_info {
 struct brcmf_cfg80211_info *cfg;
@@ -144,6 +145,7 @@
 bool gon_req_action;
 bool block_gon_req_tx;
 bool p2pdev_dynamically;
+ bool wait_for_offchan_complete;
 };

 s32 brcmf_p2p_attach(struct brcmf_cfg80211_info *cfg, bool p2pdev_forced);
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/proto.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/proto.c
@@ -66,16 +66,22 @@
 return -ENOMEM;
 }
-void brcmf_proto_detach(struct brcmf_pub *drvr)
+void brcmf_proto_detach_post_delif(struct brcmf_pub *drvr)
 { 
 brcmf_dbg(TRACE, "Enter\n");
 if (drvr->proto) {
 if (drvr->bus_if->proto_type == BRCMF_PROTO_BCDC) 
-brcmf_proto_bcdc_detach(drvr);
+ brcmf_proto_bcdc_detach_post_delif(drvr);
 else if (drvr->bus_if->proto_type == BRCMF_PROTO_MSGBUF) 
 brcmf_proto_msgbuf_detach(drvr);
 kfree(drvr->proto);
 drvr->proto = NULL;
 } 
 }
+void brcmf_proto_detach_pre_delif(struct brcmf_pub *drvr)
+
+if (drvr->proto && drvr->bus_if->proto_type == BRCMF PROTO BCDC)
+brcmf_proto_bcde_detach_pre_delif(drvr);
+
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/proto.h
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/proto.h
@@ -53,7 +53,8 @@
 int brcmf_proto_attach(struct brcmf_pub *drvr);
 void brcmf_proto_detach(struct brcmf_pub *drvr);
 +void brcmf_proto_detach_pre_delif(struct brcmf_pub *drvr);
 +void brcmf_proto_detach_post_delif(struct brcmf_pub *drvr);

 static inline int brcmf_proto_hdrpull(struct brcmf_pub *drvr, bool do_fws,
   struct sk_buff *skb,
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/sdio.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/sdio.c
@@ -1938,6 +1938,7 @@
RD->len = 0;
   brcmu_pkt_buf_free_skb(pkt);
+   continue;
 }
 bus->sdcnt.rx_readahead_cnt++;

 BRCMF SDIO FT NORMAL) {
 rd->len = 0;
 brcmu_pkt_buf_free_skb(pkt);
+   continue;
 }
 bus->sdcnt.rx_readahead_cnt++;
 if (rd->len != roundup(rd_new.len, 16)) {
 @@ -3614,7 +3615,11 @@
+   brcmf_sdio_wd_timer(bus, false);
+   brcmf_sdio_wd_timer(bus, false);
+   brcmf_sdio_wd_timer(bus, false);
+   brcmf_sdio_wd_timer(bus, false);
+   brcmf_sdio_wd_timer(bus, false);
+   if (!BRCMF FWON) ||
+    bus->console_interval == 0)
+   #endif
+   brcmf_sdio_wd_timer(bus, false);
+   bus->idlecount = 0;
   brcmf_sdio_bus_sleep(bus, true, false);
   sdio_release_host(bus->siodev->func[1]);
@@ -4267,6 +4272,13 @@
 brcmf_dbg(TRACE, "Enter\n");

 if (bus) {
+   /* Stop watchdog task */
+   if (bus->watchdog_tsk) {
+     send_sig(SIGTERM, bus->watchdog_tsk, 1);
+     kthread_stop(bus->watchdog_tsk);
/* De-register interrupt handler */
brcmf_sdiod_intr_unregister(bus->sdiodev);

--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/usb.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/usb.c
@@ -160,7 +160,7 @@}
struct usb_device *usbdev;
struct device *dev;
-struct mutex dev_init_lock;
+struct completion dev_init_done;

int ctl_in_pipe, ctl_out_pipe;
struct urb *ctl_urb; /* URB for control endpoint */
@@ -441,6 +441,7 @@
usb_free_urb(req->urb);
list_del(q->next);
}
+kfree(reqs);
return NULL;
}
@@ -684,12 +685,18 @@
static void brcmf_cancel_all_urbs(struct brcmf_usbdev_info *devinfo)
{
+int i;
+
if (devinfo->ctl_urb)
usb_kill_urb(devinfo->ctl_urb);
if (devinfo->bulk_urb)
usb_kill_urb(devinfo->bulk_urb);
-brcmf_usb_free_q(&devinfo->tx_postq, true);
-brcmf_usb_free_q(&devinfo->rx_postq, true);
+if (devinfo->tx_reqs)
+for (i = 0; i < devinfo->bus_pub.ntxq; i++)
+usb_kill_urb(devinfo->tx_reqs[i].urb);
+if (devinfo->rx_reqs)
+for (i = 0; i < devinfo->bus_pub.nrnxq; i++)
+usb_kill_urb(devinfo->rx_reqs[i].urb);
}

static void brcmf_usb_down(struct device *dev)
@@ -1210,11 +1217,11 @@
if (ret)
goto error;

-mutex_unlock(&devinfo->dev_init_lock);
+complete(&devinfo->dev_init_done);
return;

error:
brcmf_dbg(TRACE, "failed: dev=%s, err=%d\n", dev_name(dev), ret);
-mutex_unlock(&devinfo->dev_init_lock);
+complete(&devinfo->dev_init_done);
device_release_driver(dev);
}

@@ -1260,7 +1267,7 @@
if (ret)
goto fail;
/* we are done */
-mutex_unlock(&devinfo->dev_init_lock);
+complete(&devinfo->dev_init_done);
return 0;
}
bus->chip = bus_pub->devid;
@@ -1321,11 +1328,10 @@

devinfo->usbdev = usb;
devinfo->dev = &usb->dev;
-/* Take an init lock, to protect for disconnect while still loading.
+/* Init completion, to protect for disconnect while still loading.
 * Necessary because of the asynchronous firmware load construction
 */
-mutex_init(&devinfo->dev_init_lock);
-mutex_lock(&devinfo->dev_init_lock);
+init_completion(&devinfo->dev_init_done);

usb_set_intfdata(intf, devinfo);

@@ -1346,7 +1352,7 @@
goto fail;
}

-desc = &intf->altsetting[0].desc;
+desc = &intf->cur_altsetting->desc;
if ((desc->bInterfaceClass != USB_CLASS_VENDOR_SPEC) ||
 (desc->bInterfaceSubClass != 2) ||
 (desc->bInterfaceProtocol != 0xff)) {
@@ -1359,7 +1365,7 @@
num_of_eps = desc->bNumEndpoints;
for (ep = 0; ep < num_of_eps; ep++) {

endpoint = intf->altsetting[0].endpoint[ep].desc;
@end 1403,7 +1409,7 @@
endpoint = intf->cur_altsetting->endpoint[ep].desc;
endpoint_num = usb_endpoint_num(endpoint);
if (!usb_endpoint_xfer_bulk(endpoint))
    continue;
@end 1409,7 +1415,7 @@
return 0;

fail:
-    mutex_unlock(&devinfo->dev_init_lock);
+    complete(&devinfo->dev_init_done);
kfree(devinfo);
    usb_set_intfdata(intf, NULL);
    return ret;
    @ @ -1418,7 +1424,7 @@
    devinfo = (struct brcmf_usbdev_info *)usb_get_intfdata(intf);

    if (devinfo) {
-        mutex_lock(&devinfo->dev_init_lock);
+        wait_for_completion(&devinfo->dev_init_done);
/* Make sure that devinfo still exists. Firmware probe routines
* may have released the device and cleared the intfdata.
*/
    }
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmfmac/vendor.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmfmac/vendor.c
@@ -35,9 +35,10 @@
struct brcmf_if *ifp;
    const struct brcmf_vndr_dcmd_hdr *cmdhdr = data;
    struct sk_buff *reply;
-    int ret, payload, ret_len;
+    unsigned int payload, ret_len;
    void *dcmd_buf = NULL, *wr_pointer;
    u16 msglen, maxmsglen = PAGE_SIZE - 0x100;
    +int ret;

    if (len < sizeof(*cmdhdr)) {
        brcmf_err("vendor command too short: \%\d\n", len);
    } @@ -65,7 +66,7 @@
        brcmf_err("oversize return buffer \%\d\n", ret_len);
        ret_len = BRCMF_DCMD_MAXLEN;
    }
@end 85,7 +86,8 @@
    -payload = max(ret_len, len) + 1;
+payload = max_t(unsigned int, ret_len, len) + 1;
    dcmd_buf = vzalloc(payload);
    if (NULL == dcmd_buf)
        return -ENOMEM;
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmsmac/mac80211_if.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmsmac/mac80211_if.c
spin_lock_bh(&wl->lock);
+wlc->vif = vif;
wlmute_tx = false;
brcms_c_mute(wl->wlc, false);
if (vif->type == NL80211_IFTYPE_STATION)
static void
brcms_ops_remove_interface(struct ieee80211_hw *hw, struct ieee80211_vif *vif)
{
+struct brcms_info *wl = hw->priv;
++spin_lock_bh(&wl->lock);
+wlc->vif = NULL;
++spin_unlock_bh(&wl->lock);
}
static int brcms_ops_config(struct ieee80211_hw *hw, u32 changed)
static int brcms_ops_beacon_set_tim(struct ieee80211_hw *hw,
static int brcms_ops_remove_interface(struct ieee80211_hw *hw, struct ieee80211_vif *vif)
{
+struct brcms_info *wl = hw->priv;
++spin_lock_bh(&wl->lock);
+wlc->vif = NULL;
++spin_unlock_bh(&wl->lock);
}
static int brcms_ops_config(struct ieee80211_hw *hw, u32 changed)
 @} -40.8 +846.8 @@
status = brcms_c_aggregatable(wl->wlc, tid);
spin_unlock_bh(&wl->lock);
if (!status) {
-brcms_err(wl->wlc->hw->d11core,
- "START: tid %d is not agg\able\n", tid);
+brcms_dbg(ht(wl->wlc->hw->d11core,
+ "START: tid %d is not agg\able\n", tid);
return -EINVAL;
}
ieee80211_start_tx_ba_cb_irqsafe(vif, sta->addr, tid);
 @} -937.6 +943.25 @@
spin_unlock_bh(&wl->lock);
}
+static int brcms_ops_beacon_set_tim(struct ieee80211_hw *hw,
+ struct ieee80211_sta *sta, bool set)
+{
+struct brcms_info *wl = hw->priv;
+struct sk_buff *beacon = NULL;
+u16 tim_offset = 0;
+
+spin_lock_bh(&wl->lock);
+if (wl->wlc->vif)
+beacon = ieee80211_beacon_get_tim(hw, wl->wlc->vif,
+ &tim_offset, NULL);
+if (beacon)
+brcms_c_set_new_beacon(wl->wlc, beacon, tim_offset,
static const struct ieee80211_ops brcms_ops = {
    .tx = brcms_ops_tx,
    .start = brcms_ops_start,
    .flush = brcms_ops_flush,
    .get_tsf = brcms_ops_get_tsf,
    .set_tsf = brcms_ops_set_tsf,
    .set_tim = brcms_ops_beacon_set_tim,
};

void brcms_dpc(unsigned long data)
{
    struct brcms_info *wl;
    struct ieee80211_hw *hw;
    int ret;

dev_info(&pdev->dev, "mfg %x core %x rev %d class %d irq %d\n",
    pdev->id.manuf, pdev->id.id, pdev->id.rev, pdev->id.class,
    @ @ -1221,11 +1248,16 @ @
    wl = brcms_attach(pdev);
    if (!wl) {
        pr_err("%s: brcms_attach failed!\n", __func__);  
        return -ENODEV;
        ret = -ENODEV;
        goto err_free_ieee80211;
    }  
    brcms_led_register(wl);

    return 0;
    +
    +err_free_ieee80211:
    +ieee80211_free_hw(hw);
    +return ret;
}

static int brcms_suspend(struct bcma_device *pdev)
{
    @ @ -1563,7 +1595,7 @ @
}

/*
   - * precondition: perimeter lock has been acquired
+ * precondition: no locking required
+ */
int brcms_ucode_init_buf(struct brcms_info *wl, void **pbuf, u32 idx)
{
    @@ -1578,10 +1610,10 @@
        if (le32_to_cpu(hdr->idx) == idx) {
            pdata = wl->fw.fw_bin[i]->data +
                le32_to_cpu(hdr->offset);
-            *pbuf = kmemdup(pdata, len, GFP_ATOMIC);
+            *pbuf = kvmalloc(len, GFP_KERNEL);
            if (*pbuf == NULL)
            goto fail;
+            memcpy(*pbuf, pdata, len);
            return 0;
        }
    }
@@ -1629,7 +1661,7 @@
+*/
void brcms_ucode_free_buf(void *p)
{
    -kfree(p);
+    kvfree(p);
}
/*
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmsmac/main.h
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmsmac/main.h
@@ -563,6 +563,7 @@
    struct wiphy *wiphy;
    struct scb pri_scb;
    +struct ieee80211_vif *vif *
    +vif;
    
    struct sk_buff *beacon;
    u16 beacon_tim_offset;
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmsmac/phy/phy_lcn.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmsmac/phy/phy_lcn.c
@@ -5090,8 +5090,10 @@
    pi->pi_fptr.radioloftget = wlc_lcnphy_get_radio_loft;
    pi->pi_fptr.detach = wlc_phy_detach_lcnphy;
-    if (!wlc_phy_txpwr_srom_read_lcnphy(pi))
+    if (!wlc_phy_txpwr_srom_read_lcnphy(pi)) {
+        kfree(pi->u.pi_lcnphy);
        return false;
+    }
if (LCNREV_IS(pi->pubpi.phy_rev, 1)) {
  if (pi_lcn->lcnphy_tempsense_option == 3) {
    --- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmsmac/phy/phy_qmath.c
    +++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmsmac/phy/phy_qmath.c
    @ @ -213,7 +213,7 @ @
    30498,
    31267,
    32024,
  -32768
  +32767
  }
}

#define LOG_TABLE_SIZE 32 /* log_table size */
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/brcmutil/d11.c
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/brcmutil/d11.c
@@ -77,6 +77,8 @@
return BRCMU_CHSPEC_D11AC_BW_40;
case BRCMU_CHAN_BW_80:
  return BRCMU_CHSPEC_D11AC_BW_80;
+case BRCMU_CHAN_BW_160:
+  return BRCMU_CHSPEC_D11AC_BW_160;
default:
  WARN_ON(1);
}@@ -190,8 +192,41 @@
break;
}break;
-case BRCMU_CHSPEC_D11AC_BW_8080:
-case BRCMU_CHSPEC_D11AC_BW_160:
+ch->bw = BRCMU_CHAN_BW_160;
+ch->sb = brcmu_maskget16(ch->chspec, BRCMU_CHSPEC_D11AC_SB_MASK, 
+  BRCMU_CHSPEC_D11AC_SB_SHIFT);
+switch (ch->sb) {
+  case BRCMU_CHAN_SB_LLL:
+    ch->control_ch_num -= CH_70MHZ_APART;
+    break;
+  case BRCMU_CHAN_SB_LLU:
+    ch->control_ch_num -= CH_50MHZ_APART;
+    break;
+  case BRCMU_CHAN_SB_LUL:
+    ch->control_ch_num -= CH_30MHZ_APART;
+    break;
+  case BRCMU_CHAN_SB_LUU:
+    ch->control_ch_num -= CH_10MHZ_APART;
+    break;
  case BRCMU_CHAN_SB_ULL:
    ch->control_ch_num += CH_10MHZ_APART;

+break;
+case BRCMU_CHAN_SB_ULU:
  +ch->control_ch_num += CH_30MHZ_APART;
  +break;
+case BRCMU_CHAN_SB_UUL:
  +ch->control_ch_num += CH_50MHZ_APART;
  +break;
+case BRCMU_CHAN_SB_UUU:
  +ch->control_ch_num += CH_70MHZ_APART;
  +break;
+default:
  +WARN_ON_ONCE(1);
  +break;
+}
+break;
+case BRCMU_CHSPEC_D11AC_BW_8080:
  default:
  WARN_ON_ONCE(1);
  break;
--- linux-4.15.0.orig/drivers/net/wireless/broadcom/brcm80211/include/brcmu_wifi.h
+++ linux-4.15.0/drivers/net/wireless/broadcom/brcm80211/include/brcmu_wifi.h
@@ -29,6 +29,8 @@
#define CH_UPPER_SB			0x01
#define CH_LOWER_SB			0x02
#define CH_EWA_VALID			0x04
+#define CH_70MHZ_APART			14
+#define CH_50MHZ_APART			10
#define CH_30MHZ_APART			6
#define CH_20MHZ_APART			4
#define CH_10MHZ_APART			2
--- linux-4.15.0.orig/drivers/net/wireless/cisco/airo.c
+++ linux-4.15.0/drivers/net/wireless/cisco/airo.c
@@ -1928,6 +1928,10 @@
  airo_print_err(dev->name, "%s: skb == NULL!", __func__);
  return NETDEV_TX_OK;
}
+if (skb_padto(skb, ETH_ZLEN)) {
  +dev->stats.tx_dropped++;
  +return NETDEV_TX_OK;
  +}
npacks = skb_queue_len (&ai->txq);

if (npacks >= MAXTXQ - 1) {
  @@ -2130,6 +2134,10 @@
  airo_print_err(dev->name, "%s: skb == NULL!", __func__);
  return NETDEV_TX_OK;
}
+if (skb_padto(skb, ETH_ZLEN)) {


+dev->stats.tx_dropped++;
+return NETDEV_TX_OK;
+
/* Find a vacant FID */
for (i = 0; i < MAX_FIDS / 2 && (fids[i] & 0xffff0000); i++);
    airo_print_err(dev->name, "%s: skb == NULL!", __func__);
    return NETDEV_TX_OK;
}
+if (skb_padto(skb, ETH_ZLEN)) {
+    dev->stats.tx_dropped++;
+    return NETDEV_TX_OK;
+
/* Find a vacant FID */
for (i = 0; i < MAX_FIDS / 2 && (fids[i] & 0xffff0000); i++);
    airo_print_err(dev->name, "%s: skb == NULL!", __func__);
    return NETDEV_TX_OK;
}

/* Find a vacant FID */
for (i = MAX_FIDS / 2; i < MAX_FIDS && (fids[i] & 0xffff0000); i++);
    we have to add a spin lock... */
rc = readBSSListRid(ai, doLoseSync, &BSSList_rid);
while(rc == 0 && BSSList_rid.index != cpu_to_le16(0xffff)) {
    ptr += sprintf(ptr, "%pM %*s rssi = %d",
        BSSList_rid.bssid,
        (int)BSSList_rid.ssidLen,
        BSSList_rid.ssid,
        ...
    ...
-if ((iobuf = kmalloc(RIDSIZE, GFP_KERNEL)) == NULL)
+if (ridcode == RID_WEP_TEMP || ridcode == RID_WEP_PERM) {
+  /* Only super-user can read WEP keys */
+  if (!capable(CAP_NET_ADMIN))
+  return -EPERM;
+
+  if ((iobuf = kzalloc(RIDSIZE, GFP_KERNEL)) == NULL)
  return -ENOMEM;
+      
-PC4500_readrid(ai,ridcode,iobuf,RIDSIZE, 1);
+++ linux-4.15.0.orig/drivers/net/wireless/intel/ipw2x00/ipw2100.c
@@ -3220,8 +3220,9 @@
 }
 }

-static void ipw2100_irq_tasklet(struct ipw2100_priv *priv)
+static void ipw2100_irq_tasklet(unsigned long data)
{
+  struct ipw2100_priv *priv = (struct ipw2100_priv *)data;
+  struct net_device *dev = priv->net_dev;
+  unsigned long flags;
+  u32 inta, tmp;
+  @ @ -6027,7 +6028,7 @@
+    spin_unlock_irqrestore(&priv->low_lock, flags);
+ }

-static void ipw2100_irq_tasklet(struct ipw2100_priv *priv);
+static void ipw2100_irq_tasklet(unsigned long data);

static const struct net_device_ops ipw2100_netdev_ops = {
  .ndo_open	= ipw2100_open,
  @ @ -6157,7 +6158,7 @@
  INIT_DELAYED_WORK(&priv->rf_kill, ipw2100_rf_kill);
  INIT_DELAYED_WORK(&priv->scan_event, ipw2100_scan_event);

  -tasklet_init(&priv->irq_tasklet, (void (*)(unsigned long))
  +tasklet_init(&priv->irq_tasklet,
                   ipw2100_irq_tasklet, (unsigned long)priv);

  /* NOTE: We do not start the deferred work for status checks yet */
--- linux-4.15.0.orig/drivers/net/wireless/intel/ipw2x00/ipw2200.c
+++ linux-4.15.0/drivers/net/wireless/intel/ipw2x00/ipw2200.c
@@ @ -1966,8 +1966,9 @@
          wireless_send_event(priv->net_dev, SIOCGIWAP, &wrqu, NULL);
 }
static void ipw_irq_tasklet(struct ipw_priv *priv)
{
    struct ipw_priv *priv = (struct ipw_priv *)data;
    u32 inta, inta_mask, handled = 0;
    unsigned long flags;
    int rc = 0;
    INIT_WORK(&priv->qos_activate, ipw_bg_qos_activate);
    #endif /* CONFIG_IPW2200_QOS */

    tasklet_init(&priv->irq_tasklet, ipw_irq_tasklet, (unsigned long)priv);
    return ret;
}

if (ext->alg != IW_ENCODE_ALG_NONE) {
    memcpy(sec.keys[idx], ext->key, ext->key_len);
    sec.key_sizes[idx] = ext->key_len;
    int key_len = clamp_val(ext->key_len, 0, SCM_KEY_LEN);
    +
    memcpy(sec.keys[idx], ext->key, key_len);
    sec.key_sizes[idx] = key_len;
    sec.flags |= (1 << idx);
    if (ext->alg == IW_ENCODE_ALG_WEP) {
        sec.encode_alg[idx] = SEC_ALG_WEP;
        timer_setup(&il->watchdog, il_bg_watchdog, 0);
    }
}

static void
-il3945_irq_tasklet(struct il_priv *il)
+i3945_irq_tasklet(unsigned long data)
{
    struct il_priv *il = (struct il_priv *)data;
    u32 inta, inta_mask, handled = 0;
    unsigned long flags;
    @ @ -10702.7 +10703.7 @@
    return ret;
    --- linux-4.15.0.orig/drivers/net/wireless/intel/ipw2x00/libipw_wx.c
    +++ linux-4.15.0/drivers/net/wireless/intel/ipw2x00/libipw_wx.c
    @@ -649,8 +649,10 @@
    }

    if (ext->alg != IW_ENCODE_ALG_NONE) {
        memcpy(sec.keys[idx], ext->key, ext->key_len);
        sec.key_sizes[idx] = ext->key_len;
        int key_len = clamp_val(ext->key_len, 0, SCM_KEY_LEN);
        +
        memcpy(sec.keys[idx], ext->key, key_len);
        sec.key_sizes[idx] = key_len;
        sec.flags |= (1 << idx);
        if (ext->alg == IW_ENCODE_ALG_WEP) {
            sec.encode_alg[idx] = SEC_ALG_WEP;
            timer_setup(&il->watchdog, il_bg_watchdog, 0);
        }
    }

    static void
    -il3945_irq_tasklet(struct il_priv *il)
    +i3945_irq_tasklet(unsigned long data)
    {
        struct il_priv *il = (struct il_priv *)data;
        u32 inta, inta_mask, handled = 0;
        u32 inta_fh;
        unsigned long flags;
        @ @ -1399.8 +1399.9 @@
tasklet_init(&il->irq_tasklet,
-    (void (*)(unsigned long))il3945_irq_tasklet,
+    il3945_irq_tasklet,
       (unsigned long)il);
}

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlegacy/4965-mac.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlegacy/4965-mac.c
@@ -4363,8 +4363,9 @@
}
static void
-il4965_irq_tasklet(struct il_priv *il)
+il4965_irq_tasklet(unsigned long data)
{
+    struct il_priv *il = (struct il_priv *)data;
    u32 inta, handled = 0;
    u32 inta_fh;
    unsigned long flags;
@@ -6263,7 +6264,7 @@
    timer_setup(&il->watchdog, il_bg_watchdog, 0);

tasklet_init(&il->irq_tasklet,
-    (void (*)(unsigned long))il4965_irq_tasklet,
+    il4965_irq_tasklet(unsiged long data)
    (unsigned long)il);
}

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlegacy/common.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlegacy/common.c
@@ -717,7 +717,7 @@
    unsigned long flags;
@@ -4302,8 +4302,8 @@
    /* L1-ASPM enabled; disable(!) L0S */

tasklet_init(&il->irq_tasklet,
-    (void (*)(unsigned long))il4965_irq_tasklet,
+    il4965_irq_tasklet(unsiged long data)
    (unsigned long)il);
}

/* allocate eeprom */
sz = il->cfg->eeprom_size;
@@ -4302,8 +4302,8 @@
    /* power savings, even without L1.
    */
if (il->cfg->set_l0s) {
-    pcie_capability_read_word(il->pci_dev, PCI_EXP_LNKCTL, &lctl);
-    if (lctl & PCI_EXP_LNKCTL_ASPM_L1) {
+    ret = pcie_capability_read_word(il->pci_dev, PCI_EXP_LNKCTL, &lctl);
+    if (!ret && (lctl & PCI_EXP_LNKCTL_ASPM_L1)) {
/* L1-ASPM enabled; disable(!) L0S */
il_set_bit(il, CSR_GIO_REG,
    CSR_GIO_REG_VAL_L0S_ENABLED);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/cfg/9000.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/cfg/9000.c
@@ -53,6 +53,7 @@
 #include <linux/stringify.h>
 #include "iwlconfig.h"
 #include "iwl-agn-hw.h"
+#include "fw/file.h"

 /* Highest firmware API version supported */
#define IWL9000_UCODE_API_MAX34
@@ -177,6 +178,17 @@
 .max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPU_64K,
 };

+const struct iwl_cfg iwl9260_killer_2ac_cfg = {
+    .name = "Killer (R) Wireless-AC 1550 Wireless Network Adapter (9260NGW)",
+    .fw_name_pre = IWL9260A_FW_PRE,
+    .fw_name_pre_b_or_c_step = IWL9260B_FW_PRE,
+    .fw_name_pre_rf_next_step = IWL9260RF_FW_PRE,
+    .max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPU_64K,
+};
+
+const struct iwl_cfg iwl9270_2ac_cfg = {
    .name = "Intel(R) Dual Band Wireless AC 9270",
    .fw_name_pre = IWL9260A_FW_PRE,
    @ @ -265,6 +277,125 @@
    .integrated = true,
    .soc_latency = 5000,
};
+
+const struct iwl_cfg iwl9560_killer_2ac_cfg_soc = {
+    .name = "Killer (R) Wireless-AC 1550i Wireless Network Adapter (9560NGW)",
+    .fw_name_pre = IWL9000A_FW_PRE,
+    .fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
+    .fw_name_pre_rf_next_step = IWL9000RF_FW_PRE,
+    .max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPU_64K,
+    .integrated = true,
+    .soc_latency = 5000,
+};
const struct iwl_cfg iwl9560_killer_s_2ac_cfg_soc = {
    .name = "Killer (R) Wireless-AC 1550s Wireless Network Adapter (9560NGW)",
    .fw_name_pre = IWL9000A_FW_PRE,
    .fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
    .fw_name_pre_rf_next_step = IWL9000RFB_FW_PRE,
    .IWL_DEVICE_9000,
    .ht_params = &iwl9000_ht_params,
    .nvm_ver = IWL9000_NVM_VERSION,
    .nvm_calib_ver = IWL9000_TX_POWER_VERSION,
    .max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPU_64K,
    .integrated = true,
    .soc_latency = 5000,
};

const struct iwl_cfg iwl9460_2ac_cfg_shared_clk = {
    .name = "Intel(R) Dual Band Wireless AC 9460",
    .fw_name_pre = IWL9000A_FW_PRE,
    .fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
    .fw_name_pre_rf_next_step = IWL9000RFB_FW_PRE,
    .IWL_DEVICE_9000,
    .ht_params = &iwl9000_ht_params,
    .nvm_ver = IWL9000_NVM_VERSION,
    .nvm_calib_ver = IWL9000_TX_POWER_VERSION,
    .max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPU_64K,
    .integrated = true,
    .soc_latency = 5000,
    .extra_phy_cfg_flags = FW_PHY_CFG_SHARED_CLK
};

const struct iwl_cfg iwl9461_2ac_cfg_shared_clk = {
    .name = "Intel(R) Dual Band Wireless AC 9461",
    .fw_name_pre = IWL9000A_FW_PRE,
    .fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
    .fw_name_pre_rf_next_step = IWL9000RFB_FW_PRE,
    .IWL_DEVICE_9000,
    .ht_params = &iwl9000_ht_params,
    .nvm_ver = IWL9000_NVM_VERSION,
    .nvm_calib_ver = IWL9000_TX_POWER_VERSION,
    .max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPU_64K,
    .integrated = true,
    .soc_latency = 5000,
    .extra_phy_cfg_flags = FW_PHY_CFG_SHARED_CLK
};

const struct iwl_cfg iwl9462_2ac_cfg_shared_clk = {
    .name = "Intel(R) Dual Band Wireless AC 9462",
    .fw_name_pre = IWL9000A_FW_PRE,
+.fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
+.fw_name_pre_rf_next_step = IWL9000RFB_FW_PRE,
+IWL_DEVICE_9000,
+.ht_params = &iwl9000_ht_params,
+.nvm_ver = IWL9000_NVM_VERSION,
+.nvm_calib_ver = IWL9000_TX_POWER_VERSION,
+.max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPDU_64K,
+.integrated = true,
+.soc_latency = 5000,
+.extra_phy_cfg_flags = FW_PHY_CFG_SHARED_CLK
+};
+
+const struct iwl_cfg iwl9560_2ac_cfg_shared_clk = {
+.name = "Intel(R) Dual Band Wireless AC 9560",
+.fw_name_pre = IWL9000A_FW_PRE,
+.fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
+.fw_name_pre_rf_next_step = IWL9000RFB_FW_PRE,
+IWL_DEVICE_9000,
+.ht_params = &iwl9000_ht_params,
+.nvm_ver = IWL9000_NVM_VERSION,
+.nvm_calib_ver = IWL9000_TX_POWER_VERSION,
+.max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPDU_64K,
+.integrated = true,
+.soc_latency = 5000,
+.extra_phy_cfg_flags = FW_PHY_CFG_SHARED_CLK
+};
+
+const struct iwl_cfg iwl9560_killer_2ac_cfg_shared_clk = {
+.name = "Killer (R) Wireless-AC 1550i Wireless Network Adapter (9560NGW)",
+.fw_name_pre = IWL9000A_FW_PRE,
+.fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
+.fw_name_pre_rf_next_step = IWL9000RFB_FW_PRE,
+IWL_DEVICE_9000,
+.ht_params = &iwl9000_ht_params,
+.nvm_ver = IWL9000_NVM_VERSION,
+.nvm_calib_ver = IWL9000_TX_POWER_VERSION,
+.max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPDU_64K,
+.integrated = true,
+.soc_latency = 5000,
+.extra_phy_cfg_flags = FW_PHY_CFG_SHARED_CLK
+};
+
+const struct iwl_cfg iwl9560_killer_s_2ac_cfg_shared_clk = {
+.name = "Killer (R) Wireless-AC 1550s Wireless Network Adapter (9560NGW)",
+.fw_name_pre = IWL9000A_FW_PRE,
+.fw_name_pre_b_or_c_step = IWL9000B_FW_PRE,
+.fw_name_pre_rf_next_step = IWL9000RFB_FW_PRE,
+IWL_DEVICE_9000,
+.ht_params = &iwl9000_ht_params,
+.nvm_ver = IWL9000_NVM_VERSION,
+.nvm_calib_ver = IWL9000_TX_POWER_VERSION,
+.max_ht_ampdu_exponent = IEEE80211_HT_MAX_AMPDU_64K,
+.integrated = true,
+.soc_latency = 5000,
+.extra_phy_cfg_flags = FW_PHY_CFG_SHARED_CLK
+};
+
+.ht_params = &iwl9000_ht_params,
+.nvm_ver = IWL9000_NVM_VERSION,
+.nvm_calib_ver = IWL9000_TX_POWER_VERSION,
+.max_ht_amdu_exponent = IEEE80211_HT_MAX_AMDPDU_64K,
+.integrated = true,
+.soc_latency = 5000,
+.extra_phy_cfg_flags = FW_PHY_CFG_SHARED_CLK
+};
+
MODULE_FIRMWARE(IWL9000A_MODULE_FIRMWARE(IWL9000_UCODE_API_MAX));
MODULE_FIRMWARE(IWL9000B_MODULE_FIRMWARE(IWL9000_UCODE_API_MAX));
MODULE_FIRMWARE(IWL9000RFB_MODULE_FIRMWARE(IWL9000_UCODE_API_MAX));

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/dvm/led.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/dvm/led.c
@@ -185,6 +185,9 @@
priv->led.name = kasprintf(GFP_KERNEL, "%s-led",
                    wiphy_name(priv->hw->wiphy));
+if (!priv->led.name)
+return;
+
priv->led.brightness_set = iwl_led_brightness_set;
priv->led.blink_set = iwl_led_blink_set;
priv->led.max_brightness = 1;
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/dvm/main.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/dvm/main.c
@@ -1227,6 +1227,23 @@
return 0;
}

+static int iwl_nvm_check_version(struct iwl_nvm_data *data,  
+struct iwl_trans *trans, 
+{ 
+if ((data->nvm_version >= trans->cfg->nvm_ver ||  
+data->calib_version >= trans->cfg->nvm_calib_ver) {  
+IWL_DEBUG_INFO(trans, "device EEPROM VER=0x%x, CALIB=0x%x\n",  
+data->nvm_version, data->calib_version);  
+return 0;  
+}  
+IWL_ERR(trans,  
+"Unsupported (too old) EEPROM VER=0x%x < 0x%x CALIB=0x%x < 0x%x\n",  
+data->nvm_version, trans->cfg->nvm_ver,  
+data->calib_version, trans->cfg->nvm_calib_ver);  
+return -EINVAL;  
+}  
+static struct iwl_op_mode *iwl_op_mode_dvm_start(struct iwl_trans *trans,
const struct iw_lcfg *cfg,
const struct iw_lfw *fw,
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/fw/acpi.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/fw/acpi.h
@@ -6,6 +6,7 @@
 * GPL LICENSE SUMMARY
 *
 * Copyright(c) 2017        Intel Deutschland GmbH
+ * Copyright(c) 2018        Intel Corporation
 *
 * This program is free software; you can redistribute it and/or modify
 * it under the terms of version 2 of the GNU General Public License as
@@ -29,6 +30,7 @@
 * BSD LICENSE
 *
 * Copyright(c) 2017        Intel Deutschland GmbH
+ * Copyright(c) 2018        Intel Corporation
 * All rights reserved.
 *
 * Redistribution and use in source and binary forms, with or without
@@ -84,7 +86,7 @@
#define ACPI_WRDS_WIFI_DATA_SIZE	(ACPI_SAR_TABLE_SIZE + 2)
#define ACPI_EWRD_WIFI_DATA_SIZE	((ACPI_SAR_PROFILE_NUM - 1) * \
 ACPI_SAR_TABLE_SIZE + 3)
-#define ACPI_WGDS_WIFI_DATA_SIZE	18
+#define ACPI_WGDS_WIFI_DATA_SIZE	19
#define ACPI_WRDD_WIFI_DATA_SIZE	2
#define ACPI_SPLC_WIFI_DATA_SIZE	2
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/fw/api/alive.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/fw/api/alive.h
@@ -95,8 +95,8 @@
#define IWL_ALIVE_FLG_RFKILL	BIT(0)
struct iwl_lmac_alive {
-  __le32 ucode_minor;
+  __le32 ucode_minor;
  __le32 ucode_major;
  __le32 umac_minor;
  __le32 umac_major;
  u8 ver_subtype;
  u8 ver_type;
  u8 mac;
@@ -113,8 +113,8 @@
} __packed; /* UCODE_ALIVE_NTFY_API_S_VER_3 */

struct iwl_umac_alive {
-  __le32 ucode_minor; /* UMAC version: minor */
+  __le32 ucode_minor; /* UMAC version: minor */
-  __le32 umac_major; /* UMAC version: major */
+  __le32 umac_major; /* UMAC version: major */
__le32 error_info_addr; /* SRAM address for UMAC error log */
__le32 dbg_print_buff_addr;
} __packed; /* UMAC_ALIVE_DATA_API_S_VER_2 */
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/fw/api/time-event.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/fw/api/time-event.h
@@ -211,7 +211,7 @@
 * @TE_V2_NOTIF_HOST_FRAG_END: request/receive notification on frag end
 * @TE_V2_NOTIF_INTERNAL_FRAG_START: internal FW use.
 * @TE_V2_NOTIF_INTERNAL_FRAG_END: internal FW use.
- * @T2_V2_START_IMMEDIATELY: start time event immediately
+ * @TE_V2_START_IMMEDIATELY: start time event immediately
 * @TE_V2_DEP_OTHER: depends on another time event
 * @TE_V2_DEP_TSF: depends on a specific time
 * @TE_V2_EVENT_SOCIOPATHIC: can't co-exist with other events of the same MAC
 @@ -230,7 +230,7 @@
 TE_V2_NOTIF_HOST_FRAG_END = BIT(5),
 TE_V2_NOTIF_INTERNAL_FRAG_START = BIT(6),
 TE_V2_NOTIF_INTERNAL_FRAG_END = BIT(7),
- * @T2_V2_START_IMMEDIATELY = BIT(11),
+ * @TE_V2_START_IMMEDIATELY = BIT(11),
 /* placement characteristics */
 TE_V2_DEP_OTHER = BIT(TE_V2_PLACEMENT_POS),
 --- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/fw/api/tx.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/fw/api/tx.h
@@ -722,9 +722,9 @@
 * @ra_tid_cnt: number of RA-TID-Q elements
 * @ra_tid: array of RA-TID queue status updates. For debug purposes only. See
- *)&iwl_mvm_compressed_ba_ratid for more details.
+ *)&iwl_mvm_compressed_ba_ratid for more details. Length in @ra_tid_cnt.
 */
struct iwl_mvm_compressed_ba_notif {
    __le32 flags;
@@ -741,7 +741,7 @@
 __le32 tx_rate;
 __le16 tfd_cnt;
 __le16 ra_tid_cnt;
-struct iwl_mvm_compressed_ba_tfd tfd[1];
+struct iwl_mvm_compressed_ba_tfd tfd[0];
 struct iwl_mvm_compressed_ba_ratid ra_tid[0];
} __packed; /* COMPRESSED_BA_RES_API_S_VER_4 */
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/fw/dbg.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/fw/dbg.c
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@ @ -536,6 +538,7 @@
if (new_page)
  __free_page(new_page);
}
+kfree(table);
return NULL;
}
alloc_size = min_t(int, size, PAGE_SIZE);
@ @ -781,7 +784,7 @@
dump_data = iwl_fw_error_next_data(dump_data);

/* We only dump the FIFOs if the FW is in error state */
-if (test_bit(STATUS_FW_ERROR, &fwrt->trans->status)) {
+if (fifo_data_len) {
  iwl_fw_dump_fifos(fwrt, &dump_data);
  if (radio_len)
    iwl_read_radio_regs(fwrt, &dump_data);
@@ -781,7 +784,7 @@
@ @ -942,7 +945,6 @@

out:
  iwl_fw_free_dump_desc(fwrt);
-fwrt->dump.trig = NULL;
  clear_bit(IWL_FWRT_STATUS_DUMPING, &fwrt->status);
  IWL_DEBUG_INFO(fwrt, "WRT dump done\n");
}@
@ @ -964,8 +966,20 @@
if (trigger)
  delay = msecs_to_jiffies(le32_to_cpu(trigger->stop_delay));

-if (WARN(fwrt->trans->state == IWL_TRANS_NO_FW,
- "Can't collect dbg data when FW isn't alive\n")
+/*
If the loading of the FW completed successfully, the next step is to get the SMEM config data. Thus, if fwrt->smem_cfg.num_lmacs is non-zero, the FW was already loaded successfully. If the state is "NO_FW" in such a case - exit, since FW may be dead. Otherwise, we can try to collect the data, since FW might just not be fully loaded (no "ALIVE" yet), and the debug data is accessible.

Corner case: got the FW alive but crashed before getting the SMEM config. In such a case, due to HW access problems, we might collect garbage.

```
if (fwrt->trans->state == IWL_TRANS_NO_FW && fwrt->smem_cfg.num_lmacs)
    return -EIO;
```

```
if (test_and_set_bit(IWL_FWRT_STATUS_DUMPING, &fwrt->status))
    return;
```

The following code is included, but not executed:

```
+ if (fwrt->ops->fw_running && !fwrt->ops->fw_running(fwrt->ops_ctx)) {
+     IWL_ERR(fwrt, "Firmware not running - cannot dump error\n");
+     iwl_fw_free_dump_desc(fwrt);
+     clear_bit(IWL_FWRT_STATUS_DUMPING, &fwrt->status);
+     goto out;
+ }
+
+ if (fwrt->trans->cfg->device_family == IWL_DEVICE_FAMILY_7000) {
+     /* stop recording */
+     iwl_fw_dbg_stop_recording(fwrt);
+     iwl_write_prph(fwrt->trans, DBGC_OUT_CTRL, out_ctrl);
+ }
+ out:
```

If the end of the dump is reached, the following code is executed:

```
if (fwrt->ops && fwrt->ops->dump_end)
    fwrt->ops->dump_end(fwrt->ops_ctx);
```
void iwl_fw_error_dump(struct iwl_fw_runtime *fwrt);

#define IWL_UCODE_MAX_CS 1
const struct fw_img *image) {
    int sec_idx, idx;
    +int sec_idx, idx, ret;
u32 offset = 0;

    /*
     @ @ -190,17 +192,23 @@
    */
    if (sec_idx >= image->num_sec - 1) {
        IWL_ERR(fwrt, "Paging: Missing CSS and/or paging sections\n");
        -iwlfree-fw_paging(fwrt);
        -return -EINVAL;
        +ret = -EINVAL;
        +goto err;
    }

    /* copy the CSS block to the dram */
    IWL_DEBUG_FW(fwrt, "Paging: load paging CSS to FW, sec = %d\n", sec_idx);
    
    +if (image->sec[sec_idx].len > fwrt->fw_paging_db[0].fw_paging_size) {
        +IWL_ERR(fwrt, "CSS block is larger than paging size\n");
        +ret = -EINVAL;
        +goto err;
        +}
        +memcpy(page_address(fwrt->fw_paging_db[0].fw_paging_block),
                image->sec[sec_idx].data,
                fwrt->fw_paging_db[0].fw_paging_size);
    }
    
    for (idx = 1; idx < fwrt->num_of_paging_blk; idx++) {
        struct iwl_fw_paging *block = &fwrt->fw_paging_db[idx];
        
        +if (block->fw_paging_size > image->sec[sec_idx].len - offset) {
            +IWL_ERR(fwrt, "Paging: paging size is larger than remaining data in block %d\n",
                    +idx);
            +ret = -EINVAL;
            +goto err;
            +}
            +memcpy(page_address(block->fw_paging_block),
                    image->sec[sec_idx].data + offset,
block->fw_paging_size);
@@ -231,19 +247,32 @@
IWL_DEBUG_FW(fwrt,
    "Paging: copied %d paging bytes to block %d\n",
    - fwrt->fw_paging_db[idx].fw_paging_size,
    - idx);
+ block->fw_paging_size, idx);
+ offset += block->fw_paging_size;

-offset += fwrt->fw_paging_db[idx].fw_paging_size;
+if (offset > image->sec[sec_idx].len) {
+  IWL_ERR(fwrt,
+    "$Paging: offset goes over section size\n")
+  ret = -EINVAL;
+  goto err;
+}
}

/* copy the last paging block */
if (fwrt->num_of_pages_in_last_blk > 0) {
    struct iwl_fw_paging *block = &fwrt->fw_paging_db[idx];

    +if (image->sec[sec_idx].len - offset > block->fw_paging_size) {
        IWL_ERR(fwrt,
            "$Paging: last block is larger than paging size\n")
        ret = -EINVAL;
        goto err;
    }
+
    memcpy(page_address(block->fw_paging_block),
        image->sec[sec_idx].data + offset,
        FW_PAGING_SIZE * fwrt->num_of_pages_in_last_blk);
+    dma_sync_single_for_device(fwrt->trans->dev,
        block->fw_paging_phys,
        block->fw_paging_size,
        @@ -255,6 +284,10 @@
    }

    return 0;
+}
+
+
+err:
+iwl_free_fw_paging(fwrt);
+return ret;
}
static int iwl_save_fw_paging(struct iwl_fw_runtime *fwrt,
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/fw/runtime.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/fw/runtime.h
@@ -6,6 +6,7 @@
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 @@ -68,6 +70,7 @@
 struct iwl_fw_runtime_ops {
 int (*dump_start)(void *ctx);
 void (*dump_end)(void *ctx);
+bool (*fw_running)(void *ctx);
};
#define MAX_NUM_LMAC 2
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/fw/smem.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/fw/smem.c
@@ -8,6 +8,7 @@
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 @@ -132,6 +134,7 @@
 .len = { 0, },
 };
struct iwl_rx_packet *pkt;
+int ret;

if (fw_has_capa(&fwrt->fw->ucode_capa,
    IWL_UCODE_TLV_CAPA_EXTEND_SHARED_MEM_CFG))
    @@ -139,8 +142,13 @@
else
    cmd.id = SHARED_MEM_CFG;

    if (WARN_ON(iwl_trans_send_cmd(fwrt->trans, &cmd)))
+    ret = iwl_trans_send_cmd(fwrt->trans, &cmd);
+    +
    +if (ret) {
    +WARN(ret != -ERFKILL,
        +"Could not send the SMEM command: %d\n", ret);
    return;
    +}

    pkt = cmd.resp_pkt;
if (fwrt->trans->cfg->device_family == IWL_DEVICE_FAMILY_A000)
    --- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/iwl-config.h
    +++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/iwl-config.h
    @@ -398,6 +398,7 @@
        u8 ucode_api_max;
        u8 ucode_api_min;
        u32 min_umac_error_event_table;
        +u32 extra_phy_cfg_flags;
    }

/*
    @@ -470,6 +471,7 @@
    extern const struct iwl_cfg iwl4165_2ac_cfg;
    extern const struct iwl_cfg iwl9160_2ac_cfg;
    extern const struct iwl_cfg iwl9260_2ac_cfg;
    +extern const struct iwl_cfg iwl9260_killer_2ac_cfg;
    extern const struct iwl_cfg iwl9270_2ac_cfg;
    extern const struct iwl_cfg iwl9460_2ac_cfg;
    extern const struct iwl_cfg iwl9560_2ac_cfg;
    @@ -477,6 +479,14 @@
    extern const struct iwl_cfg iwl9461_2ac_cfg_soc;
    extern const struct iwl_cfg iwl9462_2ac_cfg_soc;
    extern const struct iwl_cfg iwl9560_2ac_cfg_soc;
    +extern const struct iwl_cfg iwl9560_killer_2ac_cfg_soc;
    +extern const struct iwl_cfg iwl9560_killer_s_2ac_cfg_soc;
    +extern const struct iwl_cfg iwl9460_2ac_cfg_shared_clk;
    +extern const struct iwl_cfg iwl9461_2ac_cfg_shared_clk;
    +extern const struct iwl_cfg iwl9462_2ac_cfg_shared_clk;
    +extern const struct iwl_cfg iwl9560_2ac_cfg_shared_clk;
```c
+extern const struct iwl_cfg iwl9560_killer_2ac_cfg_shared_clk;
+extern const struct iwl_cfg iwl9560_killer_s_2ac_cfg_shared_clk;
extern const struct iwl_cfg iwla000_2ac_cfg_hr;
extern const struct iwl_cfg iwla000_2ac_cfg_hr_cdb;
extern const struct iwl_cfg iwla000_2ac_cfg_pf;
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/iwl-drv.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/iwl-drv.c
@@ -1504,7 +1504,6 @@
goto free;
out_free_fw:
-iwl_dealloc_ucode(drv);
release_firmware(ucode_raw);
out_unbind:
complete(&drv->request_firmware_complete);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/iwl-eeprom-parse.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/iwl-eeprom-parse.c
@@ -928,22 +928,3 @@
return NULL;
}
IWL_EXPORT_SYMBOL(iwl_parse_eeprom_data);

-/* helper functions */
-int iwl_nvm_check_version(struct iwl_nvm_data *data,
- struct iwl_trans *trans)
-{ 
- if (data->nvm_version >= trans->cfg->nvm_ver ||
- data->calib_version >= trans->cfg->nvm_calib_ver) { 
- IWL_DEBUG_INFO(trans, "device EEPROM VER=0x%x, CALIB=0x%x\n",
- data->nvm_version, data->calib_version);
- return 0;
- }
- 
- IWL_ERR(trans,
- "Unsupported (too old) EEPROM VER=0x%x < 0x%x CALIB=0x%x < 0x%x\n",
- data->nvm_version, trans->cfg->nvm_ver,
- data->calib_version, trans->cfg->nvm_calib_ver);
- return -EINVAL;
- }
-IWL_EXPORT_SYMBOL(iwl_nvm_check_version);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/iwl-eeprom-parse.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/iwl-eeprom-parse.h
@@ -7,6 +7,7 @@

*/
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@@ -33,6 +34,7 @@
iwl_parse_eeprom_data(struct device *dev, const struct iwl_cfg *cfg,
            const u8 *eeprom, size_t eeprom_size);

-int iwl_nvm_check_version(struct iwl_nvm_data *data,
-    struct iwl_trans *trans);
-
-int iwl_init_sband_channels(struct iwl_nvm_data *data,
    struct iee80211_supported_band *sband,
    int n_channels, enum nl80211_band band);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/iwl-prph.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/iwl-prph.h
@@ -8,6 +8,7 @@
    #define PREG_PRPH_WPROT_0	0xA04CE0
    #define SB_CPU_1_STATUS	0xA01E30
    #define SB_CPU_2_STATUS	0xA01E34
@@ -425,4 +428,8 @@
    #define UREG_CHICK	(0xA05C00)
#define UREG_CHICK_MSI_ENABLE	BIT(24)
#define UREG_CHICK_MSIX_ENABLE	BIT(25)
+
+#define HPM_DEBUG		0xA03440
+#define PERSISTENCE_BIT		BIT(12)
+#define PREG_WFPM_ACCESSBIT(12)
#endif		/* __iwl_prph_h__ */
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/d3.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/d3.c
@@ -951,8 +951,10 @@
{
    struct iwl_wowlan_kek_kck_material_cmd kek_kck_cmd = {
    struct iwl_wowlan_tkip_params_cmd tkip_cmd = {
+    bool unified = fw_has_capa(&mvm->fw->ucode_capa,
+        IWL_UCODE_TLV_CAPA_CNSLDTD_D3_D0_IMG);
    struct wowlan_key_data key_data = {
        .configure_keys = !d0i3,
        .use_rsc_tsc = false,
        .tkip = &tkip_cmd,
        .use_tkip = false,
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/debugfs-vif.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/debugfs-vif.c
@@ -518,7 +518,10 @@
            int pos = 0;

+    mutex_lock(&mvm->mutex);
    iwl_mvm_get_sync_time(mvm, &curr_gp2, &curr_os);
+    mutex_unlock(&mvm->mutex);
+    do_div(curr_os, NSEC_PER_USEC);
    diff = curr_os - curr_gp2;
    pos += scnprintf(buf + pos, bufsz - pos, "diff=%lld\n", diff);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/debugfs.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/debugfs.c
@@ @ -518,10 +518,10 @@
    "diff=%lld\n",
    diff);
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---
int ret;

-if (!iwl_mvm_firmware_running(mvm))
-return -EIO;
-
ret = iwl_mvm_ref_sync(mvm, IWL_MVM_REF_PRPH_WRITE);
if (ret)
return ret;

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/fw.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/fw.c
@@ -1239,9 +1241,6 @@
{
+ int ret;

+ if (!iwl_mvm_firmware_running(mvm))
+ return -EIO;
+-
ret = iwl_mvm_ref_sync(mvm, IWL_MVM_REF_PRPH_WRITE);
if (ret)
return ret;

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/fw.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/fw.c
@@ -106,12 +106,12 @@
+
	.hash_mask = BIT(IWL_RSS_HASH_TYPE_IPV4_TCP) |
+ BIT(IWL_RSS_HASH_TYPE_IPV4_UDP) | 
+ BIT(IWL_RSS_HASH_TYPE_IPV4_PAYLOAD) |
+ BIT(IWL_RSS_HASH_TYPE_IPV6_TCP) |
+ BIT(IWL_RSS_HASH_TYPE_IPV6_UDP) |
+ BIT(IWL_RSSHASH_TYPE_IPV6_PAYLOAD), 
+ .hash_mask = BIT(IWL_RSS_HASH_TYPE_IPV4_TCP) |
+ BIT(IWL_RSS_HASH_TYPE_IPV4_UDP) |
+ BIT(IWL_RSS_HASH_TYPE_IPV4_PAYLOAD) |
+ BIT(IWL_RSS_HASH_TYPE_IPV6_TCP) |
+ BIT(IWL_RSS_HASH_TYPE_IPV6_UDP) |
+ BIT(IWL_RSS_HASH_TYPE_IPV6_PAYLOAD), 
}

if (mvm->trans->num_rx_queues == 1) 
@@ -433,6 +433,10 @@
/* Set parameters */
phy_cfg_cmd.phy_cfg = cpu_to_le32(iwl_mvm_get_phy_config(mvm));
+
+/* set flags extra PHY configuration flags from the device's cfg */
+phy_cfg_cmd.phy_cfg |= cpu_to_le32(mvm->cfg->extra_phy_cfg_flags);
+phy_cfg_cmd.calib_control.event_trigger = 
+ mvm->fw->default_calib[ucode_type].event_trigger;
phy_cfg_cmd.calib_control.flow_trigger = 
@@ -495,7 +499,9 @@
if (mvm->nvm_file_name)
iw1_mvm_load_nvm_to_nic(mvm);

-WARN_ON(iwl_nvm_check_version(mvm->nvm_data, mvm->trans));
+WARN_ONCE(mvm->nvm_data->nvm_version < mvm->trans->cfg->nvm_ver,
+    "Too old NVM version (0x%0x, required = 0x%0x)",
+    mvm->nvm_data->nvm_version, mvm->trans->cfg->nvm_ver);

/*
* abort after reading the nvm in case RF Kill is on, we will complete
@@ -660,15 +666,19 @@
enabled = !!wifi_pkg->package.elements[1].integer.value;
n_profiles = wifi_pkg->package.elements[2].integer.value;

-/* in case of BIOS bug */
-if (n_profiles <= 0) {
+/*
+ * Check the validity of n_profiles. The EWRD profiles start
+ * from index 1, so the maximum value allowed here is
+ * ACPI_SAR_PROFILES_NUM - 1.
+ */
+if (n_profiles <= 0 || n_profiles >= ACPI_SAR_PROFILE_NUM) {
ret = -EINVAL;
goto out_free;
}

for (i = 0; i < n_profiles; i++) {
/* the tables start at element 3 */
-static int pos = 3;
+int pos = 3;

/ * The EWRD profiles officially go from 2 to 4, but we
* save them in sar_profiles[1-3] (because we don’t
@@ -780,6 +790,26 @@
return iw1_mvm_send_cmd_pdu(mvm, REDUCE_TX_POWER_CMD, 0, len, &cmd);
}

+static bool iwl_mvm_sar_geo_support(struct iwl_mvm *mvm)
+{
+    /* The GEO_TX_POWER_LIMIT command is not supported on earlier
+     * firmware versions. Unfortunately, we don’t have a TLV API
+     * flag to rely on, so rely on the major version which is in
+     * the first byte of ucode_ver. This was implemented
+     * initially on version 38 and then backported to 17. It was
+     * also backported to 29, but only for 7265D devices. The
+     * intention was to have it in 36 as well, but not all 8000
+     * family got this feature enabled. The 8000 family is the
+     * only one using version 36, so skip this version entirely.

+ /*
+ + return IWL_UCODE_SERIAL(mvm->fw->ucode_ver) >= 38 ||
+ + IWL_UCODE_SERIAL(mvm->fw->ucode_ver) == 17 ||
+ + (IWL_UCODE_SERIAL(mvm->fw->ucode_ver) == 29 &&
+ + ((mvm->trans->hw_rev & CSR_HW_REV_TYPE_MSK) ==
+ + CSR_HW_REV_TYPE_7265D));
+ +
+ + int iwl_mvm_get_sar_geo_profile(struct iwl_mvm *mvm)
+ {
+ struct iwl_geo_tx_power_profiles_resp *resp;
+ @ @ .795,6 +825,9 @ @
+ .data = { &geo_cmd },
+ @ @ .795,6 +825,9 @ @
+ @ @ .795,6 +825,9 @ @
+ ;
+
+ + if (!iwl_mvm_sar_geo_support(mvm))
+ + return -EOPNOTSUPP;
+ +
+ ret = iwl_mvm_send_cmd(mvm, &cmd);
+ if (ret) {
+ IWL_ERR(mvm, "Failed to get geographic profile info %d\n", ret);
+ @ @ .820,6 +853,9 @ @
+ int ret, i, j;
+ u16 cmd_wide_id = WIDE_ID(PHY_OPS_GROUP, GEO_TX_POWER_LIMIT);
+
+ + if (!iwl_mvm_sar_geo_support(mvm))
+ + return 0;
+ +
+ ret = iwl_mvm_sar_get_wgds_table(mvm);
+ if (ret < 0) {
+ IWL_DEBUG_RADIO(mvm,
+ @ @ .832,7 +868,7 @ @
+ IWL_DEBUG_RADIO(mvm, "Sending GEO_TX_POWER_LIMIT\n");
+
+ BUILD_BUG_ON(ACPI_NUM_GEO_PROFILES * ACPI_WGDS_NUM_BANDS *
+ ACPI_WGDS_TABLE_SIZE != ACPI_WGDS_WIFI_DATA_SIZE);
+ BUILD_BUG_ON(ACPI_NUM_GEO_PROFILES > IWL_NUM_GEO_PROFILES);
+
+ @ @ .867,6 +903,11 @ @
+ return -ENOENT;
+ }
+
+ +static int iwl_mvm_sar_get_wgds_table(struct iwl_mvm *mvm)
+ +{
+ +return -ENOENT;
+ +}
static int iwl_mvm_sar_geo_init(struct iwl_mvm *mvm)
{
    return 0;
}

/**
 * If not available, don't fail and don't bother with EWRD.
 * Return 1 to tell that we can't use WGDS either.
 */
return 1;
}

ret = iwl_mvm_sar_get_ewrd_table(mvm);
/* choose profile 1 (WRDS) as default for both chains */
ret = iwl_mvm_sar_select_profile(mvm, 1, 1);

/* if we don't have profile 0 from BIOS, just skip it */
/* If we don't have profile 0 from BIOS, just skip it. This
 * means that SAR Geo will not be enabled either, even if we
 * have other valid profiles.
 */
if (ret == -ENOENT)
    return 0;
return 1;

return ret;
}

iwl_mvm_unref(mvm, IWL_MVM_REF_CODEC_DOWN);

ret = iwl_mvm_sar_init(mvm);
-if (ret)
-goto error;
+if (ret == 0) {
+    return 0;
+} else if (ret > 0 && !iwl_mvm_sar_get_wgds_table(mvm)) {
+/*
 * If basic SAR is not available, we check for WGDS,
 * which should *not* be available either. If it is
 * available, issue an error, because we can't use SAR
 * Geo without basic SAR.
 */
+}
+ */
+ IWL_ERR(mvm, "BIOS contains WGDS but no WRDS\n");
+ }

-ret = iwl_mvm_sar_geo_init(mvm);
-if (ret)
+if (ret < 0)
    goto error;

iwl_mvm_leds_sync(mvm);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/led.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/led.c
@@ -131,6 +131,9 @@
    mvm->led.name = kasprintf(GFP_KERNEL, "%-s-led",
                        wiphy_name(mvm->hw->wiphy));
+if (!mvm->led.name)
+    return -ENOMEM;
+    mvm->led.brightness_set = iwl_led_brightness_set;
    mvm->led.max_brightness = 1;

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/mac-ctxt.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/mac-ctxt.c
@@ -438,7 +438,8 @@
}

    /* Allocate the CAB queue for softAP and GO interfaces */
    -if (vif->type == NL80211_IFTYPE_AP) {
    +if (vif->type == NL80211_IFTYPE_AP ||
        +vif->type == NL80211_IFTYPE_ADHOC) {
            /* For TVQM this will be overwritten later with the FW assigned
             * queue value (when queue is enabled).
             
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-        Copyright(c) 2016 - 2017 Intel Deutschland GmbH
+        Copyright(c) 2018 Intel Corporation
             *
             * This program is free software; you can redistribute it and/or modify
             * it under the terms of version 2 of the GNU General Public License as
             @ @ -327,8 +328,12 @@
             goto out;
         }
    }
if (changed) {
    status = le32_to_cpu(resp->status);
    *changed = (status == MCC_RESP_NEW_CHAN_PROFILE ||
               status == MCC_RESP_ILLEGAL);
}

regd = iwl_parse_nvm_mcc_info(mvm->trans->dev, mvm->cfg,
    __le32_to_cpu(resp->n_channels),
    @ @ -817,6 +822,21 @@
    !ieee80211_is_bufferable_mmpdu(hdr->frame_control))
sta = NULL;

/* If there is no sta, and it's not offchannel - send through AP */
if (info->control.vif->type == NL80211_IFTYPE_STATION &&
    info->hw_queue != IWL_MVM_OFFCHANNEL_QUEUE && !sta) {
    struct iwl_mvm_vif *mvmvif =
      iwl_mvm_vif_from_mac80211(info->control.vif);
    u8 ap_sta_id = READ_ONCE(mvmvif->ap_sta_id);
    if (ap_sta_id < IWL_MVM_STATION_COUNT) {
        /* mac80211 holds rcu read lock */
        sta = rcu_dereference(mvmvif->fw_id_to_mac_id + ap_sta_id);
        if (IS_ERR_OR_NULL(sta))
            goto drop;
    }
    if (sta) {
        goto drop;
    }
}

if (iwl_mvm_defer_tx(mvm, sta, skb))
    return;

/*
 - * Clear IN_HW_RESTART flag when stopping the hw (as restart_complete() 
   - * won't be called in this case).
   * * Clear IN_HW_RESTART and HW_RESTART_REQUESTED flag when stopping the
   + * hw (as restart_complete() won't be called in this case) and mac80211
   + * won't execute the restart.
   * But make sure to cleanup interfaces that have gone down before/during
   * HW restart was requested.
   */
-if (test_and_clear_bit(IWL_MVM_STATUS_IN_HW_RESTART, &mvm->status))
+if (test_and_clear_bit(IWL_MVM_STATUS_IN_HW_RESTART, &mvm->status) ||
   + test_and_clear_bit(IWL_MVM_STATUS_HW_RESTART_REQUESTED,
if (ret)
    goto out_remove;

-ret = iwl_mvm_add_mcast_sta(mvm, vif);
@if (ret)
    goto out_unbind;

/* Send the bcast station. At this stage the TBTT and DTIM time events
   * are added and applied to the scheduler */
-ret = iwl_mvm_send_add_bcast_sta(mvm, vif);
@if (ret)
    goto out_rm_mcast;
+/
+ * This is not very nice, but the simplest:
+ * For older FWs adding the mcast sta before the bcast station may
+ * cause assert 0x2b00.
+ * This is fixed in later FW so make the order of removal depend on
+ * the TLV
+ */
+if (fw_has_api(&mvm->fw->ucode_capa, IWL_UCODE_TLV_API_STA_TYPE)) {
+ret = iwl_mvm_add_mcast_sta(mvm, vif);
+if (ret)
    goto out_unbind;
+/
+ * Send the bcast station. At this stage the TBTT and DTIM time
+ * events are added and applied to the scheduler
+ */
+ret = iwl_mvm_send_add_bcast_sta(mvm, vif);
+if (ret) {
+iwl_mvm_rm_mcast_sta(mvm, vif);
+goto out_unbind;
+} else {
+/*
+ * Send the bcast station. At this stage the TBTT and DTIM time
+ * events are added and applied to the scheduler
+ */
+ret = iwl_mvm_send_add_bcast_sta(mvm, vif);
+if (ret)
    goto out_unbind;
+ret = iwl_mvm_add_mcast_sta(mvm, vif);
+if (ret) {
+iwl_mvm_send_rm_bcast_sta(mvm, vif);
+ goto out_unbind;
+
/* must be set before quota calculations */
mvmvif->ap_ibss_active = true;
@@ -2160,7 +2208,6 @@
iwl_mvm_power_update_mac(mvm);
mvmvif->ap_ibss_active = false;
iwl_mvm_send_rm_bcast_sta(mvm, vif);
-out_rm_mcast:
iwl_mvm_rm_mcast_sta(mvm, vif);
out_unbind:
iwl_mvm_binding_remove_vif(mvm, vif);
@@ -2602,7 +2649,7 @@
/* this would be a mac80211 bug ... but don't crash */
if (WARN_ON_ONCE(!mvmvif->phy_ctxt))
 -return -EINVAL;
+return test_bit(IWL_MVM_STATUS_HW_RESTART_REQUESTED, &mvm->status) ? 0 : -EINVAL;

/*
* If we are in a STA removal flow and in DQA mode:
@@ -2630,7 +2677,7 @@
mutex_lock(&mvm->mutex);
/* track whether or not the station is associated */
-mvm_sta->associated = new_state >= IEEE80211_STA_ASSOC;
+mvm_sta->sta_state = new_state;
if (old_state == IEEE80211_STA_NOTEXIST &&
    new_state == IEEE80211_STA_NONE) {
@@ -2682,8 +2729,7 @@
iwl_mvm_mac_ctxt_changed(mvm, vif, false, NULL);
}
-iwl_mvm_rs_rate_init(mvm, sta, mvmvif->phy_ctxt->channel->band,
- true);
+iwl_mvm_rs_rate_init(mvm, sta, mvmvif->phy_ctxt->channel->band);
ret = iwl_mvm_update_sta(mvm, vif, sta);
} else if (old_state == IEEE80211_STA_ASSOC &&
    new_state == IEEE80211_STA_AUTHORIZED) {
@@ -2698,6 +2744,9 @@
/* enable beacon filtering */
WARN_ON(iwl_mvm_enable_beacon_filter(mvm, vif, 0));
+
/* enable beacon filtering */
WARN_ON(iwl_mvm_enable_beacon_filter(mvm, vif, 0));
ret = 0;
} else if (old_state == IEEE80211_STA_AUTHORIZED &&
      new_state == IEEE80211_STA_ASSOC) {
    IWL_DEBUG_TE(mvm,
      "ROC: Requesting to remain on channel %u for %ums
      (requested = %ums, max_delay = %ums, dtim_interval = %ums)\n",
      channel->hw_value, req_dur, duration, delay,
      dtim_interval);
    /* Set the node address */
    memcpy(aux_roc_req.node_addr, vif->addr, ETH_ALEN);
    @ @ -3211,6 +3263,7 @ @
    struct iw_lvm_vif *mvmvif = iw_lvm_vif_from_mac80211(vif);
    struct cfg80211_chan_def chandef;
    struct iw_lvm_phy_ctxt *phy_ctxt;
    @ @ -3276,19 +3329,30 @ @
    bool band_change_removal;
    int ret, i;
    IWL_DEBUG_MAC80211(mvm, "enter (%d, %d, %d)\n",
      channel->hw_value,
      @ @ -3276,19 +3329,30 @ @
      channel->band);
    cfg80211_chandef_create(&chandef, channel, NL80211_CHAN_NO_HT);
    /*
     * Check if the remain-on-channel is on a different band and that
     * requires context removal, see iw_lvm_phy_ctxt_changed(). If
     * so, we'll need to release and then re-configure here, since we
     * must not remove a PHY context that's part of a binding.
     */
    -if (mvmvif->phy_ctxt->ref == 1) {
      @ @ -3142,9 +3191,12 @ @
      aux_roc_req.apply_time_max_delay = cpu_to_le32(delay);
      IWl_DEBUG_TE(mvm,
        "ROC: Requesting to remain on channel %u for %ums
        (requested = %ums, max_delay = %ums, dtim_interval = %ums)\n",
        channel->hw_value, req_dur);
      IWl_DEBUG_TE(mvm,
        "(requested = %ums, max_delay = %ums, dtim_interval = %ums)\n",
        duration, delay, dtim_interval);
      +
      /* Set the node address */
      memcpy(aux_roc_req.node_addr, vif->addr, ETH_ALEN);
      @ @ -3211,6 +3263,7 @ @
      struct iw_lvm_vif *mvmvif = iw_lvm_vif_from_mac80211(vif);
      struct cfg80211_chan_def chandef;
      struct iw_lvm_phy_ctxt *phy_ctxt;
      @ @ -3276,19 +3329,30 @ @
      bool band_change_removal;
      int ret, i;
      IWL_DEBUG_MAC80211(mvm, "enter (%d, %d, %d)\n",
        channel->hw_value,
        @ @ -3276,19 +3329,30 @ @
        channel->band);
      cfg80211_chandef_create(&chandef, channel, NL80211_CHAN_NO_HT);
      /*
       * Check if the remain-on-channel is on a different band and that
       * requires context removal, see iw_lvm_phy_ctxt_changed(). If
       * so, we'll need to release and then re-configure here, since we
       * must not remove a PHY context that's part of a binding.
       */
       -if (mvmvif->phy_ctxt->ref == 1) {
         @ @ -3142,9 +3191,12 @ @
         aux_roc_req.apply_time_max_delay = cpu_to_le32(delay);
         IWl_DEBUG_TE(mvm,
           "ROC: Requesting to remain on channel %u for %ums
           (requested = %ums, max_delay = %ums, dtim_interval = %ums)\n",
           channel->hw_value, req_dur);
         IWl_DEBUG_TE(mvm,
           "(requested = %ums, max_delay = %ums, dtim_interval = %ums)\n",
           duration, delay, dtim_interval);
         +
         /* Set the node address */
         memcpy(aux_roc_req.node_addr, vif->addr, ETH_ALEN);
         @ @ -3211,6 +3263,7 @ @
         struct iw_lvm_vif *mvmvif = iw_lvm_vif_from_mac80211(vif);
         struct cfg80211_chan_def chandef;
         struct iw_lvm_phy_ctxt *phy_ctxt;
         @ @ -3276,19 +3329,30 @ @
         bool band_change_removal;
         int ret, i;
         IWL_DEBUG_MAC80211(mvm, "enter (%d, %d, %d)\n",
           channel->hw_value,
           @ @ -3276,19 +3329,30 @ @
           channel->band);
         cfg80211_chandef_create(&chandef, channel, NL80211_CHAN_NO_HT);
         /*
          * Check if the remain-on-channel is on a different band and that
          * requires context removal, see iw_lvm_phy_ctxt_changed(). If
          * so, we'll need to release and then re-configure here, since we
          * must not remove a PHY context that's part of a binding.
          */
          -if (mvmvif->phy_ctxt->ref == 1) {
/* Change the PHY context configuration as it is currently
   * referenced only by the P2P Device MAC (and we can modify it)
   */
ret = iwl_mvm_phy_ctxt_changed(mvm, mvmvif->phy_ctxt,
    &chandef, 1, 1);
if (ret)
goto out_unlock;
} else {
    /*
    * The PHY context is shared with other MACs. Need to remove the
    * P2P Device from the binding, allocate an new PHY context and
    * create a new binding
    * The PHY context is shared with other MACs (or we're trying to
    * switch bands), so remove the P2P Device from the binding,
    * allocate an new PHY context and create a new binding.
    */
    phy_ctxt = iwl_mvm_get_free_phy_ctxt(mvm);
    if (!phy_ctxt) {
        goto out;
    }
    /*
    * always disable PS when a monitor interface is active */
    @ @ -3520.7 +3585.7 @ @
    }
}
if (switching_chanctx && vif->type == NL80211_IFTYPE_STATION) {
    u32 duration = 2 * vif->bss_conf.beacon_int;
+u32 duration = 3 * vif->bss_conf.beacon_int;

    /* iwl_mvm_protect_session() reads directly from the
    * device (the system time), so make sure it is
    * Protect the session to make sure we hear the first
    * beacon on the new channel.
    */
    +mvmvif->csa_bcn_pending = true;
iwl_mvm_protect_session(mvm, vif, duration, duration,
    vif->bss_conf.beacon_int / 2,
    true);
    @ @ -3971.6 +4037.7 @ @
    if (vif->type == NL80211_IFTYPE_STATION) {
        struct iwl_mvm_sta *mvmsta;

+    +mvmvif->csa_bcn pending = false;
mvmsta = iwl_mvm_sta_from_staid_protected(mvm, mvmvif->ap_sta_id);

ifar (!fw_has_capa(&mvm->fw->ucode_capa, - IWL_UCODE_TLV_CAPA_RADIO_BEACON_STATS))
    return;
    -
    /* if beacon filtering isn't on mac80211 does it anyway */
    if (!(!(vif->driver_flags & IEEE80211_VIF_BEACON_FILTER))
        return;

bool csa_failed;
u16 csa_target_freq;

/* Indicates that we are waiting for a beacon on a new channel */
+bool csa_bcn_pending;
+
/* TCP Checksum Offload */
etdev_features_t features;
};

int regulatory_type;

/* Checking for required sections */
-if (mvm->trans->cfg->nvm_type != IWL_NVM_EXT) {
    if (mvm->trans->cfg->nvm_type == IWL_NVM) {
        if (!mvm->nvm_sections[NVM_SECTION_TYPE_SW].data ||!
             mvm->nvm_sections[mvm->cfg->nvm_hw_section_num].data) {
            IWL_ERR(mvm, "Can't parse empty OTP/NVM sections\n");
            @ @ -327,7 +327,8 @@
        }
    }
    /* PHYSKU section is mandatory in B0 */
    if (!mvm->nvm_sections[NVM_SECTION_TYPE_PHYSKU].data) {
#include "wlan.h"

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IWL_DEBUG_LAR(mvm,
- "MCC response status: 0x%x. new MCC: 0x%x (%c%c) change: %d n_chans: %d\n",
- status, mcc, mcc >> 8, mcc & 0xff,
- !!((status == MCC_RESP_NEW_CHAN_PROFILE), n_channels);
+ "MCC response status: 0x%x. new MCC: 0x%x (%c%c) n_chans: %d\n",
+ status, mcc, mcc >> 8, mcc & 0xff, n_channels);

exit:
iwl_free_resp(&cmd);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/ops.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/ops.c
@@ -8,6 +8,7 @@
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@@ -35,6 +36,7 @@
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@@ -555,9 +557,15 @@
iwl_mvm_unref(mvm, IWL_MVM_REF_FW_DBG_COLLECT);
}

+static bool iwl_mvm_fwrt_fw_running(void *ctx)
+{
++return iwl_mvm_firmware_running(ctx);
+}
+
static const struct iwl_fw_runtime_ops iwl_mvm_fwrt_ops = {
    .dump_start = iwl_mvm_fwrt_dump_start,
    .dump_end = iwl_mvm_fwrt_dump_end,
+    .fw_running = iwl_mvm_fwrt_fw_running,
};

static struct iwl_op_mode *
@@ -1162,6 +1170,7 @@
reprobe = container_of(wk, struct iwl_mvm_reprobe, work);
if (device_reprobe(reprobe->dev))
dev_err(reprobe->dev, "reprobe failed!\n");
+put_device(reprobe->dev);
kfree(reprobe);
module_put(THIS_MODULE);
}
@@ -1212,7 +1221,7 @@
module_put(THIS_MODULE);
return;
}
-reprobe->dev = mvm->trans->dev;
+reprobe->dev = get_device(mvm->trans->dev);
INIT_WORK(&reprobe->work, iwl_mvm_reprobe_wk);
schedule_work(&reprobe->work);
} else if (mvm->fwrt.cur_fw_img == IWL_UCODE_REGULAR &&
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/rs.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/rs.c
@@ -3,6 +3,7 @@
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+* Copyright(c) 2018 Intel Corporation
*
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* under the terms of version 2 of the GNU General Public License as
@@ -13,10 +14,6 @@
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* more details.
*
- * You should have received a copy of the GNU General Public License along with
- * this program; if not, write to the Free Software Foundation, Inc.,
- * 51 Franklin Street, Fifth Floor, Boston, MA 02110, USA
- *
- * The full GNU General Public License is included in this distribution in the
- * file called LICENSE.
 *
@@ -653,9 +650,10 @@
}
tid_data = &mvmsta->tid_data[tid];
- if ((tid_data->state == IWL_AGG_OFF) &&
+ if (mvmsta->sta_state >= IEEE80211_STA_AUTHORIZED &&
+ tid_data->state == IWL_AGG_OFF &&
+ (lq_sta->tx_agg_tid_en & BIT(tid)) &&
- (tid_data->tx_count_last >= IWL_MVM_RS_AGG_START_THRESHOLD)) {
+ (tid_data->tx_count_last >= IWL_MVM_RS_AGG_START_THRESHOLD)) {
+ IWL_DEBUG_RATE(mvm, "try to aggregate tid %d\n", tid);
if (rs_tl_turn_on_agg_for_tid(mvm, lq_sta, tid, sta) == 0)
tid_data->state = IWL_AGG_QUEUEED;
!/info->flags & IEEE80211_TX_STAT_AMPDU) return;

rs_rate_from_ucode_rate(tx_resp_hwrate, info->band, &tx_resp_rate);
+if (rs_rate_from_ucode_rate(tx_resp_hwrate, info->band,
+ &tx_resp_rate)) {
+WARN_ON_ONCE(1);
+return;
+
}

#ifdef CONFIG_MAC80211_DEBUGFS
/* Disable last tx check if we are debugging with fixed rate but
@@ -1259,7 +1261,7 @@
    (unsigned long)(lq_sta->last_tx +
        (IWL_MVM_RS_IDLE_TIMEOUT * HZ)))} {
IWL_DEBUG_RATE(mvm, "Tx idle for too long. reinit rs\n");
-iwl_mvm_rs_rate_init(mvm, sta, info->band, false);
+iw1_mvm_rs_rate_init(mvm, sta, info->band);
return;
}
lq_sta->last_tx = jiffies;
@@ -1273,7 +1275,10 @@
/*
table = &lq_sta->lq;
lq_hwrate = le32_to_cpu(table->rs_table[0]);
-rs_rate_from_ucode_rate(lq_hwrate, info->band, &lq_rate);
+if (rs_rate_from_ucode_rate(lq_hwrate, info->band, &lq_rate)) {
+WARN_ON_ONCE(1);
+return;
+
/* Here we actually compare this rate to the latest LQ command */
if (lq_color != LQ_FLAG_COLOR_GET(table->flags)) {
@@ -1375,8 +1380,12 @@
/* Collect data for each rate used during failed TX attempts */
for (i = 0; i <= retries; ++i) {
lq_hwrate = le32_to_cpu(table->rs_table[i]);
-rs_rate_from_ucode_rate(lq_hwrate, info->band, &lq_rate);
+if (rs_rate_from_ucode_rate(lq_hwrate, info->band, &lq_rate)) {
+WARN_ON_ONCE(1);
+return;
+
* Only collect stats if retried rate is in the same RS
* table as active/search.
@@ -1877,12 +1886,10 @@
struct rs_rate *rate = &search_tbl->rate;
const struct rs_tx_column *column = &rs_tx_columns[col_id];
const struct rs_tx_column *curr_column = &rs_tx_columns[tbl->column];
-u32 sz = (sizeof(struct iwl_scale_tbl_info) -
- (sizeof(struct iwl_rate_scale_data) * IWL_RATE_COUNT));
unsigned long rate_mask = 0;
-u32 rate_idx = 0;

-memcpy(search_tbl, tbl, sz);
+memcpy(search_tbl, tbl, offsetof(struct iwl_scale_tbl_info, win));

rate->sgi = column->sgi;
rate->ant = column->ant;
@@ -2690,6 +2697,7 @@
enum nl80211_band band, band,
struct rs_rate *rate)
{
+struct iwl_mvm_sta *mvmsta = iwl_mvm_sta_from_mac80211(sta);
int i, nentries;
unsigned long active_rate;
s8 best_rssi = S8_MIN;
@@ -2742,14 +2750,26 @@
/*
 if (sta->vht_cap.vht_supported &&
     best_rssi > IWL_RS_LOW_RSSI_THRESHOLD) {
-switch (sta->bandwidth) {
-case IEEE80211_STA_RX_BW_160:
-case IEEE80211_STA_RX_BW_80:
-case IEEE80211_STA_RX_BW_40:
+/*
+ * In AP mode, when a new station associates, rs is initialized
+ * immediately upon association completion, before the phy
+ * context is updated with the association parameters, so the
+ * sta bandwidth might be wider than the phy context allows.
+ * To avoid this issue, always initialize rs with 20mhz
+ * bandwidth rate, and after authorization, when the phy context
+ * is already up-to-date, re-init rs with the correct bw.
+ */
+u32 bw = mvmsta->sta_state < IEEE80211_STA_AUTHORIZED ?
+RATE_MCS_CHAN_WIDTH_20 : rs_bw_from_sta_bw(sta);
+
switch (bw) {
+case RATE_MCS_CHAN_WIDTH_40:
+case RATE_MCS_CHAN_WIDTH_80:
+case RATE_MCS_CHAN_WIDTH_160:
initial_rates = rs_optimal_rates_vht;
nentries = ARRAY_SIZE(rs_optimal_rates_vht);
break;
- case IEEE80211_STA_RX_BW_20:
+ case RATE_MCS_CHAN_WIDTH_20:
  initial_rates = rs_optimal_rates_vht_20mhz;
  nentries = ARRAY_SIZE(rs_optimal_rates_vht_20mhz);
break;
@@ -2760,7 +2780,7 @@
active_rate = lq_sta->active_siso_rate;
rate->type = LQ_VHT_SISO;
-rate->bw = rs_bw_from_sta_bw(sta);
+rate->bw = bw;
 } else if (sta->ht_cap.ht_supported &&
   best_rssi > IWL_RS_LOW_RSSI_THRESHOLD) {
initial_rates = rs_optimal_rates_ht;
@@ -2824,9 +2844,9 @@
static void rs_initialize_lq(struct iwl_mvm *mvm,  
   struct ieee80211_sta *sta,  
   struct iwl_lq_sta *lq_sta,  
   - enum nl80211_band band,  
   - bool init)  
   + enum nl80211_band band)  
   {  
+struct iwl_mvm_sta *mvmsta = iwl_mvm_sta_from_mac80211(sta);
struct iwl_scale_tbl_info *tbl;
struct rs_rate *rate;
u8 active_tbl = 0;
@@ -2855,7 +2875,8 @@
rs_set_expected_tpt_table(lq_sta, tbl);
rs_fill_lq_cmd(mvm, sta, lq_sta, rate);
/* TODO restore station should remember the lq cmd */
-iwl_mvm_send_lq_cmd(mvm, &lq_sta->lq, init);
+iwl_mvm_send_lq_cmd(mvm, &lq_sta->lq,  
+ mvmsta->sta_state < IEEE80211_STA_AUTHORIZED);
}
static void rs_get_rate(void *mvm_r, struct ieee80211_sta *sta, void *mvm_sta,  
@@ -3112,7 +3133,7 @@
* Called after adding a new station to initialize rate scaling
*/
void iwl_mvm_rs_rate_init(struct iwl_mvm *mvm, struct ieee80211_sta *sta,  
- enum nl80211_band band, bool init)  
+ enum nl80211_band band)  
{  
int i, j;
struct ieee80211_hw *hw = mvm->hw;
@@ -3191,7 +3212,7 @@
#ifdef CONFIG_IWLWIFI_DEBUGFS
iwlmvmsv reset_frame_stats(mvm);
#endif
-iwl_mvm_reset_frame_stats(mvm);

+rs_initialize_lq(mvm, sta, lq_sta, band);
+
}

static void rs_rate_update(void *mvm_r,
@@ -3212,7 +3233,7 @@
for (tid = 0; tid < IWL_MAX_TID_COUNT; tid++)
iwew80211_stop tx ba_session(sta, tid);

-iwl_mvm_rs_rate_init(mvm, sta, sband->band, false);
+utilw_mvm_rs_rate_init(mvm, sta, sband->band);

}

#ifdef CONFIG_MAC80211_DEBUGFS
@@ -3230,7 +3251,10 @@
for (i = 0; i < num_rates; i++)
lq_cmd->rs_table[i] = ucode_rate_le32;

-iwl_mvm_rs_rate_init(mvm, sta, sband->band, &rate);
+utilw_mvm_rs_rate_init(mvm, sta, sband->band);
}

if (is_mimo(&rate))
lq_cmd->mimo_delim = num_rates - 1;
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/rs.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/rs.h
@@ -3,6 +3,7 @@
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/* Initialize station's rate scaling information after adding station */
void iwl_mvm_rs_rate_init(struct iwl_mvm *mvm, struct ieee80211_sta *sta,
   enum nl80211_band band, bool init);

/* Notify RS about Tx status */
void iwl_mvm_rs_tx_status(struct iwl_mvm *mvm, struct ieee80211_sta *sta,
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/rx.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/rx.c
@@ -62,6 +62,7 @@
   */
   * (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
   * OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
   */
#include <asm/unaligned.h>
#include <linux/etherdevice.h>
#include <linux/skbuff.h>
#include "iwl-trans.h"
@@ -290,7 +291,7 @@
   rx_res = (struct iwl_rx_mpdu_res_start *)pkt->data;
   hdr = (struct ieee80211_hdr *)(pkt->data + sizeof(*rx_res));
   len = le16_to_cpu(rx_res->byte_count);
   -rx_pkt_status = le32_to_cpup((__le32 *)
   +rx_pkt_status = get_unaligned_le32((__le32 *)
   (pkt->data + sizeof(*rx_res) + len));

   /* Dont use dev_alloc_skb(), we'll have enough headroom once
   @@ -439,7 +440,8 @@
      if (rate_n_flags & RATE_MCS_SGI_MSK)
         +if (!(rate_n_flags & RATE_MCS_CCK_MSK) &&
               rate_n_flags & RATE_MCS_SGI_MSK)
         rx_status->enc_flags |= RX_ENC_FLAG_SHORT_GI;
      if (rate_n_flags & RATE_HT_MCS_GF_MSK)
         rx_status->enc_flags |= RX_ENC_FLAG_HT_GF;
   @@ -509,6 +511,7 @@
   struct iwl_mvm_stat_data {
   struct iwl_mvm *mvm;
   +__le32 flags;
   __le32 mac_id;
   u8 beacon_filter_average_energy;
   void *general;
/* make sure that beacon statistics don't go backwards with TCM */
/* request to clear statistics */
@if (le32_to_cpu(data->flags) & IWL_STATISTICS_REPLY_FLG_CLEAR)
+mvmvif->beacon_stats.accu_num_beacons +=
+mvmvif->beacon_stats.num_beacons;
+
if (mvmvif->id != id)
return;

flags = stats->flag;
+
data.flags = flags;

iw1_mvm_rx_stats_check_trigger(mvm, pkt);

---
---
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/rxmq.c
@@ -71,6 +71,7 @@<br>
struct ieee80211_hdr *hdr = (struct ieee80211_hdr *)skb->data;
struct ieee80211_rx_status *stats = IEEE80211_SKB_RXCB(skb);
struct iwl_mvm_key_pn *ptk_pn;
+int res;
int tid, keyidx;
int pn[IEEE80211_CCMP_PN_LEN];
int *extiv;
@@ -127,21 +128,22 @@<br>-if (memcmp(pn, ptk_pn->q[queue].pn[tid],
-IEEE80211_CCMP_PN_LEN) <= 0)
+res = memcmp(pn, ptk_pn->q[queue].pn[tid], IEEE80211_CCMP_PN_LEN);
+if (res < 0)
+return -1;
+if (!res && !(stats->flag & RX_FLAG_ALLOW_SAME_PN))
return -1;

-if (!((stats->flag & RX_FLAG_AMSDU_MORE))
-memcpy(ptk_pn->q[queue].pn[tid], pn, IEEE80211_CCMP_PN_LEN);
+memcpy(ptk_pn->q[queue].pn[tid], pn, IEEE80211_CCMP_PN_LEN);
stats->flag |= RX_FLAG_PN_VALIDATED;
return 0;

/
 iwl_mvm_create_skb Adds the rxb to a new skb */
static void iwl_mvm_create_skb(struct sk_buff *skb, struct ieee80211_hdr *hdr,
  - u16 len, u8 crypt_len,
  - struct iw瑚 rx_cmd_buffer *rxb)
+static int iwl_mvm_create_skb(struct iwl_mvm *mvm, struct sk_buff *skb,
+   struct ieee80211_hdr *hdr, u16 len, u8 crypt_len,
+   struct iw瑚 rx_cmd_buffer *rxb)
{
struct iwl_rx_packet *pkt = rxb_addr(rxb);
struct iwl_rx_mpdu_desc *desc = (void *)pkt->data;

/* We warn and trace because we want to be able to see
   * it in trace-cmd as well.
   */
+IWL_DEBUG_RX(mvm,
   +  "invalid packet lengths (hdrlen=%d, len=%d, crypt_len=%d)\n",
   +  hdrlen, len, crypt_len))
+}/*
+ * We warn and trace because we want to be able to see
+ * it in trace-cmd as well.
+ */
+IWL_DEBUG_RX(mvm,
   +  "invalid packet lengths (hdrlen=%d, len=%d, crypt_len=%d)\n",
   +  hdrlen, len, crypt_len);
+return -EINVAL;
+
skb_put_data(skb, hdr, hdrlen);
skb_put_data(skb, (u8 *)hdr + hdrlen + pad_len, headlen - hdrlen);

/* iwl_mvm_pass_packet_to_mac80211 - passes the packet for mac80211 */
 @} -312,28 +330,21 @@
- * returns true if a packet outside BA session is a duplicate and
- * should be dropped
+ * returns true if a packet is a duplicate and should be dropped.
+ * Updates AMSDU PN tracking info
 */
static bool iwl_mvm_is_nonagg_dup(struct ieee80211_sta *sta, int queue,
- struct ieee80211_rx_status *rx_status,
- struct ieee80211_hdr *hdr,
- struct iwl_rx_mpdu_desc *desc)
+static bool iwl_mvm_is_dup(struct ieee80211_sta *sta, int queue,
+ struct ieee80211_rx_status *rx_status,
+ struct ieee80211_hdr *hdr,
+ struct iwl_rx_mpdu_desc *desc)
 {
 struct iwl_mvm_sta *mvm_sta;
 struct iwl_mvm_rxq_dup_data *dup_data;
-u8 baid, tid, sub_frame_idx;
+u8 tid, sub_frame_idx;

 if (WARN_ON(IS_ERR_OR_NULL(sta)))
 return false;

 -baid = (le32_to_cpu(desc->reorder_data) &
 -IWL_RX_MPDU_REORDER_BAID_MASK) >>
 -IWL_RX_MPDU_REORDER_BAID_SHIFT;
 -
 -if (baid != IWL_RX_REORDER_DATA_INVALID_BAID)
 -return false;
 -
 mvm_sta = iwl_mvm_sta_from_mac80211(sta);
 dup_data = &mvm_sta->dup_data[queue];
@@ -363,6 +374,12 @@
    return true;
+/* Allow same PN as the first subframe for following sub frames */
+if (dup_data->last_seq[tid] == hdr->seq_ctrl &&
 + sub_frame_idx > dup_data->last_sub_frame[tid] &&
 + desc->mac_flags2 & IWL_RX_MPDU_MFLG2_AMSDU)
+rx_status->flag |= RX_FLAG_ALLOW_SAME_PN;
 +
dup_data->last_seq[tid] = hdr->seq_ctrl;
dup_data->last_sub_frame[tid] = sub_frame_idx;
@@ -894,12 +911,12 @@
 bool toggle_bit = phy_info & IWL_RX_MPDU_PHY_AMPU_DISCONNECTED;
rx_status->flag |= RX_FLAG_AMPDU_DETAILS;
-rx_status->ampdu_reference = mvm->ampdu_ref;
/* toggle is switched whenever new aggregation starts */
if (toggle_bit != mvm->ampdu_toggle) {
    mvm->ampdu_ref++;
    mvm->ampdu_toggle = toggle_bit;
}
+rx_status->ampdu_reference = mvm->ampdu_ref;
}

cpu_to_le32(agg_size << STA_FLG_MAX_AGG_SIZE_SHIFT);

rcu_read_lock();
@@ -969,7 +986,7 @@
    if (ieee80211_is_data(hdr->frame_control))
        iwl_mvm_rx_csum(sta, skb, desc);
    
-    if (iwl_mvm_is_nonagg_dup(sta, queue, rx_status, hdr, desc)) {
+    if (iwl_mvm_is_dup(sta, queue, rx_status, hdr, desc)) {
        kfree_skb(skb);
        goto out;
    }
@@ -1020,7 +1037,9 @@
    rx_status->bw = RATE_INFO_BW_160;
    break;
    }
  -if (rate_n_flags & RATE_MCS_SGI_MSK)
  +if (!(rate_n_flags & RATE_MCS_CCK_MSK) &&
      rate_n_flags & RATE_MCS_SGI_MSK)
      rx_status->enc_flags |= RX_ENC_FLAG_SHORT_GI;
    if (rate_n_flags & RATE_HT_MCS_GF_MSK)
      rx_status->enc_flags |= RX_ENC_FLAG_HT_GF;
@@ -1070,7 +1089,11 @@
      rx_status->boottime_ns = ktime_get_boot_ns();
    }

-    -iw1_mvm_create_skb(skb, hdr, len, crypt_len, rxb); 
+    if (iwl_mvm_create_skb(mvm, skb, hdr, len, crypt_len, rxb)) {
+        kfree_skb(skb);
+        goto out;
+    }
+    
+    if (!iwl_mvm_reorder(mvm, napi, queue, sta, skb, desc))
        iwl_mvm_pass_packet_to_mac80211(mvm, napi, skb, queue, sta);
out:
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/sta.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/sta.c
@@ -214,7 +214,7 @@
    }
add_sta_cmd.station_flags |=
cpu_to_le32(mpdu_dens << STA_FLG_AGG_MPDU_DENS_SHIFT);
if (mvm_sta->associated)
+ if (mvm_sta->sta_state >= IEEE80211_STA_ASSOC)
add_sta_cmd.assoc_id = cpu_to_le16(sta->aid);

if (sta->wme) {
@@ -438,6 +438,16 @@
rcu_read_unlock();

+/*
+ * The TX path may have been using this TXQ_ID from the tid_data,
+ * so make sure it's no longer running so that we can safely reuse
+ * this TXQ later. We've set all the TID's to IWL_MVM_INVALID_QUEUE
+ * above, but nothing guarantees we've stopped using them. Thus,
+ * without this, we could get to iwl_mvm_disable_txq() and remove
+ * the queue while still sending frames to it.
+ */
+ synchronize_net();
+ return disable_agg_tids;
}

@@ -1688,7 +1698,8 @@
u32 qmask, enum nl80211_iftype iftype,
enum iwl_sta_type type)
{
- if (!test_bit(IWL_MVM_STATUS_IN_HW_RESTART, &mvm->status)) {
+ if (!test_bit(IWL_MVM_STATUS_IN_HW_RESTART, &mvm->status) ||
+ sta->sta_id == IWL_MVM_INVALID_STA) {
sta->sta_id = iwl_mvm_find_free_sta_id(mvm, iftype);
if (WARN_ON_ONCE(sta->sta_id == IWL_MVM_INVALID_STA))
return -ENOSPC;
@@ -2032,7 +2043,7 @@
struct iwl_trans_txq_scd_cfg cfg = {
 .fifo = IWL_MVM_TX_FIFO_MCAST,
 .sta_id = msta->sta_id,
- .tid = IWL_MAX_TID_COUNT,
+ .tid = 0,
 .aggregate = false,
 .frame_limit = IWL_FRAME_LIMIT,
};
@@ -2046,6 +2057,17 @@
return -ENOTSUPP;

/*
 * In IBSS, ieee80211_check_queues() sets the cab_queue to be

/* invalid, so make sure we use the queue we want. */
/* Note that this is done here as we want to avoid making DQA changes in mac80211 layer. */

if (vif->type == NL80211_IFTYPE_ADHOC) {
    vif->cab_queue = IWL_MVM_DQA_GCAST_QUEUE;
    mvmvif->cab_queue = vif->cab_queue;
}
+
/+/*
* While in previous FWs we had to exclude cab queue from TFD queue mask, now it is needed as any other queue.
*/
@@ -2072,24 +2094,13 @@
if (iwl_mvm_has_new_tx_api(mvm)) {
    int queue = iwl_mvm_tvqm_enable_txq(mvm, vif->cab_queue,
        msta->sta_id,
-    IWL_MAX_TID_COUNT,
    +    0,
        timeout);
    mvmvif->cab_queue = queue;
} else if (!fw_has_api(&mvm->fw->ucode_capa,
    IWL_UCODE_TLV_API_STA_TYPE)) {
    /*
     * In IBSS, ieee80211_check_queues() sets the cab_queue to be invalid, so make sure we use the queue we want.
     * Note that this is done here as we want to avoid making DQA changes in mac80211 layer.
     */
-    if (vif->type == NL80211_IFTYPE_ADHOC) {
         vif->cab_queue = IWL_MVM_DQA_GCAST_QUEUE;
         mvmvif->cab_queue = vif->cab_queue;
         }
    +    IWL_UCODE_TLV_API_STA_TYPE)
    iwl_mvm_enable_txq(mvm, vif->cab_queue, vif->cab_queue, 0,
        &cfg, timeout);
    -}

    return 0;
}
@@ -2108,7 +2119,7 @@
iwl_mvm_flush_sta(mvm, &mvmvif->mcast_sta, true, 0);

    iwl_mvm_disable_txq(mvm, mvmvif->cab_queue, vif->cab_queue,
        IWL_MAX_TID_COUNT, 0);
    + 0, 0);

    ret = iwl_mvm_rm_sta_common(mvm, mvmvif->mcast_sta.sta_id);
if (ret) @ @ -2442,7 +2453,7 @ @
struct iwl_mvm_sta *mvmsta = iwl_mvm_sta_from_mac80211(sta);
struct iwl_mvm_tid_data *tid_data;
uint16_t normalized_ssn;
-int txq_id;
+uint16_t txq_id;
int ret;

if (WARN_ON_ONCE(tid >= IWL_MAX_TID_COUNT)) @ @ -2471,20 +2482,30 @ @

/*
 * Note the possible cases:
 * - 1. In DQA mode with an enabled TXQ - TXQ needs to become agg'ed
 * - 2. Non-DQA mode: the TXQ hasn't yet been enabled, so find a free
 *    one and mark it as reserved
 * - 3. In DQA mode, but no traffic yet on this TID: same treatment as in
 *    -non-DQA mode, since the TXQ hasn't yet been allocated
 * - Don't support case 3 for new TX path as it is not expected to happen
 *    - and aggregation will be offloaded soon anyway
 * + 1. An enabled TXQ - TXQ needs to become agg'ed
 * + 2. The TXQ hasn't yet been enabled, so find a free one and mark
 *    +it as reserved
 * /

txq_id = mvmsta->tid_data[tid].txq_id;
-if (iwlmvm_has_new_tx_api(mvm)) {
- if (txq_id == IWL_MVM_INVALID_QUEUE) {
- ret = -ENXIO;
+ if (txq_id == IWL_MVM_INVALID_QUEUE) {
+ ret = iwlmvm_find_free_queue(mvm, mvmsta->sta_id,
+ IWL_MVM_DQA_MIN_DATA_QUEUE,
+ IWL_MVM_DQA_MAX_DATA_QUEUE);
+ if (ret < 0) {
+ IWLError(mvm, "Failed to allocate agg queue\n");
goto release_locks;
+ }
+}

+/* TXQ hasn't yet been enabled, so mark it only as reserved */
+ mvm->queue_info[txq_id].status = IWL_MVM_QUEUE_RESERVED;
+ } else if (WARN_ON(txq_id >= IWL_MAX_HW_QUEUES)) {
+ ret = -ENXIO;
+ IWLError(mvm, "tid_id %d out of range (0, %d)!\n",
+ tid, IWL_MAX_HW_QUEUES - 1);
+ goto out;
+ /*
} else if (unlikely(mvm->queue_info[txq_id].status ==
    IWL_MVM_QUEUE_SHARED))
    ret = -ENXIO;
@@ -2492,25 +2513,6 @@
    "Can't start tid %d agg on shared queue!\n",
    tid);
goto release_locks;
-} else if (mvm->queue_info[txq_id].status != IWL_MVM_QUEUE_READY) {
-    txq_id = iwl_mvm_find_free_queue(mvm, mvmsta->sta_id,
-    IWL_MVM_DQA_MIN_DATA_QUEUE,
-    IWL_MVM_DQA_MAX_DATA_QUEUE);
-    if (txq_id < 0) {
-        ret = txq_id;
-        IWL_ERR(mvm, "Failed to allocate agg queue\n");
-        goto release_locks;
-    }
-    /*
-     * TXQ shouldn't be in inactive mode for non-DQA, so getting
-     * an inactive queue from iwl_mvm_find_free_queue() is
-     * certainly a bug
-     */
-    WARN_ON(mvm->queue_info[txq_id].status ==
-    IWL_MVM_QUEUE_INACTIVE);
-}
-/*
- * TXQ hasn't yet been enabled, so mark it only as reserved */
- mvm->queue_info[txq_id].status = IWL_MVM_QUEUE_RESERVED;
} }

spin_unlock(&mvm->queue_info_lock);
@@ -2682,8 +2684,10 @@
static void iwl_mvm_unreserve_agg_queue(struct iwl_mvm *mvm,
    struct iwl_mvm_sta *mvmsta,
    struct iwl_mvm_tid_data *tid_data)
{
+u16 txq_id = tid_data->txq_id;
    if (iwl_mvm_has_new_tx_api(mvm))
        return;

    if (mvm->queue_info[txq_id].status ==
    IWL_MVM_QUEUE_RESERVED)
        mvm->queue_info[txq_id].status = IWL_MVM_QUEUE_FREE;
```c
+tid_data->txq_id = IWL_MVM_INVALID_QUEUE;
+

spin_unlock_bh(&mvm->queue_info_lock);
}
@@ -2727,7 +2733,7 @@
 mvmsta->agg_tids &= ~BIT(tid);

-iwl_mvm_unreserve_agg_queue(mvm, mvmsta, txq_id);
+iwl_mvm_unreserve_agg_queue(mvm, mvmsta, tid_data);

switch (tid_data->state) {
 case IWL_AGG_ON:
@@ -2794,7 +2800,7 @@
 mvmsta->agg_tids &= ~BIT(tid);
 spin_unlock_bh(&mvmsta->lock);

-iwl_mvm_unreserve_agg_queue(mvm, mvmsta, txq_id);
+iwl_mvm_unreserve_agg_queue(mvm, mvmsta, tid_data);

if (old_state >= IWL_AGG_ON) {
 iwl_mvm_drain_sta(mvm, mvmsta, true);
@@ -3012,6 +3018,10 @@
 igtk_cmd.sta_id = cpu_to_le32(sta_id);

 if (remove_key) {
+/* This is a valid situation for IGTK */
+if (sta_id == IWL_MVM_INVALID_STA)
+    return 0;
+    igtk_cmd.ctrl_flags |= cpu_to_le32(STA_KEY_NOT_VALID);
 } else {
 struct ieee80211_key_seq seq;
@@ -3115,10 +3125,6 @@
 switch (keyconf->cipher) {
 case WLAN_CIPHER_SUITE_TKIP:
-    if (vif->type == NL80211_IFTYPE_AP) {
-        ret = -EINVAL;
-        break;
-    }
 addr = iwl_mvm_get_mac_addr(mvm, vif, sta);
/* get phase 1 key from mac80211 */
 ieee80211_get_key_rx_seq(keyconf, 0, &seq);
@@ -3156,8 +3162,9 @@
 int ret, size;
 u32 status;
```
/* This is a valid situation for GTK removal */
if (sta_id == IWL_MVM_INVALID_STA)
  return -EINVAL;
+return 0;

key_flags = cpu_to_le16((keyconf->keyidx << STA_KEY_FLG_KEYID_POS) & STA_KEY_FLG_KEYID_MSK);
@@ -3218,17 +3225,9 @@

sta_id = mvm_sta->sta_id;

- if (keyconf->cipher == WLAN_CIPHER_SUITE_AES_CMAC ||
-     keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_128 ||
-     keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_256) {
-     ret = iwl_mvm_send_sta_igtk(mvm, keyconf, sta_id,
-       false);
-     goto end;
- }
-
/*
 * It is possible that the 'sta' parameter is NULL, and thus
 * there is a need to retrieve the sta from the local station
 * there is a need to retrieve the sta from the local station
 * table.
 */
if (!sta) {
  @@ -3243,6 +3242,17 @@

  if (WARN_ON_ONCE(iwl_mvm_sta_from_mac80211(sta)->vif != vif))
    return -EINVAL;
+} else {
+    struct iwl_mvm_vif *mvmvif = iwl_mvm_vif_from_mac80211(vif);
+    +sta_id = mvmvif->mcast_sta.sta_id;
+ } 
+ 
+ if (keyconf->cipher == WLAN_CIPHER_SUITE_AES_CMAC ||
+     keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_128 ||
+     keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_256) {
+     ret = iwl_mvm_send_sta_igtk(mvm, keyconf, sta_id, false);
+     goto end;
+ }

/* If the key_offset is not pre-assigned, we need to find a
@@ -3316,9 +3326,9 @@
  IWL_DEBUG_WEP(mvm, "mvm remove dynamic key: idx=%d sta=%d\n",
       keyconf->keyidx, sta_id);
- if (mvm_sta && (keyconf->cipher == WLAN_CIPHER_SUITE_AES_CMAC ||
- keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_128 ||
- keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_256))
+ if (keyconf->cipher == WLAN_CIPHER_SUITE_AES_CMAC ||
+     keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_128 ||
+     keyconf->cipher == WLAN_CIPHER_SUITE_BIP_GMAC_256)
  return iwl_mvm_send_sta_igtk(mvm, keyconf, sta_id, true);

if (!__test_and_clear_bit(keyconf->hw_key_idx, mvm->fw_key_table)) {
  --- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/sta.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/sta.h
@@ -8,6 +8,7 @@
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@@ -35,6 +31,7 @@
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@@ -376,6 +373,7 @@
* tid.
* @max_agg bufsize: the maximal size of the AGG buffer for this station
* @sta_type: station type
+ * @sta_state: station state according to enum %ieee80211_sta_state
+ * @bt_reduced_txpower: is reduced tx power enabled for this station
* @next_status_eosp: the next reclaimed packet is a PS-Poll response and
* we need to signal the EOSP
u16 tid_disable_agg;

u8 max_agg_bufsize;

enum iwl_sta_type sta_type;

+enum ieee80211_sta_state sta_state;

bool bt_reduced_txpower;

bool next_status_eosp;

spinlock_t lock;

bool disable_tx;

bool tlc_amsdu;

bool sleeping;

-boot associated;

u8 agg_tids;

u8 sleep_tx_count;

u8 avg_energy;

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/time-event.c

+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/time-event.c

@@ -8,6 +8,7 @@

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@@ -203,9 +200,13 @@

struct ieee80211_vif *vif,
const char *errmsg)
{
    struct iwl_mvm_vif *mvmvif = iwl_mvm_vif_from_mac80211(vif);
    if (vif->type != NL80211_IFTYPE_STATION)
        return false;
    if (!mvmvif->csa_bcn_pending && vif->bss_conf.assoc &&
        vif->bss_conf.dtim_period)
        return false;
    if (errmsg)
        IWL_ERR(mvm, "%s\n", errmsg);
    /* and know the dtim period.
    */
    iwl_mvm_te_check_disconnect(mvm, te_data->vif,
        "No association and the time event is over already...");
    /*"No beacon heard and the time event is over already...");
    break;
    default:
    break;
    
    time_cmd.repeat = 1;
    time_cmd.policy = cpu_to_le16(TE_V2_NOTIF_HOST_EVENT_START |
        TE_V2_NOTIF_HOST_EVENT_END |
        T2_V2_START_IMMEDIATELY);
    if (!wait_for_notif) {
        iwl_mvm_time_event_send_add(mvm, vif, te_data, &time_cmd);
        time_cmd.repeat = 1;
        time_cmd.policy = cpu_to_le16(TE_V2_NOTIF_HOST_EVENT_START |
            TE_V2_NOTIF_HOST_EVENT_END |
            T2_V2_START_IMMEDIATELY);
        if (!apply_time)
            time_cmd.policy |= cpu_to_le16(TE_V2_START_IMMEDIATELY);
        return iwl_mvm_time_event_send_add(mvm, vif, te_data, &time_cmd);
    }
    @ @ -924,6 +925,8 @@
    time_cmd.interval = cpu_to_le32(1);
    time_cmd.policy = cpu_to_le16(TE_V2_NOTIF_HOST_EVENT_START |
        TE_V2_ABSENCE);
    +if (!apply_time)
    +time_cmd.policy |= cpu_to_le16(TE_V2_START_IMMEDIATELY);
    return iwl_mvm_time_event_send_add(mvm, vif, te_data, &time_cmd);
static void iwl_mvm_thermal_zone_register(struct iwl_mvm *mvm)
{
    int i;
    char name[] = "iwlwifi";
+    char name[16];
+    static atomic_t counter = ATOMIC_INIT(0);

    if (!iwl_mvm_is_tt_in_fw(mvm)) {
        mvm->tz_device.tzone = NULL;
    }

    BUILD_BUG_ON(ARRAY_SIZE(name) >= THERMAL_NAME_LENGTH);

    +    sprintf(name, "iwlwifi_%u", atomic_inc_return(&counter) & 0xFF);

    mvm->tz_device.tzone = thermal_zone_device_register(name, IWL_MAX_DTS_TRIPS, IWL_WRITABLE_TRIPS_MSK);

    --- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/tx.c
    +++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/tx.c
    @@ -419,11 +419,11 @@
    {
        struct ieee80211_key_conf *keyconf = info->control.hw_key;
        u8 *crypto_hdr = skb_frag->data + hdrlen;
+        enum iwl_tx_cmd_sec_ctrl type = TX_CMD_SEC_CCM;
        u64 pn;

        switch (keyconf->cipher) {
        case WLAN_CIPHER_SUITE_CCMP:
            -        case WLAN_CIPHER_SUITE_CCMP_256:
            iwl_mvm_set_tx_cmd_ccmp(info, tx_cmd);
            iwl_mvm_set_tx_cmd_pn(info, crypto_hdr);
            break;
            @@ -447,13 +447,16 @@
            break;
        case WLAN_CIPHER_SUITE_GCMP:
        case WLAN_CIPHER_SUITE_GCMP_256:
+            type = TX_CMD_SEC_GCMP;
+            /* Fall through */
+            /* TODO: Taking the key from the table might introduce a race
             * when PTK rekeying is done, having an old packets with a PN
             * based on the old key but the message encrypted with a new
             * one.
+            */
+            Need to handle this.
-tx_cmd->sec_ctl |= TX_CMD_SEC_GCMP | TX_CMD_SEC_KEY_FROM_TABLE;
+tx_cmd->sec_ctl |= type | TX_CMD_SEC_KEY_FROM_TABLE;
tx_cmd->key[0] = keyconf->hw_key_idx;
iwl_mvm_setTxCmdPn(info, crypto_hdr);
break;
@@ -618,6 +621,9 @@
  memcpy(&info, skb->cb, sizeof(info));

+if (WARN_ON_ONCE(skb->len > IEEE80211_MAX_DATA_LEN + hdrlen))
+return -1;
+
if (WARN_ON_ONCE(info.flags & IEEE80211_TX_CTL_AMPDU))
return -1;
@@ -645,7 +651,11 @@
if (info.control.vif->type == NL80211_IFTYPE_P2P_DEVICE ||
    info.control.vif->type == NL80211_IFTYPE_AP ||
    info.control.vif->type == NL80211_IFTYPE_ADHOC) {
-sta_id = mvmvif->bcast_sta.sta_id;
+sta_id = mvmvif->bcast_sta.sta_id;
+else
+sta_id = mvmvif->mcast_sta.sta_id;
+queue = iwl_mvm_getCtrlVifQueue(mvm, &info,
    hdr->frame_control);
if (queue < 0)
@@ -1338,6 +1348,14 @@
  while (!skb_queue_empty(&skbs)) {
    struct sk_buff *skb = _skb_dequeue(&skbs);
    struct ieee80211_tx_info *info = IEEE80211_SKCB(skb);
+struct ieee80211_hdr *hdr = (void *)skb->data;
    bool flushed = false;

    skb_freed++;
@@ -1367,6 +1378,14 @@
  break;
  }

+/*
+ * If we are freeing multiple frames, mark all the frames
+ * but the first one as acked, since they were acknowledged
+ * before
+ */
+if (skb_freed > 1)
+info->flags |= IEEE80211_TX_STAT_ACK;
+ iwl_mvm_tx_status_check_trigger(mvm, status);

info->status.rates[0].count = tx_resp->failure_frame + 1;
@@ -1382,11 +1401,11 @@
info->flags |= IEEE80211_TX_STAT_AMPDU_NO_BACK;
info->flags &= ~IEEE80211_TX_CTL_AMPDU;

-/* W/A FW bug: seq_ctl is wrong when the status isn't success */
-#if (status != TX_STATUS_SUCCESS) {
-struct ieee80211_hdr *hdr = (void *)skb->data;
+#/ッグ NG W/A FW bug: seq_ctl is wrong upon failure / BAR frame */
+if (ieee80211_is_back_req(hdr->frame_control))
+seq_ctl = 0;
+else if (status != TX_STATUS_SUCCESS)
seq_ctl = le16_to_cpu(hdr->seq_ctrl);
-}

if (unlikely(!seq_ctl)) {
struct ieee80211_hdr *hdr = (void *)skb->data;
@@ -1881,14 +1900,12 @@
struct iwl_mvm_int_sta *int_sta = sta;
struct iwl_mvm_sta *mvm_sta = sta;

-#if (iwl_mvm_has_new_tx_api(mvm)) {
-#if (internal)
-#return iwl_mvm_flush_sta_tids(mvm, int_sta->sta_id,
-#- BIT(IWL_MGMT_TID), flags);
+#BUILD_BUG_ON(offsetof(struct iwl_mvm_int_sta, sta_id) !=
+# offsetof(struct iwl_mvm_sta, sta_id));

+#if (iwl_mvm_has_new_tx_api(mvm))
return iwl_mvm_flush_sta_tids(mvm, mvm_sta->sta_id,
- 0xFF, flags);
-}
-    + 0xff | BIT(IWL_MGMT_TID), flags);

if (internal)
return iwl_mvm_flush_tx_path(mvm, int_sta->tfd_queue_msk,
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/mvm/utils.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/mvm/utils.c
@@ -595,6 +595,12 @@
 void iwl_mvm_dump_nic_error_log(struct iwl_mvm *mvm) {
+if (!test_bit(STATUS_DEVICE_ENABLED, &mvm->trans->status)) {
+IWL_ERR(mvm,
+"DEVICE_ENABLED bit is not set. Aborting dump.
");


return;
+
if (mvm->error_event_table[0])
@@ -795,12 +801,19 @@
    .scd_queue = queue,
    .action = SCD_CFGDISABLE_QUEUE,
    }
-bool remove_mac_queue = true;
+bool remove_mac_queue = mac80211_queue != IEEE80211_MAX_QUEUES;
int ret;

+if (WARN_ON(remove_mac_queue && mac80211_queue >= IEEE80211_MAX_QUEUES))
+return -EINVAL;
+
if (iwl_mvm_has_new_tx_api(mvm)) {
    spin_lock_bh(&mvm->queue_info_lock);
-    mvm->hw_queue_to_mac80211[queue] &= ~BIT(mac80211_queue);
+    if (remove_mac_queue)
+        mvm->hw_queue_to_mac80211[queue] &=
+            ~BIT(mac80211_queue);
    spin_unlock_bh(&mvm->queue_info_lock);

    iwl_trans_txq_free(mvm->trans, queue);
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/ctxt-info.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/ctxt-info.c
@@ -256,7 +256,7 @@
    trans_pcie->ctxt_info = ctxt_info;

    -iw1_enable_interrupts(trans);
+iw1_enable_fw_load_int_ctx_info(trans);

    /* Configure debug, if exists */
    if (trans->dbg_dest_tlv)
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/drv.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/drv.c
@@ -8,6 +8,7 @@
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@@ -36,6 +37,7 @@
{IWL_PCI_DEVICE(0x24FD, 0x9074, iwl8265_2ac_cfg)},
/* 9000 Series */
- {IWL_PCI_DEVICE(0x2526, 0x0000, iwl9260_2ac_cfg)},
+ {IWL_PCI_DEVICE(0x02F0, 0x0030, iwl9560_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x02F0, 0x0034, iwl9560_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x02F0, 0x0038, iwl9560_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x02F0, 0x003C, iwl9560_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x02F0, 0x0060, iwl9461_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x02F0, 0x0064, iwl9461_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x02F0, 0x00A0, iwl9462_2ac_cfg_soc)},
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+ {IWL_PCI_DEVICE(0x02F0, 0x0230, iwl9560_2ac_cfg_soc)},
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+ {IWL_PCI_DEVICE(0x02F0, 0x4234, iwl9560_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x02F0, 0x42A4, iwl9462_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x06F0, 0x00A0, iwl9462_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x06F0, 0x00A4, iwl9462_2ac_cfg_soc)},
+ {IWL_PCI_DEVICE(0x06F0, 0x0230, iwl9560_2ac_cfg_soc)}.
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+{IWL_PCI_DEVICE(0x30DC, 0x1030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x1210, iwl9260_2ac_cfg)},
+{IWL_PCI_DEVICE(0x30DC, 0x1551, iwl9560_killer_s_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x1552, iwl9560_killer_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x2030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x2034, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x4030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x4034, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x40A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x4234, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x30DC, 0x42A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x31DC, 0x0030, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI_DEVICE(0x31DC, 0x0034, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI_DEVICE(0x31DC, 0x0038, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI_DEVICE(0x31DC, 0x003C, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x0060, iwl9460_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x0064, iwl9461_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x00A0, iwl9462_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x00A4, iwl9462_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x0230, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x0234, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x0238, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x023C, iwl9560_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x0260, iwl9461_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x0264, iwl9461_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x02A0, iwl9462_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x02A4, iwl9462_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x1010, iwl9260_2ac_cfg)},
+{IWL_PCI DEVICE(0x31DC, 0x1030, iwl9560_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x1210, iwl9260_2ac_cfg)},
+{IWL_PCI DEVICE(0x31DC, 0x1551, iwl9560_killer_s_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x1552, iwl9560_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x2030, iwl9560_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x2034, iwl9560_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x4030, iwl9560_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x4034, iwl9560_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x40A4, iwl9462_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x4234, iwl9560_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x31DC, 0x42A4, iwl9462_killer_2ac_cfg_shared_clk)},
+{IWL_PCI DEVICE(0x34F0, 0x0030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI DEVICE(0x34F0, 0x0034, iwl9560_2ac_cfg_soc)},
+{IWL_PCI DEVICE(0x34F0, 0x0038, iwl9560_2ac_cfg_soc)},
+{IWL_PCI DEVICE(0x34F0, 0x003C, iwl9560_2ac_cfg_soc)},
+{IWL_PCI DEVICE(0x34F0, 0x0060, iwl9461_2ac_cfg_soc)},
+{IWL_PCI DEVICE(0x34F0, 0x0064, iwl9461_2ac_cfg_soc)},
+{IWL_PCI DEVICE(0x34F0, 0x00A0, iwl9462_2ac_cfg_soc)},
+{IWL_PCI DEVICE(0x34F0, 0x00A4, iwl9462_2ac_cfg_soc)},

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-{IWL_PCI_DEVICE(0x34F0, 0x0230, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x0234, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x0238, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x023C, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x0260, iwl9461_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x0264, iwl9461_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x02A0, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x02A4, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x1010, iwl9260_2ac cfg)},
-{IWL_PCI_DEVICE(0x34F0, 0x1030, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x1210, iwl9260_2ac cfg)},
-{IWL_PCI_DEVICE(0x34F0, 0x1551, iwl9560_killer_s_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x1552, iwl9560_killer_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x2030, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x2034, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x4030, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x4034, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x40A4, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x4234, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x34F0, 0x42A4, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0030, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0034, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0038, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x003C, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0060, iwl9461_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0064, iwl9461_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x00A0, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x00A4, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0230, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0234, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0238, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x023C, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0260, iwl9461_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x0264, iwl9461_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x02A0, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x02A4, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x1010, iwl9260_2ac cfg)},
-{IWL_PCI_DEVICE(0x3DF0, 0x1030, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x1210, iwl9260_2ac cfg)},
-{IWL_PCI_DEVICE(0x3DF0, 0x1551, iwl9560_killer_s_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x1552, iwl9560_killer_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x2030, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x2034, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x4030, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x4034, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x40A4, iwl9462_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x4234, iwl9560_2ac_cfg_soc)},
-{IWL_PCI_DEVICE(0x3DF0, 0x42A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x0000, iwl9460_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x0010, iwl9460_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x0030, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x0034, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x0038, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x003C, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x0060, iwl9461_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x0064, iwl9461_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x00A0, iwl9462_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x00A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x0230, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x0234, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x0238, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x023C, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x0260, iwl9461_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x0264, iwl9461_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x02A0, iwl9462_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x02A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x1010, iwl9260_2ac_cfg)},{IWL_PCI_DEVICE(0x43F0, 0x1030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x1210, iwl9260_2ac_cfg)},{IWL_PCI_DEVICE(0x43F0, 0x1551, iwl9560_killer_s_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x1552, iwl9560_killer_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x2030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x2034, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x4030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x4034, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x40A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x4234, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x42A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x2A10, iwl9460_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x0710, iwl9460_2ac_cfg_soc)},
+{IWL_PCIDEVICE(0x43F0, 0x00A10, iwl9460_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x43F0, 0x1010, iwl9260_2ac_cfg)},{IWL_PCI_DEVICE(0x43F0, 0x1030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x43F0, 0x1210, iwl9260_2ac_cfg)},{IWL_PCI_DEVICE(0x9DF0, 0x0000, iwl9460_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x0010, iwl9460_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x0610, iwl9460_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x0710, iwl9460_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x09A10, iwl9460_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x0A10, iwl9460_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x1010, iwl9260_2ac_cfg)},{IWL_PCI_DEVICE(0x9DF0, 0x1030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x1210, iwl9260_2ac_cfg)},{IWL_PCI_DEVICE(0x9DF0, 0x1551, iwl9560_killer_s_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x1552, iwl9560_killer_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x2030, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x2034, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x4030, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x40A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x4234, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x42A4, iwl9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x0030, iwl9560_2ac_cfg_soc)},{IWL_PCI_DEVICE(0x9DF0, 0x0100, iwl9460_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x0300, iwl9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0x9DF0, 0x42A4, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0034, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0038, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x003C, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0060, iw9461_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0064, iw9461_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x00A0, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x00A4, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0230, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0234, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0238, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x023C, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0260, iw9461_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x0264, iw9461_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x02A0, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x02A4, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x1010, iw9260_2ac_cfg)},
+{IWL_PCI_DEVICE(0xA0F0, 0x1030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x1210, iw9260_2ac_cfg)},
+{IWL_PCI_DEVICE(0xA0F0, 0x1551, iw9560_killer_s_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x1552, iw9560_killer_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x2030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x2034, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x4030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x4034, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x40A4, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x4234, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA0F0, 0x42A4, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x0030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x0034, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x0038, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x01030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x01210, iw9260_2ac_cfg)},
+{IWL_PCI_DEVICE(0xA370, 0x01551, iw9560_killer_s_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x01552, iw9560_killer_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x0264, iw9461_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x02A0, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x02A4, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x1010, iw9260_2ac_cfg)},
+{IWL_PCI_DEVICE(0xA370, 0x1030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x1210, iw9260_2ac_cfg)},
+{IWL_PCI_DEVICE(0xA370, 0x1551, iw9560_killer_s_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x1552, iw9560_killer_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x2030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x2034, iw9560_2ac_cfg_soc)},
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+{IWL_PCI_DEVICE(0xA370, 0x4234, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x42A4, iw9462_2ac_cfg_soc)},
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+{IWL_PCI_DEVICE(0xA370, 0x1551, iw9560_killer_s_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x1552, iw9560_killer_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x2030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x2034, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x4030, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x4034, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x40A4, iw9462_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x4234, iw9560_2ac_cfg_soc)},
+{IWL_PCI_DEVICE(0xA370, 0x42A4, iw9462_2ac_cfg_soc)},
/* a000 Series */
{IWL_PCI_DEVICE(0x2720, 0x0A10, iwla000_2ac_cfg_hr_cdb)},
@@ -825,6 +1051,10 @@
if (!trans->op_mode)
  return 0;
+
/* In WOWLAN, let iwlt_pcie_d3_resume do the rest of the work */
+if (test_bit(STATUS_DEVICE_ENABLED, &trans->status))
+return 0;
+
/*@ reconfigure the MSI-X mapping to get the correct IRQ for rfs */
iwl_pcie_conf_msix_hw(trans_pcie);

--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/internal.h
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/internal.h
@@ -658,6 +658,33 @@
}
}
+
+static inline void iwl_enable_fw_load_int_ctx_info(struct iwl_trans *trans) {
+  
+  struct iwl_trans_pcie *trans_pcie = IWL_TRANS_GET_PCIE_TRANS(trans);
+  
+  IWL_DEBUG_ISR(trans, "Enabling ALIVE interrupt only\n");
+  
+  if (!trans_pcie->msix_enabled) {
+    
+      /* When we'll receive the ALIVE interrupt, the ISR will call
+      * iwlt_enable_fw_load_int_ctx_info again to set the ALIVE
+      * interrupt (which is not really needed anymore) but also the
+      * RX interrupt which will allow us to receive the ALIVE
+      * notification (which is Rx) and continue the flow.
+      */
+      
+      trans_pcie->inta_mask = CSR_INT_BIT_ALIVE | CSR_INT_BIT_FH_RX;
+      iwlt_write32(trans, CSR_INT_MASK, trans_pcie->inta_mask);
+    } else {
+      iwlt_enable_hw_int_msk_msix(trans,
+          MSIX_HW_INT_CAUSES_REG_ALIVE);
+      /*
+      * Leave all the FH causes enabled to get the ALIVE
+      * notification.
+      */
+      iwlt_enable_fh_int_msk_msix(trans, trans_pcie->fh_init_mask);
+    }
+  }
+  
+  static inline void iwlt_pcie_sw_reset(struct iwl_trans *trans)
/* Reset entire device - do controller reset (results in SHRD_HW_RST) */
@@ -665,7 +692,7 @@
usleep_range(5000, 6000);
}

-static inline u8 iwl_pcie_get_cmd_index(struct iwl_txq *q, u32 index)
+static inline u8 iwl_pcie_get_cmd_index(const struct iwl_txq *q, u32 index)
{
    return index & (q->n_window - 1);
}
@@ -735,9 +762,13 @@
static inline bool iwl_queue_used(const struct iwl_txq *q, int i)
{
    -return q->write_ptr >= q->read_ptr ?
    -(i >= q->read_ptr && i < q->write_ptr) :
    -(i < q->read_ptr && i >= q->write_ptr);
+int index = iwl_pcie_get_cmd_index(q, i);
+int r = iwl_pcie_get_cmd_index(q, q->read_ptr);
+int w = iwl_pcie_get_cmd_index(q, q->write_ptr);
+    +return w >= r ?
+    +(index >= r && index < w) :
+    !(index < r && index >= w);
}

static inline bool iwl_is_rfkill_set(struct iwl_trans *trans)
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/rx.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/rx.c
@@ -475,7 +475,7 @@
struct iwl_trans_pcie *trans_pcie = IWL_TRANS_GET_PCIE_TRANS(trans);
struct iwl_rb_allocator *rba = &trans_pcie->rba;
struct list_head local_empty;
    -int pending = atomic_xchg(&rba->req_pending, 0);
    +int pending = atomic_read(&rba->req_pending);
    +IWL_DEBUG_RX(trans, "Pending allocation requests = %d\n", pending);

    @ @ -530,11 +530,13 @@
i++;}

    +atomic_dec(&rba->req_pending);
    pending--;
    +
    if (!pending) {
        -pending = atomic_xchg(&rba->req_pending, 0);
+pending = atomic_read(&rba->req_pending);
+IWL_DEBUG_RX(trans,
+    "Pending allocation requests = %d\n",
+    pending);
+
+spin_unlock(&rba->lock);
+atomic_inc(&rba->req_ready);
+
+}
+
+spin_lock(&rba->lock);
+/* return unused rbds to the allocator empty list */
+list_splice_tail(&local_empty, &rba->rbd_empty);
+spin_unlock(&rba->lock);
+
+IWL_DEBUG_RX(trans, "%s, exit.\n", __func__);
+
+/*
+ * iwl_pcie_rx_move_to_allocator - Recycle used RBDs
+ */
+static void iwl_pcie_rx_move_to_allocator(struct iwl_rxq *rxq,
+    struct iwl_rb_allocator *rba)
+{
+spin_lock(&rba->lock);
+list_splice_tail_init(&rxq->rx_used, &rba->rbd_empty);
+spin_unlock(&rba->lock);
+
+static void iwl_pcie_rx_reuse_rbd - Recycle used RBDs
+ * @@ -1078,9 +1093,7 @@
if ((rxq->used_count % RX_CLAIM_REQ_ALLOC) == RX_POST_REQ_ALLOC) {
    /* Move the 2 RBDs to the allocator ownership. 
       Allocator has another 6 from pool for the request completion*/
    -spin_lock(&rba->lock);
    -list_splice_tail_init(&rxq->rx_used, &rba->rbd_empty);
    -spin_unlock(&rba->lock);
    +iwl_pcie_rx_move_to_allocator(rxq, rba);

    atomic_inc(&rba->req_pending);
    queue_work(rba->alloc_wq, &rba->rx_alloc);
@@ -1239,10 +1252,15 @@
static void iwl_pcie_rx_handle(struct iwl_trans *trans, int queue)
{
    struct iwl_trans_pcie *trans_pcie = IWL_TRANS_GET_PCIE_TRANS(trans);
    -struct iwl_rxq *rxq = &trans_pcie->rxq[queue];
    +struct iwl_rxq *rxq;
    u32 r, i, count = 0;
    bool emergency = false;

    +if (WARN_ON_ONCE(!trans_pcie->rxq || !trans_pcie->rxq[queue].bd))
        +return;
    +rxq = &trans_pcie->rxq[queue];
    +restart: 
        spin_lock(&rxq->lock);
        /* uCode's read index (stored in shared DRAM) indicates the last Rx 
@@ -1258,10 +1276,18 @@
    IWL_DEBUG_RX(trans, "Q %d: HW = SW = %d\n", rxq->id, r);

    while (i != r) {
        +struct iwl_rb_allocator *rba = &trans_pcie->rba;
        struct iwl_rx_mem_buffer *rxb;
        -
        -if (unlikely(rxq->used_count == rxq->queue_size / 2))
            /* number of RBDs still waiting for page allocation */
            +u32 rb_pending_alloc =
            +atomic_read(&trans_pcie->rba.req_pending) * 
            +RX_CLAIM_REQ_ALLOC;
            +
            +if (unlikely(rb_pending_alloc >= rxq->queue_size / 2 &&
                + !emergency)) {
                +iwl_pcie_rx_move_to_allocator(rxq, rba);
                emergency = true;
                +}

    if (trans->cfg->mq_rx_supported) {
        /*
iw1_pcie_rx_allocator_get(trans, rxq);

if (rxq->used_count % RX_CLAIM_REQ_ALLOC == 0 && !emergency) {
  struct iwl_rb_allocator *rba = &trans_pcie->rba;

  /* Add the remaining empty RBDs for allocator use */
  spin_lock(&rba->lock);
  list_splice_tail_init(&rxq->rx_used, &rba->rbd_empty);
  spin_unlock(&rba->lock);
  iwl_pcie_rx_move_to_allocator(rxq, rba);
} else if (emergency) {
  count++;
  if (count == 8) {
    count = 0;
    -if (rxq->used_count < rxq->queue_size / 3)
  +if (rb_pending_alloc < rxq->queue_size / 3)
    emergency = false;

  rxq->read = i;
  goto out;
}

-if (iw1_have_debug_level(IWL_DL_ISR)) {
  /* NIC fires this, but we don't use it, redundant with WAKEUP */
  if (inta & CSR_INT_BIT_SCD) {
    IWL_DEBUG_ISR(trans,
      "Scheduler finished to transmit the frame/frames.\n");
    isr_stats->sch++;
  }
+/* NIC fires this, but we don't use it, redundant with WAKEUP */
+if (inta & CSR_INT_BIT_SCD) {
+  IWL_DEBUG_ISR(trans,
+    "Scheduler finished to transmit the frame/frames.\n");
+  isr_stats->sch++;
  +}

-if (iw1_have_debug_level(IWL_DL_ISR)) {
  /* Alive notification via Rx interrupt will do the real work */
  if (inta & CSR_INT_BIT_ALIVE) {
    IWL_DEBUG_ISR(trans, "Alive interrupt\n");
    isr_stats->alive++;
    if (trans->cfg->gen2) {
      /* We can restock, since firmware configured
       * the RFH
       */
      iwl_pcie_rxmq_restock(trans, trans_pcie->rxq);
    }
  }
}
+)/* Alive notification via Rx interrupt will do the real work */
+if (inta & CSR_INT_BIT_ALIVE) {
+    IWL_DEBUG_ISR(trans, "Alive interrupt\n");
+    isr_stats->alive++;
+    if (trans->cfg->gen2) {
+        /* We can restock, since firmware configured
+         * the RFH
+         */
+        iwl_pcie_rxmq_restock(trans, trans_pcie->rxq);
+    }
+    handled |= CSR_INT_BIT_ALIVE;
+}
+
+/* Safely ignore these bits for debug checks below */
+@@ -1790,6 +1812,9 @@
+    /* Re-enable RF_KILL if it occurred */
+else if (handled & CSR_INT_BIT_RF_KILL)
+    iwl_enable_rfkill_int(trans);
+/* Re-enable the ALIVE / Rx interrupt if it occurred */
+else if (handled & (CSR_INT_BIT_ALIVE | CSR_INT_BIT_FH_RX))
+           iwl_enable_fw_load_int_ctx_info(trans);
+    spin_unlock(&trans_pcie->irq_lock);
+
+out:
+@@ -1934,10 +1959,18 @@
+    return IRQ_NONE;
+
+    if (iwl_have_debug_level(IWL_DL_ISR)) {
+        IWL_DEBUG_ISR(trans, "ISR inta_fh 0x%08x, enabled 0x%08x\n",
+                        inta_fh,
+                        inta_fh, &trans_pcie->fh_mask);
+    }
+    if (iwl_have_debug_level(IWL_DL_ISR)) {
+        IWL_DEBUG_ISR(trans, "ISR inta_fh 0x%08x, enabled (sw) 0x%08x (hw) 0x%08x\n",
+                        inta_fh, trans_pcie->fh_mask,
+                        iwl_read32(trans, CSR_MSIX_FH_INT_MASK_AD));
+    }
+    if (inta_fh & ~trans_pcie->fh_mask)
+        iwl_pcie_rxmq_restock(trans, trans_pcie->rxq);
+    }
+}
inta_fh & MSIX_FH_INT_CAUSES_Q0) {
    @ @ -1976.11 +2009.18 @ @
}

/* After checking FH register check HW register */
-if (iwl_have_debug_level(IWL_DL_ISR))
+if (iwl_have_debug_level(IWL_DL_ISR)) {
    IWL_DEBUG_ISR(trans,
    -    "ISR inta_hw 0x%08x, enabled 0x%08x\n",
+    - inta_hw,
    +    "ISR inta_hw 0x%08x, enabled (sw) 0x%08x (hw) 0x%08x\n",
       + inta_hw, trans_pcie->hw_mask,
           - iwl_read32(trans, CSR_MSIX_HW_INT_MASK_AD));
+if (inta_hw & ~trans_pcie->hw_mask)
+    IWL_DEBUG_ISR(trans,
+    +    "We got a masked interrupt 0x%08x\n",
+    +    inta_hw & ~trans_pcie->hw_mask);
    +}
    +
    +inta_hw &= trans_pcie->hw_mask;

/* Alive notification via Rx interrupt will do the real work */
if (inta_hw & MSIX_HW_INT_CAUSES_REG_ALIVE) {
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/trans-gen2.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/trans-gen2.c
@@ -280,6 +280,15 @@
    * paging memory cannot be freed included since FW will still use it
    */
iwl_pcie_ctxt_info_free(trans);
    +
    +/*
    + * Re-enable all the interrupts, including the RF-Kill one, now that
    + * the firmware is alive.
    + */
    +iwl_enableInterrupts(trans);
    +mutex_lock(&trans_pcie->mutex);
    +iwl_pcie_check_hw_rf_kill(trans);
    +mutex_unlock(&trans_pcie->mutex);
}

int iwl_trans_PCIE_gen2_start_FW(struct iwl_trans *trans,
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/trans.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/trans.c
@@ -1529,18 +1529,6 @@
iwl_pcie_enable_rx_wake(trans, true);
    */
- * Reconfigure IVAR table in case of MSIX or reset ict table in
- * MSI mode since HW reset erased it.
- * Also enables interrupts - none will happen as
- * the device doesn't know we're waking it up, only when
- * the opmode actually tells it after this call.
    */
iwl_pcie_conf_msix_hw(trans_pcie);
if (!trans_pcie->msix_enabled)
    iwl_pcie_reset_ict(trans);
iwl_enable_interrupts(trans);
-
iwl_set_bit(trans, CSR_GP_CNTRL, CSR_GP_CNTRL_REG_FLAG_MAC_ACCESS_REQ);
iwl_set_bit(trans, CSR_GP_CNTRL, CSR_GP_CNTRL_REG_FLAG_INIT_DONE);
@@ -1556,6 +1544,18 @@
return ret;
"
/
* Reconfigure IVAR table in case of MSIX or reset ict table in
+ * MSI mode since HW reset erased it.
+ * Also enables interrupts - none will happen as
+ * the device doesn't know we're waking it up, only when
+ * the opmode actually tells it after this call.
+ */
iwl_pcie_conf_msix_hw(trans_pcie);
iwl_pcie_reset_ict(trans);
iwl_enable_interrupts(trans);
+
iwl_pcie_set_pwr(trans, false);

if (!reset) {
@@ -1588,14 +1588,13 @@
struct iwl_trans *trans)
{
struct iwl_trans_pcie *trans_pcie = IWL_TRANS_GET_PCIE_TRANS(trans);
-int max_irqs, num_irqs, i, ret, nr_online_cpus;
+int max_irqs, num_irqs, i, ret;
  u16 pci_cmd;

  if (!trans->cfg->mq_rx_supported)
  goto enable_msi;
  -nr_online_cpus = num_online_cpus();
  -max_irqs = min_t(u32, nr_online_cpus + 2, IWL_MAX_RX_HW_QUEUES);
  +max_irqs = min_t(u32, num_online_cpus() + 2, IWL_MAX_RX_HW_QUEUES);
  for (i = 0; i < max_irqs; i++)
trans_pcie->msix_entries[i].entry = i;

@@ -1621,16 +1620,17 @@
 * Two interrupts less: non rx causes shared with FBQ and RSS.
 * More than two interrupts: we will use fewer RSS queues.
 */
- if (num_irqs <= nr_online_cpus) {
+ if (num_irqs <= max_irqs - 2) {
    trans_pcie->trans->num_rx_queues = num_irqs + 1;
    trans_pcie->shared_vec_mask = IWL_SHARED_IRQ_NON_RX | IWL_SHARED_IRQ_FIRST_RSS;
- } else if (num_irqs == nr_online_cpus + 1) {
+ } else if (num_irqs == max_irqs - 1) {
    trans_pcie->trans->num_rx_queues = num_irqs;
    trans_pcie->shared_vec_mask = IWL_SHARED_IRQ_NON_RX;
 } else {
    trans_pcie->trans->num_rx_queues = num_irqs - 1;
+WARN_ON(trans_pcie->trans->num_rx_queues > IWL_MAX_RX_HW_QUEUES);
 }

 trans_pcie->alloc_vecs = num_irqs;
 trans_pcie->msix_enabled = true;
@@ -1734,6 +1734,17 @@
 static int _iwl_trans_pcie_start_hw(struct iwl_trans *trans, bool low_power) {
     struct iwl_trans_pcie *trans_pcie = IWL_TRANS_GET_PCIE_TRANS(trans);
+     u32 hpm;
     int err;

     lockdep_assert_held(&trans_pcie->mutex);
@@ -1744,6 +1745,17 @@
     return err;
 }

+     hpm = iwl_trans_read_prph(trans, HPM_DEBUG);
+     if (hpm != 0xa5a5a5a0 && (hpm & PERSISTENCE_BIT)) {
+         if (iwl_trans_read_prph(trans, PREG_PRPH_WPROT_0) &
+             PREG_WFPM_ACCESS) {
+             IWL_ERR(trans,
+                 "Error, can not clear persistence bit\n");
+             return -EPERM;
+         }
+     }
+     iwl_trans_write_prph(trans, HPM_DEBUG, hpm & ~PERSISTENCE_BIT);
+ }
+ iwl_pcie_sw_reset(trans);

 err = iwl_pcie_apm_init(trans);
void *buf, int dwords)
{
  unsigned long flags;
  int offs, ret = 0;
  int offs = 0;
  u32 *vals = buf;

  if (iwl_trans_grab_nic_access(trans, &flags)) {
    iwl_write32(trans, HBUS_TARG_MEM_RADDR, addr);
    for (offs = 0; offs < dwords; offs++)
      vals[offs] = iwl_read32(trans, HBUS_TARG_MEM_RDAT);
    iwl_trans_release_nic_access(trans, &flags);
  } else {
    ret = -EBUSY;
  }
  return ret;
}

static int iwl_trans_pcie_write_mem(struct iwl_trans *trans, u32 addr,
spin_lock_init(&trans_pcie->reg_lock);
mutex_init(&trans_pcie->mutex);
init_waitqueue_head(&trans_pcie->ucode_write_waitq);
+
trans_pcie->rba.alloc_wq = alloc_workqueue("rb_allocator",
+ WQ_HIGHPRI | WQ_UNBOUND, 1);
+if (!trans_pcie->rba.alloc_wq) {
+ret = -ENOMEM;
+goto out_free_trans;
+}
+INIT_WORK(&trans_pcie->rba.rx_alloc, iwl_pcie_rx_allocator_work);
+
trans_pcie->tso_hdr_page = alloc_percpu(struct iwl_tso_hdr_page);
if (!trans_pcie->tso_hdr_page) {
ret = -ENOMEM;
}@ @ -3286,10 +3327,6 @@
trans_pcie->inta_mask = CSR_INI_SET_MASK;
}
-
-trans_pcie->rba.alloc_wq = alloc_workqueue("rb_allocator",
- WQ_HIGHPRI | WQ_UNBOUND, 1);
-INIT_WORK(&trans_pcie->rba.rx_alloc, iwl_pcie_rx_allocator_work);
-
#ifdef CONFIG_IWLWIFI_PCIE_RTPM
trans->runtime_pm_mode = IWL_PLAT_PM_MODE_D0I3;
#else
//@ @ -3302,6 +3339,8 @@
iwl_pcie_free_ict(trans);
out_no_pci:
free_percpu(trans_pcie->tso_hdr_page);
+destroy_workqueue(trans_pcie->rba.alloc_wq);
+out_free_trans:
iwl_trans_free(trans);
return ERR_PTR(ret);
}
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/tx-gen2.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/tx-gen2.c
//@ @ -147,7 +147,7 @@
/* Sanity check on number of chunks */
um_tbs = iwl_pcie_gen2_get_num_tbs(trans, tfd);
-
-if (num_tbs >= trans_pcie->max_tbs) {
+if (num_tbs > trans_pcie->max_tbs) {
IWL_ERR(trans, "Too many chunks: \%d", num_tbs);
return;
}
//@ @ -232,27 +232,23 @@
 struct ieee80211_hdr *hdr = (void *)skb->data;
unsigned int snap_ip_tcp_hdrlen, ip_hdrlen, total_len, hdr_room;
unsigned int mss = skb_shinfo(skb)->gso_size;
- u16 length, iv_len, amsdu_pad;
+ u16 length, amsdu_pad;
u8 *start_hdr;
struct iwl_tso_hdr_page *hdr_page;
struct page **page_ptr;
struct tso_t tso;

/* if the packet is protected, then it must be CCMP or GCMP */
- iv_len = ieee80211_has_protected(hdr->frame_control) ?
- IEEE80211_CCMP_HDR_LEN : 0;
-
 trace_iwlwifi_dev_tx(trans->dev, skb, tfd, sizeof(*tfd),
 &dev_cmd->hdr, start_len, 0);

 ip_hdrlen = skb_transport_header(skb) - skb_network_header(skb);
snap_ip_tcp_hdrlen = 8 + ip_hdrlen + tcp_hdrlen(skb);
-total_len = skb->len - snap_ip_tcp_hdrlen - hdr_len - iv_len;
+total_len = skb->len - snap_ip_tcp_hdrlen - hdr_len;
amsdu_pad = 0;
/* total amount of header we may need for this A-MSDU */
hdr_room = DIV_ROUND_UP(total_len, mss) *
-(3 + snap_ip_tcp_hdrlen + sizeof(struct ethhdr)) + iv_len;
+(3 + snap_ip_tcp_hdrlen + sizeof(struct ethhdr));

 /* Our device supports 9 segments at most, it will fit in 1 page */
 hdr_page = get_page_hdr(trans, hdr_room);
@@ -263,14 +259,12 @@
 start_hdr = hdr_page->pos;
 page_ptr = (void *)(u8 *)&skb->cb + trans_pcie->page_offs);
 *page_ptr = hdr_page->page;
-memcpy(hdr_page->pos, skb->data + hdr_len, iv_len);
-hdr_page->pos += iv_len;

 /*
 - * Pull the ieee80211 header + IV to be able to use TSO core,
 + * Pull the ieee80211 header to be able to use TSO core,
 * we will restore it for the tx_status flow.
 */
-skb_pull(skb, hdr_len + iv_len);
+skb_pull(skb, hdr_len);

 /*
 * Remove the length of all the headers that we don't actually
@@ -345,8 +339,8 @@

/* re-add the WiFi header and IV */
skb_push(skb, hdr_len + iv_len);

/* re-add the WiFi header */
skb_push(skb, hdr_len);

return 0;

@@ -411,7 +405,12 @@

hdr_len = ieee80211_hdrlen(hdr->frame_control);

- if (amsdu) {
-+ /* Only build A-MSDUs here if doing so by GSO, otherwise it may be
-+ an A-MSDU for other reasons, e.g. NAN or an A-MSDU having been
-+ built in the higher layers already.
-+ */
-+ if (amsdu && skb_shinfo(skb)->gso_size) {
- if (iwl_pcie_gen2_build_amsdu(trans, skb, tfd,
-tbl_len + IWL_FIRST_TB_SIZE,
-hdr_len, dev_cmd))
-@@ -562,6 +561,7 @@
-const u8 *cmddata[IWL_MAX_CMD_TBS_PER_TFD];
u16 cmdlen[IWL_MAX_CMD_TBS_PER_TFD];
-struct iwl_tfh_tfd *tfd = iwl_pcie_get_tfd(trans, txq, txq->write_ptr);
+unsigned long flags2;

memset(tfd, 0, sizeof(*tfd));

@@ -632,10 +632,10 @@
goto free_dup_buf;
}

-spin_lock_bh(&txq->lock);
+spin_lock_irqsave(&txq->lock, flags2);

if (iwl_queue_space(txq) < ((cmd->flags & CMD_ASYNC) ? 2 : 1)) {
-spin_unlock_bh(&txq->lock);
+spin_unlock_irqrestore(&txq->lock, flags2);

IWL_ERR(trans, "No space in command queue\n");
iwl_op_mode_cmd_queue_full(trans->op_mode);
@@ -776,7 +776,7 @@
spin_unlock_irqrestore(&trans_PCIE->reg_lock, flags);
out:
-spin_unlock_bh(&txq->lock);
+spin_unlock_irqrestore(&txq->lock, flags2);
free_dup_buf:
if (idx < 0)
kfree(dup_buf);
@@ -1127,6 +1127,9 @@
iwl_pcie_gen2_txq_unmap(trans, queue);
+iwl_pcie_gen2_txq_free_memory(trans, trans_pcie->txq[queue]);
+trans_pcie->txq[queue] = NULL;
+
IWL_DEBUG_TX_QUEUES(trans, "Deactivate queue %d\n", queue);
}
--- linux-4.15.0.orig/drivers/net/wireless/intel/iwlwifi/pcie/tx.c
+++ linux-4.15.0/drivers/net/wireless/intel/iwlwifi/pcie/tx.c
@@ -378,7 +378,7 @@
/* Sanity check on number of chunks */
 num_tbs = iwl_pcie_tfd_get_num_tbs(trans, tfd);

-if (num_tbs >= trans_pcie->max_tbs) {
+if (num_tbs > trans_pcie->max_tbs) {
 IWL_ERR(trans, "Too many chunks: %i\n", num_tbs);
 /* @todo issue fatal error, it is quite serious situation */
 return;
@@ -401,6 +401,8 @@
 DMA_TO_DEVICE);
 }

+meta->tbs = 0;
+
if (trans->cfg->use_tfh) {
struct iwl_tfh_tfd *tfd_fh = (void *)tfd;

@@ -619,6 +621,11 @@
struct iwl_trans_pcie *trans_pcie = IWL_TRANS_GET_PCIE_TRANS(trans);
struct iwl_txq *txq = trans_pcie->txq[txq_id];

+if (!txq) {
+IWL_ERR(trans, "Trying to free a queue that wasn't allocated?\n");
+return;
+}
+spin_lock_bh(&txq->lock);
while (txq->write_ptr != txq->read_ptr) {
IWL_DEBUG_TX_REPLY(trans, "Q %d Free %d\n",
if (!iwl_queue_used(txq, last_to_free)) {
    IWL_ERR(trans,
    "%s: Read index for DMA queue txq id (%d), last_to_free %d is out of range [0-%d] %d %d.\n",
    __func__, txq_id, last_to_free, TFD_QUEUE_SIZE_MAX,
    txq->write_ptr, txq->read_ptr);
    goto out;
}

for (idx = iwl_queue_inc_wrap(idx); txq->read_ptr != idx;
     txq->read_ptr = iwl_queue_inc_wrap(txq->read_ptr)) {  
    txq->write_ptr = iwl_queue_inc_wrap(txq->write_ptr);
    if (nfreed++ > 0) {
        IWL_ERR(trans, "HCMD skipped: index (%d) %d %d\n",
        idx, txq->write_ptr, txq->read_ptr);
        iwl_force_nmi(trans);
    }
}

if (nfreed++ > 0) {
    IWL_ERR(trans, "HCMD skipped: index (%d) %d %d\n",
    -idx, txq->write_ptr, txq->read_ptr);
    +idx, txq->write_ptr, r);
    iwl_force_nmi(trans);
}

u16 cmdlen[IWL_MAX_CMD_TBS_PER_TFD];
+unsigned long flags2;

if (WARN(!trans->wide_cmd_header &&
    group_id > IWL_ALWAYS_LONG_GROUP,
    -- -1580,10 +1576,10 @@
goto free_dup_buf;
}

-spin_lock_bh(&txq->lock);
+spin_lock_irqsave(&txq->lock, flags2);

if (iwl_queue_space(txq) < ((cmd->flags & CMD_ASYNC) ? 2 : 1)) {
    -spin_unlock_bh(&txq->lock);
    +spin_unlock_irqrestore(&txq->lock, flags2);
}

IWL_ERR(trans, "No space in command queue\n");
iwl_op_mode_cmd_queue_full(trans->op_mode);  
@@ -1567,10 +1580,10 @@
spin_unlock_irqrestore(&trans_pcie->reg_lock, flags);

out:
-spin_lock_bh(&txq->lock);
+spin_lock_irqrestore(&txq->lock, flags2);
free_dup_buf:
if (idx < 0)
kfree(dup_buf);
--- linux-4.15.0.orig/drivers/net/wireless/intersil/hostap/hostap_ap.c
+++ linux-4.15.0/drivers/net/wireless/hostap/hostap_ap.c
@@ -2566,7 +2566,7 @@
statioupported_rates[0] = 2;
ift sta->tx_supp_rates & WLAN_RATE_2M)
sta->supported_rates[1] = 4;
- if (sta->tx_supp_rates & WLAN_RATE_5M5)
+if (sta->tx_supp_rates & WLAN_RATE_5M5)
sta->supported_rates[2] = 11;
if (sta->tx_supp_rates & WLAN_RATE_11M)
sta->supported_rates[3] = 22;
--- linux-4.15.0.orig/drivers/net/wireless/intersil/orinoco/orinoco_usb.c
+++ linux-4.15.0/drivers/net/wireless/intersil/orinoco/orinoco_usb.c
@@ -1237,13 +1237,6 @@
if (skb->len < ETH_HLEN)
goto drop;
-ctx = ezusb_alloc_ctx(upriv, EZUSB_RID_TX, 0);
-if (!ctx)
-goto busy;
-
memset(ctx->buf, 0, BULK_BUF_SIZE);
buf = ctx->buf->data;

tx_control = 0;

err = orinoco_process_xmit_skb(skb, dev, priv, &tx_control,
@@ -1251,6 +1244,13 @@
if (err)
goto drop;

+ctx = ezusb_alloc_ctx(upriv, EZUSB_RID_TX, 0);
+if (!ctx)
+goto drop;
+
+memset(ctx->buf, 0, BULK_BUF_SIZE);
+buf = ctx->buf->data;
+
{__le16 *tx_cntl = (__le16 *)buf;
 *tx_cntl = cpu_to_le16(tx_control);
@@ -1364,7 +1364,8 @@
         int retval;

         BUG_ON(in_interrupt());
-BUG_ON(!upriv);
+if (!upriv)
+return -EINVAL;

         upriv->reply_count = 0;
         /* Write the MAGIC number on the simulated registers to keep
@@ -1611,9 +1612,9 @@
         /* set up the endpoint information */
         /* check out the endpoints */

         -iface_desc = &interface->altsetting[0].desc;
+iface_desc = &interface->cur_altsetting->desc;
         for (i = 0; i < iface_desc->bNumEndpoints; ++i) {
             -ep = &interface->altsetting[0].endpoint[i].desc;
+ep = &interface->cur_altsetting->endpoint[i].desc;

             if (usb_endpoint_is_bulk_in(ep)) {
                 /* we found a bulk in endpoint */
--- linux-4.15.0.orig/drivers/net/wireless/intersil/p54/p54pci.c
+++ linux-4.15.0/drivers/net/wireless/intersil/p54/p54pci.c
@@ -332,10 +332,12 @@
             struct p54p_desc *desc;
             dma_addr_t mapping;
             u32 idx, i;

device_addr = ((struct p54_hdr *)skb->data)->req_id;

mapping = pci_map_single(priv->pdev, skb->data, skb->len, PCI_DMA_TODEVICE);

desc = &ring_control->tx_data[i];
desc->host_addr = cpu_to_le32(mapping);
desc->device_addr = device_addr;
desc->len = cpu_to_le16(skb->len);
desc->flags = 0;

err = pci_enable_device(pdev);
if (err) {
    dev_err(&pdev->dev, "Cannot enable new PCI device\n");
    -return err;
    goto err_put;
}

mem_addr = pci_resource_start(pdev, 0);
pci_release_regions(pdev);
err_disable_dev:
pci_disable_device(pdev);
+err_put:
pici_dev_put(pdev);
return err;

--- linux-4.15.0.orig/drivers/net/wireless/intersil/p54/p54usb.c
+++ linux-4.15.0/drivers/net/wireless/intersil/p54/p54usb.c
@@ -33,6 +33,8 @@
 MODULE_FIRMWARE("isl3886usb");
 MODULE_FIRMWARE("isl3887usb");

+static struct usb_driver p54u_driver;
+
/*
 * Note:
 * 
@@ -62,6 +64,7 @@
 {USB_DEVICE(0x0db0, 0x6826)},	/* MSI UB54G (MS-6826) */
{USB_DEVICE(0x107b, 0x55f2)}, /* Gateway WGU-210 (Gemtek) */
{USB_DEVICE(0x124a, 0x4023)}, /* Shuttle PN15, Airvast WM168g, IOGear GWU513 */
+{USB DEVICE(0x124a, 0x4026)}, /* AirVasT USB wireless device */
{USB DEVICE(0x1435, 0x0210)}, /* Inventel UR054G */
{USB DEVICE(0x15a9, 0x0002)}, /* Gemtek WUBI-100GW 802.11g */
{USB DEVICE(0x1630, 0x0005)}, /* 2Wire 802.11g USB (v1) / Z-Com */
@@ -921,9 +924,9 @@
{
 struct p54u_priv *priv = context;
 struct usb_device *udev = priv->udev;
+struct usb_interface *intf = priv->intf;
 int err;

 -complete(&priv->fw_wait_load);
 if (firmware) {
 priv->fw = firmware;
 err = p54u_start_ops(priv);
@@ -932,26 +935,22 @@
 dev_err(&udev->dev, "Firmware not found.
")
 }

-if (err) {
-struct device *parent = priv->udev->dev.parent;
-
-dev_err(&udev->dev, "failed to initialize device (%d)\n", err);
-
-if (parent)
-device_lock(parent);
+complete(&priv->fw_wait_load);
+/*
+ * At this point p54u_disconnect may have already freed
+ * the "priv" context. Do not use it anymore!
+ */
+priv = NULL;

-device_release_driver(&udev->dev);
-/*
- * At this point p54u_disconnect has already freed
- * the "priv" context. Do not use it anymore!
- */
-
-priv = NULL;
+if (err) {
+dev_err(&intf->dev, "failed to initialize device (%d)\n", err);

-if (parent)
-device_unlock(parent);
+usb_lock_device(udev);
+usb_driver_release_interface(&p54u_driver, intf);
static int p54u_load_firmware(struct ieee80211_hw *dev,
    const char *fw, struct usb_device *udev)
{
    dev_info(&priv->udev->dev, "Loading firmware file %s\n",
        p54u_fwlist[i].fw);

    if (err) {
        dev_err(&priv->udev->dev, "(p54usb) cannot load firmware %s "
            "(%d)!\n", p54u_fwlist[i].fw, err);
        usb_put_dev(udev);
        usb_put_intf(intf);
    }

    return err;
}

skb_queue_head_init(&priv->rx_queue);
init_usb_anchor(&priv->submitted);

/* really lazy and simple way of figuring out if we're a 3887 */
/* TODO: should just stick the identification in the device table */
i = intf->altsetting->desc.bNumEndpoints;

priv->upload_fw = p54u_upload_firmware_net2280;
}

err = p54u_load_firmware(dev, intf);
-if (err) {
    usb_put_dev(udev);
+if (err)
        p54_free_common(dev);
-}
    return err;
}

wait_for_completion(&priv->fw_wait_load);
p54_unregister_common(dev);

-usb_put_dev(interface_to_usbdev(intf));
release_firmware(priv->fw);
p54_free_common(dev);
}
--- linux-4.15.0.orig/drivers/net/wireless/mac80211_hwsim.c
+++ linux-4.15.0/drivers/net/wireless/mac80211_hwsim.c
@@ -32,6 +32,7 @@
#include <genetlink.h>
#include <net/net_namespace.h>
#include <net/socks/generic.h>
+include <linux/nospec.h>
#include "mac80211_hwsim.h"

#define WARN_QUEUE 100
@@ -729,16 +730,21 @@
    val != PS_MANUAL_POLL)
    return -EINVAL;
-old_ps = data->ps;
-data->ps = val;
-
-local_bh_disable();
if (val == PS_MANUAL_POLL) {
+if (data->ps != PS_ENABLED)
+    return -EINVAL;
+local_bh_disable();
ieee80211_iterate_active_interfaces_atomic(
data->hw, IEEE80211_IFACE_ITER_NORMAL,
hwsim_send_ps_poll, data);
-old_ps_poll_pending = true;
} else if (old_ps == PS_DISABLED && val != PS_DISABLED) {
+local_bh_enable();
+return 0;
+old_ps = data->ps;
+data->ps = val;
+
+local_bh_disable();
+if (old_ps == PS_DISABLED && val != PS_DISABLED) {
ieee80211_iterate_active_interfaces_atomic(
data->hw, IEEE80211_IFACE_ITER_NORMAL,
hwsim_send_nullfunc_ps, data);
@@ -2629,9 +2635,6 @@
IEEE80211_VHT_CAP_SHORT_GI_80 |
IEEE80211_VHT_CAP_RXSTBC_1 | IEEE80211_VHT_CAP_RXSTBC_2 | IEEE80211_VHT_CAP_RXSTBC_3 |
IEEE80211_VHT_CAP_RXSTBC_4 |
IEEE80211_VHT_CAP_MAX_A_MPDU_LENGTH_EXPONENT_MASK;

sband->vht_cap.vht_mcs.rx_mcs_map =

```
wiphy_ext_feature_set(hw->wiphy, NL80211_EXT_FEATURE_CQM_RSSI_LIST);
```

```
+tasklet_hrtimer_init(&data->beacon_timer,
+    mac80211_hwsim_beacon,
+    CLOCK_MONOTONIC, HRTIMER_MODE_ABS);
+
+err = ieee80211_register_hw(hw);
if (err < 0) {
    pr_debug("mac80211_hwsim: ieee80211_register_hw failed (%d)\n",
        data->debugfs,
        &hwsim_simulate_radar);
}
```

```
-tasklet_hrtimer_init(&data->beacon_timer,
    mac80211_hwsim_beacon,
    CLOCK_MONOTONIC, HRTIMER_MODE_ABS);
-
spin_lock_bh(&hwsim_radio_lock);
list_add_tail(&data->list, &hwsim_radios);
spin_unlock_bh(&hwsim_radio_lock);
-
@if (idx > 0)
    hwsim_mcast_new_radio(idx, info, param);
+    hwsim_mcast_new_radio(idx, info, param);
return idx;
```

```
@@ -3121,6 +3123,11 @@
if (info->attrs[HWSIM_ATTR_CHANNELS])
    param.channels = nla_get_u32(info->attrs[HWSIM_ATTR_CHANNELS]);
+
+if (param.channels < 1) {
+    GENL_SET_ERR_MSG(info, "must have at least one channel");
+    return -EINVAL;
+}
+
+if (param.channels > CFG80211_MAX_NUM_DIFFERENT_CHANNELS) {
    GENL_SET_ERR_MSG(info, "too many channels specified");
    return -EINVAL;
@@ -3130,9 +3137,9 @@
```
param.no_vif = true;

if (info->attrs[HWSIM_ATTR_RADIO_NAME]) {
    hwname = kasprintf(GFP_KERNEL, "%.*s",
                        nla_len(info->attrs[HWSIM_ATTR_RADIO_NAME]),
                        (char *)nla_data(info->attrs[HWSIM_ATTR_RADIO_NAME]));
    hwname = kstrndup((char *)nla_data(info->attrs[HWSIM_ATTR_RADIO_NAME]),
                      nla_len(info->attrs[HWSIM_ATTR_RADIO_NAME]),
                      GFP_KERNEL);
    if (!hwname)
        return -ENOMEM;
    param.hwname = hwname;
    if (!hwname)
        return -ENOMEM;
}

if (info->attrs[HWSIM_ATTR_REG_CUSTOM_REG]) {
    u32 idx = nla_get_u32(info->attrs[HWSIM_ATTR_REG_CUSTOM_REG]);
    if (idx >= ARRAY_SIZE(hwsim_world_regdom_custom)) {
        kfree(hwname);
        return -EINVAL;
    }
    idx = array_index_nospec(idx, ARRAY_SIZE(hwsim_world_regdom_custom));
    param.regd = hwsim_world_regdom_custom[idx];
}

if (info->attrs[HWSIM_ATTR_RADIO_ID]) {
    idx = nla_get_u32(info->attrs[HWSIM_ATTR_RADIO_ID]);
} else if (info->attrs[HWSIM_ATTR_RADIO_NAME]) {
    hwname = kasprintf(GFP_KERNEL, "%.*s",
                        nla_len(info->attrs[HWSIM_ATTR_RADIO_NAME]),
                        (char *)nla_data(info->attrs[HWSIM_ATTR_RADIO_NAME]));
    hwname = kstrndup((char *)nla_data(info->attrs[HWSIM_ATTR_RADIO_NAME]),
                      nla_len(info->attrs[HWSIM_ATTR_RADIO_NAME]),
                      GFP_KERNEL);
    if (!hwname)
        return -ENOMEM;
    goto out_err;
} else
    goto out_err;

 genus_reply(skb, info);
 +res = genlmsg_reply(skb, info);
 break;
}
static void __net_exit hwsim_exit_net(struct net *net)
{
    struct mac80211_hwsim_data *data, *tmp;
    LIST_HEAD(list);

    spin_lock_bh(&hwsim_radio_lock);
    list_for_each_entry_safe(data, tmp, &hwsim_radios, list) {
        if (data->netgroup == hwsim_net_get_netgroup(&init_net))
            continue;

        list_del(&data->list);
        INIT_WORK(&data->destroy_work, destroy_radio);
        queue_work(hwsim_wq, &data->destroy_work);
        list_move(&data->list, &list);
    }
    spin_unlock_bh(&hwsim_radio_lock);

    list_for_each_entry_safe(data, tmp, list, list) {
        list_del(&data->list);
        mac80211_hwsim_del_radio(data,
            wiphy_name(data->hw->wiphy),
            NULL);
    }
}

static struct pernet_operations hwsim_net_ops = {
    spin_lock_init(&hwsim_radio_lock);

    hwsim_wq = alloc_workqueue("hwsim_wq", WQ_MEM_RECLAIM, 0);
    hwsim_wq = alloc_workqueue("hwsim_wq", 0, 0);
    if (!hwsim_wq)
        return -ENOMEM;

    hwsim_class = class_create(THIS_MODULE, "mac80211_hwsim");
    if (IS_ERR(hwsim_class)) {
        goto out_unregister_pernet;
    }

    hwsim_init_netlink();
    if (err)
        goto out_unregister_pernet;

    if (err)
        goto out_unregister_driver;

    hwsim_class = class_create(THIS_MODULE, "mac80211_hwsim");
    if (IS_ERR(hwsim_class)) {
        goto out_unregister_driver;
    }

    spin_lock_init(&hwsim_radio_lock);

    hwsim_wq = alloc_workqueue("hwsim_wq", WQ_MEM_RECLAIM, 0);
    hwsim_wq = alloc_workqueue("hwsim_wq", 0, 0);
    if (!hwsim_wq)
        return -ENOMEM;

    if (err)
        goto out_unregister_pernet;

    hwsim_init_netlink();
    if (err)
        goto out_unregister_driver;

    hwsim_class = class_create(THIS_MODULE, "mac80211_hwsim");
    if (IS_ERR(hwsim_class)) {
        goto out_unregister_driver;
    }

    list_for_each_entry_safe(data, tmp, list, list) {
        list_del(&data->list);
        mac80211_hwsim_del_radio(data,
            wiphy_name(data->hw->wiphy),
            NULL);
    }

    spin_unlock_bh(&hwsim_radio_lock);

    list_for_each_entry_safe(data, tmp, list, list) {
        list_del(&data->list);
        mac80211_hwsim_del_radio(data,
            wiphy_name(data->hw->wiphy),
            NULL);
    }

    spin_lock_init(&hwsim_radio_lock);

    hwsim_wq = alloc_workqueue("hwsim_wq", WQ_MEM_RECLAIM, 0);
    hwsim_wq = alloc_workqueue("hwsim_wq", 0, 0);
    if (!hwsim_wq)
        return -ENOMEM;

    if (err)
        goto out_unregister_pernet;

    hwsim_init_netlink();
    if (err)
        goto out_unregister_driver;

    hwsim_class = class_create(THIS_MODULE, "mac80211_hwsim");
    if (IS_ERR(hwsim_class)) {
        goto out_unregister_driver;
    }

    spin_lock_init(&hwsim_radio_lock);

    hwsim_wq = alloc_workqueue("hwsim_wq", WQ_MEM_RECLAIM, 0);
    hwsim_wq = alloc_workqueue("hwsim_wq", 0, 0);
    if (!hwsim_wq)
        return -ENOMEM;

    if (err)
        goto out_unregister_pernet;

    hwsim_init_netlink();
    if (err)
        goto out_unregister_driver;

    hwsim_class = class_create(THIS_MODULE, "mac80211_hwsim");
    if (IS_ERR(hwsim_class)) {
err = PTR_ERR(hwsim_class);
-goto out_unregister_driver;
+goto out_exit_netlink;
}

-err = hwsim_init_netlink();
-if (err < 0)
-goto out_unregister_driver;
-
-for (i = 0; i < radios; i++) {
struct hwsim_new_radio_params param = { 0 };

@@ -3582,6 +3600,8 @@
free_netdev(hwsim_mon);
out_free_radios:
mac80211_hwsim_free();
+out_exit_netlink:
+hwsim_exit_netlink();
out_unregister_driver:
platform_driver_unregister(&mac80211_hwsim_driver);
out_unregister_pernet:
--- linux-4.15.0.orig/drivers/net/wireless/marvell/libertas/cfg.c
+++ linux-4.15.0/drivers/net/wireless/marvell/libertas/cfg.c
@@ -273,6 +273,10 @@
int hw, ap, ap_max = ie[1];
u8 hw_rate;

+if (ap_max > MAX_RATES) {
+-lbs_deb_assoc("invalid rates\n");
+return tlv;
+}
/* Advance past IE header */
ie += 2;

@@ -1717,6 +1721,9 @@
struct cmd_ds_802_11_ad_hoc_join cmd;
u8 preamble = RADIO_PREAMBLE_SHORT;
int ret = 0;
+int hw, i;
+u8 rates_max;
+u8 *rates;

/* TODO: set preamble based on scan result */
ret = lbs_set_radio(priv, preamble, 1);
@@ -1775,9 +1782,14 @@
if (!rates_eid) {
lbs_add_rates(cmd.bss.rates);
} else {

# Open Source Used In 5GaaS Edge AC-4

```c
-int hw, i;
-u8 rates_max = rates_eid[1];
-u8 *rates = cmd.bss.rates;
+rates_max = rates_eid[1];
+if (rates_max > MAX_RATES) {
+lbs_deb_join("invalid rates");
+rcu_read_unlock();
+ret = -EINVAL;
+goto out;
+} 
+rates = cmd.bss.rates;
for (hw = 0; hw < ARRAY_SIZE(lbs_rates); hw++) {
  u8 hw_rate = lbs_rates[hw].bitrate / 5;
  for (i = 0; i < rates_max; i++) {
--- linux-4.15.0.orig/drivers/net/wireless/marvell/libertas/dev.h
+++ linux-4.15.0/drivers/net/wireless/marvell/libertas/dev.h
@@ -104,6 +104,7 @@
       u8 fw_ready;
       u8 surpriseremoved;
       u8 setup_fw_on_resume;
+   u8 power_up_on_resume;
       int (*hw_host_to_card) (struct lbs_private *priv, u8 type, u8 *payload, u16 nb);
       void (*reset_card) (struct lbs_private *priv);
       int (*power_save) (struct lbs_private *priv);
--- linux-4.15.0.orig/drivers/net/wireless/marvell/libertas/if_sdio.c
+++ linux-4.15.0/drivers/net/wireless/marvell/libertas/if_sdio.c
@@ -1183,6 +1183,10 @@
       spin_lock_init(&card->lock);
       card->workqueue = alloc_workqueue("libertas_sdio", WQ_MEM_RECLAIM, 0);
+       if (unlikely(!card->workqueue)) {
+         ret = -ENOMEM;
+         goto err_queue;
+       }
+       INIT_WORK(&card->packet_worker, if_sdio_host_to_card_worker);
+       init_waitqueue_head(&card->pwron_waitq);

       @ @ -1234,6 +1238,7 @@
       lbs_remove_card(priv);
       free:
       destroy_workqueue(card->workqueue);
+       @ @ -1290,15 +1295,23 @@
       static int if_sdio_suspend(struct device *dev) {
```
struct sdio_func *func = dev_to_sdio_func(dev);
-int ret;
struct if_sdio_card *card = sdio_get_drvdata(func);
+struct lbs_private *priv = card->priv;
+int ret;

mmc_pm_flag_t flags = sdio_get_host_pm_caps(func);
+priv->power_up_on_resume = false;

/* If we're powered off anyway, just let the mmc layer remove the
 * card. */
-if (!lbs_iface_active(card->priv))
-    return -ENOSYS;
+if (!lbs_iface_active(priv)) {
+    if (priv->fw_ready) {
+        priv->power_up_on_resume = true;
+        if_sdio_power_off(card);
+    }
+    return 0;
+}

dev_info(dev, "%s: suspend: PM flags = 0x%x\n",
    sdio_func_id(func), flags);
@@ -1306,9 +1319,18 @@
/* If we aren't being asked to wake on anything, we should bail out
 * and let the SD stack power down the card.
 */
-if (card->priv->wol_criteria == EHS_REMOVE_WAKEUP) {
+if (priv->wol_criteria == EHS_REMOVE_WAKEUP) {
    dev_info(dev, "Suspend without wake params -- powering down card\n");
-    return -ENOSYS;
+    if (priv->fw_ready) {
+        ret = lbs_suspend(priv);
+        if (ret)
+            return ret;
+        priv->power_up_on_resume = true;
+        if_sdio_power_off(card);
+    }
+    return 0;
+}

if (!(flags & MMC_PM_KEEPPOWER)) {
    @@ -1321,7 +1343,7 @@
        if (ret)
            return ret;
    }

if (!flags & MMC_PM_KEEP_POWER)) {
    @@ -1321,7 +1343,7 @@
        if (ret)
            return ret;
- ret = lbs_suspend(card->priv);
+ ret = lbs_suspend(priv);
 if (ret)
 return ret;

@@ -1336,6 +1358,11 @@
 dev_info(dev, "%s: resume: we're back\n", sdio_func_id(func));

+if (card->priv->power_up_on_resume) {
+ if_sdio_power_on(card);
+ wait_event(card->pwron_waitq, card->priv->fw_ready);
+ }
+
 ret = lbs_resume(card->priv);

return ret;
--- linux-4.15.0.orig/drivers/net/wireless/marvell/libertas/if_usb.c
+++ linux-4.15.0/drivers/net/wireless/marvell/libertas/if_usb.c
@@ -49,7 +49,8 @@
 { MODEL_8388, "libertas/usb8388_v5.bin", NULL },
 { MODEL_8388, "libertas/usb8388.bin", NULL },
 { MODEL_8388, "usb8388.bin", NULL },
-{ MODEL_8682, "libertas/usb8682.bin", NULL }
+{ MODEL_8682, "libertas/usb8682.bin", NULL },
+{ 0, NULL, NULL }
};

static const struct usb_device_id if_usb_table[] = {
@@ -456,8 +457,6 @@
 MRVDRV_ETH_RX_PACKET_BUFFER_SIZE, callbackfn,
 cardp);

-cardp->rx_urb->transfer_flags |= URB_ZERO_PACKET;
-
 lbs_deb_usb2(&cardp->udev->dev, "Pointer for rx_urb %p\n", cardp->rx_urb);
 if ((ret = usb_submit_urb(cardp->rx_urb, GFP_ATOMIC))) {
 lbs_deb_usb2(&cardp->udev->dev, "Submit Rx URB failed: %d\n", ret);
--- linux-4.15.0.orig/drivers/net/wireless/marvell/libertas/mesh.c
+++ linux-4.15.0/drivers/net/wireless/marvell/libertas/mesh.c
@@ @ -793,19 +793,6 @@
 .attrs = mesh_ie_attrs,
         cardp);
-expdev_warn("IE Attrs Filled: %s\n", cardp->attrs);
-
-static void lbs_persist_config_init(struct net_device *dev)
-{  
-int ret;


static void lbs_persist_config_remove(struct net_device *dev)
{
    sysfs_remove_group(&(dev->dev.kobj), &boot_opts_group);
    sysfs_remove_group(&(dev->dev.kobj), &mesh_ie_group);
}

/**************************************************************************
* Initializing and starting, stopping mesh
@@ -1005,6 +992,10 @@
 SET_NETDEV_DEV(priv->mesh_dev, priv->dev->dev.parent);

 mesh_dev->flags |= IFF_BROADCAST | IFF_MULTICAST;
+mesh_dev->sysfs_groups[0] = &lbs_mesh_attr_group;
+mesh_dev->sysfs_groups[1] = &boot_opts_group;
+mesh_dev->sysfs_groups[2] = &mesh_ie_group;
+
 /* Register virtual mesh interface */
 ret = register_netdev(mesh_dev);
 if (ret) {
@@ -1012,19 +1003,10 @@
goto err_free_netdev;
 }

 -ret = sysfs_create_group(&(mesh_dev->dev.kobj), &lbs_mesh_attr_group);
-if (ret)
-goto err_unregister;
-
-lbs_persist_config_init(mesh_dev);
-
 /* Everything successful */
 ret = 0;
goto done;

-err_unregister:
-unregister_netdev(mesh_dev);
-
 err_free_netdev:
 free_netdev(mesh_dev);
@@ -1045,8 +1027,6 @@
 netif_stop_queue(mesh_dev);
 netif_carrier_off(mesh_dev);
-sysfs_remove_group(&(mesh_dev->dev.kobj), &lbs_mesh_attr_group);
-lbs_persist_config_remove(mesh_dev);
 unregister_netdev(mesh_dev);
 priv->mesh_dev = NULL;
kfree(mesh_dev->ieee80211_ptr);
--- linux-4.15.0.orig/drivers/net/wireless/marvell/libertas_tf/cmd.c
+++ linux-4.15.0/drivers/net/wireless/marvell/libertas_tf/cmd.c
@@ -69,7 +69,7 @@
 break;
 }

- for (ch = priv->range.start; ch < priv->range.end; ch++)
+ for (ch = range->start; ch < range->end; ch++)
 priv->channels[CHAN_TO_IDX(ch)].flags = 0;
 }

--- linux-4.15.0.orig/drivers/net/wireless/marvell/libertas_tf/if_usb.c
+++ linux-4.15.0/drivers/net/wireless/marvell/libertas_tf/if_usb.c
@@ -433,8 +433,6 @@
 skb_tail_pointer(skb),
 MRVDRV_ETH_RX_PACKET_BUFFER_SIZE, callbackfn, cardp);

-cardp->rx_urb->transfer_flags |= URB_ZERO_PACKET;
-
 lbtf_deb_usb2(&cardp->udev->dev, "Pointer for rx_urb \%p\n", cardp->rx_urb);
 ret = usb_submit_urb(cardp->rx_urb, GFP_ATOMIC);
--- linux-4.15.0.orig/drivers/net/wireless/mwifiex/cfg80211.c
+++ linux-4.15.0/drivers/net/wireless/mwifiex/cfg80211.c
@@ -362,11 +362,20 @@
 struct mwifiex_power_cfg power_cfg;
 int dbm = MBM_TO_DBM(mbm);

-if (type == NL80211_TX_POWER_FIXED) {
+switch (type) {
+ case NL80211_TX_POWER_FIXED:
+ power_cfg.is_power_auto = 0;
+ power_cfg.is_power_fixed = 1;
+ power_cfg.power_level = dbm;
+ } else {
+ break;
+ case NL80211_TX_POWER_LIMITED:
+ power_cfg.is_power_auto = 0;
+ power_cfg.is_power_fixed = 0;
+ power_cfg.power_level = dbm;
+ break;
+ case NL80211_TX_POWER_AUTOMATIC:
+ power_cfg.is_power_auto = 1;
struct mwifiex_private *priv = mwifiex_netdev_get_priv(dev);
enum nl80211_iftype curr_iftype = dev->ieee80211_ptr->iftype;

+if (priv->scan_request) {
+mwifiex_dbg(priv->adapter, ERROR,
+    "change virtual interface: scan in process\n");
+return -EBUSY;
+}
+
+switch (curr_iftype) {
+case NL80211_IFTYPE_ADHOC:
+
+if ((GET_BSS_ROLE(priv) == MWIFIEX_BSS_ROLE_STA) &&
+    priv->media_connected && idx == 0) {
+mwifiex_send_cmd(priv, HOST_CMD_APCMD_STA_LIST,
+    HostCmd_ACT_GEN_GET, 0, NULL, true);
+
+node = list_prepare_entry(node, &priv->sta_list, list);
+list_for_each_entry_continue(node, &priv->sta_list, list) {
+i = 0;
+list_for_each_entry(node, &priv->sta_list, list) {
+if (i++ != idx)
+continue;
+ether_addr_copy(mac, node->mac_addr);
+return mwifiex_dump_station_info(priv, node, sinfo);
+
}
dev_err(priv->adapter->dev, "Failed to process hostcmd\n");
+kfree(hostcmd);
return -EFAULT;
}

/* process hostcmd response*/
skb = cfg80211_testmode_alloc_reply_skb(wiphy, hostcmd->len);
- if (!skb)
+ if (!skb) {
  +kfree(hostcmd);
  return -ENOMEM;
+ }
err = nla_put(skb, MWIFIEX_TM_ATTR_DATA,
    hostcmd->len, hostcmd->cmd);
if (err) {
  +kfree(hostcmd);
  kfree_skb(skb);
  return -EMSGSIZE;
}

wiphy->mgmt_stypes = mwifiex_mgm_tstypes;
wiphy->max_remain_on_channel_duration = 5000;
wiphy->interface_modes = BIT(NL80211_IFTYPE_STATION) |
- BIT(NL80211_IFTYPE_ADHOC) |
  BIT(NL80211_IFTYPE_P2P_CLIENT) |
  BIT(NL80211_IFTYPE_P2P_GO) |
  BIT(NL80211_IFTYPE_AP);

+if (ISSUPP_ADHOC_ENABLED(adapter->fw_cap_info))
+wiphy->interface_modes |= BIT(NL80211_IFTYPE_ADHOC);
+
+wiphy->bands[NL80211_BAND_2GHZ] = &mwifiex_band_2ghz;
if (adapter->config_bands & BAND_A)
wiphy->bands[NL80211_BAND_5GHZ] = &mwifiex_band_5ghz;
- @ @ -4309,11 +4328,13 @@
wiphy->available_antennas_tx = BIT(adapter->number_of_antenna) - 1;
wiphy->available_antennas_rx = BIT(adapter->number_of_antenna) - 1;

-wiphy->features |= NL80211_FEATURE_HT_IBSS |
- NL80211_FEATURE_INACTIVITY_TIMER |
+ wiphy->features |= NL80211_FEATURE_INACTIVITY_TIMER |
  NL80211_FEATURE_LOW_PRIORITY_SCAN |
  NL80211_FEATURE_NEED_OBSS_SCAN;

+if (ISSUPP_ADHOC_ENABLED(adapter->fw_cap_info))
+wiphy->features |= NL80211_FEATURE_HT_IBSS;
+
if (ISSUPP_RANDOM_MAC(adapter->fw_cap_info))
wiphy->features |= NL80211_FEATURE_SCAN_RANDOM_MAC_ADDR |
NL80211_FEATURE_SCHED_SCAN_RANDOM_MAC_ADDR |
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/cfp.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/cfp.c
@@ -531,5 +531,8 @@
rate_index = (rx_rate > MWIFIEX_RATE_INDEX_OFDM0) ?
               rx_rate - 1 : rx_rate;
+if (rate_index >= MWIFIEX_MAX_AC_RX_RATES)
+rate_index = MWIFIEX_MAX_AC_RX_RATES - 1;
+
return rate_index;
}
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/debugfs.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/debugfs.c
@@ -296,15 +296,13 @@
"total samples = %d\n",
    atomic_read(&phist_data->num_samples));

-p += sprintf(p, "rx rates (in Mbps): 0=1M   1=2M"
-p += sprintf(p, "2=5.5M 3=11M 4=6M 5=9M 6=12M\n"
-p += sprintf(p, "7=18M 8=24M 9=36M 10=48M 11=54M"
-p += sprintf(p, "12-27=MCS0-15(BW20) 28-43=MCS0-15(BW40)\n"
+    p += sprintf(p,
+        "rx rates (in Mbps): 0=1M   1=2M 2=5.5M 3=11M   4=6M   5=9M  6=12M\n"
+        "7=18M  8=24M  9=36M  10=48M  11=54M  12-27=MCS0-15(BW20) 28-43=MCS0-15(BW40)\n"
        if (ISSUPP_11ACENABLED(priv->adapter->fw_cap_info)) {
-p += sprintf(p, "44-53=MCS0-9(VHT:BW20)"
-p += sprintf(p, "54-63=MCS0-9(VHT:BW40)"
-p += sprintf(p, "64-73=MCS0-9(VHT:BW80)\n"
+    p += sprintf(p,
+        "44-53=MCS0-9(VHT:BW20) 54-63=MCS0-9(VHT:BW40) 64-73=MCS0-9(VHT:BW80)\n"
+    } else {
+    p += sprintf(p, \"\n\nfor (i = 0; i < MWIFIEX_MAX_NOISE_FLR; i++) {
value = atomic_read(&phist_data->noise_flr[i]);
if (value)
    p += sprintf(p, \"\n\nfor (i = 0; i < MWIFIEX_MAX_SIG_STRENGTH; i++) {
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/fw.h
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/fw.h
@@ -333,7 +331,7 @@
for (i = 0; i < MWIFIEX_MAX_NOISE_FLR; i++) {
    value = atomic_read(&phist_data->noise_flr[i]);
    if (value)
        p += sprintf(p, \"\n
for (i = 0; i < MWIFIEX_MAX_SIG_STRENGTH; i++) {
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/fw.h
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/fw.h
@@ -208,6 +208,7 @@
#define TLV_TYPE_CHANNEL_STATS     (PROPRIETARY_TLV_BASE_ID + 198)
#define TLV_BTCOEX_WL_AGGR_WINSIZE (PROPRIETARY_TLV_BASE_ID + 202)
#define TLV_BTCOEX_WL_SCANTIME     (PROPRIETARY_TLV_BASE_ID + 203)
+#define TLV_TYPE_LED_CONTROL      (PROPRIETARY_TLV_BASE_ID + 205)
#define TLV_TYPE_BSS_MODE          (PROPRIETARY_TLV_BASE_ID + 206)
#define TLV_TYPE_RANDOM_MAC        (PROPRIETARY_TLV_BASE_ID + 236)
#define TLV_TYPE_CHAN_ATTR_CFG     (PROPRIETARY_TLV_BASE_ID + 237)
@@ -353,6 +354,7 @@
    #define HostCmd_CMD_802_11_AD_HOC_JOIN                0x002c
    #define HostCmd_CMD_802_11_AD_HOC_STOP                0x0040
    #define HostCmd_CMD_802_11_MAC_ADDRESS                0x004D
+    #define HostCmd_CMD_802_11_LED_CONTROL                0x004E
    #define HostCmd_CMD_802_11D_DOMAIN_INFO               0x005b
    #define HostCmd_CMD_802_11?key\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_material\_m
+} __packed;
+enum SNMP_MIB_INDEX {
+OP_RATE_SET_I = 1,
+DTIM_PERIOD_I = 3,
+@@ -1746,9 +1763,10 @@
+struct ieee_types_vendor_header {
+u8 element_id;
+u8 len;
-    u8 oui[4]; /* 0~2: oui, 3: oui_type */
-    u8 oui_subtype;
-    u8 version;
+    struct {
+        u8 oui[3];
+        u8 oui_type;
+    } __packed oui;
+} __packed;

struct ieee_types_wmm_parameter {
@@ -1762,6 +1780,9 @@
    *   Version     [1]
    */
    struct ieee_types_vendor_header vend_hdr;
+    u8 oui_subtype;
+    u8 version;
+    u8 qos_info_bitmap;
    u8 reserved;
    struct ieee_types_wmm_ac_parameters ac_params[IEEE80211_NUM_ACS];
@@ -1779,6 +1800,8 @@
    *   Version     [1]
    */
    struct ieee_types_vendor_header vend_hdr;
+    u8 oui_subtype;
+    u8 version;

    u8 qos_info_bitmap;
} __packed;
@@ -2346,6 +2369,7 @@
    struct host_cmd_sdio_sp_rx_aggr_cfg sdio_rx_aggr_cfg;
    struct host_cmd_ds_multi_chan_policy mc_policy;
    struct host_cmd_ds_robust_coex coex;
+    struct host_cmd_ds_802_11_led_control led_cfg;
    struct host_cmd_ds_wakeup_reason hs_wakeup_reason;
    struct host_cmd_ds_gtk_rekey_params rekey;
    struct host_cmd_ds_chan_region_cfg reg_cfg;
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/ie.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/ie.c
vs_ie = (struct ieee_types_header *)vendor_ie;
+ if (le16_to_cpu(ie->ie_length) + vs_ie->len + 2 > 
+ IEEE_MAX_IE_SIZE)
+ return -EINVAL;
+ memcpy(ie->ie_buffer + le16_to_cpu(ie->ie_length),
+ vs_ie, vs_ie->len + 2);
le16_unaligned_add_cpu(&ie->ie_length, vs_ie->len + 2);
@@ -329,6 +332,8 @@
 structieee80211_vendor_ie *vendorhdr;
 u16 gen_idx = MWIFIEX_AUTO_IDX_MASK, ie_len = 0;
 int left_len, parsed_len = 0;
+ unsigned int token_len;
+ int err = 0;

 if (!info->tail || !info->tail_len)
 return 0;
@@ -344,6 +349,12 @@
/*
 while (left_len > sizeof(struct ieee_types_header)) {
 hdr = (void *)(info->tail + parsed_len);
+ token_len = hdr->len + sizeof(struct ieee_types_header);
+ if (token_len > left_len) {
+ err = -EINVAL;
+ goto out;
+ }
+ 
+ switch (hdr->element_id) {
 case WLAN_EID_SSID:
 case WLAN_EID_SUPP_RATES:
@@ -357,13 +368,16 @@
 case WLAN_EID_VENDOR_SPECIFIC:
 break;
 default:
- memcpy(gen_ie->ie_buffer + ie_len, hdr, 
- hdr->len + sizeof(structieee_types_header));
- ie_len += hdr->len + sizeof(structieee_types_header);
+ if (ie_len + token_len > IEEE_MAX_IE_SIZE) {
+ err = -EINVAL;
+ goto out;
+ }
+ 
+ memcpy(gen_ie->ie_buffer + ie_len, hdr, token_len);
+ ie_len += token_len;
break;
} 
-left_len -= hdr->len + sizeof(structieee_types_header);
parsed_len += hdr->len + sizeof(struct ieee_types_header);
+left_len -= token_len;
+parsed_len += token_len;
}

/* parse only WPA vendor IE from tail, WMM IE is configured by
   @  @ -373,15  +387,17  @ *
   WLAN_OUI_TYPE_MICROSOFT_WPA,
   info->tail, info->tail_len);
if (vendorhdr) {
-memcpy(gen_ie->ie_buffer + ie_len, vendorhdr,
-     vendorhdr->len + sizeof(struct ieee_types_header));
-ie_len += vendorhdr->len + sizeof(struct ieee_types_header);
+token_len = vendorhdr->len + sizeof(struct ieee_types_header);
+if (ie_len + token_len > IEEE_MAX_IE_SIZE) {
    +err = -EINVAL;
    +goto out;
    +}
+memcpy(gen_ie->ie_buffer + ie_len, vendorhdr, token_len);
+ie_len += token_len;
}

-if (!ie_len) {
-kfree(gen_ie);
-return 0;
-
}
+if (!ie_len)
+goto out;

gen_ie->ie_index = cpu_to_le16(gen_idx);
gen_ie->mgmt_subtype_mask = cpu_to_le16(MGMT_MASK_BEACON |
   @  @ -391,13  +407,15  @ *
   if (mwifiex_update_uap_custom_ie(priv, gen_ie, &gen_idx, NULL, NULL, NULL, NULL)) {
-kfree(gen_ie);
-return -1;
+err = -EINVAL;
+goto out;
}

priv->gen_idx = gen_idx;
+
+ out:
kfree(gen_ie);
-return 0;
+return err;
}
/* This function parses different IEs-head & tail IEs, beacon IEs,
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/ioctl.h
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/ioctl.h
@@ -267,6 +267,7 @@
struct mwifiex_power_cfg {
 u32 is_power_auto;
 +u32 is_power_fixed;
 u32 power_level;
};

--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/join.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/join.c
@@ -877,6 +877,8 @@

memset(adhoc_start->ssid, 0, IEEE80211_MAX_SSID_LEN);

+if (req_ssid->ssid_len > IEEE80211_MAX_SSID_LEN)
+req_ssid->ssid_len = IEEE80211_MAX_SSID_LEN;
memcpy(adhoc_start->ssid, req_ssid->ssid, req_ssid->ssid_len);

mwifiex_open(struct net_device *dev)
{
-netif_carrier_off(dev);
+struct mwifiex_private *priv = mwifiex_netdev_get_priv(dev);

+netif_carrier_off(dev);
+mwifiex_set_led(priv->adapter, MWIFIEX_LED_ON);
return 0;
}

@@ -759,6 +761,7 @@
cfg80211_sched_scan_stopped(priv->wdev.wiphy, 0);
}

+mwifiex_set_led(priv->adapter, MWIFIEX_LED_OFF);
return 0;
}

@@ -1446,6 +1449,8 @@
priv = mwifiex_get_priv(adapter, MWIFIEX_BSS_ROLE_ANY);
mwifiex_deauthenticate(priv, NULL);
mwifiex_init_shutdown_fw(priv, MWIFIEX_FUNC_SHUTDOWN);

mwifiex_uninit_sw(adapter);

if (adapter->if_ops.down_dev)

#define MWIFIEX_MAX_TOTAL_SCAN_TIME(MWIFIEX_TIMER_10S - MWIFIEX_TIMER_1S)

#define WPA_GTK_OUI_OFFSET				2
#define RSN_GTK_OUI_OFFSET				2
#define MWIFIEX_OUI_NOT_PRESENT			0

#define PKT_TYPE_MGMT	0xE5

#define MWIFIEX_LED_ON		1
#define MWIFIEX_LED_OFF		0
#define MWIFIEX_LED_MAX		3

/*
 * Do not check for data_received for USB, as data_received
 * is handled in mwifiex_usb_recv for USB
 */

struct mwifiex_user_scan_chan hidden_chan[MWIFIEX_USER_SCAN_CHAN_MAX];

--+ bool is_edge_gateway;
;

const struct pci_device_id *ent)

struct cmd_ctrl_node *cmd_queued);

int mwifiex_bss_start(struct mwifiex_private *priv, struct cfg80211_bss *bss,
                      struct cfg80211_ssid *req_ssid);

int mwifiex_set_led(struct mwifiex_adapter *adapter, int on);

int mwifiex_cancel_hs(struct mwifiex_private *priv, int cmd_type);

int mwifiex_enable_hs(struct mwifiex_adapter *adapter);

int mwifiex_disable_auto_ds(struct mwifiex_private *priv);

--- linux-4.15.0.org/drivers/net/wireless/marvell/mwifi/pcie.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifi/pcie.c
@@ -233,6 +233,8 @@

const struct pci_device_id *ent)
struct pcie_service_card *card;
+struct mwifiex_private *priv;
+struct pci_dev *pdev_host;
int ret;

pr_debug("info: vendor=0x%4.04X device=0x%4.04X rev=%d\n",
@@ -271,6 +273,14 @@
return -1;
}

+priv = mwifiex_get_priv(card->adapter, MWIFIEX_BSS_ROLE_STA);
+pdev_host = pci_get_subsys(PCI_ANY_ID, PCI_ANY_ID, 0x1028, 0x0720, NULL);
+if (!pdev_host)
+pdev_host = pci_get_subsys(PCI_ANY_ID, PCI_ANY_ID, 0x1028, 0x0733, NULL);
+if (pdev_host) {
+priv->is_edge_gateway = true;
+pci_dev_put(pdev_host);
+}
return 0;
}

@@ -368,6 +378,8 @@
clear_bit(MWIFIEX_IFACE_WORK_DEVICE_DUMP, &card->work_flags);
clear_bit(MWIFIEX_IFACE_WORK_CARD_RESET, &card->work_flags);
mwifiex_dbg(adapter, INFO, "%s, successful\n", __func__);
+
+card->pci_reset_ongoing = true;
}

/*
@@ -396,6 +408,8 @@
dev_err(&pdev->dev, "reinit failed: %d\n", ret);
else
mwifiex_dbg(adapter, INFO, "%s, successful\n", __func__);
+
+card->pci_reset_ongoing = false;
}

static const struct pci_error_handlers mwifiex_pcie_err_handler = {
@@ -677,8 +691,11 @@
skb_put(skb, MAX_EVENT_SIZE);
    skb_put(skb, MAX_EVENT_SIZE, - PCI_DMA_FROMDEVICE))
+    PCI_DMA_FROMDEVICE)) {
+    kfree_skb(skb);
+    kfree(card->evlbdev_ring_vbase);
    return -1;
}
buf_pa = MWIFIEX_SKB_DMA_ADDR(skb);

 skb_put(skb, MWIFIEX_UPLD_SIZE);
 if (mwifiex_map_pci_memory(adapter, skb, MWIFIEX_UPLD_SIZE,
   - PCI_DMA_FROMDEVICE))
 + PCI_DMA_FROMDEVICE)) {
 +kfree_skb(skb);
 return -1;
 +}  

 card->cmdrsp_buf = skb;

 static int mwifiex_pcie_alloc_sleep_cookie_buf(struct mwifiex_adapter *adapter)
 {  
 struct pcie_service_card *card = adapter->card;
 -u32 tmp;
 +u32 *cookie;

 card->sleep_cookie_vbase = pci_alloc_consistent(card->dev, sizeof(u32),
 &card->sleep_cookie_pbase);
 }
 +cookie = (u32 *)card->sleep_cookie_vbase;
 /* Init val of Sleep Cookie */
 -tmp = FW_AWAKE_COOKIE;
 -put_unaligned(tmp, card->sleep_cookie_vbase);
 +*cookie = FW_AWAKE_COOKIE;

 -mwifiex_dbg(adapter, INFO,
 - "alloc_scook: sleep cookie=0x%lx\n",
 - get_unaligned(card->sleep_cookie_vbase));
 +mwifiex_dbg(adapter, INFO, "alloc_scook: sleep cookie=0x%lx\n", *cookie);

 return 0;
 }

 struct pcie_service_card *card = adapter->card;

 pcireset_function(card->dev);
 /* We can’t afford to wait here; remove() might be waiting on us. If we
static void mwifiex_pcie_work(struct work_struct *work)
{
    int ret;
    u32 fw_status;

    cancel_work_sync(&card->work);
    /* Perform the cancel_work_sync() only when we're not resetting
     * the card. It's because that function never returns if we're
     * in reset path. If we're here when resetting the card, it means
     * that we failed to reset the card (reset failure path).
     */
    if (!card->pci_reset_ongoing) {
        mwifiex_dbg(adapter, MSG, "performing cancel_work_sync()...
"");
        cancel_work_sync(&card->work);
        mwifiex_dbg(adapter, MSG, "cancel_work_sync() done
");
    } else {
        mwifiex_dbg(adapter, MSG,
            "skipped cancel_work_sync() because we're in card reset failure path\n"");
    }

    ret = mwifiex_read_reg(adapter, reg->fw_status, &fw_status);
    if (fw_status == FIRMWARE_READY_PCIE) {
        struct mwifiex_msix_context share_irq_ctx;
        struct work_struct work;
        unsigned long work_flags;

        bool pci_reset_ongoing;
    }

    static inline int

    if (has_vendor_hdr(bss_desc->bcn_wpa_ie, WLAN_EID_VENDOR_SPECIFIC)) {
        iebody = (struct ie_body *) bss_desc->bcn_wpa_ie->data;
        iebody = (struct ie_body *)(u8 *)bss_desc->bcn_wpa_ie->data +
            WPA_GTK_OUI_OFFSET);
        oui = &mwifiex_wpa_oui[cipher][0];
    }
ret = mwifiex_search_oui_in_ie(iebody, oui);
if (ret)
    @@ -1244,6 +1245,8 @@
} switch (element_id) {
case WLAN_EID_SSID:
    +if (element_len > IEEE80211_MAX_SSID_LEN)
        +return -EINVAL;
    bss_entry->ssid.ssid_len = element_len;
    memcpy(bss_entry->ssid.ssid, (current_ptr + 2),
           element_len);
    @@ -1253,6 +1256,8 @@
        break;

case WLAN_EID_SUPP_RATES:
    +if (element_len > MWIFIEX_SUPPORTED_RATES)
        +return -EINVAL;
    memcpy(bss_entry->data_rates, current_ptr + 2,
           element_len);
    memcpy(bss_entry->supported_rates, current_ptr + 2,
           @@ -1262,6 +1267,8 @@
        break;

case WLAN_EID_FH_PARAMS:
    +if (element_len + 2 < sizeof(*fh_param_set))
        +return -EINVAL;
    fh_param_set =
        (struct ieee_types_fh_param_set *) current_ptr;
    memcpy(&bss_entry->phy_param_set.fh_param_set,
           @@ -1270,6 +1277,8 @@
        break;

case WLAN_EID_DS_PARAMS:
    +if (element_len + 2 < sizeof(*ds_param_set))
        +return -EINVAL;
    ds_param_set =
        (struct ieee_types_ds_param_set *) current_ptr;
    @@ -1281,6 +1290,8 @@
        break;

case WLAN_EID_CF_PARAMS:
    +if (element_len + 2 < sizeof(*cf_param_set))
        +return -EINVAL;
    cf_param_set =
        (struct ieee_types_cf_param_set *) current_ptr;
    memcpy(&bss_entry->ss_param_set.cf_param_set,
           @@ -1289,6 +1300,8 @@
case WLAN_EID_IBSS_PARAMS:
+if (element_len + 2 < sizeof(*ibss_param_set))
+return -EINVAL;
ibss_param_set =
(struct ieee_types_ibss_param_set *)
current_ptr;
@@ -1298,10 +1311,14 @@
break;

case WLAN_EID_ERP_INFO:
+if (!element_len)
+return -EINVAL;
bss_entry->erp_flags = *(current_ptr + 2);
break;

case WLAN_EID_PWR_CONSTRAINT:
+if (!element_len)
+return -EINVAL;
bss_entry->local_constraint = *(current_ptr + 2);
bss_entry->sensed_11h = true;
break;
@@ -1344,15 +1361,22 @@
vendor_ie = (struct ieee_types_vendor_specific *)
current_ptr;

-if (!memcmp
-    (vendor_ie->vend_hdr.oui, wpa_oui,
- sizeof(wpa_oui)))
+/* 802.11 requires at least 3-byte OUI. */
+if (element_len < sizeof(vendor_ie->vend_hdr.oui.oui))
+return -EINVAL;
+
+/* Not long enough for a match? Skip it. */
+if (element_len < sizeof(wpa_oui))
+break;
+
+if (vendor_ie->vend_hdr.oui, wpa_oui,
+ sizeof(wpa_oui)))
+ bss_entry->bcn_wpa_ie =
(struct ieee_types_vendor_specific *)
current_ptr;
bss_entry->wpa_offset = (u16)
(current_ptr - bss_entry->beacon_buf);
-} else if (!memcmp(vendor_ie->vend_hdr.oui, wmm_oui,
+} else if (!memcmp(&vendor_ie->vend_hdr.oui, wmm_oui,
sizeof(wmm_oui))) {
if (total_ie_len ==
    sizeof(struct ieee_types_wmm_parameter) ||
@@ -1866,7 +1890,7 @@
    chan, CFG80211_BSS_FTYPE_UNKNOWN,
    bssid, timestamp,
    cap_info_bitmap, beacon_period,
-    ie_buf, ie_len, rssi, GFP_KERNEL);
+    ie_buf, ie_len, rssi, GFP_ATOMIC);
    if (bss) {
        bss_priv = (struct mwifiex_bss_priv *)bss->priv;
        bss_priv->band = band;
@@ -1877,15 +1901,17 @@
        ETH_ALEN))
        mwifiex_update_curr_bss_params(priv,
            bss);
-        cfg80211_put_bss(priv->wdev.wiphy, bss);
-    }

    -if ((chan->flags & IEEE80211_CHAN_RADAR) ||
        (chan->flags & IEEE80211_CHAN_NO_IR)) {
        -mwifiex_dbg(adapter, INFO,
-            "radar or passive channel %d\n",
-            channel);
        -mwifiex_save_hidden_ssid_channels(priv, bss);
+    if ((chan->flags & IEEE80211_CHAN_RADAR) ||
+        (chan->flags & IEEE80211_CHAN_NO_IR)) {
+        mwifiex_dbg(adapter, INFO,
+            "radar or passive channel %d\n",
+            channel);
+        mwifiex_save_hidden_ssid_channels(priv,
+            bss);
+    }
+    +cfg80211_put_bss(priv->wdev.wiphy, bss);
+    }
+}
+}
+}
} else {
@@ -2863,6 +2889,13 @@
    vs_param_set->header.len =
    cpu_to_le16(((u16) priv->vs_ie[id].ie[1])
        & 0x00FF) + 2);
+    if (le16_to_cpu(vs_param_set->header.len) >
+        MWIFIEX_MAX_VSIE_LEN) {
+        mwifiex_dbg(priv->adapter, ERROR,
+            "Invalid param length!\n");
+        break;
+    }
+}
memcpy(vs_param_set->ie, priv->vs_ie[id].ie,
   le16_to_cpu(vs_param_set->header.len));

*buffer += le16_to_cpu(vs_param_set->header.len) +

--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/sdio.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/sdio.c
@@ -1973,6 +1973,8 @@
kfree(card->mpa_rx.buf);
card->mpa_tx.buf_size = 0;
card->mpa_rx.buf_size = 0;
+card->mpa_tx.buf = NULL;
+card->mpa_rx.buf = NULL;
}
return ret;

--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/sta_cmd.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/sta_cmd.c
@@ -424,6 +424,31 @@
return 0;
}

+static int mwifiex_cmd_802_11_led_cfg(struct mwifiex_private *priv,
+    struct host_cmd_ds_command *cmd,
+    u16 cmd_action,
+    struct mwifiex_led_param *ledcfg_param)
+{
+  struct host_cmd_ds_802_11_led_control *led_cfg = &cmd->params.led_cfg;
+  struct mwifiex_ie_types_led_param *led_tlv;
+  u8 *pos;
+  
+  cmd->command = cpu_to_le16(HostCmd_CMD_802_11_LED_CONTROL);
+  cmd->size = cpu_to_le16(S_DS_GEN);
+  le16_add_cpu(&cmd->size, sizeof(struct host_cmd_ds_802_11_led_control));
+  
+  led_cfg->action = cpu_to_le16(cmd_action);
+  led_cfg->num_led = cpu_to_le16(MWIFIEX_LED_MAX);
+  
+  *pos = (u8 *)led_cfg + sizeof(struct host_cmd_ds_802_11_led_control);
+  led_tlv = (void *)pos;
+  led_tlv->header.type = cpu_to_le16(TLV_TYPE_LED_CONTROL);
+  led_tlv->header.len = cpu_to_le16(sizeof(struct mwifiex_led_param));
+  memcpy(&led_tlv->led_cfg, ledcfg_param, sizeof(struct mwifiex_led_param));
+  le16_add_cpu(&cmd->size, sizeof(struct mwifiex_ie_types_led_param));
+  return 0;
+}
+
/*
 * This function prepares command to set/get MAC address.
 */
ret = mwifiex_cmd_802_11_hs_cfg(priv, cmd_ptr, cmd_action, (struct mwifiex_hs_config_param *) data_buf);
break;
+case HostCmd_CMD_802_11_LED_CONTROL:
+ret = mwifiex_cmd_802_11_led_cfg(priv, cmd_ptr, cmd_action, + data_buf);
+=break;
case HostCmd_CMD_802_11_SCAN:
ret = mwifiex_cmd_802_11_scan(cmd_ptr, data_buf);
break;
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/sta_cmdresp.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/sta_cmdresp.c
@@ -581,6 +581,11 @@
{
struct host_cmd_ds_802_11_key_material *key =
&resp->params.key_material;
+int len;
+
+len = le16_to_cpu(key->key_param_set.key_len);
+if (len > sizeof(key->key_param_set.key))
+return -EINVAL;

if (le16_to_cpu(key->action) == HostCmd_ACT_GEN_SET) {
  if ((le16_to_cpu(key->key_param_set.key_info) & KEY_MCAST)) {
@@ -594,9 +599,8 @@
    memset(priv->aes_key.key_param_set.key, 0,
            sizeof(key->key_param_set.key));
    -priv->aes_key.key_param_set.key_len = key->key_param_set.key_len;
-memcpy(priv->aes_key.key_param_set.key, key->key_param_set.key,
-       le16_to_cpu(priv->aes_key.key_param_set.key_len));
+priv->aes_key.key_param_set.key_len = cpu_to_le16(len);
+memcpy(priv->aes_key.key_param_set.key, key->key_param_set.key, len);

  return 0;
}
@@ -611,9 +615,14 @@
    struct host_cmd_ds_command *resp)
{
    struct host_cmd_ds_802_11_key_material_v2 *key_v2;
-__le16 len;
+int len;

key_v2 = &resp->params.key_material_v2;
+len = le16_to_cpu(key_v2->key_param_set.key_params.aes.key_len);
+if (len > sizeof(key_v2->key_param_set.key_params.aes.key))
+return -EINVAL;
+
+if (le16_to_cpu(key_v2->action) == HostCmd_ACT_GEN_SET) {
+  if ((le16_to_cpu(key_v2->key_param_set.key_info) & KEY_MCAST)) {
+    mwifiex_dbg(priv->adapter, INFO, "info: key: GTK is set\n");
+    @@ -627,12 +636,11 @@
+    return 0;
+
+    memset(priv->aes_key_v2.key_param_set.key_params.aes.key, 0,
+           WLAN_KEY_LEN_CCMP);
+    +    sizeof(key_v2->key_param_set.key_params.aes.key));
+    priv->aes_key_v2.key_param_set.key_params.aes.key_len =
-    -key_v2->key_param_set.key_params.aes.key_len;
-    -len = priv->aes_key_v2.key_param_set.key_params.aes.key_len;
+    +cpu_to_le16(len);
+    memcpy(priv->aes_key_v2.key_param_set.key_params.aes.key,
+           key_v2->key_param_set.key_params.aes.key, le16_to_cpu(len));
+    return 0;
+  }
+}
+
+case HostCmd_CMD_ROBUST_COEX:
+  ret = mwifiex_ret_robust_coex(priv, resp, data_buf);
+  break;
+
+case HostCmd_CMD_802_11_LED_CONTROL:
+  break;
+
+case HostCmd_CMD_GTK_REKEY_OFFLOAD_CFG:
+  break;
+
+case HostCmd_CMD_CHAN_REGION_CFG:
+  --- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/sta_ioctl.c
+  +++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/sta_ioctl.c
+  @@ -271,6 +271,14 @@
+    "11D: skip setting domain info in FW\n");
+  return 0;
+  }
+  +
+  +if (country_ie_len >
+  +  (IEEE80211_COUNTRY_STRING_LEN + MWIFIEX_MAX_TRIPLET_802_11D)) {
+    +rcu_read_unlock();
+    +mwifiex_dbg(priv->adapter, ERROR,
+    +  "11D: country_ie_len overflow!, deauth AP\n");
+    +return -EINVAL;
+    +}
+    +memcpy(priv->adapter->country_code, &country_ie[2], 2);
+
+    domain_info->country_code[0] = country_ie[2];
+    @@ -314,8 +322,9 @@
priv->scan_block = false;

if (bss) {
    -if (adapter->region_code == 0x00)
    -mwifiex_process_country_ie(priv, bss);
+    if (adapter->region_code == 0x00 &&
+        mwifiex_process_country_ie(priv, bss))
+    return -EINVAL;

    /* Allocate and fill new bss descriptor */
    bss_desc = kzalloc(sizeof(struct mwifiex_bssdescriptor),
    @ @ -601,6 +610,24 @ @
}
EXPORT_SYMBOL_GPL(mwifiex_enable_hs);

+int mwifiex_set_led(struct mwifiex_adapter *adapter, int on)
+{
+    struct mwifiex_private *priv;
+    struct mwifiex_led_param ledfcg;
+    
+    priv = mwifiex_get_priv(adapter, MWIFIEX_BSS_ROLE_STA);
+    if (!priv->is_edge_gateway)
+        return -ENODEV;
+    
+    memset(&ledcfg, 0, sizeof(struct mwifiex_led_param));
+    ledfcg.on = cpu_to_le16(on);
+    
+    return mwifiex_send_cmd(priv,
+             HostCmd_CMD_802_11_LED_CONTROL,
+             HostCmd_ACT_GEN_SET, 0,
+             &ledcfg, true);
+}
+
+/*
* IOCTL request handler to get BSS information.
*
@@ -728,6 +755,9 @@
    txp_cfg = (struct host_cmd_ds_txpwr_cfg *) buf;
    txp_cfg->action = cpu_to_le16(HostCmd_ACT_GEN_SET);
    if (!power_cfg->is_power_auto) {
+u16 dbm_min = power_cfg->is_power_fixed ?
+    dbm : priv->min_tx_power_level;
+    dbm : priv->min_tx_power_level;
+    
+    txp_cfg->mode = cpu_to_le32(1);
    pg_tlv = (struct mwifiex_types_power_group *)
        (buf + sizeof(struct host_cmd_ds_txpwr_cfg));
@@ -742,7 +772,7 @@
        pg->last_rate_code = 0x03;
}
pg->modulation_class = MOD_CLASS_HR_DSSS;
pg->power_step = 0;
-pg->power_min = (s8) dbm;
+pg->power_min = (s8) dbm_min;
pg->power_max = (s8) dbm;
pg++;
/* Power group for modulation class OFDM */
@@ -750,7 +780,7 @@
pg->last_rate_code = 0x07;
pg->modulation_class = MOD_CLASS_OFDM;
pg->power_step = 0;
-pg->power_min = (s8) dbm;
+pg->power_min = (s8) dbm_min;
pg->power_max = (s8) dbm;
pg++;
/* Power group for modulation class HTBW20 */
@@ -758,7 +788,7 @@
pg->last_rate_code = 0x20;
pg->modulation_class = MOD_CLASS_HT;
pg->power_step = 0;
-pg->power_min = (s8) dbm;
+pg->power_min = (s8) dbm_min;
pg->power_max = (s8) dbm;
p->ht_bandwidth = HT_BW_20;
p++;
@@ -767,7 +797,7 @@
pg->last_rate_code = 0x20;
pg->modulation_class = MOD_CLASS_HT;
pg->power_step = 0;
-pg->power_min = (s8) dbm;
+pg->power_min = (s8) dbm_min;
pg->power_max = (s8) dbm;
p->ht_bandwidth = HT_BW_40;
}
@@ -1388,7 +1418,7 @@
/* Test to see if it is a WPA IE, if not, then
* it is a gen IE
*/
-if (!memcmp(pvendor_ie->oui, wpa_oui,
+if (!memcmp(&pvendor_ie->oui, wpa_oui,
sizeof(wpa_oui))) {
/* IE is a WPA/WPA2 IE so call set_wpa function
*/
@@ -1398,7 +1428,7 @@
goto next_ie;
}
-if (!memcmp(pvendor_ie->oui, wps_oui,
if (!memcmp(&pvendor_ie->oui, wps_oui, sizeof(wps_oui))) {
/* Test to see if it is a WPS IE,
* if so, enable wps session flag
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/tdls.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/tdls.c
@@ -897,7 +897,7 @@
     u8 *peer, *pos, *end;
     u8 i, action, basic;
     u16 cap = 0;
    -int ie_len = 0;
    +int ies_len = 0;
    int len = 0;

    if (len < (sizeof(struct ethhdr) + 3))
        return;
@@ -919,7 +919,7 @@
    u8 *peer, *pos, *end;
    u8 i, action, basic;
    u16 cap = 0;
    -int ie_len = 0;
    +int ies_len = 0;
    int len = 0;

    if (len < (sizeof(struct ethhdr) + 3))
        return;
    pos = buf + sizeof(struct ethhdr) + 4;
    /* payload 1+ category 1 + action 1 + dialog 1 */
    cap = get_unaligned_le16(pos);
    -ie_len = len - sizeof(struct ethhdr) - TDLS_REQ_FIX_LEN;
    +ies_len = len - sizeof(struct ethhdr) - TDLS_REQ_FIX_LEN;
    pos += 2;
    break;
@@ -929,7 +929,7 @@
    u8 *peer, *pos, *end;
    u8 i, action, basic;
    u16 cap = 0;
    -int ie_len = 0;
    +int ies_len = 0;
    int len = 0;

    if (len < (sizeof(struct ethhdr) + 3))
        return;
    pos = buf + sizeof(struct ethhdr) + 4;
    /* payload 1+ category 1 + action 1 + dialog 1 + status code 2*/
    cap = get_unaligned_le16(pos);
    -ie_len = len - sizeof(struct ethhdr) - TDLS_RESP_FIX_LEN;
    +ies_len = len - sizeof(struct ethhdr) - TDLS_RESP_FIX_LEN;
    pos += 2;
    break;
@@ -937,7 +937,7 @@
    u8 *peer, *pos, *end;
    u8 i, action, basic;
    u16 cap = 0;
    -int ie_len = 0;
    +int ies_len = 0;
    int len = 0;

    if (len < (sizeof(struct ethhdr) + 3))
        return;
    pos = buf + sizeof(struct ethhdr) + 4;
    /* payload 1+ category 1 + action 1 + dialog 1 + status code 2*/
    cap = get_unaligned_le16(pos);
    -ie_len = len - sizeof(struct ethhdr) - TDLS_RESP_FIX_LEN;
    +ies_len = len - sizeof(struct ethhdr) - TDLS_RESP_FIX_LEN;
    pos += 2;
    break;
    default:
    mwifiex_dbg(priv->adapter, ERROR, "Unknown TDLS frame type\n");
@@ -950,65 +950,104 @@
    sta_ptr->tdls_cap.capab = cpu_to_le16(cap);

    -for (end = pos + ie_len; pos + 1 < end; pos += 2 + pos[1]) {
    -if (pos + 2 + pos[1] > end)
+for (end = pos + ies_len; pos + 1 < end; pos += 2 + pos[1]) {
    u8 ie_len = pos[1];
    +
    +if (pos + 2 + ie_len > end)
        break;

    switch (*pos) {
    case WLAN_EID_SUPP_RATES:
        -sta_ptr->tdls_cap.rates_len = pos[1];
        -for (i = 0; i < pos[1]; i++)
            +if (ie_len > sizeof(sta_ptr->tdls_cap.rates))
                +return;
            +sta_ptr->tdls_cap.rates_len = ie_len;
            +for (i = 0; i < ie_len; i++)
                sta_ptr->tdls_cap.rates[i] = pos[i + 2];
        break;
    case WLAN_EID_EXT_SUPP_RATES:
        +if (ie_len > sizeof(sta_ptr->tdls_cap.rates))
            +return;
        basic = sta_ptr->tdls_cap.rates_len;
        -for (i = 0; i < pos[1]; i++)
            +if (ie_len > sizeof(sta_ptr->tdls_cap.rates) - basic)
                +return;
            +for (i = 0; i < ie_len; i++)
                sta_ptr->tdls_cap.rates[basic + i] = pos[i + 2];
        break;
    case WLAN_EID_HT_CAPABILITY:
        -memcpy((u8 *)&sta_ptr->tdls_cap.ht_capb, pos,
            if (ie_len != sizeof(struct ieee80211_ht_cap))
                +return;
            /* copy the ie's value into ht_capb*/
            +memcpy((u8 *)&sta_ptr->tdls_cap.ht_capb, pos + 2,
                sizeof(struct ieee80211_ht_cap));
        sta_ptr->is_11n_enabled = 1;
        break;
    case WLAN_EID_HT_OPERATION:
        -memcpy(&sta_ptr->tdls_cap.ht_oper, pos,
            if (ie_len != sizeof(struct ieee80211_ht_operation))
                +return;
            /* copy the ie's value into ht_oper*/
            +memcpy(&sta_ptr->tdls_cap.ht_oper, pos + 2,
                sizeof(struct ieee80211_ht_operation));
        break;
    case WLAN_EID_BSS_COEX_2040:
        +if (ie_len != sizeof(pos[2]))
+return;
sta_ptr->tdls_cap.coex_2040 = pos[2];
break;
case WLAN_EID_EXT_CAPABILITY:
+if (ie_len < sizeof(struct ieee_types_header))
+return;
+if (ie_len > 8)
+return;
mempy((u8 *)&sta_ptr->tdls_cap.extcap, pos,
       sizeof(struct ieee_types_header) +
       min_t(u8, pos[1], 8));
break;
case WLAN_EID_RSN:
+if (ie_len < sizeof(struct ieee_types_header))
+return;
+if (ie_len > IEEE_MAX_IE_SIZE -
    sizeof(struct ieee_types_header))
+return;
mempy((u8 *)&sta_ptr->tdls_cap.rsn_ie, pos,
       sizeof(struct ieee_types_header) +
       min_t(u8, pos[1], IEEE_MAX_IE_SIZE -
       min_t(u8, ie_len, IEEE_MAX_IE_SIZE -
       sizeof(struct ieee_types_header))));
break;
case WLAN_EID_QOS_CAPA:
+if (ie_len != sizeof(pos[2]))
+return;
sta_ptr->tdls_cap.qos_info = pos[2];
break;
case WLAN_EID_VHT_OPERATION:
-if (priv->adapter->is_hw_11ac_capable)
-mempy(&sta_ptr->tdls_cap.vhtoper, pos,
+if (priv->adapter->is_hw_11ac_capable) {
 +sizeof(struct ieee80211_vht_operation))
+return;
/* copy the ie's value into vhtoper*/
+mempy(&sta_ptr->tdls_cap.vhtoper, pos + 2,
       sizeof(struct ieee80211_vht_operation));
+}
break;
case WLAN_EID_VHT_CAPABILITY:
if (priv->adapter->is_hw_11ac_capable) {
-mempy((u8 *)&sta_ptr->tdls_cap.vhtcap, pos,
+if (ie_len != sizeof(struct ieee80211_vht_cap))
+return;
/* copy the ie's value into vhtcap*/

memcpy((u8 *)&sta_ptr->tdls_cap.vhtcap, pos + 2,
        sizeof(struct ieee80211_vht_cap));
sta_ptr->is_11ac_enabled = 1;
}
break;
case WLAN_EID_AID:
    if (priv->adapter->is_hw_11ac_capable) {
        if (ie_len != sizeof(u16))
            return;
        sta_ptr->tdls_cap.aid =
            get_unaligned_le16((pos + 2));
    } +break;
default:
    break;
}
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/uap_cmd.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/uap_cmd.c
@@ -265,6 +265,8 @@
rate_ie = (void *)cfg80211_find_ie(WLAN_EID_SUPP_RATES, var_pos, len);
        if (rate_ie) {
            if (rate_ie->len > MWIFIEX_SUPPORTED_RATES)
                return;
        }
        memcpy(bss_cfg->rates, rate_ie + 1, rate_ie->len);
        rate_len = rate_ie->len;
    } @@ -272,8 +274,11 @@
rate_ie = (void *)cfg80211_find_ie(WLAN_EID_EXT_SUPP_RATES,
        params->beacon.tail,
        params->beacon.tail_len);
    if (rate_ie) {
        if (rate_ie->len > MWIFIEX_SUPPORTED_RATES - rate_len)
            return;
        memcpy(bss_cfg->rates + rate_len, rate_ie + 1, rate_ie->len);
    } +}
return;
}
@@ -391,6 +396,8 @@
        params->beacon.tail_len);
    if (vendor_ie) {
        wmm_ie = vendor_ie;
        if (*((u8 *)&wmm_ie + 1) > sizeof(struct mwifiex_types_wmm_info))
            return;
        memcpy(&bss_cfg->wmm_info, wmm_ie +
sizeof(struct ieee_types_header), *(wmm_ie + 1));
priv->wmm_enabled = 1;
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/usb.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/usb.c
@@ -644,6 +644,9 @@
MWIFIEX_FUNC_SHUTDOWN);
}
+if (adapter->workqueue)
+flush_workqueue(adapter->workqueue);
+mwifiex_usb_free(card);

mwifiex_dbg(adapter, FATAL,
@@ -1331,7 +1334,8 @@
skb_dequeue(&port->tx_aggr.aggr_list)))
mwifiex_write_data_complete(adapter, skb_tmp,
 0, -1);
-del_timer_sync(&port->tx_aggr.timer_cnxt.hold_timer);
+if (port->tx_aggr.timer_cnxt.hold_timer.function)
+del_timer_sync(&port->tx_aggr.timer_cnxt.hold_timer);
port->tx_aggr.timer_cnxt.is_hold_timer_set = false;
port->tx_aggr.timer_cnxt.tmo_msecs = 0;
}
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/util.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/util.c
@@ -708,12 +708,14 @@
s8 nflr)
struct mwifiex_histogram_data *phist_data = priv->hist_data;
+s8 nf = -nflr;
+s8 rssi = snr - nflr;
atomic_inc(&phist_data->num_samples);
atomic_inc(&phist_data->rx_rate[rx_rate]);
-atomic_inc(&phist_data->snr[snr]);
-atomic_inc(&phist_data->noise_flr[128 + nflr]);
-atomic_inc(&phist_data->sig_str[nflr - snr]);
+atomic_inc(&phist_data->snr[snr + 128]);
+atomic_inc(&phist_data->noise_flr[nf + 128]);
+atomic_inc(&phist_data->sig_str[rssi + 128]);
}
/* function to reset histogram data during init/reset */
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwifiex/wmm.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwifiex/wmm.c
@@ -240,7 +240,7 @@
MWIFIEX_FUNC_SHUTDOWN);

"info: WMM Parameter IE: version=%d\t"
"qos_info Parameter Set Count=%d, Reserved=%#x\n",
- wmm_ie->vend_hdr.version, wmm_ie->qos_info_bitmap &
+ wmm_ie->version, wmm_ie->qos_info_bitmap &
    IEEE80211_WMM_IE_AP_QOSINFO_PARAM_SET_CNT_MASK,
    wmm_ie->reserved);

@@ -977,6 +977,10 @@
    "WMM Parameter Set Count: %d\n",
    wmm_param_ie->qos_info_bitmap & mask);

+if (wmm_param_ie->vend_hdr.len + 2 >
+sizeof(struct ieee_types_wmm_parameter))
+break;
+
memcpy((u8 *) &priv->curr_bss_params.bss_descriptor.
    wmm_ie, wmm_param_ie,
    wmm_param_ie->vend_hdr.len + 2);
--- linux-4.15.0.orig/drivers/net/wireless/marvell/mwl8k.c
+++ linux-4.15.0/drivers/net/wireless/marvell/mwl8k.c
@@ -436,6 +436,9 @@
#define MWL8K_CMD_UPDATE_STADB		0x1123
#define MWL8K_CMD_BASTREAM		0x1125
+
#define MWL8K_LEGACY_5G_RATE_OFFSET
+(ARRAY_SIZE(mwl8k_rates_24) - ARRAY_SIZE(mwl8k_rates_50))
+
static const char *mwl8k_cmd_name(__le16 cmd, char *buf, int bufsize)
{
    u16 command = le16_to_cpu(cmd);
@@ -1011,8 +1014,9 @@
if (rxd->channel > 14) {
    status->band = NL80211_BAND_5GHZ;
-    if (!(status->encoding == RX_ENC_HT))
-        status->rate_idx -= 5;
+    if (!(status->encoding == RX_ENC_HT) &&
+        status->rate_idx >= MWL8K_LEGACY_5G_RATE_OFFSET)
+        status->rate_idx -= MWL8K_LEGACY_5G_RATE_OFFSET;
    } else {
    status->band = NL80211_BAND_2GHZ;
    }
@@ -1119,8 +1123,9 @@
if (rxd->channel > 14) {
    status->band = NL80211_BAND_5GHZ;
-    if (!(status->encoding == RX_ENC_HT))
-        status->rate_idx -= 5;
if (!(status->encoding == RX_ENC_HT) &&
    status->rate_idx >= MWL8K_LEGACY_5G_RATE_OFFSET)
status->rate_idx -= MWL8K_LEGACY_5G_RATE_OFFSET;
} else {
    status->band = NL80211_BAND_2GHZ;
}
@@ -1459,6 +1464,7 @@
txq->skb = kcalloc(MWL8K_TX_DESCS, sizeof(*txq->skb), GFP_KERNEL);
if (txq->skb == NULL) {
    pci_free_consistent(priv->pdev, size, txq->txd, txq->txd_dma);
+    txq->txd = NULL;
    return -ENOMEM;
}
@@ -160,8 +160,7 @@
if (new_p) {
    /* we have one extra ref from the allocator */
-    __free_pages(e->p, MT_RX_ORDER);
-    put_page(e->p);
+    put_page(e->p);
    e->p = new_p;
}
@@ -193,10 +192,23 @@
struct mt7601u_rx_queue *q = &dev->rx_q;
unsigned long flags;
-    spin_lock_irqsave(&dev->rx_lock, flags);
+    /* do not schedule rx tasklet if urb has been unlinked
+     * or the device has been removed
+     */
+    switch (urb->status) {
+        case -ECONNRESET:
+            case -ESHUTDOWN:
+            case -ENOENT:
+                return;
+            default:
+                dev_err_ratelimited(dev->dev, "rx urb failed: %d\n",
+                    urb->status);
+                /* fall through */
+                case 0:
+                    break;
+    }
-    if (mt7601u_urb_has_error(urb))
+    -spin_lock_irqsave(&dev->rx_lock, flags);
+    /* do no schedule rx tasklet if urb has been unlinked
+     * or the device has been removed
+     */
+    switch (urb->status) {
+        case -ECONNRESET:
+        case -ESHUTDOWN:
+        case -ENOENT:
+            return;
+        default:
+            dev_err_ratelimited(dev->dev, "rx urb failed: %d\n",
+                urb->status);
+            /* fall through */
+            case 0:
+                break;
+    }
-    if (mt7601u_urb_has_error(urb))
dev_err(dev->dev, "Error: RX urb failed: %d
", urb->status);

spin_lock_irqsave(&dev->rx_lock, flags);
if (WARN_ONCE(q->e[q->end].urb != urb, "RX urb mismatch"))
goto out;

@@ -228,14 +240,25 @@
struct sk_buff *skb;
unsigned long flags;

spin_lock_irqsave(&dev->tx_lock, flags);
switch (urb->status) {
+case -ECONNRESET:
+case -ESHUTDOWN:
+case -ENOENT:
+return;
+default:
+dev_err_ratelimited(dev->dev, "tx urb failed: %d\n",
+ urb->status);
+/* fall through */
+case 0:
+break;
+
-if (mt7601u_urb_has_error(urb))
-dev_err(dev->dev, "Error: TX urb failed: %d\n", urb->status);
+spin_lock_irqsave(&dev->tx_lock, flags);
if (WARN_ONCE(q->e[q->start].urb != urb, "TX urb mismatch"))
goto out;

skb = q->e[q->start].skb;
+q->e[q->start].skb = NULL;
trace_mt_tx_dma_done(dev, skb);

_skb_queue_tail(&dev->tx_skb_done, skb);
@@ -294,7 +317,6 @@
}

e = &q-e[q->end];
-e->skb = skb;
usb_fill_bulk_urb(e->urb, usb_dev, snd_pipe, skb->data, skb->len,
-mt7601u_complete_tx, q);
ret = usb_submit_urb(e->urb, GFP_ATOMIC);
@@ -312,6 +334,7 @@
q->end = (q->end + 1) % q->entries;
q->used++;
+e->skb = skb;
if (q->used >= q->entries)
    ieee80211_stop_queue(dev->hw, skb_get_queue_mapping(skb));
@@ -363,19 +386,9 @@
static void mt7601u_kill_rx(struct mt7601u_dev *dev)
{
    int i;
    unsigned long flags;
-
-	spin_lock_irqsave(&dev->rx_lock, flags);
-
	for (i = 0; i < dev->rx_q.entries; i++) {
	    int next = dev->rx_q.end;
-
-	spin_unlock_irqrestore(&dev->rx_lock, flags);
-
	for (i = 0; i < dev->rx_q.entries; i++)
	    usb_poison_urb(dev->rx_q.e[i].urb);
};
-
-
spin_unlock_irqrestore(&dev->rx_lock, flags);
usb_poison_urb(dev->rx_q.e[next].urb);
spin_lock_irqsave(&dev->rx_lock, flags);
-
spin_unlock_irqrestore(&dev->rx_lock, flags);
+for (i = 0; i < dev->rx_q.entries; i++)
+    usb_poison_urb(dev->rx_q.e[i].urb);
}

static int mt7601u_submit_rx_buf(struct mt7601u_dev *dev,
@@ -445,10 +458,10 @@
{
    int i;

-WARN_ON(q->used);
-
    for (i = 0; i < q->entries; i++) {
        usb_poison_urb(q->e[i].urb);
        +if (q->e[i].skb)
        +mt7601u_tx_status(q->dev, q->e[i].skb);
        usb_free_urb(q->e[i].urb);
    }
}

--- linux-4.15.0.orig/drivers/net/wireless/mediatek/mt7601u/eeprom.c
+++ linux-4.15.0/drivers/net/wireless/mediatek/mt7601u/eeprom.c
@@ -106,7 +106,7 @@
{
    u16 nic_conf1 = get_unaligned_le16(eeprom + MT_EE_NIC_CONF_1);

-return ~(nic_conf1 && (nic_conf1 & MT_EE_NIC_CONF_1_TX_ALC_EN));
+return (u16)~nic_conf1 && (nic_conf1 & MT_EE_NIC_CONF_1_TX_ALC_EN);
}

static void
struct mt7601u_dev;

#define MT7601U_EE_MAX_VER			0x0d
#define MT7601U_EEPROM_SIZE			256
#define MT7601U_DEFAULT_TX_POWER		6

--- linux-4.15.0.orig/drivers/net/wireless/mediatek/mt7601u/phy.c
+++ linux-4.15.0/drivers/net/wireless/mediatek/mt7601u/phy.c
@@ @ -221,7 +221,7 @@
do {
    val = mt7601u_bbp_rr(dev, MT_BBP_REG_VERSION);
    -if (val && ~val)
    +if (val && val != 0xff)
        break;
    } while (--i);

--- linux-4.15.0.orig/drivers/net/wireless/mediatek/mt7601u/tx.c
+++ linux-4.15.0/drivers/net/wireless/mediatek/mt7601u/tx.c
@@ @ -117,9 +117,9 @@
    ieee80211_tx_status(dev->hw, skb);
    -spin_unlock(&dev->mac_lock);
    +spin_unlock_bh(&dev->mac_lock);
}

static int mt7601u_skb_rooms(struct mt7601u_dev *dev, struct sk_buff *skb)
--- linux-4.15.0.orig/drivers/net/wireless/quantenna/qtnfmac/cfg80211.c
+++ linux-4.15.0/drivers/net/wireless/quantenna/qtnfmac/cfg80211.c
@@ @ -461,9 +461,16 @@
    int ret;

    ret = qtnf_cmd_send_del_key(vif, key_index, pairwise, mac_addr);
    -if (ret)
    -pr_err("VIF%u.%u: failed to delete key: idx=%u pw=%u\n",
    -vif->mac->macid, vif->vifid, key_index, pairwise);
    +if (ret) {
    +pr_debug("VIF%u.%u: key index %d out of bounds\n",}
vif->mac->macid, vif->vifid, key_index);
  
+} else {
+  pr_err("VIF%u.%u: failed to delete key: idx=%u pw=%u\n",
+  vif->mac->macid, vif->vifid,
+  key_index, pairwise);
+}
+}
+

return ret;
}

--- linux-4.15.0.orig/drivers/net/wireless/quantenna/qtnfmac/commands.c
+++ linux-4.15.0/drivers/net/wireless/quantenna/qtnfmac/commands.c
@@ -520,6 +520,9 @@
rate_dst->flags |= RATE_INFO_FLAGS_MCS;
else if (rate_src->flags & QLINK_STA_INFO_RATE_FLAG_VHT_MCS)
  rate_dst->flags |= RATE_INFO_FLAGS_VHT_MCS;
+
+if (rate_src->flags & QLINK_STA_INFO_RATE_FLAG_SHORT_GI)
+  rate_dst->flags |= RATE_INFO_FLAGS_SHORT_GI;
}

static void
@@ -828,6 +831,7 @@
  default:
    pr_warn("VIF%u.%u: unsupported iftype %d\n", vif->mac->macid,
    vif->vifid, vif->wdev.iftype);
+-dev_kfree_skb(cmd_skb);
  ret = -EINVAL;
  goto out;
}
@@ -1966,6 +1970,7 @@
  default:
    pr_err("unsupported iftype %d\n", vif->wdev.iftype);
    +dev_kfree_skb(cmd_skb);
    ret = -EINVAL;
    goto out;
}

--- linux-4.15.0.orig/drivers/net/wireless/ralink/rt2x00/rt2x00.h
+++ linux-4.15.0/drivers/net/wireless/ralink/rt2x00/rt2x00.h
@@ -672,7 +672,6 @@
CONFIG_CHANNEL_HT40,
CONFIG_POWERSAVING,
CONFIG_HT_DISABLED,
-CONFIG_QOS_DISABLED,
CONFIG_MONITORING,
/*
if (!rt2x00dev->ops->hw->set_rts_threshold &&
    (tx_info->control.rates[0].flags & (IEEE80211_TX_RC_USE_RTS_CTS |
        IEEE80211_TX_RC_USE_CTS_PROTECT))) {
    if (rt2x00queue_available(queue) <= 1) {
        if (rt2x00queue_available(queue) <= 1) {
            /* Recheck for full queue under lock to avoid race
               conditions with rt2x00lib_txdone().
            */
            spin_lock(&queue->tx_lock);
            if (rt2x00queue_threshold(queue))
                rt2x00queue_pause_queue(queue);
            spin_unlock(&queue->tx_lock);
            goto exit_free_skb;
        }
        if (unlikely(rt2x00queue_write_tx_frame(queue, skb, control->sta, false)))
            goto exit_free_skb;
    }
}

if (rt2x00mac_tx_rts_cts(rt2x00dev, queue, skb))
    goto exit_fail;

rt2x00dev->intf_associated--;
rt2x00leds_led_assoc(rt2x00dev, !!rt2x00dev->intf_associated);

/*
   * Pausing queue has to be serialized with rt2x00lib_txdone(). Note
   */
return;

- spin_lock(&queue->tx_lock);
- rt2x00queue_pause_queue(queue);
- spin_unlock(&queue->tx_lock);
exit_free_skb:
ieee80211_free_txskb(hw, skb);
}

- spin_lock(&queue->tx_lock);
- rt2x00queue_pause_queue(queue);
- spin_unlock(&queue->tx_lock);

- rt2x00leds_led_assoc(rt2x00dev, !!rt2x00dev->intf_associated);
-
clear_bit(CONFIG_QOS_DISABLED, &rt2x00dev->flags);
}

/*
 * Check for access point which do not support 802.11e. We have to
 * generate data frames sequence number in S/W for such AP, because
 * of H/W bug.
 * */
if (changes & BSS_CHANGED_QOS && !bss_conf->qos)
set_bit(CONFIG_QOS_DISABLED, &rt2x00dev->flags);

/* When the erp information has changed, we should perform
* additional configuration steps. For all other changes we are done.
*/

--- linux-4.15.0.orig/drivers/net/wireless/ralink/rt2x00/rt2x00queue.c
+++ linux-4.15.0/drivers/net/wireless/ralink/rt2x00/rt2x00queue.c
@@ -200,15 +200,18 @@
if (!rt2x00_has_cap_flag(rt2x00dev, REQUIRE_SW_SEQNO))
{
/* rt2800 has a H/W (or F/W) bug, device incorrectly increase
 * seqno on retransmited data (non-QOS) frames. To workaround
 * the problem let's generate seqno in software if QOS is
 * disabled.
 + seqno on retransmitted data (non-QOS) and management frames.
 + To workaround the problem let's generate seqno in software.
 + Except for beacons which are transmitted periodically by H/W
 + hence hardware has to assign seqno for them.
 */
- if (test_bit(CONFIG_QOS_DISABLED, &rt2x00dev->flags))
- _clear_bit(ENTRY_TXD_GENERATE_SEQ, &txdesc->flags);
- else
+ if (ieee80211_is_beacon(hdr->frame_control)) {
+ _set_bit(ENTRY_TXD_GENERATE_SEQ, &txdesc->flags);
/* H/W will generate sequence number */
return;
+ }
+
+ _clear_bit(ENTRY_TXD_GENERATE_SEQ, &txdesc->flags);
}

/*
@@ -372,16 +375,15 @@
*/

/* Determine IFS values
 * - Use TXOP_BACKOFF for probe and management frames except beacons
 + * Use TXOP_BACKOFF for management frames except beacons

- Use TXOP_SIFS for fragment bursts
- Use TXOP_HTTXOP for everything else

* Note: rt2800 devices won't use CTS protection (if used)
* for frames not transmitted with TXOP_HTTXOP

```
+ if (ieee80211_is_mgmt(hdr->frame_control) &&
    !ieee80211_is_beacon(hdr->frame_control)) ||
+ txdesc->u.ht.txop = TXOP_BACKOFF;
else if (!(tx_info->flags & IEEE80211_TX_CTL_FIRST_FRAGMENT))
txdesc->u.ht.txop = TXOP_SIFS;
```
struct rtl8xxxu_fileops;

+/*mlme related.*/
+enum wireless_mode {
+    WIRELESS_MODE_UNKNOWN = 0,
+    /* Sub-Element */
+    WIRELESS_MODE_B = BIT(0),
+    WIRELESS_MODE_G = BIT(1),
+    WIRELESS_MODE_A = BIT(2),
+    WIRELESS_MODE_N_24G = BIT(3),
+    WIRELESS_MODE_N_5G = BIT(4),
+    WIRELESS_AUTO = BIT(5),
+    WIRELESS_MODE_AC = BIT(6),
+    WIRELESS_MODE_MAX = 0x7F,
+};
+
+/* from rtlwifi/wifi.h */
+enum ratr_table_mode_new {
+    RATEID_IDX_BGN_40M_2SS = 0,
+    RATEID_IDX_BGN_40M_1SS = 1,
+    RATEID_IDX_BGN_20M_2SS_BN = 2,
+    RATEID_IDX_BGN_20M_1SS_BN = 3,
+    RATEID_IDX_GN_N2SS = 4,
+    RATEID_IDX_GN_N1SS = 5,
+    RATEID_IDX_BG = 6,
+    RATEID_IDX_G = 7,
+    RATEID_IDX_B = 8,
+    RATEID_IDX_VHT_2SS = 9,
+    RATEID_IDX_VHT_1SS = 10,
+    RATEID_IDX_MIX1 = 11,
+    RATEID_IDX_MIX2 = 12,
+    RATEID_IDX_VHT_3SS = 13,
+    RATEID_IDX_BGN_3SS = 14,
+};
+#define BT_INFO_8723B_1ANT_B_FTPBIT(7)
+#define BT_INFO_8723B_1ANT_B_A2DPBIT(6)
+#define BT_INFO_8723B_1ANT_B_HIDBIT(5)
+#define BT_INFO_8723B_1ANT_B_SCO_BUSYBIT(4)
+#define BT_INFO_8723B_1ANT_B_ACL_BUSYBIT(3)
+#define BT_INFO_8723B_1ANT_B_INQ_PAGEBIT(2)
+#define BT_INFO_8723B_1ANT_B_SCO_ESCOBIT(1)
+#define BT_INFO_8723B_1ANT_B_CONNECTIONBIT(0)
+
+enum _BT_8723B_1ANT_STATUS {
+BT_8723B_1ANT_STATUS_NON_CONNECTED_IDLE      = 0x0,
+BT_8723B_1ANT_STATUS_CONNECTED_IDLE          = 0x1,
+BT_8723B_1ANT_STATUS_INQ_PAGE                = 0x2,
+BT_8723B_1ANT_STATUS_ACL_BUSY                = 0x3,
+BT_8723B_1ANT_STATUS_SCO_BUSY                = 0x4,
+BT_8723B_1ANT_STATUS_ACL_SCO_BUSY            = 0x5,
+BT_8723B_1ANT_STATUS_MAX
+};
+
+struct rtl8xxxu_btcoex {
+u8    bt_status;
+bool  bt_busy;
+bool  has_sco;
+bool  has_a2dp;
+bool  has_hid;
+bool  has_pan;
+bool  hid_only;
+bool  a2dp_only;
+bool  c2h_bt_inquiry;
+};
+
+#define RTL8XXXU_RATR_STA_INIT 0
+#define RTL8XXXU_RATR_STA_HIGH 1
+#define RTL8XXXU_RATR_STA_MID   2
+#define RTL8XXXU_RATR_STA_LOW  3
+
+#define RTL8XXXU_NOISE_FLOOR_MIN  -100
+#define RTL8XXXU_SNR_THRESH_HIGH  50
+#define RTL8XXXU_SNR_THRESH_LOW   20
+
struct rtl8xxxu_priv {
struct ieee80211_hw *hw;
struct usb_device *udev;
    @ @ -1299.6 +1372.17 @ @
u8    pi_enabled:1;
u8    no_pape:1;
u8    int_buf[USB_INTR_CONTENT_LENGTH];
struct ieee80211_vif *vif;
+struct delayed_work ra_watchdog;
+struct work_struct c2hcmd_work;
+struct sk_buff_head c2hcmd_queue;
+spinlock_t c2hcmd_lock;
+struct rtl8xxxu_btcoex bt_coex;
};

struct rtl8xxxu_rx_urb {
    void (*set_tx_power) (struct rtl8xxxu_priv *priv, int channel,
             bool ht40);
    void (*update_rate_mask) (struct rtl8xxxu_priv *priv,
-       u32 ramask, int sgi);
+       u32 ramask, u8 rateid, int sgi);
    void (*report_connect) (struct rtl8xxxu_priv *priv,
             u8 macid, bool connect);
    void (*fill_txdesc) (struct ieee80211_hw *hw, struct ieee80211_hdr *hdr,
             u8 has_s0s1:1;
             u8 has_tx_report:1;
             u8 gen2_thermal_meter:1;
+      u8 needs_full_init:1;
    u32 adda_1t_init;
    u32 adda_1t_path_on;
    u32 adda_2t_path_on_a;
   void rtl8xxxu_gen1_usb_quirks(struct rtl8xxxu_priv *priv);
   void rtl8xxxu_gen2_usb_quirks(struct rtl8xxxu_priv *priv,
-       u32 ramask, int sgi);
+       u32 ramask, u8 rateid, int sgi);
   void rtl8xxxu_gen2_update_rate_mask(struct rtl8xxxu_priv *priv,
-       u32 ramask, int sgi);
+       u32 ramask, u8 rateid, int sgi);
   void rtl8xxxu_gen1_report_connect(struct rtl8xxxu_priv *priv,
       u8 macid, bool connect);
   void rtl8xxxu_gen2_report_connect(struct rtl8xxxu_priv *priv,
       u32 ramask, u8 sgi, bool short_preamble, bool ampdu_enable,
       u32 rts_rate);
+void rtl8723bu_set_ps_tdma(struct rtl8xxxu_priv *priv,
extern struct rtl8xxxu_fileops rtl8192cu_fops;
extern struct rtl8xxxu_fileops rtl8192eu_fops;

--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtl8xxxu/rtl8xxxu_8723b.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtl8xxxu/rtl8xxxu_8723b.c
@@ -1583,9 +1583,7 @@
 /*
  * Software control, antenna at WiFi side
  */
-#ifdef NEED_PS_TDMA
rtl8723bu_set_ps_tdma(priv, 0x08, 0x00, 0x00, 0x00, 0x00);
-#endif

rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0x55555555);
rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0x55555555);
@@ -1673,6 +1671,7 @@
 .has_s0s1 = 1,
 .has_tx_report = 1,
 .gen2_thermal_meter = 1,
+.needs_full_init = 1,
 .adda_1t_init = 0x01c00014,
 .adda_1t_path_on = 0x01c00014,
 .adda_2t_path_on_a = 0x01c00014,
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtl8xxxu/rtl8xxxu_core.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtl8xxxu/rtl8xxxu_core.c
@@ -3824,9 +3824,8 @@
 rtl8xxxu_write8(priv, REG_RSV_CTRL, 0x0e);
 }

-#ifdef NEED_PS_TDMA
-static void rtl8723bu_set_ps_tdma(struct rtl8xxxu_priv *priv,
-      u8 arg1, u8 arg2, u8 arg3, u8 arg4, u8 arg5)
+void rtl8723bu_set_ps_tdma(struct rtl8xxxu_priv *priv,
+      u8 arg1, u8 arg2, u8 arg3, u8 arg4, u8 arg5)
 {
 struct h2c_cmd h2c;

@@ -3839,7 +3838,6 @@
 h2c.b_type_dma.data5 = arg5;
 rtl8xxxu_gen2_h2c_cmd(priv, &h2c, sizeof(h2c.b_type_dma));
 }
-#endif

void rtl8xxxu_gen2_disable_rf(struct rtl8xxxu_priv *priv)
{
@@ -3905,6 +3903,9 @@
 else
macpower = true;

+if (fops->needs_full_init)
+macpower = false;
+
ret = fops->power_on(priv);
if (ret < 0) {
    dev_warn(dev, "%s: Failed power on\n", __func__);
@@ -4307,7 +4308,8 @@
    rtl8xxxu_write8(priv, REG_BEACON_CTRL, val8);
}

-void rtl8xxxu_update_rate_mask(struct rtl8xxxu_priv *priv, u32 ramask, int sgi)
+void rtl8xxxu_update_rate_mask(struct rtl8xxxu_priv *priv,
+    u32 ramask, u8 rateid, int sgi)
{
    struct h2c_cmd h2c;

    @@ -4327,7 +4329,7 @@
}

void rtl8xxxu_gen2_update_rate_mask(struct rtl8xxxu_priv *priv, u32 ramask, int sgi)
-    u32 ramask, int sgi)
+    u32 ramask, u8 rateid, int sgi)
{
    struct h2c_cmd h2c;
    u8 bw = 0;
@@ -4341,7 +4343,7 @@
    h2c.b_macid_cfg.ramask3 = (ramask >> 24) & 0xff;

    h2c.ramask.arg = 0x80;
    -h2c.b_macid_cfg.data1 = 0;
    +h2c.b_macid_cfg.data1 = rateid;
    if (sgi)
    h2c.b_macid_cfg.data1 |= BIT(7);

    @@ -4481,6 +4483,35 @@
    rtl8xxxu_write8(priv, REG_INIRTS_RATE_SEL, rate_idx);
}

+static u16
+rtl8xxxu_wireless_mode(struct ieee80211_hw *hw, struct ieee80211_sta *sta)
+{
+    u16 network_type = WIRELESS_MODE_UNKNOWN;
+    
+    if (hw->conf.chandef.chan->band == NL80211_BAND_5GHZ) {
+        if (sta->vht_cap.vht_supported)
+            network_type = WIRELESS_MODE_AC;
+else if (sta->ht_cap.ht_supported)
+  network_type = WIRELESS_MODE_N_5G;
+  +
+  network_type |= WIRELESS_MODE_A;
+  +} else {
+if (sta->vht_cap.vht_supported)
+  network_type = WIRELESS_MODE_AC;
+else if (sta->ht_cap.ht_supported)
+  network_type = WIRELESS_MODE_N_24G;
+  +
+  if (sta->supp_rates[0] <= 0xf)
+    network_type |= WIRELESS_MODE_B;
+  else if (sta->supp_rates[0] & 0xf)
+    network_type |= (WIRELESS_MODE_B | WIRELESS_MODE_G);
+  else
+    network_type |= WIRELESS_MODE_G;
+  +
+  return network_type;
+  +}
+  +
+  static void
+  rtl8xxxu_bss_info_changed(struct ieee80211_hw *hw, struct ieee80211_vif *vif,
+  struct ieee80211_bss_conf *bss_conf, u32 changed)
+  @@ -4523,7 +4554,10 @@
+  sgi = 1;
+  rcu_read_unlock();
+  -priv->fops->update_rate_mask(priv, ramask, sgi);
+  +priv->vif = vif;
+  +priv->rssi_level = RTL8XXXU_RATR_STA_INIT;
+  +
+  +priv->fops->update_rate_mask(priv, ramask, 0, sgi);
+  +
+  rtl8xxxu_write8(priv, REG_BCN_MAX_ERR, 0xff);
+  @@ -5154,12 +5188,259 @@
+  } {5154,12 +5188,259 @}
+  }{5154,12 +5188,259 @}
+  
  +/*
+  +  * The RTL8723BU/RTL8192EU vendor driver use coexistence table type
+  +  * 0-7 to represent writing different combinations of register values
+  +  * to REG_BT_COEX_TABLEs. It's for different kinds of coexistence use
+  +  * cases which Realtek doesn't provide detail for these settings. Keep
+  +  * this aligned with vendor driver for easier maintenance.
+  +  */
+  +void rtl8723bu_set_coex_with_type(struct rtl8xxxu_priv *priv, u8 type)
+{
+switch (type) {
+case 0:
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0x55555555);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0x55555555);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE3, 0x00ffffff);
+rtl8xxxu_write8(priv, REG_BT_COEX_TABLE4, 0x03);
+break;
+case 1:
+case 3:
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0x55555555);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0x5a5a5a5a);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE3, 0x00ffffff);
+rtl8xxxu_write8(priv, REG_BT_COEX_TABLE4, 0x03);
+break;
+case 2:
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0x5a5a5a5a);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0x5a5a5a5a);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE3, 0x00ffffff);
+rtl8xxxu_write8(priv, REG_BT_COEX_TABLE4, 0x03);
+break;
+case 4:
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0x5a5a5a5a);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0xaaaa5a5a);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE3, 0x00ffffff);
+rtl8xxxu_write8(priv, REG_BT_COEX_TABLE4, 0x03);
+break;
+case 5:
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0x5a5a5a5a);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0xaa5a5a5a);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE3, 0x00ffffff);
+rtl8xxxu_write8(priv, REG_BT_COEX_TABLE4, 0x03);
+break;
+case 6:
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0x55555555);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0xaaaaaaaa);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE3, 0x00ffffff);
+rtl8xxxu_write8(priv, REG_BT_COEX_TABLE4, 0x03);
+break;
+case 7:
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE1, 0xaaaaaaaa);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE2, 0xaaaaaaaa);
+rtl8xxxu_write32(priv, REG_BT_COEX_TABLE3, 0x00ffffff);
+rtl8xxxu_write8(priv, REG_BT_COEX_TABLE4, 0x03);
+break;
+default:
+break;
+}

Open Source Used In 5GaaS Edge AC-4 26586
void rtl8723bu_update_bt_link_info(struct rtl8xxxu_priv *priv, u8 bt_info) {
    struct rtl8xxxu_btcoex *btcoex = &priv->bt_coex;

    if (bt_info & BT_INFO_8723B_1ANT_B_INQ_PAGE)
        btcoex->c2h_bt_inquiry = true;
    else
        btcoex->c2h_bt_inquiry = false;

    if (!(bt_info & BT_INFO_8723B_1ANT_B_CONNECTION)) {
        btcoex->bt_status = BT_8723B_1ANT_STATUS_NON_CONNECTED_IDLE;
        btcoex->has_sco = false;
        btcoex->has_hid = false;
        btcoex->has_pan = false;
        btcoex->has_a2dp = false;
    } else {
        if ((bt_info & 0x1f) == BT_INFO_8723B_1ANT_B_CONNECTION)
            btcoex->bt_status = BT_8723B_1ANT_STATUS_CONNECTED_IDLE;
        else if (bt_info & BT_INFO_8723B_1ANT_B_SCO_ESCO)
            btcoex->bt_status = BT_8723B_1ANT_STATUS_SCO_BUSY;
        else if (bt_info & BT_INFO_8723B_1ANT_B_ACL_BUSY)
            btcoex->bt_status = BT_8723B_1ANT_STATUS_ACL_BUSY;
        else
            btcoex->bt_status = BT_8723B_1ANT_STATUS_MAX;

        if (bt_info & BT_INFO_8723B_1ANT_B_FTP)
            btcoex->has_pan = true;
        else
            btcoex->has_pan = false;

        if (bt_info & BT_INFO_8723B_1ANT_B_A2DP)
            btcoex->has_a2dp = true;
        else
            btcoex->has_a2dp = false;

        if (bt_info & BT_INFO_8723B_1ANT_B_HID)
            btcoex->has_hid = true;
        else
            btcoex->has_hid = false;

        if (bt_info & BT_INFO_8723B_1ANT_B_SCO_ESCO)
            btcoex->has_sco = true;
        else
            btcoex->has_sco = false;
    }
}
+if (!btcoex->has_a2dp && !btcoex->has_sco &&
+    !btcoex->has_pan && btcoex->has_hid)
+    btcoex->hid_only = true;
+else
+    btcoex->hid_only = false;
+
+if (!btcoex->has_sco && !btcoex->has_pan &&
    !btcoex->has_hid && btcoex->has_a2dp)
+    btcoex->has_a2dp = true;
+else
+    btcoex->has_a2dp = false;
+
+if (btcoex->bt_status == BT_8723B_1ANT_STATUS_SCO_BUSY ||
    btcoex->bt_status == BT_8723B_1ANT_STATUS_ACL_BUSY)
+    btcoex->bt_busy = true;
+else
+    btcoex->bt_busy = false;
+
+void rtl8723bu_handle_bt_inquiry(struct rtl8xxxu_priv *priv)
+{
+    struct ieee80211_vif *vif;
+    struct rtl8xxxu_btcoex *btcoex;
+    bool wifi_connected;
+
+    vif = priv->vif;
+    btcoex = &priv->bt_coex;
+    wifi_connected = (vif && vif->bss_conf.assoc);
+
+    if (!wifi_connected) {
+        rtl8723bu_set_ps_tdma(priv, 0x8, 0x0, 0x0, 0x0, 0x0);
+        rtl8723bu_set_coex_with_type(priv, 0);
+    } else if (btcoex->has_sco || btcoex->has_hid || btcoex->has_a2dp) {
+        rtl8723bu_set_ps_tdma(priv, 0x61, 0x35, 0x3, 0x11, 0x11);
+        rtl8723bu_set_coex_with_type(priv, 4);
+    } else if (btcoex->has_pan) {
+        rtl8723bu_set_ps_tdma(priv, 0x61, 0x3f, 0x3, 0x11, 0x11);
+        rtl8723bu_set_coex_with_type(priv, 4);
+    } else {
+        rtl8723bu_set_ps_tdma(priv, 0x8, 0x0, 0x0, 0x0, 0x0);
+        rtl8723bu_set_coex_with_type(priv, 7);
+    }
+
+    void rtl8723bu_handle_bt_info(struct rtl8xxxu_priv *priv)
+    {
+        struct ieee80211_vif *vif;
+struct rtl8xxxu_btcoex *btcoex;
+bool wifi_connected;
+
+if (wifi_connected) {
+    u32 val32 = rtl8xxxu_read32(priv, 0x770);
+    high_prio_tx = val32 & 0x0000ffff;
+    high_prio_rx = (val32 & 0xffff0000) >> 16;
+    if (btcoex->bt_busy) {
+        if (btcoex->hid_only) {
+            rtl8723bu_set_ps_tdma(priv, 0x61, 0x20, 0x3, 0x11, 0x11);
+            rtl8723bu_set_coex_with_type(priv, 5);
+        } else if (btcoex->a2dp_only) {
+            rtl8723bu_set_ps_tdma(priv, 0x61, 0x35, 0x3, 0x11, 0x11);
+            rtl8723bu_set_coex_with_type(priv, 4);
+        } else if ((btcoex->has_a2dp && btcoex->has_pan) ||
+            (btcoex->has_hid && btcoex->has_a2dp &&
+             btcoex->has_pan)) {
+            rtl8723bu_set_ps_tdma(priv, 0x51, 0x21, 0x3, 0x10, 0x10);
+            rtl8723bu_set_coex_with_type(priv, 4);
+        } else if (btcoex->has_hid && btcoex->has_a2dp) {
+            rtl8723bu_set_ps_tdma(priv, 0x51, 0x21, 0x3, 0x10, 0x10);
+            rtl8723bu_set_coex_with_type(priv, 3);
+        } else {
+            rtl8723bu_set_coex_with_type(priv, 4);
+        }
+    } else {
+        rtl8723bu_set_ps_tdma(priv, 0x8, 0x0, 0x0, 0x0, 0x0);
+        if (high_prio_tx + high_prio_rx <= 60)
+            rtl8723bu_set_coex_with_type(priv, 2);
+        else
+            rtl8723bu_set_coex_with_type(priv, 7);
+    }
+} else {
+    rtl8723bu_set_ps_tdma(priv, 0x8, 0x0, 0x0, 0x0, 0x0);
+rtl8723bu_set_coex_with_type(priv, 0);
+
+static void rtl8xxxu_c2hcmd_callback(struct work_struct *work)
+
+{
+EXTERN struct rtl8xxxu_priv *priv;
+EXTERN struct rtl8723bu_c2h *c2h;
+EXTERN struct sk_buff *skb = NULL;
+unsigned long flags;
+u8 bt_info = 0;
+EXTERN struct rtl8xxxu_btcoex *btcoex;
+
+priv = container_of(work, struct rtl8xxxu_priv, c2hcmd_work);
+btcoex = &priv->bt_coex;
+
+if (priv->rf_paths > 1)
+goto out;
+
+while (!skb_queue_empty(&priv->c2hcmd_queue)) {
+spin_lock_irqsave(&priv->c2hcmd_lock, flags);
+skb = __skb_dequeue(&priv->c2hcmd_queue);
+spin_unlock_irqrestore(&priv->c2hcmd_lock, flags);
+
+c2h = (struct rtl8723bu_c2h *)skb->data;
+
+switch (c2h->id) {
+case C2H_8723B_BT_INFO:
+bt_info = c2h->bt_info.bt_info;
+
+rtl8723bu_update_bt_link_info(priv, bt_info);
+if (btcoex->c2h_bt_inquiry) {
+rtl8723bu_handle_bt_inquiry(priv);
+break;
+}
+rtl8723bu_handle_bt_info(priv);
+break;
+default:
+break;
+
+out:
+dev_kfree_skb(skb);
+
+static void rtl8723bu_handle_c2h(struct rtl8xxxu_priv *priv,
 struct sk_buff *skb)
struct rtl8723bu_c2h *c2h = (struct rtl8723bu_c2h *)skb->data;
struct device *dev = &priv->udev->dev;
int len;

++unsigned long flags;

len = skb->len - 2;

@@ -5197,6 +5478,12 @@
   16, 1, c2h->raw.payload, len, false);
 break;
 }
+
+spin_lock_irqsave(&priv->c2hcmd_lock, flags);
+__skb_queue_tail(&priv->c2hcmd_queue, skb);
+spin_unlock_irqrestore(&priv->c2hcmd_lock, flags);
+
+schedule_work(&priv->c2hcmd_work);
}

int rtl8xxxu_parse_rxdesc16(struct rtl8xxxu_priv *priv, struct sk_buff *skb)
@@ -5321,7 +5608,6 @@
 struct device *dev = &priv->udev->dev;
 dev_dbg(dev, "%s: C2H packet\n", __func__);
 rtl8723bu_handle_c2h(priv, skb);
-dev_kfree_skb(skb);
 return RX_TYPE_C2H;
 }

@@ -5458,6 +5744,7 @@
 rtl8xxxu_write32(priv, REG_USB_HIMR, val32);

error:
+usb_free_urb(urb);
 return ret;
 }

@@ -5470,6 +5757,10 @@

switch (vif->type) {
 case NL80211_IFTYPE_STATION:
+if (!priv->vif)
+priv->vif = vif;
+else
+return -EOPNOTSUPP;
 rtl8xxxu_stop_tx_beacon(priv);

 val8 = rtl8xxxu_read8(priv, REG_BEACON_CTRL);
struct rtl8xxxu_priv *priv = hw->priv;

dev_dbg(&priv->udev->dev, "%s\n", __func__);
+
+if (priv->vif)
+priv->vif = NULL;
}

static int rtl8xxxu_config(struct ieee80211_hw *hw, u32 changed)
@@ -5777,11 +6072,184 @@
return 0;
}

+static u8 rtl8xxxu_signal_to_snr(int signal)
+{
+  if (signal < RTL8XXXU_NOISE_FLOOR_MIN)
+    signal = RTL8XXXU_NOISE_FLOOR_MIN;
+  else if (signal > 0)
+    signal = 0;
+  return (u8)(signal - RTL8XXXU_NOISE_FLOOR_MIN);
+}
+
+static void rtl8xxxu_refresh_rate_mask(struct rtl8xxxu_priv *priv,
+    int signal, struct ieee80211_sta *sta)
+{
+  struct ieee80211_hw *hw = priv->hw;
+  u16 wireless_mode;
+  u8 rssi_level, ratr_idx;
+  u8 txbw_40mhz;
+  u8 snr, snr_thresh_high, snr_thresh_low;
+  u8 go_up_gap = 5;
+
+  rssi_level = priv->rssi_level;
+  snr = rtl8xxxu_signal_to_snr(signal);
+  snr_thresh_high = RTL8XXXU_SNR_THRESH_HIGH;
+  snr_thresh_low = RTL8XXXU_SNR_THRESH_LOW;
+  txbw_40mhz = (hw->conf.chandef.width == NL80211_CHAN_WIDTH_40) ? 1 : 0;
+
+  switch (rssi_level) {
+case RTL8XXXU_RATR_STA_MID:
+snr_thres_high += go_up_gap;
+break;
+case RTL8XXXU_RATR_STA_LOW:
+snr_thres_high += go_up_gap;
+snr_thres_low += go_up_gap;
+break;
+default:
+break;
+
+if (snr > snr_thres_high)
+rssi_level = RTL8XXXU_RATR_STA_HIGH;
+else if (snr > snr_thres_low)
+rssi_level = RTL8XXXU_RATR_STA_MID;
+else
+rssi_level = RTL8XXXU_RATR_STA_LOW;
+
+if (rssi_level != priv->rssi_level) {
+int sgi = 0;
+u32 rate_bitmap = 0;
+
+rcu_read_lock();
+rate_bitmap = (sta->supp_rates[0] & 0xff) |
+(sta->ht_cap.mcs.rx_mask[0] << 12) |
+(sta->ht_cap.mcs.rx_mask[1] << 20);
+if (sta->ht_cap.cap &
+   (IEEE80211_HT_CAP_SGI_40 | IEEE80211_HT_CAP_SGI_20))
+sgi = 1;
+rcu_read_unlock();
+
+wireless_mode = rtl8xxxu_wireless_mode(hw, sta);
+switch (wireless_mode) {
+case WIRELESS_MODE_B:
+ratr_idx = RATEID_IDX_B;
+if (rate_bitmap & 0x0000000c)
+rate_bitmap &= 0x0000000d;
+break;
+case WIRELESS_MODE_A:
+case WIRELESS_MODE_G:
+ratr_idx = RATEID_IDX_G;
+if (rssi_level == RTL8XXXU_RATR_STA_HIGH)
+rate_bitmap &= 0x000000f0;
+break;
+case (WIRELESS_MODE_B | WIRELESS_MODE_G):
+  +ratr_idx = RATEID_IDX_BG;
+  +if (rssi_level == RTL8XXXU_RATR_STA_HIGH)
+    +rate_bitmap &= 0x00000f00;
+  +else if (rssi_level == RTL8XXXU_RATR_STA_MID)
+    +rate_bitmap &= 0x00000ff0;
+  +else
+    +rate_bitmap &= 0x00000ff5;
+    +break;
+case WIRELESS_MODE_N_24G:
+case WIRELESS_MODE_N_5G:
+case (WIRELESS_MODE_G | WIRELESS_MODE_N_24G):
+case (WIRELESS_MODE_A | WIRELESS_MODE_N_5G):
+  +if (priv->tx_paths == 2 && priv->rx_paths == 2)
+    +ratr_idx = RATEID_IDX_GN_N2SS;
+  +else
+    +ratr_idx = RATEID_IDX_GN_N1SS;
+    +break;
+case (WIRELESS_MODE_B | WIRELESS_MODE_G | WIRELESS_MODE_N_24G):
+case (WIRELESS_MODE_B | WIRELESS_MODE_N_24G):
+  +if (txbw_40mhz) {
+    +if (priv->tx_paths == 2 && priv->rx_paths == 2)
+      +ratr_idx = RATEID_IDX_BGN_40M_2SS;
+  +else
+    +ratr_idx = RATEID_IDX_BGN_40M_1SS;
+  +} else {
+    +if (priv->tx_paths == 2 && priv->rx_paths == 2)
+      +ratr_idx = RATEID_IDX_BGN_20M_2SS_BN;
+  +else
+    +ratr_idx = RATEID_IDX_BGN_20M_1SS_BN;
+  +}
+  +if (priv->tx_paths == 2 && priv->rx_paths == 2) {
+    +if (rssi_level == RTL8XXXU_RATR_STA_HIGH) {
+      +rate_bitmap &= 0x0f8f0000;
+    +} else if (rssi_level == RTL8XXXU_RATR_STA_MID) {
+      +rate_bitmap &= 0x0f8ff000;
+    +} else {
+      +if (txbw_40mhz)
+        +rate_bitmap &= 0x0f8ff015;
+    +else
+      +rate_bitmap &= 0x0f8ff005;
+    +}
+  +} else {
+    +if (rssi_level == RTL8XXXU_RATR_STA_HIGH) {
+      +rate_bitmap &= 0x00ff0000;
+    +} else if (rssi_level == RTL8XXXU_RATR_STA_MID) {
+      +rate_bitmap &= 0x00ff0000;
+    +} else {
+      +rate_bitmap &= 0x00ff0000;
+    +}
+ } else {
+ if (txbw_40mhz)
+ rate_bitmap &= 0x000ff015;
+ else
+ rate_bitmap &= 0x000ff005;
+ }
+ }
+ break;
+ default:
+ rattr_idx = RATEID_IDX_BGN_40M_2SS;
+ rate_bitmap &= 0x0fffffff;
+ break;
+ }
+
+ priv->rssi_level = rssi_level;
+ priv->fops->update_rate_mask(priv, rate_bitmap, rattr_idx, sgi);
+ }
+ }
+
+ static void rtl8xxxu_watchdog_callback(struct work_struct *work)
+ {
+ struct ieee80211_vif *vif;
+ struct rtl8xxxu_priv *priv;
+ +
+ priv = container_of(work, struct rtl8xxxu_priv, ra_watchdog.work);
+ vif = priv->vif;
+ if (vif && vif->type == NL80211_IFTYPE_STATION) {
+ int signal;
+ struct ieee80211_sta *sta;
+ +
+ rcu_read_lock();
+ sta = ieee80211_find_sta(vif, vif->bss_conf.bssid);
+ if (!sta) {
+ struct device *dev = &priv->udev->dev;
+ +
+ dev_dbg(dev, "%s: no sta found\n", __func__);
+ rcu_read_unlock();
+ goto out;
+ }
+ rcu_read_unlock();
+ +
+ signal = ieee80211_ave_rssi(vif);
+ rtl8xxxu_refresh_rate_mask(priv, signal, sta);
+ }
+ +
+ out:
+ schedule_delayed_work(&priv->ra_watchdog, 2 * HZ);
static int rtl8xxxu_start(struct ieee80211_hw *hw)
{
    struct rtl8xxxu_priv *priv = hw->priv;
    struct rtl8xxxu_rx_urb *rx_urb;
    struct rtl8xxxu_tx_urb *tx_urb;
    struct sk_buff *skb;
    unsigned long flags;
    int ret, i;

    rx_urb->hw = hw;

    ret = rtl8xxxu_submit_rx_urb(priv, rx_urb);
    if (ret) {
        if (ret != -ENOMEM) {
            skb = (struct sk_buff *)rx_urb->urb.context;
            dev_kfree_skb(skb);
        }
        rtl8xxxu_queue_rx_urb(priv, rx_urb);
    }
    +schedule_delayed_work(&priv->ra_watchdog, 2 * HZ);
    exit:
    /*
    * Accept all data and mgmt frames
    */
    if (priv->usb_interrupts)
        rtl8xxxu_write32(priv, REG_USB_HIMR, 0);
    +cancel_delayed_work_sync(&priv->ra_watchdog);
    rtl8xxxu_free_rx_resources(priv);
    rtl8xxxu_free_tx_resources(priv);
    }
    if (-host_interface = &interface->altsetting[0];
    +host_interface = interface->cur_altsetting;
    interface_desc = &host_interface->desc;
    endpoints = interface_desc->bNumEndpoints;

    INIT_LIST_HEAD(&priv->rx_urb_pending_list);
spin_lock_init(&priv->rx_urb_lock);
INIT_WORK(&priv->rx_urb_wq, rtl8xxxu_rx_urb_work);
+INIT_DELAYED_WORK(&priv->ra_watchdog, rtl8xxxu_watchdog_callback);
+spin_lock_init(&priv->c2hcmd_lock);
+INIT_WORK(&priv->c2hcmd_work, rtl8xxxu_c2hcmd_callback);
+skb_queue_head_init(&priv->c2hcmd_queue);

usb_set_intfdata(interface, hw);

--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/base.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/base.c
@@ -452,9 +452,14 @@
 }
 }

-static void _rtl_init_deferred_work(struct ieee80211_hw *hw)
+static int _rtl_init_deferred_work(struct ieee80211_hw *hw)
{
 struct rtl_priv *rtlpriv = rtl_priv(hw);
+struct workqueue_struct *wq;
 +
 +wq = alloc_workqueue("%s", 0, 0, rtlpriv->cfg->name);
 +if (!wq)
 +return -ENOMEM;
 /* <1> timer */
 timer_setup(&rtlpriv->works.watchdog_timer,
 @@ -463,7 +468,8 @@
   rtl_easy_concurrent_retrytimer_callback, 0);
 /* <2> work queue */
 rtlpriv->works.hw = hw;
-rtlpriv->works.rtl_wq = alloc_workqueue("%s", 0, 0, rtlpriv->cfg->name);
+rtlpriv->works.rtl_wq = wq;
 +INIT_DELAYED_WORK(&rtlpriv->works.watchdog_wq,
   (void *)&rtl_watchdog_wq_callback);
 INIT_DELAYED_WORK(&rtlpriv->works.ips_nic_off_wq,
 @@ -476,21 +482,24 @@
   (void *)&rtl_fwevt_wq_callback);
 INIT_DELAYED_WORK(&rtlpriv->works.c2hcmd_wq,
   (void *)&rtl_c2hcmd_wq_callback);
-
+return 0;
 }

-void rtl_deinit_deferred_work(struct ieee80211_hw *hw)
+void rtl_deinit_deferred_work(struct ieee80211_hw *hw, bool ips_wq)
{
struct rtl_priv *rtlpriv = rtl_priv(hw);

del_timer_sync(&rtlpriv->works.watchdog_timer);

-cancel_delayed_work(&rtlpriv->works.watchdog_wq);
-cancel_delayed_work(&rtlpriv->works.ips_nic_off_wq);
-cancel_delayed_work(&rtlpriv->works.ps_work);
-cancel_delayed_work(&rtlpriv->works.ps_rfon_wq);
-cancel_delayed_work(&rtlpriv->works.fwevt_wq);
-cancel_delayed_work(&rtlpriv->works.c2hcmd_wq);
+cancel_delayed_work_sync(&rtlpriv->works.watchdog_wq);
+if (ips_wq)
+cancel_delayed_work(&rtlpriv->works.ips_nic_off_wq);
+else
+cancel_delayed_work_sync(&rtlpriv->works.ips_nic_off_wq);
+cancel_delayed_work_sync(&rtlpriv->works.ps_work);
+cancel_delayed_work_sync(&rtlpriv->works.ps_rfon_wq);
+cancel_delayed_work_sync(&rtlpriv->works.fwevt_wq);
+cancel_delayed_work_sync(&rtlpriv->works.c2hcmsg_wq);
}
EXPORT_SYMBOL_GPL(rtl_deinit_deferred_work);

@@ -573,9 +582,7 @@
rtlmac->link_state = MAC80211_NOLINK;

/* <6> init deferred work */

-rtl_init_deferred_work(hw);
-
-return 0;
+return _rtl_init_deferred_work(hw);
}
EXPORT_SYMBOL_GPL(rtl_init_core);

@@ -1726,7 +1733,7 @@
void rtl_rx_ampdu_apply(struct rtl_priv *rtlpriv)
{
 struct rtl_btc_ops *btc_ops = rtlpriv->btcoexist.btc_ops;
-            u8 reject_agg, ctrl_agg_size = 0, agg_size;
+            u8 reject_agg = 0, ctrl_agg_size = 0, agg_size = 0;

 if (rtlpriv->cfg->ops->get_btc_status())
 btc_ops->btc_get_ampdu_cfg(rtlpriv, &reject_agg,
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/base.h
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/base.h
@@ -121,7 +121,7 @@
void rtl_deinit_rfkill(struct ieee80211_hw *hw);

void rtl_watchdog_timer_callback(struct timer_list *t);
-void rtl_deinit_deferred_work(struct ieee80211_hw *hw);
+void rtl_deinit_deferred_work(struct ieee80211_hw *hw, bool ips_wq);

bool rtl_action_proc(struct ieee80211_hw *hw, struct sk_buff *skb, u8 is_tx);
int rtlwifi_rate_mapping(struct ieee80211_hw *hw, bool isht,
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/btcoexist/halbtcoutsrc.h
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/btcoexist/halbtcoutsrc.h
@@ -601,6 +601,7 @@
bool exhaltbc_initlize_variables(void);
bool exhaltbc_bind_bt_coex_withadapter(void *adapter);
+void exhaltbc_power_on_setting(struct btc_coexist *btcoexist);
void exhaltbc_init_hw_config(struct btc_coexist *btcoexist, bool wifi_only);
void exhaltbc_init_coex_dm(struct btc_coexist *btcoexist);
void exhaltbc_ips_notify(struct btc_coexist *btcoexist, u8 type);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl_btc.h
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl_btc.c
@@ -29,6 +29,7 @@
void rtl_btc_init_variables(struct rtl_priv *rtlpriv);
void rtl_btc_ips_notify(struct rtl_priv *rtlpriv, u8 type);
void rtl_btc_lps_notify(struct rtl_priv *rtlpriv, u8 type);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/core.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/core.c
@@ -130,7 +130,6 @@
 firmware->size);
 rtlpriv->rtlhal.wowlan_fws = firmware->size;
 }
-rtlpriv->rtlhal.fwsize = firmware->size;
 release_firmware(firmware);
 }

@@ -196,7 +195,7 @@
 /* reset sec info */
 rtl_cam_reset_sec_info(hw);

-rtl_deinit_deferred_work(hw);
+rtl_deinit_deferred_work(hw, false);
}
rtlpriv->intf_ops->adapter_stop(hw);

--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/pci.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/pci.c
@@ -1080,13 +1080,15 @@
 return ret;
 }

-static void _rtl_pci_irq_tasklet(struct ieee80211_hw *hw)
+static void _rtl_pci_irq_tasklet(unsigned long data)
 {
+ struct ieee80211_hw *hw = (struct ieee80211_hw *)data;
   _rtl_pci_tx_chk_waitq(hw);
 }

-static void _rtl_pci_prepare_bcn_tasklet(struct ieee80211_hw *hw)
+static void _rtl_pci_prepare_bcn_tasklet(unsigned long data)
 {+ struct ieee80211_hw *hw = (struct ieee80211_hw *)data;
   _rtl_pci_tx_chk_waitq(hw);
 }

 /*task */
tasklet_init(&rtlpriv->works.irq_tasklet,
  - (void (*)(unsigned long))_rtl_pci_irq_tasklet,
+  _rtl_pci_irq_tasklet,
    (unsigned long)hw);
tasklet_init(&rtlpriv->works.irq_prepare_bcn_tasklet,
  - (void (*)(unsigned long))_rtl_pci_prepare_bcn_tasklet,
+  _rtl_pci_prepare_bcn_tasklet,
(unsigned long)hw);
INIT_WORK(&rtlpriv->works.lps_change_work,
   rtl_lps_change_work_callback);
@@ -1555,7 +1557,14 @@
   dev_kfree_skb_irq(skb);
   ring->idx = (ring->idx + 1) % ring->entries;
 }
+ + if (rtlpriv->use_new_trx_flow) {
+   rtlpci->tx_ring[i].cur_tx_rp = 0;
+   rtlpci->tx_ring[i].cur_tx_wp = 0;
+ }
 +
   ring->idx = 0;
 + ring->entries = rtlpci->txringcount[i];
 }
 }
spin_unlock_irqrestore(&rtlpriv->locks.irq_th_lock, flags);
@@ -2355,7 +2364,7 @@
   ieee80211_unregister_hw(hw);
   rtlmac->mac80211_registered = 0;
 } else {
-   rtl_deinit_deferred_work(hw);
+   rtl_deinit_deferred_work(hw, false);
   rtlpriv->intf_ops->adapter_stop(hw);
 }
 rtlpriv->cfg->ops->disable_interrupt(hw);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/ps.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/ps.c
@@ -66,7 +66,7 @@
   rtl_deinit_deferred_work(hw);
+rtl_deinit_deferred_work(hw, true);
   rtlpriv->cfg->ops->disable_interrupt(hw);
}
/*<1> Stop all timer */
-rtl_deinit_deferred_work(hw);
+rtl_deinit_deferred_work(hw, true);

/*<2> Disable Interrupt */
rtlpriv->cfg->ops->disable_interrupt(hw);
@@ -287,7 +287,7 @@
   struct rtl_ps_ctl *ppsc = rtl_psc(rtl_priv(hw));
   enum rf_pwrstate rtstate;

-cancelDelayed_work(&rtlpriv->works.ips_nic_off_wq);
+cancelDelayed_work_sync(&rtlpriv->works.ips_nic_off_wq);

spin_lock(&rtlpriv->locks.ips_lock);
if (ppsc->inactiveps) {
   @@ -773,7 +773,8 @@

noa_len);
return;
} else {
    noa_num = (noa_len - 2) / 13;
    noa_num = min((noa_len - 2) / 13,
        P2P_MAX_NOA_NUM);
}
noa_index = ie[3];
if (rtlpriv->psc.p2p_ps_info.p2p_ps_mode ==
    @ @ -867,7 +868,8 @@
    noa_len);
return;
} else {
    noa_num = (noa_len - 2) / 13;
    noa_num = min((noa_len - 2) / 13,
        P2P_MAX_NOA_NUM);
}
noa_index = ie[3];
if (rtlpriv->psc.p2p_ps_info.p2p_ps_mode ==
    --- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/regd.c
    +++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/regd.c
    @ @ -427,7 +427,7 @@
struct wiphy *wiphy = hw->wiphy;
struct country_code_to_enum_rd *country = NULL;

    -if (wiphy == NULL || &rtlpriv->regd == NULL)
+if (!wiphy)
    return -EINVAL;

    /* init country_code from efuse channel plan */
    --- linux-4.15.0.orig/drivers/net/wireless/realtek/rtl8188ee/fw.c
    +++ linux-4.15.0/drivers/net/wireless/realtek/rtl8188ee/fw.c
    @ @ -620,6 +620,8 @@
        u1rsvdpageloc, 3);

    skb = dev_alloc_skb(totalpacketlen);
    +if (!skb)
    +return;
    skb_put_data(skb, &reserved_page_packet, totalpacketlen);

    rtstatus = rtl_cmd_send_packet(hw, skb);
    --- linux-4.15.0.orig/drivers/net/wireless/realtek/rtl8192c/fw_common.c
    +++ linux-4.15.0/drivers/net/wireless/realtek/rtl8192c/fw_common.c
    @ @ -647,6 +647,8 @@

    skb = dev_alloc_skb(totalpacketlen);
    +if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

if (cmd_send_packet)
    --- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192cu/hw.c
    +++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192cu/hw.c
    @@ -1556,6 +1556,8 @@
        * This is maybe necessary:
        * rtlpriv->cfg->ops->fill_tx_cmddesc(hw, buffer, 1, 1, skb);
        */
+dev_kfree_skb(skb);
+return true;

--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192cu/rf.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192cu/rf.c
@@ -299,9 +299,6 @@
    writeVal = writeVal - 0x06060606;
  -else if (rtlpriv->dm.dynamic_txhighpower_lvl ==
    - TXHIGHPWRLEVEL_BT2)
  -writeVal = writeVal;
*p_outwriteval + rf) = writeVal;
}
}

--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192de/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192de/fw.c
@@ -173,7 +173,7 @@
    rtl_read_byte(rtlpriv, FW_MAC1_READY));
}
RT_TRACE(rtlpriv, COMP_FW, DBG_DMESG,
- "Polling FW ready fail!! REG_MCUFWDL:0x%08u\n",
+ "Polling FW ready fail!! REG_MCUFWDL:0x%08x\n",
    rtl_read_dword(rtlpriv, REG_MCUFWDL));
return -1;
}

--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192de/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192de/hw.c
@@ -1198,6 +1198,7 @@
    rtlpci->irq_enabled = true;
}

void rtl92de_disable_interrupt(struct ieee80211_hw *hw)
rtl_write_dword(rtlpriv, REG_HIMR, IMR8190_DISABLED);
rtl_write_dword(rtlpriv, REG_HIMRE, IMR8190_DISABLED);
-synchronize_irq(rtlpci->pdev->irq);
+rtlpci->irq_enabled = false;
}

static void _rtl92de_poweroff_adapter(struct ieee80211_hw *hw)
{
  bcn_interval = mac->beacon_interval;
atim_window = 2;
-/*rtl92de_disable_interrupt(hw); */
+rtl92de_disable_interrupt(hw);
rtl_write_word(rtlpriv, REG_ATIMWND, atim_window);
rtl_write_word(rtlpriv, REG_BCN_INTERVAL, bcn_interval);
rtl_write_word(rtlpriv, REG_BCNTCFG, 0x660f);
}

RT_TRACE(rtlpriv, COMP_BEACON, DBG_DMESG,
  "beacon_interval:%d\n", bcn_interval);
-/* rtl92de_disable_interrupt(hw); */
+rtl92de_disable_interrupt(hw);
rtl_write_word(rtlpriv, REG_BCN_INTERVAL, bcn_interval);
-/* rtl92de_enable_interrupt(hw); */
+rtl92de_enable_interrupt(hw);
}

void rtl92de_update_interrupt_mask(struct ieee80211_hw *hw,
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192de/sw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192de/sw.c
@@ -238,6 +238,7 @@
      .led_control = rtl92de_led_control,
      .set_desc = rtl92de_set_desc,
      .get_desc = rtl92de_get_desc,
+    .is_tx_desc_closed = rtl92de_is_tx_desc_closed,
      .tx_polling = rtl92de_tx_polling,
      .enable_hw_sec = rtl92de_enable_hw_security_config,
      .set_key = rtl92de_set_key,
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192de/trx.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192de/trx.c
@@ -840,13 +840,15 @@ break;
  } else {
    -struct rx_desc_92c *pdesc = (struct rx_desc_92c *)p_desc;
    switch (desc_name) {

case HW_DESC_OWN:
    ret = GET_RX_DESC_OWN(pdesc);
    break;

case HW_DESC_RXPKT_LEN:
    ret = GET_RX_DESC_PKT_LEN(pdesc);
    break;

case HW_DESC_RXBUFF_ADDR:
    ret = GET_RX_DESC_BUFF_ADDR(p_desc);
    break;

default:
    WARN_ONCE(true, "rtl8192de: ERR rxdesc :%d not processed\n", ret);
    return ret;

bool rtl92de_is_tx_desc_closed(struct ieee80211_hw *hw,
                                u8 hw_queue, u16 index)
{
    struct rtl_pci *rtlpci = rtl_pcidev(rtl_pcipriv(hw));
    struct rtl8192_tx_ring *ring = &rtlpci->tx_ring[hw_queue];
    u8 *entry = (u8 *)&ring->desc[ring->idx];
    u8 own = (u8)rtl92de_get_desc(hw, entry, true, HW_DESC_OWN);

    /* a beacon packet will only use the first
     * descriptor by default, and the own bit may not
     * be cleared by the hardware
     */
    if (own)
        return false;
    return true;
}

void rtl92de_tx_polling(struct ieee80211_hw *hw, u8 hw_queue)
{
    struct rtl_priv *rtlpriv = rtl_priv(hw);
    --- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192de/trx.h
    +++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192de/trx.h
    @ @ -737,6 +737,8 @ @
        u8 desc_name, u8 *val);
    u64 rtl92de_get_desc(struct ieee80211_hw *hw,
                         u8 *p_desc, bool istx, u8 desc_name);
    +bool rtl92de_is_tx_desc_closed(struct ieee80211_hw *hw,
                                   u8 hw_queue, u16 index);
    void rtl92de_tx_polling(struct ieee80211_hw *hw, u8 hw_queue);
    void rtl92de_tx_fill_cmddesc(struct ieee80211_hw *hw, u8 *pdesc,
                                 bool b_firstseg, bool b_lastseg,
skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8723be/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8723be/fw.c
@@ -584,6 +584,8 @@
 skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8723be/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8723be/hw.c
@@ -1124,7 +1124,8 @@
 skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8723ae/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8723ae/hw.c
@@ -470,6 +470,8 @@
 skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8723ae/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8723ae/fw.c
@@ -766,6 +766,8 @@
 skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
@@ -1700,6 +1700,7 @@
 if (oem_id == RT_CID_819X_LENOVO)
 break; 
 } 
+break;
case 0x1025:
rthal->oem_id = RT_CID_819X_ACER;
break;
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
@@ -676,6 +676,8 @@
 skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
@@ -746,6 +746,8 @@
 skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
@@ -680,7 +680,8 @@
 if (rtstatus == RTL_SUCCESS)
 {
  u1rsvdpageloc = sizeof(u1rsvdpageloc);
+break;

 rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
@@ -680,7 +680,8 @@
 if (rtstatus == RTL_SUCCESS)
 {
  u1rsvdpageloc = sizeof(u1rsvdpageloc);
+break;

 rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
@@ -684,6 +684,8 @@
 rtstatus = rtl_cmd_send_packet(hw, skb);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
@@ -676,6 +676,8 @@
 rtstatus = rtl_cmd_send_packet(hw, skb);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
@@ -680,7 +680,8 @@
 if (rtstatus == RTL_SUCCESS)
 {
  u1rsvdpageloc = sizeof(u1rsvdpageloc);
+break;

 rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
@@ -680,7 +680,8 @@
 if (rtstatus == RTL_SUCCESS)
 {
  u1rsvdpageloc = sizeof(u1rsvdpageloc);
+break;

 rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
@@ -684,6 +684,8 @@
 rtstatus = rtl_cmd_send_packet(hw, skb);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
@@ -676,6 +676,8 @@
 rtstatus = rtl_cmd_send_packet(hw, skb);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
@@ -680,7 +680,8 @@
 if (rtstatus == RTL_SUCCESS)
 {
  u1rsvdpageloc = sizeof(u1rsvdpageloc);
+break;

 rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/fw.c
@@ -680,7 +680,8 @@
 if (rtstatus == RTL_SUCCESS)
 {
  u1rsvdpageloc = sizeof(u1rsvdpageloc);
+break;

 rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8192ee/hw.c
@@ -684,6 +684,8 @@
 rtstatus = rtl_cmd_send_packet(hw, skb);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet, totalpacketlen);

/* Configuration Space offset 0x70f BIT7 is used to control LOS */
tmp8 = _rtl8723be_dbi_read(rtlpriv, 0x70f);
- _rtl8723be_dbi_write(rtlpriv, 0x70f, tmp8 | BIT(7));
+ _rtl8723be_dbi_write(rtlpriv, 0x70f, tmp8 | BIT(7) |
+ ASPM_L1_LATENCY << 3);

/* Configuration Space offset 0x719 Bit3 is for L1
 * BIT4 is for clock request
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8821ae/fw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8821ae/fw.c
@@ -1645,6 +1645,8 @@
 &reserved_page_packet_8812[0], totalpacketlen);

skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet_8812, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
@@ -1781,6 +1783,8 @@
 &reserved_page_packet_8821[0], totalpacketlen);

skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
skb_put_data(skb, &reserved_page_packet_8821, totalpacketlen);

rtstatus = rtl_cmd_send_packet(hw, skb);
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/rtl8821ae/hw.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/rtl8821ae/hw.c
@@ -1123,7 +1123,7 @@
 }
 if (0 == tmp) {
 read_addr = REG_DBI_RDATA + addr % 4;
- ret = rtl_read_word(rtlpriv, read_addr);
+ ret = rtl_read_byte(rtlpriv, read_addr);
 } return ret;
 }
@@ -1165,7 +1165,8 @@
 }

tmp = _rtl8821ae_dbi_read(rtlpriv, 0x70f);
- _rtl8821ae_dbi_write(rtlpriv, 0x70f, tmp | BIT(7));
+ _rtl8821ae_dbi_write(rtlpriv, 0x70f, tmp | BIT(7) |
+ ASPM_L1_LATENCY << 3);

tmp = _rtl8821ae_dbi_read(rtlpriv, 0x719);
- _rtl8821ae_dbi_write(rtlpriv, 0x719, tmp | BIT(3) | BIT(4));
-0xFF0F0404, 0xCDEF,
-0x034, 0x0004ADF3,
-0x034, 0x00049DF0,
-0xFF0F0200, 0xCDEF,
+0x90000210, 0x00000000, 0x40000000, 0x00000000,
 0x034, 0x0004ADF5,
 0x034, 0x00049DF2,
-0xFF0F02C0, 0xCDEF,
+0x9000020c, 0x00000000, 0x40000000, 0x00000000,
+0x034, 0x0004A0F3,
+0x034, 0x000490B1,
+0x90000404, 0x00000000, 0x40000000, 0x00000000,
 0x034, 0x0004A0F3,
 0x034, 0x000490B1,
-0xCDCDCDCD, 0xCDCD,
+0x90000200, 0x00000000, 0x40000000, 0x00000000,
+0x034, 0x0004ADF5,
+0x034, 0x00049DF2,
+0x90000410, 0x00000000, 0x40000000, 0x00000000,
+0x034, 0x0004ADF3,
+0x034, 0x00049DF0,
+0xA0000000, 0x00000000,
 0x034, 0x0004ADF7,
 0x034, 0x00049DF3,
-0xFF0F0104, 0xDEAD,
-0xFF0F0104, 0xABCD,
-0x034, 0x00048DED,
-0x034, 0x00047DEA,
-0x034, 0x00046DE7,
-0x034, 0x00045CE9,
-0x034, 0x00044CE6,
-0x034, 0x000438C6,
-0x034, 0x00042886,
-0x034, 0x00041486,
-0x034, 0x00040447,
-0xFF0F0204, 0xCDEF,
+0x80000000, 0x00000000,
+0x80000111, 0x00000000, 0x40000000, 0x00000000,
 0x034, 0x00048DED,
 0x034, 0x00047DEA,
 0x034, 0x00046DE7,
@@ -1475,7 +1475,7 @@
 0x034, 0x00042886,
 0x034, 0x00041486,
 0x034, 0x00040447,
-0xFF0F0404, 0xCDEF,
+0x90000110, 0x00000000, 0x40000000, 0x00000000,
 0x034, 0x00048DED,
0x034, 0x00047DEA,
0x034, 0x00046DE7,
@@ -1485,7 +1485,17 @@
0x034, 0x00042886,
0x034, 0x00041486,
0x034, 0x00040447,
-0xFF0F02C0, 0xCDEF,
++0x900002C0, 0x00000000,
++0x00000000,
++0x40000000,
++0x00000000,
++0x034, 0x000480AE,
++0x034, 0x000470AB,
++0x034, 0x0004608B,
++0x034, 0x00045069,
++0x034, 0x00044048,
++0x034, 0x00043045,
++0x034, 0x00042026,
++0x034, 0x00041023,
++0x034, 0x00040002,
++0x9000040c, 0x00000000,
++0x40000000,
++0x00000000,
@@ -1495,7 +1505,17 @@
0x034, 0x00042026,
0x034, 0x00041023,
0x034, 0x00040002,
-0xCDCDCDCD, 0xCDCD,
++0x90000410, 0x00000000,
++0x40000000,
++0x00000000,
++0x034, 0x00048DED,
++0x034, 0x00047DEA,
++0x034, 0x00046DE7,
++0x034, 0x00045CE9,
++0x034, 0x00044CE6,
++0x034, 0x000438C6,
++0x034, 0x00042886,
++0x034, 0x00041486,
++0x034, 0x00040447,
++0xA0000000, 0x00000000,
0x034, 0x00048DEF,
0x034, 0x00047DEC,
0x034, 0x00046DE9,
@@ -1505,38 +1525,36 @@
0x034, 0x0004248A,
0x034, 0x0004108D,
0x034, 0x0004008A,
-0xFF0F0104, 0xDEAD,
-0xFF0F0200, 0xABCD,
+0xB0000000, 0x00000000,
+0x80000210, 0x00000000,
+0x40000000, 0x00000000,
+0xB0000000,0x00000000,
+0x80000111,0x00000000,0x40000000,0x00000000,
0x034, 0x00028DF1,
0x034, 0x00027DEE,
0x034, 0x00026DEB,
@@ -1546,7 +1564,7 @@
0x034, 0x00022889,
0x034, 0x00021489,
0x034, 0x0002044A,
-0xFF0F0404, 0xCDEF,
+0x90000110,0x00000000,0x40000000,0x00000000,
0x034, 0x00028DF1,
0x034, 0x00027DEE,
0x034, 0x00026DEB,
@@ -1556,7 +1574,7 @@
0x034, 0x00022889,
0x034, 0x00021489,
0x034, 0x0002044A,
-0xFF0F02C0, 0xCDEF,
+0x9000020c,0x00000000,0x40000000,0x00000000,
0x034, 0x000280AF,
0x034, 0x000270AC,
0x034, 0x0002608B,
@@ -1566,7 +1584,27 @@
0x034, 0x00022026,
0x034, 0x00021023,
0x034, 0x00020002,
-0xCDCDCDCD, 0xCDCD,
+0x9000040c,0x00000000,0x40000000,0x00000000,
0x034, 0x000280AF,
+0x034, 0x000270AC,
+0x034, 0x0002608B,
+0x034, 0x00025069,
+0x034, 0x00024048,
+0x034, 0x00023045,
+0x034, 0x00022026,
+0x034, 0x00021023,
+0x034, 0x00020002,
+0x90000410,0x00000000,0x40000000,0x00000000,
+0x034, 0x00028DF1,
+0x034, 0x00027DEE,
+0x034, 0x00026DEB,
+0x034, 0x00025CEC,
+0x034, 0x00024CE9,
+0x034, 0x000238CA,
+0x034, 0x00022889,
+0x034, 0x00021489,
+0x034, 0x0002044A,
+0xA0000000,0x00000000,
0x034, 0x00028DEE,
0x034, 0x00027DEB,
0x034, 0x00026CCD,
@@ -1576,27 +1614,24 @@
0x034, 0x00022849,
0x034, 0x00021449,
0x034, 0x0002004D,
-0xFF0F0104, 0xDEAD,
-0xFF0F02C0, 0xABCD,
+0xB0000000,0x00000000,
+0x8000020c,0x00000000,0x40000000,0x00000000,
+0x34, 0x0000A0D7,
+0x34, 0x000090D3,
+0x34, 0x000080B1,
+0x34, 0x000070AE,
+0x9000040c,0x00000000,0x40000000,0x00000000,
0x34, 0x0000A0D7,
0x34, 0x000090D3,
0x34, 0x000080B1,
0x34, 0x000070AE,
-0xCDCDCDCD, 0xCDCD,
-0xFF0F0404, 0xCDEF,
+0xB0000000,0x00000000,
0x34, 0x00006DEB,
-0x034, 0x00006DEB,
-0x034, 0x00005CEC,
-0x034, 0x00004CE9,
-0x034, 0x000038CA,
-0x034, 0x00002889,
-0x034, 0x00001489,
-0x034, 0x0000044A,
-0xFF0F0240, 0xCDEF,
+0xB0000000,0x00000000,
+0x80000111,0x00000000,0x40000000,0x00000000,
0x34, 0x00006DEB,
0x34, 0x00005CEC,
0x34, 0x00004CE9,
@@ -1604,7 +1639,7 @@
0x34, 0x00002889,
0x34, 0x00001489,
0x34, 0x0000044A,
-0xFF0F0404, 0xCDEF,
+0x90000110,0x00000000,0x40000000,0x00000000,
-0xFF0F0104, 0xDEAD,
+0xB0000000,0x00000000,
0x0EF, 0x00000000,
0x0EF, 0x00000008,
-0xFF0F0104, 0xABCD,
+0x80000111,0x00000000,0x40000000,0x00000000,
0x03C, 0x000001C8,
0x03C, 0x00000492,
-0xFF0F0204, 0xCDEF,
+0x90000110,0x00000000,0x40000000,0x00000000,
0x03C, 0x000001C8,
0x03C, 0x00000492,
-0xFF0F0404, 0xCDEF,
+0x90000210,0x00000000,0x40000000,0x00000000,
+0x03C, 0x000001B6,
+0x03C, 0x00000492,
+0x9000040c,0x00000000,0x40000000,0x00000000,
+0x03C, 0x0000022A,
+0x03C, 0x00000594,
+0x90000020,0x00000000,0x40000000,0x00000000,
+0x03C, 0x000001B6,
+0x03C, 0x00000492,
+0x900000410,0x00000000,0x40000000,0x00000000,
0x03C, 0x000001C8,
0x03C, 0x00000492,
-0xCDCDCDCD, 0xCDCD,
+0xA0000000,0x00000000,
0x03C, 0x00000800,
-0xFF0F0104, 0xDEAD,
-0xFF0F0104, 0xABCD,
+0xB0000000,0x00000000,
0x0EF, 0x00000000,
0x0EF, 0x00000008,
-0xFF0F0204, 0xCDEF,
+0x90000110,0x00000000,0x40000000,0x00000000,
0x03C, 0x000001C8,
0x03C, 0x00000492,
-0xFF0F0204, 0xCDEF,
+0x90000210,0x00000000,0x40000000,0x00000000,
0x03C, 0x00000800,
-0xFF0F0404, 0xCDEF,
+0x90000210,0x00000000,0x40000000,0x00000000,
0x03C, 0x00000800,
-0xFF0F02C0, 0xCDEF,
+0x90000020c,0x00000000,0x40000000,0x00000000,
0x03C, 0x00000820,
-0xCDCDCDCD, 0xCDCD,
+0xA0000000,0x00000000,
0x03C, 0x00000800,
-0xCDCDCDCD, 0xCDCD,
+0x90000040c,0x00000000,0x40000000,0x00000000,
+0x065, 0x00093015,
+0x90000200,0x00000000,0x40000000,0x00000000,
+0x065, 0x00093016,
+0xA0000000,0x00000000,
0x018, 0x00000006,
0x0EF, 0x00002000,
0x03B, 0x0003824B,
@@ -1922,9 +2101,10 @@
0xB4, 0x0001214C,
0xB7, 0x0003000C,
0x01C, 0x000539D2,
+0x0C4, 0x000AFE00,
0x018, 0x0001F12A,
-0x0FE, 0x00000000,
-0x0FE, 0x00000000,
+0xFFE, 0x00000000,
+0xFFE, 0x00000000,
0x018, 0x0001712A,

};
@@ -2044,6 +2224,7 @@
u32 RTL8812AE_MAC_1T_ARRAYLEN = sizeof(RTL8812AE_MAC_REG_ARRAY) / sizeof(u32);

u32 RTL8821AE_MAC_REG_ARRAY[] = {
+0x421, 0x0000000F,
0x428, 0x0000000A,
0x429, 0x00000010,
0x430, 0x00000000,
@@ -2513,7 +2694,7 @@
0x81C, 0xA53A0001,
0x81C, 0xA4380001,
0x81C, 0xA3360001,
-0x81C, 0xA2340001,
+0x81C, 0x683C0001,
0x81C, 0x673E0001,
0x81C, 0x66400001,
0x81C, 0x65420001,
@@ -2547,7 +2728,66 @@
0x81C, 0x017A0001,
0x81C, 0x017C0001,
0x81C, 0x017E0001,
-0xFF0F02C0, 0xABCD,
+0x8000020c,0x00000000,0x40000000,0x00000000,
+0x81C, 0xFB000101,
+0x81C, 0xFA020101,
+0x81C, 0xF9040101,
+0x81C, 0xF8060101,
+0x81C, 0xF7080101,
+0x81C, 0xF60A0101,
+0x81C, 0xF50C0101,
+0x81C, 0xF40E0101,
+0x81C, 0xF3100101,
+0x81C, 0xF2120101,
+0x81C, 0xF1140101,
+0x81C, 0xF0160101,
+0x81C, 0xEE1A0101,
+0x81C, 0xEE1A0101,
+0x81C, 0xED1C0101,
+0x81C, 0xEC1E0101,
+0x81C, 0xEB200101,
+0x81C, 0xEA220101,
+0x81C, 0xE9240101,
+0x81C, 0xE8260101,
+0x81C, 0xE7280101,
+0x81C, 0xE62A0101,
+0x81C, 0xE52C0101,
+0x81C, 0xE42E0101,
+0x81C, 0xE3300101,
+0x81C, 0xE2320101,
+0x81C, 0xE1340101,
+0x81C, 0xEA360101,
+0x81C, 0xEB380101,
+0x81C, 0x863A0101,
+0x81C, 0x853C0101,
+0x81C, 0x843E0101,
+0x81C, 0x83400101,
+0x81C, 0x82420101,
+0x81C, 0x81440101,
+0x81C, 0x80460101,
+0x81C, 0x7F4E0101,
+0x81C, 0x7E4A0101,
+0x81C, 0x7D4C0101,
+0x81C, 0x055E0101,
+0x81C, 0x04600101,
+0x81C, 0x03620101,
+0x81C, 0x02640101,
+0x81C, 0x01660101,
+0x81C, 0x01680101,
+0x81C, 0x016A0101,
+0x81C, 0x016C0101,
+0x81C, 0x016E0101,
+0x81C, 0x01700101,
+0x81C, 0x01720101,
+0x9000040c, 0x00000000, 0x40000000, 0x00000000,
0x81C, 0xFB000101,
0x81C, 0xFA020101,
0x81C, 0xF9040101,
@@ -2606,7 +2846,7 @@
0x81C, 0x016E0101,
0x81C, 0x01700101,
0x81C, 0x01720101,
-0xCDCDCDCD, 0xCDCD,
+0xA0000000, 0x00000000,
0x81C, 0xFF000101,
0x81C, 0xFF020101,
0x81C, 0xFE040101,
@@ -2665,7 +2905,7 @@
0x81C, 0x016E0101,
0x81C, 0x016F0101,
0x81C, 0x01700101,
-0xFF0F02C0, 0xDEAD,
+0xB0000000, 0x00000000,
0x81C, 0x01740101,
0x81C, 0x01760101,
0x81C, 0x01780101,
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/usb.c
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/usb.c
@@ -739,8 +739,11 @@
usb_anchor_urb(urb, &rtlusb->rx_submitted);
err = usb_submit_urb(urb, GFP_KERNEL);
	-if (err)
+if (err) {
	+usb_unanchor_urb(urb);
	+usb_free_urb(urb);
	goto err_out;
+
	usb_free_urb(urb);
}
return 0;
@@ -910,10 +913,8 @@
WARN_ON(NULL == skb);
_urb = usb_alloc_urb(0, GFP_ATOMIC);
@if (!_urb) {
  kfree_skb(skb);
+  if (!_urb)
    return NULL;
-}
+  _rtl_install_trx_info(rtlusb, skb, ep_num);
usb_fill_bulk_urb(_urb, rtlusb->udev, usb_sndbulkpipe(rtlusb->udev,
    ep_num), skb->data, skb->len, _rtl_tx_complete, skb);
@@ -927,7 +928,6 @@
struct rtl_usb *rtlusb = rtl_usbdev(rtl_usbpriv(hw));
u32 ep_num;
struct urb * _urb = NULL;
-struct sk_buff * _skb = NULL;
if (unlikely(IS_USB_STOP(rtlusb))) {
@@ -936,8 +936,7 @@
  return;
}
  ep_num = rtlusb->ep_map.ep_mapping[qnum];
  _skb = skb;
- _urb = _rtl_usb_tx_urb_setup(hw, _skb, ep_num);
+ _urb = _rtl_usb_tx_urb_setup(hw, skb, ep_num);
  if (unlikely(!_urb)) {
    pr_err("Can't allocate urb. Drop skb\n");
    kfree_skb(skb);
@@ -1051,8 +1050,10 @@
rtlpriv->usb_data = kzalloc(RTL_USB_MAX_RX_COUNT * sizeof(u32),
    GFP_KERNEL);
- if (!rtlpriv->usb_data)
+ if (!rtlpriv->usb_data) {
+  ieee80211_free_hw(hw);
    return -ENOMEM;
+  }
/* this spin lock must be initialized early */
spin_lock_init(&rtlpriv->locks.usb_lock);
@@ -1082,13 +1083,13 @@
rtlpriv->cfg->ops->read_eeprom_info(hw);
err = _rtl_usb_init(hw);
 if (err)
   goto error_out;
+  goto error_out2;
rtl_usb_init_sw(hw);
/* Init mac80211 sw */
err = rtl_init_core(hw);
if (err) {
    pr_err("Can't allocate sw for mac80211\n");
    -		goto error_out;
+    goto error_out2;
}
if (rtlpriv->cfg->ops->init_sw_vars(hw)) {
    pr_err("Can't init_sw_vars\n");
error_out:
    rtl_deinit_core(hw);
    +error_out2:
    rtl_usb_io_handler_release(hw);
    usb_put_dev(udev);
    complete(&rtlpriv->firmware_loading_complete);
    +kfree(rtlpriv->usb_data);
    return -ENODEV;
    }
    EXPORT_SYMBOL(rtl_usb_probe);
    @@ -1133,7 +1136,7 @@
    ieee80211_unregister_hw(hw);
    rtlmac->mac80211_registered = 0;
    } else {
    -rtl_deinit_deferred_work(hw);
    +rtl_deinit_deferred_work(hw, false);
    rtlpriv->intf_ops->adapter_stop(hw);
    }
/*deinit rfkill */
--- linux-4.15.0.orig/drivers/net/wireless/realtek/rtlwifi/wifi.h
+++ linux-4.15.0/drivers/net/wireless/realtek/rtlwifi/wifi.h
@@ -99,6 +99,7 @@
#define RTL_USB_MAX_RX_COUNT 100
#define QBSS_LOAD_SIZE 5
#define MAX_WMMELE_LENGTH 64
+#define ASPM_L1_LATENCY 7

#define TOTAL_CAM_ENTRY 32

@@ -2550,6 +2551,7 @@
struct rtl_btc_ops {
    void (*btc_init_variables) (struct rtl_priv *rtlpriv);
    void (*btc_init_hal_vars) (struct rtl_priv *rtlpriv);
+    void (*btc_power_on_setting)(struct rtl_priv *rtlpriv);
    void (*btc_init_hw_config) (struct rtl_priv *rtlpriv);
    void (*btc_ips_notify) (struct rtl_priv *rtlpriv, u8 type);
    void (*btc_lps_notify)(struct rtl_priv *rtlpriv, u8 type);
--- linux-4.15.0.orig/drivers/net/wireless/rndis_wlan.c
+++ linux-4.15.0/drivers/net/wireless/rndis_wlan.c
@@ -2928,6 +2928,8 @@
 while (buflen >= sizeof(*auth_req)) {
     auth_req = (void *)buf;
     if (buflen < le32_to_cpu(auth_req->length))
+			return;
     type = "unknown";
     flags = le32_to_cpu(auth_req->flags);
     pairwise_error = false;
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_91x_hal.c
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_91x_hal.c
@@ -196,7 +196,7 @@
     wh->frame_control |= cpu_to_le16(RSI_SET_PS_ENABLE);
 
 if (!((info->flags & IEEE80211_TX_INTFL_DONT_ENCRYPT)) &&
-    (common->secinfo.security_enable)) {
+    (info->control.hw_key) {
     if (rsi_is_cipher_wep(common))
         ieee80211_size += 4;
     else
@@ -403,9 +403,9 @@
     if (common->band == NL80211_BAND_2GHZ)
         -bcn_frm->bbp_info |= cpu_to_le16(RSI_RATE_1);
         +bcn_frm->rate_info |= cpu_to_le16(RSI_RATE_1);
     else
         -bcn_frm->bbp_info |= cpu_to_le16(RSI_RATE_6);
         +bcn_frm->rate_info |= cpu_to_le16(RSI_RATE_6);
 
 if (mac_bcn->data[tim_offset + 2] == 0)
     bcn_frm->frame_info |= cpu_to_le16(RSI_DATA_DESC_DTIM_BEACON);
@@ -556,6 +556,7 @@
     bl_start_cmd_timer(adapter, timeout);
     status = bl_write_cmd(adapter, cmd, exp_resp, &regout_val);
     if (status < 0) {
         +bl_stop_cmd_timer(adapter);
         rsi_dbg(ERR_ZONE,
             "%s: Command %s (%0x) writing failed.
              __func__, str, cmd);
@@ -572,28 +573,32 @@
             u32 content_size)
             { struct rsi_host_intf_ops *hif_ops = adapter->host_intf_ops;
                   -struct bl_header bl_hdr;
                   +struct bl_header *bl_hdr;
u32 write_addr, write_len;
int status;

-bl_hdr.flags = 0;
-bl_hdr.image_no = cpu_to_le32(adapter->priv->coex_mode);
-bl_hdr.check_sum = cpu_to_le32(*(u32 *)&flash_content[CHECK_SUM_OFFSET]);
-bl_hdr.flash_start_address = cpu_to_le32(*(u32 *)&flash_content[ADDR_OFFSET]);
-bl_hdr.flash_len = cpu_to_le32(*(u32 *)&flash_content[LEN_OFFSET]);
+bl_hdr = kzalloc(sizeof(*bl_hdr), GFP_KERNEL);
+if (!bl_hdr)
+return -ENOMEM;
+
+bl_hdr->flags = 0;
+bl_hdr->image_no = cpu_to_le32(adapter->priv->coex_mode);
+bl_hdr->check_sum =
+cpu_to_le32(*(u32 *)&flash_content[CHECK_SUM_OFFSET]);
+bl_hdr->flash_start_address =
+cpu_to_le32(*(u32 *)&flash_content[ADDR_OFFSET]);
+bl_hdr->flash_len = cpu_to_le32(*(u32 *)&flash_content[LEN_OFFSET]);
+write_len = sizeof(struct bl_header);

write_addr = PING_BUFFER_ADDRESS;
status = hif_ops->write_reg_multiple(adapter, write_addr,
- (u8 *)&bl_hdr, write_len);
+ (u8 *)&bl_hdr, write_len);
+if (status < 0) {
 rsi_dbg(ERR_ZONE,
 "%s: Failed to load Version/CRC structure\n",
 __func__);  
-return status;
+goto fail;
}  
} else {
write_addr = PING_BUFFER_ADDRESS >> 16;
@@ -602,20 +607,23 @@
 rsi_dbg(ERR_ZONE,
 "%s: Unable to set ms word to common reg\n",
 __func__);  
-return status;
+goto fail;
}
} else {
write_addr = RSI_SD_REQUEST_MASTER |

(PING_BUFFER_ADDRESS & 0xFFFF);
status = hif_ops->write_reg_multiple(adapter, write_addr,
- (u8 *)&bl_hdr, write_len);
+ (u8 *)&bl_hdr, write_len);
if (status < 0) {
    rsi_dbg(ERR_ZONE, "Failed to load Version/CRC structure", __func__);  
    return status;
}

status = bl_cmd(adapter, cmd_req, cmd_resp, str);
@if (status) {
    bl_stop_cmd_timer(adapter);
+if (status)
    return status;
-}
+
    rsi_dbg(INFO_ZONE, "FW loading is done and FW is running.");
    return 0;
}

status = bl_cmd(adapter, EOF_REACHED, FW>Loading_SUCCESSFUL, "EOF_REACHED");
@if (status) {
    bl_stop_cmd_timer(adapter);
+if (status)
    return status;
-}
+
    rsi_dbg(INFO_ZONE, "FW loading is done and FW is running.");
    return 0;
}

status = hif_ops->master_reg_read(adapter, SWBL_REGOUT, &regout_val, 2);
if (status < 0) {
+bl_stop_cmd_timer(adapter);
rsi_dbg(ERR_ZONE,
"%s: REGOUT read failed\n", __func__);
return status;
--- linux-4.15.0.org/drivers/net/wireless/rsi/rsi_91x_mac80211.c
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_91x_mac80211.c
@@ -188,27 +188,27 @@
* @adapter: Pointer to the adapter structure.
* @band: Operating band to be set.
* 
- * Return: None.
+ * Return: int - 0 on success, negative error on failure.
 */
-static void rsi_register_rates_channels(struct rsi_hw *adapter, int band)
+static int rsi_register_rates_channels(struct rsi_hw *adapter, int band)
{ struct ieee80211_supported_band *sbands = &adapter->sbands[band];
    void *channels = NULL;

    if (band == NL80211_BAND_2GHZ) {
-     channels = kmalloc(sizeof(rsi_2ghz_channels), GFP_KERNEL);
-     memcpy(channels,
-            rsi_2ghz_channels,
-            sizeof(rsi_2ghz_channels));
+     channels = kmemdup(rsi_2ghz_channels, sizeof(rsi_2ghz_channels),
+                        GFP_KERNEL);
+     if (!channels)
+         return -ENOMEM;
     sbands->band = NL80211_BAND_2GHZ;
     sbands->n_channels = ARRAY_SIZE(rsi_2ghz_channels);
     sbands->bitrates = rsi_rates;
     sbands->n_bitrates = ARRAY_SIZE(rsi_rates);
    } else {
-     channels = kmalloc(sizeof(rsi_5ghz_channels), GFP_KERNEL);
-     memcpy(channels,
-            rsi_5ghz_channels,
-            sizeof(rsi_5ghz_channels));
+     channels = kmemdup(rsi_5ghz_channels, sizeof(rsi_5ghz_channels),
+                        GFP_KERNEL);
+     if (!channels)
+         return -ENOMEM;
+     sbands->band = NL80211_BAND_5GHZ;
+     sbands->n_channels = ARRAY_SIZE(rsi_5ghz_channels);
+     sbands->bitrates = &rsi_rates[4];
+     sbands->ht_cap.mcs.rx_mask[0] = 0xff;
+     sbands->ht_cap.mcs.tx_params = IEEE80211_HT_MCS_TX_DEFINED;
/* sbands->ht_cap.mcs.rx_highest = 0x82; */
+     return 0;
/**
@@ -245,6 +246,7 @@
 ieee80211_stop_queues(hw);
 ieee80211_unregister_hw(hw);
 ieee80211_free_hw(hw);
+   adapter->hw = NULL;
 }

 for (band = 0; band < NUM_NL80211_BANDS; band++) {
+   @ @ -940,7 +942,6 @@
 mutex_lock(&common->mutex);
 switch (cmd) {
 case SET_KEY:
-   @ @ -940,7 +942,6 @@
secinfo->security_enable = true;
 status = rsi_hal_key_config(hw, vif, key, sta);
 if (status) {
 mutex_unlock(&common->mutex);
+   @ @ -959,8 +960,6 @@
 break;

 case DISABLE_KEY:
-   if (vif->type == NL80211_IFTYPE_STATION)
-      secinfo->security_enable = false;
 rsi_dbg(ERR_ZONE, "%s: RSI del key\n", __func__);
 memset(key, 0, sizeof(struct ieee80211_key_conf));
 status = rsi_hal_key_config(hw, vif, key, sta);
@@ -959,8 +960,6 @@
 break;

 struct rsi_common *common = adapter->priv;
 u16 triggers = 0;
 u16 rx_filter_word = 0;
-   struct ieee80211_bss_conf *bss = &adapter->vifs[0]->bss_conf;
+   struct ieee80211_bss_conf *bss = NULL;
 if (WARN_ON(!wowlan)) {
 rsi_dbg(ERR_ZONE, "WoW triggers not enabled\n");
 return -EINVAL;
@@ -1940,8 +1944,12 @@
hw->uapsd_max_sp_len = IEEE80211_WMM_IE_STA_QOSINFO_SP_ALL;

+if (!adapter->vifs[0])
+   return -EINVAL;
+   bss = &adapter->vifs[0]->bss_conf;
+   if (WARN_ON(!wowlan)) {
 rsi_dbg(ERR_ZONE, "WoW triggers not enabled\n");
 return -EINVAL;
@@ -1940,8 +1944,12 @@
hw->uapsd_max_sp_len = IEEE80211_WMM_IE_STA_QOSINFO_SP_ALL;

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hw->max_tx_aggregation_subframes = 6;
-rsi_register_rates_channels(adapter, NL80211_BAND_2GHZ);
-rsi_register_rates_channels(adapter, NL80211_BAND_5GHZ);
+status = rsi_register_rates_channels(adapter, NL80211_BAND_2GHZ);
+if (status)
+return status;
+status = rsi_register_rates_channels(adapter, NL80211_BAND_5GHZ);
+if (status)
+return status;
hw->rate_control_algorithm = "AARF";

SET_IEEE80211_PERM_ADDR(hw, common->mac_addr);
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_91x_mgmt.c
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_91x_mgmt.c
@@ -1588,6 +1588,7 @@
 skb_pull(skb, (64 - dword_align_bytes));
 if (rsi_prepare_beacon(common, skb)) {
     rsi_dbg(ERR_ZONE, "Failed to prepare beacon\n");
+    dev_kfree_skb(skb);
     return -EINVAL;
 }
 skb_queue_tail(&common->tx_queue[MGMT_BEACON_Q], skb);
@@ -1619,8 +1620,7 @@
cmd_frame->desc.desc_dword0.frame_type = WOWLAN_CONFIG_PARAMS;
 -if (common->secinfo.security_enable &&
 -    common->secinfo.gtk_cipher)
+    if (common->secinfo.gtk_cipher)
     flags |= RSI_WOW_GTK_REKEY;
 if (sleep_status)
     cmd_frame->wow_flags = flags;
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_91x_sdio.c
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_91x_sdio.c
@@ -161,7 +161,6 @@
 int err;
 struct mmc_card *card = pfunction->card;
 struct mmc_host *host = card->host;
-    s32 bit = (fls(host->ocr_avail) - 1);
    u8 cmd52_resp;
    u32 clock, resp, i;
    u16 rca;
@@ -181,7 +180,6 @@
    flags |= RSI_WOW_GTK_REKEY;
    if (sleep_status)
        cmd_frame->wow_flags = flags;
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_91x_sdio.c
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_91x_sdio.c
@@ -1619,8 +1620,7 @@
    if (sleep_status)
        cmd_frame->wow_flags = flags;
    if (sleep_status)
/* Initialize the SDIO card */
-host->ios.vdd = bit;
-host->ios.chip_select = MMC_CS_DONTCARE;
host->ios.bus_mode = MMC_BUSMODE_OPENDRAIN;
host->ios.power_mode = MMC_POWER_UP;
@@ -636,11 +634,14 @@
    u32 *read_buf, u16 size)
{
    u32 addr_on_bus, *data;
-u32 align[2] = {};
    u16 ms_addr;
    int status;

-data = PTR_ALIGN(&align[0], 8);
+data = kzalloc(RSI_MASTER_REG_BUF_SIZE, GFP_KERNEL);
+if (!data)
+    return -ENOMEM;
+data = PTR_ALIGN(data, 8);

    ms_addr = (addr >> 16);
    status = rsi_sdio_master_access_msword(adapter, ms_addr);
@@ -648,7 +649,7 @@
    rsi_dbg(ERR_ZONE, "%s: Unable to set ms word to common reg\n", __func__);
    -return status;
    +goto err;

    addr &= 0xFFFF;
@@ -666,7 +667,7 @@
     (u8 *)data, 4);
    if (status < 0) {
        rsi_dbg(ERR_ZONE, "%s: AHB register read failed\n", __func__);
    -return status;
    +goto err;
    }
    if (size == 2) {
        if ((addr & 0x3) == 0)
@@ -688,17 +689,23 @@
            *read_buf = *data;
        }

    -return 0;
    +err:
    +kfree(data);
    +return status;
}

static int rsi_sdio_master_reg_write(struct rsi_hw *adapter,
unsigned long addr,
    unsigned long data, u16 size)
{
    unsigned long data1[2], *data_aligned;
    int status;

    data_aligned = PTR_ALIGN(&data1[0], 8);
    *data_aligned = ((data << 16) | (data & 0xFFFF));
    rsi_dbg(ERR_ZONE, "%s: Unable to set ms word to common reg\n", __func__);  
    return -EIO;
}

addr = addr & 0xFFFF;
(rsio_interrupt_status = 0);
(adapter, (addr | RSI_SD_REQUEST_MASTER), (u8 *)data_aligned, size);
-rsi_dbg(ERR_ZONE, "%s: Unable to do AHB reg write\n", __func__);  
-return status;
-}
=return 0;
+/kfree(data_aligned);
+return status;
}
u8 request = 1;
int ret;

+data = kzalloc(sizeof(u32), GFP_KERNEL);
+if (!data)
+return;
+
rsi_dbg(INFO_ZONE, "Writing disable to wakeup register\n");
ret = rsi_sdio_write_register(adapter, 0, SDIO_WAKEUP_REG, &request);
if (ret < 0) {
    rsi_dbg(ERR_ZONE, "%s: Failed to write SDIO wakeup register\n", __func__);
    return;
}
+goto err;

msleep(20);
ret = rsi_sdio_read_register(adapter, RSI_FN1_INT_REGISTER,
@@ -1007,7 +1019,7 @@
if (ret < 0) {
    rsi_dbg(ERR_ZONE, "%s: Failed to Read Intr Status Register\n", __func__);
    return;
    +goto err;
}

rsi_dbg(INFO_ZONE, "%s: Intr Status Register value = %d\n", __func__, sdio_interrupt_status);
@@ -1017,17 +1029,17 @@
rsi_dbg(ERR_ZONE, "%s: Unable to set ms word to common reg\n", __func__);
    return;
    +goto err;
}

-data = TA_HOLD_THREAD_VALUE;
+put_unaligned_le32(TA_HOLD_THREAD_VALUE, data);
if (rsi_sdio_write_register_multiple(adapter, TA_HOLD_THREAD_REG |
    RSI_SD_REQUEST_MASTER,
    (u8 *)&data, 4)) {
    rsi_dbg(ERR_ZONE, "%s: Unable to hold Thread-Arch processor threads\n", __func__);
    return;
    +goto err;
}

/* This msleep will ensure Thread-Arch processor to go to hold
@@ -1048,6 +1060,9 @@
 * read write operations to complete for chip reset.
 */
 msleep(500);
+err:
+kfree(data);
+return;
}

/**
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_91x_usb.c
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_91x_usb.c
@@ -105,7 +105,7 @@
 __le16 buffer_size;
 int ii, bep_found = 0;

-iface_desc = &(interface->altsetting[0]);
+iface_desc = interface->cur_altsetting:

 for (ii = 0; ii < iface_desc->desc.bNumEndpoints; ++ii) {
   endpoint = &(iface_desc->endpoint[ii].desc);
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_common.h
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_common.h
@@ -74,7 +74,6 @@
 atomic_inc(&handle->thread_done);
 rsi_set_event(&handle->event);

-wait_for_completion(&handle->completion);
 return kthread_stop(handle->task);
 }

--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_sdio.h
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_sdio.h
@@ -46,6 +46,8 @@
#define PKT_BUFF_AVAILABLE                      1
#define FW_ASSERT_IND                           2
+#define RSI_MASTER_REG_BUF_SIZE	12

struct security_info {
-bool security_enable;
 u32 ptk_cipher;
 u32 gtk_cipher;
};
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_main.h
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_main.h
@@ -149,7 +149,6 @@
};

struct security_info {
-bool security_enable;
 u32 ptk_cipher;
 u32 gtk_cipher;
};
--- linux-4.15.0.orig/drivers/net/wireless/rsi/rsi_sdio.h
+++ linux-4.15.0/drivers/net/wireless/rsi/rsi_sdio.h
@@ -46,6 +46,8 @@
#define PKT_BUFF_AVAILABLE                      1
#define FW_ASSERT_IND                           2
+#define RSI_MASTER_REG_BUF_SIZE12

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#define RSI_DEVICE_BUFFER_STATUS_REGISTER 0xf3
#define RSI_FN1_INT_REGISTER 0xf9
#define RSI_INT_ENABLE_REGISTER 0x04
#define TA_SOFT_RST_CLR 0
#define TA_SOFT_RST_SET BIT(0)
#define TA_PC_ZERO 0
#define TA_HOLD_THREAD_VALUE cpu_to_le32(0xF)
#define TA_RELEASE_THREAD_VALUE cpu_to_le32(0xF)
#define TA_BASE_ADDR 0x2200
#define MISC_CFG_BASE_ADDR 0x4105

--- linux-4.15.0.orig/drivers/net/wireless/st/cw1200/cw1200_sdio.c
+++ linux-4.15.0/drivers/net/wireless/st/cw1200/cw1200_sdio.c
@@ -63,6 +63,7 @@
 { SDIO_DEVICE(SDIO_VENDOR_ID_STE, SDIO_DEVICE_ID_STE_CW1200) },
 { /* end: all zeroes */			},
};
+MODULE_DEVICE_TABLE(sdio, cw1200_sdio_ids);

/* hwbus_ops implementatation */

--- linux-4.15.0.orig/drivers/net/wireless/st/cw1200/fwio.c
+++ linux-4.15.0/drivers/net/wireless/st/cw1200/fwio.c
@@ -323,12 +323,12 @@
 goto out;
 }

-priv->hw_type = cw1200_get_hw_type(val32, &major_revision);
-if (priv->hw_type < 0) {
+ret = cw1200_get_hw_type(val32, &major_revision);
+if (ret < 0) {
 pr_err("Can't deduce hardware type.\n");
-rett = -ENOTSUPP;
-goto out;
 }
+priv->hw_type = ret;

 /* Set DPLL Reg value, and read back to confirm writes work */
 ret = cw1200_reg_write_32(priv, ST90TDS_TSET_GEN_R_W_REG_ID,
 --- linux-4.15.0.orig/drivers/net/wireless/st/cw1200/main.c
+++ linux-4.15.0/drivers/net/wireless/st/cw1200/main.c
@@ -345,6 +345,11 @@
 mutex_init(&priv->wsm_cmd_mux);
 mutex_init(&priv->conf_mutex);
 priv->workqueue = create_singlethread_workqueue("cw1200_wq");
+if (!priv->workqueue) {

+ieee80211_free_hw(hw);
+return NULL;
+
+sema_init(&priv->scan.lock, 1);
+INIT_WORK(&priv->scan.work, cw1200_scan_work);
+INIT_DELAYED_WORK(&priv->scan.probe_work, cw1200_probe_work);
@@ -379,6 +384,7 @@
     CW1200_LINK_ID_MAX,
     cw1200_skb_dtor,
     priv)) {
+  destroy_workqueue(priv->workqueue);
  ieee80211_free_hw(hw);
  return NULL;
  }
@@ -390,6 +396,7 @@
 for (; i > 0; i--) {
    cw1200_queue_deinit(&priv->tx_queue[i - 1]);
    cw1200_queue_stats_deinit(&priv->tx_queue_stats);
+  destroy_workqueue(priv->workqueue);
    ieee80211_free_hw(hw);
  return NULL;
  }
--- linux-4.15.0.orig/drivers/net/wireless/st/cw1200/scan.c
+++ linux-4.15.0/drivers/net/wireless/st/cw1200/scan.c
@@ -78,27 +78,30 @@
if (req->n_ssids > WSM_SCAN_MAX_NUM_OF_SSIDS)
    return -EINVAL;
+/* will be unlocked in cw1200_scan_work() */
+down(&priv->scan.lock);
+mutex_lock(&priv->conf_mutex);
+
+frame skb = ieee80211 probereq_get(hw, priv->vif->addr, NULL, 0,
 req->ie_len);
-if (!frame skb)
+if (!frame skb) { 
  +mutex_unlock(&priv->conf_mutex);
  +up(&priv->scan.lock);
  return -ENOMEM;
+}  

if (req->ie_len)
  skb_put_data(frame skb, req->ie, req->ie_len);

-/* will be unlocked in cw1200_scan_work() */
- down(&priv-> scan.lock);
- mutex_lock(&priv->conf_mutex);
ret = wsm_set_template_frame(priv, &frame);
if (!ret) {
    /* Host want to be the probe responder. */
    ret = wsm_set_probe_responder(priv, true);
}
if (ret) {
    dev_kfree_skb(frame.skb);
    mutex_unlock(&priv->conf_mutex);
    up(&priv->scan.lock);
    dev_kfree_skb(frame.skb);
    return ret;
}
++priv->scan.n_ssids;
-
mutex_unlock(&priv->conf_mutex);
-
if (frame.skb)
    dev_kfree_skb(frame.skb);
+mutex_unlock(&priv->conf_mutex);
queue_work(priv->workqueue, &priv->scan.work);
return 0;
}
--- linux-4.15.0.orig/drivers/net/wireless/ti/wl1251/cmd.c
+++ linux-4.15.0/drivers/net/wireless/ti/wl1251/cmd.c
@@ -466,9 +466,12 @@
    cmd->channels[i].channel = channels[i]->hw_value;
}
-cmd->params.ssid_len = ssid_len;
-if (ssid)
    -memcpy(cmd->params.ssid, ssid, ssid_len);
+if (ssid) {
+    int len = clamp_val(ssid_len, 0, IEEE80211_MAX_SSID_LEN);
+    cmd->params.ssid_len = len;
+    memcpy(cmd->params.ssid, ssid, len);
+}
ret = wl1251_cmd_send(wl, CMD_SCAN, cmd, sizeof(*cmd));
if (ret < 0) {
    --- linux-4.15.0.orig/drivers/net/wireless/ti/wl1251/event.c
+++ linux-4.15.0/drivers/net/wireless/ti/wl1251/event.c
@@ -84,7 +84,7 @@
    break;
static void wl1251_event_mbox_dump(struct event_mailbox *mbox)
{
    return 0;
    +return ret;
}

--- linux-4.15.0.orig/drivers/net/wireless/ti/wl1251/main.c
+++ linux-4.15.0/drivers/net/wireless/ti/wl1251/main.c
@@ -1200,8 +1200,7 @@
         WARN_ON(wl->bss_type != BSS_TYPE_STA_BSS);

         enable = bss_conf->arp_addr_cnt == 1 && bss_conf->assoc;
-        -wl1251_acx_arp_ip_filter(wl, enable, addr);
-        +ret = wl1251_acx_arp_ip_filter(wl, enable, addr);
         if (ret < 0)
             goto out_sleep;
}
--- linux-4.15.0.orig/drivers/net/wireless/ti/wl12xx/main.c
+++ linux-4.15.0/drivers/net/wireless/ti/wl12xx/main.c
@@ -648,7 +648,6 @@
         wl->quirks |= WLCORE_QUIRK_LEGACY_NVS |
             WLCORE_QUIRK_DUAL_PROBE_TMPL |
             WLCORE_QUIRK_TKIP_HEADER_SPACE |
-        - WLCORE_QUIRK_START_STA_FAILS |
         WLCORE_QUIRK_AP_ZERO_SESSION_ID;
         wl->sr_fw_name = WL127X_FW_NAME_SINGLE;
         wl->mr_fw_name = WL127X_FW_NAME_MULTI;
@@ -672,7 +671,6 @@
         wl->quirks |= WLCORE_QUIRK_LEGACY_NVS |
             WLCORE_QUIRK_DUAL_PROBE_TMPL |
             WLCORE_QUIRK_TKIP_HEADER_SPACE |
-        - WLCORE_QUIRK_START_STA_FAILS |
         WLCORE_QUIRK_AP_ZERO_SESSION_ID;
         wl->plt_fw_name = WL127X_PLT_FW_NAME;
         wl->sr_fw_name = WL127X_FW_NAME_SINGLE;
@@ -701,7 +699,6 @@
         wl->quirks |= WLCORE_QUIRK_TX_BLOCKSIZE_ALIGN |
             WLCORE_QUIRK_DUAL_PROBE_TMPL |
             WLCORE_QUIRK_TKIP_HEADER_SPACE |
-        - WLCORE_QUIRK_START_STA_FAILS |
         WLCORE_QUIRK_AP_ZERO_SESSION_ID;

         wlcore_set_min_fw_ver(wl, WL128X_CHIP_VER,
@@ -1519,6 +1516,13 @@
         u32 mac1, mac2;
         int ret;
+/* Device may be in ELP from the bootloader or kexec */
+ret = wlcore_write32(wl, WL12XX_WELP_ARM_COMMAND, WELP_ARM_COMMAND_VAL);
+if (ret < 0)
+goto out;
+
+usleep_range(500000, 700000);
+
+ret = wlcore_set_partition(wl, &wl->ptable[PART_DRPW]);
+if (ret < 0)
+goto out;

--- linux-4.15.0.orig/drivers/net/wireless/ti/wlcore/main.c
+++ linux-4.15.0/drivers/net/wireless/ti/wlcore/main.c
@@ -1058,8 +1058,11 @@
 goto out;
 ret = wl12xx_fetch_firmware(wl, plt);
 -if (ret < 0)
-goto out;
+if (ret < 0) {
+kfree(wl->fw_status);
+kfree(wl->raw_fw_status);
+kfree(wl->tx_res_if);
+
+}

out:
return ret;
@@ -2828,21 +2831,8 @@

if (is_ibss)
 ret = wl12xx_cmd_role_start_ibss(wl, wlvif);
 -else {
- -if (wl->quirks & WLCORE_QUIRK_START_STA_FAILS) {
- -/*
- - * TODO: this is an ugly workaround for wl12xx fw
- - * bug - we are not able to tx/rx after the first
- - * start_sta, so make dummy start+stop calls,
- - * and then call start_sta again.
- - * this should be fixed in the fw.
- - */
- -wl12xx_cmd_role_start_sta(wl, wlvif);
- -wl12xx_cmd_role_stop_sta(wl, wlvif);
- -}
- -
- +else
- ret = wl12xx_cmd_role_start_sta(wl, wlvif);
- -}
static void wl1271_rx_status(struct wl1271 *wl, 
    struct wl1271_rx_descriptor *desc, 
    struct ieee80211_rx_status *status, 
    u8 beacon, u8 probe_rsp)
{
    memset(status, 0, sizeof(struct ieee80211_rx_status));

    if (beacon || probe_rsp)
        status->boottime_ns = ktime_get_boot_ns();
    if (beacon)
        wlcore_set_pending_regdomain_ch(wl, (u16)desc->channel, 
            status->band);
    if (ieee80211_is_data_present(hdr->frame_control))
        is_data = 1;

    seq_num = (le16_to_cpu(hdr->seq_ctrl) & IEEE80211_SCTL_SEQ) >> 4;

    if (!wl) {
        dev_err(dev, "no wilink module was probed\n");
        goto out;
    }

    dev_dbg(dev, "wl1271 suspend. wow_enabled: %d\n", 
            wl->wow_enabled);

    seq_num = (le16_to_cpu(hdr->seq_ctrl) & IEEE80211_SCTL_SEQ) >> 4;

    if (!wl) {
        dev_err(dev, "no wilink module was probed\n");
        goto out;
    }

    dev_dbg(dev, "wl1271 suspend. wow_enabled: %d\n", 
            wl->wow_enabled);
+++ linux-4.15.0/drivers/net/wireless/ti/wlcore/tx.c
@@ -24,6 +24,7 @@
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/etherdevice.h>
+#include <linux/pm_runtime.h>
#include <linux/spinlock.h>
#include "wlcore.h"
@@ -876,6 +877,7 @@
ret = wlcore_tx_work_locked(wl);
if (ret < 0) {
+    pm_runtime_put_noidle(wl->dev);
    w112xx_queue_recovery_work(wl);
go to out;
}
--- linux-4.15.0.orig/drivers/net/wireless/ti/wlcore/vendor_cmd.c
+++ linux-4.15.0/drivers/net/wireless/ti/wlcore/vendor_cmd.c
@@ -66,7 +66,7 @@
   out:
   mutex_unlock(&wl->mutex);

-return 0;
+return ret;
}

static int
--- linux-4.15.0.orig/drivers/net/wireless/ti/wlcore/wlcore.h
+++ linux-4.15.0/drivers/net/wireless/ti/wlcore/wlcore.h
@@ -560,9 +560,6 @@
/* Each RX/TX transaction requires an end-of-transaction transfer */
#define WLCORE_QUIRK_END_OF_TRANSACTION BIT(0)
-/* the first start_role(sta) sometimes doesn't work on w112xx */
-#define WLCORE_QUIRK_START_STA_FAILS BIT(1)
-
/* w1127x and SPI don't support SDIO block size alignment */
#define WLCORE_QUIRK_TX_BLOCKSIZE_ALIGN BIT(2)
--- linux-4.15.0.orig/drivers/net/wireless/wl3501.h
+++ linux-4.15.0/drivers/net/wireless/wl3501.h
@@ -379,16 +379,7 @@
   mib_value[100];
};

-struct wl3501_join_req {
-   u16			    next_blk;

-u8    sig_id;
-u8    reserved;
-struct iw_mgmt_data_rset    operational_rset;
-u16   reserved2;
-u16   timeout;
-u16   probe_delay;
-u8    timestamp[8];
-u8    local_time[8];
+struct w3501_req {
  u16   beacon_period;
  u16   dtim_period;
  u16   cap_info;
  struct iw_mgmt_data_rset    bss_basic_rset;
};

+struct w3501_join_req {
  +u16   next_blk;
  +u8    sig_id;
  +u8    reserved;
  +struct iw_mgmt_data_rset    operational_rset;
  +u16   reserved2;
  +u16   timeout;
  +u16   probe_delay;
  +u8    timestamp[8];
  +u8    local_time[8];
  +struct w3501_req    req;
};
+
struct w3501_join_confirm {
  u16   next_blk;
  u8    sig_id;
  struct iw_mgmt_data_rset    bss_basic_rset;
  u16   status;
  char   timestamp[8];
  char   localtime[8];
  -u16   beacon_period;
  -u16   dtim_period;
  -u16   cap_info;
  -u8    bss_type;
  -u8    bssid[ETH_ALEN];
  -struct iw_mgmt_essid_pset   ssid;
  -struct iw_mgmt_ds_pset    ds_pset;
  -struct iw_mgmt_cf_pset    cf_pset;
  -struct iw_mgmt_ibss_pset   ibss_pset;
  -struct iw_mgmt_data_rset    bss_basic_rset;
  +struct w3501_req    req;
  u8    rssi;

-392.19 @ @
struct wl3501_md_ind {
    u8 reception;
    u8 pri;
    u8 service_class;
    u8 daddr[ETH_ALEN];
    u8 saddr[ETH_ALEN];
    struct {
        u8 daddr[ETH_ALEN];
        u8 saddr[ETH_ALEN];
    } addr;
};

struct wl3501_md_confirm {
    ...linux-4.15.0.orig/drivers/net/wireless/wl3501_cs.c
    struct wl3501_md_req sig = {
        .sig_id = WL3501_SIG_MD_REQ,
    };
    int rc = -EIO;
}

goto out;}

rc = 0;
-memcpy(&sig.daddr[0], pdata, 12);
-pktlen = len - 12;
-pdata += 12;
+memcpy(&sig.addr, pdata, sig_addr_len);
+pktlen = len - sig_addr_len;
+pdata += sig_addr_len;
sig.data = bf;
if (((*pdata) * 256 + (*(pdata + 1))) > 1500) {
    u8 addr4[ETH_ALEN] = { 
        @ @ -588,7 +589,7 @ @ 
    struct wl3501_join_req sig = {
        .sig_id = WL3501_SIG_JOIN_REQ,
        .timeout = 10,
        .ds_pset = {
            +.req.ds_pset = {
                .el = {
                    .id = IW_MGMT_INFO_ELEMENT_DS_PARAMETER_SET,
                    .len = 1,
                    @ @ -597,7 +598,7 @ @ 
                },
            }
        }
        .memcpy(&sig.beacon_period, &this->bss_set[stas].beacon_period, 72);
        +memcpy(&sig.req, &this->bss_set[stas].req, sizeof(sig.req));
        return wl3501_esbq_exec(this, &sig, sizeof(sig));
    }
}

if (sig.status == WL3501_STATUS_SUCCESS) {
    pr_debug("success");
    if ((this->net_type == IW_MODE_INFRA && 
        - (sig.cap_info & WL3501_MGMT_CAPABILITY_ESS)) || 
        + (sig.req.cap_info & WL3501_MGMT_CAPABILITY_ESS)) ||
        (this->net_type == IW_MODE_ADHOC && 
        - (sig.cap_info & WL3501_MGMT_CAPABILITY_IBSS)) || 
        + (sig.req.cap_info & WL3501_MGMT_CAPABILITY_IBSS)) ||
        this->net_type == IW_MODE_AUTO) {
        if (!this->essid.el.len)
            matchflag = 1;
        else if (this->essid.el.len == 3 && 
            !memcmp(this->essid.essid, "ANY", 3))
            matchflag = 1;
        -else if (this->essid.el.len != sig.ssid.el.len)
            matchflag = 0;
        +else if (this->essid.el.len != sig.req.ssid.el.len)
            matchflag = 0;
        else
            matchflag = 1;
        if (matchflag) {
            for (i = 0; i < this->bss_cnt; i++) {
                -if (ether_addr_equal_unaligned(this->bss_set[i].bssid, sig.bssid)) {
                    
                }
            }
        }
    }
}
if (ether_addr_equal_unaligned(this->bss_set[i].req.bssid,
   + sig.req.bssid)) {
    matchflag = 0;
    break;
   }
   }
   } 
if (matchflag && (i < 20)) {
- memcpy(&this->bss_set[i].beacon_period,
   - &sig.beacon_period, 73);
+ memcpy(&this->bss_set[i].req,
   + &sig.req, sizeof(sig.req));
this->bss_cnt++;
this->rssi = sig.rssi;
+this->bss_set[i].rssi = sig.rssi;
} }
}

} else if (sig.status == WL3501_STATUS_TIMEOUT) {
@@ -885,19 +888,19 @@
if (this->join_sta_bss < this->bss_cnt) {
   const int i = this->join_sta_bss;
   memcpy(this->bssid,
   - this->bss_set[i].bssid, ETH_ALEN);
- this->chan = this->bss_set[i].ds_pset.chan;
+ this->bss_set[i].req.bssid, ETH_ALEN);
+this->chan = this->bss_set[i].req.ds_pset.chan;
iw_copy_mgmt_info_element(&this->keep_essid.el,
   - &this->bss_set[i].ssid.el);
+ &this->bss_set[i].req.ssid.el);
wl3501_mgmt_auth(this);
} }
else {
   const int i = this->join_sta_bss;
   memcpy(&this->bssid,
   - &this->bss_set[i].bssid, ETH_ALEN);
   -this->chan = this->bss_set[i].ds_pset.chan;
+ memcpy(&this->bssid, &this->bss_set[i], req.bssid, ETH_ALEN);
+this->chan = this->bss_set[i].req.ds_pset.chan;
iw_copy_mgmt_info_element(&this->keep_essid.el,
   - &this->bss_set[i].ssid.el);
+ &this->bss_set[i].req.ssid.el);
wl3501_online(dev);
} }
else {
@@ -979,7 +982,8 @@
   skb->dev = dev;
   skb_reserve(skb, 2); /* IP headers on 16 bytes boundaries */
skb_copy_to_linear_data(skb, (unsigned char *)&sig.daddr, 12);
+skb_copy_to_linear_data(skb, (unsigned char *)&sig.addr, sizeof(sig.addr));
w13501_receive(this, skb->data, pkt_len);
skb_put(skb, pkt_len);
skb->protocol = eth_type_trans(skb, dev);
@@ -1574,30 +1578,30 @@
for (i = 0; i < this->bss_cnt; ++i) {
    iwe.cmd = SIOCGIWAP;
    iwe.u.ap_addr.sa_family = ARPHRD_ETHER;
    -memcpy(iwe.u.ap_addr.sa_data, this->bss_set[i].bssid, ETH_ALEN);
    +memcpy(iwe.u.ap_addr.sa_data, this->bss_set[i].req.bssid, ETH_ALEN);
    current_ev = iwe_stream_add_event(info, current_ev,
    extra + IW_SCAN_MAX_DATA,
    &iwe, IW_EV_ADDR_LEN);
    iwe.cmd = SIOCGIWESSID;
    iwe.u.data.flags = 1;
    -iwe.u.data.length = this->bss_set[i].ssid.el.len;
    +iwe.u.data.length = this->bss_set[i].req.ssid.el.len;
    current_ev = iwe_stream_add_point(info, current_ev,
    extra + IW_SCAN_MAX_DATA,
    &iwe,
    - this->bss_set[i].ssid.essid);
    + this->bss_set[i].req.ssid.essid);
    iwe.cmd = SIOCGIWMODE;
    -iwe.u.mode = this->bss_set[i].bss_type;
    +iwe.u.mode = this->bss_set[i].req.bss_type;
    current_ev = iwe_stream_add_event(info, current_ev,
    extra + IW_SCAN_MAX_DATA,
    &iwe, IW_EV_UINT_LEN);
    iwe.cmd = SIOCGIW_FREQ;
    -iwe.u.freq.m = this->bss_set[i].ds_pset.chan;
    +iwe.u.freq.m = this->bss_set[i].req.ds_pset.chan;
    iwe.u.freq.e = 0;
    current_ev = iwe_stream_add_event(info, current_ev,
    extra + IW_SCAN_MAX_DATA,
    &iwe, IW_EV_FREQ_LEN);
    iwe.cmd = SIOCGIW_CODEC;
    -if (this->bss_set[i].cap_info & WL3501_MGMT_CAPABILITY_PRIVACY)
    +if (this->bss_set[i].req.cap_info & WL3501_MGMT_CAPABILITY_PRIVACY)
    iwe.u.data.flags = IW_ENCODE_ENABLED | IW_ENCODE_NOKEY;
  else
    iwe.u.data.flags = IW_ENCODE_DISABLED;
--- linux-4.15.0.orig/drivers/net/wireless/zydas/zd1211rw/zd_usb.c
+++ linux-4.15.0/drivers/net/wireless/zydas/zd1211rw/zd_usb.c
@@ -1272,7 +1272,7 @@
 static int eject_installer(struct usb_interface *intf) {

struct usb_device *udev = interface_to_usbdev(intf);
struct usb_host_interface *iface_desc = intf->altsetting[0];
+struct usb_host_interface *iface_desc = intf->cur_altsetting;
struct usb_endpoint_descriptor *endpoint;
unsigned char *cmd;

u8 bulk_out_ep;

--- linux-4.15.0.org/drivers/net/xen-netback/common.h
+++ linux-4.15.0/drivers/net/xen-netback/common.h
@@ -140,6 +140,20 @@
 char name[QUEUE_NAME_SIZE]; /* DEVNAME-qN */
 struct xenvif *vif; /* Parent VIF */
+/*
+ * TX/RX common EOI handling.
+ * When feature-split-event-channels = 0, interrupt handler sets
+ * NETBK_COMMON_EOI, otherwise NETBK_RX_EOI and NETBK_TX_EOI are set
+ * by the RX and TX interrupt handlers.
+ * RX and TX handler threads will issue an EOI when either
+ * NETBK_COMMON_EOI or their specific bits (NETBK_RX_EOI or
+ * NETBK_TX_EOI) are set and they will reset those bits.
+ */
+atomic_t eoi_pending;
+#define NETBK_RX_EOI	0x01
+#define NETBK_TX_EOI	0x02
+#define NETBK_COMMON_EOI	0x04
+
/* Use NAPI for guest TX */
struct napi_struct napi;
/* When feature-split-event-channels = 0, tx_irq = rx_irq. */
@@ -356,6 +370,7 @@
 struct xenvif_queue *queue, bool test_kthread);
 void xenvif_rx_action(struct xenvif_queue *queue);
 void xenvif_rx_queue_tail(struct xenvif_queue *queue, struct sk_buff *skb);

--- linux-4.15.0.org/drivers/net/xen-netback/hash.c
+++ linux-4.15.0/drivers/net/xen-netback/hash.c
@@ -332,20 +332,22 @@
 u32 xenvif_set_hash_mapping(struct xenvif *vif, u32 gref, u32 len,
  
 irqreturn_t xenvif_ctrl_irq_fn(int irq, void *data);

+bool xenvif_have_rx_work(struct xenvif_queue *queue, bool test_kthread);
 void xenvif_rx_action(struct xenvif_queue *queue);
 void xenvif_rx_queue_tail(struct xenvif_queue *queue, struct sk_buff *skb);

--- linux-4.15.0.org/drivers/net/xen-netback/hash.c
+++ linux-4.15.0/drivers/net/xen-netback/hash.c
@@ -332,20 +332,22 @@
 u32 xenvif_set_hash_mapping(struct xenvif *vif, u32 gref, u32 len,
  
- u32 *mapping = &vif->hash.mapping[off];
+ u32 *mapping = vif->hash.mapping;
 struct gnttab_copy copy_op = {
  .source.u.ref = gref,
  .source.domid = vif->domid,
- .dest.u.gmfn = virt_to_gfn(mapping),
  .dest.domid = DOMID_SELF,
- .dest.offset = xen_offset_in_page(mapping),
- .len = len * sizeof(u32),
+ .len = len * sizeof(*mapping),
  .flags = GNTCOPY_source_gref
};

-if ((off + len > vif->hash.size) || copy_op.len > XEN_PAGE_SIZE)
+if ((off + len < off) || (off + len > vif->hash.size) ||
  + len > XEN_PAGE_SIZE / sizeof(*mapping))
return XEN_NETIF_CTRL_STATUS_INVALID_PARAMETER;

+copy_op.dest.u.gmfn = virt_to_gfn(mapping + off);
+copy_op.dest.offset = xen_offset_in_page(mapping + off);
+
  while (len-- != 0)
+    if (mapping[off++] >= vif->num_queues)
return XEN_NETIF_CTRL_STATUS_INVALID_PARAMETER;
+    @ @ -433,6 +435,8 @@
if (xenvif_hash_cache_size == 0)
return;

+BUG_ON(vif->hash.cache.count);
+
spin_lock_init(&vif->hash.cache.lock);
INIT_LIST_HEAD(&vif->hash.cache.list);
}
--- linux-4.15.0.orig/drivers/net/xen-netback/interface.c
+++ linux-4.15.0/drivers/net/xen-netback/interface.c
@@ -77,12 +77,28 @@
!vif->disabled;
}

+static bool xenvif_handle_tx_interrupt(struct xenvif_queue *queue)
+{
+  bool rc;
+  +
+  rc = RING_HAS_UNCONSUMED_REQUESTS(&queue->tx);
+  if (rc)
+    napi_schedule(&queue->napi);
+  return rc;
+}
+
static irqreturn_t xenvif_tx_interrupt(int irq, void *dev_id)
{
  struct xenvif_queue *queue = dev_id;
+int old;
if (RING_HAS_UNCONSUMED_REQUESTS(&queue->tx))
napi_schedule(&queue->napi);
old = atomic_fetch_or(NETBK_TX_EOI, &queue->eoi_pending);
WARN(old & NETBK_TX_EOI, "Interrupt while EOI pending\n");
+
+if (!xenvif_handle_tx_interrupt(queue)) {
+atomic_andnot(NETBK_TX_EOI, &queue->eoi_pending);
+xen_irq_lateeoi(irq, XEN_EOI_FLAG_SPURIOUS);
+}

return IRQ_HANDLED;
}
@@ -116,19 +132,48 @@
return work_done;
}

+static bool xenvif_handle_rx_interrupt(struct xenvif_queue *queue)
+{
+- bool rc;
+-
+-rc = xenvif_have_rx_work(queue, false);
+if (rc)
+xenvif_kick_thread(queue);
+return rc;
+}
+
+static irqreturn_t xenvif_rx_interrupt(int irq, void *dev_id)
+{
+struct xenvif_queue *queue = dev_id;
+int old;

-xenvif_kick_thread(queue);
+old = atomic_fetch_or(NETBK_RX_EOI, &queue->eoi_pending);
+WARN(old & NETBK_RX_EOI, "Interrupt while EOI pending\n");
+
+if (!xenvif_handle_rx_interrupt(queue)) {
+atomic_andnot(NETBK_RX_EOI, &queue->eoi_pending);
+xen_irq_lateeoi(irq, XEN_EOI_FLAG_SPURIOUS);
+}

return IRQ_HANDLED;
}

irqreturn_t xenvif_interrupt(int irq, void *dev_id)
{
-xenvif_tx_interrupt(irq, dev_id);
-xenvif_rx_interrupt(irq, dev_id);
+struct xenvif_queue *queue = dev_id;
+int old;
+bool has_rx, has_tx;
+
+old = atomic_fetch_or(NETBK_COMMON_EOI, &queue->eoi_pending);
+WARN(old, "Interrupt while EOI pending\n");
+
+has_tx = xenvif_handle_tx_interrupt(queue);
+has_rx = xenvif_handle_rx_interrupt(queue);
+
+if (!has_rx && !has_tx) {
+atomic_andnot(NETBK_COMMON_EOI, &queue->eoi_pending);
+xen_irq_lateeoi(irq, XEN_EOI_FLAG_SPURIOUS);
+
}

return IRQ_HANDLED;
}
@@ -153,6 +198,13 @@
{
    struct xenvif *vif = netdev_priv(dev);
    unsigned int size = vif->hash.size;
    unsigned int num_queues;
+
    /* If queues are not set up internally - always return 0
     * as the packet going to be dropped anyway */
    num_queues = READ_ONCE(vif->num_queues);
+
+    if (num_queues < 1)
+    return 0;
+
   =explode(vif->hash.size, skb_get_hash_raw(skb) % size);
}

-static int xenvif_start_xmit(struct sk_buff *skb, struct net_device *dev)
+static netdev_tx_t
+xenvif_start_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct xenvif *vif = netdev_priv(dev);
    struct xenvif_queue *queue = NULL;
+static netdev_tx_t
    xenvif_start_xmit(struct sk_buff *skb, struct net_device *dev)
    {
        struct xenvif *vif = netdev_priv(dev);
        struct xenvif_queue *queue = NULL;
@@ -586,7 +639,7 @@
            shared = (struct xen_netif_ctrl_sring *)addr;
            BACK_RING_INIT(&vif->ctrl, shared, XEN_PAGE_SIZE);

-err = bind_interdomain_evtchn_to_irq(vif->domid, evtchn);
+err = bind_interdomain_evtchn_to_irq_lateeoi(vif->domid, evtchn);
    if (err < 0)
goto err_unmap;

@@ -644,7 +697,7 @@
if (tx_evtchn == rx_evtchn) {
        /* feature-split-event-channels == 0 */
-       err = bind_interdomain_evtchn_to_irqhandler(
+       err = bind_interdomain_evtchn_to_irqhandler_lateeoi(
            queue->vif->domid, tx_evtchn, xenvif_interrupt, 0,
            queue->name, queue);
        if (err < 0)
@@ -655,7 +708,7 @@
        /* feature-split-event-channels == 1 */
        snprintf(queue->tx_irq_name, sizeof(queue->tx_irq_name),
            "%s-tx", queue->name);
-       err = bind_interdomain_evtchn_to_irqhandler(
+       err = bind_interdomain_evtchn_to_irqhandler_lateeoi(
            queue->vif->domid, tx_evtchn, xenvif_tx_interrupt, 0,
            queue->tx_irq_name, queue);
        if (err < 0)
@@ -665,7 +718,7 @@
        snprintf(queue->rx_irq_name, sizeof(queue->rx_irq_name),
            "%s-rx", queue->name);
-       err = bind_interdomain_evtchn_to_irqhandler(
+       err = bind_interdomain_evtchn_to_irqhandler_lateeoi(
            queue->vif->domid, rx_evtchn, xenvif_rx_interrupt, 0,
            queue->rx_irq_name, queue);
        if (err < 0)
@@ -710,7 +763,6 @@
xenvif_unmap_frontend_data_rings(queue);
        netif_napi_del(&queue->napi);
        err:
        -module_put(THIS_MODULE);
        return err;
    }

--- linux-4.15.0.orig/drivers/net/xen-netback/netback.c
+++ linux-4.15.0/drivers/net/xen-netback/netback.c
@@ -162,6 +162,10 @@
if (more_to_do)
    napi_schedule(&queue->napi);
+else if (atomic_fetch_andnot(NETBK_TX_EOI | NETBK_COMMON_EOI,
+    &queue->eoi_pending) &
+    (NETBK_TX_EOI | NETBK_COMMON_EOI))
+    xen_irq_lateeoi(queue->tx_irq, 0);
static void tx_add_credit(struct xenvif_queue *queue)
@@ -488,7 +492,7 @@
     * the header's copy failed, and they are
     * sharing a slot, send an error
     */
-    if (i == 0 && sharedslot)
+    if (i == 0 && !first_shinfo && sharedslot)
        xenvif_idx_release(queue, pending_idx,
            XEN_NETIF_RSP_ERROR);
    else
@@ -925,6 +929,7 @@
        skb_shinfo(skb)->nr_frags = MAX_SKB_FRAGS;
        nskb = xenvif_alloc_skb(0);
        if (unlikely(nskb == NULL)) {
            skb_shinfo(skb)->nr_frags = 0;
            kfree_skb(skb);
            xenvif_tx_err(queue, &txreq, extra_count, idx);
        }
    if (net_ratelimit())
@@ -940,6 +945,7 @@
        skb_shinfo(skb)->nr_frags = 0;
        kfree_skb(skb);
        kfree_skb(nskb);
        break;
@@ -1072,11 +1078,6 @@
        skb_frag_size_set(&frags[i], len);
    }

-/* Copied all the bits from the frag list -- free it. */
-skb_frag_list_init(skb);
-xenvif_skb_zerocopy_prepare(queue, nskb);
-kfree_skb(nskb);
-
-/* Release all the original (foreign) frags. */
-for (f = 0; f < skb_shinfo(skb)->nr_frags; f++)
    skb_frag_unref(skb, f);
@@ -1145,6 +1146,8 @@
        xenvif_fill_frags(queue, skb);

    if (unlikely(skb_has_frag_list(skb))) {
        +struct sk_buff *nskb = skb_shinfo(skb)->frag_list;
        +xenvif_skb_zerocopy_prepare(queue, nskb);
        if (xenvif_handle_frag_list(queue, skb)) {
            if (net_ratelimit())
                netdev_err(queue->vif->dev, 


kfree_skb(skb);
continue;
}
/* Copied all the bits from the frag list -- free it. */
skb_frag_list_init(skb);
kfree_skb(skb);
}

skb->dev = queue->vif->dev;

skb->dev = queue->vif->dev;

if (ret) {
unsigned int i;
+
+netdev_err(queue->vif->dev, "Map fail: nr %u ret %d\n",
  + nr_mops, ret);
+for (i = 0; i < nr_mops; ++i)
  +WARN_ON_ONCE(queue->tx_map_ops[i].status ==
    + GNTST_okay);
++}
}

work_done = xenvif_tx_submit(queue);

irqreturn_t xenvif_ctrl_irq_fn(int irq, void *data)
{
struct xenvif *vif = data;
+unsigned int eoi_flag = XEN_EOI_FLAG_SPURIOUS;

-while (xenvif_ctrl_work_todo(vif))
+while (xenvif_ctrl_work_todo(vif)) {
xenvif_ctrl_action(vif);
+eoi_flag = 0;
++}
+xen_irq_lateeoi(irq, eoi_flag);

return IRQ_HANDLED;
}

--- linux-4.15.0.orig/drivers/net/xen-netback/rx.c
+++ linux-4.15.0/drivers/net/xen-netback/rx.c
@@ -38,10 +38,15 @@
RINT_IDX prod, cons;
struct sk_buff *skb;

--- linux-4.15.0.orig/drivers/net/xen-netback/rx.c
+++ linux-4.15.0/drivers/net/xen-netback/rx.c
@ @ -38,10 +38,15 @@
RINT_IDX prod, cons;
struct sk_buff *skb;
int needed;
+unsigned long flags;
+
+spin_lock_irqsave(&queue->rx_queue.lock, flags);

skb = skb_peek(&queue->rx_queue);
-if (!skb)
+if (!skb) {
  spin_unlock_irqrestore(&queue->rx_queue.lock, flags);
  return false;
+
  needed = DIV_ROUND_UP(skb->len, XEN_PAGE_SIZE);
  if (skb_is_gso(skb))
    @ @ -49.6 +54.8 @@
  if (skb->sw_hash)
    needed++;
+
  spin_unlock_irqrestore(&queue->rx_queue.lock, flags);
  +
  do {
    prod = queue->rx.sring->req_prod;
    cons = queue->rx.req_cons;
    @ @ -490.13 +497.13 @@
    return queue->stalled && prod - cons >= 1;
  }

-static bool xenvif_have_rx_work(struct xenvif_queue *queue)
+bool xenvif_have_rx_work(struct xenvif_queue *queue, bool test_kthread)
{
  return xenvif_rx_ring_slots_available(queue) ||
  (queue->vif->stall_timeout &&
   (xenvif_rx_queue_stalled(queue) ||
    xenvif_rx_queue_ready(queue))) ||
  -kthread_should_stop() ||
  +(test_kthread && kthread_should_stop()) ||
  queue->vif->disabled;
}

@@ -527,15 +534,20 @@
{
  DEFINE_WAIT(wait);

-if (xenvif_have_rx_work(queue))
+if (xenvif_have_rx_work(queue, true))
  return;

  for (;;) {
prepare_to_wait(&queue->wq, &wait, TASK_INTERRUPTIBLE);
-if (xenvif_have_rx_work(queue))
+if (xenvif_have_rx_work(queue, true))
  break;
+if (atomic_fetch_andnot(NETBK_RX_EOI | NETBK_COMMON_EOI,
   &queue->eoi_pending) &
   + (NETBK_RX_EOI | NETBK_COMMON_EOI))
+xen_irq_lateeoi(queue->rx_irq, 0);
+ ret = schedule_timeout(xenvif_rx_queue_timeout(queue));
if (!ret)
  break;
--- linux-4.15.0.orig/drivers/net/xen-netback/xenbus.c
+++ linux-4.15.0/drivers/net/xen-netback/xenbus.c
@@ -777,12 +777,14 @@
  return -ENOMEM;
sprintf(node, maxlen, "%s/rate", dev->nodename);
vif->credit_watch.node = node;
+  vif->credit_watch.will_handle = NULL;
vif->credit_watch.callback = xen_net_rate_changed;
  err = register_xenbus_watch(&vif->credit_watch);
if (err) {
  pr_err("Failed to set watcher %s\n", vif->credit_watch.node);
  kfree(node);
  vif->credit_watch.node = NULL;
+  vif->credit_watch.will_handle = NULL;
  vif->credit_watch.callback = NULL;
} return err;
@@ -829,6 +831,7 @@
sprintf(node, maxlen, "%s/request-multicast-control",
   dev->otherend);
vif->mcast_ctrl_watch.node = node;
+  vif->mcast_ctrl_watch.will_handle = NULL;
vif->mcast_ctrl_watch.callback = xen_mcast_ctrl_changed;
  err = register_xenbus_watch(&vif->mcast_ctrl_watch);
if (err) {
  @ @ -836,6 +839,7 @ @
    vif->mcast_ctrl_watch.node);
kfree(node);
  vif->mcast_ctrl_watch.node = NULL;
+  vif->mcast_ctrl_watch.will_handle = NULL;
  vif->mcast_ctrl_watch.callback = NULL;
} return err;
@@ -1039,11 +1043,15 @ @
xenvif_carrier_on(be->vif);

unregister_hotplug_status_watch(be);
-err = xenbus_watch_pathfmt(dev, &be->hotplug_status_watch,
  -hotplug_status_changed,
  -"%s/%s", dev->nodename, "hotplug-status");
-if (!err)
+if (xenbus_exists(XBT_NIL, dev->nodename, "hotplug-status") ) {
  +err = xenbus_watch_pathfmt(dev, &be->hotplug_status_watch,
  +NULL, hotplug_status_changed,
  +"%s/%s", dev->nodename,
  +"hotplug-status");
  +if (err)
  +goto err;
  be->have_hotplug_status_watch = 1;
  +}

netif_tx_wake_all_queues(be->vif->dev);

--- linux-4.15.0.orig/drivers/net/xen-netfront.c
+++ linux-4.15.0/drivers/net/xen-netfront.c
@@ -63,6 +63,8 @@
 MODULE_PARM_DESC(max_queues,
                     "Maximum number of queues per virtual interface");

+#define XENNET_TIMEOUT (5 * HZ)
+
 static const struct ethtool_ops xennet_ethtool_ops;

 struct netfront_cb {
   @ @ -87.7 +89.7 @@
  /* IRQ name is queue name with "-tx" or "-rx" appended */
 #define IRQ_NAME_SIZE (QUEUE_NAME_SIZE + 3)

-static DECLARE_WAIT_QUEUE_HEAD(module_unload_q);
+static DECLARE_WAIT_QUEUE_HEAD(module_wq);

 struct netfront_stats {
   u64 packets;
   @ @ -239.7 +241.7 @@
 static int netfront_tx_slot_available(struct netfront_queue *queue) {
   return (queue->tx.req_prod_pvt - queue->tx.rsp_cons) <
   -(NET_TX_RING_SIZE - MAX_SKB_FRAGS - 2);
+  +(NET_TX_RING_SIZE - XEN_NETIF_NR_SLOTS_MIN - 1);
 }

 static void xennet_maybe_wake_tx(struct netfront_queue *queue)
@@ -351,6 +353,9 @@
 unsigned int i = 0;
 struct netfront_queue *queue = NULL;

+if (!np->queues)
+return -ENODEV;
+
 for (i = 0; i < num_queues; ++i) {
 queue = &np->queues[i];
 napi_enable(&queue->napi);
@@ -787,7 +792,7 @@
 int max = XEN_NETIF_NR_SLOTS_MIN + (rx->status <= RX_COPY_THRESHOLD);
 int slots = 1;
 int err = 0;
 unsigned long ret;
@@ -886,11 +891,10 @@
 return 0;
 }

-static RING_IDX xennet_fill_frags(struct netfront_queue *queue,
-struct sk_buff *skb,
-struct sk_buff_head *list)
+static int xennet_fill_frags(struct netfront_queue *queue,
+struct sk_buff *skb,
+struct sk_buff_head *list)
{
 struct skb_shared_info *shinfo = skb_shinfo(skb);
 RING_IDX cons = queue->rx.rsp_cons;
 struct sk_buff *nskb;
@@ -899,22 +903,29 @@
 skb_frag_t *nfrag = &skb_shinfo(skb)->frags[0];

-if (shinfo->nr_frags == MAX_SKB_FRAGS) {
-unsigned int pull_to = NETFRONT_SKB_CB(skb)->pull_to;
-BUG_ON(pull_to <= skb_headlen(skb));
+BUG_ON(pull_to <= skb_headlen(skb));
+BUG_ON(pull_to < skb_headlen(skb));
 ++pskb_pull_tail(skb, pull_to - skb_headlen(skb));
 } 
-BUG_ON(shinfo->nr_frags >= MAX_SKB_FRAGS);
+if (unlikely(skb_shinfo(skb)->nr_frags >= MAX_SKB_FRAGS)) {

+queue->rx.rsp_cons = ++cons + skb_queue_len(list);
+kfree_skb(nskb);
+return -ENOENT;
+}
-skb_add_rx_frag(skb, shinfo->nr_frags, skb_frag_page(nfrag),
+skb_add_rx_frag(skb, skb_shinfo(skb)->nr_frags,
+skb_frag_page(nfrag),
rx->offset, rx->status, PAGE_SIZE);
skb_shinfo(nskb)->nr_frags = 0;
kfree_skb(nskb);
}
-return cons;
+queue->rx.rsp_cons = cons;
+
+return 0;
}
static int checksum_setup(struct net_device *dev, struct sk_buff *skb)
@@ -1040,7 +1051,8 @@
skb->data_len = rx->status;
skb->len += rx->status;
-i = xennet_fill_frags(queue, skb, &tmpq);
+if (unlikely(xennet_fill_frags(queue, skb, &tmpq)))
+goto err;
if (rx->flags & XEN_NETRXF_csum_blank)
skb->ip_summed = CHECKSUM_PARTIAL;
@@ -1049,7 +1061,7 @@
__skb_queue_tail(&rxq, skb);
-queue->rx.rsp_cons = ++i;
+i = ++queue->rx.rsp_cons;
work_done++;
}
@@ -1326,7 +1338,15 @@
netif_carrier_off(netdev);
-xenbus_switch_state(dev, XenbusStateInitialising);
+do {
+xenbus_switch_state(dev, XenbusStateInitialising);
+err = wait_event_timeout(module_wq,

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+ xenbus_read_driver_state(dev->otherend) !=
+ XenbusStateClosed &&
+ xenbus_read_driver_state(dev->otherend) !=
+ XenbusStateUnknown, XENNET_TIMEOUT);
+ } while (!err);
+
+ return netdev;

exit:
@@ -1358,18 +1378,8 @@
 #ifdef CONFIG_SYSFS
 info->netdev->sysfs_groups[0] = &xennet_dev_group;
 #endif
-err = register_netdev(info->netdev);
-if (err) {
-   pr_warn("%s: register_netdev err=%d\n", __func__, err);
-   goto fail;
-}

return 0;
-
- fail:
- xennet_free_netdev(netdev);
- dev_set_drvdata(&dev->dev, NULL);
- return err;
}

static void xennet_end_access(int ref, void *page)
@@ -1604,14 +1614,16 @@
 {
 unsigned short i;
 int err = 0;
+char *devid;

 spin_lock_init(&queue->tx_lock);
 spin_lock_init(&queue->rx_lock);

timer_setup(&queue->rx_refill_timer, rx_refill_timeout, 0);

-snprintf(queue->name, sizeof(queue->name), "%s-q%%u",
 - queue->info->netdev->name, queue->id);
+devid = strchr(queue->info->xbdev->nodename, '/') + 1;
+snprintf(queue->name, sizeof(queue->name), "vif%s-q%%u",
 + devid, queue->id);

 /* Initialise tx_skb as a free chain containing every entry. */
 queue->tx_skb_freelist = 0;
@@ -1737,8 +1749,6 @@
unsigned int i;

-rtnl_lock();
-
for (i = 0; i < info->netdev->real_num_tx_queues; i++) {
struct netfront_queue *queue = &info->queues[i];

netif_napi_del(&queue->napi);
}

-rtnl_unlock();
-
kfree(info->queues);
info->queues = NULL;
}

if (!info->queues)
return -ENOMEM;

-rtnl_lock();
-
for (i = 0; i < *num_queues; i++) {
struct netfront_queue *queue = &info->queues[i];

ret = xennet_init_queue(queue);
if (ret < 0) {
-dev_warn(&info->netdev->dev,
+dev_warn(&info->xbdev->dev,
"only created %d queues\n", i);
*num_queues = i;
break;
}

netif_set_real_num_tx_queues(info->netdev, *num_queues);

-rtnl_unlock();
-
if (*num_queues == 0) {
-dev_err(&info->netdev->dev, "no queues\n");
+dev_err(&info->xbdev->dev, "no queues\n");
return -EINVAL;
}
return 0;
err = xen_net_read_mac(dev, info->netdev->dev_addr);
if (err) {
xenbus_dev_fatal(dev, err, "parsing %s/mac", dev->nodename);
-goto out;
+goto out_unlocked;
}
+rtnl_lock();
if (info->queues)
xennet_destroy_queues(info);

@@ -1838,6 +1843,7 @@
info->queues = NULL;
goto out;
}
+rtnl_unlock();

/* Create shared ring, alloc event channel -- for each queue */
for (i = 0; i < num_queues; ++i) {
@@ -1934,8 +1940,11 @@
xennet_disconnect_backend(info);
+rtnl_lock();
xennet_destroy_queues(info);
out:
+rtnl_unlock();
+out_unlocked:
device_unregister(&dev->dev);
return err;
}
@@ -1961,6 +1970,15 @@
/* talk_to_netback() sets the correct number of queues */
um_queues = dev->real_num_tx_queues;

+if (dev->reg_state == NETREG_UNINITIALIZED) {
+err = register_netdev(dev);
+if (err) {
++pr_warn("%s: register_netdev err=%d\n", __func__, err);
+device_unregister(&np->xbdev->dev);
+return err;
+}
++}
+
rtnl_lock();
netdev_update_features(dev);
rtnl_unlock();
@@ -2002,6 +2020,8 @@
dev_dbg(&dev->dev, "\%s\n", xenbus_strerror(backend_state));

+wake_up_all(&module_wq);
+
switch (backend_state) {
    case XenbusStateInitialising:
    case XenbusStateInitialised:
        break;

    case XenbusStateClosed:
        -wake_up_all(&module_unload_q);
        if (dev->state == XenbusStateClosed)
            break;
    /* Missed the backend's CLOSING state -- fallthrough */
    case XenbusStateClosing:
        -wake_up_all(&module_unload_q);
        xenbus_frontend_closed(dev);
        break;
    }
    @@ -2128,32 +2146,53 @@
};
#endif /* CONFIG_SYSFS */

-static int xennet_remove(struct xenbus_device *dev)
+static void xennet_bus_close(struct xenbus_device *dev)
{
    -struct netfront_info *info = dev_get_drvdata(&dev->dev);
    -
    -dev_dbg(&dev->dev, "%s\n", dev->nodename);
    +int ret;

    -if (xenbus_read_driver_state(dev->otherend) != XenbusStateClosed) {
    +if (xenbus_read_driver_state(dev->otherend) == XenbusStateClosed)
    +return;
    +do {
        xenbus_switch_state(dev, XenbusStateClosing);
        -wait_event(module_unload_q,
        -  xenbus_read_driver_state(dev->otherend) ==
        -  XenbusStateClosing);
        +ret = wait_event_timeout(module_wq,
        +  xenbus_read_driver_state(dev->otherend) ==
        +  XenbusStateClosing ||
        +  xenbus_read_driver_state(dev->otherend) ==
        +  XenbusStateClosed ||
        +  xenbus_read_driver_state(dev->otherend) ==
        +  XenbusStateUnknown,
+ XENNET_TIMEOUT);
+ } while (!ret);
+
+ if (xenbus_read_driver_state(dev->otherend) == XenbusStateClosed)
+ return;
+
+do {
  xenbus_switch_state(dev, XenbusStateClosed);
  -wait_event(module_unload_q,
  -  xenbus_read_driver_state(dev->otherend) ==
  -  XenbusStateClosed ||
  -  xenbus_read_driver_state(dev->otherend) ==
  -  XenbusStateUnknown);
  -}
+  ret = wait_event_timeout(module_wq,
+    xenbus_read_driver_state(dev->otherend) ==
+    XenbusStateClosed ||
+    xenbus_read_driver_state(dev->otherend) ==
+    XenbusStateUnknown,
+    XENNET_TIMEOUT);
+ } while (!ret);
+
+static int xennet_remove(struct xenbus_device *dev)
+{
+  struct netfront_info *info = dev_get_drvdata(&dev->dev);
+  
+  xennet_bus_close(dev);
+  xennet_disconnect_backend(info);
+  
+  -unregister_netdev(info->netdev);
+  +if (info->netdev->reg_state == NETREG_REGISTERED)
+    unregister_netdev(info->netdev);
+  
+  -if (info->queues)
+    +if (info->queues) {
+      +rtnl_lock();
+      xennet_destroy_queues(info);
+      +rtnl_unlock();
+    +}
+  xennet_free_netdev(info->netdev);
+}
+
return 0;
--- linux-4.15.0.orig/drivers/nfc/fdp/fdp.c
+++ linux-4.15.0/drivers/nfc/fdp/fdp.c
@@ -192,7 +192,7 @@
const struct firmware *fw;
 struct sk_buff *skb;
unsigned long len;
-u8 max_size, payload_size;
+int max_size, payload_size;
int rc = 0;

if ((type == NCI_PATCH_TYPE_OTP && !info->otp_patch) ||
@@ -215,8 +215,7 @@
while (len) {

-payload_size = min_t(unsigned long, (unsigned long) max_size,
-  len);
+payload_size = min_t(unsigned long, max_size, len);

skb = nci_skb_alloc(ndev, (NCI_CTRL_HDR_SIZE + payload_size),
  GFP_KERNEL);
--- linux-4.15.0.orig/drivers/nfc/fdp/i2c.c
+++ linux-4.15.0/drivers/nfc/fdp/i2c.c
@@ -267,7 +267,7 @@
  *fw_vsc_cfg, len);

if (r) {
-devm_kfree(dev, fw_vsc_cfg);
+devm_kfree(dev, *fw_vsc_cfg);
  goto vsc_read_err;
  }
} else {
--- linux-4.15.0.orig/drivers/nfc/nfcmrvl/main.c
+++ linux-4.15.0/drivers/nfc/nfcmrvl/main.c
@@ -244,7 +244,7 @@
 /* Reset possible fault of previous session */
  clear_bit(NFCMRVL_PHY_ERROR, &priv->flags);

-if (priv->config.reset_n_io) {
+if (gpio_is_valid(priv->config.reset_n_io)) {
   nfc_info(priv->dev, "reset the chip\n");
   gpio_set_value(priv->config.reset_n_io, 0);
   usleep_range(5000, 10000);
@@ -255,7 +255,7 @@

void nfcmrvl_chip_halt(struct nfcmrvl_private *priv)
{
-if (priv->config.reset_n_io)
+if (gpio_is_valid(priv->config.reset_n_io))
   gpio_set_value(priv->config.reset_n_io, 0);
}
+++ linux-4.15.0/drivers/nfc/nfcmrvl/uart.c
@@ -26,7 +26,7 @@
 static unsigned int hci_muxed;
 static unsigned int flow_control;
 static unsigned int break_control;
- static unsigned int reset_n_io;
+ static int reset_n_io = -EINVAL;

 /*
 ** NFCMRVL NCI OPS
 @@ -73,10 +73,9 @@
 struct device_node *matched_node;
 int ret;

 -matched_node = of_find_compatible_node(node, NULL, "marvell,nfc-uart");
+matched_node = of_get_compatible_child(node, "marvell,nfc-uart");
 if (!matched_node) {
 -matched_node = of_find_compatible_node(node, NULL,
- "mrvl,nfc-uart");
+matched_node = of_get_compatible_child(node, "mrvl,nfc-uart");
 if (!matched_node)
 return -ENODEV;
 }
 @@ -232,5 +231,5 @@
 module_param(hci_muxed, uint, 0);
 MODULE_PARM_DESC(hci_muxed, "Tell if transport is muxed in HCI one.");

- module_param(reset_n_io, uint, 0);
+ module_param(reset_n_io, int, 0);
 MODULE_PARM_DESC(reset_n_io, "GPIO that is wired to RESET_N signal.");
--- linux-4.15.0.orig/drivers/nfc/nfcmrvl/usb.c
+++ linux-4.15.0/drivers/nfc/nfcmrvl/usb.c
@@ -304,6 +304,7 @@
 /* No configuration for USB */
 memset(&config, 0, sizeof(config));
 + config.reset_n_io = -EINVAL;
 nfc_info(&udev->dev, "intf %p id %p\n", intf, id);

 --- linux-4.15.0.orig/drivers/nfc/nfcsim.c
+++ linux-4.15.0/drivers/nfc/nfcsim.c
@@ -304,6 +304,7 @@
 if (!IS_ERR(skb))
 dev_kfree_skb(skb);

- skb = ERR_PTR(-ENODEV);
dev->cb(dev->nfc_digital_dev, dev->arg, skb);

--- linux-4.15.0.orig/drivers/nfc/nxp-nci/i2c.c
+++ linux-4.15.0/drivers/nfc/nxp-nci/i2c.c
@@ -236,8 +236,10 @@
if (r == -EREMOTEIO) {
    phy->hard_fault = r;
    skb = NULL;
    } else if (r < 0) {
-        skb = NULL;
-    } else if (info->mode == NXP_NCI_MODE_FW)
+        if (info->mode == NXP_NCI_MODE_FW)
+            nxp_nci_fw_recv_frame(phy->ndev, NULL);
+    }
+    if (r < 0) {
        nfc_err(&client->dev, "Read failed with error %d\n", r);
        goto exit_irq_handled;
    }
    --- linux-4.15.0.orig/drivers/nfc/pn533/pn533.c
+++ linux-4.15.0/drivers/nfc/pn533/pn533.c
@@ -692,6 +692,9 @@
    if (PN533_TYPE_A_SEL_CASCADE(type_a->sel_res) != 0)
        return false;
    if (type_a->nfcid_len > NFC_NFCID1_MAXSIZE)
+        return false;
+    return true;
}

--- linux-4.15.0.orig/drivers/nfc/pn533/usb.c
+++ linux-4.15.0/drivers/nfc/pn533/usb.c
@@ -62,6 +62,9 @@
    struct urb *out_urb;
    struct urb *in_urb;
    +struct urb *ack_urb;
    +u8 *ack_buffer;
    +
    struct pn533 *priv;
    };
    @ @ -71,7 +74,7 @@
    struct sk_buff *skb = NULL;

    if (!urb->status) {
        skb = alloc_skb(urb->actual_length, GFP_KERNEL);
+skb = alloc_skb(urb->actual_length, GFP_ATOMIC);
if (skb) {
    nfc_err(&phy->udev->dev, "failed to alloc memory
);  
} else {
    skb = alloc_skb(urb->actual_length, GFP_ATOMIC);
    if (!skb) {
        nfc_err(&phy->udev->dev, "failed to alloc memory
);
    } else {
        struct pn533_usb_phy *phy = dev->phy;
        static const u8 ack[6] = {0x00, 0x00, 0xff, 0x00, 0xff, 0x00};
/* spec 7.1.1.3:  Preamble, SoPC (2), ACK Code (2), Postamble */
        -int rc;

        -phy->out_urb->transfer_buffer = (u8 *)ack;
        -phy->out_urb->transfer_buffer_length = sizeof(ack);
        -rc = usb_submit_urb(phy->out_urb, flags);
        +if (!phy->ack_buffer) {
            +phy->ack_buffer = kmemdup(ack, sizeof(ack), flags);
        +if (!phy->ack_buffer)
            +return -ENOMEM;
        +}

        -return rc;
        +phy->ack_urb->transfer_buffer = phy->ack_buffer;
        +phy->ack_urb->transfer_buffer_length = sizeof(ack);
        +return usb_submit_urb(phy->ack_urb, flags);
    }
}

static int pn533_usb_send_frame(struct pn533 *dev,
    @ @ -180,7 +186,7 @ @
    if (dev->protocol_type == PN533_PROTO_REQ_RESP) {
/* request for response for sent packet directly */
        -rc = pn533_submit_urb_for_response(phy, GFP_ATOMIC);
        +rc = pn533_submit_urb_for_response(phy, GFP_KERNEL);
    } else if (dev->protocol_type == PN533_PROTO_REQ_ACK_RESP) {
    @ @ -375,26 +381,31 @ @
/* Power on th reader (CCID cmd) */
        u8 cmd[10] = {PN533_ACR122_PC_TO_RDR_ICCPOWERON,
            0, 0, 0, 0, 0, 0, 3, 0, 0};
        +char *buffer;
        +int transferred;
        int rc;
        void *cntx;
        struct pn533_acr122_poweron_rdr_arg arg;

        dev_dbg(&phy->udev->dev, "%s
", __func__);

        +buffer = kmemdup(cmd,  sizeof(cmd), GFP_KERNEL);


```c
+if (!buffer)
+return -ENOMEM;
+
+init_completion(&arg.done);

phy->in_urb->complete = pn533_acr122_poweron_rdr_resp;
phy->in_urb->context = &arg;

-phy->out_urb->transfer_buffer = cmd;
-phy->out_urb->transfer_buffer_length = sizeof(cmd);
-
print_hex_dump_debug("ACR122 TX: ", DUMP_PREFIX_NONE, 16, 1,
    cmd, sizeof(cmd), false);

-rc = usb_submit_urb(phy->out_urb, GFP_KERNEL);
-phy->out_urb = usb_alloc_urb(0, GFP_KERNEL);
+phy->ack_urb = usb_alloc_urb(0, GFP_KERNEL);
-if (!phy->in_urb || !phy->out_urb)
  goto error;
usb_fill_bulk_urb(phy->in_urb, phy->out_urb, phy->udev, 0, GFP_KERNEL);
usb_fill_bulk_urb(phy->out_urb, phy->udev, usb_sndbulkpipe(phy->udev, out_endpoint),
    NULL, 0, pn533_send_complete, phy);
-
+usb_fill_bulk_urb(phy->ack_urb, phy->udev, 0, pn533_send_complete, phy);

switch (id->driver_info) {
  case PN533_DEVICE_STD:
    break;
  case PN533_DEVICE_DUAL:
    break;
  case PN533_DEVICE_DUAL_HF:
    break;
}
```

---

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rc = pn533_finalize_setup(priv);
if (rc)
+    goto error;
+    goto err_deregister;

usb_set_intfdata(interface, phy);

return 0;

+err_deregister:
+pn533_unregister_device(phy->priv);
error:
+usb_kill_urb(phy->in_urb);
+usb_kill_urb(phy->out_urb);
+usb_kill_urb(phy->ack_urb);

+usb_free_urb(phy->in_urb);
usb_free_urb(phy->out_urb);
+usb_free_urb(phy->ack_urb);
usb_put_dev(phy->udev);
kfree(in_buf);
+kfree(phy->ack_buffer);

return rc;
}
@@ -573,10 +595,13 @@
usb_kill_urb(phy->in_urb);
usb_kill_urb(phy->out_urb);
+usb_kill_urb(phy->ack_urb);

+kfree(phy->in_urb->transfer_buffer);
usb_free_urb(phy->in_urb);
usb_free_urb(phy->out_urb);
+usb_free_urb(phy->ack_urb);
+kfree(phy->ack_buffer);

nfc_info(&interface->dev, "NXP PN533 NFC device disconnected\n");
}
static void pn544_hci_i2c_enable_mode(struct pn544_i2c_phy *phy, int run_mode)
--- linux-4.15.0.orig/drivers/nfc/pn544/pn544.c
+++ linux-4.15.0/drivers/nfc/pn544/pn544.c
@@ -704,7 +704,7 @@
 target->nfcid1_len != 10)
 return -EOPNOTSUPP;

- return nfc_hci_send_cmd(hdev, NFC_HCI_RF_READER_A_GATE,
+ return nfc_hci_send_cmd(hdev, NFC_HCI_RF_READER_A_GATE,
     PN544_RF_READER_CMD_ACTIVATE_NEXT,
     target->nfcid1, target->nfcid1_len, NULL);
 } else if (target->supported_protocols & (NFC_PROTO_JEWEL_MASK |
--- linux-4.15.0.orig/drivers/nfc/port100.c
+++ linux-4.15.0/drivers/nfc/port100.c
@@ -574,7 +574,7 @@
 {
     struct port100_frame *frame = _frame;
- frame->datalen = cpu_to_le16(le16_to_cpu(frame->datalen) + len);
+ le16_add_cpu(&frame->datalen, len);
 } } static bool port100_rx_frame_is_valid(void *_frame)
@@ -792,7 +792,7 @@
 rc = port100_submit_urb_for_ack(dev, GFP_KERNEL);
 if (rc)
     -usb_unlink_urb(dev->out_urb);
+     usb_kill_urb(dev->out_urb);

     exit:
     mutex_unlock(&dev->out_urb_lock);
--- linux-4.15.0.orig/drivers/nfc/s3fwrn5/core.c
+++ linux-4.15.0/drivers/nfc/s3fwrn5/core.c
@@ -209,6 +209,7 @@
     case S3FWRN5_MODE_FW:
         return s3fwrn5_fw_recv_frame(ndev, skb);
     default:
-         kfree_skb(skb);
         return -ENODEV;
-     }
+ }
     }
     return ret;
if (fw->fw->size < S3FWRN5_FW_IMAGE_HEADER_SIZE) {
    release_firmware(fw->fw);
    return -EINVAL;
}

memcpy(fw->date, fw->fw->data + 0x00, 12);
fw->date[12] = '0';
--- linux-4.15.0.orig/drivers/nfc/s3fwrn5/i2c.c
+++ linux-4.15.0/drivers/nfc/s3fwrn5/i2c.c
@@ -37,8 +37,8 @@
struct i2c_client *i2c_dev;
struct nci_dev *ndev;
-    unsigned int gpio_en;
-    unsigned int gpio_fw_wake;
+    int gpio_en;
+    int gpio_fw_wake;

struct mutex mutex;

--- linux-4.15.0.orig/drivers/nfc/st-nci/se.c
+++ linux-4.15.0/drivers/nfc/st-nci/se.c
@@ -344,6 +344,8 @@
    if (!transaction)
        return -ENOMEM;
    transaction->aid_len = skb->data[1];
+if (transaction)
+    return -ENOMEM;

transaction->aid_len = skb->data[1];
memcpy(transaction->aid, &skb->data[2], transaction->aid_len);
--- linux-4.15.0.orig/drivers/nfc/st21nfca/core.c
+++ linux-4.15.0/drivers/nfc/st21nfca/core.c
@@ -719,6 +719,7 @@
NFC_PROTO_FELICA_MASK;
} else {
    kfree_skb(nfcid_skb);
+    nfcid_skb = NULL;
/* P2P in type A */
    r = nfc_hci_get_param(hdev, ST21NFCA_RF_READER_F_GATE,
ST21NFCA_RF_READER_F_NFCID1,
--- linux-4.15.0.orig/drivers/nfc/st21nfca/dep.c
+++ linux-4.15.0/drivers/nfc/st21nfca/dep.c
@@ -184,8 +184,10 @@
    memcpy(atr_res->gbi, atr_req->gbi, gb_len);
    r = nfc_set_remote_general_bytes(hdev->ndev, atr_res->gbi, gb_len);
-if (r < 0)
+if (r < 0) {
+kfree_skb(skb);
return r;
+}

info->dep_info.curr_nfc_dep_pni = 0;
--- linux-4.15.0.orig/drivers/nfc/st21nfca/se.c
+++ linux-4.15.0/drivers/nfc/st21nfca/se.c
@@ -328,6 +328,8 @@
transaction = (struct nfc_evt_transaction *)devm_kzalloc(dev,
               skb->len - 2, GFP_KERNEL);
+if (!transaction)
+return -ENOMEM;
transaction->aid_len = skb->data[1];
memcpy(transaction->aid, &skb->data[2],
--- linux-4.15.0.orig/drivers/nfc/st95hf/core.c
+++ linux-4.15.0/drivers/nfc/st95hf/core.c
@@ -981,7 +981,7 @@
rc = down_killable(&stcontext->exchange_lock);
if (rc) {
    WARN(1, "Semaphore is not found up in st95hf_in_send_cmd
@@ -1074,6 +1074,12 @@
};
MODULEDEVICE_TABLE(spi, st95hf_id);

+static const struct_of_device_id st95hf_spi_of_match[] = {
+    { .compatible = "st, st95hf" },
+};
+MODULEDEVICE_TABLE(of, st95hf_spi_of_match);
+static int st95hf_probe(struct spi_device *nfc_spi_dev)
{ int ret;
@@ -1260,6 +1266,7 @@
    .driver = {
        .name = "st95hf",
        .owner = THIS_MODULE,
+        .of_match_table = of_match_ptr(st95hf_spi_of_match),
}
err_dma_mask:  
pci_clear_master(pdev);  
+pci_release_regions(pdev);  
err_pci_regions:  
pci_disable_device(pdev);  
err_pci_enable:  
--- linux-4.15.0.orig/drivers/ntb/hw/amd/ntb_hw_amd.c  
+++ linux-4.15.0/drivers/ntb/hw/amd/ntb_hw_amd.c  
@@ -1032,6 +1032,7 @@
"err_dma_mask:  
err_pci_enable:  
--- linux-4.15.0.orig/drivers/ntb/hw/idt/ntb_hw_idt.c  
+++ linux-4.15.0/drivers/ntb/hw/idt/ntb_hw_idt.c  
@@ -1105,9 +1105,9 @@
/* Allocate memory for memory window descriptors */  
-ret_mws = devm_kcalloc(&ndev->ntb.pdev->dev, *mw_cnt,  
-sizeof(*ret_mws), GFP_KERNEL);  
-if (IS_ERR_OR_NULL(ret_mws))  
+ret_mws = devm_kcalloc(&ndev->ntb.pdev->dev, *mw_cnt, sizeof(*ret_mws),  
+    GFP_KERNEL);  
+if (!ret_mws)  
return ERR_PTR(-ENOMEM);  
/* Copy the info of detected memory windows */  
@@ -2393,7 +2393,7 @@
/* Allocate memory for the IDT PCIe-device descriptor */  
ndev = devm_kzalloc(&pdev->dev, sizeof(*ndev), GFP_KERNEL);  
-if (IS_ERR_OR_NULL(ndev)) {  
+if (!ndev) {  
    dev_err(pdev->dev, "Memory allocation failed for descriptor");  
return ERR_PTR(-ENOMEM);  
}  
--- linux-4.15.0.orig/drivers/ntb/hw/intel/ntb_hw_intel.c  
+++ linux-4.15.0/drivers/ntb/hw/intel/ntb_hw_intel.c  
@@ -348,7 +348,7 @@
return 0;
}  
--- static inline int ndev_vec_mask(struct intel_ntb_dev *ndev, int db_vector)  
+static inline u64 ndev_vec_mask(struct intel_ntb_dev *ndev, int db_vector)  
{  
u64 shift, mask;
--- linux-4.15.0.orig/drivers/ntb/ntb.c
+++ linux-4.15.0/drivers/ntb/ntb.c
@@ -216,10 +216,8 @@
case NTB_TOPO_B2B_DSD:
    return NTB_PORT_SEC_DSD;
default:
-    break;
+    return 0;
}
-
-return -EINVAL;
}
EXPORT_SYMBOL(ntb_default_port_number);

@@ -242,10 +240,8 @@
case NTB_TOPO_B2B_DSD:
    return NTB_PORT_PRI_USD;
default:
-    break;
+    return 0;
}
-
-return -EINVAL;
}
EXPORT_SYMBOL(ntb_default_peer_port_number);

@@ -317,4 +313,3 @@
bus_unregister(&ntb_bus);
} module_exit(ntb_driver_exit);
-
--- linux-4.15.0.orig/drivers/ntb/ntb_transport.c
+++ linux-4.15.0/drivers/ntb/ntb_transport.c
@@ -1003,6 +1003,9 @@
mw_base = nt->mw_vec[mw_num].phys_addr;
mw_size = nt->mw_vec[mw_num].phys_size;

+if (max_mw_size && mw_size > max_mw_size)
+    mw_size = max_mw_size;
+tx_size = (unsigned int)mw_size / num_qps_mw;
qp_offset = tx_size * (qp_num / mw_count);

--- linux-4.15.0.orig/drivers/nvdimm/blk.c
+++ linux-4.15.0/drivers/nvdimm/blk.c
@@ -278,8 +278,6 @@
disk->queue = q;
disk->flags = GENHD_FL_EXT_DEVT;
nvdimm_namespace_disk_name(&nsblk->common, disk->disk_name);
-set_capacity(disk, 0);
-device_add_disk(dev, disk);

if (devm_add_action_or_reset(dev, nd_blk_release_disk, disk))
    return -ENOMEM;
@@ -292,6 +290,7 @@
}

set_capacity(disk, available_disk_size >> SECTOR_SHIFT);
+device_add_disk(dev, disk);
revalidate_disk(disk);
return 0;
}
--- linux-4.15.0.orig/drivers/nvdimm/btt.c
+++ linux-4.15.0/drivers/nvdimm/btt.c
@@ -400,9 +400,9 @@
arena->freelist[lane].sub = 1 - arena->freelist[lane].sub;
if (++(arena->freelist[lane].seq) == 4)
    arena->freelist[lane].seq = 1;
-    if (ent_e_flag(ent->old_map))
+    if (ent_e_flag(le32_to_cpu(ent->old_map)))
        arena->freelist[lane].has_err = 1;
-    arena->freelist[lane].block = le32_to_cpu(ent_lba(ent->old_map));
+    arena->freelist[lane].block = ent_lba(le32_to_cpu(ent->old_map));

return ret;
}
@@ -541,9 +541,9 @@
static int btt_freelist_init(struct arena_info *arena)
{
    int old, new, ret;
    u32 i, map_entry;
-    struct log_entry log_new, log_old;
+    struct log_entry log_new;
    int new, ret;
    struct log_entry log_new;
    u32 i, map_entry, log_oldmap, log_newmap;

    arena->freelist = kcalloc(arena->nfree, sizeof(struct free_entry),
        GFP_KERNEL);
@@ -551,24 +551,26 @@
    for (i = 0; i < arena->nfree; i++) {
        old = btt_log_read(arena, i, &log_old, LOG_OLD_ENT);
        if (old < 0)
            return old;
-    return -ENOMEM;
+    return -ENOMEM;

new = btt_log_read(arena, i, &log_new, LOG_NEW_ENT);
if (new < 0)
return new;

/* old and new map entries with any flags stripped out */
+log_oldmap = ent_lba(le32_to_cpu(log_new.old_map));
+log_newmap = ent_lba(le32_to_cpu(log_new.new_map));
+
/* sub points to the next one to be overwritten */
arena->freelist[i].sub = 1 - new;
arena->freelist[i].seq = nd_inc_seq(le32_to_cpu(log_new.seq));
-arena->freelist[i].block = le32_to_cpu(log_new.old_map);
+arena->freelist[i].block = log_oldmap;

/*
 * FIXME: if error clearing fails during init, we want to make
 * the BTT read-only
 */
-if (ent_e_flag(log_new.old_map)) {
+if (ent_e_flag(le32_to_cpu(log_new.old_map)) &&
    !ent_normal(le32_to_cpu(log_new.old_map))) {
+arena->freelist[i].has_err = 1;
ret = arena_clear_freelist_error(arena, i);
if (ret)
  dev_err_ratelimited(to_dev(arena),
@@ -576,7 +578,7 @@
}                

/* This implies a newly created or untouched flog entry */
-if (log_new.old_map == log_new.new_map)
+if (log_oldmap == log_newmap)
  continue;

/* Check if map recovery is needed */
@@ -584,8 +586,15 @@
 NULL, NULL, 0);
if (ret)
  return ret;
-if ((le32_to_cpu(log_new.new_map) != map_entry) &&
-((le32_to_cpu(log_new.old_map) == map_entry)) {
++
+/*
+ * The map_entry from btt_read_map is stripped of any flag bits,
+ * so use the stripped out versions from the log as well for
+ * testing whether recovery is needed. For restoration, use the
+ * 'raw' version of the log entries as that captured what we
+ * were going to write originally.
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+ */
+if ((log_newmap != map_entry) && (log_oldmap == map_entry)) {
    /*
       * Last transaction wrote the flog, but wasn't able
       * to complete the map write. So fix up the map.
    */
@@ -1260,11 +1269,11 @@
    ret = btt_data_read(arena, page, off, postmap, cur_len);
    if (ret) {
        int rc;
-
        /* Media error - set the e_flag */
-        rc = btt_map_write(arena, premap, postmap, 0, 1,
-                           NVDIMM_IO_ATOMIC);
+        if (btt_map_write(arena, premap, postmap, 0, 1, NVDIMM_IO_ATOMIC))
+            dev_warn_ratelimited(to_dev(arena),
+                          "Error persistently tracking bad blocks at %#x\n",
+                          premap);
        goto out_rtt;
    }
@@ -1545,8 +1554,6 @@
    queue_flag_set_unlocked(QUEUE_FLAG_NONROT, btt->btt_queue);
    btt->btt_queue->queuedata = btt;
-
    -set_capacity(btt->btt_disk, 0);
    -device_add_disk(&btt->nd_btt->dev, btt->btt_disk);
    if (btt_meta_size(btt)) {
        int rc = nd_integrity_init(btt->btt_disk, btt_meta_size(btt));
@@ -1558,6 +1565,7 @@
        }
    }
    set_capacity(btt->btt_disk, btt->nlba * btt->sector_size >> 9);
+    device_add_disk(&btt->nd_btt->dev, btt->btt_disk);
    btt->nd_btt->size = btt->nlba * (u64)btt->sector_size;
    revalidate_disk(btt->btt_disk);

--- linux-4.15.0.orig/drivers/nvdimm/btt.h
+++ linux-4.15.0/drivers/nvdimm/btt.h
@@ -44,6 +44,8 @@
 #define ent_e_flag(ent) (!!(ent & MAP_ERR_MASK))
 #define ent_z_flag(ent) (!!(ent & MAP_TRIM_MASK))
 #define set_e_flag(ent) (ent |= MAP_ERR_MASK)
+/* 'normal' is both e and z flags set */
+#define ent_normal(ent) (ent_e_flag(ent) && ent_z_flag(ent))

 enum btt_init_state {
static DEVICE_ATTR_RO(size);

+static ssize_t log_zero_flags_show(struct device *dev,
+       struct device_attribute *attr, char *buf)
+{
+    return sprintf(buf, "Yn");
+}
+static DEVICE_ATTR_RO(log_zero_flags);
+
static struct attribute *nd_btt_attributes[] = {
    &dev_attr_sector_size.attr,
    &dev_attr_namespace.attr,
    &dev_attr_uuid.attr,
    &dev_attr_size.attr,
    +&dev_attr_log_zero_flags.attr,
    NULL,
};

@@ -190,14 +198,15 @@
return NULL;

nd_btt->id = ida_simple_get(&nd_region->btt_ida, 0, 0, GFP_KERNEL);
-if (nd_btt->id < 0) {
-    kfree(nd_btt);
-    return NULL;
-}
+if (nd_btt->id < 0)
+    goto out_nd_btt;

nd_btt->lbasize = lbasize;
-if (uuid)
+if (uuid) {
    uuid = kmempdup(uuid, 16, GFP_KERNEL);
+if (!uuid)
+    goto out_put_id;
+
    nd_btt->uuid = uuid;
    dev = &nd_btt->dev;
    dev_set_name(dev, "btt%d.%d", nd_region->id, nd_btt->id);
@@ -212,6 +221,13 @@
return NULL;
}
return dev;
+out_put_id:
+ida_simple_remove(&nd_region->btt_ida, nd_btt->id);
+
+out_nd_btt:
+kfree(nd_btt);
+return NULL;
}

struct device *nd_btt_create(struct nd_region *nd_region)
--- linux-4.15.0.orig/drivers/nvdimm/bus.c
+++ linux-4.15.0/drivers/nvdimm/bus.c
@@ -86,7 +86,7 @@
{
    nvdimm_bus_lock(&nvdimm_bus->dev);
    if (--nvdimm_bus->probe_active == 0)
        -wake_up(&nvdimm_bus->probe_wait);
        +wake_up(&nvdimm_bus->wait);
    nvdimm_bus_unlock(&nvdimm_bus->dev);
}

@@ -186,7 +186,7 @@
 sector_t sector;

 /* make sure device is a region */
-if (!is_nd_pmem(dev))
+if (!is_memory(dev))
    return 0;

    nd_region = to_nd_region(dev);
@@ -345,7 +345,7 @@
 return NULL;
 INIT_LIST_HEAD(&nvdimm_bus->list);
 INIT_LIST_HEAD(&nvdimm_bus->mapping_list);
-    init_waitqueue_head(&nvdimm_bus->probe_wait);
+    init_waitqueue_head(&nvdimm_bus->wait);
    nvdimm_bus->id = ida_simple_get(&nd_ida, 0, 0, GFP_KERNEL);
    mutex_init(&nvdimm_bus->reconfig_mutex);
    badrange_init(&nvdimm_bus->badrange);
@@ -414,6 +414,9 @@
 list_del_init(&nvdimm_bus->list);
 mutex_unlock(&nvdimm_bus_list_mutex);
+
+    wait_event(nvdimm_bus->wait,
+        atomic_read(&nvdimm_bus->ioctl_active) == 0);
+    nd_synchronize();
    device_for_each_child(&nvdimm_bus->dev, NULL, child_unregister);
static void nd_async_device_unregister(void *d, async_cookie_t cookie)
{
    if (!d)
        return;
    d->bus = &nvdimm_bus_type;
    if (d->parent)
        get_device(d->parent);
    get_device(d);
    async_schedule_domain(nd_async_device_register, d, &nd_async_domain);
}

void nd_device_unregister(struct device *dev, enum nd_async_mode mode)
{
    bool killed;
    switch (mode) {
    case ND_ASYNC:
        /*
         * In the async case this is being triggered with the
         * device lock held and the unregistration work needs to
         * be moved out of line iff this is thread has won the
         * race to schedule the deletion.
         * */
        if (!kill_device(dev))
            return;

        get_device(dev);
        async_schedule_domain(nd_async_device_unregister, dev, &nd_async_domain);
        break;
    case ND_SYNC:
        /*
         * In the sync case the device is being unregistered due
         * to a state change of the parent. Claim the kill state
         * to synchronize against other unregistration requests,
         * or otherwise let the async path handle it if the
         * unregistration was already queued.
         * */
        break;
    }
}
+device_lock(dev);
+killed = kill_device(dev);
+device_unlock(dev);
+
+if (!killed)
+return;
+
+nd_synchronize();
+device_unregister(dev);
+break;
@@ -565,14 +597,18 @@
{
    struct device *dev = disk_to_dev(disk)->parent;
    struct nd_region *nd_region = to_nd_region(dev->parent);
-    const char *pol = nd_region->ro ? "only" : "write";
+    int disk_ro = get_disk_ro(disk);

-    if (nd_region->ro == get_disk_ro(disk))
+    /*
+     * Upgrade to read-only if the region is read-only preserve as
+     * read-only if the disk is already read-only.
+     */
+    if (disk_ro || nd_region->ro == disk_ro)
        return 0;

-    dev_info(dev, "%s read-%s, marking %s read-%s\n",
-             dev_name(&nd_region->dev), pol, disk->disk_name, pol);
-    set_disk_ro(disk, nd_region->ro);
+    dev_info(dev, "%s read-only, marking %s read-only\n",
+             dev_name(&nd_region->dev), disk->disk_name);
+    set_disk_ro(disk, 1);

    return 0;

@@ -600,7 +636,7 @@
 NULL,
 };

-/**
+/**
 * nd_device_attribute_group - generic attributes for all devices on an nd bus
 */
 struct attribute_group nd_device_attribute_group = {
 @@ -629,7 +665,7 @@
 return a->mode;
 }
/*
 * nd_numa_attribute_group - NUMA attributes for all devices on an nd bus
 */
struct attribute_group nd_numa_attribute_group = {
    /* overshoots the remainder by 4 bytes, assume it was
     * including 'status'.
     */
    -if (out_field[1] - 8 == remainder)
    +if (out_field[1] - 4 == remainder)
        return remainder;
    -return out_field[1] - 4;
    +return out_field[1] - 8;
} else if (cmd == ND_CMD_CALL) {
    struct nd_cmd_pkg *pkg = (struct nd_cmd_pkg *) in_field;

    do {
        if (nvdimm_bus->probe_active == 0)
            break;
        -nvdimm_bus_unlock(&nvdimm_bus->dev);
        -wait_event(nvdimm_bus->probe_wait,
            +nvdimm_bus_unlock(dev);
            +device_unlock(dev);
            +wait_event(nvdimm_bus->wait,
                nvdimm_bus->probe_active == 0);
        -nvdimm_bus_lock(&nvdimm_bus->dev);
        +device_lock(dev);
        +nvdimm_bus_unlock(dev);
    } while (true);

    int read_only, unsigned int ioctl_cmd, unsigned long arg)
    {
        struct nvdimm_bus_descriptor *nd_desc = nvdimm_bus->nd_desc;
        -static char out_env[ND_CMD_MAX_ENVELOPE];
        -static char in_env[ND_CMD_MAX_ENVELOPE];
        const struct nd_cmd_desc *desc = NULL;
        unsigned int cmd = _IOC_NR(ioctl_cmd);
        struct device *dev = &nvdimm_bus->dev;
        void __user *p = (void __user *) arg;
        +char *out_env = NULL, *in_env = NULL;
        const char *cmd_name, *dimm_name;
        u32 in_len = 0, out_len = 0;
        unsigned int func = cmd;
        unsigned long cmd_mask;
        struct nd_cmd_pkg pkg;
int rc, i, cmd_rc;
+void *buf = NULL;
u64 buf_len = 0;
-void *buf;

if (nvdimm) {
  desc = nd_cmd_dimm_desc(cmd);
  return -EFAULT;
}

-if (!desc || (desc->out_num + desc->in_num == 0) ||
  !test_bit(cmd, &cmd_mask))
+if (!desc ||
  (desc->out_num + desc->in_num == 0) ||
  cmd > ND_CMD_CALL ||
  !test_bit(cmd, &cmd_mask))
  return -ENOTTY;
/* fail write commands (when read-only) */
@@ -955,7 +994,7 @@
case ND_CMD_ARS_START:
case ND_CMD_CLEAR_ERROR:
case ND_CMD_CALL:
  dev_dbg(dev, "'%s'") command while read-only.
  return -EPERM;
 @@ -964,6 +1003,9 @@
 /* process an input envelope */
in_env = kzalloc(ND_CMD_MAX_ENVELOPE, GFP_KERNEL);
+if (!in_env)
+  return -ENOMEM;
  for (i = 0; i < desc->in_num; i++) {
  u32 in_size, copy;

  if (in_size == UINT_MAX) {
    dev_err(dev, "unknown input size cmd: %s field: %d\n",
      __func__, dimm_name, cmd_name, i);
  -return -ENXIO;
  +rc = -ENXIO;
  +goto out;
  }
  -if (in_len < sizeof(in_env))

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-copy = min_t(u32, sizeof(in_env) - in_len, in_size);
+if (in_len < ND_CMD_MAX_ENVELOPE)
+copy = min_t(u32, ND_CMD_MAX_ENVELOPE - in_len, in_size);
else
    copy = 0;
-if (copy && copy_from_user(&in_env[in_len], p + in_len, copy))
-    return -EFAULT;
+if (copy && copy_from_user(&in_env[in_len], p + in_len, copy)) {
+    rc = -EFAULT;
+    goto out;
+}
in_len += in_size;
}
@@ -990,6 +1035,12 @@
}
/* process an output envelope */
+out_env = kzalloc(ND_CMD_MAX_ENVELOPE, GFP_KERNEL);
+if (!out_env) {
+    rc = -ENOMEM;
+    goto out;
+}
+
+for (i = 0; i < desc->out_num; i++) {
    u32 out_size = nd_cmd_out_size(nvdimm, cmd, desc, i,
        (u32 *) in_env, (u32 *) out_env, 0);
-    if (out_size == UINT_MAX) {
-        dev_dbg(dev, "%s:%s unknown output size cmd: %s field: %d\n", __func__, dimm_name, cmd_name, i);
-        -return -EFAULT;
-    }
-    if (out_len < sizeof(out_env))
-        copy = min_t(u32, sizeof(out_env) - out_len, out_size);
-    +if (out_len < ND_CMD_MAX_ENVELOPE)
-        +copy = min_t(u32, ND_CMD_MAX_ENVELOPE - out_len, out_size);
else
    copy = 0;
-if (copy && copy_from_user(&out_env[out_len],
        -p + in_len + out_len, copy))
-    -return -EFAULT;
+    if (copy && copy_from_user(&out_env[out_len],
+        +p + in_len + out_len, copy)) {
+        +rc = -EFAULT;
+        +goto out;
+    }

out_len += out_size;
}

@@ -1015,19 +1069,23 @@
dev_dbg(dev, "%s:%s cmd: %s buf_len: %llu > %d\n", __func__,
dimm_name, cmd_name, buf_len,
ND_IOCTL_MAX_BUFLEN);
-rc = -EINVAL;
+rc = -EINVAL;
+goto out;
}

buf = vmalloc(buf_len);
-rc = -ENOMEM;
+if (!buf) {
+rc = -ENOMEM;
+goto out;
+
}

if (copy_from_user(buf, p, buf_len)) {
    rc = -EFAULT;
    goto out;
}

-nvdimm_bus_lock(&nvdimm_bus->dev);
-device_lock(dev);
+nvdimm_bus_lock(dev);
+device_lock(dev);
rc = nd_cmd_clear_to_send(nvdimm_bus, nvdimm, func, buf);
if (rc)
goto out_unlock;
@@ -1042,39 +1100,24 @@
nvdimm_account_cleared_poison(nvdimm_bus, clear_err->address,
clear_err->cleared);
}
-nvdimm_bus_unlock(&nvdimm_bus->dev);
if (copy_to_user(p, buf, buf_len))
rc = -EFAULT;
-vfree(buf);
-return rc;
-
-out_unlock:
-nvdimm_bus_unlock(&nvdimm_bus->dev);
-out:
+nvdimm_bus_unlock(dev);
device_unlock(dev);
+out:
+kfree(in_env);
+kfree(out_env);
vfree(buf);
return rc;
}

static long nd_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
{
<long id = (long) file->private_data;
-int rc = -ENXIO, ro;
-struct nvdimm_bus *nvdimm_bus;
-
-ro = ((file->f_flags & O_ACCMODE) == O_RDONLY);
-mutex_lock(&nvdimm_bus_list_mutex);
-list_for_each_entry(nvdimm_bus, &nvdimm_bus_list, list) {
-    if (nvdimm_bus->id == id) {
-        rc = __nd_ioctl(nvdimm_bus, NULL, ro, cmd, arg);
-        break;
-    }
-}
-mutex_unlock(&nvdimm_bus_list_mutex);
-
-return rc;
-
+enum nd_ioctl_mode {
+    BUS_IOCTL,
+    DIMM_IOCTL,
+};

static int match_dimm(struct device *dev, void *data)
{
    return 0;
}

-static long nvdimm_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
+static long nd_ioctl(struct file *file, unsigned int cmd, unsigned long arg,
+enum nd_ioctl_mode mode)
+
{
-int rc = -ENXIO, ro;
-struct nvdimm_bus *nvdimm_bus;
+struct nvdimm_bus *nvdimm_bus, *found = NULL;
+long id = (long) file->private_data;
+struct nvdimm *nvdimm = NULL;
+int rc, ro;
ro = ((file->f_flags & O_ACCMODE) == O_RDONLY);
mutex_lock(&nvdimm_bus_list_mutex);
list_for_each_entry(nvdimm_bus, &nvdimm_bus_list, list) {
-struct device *dev = device_find_child(&nvdimm_bus->dev,
-file->private_data, match_dimm);
-struct nvdimm *nvdimm;
+if (mode == DIMM_IOCTL) {
+struct device *dev;

-if (!dev)
-continue;
+dev = device_find_child(&nvdimm_bus->dev,
+file->private_data, match_dimm);
+if (!dev)
+continue;
+nvdimm = to_nvdimm(dev);
+found = nvdimm_bus;
+} else if (nvdimm_bus->id == id) {
+found = nvdimm_bus;
+
+nvdimm = to_nvdimm(dev);
-rc = __nd_ioctl(nvdimm_bus, nvdimm, ro, cmd, arg);
-put_device(dev);
-break;
+if (found) {
+atomic_inc(&nvdimm_bus->ioctl_active);
+break;
+}
}
mutex_unlock(&nvdimm_bus_list_mutex);

+if (!found)
+return -ENXIO;
+
+nvdimm_bus = found;
+rc = __nd_ioctl(nvdimm_bus, nvdimm, ro, cmd, arg);
+
+if (nvdimm)
+put_device(&nvdimm->dev);
+if (atomic_dec_and_test(&nvdimm_bus->ioctl_active))
+wake_up(&nvdimm_bus->wait);
+
+return rc;
}

+static long bus_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
+{
+    return nd_ioctl(file, cmd, arg, BUS_IOCTL);
+}
+
+static long dimm_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
+{
+    return nd_ioctl(file, cmd, arg, DIMM_IOCTL);
+}
+
+static int nd_open(struct inode *inode, struct file *file)
+
+    long minor = iminor(inode);
+    @ @ -1125,16 +1199,16 @ @
+    static const struct file_operations nvdimm_bus_fops = {
+        .owner = THIS_MODULE,
+        .open = nd_open,
+        -.unlocked_ioctl = nd_ioctl,
+        -.compat_ioctl = nd_ioctl,
+        +.unlocked_ioctl = bus_ioctl,
+        +.compat_ioctl = bus_ioctl,
+        .llseek = noop_llseek,
+    };
+
+    static const struct file_operations nvdimm_fops = {
+        .owner = THIS_MODULE,
+        .open = nd_open,
+        -.unlocked_ioctl = nvdimm_ioctl,
+        -.compat_ioctl = nvdimm_ioctl,
+        +.unlocked_ioctl = dimm_ioctl,
+        +.compat_ioctl = dimm_ioctl,
+        .llseek = noop_llseek,
+    };

--- linux-4.15.0.orig/drivers/nvdimm/dax_devs.c
+++ linux-4.15.0/drivers/nvdimm/dax_devs.c
@@ -126,7 +126,7 @@
    nd_pfn_validate(nd_pfn, DAX_SIG);
    dev_dbg(dev, "%s: dax: %s\n", __func__,
        ndd->ns_next = nd_label_next_nsindex(ndd->ns_current);
nd_label_copy(ndd, to_next_namespace_index(ndd)),
to_current_namespace_index(ndd));
-rc = nd_label_reserve_dpa(ndd);
-if (ndd->ns_current >= 0)
  nvdimm_set_aliasing(dev);
+if (ndd->ns_current >= 0) {
+  rc = nd_label_reserve_dpa(ndd);
+  if (rc == 0)
+    nvdimm_set_aliasing(dev);
+}
  nvdimm_clear_locked(dev);
  nvdimm_bus_unlock(dev);
@@ -88,9 +88,9 @@
int nvdimm_init_config_data(struct nvdimm_drvdata *ndd)
{
  struct nvdimm_bus *nvdimm_bus = walk_to_nvdimm_bus(ndd->dev);
+  int rc = validate_dimm(ndd), cmd_rc = 0;
  struct nd_cmd_get_config_data_hdr *cmd;
  struct nvdimm_bus_descriptor *nd_desc;
  -int rc = validate_dimm(ndd);
  u32 max_cmd_size, config_size;
  size_t offset;
@@ -124,9 +124,11 @@
  cmd->in_offset = offset;
  rc = nd_desc->ndctl(nd_desc, to_nvdimm(ndd->dev),
  ND_CMD_GET_CONFIG_DATA, cmd,
  -cmd->in_length + sizeof(*cmd), NULL);
  -if (rc || cmd->status) {
  -  rc = -ENXIO;
  +cmd->in_length + sizeof(*cmd), &cmd_rc);
  +if (rc < 0)
  +  break;
  +if (cmd_rc < 0) {
  +  rc = cmd_rc;
  +break;
  }
  memcpy(ndd->data + offset, cmd->out_buf, cmd->in_length);
@@ -140,9 +142,9 @@
int nvdimm_set_config_data(struct nvdimm_drvdata *ndd, size_t offset,
void *buf, size_t len)
{
  -int rc = validate_dimm(ndd);
  size_t max_cmd_size, buf_offset;
  struct nd_cmd_set_config_data_hdr *cmd;
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+int rc = validate_dimm(ndd), cmd_rc = 0;
struct nvdimm_bus *nvdimm_bus = walk_to_nvdimm_bus(ndd->dev);
struct nvdimm_bus_descriptor *nd_desc = nvdimm_bus->nd_desc;

@@ -164,7 +166,6 @@
for (buf_offset = 0; len; len -= cmd->in_length,
    buf_offset += cmd->in_length) {
    size_t cmd_size;
    -u32 *status;
-
    cmd->in_offset = offset + buf_offset;
    cmd->in_length = min(max_cmd_size, len);
@@ -172,12 +173,13 @@
    /* status is output in the last 4-bytes of the command buffer */
    cmd_size = sizeof(*cmd) + cmd->in_length + sizeof(u32);
    -status = ((void *) cmd) + cmd_size - sizeof(u32);
    rc = nd_desc->ndctl(nd_desc, to_nvdimm(ndd->dev),
       -ND_CMD_SET_CONFIG_DATA, cmd, cmd_size, NULL);
    -if (rc || *status) {
    -rc = rc ? rc : -ENXIO;
    +ND_CMD_SET_CONFIG_DATA, cmd, cmd_size, &cmd_rc);
    +if (rc < 0)
        +break;
    +if (cmd_rc < 0) {
        +rc = cmd_rc;
        break;
    }
@@ -358,16 +360,16 @@
    }
 static DEVICE_ATTR_RO(state);

-static ssize_t available_slots_show(struct device *dev,
-struct device_attribute *attr, char *buf)
+static ssize_t __available_slots_show(struct nvdimm_drvdata *ndd, char *buf)
{
    struct nvdimm_drvdata *ndd = dev_get_drvdata(dev);
    ssize_t rc;
    u32 nfree;

    if (!ndd)
        return -ENXIO;

    +dev = ndd->dev;
    nvdimm_bus_lock(dev);
nfree = nd_label_nfree(ndd);
if (nfree - 1 > nfree) {
    nvdimm_bus_unlock(dev);
    return rc;
}
+
+static ssize_t available_slots_show(struct device *dev,
  struct device_attribute *attr, char *buf)
+{
+  ssize_t rc;
+  device_lock(dev);
+  rc = __available_slots_show(dev_get_drvdata(dev), buf);
+  device_unlock(dev);
+  return rc;
+
static DEVICE_ATTR_RO(available_slots);

static struct attribute *nvdimm_attributes[] = {
  --- linux-4.15.0.orig/drivers/nvdimm/label.c
  +++ linux-4.15.0/drivers/nvdimm/label.c
  @@ -25,6 +25,8 @@
  static guid_t nvdimm_pfn_guid;
  static guid_t nvdimm_dax_guid;

  +static const char NSINDEX_SIGNATURE[] = "NAMESPACE_INDEX";
  +
  static u32 best_seq(u32 a, u32 b)
  {
    a &= NSINDEX_SEQ_MASK;
    return &guid_null;
  }

  +static void reap_victim(struct nd_mapping *nd_mapping,
    struct nd_label_ent *victim)
  +{
    struct nvdimm_drvdata *ndd = to_ndd(nd_mapping);
    u32 slot = to_slot(ndd, victim->label);
    dev_dbg(ndd->dev, "free: %d\n", slot);
    nd_label_free_slot(ndd, slot);
    victim->label = NULL;
  }

  +static int __pmem_label_update(struct nd_region *nd_region,
struct nd_mapping *nd_mapping, struct nd_namespace_pmem *nspm,
-int pos)
+int pos, unsigned long flags)
{
struct nd_namespace_common *ndns = &nspm->nsio.common;
struct nd_interleave_set *nd_set = nd_region->nd_set;
struct nvdimm_drvdata *ndd = to_ndd(nd_mapping);
-struct nd_label_ent *label_ent, *victim = NULL;
struct nd_namespace_label *nd_label;
struct nd_namespace_index *nsindex;
+struct nd_label_ent *label_ent;
struct nd_label_id label_id;
struct resource *res;
unsigned long *free;
@@ -657,7 +670,7 @@
    memcpy(nd_label->uuid, nspm->uuid, NSLABEL_UUID_LEN);
    if (nspm->alt_name)
        memcpy(nd_label->name, nspm->alt_name, NSLABEL_NAME_LEN);
    -nd_label->flags = __cpu_to_le32(NSLABEL_FLAG_UPDATING);
    +nd_label->flags = __cpu_to_le32(flags);
    nd_label->nlabel = __cpu_to_le16(nd_region->ndr_mappings);
    nd_label->position = __cpu_to_le16(pos);
    nd_label->isetcookie = __cpu_to_le64(cookie);
@@ -692,18 +705,10 @@
 list_for_each_entry(label_ent, &nd_mapping->labels, list) {
    if (!label_ent->label)
        continue;
    -if (memcmp(nspm->uuid, label_ent->label->uuid,
        -NSLABEL_UUID_LEN) != 0)
    -continue;
    -victim = label_ent;
    -list_move_tail(&victim->list, &nd_mapping->labels);
    -break;
    -}
    -if (victim) {
        -dev_dbg(ndd->dev, "%s: free: %d\n", __func__, slot);
        -slot = to_slot(ndd, victim->label);
        -nd_label_free_slot(ndd, slot);
        -victim->label = NULL;
        +if (test_and_clear_bit(ND_LABEL_REAP, &label_ent->flags)
            +|| memcmp(nspm->uuid, label_ent->label->uuid,
                +NSLABEL_UUID_LEN) == 0)
            +reap_victim(nd_mapping, label_ent);
    }
    /* update index */
    @@ -847,6 +852,15 @@
}
/* release slots associated with any invalidated UUIDs */
+mutex_lock(&nd_mapping->lock);
+list_for_each_entry_safe(label_ent, e, &nd_mapping->labels, list)
+if (test_and_clear_bit(ND_LABEL_REAP, &label_ent->flags)) {
+reap_victim(nd_mapping, label_ent);
+list_move(&label_ent->list, &list);
+}
+mutex_unlock(&nd_mapping->lock);
+
+/*
* Find the resource associated with the first label in the set
* per the v1.2 namespace specification.
@ @ -866.8 +880.10 @@
if (is_old_resource(res, old_res_list, old_num_resources))
continue; /* carry-over */
slot = nd_label_alloc_slot(ndd);
-if (slot == UINT_MAX)
+if (slot == UINT_MAX) {
+rc = -ENXIO;
+goto abort;
+
+dev_dbg(ndd->dev, "%s: allocated: %d\n", __func__, slot);
+
+nd_label = to_label(ndd, slot);
@@ -1111,13 +1127,13 @@
int nd_pmem_namespace_label_update(struct nd_region *nd_region,
struct nd_namespace_pmem *nspm, resource_size_t size)
{ +
-int i;
+int i, rc;

for (i = 0; i < nd_region->ndr_mappings; i++) {
struct nd_mapping *nd_mapping = &nd_region->mapping[i];
struct nvdimm_drvdata *ndd = to_ndd(nd_mapping);
struct resource *res;
-int rc, count = 0;
+int count = 0;

if (size == 0) {
+rc = __pmem_label_update(nd_region, nd_mapping, nspm, i);
+rc = __pmem_label_update(nd_region, nd_mapping, nspm, i,
+NSLABEL_FLAG_UPDATING);
+if (rc)
+return rc;
+
+if (size == 0)
+return 0;
+
+/* Clear the UPDATING flag per UEFI 2.7 expectations */
+for (i = 0; i < nd_region->ndr_mappings; i++) {
+struct nd_mapping *nd_mapping = &nd_region->mapping[i];
+
+rc = __pmem_label_update(nd_region, nd_mapping, nspm, i, 0);
+if (rc)
+return rc;
}
--- linux-4.15.0.orig/drivers/nvdimm/label.h
+++ linux-4.15.0/drivers/nvdimm/label.h
@@ -38,8 +38,6 @@
ND_NSINDEX_INIT = 0x1,
]

-static const char NSINDEX_SIGNATURE[] = "NAMESPACE_INDEX\0";
-
-/** *
- * struct nd_namespace_index - label set superblock
- * @sig: NAMESPACE_INDEX\0
--- linux-4.15.0.orig/drivers/nvdimm/namespace_devs.c
+++ linux-4.15.0/drivers/nvdimm/namespace_devs.c
@@ -138,6 +138,7 @@

bool pmem_should_map_pages(struct device *dev)
{
 struct nd_region *nd_region = to_nd_region(dev->parent);
+struct nd_namespace_common *ndns = to_ndns(dev);
 struct nd_namespace_io *nsio;

 if (!IS_ENABLED(CONFIG_ZONE_DEVICE))
@@ -149,6 +150,9 @@
 if (is_nd_pfn(dev) || is_nd_btt(dev))
 return false;
+
+if (ndns->force_raw)
+return false;
+
 nsio = to_nd_namespace_io(dev);
 if (region_intersects(nsio->res.start, resource_size(&nsio->res),
 IORESOURCE_SYSTEM_RAM,
@@ -1225,12 +1229,27 @@
for (i = 0; i < nd_region->ndr_mappings; i++) {
    struct nd_mapping *nd_mapping = &nd_region->mapping[i];
    struct nvdimm_drvdata *ndd = to_ndd(nd_mapping);
+    struct nd_label_ent *label_ent;
    struct resource *res;

    for_each_dpa_resource(ndd, res)
    if (strcmp(res->name, old_label_id.id) == 0)
        sprintf((void *) res->name, "%s",
                new_label_id.id);
+    mutex_lock(&nd_mapping->lock);
+    list_for_each_entry(label_ent, &nd_mapping->labels, list) {
+        struct nd_namespace_label *nd_label = label_ent->label;
+        struct nd_label_id label_id;
+        if (!nd_label)
+            continue;
+        nd_label_gen_id(&label_id, nd_label->uuid,
+                        __le32_to_cpu(nd_label->flags));
+        if (strcmp(old_label_id.id, label_id.id) == 0)
+            set_bit(ND_LABEL_REAP, &label_ent->flags);
    }
+    mutex_unlock(&nd_mapping->lock);
}
kfree(*old_uuid);
out:
@@ -1926,7 +1945,7 @@
}
if (i < nd_region->ndr_mappings) {
-    struct nvdimm_drvdata *ndd = to_ndd(&nd_region->mapping[i]);
+    struct nvdimm *nvdimm = nd_region->mapping[i].nvdimm;

    /*
     * Give up if we don't find an instance of a uuid at each
@@ -1934,7 +1953,7 @@
     * find a dimm with two instances of the same uuid.
     */
    dev_err(&nd_region->dev, "%s missing label for %pUb\n",
-    -dev_name(ndd->dev), nd_label->uuid);
+    +nvdimm_name(nvdimm), nd_label->uuid);
    rc = -EINVAL;
    goto err;
}
@@ -1959,7 +1978,7 @@
    nd_mapping = &nd_region->mapping[i];
    label_ent = list_first_entry_or_null(&nd_mapping->labels,

typedef(*label_ent), list);
- label0 = label_ent ? label_ent->label : 0;
+ label0 = label_ent ? label_ent->label : NULL;

if (!label0) {
    WARN_ON(1);
    goto blk_err;
}

if (!nsblk->uuid)
    goto blk_err;

memcpy(name, nd_label->name, NSLABEL_NAME_LEN);
-if (name[0])
    +if (name[0]) {
        nsblk->alt_name = kmemdup(name, NSLABEL_NAME_LEN,
        GFP_KERNEL);
        +goto blk_err;
    +}

res = nsblk_add_resource(nd_region, ndd, nsblk,
    __le64_to_cpu(nd_label->dpa));
-if (!res)
    +res = nsblk_add_resource(nd_region, ndd, nsblk,
    __le64_to_cpu(nd_label->dpa));
    if (!res)
        goto blk_err;

/* skip labels that describe extents outside of the region */
-if (nd_label->dpa < nd_mapping->start || nd_label->dpa > map_end)
    -continue;
+if (__le64_to_cpu(nd_label->dpa) < nd_mapping->start ||
    __le64_to_cpu(nd_label->dpa) > map_end)
    +continue;

i = add_namespace_resource(nd_region, nd_label, devs, count);
-if (i < 0)
    --- linux-4.15.0.orig/drivers/nvdimm/nd-core.h
    +++ linux-4.15.0/drivers/nvdimm/nd-core.h
    @@ -25,10 +25,11 @@
    struct nvdimm_bus {
    struct nvdimm_bus_descriptor *nd_desc;
    -wait_queue_head_t probe_wait;
    +wait_queue_head_t probe_wait;
    struct list_head list;
    struct device dev;
    int id, probe_active;
    +atomic_t ioctl_active;
    struct list_head mapping_list;
    struct mutex reconfig_mutex;
    struct badrange badrange;
    @@ -104,6 +105,8 @@
struct nd_mapping *nd_mapping, resource_size_t *overlap);
resource_size_t nd_blk_available_dpa(struct nd_region *nd_region);
resource_size_t nd_region_available_dpa(struct nd_region *nd_region);
+int nd_region_conflict(struct nd_region *nd_region, resource_size_t start,
+resource_size_t size);
resource_size_t nvdimm_allocated_dpa(struct nvdimm_drvdata *ndd,
struct nd_label_id *label_id);
int alias_dpa_busy(struct device *dev, void *data);
--- linux-4.15.0.orig/drivers/nvdimm/nd.h
+++ linux-4.15.0/drivers/nvdimm/nd.h
@@ -29,7 +29,6 @@
*/
ND_MAX_LANES = 256,
-SECTOR_SHIFT = 9,
INT_LBASE_SIZE_ALIGNMENT = 64,
NVDIMM_IO_ATOMIC = 1,
};
@@ -114,8 +113,12 @@
spinlock_t lock;
}

+enum nd_label_flags {
+ND_LABEL_REAP,
+};
struct nd_label_ent {
struct list_head list;
+unsigned long flags;
struct nd_namespace_label *label;
}

--- linux-4.15.0.orig/drivers/nvdimm/pfn.h
+++ linux-4.15.0/drivers/nvdimm/pfn.h
@@ -36,6 +36,7 @@
 __le32 end_trunc;
 /* minor-version-2 record the base alignment of the mapping */
 __le32 align;
+/* minor-version-3 guarantee the padding and flags are zero */
u8 padding[4000];
 __le64 checksum;
};
--- linux-4.15.0.orig/drivers/nvdimm/pfn_devs.c
+++ linux-4.15.0/drivers/nvdimm/pfn_devs.c
@@ -361,6 +361,15 @@
 return dev;
}

+/**

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+ * nd_pfn_validate - read and validate info-block
+ * @nd_pfn: fsdax namespace runtime state / properties
+ * @sig: 'devdax' or 'fsdax' signature
+ *
+ * Upon return the info-block buffer contents (-pfn_sb) are
+ * indeterminate when validation fails, and a coherent info-block
+ * otherwise.
+ */
int nd_pfn_validate(struct nd_pfn *nd_pfn, const char *sig)
{
    u64 checksum, offset;
    nvdimm_bus_unlock(&ndns->dev);
    if (!pfn_dev)
        return -ENOMEM;
    pfn_sb = devm_kzalloc(dev, sizeof(*pfn_sb), GFP_KERNEL);
    nd_pfn = to_nd_pfn(pfn_dev);
    nd_pfn->pfn_sb = pfn_sb;
    rc = nd_pfn_validate(nd_pfn, PFN_SIG);
}

static unsigned long init_altmap_reserve(resource_size_t base)
{
    unsigned long reserve = PHYS_PFN(SZ_8K);
    unsigned long reserve = PFN_UP(SZ_8K);
    unsigned long base_pfn = PHYS_PFN(base);
    reserve += base_pfn - PFN_SECTION_ALIGN_DOWN(base_pfn);
}

+/*
+ * Check if pmem collides with 'System RAM', or other regions when
+ * section aligned. Trim it accordingly.
+ */
+static void trim_pfn_device(struct nd_pfn *nd_pfn, u32 *start_pad, u32 *end_trunc)
+{
+    struct nd_namespace_common *ndns = nd_pfn->ndns;
+    struct nd_namespace_io *nsio = to_nd_namespace_io(&ndns->dev);
+    struct nd_region *nd_region = to_nd_region(nd_pfn->dev.parent);
+    const resource_size_t start = nsio->res.start;
+    const resource_size_t end = start + resource_size(&nsio->res);
+    const resource_size_t adjust, size;
+    *start_pad = 0;
+    *end_trunc = 0;
+adjust = start - PHYS_SECTION_ALIGN_DOWN(start);
+size = resource_size(&nsio->res) + adjust;
+if (region_intersects(start - adjust, size, IORESOURCE_SYSTEM_RAM,
+IORES_DESC_NONE) == REGION_MIXED
+|| nd_region_conflict(nd_region, start - adjust, size))
+*start_pad = PHYS_SECTION_ALIGN_UP(start) - start;
+
+/* Now check that end of the range does not collide. */
+adjust = PHYS_SECTION_ALIGN_UP(end) - end;
+size = resource_size(&nsio->res) + adjust;
+if (region_intersects(start, size, IORESOURCE_SYSTEM_RAM,
+IORES_DESC_NONE) == REGION_MIXED
+|| !IS_ALIGNED(end, nd_pfn->align)
+|| nd_region_conflict(nd_region, start, size))
+*end_trunc = end - phys_pmem_align_down(nd_pfn, end);
+
}+

static int nd_pfn_init(struct nd_pfn *nd_pfn)
{
    u32 dax_label_reserve = is_nd_dax(&nd_pfn->dev) ? SZ_128K : 0;
    struct nd_namespace_common *ndns = nd_pfn->ndns;
    u32 start_pad = 0, end_trunc = 0;
    struct nd_namespace_io *nsio = to_nd_namespace_io(&ndns->dev);
    resource_size_t start, size;
    struct nd_region *nd_region;
    u32 start_pad, end_trunc;
    struct nd_pfn_sb *pfn_sb;
    unsigned long npfns;
    phys_addr_t offset;
    /* -604,7 +646,7 @@
    u64 checksum;
    int rc;

    -pfn_sb = devm_kzalloc(&nd_pfn->dev, sizeof(*pfn_sb), GFP_KERNEL);
    +pfn_sb = devm_kmalloc(&nd_pfn->dev, sizeof(*pfn_sb)), GFP_KERNEL);
    if (!pfn_sb)
        return -ENOMEM;

    @ @ -613,11 +655,14 @@
sig = DAX_SIG;
else
    sig = PFN_SIG;
+
    rc = nd_pfn_validate(nd_pfn, sig);
    if (rc != -ENODEV)
        return rc;

    @ @ -613,11 +655,14 @@
    sig = DAX_SIG;
else
    sig = PFN_SIG;
+
    rc = nd_pfn_validate(nd_pfn, sig);
    if (rc != -ENODEV)
        return rc;
/* no info block, do init */;
+memset(pfn_sb, 0, sizeof(*pfn_sb));
+
nd_region = to_nd_region(nd_pfn->dev.parent);
if (nd_region->ro) {
  dev_info(&nd_pfn->dev,
@@ -628,30 +673,7 @@
    
memset(pfn_sb, 0, sizeof(*pfn_sb));
-
-/* Check if pmem collides with 'System RAM' when section aligned and
- * trim it accordingly
- */
-nsio = to_nd_namespace_io(&ndns->dev);
-start = PHYS_SECTION_ALIGN_DOWN(nsio->res.start);
-size = resource_size(&nsio->res);
-if (region_intersects(start, size, IORESOURCE_SYSTEM_RAM,
-IORES_DESC_NONE) == REGION_MIXED) {
  start = nsio->res.start;
  -start_pad = PHYS_SECTION_ALIGN_UP(start) - start;
-}
-
-start = nsio->res.start;
-size = PHYS_SECTION_ALIGN_UP(start + size) - start;
-if (region_intersects(start, size, IORESOURCE_SYSTEM_RAM,
-IORES_DESC_NONE) == REGION_MIXED
- || !IS_ALIGNED(start + resource_size(&nsio->res),
-nd_pfn->align)) {
  size = resource_size(&nsio->res);
  -end_trunc = start + size - phys_pmem_align_down(nd_pfn,
  -start + size);
-}
-
+trim_pfn_device(nd_pfn, &start_pad, &end_trunc);
  if (start_pad + end_trunc)
    dev_info(&nd_pfn->dev, "%s alignment collision, truncate %d bytes\n",
    dev_name(&ndns->dev), start_pad + end_trunc);
@@ -662,7 +684,7 @@
 * implementation will limit the pfns advertised through
 * ->direct_access() to those that are included in the memmap.
 */
-start += start_pad;
+start = nsio->res.start + start_pad;
-size = resource_size(&nsio->res);
 npfns = PFN_SECTION_ALIGN_UP((size - start_pad - end_trunc - SZ_8K)
 / PAGE_SIZE);
memcpy(pfn_sb->uuid, nd_pfn->uuid, 16);
memcpy(pfn_sb->parent_uuid, nd_dev_to_uuid(&ndns->dev), 16);
pfn_sb->version_major = cpu_to_le16(1);
-pfn_sb->version_minor = cpu_to_le16(2);
+pfn_sb->version_minor = cpu_to_le16(3);
pfn_sb->start_pad = cpu_to_le32(start_pad);
pfn_sb->end_trunc = cpu_to_le32(end_trunc);
pfn_sb->align = cpu_to_le32(nd_pfn->align);
--- linux-4.15.0.orig/drivers/nvdimm/pmem.c
+++ linux-4.15.0/drivers/nvdimm/pmem.c
@@ -35,6 +35,7 @@
#include "pmem.h"
#include "PFN.h"
#include "nd.h"
+#include "nd-core.h"

static struct device *to_dev(struct pmem_device *pmem)
{
@@ -86,13 +87,13 @@
while (len) {
    mem = kmap_atomic(page);
    -chunk = min_t(unsigned int, len, PAGE_SIZE);
    +chunk = min_t(unsigned int, len, PAGE_SIZE - off);
    memcpy_flushcache(pmem_addr, mem + off, chunk);
    kunmap_atomic(mem);
    len -= chunk;
    off = 0;
    page++;
    -pmem_addr += PAGE_SIZE;
    +pmem_addr += chunk;
}
}

@@ -105,7 +106,7 @@
while (len) {
    mem = kmap_atomic(page);
    -chunk = min_t(unsigned int, len, PAGE_SIZE);
    +chunk = min_t(unsigned int, len, PAGE_SIZE - off);
    rc = memcpy_mcsafe(mem + off, pmem_addr, chunk);
    kunmap_atomic(mem);
    if (rc)
@@ -113,7 +114,7 @@
        len -= chunk;
        off = 0;
        page++;
- pmem_addr += PAGE_SIZE;
+ pmem_addr += chunk;

} return BLK_STS_OK;
}
@@ -257,10 +258,16 @@ return __pmem_direct_access(pmem, pgoff, nr_pages, kaddr, pfn);

+/*@ *
+ * Use the 'no check' versions of copy_from_iter_flushcache() and
+ * copy_to_iter_mcsafe() to bypass HARDENED_USERCOPY overhead. Bounds
+ * checking, both file offset and device offset, is handled by
+ * dax_iomap_actor()
+ */
+ static size_t pmem_copy_from_iter(struct dax_device *dax_dev, pgoff_t pgoff,
+ void *addr, size_t bytes, struct iov_iter *i)
+ {
+ - return copy_from_iter_flushcache(addr, bytes, i);
+ + return _copy_from_iter_flushcache(addr, bytes, i);
+ }

 static const struct dax_operations pmem_dax_ops = {
@@ -299,7 +306,7 @@ struct nd_namespace_io *nsio = to_nd_namespace_io(&ndns->dev);
 struct nd_region *nd_region = to_nd_region(dev->parent);
 struct vmem_altmap __altmap, *altmap = NULL;
 -int nid = dev_to_node(dev), fua, wbc;
+int nid = dev_to_node(dev), fua;
 struct resource *res = &nsio->res;
 struct nd_pfn *nd_pfn = NULL;
 struct dax_device *dax_dev;
@@ -334,7 +341,6 @@
 dev_warn(dev, "unable to guarantee persistence of writes\n");
 fua = 0;
 }
- wbc = nvdimm_has_cache(nd_region);
+ wbc = true;

 if (!devm_request_mem_region(dev, res->start, resource_size(res),
 dev_name(&ndns->dev))) {
@@ -378,7 +384,7 @@
 return PTR_ERR(addr);
 pmem->virt_addr = addr;

 - blk_queue_write_cache(q, wbc, fua);
+ blk_queue_write_cache(q, true, fua);
 blk_queue_make_request(q, pmem_make_request);
 blk_queue_physical_block_size(q, PAGE_SIZE);
blk_queue_logical_block_size(q, pmem_sector_size(ndns));
@@ -409,7 +415,7 @@
    put_disk(disk);
    return -ENOMEM;
 }
@dax_write_cache(dax_dev, wbc);
+dax_write_cache(dax_dev, nvdimm_has_cache(nd_region));
    pmem->dax_dev = dax_dev;

    gendev = disk_to_dev(disk);
--- linux-4.15.0.orig/drivers/nvdimm/region.c
+++ linux-4.15.0/drivers/nvdimm/region.c
@@ -42,18 +42,7 @@
        if (rc)
            return rc;

-rc = nd_region_register_namespaces(nd_region, &err);
-if (rc < 0)
-    return rc;
-
-ndrd = dev_get_drvdata(dev);
-ndrd->ns_active = rc;
-ndrd->ns_count = rc + err;
-
-if (rc && err && rc == err)
    return -ENODEV;
-
-if (is_nd_pmem(&nd_region->dev)) {
+if (is_memory(&nd_region->dev)) {
    struct resource ndr_res;

    if (devm_init_badblocks(dev, &nd_region->bb))
@@ -68,6 +57,17 @@
    nvdimm_badblocks_populate(nd_region, &nd_region->bb, &ndr_res);
 } }
+rc = nd_region_register_namespaces(nd_region, &err);
+if (rc < 0)
+    return rc;
+ndrd = dev_get_drvdata(dev);
+ndrd->ns_active = rc;
+ndrd->ns_count = rc + err;
+
+if (rc && err && rc == err)
     return -ENODEV;
+
     nd_region->btt_seed = nd_btt_create(nd_region);
nd_region->pfn_seed = nd_pfn_create(nd_region);
nd_region->dax_seed = nd_dax_create(nd_region);
@@ -131,7 +131,7 @@
 struct nd_region *nd_region = to_nd_region(dev);
 struct resource res;

-@if (is_nd_pmem(&nd_region->dev)) {
+@if (is_memory(&nd_region->dev)) {
    res.start = nd_region->ndr_start;
    res.end = nd_region->ndr_start +
    nd_region->ndr_size - 1;
--- linux-4.15.0.orig/drivers/nvdimm/region_devs.c
+++ linux-4.15.0/drivers/nvdimm/region_devs.c
@@ -393,10 +393,12 @@
 * memory nvdimm_bus_lock() is dropped, but that's userspace's
 * problem to not race itself.
 */
+device_lock(dev);
 nvdimm_bus_lock(dev);
 wait_nvdimm_bus_probe_idle(dev);
 available = nd_region_available_dpa(nd_region);
 nvdimm_bus_unlock(dev);
+device_unlock(dev);

 return sprintf(buf, "%llu\n", available);
 }
@@ -513,10 +515,17 @@
 struct device_attribute *attr, char *buf)
 {
 struct nd_region *nd_region = to_nd_region(dev);
+ssize_t rc;

-return badblocks_show(&nd_region->bb, buf, 0);
-}
+device_lock(dev);
 +if (dev->driver)
 +rc = badblocks_show(&nd_region->bb, buf, 0);
+else
 +rc = -ENXIO;
+device_unlock(dev);

 +return rc;
 +}
 static DEVICE_ATTR(badblocks, 0444, region_badblocks_show, NULL);

 static ssize_t resource_show(struct device *dev,
@@ -528,6 +537,20 @@
}
static DEVICE_ATTR_RO(resource);

+static ssize_t persistence_domain_show(struct device *dev,
+struct device_attribute *attr, char *buf)
+
+static struct nd_region *nd_region = to_nd_region(dev);
+
+static struct nd_region *nd_region = to_nd_region(dev);
+
+if (test_bit(ND_REGION_PERSIST_CACHE, &nd_region->flags))
+    return sprintf(buf, "cpu_cache\n");
+else if (test_bit(ND_REGION_PERSIST_MEMCTRL, &nd_region->flags))
+    return sprintf(buf, "memory_controller\n");
+else
+    return sprintf(buf, "\n");
+
+static DEVICE_ATTR_RO(persistence_domain);
+
+static struct attribute *nd_region_attributes[] = {
    &dev_attr_size.attr,
    &dev_attr_nstype.attr,
    @ @ .543,6 +566,7 @ @
    &dev_attr_init_namespaces.attr,
    &dev_attr_badblocks.attr,
    &dev_attr_resource.attr,
    +&dev_attr_persistence_domain.attr,
    NULL,
};
+
@@ -559,11 +583,11 @@
    if (!is_memory(dev) && a == &dev_attr_dax_seed.attr)
        return 0;
    
-    if (!is_nd_pmem(dev) && a == &dev_attr_badblocks.attr)
+    if (!is_memory(dev) && a == &dev_attr_badblocks.attr)
        return 0;
    if (a == &dev_attr_resource.attr) {
        -if (is_nd_pmem(dev))
+        if (is_memory(dev))
            return 0400;
        else
            return 0;
        @ @ -1101,10 +1125,52 @ @

    int nvdimm_has_cache(struct nd_region *nd_region)
    {
        -return is_nd_pmem(&nd_region->dev);
+        return is_nd_pmem(&nd_region->dev) &&
            !test_bit(ND_REGION_PERSIST_CACHE, &nd_region->flags);
struct conflict_context {
    struct nd_region *nd_region;
    resource_size_t start, size;
};

static int region_conflict(struct device *dev, void *data)
{
    struct nd_region *nd_region;
    struct conflict_context *ctx = data;
    resource_size_t res_end, region_end, region_start;
    
    if (!is_memory(dev))
        return 0;
    
    nd_region = to_nd_region(dev);
    if (nd_region == ctx->nd_region)
        return 0;
    
    res_end = ctx->start + ctx->size;
    region_start = nd_region->ndr_start;
    region_end = region_start + nd_region->ndr_size;
    if (ctx->start >= region_start && ctx->start < region_end)
        return -EBUSY;
    if (res_end > region_start && res_end <= region_end)
        return -EBUSY;
    return 0;
}

int nd_region_conflict(struct nd_region *nd_region, resource_size_t start,
                      resource_size_t size)
{
    struct nvdimm_bus *nvdimm_bus = walk_to_nvdimm_bus(&nd_region->dev);
    struct conflict_context ctx = {
        .nd_region = nd_region,
        .start = start,
        .size = size,
    };
    
    return device_for_each_child(&nvdimm_bus->dev, &ctx, region_conflict);
}

void __exit nd_region_devs_exit(void)
{
    ida_destroy(&region_ida);
}
--- linux-4.15.0.orig/drivers/nvme/host/Kconfig
+++ linux-4.15.0/drivers/nvme/host/Kconfig
@@ -27,7 +27,7 @@
    depends on INFINIBAND && BLOCK
+depends on INFINIBAND && INFINIBAND_ADDR_TRANS && BLOCK
select NVME_CORE
select NVME_FABRICS
select SG_POOL
--- linux-4.15.0.orig/drivers/nvme/host/core.c
+++ linux-4.15.0/drivers/nvme/host/core.c
@@ -79,6 +79,7 @@
static void nvme_put_subsystem(struct nvme_subsystem *subsys);
static __le32 nvme_get_log_dw10(u8 lid, size_t size)
{
    ida_simple_remove(&head->subsys->ns_ida, head->instance);
    list_del_init(&head->entry);
    cleanup_srcu_struct(&head->srcu);
+    nvme_put_subsystem(head->subsys);
    kfree(head);
}
@@ -468,7 +470,14 @@
 range = kmalloc_array(segments, sizeof(*range), GFP_ATOMIC);
 /*
 * Some devices do not consider the DSM 'Number of Ranges' field when
 * determining how much data to DMA. Always allocate memory for maximum
 * number of segments to prevent device reading beyond end of buffer.
 * /
+static const size_t alloc_size = sizeof(*range) * NVME_DSM_MAX_RANGES;
+range = kzalloc(alloc_size, GFP_ATOMIC | __GFP_NOWARN);

 req->special_vec.bv_page = virt_to_page(range);
req->special_vec.bv_offset = offset_in_page(range);
-req->special_vec.bv_len = sizeof(*range) * segments;
+req->special_vec.bv_len = alloc_size;
req->rq_flags |= RQF_SPECIAL_PAYLOAD;

return BLK_STS_OK;
@@ -707,6 +716,7 @@
ret = PTR_ERR(meta);
goto out_unmap;
}
+req->cmd_flags |= REQ_INTEGRITY;
}
}

@@ -799,6 +809,19 @@
}
EXPORT_SYMBOL_GPL(nvme_stop_keep_alive);

+/
+ * In NVMe 1.0 the CNS field was just a binary controller or namespace
+ * flag, thus sending any new CNS opcodes has a big chance of not working.
+ * Qemu unfortunately had that bug after reporting a 1.1 version compliance
+ * (but not for any later version).
+ */
+static bool nvme_ctrl_limited_cns(struct nvme_ctrl *ctrl)
+
+if (ctrl->quirks & NVME_QUIRK_IDENTIFY_CNS)
+return ctrl->vs < NVME_VS(1, 2, 0);
+return ctrl->vs < NVME_VS(1, 1, 0);
+
+static int nvme_identify_ctrl(struct nvme_ctrl *dev, struct nvme_id_ctrl **id)
+
+    struct nvme_command c = { 0 };
+@@ -927,15 +950,15 @@
+    return id;
+
-static int nvme_set_features(struct nvme_ctrl *dev, unsigned fid, unsigned dword11,
-    void *buffer, size_t buflen, u32 *result)
+static int nvme_features(struct nvme_ctrl *dev, u8 op, unsigned int fid,
+unsiged int dword11, void *buffer, size_t buflen, u32 *result)
+
+union nvme_result res = { 0 };
+struct nvme_command c;
-union nvme_result res;
+int ret;

    memset(&c, 0, sizeof(c));
- c.features.opcode = nvme_admin_set_features;
+ c.features.opcode = op;
 c.features.fid = cpu_to_le32(fid);
 c.features.dword11 = cpu_to_le32(dword11);

@@ -946,6 +969,24 @@
 return ret;
 }

+int nvme_set_features(struct nvme_ctrl *dev, unsigned int fid,
+    unsigned int dword11, void *buffer, size_t buflen,
+    u32 *result)
+{
+    return nvme_features(dev, nvme_admin_set_features, fid, dword11, buffer,
+        buflen, result);
+}
+EXPORT_SYMBOL_GPL(nvme_set_features);

+int nvme_get_features(struct nvme_ctrl *dev, unsigned int fid,
+    unsigned int dword11, void *buffer, size_t buflen,
+    u32 *result)
+{
+    return nvme_features(dev, nvme_admin_get_features, fid, dword11, buffer,
+        buflen, result);
+}
+EXPORT_SYMBOL_GPL(nvme_get_features);

+int nvme_set_queue_count(struct nvme_ctrl *ctrl, int *count)
+{
+    u32 q_count = (*count - 1) | ((*count - 1) << 16);
@@ -1054,7 +1095,7 @@
 }

 if (ctrl->effects)
-    effects = le32_to_cpu(ctrl->effects->iocs[opcode]);
+    effects = le32_to_cpu(ctrl->effects->acs[opcode]);
 else
    effects = nvme_known_admin_effects(opcode);

@@ -1133,7 +1174,7 @@
     effects = nvme_passthru_start(ctrl, ns, cmd.opcode);
     status = nvme_submit_user_cmd(ns ? ns->queue : ctrl->admin_q, &c,
         (void __user *)(uintptr_t)cmd.addr, cmd.data_len,
-            (void __user *)(uintptr_t)cmd.metadata, cmd.metadata,
+            (void __user *)(uintptr_t)cmd.metadata, cmd.metadata_len,
         0, &cmd.result, timeout);
     nvme_passthru_end(ctrl, effects);
ifdef CONFIG_NVME_MULTIPATH
if (disk->fops == &nvme_ns_head_ops) {
  struct nvme_ns *ns;
+
  *head = disk->private_data;
  *srcu_idx = srcu_read_lock(&(*head)->srcu);
  return nvme_find_path(*head);
  ns = nvme_find_path(*head);
  if (!ns)
    srcu_read_unlock(&(*head)->srcu, *srcu_idx);
  return ns;
}
#endif
*head = NULL;

srcu_read_unlock(&head->srcu, idx);
}

static int nvme_ns_ioctl(struct nvme_ns *ns, unsigned cmd, unsigned long arg)
static int nvme_ioctl(struct block_device *bdev, fmode_t mode,
  unsigned int cmd, unsigned long arg)
{
  struct nvme_ns_head *head = NULL;
  void __user *argp = (void __user *)arg;
  struct nvme_ns *ns;
  int srcu_idx, ret;
+
  ns = nvme_get_ns_from_disk(bdev->bd_disk, &head, &srcu_idx);
  if (unlikely(!ns))
    return -EWOULDBLOCK;
+
  /* Handle ioctls that apply to the controller instead of the namespace
   * separately and drop the ns SRCU reference early. This avoids a
   * deadlock when deleting namespaces using the passthrough interface.
   * /
   +if (cmd == NVME_IOCTL_ADMIN_CMD || is_sed_ioctl(cmd)) {
     struct nvme_ctrl *ctrl = ns->ctrl;
+
     nvme_get_ctrl(ns->ctrl);
     nvme_put_ns_from_disk(head, srcu_idx);
+
     if (cmd == NVME_IOCTL_ADMIN_CMD)
       ret = nvme_user_cmd(ctrl, NULL, argp);
     else
       ret = sed_ioctl(ctrl->opal_dev, cmd, argp);
  +*/
  #endif
}
+nvme_put_ctrl(ctrl);
+return ret;
+
+}
+
switch (cmd) {
    case NVME_IOCTL_ID:
        force_successful_syscall_return();
        return ns->head->ns_id;
    -case NVME_IOCTL_ADMIN_CMD:
        return nvme_user_cmd(ns->ctrl, NULL, (void __user *)arg);
        +ret = ns->head->ns_id;
        +break;
    case NVME_IOCTL_IO_CMD:
        return nvme_user_cmd(ns->ctrl, ns, (void __user *)arg);
        +ret = nvme_user_cmd(ns->ctrl, ns, argp);
        +break;
    case NVME_IOCTL_SUBMIT_IO:
        return nvme_submit_io(ns, (void __user *)arg);
        +ret = nvme_submit_io(ns, argp);
        +break;
    default:
        #ifdef CONFIG_NVM
        if (ns->ndev)
            -return nvme_nvm_ioctl(ns, cmd, arg);
        #endif
        -if (is_sed_ioctl(cmd))
        -return sed_ioctl(ns->ctrl->opal_dev, cmd,
            - (void __user *) arg);
        -return -ENOTTY;
        +ret = nvme_nvm_ioctl(ns, cmd, arg);
        +else
        +ret = -ENOTTY;
        }
    -}
    -
    -static int nvme_ioctl(struct block_device *bdev, fmode_t mode,
        -unsigned int cmd, unsigned long arg)
    -{
        -struct nvme_ns_head *head = NULL;
        -struct nvme_ns *ns;
        -int srcu_idx, ret;

        -ns = nvme_get_ns_from_disk(bdev->bd_disk, &head, &srcu_idx);
        -if (unlikely(!ns))
        -ret = -EWOULDBLOCK;
        -else
        -ret = nvme_ns_ioctl(ns, cmd, arg);
nvme_put_ns_from_disk(head, srcu_idx);
return ret;
}
@@ -1341,6 +1401,10 @@
if (ns->ctrl->nr_streams && ns->sws && ns->sgs)
stream_alignment = ns->sws * ns->sgs;

+if (ns->lba_shift > PAGE_SHIFT) {
+/* unsupported block size, set capacity to 0 later */
+bs = (1 << 9);
+}
blk_mq_freeze_queue(disk->queue);
blk_integrity_unregister(disk);
@@ -1351,7 +1415,8 @@
if (ns->ms && !ns->ext &&
    (ns->ctrl->ops->flags & NVME_F_METADATA_SUPPORTED))
nvme_init_integrity(disk, ns->ms, ns->pi_type);
-if (ns->ms && !nvme_ns_has_pi(ns) && !blk_get_integrity(disk))
+if ((ns->ms && !nvme_ns_has_pi(ns) && !blk_get_integrity(disk)) ||
    + ns->lba_shift > PAGE_SHIFT)
capacity = 0;
set_capacity(disk, capacity);
@@ -1372,8 +1437,8 @@
if (ns->lba_shift == 0)
ns->lba_shift = 9;
nvme_set_chunk_size(ns);
nvme_update_disk_info(disk, ns, id);
#ifdef CONFIG_NVME_MULTIPATH
-if (ns->head->disk)
+if (ns->head->disk) {
    blk_queue_stack_limits(ns->head->disk->queue, ns->queue);
    nvme_mpath_update_disk_size(ns->head->disk);
+}
#endif

@@ -1500,7 +1568,7 @@
static int nvme_pr_preempt(struct block_device *bdev, u64 old, u64 new, enum pr_type type, bool abort)
{
    u32 cdw10 = nvme_pr_type(type) << 8 | abort ? 2 : 1;
    return nvme_pr_command(bdev, cdw10, old, new, nvme_cmd_resv_acquire);
}

@@ -1512,7 +1580,7 @@

static int nvme_pr_release(struct block_device *bdev, u64 key, enum pr_type type)
{
    u32 cdw10 = nvme_pr_type(type) << 8 | (key ? 1 << 3 : 0);
    return nvme_pr_command(bdev, cdw10, key, 0, nvme_cmd_resv_release);
}

@@ -1875,7 +1943,8 @@

    struct block_device *bdev, u64 key, enum pr_type type))
{
    u32 cdw10 = nvme_pr_type(type) << 8 | key ? 1 << 3 : 0;
    return nvme_pr_command(bdev, cdw10, key, 0, nvme_cmd_resv_release);
}

@@ -1938,18 +2007,20 @@

    int off;

    nqnlen = strnlen(id->subnqn, NVMF_NQN_SIZE);
    if (nqnlen > 0 && nqnlen < NVMF_NQN_SIZE) {
        strncpy(subsys->subnqn, id->subnqn, NVMF_NQN_SIZE);
        return;
    }
+    if(!(ctrl->quirks & NVME_QUIRK_IGNORE_DEV_SUBNQN)) {
+        nqnlen = strnlen(id->subnqn, NVMF_NQN_SIZE);
+        if (nqnlen > 0 && nqnlen < NVMF_NQN_SIZE) {
+            strcpy(subsys->subnqn, id->subnqn, NVMF_NQN_SIZE);
+            return;
+        }
+    }
    if (ctrl->vs >= NVME_VS(1, 2, 1))
        dev_warn(ctrl->device, "missing or invalid SUBNQN field.");
    if (ctrl->vs >= NVME_VS(1, 2, 1))
        dev_warn(ctrl->device, "missing or invalid SUBNQN field.");
+}
/* Generate a "fake" NQN per Figure 254 in NVMe 1.3 + ECN 001 */
off = snprintf(subsys->subnqn, NVMF_NQN_SIZE,
- "nqn.2014.08.org.nvmexpress:%4x%4x",
+ "nqn.2014.08.org.nvmexpress:%04x%04x",
le16_to_cpu(id->vid), le16_to_cpu(id->ssvid));
memcpy(subsys->subnqn + off, id->sn, sizeof(id->sn));
off += sizeof(id->sn);
@@ -1994,6 +2065,17 @@

lockdep_assert_held(&nvme_subsystems_lock);

+/*
+ * Fail matches for discovery subsystems. This results
+ * in each discovery controller bound to a unique subsystem.
+ * This avoids issues with validating controller values
+ * that can only be true when there is a single unique subsystem.
+ * There may be multiple and completely independent entities
+ * that provide discovery controllers.
+ */
+if (!strncmp(subsysnqn, NVME_DISC_SUBSYS_NAME))
+return NULL;
+
+list_for_each_entry(subsys, &nvme_subsystems, entry) {
+ if (strcmp(subsys->subnqn, subsysnqn))
+ continue;
+}
+
+static int nvme_activeCtrls(struct nvme_subsystem *subsys)
+{
+ int count = 0;
+ struct nvme_ctrl *ctrl;
+ mutex_lock(&subsys->lock);
+ list_for_each_entry(ctrl, &subsys->ctrls, subsys_entry) {
+ if (ctrl->state != NVME_CTRL_DELETING &&
+ ctrl->state != NVME_CTRL_DEAD)
+ count++;:
+ }
+ mutex_unlock(&subsys->lock);
+ return count;
+ }
+
+ static int nvme_init_subsystem(struct nvme_ctrl *ctrl, struct nvme_id_ctrl *id)
struct nvme_subsystem *subsys, *found;
@@ -2090,7 +2188,7 @@
 * Verify that the subsystem actually supports multiple
 * controllers, else bail out.
 */
-@  @ -2343,9 +2441,26 @@
+if (nvme_activeCtrls(found) && !!(id->cmic & (1 << 1))) {
+dev_err(ctrl->device,
+"ignoring ctrl due to duplicate subnqn (%s).\n",
+found->subnqn);
+@@ -2343,9 +2441,26 @@
 if (ctrl->state != NVME_CTRL_LIVE)
 return -EWOULDBLOCK;
 +
+nvme_get_ctrl(ctrl);
+if (!try_module_get(ctrl->ops->module)) {
+nvme_put_ctrl(ctrl);
+return -EINVAL;
+
+file->private_data = ctrl;
 return 0;
 }
+
+static int nvme_dev_release(struct inode *inode, struct file *file)
+{
+struct nvme_ctrl *ctrl =
+container_of(inode->i_cdev, struct nvme_ctrl, cdev);
+module_put(ctrl->ops->module);
+nvme_put_ctrl(ctrl);
+return 0;
+}
+
 static int nvme_dev_user_cmd(struct nvme_ctrl *ctrl, void __user *argp)
 { 
 @@ -2407,6 +2522,7 @@
 static const struct file_operations nvme_dev_fops = {
 .owner = THIS_MODULE,
 .open = nvme_dev_open,
 .release = nvme_dev_release,
.unlocked_ioctl = nvme_dev_ioctl,
 .compat_ioctl = nvme_dev_ioctl,
};
@@ -2475,14 +2591,14 @@
 serial_len, subsys->serial, model_len, subsys->model,
 head->ns_id);
static DEVICE_ATTR(wwid, S_IRUGO, wwid_show, NULL);
+static DEVICE_ATTR_RO(wwid);

static ssize_t nguid_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
    return sprintf(buf, "%pU\n", dev_to_ns_head(dev)->ids.nguid);
}
-static DEVICE_ATTR(nguid, S_IRUGO, nguid_show, NULL);
+static DEVICE_ATTR_RO(nguid);

static ssize_t uuid_show(struct device *dev, struct device_attribute *attr,
    char *buf)
@@ -2499,21 +2615,21 @@
    return sprintf(buf, "%pU\n", &ids->uuid);
}
-static DEVICE_ATTR(uuid, S_IRUGO, uuid_show, NULL);
+static DEVICE_ATTR_RO(uuid);

static ssize_t eui_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
    return sprintf(buf, "%8ph\n", dev_to_ns_head(dev)->ids.eui64);
}
-static DEVICE_ATTR(eui, S_IRUGO, eui_show, NULL);
+static DEVICE_ATTR_RO(eui);

static ssize_t nsid_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
    return sprintf(buf, "%d\n", dev_to_ns_head(dev)->ns_id);
}
-static DEVICE_ATTR(nsid, S_IRUGO, nsid_show, NULL);
+static DEVICE_ATTR_RO(nsid);

static struct attribute *nvme_ns_id_attrs[] = {
    &dev_attr_wwid.attr,
    @ @ -2582,6 +2698,10 @ @
    { struct nvme_ctrl *ctrl = dev_get_drvdata(dev);

    /* Can't delete non-created controllers */
    +if (!ctrl->created)
    +return -EBUSY;
    +
    if (device_remove_file_self(dev, attr))
}
nvme_delete_ctrl_sync(ctrl);
return count;
@@ -2704,6 +2824,7 @@
list_for_each_entry(h, &subsys->nsheads, entry) {
  if (nvme_ns_ids_valid(&new->ids) &&
    !list_empty(&h->list) &&
    nvme_ns_ids_equal(&new->ids, &h->ids))
return -EINVAL;
}
@@ -2744,6 +2865,9 @@
goto out_cleanup_srcu;

list_add_tail(&head->entry, &ctrl->subsys->nsheads);
+ kref_get(&ctrl->subsys->ref);  
+ return head;
out_cleanup_srcu:
cleanup_srcu_struct(&head->srcu);
@@ -2885,31 +3009,7 @@
        if (nvme_init_ns_head(ns, nsid, id, &new))
goto out_free_id;
nvme_setup_streams_ns(ctrl, ns);
-
-#ifdef CONFIG_NVME_MULTIPATH
-/*
-* If multipathing is enabled we need to always use the subsystem
-* instance number for numbering our devices to avoid conflicts
-* between subsystems that have multiple controllers and thus use
-* the multipath-aware subsystem node and those that have a single
-* controller and use the controller node directly.
-*/
-if (ns->head->disk) {
-sprintf(disk_name, "nvme%dc%dn%d", ctrl->subsys->instance,
-ctrl->cntlid, ns->head->instance);
flags = GENHD_FL_HIDDEN;
} else {
-sprintf(disk_name, "nvme%dn%d", ctrl->subsys->instance,
-ns->head->instance);
}
#else
-/*
-* But without the multipath code enabled, multiple controller per
-* subsystems are visible as devices and thus we cannot use the
-* subsystem instance.
-*/
-sprintf(disk_name, "nvme%dn%d", ctrl->instance, ns->head->instance);
if ((ctrl->quirks & NVME_QUIRK_LIGHTNVM) && id->vs[0] == 0x1) {
    if (nvme_nvm_register(ns, disk_name, node)) {
        @ @ -2950,7 +3050,6 @@

    if (new)
        nvme_mpath_add_disk(ns->head);
    -nvme_mpath_add_disk_links(ns);
    return;
    out_unlink_ns:
    mutex_lock(&ctrl->subsys->lock);
    @ @ -2970,7 +3069,6 @@
    return;

    if (ns->disk && &ns->disk->flags & GENHD_FL_UP) {
        -nvme_mpath_remove_disk_links(ns);
        sysfs_remove_group(&disk_to_dev(ns->disk)->kobj,
           &nvme_ns_id_attr_group);
    if (ns->ndev)
        @ @ -2982,8 +3080,8 @@
    }

    mutex_lock(&ns->ctrl->subsys->lock);
    -nvme_mpath_clear_current_path(ns);
    list_del_rcu(&ns->siblings);
    +nvme_mpath_clear_current_path(ns);
    mutex_unlock(&ns->ctrl->subsys->lock);

    mutex_lock(&ns->ctrl->namespaces_mutex);
    @ @ -3023,7 +3121,8 @@
    }
    struct nvme_ns *ns;
    __le32 *ns_list;
    -unsigned i, j, nsid, prev = 0, num_lists = DIV_ROUND_UP(nn, 1024);
    +unsigned i, j, nsid, prev = 0;
    +unsigned num_lists = DIV_ROUND_UP_ULL((u64)nn, 1024);
    int ret = 0;

    ns_list = kzalloc(0x1000, GFP_KERNEL);
    @ @ -3083,8 +3182,7 @@
    return;

    nn = le32_to_cpu(id->nn);
    -if (ctrl->vs >= NVME_VS(1, 1, 0) &&
    - !/(ctrl->quirks & NVME_QUIRK_IDENTIFY_CNS)) {
    +if (!nvme_ctrl_limited_cns(ctrl)) {

if (!nvme_scan_ns_list(ctrl, nn))
goto done;
}
@@ -3116,6 +3214,9 @@
{  
  struct nvme_ns *ns, *next;

  /* prevent racing with ns scanning */
  flush_work(&ctrl->scan_work);
  +
  /*
   * The dead states indicates the controller was not gracefully
   * disconnected. In that case, we won't be able to flush any data while
@@ -3253,7 +3354,6 @@
  
  nvme_stop_keep_alive(ctrl);
  flush_work(&ctrl->async_event_work);
-  flush_work(&ctrl->scan_work);
  cancel_work_sync(&ctrl->fw_act_work);
  }
EXPORT_SYMBOL_GPL(nvme_stop_ctrl);
@@ -3268,11 +3368,13 @@
  queue_work(nvme_wq, &ctrl->async_event_work);
  nvme_start_queues(ctrl);
  }
  +ctrl->created = true;
  }
EXPORT_SYMBOL_GPL(nvme_start_ctrl);

void nvme_uninit_ctrl(struct nvme_ctrl *ctrl)
{  
  +dev_pm_qos_hide_latency_tolerance(ctrl->device);
  cdev_device_del(&ctrl->cdev, ctrl->device);
  }
EXPORT_SYMBOL_GPL(nvme_uninit_ctrl);
@@ -3354,7 +3456,7 @@
  return 0;
  out_free_name:
-  kfree_const(dev->kobj.name);
+  kfree_const(ctrl->device->kobj.name);
  out_release_instance:
  ida_simple_remove(&nvme_instance_ida, ctrl->instance);
  out:
@@ -3376,7 +3478,7 @@
 mutex_lock(&ctrl->namespaces_mutex);

 /* Forcibly unquiesce queues to avoid blocking dispatch */
-if (ctrl->admin_q)
+if (ctrl->admin_q && !blk_queue_dying(ctrl->admin_q))
blk_mq_unquiesce_queue(ctrl->admin_q);

list_for_each_entry(ns, &ctrl->namespaces, list) {
@@ -3475,6 +3577,17 @@}

EXPORT_SYMBOL_GPL(nvme_reinit_tagset);

+void nvme_sync_queues(struct nvme_ctrl *ctrl)
+{
+struct nvme_ns *ns;
+
+mutex_lock(&ctrl->namespaces_mutex);
+list_for_each_entry(ns, &ctrl->namespaces, list)
+blk_sync_queue(ns->queue);
+mutex_unlock(&ctrl->namespaces_mutex);
+
+EXPORT_SYMBOL_GPL(nvme_sync_queues);
+
+int __init nvme_core_init(void)
{ int result;
--- linux-4.15.0.orig/drivers/nvme/host/fabrics.c
+++ linux-4.15.0/drivers/nvme/host/fabrics.c
@@ -589,6 +589,7 @@
ret = -ENOMEM;
 goto out;
}
+kfree(opts->transport);
 opts->transport = p;
 break;
 case NVMF_OPT_NQN:
@@ -597,6 +598,7 @@
ret = -ENOMEM;
 goto out;
}
+kfree(opts->subsysnqn);
 opts->subsysnqn = p;
 nqlen = strlen(opts->subsysnqn);
 if (nqlen >= NVMF_NQN_SIZE) {
@@ -608,8 +610,10 @@
opts->discovery_nqn =
 !(strcmp(opts->subsysnqn,
 NVME_DISC_SUBSYS_NAME));
-if (opts->discovery_nqn)
+if (opts->discovery_nqn) {
+opts->kato = 0;


opts->nr_io_queues = 0;
+
break;
case NVMF_OPT_TRADDR:
p = match_strdup(args);
@@ -617,6 +621,7 @@
ret = -ENOMEM;
goto out;
}
+kfree(opts->traddr);
opts->traddr = p;
break;
case NVMF_OPT_TRSVCID:
@@ -625,6 +630,7 @@
ret = -ENOMEM;
goto out;
}
+kfree(opts->trsvcid);
opts->trsvcid = p;
break;
case NVMF_OPT_QUEUE_SIZE:
@@ -706,6 +712,7 @@
ret = -EINVAL;
goto out;
}
+nvmf_host_put(opts->host);
opts->host = nvmf_host_add(p);
kfree(p);
if (!opts->host) {
@@ -731,6 +738,7 @@
ret = -ENOMEM;
goto out;
}
+kfree(opts->host_traddr);
opts->host_traddr = p;
break;
case NVMF_OPT_HOST_ID:
@@ -869,32 +877,41 @@
goto out_unlock;
}

+if (!try_module_get(ops->module)) {
+ret = -EBUSY;
+goto out_unlock;
+
+ret = nvmf_check_required_opts(opts, ops->required_opts);
if (ret)
- goto out_unlock;
+ goto out_module_put;
ret = nvmf_check_allowed_opts(opts, NVMF_ALLOWED_OPTS | 
ops->allowed_opts | ops->required_opts);
if (ret)
- goto out_unlock;
+ goto out_module_put;
ctrl = ops->create_ctrl(dev, opts);
if (IS_ERR(ctrl)) {
    ret = PTR_ERR(ctrl);
- goto out_unlock;
+ goto out_module_put;
}
if (strcmp(ctrl->subsys->subnqn, opts->subsysnqn)) {
    dev_warn(ctrl->device,
"controller returned incorrect NQN: "%s".\n", 
ctrl->subsys->subnqn);
+ module_put(ops->module);
    up_read(&nvmf_transports_rwsem);
    nvme_delete_ctrl_sync(ctrl);
    return ERR_PTR(-EINVAL);
}
+ module_put(ops->module);
+ up_read(&nvmf_transports_rwsem);
return ctrl;
+ out_module_put:
+ module_put(ops->module);
out_unlock:
+ up_read(&nvmf_transports_rwsem);
out_free_opts:
--- linux-4.15.0.orig/drivers/nvme/host/fabrics.h
+++ linux-4.15.0/drivers/nvme/host/fabrics.h
@@ -108,6 +108,7 @@
+      fabric implementation of NVMe fabrics.
* @entry:Used by the fabrics library to add the new
* registration entry to its linked-list internal tree.
+ * @module: Transport module reference
* @name:Name of the NVMe fabric driver implementation.
+ * @required_opts:sysfs command-line options that must be specified
*when adding a new NVMe controller.
@@ -126,6 +127,7 @@
* /
struct nvmf_transport_ops {
struct list_head entry;
struct module *module;
const char *name;
int required_opts;
int allowed_opts;
+-#define NVMEFC_QUEUE_DELAY 3 /* ms units */
-
#define NVME_FC_DEFAULT_DEV_LOSS_TMO 60 /* seconds */

struct nvme_fc_queue {
  @ @ -1767.7 +1765.7 @@
if (fc_dma_mapping_error(lport->dev, op->fcp_req.cmddma)) {
  dev_err(dev, "FCP Op failed - cmdiu dma mapping failed\n");
  -ret = EFAULT;
  +ret = -EFAULT;
  goto out_on_error;
}

@ @ -1777.7 +1775.7 @@
if (fc_dma_mapping_error(lport->dev, op->fcp_req.rspdma)) {
  dev_err(dev, "FCP Op failed - rspiu dma mapping failed\n");
  -ret = EFAULT;
  +ret = -EFAULT;
  }

atomic_set(&op->state, FCPOP_STATE_IDLE);
@ @ -1841.6 +1839.7 @@
struct nvme_fc_fcp_op *aen_op;
int i;

+cancel_work_sync(&ctrl->async_event_work);
aen_op = ctrl->aen_ops;
for (i = 0; i < NVME_NR_AEN_COMMANDS; i++, aen_op++) {
  if (!aen_op->fcp_req.private)
    @ @ -2231.7 +2230.7 @@
    * the target device is present
    */
  if (ctrl->rport->remoteport.port_state != FC_OBJSTATE_ONLINE)
    -goto busy;
  +return BLK_STSRESOURCE;
if (!nvme_fc_ctrl_get(ctrl))
return BLK_STS_IOERR;
@@ -2311,16 +2310,10 @@
ret != -EBUSY)
return BLK_STS_IOERR;
@goto busy;
+return BLK_STSRESOURCE;
}

return BLK_STS_OK;
-
-busy:
-if (!(op->flags & FCOP_FLAGS_AEN) && queue->hctx)
-bkl_mq_delay_run_hw_queue(queue->hctx, NVMEFC_QUEUE_DELAY);
-
-return BLK_STSRESOURCE;
}

static inline blk_status_t nvme_fc_is_ready(struct nvme_fc_queue *queue,
@@ -3213,6 +3206,10 @@
}

if (ret) {
+nvme_change_ctrl_state(&ctrl->ctrl, NVME_CTRL_DELETING);
+cancel_work_sync(&ctrl->ctrl.reset_work);
+cancel_delayed_work_sync(&ctrl->connect_work);
+
+/* couldn't schedule retry - fail out */
+dev_err(ctrl->ctrl.device,
+"NVME-FC{%d}: Connect retry failed\n", ctrl->cnum);
@@ -3352,12 +3349,14 @@
spin_lock_irqsave(&nvme_fc_lock, flags);
list_for_each_entry(lport, &nvme_fc_lport_list, port_list) {
  if (lport->localport.node_name != laddr.nn ||
-   lport->localport.port_name != laddr.pn)
+   lport->localport.port_name != laddr.pn ||
+   lport->localport.port_state != FC_OBJSTATE_ONLINE)
continue;

  list_for_each_entry(rport, &lport->endp_list, endp_list) {
    if (rport->remoteport.node_name != raddr.nn ||
-     rport->remoteport.port_name != raddr.pn)
+     rport->remoteport.port_name != raddr.pn ||
+     rport->remoteport.port_state != FC_OBJSTATE_ONLINE)
continue;

    /* if fail to get reference fall through. Will error */
static struct nvmf_transport_ops nvme_fc_transport = {
    .name = "fc",
    .module = THIS_MODULE,
    .required_opts = NVMF_OPT_TRADDR | NVMF_OPT_HOST_TRADDR,
    .allowed_opts = NVMF_OPT_RECONNECT_DELAY | NVMF_OPT_CTRL_LOSS_TMO,
    .create_ctrl = nvme_fc_create_ctrl,

--- linux-4.15.0.orig/drivers/nvme/host/multipath.c
+++ linux-4.15.0/drivers/nvme/host/multipath.c
@@ -15,10 +15,32 @@
#include "nvme.h"

static bool multipath = true;
-module_param(multipath, bool, 0644);
+module_param(multipath, bool, 0444);
 MODULE_PARM_DESC(multipath,
  "turn on native support for multiple controllers per subsystem");

+/**
+ * If multipathing is enabled we need to always use the subsystem instance
+ * number for numbering our devices to avoid conflicts between subsystems that
+ * have multiple controllers and thus use the multipath-aware subsystem node
+ * and those that have a single controller and use the controller node
+ * directly.
+ */
+void nvme_set_disk_name(char *disk_name, struct nvme_ns *ns,
+                        struct nvme_ctrl *ctrl, int *flags)
+{
+    if (!multipath) {
+        sprintf(disk_name, "nvme%dn%d", ctrl->instance, ns->head->instance);
+    } else if (ns->head->disk) {
+        sprintf(disk_name, "nvme%dc%dn%d", ctrl->subsys->instance,
+                ctrl->cntlid, ns->head->instance);
+        *flags = GENHD_FL_HIDDEN;
+    } else {
+        sprintf(disk_name, "nvme%dn%d", ctrl->subsys->instance,
+                ns->head->instance);
+    }
+}
+
+void nvme_failover_req(struct request *req)
+{
+    struct nvme_ns *ns = req->q->queuedata;
+    queue_flag_set_unlocked(QUEUE_FLAG_NONROT, q);
+    /* set to a default value for 512 until disk is validated */
+    blk_queue_logical_block_size(q, 512);
/* we need to propagate up the VMC settings */
if (ctrl->vwc & NVME_CTRL_VWC_PRESENT)
@@ -245,25 +268,6 @@
head->disk->disk_name);
}

void nvme_mpath_add_disk_links(struct nvme_ns *ns)
{-
struct kobject *slave_disk_kobj, *holder_disk_kobj;
-
-if (!ns->head->disk)
-return;
-
-slave_disk_kobj = &disk_to_dev(ns->disk)->kobj;
-if (sysfs_create_link(ns->head->disk->slave_dir, slave_disk_kobj,
-kobject_name(slave_disk_kobj)))
-return;
-
-holder_disk_kobj = &disk_to_dev(ns->head->disk)->kobj;
-if (sysfs_create_link(ns->disk->part0.holder_dir, holder_disk_kobj,
-kobject_name(holder_disk_kobj)))
-sysfs_remove_link(ns->head->disk->slave_dir,
-kobject_name(slave_disk_kobj));
-}

void nvme_mpath_remove_disk(struct nvme_ns_head *head)
{
-if (!head->disk)
@@ -278,14 +282,3 @@
blk_cleanup_queue(head->disk->queue);
put_disk(head->disk);
}
-
-void nvme_mpath_remove_disk_links(struct nvme_ns *ns)
{-
-if (!ns->head->disk)
-return;
-
-sysfs_remove_link(ns->disk->part0.holder_dir,
-kobject_name(&disk_to_dev(ns->head->disk)->kobj));
-sysfs_remove_link(ns->head->disk->slave_dir,
-kobject_name(&disk_to_dev(ns->disk)->kobj));
-}
--- linux-4.15.0.orig/drivers/nvme/host/nvme.h
+++ linux-4.15.0/drivers/nvme/host/nvme.h
@@ -81,6 +81,16 @@
* Supports the LighNVM command set if indicated in vs[1].
*/
NVME_QUIRK_LIGHTNVM = (1 << 6),
+
+/*
+ * Set MEDIUM priority on SQ creation
+ */
+NVME_QUIRK_MEDIUM_PRIO_SQ = (1 << 7),
+
+/*
+ * Ignore device provided subnqn.
+ */
+NVME_QUIRK_IGNORE_DEV_SUBNQN = (1 << 8),
};
/*
@@ -181,6 +191,7 @@
struct work_struct async_event_work;
struct delayed_work ka_work;
struct work_struct fw_act_work;
+bool created;

/* Power saving configuration */
u64 ps_max_latency_us;
@@ -372,6 +383,7 @@
void nvme_stop_queues(struct nvme_ctrl *ctrl);
void nvme_start_queues(struct nvme_ctrl *ctrl);
void nvme_kill_queues(struct nvme_ctrl *ctrl);
+void nvme_sync_queues(struct nvme_ctrl *ctrl);
void nvme_unfreeze(struct nvme_ctrl *ctrl);
void nvme_wait_freeze(struct nvme_ctrl *ctrl);
void nvme_wait_freeze_timeout(struct nvme_ctrl *ctrl, long timeout);
@@ -389,6 +401,12 @@
union nvme_result *result, void *buffer, unsigned bufflen,
unsigned timeout, int qid, int at_head,
blk_mq_req_flags_t flags);
+int nvme_set_features(struct nvme_ctrl *dev, unsigned int fid,
+          unsigned int dword11, void *buffer, size_t buflen,
+       u32 *result);
+int nvme_get_features(struct nvme_ctrl *dev, unsigned int fid,
+          unsigned int dword11, void *buffer, size_t buflen,
+       u32 *result);
int nvme_set_queue_count(struct nvme_ctrl *ctrl, int *count);
void nvme_start_keep_alive(struct nvme_ctrl *ctrl);
void nvme_stop_keep_alive(struct nvme_ctrl *ctrl);
@@ -400,14 +418,14 @@
extern const struct block_device_operations nvme_ns_head_ops;
#ifdef CONFIG_NVME_MULTIPATH
+void nvme_set_disk_name(char *disk_name, struct nvme_ns *ns,
+struct nvme_ctrl *ctrl, int *flags);
void nvme_failover_req(struct request *req);
bool nvme_req_needs_failover(struct request *req);
void nvme_kick_requeue_lists(struct nvme_ctrl *ctrl);
int nvme_mpath_alloc_disk(struct nvme_ctrl *ctrl,struct nvme_ns_head *head);
void nvme_mpath_add_disk(struct nvme_ns_head *head);
-void nvme_mpath_add_disk_links(struct nvme_ns *ns);
void nvme_mpath_remove_disk(struct nvme_ns_head *head);
-void nvme_mpath_remove_disk_links(struct nvme_ns *ns);

static inline void nvme_mpath_clear_current_path(struct nvme_ns *ns)
{
}@ @ -426,7 +444,27 @@
kblockd_schedule_work(&head->requeue_work);
}

+static inline void nvme_mpath_update_disk_size(struct gendisk *disk)
+{
+struct block_device *bdev = bdget_disk(disk, 0);
+
+if (bdev) {
+bd_set_size(bdev, get_capacity(disk) << SECTOR_SHIFT);
+bdput(bdev);
+}
+}
+
+/*
+ * Without the multipath code enabled, multiple controller per subsystems are
+ * visible as devices and thus we cannot use the subsystem instance.
+ */
+static inline void nvme_set_disk_name(char *disk_name, struct nvme_ns *ns,
+ struct nvme_ctrl *ctrl, int *flags)
+{
+sprintf(disk_name, "nvme%dn%d", ctrl->instance, ns->head->instance);
+}
+
+static inline void nvme_failover_req(struct request *req)
+
@@ -448,18 +486,15 @@
static inline void nvme_mpath_remove_disk(struct nvme_ns_head *head)
{
}

-static inline void nvme_mpath_add_disk_links(struct nvme_ns *ns)
{-

-\}  
\-static inline void nvme_mpath_remove_disk_links(struct nvme_ns *ns)  
\-{  
\-\}  
static inline void nvme_mpath_clear_current_path(struct nvme_ns *ns)  
\{  
\}  
static inline void nvme_mpath_check_last_path(struct nvme_ns *ns)  
\{  
\}  
+static inline void nvme_mpath_update_disk_size(struct gendisk *disk)  
+{  
+}  
#endif /* CONFIG_NVME_MULTIPATH */

#ifdef CONFIG_NVM  
--- linux-4.15.0.orig/drivers/nvme/host/pci.c  
+++ linux-4.15.0/drivers/nvme/host/pci.c  
@@ -25,6 +25,7 @@  
#include <linux/mutex.h>  
#include <linux/once.h>  
#include <linux/pci.h>  
+#include <linux/suspend.h>  
#include <linux/t10-pi.h>  
#include <linux/types.h>  
#include <linux/io-64-nonatomic-lo-hi.h>  
@@ -75,7 +76,7 @@  
\* Represents an NVM Express device. Each nvme_dev is a PCI function.*  
\*/  
struct nvme_dev {  
-struct nvme_queue **queues;  
+struct nvme_queue *queues;  
struct blk_mq_tag_set tagset;  
struct blk_mq_tag_set admin_tagset;  
u32 __iomem *dbs;  
@@ -98,6 +99,7 @@  
u32 cmbloc;  
struct nvme_ctrl ctrl;  
struct completion ioq_wait;  
+u32 last_ps;  

/\* shadow doorbell buffer support: */  
u32 *dbbuf_dbs;  
@@ -265,9 +267,21 @@  
nvmeq->dbbuf_cq_ei = &dev->dbbuf_eis[cq_idx(qid, dev->db_stride)];  
}  

+static void nvme_dbbuf_free(struct nvme_queue *nvmeq)
+{
+if (!nvmeq->qid)
+return;
+
+nvmeq->dbuf_sq_db = NULL;
+nvmeq->dbuf_cq_db = NULL;
+nvmeq->dbuf_sq_ei = NULL;
+nvmeq->dbuf_cq_ei = NULL;
+
}+

static void nvme_dbbuf_set(struct nvme_dev *dev)
{
struct nvme_command c;
unsigned int i;

if (!dev->dbuf_dbs)
return;
@@ -281,6 +295,9 @@
dev_warn(dev->ctrl.device, "unable to set dbbuf\n");
/* Free memory and continue on */
nvme_dbbuf_dma_free(dev);
+
+for (i = 1; i <= dev->online_queues; i++)
+nvme_dbbuf_free(&dev->queues[i]);
}
}

@@ -305,6 +322,14 @@
old_value = *dbuff_db;
*dbuff_db = value;

+/*
+ * Ensure that the doorbell is updated before reading the event
+ * index from memory. The controller needs to provide similar
+ * ordering to ensure the event index is updated before reading
+ * the doorbell.
+ */
+mb();
+
if (!nvme_dbbuf_need_event(*dbuff_ei, value, old_value))
return false;
@@ -365,7 +390,7 @@
unsigned int hctx_idx)
{
struct nvme_dev *dev = data;
-struct nvme_queue *nvmeq = dev->queues[0];
+struct nvme_queue *nvmeq = &dev->queues[0];

WARN_ON(hctx_idx != 0);
WARN_ON(dev->admin_tagset.tags[0] != hctx->tags);
@@ -387,7 +412,7 @@
       unsigned int hctx_idx)
 {
   struct nvme_dev *dev = data;
-  struct nvme_queue *nvmeq = dev->queues[hctx_idx + 1];
+  struct nvme_queue *nvmeq = &dev->queues[hctx_idx + 1];

   if (!nvmeq->tags)
     nvmeq->tags = &dev->tagset.tags[hctx_idx];
@@ -403,7 +428,7 @@
     struct nvme_dev *dev = set->driver_data;
     struct nvme_iqd *iod = blk_mq_rq_to_pdu(req);
     int queue_idx = (set == &dev->tagset) ? hctx_idx + 1 : 0;
-    struct nvme_queue *nvmeq = dev->queues[queue_idx];
+    struct nvme_queue *nvmeq = &dev->queues[queue_idx];

   BUG_ON(!nvmeq);
   iod->nvmeq = nvmeq;
@@ -965,9 +990,11 @@
   if (nvme_cqe_valid(nvmeq, nvmeq->cq_head, nvmeq->cq_phase)) {
     *cqe = nvmeq->cques[nvmeq->cq_head];
     -if (++nvmeq->cq_head == nvmeq->q_depth) {
+     if (nvmeq->cq_head == nvmeq->q_depth - 1) {
       nvmeq->cq_head = 0;
       nvmeq->cq_phase = !nvmeq->cq_phase;
     } else {
       +nvmeq->cq_head++;
     }
   return true;
 }
struct nvme_command c;
int flags = NVME_QUEUE_PHYSTS_CONTIG | NVME_CQ_IRQ_ENABLED;

/*
 * Some drives have a bug that auto-enables WRRU if MEDIUM isn't
 * set. Since URGENT priority is zeroes, it makes all queues
 * URGENT.
 */
@if (ctrl->quirks & NVME_QUIRK_MEDIUM_PRIO_SQ)
+flags |= NVME_SQ_PRIO_MEDIUM;
+
+/*
 * Note: we (ab)use the fact that the prp fields survive if no data
 * is attached to the request.
 */
@@ -1148,12 +1184,6 @@
if (!(csts & NVME_CSTS_CFS) && !nssro)
    return false;
-
-/* If PCI error recovery process is happening, we cannot reset or
- * the recovery mechanism will surely fail.
- */
-@-1184,6 +1214,13 @@
-    return true;
-
@-1184,6 +1214,13 @@
struct nvme_command cmd;
u32 csts = readl(dev->bar + NVME_REG_CSTS);

+/* If PCI error recovery process is happening, we cannot reset or
+ * the recovery mechanism will surely fail.
+ */
+mb();
+if (pci_channel_offline(to_pci_dev(dev->dev)))
+    return BLK_EH_RESET_TIMER;
+
+/*
 * Reset immediately if the controller is failed
 */
@@ -1280,7 +1317,6 @@
if (nvmeq->sq_cmds)
    dma_free_coherent(nvmeq->q_dmadev, SQ_SIZE(nvmeq->q_depth),
        nvmeq->sq_cmds, nvmeq->sq_dma_addr);
-kfree(nvmeq);
}
static void nvme_free_queues(struct nvme_dev *dev, int lowest)
@@ -1288,10 +1324,8 @@
    int i;

    for (i = dev->ctrl.queue_count - 1; i >= lowest; i--) {
-      struct nvme_queue *nvmeq = dev->queues[i];
-      dev->ctrl.queue_count--;
-      dev->queues[i] = NULL;
-      nvme_free_queue(nvmeq);
+      nvme_free_queue(&dev->queues[i]);
    }
}

@@ -1323,10 +1357,8 @@
 static void nvme_disable_admin_queue(struct nvme_dev *dev, bool shutdown)
 {
-    struct nvme_queue *nvmeq = dev->queues[0];
+    struct nvme_queue *nvmeq = &dev->queues[0];

-    if (!nvmeq)
-        return;
-    if (nvme_suspend_queue(nvmeq))
-        return;
+    /* CMB SQEs will be mapped before creation */
+    if (qid && dev->cmb && use_cmb_sqes && NVME_CMB_SQS(dev->cmbsz))
+        return 0;

 static int nvme_alloc_sq_cmds(struct nvme_dev *dev, struct nvme_queue *nvmeq, int qid, int depth)
 {
-    if (qid && dev->cmb && use_cmb_sqes && NVME_CMB_SQS(dev->cmbsz)) {
-        unsigned offset = (qid - 1) * roundup(SQ_SIZE(depth),
-            dev->ctrl.page_size);
-        nvmeq->sq_dma_addr = dev->cmb_bus_addr + offset;
-        nvmeq->sq_cmds_io = dev->cmb + offset;
-    } else {
-        nvmeq->sq_cmds = dma_alloc_coherent(dev->dev, SQ_SIZE(depth),
-            &nvmeq->sq_dma_addr, GFP_KERNEL);
-    } else {
-        nvmeq->sq_cmds = dma_alloc_coherent(dev->dev, SQ_SIZE(depth),
-            &nvmeq->sq_dma_addr, GFP_KERNEL);
-        return -ENOMEM;
-    }
+    /* CMB SQEs will be mapped before creation */
+    if (qid && dev->cmb && use_cmb_sqes && NVME_CMB_SQS(dev->cmbsz))
+        return 0;
+    nvmeq->sq_cmds = dma_alloc_coherent(dev->dev, SQ_SIZE(depth),
+        &nvmeq->sq_dma_addr, GFP_KERNEL);
if (!nvmeq->sq cmds)  
+return -ENOMEM;

return 0;
}

-struct nvme_queue *nvme_alloc_queue(struct nvme_dev *dev, int qid,
-int depth, int node)
+static struct nvme_queue *nvme_alloc_queue(struct nvme_dev *dev, int qid,
+int depth, int node)
{
-struct nvme_queue *nvmeq = kzalloc_node(sizeof(*nvmeq), GFP_KERNEL,
-node);
-if (!nvmeq)
-return NULL;
+struct nvme_queue *nvmeq = &dev->queues[qid];
+
+if (dev->ctrl.queue_count > qid)
+return 0;

nvmeq->cqes = dma_zalloc_coherent(dev->dev, CQ_SIZE(depth),
   &nvmeq->cq_dma_addr, GFP_KERNEL);
@@ -1407,17 +1437,15 @@
   nvmeq->q_depth = depth;
   nvmeq->qid = qid;
   nvmeq->cq_vector = -1;
   -dev->queues[qid] = nvmeq;
   dev->ctrl.queue_count++;

   -return nvmeq;
+return 0;

free_cqdma:
   dma_free_coherent(dev->dev, CQ_SIZE(depth), (void *)nvmeq->cqes,
   nvmeq->cq_dma_addr);
   free_nvmeq:
   -kfree(nvmeq);
   -return NULL;
   +return -ENOMEM;
}

static int queue_request_irq(struct nvme_queue *nvmeq)
@@ -1454,10 +1482,17 @@
   struct nvme_dev *dev = nvmeq->dev;
   int result;

   +if (qid && dev->cmb && use_cmb_sqes && NVME_CMB_SQS(dev->cmbsz)) {
   +unsigned offset = (qid - 1) * roundup(SQ_SIZE(nvmeq->q_depth),

+    dev->ctrl.page_size);
+    nvmeq->sq_dma_addr = dev->cmb_bus_addr + offset;
+    nvmeq->sq_cmds_io = dev->cmb + offset;
+}
+
+    nvmeq->cq_vector = qid - 1;
result = adapter_alloc_cq(dev, qid, nvmeq);
if (result < 0)
    -return result;
    +goto release_vector;

result = adapter_alloc_sq(dev, qid, nvmeq);
if (result < 0)
    @@ -1471,9 +1506,12 @@
    return result;

    release_sq:
    +dev->online_queues--;
    adapter_delete_sq(dev, qid);
    release_cq:
    adapter_delete_cq(dev, qid);
    + release_vector:
    +nvmeq->cq_vector = -1;
    return result;
    }

@@ -1590,14 +1628,12 @@
    if (result < 0)
    return result;

-nvmeq = dev->queues[0];
-    if (!nvmeq) {
-        nvmeq = nvme_alloc_queue(dev, 0, NVME_AQ_DEPTH,
-            dev_to_node(dev->dev));
-        if (!nvmeq)
-            -return -ENOMEM;
-    }
+    result = nvme_alloc_queue(dev, 0, NVME_AQ_DEPTH,
+        dev_to_node(dev->dev));
+    if (result)
+        return result;
+    nvmeq = &dev->queues[0];
    aqa = nvmeq->q_depth - 1;
    aqa |= aqa << 16;

@@ -1627,7 +1663,7 @@
for (i = dev->ctrl.queue_count; i <= dev->max_qid; i++) {
    /* vector == qid - 1, match nvme_create_queue */
    -if (!nvme_alloc_queue(dev, i, dev->q_depth, 
+if (nvme_alloc_queue(dev, i, dev->q_depth, 
        pci_irq_get_node(to_pci_dev(dev->dev), i - 1))) {
        ret = -ENOMEM;
        break;
    }
@@ -1636,7 +1672,7 @@
    max = min(dev->max_qid, dev->ctrl.queue_count - 1);
    for (i = dev->online_queues; i <= max; i++) {
        -ret = nvme_create_queue(dev->queues[i], i); 
+ret = nvme_create_queue(&dev->queues[i], i); 
        if (ret)
            break;
    }
@@ -1669,6 +1705,9 @@
    void __iomem *cmb;
    int bar;

    +if (dev->cmb_size)
        +return NULL;
        +
        dev->cmbsz = readl(dev->bar + NVME_REG_CMBSZ);
    if (!(NVME_CMB_SZ(dev->cmbsz)))
        return NULL;
@@ -1747,8 +1786,9 @@
    struct nvme_host_mem_buf_desc *desc = &dev->host_mem_descs[i];
    size_t size = le32_to_cpu(desc->size) * dev->ctrl.page_size;
    
    -dma_free_coherent(dev->dev, size, dev->host_mem_desc_bufs[i],
    -le64_to_cpu(desc->addr));
+dma_free_attrs(dev->dev, size, dev->host_mem_desc_bufs[i],
+    le64_to_cpu(desc->addr),
+    DMA_ATTR_NO_KERNEL_MAPPING | DMA_ATTR_NO_WARN);
}

kfree(dev->host_mem_desc_bufs);
@@ -1814,8 +1854,9 @@
    while (--i >= 0) {
        size_t size = le32_to_cpu(descs[i].size) * dev->ctrl.page_size;
        
        -dma_free_coherent(dev->dev, size, bufs[i],
        -le64_to_cpu(descs[i].addr));
+dma_free_attrs(dev->dev, size, bufs[i],
+    le64_to_cpu(descs[i].addr),
+    DMA_ATTR_NO_KERNEL_MAPPING | DMA_ATTR_NO_WARN);
    }
kfree(bufs);
@@ -1892,12 +1933,12 @@

static int nvme_setup_io_queues(struct nvme_dev *dev)
{
  struct nvme_queue *adminq = dev->queues[0];
+struct nvme_queue *adminq = &dev->queues[0];
  structpci_dev*pdev = to_pci_dev(dev->dev);
  int result, nr_io_queues;
  unsigned long size;

-  nr_io_queues = num_present_cpus();
+  nr_io_queues = num_possible_cpus();
  result = nvme_set_queue_count(&dev->ctrl, &nr_io_queues);
  if (result < 0)
    return result;
  @ @ -2018,7 +2059,7 @@
    retry:
    timeout = ADMIN_TIMEOUT;
    for (; i > 0; i--, sent++)
-      if (nvme_delete_queue(dev->queues[i], opcode))
+      if (nvme_delete_queue(&dev->queues[i], opcode))
        break;

    while (sent--){
      @ @ -2159,7 +2200,6 @@
      {
        structpci_dev*pdev = to_pci_dev(dev->dev);

        -nvme_release_cmb(dev);
        pci_free_irq_vectors(pdev);

        if (pci_is_enabled(pdev)) {
          @ @ -2207,7 +2247,7 @@
          queues = dev->online_queues - 1;
          for (i = dev->ctrl.queue_count - 1; i > 0; i--)
-            nvme_suspend_queue(dev->queues[i]);
+            nvme_suspend_queue(&dev->queues[i]);

          if (dead) {
            /* A device might become IO incapable very soon during
              @ @ -2215,7 +2255,7 @@
              * queue_count can be 0 here.
              */
            if (dev->ctrl.queue_count)
              -nvme_suspend_queue(dev->queues[0]);
              +nvme_suspend_queue(&dev->queues[0]);
        }
nvme_suspend_queue(&dev->queues[0]);
} else {
    nvme_disable_io_queues(dev, queues);
    nvme_disable_admin_queue(dev, shutdown);
    *
    must flush all entered requests to their failed completion to avoid
    * deadlocking blk-mq hot-cpu notifier.
    */
    -if (shutdown)
    +if (shutdown) {
        nvme_start_queues(&dev->ctrl);
        +if (dev->ctrl.admin_q && !blk_queue_dying(dev->ctrl.admin_q))
            +blk_mq_unquiesce_queue(dev->ctrl.admin_q);
    +}
    mutex_unlock(&dev->shutdown_lock);
}

nvme_get_ctrl(&dev->ctrl);
nvme_dev_disable(dev, false);
+nvme_kill_queues(&dev->ctrl);
if (!queue_work(nvme_wq, &dev->remove_work))
    nvme_put_ctrl(&dev->ctrl);
}

struct nvme_dev *dev =
container_of(work, struct nvme_dev, ctrl.reset_work);
bool was_suspend = !!(dev->ctrl.ctrl_config & NVME_CC_SHN_NORMAL);
-int result = -ENODEV;
+int result;

-if (WARN_ON(dev->ctrl.state != NVME_CTRL_RESETTING))
    +if (dev->ctrl.state != NVME_CTRL_RESETTING) {
        +dev_warn(dev->ctrl.device, "ctrl state %d is not RESETTING\n",
            +dev->ctrl.state);
        +result = -ENODEV;
        goto out;
    +}
/*
 * If we're called to reset a live controller first shut it down before
 * @@ -2299,18 +2347,19 @@
 */
-if (dev->ctrl.ctrl_config & NVME_CC_ENABLE)
    nvme_dev_disable(dev, false);
+nvme_sync_queues(&dev->ctrl);
result = nvme_pci_enable(dev);
if (result)
-goto out;
+goto out_unlock;

result = nvme_pci_configure_admin_queue(dev);
if (result)
-goto out;
+goto out_unlock;

result = nvme_alloc_admin_tags(dev);
if (result)
-goto out;
+goto out_unlock;

result = nvme_init_identify(&dev->ctrl);
if (result)
@@ -2361,12 +2410,15 @@
if (!nvme_change_ctrl_state(&dev->ctrl, NVME_CTRL_LIVE)) {
  dev_warn(dev->ctrl.device, "failed to mark controller live\n");
+result = -EBUSY;
  goto out;
}

nvme_start_ctrl(&dev->ctrl);
return;

+ out_unlock:
+mutex_unlock(&dev->shutdown_lock);
out:
  nvme_remove_dead_ctrl(dev, result);
}@@ -2376,7 +2428,6 @@
struct nvme_dev *dev = container_of(work, struct nvme_dev, remove_work);
struct pci_dev *pdev = to_pci_dev(dev->dev);

-nvme_kill_queues(&dev->ctrl);
if (pci_get_drvdata(pdev))
  device_release_driver(&pdev->dev);
  nvme_put_ctrl(&dev->ctrl);
@@ -2396,7 +2447,7 @@
static int nvme_pci_reg_read64(struct nvme_ctrl *ctrl, u32 off, u64 *val)
{
  -*val = readq(to_nvme_dev(ctrl)->bar + off);
  +*val = lo_hi_readq(to_nvme_dev(ctrl)->bar + off);
  return 0;


```c
/*
 * Samsung SSD 960 EVO drops off the PCIe bus after system
 * - suspend on a Ryzen board, ASUS PRIME B350M-A.
 * + suspend on a Ryzen board, ASUS PRIME B350M-A, as well as
 * + within few minutes after bootup on a Coffee Lake board -
 * + ASUS PRIME Z370-A
 */
if (dmi_match(DMI_BOARD_VENDOR, "ASUSTeK COMPUTER INC.") &&
    (dmi_match(DMI_BOARD_NAME, "PRIME B350M-A") ||
     dmi_match(DMI_BOARD_NAME, "PRIME Z370-A")))
return NVME_QUIRK_NO_APST;

dev = kzalloc_node(sizeof(*dev), GFP_KERNEL, node);
if (!dev)
return -ENOMEM;
-dev->queues = kzalloc_node((num_possible_cpus() + 1) * sizeof(void *),
+    dev->queues = kzalloc_node((num_possible_cpus() + 1) * sizeof(struct nvme_queue),
GFP_KERNEL, node);
if (!dev->queues)
goto free;
```

```c
nvme_change_ctrl_state(&dev->ctrl, NVME_CTRL_DELETING);
-cancel_work_sync(&dev->ctrl.reset_work);
pci_set_drvdata(pdev, NULL);
if (!pci_device_is_present(pdev)) {
    nvme_stop_ctrl(&dev->ctrl);
    nvme_remove_namespaces(&dev->ctrl);
    nvme_dev_disable(dev, true);
    nvme_release cmb(dev);  
    nvme_free_host_mem(dev);
    nvme_dev_remove_admin(dev);
    nvme_free_queues(dev, 0);
} /* @ @ -2583,16 +2637,93 @ @ */
```
#ifdef CONFIG_PM_SLEEP
+static int nvme_get_power_state(struct nvme_ctrl *ctrl, u32 *ps)
+{
+return nvme_get_features(ctrl, NVME_FEAT_POWER_MGMT, 0, NULL, 0, ps);
+}
+
+static int nvme_set_power_state(struct nvme_ctrl *ctrl, u32 ps)
+{
+return nvme_set_features(ctrl, NVME_FEAT_POWER_MGMT, ps, NULL, 0, NULL);
+}
+
+static int nvme_resume(struct device *dev)
+{
+struct nvme_dev *ndev = pci_get_drvdata(to_pci_dev(dev));
+struct nvme_ctrl *ctrl = &ndev->ctrl;
+
+if (pm_resume_via_firmware() || !ctrl->npss ||
+    nvme_set_power_state(ctrl, ndev->last_ps) != 0)
+nvme_reset_ctrl(ctrl);
+return 0;
+}
+
+static int nvme_suspend(struct device *dev)
+{
+struct pci_dev *pdev = to_pci_dev(dev);
+struct nvme_dev *ndev = pci_get_drvdata(pdev);
+struct nvme_ctrl *ctrl = &ndev->ctrl;
+int ret = -EBUSY;
+
+if (pm_suspend_via_firmware() || !ctrl->npss) {
+nvme_dev_disable(ndev, true);
+return 0;
+}
+
+/*
+ * The platform does not remove power for a kernel managed suspend so
+ * use host managed nvme power settings for lowest idle power if
+ * possible. This should have quicker resume latency than a full device
+ * shutdown. But if the firmware is involved after the suspend or the
+ * device does not support any non-default power states, shut down the
+ * device fully.
+ */
+if (pm_suspend_via_firmware() || !ctrl->npss) {
+nvme_dev_disable(ndev, true);
+return 0;
+}
+
+nvme_start_freeze(ctrl);
+nvme_wait_freeze(ctrl);
+nvme_sync_queues(ctrl);
+
+if (ctrl->state != NVME_CTRL_LIVE) goto unfreeze;
+ ndev->last_ps = 0;
+ ret = nvme_get_power_state(ctrl, &ndev->last_ps);
+ if (ret < 0)
+ goto unfreeze;
+ ret = nvme_set_power_state(ctrl, ctrl->npss);
+ if (ret < 0)
+ goto unfreeze;
+ if (ret) {
+ /*
+ * Clearing npss forces a controller reset on resume. The
+ * correct value will be rediscoved then.
+ */
+ nvme_dev_disable(ndev, true);
+ ctrl->npss = 0;
+ ret = 0;
+ goto unfreeze;
+ }
+ /*
+ * A saved state prevents pci pm from generically controlling the
+ * device's power. If we're using protocol specific settings, we don't
+ * want pci interfering.
+ */
+ pci_save_state(pdev);
+ unfreeze:
+ nvme_unfreeze(ctrl);
+ return ret;
+ }
+
+static int nvme_simple_suspend(struct device *dev)
+{
+ struct nvme_dev *ndev = pci_get_drvdata(to_pci_dev(dev));
+
+ nvme_dev_disable(ndev, true);
+ return 0;
+ }

- static int nvme_resume(struct device *dev)
+ static int nvme_simple_resume(struct device *dev)
+ {
+ struct pci_dev *pdev = to_pci_dev(dev);
+ struct nvme_dev *ndev = pci_get_drvdata(pdev);
+ @ @ -2600.9 +2731.19 @ @
+ nvme_reset_ctrl(&ndev->ctrl);
+ return 0;
+ }
-#endif

-static SIMPLE_DEV_PM_OPS(nvme_dev_pm_ops, nvme_suspend, nvme_resume);
+const struct dev_pm_ops nvme_dev_pm_ops = {
+    .suspend = nvme_suspend,
+    .resume  = nvme_resume,
+    .freeze  = nvme_simple_suspend,
+    .thaw    = nvme_simple_resume,
+    .poweroff= nvme_simple_suspend,
+    .restore = nvme_simple_resume,
+};
+
+#else
+#define nvme_dev_pm_ops NULL
+#endif

static pci_ers_result_t nvme_error_detected(struct pci_dev *pdev, 
   pci_channel_state_t state)
@@ -2642,6 +2783,9 @@

static void nvme_error_resume(struct pci_dev *pdev)
{ 
+    struct nvme_dev *dev = pci_get_drvdata(pdev);
+    
+    flush_work(&dev->ctrl.reset_work);
pci_cleanup_aer_uncorrect_error_status(pdev);
}

@@ -2667,7 +2811,10 @@
 .driver_data = NVME_QUIRK_STRIPE_SIZE |
 NVME_QUIRK_DEALLOCATE_ZEROES, },
 { PCI_VDEVICE(INTEL, 0xf1a5),/* Intel 600P/P3100 */
@@ -2684,7 +2831,11 @@
 .driver_data = NVME_QUIRK_LIGHTNVM, },
 { PCI_DEVICE_CLASS(PCI_CLASS_STORAGE_EXPRESS, 0xffffff) },
+{ PCI_DEVICE(0x2646, 0x2263), /* KINGSTON A2000 NVMe SSD */
 .driver_data = NVME_QUIRK_LIGHTNVM, },
 .driver_data = NVME_QUIRK_IDENTIFY_CNS, },
 { PCI_DEVICE_CLASS(PCI_CLASS_STORAGE_EXPRESS, 0xfffff) },
+{ PCI_DEVICE(0x1d1d, 0x2601), /* CNEX Granby */
+    .driver_data = NVME_QUIRK_LIGHTNVM, },
+{ PCI_DEVICE(0x1d1d, 0x2807), /* CNEX WL */
+    .driver_data = NVME_QUIRK_LIGHTNVM, },
+{ PCI_DEVICE(0x1c58, 0x0003), /* HGST adapter */
@@ -2690,10 +2837,11 @@
 .driver_data = NVME_QUIRK_LIGHTNVM, },
 { PCI_DEVICE_CLASS(PCI_CLASS_STORAGE_EXPRESS, 0xffffff) },
+{ PCI_DEVICE(0x2646, 0x2263), /* KINGSTON A2000 NVMe SSD */
.
/* Spread I/O queues completion vectors according their queue index.
 * Admin queues can always go on completion vector 0.
 */
-comp_vector = idx == 0 ? idx : idx - 1;
+comp_vector = (idx == 0 ? idx : idx - 1) % ibdev->num_comp_vectors;

"+1 for ib_stop_cq +/
queue->ib_cq = ib_alloc_cq(ibdev, queue,
@@ -643,10 +643,13 @@
if (ret)
    return ret;
-ctrl->ctrl.queue_count = nr_io_queues + 1;
-if (ctrl->ctrl.queue_count < 2)
-    return 0;
+if (nr_io_queues == 0) {
+    dev_err(ctrl->ctrl.device,
+        "unable to set any I/O queues\n");
+    return -ENOMEM;
+}
+ctrl->ctrl.queue_count = nr_io_queues + 1;
    dev_info(ctrl->ctrl.device,
        "creating %d I/O queues\n", nr_io_queues);
@@ -735,7 +738,6 @@
static void nvme_rdma_destroy_admin_queue(struct nvme_rdma_ctrl *ctrl,
bolt remove)
{
-    nvme_rdma_stop_queue(&ctrl->queues[0]);
    if (remove) {
        blk_cleanup_queue(ctrl->ctrl.admin_q);
        nvme_rdma_free_tagset(&ctrl->ctrl, ctrl->ctrl.admin_tagset);
@@ -779,7 +781,7 @@
if (error) {
    dev_err(ctrl->ctrl.device,
        "prop_get NVME_REG_CAP failed\n");
    goto out_cleanup_queue;
+    goto out_stop_queue;
}
ctrl->ctrl.sqsize =
@@ -787,23 +789,25 @@
error = nvme_enable_ctrl(&ctrl->ctrl, ctrl->ctrl.cap);
if (error)
    goto out_cleanup_queue;
+    goto out_stop_queue;

ctrl->ctrl.max_hw_sectors =
(ctrl->max_fr_pages - 1) << (ilog2(SZ_4K) - 9);

error = nvme_init_identify(&ctrl->ctrl);
if (error)
    goto out_cleanup_queue;
+    goto out_stop_queue;

error = nvme_rdma_alloc_qe(ctrl->queues[0].device->dev,
&ctrl->async_event_sqe, sizeof(struct nvme_command),
DMA_TO_DEVICE);
if (error)
    goto out_cleanup_queue;
+    goto out_stop_queue;

return 0;

+out_stop_queue:
+nvme_rdma_stop_queue(&ctrl->queues[0]);
out_cleanup_queue:
if (new)
    blk_cleanup_queue(ctrl->ctrl.admin_q);
@@ -818,7 +822,6 @@
static void nvme_rdma_destroy_io_queues(struct nvme_rdma_ctrl *ctrl,
bool remove)
{
    -nvme_rdma_stop_io_queues(ctrl);
    if (remove) {
        blk_cleanup_queue(ctrl->ctrl.connect_q);
        nvme_rdma_free_tagset(&ctrl->ctrl, ctrl->ctrl.tagset);
@@ -879,9 +882,9 @@
        list_del(&ctrl->list);
        mutex_unlock(&nvme_rdma_ctrl_mutex);

        -kfree(ctrl->queues);
        nvmf_free_options(nctrl->opts);
        free_ctrl;
        +kfree(ctrl->queues);
        kfree(ctrl);
    }
destroy_admin:
+nvme_rdma_stop_queue(&ctrl->queues[0]);
nvme_rdma_destroy_admin_queue(ctrl, false);
requeue:
dev_info(ctrl->ctrl.device, "Failed reconnect attempt %d\n",
@@ -957,12 +961,14 @@
if (ctrl->ctrl.queue_count > 1) {
    nvme_stop_queues(&ctrl->ctrl);
+nvme_rdma_stop_io_queues(ctrl);
    blk_mq_tagset_busy_iter(&ctrl->tag_set,
        nvme_cancel_request, &ctrl->ctrl);
    nvme_rdma_destroy_io_queues(ctrl, false);
    blk_mq_quiesce_queue(ctrl->ctrl.admin_q);
+nvme_rdma_stop_queue(&ctrl->queues[0]);
    blk_mq_tagset_busy_iter(&ctrl->ctrl->admin_tag_set,
        nvme_cancel_request, &ctrl->ctrl);
    nvme_rdma_destroy_admin_queue(ctrl, false);
@@ -1542,7 +1548,6 @@
        complete(&queue->cm_done);
    return 0;
    case RDMA_CM_EVENT_REJECTED:
        -nvme_rdma_destroy_queue_ib(queue);
        cm_error = nvme_rdma_conn_rejected(queue, ev);
        break;
    case RDMA_CM_EVENT_ROUTE_ERROR:
@@ -1727,8 +1732,11 @@
        if (ctrl->ctrl.queue_count > 1) {
            nvme_stop_queues(&ctrl->ctrl);
+nvme_rdma_stop_io_queues(ctrl);
            blk_mq_tagset_busy_iter(&ctrl->ctrl->tag_set,
                nvme_cancel_request, &ctrl->ctrl);
            +if (shutdown)
                +nvme_start_queues(&ctrl->ctrl);
            nvme_rdma_destroy_io_queues(ctrl, shutdown);
        }
@@ -1738,6 +1746,7 @@
        blk_mq_quiesce_queue(ctrl->ctrl.admin_q);
+nvme_rdma_stop_queue(&ctrl->queues[0]);
blk_mq_tagset_busy_iter(&ctrl->admin_tag_set,
nvme_cancel_request, &ctrl->ctrl);
blk_mq_unquiesce_queue(ctrl->ctrl.admin_q);
@@ -1925,11 +1934,6 @@
goto out_free_ctrl;
}

-ret = nvme_init_ctrl(&ctrl->ctrl, dev, &nvme_rdma_ctrl_ops,
-0 /* no quirks, we're perfect! */);
-if (ret)
-goto out_free_ctrl;
-
INIT_DELAYED_WORK(&ctrl->reconnect_work,
nvme_rdma_reconnect_ctrl_work);
INIT_WORK(&ctrl->err_work, nvme_rdma_error_recovery_work);
@@ -1943,12 +1947,17 @@
ctrl->queues = kcalloc(ctrl->ctrl.queue_count, sizeof(*ctrl->queues),
GFP_KERNEL);
if (!ctrl->queues)
-goto out_uninit_ctrl;
+goto out_free_ctrl;

-ret = nvme_rdma_configure_admin_queue(ctrl, true);
+ret = nvme_init_ctrl(&ctrl->ctrl, dev, &nvme_rdma_ctrl_ops,
+0 /* no quirks, we're perfect! */);
-if (ret)
-goto out_kfree_queues;

out_remove_admin_queue:
+nvme_rdma_stop_queue(&ctrl->queues[0]);
nvme_rdma_destroy_admin_queue(ctrl, true);
-out_kfree_queues:
-kfree(ctrl->queues);
out_uninit_ctrl:
_nvme_uninit_ctrl(&ctrl->ctrl);
nvme_put_ctrl(&ctrl->ctrl);
if (ret > 0)
static struct nvmf_transport_ops nvme_rdma_transport = {
    .name = "rdma",
    .module = THIS_MODULE,
    .required_opts = NVMF_OPT_TRADDR,
    .allowed_opts = NVMF_OPT_TRSVCID | NVMF_OPT_RECONNECT_DELAY | NVMF_OPT_HOST_TRADDR | NVMF_OPT_CTRL_LOSS_TMO,
}

static void nvme_rdma_remove_one(struct ib_device *ib_device, void *client_data)
{
    struct nvme_rdma_ctrl *ctrl;
    struct nvme_rdma_device *ndev;
    bool found = false;
    +
    +mutex_lock(&device_list_mutex);
    +list_for_each_entry(ndev, &device_list, entry) {
        +if (ndev->dev == ib_device) {
            +found = true;
            +break;
            +}
        +}
    +mutex_unlock(&device_list_mutex);
    +
    +if (!found)
        +return;

    /* Delete all controllers using this device */
    mutex_lock(&nvme_rdma_ctrl_mutex);
    --- linux-4.15.0.orig/drivers/nvme/target/Kconfig
    +++ linux-4.15.0/drivers/nvme/target/Kconfig
    @@ -27,7 +27,7 @@
     config NVME_TARGET_RDMA
     tristate "NVMe over Fabrics RDMA target support"
     -depends on INFINIBAND
     +depends on INFINIBAND && INFINIBAND_ADDR_TRANS
     depends on NVME_TARGET
     help
        This enables the NVMe RDMA target support, which allows exporting NVMe
     --- linux-4.15.0.orig/drivers/nvme/target/admin-cmd.c
host_reads = part_stat_read(ns->bdev->bd_part, ios[READ]);
data_units_read = part_stat_read(ns->bdev->bd_part, sectors[READ]);
+data_units_read = DIV_ROUND_UP(part_stat_read(ns->bdev->bd_part,
+sectors[READ]), 1000);
host_writes = part_stat_read(ns->bdev->bd_part, ios[WRITE]);
data_units_written = part_stat_read(ns->bdev->bd_part, sectors[WRITE]);
+data_units_written = DIV_ROUND_UP(part_stat_read(ns->bdev->bd_part,
+sectors[WRITE]), 1000);

put_unaligned_le64(host_reads, &slog->host_reads[0]);
put_unaligned_le64(data_units_read, &slog->data_units_read[0]);
rcu_read_lock();
list_for_each_entry_rcu(ns, &ctrl->subsys->namespaces, dev_link) {
    host_reads += part_stat_read(ns->bdev->bd_part, ios[READ]);
data_units_read +=
    part_stat_read(ns->bdev->bd_part, sectors[READ]);
+data_units_read += DIV_ROUND_UP(
    part_stat_read(ns->bdev->bd_part, sectors[READ]), 1000);
host_writes += part_stat_read(ns->bdev->bd_part, ios[WRITE]);
data_units_written +=
    part_stat_read(ns->bdev->bd_part, sectors[WRITE]);
+data_units_written += DIV_ROUND_UP(
    part_stat_read(ns->bdev->bd_part, sectors[WRITE]), 1000);
}
rcu_read_unlock();
--- linux-4.15.0.orig/drivers/nvme/target/core.c
+++ linux-4.15.0/drivers/nvme/target/core.c
@@ -219,6 +219,9 @@
static void nvmet_start_keep_alive_timer(struct nvmet_ctrl *ctrl)
{
    +if (unlikely(ctrl->kato == 0))
    +return;
    +pr_debug("ctrl %d start keep-alive timer for %d secs\n",
    +ctrl->cntlid, ctrl->kato);
    @ @ -228,6 +231,9 @@

static void nvmet_stop_keep_alive_timer(struct nvmet_ctrl *ctrl)
{
    +if (unlikely(ctrl->kato == 0))

Open Source Used In 5GaaS Edge AC-4  26751
+return;
+
pr_debug("ctrl %d stop keep-alive\n", ctrl->cntlid);

cancel_delayed_work_sync(&ctrl->ka_work);
@@ -519,9 +525,12 @@
go to fail;
}

-/* either variant of SGLs is fine, as we don't support metadata */
-if (unlikely((flags & NVME_CMD_SGL_ALL) != NVME_CMD_SGL_METABUF &&
 - (flags & NVME_CMD_SGL_ALL) != NVME_CMD_SGL_METASEG)) {
+/*
+ * For fabrics, PSDT field shall describe metadata pointer (MPTR) that
+ * contains an address of a single contiguous physical buffer that is
+ * byte aligned.
+ */
+if (unlikely((flags & NVME_CMD_SGL_ALL) != NVME_CMD_SGL_METABUF)) {
status = NVME_SC_INVALID_FIELD | NVME_SC_DNR;
go to fail;
}
@@ -608,9 +617,20 @@
-	if (nvmet_cc_iosqes(ctrl->cc) != NVME_NVM_IOSQES ||
-    nvmet_cc_iocqes(ctrl->cc) != NVME_NVM_IOCQES ||
-    nvmet_cc_mps(ctrl->cc) != 0 ||
+/*
+ * Only I/O controllers should verify iosqes,iocqes.
+ * Strictly speaking, the spec says a discovery controller
+ * should verify iosqes,iocqes are zeroed, however that
+ * would break backwards compatibility, so don't enforce it.
+ */
+if (ctrl->subsys->type != NVME_NQN_DISC &&
+ (nvmet_cc_iosqes(ctrl->cc) != NVME_NVM_IOSQES ||
+ nvmet_cc_iocqes(ctrl->cc) != NVME_NVM_IOCQES)) {
+ctrl->csts = NVME_CSTS_CFS;
+return;
+}
+
+if (nvmet_cc_mps(ctrl->cc) != 0 ||
    nvmet_cc_ams(ctrl->cc) != 0 ||
    nvmet_cc_css(ctrl->cc) != 0) {
ctrl->csts = NVME_CSTS_CFS;
@@ -618,6 +638,15 @@
}
ctrl->csts = NVME_CSTS_RDY;
+
+/*
+ * Controllers that are not yet enabled should not really enforce the
+ * keep alive timeout, but we still want to track a timeout and cleanup
+ * in case a host died before it enabled the controller. Hence, simply
+ * reset the keep alive timer when the controller is enabled.
+ */
+if (ctrl->kato)
+mod_delayed_work(system_wq, &ctrl->ka_work, ctrl->kato * HZ);
}

static void nvmet_clear_ctrl(struct nvmet_ctrl *ctrl)
@@ -758,6 +787,15 @@
return __nvmet_host_allowed(subsys, hostnqn);
}

+static void nvmet_fatal_error_handler(struct work_struct *work)
{+struct nvmet_ctrl *ctrl =+
container_of(work, struct nvmet_ctrl, fatal_err_work);
+
+pr_err("ctrl %d fatal error occurred!\n", ctrl->cntlid);
+ctrl->ops->delete_ctrl(ctrl);
+}
+
+u16 nvmet_alloc_ctrl(const char *subsysnqn, const char *hostnqn,
+struct nvmet_req *req, u32 kato, struct nvmet_ctrl **ctrlp)
{@@ -797,6 +835,7 @@
INIT_WORK(&ctrl->async_event_work, nvmet_async_event_work);
INIT_LIST_HEAD(&ctrl->async_events);
+INIT_WORK(&ctrl->fatal_err_work, nvmet_fatal_error_handler);

memcpy(ctrl->subsysnqn, subsysnqn, NVMF_NQN_SIZE);
memcpy(ctrl->hostnqn, hostnqn, NVMF_NQN_SIZE);
@@ -899,21 +938,11 @@
kref_put(&ctrl->ref, nvmet_ctrl_free);
}

-static void nvmet_fatal_error_handler(struct work_struct *work)
-{
-struct nvmet_ctrl *ctrl =
-container_of(work, struct nvmet_ctrl, fatal_err_work);
-******************************************
-pr_err("ctrl %d fatal error occurred!\n", ctrl->cntlid);
-ctrl->ops->delete_ctrl(ctrl);

void nvmet_ctrl_fatal_error(struct nvmet_ctrl *ctrl)
{
    mutex_lock(&ctrl->lock);
    if (!(ctrl->csts & NVME_CSTS_CFS)) {
        ctrl->csts |= NVME_CSTS_CFS;
        INIT_WORK(&ctrl->fatal_err_work, nvmet_fatal_error_handler);
        schedule_work(&ctrl->fatal_err_work);
    }
    mutex_unlock(&ctrl->lock);
}

/* desired maximum for a single sequence - if sg list allows it */
#define NVMET_FC_MAX_SEQ_LENGTH(256 * 1024)
#define NVMET_FC_MAX_XFR_SGENTS(NVMET_FC_MAX_SEQ_LENGTH / PAGE_SIZE)

enum nvmet_fcp_datadir {
    NVMET_FCP_NODATA,
    NVMET_FCP_READ,
    NVMET_FCP_WRITE,
} __aligned(sizeof(unsigned long long));

struct nvme_fc_cmd_iucmdiobuf;
struct nvme_fc_ersp_iurspiubuf;
dma_addr_t trspdma;
+struct scatterlist*next_sg;
struct scatterlist*data_sg;
int data_sg_cnt;
u32 offset;
INIT_LIST_HEAD(&newrec->assoc_list);
kref_init(&newrec->ref);
ida_init(&newrec->assoc_cnt);
-newrec->max_sg_cnt = min_t(u32, NVMET_FC_MAX_XFR_SGENTS, template->max_sgl_segments);
+newrec->max_sg_cnt = template->max_sgl_segments;

ret = nvmet_fc_alloc_ls_iodlist(newrec);
if (ret) {
    @@ -1728,6 +1728,7 @@
    ((fod->io_dir == NVMET_FCP_WRITE) ?
        DMA_FROM_DEVICE : DMA_TO_DEVICE));
    /* note: write from initiator perspective */
    +fod->next_sg = fod->data_sg;

    return 0;
@@ -1885,24 +1886,49 @@
struct nvmefc_tgt_fcp_req *fcpreq = fod->fcpreq;
+struct scatterlist *sg = fod->next_sg;
unsigned long flags;
-u32 tlen;
+u32 remaininglen = fod->req.transfer_len - fod->offset;
+u32 tlen = 0;
int ret;

fcpreq->op = op;
fcpreq->offset = fod->offset;
fcpreq->timeout = NVME_FC_TGTOP_TIMEOUT_SEC;

-tlen = min_t(u32, tgtport->max_sg_cnt * PAGE_SIZE,
-(fod->req.transfer_len - fod->offset));
+/*
+ * for next sequence:
+ *  break at a sg element boundary
+ *  attempt to keep sequence length capped at
+ *  NVMET_FC_MAX_SEQ_LENGTH but allow sequence to
+ *  be longer if a single sg element is larger
+ *  than that amount. This is done to avoid creating
+ *  a new sg list to use for the tgtport api.
+ */
+fcpreq->sg = sg;
+fcpreq->sg_cnt = 0;
+while (tlen < remaininglen &&
+    fcpreq->sg_cnt < tgtport->max_sg_cnt &&
+    tlen + sg_dma_len(sg) < NVMET_FC_MAX_SEQ_LENGTH) {
+    fcpreq->sg_cnt++;
+    tlen += sg_dma_len(sg);
+    sg = sg_next(sg);
+}  
+if (tlen < remaininglen && fcpreq->sg_cnt == 0) {
+    fcpreq->sg_cnt++;
+    tlen += min_t(u32, sg_dma_len(sg), remaininglen);
+    sg = sg_next(sg);
+}  
+if (tlen < remaininglen)
+    fod->next_sg = sg;
+else
+    fod->next_sg = NULL;
+
+fcpreq->transfer_length = tlen;
+fcpreq->transferred_length = 0;
fcpreq->fcp_error = 0;
fcpreq->rsplen = 0;

-fcpreq->sg = &fod->data_sg[fod->offset / PAGE_SIZE];
-fcpreq->sg_cnt = DIV_ROUND_UP(tlen, PAGE_SIZE);
-
/*
 * If the last READDATA request: check if LLDD supports
 * combined xfr with response.
 @@ -1979,9 +2005,9 @@
 return;
 if (fcpreq->fcp_error ||
     fcpreq->transferred_length != fcpreq->transfer_length) {
-    spin_lock(&fod->flock);
+    spin_lock_irqsave(&fod->flock, flags);
    fod->abort = true;
-    spin_unlock(&fod->flock);
+    spin_unlock_irqrestore(&fod->flock, flags);
    nvmet_req_complete(&fod->req, NVME_SC_INTERNAL);
    return;
--- linux-4.15.0.orig/drivers/nvme/target/fcloop.c
+++ linux-4.15.0/drivers/nvme/target/fcloop.c
@@ -204,6 +204,10 @@
 struct completion unreg_done;
 }

+struct fcloop_lport_priv {
+    struct fcloop_lport *lport;
    +};
+
 struct fcloop_rport {
     struct nvme_fc_remote_port *remoteport;
     struct nvme_fc_target_port *targetport;
@@ -296,7 +300,7 @@
     struct fcloop_tport *tport = tls_req->tport;
     struct nvmefc_ls_req *lsreq = tls_req->lsreq;
     
-    if (tport->remoteport)
+    if (!tport || tport->remoteport)
         lsreq->done(lsreq, tls_req->status);
 }
@@ -314,6 +318,7 @@

 if (!rport->targetport) {
     tls_req->status = -ECONNREFUSED;
+    tls_req->tport = NULL;

schedule_work(&tls_req->work);
return ret;
}
@@ -370,6 +375,7 @@
spin_lock(&tfcp_req->reqlock);
fcpreq = tfcp_req->fcpreq;
+tfcp_req->fcpreq = NULL;
spin_unlock(&tfcp_req->reqlock);
if (tport->remoteport && fcpreq) {
@@ -529,6 +535,7 @@
/* Fall-Thru to RSP handling */
+/* FALLTHRU */

case NVMET_FCOP_RSP:
if (fcpreq) {
@@ -611,11 +618,7 @@
if (!tfcp_req)
/* abort has already been called */
-return;
-
-if (rport->targetport)
-nvmet_fc_rcv_fcp_abort(rport->targetport,
-&tfcp_req->tgt_fcp_req);
+goto finish;
/* break initiator/target relationship for io */
spin_lock(&tfcp_req->reqlock);
@@ -623,6 +626,11 @@
tfcp_req->fcpreq = NULL;
spin_unlock(&tfcp_req->reqlock);
+if (rport->targetport)
+nvmet_fc_rcv_fcp_abort(rport->targetport,
+&tfcp_req->tgt_fcp_req);
+finish:
/* post the aborted io completion */
fcreq->status = -ECANCELED;
schedule_work(&inireq->iniwork);
@@ -657,7 +665,8 @@
static void
fcloop_localport_delete(struct nvme_fc_local_port *localport) {

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-struct fcloop_lport *lport = localport->private;
+struct fcloop_lport_priv *lport_priv = localport->private;
+struct fcloop_lport *lport = lport_priv->lport;

/* release any threads waiting for the unreg to complete */
complete(&lport->unreg_done);
@@ -697,7 +706,7 @@
    .max_dif_sgl_segments = FCLOOP_SGL_SEGS,
    .dma_boundary = FCLOOP_DMABOUND_4G,
/* sizes of additional private data for data structures */
-.local_priv_sz = sizeof(struct fcloop_lport),
+.local_priv_sz = sizeof(struct fcloop_lport_priv),
    .remote_priv_sz = sizeof(struct fcloop_rport),
    .lsrqst_priv_sz = sizeof(struct fcloop_lsrq),
    .fcprqst_priv_sz = sizeof(struct fcloop_ini_fcpreq),
@@ -728,11 +737,17 @@
struct fcloop_ctrl_options *opts;
struct nvme_fc_local_port *localport;
struct fcloop_lport *lport;
-int ret;
+struct fcloop_lport_priv *lport_priv;
+unsigned long flags;
+int ret = -ENOMEM;
+	lport = kzalloc(sizeof(*lport), GFP_KERNEL);
	if (!lport)
		return -ENOMEM;
	lport_priv = localport->private;
+lport_priv->lport = lport;
+lport->localport = localport;
INIT_LIST_HEAD(&lport->lport_list);

opts = kzalloc(sizeof(*opts), GFP_KERNEL);
if (!opts)
	return -ENOMEM;
+goto out_free_lport;

ret = fcloop_parse_options(opts, buf);
if (ret)
@@ -752,23 +767,25 @@
ret = nvme_fc_register_localport(&pinfo, &fctemplate, NULL, &localport);
if (!ret) {
    unsigned long flags;
    /* success */
    -lport = localport->private;
+lport_priv = localport->private;
+lport_priv->lport = lport;
+}
    lport->localport = localport;
    INIT_LIST_HEAD(&lport->lport_list);
spin_lock_irqsave(&fcloop_lock, flags);
list_add_tail(&lport->lport_list, &fcloop_lports);
spin_unlock_irqrestore(&fcloop_lock, flags);
-
-/* mark all of the input buffer consumed */
-ret = count;
}

out_free_opts:
kfree(opts);
+out_free_lport:
+/* free only if we're going to fail */
+if (ret)
+kfree(lport);
+
return ret ? ret : count;
}

wait_for_completion(&lport->unreg_done);

+kfree(lport);
+
return ret;
}

--- linux-4.15.0.orig/drivers/nvme/target/loop.c
+++ linux-4.15.0/drivers/nvme/target/loop.c
@@ -790,6 +807,8 @@
wait_for_completion(&lport->unreg_done);

+kfree(lport);
+
return ret;

+blk_mq_start_request(req);
iod->cmd.common.flags |= NVME_CMD_SGL_METABUF;
iod->req.port = nvmet_loop_port;
if (!nvmet_req_init(&iod->req, &queue->nvme_cq,
-&queue->nvme_sq, &nvme_loop_ops)) {
-nvme_cleanup_cmd(req);
-blk_mq_start_request(req);
-nvme_loop_queue_response(&iod->req);
+&queue->nvme_sq, &nvme_loop_ops))
return BLK_STS_OK;
-}

if (blk_rq_bytes(req)) {
iod->sg_table.sgl = iod->first_sgl;

iod->req.transfer_len = blk_rq_bytes(req);
}

-blk_mq_start_request(req);
-
schedule_work(&iod->work);
return BLK_STS_OK;
}

static void nvme_loop_destroy_admin_queue(struct nvme_loop_ctrl *ctrl)
{
-clear_bit(NVME_LOOP_Q_LIVE, &ctrl->queues[0].flags);
+if (!test_and_clear_bit(NVME_LOOP_Q_LIVE, &ctrl->queues[0].flags))
+return;
	nvmet_sq_destroy(&ctrl->queues[0].nvme_sq);
blk_cleanup_queue(ctrl->ctrl.admin_q);
blk_mq_free_tag_set(&ctrl->admin_tag_set);
@@ -319,6 +315,7 @@
clear_bit(NVME_LOOP_Q_LIVE, &ctrl->queues[i].flags);
nvmet_sq_destroy(&ctrl->queues[i].nvme_sq);
} 
+ctrl->ctrl.queue_count = 1;
}

static int nvme_loop_init_io_queues(struct nvme_loop_ctrl *ctrl)
@@ -427,6 +424,7 @@
return 0;

out_cleanup_queue:
-clear_bit(NVME_LOOP_Q_LIVE, &ctrl->queues[0].flags);
blk_cleanup_queue(ctrl->ctrl.admin_q);
out_free_tagset:
blk_mq_free_tag_set(&ctrl->admin_tag_set);
@@ -686,6 +684,7 @@

static struct nvmf_transport_ops nvme_loop_transport = {
 .name = "loop",
 .module = THIS_MODULE,
 .create_ctrl = nvme_loop_create_ctrl,
};

--- linux-4.15.0.orig/drivers/nvme/target/rdma.c
+++ linux-4.15.0/drivers/nvme/target/rdma.c
@@ -65,6 +65,7 @@

struct nvmet_req req;
static void nvmet_rdma_read_data_done(struct ib_cq *cq, struct ib_wc *wc);
static void nvmet_rdma_qp_event(struct ib_event *event, void *priv);
static void nvmet_rdma_queue_disconnect(struct nvmet_rdma_queue *queue);
+static void nvmet_rdma_free_rsp(struct nvmet_rdma_device *ndev,
+struct nvmet_rdma_rsp *r);
+static int nvmet_rdma_alloc_rsp(struct nvmet_rdma_device *ndev,
+struct nvmet_rdma_rsp *r);

static struct nvmet_fabrics_ops nvmet_rdma_ops;

unsigned long flags;
spin_lock_irqsave(&queue->rsps_lock, flags);
-rsp = list_first_entry(&queue->free_rsps,
+rsp = list_first_entry_or_null(&queue->free_rsps,
struct nvmet_rdma_rsp, free_list);
-list_del(&rsp->free_list);
+if (likely(rsp))
+list_del(&rsp->free_list);
spin.unlock_irqrestore(&queue->rsps_lock, flags);

+if (unlikely(!rsp)) {
+int ret;
+
+rsp = kzalloc(sizeof(*rsp), GFP_KERNEL);
+if (unlikely(!rsp))
+return NULL;
+ret = nvmet_rdma_alloc_rsp(queue->dev, rsp);
+if (unlikely(ret)) {
+kfree(rsp);
+return NULL;
+}
+rsp->allocated = true;
+
return rsp;
}

static void nvmet_rdma_free_rsp(struct nvmet_rdma_device *ndev,
struct nvmet_rdma_rsp *r);
+static int nvmet_rdma_alloc_rsp(struct nvmet_rdma_device *ndev,
+struct nvmet_rdma_rsp *r);
unsigned long flags;

+if (unlikely(rsp->allocated)) {
+nvmet_rdma_free_rsp(rsp->queue->dev, rsp);
+kfree(rsp);
+return;
+}
+
+spin_lock_irqsave(&rsp->queue->rsps_lock, flags);
+list_add_tail(&rsp->free_list, &rsp->queue->free_rsps);
+spin_unlock_irqrestore(&rsp->queue->rsps_lock, flags);
+
{  
struct nvmet_rdma_rsp *rsp =
    container_of(wc->wr_cqe, struct nvmet_rdma_rsp, send_cqe);
+struct nvmet_rdma_queue *queue = cq->cq_context;

nvmet_rdma_release_rsp(rsp);

+}  
++ -517,7 +545,7 @@
++ -517,7 +545,7 @@
++ wc->status != IB_WC_WR_FLUSH_ERR)) {
++ pr_err("SEND for CQE 0x%p failed with status %s (%d).\n",
++ wc->wr_cqe, ib_wc_status_msg(wc->status), wc->status);
++-nvmet_rdma_error_comp(rsp->queue);
+++nvmet_rdma_error_comp(queue);
++}
++}
++
++ @ @ -758,6 +786,15 @@
++
++ cmd->queue = queue;
++ rsp = nvmet_rdma_get_rsp(queue);
+++if (unlikely(!rsp)) {
+++/*
+++ * we get here only under memory pressure,
+++ * silently drop and have the host retry
+++ * as we can't even fail it.
+++ */
+++nvmet_rdma_post_recv(queue->dev, cmd);
+++return;
+++
++}
++ rsp->queue = queue;
++ rsp->cmd = cmd;
++ rsp->flags = 0;
++ @ @ -1515,8 +1552,25 @@
++ static void nvmet_rdma_remove_one(struct ib_device *ib_device, void *client_data)
++ {  
struct nvmet_rdma_queue *queue, *tmp;
```c
+struct nvmet_rdma_device *ndev;
+bool found = false;
+
+mutex_lock(&device_list_mutex);
+list_for_each_entry(ndev, &device_list, entry) {
+  if (ndev->device == ib_device) {
+    found = true;
+    break;
+  }
+}
+mutex_unlock(&device_list_mutex);

-/* Device is being removed, delete all queues using this device */
+if (!found)
+  return;
+
+/*
+ * IB Device that is used by nvmet controllers is being removed,
+ * delete all queues using this device.
+ */
+mutex_lock(&nvmet_rdma_queue_mutex);
+list_for_each_entry_safe(queue, tmp, &nvmet_rdma_queue_list, queue_list) {
+  // Linux-4.15.0.orig/drivers/nvmem/core.c
+  // Linux-4.15.0/drivers/nvmem/core.c
+  // @ @ -407,10 +407,17 @ @
+  if (!config->base_dev)
+    return -EINVAL;
+
+  nvmem->eeprom = bin_attr_ro_root_nvmem;
+  else
+    nvmem->eeprom = bin_attr_rw_root_nvmem;
+    if (nvmem->read_only) {
+      if (config->root_only)
+        nvmem->eeprom = bin_attr_ro_root_nvmem;
+      else
+        nvmem->eeprom = bin_attr_ro_nvmem;
+    } else {
+      if (config->root_only)
+        nvmem->eeprom = bin_attr_rw_root_nvmem;
+      else
+        nvmem->eeprom = bin_attr_rw_nvmem;
+    }
+  nvmem->eeprom.attr.name = "eeprom";
+  nvmem->eeprom.size = nvmem->size;
+  ifdef CONFIG_DEBUG_LOCK_ALLOC
+  @@ -505,11 +512,17 @@
```
goto err_device_del;
}

-if (config->cells)
-nvmem_add_cells(nvmem, config);
+if (config->cells) {
+rval = nvmem_add_cells(nvmem, config);
+if (rval)
+goto err_teardown_compat;
+
return nvmem;

+err_teardown_compat:
+if (config->compat)
+device_remove_bin_file(nvmem->base_dev, &nvmem->eeprom);
err_device_del:
device_del(&nvmem->dev);
err_put_device:
@@ -612,7 +625,7 @@
    d = bus_find_device(&nvmem_bus_type, NULL, (void *)name, nvmem_match);

    if (!d)
    -return NULL;
    +return ERR_PTR(-ENOENT);

    return to_nvmem_device(d);
    }
    @@ -867,6 +880,10 @@
        return cell;
    }

    +/* NULL cell_id only allowed for device tree; invalid otherwise */
    +if (!cell_id)
    +return ERR_PTR(-EINVAL);
    +
    return nvmem_cell_get_from_list(cell_id);
    }
EXPORT_SYMBOL_GPL(nvmem_cell_get);
@@ -951,7 +968,7 @@
    static void nvmem_shift_read_buffer_in_place(struct nvmem_cell *cell, void *buf)
    {
        u8 *p, *b;
        -int i, bit_offset = cell->bit_offset;
        +int i, extra, bit_offset = cell->bit_offset;

        p = b = buf;
        if (bit_offset) {
static int __nvmem_cell_read(struct nvmem_device *nvmem, uint64_t offset, uint64_t *v, size_t nbits, size_t bit_offset)
{
    uint64_t *b = ALLOCATE(uint64_t, 1);
    *b++ >>= bit_offset;

    /* result fits in less bytes */
    if (cell->bytes != DIV_ROUND_UP(cell->nbits, BITS_PER_BYTE))
        *p-- = 0;
    else {
        /* point to the msb */
        p += cell->bytes - 1;
        
        /* result fits in less bytes */
        extra = cell->bytes - DIV_ROUND_UP(cell->nbits, BITS_PER_BYTE);
        while (--extra >= 0)
            *p-- = 0;
        
        /* clear msb bits if any leftover in the last byte */
        if (cell->nbits % BITS_PER_BYTE)
            *p &= GENMASK((cell->nbits % BITS_PER_BYTE) - 1, 0);
    }

    /* setup the first byte with lsb bits from nvmem */
    rc = nvmem_reg_read(nvmem, offset, v, 1);
    if (rc)
        goto err;
    *b++ |= GENMASK(bit_offset - 1, 0) & v;

    /* setup rest of the byte if any */
    rc = nvmem_reg_read(nvmem, offset + cell->bytes - 1, v, 1);
    if (rc)
        goto err;
    *p |= GENMASK(7, (nbits + bit_offset) % BITS_PER_BYTE) & v;

    return buf;
err:
    kfree(buf);
    return ERR_PTR(rc);
/**
--- linux-4.15.0.orig/drivers/nvmem/imx-ocotp.c
+++ linux-4.15.0/drivers/nvmem/imx-ocotp.c
@@ -50,7 +50,9 @@
#define IMX_OCOTP_BM_CTRL_ERROR		0x00000200
#define IMX_OCOTP_BM_CTRL_REL_SHADOWS	0x00000400
-#define DEF_RELAX			20	/* > 16.5ns */
+#define TIMING_STROBE_PROG_US		10	/* Min time to blow a fuse */
+#define TIMING_STROBE_READ_NS37/* Min time before read */
+﻿#define TIMING_RELAX_NS17
#define DEF_FSOURCE			1001	/* > 1000 ns */
#define DEF_STROBE_PROG10000/* IPG clocks */
#define IMX_OCOTP_WR_UNLOCK		0x3E770000
@@ -182,14 +184,41 @@
* fields with timing values to match the current frequency of the
* ipg_clk. OTP writes will work at maximum bus frequencies as long
* as the HW_OCOTP_TIMING parameters are set correctly.
+ *
+ * Note: there are minimum timings required to ensure an OTP fuse burns
+ * correctly that are independent of the ipg_clk. Those values are not
+ * formally documented anywhere however, working from the minimum
+ * timings given in u-boot we can say:
+ *
+ * - Minimum STROBE_PROG time is 10 microseconds. Intuitively 10
+ * microseconds feels about right as representative of a minimum time
+ * to physically burn out a fuse.
+ *
+ * - Minimum STROBE_READ i.e. the time to wait post OTP fuse burn before
+ * performing another read is 37 nanoseconds
+ *
+ * - Minimum RELAX timing is 17 nanoseconds. This final RELAX minimum
+ * timing is not entirely clear the documentation says "This
+ * count value specifies the time to add to all default timing
+ * parameters other than the Tpgm and Trd. It is given in number
+ * of ipg_clk periods." where Tpgm and Trd refer to STROBE_PROG
+ * and STROBE_READ respectively. What the other timing parameters
+ * are though, is not specified. Experience shows a zero RELAX
+ * value will mess up a re-load of the shadow registers post OTP
+ * burn.
+ */

clk_rate = clk_get_rate(priv->clk);

-relax = clk_rate / (1000000000 / DEF_RELAX) - 1;
-strobe_prog = clk_rate / (1000000000 / 10000) + 2 * (DEF_RELAX + 1) - 1;
-strobe_read = clk_rate / (1000000000 / 40) + 2 * (DEF_RELAX + 1) - 1;
relax = DIV_ROUND_UP(clk_rate * TIMING_RELAX_NS, 1000000000) - 1;
+strobe_read = DIV_ROUND_UP(clk_rate * TIMING_STROBE_READ_NS, 1000000000);
+strobe_read += 2 * (relax + 1) - 1;
+strobe_prog = DIV_ROUND_CLOSEST(clk_rate * TIMING_STROBE_PROG_US, 10000000);
+strobe_prog += 2 * (relax + 1) - 1;
+timing = strobe_prog & 0x00000FFF;
+timing = readl(priv->base + IMX_OCOTP_ADDR_TIMING) & 0x0FC00000;
+timing |= strobe_prog & 0x00000FFF;
timing |= (relax << 12) & 0x0000F000;
timing |= (strobe_read << 16) & 0x003F0000;
@@ -460,6 +489,10 @@
if (IS_ERR(priv->clk))
    return PTR_ERR(priv->clk);

+clk_prepare_enable(priv->clk);
+imx_ocotp_clr_err_if_set(priv->base);
+clk_disable_unprepare(priv->clk);
+of_id = of_match_device(imx_ocotp_dt_ids, dev);
priv->params = of_device_get_match_data(&pdev->dev);
imx_ocotp_nvmem_config.size = 4 * priv->params->nregs;
--- linux-4.15.0.orig/drivers/nvmem/qfprom.c
+++ linux-4.15.0/drivers/nvmem/qfprom.c
@@ -34,19 +34,6 @@
    return 0;
}

-static int qfprom_reg_write(void *context,
- unsigned int reg, void *_val, size_t bytes)
-{
- struct qfprom_priv *priv = context;
- u8 *val = _val;
- int i = 0, words = bytes;
- -while (words--)
-    writeb(*val++, priv->base + reg + i++);
- -return 0;
- }
- 
- static int qfprom_remove(struct platform_device *pdev)
- {
- struct nvmem_device *nvmem = platform_get_drvdata(pdev);
- @@ -59,7 +46,6 @@

.stride = 1,
.word_size = 1,
.reg_read = qfprom_reg_read,
.reg_write = qfprom_reg_write,
};

static int qfprom_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/nvmem/sunxi_sid.c
+++ linux-4.15.0/drivers/nvmem/sunxi_sid.c
@@ -206,8 +206,10 @@
 static const struct of_device_id sunxi_sid_of_match[] = {
  {.compatible = "allwinner,sun4i-a10-sid", .data = &sun4i_a10_cfg },
  {.compatible = "allwinner,sun7i-a20-sid", .data = &sun7i_a20_cfg },
+  {.compatible = "allwinner,sun8i-a83t-sid", .data = &sun50i_a64_cfg },
  {.compatible = "allwinner,sun8i-h3-sid", .data = &sun8i_h3_cfg },
  {.compatible = "allwinner,sun50i-a64-sid", .data = &sun50i_a64_cfg },
  {.compatible = "allwinner,sun50i-h5-sid", .data = &sun50i_a64_cfg },
+/* sentinel */,
};
MODULE_DEVICE_TABLE(of, sunxi_sid_of_match);
--- linux-4.15.0.orig/drivers/of/Kconfig
+++ linux-4.15.0/drivers/of/Kconfig
@@ -116,4 +116,8 @@
 config OF_NUMA
 bool
+config OF_DMA_DEFAULT_COHERENT
+# arches should select this if DMA is coherent by default for OF devices
+bool
+endif # OF
--- linux-4.15.0.orig/drivers/of/address.c
+++ linux-4.15.0/drivers/of/address.c
@@ -335,7 +337,8 @@
 if (res->flags & IORESOURCE_IO) {
     unsigned long port;

#include <linux/device.h>
+##include <linux/fwnode.h>
#include <linux/io.h>
#include <linux/ioprobe.h>
+##include <linux/logic_pio.h>
#include <linux/module.h>
#include <linux/of_address.h>
#include <linux/pci.h>
@@ -335,7 +337,8 @@

 if (res->flags & IORESOURCE_IO) {
     unsigned long port;
-err = pci_register_io_range(range->cpu_addr, range->size);
+err = pci_register_io_range(&np->fwnode, range->cpu_addr, range->size);
if (err)
goto invalid_range;
port = pci_address_to_pio(range->cpu_addr);
@@ -561,9 +564,14 @@
 * that translation is impossible (that is we are not dealing with a value
 * that can be mapped to a cpu physical address). This is not really specified
 * that way, but this is traditionally the way IBM at least do things
+ *
+- Whenever the translation fails, the *host pointer will be set to the
+- device that had registered logical PIO mapping, and the return code is
+- relative to that node.
+ */
static u64 __of_translate_address(struct device_node *dev,
    const __be32 *in_addr, const char *rprop)
    const __be32 *in_addr, const char *rprop,
+ struct device_node **host)
{ }
struct device_node *parent = NULL;
struct of_bus *bus, *pbus;
@@ -576,6 +584,7 @@
 /* Increase refcount at current level */
of_node_get(dev);

+*host = NULL;
/* Get parent & match bus type */
parent = of_get_parent(dev);
if (parent == NULL)
@@ -596,6 +605,8 @@
/* Translate */
for (;;) {
+struct logic_pio_hwaddr *iorange;
+ /* Switch to parent bus */
of_node_put(dev);
    dev = parent;
@@ -608,6 +619,19 @@
break;
} }

+/*
+ * For indirectIO device which has no ranges property, get
+ * the address from reg directly.
+ */
+iorange = find_io_range_by_fwnode(&dev->fwnode);
+if (iorange && (iorange->flags != LOGIC_PIO_CPU_MMIO)) {
+  result = of_read_number(addr + 1, na - 1);
+  pr_debug("indirectIO matched(%pOF) 0x%llx\n",
+    dev, result);
+  *host = of_node_get(dev);
+  break;
+}
+
+  /* Get new parent bus and counts */
+  pbus = of_match_bus(parent);
+  pbus->count_cells(dev, &pna, &pns);
+  @@ -639,13 +663,32 @@
+  u64 of_translate_address(struct device_node *dev, const __be32 *in_addr)
+  {
+    return __of_translate_address(dev, in_addr, "ranges");
+  +struct device_node *host;
+  +u64 ret;
+  +
+  +return ret;
+  }
+  
+  EXPORT_SYMBOL(of_translate_address);
+
+  u64 of_translate_dma_address(struct device_node *dev, const __be32 *in_addr)
+  {
+    return __of_translate_address(dev, in_addr, "dma-ranges");
+  +struct device_node *host;
+  +u64 ret;
+  +
+  +return ret;
+  }
+  
+  EXPORT_SYMBOL(of_translate_dma_address);
+  
+  @@ -687,29 +730,48 @@
+}

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EXPORT_SYMBOL(of_get_address);

+static u64 of_translate_ioport(struct device_node *dev, const __be32 *in_addr,
+u64 size)
+{
+u64 taddr;
+unsigned long port;
+struct device_node *host;
+
+taddr = __of_translate_address(dev, in_addr, "ranges", &host);
+if (host) {
+/* host-specific port access */
+port = logic_pio_trans_hwaddr(&host->fwnode, taddr, size);
+of_node_put(host);
+} else {
+/* memory-mapped I/O range */
+port = pci_address_to_pio(taddr);
+}
+
+if (port == (unsigned long)-1)
+return OF_BAD_ADDR;
+
+return port;
+}
+
static int __of_address_to_resource(struct device_node *dev,
const __be32 *addrp, u64 size, unsigned int flags,
const char *name, struct resource *r)
{

u64 taddr;

-if ((flags & (IORESOURCE_IO | IORESOURCE_MEM)) == 0)
+if (flags & IORESOURCE_MEM)
+taddr = of_translate_address(dev, addrp);
+else if (flags & IORESOURCE_IO)
+taddr = of_translate_ioport(dev, addrp, size);
+else
return -EINVAL;
-taddr = of_translate_address(dev, addrp);
+
if (taddr == OF_BAD_ADDR)
return -EINVAL;
memset(r, 0, sizeof(struct resource));
-if (flags & IORESOURCE_IO) {
-unsigned long port;
-port = pci_address_to_pio(taddr);
-if (port == (unsigned long)-1)
-return -EINVAL;
}
- r->start = port;
- r->end = port + size - 1;
- } else {
- r->start = taddr;
- r->end = taddr + size - 1;
- }
+
+ r->start = taddr;
+ r->end = taddr + size - 1;
  r->flags = flags;
  r->name = name ? name : dev->full_name;

@@ -907,11 +969,17 @@
  * @np: device node
  *
  * It returns true if "dma-coherent" property was found
  * for this device in DT.
  + * for this device in the DT, or if DMA is coherent by
  + * default for OF devices on the current platform.
  */
bool of_dma_is_coherent(struct device_node *np)
{
-struct device_node *node = of_node_get(np);
+struct device_node *node;
+
+ if (IS_ENABLED(CONFIG_OF_DMA_DEFAULT_COHERENT))
+ return true;
+ 
+ node = of_node_get(np);

while (node) {
  if (of_property_read_bool(node, "dma-coherent")) {
--- linux-4.15.0.orig/drivers/of/base.c
+++ linux-4.15.0/drivers/of/base.c
@@ -636,6 +636,31 @@
 EXPORT_SYMBOL(of_get_next_available_child);

 /**<
 + * of_get_compatible_child - Find compatible child node
 + * @parent: parent node
 + * @compatible: compatible string
 + *
 + * Lookup child node whose compatible property contains the given compatible
 + * string.
 + *
 + * Returns a node pointer with refcount incremented, use of_node_put() on it
 + * when done; or NULL if not found.
 + */

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+struct device_node *of_get_compatible_child(const struct device_node *parent,
+const char *compatible)
+{
+struct device_node *child;
+
+for_each_child_of_node(parent, child) {
+if (of_device_is_compatible(child, compatible))
+break;
+}
+
+return child;
+}
+EXPORT_SYMBOL(of_get_compatible_child);
+
+/**
+ * of_get_child_by_name - Find the child node by name for a given parent
+ * @node: parent node
+ * @name: child name to look for.
+ */
+if (!strcmp(np->type, "cpu"))
+for_each_child_of_node(np, child)
+if (!strcmp(child->type, "cache"))
+return child;
-/* OF on pmac has nodes instead of properties named "l2-cache"
-* beneath CPU nodes.
-*/
-if (!strcmp(np->type, "cpu"))
+if (IS_ENABLED(CONFIG_PPC_PMAC) && !strcmp(np->type, "cpu"))
+for_each_child_of_node(np, child)
+if (!strcmp(child->type, "cache"))
+return child;
--- linux-4.15.0.orig/drivers/of/device.c
+++ linux-4.15.0/drivers/of/device.c
@@ -215,7 +215,8 @@
+return -ENODEV;
+/* Name & Type */
-csize = snprintf(str, len, "of:N%sT%s", dev->of_node->name,
+/* %p eats all alphanum characters, so %c must be used here */
+csizet = snprintf(str, len, "of:N%pOFn%c%s", dev->of_node, 'T',
+dev->of_node->type);
+tsize = csize;
+len = csize;
@@ -294,7 +295,7 @@
+if (!(dev) || !(dev->of_node))
+return;
+
+add_uevent_var(env, "OF_NAME=%s", dev->of_node->name);
+add_uevent_var(env, "OF_NAME=%pOFn", dev->of_node);
+add_uevent_var(env, "OF_FULLNAME=%pOF", dev->of_node);
+if (dev->of_node->type && strcmp("<NULL>", dev->of_node->type) != 0)
+add_uevent_var(env, "OF_TYPE=%s", dev->of_node->type);
const __be32 *phandle;

int sz;

-np->name = __of_get_property(np, "name", NULL) ? "<NULL>";
-np->type = __of_get_property(np, "device_type", NULL) ? "<NULL>";
-
-phandle = __of_get_property(np, "phandle", &sz);
-if (!phandle)
-    phandle = __of_get_property(np, "linux,phandle", &sz);
-if (IS_ENABLED(CONFIG_PPC_PSERIES) && !phandle)
-    phandle = __of_get_property(np, "ibm,phandle", &sz);
-np->phandle = (phandle && (sz >= 4)) ? be32_to_cpup(phandle) : 0;
+if (!of_node_check_flag(np, OF_OVERLAY)) {
+    np->name = __of_get_property(np, "name", NULL);
+    np->type = __of_get_property(np, "device_type", NULL);
+    if (!np->name)
+        np->name = "<NULL>";
+    if (!np->type)
+        np->type = "<NULL>";
+    if (!phandle)
+        phandle = __of_get_property(np, "phandle", &sz);
+    if (phandle && (sz >= 4))
+        np->phandle = be32_to_cpup(phandle);
+    else
+        np->phandle = 0;
+}

np->child = NULL;
np->sibling = np->parent->child;

/**
 * of_detach_node() - "Unplug" a node from the device tree.
 * *
 * The caller must hold a reference to the node. The memory associated with
 * the node is not freed until its refcount goes to zero.
 */
int of_detach_node(struct device_node *np)
{
    if (!of_node_check_flag(node, OF_DYNAMIC))
return;

+if (of_node_check_flag(node, OF_OVERLAY)) {
  +
+if (!of_node_check_flag(node, OF_OVERLAY_FREE_CSET)) {
  +/* premature refcount of zero, do not free memory */
  +pr_err("ERROR: memory leak before free overlay changeset, \%pOF\n", node);
  +return;
  +}
  +
  +/*
  +  * If node->properties non-empty then properties were added
  +  * to this node either by different overlay that has not
  +  * yet been removed, or by a non-overlay mechanism.
  +  */
  +if (node->properties)
  +pr_err("ERROR: %s(), unexpected properties in \%pOF\n", __func__, node);
  +}
  +
  property_list_free(node->properties);
  property_list_free(node->deadprops);

static void __of_changeset_entry_destroy(struct of_changeset_entry *ce)
{
  +if (ce->action == OF_RECONFIG_ATTACH_NODE &&
  +of_node_check_flag(ce->np, OF_OVERLAY)) {
  +if (kref_read(&ce->np->kobj.kref) > 1) {
  +pr_err("ERROR: memory leak, expected refcount 1 instead of \%d, of_node_get()/of_node_put() unbalanced -
  +destroy cset entry: attach overlay node \%pOF\n",
  +kref_read(&ce->np->kobj.kref), ce->np);
  +} else {
  +of_node_set_flag(ce->np, OF_OVERLAY_FREE_CSET);
  +}
  +}
  +
  of_node_put(ce->np);
  list_del(&ce->node);
  kfree(ce);

if (size &&
  early_init_dt_reserve_memory_arch(base, size, nomap) == 0)
pr_debug("Reserved memory: reserved region for node '%s': base %pa, size %ld MiB\n",
    uname, &base, (unsigned long)size / SZ_1M);
else
    pr_info("Reserved memory: failed to reserve memory for node '%s': base %pa, size %ld MiB\n",
        uname, &base, (unsigned long)size / SZ_1M);

len -= t_len;
if (first) {
    int offset;
    const char *p, *q, *options = NULL;
    int l;
    const struct earlycon_id *match;
    const __earlycon_id **p_match;
    const void *fdt = initial_boot_params;

    offset = fdt_path_offset(fdt, "/chosen");
    return 0;
}

for (match = __earlycon_table; match < __earlycon_table_end; match++) {
    for (p_match = __earlycon_table; p_match < __earlycon_table_end;
        p_match++) {
        const struct earlycon_id *match = *p_match;
        if (!match->compatible[0])
            continue;

        for (pp) {
            __of_add_property_sysfs(np, pp);
        }
    }
}

--- linux-4.15.0.orig/drivers/of/kobj.c
+++ linux-4.15.0/drivers/of/kobj.c
@@ -132,6 +132,7 @@
}
if (!name)
    return -ENOMEM;
+    rc = kobject_add(&np->kobj, parent, "%s", name);
    kfree(name);
    if (rc)
        for_each_property_of_node(np, pp)
            __of_add_property_sysfs(np, pp);
        
+of_node_get(np);
return 0;
}

@@ -158,7 +160,6 @@
kobject_del(&np->kobj);
}

/* finally remove the kobj_init ref */
of_node_put(np);
}

--- linux-4.15.0.orig/drivers/of/of_mdio.c
+++ linux-4.15.0/drivers/of/of_mdio.c
@@ -92,8 +92,8 @@
return rc;
}

-dev_dbg(&mdio->dev, "registered phy %s at address %i\n",
-dev_dbg(&mdio->dev, "registered mdio device %s at address %i\n",
-return 0;
}

@@ -122,8 +122,8 @@
return rc;
}

-dev_dbg(&mdio->dev, "registered mdio device %s at address %i\n",
-dev_dbg(&mdio->dev, "registered mdio device %pOFn at address %i\n",
-return 0;
}

@@ -255,12 +255,18 @@
continue;

/* be noisy to encourage people to set reg property */
-dev_info(&mdio->dev, "scan phy %s at address %i\n",
-dev_info(&mdio->dev, "scan phy %pOFn at address %i\n",
-if (of_mdiobus_child_is_phy(child)) {
+/* -ENODEV is the return code that PHYLIB has
+ * standardized on to indicate that bus
+ * scanning should continue.
+ */

rc = of_mdiobus_register_phy(mdio, child, addr);
-if (rc && rc != -ENODEV)
+if (!rc)
+break;
+if (rc != -ENODEV)
goto unregister;
}
}
@@ -361,7 +367,7 @@
struct phy_device *phy;

iface = of_get_phy_mode(np);
-if (iface < 0)
+if ((int)iface < 0)
return NULL;

phy_np = of_parse_phandle(np, "phy-handle", 0);
--- linux-4.15.0.orig/drivers/of/of_numa.c
+++ linux-4.15.0/drivers/of/of_numa.c
@@ -126,9 +126,14 @@
distance = of_read_number(matrix, 1);
matrix++;

+if ((nodea == nodeb && distance != LOCAL_DISTANCE) ||
+ (nodea != nodeb && distance <= LOCAL_DISTANCE)) {
+pr_err("Invalid distance[node%d -> node%d] = %d\n",
+ nodea, nodeb, distance);
+return -EINVAL;
+}
+n numa_set_distance(nodea, nodeb, distance);
-pr_debug("distance[node%d -> node%d] = %d\n",
- nodea, nodeb, distance);
/* Set default distance of node B->A same as A->B */
if (nodeb > nodea)
@@ -174,8 +179,8 @@
np = of_get_next_parent(np);
}
if (np && r)
-pr_warn("Invalid \"numa-node-id\" property in node \%s\n",
- np->name);
+pr_warn("Invalid \"numa-node-id\" property in node \%pOFn\n",
+np);
of_node_put(np);
*/
--- linux-4.15.0.orig/drivers/of/of_reserved_mem.c
+++ linux-4.15.0/drivers/of/of_reserved_mem.c
@@ -158,9 +158,9 @@
    ret = early_init_dt_alloc_reserved_memory_arch(size,
                                                align, start, end, nomap, &base);
    if (ret == 0) {
-       pr_debug("allocated memory for \'%s\' node: base %pa, size %ld MiB\n",
+       pr_debug("allocated memory for \'%s\' node: base %pa, size %lu MiB\n",
            uname, &base,
-       (unsigned long)size / SZ_1M);
+       (unsigned long)(size / SZ_1M));
    break;
    }
    len -= t_len;
@@ -170,8 +170,8 @@
    ret = early_init_dt_alloc_reserved_memory_arch(size, align,
                                                0, 0, nomap, &base);
    if (ret == 0)
-       pr_debug("allocated memory for \'%s\' node: base %pa, size %ld MiB\n",
-              uname, &base, (unsigned long)size / SZ_1M);
+       pr_debug("allocated memory for \'%s\' node: base %pa, size %lu MiB\n",
+              uname, &base, (unsigned long)(size / SZ_1M));
    }
    if (base == 0) {
       @ @ -222,6 +222,16 @@
@@ -222,6 +222,16 @@
    if (ra->base > rb->base)
    return 1;
+
+ /*
+  * Put the dynamic allocations (address == 0, size == 0) before static
+  * allocations at address 0x0 so that overlap detection works
+  * correctly.
+  */
+ if (ra->size < rb->size)
+    return -1;
+ if (ra->size > rb->size)
+    return 1;
+ return 0;
    }

@@ -239,8 +249,7 @@
    this = &reserved_mem[i];
    next = &reserved_mem[i + 1];
-   if (!((this->base && next->base))
-      continue;

this = &reserved_mem[i];
next = &reserved_mem[i + 1];
-   if (!((this->base && next->base))
-      continue;
if (this->base + this->size > next->base) {
    phys_addr_t this_end, next_end;

    --- linux-4.15.0.orig/drivers/of/overlay.c
    +++ linux-4.15.0/drivers/of/overlay.c
    @@ -25,6 +25,26 @@
    #include "of_private.h"

    /**
     * struct target - info about current target node as recursing through overlay
     * @np: node where current level of overlay will be applied
     * @in_livetree: @np is a node in the live devicetree
     */
     +* Used in the algorithm to create the portion of a changeset that describes
     +* an overlay fragment, which is a devicetree subtree. Initially @np is a node
     +* in the live devicetree where the overlay subtree is targeted to be grafted
     +* into. When recursing to the next level of the overlay subtree, the target
     +* also recurses to the next level of the live devicetree, as long as overlay
     +* subtree node also exists in the live devicetree. When a node in the overlay
     +* subtree does not exist at the same level in the live devicetree, target->np
     +* points to a newly allocated node, and all subsequent targets in the subtree
     +* will be newly allocated nodes.
     +*/
     +struct target {
         +struct device_node *np;
         +bool in_livetree;
         +};
     +
    /**
     * struct fragment - info about fragment nodes in overlay expanded device tree
     * @target: target of the overlay operation
     * @overlay: pointer to the __overlay__ node
     */
}

static int build_changeset_next_level(struct overlay_changeset *ovcs,
    -struct device_node *target_node,
    -const struct device_node *overlay_node);

    /*
     * of_resolve_phandles() finds the largest phandle in the live tree.
     */
    @ @ -224,6 +243,8 @@

    of_property_set_flag(new_prop, OF_DYNAMIC);

    +kfree(target_path);
+ return new_prop;

err_free_new_prop:
@@ -239,15 +260,23 @@
/**
 * add_changeset_property() - add @overlay_prop to overlay changeset
 * @ovcs:overlay changeset
- * @target_node:where to place @overlay_prop in live tree
+ * @target:where @overlay_prop will be placed
 * @overlay_prop:property to add or update, from overlay tree
 * @is_symbols_prop:1 if @overlay_prop is from node "/__symbols__"
 *
- * If @overlay_prop does not already exist in @target_node, add changeset entry
- * to add @overlay_prop in @target_node, else add changeset entry to update
+ * If @overlay_prop does not already exist in live devicetree, add changeset
+ * entry to add @overlay_prop in @target, else add changeset entry to update
 * value of @overlay_prop.
 *
- * Some special properties are not updated (no error returned).
+ * @target may be either in the live devicetree or in a new subtree that
+ * is contained in the changeset.
 *
+ * Some special properties are not added or updated (no error returned):
+ * "name", "phandle", "linux,phandle".
+ *
+ * Properties "+address-cells" and "+size-cells" are not updated if they
+ * are already in the live tree, but if present in the live tree, the values
+ * in the overlay must match the values in the live tree.
 *
* Update of property in symbols node is not allowed.
* @@ -255,19 +284,41 @@
* invalid @overlay.
*/
static int add_changeset_property(struct overlay_changeset *ovcs,
-struct device_node *target_node,
-struct property *overlay_prop,
+struct target *target, struct property *overlay_prop,
    bool is_symbols_prop)
{
    struct property *new_prop = NULL, *prop;
    int ret = 0;

- prop = of_find_property(target_node, overlay_prop->name, NULL);
+ if (target->in_livetree)
+     if (!of_prop_cmp(overlay_prop->name, "name") ||
+         !of_prop_cmp(overlay_prop->name, "phandle") ||
+ if (of_prop_cmp(overlay_prop->name, "linux,phandle"))
+ return 0;
+
+ if (target->in_livetree)
+ prop = of_find_property(target->np, overlay_prop->name, NULL);
+ else
+ prop = NULL;

- if (!of_prop_cmp(overlay_prop->name, "name")
- || !of_prop_cmp(overlay_prop->name, "phandle")
- || !of_prop_cmp(overlay_prop->name, "linux,phandle"))
- return 0;
+ if (prop) {
+ if (!of_prop_cmp(prop->name, "#address-cells")) {
+ if (!of_prop_val_eq(prop, overlay_prop)) {
+ pr_err("ERROR: changing value of #address-cells is not allowed in %pOFn",
+ target->np);
+ ret = -EINVAL;
+ }
+ return ret;
+ } else if (!of_prop_cmp(prop->name, "#size-cells")) {
+ if (!of_prop_val_eq(prop, overlay_prop)) {
+ pr_err("ERROR: changing value of #size-cells is not allowed in %pOFn",
+ target->np);
+ ret = -EINVAL;
+ }
+ return ret;
+ }
+
+ if (is_symbols_prop) {
+ if (prop)
+ @ @ -280,12 +331,21 @ @
+ if (!new_prop)
+ return -ENOMEM;
+ if (!prop)
+ if (!target->in_livetree) {
+ new_prop->next = target->np->deadprops;
+ target->np->deadprops = new_prop;
+ }
+ ret = of_changeset_add_property(&ovcs->cset, target_node,
+ new_prop);
+)
+ret = of_changeset_update_property(&ovcs->cset, target->np, new_prop);
+
+} else {
+ret = of_changeset_update_property(&ovcs->cset, target->np, new_prop);
+}
+
+if (!of_node_check_flag(target->np, OF_OVERLAY))
+pr_err("WARNING: memory leak will occur if overlay removed, property: %pOF/%s in",
+target->np, new_prop->name);
+
+if (ret) {
+kfree(new_prop->name);
+@@ -297,14 +357,14 @@
+/
+ * add_changeset_node() - add @node (and children) to overlay changeset
- * @ovcs: overlay changeset
- * @target_node: where to place @node in live tree
- * @node: node from within overlay device tree fragment
+ * @ovcs: overlay changeset
+ * @target: where @node will be placed in live tree or changeset
+ * @node: node from within overlay device tree fragment
+
+ * - * If @node does not already exist in @target_node, add changeset entry
- * to add @node in @target_node.
+ * If @node does not already exist in @target, add changeset entry
+ * to add @node in @target.
+
+ * - * If @node already exists in @target_node, and the existing node has
+ * If @node already exists in @target, and the existing node has
+ * a phandle, the overlay node is not allowed to have a phandle.
+
+ * - * If @node has child nodes, add the children recursively via
@@ -324,37 +384,61 @@
* invalid @overlay.
*/
static int add_changeset_node(struct overlay_changeset *ovcs,
-struct device_node *target_node, struct device_node *node)
+struct target *target, struct device_node *node)
{
    const char *node_kbasename;
    +const __be32 *phandle;
    struct device_node *tchild;
    -int ret = 0;
    +struct target *target_child;
    +int ret = 0, size;

    node_kbasename = kbasename(node->full_name);
for_each_child_of_node(target_node, tchild)
+for_each_child_of_node(target->np, tchild)
if (!of_node_cmp(node_kbasename, kbasename(tchild->full_name)))
break;

if (!tchild) {
- tchild = __of_node_dup(node, "%pOF/%s",
 - target_node, node_kbasename);
+ tchild = __of_node_dup(NULL, "%pOF/%s",
 + target->np, node_kbasename);
if (!tchild)
return -ENOMEM;
- tchild->parent = target_node;
+ tchild->parent = target->np;
+ tchild->name = __of_get_property(node, "name", NULL);
+ tchild->type = __of_get_property(node, "device_type", NULL);
+
+ if (!tchild->name)
+ tchild->name = "<NULL>";
+ if (!tchild->type)
+ tchild->type = "<NULL>";
+
+ /* ignore obsolete "linux.phandle" */
+ phandle = __of_get_property(node, "phandle", &size);
+ if (phandle && (size == 4))
+ tchild->phandle = be32_to_cpup(phandle);
+
+ of_node_set_flag(tchild, OF_OVERLAY);
ret = of_changeset_attach_node(&ovcs->cset, tchild);
if (ret)
return ret;

- return build_changeset_next_level(ovcs, tchild, node);
+ target_child.np = tchild;
+ target_child.in_livetree = false;
+
+ ret = build_changeset_next_level(ovcs, &target_child, node);
+ of_node_put(tchild);
+ return ret;
}

- if (node->phandle && tchild->phandle)
+ if (node->phandle && tchild->phandle) {
ret = -EINVAL;
- else
- ret = build_changeset_next_level(ovcs, tchild, node);
+} else {
+target_child.np = tchild;
+target_child.in_livetree = target->in_livetree;
+ret = build_changeset_next_level(ovcs, &target_child, node);
+}
+of_node_put(tchild);

return ret;
@@ -363,7 +447,7 @@
/**
 * build_changeset_next_level() - add level of overlay changeset
 * @ovcs:		overlay changeset
- * @target_node:	where to place @overlay_node in live tree
+ * @target:		where to place @overlay_node in live tree
 * @overlay_node:	node from within an overlay device tree fragment
 *
 * Add the properties (if any) and nodes (if any) from @overlay_node to the
@@ -376,27 +460,26 @@
 */
static int build_changeset_next_level(struct overlay_changeset *ovcs,
-struct device_node *target_node,
-const struct device_node *overlay_node)
+		struct target *target, const struct device_node *overlay_node)
{
struct device_node *child;
struct property *prop;
int ret;

    for_each_property_of_node(overlay_node, prop) {
-        ret = add_changeset_property(ovcs, target_node, prop, 0);
+        ret = add_changeset_property(ovcs, target, prop, 0);
        if (ret) {
            pr_debug("Failed to apply prop @%pOF/%s, err=%d\n",
-                target_node, prop->name, ret);
+                target->np, prop->name, ret);
            return ret;
        }
    }

    for_each_child_of_node(overlay_node, child) {
-        ret = add_changeset_node(ovcs, target_node, child);
+        ret = add_changeset_node(ovcs, target, child);
        if (ret) {
-            pr_debug("Failed to apply node @%pOF/%s, err=%d\n",
+            pr_debug("Failed to apply node @%pOF/%pOFn, err=%d\n",
                - target_node, child->name, ret);
                + target->np, child, ret);
                +pr_debug("Failed to apply node @%pOF/%pOFn, err=%d\n",

of_node_put(child);
return ret;
}
@@ -409,17 +492,17 @@
* Add the properties from __overlay__ node to the @ovcs->cset changeset.
*/
static int build_changeset_symbols_node(struct overlay_changeset *ovcs,
-struct device_node *target_node,
+struct target *target,
 const struct device_node *overlay_symbols_node)
{
 struct property *prop;
 int ret;

 for_each_property_of_node(overlay_symbols_node, prop) {
- ret = add_changeset_property(ovcs, target_node, prop, 1);
+ ret = add_changeset_property(ovcs, target, prop, 1);
 if (ret) {
 pr_debug("Failed to apply prop @%pOF/%s, err=%d\n",
- target_node, prop->name, ret);
+ target->np, prop->name, ret);
 return ret;
 }
 }
@@ -442,6 +525,7 @@
 static int build_changeset(struct overlay_changeset *ovcs)
 {
 struct fragment *fragment;
+struct target target;
 int fragments_count, i, ret;

 /*
@@ -456,7 +540,9 @@
 for (i = 0; i < fragments_count; i++) {
 fragment = &ovcs->fragments[i];

- ret = build_changeset_next_level(ovcs, fragment->target,
+ ret = build_changeset_next_level(ovcs, &target,
 fragment->overlay);
 if (ret) {
 pr_debug("apply failed '%pOF\n", fragment->target);
@@ -466,7 +552,10 @@
 if (ovcs->symbols_fragment) {
 fragment = &ovcs->fragments[ovcs->count - 1];
- ret = build_changeset_symbols_node(ovcs, fragment->target,
+target.np = fragment->target;
+target.in_livetree = true;
+ret = build_changeset_symbols_node(ovcs, &target,
    fragment->overlay);
if (ret) {
    pr_debug("apply failed '%pOF\n", fragment->target);
    @ @ -484.7 +573.7 @@
    * 1) "target" property containing the phandle of the target
    * 2) "target-path" property containing the path of the target
    */

-static struct device_node *find_target_node(struct device_node *info_node)
+static struct device_node *find_target(struct device_node *info_node)
{
    const char *path;
    u32 val;
    @ @ -578.7 +667.7 @@

    fragment = &fragments[cnt];
    fragment->overlay = overlay_node;
    -fragment->target = find_target_node(node);
    +fragment->target = find_target(node);
    if (!fragment->target) {
        of_node_put(fragment->overlay);
        ret = -EINVAL;
    
    --- linux-4.15.0.orig/drivers/of/platform.c
    +++ linux-4.15.0/drivers/of/platform.c
    @@ -91,8 +91,8 @@
    */
    reg = of_get_property(node, "reg", NULL);
    if (reg && (addr = of_translate_address(node, reg)) != OF_BAD_ADDR) {
        -dev_set_name(dev, dev_name(dev) ? "%llx.%s:%s" : "%llx.%s",
        - (unsigned long long)addr, node->name,
        +dev_set_name(dev, dev_name(dev) ? "%llx.%pOFn:%s" : "%llx.%pOFn",
        + (unsigned long long)addr, node,
            dev_name(dev));
        return;
    }
    @ @ -142.8 +142.8 @@
    WARN_ON(rc);
}
if (of_irq_to_resource_table(np, res, num_irq) != num_irq)
    -pr_debug("not all legacy IRQ resources mapped for %s\n",
    - np->name);
    +pr_debug("not all legacy IRQ resources mapped for %pOFn\n",
        + np);
}
dev->dev.of_node = of_node_get(np);
@@ -536,6 +536,9 @@
if (of_node_check_flag(dev->of_node, OF_POPULATED_BUS))
device_for_each_child(dev, NULL, of_platform_device_destroy);

+of_node_clear_flag(dev->of_node, OF_POPULATED);
+of_node_clear_flag(dev->of_node, OF_POPULATED_BUS);
+
if (dev->bus == &platform_bus_type)
platform_device_unregister(to_platform_device(dev));
#ifdef CONFIG_ARM_AMBA
@@ -543,8 +546,6 @@
amba_device_unregister(to_amba_device(dev));
#else
- of_node_clear_flag(dev->of_node, OF_POPULATED);
- of_node_clear_flag(dev->of_node, OF_POPULATED_BUS);
 return 0;
}
EXPORT_SYMBOL_GPL(of_platform_device_destroy);
--- linux-4.15.0.orig/drivers/of/property.c
+++ linux-4.15.0/drivers/of/property.c
@@ -810,6 +810,7 @@
if (!of_device_is_available(remote)) {
 pr_debug("not available for remote node\n");
 +of_node_put(remote);
 return NULL;
 }
--- linux-4.15.0.orig/drivers/of/resolver.c
+++ linux-4.15.0/drivers/of/resolver.c
@@ -128,6 +128,11 @@
goto err_fail;
    if (offset < 0 || offset + sizeof(__be32) > prop->length) {
 +err = -EINVAL;
 +goto err_fail;
 +}
+ *(__be32 *)(prop->value + offset) = cpu_to_be32(phandle);
 }
--- linux-4.15.0.orig/drivers/of/unittest.c
+++ linux-4.15.0/drivers/of/unittest.c
@@ -164,20 +164,20 @@/* Add a new property - should pass*/

prop->name = "new-property";
prop->value = "new-property-data";
-prop->length = strlen(prop->value);
+prop->length = strlen(prop->value) + 1;
unittest(of_add_property(np, prop) == 0, "Adding a new property failed\n");

/* Try to add an existing property - should fail */
prop++;
prop->name = "new-property";
prop->value = "new-property-data-should-fail";
-prop->length = strlen(prop->value);
+prop->length = strlen(prop->value) + 1;
unittest(of_add_property(np, prop) != 0,
"Adding an existing property should have failed\n");

/* Try to modify an existing property - should pass */
prop->value = "modify-property-data-should-pass";
-prop->length = strlen(prop->value);
+prop->length = strlen(prop->value) + 1;
unittest(of_update_property(np, prop) == 0,
"Updating an existing property should have passed\n");

@@ -185,7 +185,7 @@
prop++;
prop->name = "modify-property";
prop->value = "modify-missing-property-data-should-pass";
-prop->length = strlen(prop->value);
+prop->length = strlen(prop->value) + 1;
unittest(of_update_property(np, prop) == 0,
"Updating a missing property should have passed\n");

@@ -211,8 +211,8 @@
for_each_child_of_node(np, child) {
  if (child->parent != np) {
    -pr_err("Child node %s links to wrong parent %s\n",
     - child->name, np->name);
    +pr_err("Child node %pOFn links to wrong parent %pOFn\n",
        + child, np);
    rc = -EINVAL;
    goto put_child;
  }
@@ -367,6 +367,7 @@
for (i = 0; i < 8; i++) {
  bool passed = true;
+memset(&args, 0, sizeof(args));
  rc = of_parse_phandle_with_args(np, "phandle-list",}
/* Check for missing list property */
+memset(&args, 0, sizeof(args));
rc = of_parse_phandle_with_args(np, "phandle-list-missing",
"#phandle-cells", 0, &args);
unittest(rc == -ENOENT, "expected:%i got:%i", -ENOENT, rc);
@@ -428,6 +430,7 @@
unittest(rc == -ENOENT, "expected:%i got:%i", -ENOENT, rc);
/* Check for missing cells property */
+memset(&args, 0, sizeof(args));
rc = of_parse_phandle_with_args(np, "phandle-list",
"#phandle-cells-missing", 0, &args);
unittest(rc == -EINVAL, "expected:%i got:%i", -EINVAL, rc);
@@ -436,6 +439,7 @@
unittest(rc == -EINVAL, "expected:%i got:%i", -EINVAL, rc);
/* Check for bad phandle in list */
+memset(&args, 0, sizeof(args));
rc = of_parse_phandle_with_args(np, "phandle-list-bad-phandle",
"#phandle-cells", 0, &args);
unittest(rc == -EINVAL, "expected:%i got:%i", -EINVAL, rc);
@@ -444,6 +448,7 @@
unittest(rc == -EINVAL, "expected:%i got:%i", -EINVAL, rc);
/* Check for incorrectly formed argument list */
+memset(&args, 0, sizeof(args));
rc = of_parse_phandle_with_args(np, "phandle-list-bad-args",
"#phandle-cells", 1, &args);
unittest(rc == -EINVAL, "expected:%i got:%i", -EINVAL, rc);
@@ -605,6 +610,10 @@
unittest(of_changeset_revert(&chgset), "revert failed\n");
of_changeset_destroy(&chgset);
+
of_node_put(n1);
of_node_put(n2);
of_node_put(n21);
#endif
}
@@ -614,6 +623,9 @@
struct of_phandle_args args;
int i, rc;
+if (of_irq_workarounds & OF_IMAP_OLDWORLD_MAC)
+return;
+
np = of_find_node_by_path("/testcase-data/interrupts/interrupts0");
if (!np) {
    pr_err("missing testcase data\n");
    @ @ -623,7 +635,7 @@
    for (i = 0; i < 4; i++) {
        bool passed = true;
-
            -args.args_count = 0;
+            +memset(&args, 0, sizeof(args));
rc = of_irq_parse_one(np, i, &args);

        passed &= !rc;
        @ @ -644,7 +656,7 @@
        for (i = 0; i < 4; i++) {
            bool passed = true;
-
            -args.args_count = 0;
+            +memset(&args, 0, sizeof(args));
rc = of_irq_parse_one(np, i, &args);

        /* Test the values from tests-phandle.dtsi */
        @ @ -688,6 +700,9 @@
    struct of_phandle_args args;
    int i, rc;

+if (of_irq_workarounds & OF_IMAP_OLDWORLD_MAC)
+return;
+
np = of_find_node_by_path("/testcase-data/interrupts/interrupts-extended0");
if (!np) {
    pr_err("missing testcase data\n");
    @ @ -697,6 +712,7 @@
    for (i = 0; i < 7; i++) {
        bool passed = true;
-
            +memset(&args, 0, sizeof(args));
rc = of_irq_parse_one(np, i, &args);

        /* Test the values from tests-phandle.dtsi */
        @ @ -844,15 +860,19 @@
pdev = of_find_device_by_node(np);
unittest(pdev, "device 1 creation failed\n");
-
            -irq = platform_get_irq(pdev, 0);
-unittest(irq == -EPROBE_DEFER, "device deferred probe failed - %d\n", irq);
-
-/* Test that a parsing failure does not return -EPROBE_DEFER */
-np = of_find_node_by_path("/testcase-data/testcase-device2");
-pdev = of_find_device_by_node(np);
-unittest(pdev, "device 2 creation failed\n");
-irq = platform_get_irq(pdev, 0);
-unittest(irq < 0 & & irq != -EPROBE_DEFER, "device parsing error failed - %d\n", irq);
+if (!(of_irq_workarounds & OF_IMAP_OLDWORLD_MAC)) {
+irq = platform_get_irq(pdev, 0);
+unittest(irq == -EPROBE_DEFER,
+"device deferred probe failed - %d\n", irq);
+
+/* Test that a parsing failure does not return -EPROBE_DEFER */
+np = of_find_node_by_path("/testcase-data/testcase-device2");
+pdev = of_find_device_by_node(np);
+unittest(pdev, "device 2 creation failed\n");
+irq = platform_get_irq(pdev, 0);
+unittest(irq < 0 & & irq != -EPROBE_DEFER,
+"device parsing error failed - %d\n", irq);
+
}

np = of_find_node_by_path("/testcase-data/platform-tests");
unittest(np, "No testcase data in device tree\n");
@@ -877,18 +897,21 @@
of_platform_populate(np, match, NULL, &test_bus->dev);
 for_each_child_of_node(np, child) {
- for_each_child_of_node(child, grandchild)
- unittest(of_find_device_by_node(grandchild),
- "Could not create device for node '%s\n",
- grandchild->name);
+for_each_child_of_node(child, grandchild) {
+ pdev = of_find_device_by_node(grandchild);
+ unittest(pdev,
+ "Could not create device for node '%pOFn\n",
+ grandchild);
+ of_dev_put(pdev);
+}
}

of_platform_depopulate(&test_bus->dev);
 for_each_child_of_node(np, child) {
 for_each_child_of_node(child, grandchild)
 unittest(of_find_device_by_node(grandchild),
 "device didn't get destroyed '%s\n",
 grandchild->name);
+ "device didn't get destroyed '%pOFn\n",

+ grandchild);
}

platform_device_unregister(test_bus);
@@ -900,20 +923,44 @@
**of np into dup node (present in live tree) and
**updates parent of children of np to dup.
*
- */
+ *
- *@np:* node already present in live tree
+ *@np:* node whose properties are being added to the live tree
+ *@dup:* node present in live tree to be updated
+ */
static void update_node_properties(struct device_node *np, 
struct device_node *dup)
{
    struct property *prop;
    +struct property *save_next;
    struct device_node *child;

    -for_each_property_of_node(np, prop)
    -of_add_property(dup, prop);
    +int ret;

    for_each_child_of_node(np, child)
    child->parent = dup;
    +
    +/*
    + * "unittest internal error: unable to add testdata property"
    + *
    + * If this message reports a property in node '/__symbols__' then
    + * the respective unittest overlay contains a label that has the
    + * same name as a label in the live devicetree. The label will
    + * be in the live devicetree only if the devicetree source was
    + * compiled with the '-@' option. If you encounter this error,
    + * please consider renaming __all__ of the labels in the unittest
    + * overlay dts files with an odd prefix that is unlikely to be
    + * used in a real devicetree.
    + */
    +
    +/*
    + * open code for_each_property_of_node() because of_add_property()
    + * sets prop->next to NULL
    + */
    +for (prop = np->properties; prop != NULL; prop = save_next) {
    +save_next = prop->next;
    +ret = of_add_property(dup, prop);
    +if (ret)
    +pr_err("unittest internal error: unable to add testdata property %pOF/%s", 

@@ -922,18 +969,25 @@
 * @np: Node to attach to live tree
 */
static int attach_node_and_children(struct device_node *np)
+static void attach_node_and_children(struct device_node *np)
{
    struct device_node *next, *dup, *child;
    unsigned long flags;
    const char *full_name;
    full_name = kasprintf(GFP_KERNEL, "%pOF", np);
    +
    +if (!strcmp(full_name, "/__local_fixups__") ||
    +    !strcmp(full_name, "/__fixups__")) {
    +kfree(full_name);
    +return;
    +}
    +
    dup = of_find_node_by_path(full_name);
    kfree(full_name);
    if (dup) {
        update_node_properties(np, dup);
        -return 0;
    +return;
    }
    +
    child = np->child;
    @ @ -954,8 +1008,6 @@
    attach_node_and_children(child);
    child = next;
    }
    -
    -return 0;
    }

/**
 @@ -992,6 +1044,7 @@
of_fdt_unflatten_tree(unittest_data, NULL, &unittest_data_node);
    if (!unittest_data_node) {
        pr_warn("%s: No tree to attach; not running tests\n", __func__);
        +kfree(unittest_data);
        return -ENODATA;
    }
struct regulator *dev_pm_opp_get_regulator(struct device *dev) {
    struct opp_table *opp_table;
    struct regulator *reg;

    rcu_read_lock();
    opp_table = _find_opp_table(dev);
    if (IS_ERR(opp_table)) {
        rcu_read_unlock();
        return ERR_CAST(opp_table);
    }
    reg = opp_table->regulators[0];
    rcu_read_unlock();

    return reg;
}

EXPORT_SYMBOL_GPL(dev_pm_opp_get_regulator);

/**
 * dev_pm_opp_is_turbo() - Returns if opp is turbo OPP or not
 * @opp: opp for which turbo mode is being verified
 * @@ -193,12 +214,12 @@
 * if (IS_ERR(opp_table))
 *    return 0;
 *
-    count = opp_table->regulator_count;
-
-    /* Regulator may not be required for the device */
-    if (!count)
-        goto put_opp_table;
+
+    count = opp_table->regulator_count;
+
    uV = kmalloc_array(count, sizeof(*uV), GFP_KERNEL);
    if (!uV)
        goto put_opp_table;

--- linux-4.15.0.orig/drivers/opp/core.c
+++ linux-4.15.0/drivers/opp/core.c
@@ -127,6 +127,27 @@

EXIT_SYMBOL_GPL(dev_pm_opp_get_freq);


/* Scaling up? Scale voltage before frequency */
-if (freq > old_freq) {
+if (freq >= old_freq) {
    ret = _set_opp_voltage(dev, reg, new_supply);
    if (ret)
        goto restore_voltage;
    @ @ -786,6 +807,9 @@

INIT_LIST_HEAD(&opp_table->dev_list);

+/* Mark regulator count uninitialized */
+opp_table->regulator_count = -1;
+
opp_dev = _add_opp_dev(dev, opp_table);
if (!opp_dev) {
    kfree(opp_table);
    @ @ -948,7 +972,7 @@

    int count, supply_size;

    /* Allocate space for at least one supply */
    -count = table->regulator_count ? table->regulator_count : 1;
    +count = table->regulator_count > 0 ? table->regulator_count : 1;
    supply_size = sizeof(*opp->supplies) * count;

    /* allocate new OPP node and supplies structures */
    @ @ -969,6 +993,9 @@
    struct regulator *reg;
    int i;

    +if (!opp_table->regulators)
        return true;
+
    for (i = 0; i < opp_table->regulator_count; i++) {
        reg = opp_table->regulators[i];
        @ @ -1277,7 +1304,7 @@
        struct dev_pm_set_opp_data *data;
        int len, count = opp_table->regulator_count;

        -if (WARN_ON(!count))
            +if (WARN_ON(!opp_table->regulators))
                return -EINVAL;

        /* space for set_opp_data */
        @ @ -1328,11 +1355,13 @@
if (!opp_table)
return ERR_PTR(-ENOMEM); 

+if 0
/* This should be called before OPPs are initialized */
if (WARN_ON(!list_empty(&opp_table->opp_list))) {
  ret = -EBUSY;
  goto err;
}
+endif

/* Already have regulators set */
if (opp_table->regulators) {
@@ -1376,7 +1405,7 @@
kfree(opp_table->regulators);
  opp_table->regulators = NULL;
  -opp_table->regulator_count = 0;
  +opp_table->regulator_count = -1;
err:
  dev_pm_opp_put_opp_table(opp_table);
@@ -1407,7 +1436,7 @@
kfree(opp_table->regulators);
  opp_table->regulators = NULL;
  -opp_table->regulator_count = 0;
  +opp_table->regulator_count = -1;
  dev_pm_opp_put_opp_table(opp_table);
} 
@@ -1651,6 +1680,76 @@
if (!opp_table)
  return -ENOMEM;
+/* Fix regulator count for dynamic OPPs */
+opp_table->regulator_count = 1;
+ret = _opp_add_v1(opp_table, dev, freq, u_volt, true);

  dev_pm_opp_put_opp_table(opp_table);
@@ -1728,6 +1760,76 @@
  return r;
}
+/**
+ * dev_pm_opp_adjust_voltage() - helper to change the voltage of an OPP
+ * @dev: device for which we do this operation
+ */
Modify the voltage of an OPP with an RCU operation.

Return: -EINVAL for bad pointers, -ENOMEM if no memory available for the copy operation, returns 0 if no modification was done OR modification was successful.

Locking: The internal device_opp and opp structures are RCU protected. Hence this function internally uses RCU updater strategy with mutex locks to keep the integrity of the internal data structures. Callers should ensure that this function is NOT called under RCU protection or in contexts where mutex locking or synchronize_rcu() blocking calls cannot be used.

```c
int dev_pm_opp_adjust_voltage(struct device *dev, unsigned long freq, unsigned long u_volt)
{
    struct opp_table *opp_table;
    struct dev_pm_opp *tmp_opp, *opp = ERR_PTR(-ENODEV);
    int r = 0;
    unsigned long tol;

    mutex_lock(&opp_table_lock);

    /* Find the opp_table */
    opp_table = _find_opp_table_unlocked(dev);
    if (IS_ERR(opp_table)) {
        r = PTR_ERR(opp_table);
        dev_warn(dev, "%s: Device OPP not found (%d)\n", __func__, r);
        goto unlock;
    }

    /* Do we have the frequency? */
    list_for_each_entry(tmp_opp, &opp_table->opp_list, node) {
        if (tmp_opp->rate == freq) {
            opp = tmp_opp;
            break;
        }
    }
    if (IS_ERR(opp)) {
        r = PTR_ERR(opp);
        goto unlock;
    }

    /* Is update really needed? */
    if (opp->supplies[0].u_volt == u_volt)
        goto unlock;

    /* Find the opp_table */
    opp_table = _find_opp_table_unlocked(dev);
    if (IS_ERR(opp_table)) {
        r = PTR_ERR(opp_table);
        dev_warn(dev, "%s: Device OPP not found (%d)\n", __func__, r);
        goto unlock;
    }

    /* Do we have the frequency? */
    list_for_each_entry(tmp_opp, &opp_table->opp_list, node) {
        if (tmp_opp->rate == freq) {
            opp = tmp_opp;
            break;
        }
    }
    if (IS_ERR(opp)) {
        r = PTR_ERR(opp);
        goto unlock;
    }

    /* Is update really needed? */
    if (opp->supplies[0].u_volt == u_volt)
        goto unlock;
```

+ @freq: OPP frequency to adjust voltage of
+ @u_volt: new OPP voltage
+ + Change the voltage of an OPP with an RCU operation.
+ + Return: -EINVAL for bad pointers, -ENOMEM if no memory available for the copy operation, returns 0 if no modification was done OR modification was successful.
+ + Locking: The internal device_opp and opp structures are RCU protected. Hence this function internally uses RCU updater strategy with mutex locks to keep the integrity of the internal data structures. Callers should ensure that this function is NOT called under RCU protection or in contexts where mutex locking or synchronize_rcu() blocking calls cannot be used.
+ */
+ int dev_pm_opp_adjust_voltage(struct device *dev, unsigned long freq,
+    unsigned long u_volt)
+{ + struct opp_table *opp_table;
+    struct dev_pm_opp *tmp_opp, *opp = ERR_PTR(-ENODEV);
+    int r = 0;
+    unsigned long tol;
+    +mutex_lock(&opp_table_lock);
+    +/* Find the opp_table */
+    +opp_table = _find_opp_table_unlocked(dev);
+    +if (IS_ERR(opp_table)) {
+        +r = PTR_ERR(opp_table);
+        +dev_warn(dev, "%s: Device OPP not found (%d)\n", __func__, r);
+        +goto unlock;
+    +}
+    +/* Do we have the frequency? */
+    +list_for_each_entry(tmp_opp, &opp_table->opp_list, node) {
+        +if (tmp_opp->rate == freq) {
+            +opp = tmp_opp;
+            +break;
+        +}
+    +}
+    +if (IS_ERR(opp)) {
+        +r = PTR_ERR(opp);
+        +goto unlock;
+    +}
+    +/* Is update really needed? */
+    +if (opp->supplies[0].u_volt == u_volt)
+        +goto unlock;
```
+/* adjust voltage node */
+tol = u_volt * opp_table->voltage_tolerance_v1 / 100;
+opp->supplies[0].u_volt = u_volt;
+opp->supplies[0].u_volt_min = u_volt - tol;
+opp->supplies[0].u_volt_max = u_volt + tol;
+
+mutex_unlock(&opp_table_lock);
+
+/* Notify the change of the OPP */
+blocking_notifier_call_chain(&opp_table->head, OPP_EVENT_ADJUST_VOLTAGE, opp);
+
+return 0;
+
+unlock:
+mutex_unlock(&opp_table_lock);
+return r;
+
}/**
 * dev_pm_opp_enable() - Enable a specific OPP
 * @dev:	device for which we do this operation
--- linux-4.15.0.orig/drivers/opp/of.c
+++ linux-4.15.0/drivers/opp/of.c
@@ -112,12 +112,10 @@
 struct opp_table *opp_table)
 {  
 u32 *microvolt, *microamp = NULL;
-int supplies, vcount, icount, ret, i, j;
+int supplies = opp_table->regulator_count, vcount, icount, ret, i, j;
 struct property *prop = NULL;
 char name[NAME_MAX];

-supplies = opp_table->regulator_count ? opp_table->regulator_count : 1;
-
-/* Search for "opp-microvolt-<name>" */
-if (opp_table->prop_name) {
-snprintf(name, sizeof(name), "opp-microvolt-%s",
-@@ -132,7 +130,13 @@
 /* Missing property isn't a problem, but an invalid entry is */
 if (!prop) {
 -if (!opp_table->regulator_count)
 +if (unlikely(supplies == -1)) {
 +/* Initialize regulator_count */
 +opp_table->regulator_count = 0;
 +return 0;
 +}
if (!supplies)
return 0;

dev_err(dev, "%s: opp-microvolt missing although OPP managing regulators\n", @ @ -141,6 +145,14 @ @
}

+if (unlikely(supplies == -1)) {
+/* Initialize regulator_count */
+supplies = opp_table->regulator_count = 1;
+} else if (unlikely(!supplies)) {
+dev_err(dev, "%s: opp-microvolt wasn't expected\n", __func__);
+return -EINVAL;
+}
+
+ vcount = of_property_count_u32_elems(opp->np, name);
if (vcount < 0) {
  dev_err(dev, "%s: Invalid %s property (%d)\n", @ @ -402,9 +414,11 @ @
}

-/* There should be one of more OPP defined */
-if (WARN_ON(!count)) {
-/* There should be one or more OPPs defined */
-if (!count) {
+ /* There should be one or more OPPs defined */
+if (!count) {
  dev_err(dev, "%s: no supported OPPs", __func__);
  ret = -ENOENT;
  _dev_pm_opp_remove_table(opp_table, dev, false);
  goto put_opp_table;
}

--- linux-4.15.0.orig/drivers/opp/opp.h
+++ linux-4.15.0/drivers/opp/opp.h
@@ -136,7 +136,9 @@
* @prop_name: A name to postfix to many DT properties, while parsing them.
* @clk: Device's clock handle
* @regulators: Supply regulators
- * @regulator_count: Number of power supply regulators
+ * @regulator_count: Number of power supply regulators. Its value can be -1
+ * (uninitialized), 0 (no opp-microvolt property) or > 0 (has opp-microvolt
+ * property).
* @genpd_performance_state: Device's power domain support performance state.
* @set_opp: Platform specific set_opp callback
* @set_opp_data: Data to be passed to set_opp callback
@ @ -173,7 +175,7 @@
const char *prop_name;
struct clk *clk;
struct regulator **regulators;
unsigned int regulator_count;
int regulator_count;
bool genpd_performance_state;

int (*set_opp)(struct dev_pm_set_opp_data *data);
--- linux-4.15.0.orig/drivers/parisc/ccio-dma.c
+++ linux-4.15.0/drivers/parisc/ccio-dma.c
@@ -565,8 +565,6 @@
/* We currently only support kernel addresses */
BUG_ON(sid != KERNEL_SPACE);

- mtp(sid, 1);
- /*
- ** WORD 1 - low order word
- ** "hints" parm includes the VALID bit!
- @ @ -597,7 +595,7 @@
- ** Grab virtual index [0:11]
- ** Deposit virt_idx bits into I/O PDIR word
- */
-asm volatile ("lci %%r0(%%sr1, %1), %0" : "=r" (ci) : "r" (vba));
+asm volatile ("lci %%r0(%1), %0" : "=r" (ci) : "r" (vba));
asm volatile ("extru %1,19,12,%0" : "=r" (ci) : "r" (ci));
asm volatile ("depw %1,15,12,%0" : "=r" (pa) : "r" (ci));

--- linux-4.15.0.orig/drivers/parisc/dino.c
+++ linux-4.15.0/drivers/parisc/dino.c
@@ -442,6 +442,30 @@
} DECLARE_PCI_FIXUP_ENABLE(PCI_VENDOR_ID_CIRRUS, PCI_DEVICE_ID_CIRRUS_6832, quirk_cirrus_cardbus);

+#ifdef CONFIG_TULIP
+ /* Check if PCI device is behind a Card-mode Dino. */
+static int pci_dev_is_behind_card_dino(struct pci_dev *dev)
+{
+ struct dino_device *dino_dev;
+ +
+ dino_dev = DINO_DEV(parisc_walk_tree(dev->bus->bridge));
+ +return is_card_dino(&dino_dev->hba.dev->id);
+ +}
+ +
+static void pci_fixup_tulip(struct pci_dev *dev)
+{
+ if (!pci_dev_is_behind_card_dino(dev))
+return;
+if (!(pci_resource_flags(dev, 1) & IORESOURCE_MEM))
+return;
+pr_warn("%s: HP HSC-PCI Cards with card-mode Dino not yet supported.\n", 
+pci_name(dev));
+/* Disable this card by zeroing the PCI resources */
+memset(&dev->resource[0], 0, sizeof(dev->resource[0]));
+memset(&dev->resource[1], 0, sizeof(dev->resource[1]));
+}
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_DEC, PCI_ANY_ID, pci_fixup_tulip);
+#endif /* CONFIG_TULIP */

static void __init
dino_bios_init(void)
--- linux-4.15.0.orig/drivers/parisc/lba_pci.c
+++ linux-4.15.0/drivers/parisc/lba_pci.c
@@ -1403,9 +1403,27 @@
WRITE_REG32(stat, d->hba.base_addr + LBA_ERROR_CONFIG);
}

-/* Set HF mode as the default (vs. -1 mode). */
+
+/*
+ * Hard Fail vs. Soft Fail on PCI "Master Abort".
+ * + "Master Abort" means the MMIO transaction timed out - usually due to
+ * + the device not responding to an MMIO read. We would like HF to be
+ * + enabled to find driver problems, though it means the system will
+ * + crash with a HPMC.
+ * + In SoftFail mode "-0L" is returned as a result of a timeout on the
+ * + PCI bus. This is like how PCI busses on x86 and most other
+ * + architectures behave. In order to increase compatibility with
+ * + existing (x86) PCI hardware and existing Linux drivers we enable
+ * + Soft Fail mode on PA-RISC now too.
+ */
+ #if defined(ENABLE_HARDFAIL)
WRITE_REG32(stat | HF_ENABLE, d->hba.base_addr + LBA_STAT_CTL);
+#else
WRITE_REG32(stat & ~HF_ENABLE, d->hba.base_addr + LBA_STAT_CTL);
+#endif

/*
 ** Writing a zero to STAT_CTL.rf (bit 0) will clear reset signal
 --- linux-4.15.0.orig/drivers/parisc/led.c
+++ linux-4.15.0/drivers/parisc/led.c
@@ -568,6 +568,9 @@

case DISPLAY_MODEL_LASI:
+/* Skip to register LED in QEMU */
+if (running_on_qemu)
+return 1;

LED_DATA_REG = data_reg;
led_func_ptr = led_LASI_driver;
printk(KERN_INFO "LED display at %lx registered\n", LED_DATA_REG);

--- linux-4.15.0.orig/drivers/parisc/sba_iommu.c
+++ linux-4.15.0/drivers/parisc/sba_iommu.c
@@ -575,8 +575,7 @@
    pa = virt_to_phys(vba);
    pa &= IOVP_MASK;

-mtp(sid,1);
-asm("lci 0(%%sr1, %1), %0" : "=r" (ci) : "r" (vba));
+asm("lci 0(%1), %0" : "=r" (ci) : "r" (vba));
    pa |= (ci >> PAGE_SHIFT) & 0xff;  /* move CI (8 bits) into lowest byte */

    pa |= SBA_PDIR_VALID_BIT; /* set "valid" bit */
    @@ -1292,7 +1291,7 @@
 ** (one that doesn't overlap memory or LMMIO space) in the
 ** IBASE and IMASK registers.
 */
-ioctl->ibase = READ_REG(ioc->ioc_hpa + IOC_IBASE);
+ioc->ibase = READ_REG(ioc->ioc_hpa + IOC_IBASE) & ~0x1fffffULL;
    iova_space_size = ~(READ_REG(ioc->ioc_hpa + IOC_IMASK) & 0xFFFFFFFFUL) + 1;

    if ((ioc->ibase < 0xfed00000UL) && ((ioc->ibase + iova_space_size) > 0xfee00000UL)) {
-    --- linux-4.15.0.orig/drivers/parport/ieee1284_ops.c
+++ linux-4.15.0/drivers/parport/ieee1284_ops.c
@@ -535,7 +535,7 @@
        goto out;
 /* Yield the port for a while. */
-    if (count && &dev->port->irq != PARPORT_IRQ_NONE) {
+ioc->port->irq != PARPORT_IRQ_NONE) {
        parport_release (dev);
        schedule_timeout_interruptible(msecs_to_jiffies(40));
        parport_claim_or_block (dev);
-    --- linux-4.15.0.orig/drivers/parport/parport_pc.c
+++ linux-4.15.0/drivers/parport/parport_pc.c
@@ -1377,7 +1377,7 @@
        int i;
        for (i = 0; i < NR_SUPERIOS; i++)
            -if (superios[i].io != p->base)
if (superiors[i].io == p->base)
    return &superiors[i];
return NULL;
}

/* netmos_9901 */               { 1, { { 0, -1 }, } },
/* netmos_9865 */               { 1, { { 0, -1 }, } },
/* quatech_sppxp100 */          { 1, { { 0, 1 }, } },
/* wch_ch382l */               { 1, { { 2, -1 }, } },
};

static const struct pci_device_id parport_pc_pci_tbl[] = {
/* Quatech SPPXP-100 Parallel port PCI ExpressCard */
{ PCI_VENDOR_ID_QUATECH, PCI_DEVICE_ID_QUATECH_SPPXP_100,
  PCI_ANY_ID, PCI_ANY_ID, 0, 0, quatech_sppxp100 },
/* WCH CH382L PCI-E single parallel port card */
{ 0x1c00, 0x3050, 0x1c00, 0x3050, 0, 0, wch_ch382l },
{ 0, } /* terminate list */
};
MODULE_DEVICE_TABLE(pci, parport_pc_pci_tbl);
--- linux-4.15.0.orig/drivers/parport/parport_serial.c
+++ linux-4.15.0/drivers/parport/parport_serial.c
@@ -65,7 +65,10 @@
wch_ch353_1s1p,
    wch_ch353_2s1p,
    wch_ch382_2s1p,
-sunix_2s1p,
    +sunix_4008a,
    +sunix_5069a,
    +sunix_5079a,
    +sunix_5099a,
};
/* each element directly indexed from enum list, above */
@@ -153,7 +156,10 @@
    /* wch_ch353_1s1p*/             { 1, { { 1, -1}, } },
    /* wch_ch353_2s1p*/             { 1, { { 2, -1}, } },
    /* wch_ch382_2s1p*/             { 1, { { 2, -1}, } },
-sunix_2s1p */                { 1, { { 3, -1 }, } },

```c
#define PCI_VENDOR_ID_SUNIX		0x1fd4
@@ -261,13 +267,15 @@
 { 0x4348, 0x7053, 0x4348, 0x3253, 0, 0, wch_ch353_2s1p},
 { 0x1c00, 0x3250, 0x1c00, 0x3250, 0, 0, wch_ch382_2s1p},

-/*
- * More SUNIX variations. At least one of these has part number
- * '5079A but subdevice 0x102. That board reports 0x0708 as
- * its PCI Class.
- */
-*/
+/* Sunix boards */
{ PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999, PCI_VENDOR_ID_SUNIX,
  0x0102, 0, 0, sunix_2s1p },
+ 0x0100, 0, 0, sunix_4008a },
+{ PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999, PCI_VENDOR_ID_SUNIX,
  0x0101, 0, 0, sunix_5069a },
+{ PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999, PCI_VENDOR_ID_SUNIX,
  0x0102, 0, 0, sunix_5079a },
+{ PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999, PCI_VENDOR_ID_SUNIX,
  0x0104, 0, 0, sunix_5099a },
{ 0, } /* terminate list */
};
@@ -504,11 +512,23 @@
 .uart_offset    = 8,
 .first_offset   = 0xC0,
 },
-[-sunix_2s1p] = {
- .flags= FL_BASE0|FL_BASE_BARS,
+[-sunix_4008a] = {
+ .num_ports= 0,
+ },
+[-sunix_5069a] = {
+ .num_ports= 1,
+ .base_baud      = 921600,
+ .uart_offset= 0x8,
+ },
+[-sunix_5079a] = {
+ .num_ports= 2,
- .base_baud= 921600,
- .uart_offset= 8,
+ .base_baud      = 921600,
```

---

Open Source Used In 5GaaS Edge AC-4 26805
.uart_offset= 0x8,
+],
+[sunix_5099a] = {
+.num_ports= 4,
+.base_baud = 921600,
+.uart_offset= 0x8,
],
};

--- linux-4.15.0.orig/drivers/parport/parport_sunbpp.c
+++ linux-4.15.0/drivers/parport/parport_sunbpp.c
@@ -286,12 +286,16 @@
     ops = kmemdup(&parport_sunbpp_ops, sizeof(struct parport_operations),
        GFP_KERNEL);
     -    if (!ops)
     +if (!ops) {
     +err = -ENOMEM;
     goto out_unmap;
     +}
     dprintk("register_port\n");
-    if (!(p = parport_register_port((unsigned long)base, irq, dma, ops)))
+    if (!(p = parport_register_port((unsigned long)base, irq, dma, ops))) {
+        err = -ENOMEM;
+        goto out_free_ops;
+    }

     p->size = size;
     p->dev = &op->dev;
--- linux-4.15.0.orig/drivers/parport/share.c
+++ linux-4.15.0/drivers/parport/share.c
@@ -230,6 +230,18 @@
     return 0;
 }
+/*
+ * Iterates through all the devices connected to the bus and return 1
+ * if the device is a parallel port.
+ */
+ *
+static int port_detect(struct device *dev, void *dev_drv)
+{
+    if (is_parport(dev))
+        return 1;
+    return 0;
+    
+*/
/**
 * parport_register_driver - register a parallel port device driver
 * @drv: structure describing the driver
 @@ -282,6 +294,15 @@
 if (ret)
 return ret;

+/**
+ * check if bus has any parallel port registered, if
+ * none is found then load the lowlevel driver.
+ */
+ret = bus_for_each_dev(&parport_bus_type, NULL, NULL,
+    port_detect);
+if (!ret)
+get_lowlevel_driver();
+
mutex_lock(&registration_lock);
if (drv->match_port)
bus_for_each_dev(&parport_bus_type, NULL, drv,
@@ -895,6 +916,7 @@
par_dev->devmodel = true;
ret = device_register(&par_dev->dev);
if (ret) {
+kfree(par_dev->state);
put_device(&par_dev->dev);
goto err_put_port;
 }
@@ -912,6 +934,7 @@
spin_unlock(&port->physport->pardevice_lock);
pr_debug("%s: cannot grant exclusive access for device %s\n",
    port->name, name);
+kfree(par_dev->state);
device_unregister(&par_dev->dev);
goto err_put_port;
}

--- linux-4.15.0.orig/drivers/pci/access.c
+++ linux-4.15.0/drivers/pci/access.c
@@ -205,17 +205,13 @@
static DECLARE_WAIT_QUEUE_HEAD(pci_cfg_wait);

static noinline void pci_wait_cfg(struct pci_dev *dev)
+__must_hold(&pci_lock)
 {
-DECLARE_WAITQUEUE(wait, current);
-
-__add_wait_queue(&pci_cfg_wait, &wait);
do {
-set_current_state(TASK_UNINTERRUPTIBLE);
raw_spin_unlock_irq(&pci_lock);
-schedule();
+wait_event(pci_cfg_wait, !dev->block_cfg_access);
raw_spin_lock_irq(&pci_lock);
} while (dev->block_cfg_access);
-__remove_wait_queue(&pci_cfg_wait, &wait);
}

/* Returns 0 on success, negative values indicate error. */
--- linux-4.15.0.orig/drivers/pci/bus.c
+++ linux-4.15.0/drivers/pci/bus.c
@@ -324,12 +324,8 @@
dev->match_driver = true;
    retval = device_attach(&dev->dev);
    -if (retval < 0 & & retval != -EPROBE_DEFER) {
    +if (retval < 0 & & retval != -EPROBE_DEFER)
       dev_warn(&dev->dev, "device attach failed (%d)\n", retval);
       -pci_proc_detach_device(dev);
       -pci_remove_sysfs_dev_files(dev);
       -return;
    -}

dev->is_added = 1;
}
--- linux-4.15.0.orig/drivers/pci/dwc/pci-dra7xx.c
+++ linux-4.15.0/drivers/pci/dwc/pci-dra7xx.c
@@ -29,6 +29,7 @@
 #include <linux/types.h>
 #include <linux/mfd/syscon.h>
 #include <linux/regmap.h>
+#include <linux/gpio/consumer.h>
 #include "pcie-designware.h"

 @ @ -226,6 +227,7 @ @

 static const struct irq_domain_ops intx_domain_ops = {
 .map = dra7xx_pcie_intx_map,
 +.xlate = pci_irqd_intx_xlate,
 };
+    ffs(reg) - 1));
break;
}

@@ -546,7 +548,7 @@
};

/*
- * dra7xx_pcie_ep_unaligned_memaccess: workaround for AM572x/AM571x Errata i870
+ * dra7xx_pcie_unaligned_memaccess: workaround for AM572x/AM571x Errata i870
 * @dra7xx: the dra7xx device where the workaround should be applied
 *
 */
@@ -556,7 +558,7 @@
 *
 * To avoid this issue set PCIE_SS1_AXI2OCP_LEGACY_MODE_ENABLE to 1.
 */
 static int dra7xx_pcie_ep_unaligned_memaccess(struct device *dev)
+static int dra7xx_pcie_unaligned_memaccess(struct device *dev)
 {
   int ret;
   struct device_node *np = dev->of_node;
@@ -707,6 +709,11 @@
     case DW_PCIE_RC_TYPE:
       dra7xx_pcie_writel(dra7xx, PCIECTRL_TI_CONF_DEVICE_TYPE,
       DEVICE_TYPE_RC);
+    +ret = dra7xx_pcie_unaligned_memaccess(dev);
+    +if (ret)
+    +dev_err(dev, "WA for Errata i870 not applied\n");
+    +ret = dra7xx_add_pcie_port(dra7xx, pdev);
+    if (ret < 0)
+      goto err_gpio;
+    err_gpio:
+    ep->phy = devm_of_phy_get(dev, np, NULL);
if (IS_ERR(ep->phy)) {
    if (PTR_ERR(ep->phy) == -EPROBE_DEFER)
        return PTR_ERR(ep->phy);
    dev_warn(dev, "Use the 'phy' property. Current DT of pci-exynos was deprecated!!\n");
    return PTR_ERR(ep->phy);
}

-dev_warn(dev, "Use the 'phy' property. Current DT of pci-exynos was deprecated!!\n");
return ret;

static int imx6_pcie_link_up(struct dw_pcie *pci)
{
    -return dw_pcie_readl_dbi(pci, PCIE_PHY_DEBUG_R1) &
        PCIE_PHY_DEBUG_R1_XMLH_LINK_UP;
}

static const struct dw_pcie_host_ops imx6_pcie_host_ops = {
    .host_init = imx6_pcie_host_init,
};
static const struct dw_pcie_ops dw_pcie_ops = {
    .link_up = imx6_pcie_link_up,
    /* No special ops needed, but pcie-designware still expects this struct */
};

static int imx6_pcie_probe(struct platform_device *pdev)
{
    struct resource *dbi_base;
    struct device_node *node = dev->of_node;
    int ret;
    u16 val;

    imx6_pcie = devm_kzalloc(dev, sizeof(*imx6_pcie), GFP_KERNEL);
    if (!imx6_pcie)
        return -ENOMEM;

    imx6_pcie->vpcie = devm_regulator_get_optional(&pdev->dev, "vpcie");
    if (IS_ERR(imx6_pcie->vpcie)) {
        if (PTR_ERR(imx6_pcie->vpcie) == -EPROBE_DEFER)
            return -EPROBE_DEFER;
        if (PTR_ERR(imx6_pcie->vpcie) != -ENODEV)
            return PTR_ERR(imx6_pcie->vpcie);
        imx6_pcie->vpcie = NULL;
    }

    @ -846,6 +840,14 @@
    if (ret < 0)
        return ret;

    @ -712,6 +705,7 @
    if (pci_msi_enabled()) {
        val = dw_pcie_readw_dbi(pci, PCIE_RC_IMX6_MSI_CAP +
                                PCI_MSI_FLAGS);
        val |= PCI_MSI_FLAGS_ENABLE;
        dw_pcie_writew_dbi(pci, PCIE_RC_IMX6_MSI_CAP + PCI_MSI_FLAGS, +
                            val);
        +}
    +
    return 0;
}

--- linux-4.15.0.orig/drivers/pci/dwc/pci-keystone-dw.c
+++ linux-4.15.0/drivers/pci/dwc/pci-keystone-dw.c
@@ -510,7 +510,7 @@
     /* Disable Link training */
     val = ks_dw_app_readl(ks_pcie, CMD_STATUS);
val &= ~LTSSM_EN_VAL;
-ks_dw_app_writel(ks_pcie, CMD_STATUS, LTSSM_EN_VAL | val);
+ks_dw_app_writel(ks_pcie, CMD_STATUS, val);

/* Initiate Link Training */
val = ks_dw_app_readl(ks_pcie, CMD_STATUS);
--- linux-4.15.0.orig/drivers/pci/dwc/pci-keystone.c
+++ linux-4.15.0/drivers/pci/dwc/pci-keystone.c
@@ -39,6 +39,7 @@
#define PCIE_RC_K2HK 0xb008
#define PCIE_RC_K2E 0xb009
#define PCIE_RC_K2L 0xb00a
+#define PCIE_RC_K2G 0xb00b

#define to_keystone_pcie(x) dev_get_drvdata((x)->dev)

@@ -53,6 +54,8 @@
    },
    { PCI_DEVICE(PCI_VENDOR_ID_TI, PCIE_RC_K2L),
    .class = PCI_CLASS_BRIDGE_PCI << 8, .class_mask = ~0, },
+    { PCI_DEVICE(PCI_VENDOR_ID_TI, PCIE_RC_K2G),
+      .class = PCI_CLASS_BRIDGE_PCI << 8, .class_mask = ~0, },
    { 0, },
};

@@ -178,7 +181,7 @@
}

/* interrupt controller is in a child node */
-*np_temp = of_find_node_by_name(np_pcie, controller);
+*np_temp = of_get_child_by_name(np_pcie, controller);
if (!(*np_temp)) {
    dev_err(dev, "Node for %s is absent\n", controller);
    return -EINVAL;
@@ -187,6 +190,7 @@
temp = of_irq_count(*np_temp);
if (!temp) {
    dev_err(dev, "No IRQ entries in %s\n", controller);
+of_node_put(*np_temp);
    return -EINVAL;
}

@@ -204,6 +208,8 @@
break;
}

+of_node_put(*np_temp);
if (temp) {
    *num_irqs = temp;
    return 0;
    @@ -237,6 +243,7 @@
    ks_dw_pcie_enable_error_irq(ks_pcie);
 }

+#ifdef CONFIG_ARM
/*
 * When a PCI device does not exist during config cycles, keystone host gets a
 * bus error instead of returning 0xffffffff. This handler always returns 0
 @@ -256,6 +263,7 @@
 return 0;
 }
+#endif

static int __init ks_pcie_host_init(struct pcie_port *pp)
{
    @@ -279,12 +287,14 @@
    val |= BIT(12);
    writel(val, pci->dbi_base + PCIE_CAP_BASE + PCI_EXP_DEVCTL);

+#ifdef CONFIG_ARM
/*
 * PCIe access errors that result into OCP errors are caught by ARM as
 * "External aborts"
 */
    hook_fault_code(17, keystone_pcie_fault, SIGBUS, 0,
    "Asynchronous external abort");
+#endif

    return 0;
}
--- linux-4.15.0.orig/drivers/pci/dwc/pci-layerscape.c
+++ linux-4.15.0/drivers/pci/dwc/pci-layerscape.c
@@ -91,7 +91,7 @@
    int i;

    for (i = 0; i < PCIE_IATU_NUM; i++)
    -dw_pcie_disable_atu(pcie->pci, DW_PCIE_REGION_OUTBOUND, i);
    +dw_pcie_disable_atu(pcie->pci, i, DW_PCIE_REGION_OUTBOUND);
 }

static int ls1021_pcie_link_up(struct dw_pcie *pci)
--- linux-4.15.0.orig/drivers/pci/dwc/pcie-designware-ep.c
+++ linux-4.15.0/drivers/pci/dwc/pcie-designware-ep.c
@@ -91,7 +91,7 @@
 int i;

    for (i = 0; i < PCIE_IATU_NUM; i++)
    -dw_pcie_disable_atu(pcie->pci, DW_PCIE_REGION_OUTBOUND, i);
    +dw_pcie_disable_atu(pcie->pci, i, DW_PCIE_REGION_OUTBOUND);
 }
u32 reg;

reg = PCI_BASE_ADDRESS_0 + (4 * bar);
+dw_pcie_dbi_ro_wr_en(pci);
dw_pcie_writel_dbi2(pci, reg, 0x0);
dw_pcie_writel_dbi(pci, reg, 0x0);
+dw_pcie_dbi_ro_wr_dis(pci);
}

static int dw_pcie_ep_write_header(struct pci_epc *epc,
@@ -45,6 +47,7 @@
    struct dw_pcie_ep *ep = epc_get_drvdata(epc);
    struct dw_pcie *pci = to_dw_pcie_from_ep(ep);

+dw_pcie_dbi_ro_wr_en(pci);
dw_pcie_writew_dbi(pci, PCI_VENDOR_ID, hdr->vendorid);
dw_pcie_writew_dbi(pci, PCI_DEVICE_ID, hdr->deviceid);
dw_pcie_writeb_dbi(pci, PCI_REVISION_ID, hdr->revid);
@@ -58,6 +61,7 @@
dw_pcie_writew_dbi(pci, PCI_SUBSYSTEM_ID, hdr->subsys_id);
dw_pcie_writeb_dbi(pci, PCI_INTERRUPT_PIN,
    hdr->interrupt_pin);
+dw_pcie_dbi_ro_wr_dis(pci);
return 0;
}  
@@ -70,8 +74,7 @@
    u32 free_win;
    struct dw_pcie *pci = to_dw_pcie_from_ep(ep);

-free_win = find_first_zero_bit(&ep->ib_window_map,
-    sizeof(ep->ib_window_map));
+free_win = find_first_zero_bit(ep->ib_window_map, ep->num_ib_windows);
if (free_win >= ep->num_ib_windows) {
    dev_err(pci->dev, "no free inbound window\n");
    return -EINVAL;
@@ -85,7 +88,7 @@
    }
ep->bar_to_atu[bar] = free_win;
-set_bit(free_win, &ep->ib_window_map);
+set_bit(free_win, ep->ib_window_map);

    return 0;
}  
@@ -96,8 +99,7 @@
    u32 free_win;
    struct dw_pcie *pci = to_dw_pcie_from_ep(ep);
- free_win = find_first_zero_bit(&ep->ob_window_map);
+ free_win = find_first_zero_bit(ep->ob_window_map, ep->num_ob_windows);
if (free_win >= ep->num_ob_windows) {
  dev_err(pci->dev, "no free outbound window\n");
  return -EINVAL;
@@ -106,7 +108,7 @@
dw_pcie_prog_outbound_atu(pci, free_win, PCIE_ATU_TYPE_MEM,
    phys_addr, pci_addr, size);

- set_bit(free_win, &ep->ob_window_map);
+ set_bit(free_win, ep->ob_window_map);
ep->outbound_addr[free_win] = phys_addr;

  return 0;
@@ -121,7 +123,7 @@
dw_pcie_ep_reset_bar(pci, bar);

dw_pcie_disable_atu(pci, atu_index, DW_PCIE_REGION_INBOUND);
- clear_bit(atu_index, &ep->ib_window_map);
+ clear_bit(atu_index, ep->ib_window_map);
}

static int dw_pcie_ep_set_bar(struct pci_epc *epc, enum pci_barno bar,
@@ -142,8 +144,10 @@
  if (ret)
    return ret;

+dw_pcie_dbi_ro_wr_en(pci);
  dw_pcie_writel_dbi2(pci, reg, size - 1);
  dw_pcie_writel_dbi(pci, reg, flags);
+dw_pcie_dbi_ro_wr_dis(pci);

  return 0;
}  
@@ -175,7 +179,7 @@
return;

dw_pcie_disable_atu(pci, atu_index, DW_PCIE_REGION_OUTBOUND);
- clear_bit(atu_index, &ep->ob_window_map);
+ clear_bit(atu_index, ep->ob_window_map);
}

static int dw_pcie_ep_map_addr(struct pci_epc *epc, phys_addr_t addr,
@@ -197,20 +201,14 @@
static int dw_pcie_ep_get_msi(struct pci_epc *epc)
int val;
-u32 lower_addr;
-u32 upper_addr;
struct dw_pcie_ep *ep = epc_get_drvdata(epc);
struct dw_pcie *pci = to_dw_pcie_from_ep(ep);

-val = dw_pcie_readb_dbi(pci, MSI_MESSAGE_CONTROL);
-val = (val & MSI_CAP_MME_MASK) >> MSI_CAP_MME_SHIFT;
-
-lower_addr = dw_pcie_readl_dbi(pci, MSI_MESSAGE_ADDR_L32);
-upper_addr = dw_pcie_readl_dbi(pci, MSI_MESSAGE_ADDR_U32);
-
-if (!(lower_addr || upper_addr))
+val = dw_pcie_readw_dbi(pci, MSI_MESSAGE_CONTROL);
+if (!(val & MSI_CAP_MSI_EN_MASK))
   return -EINVAL;
+
+val = (val & MSI_CAP_MME_MASK) >> MSI_CAP_MME_SHIFT;
return val;
}

@@ -220,8 +218,12 @@
struct dw_pcie_ep *ep = epc_get_drvdata(epc);
struct dw_pcie *pci = to_dw_pcie_from_ep(ep);

-val = (encode_int << MSI_CAP_MMC_SHIFT);
+val = dw_pcie_readw_dbi(pci, MSI_MESSAGE_CONTROL);
+val &= ~MSI_CAP_MMC_MASK;
+val |= (encode_int << MSI_CAP_MMC_SHIFT) & MSI_CAP_MMC_MASK;
+dw_pcie_dbi_ro_wr_en(pci);
dw_pcie_writew_dbi(pci, MSI_MESSAGE_CONTROL, val);
+dw_pcie_dbi_ro_wr_dis(pci);

return 0;
}
@@ -298,12 +300,32 @@
dev_err(dev, "unable to read *num-ib-windows* property\n");
return ret;
}
+if (ep->num_ib_windows > MAX_IATU_IN) {
+dev_err(dev, "invalid *num-ib-windows*\n");
+return -EINVAL;
+
ret = of_property_read_u32(np, "num-ob-windows", &ep->num_ob_windows);
if (ret < 0) {
   dev_err(dev, "unable to read *num-ob-windows* property\n");
return ret;
+if (ep->num_ob_windows > MAX_IATU_OUT) {
+dev_err(dev, "invalid *num-ob-windows*\n");
+return -EINVAL;
+}
+
ep->ib_window_map = devm_kzalloc(dev, sizeof(long) * 
+BITS_TO_LONGS(ep->num_ib_windows), 
+GFP_KERNEL);
+if (!ep->ib_window_map)
+return -ENOMEM;
+
ep->ob_window_map = devm_kzalloc(dev, sizeof(long) * 
+BITS_TO_LONGS(ep->num_ob_windows), 
+GFP_KERNEL);
+if (!ep->ob_window_map)
+return -ENOMEM;

addr = devm_kzalloc(dev, sizeof(phys_addr_t) * ep->num_ob_windows, 
                     GFP_KERNEL);
--- linux-4.15.0.orig/drivers/pci/dwc/pcie-designware-host.c
+++ linux-4.15.0/drivers/pci/dwc/pcie-designware-host.c
@@ -45,8 +45,19 @@
  return dw_pcie_write(pci->dbi_base + where, size, val);
 }

+static void dwc_irq_ack(struct irq_data *d)
+{
+  struct msi_desc *msi = irq_data_get_msi_desc(d);
+  struct pcie_port *pp = msi_desc_to_pci_sysdata(msi);
+  int pos = d->hwirq % 32;
+  int i = d->hwirq / 32;
+  
+  dw_pcie_wr_own_conf(pp, PCIE_MSI_INTR0_STATUS + i * 12, 4, BIT(pos));
+}
+
+static struct irq_chip dw_msi_irq_chip = {
  .name = "PCI-MSI",
  .irq_ack = dwc_irq_ack,
  .irq_enable =pci_msi_unmask_irq,
  .irq_disable =pci_msi_mask_irq,
  .irq_mask =pci_msi_mask_irq,
  @ @ -72.8 +83.6 @@
  pos)) != 32) {
  irq = irq_find_mapping(pp->irq_domain, i * 32 + pos);
  generic_handle_irq(irq);
  -dw_pcie_wr_own_conf(pp, PCIE_MSI_INTR0_STATUS + i * 12,
-  4, 1 << pos);
pos++;  
}  
}

@@ -263,7 +272,7 @@
static int dw_pcie_msi_map(struct irq_domain *domain, unsigned int irq,
    irq_hw_number_t hwirq)
{
    -irq_set_chip_and_handler(irq, &dw_msi_irq_chip, handle_simple_irq);
    +irq_set_chip_and_handler(irq, &dw_msi_irq_chip, handle_edge_irq);
    irq_set_chip_data(irq, domain->host_data);

    return 0;
@@ -312,7 +321,8 @@
resource_list_for_each_entry_safe(win, tmp, &bridge->windows) {
    switch (resource_type(win->res)) {
    case IORESOURCE_IO:
    -ret = pci_remap_iospace(win->res, pp->io_base);
    +ret = devm_pci_remap_iospace(dev, win->res,
    +   pp->io_base);
        if (ret) {
            dev_warn(dev, "error %d: failed to map resource %pR
", ret, win->res);
@@ -607,7 +617,7 @@
    /* setup bus numbers */
    val = dw_pcie_readl_dbi(pci, PCI_PRIMARY_BUS);
    val &= 0xff000000;
    -val |= 0x00010100;
    +val |= 0x00ff0100;
    dw_pcie_writel_dbi(pci, PCI_PRIMARY_BUS, val);

    /* setup command register */
--- linux-4.15.0.orig/drivers/pci/dwc/pcie-designware.c
+++ linux-4.15.0/drivers/pci/dwc/pcie-designware.c
@@ -138,7 +138,7 @@
        if (val & PCIE_ATU_ENABLE)
            return;
        -usleep_range(LINK_WAIT_IATU_MIN, LINK_WAIT_IATU_MAX);
        +mdelay(LINK_WAIT_IATU);
    }
    dev_err(pci->dev, "outbound iATU is not being enabled\n");
}  
@@ -181,7 +181,7 @@
        if (val & PCIE_ATU_ENABLE)
            return;
        -usleep_range(LINK_WAIT_IATU_MIN, LINK_WAIT_IATU_MAX);
        +mdelay(LINK_WAIT_IATU);
    }
    dev_err(pci->dev, "outbound iATU is not being enabled\n");
}  

} dev_err(pci->dev, "outbound iATU is not being enabled\n");
}
@@ -239,7 +239,7 @@ if (val & PCIE_ATU_ENABLE)
 return 0;

 -usleep_range(LINK_WAIT_IATU_MIN, LINK_WAIT_IATU_MAX);
 +mdelay(LINK_WAIT_IATU);
 }
 dev_err(pci->dev, "inbound iATU is not being enabled\n");

 @@ -285,7 +285,7 @@ if (val & PCIE_ATU_ENABLE)
 return 0;

 -usleep_range(LINK_WAIT_IATU_MIN, LINK_WAIT_IATU_MAX);
 +mdelay(LINK_WAIT_IATU);
 }
 dev_err(pci->dev, "inbound iATU is not being enabled\n");

 --- linux-4.15.0.orig/drivers/pci/dwc/pcie-designware.h
 +++ linux-4.15.0/drivers/pci/dwc/pcie-designware.h
 @@ -28,8 +28,7 @@
 /* Parameters for the waiting for iATU enabled routine */
 #define LINK_WAIT_MAX_IATU_RETRIES5
 -#define LINK_WAIT_IATU_MIN9000
 -#define LINK_WAIT_IATU_MAX10000
 +#define LINK_WAIT_IATU9

 /* Synopsys-specific PCIe configuration registers */
 #define PCIE_PORT_LINK_CONTROL0x710
 @@ -100,7 +99,9 @@

 #define MSI_MESSAGE_CONTROL0x52
 #define MSI_CAP_MMC_SHIFT1
 +#define MSI_CAP_MMC_MASK(7 << MSI_CAP_MMC_SHIFT)
 #define MSI_CAP_MME_SHIFT4
 +#define MSI_CAP_MSI_EN_MASK0x1
 #define MSI_CAP_MME_MASK(7 << MSI_CAP_MME_SHIFT)
 #define MSI_MESSAGE_ADDR_L320x54
 #define MSI_MESSAGE_ADDR_U320x58
 @@ -113,6 +114,10 @@
 #define MAX_MSI_IRQS32
 #define MAX_MSICTRLS(MAX_MSI_IRQS / 32)

 +/* Maximum number of inbound/outbound iATUs */
+\#define MAX_IATU_IN 256  
+\#define MAX_IATU_OUT 256  
+  
+struct pcie_port;  
+struct dw_pcie;  
+struct dw_pcie_ep;  
+  @ @ -192,8 +197,8 @ @  
+size_t ppage_size;  
+u8 *bar_to_atu[6];  
+phys_addr_t *outbound_addr;  
+-unsigned long *ib_window_map;  
+-unsigned long *ob_window_map;  
+unsigned long *ib_window_map;  
+unsigned long *ob_window_map;  
+u32 num_ib_windows;  
+u32 num_ob_windows;  
};  
--- linux-4.15.0.orig/drivers/pci/dwc/pcie-kirin.c  
+++ linux-4.15.0/drivers/pci/dwc/pcie-kirin.c  
@@ -449,8 +449,8 @@  
Kirin_PcieHostInit = kirin_pcie_host_init,  
    };  

-kirin_pcie_ops = &kirin_pcie_ops;  
+static int kirin_add_pcie_port(struct dw_pcie *pci,  
+    struct platform_device *pdev)  
+  }
+  
-pci->pp.ops = &kirin_pcie_host_ops;  
+static int kirin_add_pcie_port(struct dw_pcie *pci,  
+    struct platform_device *pdev)  
+  }
+  
-pci->pp.ops = &kirin_pcie_host_ops;  
+return ret;  

kirin_pcie->gpio_id_reset = of_get_named_gpio(dev->of_node,  
-    "reset-gpio", 0);  
+    "reset-gpios", 0);  
if (kirin_pcie->gpio_id_reset < 0)  
  return -ENODEV;  

--- linux-4.15.0.orig/drivers/pci/dwc/pcie-qcom.c  
+++ linux-4.15.0/drivers/pci/dwc/pcie-qcom.c  
@@ -52,7 +52,13 @@  
#define PCIE20_PARF_PHY_CTRL 0x40  
+#define PHY_CTRL_PHY_TX0_TERM_OFFSET_MASK GENMASK(20, 16)  
+#define PHY_CTRL_PHY_TX0_TERM_OFFSET(x)((x) << 16)  
+  
#define PCIE_CAP_CPL_TIMEOUT_DISABLE0x10  

#define PCIE20_PARF_PHY_CTRL0x40  
+#define PHY_CTRL_PHY_TX0_TERM_OFFSET_MASKGENMASK(20, 16)  
+#define PHY_CTRL_PHY_TX0_TERM_OFFSET(x)((x) << 16)  
+  

---
#define PCIE20_PARF_PHY_REFCLK 0x4C
+#define PHY_REFCLK_SSP_ENBIT(16)
+#define PHY_REFCLK_USE_PADBIT(12)
+
#define PCIE20_PARF_DBI_BASE_ADDR 0x168
#define PCIE20_PARF_SLV_ADDR_SPACE_SIZE 0x16C
#define PCIE20_PARF_MHI_CLOCK_RESET_CTRL 0x174
@@ -83,6 +89,18 @@
#define DBI_RO_WR_EN 1
#define PERST_DELAY_US 1000
+/* PARF registers */
+#define PCIE20_PARF_PCS_DEEMPH 0x34
+#define PCS_DEEMPH_TX_DEEMPH_GEN1(x) ((x) << 16)
+#define PCS_DEEMPH_TX_DEEMPH_GEN2_3_5DB(x) ((x) << 8)
+#define PCS_DEEMPH_TX_DEEMPH_GEN2_6DB(x) ((x) << 0)
+
+#define PCIE20_PARF_PCS_SWING 0x38
+#define PCS_SWING_TX_SWING_FULL(x) ((x) << 8)
+#define PCS_SWING_TX_SWING_LOW(x) ((x) << 0)
+
+#define PCIE20_PARF_CONFIG_BITS 0x50
+#define PHY_RX0_EQ(x) ((x) << 24)
#define PCIE20_v3_PARF_SLV_ADDR_SPACE_SIZE 0x358
#define SLV_ADDR_SPACE_SZ 0x10000000
@@ -96,6 +114,7 @@
struct reset_control *ahb_reset;
struct reset_control *por_reset;
struct reset_control *phy_reset;
+struct reset_control *ext_reset;
struct regulator *vdda;
struct regulator *vdda_phy;
struct regulator *vdda_refclk;
@@ -184,6 +203,8 @@
static void qcom_ep_reset_deassert(struct qcom_pcie *pcie)
{
+/* Ensure that PERST has been asserted for at least 100 ms */
+msleep(100);
 gpiod_set_value_cansleep(pcie->reset, 0);
 usleep_range(PERST_DELAY_US, PERST_DELAY_US + 500);
 }}
@@ -265,6 +286,10 @@
if (IS_ERR(res->por_reset))
 return PTR_ERR(res->por_reset);
+res->ext_reset = devm_reset_control_get_optional_exclusive(dev, "ext");
if (IS_ERR(res->ext_reset))
+return PTR_ERR(res->ext_reset);
+
res->phy_reset = devm_reset_control_get_exclusive(dev, "phy");
return PTR_ERR_OR_ZERO(res->phy_reset);
}
reset_control_assert(res->axi_reset);
reset_control_assert(res->ahb_reset);
reset_control_assert(res->por_reset);
+reset_control_assert(res->ext_reset);
reset_control_assert(res->pci_reset);
clk_disable_unprepare(res->iface_clk);
clk_disable_unprepare(res->core_clk);

struct qcom_pcie_resources_2_1_0 *res = &pcie->res.v2_1_0;
struct dw_pcie *pci = pcie->pci;
struct device *dev = pci->dev;
+struct device_node *node = dev->of_node;
unsigned int ret;

+ret = reset_control_deassert(res->ext_reset);
+if (ret) {
+dev_err(dev, "cannot deassert ext reset'\n");
+goto err_deassert_ahb;
+}
+
/* enable PCIe clocks and resets */
val = readl(pcie->parf + PCIE20_PARF_PHY_CTRL);
val &= ~BIT(0);
writel(val, pcie->parf + PCIE20_PARF_PHY_CTRL);

+if (of_device_is_compatible(node, "qcom,pcie-ipq8064")) {
+writel(PCS_DEEMPH_TX_DEEMPH_GEN1(24) |
+ PCS_DEEMPH_TX_DEEMPH_GEN2_3_5DB(24) |
+ PCS_DEEMPH_TX_DEEMPH_GEN2_6DB(34),
+ pcie->parf + PCIE20_PARF_PCS_DEEMPH);
+writel(PCIE20_PARF_PCS_SWING, PCIE20_PARF_PHY_CTRL);

}
+if (of_device_is_compatible(node, "qcom,pcie-ipq8064")) { 
+ /* set TX termination offset */
+ val = readl(pcie->parf + PCIE20_PARF_PHY_CTRL);
+ val &= ~PHY_CTRL_PHY_TX0_TERM_OFFSET_MASK;
+ val |= PHY_CTRL_PHY_TX0_TERM_OFFSET(7);
+ writel(val, pcie->parf + PCIE20_PARF_PHY_CTRL);
+ }
+ /* enable external reference clock */
+ val = readl(pcie->parf + PCIE20_PARF_PHY_REFCLK);
+ val &= ~PHY_REFCLK_USE_PAD;
+ val |= PHY_REFCLK_SSP_EN;
+ writel(val, pcie->parf + PCIE20_PARF_PHY_REFCLK);
+ ret = reset_control_deassert(res->phy_reset);
+}@ @ -1236,7 +1289,7 @@
+pcie->ops = (struct qcom_pcie_ops *)of_device_get_match_data(dev);
+
+ -pcie->reset = devm_gpiod_get_optional(dev, "perst", GPIOD_OUT_LOW);
+pcie->reset = devm_gpiod_get_optional(dev, "perst", GPIOD_OUT_HIGH);
+if (IS_ERR(pcie->reset))
+return PTR_ERR(pcie->reset);
+-- linux-4.15.0.orig/drivers/pci/endpoint/functions/pci-epf-test.c
+++ linux-4.15.0/drivers/pci/endpoint/functions/pci-epf-test.c
@@ -177,7 +177,7 @@
} goto err_map_addr;
}
+-memcpy(buf, src_addr, reg->size);
+-memcpy_fromio(buf, src_addr, reg->size);
+crc32 = crc32_le(~0, buf, reg->size);
+if (crc32 != reg->checksum)
+@ @ -231,7 +231,7 @@
+get_random_bytes(buf, reg->size);
+reg->checksum = crc32_le(~0, buf, reg->size);
+-memcpy(dst_addr, buf, reg->size);
+-memcpy_toio(dst_addr, buf, reg->size);
+
+ /*
+ * wait 1ms inorder for the write to complete. Without this delay L3
+ @{ @ -517,6 +517,6 @@
+ WQ_MEM_RECLAIM | WQ_HIGHPRI, 0);
+ret = pci_epf_register_driver(&test_driver);
if (ret) {
    destroy_workqueue(kpcitest_workqueue);
    pr_err("failed to register pci epf test driver --> %d\n", ret);
    return ret;
}
@@ -527,6 +528,8 @@

static void __exit pci_epf_test_exit(void)
{
    if (kpcitest_workqueue)
        destroy_workqueue(kpcitest_workqueue);
    pci_epf_unregister_driver(&test_driver);
}
module_exit(pci_epf_test_exit);
--- linux-4.15.0.orig/drivers/pci/endpoint/pci-ep-cfs.c
+++ linux-4.15.0/drivers/pci/endpoint/pci-ep-cfs.c
@@ -97,22 +97,23 @@
{
    int ret;
    u32 func_no = 0;
-    struct pci_epc *epc;
-    struct pci_epf *epf;
    struct pci_epf_group *epf_group = to_pci_epf_group(epf_item);
    struct pci_epc_group *epc_group = to_pci_epc_group(epc_item);
-
-    epc = epc_group->epc;
-    epf = epf_group->epf;
    ret = pci_epc_add_epf(epc, epf);
    if (ret)
        goto err_add_epf;
+    struct pci_epc *epc = epc_group->epc;
+    struct pci_epf *epf = epf_group->epf;
    func_no = find_first_zero_bit(&epc_group->function_num_map,
-        sizeof(epc_group->function_num_map));
-        BITS_PER_LONG);
-    if (func_no >= BITS_PER_LONG)
+    return -EINVAL;
+    set_bit(func_no, &epc_group->function_num_map);
    epf->func_no = func_no;
+
    ret = pci_epc_add_epf(epc, epf);
    if (ret)
        goto err_add_epf;
+    ret = pci_epf_bind(epf);
    if (ret)
goto err_epf_bind;
--- linux-4.15.0.orig/drivers/pci/endpoint/pci-epc-core.c
+++ linux-4.15.0/drivers/pci/endpoint/pci-epc-core.c
@@ -18,7 +18,6 @@
*/

#include <linux/device.h>
#include <linux/dma-mapping.h>
#include <linux/slab.h>
#include <linux/module.h>
#include <linux/of_device.h>
@@ -371,7 +370,6 @@
int pci_epc_add_epf(struct pci_epe *epc, struct pci_epf *epf)
{
    unsigned long flags;
    struct device *dev = epc->dev.parent;
    if (epf->epc)
        return -EBUSY;
    @@ -383,12 +381,6 @@
        return -EINVAL;
        epcf->epc = epc;
        -if (dev->of_node) {
            -of_dma_configure(&epcf->dev, dev->of_node);
        -} else {
            -dma_set_coherent_mask(&epcf->dev, epc->dev.coherent_dma_mask);
            -epcf->dev.dma_mask = epc->dev.dma_mask;
        -}
    spin_lock_irqsave(&epcf->lock, flags);
    list_add_tail(&epcf->list, &epc->pci_epf);
    INIT_LIST_HEAD(&epc->pci_epf);
    device_initialize(&epc->dev);
    -dma_set_coherent_mask(&epc->dev, dev->coherent_dma_mask);
    epc->dev.class = pci_epc_class;
    -epc->dev.dma_mask = dev->dma_mask;
    epc->dev.parent = dev;
    epc->ops = ops;

--- linux-4.15.0.orig/drivers/pci/endpoint/pci-epc-mem.c
+++ linux-4.15.0/drivers/pci/endpoint/pci-epc-mem.c
@@ -90,6 +90,7 @@
    mem->page_size = page_size;
    mem->pages = pages;
    mem->size = size;
mutex_init(&mem->lock);

epc->mem = mem;

phys_addr_t *phys_addr, size_t size) {
  int pageno;
  void __iomem *virt_addr;
  struct pci_epc_mem *mem = epc->mem;
  unsigned int page_shift = ilog2(mem->page_size);
  int order;

  page_addr = bitmap_find_free_region(mem->bitmap, mem->pages, order);
  if (pageno < 0)
    return NULL;
  goto ret;

  *phys_addr = mem->phys_base + (pageno << page_shift);
  virt_addr = ioremap(*phys_addr, size);
  if (!virt_addr)
    bitmap_release_region(mem->bitmap, pageno, order);

 (mutex_lock(&mem->lock);
  bitmap_release_region(mem->bitmap, pageno, order);
(mutex_unlock(&mem->lock);

 EXPORT_SYMBOL_GPL(pci_epc_mem_alloc_addr);

EXPORT_SYMBOL_GPL(pci_epc_mem_free_addr);

--- linux-4.15.0.orig/drivers/pci/endpoint/pci-epf-core.c
+++ linux-4.15.0/drivers/pci/endpoint/pci-epf-core.c
@@ -99,7 +99,7 @@
 *phys_addr = mem->phys_base + (pageno << page_shift);
 virt_addr = ioremap(*phys_addr, size);
 if (!virt_addr)
     bitmap_release_region(mem->bitmap, pageno, order);
(mutex_unlock(&mem->lock);

 EXPORT_SYMBOL_GPL(pci_epc_mem_free_addr);


void pci_epf_free_space(struct pci_epf *epf, void *addr, enumpci_barno bar)
\{ 
-struct device *dev = &epf->dev; 
+struct device *dev = epf->epc->dev.parent; 

if (!addr) 
return; 
@@ -122,7 +122,7 @@
void *pci_epf_alloc_space(struct pci_epf *epf, size_t size, enum pci_barno bar) 
{ 
 void *space; 
-struct device *dev = &epf->dev; 
+struct device *dev = epf->epc->dev.parent; 
dma_addr_t phys_addr; 

if (size < 128) 
--- linux-4.15.0.orig/drivers/pci/host/pci-aardvark.c 
+++ linux-4.15.0/drivers/pci/host/pci-aardvark.c 
@@ -32,6 +32,7 @@
#define PCIE_CORE_DEV_CTRL_STATS_MAX_PAYLOAD_SZ_SHIFT5 
#define PCIE_CORE_DEV_CTRL_STATS_SNOOP_DISABLE(0 << 11) 
#define PCIE_CORE_DEV_CTRL_STATS_MAX_RD_REQ_SIZE_SHIFT12 
+#define PCIE_CORE_DEV_CTRL_STATS_MAX_RD_REQ_SZ0x2 
#define PCIE_CORE_LINK_CTRL_STAT_REG0xd0 
#define PCIE_CORE_LINK_LOS_ENTRYBIT(0) 
#define PCIE_CORE_LINK_TRAININGBIT(5) 
@@ -54,7 +55,8 @@
#define PIO_COMPLETION_STATUS_ANR1 
#define PIO_COMPLETION_STATUS_CNRS2 
#define PIO_COMPLETION_STATUS_CA4 
-#define PIO_NON_POSTED_REQBIT(0) 
+#define PIO_NON_POSTED_REQBIT(10) 
+#define PIO_ERR_STATUSBIT(11) 
#define PIO_ADDR_LS(PIO_BASE_ADDR + 0x8) 
#define PIO_ADDR_MSI(PIO_BASE_ADDR + 0xc) 
#define PIO_WR_DATA(PIO_BASE_ADDR + 0x10) 
@@ -103,7 +105,8 @@
#define PCIE_ISR1_MASK_REG(CONTROL_BASE_ADDR + 0x4C) 
#define PCIE_ISR1_POWER_STATE_CHANGEBIT(4) 
#define PCIE_ISR1_FLUSHBIT(5) 
-#define PCIE_ISR1_ALL_MASKGENMASK(5, 4) 
+#define PCIE_ISR1_INTX_ASSERT(val)BIT(8 + (val)) 
+#define PCIE_ISR1_ALL_MASKGENMASK(11, 4) 
#define PCIE_MSI_ADDR_LOW_REG(CONTROL_BASE_ADDR + 0x50) 
#define PCIE_MSI_ADDR_HIGH_REG(CONTROL_BASE_ADDR + 0x54) 
#define PCIE_MSI_STATUS_REG(CONTROL_BASE_ADDR + 0x58) 
@@ -175,8 +178,6 @@
#define PCIE_CONFIG_WR_TYPE0(0xa) 
#define PCIE_CONFIG_WR_TYPE1(0xb) 

---
/* PCI_BDF shifts 8bit, so we need extra 4bit shift */
#define PCIE_BDF(dev)(dev << 4)
#define PCIE_CONF_BUS(bus)(((bus) & 0xfff) << 20)
#define PCIE_CONF_DEV(dev)(((dev) & 0x1f) << 15)
#define PCIE_CONF_FUNC(fun)(((fun) & 0x7) << 12)
@@ -185,7 +186,8 @@
(PCIE_CONF_BUS(bus) | PCIE_CONF_DEV(PCI_SLOT(devfn)) | 
PCIE_CONF_FUNC(PCI_FUNC(devfn)) | PCIE_CONF_REG(where))

#define PIO_TIMEOUT_MS			1
+#define PIO_RETRY_CNT		750000 /* 1.5 s */
+#define PIO_RETRY_DELAY		2 /* 2 us */

#define LINK_WAIT_MAX_RETRIES10
#define LINK_WAIT_USLEEP_MIN900000
@@ -199,6 +201,7 @@
struct list_head resources;
struct irq_domain *irq_domain;
struct irq_chip irq_chip;
+raw_spinlock_t irq_lock;
struct irq_domain *msi_domain;
struct irq_domain *msi_inner_domain;
struct irq_chip msi_bottom_irq_chip;
@@ -299,7 +302,8 @@
reg = PCIE_CORE_DEV_CTRL_STATS_RELAX_ORDER_DISABLE | 
(7 << PCIE_CORE_DEV_CTRL_STATS_MAX_PAYLOAD_SZ_SHIFT) | 
PCIE_CORE_DEV_CTRL_STATS_SNOOP_DISABLE | 		(PCIE_CORE_DEV_CTRL_STATS_MAX_RD_REQ_SZ << 		PCIE_CORE_DEV_CTRL_STATS_MAX_RD_REQ_SIZE_SHIFT); 
advk_writel(pcie, reg, PCIE_CORE_DEV_CTRL_STATS_REG);
/* Program PCIe Control 2 to disable strict ordering */
@@ -364,10 +368,6 @@
advk_pcie_wait_for_link(pcie);

-reg = PCIE_CORE_LINK_L0S_ENTRY | 
-(1 << PCIE_CORE_LINK_WIDTH_SHIFT);
-advk_writel(pcie, reg, PCIE_CORE_LINK_CTRL_STAT_REG);
-
reg = advk_readl(pcie, PCIE_CORE_CMD_STATUS_REG);
reg |= PCIE_CORE_CMD_MEM_ACCESS_EN | 
PCIE_CORE_CMD_IO_ACCESS_EN |
@@ -375,7 +375,7 @@
advk_writel(pcie, reg, PCIE_CORE_CMD_STATUS_REG);
}
-static void advk_pcie_check_pio_status(struct advk_pcie *pcie)
+static int advk_pcie_check_pio_status(struct advk_pcie *pcie, u32 *val)
{
    struct device *dev = &pcie->pdev->dev;
    u32 reg;
    @ @ -386.14 +386.49 @@
    status = (reg & PIO_COMPLETION_STATUS_MASK) >>
    PIO_COMPLETION_STATUS_SHIFT;

    -if (!status)
    -return;
    -
    +/*
    + * According to HW spec, the PIO status check sequence as below:
    + * 1) even if COMPLETION_STATUS(bit9:7) indicates successful,
    + * it still needs to check Error Status(bit11), only when this bit
    + * indicates no error happen, the operation is successful.
    + * 2) value Unsupported Request(1) of COMPLETION_STATUS(bit9:7) only
    + * means a PIO write error, and for PIO read it is successful with
    + * a read value of 0xFFFFFFFF.
    + * 3) value Completion Retry Status(CRS) of COMPLETION_STATUS(bit9:7)
    + * only means a PIO write error, and for PIO read it is successful
    + * with a read value of 0xFFFF0001.
    + * 4) value Completer Abort (CA) of COMPLETION_STATUS(bit9:7) means
    + * error for both PIO read and PIO write operation.
    + * 5) other errors are indicated as 'unknown'.
    + */
    switch (status) {
    +case PIO_COMPLETION_STATUS_OK:
    +if (reg & PIO_ERR_STATUS) {
    +    strcomp_status = "COMP_ERR";
    +    break;
    +}
    +/* Get the read result */
    +if (val)
    +*val = advk_readl(pcie, PIO_RD_DATA);
    +/* No error */
    +strcomp_status = NULL;
    +break;
    case PIO_COMPLETION_STATUS_UR:
    strcomp_status = "UR";
    break;
    case PIO_COMPLETION_STATUS_CRS:
    +/* PCIe r4.0, sec 2.3.2, says:
    + * If CRS Software Visibility is not enabled, the Root Complex
    + * must re-issue the Configuration Request as a new Request.
    + * A Root Complex implementation may choose to limit the number
    + * of attempts. */
    break;
+ * of Configuration Request/CRS Completion Status loops before 
+ * determining that something is wrong with the target of the 
+ * Request and taking appropriate action, e.g., complete the 
+ * Request to the host as a failed transaction.
+ *
+ * To simplify implementation do not re-issue the Configuration 
+ * Request and complete the Request as a failed transaction.
+ */
strcomp_status = "CRS";
break;
case PIO_COMPLETION_STATUS_CA:
    // -404,6 +439,9 @@
break;
}

+if (!strcomp_status)
+return 0;
+
if (reg & PIO_NON_POSTED_REQ)
    str_posted = "Non-posted";
else
    // -411,28 +449,58 @@

dev_err(dev, "%s PIO Response Status: %s, %x @ %x\n", 
str_posted, strcomp_status, reg, advk_readl(pcie, PIO_ADDR_LS));
+
+return -EFAULT;
}

static int advk_pcie_wait_pio(struct advk_pcie *pcie)
{
    struct device *dev = &pcie->pdev->dev;
    -unsigned long timeout;
    -
    -timeout = jiffies + msecs_to_jiffies(PIO_TIMEOUT_MS);
    +int i;

    -while (time_before(jiffies, timeout)) {
    +for (i = 0; i < PIO_RETRY_CNT; i++) {
        u32 start, isr;

        start = advk_readl(pcie, PIO_START);
        isr = advk_readl(pcie, PIO_ISR);
        if (!start && isr)
            return 0;
        +udelay(PIO_RETRY_DELAY);
    }
}
dev_err(dev, "config read/write timed out\n");
+dev_err(dev, "PIO read/write transfer time out\n");
return -ETIMEDOUT;
}

+static bool advk_pcie_pio_is_running(struct advk_pcie *pcie)
+{
+struct device *dev = &pcie->pdev->dev;
+
+/*
+ * Trying to start a new PIO transfer when previous has not completed
+ * cause External Abort on CPU which results in kernel panic:
+ */
+ * SError Interrupt on CPU0, code 0xbf000002 -- SError
+ * Kernel panic - not syncing: Asynchronous SError Interrupt
+ */
+ * Functions advk_pcie_rd_conf() and advk_pcie_wr_conf() are protected
+ * by raw_spin_lock_irqsave() at pci_lock_config() level to prevent
+ * concurrent calls at the same time. But because PIO transfer may take
+ * about 1.5s when link is down or card is disconnected, it means that
+ * advk_pcie_wait_pio() does not always have to wait for completion.
+ */
+ * Some versions of ARM Trusted Firmware handles this External Abort at
+ * EL3 level and mask it to prevent kernel panic. Relevant TF-A commit:
+ */
+ * https://git.trustedfirmware.org/TF-A/trusted-firmware-a.git/commit/?id=3c7dcdac5c50
+ */
+if (advk_readl(pcie, PIO_START)) {
+dev_err(dev, "Previous PIO read/write transfer is still running\n");
+return true;
+}
+
+return false;
+
static int advk_pcie_rd_conf(struct pci_bus *bus, u32 devfn,
    int where, int size, u32 *val)
{
    u32 reg;
    int ret;

    -if (PCI_SLOT(devfn) != 0) {
+if (((bus->number == pcie->root_bus_nr) && PCI_SLOT(devfn) != 0) {
        *val = 0xffffffff;
        return PCIBIOS_DEVICE_NOT_FOUND;
    }

    /* Start PIO */
-advk_writel(pcie, 0, PIO_START);
-advk_writel(pcie, 1, PIO_ISR);
+if (advk_pcie_pio_is_running(pcie)) {
  +*val = 0xffffffff;
  +return PCIBIOS_SET_FAILED;
+}

/* Program the control register */
reg = advk_readl(pcie, PIO_CTRL);
@@ -459,24 +528,28 @@
advk_writel(pcie, reg, PIO_CTRL);

/* Program the address registers */
-reg = PCIE_BDF(devfn) | PCIE_CONF_REG(where);
+reg = PCIE_CONF_ADDR(bus->number, devfn, where);
advk_writel(pcie, reg, PIO_ADDR_LS);
advk_writel(pcie, 0, PIO_ADDR_MS);

/* Program the data strobe */
advk_writel(pcie, 0xf, PIO_WR_DATA_STRB);

/* Start the transfer */
+/* Clear PIO DONE ISR and start the transfer */
+advk_writel(pcie, 1, PIO_ISR);
advk_writel(pcie, 1, PIO_START);

ret = advk_pcie_wait_pio(pcie);
if (ret < 0)
  return PCIBIOS_SET_FAILED;

-advk_pcie_check_pio_status(pcie);
+/* Check PIO status and get the read result */
+ret = advk_pcie_check_pio_status(pcie, val);
+if (ret < 0) {
  +*val = 0xffffffff;
  +return PCIBIOS_SET_FAILED;
+}

/* Get the read result */
-*val = advk_readl(pcie, PIO_RD_DATA);
  if (size == 1)
    *val = (*val >> (8 * (where & 3))) & 0xff;
  else if (size == 2)
@@ -494,15 +567,14 @@
    int offset;
    int ret;

  -if (PCI_SLOT(devfn) != 0)
+if ((bus->number == pcie->root_bus_nr) &\& PCI_SLOT(devfn) != 0)
return PCIBIOS_DEVICE_NOT_FOUND;

if (where % size)
return PCIBIOS_SET_FAILED;

-/* Start PIO */
-advk_writel(pcie, 0, PIO_START);
-advk_writel(pcie, 1, PIO_ISR);
+if (advk_pcie_pio_is_running(pcie))
+return PCIBIOS_SET_FAILED;

/* Program the control register */
reg = advk_readl(pcie, PIO_CTRL);
@@ -529,14 +601,17 @@
/* Program the data strobe */
advk_writel(pcie, data_strobe, PIO_WR_DATA_STRB);

-/* Start the transfer */
+/* Clear PIO DONE ISR and start the transfer */
+advk_writel(pcie, 1, PIO_ISR);
advk_writel(pcie, 1, PIO_START);

ret = advk_pcie_wait_pio(pcie);
if (ret < 0)
return PCIBIOS_SET_FAILED;

-advk_pcie_check_pio_status(pcie);
+ret = advk_pcie_check_pio_status(pcie, NULL);
+if (ret < 0)
+return PCIBIOS_SET_FAILED;

return PCIBIOS_SUCCESSFUL;
}
@@ -610,22 +685,28 @@
{
struct advk_pcie *pcie = d->domain->host_data;
irq_hw_number_t hwirq = irqd_to_hwirq(d);
+unsigned long flags;
u32 mask;

-mask = advk_readdl(pcie, PCIE_ISR0_MASK_REG);
-mask |= PCIE_ISR0_INTX_ASSERT(hwirq);
-advk_writel(pcie, mask, PCIE_ISR0_MASK_REG);
+raw_spin_lock_irqsave(&pcie->irq_lock, flags);
+mask = advk_readdl(pcie, PCIE_ISR1_MASK_REG);
+mask |= PCIE_ISR1_INTX_ASSERT(hwirq);
+advk_writel(pcie, mask, PCIE_ISR1_MASK_REG);
+raw_spin_unlock_irqrestore(&pcie->irq_lock, flags);
}

static void advk_pcie_irq_unmask(struct irq_data *d)
{
  struct advk_pcie *pcie = d->domain->host_data;
  irq_hw_number_t hwirq = irqd_to_hwirq(d);
  +unsigned long flags;
  u32 mask;

  -mask = advk_readl(pcie, PCIE_ISR0_MASK_REG);
  -mask &=-PCIE_ISR0_INTX_ASSERT(hwirq);
  -advk_writel(pcie, mask, PCIE_ISR0_MASK_REG);
  +raw_spin_lock_irqsave(&pcie->irq_lock, flags);
  +mask = advk_readl(pcie, PCIE_ISR1_MASK_REG);
  +mask &=-PCIE_ISR1_INTX_ASSERT(hwirq);
  +advk_writel(pcie, mask, PCIE_ISR1_MASK_REG);
  +raw_spin_unlock_irqrestore(&pcie->irq_lock, flags);
}

static int advk_pcie_irq_map(struct irq_domain *h,
@@ -708,6 +789,8 @@
  struct device_node *pcie_intc_node;
  struct irq_chip *irq_chip;

  +raw_spin_lock_init(&pcie->irq_lock);
  +
  pcie_intc_node = of_get_next_child(node, NULL);
  if (!pcie_intc_node) {
    dev_err(dev, "No PCIe Intc node found\n");
@@ -768,29 +851,35 @@

  static void advk_pcie_handle_int(struct advk_pcie *pcie)
  {
    -u32 val, mask, status;
    +u32 isr0_val, isr0_mask, isr0_status;
    +u32 isr1_val, isr1_mask, isr1_status;
    int i, irq;

    -val = advk_readl(pcie, PCIE_ISR0_REG);
    -mask = advk_readl(pcie, PCIE_ISR0_MASK_REG);
    -status = val & ((~mask) & PCIE_ISR0_ALL_MASK);
    -
    -if (!status) {
    -advk_writel(pcie, val, PCIE_ISR0_REG);
    +isr0_val = advk_readl(pcie, PCIE_ISR0_REG);
    +isr0_mask = advk_readl(pcie, PCIE_ISR0_MASK_REG);
    +isr0_status = isr0_val & ((~isr0_mask) & PCIE_ISR0_ALL_MASK);
ISR1_val = advk_readl(pcie, PCIE_ISR1_REG);
ISR1_mask = advk_readl(pcie, PCIE_ISR1_MASK_REG);
ISR1_status = ISR1_val & ((~ISR1_mask) & PCIE_ISR1_ALL_MASK);

if (!ISR0_status && !ISR1_status) {
    advk_writel(pcie, ISR0_val, PCIE_ISR0_REG);
    advk_writel(pcie, ISR1_val, PCIE_ISR1_REG);
    return;
}

/* Process MSI interrupts */
if (status & PCIE_ISR0_MSI_INT_PENDING)
    advk_pcie_handle_msi(pcie);

/* Process legacy interrupts */
for (i = 0; i < PCI_NUM_INTX; i++) {
    if (!(status & PCIE_ISR0_INTX_ASSERT(i)))
        continue;
    advk_writel(pcie, PCIE_ISR0_INTX_ASSERT(i),
                PCIE_ISR0_REG);
}

virq = irq_find_mapping(pcie->irq_domain, i);
generic_handle_irq(virq);

err = pci_remap_iospace(res, iobase);
if (err) {
    dev_warn(dev, "error %d: failed to map resource %pR",
             res, res);
}

bus = bridge->bus;

pci_bus_size_bridges(bus);
pci_bus_assign_resources(bus);

list_for_each_entry(child, &bus->children, node)
irq = of_irq_get(intc, 0);
if (irq <= 0) {
    dev_err(p->dev, "failed to get parent IRQ\n");
    +of_node_put(intc);
    return irq ?: -EINVAL;
}

p->irqdomain = irq_domain_add_linear(intc, PCI_NUM_INTX,
    &faraday_pci_irqdomain_ops, p);
+of_node_put(intc);
if (!p->irqdomain) {
    dev_err(p->dev, "failed to create Gemini PCI IRQ domain\n");
    return -EINVAL;
}

switch (resource_type(res)) {
case IORESOURCE_IO:
    -err = pci_remap_iospace(res, iobase);
    +err = devm_pci_remap_iospace(dev, res, iobase);
    if (err) {
        dev_warn(dev, "error %d: failed to map resource %pR\n",
            err, res);
    }
    --- linux-4.15.0.orig/drivers/pci/host/pci-host-common.c
    +++ linux-4.15.0/drivers/pci/host/pci-host-common.c
    @@ -499,7 +501,7 @@
    dev_err(dev, "illegal IO mem size\n");
    return -EINVAL;
    }
    -ret = pci_remap_iospace(io, io_base);
    +ret = devm_pci_remap_iospace(dev, io, io_base);
    if (ret) {
        dev_warn(dev, "error %d: failed to map resource %pR\n",
            ret, io);
}
+/* space for 32bit serial number as string */
+#define SLOT_NAME_SIZE 11
+
/*
 * Message Types
 */
@@ -457,7 +461,6 @@
 spinlock_t device_list_lock;/* Protect lists below */
 void __iomem *cfg_addr;

-struct semaphore enum_sem;
 struct list_head resources_for_children;

 struct list_head children;
 @@ -471,6 +474,8 @@
 struct retarget_msi_interrupt retarget_msi_interrupt_params;

 spinlock_t retarget_msi_interrupt_lock;
 +
 +struct workqueue_struct *wq;
 
 /*
 @@ -513,6 +518,7 @@
 struct list_head list_entry;
 refcount_t refs;
 enum hv_pcichild_state state;
+struct pci_slot *pci_slot;
 struct pci_function_description desc;
 bool reported_missing;
 struct hv_pcibus_device *hbus;
 @@ -530,6 +536,8 @@
 s32 completion_status;
 
+static void hv_pci_onchannelcallback(void *context);
 +
 /*
 * hv_pci_generic_compl() - Invoked for a completion packet
 * @context: Set up by the sender of the packet.
 @@ -563,6 +571,26 @@
 static void get_hvpcibus(struct hv_pcibus_device *hv_pcibus);
 static void put_hvpcibus(struct hv_pcibus_device *hv_pcibus);

+/*
 + * There is no good way to get notified from vmbus_onoffer_rescind(),
 + * so let's use polling here, since this is not a hot path.
 + */
+static int wait_for_response(struct hv_device *hdev,  
+    struct completion *comp)  
+{  
+while (true) {  
+if (hdev->channel->rescind) {  
+dev_warn_once(&hdev->device, "The device is gone.");  
+return -ENODEV;  
+}  
+  
+  if (wait_for_completion_timeout(comp, HZ / 10))  
+break;  
+}  
+  
+return 0;  
+}  
+

/**  
* devfn_to_wslot() - Convert from Linux PCI slot to Windows  
* @devfn: The Linux representation of PCI slot  
@@ -663,7 +691,7 @@  
break;  
}  
*/  
/*  
- * Make sure the write was done before we release the spinlock  
+ * Make sure the read was done before we release the spinlock  
* allowing consecutive reads/writes.  
*/  
mb();  
@@ -674,6 +702,31 @@  
}  
}

+/**  
* hv_pcifront_get_vendor_id() - Get vendor ID from Windows PCI slot  
* @hpdev: The Windows representation of PCI slot  
*/  
static u16 hv_pcifront_get_vendor_id(struct hv_pci_dev *hpdev)  
+{  
+u16 ret;  
+unsigned long flags;  
+void __iomem *addr = hpdev->hbus->cfg_addr + CFG_PAGE_OFFSET +  
+    PCI_VENDOR_ID;  
+spin_lock_irqsave(&hpdev->hbus->config_lock, flags);  
+  
+/* Choose the function to be read. (See comment above) */  
+write(l(hpdev->desc.win_slot.slot, hpdev->hbus->cfg_addr));  
+/* Make sure the function was chosen before we start reading. */  
+mb();  
+/* Read from that function's config space. */  
+ret = readw(addr);  
+*/
/* mb() is not required here, because the spin_unlock_irqrestore()
 * is a barrier.
 */
+
+spin_unlock_irqrestore(&hpdev->hbus->config_lock, flags);
+
+return ret;
+
/**
 * _hv_pcifront_write_config() - Internal PCI config write
 * @hpdev:	The PCI driver's representation of the device
 **@
@@ -1039,6 +1092,7 @@
 struct pci_bus *pbus;
 struct pci_dev *pdev;
 struct cpumask *dest;
+unsigned long flags;
 struct compose_comp_ctxt comp;
 struct tran_int_desc *int_desc;
 struct {
@@ -1116,8 +1170,38 @@
 * Since this function is called with IRQ locks held, can't
 * do normal wait for completion; instead poll.
 */
-while (!try_wait_for_completion(&comp.comp_pkt.host_event))
+while (!try_wait_for_completion(&comp.comp_pkt.host_event)) {
+/* 0xFFFF means an invalid PCI VENDOR ID. */
+if (hv_pcifront_get_vendor_id(hpdev) == 0xFFFF) {
+    dev_err_once(&hbus->hdev->device,
+        "the device has gone\n");
+    goto free_int_desc;
+}  
+
+/* When the higher level interrupt code calls us with
+ * interrupt disabled, we must poll the channel by calling
+ * the channel callback directly when channel->target_cpu is
+ * the current CPU. When the higher level interrupt code
+ * calls us with interrupt enabled, let's add the
+ * local_irq_save()/restore() to avoid race:
+ * hv_pci_onchannelcallback() can also run in tasklet.
+ */
+local_irq_save(flags);
+
+if (hbus->hdev->channel->target_cpu == smp_processor_id())
+hv_pci_onchannelcallback(hbus);
+
+local_irq_restore(flags);
+ if (hpdev->state == hv_pcichild_ejecting) {
+ dev_err_once(&hbus->hdev->device,
+ "the device is being ejected\n");
+ goto free_int_desc;
+ }
+
+ udelay(100);
+
+ if (comp.comp_pkt.completion_status < 0) {
+ dev_err(&hbus->hdev->device,
+ spin_unlock_irqrestore(&hbus->device_list_lock, flags);
+ }
+
+ /*
+ * Assign entries in sysfs pci slot directory.
+ *
+ * Note that this function does not need to lock the children list
+ * because it is called from pci_devices_present_work which
+ * is serialized with hv_eject_device_work because they are on the
+ * same ordered workqueue. Therefore hbus->children list will not change
+ * even when pci_create_slot sleeps.
+ */
+ static void hv_pci_assign_slots(struct hv_pcibus_device *hbus)
+ {
+ struct hv_pci_dev *hpdev;
+ char name[SLOT_NAME_SIZE];
+ int slot_nr;
+ list_for_each_entry(hpdev, &hbus->children, list_entry) {
+ if (hpdev->pci_slot)
+ continue;
+ 
+ slot_nr = PCI_SLOT(wslot_to_devfn(hpdev->desc.win_slot.slot));
+ snprintf(name, SLOT_NAME_SIZE, "%u", hpdev->desc.ser);
+ hpdev->pci_slot = pci_create_slot(hbus->pci_bus, slot_nr,
+ name, NULL);
+ if (!hpdev->pci_slot)
+ pr_warn("pci_create slot %s failed\n", name);
+ }
+ }
+
+ /*
+ * Remove entries in sysfs pci slot directory.
+ */
+ static void hv_pci_remove_slots(struct hv_pcibus_device *hbus)
+{
+struct hv_pci_dev *hpdev;
+
+list_for_each_entry(hpdev, &hbus->children, list_entry) {
+if (!hpdev->pci_slot)
+continue;
+pci_destroy_slot(hpdev->pci_slot);
+hpdev->pci_slot = NULL;
+}
+}
+
/**
 * create_root_hv_pci_bus() - Expose a new root PCI bus
 * @hbus: Root PCI bus, as understood by this driver
@@ -1419,6 +1546,7 @@
pci_lock_rescan_remove();
pci_scan_child_bus(hbus->pci_bus);
pci_bus_assign_resources(hbus->pci_bus);
+hv_pci_assign_slots(hbus);
pci_bus_add_devices(hbus->pci_bus);
pci_unlock_rescan_remove();
hbus->state = hv_pcibus_installed;
@@ -1521,24 +1649,14 @@
if (ret)
goto error;

-wait_for_completion(&comp_pkt.host_event);
+if (wait_for_response(hbus->hdev, &comp_pkt.host_event))
+goto error;

hpdev->desc = *desc;
refcount_set(&hpdev->refs, 1);
get_pcichild(hpdev, hv_pcidev_ref_childlist);
spin_lock_irqsave(&hbus->device_list_lock, flags);

-/*
- * When a device is being added to the bus, we set the PCI domain
- * number to be the device serial number, which is non-zero and
- * unique on the same VM. The serial numbers start with 1, and
- * increase by 1 for each device. So device names including this
- * can have shorter names than based on the bus instance UUID.
- * Only the first device serial number is used for domain, so the
- * domain number will not change after the first device is added.
- */
-if (list_empty(&hbus->children))
-hbus->sysdata.domain = desc->ser;
list_add_tail(&hpdev->list_entry, &hbus->children);
spin_unlock_irqrestore(&hbus->device_list_lock, flags);
return hpdev;
@@ -1600,12 +1718,8 @@
 * It must also treat the omission of a previously observed device as
 * notification that the device no longer exists.
 *
- * Note that this function is a work item, and it may not be
- * invoked in the order that it was queued. Back to back
- * updates of the list of present devices may involve queuing
- * multiple work items, and this one may run before ones that
- * were sent later. As such, this function only does something
- * if is the last one in the queue.
+ * Note that this function is serialized with hv_eject_device_work(),
+ * because both are pushed to the ordered workqueue hbus->wq.
 */
static void pci_devices_present_work(struct work_struct *work)
{
@@ -1626,11 +1740,6 @@
 INIT_LIST_HEAD(&removed);

 -if (down_interruptible(&hbus->enum_sem)) {
-put_hvpcibus(hbus);
-return;
-}
-/* Pull this off the queue and process it if it was the last one. */
spin_lock_irqsave(&hbus->device_list_lock, flags);
while (!list_empty(&hbus->dr_list)) {
@@ -1647,7 +1756,6 @@
 spin_unlock_irqrestore(&hbus->device_list_lock, flags);

 if (!dr) {
@@ -1711,6 +1819,10 @@
hpdev = list_first_entry(&removed, struct hv_pci_dev,
 list_entry);
list_del(&hpdev->list_entry);
+if (hpdev->pci_slot)
+pci_destroy_slot(hpdev->pci_slot);
+put_pcichild(hpdev, hv_pcidev_ref_initial);
}
pci_lock_rescan_remove();
pci_scan_child_bus(hbus->pci_bus);
+hv_pci_assign_slots(hbus);
pci_unlock_rescan_remove();
break;

@@ -1734,7 +1847,6 @@
break;
}
-up(&hbus->enum_sem);
put_hvpcibus(hbus);
kfree(dr);
}
@@ -1753,6 +1865,7 @@
struct hv_dr_state *dr;
struct hv_dr_work *dr_wrk;
unsigned long flags;
+bool pending_dr;

dr_wrk = kzalloc(sizeof(*dr_wrk), GFP_NOWAIT);
if (!dr_wrk)
@@ -1776,11 +1889,21 @@
}
spin_lock_irqsave(&hbus->device_list_lock, flags);
+/*
+ * If pending_dr is true, we have already queued a work,
+ * which will see the new dr. Otherwise, we need to
+ * queue a new work.
+ */
+pending_dr = !list_empty(&hbus->dr_list);
list_add_tail(&dr->list_entry, &hbus->dr_list);
spin_unlock_irqrestore(&hbus->device_list_lock, flags);

-get_hvpcibus(hbus);
-schedule_work(&dr_wrk->wrk);
+if (pending_dr) {
+kfree(dr_wrk);
+} else {
+get_hvpcibus(hbus);
+queue_work(hbus->wq, &dr_wrk->wrk);
+}
}

/**
@@ -1795,6 +1918,7 @@
static void hv_eject_device_work(struct work_struct *work)
{
    struct pci_eject_response *ejct_pkt;
    +struct hv_pcibus_device *hbus;
    struct hv_pci_dev *hpdev;
    struct pci_dev *pdev;
    unsigned long flags;
    ctxt;
    hpdev = container_of(work, struct hv_pci_dev, wrk);
    +hbus = hpdev->hbus;

    -if (hpdev->state != hv_pcichild_ejecting) {
        -put_pcichild(hpdev, hv_pcidev_ref_pnp);
        -return;
    }
    +WARN_ON(hpdev->state != hv_pcichild_ejecting);
    /*
     * Ejection can come before or after the PCI bus has been set up, so
     @ @ -1818.8 +1940.7 @ @
     * because hbus->pci_bus may not exist yet.
     */
    wslot = wslot_to_devfn(hpdev->desc.win_slot.slot);
    -pdev = pci_get_domain_bus_and_slot(hpdev->hbus->sysdata.domain, 0,
     -wslot);
    +pdev = pci_get_domain_bus_and_slot(hbus->sysdata.domain, 0, wslot);
    if (pdev) {
        pci_lock_rescan_remove();
        pci_stop_and_remove_bus_device(pdev);
        @ @ -1827.21 +1948.27 @ @
        pci_unlock_rescan_remove();
    }

    -spin_lock_irqsave(&hpdev->hbus->device_list_lock, flags);
    +spin_lock_irqsave(&hbus->device_list_lock, flags);
    list_del(&hpdev->list_entry);
    -spin_unlock_irqrestore(&hpdev->hbus->device_list_lock, flags);
    +spin_unlock_irqrestore(&hbus->device_list_lock, flags);
    +if (hpdev->pci_slot)
        +pci_destroy_slot(hpdev->pci_slot);
    memset(&ctxt, 0, sizeof(ctxt));
    ejct_pkt = (struct pci_eject_response *)&ctxt.pkt.message;
    ejct_pkt->message_type.type = PCI_EJECTION_COMPLETE;
    ejct_pkt->wslot.slot = hpdev->desc.win_slot.slot;
void vmbus_sendpacket(hpdev->hbus->channel, ejct_pkt,
    sizeof(*ejct_pkt), (unsigned long)&ctxt.pkt,
    VM_PKT_DATA_INBAND, 0);

put_pcichild(hpdev, hv_pcidev_ref_childlist);
+put_pcichild(hpdev, hv_pcidev_ref_initial);
put_pcichild(hpdev, hv_pcidev_ref_pnp);
-put_hvpcibus(hpdev->hbus);
+
+/* hpdev has been freed. Do not use it any more. */
+put_hvpcibus(hbus);
}

/**
@@ -1858,7 +1985,7 @@
get_pcichild(hpdev, hv_pcidev_ref_pnp);
INIT_WORK(&hpdev->wrk, hv_eject_device_work);
get_hvpcibus(hpdev->hbus);
-schedule_work(&hpdev->wrk);
+queue_work(hpdev->hbus->wq, &hpdev->wrk);
} }

/**
@@ -2025,15 +2152,16 @@
    sizeof(struct pci_version_request),
    (unsigned long)pkt, VM_PKT_DATA_INBAND,
    VMBUS_DATA_PACKET_FLAG_COMPLETION_REQUESTED);
+if (!ret)
+ret = wait_for_response(hdev, &comp_pkt.host_event);
+if (ret) {
    dev_err(&hdev->device,
        "PCI Pass-through VSP failed sending version request: %#x",
        "PCI Pass-through VSP failed to request version: %d",
        ret);
    goto exit;
} }

-wait_for_completion(&comp_pkt.host_event);
-
if (comp_pkt.completion_status >= 0) {
    pci_protocol_version = pci_protocol_versions[i];
    dev_info(&hdev->device,
        @ @ -2242,11 +2370,12 @ @
    ret = vmbus_sendpacket(hdev->channel, d0_entry, sizeof(*d0_entry),
        (unsigned long)pkt, VM_PKT_DATA_INBAND,
        VMBUS_DATA_PACKET_FLAG_COMPLETION_REQUESTED);
if (!ret)
ret = wait_for_response(hdev, &comp_pkt.host_event);
+
if (ret)
goto exit;

-wait_for_completion(&comp_pkt.host_event);
-
if (comp_pkt.completion_status < 0) {
dev_err(&hdev->device,
"PCI Pass-through VSP failed D0 Entry with status %x\n",
@@ -2286,11 +2415,10 @@
ret = vmbus_sendpacket(hdev->channel, &message, sizeof(message),
   0, VM_PKT_DATA_INBAND, 0);
-if (ret)
-return ret;
+if (!ret)
+ret = wait_for_response(hdev, &comp);

-wait_for_completion(&comp);
-return 0;
+-return ret;
}

/**
@@ -2360,11 +2488,11 @@
size_res, (unsigned long)pkt,
VM_PKT_DATA_INBAND,
VMBUS_DATA_PACKET_FLAG_COMPLETION_REQUESTED);
+if (!ret)
+ret = wait_for_response(hdev, &comp_pkt.host_event);
if (ret)
break;

-wait_for_completion(&comp_pkt.host_event);
-
if (comp_pkt.completion_status < 0) {
   ret = -EPROTO;
dev_err(&hdev->device,
@@ -2471,13 +2599,18 @@
spin_lock_init(&hbus->config_lock);
spin_lock_init(&hbus->device_list_lock);
spin_lock_init(&hbus->retarget_msi_interrupt_lock);
-sema_init(&hbus->enum_sem, 1);
init_completion(&hbus->remove_event);
+hbus->wq = alloc_ordered_workqueue("hv_pci_%x", 0,
+ hbus->sysdata.domain);
+if (!hbus->wq) {
+ret = -ENOMEM;
+goto free_bus;
+}

ret = vmbus_open(hdev->channel, pci_ring_size, pci_ring_size, NULL, 0,
    hv_pci_onchannelcallback, hbus);
if (ret)
-goto free_bus;
+goto destroy_wq;

hv_set_drvdata(hdev, hbus);

@@ -2546,6 +2679,8 @@
    hv_free_config_window(hbus);
    close:
    vmbus_close(hdev->channel);
    +destroy_wq:
    +destroy_workqueue(hbus->wq);
    free_bus:
    free_page((unsigned long)hbus);
    return ret;
@@ -2508,6 +2743,7 @@
 /* Remove the bus from PCI's point of view. */
    pci_lock_rescan_remove();
    pci_stop_root_bus(hbus->pci_bus);
    +hv_pci_remove_slots(hbus);
    pci_remove_root_bus(hbus->pci_bus);
    pci_unlock_rescan_remove();
    hbus->state = hv_pcibus_removed;
@@ -2625,6 +2761,7 @@
    irq_domain_free_fwnode(hbus->sysdata.fwnode);
    put_hvpcibus(hbus);
    wait_for_completion(&hbus->remove_event);
    +destroy_workqueue(hbus->wq);
    free_page((unsigned long)hbus);
    return 0;
}
--- linux-4.15.0.orig/drivers/pci/host/pci-mvebu.c
+++ linux-4.15.0/drivers/pci/host/pci-mvebu.c
@@ -1220,7 +1220,7 @@
    pcie->realio.start = PCIBIOS_MIN_IO;
    pcie->realio.end = min_t(resource_size_t,
        IO_SPACE_LIMIT,
-       resource_size(&pcie->io));
+       resource_size(&pcie->io) - 1);
} else
    pcie->realio = pcie->io;
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_NVIDIA, 0xe1c, tegra_pcie_fixup_class);
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_NVIDIA, 0xe1d, tegra_pcie_fixup_class);

/* Tegra PCIE requires relaxed ordering */
/* Tegra20 and Tegra30 PCIE requires relaxed ordering */
static void tegra_pcie_relax_enable(struct pci_dev *dev)
{
    pcie_capability_set_word(dev, PCI_EXP_DEVCTL, PCI_EXP_DEVCTL_RELAX_EN);
}
DECLARE_PCI_FIXUP_FINAL(PCI_ANY_ID, PCI_ANY_ID, tegra_pcie_relax_enable);
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_NVIDIA, 0xbf0, tegra_pcie_relax_enable);
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_NVIDIA, 0xbf1, tegra_pcie_relax_enable);
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_NVIDIA, 0xe1c, tegra_pcie_relax_enable);
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_NVIDIA, 0xe1d, tegra_pcie_relax_enable);

static int tegra_pcie_request_resources(struct tegra_pcie *pcie)
{
    err = of_pci_get_devfn(port);
    if (err < 0) {
        dev_err(dev, "failed to parse address: \%d\n", err);
        -return err;
        +goto err_node_put;
    }
    index = PCI_SLOT(err);

    if (index < 1 || index > soc->num_ports) {
        dev_err(dev, "invalid port number: \%d\n", index);
        -return -EINVAL;
        +err = -EINVAL;
        +goto err_node_put;
    }
    index--;
}

if (value > 16) {

dev_err(dev, "invalid # of lanes: \%u\n", value);
- return -EINVAL;
+ err = -EINVAL;
+ goto err_node_put;
}

lanes |= value << (index << 3);
@@ @-2028,13 +2033,15 @@
lane += value;

rp = devm_kzalloc(dev, sizeof(*rp), GFP_KERNEL);
- if (!rp)
- return -ENOMEM;
+ if (!rp) {
+ err = -ENOMEM;
+ goto err_node_put;
+ }

err = of_address_to_resource(port, 0, &rp->regs);
if (err < 0) {
 dev_err(dev, "failed to parse address: \%d\n", err);
- return err;
+ goto err_node_put;
}

INIT_LIST_HEAD(&rp->list);
@@ @-2061,6 +2068,10 @@
return err;

return 0;
+
+err_node_put:
+of_node_put(port);
+return err;
}

/*
--- linux-4.15.0.orig/drivers/pci/host/pci-thunder-ecam.c
+++ linux-4.15.0/drivers/pci/host/pci-thunder-ecam.c
@@ @-119,7 +119,7 @@
 * the config space access window. Since we are working with
 * the high-order 32 bits, shift everything down by 32 bits.
 */
-node_bits = (cfg->res.start >> 32) & (1 << 12);
+node_bits = upper_32_bits(cfg->res.start) & (1 << 12);

v |= node_bits;
set_val(v, where, size, val);
--- linux-4.15.0.orig/drivers/pci/host/pem-thunder-pem.c
+++ linux-4.15.0/drivers/pci/host/pem-thunder-pem.c
@@ -22,6 +22,7 @@
    #include <linux/pci-acpi.h>
    #include <linux/pci-ecam.h>
    #include <linux/platform_device.h>
+#include <linux/io-64-nonatomic-lo-hi.h>
    #include "../pci.h"

#if defined(CONFIG_PCI_HOST_THUNDER_PEM) || (defined(CONFIG_ACPI) &&
 defined(CONFIG_PCI_QUIRKS))
@@ -325,9 +326,9 @@
    /*
     * structure here for the BAR.
     */
-    pem_pci->ea_entry[0] = (u32)bar4_start | 2;
-    pem_pci->ea_entry[1] = (u32)(res_pem->end - bar4_start) & ~3u;
-    pem_pci->ea_entry[2] = (u32)(bar4_start >> 32);
+    pem_pci->ea_entry[0] = lower_32_bits(bar4_start) | 2;
+    pem_pci->ea_entry[1] = lower_32_bits(res_pem->end - bar4_start) & ~3u;
+    pem_pci->ea_entry[2] = upper_32_bits(bar4_start);

    cfg->priv = pem_pci;
    return 0;
@@ -335,9 +336,9 @@
#if defined(CONFIG_ACPI) && defined(CONFIG_PCI_QUIRKS)
-    #define PEM_RES_BASE		0x87e0c0000000UL
-    #define PEM_NODE_MASK		GENMASK(45, 44)
-    #define PEM_INDX_MASK		GENMASK(26, 24)
+    #define PEM_RES_BASE		0x87e0c0000000ULL
+    #define PEM_NODE_MASK		GENMASK_ULL(45, 44)
+    #define PEM_INDX_MASK		GENMASK_ULL(26, 24)
    #define PEM_MIN_DOM_IN_NODE	4
    #define PEM_MAX_DOM_IN_NODE	10
--- linux-4.15.0.orig/drivers/pci/host/pem-v3-semi.c
+++ linux-4.15.0/drivers/pci/host/pem-v3-semi.c
@@ -534,7 +534,7 @@
    v3->io_bus_addr = io->start - win->offset;
    dev_dbg(dev, "I/O window %pR, bus addr %pap
",
    io, &v3->io_bus_addr);
-    ret = pci_remap_iospace(io, io_base);
+    ret = devm_pci_remap_iospace(dev, io, io_base);
    if (ret) {
        dev_warn(dev,
            "error %d: failed to map resource %pR
",
int ret;
LIST_HEAD(res);

-host = pci_alloc_host_bridge(sizeof(*v3));
+host = devm_pci_alloc_host_bridge(dev, sizeof(*v3));
if (!host)
return -ENOMEM;

switch (resource_type(res)) {
case IORESOURCE_IO:
-err = pci_remap_iospace(res, iobase);
+err = devm_pci_remap_iospace(dev, res, iobase);
if (err) {
dev_warn(dev, "error %d: failed to map resource %pR\n",
err, res);
 }
--- linux-4.15.0.orig/drivers/pci/host/pci-versatile.c
+++ linux-4.15.0/drivers/pci/host/pci-versatile.c
@@ -89,7 +89,7 @@
switch (resource_type(res)) {
 case IORESOURCE_IO:
-err = pci_remap_iospace(res, iobase);
+err = devm_pci_remap_iospace(dev, res, iobase);
if (err) {
 dev_warn(dev, "error %d: failed to map resource %pR\n",
 err, res);
--- linux-4.15.0.orig/drivers/pci/host/pci-xgene-msi.c
+++ linux-4.15.0/drivers/pci/host/pci-xgene-msi.c
@@ -393,13 +393,9 @@
if (!msi_group->gic_irq)
 continue;

-irq_set_chained_handler(msi_group->gic_irq,
-xgene_msi_isr);
-err = irq_set_handler_data(msi_group->gic_irq, msi_group);
-if (err) {
+irq_set_chained_handler_and_data(msi_group->gic_irq,
+xgene_msi_isr, msi_group);
+ /*
+ * Statically allocate MSI GIC IRQs to each CPU core.
+ * With 8-core X-Gene v1, 2 MSI GIC IRQs are allocated
+--- linux-4.15.0.orig/drivers/pci/host/pci-xgene.c
+++ linux-4.15.0/drivers/pci/host/pci-xgene.c
@@ @ -431,7 +431,7 @@
case IORESOURCE_IO:
xgene_pcie_setup_ob_reg(port, res, OMR3BARL, io_base,
res->start - window->offset);
-ret = pci_remap_iospace(res, io_base);
+ret = devm_pci_remap_iospace(dev, res, io_base);
if (ret < 0)
return ret;
break;
@@ -668,7 +668,6 @@
bus = bridge->bus;

-pci_scan_child_bus(bus);
pci_assign_unassigned_bus_resources(bus);
list_for_each_entry(child, &bus->children, node)
pci_bus_configure_settings(child);
--- linux-4.15.0.orig/drivers/pci/host/pcie-iproc-msi.c
+++ linux-4.15.0/drivers/pci/host/pcie-iproc-msi.c
@@ -179,7 +179,7 @@
static struct msi_domain_info iproc_msi_domain_info = {
.flags = MSI_FLAG_USE_DEF_DOM_OPS | MSI_FLAG_USE_DEF_CHIP_OPS |
-MSI_FLAG_MULTI_PCI_MSI | MSI_FLAG_PCI_MSIX,
+MSI_FLAG_PCI_MSIX,
.chip = &iproc_msi_irq_chip,
};
@@ -217,15 +217,20 @@
 struct iproc_msi *msi = irq_data_get_irq_chip_data(data);
 int target_cpu = cpumask_first(mask);
 int curr_cpu;
+int ret;

curr_cpu = hirq_to_cpu(msi, data->hwirq);
if (curr_cpu == target_cpu)
-IRQ_SET_MASK_OK_DONE;
+ret = IRQ_SET_MASK_OK_DONE;
else {
+/* steer MSI to the target CPU */
+data->hwirq = hirq_to_canonical_hirq(msi, data->hwirq) + target_cpu;
+ret = IRQ_SET_MASK_OK;
+
-/* steer MSI to the target CPU */
-data->hwirq = hirq_to_canonical_hirq(msi, data->hwirq) + target_cpu;
+irq_data_update_effective_affinity(data, cpumask_of(target_cpu));

-return IRQ_SET_MASK_OK;
+return ret;
}

static void iproc_msi_irq_compose_msi_msg(struct irq_data *data,
@@ -253,20 +258,23 @@
 struct iproc_msi *msi = domain->host_data;
int hwirq, i;

+if (msi->nr_cpus > 1 && nr_irqs > 1)
+return -EINVAL;
+
mutex_lock(&msi->bitmap_lock);

-/* Allocate 'nr_cpus' number of MSI vectors each time */
-hwirq = bitmap_find_next_zero_area(msi->bitmap, msi->nr_msi_vecs, 0,
- msi->nr_cpus, 0);
-if (hwirq < msi->nr_msi_vecs) {
- bitmap_set(msi->bitmap, hwirq, msi->nr_cpus);
- } else {
- mutex_unlock(&msi->bitmap_lock);
- return -ENOSPC;
- }
+/*
+ * Allocate 'nr_irqs' multiplied by 'nr_cpus' number of MSI vectors
+ * each time
+ */
+hwirq = bitmap_find_free_region(msi->bitmap, msi->nr_msi_vecs,
+ order_base_2(msi->nr_cpus * nr_irqs));

mutex_unlock(&msi->bitmap_lock);

+if (hwirq < 0)
+return -ENOSPC;
+
for (i = 0; i < nr_irqs; i++) {
irq_domain_set_info(domain, virq + i, hwirq + i,
   &iproc_msi_bottom_irq_chip,
   @ -274.7 +282.7 @@
   NULL, NULL);
}

-return hwirq;
+return 0;
}

static void iproc_msi_irq_domain_free(struct irq_domain *domain,
   @ -287.7 +295.8 @@
mutex_lock(&msi->bitmap_lock);

hwirq = hwirq_toCanonical_hwirq(msi, data->hwirq);
-bitmap_clear(msi->bitmap, hwirq, msi->nr_cpus);
+bitmap_release_region(msi->bitmap, hwirq,
+ order_base_2(msi->nr_cpus * nr_irqs));
mutex_unlock(&msi->bitmap_lock);

@@ -541,6 +550,9 @@
mutex_init(&msi->bitmap_lock);
msi->nr_cpus = num_possible_cpus();

+if (msi->nr_cpus == 1)
+iPROC_msi_domain_info.flags |= MSI_FLAG_MULTI_PCI_MSI;
+msi->nr_irqs = of_irq_count(node);
if (!msi->nr_irqs) {
  dev_err(pdev->dev, "found no MSI GIC interrupt\n");
--- linux-4.15.0.orig/drivers/pci/host/pcie-iproc-platform.c
+++ linux-4.15.0/drivers/pci/host/pcie-iproc-platform.c
@@ -92,6 +92,13 @@
pcie->need_ob_cfg = true;
}

+/*
+ * DT nodes are not used by all platforms that use the iProc PCIe
+ * core driver. For platforms that require explicit inbound mapping
+ * configuration, "dma-ranges" would have been present in DT
+ */
+pcie->need_ib_cfg = of_property_read_bool(np, "dma-ranges");
+
/* PHY use is optional */
pcie->phy = devm_phy_get(pdev, "pcie-phy");
if (IS_ERR(pdev->phy)) {
--- linux-4.15.0.orig/drivers/pci/host/pcie-iproc.c
+++ linux-4.15.0/drivers/pci/host/pcie-iproc.c
@@ -306,7 +306,7 @@
};

/* iProc PCIe PAXB BCMA registers */
-static const u16 iproc_PCIE_reg_paxb_bcma[] = {
+static const u16 iproc_PCIE_reg_paxb_bcma[IPROC_PCIE_MAX_NUM_REG] = {
  [IPROC_PCIE_CLK_CTRL] = 0x000,
  [IPROC_PCIE_CFG_IND_ADDR] = 0x120,
  [IPROC_PCIE_CFG_IND_DATA] = 0x124,
};

/* iProc PCIe PAXB registers */
-static const u16 iproc_PCIE_reg_paxb[] = {
+static const u16 iproc_PCIE_reg_paxb[IPROC_PCIE_MAX_NUM_REG] = {
  [IPROC_PCIE_CLK_CTRL] = 0x000,
  [IPROC_PCIE_CFG_IND_ADDR] = 0x120,
  [IPROC_PCIE_CFG_IND_DATA] = 0x124,
};
/* iProc PCIe PAXB v2 registers */
-static const u16 iproc_pcie_reg_paxb_v2[] = {
+static const u16 iproc_pcie_reg_paxb_v2[IPROC_PCIE_MAX_NUM_REG] = {
    [IPROC_PCIE_CLK_CTRL]= 0x000,
    [IPROC_PCIE_CFG_IND_ADDR]= 0x120,
    [IPROC_PCIE_CFG_IND_DATA]= 0x124,
    @ @ -361,7 +361,7 @ @
};

/* iProc PCIe PAXC v1 registers */
-static const u16 iproc_pcie_reg_paxc[] = {
+static const u16 iproc_pcie_reg_paxc[IPROC_PCIE_MAX_NUM_REG] = {
    [IPROC_PCIE_CLK_CTRL]= 0x000,
    [IPROC_PCIE_CFG_IND_ADDR]= 0x1f0,
    [IPROC_PCIE_CFG_IND_DATA]= 0x1f4,
    @ @ -370,7 +370,7 @ @
};

/* iProc PCIe PAXC v2 registers */
-static const u16 iproc_pcie_reg_paxc_v2[] = {
+static const u16 iproc_pcie_reg_paxc_v2[IPROC_PCIE_MAX_NUM_REG] = {
    [IPROC_PCIE_MSI_GIC_MODE]= 0x050,
    [IPROC_PCIE_MSI_BASE_ADDR]= 0x074,
    [IPROC_PCIE_MSI_WINDOW_SIZE]= 0x078,
    @ @ -573,14 +573,6 @ @
    return (pcie->base + offset);
}

-/*
- * PAXC is connected to an internally emulated EP within the SoC. It
- * allows only one device.
- */
- if (pcie->ep_is_internal)
- if (slot > 0)
- return NULL;
-
- return iproc_pcie_map_ep_cfg_reg(pcie, busno, slot, fn, where);
}
+goto err_power_off_phy;
+if (pcie->need_ib_cfg) {
+ret = iproc_pcie_map_dma_ranges(pcie);
+if (ret && ret != -ENOENT)
+goto err_power_off_phy;
+
#elseif CONFIG_ARM
+pcie->sysdata.private_data = pcie;
@@ -1448,6 +1442,30 @@
+}
EXPORT_SYMBOL(iproc_pcie_remove);
+
+static void quirk_paxc_bridge(struct pci_dev *pdev)
+{
+*/
+/* The PCI config space is shared with the PAXC root port and the first
+ * Ethernet device. So, we need to workaround this by telling the PCI
+ * code that the bridge is not an Ethernet device.
+ */
+if (pdev->hdr_type == PCI_HEADER_TYPE_BRIDGE)
+pdev->class = PCI_CLASS_BRIDGE_PCI << 8;
+
+*/
+/* MPSS is not being set properly (as it is currently 0). This is
+ * because that area of the PCI config space is hard coded to zero, and
+ * is not modifiable by firmware. Set this to 2 (e.g., 512 byte MPS)
+ * so that the MPS can be set to the real max value.
+ */
+pdev->pcie_mpss = 2;
+
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_BROADCOM, 0x16cd, quirk_paxc_bridge);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_BROADCOM, 0x16f0, quirk_paxc_bridge);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_BROADCOM, 0xd750, quirk_paxc_bridge);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_BROADCOM, 0xd802, quirk_paxc_bridge);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_BROADCOM, 0xd804, quirk_paxc_bridge);
+
+MODULE_AUTHOR("Ray Jui <rjui@broadcom.com>");
+MODULE_DESCRIPTION("Broadcom iPROC PCIe common driver");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/pci/host/pcie-iproc.h
+++ linux-4.15.0/drivers/pci/host/pcie-iproc.h
@@ -74,6 +74,7 @@
 * @ob: outbound mapping related parameters
 * @ob_map: outbound mapping related parameters specific to the controller
 *
+ * @need_ib_cfg: indicates SW needs to configure the inbound mapping window
 * @ib: inbound mapping related parameters
* @ib_map: outbound mapping region related parameters
*
@@ -101,6 +102,7 @@
struct iproc_pcie_ob ob;
const struct iproc_pcie_ob_map *ob_map;

+bool need_ib_cfg;
struct iproc_pcie_ib ib;
const struct iproc_pcie_ib_map *ib_map;

--- linux-4.15.0.orig/drivers/pci/host/pcie-mediatek.c
+++ linux-4.15.0/drivers/pci/host/pcie-mediatek.c
@@ -333,6 +333,17 @@
{
struct mtk_pcie *pcie = bus->sysdata;
struct mtk_pcie_port *port;
+struct pci_dev *dev = NULL;
+
+/*
+ * Walk the bus hierarchy to get the devfn value
+ * of the port in the root bus.
+ */
+while (bus && bus->number) {
+dev = bus->self;
+bus = dev->bus;
+devfn = dev->devfn;
+}

list_for_each_entry(port, &pcie->ports, list)
if (port->slot == PCI_SLOT(devfn))
@@ -379,65 +390,6 @@
    .write = mtk_pcie_config_write,
};

-static int mtk_pcie_startup_port_v2(struct mtk_pcie_port *port)
-{
-    struct mtk_pcie *pcie = port->pcie;
-    struct resource *mem = &pcie->mem;
-    u32 val;
-    size_t size;
-    int err;
-    
-    /* MT7622 platforms need to enable LTSSM and ASPM from PCIe subsys */
-    if (pcie->base) {
-        val = readdl(pcie->base + PCIE_SYS_CFG_V2);
-        val |= PCIE_CSR_LTSSM_EN(port->slot) |
-            PCIE_CSR_ASPM_L1_EN(port->slot);
-        writel(val, pcie->base + PCIE_SYS_CFG_V2);
-} 
-
-/* Assert all reset signals */
-writel(0, port->base + PCIE_RST_CTRL);
-
-} 
-* Enable PCIe link down reset, if link status changed from link up to
-* link down, this will reset MAC control registers and configuration
-* space.
-* */
-writel(PCIE_LINKDOWN_RST_EN, port->base + PCIE_RST_CTRL);
-
-/* De-assert PHY, PE, PIPE, MAC and configuration reset*/
-val = readl(port->base + PCIE_RST_CTRL);
-val |= PCIE_PHY_RSTB | PCIE_PERSTB | PCIEPIPE_SRSTB |
-* PCIE_MAC_SRSTB | PCIE_CRSTB;
-writel(val, port->base + PCIE_RST_CTRL);
-
-/* 100ms timeout value should be enough for Gen1/2 training */
-err = readl_poll_timeout(port->base + PCIE_LINK_STATUS_V2, val,
-* !!(val & PCIE_PORT_LINKUP_V2), 20,
- 100 * USEC_PER_MSEC);
-if (err)
-return -ETIMEDOUT;
-
-/* Set INTx mask */
-val = readl(port->base + PCIE_INT_MASK);
-val &= ~INTX_MASK;
-writel(val, port->base + PCIE_INT_MASK);
-
-/* Set AHB to PCIe translation windows */
-size = mem->end - mem->start;
-val = lower_32_bits(mem->start) | AHB2PCIE_SIZE(fls(size));
-writel(val, port->base + PCIE_AHB_TRANS_BASE0_L);
-
-val = upper_32_bits(mem->start);
-writel(val, port->base + PCIE_AHB_TRANS_BASE0_H);
-
-/* Set PCIe to AXI translation memory space.*/
-val = fls(0xffffffff) | WIN_ENABLE;
-writel(val, port->base + PCIE_AXI_WINDOW0);
-
-return 0;
-} 
-
static int mtk_pcie_msi_alloc(struct mtk_pcie_port *port)
{
  int msi;
dev_err(dev, "failed to create MSI IRQ domain\n");
return -ENODEV;
}

-mtk_pcie_enable_msi(port);
}

return 0;

/* MT7622 platforms need to enable LTSSM and ASPM from PCIe subsys */
+if (pcie->base) {
+val = readl(pcie->base + PCIE_SYS_CFG_V2);
+val |= PCIE_CSR_LTSSM_EN(port->slot) |
+PCIE_CSR_ASPM_L1_EN(port->slot);
+writel(val, pcie->base + PCIE_SYS_CFG_V2);
+
+*/ Assert all reset signals */
+writel(0, port->base + PCIE_RST_CTRL);
+
+*/
+* Enable PCIe link down reset, if link status changed from link up to
+* link down, this will reset MAC control registers and configuration
+* space.
+ */
+writel(PCIE_LINKDOWN_RST_EN, port->base + PCIE_RST_CTRL);
+
+*/ De-assert PHY, PE, PIPE, MAC and configuration reset*/
+val = readl(port->base + PCIE_RST_CTRL);
+val |= PCIE_PHY_RSTB | PCIE_PERSTB | PCIE_PIPE_SRSTB |
+PCIE_MAC_SRSTB | PCIE_CRSTB;
+writel(val, port->base + PCIE_RST_CTRL);
+
+*/ 100ms timeout value should be enough for Gen1/2 training */
+err = readl_poll_timeout(port->base + PCIE_LINK_STATUS_V2, val,
+!(val & PCIE_PORT_LINKUP_V2), 20,
+100 * USEC_PER_MSEC);
+if (err)
+return -ETIMEDOUT;
+
+/* Set INTx mask */
+val = readl(port->base + PCIE_INT_MASK);
+val &= ~INTX_MASK;
+writel(val, port->base + PCIE_INT_MASK);
+
+if (IS_ENABLED(CONFIG_PCI_MSI))
+mtk_pcie_enable_msi(port);
+
+/* Set AHB to PCIe translation windows */
+size = mem->end - mem->start;
+val = lower_32_bits(mem->start) | AHB2PCIE_SIZE(fls(size));
+writel(val, port->base + PCIE_AHB_TRANS_BASE0_L);
+
+val = upper_32_bits(mem->start);
+writel(val, port->base + PCIE_AHB_TRANS_BASE0_H);
+
+/* Set PCIe to AXI translation memory space. */
+val = fls(0xffffffff) | WIN_ENABLE;
+writel(val, port->base + PCIE_AXI_WINDOW0);
+
+return 0;
+}
+
+static void __iomem *mtk_pcie_map_bus(struct pci_bus *bus,
unsigned int devfn, int where)
{

err = of_pci_get_devfn(child);
if (err < 0) {

dev_err(dev, "failed to parse devfn: \%d\n", err);
-return err;
-goto error_put_node;
}

slot = PCI_SLOT(err);

er = mtk_pcie_parse_port(pcie, child, slot);
if (err)
-return err;
-goto error_put_node;
}

er = mtk_pcie_subsys_powerup(pcie);
@@ -1054,6 +1067,9 @@
mtk_pcie_subsys_powerdown(pcie);
return 0;
+error_put_node:
+of_node_put(child);
+return err;
}  

static int mtk_pcie_request_resources(struct mtk_pcie *pcie)
@@ -1071,7 +1087,9 @@
 if (err < 0)
 return err;
      
-pci_remap_iospace(&pcie->pio, pcie->io.start);
+err = devm_pci_remap_iospace(dev, &pcie->pio, pcie->io.start);
+if (err)
 +return err;
+return 0;
}  
--- linux-4.15.0.orig/drivers/pci/host/pcie-rcar.c  
+++ linux-4.15.0/drivers/pci/host/pcie-rcar.c  
@@ -43,6 +43,7 @@
 /* Transfer control */
 #define PCIETCTLR	0x02000
 +#define DL_DOWN	BIT(3)
 #define CFINIT1
 #define PCIETSTR	0x02004
 #define DATA_LINK_ACTIVE1
@@ -89,8 +90,12 @@
 #define LINK_SPEED_2_5GTS	(1 << 16)
 #define LINK_SPEED_5_0GTS	(2 << 16)
 #define MACCTLR	0x011058
+#define MACCTLR_NFTS_MASK	GENMASK(23, 16)/* The name is from SH7786 */
 #define SPEED_CHANGE	(1 << 24)
 #define SCRAMBLE_DISABLE	(1 << 27)
 +#define LTSMDISBIT(31)
+#define MACCTRL_INIT_VAL(LTSD800 | MACCTRL_NFTS_MASK)
+#define PMSR0x01105c
#define MACS2R0x011078
#define MACCGSPSETR0x011084
#define SPCNGRSN(1 << 31)
@@ -328,11 +333,12 @@}
 static void rcar_pcie_setup_window(int win, struct rcar_pcie *pcie,
-          struct resource *res)
+          struct resource *res)
 +          struct resource_entry *window)  
":

static void rcar_pcie_setup_window(int win, struct rcar_pcie *pcie,

/* Setup PCIe address space mappings for each resource */
resource_size_t size;
resource_size_t res_start;
+struct resource *res = window->res;

u32 mask;

rcar_pci_write_reg(pcie, 0x00000000, PCIEPTCTLR(win));
@@ -346,9 +352,9 @@
rcar_pci_write_reg(pcie, mask << 7, PCIEPAMR(win));

if (res->flags & IORESOURCE_IO)
-   res_start = pci_pio_to_address(res->start);
+   res_start = pci_pio_to_address(res->start) - window->offset;
else
-   res_start = res->start;
+   res_start = res->start - window->offset;

rcar_pci_write_reg(pcie, upper_32_bits(res_start), PCIEPAUR(win));
rcar_pci_write_reg(pcie, lower_32_bits(res_start) & ~0x7F,
@@ -377,7 +383,7 @@
switch (resource_type(res)) { 
   case IORESOURCE_IO:
   case IORESOURCE_MEM:
-      rcar_pcie_setup_window(i, pci, res);
+      rcar_pcie_setup_window(i, pci, win);
      i++;
      break;
   case IORESOURCE_BUS:
@@ -592,6 +598,8 @@
   if (IS_ENABLED(CONFIG_PCI_MSI))
      rcar_pci_write_reg(pcie, 0x801f0000, PCIEMSITXR);
      +rcar_pci_write_reg(pcie, MACCTLR_INIT_VAL, MACCTLR);
      +
      /* Finish initialization - establish a PCI Express link */
      rcar_pci_write_reg(pcie, CFINIT, PCIETCTLR);
      
      @ @ -849,7 +857,7 @@
      |
struct device *dev = pcie->dev;
struct rcar_msi *msi = &pcie->msi;
-unsigned long base;
+phys_addr_t base;
int err, i;

mutex_init(&msi->lock);
@@ -888,10 +896,14 @@
/* setup MSI data target */
msi->pages = __get_free_pages(GFP_KERNEL, 0);
+if (!msi->pages) {
+err = -ENOMEM;
+goto err;
+
+}
base = virt_to_phys((void *)msi->pages);

-rcar_pci_write_reg(pcie, base | MSIFE, PCIEMSIALR);
-rcar_pci_write_reg(pcie, 0, PCIEMSIAUR);
+rcar_pci_write_reg(pcie, lower_32_bits(base) | MSIFE, PCIEMSIALR);
+rcar_pci_write_reg(pcie, upper_32_bits(base), PCIEMSIAUR);

/* enable all MSI interrupts */
rcar_pci_write_reg(pcie, 0xffffffff, PCIEMSIIER);
@@ -1087,7 +1099,7 @@
struct resource *res = win->res;

if (resource_type(res) == IORESOURCE_IO) {
-err = pci_remap_iospace(res, iobase);
+rerr = devm_pci_remap_iospace(dev, res, iobase);
if (err) {
dev_warn(dev, "error %d: failed to map resource %pR\n",
err, res);
@@ -1120,10 +1132,13 @@
pcie = pci_host_bridge_priv(bridge);

pcie->dev = dev;
+platform_set_drvdata(pdev, pcie);

INIT_LIST_HEAD(&pcie->resources);

-rcar_pci_parse_request_of_pci_ranges(pcie);
+rerr = rcar_pci_parse_request_of_pci_ranges(pcie);
+if (err)
+goto err_free_bridge;

err = rcar_pci_get_resources(pcie);
if (err < 0) {
@@ -1178,15 +1193,35 @@

err_free_resource_list:
pci_free_resource_list(&pcie->resources);
+err_free_bridge:
pci_free_host_bridge(bridge);

return err;
static int rcar_pcie_resume_noirq(struct device *dev) {
    struct rcar_pcie *pcie = dev_get_drvdata(dev);

    if (rcar_pci_read_reg(pcie, PMSR) &&
        !(rcar_pci_read_reg(pcie, PCIETCTLR) & DL_DOWN))
        return 0;

    /* Re-establish the PCIe link */
    rcar_pci_write_reg(pcie, MACCTLR_INIT_VAL, MACCTLR);
    rcar_pci_write_reg(pcie, CFINIT, PCIETCTLR);
    return rcar_pcie_wait_for_dl(pcie);
}

static const struct dev_pm_ops rcar_pcie_pm_ops = {
    .resume_noirq = rcar_pcie_resume_noirq,
};

static struct platform_driver rcar_pcie_driver = {
    .driver = {
        .name = "rcar-pcie",
        .of_match_table = rcar_pcie_of_match,
        .pm = &rcar_pcie_pm_ops,
        .suppress_bind_attrs = true,
    },
    .probe = rcar_pcie_probe,
};

rockchip->vpcie12v = devm_regulator_get_optional(dev, "vpcie12v");
if (IS_ERR(rockchip->vpcie12v)) {
    -if (PTR_ERR(rockchip->vpcie12v) == -EPROBE_DEFER)
    -return -EPROBE_DEFER;
    +if (PTR_ERR(rockchip->vpcie12v) != -ENODEV)
    +return PTR_ERR(rockchip->vpcie12v);
    dev_info(dev, "no vpcie12v regulator found\n");
}

rockchip->vpcie3v3 = devm_regulator_get_optional(dev, "vpcie3v3");
if (IS_ERR(rockchip->vpcie3v3)) {
    -if (PTR_ERR(rockchip->vpcie3v3) == -EPROBE_DEFER)
    -return -EPROBE_DEFER;
    +if (PTR_ERR(rockchip->vpcie3v3) != -ENODEV)
    +return PTR_ERR(rockchip->vpcie3v3);
    dev_info(dev, "no vpcie3v3 regulator found\n");
}
rockchip->vpcie1v8 = devm_regulator_get_optional(dev, "vpcie1v8");
if (IS_ERR(rockchip->vpcie1v8)) {
    if (PTR_ERR(rockchip->vpcie1v8) == -EPROBE_DEFER)
        return -EPROBE_DEFER;
    if (PTR_ERR(rockchip->vpcie1v8) != -ENODEV)
        return PTR_ERR(rockchip->vpcie1v8);
    dev_info(dev, "no vpcie1v8 regulator found\n");
}

rockchip->vpcie0v9 = devm_regulator_get_optional(dev, "vpcie0v9");
if (IS_ERR(rockchip->vpcie0v9)) {
    if (PTR_ERR(rockchip->vpcie0v9) == -EPROBE_DEFER)
        return -EPROBE_DEFER;
    if (PTR_ERR(rockchip->vpcie0v9) != -ENODEV)
        return PTR_ERR(rockchip->vpcie0v9);
    dev_info(dev, "no vpcie0v9 regulator found\n");
}

--- linux-4.15.0.orig/drivers/pci/host/pcie-xilinx-nwl.c
+++ linux-4.15.0/drivers/pci/host/pcie-xilinx-nwl.c
@@ -10,6 +10,7 @@

 u8 root_busno;
 struct nwl_msi msi;
 struct irq_domain *legacy_irq_domain;
+struct clk *clk;
 raw_spinlock_t leg_mask_lock;
};

@@ -485,15 +487,13 @@

 int i;

 mutex_lock(&msi->lock);
-    bit = bitmap_find_next_zero_area(msi->bitmap, INT_PCI_MSI_NBR, 0,
-        nr_irqs, 0);
-    if (bit >= INT_PCI_MSI_NR) {
+    bit = bitmap_find_free_region(msi->bitmap, INT_PCI_MSI_NR,
+        get_count_order(nr_irqs));
+    if (bit < 0) {
mutex_unlock(&msi->lock);
return -ENOSPC;
}

bitmap_set(msi->bitmap, bit, nr_irqs);
-
for (i = 0; i < nr_irqs; i++) {
    irq_domain_set_info(domain, virq + i, bit + i, &nwl_irq_chip,
                        domain->host_data, handle_simple_irq,
                        @@ -511,7 +511,8 @@
                        struct nwl_msi *msi = &pcie->msi;

mutex_lock(&msi->lock);
bitmap_clear(msi->bitmap, data->hwirq, nr_irqs);
+bitmap_release_region(msi->bitmap, data->hwirq,
+       get_count_order(nr_irqs));
mutex_unlock(&msi->lock);
}

@@ -561,7 +562,7 @@
PCI_NUM_INTX,
&legacy_domain_ops,
        pcie);
-
+of_node_put(legacy_intc_node);
if (!pcie->legacy_irq_domain) {
    dev_err(dev, "failed to create IRQ domain\n");
    return -ENOMEM;
@@ -853,6 +854,16 @@
return err;
}

+pcie->clk = devm_clk_get(dev, NULL);
+if (IS_ERR(pcie->clk))
+return PTR_ERR(pcie->clk);
+err = clk_prepare_enable(pcie->clk);
+if (err) {
+    dev_err(dev, "can't enable PCIe ref clock\n");
+    return err;
+}
+
err = nwl_pci_bridge_init(pcie);
if (err) {
    dev_err(dev, "HW Initialization failed\n");
--- linux-4.15.0.orig/drivers/pci/host/pcie-xilinx.c
+++ linux-4.15.0/drivers/pci/host/pcie-xilinx.c
@@ -338,14 +338,19 @@

* xilinx_pcie_enable_msi - Enable MSI support
* @port: PCIe port information
*/

- static void xilinx_pcie_enable_msi(struct xilinx_pcie_port *port)
+ static int xilinx_pcie_enable_msi(struct xilinx_pcie_port *port)
{
    phys_addr_t msg_addr;

    port->msi_pages = __get_free_pages(GFP_KERNEL, 0);
+ if (!port->msi_pages)
+     return -ENOMEM;

+ msg_addr = virt_to_phys((void *)port->msi_pages);
pie_write(port, 0x0, XILINX_PCIE_REG_MSIBASE1);
pie_write(port, msg_addr, XILINX_PCIE_REG_MSIBASE2);
+ ret = 0;
+ return ret;
}

/* INTx Functions */
@@ -500,6 +505,7 @@
        struct device *dev = port->dev;
        struct device_node *node = dev->of_node;
        struct device_node *pcie_intc_node;
+        int ret;
        /* Setup INTx */
        pcie_intc_node = of_get_next_child(node, NULL);
+        of_node_put(pcie_intc_node);
        if (!port->leg_domain) {
            dev_err(dev, "Failed to get a INTx IRQ domain\n");
            return -ENODEV;
@@ -511,6 +517,7 @@
            &intx_domain_ops,
            port);
        if (!port->leg_domain) {
+            dev_err(dev, "Failed to get a INTx IRQ domain\n");
            return -ENODEV;
        }

-     xilinx_pcie_enable_msi(port);
+     ret = xilinx_pcie_enable_msi(port);
+     if (ret)
+         return ret;
}

return 0;
--- linux-4.15.0.orig/drivers/pci/host/vmd.c
int i, best = 1;
unsigned long flags;

if (vmd->msix_count == 1)
    return &vmd->irqs[0];

/*
 * White list for fast-interrupt handlers. All others will share the
 * "slow" interrupt vector.
 */
switch (msi_desc_to_pci_dev(desc)->class) {
    case PCI_CLASS_STORAGE_EXPRESS:
        break;
    default:
        return &vmd->irqs[0];
}

raw_spin_lock_irqsave(&list_lock, flags);
for (i = 1; i < vmd->msix_count; i++)
    if (vmd->irqs[i].count < vmd->irqs[best].count)

vmd->irq_domain = pci_msi_create_irq_domain(fn, &vmd_msi_domain_info,
    x86_vector_domain);
-irq_domain_free_fwnode(fn);
-if (!vmd->irq_domain)
+if (!vmd->irq_domain) {
+irq_domain_free_fwnode(fn);
    return -ENODEV;
+
pci_add_resource(&resources, &vmd->resources[0]);
pci_add_resource(&resources, &vmd->resources[1]);
-if (!vmd->bus) {
    pci_free_resource_list(&resources);
    irq_domain_remove(vmd->irq_domain);
    +irq_domain_free_fwnode(fn);
    return -ENODEV;
}

static void vmd_remove(struct pci_dev *dev)
{
    struct vmd_dev *vmd = pci_get_drvdata(dev);
struct fwnode_handle *fn = vmd->irq_domain->fwnode;
-vmd_detach_resources(vmd);
sysfs_remove_link(&vmd->dev->dev.kobj, "domain");
pci_stop_root_bus(vmd->bus);
pci_remove_root_bus(vmd->bus);
vmd_cleanup_srcu(vmd);
vmd_teardown_dma_ops(vmd);
+vmd_detach_resources(vmd);
irq_domain_remove(vmd->irq_domain);
+irq_domain_free_fwnode(fn);
}

#ifdef CONFIG_PM_SLEEP
--- linux-4.15.0.orig/drivers/pci/hotplug/acpiphp_glue.c
+++ linux-4.15.0/drivers/pci/hotplug/acpiphp_glue.c
@@ -136,13 +136,21 @@
  context = acpiphp_get_context(adev);
  if (!context || context->func.parent->is_going_away) {
    -acpi_unlock_hp_context();
-  -return NULL;
+    if (!context)
+      goto unlock;
+    +
+    +if (context->func.parent->is_going_away) {
+      acpiphp_put_context(context);
+      context = NULL;
+      goto unlock;
    } +
    get_bridge(context->func.parent);
    acpiphp_put_context(context);
    +
    +unlock:
    acpi_unlock_hp_context();
    return context;
  }
@@ -498,6 +506,7 @@
  slot->flags &= (~SLOT_ENABLED);
  continue;
  }
+pci_dev_put(dev);
  }
}
unsigned long long sta = 0;
struct acpiphp_func *func;
+u32 dvid;

list_for_each_entry(func, &slot->funcs, sibling) {
    if (func->flags & FUNC_HAS_STA) {
        if (ACPI_SUCCESS(status) && sta)
            break;
    } else {
        -u32 dvid;
-
-pci_bus_read_config_dword(slot->bus,
- PCI_DEVFN(slot->device,
-   func->function),
- PCI_VENDOR_ID, &dvid);
-if (dvid != 0xffffffff) {
+if (pci_bus_read_dev_vendor_id(slot->bus,
+PCI_DEVFN(slot->device, func->function),
+&dvid, 0)) {
            sta = ACPI_STA_ALL;
            break;
        }
    }
    }
+
    +if (!sta) {
        +/
        + * Check for the slot itself since it may be that the
        + * ACPI slot is a device below PCIe upstream port so in
        + * that case it may not even be reachable yet.
        + */
        +if (pci_bus_read_dev_vendor_id(slot->bus,
        +PCI_DEVFN(slot->device, 0), &dvid, 0)) {
            sta = ACPI_STA_ALL;
        +}
        +}
    +
    return (unsigned int)sta;
}

--- linux-4.15.0.orig/drivers/pci/hotplug/pci_hotplug_core.c
+++ linux-4.15.0/drivers/pci/hotplug/pci_hotplug_core.c
@@ -452,8 +452,17 @@
  list_add(&slot->slot_list, &pci_hotplug_slot_list);
result = fs_add_slot(pci_slot);
+if (result)
+goto err_list_del;
+kobject_uevent(&pci_slot->kobj, KOBJ_ADD);
+dbg("Added slot %s to the list\n", name);
+goto out;
+
+err_list_del:
+list_del(&slot->slot_list);
+pci_slot->hotplug = NULL;
+pci_destroy_slot(pci_slot);
+out:
+mutex_unlock(&pci_hp_mutex);
return result;
--- linux-4.15.0.orig/drivers/pci/hotplug/pciehp.h
+++ linux-4.15.0/drivers/pci/hotplug/pciehp.h
@@ -132,9 +132,10 @@
void pciehp_queue_pushbutton_work(struct work_struct *work);
struct controller *pcie_init(struct pcie_device *dev);
int pcie_init_notification(struct controller *ctrl);
+void pcie_shutdown_notification(struct controller *ctrl);
int pciehp_enable_slot(struct slot *p_slot);
int pciehp_disable_slot(struct slot *p_slot);
-void pcie_enable_notification(struct controller *ctrl);
+void pcie_reenable_notification(struct controller *ctrl);
int pciehp_power_on_slot(struct slot *slot);
void pciehp_power_off_slot(struct slot *slot);
void pciehp_get_power_status(struct slot *slot, u8 *status);
--- linux-4.15.0.orig/drivers/pci/hotplug/pciehp_core.c
+++ linux-4.15.0/drivers/pci/hotplug/pciehp_core.c
@@ -278,6 +284,7 @@
{
+struct slot *slot = hotplug_slot->private;
+
+/* queued work needs hotplug_slot name */
+cancel_delayed_work(&slot->work);
+drain_workqueue(slot->wq);
+
kfree(hotplug_slot->ops);
kfree(hotplug_slot->info);
kfree(hotplug_slot);
@@ -278,6 +284,7 @@
{
+struct controller *ctrl = get_service_data(dev);
+pcie_shutdown_notification(ctrl);
cleanup_slot(ctrl);
pciehp_release_ctrl(ctrl);
}
@@ -297,7 +304,7 @@
ctrl = get_service_data(dev);
/
/* reinitialize the chipset’s event detection logic */
-pcie_enable_notification(ctrl);
+pcie_reenable_notification(ctrl);

slot = ctrl->slot;

--- linux-4.15.0.orig/drivers/pci/hotplug/pciehp_hpc.c
+++ linux-4.15.0/drivers/pci/hotplug/pciehp_hpc.c
 @@ -559,8 +559,6 @@
 {
 struct controller *ctrl = (struct controller *)dev_id;
 struct pci_dev *pdev = ctrl_dev(ctrl);
-struct pci_bus *subordinate = pdev->subordinate;
-struct pci_dev *dev;
 struct slot *slot = ctrl->slot;
 u16 status, events;
 u8 present;
@@ -608,14 +606,9 @@
 wake_up(&ctrl->queue);
 }

-if (subordinate) {
-list_for_each_entry(dev, &subordinate->devices, bus_list) {
-if (dev->ignore_hotplug) {
-ctrl_dbg(ctrl, "ignoring hotplug event %#06x (%s requested no hotplug)\n",
-events, pci_name(dev));
-return IRQ_HANDLED;
-}
-}
+if (pdev->ignore_hotplug) {
+ctrl_dbg(ctrl, "ignoring hotplug event %#06x\n", events);
+return IRQ_HANDLED;
 }

 /* Check Attention Button Pressed */
 @@ -673,7 +666,7 @@
 return handled;
 }

 -void pcie_enable_notification(struct controller *ctrl)
+static void pcie_enable_notification(struct controller *ctrl)
{ 
  u16 cmd, mask;

  // -711.6 +704.17 @@
  pci_pcie_cap(ctrl->pcie->port) + PCI_EXP_SLTCTL, cmd);
}

+void pcie_reenable_notification(struct controller *ctrl)
+
+{ 
+  /*
+   * Clear both Presence and Data Link Layer Changed to make sure
+   * those events still fire after we have re-enabled them.
+   */
+  pcie_capability_write_word(ctrl->pcie->port, PCI_EXP_SLTSTA,
+   PCI_EXP_SLTSTA_PDC | PCI_EXP_SLTSTA_DLLSC);
+  pcie_enable_notification(ctrl);
+}
+ 
+static void pcie_disable_notification(struct controller *ctrl)
{ 
  u16 mask;
  // -774.7 +778.7 @@
  return 0;
}

 static void pcie_shutdown_notification(struct controller *ctrl)
{ 
if (ctrl->notification_enabled) {
  pcie_disable_notification(ctrl);
  // -809.7 +813.7 @@
  static void pcie_cleanup_slot(struct controller *ctrl)
{ 
  struct slot *slot = ctrl->slot;
  cancel_delayed_work(&slot->work);
  
  destroy_workqueue(slot->wq);
  kfree(slot);
}  
  // -848.6 +852.13 @@
  if (pdev->hotplug_user_indicators)
    slot_cap &= ~(PCI_EXP_SLTCAP_AIP | PCI_EXP_SLTCAP_PIP);

  /*
  * We assume no Thunderbolt controllers support Command Complete events,
  * but some controllers falsely claim they do.
  */
  

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+if (pdev->is_thunderbolt)
+slot_cap |= PCI_EXP_SLTCAP_NCCS;
+ctrl->slot_cap = slot_cap;
+mutex_init(&ctrl->ctrl_lock);
+init_waitqueue_head(&ctrl->queue);
@@ -895,7 +906,6 @@

void pciehp_release_ctrl(struct controller *ctrl)
 {
 -pcie_shutdown_notification(ctrl);
 pcie_cleanup_slot(ctrl);
 kfree(ctrl);
 }
 --- linux-4.15.0.orig/drivers/pci/hotplug/rpadlpar_core.c
+++ linux-4.15.0/drivers/pci/hotplug/rpadlpar_core.c
 @@ -55,6 +55,7 @@
 if ((rc == 0) && (!strcmp(drc_name, name)))
 break;
 }
+of_node_put(parent);

 return dn;
 }
@@ -78,6 +79,7 @@
 return np;
 }

+/* Returns a device_node with its reference count incremented */
static struct device_node *find_dlpar_node(char *drc_name, int *node_type)
 {
 struct device_node *dn;
@@ -313,6 +315,7 @@
 rc = dlpar_add_phb(drc_name, dn);
 break;
 }
+of_node_put(dn);

 printk(KERN_INFO "%s: slot %s added\n", DLPAR_MODULE_NAME, drc_name);
 exit:
@@ -446,6 +449,7 @@
 rc = dlpar_remove_pci_slot(drc_name, dn);
 break;
 }
+of_node_put(dn);
 vm_unmap_aliases();

 printk(KERN_INFO "%s: slot %s removed\n", DLPAR_MODULE_NAME, drc_name);
if (nbytes >= MAX_DRC_NAME_LEN)
return 0;

-memcpy(drc_name, buf, nbytes);
+strncpy(drc_name, buf, nbytes + 1);

end = strchr(drc_name, '\n');
-if (!end)
-end = &drc_name[nbytes];
-*end = '0';
+if (end)
+*end = '0';

rc = dlpar_add_slot(drc_name);
if (rc)
@@ -70,12 +69,11 @@
if (nbytes >= MAX_DRC_NAME_LEN)
return 0;

-memcpy(drc_name, buf, nbytes);
+strncpy(drc_name, buf, nbytes + 1);

end = strchr(drc_name, '\n');
-if (!end)
-end = &drc_name[nbytes];
-*end = '0';
+if (end)
+*end = '0';

rc = dlpar_remove_slot(drc_name);
if (rc)
-...
* level IRQ which will never be cleared.
*/

-void __pci_msi_desc_mask_irq(struct msi_desc *desc, u32 mask, u32 flag)
{
    if (pci_msiignore_mask || !desc->msi_attrib.maskbit)
        return;

    unsigned long flags;
    raw_spin_lock_irqsave(lock, flags);
    desc->masked &= ~mask;
    desc->masked |= flag;
    pci_write_config_dword(msi_desc_to_pci_dev(desc), desc->mask_pos,
                           desc->masked);
    raw_spin_unlock_irqrestore(lock, flags);
}

static void msi_mask_irq(struct msi_desc *desc, u32 mask, u32 flag)
{
    desc->masked = __pci_msi_desc_mask_irq(desc, mask, flag);
}

static void __iomem *pci_msix_desc_addr(struct msi_desc *desc)
{    return 0;
}

mask_bits &= ~PCI_MSIX_ENTRY_CTRL_MASKBIT;
-if (flag)
+if (flag & PCI_MSIX_ENTRY_CTRL_MASKBIT)
    mask_bits |= PCI_MSIX_ENTRY_CTRL_MASKBIT;
    writel(mask_bits, pci_msix_desc_addr(desc) + PCI_MSIX_ENTRY_VECTOR_CTRL);

/*@ -619,21 +620,21 */
/* Configure MSI capability structure */
ret = pci_msi_setup_msi_irqs(dev, nvec, PCI_CAP_ID_MSI);
if (ret) {
    -msi_mask_irq(entry, mask, ~mask);
    +msi_mask_irq(entry, mask, 0);
free_msi_irqs(dev);
return ret;
}

ret = msi_verify_entries(dev);
if (ret) {
  free_msi_irqs(dev);
  return ret;
}

ret = populate_msi_sysfs(dev);
if (ret) {
  free_msi_irqs(dev);
  return ret;
}
@@ -674,6 +675,7 @@
{
  struct cpumask *curmsk, *masks = NULL;
  struct msi_desc *entry;
  void __iomem *addr;
  int ret, i;

  if (affd)
@@ -693,6 +695,7 @@

    entry->msi_attrib.is_msix = 1;
    entry->msi_attrib.is_64 = 1;
    +
    if (entries)
    entry->msi_attrib.entry_nr = entries[i].entry;
    else
@@ -700,6 +703,10 @@
    entry->msi_attrib.default_irq = dev->irq;
    entry->mask_base = base;

    +addr = pci_msix_desc_addr(entry);
    +if (addr)
    +entry->masked = readl(addr + PCI_MSIX_ENTRY_VECTOR_CTRL);
    +
    list_add_tail(&entry->list, dev_to_msi_list(&dev->dev));
    if (masks)
    curmsk++;
@@ -710,21 +717,30 @@
    return ret;
static void msix_program_entries(struct pci_dev *dev, struct msix_entry *entries)
{ struct msi_desc *entry;
  int i = 0;

  for_each_pci_msi_entry(entry, dev) {
    if (entries)
      entries[i++].vector = entry->irq;
    entry->masked = readl(pci_msix_desc_addr(entry) +
      PCI_MSIX_ENTRY_VECTOR_CTRL);
    msix_mask_irq(entry, 1);
    if (entries) {
      entries->vector = entry->irq;
      entries++;
    }
  }
}

+static void msix_update_entries(struct pci_dev *dev, struct msix_entry *entries)
{
struct msi_desc *entry;
-int i = 0;

  for_each_pci_msi_entry(entry, dev) {
    if (entries)
      entries[i++].vector = entry->irq;
    entry->masked = readl(pci_msix_desc_addr(entry) +
      PCI_MSIX_ENTRY_VECTOR_CTRL);
    msix_mask_irq(entry, 1);
    if (entries) {
      entries->vector = entry->irq;
      entries++;
    }
  }

+static void msix_mask_all(void __iomem *base, int tsize)
{ u32 ctrl = PCI_MSIX_ENTRY_CTRL_MASKBIT;
  int i;
  +if (pci_msi_ignore_mask)
    +return;
    +for (i = 0; i < tsize; i++, base += PCI_MSIX_ENTRY_SIZE)
      +writel(ctrl, base + PCI_MSIX_ENTRY_VECTOR_CTRL);
    +}
  +
  /**
   * msix_capability_init - configure device's MSI-X capability
   * @dev: pointer to the pci_dev data structure of MSI-X device function
   *
   */
static int msix_capability_init(struct pci_dev *dev, struct msix_entry *entries,
  int nvec, const struct irq_affinity *affd)
{ int ret;
  u16 control;
  void __iomem *base;
  +int ret, tsize;
  +u16 control;

  /* Ensure MSI-X is disabled while it is set up */
pci_msix_clear_and_set_ctrl(dev, PCI_MSIX_FLAGS_ENABLE, 0);

/*
 * Some devices require MSI-X to be enabled before the MSI-X
 * registers can be accessed. Mask all the vectors to prevent
 * interrupts coming in before they're fully set up.
 */
+pci_msix_clear_and_set_ctrl(dev, 0, PCI_MSIX_FLAGS_MASKALL | PCI_MSIX_FLAGS_ENABLE);

pci_read_config_word(dev, dev->msix_cap + PCI_MSIX_FLAGS, &control);
/* Request & Map MSI-X table region */
-base = msix_map_region(dev, msix_table_size(control));
-if (!base)
-return -ENOMEM;
+tsize = msix_table_size(control);
+base = msix_map_region(dev, tsize);
+if (!base) {
+ret = -ENOMEM;
+goto out_disable;
+
+/* Ensure that all table entries are masked */
+msix_mask_all(base, tsize);

ret = msix_setup_entries(dev, base, entries, nvec, affd);
if (ret)
-return ret;
+goto out_disable;

ret = pci_msi_setup_msi_irqs(dev, nvec, PCI_CAP_ID_MSIX);
if (ret)
@@ -765,15 +792,7 @@
if (ret)
goto out_free;

-/*
- * Some devices require MSI-X to be enabled before we can touch the
- * MSI-X registers. We need to mask all the vectors to prevent
- * interrupts coming in before they're fully set up.
- */
-pci_msix_clear_and_set_ctrl(dev, 0,
-PCI_MSIX_FLAGS_MASKALL | PCI_MSIX_FLAGS_ENABLE);
-
-msix_program_entries(dev, entries);
+msix_update_entries(dev, entries);

ret = populate_msi_sysfs(dev);
if (ret)
out_free:
free_msi_irqs(dev);

+out_disable:
+pci_msix_clear_and_set_ctrl(dev, PCI_MSIX_FLAGS_ENABLE, 0);
+
return ret;
}

/* Return the device with MSI unmasked as initial states */
mask = msi_mask(desc->msi_attrib.multi_cap);
-/* Keep cached state to be restored */
-__pci_msi_desc_mask_irq(desc, mask, ~mask);
+msi_mask_irq(desc, mask, 0);

/* Restore dev->irq to its default pin-assertion irq */
dev->irq = desc->msi_attrib.default_irq;
@@ -958,7 +979,6 @@
}
}
} -WARN_ON (!!dev->msix_enabled);

/* Check whether driver already requested for MSI irq */
if (dev->msi_enabled) {
@@ -981,10 +1001,8 @@
}

/* Return the device with MSI-X masked as initial states */
- for_each_pci_msi_entry(entry, dev) {
- /* Keep cached states to be restored */
+ for_each_pci_msi_entry(entry, dev)
  __pci_msix_desc_mask_irq(entry, 1);
- }

pci_msix_clear_and_set_ctrl(dev, PCI_MSIX_FLAGS_ENABLE, 0);
pci_intx_for_msi(dev, 1);
@@ -1028,8 +1046,6 @@
if (!pci_msi_supported(dev, minvec))
return -EINVAL;

-WARN_ON (!!dev->msix_enabled);
-
/* Check whether driver already requested MSI-X irqs */
if (dev->msix_enabled) {
dev_info(&dev->dev, 
@@ -1040,6 +1056,9 @@ 
if (maxvec < minvec) 
return -ERANGE;

+if (WARN_ON_ONCE(dev->msi_enabled)) 
+return -EINVAL;
+ 
+ nvec = pci_msi_vec_count(dev); 
if (nvec < 0) 
return nvec; 
@@ -1088,6 +1107,9 @@ 
if (maxvec < minvec) 
return -ERANGE;

+if (WARN_ON_ONCE(dev->msix_enabled)) 
+return -EINVAL;
+ 
+ for (;;) { 
if (affd) { 
 nvec = irq_calc_affinity_vectors(minvec, nvec, affd); 
@@ -1153,7 +1175,8 @@ 
const struct irq_affinity *affd) 
{ 
static const struct irq_affinity msi_default_affd; 
-int vecs = -ENOSPC;
+int msix_vecs = -ENOSPC;
+int msi_vecs = -ENOSPC;

if (flags & PCI_IRQ_AFFINITY) { 
if (!affd) 
@@ -1164,16 +1187,17 @@ 
} 

if (flags & PCI_IRQ_MSIX) { 
-vecs = __pci_enable_msi_range(dev, NULL, min_vecs, max_vecs, 
-affd); 
-if (vecs > 0) 
-return vecs; 
+msix_vecs = __pci_enable_msix_range(dev, NULL, min_vecs, 
+ max_vecs, affd); 
+if (msix_vecs > 0) 
+return msix_vecs; 
} 

if (flags & PCI_IRQ_MSI) { 
-vecs = __pci_enable_msi_range(dev, min_vecs, max_vecs, affd); 
-if (vecs > 0) 

-return vecs;
+msi_vecs = __pci_enable_msi_range(dev, min_vecs, max_vecs,
+     affd);
+if (msi_vecs > 0)
+return msi_vecs;
}

/* use legacy irq if allowed */
@@ -1184,7 +1208,9 @@
@@ -1184,7 +1208,9 @@
{return vecs;
+if (msix_vecs == -ENOSPC)
+return -ENOSPC;
+return msi_vecs;
}
EXPORT_SYMBOL(pci_alloc_irq_vectors_affinity);

--- linux-4.15.0.orig/drivers/pci/pci-acpi.c
+++ linux-4.15.0/drivers/pci/pci-acpi.c
@@ -573,7 +573,7 @@
{
while (bus->parent) {
 if (acpi_pm_device_can_wakeup(&bus->self->dev))
-    return acpi_pm_set_bridge_wakeup(&bus->self->dev, enable);
+    return acpi_pm_set_device_wakeup(&bus->self->dev, enable);
+return acpi_pm_set_device_wakeup(&bus->self->dev, enable);

 bus = bus->parent;
 }
@@ -581,7 +581,7 @@
 /* We have reached the root bus. */
 if (bus->bridge) {
 if (acpi_pm_device_can_wakeup(bus->bridge))
-    return acpi_pm_set_bridge_wakeup(bus->bridge, enable);
+    return acpi_pm_set_device_wakeup(bus->bridge, enable);
 } return 0;
 }
@@ -598,10 +598,21 @@
 struct acpi_device *adev = ACPI_COMPANION(&dev->dev);

+/*
+ * In some cases (eg. Samsung 305V4A) leaving a bridge in suspend over
+ * system-wide suspend/resume confuses the platform firmware, so avoid
+ * doing that. According to Section 16.1.6 of ACPI 6.2, endpoint
+ * devices are expected to be in D3 before invoking the S3 entry path
+*/
+ * from the firmware, so they should not be affected by this issue.
+ */
+ if (pci_is_bridge(dev) && acpi_target_system_state() != ACPI_STATE_S0)
+ return true;
+ if (!adev || !acpi_device_power_manageable(adev))
+ return false;
- if (device_may_wakeup(&dev->dev) != !!adev->wakeup.prepare_count)
+ if (adev->wakeup.flags.valid &&
+  device_may_wakeup(&dev->dev) != !!adev->wakeup.prepare_count)
+ return true;
+ if (acpi_target_system_state() == ACPI_STATE_S0)
@@ -723,6 +734,24 @@
    ACPI_FREE(obj);
    }
+static void pci_acpi_set_untrusted(struct pci_dev *dev)
+{
+ u8 val;
+ +
+ if (pci_pcie_type(dev) != PCI_EXP_TYPE_ROOT_PORT)
+ return;
+ if (device_property_read_u8(&dev->dev, "ExternalFacingPort", &val))
+ return;
+ */
+ * These root ports expose PCIe (including DMA) outside of the
+ * system so make sure we treat them and everything behind as
+ * untrusted.
+ */
+ if (val)
+ dev->untrusted = 1;
+ }
+ static void pci_acpi_setup(struct device *dev)
+ {
struct pci_dev *pci_dev = to_pci_dev(dev);
@@ -732,25 +761,40 @@
    return;
    pci_acpi_optimize_delay(pci_dev, adev->handle);
    pci_acpi_set_untrusted(pci_dev);
    pci_acpi_add_pm_notifier(adev, pci_dev);
    if (!adev->wakeup.flags.valid)
    return;

device_set_wakeup_capable(dev, true);
/*! 
 * For bridges that can do D3 we enable wake automatically (as 
 * we do for the power management itself in that case). The 
 * reason is that the bridge may have additional methods such as 
 * _DSW that need to be called.
 */
+if (pci_dev->bridge_d3)
device_wakeup_enable(dev);
+
acpi_pci_wakeup(pci_dev, false);
}

static void pci_acpi_cleanup(struct device *dev)
{
struct acpi_device *adev = ACPI_COMPANION(dev);
+struct pci_dev *pci_dev = to_pci_dev(dev);

if (!adev)
return;

pci_acpi_remove_pm_notifier(adev);
-if (adev->wakeup.flags.valid)
+if (adev->wakeup.flags.valid)
{
+if (pci_dev->bridge_d3)
+device_wakeup_disable(dev);
+
device_set_wakeup_capable(dev, false);
+
}
}

static bool pci_acpi_bus_match(struct device *dev)
--- linux-4.15.0.orig/drivers/pci/pci-driver.c
+++ linux-4.15.0/drivers/pci/pci-driver.c
@@ -400,7 +400,8 @@
#ifdef CONFIG_PCI_IOV
static inline bool pci_device_can_probe(struct pci_dev *pdev)
{
-return (!pdev->is_virtfn || pdev->physfn->sriov->drivers_autoprobe);
+return (!pdev->is_virtfn || pdev->physfn->sriov->drivers_autoprobe ||
+pdev->driver_override);
}
#else
static inline bool pci_device_can_probe(struct pci_dev *pdev)
@@ -415,6 +416,9 @@
struct pci_dev *pci_dev = to_pci_dev(dev);
 struct pci_driver *drv = to_pci_driver(dev->driver);
if (!pci_device_can_probe(pci_dev))
	return -ENODEV;

pci_assign_irq(pci_dev);

error = pcibios_alloc_irq(pci_dev);
@@ -422,12 +426,10 @@
return error;

pci_dev_get(pci_dev);
- if (pci_device_can_probe(pci_dev)) {
- error = __pci_device_probe(drv, pci_dev);
- if (error) {
- pcibios_free_irq(pci_dev);
- pci_dev_put(pci_dev);
- }
- +error = __pci_device_probe(drv, pci_dev);
+ if (error) {
+ pcibios_free_irq(pci_dev);
+ pci_dev_put(pci_dev);
+
} return error;
@@ -524,7 +526,6 @@
pci_power_up(pci_dev);
pci_restore_state(pci_dev);
pci_pme_restore(pci_dev);
-pci_fixup_device(pci_fixup_resume_early, pci_dev);
}

/*
@@ -699,7 +700,7 @@
pm_generic_complete(dev);

/* Resume device if platform firmware has put it in reset-power-on */
- if (dev->power.direct_complete && pm_resume_via_firmware()) {
+ if (pm_runtime_suspended(dev) && pm_resume_via_firmware()) {
pci_power_t pre_sleep_state = pci_dev->current_state;

pci_update_current_state(pci_dev, pci_dev->current_state);
@@ -722,6 +723,8 @@
struct pci_dev *pci_dev = to_pci_dev(dev);
const struct dev_pm_ops *pm = dev->driver ? dev->driver->pm : NULL;

+pci_dev->skip_bus_pm = false;
+
if (pci_has_legacy_pm_support(pci_dev))

rc

return pci_legacy_suspend(dev, PMSG_SUSPEND);

@@ -744,10 +747,11 @@
 * better to resume the device from runtime suspend here.
 */
 if (!dev_pm_test_driver_flags(dev, DPM_FLAG_SMART_SUSPEND) ||
    !pci_dev_keep_suspended(pci_dev)) {
 pm_runtime_resume(dev);
+ pci_dev->state_saved = false;
+
-pci_dev->state_saved = false;
 if (pm->suspend) {
 pci_power_t prev = pci_dev->current_state;
 int error;
@@ -783,8 +787,10 @@
 struct pci_dev *pci_dev = to_pci_dev(dev);
 const struct dev_pm_ops *pm = dev->driver ? dev->driver->pm : NULL;

-if (dev_pm_smart_suspend_and_suspended(dev))
+if (dev_pm_smart_suspend_and_suspended(dev)) {
+ dev->power.may_skip_resume = true;
 return 0;
+}

 if (pci_has_legacy_pm_support(pci_dev))
 return pci_legacy_suspend_late(dev, PMSG_SUSPEND);
@@ -812,7 +818,18 @@
 }
 }

-if (!pci_dev->state_saved) {
+if (pci_dev->skip_bus_pm) {
+/*
+ * Either the device is a bridge with a child in D0 below it, or
+ * the function is running for the second time in a row without
+ * going through full resume, which is possible only during
+ * suspend-to-idle in a spurious wakeup case. The device should
+ * be in D0 at this point, but if it is a bridge, it may be
+ * necessary to save its state.
+ */
+if (!pci_dev->state_saved)
+pci_save_state(pci_dev);
+} else if (!pci_dev->state_saved) {
 pci_save_state(pci_dev);
 if (pci_power_manageable(pci_dev))
 pci_prepare_to_sleep(pci_dev);
dev_dbg(dev, "PCI PM: Suspend power state: %s\n", pci_power_name(pci_dev->current_state));

+if (pci_dev->current_state == PCI_D0) {
    +pci_dev->skip_bus_pm = true;
    +/
    + * Per PCI PM r1.2, table 6-1, a bridge must be in D0 if any
    + * downstream device is in D0, so avoid changing the power state
    + * of the parent bridge by setting the skip_bus_pm flag for it.
    + */
    +if (pci_dev->bus->self)
    +pci_dev->bus->self->skip_bus_pm = true;
    +}
    +
    +if (pci_dev->skip_bus_pm && !pm_suspend_via_firmware()) {
        +dev_dbg(dev, "PCI PM: Skipped\n");
        +goto Fixup;
        +}
    +
    pci_pm_set_unknown_state(pci_dev);
*/

/**
 @@ -838,6 +871,16 @@
 Fixup:
 pci_fixup_device(pci_fixup_suspend_late, pci_dev);
 */

+*/
+ * If the target system sleep state is suspend-to-idle, it is sufficient
+ * to check whether or not the device's wakeup settings are good for
+ * runtime PM. Otherwise, the pm_resume_via_firmware() check will cause
+ * pci_pm_complete() to take care of fixing up the device's state
+ * anyway, if need be.
+ */
+dev->power.may_skip_resume = device_may_wakeup(dev) ||
+!device_can_wakeup(dev);
+return 0;
+}

@@ -847,6 +890,9 @@
 struct device_driver *drv = dev->driver;
 int error = 0;

+if (dev_pm_may_skip_resume(dev))
+return 0;
+*/
* Devices with DPM_FLAG_SMART_SUSPEND may be left in runtime suspend during system suspend, so update their runtime PM status to "active"
@@ -855,7 +901,16 @@
if (dev_pm_smart_suspend_and_suspended(dev))
    pm_runtime_set_active(dev);

-pci_pm_default_resume_early(pci_dev);
+/*
+ * In the suspend-to-idle case, devices left in D0 during suspend will
+ * stay in D0, so it is not necessary to restore or update their
+ * configuration here and attempting to put them into D0 again may
+ * confuse some firmware, so avoid doing that.
+ */
+if (!pci_dev->skip_bus_pm || pm_suspend_via_firmware())
    +pci_pm_default_resume_early(pci_dev);
+    +pci_fixup_device(pci_fixup_resume_early, pci_dev);
    +
    if (pci_has_legacy_pm_support(pci_dev))
        return pci_legacy_resume_early(dev);
    @@ -927,15 +982,16 @@
    }

    /*
    * This used to be done in pci_pm_prepare() for all devices and some
    * drivers may depend on it, so do it here. Ideally, runtime-suspended
    * devices should not be touched during freeze/thaw transitions,
    * however.
    * Resume all runtime-suspended devices before creating a snapshot
    * image of system memory, because the restore kernel generally cannot
    * be expected to always handle them consistently and they need to be
    * put into the runtime-active metastate during system resume anyway,
    * so it is better to ensure that the state saved in the image will be
    * always consistent with that.
    */
    -if (!dev_pm_test_driver_flags(dev, DPM_FLAG_SMART_SUSPEND))
        -pm_runtime_resume(dev);
        -
        +pm_runtime_resume(dev);
        pci_dev->state_saved = false;
        +
        if (pm->freeze) {
            int error;
            @@ -1009,17 +1065,22 @@
            return error;
        }


if (pci_has_legacy_pm_support(pci_dev))
return pci_legacy_resume_early(dev);

/*
- * pci_restore_state() requires the device to be in D0 (because of MSI
- * restoration among other things), so force it into D0 in case the
- * driver's "freeze" callbacks put it into a low-power state directly.
+ * Both the legacy ->resume_early() and the new pm->thaw_noirq()
+ * callbacks assume the device has been returned to D0 and its
+ * config state has been restored.
+ *
+ * In addition, pci_restore_state() restores MSI-X state in MMIO
+ * in case the driver's "freeze" callbacks put it into a low-power
+ * state.
*/
pci_set_power_state(pci_dev, PCI_D0);
pci_restore_state(pci_dev);

@if (pci_has_legacy_pm_support(pci_dev))
+return pci_legacy_resume_early(dev);
+
+if (drv && drv->pm && drv->pm->thaw_noirq)
error = drv->pm->thaw_noirq(dev);

@@ -1148,6 +1209,7 @@
}
pci_pm_default_resume_early(pci_dev);
+pci_fixup_device(pci_fixup_resume_early, pci_dev);

if (pci_has_legacy_pm_support(pci_dev))
return pci_legacy_resume_early(dev);
@@ -1211,36 +1273,38 @@
int error;

/*
- * If pci_dev->driver is not set (unbound), the device should
- * always remain in D0 regardless of the runtime PM status
+ * If pci_dev->driver is not set (unbound), we leave the device in D0,
+ * but it may go to D3cold when the bridge above it runtime suspends.
+ * Save its config space in case that happens.
*/
-if (!pci_dev->driver)
+if (!pci_dev->driver) {
+pci_save_state(pci_dev);
return 0;
-
-if (!pm || !pm->runtime_suspend)
-return -ENOSYS;
+
pci_dev->state_saved = false;
-error = pm->runtime_suspend(dev);
-if (error) {
+if (pm && pm->runtime_suspend) {
+error = pm->runtime_suspend(dev);
/*
 * -EBUSY and -EAGAIN is used to request the runtime PM core
 * to schedule a new suspend, so log the event only with debug
 * log level.
 */
-if (error == -EBUSY || error == -EAGAIN)
+if (error == -EBUSY || error == -EAGAIN) {
dev_dbg(dev, "can't suspend now (%pf returned %d)/n",
pm->runtime_suspend, error);
-else
+} else if (error) {
 dev_err(dev, "can't suspend (%pf returned %d)/n",
pm->runtime_suspend, error);
-}
-return error;
+} else if (error) {
+return error;
+}
}
}
pci_fixup_device(pci_fixup_suspend, pci_dev);

-if (!pci_dev->state_saved && pci_dev->current_state != PCI_D0
+if (pm && pm->runtime_suspend
+ && !pci_dev->state_saved && pci_dev->current_state != PCI_D0
 && pci_dev->current_state != PCI_UNKNOWN) {
WARN_ONCE(pci_dev->current_state != prev, 
"PCI PM: State of device not saved by %F%n",
@@ -1258,26 +1322,26 @@

static int pci_pm_runtime_resume(struct device *dev)
{
-int rc;
+int rc = 0;
 struct pci_dev *pci_dev = to_pci_dev(dev);
 const struct dev_pm_ops *pm = dev->driver ? dev->driver->pm : NULL;

 /*
-* If pci_dev->driver is not set (unbound), the device should
- * always remain in D0 regardless of the runtime PM status
+ * Restoring config space is necessary even if the device is not bound
+ * to a driver because although we left it in D0, it may have gone to
+ * D3cold when the bridge above it runtime suspended.

*/
+pci_restore_standard_config(pci_dev);
+
if (!pci_dev->driver)
return 0;

-if (!pm || !pm->runtime_resume)
-return -ENOSYS;
-
-pci_restore_standard_config(pci_dev);
pci_fixup_device(pci_fixup_resume_early, pci_dev);
pci_enable_wake(pci_dev, PCI_D0, false);
pci_fixup_device(pci_fixup_resume, pci_dev);

-rc = pm->runtime_resume(dev);
+rc = pm->runtime_resume(dev);
pci_dev->runtime_d3cold = false;

--- linux-4.15.0.orig/drivers/pci/pci-label.c
+++ linux-4.15.0/drivers/pci/pci-label.c
@@ -161,7 +161,7 @@
 len = utf16s_to_utf8s((const wchar_t *)obj->buffer.pointer,
 obj->buffer.length,
 UTF16_LITTLE_ENDIAN,
- buf, PAGE_SIZE);
+ buf, PAGE_SIZE - 1);
buf[len] = '\n';
}

--- linux-4.15.0.orig/drivers/pci/pci-mid.c
+++ linux-4.15.0/drivers/pci/pci-mid.c
@@ -65,8 +65,8 @@
 * arch/x86/platform/intel-mid/pwr.c.
 */
static const struct x86_cpu_id lpss_cpu_ids[] = {
-ICPU(INTEL_FAM6_ATOM_PENWELL),
-ICPU(INTEL_FAM6_ATOM_MERRIFIELD),
+ICPU(INTEL_FAM6_ATOM_SALTWELL_MID),
+ICPU(INTEL_FAM6_ATOM_SILVERMONT_MID),
};
--- linux-4.15.0.orig/drivers/pci/pci-sysfs.c
+++ linux-4.15.0/drivers/pci/pci-sysfs.c
@@ -168,6 +168,9 @
    return -EINVAL;
switch (linkcap & PCI_EXP_LNKCAP_SLS) {
  +case PCI_EXP_LNKCAP_SLS_16_0GB:  
    +speed = "16 GT/s";   
    +break;             
  case PCI_EXP_LNKCAP_SLS_8_0GB:  
    speed = "8 GT/s";   
    break;          
@@ -213,6 +216,9 @
    return -EINVAL;
switch (linkstat & PCI_EXP_LNKSTA_CLS) {
  +case PCI_EXP_LNKSTA_CLS_16_0GB:  
    +speed = "16 GT/s";   
    +break;             
  case PCI_EXP_LNKSTA_CLS_8_0GB:  
    speed = "8 GT/s";   
    break;          
@@ -305,13 +311,16 @
            } else
            +device_lock(dev);   
            +if (dev->driver)   
            +result = -EBUSY;  
            +else if (val)   
            result = pci_enable_device(pdev);   
            +else if (pci_is_enabled(pdev))   
            +pci_disable_device(pdev);   
            +else   
            +result = -EIO;   
            +device_unlock(dev);   

        return result < 0 ? result : count;   
    }   
@@ -493,7 +502,7 @
           pci_stop_and_remove_bus_device_locked(to_pci_dev(dev));   
           return count;
+static struct device_attribute dev_remove_attr = __ATTR(remove,
+S_IWUSR|S_IWGRP),
+NULL, remove_store);

@@ -919,6 +928,9 @@
loff_t init_off = off;
 u8 *data = (u8 *) buf;

+if (kernel_is_locked_down("Direct PCI access"))
+return -EPERM;
+ if (off > dev->cfg_size)
return 0;
if (off + count > dev->cfg_size) {
@@ -1213,6 +1225,9 @@
enum pci_mmap_state mmap_type;
struct resource *res = &pdev->resource[bar];

+if (kernel_is_locked_down("Direct PCI access"))
+return -EPERM;
+ if (res->flags & IORESOURCE_MEM && iomem_is_exclusive(res->start))
return -EINVAL;
@@ -1293,6 +1308,9 @@
struct bin_attribute *attr, char *buf,
 loff_t off, size_t count)
{
+if (kernel_is_locked_down("Direct PCI access"))
+return -EPERM;
+ return pci_resource_io(filp, kobj, attr, buf, off, count, true);
}

--- linux-4.15.0.orig/drivers/pci/pci.c
+++ linux-4.15.0/drivers/pci/pci.c
@@ -21,6 +21,7 @@
#include <linux/spinlock.h>
#include <linux/log2.h>
+#include <linux/logic_pio.h>
#include <linux/pci-aspm.h>
#include <linux/pm_wakeup.h>
#include <linux/interrupt.h>
@@ -749,19 +750,6 @@
}
### pci_power_up - Put the given device into D0 forcibly

```c
void pci_power_up(struct pci_dev *dev) {
    if (platform_pci_power_manageable(dev))
        platform_pci_set_power_state(dev, PCI_D0);
    pci_raw_set_power_state(dev, PCI_D0);
    pci_update_current_state(dev, PCI_D0);
}
```

### pci_platform_power_transition - Use platform to change device power state

```c
EXPORT_SYMBOL(pci_set_power_state);
```

```c
/**
 * pci_power_up - Put the given device into D0 forcibly
 * @dev: PCI device to power up
 */
void pci_power_up(struct pci_dev *dev) {
    __pci_start_power_transition(dev, PCI_D0);
    pci_raw_set_power_state(dev, PCI_D0);
    pci_update_current_state(dev, PCI_D0);
}
```

### pci_choose_state - Choose the power state of a PCI device

```c
EXPORT_SYMBOL(pci_save_state);
```

```c
static void pci_restore_config_dword(struct pci_dev *pdev, int offset,
     u32 saved_val, int retry) {
    u32 val;
    pci_read_config_dword(pdev, offset, &val);
    if (val == saved_val)
        return;
    if (retry)
        return;
    for (int i = 0; i < retry; i++) {
       pci_read_config_dword(pdev, offset, &val);
        if (val == saved_val)
            return;
    }
}
```
for (;;) {
    @ @ -1136,25 +1135,63 @@
}

static void pci_restore_config_space_range(struct pci_dev *pdev,
    - int start, int end, int retry)
+ int start, int end, int retry,
+ bool force)
{
    int index;

    for (index = end; index >= start; index--)
        pci_restore_config_dword(pdev, 4 * index,
            pdev->saved_config_space[index],
            - retry);
+ retry, force);
}

static void pci_restore_config_space(struct pci_dev *pdev) {
    if (pdev->hdr_type == PCI_HEADER_TYPE_NORMAL) {
        -pci_restore_config_space_range(pdev, 10, 15, 0);
        +pci_restore_config_space_range(pdev, 10, 15, 0, false);
        /* Restore BARs before the command register. */
        -pci_restore_config_space_range(pdev, 4, 9, 10);
        -pci_restore_config_space_range(pdev, 0, 3, 0);
        +pci_restore_config_space_range(pdev, 4, 9, 10, false);
        +pci_restore_config_space_range(pdev, 0, 3, 0, false);
    } else if (pdev->hdr_type == PCI_HEADER_TYPE_BRIDGE) {
        +pci_restore_config_space_range(pdev, 12, 15, 0, false);
    + /*
    + * Force rewriting of prefetch registers to avoid S3 resume
    + * issues on Intel PCI bridges that occur when these
    + * registers are not explicitly written.
    + */
        +pci_restore_config_space_range(pdev, 9, 11, 0, true);
        +pci_restore_config_space_range(pdev, 0, 8, 0, false);
    } else {
        -pci_restore_config_space_range(pdev, 0, 15, 0);
        +pci_restore_config_space_range(pdev, 0, 15, 0, false);
    +}
+}
+
+static void pci_restore_rebar_state(struct pci_dev *pdev) +{
unsigned int pos, nbars, i;
+u32 ctrl;
+
+pos = pci_find_ext_capability(pdev, PCI_EXT_CAP_ID_REBAR);
+if (!pos)
+return;
+
+pci_read_config_dword(pdev, pos + PCI_REBAR_CTRL, &ctrl);
+nbars = (ctrl & PCI_REBAR_CTRL_NBAR_MASK) >>
+PCI_REBAR_CTRL_NBAR_SHIFT;
+
+for (i = 0; i < nbars; i++, pos += 8) {
+struct resource *res;
+int bar_idx, size;
+
+pci_read_config_dword(pdev, pos + PCI_REBAR_CTRL, &ctrl);
+bar_idx = ctrl & PCI_REBAR_CTRL_BAR_IDX;
+res = pdev->resource + bar_idx;
+size = ilog2(resource_size(res)) - 20;
+ctrl &= PCI_REBAR_CTRL_BAR_SIZE;
+ctrl |= size << 8;
+pci_write_config_dword(pdev, pos + PCI_REBAR_CTRL, ctrl);
+
pci_restore_rebar_state(dev);
pci_cleanup_aer_error_status_regs(dev);

pci_restore_pri_state(dev);
pci_restore_ats_state(dev);
pici_restore_vc_state(dev);

if (atomic_inc_return(&dev->enable_cnt) > 1)
return 0;/* already enabled */

if (atomic_inc_return(&dev->enable_cnt) > 1)
return 0;/* already enabled */

unsigned int pinned:1;
unsigned int orig_intx:1;
unsigned int restore_intx:1;
+unsigned int mwi:1;
u32 region_mask;
};

@@ -1476,6 +1511,9 @@
 if (this->region_mask & (1 << i))
  pci_release_region(dev, i);

 +if (this->mwi)
 +pci_clear_mwi(dev);
 +
 if (this->restore_intx)
  pci_intx(dev, this->orig_intx);

@@ -1775,6 +1813,13 @@
 /*
 if (bridge && bridge->current_state != PCI_D0)
  continue;
+/*
 + * If the device is in D3cold it should not be
 + * polled either.
 + */
 +if (pme_dev->dev->current_state == PCI_D3cold)
 +continue;
 +
  pci_pme_wakeup(pme_dev->dev, NULL);
 } else {
  list_del(&pme_dev->list);
@@ -1892,7 +1937,7 @@
 EXPORT_SYMBOL(pci_pme_active);

 /**
- * pci_enable_wake - enable PCI device as wakeup event source
+ * __pci_enable_wake - enable PCI device as wakeup event source
 * @dev: PCI device affected
 * @state: PCI state from which device will issue wakeup events
 * @enable: True to enable event generation; false to disable
 @@ -1910,7 +1955,7 @@
 * Error code depending on the platform is returned if both the platform and
 * the native mechanism fail to enable the generation of wake-up events
 */
- int pci_enable_wake(struct pci_dev *dev, pci_power_t state, bool enable)
+ static int __pci_enable_wake(struct pci_dev *dev, pci_power_t state, bool enable)
 { int ret = 0;
if (enable) {
    int error;

    -if (pci_pme_capable(dev, state))
    +/* Enable PME signaling if the device can signal PME from
    +  D3cold regardless of whether or not it can signal PME from
    +  the current target state, because that will allow it to
    +  signal PME when the hierarchy above it goes into D3cold and
    +  the device itself ends up in D3cold as a result of that.
    + */
    +if (pci_pme_capable(dev, state) || pci_pme_capable(dev, PCI_D3cold))
    pci_pme_active(dev, true);
    else
    ret = 1;
}
@@ -1951,6 +2003,23 @@

return ret;
}
+
+/**
+ * pci_enable_wake - change wakeup settings for a PCI device
+ * @pci_dev: Target device
+ * @state: PCI state from which device will issue wakeup events
+ * @enable: Whether or not to enable event generation
+ *
+ * If @enable is set, check device_may_wakeup() for the device before calling
+ * __pci_enable_wake() for it.
+ */
+int pci_enable_wake(struct pci_dev *pci_dev, pci_power_t state, bool enable)
+{
+    +if (enable && !device_may_wakeup(&pci_dev->dev))
+        +return -EINVAL;
+
+    return __pci_enable_wake(pci_dev, state, enable);
+}
+EXPORT_SYMBOL(pci_enable_wake);

/**
 @@ -1963,9 +2032,9 @@
 * should not be called twice in a row to enable wake-up due to PCI PM vs ACPI
 * ordering constraints.
 *
- * This function only returns error code if the device is not capable of
- * generating PME# from both D3_hot and D3_cold, and the platform is unable to
- * enable wake-up power for it.
+ * This function only returns error code if the device is not allowed to wake
+ * up the system from sleep or it is not capable of generating PME# from both
+ * D3_hot and D3_cold and the platform is unable to enable wake-up power for it.
+ */

int pci_wake_from_d3(struct pci_dev *dev, bool enable)
{
    @ @ -2021,17 +2090,21 @@
    if (dev->current_state == PCI_D3cold)
        target_state = PCI_D3cold;

    -if (wakeup) {
        +if (wakeup && dev->pme_support) {
            pci_power_t state = target_state;
            +
            /*
             * Find the deepest state from which the device can generate
             * wake-up events, make it the target state and enable device
             * to generate PME#.
             */
        -if (dev->pme_support) {
            -		while (target_state
            -			      && !(dev->pme_support & (1 << target_state)))
            -				target_state--;
            -
            +while (state && !(dev->pme_support & (1 << state)))
            +
            +
            +if (state)
            +
            +}
            +else if (dev->pme_support & 1)
            +
            +return PCI_D0;
            }

        return target_state;
    @ @ -2096,7 +2169,7 @@

    dev->runtime_d3cold = target_state == PCI_D3cold;

    -pci_enable_wake(dev, target_state, pci_dev_run_wake(dev));
    +pci_enable_wake(dev, target_state, pci_dev_run_wake(dev));

    error = pci_set_power_state(dev, target_state);

    @ @ -2120,16 +2193,16 @@
    }
    struct pci_bus *bus = dev->bus;

    -if (device_can_wakeup(&dev->dev))
    -return true;
if (!dev->pme_support)
    return false;

/* PME-capable in principle, but not from the target power state */
-if (!pci_pme_capable(dev, pci_target_state(dev, false)))
+if (!pci_pme_capable(dev, pci_target_state(dev, true)))
    return false;

+if (device_can_wakeup(&dev->dev))
    return true;

+while (bus->parent) {
    struct pci_dev *bridge = bus->self;

    pm_runtime_put_sync(parent);
}

+static const struct dmi_system_id bridge_d3_blacklist[] = {
+  #ifdef CONFIG_X86
+    {
+      /*
+       * Gigabyte X299 root port is not marked as hotplug capable
+       * which allows Linux to power manage it. However, this
+       * confuses the BIOS SMI handler so don't power manage root
+       * ports on that system.
+       */
+       .ident = "X299 DESIGNARE EX-CF",
+       .matches = {
+         DMI_MATCH(DMI_BOARD_VENDOR, "Gigabyte Technology Co., Ltd."),
+         DMI_MATCH(DMI_BOARD_NAME, "X299 DESIGNARE EX-CF"),
+       },
+   },
+  #endif
+  { }
+};
+
+/**
+ * pci_bridge_d3_possible - Is it possible to put the bridge into D3
+ * @bridge: Bridge to check
+ */
+if (pci_bridge_d3_force)
    return true;

+if (dmi_check_system(bridge_d3_blacklist))
    return false;

+}
It should be safe to put PCIe ports from 2015 or newer
to D3,
@@ -3016,7 +3111,14 @@ return 0;
pci_read_config_dword(pdev, pos + PCI_REBAR_CAP, &cap);
-return (cap & PCI_REBAR_CAP_SIZES) >> 4;
+cap &= PCI_REBAR_CAP_SIZES;
+
+/* Sapphire RX 5600 XT Pulse has an invalid cap dword for BAR 0 */
+if (pdev->vendor == PCI_VEND_0015 & & pdev->device == 0x731f & &
+ bar == 0 & & cap == 0x7000)
+cap = 0x3f000;
+
+return cap >> 4;
}

-#ifdef PCI_IOBASE
-struct io_range {
-struct list_head list;
-phys_addr_t start;
-resource_size_t size;
-};
-
-static LIST_HEAD(io_range_list);
-static DEFINE_SPINLOCK(io_range_lock);
-#endif
-
/*
 * Record the PCI IO range (expressed as CPU physical address + size).
 * Return a negative value if an error has occured, zero otherwise
 */
-int __weak pci_register_io_range(phys_addr_t addr, resource_size_t size)
+int pci_register_io_range(struct fwnode_handle *fwnode, phys_addr_t addr,
+resource_size_t tsize)
{ 
-int err = 0;
-
+int ret = 0;
#ifdef PCI_IOBASE
-struct io_range *range;
-resource_size_t allocated_size = 0;
/* check if the range hasn't been previously recorded */
spin_lock(&io_range_lock);
list_for_each_entry(range, &io_range_list, list) {
  if (addr >= range->start && addr + size <= range->start + size) {
    /* range already registered, bail out */
goto end_register;
  }
  allocated_size += range->size;
}

/* range not registered yet, check for available space */
if (allocated_size + size - 1 > IO_SPACE_LIMIT) {
  /* if it's too big check if 64K space can be reserved */
  if (allocated_size + SZ_64K - 1 > IO_SPACE_LIMIT) {
    err = -E2BIG;
goto end_register;
  }
  struct logic_pio_hwaddr *range;
  size = SZ_64K;
  pr_warn("Requested IO range too big, new size set to 64K\n");
}
if (!size || addr + size < addr)
return -EINVAL;

/* add the range to the list */
range = kzalloc(sizeof(*range), GFP_ATOMIC);
if (!range) {
  err = -ENOMEM;
goto end_register;
}
range->start = addr;
range->fwnode = fwnode;
range->size = size;
range->hw_start = addr;
range->flags = LOGIC_PIO_CPU_MMIO;
list_add_tail(&range->list, &io_range_list);

end_register:
spin_unlock(&io_range_lock);
ret = logic_pio_register_range(range);
if (ret)
kfree(range);
/* Ignore duplicates due to deferred probing */
+if (ret == -EEXIST)
+ret = 0;
#endif

{return err;
+return ret;
}

phys_addr_t pci_pio_to_address(unsigned long pio)
@@ -3433,21 +3506,10 @@
phys_addr_t address = (phys_addr_t)OF_BAD_ADDR;

#ifdef PCI_IOBASE
-struct io_range *range;
-resource_size_t allocated_size = 0;
-
-#ifdef PCI_IOBASE
+if (pio >= MMIO_UPPER_LIMIT)
+return address;
-else
-#endif
-
-else
-#ifdef PCI_IOBASE
-
-else
-#endif
-#endif
-#endif
+	address = logic_pio_to_hwaddr(pio);
+#endif

return address;
@@ -3456,21 +3518,7 @@
unsigned long __weak pci_address_to_pio(phys_addr_t address)
{
#ifdef PCI_IOBASE
-struct io_range *res;
-resource_size_t offset = 0;
-unsigned long addr = -1;
-
-else
-#endif
-#endif
-#endif
-#endif
-#endif
-#endif
+addr = address - res->start + offset;
+-break;

return address;
@@ -3464,21 +3526,7 @@
unsigned long __weak pci_address_to_pio(phys_addr_t address)
{
#ifdef PCI_IOBASE
-struct io_range *res;
-resource_size_t offset = 0;
-unsigned long addr = -1;
-
-else
-#endif
-#endif
-#endif
-#endif
-#endif
-#endif
-#endif
+addr = address - res->start + offset;
+-break;
spin_unlock(&io_range_lock);
-
-return addr;
+return logic_pio_trans_cpuaddr(address);
#endif
if (address > IO_SPACE_LIMIT)
return (unsigned long)-1;
@@ -3529,6 +3577,44 @@
}
EXPORT_SYMBOL(pci_unmap_iospace);

+static void devm_pci_unmap_iospace(struct device *dev, void *ptr)
+{
+struct resource **res = ptr;
+
+pci_unmap_iospace(*res);
+}
+
+/**
+ * devm_pci_unmap_iospace - Managed pci_remap_iospace()
+ * @dev: Generic device to remap IO address for
+ * @res: Resource describing the I/O space
+ * @phys_addr: physical address of range to be mapped
+ *
+ * Managed pci_remap_iospace(). Map is automatically unmapped on driver
+ * detach.
+ */
+int devm_pci_remap_iospace(struct device *dev, const struct resource *res,
+ phys_addr_t phys_addr)
+{
+const struct resource **ptr;
+int error;
+
+ptr = devres_alloc(devm_pci_unmap_iospace, sizeof(*ptr), GFP_KERNEL);
+if (!ptr)
+return -ENOMEM;
+
+error = pci_remap_iospace(res, phys_addr);
+if (error) {
+devres_free(ptr);
+} else{
+*ptr = res;
+devres_add(dev, ptr);
+}
+return error;
+
/**
 * devm_pci_remap_cfgspace - Managed pci_remap_cfgspace()
 * @dev: Generic device to remap IO address for
 @@ -3761,6 +3847,27 @@
 EXPORT_SYMBOL(pci_set_mwi);

 /**
 * pcim_set_mwi - a device-managed pci_set_mwi()
 * @dev: the PCI device for which MWI is enabled
 * *
 * Managed pci_set_mwi().
 * *
 * RETURNS: An appropriate -ERRNO error value on error, or zero for success.
 * */
+int pcim_set_mwi(struct pci_dev *dev)
+{
+struct pci_devres *dr;
+
+dr = find_pci_dr(dev);
+if (!dr)
+    return -ENOMEM;
+
+dr->mwi = 1;
+return pci_set_mwi(dev);
+}
+EXPORT_SYMBOL(pcim_set_mwi);

/**
 * pci_try_set_mwi - enables memory-write-invalidate PCI transaction
 * @dev: the PCI device for which MWI is enabled
 * @
 @@ -5226,10 +5333,16 @@
 while (*p) {
     count = 0;
     if (sscanf(p, "%d%n", &align_order, &count) == 1 &&
         p[count] == '@') {
         p[count] == '@') {
         p += count + 1;
+         if (align_order > 63) {
+            pr_err("PCI: Invalid requested alignment (order %d)n",
+                    align_order);
+            align_order = PAGE_SHIFT;
+        }
         p += count + 1;
} else {
    align_order = -1;
    align_order = PAGE_SHIFT;
}
if (strncmp(p, "pci:", 4) == 0) {
    /* PCI vendor/device (subvendor/subdevice) ids are specified */
    @ @ @ .5249.10 +5362.7 @@
    (!subsystem_vendor || (subsystem_vendor == dev->subsystem_vendor)) &&
    (!subsystem_device || (subsystem_device == dev->subsystem_device))) {
        *resize = true;
        -if (align_order == -1)
        -align = PAGE_SIZE;
        -else
        -align = 1 << align_order;
        +align = 1ULL << align_order;
        /* Found */
        break;
    }
--- linux-4.15.0.orig/drivers/pci/pci.h
+++ linux-4.15.0/drivers/pci/pci.h
@@ -342,6 +342,26 @@
    void pci_enable_acs(struct pci_dev *dev);

+#ifdef CONFIG_PCIEASPM
    +void pcie_aspm_init_link_state(struct pci_dev *pdev);
    +void pcie_aspm_exit_link_state(struct pci_dev *pdev);
    +void pcie_aspm_pm_state_change(struct pci_dev *pdev);
    +void pcie_aspm_powersave_config_link(struct pci_dev *pdev);
    +#else
    +static inline void pcie_aspm_init_link_state(struct pci_dev *pdev) { }
    +static inline void pcie_aspm_exit_link_state(struct pci_dev *pdev) { }
    +static inline void pcie_aspm_pm_state_change(struct pci_dev *pdev) { }
    +static inline void pcie_aspm_powersave_config_link(struct pci_dev *pdev) { }
    +#endif
    +
    +#ifdef CONFIG_PCIEASPM_DEBUG
    +void pcie_aspm_create_sysfs_dev_files(struct pci_dev *pdev);
    +void pcie_aspm_remove_sysfs_dev_files(struct pci_dev *pdev);
    +#else
    +static inline void pcie_aspm_create_sysfs_dev_files(struct pci_dev *pdev) { }
    +static inline void pcie_aspm_remove_sysfs_dev_files(struct pci_dev *pdev) { }
    +#endif
    +
    +#ifdef CONFIG_PCIE_PTM
    void pci_ptm_init(struct pci_dev *dev);
    +#else
    @@ @ @ .366.6 +386.12 @@
#if defined(CONFIG_PCI_QUIRKS) && defined(CONFIG_ARM64)
int acpi_get_rc_resources(struct device *dev, const char *hid, u16 segment,
   struct resource *res);
#else
+static inline int acpi_get_rc_resources(struct device *dev, const char *hid,
+   u16 segment, struct resource *res)
+{
++return -ENODEV;
++}
#endif

u32 pci_rebar_get_possible_sizes(struct pci_dev *pdev, int bar);
--- linux-4.15.0.orig/drivers/pci/pcie/Kconfig
+++ linux-4.15.0/drivers/pci/pcie/Kconfig
@@ -92,7 +92,7 @@
 config PCIE_DPC
 bool "PCIe Downstream Port Containment support"
 -depends on PCIEPORTBUS
-+depends on PCIEPORTBUS && PCIEAER
 default n
 help
 This enables PCI Express Downstream Port Containment (DPC)
--- linux-4.15.0.orig/drivers/pci/aer/aerdrv_core.c
 +++ linux-4.15.0/drivers/pci/aer/aerdrv_core.c
@@ -633,7 +633,8 @@
 continue;
 }RecyclerView
 cper_print_aer(pdev, entry.severity, entry.regs);
-+do_recovery(pdev, entry.severity);
+if (entry.severity != AER_CORRECTABLE)
+do_recovery(pdev, entry.severity);
 pci_dev_put(pdev);
 }
 }
@@ -660,7 +661,7 @@
/* The device might not support AER */
if (!pos)
-+return 1;
+return 0;

if (info->severity == AER_CORRECTABLE) {
pci_read_config_dword(dev, pos + PCI_ERR_COR_STATUS,
--- linux-4.15.0.orig/drivers/pci/pcie/aspm.c
+++ linux-4.15.0/drivers/pci/pcie/aspm.c
@@ -43,18 +43,6 @@
#define ASPM_STATE_ALL(ASPM_STATE_L0S | ASPM_STATE_L1 |}

Open Source Used In 5GaaS Edge AC-4  26907
/*
 * When L1 substates are enabled, the LTR L1.2 threshold is a timing parameter
 * that decides whether L1.1 or L1.2 is entered (Refer PCIe spec for details).
 * Not sure is there is a way to "calculate" this on the fly, but maybe we
 * could turn it into a parameter in future. This value has been taken from
 * the following files from Intel's coreboot (which is the only code I found
 * to have used this):
 * https://review.coreboot.org/#/c/8832/
 * /
#define LTR_L1_2_THRESHOLD_BITS ((1 << 21) | (1 << 23) | (1 << 30))

 struct aspm_latency {
    u32 l0s; /* L0s latency (nsec) */
    u32 l1; /* L1 latency (nsec) */
 @ @ -80.6 +68.7 @@
    u32 clkpm_capable:1; /* Clock PM capable? */
    u32 clkpm_enabled:1; /* Current Clock PM state */
    u32 clkpm_default:1; /* Default Clock PM state by BIOS */
    +u32 clkpm_disable:1; /* Clock PM disabled */

 /* Exit latencies */
 struct aspm_latency latency_up; /* Upstream direction exit latency */
    @ @ -177.8 +166.11 @@

 static void pcie_set_clkpm(struct pcie_link_state *link, int enable) {
    /* Don't enable Clock PM if the link is not Clock PM capable */
    if (!link->clkpm_capable)
        /* Don't enable Clock PM if the link is not Clock PM capable
           or Clock PM is disabled */
        +
        +if (!link->clkpm_enabled || link->clkpm_disable)
            enable = 0;
        /* Need nothing if the specified equals to current state */
        if (link->clkpm_enabled == enable)
            @ @ -208.7 +200.40 @@
    }
    link->clkpm_enabled = enabled;
    link->clkpm_default = enabled;
    -link->clkpm_capable = (blacklist) ? 0 : capable;
    +link->clkpm_capable = capable;
    +link->clkpm_disable = blacklist ? 1 : 0;
    +}
    +


+static bool pcie_retrain_link(struct pcie_link_state *link)
+{
+    struct pci_dev *parent = link->pdev;
+    unsigned long start_jiffies;
+    u16 reg16;
+    
+    pcie_capability_read_word(parent, PCI_EXP_LNKCTL, &reg16);
+    reg16 |= PCI_EXP_LNKCTL_RL;
+    pcie_capability_write_word(parent, PCI_EXP_LNKCTL, reg16);
+    
+    /* Due to an erratum in some devices the Retrain Link bit
+    * needs to be cleared again manually to allow the link
+    * training to succeed.
+    */
+    reg16 &= ~PCI_EXP_LNKCTL_RL;
+    pcie_capability_write_word(parent, PCI_EXP_LNKCTL, reg16);
+}
+
+/* Wait for link training end. Break out after waiting for timeout */
+start_jiffies = jiffies;
+for (;;) {
+    pcie_capability_read_word(parent, PCI_EXP_LNKSTA, &reg16);
+    if (!(reg16 & PCI_EXP_LNKSTA_LT))
+        break;
+    if (time_after(jiffies, start_jiffies + LINK_RETRAIN_TIMEOUT))
+        break;
+    usleep(1);
+}
+return !(reg16 & PCI_EXP_LNKSTA_LT);
}

/*@ -220,7 +245,6 @@
{
int same_clock = 1;
    u16 reg16, parent_reg, child_reg[8];
    unsigned long start_jiffies;
    struct pci_dev *child, *parent = link->pdev;
    struct pci_bus *linkbus = parent->subordinate;
*/
/*@ -260,21 +284,7 @@
    reg16 &= ~PCI_EXP_LNKCTL_CCC;
    pcie_capability_write_word(parent, PCI_EXP_LNKCTL, reg16);
*/

-/* Retrain link */
-    reg16 |= PCI_EXP_LNKCTL_RL;
-    pcie_capability_write_word(parent, PCI_EXP_LNKCTL, reg16);
- /* Wait for link training end. Break out after waiting for timeout */
- start_jiffies = jiffies;
- for (;;) {
- pcie_capability_read_word(parent, PCI_EXP_LNKSTA, &reg16);
- if (!(reg16 & PCI_EXP_LNKSTA_LT))
- break;
- if (time_after(jiffies, start_jiffies + LINK_RETRAIN_TIMEOUT))
- break;
- msleep(1);
- }
- if (!(reg16 & PCI_EXP_LNKSTA_LT))
- if (pcie_retrain_link(link))
- return;

/* Training failed. Restore common clock configurations */
@@ -333,6 +343,32 @@
 return 0;
 }

+static void encode_l12_threshold(u32 threshold_us, u32 *scale, u32 *value)
+{
+ u64 threshold_ns = threshold_us * 1000;
+ +/* See PCIe r3.1, sec 7.33.3 and sec 6.18 */
+ if (threshold_ns < 32) {
+ *scale = 0;
+ *value = threshold_ns;
+ } else if (threshold_ns < 1024) {
+ *scale = 1;
+ *value = threshold_ns >> 5;
+ } else if (threshold_ns < 32768) {
+ *scale = 2;
+ *value = threshold_ns >> 10;
+ } else if (threshold_ns < 1048576) {
+ *scale = 3;
+ *value = threshold_ns >> 15;
+ } else if (threshold_ns < 33554432) {
+ *scale = 4;
+ *value = threshold_ns >> 20;
+ } else {
+ *scale = 5;
+ *value = threshold_ns >> 25;
+ } +
+ }
+
+ struct aspm_register_info {
+ u32 support:2;
u32 enabled:2;
@@ -370,6 +406,15 @@
 info->l1ss_cap = 0;
 return;
 }
+
+/*
+ * If we don't have LTR for the entire path from the Root Complex
+ * to this device, we can't use ASPM L1.2 because it relies on the
+ * LTR_L1.2_THRESHOLD. See PCIe r4.0, secs 5.5.4, 6.18.
+ */
+if (!pdev->ltr_path)
+info->l1ss_cap &= ~PCI_L1SS_CAP_ASPM_L1_2;
+
+pci_read_config_dword(pdev, info->l1ss_cap_ptr + PCI_L1SS_CTL1,
+    &info->l1ss_ctl1);
+pci_read_config_dword(pdev, info->l1ss_cap_ptr + PCI_L1SS_CTL2,
+    @ @ -443.6 +488.7 @ @
+struct aspm_register_info *dwreg)
+
+u32 val1, val2, scale1, scale2;
+u32 t_common_mode, t_power_on, l1_2_threshold, scale, value;

link->l1ss.up_cap_ptr = upreg->l1ss_cap_ptr;
link->l1ss.dw_cap_ptr = dwreg->l1ss_cap_ptr;
@ @ -454.16 +500.7 @ @
/* Choose the greater of the two Port Common_Mode_Restore_Times */
val1 = (upreg->l1ss_cap & PCI_L1SS_CAP_CM_RESTORE_TIME) >> 8;
val2 = (dwreg->l1ss_cap & PCI_L1SS_CAP_CM_RESTORE_TIME) >> 8;
-if (val1 > val2)
- link->l1ss.ctl1 |= val1 << 8;
-else
- link->l1ss.ctl1 |= val2 << 8;
-
-/*
- * We currently use LTR L1.2 threshold to be fixed constant picked from
- * Intel's coreboot.
- */
- link->l1ss.ctl1 |= LTR_L1_2_THRESHOLD_BITS;
+ t_common_mode = max(val1, val2);

/* Choose the greater of the two Port T_POWER_ON times */
val1 = (upreg->l1ss_cap & PCI_L1SS_CAP_P_PWR_ON_VALUE) >> 19;
@@ -472.10 +509.27 @ @
scale2 = (dwreg->l1ss_cap & PCI_L1SS_CAP_P_PWR_ON_SCALE) >> 16;

if (calc_l1ss_pwron(link->pdev, scale1, val1) >
- calc_l1ss_pwron(link->downstream, scale2, val2))
calc_l1ss_pwron(link->downstream, scale2, val2)) {
    link->l1ss.ctl2 |= scale1 | (val1 << 3);
  } else {
    t_power_on = calc_l1ss_pwron(link->pdev, scale1, val1);
  } else {
    link->l1ss.ctl2 |= scale2 | (val2 << 3);
    t_power_on = calc_l1ss_pwron(link->downstream, scale2, val2);
  }
  /* Set LTR_L1.2_THRESHOLD to the time required to transition the
   * Link from L0 to L1.2 and back to L0 so we enter L1.2 only if
   * downstream devices report (via LTR) that they can tolerate at
   * least that much latency.
   * Based on PCIe r3.1, sec 5.5.3.3.1, Figures 5-16 and 5-17, and
   * Table 5-11. T(POWER_OFF) is at most 2us and T(L1.2) is at
   * least 4us.
   */
  l1_2_threshold = 2 + 4 + t_common_mode + t_power_on;
  encode_l12_threshold(l1_2_threshold, &scale, &value);
  link->l1ss.ctl1 |= t_common_mode << 8 | scale << 29 | value << 16;
}

static void pcie_aspm_cap_init(struct pcie_link_state *link, int blacklist)
static void pcie_aspm_cap_init(struct pcie_link_state *link, int blacklist)
{
  /* Setup initial capable state. Will be updated later */
  link->aspm_capable = link->aspm_support;
  /* If the downstream component has pci bridge function, don't
   * do ASPM for now.
   */
  list_for_each_entry(child, &linkbus->devices, bus_list) {
    -if (pci_pcie_type(child) == PCI_EXP_TYPE_PCI_BRIDGE) {
      link->aspm_disable = ASPM_STATE_ALL;
      break;
    -}
  -}

  /* Get and check endpoint acceptable latencies */
  list_for_each_entry(child, &linkbus->devices, bus_list) {
    /* Enable what we need to enable */
    pci_clear_and_set_dword(parent, up_cap_ptr + PCI_L1SS_CTL1,
    -PCI_L1SS_CAP_L1_PM_SS, val);
    +PCI_L1SS_CTL1_L1SS_MASK, val);
static void pcie_config_aspm_dev(struct pci_dev *pdev, u32 val)
{
    if (!list_empty(&pdev->bus_list, &parent->subordinate->devices))
        goto out;

    link = parent->link_state;

    pcie_config_aspm_link(link, policy_to_aspm_state(link));

    if (state & PCIE_LINK_STATE_CLKPM) {
        link->clkpm_capable = 0;
        pcie_set_clkpm(link, 0);
    } else {
        cnt += sprintf(buffer + cnt, "%s ", policy_str[i]);
    }

    return cnt;
}

--- linux-4.15.0.orig/drivers/pci/pcie/pcie-dpc.c
+++ linux-4.15.0/drivers/pci/pcie/pcie-dpc.c
@@ -15,6 +15,7 @@
#include <linux/pci.h>
#include <linux/pcieport_if.h>
#include "../pci.h"
+#include "aer/aerdrv.h"

struct rp_pio_header_log_regs {
    u32 dw0;
    ...
int status;

u16 ctl, cap;

+if (pcie_aer_get_firmware_first(pdev))
+return -ENOTSUPP;
+
dpc = devm_kzalloc(device, sizeof(*dpc), GFP_KERNEL);
if (!dpc)
return -ENOMEM;
--- linux-4.15.0.orig/drivers/pci/pcie/pme.c
+++ linux-4.15.0/drivers/pci/pcie/pme.c
@@ -367,6 +367,16 @@
return false;
}

+static void pcie_pme_disable_interrupt(struct pci_dev *port,
+    struct pcie_pme_service_data *data)
+{
+    spin_lock_irq(&data->lock);
+    pcie_pme_interrupt_enable(port, false);
+    pcie_clear_root_pme_status(port);
+    data->noirq = true;
+    spin_unlock_irq(&data->lock);
+}
+
/**
 * pcie_pme_suspend - Suspend PCIe PME service device.
 * @srv: PCIe service device to suspend.
 @@ -391,11 +401,7 @@
return 0;
}

-spin_lock_irq(&data->lock);
-pcie_pme_interrupt_enable(port, false);
-pcie_clear_root_pme_status(port);
-data->noirq = true;
-spin_unlock_irq(&data->lock);
+pcie_pme_disable_interrupt(port, data);

synchronize_irq(srv->irq);

@@ -431,9 +437,12 @@
*/
static void pcie_pme_remove(struct pcie_device *srv)
{
    -pcie_pme_suspend(srv);
-struct pcie_pme_service_data *data = get_service_data(srv);
+struct pcie_pme_service_data *data = get_service_data(srv);
+}
pcie_pme_disable_interrupt(srv->port, data);
free_irq(srv->irq, srv);
-kfree(get_service_data(srv));
+cancel_work_sync(&data->work);
+kfree(data);
}

static struct pcie_port_service_driver pcie_pme_driver = {
--- linux-4.15.0.orig/drivers/pci/pcie/portdrv_core.c
+++ linux-4.15.0/drivers/pci/pcie/portdrv_core.c
@@ -216,9 +216,9 @
return 0;

cap_mask = PCIE_PORT_SERVICE_PME | PCIE_PORT_SERVICE_HP
-| PCIE_PORT_SERVICE_VC | PCIE_PORT_SERVICE_DPC;
+| PCIE_PORT_SERVICE_VC;
if (pci_aer_available())
-cap_mask |= PCIE_PORT_SERVICE_AER;
+cap_mask |= PCIE_PORT_SERVICE_AER | PCIE_PORT_SERVICE_DPC;

if (pcie_ports_auto)
pcie_port_platform_notify(dev, &cap_mask);
--- linux-4.15.0.orig/drivers/pci/ptm.c
+++ linux-4.15.0/drivers/pci/ptm.c
@@ -29,7 +29,7 @
        break;
default:
-snprintf(clock_desc, sizeof(clock_desc), "%dns",
+snprintf(clock_desc, sizeof(clock_desc), "%uns",
        dev->ptm_granularity);
        break;
    }
    @ @ -47,10 +47,6 @
if (!pci_is_pcie(dev))
return;

-pos = pci_find_ext_capability(dev, PCI_EXT_CAP_ID_PTM);
-if (!pos)
-return;
-
/*
 * Enable PTM only on interior devices (root ports, switch ports,
 * etc.) on the assumption that it causes no link traffic until an
 @ @ -60,6 +56,23 @
        pci_pcie_type(dev) == PCI_EXP_TYPE_RC_END))
return;
/*
 * Switch Downstream Ports are not permitted to have a PTM capability; their PTM behavior is controlled by the Upstream Port (PCIe r5.0, sec 7.9.16).
 */
ups = pci_upstream_bridge(dev);
if (pci_pcie_type(dev) == PCI_EXP_TYPE_DOWNSTREAM &&
    ups && ups->ptm_enabled) {
    dev->ptm_granularity = ups->ptm_granularity;
    dev->ptm_enabled = 1;
    return;
}

pos = pci_find_ext_capability(dev, PCI_EXT_CAP_ID_PTM);
if (!pos)
    return;

pci_read_config_dword(dev, pos + PCI_PTM_CAP, &cap);
local_clock = (cap & PCI_PTM_GRANULARITY_MASK) >> 8;

@@ -69,7 +82,6 @@
 */
-ups = pci_upstream_bridge(dev);
if (ups && ups->ptm_enabled) {
    ctrl = PCI_PTM_CTRL_ENABLE;
    if (ups->ptm_granularity == 0)
--- linux-4.15.0.orig/drivers/pci/probe.c
+++ linux-4.15.0/drivers/pci/probe.c
@@ -339,6 +339,57 @@
 }
 }

+static void pci_read_bridge_windows(struct pci_dev *bridge)
+{
+u16 io;
+u32 pmem, tmp;
+
+pci_read_config_word(bridge, PCI_IO_BASE, &io);
+if (!io) {
+pci_write_config_word(bridge, PCI_IO_BASE, 0xe0f0);
+pci_read_config_word(bridge, PCI_IO_BASE, &io);
+pci_write_config_word(bridge, PCI_IO_BASE, 0x0);
+}
+if (io)
+bridge->io_window = 1;
+
/*
 * DECchip 21050 pass 2 errata: the bridge may miss an address
 * disconnect boundary by one PCI data phase. Workaround: do not
 * use prefetching on this device.
 */

if (bridge->vendor == PCI_VENDOR_ID_DEC && bridge->device == 0x0001)
    return;

pci_read_config_dword(bridge, PCI_PREF_MEMORY_BASE, &pmem);
if (!pmem) {
    pci_write_config_dword(bridge, PCI_PREF_MEMORY_BASE,
        0xffe0fff0);
    pci_read_config_dword(bridge, PCI_PREF_MEMORY_BASE, &pmem);
    pci_write_config_dword(bridge, PCI_PREF_MEMORY_BASE, 0x0);
}
if (!pmem)
    return;

bridge->pref_window = 1;

if ((pmem & PCI_PREF_RANGE_TYPE_MASK) == PCI_PREF_RANGE_TYPE_64) {
    /*
    * Bridge claims to have a 64-bit prefetchable memory
    * window; verify that the upper bits are actually
    * writable.
    */
    pci_read_config_dword(bridge, PCI_PREF_BASE_UPPER32, &pmem);
    pci_write_config_dword(bridge, PCI_PREF_BASE_UPPER32,
        0xffffffff);
    pci_read_config_dword(bridge, PCI_PREF_BASE_UPPER32, &tmp);
    pci_write_config_dword(bridge, PCI_PREF_BASE_UPPER32, pmem);
    if (tmp)
        bridge->pref_64_window = 1;
}
}

static void pci_read_bridge_io(struct pci_bus *child)
{
    struct pci_dev *dev = child->self;
    @ @ -516,12 +567,14 @ @

    if (bridge->release_fn)
        bridge->release_fn(bridge);
    +
    +pci_free_resource_list(&bridge->windows);
}
static void pci_release_host_bridge_dev(struct device *dev)
{
    devm_pci_release_host_bridge_dev(dev);
    pci_free_host_bridge(to_pci_host_bridge(dev));
    kfree(to_pci_host_bridge(dev));
}

struct pci_host_bridge *pci_alloc_host_bridge(size_t priv)
@@ -587,7 +640,7 @@
    PCIE_SPEED_2_5GT,/* 1 */
    PCIE_SPEED_5_0GT,/* 2 */
    PCIE_SPEED_8_0GT,/* 3 */
-    PCI_SPEED_UNKNOWN,/* 4 */
+    PCIE_SPEED_16_0GT,/* 4 */
    PCI_SPEED_UNKNOWN,/* 5 */
    PCI_SPEED_UNKNOWN,/* 6 */
    PCI_SPEED_UNKNOWN,/* 7 */
@@ -790,9 +843,10 @@
        goto free;
    err = device_register(&bridge->dev);
    -if (err)
+    if (err) {
          put_device(&bridge->dev);
          -
+          goto free;
+      }
    bus->bridge = get_device(&bridge->dev);
    device_enable_async_suspend(bus->bridge);
    pci_set_bus_of_node(bus);
@@ -1294,6 +1348,19 @@
}

+static void set_pcie_untrusted(struct pci_dev *dev)
+{
+    struct pci_dev *parent;
+    
+    /*
+     * If the upstream bridge is untrusted we treat this device
+     * untrusted as well.
+     */
+    parent = pci_upstream_bridge(dev);
+    if (parent && parent->untrusted)
+        dev->untrusted = true;
+}
* pci_ext_cfg_is_alias - is ext config space just an alias of std config?
* @dev: PCI device
@@ -1477,6 +1544,8 @@
/* need to have dev->cfg_size ready */
set_pcie_thunderbolt(dev);

+set_pcie_untrusted(dev);
+
+/* "Unknown power state" */
dev->current_state = PCI_UNKNOWN;

@@ -1485,7 +1554,7 @@
/* device class may be changed after fixup */
class = dev->class >> 8;

-if (dev->non_compliant_bars) {
+if (dev->non_compliant_bars && !dev->mmio_always_on) {
pci_read_config_word(dev, PCI_COMMAND, &cmd);
if (cmd & (PCI_COMMAND_IO | PCI_COMMAND_MEMORY)) {
dev_info(&dev->dev, "device has non-compliant BARs; disabling IO/MEM decoding\n");
@@ -1559,6 +1628,7 @@
pci_read_irq(dev);
dev->transparent = ((dev->class & 0xff) == 1);
p pci_read_bases(dev, 2, PCI_ROM_ADDRESS1);
+pci_read_bridge_windows(dev);
set_pcie_hotplug_bridge(dev);
pos = pci_find_capability(dev, PCI_CAP_ID_SSVID);
if (pos) {
@@ -1594,9 +1664,33 @@
static void pci_configure_mps(struct pci_dev *dev)
{
struct pci_dev *bridge = pci_upstream_bridge(dev);
-int mps, p_mps, rc;
+int mps, mpss, p_mps, rc;
+
+if (!pci_is_pcie(dev))
+return;

-if (!pci_is_pcie(dev) || !bridge || !pci_is_pcie(bridge))
+/* MPS and MRRS fields are of type 'RsvdP' for VFs, short-circuit out */
+if (dev->is_virtfn)
+return;
+
+/*
+ * For Root Complex Integrated Endpoints, program the maximum
+ * supported value unless limited by the PCIE_BUS_PEER2PEER case.
+ */
+if (pci_pcie_type(dev) == PCI_EXP_TYPE_RC_END) {
if (pcie_bus_config == PCIE_BUS_PEER2PEER)
  mps = 128;
else
  mps = 128 << dev->pcie_mpss;
  rc = pcie_set_mps(dev, mps);
  if (rc) {
    pci_warn(dev, "can’t set Max Payload Size to %d; if necessary, use \"pci=pcie_bus_safe\" and report a bug\n", mps);
  }
  return;

if (!bridge || !pci_is_pcie(bridge))
  return;
mps = pcie_get_mps(dev);
@
-1618,6 +1712,14 @@
if (pcie_bus_config != PCIE_BUS_DEFAULT)
  return;

+mpss = 128 << dev->pcie_mpss;
+if (mpss < p_mps && pci_pcie_type(bridge) == PCI_EXP_TYPE_ROOT_PORT) {
+pci_set_mps(bridge, mpss);
+pci_info(dev, "Upstream bridge’s Max Payload Size set to %d (was %d, max %d)\n", mpss, p_mps, 128 << bridge->pcie_mpss);
+p_mps = pcie_get_mps(bridge);
+}
+rc = pcie_set_mps(dev, p_mps);
  if (rc) {
    dev_warn(&dev->dev, "can’t set Max Payload Size to %d; if necessary, use \"pci=pcie_bus_safe\" and report a
bug\n", @ -1626,7 +1728,7 @@
  }
  dev_info(&dev->dev, "Max Payload Size set to %d (was %d, max %d)\n",
- p_mps, mps, 128 << dev->pcie_mpss);
+ p_mps, mps, mpss);
} static struct hpp_type0 pci_default_type0 = {
  @ -1875,6 +1977,38 @@
} static void pci_configure_ltr(struct pci_dev *dev)
{+ifndef CONFIG_PCIEASPM

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+u32 cap;
+struct pci_dev *bridge;
+
+if (!pci_is_pcie(dev))
+return;
+
+pcie_capability_read_dword(dev, PCI_EXP_DEVCAP2, &cap);
+if (!(cap & PCI_EXP_DEVCAP2_LTR))
+return;
+
+/*
 * Software must not enable LTR in an Endpoint unless the Root
 * Complex and all intermediate Switches indicate support for LTR.
 * PCIe r3.1, sec 6.18.
 */
+*/
+if (pci_pcie_type(dev) == PCI_EXP_TYPE_ROOT_PORT)
+dev->ltr_path = 1;
+else {
+bridge = pci_upstream_bridge(dev);
+if (bridge && bridge->ltr_path)
+dev->ltr_path = 1;
+}
+
+if (dev->ltr_path)
+pcie_capability_set_word(dev, PCI_EXP_DEVCTL2,
+ PCI_EXP_DEVCTL2_LTR_EN);
+#endif
+
static void pci_configure_device(struct pci_dev *dev)
{
struct hotplug_params hpp;
@@ -1883,6 +2017,7 @@
p pci_configure_mps(dev);
 pci_configure_extended_tags(dev, NULL);
 pci_configure_relaxed_ordering(dev);
+pci_configure_ltr(dev);

 memset(&hpp, 0, sizeof(hpp));
 ret = pci_get_hp_params(dev, &hpp);
@@ -2028,6 +2163,7 @@
p pci_set_of_node(dev);

 if (pci_setup_device(dev)) {
+pci_release_of_node(dev);
 pci_bus_put(dev->bus);
 kfree(dev);
 return NULL;

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static int only_one_child(struct pci_bus *bus) {
    struct pci_dev *parent = bus->self;
    struct pci_dev *bridge = bus->self;

    if (!parent || !pci_is_pcie(parent))
        /*
         * Systems with unusual topologies set PCI_SCAN_ALL_PCIE_DEVS so
         * we scan for all possible devices, not just Device 0.
         */
    if (pci_has_flag(PCI_SCAN_ALL_PCIE_DEVS))
        return 0;

    if (parent->has_secondary_link &&
        !pci_has_flag(PCI_SCAN_ALL_PCIE_DEVS))
    +if (bridge && pci_is_pcie(bridge) && bridge->has_secondary_link)
        return 1;
    else
        return 0;
}

for_each_pci_bridge(dev, bus) {
    cmax = max;
    max = pci_scan_bridge_extend(bus, dev, max, 0, 0);
    -used_buses += cmax - max;
    +
    + /* Reserve one bus for each bridge now to avoid extending
    + hotplug bridges too much during the second scan below.
    */
}
used_buses++; 
if (cmax - max > 1) 
used_buses += cmax - max - 1;
}

/* Scan bridges that need to be reconfigured */
@@ -2519,12 +2667,14 @@
bridges if any.
*/
buses = available_buses / hotplug_bridges;
-buses = min(buses, available_buses - used_buses);
+buses = min(buses, available_buses - used_buses + 1);
}
cmax = max;
max = pci_scan_bridgeExtend(bus, dev, cmax, buses, 1);
-used_buses += max - cmax;
+/* One bus is already accounted so don't add it again */
+if (max - cmax > 1)
+used_buses += max - cmax - 1;
}

/*
--- linux-4.15.0.orig/drivers/pci/proc.c
+++ linux-4.15.0/drivers/pci/proc.c
@@ -117,6 +117,9 @@
int size = dev->cfg_size;
int cnt;

+if (kernel_is_locked_down("Direct PCI access"))
+return -EPERM;
+if (pos >= size)
+return 0;
if (nbytes >= size)
@@ -196,6 +199,9 @@
#ifdef /* HAVE_PCI_MMAP */
int ret = 0;

+if (kernel_is_locked_down("Direct PCI access"))
+return -EPERM;
+switch (cmd) {
+case PCIIOC_CONTROLLER:
ret = pci_domain_nr(dev->bus);
@@ -237,7 +243,8 @@
struct pci_filp_private *fpriv = file->private_data;
int i, ret, write_combine = 0, res_bit = IORESOURCE_MEM;
-if (!capable(CAP_SYS_RAWIO))
+if (!capable(CAP_SYS_RAWIO) ||
    kernel_is_locked_down("Direct PCI access"))
return -EPERM;

if (fpriv->mmap_state == pci_mmap_io) {
--- linux-4.15.0.orig/drivers/pci/quirks.c
+++ linux-4.15.0/drivers/pci/quirks.c
@@ -27,6 +27,8 @@
#include <linux/ktime.h>
#include <linux/mm.h>
+#include <linux/platform_data/x86/apple.h>
+/#include <linux/pm_runtime.h>
+/#include <linux/suspend.h>
#include <asm/dma.h>	/* isa_dma_bridge_buggy */
#include "pci.h"

@@ -43,6 +45,21 @@
DECLARE_PCI_FIXUP_CLASS_EARLY(PCI_ANY_ID, PCI_ANY_ID,
PCI_CLASS_BRIDGE_HOST, 8, quirk_mmio_always_on);

+ /* The BAR0 ~ BAR4 of Marvell 9125 device can't be accessed
+   by IO resource file, and need to skip the files
+ */
+static void quirk_marvell_mask_bar(struct pci_dev *dev)
+{
+int i;
+  
+  for (i = 0; i < 5; i++)
+    if (dev->resource[i].start)
+      dev->resource[i].start =
+      dev->resource[i].end = 0;
+}
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9125,
+quirk_marvell_mask_bar);
+ /* The Mellanox Tavor device gives false positive parity errors
   * Mark this device with a broken_parity_status, to allow
   * PCI scanning code to "skip" this now blacklisted device.
@@ -1636,8 +1653,8 @@
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_E7520_MCH,
quirk_PCIE_mch);
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_E7320_MCH,
quirk_PCIE_mch);
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_E7525_MCH,
quirk_PCIE_mch);
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_HUAWEI,0x1610,quirk_PCIE_mch);
DECLARE_PCI_FIXUP_CLASS_FINAL(PCI_VENDOR_ID_HUAWEI, 0x1610, PCI_CLASS_BRIDGE_PCI, 8, quirk_pcie_mch);

/*
 * It's possible for the MSI to get corrupted if shpc and acpi
 * @ -1764.26 +1781.92 @@
 */

/*
 * IO-APIC1 on 6300ESB generates boot interrupts, see Intel order no
 * 300641-004US, section 5.7.3.
 * + *
 * + * Core IO on Xeon E5 1600/2600/4600, see Intel order no 326509-003.
 * + * Core IO on Xeon E5 v2, see Intel order no 329188-003.
 * + * Core IO on Xeon E7 v2, see Intel order no 329595-002.
 * + * Core IO on Xeon E5 v3, see Intel order no 330784-003.
 * + * Core IO on Xeon E7 v3, see Intel order no 332315-001US.
 * + * Core IO on Xeon E5 v4, see Intel order no 333810-002US.
 * + * Core IO on Xeon E7 v4, see Intel order no 332315-001US.
 * + * Core IO on Xeon D-1500, see Intel order no 332051-001.
 * + * Core IO on Xeon Scalable, see Intel order no 610950.
 */
#define INTEL_6300_IOAPIC_ABAR		0x40 /* Bus 0, Dev 29, Func 5 */
#define INTEL_6300_DISABLE_BOOT_IRQ	(1<<14)
#define INTEL_CIPINTRC_CFG_OFFSET	0x14C /* Bus 0, Dev 5, Func 0 */
#define INTEL_CIPINTRC_DIS_INTX_ICH	(1<<25)

static void quirk_disable_intel_boot_interrupt(struct pci_dev *dev)
{
    u16 pci_config_word;
    u32 pci_config_dword;

    if (noioapicquirk)
        return;

    -pci_read_config_word(dev, INTEL_6300_IOAPIC_ABAR, &pci_config_word);
    -pci_config_word |= INTEL_6300_DISABLE_BOOT_IRQ;
    -pci_write_config_word(dev, INTEL_6300_IOAPIC_ABAR, pci_config_word);

    switch (dev->device) {
    case PCI_DEVICE_ID_INTEL_ESB_10:
        -pci_read_config_word(dev, INTEL_6300_IOAPIC_ABAR, &pci_config_word);
        -pci_config_word |= INTEL_6300_DISABLE_BOOT_IRQ;
        -pci_write_config_word(dev, INTEL_6300_IOAPIC_ABAR, pci_config_word);
        +break;
    case PCI_DEVICE_ID_INTEL_ESB_10:
        -pci_read_config_word(dev, INTEL_6300_IOAPIC_ABAR, &pci_config_word);
        -pci_config_word |= INTEL_6300_DISABLE_BOOT_IRQ;
        -pci_write_config_word(dev, INTEL_6300_IOAPIC_ABAR, pci_config_word);
        +break;
    }
+case 0x3c28:/* Xeon E5 1600/2600/4600*/
+case 0x0e28:/* Xeon E5/E7 V2*/
+case 0x2f28:/* Xeon E5/E7 V3, V4*/
+case 0x6f28:/* Xeon D-1500*/
+case 0x2034:/* Xeon Scalable Family*/
+pci_read_config_dword(dev, INTEL_CIPINTRC_CFG_OFFSET,
 + &pci_config_dword);
+pci_config_dword |= INTEL_CIPINTRC_DIS_INTX_ICH;
+pci_write_config_dword(dev, INTEL_CIPINTRC_CFG_OFFSET,
 + pci_config_dword);
+break;
+default:
+return;
+
+}
+dev_info(&dev->dev, "disabled boot interrupts on device [%04x:%04x]n",
 + dev->vendor, dev->device);

-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL,   PCI_DEVICE_ID_INTEL_ESB_10,
 -quirk_disable_intel_boot_interrupt);
-DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_INTEL,   PCI_DEVICE_ID_INTEL_ESB_10,
 -quirk_disable_intel_boot_interrupt);

+宾客 Device 29 Func 5 Device IDs of IO-APIC
+containing ABARAPIC1 Alternate Base Address Register
+*/
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_ESB_10,
 +quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_ESB_10,
 +quirk_disable_intel_boot_interrupt);
+
+/
+* Device 5 Func 0 Device IDs of Core IO modules/hubs
+* containing Coherent Interface Protocol Interrupt Control
+*
+Device IDs obtained from volume 2 datasheets of commented
+* families above.
+*/
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL,0x3c28,
 +quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL,0x0e28,
 +quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL,0x2f28,
 +quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL,0x6f28,
 +quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL,0x2034,
 +quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_INTEL,0x3c28,
+

quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_INTEL,0x2f28,
+quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_INTEL,0x6f28,
+quirk_disable_intel_boot_interrupt);
+DECLARE_PCI_FIXUP_RESUME(PCI_VENDOR_ID_INTEL,0x2034,
+quirk_disable_intel_boot_interrupt);

/*
 * disable boot interrupts on HT-1000
 @@ -2085,6 +2168,36 @@
 DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x10f4, quirk_disable_aspm_l0s);
 DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x1508, quirk_disable_aspm_l0s);
+static void quirk_disable_aspm_l0s_l1(struct pci_dev *dev)
+{
+pci_info(dev, "Disabling ASPM L0s/L1\n");
+pci_disable_link_state(dev, PCIE_LINK_STATE_L0S | PCIE_LINK_STATE_L1);
+
+} /*
+*/
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ASMEDIA, 0x1080, quirk_disable_aspm_l0s_l1);
+
+static void quirk_enable_clear_retrain_link(struct pci_dev *dev)
+{
+dev->clear_retrain_link = 1;
+pci_info(dev, "Enable PCIe Retrain Link quirk\n");
+
+DECLARE_PCI_FIXUP_HEADER(0x12d8, 0xe110, quirk_enable_clear_retrain_link);
+DECLARE_PCI_FIXUP_HEADER(0x12d8, 0xe111, quirk_enable_clear_retrain_link);
+DECLARE_PCI_FIXUP_HEADER(0x12d8, 0xe130, quirk_enable_clear_retrain_link);
+static void fixup_rev1_53c810(struct pci_dev *dev)
{
u32 class = dev->class;
@@ -2280,27 +2393,6 @@
 PCI_DEVICE_ID_TIGON3_5719,
quirk_brcm_5719_limit_mrrs);

-#ifdef CONFIG_PCIE_IPROC_PLATFORM
-#ifndef CONFIG_PCIE_IPROC_PLATFORM
-static void quirk_paxc_bridge(struct pci_dev *pdev)
-{
-/* The PCI config space is shared with the PAXC root port and the first
- * Ethernet device. So, we need to workaround this by telling the PCI
- * code that the bridge is not an Ethernet device.
- */
- if (pdev->hdr_type == PCI_HEADER_TYPE_BRIDGE)
- pdev->class = PCI_CLASS_BRIDGE_PCI << 8;
-
-/* MPSS is not being set properly (as it is currently 0). This is
- * because that area of the PCI config space is hard coded to zero, and
- * is not modifiable by firmware. Set this to 2 (e.g., 512 byte MPS)
- * so that the MPS can be set to the real max value.
- */
- pdev->pcie_mpss = 2;
-
-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_BROADCOM, 0x16cd, quirk_paxc_bridge);
-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_BROADCOM, 0x16f0, quirk_paxc_bridge);
-#endif
-
-/* Originally in EDAC sources for i82875P:
- * Intel tells BIOS developers to hide device 6 which
- * configures the overflow device access containing
- @ @ .3003,12 +3095,13 @ @
- { dev->pcie_mpss = 1; /* 256 bytes */
- }
-DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_SOLARFLARE,
- PCI_DEVICE_ID_SOLARFLARE_SFC4000A_0, fixup_mpss_256);
-DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_SOLARFLARE,
- PCI_DEVICE_ID_SOLARFLARE_SFC4000A_1, fixup_mpss_256);
-DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_SOLARFLARE,
- PCI_DEVICE_ID_SOLARFLARE_SFC4000B, fixup_mpss_256);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SOLARFLARE,
+ PCI_DEVICE_ID_SOLARFLARE_SFC4000A_0, fixup_mpss_256);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SOLARFLARE,
+ PCI_DEVICE_ID_SOLARFLARE_SFC4000A_1, fixup_mpss_256);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SOLARFLARE,
+ PCI_DEVICE_ID_SOLARFLARE_SFC4000B, fixup_mpss_256);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_ASMEDIA, 0x0612, fixup_mpss_256);

/* Intel 5000 and 5100 Memory controllers have an errata with read completion
* coalescing (which is enabled by default on some BIOSes) and MPS of 256B.
@@ -3163,7 +3256,11 @@
pci_iounmap(dev, regs);
+
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x0042, disable_igfx_irq);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x0046, disable_igfx_irq);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x004a, disable_igfx_irq);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x0102, disable_igfx_irq);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x0106, disable_igfx_irq);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x010a, disable_igfx_irq);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_INTEL, 0x0152, disable_igfx_irq);

@@ -3355,6 +3452,18 @@
+
+ * Some NVIDIA GPU devices do not work with bus reset, SBR needs to be
+ * prevented for those affected devices.
+ */
+static void quirk_nvidia_no_bus_reset(struct pci_dev *dev)
+{
+if (((dev->device & 0xffc0) == 0x2340)
+quirk_no_bus_reset(dev);
+
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_NVIDIA, PCI_ANY_ID,
+ quirk_nvidia_no_bus_reset);
+
+/*
+ * Some Atheros AR9xxx and QCA988x chips do not behave after a bus reset.
+ * The device will throw a Link Down error on AER-capable systems and
+ * regardless of AER, config space of the device is never accessible again
@@ -3365,6 +3483,16 @@
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_ATHEROS, 0x0032, quirk_no_bus_reset);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_ATHEROS, 0x003c, quirk_no_bus_reset);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_ATHEROS, 0x0033, quirk_no_bus_reset);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_ATHEROS, 0x0034, quirk_no_bus_reset);
/
+ * Root port on some Cavium CN8xxx chips do not successfully complete a bus
@@ -3373,6 +3493,16 @@
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_CAVIUM, 0xa100, quirk_no_bus_reset);
+/
+/*
+ * Some TI KeyStone C667X devices do not support bus/hot reset. The PCIESS
+ * automatically disables LTSSM when Secondary Bus Reset is received and
+ * the device stops working. Prevent bus reset for these devices. With
* this change, the device can be assigned to VMs with VFIO, but it will
* leak state between VMs. Reference
* https://e2e.ti.com/support/processors/f/791/t/954382
*/
DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_TI, 0xb005, quirk_no_bus_reset);

static void quirk_no_pm_reset(struct pci_dev *dev)
{
    /*
     * -3419,22+3539,29 @ @
     
     static void quirk_chelsio_extend_vpd(struct pci_dev *dev)
     {
         -pci_set_vpd_size(dev, 8192);
         +int chip = (dev->device & 0xf000) >> 12;
         +int func = (dev->device & 0x0f00) >> 8;
         +int prod = (dev->device & 0x00ff) >> 0;
         +
        */
        + * If this is a T3-based adapter, there's a 1KB VPD area at offset
        + * 0xc00 which contains the preferred VPD values. If this is a T4 or
        + * later based adapter, the special VPD is at offset 0x400 for the
        + * Physical Functions (the SR-IOV Virtual Functions have no VPD
        + * Capabilities). The PCI VPD Access core routines will normally
        + * compute the size of the VPD by parsing the VPD Data Structure at
        + * offset 0x000. This will result in silent failures when attempting
        + * to access these other VPD areas which are beyond those computed
        + * limits.
        + */
        +if (chip == 0x0 && prod >= 0x20)
            +pci_set_vpd_size(dev, 8192);
        +else if (chip >= 0x4 && func < 0x8)
            +pci_set_vpd_size(dev, 2048);
        }
    }

-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, 0x20, quirk_chelsio_extend_vpd);
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, 0x21, quirk_chelsio_extend_vpd);
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, 0x22, quirk_chelsio_extend_vpd);
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, 0x23, quirk_chelsio_extend_vpd);
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, 0x24, quirk_chelsio_extend_vpd);
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, 0x25, quirk_chelsio_extend_vpd);
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, 0x26, quirk_chelsio_extend_vpd);
-DECLA...
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_CHELSIO, PCI_ANY_ID,
+quirk_chelsio_extend_vpd);

#ifdef CONFIG_ACPI
/*
@@ -3460,6 +3587,16 @@
   return;
   if (pci_pcie_type(dev) != PCI_EXP_TYPE_UPSTREAM)
   return;
+
+/*
+ * SXIO/SXFP/SXLF turns off power to the Thunderbolt controller.
+ * We don't know how to turn it back on again, but firmware does,
+ * so we can only use SXIO/SXFP/SXLF if we're suspending via
+ * firmware.
+ */
+if (!pm_suspend_via_firmware())
+return;
+
+bridge = ACPI_HANDLE(&dev->dev);
+if (!bridge)
+return;
@@ -3817,6 +3954,69 @@
#define PCI_DEVICE_ID_INTEL_IVB_M_VGA 0x0156
#define PCI_DEVICE_ID_INTEL_IVB_M2_VGA 0x0166
+
+#define PCI_DEVICE_ID_HINIC_VF 0x375E
+#define HINIC_VF_FLR_TYPE 0x1000
+#define HINIC_VF_FLR_CAP_BIT (1UL << 30)
+#define HINIC_VF_OP 0xE80
+#define HINIC_VF_FLR_PROC_BIT (1UL << 18)
+#define HINIC_OPERATION_TIMEOUT 15000/* 15 seconds */
+
+/* Device-specific reset method for Huawei Intelligent NIC virtual functions */
+static int reset_hinic_vf_dev(struct pci_dev *pdev, int probe)
+{
+unsigned long timeout;
+void __iomem *bar;
+u32 val;
+
+if (probe)
+return 0;
+
+bar = pci_iomap(pdev, 0, 0);
+if (!bar)
+return -ENOTTY;
+
+/* Get and check firmware capabilities */
+val = ioread32be(bar + HINIC_VF_FLR_TYPE);
+if (!(val & HINIC_VF_FLR_CAP_BIT)) {
+pci_iounmap(pdev, bar);
+return -ENOTTY;
+
+/* Set HINIC_VF_FLR_PROC_BIT for the start of FLR */
+val = ioread32be(bar + HINIC_VF_OP);
+val = val | HINIC_VF_FLR_PROC_BIT;
+iowrite32be(val, bar + HINIC_VF_OP);
+
+pcie_flr(pdev);
+
+ /* The device must recapture its Bus and Device Numbers after FLR
+ * in order generate Completions. Issue a config write to let the
+ * device capture this information.
+ */
+pci_write_config_word(pdev, PCI_VENDOR_ID, 0);
+
+/* Firmware clears HINIC_VF_FLR_PROC_BIT when reset is complete */
+timeout = jiffies + msecs_to_jiffies(HINIC_OPERATION_TIMEOUT);
+do {
+val = ioread32be(bar + HINIC_VF_OP);
+if (!(val & HINIC_VF_FLR_PROC_BIT))
+goto reset_complete;
+msleep(20);
+} while (time_before(jiffies, timeout));
+
+val = ioread32be(bar + HINIC_VF_OP);
+if (!(val & HINIC_VF_FLR_PROC_BIT))
+goto reset_complete;
+
+pci_warn(pdev, "Reset dev timeout, FLR ack reg: %010x\n", val);
+
+reset_complete:
+pci_iounmap(pdev, bar);
+
+return 0;
+
+static const struct pci_dev_reset_methods pci_dev_reset_methods[] = {
+    { PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_82599_SFP_VF, 
+      reset_intel_82599_sfp_virtfn },
+    { PCI_VENDOR_ID_CHELSIO, PCI_ANY_ID, 
+      reset_chelsio_generic_dev },
+};
@ @ .3879,9 +4081,13 @@
quirk_dma_func1_alias);
DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9123,
quirk_dma_func1_alias);
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9128,
+ quirk_dma_func1_alias);
/* https://bugzilla.kernel.org/show_bug.cgi?id=42679#c14 */
DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9130,
quirk_dma_func1_alias);
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9170,
+ quirk_dma_func1_alias);
/* https://bugzilla.kernel.org/show_bug.cgi?id=42679#c47 + c57 */
DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9172,
quirk_dma_func1_alias);
@ @ .3894,11 +4100,19 @@
/* https://bugzilla.kernel.org/show_bug.cgi?id=42679#c46 */
DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x91a0,
quirk_dma_func1_alias);
+/* https://bugzilla.kernel.org/show_bug.cgi?id=42679#c135 */
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9215,
+ quirk_dma_func1_alias);
+/* https://bugzilla.kernel.org/show_bug.cgi?id=42679#c127 */
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_MARVELL_EXT, 0x9220,
+ quirk_dma_func1_alias);
/* https://bugs.gentoo.org/show_bug.cgi?id=497630 */
DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_JMICRON,
PCI_DEVICE_ID_JMICRON_JMB388_ESD,
@@ -3989,6 +4203,40 @@
DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x2264, quirk_mic_x200_dma_alias);
/*
+ * Intel Visual Compute Accelerator (VCA) is a family of PCIe add-in devices
+ * exposing computational units via Non Transparent Bridges (NTB, PEX 87xx).
+ * Similarly to MIC x200, we need to add DMA aliases to allow buffer access
+ * when IOMMU is enabled. These aliases allow computational unit access to
*/
+ * host memory. These aliases mark the whole VCA device as one IOMMU
+ * group.
+ *
+ * All possible slot numbers (0x20) are used, since we are unable to tell
+ * what slot is used on other side. This quirk is intended for both host
+ * and computational unit sides. The VCA devices have up to five functions
+ * (four for DMA channels and one additional).
+ */
+ static void quirk_pex_vca_alias(structpci_dev *pdev)
+ {
+ const unsigned intnum_pci_slots = 0x20;
+ unsigned int slot;
+ }
+ for (slot = 0; slot < num_pci_slots; slot++) {
+pci_add_dma_alias(pdev, PCI_DEVFN(slot, 0x0));
+pci_add_dma_alias(pdev, PCI_DEVFN(slot, 0x1));
+pci_add_dma_alias(pdev, PCI_DEVFN(slot, 0x2));
+pci_add_dma_alias(pdev, PCI_DEVFN(slot, 0x3));
+pci_add_dma_alias(pdev, PCI_DEVFN(slot, 0x4));
+ }
+ }
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x2954, quirk_pex_vca_alias);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x2955, quirk_pex_vca_alias);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x2956, quirk_pex_vca_alias);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x2958, quirk_pex_vca_alias);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x2959, quirk_pex_vca_alias);
+ DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x295A, quirk_pex_vca_alias);
+ }
+ /*
* The IOMMU and interrupt controller on Broadcom Vulcan/Cavium ThunderX2 are
* associated not at the root bus, but at a bridge below. This quirk avoids
* generating invalid DMA aliases.
@@ -4171,6 +4419,24 @@
quirk_chelsio_T5_disable_root_port_attributes);


/*
+ * pci_acs_ctrl_enabled - compare desired ACS controls with those provided
+ * by a device
+ * @acs_ctrl_req: Bitmask of desired ACS controls
+ * @acs_ctrl_ena: Bitmask of ACS controls enabled or provided implicitly by
+ * the hardware design
+ *
+ * Return 1 if all ACS controls in the @acs_ctrl_req bitmask are included
+ * in @acs_ctrl_ena, i.e., the device provides all the access controls the
+ * caller desires. Return 0 otherwise.
+ */
+ static int pci_acs_ctrl_enabled(u16acs_ctrl_req, u16acs_ctrl_ena)
+ {
+if ((acs_ctrl_req & acs_ctrl_ena) == acs_ctrl_req)
+return 1;
+return 0;
+
+/*
* AMD has indicated that the devices below do not support peer-to-peer
* in any system where they are found in the southbridge with an AMD
* IOMMU in the system. Multifunction devices that do not support
@@ -4210,10 +4476,12 @@
if (ACPI_FAILURE(status))
return -ENODEV;

+acpi_put_table(header);
+
/* Filter out flags not applicable to multifunction */
acs_flags &= (PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_EC | PCI_ACS_DT);

-return acs_flags & ~(PCI_ACS_RR | PCI_ACS_CR) ? 0 : 1;
+return pci_acs_ctrl_enabled(acs_flags, PCI_ACS_RR | PCI_ACS_CR);
#else
return -ENODEV;
#endif
@@ -4221,33 +4489,38 @@
static bool pci_quirk_cavium_acs_match(struct pci_dev *dev)
{
+if (!pci_is_pcie(dev) || pci_pcie_type(dev) != PCI_EXP_TYPE_ROOT_PORT)
+return false;
+
+switch (dev->device) {
/*
- * Effectively selects all downstream ports for whole ThunderX 1
- * family by 0xf800 mask (which represents 8 SoCs), while the lower
- * bits of device ID are used to indicate which subdevice is used
- * within the SoC.
- */
-return (pci_is_pcie(dev) &&
-!(pci_pcie_type(dev) == PCI_EXP_TYPE_ROOT_PORT) &&
-!(dev->device & 0xf800) == 0xa000));
+ * Effectively selects all downstream ports for whole ThunderX1
+ * (which represents 8 SoCs).
+ */
case 0xa000 ... 0xa7ff: /* ThunderX1 */
case 0xaf84: /* ThunderX2 */
case 0xb884: /* ThunderX3 */
+return true;
+default:
static int pci_quirk_cavium_acs(struct pci_dev *dev, u16 acs_flags)
{
    if (!pci_quirk_cavium_acs_match(dev))
        return -ENOTTY;
    
    /*
     * Cavium root ports don't advertise an ACS capability. However,
     * Cavium Root Ports don't advertise an ACS capability. However,
     * the RTL internally implements similar protection as if ACS had
     * Request Redirection, Completion Redirection, Source Validation,
     * Source Validation, Request Redirection, Completion Redirection,
     * and Upstream Forwarding features enabled. Assert that the
     * hardware implements and enables equivalent ACS functionality for
     * these flags.
     */
    -acs_flags &= ~(PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_SV | PCI_ACS_UF);
    -
    -if (!pci_quirk_cavium_acs_match(dev))
        return -ENOTTY;
    -
    -return acs_flags ? 0 : 1;

static int pci_quirk_xgene_acs(struct pci_dev *dev, u16 acs_flags)
{
    acs_flags &= ~(PCI_ACS_SV | PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_UF);
    -
    -return acs_flags ? 0 : 1;
}

/*
 * Many Intel PCH root ports do provide ACS-like features to disable peer
 * transactions and validate bus numbers in requests, but do not provide an
 * actual PCIe ACS capability. This is the list of device IDs known to fall
 * into that category as provided by Intel in Red Hat bugzilla 1037684.
 */

@@ -4257,13 +4530,12 @@
    acs_flags &= ~(PCI_ACS_SV | PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_UF);
    -
    -return acs_flags ? 0 : 1;

@@ -4311,37 +4583,32 @@
-#define INTEL_PCH_ACS_FLAGS (PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_UF | PCI_ACS_SV)
-
static int pci_quirk_intel_pch_acs(struct pci_dev *dev, u16 acs_flags)
{
    u16 flags = dev->dev_flags & PCI_DEV_FLAGS_ACS_ENABLED_QUIRK ?
    INTEL_PCH_ACS_FLAGS : 0;
-
    if (!pci_quirk_intel_pch_acs_match(dev))
        return -ENOTTY;

    -return acs_flags & ~flags ? 0 : 1;
    +if (dev->dev_flags & PCI_DEV_FLAGS_ACS_ENABLED_QUIRK)
        +return pci_acs_ctrl_enabled(acs_flags,
            +PCI_ACS_SV | PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_UF);
        +
        +return pci_acs_ctrl_enabled(acs_flags, 0);
    }

    /*
     * These QCOM root ports do provide ACS-like features to disable peer
     * transactions and validate bus numbers in requests, but do not provide an
     * actual PCIe ACS capability. Hardware supports source validation but it
     * will report the issue as Completer Abort instead of ACS Violation.
     * Hardware doesn't support peer-to-peer and each root port is a root
     * complex with unique segment numbers. It is not possible for one root
     * port to pass traffic to another root port. All PCIe transactions are
     * terminated inside the root port.
     * Hardware doesn't support peer-to-peer and each Root Port is a Root
     * Complex with unique segment numbers. It is not possible for one Root
     * Port to pass traffic to another Root Port. All PCIe transactions are
     * terminated inside the Root Port.
     */

    static int pci_quirk_qcom_rp_acs(struct pci_dev *dev, u16 acs_flags)
    {
        u16 flags = (PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_UF | PCI_ACS_SV);
        int ret = acs_flags & ~flags ? 0 : 1;
-
        -dev_info(&dev->dev, "Using QCOM ACS Quirk (%d)n", ret);
        -
        -return ret;
        +return pci_acs_ctrl_enabled(acs_flags,
            +PCI_ACS_SV | PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_UF);
    }

static bool pci_quirk_intel_spt_pch_acs_match(struct pci_dev *dev) {
    switch (dev->device) {
    case 0xa110 ... 0xa11f: case 0xa167 ... 0xa16a: /* Sunrise Point */
    case 0xa290 ... 0xa29f: case 0xa2e7 ... 0xa2ee: /* Union Point */
    +case 0x9d10 ... 0x9d1b: /* 7th & 8th Gen Mobile */
        return true;
    }

    pci_read_config_dword(dev, pos + INTEL_SPT_ACS_CTRL, &ctrl);
    -return acs_flags & ~ctrl ? 0 : 1;
    +return pci_acs_ctrl_enabled(acs_flags, ctrl);
}

static int pci_quirk_mf_endpoint_acs(struct pci_dev *dev, u16 acs_flags) {
    @ @ -4424,10 +4705,35 @@
    * perform peer-to-peer with other functions, allowing us to mask out
    * these bits as if they were unimplemented in the ACS capability.

    /*
    @ @ -4370,11 +4637,24 @@
    * 0xa290-0xa29f PCI Express Root port #{0-16}
    * 0xa2e7-0xa2ee PCI Express Root port #{17-24}
    *
    + * Mobile chipsets are also affected, 7th & 8th Generation
    + * Specification update confirms ACS errata 22, status no fix: (7th Generation
    + * Intel Processor Family I/O for U/Y Platforms and 8th Generation Intel
    + * Processor Family I/O for U Quad Core Platforms Specification Update,
    + * August 2017, Revision 002, Document#: 334660-002)[6]
    + * Device IDs from I/O datasheet: (7th Generation Intel Processor Family I/O
    + * for U/Y Platforms and 8th Generation Intel Processor Family I/O for U
    + * Quad Core Platforms, Vol 1 of 2, August 2017, Document#: 334658-003)[7]
    + *
    + * 0x9d10-0x9d1b PCI Express Root port #{1-12}
    + *
    */

-acs_flags &= ~(PCI_ACS_SV | PCI_ACS_TB | PCI_ACS_RR |
- PCI_ACS_CR | PCI_ACS_UF | PCI_ACS_DT);
+return pci_acs_ctrl_enabled(acs_flags,
+ PCI_ACS_SV | PCI_ACS_TB | PCI_ACS_RR |
+ PCI_ACS_CR | PCI_ACS_UF | PCI_ACS_DT);
+
+static int pci_quirk_rciep_acs(struct pci_dev *dev, u16 acs_flags)
+{
+    /*
+     * Intel RCiEP's are required to allow p2p only on translated
+     * addresses. Refer to Intel VT-d specification, r3.1, sec 3.16,
+     * "Root-Complex Peer to Peer Considerations".
+     */
+    if (pci_pcie_type(dev) != PCI_EXP_TYPE_RC_END)
+        return -ENOTTY;
+    return acs_flags ? 0 : 1;
+}
+
+static int pci_quirk_brcm_acs(struct pci_dev *dev, u16 acs_flags)
+{
+    /*
+     * iProc PAXB Root Ports don't advertise an ACS capability, but
+     * they do not allow peer-to-peer transactions between Root Ports.
+     * Allow each Root Port to be in a separate IOMMU group by masking
+     * SV/RR/CR/UF bits.
+     */
+    return pci_acs_ctrl_enabled(acs_flags,
+        PCI_ACS_SV | PCI_ACS_RR | PCI_ACS_CR | PCI_ACS_UF);
+}
+
static const struct pci_dev_acs_enabled {
    /* I219 */
    { PCI_VENDOR_ID_INTEL, 0x15b7, pci_quirk_mf_endpoint_acs },
    { PCI_VENDOR_ID_INTEL, 0x15b8, pci_quirk_mf_endpoint_acs },
    { PCI_VENDOR_ID_INTEL, PCI_ANY_ID, pci_quirk_rciep_acs },
    /* QCOM QDF2xxx root ports */
    { 0x17cb, 0x400, pci_quirk_qcom_rp_acs },
    { 0x17cb, 0x401, pci_quirk_qcom_rp_acs },
    @ @ -4500.6 +4806.7 @ @
    /* 1219 */

    /*
    * [ PCI_VENDOR_ID_INTEL, 0x15b7, pci_quirk_mf_endpoint_acs ],
    * [ PCI_VENDOR_ID_INTEL, 0x15b8, pci_quirk_mf_endpoint_acs ],
    * [ PCI_VENDOR_ID_INTEL, PCI_ANY_ID, pci_quirk_rciep_acs ],
    * [ PCI_VENDOR_ID_INTEL, 0x17cb, 0x400, pci_quirk_qcom_rp_acs ],
    * [ PCI_VENDOR_ID_INTEL, 0x17cb, 0x401, pci_quirk_qcom_rp_acs ],
    */

    /* Emulex Skyhawk-R */
    { 0x10df, 0x720, pci_quirk_mf_endpoint_acs },

    /* Cavium ThunderX */
    { PCI_VENDOR_ID_CAVIUM, PCI_ANY_ID, pci_quirk_cavium_acs },
}

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/* Cavium multi-function devices */
{ PCI_VENDOR_ID_CAVIUM, 0xA026, pci_quirk_mf_endpoint_acs },
{ PCI_VENDOR_ID_CAVIUM, 0xA059, pci_quirk_mf_endpoint_acs },
{ PCI_VENDOR_ID_CAVIUM, 0xA060, pci_quirk_mf_endpoint_acs },
/* APM X-Gene */
{ PCI_VENDOR_ID_AMCC, 0xE004, pci_quirk_xgene_acs },
/* Ampere Computing */
{ PCI_VENDOR_ID_AMPERE, 0xE005, pci_quirk_xgene_acs },
{ PCI_VENDOR_ID_AMPERE, 0xE006, pci_quirk_xgene_acs },
{ PCI_VENDOR_ID_AMPERE, 0xE007, pci_quirk_xgene_acs },
{ PCI_VENDOR_ID_AMPERE, 0xE008, pci_quirk_xgene_acs },
{ PCI_VENDOR_ID_AMPERE, 0xE009, pci_quirk_xgene_acs },
{ PCI_VENDOR_ID_AMPERE, 0xE00A, pci_quirk_xgene_acs },
{ PCI_VENDOR_ID_AMPERE, 0xE00B, pci_quirk_xgene_acs },
{ PCI_VENDOR_ID_AMPERE, 0xE00C, pci_quirk_xgene_acs },
/* Broadcom multi-function device */
{ PCI_VENDOR_ID_BROADCOM, 0x16D7, pci_quirk_mf_endpoint_acs },
{ PCI_VENDOR_ID_BROADCOM, 0xD714, pci_quirk_brcm_acs },
{ 0 }
};

int pci_dev_specific_acs_enabled(struct pci_dev *dev, u16 acs_flags)
{
    const struct pci_dev_acs_enabled *i;
    @ @ -4555,7 +4889,7 @@
    #define INTEL_BSPR_REG_BPPD (1 << 9)

    /* Upstream Peer Decode Configuration Register */
    -#define INTEL_UPDCR_REG 0x1114
    +#define INTEL_UPDCR_REG 0x1014
    /* 5:0 Peer Decode Enable bits */
    #define INTEL_UPDCR_REG_MASK 0x3f

    @ @ -4784,13 +5118,46 @@
}
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x443, quirk_intel_qat_vf_cap);
FLR may cause some 82579 devices to hang. */
-static void quirk_intel_no_flr(struct pci_dev *dev)
+*/
  */ FLR may cause the following to devices to hang:
  */
  */ AMD Starship/Matisse HD Audio Controller 0x1487
  */ AMD Starship USB 3.0 Host Controller 0x148c
  */ AMD Matisse USB 3.0 Host Controller 0x149c
  */ Intel 82579LM Gigabit Ethernet Controller 0x1502
  */ Intel 82579V Gigabit Ethernet Controller 0x1503
  */
  */
+static void quirk_no_flr(struct pci_dev *dev)
{
  dev->dev_flags |= PCI_DEV_FLAGS_NO_FLR_RESET;
}
-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x1502, quirk_intel_no_flr);
-DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x1503, quirk_intel_no_flr);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_AMD, 0x1487, quirk_no_flr);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_AMD, 0x148c, quirk_no_flr);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_AMD, 0x149c, quirk_no_flr);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x1502, quirk_no_flr);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_INTEL, 0x1503, quirk_no_flr);
+
+static void quirk_intel_th_rtit_bar(struct pci_dev *dev)
+
+{ 
+  struct resource *r = &dev->resource[4];
+
+  */
+  */ Hello, Denverton!
+  */ Denverton reports 2k of RTIT_BAR (resource 4), which can't be
+  */ right given the 16 threads. When Intel TH gets enabled, the
+  */ actual resource overlaps the XHCI MMIO space and causes it
+  */ to die.
+  */ We're not really using RTIT_BAR at all at the moment, so it's
+  */ a safe choice to disable this resource.
+  */
+  */
+  */
+  */
+  if (r->end == r->start + 0x7ff) {
+    r->flags = 0;
+    r->start = 0;
+    r->end = 0;
+  }
+}
+DECLARE_PCI_FIXUP_HEADER(PCI_VENDOR_ID_INTEL, 0x19e1, quirk_intel_th_rtit_bar);

static void quirk_no_ext_tags(struct pci_dev *pdev)
{
  @ @ -4804,23 +5171,38 @@
pci_walk_bus(bridge->bus, pci_configure_extended_tags, NULL);
}
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SERVERWORKS, 0x0132, quirk_no_ext_tags);
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SERVERWORKS, 0x0140, quirk_no_ext_tags);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SERVERWORKS, 0x0141, quirk_no_ext_tags);
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SERVERWORKS, 0x0142, quirk_no_ext_tags);
DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SERVERWORKS, 0x0144, quirk_no_ext_tags);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SERVERWORKS, 0x0420, quirk_no_ext_tags);
+DECLARE_PCI_FIXUP_EARLY(PCI_VENDOR_ID_SERVERWORKS, 0x0422, quirk_no_ext_tags);

#ifdef CONFIG_PCI_ATS
/*
 - * Some devices have a broken ATS implementation causing IOMMU stalls.
 - * Don’t use ATS for those devices.
 + * Some devices require additional driver setup to enable ATS. Don’t use
 + * ATS for those devices as ATS will be enabled before the driver has had a
 + * chance to load and configure the device.
 */
-static void quirk_no_ats(struct pci_dev *pdev)
+static void quirk_amd_harvest_no_ats(struct pci_dev *pdev)
{
-dev_info(&pdev->dev, "disabling ATS (broken on this device)\n");
+if (!(pdev->device == 0x7312 && pdev->revision != 0x00) ||
   (pdev->device == 0x7340 && pdev->revision != 0xc5))
+return;
+
+dev_info(&pdev->dev, "disabling ATS\n");
pdev->ats_cap = 0;
}

/* AMD Stoney platform GPU */
-DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ATI, 0x98e4, quirk_no_ats);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ATI, 0x98e4, quirk_amd_harvest_no_ats);
+/* AMD Iceland dGPU */
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ATI, 0x6900, quirk_amd_harvest_no_ats);
+/* AMD Navi10 dGPU */
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ATI, 0x7312, quirk_amd_harvest_no_ats);
+/* AMD Navi14 dGPU */
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ATI, 0x7340, quirk_amd_harvest_no_ats);
#endif /* CONFIG_PCI_ATS */

/* Freescale PCIe doesn’t support MSI in RC mode */
@@ -4830,3 +5212,109 @@
pdev->no_msi = 1;
}
DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_FREESCALE, PCI_ANY_ID, quirk_fsl_no_msi);
+/
+ * Enable the NVIDIA GPU integrated HDA controller if the BIOS left it
+ */
+static void quirk_nvidia_hda(struct pci_dev *gpu)
+{
+u8 hdr_type;
+u32 val;
+
+/* There was no integrated HDA controller before MCP89 */
+if (gpu->device < PCI_DEVICE_ID_NVIDIA_GEFORCE_320M)
+return;
+
+/* Bit 25 at offset 0x488 enables the HDA controller */
+pci_read_config_dword(gpu, 0x488, &val);
+if (val & BIT(25))
+return;
+
+pci_info(gpu, "Enabling HDA controller\n");
+pci_write_config_dword(gpu, 0x488, val | BIT(25));
+
+/* The GPU becomes a multi-function device when the HDA is enabled */
+pci_read_config_byte(gpu, PCI_HEADER_TYPE, &hdr_type);
+gpu->multifunction = !(hdr_type & 0x80);
+}
+DECLARE_PCI_FIXUP_CLASS_HEADER(PCI_VENDOR_ID_NVIDIA, PCI_ANY_ID,
+ PCI_BASE_CLASS_DISPLAY, 16, quirk_nvidia_hda);
+DECLARE_PCI_FIXUP_CLASS_RESUME_EARLY(PCI_VENDOR_ID_NVIDIA, PCI_ANY_ID,
+ PCI_BASE_CLASS_DISPLAY, 16, quirk_nvidia_hda);
+
+/
+ * Device [1b21:2142]
+ * When in D0, PME# doesn't get asserted when plugging USB 3.0 device.
+ */
+static void pci_fixup_no_d0_pme(struct pci_dev *dev)
+{
+pci_info(dev, "PME# does not work under D0, disabling it\n");
+dev->pme_support &= ~(PCI_PM_CAP_PME_D0 >> PCI_PM_CAP_PME_SHIFT);
+}
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_ASMEDIA, 0x2142, pci_fixup_no_d0_pme);
+
+/*
+ * Device [12d8:0x400e] and [12d8:0x400f]
+ * These devices advertise PME# support in all power states but don't
+ * reliably assert it.
+ */
+static void pci_fixup_no_pme(struct pci_dev *dev)
+{
+pci_info(dev, "PME# is unreliable, disabling it\n");
+dev->pme_support = 0;
+
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_PERICOM, 0x400e, pci_fixup_no_pme);
+DECLARE_PCI_FIXUP_FINAL(PCI_VENDOR_ID_PERICOM, 0x400f, pci_fixup_no_pme);
+
+/
+ * Although not allowed by the spec, some multi-function devices have
+ * dependencies of one function (consumer) on another (supplier). For the
+ * consumer to work in D0, the supplier must also be in D0. Create a
+ * device link from the consumer to the supplier to enforce this
+ * dependency. Runtime PM is allowed by default on the consumer to prevent
+ * it from permanently keeping the supplier awake.
+ */
+static void pci_create_device_link(struct pci_dev *pdev, unsigned int consumer,
+   unsigned int supplier, unsigned int class,
+   unsigned int class_shift)
+
+struct pci_dev *supplier_pdev;
+
+if (PCI_FUNC(pdev->devfn) != consumer)
+    return;
+
+supplier_pdev = pci_get_domain_bus_and_slot(pci_domain_nr(pdev->bus),
+    pdev->bus->number,
+    PCI_DEVFN(PCI_SLOT(pdev->devfn), supplier));
+if (!supplier_pdev || (supplier_pdev->class >> class_shift) != class) {
+    pci_dev_put(supplier_pdev);
+    return;
+}
+
+if (device_link_add(&pdev->dev, &supplier_pdev->dev,
+    DL_FLAG_STATELESS | DL_FLAG_PM_RUNTIME))
+    pci_info(pdev, "D0 power state depends on %s\n",
+        pci_name(supplier_pdev));
+else
+    pci_err(pdev, "Cannot enforce power dependency on %s\n",
+        pci_name(supplier_pdev));
+
+pm_runtime_allow(&pdev->dev);
+pci_dev_put(supplier_pdev);
+}
+
+/
+ * Create device link for GPUs with integrated HDA controller for streaming
+ * audio to attached displays.
+ */
+static void quirk_gpu_hda(struct pci_dev *hda)
{pci_create_device_link(hda, 1, 0, PCI_BASE_CLASS_DISPLAY, 16);
}
+DECLARE_PCI_FIXUP_CLASS_FINAL(PCI_VENDOR_ID_ATI, PCI_ANY_ID,
+ PCI_CLASS_MULTIMEDIA_HD_AUDIO, 8, quirk_gpu_hda);
+DECLARE_PCI_FIXUP_CLASS_FINAL(PCI_VENDOR_ID_AMD, PCI_ANY_ID,
+ PCI_CLASS_MULTIMEDIA_HD_AUDIO, 8, quirk_gpu_hda);
+DECLARE_PCI_FIXUP_CLASS_FINAL(PCI_VENDOR_ID_NVIDIA, PCI_ANY_ID,
+ PCI_CLASS_MULTIMEDIA_HD_AUDIO, 8, quirk_gpu_hda);
--- linux-4.15.0.orig/drivers/pci/remove.c
+++ linux-4.15.0/drivers/pci/remove.c
@@ -24,9 +24,6 @@  
pci_remove_sysfs_dev_files(dev);
 dev->is_added = 0;
 }
-
-if (dev->bus->self)
- pcie_aspm_exit_link_state(dev);

static void pci_destroy_dev(struct pci_dev *dev)
@@ -40,6 +37,7 @@  
 list_del(&dev->bus_list);
 up_write(&pci_bus_sem);

+pcie_aspm_exit_link_state(dev);
 pcie_bridge_d3_update(dev);
 pci_free_resources(dev);
 put_device(&dev->dev);
--- linux-4.15.0.orig/drivers/pci/rom.c
+++ linux-4.15.0/drivers/pci/rom.c
@@ -189,20 +189,3 @@  
 pci_disable_rom(pdev);
 }

EXPORT_SYMBOL(pci_unmap_rom);
-
-/**
- * pci_platform_rom - provides a pointer to any ROM image provided by the
- * platform
- * @pdev: pointer to pci device struct
- * @size: pointer to receive size of pci window over ROM
- */
-void __iomem *pci_platform_rom(struct pci_dev *pdev, size_t *size)
-{
- if (pdev->rom && pdev->romlen) {
- *size = pdev->romlen;
- return (phys_to_virt((phys_addr_t)pdev->rom));
- }
return NULL;
-
-EXPORT_SYMBOL(pci_platform_rom);
--- linux-4.15.0.orig/drivers/pci/setup-bus.c
+++ linux-4.15.0/drivers/pci/setup-bus.c
@@ -740,58 +740,21 @@
    base/limit registers must be read-only and read as 0. */
    static void pci_bridge_check_ranges(struct pci_bus *bus)
    {
-    u16 io;
-    u32 pmem;
-    struct pci_dev *bridge = bus->self;
-    struct resource *b_res;
+    struct resource *b_res = &bridge->resource[PCI_BRIDGE_RESOURCES];

-    b_res = &bridge->resource[PCI_BRIDGE_RESOURCES];
+    b_res[1].flags |= IORESOURCE_MEM;

-    pci_read_config_word(bus, PCI_IO_BASE, &io);
-    if (!io) {
-        pci_write_config_word(bridge, PCI_IO_BASE, 0xe0f0);
-        pci_read_config_word(bridge, PCI_IO_BASE, &io);
-        pci_write_config_word(bridge, PCI_IO_BASE, 0x0);
-    }
-    if (io)
+    if (bridge->io_window)
        b_res[0].flags |= IORESOURCE_IO;
-    /* DECchip 21050 pass 2 errata: the bridge may miss an address
-       disconnect boundary by one PCI data phase.
-       Workaround: do not use prefetching on this device. */
-    if (bridge->vendor == PCI_VENDOR_ID_DEC && bridge->device == 0x0001)
-        return;
-    pci_read_config_dword(bridge, PCI_PREF_MEMORY_BASE, &pmem);
-    if (!pmem) {
-        pci_write_config_dword(bridge, PCI_PREF_MEMORY_BASE,
-            0xffe0fff0);
-        pci_read_config_dword(bridge, PCI_PREF_MEMORY_BASE, &pmem);
-        pci_write_config_dword(bridge, PCI_PREF_MEMORY_BASE, 0x0);
-    }
-    if (pmem)
+    if (bridge->pref_window)
        b_res[2].flags |= IORESOURCE_MEM | IORESOURCE_PREFETCH;
-    if ((pmem & PCI_PREF_RANGE_TYPE_MASK) ==
-        PCI_PREF_RANGE_TYPE_64) {
+    if (bridge->pref_64_window) {
        b_res[2].flags |= IORESOURCE_MEM | IORESOURCE_PREFETCH;
-        if ((pmem & PCI_PREF_RANGE_TYPE_MASK) ==
+        if (bridge->pref_64_window) {
b_res[2].flags |= IORESOURCE_MEM_64;
b_res[2].flags |= PCI_PREF_RANGE_TYPE_64;
}
}
-
-/* double check if bridge does support 64 bit pref */
-if (b_res[2].flags & IORESOURCE_MEM_64) {
  u32 mem_base_hi, tmp;
  -pci_read_config_dword(bridge, PCI_PREF_BASE_UPPER32,
    &mem_base_hi);
  -pci_write_config_dword(bridge, PCI_PREF_BASE_UPPER32,
    0xffffffff);
  -pci_read_config_dword(bridge, PCI_PREF_BASE_UPPER32, &tmp);
  -if (!tmp)
    -b_res[2].flags &= ~IORESOURCE_MEM_64;
  -pci_write_config_dword(bridge, PCI_PREF_BASE_UPPER32,
    mem_base_hi);
  -}
  -}
}

/* Helper function for sizing routines: find first available */
@@ -1825,12 +1788,18 @@
/* restore size and flags */
 list_for_each_entry(fail_res, &fail_head, list) {
 struct resource *res = fail_res->res;
 +int idx;

   res->start = fail_res->start;
   res->end = fail_res->end;
   res->flags = fail_res->flags;
   -if (fail_res->dev->subordinate)
     -res->flags = 0;
   +
   +if (pci_is_bridge(fail_res->dev)) {
     +idx = res - &fail_res->dev->resource[0];
     +if (idx >= PCI_BRIDGE_RESOURCES &&
       + idx <= PCI_BRIDGE_RESOURCE_END)
     +res->flags = 0;
     +} 
     }
   free_list(&fail_head);

@@ -2071,12 +2040,18 @@
/* restore size and flags */
 list_for_each_entry(fail_res, &fail_head, list) {
 struct resource *res = fail_res->res;
 +int idx;


res->start = fail_res->start;
res->end = fail_res->end;
res->flags = fail_res->flags;
-\t\tif (fail_res->dev->subordinate)
-\t\t\tres->flags = 0;
+\t\tif (pci_is_bridge(fail_res->dev)) {
+\t\t\n+\t\tidx = res - &fail_res->dev->resource[0];
+\t\t\tif (idx >= PCI_BRIDGE_RESOURCES &&
+\t\t\tidx <= PCI_BRIDGE_RESOURCE_END)
+\t\t\tres->flags = 0;
+\t\t}
}  
free_list(&fail_head);

--- linux-4.15.0.orig/drivers/pci/setup-res.c
+++ linux-4.15.0/drivers/pci/setup-res.c
@@ -442,10 +442,11 @@
res->end = res->start + pci_rebar_size_to_bytes(size) - 1;

/* Check if the new config works by trying to assign everything. */
-ret = pci_reassign_bridge_resources(dev->bus->self, res->flags);
-if (ret)
-goto error_resize;
-
+if (dev->bus->self) {
+ret = pci_reassign_bridge_resources(dev->bus->self, res->flags);
+if (ret)
+goto error_resize;
+}
return 0;

error_resize:
--- linux-4.15.0.orig/drivers/pci/slot.c
+++ linux-4.15.0/drivers/pci/slot.c
@@ -75,6 +75,7 @@
"2.5 GT/s PCIe", /* 0x14 */
"5.0 GT/s PCIe", /* 0x15 */
"8.0 GT/s PCIe", /* 0x16 */
+"16.0 GT/s PCIe", /* 0x17 */
};

static ssize_t bus_speed_read(enum pci_bus_speed speed, char *buf)
@@ -303,16 +304,19 @@
slot_name = make_slot_name(name);
if (!slot_name) {
  err = -ENOMEM;
+kfree(slot);
goto err;
}

+INIT_LIST_HEAD(&slot->list);
+list_add(&slot->list, &parent->slots);
+
err = kobject_init_and_add(&slot->kobj, &pci_slot_ktype, NULL,
    "%s", slot_name);
-if (err)
+if (err) {
+kobject_put(&slot->kobj);
goto err;
-
-INIT_LIST_HEAD(&slot->list);
-list_add(&slot->list, &parent->slots);
+
}

down_read(&pci_slot_mutex);
list_for_each_entry(dev, &parent->devices, bus_list)
@@ -328,7 +332,6 @@
mutex_unlock(&pci_slot_mutex);
return slot;
err:
-slot = ERR_PTR(err);
goto out;
}
--- linux-4.15.0.orig/drivers/pci/switch/switchtec.c
+++ linux-4.15.0/drivers/pci/switch/switchtec.c
@@ -22,6 +22,8 @@
#include <linux/uaccess.h>
#include <linux/poll.h>
#include <linux/wait.h>
+include <linux/io-64-nonatomic-lo-hi.h>
+include <linux/nospec.h>

MODULE_DESCRIPTION("Microsemi Switchtec(tm) PCIe Management Driver");
MODULE_VERSION("0.1");
@@ -141,10 +143,6 @@
    stuser->data, stuser->data_len);
iowrite32(stuser->cmd, &stdev->mmio_mrpc->cmd);
-
-stuser->status = ioread32(&stdev->mmio_mrpc->status);
-if (stuser->status != SWITCHTEC_MRPC_STATUS_INPROGRESS)
-mrpc_complete_cmd(stdev);
-
schedule_delayed_work(&stdev->mrpc_timeout,
msecs_to_jiffies(500));
kref_get(&stuser->kref);
stuser->read_len = sizeof(stuser->data);
stuser_set_state(stuser, MRPC_QUEUE);
-init_completion(&stuser->comp);
+reinit_completion(&stuser->comp);
list_add_tail(&stuser->list, &stdev->mrpc_queue);

mrpc_cmd_submit(stdev);

s.global = ioread32(&stdev->mmio_sw_event->global_summary);
-s.part_bitmap = ioread32(&stdev->mmio_sw_event->part_event_bitmap);
+s.part_bitmap = readq(&stdev->mmio_sw_event->part_event_bitmap);
s.local_part = ioread32(&stdev->mmio_part_cfg->part_event_summary);

for (i = 0; i < stdev->partition_count; i++) {
	int ret;
	int nr_idxs;
+unsigned int event_flags;
struct switchtec_ioctl_event_ctl ctl;

if (copy_from_user(&ctl, uctl, sizeof(ctl)))
	return -EINVAL;
else
+event_flags = ctl.flags;
for (ctl.index = 0; ctl.index < nr_idxs; ctl.index++) {
+ctl.flags = event_flags;
ret = event_ctl(stdev, &ctl);
if (ret < 0)
	return ret;
}

default:
if (p.port > ARRAY_SIZE(pcfg->dsp_pff_inst_id))
	return -EINVAL;
+p.port = array_index_nospec(p.port,
+ARRAY_SIZE(pcfg->dsp_pff_inst_id) + 1);
p.pff = ioread32(&pcfg->dsp_pff_inst_id[p.port - 1]);
break;
}

if (!(hdr & SWITCHTEC_EVENT_OCCURRED && hdr & SWITCHTEC_EVENT_EN_IRQ))
return 0;

-if (eid == SWITCHTEC_IOCTL_EVENT_LINK_STATE)
+if (eid == SWITCHTEC_IOCTL_EVENT_LINK_STATE ||
  eid == SWITCHTEC_IOCTL_EVENT_MRPC_COMP)
return 0;

dev_dbg(&stdev->dev, "%s: %d %d %x\n", __func__, eid, idx, hdr);
@@ -1190,7 +1194,7 @@
if (nvecs < 0)
return nvecs;

-event_irq = ioread32(&stdev->mmio_part_cfg->vep_vector_number);
+event_irq = ioread16(&stdev->mmio_part_cfg->vep_vector_number);
if (event_irq < 0 || event_irq >= nvecs)
return -EFAULT;

--- linux-4.15.0.orig/drivers/pci/syscall.c
+++ linux-4.15.0/drivers/pci/syscall.c
@@ -22,10 +22,12 @
  u16 word;
  u32 dword;
  long err;
-  long cfg_ret;
+  int cfg_ret;

+err = -EPERM;
+dev = NULL;
if (!capable(CAP_SYS_ADMIN))
-  return -EPERM;
+  goto error;
err = -ENODEV;
  dev = pci_get_bus_and_slot(bus, dfn);
@@ -48,7 +50,7 @@
}
+if (!capable(CAP_SYS_ADMIN) ||
  kernel_is_locked_down("Direct PCI access"))
return -EPERM;

dev = pci_get_bus_and_slot(bus, dfn);
@@ -106,7 +109,7 @@
if (err)
break;
err = pci_user_write_config_byte(dev, off, byte);
-@if (err != PCIBIOS_SUCCESSFUL)
+if (err)
err = -EIO;
break;

@@ -115,7 +118,7 @@
if (err)
break;
err = pci_user_write_config_word(dev, off, word);
-@if (err != PCIBIOS_SUCCESSFUL)
+if (err)
err = -EIO;
break;

@@ -124,7 +127,7 @@
if (err)
break;
err = pci_user_write_config_dword(dev, off, dword);
-@if (err != PCIBIOS_SUCCESSFUL)
+if (err)
err = -EIO;
break;

--- linux-4.15.0.orig/drivers/pcmcia/cistpl.c
+++ linux-4.15.0/drivers/pcmcia/cistpl.c
@@ -1578,6 +1578,9 @@
struct pcmcia_socket *s;
int error;

+if (kernel_is_locked_down("Direct PCMCIA CIS storage"))
+return -EPERM;
+
s = to_socket(container_of(kobj, struct device, kobj));

if (off)
--- linux-4.15.0.orig/drivers/pcmcia/cs.c
+++ linux-4.15.0/drivers/pcmcia/cs.c
@@ -452,17 +452,20 @@
static int socket_suspend(struct pcmcia_socket *skt)
{
    if (skt->state & SOCKET_SUSPEND)
        return -EBUSY;

    /* store state on first suspend, but not after spurious wakeups */
    if (!(skt->state & SOCKET_IN_RESUME))
        skt->suspended_state = skt->state;

    skt->socket = dead_socket;
    skt->ops->set_socket(skt, &skt->socket);
    if (skt->ops->suspend)
        skt->ops->suspend(skt);
    skt->state &= SOCKET_SUSPEND;
    mutex_unlock(&skt->ops_mutex);
    return 0;
}

@@ -475,6 +478,7 @@
    skt->ops->set_socket(skt, &skt->socket);
    if (skt->state & SOCKET_PRESENT)
        skt->resume_status = socket_setup(skt, resume_delay);
+    skt->state |= SOCKET_IN_RESUME;
    mutex_unlock(&skt->ops_mutex);
    return 0;
}
@@ -484,7 +488,7 @@
    int ret = 0;

    mutex_lock(&skt->ops_mutex);
-    skt->state &= ~SOCKET_SUSPEND;
+    skt->state &= ~(SOCKET_SUSPEND | SOCKET_IN_RESUME);
    mutex_unlock(&skt->ops_mutex);
    if (!(skt->state & SOCKET_PRESENT)) {

--- linux-4.15.0.orig/drivers/pcmcia/cs_internal.h
+++ linux-4.15.0/drivers/pcmcia/cs_internal.h
@@ -70,6 +70,7 @@
/* Flags in socket state */
#define SOCKET_PRESENT		0x0008
#define SOCKET_INUSE		0x0010
+  #define SOCKET_IN_RESUME	0x0040
#define SOCKET_SUSPEND		0x0080
#define SOCKET_WIN_REQ(i)	(0x0100<<(i))
#define SOCKET_CARDBUS		0x8000
for (i = 0; i < socket_count; i++) {
    sockets[i].card_state = 1; /* 1 = present but empty */
    sockets[i].io_base = pci_resource_start(dev, 0);
    sockets[i].dev = dev;
    sockets[i].socket.features |= SS_CAP_PCCARD;
    sockets[i].socket.map_size = 0x1000;
    sockets[i].socket.irq_mask = 0;

    /* Misc Control 3 Register */
    #define RL5C4XX_MISC3 0x00A2 /* 16 bit */
    #define RL5C47X_MISC3_CB_CLKRUN_DIS BIT(1)

    #ifdef __YENTA_H
    #define rl_misc(socket) ((socket)->private[0])
    #endif

    static void ricoh_set_clkrun(struct yenta_socket *socket, bool quiet) {
        u16 misc3;
        
        /* RL5C475II likely has this setting, too, however no datasheet
         * is publicly available for this chip
         * */
        if (socket->dev->device != PCI_DEVICE_ID_RICOH_RL5C476 &&
            socket->dev->device != PCI_DEVICE_ID_RICOH_RL5C478)
            return;

        if (socket->dev->revision < 0x80)
            return;

        misc3 = config_readw(socket, RL5C4XX_MISC3);
        
        if (misc3 & RL5C47X_MISC3_CB_CLKRUN_DIS) {
            if (!quiet)
                dev_dbg(&socket->dev->dev,
                        "CLKRUN feature already disabled\n");
            
            /* always disable */
            
            /* only need to set on the one we dont want */
            
            if (shell_interact(dev))
                dev_dbg(&socket->dev->dev,
                        "Non standard device found\n");
            
            /* always disable */
        } else if (disable_clkrun) {
            if (!quiet)
                dev_dbg(&socket->dev->dev,
                        "CLKRUN feature already disabled\n");
            
            /* always disable */
        }
    }
+if (!quiet)
+dev_info(&socket->dev->dev,
+"Disabling CLKRUN feature\n");
+misc3 |= RL5C47X_MISC3_CB_CLKRUN_DIS;
+config_writew(socket, RL5C4XX_MISC3, misc3);
+
+static void ricoh_save_state(struct yenta_socket *socket)
+{
+rl_misc(socket) = config_readw(socket, RL5C4XX_MISC);
+@@ -172,6 +205,7 @@
+config_writew(socket, RL5C4XX_16BIT_IO_0, rl_io(socket));
+config_writew(socket, RL5C4XX_16BIT_MEM_0, rl_mem(socket));
+config_writew(socket, RL5C4XX_CONFIG, rl_config(socket));
+ricoh_set_clkrun(socket, true);
+
+ricoh_set_zv(socket); 
+ricoh_set_clkrun(socket, false);
+
+return 0;
+}

static bool disable_clkrun;
module_param(disable_clkrun, bool, 0444);
-MODULE_PARM_DESC(disable_clkrun, "If PC card doesn't function properly, please try this option");
+MODULE_PARM_DESC(disable_clkrun,
+"If PC card doesn't function properly, please try this option (TI and Ricoh bridges only)");

static bool isa_probe = 1;
module_param(isa_probe, bool, 0444);
--- linux-4.15.0.orig/drivers/pcmcia/yenta_socket.c
+++ linux-4.15.0/drivers/pcmcia/yenta_socket.c
@@ -26,7 +26,8 @@
static bool disable_clkrun;
module_param(disable_clkrun, bool, 0444);
-MODULE_PARM_DESC(disable_clkrun, "If PC card doesn't function properly, please try this option");
+MODULE_PARM_DESC(disable_clkrun,
+"If PC card doesn't function properly, please try this option (TI and Ricoh bridges only)");

static bool isa_probe = 1;
module_param(isa_probe, bool, 0444);
--- linux-4.15.0.orig/drivers/perf/Kconfig
+++ linux-4.15.0/drivers/perf/Kconfig
@@ -43,6 +43,15 @@
Adds the L3 cache PMU into the perf events subsystem for
monitoring L3 cache events.

+config THUNDERX2_PMU
+tristate "Cavium ThunderX2 SoC PMU UNCORE"
+depends on ARCH_THUNDER2 & ARM64 & ACPI & NUMA
+default m
+help
+ Provides support for ThunderX2 UNCORE events.
+ The SoC has PMU support in its L3 cache controller (L3C) and
+ in the DDR4 Memory Controller (DMC).
+
config XGENE_PMU
  depends on ARCH_XGENE
  bool "APM X-Gene SoC PMU"
--- linux-4.15.0.orig/drivers/perf/Makefile
+++ linux-4.15.0/drivers/perf/Makefile
@@ -4,5 +4,6 @@
obj-$(CONFIG_HISI_PMU) += hisilicon/
obj-$(CONFIG_QCOM_L2_PMU) += qcom_l2_pmu.o
obj-$(CONFIG_QCOM_L3_PMU) += qcom_l3_pmu.o
+obj-$(CONFIG_THUNDERX2_PMU) += thunderx2_pmu.o
obj-$(CONFIG_XGENE_PMU) += xgene_pmu.o
obj-$(CONFIG_ARM_SPE_PMU) += arm_spe_pmu.o
--- linux-4.15.0.orig/drivers/perf/arm_pmu.c
+++ linux-4.15.0/drivers/perf/arm_pmu.c
@@ -745,8 +751,8 @@
    cpu_pm_pmu_setup(armpmu, cmd);
 case CPU_PM_EXIT:
-    cpu_pm_pmu_setup(armpmu, cmd);
 case CPU_PM_ENTER_FAILED:
+    cpu_pm_pmu_setup(armpmu, cmd);
armpmu->start(armpmu);
 break;
default:
 --- linux-4.15.0.orig/drivers/perf/arm_pmu_acpi.c
+++ linux-4.15.0/drivers/perf/arm_pmu_acpi.c
@@ @ -25,8 +25,6 @@
int gsi, trigger;

gicc = acpi_cpu_get_madt_gicc(cpu);
-if (WARN_ON(!gicc))
-return EINVAL;

gsi = gicc->performance_interrupt;

static int gsi;

int gsi;

int gsi;

gicc = acpi_cpu_get_madt_gicc(cpu);
-if (!gicc)
-return;

gsi = gicc->performance_interrupt;
-acpi_unregister_gsi(gsi);
+if (gsi)
+acpi_unregister_gsi(gsi);
}

static int arm_pmu_acpi_parse_irqs(void)
--- linux-4.15.0.orig/drivers/perf/arm_pmu_platform.c
+++ linux-4.15.0/drivers/perf/arm_pmu_platform.c
@@ -222,7 +222,7 @@
 ret = armpmu_register(pmu);
 if (ret)
 -goto out_free;
+goto out_free_irqs;

 return 0;

--- linux-4.15.0.orig/drivers/perf/arm_spe_pmu.c
+++ linux-4.15.0/drivers/perf/arm_spe_pmu.c
@@ -812,10 +812,10 @@
 {
 }

-static void *arm_spe_pmu_setup_aux(int cpu, void **pages, int nr_pages,
-+ static void *arm_spe_pmu_setup_aux(struct perf_event *event, void **pages,
+ int nr_pages, bool snapshot)
{int i;
+int i, cpu = event->cpu;
 struct page **pglist;
 struct arm_spe_pmu_buf *buf;


idx = atomic_inc_return(&pmu_idx);
name = devm_kasprintf(dev, GFP_KERNEL, "%s_%d", PMUNAME, idx);
  + if (!name) {
    + dev_err(dev, "failed to allocate name for pmu %d\n", idx);
  + return -ENOMEM;
  +
  + return perf_pmu_register(&spe_pmu->pmu, name, -1);
}

/*
 * If kernelspace is unmapped when running at EL0, then the SPE
 * buffer will fault and prematurely terminate the AUX session.
 */
  + if (arm64_kernel_unmapped_at_el0()) {
  + dev_warn_once(dev, "profiling buffer inaccessible. Try passing \"kpti=off\" on the kernel command line\n");
  + return -EPERM;
  +
  + spe_pmu = devm_kzalloc(dev, sizeof(*spe_pmu), GFP_KERNEL);
  if (!spe_pmu)
    dev_err(dev, "failed to allocate spe_pmu\n");
  -- linux-4.15.0.orig/drivers/perf/hisilicon/hisi_uncore_ddrc_pmu.c
  +++ linux-4.15.0/drivers/perf/hisilicon/hisi_uncore_ddrc_pmu.c
  @@ -30,8 +30,8 @@
  #define DDRC_FLUX_RCMD  0x38c
  #define DDRC_PRE_CMD    0x3c0
  #define DDRC_ACT_CMD    0x3c4
  -#define DDRC_BNK_CHG    0x3cc
  +#define DDRC_BNK_CHG    0x3c8
  #define DDRC_RNK_CHG    0x3d0
  #define DDRC_EVENT_CTRL 0x6C0
  #define DDRC_INT_MASK0x6c8
  #define DDRC_INT_STATUS0x6cc
  @@ -51,7 +51,7 @@
    static const u32 ddrc_reg_off[] = {
    DDRC_FLUX_WR, DDRC_FLUX_RD, DDRC_FLUX_WCMD, DDRC_FLUX_RCMD,
    -DDRC_PRE_CMD, DDRC_ACT_CMD, DDRC_BNK_CHG, DDRC_RNK_CHG
    +#define DDRC_PRE_CMD, DDRC_ACT_CMD, DDRC_BNK_CHG, DDRC_RNK_CHG
    ++DDRC_PRE_CMD, DDRC_ACT_CMD, DDRC_RNK_CHG, DDRC_RW_CHG
    
  Open Source Used In 5GaaS Edge AC-4 26958
/ * 
--- linux-4.15.0.orig/drivers/perf/hisilicon/hisi_uncore_hha_pmu.c 
+++ linux-4.15.0/drivers/perf/hisilicon/hisi_uncore_hha_pmu.c 
@@ -290,7 +290,7 @@
HISI_PMU_EVENT_ATTR(rx_wbip,		0x05),
HISI_PMU_EVENT_ATTR(rx_wtistash,	0x11),
HISI_PMU_EVENT_ATTR(rd_ddr_64b,0x1c),
-HISI_PMU_EVENT_ATTR(wr_dr_64b,		0x1d),
+HISI_PMU_EVENT_ATTR(wr_ddr_64b,		0x1d),
HISI_PMU_EVENT_ATTR(rd_ddr_128b,	0x1e),
HISI_PMU_EVENT_ATTR(wr_ddr_128b,	0x1f),
HISI_PMU_EVENT_ATTR(spill_num,		0x20),
--- linux-4.15.0.orig/drivers/perf/hisilicon/hisi_uncore_l3c_pmu.c 
+++ linux-4.15.0/drivers/perf/hisilicon/hisi_uncore_l3c_pmu.c 
@@ -38,7 +38,7 @@
/* L3C has 8-counters */
#define L3C_NR_COUNTERS0x8

#define L3C_PERF_CTRL_EN0x20000
#define L3C_PERF_CTRL_EN0x10000
#define L3C_EVTYPE_NONE0xff

/ * 
--- linux-4.15.0.orig/drivers/perf/thunderx2_pmu.c 
+++ linux-4.15.0/drivers/perf/thunderx2_pmu.c 
@@ -0,0 +1,865 @@
+/ * 
+ CAVIUM THUNDERX2 SoC PMU UNCORE
+ Copyright (C) 2018 Cavium Inc.
+ Author: Ganapatrao Kulkarni <gkulkarni@cavium.com>
+ */
+
+#include <linux/acpi.h>
+#include <linux/cpuhotplug.h>
+#include <linux/perf_event.h>
+#include <linux/platform_device.h>
+
+/* Each ThunderX2(TX2) Socket has a L3C and DMC UNCORE PMU device.
+ Each UNCORE PMU device consists of 4 independent programmable counters.
+ Counters are 32 bit and do not support overflow interrupt,
+ they need to be sampled before overflow(i.e, at every 2 seconds).
+ */
+ 
+#define for_each_sibling_event(sibling, event)                 
+     if ((event)->group_leader == (event))                   
+         list_for_each_entry((sibling), &(event)->sibling_list, sibling_list)
#define TX2_PMU_MAX_COUNTERS 4
#define TX2_PMU_DMC_CHANNELS 8
#define TX2_PMU_L3_TILES 16
+
+#define TX2_PMU_HRTIMER_INTERVAL (2 * NSEC_PER_SEC)
+#define GET_EVENTID(ev)((ev->hw.config) & 0x1f)
+#define GET_COUNTERID(ev)(ev->hw.idx) & 0x3)
+ /* 1 byte per counter(4 counters).
+ * Event id is encoded in bits [5:1] of a byte,
+ */
+#define DMC_EVENT_CFG(idx, val)((val) << (((idx) * 8) + 1))
+
+#define L3C_COUNTER_CTL 0xA8
+#define L3C_COUNTER_DATA 0xAC
+#define DMC_COUNTER_CTL 0x234
+#define DMC_COUNTER_DATA 0x240
+
+/* L3C event IDs */
+#define L3_EVENT_READ_REQ 0xD
+#define L3_EVENT_WRITEBACK_REQ 0xE
+#define L3_EVENT_INV_N_WRITE_REQ 0xF
+#define L3_EVENT_INV_REQ 0x10
+#define L3_EVENT_EVICT_REQ 0x13
+#define L3_EVENT_INV_N_WRITE_HIT 0x14
+#define L3_EVENT_INV_HIT 0x15
+#define L3_EVENT_READ_HIT 0x17
+#define L3_EVENT_MAX 0x18
+
+/* DMC event IDs */
+#define DMC_EVENT_COUNT_CYCLES 0x1
+#define DMC_EVENT_WRITE_TXNS 0xB
+#define DMC_EVENT_DATA_TRANSFERS 0xD
+#define DMC_EVENT_READ_TXNS 0xF
+#define DMC_EVENT_MAX 0x10
+
+enum tx2_uncore_type {
+PMU_TYPE_L3C,
+PMU_TYPE_DMC,
+PMU_TYPE_INVALID,
+};
+
+/*
+ * pmu on each socket has 2 uncore devices(dmc and l3c),
+ * each device has 4 counters.
+ */
+struct tx2_unicore_pmu {
+struct hlist_node hpnode;

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struct list_head entry;
struct pmu pmu;
char *name;
int node;
int cpu;
uint32_t max_counters;
uint32_t prorate_factor;
uint32_t max_events;
uint64_t hrtimer_interval;
void __iomem *base;
DECLARE_BITMAP(active_counters, TX2_PMU_MAX_COUNTERS);
struct perf_event *events[TX2_PMU_MAX_COUNTERS];
struct device *dev;
struct hrtimer hrtimer;
const struct attribute_group **attr_groups;
enum tx2_uncore_type type;
void (*init_cntr_base)(struct perf_event *event,
		struct tx2_uncore_pmu *tx2_pmu);
void (*stop_event)(struct perf_event *event);
void (*start_event)(struct perf_event *event, int flags);
};

static LIST_HEAD(tx2_pmus);

static inline struct tx2_uncore_pmu *pmu_to_tx2_pmu(struct pmu *pmu)
{
	return container_of(pmu, struct tx2_uncore_pmu, pmu);
}

PMU_FORMAT_ATTR(event, "config:0-4");

static struct attribute *l3c_pmu_format_attrs[] = {
	&format_attr_event.attr,
	NULL,
};

static struct attribute *dmc_pmu_format_attrs[] = {
	&format_attr_event.attr,
	NULL,
};

static const struct attribute_group l3c_pmu_format_attr_group = {
	.name = "format",
	.attrs = l3c_pmu_format_attrs,
};

static const struct attribute_group dmc_pmu_format_attr_group = {
	.name = "format",
};
+attrs = dmc_pmu_format_attrs,
+
+/*
+ * sysfs event attributes
+ */
+static ssize_t tx2_pmu_event_show(struct device *dev,
				    struct device_attribute *attr, char *buf)
+
+struct dev_ext_attribute *eattr;
+
+eattr = container_of(attr, struct dev_ext_attribute, attr);
+return sprintf(buf, "event=0x%lx\n", (unsigned long) eattr->var);
+
+##define TX2_EVENT_ATTR(name, config) \n
+PMU_EVENT_ATTR(name, tx2_pmu_event_attr_##name, \n				config, tx2_pmu_event_show)
+
+TX2_EVENT_ATTR(read_request, L3_EVENT_READ_REQ);
+TX2_EVENT_ATTR(writeback_request, L3_EVENT_WRITEBACK_REQ);
+TX2_EVENT_ATTR(inv_nwrite_request, L3_EVENT_INV_N_WRITE_REQ);
+TX2_EVENT_ATTR(inv_request, L3_EVENT_INV_REQ);
+TX2_EVENT_ATTR(evict_request, L3_EVENT_EVICT_REQ);
+TX2_EVENT_ATTR(inv_nwrite_hit, L3_EVENT_INV_N_WRITE_HIT);
+TX2_EVENT_ATTR(inv_hit, L3_EVENT_INV_HIT);
+TX2_EVENT_ATTR(read_hit, L3_EVENT_READ_HIT);
+
+static struct attribute *l3c_pmu_events_attrs[] = {
    &tx2_pmu_event_attr_read_request.attr.attr,
    &tx2_pmu_event_attr_writeback_request.attr.attr,
    &tx2_pmu_event_attr_inv_nwrite_request.attr.attr,
    &tx2_pmu_event_attr_inv_request.attr.attr,
    &tx2_pmu_event_attr_evict_request.attr.attr,
    &tx2_pmu_event_attr_inv_nwrite_hit.attr.attr,
    &tx2_pmu_event_attr_inv_hit.attr.attr,
    &tx2_pmu_event_attr_read_hit.attr.attr,
    NULL,
};
+
+TX2_EVENT_ATTR(cnt_cycles, DMC_EVENT_COUNT_CYCLES);
+TX2_EVENT_ATTR(write_txns, DMC_EVENT_WRITE_TXNS);
+TX2_EVENT_ATTR(data_transfers, DMC_EVENT_DATA_TRANSFERS);
+TX2_EVENT_ATTR(read_txns, DMC_EVENT_READ_TXNS);
+
+static struct attribute *dmc_pmu_events_attrs[] = {
    &tx2_pmu_event_attr_cnt_cycles.attr.attr,
    &tx2_pmu_event_attr_write_txns.attr.attr,
static const struct attribute_group l3c_pmu_events_attr_group = {
    .name = "events",
    .attrs = l3c_pmu_events attrs,
};

static const struct attribute_group dmc_pmu_events_attr_group = {
    .name = "events",
    .attrs = dmc_pmu_events attrs,
};

static ssize_t cpumask_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
    struct tx2_uncore_pmu *tx2_pmu;
    tx2_pmu = pmu_to tx2_pmu(dev_get_drvdata(dev));
    return cpumap_print_to_pagebuf(true, buf, cpumask_of(tx2_pmu->cpu));
}

static struct tx2_uncore_pmu *tx2_pmu;

+static struct attribute_group l3c_pmu_attr_groups[] = {
    &l3c_pmu_format_attr_group,
    &l3c_pmu_events_attr_group,
    &pmu_cpumask_attr_group,
    NULL
};

+static struct attribute_group dmc_pmu_attr_groups[] = {
    &dmc_pmu_format_attr_group,
    &dmc_pmu_events_attr_group,
    &pmu_cpumask_attr_group,
    NULL
};

+static const struct attribute_group* l3c_pmu_attr_groups[] = {
    &l3c_pmu_format_attr_group,
    &pmu_cpumask_attr_group,
    &l3c_pmu_events_attr_group,
    NULL
};

+static const struct attribute_group* dmc_pmu_attr_groups[] = {

+&dmc_pmu_format_attr_group,
+&pmu_cpmask_attr_group,
+&dmc_pmu_events_attr_group,
+NULL
+};
+
+static inline u32 reg_readl(unsigned long addr)
+{
+    return readl((void __iomem *)addr);
+}
+
+static inline void reg_writel(u32 val, unsigned long addr)
+{
+    writel(val, (void __iomem *)addr);
+}
+
+static int alloc_counter(struct tx2_uncore_pmu *tx2_pmu)
+{
+    int counter;
+    
+    counter = find_first_zero_bit(tx2_pmu->active_counters,
+        tx2_pmu->max_counters);
+    
+    if (counter == tx2_pmu->max_counters)
+        return -ENOSPC;
+    
+    set_bit(counter, tx2_pmu->active_counters);
+    return counter;
+}
+
+static inline void free_counter(struct tx2_uncore_pmu *tx2_pmu, int counter)
+{
+    clear_bit(counter, tx2_pmu->active_counters);
+}
+
+static void init_cntr_base_l3c(struct perf_event *event,
+    struct tx2_uncore_pmu *tx2_pmu)
+{
+    struct hw_perf_event *hwc = &event->hw;
+    
+    /* counter ctrl/data reg offset at 8 */
+    hwc->config_base = (unsigned long)tx2_pmu->base
+                        + L3C_COUNTER_CTL + (8 * GET_COUNTERID(event));
+    hwc->event_base =  (unsigned long)tx2_pmu->base
+                       + L3C_COUNTER_DATA + (8 * GET_COUNTERID(event));
+}
+
+static void init_cntr_base_dmc(struct perf_event *event,
+    struct tx2_uncore_pmu *tx2_pmu)
+struct hw_perf_event *hwc = &event->hw;
+
+hwc->config_base = (unsigned long)tx2_pmu->base
++ DMC_COUNTER_CTL;
+/* counter data reg offset at 0xc */
+hwc->event_base = (unsigned long)tx2_pmu->base
++ DMC_COUNTER_DATA + (0xc * GET_COUNTERID(event));
+
+static void uncore_start_event_l3c(struct perf_event *event, int flags)
+
+u32 val;
+struct hw_perf_event *hwc = &event->hw;
+
+/* event id encoded in bits [07:03] */
+val = GET_EVENTID(event) << 3;
+reg_writel(val, hwc->config_base);
+local64_set(&hwc->prev_count, 0);
+reg_writel(0, hwc->event_base);
+
+static inline void uncore_stop_event_l3c(struct perf_event *event)
+
+reg_writel(0, event->hw.config_base);
+
+static void uncore_start_event_dmc(struct perf_event *event, int flags)
+
+u32 val;
+struct hw_perf_event *hwc = &event->hw;
+int idx = GET_COUNTERID(event);
+int event_id = GET_EVENTID(event);
+
+/* enable and start counters. 
  * 8 bits for each counter, bits[05:01] of a counter to set event type. 
  */
+val = reg_readl(hwc->config_base);
+val &= ~DMC_EVENT_CFG(idx, 0x1f);
+val |= DMC_EVENT_CFG(idx, event_id);
+reg_writel(val, hwc->config_base);
+local64_set(&hwc->prev_count, 0);
+reg_writel(0, hwc->event_base);
+
+static void uncore_stop_event_dmc(struct perf_event *event)
+
+reg_writel(0, hwc->config_base);

+struct hw_perf_event *hwc = &event->hw;
+int idx = GET_COUNTERID(event);
+
+/** clear event type(bits[05:01]) to stop counter */
+val = reg_readl(hwc->config_base);
+val &= ~DMC_EVENT_CFG(idx, 0x1f);
+reg_writel(val, hwc->config_base);
+}
+
+static void tx2_uncore_event_update(struct perf_event *event)
+{
+s64 prev, delta, new = 0;
+struct hw_perf_event *hwc = &event->hw;
+struct tx2_uncore_pmu *tx2_pmu;
+enum tx2_uncore_type type;
+u32 prorate_factor;
+
+tx2_pmu = pmu_to_tx2_pmu(event->pmu);
+type = tx2_pmu->type;
+prorate_factor = tx2_pmu->prorate_factor;
+
+new = reg_readl(hwc->event_base);
+prev = local64_xchg(&hwc->prev_count, new);
+
+/* handles rollover of 32 bit counter */
+delta = (u32)(((1UL << 32) - prev) + new);
+
+/* DMC event data_transfers granularity is 16 Bytes, convert it to 64 */
+if (type == PMU_TYPE_DMC &&
+GET_EVENTID(event) == DMC_EVENT_DATA_TRANSFERS)
+delta = delta/4;
+
+/* L3C and DMC has 16 and 8 interleave channels respectively.
+ * The sampled value is for channel 0 and multiplied with
+ * prorate_factor to get the count for a device.
+ */
+local64_add(delta * prorate_factor, &event->count);
+}
+
+static enum tx2_uncore_type get Tx2_pmu_type(struct acpi_device *adev)
+{
+int i = 0;
+struct acpi_tx2_pmu_device
+__u8 id[ACPI_ID_LEN];
+enum tx2_uncore_type type;
+} devices[] = {
+{"CAV901D", PMU_TYPE_L3C},
+{"CAV901F", PMU_TYPE_DMC},
+}
++"", PMU_TYPE_INVALID}
+
+while (devices[i].type != PMU_TYPE_INVALID) {
+if (!strcmp(acpi_device_hid(adev), devices[i].id))
+break;
+i++;
+}
+
+return devices[i].type;
+
+static bool tx2_uncore_validate_event(struct pmu *pmu,
+ struct perf_event *event, int *counters)
+{
+if (is_software_event(event))
+return true;
+/* Reject groups spanning multiple HW PMUs. */
+if (event->pmu != pmu)
+return false;
+
+*counters = *counters + 1;
+return true;
+
+/*
+ * Make sure the group of events can be scheduled at once
+ * on the PMU.
+ */
+static bool tx2_uncore_validate_event_group(struct perf_event *event)
+{
+struct perf_event *sibling, *leader = event->group_leader;
+int counters = 0;
+
+if (event->group_leader == event)
+return true;
+
+if (!tx2_uncore_validate_event(event->pmu, leader, &counters))
+return false;
+
+for_each_sibling_event(sibling, leader) {
+if (!tx2_uncore_validate_event(event->pmu, sibling, &counters))
+return false;
+}
+
+if (!tx2_uncore_validate_event(event->pmu, event, &counters))
+return false;
+}
/ * If the group requires more counters than the HW has, /
 */
+ return counters <= TX2_PMU_MAX_COUNTERS;
+
+static int tx2_uncore_event_init(struct perf_event *event)
+{
+struct hw_perf_event *hwc = &event->hw;
+struct tx2_uncore_pmu *tx2_pmu;
+
+/* Test the event attr type check for PMU enumeration */
+if (event->attr.type != event->pmu->type)
+return -ENOENT;
+
+/* SOC PMU counters are shared across all cores.
+ * Therefore, it does not support per-process mode.
+ * Also, it does not support event sampling mode.
+ */
+if (is_sampling_event(event) || event->attach_state & PERF_ATTACH_TASK)
+return -EINVAL;
+
+/* We have no filtering of any kind */
+if (event->attr.exclude_user ||
+ event->attr.exclude_kernel ||
+ event->attr.exclude_hv ||
+ event->attr.exclude_idle ||
+ event->attr.exclude_host ||
+ event->attr.exclude_guest)
+return -EINVAL;
+
+if (event->cpu < 0)
+return -EINVAL;
+
+tx2_pmu = pmu_to_tx2_pmu(event->pmu);
+if (tx2_pmu->cpu >= nr_cpu_ids)
+return -EINVAL;
+
+event->cpu = tx2_pmu->cpu;
+
+if (event->attr.config >= tx2_pmu->max_events)
+return -EINVAL;
+
+/* store event id */
+hwc->config = event->attr.config;
/* Validate the group */
+if (!tx2_uncore_validate_event_group(event))
+return -EINVAL;
+
+return 0;
+
+static void tx2_uncore_event_start(struct perf_event *event, int flags)
+{
+struct hw_perf_event *hwc = &event->hw;
+struct tx2_uncore_pmu *tx2_pmu;
+
+tx2_pmu = pmu_to_tx2_pmu(event->pmu);
+
+tx2_pmu->start_event(event, flags);
+perf_event_update_userpage(event);
+
+/* Start timer for first event */
+if (bitmap_weight(tx2_pmu->active_counters,
+tx2_pmu->max_counters) == 1) {
+hrtimer_start(&tx2_pmu->hrtimer,
+ns_to_ktime(tx2_pmu->hrtimer_interval),
+HRTIMER_MODE_REL_PINNED);
+}
+
+static void tx2_uncore_event_stop(struct perf_event *event, int flags)
+{
+struct hw_perf_event *hwc = &event->hw;
+struct tx2_uncore_pmu *tx2_pmu;
+
+if (hwc->state & PERF_HES_UPTODATE)
+return;
+
+tx2_pmu = pmu_to_tx2_pmu(event->pmu);
+tx2_pmu->stop_event(event);
+WARN_ON_ONCE(hwc->state & PERF_HES_STOPPED);
+hwc->state |= PERF_HES_STOPPED;
+if (flags & PERF_EF_UPDATE) {
+tx2_uncore_event_update(event);
+hwc->state |= PERF_HES_UPTODATE;
+}
+
+static int tx2_uncore_event_add(struct perf_event *event, int flags)
+{
+struct hw_perf_event *hwc = &event->hw;
struct tx2_uncore_pmu *tx2_pmu;
+
+tx2_pmu = pmu_to_tx2_pmu(event->pmu);
+
+/* Allocate a free counter */
+hwc->idx = alloc_counter(tx2_pmu);
+if (hwc->idx < 0)
+return -EAGAIN;
+
+tx2_pmu->events[hwc->idx] = event;
+/* set counter control and data registers base address */
+tx2_pmu->init_cntr_base(event, tx2_pmu);
+
+hwc->state = PERF_HES_UPTODATE | PERF_HES_STOPPED;
+if (flags & PERF_EF_START)
+tx2_uncore_event_start(event, flags);
+
+return 0;
+
+
+static void tx2_uncore_event_del(struct perf_event *event, int flags)
+
+{ struct tx2_uncore_pmu *tx2_pmu = pmu_to_tx2_pmu(event->pmu);
+struct hw_perf_event *hwc = &event->hw;
+
+tx2_uncore_event_stop(event, PERF_EF_UPDATE);
+
+/* clear the assigned counter */
+free_counter(tx2_pmu, GET_COUNTERID(event));
+
+perf_event_update_userpage(event);
+tx2_pmu->events[hwc->idx] = NULL;
+hwc->idx = -1;
+
+
+static void tx2_uncore_event_read(struct perf_event *event)
+
+{ tx2_uncore_event_update(event);
+
+
+static enum hrtimer_restart tx2_hrtimer_callback(struct hrtimer *timer)
+
+{ struct tx2_uncore_pmu *tx2_pmu = pmu_to_tx2_pmu(event->pmu);
+int max_counters, idx;
+
+tx2_pmu = container_of(timer, struct tx2_uncore_pmu, hrtimer);
+max_counters = tx2_pmu->max_counters;
+}
if (bitmap_empty(tx2_pmu->active_counters, max_counters))
+ return HRTIMER_NORESTART;
+
+ for_each_set_bit(idx, tx2_pmu->active_counters, max_counters) {
+ struct perf_event *event = tx2_pmu->events[idx];
+ +
+ tx2_uncore_event_update(event);
+ }
+ hrtimer_forward_now(timer, ns_to_ktime(tx2_pmu->hrtimer_interval));
+ return HRTIMER_RESTART;
+
+ static int tx2_uncore_pmu_register(
+ struct tx2_uncore_pmu *tx2_pmu) {
+ struct device *dev = tx2_pmu->dev;
+ char *name = tx2_pmu->name;
+ +
+ /* Perf event registration */
+ tx2_pmu->pmu = (struct pmu) {
+ .module = THIS_MODULE,
+ .attr_groups = tx2_pmu->attr_groups,
+ .task_ctx_nr = perf_invalid_context,
+ .event_init = tx2_uncore_event_init,
+ .add = tx2_uncore_event_add,
+ .del = tx2_uncore_event_del,
+ .start = tx2_uncore_event_start,
+ .stop = tx2_uncore_event_stop,
+ .read = tx2_uncore_event_read,
+ };
+ +
+ tx2_pmu->pmu.name = devm_kasprintf(dev, GFP_KERNEL,
+ "%s", name);
+ +
+ return perf_pmu_register(&tx2_pmu->pmu, tx2_pmu->pmu.name, -1);
+ }
+
+ static int tx2_uncore_pmu_add_dev(struct tx2_uncore_pmu *tx2_pmu) {
+ int ret, cpu;
+ +
+ cpu = cpumask_any_and(cpumask_of_node(tx2_pmu->node),
+ cpu_online_mask);
+ +
+ tx2_pmu->cpu = cpu;
+ hrtimer_init(&tx2_pmu->hrtimer, CLOCK_MONOTONIC, HRTIMER_MODE_REL);
+ tx2_pmu->hrtimer.function = tx2_hrtimer_callback;
+ +
+ret = tx2_uncore_pmu_register(tx2_pmu);
+if (ret) {
+dev_err(tx2_pmu->dev, "%s PMU: Failed to init driver\n",
+tx2_pmu->name);
+return -ENODEV;
+
+/* register hotplug callback for the pmu */
+ret = cpuhp_state_add_instance(  
+CPUHP_AP_PERF_ARM_CAVIUM_TX2_UNCORE_ONLINE,  
+&tx2_pmu->hpnode);
+if (ret) {
+dev_err(tx2_pmu->dev, "Error %d registering hotplug", ret);
+return ret;
+
+/* Add to list */
+list_add(&tx2_pmu->entry, &tx2_pmus);
+
+dev_dbg(tx2_pmu->dev, "%s PMU UNCORE registered\n",  
+tx2_pmu->pmu.name);
+return ret;
+
+static struct tx2_uncore_pmu *tx2_uncore_pmu_init_dev(struct device *dev,  
+acpi_handle handle, struct acpi_device *adev, u32 type)
+{
+struct tx2_uncore_pmu *tx2_pmu;
+void __iomem *base;
+struct resource res;
+struct resource_entry *rentry;
+struct list_head list;
+int ret;
+
+INIT_LIST_HEAD(&list);
+ret = acpi_dev_get_resources(adev, &list, NULL, NULL);
+if (ret <= 0) {
+dev_err(dev, "failed to parse _CRS method, error %d\n", ret);
+return NULL;
+
+list_for_each_entry(rentry, &list, node) {
+if (resource_type(rentry->res) == IORESOURCE_MEM) {
+res = *rentry->res;
+break;
+
+}  
+}  
+}
+if (!entry->res)
+return NULL;
+
+acpi_dev_free_resource_list(&list);
+base = devs_ioremap_resource(dev, &res);
+if (IS_ERR(base)) {
+dev_err(dev, "PMU type %d: Fail to map resource\n", type);
+return NULL;
+}
+
+tx2_pmu = devs_kzalloc(dev, sizeof(*tx2_pmu), GFP_KERNEL);
+if (!tx2_pmu)
+return NULL;
+
+tx2_pmu->dev = dev;
+tx2_pmu->type = type;
+tx2_pmu->base = base;
+tx2_pmu->node = dev_to_node(dev);
+INIT_LIST_HEAD(&tx2_pmu->entry);
+
+switch (tx2_pmu->type) {
+case PMU_TYPE_L3C:
+tx2_pmu->max_counters = TX2_PMU_MAX_COUNTERS;
+tx2_pmu->prorate_factor = TX2_PMU_L3_TILES;
+tx2_pmu->max_events = L3_EVENT_MAX;
+tx2_pmu->hrtimer_interval = TX2_PMU_HRTIMER_INTERVAL;
+tx2_pmu->attr_groups = l3c_pmu_attr_groups;
+tx2_pmu->name = devs_kasprintf(dev, GFP_KERNEL,
+"uncore_l3c_%d", tx2_pmu->node);
+tx2_pmu->init_cntr_base = init_cntr_base_l3c;
+tx2_pmu->start_event = uncore_start_event_l3c;
+tx2_pmu->stop_event = uncore_stop_event_l3c;
+break;
+
+case PMU_TYPE_DMC:
+tx2_pmu->max_counters = TX2_PMU_MAX_COUNTERS;
+tx2_pmu->prorate_factor = TX2_PMU_DMC_CHANNELS;
+tx2_pmu->max_events = DMC_EVENT_MAX;
+tx2_pmu->hrtimer_interval = TX2_PMU_HRTIMER_INTERVAL;
+tx2_pmu->attr_groups = dmc_pmu_attr_groups;
+tx2_pmu->name = devs_kasprintf(dev, GFP_KERNEL,
+"uncore_dmc_%d", tx2_pmu->node);
+tx2_pmu->init_cntr_base = init_cntr_base_dmc;
+tx2_pmu->start_event = uncore_start_event_dmc;
+tx2_pmu->stop_event = uncore_stop_event_dmc;
+break;
+
+case PMU_TYPE_INVALID:
+devs_kfree(dev, tx2_pmu);
+return NULL;
static acpi_status tx2_uncore_pmu_add(acpi_handle handle, u32 level, void *data, void **return_value)
{
    struct tx2_uncore_pmu *tx2_pmu;
    struct acpi_device *adev;
    enum tx2_uncore_type type;

    if (acpi_bus_get_device(handle, &adev))
        return AE_OK;
    if (acpi_bus_get_status(adev) || !adev->status.present)
        return AE_OK;

    type = get_tx2_pmu_type(adev);
    if (type == PMU_TYPE_INVALID)
        return AE_OK;

    tx2_pmu = tx2_uncore_pmu_init_dev((struct device *)data,
        handle, adev, type);
    if (!tx2_pmu)
        return AE_ERROR;

    if (tx2_uncore_pmu_add_dev(tx2_pmu)) {
        /* Can't add the PMU device, abort */
        return AE_ERROR;
    }
    return AE_OK;
}

static int tx2_uncore_pmu_online_cpu(unsigned int cpu,
    struct hlist_node *hpnode)
{
    struct tx2_uncore_pmu *tx2_pmu;
    /* Pick this CPU, If there is no CPU/PMU association and both are
     * from same node.
     */
    if ((tx2_pmu->cpu >= nr_cpu_ids) &&
        (tx2_pmu->node == cpu_to_node(cpu)))
        tx2_pmu->cpu = cpu;

    return 0;
+static int tx2_uncore_pmu_offline_cpu(unsigned int cpu,  
 +struct hlist_node *hpnode)
+{
+int new_cpu;
+struct tx2_uncore_pmu *tx2_pmu;
+struct cpumask cpu_online_mask_temp;
+
+tx2_pmu = hlist_entry_safe(hpnode,  
+ struct tx2_uncore_pmu, hpnode);
+
+if (cpu != tx2_pmu->cpu)
+return 0;
+
+hrtimer_cancel(&tx2_pmu->hrtimer);
+cpumask_copy(&cpu_online_mask_temp, cpu_online_mask);
+cpumask_clear_cpu(cpu, &cpu_online_mask_temp);
+new_cpu = cpumask_any_and(  
+ cpumask_of_node(tx2_pmu->node),
+&cpu_online_mask_temp);
+
+tx2_pmu->cpu = new_cpu;
+
+if (new_cpu >= nr_cpu_ids)
+ return 0;
+perf_pmu_migrate_context(&tx2_pmu->pmu, cpu, new_cpu);
+
+return 0;
+
+static const struct acpi_device_id tx2_uncore_acpi_match[] = {
+{"CAV901C", 0},
+[{ },
+];
+MODULE_DEVICE_TABLE(acpi, tx2_uncore_acpi_match);
+
+static int tx2_uncore_probe(struct platform_device *pdev)
+{
+struct device *dev = &pdev->dev;
+acpi_handle handle;
+acpi_status status;
+
+set_dev_node(dev, acpi_get_node(ACPI_HANDLE(dev)));
+
+if (!has_acpi_companion(dev))
+return -ENODEV;
handle = ACPI_HANDLE(dev);
if (!handle)
    return -EINVAL;

/* Walk through the tree for all PMU UNCORE devices */
status = acpi_walk_namespace(ACPI_TYPE_DEVICE, handle, 1,
    tx2_uncore_pmu_add,
    NULL, dev, NULL);
if (ACPI_FAILURE(status)) {
    dev_err(dev, "failed to probe PMU devices\n");
    return ACPI_STATUS(status);
}

dev_info(dev, "node%d: pmu uncore registered\n", dev_to_node(dev));
return 0;

static int tx2_uncore_remove(struct platform_device *pdev)
{
    struct tx2_uncore_pmu *tx2_pmu, *temp;
    struct device *dev = &pdev->dev;

    if (!list_empty(&tx2_pmus)) {
        list_for_each_entry_safe(tx2_pmu, temp, &tx2_pmus, entry) {
            if (tx2_pmu->node == dev_to_node(dev)) {
                cpuhp_state_remove_instance_nocalls(
                    CPUHP_AP_PERF_ARM_CAVIUM_TX2_UNCORE_ONLINE,
                    &tx2_pmu->hpnode);
                perf_pmu_unregister(&tx2_pmu->pmu);
                list_del(&tx2_pmu->entry);
            }
        }
    }
    return 0;
}

static struct platform_driver tx2_uncore_driver = {
    .driver = {
        .name = "tx2-uncore-pmu",
        .acpi_match_table = ACPI_PTR(tx2_uncore_acpi_match),
    },
    .probe = tx2_uncore_probe,
    .remove = tx2_uncore_remove,
};

static int __init tx2_uncore_driver_init(void)
{
+int ret;
+
+ret = cpuhp_setup_state_multi(CPUHP_AP_PERF_ARM_CAVIUM_TX2_UNCORE_ONLINE,
+    "perf/tx2/uncore:online",
+    tx2_uncore_pmu_online_cpu,
+    tx2_uncore_pmu_offline_cpu);
+if (ret) {
+    pr_err("TX2 PMU: setup hotplug failed(%d)\n", ret);
+    return ret;
+}
+ret = platform_driver_register(&tx2_uncore_driver);
+if (ret)
+    cpuhp_remove_multi_state(CPUHP_AP_PERF_ARM_CAVIUM_TX2_UNCORE_ONLINE);
+
+return ret;
+
+module_init(tx2_uncore_driver_init);
+
+static void __exit tx2_uncore_driver_exit(void)
+{
+    platform_driver_unregister(&tx2_uncore_driver);
+    cpuhp_remove_multi_state(CPUHP_AP_PERF_ARM_CAVIUM_TX2_UNCORE_ONLINE);
+}
+
+module_exit(tx2_uncore_driver_exit);
+
+MODULE_DESCRIPTION("ThunderX2 UNCORE PMU driver");
+MODULE_LICENSE("GPL v2");
+MODULE_AUTHOR("Ganapatrao Kulkarni <gkulkarni@cavium.com>");

--- linux-4.15.0.orig/drivers/perf/xgene_pmu.c
+++ linux-4.15.0/drivers/perf/xgene_pmu.c
@@ -1463,7 +1463,7 @@
case PMU_TYPE_IOB:
              return devm_kasprintf(dev, GFP_KERNEL, "iob%d", id);
case PMU_TYPE_IOB_SLOW:
-      return devm_kasprintf(dev, GFP_KERNEL, "iob-slow%d", id);
+      return devm_kasprintf(dev, GFP_KERNEL, "iob_slow%d", id);
case PMU_TYPE_MCB:
              return devm_kasprintf(dev, GFP_KERNEL, "mcb%d", id);
case PMU_TYPE_MC:
@@ -1474,17 +1474,6 @@
 #if defined(CONFIG_ACPI)
 -static int acpi_pmu_dev_add_resource(struct acpi_resource *ares, void *data)
 -{
-struct resource *res = data;
-
-    if (ares->type == ACPIRESOURCE_TYPE_FIXED_MEMORY32)
acpi_dev_resource_memory(ares, res);
-
-/* Always tell the ACPI core to skip this resource */
-return 1;
-
-
static struct
  xgene_pmu_dev_ctx *acpi_get_pmu_hw_inf(struct xgene_pmu *xgene_pmu,
      struct acpi_device *addev, u32 type)
@@ -1496,6 +1485,7 @@
      void __iomem *dev_csr;
    struct resource res;
    +struct resource_entry *rentry;
    int enable_bit;
    int rc;
@@ -1504,11 +1494,23 @@
       INIT_LIST_HEAD(&resource_list);
       -rc = acpi_dev_get_resources(addev, &resource_list,
       -  acpi_pmu_dev_add_resource, &res);
+rc = acpi_dev_get_resources(addev, &resource_list, NULL, NULL);
       +if (rc <= 0) {
         +dev_err(dev, "PMU type %d: No resources found\n", type);
         +return NULL;
         +}
         +
         +list_for_each_entry(rentry, &resource_list, node) {
         +if (resource_type(rentry->res) == IORESOURCE_MEM) {
           +res = *rentry->res;
           +rentry = NULL;
           +break;
           +}
           +}
         +acpi_dev_free_resource_list(&resource_list);
         +if (rc < 0) {
           -dev_err(dev, "PMU type %d: No resource address found\n", type);
           +
           +if (rentry) {
           +dev_err(dev, "PMU type %d: No memory resource found\n", type);
           return NULL;
           }

--- linux-4.15.0.orig/drivers/phy/allwinner/phy-sun4i-usb.c
+++ linux-4.15.0/drivers/phy/allwinner/phy-sun4i-usb.c
@@ -125,6 +125,7 @@
bool dedicated_clocks;
bool enable_pmu_unk1;
bool phy0_dual_route;
+int missing_phys;
};

struct sun4i_usb_phy_data {
	return true;
*/
- * The A31 companion pmic (axp221) does not generate vbus change
- * interrupts when the board is driving vbus, so we must poll
+ * The A31/A23/A33 companion pmics (AXP221/AXP223) do not
+ * generate vbus change interrupts when the board is driving
+ * vbus using the N_VBUSEN pin on the pmic, so we must poll
* when using the pmic for vbus-det _and_ we're driving vbus.
*/
-if (data->cfg->type == sun6i_a31_phy &&
+if (((data->cfg->type == sun6i_a31_phy ||
+     data->cfg->type == sun8i_a33_phy) &&
     data->vbus_power_supply && data->phys[0].regulator_on)
return true;

struct sun4i_usb_phy_data *data = to_sun4i_usb_phy_data(phy);
int new_mode;

@if (phy->index != 0)
+if (phy->index != 0) {
+if (mode == PHY_MODE_USB_HOST)
+return 0;
return -EINVAL;
+}

switch (mode) {
  case PHY_MODE_USB_HOST:
    struct sun4i_usb_phy_data *data =
      container_of(work, struct sun4i_usb_phy_data, detect.work);
    struct phy *phy0 = data->phys[0].phy;
    +struct sun4i_usb_phy *phy;
    bool force_session_end, id_notify = false, vbus_notify = false;
    int id_det, vbus_det;

    -if (phy0 == NULL)
+if (!phy0)
    return;
+phy = phy_get_drvdata(phy0);
id_det = sun4i_usb_phy0_get_id_det(data);
vbus_det = sun4i_usb_phy0_get_vbus_det(data);

@@ -599,6 +607,9 @@
 mutex_unlock(&phy0->mutex);
 }

+/* Enable PHY0 passby for host mode only. */
+sun4i_usb_phy_passby(phy, !id_det);
+
/* Re-route PHY0 if necessary */
if (data->cfg->phy0_dual_route)
  sun4i_usb_phy0_reroute(data, id_det);
@@ -643,6 +654,9 @@
 if (args->args[0] >= data->cfg->num_phys)
   return ERR_PTR(-ENODEV);

+if (data->cfg->missing_phys & BIT(args->args[0]))
  +return ERR_PTR(-ENODEV);
  +
 return data->phys[args->args[0]].phy;
 }

@@ -738,6 +752,9 @@
 struct sun4i_usb_phy *phy = data->phys + i;
 char name[16];

+if (data->cfg->missing_phys & BIT(i))
+continue;
+
 snprintf(name, sizeof(name), "usb%d_vbus", i);
 phy->vbus = devm_regulator_get_optional(dev, name);
 if (IS_ERR(phy->vbus)) {
@@ -885,7 +902,7 @@
 static const struct sun4i_usb_phy_cfg sun8i_a23_cfg = {
   .num_phys = 2,
   .type = sun4i_a10_phy,
+  .type = sun6i_a31_phy,
   .disc_thresh = 3,
   .phyctl_offset = REG_PHYCTL_A10,
   .dedicated_clocks = true,
--- linux-4.15.0.orig/drivers/phy/broadcom/Kconfig
+++ linux-4.15.0/drivers/phy/broadcom/Kconfig
@@ -60,7 +60,8 @@

config PHY_BRCM_SATA
tristate "Broadcom SATA PHY driver"
-depends on ARCH_BRCMSTB || ARCH_BCM_IPROC || BMIPS_GENERIC || COMPILE_TEST
+depends on ARCH_BRCMSTB || ARCH_BCM_IPROC || BMIPS_GENERIC || \
  ARCH_BCM_63XX || COMPILE_TEST
depends on OF
select GENERIC_PHY
default ARCH_BCM_IPROC
--- linux-4.15.0.orig/drivers/phy/broadcom/phy-brcm-usb-init.c
+++ linux-4.15.0/drivers/phy/broadcom/phy-brcm-usb-init.c
@@ -50,6 +50,8 @@
#define   USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK	0x80000000 /* option */
#define USB_CTRL_EBRIDGE0x0c
#define USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK0x00020000 /* option */
+#define USB_CTRL_OBRIDGE0x10
 +#define USB_CTRL_OBRIDGE_LS_KEEP_ALIVE_MASK0x08000000
#define USB_CTRL_MDIO0x14
#define USB_CTRL_MDIO20x18
#define USB_CTRL_UTMI_CTL_10x2c
@@ -71,6 +73,7 @@
#define   USB_CTRL_USB30_CTL1_USB3_IPP_MASK	0x20000000 /* option */
#define USB_CTRL_USB30_PCTL	0x70
#define   USB_CTRL_USB30_PCTL_PHY3_SOFT_RESETB_MASK	0x00000002
+#define USB_CTRL_USB30_PCTL_PHY3_IDDQ_OVERRIDE_MASK	0x00008000
#define   USB_CTRL_USB30_PCTL_PHY3_SOFT_RESETB_P1_MASK	0x00020000
#define USB_CTRL_USB_DEVICE_CTL1	0x90
#define USB_CTRL_USB_DEVICE_CTL1_PORT_MODE_MASK	0x00000003 /* option */
@@ -116,7 +119,6 @@
USB_CTRL_SETUP_STRAP_IPP_SEL_SELECTOR,
USB_CTRL_SETUP_OC3_DISABLE_SELECTOR,
USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_SELECTOR,
-USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_SELECTOR,
USB_CTRL_USB_PM_BDC_SOFT_RESETB_SELECTOR,
USB_CTRL_USB_PM_XHC_SOFT_RESETB_SELECTOR,
USB_CTRL_USB_PM_USB_PWRDN_SELECTOR,
@@ -203,7 +205,6 @@
USB_CTRL_SETUP_STRAP_IPP_SEL_MASK,
USB_CTRL_SETUP_OC3_DISABLE_MASK,
0, /* USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK */
-USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK,
0, /* USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK */
USB_CTRL_USB_PM_XHC_SOFT_RESETB_MASK,
USB_CTRL_USB_PM_USB_PWRDN_MASK,
@@ -225,7 +226,6 @@
USB_CTRL_SETUP_STRAP_IPP_SEL_MASK,
USB_CTRL_SETUP_OC3_DISABLE_MASK,
0, /* USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK */
USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK,

0, /* USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK */
USB_CTRL_USB_PM_XHC_SOFT_RESETB_VAR_MASK,
0, /* USB_CTRL_USB_PM_USB_PWRDN_MASK */
@@ -247,7 +247,6 @@
USB_CTRL_SETUP_STRAP_IPP_SEL_MASK,
USB_CTRL_SETUP_OC3_DISABLE_MASK,
0, /* USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK */
-USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK,
USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK,
USB_CTRL_USB_PM_XHC_SOFT_RESETB_MASK,
USB_CTRL_USB_PM_USB_PWRDN_MASK,
@@ -269,7 +268,6 @@
0, /* USB_CTRL_SETUP_STRAP_IPP_SEL_MASK */
USB_CTRL_SETUP_OC3_DISABLE_MASK,
USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK,
-USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK,
0, /* USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK */
USB_CTRL_USB_PM_XHC_SOFT_RESETB_VAR_MASK,
0, /* USB_CTRL_USB_PM_USB_PWRDN_MASK */
@@ -291,7 +289,6 @@
0, /* USB_CTRL_SETUP_STRAP_IPP_SEL_MASK */
USB_CTRL_SETUP_OC3_DISABLE_MASK,
USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK,
-0, /* USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK */
0, /* USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK */
0, /* USB_CTRL_USB_PM_XHC_SOFT_RESETB_VAR_MASK */
0, /* USB_CTRL_USB_PM_USB_PWRDN_MASK */
@@ -313,7 +310,6 @@
0, /* USB_CTRL_SETUP_STRAP_IPP_SEL_MASK */
0, /* USB_CTRL_SETUP_OC3_DISABLE_MASK */
USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK,
-0, /* USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK */
0, /* USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK */
0, /* USB_CTRL_USB_PM_XHC_SOFT_RESETB_MASK */
0, /* USB_CTRL_USB_PM_USB_PWRDN_MASK */
@@ -335,7 +331,6 @@
USB_CTRL_SETUP_STRAP_IPP_SEL_MASK,
USB_CTRL_SETUP_OC3_DISABLE_MASK,
0, /* USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK */
-0, /* USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK */
0, /* USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK */
0, /* USB_CTRL_USB_PM_XHC_SOFT_RESETB_MASK */
0, /* USB_CTRL_USB_PM_USB_PWRDN_MASK */
@@ -357,7 +352,6 @@
USB_CTRL_SETUP_STRAP_IPP_SEL_MASK,
USB_CTRL_SETUP_OC3_DISABLE_MASK,
USB_CTRL_SETUP Strap IPP_SEL_MASK,
USB_CTRL_SETUP_OC3_DISABLE_MASK,
0, /* USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK */
-USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK,
USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK,
USB_CTRL_USB_PM_XHC_SOFT_RESETB_MASK,
USB_CTRL_USB_PM_USB_PWRDN_MASK,
@@ -379,7 +373,6 @@
USB_CTRL_SETUP_Strap IPP_SEL_MASK,
USB_CTRL_SETUP_OC3_DISABLE_MASK,
0, /* USB_CTRL_PLL_CTL_PLL_IDDQ_PWRDN_MASK */
-USB_CTRL_EBRIDGE_ESTOP_SCB_REQ_MASK,
USB_CTRL_USB_PM_BDC_SOFT_RESETB_MASK,
USB_CTRL_USB_PM_XHC_SOFT_RESETB_MASK,
USB_CTRL_USB_PM_USB_PWRDN_MASK,
@@ -401,7 +394,6 @@
USB_CTRL_UNSET_FAMILY(params, USB_PM, BDC_SOFT_RESETB);
break;
default:
+USB_CTRL_UNSET_FAMILY(params, USB_PM, BDC_SOFT_RESETB);
USB_CTRL_SET_FAMILY(params, USB_PM, BDC_SOFT_RESETB);
break;
}
@@ -952,13 +945,17 @@
/* Don't enable this so the memory controller doesn't read
 * into memory holes. NOTE: This bit is low true on 7366C0.
 */
-USB_CTRL_SET_FAMILY(params, EBRIDGE, ESTOP_SCB_REQ);
+USB_CTRL_SET(ctrl, EBRIDGE, ESTOP_SCB_REQ);

/* Setup the endian bits */
reg = brcmusb_readl(USB_CTRL_REG(ctrl, SETUP));
reg &= ~USB_CTRL_SETUP_ENDIAN_BITS;
reg |= USB_CTRL_MASK_FAMILY(params, SETUP, ENDIAN);
brcmusb_writel(reg, USB_CTRL_REG(ctrl, SETUP));
+
+if (params->selected_family == BRCM_FAMILY_7271A0)
+/* Enable LS keep alive fix for certain keyboards */
+USB_CTRL_SET(ctrl, OBRIDGE, LS_KEEP_ALIVE);
}

void brcm_usb_init_xhci(struct brcm_usb_init_params *params)
@@ -1003,6 +1000,7 @@
void brcm_usb_uninit_xhci(struct brcm_usb_init_params *params)
void brcm_usb_set_family_map(struct brcm_usb_init_params *params)
--- linux-4.15.0.orig/drivers/phy/broadcom/phy-brcm-usb.c
+++ linux-4.15.0/drivers/phy/broadcom/phy-brcm-usb.c
@@ -338,9 +338,9 @@
 ARRAY_SIZE(brcm_dr_mode_to_name),
 mode, &priv->ini.mode);
 }
- if (of_property_read_bool(dn, "brcm,has_xhci"))
+ if (of_property_read_bool(dn, "brcm,has-xhci"))
 priv->has_xhci = true;
- if (of_property_read_bool(dn, "brcm,has_eohci"))
+ if (of_property_read_bool(dn, "brcm,has-eohci"))
 priv->has_eohci = true;

 err = brcm_usb_phy_dvr_init(dev, priv, dn);
@@ -378,6 +378,13 @@
 return 0;
 }
+static int brcm_usb_phy_remove(struct platform_device *pdev)
+{  
+ sysfs_remove_group(&pdev->dev.kobj, &brcm_usb_phy_group);
+  
+ return 0;
+}
+
+#ifdef CONFIG_PM_SLEEP
static int brcm_usb_phy_suspend(struct device *dev)
{  
@@ -443,6 +450,7 @@
 static struct platform_driver brcm_usb_driver = {
 .probe= brcm_usb_phy_probe,
+.remove= brcm_usb_phy_remove,
 .driver= {
 .name= "brcmstb-usb-phy",
 .owner= THIS_MODULE,
"Open Source Used In 5GaaS Edge AC-4  26984"
int ret;

priv->reg_bits = of_device_get_match_data(dev);

--- linux-4.15.0.orig/drivers/phy/marvell/Kconfig
+++ linux-4.15.0/drivers/phy/marvell/Kconfig
@@ -2,8 +2,8 @@
 # Phy drivers for Marvell platforms
 #
 config ARMADA375_USBCLUSTER_PHY
-#def_bool y
-#depends on MACH_ARMADA_375 || COMPILE_TEST
+bool "Armada 375 USB cluster PHY support" if COMPILE_TEST
+#default y if MACH_ARMADA_375
depends on OF && HAS_IOMEM
select GENERIC_PHY

--- linux-4.15.0.orig/drivers/phy/mediatek/phy-mtk-tphy.c
+++ linux-4.15.0/drivers/phy/mediatek/phy-mtk-tphy.c
@@ -440,9 +440,9 @@
    u32 tmp;

 /* switch to USB function, and enable usb pll */
tmp = readl(com + U3P_U2PHYDTM0);
-tmp &= ~(P2C_FORCE_UART_EN); 
+tmp &= ~(P2C_FORCE_UART_EN | P2C_FORCE_SUSPENDM); 
+tmp |= P2C_RG_XCVRSEL_VAL(1) | P2C_RG_DATAIN_VAL(0);
writel(tmp, com + U3P_U2PHYDTM0);

@@ -502,10 +502,8 @@
    u32 tmp;

 /* (force_suspendm=0) (let suspendm=1, enable usb 480MHz pll) */
tmp = readl(com + U3P_U2PHYDTM0);
-tmp &= ~(P2C_FORCE_SUSPENDM | P2C_RG_XCVRSEL); 
-tmp &= ~(P2C_RG_DATAIN | P2C_DTM0_PART_MASK); 
+tmp &= ~(P2C_RG_XCVRSEL | P2C_RG_DATAIN | P2C_DTM0_PART_MASK); 
+tmp |= P2C_FORCE_SUSPENDM; 
writel(tmp, com + U3P_U2PHYDTM0);

/* OTG Enable */
@@ -540,7 +538,6 @@
    u32 tmp;

 /* (force_suspendm=0) (let suspendm=1, enable usb 480MHz pll) */
tmp = readl(com + U3P_U2PHYDTM0);
-tmp &= ~(P2C_FORCE_SUSPENDM | P2C_RG_XCVRSEL); 
-tmp &= ~(P2C_RG_DATAIN | P2C_DTM0_PART_MASK); 
+tmp &= ~(P2C_RG_XCVRSEL | P2C_RG_DATAIN | P2C_DTM0_PART_MASK); 
+tmp |= P2C_FORCE_SUSPENDM; 
writel(tmp, com + U3P_U2PHYDTM0);

/* OTG Enable */
@@ -540,7 +538,6 @@

writel(tmp, com + U3P_U2PHYDTM0);

/* OTG Disable */
@ @ -548,18 +545,16 @@
tmp &= ~PA6_RG_U2_OTG_VBUSCMP_EN;
writel(tmp, com + U3P_USBPHYACR6);

/* let suspendm=0, set utmi into analog power down */
-tmp = readl(com + U3P_U2PHYDTM0);
-tmp &= ~P2C_RG_SUSPENDM;
-writel(tmp, com + U3P_U2PHYDTM0);
-udelay(1);
-
tmp = readl(com + U3P_U2PHYDTM1);
tmp &= ~(P2C_RG_VBUSVALID | P2C_RG_AVALID);
tmp |= P2C_RG_SESSEND;
writel(tmp, com + U3P_U2PHYDTM1);

if (tphy->pdata->avoid_rx_sen_degradation && index) {
  +tmp = readl(com + U3P_U2PHYDTM0);
  +tmp &= ~(P2C_RG_SUSPENDM | P2C_FORCE_SUSPENDM);
  +writel(tmp, com + U3P_U2PHYDTM0);
  +
  tmp = readl(com + U3D_U2PHYDCR0);
  tmp &= ~P2C_RG_SIF_U2PLL_FORCE_ON;
  writel(tmp, com + U3D_U2PHYDCR0);
  --- linux-4.15.0.orig/drivers/phy/motorola/phy-cpcap-usb.c
  +++ linux-4.15.0/drivers/phy/motorola/phy-cpcap-usb.c
  @@ -115,7 +115,7 @@
  
 enum cpcap_gpio_mode {
      CPCAP_DM_DP,
--- Open Source Used In 5GaaS Edge AC-4  26986

+return;
+
+dev_dbg(ddata->dev, "\%s: musb_mailbox failed: \%i\n",
+__func__, error);
+
+}
+
+static void cpcap_usb_detect(struct work_struct *work)
+{
+struct cpcap_phy_ddata *ddata;
+@@ -226,9 +239,7 @@
+if (error)
+    goto out_err;
+
-error = musb_mailbox(MUSB_ID_GROUND);
-if (error)
-    goto out_err;
+    cpcap_usb_try_musb_mailbox(ddata, MUSB_ID_GROUND);
+
+error = regmap_update_bits(ddata->reg, CPCAP_REG_USBC3,
+    CPCAP_BIT_VBUSSTBY_EN,
+    @@ -255,9 +266,7 @@
+error = cpcap_usb_set_usb_mode(ddata);
+if (error)
+    goto out_err;
+    error = musb_mailbox(MUSB_ID_GROUND);
+    goto out_err;
+    cpcap_usb_try_musb_mailbox(ddata, MUSB_ID_GROUND);
+
+    return;
+}
+@@ -267,22 +276,18 @@
+error = cpcap_usb_set_usb_mode(ddata);
+if (error)
+    goto out_err;
+    error = musb_mailbox(MUSB_ID_GROUND);
+    goto out_err;
+    cpcap_usb_try_musb_mailbox(ddata, MUSB_ID_GROUND);
+
+    return;
+}
+
+    cpcap_usb_try_musb_mailbox(ddata, MUSB_VBUS_OFF);
+    
+    /* Default to debug UART mode */
+    error = cpcap_usb_set_uart_mode(ddata);
+    if (error)
goto out_err;

-error = musb_mailbox(MUSB_VBUS_OFF);
-if (error)
-goto out_err;
-
-dev_dbg(ddata->dev, "set UART mode\n");

return;
@@ -374,7 +379,8 @@
{
int error;

-error = cpcap_usb_gpio_set_mode(ddata, CPCAP_DM_DP);
+/* Disable lines to prevent glitches from waking up mdm6600 */
+error = cpcap_usb_gpio_set_mode(ddata, CPCAP_UNKNOWN_DISABLED);
-if (error)
-goto out_err;

@@ -401,6 +407,11 @@
if (error)
-goto out_err;

+/* Enable UART mode */
+error = cpcap_usb_gpio_set_mode(ddata, CPCAP_DM_DP);
+if (error)
+goto out_err;
+
return 0;

out_err:
@@ -413,7 +424,8 @@
{
int error;

-error = cpcap_usb_gpio_set_mode(ddata, CPCAP_OTG_DM_DP);
+/* Disable lines to prevent glitches from waking up mdm6600 */
+error = cpcap_usb_gpio_set_mode(ddata, CPCAP_UNKNOWN_DISABLED);
-if (error)
-return error;

@@ -453,6 +465,11 @@
if (error)
-goto out_err;

+/* Enable USB mode */
+error = cpcap_usb_gpio_set_mode(ddata, CPCAP_OTG_DM_DP);
+if (error)
out_err:
@@ -606,35 +623,42 @@
generic_phy = devm_phy_create(ddata->dev, NULL, &ops);
if (IS_ERR(generic_phy)) {
    error = PTR_ERR(generic_phy);
    -return PTR_ERR(generic_phy);
    +goto out_reg_disable;
}

phy_set_drvdata(generic_phy, ddata);

phy_provider = devm_of_phy_provider_register(ddata->dev,
    of_phy_simple_xlate);
-    if (IS_ERR(phy_provider))
-        return PTR_ERR(phy_provider);
+    if (IS_ERR(phy_provider)) {
+        error = PTR_ERR(phy_provider);
+        goto out_reg_disable;
+    }

error = cpcap_usb_init_optional_pins(ddata);
if (error)
    -return error;
    +goto out_reg_disable;

cpcap_usb_init_optional_gpios(ddata);

error = cpcap_usb_init_iio(ddata);
if (error)
    -return error;
    +goto out_reg_disable;

error = cpcap_usb_init_interrupts(pdev, ddata);
if (error)
    -return error;
    +goto out_reg_disable;

usb_add_phy_dev(&ddata->phy);
atomic_set(&ddata->active, 1);
scheduleDelayedWork(&ddata->detect_work, msecsToJiffies(1));

    return 0;
    +
    +out_reg_disable:
+regulator_disable(ddata->vusb);
+
+return error;
}

static int cpcap_usb_phy_remove(struct platform_device *pdev)
{
    if (error)
    dev_err(ddata->dev, "could not set UART mode\n");

    error = musb_mailbox(MUSB_VBUS_OFF);
    -dev_err(ddata->dev, "could not set mailbox\n");
    +cpcap_usb_try_musb_mailbox(ddata, MUSB_VBUS_OFF);

    usb_remove_phy(&ddata->phy);
    cancel_delayed_work_sync(&ddata->detect_work);
    --- linux-4.15.0.orig/drivers/phy/qualcomm/phy-qcom-apq8064-sata.c
    +++ linux-4.15.0/drivers/phy/qualcomm/phy-qcom-apq8064-sata.c
    @@ -88,7 +88,7 @@
    while (!time_after(jiffies, timeout));
    return (readl_relaxed(addr) & mask)

    return (readl_relaxed(addr) & mask) ? 0 : -ETIMEDOUT;
    --- linux-4.15.0.orig/drivers/phy/qualcomm/phy-qcom-qmp.c
    +++ linux-4.15.0/drivers/phy/qualcomm/phy-qcom-qmp.c
    @@ -164,7 +166,7 @@
          /* QMP PHY TX registers */
          +#define QSERDES_TX_EMP_POST1_LVL		0x018
          +#define QSERDES_TX_SLEW_CNTL		0x040
          +#define QSERDES_TX_RES_CODE_LANE_OFFSET	0x054
          +#define QSERDES_TX_DEBUG_BUS_SEL0x064
          +#define QSERDES_TX_HIGHZ_TRANSCEIVEREN_BIAS_DRVRE0x068
          @@ -164,7 +166,7 @@
          /* QPHY_COM_PCS_READY_STATUS bit */
          #define PCS_READYBIT(0)

          +#define PHY_INIT_COMPLETE_TIMEOUT10000
          +#define POWER_DOWN_DELAY_US_MIN10
          +#define POWER_DOWN_DELAY_US_MAX11
+static const char * const ipq8074_pciephy_clk_l[] = {
+"aux", "cfg_ahb",
+};

/* list of resets */
static const char * const ipq8074_pciephy_reset_l[] = {
"phy", "common",
@@ -682,8 +686,8 @@
   .rx_tbl_num	= ARRAY_SIZE(ipq8074_pcie_rx_tbl),
   .pcs_tbl	= ipq8074_pcie_pcs_tbl,
   .pcs_tbl_num	= ARRAY_SIZE(ipq8074_pcie_pcs_tbl),
-+ .clk_list	= NULL,
-+ .num_clks	= 0,
+ .clk_list	= ipq8074_pciephy_clk_l,
+ .num_clks	= ARRAY_SIZE(ipq8074_pciephy_clk_l),
 .reset_list	= ipq8074_pciephy_reset_l,
 .num_resets	= ARRAY_SIZE(ipq8074_pciephy_reset_l),
 .vreg_list	= NULL,
@@ -751,8 +755,6 @@
struct qmp_phy *qphy = phy_get_drvdata(phy);
struct qcom_qmp *qmp = qphy->qmp;

- clk_disable_unprepare(qphy->pipe_clk);
-
 regulator_bulk_disable(qmp->cfg->num_vregs, qmp->vregs);

 return 0;
@@ -936,6 +938,8 @@
 const struct qmp_phy_cfg *cfg = qmp->cfg;
 int i = cfg->num_clks;

+ clk_disable_unprepare(qphy->pipe_clk);
 +
 /* PHY reset */
 qphy_setbits(qphy->pcs, cfg->regs[QPHY_SW_RESET], SW_RESET);

--- linux-4.15.0.orig/drivers/phy/qualcomm/phy-qcom-qusb2.c
+++ linux-4.15.0/drivers/phy/qualcomm/phy-qcom-qusb2.c
@@ -178,6 +178,10 @@
 struct device *dev = &qphy->phy->dev;
 u8 *val;

+ /* efuse register is optional */
+ if (!qphy->cell)
+ return;
+ /*
+ * Read efuse register having TUNE2 parameter's high nibble.
+ * If efuse register shows value as 0x0, or if we fail to find
--- linux-4.15.0.orig/drivers/phy/qualcomm/phy-qcom-ufs.c
+++ linux-4.15.0/drivers/phy/qualcomm/phy-qcom-ufs.c
@@ -675,3 +675,8 @@
 return 0;
 }
 EXPORT_SYMBOL_GPL(ufs_qcom_phy_power_off);
+MODULE_AUTHOR("Yaniv Gardi <ygardi@codeaurora.org>");
+MODULE_AUTHOR("Vivek Gautam <vivek.gautam@codeaurora.org>");
+MODULE_DESCRIPTION("Universal Flash Storage (UFS) QCOM PHY");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/phy/qualcomm/phy-qcom-usb-hs.c
+++ linux-4.15.0/drivers/phy/qualcomm/phy-qcom-usb-hs.c
@@ -159,8 +159,8 @@
 /* setup initial state */
 qcom_usb_hs_phy_vbus_notifier(&uphy->vbus_notify, state,
 uphy->vbus_edev);
-ret = devm_extcon_register_notifier(&ulpi->dev, uphy->vbus_edev,
-EXTCON_USB, &uphy->vbus_notify);
+ret = extcon_register_notifier(uphy->vbus_edev, EXTCON_USB,
+&uphy->vbus_notify);
 if (ret)
goto err_ulpi;
}
@@ -181,6 +181,9 @@
{ struct qcom_usb_hs_phy *uphy = phy_get_drvdata(phy);
+if (uphy->vbus_edev)
+extcon_unregister_notifier(uphy->vbus_edev, EXTCON_USB,
+ &uphy->vbus_notify);
 regulator_disable(upphy->v3p3);
 regulator_disable(upphy->v1p8);
 clk_disable_unprepare(upphy->sleep_clk);
--- linux-4.15.0.orig/drivers/phy/renesas/phy-rcar-gen2.c
+++ linux-4.15.0/drivers/phy/renesas/phy-rcar-gen2.c
@@ -288,6 +288,7 @@
 error = of_property_read_u32(np, "reg", &channel_num);
 if (error || channel_num > 2) {
 dev_err(dev, "Invalid \"reg\" property\n");
+of_node_put(np);
 return error;
 }
 channel->select_mask = select_mask[channel_num];
@@ -303,6 +304,7 @@
 &rcar_gen2_phy_ops);
 if (IS_ERR(phy->phy)) {
 dev_err(dev, "Failed to create PHY\n");
+of_node_put(np);
return PTR_ERR(phy->phy);
}

phy_set_drvdata(phy->phy, phy);
--- linux-4.15.0.orig/drivers/phy/renesas/phy-rcar-gen3-usb2.c
+++ linux-4.15.0/drivers/phy/renesas/phy-rcar-gen3-usb2.c
@@ -23,6 +23,7 @@
#include <linux/platform_device.h>
#include <linux/pm_runtime.h>
#include <linux/regulator/consumer.h>
+#include <linux/string.h>
#include <linux/usb/of.h>
#include <linux/workqueue.h>

@@ -66,6 +67,7 @@
#define USB2_VBCTRL_OCCLREN BIT(16)
#define USB2_VBCTRL_DRVVBUSSEL BIT(8)
/* LINECTRL1 */
@@ -198,7 +200,7 @@
val = readl(usb2_base + USB2_OBINTEN);
writel(val & ~USB2_OBINT_BITS, usb2_base + USB2_OBINTEN);
-rcar_gen3_enable_vbus_ctrl(ch, 0);
+rcar_gen3_enable_vbus_ctrl(ch, 1);
rcar_gen3_init_for_host(ch);

writel(val | USB2_OBINT_BITS, usb2_base + USB2_OBINTEN);
@@ -240,9 +242,9 @@
if (!ch->has_otg_pins || !ch->phy->init_count)
    return -EIO;

-if (!strcmp(buf, "host", strlen("host")))
+if (sysfs_streq(buf, "host"))
    new_mode = PHY_MODE_USB_HOST;
-else if (!strcmp(buf, "peripheral", strlen("peripheral")))
+else if (sysfs_streq(buf, "peripheral"))
    new_mode = PHY_MODE_USB_DEVICE;
else
    return -EINVAL;
@@ -289,6 +291,7 @@
u32 val;

val = readl(usb2_base + USB2_VBCTRL);
+val &= ~USB2_VBCTRL_OCCLREN;
writel(val | USB2_VBCTRL_DRVVBUSSEL, usb2_base + USB2_VBCTRL);
writel(USB2_OBINT_BITS, usb2_base + USB2_OBINTSTA);
val = readl(usb2_base + USB2_OBINTEN);
--- linux-4.15.0.orig/drivers/phy/rockchip/phy-rockchip-emmc.c
+++ linux-4.15.0/drivers/phy/rockchip/phy-rockchip-emmc.c
@@ -76,6 +76,10 @@
#define PHYCTRL_OTAPDLYSEL_MASK	0xf
#define PHYCTRL_OTAPDLYSEL_SHIFT	0x7
+#define PHYCTRL_IS_CALDONE(x)  
+(((((x) >> PHYCTRL_CALDONE_SHIFT) &  
+ PHYCTRL_CALDONE_MASK) == PHYCTRL_CALDONE_DONE) 
+ 
+struct rockchip_emmc_phy {
unsigned int int_reg_offset;
struct regmap*reg_base;
@@ -90,6 +94,7 @@
unsigned int freqsel = PHYCTRL_FREQSEL_200M;
unsigned long rate;
unsigned long timeout;
+int ret;
/*
 * Keep phyctrl_pdb and phyctrl_endll low to allow
@@ -160,17 +165,19 @@
PHYCTRL_PDB_SHIFT));
*/
/*
 - * According to the user manual, it asks driver to
 - * wait 5us for calpad busy trimming
 + * According to the user manual, it asks driver to wait 5us for
 + * calpad busy trimming. However it is documented that this value is
 + * PVT(A.K.A process,voltage and temperature) relevant, so some
 + * failure cases are found which indicates we should be more tolerant
 + * to calpad busy trimming.
 */
-udelay(5);
-regmap_read(rk_phy->reg_base,  
- rk_phy->reg_offset + GRF_EMMCPHY_STATUS,  
- &caldone);
- if (caldone != PHYCTRL_CALDONE_DONE) {  
- pr_err("rockchip_emmc_phy_power: caldone timeout,\n");  
- return -ETIMEDOUT;  
+ ret = regmap_read_poll_timeout(rk_phy->reg_base,  
+ rk_phy->reg_offset + GRF_EMMCPHY_STATUS,  
+ caldone, PHYCTRL_IS_CALDONE(caldone),  
+ 0, 50);
+if (ret) {
+  pr_err("%s: caldone failed, ret=%d\n", __func__, ret);
+  return ret;
+
} /* Set the frequency of the DLL operation */

--- linux-4.15.0.orig/drivers/phy/samsung/phy-s5pv210-usb2.c
+++ linux-4.15.0/drivers/phy/samsung/phy-s5pv210-usb2.c
@@ -142,6 +142,10 @@
       rst &= ~rstbits;
       writel(rst, drv->reg_phy + S5PV210_UPHYRST);
+     /* The following delay is necessary for the reset sequence to be
+      * completed
+      */
+     +udelay(80);
+ } else {
+   pwr = readl(drv->reg_phy + S5PV210_UPHYPWR);
+   pwr |= phypwr;
+   --- linux-4.15.0.orig/drivers/phy/tegra/xusb.c
+   +++ linux-4.15.0/drivers/phy/tegra/xusb.c
@@ -418,7 +418,7 @@
       } struct tegra_xusb_lane *lane, *match = ERR_PTR(-ENODEV);
-
-    for (map = map; map->type; map++) {
-      for (; map->type; map++) {
-        if (port->index != map->port)
-          continue;
+
+-for (map = map; map->type; map++) {
+    +for (; map->type; map++) {
+      if (port->index != map->port)
+        continue;
+
+    @ @ -912,6 +912,7 @@
+ reset:
+   reset_control_assert(padctl->rst);
+   remove:
+    +platform_set_drvdata(pdev, NULL);
+    soc->ops->remove(padctl);
+    return err;
+  }
++
++--- linux-4.15.0.orig/drivers/phy/ti/phy-dm816x-usb.c
+++ linux-4.15.0/drivers/phy/ti/phy-dm816x-usb.c
@@ -246,19 +246,28 @@
    pm_runtime_enable(phy->dev);
    generic_phy = devm_phy_create(phy->dev, NULL, &ops);
    -if (IS_ERR(generic_phy))
-      -return PTR_ERR(generic_phy);
-    +if (IS_ERR(generic_phy)) {
-      +error = PTR_ERR(generic_phy);
-    }
phy_set_drvdata(generic_phy, phy);

phy_provider = devm_of_phy_provider_register(phy->dev,
of_phy_simple_xlate);
-if (IS_ERR(phy_provider))
-    return PTR_ERR(phy_provider);
+    if (IS_ERR(phy_provider)) {
+        error = PTR_ERR(phy_provider);
+        goto clk_unprepare;
+    }

usb_add_phy_dev(&phy->phy);

return 0;
+
+    clk_unprepare:
+    pm_runtime_disable(phy->dev);
+    clk_unprepare(phy->refclk);
+    return error;
+
}

static int dm816x_usb_phy_remove(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/phy/ti/phy-ti-pipe3.c
+++ linux-4.15.0/drivers/phy/ti/phy-ti-pipe3.c
@@ -303,7 +303,7 @@
 val = ti_pipe3_readl(phy->phy_rx, PCIEPHYRX_ANA_PROGRAMMABILITY);
 val &= ~(INTERFACE_MASK | LOSD_MASK | MEM_PLLDIV);
-    val = (0x1 << INTERFACE_SHIFT | 0xA << LOSD_SHIFT);
+    val |= (0x1 << INTERFACE_SHIFT | 0xA << LOSD_SHIFT);
    ti_pipe3_writel(phy->phy_rx, PCIEPHYRX_ANA_PROGRAMMABILITY, val);

 val = ti_pipe3_readl(phy->phy_rx, PCIEPHYRX_DIGITAL_MODES);
--- linux-4.15.0.orig/drivers/phy/ti/phy-tw14030-usb.c
+++ linux-4.15.0/drivers/phy/ti/phy-tw14030-usb.c
@@ -144,6 +144,7 @@
 #define PMBR10x0D
 #define GPIO_USB_4PIN_ULPI_2430C(3 << 0)

+static irqreturn_t twl4030_usb_irq(int irq, void * _twl);
/*
 * If VBUS is valid or ID is ground, then we know a
 * cable is present and we need to be runtime-enabled
 @@ -395,6 +396,33 @@
 WARN_ON(twl4030_usb_write_verify(twl, PHY_PWR_CTRL, pwr) < 0);
struct twl4030_usb *twl = dev_get_drvdata(dev);
+/*
+ * we need enabled runtime on resume,
+ * so turn irq off here, so we do not get it early
+ * note: wakeup on usb plug works independently of this
+ */
+dev_dbg(twl->dev, "%s\n", __func__);
+disable_irq(twl->irq);
+
+return 0;
+}
+
+static int __maybe_unused twl4030_usb_resume(struct device *dev)
+
+{struct twl4030_usb *twl = dev_get_drvdata(dev);
+
+dev_dbg(twl->dev, "%s\n", __func__);
+enable_irq(twl->irq);
+/* check whether cable status changed */
+twl4030_usb_irq(0, twl);
+
+return 0;
+}
+
+static int __maybe_unused twl4030_usb_runtime_suspend(struct device *dev)
+
+
+static const struct dev_pm_ops twl4030_usb_pm_ops = {
+SET_RUNTIME_PM_OPS(twl4030_usb_runtime_suspend,
+twl4030_usb_runtime_resume, NULL)
+SET_SYSTEM_SLEEP_PM_OPS(twl4030_usb_suspend, twl4030_usb_resume)
+};
+
+twl4030_usb_probe(struct platform_device *pdev)
+
+usb_remove_phy(&twl->phy);
+pm_runtime_get_sync(twl->dev);
+-cancel_delayed_work(&twl->id_workaround_work);
+-cancel_delayed_work_sync(&twl->id_workaround_work);
+device_remove_file(twl->dev, &dev_attr_vbus);
/* set transceiver mode to power on defaults */

static bool aspeed_expr_is_gpio(const struct aspeed_sig_expr *expr)
{
    /* The signal type is GPIO if the signal name has "GPIO" as a prefix.
    * The signal type is GPIO if the signal name has "GPI" as a prefix.
    * strncmp (rather than strcmp) is used to implement the prefix
    * requirement.
    *
    * - expr->signal might look like "GPIOT3" in the GPIO case.
    * + expr->signal might look like "GPIOB1" in the GPIO case.
    * + expr->signal might look like "GPIT0" in the GPI case.
    */
    return strncmp(expr->signal, "GPI", 3) == 0;
}

static bool aspeed_gpio_in_exprs(const struct aspeed_sig_expr **exprs)
{
    bool select PINMUX
    select PINCONF
    +select GPIOLIB
    select GPIOLIB IRQCHIP
    config PINCTRL_IPROC_GPIO
    -spinlock_t irq_lock[BCM2835_NUM_BANKS];
    +raw_spinlock_t irq_lock[BCM2835_NUM_BANKS];
}

/* pins are just named GPIO0..GPIO53 */

unsigned bank = GPIO_REG_OFFSET(gpio);
unsigned long flags;

-raw_spin_lock_irqsave(&pc->irq_lock[bank], flags);
+raw_spin_lock_irqsave(&pc->irq_lock[bank], flags);
static void bcm2835_gpio_irq_disable(struct irq_data *data) {
    unsigned bank = GPIO_REG_OFFSET(gpio);
    unsigned long flags;

    spin_lock_irqsave(&pc->irq_lock[bank], flags);
    bcm2835_gpio_irq_config(pc, gpio, false);
    /* Clear events that were latched prior to clearing event sources */
    bcm2835_gpio_set_bit(pc, GPEDS0, gpio);
    clear_bit(offset, &pc->enabled_irq_map[bank]);
    spin_unlock_irqrestore(&pc->irq_lock[bank], flags);
}

static int __bcm2835_gpio_irq_set_type_disabled(struct bcm2835ピンctrl *pc, unsigned long flags);
err = gpiochip_add_data(&pc->gpio_chip, pc);
--- linux-4.15.0.orig/drivers/pinctrl/bcm/pinctrl-iproc-gpio.c
+++ linux-4.15.0/drivers/pinctrl/bcm/pinctrl-iproc-gpio.c
@@ -54,8 +54,12 @@
 /* drive strength control for ASIU GPIO */
 #define IPROC_GPIO_ASIU_DRV0_CTRL_OFFSET 0x58

-/* drive strength control for CCM/CRMU (AON) GPIO */
-#define IPROC_GPIO_DRV0_CTRL_OFFSET  0x00
+#define IPROC_GPIO_PULL_DN_OFFSET   0x10
+#define IPROC_GPIO_PULL_UP_OFFSET   0x14
+
+#define IPROC_GPIO_DRV_CTRL_OFFSET  0x00

#define GPIO_BANK_SIZE 0x200
#define NGPIOS_PER_BANK 32
@@ -76,6 +80,12 @@
IPROC_PINCON_MAX,
];

+enum iproc_pinconf_ctrl_type {
+    IOCTRL_TYPE_AON = 1,
+    IOCTRL_TYPE_CDRU,
+    IOCTRL_TYPE_INVALID,
+};
+
+/*
 * Iproc GPIO core
 *
 @@ -100,6 +110,7 @@
 void __iomem *base;
 void __iomem *io_ctrl;
+enum iproc_pinconf_ctrl_type io_ctrl_type;

 raw_spinlock_t lock;

 @@ -461,20 +472,44 @@
 static int iproc_gpio_set_pull(struct iproc_gpio *chip, unsigned gpio,
 bool disable, bool pull_up)
 { 
+void __iomem *base;
 unsigned long flags;
+unsigned int shift;
+u32 val_1, val_2;
raw_spin_lock_irqsave(&chip->lock, flags);
+if (chip->io_ctrl_type == IOCTRL_TYPE_CDRU) {
  +base = chip->io_ctrl;
  +shift = PROC_GPIO_SHIFT(gpio);

  -if (disable) {
    -iproc_set_bit(chip, PROC_GPIO_RES_EN_OFFSET, gpio, false);
    +val_1 = readl(base + PROC_GPIO_PULL_UP_OFFSET);
    +val_2 = readl(base + PROC_GPIO_PULL_DN_OFFSET);
    +if (disable) {
      /* no pull-up or pull-down */
      +val_1 &= ~BIT(shift);
      +val_2 &= ~BIT(shift);
      +} else if (pull_up) {
        +val_1 |= BIT(shift);
        +val_2 &= ~BIT(shift);
      +} else {
        +val_1 &= ~BIT(shift);
        +val_2 |= BIT(shift);
      +}
      +writel(val_1, base + PROC_GPIO_PULL_UP_OFFSET);
      +writel(val_2, base + PROC_GPIO_PULL_DN_OFFSET);
      +} else {
    -iproc_set_bit(chip, PROC_GPIO_PAD_RES_OFFSET, gpio, pull_up);
    -iproc_set_bit(chip, PROC_GPIO_RES_EN_OFFSET, gpio, true);
    +if (disable) {
      +iproc_set_bit(chip, PROC_GPIO_RES_EN_OFFSET, gpio, false);
    +} else {
      +iproc_set_bit(chip, PROC_GPIO_PAD_RES_OFFSET, gpio, pull_up);
      +iproc_set_bit(chip, PROC_GPIO_RES_EN_OFFSET, gpio, true);
    +}
  +}
}

raw_spin_unlock_irqrestore(&chip->lock, flags);
-
dev_dbg(chip->dev, "gpio:%u set pullup:%d\n", gpio, pull_up);

return 0;
@@ -483,14 +518,35 @@
static void iproc_gpio_get_pull(struct iproc_gpio *chip, unsigned gpio,
  bool *disable, bool *pull_up)
{
  +void __iomem *base;
  unsigned long flags;

-
unsigned int shift;
unsigned val_1, val_2;

raw_spin_lock_irqsave(&chip->lock, flags);
*disable = !iproc_get_bit(chip, IPROC_GPIO_RES_EN_OFFSET, gpio);
*pull_up = iproc_get_bit(chip, IPROC_GPIO_PAD_RES_OFFSET, gpio);
if (chip->io_ctrl_type == IOCTRL_TYPE_CDRU) {
    base = chip->io_ctrl;
    shift = IPROC_GPIO_SHIFT(gpio);
    +
    +val_1 = readl(base + IPROC_GPIO_PULL_UP_OFFSET) & BIT(shift);
    +val_2 = readl(base + IPROC_GPIO_PULL_DN_OFFSET) & BIT(shift);
    +
    +*pull_up = val_1 ? true : false;
    +*disable = (val_1 | val_2) ? false : true;
    +
} else {
    +*disable = !iproc_get_bit(chip, IPROC_GPIO_RES_EN_OFFSET, gpio);
    +*pull_up = iproc_get_bit(chip, IPROC_GPIO_PAD_RES_OFFSET, gpio);
    +
} raw_spin_unlock_irqrestore(&chip->lock, flags);
}

#define DRV_STRENGTH_OFFSET(gpio, bit, type)  ((type) == IOCTRL_TYPE_AON ?
    ((2 - (bit)) * 4 + IPROC_GPIO_DRV_CTRL_OFFSET) : 
    ((type) == IOCTRL_TYPE_CDRU) ? 
    ((bit) * 4 + IPROC_GPIO_DRV_CTRL_OFFSET) : 
    ((bit) * 4 + IPROC_GPIO_REG(gpio, IPROC_GPIO_ASIU_DRV0_CTRL_OFFSET)))

static int iproc_gpio_set_strength(struct iproc_gpio *chip, unsigned gpio,
    unsigned strength)
{
    @ @ -505,11 +561,8 @@

    if (chip->io_ctrl) {
        base = chip->io_ctrl;
        -offset = IPROC_GPIO_DRV0_CTRL_OFFSET;
    } else {
        base = chip->base;
        -offset = IPROC_GPIO_REG(gpio,
            -IPROC_GPIO_ASIU_DRV0_CTRL_OFFSET);
    }

    shift = IPROC_GPIO_SHIFT(gpio);
    @ @ -520,11 +573,11 @@
    raw_spin_lock_irqsave(&chip->lock, flags);
    strength = (strength / 2) - 1;
    for (i = 0; i < GPIO_DRV_STRENGTH_BITS; i++) {

+offset = DRV_STRENGTH_OFFSET(gpio, i, chip->io_ctrl_type);
val = readl(base + offset);
val &= ~BIT(shift);
val |= ((strength >> i) & 0x1) << shift;
writel(val, base + offset);
-offset += 4;
}
raw_spin_unlock_irqrestore(&chip->lock, flags);

@@ -541,11 +594,8 @@
if (chip->io_ctrl) {
base = chip->io_ctrl;
-offset = IPROC_GPIO_DRV0_CTRL_OFFSET;
} else {
base = chip->base;
-offset = IPROC_GPIO_REG(gpio,
- IPROC_GPIO_ASIU_DRV0_CTRL_OFFSET);
}

shift = IPROC_GPIO_SHIFT(gpio);
@@ -553,10 +603,10 @@
raw_spin_lock_irqsave(&chip->lock, flags);
*strength = 0;
for (i = 0; i < GPIO_DRV_STRENGTH_BITS; i++) {
+offset = DRV_STRENGTH_OFFSET(gpio, i, chip->io_ctrl_type);
val = readl(base + offset) & BIT(shift);
val >>= shift;
*strength += (val << i);
-offset += 4;
}

/* convert to mA */
@@ -734,6 +784,7 @@
u32 ngpios, pinconf_disable_mask = 0;
int irq, ret;
bool no_pinconf = false;
+enum iproc_pinconf_ctrl_type io_ctrl_type = IOCTRL_TYPE_INVALID;

/* NSP does not support drive strength config */
if (of_device_is_compatible(dev->of_node, "brcm,iproc-nsp-gpio"))
@@ -764,8 +815,15 @@
dev_err(dev, "unable to map I/O memory\n");
return PTR_ERR(chip->io_ctrl);
}
+if (of_device_is_compatible(dev->of_node,
+ "brcm,cygnus-ccm-gpio")
+io_ctrl_type = IOCTRL_TYPE_CDRU;
else
+ io_ctrl_type = IOCTRL_TYPE_AON;
+
+chip->io_ctrl_type = io_ctrl_type;
+
if (of_property_read_u32(dev->of_node, "ngpios", &ngpios)) {
    dev_err(&pdev->dev, "missing ngpios DT property\n");
    return -ENODEV;

--- linux-4.15.0.orig/drivers/pinctrl/bcm/pinctrl-ns2-mux.c
+++ linux-4.15.0/drivers/pinctrl/bcm/pinctrl-ns2-mux.c
@@ -640,8 +640,8 @@
    const struct ns2_pin_function *func;
    const struct ns2_pin_group *grp;

-    if (grp_select > pinctrl->num_groups ||
-        func_select > pinctrl->num_functions)
+    if (grp_select >= pinctrl->num_groups ||
+        func_select >= pinctrl->num_functions)
        return -EINVAL;
    func = &pinctrl->functions[func_select];

--- linux-4.15.0.orig/drivers/pinctrl/bcm/pinctrl-nsp-mux.c
+++ linux-4.15.0/drivers/pinctrl/bcm/pinctrl-nsp-mux.c
@@ -460,8 +460,8 @@
    const struct nsp_pin_function *func;
    const struct nsp_pin_group *grp;

-    if (grp_select > pinctrl->num_groups ||
-        func_select > pinctrl->num_functions)
+    if (grp_select >= pinctrl->num_groups ||
+        func_select >= pinctrl->num_functions)
        return -EINVAL;
    func = &pinctrl->functions[func_select];

@@ -577,6 +577,8 @@
    return PTR_ERR(pinctrl->base0);

    res = platform_get_resource(pdev, IORESOURCE_MEM, 1);
-    if (!res)
-        return -EINVAL;
+    if (!res)
+        return -EINVAL;
    pinctrl->base1 = devm_ioremap_nocache(&pdev->dev, res->start,
        resource_size(res));
    if (!pinctrl->base1) {
        --- linux-4.15.0.orig/drivers/pinctrl/berlin/berlin.c
+++ linux-4.15.0/drivers/pinctrl/berlin/berlin.c
@@ -219,9 +219,8 @@
    return PTR_ERR(pinctrl->base0);

    res = platform_get_resource(pdev, IORESOURCE_MEM, 1);
+    if (!res)
+        return -EINVAL;
    pinctrl->base1 = devm_ioremap_nocache(&pdev->dev, res->start,
        resource_size(res));
    if (!pinctrl->base1) {
        --- linux-4.15.0.orig/drivers/pinctrl/berlin/berlin.c
+++ linux-4.15.0/drivers/pinctrl/berlin/berlin.c
@@ -219,9 +219,8 @@
    return PTR_ERR(pinctrl->base0);
/* we will reallocate later */
@end
pctrl->functions = devm_kzalloc(&pdev->dev,
-max_functions * sizeof(*pctrl->functions),
-GFP_KERNEL);
+ pctrl->functions = kcalloc(max_functions,
+   sizeof(*pctrl->functions), GFP_KERNEL);
if (!pctrl->functions)
    return -ENOMEM;

@@ -259,8 +258,10 @@
    function++;
 }

-if (!found)
+if (!found) {
+    kfree(pctrl->functions);
    return -EINVAL;
+}

if (!function->groups) {
    function->groups =
-    if (!function->groups) {
+    if (!function->groups) {
        kfree(pctrl->functions);
        return -ENOMEM;
+    }

    groups = function->groups;
--- linux-4.15.0.orig/drivers/pinctrl/core.c
+++ linux-4.15.0/drivers/pinctrl/core.c
@@ -1189,19 +1189,16 @@
EXPORT_SYMBOL_GPL(pinctrl lookup state);

/**
- * pinctrl_select_state() - select/activate/program a pinctrl state to HW
+ * pinctrl_commit_state() - select/activate/program a pinctrl state to HW
 * @p: the pinctrl handle for the device that requests configuration
 * @state: the state handle to select/activate/program
 */
-int pinctrl_select_state(struct pinctrl *p, struct pinctrl_state *state)
+static int pinctrl_commit_state(struct pinctrl *p, struct pinctrl_state *state)
 {
struct pinctrl_setting *setting, *setting2;
struct pinctrl_state *old_state = p->state;
int ret;

-if (p->state == state)
-return 0;
-
if (p->state) {
/*
 * For each pinmux setting in the old state, forget SW's record
@@ -1265,6 +1262,19 @@
return ret;
}
+
+/**
+ * pinctrl_select_state() - select/activate/program a pinctrl state to HW
+ * @p: the pinctrl handle for the device that requests configuration
+ * @state: the state handle to select/activate/program
+ */
+int pinctrl_select_state(struct pinctrl *p, struct pinctrl_state *state)
+{
+if (p->state == state)
+return 0;
+
+return pinctrl_commit_state(p, state);
+}
EXPORT_SYMBOL_GPL(pinctrl_select_state);

static void devm_pinctrl_release(struct device *dev, void *res)
@@ -1430,7 +1440,7 @@
int pinctrl_force_sleep(struct pinctrl_dev *pctldev)
{
if (!IS_ERR(pctldev->p) && !IS_ERR(pctldev->hog_sleep))
-return pinctrl_select_state(pctldev->p, pctldev->hog_sleep);
+return pinctrl_commit_state(pctldev->p, pctldev->hog_sleep);
return 0;
}
EXPORT_SYMBOL_GPL(pinctrl_force_sleep);
@@ -1442,7 +1452,7 @@
int pinctrl_force_default(struct pinctrl_dev *pctldev)
{
if (!IS_ERR(pctldev->p) && !IS_ERR(pctldev->hog_default))
-return pinctrl_select_state(pctldev->p, pctldev->hog_default);
+return pinctrl_commit_state(pctldev->p, pctldev->hog_default);
return 0;
}
EXPORT_SYMBOL_GPL(pinctrl_force_default);
return PTR_ERR(pctldev->p);
}

kref_get(&pctldev->p->users);
pctldev->hog_default =
pinctrl_lookup_state(pctldev->p, PINCTRL_STATE_DEFAULT);
if (IS_ERR(pctldev->hog_default)) {
    \--- linux-4.15.0.orig/drivers/pinctrl/devicetree.c
+++ linux-4.15.0/drivers/pinctrl/devicetree.c
@@ -40,6 +40,13 @@
static void dt_free_map(struct pinctrl_dev *pctldev,
    struct pinctrl_map *map, unsigned num_maps)
{
    int i;
    +
    +for (i = 0; i < num_maps; ++i) {
        +kfree_const(map[i].dev_name);
        +map[i].dev_name = NULL;
    +}
    +
    if (pctldev) {
        const struct pinctrl_ops *ops = pctldev->desc->pctlops;
        if (ops->dt_free_map)
@@ -74,7 +81,13 @@
/* Initialize common mapping table entry fields */
for (i = 0; i < num_maps; i++) {
    -map[i].dev_name = dev_name(p->dev);
    +const char *devname;
    +
    +devname = kstrdup_const(dev_name(p->dev), GFP_KERNEL);
    +if (!devname)
        +goto err_free_map;
    +
    +map[i].dev_name = devname;
    map[i].name = statename;
    if (pctldev)
        map[i].ctrl_dev_name = dev_name(pctldev->dev);
@@ -82,10 +95,8 @@
/* Remember the converted mapping table entries */
dt_map = kzalloc(sizeof(*dt_map), GFP_KERNEL);
    -if (!dt_map) {
        -dt_free_map(pctldev, map, num_maps);
        -return -ENOMEM;
    -}
    +if (!dt_map)
+goto err_free_map;

dt_map->pctldev = pctldev;
dt_map->map = map;
@@ -93,6 +104,10 @@
    list_add_tail(&dt_map->node, &p->dt_maps);

return pinctrl_register_map(map, num_maps, false);
+
+err_free_map:
+dt_free_map(pctldev, map, num_maps);
+return -ENOMEM;
}

struct pinctrl_dev *of_pinctrl_get(struct device_node *np)
@@ -101,10 +116,11 @@
}{
    struct pinctrl_dev *pctldev = NULL;
    struct device_node *np_pctldev;
    const struct pinctrl_ops *ops;
    int ret;
@@ -122,8 +138,12 @@
/* OK let's just assume this will appear later then */
    return -EPROBE_DEFER;
}
-if (!pctldev)
-pctldev = get_pinctrl_dev_from_of_node(np_pctldev);
+/* If we're creating a hog we can use the passed pctldev */
+if (hog_pctldev && (np_pctldev == p->dev->of_node)) {
+    pctldev = hog_pctldev;
+    break;
+}
+pctldev = get_pinctrl_dev_from_of_node(np_pctldev);
    if (pctldev)
        break;
/* Do not defer probing of hogs (circular loop) */
--- linux-4.15.0.orig/drivers/pinctrl/freescale/pinctrl-imx.c
+++ linux-4.15.0/drivers/pinctrl/freescale/pinctrl-imx.c
@@ -389,7 +389,7 @@
const char *name;
int i, ret;


-if (group > pctldev->num_groups)
+if (group >= pctldev->num_groups)
    return;

    seq_printf(s, "\n");
    return 0;
}

/*
 * imx_free_resources() - free memory used by this driver
 * @info: info driver instance
 */

static void imx_free_resources(struct imx_pinctrl *ipctl)
{
    if (ipctl)
        pinctrl_unregister(ipctl);
}

int imx_pinctrl_probe(struct platform_device *pdev,
                      struct imx_pinctrl_soc_info *info)
{
    int ret = imx_pinctrl_probe_dt(pdev, ipctl);
    if (ret) {
        dev_err(&pdev->dev, "could not register IMX pinctrl driver\n");
        goto free;
    }
    ret = imx_pinctrl_probe(pdev, ipctl);
    if (ret) {
        dev_err(&pdev->dev, "fail to probe dt properties\n");
        goto free;
    }

    dev_info(&pdev->dev, "initialized IMX pinctrl driver\n");

    return pinctrl_enable(ipctl->pctl);
-
-    free:
-        imx_free_resources(ipctl);
-    -
-        return ret;
}
const char *name;
int i, ret;

-if (group > info->ngroups)
+if (group >= info->ngroups)
    return;

    seq_puts(s, "\n");

    ret = of_platform_populate(pdev->dev.of_node, NULL, NULL, &pdev->dev);
    if (ret) {
        -pinctrl_unregister(ipctl->pctl);
        dev_err(&pdev->dev, "Failed to populate subdevices\n");
        return ret;
    }

--- linux-4.15.0.orig/drivers/pinctrl/intel/pinctrl-baytrail.c
+++ linux-4.15.0/drivers/pinctrl/intel/pinctrl-baytrail.c
@@ -46,6 +46,9 @@
#define BYT_TRIG_POSBIT		BIT(25)
#define BYT_TRIG_LVL		BIT(24)
#define BYTDebeounce_ENBIT(20)
+#define BYT_GLITCH_FILTER_ENBIT(19)
+#define BYT_GLITCH_F_SLOW_CLKBIT(17)
+#define BYT_GLITCH_F_FAST_CLKBIT(16)
#define BYT_PULL_STR_SHIFT9
#define BYT_PULL_STR_MASK	(3 << BYT_PULL_STR_SHIFT)
#define BYT_PULL_STR_2K		(0 << BYT_PULL_STR_SHIFT)
@@ -201,7 +204,6 @@
             NULL,
         { };
unsigned long flags;
int i;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);

for (i = 0; i < group.npins; i++) {
    void __iomem *padcfg0;
    @ @ -873,7 +877,7 @ @
writel(value, padcfg0);
}

-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);
}

static void byt_set_group_mixed_mux(struct byt_gpio *vg,
    @ @ -883,7 +887,7 @ @
unsigned long flags;
int i;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);

for (i = 0; i < group.npins; i++) {
    void __iomem *padcfg0;
    @ @ -903,7 +907,7 @ @
writel(value, padcfg0);
}

-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);
}

static int byt_set_mux(struct pinctrl_dev *pctldev, unsigned int func_selector,
    @ @ -952,11 +956,17 @ @
unsigned long flags;
u32 value;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);

value = readl(reg);
-value &=- (BYT_TRIG_POS | BYT_TRIG_NEG | BYT_TRIG_LVL);
+
/* Do not clear direct-irq enabled IRQs (from gpio_disable_free) */
+if (value & BYT_DIRECT_IRQ_EN)
+/* nothing to do */ ;
+else
value &= ~(BYT_TRIG_POS | BYT_TRIG_NEG | BYT_TRIG_LVL);
+
+writel(value, reg);
-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);
}

static int byt_gpio_request_enable(struct pinctrl_dev *pctl_dev,
@@ -968,7 +978,7 @@
u32 value, gpio_mux;
unsigned long flags;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);

/*
 * In most cases, func pin mux 000 means GPIO function.
@@ -990,7 +1000,7 @@
"pin %u forcibly re-configured as GPIOu", offset);
 }

-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);

pm_runtime_get(&vg->pdev->dev);
@@ -1007,6 +1017,21 @@
pm_runtime_put(&vg->pdev->dev);
 }

+static void byt_gpio_direct_irq_check(struct byt_gpio *vg,
+    unsigned int offset)
+{
+    void __iomem *conf_reg = byt_gpio_reg(vg, offset, BYT_CONF0_REG);
+    *
+    /*
+     * Before making any direction modifications, do a check if gpio is set
+     * for direct IRQ. On Bay Trail, setting GPIO to output does not make
+     * sense, so let's at least inform the caller before they shoot
+     * themselves in the foot.
+     */
+    +if (readl(conf_reg) & BYT_DIRECT_IRQ_EN)
+    +dev_info_once(&vg->pdev->dev, "Potential Error: Setting GPIO with direct_irq_en to output");
+    }

+static int byt_gpio_set_direction(struct pinctrl_dev *pctl_dev,
+    unsigned int offset,
+    struct pinctrl_gpio_range *range,
+    unsigned int offset,
struct byt_gpio *vg = pinctrl_dev_get_drvdata(pctl_dev);
void __iomem *val_reg = byt_gpio_reg(vg, offset, BYT_VAL_REG);
unsigned long flags;
u32 value;

raw_spin_lock_irqsave(&vg->lock, flags);
val_reg = byt_gpio_reg(vg, offset, BYT_CONF0_REG);

value = readl(val_reg);
value &= ~BYT_DIR_MASK;
if (input)
  value |= BYT_OUTPUT_EN;
else
  /*
   * Before making any direction modifications, do a check if gpio
   * is set for direct IRQ. On baytrail, setting GPIO to output
   * does not make sense, so let's at least warn the caller before
   * they shoot themselves in the foot.
   * */
  WARN(readl(conf_reg) & BYT_DIRECT_IRQ_EN,
    "Potential Error: Setting GPIO with direct_irq_en to output");
  byt_gpio_direct_irq_check(vg, offset);
  writel(value, val_reg);

raw_spin_unlock_irqrestore(&vg->lock, flags);
return 0;
}

u32 conf, pull, val, debounce;
u16 arg = 0;

raw_spin_lock_irqsave(&vg->lock, flags);
conf = readl(conf_reg);
pull = conf & BYT_PULL_ASSIGN_MASK;
val = readl(val_reg);
raw_spin_unlock_irqrestore(&vg->lock, flags);

switch (param) {
case PIN_CONFIG_BIAS_DISABLE:
  raw_spin_lock_irqsave(&byt_lock, flags);
  conf = readl(conf_reg);
pull = conf & BYT_PULL_ASSIGN_MASK;
val = readl(val_reg);
raw_spin_unlock_irqrestore(&byt_lock, flags);
switch (param) {

if (!(conf & BYT_DEBOUNCE_EN))
  return -EINVAL;

-debounce = readl(db_reg);
switch (debounce & BYT_DEBOUNCE_PULSE_MASK) {
  case BYTE_STEP Phú 375US:
    u32 conf, val, debounce;
    int i, ret = 0;
    switch (arg) {
      case 375:
        debounce &= ~BYTE_STEP Phú 375US;
        break;
      case 750:
        debounce &= ~BYTE_STEP Phú 750US;
        break;
      case 1500:
        debounce &= ~BYTE_STEP Phú 1500US;
        break;
      case 3000:
        debounce &= ~BYTE_STEP Phú 3MS;
        break;
      case 6000:
        debounce &= ~BYTE_STEP Phú 6MS;
        break;
    }
    if (arg)
      conf |= BYT_DEBOUNCE_EN;
      @@ -1257,24 +1274,31 @@
      case PIN_CONFIG_INPUT_DEBOUNCE:
        debounce = readl(db_reg);
        -debounce &= ~BYTE_STEP Phú PULSE_MASK;
        break;
        ...
      case 375:
        +debounce &= ~BYTE_STEP Phú PULSE_MASK;
        +debounce |= BYTE_STEP Phú 375US;
        break;
        ...
      case 750:
        +debounce &= ~BYTE_STEP Phú PULSE_MASK;
        +debounce |= BYTE_STEP Phú 750US;
        break;
        ...
      case 1500:
        +debounce &= ~BYTE_STEP Phú PULSE_MASK;
        +debounce |= BYTE_STEP Phú 1500US;
        break;
        ...
      case 3000:
        +debounce &= ~BYTE_STEP Phú PULSE_MASK;
        +debounce |= BYTE_STEP Phú 3MS;
        break;
        ...
      case 6000:
        +debounce &= ~BYTE_STEP Phú PULSE MASK;
        +debounce |= BYTE_STEP Phú 6MS;
        break;
    }
    if (arg)
      conf |= BYT_DEBOUNCE_EN;
      @@ -1257,24 +1274,31 @@
    break;
  }
  case PIN_CONFIG_INPUT_DEBOUNCE:
    debounce = readl(db_reg);
    -debounce &= ~BYTE_STEP Phú PULSE_MASK;
    break;
    ...
  case 375:
    +debounce &= ~BYTE_STEP Phú PULSE_MASK;
    +debounce |= BYTE_STEP Phú 375US;
    break;
    ...
  case 750:
    +debounce &= ~BYTE_STEP Phú PULSE_MASK;
    +debounce |= BYTE_STEP Phú 750US;
    break;
    ...
  case 1500:
    +debounce &= ~BYTE_STEP Phú PULSE_MASK;
    +debounce |= BYTE_STEP Phú 1500US;
    break;
    ...
  case 3000:
    +debounce &= ~BYTE_STEP Phú PULSE_MASK;
    +debounce |= BYTE_STEP Phú 3MS;
    break;
    ...
  case 6000:
    +debounce &= ~BYTE_STEP Phú PULSE MASK;
    +debounce |= BYTE_STEP Phú 6MS;
    break;
  }
}
+debounce &= ~BYT_DEBOUNCE_PULSE_MASK;
debounce |= BYT_DEBOUNCE_PULSE_6MS;
break;
case 12000:
+debounce &= ~BYT_DEBOUNCE_PULSE_MASK;
debounce |= BYT_DEBOUNCE_PULSE_12MS;
break;
case 24000:
+debounce &= ~BYT_DEBOUNCE_PULSE_MASK;
debounce |= BYT_DEBOUNCE_PULSE_24MS;
break;
default:
@@ -1297,7 +1321,7 @@
    if (!ret)
        writel(conf, conf_reg);

-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);

    return ret;
 }
@@ -1322,9 +1346,9 @@
 unsigned long flags;
 u32 val;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);
    val = readl(reg);
-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);

    return !!(val & BYT_LEVEL);
 }
@@ -1339,13 +1363,13 @@
 if (!reg)
     return;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);
    old_val = readl(reg);
-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);

    if (value)
        writel(old_val | BYT_LEVEL, reg);
    else
        writel(old_val & ~BYT_LEVEL, reg);
-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);
    

static int byt_gpio_get_direction(struct gpio_chip *chip, unsigned int offset)  
@@ -1358,9 +1382,9 @@
   if (!reg)  
      return -EINVAL;  
   raw_spin_lock_irqsave(&vg->lock, flags);  
-      raw_spin_lock_irqsave(&byt_lock, flags);  
   value = readl(reg);  
-      raw_spin_unlock_irqrestore(&vg->lock, flags);  
+      raw_spin_unlock_irqrestore(&byt_lock, flags);  
   if (!(value & BYT_OUTPUT_EN))  
      return GPIOF_DIR_OUT;  
   @@ -1372,19 +1396,50 @@
   static int byt_gpio_direction_input(struct gpio_chip *chip, unsigned int offset)  
   {  
      -return pinctrl_gpio_direction_input(chip->base + offset);  
+      struct byt_gpio *vg = gpiochip_get_data(chip);  
+      void __iomem *val_reg = byt_gpio_reg(vg, offset, BYT_VAL_REG);  
+      unsigned long flags;  
+      u32 reg;  
+      +  
+      raw_spin_lock_irqsave(&byt_lock, flags);  
+      +  
+      reg = readl(val_reg);  
+      reg &= ~BYT_DIR_MASK;  
+      reg |= BYT_OUTPUT_EN;  
+      writel(reg, val_reg);  
+      +  
+      raw_spin_unlock_irqrestore(&byt_lock, flags);  
+      return 0;  
   }  
   +/*  
   + * Note despite the temptation this MUST NOT be converted into a call to  
   + * pinctrl_gpio_direction_output() + byt_gpio_set() that does not work this  
   + * MUST be done as a single BYT_VAL_REG register write.  
   + * See the commit message of the commit adding this comment for details.  
   + */  
   static int byt_gpio_direction_output(struct gpio_chip *chip, unsigned int offset, int value)  
   {  
      -int ret = pinctrl_gpio_direction_output(chip->base + offset);  
+      struct byt_gpio *vg = gpiochip_get_data(chip);  
+      void __iomem *val_reg = byt_gpio_reg(vg, offset, BYT_VAL_REG);  
+      unsigned long flags;  
+      u32 reg;  

if (ret)
    return ret;
+raw_spin_lock_irqsave(&byt_lock, flags);

-byt_gpio_set(chip, offset, value);
+byt_gpio_direct_irq_check(vg, offset);

+reg = readl(val_reg);
+reg &= ~BYT_DIR_MASK;
+if (value)
    +reg |= BYT_LEVEL;
+else
    +reg &= ~BYT_LEVEL;
+
+writel(reg, val_reg);
+
+raw_spin_unlock_irqrestore(&byt_lock, flags);
return 0;
}

@@ -1403,14 +1458,14 @@
const char *label;
unsigned int pin;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);
pin = vg->soc_data->pins[i].number;
reg = byt_gpio_reg(vg, pin, BYT_CONF0_REG);
if (!reg) {
    seq_printf(s,
    "Could not retrieve pin %i conf0 reg
", pin);
-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock irqrestore(&byt_lock, flags);
continue;
}
conf0 = readl(reg);
@@ -1419,11 +1474,11 @@
if (!reg) {
    seq_printf(s,
    "Could not retrieve pin %i val reg
", pin);
-raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock irqrestore(&byt_lock, flags);
continue;
}
val = readl(reg);
-raw_spin_unlock_irqrestore(&vg->lock, flags);
comm = byt_get_community(vg, pin);
if (!comm) {
    @@ -1493,6 +1548,7 @@
    .direction_output= byt_gpio_direction_output,
    .get= byt_gpio_get,
    .set= byt_gpio_set,
    .set_config= gpiochip_generic_config,
    .dbg_show= byt_gpio_dbg_show,
};

@@ -1507,9 +1563,9 @@
if (!reg)
    return;

-raw_spin_lock(&vg->lock);
+raw_spin_lock(&byt_lock);
writeI(BIT(offset % 32), reg);
-raw_spin_unlock(&vg->lock);
+raw_spin_unlock(&byt_lock);
}

static void byt_irq_mask(struct irq_data *d)
@@ -1533,7 +1610,7 @@
if (!reg)
    return;

-raw_spin_lock_irqsave(&vg->lock, flags);
+raw_spin_lock_irqsave(&byt_lock, flags);
    value = readl(reg);
switch (irqd_get_trigger_type(d)) {
@@ -1554,7 +1610,7 @@
    writel(value, reg);

    -raw_spin_unlock_irqrestore(&vg->lock, flags);
    +raw_spin_unlock_irqrestore(&byt_lock, flags);
}

static int byt_irq_type(struct irq_data *d, unsigned int type)
@@ -1568,7 +1624,7 @@
if (!reg || offset >= vg->chip.ngpio)
    return -EINVAL;

    -raw_spin_lock_irqsave(&vg->lock, flags);
    +raw_spin_lock_irqsave(&byt_lock, flags);
}
value = readl(reg);

WARN(value & BYT_DIRECT_IRQ_EN,
@@ -1579,6 +1635,9 @@
  /* Enable glitch filtering */
  value |= BYT_GLITCH_FILTER_EN | BYT_GLITCH_F_SLOW_CLK |
  + BYT_GLITCH_F_FAST_CLK;
write(val, reg);

@@ -1587,7 +1646,7 @@
 else if (type & IRQ_TYPE_LEVEL_MASK)
  irq_set_handler_locked(d, handle_level_irq);
  -raw_spin_unlock_irqrestore(&vg->lock, flags);
+raw_spin_unlock_irqrestore(&byt_lock, flags);

  return 0;
 }
@@ -1623,9 +1682,9 @@
  for_each_set_bit(pin, &pending, 32) {
   virq = irq_find_mapping(vg->chip.irq.domain, base + pin);
   generic_handle_irq(virq);
@@ -1827,8 +1886,6 @@
  return PTR_ERR(vg->pctl_dev);
 }
-
-raw_spin_lock_init(&vg->lock);
-
ret = byt_gpio_probe(vg);
if (ret)
return ret;
@@ -1844,8 +1901,11 @@
 {
  struct platform_device *pdev = to_platform_device(dev);
  struct byt_gpio *vg = platform_get_drvdata(pdev);
+unsigned long flags;
int i;

+raw_spin_lock_irqsave(&byt_lock, flags);
+
for (i = 0; i < vg->soc_data->npins; i++) {
  void __iomem *reg;
  u32 value;
  @@ -1866,6 +1926,7 @@
    vg->saved_context[i].val = value;
  }

+raw_spin_unlock_irqrestore(&byt_lock, flags);
return 0;
}

@@ -1873,8 +1934,11 @@
{
  struct platform_device *pdev = to_platform_device(dev);
  struct byt_gpio *vg = platform_get_drvdata(pdev);
  +unsigned long flags;
  int i;

+raw_spin_lock_irqsave(&byt_lock, flags);
+
for (i = 0; i < vg->soc_data->npins; i++) {
  void __iomem *reg;
  u32 value;
  @@ -1912,6 +1976,7 @@
    }

+raw_spin_unlock_irqrestore(&byt_lock, flags);
return 0;
}
#endif
--- linux-4.15.0.orig/drivers/pinctrl/intel/pinctrl-cannonlake.c
+++ linux-4.15.0/drivers/pinctrl/intel/pinctrl-cannonlake.c
@@ -18,24 +18,28 @@

#include "pinctrl-intel.h"

-#define CNL_PAD_OWN	0x020
-#define CNL_PADCFGLOCK	0x080
-#define CNL_HOSTSW_OWN	0x0b0
-#define CNL_GPI_IE	0x120
+#define CNL_PAD_OWN	0x020
+#define CNL_PADCFGLOCK	0x080
+#define CNL_LP_HOSTSW_OWN	0x0b0

---
+\#define CNL_H_HOSTSW_OWN 0x0c0
+\#define CNL_GPI_IE 0x120

-\#define CNL_GPP(r, s, e)
+\#define CNL_GPP(r, s, e, g)
{
    .reg_num = (r),
    .base = (s),
    .size = ((e) - (s) + 1),
    +.gpio_base = (g),
}

-\#define CNL_COMMUNITY(b, s, e, g)
+\#define CNL_NO_GPIO -1
+
+\#define CNL_COMMUNITY(b, s, e, o, g)
{
    .barno = (b),
    .padown_offset = CNL_PAD_OWN,
    .padcfglock_offset = CNL_PADCFGLOCK,
    -.hostown_offset = CNL_HOSTSW_OWN,
    +.hostown_offset = (o),
    .ie_offset = CNL_GPI_IE,
    .pin_base = (s),
    .npins = ((e) - (s) + 1),
    @ @ -43.6 +47.12 @@
    .ngpps = ARRAY_SIZE(g),
}

+\#define CNLLP_COMMUNITY(b, s, e, g)
+CNL_COMMUNITY(b, s, e, CNL_LP_HOSTSW_OWN, g)
+
+\#define CNLH_COMMUNITY(b, s, e, g)
+CNL_COMMUNITY(b, s, e, CNL_H_HOSTSW_OWN, g)
+
/* Cannon Lake-H */
static const struct pinctrl_pin_desc cnlh_pins[] = {
/* GPP_A */
    @ @ -363.32 +373.32 @@
};

static const struct intel_padgroup cnlh_community0_gpps[] = {
    -CNL_GPP(0, 0, 24),/* GPP_A */
    -CNL_GPP(1, 25, 50),/* GPP_B */
    +CNL_GPP(0, 0, 24, 0),/* GPP_A */
    +CNL_GPP(1, 25, 50, 32),/* GPP_B */
};
static const struct intel_padgroup cnlh_community1_gpps[] = {
  -CNL_GPP(0, 51, 74),/* GPP_C */
  -CNL_GPP(1, 75, 98),/* GPP_D */
  -CNL_GPP(2, 99, 106),/* GPP_G */
  -CNL_GPP(3, 107, 114),/* AZA */
  -CNL_GPP(4, 115, 146),/* vGPIO_0 */
  -CNL_GPP(5, 147, 154),/* vGPIO_1 */
  +CNL_GPP(0, 51, 74, 64),/* GPP_C */
  +CNL_GPP(1, 75, 98, 96),/* GPP_D */
  +CNL_GPP(2, 99, 106, 128),/* GPP_G */
  +CNL_GPP(3, 107, 114, CNL_NO_GPIO),/* AZA */
  +CNL_GPP(4, 115, 146, 160),/* vGPIO_0 */
  +CNL_GPP(5, 147, 154, CNL_NO_GPIO),/* vGPIO_1 */
};

static const struct intel_padgroup cnlh_community3_gpps[] = {
  -CNL_GPP(0, 155, 178),/* GPP_K */
  -CNL_GPP(1, 179, 202),/* GPP_H */
  -CNL_GPP(2, 203, 215),/* GPP_E */
  -CNL_GPP(3, 216, 239),/* GPP_F */
  -CNL_GPP(4, 240, 248),/* SPI */
  +CNL_GPP(0, 155, 178, 192),/* GPP_K */
  +CNL_GPP(1, 179, 202, 224),/* GPP_H */
  +CNL_GPP(2, 203, 215, 256),/* GPP_E */
  +CNL_GPP(3, 216, 239, 288),/* GPP_F */
  +CNL_GPP(4, 240, 248, CNL_NO_GPIO),/* SPI */
};

static const struct intel_padgroup cnlh_community4_gpps[] = {
  -CNL_GPP(0, 249, 259),/* CPU */
  -CNL_GPP(1, 260, 268),/* JTAG */
  -CNL_GPP(2, 269, 286),/* GPP_I */
  -CNL_GPP(3, 287, 298),/* GPP_J */
  +CNL_GPP(0, 249, 259, CNL_NO_GPIO),/* CPU */
  +CNL_GPP(1, 260, 268, CNL_NO_GPIO),/* JTAG */
  +CNL_GPP(2, 269, 286, CNL_NO_GPIO),/* GPP_I */
  +CNL_GPP(3, 287, 298, CNL_NO_GPIO),/* GPP_J */
};

static const unsigned int cnlh_spi0_pins[] = { 40, 41, 42, 43 };@@ -442,14 +452,10 @@)
};

static const struct intel_community cnlh_communities[] = {
  -CNL_COMMUNITY(0, 0, 50, cnlh_community0_gpps),
  -CNL_COMMUNITY(1, 51, 154, cnlh_community1_gpps),
  -CNL_COMMUNITY(2, 155, 178, cnlh_community3_gpps),
  -CNL_COMMUNITY(3, 249, 259, cnlh_community4_gpps),
  -CNL_COMMUNITY(4, 240, 248, CNL_NO_GPIO)
};

static const unsigned int cnlh_spi0_pins[] = { 40, 41, 42, 43 };

static const struct intel_community cnlh_communities[] = {
  -CNL_COMMUNITY(0, 0, 50, cnlh_community0_gpps),
  -CNL_COMMUNITY(1, 51, 154, cnlh_community1_gpps),
  -CNL_COMMUNITY(2, 155, 178, cnlh_community3_gpps),
  -CNL_COMMUNITY(3, 249, 259, cnlh_community4_gpps),
  -CNL_COMMUNITY(4, 240, 248, CNL_NO_GPIO)
};

static const unsigned int cnlh_spi0_pins[] = { 40, 41, 42, 43 };
- * communities 3 and 4.
- */
-CNL_COMMUNITY(3, 155, 248, cnlh_community3_gpps),
-CNL_COMMUNITY(2, 249, 298, cnlh_community4_gpps),
+CNLH_COMMUNITY(0, 0, 50, cnlh_community0_gpps),
+CNLH_COMMUNITY(1, 51, 154, cnlh_community1_gpps),
+CNLH_COMMUNITY(2, 155, 248, cnlh_community3_gpps),
+CNLH_COMMUNITY(3, 249, 298, cnlh_community4_gpps),
};

static const struct intel_pinctrl_soc_data cnlh_soc_data = {
    @ @ -785,31 +791,31 @ @
};

static const struct intel_padgroup cnllp_community0_gpps[] = {
    -CNL_GPP(0, 0, 24), /* GPP_A */
    -CNL_GPP(1, 25, 50), /* GPP_B */
    -CNL_GPP(2, 51, 58), /* GPP_G */
    -CNL_GPP(3, 59, 67), /* SPI */
    +CNL_GPP(0, 0, 24, 0), /* GPP_A */
    +CNL_GPP(1, 25, 50, 32), /* GPP_B */
    +CNL_GPP(2, 51, 58, 64), /* GPP_G */
    +CNL_GPP(3, 59, 67, CNL_NO_GPIO), /* SPI */
};

static const struct intel_padgroup cnllp_community1_gpps[] = {
    -CNL_GPP(0, 68, 92), /* GPP_D */
    -CNL_GPP(1, 93, 116), /* GPP_F */
    -CNL_GPP(2, 117, 140), /* GPP_H */
    -CNL_GPP(3, 141, 172), /* vGPIO */
    -CNL_GPP(4, 173, 180), /* vGPIO */
    +CNL_GPP(0, 68, 92, 96), /* GPP_D */
    +CNL_GPP(1, 93, 116, 128), /* GPP_F */
    +CNL_GPP(2, 117, 140, 160), /* GPP_H */
    +CNL_GPP(3, 141, 172, 192), /* vGPIO */
    +CNL_GPP(4, 173, 180, 224), /* vGPIO */
};

static const struct intel_padgroup cnllp_community4_gpps[] = {
    -CNL_GPP(0, 181, 204), /* GPP_C */
    -CNL_GPP(1, 205, 228), /* GPP_E */
    -CNL_GPP(2, 229, 237), /* JTAG */
    -CNL_GPP(3, 238, 243), /* HVCMS */
    +CNL_GPP(0, 181, 204, 256), /* GPP_C */
    +CNL_GPP(1, 205, 228, 288), /* GPP_E */
    +CNL_GPP(2, 229, 237, CNL_NO_GPIO), /* JTAG */
    +CNL_GPP(3, 238, 243, CNL_NO_GPIO), /* HVCMS */
};
static const struct intel_community cnllp_communities[] = {
    CNL_COMMUNITY(0, 0, 67, cnllp_community0_gpps),
    CNL_COMMUNITY(1, 68, 180, cnllp_community1_gpps),
    CNL_COMMUNITY(2, 181, 243, cnllp_community4_gpps),
    CNLLP_COMMUNITY(0, 0, 67, cnllp_community0_gpps),
    CNLLP_COMMUNITY(1, 68, 180, cnllp_community1_gpps),
    CNLLP_COMMUNITY(2, 181, 243, cnllp_community4_gpps),
};

static const struct intel_pinctrl_soc_data cnllp_soc_data = {
    --- linux-4.15.0.orig/drivers/pinctrl/intel/pinctrl-cherryview.c
    +++ linux-4.15.0/drivers/pinctrl/intel/pinctrl-cherryview.c
    @@ -131,10 +131,8 @@
    * @ngroups: Number of groups
    * @functions: All functions in this community
    * @nfunctions: Number of functions
    - * @ngpios: Number of GPIOs in this community
    * @gpio_ranges: An array of GPIO ranges in this community
    * @ngpio_ranges: Number of GPIO ranges
    - * @ngpios: Total number of GPIOs in this community
    * @nirqs: Total number of IRQs this community can generate
    */
    struct chv_community {
    @@ -147,7 +145,6 @@
        size_t nfunctions;
        const struct chv_gpio_pinrange *gpio_ranges;
        size_t ngpio_ranges;
        -size_t ngpios;
        size_t nirqs;
        acpi_adr_space_type acpi_space_id;
    };
    @@ -163,6 +160,7 @@
        struct pinctrl_dev *pctldev;
        struct gpio_chip *chip;
        +struct irq_chip *irqchip;
        void __iomem *regs;
        unsigned intr_lines[16];
    const struct chv_community *community;
.nfunctions = ARRAY_SIZE(southwest_functions),
.gpio_ranges = southwest_gpio_ranges,
.ngpio_ranges = ARRAY_SIZE(southwest_gpio_ranges),
.ngpios = ARRAY_SIZE(southwest_pins),
/*
 * Southwest community can generate GPIO interrupts only for the
 * first 8 interrupts. The upper half (8-15) can only be used to
*/
.npins = ARRAY_SIZE(north_pins),
.gpio_ranges = north_gpio_ranges,
.ngpio_ranges = ARRAY_SIZE(north_gpio_ranges),
.ngpios = ARRAY_SIZE(north_pins),
/*
 * North community can generate GPIO interrupts only for the first
 * 8 interrupts. The upper half (8-15) can only be used to trigger
*/
.npins = ARRAY_SIZE(east_pins),
.gpio_ranges = east_gpio_ranges,
.ngpio_ranges = ARRAY_SIZE(east_gpio_ranges),
.ngpios = ARRAY_SIZE(east_pins),
.nirqs = 16,
.acpi_space_id = 0x93,
};
@@ -538,7 +535,6 @@
 .nfunctions = ARRAY_SIZE(southeast_functions),
 .gpio_ranges = southeast_gpio_ranges,
 .ngpio_ranges = ARRAY_SIZE(southeast_gpio_ranges),
- .ngpios = ARRAY_SIZE(southeast_pins),
 .nirqs = 16,
 .acpi_space_id = 0x94,
 };
raw_spin_lock_irqsave(&chv_lock, flags);
-ctrl0 = readl(chv_padreg(pctrl, pin, CHV_PADCTRL0));
++ctrl0 = readl(chv_padreg(pctrl, offset, CHV_PADCTRL0));
raw_spin_unlock_irqrestore(&chv_lock, flags);

cfg = ctrl0 & CHV_PADCTRL0_GPIOCFG_MASK;
@@ -1281,14 +1269,13 @@
static void chv_gpio_set(struct gpio_chip *chip, unsigned offset, int value)
{
    struct chv_pinctrl *pctrl = gpiochip_get_data(chip);
    unsigned pin = chv_gpio_offset_to_pin(pctrl, offset);
    unsigned long flags;
    void __iomem *reg;
    u32 ctrl0;

    raw_spin_lock_irqsave(&chv_lock, flags);

    -reg = chv_padreg(pctrl, pin, CHV_PADCTRL0);
    +reg = chv_padreg(pctrl, offset, CHV_PADCTRL0);
    ctrl0 = readl(reg);

    if (value)
@@ -1304,12 +1291,11 @@
static int chv_gpio_get_direction(struct gpio_chip *chip, unsigned offset)
{
    struct chv_pinctrl *pctrl = gpiochip_get_data(chip);
    unsigned pin = chv_gpio_offset_to_pin(pctrl, offset);
    u32 ctrl0, direction;
    unsigned long flags;

    raw_spin_lock_irqsave(&chv_lock, flags);
    -ctrl0 = readl(chv_padreg(pctrl, pin, CHV_PADCTRL0));
    +ctrl0 = readl(chv_padreg(pctrl, offset, CHV_PADCTRL0));
    raw_spin_unlock_irqrestore(&chv_lock, flags);

direction = ctrl0 & CHV_PADCTRL0_GPIOCFG_MASK;
@@ -1345,7 +1331,7 @@
{
    struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
    struct chv_pinctrl *pctrl = gpiochip_get_data(gc);
    -int pin = chv_gpio_offset_to_pin(pctrl, irqd_to_hwirq(d));
    +int pin = irqd_to_hwirq(d);
    u32 intr_line;

    raw_spin_lock(&chv_lock);
@@ -1362,7 +1348,7 @@
{
struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
struct chv_pinctrl *pctrl = gpiochip_get_data(gc);
-int pin = chv_gpio_offset_to_pin(pctrl, irqd_to_hwirq(d));
+int pin = irqd_to_hwirq(d);
u32 value, intr_line;
unsigned long flags;

@@ -1407,8 +1393,7 @@
if (irqd_get_trigger_type(d) == IRQ_TYPE_NONE) {
 struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
 struct chv_pinctrl *pctrl = gpiochip_get_data(gc);
-unsigned offset = irqd_to_hwirq(d);
-unsigned pin = chv_gpio_offset_to_pin(pctrl, offset);
+unsigned pin = irqd_to_hwirq(d);
 irq_flow_handler_t handler;
 unsigned long flags;
 u32 intsel, value;
@@ -1426,7 +1411,7 @@
if (!pctrl->intr_lines[intsel]) {
 irq_set_handler_locked(d, handler);
- pctrl->intr_lines[intsel] = offset;
+ pctrl->intr_lines[intsel] = pin;
 } raw_spin_unlock_irqrestore(&chv_lock, flags);
 }
@@ -1439,8 +1424,7 @@
 {
 struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
 struct chv_pinctrl *pctrl = gpiochip_get_data(gc);
-unsigned offset = irqd_to_hwirq(d);
-unsigned pin = chv_gpio_offset_to_pin(pctrl, offset);
+unsigned pin = irqd_to_hwirq(d);
 unsigned long flags;
 u32 value;
@@ -1486,7 +1470,7 @@
 value &= CHV_PADCTRL0_INTSEL_MASK;
 value >>= CHV_PADCTRL0_INTSEL_SHIFT;
- pctrl->intr_lines[value] = offset;
+ pctrl->intr_lines[value] = pin;

 if (type & IRQ_TYPE_EDGE_BOTH)
 irq_set_handler_locked(d, handle_edge_irq);
@@ -1498,27 +1482,21 @@
 return 0;
}
static struct irq_chip chv_gpio_irqchip = {
    .name = "chv-gpio",
    .irq_startup = chv_gpio_irq_startup,
    .irq_ack = chv_gpio_irq_ack,
    .irq_mask = chv_gpio_irq_mask,
    .irq_unmask = chv_gpio_irq_unmask,
    .irq_set_type = chv_gpio_irq_type,
    .flags = IRQCHIP_SKIP_SET_WAKE,
};

static void chv_gpio_irq_handler(irq_desc *desc)
{
    struct gpio_chip *gc = irq_desc_get_handler_data(desc);
    struct chv_pinctrl *pctrl = gpiochip_get_data(gc);
    struct irq_chip *chip = irq_desc_get_chip(desc);
    unsigned long pending;
    unsigned long flags;
    u32 intr_line;
    chained_irq_enter(chip, desc);
    raw_spin_lock_irqsave(&chv_lock, flags);
    pending = readl(pctrl->regs + CHV_INTSTAT);
    raw_spin_unlock_irqrestore(&chv_lock, flags);
    for_each_set_bit(intr_line, &pending, pctrl->community->nirqs) {
        unsigned irq, offset;
        const struct chv_gpio_pinrange *range;
        struct gpio_chip *chip = irq_desc_get_chip(desc);
        unsigned long pending;
        unsigned long flags;
        u32 intr_line;
        chained_irq_enter(chip, desc);
        raw_spin_lock_irqsave(&chv_lock, flags);
        pending = readl(pctrl->regs + CHV_INTSTAT);
        raw_spin_unlock_irqrestore(&chv_lock, flags);
        for_each_set_bit(intr_line, &pending, pctrl->community->nirqs) {
            unsigned irq, offset;
            const struct chv_gpio_pinrange *range;
            struct gpio_chip *chip = irq_desc_get_chip(desc);
            unsigned long pending;
            unsigned long flags;
            u32 intr_line;
            chained_irq_enter(chip, desc);
            raw_spin_lock_irqsave(&chv_lock, flags);
            pending = readl(pctrl->regs + CHV_INTSTAT);
            raw_spin_unlock_irqrestore(&chv_lock, flags);
            for_each_set_bit(intr_line, &pending, pctrl->community->nirqs) {
                unsigned irq, offset;
                const struct chv_gpio_pinrange *range;
                struct gpio_chip *chip = irq_desc_get_chip(desc);
                unsigned long pending;
                unsigned long flags;
                u32 intr_line;
            }
        }
    }
}

-chip->ngpio = pctrl->community->ngpios;
+chip->ngpio = community->pins[community->npins - 1].number + 1;
chip->label = dev_name(pctrl->dev);
chip->parent = pctrl->dev;
chip->base = -1;
return ret;
}
for (i = 0, offset = 0; i < pctrl->community->ngpio_ranges; i++) {
    range = &pctrl->community->gpio_ranges[i];
    ret = gpiochip_add_pin_range(chip, dev_name(pctrl->dev), offset,
        range->base, range->npins);
    for (i = 0; i < pctrl->community->ngpio_ranges; i++) {
        range = &pctrl->community->gpio_ranges[i];
        ret = gpiochip_add_pin_range(chip, dev_name(pctrl->dev),
            range->base, range->base,
            range->npins);
        if (ret) {
            dev_err(pctrl->dev, "failed to add GPIO pin range\n");
            return ret;
        }
        offset += range->npins;
    }

    /* Do not add GPIOs that can only generate GPEs to the IRQ domain */
    for (i = 0; i < pctrl->community->npins; i++) {
        const struct pinctrl_pin_desc *desc;
        u32 intsel;

        desc = &pctrl->community->pins[i];
        intsel = readl(chv_padreg(pctrl, desc->number, CHV_PADCTRL0));
        intsel &= CHV_PADCTRL0_INTSEL_MASK;
        intsel >>= CHV_PADCTRL0_INTSEL_SHIFT;

        if (need_valid_mask && intsel >= pctrl->community->nirqs)
            clear_bit(i, chip->irq.valid_mask);
        if (need_valid_mask && intsel >= community->nirqs)
            clear_bit(desc->number, chip->irq.valid_mask);
    }

    /*
        @ @ -1641.23 +1618.39 @ @
    */
    if (!need_valid_mask) {
        irq_base = devm_irq_alloc_descs(pctrl->dev, -1, 0,
            chip->ngpio, NUMA_NO_NODE);
        +community->npins, NUMA_NO_NODE);
        if (irq_base < 0) {
            dev_err(pctrl->dev, "Failed to allocate IRQ numbers\n");
            return irq_base;
        }
    }
```c
- irq_base = 0;
}

-ret = gpiochip_irqchip_add(chip, &chv_gpio_irqchip, irq_base,
+ pctrl->irqchip.name = "chv-gpio";
+ pctrl->irqchip.irq_startup = chv_gpio_irq_startup;
+ pctrl->irqchip.irq_ack = chv_gpio_irq_ack;
+ pctrl->irqchip.irq_mask = chv_gpio_irq_mask;
+ pctrl->irqchip.irq_unmask = chv_gpio_irq_unmask;
+ pctrl->irqchip.irq_set_type = chv_gpio_irq_type;
+ pctrl->irqchip.flags = IRQCHIP_SKIP_SET_WAKE;
+
+ret = gpiochip_irqchip_add(chip, &pctrl->irqchip, 0,
   handle_bad_irq, IRQ_TYPE_NONE);
if (ret) {
   dev_err(pctrl->dev, "failed to add IRQ chip\n");
   return ret;
}

-gpiochip_set_chained_irqchip(chip, &chv_gpio_irqchip, irq,
+if (!need_valid_mask) {
+for (i = 0; i < community->ngpio_ranges; i++) {
+ range = &community->gpio_ranges[i];
+
+ irq_domain_associate_many(chip->irq.domain, irq_base,
+ range->base, range->npins);
+ irq_base += range->npins;
+}
+}
+
+gpiochip_set_chained_irqchip(chip, &pctrl->irqchip, irq,
   chv_gpio_irq_handler);
return 0;
}
--- linux-4.15.0.orig/drivers/pinctrl/intel/pinctrl-intel.c
+++ linux-4.15.0/drivers/pinctrl/intel/pinctrl-intel.c
@@ -52,6 +52,7 @@
#define PADCFG0_GPIROUTNMI	
#define PADCFG0_PMODE_SHIFT	10
#define PADCFG0_PMODE_MASK	(0xf << PADCFG0_PMODE_SHIFT)

-#define PADCFG0_PMODE_GPIO	0
+#define PADCFG0_PMODE_GPIO0
#define PADCFG0_GPIORXDISBIT(9)
#define PADCFG0_GPIOTXDISBIT(8)
#define PADCFG0_GPIORXSTATEBIT(1)
@@ -304,7 +305,7 @@
   cfg1 = readl(intel_get_padcfg(pctrl, pin, PADCFG1));
```
mode = (cfg0 & PADCFG0_PMODE_MASK) >> PADCFG0_PMODE_SHIFT;
-if (!mode)
+if (mode == PADCFG0_PMODE_GPIO)
    seq_puts(s, "GPIO ");
else
    seq_printf(s, "mode %d ", mode);
@@ -425,6 +426,23 @@
    write(value, padcfg0);
 }

+static int intel_gpio_get_gpio_mode(void __iomem *padcfg0)
+{
+    return (readl(padcfg0) & PADCFG0_PMODE_MASK) >> PADCFG0_PMODE_SHIFT;
+}
+
+static void intel_gpio_set_gpio_mode(void __iomem *padcfg0)
+{
+    u32 value;
+    /* Put the pad into GPIO mode */
+    value = readl(padcfg0) & ~PADCFG0_PMODE_MASK;
+    /* Disable SCI/SMI/NMI generation */
+    value &= ~(PADCFG0_GPIROUTIOXAPIC | PADCFG0_GPIROUTSCI);
+    value &= ~(PADCFG0_GPIROUTSMI | PADCFG0_GPIROUTNMI);
+    write(value, padcfg0);
+}
+
+static int intel_gpio_request_enable(struct pinctrl_dev *pctldev,
+    struct pinctrl_gpio_range *range,
+    unsigned pin)
+{
+    struct intel_pinctrl *pctrl = pinctrl_dev_get_drvdata(pctldev);
+    void __iomem *padcfg0;
+    unsigned long flags;
@ @ -432,7 +450,6 @@
+    struct intel_pinctrl *pctrl = pinctrl_dev_get_drvdata(pctldev);
+    void __iomem *padcfg0;
+    unsigned long flags;
-    u32 value;

    raw_spin_lock_irqsave(&pctrl->lock, flags);

    @ @ -442,12 +459,19 @@
 }

    padcfg0 = intel_get_padcfg(pctrl, pin, PADCFG0);
-/* Put the pad into GPIO mode */
-    value = readl(padcfg0) & ~PADCFG0_PMODE_MASK;
-/* Disable SCI/SMI/NMI generation */
-    value &= ~(PADCFG0_GPIROUTIOXAPIC | PADCFG0_GPIROUTSCI);
-    value &= ~(PADCFG0_GPIROUTSMI | PADCFG0_GPIROUTNMI);
-    write(value, padcfg0);
/* If pin is already configured in GPIO mode, we assume that firmware provides correct settings. In such case we avoid potential glitches on the pin. Otherwise, for the pin in alternative mode, consumer has to supply respective flags. */

if (intel_gpio_get_gpio_mode(padcfg0) == PADCFG0_PMODE_GPIO) {
    raw_spin_unlock_irqrestore(&pctrl->lock, flags);
    return 0;
}

+intel_gpio_set_gpio_mode(padcfg0);

/* Disable TX buffer and enable RX (this will be input) */
__intel_gpio_set_direction(padcfg0, true);

value |= PADCFG1_TERM_UP;

/* Set default strength value in case none is given */
+if (arg == 1)
+arg = 5000;
+
switch (arg) {
    case 20000:
        value |= PADCFG1_TERM_20K << PADCFG1_TERM_SHIFT;
    }

/* Set default strength value in case none is given */
+if (arg == 1)
+arg = 5000;
+
switch (arg) {
    case 20000:
        value |= PADCFG1_TERM_20K << PADCFG1_TERM_SHIFT;
    }

/open-source-used-in-5g-acs_edge_ac-4/27033
When coming through gpiolib irqchip, the GPIO offset is not automatically translated to pinctrl pin number. This function can be used to find out the corresponding pinctrl pin.

```
static int intel_gpio_to_pin(struct intel_pinctrl *pctrl, unsigned offset,
   const struct intel_community **community,
   const struct intel_padgroup **padgrp)
{
    int i;
    for (i = 0; i < pctrl->ncommunities; i++) {
        const struct intel_community *comm = &pctrl->communities[i];
        int j;
        for (j = 0; j < comm->ngpps; j++) {
            const struct intel_padgroup *pgrp = &comm->gpps[j];
            if (pgrp->gpio_base < 0)
                continue;
            if (offset >= pgrp->gpio_base &&
                offset < pgrp->gpio_base + pgrp->size) {
                int pin;
                pin = pgrp->base + offset - pgrp->gpio_base;
                if (community)
                    *community = comm;
                if (padgrp)
                    *padgrp = pgrp;
                return pin;
            }
        }
    }
    return -EINVAL;
}
```

```
static int intel_pin_to_gpio(struct intel_pinctrl *pctrl, int pin)
{
    * community
    * padgrp
    return pin;
}
```

```
*piel_pin_to_gpio() - Translate from pin number to GPIO offset
* @pctrl: Pinctrl structure
* @pin: pin number
* Translate the pin number of pinctrl to GPIO offset
*/
static int intel_pin_to_gpio(struct intel_pinctrl *pctrl, int pin)
{
```
+const struct intel_community *community;
+const struct intel_padgroup *padgrp;
+
+community = intel_get_community(pctrl, pin);
+if (!community)
+return -EINVAL;
+
+padgrp = intel_community_get_padgroup(community, pin);
+if (!padgrp)
+return -EINVAL;
+
+return pin - padgrp->base + padgrp->gpio_base;
+
+
static int intel_gpio_get(struct gpio_chip *chip, unsigned offset) {

struct intel_pinctrl *pctrl = gpiochip_get_data(chip);
void __iomem *reg;
int pin;

+pin = intel_gpio_to_pin(pctrl, offset, NULL, NULL);
+if (pin < 0)
+return -EINVAL;
+
-reg = intel_get_padcfg(pctrl, offset, PADCFG0);
+reg = intel_get_padcfg(pctrl, offset, PADCFG0);
if (!reg)
return -EINVAL;
+
-unsigned long flags;
void __iomem *reg;
int pin;
+
+pin = intel_gpio_to_pin(pctrl, offset, NULL, NULL);
+if (pin < 0)
+return;
+
-reg = intel_get_padcfg(pctrl, offset, PADCFG0);
+reg = intel_get_padcfg(pctrl, offset, PADCFG0);
if (!reg)
return -EINVAL;
+
-raw_spin_unlock_irqrestore(&pctrl->lock, flags);
}
+static int intel_gpio_get_direction(struct gpio_chip *chip, unsigned int offset)  
+{
+struct intel_pinctrl *pctrl = gpiochip_get_data(chip);
+void __iomem *reg;
+u32 padcfg0;
+int pin;
+
+pin = intel_gpio_to_pin(pctrl, offset, NULL, NULL);
+if (pin < 0)
+return -EINVAL;
+
+reg = intel_get_padcfg(pctrl, pin, PADCFG0);
+if (!reg)
+return -EINVAL;
+
+padcfg0 = readl(reg);
+
+if (padcfg0 & PADCFG0_PMODE_MASK)
+return -EINVAL;
+
+return !!((padcfg0 & PADCFG0_GPIOTXDIS);
+}
+
+static int intel_gpio_direction_input(struct gpio_chip *chip, unsigned offset)  
{
return pinctrl_gpio_direction_input(chip->base + offset);
@@ -799,6 +932,7 @@
.owner = THIS_MODULE,
.request = gpiochip_generic_request,
.free = gpiochip_generic_free,
+get_direction = intel_gpio_get_direction,
.direction_input = intel_gpio_direction_input,
.direction_output = intel_gpio_direction_output,
.get = intel_gpio_get,
@@ -811,17 +945,13 @@
struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
struct intel_pinctrl *pctrl = gpiochip_get_data(gc);
const struct intel_community *community;
-unsigned pin = irqd_to_hwirq(d);
+const struct intel_padgroup *padgrp;
+int pin;
+
-community = intel_get_community(pctrl, pin);
-if (community) {
-const struct intel_padgroup *padgrp;
+pin = intel_gpio_to_pin(pctrl, irqd_to_hwirq(d), &community, &padgrp);
+if (pin >= 0) {
unsigned gpp, gpp_offset, is_offset;

-padgrp = intel_community_get_padgroup(community, pin);
-if (!padgrp)
-return;
-
-gpp = padgrp->reg_num;
gpp_offset = padgroup_offset(padgrp, pin);
is_offset = community->is_offset + gpp * 4;
@@ -837,19 +967,15 @@
struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
struct intel_pinctrl *pctrl = gpiochip_get_data(gc);
const struct intel_community *community;
-unsigned pin = irqd_to_hwirq(d);
+const struct intel_padgroup *padgrp;
+int pin;

-community = intel_get_community(pctrl, pin);
-if (community) {
-const struct intel_padgroup *padgrp;
+pin = intel_gpio_to_pin(pctrl, irqd_to_hwirq(d), &community, &padgrp);
+if (pin >= 0) {
unsigned gpp, gpp_offset, is_offset;
unsigned long flags;

-padgrp = intel_community_get_padgroup(community, pin);
-if (!padgrp)
-return;
-
-gpp = padgrp->reg_num;
gpp_offset = padgroup_offset(padgrp, pin);
is_offset = community->is_offset + gpp * 4;
@@ -870,20 +996,16 @@
struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
struct intel_pinctrl *pctrl = gpiochip_get_data(gc);
const struct intel_community *community;
-unsigned pin = irqd_to_hwirq(d);
+const struct intel_padgroup *padgrp;
+int pin;

-community = intel_get_community(pctrl, pin);
-if (community) {
-const struct intel_padgroup *padgrp;
+pin = intel_gpio_to_pin(pctrl, irqd_to_hwirq(d), &community, &padgrp);
+if (pin >= 0) {
unsigned gpp, gpp_offset;
void __iomem *reg;

u32 value;

-padgrp = intel_community_get_padgroup(community, pin);
-if (!padgrp)
-return;
-
-gpp = padgrp->reg_num;
gpp_offset = padgroup_offset(padgrp, pin);

@@ -914,7 +1036,7 @@
 |
 struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
 struct intel_pinctrl *pctrl = gpiochip_get_data(gc);
-unsigned pin = irqd_to_hwirq(d);
+unsigned pin = intel_gpio_to_pin(pctrl, irqd_to_hwirq(d), NULL, NULL);
 unsigned long flags;
 void __iomem *reg;
 u32 value;
@@ -935,6 +1057,8 @@
 raw_spin_lock_irqsave(&pctrl->lock, flags);

+intel_gpio_set_gpio_mode(reg);
+
 value = readl(reg);

value &= ~(PADCFG0_RXEVCFG_MASK | PADCFG0_RXINV);
@@ -969,7 +1093,7 @@
 |
 struct gpio_chip *gc = irq_data_get_irq_chip_data(d);
 struct intel_pinctrl *pctrl = gpiochip_get_data(gc);
-unsigned pin = irqd_to_hwirq(d);
+unsigned pin = intel_gpio_to_pin(pctrl, irqd_to_hwirq(d), NULL, NULL);

if (on)
 enable_irq_wake(pctrl->irq);
@@ -1000,14 +1124,10 @@
pending &= enabled;

for_each_set_bit(gpp_offset, &pending, padgrp->size) {
-unsigned padno, irq;
-
-padno = padgrp->base - community->pin_base + gpp_offset;
-if (padno >= community->npins)
-break;
+unsigned irq;
irq = irq_find_mapping(gc->irq.domain,  
    - community->pin_base + padno);  
+     padgrp->gpio_base + gpp_offset);  
generic_handle_irq(irq);  

ret |= IRQ_HANDLED;  
@@ -1044,13 +1164,56 @@  
.flags = IRQCHIP_MASK_ON_SUSPEND,  
};  

+static int intel_gpio_add_pin_ranges(struct intel_pinctrl *pctrl,  
+    const struct intel_community *community)  
+{  
+    int ret, i;  
+    
+    +for (i = 0; i < community->ngpps; i++) {  
+        const struct intel_padgroup *gpp = &community->gpps[i];  
+        +if (gpp->gpio_base < 0)  
+            continue;  
+        +ret = gpiochip_add_pin_range(&pctrl->chip, dev_name(pctrl->dev),  
+            +gpp->gpio_base, gpp->base,  
+            +gpp->size);  
+        +if (ret)  
+            +return ret;  
+    }  
+    +return ret;  
+}  
+  
+static unsigned intel_gpio_ngpio(const struct intel_pinctrl *pctrl)  
+{  
+    const struct intel_community *community;  
+    unsigned ngpio = 0;  
+    int i, j;  
+    
+    +for (i = 0; i < pctrl->ncommunities; i++) {  
+        community = &pctrl->communities[i];  
+        +for (j = 0; j < community->ngpps; j++) {  
+            const struct intel_padgroup *gpp = &community->gpps[j];  
+            +if (gpp->gpio_base < 0)  
+                continue;  
+            +if (gpp->gpio_base + gpp->size > ngpio)  
+                ngpio = gpp->gpio_base + gpp->size;  
+    }  

static int intel_gpio_probe(struct intel_pinctrl *pctrl, int irq)
{
  int ret, i;

  pctrl->chip = intel_gpio_chip;
  pctrl->chip.ngpio = intel_gpio_ngpio(pctrl);
  pctrl->chip.label = dev_name(pctrl->dev);
  pctrl->chip.parent = pctrl->dev;
  pctrl->chip.base = -1;
  return ret;
}

int intel_gpio_add_pin_ranges(struct intel_pinctrl *pctrl, int community)
{
  int ret, i;

  pctrl->chip.ngpio = pctrl->soc->npins;
  for (i = 0; i < pctrl->ncommunities; i++) {
    ret = intel_gpio_add_pin_ranges(pctrl, &pctrl->communities[i]);
    if (ret) {
      dev_err(pctrl->dev, "failed to add GPIO pin range\n");
      return ret;
    }
  }
  return 0;
}

/*
 @@ -1126,6 +1466,7 @@
 if (gpps[i].size > 32)
 return -EINVAL;
 */

/*
 @@ -1297,7 +1466,7 @@
 if (!gpps[i].gpio_base)
 gpps[i].gpio_base = gpps[i].base;
 +
 gpps[i].padown_num = padown_num;
*/

+return ngpio;
+}
++

if (pd->mux_owner || pd->gpio_owner ||
    gpiochip_line_is_irq(&pctrl->chip, pin))
+    gpiochip_line_is_irq(&pctrl->chip, intel_pin_to_gpio(pctrl, pin)))
return true;
return false;

--- linux-4.15.0.orig/drivers/pinctrl/intel/pinctrl-intel.h
+++ linux-4.15.0/drivers/pinctrl/intel/pinctrl-intel.h
@@ -51,6 +51,8 @@
 * @reg_num: GPI_IS register number
 * @base: Starting pin of this group
 * @size: Size of this group (maximum is 32).
+ * @gpio_base: Starting GPIO base of this group (%0 if matches with @base,
+ *       and %-1 if no GPIO mapping should be created)
 * @padown_num: PAD_OWN register number (assigned by the core driver)
 *
 * If pad groups of a community are not the same size, use this structure
@@ -60,6 +62,7 @@
 unsigned reg_num;
 unsigned base;
 unsigned size;
+int gpio_base;
 unsigned padown_num;
);

--- linux-4.15.0.orig/drivers/pinctrl/intel/pinctrl-lewisburg.c
+++ linux-4.15.0/drivers/pinctrl/intel/pinctrl-lewisburg.c
@@ -34,6 +34,7 @@
 .npins = ((e) - (s) + 1),		|
} +/* Lewisburg */
static const struct pinctrl_pin_desc lbg_pins[] = {
 /* GPP_A */
PINCTRL_PIN(0, "RCINB"),
@@ -73,7 +74,7 @@
 PINCTRL_PIN(33, "SRCKREQB_4"),
 PINCTRL_PIN(34, "SRCKREQB_5"),
 PINCTRL_PIN(35, "GPP_B_11"),
- PINCTRL_PIN(36, "GLB_RST_WARN_N"),
+ PINCTRL_PIN(36, "SLP_S0B"),
 PINCTRL_PIN(37, "PLTRSTB"),
 PINCTRL_PIN(38, "SPKR"),
 PINCTRL_PIN(39, "GPP_B_15"),
@@ -186,96 +187,96 @@
 PINCTRL_PIN(141, "GBE_PCI_DIS"),
PINCTRL_PIN(142, "GBE_LAN_DIS"),
PINCTRL_PIN(143, "GPP_I_10"),
PINCTRL_PIN(144, "GPIO_RCOMP_3P3"),
/* GPP_J */
PINCTRL_PIN(145, "GBE_LED_0_0"),
PINCTRL_PIN(146, "GBE_LED_0_1"),
PINCTRL_PIN(147, "GBE_LED_1_0"),
PINCTRL_PIN(148, "GBE_LED_1_1"),
PINCTRL_PIN(149, "GBE_LED_2_0"),
PINCTRL_PIN(150, "GBE_LED_2_1"),
PINCTRL_PIN(151, "GBE_LED_3_0"),
PINCTRL_PIN(152, "GBE_LED_3_1"),
PINCTRL_PIN(153, "GBE_SCL_0"),
PINCTRL_PIN(154, "GBE_SDA_0"),
PINCTRL_PIN(155, "GBE_SCL_1"),
PINCTRL_PIN(156, "GBE_SDA_1"),
PINCTRL_PIN(157, "GBE_SCL_2"),
PINCTRL_PIN(158, "GBE_SDA_2"),
PINCTRL_PIN(159, "GBE_SCL_3"),
PINCTRL_PIN(160, "GBE_SDA_3"),
PINCTRL_PIN(161, "GBE_SDP_0_0"),
PINCTRL_PIN(162, "GBE_SDP_0_1"),
PINCTRL_PIN(163, "GBE_SDP_1_0"),
PINCTRL_PIN(164, "GBE_SDP_1_1"),
PINCTRL_PIN(165, "GBE_SDP_2_0"),
PINCTRL_PIN(166, "GBE_SDP_2_1"),
PINCTRL_PIN(167, "GBE_SDP_3_0"),
PINCTRL_PIN(168, "GBE_SDP_3_1"),
+PINCTRL_PIN(144, "GBE_LED_0_0"),
+PINCTRL_PIN(145, "GBE_LED_0_1"),
+PINCTRL_PIN(146, "GBE_LED_1_0"),
+PINCTRL_PIN(147, "GBE_LED_1_1"),
+PINCTRL_PIN(148, "GBE_LED_2_0"),
+PINCTRL_PIN(149, "GBE_LED_2_1"),
+PINCTRL_PIN(150, "GBE_LED_3_0"),
+PINCTRL_PIN(151, "GBE_LED_3_1"),
+PINCTRL_PIN(152, "GBE_SCL_0"),
+PINCTRL_PIN(153, "GBE_SDA_0"),
+PINCTRL_PIN(154, "GBE_SCL_1"),
+PINCTRL_PIN(155, "GBE_SDA_1"),
+PINCTRL_PIN(156, "GBE_SCL_2"),
+PINCTRL_PIN(157, "GBE_SDA_2"),
+PINCTRL_PIN(158, "GBE_SCL_3"),
+PINCTRL_PIN(159, "GBE_SDA_3"),
+PINCTRL_PIN(160, "GBE_SDP_0_0"),
+PINCTRL_PIN(161, "GBE_SDP_0_1"),
+PINCTRL_PIN(162, "GBE_SDP_1_0"),
+PINCTRL_PIN(163, "GBE_SDP_1_1"),
PINCTRL_PIN(164, "GBE_SDPI_2_0"),
PINCTRL_PIN(165, "GBE_SDPI_2_1"),
PINCTRL_PIN(166, "GBE_SDPI_3_0"),
PINCTRL_PIN(167, "GBE_SDPI_3_1"),
/* GPP_K */
-PINCTRL_PIN(169, "GBE_RMIICLK"),
-PINCTRL_PIN(170, "GBE_RMIITXD_0"),
-PINCTRL_PIN(171, "GBE_RMIITXD_1"),
-PINCTRL_PIN(168, "GBE_RMIICLK"),
+PINCTRL_PIN(169, "GBE_RMIIRXD_0"),
+PINCTRL_PIN(170, "GBE_RMIIRXD_1"),
+PINCTRL_PIN(171, "GBE_RMIICRS_DV"),
PINCTRL_PIN(172, "GBE_RMIITX_EN"),
-PINCTRL_PIN(173, "GBE_RMIICRS_DV"),
-PINCTRL_PIN(174, "GBE_RMIIRXD_0"),
-PINCTRL_PIN(175, "GBE_RMIIRXD_1"),
-PINCTRL_PIN(176, "GBE_RMIIRX_ER"),
-PINCTRL_PIN(177, "GBE_RMIIARBIN"),
-PINCTRL_PIN(178, "GBE_RMIIARBOU"),
-PINCTRL_PIN(179, "PE_RST_N"),
-PINCTRL_PIN(180, "GPIO_RCOMP_IP8_3P3"),
+PINCTRL_PIN(173, "GBE_RMIITXD_0"),
+PINCTRL_PIN(174, "GBE_RMIITXD_1"),
+PINCTRL_PIN(175, "GBE_RMIIRX_ER"),
+PINCTRL_PIN(176, "GBE_RMIIARBIN"),
+PINCTRL_PIN(177, "GBE_RMIIARBOU"),
+PINCTRL_PIN(178, "PE_RST_N"),
/* GPP_G */
-PINCTRL_PIN(181, "FAN_TACH_0"),
-PINCTRL_PIN(182, "FAN_TACH_1"),
-PINCTRL_PIN(183, "FAN_TACH_2"),
-PINCTRL_PIN(184, "FAN_TACH_3"),
-PINCTRL_PIN(185, "FAN_TACH_4"),
-PINCTRL_PIN(186, "FAN_TACH_5"),
-PINCTRL_PIN(187, "FAN_TACH_6"),
-PINCTRL_PIN(188, "FAN_TACH_7"),
-PINCTRL_PIN(189, "FAN_PWM_0"),
-PINCTRL_PIN(190, "FAN_PWM_1"),
-PINCTRL_PIN(191, "FAN_PWM_2"),
-PINCTRL_PIN(192, "FAN_PWM_3"),
-PINCTRL_PIN(193, "GSXDOU"),
-PINCTRL_PIN(194, "GSXSLOAD"),
-PINCTRL_PIN(195, "GSXDIN"),
-PINCTRL_PIN(196, "GSXSERESTB"),
-PINCTRL_PIN(197, "GSXCLK"),
-PINCTRL_PIN(198, "ADR_COMPLETE"),
-PINCTRL_PIN(199, "NMIB"),
-PINCTRL_PIN(200, "SMIB"),
-PINCTRL_PIN(201, "SSATA_DEVSLP_0"),
-PINCTRL_PIN(202, "SSATA_DEVSLP_1"),
-PINCTRL_PIN(203, "SSATA_DEVSLP_2"),
-PINCTRL_PIN(204, "SSATAXPCIE0_SSATAGP0"),
+PINCTRL_PIN(179, "FAN_TACH_0"),
+PINCTRL_PIN(180, "FAN_TACH_1"),
+PINCTRL_PIN(181, "FAN_TACH_2"),
+PINCTRL_PIN(182, "FAN_TACH_3"),
+PINCTRL_PIN(183, "FAN_TACH_4"),
+PINCTRL_PIN(184, "FAN_TACH_5"),
+PINCTRL_PIN(185, "FAN_TACH_6"),
+PINCTRL_PIN(186, "FAN_TACH_7"),
+PINCTRL_PIN(187, "FAN_PWM_0"),
+PINCTRL_PIN(188, "FAN_PWM_1"),
+PINCTRL_PIN(189, "FAN_PWM_2"),
+PINCTRL_PIN(190, "FAN_PWM_3"),
+PINCTRL_PIN(191, "GSXDOUT"),
+PINCTRL_PIN(192, "GSXSLOAD"),
+PINCTRL_PIN(193, "GSXDIN"),
+PINCTRL_PIN(194, "GSXSRESETB"),
+PINCTRL_PIN(195, "GSXCLK"),
+PINCTRL_PIN(196, "ADR_COMPLETE"),
+PINCTRL_PIN(197, "NMIB"),
+PINCTRL_PIN(198, "SMIB"),
+PINCTRL_PIN(199, "SSATA_DEVSLP_0"),
+PINCTRL_PIN(200, "SSATA_DEVSLP_1"),
+PINCTRL_PIN(201, "SSATA_DEVSLP_2"),
+PINCTRL_PIN(202, "SSATAXPCIE0_SSATAGP0"),
/* GPP_H */
-PINCTRL_PIN(205, "SRCCLKREQB_6"),
-PINCTRL_PIN(206, "SRCCLKREQB_7"),
-PINCTRL_PIN(207, "SRCCLKREQB_8"),
-PINCTRL_PIN(208, "SRCCLKREQB_9"),
-PINCTRL_PIN(209, "SRCCLKREQB_10"),
-PINCTRL_PIN(210, "SRCCLKREQB_11"),
-PINCTRL_PIN(211, "SRCCLKREQB_12"),
-PINCTRL_PIN(212, "SRCCLKREQB_13"),
-PINCTRL_PIN(213, "SRCCLKREQB_14"),
-PINCTRL_PIN(214, "SRCCLKREQB_15"),
+PINCTRL_PIN(215, "SML2CLK"),
+PINCTRL_PIN(216, "SML2DATA"),
+PINCTRL_PIN(217, "SML2ALERTB"),
+PINCTRL_PIN(218, "SML3CLK"),
+PINCTRL_PIN(219, "SML3DATA"),
+PINCTRL_PIN(220, "SML3ALERTB"),
+PINCTRL_PIN(221, "SML4CLK"),
+PINCTRL_PIN(222, "SML4DATA"),
+PINCTRL_PIN(223, "SML4ALERTB"),
-PINCTRL_PIN(224, "SSATAXPCIE1_SSATAGP1"),
-PINCTRL_PIN(225, "SSATAXPCIE2_SSATAGP2"),
-PINCTRL_PIN(226, "SSATAXPCIE3_SSATAGP3"),
-PINCTRL_PIN(227, "SSATAXPCIE4_SSATAGP4"),
-PINCTRL_PIN(228, "SSATAXPCIE5_SSATAGP5"),
+PINCTRL_PIN(203, "SRCCCLKREQB_6"),
+PINCTRL_PIN(204, "SRCCCLKREQB_7"),
+PINCTRL_PIN(205, "SRCCCLKREQB_8"),
+PINCTRL_PIN(206, "SRCCCLKREQB_9"),
+PINCTRL_PIN(207, "SRCCCLKREQB_10"),
+PINCTRL_PIN(208, "SRCCCLKREQB_11"),
+PINCTRL_PIN(209, "SRCCCLKREQB_12"),
+PINCTRL_PIN(210, "SRCCCLKREQB_13"),
+PINCTRL_PIN(211, "SRCCCLKREQB_14"),
+PINCTRL_PIN(212, "SRCCCLKREQB_15"),
+PINCTRL_PIN(213, "SML2CLK"),
+PINCTRL_PIN(214, "SML2DATA"),
+PINCTRL_PIN(215, "SML2ALERTB"),
+PINCTRL_PIN(216, "SML3CLK"),
+PINCTRL_PIN(217, "SML3DATA"),
+PINCTRL_PIN(218, "SML3ALERTB"),
+PINCTRL_PIN(219, "SML4CLK"),
+PINCTRL_PIN(220, "SML4DATA"),
+PINCTRL_PIN(221, "SML4ALERTB"),
+PINCTRL_PIN(222, "SSATAXPCIE1_SSATAGP1"),
+PINCTRL_PIN(223, "SSATAXPCIE2_SSATAGP2"),
+PINCTRL_PIN(224, "SSATAXPCIE3_SSATAGP3"),
+PINCTRL_PIN(225, "SSATAXPCIE4_SSATAGP4"),
+PINCTRL_PIN(226, "SSATAXPCIE5_SSATAGP5"),
/* GPP_L */
+PINCTRL_PIN(227, "GPP_L_0"),
+PINCTRL_PIN(228, "EC_CSME_INTR_OUT"),
PINCTRL_PIN(229, "VISA2CH0_D0"),
PINCTRL_PIN(230, "VISA2CH0_D1"),
PINCTRL_PIN(231, "VISA2CH0_D2"),
@@ -299,9 +300,9 @@
static const struct intel_community lbg_communities[] = {
  LBG_COMMUNITY(0, 0, 71),
  LBG_COMMUNITY(1, 72, 132),
  -LBG_COMMUNITY(3, 133, 144),
  -LBG_COMMUNITY(4, 145, 180),
  -LBG_COMMUNITY(5, 181, 246),
  +LBG_COMMUNITY(3, 133, 143),
  +LBG_COMMUNITY(4, 144, 178),
  +LBG_COMMUNITY(5, 179, 246),
};

static const struct intel_pinctrl_soc_data lbg_soc_data = {

mask |= BUFCFG_Px_EN_MASK | BUFCFG_PUPD_VAL_MASK;
bits |= BUFCFG_PU_EN;

/* Set default strength value in case none is given */
+if (arg == 1)
+arg = 20000;
+
switch (arg) {
  case 50000:
    bits |= BUFCFG_PUPD_VAL_50K << BUFCFG_PUPD_VAL_SHIFT;
    mask |= BUFCFG_Px_EN_MASK | BUFCFG_PUPD_VAL_MASK;
    bits |= BUFCFG_PD_EN;

/* Set default strength value in case none is given */
+if (arg == 1)
+arg = 20000;
+
switch (arg) {
  case 50000:
    bits |= BUFCFG_PUPD_VAL_50K << BUFCFG_PUPD_VAL_SHIFT;
    mask |= BUFCFG_Px_EN_MASK | BUFCFG_PUPD_VAL_MASK;
    bits |= BUFCFG_PD_EN;

static const unsigned int uart_tx_c_pins[] = { GPIOY_13 };
static const unsigned int uart_rx_c_pins[] = { GPIOY_14 };
static const unsigned int uart_cts_c_pins[] = { GPIOX_11 };
static const unsigned int uart_rts_c_pins[] = { GPIOX_12 };
static const unsigned int i2c_sck_a_pins[] = { GPIODV_25 };
static const unsigned int i2c_sda_a_pins[] = { GPIODV_24 };
GROUP(pwm_f_x,3,18),

/* Bank Y */
-GROUP(uart_cts_c,1,19),
-GROUP(uart_rts_c,1,18),
-GROUP(uart_tx_c,1,17),
-GROUP(uart_rx_c,1,16),
+GROUP(uart_cts_c,1,17),
+GROUP(uart_rts_c,1,16),
+GROUP(uart_tx_c,1,19),
+GROUP(uart_rx_c,1,18),
GROUP(pwm_a_y,1,21),
GROUP(pwm_f_y,1,20),
GROUP(i2s_out_ch23_y,1,5),
@@ -822,7 +822,7 @@
static struct meson_bank meson_gxbb_aobus_banks[] = {
    /* name first last irq pullen pull dir out */
    -BANK("AO", GPIOAO_0, GPIOAO_13, 0, 13, 0, 0, 0, 0, 0, 0, 0, 16, 1, 0),
    +BANK("AO", GPIOAO_0, GPIOAO_13, 0, 13, 0, 16, 0, 0, 0, 0, 0, 16, 1, 0),
};

static struct meson_pinctrl_data meson_gxbb_periphs_pinctrl_data = {
    --- linux-4.15.0.orig/drivers/pinctrl/meson/pinctrl-meson-gxl.c
    +++ linux-4.15.0/drivers/pinctrl/meson/pinctrl-meson-gxl.c
    @@ -153,8 +153,8 @@
    static const unsigned int sdio_d1_pins[] = { GPIOX_1 };
    static const unsigned int sdio_d2_pins[] = { GPIOX_2 };
    static const unsigned int sdio_d3_pins[] = { GPIOX_3 };
    -static const unsigned int sdio_cmd_pins[] = { GPIOX_4 };
    -static const unsigned int sdio_clk_pins[] = { GPIOX_5 };
    +static const unsigned int sdio_clk_pins[] = { GPIOX_4 };
    +static const unsigned int sdio_cmd_pins[] = { GPIOX_5 };
    static const unsigned int sdio_irq_pins[] = { GPIOX_7 };

    static const unsigned int nand_ce0_pins[] = { BOOT_8 };
    @@ -239,13 +239,9 @@
    static const unsigned int eth_act_led_pins[] = { GPIOZ_15 };

    static const unsigned int tsin_a_d0_pins[] = { GPIODV_0 };
    -static const unsigned int tsin_a_d0_x_pins[] = { GPIOX_10 };
    static const unsigned int tsin_a_clk_pins[] = { GPIODV_8 };
    -static const unsigned int tsin_a_clk_x_pins[] = { GPIOX_11 };
    static const unsigned int tsin_a_sop_pins[] = { GPIODV_9 };
    -static const unsigned int tsin_a_sop_x_pins[] = { GPIOX_8 };
    static const unsigned int tsin_a_d_valid_pins[] = { GPIODV_10 };
    -static const unsigned int tsin_a_d_valid_x_pins[] = { GPIOX_9 };
    static const unsigned int tsin_a_fail_pins[] = { GPIODV_11 };
    static const unsigned int tsin_a_dp_pins[] = {
        GPIODV_1, GPIODV_2, GPIODV_3, GPIODV_4, GPIODV_5, GPIODV_6, GPIODV_7,
    @@ -432,10 +428,6 @@
    GROUP(spi_miso,5,2),
    GROUP(spi_ss0,5,1),
    GROUP(spi_sclk,5,0),
    -GROUP(tsin_a_sop_x,6,3),
    -GROUP(tsin_a_d_valid_x,6,2),
    -GROUP(tsin_a_d0_x,6,1),
    -GROUP(tsin_a_clk_x,6,0),
static const char * const tsin_a_groups[] = {
    "tsin_a_clk", "tsin_a_clk_x", "tsin_a_sop", "tsin_a_sop_x",
    "tsin_a_d_valid", "tsin_a_d_valid_x", "tsin_a_d0", "tsin_a_d0_x",
    "tsin_a_dp", "tsin_a_fail",
};

static struct meson_bank gxl_aobus_banks[] = {
    /* name first last irq pullen pull dir out in */
    -BANK("AO", GPIOAO_0, GPIOAO_9, 0, 9, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0),
    +BANK("AO", GPIOAO_0, GPIOAO_9, 0, 9, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0),
};

static struct meson_pinctrl_data gxl_periph_pinctrl_data = {
    --- linux-4.15.0.orig/drivers/pinctrl/meson/pinctrl-meson.c
    +++ linux-4.15.0/drivers/pinctrl/meson/pinctrl-meson.c
    @@ -191,8 +191,9 @@
    case PIN_CONFIG_BIAS_DISABLE:
        dev_dbg(pc->dev, "pin %u: disable bias\n", pin);

        -meson_calc_reg_and_bit(bank, pin, REG_PULL, &reg, &bit);
        -ret = regmap_update_bits(pc->reg_pull, reg, &reg, &bit);
        +meson_calc_reg_and_bit(bank, pin, REG_PULLLEN, &reg, &bit);
        +ret = regmap_update_bits(pc->reg_pullen, reg, BIT(bit), 0);
    if (ret)
        return ret;
    --- linux-4.15.0.orig/drivers/pinctrl/meson/pinctrl-meson8.c
    +++ linux-4.15.0/drivers/pinctrl/meson/pinctrl-meson8.c
    @@ -797,7 +797,9 @@
        "BOOT_5", "BOOT_6", "BOOT_7", "BOOT_8", "BOOT_9",
        "BOOT_10", "BOOT_11", "BOOT_12", "BOOT_13", "BOOT_14",
        "BOOT_15", "BOOT_16", "BOOT_17", "BOOT_18",
    +};
    +static const char * const gpio_aobus_groups[] = {
        "GPIOAO_0", "GPIOAO_1", "GPIOAO_2", "GPIOAO_3",
        "GPIOAO_4", "GPIOAO_5", "GPIOAO_6", "GPIOAO_7",
"GPIOAO_8", "GPIOAO_9", "GPIOAO_10", "GPIOAO_11", @@ -1019,6 +1021,7 @@
 
 static struct meson_pmx_func meson8_aobus_functions[] = {
     +FUNCTION(gpio_aobus),
     FUNCTION(uart_ao),
     FUNCTION(remote),
     FUNCTION(i2c_slave_ao),
@@ -1042,7 +1045,7 @@
 
 static struct meson_bank meson8_aobus_banks[] = {
     /* name first last irq pullen pull dir out in */
-    BANK("AO",  GPIOAO_0, GPIO_TEST_N, 0, 13, 0, 0, 0, 0, 16, 0, 0, 16, 1, 0),
+    BANK("AO",  GPIOAO_0, GPIO_TEST_N, 0, 13, 0, 16, 0, 0, 0, 0, 16, 1, 0),
     
 static struct meson_pinctrl_data meson8_cbus_pinctrl_data = {
     --- linux-4.15.0.orig/drivers/pinctrl/meson/pinctrl-meson8b.c
+++ linux-4.15.0/drivers/pinctrl/meson/pinctrl-meson8b.c
@@ -346,6 +346,8 @@
     static const unsigned int eth_rx_clk_pins[]= { DIF_1_N };  
     static const unsigned int eth_txd0_1_pins[]= { DIF_2_P };  
     static const unsigned int eth_txd1_1_pins[]= { DIF_2_N };  
+    static const unsigned int eth_rxd3_pins[]= { DIF_2_P };  
+    static const unsigned int eth_rxd2_pins[]= { DIF_2_N };  
     static const unsigned int eth_tx_en_pins[]= { DIF_3_P };  
     static const unsigned int eth_ref_clk_pins[]= { DIF_3_N };  
     static const unsigned int eth_mdc_pins[]= { DIF_4_P };  
@@ -571,6 +573,18 @@
     GROUP(eth_ref_clk,6,8),
     GROUP(eth_mdc,6,9),
     GROUP(eth_mdio_en,6,10),
+    GROUP(eth_rxd3,7,22),
+    GROUP(eth_rxd2,7,23),
     
 static struct meson_pmx_group meson8b_aobus_groups[] = {
@@ -646,16 +650,18 @@
     "BOOT_10", "BOOT_11", "BOOT_12", "BOOT_13", "BOOT_14", 
     "BOOT_15", "BOOT_16", "BOOT_17", "BOOT_18", 
-    "GPIOAO_0", "GPIOAO_1", "GPIOAO_2", "GPIOAO_3", 
-    "GPIOAO_4", "GPIOAO_5", "GPIOAO_6", "GPIOAO_7", 
-    "GPIOAO_8", "GPIOAO_9", "GPIOAO_10", "GPIOAO_11", 
-    "GPIOAO_12", "GPIOAO_13", "GPIO_BSD_EN", "GPIO_TEST_N", 
     "DIF_0_P", "DIF_0_N", "DIF_1_P", "DIF_1_N", 

"DIF_2_P", "DIF_2_N", "DIF_3_P", "DIF_3_N",
"DIF_4_P", "DIF_4_N"
};

+static const char * const gpio_aobus_groups[] = {
+"GPIOAO_0", "GPIOAO_1", "GPIOAO_2", "GPIOAO_3",
+"GPIOAO_4", "GPIOAO_5", "GPIOAO_6", "GPIOAO_7",
+"GPIOAO_8", "GPIOAO_9", "GPIOAO_10", "GPIOAO_11",
+"GPIOAO_12", "GPIOAO_13", "GPIO_BSD_EN", "GPIO_TEST_N"
+};
+
+static const char * const sd_a_groups[] = {
+"sd_d0_a", "sd_d1_a", "sd_d2_a", "sd_d3_a", "sd_clk_a",
+"sd_cmd_a"
+
static const char * const sdxc_a_groups[] = {
+"sdxc_d0_0_a", "sdxc_d13_0_a", "sdxc_d47_a", "sdxc_clk_a",
+-"sdxc_cmd_a", "sdxc_d0_1_a", "sdxc_d0_13_1_a"
+"sdxc_cmd_a", "sdxc_d0_1_a", "sdxc_d13_1_a"
};

static const char * const pcm_a_groups[] = {
+static const char * const i2c_a_groups[] = {
+static struct meson_pmx_func meson8b_aobus_functions[] = {
+FUNCTION(gpio_aobus),
+FUNCTION(uart_ao),
+FUNCTION(uart_ao_b),
+FUNCTION(i2c_slave_ao),
+ static struct meson_bank meson8b_aobus_banks[] = {
+ /* name first lastc irq pullen pull dir out in */
+-BANK("AO", GPIOAO_0, GPIO_TEST_N, 0, 13, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0),
+ BANK("AO", GPIOAO_0, GPIO_TEST_N, 0, 13, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0),
+};
static struct meson_pinctrl_data meson8b_cbus_pinctrl_data = {
--- linux-4.15.0.orig/drivers/pinctrl/mvebu/pinctrl-armada-37xx.c
+++ linux-4.15.0/drivers/pinctrl/mvebu/pinctrl-armada-37xx.c
@@ -170,10 +170,10 @@
  PIN_GRP_EXTRA("uart2", 9, 2, BIT(1) | BIT(13) | BIT(14) | BIT(19),
                  BIT(1) | BIT(13) | BIT(14), BIT(1) | BIT(19),
                  18, 2, "gpio", "uart"),
-  PIN_GRP_GPIO("led0_od", 11, 1, BIT(20), "led"),
-  PIN_GRP_GPIO("led1_od", 12, 1, BIT(21), "led"),
-  PIN_GRP_GPIO("led2_od", 13, 1, BIT(22), "led"),
-  PIN_GRP_GPIO("led3_od", 14, 1, BIT(23), "led"),
+  PIN_GRP_GPIO_2("led0_od", 11, 1, BIT(20), BIT(20), 0, "led"),
+  PIN_GRP_GPIO_2("led1_od", 12, 1, BIT(21), BIT(21), 0, "led"),
+  PIN_GRP_GPIO_2("led2_od", 13, 1, BIT(22), BIT(22), 0, "led"),
+  PIN_GRP_GPIO_2("led3_od", 14, 1, BIT(23), BIT(23), 0, "led"),
};
@@ -205,11 +205,11 @@
};

static inline void armada_37xx_update_reg(unsigned int *reg,
  - unsigned int offset)
  + unsigned int *offset)
  {
      /* We never have more than 2 registers */
      -if (offset >= GPIO_PER_REG) {
      +if (*offset >= GPIO_PER_REG) {
          -offset -= GPIO_PER_REG;
          +*offset -= GPIO_PER_REG;
          *reg += sizeof(u32);
      }
      }
@@ -373,7 +373,7 @@
      int offset = irqd_to_hwirq(d);

      -armada_37xx_update_reg(reg, offset);
      +armada_37xx_update_reg(reg, &offset);
  }

  static int armada_37xx_gpio_direction_input(struct gpio_chip *chip,
    @ @ -383,7 +383,7 @@
    unsigned int reg = OUTPUT_EN;
    unsigned int mask;

      -armada_37xx_update_reg(&reg, offset);
      +armada_37xx_update_reg(&reg, &offset);


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mask = BIT(offset);

return regmap_update_bits(info->regmap, reg, mask, 0);
@@ -396,7 +396,7 @@
unsigned int reg = OUTPUT_EN;
unsigned int val, mask;

-armada_37xx_update_reg(&reg, offset);
+armada_37xx_update_reg(&reg, &offset);
mask = BIT(offset);
regmap_read(info->regmap, reg, &val);

@@ -410,7 +410,7 @@
unsigned int reg = OUTPUT_EN;
unsigned int mask, val, ret;

-armada_37xx_update_reg(&reg, offset);
+armada_37xx_update_reg(&reg, &offset);
mask = BIT(offset);

ret = regmap_update_bits(info->regmap, reg, mask, mask);
@@ -431,7 +431,7 @@
unsigned int reg = INPUT_VAL;
unsigned int val, mask;

-armada_37xx_update_reg(&reg, offset);
+armada_37xx_update_reg(&reg, &offset);
mask = BIT(offset);

regmap_read(info->regmap, &reg, &val);
@@ -446,7 +446,7 @@
unsigned int reg = OUTPUT_VAL;
unsigned int mask, val;

-armada_37xx_update_reg(&reg, offset);
+armada_37xx_update_reg(&reg, &offset);
mask = BIT(offset);
val = value ? mask : 0;

@@ -592,10 +592,10 @@
regmap_read(info->regmap, in_reg, &in_val);
/* Set initial polarity based on current input level. */
-if (in_val & d->mask)
-  val |= d->mask;/* falling */
+if (in_val & BIT(d->hwirq % GPIO_PER_REG))
+  val |= BIT(d->hwirq % GPIO_PER_REG);/* falling */
else
- val &= ~d->mask; /* rising */
+ val &= ~(BIT(d->hwirq % GPIO_PER_REG)); /* rising */
break;
}
}
default:
@@ -679,12 +679,13 @@
 writel(1 << hwirq,
     info->base +
     IRQ_STATUS + 4 * i);
-continue;
+goto update_status;
}
}
generic_handle_irq(virq);

+update_status:
+/* Update status in case a new IRQ appears */
spin_lock_irqsave(&info->irq_lock, flags);
status = readl_relaxed(info->base +
--- linux-4.15.0.orig/drivers/pinctrl/mvebu/pinctrl-armada-xp.c
+++ linux-4.15.0/drivers/pinctrl/mvebu/pinctrl-armada-xp.c
@@ -418,7 +418,7 @@
 MPP_VAR_FUNCTION(0x1, "i2c0", "sck",        V_98DX3236_PLUS)),
 MPP_VAR_FUNCTION(0x0, "gpio", NULL,         V_98DX3236_PLUS),
-MPP_VAR_FUNCTION(0x4, "i2c0", "sda",        V_98DX3236_PLUS)),
+MPP_VAR_FUNCTION(0x1, "i2c0", "sda",        V_98DX3236_PLUS)),
 MPP_MODE(16,
 MPP_VAR_FUNCTION(0x0, "gpo", NULL,          V_98DX3236_PLUS),
MPP_VAR_FUNCTION(0x4, "dev", "oe",          V_98DX3236_PLUS)),
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-amd.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-amd.c
@@ -144,7 +144,7 @@
 pin_reg |= BIT(DB_TMR_OUT_UNIT_OFF);
 pin_reg &= ~BIT(DB_TMR_LARGE_OFF);
 } else if (debounce < 250000) {
-    -time = debounce / 15600;
+    +time = debounce / 15625;
    pin_reg |= time & DB_TMR_OUT_MASK;
    pin_reg &= ~BIT(DB_TMR_OUT_UNIT_OFF);
    pin_reg |= BIT(DB_TMR_LARGE_OFF);
    @ @ -144,7 +144,7 @@
    pin_reg &= ~DB_CNTRl_MASK;
+    +pin_reg &= ~(DB_CNTRl_MASK << DB_CNTRL_OFF);
ret = -EINVAL;
}
} else {
    pin_reg &= ~BIT(DB_TMR_OUT_UNIT_OFF);
    pin_reg &= ~BIT(DB_TMR_LARGE_OFF);
    pin_reg &= ~DB_TMR_OUT_MASK;
    pin_reg &= ~DB_CNTRL_MASK;
    pin_reg &= ~(DB_CNTR1_MASK << DB_CNTRL_OFF);
}
writel(pin_reg, gpio_dev->base + offset * 4);
raw_spin_unlock_irqrestore(&gpio_dev->lock, flags);
@@ -426,7 +426,6 @@
    pin_reg &= ~BIT(LEVEL_TRIG_OFF);
    pin_reg &= ~(ACTIVE_LEVEL_MASK << ACTIVE_LEVEL_OFF);
    pin_reg |= ACTIVE_HIGH << ACTIVE_LEVEL_OFF;
-    pin_reg |= DB_TYPE_REMOVE_GLITCH << DB_CNTRL_OFF;
    irq_set_handler_locked(d, handle_edge_irq);
    break;
@@ -434,7 +433,6 @@
    pin_reg &= ~BIT(LEVEL_TRIG_OFF);
    pin_reg &= ~(ACTIVE_LEVEL_MASK << ACTIVE_LEVEL_OFF);
    pin_reg |= ACTIVE_LOW << ACTIVE_LEVEL_OFF;
-    pin_reg |= DB_TYPE_REMOVE_GLITCH << DB_CNTRL_OFF;
    irq_set_handler_locked(d, handle_edge_irq);
    break;
@@ -442,7 +440,6 @@
    pin_reg &= ~BIT(LEVEL_TRIG_OFF);
    pin_reg &= ~(ACTIVE_LEVEL_MASK << ACTIVE_LEVEL_OFF);
    pin_reg |= BOTH_EARDE << ACTIVE_LEVEL_OFF;
-    pin_reg |= DB_TYPE_REMOVE_GLITCH << DB_CNTRL_OFF;
    irq_set_handler_locked(d, handle_edge_irq);
    break;
@@ -450,8 +447,6 @@
    pin_reg |= LEVEL_TRIGGER << LEVEL_TRIG_OFF;
    pin_reg &= ~(ACTIVE_LEVEL_MASK << ACTIVE_LEVEL_OFF);
    pin_reg |= ACTIVE_HIGH << ACTIVE_LEVEL_OFF;
-    pin_reg &= ~(DB_CNTR1_MASK << DB_CNTRL_OFF);
-    pin_reg |= DB_TYPE_PRESERVE_LOW_GLITCH << DB_CNTRL_OFF;
    irq_set_handler_locked(d, handle_level_irq);
    break;
@@ -459,8 +454,6 @@
    pin_reg |= LEVEL_TRIGGER << LEVEL_TRIG_OFF;
    pin_reg &= ~(ACTIVE_LEVEL_MASK << ACTIVE_LEVEL_OFF);
    pin_reg |= ACTIVE_LOW << ACTIVE_LEVEL_OFF;

-pin_reg &= ~(DB_CNTRL_MASK << DB_CNTRL_OFF);
-pin_reg |= DB_TYPE_PRESERVE_HIGH_GLITCH << DB_CNTRL_OFF;
irq_set_handler_locked(d, handle_level_irq);
break;

@@ -509,7 +502,7 @@
irqreturn_t ret = IRQ_NONE;
unsigned int i, irqnr;
unsigned long flags;
-u32 *regs, regval;
-u32 __iomem *regs;
+u32 *regs, regval;
+u32 __iomem *regs;
u64 status, mask;

/*! Read the wake status */
@@ -530,18 +524,20 @@
/* Each status bit covers four pins */
for (i = 0; i < 4; i++) {
    regval = readl(regs + i);
-  if (!(regval & PIN_IRQ_PENDING))
-    continue;
-  irq = irq_find_mapping(gc->irq.domain, irqnr + i);
-  generic_handle_irq(irq);
-  if (irq != 0)
-    generic_handle_irq(irq);
+  irq = irq_find_mapping(gc->irq.domain, irqnr + i);
+  generic_handle_irq(irq);
+  if (irq != 0)
+    generic_handle_irq(irq);
+
/*! Clear interrupt.
  * We must read the pin register again, in case the
  * value was changed while executing
  * generic_handle_irq() above.
  * If we didn't find a mapping for the interrupt,
  * disable it in order to avoid a system hang caused
  * by an interrupt storm.
  */
  raw_spin_lock_irqsave(&gpio_dev->lock, flags);
  regval = readl(regs + i);
  +regval &= ~BIT(INTERRUPT_ENABLE_OFF);
  +dev_dbg(&gpio_dev->pdev->dev,
    +"Disabling spurious GPIO IRQ %d\n",
    +irqnr + i);
  }
  writel(regval, regs + i);
  raw_spin_unlock_irqrestore(&gpio_dev->lock, flags);
  ret = IRQ_HANDLED;
@@ -925,6 +930,7 @@
static const struct acpi_device_id amd_gpio_acpi_match[] = {
    { "AMD0030", 0 },
    { "AMDI0030", 0 },
    { "AMDI0031", 0 },
    { },
};
MODULE_DEVICE_TABLE(acpi, amd_gpio_acpi_match);
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-amd.h
+++ linux-4.15.0/drivers/pinctrl/pinctrl-amd.h
@@ -252,7 +252,7 @@
{
    .name = "uart0",
    .pins = uart0_pins,
-    .npins = 9,
+    .npins = 5,
    },
    { 
    .name = "uart1",
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-at91-pio4.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-at91-pio4.c
@@ -483,7 -483,6 @@
unsigned num_pins, num_configs, reserve;
unsigned long *configs;
struct property *pins;
-bool has_config;
u32 pinfunc;
int ret, i;
@@ -499,9 -499,6 @@
return ret;
}
-if (num_configs)
-    has_config = true;
-
num_pins = pins->length / sizeof(u32);
if (!num_pins) {
    dev_err(pctldev->dev, "no pins found in node %pOFn", np);
    @ @ -514,7 +510,7 @@
    * map for each pin.
    */
    reserve = 1;
    -if (has_config && num_pins >= 1)
+if (num_configs)
        reserve++;
    reserve *= num_pins;
    ret = pinctrl_utils_reserve_map(pctldev, map, reserved_maps, num_maps,
    @ @ -537,7 +533,7 @@
pinctrl_utils_add_map_mux(pctldev, map, reserved_maps, num_maps, group, func);

- if (has_config) {
+ if (num_configs) {
    ret = pinctrl_utils_add_map_configs(pctldev, map, reserved_maps, num_maps, group, configs, num_configs,
    for_each_child_of_node(np_config, np) {
        ret = atmel_pctl_dt_subnode_to_map(pctldev, np, map, &reserved_maps, num_maps);
        - if (ret < 0)
        + if (ret < 0) {
            + of_node_put(np);
            break;
        +}
    }
}

--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-at91.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-at91.c
@@ -576,8 +572,10 @@
for_each_child_of_node(np_config, np) {
    ret = atmel_pctl_dt_subnode_to_map(pctldev, np, map, &reserved_maps, num_maps);
- if (ret < 0)
- if (ret < 0) {
- of_node_put(np);
- break;
- +}
- }
-
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-at91.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-at91.c
@@ -1566,16 +1566,6 @@
#define gpio_irq_set_wake NULL
#endif /* CONFIG_PM */

-static struct irq_chip gpio_irqchip = {
- .name = "GPIO",
- .irq_ack = gpio_irq_ack,
- .irq_disable = gpio_irq_mask,
- .irq_mask = gpio_irq_mask,
- .irq_unmask = gpio_irq_unmask,
- /* .irq_set_type is set dynamically */
- .irq_set_wake = gpio_irq_set_wake,
- };
-
-static void gpio_irq_handler(struct irq_desc *desc) {
- struct irq_chip *chip = irq_desc_get_chip(desc);
- struct gpio_chip *gpiochip_prev = NULL;
- struct at91_gpio_chip *prev = NULL;
- struct irq_data *d = irq_get_irq_data(at91_gpio->pio_c_virq);
+ struct gpiochip *gpio_irqchip;
+ int ret, i;
+
+ gpio_irqchip = devm_kzalloc(&pdev->dev, sizeof(*gpio_irqchip), GFP_KERNEL);
+ if (!gpio_irqchip)
return -ENOMEM;

at91_gpio->pioc_hwirq = irqd_to_hwirq(d);

/* Setup proper .irq_set_type function */
gpio_irqchip.irq_set_type = at91_gpio->ops->irq_type;
gpio_irqchip->name = "GPIO";
gpio_irqchip->irq_ack = gpio_irq_ack;
gpio_irqchip->irq_disable = gpio_irq_mask;
gpio_irqchip->irq_mask = gpio_irq_mask;
gpio_irqchip->irq_unmask = gpio_irq_unmask;
gpio_irqchip->irq_set_wake = gpio_irq_set_wake,
gpio_irqchip->irq_set_type = at91_gpio->ops->irq_type;

/* Disable irqs of this PIO controller */
writel_relaxed(~0, at91_gpio->regbase + PIO_IDR);
ret = gpiochip_irqchip_add(&at91_gpio->chip,
 &gpio_irqchip,
   handle_edge_irq,
   handle_edge_irq);

/* load and remap the pad resources of the different banks */
for_each_compatible_node(np, NULL, "lantiq,pad-falcon") {
  struct platform_device *ppdev = of_find_device_by_node(np);
  const __be32 *bank = of_get_property(np, "lantiq,bank", NULL);
  struct resource res;
  u32 avail;
  int pins;

  if (!of_device_is_available(np))
"
continue;

- if (!ppdev) {
- dev_err(&pdev->dev, "failed to find pad pdev\n");
- continue;
- }

if (!bank || *bank >= PORTS)
continue;
if (of_address_to_resource(np, 0, &res))
continue;
+
+ ppdev = of_find_device_by_node(np);
+ if (!ppdev) {
+ dev_err(&pdev->dev, "failed to find pad pdev\n");
+ continue;
+
+ falcon_info.clk[*bank] = clk_get(&ppdev->dev, NULL);
+ put_device(&ppdev->dev);
if (IS_ERR(falcon_info.clk[*bank])) {
  dev_err(&pdev->dev, "failed to get clock\n");
return PTR_ERR(falcon_info.clk[*bank]);
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-gemini.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-gemini.c
@@ -586,13 +586,16 @@
319, /* TVC_DATA[1] */
301, /* TVC_DATA[2] */
283, /* TVC_DATA[3] */
-265, /* TVC_CLK */
320, /* TVC_DATA[4] */
302, /* TVC_DATA[5] */
284, /* TVC_DATA[6] */
266, /* TVC_DATA[7] */
};

+static const unsigned int tvc_clk_3512_pins[] = {
+ 265, /* TVC_CLK */
+};
+
+ /* NAND flash pins */
static const unsigned int nflash_3512_pins[] = {
199, 200, 201, 202, 216, 217, 218, 219, 220, 234, 235, 236, 237, 252,
@@ -624,7 +627,7 @@
/* Serial flash pins CE0, CE1, DI, DO, CK */
static const unsigned int sflash_3512_pins[] = {
 230, 231, 232, 233, 211 };

-/* The GPIO00A (0) pin overlap with TVC and extended parallel flash */
+/* The GPIO00A (0) pin overlap with TVC CLK and extended parallel flash */
static const unsigned int gpio0a_3512_pins[] = {265};

/* The GPIO0B (1-4) pins overlap with TVC and ICE */
@ @ -814.7 +817.13 @@
.num_pins = ARRAY_SIZE(tvc_3512_pins),
/* Conflict with character LCD and ICE */
.msk = LCD_PADS_ENABLE,
- .value = TVC_PADS_ENABLE | TVC_CLK_PAD_ENABLE,
+ .value = TVC_PADS_ENABLE,
+ },
+
+.name = "tvcclkgrp",
+.pins = tvc_clk_3512_pins,
+.num_pins = ARRAY_SIZE(tvc_clk_3512_pins),
+.value = TVC_CLK_PAD_ENABLE,
},
/*
* The construction is done such that it is possible to use a serial
@ @ -851.8 +860.8 @@
 .name = "gpio0agrp",
 .pins = gpio0a_3512_pins,
 .num_pins = ARRAY_SIZE(gpio0a_3512_pins),
- /* Conflict with TVC */
- .mask = TVC_PADS_ENABLE,
+ /* Conflict with TVC CLK */
+ .mask = TVC_CLK_PAD_ENABLE,
+ },
{
 .name = "gpio0bgrp",
 @ @ -1522.13 +1531.16 @@
 311, /* TVC_DATA[1] */
 394, /* TVC_DATA[2] */
 374, /* TVC_DATA[3] */
 -333, /* TVC_CLK */
 354, /* TVC_DATA[4] */
 395, /* TVC_DATA[5] */
 312, /* TVC_DATA[6] */
 334, /* TVC_DATA[7] */
};

+static const unsigned int tvc_clk_3516_pins[] = {
+333, /* TVC_CLK */
+};
+
/* NAND flash pins */
static const unsigned int nflash_3516_pins[] = {
243, 260, 261, 224, 280, 262, 281, 264, 300, 263, 282, 301, 320, 283,
@ @ -1561.7 +1573.7 @@
static const unsigned int sflash_3516_pins[] = { 296, 338, 295, 359, 339 };

/* The GPIO0A (0-4) pins overlap with TVC and extended parallel flash */
static const unsigned int gpio0a_3516_pins[] = { 333, 354, 395, 312, 334 };
+static const unsigned int gpio0a_3516_pins[] = { 354, 395, 312, 334 };

/* The GPIO0B (5-7) pins overlap with ICE */
static const unsigned int gpio0b_3516_pins[] = { 375, 396, 376 };
@@ -1593,6 +1605,9 @@
/* The GPIO0K (30,31) pins overlap with NAND flash */
static const unsigned int gpio0k_3516_pins[] = { 275, 298 };
+
+/* The GPIO0L (0) pins overlap with TVC_CLK */
+static const unsigned int gpio0l_3516_pins[] = { 333 };
+
/* The GPIO1A (0-4) pins that overlap with IDE and parallel flash */
static const unsigned int gpio1a_3516_pins[] = { 221, 200, 222, 201, 220 };

@@ -1746,7 +1761,13 @@
    .num_pins = ARRAY_SIZE(tvc_3516_pins),
/* Conflict with character LCD */
    .mask = LCD_PADS_ENABLE,
-    .value = TVC_PADS_ENABLE | TVC_CLK_PAD_ENABLE,
+    .value = TVC_PADS_ENABLE,
+    {, 
+      .name = "tvcclkgrp",
+      .pins = tvc_clk_3516_pins,
+      .num_pins = ARRAY_SIZE(tvc_clk_3516_pins),
+      .value = TVC_CLK_PAD_ENABLE,
+    },
+    {, 
    /* The construction is done such that it is possible to use a serial
    @ @ -1858,6 +1879,13 @@
    .value = PFLASH_PADS_DISABLE | NAND_PADS_DISABLE,
    },
    {, 
+    .name = "gpio0lgrp",
+    .pins = gpio0l_3516_pins,
+    .num_pins = ARRAY_SIZE(gpio0l_3516_pins),
+    },
+    {, 
+      .name = "gpio1agrp",
+      .pins = gpio1a_3516_pins,
+      .num_pins = ARRAY_SIZE(gpio1a_3516_pins),
+    },
    {, 
      .name = "tvcclkgrp",
      .pins = tvc_clk_3516_pins,
      .num_pins = ARRAY_SIZE(tvc_clk_3516_pins),
      .value = TVC_CLK_PAD_ENABLE,
    },
+    {, 
    /* The construction is done such that it is possible to use a serial
    @ @ -2168,7 +2196,8 @@

func->name, grp->name);

regmap_read(pmx->map, GLOBAL_MISC_CTRL, &before);
-regmap_update_bits(pmx->map, GLOBAL_MISC_CTRL, grp->mask,
+regmap_update_bits(pmx->map, GLOBAL_MISC_CTRL,
  + grp->mask | grp->value,
  + grp->value);
regmap_read(pmx->map, GLOBAL_MISC_CTRL, &after);

--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-ingenic.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-ingenic.c
@@ -536,7 +536,7 @@
ingenic_config_pin(jzpc, pin, JZ4770_GPIO_PAT1, input);
 } else {
 ingenic_config_pin(jzpc, pin, JZ4740_GPIO_SELECT, false);
-ingenic_config_pin(jzpc, pin, JZ4740_GPIO_DIR, input);
+ingenic_config_pin(jzpc, pin, JZ4740_GPIO_DIR, !input);
 ingenic_config_pin(jzpc, pin, JZ4740_GPIO_FUNC, false);
 }

@@ -642,7 +642,8 @@
 break;

default:
-unreachable();
+/* unreachable */
+break;
+}
+
@@ -849,4 +850,4 @@
 }
 return platform_driver_register(&ingenic_pinctrl_driver);
 }
-subsys_inicall(ingenic_pinctrl_drv_register);
+subsys_inicall(ingenic_pinctrl_drv_register);
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-lpc18xx.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-lpc18xx.c
@@ -630,14 +630,8 @@
 LPC18XX_PIN(i2c0_sda, PIN_I2C0_SDA),
 }

-/* enum lpc18xx_pin_config_param - possible pin configuration parameters
- * @PIN_CONFIG_GPIO_PIN_INT: route gpio to the gpio pin interrupt
- * controller.
- */

-enum lpc18xx_pin_config_param {
-PIN_CONFIG_GPIO_PIN_INT = PIN_CONFIG_END + 1,
-};
+/* PIN_CONFIG_GPIO_PIN_INT: route gpio to the gpio pin interrupt controller */
+#define PIN_CONFIG_GPIO_PIN_INT(PIN_CONFIG_END + 1)

static const struct pinconf_generic_params lpc18xx_params[] = {
  /*"nxp,gpio-pin-interrupt", PIN_CONFIG_GPIO_PIN_INT, 0},
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-max77620.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-max77620.c
@@ -34,14 +34,12 @@
-MAX77620_PIN_PP_DRV,
-enum max77620_pinconf_param {
-MAX77620_ACTIVE_FPS_SOURCE = PIN_CONFIG_END + 1,
-MAX77620_ACTIVE_FPS_POWER_ON_SLOTS,
-MAX77620_ACTIVE_FPS_POWER_DOWN_SLOTS,
-MAX77620_SUSPEND_FPS_SOURCE,
-MAX77620_SUSPEND_FPS_POWER_ON_SLOTS,
-MAX77620_SUSPEND_FPS_POWER_DOWN_SLOTS,
-};
+#define MAX77620_ACTIVE_FPS_SOURCE(PIN_CONFIG_END + 1)
+#define MAX77620_ACTIVE_FPS_POWER_ON_SLOTS(PIN_CONFIG_END + 2)
+#define MAX77620_ACTIVE_FPS_POWER_DOWN_SLOTS(PIN_CONFIG_END + 3)
+#define MAX77620_SUSPEND_FPS_SOURCE(PIN_CONFIG_END + 4)
+#define MAX77620_SUSPEND_FPS_POWER_ON_SLOTS(PIN_CONFIG_END + 5)
+#define MAX77620_SUSPEND_FPS_POWER_DOWN_SLOTS(PIN_CONFIG_END + 6)

struct max77620_pin_function {
  const char *name;
-};
+static const struct reg_default mcp23x17_defaults[] = {
      {.reg = MCP_IODIR << 1, .def = 0xffff},
      {.reg = MCP_IPOL << 1, .def = 0x0000},
      {.reg = MCP_GPINTEN << 1, .def = 0x0000},
-      {.reg = MCP_OLAT << 1,
+      {.reg = MCP_OLAT << 1, .def = 0x0000},
          @ -131.23 +131.23 @@
      ];
-};
+static const struct regmap_range mcp23x17_volatile_range = {
      .range_min = MCP_INTF << 1,
.range_max = MCP_GPIO << 1,
];

-static const struct regmap_access_table mcp23x16_volatile_table = {
	.yes_ranges = &mcp23x16_volatile_range,
};
+static const struct regmap_access_table mcp23x17_volatile_table = {
	.yes_ranges = &mcp23x17_volatile_range,
	.n_yes_ranges = 1,
};

-static const struct regmap_range mcp23x16_precious_range = {
	.range_min = MCP_GPIO << 1,
};
+static const struct regmap_range mcp23x17_precious_range = {
	.range_min = MCP_INTCAP << 1,
	.range_max = MCP_GPIO << 1,
};

-static const struct regmap_access_table mcp23x16_precious_table = {
	.yes_ranges = &mcp23x16_precious_range,
};
+static const struct regmap_access_table mcp23x17_precious_table = {
	.yes_ranges = &mcp23x17_precious_range,
	.n_yes_ranges = 1,
};

@@ -157,10 +157,10 @@
.reg_stride = 2,
.max_register = MCP_OLAT << 1,
-.volatile_table = &mcp23x16_volatile_table,
-.precious_table = &mcp23x16_precious_table,
-.reg_defaults = mcp23x16_defaults,
-.num_reg_defaults = ARRAY_SIZE(mcp23x16_defaults),
+.volatile_table = &mcp23x17_volatile_table,
+.precious_table = &mcp23x17_precious_table,
+.reg_defaults = mcp23x17_defaults,
+.num_reg_defaults = ARRAY_SIZE(mcp23x17_defaults),
cache_type = REGCACHE_FLAT,
.val_format_endian = REGMAP_ENDIAN_LITTLE,
};
@@ -641,6 +641,14 @@
return err;
}

+return 0;
+
+static int mcp23s08_irqchip_setup(struct mcp23s08 *mcp)
+{

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struct gpio_chip *chip = &mcp->chip;
int err;

err = gpiochip_irqchip_add_nested(chip,
    &mcp23s08_irq_chip,
    0,
    @ @ -777,6 +785,7 @@
{}  
int status, ret;
bool mirror = false;

mutex_init(&mcp->lock);

switch (type) {
#ifdef CONFIG_SPI_MASTER
    case MCP_TYPE_S08:
        mcp->regmap = devm_regmap_init(dev, &mcp23s08xx_spi_regmap, mcp,
                &mcp23x08_regmap);
        mcp->reg_shift = 0;
        mcp->chip.ngpio = 8;
        mcp->chip.label = "mcp23s08";
        break;
    case MCP_TYPE_S17:
        mcp->reg_shift = 1;
        mcp->chip.ngpio = 16;
        mcp->chip.label = "mcp23s17";
        break;
    #if 
    +case MCP_TYPE_S08:
    +one_regmap_config =
    +devm_kmemdup(dev, &mcp23x08_regmap,
    +sizeof(struct regmap_config), GFP_KERNEL);
    +mcp->reg_shift = 0;
    +mcp->chip.ngpio = 8;
    +mcp->chip.label = "mcp23s08";
    +break;
    +case MCP_TYPE_S17:
    +one_regmap_config =
    +devm_kmemdup(dev, &mcp23x17_regmap,
    +sizeof(struct regmap_config), GFP_KERNEL);
    +mcp->reg_shift = 1;
    +mcp->chip.ngpio = 16;
    +mcp->chip.label = "mcp23s17";
    +break;
    +}
    +#if (!one_regmap_config)
    +return -ENOMEM;
    +
    +one_regmap_config->name = devm_kasprintf(dev, GFP_KERNEL, "%d", (addr & ~0x40) >> 1);
}
mcp->regmap = devm_regmap_init(dev, &mcp23sxx_spi_regmap, mcp,
- &mcp23x17_regmap);
-mcp->reg_shift = 1;
-mcp->chip.ngpio = 16;
-mcp->chip.label = "mcp23s17";
+ one_regmap_config);
break;

case MCP_TYPE_S18:
+one_regmap_config =
+devm_kmemdup(dev, &mcp23x17_regmap,
+sizeof(struct regmap_config), GFP_KERNEL);
+if (!one_regmap_config)
+return -ENOMEM;
 mcp->regmap = devm_regmap_init(dev, &mcp23sxx_spi_regmap, mcp,
- &mcp23x17_regmap);
+ one_regmap_config);
 mcp->reg_shift = 1;
 mcp->chip.ngpio = 16;
 mcp->chip.label = "mcp23s18";
@@ -865,6 +891,10 @@
 if (ret < 0)
 goto fail;

+ret = devm_gpiochip_add_data(dev, &mcp->chip, mcp);
+if (ret < 0)
+goto fail;
+ mcp->irq_controller =
 device_property_read_bool(dev, "interrupt-controller");
 if (mcp->irq && mcp->irq_controller) {
@@ -896,12 +926,8 @@
 goto fail;
 }

 -ret = devm_gpiochip_add_data(dev, &mcp->chip, mcp);
 -if (ret < 0)
 -goto fail;
 - if (mcp->irq && mcp->irq_controller) {
 -ret = mcp23s08_irq_setup(mcp);
 +ret = mcp23s08_irqchip_setup(mcp);
 if (ret)
 goto fail;
 }
@@ -922,6 +948,9 @@
 goto fail;
 }


+if (mcp->irq)
+ret = mcp23s08_irq_setup(mcp);
+
+fail:
+if (ret < 0)
+dev_dbg(dev, "can't setup chip %d, --> %d\n", addr, ret);

--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-pistachio.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-pistachio.c
@@ -1368,6 +1368,7 @@
if (!of_find_property(child, "gpio-controller", NULL)) {
    dev_err(pctl->dev, "No gpio-controller property for bank %u\n", i);
    +of_node_put(child);
    ret = -ENODEV;
    goto err;

@@ -1375,6 +1376,7 @@
    interrupt = irq_of_parse_and_map(child, 0);
    if (interrupt < 0) {
        dev_err(pctl->dev, "No IRQ for bank %u: %d\n", i, interrupt);
        +of_node_put(child);
        ret = interrupt;
        goto err;
    }

--- linux-4.15.0.orig drivers/pinctrl/pinctrl-rockchip.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-rockchip.c
@@ -506,8 +506,7 @@
}
    map_num += grp->npins;
    +new_map = devm_kzalloc(pctldev->dev, sizeof(*new_map) * map_num, GFP_KERNEL);
    +new_map = kcalloc(map_num, sizeof(*new_map), GFP_KERNEL);
    if (!new_map)
        return -ENOMEM;

@@ -517,7 +516,7 @@
    /* create mux map */
    parent = of_get_parent(np);
    if (!parent) {
        -devm_kfree(pctldev->dev, new_map);
        +kfree(new_map);
        return -EINVAL;
    }

new_map[0].type = PIN_MAP_TYPE_MUX_GROUP;
@@ -544,6 +543,7 @@
static void rockchip_dt_free_map(struct pinctrl_dev *pctldev,

/*
struct pinctrl_map *map, unsigned num_maps)
{
+kfree(map);
}

static const struct pinctrl_ops rockchip_pctrl_ops = {
@@ -2014,8 +2014,16 @@
    struct rockchip_pin_bank *bank = gpiochip_get_data(chip);
    u32 data;
    +int ret;
    
    +ret = clk_enable(bank->clk);
    +if (ret < 0) {
    +dev_err(bank->drvdata->dev,
    +"failed to enable clock for bank %s\n", bank->name);
    +return ret;
    +}
    data = readl_relaxed(bank->reg_base + GPIO_SWPORT_DDR);
    +clk_disable(bank->clk);

    return !(data & BIT(offset));
    }
@@ -2564,7 +2572,9 @@
        if (!bank->domain)
            return -ENXIO;
        +clk_enable(bank->clk);
        virq = irq_create_mapping(bank->domain, offset);
        +clk_disable(bank->clk);

        return (virq) ? : -ENXIO;
    }
@@ -2958,6 +2968,7 @@
        base,
            &rockchip_regmap_config);
    }
    +of_node_put(node);
    }

    bank->irq = irq_of_parse_and_map(bank->of_node, 0);
@@ -3135,12 +3146,15 @@
    static int __maybe_unused rockchip_pinctrl_resume(struct device *dev)
    {
        struct rockchip_pinctrl *info = dev_get_drvdata(dev);
        -int ret = regmap_write(info->regmap_base, RK3288_GRF_GPIO6C_IOMUX,
-          rk3288_grf_gpio6c_iomux |
-          GPIO6C6_SEL_WRITE_ENABLE);
+int ret;

-if (ret)
-    return ret;
+if (info->ctrl->type == RK3288) {
+    ret = regmap_write(info->regmap_base, RK3288_GRF_GPIO6C_IOMUX,
+                        rk3288_grf_gpio6c_iomux |
+                        GPIO6C6_SEL_WRITE_ENABLE);
+    if (ret)
+        return ret;
+}

return pinctrl_force_default(info->pctl_dev);
}
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-rza1.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-rza1.c
@@ -421,7 +421,7 @@
};
static const struct rza1_swio_entry rza1l_swio_entries[] = {
-    [0] = { ARRAY_SIZE(rza1h_swio_pins), rza1h_swio_pins },
+    [0] = { ARRAY_SIZE(rza1l_swio_pins), rza1l_swio_pins },
};
/* RZ/A1L (r7s72102x) pinmux flags table */
@@ -1006,6 +1006,7 @@
    const char *grpname;
    const char **fngrps;
    int ret, npins;
+    int gsel, fsel;

    npins = rza1_dt_node_pin_count(np);
    if (npins < 0) {
@@ -1055,18 +1056,19 @@
        fngrps[0] = grpname;
    }

    mutex_lock(&rza1_pctl->mutex);
-    ret = pinctrl_generic_add_group(pctldev, grpname, grpins, npins,
-                                    NULL);
-    if (ret) {
+    gsel = pinctrl_generic_add_group(pctldev, grpname, grpins, npins,
+                                      NULL);
+    if (gsel < 0) {
          mutex_unlock(&rza1_pctl->mutex);
          return ret;
+          return gsel;
    }
- ret = pinmux_generic_add_function(pctldev, grpname, fngrps, 1,
  - mux_confs);
- if (ret)
+ fsel = pinmux_generic_add_function(pctldev, grpname, fngrps, 1,
  + mux_confs);
+ if (fsel < 0) {
  + ret = fsel;
  goto remove_group;
- mutex_unlock(&rza1_pctl->mutex);
+ mutex_unlock(&rza1_pctl->mutex);
+ }

dev_info(rza1_pctl->dev, "Parsed function and group %s with %d pins\n",
  grpname, npins);
@@ -1083,15 +1085,15 @@
  (*map)->data.mux.group = np->name;
  (*map)->data.mux.function = np->name;
  *num_maps = 1;
  +mutex_unlock(&rza1_pctl->mutex);
  return 0;

remove_function:
- mutex_lock(&rza1_pctl->mutex);
- pinmux_generic_remove_last_function(pctldev);
+ pinmux_generic_remove_function(pctldev, fsel);

remove_group:
- pinctrl_generic_remove_last_group(pctldev);
+ pinctrl_generic_remove_group(pctldev, gsel);
 mutex_unlock(&rza1_pctl->mutex);

dev_info(rza1_pctl->dev, "Unable to parse function and group %s\n",
--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-single.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-single.c
@@ -891,7 +891,7 @@
/* If pinconf isn't supported, don't parse properties in below. */
 if (!PCS_HAS_PINCONF)
  -return 0;
  +return -ENOTSUPP;

/* count how much properties are supported in current node */
for (i = 0; i < ARRAY_SIZE(prop2); i++) {
  @@ -903,7 +903,7 @@
    nconfs++;
  }
  if (!nconfs)
  -return 0;
  +return -ENOTSUPP;
+return -ENOTSUPP;

func->conf = devm_kzalloc(pcs->dev,
    sizeof(struct pcs_conf_vals) * nconfs,
@@ -1027,9 +1027,12 @@
if (PCS_HAS_PINCONF) {
    res = pcs_parse_pinconf(pcs, np, function, map);
    -if (res)
    +if (res == 0)
        +*num_maps = 2;
        +else if (res == -ENOTSUPP)
        +*num_maps = 1;
        +else
            goto free_pingroups;
    -*num_maps = 2;
    } else {
   +*num_maps = 1;
    }
@@ -1161,6 +1164,7 @@
if (PCS_HAS_PINCONF) {
    dev_err(pcs->dev, "pinconf not supported\n");
    +res = -ENOTSUPP;
    goto free_pingroups;
}

--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-sx150x.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-sx150x.c
@@ -1144,8 +1144,28 @@
    if (ret)
        return ret;

+/* Pinctrl_desc */
+*pctl->pinctrl_desc.name = "sx150x-pinctrl";
+*pctl->pinctrl_desc.pctlops = &sx150x_pinctrl_ops;
+*pctl->pinctrl_desc.confops = &sx150x_pinconf_ops;
+*pctl->pinctrl_desc.pins = pctl->data->pins;
+*pctl->pinctrl_desc.npins = pctl->data->npins;
+*pctl->pinctrl_desc.owner = THIS_MODULE;
+*ret = devm_pinctrl_register_and_init(dev, &pctl->pinctrl_desc, 
+    pctl, &pctl->pctldev);
+if (ret) {
+    dev_err(dev, "Failed to register pinctrl device\n");
+    return ret;
+}
+ret = pinctrl_enable(pctl->pctldev);
+if (ret) {
+dev_err(dev, "Failed to enable pinctrl device\n");
+return ret;
+}
+
+/* Register GPIO controller */
-pctl->gpio.label = devm_kstrdup(dev, client->name, GFP_KERNEL);
pctl->gpio.base = -1;
pctl->gpio.ngpio = pctl->data->npins;
pctl->gpio.get_direction = sx150x_gpio_get_direction;
@@ -1159,6 +1179,10 @@
pctl->gpio.of_node = dev->of_node;
#endif
pctl->gpio.can_sleep = true;
+pctl->gpio.label = devm_kstrdup(dev, client->name, GFP_KERNEL);
+if (!pctl->gpio.label)
+return -ENOMEM;
+
+/* Setting multiple pins is not safe when all pins are not 
* handled by the same regmap register. The oscio pin (present 
@@ -1172,15 +1196,22 @@
if (ret)
return ret;

+ret = gpiochip_add_pin_range(&pctl->gpio, dev_name(dev),
+ 0, 0, pctl->data->npins);
+if (ret)
+return ret;
+
+/* Add Interrupt support if an irq is specified */
+if (client->irq > 0) {
-pctl->irq_chip.name = devm_kstrdup(dev, client->name,
- GFP_KERNEL);
pctl->irq_chip.irq_mask = sx150x_irq_mask;
pctl->irq_chip.irq_unmask = sx150x_irq_unmask;
pctl->irq_chip.irq_set_type = sx150x_irq_set_type;
pctl->irq_chip.irq_bus_lock = sx150x_irq_bus_lock;
pctl->irq_chip.irq_bus_sync_unlock = sx150x_irq_bus_sync_unlock;
+pctl->irq_chip.name = devm_kstrdup(dev, client->name,
+ GFP_KERNEL);
+if (!pctl->irq_chip.name)
+return -ENOMEM;

pctl->irq.masked = ~0;
pctl->irq.sense = 0;
@@ -1217,20 +1248,6 @@
client->irq);
}

/* Pinctrl_desc */
pctl->pinctrl_desc.name = "sx150x-pinctrl";
pctl->pinctrl_desc.pctlops = &sx150x_pinctrl_ops;
pctl->pinctrl_desc.confops = &sx150x_pinconf_ops;
pctl->pinctrl_desc.pins = pctl->data->pins;
pctl->pinctrl_desc.npins = pctl->data->npins;
pctl->pinctrl_desc.owner = THIS_MODULE;
-
pctl->pctldev = pinctrl_register(&pctl->pinctrl_desc, dev, pctl);
-if (IS_ERR(pctl->pctldev)) {
-dev_err(dev, "Failed to register pinctrl device\n");
-return PTR_ERR(pctl->pctldev);
-
-
return 0;
}

--- linux-4.15.0.orig/drivers/pinctrl/pinctrl-xway.c
+++ linux-4.15.0/drivers/pinctrl/pinctrl-xway.c
@@ -1748,14 +1748,6 @@
}
xway_pctrl_desc.pins = xway_info.pads;

/* register the gpio chip */
xway_chip.parent = &pdev->dev;
-ret = devm_gpiochip_add_data(&pdev->dev, &xway_chip, NULL);
-if (ret) {
-dev_err(&pdev->dev, "Failed to register gpio chip\n");
-return ret;
-
-
/* setup the data needed by pinctrl */
xway_pctrl_desc.name = dev_name(&pdev->dev);
xway_pctrl_desc.npins = xway_chip.ngpio;
@@ -1777,10 +1769,33 @@
return ret;
}

/* finish with registering the gpio range in pinctrl */
xway_gpio_range.npins = xway_chip.ngpio;
xway_gpio_range.base = xway_chip.base;
pinctrl_add_gpio_range(xway_info.pctl, &xway_gpio_range);
*/
+xway_chip.parent = &pdev->dev;
+xway_chip.owner = THIS_MODULE;

---
+xway_chip.of_node = pdev->dev.of_node;
+ret = devm_gpiochip_add_data(pdev->dev, &xway_chip, NULL);
+if (ret) {
+dev_err(pdev->dev, "Failed to register gpio chip\n");
+return ret;
+
+/*
+ * For DeviceTree-supported systems, the gpio core checks the
+ * pinctrl's device node for the "gpio-ranges" property.
+ * If it is present, it takes care of adding the pin ranges
+ * for the driver. In this case the driver can skip ahead.
+ *
+ * In order to remain compatible with older, existing DeviceTree
+ * files which don't set the "gpio-ranges" property or systems that
+ * utilize ACPI the driver has to call gpiochip_add_pin_range().
+ */
+if (!of_property_read_bool(pdev->dev.of_node, "gpio-ranges")) {
+/* finish with registering the gpio range in pinctrl */
+xway_gpio_range.npins = xway_chip.ngpio;
+xway_gpio_range.base = xway_chip.base;
+pinctrl_add_gpio_range(xway_info.pctrl, &xway_gpio_range);
+}
+
dev_info(pdev->dev, "Init done\n");
return 0;
}
--- linux-4.15.0.orig/drivers/pinctrl/pxa/pinctrl-pxa2xx.c
+++ linux-4.15.0/drivers/pinctrl/pxa/pinctrl-pxa2xx.c
@@ -436,3 +436,7 @@
 return 0;
 }
 EXPORT_SYMBOL_GPL(pxa2xx_pinctrl_exit);
+MODULE_AUTHOR("Robert Jarzmik <robert.jarzmik@free.fr>");
+MODULE_DESCRIPTION("Marvell PXA2xx pinctrl driver");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/pinctrl/qcom/pinctrl-msm.c
+++ linux-4.15.0/drivers/pinctrl/qcom/pinctrl-msm.c
@@ -238,22 +238,30 @@
 /* Convert register value to pinconf value */
 switch (param) {
 case PIN_CONFIG_BIAS_DISABLE:
- arg = arg == MSM_NO_PULL;
+ if (arg != MSM_NO_PULL)
+ arg = 1;
+ return -EINVAL;
+ arg = 1;
 break;
 case PIN_CONFIG_BIAS_PULL_DOWN:
- arg = arg == MSM_PULL_DOWN;
+ if (arg != MSM_PULL_DOWN)
+ arg = 1;
+ return -EINVAL;
+ arg = 1;
 break;
 case PIN_CONFIG_BIAS_BUS_HOLD:
 if (pctrl->soc->pull_no_keeper)
 return -ENOTSUPP;
- arg = arg == MSM_KEEPER;
+ if (arg != MSM_KEEPER)
+ arg = 1;
 break;
 case PIN_CONFIG_BIAS_PULL_UP:
 if (pctrl->soc->pull_no_keeper)
 arg = arg == MSM_PULL_UP_NO_KEEPER;
 else
 arg = arg == MSM_PULL_UP;
+ if (!arg)
+ return -EINVAL;
 break;
 case PIN_CONFIG_DRIVE_STRENGTH:
 arg = msm_regval_to_drive(arg);
@@ -831,11 +839,24 @@
 return ret;
ret = gpiochip_add_pin_range(&pctrl->chip, dev_name(pctrl->dev), 0, 0, chip->ngpio);
-if (ret) {
-dev_err(pctrl->dev, "Failed to add pin range\n");
-gpiochip_remove(&pctrl->chip);
-return ret;
+/*
+ * For DeviceTree-supported systems, the gpio core checks the
+ * pinctrl's device node for the "gpio-ranges" property.
+ * If it is present, it takes care of adding the pin ranges
+ * for the driver. In this case the driver can skip ahead.
+ *
+ * In order to remain compatible with older, existing DeviceTree
+ * files which don't set the "gpio-ranges" property or systems that
+ * utilize ACPI the driver has to call gpiochip_add_pin_range().
+ */
+if (!of_property_read_bool(pctrl->dev->of_node, "gpio-ranges")) {
+ret = gpiochip_add_pin_range(&pctrl->chip,
+dev_name(pdev->dev), 0, 0, chip->ngpio);
+if (ret) {
+dev_err(pdev->dev, "Failed to add pin range\n");
+gpiochip_remove(&pctrl->chip);
+return ret;
+}
}
}

ret = gpiochip_irqchip_add(chip,
--- linux-4.15.0.orig/drivers/pinctrl/qcom/pinctrl-spmi-gpio.c
+++ linux-4.15.0/drivers/pinctrl/qcom/pinctrl-spmi-gpio.c
@@ -390,31 +390,47 @@
switch (param) {
 case PIN_CONFIG_DRIVE_PUSH_PULL:
-arg = pad->buffer_type == PMIC_GPIO_OUT_BUF_CMOS;
+if (pad->buffer_type != PMIC_GPIO_OUT_BUF_CMOS)
 +arg = 1;
+return -EINVAL;
+arg = 1;
+break;
 case PIN_CONFIG_DRIVE_OPEN_DRAIN:
-arg = pad->buffer_type == PMIC_GPIO_OUT_BUF_OPEN_DRAIN_NMOS;
+if (pad->buffer_type != PMIC_GPIO_OUT_BUF_OPEN_DRAIN_NMOS)
 +arg = 1;
+return -EINVAL;
+arg = 1;
+break;
 case PIN_CONFIG_DRIVE_OPEN_SOURCE:
-arg = pad->buffer_type == PMIC_GPIO_OUT_BUF_OPEN_DRAIN_PMOS;
+if (pad->buffer_type != PMIC_GPIO_OUT_BUF_OPEN_DRAIN_PMOS)
return -EINVAL;
+arg = 1;
break;

case PIN_CONFIG_BIAS_PULL_DOWN:
-arg = pad->pullup == PMIC_GPIO_PULL_DOWN;
+if (pad->pullup != PMIC_GPIO_PULL_DOWN)
+return -EINVAL;
+arg = 1;
break;

case PIN_CONFIG_BIAS_DISABLE:
-arg = pad->pullup = PMIC_GPIO_PULL_DISABLE;
+if (pad->pullup != PMIC_GPIO_PULL_DISABLE)
+return -EINVAL;
+arg = 1;
break;

case PIN_CONFIG_BIAS_PULL_UP:
-arg = pad->pullup == PMIC_GPIO_PULL_UP_30;
+if (pad->pullup != PMIC_GPIO_PULL_UP_30)
+return -EINVAL;
+arg = 1;
break;

case PIN_CONFIG_BIAS_HIGH_IMPEDANCE:
-arg = !pad->is_enabled;
+if (pad->is_enabled)
+return -EINVAL;
+arg = 1;
break;

case PIN_CONFIG_POWER_SOURCE:
arg = pad->power_source;
break;

case PIN_CONFIG_INPUT_ENABLE:
-arg = pad->input_enabled;
+if (!pad->input_enabled)
+return -EINVAL;
+arg = 1;
break;

case PIN_CONFIG_OUTPUT:
arg = pad->out_value;
@@ -1012,10 +1028,23 @@
return ret;
}

-ret = gpiochip_add_pin_range(&state->chip, dev_name(dev), 0, 0, npins);
-if (ret) {
-dev_err(dev, "failed to add pin range\n");
-goto err_range;
+/*
+ * For DeviceTree-supported systems, the gpio core checks the
pinctrl's device node for the "gpio-ranges" property. If it is present, it takes care of adding the pin ranges for the driver. In this case the driver can skip ahead.

In order to remain compatible with older, existing DeviceTree files which don't set the "gpio-ranges" property or systems that utilize ACPI the driver has to call gpiochip_add_pin_range().

```
;if (!of_property_read_bool(dev->of_node, "gpio-ranges")) {
    ret = gpiochip_add_pin_range(&state->chip, dev_name(dev), 0, 0, npins);
    if (ret) {
        dev_err(dev, "failed to add pin range\n");
        goto err_range;
    }
}
```

return 0;

```
pad->function = function;
ret = pmic_mpp_write_mode_ctl(state, pad);
if (ret < 0)
    return ret;

val = pad->is_enabled << PMIC_MPP_REG_MASTER_EN_SHIFT;
```

```
switch (param) {
case PIN_CONFIG_BIAS_DISABLE:
    arg = pad->pullup == PMIC_MPP_PULL_UP_OPEN;
    if (pad->pullup != PMIC_MPP_PULL_UP_OPEN)
        return -EINVAL;
    arg = 1;
    break;
case PIN_CONFIG_BIAS_PULL_UP:
    switch (pad->pullup) {
    case PMIC_MPP_PULL_UP_OPEN:
        arg = 600;
        break;
    case PMIC_MPP_PULL_UP_0P6KOHM:
        arg = 600;
        break;
    }
break;
case PIN_CONFIG_BIAS_HIGH_IMPEDANCE:
    -arg = !pad->is_enabled;
    +if (pad->is_enabled)
    +return -EINVAL;
    +arg = 1;
    break;
case PIN_CONFIG_POWER_SOURCE:
    arg = pad->power_source;
    break;
case PIN_CONFIG_INPUT_ENABLE:
    -arg = pad->input_enabled;
    +if (!pad->input_enabled)
    +return -EINVAL;
    +arg = 1;
    break;
case PIN_CONFIG_OUTPUT:
    arg = pad->out_value;
    @@ -382,7 +387,9 @@
    arg = pad->amux_input;
    break;
case PMIC_MPP_CONF_PAIRED:
    -arg = pad->paired;
    +if (!pad->paired)
    +return -EINVAL;
    +arg = 1;
    break;
case PIN_CONFIG_DRIVE_STRENGTH:
    arg = pad->drive_strength;
    @@ -455,7 +462,7 @@
    pad->dtest = arg;
    break;
case PIN_CONFIG_DRIVE_STRENGTH:
    -arg = pad->drive_strength;
    +pad->drive_strength = arg;
    break;
case PMIC_MPP_CONF_AMUX_ROUTE:
    if (arg >= PMIC_MPP_AMUX_ROUTE_ABUS4)
    @@ -502,6 +509,10 @@
    if (ret < 0)
    return ret;
    +ret = pmic_mpp_write(state, pad, PMIC_MPP_REG_SINK_CTL, pad->drive_strength);
    +if (ret < 0)
    +return ret;
    +val = pad->is_enabled << PMIC_MPP_REG_MASTER_EN_SHIFT;
return pmic_mpp_write(state, pad, PMIC_MPP_REG_EN_CTL, val);
--- linux-4.15.0.orig/drivers/pinctrl/qcom/pinctrl-ssbi-gpio.c
+++ linux-4.15.0/drivers/pinctrl/qcom/pinctrl-ssbi-gpio.c
@@ -260,22 +260,32 @@
 switch (param) {
     case PIN_CONFIG_BIAS_DISABLE:
         -arg = pin->bias == PM8XXX_GPIO_BIAS_NP;
+        if (pin->bias != PM8XXX_GPIO_BIAS_NP)
             +return -EINVAL;
+        arg = 1;
         break;
     case PIN_CONFIG_BIAS_PULL_DOWN:
         -arg = pin->bias == PM8XXX_GPIO_BIAS_PD;
+        if (pin->bias != PM8XXX_GPIO_BIAS_PD)
             +return -EINVAL;
+        arg = 1;
         break;
     case PIN_CONFIG_BIAS_PULL_UP:
         -arg = pin->bias <= PM8XXX_GPIO_BIAS_PU_1P5_30;
+        if (pin->bias > PM8XXX_GPIO_BIAS_PU_1P5_30)
             +return -EINVAL;
+        arg = 1;
         break;
     case PIN_CONFIG_BIAS_HIGH_IMPEDANCE:
         -arg = pin->disable;
+        if (!pin->disable)
             +return -EINVAL;
+        arg = 1;
         break;
     case PIN_CONFIG_INPUT_ENABLE:
         -arg = pin->mode == PM8XXX_GPIO_MODE_INPUT;
+        if (pin->mode != PM8XXX_GPIO_MODE_INPUT)
             +return -EINVAL;
+        arg = 1;
         break;
     case PIN_CONFIG_OUTPUT:
         if (pin->mode & PM8XXX_GPIO_MODE_OUTPUT)
             @ @ -290,10 +300,14 @ @
         arg = pin->output_strength;
         break;
     case PIN_CONFIG_DRIVE_PUSH_PULL:
         -arg = !pin->open_drain;
+        if (pin->open_drain)
             +return -EINVAL;
case PIN_CONFIG_DRIVE_OPEN_DRAIN:
    -arg = pin->open_drain;
    +if (!pin->open_drain)
    +arg = 1;
    break;
default:
    return -EINVAL;
@@ -748,12 +762,23 @@
    return ret;
}

-ret = gpiochip_add_pin_range(&pctrl->chip,
-    dev_name(pctrl->dev),
-    0, 0, pctrl->chip.ngpio);
-if (ret) {
    -dev_err(pctrl->dev, "failed to add pin range\n");
    -goto unregister_gpiochip;
    +/*
    + * For DeviceTree-supported systems, the gpio core checks the
    + * pinctrl's device node for the "gpio-ranges" property.
    + * If it is present, it takes care of adding the pin ranges
    + * for the driver. In this case the driver can skip ahead.
    + *
    + * In order to remain compatible with older, existing DeviceTree
    + * files which don't set the "gpio-ranges" property or systems that
    + * utilize ACPI the driver has to call gpiochip_add_pin_range().
    + */
    +if (!of_property_read_bool(pctrl->dev->of_node, "gpio-ranges")) {
        +ret = gpiochip_add_pin_range(&pctrl->chip, dev_name(pctrl->dev),
        +    0, 0, pctrl->chip.ngpio);
        +if (ret) {
            +dev_err(pctrl->dev, "failed to add pin range\n");
            +goto unregister_gpiochip;
            +}
    }

platform_set_drvdata(pdev, pctrl);
--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-exynos-arm.c
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-exynos-arm.c
@@ -76,6 +76,7 @@
    }

    clk_base = of_iomap(np, 0);
    +of_node_put(np);
    if (!clk_base) {
pr_err("%s: failed to map clock registers\n", __func__);
return ERR_PTR(-EINVAL);
@@ -110,12 +111,12 @@
EXYNOS_PIN_BANK_EINTG(7, 0x1c0, "gpg1", 0x38),
EXYNOS_PIN_BANK_EINTG(7, 0x1e0, "gpg2", 0x3c),
EXYNOS_PIN_BANK_EINTG(7, 0x200, "gpg3", 0x40),
-EXYNOS_PIN_BANK_EINTN(7, 0x220, "gpi"),
EXYNOS_PIN_BANK_EINTG(8, 0x240, "gpj0", 0x44),
EXYNOS_PIN_BANK_EINTG(6, 0x260, "gpj1", 0x48),
EXYNOS_PIN_BANK_EINTG(8, 0x280, "gpj2", 0x4c),
EXYNOS_PIN_BANK_EINTG(8, 0x2a0, "gpj3", 0x50),
EXYNOS_PIN_BANK_EINTG(5, 0x2c0, "gpj4", 0x54),
+EXYNOS_PIN_BANK_EINTN(7, 0x220, "gpi"),
EXYNOS_PIN_BANK_EINTN(8, 0x2e0, "mp01"),
EXYNOS_PIN_BANK_EINTN(4, 0x300, "mp02"),
EXYNOS_PIN_BANK_EINTN(8, 0x320, "mp03"),
@@ -129,7 +130,7 @@
EXYNOS_PIN_BANK_EINTW(8, 0xc60, "gph3", 0x0c),
};

-const struct samsung_pin_ctrl s5pv210_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl s5pv210_pin_ctrl[] __initconst = {
    /* pin-controller instance 0 data */
    .pin_banks= s5pv210_pin_bank,
    @ @ -142,6 +143,11 @@
},
};

+const struct samsung_pinctrl_of_match_data s5pv210_of_data __initconst = {
+    .ctrl= s5pv210_pin_ctrl,
+    .num_ctrl= ARRAY_SIZE(s5pv210_pin_ctrl),
+};
+
 /* Pad retention control code for accessing PMU regmap */
static atomic_t exynos_shared_retention_refcnt;

@@ -204,7 +210,7 @@
 * Samsung pinctrl driver data for Exynos3250 SoC. Exynos3250 SoC includes
 * two gpio/pin-mux/pinconfig controllers.
 */
-const struct samsung_pin_ctrl exynos3250_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos3250_pin_ctrl[] __initconst = {
    /* pin-controller instance 0 data */
    .pin_banks= exonos3250_pin_banks0,
    @ @ -225,6 +231,11 @@
},

---
+const struct samsung_pinctrl_of_match_data exynos3250_of_data __initconst = {
+.ctrl= exynos3250_pin_ctrl,
+.num_ctrl= ARRAY_SIZE(exynos3250_pin_ctrl),
+};
+
+static const struct samsung_pin_bank_data exynos4210_pin_banks0[] __initconst = {
EXYNOS_PIN_BANK_EINTG(8, 0x000, "gpa0", 0x00),
@@ -308,7 +319,7 @@
* Samsung pinctrl driver data for Exynos4210 SoC. Exynos4210 SoC includes
* three gpio/pin-mux/pinconfig controllers.
 */
-const struct samsung_pin_ctrl exynos4210_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos4210_pin_ctrl[] __initconst = {
{
/* pin-controller instance 0 data */
.pin_banks= exynos4210_pin_banks0,
@@ -334,6 +345,11 @@
},
};
+
+const struct samsung_pinctrl_of_match_data exynos4210_of_data __initconst = {
+.ctrl= exynos4210_pin_ctrl,
+.num_ctrl= ARRAY_SIZE(exynos4210_pin_ctrl),
+};
+
+static const struct samsung_pin_bank_data exynos4x12_pin_banks0[] __initconst = {
EXYNOS_PIN_BANK_EINTG(8, 0x000, "gpa0", 0x00),
@@ -396,7 +412,7 @@
* Samsung pinctrl driver data for Exynos4x12 SoC. Exynos4x12 SoC includes
* four gpio/pin-mux/pinconfig controllers.
 */
-const struct samsung_pin_ctrl exynos4x12_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos4x12_pin_ctrl[] __initconst = {
{
/* pin-controller instance 0 data */
.pin_banks= exynos4x12_pin_banks0,
@@ -432,6 +448,11 @@
},
};
+
+const struct samsung_pinctrl_of_match_data exynos4x12_of_data __initconst = {
+.ctrl= exynos4x12_pin_ctrl,
+.num_ctrl= ARRAY_SIZE(exynos4x12_pin_ctrl),
+};
/* pin banks of exynos5250 pin-controller 0 */
static const struct samsung_pin_bank_data exynos5250_pin_banks0[] __initconst = {
    EXYNOS_PIN_BANK_EINTG(8, 0x000, "gpa0", 0x00),
    @ @ -492,7 +513,7 @ @
* Samsung pinctrl driver data for Exynos5250 SoC. Exynos5250 SoC includes
* four gpio/pin-mux/pinconfig controllers.
*/
-const struct samsung_pin_ctrl exynos5250_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos5250_pin_ctrl[] __initconst = {
{
    /* pin-controller instance 0 */
    .pin_banks= exynos5250_pin_banks0,
    @ @ -528,6 +549,11 @ @
    },
    }

+const struct samsung_pinctrl_of_match_data exynos5250_of_data __initconst = {
    +.ctrl= exynos5250_pin_ctrl,
    +.num_ctrl= ARRAY_SIZE(exynos5250_pin_ctrl),
    +
};
+
/* pin banks of exynos5260 pin-controller 0 */
static const struct samsung_pin_bank_data exynos5260_pin_banks0[] __initconst = {
    EXYNOS_PIN_BANK_EINTG(4, 0x000, "gpa0", 0x00),
    @ @ -572,7 +598,7 @ @
* Samsung pinctrl driver data for Exynos5260 SoC. Exynos5260 SoC includes
* three gpio/pin-mux/pinconfig controllers.
*/
-const struct samsung_pin_ctrl exynos5260_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos5260_pin_ctrl[] __initconst = {
{
    /* pin-controller instance 0 */
    .pin_banks= exynos5260_pin_banks0,
    @ @ -592,6 +618,11 @ @
    },
    }

+const struct samsung_pinctrl_of_match_data exynos5260_of_data __initconst = {
    +.ctrl= exynos5260_pin_ctrl,
    +.num_ctrl= ARRAY_SIZE(exynos5260_pin_ctrl),
    +
};
+
/* pin banks of exynos5410 pin-controller 0 */
static const struct samsung_pin_bank_data exynos5410_pin_banks0[] __initconst = {
    EXYNOS_PIN_BANK_EINTG(8, 0x000, "gpa0", 0x00),
    @ @ -605,7 +636,6 @ @
EXYNOS_PIN_BANK_EINTG(4, 0x100, "gpc3", 0x20),
EXYNOS_PIN_BANK_EINTG(7, 0x120, "gpc1", 0x24),
EXYNOS_PIN_BANK_EINTG(7, 0x140, "gpc2", 0x28),
-EXYNOS_PIN_BANK_EINTN(2, 0x160, "gpm5"),
EXYNOS_PIN_BANK_EINTG(8, 0x180, "gpd1", 0x2c),
EXYNOS_PIN_BANK_EINTG(8, 0x1A0, "gpe0", 0x30),
EXYNOS_PIN_BANK_EINTG(2, 0x1C0, "gpe1", 0x34),
@@ -616,6 +646,7 @@
EXYNOS_PIN_BANK_EINTG(2, 0x260, "gpg2", 0x48),
EXYNOS_PIN_BANK_EINTG(4, 0x280, "gph0", 0x4c),
EXYNOS_PIN_BANK_EINTG(8, 0x2A0, "gph1", 0x50),
+EXYNOS_PIN_BANK_EINTN(2, 0x160, "gpm5"),
EXYNOS_PIN_BANK_EINTN(8, 0x2C0, "gpm7"),
EXYNOS_PIN_BANK_EINTN(6, 0x2E0, "gpy0"),
EXYNOS_PIN_BANK_EINTN(4, 0x300, "gpy1"),
@@ -662,7 +693,7 @@
* Samsung pinctrl driver data for Exynos5410 SoC. Exynos5410 SoC includes
* four gpio/pin-mux/pinconfig controllers.
*/
-const struct samsung_pin_ctrl exynos5410_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos5410_pin_ctrl[] __initconst = {
  {
  /* pin-controller instance 0 data */
    .pin_banks= exynos5410_pin_banks0,
    @ @ -695,6 +726,11 @@
  },
};

+const struct samsung_pinctrl_of_match_data exynos5410_of_data __initconst = {
+  .ctrl= exynos5410_pin_ctrl,
+  .num_ctrl= ARRAY_SIZE(exynos5410_pin_ctrl),
+};
+
/* pin banks of exynos5420 pin-controller 0 */
static const struct samsung_pin_bank_data exynos5420_pin_banks0[] __initconst = {
EXYNOS_PIN_BANK_EINTG(8, 0x000, "gpy7", 0x00),
@@ -779,7 +815,7 @@
* Samsung pinctrl driver data for Exynos5420 SoC. Exynos5420 SoC includes
* four gpio/pin-mux/pinconfig controllers.
*/
-const struct samsung_pin_ctrl exynos5420_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos5420_pin_ctrl[] __initconst = {
  {
  /* pin-controller instance 0 data */
    .pin_banks= exynos5420_pin_banks0,
    @ @ -813,3 +849,8 @@
    .retention_data= &exynos4_audio_retention_data,
  },
};
+const struct samsung_pinctrl_of_match_data exynos5420_of_data __initconst = {
+ .ctrl = exynos5420_pin_ctrl,
+ .num_ctrl = ARRAY_SIZE(exynos5420_pin_ctrl),
+};
--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-exynos-arm64.c
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-exynos-arm64.c
@@ -180,7 +180,7 @@

 /* Samsung pinctrl driver data for Exynos5433 SoC. Exynos5433 SoC includes
  * ten gpio/pin-mux/pinconfig controllers.
 */
-const struct samsung_pin_ctrl exynos5433_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos5433_pin_ctrl[] __initconst = {

  
 `pin-controller instance 0 data */
 .pin_banks = exynos5433_pin_banks0,
@@ -265,6 +265,11 @@

  
 /* pin banks of exynos7 pin-controller - ALIVE */
 static const struct samsung_pin_bank_data exynos7_pin_banks0[] __initconst = {
 EXYNOS_PIN_BANK_EINTW(8, 0x000, "gpa0", 0x00),
@@ -344,7 +349,7 @@

  
 /* pin-controller instance 0 Alive data */
 .pin_banks = exynos7_pin_banks0,
@@ -397,3 +402,8 @@

  
 };

-const struct samsung_pin_ctrl exynos7_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl exynos7_pin_ctrl[] __initconst = {

  
 /* pin-controller instance 0 Alive data */
 .pin_banks = exynos7_pin_banks0,
@@ -407,6 +413,8 @@

  
 };

+const struct samsung_pinctrl_of_match_data exynos7_of_data __initconst = {
+ .ctrl = exynos7_pin_ctrl,
+ .num_ctrl = ARRAY_SIZE(exynos7_pin_ctrl),
+};
--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-exynos.c
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-exynos.c

struct exynos_irq_chip *our_chip = to_exynos_irq_chip(chip);
struct samsung_pin_bank *bank = irq_data_get_irq_chip_data(irqd);
unsigned long reg_mask = our_chip->eint_mask + bank->eint_offset;
unsigned long mask;
unsigned long flags;

spin_lock_irqsave(&bank->slock, flags);

struct exynos_irq_chip *our_chip = to_exynos_irq_chip(chip);
struct samsung_pin_bank *bank = irq_data_get_irq_chip_data(irqd);
unsigned long reg_mask = our_chip->eint_mask + bank->eint_offset;
unsigned long mask;
unsigned long flags;

static inline void exynos_irq_demux_eint(unsigned int pend,
struct irq_domain *domain)
{
unsigned int irq;
unsigned int pend;
unsigned int mask;
int i;

chained_irq_exit(chip, desc);
}

-chained_irq_exit(chip, desc);
}
irq_chip = kmemdup(match->data, sizeof(*irq_chip), GFP_KERNEL);
-if (!irq_chip)
+if (!irq_chip) {
> +of_node_put(np);
> return -ENOMEM;
+}
wkup_np = np;
break;
}
@@ -485,6 +488,7 @@
> bank->nr_pins, &exynos_eint_irqd_ops, bank);
> if (!bank->irq_domain) {
> dev_err(dev, "wkup irq domain add failed\n");
+of_node_put(wkup_np);
return -ENXIO;
}
@@ -498,8 +502,10 @@
> weint_data = devm_kzalloc(dev, bank->nr_pins
> * sizeof(*weint_data), GFP_KERNEL);
-if (!weint_data)
+if (!weint_data) {
> +of_node_put(wkup_np);
> return -ENOMEM;
+}
for (idx = 0; idx < bank->nr_pins; ++idx) {
irq = irq_of_parse_and_map(bank->of_node, idx);
@@ -516,10 +522,13 @@
> }

-if (!muxed_banks)
+if (!muxed_banks) {
+of_node_put(wkup_np);
return 0;
+
irq = irq_of_parse_and_map(wkup_np, 0);
+of_node_put(wkup_np);
if (!irq) {
 dev_err(dev, "irq number for muxed EINTs not found\n");
return 0;
@@ -559,10 +568,13 @@
> + 2 * bank->eint_offset);
save->eint_fltcon1 = readl(regs + EXYNOS_GPIO_EFLTCON_OFFSET
+ 2 * bank->eint_offset + 4);
+save->eint_mask = readl(regs + bank->irq_chip->eint_mask
++ bank->eint_offset);

pr_debug("%s: save    con %#010x\n", bank->name, save->eint_con);
pr_debug("%s: save fltcon0 %#010x\n", bank->name, save->eint_fltcon0);
pr_debug("%s: save fltcon1 %#010x\n", bank->name, save->eint_fltcon1);
+pr_debug("%s: save    mask %#010x\n", bank->name, save->eint_mask);
}

void exynos_pinctrl_suspend(struct samsung_pinctrl_drv_data *drvdata)
@@ -591,6 +603,9 @@
pr_debug("%s: fltcon1 %#010x => %#010x
", bank->name, readl(regs + EXYNOS_GPIO_EFLTCON_OFFSET
+ 2 * bank->eint_offset + 4), save->eint_fltcon1);
+pr_debug("%s:    mask %#010x => %#010x
", bank->name, 
+readl(regs + bank->irq_chip->eint_mask
++ bank->eint_offset), save->eint_mask);

writel(save->eint_con, regs + EXYNOS_GPIO_ECON_OFFSET
+ bank->eint_offset);
@@ -598,6 +613,8 @@
+ 2 * bank->eint_offset);
writel(save->eint_fltcon1, regs + EXYNOS_GPIO_EFLTCON_OFFSET
+ 2 * bank->eint_offset + 4);
+writel(save->eint_mask, regs + bank->irq_chip->eint_mask
++ bank->eint_offset);
}

void exynos_pinctrl_resume(struct samsung_pinctrlDrvData *drvdata)
--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-s3c24xx.c
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-s3c24xx.c
@@ -495,8 +495,10 @@
return -ENODEV;
eint_data = devm_kzalloc(dev, sizeof(*eint_data), GFP_KERNEL);
-if (!eint_data)
+if (!eint_data) {
+of_node_put(eint_np);
+return -ENOMEM;
+}
eint_data->drvdata = d;

@@ -508,12 +510,14 @@
irq = irq_of_parse_and_map(eint_np, i);
if (!irq) {
 dev_err(dev, "failed to get wakeup EINT IRQ %d\n", i);
+of_node_put(eint_np);
return -ENXIO;
}

eint_data->parents[i] = irq;
irq_set_chained_handler_and_data(irq, handlers[i], eint_data);
} +of_node_put(eint_np);

bank = d->pin_banks;
for (i = 0; i < d->nr_banks; ++i, ++bank) {
  @ @ -570.7 +574.7 @ @
  PIN_BANK_2BIT(13, 0x080, "gpj"),
};

-const struct samsung_pin_ctrl s3c2412_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl s3c2412_pin_ctrl[] __initconst = {
  {
    .pin_banks= s3c2412_pin_banks,
    .nr_banks= ARRAY_SIZE(s3c2412_pin_banks),
    @ @ -578.6 +582.11 @@
  },
};

+const struct samsung_pinctrl_of_match_data s3c2412_of_data __initconst = {
+  .ctrl= s3c2412_pin_ctrl,
+  .num_ctrl= ARRAY_SIZE(s3c2412_pin_ctrl),
+};
+
+static const struct samsung_pin_bank_data s3c2416_pin_banks[] __initconst = {
+  PIN_BANK_A(27, 0x000, "gpa"),
+  PIN_BANK_2BIT(11, 0x010, "gpb"),
+  @ @ -592.7 +601.7 @ @
+  PIN_BANK_2BIT(2, 0x100, "gpm"),
+};

-const struct samsung_pin_ctrl s3c2416_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl s3c2416_pin_ctrl[] __initconst = {
  {
    .pin_banks= s3c2416_pin_banks,
    .nr_banks= ARRAY_SIZE(s3c2416_pin_banks),
    @ @ -600.6 +609.11 @@
  },
};

+const struct samsung_pinctrl_of_match_data s3c2416_of_data __initconst = {
+  .ctrl= s3c2416_pin_ctrl,
+  .num_ctrl= ARRAY_SIZE(s3c2416_pin_ctrl),
}
static const struct samsung_pin_bank_data s3c2440_pin_banks[] __initconst = {
  PIN_BANK_A(25, 0x000, "gpa"),
  PIN_BANK_2BIT(11, 0x010, "gpb"),
  PIN_BANK_2BIT(13, 0x0d0, "gpj"),
};

const struct samsung_pin_ctrl s3c2440_pin_ctrl[] __initconst = {
  {
    .pin_banks = s3c2440_pin_banks,
    .nr_banks = ARRAY_SIZE(s3c2440_pin_banks),
  },
};

+const struct samsung_pinctrl_of_match_data s3c2440_of_data __initconst = {
  .ctrl = s3c2440_pin_ctrl,
  .num_ctrl = ARRAY_SIZE(s3c2440_pin_ctrl),
};

static const struct samsung_pin_bank_data s3c2450_pin_banks[] __initconst = {
  PIN_BANK_A(28, 0x000, "gpa"),
  PIN_BANK_2BIT(11, 0x010, "gpb"),
  PIN_BANK_2BIT(2, 0x100, "gpm"),
};

void pinctrl_fini()
{
  /* Finish processing of the pinctrl controller. */
  /* Free the controller structure. */
  /* Free the pin banks. */
  /* Free the pin control data. */
  /* Free the pinctrl of driver. */
  /* Free the pinctrl of device. */
}

--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-s3c64xx.c
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-s3c64xx.c
@@ -709,8 +709,10 @@
 return -ENODEV;

data = devm_kzalloc(dev, sizeof(*data), GFP_KERNEL);
-if (!data)
+if (!data) {
+ of_node_put(eint0_np);
return -ENOMEM;
+
} data->drvdata = d;

for (i = 0; i < NUM_EINT0_IRQ; ++i) {
	irq = irq_of_parse_and_map(eint0_np, i);
-if (!irq)
+-of_node_put(eint0_np);
return -ENXIO;
+
}

s3c64xx_eint0_handlers[i],
data);
+of_node_put(eint0_np);

bank = d->pin_banks;
for (i = 0; i < d->nr_banks; ++i, ++bank) {
 *
 * Samsung pinctrl driver data for S3C64xx SoC. S3C64xx SoC includes
 * one gpio/pin-mux/pinconfig controller.
 */
-const struct samsung_pin_ctrl s3c64xx_pin_ctrl[] __initconst = {
+static const struct samsung_pin_ctrl s3c64xx_pin_ctrl[] __initconst = {
 .pin_banks	= s3c64xx_pin_banks0,
-const struct samsung_pinctrl_of_match_data s3c64xx_of_data __initconst = {

"failed to get wakeup EINT IRQ %d\n", i);
+of_node_put(eint0_np);

/* pin-controller instance 1 data */
 .pin_banks= s3c64xx_pin_banks0,
 .eint_wkup_init = s3c64xx_eint_eint0_init,
 },
};
+
+const struct samsung_pinctrl_of_match_data s3c64xx_of_data __initconst = {
 +.ctrl= s3c64xx_pin_ctrl,
 +.num_ctrl= ARRAY_SIZE(s3c64xx_pin_ctrl),
 +};
--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-samsung.c
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-samsung.c
@@ -726,6 +729,7 @@
 s3c64xx_eint0_handlers[i],
data);
 }
+of_node_put(eint0_np);

--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-samsung.c
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-samsung.c
@@ -277,6 +277,7 @@
 &reserved_maps, num_maps);
 if (ret < 0) {

+int id;
+
+id = of_alias_get_id(node, "pinctrl");
+if (id < 0) {
+dev_err(&pdev->dev, "failed to get alias id\n");
+return NULL;
+}
+
of_data = of_device_get_match_data(&pdev->dev);
+if (id >= of_data->num_ctrl) {
+dev_err(&pdev->dev, "invalid alias id %d\n", id);
+return NULL;
+}
+
+return &(of_data->ctrl[id]);
+
/* retrieve the soc specific data */
static const struct samsung_pin_ctrl *
samsung_pinctrl_get_soc_data(struct samsung_pinctrl_drv_data *d, 
    struct platform_device *pdev)
{
    int id;
    struct device_node *node = pdev->dev.of_node;
    struct device_node *np;
    const struct samsung_pin_bank_data *bdata;
    void __iomem *virt_base[SAMSUNG_PINCTRL_NUM_RESOURCES];
    unsigned int i;

    -id = of_alias_get_id(node, "pinctrl");
    -if (id < 0) {
    -dev_err(&pdev->dev, "failed to get alias id\n");
    +%ctrl = samsung_pinctrl_get_soc_data_for_of_alias(pdev);
    +%if (!ctrl)
    +return ERR_PTR(-ENOENT);
    -}
    -ctrl = of_device_get_match_data(&pdev->dev);
    -ctrl += id;

    d->suspend = ctrl->suspend;
    d->resume = ctrl->resume;
        @ @ -1193,41 +1216,41 @@
    static const struct of_device_id samsung_pinctrl_dt_match[] = {
#ifdef CONFIG_PINCTRL_EXYNOS_ARM
    {.compatible = "samsung,exynos3250-pinctrl",
    -.data = exynos3250_pin_ctrl },
    +.data = &exynos3250_of_data },

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{ .compatible = "samsung,exynos4210-pinctrl",
- .data = exynos4210_pin_ctrl },
+ .data = &exynos4210_of_data },
{ .compatible = "samsung,exynos4x12-pinctrl",
- .data = exynos4x12_pin_ctrl },
+ .data = &exynos4x12_of_data },
{ .compatible = "samsung,exynos5250-pinctrl",
- .data = exynos5250_pin_ctrl },
+ .data = &exynos5250_of_data },
{ .compatible = "samsung,exynos5260-pinctrl",
- .data = exynos5260_pin_ctrl },
+ .data = &exynos5260_of_data },
{ .compatible = "samsung,exynos5410-pinctrl",
- .data = exynos5410_pin_ctrl },
+ .data = &exynos5410_of_data },
{ .compatible = "samsung,exynos5420-pinctrl",
- .data = exynos5420_pin_ctrl },
+ .data = &exynos5420_of_data },
{ .compatible = "samsung,s5pv210-pinctrl",
- .data = s5pv210_pin_ctrl },
+ .data = &s5pv210_of_data },
#endif
#ifdef CONFIG_PINCTRL_EXYNOS_ARM64
{ .compatible = "samsung,exynos5433-pinctrl",
- .data = exynos5433_pin_ctrl },
+ .data = &exynos5433_of_data },
{ .compatible = "samsung,exynos7-pinctrl",
- .data = exynos7_pin_ctrl },
+ .data = &exynos7_of_data },
#endif
#ifdef CONFIG_PINCTRL_S3C64XX
{ .compatible = "samsung,s3c64xx-pinctrl",
- .data = s3c64xx_pin_ctrl },
+ .data = &s3c64xx_of_data },
#endif
#ifdef CONFIG_PINCTRL_S3C24XX
{ .compatible = "samsung,s3c2412-pinctrl",
- .data = s3c2412_pin_ctrl },
+ .data = &s3c2412_of_data },
{ .compatible = "samsung,s3c2416-pinctrl",
- .data = s3c2416_pin_ctrl },
+ .data = &s3c2416_of_data },
{ .compatible = "samsung,s3c2440-pinctrl",
- .data = s3c2440_pin_ctrl },
+ .data = &s3c2440_of_data },
{ .compatible = "samsung,s3c2450-pinctrl",
- .data = s3c2450_pin_ctrl },
+ .data = &s3c2450_of_data },
#endif
{
};
--- linux-4.15.0.orig/drivers/pinctrl/samsung/pinctrl-samsung.h
+++ linux-4.15.0/drivers/pinctrl/samsung/pinctrl-samsung.h
@@ -286,6 +286,16 @@
};
/**
 + * struct samsung_pinctrl_of_match_data: OF match device specific configuration data.
 + * @ctrl: array of pin controller data.
 + * @num_ctrl: size of array @ctrl.
 + */
+struct samsung_pinctrl_of_match_data {
+const struct samsung_pin_ctrl *ctrl;
+unsigned int num_ctrl;
+};
+/**
 * struct samsung_pin_group: represent group of pins of a pinmux function.
 * @name: name of the pin group, used to lookup the group.
 * @pins: the pins included in this group.
@@ -313,20 +323,20 @@
};
/* list of all exported SoC specific data */
-extern const struct samsung_pin_ctrl exynos3250_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos4210_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos4x12_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos5250_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos5260_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos5410_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos5420_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos5433_pin_ctrl[];
-extern const struct samsung_pin_ctrl exynos7_pin_ctrl[];
-extern const struct samsung_pin_ctrl s3c64xx_pin_ctrl[];
-extern const struct samsung_pin_ctrl s3c2412_pin_ctrl[];
-extern const struct samsung_pin_ctrl s3c2416_pin_ctrl[];
-extern const struct samsung_pin_ctrl s3c2440_pin_ctrl[];
-extern const struct samsung_pin_ctrl s3c2450_pin_ctrl[];
-extern const struct samsung_pin_ctrl s5pv210_pin_ctrl[];
+extern const struct samsung_pinctrl_of_match_data exynos3250_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos4210_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos4x12_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos5250_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos5260_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos5410_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos5420_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos5433_of_data;
+extern const struct samsung_pinctrl_of_match_data exynos7_of_data;
+extern const struct samsung_pinctrl_of_match_data s3c64xx_of_data;
+extern const struct samsung_pinctrl_of_match_data s3c2412_of_data;
+extern const struct samsung_pinctrl_of_match_data s3c2416_of_data;
+extern const struct samsung_pinctrl_of_match_data s3c2440_of_data;
+extern const struct samsung_pinctrl_of_match_data s3c2450_of_data;
+extern const struct samsung_pinctrl_of_match_data s5pv210_of_data;

#endif /* __PINCTRL_SAMSUNG_H */
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-emev2.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-emev2.c
@@ -1263,6 +1263,14 @@
 "dtv_b",
 ];

+static const char * const err_rst_reqb_groups[] = {
 +"err_rst_reqb",
 +};
 +
+static const char * const ext_clki_groups[] = {
 +"ext_clki",
 +};
 +
 static const char * const iic0_groups[] = {
 "iic0",
 @ @ -1285,6 +1293,10 @@
 "yuv3",
 ];

+static const char * const lowpwr_groups[] = {
 +"lowpwr",
 +};
 +
+static const char * const ntsc_groups[] = {
 +"ntsc_clk",
 +"ntsc_data",
 @ @ -1298,6 +1310,10 @@
 "pwm1",
 ];

+static const char * const ref_clko_groups[] = {
 +"ref_clko",
 +};
 +
 static const char * const sd_groups[] = {
 +"sd_cki",

); @ @ -1391,13 +1407,17 @ @
SH_PFC_FUNCTION(cam),
SH_PFC_FUNCTION(cf),
SH_PFC_FUNCTION(dtv),
+SH_PFC_FUNCTION(err_rst_reqb),
+SH_PFC_FUNCTION(ext_clki),
SH_PFC_FUNCTION(iic0),
SH_PFC_FUNCTION(iic1),
SH_PFC_FUNCTION(jtag),
SH_PFC_FUNCTION(lcd),
+SH_PFC_FUNCTION(lowpwr),
SH_PFC_FUNCTION(ntsc),
SH_PFC_FUNCTION(pwm0),
SH_PFC_FUNCTION(pwm1),
+SH_PFC_FUNCTION(ref_clko),
SH_PFC_FUNCTION(sd),
SH_PFC_FUNCTION(sdi0),
SH_PFC_FUNCTION(sdi1),
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a7740.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a7740.c
@@ -1982,7 +1982,7 @@
185, 186, 187, 188, 189, 190, 191, 192, 174, 161, 204,
171, 170, 169, 168, 167, 166, 173, 172, 176, 184, 183, 203,
-205, 163, 206, 207,
+205, 163, 206, 207, 158,
};
static const unsigned int gether_gmii_mux[] = {
ET_ERXD0_MARK, ET_ERXD1_MARK, ET_ERXD2_MARK, ET_ERXD3_MARK,
@ @ -2154,6 +2154,7 @ @
LCD0_D0_MARK, LCD0_D1_MARK, LCD0_D2_MARK, LCD0_D3_MARK,
LCD0_D4_MARK, LCD0_D5_MARK, LCD0_D6_MARK, LCD0_D7_MARK,
LCD0_D8_MARK, LCD0_D9_MARK, LCD0_D10_MARK, LCD0_D11_MARK,
+LCD0_D12_MARK, LCD0_D13_MARK, LCD0_D14_MARK, LCD0_D15_MARK,
LCD0_D16_MARK, LCD0_D17_MARK, LCD0_D18_PORT163_MARK,
LCD0_D19_PORT162_MARK, LCD0_D20_PORT161_MARK, LCD0_D21_PORT158_MARK,
LCD0_D22_PORT160_MARK, LCD0_D23_PORT159_MARK,
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a7778.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a7778.c
@@ -2325,7 +2325,7 @@
FN_ATAG0_A,O,FN_REMOCON_B,O,
/* IP0.11_8 [4] */
FN_SD1_DAT2_A,FN_MMC_D2,O,FN_BS,
-FN_ATADIR0_A,O,FN_SDSELF_B,O,
+FN_ATADIR0_A,O,FN_SDSELF_A,O,
FN_PWM4_B,0,0,0,
0,0,0,0,
FN_TS_SDAT0_A, 0, 0, 0,
/* IP1_10_8 [3] */
-FN_SD1_CLK_B, FN_MMC_D6, 0, FN_A24,
+FN_SD1_CD_A, FN_MMC_D6, 0, FN_A24,
FN_DREQ1_A, 0, FN_HRX0_B, FN_TS_SPSYNC0_A,
/* IP1_7_5 [3] */
FN_A23, FN_HTX0_B, FN_TX2_B, FN_DACK2_A,
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a7791.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a7791.c
@@ -2367,7 +2367,7 @@
FN_TS_SDAT0_A, 0, 0, 0,
/* IP1_10_8 [3] */
-FN_SD1_CLK_B, FN_MMC_D6, 0, FN_A24,
+FN_SD1_CD_A, FN_MMC_D6, 0, FN_A24,
FN_DREQ1_A, 0, FN_HRX0_B, FN_TS_SPSYNC0_A,
/* IP1_7_5 [3] */
FN_A23, FN_HTX0_B, FN_TX2_B, FN_DACK2_A,
"can_clk",
"can_clk_b",
"can_clk_c",
@@ -4837,6 +4837,21 @@
"can1_data_b",
"can1_data_c",
"can1_data_d",
+/*
+ * Retained for backwards compatibility, use can_clk_groups in new
+ * designs.
+ */
+"can_clk",
+"can_clk_b",
+"can_clk_c",
+"can_clk_d",
+};
+
+/*
 * can_clk_groups allows for independent configuration, use can_clk function
 * in new designs.
 */
+static const char * const can_clk_groups[] = {
  "can_clk",
  "can_clk_b",
  "can_clk_c",
@@ -5194,7 +5209,7 @@
  "scifb2_data_b",
  "scifb2_clk_b",
  "scifb2_ctrl_b",
-"scifb0_data_c",
+"scifb2_data_c",
  "scifb2_clk_c",
  "scifb2_data_d",
  
};
@@ -5308,7 +5323,7 @@
};

static const struct {
-struct sh_pfc_function common[56];
+struct sh_pfc_function common[57];
 struct sh_pfc_function r8a779x[2];
 } pinmux_functions = {
 .common = {
@@ -5316,6 +5331,7 @@
 SH_PFC_FUNCTION(avb),
 SH_PFC_FUNCTION(can0),
 SH_PFC_FUNCTION(can1),
+SH_PFC_FUNCTION(can_clk),

SH_PFC_FUNCTION(du),
SH_PFC_FUNCTION(du0),
SH_PFC_FUNCTION(du1),

--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a7792.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a7792.c
@@ -1916,6 +1916,7 @@
    "vin1_data8",
    "vin1_data24_b",
    "vin1_data20_b",
+    "vin1_data18_b",
    "vin1_data16_b",
    "vin1_sync",
    "vin1_field",

--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a7794.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a7794.c
@@ -4742,7 +4742,7 @@
    { PINMUX_CFG_REG_VAR("IPSR9", 0xE6060044, 32,
-        1, 3, 3, 3, 2, 2, 3, 3, 3, 3, 3) {
+        1, 3, 3, 3, 2, 2, 3, 3, 3, 3, 3) {
        /* IP9_31 [1] */
        0, 0,
/* IP9_30_28 [3] */

--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a7795-es1.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a7795-es1.c
@@ -1397,7 +1397,7 @@
    PINMUX_IPSR_MSEL(IP16_27_24, AUDIO_CLKOUT_B, SEL_ADG_1),
    PINMUX_IPSR_MSEL(IP16_27_24, SSI_SCK2_B, SEL_SSI_1),
    PINMUX_IPSR_MSEL(IP16_27_24, TS_SDEN1_D, SEL_TSIF1_3),
-    PINMUX_IPSR_MSEL(IP16_27_24, STP_ISEN1_D, SEL_SSP1_1_2),
+    PINMUX_IPSR_MSEL(IP16_27_24, STP_ISEN1_D, SEL_SSP1_1_3),
    PINMUX_IPSR_MSEL(IP16_27_24, STP_OPWM_0_E, SEL_SSP1_0_4),
    PINMUX_IPSR_MSEL(IP16_27_24, RIF3_D0_B, SEL_DRIF3_1),
    PINMUX_IPSR_MSEL(IP16_27_24, TCLK2_B, SEL_TIMER_TMU_1),
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a7796.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a7796.c
@@ -1,7 +1,7 @@
/*
 * R8A7796 processor support - PFC hardware block.
 *
- * Copyright (C) 2016 Renesas Electronics Corp.
+ * Copyright (C) 2016-2017 Renesas Electronics Corp.
 *
 * This file is based on the drivers/pinctrl/sh-pfc/pfc-r8a7795.c
 *
 @@ -477,7 +477,7 @@
 #define MOD_SEL1_26FM(SEL_TIMER_TMU_0)FM(SEL_TIMER_TMU_1)
#define MOD_SEL1_25_24FM(SEL_SSP1_1_0)FM(SEL_SSP1_1_1)FM(SEL_SSP1_1_2)FM(SEL_SSP1_1_3)
#define MOD_SEL1_23_22_21FM(SEL_SSP1_0_0)FM(SEL_SSP1_0_1)FM(SEL_SSP1_0_2)
FM(SEL_SSP1_0_3)FM(SEL_SSP1_0_4)F_(0, 0)F_(0, 0)F_(0, 0)
-#define MOD_SEL1_20FM(SEL_SSI_0)FM(SEL_SSI_1)
+#define MOD_SEL1_20FM(SEL_SSI1_0)FM(SEL_SSI1_1)
#define MOD_SEL1_19FM(SEL_SPEED_PULSE_0)FM(SEL_SPEED_PULSE_1)
#define MOD_SEL1_18_17FM(SEL_SIMCARD_0)FM(SEL_SIMCARD_1)FM(SEL_SIMCARD_2)
FM(SEL_SIMCARD_3)
#define MOD_SEL1_16FM(SEL_SDHI2_0)FM(SEL_SDHI2_1)
@@ -1224,7 +1224,7 @@
PINF MUX_IPSR_GPSR(IP13_11_8,HSC0),
PINF MUX_IPSR_MSEL(IP13_11_8,MSIOF1_SCK_D,SEL_MSIOF1_3),
PINF MUX_IPSR_MSEL(IP13_11_8,AUDIO_CLKB_A,SEL_ADG_B_0),
-PINF MUX_IPSR_MSEL(IP13_11_8,SSI_SDATA1_B,SEL_SSI_1),
+PINF MUX_IPSR_MSEL(IP13_11_8,SSI_SDATA1_B,SEL_SSI1_1),
PINF MUX_IPSR_MSEL(IP13_11_8,SSI_SDATA1_B,SEL_SSI1_1),
PINF MUX_IPSR_MSEL(IP13_11_8,TS_SCK0_D,SEL_TSIF0_3),
PINF MUX_IPSR_MSEL(IP13_11_8,STP_ISCLK_0_D,SEL_SSP1_0_3),
PINF MUX_IPSR_MSEL(IP13_11_8,RIF0_CLK_C,SEL_DRIF0_2),
@@ -1232,14 +1232,14 @@
PINF MUX_IPSR_GPSR(IP13_15_12,HRX0),
PINF MUX_IPSR_MSEL(IP13_15_12,MSIOF1_RXD_D,SEL_MSIOF1_3),
-PINF MUX_IPSR_MSEL(IP13_15_12,SSI_SDATA2_B,SEL_SSI_1),
+PINF MUX_IPSR_MSEL(IP13_15_12,SSI_SDATA2_B,SEL_SSI2_1),
PINF MUX_IPSR_MSEL(IP13_15_12,TS_SDEN0_D,SEL_TSIF0_3),
PINF MUX_IPSR_MSEL(IP13_15_12,STP_ISEN_0_D,SEL_SSP1_0_3),
PINF MUX_IPSR_MSEL(IP13_15_12,RIF0_D0_C,SEL_DRIF0_2),
@@ -1247,7 +1247,7 @@
PINF MUX_IPSR_GPSR(IP13_19_16,HTX0),
PINF MUX_IPSR_MSEL(IP13_19_16,MSIOF1_TXD_D,SEL_MSIOF1_3),
-PINF MUX_IPSR_MSEL(IP13_19_16,SSI_SDATA9_B,SEL_SSI_1),
+PINF MUX_IPSR_MSEL(IP13_19_16,SSI_SDATA9_B,SEL_SSI9_1),
PINF MUX_IPSR_MSEL(IP13_19_16,TS_SDAT0_D,SEL_TSIF0_3),
PINF MUX_IPSR_MSEL(IP13_19_16,STP_ISD_0_D,SEL_SSP1_0_3),
PINF MUX_IPSR_MSEL(IP13_19_16,RIF0_D1_C,SEL_DRIF0_2),
@@ -1247,7 +1247,7 @@
PINF MUX_IPSR_GPSR(IP13_23_20,HCTS0_N),
PINF MUX_IPSR_MSEL(IP13_23_20,RX2_B,SEL_SCIF2_1),
PINF MUX_IPSR_MSEL(IP13_23_20,MSIOF1_SYNC_D,SEL_MSIOF1_3),
-PINF MUX_IPSR_MSEL(IP13_23_20,SSI_SCK9_A,SEL_SSI_0),
+PINF MUX_IPSR_MSEL(IP13_23_20,SSI_SCK9_A,SEL_SSI9_0),
PINF MUX_IPSR_MSEL(IP13_23_20,TS_SPSYNC0_D,SEL_TSIF0_3),
PINF MUX_IPSR_MSEL(IP13_23_20,STP_ISSYNC_0_D,SEL_SSP1_0_3),
PINF MUX_IPSR_MSEL(IP13_23_20,RIF0_SYNC_C,SEL_DRIF0_2),
@@ -1256,7 +1256,7 @@
PINF MUX_IPSR_GPSR(IP13_27_24,HRTS0_N),
PINF MUX_IPSR_MSEL(IP13_27_24,TX2_B,SEL_SCIF2_1),
PINF MUX_IPSR_MSEL(IP13_27_24,MSIOF1_SS1_D,SEL_MSIOF1_3),
-PINMUX_IPSR_MSEL(IP13_27_24,SSI_WS9_A,SEL_SSI0),
+PINMUX_IPSR_MSEL(IP13_27_24,SSI_WS9_A,SEL_SSI9),
PINMUX_IPSR_MSEL(IP13_27_24,STP_IVCXO27_0_D,SEL_SSP1_0_3),
PINMUX_IPSR_MSEL(IP13_27_24,BPFCLK_A,SEL_FM0),
PINMUX_IPSR_GPSR(IP13_27_24,AUDIO_CLKOUT2_A),
@@ -1271,7 +1271,7 @@
 PINMUX_IPSR_MSEL(IP14_3_0,RX5_A,SEL_SCIF5_0),
 PINMUX_IPSR_MSEL(IP14_3_0,NFWP_N_A,SEL_NDF_0),
 PINMUX_IPSR_MSEL(IP14_3_0,AUDIO_CLKA_C,SEL_ADG_A_2),
-PINMUX_IPSR_MSEL(IP14_3_0,SSI_SCK2_A,SEL_SSI0),
+PINMUX_IPSR_MSEL(IP14_3_0,SSI_SCK2_A,SEL_SSI2_0),
 PINMUX_IPSR_MSEL(IP14_3_0,STP_IVCXO27_0_C,SEL_SSP1_0_2),
 PINMUX_IPSR_GPSR(IP14_3_0,AUDIO_CLKOUT3_A),
 PINMUX_IPSR_MSEL(IP14_3_0,TCLK1_B,SEL_TIMER_TMU1),
@@ -1280,7 +1280,7 @@
 PINMUX_IPSR_MSEL(IP14_7_4,TX5_A,SEL_SCIF5_0),
 PINMUX_IPSR_MSEL(IP14_7_4,MSIOF1_SS2_D,SEL_MSIOF1_3),
 PINMUX_IPSR_MSEL(IP14_7_4,AUDIO_CLKC_A,SEL_ADG_C_0),
-PINMUX_IPSR_MSEL(IP14_7_4,SSI_WS2_A,SEL_SSI0),
+PINMUX_IPSR_MSEL(IP14_7_4,SSI_WS2_A,SEL_SSI2_0),
+PINMUX_IPSR_MSEL(IP14_7_4,SSI_WS1_B,SEL_SSI1_1),
 PINMUX_IPSR_GPSR(IP14_7_4,AUDIO_CLKOUT_D),
 PINMUX_IPSR_MSEL(IP14_7_4,SPEEDIN_B,SEL_SPEED_PULSE1),
@@ -1308,10 +1308,10 @@
 PINMUX_IPSR_MSEL(IP15_3_0,SSI_SDATA1_A,SEL_SSI0),
-PINMUX_IPSR_MSEL(IP15_7_4,SSI_SDATA2_A,SEL_SSI0),
-PINMUX_IPSR_MSEL(IP15_7_4,SSI_SCK1_B,SEL_SSI1),
-PINMUX_IPSR_MSEL(IP15_7_4,SSI_SDATA9_A,SEL_SSI0),
+PINMUX_IPSR_MSEL(IP15_7_4,SSI_SDATA2_A,SEL_SSI2_0),
+PINMUX_IPSR_MSEL(IP15_7_4,SSI_SCK1_B,SEL_SSI1_1),
 PINMUX_IPSR_GPSR(IP15_11_8,SSI_SCK349),
 PINMUX_IPSR_MSEL(IP15_11_8,MSIOF1_SS1_A,SEL_MSIOF1_0),
@@ -1397,11 +1397,11 @@
 PINMUX_IPSR_MSEL(IP16_27_24,RIFF1_D1_A,SEL_DRIF1_0),
 PINMUX_IPSR_MSEL(IP16_27_24,RIFF3_D1_A,SEL_DRIF3_0),
-PINMUX_IPSR_MSEL(IP16_31_28,SSI_SDATA9_A,SEL_SSI0),
-PINMUX_IPSR_MSEL(IP16_31_28,SSI_SDATA9_A,SEL_SSI9),
-PINMUX_IPSR_MSEL(IP16_31_28,HSCCK2_B,SEL_HSCIF2_1),
-PINMUX_IPSR_MSEL(IP16_31_28,MSIOF1_SS1_C,SEL_MSIOF1_2),
-PINMUX_IPSR_MSEL(IP16_31_28,HSCK1_A,SEL_HSCIF1_0),
-PINMUX_IPSR_MSEL(IP16_31_28,SSI_WS1_B,SEL_SSI1),
+PINMUX_IPSR_MSEL(IP16_31_28,SSI_WS1_B,SEL_SSI1_1),
+PINMUX_IPSR_MSEL(IP16_31_28,SSI_WS1_B,SEL_SSI1_1),
PINMUX_IPSR_GPSR(IP16_31_28,SCK1),
PINMUX_IPSR_MSEL(IP16_31_28,STP_IVCXO27_1,A,SEL_SSP1_1_0),
PINMUX_IPSR_MSEL(IP16_31_28,SCK5_A,SEL_SCIF5_0),
@@ -1433,7 +1433,7 @@
PINMUX_IPSR_GPSR(IP17_19_16,USB1_PWEN),
PINMUX_IPSR_MSEL(IP17_19_16,SIM0_CLK_C,SEL_SIMCARD_2),
-PINMUX_IPSR_MSEL(IP17_19_16,SSI_SCK1_A,SEL_SSI_0),
+PINMUX_IPSR_MSEL(IP17_19_16,SSI_SCK1_A,SEL_SSI0_0),
PINMUX_IPSR_MSEL(IP17_19_16,TS_SCK0_E,SEL_TSIF0_4),
PINMUX_IPSR_MSEL(IP17_19_16,STP_ISCLK_0_E,SEL_SSP1_0_4),
PINMUX_IPSR_MSEL(IP17_19_16,FMCCLK_B,SEL_FM_1),
@@ -1443,7 +1443,7 @@
PINMUX_IPSR_GPSR(IP17_23_20,USB1_OVC),
PINMUX_IPSR_MSEL(IP17_23_20,MSIOF1_SS2_C,SEL_MSIOF1_2),
-PINMUX_IPSR_MSEL(IP17_23_20,SSI_WS1_A,SEL_SSI_0),
+PINMUX_IPSR_MSEL(IP17_23_20,SSI_WS1_A,SEL_SSI1_0),
PINMUX_IPSR_MSEL(IP17_23_20,TS_SDAT0_E,SEL_TSIF0_4),
PINMUX_IPSR_MSEL(IP17_23_20,STP_ISD_0_E,SEL_SSP1_0_4),
PINMUX_IPSR_MSEL(IP17_23_20,FMIN_B,SEL_FM_1),
@@ -1453,7 +1453,7 @@
PINMUX_IPSR_GPSR(IP17_27_24,USB30_PWEN),
PINMUX_IPSR_GPSR(IP17_27_24,AUDIO_CLKOUT_B),
-PINMUX_IPSR_MSEL(IP17_27_24,SSI_SCK2_B,SEL_SSI_1),
+PINMUX_IPSR_MSEL(IP17_27_24,SSI_SCK2_B,SEL_SSI2_1),
PINMUX_IPSR_MSEL(IP17_27_24,TS_SDEN1_D,SEL_TSIF1_3),
PINMUX_IPSR_MSEL(IP17_27_24,STP_ISEN_1_D,SEL_SSP1_1_3),
PINMUX_IPSR_MSEL(IP17_27_24,STP_OPWM_0_E,SEL_SSP1_0_4),
@@ -1465,7 +1465,7 @@
PINMUX_IPSR_GPSR(IP17_31_28,USB30_OVC),
PINMUX_IPSR_GPSR(IP17_31_28,AUDIO_CLKOUT1_B),
-PINMUX_IPSR_MSEL(IP17_31_28,SSI_WS2_B,SEL_SSI_1),
+PINMUX_IPSR_MSEL(IP17_31_28,SSI_WS2_B,SEL_SSI2_1),
PINMUX_IPSR_MSEL(IP17_31_28,TS_SPSYNC1_D,SEL_TSIF1_3),
PINMUX_IPSR_MSEL(IP17_31_28,STP_ISSYNC_1_D,SEL_SSP1_1_3),
PINMUX_IPSR_MSEL(IP17_31_28,STP_IVCXO27_0_E,SEL_SSP1_0_4),
@@ -1476,7 +1476,7 @@/* IPSR18 */
PINMUX_IPSR_GPSR(IP18_3_0,GP6_30),
PINMUX_IPSR_GPSR(IP18_3_0,AUDIO_CLKOUT2_B),
-PINMUX_IPSR_MSEL(IP18_3_0,SSI_SCK9_B,SEL_SSI_1),
+PINMUX_IPSR_MSEL(IP18_3_0,SSI_SCK9_B,SEL_SSI9_1),
PINMUX_IPSR_MSEL(IP18_3_0,TS_SDENO_E,SEL_TSIF0_4),
PINMUX_IPSR_MSEL(IP18_3_0,STP_ISEN_0_E,SEL_SSP1_0_4),
PINMUX_IPSR_MSEL(IP18_3_0,RIF2_D0_B,SEL_DRIF2_1),
PINMUX_IPSR_GPSR(IP18_7_4,GP6_31),
PINMUX_IPSR_GPSR(IP18_7_4,AUDIO_CLKOUT3_B),
-PINMUX_IPSR_MSEL(IP18_7_4,SSI_WS9_B,SEL_SSI_1),
+PINMUX_IPSR_MSEL(IP18_7_4,SSI_WS9_B,SEL_SSI9_1),
PINMUX_IPSR_MSEL(IP18_7_4,TS_SPSYNC0_E,SEL_TSF0_4),
PINMUX_IPSR_MSEL(IP18_7_4,STP_ISSYNC_0_E,SEL_SSP1_0_4),
PINMUX_IPSR_MSEL(IP18_7_4,RIF2_D1_B,SEL_DRIF2_1),
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a77995.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a77995.c
@@ -1486,7 +1486,7 @@
 PINMUX_IPSR_MSEL(IP18_7_4,	SSL_WS9_B,SEL_SSI9_1),
 PINMUX_IPSR_MSEL(IP18_7_4,TS_SPSYNC0_E,SEL_TSF0_4),
 PINMUX_IPSR_MSEL(IP18_7_4,STP_ISSSYNC_0_E,SEL_SSP1_0_4),
 PINMUX_IPSR_MSEL(IP18_7_4,RIF2_D1_B,SEL_DRIF2_1),
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-r8a77995.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a77995.c
@@ -391,10 +391,10 @@
 #define MOD_SEL0_27FM(SEL_MSIOF3_0)FM(SEL_MSIOF3_1)
 #define MOD_SEL0_26FM(SEL_HSCIF3_0)FM(SEL_HSCIF3_1)
 #define MOD_SEL0_25FM(SEL_SCIF4_0)FM(SEL_SCIF4_1)
-#define MOD_SEL0_24_23FM(SEL_PWM0_0)FM(SEL_PWM0_1)FM(SEL_PWM0_2)FM(SEL_PWM0_3)
-#define MOD_SEL0_22_21FM(SEL_PWM1_0)FM(SEL_PWM1_1)FM(SEL_PWM1_2)FM(SEL_PWM1_3)
-#define MOD_SEL0_20_19FM(SEL_PWM2_0)FM(SEL_PWM2_1)FM(SEL_PWM2_2)FM(SEL_PWM2_3)
-#define MOD_SEL0_18_17FM(SEL_PWM3_0)FM(SEL_PWM3_1)FM(SEL_PWM3_2)FM(SEL_PWM3_3)
+#define MOD_SEL0_24_23FM(SEL_PWM0_0)FM(SEL_PWM0_1)FM(SEL_PWM0_2)FM(SEL_PWM0_3)
+#define MOD_SEL0_22_21FM(SEL_PWM1_0)FM(SEL_PWM1_1)FM(SEL_PWM1_2)FM(SEL_PWM1_3)
+#define MOD_SEL0_20_19FM(SEL_PWM2_0)FM(SEL_PWM2_1)FM(SEL_PWM2_2)FM(SEL_PWM2_3)
+#define MOD_SEL0_18_17FM(SEL_PWM3_0)FM(SEL_PWM3_1)FM(SEL_PWM3_2)FM(SEL_PWM3_3)
+* DMAC *
++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-r8a77995.c
@@ -998,12 +996,12 @@@
 SD_WP_MARK, SD_CLK_MARK, SD_CMD_MARK,
 CRX0_MARK, CRX1_MARK,
 CTX0_MARK, CTX1_MARK,
+CRX0_CRX1_MARK, CTX0_CTX1_MARK,

 PWM1A_MARK, PWM1B_MARK, PWM1C_MARK, PWM1D_MARK,
 PWM1E_MARK, PWM1F_MARK, PWM1G_MARK, PWM1H_MARK,
 PWM2A_MARK, PWM2B_MARK, PWM2C_MARK, PWM2D_MARK,
 PWM2E_MARK, PWM2F_MARK, PWM2G_MARK, PWM2H_MARK,
 IERXD_MARK, IETXD_MARK,
-CRX0_CRX1_MARK, WDTOVF_MARK,
-CRX0X1_MARK,

 /* DMAC */
 TEND0_MARK, DACK0_MARK, DREQ0_MARK,
 TEND1_MARK, DACK1_MARK, DREQ1_MARK,
PINMUX_DATA(PJ3_DATA, PJ3MD_00),
PINMUX_DATA(CRX1_MARK, PJ3MD_01),
-PINMUX_DATA(CRX0X1_MARK, PJ3MD_10),
+PINMUX_DATA(CRX0_CRX1_MARK, PJ3MD_10),
PINMUX_DATA(IRQ1_PJ_MARK, PJ3MD_11),

PINMUX_DATA(PJ2_DATA, PJ2MD_000),
PINMUX_DATA(CTX1_MARK, PJ2MD_001),
-PINMUX_DATA(CRX0_CRX1_MARK, PJ2MD_010),
+PINMUX_DATA(CTX0_CTX1_MARK, PJ2MD_010),
PINMUX_DATA(CS2_MARK, PJ2MD_011),
PINMUX_DATA(SCK0_MARK, PJ2MD_100),
PINMUX_DATA(LCD_M_DISP_MARK, PJ2MD_101),
@@ -1248,6 +1246,7 @@
GPIO_FN(CTX1),
GPIO_FN(CRX1),
GPIO_FN(CTX0),
+GPIO_FN(CTX0_CTX1),
GPIO_FN(CRX0),
GPIO_FN(CRX0_CRX1),
@@ -1716,6 +1715,9 @@

{ PINMUX_CFG_REG("PFCR3", 0xffffe38a8, 16, 4) { 
+0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 
+0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 
+0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 
PFI2MD_000, PFI2MD_001, 0, PFI2MD_011, 
PFI2MD_100, PFI2MD_101, 0, 0, 
0, 0, 0, 0, 0, 0, 0, 0 } 
@@ -1759,8 +1761,10 @@
0, 0, 0, 0, 0, 0, 0, 0, 
PF1MD_000, PF1MD_001, PF1MD_010, PF1MD_011, 
PF1MD_100, PF1MD_101, 0, 0, 
-0, 0, 0, 0, 0, 0, 0, 0 
- } 
+0, 0, 0, 0, 0, 0, 0, 0, 
+PF0MD_000, PF0MD_001, PF0MD_010, PF0MD_011, 
+PF0MD_100, PF0MD_101, 0, 0, 
+0, 0, 0, 0, 0, 0, 0 } 
},

{ PINMUX_CFG_REG("PFIOR0", 0xffffe38b2, 16, 1) { 
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-sh7269.c 
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-sh7269.c 
@@ -740,13 +740,12 @@
CRX0_MARK, CTX0_MARK, CRX1_MARK, CTX1_MARK, CRX2_MARK, CTX2_MARK,
-CRX0_CRX1_MARK, -CRX0_CRX1_CRX2_MARK, -CTX0CTX1CTX2_MARK,
+CRX0_CRX1_MARK, CTX0_CTX1_MARK, +CRX0_CRX1_CRX2_MARK, CTX0_CTX1_CTX2_MARK, CRX1_PJ22_MARK, CTX1_PJ23_MARK, CRX2_PJ20_MARK, CTX2_PJ21_MARK, -CRX0CRX1_PJ22_MARK, -CRX0CRX1CRX2_PJ20_MARK, +CRX0_CRX1_PJ22_MARK, CTX0_CTX1_PJ23_MARK, +CRX0_CRX1_CRX2_PJ20_MARK, CTX0_CTX1_CTX2_PJ21_MARK,

/* VDC */
DV_CLK_MARK,
@@ -824,6 +823,7 @@
PINMUX_DATA(CS3_MARK, PC8MD_001),
PINMUX_DATA(TXD7_MARK, PC8MD_010),
PINMUX_DATA(CTX1_MARK, PC8MD_011),
+PINMUX_DATA(CTX0_CTX1_MARK, PC8MD_100),
PINMUX_DATA(PC7_DATA, PC7MD_000),
PINMUX_DATA(CKE_MARK, PC7MD_001),
@@ -836,11 +836,12 @@
PINMUX_DATA(CAS_MARK, PC6MD_001),
PINMUX_DATA(SCK7_MARK, PC6MD_010),
PINMUX_DATA(CTX0_MARK, PC6MD_011),
+PINMUX_DATA(CTX0_CTX1_CTX2_MARK, PC6MD_100),
PINMUX_DATA(PC5_DATA, PC5MD_000),
PINMUX_DATA(RAS_MARK, PC5MD_001),
PINMUX_DATA(CRX0_MARK, PC5MD_011),
-PINMUX_DATA(CTX0CTX1CTX2_MARK, PC5MD_100),
+PINMUX_DATA(CTX0_CTX1_CTX2_MARK, PC5MD_100),
+PINMUX_DATA(CTX0_CTX1_PJ23_MARK, PJ23MD_110),
PINMUX_DATA(PJ22_DATA, PJ22MD_000),
@ @ -1292.30 +1293.32 @ @
PINMUX_DATA(LCD_DATA23_PJ23_MARK, PJ23MD_010),
PINMUX_DATA(LCD_TCON6_MARK, PJ23MD_011),
PINMUX_DATA(IRQ3_PJ_MARK, PJ23MD_100),
-PINMUX_DATA(CTX1_MARK, PJ23MD_101),
+PINMUX_DATA(CTX1_PJ23_MARK, PJ23MD_101),
+PINMUX_DATA(CTX0_CTX1_PJ23_MARK, PJ23MD_110),
PINMUX_DATA(PJ22_DATA, PJ22MD_000),
PINMUX_DATA(DV_DATA22_MARK, PJ22MD_001),
PINMUX_DATA(LCD_DATA22_PJ22_MARK, PJ22MD_010),
PINMUX_DATA(LCD_TCON5_MARK, PJ22MD_011),
PINMUX_DATA(IRQ2_PJ_MARK, PJ22MD_100),
-PINMUX_DATA(CRX1_MARK, PJ22MD_101),
-PINMUX_DATA(CRX0_CRX1_MARK, PJ22MD_110),
+PINMUX_DATA(CRX1_PJ22_MARK, PJ22MD_101),
+PINMUX_DATA(CRX1_PJ22_MARK, PJ22MD_110),

PINMUX_DATA(PJ21_DATA, PJ21MD_000),
PINMUX_DATA(DV_DATA21_MARK, PJ21MD_001),
PINMUX_DATA(LCD_DATA21_PJ21_MARK, PJ21MD_010),
PINMUX_DATA(LCD_TCON4_MARK, PJ21MD_011),
PINMUX_DATA(IRQ1_PJ_MARK, PJ21MD_100),
-PINMUX_DATA(CTX2_MARK, PJ21MD_101),
+PINMUX_DATA(CTX2_PJ21_MARK, PJ21MD_101),
+PINMUX_DATA(CTX0_CTX1_CTX2_PJ21_MARK, PJ21MD_110),

PINMUX_DATA(PJ20_DATA, PJ20MD_000),
PINMUX_DATA(DV_DATA20_MARK, PJ20MD_001),
PINMUX_DATA(LCD_DATA20_PJ20_MARK, PJ20MD_010),
PINMUX_DATA(LCD_TCON3_MARK, PJ20MD_011),
PINMUX_DATA(IRQ0_PJ_MARK, PJ20MD_100),
-PINMUX_DATA(CRX2_MARK, PJ20MD_101),
-PINMUX_DATA(CRX0_CRX1_CRX2_PJ20_MARK, PJ20MD_110),
+PINMUX_DATA(CRX2_PJ20_MARK, PJ20MD_101),
+PINMUX_DATA(CRX0_CRX1_CRX2_PJ20_MARK, PJ20MD_110),

PINMUX_DATA(PJ19_DATA, PJ19MD_000),
PINMUX_DATA(DV_DATA19_MARK, PJ19MD_001),
@@ -1666,12 +1669,24 @@
GPIO_FN(WDTOVF),

/* CAN */
+GPIO_FN(CTX2),
+GPIO_FN(CRX2),
GPIO_FN(CTX1),
GPIO_FN(CRX1),
GPIO_FN(CTX0),
GPIO_FN(CRX0),
+GPIO_FN(CTX0_CTX1),
GPIO_FN(CRX0_CTX1),
+GPIO_FN(CTX0_CTX1_CTX2),
GPIO_FN(CRX0_CTX1_CTX2),
+GPIO_FN(CTX2_PJ21),
+GPIO_FN(CRX2_PJ20),
+GPIO_FN(CTX1_PJ23),
+GPIO_FN(CRX1_PJ22),
+GPIO_FN(CTX0_CTX1_PJ23),
+GPIO_FN(CRX0_CRX1_PJ22),
+GPIO_FN(CTX0_CTX1_CTX2_PJ21),
+GPIO_FN(CRX0_CRX1_CRX2_PJ20),

/* DMAC */
GPIO_FN(TEND0),
@@ -2119,7 +2134,7 @@

{ PINMUX_CFG_REG("PCIOR0", 0xfffe3852, 16, 1) {
-0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
+0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
PC8_IN, PC8_OUT,
PC7_IN, PC7_OUT,
PC6_IN, PC6_OUT,
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-sh73a0.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-sh73a0.c
@@ -3086,6 +3086,7 @@

static const unsigned int tpu4_to3_pins[] = {
/* TO */
+PIN_NUMBER(6, 26),
};
static const unsigned int tpu4_to3_mux[] = {
TPU4TO3_MARK,
@@ -3366,7 +3367,8 @@
"fsic_sclk_out",
"fsic_data_in",
"fsic_data_out",
+"fsic_spdif",
+"fsic_spdif_0",
+"fsic_spdif_1",
};

static const char * const fsid_groups[] = {
--- linux-4.15.0.orig/drivers/pinctrl/sh-pfc/pfc-sh7734.c
+++ linux-4.15.0/drivers/pinctrl/sh-pfc/pfc-sh7734.c
@@ -1453,7 +1453,7 @@
GPIO_FN(ET0_ETXD2_A),
GPIO_FN(EX_CS5), GPIO_FN(SD1_CMD_A), GPIO_FN(ATADIR), GPIO_FN(QSSL_B),
GPIO_FN(ET0_ETXD3_A),
-GPIO_FN(RD_WR), GPIO_FN(TCLK1_B),
+GPIO_FN(RD_WR), GPIO_FN(TCLK0), GPIO_FN(CAN_CLK_B), GPIO_FN(ET0_ETXD4),
GPIO_FN(EX_WAIT0), GPIO_FN(TCLK1_B),
GPIO_FN(EX_WAIT1), GPIO_FN(SD1_DAT0_A), GPIO_FN(DREQ2),
GPIO_FN(CAN1_TX_C), GPIO_FN(ET0_LINK_C), GPIO_FN(ET0_ETXD5_A),
@@ -1949,7 +1949,7 @@
/* IP3_20 [1] */
FN_EX_WAIT0, FN_TCLK1_B,
/* IP3_19_18 [2] */
-FN_RD_WR, FN_TCLK1_B, 0, 0,
+FN_RD_WR, FN_TCLK0, FN_CAN_CLK_B, FN_ET0_ETXD4,
/* IP3_17_15 [3] */
FN_EX_CS5, FN_SD1_CMD_A, FN_ATADIR, FN_QSSL_B,
FN_ET0_ETXD3_A, 0, 0, 0,
@@ -2213,31 +2213,31 @@
/* IP10_22 [1] */
FN_CAN_CLK_A, FN_RX4_D,
/* IP10_21 [3] */
-FN_AUDIO_CLKOUT, FN_TX1_E, FN_HRTS0_C, FN_FSE_B,
-FN_LCD_M_DISP_B, 0, 0, 0,
+FN_AUDIO_CLKOUT, FN_TX1_E, 0, FN_HRTS0_C, FN_FSE_B,
+FN_LCD_M_DISP_B, 0, 0,
/* IP10_18 [3] */
-FN_AUDIO_CLKC, FN_SCK1_E, FN_HCTS0_C, FN_FRB_B,
-FN_LCD_VEPWC_B, 0, 0, 0,
+FN_AUDIO_CLKC, FN_SCK1_E, 0, FN_HCTS0_C, FN_FRB_B,
+FN_LCD_VEPWC_B, 0, 0,
/* IP10_15 [1] */
FN_AUDIO_CLKB_A, FN_LCD_CLK_B,
/* IP10_14 [3] */
FN_AUDIO_CLKA_A, FN_V11_CLK_B, FN_SCK1_D, FN_IECLK_B,
FN_LCD_FLM_B, 0, 0, 0,
/* IP10_11 [3] */
-FN_SSI_SDATA3, FN_VI1_7_B, FN_HTX0_C, FN_FWE_B,
-FN_LCD_CL2_B, 0, 0, 0,
+FN_SSI_SDATA3, FN_VI1_7_B, 0, FN_HTX0_C, FN_FWE_B,
+FN_LCD_CL2_B, 0, 0,
/* IP10_8 [3] */
-FN_SSI_SDATA2, FN_VI1_6_B, FN_HRX0_C, FN_FRE_B,
-FN_LCD_CL1_B, 0, 0, 0,
+FN_SSI_SDATA2, FN_VI1_6_B, 0, FN_HRX0_C, FN_FRE_B,
+FN_LCD_CL1_B, 0, 0,
/* IP10_5 [3] */
FN_SSI_WS23, FN_VI1_5_B, FN_TX1_D, FN_HSCK0_C, FN_FALE_B,
-FN_LCD_DON_B, 0, 0, 0,
+FN_LCD_DON_B, 0, 0,
/* IP10_2 [3] */
FN_SSI_SCK23, FN_VI1_4_B, FN_RX1_D, FN_FCLE_B,
FN_LCD_DATA15_B, 0, 0, 0 }
}

`
struct sprd_pinctrl_soc_info *info;

-#define SPRD_PIN_CONFIG_CONTROL (PIN_CONFIG_END + 1)
-#define SPRD_PIN_CONFIG_SLEEP_MODE (PIN_CONFIG_END + 2)

static int sprd_pinctrl_get_id_by_name(struct sprd_pinctrl *sprd_pctl,
    const char *name)
err = of_property_read_u32_index(node, "pinmux", i, &pinfunc);
if (err)
  return err;
+goto exit;

pin = STM32_GET_PIN_NO(pinfunc);
func = STM32_GET_PIN_FUNC(pinfunc);

if (!stm32_pctrl_is_function_valid(pctl, pin, func)) {
  dev_err(pctl->dev, "invalid function\n");
  return -EINVAL;
  err = -EINVAL;
  goto exit;
}

grp = stm32_pctrl_find_group_by_pin(pctl, pin);
if (!grp) {
  dev_err(pctl->dev, "unable to match pin %d to group\n", pin);
  return -EINVAL;
  err = -EINVAL;
  goto exit;
}

err = stm32_pctrl_dt_node_to_map_func(pctl, pin, func, grp, map,
reserved_maps, num_maps);
if (err)
  return err;
+goto exit;

if (has_config) {
  err = pinctrl_utils_add_map_configs(pctldev, map,
@@ -473,11 +477,13 @@
  config, num_configs,
  PIN_MAP_TYPE_CONFIGS_GROUP);
  if (err)
    return err;
  +goto exit;
  }
}

-return 0;
+exit:
+kfree(configs);
+return err;
}
static int stm32_pctrl_dt_node_to_map(struct pinctrl_dev *pctldev,
    struct resource res;
    struct reset_control *rstc;
    int npins = STM32_GPIO_PINS_PER_BANK;
    int bank_nr, err, i = 0;

    rstc = of_reset_control_get_exclusive(np, NULL);
    if (!IS_ERR(rstc))
        of_property_read_string(np, "st.bank-name", &bank->gpio_chip.label);

        -if (!of_parse_phandle_with_fixed_args(np, "gpio-ranges", 3, 0, &args)) {
        +if (!of_parse_phandle_with_fixed_args(np, "gpio-ranges", 3, i, &args)) {
            bank_nr = args.args[1] / STM32_GPIO_PINS_PER_BANK;
            bank->gpio_chip.base = args.args[1];
            +npins = args.args[2];
            +while (!of_parse_phandle_with_fixed_args(np, "gpio-ranges", 3,
                ++i, &args))
                +npins += args.args[2];
        } else {
            bank_nr = pctl->nbanks;
            bank->gpio_chip.base = bank_nr * STM32_GPIO_PINS_PER_BANK;
            --- linux-4.15.0.orig/drivers/pinctrl/sunxi/pinctrl-sun8i-a83t.c
            +++ linux-4.15.0/drivers/pinctrl/sunxi/pinctrl-sun8i-a83t.c
            @ @ -568,7 +568,7 @@
            SUNXI_PIN(SUNXI_PINCTRL_PIN(H, 11),
                SUNXI_FUNCTION(0x0, "gpio_in"),
                SUNXI_FUNCTION(0x1, "gpio_out"),
            - SUNXI_FUNCTION_IRQ_BANK(0x6, 2, 1),/* PH_EINT11 */
            + SUNXI_FUNCTION_IRQ_BANK(0x6, 2, 11),/* PH_EINT11 */
            );

        static const struct sunxi_pinctrl_desc sun8i_a83t_pinctrl_data = {
            --- linux-4.15.0.orig/drivers/pinctrl/sunxi/pinctrl-sunxi.c
            +++ linux-4.15.0/drivers/pinctrl/sunxi/pinctrl-sunxi.c
            @ @ -.999,20 +999,22 @@
            if (bank == pctl->desc->irq_banks)
            return;

            +chained_irq_enter(chip, desc);
            +reg = sunxi_irq_status_reg_from_bank(bank, pctl->desc->irq_bank_base);
            val = readl(pctl->membase + reg);
if (val) {
    int irqoffset;

    chained_irq_enter(chip, desc);
    for_each_set_bit(irqoffset, &val, IRQ_PER_BANK) {
        int pin_irq = irq_find_mapping(pctl->domain,
        bank * IRQ_PER_BANK + irqoffset);
        generic_handle_irq(pin_irq);
    }
    chained_irq_exit(chip, desc);
}

chained_irq_exit(chip, desc);

static int sunxi_pinctrl_add_function(struct sunxi_pinctrl *pctl, 
@@ -1040,6 +1042,7 @@
static int sunxi_pinctrl_build_state(struct platform_device *pdev) 
{
    struct sunxi_pinctrl *pctl = platform_get_drvdata(pdev);
    void *ptr;
+    int i;

    /*
    * We suppose that we won’t have any more functions than pins,
    * we’ll reallocate that later anyway
    */
    -pctl->functions = devm_kzalloc(&pdev->dev,
    -    pctl->ngroups * sizeof(*pctl->functions),
    -    GFP_KERNEL);
+    pctl->functions = kcalloc(pctl->ngroups,
+        sizeof(*pctl->functions),
+        GFP_KERNEL);
    if (!pctl->functions)
        return -ENOMEM;

    @ @ -1106,13 +1109,15 @@
    }

    /* And now allocated and fill the array for real */
    -pctl->functions = krealloc(pctl->functions,
    -    pctl->nfunctions * sizeof(*pctl->functions),
    -    GFP_KERNEL);
    -if (!pctl->functions) {
    +ptr = krealloc(pctl->functions,
    +    pctl->nfunctions * sizeof(*pctl->functions),
    +    GFP_KERNEL);

    et

    "Open Source Used In 5GaaS Edge AC-4 27114"
if (!ptr) {
    kfree(pctl->functions);
    pctl->functions = NULL;
    return -ENOMEM;
}

pctl->functions = ptr;

for (i = 0; i < pctl->desc->npins; i++) {
    const struct sunxi_desc_pin *pin = pctl->desc->pins + i;

    func_item = sunxi_pinctrl_find_function_by_name(pctl, func->name);
    -if (!func_item)
+    if (!func_item) {
+        kfree(pctl->functions);
        return -EINVAL;
+    }

    if (!func_item->groups) {
        func_item->groups = devm_kzalloc(&pdev->dev, func_item->ngroups * sizeof(*func_item->groups), GFP_KERNEL);
        -if (!func_item->groups)
+        if (!func_item->groups) {
+            kfree(pctl->functions);
+            return -ENOMEM;
+        }
    }

    func_grp = func_item->groups;
}

static inline void pmx_writel(struct tegra_pmx *pmx, u32 val, u32 bank, u32 reg)
{ }

static int tegra_pinctrl_get_groups_count(struct pinctrl_dev *pctldev)
{ }

static inline void pmx_writel_relaxed(struct tegra_pmx *pmx, u32 val, u32 bank, u32 reg)
{ /* make sure pinmux register write completed */
    pmx_readl(pmx, bank, reg);

return -EINVAL;

rows = pinctrl_count_index_with_args(np, name);
-if (rows == -EINVAL)
+if (rows < 0)
    return rows;

*map = devm_kzalloc(iod->dev, sizeof(**map), GFP_KERNEL);
--- linux-4.15.0.orig/drivers/pinctrl/zte/pinctrl-zx.c
+++ linux-4.15.0/drivers/pinctrl/zte/pinctrl-zx.c
@@ -411,6 +411,7 @@
    }

zpctl->aux_base = of_iomap(np, 0);
+of_node_put(np);
if (!zpctl->aux_base)
    return -ENOMEM;

--- linux-4.15.0.orig/drivers/platform/chrome/cros_ec_dev.c
+++ linux-4.15.0/drivers/platform/chrome/cros_ec_dev.c
@@ -455,6 +455,7 @@
    mfd_remove_devices(ec->dev);
    cdev_del(&ec->cdev);
    device_unregister(&ec->class_dev);
    return 0;
--- linux-4.15.0.orig/drivers/platform/chrome/cros_ec_lpc.c
+++ linux-4.15.0/drivers/platform/chrome/cros_ec_lpc.c
@@ -35,6 +35,9 @@
#define DRV_NAME "cros_ec_lpcs"
#define ACPI_DRV_NAME "GOOG0004"

+/* True if ACPI device is present */
+static bool cros_ec_lpc_acpi_device_found;
+
+static int ec_response_timed_out(void)
+{
  unsigned long one_second = jiffies + HZ;
  @ @ -54,7 +57,6 @@
  static int cros_ec_pkt_xfer_lpc(struct cros_ec_device *ec,
    struct cros_ec_command *msg)
  {
    struct ec_host_request *request;
    struct ec_host_response response;
    int ret = 0;
    

/* Write buffer */
cros_ec_lpc_write_bytes(EC_LPC_ADDR_HOST_PACKET, ret, ec->dout);

-request = (struct ec_host_request *)ec->dout;

/* Here we go */
sum = EC_COMMAND_PROTOCOL_3;
cros_ec_lpc_write_bytes(EC_LPC_ADDR_HOST_CMD, 1, &sum);

+static struct platform_device cros_ec_lpc_device = {
+    .name = DRV_NAME
+};
+
+static acpi_status cros_ec_lpc_parse_device(acpi_handle handle, u32 level,
+    void *context, void **retval)
+{
+    *(bool *)context = true;
+    return AE_CTRL_TERMINATE;
+}
+
+static int __init cros_ec_lpc_init(void)
+{
+    int ret;
+    acpi_status status;
+    +
+    status = acpi_get_devices(ACPI_DRV_NAME, cros_ec_lpc_parse_device,
+        &cros_ec_lpc_acpi_device_found, NULL);
+    +if (ACPI_FAILURE(status))
+        pr_warn(DRV_NAME": Looking for %s failed\n", ACPI_DRV_NAME);
+    -if (!dmi_check_system(cros_ec_lpc_dmi_table)) {
+        if (!cros_ec_lpc_acpi_device_found &&
+            !dmi_check_system(cros_ec_lpc_dmi_table)) {
+            pr_err(DRV_NAME": unsupported system.\n");
+            return -ENODEV;
+        }
+    }
+    if (!cros_ec_lpc_acpi_device_found) {
+        /* Register the device, and it'll get hooked up automatically */
+        +ret = platform_device_register(&cros_ec_lpc_device);
+    }
+    return ret;
+}

-return 0;
+/* Register the device, and it'll get hooked up automatically */
+ret = platform_device_register(&cros_ec_lpc_device);
+if (ret) {
+    pr_err(DRV_NAME ": can’t register device: %d\n", ret);
+    platform_driver_unregister(&cros_ec_lpc_driver);
+    cros_ec_lpc_reg_destroy();
+}
+
+return ret;
}

static void __exit cros_ec_lpc_exit(void)
{
+    if (!cros_ec_lpc_acpi_device_found)
+        platform_device_unregister(&cros_ec_lpc_device);
+    platform_driver_unregister(&cros_ec_lpc_driver);
+    cros_ec_lpc_reg_destroy();
}

--- linux-4.15.0.orig/drivers/platform/chrome/cros_ec_proto.c
+++ linux-4.15.0/drivers/platform/chrome/cros_ec_proto.c
@@ -60,12 +60,25 @@
 struct cros_ec_command *msg)
 {
     int ret;
+    int (*xfer_fxn)(struct cros_ec_device *ec, struct cros_ec_command *msg);

     if (ec_dev->proto_version > 2)
         -ret = ec_dev->pkt_xfer(ec_dev, msg);
+    xfer_fxn = ec_dev->pkt_xfer;
     else
         -ret = ec_dev->cmd_xfer(ec_dev, msg);
+    xfer_fxn = ec_dev->cmd_xfer;

+    if (!xfer_fxn) {
+        /*
+        * This error can happen if a communication error happened and
+        * the EC is trying to use protocol v2, on an underlying
+        * communication mechanism that does not support v2.
+        */
+        dev_err_once(ec_dev->dev,
+             "missing EC transfer API, cannot send command\n");}
+    return -EIO;
+}
+
+ret = (*xfer_fxn)(ec_dev, msg);
+if (msg->result == EC_RES_IN_PROGRESS) {
    int i;
    struct cros_ec_command *status_msg;
    @@ -88,7 +101,7 @@
for (i = 0; i < EC_COMMAND_RETRIES; i++) {
    usleep_range(10000, 11000);

    -ret = ec_dev->cmd_xfer(ec_dev, status_msg);
+ret = (*xfer_fxn)(ec_dev, status_msg);
    if (ret < 0)
        break;

    msg->insize = sizeof(struct ec_response_get_protocol_info);

    ret = send_command(ec_dev, msg);
*/
+ * Send command once again when timeout occurred.
+ * Fingerprint MCU (FPMCU) is restarted during system boot which
+ * introduces small window in which FPMCU won't respond for any
+ * messages sent by kernel. There is no need to wait before next
+ * attempt because we waited at least EC_MSG_DEADLINE_MS.
+ */
+if (ret == -ETIMEDOUT)
+ret = send_command(ec_dev, msg);

if (ret < 0) {
    dev_dbg(ec_dev->dev,
@@ -549,6 +571,7 @@

int cros_ec_get_next_event(struct cros_ec_device *ec_dev, bool *wake_event)
{
    u8 event_type;
    u32 host_event;
    int ret;

@@ -568,11 +591,22 @@

    return ret;

    if (wake_event) {
+event_type = ec_dev->event_data.event_type;
    host_event = cros_ec_get_host_event(ec_dev);

    /* Consider non-host_event as wake event */
-*wake_event = !host_event ||
-    !(host_event & ec_dev->host_event_wake_mask);
+*/
+ * Sensor events need to be parsed by the sensor sub-device.
+ * Defer them, and don't report the wakeup here.
+ */
+if (event_type == EC_MKBP_EVENT_SENSOR_FIFO)
+*wake_event = false;


/* Masked host-events should not count as wake events. */
else if (host_event &&
 !((host_event & ec_dev->host_event_wake_mask))
*wake_event = false;
/* Consider all other events as wake events. */
else
*wake_event = true;
}

return ret;
--- linux-4.15.0.orig/drivers/platform/chrome/cros_ec_sysfs.c
+++ linux-4.15.0/drivers/platform/chrome/cros_ec_sysfs.c
@@ -187,7 +187,7 @@
count += scnprintf(buf + count, PAGE_SIZE - count,
        "Build info:    EC error %d\n", msg->result);
else {
    -msg->data[sizeof(msg->data) - 1] = '\0';
    +msg->data[EC_HOST_PARAM_SIZE - 1] = '\0';
    count += scnprintf(buf + count, PAGE_SIZE - count,
        "Build info:    %s\n", msg->data);
}
--- linux-4.15.0.orig/drivers/platform/mips/cpu_hwmon.c
+++ linux-4.15.0/drivers/platform/mips/cpu_hwmon.c
@@ -158,7 +158,7 @@
cpu_hwmon_dev = hwmon_device_register(NULL);
if (IS_ERR(cpu_hwmon_dev)) {
    -ret = -ENOMEM;
    +ret = PTR_ERR(cpu_hwmon_dev);
    pr_err("hwmon_device_register fail!\n");
    goto fail_hwmon_device_register;
}
--- linux-4.15.0.orig/drivers/platform/x86/Kconfig
+++ linux-4.15.0/drivers/platform/x86/Kconfig
@@ -92,10 +92,15 @@
    If you have an ACPI-compatible ASUS laptop, say Y or M here.

 config DELL_SMBIOS
   tristate
+tristate "Dell SMBIOS driver"
+++help---
       +This provides support for the Dell SMBIOS calling interface.
     +If you have a Dell computer you should enable this option.
     +
     +Be sure to select at least one backend for it to work properly.

 config DELL_SMBIOS_WMI
   tristate "Dell SMBIOS calling interface (WMI implementation)"
bool "Dell SMBIOS driver WMI backend"
depends on ACPI_WMI
select DELL_WMI_DESCRIPTOR
select DELL_SMBIOS
@@ -103,19 +108,19 @@
This provides an implementation for the Dell SMBIOS calling interface communicated over ACPI-WMI.

-If you have a Dell computer from >2007 you should say Y or M here.
+If you have a Dell computer from >2007 you should say Y here.
If you aren't sure and this module doesn't work for your computer it just won't load.

cfg DELL_SMBIOS_SMM
-tristate "Dell SMBIOS calling interface (SMM implementation)"
+bool "Dell SMBIOS driver SMM backend"
depends on DCDBAS
select DELL_SMBIOS
---help---
This provides an implementation for the Dell SMBIOS calling interface communicated over SMI/SMM.

-If you have a Dell computer from <=2017 you should say Y or M here.
+If you have a Dell computer from <=2017 you should say Y here.
If you aren't sure and this module doesn't work for your computer it just won't load.

@@ -126,7 +131,7 @@
depends on ACPI_VIDEO || ACPI_VIDEO = n
depends on RFKILL || RFKILL = n
depends on SERIO_18042
-select DELL_SMBIOS
+depends on DELL_SMBIOS
select POWER_SUPPLY
select LEDS_CLASS
select NEW_LEDS
@@ -140,8 +145,8 @@
depends on DMI
depends on INPUT
depends on ACPI_VIDEO || ACPI_VIDEO = n
+depends on DELL_SMBIOS
select DELL_WMI_DESCRIPTOR
-select DELL_SMBIOS
+select INPUT_SPARSEKMAP
---help---
  Say Y here if you want to support WMI-based hotkeys on Dell laptops.
@@ -199,6 +204,20 @@
To compile this driver as a module, choose M here: the module will
be called dell-rbtn.

+config DELL_UART_BACKLIGHT
+tristate "Dell AIO UART Backlight driver"
+depends on SERIAL_8250
+depends on ACPI
+---help---
+ Say Y here if you want to support Dell AIO UART backlight interface.
+ The Dell AIO machines released after 2017 come with a UART interface
+ to communicate with the backlight scalar board. This driver creates
+ a standard backlight interface and talks to the scalar board through
+ UART to adjust the AIO screen brightness.
+ + To compile this driver as a module, choose M here: the module will
+ be called dell_uart_backlight.
+

config FUJITSU_LAPTOP
tristate "Fujitsu Laptop Extras"
@@ -207,6 +226,7 @@
depends on BACKLIGHT_CLASSDEVICE
depends on ACPI_VIDEO || ACPI_VIDEO = n
select INPUT_SPARSEKMAP
+select NEW_LEDS
select LEDS_CLASS
---help---
This is a driver for laptops built by Fujitsu:
@@ -949,7 +969,7 @@
If you are running on a Galileo/Quark say Y here.

config INTEL_PMC_CORE
-bool "Intel PMC Core driver"
+tristate "Intel PMC Core driver"
depends on PCI
---help---
The Intel Platform Controller Hub for Intel Core SoCs provides access
@@ -1032,6 +1052,7 @@
config SAMSUNG_Q10
tristate "Samsung Q10 Extras"
depends on ACPI
+depends on BACKLIGHT_LCD_SUPPORT
select BACKLIGHT_CLASSDEVICE
---help---
This driver provides support for backlight control on Samsung Q10
@@ -1170,6 +1191,18 @@
with the OS-image for the device. This option supplies the missing
information. Enable this for x86 tablets with Silead touchscreens.
+config INTEL_ATOMISP2_PM
+tristate "Intel AtomISP2 dummy / power-management driver"
+depends on PCI && IOSF_MBI && PM
+help
+ Power-management driver for Intel's Image Signal Processor found on
+ Bay and Cherry Trail devices. This dummy driver's sole purpose is to
+ turn the ISP off (put it in D3) to save power and to allow entering
+ of S0ix modes.
+ 
+ To compile this driver as a module, choose M here: the module
+ will be called intel_atomisp2_pm.
+
+endif # X86_PLATFORM_DEVICES

config PMC_ATOM
--- linux-4.15.0.orig/drivers/platform/x86/Makefile
+++ linux-4.15.0/drivers/platform/x86/Makefile
@@ -13,8 +13,9 @@
obj-$(CONFIG_ACPI_CMPC)	+= classmate-laptop.o
obj-$(CONFIG_COMPAL_LAPTOP)	+= compal-laptop.o
obj-$(CONFIG_DELL_SMBIOS)	+= dell-smbios.o
-obj-$(CONFIG_DELL_SMBIOS_WMI)	+= dell-smbios-wmi.o
-obj-$(CONFIG_DELL_SMBIOS_SMM)	+= dell-smbios-smm.o
+dell-smbios-objs:= dell-smbios-base.o
+dell-smbios-$(CONFIG_DELL_SMBIOS_WMI)	+= dell-smbios-wmi.o
+dell-smbios-$(CONFIG_DELL_SMBIOS_SMM)	+= dell-smbios-smm.o
obj-$(CONFIG_DELL_LAPTOP)	+= dell-laptop.o
obj-$(CONFIG_DELL_WMI)	+= dell-wmi.o
obj-$(CONFIG_DELL_WMI_DESCRIPTOR)	+= dell-wmi-descriptor.o
@@ -22,6 +23,7 @@
obj-$(CONFIG_DELL_WMI_LED)	+= dell-wmi-led.o
obj-$(CONFIG_DELL_SM08800)	+= dell-sm08800.o
obj-$(CONFIG_DELL_RBTN)	+= dell-rbtn.o
+obj-$(CONFIG_DELL_UART_BACKLIGHT)	+= dell-uart-backlight.o
obj-$(CONFIG_ACER_WMI)	+= acer-wmi.o
obj-$(CONFIG_ACERHDF)	+= acerhdf.o
obj-$(CONFIG_HP_ACCEL)	+= hp_accel.o
@@ -88,3 +90,4 @@
obj-$(CONFIG_MLX_PLATFORM)	+= mlx-platform.o
obj-$(CONFIG_MLX_CPLD_PLATFORM)	+= mlxcpld-hotplug.o
obj-$(CONFIG_INTEL_TURBO_MAX_3) += intel_turbo_max_3.o
+obj-$(CONFIG_INTEL_ATOMISP2_PM) += intel_atomisp2_pm.o
--- linux-4.15.0.orig/drivers/platform/x86/acer-wmi.c
+++ linux-4.15.0/drivers/platform/x86/acer-wmi.c
@@ -43,6 +43,7 @@
#include <linux/input/sparse-keymap.h>
#include <acpi/video.h>
enumacer_wmi_event_ids {
WMID_HOTKEY_EVENT = 0x1,
-WMID_ACCEL_EVENT = 0x5,
+WMID_ACCEL_OR_KBD_DOCK_EVENT = 0x5,
};

static const struct key_entry acer_wmi_keymap[] __initconst = {
@ @ -124,11 +125,13 @@
{KE_KEY, 0x64, {KEY_SWITCHVIDEOMODE} }, /* Display Switch */
{KE_IGNORE, 0x81, {KEY_SLEEP} },
{KE_KEY, 0x82, {KEY_TOUCHPAD_TOGGLE} }, /* Touch Pad Toggle */
+{KE_IGNORE, 0x84, {KEY_KBDILLUMTOGGLE} }, /* Automatic Keyboard background light toggle */
{KE_KEY, KEY_TOUCHPAD_ON, {KEY_TOUCHPAD_ON} },
{KE_KEY, KEY_TOUCHPAD_OFF, {KEY_TOUCHPAD_OFF} },
{KE_IGNORE, 0x83, {KEY_TOUCHPAD_TOGGLE} },
{KE_KEY, 0x85, {KEY_TOUCHPAD_TOGGLE} },
{KE_KEY, 0x86, {KEY_WLAN} },
+{KE_KEY, 0x87, {KEY_POWER} },
{KE_END, 0} }
);

@ @ -139,7 +142,9 @@
u8 function;
u8 key_num;
u16 device_state;
-u32 reserved;
+u16 reserved1;
+u8 kbd_dock_state;
+u8 reserved2;
} __attribute__((packed));

/*
@@ -217,14 +222,13 @@
/*
 * Interface capability flags
 */
-#define ACER_CAP_MAILLED		(1<<0)
-#define ACER_CAP_WIRELESS		(1<<1)
-#define ACER_CAP_BLUETOOTH		(1<<2)
-#define ACER_CAP_BRIGHTNESS		(1<<3)
-#define ACER_CAP_ACCEL			(1<<5)
-#define ACER_CAP_RFBTN(1<<6)
-#define ACER_CAP_ANY(0xFFFFFFFF)
+#define ACER_CAP_MAILLEDBIT(0)
+#define ACER_CAP_WIRELESSBIT(1)
+#define ACER_CAP_BLUETOOTHBIT(2)
+#define ACER_CAP_BRIGHTNESSBIT(3)
+#define ACER_CAP_THREEGBIT(4)
+#define ACER_CAP_SET_FUNCTION_MODEBIT(5)
+#define ACER_CAP_KBD_DOCKBIT(6)

/*
 * Interface type flags
 @@ -247,6 +251,7 @@
 static int brightness = -1;
 static int threeg = -1;
 static int force_series;
+static int force_caps = -1;
 static bool ec_raw_mode;
 static bool has_type_aa;
 static u16 commun_func_bitmap;
 @@ -256,11 +261,13 @@
 module_param(brightness, int, 0444);
 module_param(threeg, int, 0444);
 module_param(force_series, int, 0444);
+module_param(force_caps, int, 0444);
 module_param(ec_raw_mode, bool, 0444);
 MODULE_PARM_DESC(mailled, "Set initial state of Mail LED");
 MODULE_PARM_DESC(brightness, "Set initial LCD backlight brightness");
 MODULE_PARM_DESC(threeg, "Set initial state of 3G hardware");
 MODULE_PARM_DESC(force_series, "Force a different laptop series");
+MODULE_PARM_DESC(force_caps, "Force the capability bitmask to this value");
 MODULE_PARM_DESC(ec_raw_mode, "Enable EC raw mode");

 struct acer_data {
 @@ -331,6 +338,15 @@
 return 1;
 }

+static int __init set_force_caps(const struct dmi_system_id *dmi)
+{ 
+ if (force_caps == -1) {
+ force_caps = (uintptr_t)dmi->driver_data;
+ pr_info("Found %s, set force_caps to 0x%x\n", dmi->ident, force_caps);
+ } 
+return 1;
+} 
+
 static struct quirk_entry quirk_unknown = {

{
	.callback = set_force_caps,
	.ident = "Acer Aspire Switch 10E SW3-016",
	.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire SW3-016"),
+},
	.driver_data = (void *)ACER_CAP_KBD_DOCK,
+},
+{
+callback = set_force_caps,
+ident = "Acer Aspire Switch 10 SW5-012",
+matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_MATCH(DMI_PRODUCT_NAME, "Aspire SW5-012"),
+},
+driver_data = (void *)ACER_CAP_KBD_DOCK,
+},
+{
+callback = set_force_caps,
+ident = "Acer One 10 (S1003)",
+matches = {
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "Acer"),
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "One S1003"),
+},
+driver_data = (void *)ACER_CAP_KBD_DOCK,
+},
{}
};

interface->capability |= ACER_CAP_THREEG;
if (type_aa->commun_func_bitmap & ACER_WMID3_GDS_BLUETOOTH)
interface->capability |= ACER_CAP_BLUETOOTH;
-if (type_aa->commun_func_bitmap & ACER_WMID3_GDS_RFBTN) {
-interface->capability |= ACER_CAP_RFBTN;
+if (type_aa->commun_func_bitmap & ACER_WMID3_GDS_RFBTN)
commun_func_bitmap &= ~ACER_WMID3_GDS_RFBTN;
-}

commun_fn_key_number = type_aa->commun_fn_key_number;
struct acpi_buffer output;
union acpi_object out_obj[5];

-if (!has_cap(ACER_CAP_ACCEL))
+if (!acer_wmi_accel_dev)
    return -1;

output.length = sizeof(out_obj);

/*
 * Switch series keyboard dock status
 * */
+static int acer_kbd_dock_state_to_sw_tablet_mode(u8 kbd_dock_state)
{+
    switch (kbd_dock_state) {
+    case 0x01: /* Docked, traditional clamshell laptop mode */
+        return 0;
+    case 0x04: /* Stand-alone tablet */
+    case 0x40: /* Docked, tent mode, keyboard not usable */
+        return 1;
+    default:
+        pr_warn("Unknown kbd_dock_state 0x%02x\n", kbd_dock_state);
+    }
+}
+
+static void acer_kbd_dock_get_initial_state(void)
{+
    u8 *output, input[8] = { 0x05, 0x00, };
    struct acpi_buffer input_buf = { sizeof(input), input };
    struct acpi_buffer output_buf = { ACPI_ALLOCATE_BUFFER, NULL };
    union acpi_object *obj;
    acpi_status status;
    int sw_tablet_mode;
    +
    +status = wmi_evaluate_method(WMID_GUID3, 0, 0x2, &input_buf, &output_buf);
+    if (ACPI_FAILURE(status)) {
+        ACPI_EXCEPTION((AE_INFO, status, "Error getting keyboard-dock initial status"));
+        return;
+    }
    +
    +obj = output_buf-pointer;
+    if (!obj || obj->type != ACPI_TYPE_BUFFER || obj->buffer.length != 8) {
+        pr_err("Unexpected output format getting keyboard-dock initial status\n");
goto out_free_obj;
+
+output = obj->buffer.pointer;
+if (output[0] != 0x00 || (output[3] != 0x05 && output[3] != 0x45)) {
+    pr_err("Unexpected output [0]=0x%02x [3]=0x%02x getting keyboard-dock initial status\n",
+            output[0], output[3]);
+    goto out_free_obj;
+}
+
+sw_tablet_mode = acer_kbd_dock_state_to_sw_tablet_mode(output[4]);
+input_report_switch(acer_wmi_input_dev, SW_TABLET_MODE, sw_tablet_mode);
+
+out_free_obj:
+kfree(obj);
+
+static void acer_kbd_dock_event(const struct event_return_value *event)
+{
+    int sw_tablet_mode;
+
+    if (!has_cap(ACER_CAP_KBD_DOCK))
+        return;
+
+    sw_tablet_mode = acer_kbd_dock_state_to_sw_tablet_mode(event->kbd_dock_state);
+    input_report_switch(acer_wmi_input_dev, SW_TABLET_MODE, sw_tablet_mode);
+
+}
+
+/*
 * Rfkill devices
 */
static void acer_rfkill_update(struct work_struct *ignored);
@@ -1781,8 +1887,9 @@ sparse_keymap_report_event(acer_wmi_input_dev, scancode, 1, true);
} break;
-    case WMID_ACCEL_EVENT:
+    case WMID_ACCEL_OR_KBD_DOCK_EVENT:
        acer_gsensor_event();
+        acer_kbd_dock_event(&return_value);
        break;
    default:
        pr_warn("Unknown function number - %d - %d\n",
@@ -1940,8 +2047,6 @@ if (err)
            return err;


-interface->capability |= ACER_CAP_ACCEL;
-
acer_wmi_accel_dev = input_allocate_device();
if (!acer_wmi_accel_dev)
return -ENOMEM;
@@ -1967,11 +2072,6 @@
return err;
}

-static void acer_wmi_accel_destroy(void)
-{
-input_unregister_device(acer_wmi_accel_dev);
-}
-
static int __init acer_wmi_input_setup(void)
{
    ACPI_STATUS status;
    @@ -1989,6 +2089,9 @@
    if (err)
goto err_free_dev;

    +if (has_cap(ACER_CAP_KBD_DOCK))
    +input_set_capability(acer_wmi_input_dev, EV_SW, SW_TABLET_MODE);
    +
    status = wmi_install_notify_handler(ACERWMID_EVENT_GUID,
        acer_wmi_notify, NULL);
    if (ACPI_FAILURE(status)) {
        @@ -1996,6 +2099,9 @@
        goto err_free_dev;
    }

    +if (has_cap(ACER_CAP_KBD_DOCK))
    +acer_kbd_dock_get_initial_state();
    +
    err = input_register_device(acer_wmi_input_dev);
    if (err)
goto err_uninstall_notifier;
    @@ -2126,7 +2232,7 @@
    if (has_cap(ACER_CAP_BRIGHTNESS))
        set_u32(data->brightness, ACER_CAP_BRIGHTNESS);

    -if (has_cap(ACER_CAP_ACCEL))
    +if (acer_wmi_accel_dev)
        acer_gsensor_init();

    return 0;
    @@ -2241,7 +2347,7 @@
/* WMID always provides brightness methods */
interface->capability |= ACER_CAP_BRIGHTNESS;
-} else if (!wmi_has_guid(WMID_GUID2) && interface && !has_type_aa) {
+} else if (!wmi_has_guid(WMID_GUID2) && interface && !has_type_aa && force_caps == -1) {
    pr_err("No WMID device detection method found\n");
    return -ENODEV;
}
@@ -2271,7 +2377,14 @@
if (acpi_video_get_backlight_type() != acpi_backlight_vendor)
    interface->capability &= ~ACER_CAP_BRIGHTNESS;
-
+    if (wmi_has_guid(WMID_GUID3)) {
+        if (wmi_has_guid(WMID_GUID3))
+            interface->capability |= ACER_CAP_SET_FUNCTION_MODE;
+        +
+            if (force_caps != -1)
+                interface->capability = force_caps;
+        +
+            if (wmi_has_guid(WMID_GUID3) &&
+                (interface->capability & ACER_CAP_SET_FUNCTION_MODE)) {
                if (ACPI_FAILURE(acer_wmi_enable_rf_button()))
                    pr_warn("Cannot enable RF Button Driver\n");
@@ -2334,8 +2447,8 @@
    if (wmi_has_guid(ACERWMID_EVENT_GUID))
        acer_wmi_input_destroy();
    -if (has_cap(ACER_CAP_ACCEL))
    -acer_wmi_accel_destroy();
+    acer_wmi_accel_dev)
+        input_unregister_device(acer_wmi_accel_dev);

    return err;
}
@@ -2345,8 +2458,8 @@
    if (wmi_has_guid(ACERWMID_EVENT_GUID))
        acer_wmi_input_destroy();
    -if (has_cap(ACER_CAP_ACCEL))
    -acer_wmi_accel_destroy();
+    acer_wmi_accel_dev)
+        input_unregister_device(acer_wmi_accel_dev);

    remove_debugfs();
    platform_device_unregister(acer_platform_device);
--- linux-4.15.0.orig/drivers/platform/x86/acerhdf.c
+++ linux-4.15.0/drivers/platform/x86/acerhdf.c
@@ -233,6 +233,7 @@
input.length = (acpi_size) sizeof(*in_args);
input.pointer = in_args;

-if (out_data != NULL) {
  +if (out_data) {
    output.length = ACPI_ALLOCATE_BUFFER;
    output.pointer = NULL;
    status = wmi_evaluate_method(WMAX_CONTROL_GUID, 0,
                                command, &input, &output);
  } else {
    +if (ACPI_SUCCESS(status)) {
      +obj = (union acpi_object *)output.pointer;
      +if (obj & & obj->type == ACPI_TYPE_INTEGER)
        +*out_data = (u32)obj->integer.value;
    }
    +kfree(output.pointer);
  } else {
    status = wmi_evaluate_method(WMAX_CONTROL_GUID, 0,
                                command, &input, NULL);
  }

  -if (ACPI_SUCCESS(status)) & & out_data != NULL) {
    -obj = (union acpi_object *)output.pointer;
    -if (obj & & obj->type == ACPI_TYPE_INTEGER)
      -*out_data = (u32) obj->integer.value;
  }
  return status;
}

/*
 @@ -570,7 +570,7 @@
 return scnprintf(buf, PAGE_SIZE,
   "input [gpu] unknown\n");
 }
-pp_err("alienware-wmi: unknown HDMI source status: %d\n", out_data);
 +pr_err("alienware-wmi: unknown HDMI source status: %u\n", status);
 return scnprintf(buf, PAGE_SIZE, "input gpu [unknown]\n");
}
--- linux-4.15.0.orig/drivers/platform/x86/apple-gmux.c
+++ linux-4.15.0/drivers/platform/x86/apple-gmux.c
@@ -24,7 +24,6 @@
#include <linux/delay.h>
#include <linux/pci.h>
#include <linux/vga_switcheroo.h>
-#include <linux/vgaarb.h>
#include <acpi/video.h>
#include <asm/io.h>
@@ -54,7 +53,6 @@
bool indexed;
struct mutex index_lock;

-struct pci_dev *pdev;
struct backlight_device *bdev;

/* switcheroo data */
@@ -497,7 +495,7 @@
return gmux_set_discrete_state(apple_gmux_data, state);
}

-static int gmux_get_client_id(struct pci_dev *pdev)
+static enum vga_switcheroo_client_id gmux_get_client_id(struct pci_dev *pdev)
{
/*
 * Early Macbook Pros with switchable graphics use nvidia
@@ -599,23 +597,6 @@
return 0;
}

-static struct pci_dev *gmux_get_io_pdev(void)
-{
+-static struct pci_dev *pdev = NULL;
+-  -while ((pdev = pci_get_class(PCI_CLASS_DISPLAY_VGA << 8, pdev))) {
+-    -u16 cmd;
+-    -pci_read_config_word(pdev, PCI_COMMAND, &cmd);
+-    -if (!(cmd & PCI_COMMAND_IO))
+-      -continue;
+-    -return pdev;
+-  -}
-}

-}
static int is_thunderbolt(struct device *dev, void *data)
{
    return to_pci_dev(dev)->is_thunderbolt;
}

int ret = -ENXIO;
acpi_status status;
unsigned long long gpe;
-struct pci_dev *pdev = NULL;

if (apple_gmux_data)
    return -EBUSY;
@@ -682,7 +662,7 @@
ver_minor = (version >> 16) & 0xff;
ver_release = (version >> 8) & 0xff;
} else {
-    pr_info("gmux device not present or IO disabled\n");
+    pr_info("gmux device not present\n");
    ret = -ENODEV;
    goto err_release;
}@@ -690,23 +670,6 @@
pr_info("Found gmux version %d.%d.%d [%s]\n", ver_major, ver_minor,
ver_release, (gmux_data->indexed ? "indexed" : "classic");

-/*
- * Apple systems with gmux are EFI based and normally don't use
- * VGA. In addition changing IO+MEM ownership between IGP and dGPU
- * disables IO/MEM used for backlight control on some systems.
- * Lock IO+MEM to GPU with active IO to prevent switch.
- */
- pdev = gmux_get_io_pdev();
- if (pdev &&
- VGA_RSRC_NORMAL_IO | VGA_RSRC_NORMAL_MEM)) {
-    pr_err("IO+MEM vgaarb-locking for PCI:%s failed\n",
-    pci_name(pdev));
-    ret = -EBUSY;
-    goto err_release;
- } else if (pdev)
-    pr_info("locked IO for PCI:%s\n", pci_name(pdev));
- gmux_data->pdev = pdev;
- memset(&props, 0, sizeof(props));
- props.type = BACKLIGHT_PLATFORM;
- props.max_brightness = gmux_read32(gmux_data, GMUX_PORT_MAX_BRIGHTNESS);
- err_notify:
- backlight_device_unregister(bdev);
err_release:
- if (gmux_data->pdev)
  - vga_put(gmux_data->pdev, 
  - VGA_RSRC_NORMAL_IO | VGA_RSRC_NORMAL_MEM);
  - pci_dev_put(pdev);
  - release_region(gmux_data->iostart, gmux_data->iolen);
err_free:
  kfree(gmux_data);
@@ -845,11 +804,6 @@
      &gmux_notify_handler);
 }

- if (gmux_data->pdev) {
-   vga_put(gmux_data->pdev, 
-   VGA_RSRC_NORMAL_IO | VGA_RSRC_NORMAL_MEM);
-   pci_dev_put(gmux_data->pdev);
- }
backlight_device_unregister(gmux_data->bdev);

release_region(gmux_data->iostart, gmux_data->iolen);
--- linux-4.15.0.orig/drivers/platform/x86/asus-nb-wmi.c
+++ linux-4.15.0/drivers/platform/x86/asus-nb-wmi.c
@@ -78,10 +78,12 @@
static struct quirk_entry quirk_asus_unknown = {
   .wapf = 0,
   .wmi_backlight_set_devstate = true,
};

static struct quirk_entry quirk_asus_q500a = {
   .i8042_filter = asus_q500a_i8042_filter,
   .wmi_backlight_set_devstate = true,
};
/*
 @@ -92,26 +94,32 @@
static struct quirk_entry quirk_asus_x55u = {
   .wapf = 4,
   .wmi_backlight_power = true,
   .wmi_backlight_set_devstate = true,
   .no_display-toggle = true,
};

static struct quirk_entry quirk_asus_wapf4 = {
   .wapf = 4,
   .wmi_backlight_set_devstate = true,
};
static struct quirk_entry quirk_asus_x200ca = {
    .wapf = 2,
    .wmi_backlight_set_devstate = true,
};

static struct quirk_entry quirk_asus_ux303ub = {
    .wmi_backlight_native = true,
    .wmi_backlight_set_devstate = true,
};

static struct quirk_entry quirk_asus_x550lb = {
    .xusb2pr = 0x01D9,
    .wmi_backlight_set_devstate = true,
};

- static struct quirk_entry quirk_asus_ux330uak = {
  + static struct quirk_entry quirk_asus_forceals = {
    .wmi_backlight_set_devstate = true,
    .wmi_force_als_set = true,
  }
};

@@ -387,7 +395,7 @@
 DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
 DMI_MATCH(DMI_PRODUCT_NAME, "UX330UAK"),
 },
-.driver_data = &quirk_asus_ux330uak,
+.driver_data = &quirk_asus_forceals,
 },
 {.
callback = dmi_matched,
@@ -398,6 +406,15 @@
 },
 .driver_data = &quirk_asus_x550lb,
 },
+{
+callback = dmi_matched,
+.ident = "ASUSTeK COMPUTER INC. UX430UQ",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC.")},
+DMI_MATCH(DMI_PRODUCT_NAME, "UX430UQ"),
+},
+.driver_data = &quirk_asus_forceals,
+},
+{
+},

@@ -433,8 +450,7 @@
 { KE_KEY, 0x30, { KEY_VOLUMEUP } },


{ KE_KEY, 0x31, { KEY_VOLUMEDOWN } },
{ KE_KEY, 0x32, { KEY_MUTE } },
-{ KE_KEY, 0x33, { KEY_DISPLAYTOGGLE } }, /* LCD on */
-{ KE_KEY, 0x34, { KEY_DISPLAY_OFF } }, /* LCD off */
+{ KE_KEY, 0x35, { KEY_SCREENLOCK } },
{ KE_KEY, 0x40, { KEY_PREVIOUSSONG } },
{ KE_KEY, 0x41, { KEY_NEXTSONG } },
{ KE_KEY, 0x42, { KEY_STOPCD } }, /* Stop/Eject */
@@ -487,6 +503,7 @@
{ KE_KEY, 0xC4, { KEY_KBDILLUMUP } },
{ KE_KEY, 0xC5, { KEY_KBDILLUMDOWN } },
{ KE_IGNORE, 0xC6, }, /* Ambient Light Sensor notification */
+{ KE_KEY, 0xFA, { KEY_PROG2 } }, /* Lid flip action */
{ KE_END, 0},
};

@@ -500,9 +517,33 @@
.detect_quirks = asus_nb_wmi_quirks,
};

+static const struct dmi_system_id asus_nb_wmi_blacklist[] __initconst = {
+{
+  /* asus-nb-wm adds no functionality. The T100TA has a detachable
+     USB kbd, so no hotkeys and it has no WMI rfkill; and loading
+     asus-nb-wm causes the camera LED to turn and _stay_ on.
+     */
+     .matches = {
+         DMI_EXACT_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
+         DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "T100TA"),
+     },
+},
+{
+  /* The Asus T200TA has the same issue as the T100TA */
+  .matches = {
+      DMI_EXACT_MATCH(DMI_SYS_VENDOR, "ASUSTeK COMPUTER INC."),
+      DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "T200TA"),
+  },
+},
+{" /* Terminating entry */
+};

static int __init asus_nb_wmi_init(void)
{
  if (dmi_check_system(asus_nb_wmi_blacklist))
    return -ENODEV;
  return asus_wmi_register_driver(&asus_nb_wmi_driver);

static u64 asus_wireless_method(acpi_handle handle, const char *method,
   int param)
static acpi_status asus_wireless_method(acpi_handle handle, const char *method,
   int param, u64 *ret)
{
    struct acpi_object_list p;
    union acpi_object obj;
    acpi_status s;
    -u64 ret;

    acpi_handle_debug(handle, "Evaluating method %s, parameter %#x\n", 
      method, param);
    @ -67,24 +66,27 @@
    p.count = 1;
    p.pointer = &obj;

    -s = acpi_evaluate_integer(handle, (acpi_string) method, &p, &ret);
    +s = acpi_evaluate_integer(handle, (acpi_string) method, &p, ret);
    if (ACPI_FAILURE(s))
      acpi_handle_err(handle,
          "Failed to eval method %s, param %#x (%d)\n", 
          method, param, s);
    -acpi_handle_debug(handle, "%s returned %#x\n", method, (uint) ret);
    +return ret;
    +else
    +acpi_handle_debug(handle, "%s returned %#llx\n", method, *ret);
    +
    +return s;
}

static enum led_brightness led_state_get(struct led_classdev *led)
{
    struct asus_wireless_data *data;
    -int s;
    +acpi_status s;
    +u64 ret;

    data = container_of(led, struct asus_wireless_data, led);
    s = asus_wireless_method(acpi_device_handle(data->adev), "HSWC",
        - data->hswc_params->status);
if (s == data->hswc_params->on)
  + data->hswc_params->status, &ret);
+if (ACPI_SUCCESS(s) && ret == data->hswc_params->on)
  return LED_FULL;
return LED_OFF;
}
@@ -92,10 +94,11 @@
static void led_state_update(struct work_struct *work)
 {
 struct asus_wireless_data *data;
+u64 ret;

data = container_of(work, struct asus_wireless_data, led_work);
asus_wireless_method(acpi_device_handle(data->adev), "HSWC",
  + data->led_state, &ret);
}
static void led_state_set(struct led_classdev *led, enum led_brightness value)
@@ -178,8 +181,10 @@
{
 struct asus_wireless_data *data = acpi_driver_data(adev);

-if (data->wq)
+if (data->wq) {
  +devm_led_classdev_unregister(&adev->dev, &data->led);
  destroy_workqueue(data->wq);
  +}
  return 0;
 }

--- linux-4.15.0.orig/drivers/platform/x86/asus-wmi.c
+++ linux-4.15.0/drivers/platform/x86/asus-wmi.c
@@ -163,6 +163,16 @@
static const char * const ashs_ids[] = { "ATK4001", "ATK4002", NULL };

+static bool ashs_present(void)
+{
+int i = 0;
+while (ashs_ids[i]) {
+if (acpi_dev_found(ashs_ids[i++]))
+return true;
+}
+return false;
+}
+
+struct bios_args {
u32 arg0;
 u32 arg1;
@@ -452,13 +462,7 @@
asus = container_of(work, struct asus_wmi, kbd_led_work);

- /*
- * bits 0-2: level
- * bit 7: light on/off
- */
- if (asus->kbd_led_wk > 0)
- ctrl_param = 0x80 | (asus->kbd_led_wk & 0x7F);
- 
+ ctrl_param = 0x80 | (asus->kbd_led_wk & 0x7F);
 asus_wmi_set_devstate(ASUS_WMI_DEVID_KBD_BACKLIGHT, ctrl_param, NULL);
 }
@@ -1025,6 +1029,9 @@

 static void asus_wmi_rfkill_exit(struct asus_wmi *asus)
 {
+ if (asus->driver->wlan_ctrl_by_user && ashs_present())
+ return;
+ 
asus_unregister_rfkill_notifier(asus, "\_SB.PCI0.P0P5");
asus_unregister_rfkill_notifier(asus, "\_SB.PCI0.P0P6");
asus_unregister_rfkill_notifier(asus, "\_SB.PCI0.P0P7");
@@ -1968,6 +1975,9 @@
 int err;
 u32 retval = -1;

+ if (kernel_is_locked_down("Asus WMI"))
+ return -EPERM;
+ 
 err = asus_wmi_get_devstate(asus, asus->debug.dev_id, &retval);

 if (err < 0)
@@ -1984,6 +1994,9 @@
 int err;
 u32 retval = -1;

+ if (kernel_is_locked_down("Asus WMI"))
+ return -EPERM;
+ 
 err = asus_wmi_set_devstate(asus->debug.dev_id, asus->debug.ctrl_param,
 &retval);
@@ -2008,6 +2021,9 @@
union acpi_object *obj;
acpi_status status;

+if (kernel_is_locked_down("Asus WMI"))
+return -EPERM;
+
status = wmi_evaluate_method(ASUS_WMI_MGMT_GUID,
0, asus->debug.method_id,
&input, &output);
@@ -2121,16 +2137,6 @@
return 0;
}

-static bool ashs_present(void)
-{
-    int i = 0;
-    while (ashs_ids[i]) {
-        if (acpi_dev_found(ashs_ids[i++]))
-            return true;
-    }
-    return false;
-}
-
/*
 * WMI Driver
 */
@@ -2207,7 +2213,8 @@
err = asus_wmi_backlight_init(asus);
if (err && err != -ENODEV)
goto fail_backlight;
-} else if (asus->driver->quirks->wmi_backlight_set_devstate)
+err = asus_wmi_set_devstate(ASUS_WMI_DEVID_BACKLIGHT, 2, NULL);

status = wmi_install_notify_handler(asus->driver->event_guid,
    asus_wmi_notify, asus);
--- linux-4.15.0.orig/drivers/platform/x86/asus-wmi.h
+++ linux-4.15.0/drivers/platform/x86/asus-wmi.h
@@ -44,6 +44,7 @@
    bool wmi_backlight_power;
    bool wmi_backlight_native;
    +bool wmi_backlight_set_devstate;
    bool wmi_force_als_set;
    int wapf;
/*
--- linux-4.15.0.orig/drivers/platform/x86/compal-laptop.c
+++ linux-4.15.0/drivers/platform/x86/compal-laptop.c
/* ============== */
/* DriverGlobals */
/* ============== */

static DEVICE_ATTR(wake_up_pme,
	0644, wake_up_pme_show, wake_up_pme_store);
static DEVICE_ATTR(wake_up_modem,
	0644, wake_up_modem_show, wake_up_modem_store);
static DEVICE_ATTR(wake_up_lan,
	0644, wake_up_lan_show, wake_up_lan_store);
static DEVICE_ATTR(wake_up_wlan,
	0644, wake_up_wlan_show, wake_up_wlan_store);
static DEVICE_ATTR(wake_up_key,
	0644, wake_up_key_show, wake_up_key_store);
static DEVICE_ATTR(wake_up_mouse,
	0644, wake_up_mouse_show, wake_up_mouse_store);

static DEVICE_ATTR_RW(wake_up_pme);
static DEVICE_ATTR_RW(wake_up_modem);
static DEVICE_ATTR_RW(wake_up_lan);
static DEVICE_ATTR_RW(wake_up_wlan);
static DEVICE_ATTR_RW(wake_up_key);
static DEVICE_ATTR_RW(wake_up_mouse);

struct quirk_entry {
   u8 touchpad_led;
   +u8 kbd_led_not_present;
   u8 kbd_led_levels_off_1;
   int needs_kbd_timeouts;
};

+static struct quirk_entry quirk_dell_inspiron_1012 = {
   +.kbd_led_not_present = 1,
   +.kbd_led_levels_off_1 = 1,
};

+static struct platform_driver platform_driver = {
   .driver = {
      .name = "dell-laptop",
   }
};
static struct calling_interface_buffer *buffer;
static struct platform_device *platform_device;
static struct backlight_device *dell_backlight_device;
static struct rfkill *wifi_rfkill;

@@ -110,6 +114,24 @@
},
},
{
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_CHASSIS_TYPE, "30"), /*Tablet*/ +
+ },
+ },
+{
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_CHASSIS_TYPE, "31"), /*Convertible*/ +
+ },
+ },
+{
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_CHASSIS_TYPE, "32"), /*Detachable*/ +
+ },
+ },
+{
+ ident = "Dell Computer Corporation",
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Computer Corporation"),
+ @ @ -283,10 +305,29 @ @
},
+ driver_data = &quirk_dell_latitude_e6410,
+ },
+{ callback = dmi_matched,
+ ident = "Dell Inspiron 1012",
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 1012"),
+ },
+ driver_data = &quirk_dell_inspiron_1012,
+ },
+{ callback = dmi_matched,
+ ident = "Dell Inspiron 1018",
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 1018"),
+ DMI_MATCH(DMI_CHASSIS_TYPE, "34"), /*Convertible*/
+ },
+ driver_data = &quirk_dell_inspiron_1018,
+ },
+{ callback = dmi_matched,
+ ident = "Dell Inspiron 1020",
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 1020"),
+ DMI_MATCH(DMI_CHASSIS_TYPE, "35"), /*Convertible*/
+ },
+ driver_data = &quirk_dell_inspiron_1020,
+ },
+{ callback = dmi_matched,
+ ident = "Dell Inspiron 1021",
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 1021"),
+ DMI_MATCH(DMI_CHASSIS_TYPE, "36"), /*Convertible*/
+ },
+ driver_data = &quirk_dell_inspiron_1021,
+ },
+{ callback = dmi_matched,
+ ident = "Dell Inspiron 1024",
+ matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
+ DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 1024"),
+ DMI_MATCH(DMI_CHASSIS_TYPE, "37"), /*Convertible*/
+ },
+ driver_data = &quirk_dell_inspiron_1024,
+DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 1018"),
+},
+.driver_data = &quirk_dell_inspiron_1012,
+},
  { }
};

void dell_set_arguments(u32 arg0, u32 arg1, u32 arg2, u32 arg3)
+static void dell_fill_request(struct calling_interface_buffer *buffer,
  + u32 arg0, u32 arg1, u32 arg2, u32 arg3)
{
  memset(buffer, 0, sizeof(struct calling_interface_buffer));
  buffer->input[0] = arg0;
  @ @ -295,7 +336,8 @ @
  buffer->input[3] = arg3;
}

-int dell_send_request(u16 class, u16 select)
+static int dell_send_request(struct calling_interface_buffer *buffer,
  + u16 class, u16 select)
{
  int ret;
  @ @ -432,21 +474,22 @ @
  int disable = blocked ? 1 : 0;
  unsigned long radio = (unsigned long)data;
  int hwswitch_bit = (unsigned long)data - 1;
  +struct calling_interface_buffer buffer;
  int hwswitch;
  int status;
  int ret;

  -dell_set_arguments(0, 0, 0, 0);
  -ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
  +dell_fill_request(&buffer, 0, 0, 0);
  +ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
  if (ret)
    return ret;
  -status = buffer->output[1];
  +status = buffer->output[1];

  -dell_set_arguments(0x2, 0, 0, 0);
  -ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
  +dell_fill_request(&buffer, 0x2, 0, 0, 0);
  +ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
  if (ret)
    return ret;
  -hwswitch = buffer->output[1];
hwswitch = buffer.output[1];

/* If the hardware switch controls this radio, and the hardware
 switch is disabled, always disable the radio */
@@ -454,8 +497,8 @
    (status & BIT(0)) && (!(status & BIT(16)))

disable = 1;

dell_set_arguments(1 | (radio<<8) | (disable << 16), 0, 0, 0);
-dell_send_request(CLASS_INFO, SELECT_RFKILL);
+dell_fill_request(&buffer, 1 | (radio<<8) | (disable << 16), 0, 0, 0);
+ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
return ret;

@@ -464,9 +507,11 @
{
    if (status & BIT(0)) {
        /* Has hw-switch, sync sw_state to BIOS */
+    struct calling_interface_buffer buffer;
        int block = rfkill_blocked(rfkill);
-    dell_set_arguments(1 | (radio << 8) | (block << 16), 0, 0, 0);
-    dell_send_request(CLASS_INFO, SELECT_RFKILL);
+    dell_fill_request(&buffer, 1 | (radio << 8) | (block << 16), 0, 0, 0);
+    dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
    } else {
        /* No hw-switch, sync BIOS state to sw_state */
        rfkill_set_sw_state(rfkill, !(status & BIT(radio + 16)));
-    dell_set_arguments(0, 0, 0, 0);
-    ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
-    status = buffer->output[1];
+    status = buffer.output[1];
+    dell_fill_request(&buffer, 0, 0, 0, 0);
+    ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
+    status = buffer.output[1];

        if (ret != 0 || !(status & BIT(0))) {
            return;
        }
-dell_set_arguments(0, 0x2, 0, 0);
-ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
-hwswitch = buffer->output[1];
+dell_fill_request(&buffer, 0x2, 0, 0, 0);
+ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
+hwswitch = buffer.output[1];

if (ret != 0)
    return;
@@ -514,22 +560,23 @@

static int dell_debugfs_show(struct seq_file *s, void *data)
{
    struct calling_interface_buffer buffer;
    int hwswitch_state;
    int hwswitch_ret;
    int status;
    int ret;

    -dell_set_arguments(0, 0, 0, 0);
    -ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
    +dell_fill_request(&buffer, 0, 0, 0, 0);
    +ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
    if (ret)
        return ret;
    -status = buffer->output[1];
    +status = buffer.output[1];
    -dell_set_arguments(0, 0x2, 0, 0);
    -hwswitch_ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
    +dell_fill_request(&buffer, 0x2, 0, 0, 0);
    +hwswitch_ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
    if (hwswitch_ret)
        return hwswitch_ret;
    -hwswitch_state = buffer->output[1];
    +hwswitch_state = buffer.output[1];

    seq_printf(s, "return:\t%d\n", ret);
    seq_printf(s, "status:\t0x%X\n", status);
@@ -610,22 +657,23 @@

static void dell_update_rfkill(struct work_struct *ignored)
{
    struct calling_interface_buffer buffer;
    int hwswitch = 0;
    int status;
    int ret;
-dell_set_arguments(0, 0, 0, 0);
-ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
-status = buffer->output[1];
+dell_fill_request(&buffer, 0, 0, 0);
+ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
+status = buffer.output[1];

if (ret != 0)
return;

-dell_set_arguments(0, 0x2, 0, 0);
-ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
+dell_fill_request(&buffer, 0x2, 0, 0);
+ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);

if (ret == 0 && (status & BIT(0)))
-hwswitch = buffer->output[1];
+hwswitch = buffer.output[1];

if (wifi_rfkill) {
dell_rfkill_update_hw_state(wifi_rfkill, 1, status, hwswitch);
@@ -683,6 +731,7 @@
static int __init dell_setup_rfkill(void)
{
+struct calling_interface_buffer buffer;
int status, ret, whitelisted;
const char *product;

@@ -698,9 +747,9 @@
if (!force_rfkill && !whitelisted)
return 0;

-dell_set_arguments(0, 0, 0, 0);
-ret = dell_send_request(CLASS_INFO, SELECT_RFKILL);
-status = buffer->output[1];
+dell_fill_request(&buffer, 0, 0, 0);
+ret = dell_send_request(&buffer, CLASS_INFO, SELECT_RFKILL);
+status = buffer.output[1];

/* dell wireless info smbios call is not supported */
if (ret != 0)
@@ -853,6 +902,7 @@
static int dell_send_intensity(struct backlight_device *bd)
{
+struct calling_interface_buffer buffer;
struct calling_interface_token *token;
int ret;

@@ -860,17 +910,21 @@
if (!token)
    return -ENODEV;
    dell_set_arguments(token->location, bd->props.brightness, 0, 0);
    +dell_fill_request(&buffer, token->location, bd->props.brightness, 0, 0);
    if (power_supply_is_system_supplied() > 0)
        -ret = dell_send_request(CLASS_TOKEN_WRITE, SELECT_TOKEN_AC);
        +ret = dell_send_request(CLASS_TOKEN_WRITE, SELECT_TOKEN_AC);
else
    -ret = dell_send_request(CLASS_TOKEN_WRITE, SELECT_TOKEN_BAT);
    +ret = dell_send_request(CLASS_TOKEN_WRITE, SELECT_TOKEN_BAT);
return ret;
}

static int dell_get_intensity(struct backlight_device *bd)
{
    struct calling_interface_buffer buffer;
    struct calling_interface_token *token;
    int ret;

    @@ -878,14 +932,17 @@
if (!token)
    return -ENODEV;
    -dell_set_arguments(token->location, 0, 0, 0);
    +dell_fill_request(&buffer, token->location, 0, 0, 0);
    if (power_supply_is_system_supplied() > 0)
        -ret = dell_send_request(CLASS_TOKEN_READ, SELECT_TOKEN_AC);
        +ret = dell_send_request(CLASS_TOKEN_READ, SELECT_TOKEN_AC);
else
    -ret = dell_send_request(CLASS_TOKEN_READ, SELECT_TOKEN_BAT);
    +ret = dell_send_request(CLASS_TOKEN_READ, SELECT_TOKEN_BAT);
if (ret == 0)
    -ret = buffer->output[1];
    +ret = buffer.output[1];
    +
    return ret;
static bool kbd_led_present;
static DEFINE_MUTEX(kbd_led_mutex);
+static enum led_brightness kbd_led_level;

/*
 * NOTE: there are three ways to set the keyboard backlight level.
*
static int kbd_get_info(struct kbd_info *info)
{
+struct calling_interface_buffer buffer;
    u8 units;
    int ret;

-dell_set_arguments(0, 0, 0, 0);
-ret = dell_send_request(CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT);
+dell_fill_request(&buffer, 0, 0, 0, 0);
+ret = dell_send_request(&buffer,
+CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT);
    if (ret)
        return ret;

-info->modes = buffer->output[1] & 0xFFFF;
-info->type = (buffer->output[1] >> 24) & 0xFF;
-info->triggers = buffer->output[2] & 0xFF;
-units = (buffer->output[2] >> 8) & 0xFF;
-info->levels = (buffer->output[2] >> 16) & 0xFF;
+info->modes = buffer.output[1] & 0xFFFF;
+info->type = (buffer.output[1] >> 24) & 0xFF;
+info->triggers = buffer.output[2] & 0xFF;
+units = (buffer.output[2] >> 8) & 0xFF;
+info->levels = (buffer.output[2] >> 16) & 0xFF;

    if (quirks && quirks->kbd_led_levels_off_1 && info->levels)
        info->levels--;

    if (units & BIT(0))
        -info->seconds = (buffer->output[3] >> 0) & 0xFF;
+info->seconds = (buffer.output[3] >> 0) & 0xFF;
    if (units & BIT(1))
        -info->minutes = (buffer->output[3] >> 8) & 0xFF;
+info->minutes = (buffer.output[3] >> 8) & 0xFF;
    if (units & BIT(2))
        -info->hours = (buffer->output[3] >> 16) & 0xFF;
+info->hours = (buffer.output[3] >> 16) & 0xFF;
+info->hours = (buffer.output[3] >> 16) & 0xFF;
if (units & BIT(3))
- info->days = (buffer->output[3] >> 24) & 0xFF;
+ info->days = (buffer.output[3] >> 24) & 0xFF;

return ret;
}
@@ -1233,31 +1293,34 @@
static int kbd_get_state(struct kbd_state *state)
{
+struct calling_interface_buffer buffer;
int ret;

-dell_set_arguments(0x1, 0, 0, 0);
-ret = dell_send_request(CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT);
+dell_fill_request(&buffer, 0x1, 0, 0, 0);
+ret = dell_send_request(&buffer,
+CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT);
if (ret)
+ ret = dell_send_request(&buffer,
+CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT);
 return ret;

-state->mode_bit = ffs(buffer->output[1] & 0xFFFF);
+state->mode_bit = ffs(buffer.output[1] & 0xFFFF);
if (state->mode_bit != 0)
-state->mode_bit--;
+ state->mode_bit--;

-state->triggers = (buffer->output[1] >> 16) & 0xFF;
+state->triggers = (buffer.output[1] >> 16) & 0xFF;
-state->timeout_value = (buffer->output[1] >> 24) & 0x3F;
+state->timeout_value = (buffer.output[1] >> 24) & 0x3F;
-state->timeout_unit = (buffer->output[1] >> 30) & 0x3;
+state->timeout_unit = (buffer.output[1] >> 30) & 0x3;
-state->als_setting = buffer->output[2] & 0xFF;
+state->als_setting = buffer.output[2] & 0xFF;
-state->als_value = (buffer->output[2] >> 8) & 0xFF;
+state->als_value = (buffer.output[2] >> 8) & 0xFF;
-state->level = (buffer->output[2] >> 16) & 0xFF;
+state->level = (buffer.output[2] >> 16) & 0xFF;
-state->timeout_value_ac = (buffer->output[2] >> 24) & 0x3F;
+state->timeout_value_ac = (buffer.output[2] >> 24) & 0x3F;
+state->timeout_unit_ac = (buffer.output[2] >> 30) & 0x3;
+state->timeout_unit_ac = (buffer.output[2] >> 30) & 0x3;

return ret;
}

static int kbd_set_state(struct kbd_state *state)


{+struct calling_interface_buffer buffer;
 int ret;
 u32 input1;
 u32 input2;
@@ -1270,8 +1333,9 @@
 input2 |= (state->level & 0xFF) << 16;
 input2 |= (state->timeout_value_ac & 0x3F) << 24;
 input2 |= (state->timeout_unit_ac & 0x3) << 30;
- dell_set_arguments(0x2, input1, input2, 0);
- ret = dell_send_request(CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT);
+ dell_fill_request(&buffer, 0x2, input1, input2, 0);
+ ret = dell_send_request(&buffer, CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT);
 return ret;
 }
@@ -1298,6 +1362,7 @@
 static int kbd_set_token_bit(u8 bit)
 {
+ struct calling_interface_buffer buffer;
 struct calling_interface_token *token;
 int ret;
@@ -1308,14 +1373,15 @@
 if (!token)
 return -EINVAL;
- dell_set_arguments(token->location, token->value, 0, 0);
- ret = dell_send_request(CLASS_TOKEN_WRITE, SELECT_TOKEN_STD);
+ dell_fill_request(&buffer, token->location, token->value, 0, 0);
+ ret = dell_send_request(&buffer, CLASS_TOKEN_WRITE, SELECT_TOKEN_STD);
 return ret;
 }

 static int kbd_get_token_bit(u8 bit)
 {
+ struct calling_interface_buffer buffer;
 struct calling_interface_token *token;
 int ret;
 int val;
@@ -1327,9 +1393,9 @@
 if (!token)
 return -EINVAL;
- dell_set_arguments(token->location, 0, 0, 0);
ret = dell_send_request(CLASS_TOKEN_READ, SELECT_TOKEN_STD);
-val = buffer->output[1];
+dell_fill_request(&buffer, token->location, 0, 0, 0);
+ret = dell_send_request(&buffer, CLASS_TOKEN_READ, SELECT_TOKEN_STD);
+val = buffer.output[1];

if (ret)
    return ret;
@@ -1451,6 +1517,9 @@
{
    int ret;

+if (quirks && quirks->kbd_led_not_present)
+return;
+
    ret = kbd_init_info();
    kbd_init_tokens();
@@ -1947,6 +2016,7 @@
static int kbd_led_level_set(struct led_classdev *led_cdev,
    enum led_brightness value)
{
    enum led_brightness new_value = value;
    struct kbd_state state;
    struct kbd_state new_state;
    u16 num;
    @@ -1976,6 +2046,9 @@
    }
out:
+if (ret == 0)
+kbd_led_level = new_value;
+
    mutex_unlock(&kbd_led_mutex);
    return ret;
    }
@@ -2003,6 +2103,25 @@
if (kbd_led.max_brightness)
    kbdLed.max_brightness--;
    }
+
+kbd_led_level = kbd_led_level_get(NULL);
+
    ret = led_classdev_register(dev, &kbd_led);
    if (ret)
        kbd_led_present = false;
@@ -2027,13 +2103,25 @@
    static int dell_laptop_notifier_call(struct notifier_block *nb,
unsigned long action, void *data) {
  bool changed = false;
  enum led_brightness new_kbd_led_level;

  switch (action) {
    case DELL_LAPTOP_KBD_BACKLIGHT_BRIGHTNESS_CHANGED:
      if (!kbd_led_present)
        break;

      led_classdev_notify_brightness_hw_changed(&kbd_led,
          kbd_led_level_get(&kbd_led));
      mutex_lock(&kbd_led_mutex);
      new_kbd_led_level = kbd_led_level_get(&kbd_led);
      if (kbd_led_level != new_kbd_led_level) {
        kbd_led_level = new_kbd_led_level;
        changed = true;
      }
      mutex_unlock(&kbd_led_mutex);

    if (changed)
      led_classdev_notify_brightness_hw_changed(&kbd_led,
          kbd_led_level);
    break;
  }

  int dell_micmute_led_set(int state) {
    struct calling_interface_buffer buffer;
    struct calling_interface_token *token;

    if (state == 0)
      dell_set_arguments(token->location, token->value, 0, 0);
    if (!token)
      return -ENODEV;
    // @ @ -2058.8 +2147.8 @ @
    return state;
  }

  @ @ -2090.13 +2179.6 @ @
  if (ret)
    goto fail_platform_device2;
-buffer = kzalloc(sizeof(struct calling_interface_buffer), GFP_KERNEL);
-if (!buffer) {
-ret = -ENOMEM;
-goto fail_buffer;
-}
-
-
ret = dell_setup_rfkill();

if (ret) {
@@ -2121,10 +2203,13 @@

token = dell_smbios_find_token(BRIGHTNESS_TOKEN);
if (token) {
-dell_set_arguments(token->location, 0, 0, 0);
-ret = dell_send_request(CLASS_TOKEN_READ, SELECT_TOKEN_AC);
-if (ret)
-max_intensity = buffer->output[3];
+struct calling_interface_buffer buffer;
+		dell_fill_request(&buffer, token->location, 0, 0, 0);
+ret = dell_send_request(&buffer,
+CLASS_TOKEN_READ, SELECT_TOKEN_AC);
+if (ret == 0)
+max_intensity = buffer.output[3];
}

if (max_intensity) {
@@ -2158,8 +2243,6 @@
  fail_get_brightness:
  backlight_device_unregister(dell_backlight_device);
  fail_backlight:
-kfree(buffer);
-fail_buffer:
-dell_cleanup_rfkill();
-fail_rfkill:
-platform_device_del(platform_device);
@@ -2179,7 +2262,6 @@
touchpad_led_exit();
kbd_led_exit();
backlight_device_unregister(dell_backlight_device);
-kfree(buffer);
-dell_cleanup_rfkill();
if (platform_device) {
-platform_device_unregister(platform_device);
--- linux-4.15.0.orig/drivers/platform/x86/dell-smbios-base.c
+++ linux-4.15.0/drivers/platform/x86/dell-smbios-base.c
+/*
+ * Common functions for kernel modules using Dell SMBIOS
+ * 
+ * Copyright (c) Red Hat <mjg@redhat.com>
+ * Copyright (c) 2014 Gabriele Mazzotta <gabriele.mzt@gmail.com>
+ * Copyright (c) 2014 Pali Rohr <pali.rohar@gmail.com>
+ * 
+ * Based on documentation in the libsmbios package:
+ * Copyright (C) 2005-2014 Dell Inc.
+ * 
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License version 2 as
+ * published by the Free Software Foundation.
+ */
+
+##define pr_fmt(fmt) KBUILD_MODNAME ": " fmt
+
+##include <linux/kernel.h>
+##include <linux/module.h>
+##include <linux/capability.h>
+##include <linux/dmi.h>
+##include <linux/err.h>
+##include <linux/mutex.h>
+##include <linux/platform_device.h>
+##include <linux/slab.h>
+##include "dell-smbios.h"
+
+static u32 da_supported_commands;
+static int da_num_tokens;
+static struct platform_device *platform_device;
+static struct calling_interface_token *da_tokens;
+static struct device_attribute *token_location_attrs;
+static struct device_attribute *token_value_attrs;
+static struct attribute **token_attrs;
+static DEFINE_MUTEX(smbios_mutex);
+
+struct smbios_device {
+struct list_head list;
+struct device *device;
+int (*call_fn)(struct calling_interface_buffer *arg);
+};
+
+struct smbios_call {
+u32 need_capability;
+int cmd_class;
+int cmd_select;
+};
/* calls that are whitelisted for given capabilities */
+static struct smbios_call call_whitelist[] = {
+/* generally tokens are allowed, but may be further filtered or */
+/* restricted by token blacklist or whitelist */
+/* */
+{CAP_SYS_ADMIN,CLASS_TOKEN_READ,SELECT_TOKEN_STD},
+{CAP_SYS_ADMIN,CLASS_TOKEN_READ,SELECT_TOKEN_AC},
+{CAP_SYS_ADMIN,CLASS_TOKEN_READ,SELECT_TOKEN_BAT},
+{CAP_SYS_ADMIN,CLASS_TOKEN_WRITE,SELECT_TOKEN_STD},
+{CAP_SYS_ADMIN,CLASS_TOKEN_WRITE,SELECT_TOKEN_AC},
+{CAP_SYS_ADMIN,CLASS_TOKEN_WRITE,SELECT_TOKEN_BAT},
+/* used by userspace: fwupdate */
+{CAP_SYS_ADMIN,CLASS_ADMIN_PROP,SELECT_ADMIN_PROP},
+/* used by userspace: fwupd */
+{CAP_SYS_ADMIN,CLASS_INFO,SELECT_DOCK},
+{CAP_SYS_ADMIN,CLASS_FLASH_INTERFACE,SELECT_FLASH_INTERFACE},
+};
+
+/* calls that are explicitly blacklisted */
+static struct smbios_call call_blacklist[] = {
+{0x0000, 01, 07}, /* manufacturing use */
+{0x0000, 06, 05}, /* manufacturing use */
+{0x0000, 11, 03}, /* write once */
+{0x0000, 11, 07}, /* write once */
+{0x0000, 11, 11}, /* write once */
+{0x0000, 19, -1}, /* diagnostics */
+/* handled by kernel: dell-laptop */
+{0x0000, CLASS_INFO, SELECT_RFKILL},
+{0x0000, CLASS_KBD_BACKLIGHT, SELECT_KBD_BACKLIGHT},
+};
+
+struct token_range {
+u32 need_capability;
+u16 min;
+u16 max;
+};
+
+/* tokens that are whitelisted for given capabilities */
+static struct token_range token_whitelist[] = {
+/* used by userspace: fwupdate */
+{CAP_SYS_ADMIN, CAPSULE_EN_TOKEN, CAPSULE_DIS_TOKEN},
+/* can indicate to userspace that WMI is needed */
+{0x0000, WSMT_EN_TOKEN, WSMT_DIS_TOKEN}
+};
+
+/* tokens that are explicitly blacklisted */
+static struct token_range token_blacklist[] = {
+{0x0000, 0x0058, 0x0059}, /* ME use */
+};
+[0x0000, 0x00CD, 0x00D0], /* raid shadow copy */
+[0x0000, 0x013A, 0x01FF], /* sata shadow copy */
+[0x0000, 0x0175, 0x0176], /* write once */
+[0x0000, 0x0195, 0x0197], /* diagnostics */
+[0x0000, 0x01DC, 0x01DD], /* diagnostics */
+[0x0000, 0x027D, 0x0284], /* diagnostics */
+[0x0000, 0x02E3, 0x02E3], /* diagnostics */
+[0x0000, 0x02FF, 0x02FF], /* manufacturing use */
+[0x0000, 0x0300, 0x0302], /* manufacturing use */
+[0x0000, 0x0325, 0x0326], /* manufacturing use */
+[0x0000, 0x0332, 0x0335], /* fan control */
+[0x0000, 0x0350, 0x0350], /* manufacturing use */
+[0x0000, 0x0363, 0x0363], /* manufacturing use */
+[0x0000, 0x0368, 0x0368], /* manufacturing use */
+[0x0000, 0x03F6, 0x03F7], /* manufacturing use */
+[0x0000, 0x049E, 0x049F], /* manufacturing use */
+[0x0000, 0x04A0, 0x04A3], /* diagnostics */
+[0x0000, 0x04E6, 0x04E7], /* manufacturing use */
+[0x0000, 0x4000, 0x7FFF], /* internal BIOS use */
+[0x0000, 0x9000, 0x9001], /* internal BIOS use */
+[0x0000, 0xA000, 0xBFFF], /* write only */
+[0x0000, 0xEFF0, 0xEFFF], /* internal BIOS use */
+*/ handled by kernel: dell-laptop */
+[0x0000, BRIGHTNESS_TOKEN,BRIGHTNESS_TOKEN],
+[0x0000, KBD_LED_OFF_TOKEN,KBD_LED_AUTO_TOKEN],
+[0x0000, KBD_LED_AC_TOKEN,KBD_LED_AC_TOKEN],
+[0x0000, KBD_LED_AUTO_25_TOKEN,KBD_LED_AUTO_75_TOKEN],
+[0x0000, KBD_LED_AUTO_100_TOKEN,KBD_LED_AUTO_100_TOKEN],
+[0x0000, GLOBAL_MIC_MUTE_ENABLE,GLOBAL_MIC_MUTE_DISABLE],
+};
+
+static LIST_HEAD(smbios_device_list);
+
+int dell_smbios_error(int value)
+{
+switch (value) {
+case 0: /* Completed successfully */
+return 0;
+case -1: /* Completed with error */
+return -EIO;
+case -2: /* Function not supported */
+return -ENXIO;
+default: /* Unknown error */
+return -EINVAL;
+}
+EXPORT_SYMBOL_GPL(dell_smbios_error);
+}
+int dell_smbios_register_device(struct device *d, void *call_fn)
+
+struct smbios_device *priv;
+
+priv = devm_kzalloc(d, sizeof(struct smbios_device), GFP_KERNEL);
+if (!priv)
+return -ENOMEM;
+get_device(d);
+priv->device = d;
+priv->call_fn = call_fn;
+mutex_lock(&smbios_mutex);
+list_add_tail(&priv->list, &smbios_device_list);
+mutex_unlock(&smbios_mutex);
+dev_dbg(d, "Added device: %s\n", d->driver->name);
+return 0;
+}
+EXPORT_SYMBOL_GPL(dell_smbios_register_device);
+
+void dell_smbios_unregister_device(struct device *d)
+
+struct smbios_device *priv;
+
+mutex_lock(&smbios_mutex);
+list_for_each_entry(priv, &smbios_device_list, list) {
+if (priv->device == d) {
+list_del(&priv->list);
+put_device(d);
+break;
+}
+}
+mutex_unlock(&smbios_mutex);
+dev_dbg(d, "Remove device: %s\n", d->driver->name);
+}
+EXPORT_SYMBOL_GPL(dell_smbios_unregister_device);
+
+int dell_smbios_call_filter(struct device *d,
+    struct calling_interface_buffer *buffer)
+
+u16 t = 0;
+int i;
+
+/* can't make calls over 30 */
+if (buffer->cmd_class > 30) {
+dev_dbg(d, "class too big: %u\n", buffer->cmd_class);
+return -EINVAL;
+}
+
+/* supported calls on the particular system */
+if (!(da_supported_commands & (1 << buffer->cmd_class))) {
+dev_dbg(d, "invalid command, supported commands: 0x%8x\n",
+da_supported_commands);
+return -EINVAL;
+}
+
+/* match against call blacklist */
+for (i = 0; i < ARRAY_SIZE(call_blacklist); i++) {
+if (buffer->cmd_class != call_blacklist[i].cmd_class)
+continue;
+if (buffer->cmd_select != call_blacklist[i].cmd_select &&
+call_blacklist[i].cmd_select != -1)
+continue;
+dev_dbg(d, "blacklisted command: %u/%u\n",
+buffer->cmd_class, buffer->cmd_select);
+return -EINVAL;
+}
+
+/* if a token call, find token ID */
+
+if ((buffer->cmd_class == CLASS_TOKEN_READ ||
+ buffer->cmd_class == CLASS_TOKEN_WRITE) &&
+ buffer->cmd_select < 3) {
+/* find the matching token ID */
+for (i = 0; i < da_num_tokens; i++) {
+if (da_tokens[i].location != buffer->input[0])
+continue;
+t = da_tokens[i].tokenID;
+break;
+}
+
+/* token call; but token didn't exist */
+if (!t) {
+dev_dbg(d, "token at location %04x doesn't exist\n",
+buffer->input[0]);
+return -EINVAL;
+}
+
+/* match against token blacklist */
+for (i = 0; i < ARRAY_SIZE(token_blacklist); i++) {
+if (!token_blacklist[i].min || !token_blacklist[i].max)
+continue;
+if (t >= token_blacklist[i].min || !token_blacklist[i].max)
+continue;
+if (t <= token_blacklist[i].min &&
+t <= token_blacklist[i].max)
+return -EINVAL;
+}
+
+/* match against token whitelist */
for (i = 0; i < ARRAY_SIZE(token_whitelist); i++) {
    if (!token_whitelist[i].min || !token_whitelist[i].max)
        continue;
    if (t < token_whitelist[i].min ||
        t > token_whitelist[i].max)
        continue;
    if (!token_whitelist[i].need_capability ||
        capable(token_whitelist[i].need_capability)) {
        dev_dbg(d, "whitelisted token: %x\n", t);
        return 0;
    }
}
/* match against call whitelist */
for (i = 0; i < ARRAY_SIZE(call_whitelist); i++) {
    if (buffer->cmd_class != call_whitelist[i].cmd_class)
        continue;
    if (buffer->cmd_select != call_whitelist[i].cmd_select)
        continue;
    if (!call_whitelist[i].need_capability ||
        capable(call_whitelist[i].need_capability)) {
        dev_dbg(d, "whitelisted capable command: %u/%u\n",
            call_whitelist[i].cmd_class,
            call_whitelist[i].cmd_select);
        return 0;
    }
    dev_dbg(d, "missing capability %d for %u/%u\n",
        call_whitelist[i].need_capability,
        call_whitelist[i].cmd_class,
        call_whitelist[i].cmd_select);
    +
}
/* not in a whitelist, only allow processes with capabilities */
if (capable(CAP_SYS_RAWIO)) {
    dev_dbg(d, "Allowing %u/%u due to CAP_SYS_RAWIO\n",
        buffer->cmd_class,
        buffer->cmd_select);
    return 0;
}
+return -EACCES;
+EXPRESS_SYMBOL_GPL(dell_smbios_call_filter);
+
+int dell_smbios_call(struct calling_interface_buffer *buffer)
+{
    int (*call_fn)(struct calling_interface_buffer *) = NULL;
    struct device *selected_dev = NULL;
    struct smbios_device *priv;
}
int ret;
+
mutex_lock(&smbios_mutex);
list_for_each_entry(priv, &smbios_device_list, list) {
  if (!selected_dev || priv->device->id >= selected_dev->id) {
    dev_dbg(priv->device, "Trying device ID: %d\n",
            priv->device->id);
    call_fn = priv->call_fn;
    selected_dev = priv->device;
  }
}

if (!selected_dev) {
  ret = -ENODEV;
  pr_err("No dell-smbios drivers are loaded\n");
  goto out_smbios_call;
}

ret = call_fn(buffer);
+
out_smbios_call:
mutex_unlock(&smbios_mutex);
return ret;
}

EXPORT_SYMBOL_GPL(dell_smbios_call);

struct calling_interface_token *dell_smbios_find_token(int tokenid)
{
  int i;
  
  for (i = 0; i < da_num_tokens; i++) {
    if (da_tokens[i].tokenID == tokenid)
      return &da_tokens[i];
  }

  return NULL;
}

EXPORT_SYMBOL_GPL(dell_smbios_find_token);

static BLOCKING_NOTIFIER_HEAD(dell_laptop_chain_head);

int dell_laptop_register_notifier(struct notifier_block *nb)
{
  return blocking_notifier_chain_register(&dell_laptop_chain_head, nb);
}

EXPORT_SYMBOL_GPL(dell_laptop_register_notifier);

int dell_laptop_unregister_notifier(struct notifier_block *nb)
+\{  
+return blocking_notifier_chain_unregister(&dell_laptop_chain_head, nb);  
+\}  
+EXPORT_SYMBOL_GPL(dell_laptop_unregister_notifier);  
+  
+void dell_laptop_call_notifier(unsigned long action, void *data)  
+\{  
+blocking_notifier_call_chain(&dell_laptop_chain_head, action, data);  
+\}  
+EXPORT_SYMBOL_GPL(dell_laptop_call_notifier);  
+  
+static void __init parse_da_table(const struct dmi_header *dm)  
+\{  
+  /* Final token is a terminator, so we don't want to copy it */  
+  int tokens = (dm->length-11)/sizeof(struct calling_interface_token)-1;  
+  struct calling_interface_token *new_da_tokens;  
+  struct calling_interface_structure *table =  
+  container_of(dm, struct calling_interface_structure, header);  
+  
+  /*  
+   * 4 bytes of table header, plus 7 bytes of Dell header  
+   * plus at least 6 bytes of entry  
+   */  
+  
+  if (dm->length < 17)  
+  return;  
+  
+  da_supported_commands = table->supportedCmds;  
+  
+  new_da_tokens = krealloc(da_tokens, (da_num_tokens + tokens) *  
+  sizeof(struct calling_interface_token),  
+  GFP_KERNEL);  
+  
+  if (!new_da_tokens)  
+  return;  
+  
+  da_tokens = new_da_tokens;  
+  
+  memcpy(da_tokens+da_num_tokens, table->tokens,  
+  sizeof(struct calling_interface_token) * tokens);  
+  
+  da_num_tokens += tokens;  
+\}  
+  
+static void zero_duplicates(struct device *dev)  
+\{  
+  int i, j;  
+  
+  for (i = 0; i < da_num_tokens; i++) {  
+  

if (da_tokens[i].tokenID == 0)
    continue;
for (j = i+1; j < da_num_tokens; j++) {
    if (da_tokens[j].tokenID == 0)
        continue;
    if (da_tokens[i].tokenID == da_tokens[j].tokenID) {
        dev_dbg(dev, "Zeroing dup token ID \%x(\%x/\%x)\n",
                da_tokens[j].tokenID,
                da_tokens[j].location,
                da_tokens[j].value);
        da_tokens[j].tokenID = 0;
    }
}

static void __init find_tokens(const struct dmi_header *dm, void *dummy) {
    switch (dm->type) {
    case 0xd4: /* Indexed IO */
    case 0xd5: /* Protected Area Type 1 */
    case 0xd6: /* Protected Area Type 2 */
        break;
    case 0xda: /* Calling interface */
        parse_da_table(dm);
        break;
    }

    static int match_attribute(struct device *dev,
            struct device_attribute *attr) {
        int i;
        for (i = 0; i < da_num_tokens * 2; i++) {
            if (!token_attrs[i])
                continue;
            if (strcmp(token_attrs[i]->name, attr->attr.name) == 0)
                return i/2;
        }
        dev_dbg(dev, "couldn't match: %s\n", attr->attr.name);
        return -EINVAL;
    }
    ssize_t location_show(struct device *dev,
            struct device_attribute *attr, char *buf) {
        int i;
+if (!capable(CAP_SYS_ADMIN))
  return -EPERM;
+
+i = match_attribute(dev, attr);
+if (i > 0)
  return scnprintf(buf, PAGE_SIZE, "%08x", da_tokens[i].location);
+return 0;
+
+static ssize_t value_show(struct device *dev,
  struct device_attribute *attr, char *buf)
+{
+  int i;
+
+  if (!capable(CAP_SYS_ADMIN))
+    return -EPERM;
+  +i = match_attribute(dev, attr);
+  +if (i > 0)
+    return scnprintf(buf, PAGE_SIZE, "%08x", da_tokens[i].value);
+  return 0;
+}
+
+static struct_attribute_group smbios_attribute_group = {
+  .name = "tokens"
+};
+
+static struct platform_driver platform_driver = {
+  .driver = {
+    .name = "dell-smbios",
+  },
+};
+
+static int build_tokens_sysfs(struct platform_device *dev)
+{
+  char *location_name;
+  char *value_name;
+  size_t size;
+  int ret;
+  int i, j;
+
  /* (number of tokens  + 1 for null terminated */
  +size = sizeof(struct device_attribute) * (da_num_tokens + 1);
  +token_location_attrs = kzalloc(size, GFP_KERNEL);
  +if (!token_location_attrs)
    return -ENOMEM;
  +token_value_attrs = kzalloc(size, GFP_KERNEL);
+if (!token_value_attrs)
+goto out_allocate_value;
+
+/* need to store both location and value + terminator*/
+size = sizeof(struct attribute *) * ((2 * da_num_tokens) + 1);
+token_attrs = kzalloc(size, GFP_KERNEL);
+if (!token_attrs)
+goto out_allocate_attrs;
+
+for (i = 0, j = 0; i < da_num_tokens; i++) {
+    /* skip empty */
+    if (da_tokens[i].tokenID == 0)
+        continue;
+    /* add location */
+    location_name = kasprintf(GFP_KERNEL, "%04x_location",
+     da_tokens[i].tokenID);
+    if (location_name == NULL)
+        goto out_unwind_strings;
+    sysfs_attr_init(&token_location_attrs[i].attr);
+    token_location_attrs[i].attr.name = location_name;
+    token_location_attrs[i].attr.mode = 0444;
+    token_location_attrs[i].show = location_show;
+    token_attrs[j++] = &token_location_attrs[i].attr;
+
+    /* add value */
+    value_name = kasprintf(GFP_KERNEL, "%04x_value",
+     da_tokens[i].tokenID);
+    if (value_name == NULL)
+        goto loop_fail_create_value;
+    sysfs_attr_init(&token_value_attrs[i].attr);
+    token_value_attrs[i].attr.name = value_name;
+    token_value_attrs[i].attr.mode = 0444;
+    token_value_submit[i].show = value_show;
+    token_attrs[j++] = &token_value_attrs[i].attr;
+    continue;
+}
+smbios_attribute_group.attrs = token_attrs;
+
+ret = sysfs_create_group(&dev->dev.kobj, &smbios_attribute_group);
+if (ret)
+goto out_unwind_strings;
+return 0;
+
+out_unwind_strings:
while (i--) {
	kfree(token_location_attrs[i].attr.name);
	kfree(token_value_attrs[i].attr.name);
}  
+kfree(token_attrs);
+out_allocate_attrs:
+kfree(token_value_attrs);
+out_allocate_value:
+kfree(token_location_attrs);
+
+return -ENOMEM;
+
+static void free_group(struct platform_device *pdev) {
+  +int i;
+
+  +sysfs_remove_group(&pdev->dev.kobj,
+    +&smbios_attribute_group);
+  +for (i = 0; i < da_num_tokens; i++) {
+    +kfree(token_location_attrs[i].attr.name);
+    +kfree(token_value_attrs[i].attr.name);
+  }  
+  +kfree(token_attrs);
+  +kfree(token_value_attrs);
+  +kfree(token_location_attrs);
+  +}
+  +static int __init dell_smbios_init(void) {
+  +int ret, wmi, smm;
+  +
+  +if (!dmi_find_device(DMI_DEV_TYPE_OEM_STRING, "Dell System", NULL) &&
+    +!dmi_find_device(DMI_DEV_TYPE_OEM_STRING, "www.dell.com", NULL)) {  
+    +pr_err("Unable to run on non-Dell system\n");
+    +return -ENODEV;
+  }  
+  +
+  +dmi_walk(find_tokens, NULL);
+  +
+  +if (!da_tokens) {  
+    +pr_info("Unable to find dmi tokens\n");
+    +return -ENODEV;
+  }  
+  +
+  +ret = platform_driver_register(&platform_driver);
+  +if (ret)
+    +goto fail_platform_driver;
platform_device = platform_device_alloc("dell-smbios", 0);
if (!platform_device) {
    ret = -ENOMEM;
    goto fail_platform_device_alloc;
}
ret = platform_device_add(platform_device);
if (ret)
    goto fail_platform_device_add;

/* duplicate tokens will cause problems building sysfs files */
zero_duplicates(&platform_device->dev);
ret = build_tokens_sysfs(platform_device);
if (ret)
    goto fail_create_group;

/* register backends */
wmi = init_dell_smbios_wmi();
if (wmi)
    pr_debug("Failed to initialize WMI backend: %d\n", wmi);
smm = init_dell_smbios_smm();
if (smm)
    pr_debug("Failed to initialize SMM backend: %d\n", smm);
if (wmi && smm) {
    pr_err("No SMBIOS backends available (wmi: %d, smm: %d)\n", wmi, smm);
    ret = -ENODEV;
    goto fail_sysfs;
}
return 0;

fail_sysfs:
free_group(platform_device);
fail_create_group:
platform_device_del(platform_device);
fail_platform_device_add:
platform_device_put(platform_device);
fail_platform_driver_alloc:
platform_driver_unregister(&platform_driver);
fail_platform_driver:
kfree(da_tokens);
return ret;
+static void __exit dell_smbios_exit(void)
+{
+exit_dell_smbios_wmi();
+exit_dell_smbios_smm();
+mutex_lock(&smbios_mutex);
+if (platform_device) {
+free_group(platform_device);
+platform_device_unregister(platform_device);
+platform_driver_unregister(&platform_driver);
+}
+kfree(da_tokens);
+mutex_unlock(&smbios_mutex);
+}
+
+subsys_initcall(dell_smbios_init);
+module_exit(dell_smbios_exit);
+
+MODULE_AUTHOR("Matthew Garrett <mjg@redhat.com>");
+MODULE_AUTHOR("Gabriele Mazzotta <gabriele.mzt@gmail.com>");
+MODULE_AUTHOR("Pali Rohr <pali.rohar@gmail.com>");
+MODULE_AUTHOR("Mario Limonciello <mario.limonciello@dell.com>");
+MODULE_DESCRIPTION("Common functions for kernel modules using Dell SMBIOS");
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/platform/x86/dell-smbios-smm.c
+++ linux-4.15.0/drivers/platform/x86/dell-smbios-smm.c
@@ -58,7 +58,7 @@
};
MODULE_DEVICE_TABLE(dmi, dell_device_table);

- static void __init parse_da_table(const struct dmi_header *dm)
- static void parse_da_table(const struct dmi_header *dm)
- {
- struct calling_interface_structure *table =
- container_of(dm, struct calling_interface_structure, header);
- @ @ -73,7 +73,7 @@
- da_command_code = table->cmdIOCode;
- }

- static void __init find_cmd_address(const struct dmi_header *dm, void *dummy)
- static void find_cmd_address(const struct dmi_header *dm, void *dummy)
- {
- switch (dm->type) {
- case 0xda: /* Calling interface */
- @ @ -128,7 +128,7 @@
- return false;
- }
static int __init dell_smbios_smm_init(void)
+int init_dell_smbios_smm(void)
{
    int ret;
    /*
     @@ -176,7 +176,7 @@
     return ret;
     }

    static void __exit dell_smbios_smm_exit(void)
+void exit_dell_smbios_smm(void)
    {
        if (platform_device) {
            dell_smbios_unregister_device(&platform_device->dev);
            @@ -184,13 +184,3 @@
            free_page((unsigned long)buffer);
        }
    }
    -
    -subsys_initcall(dell_smbios_smm_init);
    -module_exit(dell_smbios_smm_exit);
    -
    -MODULE_AUTHOR("Matthew Garrett <mjg@redhat.com>");
    -MODULE_AUTHOR("Gabriele Mazzota <gabriele.mzt@gmail.com>");
    -MODULE_AUTHOR("Pali Rohr <pali.rohar@gmail.com>");
    -MODULE_AUTHOR("Mario Limonciello <mario.limonciello@dell.com>");
    -MODULE_DESCRIPTION("Dell SMBIOS communications over SMI");
    -MODULE_LICENSE("GPL");
    --- linux-4.15.0.orig/drivers/platform/x86/dell-smbios-wmi.c
    +++ linux-4.15.0/drivers/platform/x86/dell-smbios-wmi.c
    @@ -72,12 +72,14 @@
    if (obj->type == ACPI_TYPE_INTEGER)
        dev_dbg(&wdev->dev, "SMBIOS call failed: %llu\n",
        obj->integer.value);
        +kfree(output.pointer);
        return -EIO;
    }
    memcpy(&priv->buf->std, obj->buffer.pointer, obj->buffer.length);
    dev_dbg(&wdev->dev, "result: [%08x,%08x,%08x,%08x]\n",
    priv->buf->std.output[0], priv->buf->std.output[1],
    priv->buf->std.output[2], priv->buf->std.output[3]);
    +kfree(output.pointer);

    return 0;
    }
    @@ -228,7 +230,7 @@
    { },

static void __init parse_b1_table(const struct dmi_header *dm)
{
    struct misc_bios_flags_structure *flags =
        container_of(dm, struct misc_bios_flags_structure, header);
    wmi_supported = 1;
}

static void __init find_b1(const struct dmi_header *dm, void *dummy)
{
    switch (dm->type) {
    case 0xb1: /* misc bios flags */
        .filter_callback = dell_smbios_wmi_filter,
    }

static int __init init_dell_smbios_wmi(void)
{
    dmi_walk(find_b1, NULL);

    return wmi_driver_register(&dell_smbios_wmi_driver);
}

static void __exit exit_dell_smbios_wmi(void)
{
    -wmi_driver_unregister(&dell_smbios_wmi_driver);
}

module_init(init_dell_smbios_wmi);
module_exit(exit_dell_smbios_wmi);

MODULE_ALIAS("wmi:" DELL_WMI_SMBIOS_GUID);
MODULE_AUTHOR("Mario Limonciello <mario.limonciello@dell.com> ");
MODULE_DESCRIPTION("Dell SMBIOS communications over WMI");
MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/platform/x86/dell-smbios.h
+++ linux-4.15.0/drivers/platform/x86/dell-smbios.h
@@ -75,4 +75,29 @@
 int dell_laptop_unregister_notifier(struct notifier_block *nb);
void dell_laptop_call_notifier(unsigned long action, void *data);

-#endif
+/* for the supported backends */
+#ifdef CONFIG_DELL_SMBIOS_WMI
+int init_dell_smbios_wmi(void);
+void exit_dell_smbios_wmi(void);
+#else /* CONFIG_DELL_SMBIOS_WMI */
+static inline int init_dell_smbios_wmi(void)
+{
+    return -ENODEV;
+}
+static inline void exit_dell_smbios_wmi(void)
+{ }
+#endif /* CONFIG_DELL_SMBIOS_WMI */
+
+#ifdef CONFIG_DELL_SMBIOS_SMM
+int init_dell_smbios_smm(void);
+void exit_dell_smbios_smm(void);
+#else /* CONFIG_DELL_SMBIOS_SMM */
+static inline int init_dell_smbios_smm(void)
+{
+    return -ENODEV;
+}
+static inline void exit_dell_smbios_smm(void)
+{ }
+#endif /* CONFIG_DELL_SMBIOS_SMM */
+
+#endif /* _DELL_SMBIOS_H_ */
--- linux-4.15.0.orig/drivers/platform/x86/dell-uart-backlight.c
+++ linux-4.15.0/drivers/platform/x86/dell-uart-backlight.c
@@ -0,0 +1,531 @@
+/*
+ *  Dell AIO Serial Backlight Driver
+ *
+ *  Copyright (C) 2017 AceLan Kao <acelan.kao@canonical.com>
+ *
+ *  This program is free software; you can redistribute it and/or modify
+ *  it under the terms of the GNU General Public License as published by
+ *  the Free Software Foundation; either version 2 of the License, or
+ *  (at your option) any later version.
+ *
+ *  This program is distributed in the hope that it will be useful,
+ *  but WITHOUT ANY WARRANTY; without even the implied warranty of
+ *  MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ *  GNU General Public License for more details.
+ *
+ */
```c
#include <linux/kernel.h>
#include <linux/module.h>
#include <linux/acpi.h>
#include <linux/serial_8250.h>
#include <linux/delay.h>
#include <linux/backlight.h>
#include <linux/dmi.h>
#include <acpi/video.h>

#include "dell-uart-backlight.h"

struct dell_uart_backlight {
    struct device *dev;
    struct backlight_device *dell_uart_bd;
    struct mutex brightness_mutex;
    int line;
    int bl_power;
};

static struct uart_8250_port *serial8250_get_port(int line);
static struct tty_struct *tty;
static struct file *ftty;

unsigned int (*io_serial_in)(struct uart_port *p, int offset);
int (*uart_write)(struct tty_struct *tty, const unsigned char *buf, int count);
int (*uart_chars_in_buffer)(struct tty_struct *tty);

static bool force;
module_param(force, bool, 0444);
MODULE_PARM_DESC(force, "load the driver regardless of the scalar status");

static struct dell_uart_bl_cmd uart_cmd[] = {
    /*
     * Get Firmware Version: Tool uses this command to get firmware version.
     * Command: 0x6A 0x06 0x8F (Length:3 Type: 0x0A, Cmd:6 Checksum:0x8F)
     * Return data: 0x0D 0x06 Data checksum (Length:13,Cmd:0x06,
     *              Data :F/W version(APRILIA=APR27-VXXX,PHINE=PHI23-VXXX),
     *              checksum:SUM(Length and Cmd and Data)xor 0xFF .
     */
    [DELL_UART_GET_FIRMWARE_VER] = {
        .cmd = {0x6A, 0x06, 0x8F},
        .tx_len = 3,
        },
    /*
     * Get Brightness level: Application uses this command for scaler to
     * get brightness.
     * Command: 0x6A 0x0C 0x89
     * (Length:3 Type: 0x0A, Cmd:0x0C, Checksum:0x89)
     */
};
```

---

**Open Source Used In 5GasS Edge AC-4 27171**
/* Return data: 0x04 0x0C Data checksum (Length:4 Cmd: 0x0C Data: brightness level checksum: SUM(Length and Cmd and Data)xor 0xFF) 
* brightness level which ranges from 0~100. */

[DELL_UART_GET_BRIGHTNESS] = {
	.cmd = {0x6A, 0x0C, 0x89},
	.ret = {0x04, 0x0C, 0x00, 0x00},
	.tx_len = 3,
	.rx_len = 4,
},

/* Set Brightness level: Application uses this command for scaler to
* set brightness.
* Command: 0x8A 0x0B Byte2 Checksum (Length:4 Type: 0x0A, Cmd:0x0B)
* where Byte2 is the brightness level which ranges from 0~100.
* Return data: 0x03 0x0B 0xF1(Length:3,Cmd:B,checksum:0xF1)
* Scaler must send the 3bytes ack within 1 second when success,
* other value if error */

[DELL_UART_SET_BRIGHTNESS] = {
	.cmd = {0x8A, 0x0B, 0x0, 0x0},
	.ret = {0x03, 0x0B, 0xF1},
	.tx_len = 4,
	.rx_len = 3,
},

/* Screen ON/OFF Control: Application uses this command to control
* screen ON or OFF.
* Command: 0x8A 0x0E Byte2 Checksum (Length:4 Type: 0x0A, Cmd:0x0E)
* where
* Byte2=0 to turn OFF the screen.
* Byte2=1 to turn ON the screen
* Other value of Byte2 is reserved and invalid.
* Return data: 0x03 0x0E 0xEE(Length:3,Cmd:E,checksum:0xEE)
*/

[DELL_UART_SET_BACKLIGHT_POWER] = {
	.cmd = {0x8A, 0x0E, 0x00, 0x0},
	.ret = {0x03, 0x0E, 0xEE},
	.tx_len = 4,
	.rx_len = 3,
},

/* Get display mode: Application uses this command to get scaler
* display mode.
* Command: 0x6A 0x10 0x85 (Length:3 Type: 0x0A, Cmd:0x10)
* Return data: 0x04 0x10 Data checksum
* (Length:4 Cmd:0x10 Data: mode checksum: SUM
* mode =0 if PC mode
*/
*mode =1 if AV(HDMI) mode
*/

+[DELL_UART_GET_DISPLAY_MODE] = {
+.cmd = {0x6A, 0x10, 0x85},
+.ret = {0x04, 0x10, 0x00, 0x00},
+.tx_len = 3,
+.rx_len = 4,
+};
+
+static const struct dmi_system_id dell_uart_backlight_alpha_platform[] __initconst = {
+
+.ident = "Dell Inspiron 7777 AIO",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc.")],
+DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 7777 AIO"),
+},
+},
+{ 
+.ident = "Dell Inspiron 5477 AIO",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc.")],
+DMI_MATCH(DMI_PRODUCT_NAME, "Inspiron 5477 AIO"),
+},
+},
+{ 
+.ident = "Dell OptiPlex 7769 AIO",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc.")],
+DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 7769 AIO"),
+},
+},
+{ 
+.ident = "Dell OptiPlex 5260 AIO",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc.")],
+DMI_MATCH(DMI_PRODUCT_NAME, "OptiPlex 5260 AIO"),
+},
+},
+{ } 
+};
+
+static int dell_uart_write(struct uart_8250_port *up, __u8 *buf, int len)
+{
+int actual = 0;
+struct uart_port *port = &up->port; 
+ 
tty_port_tty_wakeup(&port->state->port);
tty = tty_port_tty_get(&port->state->port);
actual = uart_write(tty, buf, len);
while (uart_chars_in_buffer(tty))
udelay(10);
+
+return actual;
+
+static int dell_uart_read(struct uart_8250_port *up, __u8 *buf, int len)
+
+int i, retry;
+unsigned long flags;
+
+spin_lock_irqsave(&up->port.lock, flags);
+for (i = 0; i < len; i++) {
+retry = 10;
+while (!(io_serial_in(&up->port, UART_LSR) & UART_LSR_DR)) {
++retry = 10;
}while (!((io_serial_in(&up->port, UART_LSR) & UART_LSR_DR)) { 
+if (--retry == 0)
+break;
+mdelay(20);
+}
+if (retry == 0)
+break;
+buf[i] = io_serial_in(&up->port, UART_RX);
+}
+spin_unlock_irqrestore(&up->port.lock, flags);
+
+return i;
+
+static void dell_uart_dump_cmd(const char *func, const char *prefix,
+const char *cmd, int len)
+
+char buf[80];
+
+snprintf(buf, 80, "dell_uart_backlight:%s:%s", func, prefix);
+if (len != 0)
+print_hex_dump_debug(buf, DUMP_PREFIX_NONE,
+16, 1, cmd, len, false);
+else
+pr_debug("dell_uart_backlight:%s:%sNULL\n", func, prefix);
+
+/
+/*
+ * checksum: SUM(Length and Cmd and Data)xor 0xFF)
+ */

Open Source Used In 5GaaS Edge AC-4 27174
+static unsigned char dell_uart_checksum(unsigned char *buf, int len)
+{
+    unsigned char val = 0;
+
+    while (len-- > 0)
+        val += buf[len];
+    
+    return val ^ 0xff;
+}
+
+/*
+ * There is no command to get backlight power status,
+ * so we set the backlight power to "on" while initializing,
+ * and then track and report its status by bl_power variable
+ */
+static inline int dell_uart_get_bl_power(struct dell_uart_backlight *dell_pdata)
+{
+    return dell_pdata->bl_power;
+}
+
+static int dell_uart_set_bl_power(struct backlight_device *bd, int power)
+{
+    struct dell_uart_bl_cmd *bl_cmd =
+        uart_cmd[DELL_UART_SET_BACKLIGHT_POWER];
+    struct dell_uart_backlight *dell_pdata = bl_get_data(bd);
+    struct uart_8250_port *uart = serial8250_get_port(dell_pdata->line);
+    int rx_len;
+
+    if (power != FB_BLANK_POWERDOWN)
+        power = FB_BLANK_UNBLANK;
+    
+    bl_cmd->cmd[2] = power ? 0 : 1;
+    bl_cmd->cmd[3] = dell_uart_checksum(bl_cmd->cmd, bl_cmd->tx_len - 1);
+    
+    dell_uart_dump_cmd(__func__, "tx: ", bl_cmd->cmd, bl_cmd->tx_len);
+    
+    if (mutex_lock_killable(&dell_pdata->brightness_mutex) < 0) {
+        pr_debug("Failed to get mutex_lock");
+        return 0;
+    }
+    
+    dell_uart_write(uart, bl_cmd->cmd, bl_cmd->tx_len);
+    rx_len = dell_uart_read(uart, bl_cmd->ret, bl_cmd->rx_len);
+    
+    mutex_unlock(&dell_pdata->brightness_mutex);
+    
+    dell_uart_dump_cmd(__func__, "rx: ", bl_cmd->ret, rx_len);
+    

+bd->props.power = power;
+dell_pdata->bl_power = power;
+
+return 0;
+}
+
+static int dell_uart_get_brightness(struct backlight_device *bd)
+{
+struct dell_uart_bl_cmd *bl_cmd = &uart_cmd[DELL_UART_GET_BRIGHTNESS];
+struct dell_uart_backlight *dell_pdata = bl_get_data(bd);
+struct uart_8250_port *uart = serial8250_get_port(dell_pdata->line);
+int rx_len, brightness = 0;
+
+dell_uart_dump_cmd(__func__, "tx: ", bl_cmd->cmd, bl_cmd->tx_len);
+
+if (mutex_lock_killable(&dell_pdata->brightness_mutex) < 0) {
+pr_debug("Failed to get mutex_lock");
+return 0;
+}
+
+dell_uart_write(uart, bl_cmd->cmd, bl_cmd->tx_len);
+rx_len = dell_uart_read(uart, bl_cmd->ret, bl_cmd->rx_len);
+
+mutex_unlock(&dell_pdata->brightness_mutex);
+
+dell_uart_dump_cmd(__func__, "rx: ", bl_cmd->ret, rx_len);
+
+brightness = (unsigned int)bl_cmd->ret[2];
+
+return brightness;
+}
+
+static int dell_uart_update_status(struct backlight_device *bd)
+{
+struct dell_uart_bl_cmd *bl_cmd = &uart_cmd[DELL_UART_SET_BRIGHTNESS];
+struct dell_uart_backlight *dell_pdata = bl_get_data(bd);
+struct uart_8250_port *uart = serial8250_get_port(dell_pdata->line);
+int rx_len;
+
+bl_cmd->cmd[3] = dell_uart_checksum(bl_cmd->cmd, bl_cmd->tx_len - 1);
+
+dell_uart_dump_cmd(__func__, "tx: ", bl_cmd->cmd, bl_cmd->tx_len);
+
+if (mutex_lock_killable(&dell_pdata->brightness_mutex) < 0) {
+pr_debug("Failed to get mutex_lock");
+return 0;
+}
+}
+ dell_uart_write(uart, bl_cmd->cmd, bl_cmd->tx_len);
+ rx_len = dell_uart_read(uart, bl_cmd->ret, bl_cmd->rx_len);
+
+ mutex_unlock(&dell_pdata->brightness_mutex);
+
+ dell_uart_dump_cmd(__func__, "rx: ", bl_cmd->ret, rx_len);
+
+ if (bd->props.power != dell_uart_get_bl_power(dell_pdata))
+ dell_uart_set_bl_power(bd, bd->props.power);
+
+ return 0;
+
+
+ static int dell_uart_show_firmware_ver(struct dell_uart_backlight *dell_pdata)
+ {
+ struct dell_uart_bl_cmd *bl_cmd = &uart_cmd[DELL_UART_GET_FIRMWARE_VER];
+ struct uart_8250_port *uart = serial8250_get_port(dell_pdata->line);
+ int rx_len = 0, retry = 10;
+
+ dell_uart_dump_cmd(__func__, "tx: ", bl_cmd->cmd, bl_cmd->tx_len);
+
+ if (mutex_lock_killable(&dell_pdata->brightness_mutex) < 0) {
+ pr_debug("Failed to get mutex_lock");
+ return -1;
+ }
+
+ dell_uart_write(uart, bl_cmd->cmd, bl_cmd->tx_len);
+ while (retry-- > 0) {
+ /* first byte is data length */
+ dell_uart_read(uart, bl_cmd->ret, 1);
+ rx_len = (int)bl_cmd->ret[0];
+ if (bl_cmd->ret[0] > 80 || bl_cmd->ret[0] == 0) {
+ pr_debug("Failed to get firmware version\n");
+ if (retry == 0) {
+ mutex_unlock(&dell_pdata->brightness_mutex);
+ return -1;
+ }
+ msleep(100);
+ continue;
+ }
+ dell_uart_read(uart, bl_cmd->ret+1, rx_len-1);
+ break;
+ }
+ mutex_unlock(&dell_pdata->brightness_mutex);
+
+ dell_uart_dump_cmd(__func__, "rx: ", bl_cmd->ret, rx_len);
static int dell_uart_get_display_mode(struct dell_uart_backlight *dell_pdata) {
    struct dell_uart_bl_cmd *bl_cmd = &uart_cmd[DELL_UART_GET_DISPLAY_MODE];
    struct uart_8250_port *uart = serial8250_get_port(dell_pdata->line);
    int rx_len;
    int status = 0, retry = 10;
    do {
        dell_uart_dump_cmd(__func__, "tx: ", bl_cmd->cmd, bl_cmd->tx_len);
        if (mutex_lock_killable(&dell_pdata->brightness_mutex) < 0) {
            pr_debug("Failed to get mutex_lock");
            return 0;
        }
        dell_uart_write(uart, bl_cmd->cmd, bl_cmd->tx_len);
        rx_len = dell_uart_read(uart, bl_cmd->ret, bl_cmd->rx_len);
        mutex_unlock(&dell_pdata->brightness_mutex);
        dell_uart_dump_cmd(__func__, "rx: ", bl_cmd->ret, rx_len);
        msleep(1000);
    } while (rx_len == 0 && --retry);
    if (rx_len == 4)
        status = ((unsigned int)bl_cmd->ret[2] == PC_MODE);
    return status;
}

static const struct backlight_ops dell_uart_backlight_ops = {
    .get_brightness = dell_uart_get_brightness,
    .update_status = dell_uart_update_status,
};

static int dell_uart_startup(struct dell_uart_backlight *dell_pdata) {
    struct uart_8250_port *uartp;
    struct uart_port *port;
    dell_pdata->line = 0;
    uartp = serial8250_get_port(dell_pdata->line);
    port = &uartp->port;
tty = port->state->port.tty;
+io_serial_in = port->serial_in;
+uart_write = tty->driver->ops->write;
+uart_chars_in_buffer = tty->driver->ops->chars_in_buffer;
+
+return 0;
+
+static int dell_uart_bl_add(struct acpi_device *dev)
+
+{  
+struct dell_uart_backlight *dell_pdata;
+struct backlight_properties props;
+struct backlight_device *dell_uart_bd;
+
+dell_pdata = kzalloc(sizeof(struct dell_uart_backlight), GFP_KERNEL);
+if (!dell_pdata) {
+    pr_debug("Failed to allocate memory for dell_uart_backlight\n");
+    return -ENOMEM;
+}  
+dell_pdata->dev = &dev->dev;
+dell_uart_startup(dell_pdata);
+dev->driver_data = dell_pdata;
+
+mutex_init(&dell_pdata->brightness_mutex);
+
+if (!force) {
+    if (dmi_check_system(dell_uart_backlight_alpha_platform)) {
+        /* try another command to make sure there is no scalar IC */
+        if (dell_uart_show_firmware_ver(dell_pdata) <= 4) {
+            pr_debug("Scalar is not in charge of brightness adjustment\n");
+            kzfree(dell_pdata);
+            return -ENODEV;
+        }
+    }
+    else if (!dell_uart_get_display_mode(dell_pdata)) {
+        pr_debug("Scalar is not in charge of brightness adjustment\n");
+        kzfree(dell_pdata);
+        return -ENODEV;
+    }
+}
+
+memset(&props, 0, sizeof(struct backlight_properties));
+props.type = BACKLIGHT_PLATFORM;
+props.max_brightness = 100;
+
+dell_uart_bd = backlight_device_register("dell_uart_backlight",
+    &dev->dev,
+    dell_pdata,
+ &dell_uart_backlight_ops,
+ &props);
+if (IS_ERR(dell_uart_bd)) {
+kzfree(dell_pdata);
+pr_debug("Backlight registration failed\n");
+return PTR_ERR(dell_uart_bd);
+}
+
dell_pdata->dell_uart_bd = dell_uart_bd;
+
dell_uart_set_bl_power(dell_uart_bd, FB_BLANK_UNBLANK);
+dell_uart_bd->props.brightness = 100;
+backlight_update_status(dell_uart_bd);
+
+/* unregister acpi backlight interface */
+acpi_video_set_dmi_backlight_type(acpi_backlight_vendor);
+
+return 0;
+
+
+static int dell_uart_bl_remove(struct acpi_device *dev)
+{
+struct dell_uart_backlight *dell_pdata = dev->driver_data;
+
+backlight_device_unregister(dell_pdata->dell_uart_bd);
+kzfree(dell_pdata);
+
+return 0;
+}
+
+
+static int dell_uart_bl_suspend(struct device *dev)
+{
+filp_close(ftty, NULL);
+return 0;
+}
+
+
+static int dell_uart_bl_resume(struct device *dev)
+{
+ftty = filp_open("/dev/ttyS0", O_RDWR | O_NOCTTY | O_NDELAY, 0);
+return 0;
+}
+
+
+static SIMPLE_DEV_PM_OPS(dell_uart_bl_pm, dell_uart_bl_suspend, dell_uart_bl_resume);
+
+static const struct acpi_device_id dell_uart_bl_ids[] = {
+{"DELL0501", 0},
+{"", 0},
+};
static struct acpi_driver dell_uart_backlight_driver = {
    .name = "Dell AIO serial backlight",
    .ids = dell_uart_bl_ids,
    .ops = {
        .add = dell_uart_bl_add,
        .remove = dell_uart_bl_remove,
    },
    .drv.pm = &dell_uart_bl_pm,
};

static int __init dell_uart_bl_init(void)
{
    ftty = filp_open("/dev/ttyS0", O_RDWR | O_NOCTTY | O_NDELAY, 0);
    if (IS_ERR(ftty)) {
        pr_debug("cannot open /dev/ttyS0\n");
        return -EINVAL;
    }

    return acpi_bus_register_driver(&dell_uart_backlight_driver);
}

static void __exit dell_uart_bl_exit(void)
{
    filp_close(ftty, NULL);

    acpi_bus_unregister_driver(&dell_uart_backlight_driver);
}

module_init(dell_uart_bl_init);
module_exit(dell_uart_bl_exit);

MODULE_DEVICE_TABLE(acpi, dell_uart_bl_ids);
MODULE_DESCRIPTION("Dell AIO Serial Backlight module");
MODULE_AUTHOR("AceLan Kao <acelan.kao@canonical.com>");
MODULE_LICENSE("GPL");

--- linux-4.15.0.orig/drivers/platform/x86/dell-uart-backlight.h
+++ linux-4.15.0/drivers/platform/x86/dell-uart-backlight.h
@@ -0,0 +1,41 @@
+/*
+ * Dell AIO Serial Backlight Driver
+ *
+ * Copyright (C) 2017 AceLan Kao <acelan.kao@canonical.com>
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
This program is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
GNU General Public License for more details.

*/

#ifndef _DELL_UART_BACKLIGHT_H_
#define _DELL_UART_BACKLIGHT_H_

enum {
    DELL_UART_GET_FIRMWARE_VER,
    DELL_UART_GET_BRIGHTNESS,
    DELL_UART_SET_BRIGHTNESS,
    DELL_UART_SET_BACKLIGHT_POWER,
    DELL_UART_GET_DISPLAY_MODE,
};

enum {
    PC_MODE,
    AV_MODE,
};

struct dell_uart_bl_cmd {
    unsigned char cmd[10];
    unsigned char ret[80];
    unsigned short tx_len;
    unsigned short trx_len;
};

#endif /* _DELL_UART_BACKLIGHT_H_ */

--- linux-4.15.0.orig/drivers/platform/x86/dell-wmi.c
+++ linux-4.15.0/drivers/platform/x86/dell-wmi.c
@@ -261,6 +261,15 @@
 * override them.
 */
 static const struct key_entry dell_wmi_keymap_type_0010[] = {
+/* Fn-lock switched to function keys */
+{ KE_IGNORE, 0x0, { KEY_RESERVED } },
+ +/* Fn-lock switched to multimedia keys */
+{ KE_IGNORE, 0x1, { KEY_RESERVED } },
+ +/* Keyboard backlight change notification */
+{ KE_IGNORE, 0x3f, { KEY_RESERVED } },
+ +/* Fn-lock */
+{ KE_IGNORE, 0x151, { KEY_RESERVED } },

*/
+ * Radio disable (notify only -- there is no model for which the
+ * WMI event is supposed to trigger an action).
+ */
+{ KE_IGNORE, 0xe008, { KEY_RFKILL } },
+
+/* Fn-lock */
+{ KE_IGNORE, 0xe035, { KEY_RESERVED } },
};

/*
--- linux-4.15.0.orig/drivers/platform/x86/hp-wireless.c
+++ linux-4.15.0/drivers/platform/x86/hp-wireless.c
@@ -30,12 +30,14 @@

static struct input_dev *hpwl_input_dev;

static const struct acpi_device_id hpwl_ids[] = {
+{"AMDI0051", 0},

static const struct acpi_device_id hpwl_ids[] = {
+{"AMDI0051", 0},
+{"", 0},
};

--- linux-4.15.0.orig/drivers/platform/x86/hp-wmi.c
+++ linux-4.15.0/drivers/platform/x86/hp-wmi.c
@@ -45,6 +45,10 @@

#define HPWMI_EVENT_GUID "95F24279-4D7B-4334-9387-ACCD67EF61C"
#define HPWMI_BIOS_GUID "5FB7F034-2C63-45e9-BE91-3D44E2C707E4"

+static int enable_tablet_mode_sw = -1;
+module_param(enable_tablet_mode_sw, int, 0444);
+MODULE_PARM_DESC(enable_tablet_mode_sw, "Enable SW_TABLET_MODE reporting (-1=auto, 0=no,
+1=yes)");
+
+##define HPWMI_EVENT_GUID "95F24279-4D7B-4334-9387-ACCD67EF61C"
+##define HPWMI_BIOS_GUID "5FB7F034-2C63-45e9-BE91-3D44E2C707E4"

@@ -78,7 +82,7 @@
u32 command;
u32 commandtype;
u32 datasize;
-3 u32 data;
+3 u8 data[128];
};

enum hp_wmi_commandtype {
  .command = command,
  .commandtype = query,
  .datasize = insize,
  -.data = 0,
  +.data = { 0 },
};

struct acpi_buffer input = { sizeof(struct bios_args), &args };
struct acpi_buffer output = { ACPI_ALLOCATE_BUFFER, NULL };

if (WARN_ON(insize > sizeof(args.data)))
return -EINVAL;

memcpy(&args.data, buffer, insize);

wmi_evaluate_method(HPWMI_BIOS_GUID, 0, mid, &input, &output);

static int __init hp_wmi_bios_2009_later(void)
{
  -int state = 0;
  +u8 state[128];
  int ret = hp_wmi_perform_query(HPWMI_FEATURE2_QUERY, HPWMI_READ, &state,
    sizeof(state), sizeof(state));
  if (!ret)
    return err, i;

  err = hp_wmi_perform_query(HPWMI_WIRELESS2_QUERY, HPWMI_READ, &state,
    - 0, sizeof(state));
  + sizeof(state), sizeof(state));
  if (err)
    return err;

  @ @ -474,8 +478,14 @@
  static ssize_t als_store(struct device *dev, struct device_attribute *attr,
    const char *buf, size_t count)
  {

- u32 tmp = simple_strtoul(buf, NULL, 10);
- int ret = hp_wmi_perform_query(HPWMI_ALS_QUERY, HPWMI_WRITE, &tmp,
  +u32 tmp;
  +int ret;
  +
  +ret = kstrtou32(buf, 10, &tmp);
  +if (ret)
  +return ret;
  +
  +ret = hp_wmi_perform_query(HPWMI_ALS_QUERY, HPWMI_WRITE, &tmp,
    sizeof(tmp), sizeof(tmp));
  if (ret)
    return ret < 0 ? ret : -EINVAL;

/* Tablet mode */
- val = hp_wmi_hw_state(HPWMI_TABLET_MASK);
- if (!(val < 0)) {
  - __set_bit(SW_TABLET_MODE, hp_wmi_input_dev->swbit);
  - input_report_switch(hp_wmi_input_dev, SW_TABLET_MODE, val);
  +if (enable_tablet_mode_sw > 0) {
  + val = hp_wmi_hw_state(HPWMI_TABLET_MASK);
  + if (val >= 0) {
  + __set_bit(SW_TABLET_MODE, hp_wmi_input_dev->swbit);
  + input_report_switch(hp_wmi_input_dev, SW_TABLET_MODE, val);
  + }
  }
}

err = sparse_keymap_setup(hp_wmi_input_dev, hp_wmi_keymap, NULL);
@ @ -790,7 +802,7 @@
int err, i;

err = hp_wmi_perform_query(HPWMI_WIRELESS2_QUERY, HPWMI_READ, &state,
  - 0, sizeof(state));
  + sizeof(state), sizeof(state));
if (err)
  return err < 0 ? err : -EINVAL;

--- linux-4.15.0.orig/drivers/platform/x86/hp_accel.c
+++ linux-4.15.0/drivers/platform/x86/hp_accel.c
@ @ -101,6 +101,9 @@
static int lis3lv02d_acpi_init(struct lis3lv02d *lis3)
 |
 struct acpi_device *dev = lis3->bus_priv;
 +if (!lis3->init_required)
 +return 0;
 +
if (acpi_evaluate_object(dev->handle, METHOD_NAME__INI, NULL, NULL) != AE_OK)
return -EINVAL;
@@ -367,6 +370,7 @@
}
/* call the core layer do its init */
+lis3_dev.init_required = true;
ret = lis3lv02d_init_device(&lis3_dev);
if (ret)
return ret;
@@ -414,11 +418,27 @@
static int lis3lv02d_resume(struct device *dev)
{
+lis3_dev.init_required = false;
+lis3lv02d_poweron(&lis3_dev);
+return 0;
+}
+
+static int lis3lv02d_restore(struct device *dev)
+{
+lis3_dev.init_required = true;
+lis3lv02d_poweron(&lis3_dev);
+return 0;
+
-#define SIMPLE_DEV_PM_OPS(hp_accel_pm, lis3lv02d_suspend, lis3lv02d_resume); 
+static const struct dev_pm_ops hp_accel_pm = {
+.suspend = lis3lv02d_suspend,
+.resume = lis3lv02d_resume,
+.freeze = lis3lv02d_suspend,
+.thaw = lis3lv02d_resume,
+.poweroff = lis3lv02d_suspend,
+.restore = lis3lv02d_restore,
+};
+
#define HP_ACCEL_PM (&hp_accel_pm)
#else
#define HP_ACCEL_PM NULL
--- linux-4.15.0.orig/drivers/platform/x86/ideapad-laptop.c
+++ linux-4.15.0/drivers/platform/x86/ideapad-laptop.c
@@ -113,7 +113,7 @@
*/
/* ACPI Helpers */
-#define IDEAPAD_EC_TIMEOUT (100) /* in ms */
+#define IDEAPAD_EC_TIMEOUT (200) /* in ms */
static int read_method_int(acpi_handle handle, const char *method, int *val)
{
    @-958,221 +958,21 @@
    #endif

    /*
    - * Some ideapads don't have a hardware rfkill switch, reading VPCCMD_R_RF
    - * always results in 0 on these models, causing ideapad_laptop to wrongly
    - * report all radios as hardware-blocked.
    + * Some ideapads have a hardware rfkill switch, but most do not have one.
    + * Reading VPCCMD_R_RF always results in 0 on models without a hardware rfkill,
    + * switch causing ideapad_laptop to wrongly report all radios as hw-blocked.
    + * There used to be a long list of DMI ids for models without a hw rfkill
    + * switch here, but that resulted in playing whack a mole.
    + * More importantly wrongly reporting the wifi radio as hw-blocked, results in
    + * non working wifi. Whereas not reporting it hw-blocked, when it actually is
    + * hw-blocked results in an empty SSID list, which is a much more benign
    + * failure mode.
    + * So the default now is the much safer option of assuming there is no
    + * hardware rfkill switch. This default also actually matches most hardware,
    + * since having a hw rfkill switch is quite rare on modern hardware, so this
    + * also leads to a much shorter list.
    */
    -static const struct dmi_system_id no_hw_rfkill_list[] = {
        -{
            .ident = "Lenovo G40-30",
            .matches = {
                -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
                -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo G40-30"),
                -
            },
        },
        -{
            .ident = "Lenovo G50-30",
            .matches = {
                -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
                -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo G50-30"),
                -
            },
        },
        -{
            .ident = "Lenovo V310-14ISK",
            .matches = {
                -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
                -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo V310-14ISK"),
                -
            },
        }
    };
Open Source Used In 5GaaS Edge AC-4 27187
matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo V310-14ISK"),
-},
-},
-{ ident = "Lenovo V310-15IKB",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo V310-15IKB"),
-},
-},
-{ ident = "Lenovo V310-15ISK",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo V310-15ISK"),
-},
-},
-{ ident = "Lenovo V510-15IKB",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo V510-15IKB"),
-},
-},
-{ ident = "Lenovo ideapad 300-15IBR",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 300-15IBR"),
-},
-},
-{ ident = "Lenovo ideapad 300-15IKB",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 300-15IKB"),
-},
-},
-{ ident = "Lenovo ideapad 300S-11IBR",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 300S-11IBR"),
-},
-},
-}
- .ident = "Lenovo ideapad 310-15ABR",
- .matches = {
  -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 310-15ABR"),
- },
-},
-{
  .ident = "Lenovo ideapad 310-15IAP",
  .matches = {
  -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 310-15IAP"),
- },
-},
-{
  .ident = "Lenovo ideapad 310-15IKB",
  .matches = {
  -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 310-15IKB"),
- },
-},
-{
  .ident = "Lenovo ideapad 310-15ISK",
  .matches = {
  -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad 310-15ISK"),
- },
-},
-{
  .ident = "Lenovo ideapad Y700-14ISK",
  .matches = {
  -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad Y700-14ISK"),
- },
-},
-{
  .ident = "Lenovo ideapad Y700-15ACZ",
  .matches = {
  -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad Y700-15ACZ"),
- },
-},
-{
  .ident = "Lenovo ideapad Y700-15ISK",
  .matches = {
  -DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
  -DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad Y700-15ISK"),
- },
-}.
-{  
.ident = "Lenovo ideapad Y700 Touch-15ISK";
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad Y700 Touch-15ISK"),
-},
-},
-{
.ident = "Lenovo ideapad Y700-17ISK",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo ideapad Y700-17ISK"),
-},
-},
-{
.ident = "Lenovo Legion Y520-15IKBN",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo Y520-15IKBN"),
-},
-},
-{
.ident = "Lenovo Legion Y720-15IKBN",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo Y720-15IKBN"),
-},
-},
-{
.ident = "Lenovo Yoga 2 11 / 13 / Pro",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo Yoga 2"),
-},
-},
-{
.ident = "Lenovo Yoga 3 1170 / 1470",
.matches = {
-DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
-DMI_MATCH(DMI_BOARD_NAME, "Yoga2"),
-},
-}.}
static const struct dmi_system_id hw_rfkill_list[] = {
{

));

@@ -1198,7 +998,7 @@
priv->cfg = cfg;
priv->adev = adev;
priv->platform_device = pdev;
-priv->has_hw_rfkill_switch = !dmi_check_system(no_hw_rfkill_list);
+priv->has_hw_rfkill_switch = dmi_check_system(hw_rfkill_list);

ret = ideapad_sysfs_init(priv);
if (ret)
--- linux-4.15.0.orig/drivers/platform/x86/intel-hid.c
+++ linux-4.15.0/drivers/platform/x86/intel-hid.c
@@ -231,7 +231,7 @@
 * the 5-button array, but still send notifies with power button
 * event code to this device object on power button actions.
 *
- * Report the power button press; catch and ignore the button release.
+ * Report the power button press and release.
 */
if (!priv->array) {
if (event == 0xce) {
@@ -240,8 +240,11 @@
 return;
 }
-if (event == 0xcf)
+if (event == 0xcf) {
+input_report_key(priv->input_dev, KEY_POWER, 0);
+input_sync(priv->input_dev);
 return;
+}
}

/* 0xC0 is for HID events, other values are for 5 button array */
@@ -384,7 +387,7 @@
 return AE_OK;

if (acpi_match_device_ids(dev, ids) == 0)
-if (acpi_create_platform_device(dev, NULL))
+if (!IS_ERR_OR_NULL(acpi_create_platform_device(dev, NULL)))
 dev_info(&dev->dev,
 "intel-hid: created platform device\n");

--- linux-4.15.0.orig/drivers/platform/x86/intel-vbtn.c
+++ linux-4.15.0/drivers/platform/x86/intel-vbtn.c
@@ -74,10 +74,24 @@
 {
 struct platform_device *device = context;
 struct intel_vbtn_priv *priv = dev_get_drvdata(&device->dev);
+unsigned int val = !(event & 1); /* Even=press, Odd=release */
const struct key_entry *ke;

if (priv->wakeup_mode) {
  if (sparse_keymap_entry_from_scancode(priv->input_dev, event)) {
    ke = sparse_keymap_entry_from_scancode(priv->input_dev, event);
    if (ke) {
      pm_wakeup_hard_event(&device->dev);
      /*
      * Switch events like tablet mode will wake the device
      * and report the new switch position to the input
      * subsystem.
      */
      if (ke->type == KE_SW)
        sparse_keymap_report_event(priv->input_dev, event, val, 0);
      return;
    }
  } else if (sparse_keymap_report_event(priv->input_dev, event, 1, true)) {
    return AE_OK;
  }
}

if (acpi_match_device_ids(dev, ids) == 0)
  if (!IS_ERR_OR_NULL(acpi_create_platform_device(dev, NULL)))
    dev_info(&dev->dev, "intel-vbtn: created platform device\n");

--- linux-4.15.0.orig/drivers/platform/x86/intel_atomisp2_pm.c
+++ linux-4.15.0/drivers/platform/x86/intel_atomisp2_pm.c
@@ -0,0 +1,148 @@
+// SPDX-License-Identifier: GPL-2.0
+/
+ * Dummy driver for Intel's Image Signal Processor found on Bay and Cherry
+ * Trail devices. The sole purpose of this driver is to allow the ISP to
+ * be put in D3.
+ *
+ * Copyright (C) 2018 Hans de Goede <hdegoede@redhat.com>
+ *
+ * Copyright (C) 2010-2017 Intel Corporation. All rights reserved.
+ * Copyright (c) 2010 Silicon Hive www.siliconhive.com.
+ */
+
+#include <linux/delay.h>
+#include <linux/module.h>
+/* PCI configuration regs */
+#define PCI_INTERRUPT_CTRL 0x9c
+
+/* PCI CONFIGURATION_REGS */
+#define PCI_CSI_CONTROL 0xe8
+
+/* IOSF_BT_MBI_UNITPMC_REGS */
+static int isp_set_power(struct pci_dev *dev, bool enable)
+{
+  unsigned long timeout;
+  u32 val = enable ? ISPSSPM0_IUNIT_POWER_ON : ISPSSPM0_IUNIT_POWER_OFF;
+  /* Write to ISPSSPM0 bit[1:0] to power on/off the IUNIT */
+  iosf_mbi_modify(BT_MBI_UNIT_PMC, MBI_REG_READ, ISPSSPM0, val, ISPSSPM0_ISPSSC_MASK);
+  /* There should be no IUNIT access while power-down is in progress HW sighting: 4567865 */
+  /* Wait up to 50 ms for the IUNIT to shut down. */
+  /* Wait up to 50 ms for the IUNIT to shut down. */
+  timeout = jiffies + msecs_to_jiffies(50);
+  while (1) {
+    u32 tmp;
+    /* Wait until ISPSSPM0 bit[25:24] shows the right value */
+    iosf_mbi_read(BT_MBI_UNIT_PMC, MBI_REG_READ, ISPSSPM0, &tmp);
+    tmp = (tmp & ISPSSPM0_ISPSSS_MASK) >> ISPSSPM0_ISPSSS_OFFSET;
+    if (tmp == val)
+      break;
+    if (time_after(jiffies, timeout)) {
+      dev_err(&dev->dev, "IUNIT power-%s timeout.
+      "
+    }
+  }
enable ? "on" : "off");
+return -EBUSY;
+
+usleep_range(1000, 2000);
+
+return 0;
+
+
+static int isp_probe(struct pci_dev *dev, const struct pci_device_id *id)
+{
+pm_runtime_allow(&dev->dev);
+pm_runtime_put_sync_suspend(&dev->dev);
+
+return 0;
+
+
+static void isp_remove(struct pci_dev *dev)
+{
+pm_runtime_get_sync(&dev->dev);
+pm_runtime_forbid(&dev->dev);
+
+
+static int isp_pci_suspend(struct device *dev)
+{
+struct pci_dev *pdev = to_pci_dev(dev);
+u32 val;
+
+pci_write_config_dword(pdev, PCI_INTERRUPT_CTRL, 0);
+
+/
+ * MRFLD IUNIT DPHY is located in an always-power-on island
+ * MRFLD HW design need all CSI ports are disabled before
+ * powering down the IUNIT.
+ */
+pci_read_config_dword(pdev, PCI_CSI_CONTROL, &val);
+val |= PCI_CSI_CONTROL_PORTS_OFF_MASK;
+pci_write_config_dword(pdev, PCI_CSI_CONTROL, val);
+
+/
+ * We lose config space access when punit power gates
+ * the ISP. Can't use pci_set_power_state() because
+ * pmcsr won't actually change when we write to it.
+ */
+pci_save_state(pdev);
pdev->current_state = PCI_D3cold;
+isp_set_power(pdev, false);
+
+return 0;
+
+static int isp_pci_resume(struct device *dev)
+{
+    struct pci_dev *pdev = to_pci_dev(dev);
+    isp_set_power(pdev, true);
+    pdev->current_state = PCI_D0;
+    pci_restore_state(pdev);
+    return 0;
+}
+
+static UNIVERSAL_DEV_PM_OPS(isp_pm_ops, isp_pci_suspend,
+    isp_pci_resume, NULL);
+
+static const struct pci_device_id isp_id_table[] = {
+    { PCI_VDEVICE(INTEL, 0x0f38), },
+    { PCI_VDEVICE(INTEL, 0x22b8), },
+    { 0, }
+};
+MODULE_DEVICE_TABLE(pci, isp_id_table);
+
+static struct pci_driver isp_pci_driver = {
+    .name = "intel_atomisp2_pm",
+    .id_table = isp_id_table,
+    .probe = isp_probe,
+    .remove = isp_remove,
+    .driver.pm = &isp_pm_ops,
+};
+module_pci_driver(isp_pci_driver);
+
+MODULE_DESCRIPTION("Intel AtomISP2 dummy / power-management drv (for suspend)"—linux-4.15.0.orig/drivers/platform/x86/intel_int0002_vgpio.c
+++ linux-4.15.0/drivers/platform/x86/intel_int0002_vgpio.c
@@ -60,7 +60,7 @@
   /* Limit ourselves to Cherry Trail for now, until testing shows we
   * need to handle the INT0002 device on Baytrail too.
   - *ICPU(INTEL_FAM6_ATOM_SILVERMONT1), * Valleyview, Bay Trail *
   + *ICPU(INTEL_FAM6_ATOM_SILVERMONT), * Valleyview, Bay Trail *
   */
   ICPU(INTEL_FAM6_ATOM_AIRMONT),/* Braswell, Cherry Trail */
+##define pr_fmt(fmt) KBUILD_MODNAME ": " fmt
+
+##include <linux/acpi.h>
##include <linux/debugfs.h>
##include <linux/delay.h>
-##include <linux/device.h>
+##include <linux/init.h>
##include <linux/io.h>
+##include <linux/module.h>
##include <linux/pci.h>
##include <linux/uaccess.h>

##include <asm/cpu_device_id.h>
##include <asm/intel-family.h>
-##include <asm/pmc_core.h>

##include "intel_pmc_core.h"

+##define ICPU(model, data)\
+{ X86_VENDOR_INTEL, 6, model, X86_FEATURE_MWAIT, (kernel_ulong_t)data }
+
static struct pmc_dev pmc;

static const struct pmc_bit_map spt_pll_map[] = {
  @ @ -119,10 +123,88 @ @
  .pm_read_disable_bit = SPT_PMC_READ_DISABLE_BIT,
};

-static const struct pci_device_id pmc_pci_ids[] = {
-  { PCI_VDEVICE(INTEL, SPT_PMC_PCI_DEVICE_ID),
-    (kernel_ulong_t)&spt_reg_map },
-  { 0, },
-}
+/* Cannonlake: PGD PFET Enable Ack Status Register(s) bitmap */
+static const struct pmc_bit_map cnp_pfear_map[] = {
  {"PMC",           BIT(0)},
  {"OPI-DMI",       BIT(1)},
  {"SPI/eSPI",      BIT(2)},
  {"XHCI",          BIT(3)},
  {"SPA",           BIT(4)},
  {"SPB",           BIT(5)},
  {"SPC",           BIT(6)},
  {"GBE",           BIT(7)},
  +
  {"SATA",          BIT(0)},
  {"HDA_PGD0",      BIT(1)},
  {"HDA_PGD1",      BIT(2)},
  {"HDA_PGD2",      BIT(3)},

  .pm_read_disable_bit = SPT_PMC_READ_DISABLE_BIT,
+{"HDA_PGD3", BIT(4)},
+{"SPD", BIT(5)},
+{"LPSS", BIT(6)},
+{"LPC", BIT(7)},
+
+{"SMB", BIT(0)},
+{"ISH", BIT(1)},
+{"P2SB", BIT(2)},
+{"NPK_VNN", BIT(3)},
+{"SDX", BIT(4)},
+{"SPE", BIT(5)},
+{"Fuse", BIT(6)},
+{"Res_23", BIT(7)},
+
+{"CSME_FSC", BIT(0)},
+{"USB3_OTG", BIT(1)},
+{"EXI", BIT(2)},
+{"CSE", BIT(3)},
+{"csmc_kvm", BIT(4)},
+{"csmc_pmt", BIT(5)},
+{"csmc_clink", BIT(6)},
+{"csmc_pio", BIT(7)},
+
+{"csmc_usbr", BIT(0)},
+{"csmc_susram", BIT(1)},
+{"csmc_smt1", BIT(2)},
+{"CSME_SMT4", BIT(3)},
+{"csmc_sms2", BIT(4)},
+{"csmc_sms1", BIT(5)},
+{"csmc_rtc", BIT(6)},
+{"csmc_psf", BIT(7)},
+
+{"SBR0", BIT(0)},
+{"SBR1", BIT(1)},
+{"SBR2", BIT(2)},
+{"SBR3", BIT(3)},
+{"SBR4", BIT(4)},
+{"SBR5", BIT(5)},
+{"CSME_PECI", BIT(6)},
+{"PSF1", BIT(7)},
+
+{"PSF2", BIT(0)},
+{"PSF3", BIT(1)},
+{"PSF4", BIT(2)},
+{"CNVI", BIT(3)},
+{"UFS0", BIT(4)},
+{"EMMC", BIT(5)},
+{"SPF", BIT(6)}. 
static const struct pmc_reg_map cnp_reg_map = {
    .pfear_sts = cnp_pfear_map,
    .slp_s0_offset = CNP_PMC_SLP_S0_RES_COUNTER_OFFSET,
    .ltr_ignore_offset = CNP_PMC_LTR_IGNORE_OFFSET,
    .regmap_length = CNP_PMC_MMIO_REG_LEN,
    .ppfear0_offset = CNP_PMC_HOST_PPFEAR0A,
    .ppfear_buckets = CNP_PPFEAR_NUM_ENTRIES,
    .pm_cfg_offset = CNP_PMC_PM_CFG_OFFSET,
    .pm_read_disable_bit = CNP_PMC_READ_DISABLE_BIT,
};

static inline u8 pmc_core_reg_read_byte(struct pmc_dev *pmcdev, int offset)
@@ -146,37 +228,6 @@
    return value * SPT_PMC_SLP_S0_RES_COUNTER_STEP;
}

/**
- * intel_pmc_slp_s0_counter_read() - Read SLP_S0 residency.
- * @data: Out param that contains current SLP_S0 count.
- * @
- * This API currently supports Intel Skylake SoC and Sunrise
- * Point Platform Controller Hub. Future platform support
- * should be added for platforms that support low power modes
- * beyond Package C10 state.
- *
- * SLP_S0_RESIDENCY counter counts in 100 us granularity per
- * step hence function populates the multiplied value in out
- * parameter @data.
- *
- * Return: an error code or 0 on success.
- */
-#intel_pmc_slp_s0_counter_read(u32 *data)
-
-struct pmc_dev *pmcdev = &pmc;
-const struct pmc_reg_map *map = pmcdev->map;
-u32 value;
-
-if (!pmcdev->has_slp_s0_res)
-return -EACCES;
-
-value = pmc_core_reg_read(pmcdev, map->slp_s0_offset);
-*data = pmc_core_adjust_slp_s0_step(value);
-
-return 0;
-
-EXPORT_SYMBOL_GPL(intel_pmc_slp_s0_counter_read);
-
static int pmc_core_dev_state_get(void *data, u64 *val)
{
  struct pmc_dev *pmcdev = data;
  @@ -222,7 +273,8 @@
    index < PPFEAR_MAX_NUM_ENTRIES; index++, iter++)
  pf_regs[index] = pmc_core_reg_read_byte(pmcdev, iter);

  -for (index = 0; map[index].name; index++)
  +for (index = 0; map[index].name &&
  +    index < pmcdev->map->ppfear_buckets * 8; index++)
  pmc_core_display_map(s, index, pf_regs[index / 8], map);

  return 0;
@@ -437,47 +489,33 @@
static int pmc_core_dbgfs_register(struct pmc_dev *pmcdev)
{
  struct dentry *dir, *file;
  +struct dentry *dir;

  dir = debugfs_create_dir("pmc_core", NULL);
  if (!dir)
    return -ENOMEM;

  pmcdev->dbgfs_dir = dir;
  -file = debugfs_create_file("slp_s0_residency_usec", S_IFREG | S_IRUGO,
  -  dir, pmcdev, &pmc_core_dev_state);
  -if (!file)
  -  goto err;
  -
  -file = debugfs_create_file("pch_ip_power_gating_status",
  -  S_IFREG | S_IRUGO, dir, pmcdev,
  -  &pmc_core_ppfear_ops);
  -if (!file)
  -  goto err;
  -
  -file = debugfs_create_file("mphy_core_lanes_power_gating_status",
  -  S_IFREG | S_IRUGO, dir, pmcdev,
  -  &pmc_core_mphy_pg_ops);
-if (!file)
-goto err;
-
-file = debugfs_create_file("pll_status",
-S_IFREG | S_IRUGO, dir, pmcdev,
-&pmc_core_pll_ops);
-if (!file)
-goto err;
-
-file = debugfs_create_file("ltr_ignore",
-S_IFREG | S_IRUGO, dir, pmcdev,
-&pmc_core_ltr_ignore_ops);

-if (!file)
-goto err;
+debugfs_create_file("slp_s0_residency_usec", 0444, dir, pmcdev,
+ &pmc_core_dev_state);
+
+debugfs_create_file("pch_ip_power_gating_status", 0444, dir, pmcdev,
+ &pmc_core_ppfear_ops);
+
+debugfs_create_file("ltr_ignore", 0644, dir, pmcdev,
+ &pmc_core_ltr_ignore_ops);
+
+if (pmcdev->map->pll_sts)
+debugfs_create_file("pll_status", 0444, dir, pmcdev,
+ &pmc_core_pll_ops);
+
+if (pmcdev->map->mphy_sts)
+debugfs_create_file("mphy_core_lanes_power_gating_status",
+ 0444, dir, pmcdev,
+ &pmc_core_mphy_pg_ops);

return 0;
-err:
-pmc_core_dbgfs_unregister(pmcdev);
-return -ENODEV;
}
#endif /* CONFIG_DEBUG_FS */

static const struct x86_cpu_id intel_pmc_core_ids[] = {
-{ X86_VENDOR_INTEL, 6, INTEL_FAM6_SKYLAKE_MOBILE, X86_FEATURE_MWAIT,
-(kernel_ulong_t)NULL },
-{ X86_VENDOR_INTEL, 6, INTEL_FAM6_SKYLAKE_DESKTOP, X86_FEATURE_MWAIT,
-(kernel_ulong_t)NULL },

static int pmc_core_probe(struct pci_dev *dev, const struct pci_device_id *id)
{
    struct device *ptr_dev = &dev->dev;
    struct pmc_dev *pmcdev = &pmc;
    const struct x86_cpu_id *cpu_id;
    const struct pmc_reg_map *map = (struct pmc_reg_map *)id->driver_data;
    u64 slp_s0_addr;
    int err;

    cpu_id = x86_match_cpu(intel_pmc_core_ids);
    if (!cpu_id) {
        dev_dbg(&dev->dev, "PMC Core: cpuid mismatch.
    return -EINVAL;
    }
    if (!cpu_id)
        return -ENODEV;
    err = pcim_enable_device(dev);
    if (err < 0) {
        dev_dbg(&dev->dev, "PMC Core: failed to enable Power Management Controller.
        return err;
        }
    if (!cpu_id)
        return -ENODEV;
    err = pci_read_config_dword(dev,
        SPT_PMC_BASE_ADDR_OFFSET,
        &pmcdev->base_addr);
    if (err < 0) {
        dev_dbg(&dev->dev, "PMC Core: failed to read PCI config space.
        return -ENODEV;
        }
    }
-return err;
-
-pmcdev->base_addr &= PMC_BASE_ADDR_MASK;
-dev_dbg(&dev->dev, "PMC Core: PWRMBASE is %#x\n", pmcdev->base_addr);
+pmcdev->map = (struct pmc_reg_map *)cpu_id->driver_data;

-pmcdev->regbase = devm_ioremap_nocache(ptr_dev,
-    pmcdev->base_addr,
-    SPT_PMC_MMIO_REG_LEN);
-if (!pmcdev->regbase) {
-dev_dbg(&dev->dev, "PMC Core: ioremap failed.\n");
+/*
+ * Coffeelake has CPU ID of Kabylake and Cannonlake PCH. So here
+ * Sunrisepoint PCH regmap can't be used. Use Cannonlake PCH regmap
+ * in this case.
+ */
+if (pmcdev->map == &spt_reg_map && !pci_dev_present(pmc_pci_ids))
+pmcdev->map = &cnp_reg_map;
+
+if (lpit_read_residency_count_address(&slp_s0_addr)) {
+    pmcdev->base_addr = PMC_BASE_ADDR_DEFAULT;
+
+    if (page_is_ram(PHYS_PFN(pmcdev->base_addr)))
+        return -ENODEV;
+
+    else {
+        pmcdev->base_addr = slp_s0_addr - pmcdev->map->slp_s0_offset;
+    }
+
+    pmcdev->regbase = ioremap(pmcdev->base_addr,
+        pmcdev->map->regmap_length);
+        if (!pmcdev->regbase)
return -ENOMEM;
-
mutex_init(&pmcdev->lock);

-pmcdev->map = map;

-pmcdev->pmc_xram_read_bit = pmc_core_check_read_lock_bit();

err = pmc_core_dbgfs_register(pmcdev);
-if (err < 0)
-dev_warn(&dev->dev, "PMC Core: debugfs register failed.\n");
+if (err < 0) {
+    pr_warn(" debugfs register failed.\n");
+    iounmap(pmcdev->regbase);
+    return err;
+}

-pmc.has_slp_s0_res = true;
+pr_info(" initialized\n");
return 0;
}
+module_init(pmc_core_probe)

-static struct pci_driver intel_pmc_core_driver = {
- .name = "intel_pmc_core",
- .id_table = pmc_pci_ids,
- .probe = pmc_core_probe,
-};
+static void __exit pmc_core_remove(void)
+
+struct pmc_dev *pmcdev = &pmc;
+
+pmc_core_dbgfs_unregister(pmcdev);
+mutex_destroy(&pmcdev->lock);
+iounmap(pmcdev->regbase);
+
+module_exit(pmc_core_remove)

-builtin_pci_driver(intel_pmc_core_driver);
+MODULE_LICENSE("GPL v2");
+MODULE_DESCRIPTION("Intel PMC Core Driver");
--- linux-4.15.0.orig/drivers/platform/x86/intel_pmc_core.h
+++ linux-4.15.0/drivers/platform/x86/intel_pmc_core.h
@@ -21,9 +21,10 @@

#ifndef PMC_CORE_H
#define PMC_CORE_H
+#define PMC_BASE_ADDR_DEFAULT	\t0xFE000000
+
/* Sunrise Point Power Management Controller PCI Device ID */
#define SPT_PMC_PCI_DEVICE_ID	\t0x9d21
-
#define SPT_PMC_BASE_ADDR_OFFSET	\t0x48
#define SPT_PMC_SLP_S0_RES_COUNTER_OFFSET	\t0x13c
#define SPT_PMC_PM_CFG_OFFSET	\t\t0x18
@@ -38,7 +39,7 @@
#define SPT_PMC_SLP_S0_RES_COUNTER_STEP	\t\t\t0x64
#define PMC_BASE_ADDR_MASK	\t\t\t~(SPT_PMC_MMIO_REG_LEN - 1)
#define MTPMC_MASK	\t\t\t\t0xffff0000
#define PPFEAR_MAX_NUM_ENTRIES	\t\t\t5
-#define SPT_PPFEAR_NUM_ENTRIES\t\t\t5
+#define SPT_PPFEAR_NUM_ENTRIES\t\t\t12
#define SPT_PMC_READ_DISABLE_BIT	\t\t\t0x16
#define SPT_PMC_MSG_FULL_STS_BIT	\t\t\t0x18
@@ -122,6 +123,17 @@
#define SPT_PMC_BIT_MPHY_CMN_LANE2\t\t\t\t\tBIT(2)

+#define PMC_BASE_ADDR_DEFAULT0xFE000000
+
/* Sunrise Point Power Management Controller PCI Device ID */
#define SPT_PMC_PCI_DEVICE_ID0x9d21
-
#define SPT_PMC_BASE_ADDR_OFFSET0x48
#define SPT_PMC_SLP_S0_RES_COUNTER_OFFSET0x13c
#define SPT_PMC_PM_CFG_OFFSET0x18
@@ -38,7 +39,7 @@
#define SPT_PMC_SLP_S0_RES_COUNTER_STEP0x64
#define PMC_BASE_ADDR_MASK~(SPT_PMC_MMIO_REG_LEN - 1)
#define MTPMC_MASK0xffff0000
-#define PPFEAR_MAX_NUM_ENTRIES5
+#define PPFEAR_MAX_NUM_ENTRIES12
#define SPT_PPFEAR_NUM_ENTRIES5
#define SPT_PPFEAR_NUM_ENTRIES12
#define SPT_PMC_READ_DISABLE_BIT0x16
#define SPT_PMC_MSG_FULL_STS_BIT0x18
@@ -122,6 +123,17 @@
#define SPT_PMC_BIT_MPHY_CMN_LANE2BIT(2)
```c
#define SPT_PMC_BIT_MPHY_CMN_LANE3BIT(3)

#define CNP_PMC_SLP_S0_RES_COUNTER_OFFSET 0x193C
#define CNP_PMC_LTR_IGNORE_OFFSET 0x1B0C
#define CNP_PMC_PM_CFG_OFFSET 0x1818
#define CNP_PMC_HOST_PPFEAR0A 0x1D90
#define CNP_PMC_MMIO_REG_LEN 0x2000
#define CNP_PPFEAR_NUM_ENTRIES 8
#define CNP_PMC_READ_DISABLE_BIT 22

struct pmc_bit_map {
    const char *name;
    u32 bit_mask;
} __attribute__((aligned(8)));
```

--- linux-4.15.0.orig/drivers/platform/x86/intel_pmc_ipc.c
+++ linux-4.15.0/drivers/platform/x86/intel_pmc_ipc.c
@@ -747,13 +747,17 @@ if (ret) {
     dev_err(ipcdev.dev, "Failed to add punit platform device\n");
     platform_device_unregister(ipcdev.punit_dev);
     platform_device_unregister(ipcdev.tco_dev);
+    return ret;
 }

 if (!ipcdev.telem_res_inval) {
     ret = ipc_create_telemetry_device();
-    if (ret)
+    if (ret) {
         dev_warn(ipcdev.dev,
             "Failed to add telemetry platform device\n");
         platform_device_unregister(ipcdev.punit_dev);
         platform_device_unregister(ipcdev.tco_dev);
+    }
 }

 return ret;
```
#include <linux/bitops.h>
#include <linux/device.h>
#include <linux/interrupt.h>
#include <linux/io.h>
#include <linux/platform_device.h>
#include <asm/intel_punit_ipc.h>

#include "asm/intel_punit_ipc.h"
@
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   
   

static struct platform_driver intel_punit_ipc_driver = {
   .probe = intel_punit_ipc_probe,

   --- linux-4.15.0.orig/drivers/platform/x86/intel_scu_ipc.c
   +++ linux-4.15.0/drivers/platform/x86/intel_scu_ipc.c
   @@ -69,26 +69,22 @@
   struct intel_scu_ipc_pdata_t {
     u32 i2c_base;
     u32 i2c_len;
   -u8 irq_mode;
   }

   static const struct intel_scu_ipc_pdata_t intel_scu_ipc_lincroft_pdata = {
     .i2c_base = 0xff12b000,
     .i2c_len = 0x10,
   - .irq_mode = 0,
   }

   /* Penwell and Cloverview */
   static const struct intel_scu_ipc_pdata_t intel_scu_ipc_penwell_pdata = {
     .i2c_base = 0xff12b000,
     .i2c_len = 0x10,
   - .irq_mode = 1,
   }

   static const struct intel_scu_ipc_pdata_t intel_scu_ipc_tangier_pdata = {
     .i2c_base  = 0xff00d000,
     .i2c_len = 0x10,
   - .irq_mode = 0,
   }

   struct intel_scu_ipc_dev {
   @@ -101,6 +97,9 @@

   static struct intel_scu_ipc_dev ipcdev; /* Only one for now */
```c
#define IPC_STATUS 0x04
#define IPC_STATUS_IRQ BIT(2)

/* IPC Read Buffer (Read Only):
* 16 byte buffer for receiving data from SCU, if IPC command
@@ -122,11 +121,8 @@ */
static inline void ipc_command(struct intel_scu_ipc_dev *scu, u32 cmd)
{
    -if (scu->irq_mode) {
        -reinit_completion(&scu->cmd_complete);
        -writel(cmd | IPC_IOC, scu->ipc_base);
    }
    -writel(cmd, scu->ipc_base);
+    reinit_completion(&scu->cmd_complete);
+    writel(cmd | IPC_IOC, scu->ipc_base);
}

/* Wait till ipc ioc interrupt is received or timeout in 10 HZ */
static inline int ipc_wait_for_interrupt(struct intel_scu_ipc_dev *scu)
{
    int status;
    @@ -187,7 +183,7 @@
    return 0;
}

-/* Wait till ipc ioc interrupt is received or timeout in 3 HZ */
+/* Wait till ipc ioc interrupt is received or timeout in 10 HZ */
static irqreturn_t ioc(int irq, void *dev_id)
{
    struct intel_scu_ipc_dev *scu = dev_id;
    -if (scu->irq_mode)
    -complete(&scu->cmd_complete);
    +writel(status | IPC_STATUS_IRQ, scu->ipc_base + IPC_STATUS);
    +complete(&scu->cmd_complete);
    return IRQ_HANDLED;
}

if (!pdata)
    return -ENODEV;
-    scu->irq_mode = pdata->irq_mode;
```
err = pcim_enable_device(pdev);
if (err)
    return err;

--- linux-4.15.0.orig/drivers/platform/x86/intel_telemetry_debugfs.c
+++ linux-4.15.0/drivers/platform/x86/intel_telemetry_debugfs.c
@@ -327,7 +327,7 @@
static const struct x86_cpu_id telemetry_debugfs_cpu_ids[] = {
    TELEM_DEBUGFS_CPU(INTEL_FAM6_ATOM_GOLDMONT, telem_apl_debugfs_conf),
    TELEM_DEBUGFS_CPU(INTEL_FAM6_ATOM_GEMINI_LAKE, telem_apl_debugfs_conf),
-   TELEM_DEBUGFS_CPU(INTEL_FAM6_ATOM_GOLDMONT_PLUS, telem_apl_debugfs_conf),
+   TELEM_DEBUGFS_CPU(INTEL_FAM6_ATOM_GOLDMONT_PLUS, telem_apl_debugfs_conf),
    {}
};

@@ -964,12 +964,16 @@
debugfs_conf = (struct telemetry_debugfs_conf *)id->driver_data;

err = telemetry_pltconfig_valid();
- if (err < 0)
+ if (err < 0) {
+     pr_info("Invalid pltconfig, ensure IPC1 device is enabled in BIOS\n");
     return -ENODEV;
+ }

err = telemetry_debugfs_check_evt();
- if (err < 0)
+ if (err < 0) {
+     pr_info("telemetry_debugfs_check_evt failed\n");
     return -EINVAL;
+ }

register_pm_notifier(&pm_notifier);

--- linux-4.15.0.orig/drivers/platform/x86/intel_telemetry_pltdrv.c
+++ linux-4.15.0/drivers/platform/x86/intel_telemetry_pltdrv.c
@@ -192,7 +192,7 @@
static const struct x86_cpu_id telemetry_cpu_ids[] = {
    TELEM_CPU(INTEL_FAM6_ATOM_GOLDMONT, telem_apl_config),
-   TELEM_CPU(INTEL_FAM6_ATOM_GEMINI_LAKE, telem_glk_config),
+   TELEM_CPU(INTEL_FAM6_ATOM_GOLDMONT_PLUS, telem_glk_config),
    {}
};

--- linux-4.15.0.orig/drivers/platform/x86/mlx-platform.c
+++ linux-4.15.0/drivers/platform/x86/mlx-platform.c
@@ -318,7 +318,7 @@
static const struct x86_cpu_id telemetry_cpu_ids[] = {
    TELEM_CPU(INTEL_FAM6_ATOM_GOLDMONT, telem_apl_config),
-   TELEM_CPU(INTEL_FAM6_ATOM_GEMINI_LAKE, telem_glk_config),
+   TELEM_CPU(INTEL_FAM6_ATOM_GOLDMONT_PLUS, telem_glk_config),
    {}
};
for (i = 0; i < ARRAY_SIZE mlxplat_mux_data; i++) {
priv->pdev_mux[i] = platform_device_register_resndata(
-&mlxplat_dev->dev,
+&priv->pdev_i2c->dev,
"i2c-mux-reg", i, NULL,
0, &mlxplat_mux_data[i],
sizeof mlxplat_mux_data[i]);
--- linux-4.15.0.orig/drivers/platform/x86/pmc_atom.c
+++ linux-4.15.0/drivers/platform/x86/pmc_atom.c
@@ -17,6 +17,7 @@
#include <linux/debugfs.h>
#include <linux/device.h>
+#include <linux/dmi.h>
#include <linux/init.h>
#include <linux/io.h>
#include <linux/platform_data/x86/clk-pmc-atom.h>
@@ -421,11 +422,67 @@
} #endif /* CONFIG_DEBUG_FS */
+/
+ * Some systems need one or more of their pmc_plt_clks to be
+ * marked as critical.
+ */
+static const struct dmi_system_id critclk_systems[] = {
+{
+/* pmc_plt_clk0 is used for an external HSIC USB HUB */
+.ident = "MPL CEC1x",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "MPL AG"),
+DMI_MATCH(DMI_PRODUCT_NAME, "CEC10 Family"),
+},
+},
+{
+/* pmc_plt_clk0 - 3 are used for the 4 ethernet controllers */
+.ident = "Lex 3I380D",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Lex BayTrail"),
+DMI_MATCH(DMI_PRODUCT_NAME, "3I380D"),
+},
+},
+{
+/* pmc_plt_clk* - are used for ethernet controllers */
+.ident = "Lex 2I385SW",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "Lex BayTrail"),
+DMI_MATCH(DMI_PRODUCT_NAME, "2I385SW"),
static int pmc_setup_clks(struct pci_dev *pdev, void __iomem *pmc_regmap, const struct pmc_data *pmc_data)
{

/* pmc_plt_clk* - are used for ethernet controllers */
+ .ident = "Beckhoff Baytrail",
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "Beckhoff Automation"),
+ DMI_MATCH(DMI_PRODUCT_FAMILY, "CBxx63"),
+ },
+ },
+ {
+ .ident = "SIMATIC IPC227E",
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "SIEMENS AG"),
+ DMI_MATCH(DMI_PRODUCT_VERSION, "6ES7647-8B"),
+ },
+ },
+ {
+ .ident = "CONNECT X300",
+ .matches = {
+ DMI_MATCH(DMI_SYS_VENDOR, "SIEMENS AG"),
+ DMI_MATCH(DMI_PRODUCT_VERSION, "A5E45074588"),
+ },
+ },
+
+ /*sentinel*/
+
+ static int pmc_setup_clks(struct pci_dev *pdev, void __iomem *pmc_regmap, 
+ const struct pmc_data *pmc_data)
+ {
+ struct platform_device *clkdev;
+ struct pmc_clk_data *clk_data;
+ const struct dmi_system_id *d = dmi_first_match(critclk_systems);
+ 
+ clk_data = kmalloc(sizeof(*clk_data), GFP_KERNEL);
+ if (!clk_data)
+ @@ -433,6 +490,10 @@
+ 
+ clk_data->base = pmc_regmap; /* offset is added by client */
+ clk_data->clks = pmc_data->clks;
+ +if (d) {
+ +clk_data->critical = true;
+ +pr_info("%s critclk quirk enabled\n", d->ident);
+ +}
+
+ clkdev = platform_device_register_data(&pdev->dev, "clk-pmc-atom", 
+ PLATFORM_DEVID_NONE,
static int sony_pic_possible_resources(struct acpi_device *device)

static int hotkey_kthread(void *data)
- struct tp_nvram_state s[2];
+ struct tp_nvram_state s[2] = { 0 };
u32 poll_mask, event_mask;
unsigned int si, so;
unsigned long t;
@@ -3221,7 +3225,14 @@
in_tablet_mode = hotkey_gmms_get_tablet_mode(res,
  &has_tablet_mode);
-#* The Yoga 11e series has 2 accelerometers described by a
+ * The Yoga 11e series has 2 accelerometers described by a
+ * BOSC0200 ACPI node. This setup relies on a Windows service
+ * which calls special ACPI methods on this node to report
+ * the laptop/tent/tablet mode to the EC. The bmc150 iio driver
+ * does not support this, so skip the hotkey on these models.
+ */
+if (has_tablet_mode && !acpi_dev_present("BOSC0200", "1", -1))
  tp_features.hotkey_tablet = TP_HOTKEY_TABLET_USES_GMMS;
type = "GMMS";
} else if (acpi_evalf(hkey_handle, &res, "MHKG", "qd")) {
  @@ -4066,19 +4077,31 @@
case TP_HKEY_EV_KEY_NUMLOCK:
case TP_HKEY_EV_KEY_FN:
-#case TP_HKEY_EV_KEY_FN_ESC:
+  /* key press events, we just ignore them as long as the EC
+   * is still reporting them in the normal keyboard stream */
+  *send_acpi_ev = false;
+  *ignore_acpi_ev = true;
+  return true;
+
+case TP_HKEY_EV_KEY_FN_ESC:
+  /* Get the media key status to force the status LED to update */
+  acpi_evalf(hkey_handle, NULL, "GMKS", "v");
+  *send_acpi_ev = false;
+  *ignore_acpi_ev = true;
+  return true;
+
+ case TP_HKEY_EV_TABLET_CHANGED:
+  tpacpi_input_send_tabletsw();
+  hotkey_tablet_mode_notify_change();
+  *send_acpi_ev = false;
+  break;
+
+ case TP_HKEY_EV_PALM_DETECTED:
+ case TP_HKEY_EV_PALM_UNDETECTED:
+ /* palm detected hovering the keyboard, forward to user-space
+ * via netlink for consumption */
+return true;
+
default:
pr_warn("unknown possible thermal alarm or keyboard event received\n");
known = false;
@@ -4217,6 +4240,7 @@
pr_err("error while attempting to reset the event firmware interface\n");

tpacpi_send_radiosw_update();
+tpacpi_input_send_tabletsw();
hotkey_tablet_mode_notify_change();
hotkey_wakeup_reason_notify_change();
hotkey_wakeup_hotunplug_complete_notify_change();
@@ -4462,6 +4486,74 @@
bluetooth_shutdown();
}

+static const struct dmi_system_id bt_fwbug_list[] __initconst = {
+{
+.ident = "ThinkPad E485",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_BOARD_NAME, "20KU"),
+},
+},
+{
+.ident = "ThinkPad E585",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_BOARD_NAME, "20KV"),
+},
+},
+{
+.ident = "ThinkPad A285 - 20MW",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_BOARD_NAME, "20MW"),
+},
+},
+{
+.ident = "ThinkPad A285 - 20MX",
+.matches = {
+DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+DMI_MATCH(DMI_BOARD_NAME, "20MX"),
+},
+},
+{
+.ident = "ThinkPad A485 - 20MU",
+.matches = {
+  DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+  DMI_MATCH(DMI_BOARD_NAME, "20MU"),
+},
+
+{ .ident = "ThinkPad A485 - 20MV",
+  .matches = {
+    DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
+    DMI_MATCH(DMI_BOARD_NAME, "20MV"),
+  },
+},
+
+
+static const struct pci_device_id fwbug_cards_ids[] __initconst = {
+  PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x24F3 ),
+  PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x24FD ),
+  PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x2526 )
+};
+
+
+static int __init have_bt_fwbug(void)
+{
+  /* Some AMD based ThinkPads have a firmware bug that calling
+     "GBDC" will cause bluetooth on Intel wireless cards blocked
+     */
+  if (dmi_check_system(bt_fwbug_list) && pci_dev_present(fwbug_cards_ids)) {
+    vdbg_printk(TPACPI_DBG_INIT | TPACPI_DBG_RFKILL,
+            FW_BUG "disable bluetooth subdriver for Intel cards\n");
+    return 1;
+  } else
+    return 0;
+}
+
+static int __init bluetooth_init(struct ibm_init_struct *iibm)
+{
+  int res;
+  @@ -4474,7 +4566,7 @@
+  int res;
+  /* bluetooth not supported on 570, 600e/x, 770e, 770x, A21e, A2xm/p,
+     G4x, R30, R31, R40e, R50e, T20-22, X20-21 */
+  -tp_features.bluetooth = hkey_handle &&
+  +tp_features.bluetooth = !have_bt_fwbug() && hkey_handle &&
+    acpi_evalf(hkey_handle, &status, "GBDC", "qd");
vdbg_printk(TPACPI_DBG_INIT | TPACPI_DBG_RFKILL,
@@ -6184,6 +6276,7 @@
enum { /* TPACPI_THERMAL_TPEC_* */
  TP_EC_THERMAL_TMP0 = 0x78, /* ACPI EC regs TMP 0..7 */
  TP_EC_THERMAL_TMP8 = 0xC0, /* ACPI EC regs TMP 8..15 */
 +TP_EC_FUNCREV = 0xEF, /* ACPI EC Functional revision */
  TP_EC_THERMAL_TMP_NA = -128, /* ACPI EC sensor not available */

  TPACPI_THERMAL_SENSOR_NA = -128000, /* Sensor not available */
@@ -6382,7 +6475,7 @@
static int __init thermal_init(struct ibm_init_struct *iibm)
{
  u8 t, ta1, ta2;
  +u8 t, ta1, ta2, ver = 0;
  int i;
  int acpi_tmp7;
  int res;
@@ -6397,7 +6490,14 @@
    * 0x78-0x7F, 0xC0-0xC7. Registers return 0x00 for
    * non-implemented, thermal sensors return 0x80 when
    * not available
    + * The above rule is unfortunately flawed. This has been seen with
    + * 0xC2 (power supply ID) causing thermal control problems.
    + * The EC version can be determined by offset 0xEF and at least for
    + * version 3 the Lenovo firmware team confirmed that registers 0xC0-0xC7
    + * are not thermal registers.
    */
    +if (!acpi_ec_read(TP_EC_FUNCREV, &ver))
    +pr_warn("Thinkpad ACPI EC unable to access EC version\n");
    ta1 = ta2 = 0;
    for (i = 0; i < 8; i++) {
@@ -6407,11 +6507,13 @@
      ta1 = 0;
      break;
    }
    -if (acpi_ec_read(TP_EC_THERMAL_TMP8 + i, &t)) {
      -ta2 |= t;
    -} else {
      -ta1 = 0;
      -break;
      +if (ver < 3) {
        +if (acpi_ec_read(TP_EC_THERMAL_TMP8 + i, &t)) {
          +ta2 |= t;
        +} else {
          +ta1 = 0;
          

thermal_read_mode = TPACPI_THERMAL_NONE;
}
} else {
  -thermal_read_mode =
  - (ta2 != 0) ?
  - TPACPI_THERMAL_TPEC_16 : TPACPI_THERMAL_TPEC_8;
  +if (ver >= 3)
  +thermal_read_mode = TPACPI_THERMAL_TPEC_8;
  +else
  +thermal_read_mode =
  +(ta2 != 0) ?
  +TPACPI_THERMAL_TPEC_16 : TPACPI_THERMAL_TPEC_8;
}
} else if (acpi_tmp7) {
  if (tpacpi_is_ibm())
@@ -6777,8 +6882,10 @@
  list_for_each_entry(child, &device->children, node) {
    acpi_status status = acpi_evaluate_object(child->handle, "_BCL",
    NULL, &buffer);
-  -if (ACPI_FAILURE(status))
-  +if (ACPI_FAILURE(status)) {
+buffer.length = ACPI_ALLOCATE_BUFFER;
    continue;
  +}

  obj = (union acpi_object *)buffer.pointer;
  if (!obj || (obj->type != ACPI_TYPE_PACKAGE)) {
--- linux-4.15.0.orig/drivers/platform/x86/toshiba_acpi.c
+++ linux-4.15.0/drivers/platform/x86/toshiba_acpi.c
@@ -34,6 +34,7 @@
 #define TOSHIBA_ACPI_VERSION "0.24"
 #define PROC_INTERFACE_VERSION1

+  #include <linux/compiler.h>
+  #include <linux/kernel.h>
+  #include <linux/module.h>
+  #include <linux/moduleparam.h>
+  @ @ -1496,7 +1497,7 @@
+struct toshiba_acpi_dev *dev = PDE_DATA(file_inode(file));
+char *buffer;
+char *cmd;
-  int lcd_out, crt_out, tv_out;
int lcd_out = -1, crt_out = -1, tv_out = -1;
int remain = count;
int value;
int ret;
@@ -1528,7 +1529,6 @@
kfree(cmd);

lcd_out = crt_out = tv_out = -1;
ret = get_video_status(dev, &video_out);
if (!ret) {
unsigned int new_video_out = video_out;
@@ -1682,7 +1682,7 @@
    .write= keys_proc_write,
    };

-static int version_proc_show(struct seq_file *m, void *v)
+static int __maybe_unused version_proc_show(struct seq_file *m, void *v)
{
seq_printf(m, "driver:                  %s\n", TOSHIBA_ACPI_VERSION);
seq_printf(m, "proc_interface:          %d\n", PROC_INTERFACE_VERSION);
@@ -2860,6 +2860,7 @@
if (!dev->info_supported && !dev->system_event_supported) {
pr_warn("No hotkey query interface found\n");
+    error = -EINVAL;
    goto err_remove_filter;
}

--- linux-4.15.0.orig/drivers/platform/x86/wmi.c
+++ linux-4.15.0/drivers/platform/x86/wmi.c
@@ -776,6 +776,9 @@
    struct wmi_block *wblock = dev_to_wblock(dev);
    const struct wmi_device_id *id = wmi_driver->id_table;
    if (id == NULL)
+        return 0;
+    while (id->guid_string) {
        uuid_le driver_guid;
@@ -903,7 +906,6 @@
    struct wmi_driver *wdriver =
        container_of(dev->driver, struct wmi_driver, driver);
    int ret = 0;
-    int count;
    char *buf;
if (ACPI_FAILURE(wmi_method_enable(wblock, 1)))
@@ -925,15 +927,14 @@
goto probe_failure;
}

-count = get_order(wblock->req_buf_size);
-wblock->handler_data = (void *)__get_free_pages(GFP_KERNEL,
-count);
+wblock->handler_data = kmalloc(wblock->req_buf_size,
 + GFP_KERNEL);
if (!wblock->handler_data) {
 ret = -ENOMEM;
goto probe_failure;
}

-buf = kmalloc(strlen(wdriver->driver.name) + 4, GFP_KERNEL);
+buf = kmalloc(strlen(wdriver->driver.name) + 5, GFP_KERNEL);
if (!buf) {
 ret = -ENOMEM;
goto probe_string_failure;
@@ -973,8 +974,7 @@
 if (wdriver->filter_callback) {
     misc_deregister(&wblock->char_dev);
     kfree(wblock->char_dev.name);
-    free_pages((unsigned long)wblock->handler_data,
-    - get_order(wblock->req_buf_size));
+    kfree(wblock->handler_data);
     }

 if (wdriver->remove)
--- linux-4.15.0.orig/drivers/pnp/isapnp/core.c
+++ linux-4.15.0/drivers/pnp/isapnp/core.c
@@ -41,6 +41,7 @@
 #include <linux/init.h>
 #include <linux/isapnp.h>
 #include <linux/mutex.h>
+#include <linux/async.h>
 #include <asm/io.h>

 #include "../base.h"
@@ -987,7 +988,7 @@
 .disable = isapnp_disable_resources,
 }

-static int __init isapnp_init(void)
+static int __init real_isapnp_init(void)
 {
 int cards;
struct pnp_card *card;
@@ -1081,6 +1082,16 @@
 return 0;
 }

+static void __init async_isapnp_init(void *unused, async_cookie_t cookie)
+{
+ (void)real_isapnp_init();
+ }
+ static int __init isapnp_init(void)
+{
+ async_schedule(async_isapnp_init, NULL);
+ return 0;
+ }
 device_initcall(isapnp_init);

 /* format is: noisapnp */
--- linux-4.15.0.orig/drivers/power/avs/Kconfig
+++ linux-4.15.0/drivers/power/avs/Kconfig
@@ -11,6 +11,21 @@
 Say Y here to enable Adaptive Voltage Scaling class support.

 +config QCOM_CPR
 +tristate "QCOM Core Power Reduction (CPR) support"
 +depends on POWER_AVS
 +select PM_OPP
 +help
 + Say Y here to enable support for the CPR hardware found on Qualcomm SoCs like MSM8916.
 +
 + This driver populates CPU OPPs tables and makes adjustments to the tables based on feedback from the CPR hardware. If you want to do CPU frequency scaling say Y here.
 +
 + To compile this driver as a module, choose M here: the module will be called qcom-cpr
 +
 +config ROCKCHIP_IODOMAIN
 +tristate "Rockchip IO domain support"
 + depends on POWER_AVS && ARCH_ROCKCHIP && OF
--- linux-4.15.0.orig/drivers/power/avs/Makefile
+++ linux-4.15.0/drivers/power/avs/Makefile
@@ -1,2 +1,3 @@
 obj-$(CONFIG_POWER_AVS_OMAP)+= smartreflex.o
 obj-$(CONFIG_ROCKCHIP_IODOMAIN)+= rockchip-io-domain.o
 +obj-$(CONFIG_QCOM_CPR)+= qcom-cpr.o
/* Copyright (c) 2013-2015, The Linux Foundation. All rights reserved. */

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 */

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 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
 * GNU General Public License for more details.
 */

#include <linux/module.h>
#include <linux/err.h>
#include <linux/string.h>
#include <linux/kernel.h>
#include <linux/list.h>
#include <linux/init.h>
#include <linux/io.h>
#include <linux/bitops.h>
#include <linux/slab.h>
#include <linux/of.h>
#include <linux/of_device.h>
#include <linux/platform_device.h>
#include <linux/pm_opp.h>
#include <linux/interrupt.h>
#include <linux/regmap.h>
#include <linux/mfd/syscon.h>
#include <linux/regulator/consumer.h>
#include <linux/cpufreq.h>
#include <linux/nvmem-consumer.h>
#include <linux/bitops.h>
#include <linux/regulator/qcom_smd-regulator.h>

/* Register Offsets for RB-CPR and Bit Definitions */

/* RBCPR Version Register */
define REG_RBCPR_VERSION		0
#define RBCPR_VER_2			0x02

/* RBCPR Gate Count and Target Registers */
define REG_RBCPR_GCNT_TARGET(n)	(0x60 + 4 * n)
define RBCPR_GCNT_TARGET_TARGET_SHIFT	0
/* RBCPR Timer Control */
#define REG_RBCPR_TIMER_INTERVAL 0x44
#define REG_RBIF_TIMER_ADJUST 0x4c

#define RBIF_TIMER_ADJ_CONS_UP_MASK GENMASK(3, 0)
#define RBIF_TIMER_ADJ_CONS_UP_SHIFT 0
#define RBIF_TIMER_ADJ_CONS_DOWN_MASK GENMASK(3, 0)
#define RBIF_TIMER_ADJ_CONS_DOWN_SHIFT 4
#define RBIF_TIMER_ADJ_CLAMP_INT_MASK GENMASK(7, 0)
#define RBIF_TIMER_ADJ_CLAMP_INT_SHIFT 8

/* RBCPR Config Register */
#define REG_RBIF_LIMIT 0x48
#define RBIF_LIMIT_CEILING_MASK GENMASK(5, 0)
#define RBIF_LIMIT_CEILING_SHIFT 6
#define RBIF_LIMIT_FLOOR_BITS 6
#define RBIF_LIMIT_FLOOR_MASK GENMASK(5, 0)

#define RBIF_LIMIT_CEILING_DEFAULT RBIF_LIMIT_CEILING_MASK
#define RBIF_LIMIT_FLOOR_DEFAULT 0

#define REG_RBIF_SW_VLEVEL 0x94
#define RBIF_SW_VLEVEL_DEFAULT 0x20

#define REG_RBCPR_STEP_QUOT 0x80
#define RBCPR_STEP_QUOT_STEPQUOT_MASK GENMASK(7, 0)
#define RBCPR_STEP_QUOT_IDLE_CLK_MASK GENMASK(3, 0)
#define RBCPR_STEP_QUOT_IDLE_CLK_SHIFT 8

/* RBCPR Control Register */
#define REG_RBCPR_CTL 0x90

#define RBCPR_CTL_LOOP_EN BIT(0)
#define RBCPR_CTL_TIMER_EN BIT(3)
#define RBCPR_CTL_SW_AUTO_CONT_ACK_EN BIT(5)
#define RBCPR_CTL_SW_AUTO_CONT_NACK_DN_EN BIT(6)
#define RBCPR_CTL_COUNT_MODE BIT(10)
#define RBCPR_CTL_UP_THRESHOLD_MASK GENMASK(3, 0)
#define RBCPR_CTL_UP_THRESHOLD_SHIFT 24
#define RBCPR_CTL_DN_THRESHOLD_MASK GENMASK(3, 0)
#define RBCPR_CTL_DN_THRESHOLD_SHIFT 28

/* RBCPR Ack/Nack Response */
#define REG_RBIF_CONT_ACK_CMD 0x98
#define REG_RBIF_CONT_NACK_CMD 0x9c
+
/* RBCPR Result status Register */
+#define REG_RBCPR_RESULT_00xa0
+
+#define RBCPR_RESULT0_BUSY_SHIFT19
+#define RBCPR_RESULT0_BUSY_MASKBIT(RBCPR_RESULT0_BUSY_SHIFT)
+#define RBCPR_RESULT0_ERROR_LT0_SHIFT18
+#define RBCPR_RESULT0_ERROR_SHIFT6
+#define RBCPR_RESULT0_ERROR_MASKGENMASK(11, 0)
+#define RBCPR_RESULT0_ERROR_STEPS_SHIFT2
+#define RBCPR_RESULT0_ERROR_STEPS_MASKGENMASK(3, 0)
+#define RBCPR_RESULT0_STEP_UP_SHIFT1
+
/* RBCPR Interrupt Control Register */
+#define REG_RBIF_IRQ_EN(n) (0x100 + 4 * n)
+#define REG_RBIF_IRQ_CLEAR 0x110
+#define REG_RBIF_IRQ_STATUS 0x114
+
+#define CPR_INT_ALL(CPR_INT_DONE | CPR_INT_MIN | CPR_INT_DOWN | CPR_INT_MID | CPR_INT_UP | CPR_INT_MAX | CPR_INT_CLAMP)
+#define CPR_INT_DEFAULT(CPR_INT_UP | CPR_INT_DOWN)
+
+#define CPR_NUM_RING_OSC 8
+
/* RBCPR Clock Control Register */
+#define RBCPR_CLK_SEL_MASK BIT(-1)
+#define RBCPR_CLK_SEL_AHB_CLK BIT(0)
+
/* CPR eFuse parameters */
+#define CPR_FUSE_TARGET_QUOT_BITS_MASKGENMASK(11, 0)
+
+#define CPR_FUSE_MIN_QUOT_DIFF 50
+
+#define SPEED_BIN_NONE UINT_MAX
+
+#define FUSE_REVISION_UNKNOWN (-1)
+#define FUSE_MAP_NO_MATCH (-1)
+#define FUSE_PARAM_MATCH_ANY 0xffffffff
+
+enum vdd_mx_vmin_method {
+VDD_MX_VMIN_APC_CORNER_CEILING,
+VDD_MX_VMIN_FUSE_CORNER_MAP,
+};
+
+enum voltage_change_dir {
+NO_CHANGE,
+DOWN,
+UP,
+};
+
+struct qfprom_offset {
+u16 offset;
+u8 width;
+u8 shift;
+};
+
+struct cpr_fuse {
+struct qfprom_offset ring_osc;
+struct qfprom_offset init_voltage;
+struct qfprom_offset quotient;
+struct qfprom_offset quotient_offset;
+};
+
+struct fuse_corner_data {
+int ref_uV;
+int max_uV;
+int min_uV;
+int max_quot_scale;
+int quot_offset;
+int quot_scale;
+int max_volt_scale;
+int vdd_mx_req;
+};
+
+struct cpr_fuses {
+struct qfprom_offset redundant;
+u8 redundant_value;
+int init_voltage_step;
+struct fuse_corner_data *fuse_corner_data;
+struct cpr_fuse *cpr_fuse;
+struct qfprom_offset *disable;
+};
+
+struct pvs_bin {
+int *uV;
+};
+
+struct pvs_fuses {
+struct qfprom_offset redundant;
+u8 redundant_value;
+struct qfprom_offset *pvs_fuse;
+struct pvs_bin *pvs_bins;
+};
+
+struct corner_data {
+unsigned int fuse_corner;
+unsigned long freq;
+};
+
+struct freq_plan {
+u32 speed_bin;
+u32 pvs_version;
+const struct corner_data **plan;
+};
+
+struct fuse_conditional_min_volt {
+struct qfprom_offset redundant;
+u8 expected;
+int min_uV;
+};
+
+struct fuse_uplift_wa {
+struct qfprom_offset redundant;
+u8 expected;
+int uV;
+int *quot;
+int max_uV;
+int speed_bin;
+};
+
+struct corner_override {
+u32 speed_bin;
+u32 pvs_version;
+int *max_uV;
+int *min_uV;
+};
+
+struct corner_adjustment {
+u32 speed_bin;
+u32 pvs_version;
+u32 cpr_rev;
+u8 *ring_osc_idx;
+int *fuse_quot;
+int *fuse_quot_diff;
+int *fuse_quot_min;
+int *fuse_quot_offset;
+int *fuse_init_uV;
+int *quot;
+int *init_uV;
+bool disable_closed_loop;
+};
+
+struct cpr_desc {
+unsigned int num_fuse_corners;
+unsigned int num_corners;
+enum vdd_mx_vmin_method vdd_mx_vmin_method;
+int min_diff_quot;
+int *step_quot;
+struct cpr_fuses cpr_fuses;
+struct qfprom_offset fuse_revision;
+struct qfprom_offset speed_bin;
+struct qfprom_offset pvs_version;
+struct corner_data *corner_data;
+struct freq_plan *freq_plans;
+size_t num_freq_plans;
+struct pvs_fuses *pvs_fuses;
+struct fuse_conditional_min_volt *min_volt_fuse;
+struct fuse_uplift_wa *uplift_wa;
+struct corner_override *corner_overrides;
+size_t num_corner_overrides;
+struct corner_adjustment *adjustments;
+size_t num_adjustments;
+bool reduce_to_fuse_uV;
+bool reduce_to_corner_uV;
+};
+
+struct acc_desc {
+unsigned int enable_reg;
+u32 enable_mask;
+
+struct reg_sequence *settings;
+struct reg_sequence *override_settings;
+int num_regs_per_fuse;
+
+struct qfprom_offset override;
+u8 override_value;
+};
+
+struct fuse_corner {
+int min_uV;
+int max_uV;
+int uV;
+int quot;
+};
struct cpr_drv {
	unsigned int		num_fuse_corners;
	unsigned int		num_corners;

	unsigned int		ref_clk_khz;
	unsigned int		timer_delay_us;
	unsigned int		timer_cons_up;
	unsigned int		timer_cons_down;
	unsigned int		up_threshold;
	unsigned int		down_threshold;
	unsigned int		idle_clocks;
	unsigned int		gcnt_us;
	unsigned int		vdd_apc_step_up_limit;
	unsigned int		vdd_apc_step_down_limit;
	unsigned int		clamp_timer_interval;
	enum vdd_mx_vmin_method	vdd_mx_vmin_method;

	struct device*dev;
	struct mutex		lock;
	void __iomem		*base;
	struct corner		*corner;
	struct regulator	*vdd_apc;
	struct regulator	*vdd_mx;
+struct clk *cpu_clk;
+struct device *cpu_dev;
+struct regmap *tcsr;
+bool loop_disabled;
+bool suspended;
+u32 gcnt;
+unsigned long flags;
+#define FLAGS_IGNORE_1ST_IRQ_STATUSBIT 0
+
+struct fuse_corner *fuse_corners;
+struct corner *corners;
+
+static bool cpr_is_allowed(struct cpr_drv *drv)
+
+if (drv->loop_disabled) /* || disabled in software */
+return false;
+else
+return true;
+
+static void cpr_write(struct cpr_drv *drv, u32 offset, u32 value)
+
writel_relaxed(value, drv->base + offset);
+
+static u32 cpr_read(struct cpr_drv *drv, u32 offset)
+
+return readl_relaxed(drv->base + offset);
+
+static void cpr_masked_write(struct cpr_drv *drv, u32 offset, u32 mask, u32 value)
+
+u32 val;
+
+val = readl_relaxed(drv->base + offset);
+val &= ~mask;
+val |= value & mask;
+writel_relaxed(val, drv->base + offset);
+
+static void cpr_irq_clr(struct cpr_drv *drv)
+
cpr_write(drv, REG_RBIF_IRQ_CLEAR, CPR_INT_ALL);
+
+static void cpr_irq_clr_nack(struct cpr_drv *drv)
+{ 
+cpr_irq_clr(drv); 
+cpr_write(drv, REG_RBIF_CONT_NACK_CMD, 1); 
+} 
+
+static void cpr_irq_clr_ack(struct cpr_drv *drv) 
+{ 
+cpr_irq_clr(drv); 
+cpr_write(drv, REG_RBIF_CONT_ACK_CMD, 1); 
+} 
+
+static void cpr_irq_set(struct cpr_drv *drv, u32 int_bits) 
+{ 
+cpr_write(drv, REG_RBIF_IRQ_EN(0), int_bits); 
+} 
+
+static void cpr_ctl_modify(struct cpr_drv *drv, u32 mask, u32 value) 
+{ 
+cpr_masked_write(drv, REG_RBCPR_CTL, mask, value); 
+} 
+
+static void cpr_ctl_enable(struct cpr_drv *drv, struct corner *corner) 
+{ 
+u32 val, mask; 
+
+if (drv->suspended) 
+return; 
+
+/* Program Consecutive Up & Down */ 
+val = drv->timer_cons_down << RBIF_TIMER_ADJ_CONS_DOWN_SHIFT; 
+val |= drv->timer_cons_up << RBIF_TIMER_ADJ_CONS_UP_SHIFT; 
+mask = RBIF_TIMER_ADJ_CONS_UP_MASK | RBIF_TIMER_ADJ_CONS_DOWN_MASK; 
+cpr_masked_write(drv, REG_RBCPR_CTL, mask, val); 
+cpr_masked_write(drv, REG_RBIF_TIMER_ADJUST, RBCPR_CTL_SW_AUTO_CONT_NACK_DN_EN | RBCPR_CTL_SW_AUTO_CONT_ACK_EN, 
+corner->save_ctl); 
+cpr_irq_set(drv, corner->save_irq); 
+
+if (cpr_is_allowed(drv) /*&& drv->vreg_enabled */ && 
+corner->max_uV > corner->min_uV) 
+val = RBCPR_CTL_LOOP_EN; 
+else 
+val = 0; 
+cpr_ctl_modify(drv, RBCPR_CTL_LOOP_EN, val); 
+} 
+
+static void cpr_ctl_disable(struct cpr_drv *drv)
{  
+if (drv->suspended)  
+return;  
+  
+cpr_irq_set(drv, 0);  
+cpr_ctl_modify(drv, RBCPR_CTL_SW_AUTO_CONT_NACK_DN_EN |  
+RBCPR_CTL_SW_AUTO_CONT_ACK_EN, 0);  
+cpr_masked_write(drv, REG_RBIF_TIMER_ADJUST,  
+RBIF_TIMER_ADJ_CONS_UP_MASK |  
+RBIF_TIMER_ADJ_CONS_DOWN_MASK, 0);  
+cpr_irq_clr(drv);  
+cpr_write(drv, REG_RBIF_CONT_ACK_CMD, 1);  
+cpr_write(drv, REG_RBIF_CONT_NACK_CMD, 1);  
+cpr_ctl_modify(drv, RBCPR_CTL_LOOP_EN, 0);  
+}  
+  
+static bool cpr_ctl_is_enabled(struct cpr_drv *drv)  
+{  
+u32 reg_val;  
+  
+reg_val = cpr_read(drv, REG_RBCPR_CTL);  
+return reg_val & RBCPR_CTL_LOOP_EN;  
+}  
+  
+static bool cpr_ctl_is_busy(struct cpr_drv *drv)  
+{  
+u32 reg_val;  
+  
+reg_val = cpr_read(drv, REG_RBCPR_RESULT_0);  
+return reg_val & RBCPR_RESULT0_BUSY_MASK;  
+}  
+  
+static void cpr_corner_save(struct cpr_drv *drv, struct corner *corner)  
+{  
+corner->save_ctl = cpr_read(drv, REG_RBCPR_CTL);  
+corner->save_irq = cpr_read(drv, REG_RBIF_IRQ_EN(0));  
+}  
+  
+static void cpr_corner_restore(struct cpr_drv *drv, struct corner *corner)  
+{  
+u32 gcnt, ctl, irq, ro_sel, step_quot;  
+struct fuse_corner *fuse = corner->fuse_corner;  
+int i;  
+  
+ro_sel = fuse->ring_osc_idx;  
+gcnt = drv->gcnt;  
+gcnt |= fuse->quot - corner->quot_adjust;  
+}
/* Program the step quotient and idle clocks */
step_quot = drv->idle_clocks << RBCPR_STEP_QUOT_IDLE_CLK_SHIFT;
step_quot |= fuse->step_quot;
cpr_write(drv, REG_RBCPR_STEP_QUOT, step_quot);
+
/* Clear the target quotient value and gate count of all ROs */
for (i = 0; i < CPR_NUM_RING_OSC; i++)
cpr_write(drv, REG_RBCPR_GCNT_TARGET(i), 0);
+
cpr_write(drv, REG_RBCPR_GCNT_TARGET(ro_sel), gcnt);
+ctl = corner->save_ctl;
cpr_write(drv, REG_RBCPR_CTL, ctl);
+irq = corner->save_irq;
cpr_irq_set(drv, irq);
+dev_dbg(drv->dev, "gcnt = 0x%08x, ctl = 0x%08x, irq = 0x%08x\n", gcnt,
+ctl, irq);
+
+
static int
+cpr_mx_get(struct cpr_drv *drv, struct fuse_corner *fuse, int apc_volt)
{+
+switch (drv->vdd_mx_vmin_method) {
+case VDD_MX_VMIN_APC_CORNER_CEILING:
+return fuse->max_uV;
+case VDD_MX_VMIN_FUSE_CORNER_MAP:
+return fuse->vdd_mx_req;
+}
+
+dev_warn(drv->dev, "Failed to get mx\n");
+return 0;
+}
+
+static void cpr_set_acc(struct regmap *tcsr, struct fuse_corner *f,
+struct fuse_corner *end)
{+
+if (f < end) {
++for (f += 1; f <= end; f++)
+regmap_multi_reg_write(tcsr, f->accs, f->num_accs);
+}
+
+static int cpr_pre_voltage(struct cpr_drv *drv,
+ struct fuse_corner *fuse_corner,
+ enum voltage_change_dir dir, int vdd_mx_vmin)
+{+}
int ret = 0;
struct fuse_corner *prev_fuse_corner = drv->corner->fuse_corner;

if (drv->tcsr && dir == DOWN)
cpr_set_acc(drv->tcsr, prev_fuse_corner, fuse_corner);

if (vdd_mx_vmin && dir == UP)
ret = qcom_rpm_set_corner(drv->vdd_mx, vdd_mx_vmin);

return ret;
}

static int cpr_post_voltage(struct cpr_drv *drv, struct fuse_corner *fuse_corner, enum voltage_change_dir dir, int vdd_mx_vmin)
{
int ret = 0;
struct fuse_corner *prev_fuse_corner = drv->corner->fuse_corner;

if (drv->tcsr && dir == UP)
cpr_set_acc(drv->tcsr, prev_fuse_corner, fuse_corner);

if (vdd_mx_vmin && dir == DOWN)
ret = qcom_rpm_set_corner(drv->vdd_mx, vdd_mx_vmin);

return ret;
}

static int cpr_regulator_notifier(struct notifier_block *nb, unsigned long event, void *d)
{
struct cpr_drv *drv = container_of(nb, struct cpr_drv, reg_nb);
t32 val, mask;

switch (event) {
case REGULATOR_EVENT_VOLTAGE_CHANGE:
new_uV = (int)(uintptr_t)d;
break;
default:
return NOTIFY_OK;
}

mutex_lock(&drv->lock);

last_uV = drv->corner->last_uV;

switch (event) {


}}
goto unlock;
} else if (last_uV < new_uV) {
    /* Disable auto nack down */
    mask = RBCPR_CTL_SW_AUTO_CONT_NACK_DN_EN;
    val = 0;
} else if (last_uV > new_uV) {
    /* Restore default threshold for UP */
    mask = RBCPR_CTL_UP_THRESHOLD_MASK;
    mask <<= RBCPR_CTL_UP_THRESHOLD_SHIFT;
    val = drv->up_threshold;
    val <<= RBCPR_CTL_UP_THRESHOLD_SHIFT;
} else { /* Somehow it’s the same? */
    goto unlock;
}

cpr_ctl_modify(drv, mask, val);

/* Re-enable default interrupts */
cpr_irq_set(drv, CPR_INT_DEFAULT);

/* Ack */
cpr_irq_clr_ack(drv);

/* Save register values for the corner */
cpr_corner_save(drv, drv->corner);
drv->corner->last_uV = new_uV;
unlock:
mutex_unlock(&drv->lock);

return NOTIFY_OK;
}

static int cpr_scale(struct cpr_drv *drv, enum voltage_change_dir dir)
{
    u32 val, error_steps, reg_mask;
    int last_uV, new_uV, step_uV;
    struct corner *corner;
    
    //step_uV = regulator_get_linear_step(drv->vdd_apc);
    step_uV = 12500; /*TODO: Get step volt here */
    corner = drv->corner;
    
    val = cpr_read(drv, REG_RBCPR_RESULT_0);
    
    error_steps = val >> RBCPR_RESULT0_ERROR_STEPS_SHIFT;
    error_steps &= RBCPR_RESULT0_ERROR_STEPS_MASK;
    last_uV = corner->last_uV;
    


```c
+if (dir == UP) {
+  if (drv->clamp_timer_interval &&
+      error_steps < drv->up_threshold) {
+    /* Handle the case where another measurement started
+       after the interrupt was triggered due to a core
+       exiting from power collapse.
+    */
+    error_steps = max(drv->up_threshold,
+                      drv->vdd_apc_step_up_limit);
+  }
+
+  if (last_uV >= corner->max_uV) {
+    cpr_irq_clr_nack(drv);
+    /* Maximize the UP threshold */
+    reg_mask = RBCPR_CTL_UP_THRESHOLD_MASK;
+    reg_mask <<= RBCPR_CTL_UP_THRESHOLD_SHIFT;
+    val = reg_mask;
+    cpr_ctl_modify(drv, reg_mask, val);
+    /* Disable UP interrupt */
+    cpr_irq_set(drv, CPR_INT_DEFAULT & ~CPR_INT_UP);
+    return 0;
+  }
+
+  if (error_steps > drv->vdd_apc_step_up_limit)
+    error_steps = drv->vdd_apc_step_up_limit;
+  /* Calculate new voltage */
+  new_uV = last_uV + error_steps * step_uV;
+  new_uV = min(new_uV, corner->max_uV);
+} else if (dir == DOWN) {
+  if (drv->clamp_timer_interval
+      && error_steps < drv->down_threshold) {
+    /* Handle the case where another measurement started
+       after the interrupt was triggered due to a core
+       exiting from power collapse.
+    */
+    error_steps = max(drv->down_threshold,
+                      drv->vdd_apc_step_down_limit);
+  }
+
+  if (last_uV <= corner->min_uV) {
+    cpr_irq_clr_nack(drv);
+  }
+}
```
/* Enable auto nack down */
reg_mask = RBCPR_CTL_SW_AUTO_CONT_NACK_DN_EN;
val = RBCPR_CTL_SW_AUTO_CONT_NACK_DN_EN;
+
cpr_ctl_modify(drv, reg_mask, val);
+
/* Disable DOWN interrupt */
cpr_irq_set(drv, CPR_INT_DEFAULT & ~CPR_INT_DOWN);
+
return 0;
+
if (error_steps > drv->vdd_apc_step_down_limit)
error_steps = drv->vdd_apc_step_down_limit;
+
/* Calculate new voltage */
new_uV = last_uV - error_steps * step_uV;
new_uV = max(new_uV, corner->min_uV);
+
return new_uV;
+
static irqreturn_t cpr_irq_handler(int irq, void *dev)
+
struct cpr_drv *drv = dev;
u32 val;
int new_uV = 0;
struct corner *corner;
+
mutex_lock(&drv->lock);
+
val = cpr_read(drv, REG_RBIF_IRQ_STATUS);
if (drv->flags & FLAGS_IGNORE_1ST_IRQ_STATUS)
val = cpr_read(drv, REG_RBIF_IRQ_STATUS);
+
debug(drv->dev, "IRQ_STATUS = %#02x\n", val);
+
if (!cpr_ctl_is_enabled(drv)) {

debug(drv->dev, "CPR is disabled\n");
goto unlock;
} else if (cpr_ctl_is_busy(drv) && !drv->clamp_timer_interval) {

debug(drv->dev, "CPR measurement is not ready\n");
goto unlock;
} else if (!cpr_is_allowed(drv)) {
val = cpr_read(drv, REG_RBCPR_CTL);
err_rate_limited(drv->dev, "Interrupt broken? RBCPR_CTL = %#02x\n", val);
+
if (!cpr_ctl_is_enabled(drv)) {

debug(drv->dev, "CPR is disabled\n");
goto unlock;
} else if (!cpr_is_allowed(drv)) {
val = cpr_read(drv, REG_RBCPR_CTL);
err_rate_limited(drv->dev, "Interrupt broken? RBCPR_CTL = %#02x\n", val);
val);
+goto unlock;
+
+/* Following sequence of handling is as per each IRQ's priority */
+if (val & CPR_INT_UP) {
+new_uV = cpr_scale(drv, UP);
+} else if (val & CPR_INT_DOWN) {
+new_uV = cpr_scale(drv, DOWN);
+} else if (val & CPR_INT_MIN) {
+cpr_irq_clr_nack(drv);
+} else if (val & CPR_INT_MAX) {
+cpr_irq_clr_nack(drv);
+} else if (val & CPR_INT_MID) {
+/* RBCPR_CTL_SW_AUTO_CONT_ACK_EN is enabled */
+dev_dbg(drv->dev, "IRQ occurred for Mid Flag\n");
+} else {
+dev_dbg(drv->dev, "IRQ occurred for unknown flag (%#08x)\n",
+val);
+}
+
+/* Save register values for the corner */
+corner = drv->corner;
+cpr_corner_save(drv, corner);
+unlock:
+mutex_unlock(&drv->lock);
+
+if (new_uV)
+dev_pm_opp_adjust_voltage(drv->cpu_dev, corner->freq, new_uV);
+
+return IRQ_HANDLED;
+
+/*
+ * TODO: Register for hotplug notifier and turn on/off CPR when CPUs are offline
+ */
+static int cpr_enable(struct cpr_drv *drv)
+{
+int ret;
+
+/* Enable dependency power before vdd_apc */
+if (drv->vdd_mx) {
+ret = regulator_enable(drv->vdd_mx);
+if (ret)
+return ret;
+}
+
+ret = regulator_enable(drv->vdd_apc);
if (ret)
  return ret;
+
+mutex_lock(&drv->lock);
+//drv->vreg_enabled = true;
+if (cpr_is_allowed(drv) && drv->corner) {
  +cpr_irq_clr(drv);
  +cpr_corner_restore(drv, drv->corner);
  +cpr_ctl_enable(drv, drv->corner);
  +}
+mutex_unlock(&drv->lock);
+
+return 0;
+
+/*
+static int cpr_disable(struct cpr_drv *drv)
+{
+  int ret;
+
+  ret = regulator_disable(drv->vdd_apc);
+  if (ret)
+    return ret;
+
+  if (drv->vdd_mx)
+    ret = regulator_disable(drv->vdd_mx);
+  if (ret)
+    return ret;
+  mutex_lock(&drv->lock);
+  //drv->vreg_enabled = false;
+  if (cpr_is_allowed(drv))
+    cpr_ctl_disable(drv);
+  mutex_unlock(&drv->lock);
+  return 0;
+ }*/
+
#if defined CONFIG_PM_SLEEP
+static int cpr_suspend(struct device *dev)
+{
+  struct cpr_drv *drv = platform_get_drvdata(to_platform_device(dev));
+
+  if (cpr_is_allowed(drv)) {
+    mutex_lock(&drv->lock);
+    cpr_irq_disable(drv);
+  }
+  mutex_lock(&drv->lock);
+  //drv->vreg_enabled = false;
+  if (cpr_is_allowed(drv))
+    cpr_ctl_disable(drv);
+  mutex_unlock(&drv->lock);
+  return 0;
+}
+drv->suspended = true;
+mutex_unlock(&drv->lock);
+
+return 0;
+
+static int cpr_resume(struct device *dev)
+
+{  
+    struct cpr_drv *drv = platform_get_drvdata(to_platform_device(dev));
+    
+    if (cpr_is_allowed(drv)) {
+        mutex_lock(&drv->lock);
+        drv->suspended = false;
+        cpr_irq_clr(drv);
+        cpr_ctl_enable(drv, drv->corner);
+        mutex_unlock(&drv->lock);
+    }
+    
+    return 0;
+
+#endif
+
+static SIMPLE_DEV_PM_OPS(cpr_pm_ops, cpr_suspend, cpr_resume);
+
+static int cpr_config(struct cpr_drv *drv)
+
+{  
+    int i;
+    u32 val, gcnt;
+    struct corner *corner;
+    
+    /* Disable interrupt and CPR */
+    cpr_write(drv, REG_RBIF_IRQ_EN(0), 0);
+    cpr_write(drv, REG_RBCPR_CTL, 0);
+    
+    /* Program the default HW Ceiling, Floor and vlevel */
+    val = RBIF_LIMIT_CEILING_DEFAULT << RBIF_LIMIT_CEILING_SHIFT;
+    val |= RBIF_LIMIT_FLOOR_DEFAULT;
+    cpr_write(drv, REG_RBIF_LIMIT, val);
+    cpr_write(drv, REG_RBIF_SW_VLEVEL, RBIF_SW_VLEVEL_DEFAULT);
+    
+    /* Clear the target quotient value and gate count of all ROs */
+    for (i = 0; i < CPR_NUM_RING_OSC; i++)
+        cpr_write(drv, REG_RBCPR_GCNT_TARGET(i), 0);
+    
+    /* Init and save gcnt */
+    gcnt = (drv->ref_clk_khz * drv->gcnt_us) / 1000;
+    gcnt = gcnt & RBCPR_GCNT_TARGET_GCNT_MASK;
+gcnt <<= RBCPR_GCNT_TARGET_GCNT_SHIFT;
+drv->gcnt = gcnt;
+
+/*! Program the delay count for the timer */
+val = (drv->ref_clk_khz * drv->timer_delay_us) / 1000;
+cpr_write(drv, REG_RBCPR_TIMER_INTERVAL, val);
+dev_dbg(drv->dev, "Timer count: 0x%0x (for %d us)\n", val,
+drv->timer_delay_us);
+
+/*! Program Consecutive Up & Down */
+val = drv->timer_cons_down << RBIF_TIMER_ADJCONS_DOWN_SHIFT;
+val |= drv->timer_cons_up << RBIF_TIMER_ADJCONS_UP_SHIFT;
+val |= clamp_timer_interval << RBIF_TIMER_ADJ_CLAMP_INT_SHIFT;
+cpr_write(drv, REG_RBIF_TIMER_ADJUST, val);
+
+/*! Program the control register */
+val = drv->up_threshold << RBCPR_CTL_UP_THRESHOLD_SHIFT;
+val |= drv->down_threshold << RBCPR_CTL_DN_THRESHOLD_SHIFT;
+val |= RBCPR_CTL_TIMER_EN | RBCPR_CTL_COUNT_MODE;
+cpr_write(drv, REG_RBCPR_CTL, val);
+
+for (i = 0; i < drv->num_corners; i++) {
+corner = &drv->corners[i];
+corner->save_ctl = val;
+corner->save_irq = CPR_INT_DEFAULT;
+}
+
cpr_irq_set(drv, CPR_INT_DEFAULT);
+
+val = cpr_read(drv, REG_RBCPR_VERSION);
+if (val <= RBCPR_VER_2)
+drv->flags |= FLAGS_IGNORE_1ST_IRQ_STATUS;
+
+return 0;
+}
+
+/*! Called twice for each CPU in policy, one pre and one post event */
+static int
+cpr_cpufreq_notifier(struct notifier_block *nb, unsigned long event, void *f)
+{
+struct cpr_drv *drv = container_of(nb, struct cpr_drv, cpufreq_nb);
+struct cpufreq_freqs *freqs = f;
+unsigned long old = freqs->old * 1000;
+unsigned long new = freqs->new * 1000;
+struct corner *corner, *end;
+enum voltage_change_dir dir;
+int ret = 0, new_uV;
int vdd_mx_vmin = 0;
struct fuse_corner *fuse_corner;

/* Determine direction */
if (old > new)
    dir = DOWN;
else if (old < new)
    dir = UP;
else
    dir = NO_CHANGE;

/* Determine new corner we're going to */
corner = drv->corners;
end = &corner[drv->num_corners - 1];
for (; corner <= end; corner++)
    if (corner->freq == new)
        break;

if (corner > end)
    return -EINVAL;

fuse_corner = corner->fuse_corner;

if (cpr_is_allowed(drv)) {
    new_uV = corner->last_uV;
} else {
    new_uV = corner->uV;
}

if (dir != NO_CHANGE && drv->vdd_mx)
    vdd_mx_vmin = cpr_mx_get(drv, fuse_corner, new_uV);

mutex_lock(&drv->lock);
if (event == CPUFREQ_PRECHANGE) {
    if (drv->nb_count++)
        goto unlock;
    if (cpr_is_allowed(drv))
        cpr_ctl_disable(drv);
    ret = cpr_pre_voltage(drv, fuse_corner, dir, vdd_mx_vmin);
    if (ret)
        goto unlock;
    drv->switching_opp = true;
}

if (event == CPUFREQ_POSTCHANGE) {

if (--drv->nb_count)
+ goto unlock;
+
+ ret = cpr_post_voltage(drv, fuse_corner, dir, vdd_mx_vmin);
+ if (ret)
+ goto unlock;
+
+ if (cpr_is_allowed(drv) /* && drv->vreg_enabled */) {
+ cpr_irq_clr(drv);
+ if (drv->corner != corner)
+ cpr_corner_restore(drv, corner);
+ cpr_ctl_enable(drv, corner);
+ }
+
+ drv->corner = corner;
+ drv->switching_opp = false;
+ }
+ unlock:
+ mutex_unlock(&drv->lock);
+
+ return ret;
+ }
+
+ static u32 cpr_read_efuse(void __iomem *prom, const struct qfprom_offset *efuse)
+ {
+ u64 buffer = 0;
+ u8 val;
+ int i, num_bytes;
+ 
+ num_bytes = DIV_ROUND_UP(efuse->width + efuse->shift, BITS_PERBYTE);
+ 
+ for (i = 0; i < num_bytes; i++) {
+ val = readb_relaxed(prom + efuse->offset + i);
+ buffer |= val << (i * BITS_PERBYTE);
+ }
+ 
+ buffer >>= efuse->shift;
+ buffer &= BIT(efuse->width) - 1;
+
+ return buffer;
+ }
+
+ static void
+ cpr_populate_ring_osc_idx(const struct cpr_fuse *fuses, struct cpr_drv *drv,
+ void __iomem *prom)
+ {
+ struct fuse_corner *fuse = drv->fuse_corners;
+ struct fuse_corner *end = fuse + drv->num_fuse_corners;
for (; fuse < end; fuse++, fuses++)
        fuse->ring_osc_idx = cpr_read_efuse(prom, &fuses->ring_osc);
    }

static const struct corner_adjustment *cpr_find_adjustment(u32 speed_bin,
        u32 pvs_version, u32 cpr_rev, const struct cpr_desc *desc,
        const struct cpr_drv *drv)
{
    int i, j;
    u32 val, ro;
    struct corner_adjustment *a;
    for (i = 0; i < desc->num_adjustments; i++) {
        a = &desc->adjustments[i];
        if (a->speed_bin != speed_bin &&
            a->speed_bin != FUSE_PARAM_MATCH_ANY)
            continue;
        if (a->pvs_version != pvs_version &&
            a->pvs_version != FUSE_PARAM_MATCH_ANY)
            continue;
        if (a->cpr_rev != cpr_rev &&
            a->cpr_rev != FUSE_PARAM_MATCH_ANY)
            continue;
        for (j = 0; j < drv->num_fuse_corners; j++) {
            val = a->ring_osc_idx[j];
            ro = drv->fuse_corners[j].ring_osc_idx;
            if (val != ro && val != FUSE_PARAM_MATCH_ANY)
                break;
        }
        if (j == drv->num_fuse_corners)
            return a;
    }
    return NULL;
}

static const int *cpr_get_pvs_uV(const struct cpr_desc *desc,
        struct nvmem_device *qfprom)
{
    const struct qfprom_offset *pvs_efuse;
    const struct qfprom_offset *redun;
    unsigned int idx = 0;
    u8 expected;
    u32 bin;
    }
redun = &desc->pvs_fuses->redundant;
expected = desc->pvs_fuses->redundant_value;
if (redun->width)
idx = !!(cpr_read_efuse(qfprom, redun) == expected);
	pvs_efuse = &desc->pvs_fuses->pvs_fuse[idx];
bin = cpr_read_efuse(qfprom, pvs_efuse);

return desc->pvs_fuses->pvs_bins[bin].uV;
}

static int cpr_read_fuse_uV(const struct cpr_desc *desc,
		const struct fuse_corner_data *fdata,
		const struct qfprom_offset *init_v_efuse,
		struct nvmem_device *qfprom, int step_volt)
{
int step_size_uV, steps, uV;

bits = cpr_read_efuse(qfprom, init_v_efuse);
steps = bits & ~BIT(init_v_efuse->width - 1);

/* Not two's complement.. instead highest bit is sign bit */
if (bits & BIT(init_v_efuse->width - 1))
steps = -steps;

step_size_uV = desc->cpr_fuses.init_voltage_step;

uV = fdata->ref_uV + steps * step_size_uV;
return DIV_ROUND_UP(uV, step_volt) * step_volt;
}

static void cpr_fuse_corner_init(struct cpr_drv *drv,
		const struct cpr_desc *desc,
		void __iomem *qfprom,
		const struct cpr_fuse *fuses, u32 speed,
		const struct corner_adjustment *adjustments,
		const struct acc_desc *acc_desc)
{
int i;

unsigned int step_volt;
const struct fuse_corner_data *fdata;
const struct fuse_corner *fuse, *prev;
const struct qfprom_offset *redun;
const struct fuse_conditional_min_volt *min_v;
const struct fuse_uplift_wa *up;
bool do_min_v = false, do_uplift = false;
const int *pvs_uV = NULL;
const int *adj_min;
+int uV, diff;
+u32 min_uV;
+u8 expected;
+const struct reg_sequence *accs;
+
+redun = &acc_desc->override;
+expected = acc_desc->override_value;
+if (redun->width && cpr_read_efuse(qfprom, redun) == expected)
+accs = acc_desc->override_settings;
+else
+accs = acc_desc->settings;
+
+/* Figure out if we should apply workarounds */
+min_v = desc->min_volt_fuse;
+do_min_v = min_v &&
+  cpr_read_efuse(qfprom, &min_v->redundant) == min_v->expected;
+if (do_min_v)
+min_uV = min_v->min_uV;
+
+up = desc->uplift_wa;
+if (!do_min_v && up)
+  if (cpr_read_efuse(qfprom, &up->redundant) == up->expected)
+    do_uplift = up->speed_bin == speed;
+
+/*
+ * The initial voltage for each fuse corner may be determined by one of
+ * two ways. Either initial voltages are encoded for each fuse corner
+ * in a dedicated fuse per fuse corner (fuses::init_voltage), or we
+ * use the PVS bin fuse to use a table of initial voltages (pvs_uV).
+ */
+if (fuses->init_voltage.width)
+  //step_volt = regulator_get_linear_step(drv->vdd_apc);
+  step_volt = 12500; /* TODO: Replace with ^ when apc_reg ready */
+else
+pvs_uV = cpr_get_pvs_uV(desc, qfprom);
+
+/* Populate fuse_corner members */
+adj_min = adjustments->fuse_quot_min;
+fuse = drv->fuse_corners;
+end = &fuse[drv->num_fuse_corners - 1];
+fdata = desc->cpr_fuses.fuse_corner_data;
+
+for (i = 0, prev = NULL; fuse <= end; fuse++, fuses++, i++, fdata++) {
+
+/* Populate uV */
+if (pvs_uV)
+uV = pvs_uV[i];
+else
+uV = cpr_read_fuse_uV(desc, fdata, &fuses->init_voltage,
    + qfprom, step_volt);
+
+if (adjustments->fuse_init_uV)
+uV += adjustments->fuse_init_uV[i];
+
+fuse->min_uV = fdata->min_uV;
+fuse->max_uV = fdata->max_uV;
+
+if (do_min_v) {
+if (fuse->max_uV < min_uV) {
+fuse->max_uV = min_uV;
+fuse->min_uV = min_uV;
+} else if (fuse->min_uV < min_uV) {
+fuse->min_uV = min_uV;
+}
+}
+
+fuse->uV = clamp(uV, fuse->min_uV, fuse->max_uV);
+
+if (fuse == end) {
+if (do_uplift) {
+end->uV += up->uV;
+end->uV = clamp(end->uV, 0, up->max_uV);
+}
+'/'+
+ * Allow the highest fuse corner’s PVS voltage to
+ * define the ceiling voltage for that corner in order
+ * to support SoC’s in which variable ceiling values
+ * are required.
+ */
+end->max_uV = max(end->max_uV, end->uV);
+}
+
+'/'+ Populate target quotient by scaling */
+fuse->quot = cpr_read_efuse(qfprom, &fuses->quotient);
+fuse->quot *= fdata->quot_scale;
+fuse->quot += fdata->quot_offset;
+
+if (adjustments->fuse_quot) {
+fuse->quot += adjustments->fuse_quot[i];
+
+if (prev && adjustments->fuse_quot_diff) {
+diff = adjustments->fuse_quot_diff[i];
+if (fuse->quot - prev->quot <= diff)
+fuse->quot = prev->quot + adj_min[i];
+}
+prev = fuse;
+} 
+
+if (do_uplift)
+  fuse->quot += up->quot[i];
+
+  fuse->step_quot = desc->step_quot[fuse->ring_osc_idx];
+
+  /* Populate acc settings */
+  fuse->accs = accs;
+  fuse->num_accs = acc_desc->num_regs_per_fuse;
+  accs += acc_desc->num_regs_per_fuse;
+
+  /* Populate MX request */
+  fuse->vdd_mx_req = fdata->vdd_mx_req;
+}
+
+/*
+ * Restrict all fuse corner PVS voltages based upon per corner
+ * ceiling and floor voltages.
+ */
+for (fuse = drv->fuse_corners, i = 0; fuse <= end; fuse++, i++) {
+  if (fuse->uV > fuse->max_uV)
+    fuse->uV = fuse->max_uV;
+  else if (fuse->uV < fuse->min_uV)
+    fuse->uV = fuse->min_uV;
+  dev_dbg(drv->dev, 
+    "fuse corner %d: [%d %d %d] RO%d quot %d squot %d\n",
+    i, fuse->min_uV, fuse->uV, fuse->max_uV, 
+    fuse->ring_osc_idx, fuse->quot, fuse->step_quot);
+}
+
+static struct device *cpr_get_cpu_device(struct device_node *of_node, int index)
+{
+  struct device_node *np;
+  int cpu;
+
+  np = of_parse_phandle(of_node, "qcom,cpr-cpus", index);
+  if (!np)
+    return NULL;
+
+  for_each_possible_cpu(cpu)
+    if (arch_find_n_match_cpu_physical_id(np, cpu, NULL))
+      break;
+  of_node_put(np);
+  if (cpu >= nr_cpu_ids)
```c
+return NULL;
+
+return get_cpu_device(cpu);
+
+*/
+ * Get the clock and regulator for the first CPU so we can update OPPs,
+ * listen in on regulator voltage change events, and figure out the
+ * boot OPP based on clock frequency.
+ */
+
+static int
cpr_get_cpu_resources(struct cpr_drv *drv, struct device_node *of_node)
+
+{ struct device *cpu_dev;
+
+cpu_dev = cpr_get_cpu_device(of_node, 0);
+if (!cpu_dev)
+ return -EINVAL;
+
+drv->cpu_dev = cpu_dev;
+drv->vdd_apc = devm_regulator_get(cpu_dev, "cpu");
+if (IS_ERR(drv->vdd_apc))
+ return PTR_ERR(drv->vdd_apc);
+drv->cpu_clk = devm_clk_get(cpu_dev, NULL);
+return PTR_ERR_OR_ZERO(drv->cpu_clk);
+
+static int cpr_populate_opps(struct device_node *of_node, struct cpr_drv *drv,
+ const struct corner_data **plan)
+{ int j, ret;
+ struct device *cpu_dev;
+ struct corner *corner;
+ const struct corner_data *p;
+
+cpu_dev = get_cpu_device(0);
+for (j = 0, corner = drv->corners; plan[j]; j++, corner++) {
+ p = plan[j];
+ ret = dev_pm_opp_add(cpu_dev, p->freq, corner->uV);
+ if (ret)
+ return ret;
+}
+
+return 0;
+
+static const struct corner_data **
+find_freq_plan(const struct cpr_desc *desc, u32 speed_bin, u32 pvs_version)
+
+int i;
+const struct freq_plan *p;
+
+for (i = 0; i < desc->num_freq_plans; i++) {
+p = &desc->freq_plans[i];
+
+if (p->speed_bin != speed_bin &&
+    p->speed_bin != FUSE_PARAM_MATCH_ANY)
+    continue;
+
+    if (p->pvs_version != pvs_version &&
+        p->pvs_version != FUSE_PARAM_MATCH_ANY)
+        continue;
+
+    return p->plan;
+}
+
+return NULL;
+
+
+static struct corner_override *find_corner_override(const struct cpr_desc *desc,
+    u32 speed_bin, u32 pvs_version)
+
+int i;
+struct corner_override *o;
+
+for (i = 0; i < desc->num_corner_overrides; i++) {
+o = &desc->corner_overrides[i];
+
+if (o->speed_bin != speed_bin &&
+    o->speed_bin != FUSE_PARAM_MATCH_ANY)
+    continue;
+
+    if (o->pvs_version != pvs_version &&
+        o->pvs_version != FUSE_PARAM_MATCH_ANY)
+        continue;
+
+    return o;
+}
+
+return NULL;
+
+
+static int cpr_calculate_scaling(const struct qfprom_offset *quot_offset,
+    struct nvmem_device *qfprom,
+    const struct fuse_corner_data *fdata,
+    int adj_quot_offset,
const struct corner *corner) {
  int quot_diff;
  unsigned long freq_diff;
  int scaling;
  const struct fuse_corner *fuse, *prev_fuse;

  fuse = corner->fuse_corner;
  prev_fuse = fuse - 1;

  if (quot_offset->width) {
    quot_diff = cpr_read_efuse(qfprom, quot_offset);
    quot_diff *= fdata->quot_scale;
    quot_diff += adj_quot_offset;
  } else {
    quot_diff = fuse->quot - prev_fuse->quot;
  }

  freq_diff = fuse->max_freq - prev_fuse->max_freq;
  freq_diff /= 1000000; /* Convert to MHz */
  scaling = 1000 * quot_diff / freq_diff;
  return min(scaling, fdata->max_quot_scale);
}

static int cpr_interpolate(const struct corner *corner, int step_volt, const struct fuse_corner_data *fdata) {
  unsigned long f_high, f_low, f_diff;
  int uV_high, uV_low, uV;
  u64 temp, temp_limit;
  const struct fuse_corner *fuse, *prev_fuse;

  fuse = corner->fuse_corner;
  prev_fuse = fuse - 1;

  f_high = fuse->max_freq;
  f_low = prev_fuse->max_freq;
  uV_high = fuse->uV;
  uV_low = prev_fuse->uV;
  f_diff = fuse->max_freq - corner->freq;

  /*
   * Don't interpolate in the wrong direction. This could happen
   * if the adjusted fuse voltage overlaps with the previous fuse's
   * adjusted voltage.
   * */
  if (f_high <= f_low || uV_high <= uV_low || f_high <= corner->freq)
    return corner->uV;
```c
+ temp = f_diff * (uV_high - uV_low);
+ do_div(temp, f_high - f_low);
+ /*
+ * max_volt_scale has units of uV/MHz while freq values
+ * have units of Hz. Divide by 1000000 to convert to.
+ */
+ temp_limit = f_diff * fdata->max_volt_scale;
+ do_div(temp_limit, 1000000);
+ 
+ uV = uV_high - min(temp, temp_limit);
+ return roundup(uV, step_volt);
+ }
+
+ static void cpr_corner_init(struct cpr_drv *drv, const struct cpr_desc *desc,
+ const struct cpr_fuse *fuses, u32 speed_bin,
+ u32 pvs_version, void __iomem *qfprom,
+ const struct corner_adjustment *adjustments,
+ const struct corner_data **plan)
+ { 
+ int i, fnum, scaling;
+ const struct qfprom_offset *quot_offset;
+ struct fuse_corner *fuse, *prev_fuse;
+ struct corner *corner, *end;
+ const struct corner_data *cdata, *p;
+ const struct fuse_corner_data *fdata;
+ bool apply_scaling;
+ const int *adj_quot_offset;
+ unsigned long freq_corner, freq_diff, freq_diff_mhz;
+ int step_volt = 12500; /* TODO: Get from regulator APIs */
+ const struct corner_override *override;
+ 
+ corner = drv->corners;
+ end = &corner[drv->num_corners - 1];
+ cdata = desc->corner_data;
+ adj_quot_offset = adjustments->fuse_quot_offset;
+ 
+ override = find_corner_override(desc, speed_bin, pvs_version);
+ 
+ /*
+ * Store maximum frequency for each fuse corner based on the frequency
+ * plan
+ */
+ for (i = 0; plan[i]; i++) {
+ p = plan[i];
+ freq_corner = p->freq;
+ fnum = p->fuse_corner;
```
+\texttt{fuse} = \&\texttt{drv->fuse_corners}[fnum];
+if (\texttt{freq\_corner} > \texttt{fuse->max\_freq})
+\texttt{fuse->max\_freq} = \texttt{freq\_corner};
+
+
+/*
+ * Get the quotient adjustment scaling factor, according to:
+ * scaling = min(1000 * (QUOT(corner\_N) - QUOT(corner\_N-1))
+ * / (freq(corner\_N) - freq(corner\_N-1)), max\_factor)
+ *
+ * QUOT(corner\_N): quotient read from fuse for fuse corner N
+ * QUOT(corner\_N-1): quotient read from fuse for fuse corner (N - 1)
+ * freq(corner\_N): max frequency in MHz supported by fuse corner N
+ * freq(corner\_N-1): max frequency in MHz supported by fuse corner
+ * (N - 1)
+ *
+ * Then walk through the corners mapped to each fuse corner
+ * and calculate the quotient adjustment for each one using the
+ * following formula:
+ *
+ * \texttt{quot\_adjust} = (\texttt{freq\_max} - \texttt{freq\_corner}) * \texttt{scaling} / 1000
+ *
+ * freq\_max: max frequency in MHz supported by the fuse corner
+ * freq\_corner: frequency in MHz corresponding to the corner
+ * scaling: calculated from above equation
+ *
+ *
+ * + +
+ * | v |
+ * q | fc o | fc
+ * u | c 1 | c
+ * o | f t | f
+ * t | c a | c
+ * | cf g | cf
+ * | e |
+ * +------------------------ +------------------------
+ * 0 1 2 3 4 5 6 0 1 2 3 4 5 6
+ * corner corner
+ *
+ * c = corner
+ * f = fuse corner
+ *
+ */
+for (\texttt{apply\_scaling} = false, i = 0; corner \leq end; corner++, i++) {
+\texttt{fnum} = \texttt{cdata[i].fuse\_corner};
+\texttt{fdata} = \&\texttt{desc->cpr\_fuses.fuse\_corner\_data}[fnum];
}
+quot_offset = &fuses[fnum].quotient_offset;
+fuse = &drv->fuse_corners[fnum];
+if (fnum)
+prev_fuse = &drv->fuse_corners[fnum - 1];
+else
+prev_fuse = NULL;
+
+corner->fuse_corner = fuse;
+corner->freq = cdata[i].freq;
+corner->uV = fuse->uV;
+
+if (prev_fuse && cdata[i - 1].freq == prev_fuse->max_freq) {
+scaling = cpr_calculate_scaling(quot_offset, qfprom,
+fdata, adj_quot_offset ?
+adj_quot_offset[fnum] : 0,
+corner);
+apply_scaling = true;
+} else if (corner->freq == fuse->max_freq) {
+/* This is a fuse corner; don't scale anything */
+apply_scaling = false;
+}
+
+if (apply_scaling) {
+freq_diff = fuse->max_freq - corner->freq;
+freq_diff_mhz = freq_diff / 1000000;
+corner->quot_adjust = scaling * freq_diff_mhz / 1000;
+
+corner->uV = cpr_interpolate(corner, step_volt, fdata);
+}
+
+if (adjustments->fuse_quot)
+corner->quot_adjust -= adjustments->fuse_quot[i];
+
+if (adjustments->init_uV)
+corner->uV += adjustments->init_uV[i];
+
+/* Load per corner ceiling and floor voltages if they exist. */
+if (override) {
+corner->max_uV = override->max_uV[i];
+corner->min_uV = override->min_uV[i];
+} else {
+corner->max_uV = fuse->max_uV;
+corner->min_uV = fuse->min_uV;
+}
+
+corner->uV = clamp(corner->uV, corner->min_uV, corner->max_uV);
+corner->last_uV = corner->uV;
+
/* Reduce the ceiling voltage if needed */
+if (desc->reduce_to_corner_uV && corner->uV < corner->max_uV)
+corner->max_uV = corner->uV;
+else if (desc->reduce_to_fuse_uV && fuse->uV < corner->max_uV)
+corner->max_uV = max(corner->min_uV, fuse->uV);
+
+dev_dbg(drv->dev, "corner %d: [%d %d %d] quot %d\n", i,
+ corner->min_uV, corner->uV, corner->max_uV,
+ fuse->quot - corner->quot_adjust);
+
+static const struct cpr_fuse *
cpr_get_fuses(const struct cpr_desc *desc, void __iomem *qfprom)
+{
+u32 expected = desc->cpr_fuses.redundant_value;
+const struct qfprom_offset *fuse = &desc->cpr_fuses.redundant;
+unsigned int idx;
+
+idx = !!(fuse->width && cpr_read_efuse(qfprom, fuse) == expected);
+
+return &desc->cpr_fuses.cpr_fuse[idx * desc->num_fuse_corners];
+}
+
+static bool cpr_is_close_loop_disabled(struct cpr_drv *drv,
+const struct cpr_desc *desc, void __iomem *qfprom,
+const struct cpr_fuse *fuses,
+const struct corner_adjustment *adj)
+{
+const struct qfprom_offset *disable;
+unsigned int idx;
+struct fuse_corner *highest_fuse, *second_highest_fuse;
+int min_diff_quot, diff_quot;
+
+if (adj->disable_closed_loop)
+return true;
+
+if (!desc->cpr_fuses.disable)
+return false;
+
+/*
+ * Are the fuses the redundant ones? This avoids reading the fuse
+ * redundant bit again
+ */
+idx = !!(fuses == desc->cpr_fuses.cpr_fuse);
+disable = &desc->cpr_fuses.disable[idx];
+
+if (cpr_read_efuse(qfprom, disable))
+return true;
+
+if (!fuses->quotient_offset.width) {
+  /*
+   * Check if the target quotients for the highest two fuse
+   * corners are too close together.
+   */
+highest_fuse = &drv->fuse_corners[drv->num_fuse_corners - 1];
+second_highest_fuse = highest_fuse - 1;
+
+  min_diff_quot = desc->min_diff_quot;
+  diff_quot = highest_fuse->quot - second_highest_fuse->quot;
+
+  return diff_quot < min_diff_quot;
+}
+
+return false;
+}
+
+static int cpr_init_parameters(struct platform_device *pdev,
+    struct cpr_drv *drv)
+{
+  struct device_node *of_node = pdev->dev.of_node;
+  int ret;
+
+  ret = of_property_read_u32(of_node, "qcom,cpr-ref-clk",
+    &drv->ref_clk_khz);
+  if (ret)
+    return ret;
+
+  ret = of_property_read_u32(of_node, "qcom,cpr-timer-delay-us",
+    &drv->timer_delay_us);
+  if (ret)
+    return ret;
+
+  ret = of_property_read_u32(of_node, "qcom,cpr-timer-cons-up",
+    &drv->timer_cons_up);
+  if (ret)
+    return ret;
+
+  ret = of_property_read_u32(of_node, "qcom,cpr-timer-cons-down",
+    &drv->timer_cons_down);
+  if (ret)
+    return ret;
+
+  drv->timer_cons_down &= RBIF_TIMER_ADJ_CONS_DOWN_MASK;
+
+  ret = of_property_read_u32(of_node, "qcom,cpr-up-threshold",
+    &drv->up_threshold);
+  if (ret)
+    return ret;
+
+  drv->up_threshold &= RBCPR_CTL_UP_THRESHOLD_MASK;
+  return ret;
+ret = of_property_read_u32(of_node, "qcom.cpr-down-threshold", 
+ &drv->down_threshold);
+drv->down_threshold &= RBCPR_CTL_DN_THRESHOLD_MASK;
+if (ret)
+return ret;
+
+ret = of_property_read_u32(of_node, "qcom.cpr-idle-clocks", 
+ &drv->idle_clocks);
+drv->idle_clocks &= RBCPR_STEP_QUOT_IDLE_CLK_MASK;
+if (ret)
+return ret;
+
+ret = of_property_read_u32(of_node, "qcom.cpr-gcnt-us", &drv->gcnt_us);
+if (ret)
+return ret;
+
+ret = of_property_read_u32(of_node, "qcom.vdd-apc-step-up-limit", 
+ &drv->vdd_apc_step_up_limit);
+if (ret)
+return ret;
+
+ret = of_property_read_u32(of_node, "qcom.vdd-apc-step-down-limit", 
+ &drv->vdd_apc_step_down_limit);
+if (ret)
+return ret;
+
+ret = of_property_read_u32(of_node, "qcom.cpr-clamp-timer-interval", 
+ &drv->clamp_timer_interval);
+if (ret && ret != -EINVAL)
+return ret;
+
+drv->clamp_timer_interval = min_t(unsigned int, 
+ drv->clamp_timer_interval, 
+ RBIF_TIMER_ADJ_CLAMP_INT_MASK);
+
+dev_dbg(drv->dev, "up threshold = %u, down threshold = %u\n", 
+ drv->up_threshold, drv->down_threshold);
+
+return 0;
+}
+
+static int cpr_init_and_enable_corner(struct cpr_drv *drv)
+{
+unsigned long rate;
+const struct corner *end;
+
+end = &drv->corners[drv->num_corners - 1];
+rate = clk_get_rate(drv->cpu_clk);
for (drv->corner = drv->corners; drv->corner <= end; drv->corner++)
+if (drv->corner->freq == rate)
+break;
+
+if (drv->corner > end)
+return -EINVAL;
+
+return cpr_enable(drv);
+
+static struct corner_data msm8916_corner_data[] = {
+  /* [corner] -> { fuse corner, freq } */
+  { 0,  200000000 },
+  { 0,  400000000 },
+  { 1,  533330000 },
+  { 1,  800000000 },
+  { 2,  998400000 },
+  { 2, 1094400000 },
+  { 2, 1152000000 },
+  { 2, 1209600000 },
+  { 2, 1363200000 },
+};
+
+static const struct cpr_desc msm8916_desc = {
+  .num_fuse_corners = 3,
+  .vdd_mx_vmin_method = VDD_MX_VMIN_FUSE_CORNER_MAP,
+  .min_diff_quot = CPR_FUSE_MIN_QUOT_DIFF,
+  .step_quot = (int []){ 26, 26, 26, 26, 26, 26, 26, 26 },
+  .cpr_fuses = {
+    .init_voltage_step = 10000,
+    .fuse_corner_data = (struct fuse_corner_data[]){
+      /* ref_uV max_uV min_uV max_q q_off q_scl v_scl mx */
+      { 1050000, 1050000, 1050000, 0, 0, 1, 0, 3 },
+      { 1150000, 1150000, 1050000, 0, 0, 1, 0, 4 },
+      { 1350000, 1350000, 1162500, 650, 0, 1, 0, 6 },
+    },
+    .cpr_fuse = (struct cpr_fuse[]){
+      .
+      .ring_osc = { 222, 3, 6},
+      .init_voltage = { 220, 6, 2 },
+      .quotient = { 221, 12, 2 },
+    },
+    .
+    .ring_osc = { 222, 3, 6},
+    .init_voltage = { 218, 6, 2 },
+    .quotient = { 219, 12, 0 },
+  },
+  .
+  .
+.ring_osc = { 222, 3, 6 },
+.init_voltage = { 216, 6, 0 },
+.quotient = { 216, 12, 6 },
+},
+.disable = &(struct qfprom_offset){ 223, 1, 1 },
+},
+.speed_bin = { 12, 3, 2 },
+.pvs_version = { 6, 2, 7 },
+.corner_data = msm8916_corner_data,
+.num_corners = ARRAY_SIZE(msm8916_corner_data),
+.num_freq_plans = 3,
+.freq_plans = (struct freq_plan[]){
+{
+.speed_bin = 0,
+.pvs_version = 0,
+.plan = (const struct corner_data* []){
+msm8916_corner_data + 0,
+msm8916_corner_data + 1,
+msm8916_corner_data + 2,
+msm8916_corner_data + 3,
+msm8916_corner_data + 4,
+msm8916_corner_data + 5,
+msm8916_corner_data + 6,
+msm8916_corner_data + 7,
+NULL
+},
+},
+{
+.speed_bin = 0,
+.pvs_version = 1,
+.plan = (const struct corner_data* []){
+msm8916_corner_data + 0,
+msm8916_corner_data + 1,
+msm8916_corner_data + 2,
+msm8916_corner_data + 3,
+msm8916_corner_data + 4,
+msm8916_corner_data + 5,
+msm8916_corner_data + 6,
+msm8916_corner_data + 7,
+NULL
+},
+},
+{
+.speed_bin = 2,
+.pvs_version = 0,
+.plan = (const struct corner_data* []){
+msm8916_corner_data + 0,
static const struct acc_desc msm8916_acc_desc = {
    .settings = (struct reg_sequence[]){
        { 0xf000, 0 },
        { 0xf000, 0x100 },
        { 0xf000, 0x101 }
    },
    .override_settings = (struct reg_sequence[]){
        { 0xf000, 0 },
        { 0xf000, 0x100 },
        { 0xf000, 0x100 }
    },
    .num_regs_per_fuse = 1,
    .override = { 6, 1, 4 },
    .override_value = 1,
};

static const struct of_device_id acc_descs[] = {
    { .compatible = "qcom,tcsr-msm8916", .data = &msm8916_acc_desc },
};
+const struct corner_data **plan;
+size_t len;
+int irq, ret;
+const struct cpr_desc *desc;
+const struct acc_desc *acc_desc;
+const struct of_device_id *match;
+struct device_node *np;
+void __iomem *qfprom;
+u32 cpr_rev = FUSE_REVISION_UNKNOWN;
+u32 speed_bin = SPEED_BIN_NONE;
+u32 pvs_version = 0;
+struct platform_device *cpufreq_dt_pdev;
+
+np = of_parse_phandle(dev->of_node, "eeprom", 0);
+if (!np)
+return -ENODEV;
+
+match = of_match_node(cpr_descs, np);
+of_node_put(np);
+if (!match)
+return -EINVAL;
	desc = match->data;
+
+/* TODO: Get from eeprom API */
+qfprom = devm_ioremap(dev, 0x58000, 0x7000);
+if (!qfprom)
+return -ENOMEM;
+
+len = sizeof(*drv) +
+sizeof(*drv->fuse_corners) * desc->num_fuse_corners +
+sizeof(*drv->corners) * desc->num_corners;
+
+drv = devm_kzalloc(dev, len, GFP_KERNEL);
+if (!drv)
+return -ENOMEM;
+drv->dev = dev;
+
+np = of_parse_phandle(dev->of_node, "acc-syscon", 0);
+if (!np)
+return -ENODEV;
+
+match = of_match_node(acc_descs, np);
+if (!match) {
+of_node_put(np);
+return -EINVAL;
+}
+
+acc_desc = match->data;
+drv->tcsr = syscon_node_to_regmap(np);
+of_node_put(np);
+if (IS_ERR(drv->tcsr))
+return PTR_ERR(drv->tcsr);
+
+drv->num_fuse_corners = desc->num_fuse_corners;
+drv->num_corners = desc->num_corners;
+drv->fuse_corners = (struct fuse_corner *) (drv + 1);
+drv->corners = (struct corner *) (drv->fuse_corners +
+drv->num_fuse_corners);
+mutex_init(&drv->lock);
+
+res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
+drv->base = devm_ioremap_resource(&pdev->dev, res);
+if (IS_ERR(drv->base))
+return PTR_ERR(drv->base);
+
+irq = platform_get_irq(pdev, 0);
+if (irq < 0)
+return -EINVAL;
+
+ret = cpr_get_cpu_resources(drv, dev->of_node);
+if (ret)
+return ret;
+
+drv->vdd_mx = devm_regulator_get(dev, "vdd-mx");
+if (IS_ERR(drv->vdd_mx))
+return PTR_ERR(drv->vdd_mx);
+
+drv->vdd_mx_vmin_method = desc->vdd_mx_vmin_method;
+
+if (desc->fuse_revision.width)
+cpr_rev = cpr_read_efuse(qfprom, &desc->fuse_revision);
+if (desc->speed_bin.width)
+speed_bin = cpr_read_efuse(qfprom, &desc->speed_bin);
+if (desc->pvs_version.width)
+pvs_version = cpr_read_efuse(qfprom, &desc->pvs_version);
+
+plan = find_freq_plan(desc, speed_bin, pvs_version);
+if (!plan)
+return -EINVAL;
+
+cpr_fuses = cpr_get_fuses(desc, qfprom);
+cpr_populate_ring_osc_idx(cpr_fuses, drv, qfprom);
+
+adj = cpr_find_adjustment(speed_bin, pvs_version, cpr_rev, desc, drv);
+if (!adj)
+adj = &empty_adj;
+ cpr_fuse_corner_init(drv, desc, qf prom, cpr_fuses, speed_bin, adj, acc_desc);
+ cpr_corner_init(drv, desc, cpr_fuses, speed_bin, pvs_version, qf prom, adj, plan);
+ ret = cpr_populate_opps(dev->of_node, drv, plan);
+ if (ret)
+ return ret;
+ /* Register cpufreq-dt driver after the OPPs are populated */
+ cpu freq_dt_pdev = platform_device_register_simple("cpufreq-dt", -1, NULL, 0);
+ if (IS_ERR(cpu freq_dt_pdev)) {
+ ret = PTR_ERR(cpu freq_dt_pdev);
+ pr_err("%s error registering cpufreq-dt (%d)\n", __func__, ret);
+ return ret;
+ }
+ drv->loop_disabled = cpr_is_close_loop_disabled(drv, desc, qf prom,
+ cpr_fuses, adj);
+ dev_dbg(drv->dev, "CPR closed loop is %s a bled\n", drv->loop_disabled ? "dis" : "en");
+ ret = cpr_init_parameters(pdev, drv);
+ if (ret)
+ return ret;
+ /* Configure CPR HW but keep it disabled */
+ ret = cpr_config(drv);
+ if (ret)
+ return ret;
+ /* Enable ACC if required */
+ if (acc_desc->enable_mask)
+ regmap_update_bits(drv->tcsr, acc_desc->enable_reg,
+ acc_desc->enable_mask,
+ acc_desc->enable_mask);
+ ret = devm_request_threaded_irq(&pdev->dev, irq, NULL,
+ cpu_irq_handler, IRQF_ONESHOT | IRQF_TRIGGER_RISING,
+ "cpr", drv);
+ if (ret)
+ return ret;
+ /* Enable ACC if required */
+ if (acc_desc->enable_mask)
+ regmap_update_bits(drv->tcsr, acc_desc->enable_reg,
+ acc_desc->enable_mask,
+ acc_desc->enable_mask);
+ ret = cpr_init_and_enable_corner(drv);
+ if (ret)
+ return ret;
+drv->reg_nb.notifier_call = cpr_regulator_notifier;
+ret = regulator_register_notifier(drv->vdd_apc, &drv->reg_nb);
+if (ret)
+return ret;
+
+drv->cpufreq_nb.notifier_call = cpr_cpufreq_notifier;
+ret = cpufreq_register_notifier(&drv->cpufreq_nb,
+CPUFREQ_TRANSITION_NOTIFIER);
+if (ret) {
+regulator_unregister_notifier(drv->vdd_apc, &drv->reg_nb);
+return ret;
+}
+
+platform_set_drvdata(pdev, drv);
+
+return 0;
+
+static int cpr_remove(struct platform_device *pdev)
+{
+struct cpr_drv *drv = platform_get_drvdata(pdev);
+
+if (cpr_is_allowed(drv)) {
+cpr_ctl_disable(drv);
+cpr_irq_set(drv, 0);
+}
+
+return 0;
+}
+
+static const struct of_device_id cpr_match_table[] = {
+{ .compatible = "qcom,cpr" },
+{ }
+};
+MODULE_DEVICE_TABLE(of, cpr_match_table);
+
+static struct platform_driver cpr_driver = {
+.probe= cpr_probe,
+.remove= cpr_remove,
+.driver= {
+.name= "qcom-cpr",
+.of_match_table = cpr_match_table,
+.pm = &cpr_pm_ops,
+},
+};
+module_platform_driver(cpr_driver);
+
+MODULE_DESCRIPTION("Core Power Reduction (CPR) driver");
if (sr_info->autocomp_active)
    sr_stop_vddautocomp(sr_info);
-if (sr_info->dbg_dir)
   -debugfs_remove_recursive(sr_info->dbg_dir);
+ debugfs_remove_recursive(sr_info->dbg_dir);

pm_runtime_disable(&pdev->dev);
list_del(&sr_info->node);

#define AT91_SHDW_MR	0x04		/* Shut Down Mode Register */
#define AT91_SHDW_WKUPDBC_SHIFT	24
#define AT91_SHDW_WKUPDBC_MASK	GENMASK(31, 16)
#define AT91_SHDW_WKUPDBC(x)	(((x) << AT91_SHDW_WKUPDBC_SHIFT) & AT91_SHDW_WKUPDBC_MASK)

if (!pdev->dev.of_node)
    return -ENODEV;
-if (at91_shdwc)
    return -EBUSY;
+
+ at91_shdwc = devm_kzalloc(&pdev->dev, sizeof(*at91_shdwc), GFP_KERNEL);
if (!at91_shdwc)
    return -ENOMEM;

static struct platform_driver gpio_poweroff_driver = {
    .probe = gpio_poweroff_probe,
    --- linux-4.15.0.orig/drivers/power/reset/gpio-poweroff.c
    +++ linux-4.15.0/drivers/power/reset/gpio-poweroff.c
    @ @ -84,6 +84,7 @@
        {
            .compatible = "gpio-poweroff",
        },
    
};
+MODULE_DEVICE_TABLE(of, of_gpio_poweroff_match);

static struct platform_driver vexpress_poweroff_driver = {
    .probe = vexpress_poweroff_probe,
    --- linux-4.15.0.orig/drivers/power/reset/vexpress-poweroff.c
    +++ linux-4.15.0/drivers/power/reset/vexpress-poweroff.c
    @ @ -35,6 +35,7 @@
static struct device *vexpress_power_off_device;
+static atomic_t vexpress_restart_nb_refcnt = ATOMIC_INIT(0);

call xpress_power_off(void)
{
int err;

vexpress_restart_device = dev;
-err = register_restart_handler(&vexpress_restart_nb);
-if (err) {
-dev_err(dev, "cannot register restart handler (err=%d)\n", err);
-return err;
+if (atomic_inc_return(&vexpress_restart_nb_refcnt) == 1) {
+err = register_restart_handler(&vexpress_restart_nb);
+if (err) {
+dev_err(dev, "cannot register restart handler (err=%d)\n", err);
+atomic_dec(&vexpress_restart_nb_refcnt);
+return err;
+} 
} 
device_create_file(dev, &dev_attr_active);

.driver = {
.name = "vexpress-reset",
.of_match_table = vexpress_reset_of_match,
+suppress_bind_attrs = true,
},
};

--- linux-4.15.0.orig/drivers/power/reset/zx-reboot.c
+++ linux-4.15.0/drivers/power/reset/zx-reboot.c
@@ -82,3 +82,7 @@
};
module_platform_driver(zx_reboot_driver);
+
+MODULE_DESCRIPTION("ZTE SoCs reset driver");
+MODULE_AUTHOR("Jun Nie <jun.nie@linaro.org>");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/power/supply/88pm860x_battery.c
+++ linux-4.15.0/drivers/power/supply/88pm860x_battery.c
@@ -82,3 +82,7 @@
;
};
module_platform_driver(88pm860x_battery_driver);
+
+MODULE_DESCRIPTION("88pm860x Battery driver");
+MODULE_AUTHOR("Jun Nie <jun.nie@linaro.org>");
+MODULE_LICENSE("GPL v2");
int bat_remove;
-int soc;
+int soc = 0;

/* measure enable on GPADC1 */
data = MEAS1_GP1;
@@ -499,7 +499,9 @@
 mutex_unlock(&info->lock);

-calc_soc(info, OCV_MODE_ACTIVE, &soc);
+ret = calc_soc(info, OCV_MODE_ACTIVE, &soc);
+if (ret < 0)
+goto out;

data = pm860x_reg_read(info->i2c, PM8607_POWER_UP_LOG);
bat_remove = data & BAT_WU_LOG;
-\--- linux-4.15.0.orig/drivers/power/supply/Kconfig
<<< linux-4.15.0/drivers/power/supply/Kconfig
@@ -544,7 +544,7 @@
tristate "TI BQ24250/24251/24257 battery charger driver"
depends on I2C
 depend on GPIOLIB || COMPILE_TEST
- depends on REGMAP_I2C
+ select REGMAP_I2C
 help
 Say Y to enable support for the TI BQ24250, BQ24251, and BQ24257 battery
 chargers.
@@ -610,7 +610,8 @@
config BATTERY_RT5033
tristate "RT5033 fuel gauge support"
- depends on MFD_RT5033
+ depends on I2C
+ select REGMAP_I2C
 help
 This adds support for battery fuel gauge in Richtek RT5033 PMIC.
 The fuelgauge calculates and determines the battery state of charge
-\--- linux-4.15.0.orig/drivers/power/supply/ab8500_btemp.c
<<< linux-4.15.0/drivers/power/supply/ab8500_btemp.c
@@ -1177,6 +1177,7 @@
 { .compatible = "stericsson,ab8500-btemp", },
 { },
};
+MODULE_DEVICE_TABLE(of, ab8500_btemp_match);

static struct platform_driver ab8500_btemp_driver = {
 .probe = ab8500_btemp_probe,
static void ab8500_power_supply_changed(struct ab8500_charger *di,
       struct power_supply *psy)
{
    /*
     * This happens if we get notifications or interrupts and
     * the platform has been configured not to support one or
     * other type of charging.
     */
    if (!psy)
        return;

    if (di->autopower_cfg) {
        if (!di->usb.charger_connected &&
            !di->ac.charger_connected &&
            @ @ -435,7 +443,15 @@
        if (!connected)
            di->flags.vbus_drop_end = false;

        -sysfs_notify(&di->usb_chg.psy->dev.kobj, NULL, "present");
        /*
         * Sometimes the platform is configured not to support
         * USB charging and no psy has been created, but we still
         * will get these notifications.
         */
        +if (di->usb_chg.psy) {
            +sysfs_notify(&di->usb_chg.psy->dev.kobj, NULL,
              +    "present");
            +}

        if (connected) {
            mutex_lock(&di->charger_attached_mutex);
            @ @ -3218,11 +3234,13 @@
        }

        /* Enable backup battery charging */
        -abx500_mask_and_set_register_interruptible(di->dev,
        +ret = abx500_mask_and_set_register_interruptible(di->dev,
             AB8500_RTC, AB8500_RTC_CTRL_REG,
             RTC_BUP_CH_ENA, RTC_BUP_CH_ENA);
        -if (ret < 0)
        +if (ret < 0) {
            dev_err(di->dev, "%s mask and set failed\n", __func__); 
            +goto out;
            +}
if (is_ab8540(di->parent)) {
    ret = abx500_mask_and_set_register_interruptible(di->dev,
            @ @ .3734.6 +3752.7 @ @
        .compatible = "stericsson,ab8500-charger", },
        [ ];
+MODULE_DEVICE_TABLE(of, ab8500_charger_match);

static struct platform_driver ab8500_charger_driver = {
    .probe = ab8500_charger_probe,
--- linux-4.15.0.orig/drivers/power/supply/ab8500_fg.c
+++ linux-4.15.0/drivers/power/supply/ab8500_fg.c
@@ -2437,17 +2437,14 @@
    size_t count)
    }
    unsigned long charge_full;
-ssize_t ret;
+int ret;

    ret = kstrtoul(buf, 10, &charge_full);
+if (ret)
+return ret;

-    dev_dbg(di->dev, "Ret %zd charge_full %lu", ret, charge_full);
-    if (!ret) {
-        di->bat_cap.max_mah = (int) charge_full;
-        ret = count;
-    }
-    return ret;
+    di->bat_cap.max_mah = (int) charge_full;
+    return count;
}

static ssize_t charge_now_show(struct ab8500_fg *di, char *buf)
@@ -2459,20 +2456,16 @@
    size_t count)
    }
    unsigned long charge_now;
-ssize_t ret;
+int ret;

    ret = kstrtoul(buf, 10, &charge_now);
+if (ret)
+return ret;

-    dev_dbg(di->dev, "Ret %zd charge_now %lu was %d",
-       ret, charge_now, di->bat_cap.prev_mah);

static struct ab8500_fg_sysfs_entry charge_full_attr =
{   .compatible = "stericsson,ab8500-fg", },
{   },
};
+MODULE_DEVICE_TABLE(of, ab8500_fg_match);

static struct platform_driver ab8500_fg_driver = {
   .probe = ab8500_fg_probe,
   --- linux-4.15.0.orig/drivers/power/supply/axp288_charger.c
   +++ linux-4.15.0/drivers/power/supply/axp288_charger.c
   @ @ -27.6 +27.7 @@
   #include <linux/property.h>
   #include <linux/mfd/axp20x.h>
   #include <linux/extcon.h>
   +#include <linux/dmi.h>

   #define PS_STAT_VBUS_TRIGGER	(1 << 0)
   #define PS_STAT_BAT_CHRG_DIR	(1 << 2)
   @ @ -559.6 +560.55 @@
   return IRQ_HANDLED;
}

+/*
  * The HP Pavilion x2 10 series comes in a number of variants:
  * + Bay Trail SoC    + AXP288 PMIC, Micro-USB, DMI_BOARD_NAME: "8021"
  * + Bay Trail SoC    + AXP288 PMIC, Type-C,   DMI_BOARD_NAME: "815D"
  * + Cherry Trail SoC + AXP288 PMIC, Type-C,   DMI_BOARD_NAME: "813E"
  * + Cherry Trail SoC+ TI PMIC,  Type-C,   DMI_BOARD_NAME: "827C" or "82F4"
  * +
  * + The variants with the AXP288 + Type-C connector are all kinds of special:
  * +
  * + 1. They use a Type-C connector which the AXP288 does not support, so when
  * + using a Type-C charger it is not recognized. Unlike most AXP288 devices,
this model actually has mostly working ACPI AC/Battery code, the ACPI code
"solves" this by simply setting the input_current_limit to 3A.
There are still some issues with the ACPI code, so we use this native driver,
and to solve the charging not working (500mA is not enough) issue we hardcode
the 3A input_current_limit like the ACPI code does.

2. If no charger is connected the machine boots with the vbus-path disabled.
Normally this is done when a 5V boost converter is active to avoid the PMIC
trying to charge from the 5V boost converter's output. This is done when
an OTG host cable is inserted and the ID pin on the micro-B receptacle is
pulled low and the ID pin has an ACPI event handler associated with it
which re-enables the vbus-path when the ID pin is pulled high when the
OTG host cable is removed. The Type-C connector has no ID pin, there is
no ID pin handler and there appears to be no 5V boost converter, so we
end up not charging because the vbus-path is disabled, until we unplug
the charger which automatically clears the vbus-path disable bit and then
on the second plug-in of the adapter we start charging. To solve the not
charging on first charger plugin we unconditionally enable the vbus-path at
probe on this model, which is safe since there is no 5V boost converter.

static const struct dmi_system_id axp288_hp_x2_dmi_ids[] = {
+{  
+ .matches = {  
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "Hewlett-Packard"),  
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "HP Pavilion x2 Detachable"),  
+DMI_EXACT_MATCH(DMI_BOARD_NAME, "815D"),  
+},  
+},  
+{  
+ .matches = {  
+DMI_EXACT_MATCH(DMI_SYS_VENDOR, "HP"),  
+DMI_EXACT_MATCH(DMI_PRODUCT_NAME, "HP Pavilion x2 Detachable"),  
+DMI_EXACT_MATCH(DMI_BOARD_NAME, "813E"),  
+},  
+},  
+} /* Terminating entry */
+};
+
static void axp288_charger_extcon_evt_worker(struct work_struct *work)
{
    struct axp288_chrg_info *info =
    @@ -569,7 +619,11 @@
    enum power_supply_type old_chg_type = info->cable.chg_type;

    /* Determine cable/charger type */
    if (extcon_get_state(edev, EXTCON_CHG_USB_SDP) > 0) {
        if (dmi_check_system(axp288_hp_x2_dmi_ids)) {
            /* See comment above axp288_hp_x2_dmi_ids declaration */

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+dev_dbg(&info->pdev->dev, "HP X2 with Type-C, setting inlmt to 3A\n");
+current_limit = 3000000;
+} else if (extcon_get_state(edev, EXTCON_CHG_USB_SDP) > 0) {
    dev_dbg(&info->pdev->dev, "USB SDP charger is connected");
    info->cable.connected = true;
    info->cable.chg_type = POWER_SUPPLY_TYPE_USB;
    return ret;
}

@if (dmi_check_system(axp288_hp_x2_dmi_ids)) {
+/* See comment above axp288_hp_x2_dmi_ids declaration */
+ret = axp288_charger_vbus_path_select(info, true);
+if (ret < 0)
+return ret;
+}
+
+/* Read current charge voltage and current limit */
+ret = regmap_read(info->regmap, AXP20X_CHRG_CTRL1, &val);
+if (ret < 0) {
+    @ @ -771,7 +832,7 @ @
+}
+
+/* Determine charge current limit */
-cc = (ret & CHRG_CCCV_CC_MASK) >> CHRG_CCCV_CC_BIT_POS;
+cc = (val & CHRG_CCCV_CC_MASK) >> CHRG_CCCV_CC_BIT_POS;
+cc = (cc * CHRG_CCCV_CC_LSB_RES) + CHRG_CCCV_CC_OFFSET;
+info->cc = cc;
+
+ @ @ -785,6 +846,14 @ @
+return 0;
+
+static void axp288_charger_cancel_work(void *data)
+{
+    struct axp288_chrg_info *info = data;
+    +cancel_work_sync(&info->otg.work);
+    +cancel_work_sync(&info->cable.work);
+}
+
+static int axp288_charger_probe(struct platform_device *pdev)
+{
+    int ret, i, irq;
+    @ @ -836,6 +905,11 @ @
+    return ret;
+}
/* Cancel our work on cleanup, register this before the notifiers */
ret = devm_add_action(dev, axp288_charger_cancel_work, info);
if (ret)
+return ret;

/* Register for extcon notification */
INIT_WORK(&info->cable.work, axp288_charger_extcon_evt_worker);
info->cable.nb[0].notifier_call = axp288_charger_handle_cable0_evt;

/* Register charger interrupts */
for (i = 0; i < CHRG_INTR_END; i++) {
    pirq = platform_get_irq(info->pdev, i);
    if (pirq < 0) {
        dev_err(&pdev->dev, "Failed to get IRQ: %d\n", pirq);
        +return pirq;
    }
    info->irq[i] = regmap_irq_get_virq(info->regmap_irqc, pirq);
    if (info->irq[i] < 0) {
        dev_warn(&info->pdev->dev, "Failed to get IRQ: %d\n", pirq);
        +return pirq;
    }

    info->irq[i] = regmap_irq_get_virq(info->regmap_irqc, pirq);
    if (info->irq[i] < 0) {
        dev_warn(&info->pdev->dev, "Failed to get IRQ: %d\n", pirq);
        +return pirq;
    }
}

if (ret < 0) {
    -dev_err(&pdev->dev, "axp288 reg read err:%d\n", ret);
    +dev_err(&pdev->dev, "Error reading reg 0x%02x err: %d\n", reg, ret);
    return ret;
}

if (ret < 0) {
    -dev_err(&pdev->dev, "axp288 reg write err:%d\n", ret);
    +dev_err(&pdev->dev, "Error writing reg 0x%02x err: %d\n", reg, ret);
    return ret;
}

return ret;

return -EINVAL;

ret = pm_runtime_get_sync(bdi->dev);
-if (ret < 0)
+if (ret < 0) {
+    pm_runtime_put_noidle(bdi->dev);

--- linux-4.15.0.orig/drivers/power/supply/axp288_fuel_gauge.c
+++ linux-4.15.0/drivers/power/supply/axp288_fuel_gauge.c
@@ -142,7 +142,7 @@
            }
        if (ret < 0) {
            dev_err(&info->pdev->dev, "axp288 reg read err:%d\n", ret);
    
--- linux-4.15.0.orig/drivers/power/supply/bq24190_charger.c
+++ linux-4.15.0/drivers/power/supply/bq24190_charger.c
@@ -450,8 +450,10 @@
            return -EINVAL;
        ret = regmap_write(info->regmap, reg, (unsigned int)val);

--- linux-4.15.0.orig/drivers/power/supply/bq24190_charger.c
+++ linux-4.15.0/drivers/power/supply/bq24190_charger.c
@@ -450,8 +450,10 @@
            return -EINVAL;
        ret = regmap_write(info->regmap, reg, (unsigned int)val);

--- linux-4.15.0.orig/drivers/power/supply/bq24190_charger.c
+++ linux-4.15.0/drivers/power/supply/bq24190_charger.c
@@ -450,8 +450,10 @@
            return -EINVAL;
        ret = regmap_write(info->regmap, reg, (unsigned int)val);

--- linux-4.15.0.orig/drivers/power/supply/bq24190_charger.c
+++ linux-4.15.0/drivers/power/supply/bq24190_charger.c
@@ -450,8 +450,10 @@
            return -EINVAL;
        ret = regmap_write(info->regmap, reg, (unsigned int)val);
return ret;
+

ret = bq24190_read_mask(bdi, info->reg, info->mask, info->shift, &v);
if (ret)
@@ -1086,8 +1088,10 @@
dev_dbg(bdi->dev, "prop: %d\n", psp);

ret = pm_runtime_get_sync(bdi->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put_noidle(bdi->dev);
return ret;
+

switch (psp) {
 case POWER_SUPPLY_PROP_CHARGE_TYPE:
@@ -1158,8 +1162,10 @@
dev_dbg(bdi->dev, "prop: %d\n", psp);

ret = pm_runtime_get_sync(bdi->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put_noidle(bdi->dev);
return ret;
+

switch (psp) {
 case POWER_SUPPLY_PROP_ONLINE:
@@ -1424,8 +1430,10 @@
dev_dbg(bdi->dev, "prop: %d\n", psp);

ret = pm_runtime_get_sync(bdi->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put_noidle(bdi->dev);
return ret;
+

switch (psp) {
 case POWER_SUPPLY_PROP_STATUS:
@@ -1470,8 +1478,10 @@
dev_dbg(bdi->dev, "prop: %d\n", psp);

ret = pm_runtime_get_sync(bdi->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put_noidle(bdi->dev);
switch (psp) {
    case POWER_SUPPLY_PROP_ONLINE:
        /* Read an average power register. */
        /* Return < 0 if something fails. */
        /* */
        static int bq27xxx_battery_read_pwr_avg(struct bq27xxx_device_info *di) {
            int tval;

            tval = bq27xxx_read(di, BQ27XXX_REG_AP, false);
            if (tval < 0) {
                dev_err(di->dev, "error reading average power register 02x: 0X",
                        BQ27XXX_REG_AP, tval);
                return tval;
            }

            if (di->opts & BQ27XXX_O_ZERO)
                return (tval * BQ27XXX_POWER_CONSTANT) / BQ27XXX_RS;
            else
                return tval;
        }

        /* Returns true if a battery over temperature condition is detected */
        static bool bq27xxx_battery_overtemp(struct bq27xxx_device_info *di, u16 flags) {
            /* */
            if (di->regs[BQ27XXX_REG_CYCT] != INVALID_REG_ADDR)
                cache.cycle_count = bq27xxx_battery_read_cyct(di);
            if (di->regs[BQ27XXX_REG_AP] != INVALID_REG_ADDR)
                cache.power_avg = bq27xxx_battery_read_pwr_avg(di);

            /* We only have to read charge design full once */
            if (di->charge_design_full <= 0)
                return 0;
        }
}

/ * Get the average power in W
 */
static int bq27xxx_battery_pwr_avg(struct bq27xxx_device_info *di,
   union power_supply_propval *val)
{
  int power;

  power = bq27xxx_read(di, BQ27XXX_REG_AP, false);
  if (power < 0) {
    dev_err(di->dev,
      "error reading average power register %02x: %d",
      BQ27XXX_REG_AP, power);
    return power;
  }

  if (di->opts & BQ27XXX_O_ZERO)
    val->intval = (power * BQ27XXX_POWER_CONSTANT) / BQ27XXX_RS;
  else
    /* Other gauges return a signed value in units of 10mW */
    val->intval = (int)((s16)power) * 10000;

  return 0;
}

static int bq27xxx_battery_status(struct bq27xxx_device_info *di,
   union power_supply_propval *val)
{
  status = POWER_SUPPLY_STATUS_FULL;
else if (di->cache.flags & BQ27000_FLAG_CHGS)
  status = POWER_SUPPLY_STATUS_CHARGING;
else if (power_supply_am_i_supplied(di->bat))
  -status = POWER_SUPPLY_STATUS_NOT_CHARGING;
else
  status = POWER_SUPPLY_STATUS_DISCHARGING;
} else {
  status = POWER_SUPPLY_STATUS_CHARGING;
}

+#if ((status == POWER_SUPPLY_STATUS_DISCHARGING) &&
    + power_supply_am_i_supplied(di->bat))
  +status = POWER_SUPPLY_STATUS_NOT_CHARGING;
  +val->intval = status;
return 0;
@@ -1790,7 +1795,7 @@
 ret = bq27xxx_simple_value(di->cache.energy, val);
 break;
 case POWER_SUPPLY_PROP_POWER_AVG:
- ret = bq27xxx_simple_value(di->cache.power_avg, val);
+ ret = bq27xxx_battery_pwr_avg(di, val);
 break;
 case POWER_SUPPLY_PROP_HEALTH:
 ret = bq27xxx_simple_value(di->cache.health, val);
@@ -1842,7 +1847,10 @@
 di->bat = power_supply_register_no_ws(di->dev, psy_desc, &psy_cfg);
 if (IS_ERR(di->bat)) {
 -dev_err(di->dev, "failed to register battery\n");
+  if (PTR_ERR(di->bat) == -EPROBE_DEFER)
+    dev_dbg(di->dev, "failed to register battery, deferring probe\n");
+  else
+    dev_err(di->dev, "failed to register battery\n");
  return PTR_ERR(di->bat);
 }

--- linux-4.15.0.orig/drivers/power/supply/charger-manager.c
+++ linux-4.15.0/drivers/power/supply/charger-manager.c
@@ -1212,7 +1212,6 @@
 if (ret < 0) {
 pr_info("Cannot register extcon_dev for %s(cable: %s)\n", 
 cable->extcon_name, cable->name);
-  ret = -EINVAL;
 } 

 return ret;
@@ -1485,6 +1484,7 @@
},
{ }
;
+MODULE_DEVICE_TABLE(of, charger_manager_match);

static struct charger_desc *of_cm_parse_desc(struct device *dev) 
{
@@ -1629,7 +1629,7 @@
 if (IS_ERR(desc)) {
 dev_err(&pdev->dev, "No platform data (desc) found\n");
  return -ENODEV;
+  return PTR_ERR(desc);
 }
```c
cm = devm_kzalloc(&pdev->dev, sizeof(*cm), GFP_KERNEL);
--- linux-4.15.0.orig/drivers/power/supply/cpcap-battery.c
+++ linux-4.15.0/drivers/power/supply/cpcap-battery.c
@@ -82,7 +82,7 @@};

struct cpcap_coulomb_counter_data {
    s32 sample; /* 24-bits */
    +s32 sample; /* 24 or 32 bits */
    s32 accumulator;
    s16 offset; /* 10-bits */
    }
@@ -213,7 +213,7 @@
    * TI or ST coulomb counter in the PMIC. */
    static int cpcap_battery_cc_raw_div(struct cpcap_battery_ddata *ddata,
    -    u32 sample, s32 accumulator,
    +    s32 sample, s32 accumulator,
        s16 offset, u32 divider)
    {
    s64 acc;
@@ -221,7 +221,9 @@
        int avg_current;
    u32 cc_lsb;

    -sample &= 0xffffffff; /* 24-bits, unsigned */
    +if (!divider)
    +return 0;
    +offset &= 0x7ff; /* 10-bits, signed */

    switch (ddata->vendor) {
    @@ -256,7 +258,7 @@
        /* 3600000Ams = 1Ah */
    static int cpcap_battery_cc_to_uah(struct cpcap_battery_ddata *ddata,
    -    u32 sample, s32 accumulator,
    +    s32 sample, s32 accumulator,
        s16 offset)
    {
        return cpcap_battery_cc_raw_div(ddata, sample,
@@ -265,7 +267,7 @@
    static int cpcap_battery_cc_to_ua(struct cpcap_battery_ddata *ddata,
    -    u32 sample, s32 accumulator,
    +    s32 sample, s32 accumulator,
        s16 offset)
    ```

return capcap_battery_cc_raw_div(ddata, sample,
    @ @ -309,6 +311,8 @ @
/* Sample value CPCAP_REG_CCS1 & 2 */
    ccd->sample = (buf[1] & 0x0fff) << 16;
+if (ddata->vendor == CPCAP_VENDOR_TI)
+    ccd->sample = sign_extend32(24, ccd->sample);
    /* Accumulator value CPCAP_REG_CCA1 & 2 */
    ccd->accumulator = ((s16)buf[3]) << 16;
+++ linux-4.15.0/drivers/power/supply/cpcap-charger.c
    @ @ -458,6 +458,7 @ @
goto out_err;
}

+power_supply_changed(ddata->usb);
return;

out_err:
--- linux-4.15.0.orig/drivers/power/supply/generic-adc-battery.c
+++ linux-4.15.0/drivers/power/supply/generic-adc-battery.c
    @ @ -241,10 +241,10 @ @
    struct power_supply_desc *psy_desc;
    struct power_supply_config psy_cfg = {};
    struct gab_platform_data *pdata = pdev->dev.platform_data;
-enum power_supply_property *properties;
-int ret = 0;
-int chan;
-bool any = false;

    adc_bat = devm_kzalloc(&pdev->dev, sizeof(*adc_bat), GFP_KERNEL);
    if (!adc_bat) {
        @ @ -278,8 +278,6 @ @
    }

memcpy(psy_desc->properties, gab_props, sizeof(gab_props));
-properties = (enum power_supply_property *)
-(char *)psy_desc->properties + sizeof(gab_props));

/*
 * getting channel from iio and copying the battery properties
    @ @ -293,15 +291,22 @ @
    adc_bat->channel[chan] = NULL;
 } else {
/* copying properties for supported channels only */
-memcpy(properties + sizeof(*(psy_desc->properties)) * index,
-&gab_dyn_props[chan],
-sizeof(gab_dyn_props[chan]));
-index++;
+int index2;
+
+for (index2 = 0; index2 < index; index2++) {
+if (psy_desc->properties[index2] ==
+ gab_dyn_props[chan])
+break;/* already known */
+}
+if (index2 == index)/* really new */
+psy_desc->properties[index++] =
+gab_dyn_props[chan];
+any = true;
}
}
/* none of the channels are supported so let's bail out */
-if (index == 0) {
+if (!any) {
ret = -ENODEV;
goto second_mem_fail;
}
@@ -312,7 +317,7 @@
* as come channels may be not be supported by the device.So
* we need to take care of that.
*/
-psy_desc->num_properties = ARRAY_SIZE(gab_props) + index;
+psy_desc->num_properties = index;
adc_bat->psy = power_supply_register(&pdev->dev, psy_desc, &psy_cfg);
if (IS_ERR(adc_bat->psy)) {
@@ -377,7 +382,7 @@
}
kfree(adc_bat->psy_desc.properties);
-cancel_delayed_work(&adc_bat->bat_work);
+cancel_delayed_work_sync(&adc_bat->bat_work);
return 0;
}
--- linux-4.15.0.orig/drivers/power/supply/lp8788-charger.c
+++ linux-4.15.0/drivers/power/supply/lp8788-charger.c
@@ -529,7 +529,7 @@
ret = request_threaded_irq(virq, NULL,

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lp8788_charger_irq_thread,
-0, name, pchg);
+IRQF_ONESHOT, name, pchg);
if (ret)
break;
}
@@ -600,27 +600,14 @@
return;

/* ADC channel for battery voltage */
-chan = iio_channel_get(dev, pdata->adc_vbatt);
+chan = devm_iio_channel_get(dev, pdata->adc_vbatt);
 pchg->chan[LP8788_VBATT] = IS_ERR(chan) ? NULL : chan;

/* ADC channel for battery temperature */
-chan = iio_channel_get(dev, pdata->adc_batt_temp);
+chan = devm_iio_channel_get(dev, pdata->adc_batt_temp);
 pchg->chan[LP8788_BATT_TEMP] = IS_ERR(chan) ? NULL : chan;
 
-static void lp8788_release_adc_channel(struct lp8788_charger *pchg)
-{  
-  int i;  
-  for (i = 0; i < LP8788_NUM_CHG_ADC; i++) {
-    if (!pchg->chan[i])  
-      continue;
-    --iio_channel_release(pchg->chan[i]);  
-    pchg->chan[i] = NULL;
-  }  
-}  
-
  static ssize_t lp8788_show_charger_status(struct device *dev,
  struct device_attribute *attr, char *buf)
  {
@@ -747,7 +734,6 @@
 lp8788_irq_unregister(pdev, pchg);
 sysfs_remove_group(&pdev->dev.kobj, &lp8788_attr_group);
 lp8788_psy_unregister(pchg);
- lp8788_release_adc_channel(pchg);

  return 0;
  }
--- linux-4.15.0.orig/drivers/power/supply/ltc2941-battery-gauge.c
+++ linux-4.15.0/drivers/power/supply/ltc2941-battery-gauge.c
@@ @ -316,15 +316,15 @@
if (info->id == LTC2942_ID) {
    reg = LTC2942_REG_TEMPERATURE_MSB;
    -value = 60000; /* Full-scale is 600 Kelvin */
    +value = 6000; /* Full-scale is 600 Kelvin */
} else {
    reg = LTC2943_REG_TEMPERATURE_MSB;
    -value = 51000; /* Full-scale is 510 Kelvin */
    +value = 5100; /* Full-scale is 510 Kelvin */
}
ret = ltc294x_read_regs(info->client, reg, &datar[0], 2);
value = (datar[0] << 8) | datar[1];
-/* Convert to centidegrees */
-*val = value / 0xFFFF - 27215;
+/* Convert to tenths of degree Celsius */
+*val = value / 0xFFFF - 2722;
return ret;
}

--- linux-4.15.0.orig/drivers/power/supply/max14656_charger_detector.c
+++ linux-4.15.0/drivers/power/supply/max14656_charger_detector.c
@@ -240,6 +240,14 @@
    POWER_SUPPLY_PROP_MANUFACTURER,
    POWER_SUPPLY_PROP_MAX_VOLTAGE,
    POWER_SUPPLY_PROP_MAX_CURRENT,
+    POWER_SUPPLY_PROP_MAX_CURRENT_TYPE,
+    POWER_SUPPLY_PROP_MAX_VOLTAGE_TYPE,
+    POWER_SUPPLY_PROP_MAX_CURRENT.nextIntType,
+    POWER_SUPPLY_PROP_MAX_VOLTAGE.nextIntType,
+    CODING_STYLE_OVERRIDE
    ];

+static void stop_irq_work(void *data)
+{
+    struct max14656_chip *chip = data;
+    +cancel_delayed_work_sync(&chip->irq_work);
+}
+static int max14656_probe(struct i2c_client *client,
+    const struct i2c_device_id *id)
+{
+    if (ret)
+        return -ENODEV;
+chip->detect_psy = devm_power_supply_register(dev,
+    &chip->psy_desc, &psy_cfg);
+if (IS_ERR(chip->detect_psy)) {
+    dev_err(dev, "power_supply_register failed\n");
+    return -EINVAL;
+}
+
+INIT_DELAYED_WORK(&chip->irq_work, max14656_irq_worker);
+ret = devm_add_action(dev, stop_irq_work, chip);
+if (ret) {
+    dev_err(dev, "devm_add_action %d failed\n", ret);
+    return ret;
+}
+
+schedule_delayed_work(&chip->irq_work, msecs_to_jiffies(2000));
+
+chip->detect_psy = devm_power_supply_register(dev,
+    &chip->psy_desc, &psy_cfg);
+if (IS_ERR(chip->detect_psy)) {
+    dev_err(dev, "power_supply_register failed\n");
+    return -EINVAL;
+}

schedule_delayed_work(&chip->irq_work, msecs_to_jiffies(2000));

return 0;
--- linux-4.15.0.orig/drivers/power/supply/max17040_battery.c
+++ linux-4.15.0/drivers/power/supply/max17040_battery.c
@@ -109,7 +109,7 @@
 vcell = max17040_read_reg(client, MAX17040_VCELL);

-chip->vcell = vcell;
-    &chip->psy_desc, &psy_cfg);
-if (IS_ERR(chip->detect_psy)) {
-    dev_err(dev, "power_supply_register failed\n");
-    return -EINVAL;
-}
-
-vcell = max17040_read_reg(client, MAX17040_VCELL);

-vcell = (vcell >> 4) * 1250;
}

static void max17040_get_soc(struct i2c_client *client)
--- linux-4.15.0.orig/drivers/power/supply/max17042_battery.c
+++ linux-4.15.0/drivers/power/supply/max17042_battery.c
@@ -717,7 +717,7 @@
 struct max17042_config_data *config = chip->pdata->config_data;

 max17042_override_por(map, MAX17042_TGAIN, config->tgain);
-max17042_override_por(map, MAX17042_TOFF, config->toff);
max17042_override_por(map, MAX17042_TOFF, config->toff);
max17042_override_por(map, MAX17042_CGAIN, config->cgain);
max17042_override_por(map, MAX17042_COFF, config->coff);

@@ -833,8 +833,12 @@
{
 struct max17042_chip *chip = dev;
 u32 val;
 +int ret;
 +
 +ret = regmap_read(chip->regmap, MAX17042_STATUS, &val);
 +if (ret)
 +return IRQ_HANDLED;
-
-regmap_read(chip->regmap, MAX17042_STATUS, &val);
 if ((val & STATUS_INTR_SOCMIN_BIT) ||
 (val & STATUS_INTR_SOCMAX_BIT)) {
 dev_info(&chip->client->dev, "SOC threshold INTR\n");
@@ -1021,6 +1025,7 @@
i2c_set_clientdata(client, chip);
psy_cfg.drv_data = chip;
+psy_cfg.of_node = dev->of_node;
/* When current is not measured,
 * CURRENT_NOW and CURRENT_AVG properties should be invisible. */
@@ -1050,7 +1055,7 @@
if (client->irq) {
-unsigned int flags = IRQF_TRIGGER_FALLING | IRQF_ONESHOT;
+unsigned int flags = IRQF_ONESHOT;
 /* On ACPI systems the IRQ may be handled by ACPI-event code,
--- linux-4.15.0.orig/drivers/power/supply/max8998_charger.c
+++ linux-4.15.0/drivers/power/supply/max8998_charger.c
@@ -85,7 +85,7 @@
static int max8998_battery_probe(struct platform_device *pdev)
{
 struct max8998_dev *iodev = dev_get_drvdata(pdev->dev.parent);
-struct max8998_platform_data *pdata = dev_get_platdata(iodev->dev);
+struct max8998_platform_data *pdata = iodev->pdata;
 struct power_supply_config psy_cfg = {};
 struct max8998_battery_data *max8998;
 struct i2c_client *i2c;
--- linux-4.15.0.orig/drivers/power/supply/olpc_battery.c
+++ linux-4.15.0/drivers/power/supply/olpc_battery.c
if (ret)
return ret;

-val->intval = (s16)be16_to_cpu(ec_word) * 100 / 256;
+val->intval = (s16)be16_to_cpu(ec_word) * 10 / 256;
break;
case POWER_SUPPLY_PROP_TEMP_AMBIENT:
ret = olpc_ec_cmd(EC_AMB_TEMP, NULL, 0, (void *)&ec_word, 2);
if (ret)
return ret;

-val->intval = (int)be16_to_cpu(ec_word) * 100 / 256;
+val->intval = (int)be16_to_cpu(ec_word) * 10 / 256;
break;
case POWER_SUPPLY_PROP_CHARGE_COUNTER:
ret = olpc_ec_cmd(EC_BAT_ACR, NULL, 0, (void *)&ec_word, 2);
--- linux-4.15.0.orig/drivers/power/supply/pm2301_charger.c
+++ linux-4.15.0/drivers/power/supply/pm2301_charger.c
@@ -1098,7 +1098,7 @@
ret = request_threaded_irq(gpio_to_irq(pm2->pdata->gpio_irq_number),
NULL,
pm2xxx Charger irq[0].isr,
.pm2->pdata->irq_type,
.pm2->pdata->irq_type | IRQF_ONESHOT,
.pm2xxx Charger irq[0].name, pm2);

if (ret != 0) {
--- linux-4.15.0.orig/drivers/power/supply/power_supply_core.c
+++ linux-4.15.0/drivers/power/supply/power_supply_core.c
@@ -14,6 +14,7 @@
#include <linux/types.h>
#include <linux/init.h>
#include <linux/slab.h>
+#include <linux/delay.h>
#include <linux/device.h>
#include <linux/notifier.h>
#include <linux/error.h>
@@ -139,8 +140,13 @@
struct power_supply *psy = container_of(work, struct power_supply,
deferred_register_work.work);

-if (psy->dev.parent)
-mutex_lock(&psy->dev.parent->mutex);
+if (psy->dev.parent) {
+while (!mutex_trylock(&psy->dev.parent->mutex)) {
+if (psy->removing)
+return;

+msleep(10);
+
+
power_supply_changed(psy);

@@ -885,14 +891,14 @@
 }

spin_lock_init(&psy->changed_lock);
-rc = device_init_wakeup(dev, ws);
-if (rc)
-goto wakeup_init_failed;
-
rc = device_add(dev);
if (rc)
goto device_add_failed;

+rc = device_init_wakeup(dev, ws);
+if (rc)
+goto wakeup_init_failed;
+
rc = psy_register_thermal(psy);
if (rc)
goto register_thermal_failed;
@@ -929,8 +935,8 @@
psy_unregister_thermal(psy);
register_thermal_failed:
device_del(dev);
-device_add_failed:
-wakeup_init_failed:
+device_add_failed:
+check_supplies_failed:
dev_set_name_failed:
put_device(dev);
@@ -1071,6 +1077,7 @@
void power_supply_unregister(struct power_supply *psy)
{
WARN_ON(atomic_dec_return(&psy->use_cnt));
+psy->removing = true;
cancel_work_sync(&psy->changed_work);
cancelDelayed_work_sync(&psy->deferred_register_work);
sysfs_remove_link(&psy->dev.kobj, "powers");
--- linux-4.15.0.orig/drivers/power/supply/power_supply_sysfs.c
+++ linux-4.15.0/drivers/power/supply/power_supply_sysfs.c
@@ -91,7 +91,8 @@
dev_dbg(dev, "driver has no data for '%s' property\n", 
attr->attr.name);
else if (ret != -ENODEV && ret != -EAGAIN)
+dev_err_ratelimited(dev, 
+"driver failed to report `%s' property: %zd\n",
attr->attr.name, ret);
return ret;
}

char *prop_buf;
char *attrname;

-dev_dbg(dev, "uevent\n");
-
if (!psy || !psy->desc) {
  dev_dbg(dev, "No power supply yet\n");
  return ret;
}

-dev_dbg(dev, "POWER_SUPPLY_NAME=%s\n", psy->desc->name);
-
ret = add_uevent_var(env, "POWER_SUPPLY_NAME=%s", psy->desc->name);
if (ret)
  return ret;
@@ -369,8 +366,6 @@
goto out;
}

-dev_dbg(dev, "prop %s=%s\n", attrname, prop_buf);
-
ret = add_uevent_var(env, "POWER_SUPPLY_%s=%s", attrname, prop_buf);
kfree(attrname);
if (ret)
  --- linux-4.15.0.orig/drivers/power/supply/rt5033_battery.c
  +++ linux-4.15.0/drivers/power/supply/rt5033_battery.c
  @@ -167,9 +167,16 @@
  );
  MODULE_DEVICE_TABLE(i2c, rt5033_battery_id);
+
+static const struct of_device_id rt5033_battery_of_match[] = {
+{ .compatible = "richtek,rt5033-battery", },
+{ } 
+};
+MODULE_DEVICE_TABLE(of, rt5033_battery_of_match);
+
static struct i2c_driver rt5033_battery_driver = {
  .driver = {
    .name = "rt5033-battery",
    .of_match_table = rt5033_battery_of_match,
},
.probe = rt5033_battery_probe,
.remove = rt5033_battery_remove,
--- linux-4.15.0.orig/drivers/power/supply/s3c_adc_battery.c
+++ linux-4.15.0/drivers/power/supply/s3c_adc_battery.c
@@ -392,7 +392,7 @@
gpio_free(pdata->gpio_charge_finished);
}

-cancel_delayed_work(&bat_work);
cancel_delayed_work_sync(&bat_work);

if (pdata->exit)
pdata->exit();
--- linux-4.15.0.orig/drivers/power/supply/sbs-manager.c
+++ linux-4.15.0/drivers/power/supply/sbs-manager.c
@@ -183,7 +183,7 @@
return ret;
/* chan goes from 1 ... 4 */
-reg = 1 << BIT(SBSM_SMB_BAT_OFFSET + chan);
+reg = BIT(SBSM_SMB_BAT_OFFSET + chan);
ret = sbsm_write_word(data->client, SBSM_CMD_BATSYSSTATE, reg);
if (ret)
dev_err(dev, "Failed to select channel %i\n", chan);
--- linux-4.15.0.orig/drivers/power/supply/smb347-charger.c
+++ linux-4.15.0/drivers/power/supply/smb347-charger.c
@@ -1141,6 +1141,7 @@
switch (reg) {
case IRQSTAT_A:
case IRQSTAT_C:
+case IRQSTAT_D:
case IRQSTAT_E:
case IRQSTAT_F:
case STAT_A:
--- linux-4.15.0.orig/drivers/power/supply/test_power.c
+++ linux-4.15.0/drivers/power/supply/test_power.c
@@ -344,6 +344,7 @@
static int param_get_ac_online(char *buffer, const struct kernel_param *kp)
{
strcpy(buffer, map_get_key(map_ac_online, ac_online, "unknown"));
+strcat(buffer, "\n");
return strlen(buffer);
}

@@ -357,6 +358,7 @@
static int param_get_usb_online(char *buffer, const struct kernel_param *kp)
{

---
---
---
---
---
strcpy(buffer, map_get_key(map_ac_online, usb_online, "unknown"));
+strcat(buffer, "\n");
return strlen(buffer);
}
@@ -371,6 +373,7 @@
static int param_get_battery_status(char *buffer, const struct kernel_param *kp)
{
strcpy(buffer, map_get_key(map_status, battery_status, "unknown"));
+strcat(buffer, "\n");
return strlen(buffer);
}
@@ -385,6 +388,7 @@
static int param_get_battery_health(char *buffer, const struct kernel_param *kp)
{
strcpy(buffer, map_get_key(map_health, battery_health, "unknown"));
+strcat(buffer, "\n");
return strlen(buffer);
}
@@ -400,6 +404,7 @@
const struct kernel_param *kp)
{
strcpy(buffer, map_get_key(map_present, battery_present, "unknown"));
+strcat(buffer, "\n");
return strlen(buffer);
}
@@ -417,6 +422,7 @@
{
strcpy(buffer,
map_get_key(map_technology, battery_technology, "unknown"));
+strcat(buffer, "\n");
return strlen(buffer);
}
--- linux-4.15.0.orig/drivers/power/supply/tps65090-charger.c
+++ linux-4.15.0/drivers/power/supply/tps65090-charger.c
@@ -311,7 +311,7 @@
if (irq != -ENXIO) {
ret = devm_request_threaded_irq(&pdev->dev, irq, NULL,
-tps65090_charger_isr, 0, "tps65090-charger", cdata);
+tps65090_charger_isr, IRQF_ONESHOT, "tps65090-charger", cdata);
if (ret) {
dev_err(cdata->dev,
"Unable to register irq %d err %d\n", irq,

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for (i = 0; i < NUM_CHARGER_IRQS; i++) {
ret = devm_request_threaded_irq(&pdev->dev, irq[i], NULL, 
tps65217_charger_irq, 
-0, "tps65217-charger",
+IRQF_ONESHOT, "tps65217-charger",
charger);
if (ret) {
dev_err(charger->dev,
--- linux-4.15.0.orig/drivers/power/supply/twl4030_charger.c
+++ linux-4.15.0/drivers/power/supply/twl4030_charger.c
@@ -420,7 +420,8 @@
    if (v < USB_MIN_VOLT) {
        /* Back up and stop adjusting. */
        -bci->usb_cur -= USB_CUR_STEP;
+if (bci->usb_cur >= USB_CUR_STEP)
+bci->usb_cur = USB_CUR_STEP;
    bci->usb_cur_target = bci->usb_cur;
} else if (bci->usb_cur >= bci->usb_cur_target ||
    bci->usb_cur + USB_CUR_STEP > USB_MAX_CURRENT) {
    @ @ -439,6 +440,7 @@
static int twl4030_charger_enable_usb(struct twl4030_bci *bci, bool enable)
{
    int ret;
    +u32 reg;

    if (bci->usb_mode == CHARGE_OFF)
        enable = false;
    @ @ -452,14 +454,38 @@
    bci->usb_enabled = 1;
}

    -if (bci->usb_mode == CHARGE_AUTO)
    +if (bci->usb_mode == CHARGE_AUTO) {
        /* Enable interrupts now. */
        +reg = ~(u32)(TWL4030_ICHGLOW | TWL4030_ICHGEOC |
            +TWL4030_TBATOR2 | TWL4030_TBATOR1 |
            +TWL4030_BATSTS);
        +ret = twl_i2c_write_u8(TWL4030_MODULE_INTERRUPTS, reg, 
            + TWL4030_INTERRUPTS_BCIIMR1A);
        +if (ret < 0) {
            +dev_err(bci->dev,
                +"failed to unmask interrupts: \d\n",
            +ret);
            +return ret;
ret = twl4030_clear_set(TWL_MODULE_MAIN_CHARGE, 0, TWL4030_USBFASTMCHG, TWL4030_BCIIMFSTS4);

if (bci->usb_mode == CHARGE_LINEAR) {
    ret = twl_i2c_write_u8(TWL4030_MODULE_INTERRUPTS, reg, TWL4030_INTERRUPTS_BCIIMR1A);
    if (ret < 0) {
        dev_err(bci->dev, "failed to unmask interrupts: %d",
                ret);
        return ret;
    }
    twl4030_clear_set_boot_bci(TWL4030_BCIAUTOAC|TWL4030_CVENAC, 0);
}

/* Watch dog key: WOVF acknowledge */
ret = twl_i2c_write_u8(TWL_MODULE_MAIN_CHARGE, 0x33,
                      @ @ -996,12 +1022,13 @@
if (bci->dev->of_node) {
    struct device_node *phynode = of_get_compatible_child(bci->dev->of_node,
                                                        "ti,twl4030-usb");
    bci->usb_nb.notifier_call = twl4030_bci_usb_ncb;
    bci->transceiver = devm_usb_get_phy_by_node(bci->dev, phynode,
                                             &bci->usb_nb);
    if (IS_ERR(bci->transceiver)) {
        ret = PTR_ERR(bci->transceiver);
        if (ret == -EPROBE_DEFER)
        --- linux-4.15.0.orig/drivers/powercap/intel_rapl.c
        +++ linux-4.15.0/drivers/powercap/intel_rapl.c
            @ @ -1160,14 +1160,15 @@
        RAPL_CPU(INTEL_FAM6_SKYLAKE_X,rapl_defaults_hsw_server),
        RAPL_CPU(INTEL_FAM6_KABYLAKE_MOBILE,rapl_defaults_core),
        RAPL_CPU(INTEL_FAM6_KABYLAKE_DESKTOP,rapl_defaults_core),
        +RAPL_CPU(INTEL_FAM6_CANNONLAKE_MOBILE,rapl_defaults_core),
            -RAPL_CPU(INTEL_FAM6_ATOM_SILVERMONT1,rapl_defaults_byt),
    }

    -phynode = of_find_compatible_node(bci->dev->of_node->parent,
        - NULL,"ti,twl4030-usb");
    +phynode = of_get_compatible_child(bci->dev->of_node->parent,
        + "ti,twl4030-usb");
    if (phynode) {
        bci->usb_nb.notifier_call = twl4030_bci_usb_ncb;
        bci->transceiver = devm_usb_get_phy_by_node(bci->dev, phynode,
         &bci->usb_nb);
        if (IS_ERR(bci->transceiver)) {
            ret = PTR_ERR(bci->transceiver);
            if (ret == -EPROBE_DEFER)
            --- linux-4.15.0.orig/drivers/powercap/intel_rapl.c
            +++ linux-4.15.0/drivers/powercap/intel_rapl.c
                @ @ -1160,14 +1160,15 @@
            RAPL_CPU(INTEL_FAM6_SKYLAKE_X,rapl_defaults_hsw_server),
            RAPL_CPU(INTEL_FAM6_KABYLAKE_MOBILE,rapl_defaults_core),
            RAPL_CPU(INTEL_FAM6_KABYLAKE_DESKTOP,rapl_defaults_core),
            +RAPL_CPU(INTEL_FAM6_CANNONLAKE_MOBILE,rapl_defaults_core),
                -RAPL_CPU(INTEL_FAM6_ATOM_SILVERMONT1,rapl_defaults_byt),
    }
id = x86_match_cpu(rapl_ids);
if (!id) {
    -pr_err("driver does not support CPU family %d model %d
",
+pr_info("driver does not support CPU family %d model %d
",
boot_cpu_data.x86, boot_cpu_data.x86_model);

    return -ENODEV;
}
--- linux-4.15.0.orig/drivers/powercap/powercap_sys.c
+++ linux-4.15.0/drivers/powercap/powercap_sys.c
@@ -236,46 +236,46 @@
for (i = 0; i < MAX_CONSTRAINTS_PER_ZONE; ++i) {
    ret = create_constraint_attribute(i, "power_limit_uw",
    -S_IWUSR | S_IRUGO,
+S_IWUSR | S_IRUSR,
    &constraint_attrs[i].power_limit_attr,
    show_constraint_power_limit_uw,
    store_constraint_power_limit_uw);
    if (ret)
        goto err_alloc;
    ret = create_constraint_attribute(i, "time_window_us",
    -S_IWUSR | S_IRUGO,
+S_IWUSR | S_IRUSR,
    &constraint_attrs[i].time_window_attr,
    show_constraint_time_window_us,
    store_constraint_time_window_us);
    if (ret)
        goto err_alloc;
-ret = create_constraint_attribute(i, "name", S_IRUGO,
+ret = create_constraint_attribute(i, "name", S_IRUSR,
    &constraint_attrs[i].name_attr,
    show_constraint_name,
if (ret)
  goto err_alloc;
-ret = create_constraint_attribute(i, "max_power_uw", S_IRUGO,
+ret = create_constraint_attribute(i, "max_power_uw", S_IRUSR,
&constraint attrs[i].max_power_attr,
show_constraint_max_power_uw,
NULL);
if (ret)
  goto err_alloc;
-ret = create_constraint_attribute(i, "min_power_uw", S_IRUGO,
+ret = create_constraint_attribute(i, "min_power_uw", S_IRUSR,
&constraint attrs[i].min_power_attr,
show_constraint_min_power_uw,
NULL);
if (ret)
  goto err_alloc;
ret = create_constraint_attribute(i, "max_time_window_us",
-S_IRUGO,
+S_IRUSR,
&constraint attrs[i].max_time_window_attr,
show_constraint_max_time_window_us,
NULL);
if (ret)
  goto err_alloc;
ret = create_constraint_attribute(i, "min_time_window_us",
-S_IRUGO,
+S_IRUSR,
&constraint attrs[i].min_time_window_attr,
show_constraint_min_time_window_us,
NULL);
int count = 0;

power_zone->zone_dev_attrs[count++] = &dev_attr_name.attr;
-if (power_zone->ops->get_max_energy_range_uj)
+if (power_zone->ops->get_max_energy_range_uj) {
+dev_attr_max_energy_range_uj.attr.mode = S_IRUSR;
  power_zone->zone_dev_attrs[count++] =
&dev_attr_max_energy_range_uj.attr;
+}
if (power_zone->ops->get_energy_uj) {
  if (power_zone->ops->reset_energy_uj)
+dev_attr_energy_uj.attr.mode = S_IWUSR | S_IRUSR;
else
+dev_attr_energy_uj.attr.mode = S_IRUGO;
+dev_attr_energy_uj.attr.mode = S_IRUSR;
power_zone->zone_dev_attrs[count++] =
 &dev_attr_energy_uj.attr;
 }
- if (power_zone->ops->get_power_uw)
+ if (power_zone->ops->get_power_uw) {
  +dev_attr_power_uw.attr.mode = S_IRUSR;
 power_zone->zone_dev_attrs[count++] =
 &dev_attr_power_uw.attr;
- if (power_zone->ops->get_max_power_range_uw)
+ }
  +dev_attr_max_power_range_uw.attr.mode = S_IRUSR;
 power_zone->zone_dev_attrs[count++] =
 &dev_attr_max_power_range_uw.attr;
+ }
 power_zone->zone_dev_attrs[count] = NULL;
power_zone->zone_attr_count = count;
}
--- linux-4.15.0.orig/drivers/pps/pps.c
+++ linux-4.15.0/drivers/pps/pps.c
@@ -166,6 +166,14 @@
 pps->params.mode |= PPS_CANWAIT;
 pps->params.api_version = PPS_API_VERS;
+/*
+ * Clear unused fields of pps_kparams to avoid leaking
+ * uninitialized data of the PPS_SETPARAMS caller via
+ * PPS_GETPARAMS
+ */
+ pps->params.assert_off_tu.flags = 0;
+ pps->params.clear_off_tu.flags = 0;
+ spin_unlock_irq(&pps->lock);

 break;
--- linux-4.15.0.orig/drivers/ps3/ps3stor_lib.c
+++ linux-4.15.0/drivers/ps3/ps3stor_lib.c
@@ -201,7 +201,7 @@
 dev->bounce_lpar = ps3_mm_phys_to_lpar(__pa(dev->bounce_buf));
 dev->bounce_dma = dma_map_single(&dev->sbd.core, dev->bounce_buf,
 dev->bounce_size, DMA_BIDIRECTIONAL);
- if (!dev->bounce_dma) {
+ if (dma_mapping_error(&dev->sbd.core, dev->bounce_dma)) {
 dev_err(&dev->sbd.core, "%s: %u: map DMA region failed\n",
 __func__, __LINE__);
 error = -ENODEV;
--- linux-4.15.0.orig/drivers/ptp/Kconfig
+++ linux-4.15.0/drivers/ptp/Kconfig
@@ -91,7 +91,8 @@
 config PTP_1588_CLOCK_PCH
 tristate "Intel PCH EG20T as PTP clock"
 depends on X86_32 || COMPILE_TEST
-depends on HAS_IOMEM && NET
+depends on HAS_IOMEM && PCI
+depends on NET
 imply PTP_1588_CLOCK
 help
 
This driver adds support for using the PCH EG20T as a PTP
--- linux-4.15.0.orig/drivers/ptp/ptp_chardev.c
+++ linux-4.15.0/drivers/ptp/ptp_chardev.c
@@ -24,6 +24,8 @@
#include <linux/slab.h>
#include <linux/timekeeping.h>

+#include <linux/nospec.h>
+
#include "ptp_private.h"

static int ptp_disable_pinfunc(struct ptp_clock_info *ops,
@@ -89,6 +91,7 @@
case PTP_PF_PHYSYNC:
if (chan != 0)
return -EINVAL;
+break;
default:
return -EINVAL;
}
@@ -225,7 +228,9 @@
pct->sec = ts.tv_sec;
pct->nsec = ts.tv_nsec;
pct++;
-tpp->info->gettime64(ptp->info, &ts);
+err = ptp->info->gettime64(ptp->info, &ts);
+if (err)
+goto out;
pct->sec = ts.tv_sec;
pct->nsec = ts.tv_nsec;
pct++;
@@ -247,6 +252,7 @@
err = -EINVAL;
break;
}
+pin_index = array_index_nospec(pin_index, ops->n_pins);
if (mutex_lock_interruptible(&ptp->pinconf_mux))
return -ERESTARTSYS;
pd = ops->pin_config[pin_index];
```c
err = -EINVAL;
break;
}
+pin_index = array_index_nospec(pin_index, ops->n_pins);
if (mutex_lock_interruptible(&ptp->pincfg_mux))
    return -ERESTARTSYS;
err = ptp_set_pinfunc(ptp, pin_index, pd.func, pd.chan);
@@ -276,6 +283,7 @@
    break;
}

+out:
kfree(sysoff);
return err;
}
--- linux-4.15.0.orig/drivers/ptp/ptp_clock.c
+++ linux-4.15.0/drivers/ptp/ptp_clock.c
@@ -76,7 +76,7 @@
    spin_unlock_irqrestore(&queue->lock, flags);
}

-static s32 scaled_ppm_to_ppb(long ppm)
+long scaled_ppm_to_ppb(long ppm)
{
    /*
    * The 'freq' field in the 'struct timex' is in parts per
@@ -93,8 +93,9 @@
    ppb *= 125;
    ppb >>= 13;
    -return (s32) ppb;
+return (long) ppb;
    }
+EXPORT_SYMBOL(scaled_ppm_to_ppb);

    /* posix clock implementation */
    @ @ -147,7 +148,7 @ @
    delta = ktime_to_ns(kt);
    err = ops->adjtime(ops, delta);
} else if (tx->modes & ADJ_FREQUENCY) {
-    s32 ppb = scaled_ppm_to_ppb(tx->freq);
+    long ppb = scaled_ppm_to_ppb(tx->freq);
    if (ppb > ops->max_adj || ppb < -ops->max_adj)
        return -ERANGE;
    if (ops->adjfine)
@@ -175,10 +176,11 @@
```
-static void delete_ptp_clock(struct posix_clock *pc)
+static void ptp_clock_release(struct device *dev)
{
-struct ptp_clock *ptp = container_of(pc, struct ptp_clock, clock);
+struct ptp_clock *ptp = container_of(dev, struct ptp_clock, dev);

+ptp_cleanup_pin_groups(ptp);
mutex_destroy(&ptp->tsevq_mux);
mutex_destroy(&ptp->pincfg_mux);
ida_simple_remove(&ptp_clocks_map, ptp->index);
@@ -222,7 +224,6 @@
}

ptp->clock.ops = ptp_clock_ops;
-ptp->clock.release = delete_ptp_clock;
ptp->info = info;
ptp->devid = MKDEV(major, index);
ptp->index = index;
@@ -249,13 +250,6 @@
if (err)
goto no_pin_groups;

-/* Create a new device in our class. */
-ptp->dev = device_create_with_groups(ptp_class, parent, ptp->devid,
-     ptp, ptp->pin_attr_groups,
-     "ptp%d", ptp->index);
-if (IS_ERR(ptp->dev))
goto no_device;
-
/* Register a new PPS source. */
if (info->pps) {
struct pps_source_info pps;
@@ -265,13 +259,24 @@
     pps.owner = info->owner;
ptp->pps_source = pps_register_source(&pps, PTP_PPS_DEFAULTS);
if (!ptp->pps_source) {
+    err = -EINVAL;
pr_err("failed to register pps source\n");
goto no_pps;
}
}

-/* Create a posix clock. */
-err = posix_clock_register(&ptp->clock, ptp->devid);
+/* Initialize a new device of our class in our clock structure. */
+device_initialize(&ptp->dev);
+ptp->dev.dev = ptp->devid;
+ptp->dev.class = ptp_class;
+ptp->dev.parent = parent;
+ptp->dev.groups = ptp->pin_attr_groups;
+ptp->dev.release = ptp_clock_release;
+dev_set_drvdata(&ptp->dev, ptp);
+dev_set_name(&ptp->dev, "ptp%d", ptp->index);
+
+/* Create a posix clock and link it to the device. */
+err = posix_clock_register(&ptp->clock, &ptp->dev);
+if (err) {
  pr_err("failed to create posix clock\n");
  goto no_clock;
}
@@ -283,8 +288,6 @@
  if (ptp->pps_source)
    pps_unregister_source(ptp->pps_source);
  no_pps:
-    device_destroy(ptp_class, ptp->devid);
-    no_device:
  ptp_cleanup_pin_groups(ptp);
  no_pin_groups:
    if (ptp->kworker)
@@ -314,10 +317,8 @@
    if (ptp->pps_source)
      pps_unregister_source(ptp->pps_source);
      posix_clock_unregister(&ptp->clock);
+    return 0;
  }
EXPORT_SYMBOL(ptp_clock_unregister);
--- linux-4.15.0.orig/drivers/ptp/ptp_pch.c
+++ linux-4.15.0/drivers/ptp/ptp_pch.c
@@ -698,6 +698,7 @
    ];
+MODULE_DEVICE_TABLE(pci, pch_ieee1588_pcidev_id);

static struct pci_driver pch_driver = {
  .name = KBUILD_MODNAME,
--- linux-4.15.0.orig/drivers/ptp/ptp_private.h
+++ linux-4.15.0/drivers/ptp/ptp_private.h
@@ -41,7 +41,7 @
     ];
+MODULE_DEVICE_TABLE(pci, pch_ieee1588_pcidev_id);

static struct pci_driver pch_driver = {
  .name = KBUILD_MODNAME,
struct ptp_clock {
    struct posix_clock clock;
    /*struct device *dev;
      */
    struct device dev;
    struct ptp_clock_info *info;
    dev_t devid;
    int index; /* index into clocks.map */
}

--- linux-4.15.0.orig/drivers/pwm/core.c
+++ linux-4.15.0/drivers/pwm/core.c
@@ -311,10 +311,12 @@
if (IS_ENABLED(CONFIG_OF))
    if (!ret)
        pwmchip_sysfs_export(chip);
+    return ret;
}
EXPORT_SYMBOL_GPL(pwmchip_add_with_polarity);
@@ -348,7 +350,7 @@
unsigned int i;
int ret = 0;
    -pwmchip_sysfs_unexport_children(chip);
    +pwmchip_sysfs_unexport(chip);
    +
    return ret;
}
EXPORT_SYMBOL_GPL(pwmchip_add_with_polarity);
@@ -874,6 +874,7 @@
if (pwm->chip->ops->free)
    pwm->chip->ops->free(pwm->chip, pwm);
    +pwm_set_chip_data(pwm, NULL);
pwm->label = NULL;

module_put(pwm->chip->ops->owner);
--- linux-4.15.0.orig/drivers/pwm/pwm-bcm-iproc.c
+++ linux-4.15.0/drivers/pwm/pwm-bcm-iproc.c
@@ -85,8 +85,6 @@
   u64 tmp, multi, rate;
   u32 value, prescale;

-rate = clk_get_rate(ip->clk);
-
   value = readl(ip->base + IPROC_PWM_CTRL_OFFSET);

   if (value & BIT(IPROC_PWM_CTRL_EN_SHIFT(pwm->hwpwm)))
@@ -99,6 +97,13 @@
      state->polarity = PWM_POLARITY_INVERSED;

+rate = clk_get_rate(ip->clk);
+if (rate == 0) {
   +state->period = 0;
   +state->duty_cycle = 0;
   +return;
   +}
   +
   value = readl(ip->base + IPROC_PWM_PRESCALE_OFFSET);
   prescale = value >> IPROC_PWM_PRESCALE_SHIFT(pwm->hwpwm);
   prescale &= IPROC_PWM_PRESCALE_MAX;
@@ -187,6 +192,7 @@
static const struct pwm_ops iproc_pwm_ops = {
   .apply = iproc_pwmc_apply,
   .get_state = iproc_pwmc_get_state,
   +.owner = THIS_MODULE,
   };

static int iproc_pwmc_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/pwm/pwm-bcm2835.c
+++ linux-4.15.0/drivers/pwm/pwm-bcm2835.c
@@ @ -166,7 +166,7 @@
   pc->chip.dev = &pdev->dev;
   pc->chip.ops = &bcm2835_pwm_ops;
   +pc->chip.base = -1;
   pc->chip.npwm = 2;
   pc->chip.of_xlate = of_pwm_xlate_with_flags;
   pc->chip.of_pwm_n_cells = 3;
--- linux-4.15.0.orig/drivers/pwm/pwm-berlin.c
+++ linux-4.15.0/drivers/pwm/pwm-berlin.c
struct berlin_pwm_channel *channel = pwm_get_chip_data(pwm);

-pwm_set_chip_data(pwm, NULL);
kfree(channel);
}

--- linux-4.15.0.orig/drivers/pwm/pwm-clps711x.c
+++ linux-4.15.0/drivers/pwm/pwm-clps711x.c
@@ -48,7 +48,7 @@
static unsigned int clps711x_get_duty(struct pwm_device *pwm, unsigned int v)
{
    /* Duty cycle 0..15 max */
    -return DIV_ROUND_CLOSEST(v * 0xf, pwm_get_period(pwm));
    +return DIV_ROUND_CLOSEST(v * 0xf, pwm->args.period);
}

static int clps711x_pwm_request(struct pwm_chip *chip, struct pwm_device *pwm)
@@ -71,7 +71,7 @@
     struct clps711x_chip *priv = to_clps711x_chip(chip);
     unsigned int duty;

     -if (period_ns != pwm_get_period(pwm))
     +if (period_ns != pwm->args.period)
         return -EINVAL;
     duty = clps711x_get_duty(pwm, duty_ns);

--- linux-4.15.0.orig/drivers/pwm/pwm-img.c
+++ linux-4.15.0/drivers/pwm/pwm-img.c
@@ -132,8 +132,10 @@
     ret = pm_runtime_get_sync(chip->dev);
     -if (ret < 0)
     +if (ret < 0) {
         +pm_runtime_put_autosuspend(chip->dev);
         return ret;
     +}

     val = img_pwm_readl(pwm_chip, PWM_CTRL_CFG);
     val &= ~(PWM_CTRL_CFG_DIV_MASK << PWM_CTRL_CFG_DIV_SHIFT(pwm->hwpwm));
--- linux-4.15.0.orig/drivers/pwm/pwm-img.c
+++ linux-4.15.0/drivers/pwm/pwm-img.c
@@ -278,6 +280,8 @@
     return PTR_ERR(pwm->pwm_clk);
 }

+platform_set_drvdata(pdev, pwm);
pm_runtime_set_autosuspend_delay(&pdev->dev, IMG_PWM_PM_TIMEOUT);
pm_runtime_use_autosuspend(&pdev->dev);
pm_runtime_enable(&pdev->dev);
@@ -314,7 +318,6 @@
goto err_suspend;
}

platform_set_drvdata(pdev, pwm);
return 0;

err_suspend:
@@ -334,8 +337,10 @@
int ret;
ret = pm_runtime_get_sync(&pdev->dev);
-if (ret < 0)
+if (ret < 0) {
+    pm_runtime_put(&pdev->dev);
return ret;
+
for (i = 0; i < pwm_chip->chip.npwm; i++) {
    val = img_pwm_readl(pwm_chip, PWM_CTRL_CFG);
    --- linux-4.15.0.orig/drivers/pwm/pwm-lp3943.c
+++ linux-4.15.0/drivers/pwm/pwm-lp3943.c
@@ -278,6 +278,7 @@
lp3943_pwm->chip.dev = &pdev->dev;
lp3943_pwm->chip.ops = &lp3943_pwm_ops;
lp3943_pwm->chip.npwm = LP3943_NUM_PWMS;
+lp3943_pwm->chip.base = -1;
platform_set_drvdata(pdev, lp3943_pwm);

--- linux-4.15.0.orig/drivers/pwm/pwm-lpc32xx.c
+++ linux-4.15.0/drivers/pwm/pwm-lpc32xx.c
@@ -124,17 +124,17 @@
lpc32xx->chip.ops = &lpc32xx_chip_ops;
lpc32xx->chip.npwm = 1;
lpc32xx->chip.base = -1;

+/* If PWM is disabled, configure the output to the default value */
+val = readl(lpc32xx->base + (lpc32xx->chip.pwms[0].hwpwm << 2));
+val &= ~PWM_PIN_LEVEL;
+writel(val, lpc32xx->base + (lpc32xx->chip.pwms[0].hwpwm << 2));
+
ret = pwmchip_add(&lpc32xx->chip);
if (ret < 0) {
    dev_err(&pdev->dev, "failed to add PWM chip, error \%d\n", ret);
    return ret;
}
/* When PWM is disable, configure the output to the default value */
-val = readl(lpc32xx->base + (lpc32xx->chip.pwms[0].hwpwm << 2));
-val &= ~PWM_PIN_LEVEL;
-writel(val, lpc32xx->base + (lpc32xx->chip.pwms[0].hwpwm << 2));
-
platform_set_drvdata(pdev, lpc32xx);

return 0;
--- linux-4.15.0.orig/drivers/pwm/pwm-lpss-platform.c
+++ linux-4.15.0/drivers/pwm/pwm-lpss-platform.c
@@ -74,6 +74,10 @@
return pwm_lpss_remove(lpwm);
 }

+static SIMPLE_DEV_PM_OPS(pwm_lpss_platform_pm_ops,
+ pwmpkpss_suspend,
+ pwmpkpss_resume);
+
static const struct acpi_device_id pwm_lpss_acpi_match[] = {
    { "80860F09", (unsigned long)&pwm_lpss_byt_info },
    { "80862288", (unsigned long)&pwm_lpss_bsw_info },
@@ -86,6 +90,7 @@
 .driver = {
   .name = "pwm-lpss",
   .acpi_match_table = pwm_lpss_acpi_match,
+    .pm = &pwm_lpss_platform_pm_ops,
 },
 .probe = pwm_lpss_probe_platform,
 .remove = pwm_lpss_remove_platform,
--- linux-4.15.0.orig/drivers/pwm/pwm-lpss.c
+++ linux-4.15.0/drivers/pwm/pwm-lpss.c
@@ -32,10 +32,13 @@
/* Size of each PWM register space if multiple */
#define PWM_SIZE 0x400

+##define MAX_PWMS4
+
struct pwm_lpss_chip {
 struct pwm_chip chip;
 void __iomem *regs;
 const struct pwm_lpss_boardinfo *info;
+u32 saved_ctrl[MAX_PWMS];
};

static inline struct pwm_lpss_chip *to_lpwms(struct pwm_chip *chip)
@@ -94,7 +97,7 @@
unsigned long long on_time_div;
unsigned long c = lpwm->info->clk_rate, base_unit_range;
unsigned long long base_unit, freq = NSEC_PER_SEC;
-u32 ctrl;
+u32 orig_ctrl, ctrl;

do_div(freq, period_ns);

@@ -102,22 +105,27 @@
 * The equation is:
 * base_unit = round(base_unit_range * freq / c)
 */
-base_unit_range = BIT(lpwm->info->base_unit_bits) - 1;
+base_unit_range = BIT(lpwm->info->base_unit_bits);
 freq *= base_unit_range;

 base_unit = DIV_ROUND_CLOSEST_ULL(freq, c);
+/* base_unit must not be 0 and we also want to avoid overflowing it */
+base_unit = clamp_val(base_unit, 1, base_unit_range - 1);

 on_time_div = 255ULL * duty_ns;
do_div(on_time_div, period_ns);
on_time_div = 255ULL - on_time_div;
-ctrl = pwm_lpss_read(pwm);
+orig_ctrl = ctrl = pwm_lpss_read(pwm);
 ctrl &= ~PWM_ON_TIME_DIV_MASK;
-ctrl &= ~(base_unit_range << PWM_BASE_UNIT_SHIFT);
-ctrl &= ~base_unit_range;
+ctrl &= ~((base_unit_range - 1) << PWM_BASE_UNIT_SHIFT);
 ctrl |= (u32) base_unit << PWM_BASE_UNIT_SHIFT;
 ctrl |= on_time_div;
-pwm_lpss_write(pwm, ctrl);
+if (orig_ctrl != ctrl) {
+pwm_lpss_write(pwm, ctrl);
+pwm_lpss_write(pwm, ctrl | PWM_SW_UPDATE);
+}
}

static inline void pwm_lpss_cond_enable(struct pwm_device *pwm, bool cond)
@@ -141,7 +149,6 @@
 return ret;
 }
pwm_lpss_prepare(lpwm, pwm, state->duty_cycle, state->period);
-pwm_lpss_write(pwm, pwm_lpss_read(pwm) | PWM_SW_UPDATE);
pwm_lpss_cond_enable(pwm, lpwm->info->bypass == false);
ret = pwm_lpss_wait_for_update(pwm);
if (ret) {
    @ @ -154,7 +161,6 @@
if (ret)
    return ret;
pwm_lpss_prepare(lpwm, pwm, state->duty_cycle, state->period);
-pwm_lpss_write(pwm, pwm_lpss_read(pwm) | PWM_SW_UPDATE);
return pwm_lpss_wait_for_update(pwm);
} }
} else if (pwm_is_enabled(pwm)) {
@@ -177,6 +183,9 @@
unsigned long c;
int ret;

+if (WARN_ON(info->npwm > MAX_PWMS))
+return ERR_PTR(-ENODEV);
+
lpwm = devm_kzalloc(dev, sizeof(*lpwm), GFP_KERNEL);
if (!lpwm)
    return ERR_PTR(-ENOMEM);
@@ -208,10 +217,40 @@

int pwm_lpss_remove(struct pwm_lpss_chip *lpwm)
{
    +int i;
+
    +for (i = 0; i < lpwm->info->npwm; i++) {
    +if (pwm_is_enabled(&lpwm->chip.pwms[i])
    +pm_runtime_put(lpwm->chip.dev);
    +}
    return pwmchip_remove(&lpwm->chip);
}
EXPERIMENT_SYMBOL_COMPAT(pwm_lpss_remove);

+int pwm_lpss_suspend(struct device *dev)
+{
    +struct pwm_lpss_chip *lpwm = dev_get_drvdata(dev);
    +int i;
    +
    +for (i = 0; i < lpwm->info->npwm; i++)
    +lpwm->saved_ctrl[i] = readl(lpwm->regs + i * PWM_SIZE + PWM);
    +
    +return 0;
    +}
+EXPORT_SYMBOL_GPL(pwm_lpss_suspend);
+
+int pwm_lpss_resume(struct device *dev)
+{
    +struct pwm_lpss_chip *lpwm = dev_get_drvdata(dev);
+int i;
+
+for (i = 0; i < lpwm->info->npwm; i++)
+writel(lpwm->saved_ctrl[i], lpwm->regs + i * PWM_SIZE + PWM);
+
+return 0;
+
+EXPORT_SYMBOL_GPL(pwm_lpss_resume);
+
MODULE_DESCRIPTION("PWM driver for Intel LPSS");
MODULE_AUTHOR("Mika Westerberg <mika.westerberg@linux.intel.com>");
MODULE_LICENSE("GPL v2");

--- linux-4.15.0.orig/drivers/pwm/pwm-lpss.h
+++ linux-4.15.0/drivers/pwm/pwm-lpss.h
@@ -28,5 +28,7 @@
 struct pwm_lpss_chip *pwm_lpss_probe(struct device *dev, struct resource *r,
 const struct pwm_lpss_boardinfo *info);
 int pwm_lpss_remove(struct pwm_lpss_chip *lpwm);
+int pwm_lpss_suspend(struct device *dev);
+int pwm_lpss_resume(struct device *dev);

#endif /* __PWM_LPSS_H */

--- linux-4.15.0.orig/drivers/pwm/pwm-mediatek.c
+++ linux-4.15.0/drivers/pwm/pwm-mediatek.c
@@ -29,7 +29,9 @@
 #define PWMGDUR			0x0c
 #define PWMWAVENUM		0x28
 #define PWMDWIDTH		0x2c
+#define PWM45DWIDTH_FIXUP	0x30
 #define PWMTHRES		0x30
+#define PWM45THRES_FIXUP	0x34

 #define PWM_CLK_DIV_MAX		7
@@ -54,6 +56,7 @@
 struct mtk_pwm_platform_data {
 unsigned int num_pwms;
+bool pwm45_fixup;

};

/**
@@ -66,6 +69,7 @@
 struct pwm_chip chip;
 void __iomem *regs;
 struct clk *clks[MTK_CLK_MAX];
+const struct mtk_pwm_platform_data *soc;


static const unsigned int mtk_pwm_reg_offset[] = {
@ @ -131,18 +135,25 @@
}
struct mtk_pwm_chip *pc = to_mtk_pwm_chip(chip);
struct clk *clk = pc->clks[MTK_CLK_PWM1 + pwm->hwpwm];
-u32 resolution, clkdiv = 0;
+u32 clkdiv = 0, cnt_period, cnt_duty, reg_width = PWMDWIDTH,
+reg_thres = PWMTHRES;
+u64 resolution;
int ret;

ret = mtk_pwm_clk_enable(chip, pwm);
if (ret < 0)
return ret;

-resolution = NSEC_PER_SEC / clk_get_rate(clk);
+/* Using resolution in picosecond gets accuracy higher */
+resolution = (u64)NSEC_PER_SEC * 1000;
+do_div(resolution, clk_get_rate(clk));

-while (period_ns / resolution > 8191) {
+while (cnt_period > 8191) {
cnt_period = DIV_ROUND_CLOSEST_ULL((u64)period_ns * 1000, resolution);
+cnt_period = DIV_ROUND_CLOSEST_ULL((u64)period_ns * 1000,
+ resolution);
}

if (clkdiv > PWM_CLK_DIV_MAX) {
@@ -151,9 +162,19 @@
return -EINVAL;
}

+if (pc->soc->pwm45_fixup && pwm->hwpwm > 2) {
+/*
+ * PWM[4,5] has distinct offset for PWMDWIDTH and PWMTHRES
+ * from the other PWMs on MT7623.
+ */
+reg_width = PWM45DWIDTH_FIXUP;
+reg_thres = PWM45THRES_FIXUP;
+}
+
+cnt_duty = DIV_ROUND_CLOSEST_ULL((u64)duty_ns * 1000, resolution);
mtk_pwm_writel(pc, pwm->hwpwm, PWMDWIDTH, period_ns / resolution);
-mtk_pwm_writel(pc, pwm->hwpwm, PWMTHRES, duty_ns / resolution);
+mtk_pwm_writel(pc, pwm->hwpwm, reg_width, cnt_period);
+mtk_pwm_writel(pc, pwm->hwpwm, reg_thres, cnt_duty);

mtk_pwm_clk_disable(chip, pwm);

@@ -211,6 +232,7 @@
data = of_device_get_match_data(&pdev->dev);
if (data == NULL)
    return -EINVAL;
+pc->soc = data;

res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
pc->regs = devm_ioremap_resource(&pdev->dev, res);
@@ -251,14 +273,17 @@
static const struct mtk_pwm_platform_data mt2712_pwm_data = {
    .num_pwms = 8,
    .pwm45_fixup = false,
};

static const struct mtk_pwm_platform_data mt7622_pwm_data = {
    .num_pwms = 6,
    .pwm45_fixup = false,
};

static const struct mtk_pwm_platform_data mt7623_pwm_data = {
    .num_pwms = 5,
    .pwm45_fixup = true,
};

static const struct of_device_id mtk_pwm_of_match[] = {
    --- linux-4.15.0.orig/drivers/pwm/pwm-meson.c
    +++ linux-4.15.0/drivers/pwm/pwm-meson.c
    @@ -111,6 +111,10 @@
    const struct meson_pwm_data *data;
    void __iomem *base;
    u8 inverter_mask;
+/*
+ * Protects register (write) access to the REG_MISC_AB register
+ * that is shared between the two PWMs.
+ */
    spinlock_t lock;
};

@@ -184,7 +188,7 @@
do_div(fin_ps, fin_freq);

/* Calc pre_div with the period */
for (pre_div = 0; pre_div < MISC_CLK_DIV_MASK; pre_div++) {
  for (pre_div = 0; pre_div <= MISC_CLK_DIV_MASK; pre_div++) {
    cnt = DIV_ROUND_CLOSEST_ULL((u64)period * 1000, 
    fin_ps * (pre_div + 1));
    dev_dbg(meson->chip.dev, "fin_ps=%llu pre_div=%u cnt=%u\n",
    @@ -193,7 +197,7 @@
    break;
  }
-
  if (pre_div == MISC_CLK_DIV_MASK) {
    dev_err(meson->chip.dev, "unable to get period pre_div\n");
    return -EINVAL;
  }
  @ @ -235,6 +239,7 @@
  }
  u32 value, clk_shift, clk_enable, enable;
  unsigned int offset;

  unsigned long flags;
  switch (id) {
    case 0:
    @ @ -255,6 +260,8 @@
    return;
  }
  +
  spin_lock_irqsave(&meson->lock, flags);
  
  value = readl(meson->base + REG_MISC_AB);
  value &= ~(MISC_CLK_DIV_MASK << clk_shift);
  value |= channel->pre_div << clk_shift;
  @ @ -267,11 +274,14 @@
  value = readl(meson->base + REG_MISC_AB);
  value |= enable;
  writel(value, meson->base + REG_MISC_AB);
  +
  +spin_unlock_irqrestore(&meson->lock, flags);
  }

static void meson_pwm_disable(struct meson_pwm *meson, unsigned int id)
{
  u32 value, enable;
  +unsigned long flags;

  switch (id) {
    case 0:
    @ @ -286,9 +296,13 @@
    return;
static int meson_pwm_apply(struct pwm_chip *chip, struct pwm_device *pwm, 
@@ -296,29 +310,21 @@
{
    struct meson_pwm_channel *channel = pwm_get_chip_data(pwm);
    struct meson_pwm *meson = to_meson_pwm(chip);
    unsigned long flags;
    int err = 0;

    if (!state)
        return -EINVAL;

    -spin_lock_irqsave(&meson->lock, flags);
    -
    if (!state->enabled) {
        meson_pwm_disable(meson, pwm->hwpwm);
        channel->state.enabled = false;
    }
    -goto unlock;
    +return 0;
    }
channel->state.polarity = state->polarity;
channel->state.period = state->period;

unlock:
- spin_unlock_irqrestore(&meson->lock, flags);
- return err;
+ return 0;
}

static void meson_pwm_get_state(struct pwm_chip *chip, struct pwm_device *pwm,
    struct meson_pwm_channel *channels)
{
    struct device *dev = meson->chip.dev;
    struct device_node *np = dev->of_node;
    struct clk_init_data init;
    unsigned int i;
    char name[255];

    for (i = 0; i < meson->chip.npwm; i++) {
        struct meson_pwm_channel *channel = &channels[i];

- snprintf(name, sizeof(name), "%pOF#mux%u", np, i);
+ snprintf(name, sizeof(name), "%s#mux%u", dev_name(dev), i);

        init.name = name;
        init.ops = &clk_mux_ops;
    }

    static int pwm_omap_dmtimer_remove(struct platform_device *pdev)
    {
        struct pwm_omap_dmtimer_chip *omap = platform_get_drvdata(pdev);
        int ret;
        + ret = pwmchip_remove(&omap->chip);
        + if (ret)
            + return ret;

        if (pm_runtime_active(&omap->dm_timer_pdev->dev))
            omap->pdata->stop(omap->dm_timer);
    }

    --- linux-4.15.0.orig/drivers/pwm/pwm-omap-dmtimer.c
    +++ linux-4.15.0/drivers/pwm/pwm-omap-dmtimer.c
    @@ -337,6 +337,11 @@
    static int pwm_omap_dmtimer_remove(struct platform_device *pdev)
    {
        struct pwm_omap_dmtimer_chip *omap = platform_get_drvdata(pdev);
        int ret;
        + ret = pwmchip_remove(&omap->chip);
        + if (ret)
            + return ret;

        if (pm_runtime_active(&omap->dm_timer_pdev->dev))
            omap->pdata->stop(omap->dm_timer);
    }

    -- Open Source Used In 5GaaS Edge AC-4 27309
mutex_destroy(&omap->mutex);

return pwmchip_remove(&omap->chip);
+return 0;
}

static const struct of_device_id pwm_omap_dmtimer_of_match[] = {
    --- linux-4.15.0.orig/drivers/pwm/pwm-pca9685.c
    +++ linux-4.15.0/drivers/pwm/pwm-pca9685.c
    @@ -31,6 +31,7 @@
    #include <linux/slab.h>
    #include <linux/delay.h>
    #include <linux/pm_runtime.h>
    +#include <linux(bitmap.h>

    /*
     * Because the PCA9685 has only one prescaler per chip, changing the period of
     * @ @ -85.6 +86.7 @ @
     #if IS_ENABLED(CONFIG_GPIOLIB)
     struct mutex lock;
     struct gpio_chip gpio;
     +DECLARE_BITMAP(pwms_inuse, PCA9685_MAXCHAN + 1);
     #endif
    
    @@ -94,51 +96,51 @@
    }

    #if IS_ENABLED(CONFIG_GPIOLIB)
    -static int pca9685_pwm_gpio_request(struct gpio_chip *gpio, unsigned int offset)
    +static bool pca9685_pwm_test_and_set_inuse(struct pca9685 *pca, int pwm_idx)
    {
    -struct pca9685 *pca = gpiochip_get_data(gpio);
    -struct pwm_device *pwm;
    +bool is_inuse;

    mutex_lock(&pca->lock);
    -
    -pwm = &pca->chip.pwms[offset];
    -
    -if (pwm->flags & (PWMF_REQUESTED | PWMF_EXPORTED)) {
    -mutex_unlock(&pca->lock);
    -return -EBUSY;
    +if (pwm_idx >= PCA9685_MAXCHAN) {
    +*/
    + * "all LEDs" channel:
    + * pretend already in use if any of the PWMs are requested
    + */
static bool pca9685_pwm_is_gpio(struct pca9685 *pca, struct pwm_device *pwm) {
  bool is_gpio = false;
  
  mutex_lock(&pca->lock);
  clear_bit(pwm->pwm_idx, pca->pwms_inuse);
  mutex_unlock(&pca->lock);
}

if (pwm->hwpwm >= PCA9685_MAXCHAN) {
  unsigned int i;
  
  /* Check if any of the GPIOs are requested and in that case
   * prevent using the "all LEDs" channel.
   */
  for (i = 0; i < pca->pca_gpio.ngpio; i++)
    if (gpiochip_is_requested(&pca->gpio, i)) {
      is_gpio = true;
      break;
    }
} else if (pwm_get_chip_data(pwm)) {
  +is_inuse = test_and_set_bit(pwm->pwm_idx, pca->pwms_inuse);
  +out:
  mutex_unlock(&pca->lock);
  pm_runtime_get_sync(pca->chip.dev);
  return 0;
  +return is_inuse;
}
-is_gpio = true;
-
+static int pca9685_pwm_gpio_request(struct gpio_chip *gpio, unsigned int offset)
+{
+  struct pca9685 *pca = gpiochip_get_data(gpio);
+
-  mutex_unlock(&pca->lock);
-  return is_gpio;
+  if (pca9685_pwm_test_and_set_inuse(pca, offset))
+    return -EBUSY;
+  pm_runtime_get_sync(pca->chip.dev);
+  return 0;
+
+  struct pca9685_pwm_gpio_get(struct gpio_chip *gpio, unsigned int offset)
@@ -170,14 +172,10 @@
  }
  struct pca9685 *pca = gpiochip_get_data(gpio);
-  struct pwm_device *pwm;
  pca9685_pwm_gpio_set(gpio, offset, 0);
  pm_runtime_put(pca->chip.dev);
-  mutex_lock(&pca->lock);
-  pwm = &pca->chip.pwms[offset];
-  pwm_set_chip_data(pwm, NULL);
-  mutex_unlock(&pca->lock);
+  pca9685_pwm_clear_inuse(pca, offset);
  }

 static int pca9685_pwm_gpio_set(struct gpio_chip *gpio, unsigned int offset)
@@ -229,12 +227,17 @@
  }
  return devm_gpiochip_add_data(dev, &pca->gpio, pca);
 }
 #else
-  static inline bool pca9685_pwm_is_gpio(struct pca9685 *pca,
-      struct pwm_device *pwm)
+  static inline bool pca9685_pwm_test_and_set_inuse(struct pca9685 *pca,
+      int pwm_idx)
  {
    return false;
  }

+  static inline void
+  pca9685_pwm_clear_inuse(struct pca9685 *pca, int pwm_idx)
+  {
+    +
+  

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static inline int pca9685_pwm_gpio_probe(struct pca9685 *pca)
{
    return 0;
}
static void pca9685_pwm_free(struct pwm_chip *chip, struct pwm_device *pwm)
{
    struct pca9685 *pca = to_pca(chip);
    pca9685_pwm_disable(chip, pwm);
    pm_runtime_put(chip->dev);
    pca9685_pwm_clear_inuse(pca, pwm->hwpwm);
}
static const struct pwm_ops pca9685_pwm_ops = {
    if (div < 0)
        return div;
    /* Let the core driver set pwm->period if disabled and duty_ns == 0 */
    if (!pwm_is_enabled(pwm) && !duty_ns)
        /* Let the core driver set pwm->period if disabled and duty_ns == 0. 
        * But, this driver should prevent to set the new duty_ns if current 
        * duty_cycle is not set 
        * */
        if (!pwm_is_enabled(pwm) && !duty_ns && !pwm->state.duty_cycle)
            return 0;
    rcar_pwm_update(rp, RCAR_PWMCR_SYNC, RCAR_PWMCR_SYNC, RCAR_PWMCR);
    pm_runtime_enable(&pdev->dev);
    ret = pwmchip_add(&rcar_pwm->chip);

    rcar_pwm->chip.base = -1;
    rcar_pwm->chip.npwm = 1;

    pm_runtime_enable(&pdev->dev);
    ret = pwmchip_add(&rcar_pwm->chip);
if (ret < 0) {
    dev_err(&pdev->dev, "failed to register PWM chip: %d\n", ret);
    pm_runtime_disable(&pdev->dev);
    return ret;
}

-pm_runtime_enable(&pdev->dev);
-
return 0;
}

static int rcar_pwm_remove(struct platform_device *pdev) {
    struct rcar_pwm_chip *rcar_pwm = platform_get_drvdata(pdev);
    int ret;

    ret = pwmchip_remove(&rcar_pwm->chip);
    pm_runtime_disable(&pdev->dev);

    return ret;
}

static const struct of_device_id rcar_pwm_of_table[] = {
    --- linux-4.15.0.orig/drivers/pwm/pwm-renesas-tpu.c
    +++ linux-4.15.0/drivers/pwm/pwm-renesas-tpu.c
    @@ -423,16 +423,17 @@
    tpu->chip.base = -1;
    tpu->chip.npwm = TPU_CHANNEL_MAX;

    +pm_runtime_enable(&pdev->dev);
    +
    ret = pwmchip_add(&tpu->chip);
    if (ret < 0) {
        dev_err(&pdev->dev, "failed to register PWM chip\n");
        +pm_runtime_disable(&pdev->dev);
        return ret;
    }

    dev_info(&pdev->dev, "TPU PWM %d registered\n", tpu->pdev->id);

    -pm_runtime_enable(&pdev->dev);
    -
    return 0;
}

@@ -442,12 +443,10 @@
int ret;

ret = pwmchip_remove(&tpu->chip);
-if (ret)
 -return ret;

pm_runtime_disable(&pdev->dev);

-return 0;
+return ret;
}

#ifdef CONFIG_OF
--- linux-4.15.0.orig/drivers/pwm/pwm-rockchip.c
+++ linux-4.15.0/drivers/pwm/pwm-rockchip.c
@@ -370,7 +370,6 @@
ret = pwmchip_add(&pc->chip);
if (ret < 0) {
- clk_unprepare(pc->clk);
 dev_err(&pdev->dev, "pwmchip_add() failed: %d\n", ret);
goto err_pclk;
} 
@@ -393,20 +392,6 @@
 |
 |
 |
 |
 |
 struct rockchip_pwm_chip *pc = platform_get_drvdata(pdev);

-/*
- * Disable the PWM clk before unpreparing it if the PWM device is still
- * running. This should only happen when the last PWM user left it
- * enabled, or when nobody requested a PWM that was previously enabled
- * by the bootloader.
- *
- * FIXME: Maybe the core should disable all PWM devices in
- * pwmchip_remove(). In this case we'd only have to call
- * clk_unprepare() after pwmchip_remove().
- *
- */
-if (pwm_is_enabled(pc->chip.pwms))
- clk_disable(pc->clk);
-
 clk_unprepare(pc->pclk);
 clk_unprepare(pc->clk);

--- linux-4.15.0.orig/drivers/pwm/pwm-samsung.c
+++ linux-4.15.0/drivers/pwm/pwm-samsung.c
@@ -238,7 +238,6 @@
 static void pwm_samsung_free(struct pwm_chip *chip, struct pwm_device *pwm)
devm_kfree(chip->dev, pwm_get_chip_data(pwm));
-pwm_set_chip_data(pwm, NULL);
}

static int pwm_samsung_enable(struct pwm_chip *chip, struct pwm_device *pwm)
--- linux-4.15.0.orig/drivers/pwm/pwm-spear.c
+++ linux-4.15.0/drivers/pwm/pwm-spear.c
@@ -231,10 +231,6 @@
static int spear_pwm_remove(struct platform_device *pdev)
{
 struct spear_pwm_chip *pc = platform_get_drvdata(pdev);
 -int i;
 -
 -for (i = 0; i < NUM_PWM; i++)
 -pwm_disable(&pc->chip.pwms[i]);

 /* clk was prepared in probe, hence unprepare it here */
 clk_unprepare(pc->clk);
--- linux-4.15.0.orig/drivers/pwm/pwm-stm32-lp.c
+++ linux-4.15.0/drivers/pwm/pwm-stm32-lp.c
@@ -59,6 +59,12 @@
/* Calculate the period and prescaler value */
div = (unsigned long long)clk_get_rate(priv->clk) * state->period;
do_div(div, NSEC_PER_SEC);
+if (!div) {
+* Clock is too slow to achieve requested period. */
+dev_dbg(priv->chip.dev, "Can't reach %u ns\n", state->period);
+return -EINVAL;
+}
+
+prd = div;
while (div > STM32_LPTIM_MAX_ARR) {
  presc++;
--- linux-4.15.0.orig/drivers/pwm/pwm-stmpe.c
+++ linux-4.15.0/drivers/pwm/pwm-stmpe.c
@@ -145,7 +145,6 @@
break;

 case 2:
-offset = STMPE24XX_PWMIC1;
+offset = STMPE24XX_PWMIC2;
break;

 default:
--- linux-4.15.0.orig/drivers/pwm/pwm-tegra.c
+++ linux-4.15.0/drivers/pwm/pwm-tegra.c
@@ -245,7 +245,6 @@
static int tegra_pwm_remove(struct platform_device *pdev)
{
struct tegra_pwm_chip *pc = platform_get_drvdata(pdev);
unsigned int i;
int err;

if (WARN_ON(!pc))
  return err;

for (i = 0; i < pc->chip.npwm; i++) {
  struct pwm_device *pwm = &pc->chip.pwms[i];
  if (!pwm_is_enabled(pwm))
    if (clk_prepare_enable(pc->clk) < 0)
      continue;
  pwm_writel(pc, i, 0);
  clk_disable_unprepare(pc->clk);
}
reset_control_assert(pc->rst);
clk_disable_unprepare(pc->clk);

--- linux-4.15.0.orig/drivers/pwm/pwm-tiehrpwm.c
+++ linux-4.15.0/drivers/pwm/pwm-tiehrpwm.c
@@ -33,10 +33,6 @@
#define TBCTL			0x00
#define TBPRD			0x0A
-#define TBCTL_RUN_MASK		(BIT(15) | BIT(14))
-#define TBCTL_STOP_NEXT		0
-#define TBCTL_STOP_ON_CYCLE	BIT(14)
+#define TBCTL_FREE_RUN		(BIT(15) | BIT(14))
#define TBCTL_PRDLD_MASK	BIT(3)
#define TBCTL_PRDLD_SHDW	0
#define TBCTL_PRDLD_IMDT	BIT(3)
@@ -360,7 +356,7 @@
/* Channels polarity can be configured from action qualifier module */
configure_polarity(pc, pwm->hwpwm);

-/* Enable TBCLK before enabling PWM device */
+/* Enable TBCLK */
    ret = clk_enable(pc->tbclk);
    if (ret) {
        dev_err(chip->dev, "Failed to enable TBCLK for %s: %d\n",}

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@@ -368,9 +364,6 @@
 return ret;
 }

-/* Enable time counter for free_run */
-ehrpwm_modify(pc->mmio_base, TBCTL, TBCTL_RUN_MASK, TBCTL_FREE_RUN);
-
 return 0;
 }

@@ -388,6 +381,10 @@
 aqcsfrc_mask = AQCSFRC_CSFA_MASK;
 }

+/* Update shadow register first before modifying active register */
+ehrpwm_modify(pc->mmio_base, AQSFRC, AQSFRC_RLDCSF_MASK, 
+AQSFRC_RLDCSF_ZRO);
+ehrpwm_modify(pc->mmio_base, AQCSFRC, aqcsfrc_mask, aqcsfrc_val);
+*/
+* Changes to immediate action on Action Qualifier. This puts
+* Action Qualifier control on PWM output from next TBCLK
@@ -400,9 +397,6 @@*/
 clk_disable(pc->tbclk);

-/* Stop Time base counter */
-ehrpwm_modify(pc->mmio_base, TBCTL, TBCTL_RUN_MASK, TBCTL_STOP_NEXT);
-
-/* Disable clock on PWM disable */
 pm_runtime_put_sync(chip->dev);
 }

--- linux-4.15.0.orig/drivers/pwm/pwm-zx.c
+++ linux-4.15.0/drivers/pwm/pwm-zx.c
@@ -241,6 +241,7 @@
 ret = pwmchip_add(&zpc->chip);
 if (ret < 0) {
   dev_err(&pdev->dev, "failed to add PWM chip: %d\n", ret);
+  clk_disable_unprepare(zpc->pclk);
 return ret;
 }

--- linux-4.15.0.orig/drivers/pwm/sysfs.c
+++ linux-4.15.0/drivers/pwm/sysfs.c
@@ -399,19 +399,6 @@
 void pwmchip_sysfs_unexport(struct pwm_chip *chip)
 { 
   struct device *parent;
-
-parent = class_find_device(&pwm_class, NULL, chip,
-    pwmchip_sysfs_match);
-if (parent) {
    /* for class_find_device() */
    put_device(parent);
    device_unregister(parent);
}
-
-void pwmchip_sysfs_unexport_children(struct pwm_chip *chip)
-{
    struct device *parent;
    unsigned int i;

    parent = class_find_device(&pwm_class, NULL, chip,
@@ -427,6 +414,7 @@
    put_device(parent);
    device_unregister(parent);
}

static int __init pwm_sysfs_init(void)
--- linux-4.15.0.orig/drivers/rapidio/Kconfig
+++ linux-4.15.0/drivers/rapidio/Kconfig
@@ -25,7 +25,7 @@
 config RAPIDIO_DMA_ENGINE
 bool "DMA Engine support for RapidIO"
 depends on RAPIDIO
-    select DMADEVICES
+    depends on DMADEVICES
 select DMA_ENGINE
 help
 Say Y here if you want to use DMA Engine frameork for RapidIO data
--- linux-4.15.0.orig/drivers/rapidio/devices/rio_mport_cdev.c
+++ linux-4.15.0/drivers/rapidio/devices/rio_mport_cdev.c
@@ -898,9 +898,15 @@
    */
+    */
+    */
+    * Set nr_pages up to mean "how many pages to unpin, in
+    * the error handler:
+    */

rmcd_error("get_user_pages_unlocked err=%ld",
    pinned);
nr_pages = 0;
-} else
+} else {
    rmcd_error("pinned %ld out of %ld pages",
        pinned, nr_pages);
+/*
+ * Set nr_pages up to mean "how many pages to unpin, in
+ * the error handler:
+ */
nr_pages = pinned;
+
ret = -EFAULT;
goto err_pg;
}
@@ -1731,6 +1737,7 @@
struct rio_dev *rdev;
struct rio_switch *rswitch = NULL;
struct rio_mport *mport;
+struct device *dev;
size_t size;
u32 rval;
u32 swpinfo = 0;
@@ -1740,12 +1747,15 @@
if (copy_from_user(&dev_info, arg, sizeof(dev_info)))
    return -EFAULT;
+    dev_info.name[sizeof(dev_info.name) - 1] = '\0';

rmcd_debug(RDEV, "name:%s ct:0x%x did:0x%x hc:0x%x", dev_info.name,
    dev_info.comptag, dev_info.destid, dev_info.hopcount);

-    if (bus_find_device_by_name(&rio_bus_type, NULL, dev_info.name)) {
+    dev = bus_find_device_by_name(&rio_bus_type, NULL, dev_info.name);
+    if (dev) {
        rmcd_debug(RDEV, "device %s already exists", dev_info.name);
+        put_device(dev);
        return -EEXIST;
    }

@@ -1871,6 +1881,7 @@
if (copy_from_user(&dev_info, arg, sizeof(dev_info)))
    return -EFAULT;
+    dev_info.name[sizeof(dev_info.name) - 1] = '\0';

mport = priv->md->mport;

@@ -2455,13 +2466,6 @@
cdev_init(&md->cdev, &mport_fops);
    md->cdev.owner = THIS_MODULE;

-ret = cdev_device_add(&md->cdev, &md->dev);
-    if (ret) {
-        rmcd_error("Failed to register mport %d (err=%d)",
-            mport->id, ret);
-        goto err_cdev;
-    }

    }
INIT_LIST_HEAD(&md->doorbells);
spin_lock_init(&md->db_lock);
INIT_LIST_HEAD(&md->portwrites);
@@ -2481,6 +2485,13 @@
#else
  md->properties.transfer_mode |= RIO_TRANSFER_MODE_TRANSFER;
#endif
+ret = cdev_device_add(&md->cdev, &md->dev);
+if (ret) {
+  rmcd_error("Failed to register mport %d (err=%d)",
+            mport->id, ret);
+  goto err_cdev;
+}
ret = rio_query_mport(mport, &attr);
if (!ret) {
  md->properties.flags = attr.flags;
--- linux-4.15.0.orig/drivers/rapidio/rio_cm.c
+++ linux-4.15.0/drivers/rapidio/rio_cm.c
@@ -1215,7 +1215,9 @@
  riocm_debug(CHOP, "(ch_%d)");
  ch = riocm_get_channel(ch_id);
-  if (!ch || !riocm_cmp_exch(ch, RIO_CM_CHAN_BOUND, RIO_CM_LISTEN))
-    return -EINVAL;
+  if (!ch)
+    return -EINVAL;
  if (!riocm_cmp_exch(ch, RIO_CM_CHAN_BOUND, RIO_CM_LISTEN))
    ret = -EINVAL;
  riocm_put_channel(ch);
  return ret;
@@ -2134,6 +2136,14 @@
 return -ENODEV;
 }
+cm->rx_wq = create_workqueue(DRV_NAME "/rxq");
+if (!cm->rx_wq) {
+  rio_release_inb_mbox(mport, cmbox);
+  rio_release_outb_mbox(mport, cmbox);
+  kfree(cm);
+  return -ENOMEM;
+}
+/*
  * Allocate and register inbound messaging buffers to be ready
  * to receive channel and system management requests
  @@ -2144,7 +2154,6 @@
 cm->rx_slots = RIOCM_RX_RING_SIZE;

mutex_init(&cm->rx_lock);
riocm_rx_fill(cm, RIOCM_RX_RING_SIZE);
-cm->rx_wq = create_workqueue(DRV_NAME "/rxq");
INIT_WORK(&cm->rx_work, rio_ibmsg_handler);

cm->tx_slot = 0;
--- linux-4.15.0.orig/drivers/ras/cec.c
+++ linux-4.15.0/drivers/ras/cec.c
@@ -2,6 +2,7 @@
#include <linux/mm.h>
#include <linux/gfp.h>
#include <linux/kernel.h>
+#include <linux/workqueue.h>
+#include <asm/mce.h>

@ @ -123,16 +124,12 @ @
/* Amount of errors after which we offline */
static unsigned int count_threshold = COUNT_MASK;

-/*
- * The timer "decays" element count each timer_interval which is 24hrs by
- * default.
- */
-#
-#define CEC_TIMER_DEFAULT_INTERVAL 24 * 60 * 60/* 24 hrs */
-#define CEC_TIMER_MIN_INTERVAL 1 * 60 * 60/* 1h */
-#define CEC_TIMER_MAX_INTERVAL 30 * 24 * 60 * 60/* one month */
-#static struct timer_list cec_timer;
-#static u64 timer_interval = CEC_TIMER_DEFAULT_INTERVAL;
-*/
+/* Each element "decays" each decay_interval which is 24hrs by default. */
+#define CEC_DECAY_DEFAULT_INTERVAL 24 * 60 * 60/* 24 hrs */
+#define CEC_DECAY_MIN_INTERVAL 1 * 60 * 60/* 1h */
+#define CEC_DECAY_MAX_INTERVAL 30 * 24 * 60 * 60/* one month */
+#static struct delayed_work cec_work;
+#static u64 decay_interval = CEC_DECAY_DEFAULT_INTERVAL;

/ *
 * Decrement decay value. We're using DECAY_BITS bits to denote decay of an
 * @ @ -160,20 +157,21 @ @
 / *
 * @interval in seconds
 * /
+static void cec_mod_work(unsigned long interval)
 }
-iv = interval * HZ + jiffies;
-
-mod_timer(t, round_jiffies(iv));
+iv = interval * HZ;
+mod_delayed_work(system_wq, &cec_work, round_jiffies(iv));
}

-static void cec_timer_fn(struct timer_list *unused)
+static void cec_work_fn(struct work_struct *work)
{
+mutex_lock(&ce_mutex);
+do_spring_cleaning(&ce_arr);
+mutex_unlock(&ce_mutex);
-
-cec_mod_timer(&cec_timer, timer_interval);
+cec_mod_work(decay_interval);
}

/*
@@ -183,32 +181,38 @@
*/
static int __find_elem(struct ce_array *ca, u64 pfn, unsigned int *to)
{
+int min = 0, max = ca->n - 1;
+u64 this_pfn = PFN(ca->array[i]);
-int min = 0, max = ca->n;
+
-while (min < max) {
+while (min <= max) {
+-int i = (min + max) >> 1;
-+int tmp = (max + min) >> 1;
-+while (min <= max) {
-+int i = (min + max) >> 1;
+
-+this_pfn = PFN(ca->array[tmp]);
+this_pfn = PFN(ca->array[i]);
+
-if (this_pfn < pfn)
-+min = tmp + 1;
+min = i + 1;
-else if (this_pfn > pfn)
-+max = tmp;
-else {
+max = i - 1;
+} else if (this_pfn == pfn) {
+if (to)
+*to = i;
+} else {
+min = tmp;
+break;
+max = i - 1;
+} else if (this_pfn == pfn) {
+if (to)
+*to = i;
+}
+*/
+ * When the loop terminates without finding @pfn, min has the index of
+ * the element slot where the new @pfn should be inserted. The loop
+ * terminates when min > max, which means the min index points to the
+ * bigger element while the max index to the smaller element, in-between
+ * which the new @pfn belongs to.
+ *
+ * For more details, see exercise 1, Section 6.2.1 in TAOCP, vol. 3.
+ */
if (to)
 *to = min;

-this_pfn = PFN(ca->array[min]);
-
-if (this_pfn == pfn)
-return min;
-
return -ENOKEY;
}

@@ -365,7 +369,9 @@
{
 *(u64 *)data = val;

-return cec_add_elem(val);
+cecc_add_elem(val);
+
+return 0;
}

DEFINE_DEBUGFS_ATTRIBUTE(pfn_ops, u64_get, pfn_set, "0x%llx\n");
@@ -374,15 +380,15 @@
{
 *(u64 *)data = val;

-if (val < CEC_TIMER_MIN_INTERVAL)
+if (val < CEC_DECAY_MIN_INTERVAL)
 return -EINVAL;

-if (val > CEC_TIMER_MAX_INTERVAL)
+if (val > CEC_DECAY_MAX_INTERVAL)
 return -EINVAL;

-timer_interval = val;
+decay_interval = val;

-cec_mod_timer(&cec_timer, timer_interval);
+cec_mod_work(decay_interval);
return 0;
}
DEFINE_DEBUGFS_ATTRIBUTE(decay_interval_ops, u64_get, decay_interval_set, "%lld\n");
@@ -426,7 +432,7 @@
seq_printf(m, "Flags: 0x%x\n", ca->flags);

-seq_printf(m, "Timer interval: %lld seconds\n", timer_interval);
+seq_printf(m, "Decay interval: %lld seconds\n", decay_interval);
seq_printf(m, "Decays: %lld\n", ca->decays_done);

seq_printf(m, "Action threshold: %d\n", count_threshold);
@@ -472,7 +478,7 @@
}
decay = debugfs_create_file("decay_interval", S_IRUSR | S_IWUSR, d,
- &timer_interval, &decay_interval_ops);
+ &decay_interval, &decay_interval_ops);
if (!decay) {
pr_warn("Error creating decay_interval debugfs node!\n");
goto err;
@@ -508,8 +514,8 @@
if (create_debugfs_nodes())
return;

-timer_setup(&cec_timer, cec_timer_fn, 0);
-cec_mod_timer(&cec_timer, CEC_TIMER_DEFAULT_INTERVAL);
+INIT_DELAYED_WORK(&cec_work, cec_work_fn);
+schedule_delayed_work(&cec_work, CEC_DECAY_DEFAULT_INTERVAL);

pr_info("Correctable Errors collector initialized.\n");
}
+ * published by the Free Software Foundation.
+ */
+ #include <linux/module.h>
+ #include <linux/moduleparam.h>
+ #include <linux/init.h>
+ #include <linux/err.h>
+ #include <linux/regmap.h>
+ #include <linux/regulator/driver.h>
+ #include <linux/regulator/machine.h>
+ #include <linux/mfd/88pm80x.h>
+ #include <linux/delay.h>
+ #include <linux/io.h>
+ #include <linux/of.h>
+ #include <linux/regulator/of_regulator.h>
+
+ /* LDO1 with DVC[0..3] */
+ #define PM800_LDO1_VOUT		(0x08) /* VOUT1 */
+ #define PM800_LDO1_VOUT_2(0x09)
+ #define PM800_LDO1_VOUT_3(0x0A)
+ #define PM800_LDO2_VOUT(0x0B)
+ #define PM800_LDO3_VOUT(0x0C)
+ #define PM800_LDO4_VOUT(0x0D)
+ #define PM800_LDO5_VOUT(0x0E)
+ #define PM800_LDO6_VOUT(0x0F)
+ #define PM800_LDO7_VOUT(0x10)
+ #define PM800_LDO8_VOUT(0x11)
+ #define PM800_LDO9_VOUT(0x12)
+ #define PM800_LDO10_VOUT(0x13)
+ #define PM800_LDO11_VOUT(0x14)
+ #define PM800_LDO12_VOUT(0x15)
+ #define PM800_LDO13_VOUT(0x16)
+ #define PM800_LDO14_VOUT(0x17)
+ #define PM800_LDO15_VOUT(0x18)
+ #define PM800_LDO16_VOUT(0x19)
+ #define PM800_LDO17_VOUT(0x1A)
+ #define PM800_LDO18_VOUT(0x1B)
+ #define PM800_LDO19_VOUT(0x1C)
+
+ /* BUCK1 with DVC[0..3] */
+ #define PM800_BUCK1(0x3C)
+ #define PM800_BUCK1_1(0x3D)
+ #define PM800_BUCK1_2(0x3E)
+ #define PM800_BUCK1_3(0x3F)
+ #define PM800_BUCK2(0x40)
+ #define PM800_BUCK3(0x41)
+ #define PM800_BUCK4(0x42)
+ #define PM800_BUCK4_1(0x43)
+ #define PM800_BUCK4_2(0x44)
+#define PM800_BUCK4_3(0x45)
+#define PM800_BUCK5(0x46)
+
+#define PM800_BUCK_ENA(0x50)
+define PM800_LDO_ENA1_1(0x51)
+define PM800_LDO_ENA1_2(0x52)
+define PM800_LDO_ENA1_3(0x53)
+
+define PM800_LDO_ENA2_1(0x56)
+define PM800_LDO_ENA2_2(0x57)
+define PM800_LDO_ENA2_3(0x58)
+
+define PM800_BUCK1_MISC1(0x78)
+define PM800_BUCK3_MISC1(0x7E)
+define PM800_BUCK4_MISC1(0x81)
+define PM800_BUCK5_MISC1(0x84)
+
+struct pm800_regulator_info {
+struct regulator_desc desc;
+int max ua;
+};
+
+struct pm800_regulators {
+struct pm80x_chip *chip;
+struct regmap *map;
+};
+
+#define PM800_BUCK(match, vreg, ereg, ebit, amax, volt_ranges, n_volt) {
+.
desc = {
+.name = #vreg, 
+.of_match = of_match_ptr(#match), 
+.regulators_node = of_match_ptr("regulators"), 
+.ops = &pm800_volt_range_ops, 
+.type = REGULATOR_VOLTAGE, 
+.id = PM800_ID_##vreg, 
+.owner = THIS_MODULE, 
+.n_voltages = n_volt, 
+.linear_ranges = volt_ranges, 
+}
+n_linear_ranges = ARRAY_SIZE(volt_ranges),
+vsel_reg = PM800_##vreg,
+vsel_mask = 0x7f,
+enable_reg = PM800_##ereg,
+enable_mask = 1 << (ebit),
+},
+},
+.max_ua = (amax),
+
+/#
+ * vreg - the LDO regs string
+ * ereg - the string for the enable register.
+ * ebit - the bit number in the enable register.
+ * amax - the current
+ * volt_table - the LDO voltage table
+ * For all the LDOes, there are too many ranges. Using volt_table will be
+ * simpler and faster.
+ */
+#define PM800_LDO(match, vreg, ereg, ebit, amax, ldo_volt_table)
+{
+ .desc = {
+ .name = #vreg,
+ .of_match = of_match_ptr(#match),
+ .regulators_node = of_match_ptr("regulators"),
+ .ops = &pm800_volt_table_ops,
+ .type = REGULATOR_VOLTAGE,
+ .id = PM800_ID_##vreg,
+ .owner = THIS_MODULE,
+ .n_voltages = ARRAY_SIZE(ldo_volt_table),
+ .vsel_reg = PM800_##vreg##_VOUT,
+ .vsel_mask = 0xf,
+ .enable_reg = PM800_##ereg,
+ .enable_mask = 1 << (ebit),
+ .volt_table = ldo_volt_table,
+ },
+ .max_ua = (amax),
+ }
+/
+/* Ranges are sorted in ascending order. */
+static const struct regulator_linear_range buck1_volt_range[] = {
+REGULATOR_LINEAR_RANGE(600000, 0, 0x4f, 12500),
+REGULATOR_LINEAR_RANGE(1600000, 0x50, 0x54, 50000),
+};
+
+/* BUCK 2~5 have same ranges. */
+static const struct regulator_linear_range buck2_5_volt_range[] = {
+REGULATOR_LINEAR_RANGE(600000, 0, 0x4f, 12500),
+REGULATOR_LINEAR_RANGE(1600000, 0x50, 0x72, 50000),
+REGULATOR_LINEAR_RANGE(1600000, 0x50, 0x72, 50000),
+};
+
+static const unsigned int ldo1_volt_table[] = {
+600000, 650000, 700000, 750000, 800000, 850000, 900000, 950000,
+1000000, 1050000, 1100000, 1150000, 1200000, 1300000, 1400000, 1500000,
+};
+
+static const unsigned int ldo2_volt_table[] = {
+1700000, 1800000, 1900000, 2000000, 2100000, 2500000, 2700000, 2800000,
+};
+
+/* LDO 3~17 have same voltage table. */
+static const unsigned int ldo3_17_volt_table[] = {
+1200000, 1250000, 1700000, 1800000, 1850000, 1900000, 2500000, 2600000,
+2700000, 2750000, 2800000, 2850000, 2900000, 3000000, 3100000, 3300000,
+};
+
+/* LDO 18~19 have same voltage table. */
+static const unsigned int ldo18_19_volt_table[] = {
+1700000, 1800000, 1900000, 2500000, 2800000, 2900000, 3100000, 3300000,
+};
+
+static int pm800_get_current_limit(struct regulator_dev *rdev)
+{
+struct pm800_regulator_info *info = rdev_get_drvdata(rdev);
+
+return info->max_ua;
+}
+
+static const struct regulator_ops pm800_volt_range_ops = {
+.list_voltage= regulator_list_voltage_linear_range,
+.map_voltage= regulator_map_voltage_linear_range,
+.set_voltage_sel= regulator_set_voltage_sel_regmap,
+.get_voltage_sel= regulator_get_voltage_sel_regmap,
+.enable= regulator_enable_regmap,
+.disable= regulator_disable_regmap,
+.is_enabled= regulator_is_enabled_regmap,
+.get_current_limit= pm800_get_current_limit,
+};
+
+static const struct regulator_ops pm800_volt_table_ops = {
+.list_voltage= regulator_list_voltage_table,
+.map_voltage= regulator_map_voltage_iterate,
+.set_voltage_sel= regulator_set_voltage_sel_regmap,
+.get_voltage_sel= regulator_get_voltage_sel_regmap,
+.enable= regulator_enable_regmap,
+.disable= regulator_disable_regmap,
+.is_enabled= regulator_is_enabled_regmap,
+};
+/* The array is indexed by id(PM800_ID_XXX) */
+static struct pm800_regulator_info pm800_regulator_info[] = {
+  PM800_BUCK(buck1, BUCK1, BUCK_ENA, 0, 3000000, buck1_volt_range, 0x55),
+  PM800_BUCK(buck2, BUCK2, BUCK_ENA, 1, 1200000, buck2_5_volt_range, 0x73),
+  PM800_BUCK(buck3, BUCK3, BUCK_ENA, 2, 1200000, buck2_5_volt_range, 0x73),
+  PM800_BUCK(buck4, BUCK4, BUCK_ENA, 3, 1200000, buck2_5_volt_range, 0x73),
+  PM800_BUCK(buck5, BUCK5, BUCK_ENA, 4, 1200000, buck2_5_volt_range, 0x73),
+  PM800_LDO(ldo1, LDO1, LDO_ENA1_1, 0, 200000, ldo1_volt_table),
+  PM800_LDO(ldo2, LDO2, LDO_ENA1_1, 1, 10000, ldo2_volt_table),
+  PM800_LDO(ldo3, LDO3, LDO_ENA1_1, 2, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo4, LDO4, LDO_ENA1_1, 3, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo5, LDO5, LDO_ENA1_1, 4, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo6, LDO6, LDO_ENA1_1, 5, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo7, LDO7, LDO_ENA1_1, 6, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo8, LDO8, LDO_ENA1_1, 7, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo9, LDO9, LDO_ENA1_2, 0, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo10, LDO10, LDO_ENA1_2, 1, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo11, LDO11, LDO_ENA1_2, 2, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo12, LDO12, LDO_ENA1_2, 3, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo13, LDO13, LDO_ENA1_2, 4, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo14, LDO14, LDO_ENA1_2, 5, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo15, LDO15, LDO_ENA1_2, 6, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo16, LDO16, LDO_ENA1_2, 7, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo17, LDO17, LDO_ENA1_3, 0, 300000, ldo3_17_volt_table),
+  PM800_LDO(ldo18, LDO18, LDO_ENA1_3, 1, 200000, ldo18_19_volt_table),
+  PM800_LDO(ldo19, LDO19, LDO_ENA1_3, 2, 200000, ldo18_19_volt_table),
+};
+
+static int pm800_regulator_probe(struct platform_device *pdev)
+{  
+  struct pm80x_chip *chip = dev_get_drvdata(pdev->dev.parent);
+  struct pm80x_platform_data *pdata = dev_get_platdata(pdev->dev.parent);
+  struct pm800_regulators *pm800_data;
+  struct regulator_config config = { 1};
+  struct regulator_init_data *init_data;
+  int i, ret;
+
+  if (pdata && pdata->num_regulators) {
+    unsigned int count = 0;
+    
+    /* Check whether num_regulator is valid. */
+    for (i = 0; i < ARRAY_SIZE(pdata->regulators); i++) {
+      if (pdata->regulators[i])
+        count++;
+    } /* end of for */
+  } /* end of if */
+  
+  return ret;
+} /* end of pm800_regulator_probe */
+}
+if (count != pdata->num_regulators)
+return -EINVAL;
+
+pm800_data = devm_kzalloc(&pdev->dev, sizeof(*pm800_data),
+GFP_KERNEL);
+if (!pm800_data)
+return -ENOMEM;
+
+pm800_data->map = chip->subchip->regmap_power;
+pm800_data->chip = chip;
+
+platform_set_drvdata(pdev, pm800_data);
+
+config.dev = chip->dev;
+config.regmap = pm800_data->map;
+for (i = 0; i < PM800_ID_RG_MAX; i++) {
+struct regulator_dev *regulator;
+
+if (pdata && pdata->num_regulators) {
+init_data = pdata->regulators[i];
+if (!init_data)
+continue;
+
+config.init_data = init_data;
+}
+
+config.driver_data = &pm800_regulator_info[i];
+
+regulator = devm_regulator_register(&pdev->dev,
+&pm800_regulator_info[i].desc, &config);
+if (IS_ERR(regulator)) {
+ret = PTR_ERR(regulator);
+dev_err(&pdev->dev, "Failed to register %s\n",
+pm800_regulator_info[i].desc.name);
+return ret;
+}
+
+return 0;
+}
+
+static struct platform_driver pm800_regulator_driver = {
+.driver= {
+.name= "88pm80x-regulator",
+},
+.probe= pm800_regulator_probe,
+module_platform_driver(pm800_regulator_driver);
+MODULE_LICENSE("GPL");
+MODULE_AUTHOR("Joseph(Yossi) Hanin <yhanin@marvell.com>");
+MODULE_DESCRIPTION("Regulator Driver for Marvell 88PM800 PMIC");
+MODULE_ALIAS("platform:88pm800-regulator");
--- linux-4.15.0.orig/drivers/regulator/Makefile
+++ linux-4.15.0/drivers/regulator/Makefile
@@ -10,7 +10,7 @@
obj-$(CONFIG_REGULATOR_VIRTUAL_CONSUMER) += virtual.o
obj-$(CONFIG_REGULATOR_USERSPACE_CONSUMER) += userspace-consumer.o
-obj-$(CONFIG_REGULATOR_88PM800) += 88pm800.o
+obj-$(CONFIG_REGULATOR_88PM800) += 88pm800-regulator.o
obj-$(CONFIG_REGULATOR_88PM8607) += 88pm8607.o
obj-$(CONFIG_REGULATOR_CPCAP) += cpcap-regulator.o
obj-$(CONFIG_REGULATOR_AAT2870) += aat2870-regulator.o
--- linux-4.15.0.orig/drivers/regulator/ab8500.c
+++ linux-4.15.0/drivers/regulator/ab8500.c
@@ -1099,23 +1099,6 @@
.update_val_idle = 0x01,
.update_val_normal = 0x01,
},
[AB8505_LDO_USB] = {
- .name = "LDO-USB",
-.ops = &ab8500_regulator_mode_ops,
-.type = REGULATOR_VOLTAGE,
-.id = AB8505_LDO_USB,
-.owner = THIS_MODULE,
-.n_voltages = 1,
-.volt_table= fixed_3300000_voltage,
-},
-.update_bank = 0x03,
-.update_reg = 0x82,
-.update_mask = 0x03,
-.update_val= 0x01,
-.update_val_idle= 0x03,
-.update_val_normal= 0x01,
-}
[AB8505_LDO_AUDIO] = {
 .desc = {
 .name = "LDO-AUDIO",
 --- linux-4.15.0.orig/drivers/regulator/act8865-regulator.c
+++ linux-4.15.0/drivers/regulator/act8865-regulator.c
@@ -131,7 +131,7 @@
* ACT8865 voltage number
 */
#define ACT8865_VOLTAGE_NUM 64
-#define ACT8600_SUDCDC_VOLTAGE_NUM 255
+#define ACT8600_SUDCDC_VOLTAGE_NUM 256

struct act8865 {
    struct regmap *regmap;
    REGULATOR_LINEAR_RANGE(3000000, 0, 63, 0),
    REGULATOR_LINEAR_RANGE(3000000, 64, 159, 100000),
    REGULATOR_LINEAR_RANGE(12600000, 160, 191, 200000),
    -REGULATOR_LINEAR_RANGE(19000000, 191, 255, 400000),
    +REGULATOR_LINEAR_RANGE(19000000, 192, 247, 400000),
    +REGULATOR_LINEAR_RANGE(41400000, 248, 255, 0),
};

static struct regulator_ops act8865_ops = {
    -.558.7 +558.7 @@
    static int axp20x_regulator_parse_dt(struct platform_device *pdev)
    {
        struct device_node *np, *regulators;
        ret = 0;
        dcdcfreq = 0;
        of_node_get(pdev->dev.parent->of_node);
        @ @ -573.13 +573.12 @@
        ret = axp20x_set_dcdc_freq(pdev, dcdcfreq);
        if (ret < 0) {
            dev_err(pdev->dev, "Error setting dcdc frequency: %d\n", ret);
            -return ret;
        }
        -of_node_put(regulators);
    }

    -return 0;
    +of_node_put(np);
    +return ret;
}
static struct regulator_desc regulators[] = {
  BD9571MWV_REG("VD09", "vd09", VD09, avs_ops, 0, 0x7f,
    0x80, 600000, 10000, 0x3c),
  BD9571MWV_REG("VD18", "vd18", VD18, vid_ops, BD9571MWV_VD18_VID, 0xf,
    16, 1625000, 25000, 0),
  BD9571MWV_REG("VD25", "vd25", VD25, vid_ops, BD9571MWV_VD25_VID, 0xf,
    @ @ -128.7 +128.7 @ @
    11, 2800000, 100000, 0),
  BD9571MWV_REG("DVFS", "dvfs", DVFS, reg_ops,
    BD9571MWV_DVFS_MONIVDAC, 0x7f,
    0x80, 600000, 10000, 0x3c),
  + 0x6f, 600000, 10000, 0x3c),
};

static int bd9571mwv_regulator_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/regulator/core.c
+++ linux-4.15.0/drivers/regulator/core.c
@@ -1026,7 +1026,7 @@
 /*
  * set_machine_constraints - sets regulator constraints
  * @rdev: regulator source
- * @constraints: constraints to apply
+ * @constraints: constraints to apply
  *
  * Allows platform initialisation code to define and constrain
  * regulator circuits e.g. valid voltage/current ranges, etc. NOTE:
@@ -1034,21 +1033,11 @@
  * regulator operations to proceed i.e. set_voltage, set_current_limit,
  * set_mode.
  */
-static int set_machine_constraints(struct regulator_dev *rdev,
-const struct regulation_constraints *constraints)
+static int set_machine_constraints(struct regulator_dev *rdev)
{
  int ret = 0;
  const struct regulator_ops *ops = rdev->desc->ops;

  -if (constraints)
  -rdev->constraints = kmemdup(constraints, sizeof(*constraints),
  -  GFP_KERNEL);
  -else
  -rdev->constraints = kzalloc(sizeof(*constraints),
  -  GFP_KERNEL);
  -if (!rdev->constraints)
  -return -ENOMEM;
  -ret = machine_constraintsVoltage(rdev, rdev->constraints);
if (ret != 0)
return ret;

/* and we have control then make sure it is enabled. */
if ((rdev->constraints->always_on || rdev->constraints->boot_on) {
/* If we want to enable this regulator, make sure that we know */
/* the supplying regulator. */
+if (rdev->supply_name && !rdev->supply)
+return -EPROBE_DEFER;
+
ret = _regulator_do_enable(rdev);
if (ret < 0 && ret != -EINVAL) {
  rdev_err(rdev, "failed to enable\n");
}

const char *consumer_dev_name,
const char *supply)
{
-struct regulator_map *node;
+struct regulator_map *node, *new_node;
int has_dev;

if (supply == NULL)
  has_dev = 0;
else
  has_dev = 1;

+new_node = kzalloc(sizeof(struct regulator_map), GFP_KERNEL);
+if (new_node == NULL)
  return -ENOMEM;
+
+mutex_lock(&regulator_list_mutex);
+list_for_each_entry(node, &regulator_map_list, list) {
++has_dev && consumer_dev_name) {
++kfree(new_node);
+} ++consumer_dev_name) {
++has_dev != 0)
++} ++consumer_dev_name) !*= 0)
++if (strcmp(node->dev_name, consumer_dev_name) != 0)
node->regulator->desc->name,
supply,
dev_name(&rdev->dev), rdev_get_name(rdev));
+return -EBUSY;
+goto fail;
}

-node = kzalloc(sizeof(struct regulator_map), GFP_KERNEL);
-if (node == NULL)
-return -ENOMEM;
-
-node->regulator = rdev;
-node->supply = supply;
-
-if (has_dev) {
-node->dev_name = kstrdup(consumer_dev_name, GFP_KERNEL);
-if (node->dev_name == NULL) {
-kfree(node);
-return -ENOMEM;
-
+
-list_add(&new_node->list, &regulator_map_list);
+mutex_unlock(&regulator_list_mutex);
-
-list_add(&node->list, &regulator_map_list);
+list_add(&new_node->list, &regulator_map_list);
+mutex_unlock(&regulator_list_mutex);
-list_add(&node->list, &regulator_map_list);
}
+
+

static void unset_regulator_supplies(struct regulator_dev *rdev)
@@ -1546,6 +1550,15 @@
{}
+
+if (r == rdev) {
+dev_err(dev, "Supply for %s (%s) resolved to itself\n",
+rdev->desc->name, rdev->supply_name);
+if (!have_full_constraints())
+return -EINVAL;
+r = dummy_regulator_rdev;
+get_device(&r->dev);
+}
/*
 *
 */

* If the supply’s parent device is not the same as the
* regulator’s parent device, then ensure the parent device

regulator = create_regulator(rdev, dev, id);
if (regulator == NULL) {
    regulator = ERR_PTR(-ENOMEM);
    -put_device(&rdev->dev);
    module_put(rdev->owner);
    +put_device(&rdev->dev);
    return regulator;
}

rdev->open_count--;
rdev->exclusive = 0;
-put_device(&rdev->dev);
mutex_unlock(&rdev->mutex);

kfree_const(regulator->supply_name);
kfree(regulator);

module_put(rdev->owner);
+put_device(&rdev->dev);
}

/**

 /* set regulator constraints */

regulator_register(const struct regulator_desc *regulator_desc,
                  const struct regulator_config *cfg)
{
    -const struct regulation_constraints *constraints = NULL;
    const struct regulator_init_data *init_data;
    struct regulator_config *config = NULL;
    static atomic_t regulator_no = ATOMIC_INIT(-1);
    @@ -4074,40 +4088,51 @@

    /* set regulator constraints */

if (init_data)
-constraints = &init_data->constraints;
+sizeof(*rdev->constraints),
+GFP_KERNEL);
+else
+rdev->constraints = kzalloc(sizeof(*rdev->constraints),
+GFP_KERNEL);
+if (!rdev->constraints) {
+ret = -ENOMEM;
+goto wash;
+
}

if (init_data && init_data->supply_regulator)
    rdev->supply_name = init_data->supply_regulator;
else if (regulator_desc->supply_name)
    rdev->supply_name = regulator_desc->supply_name;

/*
 * Attempt to resolve the regulator supply, if specified,
 * but don't return an error if we fail because we will try
 * to resolve it again later as more regulators are added.
 * */
-if (regulator_resolve_supply(rdev))
-ret = set_machine_constraints(rdev, constraints);
+ret = set_machine_constraints(rdev);
+if (ret == -EPROBE_DEFER) {
+ /* Regulator might be in bypass mode and so needs its supply
+ * to set the constraints */
+ /* FIXME: this currently triggers a chicken-and-egg problem
+ * when creating -SUPPLY symlink in sysfs to a regulator
+ * that is just being created */
+ret = regulator_resolve_supply(rdev);
+if (!ret)
+ret = set_machine_constraints(rdev);
+else
+rdev_dbg(rdev, "unable to resolve supply early: %pe\n",
+ERR_PTR(ret));
+
} if (ret < 0)
goto wash;

/* add consumers devices */
if (init_data) {
    mutex_lock(&regulator_list_mutex);
    for (i = 0; i < init_data->num_consumer_supplies; i++) {
ret = set_consumer_device_supply(rdev,
init_data->consumer_supplies[i].dev_name,
init_data->consumer_supplies[i].supply);
if (ret < 0) {
    -mutex_unlock(&regulator_list_mutex);
    dev_err(dev, "Failed to set supply \%s\n",
           init_data->consumer_supplies[i].supply);
goto unset_supplies;
} 
.mutex_unlock(&regulator_list_mutex);
}

if (!rdev->desc->ops->get_voltage &&
@@ -4115,13 +4140,13 @@
   !rdev->desc->fixed_uV)
rdev->is_switch = true;

+dev_set_drvdata(&rdev->dev, rdev);
ret = device_register(&rdev->dev);
if (ret != 0) {
    put_device(&rdev->dev);
goto unset_supplies;
} 
-dev_set_drvdata(&rdev->dev, rdev);
rdev_init_debugfs(rdev);

/* try to resolve regulators supply since a new one was registered */
--- linux-4.15.0.orig/drivers/regulator/cpcap-regulator.c
+++ linux-4.15.0/drivers/regulator/cpcap-regulator.c
@@ -222,7 +222,7 @@
case CPCAP_BIT_AUDIO_LOW_PWR:
    return REGULATOR_MODE_STANDBY;
default:
    -return -EINVAL;
+return REGULATOR_MODE_INVALID;
}
}

--- linux-4.15.0.orig/drivers/regulator/da9052-regulator.c
+++ linux-4.15.0/drivers/regulator/da9052-regulator.c
@@ -258,7 +258,8 @@
case DA9052_ID_BUCK3:
case DA9052_ID_LDO2:
case DA9052_ID_LDO3:
    -ret = (new_sel - old_sel) * info->step_uV / 6250;
+ret = DIV_ROUND_UP(abs(new_sel - old_sel) * info->step_uV,
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```c
+  6250);
break;
}

--- linux-4.15.0.orig/drivers/regulator/gpio-regulator.c
+++ linux-4.15.0/drivers/regulator/gpio-regulator.c
@@ -271,8 +271,7 @@
drvdata->desc.name = kstrdup(config->supply_name, GFP_KERNEL);
if (drvdata->desc.name == NULL) {
  dev_err(&pdev->dev, "Failed to allocate supply name\n");
  ret = -ENOMEM;
-  goto err;
+  return -ENOMEM;
  +
}
if (config->nr_gpios != 0) {
  @@ -292,7 +291,7 @@
  dev_err(&pdev->dev, "Could not obtain regulator setting GPIOs: %d\n",
  ret);
  -goto err_memstate;
  +goto err_memgpio;
  }
}

@@ -303,7 +302,7 @@
  if (drvdata->states == NULL) {
  dev_err(&pdev->dev, "Failed to allocate state data\n");
  ret = -ENOMEM;
  -goto err_memgpio;
  +goto err_stategpio;
  }
  drvdata->nr_states = config->nr_states;

@@ -324,7 +323,7 @@
default:
  dev_err(&pdev->dev, "No regulator type set\n");
  ret = -EINVAL;
  -goto err_memgpio;
  +goto err_memstate;
  }
/* build initial state from gpio init data. */
@@ -361,22 +360,21 @@
  if (IS_ERR(drvdata->dev)) {
    ret = PTR_ERR(drvdata->dev);
    dev_err(&pdev->dev, "Failed to register regulator: %d\n", ret);
    -goto err_stategpio;
```

goto err_memstate;

platform_set_drvdata(pdev, drvdata);

return 0;

t�pio_get_array(drvdata->gpios, drvdata->nr_gpios);
err_memstate:
   kfree(drvdata->states);
+err_stategpio:
+gpio_free_array(drvdata->gpios, drvdata->nr_gpios);
err_memgpio:
   kfree(drvdata->gpios);
err_name:
   kfree(drvdata->desc.name);
-err:
   return ret;
}

--- linux-4.15.0.orig/drivers/regulator/lm363x-regulator.c
+++ linux-4.15.0/drivers/regulator/lm363x-regulator.c
@@ -33,7 +33,7 @@
/* LM3632 */
#define LM3632_BOOST_VSEL_MAX	0x26
-#define LM3632_LDO_VSEL_MAX	0x29
+#define LM3632_LDO_VSEL_MAX	0x28
#define LM3632_VBOOST_MIN	4500000
#define LM3632_VLDO_MIN	4000000

--- linux-4.15.0.orig/drivers/regulator/lp87565-regulator.c
+++ linux-4.15.0/drivers/regulator/lp87565-regulator.c
@@ -188,7 +188,7 @@
-struct lp87565 *lp87565 = dev_get_drvdata(pdev->dev.parent);
 struct regulator_config config = { 
 struct regulator_dev *rdev;
 -int i, min_idx = LP87565_BUCK_1, max_idx = LP87565_BUCK_3;
 +int i, min_idx = LP87565_BUCK_0, max_idx = LP87565_BUCK_3;

 platform_set_drvdata(pdev, lp87565);

--- linux-4.15.0.orig/drivers/regulator/max77620-regulator.c
+++ linux-4.15.0/drivers/regulator/max77620-regulator.c
@@ -1,7 +1,7 @@
/*
 * Maxim MAX77620 Regulator driver
/*
 * Copyright (c) 2016, NVIDIA CORPORATION. All rights reserved.
 * Copyright (c) 2016-2018, NVIDIA CORPORATION. All rights reserved.
 *
 * Author: Mallikarjun Kasoju <mkasoju@nvidia.com>
 * Laxman Dewangan <ldewangan@nvidia.com>
 */

config.dev = dev;
config.driver_data = pmic;

+/
+ * Set of_node_reuse flag to prevent driver core from attempting to
+ * claim any pinmux resources already claimed by the parent device.
+ * Otherwise PMIC driver will fail to re-probe.
+ */
+device_set_of_node_from_dev(&pdev->dev, pdev->dev.parent);
+
for (id = 0; id < MAX77620_NUM_REGS; id++) {
struct regulator_dev *rdev;
struct regulator_desc *rdesc;
@@ -803,6 +810,14 @@
 rdesc = &rinfo[id].desc;
 pmic->info[id] = &max77620_regs_info[id];
 pmic->enable_power_mode[id] = MAX77620_POWER_MODE_NORMAL;
+pmic->reg_pdata[id].active_fps_src = -1;
+pmic->reg_pdata[id].active_fps_pd_slot = -1;
+pmic->reg_pdata[id].active_fps_pu_slot = -1;
+pmic->reg_pdata[id].suspend_fps_src = -1;
+pmic->reg_pdata[id].suspend_fps_pd_slot = -1;
+pmic->reg_pdata[id].suspend_fps_pu_slot = -1;
+pmic->reg_pdata[id].power_ok = -1;
+pmic->reg_pdata[id].ramp_rate_setting = -1;

ret = max77620_read_slew_rate(pmic, id);
if (ret < 0)
--- linux-4.15.0.orig/drivers/regulator/max8907-regulator.c
+++ linux-4.15.0/drivers/regulator/max8907-regulator.c
@@ -299,7 +299,10 @@
 memcpy(pmic->desc, max8907_regulators, sizeof(pmic->desc));
 /* Backwards compatibility with MAX8907B; SD1 uses different voltages */
-regmap_read(max8907->regmap_gen, MAX8907_REG_I2RR, &val);
+ret = regmap_read(max8907->regmap_gen, MAX8907_REG_I2RR, &val);
+if (ret)
+return ret;
+
if ((val & MAX8907_I2RR_VERSION_MASK) ==
   MAX8907_I2RR_VERSION_REV_B) {

pmic->desc[MAX8907_SD1].min_uV = 637500;
@@ -336,14 +339,20 @@
 if (pmic->desc[i].ops == &max8907_ldo_ops) {
 -regmap_read(config.regmap, pmic->desc[i].enable_reg,
 +ret = regmap_read(config.regmap, pmic->desc[i].enable_reg,
       &val);
  +if (ret)
   +return ret;
+
  if (((val & MAX8907_MASK_LDO_SEQ) !=
       MAX8907_MASK_LDO_SEQ)
     pmic->desc[i].ops = &max8907_ldo_hwctl_ops;
 } else if (pmic->desc[i].ops == &max8907_out5v_ops) {
 -regmap_read(config.regmap, pmic->desc[i].enable_reg,
 +ret = regmap_read(config.regmap, pmic->desc[i].enable_reg,
       &val);
  +if (ret)
   +return ret;
+
  if (((val & (MAX8907_MASK_OUT5V_VINEN |
      MAX8907_MASK_OUT5V_ENSRC)) !=
       MAX8907_MASK_OUT5V_ENSRC)
--- linux-4.15.0.orig/drivers/regulator/of_regulator.c
+++ linux-4.15.0/drivers/regulator/of_regulator.c
@@ -31,6 +31,7 @@
 struct regulation_constraints *constraints = &(*init_data)->constraints;
 struct regulator_state *suspend_state;
 struct device_node *suspend_np;
+unsigned int mode;
 int ret, i;
 u32 pval;

@@ -124,11 +125,11 @@
 if (!of_property_read_u32(np, "regulator-initial-mode", &pval)) {
 if (desc && desc->of_map_mode) {
 -ret = desc->of_map_mode(pval);
 -if (ret == -EINVAL)
+mode = desc->of_map_mode(pval);
+if (mode == REGULATOR_MODE_INVALID)
 pr_err("%s: invalid mode %u\n", np->name, pval);
 else
  +constraints->initial_mode = ret;
  +constraints->initial_mode = mode;
 } else {
 pr_warn("%s: mapping for mode %d not defined\n","
np->name, pval);
@@ -163,12 +164,12 @@
    if (!of_property_read_u32(suspend_np, "regulator-mode", &pval)) {
        if (desc && desc->of_map_mode) {
            ret = desc->of_map_mode(pval);
        } else {
            suspend_state->mode = ret;
            +suspend_state->mode = mode;
        }
    } else {
        pr_warn("%s: mapping for mode %d not defined\n", np->name, pval);
        @ @ -305,6 +306,7 @@
        dev_err(dev,
        "failed to parse DT for regulator %s\n", child->name);
        +of_node_put(child);
        return -EINVAL;
    }
    match->of_node = of_node_get(child);
--- linux-4.15.0.orig/drivers/regulator/palmas-regulator.c
+++ linux-4.15.0/drivers/regulator/palmas-regulator.c
@@ -443,13 +443,16 @@
 static int palmas_set_mode_smps(struct regulator_dev *dev, unsigned int mode)
 {
     int id = rdev_get_id(dev);
     +int ret;
     struct palmas_pmic *pmic = rdev_get_drvdata(dev);
     struct palmas_pmic_driver_data *ddata = pmic->palmas->pmic_ddata;
     struct palmas_regs_info *rinfo = &ddata->palmas_regs_info[id];
     unsigned int reg;
     bool rail_enable = true;

     -palmas_smps_read(pmic->palmas, rinfo->ctrl_addr, &reg);
     +ret = palmas_smps_read(pmic->palmas, rinfo->ctrl_addr, &reg);
     +if (ret)
     +return ret;

     reg &= ~PALMAS_SMPS12_CTRL_MODE_ACTIVE_MASK;
--- linux-4.15.0.orig/drivers/regulator/pfuze100-regulator.c
+++ linux-4.15.0/drivers/regulator/pfuze100-regulator.c
@@ -158,6 +158,7 @@
static const struct regulator_ops pfuze100_swb_regulator_ops = {
.enable = regulator_enable_regmap,
.disable = regulator_disable_regmap,
.is_enabled = regulator_is_enabled_regmap,
.list_voltage = regulator_list_voltage_table,
.map_voltage = regulator_map_voltage_ascend,
.set_voltage_sel = regulator_set_voltage_sel_regmap,
@@ -631,7 +632,13 @@
/* SW2~SW4 high bit check and modify the voltage value table */
if (i >= sw_check_start && i <= sw_check_end) {
  -regmap_read(pfuze_chip->regmap, desc->vsel_reg, &val);
  +ret = regmap_read(pfuze_chip->regmap,
        +desc->vsel_reg, &val);
  +if (ret) {
        +dev_err(&client->dev, "Fails to read from the register.\n");
        +return ret;
        +}
  +
  if (val & sw_hi) {
    if (pfuze_chip->chip_id == PFUZE3000) {
      desc->volt_table = pfuze3000_sw2hi;
--- linux-4.15.0.orig/drivers/regulator/pv88060-regulator.c
+++ linux-4.15.0/drivers/regulator/pv88060-regulator.c
@@ -135,7 +135,7 @@
      int i;

      /* search for closest to maximum */
      -for (i = info->n_current_limits; i >= 0; i--) {
      +for (i = info->n_current_limits - 1; i >= 0; i--) {
        if (min <= info->current_limits[i]
          && max >= info->current_limits[i]) {
          return regmap_update_bits(rdev->regmap,
--- linux-4.15.0.orig/drivers/regulator/pv88080-regulator.c
+++ linux-4.15.0/drivers/regulator/pv88080-regulator.c
@@ -279,7 +279,7 @@
      int i;

      /* search for closest to maximum */
      -for (i = info->n_current_limits; i >= 0; i--) {
      +for (i = info->n_current_limits - 1; i >= 0; i--) {
        if (min <= info->current_limits[i]
          && max >= info->current_limits[i]) {
          return regmap_update_bits(rdev->regmap,
--- linux-4.15.0.orig/drivers/regulator/pv88090-regulator.c
+++ linux-4.15.0/drivers/regulator/pv88090-regulator.c
@@ -157,7 +157,7 @@
      int i;

/* search for closest to maximum */
-for (i = info->n_current_limits; i >= 0; i--) {
+for (i = info->n_current_limits - 1; i >= 0; i--) {
    if (min <= info->current_limits[i]
        && max >= info->current_limits[i]) {
        return regmap_update_bits(rdev->regmap,
--- linux-4.15.0.orig/drivers/regulator/pwm-regulator.c
+++ linux-4.15.0/drivers/regulator/pwm-regulator.c
@@ -285,7 +285,7 @@
            return ret;
        }
-drvdata->state = -EINVAL;
+drvdata->state = -ENOTRECOVERABLE;
    drvdata->duty_cycle_table = duty_cycle_table;
    memcpy(&drvdata->ops, &pwm_regulator_voltage_table_ops,
            sizeof(drvdata->ops));
--- linux-4.15.0.orig/drivers/regulator/qcom_smd-regulator.c
+++ linux-4.15.0/drivers/regulator/qcom_smd-regulator.c
@@ -20,6 +20,9 @@
    #include <linux/regulator/machine.h>
    #include <linux/regulator/of_regulator.h>
    #include <linux/soc/qcom/smd-rpm.h>
    +#include <linux/regulator/qcom_smd-regulator.h>
    +
    +#include "internal.h"

 struct qcom_rpm_reg {
     struct device *dev;
@@ -44,6 +47,11 @@
     #define RPM_KEY_SWEN 0x6e657773 /* "swen" */
     #define RPM_KEY_UV 0x00007675 /* "uv" */
     #define RPM_KEY_MA 0x0000616d /* "ma" */
     +#define RPM_KEY_FLOOR 0x00636676 /* "vfc" */
     +#define RPM_KEY_CORNER 0x6e726f63 /* "corn" */
     +
     +#define RPM_MIN_FLOOR_CORNER 0
     +#define RPM_MAX_FLOOR_CORNER 6

     static int rpm_reg_write_active(struct qcom_rpm_reg *vreg,
@@ -56,6 +64,50 @@
     req, size);
 }

+int qcom_rpm_set_floor(struct regulator *regulator, int floor)
+

struct regulator_dev *rdev = regulator->rdev;
struct qcom_rpm_reg *vreg = rdev_get_drvdata(rdev);
struct rpm_regulator_req req;
int ret;

req.key = RPM_KEY_FLOOR;
req.nbytes = sizeof(u32);
req.value = floor;

if (floor < RPM_MIN_FLOOR_CORNER || floor > RPM_MAX_FLOOR_CORNER)
    return -EINVAL;

ret = rpm_reg_write_active(vreg, &req, sizeof(req));
if (ret)
    dev_err(rdev_get_dev(rdev), "Failed to set floor %d\n", floor);
return ret;
}

EXPORT_SYMBOL(qcom_rpm_set_floor);

int qcom_rpm_set_corner(struct regulator *regulator, int corner)
{
    struct regulator_dev *rdev = regulator->rdev;
    struct qcom_rpm_reg *vreg = rdev_get_drvdata(rdev);
    struct rpm_regulator_req req;
    int ret;

    req.key = RPM_KEY_CORNER;
    req.nbytes = sizeof(u32);
    req.value = corner;

    if (corner < RPM_MIN_FLOOR_CORNER || corner > RPM_MAX_FLOOR_CORNER)
        return -EINVAL;

    ret = rpm_reg_write_active(vreg, &req, sizeof(req));
    if (ret)
        dev_err(rdev_get_dev(rdev), "Failed to set corner %d\n", corner);
    return ret;
}

EXPORT_SYMBOL(qcom_rpm_set_corner);

static int rpm_reg_enable(struct regulator_dev *rdev)
{
    struct qcom_rpm_reg *vreg = rdev_get_drvdata(rdev);
    --- linux-4.15.0.orig/drivers/regulator/rk808-regulator.c
    +++ linux-4.15.0/drivers/regulator/rk808-regulator.c
    @@ -714,7 +714,7 @@
if (!pdata->dvs_gpio[i]) {
    dev_warn(dev, "there is no dvs%d gpio", i);
    dev_info(dev, "there is no dvs%d gpio", i);
    continue;
}

--- linux-4.15.0.orig/drivers/regulator/rn5t618-regulator.c
+++ linux-4.15.0/drivers/regulator/rn5t618-regulator.c
@@ -154,6 +154,7 @@
 module_platform_driver(rn5t618_regulator_driver);
+MODULE_ALIAS("platform:rn5t618-regulator");
 MODULE_AUTHOR("Beniamino Galvani <b.galvani@gmail.com>");
 MODULE_DESCRIPTION("RN5T618 regulator driver");
 MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/regulator/s2mpa01.c
+++ linux-4.15.0/drivers/regulator/s2mpa01.c
@@ -304,13 +304,13 @@
 regulator_desc_ldo(2, STEP_50_MV),
 regulator_desc_ldo(3, STEP_50_MV),
 regulator_desc_ldo(4, STEP_50_MV),
-regulator_desc_ldo(5, STEP_50_MV),
+-regulator_desc_ldo(5, STEP_25_MV),
 regulator_desc_ldo(6, STEP_25_MV),
 regulator_desc_ldo(7, STEP_50_MV),
 regulator_desc_ldo(8, STEP_50_MV),
 regulator_desc_ldo(9, STEP_50_MV),
 regulator_desc_ldo(10, STEP_50_MV),
-regulator_desc_ldo(11, STEP_25_MV),
+-regulator_desc_ldo(11, STEP_50_MV),
 regulator_desc_ldo(12, STEP_50_MV),
 regulator_desc_ldo(13, STEP_50_MV),
 regulator_desc_ldo(14, STEP_50_MV),
@@ -321,11 +321,11 @@
 regulator_desc_ldo(19, STEP_50_MV),
 regulator_desc_ldo(20, STEP_50_MV),
 regulator_desc_ldo(21, STEP_50_MV),
-regulator_desc_ldo(22, STEP_25_MV),
+-regulator_desc_ldo(22, STEP_50_MV),
 regulator_desc_ldo(23, STEP_50_MV),
 regulator_desc_ldo(24, STEP_50_MV),
 regulator_desc_ldo(25, STEP_50_MV),
 regulator_desc_ldo(26, STEP_25_MV),
 regulator_desc_ldo(26, STEP_25_MV),
regulator_desc_buck1_4(1),
regulator_desc_buck1_4(2),
regulator_desc_buck1_4(3),
--- linux-4.15.0.orig/drivers/regulator/s2mps11.c
+++/ linux-4.15.0/drivers/regulator/s2mps11.c
@@ -376,7 +376,7 @@
regulator_desc_s2mps11_ldo(32, STEP_50_MV),
regulator_desc_s2mps11_ldo(33, STEP_50_MV),
-regulator_desc_s2mps11_ldo(34, STEP_50_MV),
+regulator_desc_s2mps11_ldo(35, STEP_25_MV),
regulator_desc_s2mps11_ldo(36, STEP_50_MV),
regulator_desc_s2mps11_ldo(37, STEP_50_MV),
-regulator_desc_s2mps11_ldo(38, STEP_50_MV),
@@ -386,8 +386,8 @@
regulator_desc_s2mps11_buck1_4(4),
regulator_desc_s2mps11_buck5,
regulator_desc_s2mps11_buck67810(6, MIN_600_MV, STEP_6_25_MV),
-regulator_desc_s2mps11_buck67810(7, MIN_600_MV, STEP_6_25_MV),
-regulator_desc_s2mps11_buck67810(8, MIN_600_MV, STEP_6_25_MV),
+regulator_desc_s2mps11_buck67810(7, MIN_750_MV, STEP_12_5_MV),
+regulator_desc_s2mps11_buck67810(8, MIN_750_MV, STEP_12_5_MV),
regulator_desc_s2mps11_buck9,
regulator_desc_s2mps11_buck67810(10, MIN_750_MV, STEP_12_5_MV),
};
--- linux-4.15.0.orig/drivers/regulator/s5m8767.c
+++/ linux-4.15.0/drivers/regulator/s5m8767.c
@@ -555,13 +555,17 @@
 rdata = devm_kzalloc(&pdev->dev, sizeof(*rdata) *
pdata->num_regulators, GFP_KERNEL);
-if (!rdata)
+if (!rdata) {
+of_node_put(regulators_np);
return -ENOMEM;
+}

 rmode = devm_kzalloc(&pdev->dev, sizeof(*rmode) *
pdata->num_regulators, GFP_KERNEL);
-if (!rmode)
+if (!rmode) {
+of_node_put(regulators_np);
return -ENOMEM;
+}

 pdata->regulators = rdata;
pdata->opmode = rmode;
--- linux-4.15.0.orig/drivers/regulator/stm32-vrefbuf.c
+++ linux-4.15.0/drivers/regulator/stm32-vrefbuf.c
@@ -51,7 +51,7 @@
 * arbitrary timeout.
 */
 ret = readl_poll_timeout(priv->base + STM32_VREFBUF_CSR, val,
 - !(val & STM32_VRR), 650, 10000);
+val & STM32_VRR, 650, 10000);
 if (ret) {
    dev_err(&rdev->dev, "stm32 vrefbuf timed out!

--- linux-4.15.0.orig/drivers/regulator/ti-abb-regulator.c
+++ linux-4.15.0/drivers/regulator/ti-abb-regulator.c
@@ -173,19 +173,14 @@
 while (timeout++ <= abb->settling_time) {
 status = ti_abb_check_txdone(abb);
 if (status)
-    break;
+    return 0;
    udelay(1);
 }

-if (timeout > abb->settling_time) {
-    dev_warn_ratelimited(dev,
-    "%s:TRANXDONE timeout(%dU) int=0x%08x\n",
-    ___func__, timeout, readl(abb->int_base));
-    return -ETIMEDOUT;
-}
-
-    return 0;
+    dev_warn_ratelimited(dev, "%s:TRANXDONE timeout(%dU) int=0x%08x\n",
+    ___func__, timeout, readl(abb->int_base));
+    return -ETIMEDOUT;
 }

/**
 @@ -205,19 +200,14 @@
 status = ti_abb_check_txdone(abb);
 if (!status)
     break;
+    return 0;
    udelay(1);
 }

-if (timeout > abb->settling_time) {
-    dev_warn_ratelimited(dev,

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- "\%s:TRANXDONE timeout(\%d\us) int=0x\%08x\n",
- __func__, timeout, readl(abb->int_base));
- return -ETIMEDOUT;
- }
-
- return 0;
+dev_warn_ratelimited(dev, "\%s:TRANXDONE timeout(\%d\us) int=0x\%08x\n",
+ __func__, timeout, readl(abb->int_base));
+ return -ETIMEDOUT;
}

/**
 @@ -352,8 +342,17 @@
 return ret;
 }

-/* If data is exactly the same, then just update index, no change */
 info = &abb->info[sel];
 */
+/*
 + * When Linux kernel is starting up, we are\'nt sure of the
 + * Bias configuration that bootloader has configured.
 + * So, we get to know the actual setting the first time
 + * we are asked to transition.
 + */
+if (abb->current_info_idx == -EINVAL)
+ goto just_set_abb;
+
+/* If data is exactly the same, then just update index, no change */
 oinfo = &abb->info[abb->current_info_idx];
 if (!memcmp(info, oinfo, sizeof(*info))) {
 dev_dbg(dev, "%s: Same data new idx=%d, old idx=%d\n", __func__,
@@ -361,6 +360,7 @@
 goto out;
 }

+just_set_abb:
 ret = ti_abb_set_opp(rdev, abb, info);

 out:
--- linux-4.15.0.orig/drivers/regulator/tps65086-regulator.c
+++ linux-4.15.0/drivers/regulator/tps65086-regulator.c
@@ -90,8 +90,8 @@
 static const struct regulator_linear_range tps65086_ldoa1_ranges[] = {
 REGULATOR_LINEAR_RANGE(1350000, 0x0, 0x0, 0),
 REGULATOR_LINEAR_RANGE(1500000, 0x1, 0x7, 100000),
-REGULATOR_LINEAR_RANGE(2300000, 0x8, 0xA, 100000),
-REGULATOR_LINEAR_RANGE(2700000, 0xB, 0xD, 150000),
+REGULATOR_LINEAR_RANGE(2300000, 0x8, 0xB, 100000),
     REGULATOR_LINEAR_RANGE(2700000, 0xB, 0xD, 150000),
     +REGULATOR_LINEAR_RANGE(2300000, 0x8, 0xB, 100000),
REGULATOR_LINEAR_RANGE(2850000, 0xC, 0xD, 150000),
REGULATOR_LINEAR_RANGE(3300000, 0xE, 0xE, 0),
};

--- linux-4.15.0.orig/drivers/regulator/tps65217-regulator.c
+++ linux-4.15.0/drivers/regulator/tps65217-regulator.c
@@ -231,6 +231,8 @@
 /* Allocate memory for strobes */
 tps->strobes = devm_kzalloc(&pdev->dev, sizeof(u8) *
 TPS65217_NUM_REGULATOR, GFP_KERNEL);
+if (!tps->strobes)
+ return -ENOMEM;
 platform_set_drvdata(pdev, tps);

--- linux-4.15.0.orig/drivers/regulator/tps65910-regulator.c
+++ linux-4.15.0/drivers/regulator/tps65910-regulator.c
@@ -1102,8 +1102,10 @@
 /* Give control of all register to control port */
 -tps65910_reg_set_bits(pmic->mfd, TPS65910_DEVCTRL,
 +err = tps65910_reg_set_bits(pmic->mfd, TPS65910_DEVCTRL,
 DEVCTRL_SR_CTL_I2C_SEL_MASK);
+if (err < 0)
+ return err;

 switch (tps65910_chip_id(tps65910)) {
 case TPS65910:
 --- linux-4.15.0.orig/drivers/regulator/twl-regulator.c
 +++ linux-4.15.0/drivers/regulator/twl-regulator.c
 @@ -274,7 +274,7 @@
 case RES_STATE_SLEEP:
 return REGULATOR_MODE_STANDBY;
 default:
- return -EINVAL;
+ return REGULATOR_MODE_INVALID;
 } }

 --- linux-4.15.0.orig/drivers/regulator/wm831x-dcdc.c
 +++ linux-4.15.0/drivers/regulator/wm831x-dcdc.c
 @@ -327,8 +327,8 @@
 /* Current limit options */
 -static u16 wm831x_dcdc_ilim[] = {
-125, 250, 375, 500, 625, 750, 875, 1000
+static const unsigned int wm831x_dcdc_ilim[] = {
+125000, 250000, 375000, 500000, 625000, 750000, 875000, 1000000
+};

static int wm831x_buckv_set_current_limit(struct regulator_dev *rdev,
   --- linux-4.15.0.orig/drivers/remoteproc/da8xx_remoteproc.c
   +++ linux-4.15.0/drivers/remoteproc/da8xx_remoteproc.c
   @@ -207,7 +207,7 @@
   res->start & DA8XX_RPROC_LOCAL_ADDRESS_MASK;
   drproc->mem[i].size = resource_size(res);

   -dev_dbg(dev, "memory %8s: bus addr %pa size 0x%zx va %p da 0x%x\n",
   +dev_dbg(dev, "memory %8s: bus addr %pa size 0x%zx va %p da 0x%x\n",
   mem_names[i], &drproc->mem[i].bus_addr,
   drproc->mem[i].size, drproc->mem[i].cpu_addr,
   drproc->mem[i].dev_addr);
   --- linux-4.15.0.orig/drivers/remoteproc/imx_rproc.c
   +++ linux-4.15.0/drivers/remoteproc/imx_rproc.c
   @@ -339,8 +339,10 @@
   }

dcfg = of_device_get_match_data(dev);
   -if (!dcfg)
   -return -EINVAL;
   +if (!dcfg) {
   +ret = -EINVAL;
   +goto err_put_rproc;
   +}

   priv = rproc->priv;
   priv->rproc = rproc;
   --- linux-4.15.0.orig/drivers/remoteproc/qcom_q6v5_pil.c
   +++ linux-4.15.0/drivers/remoteproc/qcom_q6v5_pil.c
   @@ -337,6 +337,12 @@
   |
   struct q6v5 *qproc = rproc->priv;
   /* MBA is restricted to a maximum size of 1M */
   +if (fw->size > qproc->mba_size || fw->size > SZ_1M) {
   +dev_err(qproc->dev, "MBA firmware load failed\n");
   +return -EINVAL;
   +}
   +
   memcpy(qproc->mba_region, fw->data, fw->size);

   return 0;
   @@ -690,14 +696,13 @@
if (phdr->p_filesz) {
    snprintf(seg_name, sizeof(seg_name), "modem.b%02d", i);
    ret = request_firmware(&seg_fw, seg_name, qproc->dev);
    ret = request_firmware_into_buf(&seg_fw, seg_name, qproc->dev,
        ptr, phdr->p_filesz);
    if (ret) {
        dev_err(qproc->dev, "failed to load %s\n", seg_name);
        goto release_firmware;
    }
    memcpy(ptr, seg_fw->data, seg_fw->size);
    release_firmware(seg_fw);
}
@@ -775,13 +780,11 @@
 /* Assign MBA image access in DDR to q6 */
 -xfermemop_ret = q6v5_xfer_mem_ownership(qproc, &qproc->mba_perm, true,
 -qproc->mba_phys,
 -qproc->mba_size);
 -if (xfermemop_ret) {
 -    dev_err(qproc->dev, "assigning Q6 access to mba memory failed: %d\n",
 -        xfermemop_ret);
 -    goto disable_active_clks;
 -}
 @@ -1102,6 +1105,7 @@
 dev_err(qproc->dev, "unable to resolve mba region\n");
 return ret;
 }
+of_node_put(node);
 qproc->mba_phys = r.start;
 qproc->mba_size = resource_size(&r);
 @@ -1119,6 +1123,7 @@
 dev_err(qproc->dev, "unable to resolve mpss region\n");
 return ret;
 }
+of_node_put(node);
 qproc->mpss_phys = qproc->mpss_reloc = r.start;
qproc->mpss_size = resource_size(&r);
@@ -1143,6 +1148,9 @@
 if (!desc)
 return -EINVAL;

+if (desc->need_mem_protection && !qcom_scm_is_available())
+return -EPROBE_DEFER;
+
 rproc = rproc_alloc(&pdev->dev, pdev->name, &q6v5_ops,
   desc->hexagon_mba_image, sizeof(*qproc));
if (!rproc) {
@@ -1259,16 +1267,26 @@
static const struct rproc_hexagon_res msm8996_mss = {
 .hexagon_mba_image = "mba.mbn",
 +.proxy_supply = (struct qcom_mss_reg_res[]) { 
 +{ 
 +.supply = "pll",
 +.uA = 100000,
 + },
 +{ }
 + },
 +.proxy_clk_names = (char*[]){
 +"xo",
 +"pnoc",
 +"qdss",
 NULL
 },
 .active_clk_names = (char*[]){
 +"iface",
 +"bus",
 +"mem",
 +"gpll0_mss_clk",
 +"gpll0_mss",
 +"snoc_axi",
 +"mnoc_axi",
 NULL
 },
 .need_mem_protection = true,
--- linux-4.15.0.orig/drivers/remoteproc/remoteproc_core.c
+++ linux-4.15.0/drivers/remoteproc/remoteproc_core.c
@@ -288,7 +288,7 @@
 { 
 int size = PAGE_ALIGN(vring_size(rvring->len, rvring->align));
 struct rproc *rproc = rvring->rvdev->rproc;
-int idx = rvring->rvdev->vrng - rvring;
+int idx = rvring - rvring->rvdev->vrng;
 struct fw_rsc_vdev *rsc;
dma_free_coherent(rproc->dev.parent, size, rvrng->va, rvrng->dma);
@@ -1432,6 +1432,7 @@
 rproc->dev.type = &rproc_type;
 rproc->dev.class = &rproc_class;
 rproc->dev.driver_data = rproc;
+idr_init(&rproc->notifyids);

 /* Assign a unique device index and name */
 rproc->index = ida_simple_get(&rproc_dev_index, 0, 0, GFP_KERNEL);
@@ -1450,8 +1451,6 @@
 mutex_init(&rproc->lock);

 -idr_init(&rproc->notifyids);
-
 INIT_LIST_HEAD(&rproc->carveouts);
 INIT_LIST_HEAD(&rproc->mappings);
 INIT_LIST_HEAD(&rproc->traces);
@@ -1620,7 +1619,7 @@
 return 0;
 }
-module_init(remoteproc_init);
+subsys_initcall(remoteproc_init);

 static void __exit remoteproc_exit(void)
 {
--- linux-4.15.0.orig/drivers/remoteproc/remoteproc_sysfs.c
+++ linux-4.15.0/drivers/remoteproc/remoteproc_sysfs.c
@@ -48,6 +48,11 @@
 }

 len = strcspn(buf, "\n");
+if (!len) {
+dev_err(dev, "can't provide a NULL firmware\n");
+err = -EINVAL;
+goto out;
+
 len = strcspn(buf, "\n");
+if (!len) {
+dev_err(dev, "can't provide a NULL firmware\n");
+err = -EINVAL;
+goto out;
+
 p = kstrndup(buf, len, GFP_KERNEL);
 if (!p) {
--- linux-4.15.0.orig/drivers/reset/core.c
+++ linux-4.15.0/drivers/reset/core.c
@@ -398,7 +398,10 @@
 if (!rstc)
 return ERR_PTR(-ENOMEM);
try_module_get(rcdev->owner);
+if (!try_module_get(rcdev->owner)) {
+kfree(rstc);
+-return ERR_PTR(-ENODEV);
+
}    

rstc->rcdev = rcdev;
list_add(&rstc->list, &rcdev->reset_control_head);
@@ -466,28 +469,29 @@
break;
}
}
-of_node_put(args.np);

if (!rcdev) {
-mutex_unlock(&reset_list_mutex);
-return ERR_PTR(-EPROBE_DEFER);
+rstc = ERR_PTR(-EPROBE_DEFER);
+goto out;
}

if (WARN_ON(args.args_count != rcdev->of_reset_n_cells)) {
-mutex_unlock(&reset_list_mutex);
-return ERR_PTR(-EINVAL);
+rstc = ERR_PTR(-EINVAL);
+goto out;
}

rstc_id = rcdev->of_xlate(rcdev, &args);
if (rstc_id < 0) {
-mutex_unlock(&reset_list_mutex);
-return ERR_PTR(rstc_id);
+rstc = ERR_PTR(rstc_id);
+goto out;
}

/* reset_list_mutex also protects the rcdev's reset_control list */
rstc = __reset_control_get_internal(rcdev, rstc_id, shared);

+out:
mutex_unlock(&reset_list_mutex);
+of_node_put(args.np);

return rstc;
}
@@ -512,6 +516,7 @@
for (i = 0; i < resets->num_rstcs; i++)
  __reset_control_put_internal(resets->rstc[i]);
mutex_unlock(&reset_list_mutex);
+kfree(resets);
}

/**
 @@ -566,17 +571,18 @@
 * device_reset - find reset controller associated with the device
 * and perform reset
 * @dev: device to be reset by the controller
 + * @optional: whether it is optional to reset the device
 *
 - * Convenience wrapper for reset_control_get() and reset_control_reset().
 + * Convenience wrapper for __reset_control_get() and reset_control_reset().
 * This is useful for the common case of devices with single, dedicated reset
 * lines.
 */
-int device_reset(struct device *dev)
+int __device_reset(struct device *dev, bool optional)
{
 struct reset_control *rstc;
 int ret;

 -rstc = reset_control_get(dev, NULL);
 +rstc = __reset_control_get(dev, NULL, 0, 0, optional);
 if (IS_ERR(rstc))
 return PTR_ERR(rstc);

 @@ -586,7 +592,7 @@
 return ret;
 }
-EXPORT_SYMBOL_GPL(device_reset);
+EXPORT_SYMBOL_GPL(__device_reset);

 /**
 * APIs to manage an array of reset controls.
 --- linux-4.15.0.orig/drivers/reset/reset-a10sr.c
 +++ linux-4.15.0/drivers/reset/reset-a10sr.c
 @@ -129,6 +129,7 @@
 .probe	= a10sr_reset_probe,
 .driver = {
 +.name	= "altr_a10sr_reset",
 +.of_match_table	= a10sr_reset_of_match,
 },
 }; module_platform_driver(a10sr_reset_driver);
 --- linux-4.15.0.orig/drivers/reset/reset-imx7.c
 +++ linux-4.15.0/drivers/reset/reset-imx7.c
struct imx7_src *imx7src = to_imx7_src(rcdev);
const struct imx7_src_signal *signal = &imx7_src_signals[id];
unsigned int value = 0;
unsigned int value = assert ? signal->bit : 0;

switch (id) {
    case IMX7_RESET_PCIEPHY:
"--- linux-4.15.0.orig/drivers/reset/reset-ti-syscon.c
+++ linux-4.15.0/drivers/reset/reset-ti-syscon.c
@@ -58,8 +58,8 @@
unsigned int nr_controls;
"

#define to_ti_syscon_reset_data(rcdev)	\
    container_of(rcdev, struct ti_syscon_reset_data, rcdev)
+#define to_ti_syscon_reset_data(_rcdev)	\
+    container_of(_rcdev, struct ti_syscon_reset_data, rcdev)

/**
 * ti_syscon_reset_assert() - assert device reset
"--- linux-4.15.0.orig/drivers/reset/reset-uniphier.c
+++ linux-4.15.0/drivers/reset/reset-uniphier.c
@@ -107,7 +107,7 @@
UNIPHIER_RESETX(12, 0x200c, 4), /* USB30 link */
    UNIPHIER_RESETX(13, 0x200c, 5), /* USB31 link */
    UNIPHIER_RESETX(16, 0x200c, 12),/* USB30-PHY0 */
    UNIPHIER_RESETX(17, 0x200c, 13),/* USB30-PHY1 */
    UNIPHIER_RESETX(18, 0x200c, 14),/* USB30-PHY2 */
@@ -122,8 +122,8 @@
UNIPHIER_RESETX(2, 0x200c, 0), /* NAND */
UNIPHIER_RESETX(4, 0x200c, 2),/* eMMC */
UNIPHIER_RESETX(8, 0x200c, 8),/* STDMAC (HSC) */
    UNIPHIER_RESETX(12, 0x200c, 4), /* USB30 link (GIOO) */
    UNIPHIER_RESETX(13, 0x200c, 5), /* USB31 link (GIO1) */
    UNIPHIER_RESETX(12, 0x200c, 4), /* USB30 link */
    UNIPHIER_RESETX(13, 0x200c, 5), /* USB31 link */
    UNIPHIER_RESETX(16, 0x200c, 16),/* USB30-PHY0 */
    UNIPHIER_RESETX(17, 0x200c, 18),/* USB30-PHY1 */
    UNIPHIER_RESETX(18, 0x200c, 20),/* USB30-PHY2 */
"--- linux-4.15.0.orig/drivers/rpmsg/qcom_glink_native.c
+++ linux-4.15.0/drivers/rpmsg/qcom_glink_native.c
@@ -221,6 +221,7 @@
/* Setup glink internal glink_channel data */
spin_lock_init(&channel->recv_lock);
spin_lock_init(&channel->intent_lock);
+mutex_init(&channel->intent_req_lock);

channel->glink = glink;
channel->name = kstrdup(name, GFP_KERNEL);
@@ -243,10 +244,31 @@
 {  
 struct glink_channel *channel = container_of(ref, struct glink_channel,  
 refcount);
+struct glink_core_rx_intent *intent;
+struct glink_core_rx_intent *tmp;
 unsigned long flags;
+int iid;
+  
+ /* cancel pending rx_done work */
+cancel_work_sync(&channel->intent_work);

 spin_lock_irqsave(&channel->intent_lock, flags);
+ /* Free all non-reuse intents pending rx_done work */
+list_for_each_entry_safe(intent, tmp, &channel->done_intents, node) {
+    if (!intent->reuse) {
+        kfree(intent->data);
+        kfree(intent);
+    }
+}
+ idr_for_each_entry(&channel->liids, tmp, iid) {
+    kfree(tmp->data);
+    kfree(tmp);
+}
 idr_destroy(&channel->liids);
+ idr_for_each_entry(&channel->riids, tmp, iid)
+    kfree(tmp);
 idr_destroy(&channel->riids);
 spin_unlock_irqrestore(&channel->intent_lock, flags);
@@ -790,9 +812,6 @@
 return -EAGAIN;
 }

 -if (WARN(chunk_size % 4, "Incoming data must be word aligned\n"))
-return -EINVAL;
-
 rcid = le16_to_cpu(hdr.msg.param1);
 spin_lock_irqsave(&glink->idr_lock, flags);
 channel = idr_find(&glink->rcids, rcid);
dev_err(glink->dev,
"no intent found for channel %s intent %d",
channel->name, liid);
+ret = -ENOENT;
goto advance_rx;
}
}
@@ -856,7 +837,6 @@
ret = -ENOENT;
}
throw advance_rx;
}

compact(&channel->open_ack);
+compact_all(&channel->open_ack);

return 0;
}

close_link:
/*
 * Send a close request to "undo" our open-ack. The close-ack will
 * release the last reference.
 * + release qcom_glink_send_open_req() reference and the last reference
 * + will be released after receiving remote_close or transport unregister
 * + by calling qcom_glink_native_remove().
 * /
 qcom_glink_send_close_req(glink, channel);

-/* Release qcom_glink_send_open_req() reference */
-kref_put(&channel->refcount, qcom_glink_channel_release);
-
return ret;
}

__be32 *val = defaults;
int size;

-if (glink->intentless)
+if (glink->intentless || !completion_done(&channel->open_ack))
return 0;

prop = of_find_property(np, "qcom.intents", NULL);

channel->rcid = ret;
spin_unlock_irqrestore(&glink->idr_lock, flags);

-complete(&channel->open_req);
+complete_all(&channel->open_req);

if (create_device) {
    rpdev = kzalloc(sizeof(*rpdev), GFP_KERNEL);
    ret = rpmsg_register_device(rpdev);
    if (ret)
        goto free_rpdev;
    channel->rpdev = rpdev;
}

return 0;

-free_rpdev:
-kfree(rpdev);
rcid_remove:
spin_lock_irqsave(&glink->idr_lock, flags);
idr_remove(&glink->rcids, channel->rcid);
@@ -1545,6 +1562,18 @@
}
}

+static void qcom_glink_cancel_rx_work(struct qcom_glink *glink)
+{
+    struct glink_defer_cmd *dcmd;
+    struct glink_defer_cmd *tmp;
+    /* cancel any pending deferred rx_work */
+    cancel_work_sync(&glink->rx_work);
+    list_for_each_entry_safe(dcmd, tmp, &glink->rx_queue, node)
+        kfree(dcmd);
+}
+
+struct qcom_glink *qcom_glink_native_probe(struct device *dev,
+    unsigned long features,
+    struct qcom_glink_pipe *rx,
+    struct glink_channel *channel;
+    int cid;
+    int ret;
+    unsigned long flags;

    disable_irq(glink->irq);
    -cancel_work_sync(&glink->rx_work);
+qcom_glink_cancel_rx_work(glink);

ret = device_for_each_child(glink->dev, NULL, qcom_glink_remove_device);
if (ret)
  dev_warn(glink->dev, "Can't remove GLINK devices: %d\n", ret);

-  spin_lock_irqsave(&glink->idr_lock, flags);
/* Release any defunct local channels, waiting for close-ack */
idr_for_each_entry(&glink->lcids, channel, cid)
  kref_put(&channel->refcount, qcom_glink_channel_release);

-/+  spin_unlock_irqrestore(&glink->idr_lock, flags);
/* Release any defunct local channels, waiting for close-req */
{idr_for_each_entry(&glink->rcids, channel, cid)
  +kref_put(&channel->refcount, qcom_glink_channel_release);
  +
  idr_destroy(&glink->lcids);
  idr_destroy(&glink->rcids);
-  mbox_free_channel(glink->mbox_chan);
}EXPORT_SYMBOL_GPL(qcom_glink_native_remove);

--- linux-4.15.0.orig/drivers/rpmsg/qcom_glink_smem.c
+++ linux-4.15.0/drivers/rpmsg/qcom_glink_smem.c
@@ -99,15 +99,11 @@
    tail -= pipe->native.length;
    -if (len) {
        __ioread32_copy(data, pipe->fifo + tail,
    -len / sizeof(u32));
    -}
    +if (len)
    +memcpy_fromio(data, pipe->fifo + tail, len);

    -if (len != count) {
        __ioread32_copy(data + len, pipe->fifo,
        -(count - len) / sizeof(u32));
    -}
    +if (len != count)
    +memcpy_fromio(data + len, pipe->fifo, (count - len));
}

static void glink_smem_rx_advance(struct qcom_glink_pipe *np,
@@ -119,7 +115,7 @@
tail = le32_to_cpu(*pipe->tail);

    tail += count;
    -if (tail > pipe->native.length)
+if (tail >= pipe->native.length)
tail -= pipe->native.length;

*pipe->tail = cpu_to_le32(tail);
@@ -185,6 +181,9 @@
if (head >= pipe->native.length)
head -= pipe->native.length;
+
 /* Ensure ordering of fifo and head update */
+wmb();
+
 *pipe->head = cpu_to_le32(head);
}

@@ -216,6 +215,7 @@
ret = device_register(dev);
if (ret) {
    pr_err("failed to register glink edge\n");
+put_device(dev);
    return ERR_PTR(ret);
}

@@ -298,7 +298,7 @@
return glink;
err_put_dev:
-put_device(dev);
+device_unregister(dev);

return ERR_PTR(ret);
}

--- linux-4.15.0.orig/drivers/rpmsg/qcom_smd.c
+++ linux-4.15.0/drivers/rpmsg/qcom_smd.c
@@ -1043,14 +1043,16 @@
void *info;
int ret;

-channel = devm_kzalloc(&edge->dev, sizeof(*channel), GFP_KERNEL);
+channel = kzalloc(sizeof(*channel), GFP_KERNEL);
if (!channel)
    return ERR_PTR(-ENOMEM);
channel->edge = edge;
-channel->name = devm_kstrdup(&edge->dev, name, GFP_KERNEL);
-"if (!channel->name)
-    return ERR_PTR(-ENOMEM);
+if (!channel->name) {
+    channel->name = kstrdup(name, GFP_KERNEL);
+if (!channel->name) {
mutex_init(&channel->tx_lock);
spin_lock_init(&channel->recv_lock);

free_name_and_channel:
-devm_kfree(&edge->dev, channel->name);
-devm_kfree(&edge->dev, channel);
+kfree(channel->name);
+free_channel:
+kfree(channel);

return ERR_PTR(ret);
}

edge->remote_pid = QCOM_SMEM_HOST_ANY;

syscon_np = of_parse_phandle(node, "qcom,ipc", 0);
if (!syscon_np) {
    dev_err(dev, "no qcom,ipc node\n");
    -return -ENODEV;
    +goto put_node;
}

key = "qcom,ipc";
ret = of_property_read_u32_index(node, key, 1, &edge->ipc_offset);
if (ret < 0) {
    dev_err(dev, "no offset in %s\n", key);
return -EINVAL;
goto put_node;
}

ret = of_property_read_u32_index(node, key, 2, &edge->ipc_bit);
if (ret < 0) {
    dev_err(dev, "no bit in \%s\n", key);
-    return -EINVAL;
+    goto put_node;
}

ret = of_property_read_string(node, "label", &edge->name);
@@ -1298,7 +1304,8 @@
irq = irq_of_parse_and_map(node, 0);
if (irq < 0) {
    dev_err(dev, "required smd interrupt missing\n");
-    return -EINVAL;
+    ret = irq;
+    goto put_node;
}

ret = devm_request_irq(dev, irq,
@@ -1306,12 +1313,18 @@
node->name, edge);
if (ret) {
    dev_err(dev, "failed to request smd irq\n");
-    return ret;
+    goto put_node;
}

edge->irq = irq;

return 0;
+
+put_node:
+of_node_put(node);
+edge->of_node = NULL;
+
+return ret;
}

/*
@@ -1320,13 +1333,13 @@
*/
static void qcom_smd_edge_release(struct device *dev)
{
-struct qcom_smd_channel *channel;
+struct qcom_smd_channel *channel, *tmp;
struct qcom_smd_edge *edge = to_smd_edge(dev);

-list_for_each_entry(channel, &edge->channels, list) {
-    SET_RX_CHANNEL_INFO(channel, state, SMD_CHANNEL_CLOSED);
-    SET_RX_CHANNEL_INFO(channel, head, 0);
-    SET_RX_CHANNEL_INFO(channel, tail, 0);
+    list_for_each_entry_safe(channel, tmp, &edge->channels, list) {
+        list_del(&channel->list);
+        kfree(channel->name);
+        kfree(channel);
+    }

    kfree(edge);
--- linux-4.15.0.orig/drivers/rpmsg/rpmsg_char.c
+++ linux-4.15.0/drivers/rpmsg/rpmsg_char.c
@@ -581,4 +581,6 @@
    unregister_chrdev_region(rpmsg_major, RPMSG_DEV_MAX);
 }
module_exit(rpmsg_chrdev_exit);
+
+MODULE_ALIAS("rpmsg:rpmsg_chrdev");
MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/rtc/Kconfig
+++ linux-4.15.0/drivers/rtc/Kconfig
@@ -205,6 +205,15 @@
    This driver can also be built as a module. If so, the module
    will be called rtc-ac100.

+config RTC_DRV_AM1805
+tristate "Ambiq micro AM1805 RTC driver"
+help
+ If you say yes here you get support for Ambiq micro AM1805 RTC
+ chip.
+
+ This driver can also be built as a module. If so, the module
+ will be called rtc-am1805.
+
+config RTC_DRV_BRCMSTB
tristate "Broadcom STB wake-timer"
depends on ARCH_BRCMSTB || BMIPS_GENERIC || COMPILE_TEST
@@ -323,6 +332,7 @@
config RTC_DRV_MAX8907
tristate "Maxim MAX8907"
depends on MFD_MAX8907 || COMPILE_TEST
+select REGMAP_IRQ
help
 If you say yes here you will get support for the
RTC of Maxim MAX8907 PMIC.
tristate "Samsung S2M/S5M series"
depends on MFD_SEC_CORE || COMPIL_TEST
select REGMAP_IRQ
+select REGMAP_I2C
help
 If you say yes here you will get support for the
RTC of Samsung S2MPS14 and S5M PMIC series.
--- linux-4.15.0.orig/drivers/rtc/Makefile
+++ linux-4.15.0/drivers/rtc/Makefile
@@ -637,6 +647,7 @@
tristate "Samsung S2M/S5M series"
depends on MFD_SEC_CORE || COMPILE_TEST
select REGMAP_IRQ
+select REGMAP_I2C
help
 If you say yes here you will get support for the
RTC of Samsung S2MPS14 and S5M PMIC series.
+uie = rtc->uie_rctimer.enabled || rtc->uie_irq_active;
+} else
+uie = rtc->uie_rctimer.enabled;
+} endif
+if (uie) {
+err = rtc_update_irq_enable(rtc, 0);
+if (err)
+return err;
+
+err = mutex_lock_interruptible(&rtc->ops_lock);
+if (err)
+return err;
@@ -87,6 +98,13 @@
mutex_unlock(&rtc->ops_lock);
 */ A timer might have just expired */
schedule_work(&rtc->irqwork);
+
+if (uie) {
+err = rtc_update_irq_enable(rtc, 1);
+if (err)
+return err;
+
+return err;
+}

EXPORT_SYMBOL_GPL(rtc_set_time);
@@ -359,6 +377,11 @@
{
int err;

+if (!rtc->ops)
+return -ENODEV;
+else if (!rtc->ops->set_alarm)
+return -EINVAL;
+
err = rtc_valid_tm(&alarm->time);
if (err != 0)
return err;
--- linux-4.15.0.orig/drivers/rtc/rtc-88pm80x.c
+++ linux-4.15.0/drivers/rtc/rtc-88pm80x.c
@@ -116,12 +116,14 @@
unsigned char buf[4];
unsigned long ticks, base, data;
regmap_raw_read(info->map, PM800_RTC_EXPIRE2_1, buf, 4);
+(buf[1] << 8) | buf[0];

dev_dbg(info->dev, "%x-%x-%x-%x\n", buf[0], buf[1], buf[2], buf[3]);

/* load 32-bit read-only counter */
regmap_raw_read(info->map, PM800_RTC_COUNTER1, buf, 4);
+(buf[1] << 8) | buf[0];
ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n", base, data, ticks);
@@ -144,7 +146,8 @@
/* load 32-bit read-only counter */
regmap_raw_read(info->map, PM800_RTC_COUNTER1, buf, 4);
+(buf[1] << 8) | buf[0];
ticks = base + data;
dev_dbg(info->dev, "set base:0x%lx, RO count:0x%lx, ticks:0x%lx\n", base, data, ticks);
@@ -165,11 +168,13 @@
int ret;
regmap_raw_read(info->map, PM800_RTC_EXPIRE2_1, buf, 4);
+(buf[1] << 8) | buf[0];
dev_dbg(info->dev, "%x-%x-%x-%x\n", buf[0], buf[1], buf[2], buf[3]);

regmap_raw_read(info->map, PM800_RTC_EXPIRE1_1, buf, 4);
+(buf[1] << 8) | buf[0];
ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n", base, data, ticks);
@@ -192,12 +197,14 @@
regmap_update_bits(info->map, PM800_RTC_CONTROL, PM800_ALARM1_EN, 0);
regmap_raw_read(info->map, PM800_RTC_EXPIRE2_1, buf, 4);
+(buf[1] << 8) | buf[0];
dev_dbg(info->dev, "%x-%x-%x-%x\n", buf[0], buf[1], buf[2], buf[3]);

regmap_raw_read(info->map, PM800_RTC_COUNTER1, buf, 4);
+(buf[1] << 8) | buf[0];
ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n", base, data, ticks);
regmap_update_bits(info->map, PM800_RTC_CONTROL, PM800_ALARM1_EN, 0);
ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n", base, data, ticks);

--- linux-4.15.0.orig/drivers/rtc/rtc-88pm860x.c
+++ linux-4.15.0/drivers/rtc/rtc-88pm860x.c
@@ -115,11 +115,13 @@
 pm860x_page_bulk_read(info->i2c, REG0_ADDR, 8, buf);
 dev_dbg(info->dev, "%x-%x-%x-%x-%x-%x-%x\n", buf[0], buf[1], buf[2], buf[3], buf[4], buf[5], buf[6], buf[7]);

 /* load 32-bit read-only counter */
 pm860x_bulk_read(info->i2c, PM8607_RTC_COUNTER1, 4, buf);
 +(buf[1] << 8) | buf[0];
 ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n", base, data, ticks);

--- linux-4.15.0.orig/drivers/rtc/rtc-88pm860x.c
+++ linux-4.15.0/drivers/rtc/rtc-88pm860x.c
@@ -145,7 +147,8 @@
 pm860x_page_bulk_read(info->i2c, REG0_ADDR, 8, buf);
 dev_dbg(info->dev, "%x-%x-%x-%x-%x-%x-%x\n", buf[0], buf[1], buf[2], buf[3], buf[4], buf[5], buf[6], buf[7]);

 pm860x_bulk_read(info->i2c, PM8607_RTC_EXPIRE1, 4, buf);
 +(buf[1] << 8) | buf[0];
 ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n", base, data, ticks);
pm860x_page_bulk_read(info->i2c, REG0_ADDR, 8, buf);
dev_dbg(info->dev, "%x-%x-%x-%x-%x-%x-%x\n", buf[0], buf[1],
buf[2], buf[3], buf[4], buf[5], buf[6], buf[7]);
	(buf[5] << 8) | buf[7];

ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n",
 base, data, ticks);

/* load 32-bit read-only counter */
pm860x_bulk_read(info->i2c, PM8607_RTC_COUNTER1, 4, buf);
	(buf[1] << 8) | buf[0];

ticks = base + data;
dev_dbg(info->dev, "get base:0x%lx, RO count:0x%lx, ticks:0x%lx\n",
 base, data, ticks);

pm860x_rtc_info *info = platform_get_drvdata(pdev);

+info->rtc_dev = devm_rtc_allocate_device(&pdev->dev);
+if (IS_ERR(info->rtc_dev))
+return PTR_ERR(info->rtc_dev);
+ret = devm_request_threaded_irq(&pdev->dev, info->irq, NULL,
rtc_update_handler, IRQF_ONESHOT, "rtc",
info);
@@ -375,13 +386,11 @@
} }

-/* enable internal XO instead of internal 3.25MHz clock since it can
 */
#ifdef VRTC_CALIBRATION
-flush_scheduled_work();
+cancel_delayed_work_sync(&info->calib_work);
/* disable measurement */
pm860x_set_bits(info->i2c, PM8607_MEAS_EN2, MEAS2_VRTC, 0);
#endif/* VRTC_CALIBRATION */
--- linux-4.15.0.orig/drivers/rtc/rtc-ac100.c
+++ linux-4.15.0/drivers/rtc/rtc-ac100.c
@@ -137,13 +137,15 @@
div = (reg >> AC100_CLKOUT_PRE_DIV_SHIFT) &
((1 << AC100_CLKOUT_PRE_DIV_WIDTH) - 1);
prate = divider_recalc_rate(hw, prate, div,
- ac100_clkout_prediv, 0);
+ ac100_clkout_prediv, 0,
+ AC100_CLKOUT_PRE_DIV_WIDTH);
}

div = (reg >> AC100_CLKOUT_DIV_SHIFT) &
(BIT(AC100_CLKOUT_DIV_WIDTH) - 1);
return divider_recalc_rate(hw, prate, div, NULL,
- CLK_DIVIDER_POWER_OF_TWO);
+ CLK_DIVIDER_POWER_OF_TWO,
+ AC100_CLKOUT_DIV_WIDTH);
}

static long ac100_clkout_round_rate(struct clk_hw *hw, unsigned long rate,
@@ -567,6 +569,12 @@
return chip->irq;
}

+chip->rtc = devm_rtc_allocate_device(&pdev->dev);
+if (IS_ERR(chip->rtc))
+return PTR_ERR(chip->rtc);
+
+chip->rtc->ops = &ac100_rtc_ops;
+
+ret = devm_request_threaded_irq(&pdev->dev, chip->irq, NULL,
ac100_rtc_irq,
IRQF_SHARED | IRQF_ONESHOT,
@@ -586,17 +594,16 @@
/* clear counter alarm pending interrupts */
regmap_write(chip->regmap, AC100_ALM_INT_STA, AC100_ALM_INT_ENABLE);

-chip->rtc = devm_rtc_device_register(&pdev->dev, "rtc-ac100",
- &ac100_rtc_ops, THIS_MODULE);
- if (IS_ERR(chip->rtc)) {
- dev_err(&pdev->dev, "unable to register device\n");
- return PTR_ERR(chip->rtc);
ret = ac100_rtc_register_clks(chip);
if (ret)
    return ret;

+ret = rtc_register_device(chip->rtc);
+if (ret) {
+    dev_err(&pdev->dev, "unable to register device\n");
+    return ret;
+}
+
    dev_info(&pdev->dev, "RTC enabled\n");

return 0;
--- linux-4.15.0.orig/drivers/rtc/rtc-am1805.c
+++ linux-4.15.0/drivers/rtc/rtc-am1805.c
@@ -0,0 +1,1562 @@
+/*
+ * Copyright (C) 2016 Eurotech S.p.A.
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License version 2 as
+ * published by the Free Software Foundation.
+ */
+/*
+ * Version History.
+ * 2016-10-26 0.6.0 fixed time fields in rtc_read_alarm function
+ *
+ * 2016-10-03 0.5.0 notify that UIE is not supported by our hw
+ * add mutex lock/unlock to read/set time functions
+ *
+ * 2016-07-12 0.4-0 Add clock_adj parameter for XT clock calibration
+ *
+ * 2016-04-20 0.3.0 Add board turn on feature
+ * Feature is enabled as parameter and can be changed
+ * via sysfs
+ * Trickle charger as module parameter
+ *
+ * 2016-04-010.2.0 Add alarm, watchdog functionality
+ * watchdog create a 60ms pulse on sRST pin 3.3V -> 0 -> 3.3V
+ * alarm create a 250ms pulse on nIRQ pin 3.3V -> 0 -> 3.3V
+ *
+ * 2016-01-220.1.0 First Release
+ * date time get/set commands
+ * 256 byte get/set via sysfs.
+ * ram_address allows to get/set ram_byte
+ * watchdog
#include <linux/bcd.h>
#include <linux/i2c.h>
#include <linux/module.h>
#include <linux/mutex.h>
#include <linux/rtc.h>
#include <linux/pm.h>
#include <linux/pm_wakeup.h>
#include <linux/watchdog.h>
#include <linux/jiffies.h>

#define DEFAULT_FORCE_SMBUS 0
static bool force_smbus = DEFAULT_FORCE_SMBUS;
module_param(force_smbus, bool, 0444);
MODULE_PARM_DESC(force_smbus, "force smbus protocol (default=
	__MODULE_STRING(DEFAULT_FORCE_SMBUS) ")");

#define DEFAULT_WATCHDOG_TIMEOUT 30
static int timeout = DEFAULT_WATCHDOG_TIMEOUT;
module_param(timeout, int, 0444);
MODULE_PARM_DESC(timeout, "Watchdog timeout in seconds. (1<=timeout<=124, default=
	__MODULE_STRING(DEFAULT_WATCHDOG_TIMEOUT) ")");

static bool nowayout = WATCHDOG_NOWAYOUT;
module_param(nowayout, bool, 0444);
MODULE_PARM_DESC(nowayout, "Watchdog cannot be stopped once started (default=
	__MODULE_STRING(WATCHDOG_NOWAYOUT) ")");

#define DEFAULT_DISABLE_ON_BOOT 1
static bool disable_on_boot = DEFAULT_DISABLE_ON_BOOT;
module_param(disable_on_boot, bool, 0444);
MODULE_PARM_DESC(disable_on_boot, "Watchdog automatically disabled at boot time (default=
	__MODULE_STRING(DEFAULT_DISABLE_ON_BOOT))");

/*
 * the following paramweter could be removed since revA board should
 * provide WDT IRQ to cortex via RST pin only
 */

#define DEFAULT_STEERING 1
static bool watchdog_steering = DEFAULT_STEERING;
module_param(watchdog_steering, bool, 0444);
MODULE_PARM_DESC(watchdog_steering, "Watchdog IRQ steering : 0 WIRQ , 1 RST (default=
	__MODULE_STRING(DEFAULT_STEERING))");

#define DEFAULT_BOARD_TURN_ON 0
static bool board_turn_on = DEFAULT_BOARD_TURN_ON;
/*
 * Module parameters
 */

+module_param(board_turn_on, bool, 0444);
+MODULE_PARM_DESC(board_turn_on, "Enable board turn on via alarm route (default=
+__MODULE_STRING(DEFAULT_BOARD_TURN_ON)")");
+
+define DEFAULT_TRICKLE_REGISTER 0x00
+static int trickle_register = DEFAULT_TRICKLE_REGISTER;
+module_param(trickle_register, int, 0444);
+MODULE_PARM_DESC(trickle_register, "trickle charger register (default=
+__MODULE_STRING(DEFAULT_TRICKLE_REGISTER)")");
+
+define DEFAULT_XT_CLOCK_ADJ 0
+static int xt_clock_adj = DEFAULT_XT_CLOCK_ADJ;
+module_param(xt_clock_adj, int, 0444);
+MODULE_PARM_DESC(xt_clock_adj, "Adj parameter as per Ambiq micro procedure (default=
+__MODULE_STRING(DEFAULT_XT_CLOCK_ADJ)")");
+
+define DRIVER_NAME "rtc-am1805"
+define DRIVER_VERSION "0.6.0"
+
+define AM1805_IDENTITY_CODE 0x18
+define SECONDS_BITS 0x7F
+define MINUTES_BITS 0x7F
+define HOURS_BITS 0x3F
+define DATE_BITS 0x3F
+define MONTHS_BITS 0x1F
+define WEEKDAY_BITS 0x07
+
+define REG_HUNDREDS_ADDR 0x00 // hundreds of seconds register address
+define REG_SECONDS_ADDR 0x01 // seconds register address
+define REG_MINUTES_ADDR 0x02 // minutes register address
+define REG_HOURS_ADDR 0x03 // hours register address
+define REG_MDAY_ADDR 0x04 // day of the month register address
+define REG_MONTH_ADDR 0x05 // month register address
+define REG_YEAR_ADDR 0x06 // years register address
+define REG_WDAY_ADDR 0x07 // day of the week register address
+
+define REG_ALM_HUNDREDS_ADDR 0x08 // Alarm hundreds of seconds register address
+define REG_ALM_SECONDS_ADDR 0x09 // Alarm seconds register address
+define REG_ALM_MINUTES_ADDR 0x0A // Alarm minutes register address
+define REG_ALM_HOURS_ADDR 0x0B // Alarm hours register address
+define REG_ALM_MDAY_ADDR 0x0C // Alarm day of the month register address
+define REG_ALM_MONTH_ADDR 0x0D // Alarm month register address
+define REG_ALM_WDAY_ADDR 0x0E // Alarm day of the week register address
+
+define REG_STATUS_ADDR 0x0F // status register address
+define REG_STATUS_ALM (1 << 2) // Alarm function enabled
+define REG_STATUS_WDT (1 << 5) // Watchdog expired bit
+define REG_STATUS_CB (1 << 7) // Century rollover bit
+ #define REG_CONTROL1_ADDR 0x10  // control1 register address
+ #define REG_CONTROL1_WRTC 1  // write enable for counter registers
+ #define REG_CONTROL1_PWR2 (1 << 1)  // PWR2
+ #define REG_CONTROL1_ARST (1 << 2)  // auto reset on read
+ #define REG_CONTROL1_RSP (1 << 3)  // nRST polarity 1 high 0 low
+ #define REG_CONTROL1_OUT (1 << 4)  // nIRQ pin static value
+ #define REG_CONTROL1_OUTB (1 << 5)  // nIRQ2 pin static value
+ #define REG_CONTROL1_1224 (1 << 6)  // 12/24 format selection 0 = 24h
+ #define REG_CONTROL1_STOP (1 << 7)  // stop the clocking system
+
+ #define REG_CONTROL2_ADDR 0x11  // control2 register address
+ #define REG_CONTROL2_OUT2S_BITS 0x1C  // control2 register out2s bits
+ #define REG_IRQ_MASK_ADDR 0x12  // Interrupt Mask register address
+ #define REG_IRQ_MASK_AIE (1 << 2)  // Alarm interrupt enable
+
+ #define REG_XT_CALIB_ADDR 0x14  // XT calibration register address
+ #define REG_XT_CALIB_OFFSETX_MASK 0x7F  // OFFSET X BIT MASK
+ #define REG_XT_CALIB_CMDX 0x80  // cmdx field
+
+ #define REG_TIMER_CTRL_ADDR 0x18  // Countdown timer control register address
+ #define REG_TIMER_CTRL_RPT_BITS 0x1C  // only the RPT bits
+
+ #define REG_WATCHDOG_ADDR 0x1B  // watchdog register address
+ #define REG_WATCHDOG_WDS (1 << 7)  // watchdog steering bit
+ #define WRB_1_SECOND 0x02  // watchdog clock 1Hz
+ #define WRB_4_SECONDS 0x03  // watchdog clock 1/4 Hz
+
+ #define REG_OSC_STATUS_ADDR 0x1D  // oscillator status register address
+ #define REG_OSC_STATUS_ACAL_MASK 0x60  // ACAL bit field mask
+ #define REG_OSC_STATUS_ACAL_0 0x00
+ #define REG_OSC_STATUS_ACAL_1 0x40
+ #define REG_OSC_STATUS_ACAL_2 0x80
+ #define REG_OSC_STATUS_ACAL_3 0xC0
+
+ #define REG_CONFIGKEY_ADDR 0x1F  // configuration key register address
+
+
+ #define REG_TRICKLE_ADDR 0x20  // trickle charger register
+
+ #define REG_IDENTITY_ADDR 0x28  // identity register address must contain 0x18
+
+ #define REG_EXTRAM_ADDR 0x3F  // Extension ram register address
+ #define REG_EXTRAM_XADA (1 << 2)  // select bank of memory
+
+ static struct i2c_driver am1805_driver;
+struct am1805_data {
+struct i2c_client *client;
+struct rtc_device *rtc;
+struct mutex mutex;
+intuse_smbus;
+intwatchdog_timeout;
+intwatchdog_disable_on_boot;
+intwatchdog_steering;
+intwatchdog_registered;
+intwatchdog_enabled;
+unsigned char watchdog_reg;
+unsigned long intwatchdog_start_jiffies;
+intram_byte_file_created;
+intram_address_file_created;
+unsigned chararram_address;
+intboard_turn_on;
+intboard_turn_on_file_created;
+unsigned char trickle_register;
+};
+
+static int am1805_read(struct am1805_data *amq, u8 *buf, int len)
+{
+int err, i;
+u8 base_reg;
+struct i2c_msgmsgs[] = {
+
+{.
+.addr = amq->client->addr,
+.flags = (amq->client->flags & I2C_M_TEN),
+.len = 1,
+.buf = buf,
+},
+{.
+.addr = amq->client->addr,
+.flags = (amq->client->flags & I2C_M_TEN) | I2C_M_RD,
+.len = len,
+.buf = buf,
+},
+};
+if (amq->use_smbus) {
+/* use SMBUS transfer protocol */
+base_reg = buf[0];
+for (i = 0; i < len; i++) {
+err = i2c_smbus_read_byte_data(amq->client, base_reg);
+if (err < 0) {
+dev_err(&amq->client->dev,
+"read transfer error reg 0x%02X\n",
+base_reg);
+break;
+
+base_reg++;
+err = 0;
+
+} else {
+ /* use I2C transfer protocol */
+ err = i2c_transfer(amq->client->adapter, msgs, 2);
+ if (err != 2) {
+ dev_err(&amq->client->dev, "I2C read transfer error\n");
+ err = -EIO;
+ } else {
+ err = 0;
+ }
+ }
+ return err;
+
+static int am1805_write(struct am1805_data *amq, u8 *buf, int len)
+{
+ int err = 0, i;
+ u8 base_reg;
+ struct i2c_msg msgs[] = {
+ .addr = amq->client->addr,
+ .flags = (amq->client->flags & I2C_M_TEN),
+ .len = len + 1,
+ .buf = buf,
+ },
+ ;
+ }
+ if (amq->use_smbus) {
+ /* use SMBUS transfer protocol */
+ base_reg = buf[0];
+ for (i = 1; i <= len; i++) {
+ err = i2c_smbus_write_byte_data(amq->client, base_reg,
+ buf[i]);
+ if (err < 0) {
+ dev_err(&amq->client->dev,
+ "write transfer error reg 0x%02X\n",
+ base_reg);
+ break;
+ }
+ base_reg++;
+ }
+ else {
+ /* use I2C transfer protocol */
+ err = i2c_transfer(amq->client->adapter, msgs, 2);
+ if (err != 2) {
+ dev_err(&amq->client->dev, "I2C read transfer error\n");
+ err = -EIO;
+ } else {
+ err = 0;
+ }
+ return err;
+ }}
+* use I2C transfer protocol */
+err = i2c_transfer(amq->client->adapter, msgs, 1);
+if (err != 1) {
+dev_err(&amq->client->dev, "I2C write transfer error\n");
+err = -EIO;
+} else {
+err = 0;
+
+
+/*static int am1805_stop_rtc(struct am1805_data *amq)
+{
+u8 regs[2];
+int err;
+
+regs[0] = REG_CONTROL1_ADDR;
+
+err = am1805_read(amq, regs, 1);
+if (err < 0)
+return err;
+
+regs[1] = regs[0];
+
+regs[0] = REG_CONTROL1_ADDR;
+
+
+regs[1] |= (REG_CONTROL1_STOP|REG_CONTROL1_WRTC);
+
+err = am1805_write(amq, regs, 1);
+if (err < 0)
+return err;
+
+return 0;
+}
+
+/*static int am1805_start_rtc(struct am1805_data *amq)
+{
+u8 regs[2];
+int err;
+
+regs[0] = REG_CONTROL1_ADDR;
+
+err = am1805_read(amq, regs, 1);
+if (err < 0)
+return err;
+
+return 0;
+}*/
+regs[0] = REG_CONTROL1_ADDR;
+
+regs[1] &= ~(REG_CONTROL1_STOP|REG_CONTROL1_WRTC));
+
+err = am1805_write(amq, regs, 1);
+if (err < 0)
+return err;
+
+return 0;
+
+static int am1805_rtc_read_time(struct device *dev, struct rtc_time *tm)
+{
+struct i2c_client *client = to_i2c_client(dev);
+struct am1805_data *amq;
+u8 regs[8];
+int err;
+
+amq = i2c_get_clientdata(client);
+mutex_lock(&amq->mutex);
+
+regs[0] = REG_SECONDS_ADDR;
+err = am1805_read(amq, regs, 7);
+if (err)
+goto exit;
+
+/* read the status register */
+regs[7] = REG_STATUS_ADDR;
+err = am1805_read(amq, &regs[7], 1);
+if (err)
+goto exit;
+
+regs[0] &= SECONDS_BITS;
+regs[1] &= MINUTES_BITS;
+regs[2] &= HOURS_BITS;
+regs[3] &= DATE_BITS;
+regs[4] &= MONTHS_BITS;
+regs[6] &= WEEKDAY_BITS;
+
+tm->tm_sec = bcd2bin(regs[0]);
+tm->tm_min = bcd2bin(regs[1]);
+tm->tm_hour = bcd2bin(regs[2]);
+tm->tm_mday = bcd2bin(regs[3]);
+tm->tm_mon = bcd2bin(regs[4]);
+tm->tm_mon--;
+tm->tm_year = bcd2bin(regs[5])+100;
+
+if (regs[7] & REG_STATUS_CB)
+tm->tm_year += 100;

+tm->tm_wday = regs[6];
+
+err = rtc_valid_tm(tm);
+exit:
+mutex_unlock(&amq->mutex);
+return err;
+
}
+

+static int am1805_rtc_set_time(struct device *dev, struct rtc_time *tm)
+{
+struct i2c_client *client = to_i2c_client(dev);
+struct am1805_data *amq;
+u8 regs[10];
+int err;
+
+amq = i2c_get_clientdata(client);
+
+mutex_lock(&amq->mutex);
+
+err = am1805_stop_rtc(amq);
+if (err < 0)
+goto exit;
+
+regs[0] = REG_HUNDREDS_ADDR;
+regs[1] = bin2bcd(0);
+regs[2] = bin2bcd(tm->tm_sec);
+regs[3] = bin2bcd(tm->tm_min);
+regs[4] = bin2bcd(tm->tm_hour);
+regs[5] = bin2bcd(tm->tm_mday);
+regs[6] = bin2bcd(tm->tm_mon + 1);
+regs[7] = bin2bcd(tm->tm_year - 100);
+regs[8] = tm->tm_wday;
+
+
+err = am1805_write(amq, regs, 8);
+if (am1805_start_rtc(amq))
+err = -1;
+exit:
+mutex_unlock(&amq->mutex);
+return err;
+
+}*/

+));// RAM byte
+ * 256 bytes available
+ * read return the byte pointed by ram_address
+ * write store the values in ram_address
+ */
static ssize_t am1805_ram_byte_show(struct device *dev, struct device_attribute *attr, char *buf)
{
    int err;
    unsigned char ram_byte;
    struct i2c_client *client;
    struct am1805_data *amq;

    client = to_i2c_client(dev);
    amq = i2c_get_clientdata(client);
    dev_dbg(&client->dev, "[%s]
", __func__);

    mutex_lock(&amq->mutex);
    ram_byte = amq->ram_address;
    ram_byte |= 0x80;
    err = am1805_read(amq, &ram_byte, 1);
    mutex_unlock(&amq->mutex);

    if (err == 0)
        err = sprintf(buf, "%02X
", ram_byte);
    return err;
}

static ssize_t am1805_ram_byte_store(struct device *dev, struct device_attribute *attr, const char *buf, size_t count)
{
    int err;
    unsigned char reg[2];
    struct i2c_client *client;
    struct am1805_data *amq;

    client = to_i2c_client(dev);
    amq = i2c_get_clientdata(client);
    dev_dbg(&client->dev, "[%s]
", __func__);
    mutex_lock(&amq->mutex);

    err = kstrtou8(buf, 10, &reg[1]);
    if (err == 0) {
        reg[0] = amq->ram_address;
        reg[0] |= 0x80;
        err = am1805_write(amq, reg, 1);
    }
    mutex_unlock(&amq->mutex);
    if (err)
        return err;
+return count;
+
+static const struct device_attribute am1805_ram_byte_device_attribute = {
+  .attr.name  = "ram_byte",
+  .attr.mode  = 0600,
+  .show       = am1805_ram_byte_show,
+  .store      = am1805_ram_byte_store,
+};
+/** END RAM BYTE ATTIBUTES  ***/
+
+/******************************************************************************
+ * RAM Address
+ * 256 bytes available
+ * read return current ram_address
+ * write store the values in ram_address and set Extension Ram register
+ */
+
+static ssize_t am1805_ram_address_show(struct device *dev,
+    struct device_attribute *attr,
+    char *buf)
+{
+    int err;
+    struct i2c_client *client;
+    struct am1805_data *amq;
+    
+    client = to_i2c_client(dev);
+    amq = i2c_get_clientdata(client);
+    dev_dbg(&client->dev, "[%s]\n", __func__);
+    
+    mutex_lock(&amq->mutex);
+    err = sprintf(buf, "%02X\n", amq->ram_address);
+    mutex_unlock(&amq->mutex);
+    return err;
+}
+
+static ssize_t am1805_ram_address_store(struct device *dev,
+    struct device_attribute *attr,
+    const char *buf, size_t count)
+{
+    int err;
+    unsigned char reg[2], ram_addr;
+    struct i2c_client *client;
+    struct am1805_data *amq;
+    
+    client = to_i2c_client(dev);
+    amq = i2c_get_clientdata(client);
+    dev_dbg(&client->dev, "[%s]\n", __func__);
+    
+    mutex_lock(&amq->mutex);
+    err = sprintf(buf, "%02X\n", amq->ram_address);
+    mutex_unlock(&amq->mutex);
+    return err;
+}
+
mutex_lock(&amq->mutex);
+
+err = kstrtou8(buf, 10, &ram_addr);
+if (err == 0) {
+reg[0] = (unsigned char)(ram_addr ^ amq->ram_address);
+reg[0] &= 0x80;
+if (reg[0] == 0) {
+/* no changes , same bank of memory */
+amq->ram_address = ram_addr;
+} else {
+reg[0] = REG_EXTRAM_ADDR;
+err = am1805_read(amq, reg, 1);
+if (err == 0) {
+reg[1] = reg[0];
+reg[0] = REG_EXTRAM_ADDR;
+if (ram_addr & 0x80)
+reg[1] |= REG_EXTRAM_XADA;
+else
+reg[1] &= ~REG_EXTRAM_XADA;
+err = am1805_write(amq, reg, 1);
+if (err == 0)
+amq->ram_address = ram_addr;
+}
+}
+}
+
+mutex_unlock(&amq->mutex);
+if (err)
+return err;
+return count;
+}
+
+static const struct device_attribute am1805_ram_address_device_attribute = {
+.attr.name  = "ram_address",
+.attr.mode  = 0600,
+.show       = am1805_ram_address_show,
+.store      = am1805_ram_address_store,
+};
+******/ END RAM ADDRESS ATTIBUTES ********/
+
+/**************************************************************************
+ * WATCHDOG
+ * gettimeleft function is implemented via jiffies since hw doesn't support
+ * this capability
+ */
+
+static int am1805_watchdog_compute_seconds(int *seconds,
+ unsigned char *wdt_reg, int steer)
+{
+int err = 0;
+unsigned char reg_value = 0x00;
+
+/* WatchDog-duration = BMB x stepsize */
+if (*seconds > 120) {
+*seconds = 124;
+reg_value = 31;
+reg_value <<= 2;
+reg_value |= WRB_4_SECONDS;
+} else if (*seconds > 31) {
+reg_value = (unsigned char)(*seconds);
+reg_value >>= 2;
+if (((int)reg_value * 4) != *seconds)
+reg_value++;
+*seconds = reg_value;
+*seconds <<= 2;
+reg_value <<= 2;
+reg_value |= WRB_4_SECONDS;
+} else if (*seconds >= 0) {
+reg_value = (unsigned char)*seconds;
+reg_value <<= 2;
+reg_value |= WRB_1_SECOND;
+} else {
+err = -EINVAL;
+}
+if (steer)
+reg_value |= REG_WATCHDOG_WDS;
+if (wdt_reg != NULL)
+*wdt_reg = reg_value;
+return err;
+}
+
+static int am1805_watchdog_disable(struct am1805_data *am_data)
+{
+int err;
+unsigned char regs[2];
+
+/* disable wdt */
+regs[0] = REG_WATCHDOG_ADDR;
+if (am_data->watchdog_steering)
+regs[1] = (unsigned char)REG_WATCHDOG_WDS;
+else
+regs[1] = 0x00;
+err = am1805_write(am_data, regs, 1);
+if (err) {
+dev_err(&am_data->client->dev,

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+["\[%s\] write watchdog reg ERROR\n", __func__);   
+return err;
+
+reg[0] = REG_STATUS_ADDR;
+err = am1805_read(am_data, reg, 1);
+if (err) {
+dev_err(&am_data->client->dev,
+["\[%s\] read status reg ERROR\n", __func__);   
+return err;
+
+reg[1] = reg[0];
+reg[0] = REG_STATUS_ADDR;
+reg[1] &= ~REG_STATUS_WDT;
+err = am1805_write(am_data, reg, 1);
+if (err)
+dev_err(&am_data->client->dev,
+["\[%s\] write status reg ERROR\n", __func__);   
+am_data->watchdog_enabled = 0;
+return err;
+
+static int am1805_watchdog_enable(struct am1805_data *am_data)
+{
+int err;
+unsigned char reg[2];
+
+err = am1805_watchdog_disable(am_data);
+if (err)
+return err;
+/* CALCULATE THE REFRESH VALUE */
+err = am1805_watchdog_compute_seconds(&am_data->watchdog_timeout,
+ &am_data->watchdog_reg,
+ am_data->watchdog_steering);
+if (err) {
+dev_err(&am_data->client->dev,
+["\[%s\] problems while computing actual timeout\n", 
+__func__);   
+return err;
+
+reg[0] = REG_WATCHDOG_ADDR;
+reg[1] = am_data->watchdog_reg;
+err = am1805_write(am_data, reg, 1);
+if (err) {
+dev_err(&am_data->client->dev,
+["\[%s\] write watchdog reg ERROR\n", __func__);   
+return err;
+}
am_data->watchdog_start_jiffies = jiffies;
am_data->watchdog_enabled = 1;
return 0;
}
+
static int am1805_watchdog_start_op(struct watchdog_device *device)
+
static int am1805_watchdog_start_op(struct watchdog_device *device)
+
static int am1805_watchdog_start_op(struct watchdog_device *device)
+
static int am1805_watchdog_stop_op(struct watchdog_device *device)
+
static int am1805_watchdog_stop_op(struct watchdog_device *device)
+
static int am1805_watchdog_stop_op(struct watchdog_device *device)
+{
+unsigned char regs[2];
+int err;
+struct i2c_client *client;
+struct am1805_data *amq;
+
+client = watchdog_get_drvdata(device);
+amq = i2c_get_clientdata(client);
+dev_dbg(&client->dev, "[%s]\n", __func__);  
+
+mutex_lock(&amq->mutex);
+if (amq->watchdog_enabled) {
+regs[0] = REG_WATCHDOG_ADDR;
+regs[1] = amq->watchdog_reg;
+err = am1805_write(amq, regs, 1);
+if (err)
+dev_err(&amq->client->dev, "[%s] write watchdog reg ERROR\n", __func__);  
+} else {
+err = 0;
+dev_dbg(&client->dev, "[%s] can not ping disabled watchdog\n", __func__);  
+}
+mutex_unlock(&amq->mutex);
+return err;
+}
+
+static int am1805_watchdog_set_timeout_op(struct watchdog_device *device,
+   unsigned int timeout)
+{
+int err;
+unsigned int seconds;
+struct i2c_client *client;
+struct am1805_data *amq;
+unsigned char reg_data;
+
+client = watchdog_get_drvdata(device);
+amq = i2c_get_clientdata(client);
+
+dev_dbg(&client->dev, "[%s]\n", __func__);  
+seconds = (int)timeout;
+mutex_lock(&amq->mutex);
+err = am1805_watchdog_compute_seconds((int *)seconds, &reg_data,
+   amq->watchdog_steering);
+if (err == 0) {
+device->timeout = (unsigned int)seconds;
+amq->watchdog_timeout = seconds;
+amq->watchdog_reg = reg_data;
+} else
+dev_err(&client->dev,
+"[%s] problems while computing actual timeout\n",
+__func__); 
+
+mutex_unlock(&amq->mutex);
+return 0;
+
+
+static unsigned int am1805_watchdog_get_timeleft_op(struct watchdog_device
+   *device)
+
+{unsigned int time_left;
+struct i2c_client *client;
+struct am1805_data *amq;
+
+client = watchdog_get_drvdata(device);
+amq = i2c_get_clientdata(client);
+dev_dbg(&client->dev, "[%s]\n", __func__);
+mutex_lock(&amq->mutex);
+time_left = jiffies;
+time_left -= amq->watchdog_start_jiffies;
+time_left = (unsigned int)(time_left/HZ);
+mutex_unlock(&amq->mutex);
+return time_left;
+
+
+static struct watchdog_info am1805_watchdog_info = {
+.options= WDIOF_SETTIMEOUT | WDIOF_KEEPALIVEPING
+ | WDIOF_MAGICCLOSE,
+.firmware_version = 0x00000100,
+.identity = "AM1805 Watchdog",
+};
+
+static struct watchdog_ops am1805_watchdog_ops = {
+.owner = THIS_MODULE,
+.start = am1805_watchdog_start_op,
+.stop = am1805_watchdog_stop_op,
+.ping = am1805_watchdog_ping_op,
+.set_timeout = am1805_watchdog_set_timeout_op,
+.get_timeleft = am1805_watchdog_get_timeleft_op,
+};
+
+static struct watchdog_device am1805_watchdog_device = {
+.info = &am1805_watchdog_info,
+.ops = &am1805_watchdog_ops,
+.timeout = DEFAULT_WATCHDOG_TIMEOUT,
+.min_timeout = 1,
+ max_timeout = 124,
+
+ /***/ END Watchdog FUNCTIONS  /***/*
+
+ /***/ START ALARM FUNCTIONS  /***/*
+
+ static int am1805_rtc_read_alarm(struct device *dev, struct rtc_wkalrm *alarm)
+ {
+     int err;
+     unsigned char regs[7];
+     struct i2c_client *client;
+     struct am1805_data *amq;
+     +client = to_i2c_client(dev);
+     +amq = i2c_get_clientdata(client);
+     +dev_dbg(&client->dev, "[%s]\n", __func__);
+     +mutex_lock(&amq->mutex);
+     +regs[0] = REG_ALM_SECONDS_ADDR;
+     +err = am1805_read(amq, regs, 6);
+     +if (err) {
+         +dev_err(&client->dev, "[%s] read %02X 6 register\n", __func__,
+         +REG_ALM_SECONDS_ADDR);
+         +goto exit;
+     }
+     +regs[0] &= SECONDS_BITS;
+     +regs[1] &= MINUTES_BITS;
+     +regs[2] &= HOURS_BITS;
+     +regs[3] &= DATE_BITS;
+     +regs[4] &= MONTHS_BITS;
+     +regs[5] &= WEEKDAY_BITS;
+     +alarm->time.tm_sec = bcd2bin(regs[0]);
+     +alarm->time.tm_min = bcd2bin(regs[1]);
+     +alarm->time.tm_hour = bcd2bin(regs[2]);
+     +alarm->time.tm_mday = bcd2bin(regs[3]);
+     +alarm->time.tm_mon = bcd2bin(regs[4]);
+     +if (alarm->time.tm_mon > 0)
+         +alarm->time.tm_mon--;
+     +alarm->time.tm_wday = regs[5];
+     +alarm->time.tm_year = -1;
+     +alarm->time.tm_yday = -1;
+     +alarm->time.tm_isdst = -1;
+     +regs[0] = REG_IRQ_MASK_ADDR;
+     +err = am1805_read(amq, regs, 1);
+     +if (err) {  

dev_err(&client->dev, "[%s] read %02X 1 register\n", __func__,
+REG_IRQ_MASK_ADDR);
+goto exit;
+}
+alarm->enabled = (regs[0] & REG_IRQ_MASK_AIE) ? 1 : 0;
+
+regs[0] = REG_STATUS_ADDR;
+err = am1805_read(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "[%s] read %02X 1 register\n",
+__func__, REG_STATUS_ADDR);
+goto exit;
+}
+alarm->pending = (regs[0] & REG_STATUS_ALM) ? 1 : 0;
+exit:
+mutex_unlock(&amq->mutex);
+return err;
+
+
+static int am1805_rtc_set_alarm(struct device *dev, struct rtc_wkalrm *alarm)
+{
+int err;
+unsigned char regs[8];
+unsigned char timer_ctrl_reg, irq_mask_reg;
+struct i2c_client *client;
+struct am1805_data *amq;
+
+client = to_i2c_client(dev);
+amq = i2c_get_clientdata(client);
+dev_dbg(&client->dev, "[%s]\n", __func__);
+/* Disable alarm */
+mutex_lock(&amq->mutex);
+regs[0] = REG_TIMER_CTRL_ADDR;
+err = am1805_read(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "[%s] read %02X 1 register\n",
+__func__, REG_TIMER_CTRL_ADDR);
+err = -EIO;
+goto exit;
+}
+regs[1] = regs[0];
+
+regs[0] = REG_TIMER_CTRL_ADDR;
+regs[1] &= (unsigned char)(~REG_TIMER_CTRL_RPT_BITS);
+timer_ctrl_reg = regs[1];
+err = am1805_write(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "[%s] write %02X 1 register\n",
+
+\_func\_\_, \_REG\_TIMER\_CTRL\_ADDR\_);  
+err = -EIO;  
+goto exit;  
+}  
+  
+regs[0] = \_REG\_IRQ\_MASK\_ADDR;  
+err = am1805\_read(amq, regs, 1);  
+if (err) {  
+dev\_err(&client->dev, "[%s] read \%02X 1 register\n",  
+\_func\_\_, \_REG\_IRQ\_MASK\_ADDR\_);  
+err = -EIO;  
+goto exit;  
+}  
+  
+regs[1] = regs[0];  
+regs[0] = \_REG\_IRQ\_MASK\_ADDR;  
+regs[1] &= (unsigned char)(~\_REG\_IRQ\_MASK\_AIE);  
+irq\_mask\_reg = regs[1];  
+err = am1805\_write(amq, regs, 1);  
+if (err) {  
+dev\_err(&client->dev, "[%s] write \%02X 1 register\n",  
+\_func\_\_, \_REG\_IRQ\_MASK\_ADDR\_);  
+err = -EIO;  
+goto exit;  
+}  
+  
+regs[0] = \_REG\_STATUS\_ADDR;  
+err = am1805\_read(amq, regs, 1);  
+if (err) {  
+dev\_err(&client->dev, "[%s] read \%02X 1 register\n",  
+\_func\_\_, \_REG\_STATUS\_ADDR\_);  
+err = -EIO;  
+goto exit;  
+}  
+  
+regs[1] = regs[0];  
+regs[0] = \_REG\_STATUS\_ADDR;  
+regs[1] &= (unsigned char)(~\_REG\_STATUS\_ALM);  
+err = am1805\_write(amq, regs, 1);  
+if (err) {  
+dev\_err(&client->dev, "[%s] write \%02X 1 register\n",  
+\_func\_\_, \_REG\_STATUS\_ADDR\_);  
+err = -EIO;  
+goto exit;  
+}  
+  
+if (alarm->enabled) {  
+regs[0] = \_REG\_ALM\_HUNDREDS\_ADDR;  
+regs[1] = bin2bcd(0);  /* hundreds of seconds */  
+regs[2] = bin2bcd(alarm->time.tm\_sec);  
+regs[3] = bin2bcd(alarm->time.tm\_min);  
+regs[4] = bin2bcd(alarm->time.tm\_hour);  
+}
+regs[5] = bin2bcd(alarm->time.tm_mday);
+regs[6] = bin2bcd(alarm->time.tm_mon + 1);
+regs[7] = (unsigned char)(alarm->time.tm_wday & 0x07);
+err = am1805_write(amq, regs, 7);
+if (err) {
+dev_err(&client->dev, "[%s] write %02X 7 register\n",
+__func__, REG_ALM_HUNDREDS_ADDR);
+err = -EIO;
+goto exit;
+}
+regs[0] = REG_IRQ_MASK_ADDR;
+regs[1] = irq_mask_reg;
+regs[1] |= REG_IRQ_MASK_AIE;
+err = am1805_write(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "[%s] write %02X 1 register\n",
+__func__, REG_IRQ_MASK_ADDR);
+err = -EIO;
+goto exit;
+}
+regs[0] = REG_TIMER_CTRL_ADDR;
+regs[1] = timer_ctrl_reg;
+regs[1] |= (unsigned char)(1 << 2);
+err = am1805_write(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "[%s] write %02X 1 register\n",
+__func__, REG_TIMER_CTRL_ADDR);
+err = -EIO;
+}
+exit:
+mutex_unlock(&amq->mutex);
+return err;
+
+static ssize_t am1805_board_turn_on_show(struct device *dev,
+struct device_attribute *attr,
+char *buf)
+{
+int err;
+struct i2c_client *client;
+struct am1805_data *amq;
+
+client = to_i2c_client(dev);
+amq = i2c_get_clientdata(client);
+dev_dbg(&client->dev, ":[%s]\n", __func__);
+if (amq->board_turn_on)
err = sprintf(buf, "1\n");
else
err = sprintf(buf, "0\n");
return err;
}

static ssize_t am1805_board_turn_on_store(struct device *dev,
 struct device_attribute *attr,
 const char *buf, size_t count)
{
int err, value;
struct i2c_client *client;
struct am1805_data *amq;
unsigned char regs[4];

client = to_i2c_client(dev);
amq = i2c_get_clientdata(client);
dev_dbg(&client->dev, "[%s]\n", __func__);
mutex_lock(&amq->mutex);

err = kstrtos32(buf, 10, &value);
if (err == 0) {
regs[0] = REG_CONTROL1_ADDR;
err = am1805_read(amq, regs, 2);
if (err) {
  dev_err(&client->dev, "[%s] read %02X register , count=2\n", __func__, REG_CONTROL1_ADDR);
  err = -EIO;
  goto exit;
}
regs[2] = regs[1];
regs[1] = regs[0];
regs[0] = REG_CONTROL1_ADDR;
regs[1] |= REG_CONTROL1_OUTB;
regs[2] &= (unsigned char)(~REG_CONTROL2_OUT2S_BITS);
if (value == 0) {
  regs[2] |= (unsigned char)(7 << 2);
amq->board_turn_on = 0;
} else {
  regs[2] |= (unsigned char)(3 << 2);
amq->board_turn_on = 1;
}
err = am1805_write(amq, regs, 2);
if (err) {
  dev_err(&client->dev, "[%s] write %02X register , count=2\n", __func__, REG_CONTROL1_ADDR);
  goto exit;
}
err = -EIO;
} else
+err = count;
}
exit:
+mutex_unlock(&amq->mutex);
+return err;
+
+static const struct device_attribute am1805_board_turn_on_device_attribute = {
+.attr.name  = "board_turn_on",
+.attr.mode  = 0600,
+.show       = am1805_board_turn_on_show,
+.store      = am1805_board_turn_on_store,
+};
+
+static void am1805_unload(struct i2c_client *client)
+
+dev_dbg(&client->dev, "[%s]\n", __func__);
+
+amq = i2c_get_clientdata(client);
+if (amq->ram_byte_file_created) {
+sysfs_remove_file(&client->dev.kobj,
+ &am1805_ram_byte_device_attribute.attr);
+}
+if (amq->ram_address_file_created) {
+sysfs_remove_file(&client->dev.kobj,
+ &am1805_ram_address_device_attribute.attr);
+}
+if (amq->board_turn_on_file_created) {
+sysfs_remove_file(&client->dev.kobj,
+ &am1805_board_turn_on_device_attribute.attr);
+}
+if (amq->watchdog_registered) {
+device_wakeup_disable(&client->dev);
+watchdog_unregister_device(&am1805_watchdog_device);
+
+devm_kfree(&client->dev, amq);
+
+
+static int am1805_probe(struct i2c_client *client,
+ const struct i2c_device_id *id)
+
+{
+ struct am1805_data *amq;
+ int err;
+ u8 regs[2];
+ u8 xt_calib_value = 0;
+ u32 smbus_func = (I2C_FUNC_SMBUS_BYTE_DATA | I2C_FUNC_SMBUS_WORD_DATA
+ | I2C_FUNC_SMBUS_I2C_BLOCK);
+
+ dev_info(&client->dev, "probe_start, driver version %s\n",
+ DRIVER_VERSION);
+
+ amq = devm_kzalloc(&client->dev, sizeof(struct am1805_data),
+ GFP_KERNEL);
+ if (amq == NULL) {
+ err = -ENOMEM;
+ dev_err(&client->dev,
+ "failed to allocate memory for module data: %d\n", err);
+ goto exit;
+ }
+ amq->ram_byte_file_created = 0;
+ amq->ram_address_file_created = 0;
+ amq->watchdog_timeout = timeout;
+ amq->watchdog_disable_on_boot = disable_on_boot;
+ amq->watchdog_steering = watchdog_steering;
+ amq->watchdog_enabled = 0;
+ amq->board_turn_on = board_turn_on;
+ amq->board_turn_on_file_created = 0;
+ amq->trickle_register = (unsigned char)trickle_register;
+ if (amq->watchdog_steering)
+ amq->watchdog_reg = REG_WATCHDOG_WDS;
+ else
+ amq->watchdog_reg = 0;
+ amq->watchdog_start_jiffies = 0;
+ amq->watchdog_registered = 0;
+ if ((i2c_check_functionality(client->adapter, I2C_FUNC_I2C))
+ && (force_smbus == 0)) {
+ amq->use_smbus = 0;
+ } else {
+ dev_warn(&client->dev, "client not i2c capable\n");
+ if (i2c_check_functionality(client->adapter, smbus_func)) {
+ amq->use_smbus = 1;
dev_warn(&client->dev, "client smbus capable\n");
+
++err = -ENODEV;
++dev_err(&client->dev, "client not SMBUS capable\n");
++goto exit;
++
++mutex_init(&amq->mutex);
+
+amq->client = client;
i2c_set_clientdata(client, amq);
+
/* check identity register */
+regs[0] = REG_IDENTITY_ADDR;
+if (am1805_read(amq, regs, 1)) {
++err = -ENODEV;
++dev_err(&client->dev,
+"fail to fetch identity register 0x%02X\n",
+REG_IDENTITY_ADDR);
++goto exit;
+
++
++if (regs[0] != AM1805_IDENTITY_CODE) {
++err = -ENODEV;
++dev_err(&client->dev,
+"chip not found,invalid identity code 0x%02X\n",
++regs[0]);
++goto exit;
++
++
/* set the trickle_register */
+regs[0] = REG_CONFIGKEY_ADDR;
+regs[1] = 0x9D;
+if (am1805_write(amq, regs, 1)) {
++err = -ENODEV;
++dev_err(&client->dev,
+"fail to set configuration key register\n");
++goto exit;
++
++
+regs[0] = REG_TRICKLE_ADDR;
+regs[1] = amq->trickle_register;
+if (am1805_write(amq, regs, 1)) {
++err = -ENODEV;
++dev_err(&client->dev, "fail to set trickle register\n");
++goto exit;
++

/* set extended ram register to default value */
+amq->ram_address = 0x00;
+regs[0] = REG_EXTRAM_ADDR;
+
+if (am1805_read(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to fetch extension ram register\n");
+goto exit;
+}
+regs[1] = regs[0];
+regs[0] = REG_EXTRAM_ADDR;
+regs[1] &= ~REG_EXTRAM_XADA;
+
+if (am1805_write(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to set extension ram register\n");
+goto exit;
+}
+
+/* ulock LKO2 in oscillator status register in order to drive OUTB */
+/
+ * Bit_6-7 xtcal = 0
+ * Bit_5 LKO2 = 0
+ * Bit_4 OMODE = 0
+ * Bit_2-3 RESERVED = 0
+ * Bit_1 OF = 1
+ * Bit_0 ACF = 0
+ */
+/
+ /* calibrate the XT oscillator */
+regs[1] = 0x02;
+xt_calib_value = 0x00;
+if (xt_clock_adj < -320)
+dev_warn(&client->dev,
+"XT frequency too high to be calibrated adj = %d\n",
+xt_clock_adj);
+xt_clock_adj);
+else if (xt_clock_adj < -256) {
+/* XTCAL=3 CMDX=1 OFFSETX=(adj+192)/2 */
+regs[1] = REG_OSC_STATUS ACAL_3;
+xt_calib_value = (unsigned char)((int)(xt_clock_adj+192)>>1);
+xt_calib_value &= REG_XT_CALIB_OFFSETX MASK;
+xt_calib_value |= REG_XT_CALIB_CMDX;
+} else if (xt_clock_adj < -192) {
+/* XTCAL=3 CMDX=0 OFFSETX=(adj+192) */
+regs[1] = REG_OSC_STATUS ACAL_3;
+xt_calib_value = (unsigned char)((int)(xt_clock_adj+192));
+xt_calib_value &= REG_XT_CALIB OFFSETX MASK;
+} else if (xt_clock_adj < -128) {

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structures to process.

/* XTCAL=2 CMDX=0 OFFSETX=(adj+128) */
+regs[1] |= REG_OSC_STATUS_AO\tAL_2;
+xt_calib_value = (unsigned char)((int)(xt_clock_adj+128));
+xt_calib_value &= REG_XT_CALIB_OFFSETX_MASK;
+} else if (xt_clock_adj < -64) {
+/* XTCAL=1 CMDX=0 OFFSETX=(adj+64) */
+regs[1] |= REG_OSC_STATUS_AO\tAL_1;
+xt_calib_value = (unsigned char)((int)(xt_clock_adj+64));
+xt_calib_value &= REG_XT_CALIB_OFFSETX_MASK;
+} else if (xt_clock_adj < 64) {
+/* XTCAL=0 CMDX=0 OFFSETX=(adj) */
+regs[1] |= REG_OSC_STATUS_AO\tAL_0;
+xt_calib_value = (unsigned char)(xt_clock_adj);
+xt_calib_value &= REG_XT_CALIB_OFFSETX_MASK;
+} else if (xt_clock_adj < 128) {
+/* XTCAL=0 CMDX=1 OFFSETX=(adj)/2 */
+regs[1] |= REG_OSC_STATUS_AO\tAL_0;
+xt_calib_value = (unsigned char)((int)(xt_clock_adj>>1));
+xt_calib_value &= REG_XT_CALIB_OFFSETX_MASK;
+xt_calib_value |= REG_XT_CALIB_CMDX;
+} else{
+dev_warn(&client->dev,
+"XT frequency too low to be calibrated adj = %d\n",
+ xt_clock_adj);
+
+regs[0] = REG_OSC_STATUS_ADDR;
+if (am1805_write(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to set oscillator status register\n");
+goto exit;
+}
+
+/* Calibration XT Register */
+regs[0] = REG_XT_CALIB_ADDR;
+regs[1] = xt_calib_value;
+if (am1805_write(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to set XT calibration register\n");
+goto exit;
+}
+
+/* CONTROL1 register
+* STOP = 012/24 = 0
+* OUTB = 1 remove power latch due to rtc , OUT = 1
+* RSP = 0 due to watchdog active low
+* ARST = 0PWR2 = 1 WRTC = 1

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+ * /
+ * Bit_6-7 reserved = 0
+ * Bit_5  RS1E= 0 due to watchdog
+ * Bit_2-4 OUT2S = 7 (board_turn_on =0) ; (3 board turn on =1)
+ * Bit_0-1 OUT1S = 3 due to alarm
+ */
+regs[0] = REG_CONTROL2_ADDR;
+regs[1] = 0;
+if (amq->board_turn_on)
+regs[1] |= 0x03;
+else
+regs[1] |= 0x07;
+regs[1] <<= 2;
+regs[1] |= 0x03;
+if (am1805_write(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to set control2 register\n");
+goto exit;
+}
+ */
+ * alarm IRQ must be on level
+ * Bit_7  CEB = 1
+ * Bit_5-6 IM = 3 ALARM IRQ 1/4 sec
+ * Bit_4 BLIE = 0
+ * Bit_3 TIE = 0
+ * Bit_2 AIE = 0
+ * Bit_1 EX2E = 0
+ * Bit_0 EX1E = 0
+ */
+regs[0] = REG_IRQ_MASK_ADDR;
+regs[1] = 0xE0;/* set im field to 0 */
+if (am1805_write(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to set interrupt mask register\n");
+goto exit;
+}
/* Disable alarm interrupt */
+ * Bit_7 TE = 0
+ * Bit_6 TM = 0
+ * Bit_5 TRPT = 1
+ * Bit_2-4 RPT=0 ALARM DISABLE
+ * Bit_0-1 TFS=3
+ */
+regs[0] = REG_TIMER_CTRL_ADDR;
+regs[1] = 0x23;
+if (am1805_write(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to set countdown timer control register\n");
+goto exit;
+}
+
+/* clear the status register */
+regs[0] = REG_STATUS_ADDR;
+regs[1] = 0x00;
+if (am1805_write(amq, regs, 1)) {
+err = -ENODEV;
+dev_err(&client->dev, "fail to clear status register\n");
+goto exit;
+}
+
+amq->rtc = devm_rtc_device_register(&client->dev,
+       am1805_driver.driver.name,
+       &am1805_rtc_ops, THIS_MODULE);
+
+if (IS_ERR(amq->rtc)) {
+dev_err(&client->dev, "fail to register rtc device\n");
+err = PTR_ERR(amq->rtc);
+goto exit;
+}
+amq->rtc->uie_unsupported = 1;
+
+/* RAM byte initialization */
+err = sysfs_create_file(&client->dev.kobj,
+       &am1805_ram_byte_device_attribute.attr);
+if (err) {
+dev_err(&client->dev, "fail to create sysfs file \"%s\"\n",
+       am1805_ram_byte_device_attribute.attr.name);
+goto exit;
+}
+amq->ram_byte_file_created = 1;
+
+/* RAM address initialization */
+err = sysfs_create_file(&client->dev.kobj,
+&am1805_ram_address_device_attribute.attr);
+if (err) {
+dev_err(&client->dev, "fail to create sysfs file "+
am1805_ram_address_device_attribute.attr.name);
+goto exit;
+}
+amq->ram_address_file_created = 1;
+
+/* board turn on initialization */
+err = sysfs_create_file(&client->dev.kobj,
+&am1805_board_turn_on_device_attribute.attr);
+if (err) {
+dev_err(&client->dev, "fail to create sysfs file "+
am1805_board_turn_on_device_attribute.attr.name);
+goto exit;
+}
+amq->board_turn_on_file_created = 1;
+
+/* Watchdog driver registration */
+watchdog_set_drvdata(&am1805_watchdog_device, client);
+watchdog_init_timeout(&am1805_watchdog_device, amq->watchdog_timeout,
+                      NULL);
+watchdog_set_nowayout(&am1805_watchdog_device, nowayout);
+err = watchdog_register_device(&am1805_watchdog_device);
+if (err) {
+dev_err(&client->dev,
+"ERROR, FAIL to register watchdog device\n");
+goto exit;
+}
+amq->watchdog_registered = 1;
+
+if (amq->watchdog_disable_on_boot) {
+dev_info(&client->dev, "watchdog timer disabled at boot\n");
+err = am1805_watchdog_disable(amq);
+if (err)
+goto exit;
+} else {
+dev_info(&client->dev,
+"watchdog timer enabled at boot, \%d s\n",
+amq->watchdog_timeout);
+err = am1805_watchdog_enable(amq);
+if (err)
+goto exit;
+
+err = device_init_wakeup(&client->dev, true);
+if (err)
+dev_err(&client->dev, \"device_init_wakeup \[%d\] FAIL\n\", err);
+dev_info(&client->dev, \"probe_end, init OK\n\");
+return 0;
+exit:
+dev_info(&client->dev, \"probe_end, init FAIL\n\");
+am1805_unload(client);
+return err;
+
+static int am1805_remove(struct i2c_client *client)
+{
+dev_dbg(&client->dev, \"[\%s]\n\", __func__);
+am1805_unload(client);
+return 0;
+}
+
+#ifdef CONFIG_PM_SLEEP
+static int am1805_resume(struct device *dev)
+{
+struct i2c_client *client = to_i2c_client(dev);
+struct am1805_data *amq;
+unsigned char regs[2];
+int err;
+
+amq = i2c_get_clientdata(client);
+
+dev_dbg(&client->dev, \"[\%s]\n\", __func__);
+mutex_lock(&amq->mutex);
+/* is alarm expired? */
+regs[0] = REG_STATUS_ADDR;
+err = am1805_read(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, \"[\%s] read %02X 1 register\n\", __func__, REG_STATUS_ADDR);
+err = -EIO;
+goto exit;
+
+if (regs[0] & REG_STATUS_ALM) {
+/* Disable alarm */
+regs[0] = REG_TIMER_CTRL_ADDR;
+err = am1805_read(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, \"[\%s] read %02X 1 register\n\",
```c
+__func__, REG_TIMER_CTRL_ADDR);
+err = -EIO;
+goto exit;
+
+regs[1] = regs[0];
+regs[0] = REG_TIMER_CTRL_ADDR;
+regs[1] &= (unsigned char)(~REG_TIMER_CTRL_RPT_BITS);
+err = am1805_write(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "%s write %02X 1 register\n",
+__func__, REG_TIMER_CTRL_ADDR);
+err = -EIO;
+goto exit;
+}
+
+regs[0] = REG_IRQ_MASK_ADDR;
+err = am1805_read(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "%s read %02X 1 register\n",
+__func__, REG_IRQ_MASK_ADDR);
+err = -EIO;
+goto exit;
+}
+
+regs[1] =regs[0];
+regs[0] = REG_IRQ_MASK_ADDR;
+regs[1] &= (unsigned char)(~REG_IRQ_MASK_AIE);
+err = am1805_write(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "%s write %02X 1 register\n",
+__func__, REG_IRQ_MASK_ADDR);
+err = -EIO;
+goto exit;
+}
+
+regs[0] = REG_STATUS_ADDR;
+err = am1805_read(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "%s read %02X 1 register\n",
+__func__, REG_STATUS_ADDR);
+err = -EIO;
+goto exit;
+}
+
+regs[1] =regs[0];
+regs[0] = REG_STATUS_ADDR;
+regs[1] &= (unsigned char)(~REG_STATUS_ALM);
+err = am1805_write(amq, regs, 1);
+if (err) {
+dev_err(&client->dev, "%s write %02X 1 register\n",
+__func__, REG_STATUS_ADDR);
```
err = -EIO;
+goto exit;
+}
+
+exit:
+mutex_unlock(&amq->mutex);
+return err;
+}
+
+static int am1805_suspend(struct device *dev)
+{
+"nothing to do at the moment */
+return 0;
+}
+#else
+#define am1805_suspend NULL
+#define am1805_resume NULL
+#endif /* CONFIG_PM_SLEEP */
+
+static SIMPLE_DEV_PM_OPS(am1805_pm, am1805_suspend, am1805_resume);
+
+static const struct i2c_device_id am1805_id[] = {
+{ "am1805", 0 },
+{ }
+};
+MODULE_DEVICE_TABLE(i2c, am1805_id);
+
+static struct i2c_driver am1805_driver = {
+.driver = {
+.name = DRIVER_NAME,
+.owner = THIS_MODULE,
+.pm = &am1805_pm,
+},
+.probe = am1805_probe,
+.remove = am1805_remove,
+.id_table = am1805_id,
+};
+module_i2c_driver(am1805_driver);
+
+MODULE_AUTHOR("Pierluigi Driusso <pierluigi.driusso@eurotech.com>");
+MODULE_DESCRIPTION("Ambiq micro AM1805 RTC driver");
+MODULE_LICENSE("GPL v2");
+MODULE_VERSION(DRIVER_VERSION);
--- linux-4.15.0.orig/drivers/rtc/rtc-armada38x.c
+++ linux-4.15.0/drivers/rtc/rtc-armada38x.c
@@ -491,7 +491,6 @@
static __init int armada38x_rtc_probe(struct platform_device *pdev) {
-const struct rtc_class_ops *ops;
struct resource *res;
struct armada38x_rtc *rtc;
const struct of_device_id *match;
@@ -528,6 +527,11 @@
dev_err(&pdev->dev, "no irq\n");
return rtc->irq;
}
+
+rtc->rtc_dev = devm_rtc_allocate_device(&pdev->dev);
+if (IS_ERR(rtc->rtc_dev))
+return PTR_ERR(rtc->rtc_dev);
+
+if (devm_request_irq(&pdev->dev, rtc->irq, armada38x_rtc_alarm_irq,
0, pdev->name, rtc) < 0) {
dev_warn(&pdev->dev, "Interrupt not available.\n");
@@ -537,28 +541,24 @@
++
+if (rtc->irq != -1) {
device_init_wakeup(&pdev->dev, 1);
-ops = &armada38x_rtc_ops;
+ops = &armada38x_rtc_ops;
} else {
/*
 * If there is no interrupt available then we can't
 * use the alarm
 */
-ops = &armada38x_rtc_ops_noirq;
+ops = &armada38x_rtc_ops_noirq;
+rtc->rtc_dev->ops = &armada38x_rtc_ops_noirq;
}
rtc->data = (struct armada38x_rtc_data *)match->data;
-
-/* Update RTC-MBUS bridge timing parameters */
-rtc->data->update_mbus_timing(rtc);
-
-rtc->rtc_dev = devm_rtc_device_register(&pdev->dev, pdev->name,
-ops, THIS_MODULE);
-if (IS_ERR(rtc->rtc_dev)) {
-ret = PTR_ERR(rtc->rtc_dev);
+ret = rtc_register_device(rtc->rtc_dev);
+if (ret)
dev_err(&pdev->dev, "Failed to register RTC device: %d\n", ret);
-return ret;
-}
-return 0;

+return ret;
}

#ifdef CONFIG_PM_SLEEP
--- linux-4.15.0.orig/drivers/rtc/rtc-bq4802.c
+++ linux-4.15.0/drivers/rtc/rtc-bq4802.c
@@ -164,6 +164,10 @@
} else if (p->r->flags & IORESOURCE_MEM) {
    p->regs = devm_ioremap(&pdev->dev, p->r->start,
                        resource_size(p->r));
+    if (!p->regs){
+        err = -ENOMEM;
+        goto out;
+    }
    p->read = bq4802_read_mem;
    p->write = bq4802_write_mem;
} else {
--- linux-4.15.0.orig/drivers/rtc/rtc-brcmstb-waketimer.c
+++ linux-4.15.0/drivers/rtc/rtc-brcmstb-waketimer.c
@@ -253,7 +253,7 @@
 ret = devm_request_irq(dev, timer->irq, brcmstb_waketmr_irq, 0,
                         "brcmstb-waketimer", timer);
 if (ret < 0)
+    goto err_clk;
    return ret;
    +err_notifier:
+    unregister_reboot_notifier(&timer->reboot_notifier);
+    clk_disable_unprepare(timer->clk);
+    err_clk:
+if (timer->clk)
+clk_disable_unprepare(timer->clk);
+
+return ret;
}

--- linux-4.15.0.orig/drivers/rtc/rtc-cmos.c
+++ linux-4.15.0/drivers/rtc/rtc-cmos.c
@@ -806,7 +806,7 @@
 rtc_cmos_int_handler = cmos_interrupt;
 retv = request_irq(rtc_irq, rtc_cmos_int_handler,
 -IRQF_SHARED, dev_name(&cmos_rtc.rtc->dev),
+0, dev_name(&cmos_rtc.rtc->dev),
 cmos_rtc.rtc);
 if (retv < 0) {
   dev_dbg(dev, "IRQ %d is already in use\n", rtc_irq);
--- linux-4.15.0.orig/drivers/rtc/rtc-da9063.c
+++ linux-4.15.0/drivers/rtc/rtc-da9063.c
@@ -480,6 +480,13 @@
 da9063_data_to_tm(data, &rtc->alarm_time, rtc);
 rtc->rtc_sync = false;
+/*
+ * TODO: some models have alarms on a minute boundary but still support
+ * real hardware interrupts. Add this once the core supports it.
+ */
+if (config->rtc_data_start != RTC_SEC)
+rtc->rtc_dev->uie_unsupported = 1;
+
 irq_alarm = platform_get_irq_byname(pdev, "ALARM");
 ret = devm_request_threaded_irq(&pdev->dev, irq_alarm, NULL,
da9063_alarm_event,
--- linux-4.15.0.orig/drivers/rtc/rtc-ds1307.c
+++ linux-4.15.0/drivers/rtc/rtc-ds1307.c
@@ -422,7 +422,11 @@
 t->tm_min = bcd2bin(regs[DS1307_REG_MIN] & 0x7f);
 tmp = regs[DS1307_REG_HOUR] & 0x3f;
 t->tm_hour = bcd2bin(tmp);
 t->tm_wday = bcd2bin(regs[DS1307_REG_WDAY] & 0x07) - 1;
+/*
+ * rx8130 is bit position, not BCD *
+ */
+if (ds1307->type == rx_8130)
+t->tm_wday = fls(regs[DS1307_REG_WDAY] & 0x7f);
+else
+t->tm_wday = bcd2bin(regs[DS1307_REG_WDAY] & 0x07) - 1;
+t->tm_mday = bcd2bin(regs[DS1307_REG_MDAY] & 0x3f);
 tmp = regs[DS1307_REG_MONTH] & 0x1f;
 t->tm_mon = bcd2bin(tmp) - 1;
regs[DS1307_REG_SECS] = bin2bcd(t->tm_sec);
regs[DS1307_REG_MIN] = bin2bcd(t->tm_min);
regs[DS1307_REG_HOUR] = bin2bcd(t->tm_hour);
-regs[DS1307_REG_WDAY] = bin2bcd(t->tm_wday + 1);
+/* rx8130 is bit position, not BCD */
+if (ds1307->type == rx_8130)
+regs[DS1307_REG_WDAY] = 1 << t->tm_wday;
+else
+regs[DS1307_REG_WDAY] = bin2bcd(t->tm_wday + 1);
regs[DS1307_REG_MDAY] = bin2bcd(t->tm_mday);
regs[DS1307_REG_MONTH] = bin2bcd(t->tm_mon + 1);

if (ret < 0)
return ret;

-ctl[0] &= ~RX8130_REG_EXTENSION_WADA;
-ctl[1] |= RX8130_REG_FLAG_AF;
+ctl[0] &= RX8130_REG_EXTENSION_WADA;
+ctl[1] &= ~RX8130_REG_FLAG_AF;
ctl[2] &= ~RX8130_REG_CONTROL0_AIE;

ret = regmap_bulk_write(ds1307->regmap, RX8130_REG_EXTENSION, ctl,
-   sizeof(ctl));
+   return regmap_write(ds1307->regmap, RX8130_REG_CONTROL0, ctl[2]);
}

static int rx8130_alarm_irq_enable(struct device *dev, unsigned int enabled)
--- linux-4.15.0.orig/drivers/rtc/rtc-ds1374.c
+++ linux-4.15.0/drivers/rtc/rtc-ds1374.c
@@ -620,6 +620,10 @@
if (!ds1374)
    return -ENOMEM;
+ds1374->rtc = devm_RTC_allocate_device(&client->dev);
+if (IS_ERR(ds1374->rtc))
    return PTR_ERR(ds1374->rtc);
    ds1374->client = client;
i2c_set_clientdata(client, ds1374);

@@ -641,12 +645,11 @@
device_set_wakeup_capable(&client->dev, 1);

-ds1374->rtc = devm_rtc_device_register(&client->dev, client->name,
-&ds1374_rtc_ops, THIS_MODULE);
-if (IS_ERR(ds1374->rtc)) {
-dev_err(&client->dev, "unable to register the class device\n");
-return PTR_ERR(ds1374->rtc);
-}
+ds1374->rtc->ops = &ds1374_rtc_ops;
+ret = rtc_register_device(ds1374->rtc);
+if (ret)
+return ret;

#ifdef CONFIG_RTC_DRV_DS1374_WDT
save_client = client;
--- linux-4.15.0.orig/drivers/rtc/rtc-ds1672.c
+++ linux-4.15.0/drivers/rtc/rtc-ds1672.c
@@ -58,7 +58,8 @@
"%s: raw read data - counters=%02x,%02x,%02x,%02x\n",
__func__, buf[0], buf[1], buf[2], buf[3]);
+       (buf[1] << 8) | buf[0];
rtc_time_to_tm(time, tm);
--- linux-4.15.0.orig/drivers/rtc/rtc-goldfish.c
+++ linux-4.15.0/drivers/rtc/rtc-goldfish.c
@@ -87,6 +87,7 @@
rtc_alarm64 = rtc_alarm * NSEC_PER_SEC;
    writeln((rtc_alarm64 >> 32), base + TIMER_ALARM_HIGH);
    writeln(rtc_alarm64, base + TIMER_ALARM_LOW);
+    writeln(1, base + TIMER_IRQ_ENABLED); }
} else {
* if this function was called with enabled=0
@@ -235,3 +236,5 @@
}:
module_platform_driver(goldfish_rtc);
+
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/rtc/rtc-hid-sensor-time.c
+++ linux-4.15.0/drivers/rtc/rtc-hid-sensor-time.c
@@ -213,7 +213,7 @@
get a report with all values through requesting one value */
sensor_hub_input_attr_get_raw_value(time_state->common_attributes.hsdev,
HID_USAGE_SENSOR_TIME, hid_time_addresses[0],
-time_state->info[0].report_id, SENSOR_HUB_SYNC);
+time_state->info[0].report_id, SENSOR_HUB_SYNC, false);
/* wait for all values (event) */
ret = wait_for_completion_killable_timeout(
 &time_state-&gt;comp_last_time, HZ*6);
--- linux-4.15.0.orig/drivers/rtc/rtc-hym8563.c
+++ linux-4.15.0/drivers/rtc/rtc-hym8563.c
@@ -105,7 +105,7 @@
if (!hym8563-&gt;valid) {
  dev_warn(&amp;client-&gt;dev, &quot;no valid clock/calendar values available\n&quot;);
  return -EPERM;
+return -EINVAL;
  }
ret = i2c_smbus_read_i2c_block_data(client, HYM8563_SEC, 7, buf);
--- linux-4.15.0.orig/drivers/rtc/rtc-lib.c
+++ linux-4.15.0/drivers/rtc/rtc-lib.c
@@ -52,13 +52,11 @@
*/
void rtc_time64_to_tm(time64_t time, struct rtc_time *tm)
{
  -unsigned int month, year;
  -unsigned long secs;
  +unsigned int month, year, secs;
  int days;

  /* time must be positive */
  -days = div_s64(time, 86400);
  -secs = time - (unsigned int) days * 86400;
  +days = div_s64_rem(time, 86400, &secs);

  /* day of the week, 1970-01-01 was a Thursday */
  tm-&gt;tm_wday = (days + 4) % 7;
  --- linux-4.15.0.orig/drivers/rtc/rtc-m41t80.c
  +++ linux-4.15.0/drivers/rtc/rtc-m41t80.c
  @ @ -404,7 +404,7 @ @
  alrm-&gt;time.tm_min  = bcd2bin(alarmvals[3] &amp; 0x7f);
  alrm-&gt;time.tm_hour = bcd2bin(alarmvals[2] &amp; 0x3f);
  alrm-&gt;time.tm_mday = bcd2bin(alarmvals[1] &amp; 0x3f);
  -alrm-&gt;time.tm_mon  = bcd2bin(alarmvals[0] &amp; 0x3f);
  +alrm-&gt;time.tm_mon  = bcd2bin(alarmvals[0] &amp; 0x3f) - 1;
  alrm-&gt;enabled = !(alarmvals[0] &amp; M41T80_ALMON_AFE);
  alrm-&gt;pending = (flags &amp; M41T80_FLAGS_AF) &amp;&amp; alrm-&gt;enabled;
@@ -885,7 +885,6 @@
    {
    struct i2c_adapter *adapter = to_i2c_adapter(client->dev.parent);
    int rc = 0;
-   struct rtc_device *rtc = NULL;
    struct rtc_time tm;
    struct m41t80_data *m41t80_data = NULL;
    bool wakeup_source = false;
@@ -909,6 +908,10 @@
   m41t80_data->features = id->driver_data;
   i2c_set_clientdata(client, m41t80_data);
+
   +m41t80_data->rtc = devm_rtc_allocate_device(&client->dev);
   +if (IS_PTR_ERR(m41t80_data->rtc))
   +return PTR_ERR(m41t80_data->rtc);
   +
   +#ifdef CONFIG_OF
   wakeup_source = of_property_read_bool(client->dev.of_node,
      "wakeup-source");
@@ -932,15 +935,11 @@
   device_init_wakeup(&client->dev, true);
    }
    
-   rtc = devm_rtc_device_register(&client->dev, client->name,
-      &m41t80_rtc_ops, THIS_MODULE);
-   if (IS_PTR_ERR(rtc))
-      return PTR_ERR(rtc);
+   m41t80_data->rtc->ops = &m41t80_rtc_ops;
+   m41t80_data->rtc = rtc;
    if (client->irq <= 0) {
      /* We cannot support UIE mode if we do not have an IRQ line */
      -rtc->uie_unsupported = 1;
      +m41t80_data->rtc->uie_unsupported = 1;
    }
    
    /* Make sure HT (Halt Update) bit is cleared */
@@ -993,6 +992,11 @@
    if (m41t80_data->features & M41T80_FEATURE_SQ)
    m41t80_sqw_register_clk(m41t80_data);
    #endif
    +
    +rc = rtc_register_device(m41t80_data->rtc);
    +if (rc)
    +return rc;
    +
    return 0;
    }
add_rtc_irq:
ret = regmap_add_irq_chip(info->rtc_regmap, info->rtc_irq,
    IRQF_TRIGGER_FALLING | IRQF_ONESHOT |
    IRQF_SHARED, 0, info->drv_data->rtc_irq_chip, 
    + 0, info->drv_data->rtc_irq_chip, 
    &info->rtc_irq_data);
if (ret < 0) {
    dev_err(info->dev, "Failed to add RTC irq chip: %d\n", ret);
}
out:
mutex_unlock(&info->lock);
-return 0;
+return ret;
}

static int max8997_rtc_stop_alarm(struct max8997_rtc_info *info)

/if (century)
+if (century > 20)
+time->tm_year += (century - 19) * 100;
*/

--- linux-4.15.0.orig/drivers/rtc/rtc-max77686.c
+++ linux-4.15.0/drivers/rtc/rtc-max77686.c
@@ -718,8 +718,8 @@
    IRQF_SHARED, 0, info->drv_data->rtc_irq_chip,
    IRQF_ONESHOT | IRQF_SHARED,
    0, info->drv_data->rtc_irq_chip,
    &info->rtc_irq_data);
if (ret < 0) {
    dev_err(info->dev, "Failed to add RTC irq chip: %d\n", ret);
--- linux-4.15.0.orig/drivers/rtc/rtc-max8997.c
+++ linux-4.15.0/drivers/rtc/rtc-max8997.c
@@ -221,7 +221,7 @@
 out: 
 mutex_unlock(&info->lock);
 -return 0;
+return ret;
 }

static int max8997_rtc_stop_alarm(struct max8997_rtc_info *info)

-if (century)
+if (century > 20)
+time->tm_year += (century - 19) * 100;
*/

--- linux-4.15.0.orig/drivers/rtc/rtc-mc146818-lib.c
+++ linux-4.15.0/drivers/rtc/rtc-mc146818-lib.c
@@ -82,7 +82,7 @@
    #endif

    -if (century)
    +if (century > 20)
    time->tm_year += (century - 19) * 100;

    /*

--- linux-4.15.0.orig/drivers/rtc/rtc-msm6242.c
+++ linux-4.15.0/drivers/rtc/rtc-msm6242.c
@@ -132,7 +132,8 @@
    msm6242_read(priv, MSM6242_SECOND1);
    tm->tm_min  = msm6242_read(priv, MSM6242_MINUTE10) * 10 +
    msm6242_read(priv, MSM6242_MINUTE1);
    -tm->tm_hour = (msm6242_read(priv, MSM6242_HOUR10 & 3)) * 10 +
    +tm->tm_hour = (msm6242_read(priv, MSM6242_HOUR10) &
    + MSM6242_HOUR10 HR_MASK) * 10 +
    msm6242_read(priv, MSM6242_HOUR1);
    tm->tm_mday = msm6242_read(priv, MSM6242_DAY10) * 10 +
    msm6242_read(priv, MSM6242_DAY1);
--- linux-4.15.0.orig/drivers/rtc/rtc-mt6397.c
+++ linux-4.15.0/drivers/rtc/rtc-mt6397.c
@@ -55,6 +55,14 @@
#define RTC_AL_SEC		0x0018
#define RTC_AL_SEC_MASK		0x003f
#define RTC_AL_MIN_MASK		0x003f
#define RTC_AL_HOU_MASK		0x001f
#define RTC_AL_DOM_MASK		0x001f
#define RTC_AL_DOW_MASK		0x0007
#define RTC_AL_MTH_MASK		0x000f
#define RTC_AL_YEA_MASK		0x007f
+
#define RTC_PDN2		0x002e
#define RTC_PDN2_PWRON_ALARM	BIT(4)
@@ -111,7 +119,7 @@
         irqen = irqsta & ~RTC_IRQ_EN_AL;
 mutex_lock(&rtc->lock);
         if (regmap_write(rtc->regmap, rtc->addr_base + RTC_IRQ_EN,
-            irqen) < 0)
+            irqen) == 0)
             mtk_rtc_write_trigger(rtc);
         mutex_unlock(&rtc->lock);
@@ -233,12 +241,12 @@
         alm->pending = !!(pdn2 & RTC_PDN2_PWRON_ALARM);
         mutex_unlock(&rtc->lock);

         -tm->tm_sec = data[RTC_OFFSET_SEC];
         -tm->tm_min = data[RTC_OFFSET_MIN];
         -tm->tm_hour = data[RTC_OFFSET_HOUR];
         -tm->tm_mday = data[RTC_OFFSET_DOM];
         -tm->tm_mon = data[RTC_OFFSET_MTH];
         -tm->tm_year = data[RTC_OFFSET_YEAR];
+            tm->tm_sec = data[RTC_OFFSET_SEC] & RTC_AL_SEC_MASK;
+            tm->tm_min = data[RTC_OFFSET_MIN] & RTC_AL_MIN_MASK;
+            tm->tm_hour = data[RTC_OFFSET_HOUR] & RTC_AL_HOU_MASK;
+            tm->tm_mday = data[RTC_OFFSET_DOM] & RTC_AL_DOM_MASK;
+            tm->tm_mon = data[RTC_OFFSET_MTH] & RTC_AL_MTH_MASK;
+            tm->tm_year = data[RTC_OFFSET_YEAR] & RTC_AL_YEA_MASK;

         tm->tm_year += RTC_MIN_YEAR_OFFSET;
         tm->tm_mon--;
@@ -259,14 +267,25 @@
         tm->tm_year -= RTC_MIN_YEAR_OFFSET;
         tm->tm_mon++;

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mutex_lock(&rtc->lock);
+data[RTC_OFFSET_SEC] = tm->tm_sec;
+data[RTC_OFFSET_MIN] = tm->tm_min;
+data[RTC_OFFSET_HOUR] = tm->tm_hour;
+data[RTC_OFFSET_DOM] = tm->tm_mday;
+data[RTC_OFFSET_MTH] = tm->tm_mon;
+data[RTC_OFFSET_YEAR] = tm->tm_year;
-
mutex_lock(&rtc->lock);
+ret = regmap_bulk_read(rtc->regmap, rtc->addr_base + RTC_AL_SEC,
  +data, RTC_OFFSET_COUNT);
+if (ret < 0)
  +goto exit;
+
+data[RTC_OFFSET_SEC] = ((data[RTC_OFFSET_SEC] & ~(RTC_AL_SEC_MASK)) |
  +(tm->tm_sec & RTC_AL_SEC_MASK));
+data[RTC_OFFSET_MIN] = ((data[RTC_OFFSET_MIN] & ~(RTC_AL_MIN_MASK)) |
  +(tm->tm_min & RTC_AL_MIN_MASK));
+data[RTC_OFFSET_HOUR] = ((data[RTC_OFFSET_HOUR] & ~(RTC_AL_HOU_MASK)) |
  +(tm->tm_hour & RTC_AL_HOU_MASK));
+data[RTC_OFFSET_DOM] = ((data[RTC_OFFSET_DOM] & ~(RTC_AL_DOM_MASK)) |
  +(tm->tm_mday & RTC_AL_DOM_MASK));
+data[RTC_OFFSET_MTH] = ((data[RTC_OFFSET_MTH] & ~(RTC_AL_MTH_MASK)) |
  +(tm->tm_mon & RTC_AL_MTH_MASK));
+data[RTC_OFFSET_YEAR] = ((data[RTC_OFFSET_YEAR] & ~(RTC_AL_YEA_MASK)) |
  +(tm->tm_year & RTC_AL_YEA_MASK));
+
+if (alm->enabled) {
  ret = regmap_bulk_write(rtc->regmap,
  rtc->addr_base + RTC_AL_SEC,
  @ @ -333,6 +352,10 @@

platform_set_drvdata(pdev, rtc);
+
+rtc->rtc_dev = devm_rtc_allocate_device(rtc->dev);
+if (IS_ERR(rtc->rtc_dev))
  +return PTR_ERR(rtc->rtc_dev);
+
+ret = request_threaded_irq(rtc->irq, NULL,
  mtk_rtc_irq_handler_thread,
  IRQF_ONESHOT | IRQF_TRIGGER_HIGH,
  @ @ -340,25 +363,23 @@
  if (ret) {
  dev_err(&pdev->dev, "Failed to request alarm IRQ: %d: %d\n",
  rtc->irq, ret);
  -goto out_dispose_irq;
  +return ret;
  }

device_init_wakeup(&pdev->dev, 1);

-rtc->rtc_dev = rtc_device_register("mt6397-rtc", &pdev->dev,
- &mtk_rtc_ops, THIS_MODULE);
-if (IS_ERR(rtc->rtc_dev)) {
+rtc->rtc_dev->ops = &mtk_rtc_ops;
+ +ret = rtc_register_device(rtc->rtc_dev);
+if (ret) {
+ dev_err(&pdev->dev, "register rtc device failed\n");
+ret = PTR_ERR(rtc->rtc_dev);
+goto out_free_irq;
+}
return 0;

out_free_irq:
-free_irq(rtc->irq, rtc->rtc_dev);
-out_dispose_irq;
-irq_dispose_mapping(rtc->irq);
+free_irq(rtc->irq, rtc);
return ret;
}

@@ -366,9 +387,7 @@
{
 struct mt6397_rtc *rtc = platform_get_drvdata(pdev);

-rtc_device_unregister(rtc->rtc_dev);
-free_irq(rtc->irq, rtc->rtc_dev);
-irq_dispose_mapping(rtc->irq);
+free_irq(rtc->irq, rtc);
return 0;
}

--- linux-4.15.0.orig/drivers/rtc/rtc-omap.c
+++ linux-4.15.0/drivers/rtc/rtc-omap.c
@@ -563,9 +563,7 @@
 .dt_free_map = pinconf_generic_dt_free_map,
 
 enum rtc_pin_config_param {
-PIN_CONFIG_ACTIVE_HIGH = PIN_CONFIG_END + 1,
-};
+#define PIN_CONFIG_ACTIVE_HIGH(PIN_CONFIG_END + 1)

 static const struct pinconf_generic_params rtc_params[] = {

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- if (rtc->is_pmic_controller) {
  - if (!pm_power_off) {
    - omap_rtc_power_off_rtc = rtc;
    - pm_power_off = omap_rtc_power_off;
    -
  }
}

/* Support ext_wakeup pinconf */
rtc_pinctrl_desc.name = dev_name(&pdev->dev);

return 0;

+err_deregister_pinctrl:
+pinctrl_unregister(rtc->pctldev);
err:
  device_init_wakeup(&pdev->dev, false);
  rtc->type->lock(rtc);
--- linux-4.15.0.orig/drivers/rtc/rtc-opal.c
+++ linux-4.15.0/drivers/rtc/rtc-opal.c
@@ -57,7 +57,8 @@
 static int opal_get_rtc_time(struct device *dev, struct rtc_time *tm) {
  -long rc = OPAL_BUSY;
+  s64 rc = OPAL_BUSY;
+  int retries = 10;
  u32 y_m_d;
  u64 h_m_s_ms;
  __be32 __y_m_d;
while (rc == OPAL_BUSY || rc == OPAL_BUSY_EVENT) {
    rc = opal_RTC_read(&__y_m_d, &__h_m_s_ms);
    -if (rc == OPAL_BUSY_EVENT)
    +if (rc == OPAL_BUSY_EVENT) {
        +msleep(OPAL_BUSY_DELAY_MS);
        opal_poll_events(NULL);
    -else
        -msleep(10);
    +} else if (rc == OPAL_BUSY) {
        +msleep(OPAL_BUSY_DELAY_MS);
    +} else if (rc == OPAL_HARDWARE || rc == OPAL_INTERNAL_ERROR) {
        +if (retries--) {
            +msleep(10); /* Wait 10ms before retry */
            +rc = OPAL_BUSY; /* go around again */
        +}
    +}
}

if (rc != OPAL_SUCCESS)
@@ -83,17 +91,26 @@

static int opal_set_RTC_time(struct device *dev, struct RTC_time *tm)
{
    -long rc = OPAL_BUSY;
    +s64 rc = OPAL_BUSY;
    +int retries = 10;
    u32 y_m_d = 0;
    u64 h_m_s_ms = 0;

    tm_to_opal(tm, &y_m_d, &h_m_s_ms);
    +
    while (rc == OPAL_BUSY || rc == OPAL_BUSY_EVENT) {
        rc = opal_RTC_write(y_m_d, h_m_s_ms);
        -if (rc == OPAL_BUSY_EVENT)
        +if (rc == OPAL_BUSY_EVENT) {
            +msleep(OPAL_BUSY_DELAY_MS);
            opal_poll_events(NULL);
        -else
            -msleep(10);
        +} else if (rc == OPAL_BUSY) {
            +msleep(OPAL_BUSY_DELAY_MS);
        +} else if (rc == OPAL_HARDWARE || rc == OPAL_INTERNAL_ERROR) {
            +if (retries--) {
                +msleep(10); /* Wait 10ms before retry */
                +rc = OPAL_BUSY; /* go around again */
            +}
        +}
    }
return rc == OPAL_SUCCESS ? 0 : -EIO;
--- linux-4.15.0.orig/drivers/rtc/rtc-pcf2127.c
+++ linux-4.15.0/drivers/rtc/rtc-pcf2127.c
@@ -52,20 +52,14 @@
 struct pcf2127 *pcf2127 = dev_get_drvdata(dev);
 unsigned char buf[10];
 int ret;
-int i;
-	int i;
-	for (i = 0; i <= PCF2127_REG_CTRL3; i++) {
-		ret = regmap_read(pcf2127->regmap, PCF2127_REG_CTRL1 + i,
-				  (unsigned int *)(buf + i));
-		if (ret) {
-			dev_err(dev, "%s: read error\n", __func__);
-			return ret;
-		}
-	}
-	ret = regmap_bulk_read(pcf2127->regmap, PCF2127_REG_SC,
-			       (buf + PCF2127_REG_SC),
-			       ARRAY_SIZE(buf) - PCF2127_REG_SC);
+	/*
+	 * Avoid reading CTRL2 register as it causes WD_VAL register
+	 * value to reset to 0 which means watchdog is stopped.
+	 */
+ret = regmap_bulk_read(pcf2127->regmap, PCF2127_REG_CTRL3,
+        (buf + PCF2127_REG_CTRL3),
+        ARRAY_SIZE(buf) - PCF2127_REG_CTRL3);
if (ret) {
    dev_err(dev, "%s: read error\n", __func__);
    return ret;
@@ -86,14 +80,12 @@
}
dev_dbg(dev,
    "%s: raw data is cr1=%02x, cr2=%02x, cr3=%02x, "
    "%s: raw data is cr3=%02x, sec=%02x, min=%02x, hr=%02x, "
    "%s: raw data is cr3=%02x, sec=%02x, min=%02x, hr=%02x, "
    "mday=%02x, wday=%02x, mon=%02x, year=%02x\n",
    __func__,
    -buf[0], buf[1], buf[2],
    -buf[3], buf[4], buf[5],
    -buf[6], buf[7], buf[8], buf[9]);
+buf[PCF2127_REG_MN], buf[PCF2127_REG_HR],
+buf[PCF2127_REG_DM], buf[PCF2127_REG_DW],
+buf[PCF2127_REG_MO], buf[PCF2127_REG_YR]);

tm->tm_sec = bcd2bin(buf[PCF2127_REG_SC] & 0x7F);
(tm->tm_min = bcd2bin(buf[PCF2127_REG_MN] & 0x7F);
@@ -248,6 +240,9 @@
memcpy(buf + 1, val, val_size);
ret = i2c_master_send(client, buf, val_size + 1);
+
+kfree(buf);
+
if (ret != val_size + 1)
return ret < 0 ? ret : -EIO;

--- linux-4.15.0.orig/drivers/rtc/rtc-pcf8523.c
+++ linux-4.15.0/drivers/rtc/rtc-pcf8523.c
@@ -85,23 +85,46 @@
return 0;
}

-static int pcf8523_select_capacitance(struct i2c_client *client, bool high)
+static int pcf8523_voltage_low(struct i2c_client *client)
{
    u8 value;
    int err;

    +err = pcf8523_read(client, REG_CONTROL3, &value);
    +if (err < 0)
    +return err;
    +
    +return !!(value & REG_CONTROL3_BLF);
    +}
    +
    +static int pcf8523_load_capacitance(struct i2c_client *client)
    +{
        +u32 load;
        +u8 value;
        +int err;
        +
        err = pcf8523_read(client, REG_CONTROL1, &value);
        if (err < 0)
            return err;

        -if (!high)
            -value &= ~REG_CONTROL1_CAP_SEL;
        -else
            +value &= ~REG_CONTROL1_CAP_SEL;
            +
            +return err;
+of_property_read_u32(client->dev.of_node, "quartz-load-femtofarads", 
+    &load);
+
+switch (load) {
+    +default:
+    +dev_warn(&client->dev, "Unknown quartz-load-femtofarads value: %d. Assuming 12500", 
+       .load);
+    +/* fall through */
+    +case 12500:
+        value |= REG_CONTROL1_CAP_SEL;
+        break;
+    +case 7000:
+        value &= ~REG_CONTROL1_CAP_SEL;
+        break;
+    +}
+
+err = pcf8523_write(client, REG_CONTROL1, value);
-if (err < 0)
-    return err;
-}
+
{return err;
}

@@ -167,6 +190,14 @@
struct i2c_msg msgs[2];

int err;

+err = pcf8523_voltage_low(client);
+if (err < 0) {
+    return err;
+} else if (err > 0) {
+    dev_err(dev, "low voltage detected, time is unreliable\n");
+    return -EINVAL;
+} 
+
+msgs[0].addr = client->addr;
+msgs[0].flags = 0;
+msgs[0].len = 1;
@@ -251,17 +282,13 @@
    unsigned long arg)
{
    struct i2c_client *client = to_i2c_client(dev);
-    u8 value;
-    int ret = 0, err;
-+    int ret;
+
+    switch (cmd) {
+    case RTC_VL_READ:
err = pcf8523_read(client, REG_CONTROL3, &value);
-if (err < 0)
-return err;
-
-if (value & REG_CONTROL3_BLF)
-ret = 1;
+ret = pcf8523_voltage_low(client);
+if (ret < 0)
+return ret;

if (copy_to_user((void __user *)arg, &ret, sizeof(int)))
return -EFAULT;
@@ -331,9 +358,10 @@
if (!pcf)
return -ENOMEM;
-err = pcf8523_select_capacitance(client, true);
+err = pcf8523_load_capacitance(client);
if (err < 0)
-return err;
+dev_warn(&client->dev, "failed to set xtal load capacitance: %d",
+err);

err = pcf8523_set_pm(client, 0);
if (err < 0)
--- linux-4.15.0.orig/drivers/rtc/rtc-pcf8563.c
+++ linux-4.15.0/drivers/rtc/rtc-pcf8563.c
@@ -563,7 +563,6 @@
 struct pcf8563 *pcf8563;
 int err;
 unsigned char buf;
-unsigned char alm_pending;
-unsigned char alm_pending;

 dev_dbg(&client->dev, "%s\n", __func__);
@@ -587,13 +586,13 @@
 return err;
 }
-err = pcf8563_get_alarm_mode(client, NULL, &alm_pending);
-if (err) {
-+dev_err(&client->dev, "%s: read error\n", __func__);
+/* Clear flags and disable interrupts */
+buf = 0;
+err = pcf8563_write_block_data(client, PCF8563_REG_ST2, 1, &buf);
+if (err < 0) {
+dev_err(&client->dev, "%s: write error\n", __func__);
+return err;
}
- if (alm_pending)
- pcf8563_set_alarm_mode(client, 0);

pcf8563->rtc = devm rtc_device_register(&client->dev,
pcf8563_driver.driver.name,
@@ -605,7 +604,7 @@
if (client->irq > 0) {
 err = devm request threaded irq(&client->dev, client->irq,
 NULL, pcf8563_irq,
- IRQF_SHARED | IRQF_TRIGGER_FALLING,
+ IRQF_SHARED | IRQF_TRIGGER_LOW,
 pcf8563_driver.driver.name, client);
 if (err) {
 dev_err(&client->dev, "unable to request IRQ %d\n",
--- linux-4.15.0.org/drivers/rtc/rtc-pl030.c
+++ linux-4.15.0/drivers/rtc/rtc-pl030.c
@@ -112,6 +112,13 @@
goto err_rtc;
 }
+rtc->rtc = devm rtc_allocate_device(&dev->dev);
+if (IS_ERR(rtc->rtc)) {
+ ret = PTR_ERR(rtc->rtc);
+goto err_rtc;
+}
+
+rtc->rtc->ops = &pl030_ops;
rtc->base = ioremap(dev->res.start, resource_size(&dev->res));
if (!rtc->base) {
 ret = -ENOMEM;
@@ -128,12 +135,9 @@
if (ret)
goto err_irq;

-rtc->rtc = rtc_device_register("pl030", &dev->dev, &pl030_ops,
- THIS_MODULE);
- if (IS_ERR(rtc->rtc)) {
- ret = PTR_ERR(rtc->rtc);
- ret = rtc_register_device(rtc->rtc);
- if (ret)
goto err_reg;
-
return 0;

@@ -154,7 +158,6 @@
writel(0, rtc->base + RTC_CR);
free_irq(dev->irq[0], rtc);
-rtc_device_unregister(rtc->rtc);
iounmap(rtc->base);
amba_release_regions(dev);

--- linux-4.15.0.orig/drivers/rtc/rtc-pm8xxx.c
+++ linux-4.15.0/drivers/rtc/rtc-pm8xxx.c
@@ -74,16 +74,18 @@
 /*
  * Steps to write the RTC registers.
  * 1. Disable alarm if enabled.
- * 2. Write 0x00 to LSB.
- * 3. Write Byte[1], Byte[2], Byte[3] then Byte[0].
+ * 2. Disable rtc if enabled.
+ * 3. Write 0x00 to LSB.
+ * 4. Write Byte[1], Byte[2], Byte[3] then Byte[0].
+ * 5. Enable rtc if disabled in step 2.
 */
static int pm8xxx_rtc_set_time(struct device *dev, struct rtc_time *tm)
{
  int rc, i;
  unsigned long secs, irq_flags;
-u8 value[NUM_8_BIT_RTC_REGS], alarm_enabled = 0;
-unsigned int ctrl_reg;
+u8 value[NUM_8_BIT_RTC_REGS], alarm_enabled = 0, rtc_disabled = 0;
+unsigned int ctrl_reg, rtc_ctrl_reg;
 struct pm8xxx_rtc *rtc_dd = dev_get_drvdata(dev);
 const struct pm8xxx_rtc_regs *regs = rtc_dd->regs;

@@ -92,23 +94,38 @@
rtc_tm_to_time(tm, &secs);
+dev_dbg(dev, "Seconds value to be written to RTC = %lu\n", secs);
+for (i = 0; i < NUM_8_BIT_RTC_REGS; i++) {
  value[i] = secs & 0xFF;
  secs >>= 8;
}  
-dev_dbg(dev, "Seconds value to be written to RTC = %lu\n", secs);
- spin_lock_irqsave(&rtc_dd->ctrl_reg_lock, irq_flags);
-rc = regmap_read(rtc_dd->regmap, regs->ctrl, &ctrl_reg);
+rc = regmap_read(rtc_dd->regmap, regs->alarm_ctrl, &ctrl_reg);
if (rc)
    goto rtc_rw_fail;

if (ctrl_reg & regs->alarm_en) {
    alarm_enabled = 1;
    ctrl_reg &= ~regs->alarm_en;
    -rc = regmap_write(rtc_dd->regmap, regs->ctrl, ctrl_reg);
    +rc = regmap_write(rtc_dd->regmap, regs->alarm_ctrl, ctrl_reg);
    +if (rc) {
        +dev_err(dev, "Write to RTC Alarm control register failed\n");
        +goto rtc_rw_fail;
    +}
    +
    +/* Enable RTC H/w after writing on RTC register */
    +rc = regmap_read(rtc_dd->regmap, regs->ctrl, &rtc_ctrl_reg);
    +if (rc)
        +goto rtc_rw_fail;
    +
    +if (rtc_ctrl_reg & PM8xxx_RTC_ENABLE) {
        rtc_disabled = 1;
        +rtc_ctrl_reg &= ~PM8xxx_RTC_ENABLE;
        +rc = regmap_write(rtc_dd->regmap, regs->ctrl, rtc_ctrl_reg);
        if (rc) {
            dev_err(dev, "Write to RTC control register failed\n");
            goto rtc_rw_fail;
            @@ -137,11 +154,21 @@
        goto rtc_rw_fail;
    }

    +/* Disable RTC H/w before writing on RTC register */
    +rc = regmap_read(rtc_dd->regmap, regs->ctrl, &rtc_ctrl_reg);
    +if (rc)
        +goto rtc_rw_fail;
    +
    +if (rtc_ctrl_reg & PM8xxx_RTC_ENABLE) {
        rtc_disabled = 1;
        +rtc_ctrl_reg &= ~PM8xxx_RTC_ENABLE;
        +rc = regmap_write(rtc_dd->regmap, regs->ctrl, rtc_ctrl_reg);
        if (rc) {
            dev_err(dev, "Write to RTC control register failed\n");
            goto rtc_rw Fail;
            @@ -137,11 +154,21 @@
        goto rtc_rw_fail;
    }

    +/* Enable RTC H/w after writing on RTC register */
    +if (rtc_disabled) {
        +rtc_ctrl_reg |= PM8xxx_RTC_ENABLE;
        +rc = regmap_write(rtc_dd->regmap, regs->ctrl, rtc_ctrl_reg);
        +if (rc) {
            +dev_err(dev, "Write to RTC control register failed\n");
            +goto rtc_rw_fail;
        +}
        +
        +if (alarm_enabled) {
            ctrl_reg |= regs->alarm_en;
            -rc = regmap_write(rtc_dd->regmap, regs->ctrl, ctrl_reg);
            +rc = regmap_write(rtc_dd->regmap, regs->alarm_ctrl, ctrl_reg);
            if (rc) {
                -dev_err(dev, "Write to RTC control register failed\n");
                +dev_err(dev, "Write to RTC Alarm control register failed\n");
            }
goto rtc_rw_fail;
}
}
@@ -186,7 +213,8 @@
}
}

+       ((unsigned long)value[3] << 24);

rtc_time_to_tm(secs, tm);

@@ -267,7 +295,8 @@
return rc;
}

+       ((unsigned long)value[3] << 24);

rtc_time_to_tm(secs, &alarm->time);

--- linux-4.15.0.orig/drivers/rtc/rtc-proc.c
+++ linux-4.15.0/drivers/rtc/rtc-proc.c
@@ -26,8 +26,8 @@
int size;
    char name[NAME_SIZE];

-size = scnprintf(name, NAME_SIZE, "rtc%d", rtc->id);
-if (size > NAME_SIZE)
+size = snprintf(name, NAME_SIZE, "rtc%d", rtc->id);
+if (size >= NAME_SIZE)
    return false;

return !strncmp(name, CONFIG_RTC_HCTOSYS_DEVICE, NAME_SIZE);

--- linux-4.15.0.orig/drivers/rtc/rtc-rk808.c
+++ linux-4.15.0/drivers/rtc/rtc-rk808.c
@@ -416,12 +416,11 @@
device_init_wakeup(&pdev->dev, 1);

-rk808_rtc->rtc = devm_rtc_device_register(pdev, "rk808-rtc",
-       &rk808_rtc_ops, THIS_MODULE);
-    if (IS_ERR(rk808_rtc->rtc)) {
-        ret = PTR_ERR(rk808_rtc->rtc);
-        return ret;
-    }
+rk808_rtc->rtc = devm_rtc_allocate_device(&pdev->dev);
+if (IS_ERR(rk808_rtc->rtc))
+return PTR_ERR(rk808_rtc->rtc);
+
+rk808_rtc->rtc->ops = &rk808_rtc_ops;

rk808_rtc->irq = platform_get_irq(pdev, 0);
if (rk808_rtc->irq < 0) {
    @ @ -438,9 +437,10 @@
if (ret) {
    dev_err(&pdev->dev, "Failed to request alarm IRQ %d: %d\n", 
    rk808_rtc->irq, ret);
+return ret;
}

-return ret;
+return rtc_register_device(rk808_rtc->rtc);
}

static struct platform_driver rk808_rtc_driver = {
- --- linux-4.15.0.orig/drivers/rtc/rtc-rp5c01.c
+++ linux-4.15.0/drivers/rtc/rtc-rp5c01.c
@@ -249,16 +249,24 @@
platform_set_drvdata(dev, priv);

-rtc = devm_rtc_device_register(&dev->dev, "rtc-rp5c01", &rp5c01_rtc_ops,
- THIS_MODULE);
+r = devm_rtc_device_register(&dev->dev, "rtc-rp5c01", &rp5c01_rtc_ops,
+ THIS_MODULE);
+rtc = devm_rtc_allocate_device(&dev->dev);
if (IS_ERR(rtc))
    return PTR_ERR(rtc);
+
+rtc->ops = &rp5c01_rtc_ops;
+
priv->rtc = rtc;

error = sysfs_create_bin_file(&dev->dev.kobj, &priv->nvram_attr);
if (error)
    return error;

+error = rtc_register_device(rtc);
+if (error) {
+    sysfs_remove_bin_file(&dev->dev.kobj, &priv->nvram_attr);
+    return error;
+}
+
return 0;
}
static int rv3029_eeprom_write(struct device *dev, u8 reg, 
   u8 const buf[], size_t len)
{
   int ret;
   int ret, err;
   size_t i;
   u8 tmp;

   ret = rv3029_eeprom_enter(dev);
   if (ret < 0)
      return ret;
   err = rv3029_eeprom_enter(dev);
   if (err < 0)
      return err;

   for (i = 0; i < len; i++, reg++) {
      ret = rv3029_read_regs(dev, reg, &tmp, 1);
      if (ret < 0)
         return ret;
      err = rv3029_eeprom_exit(dev);
      if (err < 0)
         return err;
   }

   ret = rv3029_eeprom_exit(dev);
   if (ret < 0)
      return ret;
   err = rv3029_eeprom_exit(dev);
   if (err < 0)
      return err;

   return 0;
}

static int rv3029_eeprom_update_bits(struct device *dev, 
static const struct of_device_id rv8803_of_match[] = {
   {
      .compatible = "microcrystal.rv8803",
      .data = (void *)rx_8900
   },
   {
      .compatible = "epson.rx8900",
      .data = (void *)rv_8803
   }
};
--- linux-4.15.0.orig/drivers/rtc/rtc-rx8010.c
+++ linux-4.15.0/drivers/rtc/rtc-rx8010.c
@@ -428,16 +428,26 @@
 }
 }

-static struct rtc_class_ops rx8010_rtc_ops = {
+static const struct rtc_class_ops rx8010_rtc_ops_default = {
 .read_time = rx8010_get_time,
 .set_time = rx8010_set_time,
 .ioctl = rx8010_ioctl,
 };

+static const struct rtc_class_ops rx8010_rtc_ops_alarm = {
+ .read_time = rx8010_get_time,
+ .set_time = rx8010_set_time,
+ .ioctl = rx8010_ioctl,
+ .read_alarm = rx8010_read_alarm,
+ .set_alarm = rx8010_set_alarm,
+ .alarm_irq_enable = rx8010_alarm_irq_enable,
+};
+
 static int rx8010_probe(struct i2c_client *client,
 const struct i2c_device_id *id)
 {
 struct i2c_adapter *adapter = to_i2c_adapter(client->dev.parent);
+ const struct rtc_class_ops *rtc_ops;
 struct rx8010_data *rx8010;
 int err = 0;

 @@ -468,16 +478,16 @@
 
 if (err) {
 dev_err(&client->dev, "unable to request IRQ\n");
- client->irq = 0;
- } else {
- rx8010_rtc_ops.read_alarm = rx8010_read_alarm;
- rx8010_rtc_ops.set_alarm = rx8010_set_alarm;
- rx8010_rtc_ops.alarm_irq_enable = rx8010_alarm_irq_enable;
+ return err;
 } 
 +
+ rtc_ops = &rx8010_rtc_ops_alarm;
+ } else {
+ rtc_ops = &rx8010_rtc_ops_default;
 }

 rx8010->rtc = devm_rtc_device_register(&client->dev, client->name,
static int s35390a_init(struct s35390a *s35390a)
{
    char buf;
    unsigned initcount = 0;

    --- linux-4.15.0.orig/drivers/rtc/rtc-s3c.c
    +++ linux-4.15.0/drivers/rtc/rtc-s3c.c
    @@ -327,7 +327,6 @@
    struct rtc_time *tm = &alrm->time;
    unsigned int alrm_en;
    int ret;
    -int year = tm->tm_year - 100;
    dev_dbg(dev, "s3c_rtc_setalarm: %d, %04d.%02d.%02d %02d:%02d:%02d
    alrm_en |= S3C2410_RTCALM_YEAREN;
    writeb(bin2bcd(year), info->base + S3C2410_ALMYEAR);
    } -if (year < 100 && year >= 0) {
    -   alrm_en |= S3C2410_RTCALM_MONEN;
    -   writeb(bin2bcd(year), info->base + S3C2410_ALMMON);
    -}
    if (tm->tm_mon < 12 && tm->tm_mon >= 0) {
    alrm_en |= S3C2410_RTCALM_MONEN;
    writeb(bin2bcd(tm->tm_mon + 1), info->base + S3C2410_ALMMON);
    --- linux-4.15.0.orig/drivers/rtc/rtc-sa1100.c
    +++ linux-4.15.0/drivers/rtc/rtc-sa1100.c
    @@ -186,7 +186,6 @@
    int sa1100_rtc_init(struct platform_device *pdev, struct sa1100_rtc *info)
    {
    -struct rtc_device *rtc;
    int ret;
    spin_lock_init(&info->lock);
writel_relaxed(0, info->rcnr);
}

rtc = devm_rtc_device_register(&pdev->dev, pdev->name, &sa1100_rtc_ops,
-THIS_MODULE);
-if (IS_ERR(rtc)) {
+info->rtc->ops = &sa1100_rtc_ops;
+info->rtc->max_user_freq = RTC_FREQ;
 +
+ret = rtc_register_device(info->rtc);
+if (ret) {
+    clk_disable_unprepare(info->clk);
-        return PTR_ERR(rtc);
+        return ret;
+    }
-    info->rtc = rtc;
-
-rtc->max_user_freq = RTC_FREQ;
rtc_irq_set_freq(rtc, NULL, RTC_FREQ);

/* Fix for a nasty initialization problem the in SA11xx RTSR register.
@@ -273,6 +271,10 @@
info->irq_1hz = irq_1hz;
info->irq_alarm = irq_alarm;

+info->rtc = devm_rtc_allocate_device(&pdev->dev);
+if (IS_ERR(info->rtc))
+    return PTR_ERR(info->rtc);
+    ret = devm_request_irq(&pdev->dev, irq_1hz, sa1100_rtc_interrupt, 0,
                "rtc 1Hz", &pdev->dev);
    if (ret) {
--- linux-4.15.0.orig/drivers/rtc/rtc-sh.c
+++ linux-4.15.0/drivers/rtc/rtc-sh.c
@@ -462,7 +462,7 @@
static inline int sh_rtc_read_alarm_value(struct sh_rtc *rtc, int reg_off)
{
    unsigned int byte;
    -int value = 0xff; /* return 0xff for ignored values */
+int value = -1; /* return -1 for ignored values */

    byte = readb(rtc->regbase + reg_off);
    if (byte & AR_ENB) {
--- linux-4.15.0.orig/drivers/rtc/rtc-snvs.c
+++ linux-4.15.0/drivers/rtc/rtc-snvs.c
@@ -47,49 +47,83 @@
struct clk *clk;
/* Read 64 bit timer register, which could be in inconsistent state */
+static u64 rtc_read_lpsrt(struct snvs_rtc_data *data)
+
+u32 mshb, lsb;
+
+regmap_read(data->regmap, data->offset + SNVS_LPSRTCMR, &msb);
+regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &lsb);
+return (u64)msb << 32 | lsb;
+
+
+/* Read the secure real time counter, taking care to deal with the cases of the
+ counter updating while being read.
+ */
+static u32 rtc_read_lp_counter(struct snvs_rtc_data *data)
{
    u64 read1, read2;
    -u32 val;
    +unsigned int timeout = 100;

    /* As expected, the registers might update between the read of the LSB
    reg and the MSB reg. It's also possible that one register might be
    in partially modified state as well.
    */
    +read1 = rtc_read_lpsrt(data);
    do {
        -regmap_read(data->regmap, data->offset + SNVS_LPSRTCMR, &val);
        -read1 = val;
        -read1 <<= 32;
        -regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &val);
        -read1 |= val;
    -
        -regmap_read(data->regmap, data->offset + SNVS_LPSRTCMR, &val);
        -read2 = val;
        -read2 <<= 32;
        -regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &val);
        -read2 |= val;
    -} while (read1 != read2);
    +read2 = read1;
    +read1 = rtc_read_lpsrt(data);
    +} while (read1 != read2 && --timeout);
    +if (!timeout)
        dev_err(&data->rtc->dev, "Timeout trying to get valid LPSRT Counter read\n");

    /* Convert 47-bit counter to 32-bit raw second count */
    return (u32) (read1 >> CNTR_TO_SECS_SH);
}
static void rtc_write_sync_lp(struct snvs_rtc_data *data)
+/* Just read the lsb from the counter, dealing with inconsistent state */
+static int rtc_read_lp_counter_lsb(struct snvs_rtc_data *data, u32 *lsb)
+{
+  u32 count1, count2, count3;
+  int i;
+  u32 count1, count2;
+  unsigned int timeout = 100;
+  
+  regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &count1);
+  do {
+    count2 = count1;
+    regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &count1);
+  } while (count1 != count2 && --timeout);
+  if (!timeout) {
+    dev_err(&data->rtc->dev, "Timeout trying to get valid LPSRT Counter read\n");
+    return -ETIMEDOUT;
+  }
+  
+  *lsb = count1;
+  return 0;
+}
+
+static int rtc_write_sync_lp(struct snvs_rtc_data *data)
+{
+  u32 count1, count2;
+  u32 elapsed;
+  unsigned int timeout = 1000;
+  int ret;
+  
+  /* Wait for 3 CKIL cycles */
+  for (i = 0; i < 3; i++) {
+    do {
+      regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &count1);
+      regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &count2);
+    } while (count1 != count2);
+  
+  /* Now wait until counter value changes */
+  do {
+    do {
+      regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &count2);
+      regmap_read(data->regmap, data->offset + SNVS_LPSRTCLR, &count3);
+    } while (count2 != count3);
+    do {
+      do {
+        ret = rtc_read_lp_counter_lsb(data, &count1);
+      } while (ret)
+      return ret;
+  }
### Note

`/* Wait for 3 CKIL cycles, about 61.0-91.5 s */`

```c
+do {
+ret = rtc_read_lp_counter_lsb(data, &count2);
+if (ret)
+return ret;
+elapsed = count2 - count1; /* wrap around _is_ handled! */
+} while (elapsed < 3 && --timeout);
+if (!timeout) {
+dev_err(&data->rtc->dev, "Timeout waiting for LPSRT Counter to change\n");
+return -ETIMEDOUT;
}
+return 0;
}
```

### Function: `snvs_rtc_enable`

```c
static int snvs_rtc_enable(struct snvs_rtc_data *data, bool enable)
{
struct snvs_rtc_data *data = dev_get_drvdata(dev);
unsigned long time;
+int ret;
	rtc_tm_to_time(tm, &time);
/* Disable RTC first */
-snvs_rtc_enable(data, false);
+ret = snvs_rtc_enable(data, false);
+if (ret)
+return ret;

/* Write 32-bit time to 47-bit timer, leaving 15 LSBs blank */
regmap_write(data->regmap, data->offset + SNVS_LPSRTCLR, time << CNTR_TO_SECS_SH);
regmap_write(data->regmap, data->offset + SNVS_LPSRTCMR, time >> (32 - CNTR_TO_SECS_SH));

/* Enable RTC again */
-snvs_rtc_enable(data, true);
+ret = snvs_rtc_enable(data, true);

-return 0;
+return ret;
}
```

### Function: `snvs_rtc_read_alarm`

```c
static int snvs_rtc_read_alarm(struct device *dev, struct rtc_wkalrm *alrm)
{
(SNVs_LPCR_LPTA_EN | SNVS_LPCR_LPWUI_EN),
 enable ? (SNVS_LPCR_LPTA_EN | SNVS_LPCR_LPWUI_EN) : 0);

-rtc_write_sync_lp(data):
```
static int snvs_rtc_set_alarm(struct device *dev, struct rtc_wkalrm *alrm)
{
    struct snvs_rtc_data *data = dev_get_drvdata(dev);
    struct rtc_time *alrm_tm = &alrm->time;
    unsigned long time = rtc_tm_to_time(alrm_tm, &time);

    regmap_update_bits(data->regmap, data->offset + SNVS_LPCR, SNVS_LPCR_LPTA_EN, 0);
    ret = rtc_write_sync_lp(data);
    if (ret)
        return ret;
    regmap_write(data->regmap, data->offset + SNVS_LPTAR, time);

    /* Clear alarm interrupt status bit */
    if (!data)
        return -ENOMEM;

    rtc = devm_rtc_allocate_device(&pdev->dev);
    if (IS_ERR(rtc))
        return PTR_ERR(rtc);

    data->regmap = syscon_regmap_lookup_by_phandle(pdev->dev.of_node, "regmap");

    if (IS_ERR(data->regmap)) {
        regmap_write(data->regmap, data->offset + SNVS_LPSR, 0xffffffff);
        /* Enable RTC */
        snvs_rtc_enable(data, true);
        ret = snvs_rtc_enable(data, true);
        if (ret) {
            dev_err(&pdev->dev, "failed to enable rtc %d\n", ret);
            goto error_rtc_device_register;
        }
        device_init_wakeup(&pdev->dev, true);
    }

    @@ -300,10 +346,9 @@
goto error_rtc_device_register;

    // OSU 5GaaS Edge AC-1
    return 0;
    +return rtc_write_sync_lp(data);
}
-data->rtc = devm_rtc_device_register(&pdev->dev, pdev->name, &snvs_rtc_ops, THIS_MODULE);
-if (IS_ERR(data->rtc)) {
-data->rtc->ops = &snvs_rtc_ops;
+data->rtc->ops = &snvs_rtc_ops;
+ret = rtc_register_device(data->rtc);
+if (ret) {
+dev_err(&pdev->dev, "failed to register rtc: %d
", ret);
+goto error_rtc_device_register;
}
--- linux-4.15.0.orig/drivers/rtc/rtc-stm32.c
+++ linux-4.15.0/drivers/rtc/rtc-stm32.c
@@ -636,7 +636,7 @@
 */
 ret = stm32_rtc_init(pdev, rtc);
 if (ret)
 -goto err;
+goto err_no_rtc_ck;
 rtc->irq_alarm = platform_get_irq(pdev, 0);
 if (rtc->irq_alarm <= 0) {
 @ @ -680,10 +680,12 @@
 dev_warn(&pdev->dev, "Date/Time must be initialized\n");
 return 0;
 +
 err:
+clk_disable_unprepare(rtc->rtc_ck);
+err_no_rtc_ck:
 if (rtc->data->has_pclk)
 clk_disable_unprepare(rtc->pclk);
 -clk_disable_unprepare(rtc->rtc_ck);
 regmap_update_bits(rtc->dbp, PWR_CR, PWR_CR_DBP, 0);
 --- linux-4.15.0.orig/drivers/rtc/rtc-sun6i.c
+++ linux-4.15.0/drivers/rtc/rtc-sun6i.c
 @@ -74,7 +74,7 @@
 #define SUN6I_ALARM_CONFIG_WAKEUP		BIT(0)
 #define SUN6I_LOSC_OUT_GATING		0x0060
-#define SUN6I_LOSC_OUT_GATING_EN		BIT(0)
+#define SUN6I_LOSC_OUT_GATING_EN_OFFSET		0
 */
 * Get date values
@@ -230,7 +230,7 @@
int_osc)) {
    pr_crit("Couldn't register the internal oscillator\n");
    return;
+  goto err;
}

parents[0] = clk_hw_get_name(rtc->int_osc);
@@ -246,18 +246,18 @@
    rtc->losc = clk_register(NULL, &rtc->hw);
    if (IS_ERR(rtc->losc)) {
        pr_crit("Couldn't register the LOSC clock\n");
-      return;
+      goto err_register;
    }
    of_property_read_string_index(node, "clock-output-names", 1,
        &clkout_name);
    rtc->ext_losc = clk_register_gate(NULL, clkout_name, rtc->hw.init->name,
        0, rtc->base + SUN6I_LOSC_OUT_GATING,
-      SUN6I_LOSC_OUT_GATING_EN, 0,
+      SUN6I_LOSC_OUT_GATING_EN_OFFSET, 0,
        &rtc->lock);
    if (IS_ERR(rtc->ext_losc)) {
        pr_crit("Couldn't register the LOSC external gate\n");
-      return;
+      goto err_register;
    }

    clk_data->num = 2;
    @@ -266,6 +266,8 @@
    of_clk_add_hw_provider(node, of_clk_hw_onecell_get, clk_data);
    return;
+  err_register:
+    clk_hw_unregister_fixed_rate(rtc->int_osc);
    err:
    kfree(clk_data);
}

--- linux-4.15.0.orig/drivers/rtc/rtc-tps6586x.c
+++ linux-4.15.0/drivers/rtc/rtc-tps6586x.c
@@ -276,14 +276,15 @@
device_init_wakeup(&pdev->dev, 1);

  -rtc->rtc = devm_rtc_device_register(&pdev->dev, dev_name(&pdev->dev),
  -  &tps6586x_rtc_ops, THIS_MODULE);
+rtc->rtc = devm_rtc_allocate_device(&pdev->dev);
if (IS_ERR(rtc->rtc)) {
    ret = PTR_ERR(rtc->rtc);
    dev_err(&pdev->dev, "RTC device register: ret %d\n", ret);
    goto fail_rtc_register;
}

+rtc->rtc->ops = &tps6586x_rtc_ops;
+
ret = devm_request_threaded_irq(&pdev->dev, rtc->irq, NULL,
    tps6586x_rtc_irq,
    IRQF_ONESHOT,
    @@ -294,6 +295,13 @@
            goto fail_rtc_register;
    }
    disable_irq(rtc->irq);
    +
    +ret = rtc_register_device(rtc->rtc);
    +if (ret) {
            dev_err(&pdev->dev, "RTC device register: ret %d\n", ret);
            goto fail_rtc_register;
    +}
    +
    return 0;

fail_rtc_register:
--- linux-4.15.0.orig/drivers/rtc/rtc-tps65910.c
+++ linux-4.15.0/drivers/rtc/rtc-tps65910.c
@@ -380,6 +380,10 @@
    if (!tps_rtc)
        return -ENOMEM;
    +tps_rtc->rtc = devm_rtc_allocate_device(&pdev->dev);
    +if (IS_ERR(tps_rtc->rtc))
    +    return PTR_ERR(tps_rtc->rtc);
    +
    /* Clear pending interrupts */
    ret = regmap_read(tps65910->regmap, TPS65910_RTC_STATUS, &rtc_reg);
    if (ret < 0)
        @@ -421,10 +425,10 @@
        tps_rtc->irq = irq;
        device_set_wakeup_capable(&pdev->dev, 1);

        -tps_rtc->rtc = devm_rtc_device_register(&pdev->dev, pdev->name,
        -&tps65910_rtc_ops, THIS_MODULE);
        -if (IS_ERR(tps_rtc->rtc)) {
                ret = PTR_ERR(tps_rtc->rtc);
                -

ttp_rtc->rtc->ops = &tps65910_rtc_ops;
+ret = rtc_register_device(tps_rtc->rtc);
+if (ret) {
    dev_err(&pdev->dev, "RTC device register: err %d\n", ret);
    return ret;
} @ @ -476,6 +480,6 @@
};

module_platform_driver(tps65910_rtc_driver);
-MODULE_ALIAS("platform:rtc-tps65910");
+MODULE_ALIAS("platform:tps65910-rtc");
MODULE_AUTHOR("Venu Byravarasu <vbyravarasu@nvidia.com>");
MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/rtc/rtc-tx4939.c
+++ linux-4.15.0/drivers/rtc/rtc-tx4939.c
@@ -86,7 +86,8 @@
    for (i = 2; i < 6; i++)
        buf[i] = __raw_readl(&rtcreg->dat);
    spin_unlock_irq(&pdata->lock);
    rtc_time_to_tm(sec, tm);
    return rtc_valid_tm(tm);
} @ @ -147,7 +148,8 @@
alrm->enabled = (ctl & TX4939_RTCCTL_ALME) ? 1 : 0;
alrm->pending = (ctl & TX4939_RTCCTL_ALMD) ? 1 : 0;
spin_unlock_irq(&pdata->lock);
    rtc_time_to_tm(sec, &alrm->time);
    return rtc_valid_tm(&alrm->time);
} --- linux-4.15.0.orig/drivers/rtc/rtc-vr41xx.c
+++ linux-4.15.0/drivers/rtc/rtc-vr41xx.c
@ @ -292,13 +292,14 @@
goto err_rtc1_iounmap;
}

-rtc = devm_rtc_device_register(&pdev->dev, rtc_name, &vr41xx_rtc_ops,
-THIS_MODULE);
+rtc = devm_rtc_allocate_device(&pdev->dev);
if (IS_ERR(rtc)) {
    retval = PTR_ERR(rtc);
goto err_iounmap_all;
}

+rtc->ops = &vr41xx_rtc_ops;
+
rtc->max_user_freq = MAX_PERIODIC_RATE;

spin_lock_irq(&rtc_lock);
@@ -340,6 +341,10 @@
dev_info(&pdev->dev, "Real Time Clock of NEC VR4100 series\n");

+retval = rtc_register_device(rtc);
+if (retval)
+goto err_iounmap_all;
+
return 0;

err_iounmap_all:
--- linux-4.15.0.orig/drivers/rtc/rtc-xgene.c
+++ linux-4.15.0/drivers/rtc/rtc-xgene.c
@@ -168,6 +168,10 @@
if (IS_ERR(pdata->csr_base))
 return PTR_ERR(pdata->csr_base);

+pdata->rtc = devm_rtc_allocate_device(&pdev->dev);
+if (IS_ERR(pdata->rtc))
+return PTR_ERR(pdata->rtc);
+
irq = platform_get_irq(pdev, 0);
if (irq < 0) {
 dev_err(&pdev->dev, "No IRQ resource\n");
@@ -198,15 +202,15 @@
 return ret;
 }

-pdata->rtc = devm_rtc_device_register(&pdev->dev, pdata->rtl, &xgene_rtc_ops, THIS_MODULE);
-if (IS_ERR(pdata->rtc)) {
- clk_disable_unprepare(pdata->clk);
- return PTR_ERR(pdata->rtc);
- }
-
/* HW does not support update faster than 1 seconds */
pdata->rtc->uie_unsupported = 1;
+pdata->rtc->ops = &xgene_rtc_ops;
+
+ret = rtc_register_device(pdata->rtc);
+if (ret) {
+clk_disable_unprepare(pdata->clk);
+return ret;
+}

return 0;
}
--- linux-4.15.0.orig/drivers/s390/block/Kconfig
+++ linux-4.15.0/drivers/s390/block/Kconfig
@@ -16,6 +16,7 @@
config DCSSBLK
 def_tristate m
 select DAX
+select FS_DAX_LIMITED
prompt "DCSSBLK support"
depends on S390 && BLOCK
help
--- linux-4.15.0.orig/drivers/s390/block/dasd.c
+++ linux-4.15.0/drivers/s390/block/dasd.c
@@ -41,6 +41,15 @@
#define DASD_DIAG_MOD		"dasd_diag_mod"
+static unsigned int queue_depth = 32;
+static unsigned int nr_hw_queues = 4;
+
+module_param(queue_depth, uint, 0444);
+MODULE_PARM_DESC(queue_depth, "Default queue depth for new DASD devices");
+
+module_param(nr_hw_queues, uint, 0444);
+MODULE_PARM_DESC(nr_hw_queues, "Default number of hardware queues for new DASD devices");
+
/*/ 
* SECTION: exported variables of dasd.c 
*/
@@ -2593,8 +2602,6 @@
case DASD_CQR_QUEUED:
	/* request was not started - just set to cleared */
cqr->status = DASD_CQR_CLEARED;
-if (cqr->callback_data == DASD_SLEEPON_START_TAG)
-cqr->callback_data = DASD_SLEEPON_END_TAG;
break;
case DASD_CQR_IN_IO:
	/* request in IO - terminate IO and release again */
@@ -2890,6 +2897,12 @@
if (!block)
return -EINVAL;
+/*
+  * If the request is an ERP request there is nothing to requeue.
+  * This will be done with the remaining original request.
+  */
+if (cqr->refers)
  +return 0;
spin_lock_irq(&cqr->dq->lock);
req = (struct request *) cqr->callback_data;
blk_mq_requeue_request(req, false);
@@ -2991,7 +3004,8 @@
basedev = block->base;
spin_lock_irq(&dq->lock);
-if (basedev->state < DASD_STATE_READY) {
+if (basedev->state < DASD_STATE_READY ||
    test_bit(DASD_FLAG_OFFLINE, &basedev->flags)) {
  DBF_DEV_EVENT(DBF_ERR, basedev,
    "device not ready for request %p", req);
  rc = BLK_STS_IOERR;
@@ -3048,7 +3062,8 @@
cqr->callback_data = req;
cqr->status = DASD_CQR_FILLED;
cqr->dq = dq;
-req->completion_data = cqr;
+((struct dasd_ccw_req **) blk_mq_rq_to_pdu(req)) = cqr;
+
blk_mq_start_request(req);
spin_lock(&block->queue_lock);
list_add_tail(&cqr->blocklist, &block->ccw_queue);
@@ -3072,12 +3087,13 @@
*/
enum blk_eh_timer_return dasd_times_out(struct request *req, bool reserved)
{
  struct dasd_ccw_req *cqr = req->completion_data;
  struct dasd_block *block = req->q->queuedata;
  struct dasd_device *device;
+struct dasd_ccw_req *cqr;
  unsigned long flags;
  int rc = 0;
+
  cqr = *((struct dasd_ccw_req **) blk_mq_rq_to_pdu(req));
  if (!cqr)
    return BLK_EH_NOT.Handled;
@@ -3183,9 +3199,11 @@
  int rc;

  block->tag_set.ops = &dasd_mq_ops;
-block->tag_set.nr_hw_queues = DASD_NR_HW_QUEUES;
-block->tag_set.queue_depth = DASD_MAX_LCU_DEV * DASD_REQ_PER_DEV;
+block->tag_set.cmd_size = sizeof(struct dasd_ccw_req *);
+block->tag_set.nr_hw_queues = nr_hw_queues;
+block->tag_set.queue_depth = queue_depth;
block->tag_set.flags = BLK_MQ_F_SHOULD_MERGE;
+block->tag_set.numa_node = NUMA_NO_NODE;

rc = blk_mq_alloc_tag_set(&block->tag_set);
if (rc)
@@ -3478,8 +3496,6 @@
struct dasd_device *device;
struct dasd_block *block;

-cdev->handler = NULL;
-
device = dasd_device_from_cdev(cdev);
if (IS_ERR(device)) {
-dasd_remove_sysfs_files(cdev);
@@ -3498,6 +3514,7 @@
/* no quite down yet.
 */
-dasd_set_target_state(device, DASD_STATE_NEW);
+cdev->handler = NULL;
/* dasd_delete_device destroys the device reference. */
block = device->block;
-dasd_delete_device(device);
@@ -3914,9 +3931,12 @@
wait_event(dasd_flush_wq,
 (cqr->status != DASD_CQR_CLEAR_PENDING));

-/* mark sleepon requests as ended */
-if (cqr->callback_data == DASD_SLEEPON_START_TAG)
-cqr->callback_data = DASD_SLEEPON_END_TAG;
+/* requeue requests to blocklayer will only work
+ for block device requests
+ */
+if (_dasd_requeue_request(cqr))
+continue;

/* remove requests from device and block queue */
list_del_init(&cqr->devlist);
@@ -3929,13 +3949,6 @@
cqr = refers;
}

-/*
- * requeue requests to blocklayer will only work
- * for block device requests
- */
-if (_dasd_requeue_request(cqr))
-continue;
-
if (cqr->block)
list_del_init(&cqr->blocklist);
cqr->block->base->discipline->free_cp(
@@ -3952,8 +3965,7 @@
list_splice_tail(&requeue_queue, &device->ccw_queue);
spin_unlock_irq(get_ccwdev_lock(device->dev));
}
-/* wake up generic waitqueue for eventually ended sleepon requests */
-wake_up(&generic_waitq);
+dasd_schedule_device_bh(device);
return rc;
}

--- linux-4.15.0.orig/drivers/s390/block/dasd_alias.c
+++ linux-4.15.0/drivers/s390/block/dasd_alias.c
@@ -256,7 +256,6 @@
return;
device->discipline->get_uid(device, &uid);
spin_lock_irqsave(&lcu->lock, flags);
-list_del_init(&device->alias_list);
/* make sure that the workers don't use this device */
if (device == lcu->suc_data.device) {
spin_unlock_irqrestore(&lcu->lock, flags);
@@ -283,6 +282,7 @@
spin_lock_irqsave(&aliastree.lock, flags);
spin_lock(&lcu->lock);
+list_del_init(&device->alias_list);
if (list_empty(&lcu->grouplist) &&
    list_empty(&lcu->active_devices) &&
    list_empty(&lcu->inactive_devices)) {
@@ -383,6 +383,20 @@
char msg_format;
char msg_no;

+/*
+ * intrc values ENODEV, ENOLINK and EPERM
+ * will be optedained from sleep_on to indicate that no
+ * IO operation can be started
+ */
+if (cqr->intrc == -ENODEV)
+return 1;
if (cqr->intrc == -ENOLINK)
  return 1;
+
if (cqr->intrc == -EPERM)
  return 1;
+
sense = dasd_get_sense(&cqr->irb);
if (!sense)
  return 0;
@@ -447,16 +461,20 @@
lcu->flags &= ~NEED_UAC_UPDATE;
spin_unlock_irqrestore(&lcu->lock, flags);
-
do {
-  rc = dasd_sleep_on(cqr);
-  if (rc && suborder_not_supported(cqr))
-    return -EOPNOTSUPP;
-} while (rc && (cqr->retries > 0));
-if (rc) {
+  rc = dasd_sleep_on(cqr);
+  if (!rc)
+    goto out;
+  
+  if (suborder_not_supported(cqr)) {
+    /* suborder not supported or device unusable for IO */
+    rc = -EOPNOTSUPP;
+  } else {
+    /* IO failed but should be retried */
+    spin_lock_irqsave(&lcu->lock, flags);
+    lcu->flags |= NEED_UAC_UPDATE;
+    spin_unlock_irqrestore(&lcu->lock, flags);
+  }
+
+out:
dasd_kfree_request(cqr, cqr->memdev);
  return rc;
}
@@ -493,6 +511,14 @@
  return rc;

spin_lock_irqsave(&lcu->lock, flags);
+/*
+ * there is another update needed skip the remaining handling
+ * the data might already be outdated
+ * but especially do not add the device to an LCU with pending
+ * update
+ */
+if (lcu->flags & NEED_UAC_UPDATE)
goto out;
lcu->pav = NO_PAV;
for (i = 0; i < MAX_DEVICES_PER_LCU; ++i) {
    switch (lcu->uac->unit[i].ua_type) {
       .alias_list) {
            _add_device_to_lcu(lcu, device, refdev);
        }
    +out:
    spin_unlock_irqrestore(&lcu->lock, flags);
    return 0;
}

int dasd_alias_add_device(struct dasd_device *device)
{
    struct dasd_eckd_private *private = device->private;
    -struct alias_lcu *lcu;
    +__u8 uaddr = private->uid.real_unit_addr;
    +struct alias_lcu *lcu = private->lcu;
    unsigned long flags;
    int rc;

    -lcu = private->lcu;
    rc = 0;
    spin_lock_irqsave(&lcu->lock, flags);
    /*
     * Check if device and lcu type differ. If so, the uac data may be
     * outdated and needs to be updated.
     */
    +if (private->uid.type != lcu->uac->unit[uaddr].ua_type) {
        lcu->flags |= UPDATE_PENDING;
        DBF_DEV_EVENT(DBF_WARNING, device, "%s",
                        "uid type mismatch - trigger rescan");
    }
    if (!(lcu->flags & UPDATE_PENDING)) {
        rc = _add_device_to_lcu(lcu, device, device);
        if (rc)
            return rc;
    }
    if (lcu->flags & UPDATE_PENDING) {
        list_move(&device->alias_list, &lcu->active_devices);
        +private->pavgroup = NULL;
        _schedule_lcu_update(lcu, device);
    }
    spin_unlock_irqrestore(&lcu->lock, flags);
    -- linux-4.15.0.orig/drivers/s390/block/dasd_eckd.c
    +++ linux-4.15.0/drivers/s390/block/dasd_eckd.c
    @@ -606,6 +642,7 @@
    }
struct dasd_eckd_private *private = device->private;
int fcx_in_css, fcx_in_gneq, fcx_in_features;
-int tpm, mdc;
+unsigned int mdc;
+int tpm;

if (dasd_nofcx)
  return 0;
@@ -1148,7 +1149,7 @@
return 0;

mdc = ccw_device_get_mdc(device->cdev, 0);
-if (mdc < 0) {
+if (mdc == 0) {
  dev_warn(&device->cdev->dev, "Detecting the maximum supported data size for zHPF requests failed\n");
  return 0;
  } else {
@@ -1159,12 +1160,12 @@
static int verify_fcx_max_data(struct dasd_device *device, __u8 lpm)
{
  struct dasd_eckd_private *private = device->private;
  -int mdc;
+unsigned int mdc;
  u32 fcx_max_data;

  if (private->fcx_max_data) {
    mdc = ccw_device_get_mdc(device->cdev, lpm);
  if ((mdc < 0)) {
+  if (mdc == 0) {
    dev_warn(&device->cdev->dev, "Detecting the maximum data size for zHPF ",
    "requests failed (rc=%d) for a new path %x\n", @ @ -1768,7 +1769,7 @@
    dasd_free_block(device->block);
    device->block = NULL;
    out_err1:
-kfree(private->conf_data);
+dasd_eckd_clear_conf_data(device);
    kfree(device->private);
    device->private = NULL;
    return rc;
@@ -1777,28 +1778,16 @@
static void dasd_eckd_uncheck_device(struct dasd_device *device)
{
  struct dasd_eckd_private *private = device->private;
  -int i;
+    

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if (!private)
+return;

dasd_alias_disconnect_device_from_lcu(device);
private->ned = NULL;
private->sneq = NULL;
private->vdsneq = NULL;
private->gneq = NULL;
-private->conf_len = 0;
-for (i = 0; i < 8; i++) {
-kfree(device->path[i].conf_data);
-if ((__u8 *)device->path[i].conf_data ==
-    private->conf_data) {
-private->conf_data = NULL;
-private->conf_len = 0;
-
-device->path[i].conf_data = NULL;
-device->path[i].cssid = 0;
-device->path[i].ssid = 0;
-device->path[i].chpid = 0;
-
-kfree(private->conf_data);
-private->conf_data = NULL;
+dasd_eckd_clear_conf_data(device);
}
}
static struct dasd_ccw_req *
@@ -1999,14 +1988,14 @@
blk_per_trk = recs_per_track(&private->rdc_data, 0, block->bp_block);

raw:
-block->blocks = (private->real_cyl *
+block->blocks = ((unsigned long) private->real_cyl *
private->rdc_data.trk_per_cyl *
blk_per_trk);

dev_info(&device->cdev->dev,
- "DASD with %d KB/block, %d KB total size, %d KB/track, 
+ "DASD with %u KB/block, %lu KB total size, %u KB/track, 
"%s\n", (block->bp_block >> 10),
- ((private->real_cyl *
+ ((unsigned long) private->real_cyl *
private->rdc_data.trk_per_cyl *
blk_per_trk * (block->bp_block >> 9)) >> 1),
((blk_per_trk * block->bp_block) >> 10),
@@ -2033,8 +2022,11 @@

static int dasd_eckd_online_to_ready(struct dasd_device *device)
{  
cancel_work_sync(&device->reload_device);  
cancel_work_sync(&device->kick_validate);  
if (cancel_work_sync(&device->reload_device))  
  dasd_put_device(device);  
if (cancel_work_sync(&device->kick_validate))  
  dasd_put_device(device);  
}  

@@ -4458,6 +4450,14 @@  
usrparm.psf_data &= 0x7fffffffULL;  
usrparm.rssd_result &= 0x7fffffffULL;  
}  
/+* at least 2 bytes are accessed and should be allocated */  
+if (usrparm.psf_data_len < 2) {  
+  DBF_DEV_EVENT(DBF_WARNING, device,  
+        "Symmetrix ioctl invalid data length %d",  
+        usrparm.psf_data_len);  
+  rc = -EINVAL;  
+  goto out;  
+}  
/+* alloc I/O data area */  
psf_data = kzalloc(usrparm.psf_data_len, GFP_KERNEL | GFP_DMA);  
rssd_result = kzalloc(usrparm.rssd_result_len, GFP_KERNEL | GFP_DMA);  
MODULE_LICENSE("GPL");  
static struct dasd_discipline dasd_fba_discipline;  
+static void *dasd_fba_zero_page;  

struct dasd_fba_private {  
    struct dasd_fba_characteristics rdc_data;  
    @ @ -270,7 +271,7 @@  
    ccw->cmd_code = DASD_FBA_CCW_WRITE;  
    ccw->flags |= CCW_FLAG_SLI;  
    ccw->count = count;  
    -ccw->cda = (__u32) (addr_t) page_to_phys(ZERO_PAGE(0));  
    +ccw->cda = (__u32) (addr_t) dasd_fba_zero_page;  
}  
/+*  
@@ -809,6 +810,11 @@  
    int ret;
ASCEBC(dasd_fba_discipline.ebcname, 4);
+
+dasd_fba_zero_page = (void *)get_zeroed_page(GFP_KERNEL | GFP_DMA);
+if (!dasd_fba_zero_page)
+return -ENOMEM;
+
ret = ccw_driver_register(&dasd_fba_driver);
if (!ret)
    wait_for_device_probe();
@@ -820,6 +826,7 @@
    dasd_fba_cleanup(void)
    {
        ccw_driver_unregister(&dasd_fba_driver);
+free_page(unsigned long)dasd_fba_zero_page);
    }

module_init(dasd_fba_init);
--- linux-4.15.0.orig/drivers/s390/block/dasd_int.h
+++ linux-4.15.0/drivers/s390/block/dasd_int.h
@@ -235,14 +235,6 @@
#define DASD_CQR_SUPPRESS_IL	6	/* Suppress 'Incorrect Length' error */
#define DASD_CQR_SUPPRESS_CR	7	/* Suppress 'Command Reject' error */

-/*
- * There is no reliable way to determine the number of available CPUs on
- * LPAR but there is no big performance difference between 1 and the
- * maximum CPU number.
- * 64 is a good trade off performance wise.
- */
-#
-#define DASD_NR_HW_QUEUES 64
-#define DASD_MAX_LCU_DEV 256
-#define DASD_REQ_PER_DEV 4

/* Signature for error recovery functions. */
--- linux-4.15.0.orig/drivers/s390/block/dcssblk.c
+++ linux-4.15.0/drivers/s390/block/dcssblk.c
@@ -916,7 +916,8 @@
    dev_sz = dev_info->end - dev_info->start + 1;
    *kaddr = (void *) dev_info->start + offset;
-*pfn = __pfn_to_pfn_t(PFN_DOWN(dev_info->start + offset), PFN_DEV);
+*pfn = __pfn_to_pfn_t(PFN_DOWN(dev_info->start + offset),
+    PFN_DEV|PFN_SPECIAL);

    return (dev_sz - offset) / PAGE_SIZE;
}
bdev->tag_set.nr_hw_queues = nr_requests;
bdev->tag_set.queue_depth = nr_requests_per_io * nr_requests;
bdev->tag_set.flags = BLK_MQ_F_SHOULD_MERGE;
+bdev->tag_set.numa_node = NUMA_NO_NODE;

ret = blk_mq_alloc_tag(&bdev->tag_set);
if (ret)
    --- linux-4.15.0.orig/drivers/s390/char/Makefile
+++ linux-4.15.0/drivers/s390/char/Makefile
@@ -19,6 +19,8 @@
    CFLAGS_sclp_early_core.o+= -D__NO_FORTIFY
+CFLAGS_REMOVE_sclp_early_core.o+= $(CC_FLAGS_EXPOLINE)
+obj-y += ctrlchar.o keyboard.o defkeymap.o sclp.o sclp_rwlock.o sclp_quiesce.o \
            sclp_cmd.o sclp_config.o sclp_cpi_sys.o sclp_ofd.o sclp_ctrl.o \
            sclp_early.o sclp_early_core.o
    --- linux-4.15.0.orig/drivers/s390/char/con3270.c
+++ linux-4.15.0/drivers/s390/char/con3270.c
@@ -629,7 +629,7 @@
 -raw3270_add_view(&condev->view, &con3270_fn, 1);
 +raw3270_add_view(&condev->view, &con3270_fn, 1, RAW3270_VIEW_LOCK_IRQ);

 INIT_LIST_HEAD(&condev->freemem);
for (i = 0; i < CON3270_STRING_PAGES; i++) {
    --- linux-4.15.0.orig/drivers/s390/char/fs3270.c
+++ linux-4.15.0/drivers/s390/char/fs3270.c
@@ -464,7 +464,8 @@
-init_waitqueue_head(&fp->wait);
    fp->fs_pid = get_pid(task_pid(current));
-rc = raw3270_add_view(&fp->view, &fs3270_fn, minor);
+rc = raw3270_add_view(&fp->view, &fs3270_fn, minor,
+    RAW3270_VIEW_LOCK_BH);
    if (rc) {
        fs3270_free_view(&fp->view);
goto out;
    --- linux-4.15.0.orig/drivers/s390/char/keyboard.c
+++ linux-4.15.0/drivers/s390/char/keyboard.c
@@ -334,37 +334,41 @@
    int cmd, int perm)
    }
    struct kbentry tmp;
unsigned long kb_index, kb_table;
ushort *key_map, val, ov;

if (copy_from_user(&tmp, user_kbe, sizeof(struct kbentry)))
    return -EFAULT;
+kb_index = (unsigned long) tmp.kb_index;
#if NR_KEYS < 256
-    if (tmp.kb_index >= NR_KEYS)
+    if (kb_index >= NR_KEYS)
        return -EINVAL;
#endif
+kb_table = (unsigned long) tmp.kb_table;
#if MAX_NR_KEYMAPS < 256
-    if (tmp.kb_table >= MAX_NR_KEYMAPS)
+    if (kb_table >= MAX_NR_KEYMAPS)
        return -EINVAL;
+    kb_table = array_index_nospec(kb_table, MAX_NR_KEYMAPS);
#endif

switch (cmd) {
    case KDGKBENT:
        -key_map = kbd->key_maps[tmp.kb_table];
        +key_map = kbd->key_maps[kb_table];
        if (key_map) {
            -    val = U(key_map[tmp.kb_index]);
            +    val = U(key_map[kb_index]);
            if (KTYP(val) >= KBD_NR_TYPES)
                val = K_HOLE;
        } else
            -    val = (tmp.kb_index ? K_HOLE : K_NOSUCHMAP);
            +    val = (kb_index ? K_HOLE : K_NOSUCHMAP);
        return put_user(val, &user_kbe->kb_value);
    case KDSKBENT:
        if (!perm)
            return -EPERM;
-        if (!tmp.kb_index && tmp.kb_value == K_NOSUCHMAP) {
+        if (!kb_index && tmp.kb_value == K_NOSUCHMAP) {
/* disallocate map */
            -key_map = kbd->key_maps[tmp.kb_table];
            +key_map = kbd->key_maps[kb_table];
            if (key_map) {
                -    kbd->key_maps[tmp.kb_table] = NULL;
                +    kbd->key_maps[kb_table] = NULL;
                kfree(key_map);
            }
            break;
        } else
            if (KVAL(tmp.kb_value) > kbd_max_vals[KTYP(tmp.kb_value)])
return -EINVAL;

- if (!(key_map = kbd->key_maps[tmp.kb_table])) {
+ if (!(key_map = kbd->key_maps[kb_table])) {
    int j;

    key_map = kmalloc(sizeof(plain_map),
                        GFP_KERNEL);
    if (!key_map)
        return -ENOMEM;
    kbd->key_maps[tmp.kb_table] = key_map;
    for (j = 0; j < NR_KEYS; j++)
        key_map[j] = U(K_HOLE);
    - ov = U(key_map[tmp.kb_index]);
+ ov = U(key_map[kb_index]);
    if (tmp.kb_value == ov)
        break; /* nothing to do */
/*
 * Add view to device with minor "minor".
 */
@@ -395,7 +399,7 @@
    if (((ov == K_SAK) || (tmp.kb_value == K_SAK)) &&
        !capable(CAP_SYS_ADMIN))
        return -EPERM;
-    key_map[tmp.kb_index] = U(tmp.kb_value);
+    key_map[kb_index] = U(tmp.kb_value);
    break;
}
return 0;
--- linux-4.15.0.orig/drivers/s390/char/raw3270.c
+++ linux-4.15.0/drivers/s390/char/raw3270.c
@@ -920,7 +920,7 @@
* Add view to device with minor "minor".
 */
int
- raw3270_add_view(struct raw3270_view *view, struct raw3270_fn *fn, int minor)
+ raw3270_add_view(struct raw3270_view *view, struct raw3270_fn *fn, int minor, int subclass)
{
    unsigned long flags;
    struct raw3270 *rp;
@@ -942,6 +942,7 @@
    view->cols = rp->cols;
    view->ascebe = rp->ascebe;
    spin_lock_init(&view->lock);
+    lockdep_set_subclass(&view->lock, subclass);
    list_add(&view->list, &rp->view_list);
    rc = 0;
    spin_unlock_irqrestore(get_ccwdev_lock(rp->cdev), flags);
struct raw3270_view {
    struct list_head list;
    spinlock_t lock;
    #define RAW3270_VIEW_LOCK_IRQ 0
    #define RAW3270_VIEW_LOCK_BH 1
    atomic_t ref_count;
    struct raw3270 *dev;
    struct raw3270_fn *fn;
}&

static void __ref sclp_cpu_change_notify(struct work_struct *work) {
    lock_device_hotplug();
    smp_rescan_cpus();
    unlock_device_hotplug();
}

static void sclp_conf_receiver_fn(struct evbuf_header *evbuf) {
&

/* Representation of a single write request */
struct sclp_vt220_request {
&

/* Representation of a single write request */
struct sclp_vt220_request {
&
return PTR_ERR(tp);

rc = raw3270_add_view(&tp->view, &tty3270_fn,
     - tty->index + RAW3270_FIRSTMINOR);
     + tty->index + RAW3270_FIRSTMINOR,
     + RAW3270_VIEW_LOCK_BH);
if (rc) {
    tty3270_free_view(tp);
    return rc;
}

--- linux-4.15.0.orig/drivers/s390/cio/blacklist.c
+++ linux-4.15.0/drivers/s390/cio/blacklist.c
@@ -303,8 +303,10 @@
cio_ignore_proc_seq_next(struct seq_file *s, void *it, loff_t *offset) {
    struct ccwdev_iter *iter;
    loff_t p = *offset;

-if (*offset >= (__MAX_SUBCHANNEL + 1) * (__MAX_SSID + 1))
+(*offset)++;
+if (p >= (__MAX_SUBCHANNEL + 1) * (__MAX_SSID + 1))
    return NULL;
    iter = it;
    if (iter->devno == __MAX_SUBCHANNEL) {
@@ -314,7 +316,6 @@
    return NULL;
    } else
    iter->devno++;
   -(*offset)++;
    return iter;
}

--- linux-4.15.0.orig/drivers/s390/cio/ccwgroup.c
+++ linux-4.15.0/drivers/s390/cio/ccwgroup.c
@@ -370,7 +370,7 @@
goto error;
} /* Check for trailing stuff. */
- if (i == num_devices && strlen(buf) > 0) {
+ if (i == num_devices && buf && strlen(buf) > 0) {
    rc = -EINVAL;
    goto error;
}
/* Wait until previous actions have settled. */
css_wait_for_slow_path();
+
if (!strncasecmp(cmd, "on", 2) || !strcmp(cmd, "1")) {
mutex_lock(&cp->lock);
error = s390_vary_chpid(cp->chpid, 1);
--- linux-4.15.0.orig/drivers/s390/cio/chsc.c
+++ linux-4.15.0/drivers/s390/cio/chsc.c
@@ -452,6 +452,7 @@
static void chsc_process_sei_res_acc(struct chsc_sei_nt0_area *sei_area)
 {
 +struct channel_path *chp;
 struct chp_link link;
 struct chp_id chpid;
 int status;
 @ @ -464,10 +465,17 @@
 chpid.id = sei_area->rsid;
 /* allocate a new channel path structure, if needed */
 status = chp_get_status(chpid);
-@ @ -465,17 +464,10 @@
-if (status < 0)
-+if (!status)
+ @ @ -452,6 +452,7 @@
+ return;
+
+if (status < 0) {
+ chp_new(chpid);
+ } else {
+ chp = chpid_to_chp(chpid);
+ mutex_lock(&chp->lock);
+ chp_update_desc(chp);
+ mutex_unlock(&chp->lock);
+ }
memset(&link, 0, sizeof(struct chp_link));
link.chpid = chpid;
if (((sei_area->vf & 0xc0) != 0) { }
@@ -762,8 +770,6 @@
{
 struct channel_path *chp = chpid_to_chp(chpid);

-/* Wait until previous actions have settled. */
-css_wait_for_slow_path();
/*
 * Redo PathVerification on the devices the chpid connects to
 */
--- linux-4.15.0.orig/drivers/s390/cio/cio.h
+++ linux-4.15.0/drivers/s390/cio/cio.h
@@ -115,7 +115,7 @@
 struct schib_config config;
 } __attribute__ ((aligned(8)));

-DECLARE_PER_CPU(struct irb, cio_irb);
+DECLARE_PER_CPU_ALIGNED(struct irb, cio_irb);

#define to_subchannel(n) container_of(n, struct subchannel, dev)

--- linux-4.15.0.orig/drivers/s390/cio/css.c
+++ linux-4.15.0/drivers/s390/cio/css.c
@@ -268,7 +268,7 @@
 return sprintf(buf, "%01x\n", sch->st);
 }

-static DEVICE_ATTR(type, 0444, type_show, NULL);
+static DEVICE_ATTR_RO(type);

static ssize_t modalias_show(struct device *dev, struct device_attribute *attr,
    char *buf)
@@ -278,7 +278,7 @@
 return sprintf(buf, "css:t%01X\n", sch->st);
 }

-static DEVICE_ATTR(modalias, 0444, modalias_show, NULL);
+static DEVICE_ATTR_RO(modalias);

static struct attribute *subch_attrs[] = {
    &dev_attr_type.attr,
@@ -315,7 +315,7 @@
 return ret;
 }

-static DEVICE_ATTR(chpids, 0444, chpids_show, NULL);
+static DEVICE_ATTR_RO(chpids);

static ssize_t pimpampom_show(struct device *dev,
    struct device_attribute *attr,
    char *buf)
@@ -327,11 +327,28 @@
 return sprintf(buf, "%02x %02x %02x\n",
                pmcw->pim, pmcw->pam, pmcw->pom);
 }

-static DEVICE_ATTR(pimpampom, 0444, pimpampom_show, NULL);
+static DEVICE_ATTR_RO(pimpampom);
+
+static ssize_t dev_busid_show(struct device *dev,
+    struct device_attribute *attr,
+    char *buf)
struct subchannel *sch = to_subchannel(dev);
struct pmcw *pmcw = &sch->schib.pmcw;

if ((pmcw->st == SUBCHANNEL_TYPE_IO || pmcw->st == SUBCHANNEL_TYPE_MSG) && pmcw->dnv)
    return sysfs_emit(buf, "0.%x.%04x
", sch->schid.ssid, pmcw->dev);
else
    return sysfs_emit(buf, "none
");
}

static DEVICE_ATTR_RO(dev_busid);

static struct attribute *io_subchannel_type_attrs[] = {
    &dev_attr_chpids.attr,
    &dev_attr_pimpampom.attr,
    +&dev_attr_dev_busid.attr,
    NULL,
};

int sch_is_pseudo_sch(struct subchannel *sch)
{
    if (!sch->dev.parent)
        return 0;
    return sch == to_css(sch->dev.parent)->pseudo_subchannel;
}

--- linux-4.15.0.orig/drivers/s390/cio/device.c
+++ linux-4.15.0/drivers/s390/cio/device.c
@@ -597,13 +597,13 @@
     }
     return sprintf(buf, "%02x
", sch->vpm);
}

int sch_is_pseudo_sch(struct subchannel *sch)
{
    if (!sch->dev.parent)
        return 0;
    return sch == to_css(sch->dev.parent)->pseudo_subchannel;
}

--- linux-4.15.0.orig/drivers/s390/cio/device.c
+++ linux-4.15.0/drivers/s390/cio/device.c
@@ -597,13 +597,13 @@
     }
     return sprintf(buf, "%02x\n", sch->vpm);
}

-static DEVICEATTR(devtype, 0444, devtype_show, NULL);
static DEVICE_ATTR(cutype, 0444, cutype_show, NULL);
static DEVICE_ATTR(modalias, 0444, modalias_show, NULL);
static DEVICE_ATTR(online, 0644, online_show, online_store);
+static DEVICE_ATTR_RO(devtype);
+static DEVICE_ATTR_RO(cutype);
+static DEVICE_ATTR_RO(modalias);
+static DEVICE_ATTR_RW(online);
static DEVICE_ATTR(availability, 0444, available_show, NULL);
static DEVICE_ATTR(logging, 0200, NULL, initiate_logging);
-static DEVICE_ATTR(vpm, 0444, vpm_show, NULL);
+static DEVICE_ATTR_RO(vpm);

static struct attribute *io_subchannel_attrs[] = {
&dev_attr_logging.attr,
@@ -827,8 +827,10 @@
* Now we know this subchannel will stay, we can throw
* our delayed uevent.
 */
-dev_set_uevent_suppress(&sch->dev, 0);
-kobject_uevent(&sch->dev.kobj, KOBJ_ADD);
+if (dev_get_uevent_suppress(&sch->dev)) { 
+dev_set_uevent_suppress(&sch->dev, 0);
+kobject_uevent(&sch->dev.kobj, KOBJ_ADD);
+}
/* make it known to the system */
ret = ccw_device_add(cdev);
if (ret) { 
@@ -1036,8 +1038,11 @@
* Throw the delayed uevent for the subchannel, register
* the ccw_device and exit.
 */
-dev_set_uevent_suppress(&sch->dev, 0);
-kobject_uevent(&sch->dev.kobj, KOBJ_ADD);
+if (dev_get_uevent_suppress(&sch->dev)) { 
+// should always be the case for the console */
+dev_set_uevent_suppress(&sch->dev, 0);
+kobject_uevent(&sch->dev.kobj, KOBJ_ADD);
+}
  cdev = sch_get_cdev(sch);
  rc = ccw_device_add(cdev);
  if (rc) { 
--- linux-4.15.0.orig/drivers/s390/cio/device_fsm.c
+++ linux-4.15.0/drivers/s390/cio/device_fsm.c
@@ -795,6 +795,7 @@
ccw_device_set_timeout(cdev, 0);
cdev->private->iretry = 255;
+cdev->private->async_kill_io_rc = -ETIMEDOUT;
ret = ccw_device_cancel_halt_clear(cdev);
if (ret == -EBUSY) {
    ccw_device_set_timeout(cdev, 3*HZ);
    @ @ -871,7 +872,7 @ @
    /* OK, i/o is dead now. Call interrupt handler. */
    if (cdev->handler)
        cdev->handler(cdev, cdev->private->intparm,
                        - ERR_PTR(-EIO));
        + ERR_PTR(cdev->private->async_kill_io_rc);
}

static void
c@ @ -888,14 +889,16 @ @
ccw_device_online_verify(cdev, 0);
if (cdev->handler)
    cdev->handler(cdev, cdev->private->intparm,
                   - ERR_PTR(-EIO));
                   + ERR_PTR(cdev->private->async_kill_io_rc);
}

void ccw_device_kill_io(struct ccw_device *cdev)
{
    int ret;

    +ccw_device_set_timeout(cdev, 0);
    cdev->private->iretry = 255;
    +cdev->private->async_kill_io_rc = -EIO;
    ret = ccw_device_cancel_halt_clear(cdev);
    if (ret == -EBUSY) {
        ccw_device_set_timeout(cdev, 3*HZ);
        --- linux-4.15.0.orig/drivers/s390/cio/device_ops.c
        +++ linux-4.15.0/drivers/s390/cio/device_ops.c
        @ @ -159,7 +159,7 @ @
    }

    /**
     * ccw_device_start_key() - start a s390 channel program with key
     * @cdev: target ccw device
     * @cpa: logical start address of channel program
     * @intparm: user specific interruption parameter; will be presented back to
     * @ @ -170,10 +170,15 @ @
     * @key: storage key to be used for the I/O
     * @flags: additional flags; defines the action to be performed for I/O
     *        * processing.
     *        + * @expires: timeout value in jiffies
     *        *
     * Start a S/390 channel program. When the interrupt arrives, the

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* IRQ handler is called, either immediately, delayed (dev-end missing,
* or sense required) or never (no IRQ handler registered).
+ * This function notifies the device driver if the channel program has not
+ * completed during the time specified by @expires. If a timeout occurs, the
+ * channel program is terminated via xsch, hsch or csch, and the device's
+ * interrupt handler will be called with an irb containing ERR_PTR(-%ETIMEDOUT).
* Returns:
*  %0, if the operation was successful;
*  -%EBUSY, if the device is busy, or status pending;
@@ -182,9 +187,9 @@
* Context:
*  Interrupts disabled, ccw device lock held
*/
-int ccw_device_start_key(struct ccw_device *cdev, struct ccw1 *cpa,
- unsigned long intparm, __u8 lpm, __u8 key,
- unsigned long flags)
+int ccw_device_start_timeout_key(struct ccw_device *cdev, struct ccw1 *cpa,
+ unsigned long intparm, __u8 lpm, __u8 key,
+ unsigned long flags, int expires)
{  
  struct subchannel *sch;
  int ret;
@@ -224,6 +229,8 @@
    switch (ret) {  
      case 0:
        cdev->private->intparm = intparm;
        +if (expires)
        +ccw_device_set_timeout(cdev, expires);
        break;
      case -EACCES:
      case -ENODEV:
@@ -234,7 +241,7 @@
    }  

/**
- * ccw_device_start_timeout_key() - start a s390 channel program with timeout and key
+ * ccw_device_start_key() - start a s390 channel program with key
* @cdev: target ccw device
* @cpa: logical start address of channel program
* @intparm: user specific interruption parameter; will be presented back to
@@ -245,15 +252,10 @@
* @key: storage key to be used for the I/O
* @flags: additional flags; defines the action to be performed for I/O
* processing.
- * @expires: timeout value in jiffies
*  
*  Start a S/390 channel program. When the interrupt arrives, the
*  IRQ handler is called, either immediately, delayed (dev-end missing,
* or sense required) or never (no IRQ handler registered).
- * This function notifies the device driver if the channel program has not
- * completed during the time specified by @expires. If a timeout occurs, the
- * channel program is terminated via xsch, hsch or csch, and the device's
- * interrupt handler will be called with an irb containing ERR_PTR(-%ETIMEDOUT).
* Returns:
*  %0, if the operation was successful;
*  -%EBUSY, if the device is busy, or status pending;
@@ -262,19 +264,12 @@
* Context:
*  Interrupts disabled, ccw device lock held
*/
+int ccw_device_start_default(struct ccw_device *cdev, struct ccw1 *cpa,
+    unsigned long intparm, __u8 lpm, __u8 key,
+    unsigned long flags)
+
{ int ret;
  "
  if (!cdev)
-   return -ENODEV;
- ccw_device_set_timeout(cdev, expires);
- ret = ccw_device_start_default(cdev, cpa, intparm, lpm, key, flags);
- if (ret != 0)
- ccw_device_set_timeout(cdev, 0);
- return ret;
+return ccw_device_start_timeout_key(cdev, cpa, intparm, lpm, key,
+    flags, 0);
}

/**
@@ -489,18 +484,20 @@
EXPORT_SYMBOL(ccw_device_get_id);

/**
- * ccw_device_tm_start_key() - perform start function
+ * ccw_device_tm_start_timeout_key() - perform start function
+ @cdev: ccw device on which to perform the start function
+ @tcw: transport-command word to be started
+ @intparm: user defined parameter to be passed to the interrupt handler
+ @lpm: mask of paths to use
+ @key: storage key to use for storage access
+ @expires: time span in jiffies after which to abort request
+ * Start the tcw on the given ccw device. Return zero on success, non-zero
+ * otherwise.
- int ccw_device_tm_start_key(struct ccw_device *cdev, struct tcw *tcw,
  - unsigned long intparm, u8 lpm, u8 key)

+ int ccw_device_tm_start_timeout_key(struct ccw_device *cdev, struct tcw *tcw,
  + unsigned long intparm, u8 lpm, u8 key,
  + int expires)

| {                          |
| struct subchannel *sch;  |
| int rc;                  |
| @ -527,37 +524,32 @ @    |
| return -EACCES;          |
| }                        |
| rc = cio_tm_start_key(sch, tcw, lpm, key); |
| -if (rc == 0)            |
| +if (rc == 0) {          |
| cdev->private->intparm = intparm; |
| +if (expires)           |
| +ccw_device_set_timeout(cdev, expires); +} |
| return rc;              |
|}                         |

-EXPORT_SYMBOL(ccw_device_tm_start_key);
+EXPORT_SYMBOL(ccw_device_tm_start_timeout_key);

/**
 - * ccw_device_tm_start_timeout_key() - perform start function
 + * ccw_device_tm_start_key() - perform start function
 * @cdev: ccw device on which to perform the start function
 * @tcw: transport-command word to be started
 * @intparm: user defined parameter to be passed to the interrupt handler
 * @lpm: mask of paths to use
 * @key: storage key to use for storage access
 - * @expires: time span in jiffies after which to abort request
 * 
 * Start the tcw on the given ccw device. Return zero on success, non-zero
 * otherwise.
 */
- int ccw_device_tm_start_timeout_key(struct ccw_device *cdev, struct tcw *tcw,
  - unsigned long intparm, u8 lpm, u8 key,
  - int expires)
+ int ccw_device_tm_start_key(struct ccw_device *cdev, struct tcw *tcw,
  + unsigned long intparm, u8 lpm, u8 key)
{                          
  -int ret;                
  -                       
  -ccw_device_set_timeout(cdev, expires); 
  -ret = ccw_device_tm_start_key(cdev, tcw, intparm, lpm, key); 
  -if (ret != 0)           
*/
-ccw_device_set_timeout(cdev, 0);
-return ret;
+return ccw_device_tm_start_timeout_key(cdev, tcw, intparm, lpm, key, 0);
}
-EXPORT_SYMBOL(ccw_device_tm_start_timeout_key);
+EXPORT_SYMBOL(ccw_device_tm_start_key);

/**
 * ccw_device_tm_start() - perform start function
@@ -602,7 +594,7 @@
 * @mask: mask of paths to use
 *
 * Return the number of 64K-bytes blocks all paths at least support
- * for a transport command. Return values <= 0 indicate failures.
+ * for a transport command. Return value 0 indicates failure.
 */
int ccw_device_get_mdc(struct ccw_device *cdev, u8 mask)
{
--- linux-4.15.0.orig/drivers/s390/cio/io_sch.h
+++ linux-4.15.0/drivers/s390/cio/io_sch.h
@@ -157,6 +157,7 @@
 unsigned long intparm;/* user interruption parameter */
 struct qdio_irq *qdio_data;
 struct irb irb;/* device status */
+int async_kill_io_rc;
 struct senseid senseid;/* SenseID info */
 struct pgid pgid[8];/* path group IDs per chpid*/
 struct ccw1 iccws[2];/* ccws for SNID/SID/SPGID commands */
--- linux-4.15.0.orig/drivers/s390/cio/qdio.h
+++ linux-4.15.0/drivers/s390/cio/qdio.h
@@ -377,7 +377,6 @@
 extern u64 last_ai_time;
 /* prototypes for thin interrupt */
-void qdio_setup_thinint(struct qdio_irq *irq_ptr);
+void qdio_setup_thinint(struct qdio_irq *irq_ptr);
 int qdio_establish_thinint(struct qdio_irq *irq_ptr);
 void qdio_shutdown_thinint(struct qdio_irq *irq_ptr);
 void qiqdio_add_input_queues(struct qdio_irq *irq_ptr);
--- linux-4.15.0.orig/drivers/s390/cio/qdio_main.c
+++ linux-4.15.0/drivers/s390/cio/qdio_main.c
@@ -127,7 +127,7 @@
 static int qdio_do_eqbs(struct qdio_q *q, unsigned char *state,
 int start, int count, int auto_ack)
{
-+int rc, tmp_count = count, tmp_start = start, nr = q->nr, retried = 0;
+int rc, tmp_count = count, tmp_start = start, nr = q->nr;
 unsigned int ccq = 0;


qperf_inc(q, eqbs);
@@ -150,14 +150,7 @@
qperf_inc(q, eqbs_partial);
DBF_DEV_EVENT(DBF_WARN, q->irq_ptr, "EQBS part:%02x", tmp_count);
-/*
- * Retry once, if that fails bail out and process the
- * extracted buffers before trying again.
- */
-/*!
-if (!retried++)
-goto again;
-else
-\treturn count - tmp_count;
+return count - tmp_count;
}

DBF_ERROR("%4x EQBS ERROR", SCH_NO(q));
@@ -213,7 +206,10 @@
return 0;
}

-/* returns number of examined buffers and their common state in *state */
+/*
+ * Returns number of examined buffers and their common state in *state.
+ * Requested number of buffers-to-examine must be > 0.
+ */
static inline int get_buf_states(struct qdio_q *q, unsigned int bufnr,
unsigned char *state, unsigned int count,
int auto_ack, int merge_pending)
@@ -224,17 +220,23 @@
if (is_qebsm(q))
return qdio_do_eqbs(q, state, bufnr, count, auto_ack);

-\tfor (i = 0; i < count; i++) {
-+/* get initial state: */
-\t\t__state = q->slsb.val[bufnr];
-+__state = q->slsb.val[bufnr];
-\t+if (merge_pending &\& __state == SLSB_P_OUTPUT_PENDING)
-+if (merge_pending &\& __state == SLSB_P_OUTPUT_PENDING)
-\t\t-__state = SLSB_P_OUTPUT_EMPTY;
-+__state = SLSB_P_OUTPUT_EMPTY;
-\t+if (auto_ack &\& __state) != __state)
-+if (auto_ack &\& __state) != __state)
-\t\t\tbreak;
-+break;
-\t+} else if (merge_pending) {
-+} else if (merge_pending) {
-\t\t-__state = (q->slsb.val[bufnr] & __state) != __state)
-+__state = (q->slsb.val[bufnr] & __state) != __state)
-\t\t\tbreak;
-+break;
+/*
+ * Get initial state: */
+\t+__state = q->slsb.val[bufnr];
+if (merge_pending &\& __state == SLSB_P_OUTPUT_PENDING)
+__state = SLSB_P_OUTPUT_EMPTY;
+
for (i = 1; i < count; i++) {
  bufnr = next_buf(bufnr);

  /* merge PENDING into EMPTY: */
  if (merge_pending &&
      q->slsb.val[bufnr] == SLSB_P_OUTPUT_PENDING &&
      __state == SLSB_P_OUTPUT_EMPTY)
    continue;

  /* stop if next state differs from initial state: */
  if (q->slsb.val[bufnr] != __state)
    break;
}

*state = __state;
return i;

unsigned long phys_aob = 0;
if (!q->use_cq)
  goto out;
  return 0;

if (!q->aobs[bufnr]) {
  struct qaob *aob = qdio_allocate_aob();
  q->aobs[bufnr] = aob;
}
if (q->aobs[bufnr]) {
  q->sbal_state[bufnr].flags = QDIO_OUTBUF_STATE_FLAG_NONE;
  q->sbal_state[bufnr].aob = q->aobs[bufnr];
  q->aobs[bufnr]->user1 = (u64) q->sbal_state[bufnr].user;
  phys_aob = virt_to_phys(q->aobs[bufnr]);
  WARN_ON_ONCE(phys_aob & 0xFF);
}

-out:
+q->sbal_state[bufnr].flags = 0;
return phys_aob;
}

switch (state) {
  case SLSB_P_OUTPUT_EMPTY:
  case SLSB_P_OUTPUT_PENDING:
    /* the adapter got it */
    DBF_DEV_EVENT(DBF_INFO, q->irq_ptr,
      "out empty:%ld %02x", q->nr, count);
    break;
  }

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/* restore interrupt handler */
-if ((void *)cdev->handler == (void *)qdio_int_handler)
+if ((void *)cdev->handler == (void *)qdio_int_handler) {
    cdev->handler = irq_ptr->orig_handler;
+    cdev->private->intparm = 0;
+}
spin_unlock_irq(get_ccwdev_lock(cdev));

qdio_set_state(irq_ptr, QDIO_IRQ_STATE_INACTIVE);
rc = qdio_kick_outbound_q(q, phys_aob);
} else if (need_siga_sync(q)) {
    rc = qdio_siga_sync_q(q);
+} else if (count < QDIO_MAX_BUFFERS_PER_Q &&
            get_buf_state(q, prev_buf(bufnr), &state, 0) > 0 &&
            state == SLSB_CU_OUTPUT_PRIMED) {
        /* The previous buffer is not processed yet, tack on. */
+        qperf_inc(q, fast_requeue);
    } else {
        /* try to fast requeue buffers */
-        get_buf_state(q, prev_buf(bufnr), &state, 0);
-        if (state != SLSB_CU_OUTPUT_PRIMED)
-            rc = qdio_kick_outbound_q(q, 0);
-        else
+        rc = qdio_kick_outbound_q(q, 0);
    }

/* in case of SIGA errors we must process the error immediately */
--- linux-4.15.0.orig/drivers/s390/cio/qdio_setup.c
+++ linux-4.15.0/drivers/s390/cio/qdio_setup.c
@@ -8,6 +8,7 @@

#include <linux/kernel.h>
#include <linux/slab.h>
#include <linux/export.h>
+include <linux/io.h>
#include <asm/qdio.h>

#include "cio.h"
@@ -141,7 +142,7 @@

int i;

for (i = 0; i < nr_queues; i++) {
    -q = kmem_cache_alloc(qdio_q_cache, GFP_KERNEL);
+q = kmem_cache_zalloc(qdio_q_cache, GFP_KERNEL);
    if (!q)
return -ENOMEM;

@@ -151,6 +152,7 @@
 return -ENOMEM;
 }
 irq_ptr_qs[i] = q;
+INIT_LIST_HEAD(&q->entry);
 }
 return 0;
 }
@@ -179,6 +181,7 @@
 q->mask = 1 << (31 - i);
 q->nr = i;
 q->handler = handler;
+INIT_LIST_HEAD(&q->entry);
 }

static void setup_storage_lists(struct qdio_q *q, struct qdio_irq *irq_ptr, 
@@ -206,7 +209,7 @@ /* fill in sl */
 for (j = 0; j < QDIO_MAX_BUFFERS_PER_Q; j++)
- q->sl->element[j].sbal = (unsigned long)q->sbal[j];
+ q->sl->element[j].sbal = virt_to_phys(q->sbal[j]);
 }

static void setup_queues(struct qdio_irq *irq_ptr, 
@@ -456,7 +459,6 @@
 {
 struct ciw *ciw;
 struct qdio_irq *irq_ptr = init_data->cdev->private->qdio_data;
- int rc;

 memset(&irq_ptr->qib, 0, sizeof(irq_ptr->qib));
 memset(&irq_ptr->siga_flag, 0, sizeof(irq_ptr->siga_flag));
@@ -478,7 +480,6 @@
 setup_queues(irq_ptr, init_data);

 setup_qib(irq_ptr, init_data);
- qdio_setup_thinint(irq_ptr);
 set_impl_params(irq_ptr, init_data->qib_param_field_format, 
 init_data->qib_param_field, 
 init_data->input_slib_elements,
@@ -493,16 +494,14 @@
 ciw = ccw_device_get_ciw(init_data->cdev, CIW_TYPE_EQUEUE);
 if (!ciw) {
 DBF_ERROR("%4x NO EQ", irq_ptr->schid.sch_no);
-rc = -EINVAL;
goto out_err;
+return -EINVAL;
}
irq_ptr->equeue = *ciw;

ciw = ccw_device_get_ciw(init_data->cdev, CIW_TYPE_AQUEUE);
if (!ciw) {
    DBF_ERROR("%4x NO AQ", irq_ptr->schid.sch_no);
    -rc = -EINVAL;
    -goto out_err;
    +return -EINVAL;
}
irq_ptr->aqueue = *ciw;

@@ -510,9 +509,6 @@
irq_ptr->orig_handler = init_data->cdev->handler;
init_data->cdev->handler = qdio_int_handler;
return 0;
-out_err:
-qdio_release_memory(irq_ptr);
-return rc;
}

void qdio_print_subchannel_info(struct qdio_irq *irq_ptr,
--- linux-4.15.0.orig/drivers/s390/cio/qdio_thinint.c
+++ linux-4.15.0/drivers/s390/cio/qdio_thinint.c
@@ -79,7 +79,6 @@
mutex_lock(&tiq_list_lock);
list_add_rcu(&irq_ptr->input_qs[0]->entry, &tiq_list);
mutex_unlock(&tiq_list_lock);
-xchg(irq_ptr->dsci, 1 << 7);
}

void tiqdio_remove_input_queues(struct qdio_irq *irq_ptr)
@@ -87,14 +86,14 @@
struct qdio_q *q;

q = irq_ptr->input_qs[0];
-/* if establish triggered an error */
-if (!q || !q->entry.prev || !q->entry.next)
+if (!q)
    return;

mutex_lock(&tiq_list_lock);
list_del_rcu(&q->entry);
mutex_unlock(&tiq_list_lock);
synchronize_rcu();
+INIT_LIST_HEAD(&q->entry);
static inline int has_multiple_irq_on_dsci(struct qdio_irq *irq_ptr)
{
    if (!is_thinint_irq(irq_ptr))
        return 0;
    return set_subchannel_ind(irq_ptr, 0);
}

void qdio_setup_thinint(struct qdio_irq *irq_ptr)
{
    if (!is_thinint_irq(irq_ptr))
        return;
    irq_ptr->dsci = get_indicator();
    DBF_HEX(&irq_ptr->dsci, sizeof(void *));
    rc = set_subchannel_ind(irq_ptr, 0);
    if (rc)
        put_indicator(irq_ptr->dsci);
    return rc;
}

void qdio_shutdown_thinint(struct qdio_irq *irq_ptr)
{
    if (unlikely(!pa->pa_iova_pfn)) {
        pa->pa_nr = 0;
        return -ENOMEM;
    }
    pa->pa_pfn = pa->pa_iova_pfn + pa->pa_nr;
    ret = pfn_array_pin(pa, mdev);
    for (i = 0; i < pat->pat_nr; i++, pa++)
        for (j = 0; j < pa->pa_nr; j++)
            if (pa->pa_iova_pfn[i] == iova_pfn)
if (pa->pa_iova_pfn[j] == iova_pfn)
    return true;

return false;

/* and stores the result to ccwchain list. @cp must have been
 * initialized by a previous call with cp_init(). Otherwise, undefined
 * behavior occurs.
 * For each chain composing the channel program:
 * - On entry ch_len holds the count of CCWs to be translated.
 * - On exit ch_len is adjusted to the count of successfully translated CCWs.
 * This allows cp_free to find in ch_len the count of CCWs to free in a chain.
 * The S/390 CCW Translation APIS (prefixed by 'cp_') are introduced
 * as helpers to do ccw chain translation inside the kernel. Basically
for (idx = 0; idx < len; idx++) {
    ret = ccwchain_fetch_one(chain, idx, cp);
    if (ret)
        goto out_err;
    /* Only cleanup the chain elements that were actually translated. */
    chain->ch_len = idx;
    list_for_each_entry_continue(chain, &cp->ccwchain_list, next) {
        chain->ch_len = 0;
    }
    return ret;
}

/**
--- linux-4.15.0.orig/drivers/s390/cio/vfio_ccw_drv.c
+++ linux-4.15.0/drivers/s390/cio/vfio_ccw_drv.c
@@ -39,26 +39,30 @@
if (ret != -EBUSY)
    goto out_unlock;
iretry = 255;
do {
    -iretry = 255;

    ret = cio_cancel_halt_clear(sch, &iretry);
    -while (ret == -EBUSY) {
    /*
- * Flush all I/O and wait for
- * cancel/halt/clear completion.
- */
- private->completion = &completion;
- spin_unlock_irq(sch->lock);

-wait_for_completion_timeout(&completion, 3*HZ);
+if (ret == -EIO) {
+pr_err("vfio_ccw: could not quiesce subchannel 0.%x.%04x!n",
+sch->schid.ssid, sch->schid.sch_no);
+break;
+}
+
+/*
+ * Flush all I/O and wait for
+ * cancel/halt/clear completion.
+ */
+private->completion = &completion;
+spin_unlock_irq(sch->lock);

-spin_lock_irq(sch->lock);
- private->completion = NULL;
- flush_workqueue(vfio_ccw_work_q);
- ret = cio_cancel_halt_clear(sch, &iretry);
- 
+if (ret == -EBUSY)
+wait_for_completion_timeout(&completion, 3*HZ);

+private->completion = NULL;
+flush_workqueue(vfio_ccw_work_q);
+spin_lock_irq(sch->lock);
ret = cio_disable_subchannel(sch);
} while (ret == -EBUSY);
out_unlock:
@@ -71,20 +75,24 @@
{
struct vfio_ccw_private *private;
struct irb *irb;
+bool is_final;

 private = container_of(work, struct vfio_ccw_private, io_work);
 irb = &private->irb;

+is_final = !(scsw_actl(&irb->scsw) &
+ (SCSW_ACTL_DEVACT | SCSW_ACTL_SCHACT));
 if (scsw_is_solicited(&irb->scsw)) {
 cp_update_scsw(&private->cp, &irb->scsw);
-cp_free(&private->cp);


if (is_final)
    cp_free(&private->cp);
}
memcpy(private->io_region.irb_area, irb, sizeof(*irb));

if (private->io_trigger)
    eventfd_signal(private->io_trigger, 1);

-if (private->mdev)
    +if (private->mdev && is_final)
        private->state = VFIO_CCW_STATE_IDLE;
    }

@@ -177,6 +185,7 @@
{
    struct vfio_ccw_private *private = dev_get_drvdata(&sch->dev);
    unsigned long flags;
    +int rc = -EAGAIN;

    spin_lock_irqsave(sch->lock, flags);
    if(!device_is_registered(&sch->dev))
        @@ -187,6 +196,7 @@

        if (cio_update_schib(sch)) {
            vfio_ccw_fsm_event(private, VFIO_CCW_EVENT_NOT_OPER);
            +rc = 0;
            goto out_unlock;
        }

        @@ -195,11 +205,12 @@

        private->state = private->mdev ? VFIO_CCW_STATE_IDLE :
            VFIO_CCW_STATE_STANDBY;
        }
        +rc = 0;

        out_unlock:
        spin_unlock_irqrestore(sch->lock, flags);

        -return 0;
        +return rc;
    }

static struct css_device_id vfio_ccw_sch_ids[] = {
    --- linux-4.15.0.orig/drivers/s390/cio/vfio_ccw_fsm.c
    +++ linux-4.15.0/drivers/s390/cio/vfio_ccw_fsm.c
    @@ -20,12 +20,12 @@
    int ccode;
    __u8 lpm;
unsigned long flags;
+int ret;

sch = private->sch;

spin_lock_irqsave(sch->lock, flags);
private->state = VFIO_CCW_STATE_BUSY;
-spin_unlock_irqrestore(sch->lock, flags);

orb = cp_get_orb(&private->cp, (u32)(addr_t)sch, sch->lpm);

@@ -38,10 +38,12 @@
 * Initialize device status information
 */
sch->schib.scsw.cmd.actl |= SCSW_ACTL_START_PEND;
-return 0;
+ret = 0;
+break;
case 1:/# Status pending */
case 2:/# Busy */
-return -EBUSY;
+ret = -EBUSY;
+break;
case 3:/# Device/path not operational */
{l
 lpm = orb->cmd.lpm;
-return sch->lpm ? -EACCES : -ENODEV;
+ret = ccode;
+else
+ret = sch->lpm ? -EACCES : -ENODEV;
+break;
}
default:
-return ccode;
+ret = ccode;
}
+spin_unlock_irqrestore(sch->lock, flags);
+return ret;
}

static void fsm_notoper(struct vfio_ccw_private *private,
-return sch->lpm ? -EACCES : -ENODEV;
+ret = ccode;
+else
+ret = sch->lpm ? -EACCES : -ENODEV;
+break;
}
default:
-return ccode;
+ret = ccode;
}
+spin_unlock_irqrestore(sch->lock, flags);
+return ret;
}
if (scsw->cmd.fctl & SCSW_FCTL_START_FUNC) {
    orb = (union orb *)io_region->orb_area;

    /* Don't try to build a cp if transport mode is specified. */
    +if (orb->tm.b) {
    +io_region->ret_code = -EOPNOTSUPP;
    +goto err_out;
    +}
    io_region->ret_code = cp_init(&private->cp, mdev_dev(mdev), orb);
    if (io_region->ret_code)
    --- linux-4.15.0.orig/drivers/s390/cio/vfio_ccw_ops.c
    +++ linux-4.15.0/drivers/s390/cio/vfio_ccw_ops.c
    @@ -130,11 +130,12 @@
        if ((private->state != VFIO_CCW_STATE_NOT_OPER) &&
            (private->state != VFIO_CCW_STATE_STANDBY)) {
            -if (!vfio_ccw_mdev_reset(mdev))
            +if (!vfio_ccw_sch_quiesce(private->sch))
            private->state = VFIO_CCW_STATE_STANDBY;
            /* The state will be NOT_OPER on error. */
        }

        +cp_free(&private->cp);
        private->mdev = NULL;
        atomic_inc(&private->avail);

        @@ -158,6 +159,14 @@
                struct vfio_ccw_private *private =
                dev_get_drvdata(mdev_parent_dev(mdev));

        +if ((private->state != VFIO_CCW_STATE_NOT_OPER) &&
            + (private->state != VFIO_CCW_STATE_STANDBY)) {
            +if (!vfio_ccw_mdev_reset(mdev))
            +private->state = VFIO_CCW_STATE_STANDBY;
            +/* The state will be NOT_OPER on error. */
            +}
            +
            +cp_free(&private->cp);
            vfio_unregister_notifier(mdev_dev(mdev), VFIO_IOMMU_NOTIFY,
                &private->nb);
        }  
        @@ -332,7 +341,7 @@
                if (ret)
                return ret;

                -return copy_to_user((void __user *)arg, &info, minsz);
                +return copy_to_user((void __user *)arg, &info, minsz) ? -EFAULT : 0;
case VFIO_DEVICE_GET_REGION_INFO:
{
    if (ret)
        return ret;

    return copy_to_user((void __user *)arg, &info, minsz);
    return copy_to_user((void __user *)arg, &info, minsz) ? -EFAULT : 0;
}

case VFIO_DEVICE_GET_IRQ_INFO:
{
    if (info.count == -1)
        return -EINVAL;

    return copy_to_user((void __user *)arg, &info, minsz);
    return copy_to_user((void __user *)arg, &info, minsz) ? -EFAULT : 0;
}

case VFIO_DEVICE_SET_IRQS:
{
    int ap_domain_index = -1; /* Adjunct Processor Domain Index */
    static DEFINE_SPINLOCK(ap_domain_lock);
-module_param_named(domain, ap_domain_index, int, S_IRUSR|S_IRGRP);
+module_param_named(domain, ap_domain_index, int, 0440);
MODULE_PARM_DESC(domain, "domain index for ap devices");
EXPORT_SYMBOL(ap_domain_index);

-static int ap_thread_flag = 0;
-module_param_named(poll_thread, ap_thread_flag, int, S_IRUSR|S_IRGRP);
+static int ap_thread_flag;
+module_param_named(poll_thread, ap_thread_flag, int, 0440);
MODULE_PARM_DESC(poll_thread, "Turn on/off poll thread, default is 0 (off). ");

+static char *apm_str;
+module_param_named(apmask, apm_str, charp, 0440);
+MODULE_PARM_DESC(apmask, "AP bus adapter mask.");
+
+static char *aqm_str;
+module_param_named(aqmask, aqm_str, charp, 0440);
+MODULE_PARM_DESC(aqmask, "AP bus domain mask.");
+
static struct device *ap_root_device;

DEFINE_SPINLOCK(ap_list_lock);
LIST_HEAD(ap_card_list);

+/* Default permissions (card and domain masking) */
+static struct ap_perms {
+DECLARE_BITMAP(apm, AP_DEVICES);
+DECLARE_BITMAP(aqm, AP_DOMAINS);
+} ap_perms;
+static DEFINE_MUTEX(ap_perms_mutex);
+
static struct ap_config_info *ap_configuration;
static bool initialised;

@@ -80,22 +95,26 @@
static void ap_tasklet_fn(unsigned long);
static void ap_tasklet_fn(unsignd long);
static DECLARE_TASKLET(ap_tasklet, ap_tasklet_fn, 0);
static DECLARE_WAIT_QUEUE_HEAD(ap_poll_wait);
-static struct task_struct *ap_poll_kthread = NULL;
+static struct task_struct *ap_poll_kthread;
static DEFINE_MUTEX(ap_poll_thread_mutex);
static DEFINE_SPINLOCK(ap_poll_timer_lock);
static struct hrtimer ap_poll_timer;
-/* In LPAR poll with 4kHz frequency. Poll every 250000 nanoseconds.
-* If z/VM change to 1500000 nanoseconds to adjust to z/VM polling.*
+/*
+ * In LPAR poll with 4kHz frequency. Poll every 250000 nanoseconds.
+ * If z/VM change to 1500000 nanoseconds to adjust to z/VM polling.

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static unsigned long long poll_timeout = 250000;

/**< Suspend flag */
static int ap_suspend_flag;
/**< Maximum domain id */
static int ap_max_domain_id;
/**< Flag to check if domain was set through module parameter domain=. This is */
/**< Flag to check if domain was set through module parameter domain=. This is */
/**< important when supsend and resume is done in a z/VM environment where the */
/**< domain might change. */
- static int user_set_domain = 0;
+ static int user_set_domain;
+static int user_set_domain;
static struct bus_type ap_bus_type;

/**< Adapter interrupt definitions */
@@ -175,24 +194,6 @@
return 0;
}

-/**
- * ap_test_queue(): Test adjunct processor queue.
- * @qid: The AP queue number
- * @tbit: Test facilities bit
- * @info: Pointer to queue descriptor
- *
- * Returns AP queue status structure.
- */
-struct ap_queue_status ap_test_queue(ap_qid_t qid,
-    int tbit,
-    unsigned long *info)
-{  
  -if (tbit)
  -qid |= 1UL << 23; /* set T bit*/
  -return ap_tapq(qid, info);
-}
-EXPORT_SYMBOL(ap_test_queue);
-
-/*
 * ap_query_configuration(): Fetch cryptographic config info
 * @ @ -201.7 +202.7 @@
 * is returned, e.g. if the PQAP(QCI) instruction is not
 * available, the return value will be -EOPNOTSUPP.
 */
int ap_query_configuration(struct ap_config_info *info)
+
+static inline int ap_query_configuration(struct ap_config_info *info)
{
    if (!ap_configuration_available())
        return -EOPNOTSUPP;
    @@ -249,24 +250,43 @@
    static inline int ap_test_config_card_id(unsigned int id)
    {
        if (!ap_configuration) /* QCI not supported */
            return 1;
        +/* only ids 0...3F may be probed */
        +return id < 0x40 ? 1 : 0;
        return ap_test_config(ap_configuration->apm, id);
    }

    /*
     * ap_test_config_domain(): Test, whether an AP usage domain is configured.
     + * ap_test_config_usage_domain(): Test, whether an AP usage domain
     + * is configured.
     * @domain AP usage domain ID
     *
     * Returns 0 if the usage domain is not configured
     * 1 if the usage domain is configured or
     * if the configuration information is not available
     */
    -static inline int ap_test_config_domain(unsigned int domain)
    +int ap_test_config_usage_domain(unsigned int domain)
    {
        if (!ap_configuration) /* QCI not supported */
            return domain < 16;
        return ap_test_config(ap_configuration->aqm, domain);
    }
    +EXPORT_SYMBOL(ap_test_config_usage_domain);
    +
    +/*
     + * ap_test_config_ctrl_domain(): Test, whether an AP control domain
     + * is configured.
     + * @domain AP control domain ID
     + *
     + Returns 1 if the control domain is configured
     + 0 in all other cases
     +*/
    +int ap_test_config_ctrl_domain(unsigned int domain)
    +{
        +if (!ap_configuration) /* QCI not supported */
            return 0;
        +return ap_test_config(ap_configuration->adm, domain);
        ++}
+EXPORT_SYMBOL(ap_test_config_ctrl_domain);

/**
 * ap_query_queue(): Check if an AP queue is available.
 * It sets up a single environment variable DEV_TYPE which contains the
 * hardware device type.
 */
-
+static int ap_uevent(struct device *dev, struct kobj_uevent_env *env)
{
    struct ap_device *ap_dev = to_ap_dev(dev);
    int retval = 0;

    static void ap_bus_suspend(void)
    {
        -AP_DBG(DBG_DEBUG, "ap_bus_suspend running\n");
        +AP_DBG(DBG_DEBUG, "%s running\n", __func__);=
    
    ap_suspend_flag = 1;
    /*
     */
    @ @ -627,7 +647,7 @@
    {
        int rc;

        -AP_DBG(DBG_DEBUG, "ap_bus_resume running\n");
        +AP_DBG(DBG_DEBUG, "%s running\n", __func__);=

        /* remove all queue devices */
        bus_for_each_dev(&ap_bus_type, NULL, NULL,
        @ @ -686,11 +706,99 @@
            .pm = &ap_bus_pm_ops,
            );

        +static int __ap_revise_reserved(struct device *dev, void *dummy)
        +{
            +int rc, card, queue, devres, drvres;
            +
            +if (is_queue_dev(dev)) {
                +card = AP_QID_CARD(to_ap_queue(dev)->qid);
                +queue = AP_QID_QUEUE(to_ap_queue(dev)->qid);
                +mutex_lock(&ap_perms_mutex);
                +devres = test_bit_inv(card, ap_perms.apm)
                +&& test_bit_inv(queue, ap_perms.aqm);
                +mutex_unlock(&ap_perms_mutex);
                +drvres = to_ap_drv(dev->driver)->flags
                +& AP_DRIVER_FLAG_DEFAULT;
                +
                +
                +
            }
if (!!devres != !!drvres) {
    AP_DBF(DBF_DEBUG, "reprobing queue=%02x.%04x
", card, queue);
    rc = device_reprobe(dev);
} +
+
+return 0;
+
+
+static void ap_bus_revise_bindings(void) {
+b{
+bus_for_each_dev(&ap_bus_type, NULL, NULL, __ap_revise_reserved);
+b+
+int ap_owned_by_def_drv(int card, int queue) {
+{
+int rc = 0;
+
+if (card < 0 || card >= AP_DEVICES || queue < 0 || queue >= AP_DOMAINS) +
+return -EINVAL;
+
+mutex_lock(&ap_perms_mutex);
+
+if (test_bit_inv(card, ap_perms.apm) +
+    && test_bit_inv(queue, ap_perms.aqm)) +
+rc = 1;
+
+mutex_unlock(&ap_perms_mutex); +
+
+return rc; +}
+EXPORT_SYMBOL(ap_owned_by_def_drv);
+
+int ap_apqn_in_matrix_owned_by_def_drv(unsigned long *apm, +
+unsigned long *aqm) {
+{
+int card, queue, rc = 0;
+
+mutex_lock(&ap_perms_mutex); +
+
+for (card = 0; !rc && card < AP_DEVICES; card++) +
+if (test_bit_inv(card, apm) && +    test_bit_inv(card, ap_perms.apm)) +
+for (queue = 0; !rc && queue < AP_DOMAINS; queue++) +
+if (test_bit_inv(queue, aqm) && +    test_bit_inv(queue, ap_perms.aqm)) +
+rc = 1;
mutex_unlock(&ap_perms_mutex);
+
+return rc;
+}
+EXPORT_SYMBOL(ap_apqn_in_matrix_owned_by_def_drv);
+
static int ap_device_probe(struct device *dev)
{
struct ap_device *ap_dev = to_ap_dev(dev);
struct ap_driver *ap_drv = to_ap_drv(dev->driver);
-int rc;
+int card, queue, devres, drvres, rc;
+
+if (is_queue_dev(dev)) {
+/*
+ * If the apqn is marked as reserved/used by ap bus and
+ * default drivers, only probe with drivers with the default
+ * flag set. If it is not marked, only probe with drivers
+ * with the default flag not set.
+ */
+card = AP_QID_CARD(to_ap_queue(dev)->qid);
+queue = AP_QID_QUEUE(to_ap_queue(dev)->qid);
+mutex_lock(&ap_perms_mutex);
+devres = test_bit_inv(card, ap_perms.apm)
+&& test_bit_inv(queue, ap_perms.aqm);
+mutex_unlock(&ap_perms_mutex);
+drvres = ap_drv->flags & AP_DRIVER_FLAG_DEFAULT;
+if (!!devres != !!drvres)
+return -ENODEV;
+/* (re-)init queue's state machine */
+ap_queue_reinit_state(to_ap_queue(dev));
+}

/* Add queue/card to list of active queues/cards */
spin_lock_bh(&ap_list_lock);
@@ -722,6 +830,8 @@
struct ap_device *ap_dev = to_ap_dev(dev);
struct ap_driver *ap_drv = ap_dev->drv;
+if (is_queue_dev(dev))
+ap_queue_remove(to_ap_queue(dev));
if (ap_drv->remove)
ap_drv->remove(ap_dev);
@@ -771,8 +881,143 @@
EXPORT_SYMBOL(ap_bus_force_rescan);
*/
+ * hex2bitmap() - parse hex mask string and set bitmap.
+ * Valid strings are "0x012345678" with at least one valid hex number.
+ * Rest of the bitmap to the right is padded with 0. No spaces allowed
+ * within the string, the leading 0x may be omitted.
+ * Returns the bitmask with exactly the bits set as given by the hex
+ * string (both in big endian order).
+ */
+static int hex2bitmap(const char *str, unsigned long *bitmap, int bits)
+{  
+  int i, n, b;
+  
+ ="/" bits needs to be a multiple of 8 */
+if (bits & 0x07)
+return -EINVAL;
+  
+  if (str[0] == '0' && str[1] == 'x')
+str++;
+  if (*str == 'x')
+str++;
+  
+  for (i = 0; isxdigit(*str) && i < bits; str++) {  
+    b = hex_to_bin(*str) && i < bits; str++)
+  
+    if (*str == 'n')
+str++;
+    if (*str)
+return -EINVAL;
+  return 0;
+  }  
+  
+ ="/" modify_bitmap() - parse bitmask argument and modify an existing
+ * bit mask accordingly. A concatenation (done with ',') of these
+ * terms is recognized:
+ * +<bitnr>[-<bitnr>] or -<bitnr>[-<bitnr>]
+ * <bitnr> may be any valid number (hex, decimal or octal) in the range
+ * 0...bits-1; the leading + or - is required. Here are some examples:
+ * +0-15,+32,-128,-0xFF
+ * -0-255,+1-16,+0x128
+ * +1,+2,+3,+4,-5,-7-10
+ * Returns the new bitmap after all changes have been applied. Every
+ * positive value in the string will set a bit and every negative value
in the string will clear a bit. As a bit may be touched more than once,
* the last 'operation' wins:
+ * +0-255,-128 = first bits 0-255 will be set, then bit 128 will be
+ * cleared again. All other bits are unmodified.
+ */
+static int modify_bitmap(const char *str, unsigned long *bitmap, int bits)
+{
+    int a, i, z;
+    char *np, sign;
+
+    /* bits needs to be a multiple of 8 */
+    if (bits & 0x07)
+        return -EINVAL;
+
+    while (*str) {
+        sign = *str++;
+        if (sign != '+' && sign != '-')
+            return -EINVAL;
+        a = z = simple_strtoul(str, &np, 0);
+        if (str == np || a >= bits)
+            return -EINVAL;
+        str = np;
+        if (*str == '-') {
+            z = simple_strtoul(++str, &np, 0);
+            if (str == np || a > z || z >= bits)
+                return -EINVAL;
+            str = np;
+        }
+        for (i = a; i <= z; i++)
+            if (sign == '+')
+                set_bit_inv(i, bitmap);
+            else
+                clear_bit_inv(i, bitmap);
+        while (*str == ',' || *str == '
')
+            str++;
+    }
+    return 0;
+}
+
+/*
+ * process_mask_arg() - parse a bitmap string and clear/set the
+ * bits in the bitmap accordingly. The string may be given as
+ * absolute value, a hex string like 0x1F2E3D4C5B6A” simple over-
+ * writing the current content of the bitmap. Or as relative string
+ * like “+1-16,-32,-0x40,+128” where only single bits or ranges of
+ * bits are cleared or set. Distinction is done based on the very
+ * first character which may be ‘+’ or ‘-’ for the relative string
+ * and otherwise assume to be an absolute value string. If parsing fails
+ * a negative errno value is returned. All arguments and bitmaps are
+ * big endian order.
+ */
+static int process_mask_arg(const char *str,
+    unsigned long *bitmap, int bits,
+    struct mutex *lock)
+{
+unsigned long *newmap, size;
+int rc;
+
+/* bits needs to be a multiple of 8 */
+if (bits & 0x07)
+    return -EINVAL;
+
+size = BITS_TO_LONGS(bits)*sizeof(unsigned long);
+newmap = kmalloc(size, GFP_KERNEL);
+if (!newmap)
+    return -ENOMEM;
+if (mutex_lock_interruptible(lock)) {
+    kfree(newmap);
+    return -ERESTARTSYS;
+}
+
+if (*str == '+' || *str == '-') {
+    memcpy(newmap, bitmap, size);
+    rc = modify_bitmap(str, newmap, bits);
+} else {
+    memset(newmap, 0, size);
+    rc = hex2bitmap(str, newmap, bits);
+} else {
+
+    if (*str == '+' || *str == '-') {
+        memcpy(newmap, bitmap, size);
+        rc = modify_bitmap(str, newmap, bits);
+    } else {
+        memset(newmap, 0, size);
+        rc = hex2bitmap(str, newmap, bits);
+    }
+}
+if (rc == 0)
+kfree(newmap);
+mutex_unlock(lock);
+kfree(newmap);
+return rc;
+
+/*
 * AP bus attributes.
 */
+
static ssize_t ap_domain_show(struct bus_type *bus, char *buf)
{
    return snprintf(buf, PAGE_SIZE, "%d", ap_domain_index);
}
if (sscanf(buf, "\%d\n", &domain) != 1 ||
-    domain < 0 || domain > ap_max_domain_id)
+    domain < 0 || domain > ap_max_domain_id ||
+    !test_bit_inv(domain, ap_perms.aqm))
    return -EINVAL;
spin_lock_bh(&ap_domain_lock);
ap_domain_index = domain;
@@ -795,7 +1041,7 @@
    return count;
}

-static BUS_ATTR(ap_domain, 0644, ap_domain_show, ap_domain_store);
+static BUS_ATTR_RW(ap_domain);

static ssize_t ap_control_domain_mask_show(struct bus_type *bus, char *buf)
{  
    ap_configuration->adm[6], ap_configuration->adm[7]);
}

-static BUS_ATTR(ap_control_domain_mask, 0444,
-    ap_control_domain_mask_show, NULL);
+static BUS_ATTR_RO(ap_control_domain_mask);

static ssize_t ap_usage_domain_mask_show(struct bus_type *bus, char *buf)
{  
    ap_configuration->aqm[6], ap_configuration->aqm[7]);
}

-static BUS_ATTR(ap_usage_domain_mask, 0444,
-    ap_usage_domain_mask_show, NULL);
-  
-  static ssize_t ap_config_time_show(struct bus_type *bus, char *buf)
-  { 
-    return snprintf(buf, PAGE_SIZE, "\%d\n", ap_config_time);
-  }
+static BUS_ATTR_RO(ap_usage_domain_mask);

static ssize_t ap_interrupts_show(struct bus_type *bus, char *buf)
{  
    ap_using_interrupts() ? 1 : 0);
}

-static BUS_ATTR(ap_interrupts, 0444, ap_interrupts_show, NULL);
+static BUS_ATTR_RO(ap_interrupts);
static ssize_t ap_config_time_store(struct bus_type *bus,
    const char *buf, size_t count)
+static ssize_t config_time_show(struct bus_type *bus, char *buf)
+{
+    return snprintf(buf, PAGE_SIZE, "%d\n", ap_config_time);
+}
+
+static ssize_t config_time_store(struct bus_type *bus,
    const char *buf, size_t count)
{
    int time;
}

@@ -854,15 +1098,15 @@
    return count;
}

-static BUS_ATTR(config_time, 0644, ap_config_time_show, ap_config_time_store);
+static BUS_ATTR_RW(config_time);

-static ssize_t ap_poll_thread_show(struct bus_type *bus, char *buf)
+static ssize_t poll_thread_show(struct bus_type *bus, char *buf)
{
    return snprintf(buf, PAGE_SIZE, "%d\n", ap_poll_kthread ? 1 : 0);
}

-static ssize_t ap_poll_thread_store(struct bus_type *bus,
    const char *buf, size_t count)
+static ssize_t poll_thread_store(struct bus_type *bus,
    const char *buf, size_t count)
{
    int flag, rc;
}

@@ -877,7 +1121,7 @@
    return count;
}

-static BUS_ATTR(poll_thread, 0644, ap_poll_thread_show, ap_poll_thread_store);
+static BUS_ATTR_RW(poll_thread);

static ssize_t poll_timeout_show(struct bus_type *bus, char *buf)
{
    return count;
}

-static BUS_ATTR(poll_timeout, 0644, poll_timeout_show, poll_timeout_store);
+static BUS_ATTR_RW(poll_timeout);


static ssize_t ap_max_domain_id_show(struct bus_type *bus, char *buf)
{
    return snprintf(buf, PAGE_SIZE, "%d\n", max_domain_id);
}

static BUS_ATTR(ap_max_domain_id, 0444, ap_max_domain_id_show, NULL);
static BUS_ATTR_RO(ap_max_domain_id);
 static ssize_t apmask_show(struct bus_type *bus, char *buf)
{
 int rc;

 if (mutex_lock_interruptible(&ap_perms_mutex))
     return -ERESTARTSYS;

 rc = snprintf(buf, PAGE_SIZE,
 "0x%016lx%016lx%016lx%016lx\n",
 ap_perms.apm[0], ap_perms.apm[1],
 ap_perms.apm[2], ap_perms.apm[3]);
 mutex_unlock(&ap_perms_mutex);

 return rc;
}

 static ssize_t aqmask_show(struct bus_type *bus, char *buf)
{
 int rc;

 if (mutex_lock_interruptible(&ap_perms_mutex))
     return -ERESTARTSYS;

 rc = snprintf(buf, PAGE_SIZE,
 "0x%016lx%016lx%016lx%016lx\n",
 ap_perms.apm[0], ap_perms.apm[1],
 ap_perms.apm[2], ap_perms.apm[3]);
 mutex_unlock(&ap_perms_mutex);

 return rc;
}

 static ssize_t apmask_store(struct bus_type *bus, const char *buf,
 size_t count)
{
 int rc;

 rc = process_mask_arg(buf, ap_perms.apm, AP_DEVICES, &ap_perms_mutex);
 if (rc)
     return rc;

 ap_bus_revise_bindings();

 return count;
}

 static BUS_ATTR_RW(apmask);

 static ssize_t aqmask_store(struct bus_type *bus, const char *buf,
 size_t count)
{
 int rc;

 if (mutex_lock_interruptible(&ap_perms_mutex))
     return -ERESTARTSYS;

 rc = snprintf(buf, PAGE_SIZE,
 "0x%016lx%016lx%016lx%016lx\n",
+ ap_perms.aqm[0], ap_perms.aqm[1],
+ ap_perms.aqm[2], ap_perms.aqm[3]);
+ mutex_unlock(&ap_perms_mutex);
+ return rc;
+
+static ssize_t aqmask_store(struct bus_type *bus, const char *buf,
+   size_t count)
+{
+  int rc;
+  rc = process_mask_arg(buf, ap_perms.aqm, AP_DOMAINS, &ap_perms_mutex);
+  if (rc)
+    return rc;
+  ap_bus_revise_bindings();
+  return count;
+
+static BUS_ATTR_RW(aqmask);

static struct bus_attribute *const ap_bus_attrs[] = {
  &bus_attr_ap_domain,
  @ @ -930,15 +1236,16 @ @
  &bus_attr_ap_interrupts,
  &bus_attr_poll_timeout,
  &bus_attr_ap_max_domain_id,
  +&bus_attr_apmask,
  +&bus_attr_aqmask,
  NULL,
};

/**
- * ap_select_domain(): Select an AP domain.
+ * ap_select_domain(): Select an AP domain if possible and we haven't
- * Pick one of the 16 AP domains.
+ * already done so before.
+ */
- static int ap_select_domain(void)
+ static void ap_select_domain(void)
  {
    int count, max_count, best_domain;
    struct ap_queue_status status;
    @ @ -953,12 +1260,13 @ @
    if (ap_domain_index >= 0) {

DOMAIN has already been selected. */
spin_unlock_bh(&ap_domain_lock);
-return 0;
+return;
}
best_domain = -1;
max_count = 0;
for (i = 0; i < AP_DOMAINS; i++) {
- if (!ap_test_config_domain(i))
+ if (!ap_test_config_usage_domain(i) ||
    !test_bit_inv(i, ap_perms.aqm))
  continue;
  count = 0;
for (j = 0; j < AP_DEVICES; j++) {
  @ @ -976,14 +1284,11 @@
  best_domain = i;
  }
- if (best_domain >= 0){
+ if (best_domain >= 0) {
  ap_domain_index = best_domain;
  AP_DBF(DBF_DEBUG, "new ap_domain_index=%d\n", ap_domain_index);
  -spin_unlock_bh(&ap_domain_lock);
  -return 0;
  }
spin_unlock_bh(&ap_domain_lock);
- return -ENODEV;
}
/*
@@ -1058,11 +1363,10 @@
unsigned int func = 0;
int rc, id, dom, borked, domains, defdomdevs = 0;

-AP_DBF(DBF_DEBUG, "ap_scan_bus running\n");
+AP_DBF(DBF_DEBUG, "%s running\n", __func__);

ap_query_configuration(ap_configuration);
- if (ap_select_domain() != 0)
- goto out;
+ap_select_domain();

for (id = 0; id < AP_DEVICES; id++) {
 /* check if device is registered */
 @ @ -1096,7 +1400,7 @@
 (void *)(long) qid,
     __match_queue_device_with_qid);
aq = dev ? to_ap_queue(dev) : NULL;
-if (!ap_test_config_domain(dom)) {
+if (!ap_test_config_usage_domain(dom)) {
  if (dev) {
      /* Queue device exists but has been
         * removed from configuration.
    @@ -1160,10 +1464,6 @@
        aq->ap_dev.device.parent = &ac->ap_dev.device;
        dev_set_name(&aq->ap_dev.device,
         "%02x,%04x", id, dom);
-      /* Start with a device reset */
-      spin_lock_bh(&aq->lock);
-      ap_wait(ap_sm_event(aq, AP_EVENT_POLL));
-      spin_unlock_bh(&aq->lock);
+      /* Register device */
        rc = device_register(&aq->ap_dev.device);
        if (rc) {
            @@ -1182,11 +1482,11 @@
            }
      } /* end device loop */
-}
-#if (defdomdevs < 1)
-  AP_DBG(DBF_INFO, "no queue device with default domain %d available\n",
+  if (ap_domain_index >= 0 && defdomdevs < 1)
+    AP_DBG(DBF_INFO, "no queue device with default domain %d available\n",
       ap_domain_index);
-out:
    mod_timer(&ap_config_timer, jiffies + ap_config_time * HZ);
  }

@@ -1202,7 +1502,7 @@
 int i, j;

 for (i = 0; i < APDOMAINS; i++) {
-  if (!ap_test_config_domain(i))
+  if (!ap_test_config_usage_domain(i))
      continue;
     for (j = 0; j < AP_DEVICES; j++) {
       if (!ap_test_config_card_id(j))
          @@ -1226,9 +1526,25 @@
             return 0;
     }

-void ap_debug_exit(void)
+static void __init ap_perms_init(void)
{
  -debug_unregister(ap_dbf_info);
/* all resources useable if no kernel parameter string given */
memset(&ap_perms.apm, 0xFF, sizeof(ap_perms.apm));
memset(&ap_perms.aqm, 0xFF, sizeof(ap_perms.aqm));

/* apm kernel parameter string */
if (apm_str) {
    memset(&ap_perms.apm, 0, sizeof(ap_perms.apm));
    process_mask_arg(apm_str, ap_perms.apm, AP_DEVICES,
        &ap_perms_mutex);
} 

/* aqm kernel parameter string */
if (aqm_str) {
    memset(&ap_perms.aqm, 0, sizeof(ap_perms.aqm));
    process_mask_arg(aqm_str, ap_perms.aqm, AP_DOMAINS,
        &ap_perms_mutex);
}

/**
@ @ -1245,11 +1561,14 @@
if (rc)
return rc;

-if (ap_instructions_available() != 0) {
+if (!ap_instructions_available()) {
    pr_warn("The hardware system does not support AP instructions\n");
    return -ENODEV;
}

/* set up the AP permissions (ap and aq masks) */
ap_perms_init();

/* Get AP configuration data if available */
ap_init_configuration();

@ @ -1258,7 +1577,9 @@
ap_max_domain_id ? ap_max_domain_id : APDOMAINS - 1;
else
    max_domain_id = 15;
-if (ap_domain_index < -1 || ap_domain_index > max_domain_id) {
+if (ap_domain_index < -1 || ap_domain_index > max_domain_id ||
    (ap_domain_index >= 0 &&
    !test_bit_inv(ap_domain_index, ap_perms.aqm))) {
    pr_warn("%d is not a valid cryptographic domain\n",
        ap_domain_index);
    ap_domain_index = -1;
--- linux-4.15.0.orig/drivers/s390/crypto/ap_bus.h
+++ linux-4.15.0/drivers/s390/crypto/ap_bus.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
/*
 * Copyright IBM Corp. 2006, 2012
 * Author(s): Cornelia Huck <cornelia.huck@de.ibm.com>
@@ -15,9 +15,10 @@
#include <linux/device.h>
#include <linux/types.h>
+#include <asm/isc.h>
#include <asm/ap.h>

#define AP_DEVICES 64 /* Number of AP devices. */
+#define AP_DEVICES 256 /* Number of AP devices. */
#define AP_DOMAINS 256 /* Number of AP domains. */
#define AP_RESET_TIMEOUT (HZ*0.7) /* Time in ticks for reset timeouts. */
#define AP_CONFIG_TIME 30 /* Time in seconds between AP bus rescans. */
@@ -116,9 +117,18 @@
struct ap_device;
struct ap_message;

+/*
 + * The ap driver struct includes a flags field which holds some info for
 + * the ap bus about the driver. Currently only one flag is supported and
 + * used: The DEFAULT flag marks an ap driver as a default driver which is
 + * used together with the apmask and aqmask whitelisting of the ap bus.
 + */
+#define AP_DRIVER_FLAG_DEFAULT 0x0001

struct ap_driver {
    struct device_driver driver;
    struct ap_device_id *ids;
    unsigned int flags;
    int (*probe)(struct ap_device *);
    void (*remove)(struct ap_device *);
    unsigned int functions; /* AP device function bitfield. */
    int queue_depth; /* AP queue depth. */
    int id; /* AP card number. */
    -atomic_t total_request_count; /* # requests ever for this AP device. */
+atomic64_t total_request_count; /* # requests ever for this AP device. */
};

#define to_ap_card(x) container_of((x), struct ap_card, ap_dev.device)
@@ -165,8 +175,8 @@
enum ap_state state; /* State of the AP device. */
int pendingq_count; /* # requests on pendingq list. */
int requestq_count; /* # requests on requestq list. */
-int total_request_count; /* # requests ever for this AP device. */
-int request_timeout; /* Request timeout in jiffies. */
+u64 total_request_count; /* # requests ever for this AP device. */
+int request_timeout; /* Request timeout in jiffies. */
struct timer_list timeout; /* Timer for request timeouts. */
struct list_head pendingq; /* List of messages sent to AP queue. */
struct list_head requestq; /* List of messages yet to be sent. */
@@ -198,11 +208,18 @@
*/
static inline void ap_init_message(struct ap_message *ap_msg)
{
-ap_msg->psmid = 0;
-ap_msg->length = 0;
-ap_msg->rc = 0;
-ap_msg->special = 0;
-ap_msg->receive = NULL;
+memset(ap_msg, 0, sizeof(*ap_msg));
+}
+
+/**
+ * ap_release_message() - Release ap_message.
+ * Releases all memory used internal within the ap_message struct
+ * Currently this is the message and private field.
+ */
+static inline void ap_release_message(struct ap_message *ap_msg)
+{
+kzfree(ap_msg->message);
+kzfree(ap_msg->private);
+
+
+#define for_each_ap_card(_ac) \
@@ -231,16 +248,40 @@
void ap_request_timeout(struct timer_list *t);
void ap_bus_force_rescan(void);

+int ap_test_config_usage_domain(unsigned int domain);
+int ap_test_config_ctrl_domain(unsigned int domain);
+
+void ap_queue_init_reply(struct ap_queue *aq, struct ap_message *ap_msg);
+struct ap_queue *ap_queue_create(ap_qid_t qid, int device_type);
+void ap_queue_remove(struct ap_queue *aq);
+void ap_queue_suspend(struct ap_device *ap_dev);
+void ap_queue_resume(struct ap_device *ap_dev);
+void ap_queue_reinit_state(struct ap_queue *aq);
struct ap_card *ap_card_create(int id, int queue_depth, int raw_device_type,
    int comp_device_type, unsigned int functions);

-int ap_module_init(void);
-void ap_module_exit(void);
+/
+ * check APQN for owned/reserved by ap bus and default driver(s).
+ * Checks if this APQN is or will be in use by the ap bus
+ * and the default set of drivers.
+ * If yes, returns 1, if not returns 0. On error a negative
+ * errno value is returned.
+ */
+int ap_owned_by_def_drv(int card, int queue);
 +
+/*
+ * check 'matrix' of APQNs for owned/reserved by ap bus and
+ * default driver(s).
+ * Checks if there is at least one APQN in the given 'matrix'
+ * marked as owned/reserved by the ap bus and default driver(s).
+ * If such an APQN is found the return value is 1, otherwise
+ * 0 is returned. On error a negative errno value is returned.
+ * The parameter apm is a bitmask which should be declared
+ * as DECLARE_BITMAP(apm, AP_DEVICES), the aqm parameter is
+ * similar, should be declared as DECLARE_BITMAP(aqm, AP_DOMAINS).
+ */
+int ap_apqn_in_matrix_owned_by_def_drv(unsigned long *apm,
    +
    unsigned long *aqm);

#include <asm/facility.h>
#include "ap_bus.h"
-include "ap_asm.h"

/*
 * AP card related attributes.
 */
-static ssize_t ap_hwtype_show(struct device *dev,
    - struct device_attribute *attr, char *buf)
+static ssize_t hwtype_show(struct device *dev,
    + struct device_attribute *attr, char *buf)
{
    struct ap_card *ac = to_ap_card(dev);

    return snprintf(buf, PAGE_SIZE, "%d\n", ac->ap_dev.device_type);


- static DEVICE_ATTR(hwtype, 0444, ap_hwtype_show, NULL);
+ static DEVICE_ATTR_RO(hwtype);

- static ssize_t ap_raw_hwtype_show(struct device *dev,
- struct device_attribute *attr, char *buf)
+ static ssize_t raw_hwtype_show(struct device *dev,
+ struct device_attribute *attr, char *buf)
{
    struct ap_card *ac = to_ap_card(dev);

    return snprintf(buf, PAGE_SIZE, "%d\n", ac->raw_hwtype);
}

- static DEVICE_ATTR(raw_hwtype, 0444, ap_raw_hwtype_show, NULL);
+ static DEVICE_ATTR_RO(raw_hwtype);

- static ssize_t ap_depth_show(struct device *dev, struct device_attribute *attr,
- char *buf)
+ static ssize_t depth_show(struct device *dev, struct device_attribute *attr,
+ char *buf)
{
    struct ap_card *ac = to_ap_card(dev);

    return snprintf(buf, PAGE_SIZE, "%d\n", ac->queue_depth);
}

- static DEVICE_ATTR(depth, 0444, ap_depth_show, NULL);
+ static DEVICE_ATTR_RO(depth);

static ssize_t ap_functions_show(struct device *dev,
@@ -57,25 +56,25 @@
        return snprintf(buf, PAGE_SIZE, "0x%08X\n", ac->functions);
}

- static DEVICE_ATTR(ap_functions, 0444, ap_functions_show, NULL);
+ static DEVICE_ATTR_RO(ap_functions);

- static ssize_t ap_req_count_show(struct device *dev,
- struct device_attribute *attr,
- char *buf)
+ static ssize_t request_count_show(struct device *dev,
+ struct device_attribute *attr,
+ char *buf)
{
    struct ap_card *ac = to_ap_card(dev);

    return snprintf(buf, PAGE_SIZE, "%d\n", ac->queue_depth);
}
unsigned int req_cnt;
+u64 req_cnt;

req_cnt = 0;
spin_lock_bh(&ap_list_lock);
-req_cnt = atomic_read(&ac->total_request_count);
+req_cnt = atomic64_read(&ac->total_request_count);
spin_unlock_bh(&ap_list_lock);
-return snprintf(buf, PAGE_SIZE, "%d\n", req_cnt);
+return snprintf(buf, PAGE_SIZE, "%llu\n", req_cnt);
}

-static ssize_t ap_req_count_store(struct device *dev, 
  - struct device_attribute *attr, 
  - const char *buf, size_t count) 
+static ssize_t request_count_store(struct device *dev, 
  + struct device_attribute *attr, 
  + const char *buf, size_t count) 
{
  struct ap_card *ac = to_ap_card(dev);
  struct ap_queue *aq;
  for_each_ap_queue(aq, ac)
  aq->total_request_count = 0;
  spin_unlock_bh(&ap_list_lock);
  -atomic_set(&ac->total_request_count, 0);
  +atomic64_set(&ac->total_request_count, 0);
  return count;
}

-static DEVICE_ATTR(request_count, 0644, ap_req_count_show, ap_req_count_store);
+static DEVICE_ATTR_RW(request_count);

-static ssize_t ap_requestq_count_show(struct device *dev, 
  - struct device_attribute *attr, char *buf) 
+static ssize_t requestq_count_show(struct device *dev, char *buf) 
{
  struct ap_card *ac = to_ap_card(dev);
  struct ap_queue *aq;
  return snprintf(buf, PAGE_SIZE, "%d\n", reqq_cnt);
}

-static DEVICE_ATTR(requestq_count, 0444, ap_requestq_count_show, NULL);
+static DEVICE_ATTR_RO(requestq_count);

-static DEVICE_ATTR(requestq_count, 0444, ap_requestq_count_show, NULL);
+static DEVICE_ATTR_RO(requestq_count);
-static ssize_t ap_pendingq_count_show(struct device *dev,
  struct device_attribute *attr, char *buf)
+static ssize_t pendingq_count_show(struct device *dev,
  struct device_attribute *attr, char *buf)
{
    struct ap_card *ac = to_ap_card(dev);
    struct ap_queue *aq;
    return snprintf(buf, PAGE_SIZE, "%d\n", penq_cnt);
}

-static DEVICE_ATTR(pendingq_count, 0444, ap_pendingq_count_show, NULL);
+static DEVICE_ATTR_RO(pendingq_count);

-static ssize_t ap_modalias_show(struct device *dev,
  struct device_attribute *attr, char *buf)
+static ssize_t modalias_show(struct device *dev,
  struct device_attribute *attr, char *buf)
{
    return sprintf(buf, "ap:t%02X\n", to_ap_dev(dev)->device_type);
}

-static DEVICE_ATTR(modalias, 0444, ap_modalias_show, NULL);
+static DEVICE_ATTR_RO(modalias);

static struct attribute *ap_card_dev_attrs[] = {
    &dev_attr_hwtype.attr,
    &dev_attr_modalias.attr,
    &dev_attr_pendingq_count.attr,
    &dev_attr_modalias.attr,
}

#include <asm/facility.h>
#include "ap_bus.h"
#include "ap_asm.h"
#include "ap_debug.h"

/**
 * ap_queue_irq_ctrl(): Control interruption on a AP queue.
 * @qirqctrl: struct ap_qirq_ctrl (64 bit value)
 * @ind: The notification indicator byte
 * @*
 * Returns AP queue status.
 * @*
 * Control interruption on the given AP queue.
 * Just a simple wrapper function for the low level PQAP(AQIC)
 * instruction available for other kernel modules.
 * */
-struct ap_queue_status ap_queue_irq_ctrl(ap_qid_t qid,
- struct ap_qirq_ctrl qirqctrl,
- void *ind)
-
-return ap_aqic(qid, qirqctrl, ind);
-
-EXPORT_SYMBOL(ap_queue_irq_ctrl);
+static void __ap_flush_queue(struct ap_queue *aq);

/**
 * ap_queue_enable_interruption(): Enable interruption on an AP queue.
**
/*
 * AP queue related attributes.
*/
-static ssize_t ap_req_count_show(struct device *dev,
- struct device_attribute *attr,
- char *buf)
+static ssize_t request_count_show(struct device *dev,
+ struct device_attribute *attr,
+ char *buf)
{
 struct ap_queue *aq = to_ap_queue(dev);
-unsigned int req_cnt;
+u64 req_cnt;

 spin_lock_bh(&aq->lock);
 req_cnt = aq->total_request_count;
 spin_unlock_bh(&aq->lock);
-return snprintf(buf, PAGE_SIZE, "%d\n", req_cnt);
+return snprintf(buf, PAGE_SIZE, "%llu\n", req_cnt);
}

-static ssize_t ap_req_count_store(struct device *dev,
- struct device_attribute *attr,
- const char *buf, size_t count)
+static ssize_t request_count_store(struct device *dev,
+ struct device_attribute *attr,
+ const char *buf, size_t count)
{
 struct ap_queue *aq = to_ap_queue(dev);

 @@ -508,10 +491,10 @@
 return count;
 }

-static DEVICE_ATTR(request_count, 0644, ap_req_count_show, ap_req_count_store);
+static DEVICE_ATTR_RW(request_count);
-static ssize_t ap_requestq_count_show(struct device *dev,
-    struct device_attribute *attr, char *buf)
+static ssize_t requestq_count_show(struct device *dev,
+    struct device_attribute *attr, char *buf)
{
    struct ap_queue *aq = to_ap_queue(dev);
    unsigned int reqq_cnt = 0;
    return snprintf(buf, PAGE_SIZE, "\d\n", reqq_cnt);
}

-static DEVICE_ATTR(requestq_count, 0444, ap_requestq_count_show, NULL);
+static DEVICE_ATTR_RO(requestq_count);

-static ssize_t ap_pendingq_count_show(struct device *dev,
-    struct device_attribute *attr, char *buf)
+static ssize_t pendingq_count_show(struct device *dev,
+    struct device_attribute *attr, char *buf)
{
    struct ap_queue *aq = to_ap_queue(dev);
    unsigned int penq_cnt = 0;
    return snprintf(buf, PAGE_SIZE, "\d\n", penq_cnt);
}

-static DEVICE_ATTR(pendingq_count, 0444, ap_pendingq_count_show, NULL);
+static DEVICE_ATTR_RO(pendingq_count);

-static ssize_t ap_reset_show(struct device *dev,
-    struct device_attribute *attr, char *buf)
+static ssize_t reset_show(struct device *dev,
+    struct device_attribute *attr, char *buf)
{
    struct ap_queue *aq = to_ap_queue(dev);
    int rc = 0;
    return rc;
}

-static DEVICE_ATTR(reset, 0444, ap_reset_show, NULL);
+static ssize_t reset_store(struct device *dev,
+    struct device_attribute *attr,
+    const char *buf, size_t count)
+{
+    struct ap_queue *aq = to_ap_queue(dev);
+    __ap_flush_queue(aq);
+aq->state = AP_STATE_RESET_START;
+ap_wait(ap_sm_event(aq, AP_EVENT_POLL));
+spin_unlock_bh(&aq->lock);
+
+AP_DBG(DBG_INFO, "reset queue=%02x.%04x triggered by user\n",
    + AP_QID_CARD(aq->qid), AP_QID_QUEUE(aq->qid));
+
+return count;
+
+}
+
+static DEVICE_ATTR_RW(reset);

-static ssize_t ap_interrupt_show(struct device *dev,
    - struct device_attribute *attr, char *buf)
-static ssize_t interrupt_show(struct device *dev,
    + struct device_attribute *attr, char *buf)
{  
struct ap_queue *aq = to_ap_queue(dev);
    int rc = 0;
   @@ -580,7 +581,7 @@
        return rc;
    }

-static DEVICE_ATTR(interrupt, 0444, ap_interrupt_show, NULL);
+static DEVICE_ATTR_RO(interrupt);

static struct attribute *ap_queue_dev_attrs[] = {
    &dev_attr_request_count.attr,
    @ @ -666,7 +667,7 @ @
    list_add_tail(&ap_msg->list, &aq->requestq);
    aq->requestq_count++;
    aq->total_request_count++;
    -atomic_inc(&aq->card->total_request_count);
    +atomic64_inc(&aq->card->total_request_count);
    /* Send/receive as many request from the queue as possible. */
    ap_wait(ap_sm_event_loop(aq, AP_EVENT_POLL));
    spin_unlock_bh(&aq->lock);
    @ @ -738,5 +739,20 @ @
    {
        ap_flush_queue(aq);
        del_timer_sync(&aq->timeout);
    +/* reset with zero, also clears irq registration */
    +spin_lock_bh(&aq->lock);
    +ap_zapq(aq->qid);
    +aq->state = AP_STATE_BORKED;
    +spin_unlock_bh(&aq->lock);
    }


EXPORT_SYMBOL(ap_queue_remove);
+
+void ap_queue_reinit_state(struct ap_queue *aq)
+{
+spin_lock_bh(&aq->lock);
+aq->state = AP_STATE_RESET_START;
+ap_wait(ap_sm_event(aq, AP_EVENT_POLL));
+spin_unlock_bh(&aq->lock);
+
+EXPORT_SYMBOL(ap_queue_reinit_state);
--- linux-4.15.0.orig/drivers/s390/crypto/pkey_api.c
+++ linux-4.15.0/drivers/s390/crypto/pkey_api.c
@@ -45,7 +45,8 @@
 static void __init pkey_debug_init(void)
 {
- debug_info = debug_register("pkey", 1, 1, 4 * sizeof(long));
+ /* 5 arguments per dbf entry (including the format string ptr) */
+ debug_info = debug_register("pkey", 1, 1, 5 * sizeof(long));
 debug_register_view(debug_info, &debug_sprintf_view);
 debug_set_level(debug_info, 3);
 }
@@ -82,20 +83,20 @@
 if (t->type != 0x01) {
 DEBUG_ERR(  
- "check_secaeskeytoken secure token check failed, type mismatch 0x%02x != 0x01\n",
- (int) t->type);
+ "%s secure token check failed, type mismatch 0x%02x != 0x01\n",
+ __func__, (int) t->type);
 return -EINVAL;
 }
 if (t->version != 0x04) {
 DEBUG_ERR(  
- "check_secaeskeytoken secure token check failed, version mismatch 0x%02x != 0x04\n",
- (int) t->version);
+ "%s secure token check failed, version mismatch 0x%02x != 0x04\n",
+ __func__, (int) t->version);
 return -EINVAL;
 }
 if (keybitsize > 0 && t->bitsize != keybitsize) {
 DEBUG_ERR(  
- "check_secaeskeytoken secure token check failed, bitsize mismatch %d != %d\n",
- (int) t->bitsize, keybitsize);
+ "%s secure token check failed, bitsize mismatch %d != %d\n",
+ __func__, (int) t->bitsize, keybitsize);
 return -EINVAL;
 }
@@ -270,8 +271,8 @@
   break;
   default:
   DEBUG_ERR(
-   "pkey_genseckey unknown/unsupported keytype %d\n", 
-   -keytype);
   +"%s unknown/unsupported keytype %d\n",
   + __func__, keytype);
   rc = -EINVAL;
   goto out;
   }
@@ -290,15 +291,16 @@
   rc = _zcrypt_send_cprb(&xcrb);
   if (rc) {
   DEBUG_ERR(
-   "pkey_genseckey zcrypt_send_cprb (cardnr=%d domain=%d) failed with errno %d\n",
-   -(int) cardnr, (int) domain, rc);
-   +"%s zcrypt_send_cprb (cardnr=%d domain=%d) failed with errno %d\n",
+   + __func__, (int) cardnr, (int) domain, rc);
   goto out;
   }

   /* check response returncode and reasoncode */
   if (prepcblk->ccp_rtcode != 0) {
       DEBUG_ERR(
-       "pkey_genseckey secure key generate failure, card response %d/%d\n",
-       -(int) prepcblk->ccp_rtcode, (int) prepcblk->ccp_rscode);
+       +__func__, (int) prepcblk->ccp_rtcode,
+       (int) prepcblk->ccp_rscode);
   rc = -EIO;
   @@ -315,8 +317,8 @@
   - sizeof(prepparm->lv3.keyblock.tokattr);
   - seckeysize != SECKEYBLOBSIZE) {
       DEBUG_ERR(
-       "pkey_genseckey secure token size mismatch %d != %d bytes\n",
-       -seckeysize, SECKEYBLOBSIZE);
+       +__func__, seckeysize, SECKEYBLOBSIZE);
   rc = -EIO;
   goto out;
   }
@@ -407,8 +409,8 @@
   break;
   default:
   DEBUG_ERR(
-   "pkey_clr2seckey unknown/unsupported keytype %d\n",
+   "%s unknown/unsupported keytype %d\n",
   + __func__, keytype);
-keytype);
+"%s unknown/unsupported keytype %d\n",
+__func__, keytype);
rc = -EINVAL;
goto out;
}
@@ -427,15 +429,16 @@
rc = _zcrypt_send_cprb(&xcrb);
if (rc) {
    DEBUG_ERR(
-"pkey_clr2seckey zcrypt_send_cprb (cardnr=%d domain=%d) failed with errno %d\n",
-(int) cardnr, (int) domain, rc);
+"%s zcrypt_send_cprb (cardnr=%d domain=%d) failed with errno %d\n",
+__func__, (int) cardnr, (int) domain, rc);
goto out;
}
/* check response returncode and reasoncode */
if (prepcblk->ccp Rtcode != 0) {
    DEBUG_ERR(
-"pkey_clr2seckey clear key import failure, card response %d/%d\n",
-(int) prepcblk->ccp Rtcode,
+"%s clear key import failure, card response %d/%d\n",
+__func__, (int) prepcblk->ccp Rtcode,
    rc = -EIO;
@@ -452,8 +455,8 @@
if (seckeysize != SECKEYBLOBSIZE) {
    DEBUG_ERR(
-"pkey_clr2seckey secure token size mismatch %d != %d bytes\n",
-seckeysize, SECKEYBLOBSIZE);
+"%s secure token size mismatch %d != %d bytes\n",
+__func__, seckeysize, SECKEYBLOBSIZE);
    rc = -EIO;
goto out;
}
@@ -553,15 +556,16 @@
rc = _zcrypt_send_cprb(&xcrb);
if (rc) {
    DEBUG_ERR(
-"pkey_sec2protkey zcrypt_send_cprb (cardnr=%d domain=%d) failed with errno %d\n",
-(int) cardnr, (int) domain, rc);
+"%s zcrypt_send_cprb (cardnr=%d domain=%d) failed with errno %d\n",
+__func__, (int) cardnr, (int) domain, rc);
goto out;
}
/* check response returncode and reasoncode */
if (prepcblk->ccp_rtcde != 0) {
    DEBUG_ERR(
        "pkey_sec2protkey unwrap secure key failure, card response %d/%d\n",
        __func__, (int) prepcblk->ccp_rtcde,
        (int) prepcblk->ccp_rscode);
    rc = -EIO;
@@ -569,7 +573,8 @@
    }
if (prepcblk->ccp_rscode != 0) {
    DEBUG_WARN(
        "pkey_sec2protkey unwrap secure key warning, card response %d/%d\n",
        __func__, (int) prepcblk->ccp_rtcde,
        (int) prepcblk->ccp_rscode);
@@ -581,8 +586,8 @@
/* check the returned keyblock */
if (prepparm->lv3.keyblock.version != 0x01) {
    DEBUG_ERR(
        "pkey_sec2protkey reply param keyblock version mismatch 0x%02x != 0x01\n",
        __func__, (int) prepparm->lv3.keyblock.version);
    rc = -EIO;
    goto out;
@@ -599,8 +604,8 @@
    protkey->type = PKEY_KEYTYPE_AES_256;
    break;
default:
        DEBUG_ERR("pkey_sec2protkey unknown/unsupported keytype %d\n",
            __func__, prepparm->lv3.keyblock.keylen);
        DEBUG_ERR("%s unknown/unsupported keytype %d\n",
            __func__, prepparm->lv3.keyblock.keylen);
    rc = -EIO;
    goto out;
@@ -638,8 +643,8 @@
    fc = CPACF_PCKMO_ENC_AES_256_KEY;
    break;
default:
        DEBUG_ERR("pkey_clr2protkey unknown/unsupported keytype %d\n",
            __func__, keytype);
rc = _zcrypt_send_cprb(&xcrb);
if (rc) {
    DEBUG_ERR(-
    "query_crypto_facility zcrypt_send_cprb (cardnr=%d domain=%d) failed with errno %d\n",
    (int) cardnr, (int) domain, rc);
    goto out;
}
/* check response returncode and reasoncode */
if (prepcblk->ccp_rtcde != 0) {
    DEBUG_ERR(-
    "query_crypto_facility unwrap secure key failure, card response %d/%d\n",
    (int) prepcblk->ccp_rtcde, (int) prepcblk->ccp_rscode);
    rc = -EIO;
}
/* fetch status of all crypto cards */
device_status = kmalloc(MAX_ZDEV_ENTRIES_EXT * sizeof(struct zcrypt_device_status_ext), GFP_KERNEL);
if (!device_status)
    return -ENOMEM;
zcrypt_device_status_mask_ext(device_status);
/* walk through all crypto cards */
for (i = 0; i < MAX_ZDEV_ENTRIES; i++) {
    card = AP_QID_CARD(device_matrix->device[i].qid);
    dom = AP_QID_QUEUE(device_matrix->device[i].qid);
    if (device_matrix->device[i].online &&
        device_matrix->device[i].functions & 0x04) {
        for (i = 0; i < MAX_ZDEV_ENTRIES_EXT; i++) {
            card = AP_QID_CARD(device_status[i].qid);
            dom = AP_QID_QUEUE(device_status[i].qid);
            if (device_status[i].online &&
                device_status[i].functions & 0x04) {
                /* an enabled CCA Coprocessor card */
                /* try cached mkvp */
                if (mkvp_cache_fetch(card, dom, mkvp) == 0 &&
                    mkvp_cache_scrub(card, dom);
            }
        }
    }
    if (i >= MAX_ZDEV_ENTRIES) {
        if (i >= MAX_ZDEV_ENTRIES_EXT) {
            /* nothing found, so this time without cache */
            for (i = 0; i < MAX_ZDEV_ENTRIES; i++) {
                if (!device_matrix->device[i].online &&
                    device_matrix->device[i].functions & 0x04)) {
                    for (i = 0; i < MAX_ZDEV_ENTRIES_EXT; i++) {
                        if (!device_status[i].online &&
                            device_status[i].functions & 0x04)) {
                            continue;
                        }
                    }
                }
    }
    -card = AP_QID_CARD(device_matrix->device[i].qid);
    -dom = AP_QID_QUEUE(device_matrix->device[i].qid);
    +card = AP_QID_CARD(device_status[i].qid);
    +dom = AP_QID_QUEUE(device_status[i].qid);
/* fresh fetch mkvp from adapter */
    if (fetch_mkvp(card, dom, mkvp) == 0) {
        mkvp_cache_update(card, dom, mkvp);
    }
    @ @ -947,13 +954,13 @@
    oi = i;
}
}
-if (i >= MAX_ZDEV_ENTRIES &&& oi >= 0) {
+if (i >= MAX_ZDEV_ENTRIES_EXT &&& oi >= 0) {
    /* old mkvp matched, use this card then */
    -card = AP_QID_CARD(device_matrix->device[oi].qid);
    -dom = AP_QID_QUEUE(device_matrix->device[oi].qid);
    +card = AP_QID_CARD(device_status[oi].qid);
    +dom = AP_QID_QUEUE(device_status[oi].qid);
}
}
-if (i < MAX_ZDEV_ENTRIES || oi >= 0) {
+if (i < MAX_ZDEV_ENTRIES_EXT || oi >= 0) {
if (pcardnr)
 *pcardnr = card;
if (pdomain)
@@ -962,7 +969,7 @@
 } else
 rc = -ENODEV;

-kfree(device_matrix);
+kfree(device_status);
 return rc;
 }
EXPORT_SYMBOL(pkey_findcard);
@@ -992,7 +999,7 @@
 }

if (rc)
 -DEBUG_DBG("pkey_skey2pkey failed rc=%d\n", rc);
 +DEBUG_DBG("%s failed rc=%d\n", __func__, rc);

 return rc;
 }
@@ -1028,8 +1035,8 @@
 rc = mkvp_cache_fetch(cardnr, domain, mkvp);
 if (rc)
 goto out;
-if (t->mkvp == mkvp[1]) {
- DEBUG_DBG("pkey_verifykey secure key has old mkvp\n");
+if (t->mkvp == mkvp[1] && t->mkvp != mkvp[0]) {
 +DEBUG_DBG("%s secure key has old mkvp\n", __func__);
 if (pattributes)
 *pattributes |= PKEY_VERIFY_ATTR_OLD_MKVP;
 }
@@ -1040,7 +1047,7 @@
 *pdomain = domain;

out:
 -DEBUG_DBG("pkey_verifykey rc=%d\n", rc);
 +DEBUG_DBG("%s rc=%d\n", __func__, rc);
 return rc;
 }
EXPORT_SYMBOL(pkey_verifykey);
@@ -1063,7 +1070,7 @@
 return -EFAULT;
rc = pkey_genseckey(kgs.cardnr, kgs.domain,
 kgs.keytype, &kgs.seckey);
-DEBUG_DBG("pkey_ioctl pkey_genseckey()=%d\n", rc);
+DEBUG_DBG("%s pkey_genseckey()=%d\n", __func__, rc);
if (rc)
break;
if (copy_to_user(ugs, &kgs, sizeof(kgs)))
@@ -1078,7 +1085,7 @@
return -EFAULT;
rc = pkey_clr2seckey(kcs.cardnr, kcs.domain, kcs.keytype,
   &kcs.clrkey, &kcs.seckey);
-DEBUG_DBG("pkey_ioctl pkey_clr2seckey()=%d\n", rc);
+DEBUG_DBG("%s pkey_clr2seckey()=%d\n", __func__, rc);
if (rc)
break;
if (copy_to_user(ucs, &kcs, sizeof(kcs)))
@@ -1094,7 +1101,7 @@
return -EFAULT;
rc = pkey_sec2protkey(ksp.cardnr, ksp.domain,
   &ksp.seckey, &ksp.protkey);
-DEBUG_DBG("pkey_ioctl pkey_sec2protkey()=%d\n", rc);
+DEBUG_DBG("%s pkey_sec2protkey()=%d\n", __func__, rc);
if (rc)
break;
if (copy_to_user(ucp, &ksp, sizeof(ksp)))
@@ -1109,7 +1116,7 @@
return -EFAULT;
rc = pkey_clr2protkey(kcp.keytype,
   &kcp.clrkey, &kcp.protkey);
-DEBUG_DBG("pkey_ioctl pkey_clr2protkey()=%d\n", rc);
+DEBUG_DBG("%s pkey_clr2protkey()=%d\n", __func__, rc);
if (rc)
break;
if (copy_to_user(ucp, &ksp, sizeof(ksp)))
@@ -1125,7 +1132,7 @@
return -EFAULT;
rc = pkey_findcard(&kfc.seckey,
   &kfc.cardnr, &kfc.domain, 1);
-DEBUG_DBG("pkey_ioctl pkey_findcard()=%d\n", rc);
+DEBUG_DBG("%s pkey_findcard()=%d\n", __func__, rc);
if (rc)
break;
if (copy_to_user(ufc, &kfc, sizeof(kfc)))
@@ -1139,7 +1146,7 @@
if (copy_from_user(&ksp, usp, sizeof(ksp)))
return -EFAULT;
rc = pkey_skey2pkey(&ksp.seckey, &ksp.protkey);
-DEBUG_DBG("pkey_ioctl pkey_skey2pkey()=%d\n", rc);
+DEBUG_DBG("%s pkey_skey2pkey()=%d\n", __func__, rc);
if (rc)
break;
if (copy_to_user(usp, &ksp, sizeof(ksp)))
@@ -1154,7 +1161,7 @@
 return -EFAULT;

 rc = pkey_verifykey(&kvk.seckey, &kvk.cardnr, &kvk.domain, 
     &kvk.keysize, &kvk.attributes);
-DEBUG_DBG("pkey_ioctl pkey_verifykey()=%d\n", rc);
+DEBUG_DBG("%s pkey_verifykey()=%d\n", __func__, rc);
 if (rc)
     break;
 if (copy_to_user(uvk, &kvk, sizeof(kvk)))
--- linux-4.15.0.orig/drivers/s390/crypto/vfio_ap_drv.c
+++ linux-4.15.0/drivers/s390/crypto/vfio_ap_drv.c
@@ -0,0 +1,183 @@
+// SPDX-License-Identifier: GPL-2.0+
+/*
+ * VFIO based AP device driver
+ *
+ * Copyright IBM Corp. 2018
+ *
+ * Author(s): Tony Krowiak <akrowiak@linux.ibm.com>
+ */
+
+#include <linux/module.h>
+#include <linux/mod_devicetable.h>
+#include <linux/slab.h>
+#include <linux/string.h>
+#include "vfio_ap_private.h"
+
+#define VFIO_AP_ROOT_NAME "vfio_ap"
+#define VFIO_AP_DEV_NAME "matrix"
+
+MODULE_AUTHOR("IBM Corporation");
+MODULE_DESCRIPTION("VFIO AP device driver, Copyright IBM Corp. 2018");
+MODULE_LICENSE("GPL v2");
+
+static struct ap_driver vfio_ap_drv;
+
+struct ap_matrix_dev *matrix_dev;
+
+/* Only type 10 adapters (CEX4 and later) are supported
+ * by the AP matrix device driver
+ */
+static struct ap_device_id ap_queue_ids[] = {
+    { .dev_type = AP_DEVICE_TYPE_CEX4,
+        .match_flags = AP_DEVICE_ID_MATCH_QUEUE_TYPE }
+    { .dev_type = AP_DEVICE_TYPE_CEX5,
+        .match_flags = AP_DEVICE_ID_MATCH_QUEUE_TYPE }
+    { .dev_type = AP_DEVICE_TYPE_CEX6,
+        .match_flags = AP_DEVICE_ID_MATCH_QUEUE_TYPE },
...
+/* end of sibling */ },
+
+MODULE_DEVICE_TABLE(vfio_ap, ap_queue_ids);
+
+static int vfio_ap_queue_dev_probe(struct ap_device *apdev)
+{
+return 0;
+}
+
+static void vfio_ap_queue_dev_remove(struct ap_device *apdev)
+{
+/* Nothing to do yet */
+}
+
+static void vfio_ap_matrix_dev_release(struct device *dev)
+{
+struct ap_matrix_dev *matrix_dev = dev_get_drvdata(dev);
+
+kfree(matrix_dev);
+}
+
+static int matrix_bus_match(struct device *dev, struct device_driver *drv)
+{
+return 1;
+}
+
+static struct bus_type matrix_bus = {
+.name = "matrix",
+.match = &matrix_bus_match,
+};
+
+static struct device_driver matrix_driver = {
+.name = "vfio_ap",
+.bus = &matrix_bus,
+.suppress_bind_attr = true,
+};
+
+static int vfio_ap_matrix_dev_create(void)
+{
+int ret;
+struct device *root_device;
+
+root_device = root_device_register(VFIO_AP_ROOT_NAME);
+if (IS_ERR(root_device))
+return PTR_ERR(root_device);
+
+ret = bus_register(&matrix_bus);
if (ret)
    goto bus_register_err;
+
+matrix_dev = kzalloc(sizeof(*matrix_dev), GFP_KERNEL);
+if (!matrix_dev) {
    ret = -ENOMEM;
    goto matrix_alloc_err;
    +}
+
+/* Fill in config info via PQAP(QCI), if available */
+if (test_facility(12)) {
    ret = ap_qci(&matrix_dev->info);
    if (ret)
        goto matrix_alloc_err;
    +}
+
+mutex_init(&matrix_dev->lock);
+INIT_LIST_HEAD(&matrix_dev->mdev_list);
+
+dev_set_name(&matrix_dev->device, "%s", VFIO_AP_DEV_NAME);
+matrix_dev->device.parent = root_device;
+matrix_dev->device.bus = &matrix_bus;
+matrix_dev->device.release = vfio_ap_matrix_dev_release;
+matrix_dev->vfio_ap_drv = &vfio_ap_drv;
+
+ret = device_register(&matrix_dev->device);
+if (ret)
    goto matrix_reg_err;
+
+driver_register(&matrix_driver);
+if (ret)
    goto matrix_drv_err;
+
+return 0;
+
+matrix_drv_err:
+device_unregister(&matrix_dev->device);
+matrix_reg_err:
+put_device(&matrix_dev->device);
+matrix_alloc_err:
+bus_unregister(&matrix_bus);
+bus_register_err:
+root_device_unregister(root_device);
+return ret;
+}
+
+static void vfio_ap_matrix_dev_destroy(void)
struct device *root_device = matrix_dev->device.parent;
+
driver_unregister(&matrix_driver);
device_unregister(&matrix_dev->device);
bus_unregister(&matrix_bus);
root_device_unregister(root_device);

int __init vfio_ap_init(void)
{
    int ret;
    
    /* If there are no AP instructions, there is nothing to pass through. */
    if (!ap_instructions_available())
        return -ENODEV;
    
    ret = vfio_ap_matrix_dev_create();
    if (ret)
        return ret;
    
    memset(&vfio_ap_drv, 0, sizeof(vfio_ap_drv));
    vfio_ap_drv.probe = vfio_ap_queue_dev_probe;
    vfio_ap_drv.remove = vfio_ap_queue_dev_remove;
    vfio_ap_drv.ids = ap_queue_ids;
    
    ret = ap_driver_register(&vfio_ap_drv, THIS_MODULE, VFIO_AP_DRV_NAME);
    if (ret) {
        vfio_ap_matrix_dev_destroy();
        return ret;
    }
    
    ret = vfio_ap_mdev_register();
    if (ret) {
        ap_driver_unregister(&vfio_ap_drv);
        vfio_ap_matrix_dev_destroy();
    }
    return 0;
}

void __exit vfio_ap_exit(void)
{
    vfio_ap_mdev_unregister();
    ap_driver_unregister(&vfio_ap_drv);
    vfio_ap_matrix_dev_destroy();
}
+module_init(vfio_ap_init);
+module_exit(vfio_ap_exit);
--- linux-4.15.0.orig/drivers/s390/crypto/vfio_ap_ops.c
+++ linux-4.15.0/drivers/s390/crypto/vfio_ap_ops.c
@@ -0,0 +1,939 @@
+// SPDX-License-Identifier: GPL-2.0+
+/#
+ * Adjunct processor matrix VFIO device callbacks.
+ *
+ * Copyright IBM Corp. 2018
+ *
+ * Author(s): Tony Krowiak <akrowiak@linux.ibm.com>
+ * Halil Pasic <pasic@linux.ibm.com>
+ * Pierre Morel <pmorel@linux.ibm.com>
+ */
+#include <linux/string.h>
+#include <linux/vfio.h>
+#include <linux/device.h>
+#include <linux/list.h>
+#include <linux/ctype.h>
+#include <linux/bitops.h>
+#include <linux/kvm_host.h>
+#include <linux/module.h>
+#include <asm/kvm.h>
+#include <asm/zcrypt.h>
+
+#include "vfio_ap_private.h"
+
+#define VFIO_AP_MDEV_TYPE_HWVIRT "passthrough"
+#define VFIO_AP_MDEV_NAME_HWVIRT "VFIO AP Passthrough Device"
+
+static void vfio_ap_matrix_init(struct ap_config_info *info,
+struct ap_matrix *matrix)
+{
+matrix->apm_max = info->apxa ? info->Na : 63;
+matrix->aqm_max = info->apxa ? info->Nd : 15;
+matrix->adm_max = info->apxa ? info->Nd : 15;
+}
+
+static int vfio_ap_mdev_create(struct kobject *kobj, struct mdev_device *mdev)
+{
+struct ap_matrix *matrix_mdev;
+
+if ((atomic_dec_if_positive(&matrix_dev->available_instances) < 0))
+return -EPERM;
+
+matrix_mdev = kzalloc(sizeof(*matrix_mdev), GFP_KERNEL);
+if (!matrix_mdev) {
+atomic_inc(&matrix_dev->available Instances);
+return -ENOMEM;
+}
+
vfio_ap_matrix_init(&matrix_dev->info, &matrix_mdev->matrix);
+mdev_set_drvdata(mdev, matrix_mdev);
+mutex_lock(&matrix_dev->lock);
+list_add(&matrix_mdev->node, &matrix_dev->mdev_list);
+mutex_unlock(&matrix_dev->lock);
+
+return 0;
+}
+
+static int vfio_ap_mdev_remove(struct mdev_device *mdev) {
+struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+
+if (matrix_mdev->kvm)
+return -EBUSY;
+
+mutex_lock(&matrix_dev->lock);
+list_del(&matrix_mdev->node);
+mutex_unlock(&matrix_dev->lock);
+
+kfree(matrix_mdev);
+mdev_set_drvdata(mdev, NULL);
+atomic_inc(&matrix_dev->available_instances);
+
+return 0;
+}
+
+static ssize_t name_show(struct kobject *kobj, struct device *dev, char *buf) {
+return sprintf(buf, "\n", VFIO_AP_MDEV_NAME_HWVIRT);
+}
+
+MDEV_TYPE_ATTR_RO(name);
+
+static ssize_t available_instances_show(struct kobject *kobj, struct device *dev, char *buf) {
+return sprintf(buf, "%d\n", atomic_read(&matrix_dev->available_instances));
+}
+
+MDEV_TYPE_ATTR_RO(available_instances);
static ssize_t device_api_show(struct kobject *kobj, struct device *dev,
    char *buf)
{
    return sprintf(buf, "%s
", VFIO_DEVICE_API_AP_STRING);
}

MDEV_TYPE_ATTR_RO(device_api);

static struct attribute *vfio_ap_mdev_type_attrs[] = {
    &mdev_type_attr_name.attr,
    &mdev_type_attr_device_api.attr,
    &mdev_type_attr_available_instances.attr,
    NULL,
};

static struct attribute_group vfio_ap_mdev_hwvirt_type_group = {
    .name = VFIO_AP_MDEV_TYPE_HWVIRT,
    .attrs = vfio_ap_mdev_type_attrs,
};

static struct attribute_group *vfio_ap_mdev_type_groups[] = {
    &vfio_ap_mdev_hwvirt_type_group,
    NULL,
};

struct vfio_ap_queue_reserved {
    unsigned long *apid;
    unsigned long *apqi;
    bool reserved;
};

/**
 * vfio_ap_has_queue
 *
 * @dev: an AP queue device
 * @data: a struct vfio_ap_queue_reserved reference
 * @
 * Flags whether the AP queue device (@dev) has a queue ID containing the APQN,
 * apid or apqi specified in @data:
 * @
 * - If @data contains both an apid and apqi value, then @data will be flagged
 * as reserved if the APID and APQI fields for the AP queue device matches
 * @
 * - If @data contains only an apid value, @data will be flagged as
 * reserved if the APID field in the AP queue device matches
 * @
 * - If @data contains only an apqi value, @data will be flagged as
 * reserved if the APQI field in the AP queue device matches
 * @
*/
static int vfio_ap_has_queue(struct device *dev, void *data)
{
    struct vfio_ap_queue_reserved *qres = data;
    struct ap_queue *ap_queue = to_ap_queue(dev);
    ap_qid_t qid;
    unsigned long id;

    if (qres->apid && qres->apqi) {
        qid = AP_MKQID(*qres->apid, *qres->apqi);
        if (qid == ap_queue->qid)
            qres->reserved = true;
    } else if (qres->apid && !qres->apqi) {
        id = AP_QID_CARD(ap_queue->qid);
        if (id == *qres->apid)
            qres->reserved = true;
    } else if (!qres->apid && qres->apqi) {
        id = AP_QID_QUEUE(ap_queue->qid);
        if (id == *qres->apqi)
            qres->reserved = true;
    } else {
        return -EINVAL;
    }

    return 0;
}

/**
 * vfio_ap_verify_queue_reserved
 *
 * @matrix_dev: a mediated matrix device
 * @apid: an AP adapter ID
 * @apqi: an AP queue index
 *
 * Verifies that the AP queue with @apid/@apqi is reserved by the VFIO AP device
 * driver according to the following rules:
 *
 * - If both @apid and @apqi are not NULL, then there must be an AP queue
 *   device bound to the vfio_ap driver with the APQN identified by @apid and
 *   @apqi
 *
 * - If only @apid is not NULL, then there must be an AP queue device bound
 *   to the vfio_ap driver with an APQN containing @apid
 *
 * - If only @apqi is not NULL, then there must be an AP queue device bound
 */
+ * to the vfio_ap driver with an APQN containing @apqi
+ *
+ * Returns 0 if the AP queue is reserved; otherwise, returns -EADDRNOTAVAIL.
+ */
+static int vfio_ap_verify_queue_reserved(unsigned long *apid,
+     unsigned long *apqi)
+{
+    int ret;
+    struct vfio_ap_queue_reserved qres;
+    qres.apid = apid;
+    qres.apqi = apqi;
+    qres.reserved = false;
+    ret = driver_for_each_device(&matrix_dev->vfio_ap_drv->driver, NULL,
+       &qres, vfio_ap_has_queue);
+    if (ret)
+        return ret;
+    if (qres.reserved)
+        return 0;
+    return -EADDRNOTAVAIL;
+}
+
+static int
+vfio_ap_mdev_verify_queues_reserved_for_apid(struct ap_matrix_mdev *matrix_mdev,
+                                               unsigned long apid)
+{
+    int ret;
+    unsigned long apqi;
+    unsigned long nbits = matrix_mdev->matrix.aqm_max + 1;
+    if (find_first_bit_inv(matrix_mdev->matrix.aqm, nbits) >= nbits)
+        return vfio_ap_verify_queue_reserved(&apid, NULL);
+    for_each_set_bit_inv(apqi, matrix_mdev->matrix.aqm, nbits) {
+        ret = vfio_ap_verify_queue_reserved(&apid, &apqi);
+        if (ret)
+            return ret;
+    }
+    return 0;
+}
+/**
+ * vfio_ap_mdev_verify_no_sharing
+ */
Verifies that the APQNs derived from the cross product of the AP adapter IDs and AP queue indexes comprising the AP matrix are not configured for another mediated device. AP queue sharing is not allowed.

@matrix_mdev: the mediated matrix device

Returns 0 if the APQNs are not shared, otherwise; returns -EADDRINUSE.

static int vfio_ap_mdev_verify_no_sharing(struct ap_matrix_mdev *matrix_mdev)
{
    struct ap_matrix_mdev *lstdev;
    DECLARE_BITMAP(apm, AP_DEVICES);
    DECLARE_BITMAP(aqm, AP_DOMAINS);
    
    list_for_each_entry(lstdev, &matrix_dev->mdev_list, node) {
        if (matrix_mdev == lstdev)
            continue;

        memset(apm, 0, sizeof(apm));
        memset(aqm, 0, sizeof(aqm));
        
        /*
         * We work on full longs, as we can only exclude the leftover
         * bits in non-inverse order. The leftover is all zeros.
         */
        if (!bitmap_and(apm, matrix_mdev->matrix.apm,
                        lstdev->matrix.apm, AP_DEVICES))
            continue;

        if (!bitmap_and(aqm, matrix_mdev->matrix.aqm,
                        lstdev->matrix.aqm, AP_DOMAINS))
            continue;

        return -EADDRINUSE;
    }

    return 0;
}
+ * Parses the APID from @buf and sets the corresponding bit in the mediated
+ * matrix device's APM.
+ *
+ * Returns the number of bytes processed if the APID is valid; otherwise,
+ * returns one of the following errors:
+ *
+ * 1. -EINVAL
+ *   The APID is not a valid number
+ *
+ * 2. -ENODEV
+ *   The APID exceeds the maximum value configured for the system
+ *
+ * 3. -EADDRNOTAVAIL
+ *   An APQN derived from the cross product of the APID being assigned
+ *   and the APQIs previously assigned is not bound to the vfio_ap device
+ *   driver; or, if no APQIs have yet been assigned, the APID is not
+ *   contained in an APQN bound to the vfio_ap device driver.
+ *
+ * 4. -EADDRINUSE
+ *   An APQN derived from the cross product of the APID being assigned
+ *   and the APQIs previously assigned is being used by another mediated
+ *   matrix device
+ */
static ssize_t assign_adapter_store(struct device *dev,
    struct device_attribute *attr,
    const char *buf, size_t count)
{
    int ret;
    unsigned long apid;
    struct mdev_device *mdev = mdev_from_dev(dev);
    struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);

    /* If the guest is running, disallow assignment of adapter */
    if (matrix_mdev->kvm)
        return -EBUSY;

    ret = kstrtoul(buf, 0, &apid);
    if (ret)
        return ret;

    if (apid > matrix_mdev->matrix.apm_max)
        return -ENODEV;

    /* Set the bit in the AP mask (APM) corresponding to the AP adapter
    * number (APID). The bits in the mask, from most significant to least
    * significant bit, correspond to APIDs 0-255.
    */
    +
+/
}
mutex_lock(&matrix_dev->lock);
+
+ret = vfio_ap_mdev_verify_queues_reserved_for_apid(matrix_mdev, apid);
+if (ret)
+goto done;
+
+set_bit_inv(apid, matrix_mdev->matrix.apm);
+
+ret = vfio_ap_mdev_verify_no_sharing(matrix_mdev);
+if (ret)
+goto share_err;
+
+ret = count;
+goto done;
+
+share_err:
+clear_bit_inv(apid, matrix_mdev->matrix.apm);
+done:
+mutex_unlock(&matrix_dev->lock);
+
+return ret;
+
static DEVICE_ATTR_WO(assign_adapter);
+
/**
 * unassign_adapter_store
 *
 * @dev: the matrix device
 * @attr: the mediated matrix device's unassign_adapter attribute
 * @buf: a buffer containing the adapter number (APID) to be unassigned
 * @count: the number of bytes in @buf
 *
 * Parses the APID from @buf and clears the corresponding bit in the mediated
 * matrix device's APM.
 * *
 * Returns the number of bytes processed if the APID is valid; otherwise,
 * returns one of the following errors:
 * -EINVAL if the APID is not a number
 * -ENODEV if the APID it exceeds the maximum value configured for the
 *   system
 * */
+static ssize_t unassign_adapter_store(struct device *dev,
+    struct device_attribute *attr,
+    const char *buf, size_t count)
+{
+    int ret;
+    unsigned long apid;
+    struct mdev_device *mdev = mdev_from_dev(dev);
+struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+
+/* If the guest is running, disallow un-assignment of adapter */
+if (matrix_mdev->kvm)
+return -EBUSY;
+
+ret = kstrtooul(buf, 0, &apid);
+if (ret)
+return ret;
+
+if (apid > matrix_mdev->matrix.apm_max)
+return -ENODEV;
+
+mutex_lock(&matrix_dev->lock);
+clear_bit_inv((unsigned long)apid, matrix_mdev->matrix.apm);
+mutex_unlock(&matrix_dev->lock);
+
+return count;
+
+DEVICE_ATTR_WO(unassign_adapter);
+
+static int
+vfio_ap_mdev_verify_queues_reserved_for_apqi(struct ap_matrix_mdev *matrix_mdev,
+    unsigned long apqi)
+{
+    int ret;
+    unsigned long apid;
+    unsigned long nbits = matrix_mdev->matrix.apm_max + 1;
+    
+    if (find_first_bit_inv(matrix_mdev->matrix.apm, nbits) >= nbits)
+        return vfio_ap_verify_queueReserved(NULL, &apqi);
+    
+    for_each_set_bit_inv(apid, matrix_mdev->matrix.apm, nbits) {
+        ret = vfio_ap_verify_queueReserved(&apid, &apqi);
+        if (ret)
+            return ret;
+    }
+    
+    return 0;
+}
+
+/**
+ * assign_domain_store
+ *
+ * @dev: the matrix device
+ * @attr: the mediated matrix device's assign_domain attribute
+ * @buf: a buffer containing the AP queue index (APQI) of the domain to
+ * be assigned
+
static ssize_t assign_domain_store(struct device *dev,  
    struct device_attribute *attr, const char *buf, size_t count)  
{
    int ret;
    unsigned long apqi;
    struct mdev_device *mdev = mdev_from_dev(dev);
    struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
    unsigned long max_apqi = matrix_mdev->matrix.aqm_max;

    /* If the guest is running, disallow assignment of domain */
    if (matrix_mdev->kvm)
        return -EBUSY;

    ret = kstrtoul(buf, 0, &apqi);
    if (ret)
        return ret;
    if (apqi > max_apqi)
        return -ENODEV;

    mutex_lock(&matrix_dev->lock);
    if (vfio_ap_mdev_verify_queues_reserved_for_apqi(matrix_mdev, apqi)  
        return -ENOMEM;
    }
}
+if (ret)
+goto done;
+
+set_bit_inv(apqi, matrix_mdev->matrix.aqm);
+
+ret = vfio_ap_mdev_verify_no_sharing(matrix_mdev);
+if (ret)
+goto share_err;
+
+ret = count;
+goto done;
+
+share_err:
+clear_bit_inv(apqi, matrix_mdev->matrix.aqm);
+done:
+mutex_unlock(&matrix_dev->lock);
+
+return ret;
+
+DEVICE_ATTR_WO(assign_domain);
+
+/**
+ * unassign_domain_store
+ *
+ * @dev: the matrix device
+ * @attr: the mediated matrix device’s unassign_domain attribute
+ * @buf: a buffer containing the AP queue index (APQI) of the domain to
+ * be unassigned
+ * @count: the number of bytes in @buf
+ *
+ * Parses the APQI from @buf and clears the corresponding bit in the
+ * mediated matrix device’s AQM.
+ *
+ * Returns the number of bytes processed if the APQI is valid; otherwise,
+ * returns one of the following errors:
+ * -EINVAL if the APQI is not a number
+ * -ENODEV if the APQI exceeds the maximum value configured for the system
+ */
+static ssize_t unassign_domain_store(struct device *dev,
+    struct device_attribute *attr,
+    const char *buf, size_t count)
+{
+    ret;
+    unsigned long apqi;
+    struct mdev_device *mdev = mdev_from_dev(dev);
+    struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+    +struct mdev_device *mdev = mdev_from_dev(dev);
+    +struct ap_matrix_mdev *matrix_mdev = mdev_get_drvddata(mdev);
/* If the guest is running, disallow un-assignment of domain */
+if (matrix_mdev->kvm)
+return -EBUSY;
+
+ret = kstrtoul(buf, 0, &apqi);
+if (ret)
+return ret;
+
+if (apqi > matrix_mdev->matrix.aqm_max)
+return -ENODEV;
+
+mutex_lock(&matrix_dev->lock);
+clear_bit_inv((unsigned long)apqi, matrix_mdev->matrix.aqm);
+mutex_unlock(&matrix_dev->lock);
+
+return count;
+
+DEVICE_ATTR_WO(unassign_domain);
+
+/**
+ * assign_control_domain_store
+ * @dev: the matrix device
+ * @attr: the mediated matrix device's assign_control_domain attribute
+ * @buf: a buffer containing the domain ID to be assigned
+ * @count: the number of bytes in @buf
+ *
+ * Parses the domain ID from @buf and sets the corresponding bit in the mediated
+ * matrix device's ADM.
+ *
+ * Returns the number of bytes processed if the domain ID is valid; otherwise,
+ * returns one of the following errors:
+ * -EINVAL if the ID is not a number
+ * -ENODEV if the ID exceeds the maximum value configured for the system
+ */
+static ssize_t assign_control_domain_store(struct device *dev,
+    struct device_attribute *attr,
+    const char *buf, size_t count)
+{
+    int ret;
+    unsigned long id;
+    struct mdev_device *mdev = mdev_from_dev(dev);
+    struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+
+    /* If the guest is running, disallow assignment of control domain */
+    if (matrix_mdev->kvm)
+        return -EBUSY;
+    
+    /* If the guest is running, disallow un-assignment of domain */
+    if (matrix_mdev->kvm)
+        return -EBUSY;
+    
+    ret = kstrtoul(buf, 0, &apqi);
+    if (ret)
+        return ret;
+
+    if (apqi > matrix_mdev->matrix.aqm_max)
+        return -ENODEV;
+
+    mutex_lock(&matrix_dev->lock);
+    clear_bit_inv((unsigned long)apqi, matrix_mdev->matrix.aqm);
+    mutex_unlock(&matrix_dev->lock);
+
+    return count;
+}
+ret = kstrtoul(buf, 0, &id);
+if (ret)
+return ret;
+
+if (id > matrix_mdev->matrix.adm_max)
+return -ENODEV;
+
+/* Set the bit in the ADM (bitmask) corresponding to the AP control
+ * domain number (id). The bits in the mask, from most significant to
+ * least significant, correspond to IDs 0 up to the one less than the
+ * number of control domains that can be assigned.
+ */
+mutex_lock(&matrix_dev->lock);
+set_bit_inv(id, matrix_mdev->matrix.adm);
+mutex_unlock(&matrix_dev->lock);
+
+return count;
+}
+DEVICE_ATTR_WO(assign_control_domain);
+
+/**
+ * unassign_control_domain_store
+ *
+ * @dev:	the matrix device
+ * @attr:	the mediated matrix device's unassign_control_domain attribute
+ * @buf:	a buffer containing the domain ID to be unassigned
+ * @count:	the number of bytes in @buf
+ *
+ * Parses the domain ID from @buf and clears the corresponding bit in the
+ * mediated matrix device's ADM.
+ *
+ * Returns the number of bytes processed if the domain ID is valid; otherwise,
+ * returns one of the following errors:
+ * -EINVAL if the ID is not a number
+ * -ENODEV if the ID exceeds the maximum value configured for the system
+ */
+static ssize_t unassign_control_domain_store(struct device *dev,
+struct device_attribute *attr,
+const char *buf, size_t count)
+{
+int ret;
+unsigned long domid;
+struct mdev_device *mdev = mdev_from_dev(dev);
+struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+unsigned long max_domid = matrix_mdev->matrix.adm_max;
+
+/* If the guest is running, disallow un-assignment of control domain */
+if (matrix_mdev->kvm)
return -EBUSY;
+
ret = kstrtoul(buf, 0, &domid);
+if (ret)
+return ret;
+if (domid > max_domid)
+return -ENODEV;
+
mutex_lock(&matrix_dev->lock);
+clear_bit_inv(domid, matrix_mdev->matrix.adm);
+mutex_unlock(&matrix_dev->lock);
+
return count;
+
DEVICE_ATTR_WO(unassign_control_domain);
+
static ssize_t control_domains_show(struct device *dev,
    struct device_attribute *dev_attr,
    char *buf)
{
unsigned long id;
int nchars = 0;
int n;
char *bufpos = buf;
+struct mdev_device *mdev = mdev_from_dev(dev);
+struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+unsigned long max_domid = matrix_mdev->matrix.adm_max;
+
mutex_lock(&matrix_dev->lock);
+for_each_set_bit_inv(id, matrix_mdev->matrix.adm, max_domid + 1) {
    n = sprintf(bufpos, "%04lx\n", id);
    bufpos += n;
    nchars += n;
}
+mutex_unlock(&matrix_dev->lock);
+
return nchars;
+
DEVICE_ATTR_RO(control_domains);
+
static ssize_t matrix_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
+struct mdev_device *mdev = mdev_from_dev(dev);
+struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+unsigned long max_domid = matrix_mdev->matrix.adm_max;

unsigned long apid;
unsigned long apqi;
unsigned long apid1;
unsigned long apqi1;
unsigned long napm_bits = matrix_mdev->matrix.apm_max + 1;
unsigned long naqm_bits = matrix_mdev->matrix.aqm_max + 1;
int nchars = 0;

unsigned long apid1 = find_first_bit_inv(matrix_mdev->matrix.apm, napm_bits);
unsigned long apqi1 = find_first_bit_inv(matrix_mdev->matrix.aqm, naqm_bits);

mutex_lock(&matrix_dev->lock);

if ((apid1 < napm_bits) && (apqi1 < naqm_bits)) {
    for_each_set_bit_inv(apid, matrix_mdev->matrix.apm, napm_bits) {
        for_each_set_bit_inv(apqi, matrix_mdev->matrix.aqm, naqm_bits) {
            n = sprintf(bufpos, "%02lx.%04lx\n", apid, apqi);
            bufpos += n;
            nchars += n;
        }
    }
} else if (apid1 < napm_bits) {
    for_each_set_bit_inv(apid, matrix_mdev->matrix.apm, napm_bits) {
        n = sprintf(bufpos, "%02lx\n", apid);
        bufpos += n;
        nchars += n;
    }
} else if (apqi1 < naqm_bits) {
    for_each_set_bit_inv(apqi, matrix_mdev->matrix.aqm, naqm_bits) {
        n = sprintf(bufpos, ".%04lx\n", apqi);
        bufpos += n;
        nchars += n;
    }
}

mutex_unlock(&matrix_dev->lock);

return nchars;

DEVICE_ATTR_RO(matrix);

static struct attribute *vfio_ap_mdev_attrs[] = {
    &dev_attr_assign_adapter.attr,
    &dev_attr_unassign_adapter.attr,
    &dev_attr_assign_domain.attr,
    &dev_attr_unassign_domain.attr,
    &dev_attr_assign_control_domain.attr,
    &dev_attr_unassign_control_domain.attr,
&dev_attr_unassign_control_domain.attr,
&dev_attr_control_domains.attr,
&dev_attr_matrix.attr,
+NULL,
+};
+
+static struct attribute_group vfio_ap_mdev_attr_group = {
+.attrs = vfio_ap_mdev_attr
+};
+
+static const struct attribute_group *vfio_ap_mdev_attr_groups[] = {
+&vfio_ap_mdev_attr_group,
+NULL
+};
+
+/**
+ * vfio_ap_mdev_set_kvm
+ *
+ * @matrix_mdev: a mediated matrix device
+ * @kvm: reference to KVM instance
+ *
+ * Verifies no other mediated matrix device has @kvm and sets a reference to
+ * it in @matrix_mdev->kvm.
+ *
+ * Return 0 if no other mediated matrix device has a reference to @kvm;
+ * otherwise, returns an -EPERM.
+ */
+static int vfio_ap_mdev_set_kvm(struct ap_matrix_mdev *matrix_mdev,
+struct kvm *kvm)
+{
+struct ap_matrix_mdev *m;
+
+mutex_lock(&matrix_dev->lock);
+
+list_for_each_entry(m, &matrix_dev->mdev_list, node) {
+if ((m != matrix_mdev) && (m->kvm == kvm)) {
+mutex_unlock(&matrix_dev->lock);
+return -EPERM;
+}
+}
+
+matrix_mdev->kvm = kvm;
+mutex_unlock(&matrix_dev->lock);
+
+return 0;
+}
+
+static int vfio_ap_mdev_group_notifier(struct notifier_block *nb,
unsigned long action, void *data)
+
+int ret;
+struct ap_matrix_mdev *matrix_mdev;
+
+if (action != VFIO_GROUP_NOTIFY_SET_KVM)
+return NOTIFY_OK;
+
+matrix_mdev = container_of(nb, struct ap_matrix_mdev, group_notifier);
+
+if (!data) {
+matrix_mdev->kvm = NULL;
+return NOTIFY_OK;
+
+ret = vfio_ap_mdev_set_kvm(matrix_mdev, data);
+if (ret)
+return NOTIFY_DONE;
+
+/* If there is no CRYCB pointer, then we can't copy the masks */
+if (!matrix_mdev->kvm->arch.crypto.crycbd)
+return NOTIFY_DONE;
+
+kvm_arch_crypto_set_masks(matrix_mdev->kvm, matrix_mdev->matrix.apm,
+matrix_mdev->matrix.aqm,
+matrix_mdev->matrix.adm);
+
+return NOTIFY_OK;
+
+
+static int vfio_ap_mdev_reset_queue(unsigned int apid, unsigned int apqi,
+
+unsigned int retry)
+
+{ struct ap_queue_status status;
+
+do {
+status = ap_zapq(AP_MKQID(apid, apqi));
+switch (status.response_code) {
+case AP_RESPONSE_NORMAL:
+return 0;
+case AP_RESPONSE_RESET_IN_PROGRESS:
+case AP_RESPONSE_BUSY:
+msleep(20);
+break;
+default:
+/* things are really broken, give up */
+return -EIO;
+
+}
+} while (retry--);
+
+return -EBUSY;
+
+static int vfio_ap_mdev_reset_queues(struct mdev_device *mdev)
+{
+    int ret;
+    int rc = 0;
+    unsigned long apid, apqi;
+    struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+
+    for_each_set_bit_inv(apid, matrix_mdev->matrix.apm,
+        matrix_mdev->matrix.apm_max + 1) {
+        for_each_set_bit_inv(apqi, matrix_mdev->matrix.aqm,
+            matrix_mdev->matrix.aqm_max + 1) {
+            ret = vfio_ap_mdev_reset_queue(apid, apqi, 1);
+            /*
+             * Regardless whether a queue turns out to be busy, or
+             * is not operational, we need to continue resetting
+             * the remaining queues.
+             */
+            if (ret)
+                rc = ret;
+        }
+    }
+
+    return rc;
+
+static int vfio_ap_mdev_open(struct mdev_device *mdev)
+{
+    struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+    unsigned long events;
+
+    if (!try_module_get(THIS_MODULE))
+        return -ENODEV;
+
+    matrix_mdev->group_notifier.notifier_call = vfio_ap_mdev_group_notifier;
+    events = VFIO_GROUP_NOTIFY_SET_KVM;
+
+    ret = vfio_register_notifier(mdev_dev(mdev), VFIO_GROUP_NOTIFY,
+        &events, &matrix_mdev->group_notifier);
+    if (ret) {
+        module_put(THIS_MODULE);
+        return ret;
+    }
+}
+}
+
+return 0;
+
+}
+
+static void vfio_ap_mdev_release(struct mdev_device *mdev)
+{
+struct ap_matrix_mdev *matrix_mdev = mdev_get_drvdata(mdev);
+
+if (matrix_mdev->kvm)
+kvm_arch_crypto_clear_masks(matrix_mdev->kvm);
+
+vfio_ap_mdev_reset_queues(mdev);
+vfio_unregister_notifier(mdev_dev(mdev), VFIO_GROUP_NOTIFY,
+ &matrix_mdev->group_notifier);
+matrix_mdev->kvm = NULL;
+module_put(THIS_MODULE);
+}
+
+static int vfio_ap_mdev_get_device_info(unsigned long arg)
+{
+unsigned long minsz;
+struct vfio_device_info info;
+
+minsiz = offsetofend(struct vfio_device_info, num_irqs);
+
+if (copy_from_user(&info, (void __user *)arg, minsiz))
+return -EFAULT;
+
+if (info.arsiz < minsiz)
+return -EINVAL;
+
+info.flags = VFIO_DEVICE_FLAGS_AP | VFIO_DEVICE_FLAGS_RESET;
+info.num_regions = 0;
+info.num_irqs = 0;
+
+return copy_to_user((void __user *)arg, &info, minsiz);
+}
+
+static ssize_t vfio_ap_mdev_ioctl(struct mdev_device *mdev,
+ unsigned int cmd, unsigned long arg)
+{
+int ret;
+
+switch (cmd) {
+case VFIO_DEVICE_GET_INFO:
+ret = vfio_ap_mdev_get_device_info(arg);
+break;
case VFIO_DEVICE_RESET:
    ret = vfio_ap_mdev_reset_queues(mdev);
    break;
default:
    ret = -EOPNOTSUPP;
    break;
}
+
+return ret;
+
+static const struct mdev_parent_ops vfio_ap_matrix_ops = {
    .owner = THIS_MODULE,
    .supported_type_groups = vfio_ap_mdev_type_groups,
    .mdev_attr_groups = vfio_ap_mdev_attr_groups,
    .create = vfio_ap_mdev_create,
    .remove = vfio_ap_mdev_remove,
    .open = vfio_ap_mdev_open,
    .release = vfio_ap_mdev_release,
    .ioctl = vfio_ap_mdev_ioctl,
};
+
+int vfio_ap_mdev_register(void)
+{
    atomic_set(&matrix_dev->available_instances, MAX_ZDEV_ENTRIES_EXT);
    +
    return mdev_register_device(&matrix_dev->device, &vfio_ap_matrix_ops);
+}
+
+void vfio_ap_mdev_unregister(void)
+{
    mdev_unregister_device(&matrix_dev->device);
}
+ #include <linux/types.h>
+ #include <linux/device.h>
+ #include <linux/mdev.h>
+ #include <linux/delay.h>
+ #include <linux/mutex.h>
+
+ #include "ap_bus.h"
+
+ #define VFIO_AP_MODULE_NAME "vfio_ap"
+#define VFIO_AP_DRV_NAME "vfio_ap"
+
+/**
 + * ap_matrix_dev - the AP matrix device structure
 + * @device: generic device structure associated with the AP matrix device
 + * @available_instances: number of mediated matrix devices that can be created
 + * @info: the struct containing the output from the PQAP(QCI) instruction
 + * @mdev_list: the list of mediated matrix devices created
 + * @lock: mutex for locking the AP matrix device. This lock will be
 + * taken every time we fiddle with state managed by the vfio_ap
 + * driver, be it using @mdev_list or writing the state of a
 + * single ap_matrix_mdev device. It's quite coarse but we don't
 + * expect much contention.
 + */
+struct ap_matrix_dev {
+struct device device;
+atomic_t available_instances;
+struct ap_config_info info;
+struct list_head mdev_list;
+struct mutex lock;
+struct ap_driver  *vfio_ap_drv;
+};
+
+extern struct ap_matrix_dev *matrix_dev;
+
+/**
 + * The AP matrix is comprised of three bit masks identifying the adapters,
 + * queues (domains) and control domains that belong to an AP matrix. The bits i
 + * each mask, from least significant to most significant bit, correspond to IDs
 + * 0 to 255. When a bit is set, the corresponding ID belongs to the matrix.
 + */
+* @apm_max: max adapter number in @apm
+* @apm identifies the AP adapters in the matrix
+* @aqm_max: max domain number in @aqm
+* @aqm identifies the AP queues (domains) in the matrix
+* @adm_max: max domain number in @adm
+* @adm identifies the AP control domains in the matrix
+*/
+struct ap_matrix {
+unsigned long apm_max;
+DECLARE_BITMAP(apm, 256);
+unsigned long aqm_max;
+DECLARE_BITMAP(aqm, 256);
+unsigned long adm_max;
+DECLARE_BITMAP(adm, 256);
+};
+
+/**
+ * struct ap_matrix_mdev - the mediated matrix device structure
+ * @list: allows the ap_matrix_mdev struct to be added to a list
+ * @matrix: the adapters, usage domains and control domains assigned to the
+ *  mediated matrix device.
+ * @group_notifier: notifier block used for specifying callback function for
+ *  handling the VFIO_GROUP_NOTIFY_SET_KVM event
+ * @kvm: the struct holding guest's state
+ */
+struct ap_matrix_mdev {
+struct list_head node;
+struct ap_matrix matrix;
+struct notifier_block group_notifier;
+struct kvm *kvm;
+};
+
+extern int vfio_ap_mdev_register(void);
+extern void vfio_ap_mdev_unregister(void);
+
+﻿#endif /* _VFIO_AP_PRIVATE_H_ */
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_api.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_api.c
@@ -18,8 +18,6 @@
 #include <linux/interrupt.h>
 #include <linux/miscdevice.h>
 #include <linux/compat.h>
-#include <linux/proc_fs.h>
-#include <linux/seq_file.h>
 #include <linux/atomic.h>
 #include <linux/slab.h>
 EXPORT_TRACEPOINT_SYMBOL(s390_zcrypt_rep);

 static int zcrypt_hwrng_seed = 1;
-module_param_named(hwrng_seed, zcrypt_hwrng_seed, int, S_IRUSR|S_IXGRP);
+module_param_named(hwrng_seed, zcrypt_hwrng_seed, int, 0440);

 MODULE_PARM_DESC(hwrng_seed, "Turn on/off hwrng auto seed, default is 1 (on)."
DEFINE_SPINLOCK(zcrypt_list_lock);
@@ -184,21 +182,23 @@
static inline bool zcrypt_card_compare(struct zcrypt_card *zc,
    struct zcrypt_card *pref_zc,
-    unsigned weight, unsigned pref_weight)
+    unsigned int weight,
+    unsigned int pref_weight)
{
    if (!pref_zc)
        return false;
    weight += atomic_read(&zc->load);
    pref_weight += atomic_read(&pref_zc->load);
    if (weight == pref_weight)
-        return atomic_read(&zc->card->total_request_count) >
-                           atomic_read(&pref_zc->card->total_request_count);
+        return atomic64_read(&zc->card->total_request_count) >
+                               atomic64_read(&pref_zc->card->total_request_count);
    return weight > pref_weight;
}

static inline bool zcrypt_queue_compare(struct zcrypt_queue *zq,
    struct zcrypt_queue *pref_zq,
-    unsigned weight, unsigned pref_weight)
+    unsigned int weight,
+    unsigned int pref_weight)
{
    if (!pref_zq)
        return false;
@@ -224,6 +224,7 @@
    trace_s390_zcrypt_req(mex, TP_ICARSAMODEXPO);

    if (mex->outputdatalength < mex->inputdatalength) {
+        func_code = 0;
        rc = -EINVAL;
        goto out;
    }
@@ -298,6 +299,7 @@
    trace_s390_zcrypt_req(crt, TP_ICARSACRT);

    if (crt->outputdatalength < crt->inputdatalength) {
+        func_code = 0;
        rc = -EINVAL;
        goto out;
    }
@@ -368,15 +370,27 @@
    struct ap_message ap_msg;
    unsigned int weight, pref_weight;
unsigned int func_code;
-unsigned short *domain;
+unsigned short *domain, tdom;
int qid = 0, rc = -ENODEV;

trace_s390_zcrypt_req(xcRB, TB_ZSECSENDPRB);

+ap_init_message(&ap_msg);
rc = get_cprb_fc(xcRB, &ap_msg, &func_code, &domain);
if (rc)
goto out;

+/*
+ * If a valid target domain is set and this domain is NOT a usage
+ * domain but a control only domain, use the default domain as target.
+ */
+tdom = *domain;
+if (tdom >= 0 && tdom < AP_DOMAINS &&
+    !ap_test_config_usage_domain(tdom) &&
+    ap_test_config_ctrl_domain(tdom) &&
+    ap_domain_index >= 0)
+tdom = ap_domain_index;
+
+pref_zc = NULL;
+pref_zq = NULL;
spin_lock(&zcrypt_list_lock);
@@ -396,8 +410,8 @@
/* check if device is online and eligible */
if (!zq->online ||
    !(zq->ops->send_cprb ||
    - ((*domain != (unsigned short) AUTOSELECT) &&
    - (*domain != AP_QID_QUEUE(zq->queue->qid))))
+    (tdom != (unsigned short) AUTOSELECT &&
+    tdom != AP_QIDQUEUE(zq->queue->qid)))
continue;
if (zcrypt_queue_compare(zq, pref_zq,
    weight, pref_weight))
@@ -427,6 +441,7 @@
spin_unlock(&zcrypt_list_lock);

out:
+ap_release_message(&ap_msg);
trace_s390_zcrypt_rep(xcRB, func_code, rc,
   AP_QID_CARD(qid), AP_QID_QUEUE(qid));
return rc;
@@ -470,6 +485,8 @@

trace_s390_zcrypt_req(xcrb, TP_ZSENDEP11CPRB);
tap_init_message(&ap_msg);
+
target_num = (unsigned short) xcrb->targets_num;

/* empty list indicates autoselect (all available targets) */
@@ -479,6 +496,7 @@
targets = kcalloc(target_num, sizeof(*targets), GFP_KERNEL);
if (!targets) {
    +func_code = 0;
    rc = -ENOMEM;
    goto out;
}  
@@ -486,8 +504,9 @@
    uptr = (struct ep11_target_dev __force __user *) xcrb->targets;
    if (copy_from_user(targets, uptr, target_num * sizeof(*targets))) {
        +func_code = 0;
        rc = -EFAULT;
        -goto out;
        +goto out_free;
    }
}  
@@ -544,6 +563,7 @@
    out_free:
    kfree(targets);
    out:
    +ap_release_message(&ap_msg);
    trace_s390_zcrypt_rep(xcrb, func_code, rc,
        AP_QID_CARD(qid), AP_QID_QUEUE(qid));
    return rc;
@@ -561,8 +612,10 @@
    trace_s390_zcrypt_req(buffer, TP_HWRNGCPRB);

    +ap_init_message(&ap_msg);
    rc = get_rng_fc(&ap_msg, &func_code, &domain);
    if (rc)
        goto out;
@@ -591,8 +612,10 @@
    pref_zq = zcrypt_pick_queue(pref_zc, pref_zq, weight);
    spin_unlock(&zcrypt_list_lock);
    -if (!pref_zq)
    -return -ENODEV;
    +if (!pref_zq) {


```c
+rc = -ENODEV;
+goto out;
+
qid = pref_zq->queue->qid;
rc = pref_zq->ops->rng(pref_zq, buffer, &ap_msg);
@@ -602,24 +625,30 @@
    spin_unlock(&zcrypt_list_lock);

out:
+ap_release_message(&ap_msg);
trace_s390_zcrypt_rep(buffer, func_code, rc,
    AP_QID_CARD(qid), AP_QID_QUEUE(qid));
return rc;
}

-void zcrypt_device_status_mask(struct zcrypt_device_matrix *matrix)
+static void zcrypt_device_status_mask(struct zcrypt_device_status *devstatus)
{
    struct zcrypt_card *zc;
    struct zcrypt_queue *zq;
    struct zcrypt_device_status *stat;
+    int card, queue;
+    
+    memset(devstatus, 0, MAX_ZDEV_ENTRIES
+        * sizeof(struct zcrypt_device_status));
+    
    memset(matrix, 0, sizeof(*matrix));
spin_lock(&zcrypt_list_lock);
for_each_zcrypt_card(zc) {
    for_each_zcrypt_queue(zq, zc) {
        -stat = matrix->device;
        -stat += AP_QID_CARD(zq->queue->qid) * MAX_ZDEV_DOMAINS;
        -stat += AP_QID_QUEUE(zq->queue->qid);
        +card = AP_QID_CARD(zq->queue->qid);
        +queue = AP_QID_QUEUE(zq->queue->qid);
        +stat = &devstatus[card * AP_DOMAINS + queue];
        stat->hwtype = zc->card->ap_dev.device_type;
        stat->functions = zc->card->functions >> 26;
        stat->qid = zq->queue->qid;
    }
    spin_unlock(&zcrypt_list_lock);
}
-EXPORT_SYMBOL(zcrypt_device_status_mask);
```

+void zcrypt_device_status_mask_ext(struct zcrypt_device_status_ext *devstatus)
{
    struct zcrypt_card *zc;
    struct zcrypt_queue *zq;
    +struct zcrypt_device_status_ext *stat;
    +int card, queue;

    +memset(devstatus, 0, MAX_ZDEV_ENTRIES_EXT
    +   * sizeof(struct zcrypt_device_status_ext));

    spin_lock(&zcrypt_list_lock);
    for_each_zcrypt_card(zc) {
        for_each_zcrypt_queue(zq, zc) {
            -if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index)
            +card = AP_QID_CARD(zq->queue->qid);
            +queue = AP_QID_QUEUE(zq->queue->qid);
            +stat = &devstatus[card * AP_DOMAINS + queue];
            +stat->hwtype = zc->card->ap_dev.device_type;
            +stat->functions = zc->card->functions >> 26;
            +stat->qid = zq->queue->qid;
            +stat->online = zq->online ? 0x01 : 0x00;
        }
    }
    spin_unlock(&zcrypt_list_lock);
    +EXPORT_SYMBOL(zcrypt_device_status_mask_ext);
    +
    +static void zcrypt_status_mask(char status[], size_t max_adapters)
    +{
        struct zcrypt_card *zc;
        struct zcrypt_queue *zq;
        +int card;

        +memset(status, 0, max_adapters);
        spin_lock(&zcrypt_list_lock);
        for_each_zcrypt_card(zc) {
            for_each_zcrypt_queue(zq, zc) {
                card = AP_QID_CARD(zq->queue->qid);
                if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index
                    || card >= max_adapters)
                    continue;
                -status[AP_QID_CARD(zq->queue->qid)] =
                -zc->online ? zc->user_space_type : 0x0d;
                +status[card] = zc->online ? zc->user_space_type : 0x0d;
            }
        }
    }
spin_unlock(&zcrypt_list_lock);
}

-static void zcrypt_qdepth_mask(char qdepth[AP_DEVICES])
+static void zcrypt_qdepth_mask(char qdepth[], size_t max_adapters)
{
    struct zcrypt_card *zc;
    struct zcrypt_queue *zq;
    +int card;

    -memset(qdepth, 0, sizeof(char)* AP_DEVICES);
    +memset(qdepth, 0, max_adapters);
    spin_lock(&zcrypt_list_lock);
    local_bh_disable();
    for_each_zcrypt_card(zc) {
        for_each_zcrypt_queue(zq, zc) {
            -			if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index)
+            			card = AP_QID_CARD(zq->queue->qid);
+            			if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index
+            			    || card >= max_adapters)
+            continue;
+            spin_lock(&zq->queue->lock);
            -qdepth[AP_QID_CARD(zq->queue->qid)] =
+qdepth[card] =
            zq->queue->pendingq_count +
            zq->queue->requestq_count;
            spin_unlock(&zq->queue->lock);
        }
        spin_unlock(&zcrypt_list_lock);
    }

    -static void zcrypt_perdev_reqcnt(int reqcnt[AP_DEVICES])
    +static void zcrypt_perdev_reqcnt(u32 reqcnt[], size_t max_adapters)
    {
        struct zcrypt_card *zc;
        struct zcrypt_queue *zq;
        +int card;
        +u64 cnt;

        -memset(reqcnt, 0, sizeof(int) * AP_DEVICES);
        +memset(reqcnt, 0, sizeof(int) * max_adapters);
        spin_lock(&zcrypt_list_lock);
        local_bh_disable();
        for_each_zcrypt_card(zc) {
            for_each_zcrypt_queue(zq, zc) {
                -if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index)
+                card = AP_QID_CARD(zq->queue->qid);
+                if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index
+                    || card >= max_adapters)
                    continue;
                spin_lock(&zq->queue->lock);
                -reqcnt[AP_QID_CARD(zq->queue->qid)] =
+                reqcnt[card] =
                zq->queue->pendingq_count +
                zq->queue->requestq_count;
                spin_unlock(&zq->queue->lock);
            }
        }
        spin_unlock(&zcrypt_list_lock);
    }

    }
|| card >= max_adapters)
continue;
spin_lock(&zq->queue->lock);
-reqcnt[AP_QID_CARD(zq->queue->qid)] =
-zq->queue->total_request_count;
+cnt = zq->queue->total_request_count;
spin_unlock(&zq->queue->lock);
+reqcnt[card] = (cnt < UINT_MAX) ? (u32) cnt : UINT_MAX;
}
}
local_bh_enable();
@@ -739,65 +802,16 @@
return requestq_count;
}

-static int zcrypt_count_type(int type)
-{ }
-struct zcrypt_card *zc;
-struct zcrypt_queue *zq;
-int device_count;
-
-device_count = 0;
-spin_lock(&zcrypt_list_lock);
-for_each_zcrypt_card(zc) {
-if (zc->card->id != type)
-continue;
-for_each_zcrypt_queue(zq, zc) {
-if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index)
-continue;
-device_count++;}
-}
-
-spin_unlock(&zcrypt_list_lock);
-return device_count;
-}
-
-/**
- * zcrypt_ica_status(): Old, deprecated combi status call.
- * Old, deprecated combi status call.
- */
-static long zcrypt_ica_status(struct file *filp, unsigned long arg)
-{ }
-struct ica_z90_status *pstat;
-int ret;
-
-pstat = kzalloc(sizeof(*pstat), GFP_KERNEL);
-if (!pstat)
return -ENOMEM;
-psstat->totalcount = zcrypt_device_count;
-psstat->leeds litecount = zcrypt_count_type(ZCRYPT_PCICA);
-psstat->leeds2count = zcrypt_count_type(ZCRYPT_PCICC);
-psstat->requestqWaitCount = zcrypt_requestq_count();
-psstat->pendingqWaitCount = zcrypt_pendingq_count();
-psstat->totalOpenCount = atomic_read(&zcrypt_open_count);
-psstat->cryptoDomain = ap_domain_index;
-zcrypt_status_mask(pstat->status);
-zcrypt_qdepth_mask(pstat->qdepth);
-ret = 0;
-if (copy_to_user((void __user *) arg, pstat, sizeof(*pstat)))
-ret = -EFAULT;
-kfree(pstat);
-return ret;
-
-
static long zcrypt_unlocked_ioctl(struct file *filp, unsigned int cmd,
   unsigned long arg)
{
   -int rc;
   +int rc = 0;

   switch (cmd) {
   case ICARSAMODEXPO: {
       struct ica_rsa_modexpo __user *umex = (void __user *) arg;
       struct ica_rsa_modexpo mex;
       +
       if (copy_from_user(&mex, umex, sizeof(mex)))
   return -EFAULT;
   do {
   @ @ -817,6 +831,7 @ @
   case ICARSACRT: {
       struct ica_rsa_modexpo_crt __user *ucrt = (void __user *) arg;
       struct ica_rsa_modexpo_crt crt;
       +
       if (copy_from_user(&crt, ucrt, sizeof(crt)))
   return -EFAULT;
   do {
   @ @ -836,6 +851,7 @ @
   case ZSECSENDCPRB: {
       struct ica_xcRB __user *uxcRB = (void __user *) arg;
       struct ica_xcRB xcRB;
       +
       if (copy_from_user(&xcRB, uxcRB, sizeof(xcRB)))
   return -EFAULT;
   do {
   @ @ -855,6 +871,7 @ @
case ZSENDEP11CPRB: {
    struct ep11_urb __user *uxcrb = (void __user *)arg;
    struct ep11_urb xcrb;
    
    if (copy_from_user(&xcrb, uxcrb, sizeof(xcrb)))
        return -EFAULT;
    do {
        @@ -871,48 +888,49 @@
            return -EFAULT;
        return rc;
    } 
    -case ZDEVICESTATUS: {
        -struct zcrypt_device_matrix *device_status;
        +case ZCRYPT_DEVICE_STATUS: {
            +struct zcrypt_device_status_ext *device_status;
            +size_t total_size = MAX_ZDEV_ENTRIES_EXT
            +* sizeof(struct zcrypt_device_status_ext);

            -device_status = kzalloc(sizeof(struct zcrypt_device_matrix),
            -GFP_KERNEL);
            +device_status = kzalloc(total_size, GFP_KERNEL);
            if (!device_status)
                return -ENOMEM;

            -zcrypt_device_status_mask(device_status);
            -
            +zcrypt_device_status_mask_ext(device_status);
            if (copy_to_user((char __user *) arg, device_status,
                +sizeof(struct zcrypt_device_matrix))) {
                -kfree(device_status);
                -return -EFAULT;
                -
                + total_size))
                +rc = -EFAULT;
                kfree(device_status);
                -return 0;
                +return rc;
            } 

            -case Z90STAT_STATUS_MASK: {
                +case ZCRYPT_STATUS_MASK: {
                    char status[AP_DEVICES];
                    -zcrypt_status_mask(status);
                    -if (copy_to_user((char __user *) arg, status,
                        - sizeof(char) * AP_DEVICES))
                        +
                        +zcrypt_status_mask(status, AP_DEVICES);
                    +if (copy_to_user((char __user *) arg, status, sizeof(status)))
                    ```
char qdepth[AP_DEVICES];
-zcrypt_qdepth_mask(qdepth);
-if (copy_to_user((char __user *) arg, qdepth,
- sizeof(char) * AP_DEVICES))
+
+zcrypt_qdepth_mask(qdepth, AP_DEVICES);
+if (copy_to_user((char __user *) arg, qdepth, sizeof(qdepth)))
return -EFAULT;
return 0;
}
-fcase Z90STAT_QDEPTH_MASK: {
+case ZCRYPT_QDEPTH_MASK: {
char qdepth[AP_DEVICES];
-zcrypt_qdepth_mask(qdepth);
-if (copy_to_user((char __user *) arg, qdepth,
- sizeof(char) * AP_DEVICES))
+
+zcrypt_qdepth_mask(qdepth, AP_DEVICES);
+if (copy_to_user((char __user *) arg, qdepth, sizeof(qdepth)))
return -EFAULT;
return 0;
}
-fcase Z90STAT_PERDEV_REQCNT: {
+case ZCRYPT_PERDEV_REQCNT: {
+u32 *reqcnt;
+
+reqcnt = kcalloc(AP_DEVICES, sizeof(u32), GFP_KERNEL);
+if (!reqcnt)
+return -ENOMEM;
+zcrypt_perdev_reqcnt(reqcnt, AP_DEVICES);
if (copy_to_user((int __user *) arg, reqcnt,
- sizeof(int) * AP_DEVICES))
-return -EFAULT;
-return 0;
+ sizeof(u32) * AP_DEVICES))
+rc = -EFAULT;
+kfree(reqcnt);
+return rc;
}
-fcase Z90STAT_REQUESTQ_COUNT:
return put_user(zcrypt_requestq_count(), (int __user *) arg);
@
-fcase Z90STAT_DOMAIN_INDEX:
return put_user(ap_domain_index, (int __user *) arg);
/*
- * Deprecated ioctls. Don't add another device count ioctl,
- * you can count them yourself in the user space with the
- * output of the Z90STAT_STATUS_MASK ioctl.
+ * Deprecated ioctls
*/
-fcase ICAZ90STATUS:
-return zcrypt_ica_status(filp, arg);
-fcase Z90STAT_TOTALCOUNT:


- return put_user(zcrypt_device_count, (int __user *) arg);
-case Z90STAT_PCICACOUNT:
- return put_user(zcrypt_count_type(ZCRYPT_PCICA),
- (int __user *) arg);
-case Z90STAT_PCICCCOUNT:
- return put_user(zcrypt_count_type(ZCRYPT_PCICC),
- (int __user *) arg);
-case Z90STAT_PCIXCCMCL2COUNT:
- return put_user(zcrypt_count_type(ZCRYPT_PCIXCC_MCL2),
- (int __user *) arg);
-case Z90STAT_PCIXCCMCL3COUNT:
- return put_user(zcrypt_count_type(ZCRYPT_PCIXCC_MCL3),
- (int __user *) arg);
-case Z90STAT_PCIXCCCOUNT:
- return put_user(zcrypt_count_type(ZCRYPT_PCIXCC_MCL2) +
- zcrypt_count_type(ZCRYPT_PCIXCC_MCL3),
- (int __user *) arg);
-case Z90STAT_CEX2CCOUNT:
- return put_user(zcrypt_count_type(ZCRYPT_CEX2C),
- (int __user *) arg);
-case Z90STAT_CEX2ACOUNT:
- return put_user(zcrypt_count_type(ZCRYPT_CEX2A),
- (int __user *) arg);
+ case ZDEVICESTATUS: {
  /* the old ioctl supports only 64 adapters */
  struct zcrypt_device_status *device_status;
  size_t total_size = MAX_ZDEV_ENTRIES
  * sizeof(struct zcrypt_device_status);
  +
  +device_status = kzalloc(total_size, GFP_KERNEL);
  +if (!device_status)
+      return -ENOMEM;
  +zcrypt_device_status_mask(device_status);
  +if (copy_to_user((char __user *) arg, device_status,
  +total_size))
  +rc = -EFAULT;
  +kfree(device_status);
  +return rc;
  +}
+ case Z90STAT_STATUS_MASK: {
  /* the old ioctl supports only 64 adapters */
  char status[MAX_ZDEV_CARDIDS];
  +
  +zcrypt_status_mask(status, MAX_ZDEV_CARDIDS);
  +if (copy_to_user((char __user *) arg, status, sizeof(status)))
  +return -EFAULT;
  +return 0;
  +}

+case Z90STAT_QDEPTH_MASK: {
+/* the old ioctl supports only 64 adapters */
+char qdepth[MAX_ZDEV_CARDIDS];
+
zcrypt_qdepth_mask(qdepth, MAX_ZDEV_CARDIDS);
+if (copy_to_user((char __user *) arg, qdepth, sizeof(qdepth)))
+return -EFAULT;
+return 0;
+
+case Z90STAT_PERDEV_REQCNT: {
+/* the old ioctl supports only 64 adapters */
+u32 reqcnt[MAX_ZDEV_CARDIDS];
+
zcrypt_perdev_reqcnt(reqcnt, MAX_ZDEV_CARDIDS);
+if (copy_to_user((int __user *) arg, reqcnt, sizeof(reqcnt)))
+return -EFAULT;
+return 0;
+
+default:
+-ZCRYPT_DBF(DBF_DEBUG, "unknown ioctl 0x%08x\n", cmd);
+return -ENOIOCTLCMD;
+}
+
+unsigned int user_defined;
+unsigned short request_ID;
+unsigned int request_control_blk_length;
+-unsigned char padding1[16 - sizeof (compat_uptr_t)];
+-unsigned char padding2[16 - sizeof (compat_uptr_t)];
+compat_uptr_t request_control_blk_addr;
+unsigned int request_data_length;
+-unsigned char padding3[16 - sizeof (compat_uptr_t)];
+compat_uptr_t request_data_address;
+unsigned int reply_control_blk_length;
+-unsigned char padding4[16 - sizeof (compat_uptr_t)];
+compat_uptr_t reply_control_blk_addr;
+unsigned int reply_data_length;
+-unsigned char padding5[16 - sizeof (compat_uptr_t)];
+compat_uptr_t reply_data_address;
compat_uptr_reply_control_blk_addr;
unsigned int reply_data_length;
- char padding4[16 - sizeof (compat_uptr_t)];
+ char padding4[16 - sizeof (compat_uptr_t)];
compat_uptr_reply_data_addr;
unsigned short priority_window;
unsigned int status;
-} __attribute__((packed));
+} __packed;

static long trans_xcRB32(struct file *filp, unsigned int cmd,
unsigned long arg)
@@ -1110,7 +1144,7 @@
xcRB32.reply_data_length = xcRB64.reply_data_length;
xcRB32.status = xcRB64.status;
if (copy_to_user(uxcRB32, &xcRB32, sizeof(xcRB32)))
- return -EFAULT;
+ return -EFAULT;
return rc;
}

@@ -1152,201 +1186,6 @@
.fops = &zcrypt_fops,
};

-/*
- * Deprecated /proc entry support.
- */
- static struct proc_dir_entry *zcrypt_entry;
- 
- static void sprintcl(struct seq_file *m, unsigned char *addr, unsigned int len)
- { 
- int i;
- 
- for (i = 0; i < len; i++)
- seq_printf(m, "\%01x", (unsigned int) addr[i]);
- seq_puts(m, ");
- }
- 
- static void sprintrw(struct seq_file *m, unsigned char *addr, unsigned int len)
- { 
- int inl, c, cx;
- 
- seq_printf(m, " ");
- inl = 0;
- for (c = 0; c < (len / 16); c++) {
- sprintcl(m, addr+inl, 16);
- inl += 16;
cx = len%16;
if (cx) {
    sprintf(m, addr+inl, cx);
inl += cx;
}
seq_putc(m, '\n');
}

static void sprinthx(unsigned char *title, struct seq_file *m, 
    unsigned char *addr, unsigned int len)
{
    int inl, r, rx;
    seq_printf(m, "\n%s\n", title);
inl = 0;
for (r = 0; r < (len / 64); r++) {
sprintfw(m, addr+inl, 64);
inl += 64;
}
rx = len % 64;
if (rx) {
sprintfw(m, addr+inl, rx);
inl += rx;
}
seq_putc(m, '\n');
}

static void sprinthx4(unsigned char *title, struct seq_file *m, 
    unsigned int *array, unsigned int len)
{
    seq_printf(m, "\n%s\n", title);
    seq_hex_dump(m, "   ", DUMP_PREFIX_NONE, 32, 4, array, len, false);
    seq_putc(m, '\n');
}

static int zcrypt_proc_show(struct seq_file *m, void *v)
{
    char workarea[sizeof(int) * AP_DEVICES];
    seq_printf(m, "\nzcrypt version: %d.%d.%d\n", 
        ZCRYPT_VERSION, ZCRYPT_RELEASE, ZCRYPT_VARIANT);
    seq_printf(m, "Cryptographic domain: %d\n", ap_domain_index);
    seq_printf(m, "Total device count: %d\n", zcrypt_device_count);
    seq_printf(m, "PCICA count: %d\n", zcrypt_count_type(ZCRYPT_PCICA));
    seq_printf(m, "PCICC count: %d\n", zcrypt_count_type(ZCRYPT_PCICC));
    seq_printf(m, "PCIXCC MCL2 count: %d\n", 
        zcrypt_count_type(ZCRYPT_PCIXCC_MCL2));
- seq_printf(m, "PCIXCC MCL3 count: %d\n", zcrypt_count_type(ZCRYPT_PCIXCC_MCL3));
- seq_printf(m, "CEX2C count: %d\n", zcrypt_count_type(ZCRYPT_CEX2C));
- seq_printf(m, "CEX2A count: %d\n", zcrypt_count_type(ZCRYPT_CEX2A));
- seq_printf(m, "CEX3C count: %d\n", zcrypt_count_type(ZCRYPT_CEX3C));
- seq_printf(m, "CEX3A count: %d\n", zcrypt_count_type(ZCRYPT_CEX3A));
- seq_printf(m, "requestq count: %d\n", zcrypt_requestq_count());
- seq_printf(m, "pendingq count: %d\n", zcrypt_pendingq_count());
- seq_printf(m, "Total open handles: %d\n", atomic_read(&zcrypt_open_count));
- zcrypt_status_mask(workarea);
- sprinthx("Online devices: 1=PCICA 2=PCICC 3=PCIXCC(MCL2) 4=PCIXCC(MCL3) 5=CEX2C 6=CEX2A 7=CEX3C 8=CEX3A", m, workarea, AP_DEVICES);
- m, workarea, AP_DEVICES);
- zcrypt_qdepth_mask(workarea);
- sprinthx("Waiting work element counts", m, workarea, AP_DEVICES);
- zcrypt_perdev_reqcnt((int *) workarea);
- sprinthx4("Per-device successfully completed request counts", m, (unsigned int *) workarea, AP_DEVICES);
- m, (unsigned int *) workarea, AP_DEVICES);
- return 0;
-
- static int zcrypt_proc_open(struct inode *inode, struct file *file)
- {
- return single_open(file, zcrypt_proc_show, NULL);
- }
- static void zcrypt_disable_card(int index)
- {
- struct zcrypt_card *zc;
- struct zcrypt_queue *zq;
- 
- spin_lock(&zcrypt_list_lock);
- for_each_zcrypt_card(zc) {
- for_each_zcrypt_queue(zq, zc) {
- if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index)
- continue;
- zq->online = 0;
- ap_flush_queue(zq->queue);
- }
- }
- spin_unlock(&zcrypt_list_lock);
- }
- 
- static void zcrypt_enable_card(int index)
- {
- struct zcrypt_card *zc;
- struct zcrypt_queue *zq;
spin_lock(&zcrypt_list_lock);
for_each_zcrypt_card(zc) {
    for_each_zcrypt_queue(zq, zc) {
        if (AP_QID_QUEUE(zq->queue->qid) != ap_domain_index)
            continue;
        zq->online = 1;
ap_flush_queue(zq->queue);
    }
}
spin_unlock(&zcrypt_list_lock);

static ssize_t zcrypt_proc_write(struct file *file, const char __user *buffer,
    size_t count, loff_t *pos)
{
    unsigned char *lbuf, *ptr;
    size_t local_count;
    int j;
    
    if (count <= 0)
        return 0;
    
    #define LBUFSIZE 1200UL
    lbuf = kmalloc(LBUFSIZE, GFP_KERNEL);
    if (!lbuf)
        return 0;

    local_count = min(LBUFSIZE - 1, count);
    if (copy_from_user(lbuf, buffer, local_count) != 0) {
        kfree(lbuf);
        return -EFAULT;
    }
    lbuf[local_count] = '\0';

    ptr = strstr(lbuf, "Online devices");
    if (!ptr)
        goto out;
    ptr = strstr(ptr, "Waiting work element counts") == NULL;
    for (j = 0; j < 64 && *ptr; ptr++) {
        /*
- * '0' for no device, '1' for PCICA, '2' for PCICC,
- * '3' for PCIXCC_MCL2, '4' for PCIXCC_MCL3,
- * '5' for CEX2C and '6' for CEX2A'
- * '7' for CEX3C and '8' for CEX3A
- */
-if (*ptr >= '0' && *ptr <= '8')
  j++;
-else if (*ptr == 'd' || *ptr == 'D')
  zcrypt_disable_card(j++);
-else if (*ptr == 'e' || *ptr == 'E')
  zcrypt_enable_card(j++);
-else if (*ptr != ' ' && *ptr != '\t')
  break;
-
-out:
-kfree(lbuf);
-return count;
-

-static const struct file_operations zcrypt_proc_fops = {
  .owner= THIS_MODULE,
  .open= zcrypt_proc_open,
  .read= seq_read,
  .llseek= seq_lseek,
  .release= single_release,
  .write= zcrypt_proc_write,
-};
-

 static int zcrypt_rng_device_count;
 static u32 *zcrypt_rng_buffer;
 static int zcrypt_rng_buffer_index;

 rc = zcrypt_rng((char *) zcrypt_rng_buffer);
 if (rc < 0)
  return -EIO;
-zcrypt_rng_buffer_index = rc / sizeof *data;
+zcrypt_rng_buffer_index = rc / sizeof(*data);
 }
 *data = zcrypt_rng_buffer[--zcrypt_rng_buffer_index];
 -return sizeof *data;
+return sizeof(*data);
 }

 static struct hwrng zcrypt_rng_dev = {
  @ @ -1367,10 +1206,10 @ @
 if (rc)
  goto out;
atomic_set(&zcrypt_rescan_req, 0);
-
/* Register the request sprayer. */
rc = misc_register(&zcrypt_misc_device);
if (rc < 0)
goto out;
-
/* Set up the proc file system */
zcrypt_entry = proc_create("driver/z90crypt", 0644, NULL,
- &zcrypt_proc_fops);
-if (!zcrypt_entry) {
-rc = -ENOMEM;
-goto out_misc;
-}
-
zcrypt_msgtype6_init();
zcrypt_msgtype50_init();
return 0;
-
-out_misc:
-misc_deregister(&zcrypt_misc_device);
out:
return rc;
}
@@ -1480,7 +1307,6 @@
*/
void __exit zcrypt_api_exit(void)
{
-remove_proc_entry("driver/z90crypt", NULL);
misc_deregister(&zcrypt_misc_device);
zcrypt_msgtype6_exit();
zcrypt_msgtype50_exit();
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_api.h
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_api.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
/*
 * zcrypt 2.1.0
 *
@@ -21,30 +21,6 @@
#include <asm/zcrypt.h>
#include "ap_bus.h"

-/* deprecated status calls */
-#define ICAZ90STATUS_IOR(ZCRYPT_IOCTL_MAGIC, 0x10, struct ica_z90_status)
-#define Z90STAT_PCIXCCOUNT_IOR(ZCRYPT_IOCTL_MAGIC, 0x43, int)
/**
 * This structure is deprecated and the corresponding ioctl() has been
 * replaced with individual ioctl()s for each piece of data!
 */

struct ica_z90_status {
    int totalcount;
    int leedslitecount; // PCICA
    int leeds2count;    // PCICC
    // int PCIXCCCount; is not in struct for backward compatibility
    int requestqWaitCount;
    int pendingqWaitCount;
    int totalOpenCount;
    int cryptoDomain;
    // status: 0=not there, 1=PCICA, 2=PCICC, 3=PCIXCC_MCL2, 4=PCIXCC_MCL3,
    // 5=CEX2C
    unsigned char status[64];
    // qdepth: # work elements waiting for each device
    unsigned char qdepth[64];
};

/**
 * device type for an actual device is either PCICA, PCICC, PCIXCC_MCL2,
 * PCIXCC_MCL3, CEX2C, or CEX2A
 
int zcrypt_api_init(void);
void zcrypt_api_exit(void);
long zcrypt_send_cprb(struct ica_xcRB *xcRB);
-void zcrypt_device_status_mask(struct zcrypt_device_matrix *devstatus);
+void zcrypt_device_status_mask_ext(struct zcrypt_device_status_ext *devstatus);

#endif /* _ZCRYPT_API_H_ */
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_card.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_card.c
@@ -38,28 +38,28 @@
 * Device attributes common for all crypto card devices.
 */

-static ssize_t zcrypt_card_type_show(struct device *dev, 
-    struct device_attribute *attr, char *buf)
+static ssize_t type_show(struct device *dev, 
+    struct device_attribute *attr, char *buf)
{
    struct zcrypt_card *zc = to_ap_card(dev)->private;

    return snprintf(buf, PAGE_SIZE, "%s\n", zc->type_string);
}

-static DEVICE_ATTR(type, 0444, zcrypt_card_type_show, NULL);

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+static DEVICE_ATTR_RO(type);

-static ssize_t zcrypt_card_online_show(struct device *dev,
   - struct device_attribute *attr,
   - char *buf)
+static ssize_t online_show(struct device *dev,
   + struct device_attribute *attr,
   + char *buf)
{
    struct zcrypt_card *zc = to_ap_card(dev)->private;
    return snprintf(buf, PAGE_SIZE, "%d\n", zc->online);
}

-static ssize_t zcrypt_card_online_store(struct device *dev,
   - struct device_attribute *attr,
   - const char *buf, size_t count)
+static ssize_t online_store(struct device *dev,
   + struct device_attribute *attr,
   + const char *buf, size_t count)
{
    struct zcrypt_card *zc = to_ap_card(dev)->private;
    struct zcrypt_queue *zq;
    return count;
}

-static DEVICE_ATTR(online, 0644, zcrypt_card_online_show,
   - zcrypt_card_online_store);
+static DEVICE_ATTR_RW(online);

+static DEVICE_ATTR(load, 0444, zcrypt_card_load_show, NULL);
static struct attribute *zcrypt_card_attrs[] = {
    &dev_attr_type.attr,
    &dev_attr_online.attr,
    +&dev_attr_load.attr,
    NULL,
};
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_cca_key.h
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_cca_key.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
/*
 * zcrypt 2.1.0
 *
@@ -31,7 +31,7 @@
 unsigned char version;
 unsigned short token_length;
 unsigned char reserved[4];
-} __attribute__((packed));
+} __packed;

#define CCA_TKN_HDR_ID_EXT 0x1E

@@ -51,7 +51,7 @@
 unsigned short exponent_len;
 unsigned short modulus_bit_len;
 unsigned short modulus_byte_len; /* In a private key, this is 0 */
-} __attribute__((packed));
+} __packed;

/**
 * mapping for the cca private CRT key 'token'
@@ -85,7 +85,7 @@
 unsigned short pad_len;
 unsigned char reserved4[52];
 unsigned char confounder[8];
-} __attribute__((packed));
+} __packed;

/#define CCA_PVT_EXT_CRT_SEC_ID_PVT 0x08

#define CCA_PVT_EXT_CRT_SEC_FMT_CL 0x40
@@ -114,7 +114,7 @@
 struct cca_token_hdr pubHdr;
 struct cca_public_sec pubSec;
 char exponent[0];
-} __attribute__((packed)) *key = p;
+} __packed *key = p;
 unsigned char *temp;
 int i;

@@ -174,7 +174,7 @@
 struct cca_token_hdr token;
 struct cca_pvt_ext_CRT_sec pvt;
char key_parts[0];
-} __attribute__((packed)) *key = p;
+} __packed *key = p;
struct cca_public_sec *pub;
int short_len, long_len, pad_len, key_len, size;

--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_cex2a.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_cex2a.c
@@ -145,6 +145,7 @@
 .probe = zcrypt_cex2a_card_probe,
 .remove = zcrypt_cex2a_card_remove,
 .ids = zcrypt_cex2a_card_ids,
+.flags = AP_DRIVER_FLAG_DEFAULT,
 }

/**
 @@ -197,7 +198,6 @@
 struct ap_queue *aq = to_ap_queue(&ap_dev->device);
 struct zcrypt_queue *zq = aq->private;

-ap_queue_remove(aq);
 if (zq)
 zcrypt_queue_unregister(zq);
 }
@@ -208,6 +208,7 @@
 .suspend = ap_queue_suspend,
 .resume = ap_queue_resume,
 .ids = zcrypt_cex2a_queue_ids,
+.flags = AP_DRIVER_FLAG_DEFAULT,
 }

int __init zcrypt_cex2a_init(void)
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_cex2a.h
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_cex2a.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
/*
 * zcrypt 2.1.0
 * @@ -30,7 +30,7 @@
 unsigned charreserved2;
 unsigned charignored;
 unsigned shortreserved3;
-} __attribute__((packed));
+} __packed;

#define TYPE50_TYPE_CODE 0x50
unsigned char exponent[128];
unsigned char modulus[128];
unsigned char message[128];
} __attribute__((packed));

/* Mod-Exp, with a larger modulus */
struct type50_meb3_msg {
    unsigned char exponent[256];
    unsigned char modulus[256];
    unsigned char message[256];
} __attribute__((packed));

/* CRT, with a small modulus */
struct type50_crb1_msg {
    unsigned char dq[64];
    unsigned char u[64];
    unsigned char message[128];
} __attribute__((packed));

/* CRT, with a larger modulus */
struct type50_crb2_msg {
    unsigned char dq[128];
    unsigned char u[128];
    unsigned char message[256];
} __attribute__((packed));

/* CRT, with a larger modulus */
struct type50_crb3_msg {
    unsigned char dq[256];
unsigned char[u[256];
unsigned char message[512];

/**
 * The type 80 response family is associated with a CEX2A card.
 * @ @ -128,7 +128,7 @@
 * unsigned char code; /* 0x00 */
 * unsigned char reserved2[3];
 * unsigned char reserved3[8];

int zcrypt_cex2a_init(void);
void zcrypt_cex2a_exit(void);
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_cex4.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_cex4.c
@@ -214,6 +214,7 @@
 .probe = zcrypt_cex4_card_probe,
 .remove = zcrypt_cex4_card_remove,
 .ids = zcrypt_cex4_card_ids,
+.flags = AP_DRIVER_FLAG_DEFAULT,
 }

/**
 @@ -272,7 +273,6 @@
 struct ap_queue *aq = to_ap_queue(&ap_dev->device);
 struct zcrypt_queue *zq = aq->private;

-ap_queue_remove(aq);
 if (zq)
 zcrypt_queue_unregister(zq);
 }
@@ -283,6 +283,7 @@
 .suspend = ap_queue_suspend,
 .resume = ap_queue_resume,
 .ids = zcrypt_cex4_queue_ids,
+.flags = AP_DRIVER_FLAG_DEFAULT,
 }

int __init zcrypt_cex4_init(void)
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_error.h
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_error.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
* zcrypt 2.1.0
*
@ @ -52,6 +52,7 @ @
#define REP82_ERROR_FORMAT_FIELD 0x29
#define REP82_ERROR_INVALID_COMMAND 0x30
#define REP82_ERROR_MALFORMED_MSG 0x40
+/*define REP82_ERROR_INVALID_SPECIAL_CMD 0x41
#define REP82_ERROR_INVALID_DOMAIN_PRECHECK 0x42
#define REP82_ERROR_RESERVED_FIELD 0x50 /* old value*/
#define REP82_ERROR_WORD_ALIGNMENT 0x60
@@ -52,6 +52,7 @@
#define REP82_ERROR_EVEN_MOD_IN_OPND 0x85
#define REP82_ERROR_RESERVED_FIELD 0x88
#define REP82_ERROR_INVALID_DOMAIN_PENDING 0x8A
+/*define REP82_ERROR_FILTERED_BY_HYPERVISOR 0x8B
#define REP82_ERROR_TRANSPORT_FAIL 0x90
#define REP82_ERROR_PACKET_TRUNCATED 0xA0
#define REP82_ERROR_ZERO_BUFFER_LEN 0xB0
@@ -61,6 +62,7 @@
case REP88_ERROR_MESSAGE_MALFORMD:
case REP82_ERROR_INVALID_DOMAIN_PRECHECK:
case REP82_ERROR_INVALID_DOMAIN_PENDING:
+case REP82_ERROR_INVALID_SPECIAL_CMD:
+case REP82_ERROR_FILTERED_BY_HYPERVISOR:
  // REP88_ERROR_INVALID_KEY // '82' CEX2A
  // REP88_ERROR_OPERAND // '84' CEX2A
  // REP88_ERROR_OPERAND_EVEN_MOD // '85' CEX2A
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_msgtype50.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_msgtype50.c
@@ -27,13 +27,14 @@
#include "zcrypt_error.h"
#include "zcrypt_msgtype50.h"

-#define CEX3A_MAX_MOD_SIZE512/* 4096 bits*/
+/* 4096 bits */
+#define CEX3A_MAX_MOD_SIZE 512

-#define CEX2A_MAX_RESPONSE_SIZE 0x110/* max outputdatalength + type80_hdr */
+/* max outputdatalength + type80_hdr */
+#define CEX2A_MAX_RESPONSE_SIZE 0x110

-#define CEX3A_MAX_RESPONSE_SIZE0x210/* 512 bit modulus
-  * (max outputdatalength) +
-  * type80_hdr*/
+/* 512 bit modulus, (max outputdatalength) + type80_hdr */
+#define CEX3A_MAX_RESPONSE_SIZE 0x210

MODULE_AUTHOR("IBM Corporation");
if (mod_len <= 128) {
    struct type50_meb1_msg *meb1 = ap_msg->message;
    +
    memset(meb1, 0, sizeof(*meb1));
    ap_msg->length = sizeof(*meb1);
    meb1->header.msg_type_code = TYPE50_TYPE_CODE;
    inp = meb1->message + sizeof(meb1->message) - mod_len;
} else if (mod_len <= 256) {
    struct type50_meb2_msg *meb2 = ap_msg->message;
    +
    memset(meb2, 0, sizeof(*meb2));
    ap_msg->length = sizeof(*meb2);
    meb2->header.msg_type_code = TYPE50_TYPE_CODE;
    inp = meb2->message + sizeof(meb2->message) - mod_len;
} else if (mod_len <= 512) {
    struct type50_meb3_msg *meb3 = ap_msg->message;
    +
    memset(meb3, 0, sizeof(*meb3));
    ap_msg->length = sizeof(*meb3);
    meb3->header.msg_type_code = TYPE50_TYPE_CODE;
    inp = meb3->message + sizeof(meb3->message) - mod_len;
} else if (mod_len <= 256) {
    struct type50_crb1_msg *crb1 = ap_msg->message;
    +
    memset(crb1, 0, sizeof(*crb1));
    ap_msg->length = sizeof(*crb1);
    crb1->header.msg_type_code = TYPE50_TYPE_CODE;
    inp = crb1->message + sizeof(crb1->message) - mod_len;
} else if (mod_len <= 512) {
    struct type50_crb2_msg *crb2 = ap_msg->message;
    +
    memset(crb2, 0, sizeof(*crb2));
    ap_msg->length = sizeof(*crb2);
    crb2->header.msg_type_code = TYPE50_TYPE_CODE;
    inp = crb2->message + sizeof(crb2->message) - mod_len;
} else if (mod_len <= 512) {
    struct type50_crb3_msg *crb3 = ap_msg->message;
    +
    memset(crb3, 0, sizeof(*crb3));
    ap_msg->length = sizeof(*crb3);
crb3->header.msg_type_code = TYPE50_TYPE_CODE;
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_msgtype50.h
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_msgtype50.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
/*
 * zcrypt 2.1.0
 *
@@ -17,10 +17,10 @@
#define MSGTYPE50_NAME			"zcrypt_msgtype50"
#define MSGTYPE50_VARIANT_DEFAULT	0
-#define MSGTYPE50_CRB2_MAX_MSG_SIZE	0x390 /*sizeof(struct type50_crb2_msg)*/
-#define MSGTYPE50_CRB3_MAX_MSG_SIZE	0x710 /*sizeof(struct type50_crb3_msg)*/
+#define MSGTYPE50_CRB2_MAX_MSG_SIZE 0x390 /* sizeof(struct type50_crb2_msg) */
+#define MSGTYPE50_CRB3_MAX_MSG_SIZE 0x710 /* sizeof(struct type50_crb3_msg) */

-#define MSGTYPE50_ADJUSTMENT	0x08  /*type04 extension (not needed in type50)*/
+#define MSGTYPE50_ADJUSTMENT 0x08 /* type04 extension (not needed in type50) */

unsigned int get_rsa_modex_fc(struct ica_rsa_modexpo *, int *);
unsigned int get_rsa_crt_fc(struct ica_rsa_modexpo_crt *, int *);
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_msgtype6.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_msgtype6.c
@@ -405,8 +405,10 @@
if (ap_msg->length > MSGTYPE06_MAX_MSG_SIZE)
   return -EINVAL;
-/* Overflow check
- sum must be greater (or equal) than the largest operand */
-/*
+ /* Overflow check
+ * sum must be greater (or equal) than the largest operand
+ */
+ req_sumlen = CEIL4(xcRB->request_control_blk_length) +
+ xcRB->request_data_length;
if ((CEIL4(xcRB->request_control_blk_length) <=
@@ -426,8 +428,10 @@
if (replylen > MSGTYPE06_MAX_MSG_SIZE)
   return -EINVAL;
-/* Overflow check
- sum must be greater (or equal) than the largest operand */
-/*
+ /* Overflow check
+ * sum must be greater (or equal) than the largest operand
+ */
resp_sumlen = CEIL4(xcRB->reply_control_blk_length) + xcRB->reply_data_length;
if ((CEIL4(xcRB->reply_control_blk_length) <= xcRB->reply_data_length) ? @ @ -438,7 +442,7 @ @

/* prepare type6 header */
msg->hdr = static_type6_hdrX;
-memcpy(msg->hdr.agent_id , &(xcRB->agent_ID), sizeof(xcRB->agent_ID));
+memcpy(msg->hdr.agent_id, &(xcRB->agent_ID), sizeof(xcRB->agent_ID));
msg->hdr.ToCardLen1 = xcRB->request_control_blk_length;
if (xcRB->request_data_length) {
  msg->hdr.offset2 = msg->hdr.offset1 + rcblen;
  @ @ -790,8 +794,10 @ @
if (msg->cprbx.cprb_ver_id == 0x02)
  return convert_type86_ica(zq, reply,
    outputdata, outputdatalength);
  /* Fall through, no break, incorrect cprb version is an unknown
   * response */
  +/*
  + * Fall through, no break, incorrect cprb version is an unknown
  + * response
  + */
default: /* Unknown response type, this should NEVER EVER happen */
  zq->online = 0;
  pr_err("Cryptographic device %02x.%04x failed and was set offline\n",
  @ @ -824,8 +830,10 @ @
  }
if (msg->cprbx.cprb_ver_id == 0x02)
  return convert_type86_xcrb(zq, reply, xcRB);
  /* Fall through, no break, incorrect cprb version is an unknown
   * response */
  +/*
  + * Fall through, no break, incorrect cprb version is an unknown
  + * response
  + */
default: /* Unknown response type, this should NEVER EVER happen */
  xcRB->status = 0x0008044DL; /* HDD_InvalidParm */
  zq->online = 0;
  @ @ -885,8 +893,10 @ @
  return -EINVAL;
if (msg->cprbx.cprb_ver_id == 0x02)
  return convert_type86_rng(zq, reply, data);
  /* Fall through, no break, incorrect cprb version is an unknown
   * response */
  +/*
  + * Fall through, no break, incorrect cprb version is an unknown
  + * response
  + */
default: /* Unknown response type, this should NEVER EVER happen */
zq->online = 0;
pr_err("Cryptographic device %02x.%04x failed and was set offline\n",
@@ -988,7 +998,7 @@
}
} else {
memcpy(msg->message, reply->message, sizeof(error_reply));
-  }
+	}
out:
complete(&(resp_type->work));
}
@@ -1084,6 +1094,13 @@
return rc;
}

+/**
+ * Fetch function code from cprb.
+ * Extracting the fc requires to copy the cprb from userspace.
+ * So this function allocates memory and needs an ap_msg prepared
+ * by the caller with ap_init_message(). Also the caller has to
+ * make sure ap_release_message() is always called even on failure.
+ */
unsigned int get_cprb_fc(struct ica_xcRB *xcRB,
struct ap_message *ap_msg,
unsigned int *func_code, unsigned short **dom)
@@ -1091,9 +1108,13 @@
struct response_type resp_type = {
 .type = PCIXCC_RESPONSE_TYPE_XCRB,
};
-int rc;

-ap_init_message(ap_msg);
ap_msg->message = kmalloc(MSGTYPE06_MAX_MSG_SIZE, GFP_KERNEL);
if (!ap_msg->message)
return -ENOMEM;
@@ -1101,17 +1116,10 @@
ap_msg->psmid = (((unsigned long long) current->pid) << 32) +
atomic_inc_return(&zcrypt_step);
ap_msg->private = kmalloc(sizeof(resp_type), GFP_KERNEL);
-if (!ap_msg->private) {
-kzfree(ap_msg->message);
+if (!ap_msg->private)
return -ENOMEM;
}
memcpy(ap_msg->private, &resp_type, sizeof(resp_type));
-rc = XCRB_msg_to_type6CPRB_msgX(ap_msg, xcRB, func_code, dom);
-if (rc) {

+/**
+ * Fetch function code from ep11 cprb.
+ * Extracting the fc requires to copy the ep11 cprb from userspace.
+ * So this function allocates memory and needs an ap_msg prepared
+ * by the caller with ap_init_message(). Also the caller has to
+ * make sure ap_release_message() is always called even on failure.
+ */
unsigned int get_ep11cprb_fc(struct ep11_urb *xcrb,
                         struct ap_message *ap_msg,
                         unsigned int *func_code)
@@ -1151,9 +1164,7 @@
struct response_type resp_type = {
    .type = PCIXCC_RESPONSE_TYPE_EP11,
};
-int rc;

-ap_init_message(ap_msg);
ap_msg->message = kmalloc(MSGTYPE06_MAX_MSG_SIZE, GFP_KERNEL);
if (!ap_msg->message)
return -ENOMEM;
@@ -1161,17 +1172,10 @@
ap_msg->psmid = (((unsigned long long) current->pid) << 32) +
atomic_inc_return(&zcrypt_step);
ap_msg->private = kmalloc(sizeof(resp_type), GFP_KERNEL);
-if (!ap_msg->private) {
-kzfree(ap_msg->message);
+if (!ap_msg->private)
return -ENOMEM;
}
memcpy(ap_msg->private, &resp_type, sizeof(resp_type));
+rc = xcrb_msg_to_type6_ep11cprb_msgx(ap_msg, xcrb, func_code);
if (rc) {
    kzfree(ap_msg->message);
    kzfree(ap_msg->private);
} return rc;

return xcrb_msg_to_type6_ep11cprb_msgx(ap_msg, xcrb, func_code);

/**
 * Signal pending. */
ap_cancel_message(zq->queue, ap_msg);

-kzfree(ap_msg->message);
-kzfree(ap_msg->private);
return rc;

-ap_init_message(ap_msg);
ap_msg->message = kmalloc(MSGTYPE06_MAX_MSG_SIZE, GFP_KERNEL);
if (!ap_msg->message)
    return -ENOMEM;

-ap_cancel_message(zq->queue, ap_msg);

-kzfree(ap_msg->message);
-kzfree(ap_msg->private);
return rc;

memcpy(ap_msg->private, &resp_type, sizeof(resp_type));
rng_type6CPRB_msgX(ap_msg, ZCRYPT_RNG_BUFFER_SIZE, domain);

ap_cancel_message(zq->queue, ap_msg);

-kzfree(ap_msg->message);
-kzfree(ap_msg->private);
return rc;

--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_msgtype6.h
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_msgtype6.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
/*
 * zcrypt 2.1.0
 */
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_pcixcc.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_pcixcc.c
@@ -95,7 +95,7 @@
 struct type86_hdr hdr;
 struct type86_fmt2_ext fmt2;
 struct CPRBX cprbx;
-} __attribute__((packed)) *reply;
+} __packed *reply;
 struct {
 struct type6_hdr hdr;
 struct CPRBX cprbx;
@@ -104,7 +104,7 @@
 char rule[8];
 short int verb_length;
 short int key_length;
-} __packed * msg;
+} __packed *msg;
 int rc, i;

 ap_init_message(&ap_msg);
@@ -223,6 +223,7 @@
 .probe = zcrypt_pcixcc_card_probe,
 .remove = zcrypt_pcixcc_card_remove,
 .ids = zcrypt_pcixcc_card_ids,
+.flags = AP_DRIVER_FLAG_DEFAULT,
 
 /**
 @@ -275,7 +276,6 @@
 struct ap_queue *aq = to_ap_queue(&ap_dev->device);
 struct zcrypt_queue *zq = aq->private;

-ap_queue_remove(aq);
 if (zq)
 zcrypt_queue_unregister(zq);
 }
@@ -286,6 +286,7 @@
 .suspend = ap_queue_suspend,
 .resume = ap_queue_resume,
 .ids = zcrypt_pcixcc_queue_ids,
+.flags = AP_DRIVER_FLAG_DEFAULT,
int __init zcrypt_pcixcc_init(void)
--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_pcixcc.h
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_pcixcc.h
@@ -1,4 +1,4 @@
-// SPDX-License-Identifier: GPL-2.0+
+/* SPDX-License-Identifier: GPL-2.0+ */
/*
 * zcrypt 2.1.0
 *--- linux-4.15.0.orig/drivers/s390/crypto/zcrypt_queue.c
+++ linux-4.15.0/drivers/s390/crypto/zcrypt_queue.c
@@ -38,18 +38,18 @@
 * Device attributes common for all crypto queue devices.
 */

-static ssize_t zcrypt_queue_online_show(struct device *dev,
-struct device_attribute *attr,
-struct *buf)
+static ssize_t online_show(struct device *dev,
+struct device_attribute *attr,
+const char *buf)
+{ static ssize_t online_show(struct device *dev,
+ struct device_attribute *attr,
+ char *buf)
+{
 struct zcrypt_queue *zq = to_ap_queue(dev)->private;

 return snprintf(buf, PAGE_SIZE, "%d\n", zq->online);
 }

-static ssize_t zcrypt_queue_online_store(struct device *dev,
-struct device_attribute *attr,
-const char *buf, size_t count)
+static ssize_t online_store(struct device *dev,
+struct device_attribute *attr,
+const char *buf, size_t count)
+{ static ssize_t online_store(struct device *dev,
+ struct device_attribute *attr,
+ const char *buf, size_t count)
+{
 struct zcrypt_queue *zq = to_ap_queue(dev)->private;
 struct zcrypt_card *zc = zq->zcard;
@@ -72,11 +72,22 @@
 return count;
 }

-static DEVICE_ATTR(online, 0644, zcrypt_queue_online_show,
-DEVICE_ATTR_RW(online);
+static DEVICE_ATTR_RW(online);
+static ssize_t zcrypt_queue_load_show(struct device *dev,
+struct device_attribute *attr,
char *buf)
{
+struct zcrypt_queue *zq = to_ap_queue(dev)->private;
+
+return snprintf(buf, PAGE_SIZE, "\%d\n", atomic_read(&zq->load));
+
+
+static DEVICE_ATTR(load, 0444, zcrypt_queue_load_show, NULL);

static struct attribute *zcrypt_queue_attr[] = {
&dev_attr_online.attr,
&dev_attr_load.attr,
NULL,
};

--- linux-4.15.0.orig/drivers/s390/net/ctcm_main.c
+++ linux-4.15.0/drivers/s390/net/ctcm_main.c
@@ -1595,6 +1595,7 @@
if (priv->channel[direction] == NULL) {
    if (direction == CTCM_WRITE)
channel_free(priv->channel[CTCM_READ]);
+    result = -ENODEV;
    goto out_dev;
}

prv->channel[direction]->netdev = dev;
--- linux-4.15.0.orig/drivers/s390/net/qeth_core.h
+++ linux-4.15.0/drivers/s390/net/qeth_core.h
@@ -85,6 +85,18 @@
#define SENSE_RESETTING_EVENT_BYTE 1
#define SENSE_RESETTING_EVENT_FLAG 0x80

static inline u32 qeth_get_device_id(struct ccw_device *cdev)
{
+struct ccw_dev_id dev_id;
+u32 id;
+
ccw_device_get_id(cdev, &dev_id);
+id = dev_id.devno;
+id |= (u32) (dev_id.ssid << 16);
+
+return id;
+
/*
 * Common IO related definitions
 */
@@ -95,7 +107,8 @@
#define CARD_RDEV_ID(card) dev_name(&card->read.ccwdev->dev)
```c
#define CARD_WDEV_ID(card) dev_name(&card->write.ccwdev->dev)
#define CARD_DDEV_ID(card) dev_name(&card->data.ccwdev->dev)
#define CHANNEL_ID(channel) dev_name(&channel->ccwdev->dev)
#define CCW_DEVID(cdev) qeth_get_device_id(cdev)
#define CARD_DEVID(card) CCW_DEVID(CARD_RDEV(card))

/**
 * card stuff
 @@ -198,6 +211,12 @@
 bool rx_bcast_enabled;
 }

+static inline int qeth_is_adp_supported(struct qeth_ipa_info *ipa,
+enum qeth_ipa_setadp_cmd func)
+{
+return (ipa->supported_funcs & func);
+}
+
static inline int qeth_is_ipa_supported(struct qeth_ipa_info *ipa,
enum qeth_ipa_funcs func)
{
@@ -211,9 +230,7 @@
 }

#define qeth_adp_supported(c, f) qeth_is_ipa_supported(&c->options.adp, f)
#define qeth_adp_enabled(c, f) qeth_is_ipa_enabled(&c->options.adp, f)
#define qeth_is_supported(c, f) qeth_is_ipa_supported(&c->options.ipa4, f)
#define qeth_is_enabled(c, f) qeth_is_ipa_enabled(&c->options.ipa4, f)

enum qeth_cmd_buffer_state {
BUF_STATE_FREE,
BUF_STATE_LOCKED,
-BUF_STATE_PROCESSED,
};

enum qeth_cq {
@@ -555,7 +572,6 @@
 void (*callback) (struct qeth_channel *, struct qeth_cmd_buffer *);
 };

+static inline struct qeth_ipa_cmd *__ipa_cmd(struct qeth_cmd_buffer *iob)
+{
+return (struct qeth_ipa_cmd *)(iob->data + IPA_PDU_HEADER_SIZE);
+
```

+**
 * definition of a qeth channel, used for read and write
 */
@@ -594,7 +615,6 @@
 struct qeth_cmd_buffer iob[QETH_CMD_BUFFER_NO];
 atomic_t irq_pending;
 int io_buf_no;
-int buf_no;
 
/**
@@ -643,7 +663,6 @@

#define QETH_BROADCAST_WITH_ECHO    0x01
#define QETH_BROADCAST_WITHOUT_ECHO 0x02
-#define QETH_LAYER2_MAC_READ	    0x01
#define QETH_LAYER2_MAC_REGISTERED  0x02
 struct qeth_card_info {
 unsigned short unit_addr2;
@@ -687,6 +706,8 @@
 char hsuid[9];
 };

+#define IS_LAYER2(card) ((card)->options.layer2 == QETH_DISCIPLINE_LAYER2)
+
/*
 * thread bits for qeth_card thread masks
 */
@@ -826,6 +847,17 @@

/*some helper functions*/
#define QETH_CARD_IFNAME(card) (((card)->dev)? (card)->dev->name : "")

+static inline void qeth_scrub_qdio_buffer(struct qdio_buffer *buf,
+    unsigned int elements)
+{
+    unsigned int i;
+    +for (i = 0; i < elements; i++)
+      memset(&buf->element[i], 0, sizeof(struct qdio_buffer_element));
+    buf->element[14].sflags = 0;
+    buf->element[15].sflags = 0;
+}
+
/**
 * qeth_get_elements_for_range() - find number of SBALEs to cover range.
 * @start:Start of the address range.
@@ -836,7 +868,7 @@

Open Source Used In 5GaaS Edge AC-4 27572
static inline int qeth_get_elements_for_range(addr_t start, addr_t end)
{
    return PFN_UP(end - 1) - PFN_DOWN(start);
}

static inline int qeth_get_micros(void)
{
    __u16, __u16,
    enum qeth_prot_versions);

int qeth_set_features(struct net_device *, netdev_features_t);
-void qeth_recover_features(struct net_device *dev);
+void qeth_enable_hw_features(struct net_device *dev);
netdev_features_t qeth_fix_features(struct net_device *, netdev_features_t);
netdev_features_t qeth_features_check(struct sk_buff *skb,
    struct net_device *dev,
--- linux-4.15.0.orig/drivers/s390/net/qeth_core_main.c
+++ linux-4.15.0/drivers/s390/net/qeth_core_main.c
@@ -24,6 +24,7 @@
#include <linux/netdevice.h>
#include <linux/netdev_features.h>
#include <linux/skbuff.h>
+#include <linux/vmalloc.h>

#include <net/iucv/af_iucv.h>
#include <net/dsfield.h>
@@ -36,6 +37,7 @@
#include <asm/diag.h>
#include <asm/cio.h>
#include <asm/ccwdev.h>
+#include <asm/cpcmd.h>

#include "qeth_core.h"

@@ -72,9 +74,6 @@
struct qeth_qdio_out_buffer *buf,
    enum iucv_tx_notify notification);
static void qeth_release_skbs(struct qeth_qdio_out_buffer *buf);
-static void qeth_clear_output_buffer(struct qeth_qdio_out_buffer *buf,
-    enum qeth_qdio_buffer_states newbufstate);
static int qeth_init_qdio_out_buf(struct qeth_qdio_out_q *, int);

struct workqueue_struct *qeth_wq;
@@ -168,6 +167,8 @@
return "OSD_1000";

case QETH_LINK_TYPE_10GBIT_ETH:
return "OSD_10GIG";
+case QETH_LINK_TYPE_25GBIT_ETH:
+return "OSD_25GIG";
case QETH_LINK_TYPE_LANE_ETH100:
return "OSD_FE_LANE";
case QETH_LINK_TYPE_LANE_TR:
@@ -471,13 +472,6 @@
 }
 }
-if (forced_cleanup && (atomic_read(&q->bufs[bidx]->state) ==
-QETH_QDIO_BUF_HANDLED_DELAYED)) {
-/* for recovery situations */
-q->bufs[bidx]->aob = q->bufstates[bidx].aob;
-qeth_init_qdio_out_buf(q, bidx);
-QETH_CARD_TEXT(q->card, 2, "clprecov");
-}
}

@@ -487,6 +481,7 @@
 struct qaob *aob;
 struct qeth_qdio_out_buffer *buffer;
 enum iucv_tx_notify notification;
+unsigned int i;

 aob = (struct qaob *) phys_to_virt(phys_aob_addr);
 QETH_CARD_TEXT(card, 5, "haob");
@@ -511,10 +506,18 @@
 qeth_notify_skbs(buffer->q, buffer, notification);
 buffer->aob = NULL;
-qeth_clear_output_buffer(buffer->q, buffer,
- QETH_QDIO_BUF_HANDLED_DELAYED);
+/* Free dangling allocations. The attached skbs are handled by
+ * qeth_cleanup_handled_pending().
+ */
+for (i = 0;
+ i < aob->sb_count && i < QETH_MAX_BUFFER_ELEMENTS(card);
+ i++) {
+if (aob->sba[i] && buffer->is_header[i])
+kmem_cache_free(qeth_core_header_cache,
+(void *) aob->sba[i]);
+}
+atomic_set(&buffer->state, QETH_QDIO_BUF_HANDLED_DELAYED);

-/* from here on: do not touch buffer anymore */
 qdio_release_aob(aob);
static int qeth_issue_next_read(struct qeth_card *card)
{
    int rc;
    struct qeth_channel *channel = &card->read;
    struct qeth_cmd_buffer *iob;

    QETH_CARD_TEXT(card, 5, "issnxrd");
    if (channel->state != CH_STATE_UP)
        return -EIO;
    iob = qeth_get_buffer(channel);
    if (!iob) {
        dev_warn(&card->gdev->dev, "The qeth device driver "
        "failed to recover an error on the device\n");
        -QETH_DBF_MESSAGE(2, "%s issue_next_read failed: no iob 
        "available\n", dev_name(&card->gdev->dev));
        +QETH_DBF_MESSAGE(2, "issue_next_read on device %x failed: no iob available\n", 
          + CARD_DEVID(card));
        return -ENOMEM;
    }
    qeth_setup_ccw(channel, iob->data, QETH_BUFSIZE);
    QETH_CARD_TEXT(card, 6, "noirqpnd");
    rc = ccw_device_start(channel->ccwdev, &channel->ccw, 
        (addr_t) iob, 0, 0);
    if (rc) {
        -QETH_DBF_MESSAGE(2, "%s error in starting next read ccw! "
        "rc=%i\n", dev_name(&card->gdev->dev), rc);
        atomic_set(&channel->irq_pending, 0);
        +QETH_DBF_MESSAGE(2, "error %i on device %x when starting next read ccw!\n", 
            + rc, CARD_DEVID(card));
        +atomic_set(&channel->irq_pending, 0);
        +qeth_release_buffer(channel, iob);
        card->read_or_write_problem = 1;
        qeth_schedule_recovery(card);
        wake_up(&card->wait_q);
    }
}
return rc;
}

+static int qeth_issue_next_read(struct qeth_card *card)
+{
+int ret;
+
+spin_lock_irq(get_ccwdev_lock(CARD_RDEV(card)));
+ret = __qeth_issue_next_read(card);
+spin_unlock_irq(get_ccwdev_lock(CARD_RDEV(card)));
+
+return ret;
+
+
static struct qeth_reply *qeth_alloc_reply(struct qeth_card *card)
{
struct qeth_reply *reply;

static void qeth_issue_ipa_msg(struct qeth_ipa_cmd *cmd, int rc, struct qeth_card *card)
{
- char *ipa_name;
+ const char *ipa_name;
  int com = cmd->hdr.command;
  ipa_name = qeth_get_ipa_cmd_name(com);
  
  if (rc)
   -QETH_DBF_MESSAGE(2, "IPA: %s(x%X) for %s/%s returned 
   -"x%X \"%s\"\n",
   -IPA_NAME, com, dev_name(&card->gdev->dev),
   -QETH_CARD_IFNAME(card), rc,
   -qeth_get_ipa_msg(rc));
   +QETH_DBG_MESSAGE(2, "IPA: %s(%#x) for device %x returned %#x "%s"
",
   +ipa_name, com, CARD_DEVID(card), rc,
   +qeth_get_ipa_msg(rc));
  else
   -QETH_DBG_MESSAGE(5, "IPA: %s(x%X) for %s/%s succeeded\n",
   -IPA_NAME, com, dev_name(&card->gdev->dev),
   -QETH_CARD_IFNAME(card));
   +QETH_DBG_MESSAGE(5, "IPA: %s(%#x) for device %x succeeded\n",
   +ipa_name, com, CARD_DEVID(card));
}

static struct qeth_ipa_cmd *qeth_check_ipa_data(struct qeth_card *card,
@@ -697,7 +710,6 @@
qeth_put_reply(reply);
}

spin_unlock_irqrestore(&card->lock, flags);
atomic_set(&card->write.irq_pending, 0);
}
EXPORT_SYMBOL_GPL(qeth_clear_ipacmd_list);

QETH_DBF_HEX(CTRL, 2, buffer, QETH_DBF_CTRL_LEN);
if ((buffer[2] & 0xc0) == 0xc0) {
    QETH_DBF_MESSAGE(2, "received an IDX TERMINATE ",
    buffer[4],
    "with cause code 0x%02x\%s\n",
    ((buffer[4] == 0x22) ? " -- try another portname" : "");
}

QETH_CARD_TEXT(card, 2, "ckidxres");
QETH_CARD_TEXT(card, 2, " idxterm");
QETH_CARD_TEXT_(card, 2, "  rc%d", -EIO);

for (cnt = 0; cnt < QETH_CMD_BUFFER_NO; cnt++)
qeth_release_buffer(channel, &channel->iob[cnt]);
channel->buf_no = 0;
channel->io_buf_no = 0;
}
EXPORT_SYMBOL_GPL(qeth_clear_cmd_buffers);

kfree(channel->iob[cnt].data);
return -ENOMEM;
}
channel->buf_no = 0;
channel->io_buf_no = 0;
atomic_set(&channel->irq_pending, 0);
spin_lock_init(&channel->iob_lock);
spun_lock_irqsave(&card->thread_mask_lock, flags);
card->thread_running_mask &= ~thread;
spin_unlock_irqrestore(&card->thread_mask_lock, flags);
wake_up(&card->wait_q);
wake_up_all(&card->wait_q);
}
EXPORT_SYMBOL_GPL(qeth_clear_thread_running_bit);

QETH_CARD_TEXT(card, 2, "CGENCHK");
dev_warn(&cdev->dev, "The qeth device driver 
"failed to recover an error on the device\n");
QETH_DBF_MESSAGE(2, "%s check on device dstat=x%0c, cstat=x%0c\n",open source used in 5gaa5 edge ac-4 27577
-dev_name(&cdev->dev), dstat, cstat);
+QETH_DBF_MESSAGE(2, "check on channel %x with dstat=%#x, cstat=%#x\n", 
+ CCW_DEVID(cdev), dstat, cstat);
print_hex_dump(KERN_WARNING, "qeth: irb ", DUMP_PREFIX_OFFSET,
16, 1, irb, 64, 1);
return 1;
@@ -1063,8 +1070,8 @@
switch (PTR_ERR(irb)) {
case -EIO:
- QETH_DBF_MESSAGE(2, "%s i/o-error on device\n", 
- dev_name(&cdev->dev));
+ QETH_DBF_MESSAGE(2, "i/o-error on channel %x\n", 
+ CCW_DEVID(cdev));
 QETH_CARD_TEXT(card, 2, "ckirberr");
 QETH_CARD_TEXT_(card, 2, " rc%d", -EIO);
brea
QETH_CARD_TEXT(card, 5, "data");
} +
+if (qeth_intparm_is_iob(intparm))
+iob = (struct qeth_cmd_buffer *) __va((addr_t)intparm);
+
+if (__qeth_check_rib_error(cdev, intparm, irb)) {
+ /* IO was terminated, free its resources. */
+ if (iob)
+ qeth_release_buffer(iob->channel, iob);
+ atomic_set(&channel->irq_pending, 0);
+ wake_up(&card->wait_q);
+ return;
+}
+
+ atomic_set(&channel->irq_pending, 0);

if (irb->scsw.cmd.fctl & (SCSW_FCTL_CLEAR_FUNC))
@@ -1144,6 +1157,10 @@
/* we don't have to handle this further */
 intparm = 0;
} +
+cstat = irb->scsw.cmd.cstat;
+dstat = irb->scsw.cmd.dstat;
+
+if ((dstat & DEV_STAT_UNIT_EXCEP) ||
+ (dstat & DEV_STAT_UNIT_CHECK) ||
+ (cstat)) {
@@ -1151,9 +1168,9 @@
 dev_warn(&channel->ccwdev->dev,
 "The qeth device driver failed to recover 
"an error on the device"");
-QETH_DBF_MESSAGE(2, "%s sense data available. cstat 
""0x%X dstat 0x%X\n", 
-dev_name(&channel->ccwdev->dev), cstat, dstat);
+QETH_DBF_MESSAGE(2, "sense data available on channel %x: cstat %#X dstat %#X\n", 
+ CCW_DEVID(channel->ccwdev), cstat,
+ dstat);
 print_hex_dump(KERN_WARNING, "qeth: irb ",
 DUMP_PREFIX_OFFSET, 16, 1, irb, 32, 1);
 print_hex_dump(KERN_WARNING, "qeth: sense data ",
@@ -1165,6 +1182,9 @@
 rc = qeth_get_problem(cdev, irb);
 if (rc) {
+ card->read_or_write_problem = 1;
+ if (iob)

+qeth_release_buffer(iob->channel, iob);
+qeth_clear_ipacmd_list(card);
+qeth_schedule_recovery(card);
go to out;
@@ -1175,25 +1195,15 @@
+channel->state = CH_STATE_RCD_DONE;
go to out;
+}
+i
+if (intparm) {
+-buffer = (struct qeth_cmd_buffer *) __va((addr_t)intparm);
+-buffer->state = BUF_STATE_PROCESSED;
+-}
+if (channel == &card->data)
+return;
+if (channel == &card->read &&
+ channel->state == CH_STATE_UP)
+-qeth_issue_next_read(card);
+-__qeth_issue_next_read(card);
+iob = channel->iob;
+index = channel->buf_no;
+-while (iob[index].state == BUF_STATE_PROCESSED) {
+-if (iob[index].callback != NULL)
+-iob[index].callback(channel, iob + index);
+if (iob && iob->callback)
+iob->callback(iob->channel, iob);
+-index = (index + 1) % QETH_CMD_BUFFER_NO;
+-}
+-channel->buf_no = index;
+out:
+wake_up(&card->wait_q);
+return;
@@ -1717,23 +1727,87 @@
+if (prcd[0x11] == _ascebc[‘M’]);
+}
+static enum qeth_discipline_id qeth_vm_detect_layer(struct qeth_card *card)
+{
+enum qeth_discipline_id disc = QETH_DISCIPLINE_UNDETERMINED;
+struct diag26c_vnic_resp *response = NULL;
+struct diag26c_vnic_req *request = NULL;
+struct ccw_dev_id id;
+char userid[80];
+int rc = 0;
++QETH_DBF_TEXT(SETUP, 2, "vmlayer");
++}
```c
+cpcmd("QUERY USERID", userid, sizeof(userid), &rc);  
+if (rc)  
+goto out;  
+  
+request = kzalloc(sizeof(*request), GFP_KERNEL | GFP_DMA);  
+response = kzalloc(sizeof(*response), GFP_KERNEL | GFP_DMA);  
+if (!request || !response) {  
+    rc = -ENOMEM;  
+    goto out;  
+}  
+  
+ccw_device_get_id(CARD_RDEV(card), &id);  
+request->resp_buf_len = sizeof(*response);  
+request->resp_version = DIAG26C_VERSION6_VM65918;  
+request->req_format = DIAG26C_VNIC_INFO;  
+ASCEBC(userid, 8);  
+memcpy(&request->sys_name, userid, 8);  
+request->devno = id.devno;  
+  
+QETH_DBF_HEX(CTRL, 2, request, sizeof(*request));  
+rc = diag26c(request, response, DIAG26C_PORT_VNIC);  
+QETH_DBF_HEX(CTRL, 2, request, sizeof(*request));  
+if (rc)  
+goto out;  
+QETH_DBF_HEX(CTRL, 2, response, sizeof(*response));  
+  
+if (request->resp_buf_len < sizeof(*response) ||  
+    response->version != request->resp_version) {  
+    rc = -EIO;  
+    goto out;  
+}  
+  
+if (response->protocol == VNIC_INFO_PROT_L2)  
+    disc = QETH_DISCIPLINE_LAYER2;  
+else if (response->protocol == VNIC_INFO_PROT_L3)  
+    disc = QETH_DISCIPLINE_LAYER3;  
+  
+out:  
+kfree(response);  
kfree(request);  
+if (rc)  
+QETH_DBF_TEXT_(SETUP, 2, "err%x", rc);  
+return disc;  
+}  
+  
/* Determine whether the device requires a specific layer discipline */  
static enum qeth_discipline_id qeth_enforce_discipline(struct qeth_card *card) {
```

The code snippet provided is from a network driver, likely for a QEMU-based network emulator. It demonstrates the handling of a query to retrieve a user ID from the device, followed by a diagnostic call to a function `diag26c()` with a request and response structure. Error checks are performed on the returned code to ensure correctness. The snippet also includes logic to determine the layer discipline required by the device based on the response protocol. Finally, it includes a function declaration `qeth_enforce_discipline()`, which is presumably responsible for enforcing the correct discipline layer for the device based on the query response.
enum qeth_discipline_id disc = QETH_DISCIPLINE_UNDETERMINED;

if (card->info.type == QETH_CARD_TYPE_OSM ||
    card->info.type == QETH_CARD_TYPE_OSN) {
    QETH_DBF_TEXT(SETUP, 3, "force l2");
    return QETH_DISCIPLINE_LAYER2;
}

else if (card->info.type == QETH_CARD_TYPE_OSN)
    disc = QETH_DISCIPLINE_LAYER2;

else if (card->info.type == QETH_CARD_TYPE_IQD)
    disc = (card->info.type == QETH_CARD_TYPE_IQD) ?
        QETH_DISCIPLINE_LAYER3 :
        qeth_vm_detect_layer(card);

/* virtual HiperSocket is L3 only: */
if (card->info.guestlan && card->info.type == QETH_CARD_TYPE_IQD) {
    switch (disc) {
    case QETH_DISCIPLINE_LAYER2:
        QETH_DBF_TEXT(SETUP, 3, "force l2");
        break;
    case QETH_DISCIPLINE_LAYER3:
        QETH_DBF_TEXT(SETUP, 3, "force l3");
        return QETH_DISCIPLINE_LAYER3;
        break;
    default:
        QETH_DBF_TEXT(SETUP, 3, "force no");
    }

    QETH_DBF_TEXT(SETUP, 3, "force no");
    return QETH_DISCIPLINE_UNDETERMINED;
    return disc;
}

static void qeth_configure_blkt_default(struct qeth_card *card, char *prcd)
@@ -1799,14 +1873,15 @@
    atomic_cmpxchg(&channel->irq_pending, 0, 1) == 0);
    QETH_DBF_TEXT(SETUP, 6, "noirqpnd");
    spin_lock_irqsave(get_ccwdev_lock(channel->ccwdev), flags);
    rc = ccw_device_start(channel->ccwdev, 
                     &channel->ccw, (addr_t) iob, 0, 0);
    +rc = ccw_device_start_timeout(channel->ccwdev, &channel->ccw, 
                       (addr_t) iob, 0, 0, QETH_TIMEOUT);
    spin_unlock_irqrestore(get_ccwdev_lock(channel->ccwdev), flags);
    if (rc) {
        QETH_DBF_MESSAGE(2, "Error2 in activating channel rc=%d\n", rc);
        QETH_DBF_TEXT_(SETUP, 2, "2err%d", rc);
        atomic_set(&channel->irq_pending, 0);
    }
+qeth_release_buffer(channel, iob);
wake_up(&card->wait_q);
return rc;
}
@@ -1817,7 +1892,6 @@
if (channel->state != CH_STATE_UP) {
  rc = -ETIME;
  QETH_DBF_TEXT_(SETUP, 2, "3err%d", rc);
-qeth_clear_cmd_buffers(channel);
} else
  rc = 0;
return rc;
@@ -1871,8 +1945,8 @@
atomic_cmpxchg(&channel->irq_pending, 0, 1) == 0);
QETH_DBF_TEXT(SETUP, 6, "noirqpnd");
spin_lock_irqsave(get_ccwdev_lock(channel->ccwdev), flags);
-rc = ccw_device_start(channel->ccwdev,
-    &channel->ccw, (addr_t) iob, 0, 0);
+rc = ccw_device_start_timeout(channel->ccwdev, &channel->ccw,
+    (addr_t) iob, 0, 0, QETH_TIMEOUT);
spin_unlock_irqrestore(get_ccwdev_lock(channel->ccwdev), flags);

if (rc) {
  @@ -1880,6 +1954,7 @@
    rc);
    QETH_DBF_TEXT_(SETUP, 2, "1err%d", rc);
    atomic_set(&channel->irq_pending, 0);
  +qeth_release_buffer(channel, iob);
wake_up(&card->wait_q);
  return rc;
}
@@ -1890,10 +1965,9 @@
if (channel->state != CH_STATE_ACTIVATING) {
  dev_warn(&channel->ccwdev->dev, "The qeth device driver"
    " failed to recover an error on the device\n");
-QETH_DBF_MESSAGE(2, "%s IDX activate timed out\n",
-QETH_DBF_MESSAGE(2, "%s IDX activate timed out on channel %x\n",
+QETH_DBF_MESSAGE(2, "IDX activate timed out on channel %x\n",
    +CCW_DEVID(channel->ccwdev));
  QETH_DBF_TEXT_(SETUP, 2, "2err%d", -ETIME);
  -qeth_clear_cmd_buffers(channel);
  return -ETIME;
}
return qeth_idx_activate_get_answer(channel, idx_reply_cb);
@@ -1924,21 +1998,19 @@
if (!(QETH_IS_IDX_ACT_POS_REPLY(iob->data))) {
  if (QETH_IDX_ACT_CAUSE_CODE(iob->data) == QETH_IDX_ACT_ERR_EXCL)
dev_err(&card->write.ccwdev->dev),
+dev_err(&channel->ccwdev->dev),
"The adapter is used exclusively by another 
"host\n";
else
- QETH_DBF_MESSAGE(2, "%s IDX_ACTIVATE on write channel:
-" negative reply\n",
-dev_name(&card->write.ccwdev->dev));
+ QETH_DBF_MESSAGE(2, "IDX_ACTIVATE on channel %x: negative reply\n",
+ CCW_DEVID(channel->ccwdev));
goto out;
}
memcpy(&temp, QETH_IDX_ACT_FUNC_LEVEL(iob->data), 2);
if (((temp & ~0x0100) != qeth_peer_func_level(card->info.func_level)) { 
- QETH_DBF_MESSAGE(2, "%s IDX_ACTIVATE on write channel:
-" function level mismatch (sent: 0x%x, received: 
-"0x%x)\n", dev_name(&card->write.ccwdev->dev),
- card->info.func_level, temp);
+ QETH_DBF_MESSAGE(2, "IDX_ACTIVATE on channel %x: function level mismatch (sent: %#x, received: 
+ %#x)\n",
+ CCW_DEVID(channel->ccwdev),
+ card->info.func_level, temp);
goto out;
} channel->state = CH_STATE_UP;
@@ -1965,20 +2037,19 @@
if (!QETH_IS_IDX_ACT_POS_REPLY(iob->data)) { 
switch (QETH_IDX_ACT_CAUSE_CODE(iob->data)) { 
 case QETH_IDX_ACT_ERR_EXCL:
- dev_err(&card->write.ccwdev->dev),
+ dev_err(&channel->ccwdev->dev),
"The adapter is used exclusively by another 
"host\n");
break;
case QETH_IDX_ACT_ERR_AUTH:
case QETH_IDX_ACT_ERR_AUTH_USER:
- dev_err(&card->read.ccwdev->dev),
+ dev_err(&channel->ccwdev->dev),
"Setting the device online failed because of 
"insufficient authorization\n");
break;
default:
- QETH_DBF_MESSAGE(2, "%s IDX_ACTIVATE on read channel:
-" negative reply\n",
- dev_name(&card->read.ccwdev->dev));
+ QETH_DBF_MESSAGE(2, "IDX_ACTIVATE on channel %x: negative reply\n",
+ CCW_DEVID(channel->ccwdev));
}
memset(&temp, QETH_IDX_ACT_FUNC_LEVEL(iob->data), 2);
if (temp != qeth_peer_func_level(card->info.func_level)) {
    QETH_DBF_MESSAGE(2, "%s IDX_ACTIVATE on channel: function level mismatch (sent: 0x%x, received: 0x%x)\n", dev_name(&card->read.ccwdev->dev), card->info.func_level, temp);
goto out;
}
memcpy(&card->token.issuer_rm_r,
    
void qeth_prepare_control_data(struct qeth_card *card, int len, struct qeth_cmd_buffer *iob)
{
    qeth_setup_ccw(&card->write, iob->data, len);
    qeth_setup_ccw(iob->channel, iob->data, len);
iob->callback = qeth_release_buffer;
    
    memcpy(QETH_TRANSPORT_HEADER_SEQ_NO(iob->data),
        unsigned long cb_cmd),
    void *reply_param)
    |
struct qeth_channel *channel = iob->channel;
    int rc;
    unsigned long flags;
    struct qeth_reply *reply = NULL;
    unsigned long timeout, event_timeout;
    struct qeth_ipa_cmd *cmd;
    +struct qeth_ipa_cmd *cmd = NULL;

    QETH_CARD_TEXT(card, 2, "sendctl"):
    if (card->read_or_write_problem) {
        qeth_release_buffer(iob->channel, iob);
        +qeth_release_buffer(channel, iob);
        return -EIO;
    }
    reply = qeth_alloc_reply(card);
    if (!reply) {
        qeth_release_buffer(channel, iob);
        return -ENOMEM;
    }
    rc = qeth_exec_cmd(channel, cmd);
    if (rc)
        goto out;
    if (cmd = qeth_reply)
        +qeth_release_buffer(channel, iob);
return -ENOMEM;
}  
reply->callback = reply_cb;
reply->param = reply_param;
- if (card->state == CARD_STATE_DOWN)
- reply->seqno = QETH_IDX_COMMAND_SEQNO;
- else
  - reply->seqno = card->seqno.ipa++;
+ init_waitqueue_head(&reply->wait_q);
- spin_lock_irqsave(&card->lock, flags);
- list_add_tail(&reply->list, &card->cmd_waiter_list);
- spin_unlock_irqrestore(&card->lock, flags);

- while (atomic_cmpxchg(&card->write.irq_pending, 0, 1)) ;
- qeth_prepare_control_data(card, len, iob);
+ while (atomic_cmpxchg(&channel->irq_pending, 0, 1)) ;

- if (IS_IPA(iob->data))
+ if (IS_IPA(iob->data)) {
  + cmd = __ipa_cmd(iob);
  + cmd->hdr.seqno = card->seqno.ipa++;
  + reply->seqno = cmd->hdr.seqno;
  event_timeout = QETH_IPA_TIMEOUT;
- else
  + } else {
    + reply->seqno = QETH_IDX_COMMAND_SEQNO;
  event_timeout = QETH_TIMEOUT;
  + }
+ qeth_prepare_control_data(card, len, iob);
+ 
+ spin_lock_irqsave(&card->lock, flags);
+ list_add_tail(&reply->list, &card->cmd_waiter_list);
+ spin_unlock_irqrestore(&card->lock, flags);
+ 
timeout = jiffies + event_timeout;

QETH_CARD_TEXT(card, 6, "noirqpnd");
- spin_lock_irqsave(get_ccwdev_lock(card->write.ccwdev), flags);
- rc = ccw_device_start(card->write.ccwdev, &card->write.ccw,
  - (addr_t) iob, 0, 0);
- spin_unlock_irqrestore(get_ccwdev_lock(card->write.ccwdev), flags);
+ spin_lock_irqsave(get_ccwdev_lock(channel->ccwdev), flags);
+ rc = ccw_device_start_timeout(channel->ccwdev, &channel->ccw,
  + (addr_t) iob, 0, 0, event_timeout);
+ spin_unlock_irqrestore(get_ccwdev_lock(channel->ccwdev), flags);
if (rc) {
- QETH_DBF_MESSAGE(2, "%s qeth_send_control_data: ")
"ccw_device_start rc = %\n",
-dev_name(&card->write.ccwdev->dev), rc);
+QETH_DBF_MESSAGE(2, "qeth_send_control_data on device %x: ccw_device_start rc = %\n",
+ CARD_DEVID(card), rc);
QETH_CARD_TEXT_(card, 2, " err%d", rc);
spin_lock_irqsave(&card->lock, flags);
list_del_init(&reply->list);
queth_put_reply(reply);
spin_unlock_irqrestore(&card->lock, flags);
-qeth_release_buffer(iob->channel, iob);
-atomic_set(&card->write.irq_pending, 0);
+qeth_release_buffer(channel, iob);
+atomic_set(&channel->irq_pending, 0);
wake_up(&card->wait_q);
return rc;
}

/* we have only one long running ipassist, since we can ensure
 process context of this command we can sleep */
-cmd = (struct qeth_ipa_cmd *)(iob->data+IPA_PDU_HEADER_SIZE);
-if ((cmd->hdr.command == IPA_CMD_SETIP) &&
 - (cmd->hdr.prot_version == QETH_PROT_IPV4)) {
 +if (cmd && cmd->hdr.command == IPA_CMD_SETIP &&
 + cmd->hdr.prot_version == QETH_PROT_IPV4) {
 if (!wait_event_timeout(reply->wait_q,
  atomic_read(&reply->received), event_timeout))
goto time_err;
@@ -2125,8 +2199,6 @@
 }
 }

-if (reply->rc == -EIO)
-goto error;
rc = reply->rc;
queth_put_reply(reply);
return rc;
@@ -2137,10 +2209,6 @@
 list_del_init(&reply->list);
 spin_unlock_irqrestore(&reply->card->lock, flags);
 atomic_inc(&reply->received);
-error:
-atomic_set(&card->write.irq_pending, 0);
-qeth_release_buffer(iob->channel, iob);
-card->write.buf_no = (card->write.buf_no + 1) % QETH_CMD_BUFFER_NO;
rc = reply->rc;
queth_put_reply(reply);
return rc;
@@ -2431,11 +2499,12 @@
-static void qeth_free_qdio_out_buf(struct qeth_qdio_out_q *q)
+static void qeth_free_output_queue(struct qeth_qdio_out_q *q)
{
  if (!q)
    return;

+qeth_clear_outq_buffers(q, 1);
qdio_free_buffers(q->qdio_bufs, QDIO_MAX_BUFFERS_PER_Q);  
kfree(q);
}
@@ -2508,10 +2577,8 @@
card->qdio.out_qs[i]->bufs[j] = NULL;
}
out_freeoutq:
-while (i > 0) {
-  qeth_free_qdio_out_buf(card->qdio.out_qs[--i]);
-  qeth_clear_outq_buffers(card->qdio.out_qs[i], 1);
-}
+while (i > 0)
+  qeth_free_output_queue(card->qdio.out_qs[--i]);
kfree(card->qdio.out_qs);
card->qdio.out_qs = NULL;
out_freepool:
@@ -2544,10 +2611,8 @@
qeth_free_buffer_pool(card);
/* free outbound qdio_qs */
if (card->qdio.out_qs) {
  -for (i = 0; i < card->qdio.no_out_queues; ++i) {
-    qeth_clear_outq_buffers(card->qdio.out_qs[i], 1);
-    qeth_free_qdio_out_buf(card->qdio.out_qs[i]);
-  }
+  for (i = 0; i < card->qdio.no_out_queues; i++)
+    qeth_free_output_queue(card->qdio.out_qs[i]);
kfree(card->qdio.out_qs);
card->qdio.out_qs = NULL;
}
@@ -2774,12 +2839,12 @@
if ((card->options.cq == QETH_CQ_ENABLED) && (!buf->rx_skb)) {
  buf->rx_skb = dev_alloc_skb(QETH_RX_PULL_LEN + ETH_HLEN);
  if (!buf->rx_skb)
    -return 1;
+return -ENOMEM;
}

pool_entry = qeth_find_free_buffer_pool_entry(card);
if (!pool_entry)
-    return 1;
+    return -ENOBUFS;

/*
 * since the buffer is accessed only from the input_tasklet
@@ -2811,10 +2876,15 @@
/* inbound queue */
qdio_reset_buffers(card->qdio.in_q->qdio_bufs,
    QDIO_MAX_BUFFERS_PER_Q);
+qeth_initialize_working_pool_list(card);
/* give only as many buffers to hardware as we have buffer pool entries */
-for (i = 0; i < card->qdio.in_buf_pool.buf_count - 1; ++i)
-    qeth_init_input_buffer(card, &card->qdio.in_q->bufs[i]);
+for (i = 0; i < card->qdio.in_buf_pool.buf_count - 1; i++) {
+    rc = qeth_init_input_buffer(card, &card->qdio.in_q->bufs[i]);
+    if (rc)
+        return rc;
+}
+return rc;
+
+card->qdio.in_q->next_buf_to_init =
    card->qdio.in_buf_pool.buf_count - 1;
rc = do_QDIO(CARD_DDEV(card), QDIO_FLAG_SYNC_INPUT, 0, 0,
@@ -2868,7 +2938,7 @@
memset(cmd, 0, sizeof(struct qeth_ipa_cmd));
cmd->hdr.command = command;
cmd->hdr.initiator = IPA_CMD_INITIATOR_HOST;
-cmd->hdr.seqno = card->seqno.ipa;
+/* cmd->hdr.seqno is set by qeth_send_control_data() */
cmd->hdr.adapter_type = qeth_get_ipa_adp_type(card->info.link_type);
cmd->hdr.rel_adapter_no = (__u8) card->info.portno;
if (card->options.layer2)
@@ -2960,28 +3030,23 @@
) else {
    dev_warn(&card->gdev->dev,
        "The qeth driver ran out of channel command buffers\n");
-QETH_DBG_MESSAGE(1,"%s The qeth driver ran out of channel command buffers",
-    dev_name(&card->gdev->dev));
+QETH_DBG_MESSAGE(1,"device %x ran out of channel command buffers",
+    CARD_DEVID(card));
}

return iob;
@@ -2960,28 +3030,23 @@
return rc;
}
static int qeth_default_setadapterparms_cb(struct qeth_card *card, struct qeth_reply *reply, unsigned long data)
+
static int qeth_setadpparms_inspect_rc(struct qeth_ipa_cmd *cmd)
{
  -
  -
  -
  -
    QETH_CARD_TEXT(card, 4, "defadpcb");
    -
    cmd = (struct qeth_ipa_cmd *) data;
    -
    if (cmd->hdr.return_code == 0)
    +
    if (!cmd->hdr.return_code)
        cmd->hdr.return_code =
        cmd->data.setadapterparms.hdr.return_code;
    -
    return 0;
  +
    return cmd->hdr.return_code;
}

static int qeth_query_setadapterparms_cb(struct qeth_card *card, struct qeth_reply *reply, unsigned long data)
{
  -
  +
    cmd = (struct qeth_ipa_cmd *) data;
    +
    if (qeth_setadpparms_inspect_rc(cmd))
        +
        return 0;
  -
  +
    cmd = (struct qeth_ipa_cmd *) data;
    if (cmd->data.setadapterparms.data.query_cmds_supp.lan_type & 0x7f) {
        card->info.link_type =
        cmd->data.setadapterparms.data.query_cmds_supp.lan_type;
        @ @ -2989,7 +3054,7 @ @
    }
    card->options.adp.supported_funcs =
    cmd->data.setadapterparms.data.query_cmds_supp.supported_cmds;
    -
    return qeth_default_setadapterparms_cb(card, reply, (unsigned long)cmd);
    +
    return 0;
}

static struct qeth_cmd_buffer *qeth_get_adapter_cmd(struct qeth_card *card, struct qeth_reply *reply, unsigned long data)
{
  -
  -
    if (cmd->data.setadapterparms.data.query_cmds_supp.lan_type & 0x7f)
        {
        card->info.link_type =
        cmd->data.setadapterparms.data.query_cmds_supp.lan_type;
        @ @ -2989,7 +3054,7 @ @
        }
    card->options.adp.supported_funcs =
    cmd->data.setadapterparms.data.query_cmds_supp.supported_cmds;
    -
    return qeth_default_setadapterparms_cb(card, reply, (unsigned long)cmd);
    +
    return 0;
}

static struct qeth_cmd_buffer *qeth_get_adapter_cmd(struct qeth_card *card, @ @ -3044,10 +3109,9 @ @
return -0;
default:
if (cmd->hdr.return_code) {
    -
    -QETH_DBF_MESSAGE(1, "%s IPA_CMD_QIPASSIST: Unhandled "
    -"rc=%d\n",
    -dev_name(&card->gdev->dev),
    -cmd->hdr.return_code);
QETH_DBF_MESSAGE(1, "IPA_CMD_QIPASSIST on device %x: Unhandled rc=%#x\n", + CARD_DEVID(card), + cmd->hdr.return_code);
return 0;
}
}
@@ -3059,8 +3123,8 @@
card->options.ipa6.supported_funcs = cmd->hdr.ipa_supported;
card->options.ipa6.enabled_funcs = cmd->hdr.ipa_enabled;
} else
-QETH_DBF_MESSAGE(1, "%s IPA_CMD_QIPASSIST: Flawed LIC detected"
-"\n", dev_name(&card->gdev->dev));
+QETH_DBF_MESSAGE(1, "IPA_CMD_QIPASSIST on device %x: Flawed LIC detected\n", + CARD_DEVID(card));
return 0;
}
@@ -3081,22 +3145,20 @@
static int qeth_query_switch_attributes_cb(struct qeth_card *card,
 struct qeth_reply *reply, unsigned long data)
{
-struct qeth_ipa_cmd *cmd;
-struct qeth_switch_info *sw_info;
+struct qeth_ipa_cmd *cmd = (struct qeth_ipa_cmd *) data;
 struct qeth_query_switch_attributes *attrs;
+struct qeth_switch_info *sw_info;

 QETH_CARD_TEXT(card, 2, "qswiatcb");
 -cmd = (struct qeth_ipa_cmd *) data;
 -sw_info = (struct qeth_switch_info *)reply->param;
- if (cmd->data.setadapterparms.hdr.return_code == 0) {
- attrs = &cmd->data.setadapterparms.data.query_switch_attributes;
- sw_info->capabilities = attrs->capabilities;
- sw_info->settings = attrs->settings;
- QETH_CARD_TEXT_(card, 2, "%04x%04x", sw_info->capabilities,
- sw_info->settings);
- }
-qeth_default_setadapterparms_cb(card, reply, (unsigned long) cmd);
+if (qeth_setadpparms_inspect_rc(cmd))
+ return 0;
+
+sw_info = (struct qeth_switch_info *)reply->param;
+attrs = &cmd->data.setadapterparms.data.query_switch_attributes;
+sw_info->capabilities = attrs->capabilities;
+sw_info->settings = attrs->settings;
+QETH_CARD_TEXT_(card, 2, "%04x%04x", sw_info->capabilities,
+sw_info->settings);
 return 0;
qdio_flags = QDIO_FLAG_SYNC_OUTPUT;
if (atomic_read(&queue->set_pci_flags_count))
    qdio_flags |= QDIO_FLAG_PCI_OUT;
atomic_add(count, &queue->used_buffers);
+
rc = do_QDIO(CARD_DDEV(queue->card), qdio_flags,
    queue->queue_no, index, count);
if (queue->card->options.performance_stats)
    queue->card->perf_stats.outbound_do_qdio_time +=
    qeth_get_micros() -
    queue->card->perf_stats.outbound_do_qdio_start_time;
-atomic_add(count, &queue->used_buffers);
if (rc) {
queue->card->stats.tx_errors += count;
/* ignore temporary SIGA errors without busy condition */
QETH_CARD_TEXT(queue->card, 5, "aob");
QETH_CARD_TEXT_(queue->card, 5, "%lx",
    virt_to_phys(buffer->aob));
+
/* prepare the queue slot for re-use: */
+qeth_scrub_qdio_buffer(buffer->buffer,
+    QETH_MAX_BUFFER_ELEMENTS(card));
if (qeth_init_qdio_out_buf(queue, bidx)) {
    QETH_DBF_MESSAGE(2, "Invalid size of IP packet ");
}
struct qeth_reply *reply, unsigned long data)
{
    struct qeth_ipa_cmd *cmd;
+struct qeth_ipa_cmd *cmd = (struct qeth_ipa_cmd *) data;
    struct qeth_ipacmd_setadpparms *setparms;

    QETH_CARD_TEXT(card, 4, "prmadpcb");

    -cmd = (struct qeth_ipa_cmd *) data;
    setparms = &(cmd->data.setadapterparms);
    -
    -qeth_default_setadapterparms_cb(card, reply, (unsigned long)cmd);
    -if (cmd->hdr.return_code) {
        if (qeth_setadpparms_inspect_rc(cmd)) {
            QETH_CARD_TEXT_(card, 4, "prmrc%x", cmd->hdr.return_code);
            setparms->data.mode = SET_PROMISC_MODE_OFF;
        }
    }
    @ @ -4211,19 +4277,19 @@
static int qeth_setadpparms_change_macaddr_cb(struct qeth_card *card,
struct qeth_reply *reply, unsigned long data)
{
    -struct qeth_ipa_cmd *cmd;
    +struct qeth_ipa_cmd *cmd = (struct qeth_ipa_cmd *) data;
    +struct qeth_ipacmd_setadpparms *adp_cmd;
    QETH_CARD_TEXT(card, 4, "chgmaccb");
    +if (qeth_setadpparms_inspect_rc(cmd)) {
        return 0;
    }

    -cmd = (struct qeth_ipa_cmd *) data;
    -if (!card->options.layer2 ||
        !(card->info.mac_bits & QETH_LAYER2_MAC_READ)) {
        memcpy(card->dev->dev_addr,
               &cmd->data.setadapterparms.data.change_addr.addr,
               OSA_ADDR_LEN);
        card->info.mac_bits |= QETH_LAYER2_MAC_READ;
    -}
    -qeth_default_setadapterparms_cb(card, reply, (unsigned long) cmd);
    +adp_cmd = &cmd->data.setadapterparms;
    +if (IS_LAYER2(card) && IS_OSD(card) && !IS_VM_NIC(card) &&
        !!(adp_cmd->hdr.flags & QETH_SETADP_FLAGS_VIRTUAL_MAC)) {
        return 0;
    +
        ether_addr_copy(card->dev->dev_addr, adp_cmd->data.change_addr.addr);
        return 0;
    }
    @ @ -4254,13 +4320,15 @@
static int qeth_setadpparms_set_access_ctrl_cb(struct qeth_card *card,
struct qeth_reply *reply, unsigned long data)
{
-struct qeth_ipa_cmd *cmd;
+struct qeth_ipa_cmd *cmd = (struct qeth_ipa_cmd *) data;
struct qeth_set_access_ctrl *access_ctrl_req;
int fallback = *(int *)reply->param;

QETH_CARD_TEXT(card, 4, "setacb");
+if (cmd->hdr.return_code)
+return 0;
+qeth_setadpparms_inspect_rc(cmd);

-cmd = (struct qeth_ipa_cmd *) data;
access_ctrl_req = &cmd->data.setadapterparms.data.set_access_ctrl;
QETH_DBF_TEXT_(SETUP, 2, "setacb");
QETH_DBF_TEXT_(SETUP, 2, "%s", card->gdev->dev.kobj.name);
@@ -4268,10 +4336,9 @@
if (cmd->data.setadapterparms.hdr.return_code !=
SET_ACCESS_CTRL_RC_SUCCESS)
-QETH_DBF_MESSAGE(3, "ERR:SET_ACCESS_CTRL(%s,%d)==%d\n",
-card->gdev->dev.kobj.name,
-access_ctrl_req->subcmd_code,
-cmd->data.setadapterparms.hdr.return_code);
+QETH_DBF_MESSAGE(3, "ERR:SET_ACCESS_CTRL(%#x) on device %x: %#x\n",
+ access_ctrl_req->subcmd_code, CARD_DEVID(card),
+ cmd->data.setadapterparms.hdr.return_code);
switch (cmd->data.setadapterparms.hdr.return_code) {
  case SET_ACCESS_CTRL_RC_SUCCESS:
if (fallback)
 card->options.isolation = card->options.prev_isolation;
break;
  case SET_ACCESS_CTRL_RC_ALREADY_NOT_ISOLATED:
-QETH_DBF_MESSAGE(2, "%s QDIO data connection isolation already 
-"deactivated\n", dev_name(&card->gdev->dev));
+QETH_DBF_MESSAGE(2, "QDIO data connection isolation on device %x already deactivated\n",
+ CARD_DEVID(card));
if (fallback)
 card->options.isolation = card->options.prev_isolation;
break;
  case SET_ACCESS_CTRL_RC_ALREADY_ISOLATED:
-QETH_DBF_MESSAGE(2, "%s QDIO data connection isolation already 
-"activated\n", dev_name(&card->gdev->dev));
+QETH_DBF_MESSAGE(2, "QDIO data connection isolation on device %x already activated\n",
+ CARD_DEVID(card));
if (fallback)
card->options.isolation = card->options.prev_isolation;
break;
@@ -4333,7 +4400,6 @@
card->options.isolation = card->options.prev_isolation;
break;
}
-qeth_default_setadapterparms_cb(card, reply, (unsigned long) cmd);
return 0;
}

@@ -4377,10 +4443,8 @@
rc = qeth_setadpparms_set_access_ctrl(card, card->options.isolation, fallback);
if (rc) {
-    QETH_DBF_MESSAGE(3, "IPA(SET_ACCESS_CTRL,%s,%d) sent failed\n",
-                    card->gdev->dev.kobj.name,
-                    rc);
+    QETH_DBF_MESSAGE(3, "IPA(SET_ACCESS_CTRL(%d) on device %x: sent failed\n",
+                    rc, CARD_DEVID(card));
    rc = -EOPNOTSUPP;
}
} else if (card->options.isolation != ISOLATION_MODE_NONE) {
@@ -4415,7 +4479,8 @@
    if ((card->info.link_type != QETH_LINK_TYPE_GBIT_ETH) &&
        (card->info.link_type != QETH_LINK_TYPE_OSN) &&
        (card->info.link_type != QETH_LINK_TYPE_10GBIT_ETH))
+        (card->info.link_type != QETH_LINK_TYPE_25GBIT_ETH))
    rc |= BMCR_SPEED100;
break;
case MII_BMSR: /* Basic mode status register */
@@ -4498,8 +4563,8 @@
{
    struct qeth_ipa_cmd *cmd;
    struct qeth_arp_query_info *qinfo;
-    struct qeth_snmp_cmd *snmp;
    unsigned char *data;
+    void *snmp_data;
    __u16 data_len;

    QETH_CARD_TEXT(card, 3, "snpcmdcb");
    @ @ -4507,7 +4572,6 @@
    cmd = (struct qeth_ipa_cmd *) sdata;
    data = (unsigned char *)((char *)cmd - reply->offset);
    qinfo = (struct qeth_arp_query_info *) reply->param;
    -snmp = &cmd->data.setadapterparms.data.snmp;
if (cmd->hdr.return_code) {
    QETH_CARD_TEXT_(card, 4, "scer1%x", cmd->hdr.return_code);
    return 0;
}
data_len *= ((__u16 *)QETH_IPA_PDU_LEN_PDU1(data));
-if (cmd->data.setadapterparms.hdr.seq_no == 1)
    data_len -= ((__u16)((char *)&snmp->data - (char *)cmd));
-else
    data_len -= ((__u16)((char *)&snmp->request - (char *)cmd));
+if (cmd->data.setadapterparms.hdr.seq_no == 1) {
    +snmp_data = &cmd->data.setadapterparms.data.snmp;
    +data_len -= offsetof(struct qeth_ipa_cmd, data.setadapterparms.data.snmp);
+} else {
    +snmp_data = &cmd->data.setadapterparms.data.snmp.request;
    +data_len -= offsetof(struct qeth_ipa_cmd, data.setadapterparms.data.snmp.request);
+}
/* check if there is enough room in userspace */
if ((qinfo->udata_len - qinfo->udata_offset) < data_len) {
    QETH_CARD_TEXT_(card, 4, "sseqn%i", cmd->data.setadapterparms.hdr.seq_no);
    /* copy entries to user buffer */
-    if (cmd->data.setadapterparms.hdr.seq_no == 1) {
-        memcpy(qinfo->udata + qinfo->udata_offset, (char *)&snmp,
-               data_len + offsetof(struct qeth_snmp_cmd, data));
-        qinfo->udata_offset += data_len;
-    } else {
-        memcpy(qinfo->udata + qinfo->udata_offset, (char *)&snmp->request, data_len);
-    }
+    memcpy(qinfo->udata + qinfo->udata_offset, snmp_data, data_len);
    qinfo->udata_offset += data_len;
+ /* check if all replies received ... */
QETH_CARD_TEXT_(card, 4, "srtot%i", cmd->data.setadapterparms.hdr.used_total);
    rc = qeth_send_ipa_snmp_cmd(card, iob, QETH_SETADP_BASE_LEN + req_len,
    qeth_snmp_command_cb, (void *)&qinfo);
    if (rc)
        QETH_DBF_MESSAGE(2, "SNMP command failed on %s: (0x%x)

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+QETH_DBF_MESSAGE(2, "SNMP command failed on device %x: (%#x)u", + CARD_DEVID(card), rc);
else {
    if (copy_to_user(udata, qinfo.udata, qinfo.udata_len))
        rc = -EFAULT;
@@ -4621,14 +4683,15 @@
    static int qeth_setadpparms_query_oat_cb(struct qeth_card *card,
                       struct qeth_reply *reply, unsigned long data)
    {
        @@ -4673,7 +4736,7 @@
                priv.buffer_len = oat_data.buffer_len;
                priv.response_len = 0;
    -priv.buffer = kzalloc(oat_data.buffer_len, GFP_KERNEL);
    +priv.buffer = vzalloc(oat_data.buffer_len);
            if (!priv.buffer) {
                rc = -ENOMEM;
                goto out;
@@ -4714,7 +4777,7 @@
        return rc;
    }
    @@ -4722,21 +4785,18 @@
    static int qeth_query_card_info_cb(struct qeth_card *card,
                              struct qeth_reply *reply, unsigned long data)
    {
        @@ -4722,21 +4785,18 @@
 static int qeth_query_card_info_cb(struct qeth_card *card,
    struct qeth_reply *reply, unsigned long data)
    {
        @@ -4722,21 +4785,18 @@
 static int qeth_query_card_info_cb(struct qeth_card *card,
    struct qeth_reply *reply, unsigned long data)
    {
        @@ -4722,21 +4785,18 @@
 static int qeth_query_card_info_cb(struct qeth_card *card,
    struct qeth_reply *reply, unsigned long data)
    {
        @@ -4722,21 +4785,18 @@
 static int qeth_query_card_info_cb(struct qeth_card *card,
    struct qeth_reply *reply, unsigned long data)
    {
struct qeth_query_card_info *card_info;
-struct carrier_info *carrier_info;

QETH_CARD_TEXT(card, 2, "qcrdincb");
-carrier_info = (struct carrier_info *)reply->param;
-cmd = (struct qeth_ipa_cmd *)data;
-card_info = &cmd->data.setadapterparms.data.card_info;
-if (cmd->data.setadapterparms.hdr.return_code == 0) {
-carrier_info->card_type = card_info->card_type;
-carrier_info->port_mode = card_info->port_mode;
-carrier_info->port_speed = card_info->port_speed;
-
+if (qeth_setadpparms_inspect_rc(cmd))
+return 0;

-qeth_default_setadapterparms_cb(card, reply, (unsigned long) cmd);
+card_info = &cmd->data.setadapterparms.data.card_info;
+carrier_info->card_type = card_info->card_type;
+carrier_info->port_mode = card_info->port_mode;
+carrier_info->port_speed = card_info->port_speed;
+return 0;
}

@@ -4789,9 +4849,12 @@
request->op_code = DIAG26C_GET_MAC;
request->devno = id.devno;

+QETH_DBF_HEX(CTRL, 2, request, sizeof(*request));
rc = diag26c(request, response, DIAG26C_MAC_SERVICES);
+QETH_DBF_HEX(CTRL, 2, request, sizeof(*request));
-if (rc)
+if (rc)
+goto out;
+QETH_DBF_HEX(CTRL, 2, response, sizeof(*response));

-if (request->resp_buf_len < sizeof(*response) ||
  response->version != request->resp_version) {
   @@ -4843,8 +4906,8 @@
rc = qeth_read_conf_data(card, (void **) &prcd, &length);
  if (rc) {
-  QETH_DBF_MESSAGE(2, "%s qeth_read_conf_data returned %i
-
+QETH_DBF_MESSAGE(2, "qeth_read_conf_data on device %x returned %i
+  " CARD_DEVID(card), rc);
    QETH_DBF_TEXT_(SETUP, 2, "5err%d", rc);
    goto out_offline;
  }
@@ -4890,10 +4953,10 @@
if (card->options.cq == QETH_CQ_ENABLED) {
    int offset = QDIO_MAX_BUFFERS_PER_Q *
        (card->qdio.no_in_queues - 1);
    for (i = 0; i < QDIO_MAX_BUFFERS_PER_Q; ++i) {
        in_sbal_ptrs[offset + i] = virt_to_phys(card->qdio.c_q->bufs[i].buffer);
    }
    +
    +for (i = 0; i < QDIO_MAX_BUFFERS_PER_Q; i++)
    +in_sbal_ptrs[offset + i] =
        +card->qdio.c_q->bufs[i].buffer;

    queue_start_poll[card->qdio.no_in_queues - 1] = NULL;
}
@@ -4928,10 +4991,9 @@
    rc = -ENOMEM;
    goto out_free_qib_param;
}
@@ -4951,11 +5013,11 @@
    rc = -ENOMEM;
    goto out_free_queue_start_poll;
}
+for (i = 0, k = 0; i < card->qdio.no_out_queues; ++i)
+    for (j = 0; j < QDIO_MAX_BUFFERS_PER_Q; j++, k++)
+        out_sbal_ptrs[k] = virt_to_phys(
+            card->qdio.out_qs[i]->bufs[j]->buffer);
+
    memset(&init_data, 0, sizeof(struct qdio_initialize));
    init_data.cdev                   = CARD_DDEV(card);
    @@ -5017,8 +5079,6 @@
    QETH_DBF_HEX(SETUP, 2, &card, sizeof(void *));
    qeth_clean_channel(&card->read);
    qeth_clean_channel(&card->write);
-if (card->dev)
free_netdev(card->dev);
qeth_free_qdio_buffers(card);
unregister_service_level(&card->qeth_service_level);
kfree(card);
@@ -5070,8 +5130,8 @@
qeth_update_from_chp_desc(card);
retry:
if (retries < 3)
-QETH_DBF_MESSAGE(2, "%s Retrying to do IDX activates.\n",
-dev_name(&card->gdev->dev));
+QETH_DBF_MESSAGE(2, "Retrying to do IDX activates on device %x.\n",
  + CARD_DEVID(card));
rc = qeth_qdio_clear_card(card, card->info.type != QETH_CARD_TYPE_IQD);
ccw_device_set_offline(CARD_DDEV(card));
ccw_device_set_offline(CARD_WDEV(card));
@@ -5169,8 +5229,8 @@
out:
dev_warn(&card->gdev->dev, "The qeth device driver failed to recover 
" "an error on the device\n");
-QETH_DBF_MESSAGE(2, "%s Initialization in hardsetup failed! rc=%d\n",
-   -dev_name(&card->gdev->dev), rc);
+QETH_DBF_MESSAGE(2, "Initialization for device %x failed in hardsetup! rc=%d\n",
  + CARD_DEVID(card), rc);
return rc;
}
EXPORT_SYMBOL_GPL(qeth_core_hardsetup_card);
@@ -6078,8 +6138,14 @@
WARN_ON_ONCE(1);
}

/* fallthrough from high to low, to select all legal speeds: */
+/* partially does fall through, to also select lower speeds */
switch (maxspeed) {
+case SPEED_25000:
  +ethtool_link_ksettings_add_link_mode(cmd, supported,
    +  25000baseSR_Full);
  +ethtool_link_ksettings_add_link_mode(cmd, advertising,
    +  25000baseSR_Full);
  +break;
  case SPEED_10000:
  ethtool_link_ksettings_add_link_mode(cmd, supported,
    +  10000baseT_Full);
@@ -6162,6 +6228,10 @@
  cmd->base.speed = SPEED_10000;
  cmd->base.port = PORT_FIBRE;
  break;
+case QETH_LINK_TYPE_25GBIT_ETH:
```c
+cmd->base.speed = SPEED_25000;
+cmd->base.port = PORT_FIBRE;
+break;
default:
  cmd->base.speed = SPEED_10;
  cmd->base.port = PORT_TP;
  case CARD_INFO_PORTS_10G:
    cmd->base.speed = SPEED_10000;
    break;
+case CARD_INFO_PORTS_25G:
  +cmd->base.speed = SPEED_25000;
  +break;
}

return 0;
@@ -6228,6 +6298,9 @@
  case CARD_INFO_PORTS_10G:
    cmd->base.speed = SPEED_10000;
    break;
+  case CARD_INFO_PORTS_25G:
+    cmd->base.speed = SPEED_25000;
+  +break;

#define QETH_HW_FEATURES (NETIF_F_RXCSUM | NETIF_F_IP_CSUM | NETIF_F_TSO)

/**
  - * qeth_recover_features() - Restore device features after recovery
  - * @dev: the recovering net_device
  - *
  - * Caller must hold rtnl lock.
  + * qeth_enable_hw_features() - (Re-)Enable HW functions for device features
  + * @dev: a net_device
  */
+void qeth_recover_features(struct net_device *dev)
+{ netdev_features_t features = dev->features;
+struct qeth_card *card = dev->ml_priv;
+netdev_features_t features;
+
+rtnl_lock();
+features = dev->features;
/* force-off any feature that needs an IPA sequence.
 * netdev_update_features() will restart them.
 */
  dev->features &= ~QETH_HW_FEATURES;
  netdev_update_features(dev);
-
-if (features == dev->features)
-  return;
-  dev_warn(&card->gdev->dev,
-    "Device recovery failed to restore all offload features\n");
+if (features != dev->features)
+  dev_warn(&card->gdev->dev,
```
+ "Device recovery failed to restore all offload features\n";  
+ rtnl_unlock();  
}  
-EXPORT_SYMBOL_GPL(qeth_recover_features);  
+EXPORT_SYMBOL_GPL(qeth_enable_hw_features);  

int qeth_set_features(struct net_device *dev, netdev_features_t features)  
{  
@@ -6488,10 +6560,14 @@  
mutex_init(&qeth_mod_mutex);  

qeth_wq = create_singlethread_workqueue("qeth_wq");  
+if (!qeth_wq) {  
+rc = -ENOMEM;  
+goto out_err;  
+}  

rc = qeth_register_dbf_views();  
if (rc)  
-goto out_err;  
+goto dbf_err;  
qeth_core_root_dev = root_device_register("qeth");  
rc = PTR_ERR_OR_ZERO(qeth_core_root_dev);  
if (rc)  
@@ -6528,6 +6604,8 @@  
root_device_unregister(qeth_core_root_dev);  
register_err:  
qeth_unregister_dbf_views();  
+dbf_err:  
+destroy_workqueue(qeth_wq);  
out_err:  
pr_err("Initializing the qeth device driver failed\n");  
return rc;  
--- linux-4.15.0.orig/drivers/s390/net/qeth_core_mpc.c  
+++ linux-4.15.0/drivers/s390/net/qeth_core_mpc.c  
@@ -159,10 +159,10 @@  
struct ipa_rc_msg {  
enum qeth_ipa_return_codes rc;  
-char *msg;  
+const char *msg;  
};  

-static struct ipa_rc_msg qeth_ipa_rc_msg[] = {  
+static const struct ipa_rc_msg qeth_ipa_rc_msg[] = {  
/IPA_RC_SUCCESS,"success"},  
/IPA_RC_NOTSUPP,"Command not supported"},  
/IPA_RC_IP_TABLE_FULL,"Add Addr IP Table Full - ipv6"},  

-char *qeth_get_ipa_msg(enum qeth_ipa_return_codes rc)
+const char *qeth_get_ipa_msg(enum qeth_ipa_return_codes rc)
{
    int x = 0;
    qeth_ipa_rc-msg[ sizeof(qeth_ipa_rc_msg) /
    sizeof(struct ipa_rc_msg) - 1].rc = rc;
    while (qeth_ipa_rc_msg[x].rc != rc)
        x++;
    return qeth_ipa_rc_msg[x].msg;
}

struct ipa_cmd_names {
    enum qeth_ipa_cmds cmd;
    -char *name;
    +const char *name;
};

-static struct ipa_cmd_names qeth_ipa_cmd_names[] = {
    +static const struct ipa_cmd_names qeth_ipa_cmd_names[] = {
        {IPA_CMD_STARTLAN,"startlan"},
        {IPA_CMD_STOPLAN,"stoplan"},
        {IPA_CMD_SETVMAC,"setvmae"},
        @@ -278,13 +278,12 @@
        {IPA_CMD_UNKNOWN,"unknown"},
    };

-char *qeth_get_ipa_cmd_name(enum qeth_ipa_cmds cmd)
+const char *qeth_get_ipa_cmd_name(enum qeth_ipa_cmds cmd)
{
    int x = 0;
    qeth_ipa_cmd_names[
    sizeof(qeth_ipa_cmd_names) /
    sizeof(struct ipa_cmd_names)-1].cmd = cmd;
    while (qeth_ipa_cmd_names[x].cmd != cmd)
        x++;
    return qeth_ipa_cmd_names[x].msg;
}
+if (qeth_ipa_cmd_names[x].cmd == cmd)
+return qeth_ipa_cmd_names[x].name;
return qeth_ipa_cmd_names[x].name;
}
--- linux-4.15.0.orig/drivers/s390/net/qeth_core_mpc.h
+++ linux-4.15.0/drivers/s390/net/qeth_core_mpc.h
@@ -35,6 +35,18 @@
#define QETH_HALT_CHANNEL_PARM -11
#define QETH_RCD_PARM -12
+static inline bool qeth_intparm_is_iob(unsigned long intparm)
+{
+switch (intparm) {
+case QETH_CLEAR_CHANNEL_PARM:
+case QETH_HALT_CHANNEL_PARM:
+case QETH_RCD_PARM:
+case 0:
+return false;
+}
+return true;
+}
+/* IP Assist related definitions */
+/*
+***************************************************************************/
+#{define IS_OSD(card)((card)->info.type == QETH_CARD_TYPE_OSD)
+#{define IS_OSN(card)((card)->info.type == QETH_CARD_TYPE_OSN)
+#{define IS_VM_NIC(card)((card)->info.guestlan)
+#{define QETH_MPC_DIFINFO_LEN_INDICATES_LINK_TYPE 0x18
+/* only the first two bytes are looked at in qeth_get_cardname_short */
+enum qeth_link_types {
+QETH_LINK_TYPE_GBIT_ETH = 0x03,
+QETH_LINK_TYPE_OSN = 0x04,
+QETH_LINK_TYPE_10GBIT_ETH = 0x10,
+QETH_LINK_TYPE_25GBIT_ETH = 0x12,
+QETH_LINK_TYPE_LANE_ETH100 = 0x81,
+QETH_LINK_TYPE_LANE_TR = 0x82,
+QETH_LINK_TYPE_LANE_ETH1000 = 0x83,
+CARD_INFO_PORTS_100M = 0x00000006,
+CARD_INFO_PORTS_1G = 0x00000007,
+CARD_INFO_PORTS_10G = 0x00000008,
+CARD_INFO_PORTS_25G= 0x0000000A, 
];

//@ -485,17 +503,20 @@
__u8 reserved3[8];
];

+#define QETH_SETADP_FLAGS_VIRTUAL_MAC	0x80	/* for CHANGE_ADDR_READ_MAC */
+
struct qeth_ipacmd_setadpparms_hdr {
  __u32 supp_hw_cmds;
  __u32 reserved1;
  __u16 cmdlength;
  __u16 reserved2;
  __u32 command_code;
  __u16 return_code;
  __u8 used_total;
  __u8 seq_no;
  __u32 reserved3;
} __attribute__ ((packed));
+u32 supp_hw_cmds;
+u32 reserved1;
+u16 cmdlength;
+u16 reserved2;
+u32 command_code;
+u16 return_code;
+u8 used_total;
+u8 seq_no;
+u8 flags;
+u8 reserved3[3];
+};

struct qeth_ipacmd_setadpparms {
 struct qeth_ipacmd_setadpparms_hdr hdr;
@@ -781,8 +802,8 @@
 QETH_IPA_ARP_RC_Q_NO_DATA    = 0x0008,
 };;

-extern char *qeth_get_ipa_msg(enum qeth_ipa_return_codes rc);
-extern char *qeth_get_ipa_cmd_name(enum qeth_ipa_cmds cmd);
+extern const char *qeth_get_ipa_msg(enum qeth_ipa_return_codes rc);
+extern const char *qeth_get_ipa_cmd_name(enum qeth_ipa_cmds cmd);

#define QETH_SETASS_BASE_LEN (sizeof(struct qeth_ipacmd_hdr) +
 sizeof(struct qeth_ipacmd_setassparms_hdr))
--- linux-4.15.0.orig/drivers/s390/net/qeth_core_sys.c
+++ linux-4.15.0/drivers/s390/net/qeth_core_sys.c
if (card->discipline) {
    card->discipline->remove(card->gdev);
    qeth_core_free_discipline(card);
+    card->options.layer2 = -1;
}

rc = qeth_core_load_discipline(card, newdis);
--- linux-4.15.0.orig/drivers/s390/net/qeth_l2.h
+++ linux-4.15.0/drivers/s390/net/qeth_l2.h
@@ -23,7 +23,6 @@
 struct qeth_mac {
     u8 mac_addr[OSA_ADDR_LEN];
-    u8 is_uc:1;
     u8 disp_flag:2;
     struct hlist_node hnode;
 };  
--- linux-4.15.0.orig/drivers/s390/net/qeth_l2_main.c
+++ linux-4.15.0/drivers/s390/net/qeth_l2_main.c
@@ -156,54 +156,37 @@
 return rc;
 }

-static int qeth_l2_send_setgroupmac(struct qeth_card *card, __u8 *mac)
+static int qeth_l2_write_mac(struct qeth_card *card, u8 *mac)
 {  
     enum qeth_ipa_cmds cmd = is_multicast_ether_addr(mac) ?
+        IPA_CMD_SETGMAC : IPA_CMD_SETVMAC;
     int rc;

-QETH_CARD_TEXT(card, 2, "L2Sgmac");
-rc = qeth_l2_send_setdelmac(card, mac, IPA_CMD_SETGMAC);
+QETH_CARD_TEXT(card, 2, "L2Wmac");
+rc = qeth_l2_send_setdelmac(card, mac, cmd);
     if (rc == -EEXIST)
-        QETH_DBF_MESSAGE(2, "Group MAC %pM already existing on %s\n",
+        QETH_CARD_IFNAME(card));
+        QETH_DBF_MESSAGE(2, "MAC already registered on device %x\n",
+        CARD_DEVID(card));
+else if (rc)
+    QETH_DBF_MESSAGE(2, "Failed to register MAC on device %x: %d\n",
+        CARD_DEVID(card), rc);
     return rc;
};
-static int qeth_l2_send_delgroupmac(struct qeth_card *card, __u8 *mac)
+static int qeth_l2_remove_mac(struct qeth_card *card, u8 *mac)
{
+enum qeth_ipa_cmds cmd = is_multicastEther_addr(mac) ?
+IPA_CMD_DELGMAC : IPA_CMD_DELVMAC;
int rc;

-QETH_CARD_TEXT(card, 2, "L2Dgmac");
-rc = qeth_l2_send_setdelmac(card, mac, IPA_CMD_DELGMAC);
+QETH_CARD_TEXT(card, 2, "L2Rmac");
+rc = qeth_l2_send_setdelmac(card, mac, cmd);
if (rc)
-QETH_DBF_MESSAGE(2,
-"Could not delete group MAC %pM on %s: %d\n",
-mac, QETH_CARD_IFNAME(card), rc);
+QETH_DBF_MESSAGE(2, "Failed to delete MAC on device %u: %d\n",
+CARD_DEVID(card), rc);
return rc;
}

-static int qeth_l2_write_mac(struct qeth_card *card, struct qeth_mac *mac)
-{
-if (mac->is_uc) {
-return qeth_l2_send_setdelmac(card, mac->mac_addr,
-IPA_CMD_SETVMAC);
-} else {
-return qeth_l2_send_setgroupmac(card, mac->mac_addr);
-}
-
-static int qeth_l2_remove_mac(struct qeth_card *card, struct qeth_mac *mac)
-{\n-if (mac->is_uc) {
-return qeth_l2_send_setdelmac(card, mac->mac_addr,
-IPA_CMD_DELVMAC);
-} else {
-return qeth_l2_send_delgroupmac(card, mac->mac_addr);
-}
-
-static void qeth_l2_del_all_macs(struct qeth_card *card)
{
struct qeth_mac *mac;
@@ -303,9 +286,9 @@
QETH_CARD_TEXT(card, 2, "L2sdvcb");
if (cmd->hdr.return_code) {
-QETH_DBF_MESSAGE(2, "Error in processing VLAN %i on %s: 0x%lx\n",
+QETH_DBF_MESSAGE(2, "Failed to delete MAC on device %u: %d\n",
+CARD_DEVID(card), rc);
return rc;
}
QETH_DBF_MESSAGE(2, "Error in processing VLAN %u on device %x: %#x\n", cmd->data.setdelvlan.vlan_id,
- QETH_CARD_IFNAME(card), cmd->hdr.return_code);
+ CARD_DEVID(card), cmd->hdr.return_code);
QETH_CARD_TEXT_(card, 2, "L2VL%4x", cmd->hdr.command);
QETH_CARD_TEXT_(card, 2, "err%d", cmd->hdr.return_code);
}

default:
dev_kfree_skb_any(skb);
QETH_CARD_TEXT(card, 3, "inbunkno");
-QETH_DBF_HEX(CTRL, 3, hdr, QETH_DBF_CTRL_LEN);
+QETH_DBF_HEX(CTRL, 3, hdr, sizeof(*hdr));
continue;
}
work_done++;
@@ -509,27 +492,29 @@
rc = qeth_vm_request_mac(card);
if (!rc)
goto out;
-QETH_DBF_MESSAGE(2, "z/VM MAC Service failed on device %s: x%x\n", CARD_BUS_ID(card), rc);
+QETH_DBF_MESSAGE(2, "z/VM MAC Service failed on device %x: %#x\n", CARD_DEVID(card), rc);
QETH_DBF_TEXT_(SETUP, 2, "err%04x", rc);
/* fall back to alternative mechanism: */
}

-if (card->info.type == QETH_CARD_TYPE_IQD ||
- card->info.type == QETH_CARD_TYPE_OSM ||
- card->info.type == QETH_CARD_TYPE_OSX ||
- card->info.guestlan) { 
+if (!IS_OSN(card)) {
rc = qeth_setadpparms_change_macaddr(card);
-rc = qeth_setadpparms_change_macaddr(card);
+if (rc) {
-QETH_DBF_MESSAGE(2, "couldn't get MAC address on 
-"device %s: x%x\n", CARD_BUS_ID(card), rc);
-QETH_DBF_TEXT_(SETUP, 2, "1err%04x", rc);
-return rc;
-} 
-} else {
-eth_random_addr(card->dev->dev_addr);
-memcpy(card->dev->dev_addr, vendor_pre, 3);
+if (!rc && is_valid_ether_addr(card->dev->dev_addr))
+goto out;
+QETH_DBF_MESSAGE(2, "READ_MAC Assist failed on device %x: %#x\n", 
+ CARD_DEVID(card), rc);
+QETH_DBF_TEXT_(SETUP, 2, "1err%04x", rc);

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+/* fall back once more: */
+
+/* some devices don't support a custom MAC address: */
+if (card->info.type == QETH_CARD_TYPE_OSM ||
+    card->info.type == QETH_CARD_TYPE_OSX)
+return (rc) ? rc : -EADDRNOTAVAIL;
+eth_random_addr(card->dev->dev_addr);
+memcpy(card->dev->dev_addr, vendor_pre, 3);
+
+out:
QETH_DBF_HEX(SETUP, 2, card->dev->dev_addr, card->dev->addr_len);
return 0;
@@ -597,27 +582,23 @@
 * only if there is not in the hash table storage already
 *
 */
-static void qeth_l2_add_mac(struct qeth_card *card, struct netdev_hw_addr *ha,
-    u8 is_uc)
+static void qeth_l2_add_mac(struct qeth_card *card, struct netdev_hw_addr *ha)
{
    u32 mac_hash = get_unaligned((u32 *)&ha->addr[2]);
    struct qeth_mac *mac;

    hash_for_each_possible(card->mac_htable, mac, hnode, mac_hash) {
        -if (is_uc == mac->is_uc &&
        -    !memcmp(ha->addr, mac->mac_addr, OSA_ADDR_LEN)) {
        +if (!memcmp(ha->addr, mac->mac_addr, OSA_ADDR_LEN)) {
            mac->disp_flag = QETH_DISP_ADDR_DO NOTHING;
            return;
        }
    }

    mac = kzalloc(sizeof(struct qeth_mac), GFP_ATOMIC);
    -
    if (!mac)
        return;

    memcpy(mac->mac_addr, ha->addr, OSA_ADDR_LEN);
    -mac->is_uc = is_uc;
    mac->disp_flag = QETH_DISP_ADDR_ADD;

    hash_add(card->mac_htable, &mac->hnode, mac_hash);
@@ -643,19 +624,18 @@
    spin_lock_bh(&card->mclock);

    netdev_for_each_mc_addr(ha, dev)
-    -qeth_l2_add_mac(card, ha, 0);
+qeth_l2_add_mac(card, ha);
netdev_for_each_uc_addr(ha, dev)
-qeth_l2_add_mac(card, ha, 1);
+qeth_l2_add_mac(card, ha);

hash_for_each_safe(card->mac_htable, i, tmp, mac, hnode) {
if (mac->disp_flag == QETH_DISP_ADDR_DELETE) {
  -qeth_l2_remove_mac(card, mac);
  +qeth_l2_remove_mac(card, mac->mac_addr);
  hash_del(&mac->hnode);
  kfree(mac);
} else if (mac->disp_flag == QETH_DISP_ADDR_ADD) {
  -rc = qeth_l2_write_mac(card, mac);
  +rc = qeth_l2_write_mac(card, mac->mac_addr);
  if (rc) {
    hash_del(&mac->hnode);
    kfree(mac);
    @@ -866,7 +846,10 @@
  }
}

if (qdio_stop_irq(card->data.ccwdev, 0) >= 0) {
  napi_enable(&card->napi);
  +local_bh_disable();
  napi_schedule(&card->napi);
  /**< kick-start the NAPI softirq: */
  +local_bh_enable();
} else
   rc = -EIO;
return rc;
@@ -933,8 +916,8 @@
qeth_l2_set_offline(cgdev);

if (card->dev) {
  -netif_napi_del(&card->napi);
  unregister_netdev(card->dev);
  +free_netdev(card->dev);
  card->dev = NULL;
} return;
@@ -1030,7 +1013,8 @@

card->info.broadcast_capable = 1;
-qeth_l2_request_initial_mac(card);
+if (!is_valid_ether_addr(card->dev->dev_addr))
  +qeth_l2_request_initial_mac(card);
  SET_NETDEV_DEV(card->dev, &card->gdev->dev);
netif_napi_add(card->dev, &card->napi, qeth_poll, QETH_NAPI_WEIGHT);
netif_carrier_off(card->dev);
@@ -1135,6 +1119,8 @@
        qeth_enable_hw_features(card->dev);
    if (recover_flag == CARD_STATE_RECOVER) {
        if (recovery_mode &&
            card->info.type != QETH_CARD_TYPE_OSN) {
            qeth_set_allowed_threads(card, 0xffffffff, 0);
+            qeth_enable_hw_features(card->dev);
        } elseif (recovery_mode)
            netif_carrier_off(card->dev);
        qeth_set_allowed_threads(card, 0xffffffff, 0);
+        qeth_enable_hw_features(card->dev);

    if (recover_flag == CARD_STATE_RECOVER) {
        if (recovery_mode &&
            card->info.type != QETH_CARD_TYPE_OSN) {
            qeth_set_allowed_threads(card, 0xffffffff, 0);
+            qeth_enable_hw_features(card->dev);
        } elseif (recovery_mode)
            netif_carrier_off(card->dev);
        qeth_set_allowed_threads(card, 0xffffffff, 0);
+            qeth_enable_hw_features(card->dev);

    /* this also sets saved unicast addresses */
    qeth_l2_set_rx_mode(card->dev);
    -rtnl_lock();
    -qeth_recover_features(card->dev);
    -rtnl_unlock();
    }
/* let user_space know that device is online */
kobject_uevent(&gdev->dev.kobj, KOBJ_CHANGE);
@@ -1347,25 +1330,26 @@

static int qeth_osn_send_control_data(struct qeth_card *card, int len,
    struct qeth_cmd_buffer *iob)
{
    struct qeth_channel *channel = iob->channel;
    unsigned long flags;
    int rc = 0;

    QETH_CARD_TEXT(card, 5, "osndctrd");

    wait_event(card->wait_q, 
-    atomic_cmpxchg(&card->write.irq_pending, 0, 1) == 0);
+    atomic_cmpxchg(&channel->irq_pending, 0, 1) == 0);
    qeth_prepare_control_data(card, len, iob);
    QETH_CARD_TEXT(card, 6, "osnoirqp");
    -spin_lock_irqsave(get_ccwdev_lock(card->write.ccwdev), flags);
    -rc = ccw_device_start(card->write.ccwdev, &card->write.ccw, 
        - (addr_t) iob, 0, 0);
    +spin_lock_irqsave(get_ccwdev_lock(channel->ccwdev), flags);
    +rc = ccw_device_start_timeout(channel->ccwdev, &channel->ccw, 
        + (addr_t) iob, 0, 0, QETH_IPA_TIMEOUT);
    +spin_unlock_irqrestore(get_ccwdev_lock(channel->ccwdev), flags);
    if (rc) {
        QETH_DBF_MESSAGE(2, "qeth_osn_send_control_data:"
            "ccw_device_start rc = %d", rc);
        QETH_CARD_TEXT_(card, 2, " err%d", rc);
    }
-qeth_release_buffer(iob->channel, iob);
-atomic_set(&card->write.irq_pending, 0);
+qeth_release_buffer(channel, iob);
+atomic_set(&channel->irq_pending, 0);
wake_up(&card->wait_q);
}
return rc;
@@ -1566,6 +1550,10 @@
int extrasize;

QETH_CARD_TEXT(card, 2, "brstchng");
+if (qports->num_entries == 0) {
+QETH_CARD_TEXT(card, 2, "BPempty");
+return;
+}
if (qports->entry_length != sizeof(struct qeth_sbp_port_entry)) {
QETH_CARD_TEXT(card, 2, "BPsz%04x", qports->entry_length);
return;
@@ -2008,7 +1996,7 @@

l2entry = (struct qdio_brinfo_entry_l2 *)entry;
code = IPA_ADDR_CHANGE_CODE_MACADDR;
-if (l2entry->addr_lnid.lnid)
+if (l2entry->addr_lnid.lnid < VLAN_N_VID)
   code |= IPA_ADDR_CHANGE_CODE_VLANID;
qeth_bridge_emit_host_event(card, anev_reg_unreg, code,
   (struct net_if_token *)&l2entry->nit,
@@ -2253,15 +2241,14 @@

QETH_CARD_TEXT(card, 2, "vniccsh");

/* do not change anything if BridgePort is enabled */
-if (qeth_bridgeport_is_in_use(card))
-return -EBUSY;
-
/* check if characteristic and enable/disable are supported */
if (!(card->options.vnicc.sup_chars & vnicc) ||
   !(card->options.vnicc.set_char_sup & vnicc))
return -EOPNOTSUPP;

+if (qeth_bridgeport_is_in_use(card))
+return -EBUSY;
+
/* set enable/disable command and store wanted characteristic */
if (state) {
   cmd = IPA_VNICC_ENABLE;
@@ -2307,14 +2294,13 @@

QETH_CARD_TEXT(card, 2, "vniccgch");

-/* do not get anything if BridgePort is enabled */
-if (qeth_bridgeport_is_in_use(card))
  -return -EBUSY;
-
-/* check if characteristic is supported */
if (!(card->options.vnicc.sup_chars & vnicc))
  return -EOPNOTSUPP;

+if (qeth_bridgeport_is_in_use(card))
+return -EBUSY;
+
+/* if card is ready, query current VNICC state */
if (qeth_card_hw_is_reachable(card))
  rc = qeth_l2_vnicc_query_chars(card);
  @@ -2332,15 +2318,14 @@
QETH_CARD_TEXT(card, 2, "vniccsto");

-/* do not change anything if BridgePort is enabled */
-if (qeth_bridgeport_is_in_use(card))
  -return -EBUSY;
-
-/* check if characteristic and set_timeout are supported */
if (!(card->options.vnicc.sup_chars & QETH_VNICC_LEARNING) ||
  !(card->options.vnicc.getset_timeout_sup & QETH_VNICC_LEARNING))
  return -EOPNOTSUPP;

+if (qeth_bridgeport_is_in_use(card))
+return -EBUSY;
+
+/* do we need to do anything? */
if (card->options.vnicc.learning_timeout == timeout)
  return rc;
  @@ -2369,14 +2354,14 @@
QETH_CARD_TEXT(card, 2, "vniccgto");

-/* do not get anything if BridgePort is enabled */
-if (qeth_bridgeport_is_in_use(card))
  -return -EBUSY;
-
-/* check if characteristic and get_timeout are supported */
if (!(card->options.vnicc.sup_chars & QETH_VNICC_LEARNING) ||
  !(card->options.vnicc.getset_timeout_sup & QETH_VNICC_LEARNING))
  return -EOPNOTSUPP;

+ /*
+if (qeth_bridgeport_is_in_use(card))
+return -EBUSY;
+
/* if card is ready, get timeout. Otherwise, just return stored value */
timeout = card->options.vnicc.learning_timeout;
if (qeth_card_hw_is_reachable(card))
  return -2390,8 +2375,7 @@
/* check if VNICC is currently enabled */
bool qeth_l2_vnicc_is_in_use(struct qeth_card *card)
{
  /* if everything is turned off, VNICC is not active */
  if (!card->options.vnicc.cur_chars)
    return false;
  /* default values are only OK if rx_bcast was not enabled by user */
  * or the card is offline.
  static void qeth_l2_vnicc_init(struct qeth_card *card)
  {
    u32 *timeout = &card->options.vnicc.learning_timeout;
    bool enable, error = false;
    unsigned int chars_len, i;
    unsigned long chars_tmp;
    u32 sup_cmds, vnicc;
    -bool enable, error;
    QETH_CARD_TEXT(card, 2, "vniccini");
    /* reset rx_bcast */
    chars_len = sizeof(card->options.vnicc.sup_chars) * BITS_PER_BYTE;
    for_each_set_bit(i, &chars_tmp, chars_len) {
      vnicc = BIT(i);
      -qeth_l2_vnicc_query_cmds(card, vnicc, &sup_cmds);
      -if (!(sup_cmds & IPA_VNICC_SET_TIMEOUT) ||
        !(sup_cmds & IPA_VNICC_GET_TIMEOUT))
        +if (qeth_l2_vnicc_query_cmds(card, vnicc, &sup_cmds)) {
          +sup_cmds = 0;
          +error = true;
        +}
      +if ((sup_cmds & IPA_VNICC_SET_TIMEOUT) &&
        (sup_cmds & IPA_VNICC_GET_TIMEOUT))
        +card->options.vnicc.getset_timeout_sup |= vnicc;
      +else
        card->options.vnicc.getset_timeout_sup &= ~vnicc;
      -if (!!(sup_cmds & IPA_VNICC_ENABLE))
        -!!(sup_cmds & IPA_VNICC_DISABLE))
        +if (((sup_cmds & IPA_VNICC_ENABLE) &&
        + (sup_cmds & IPA_VNICC_DISABLE))
        +else
          card->options.vnicc.getset_timeout_sup &= ~vnicc;
        -if (!!!(sup_cmds & IPA_VNICC_DISABLE))
          -!!(sup_cmds & IPA_VNICC_ENABLE))
          +if (((sup_cmds & IPA_VNICC_ENABLE) &&
            + (sup_cmds & IPA_VNICC_DISABLE))
            +else
              card->options.vnicc.getset_timeout_sup &= ~vnicc;
card->options.vnicc.set_char_sup |= vnicc;
else
    card->options.vnicc.set_char_sup &= ~vnicc;
}
/* enforce assumed default values and recover settings, if changed */
-error = qeth_l2_vnicc_recover_timeout(card, QETH_VNICC_LEARNING,
    + timeout);
+error |= qeth_l2_vnicc_recover_timeout(card, QETH_VNICC_LEARNING,
        + timeout);
chars_tmp = card->options.vnicc.wanted_chars ^ QETH_VNICC_DEFAULT;
-chars_tmp |= QETH_VNICC_BRIDGE_INVISIBLE;
chars_len = sizeof(card->options.vnicc.wanted_chars) * BITS_PER_BYTE;
for_each_set_bit(i, &chars_tmp, chars_len) {
    vnicc = BIT(i);
    chars_tmp |= QETH_VNICC_BRIDGE_INVISIBLE;
    chars_len = sizeof(card->options.vnicc.wanted_chars) * BITS_PER_BYTE;
chars_tmp = card->options.vnicc.wanted_chars ^ QETH_VNICC_DEFAULT;
chars_tmp |= QETH_VNICC_BRIDGE_INVISIBLE;
chars_len = sizeof(card->options.vnicc.wanted_chars) * BITS_PER_BYTE;
for_each_set_bit(i, &chars_tmp, chars_len) {
    vnicc = BIT(i);
--- linux-4.15.0.orig/drivers/s390/net/qeth_l3.h
+++ linux-4.15.0/drivers/s390/net/qeth_l3.h
@@ -40,8 +40,40 @@
unsigned int pfxlen;
} a6;
} u;
-
+static inline bool qeth_l3_addr_match_ip(struct qeth_ipaddr *a1,
+    + struct qeth_ipaddr *a2)
+{
+    +if (a1->proto != a2->proto)
+        +return false;
+    +if (a1->proto == QETH_PROT_IPV6)
+        +return ipv6_addr_equal(&a1->u.a6.addr, &a2->u.a6.addr);
+    +return a1->u.a4.addr == a2->u.a4.addr;
+}
+
+static inline bool qeth_l3_addr_match_all(struct qeth_ipaddr *a1,
+    + struct qeth_ipaddr *a2)
+{
+    /* Assumes that the pair was obtained via qeth_l3_addr_find_by_ip().
+     * So 'proto' and 'addr' match for sure.
+     */
+    + For ucast:
+    + -'mac' is always 0.
+    + -'mask'/'pfxlen' for RXIP/VIPA is always 0. For NORMAL, matching
+    + values are required to avoid mixups in takeover eligibility.
+    + For mcast,
+    + -'mac' is mapped from the IP, and thus always matches.
+    + -'mask'/'pfxlen' is always 0.
+    */
+if (a1->type != a2->type)
+return false;
+if (a1->proto == QETH_PROT_IPV6)
+return a1->u.a6.pfxlen == a2->u.a6.pfxlen;
+return a1->u.a4.mask == a2->u.a4.mask;
+
+static inline u64 qeth_l3_ipaddr_hash(struct qeth_ipaddr *addr)
+{
+  u64 ret = 0;
+- linux-4.15.0.orig/drivers/s390/net/qeth_l3_main.c
+++ linux-4.15.0/drivers/s390/net/qeth_l3_main.c
@@ -150,6 +150,24 @@
  return -EINVAL;
 }

+static struct qeth_ipaddr *qeth_l3_find_addr_by_ip(struct qeth_card *card,
+  struct qeth_ipaddr *query)
+{
+  u64 key = qeth_l3_ipaddr_hash(query);
+  struct qeth_ipaddr *addr;
+
+  if (query->is_multicast) {
+    hash_for_each_possible(card->ip_mc_htable, addr, hnode, key)
+      if (qeth_l3_addr_match_ip(addr, query))
+        return addr;
+  } else {
+    hash_for_each_possible(card->ip_htable, addr, hnode, key)
+      if (qeth_l3_addr_match_ip(addr, query))
+        return addr;
+  }
+  return NULL;
+
+  static void qeth_l3_convert_addr_to_bits(u8 *addr, u8 *bits, int len)
+  {
+    int i, j;
+    return rc;
+  }

-static inline int
-qeth_l3_ipaddrs_is_equal(struct qeth_ipaddr *addr1, struct qeth_ipaddr *addr2)
-{
-  return addr1->proto == addr2->proto &&
-    !memcmp(&addr1->u, &addr2->u, sizeof(addr1->u)) &&
-    !memcmp(&addr1->mac, &addr2->mac, sizeof(addr1->mac));
-}
static struct qeth_ipaddr *
-qeth_l3_ip_from_hash(struct qeth_card *card, struct qeth_ipaddr *tmp_addr)
{
  struct qeth_ipaddr *addr;
  
  if (tmp_addr->is_multicast) {
    hash_for_each_possible(card->ip_mc_htable,  addr,
      hnode, qeth_l3_ipaddr_hash(tmp_addr))
    if (qeth_l3_ipaddrs_is_equal(tmp_addr, addr))
      return addr;
  } else {
    hash_for_each_possible(card->ip_htable,  addr,
      hnode, qeth_l3_ipaddr_hash(tmp_addr))
    if (qeth_l3_ipaddrs_is_equal(tmp_addr, addr))
      return addr;
  } else {
    hash_for_each_possible(card->ip_htable,  addr,
      hnode, qeth_l3_ipaddr_hash(tmp_addr))
    if (qeth_l3_ipaddrs_is_equal(tmp_addr, addr))
      return addr;
  }
  return NULL;
}

int qeth_l3_delete_ip(struct qeth_card *card, struct qeth_ipaddr *tmp_addr)
{
  int rc = 0;
  QETH_CARD_HEX(card, 4, ((char *)&tmp_addr->u.a6.addr) + 8, 8);

  addr = qeth_l3_ip_from_hash(card, tmp_addr);
  if (!addr)
    addr = qeth_l3_find_addr_by_ip(card, tmp_addr);
  if (!addr || !qeth_l3_addr_match_all(addr, tmp_addr))
    return -ENOENT;
  addr->ref_counter--;
  if (addr->ref_counter > 0 && (addr->type == QETH_IP_TYPE_NORMAL ||
    addr->type == QETH_IP_TYPE_RXIP))
    rc = qeth_l3_deregister_addr_entry(card, addr);
  if (addr->in_progress)
    return -EINPROGRESS;

  if (!qeth_card_hw_is_reachable(card)) {
    addr->disp_flag = QETH_DISP_ADDR_DELETE;
    return 0;
  }

  rc = qeth_l3_deregister_addr_entry(card, addr);
+if (qeth_card_hw_is_reachable(card))
+rc = qeth_l3_deregister_addr_entry(card, addr);

hash_del(&addr->hnode);
kfree(addr);
@@ -273,6 +258,7 @@
{
 int rc = 0;
 struct qeth_ipaddr *addr;
+char buf[40];

QETH_CARD_TEXT(card, 4, "addip");

@@ -283,8 +269,20 @@
QETH_CARD_HEX(card, 4, ((char *)&tmp_addr->u.a6.addr) + 8, 8);
 }

addr = qeth_l3_ip_from_hash(card, tmp_addr);
-if (!addr) {
+addr = qeth_l3_find_addr_by_ip(card, tmp_addr);
+if (addr) {
+if (tmp_addr->type != QETH_IP_TYPE_NORMAL)
+return -EADDRINUSE;
+if (qeth_l3_addr_match_all(addr, tmp_addr)) {
+addr->ref_counter++;
+return 0;
+}
+qeth_l3_ipaddr_to_string(tmp_addr->proto, (u8 *)&tmp_addr->u,
+ buf);
+dev_warn(&card->gdev->dev,
+ "Registering IP address %s failed\n", buf);
+return -EADDRINUSE;
+} else {
+addr = qeth_l3_get_addr_buffer(tmp_addr->proto);
+if (!addr)
+return -ENOMEM;
+}
+qeth_l3_disp_flag = QETH_DISP_ADDR_DO NOTHING;
+if (addr->ref_counter < 1) {
+qeth_l3_delete_ip(card, addr);
+qeth_l3_deregister_addr_entry(card, addr);
+hash_del(&addr->hnode);
kfree(addr);
+
+#if (rc == IPA_RC_LAN_OFFLINE))
+addr->disp_flag = QETH_DISP_ADDR_DO NOTHING;
+if (addr->ref_counter < 1) {
+qeth_l3_delete_ip(card, addr);
+qeth_l3_deregister_addr_entry(card, addr);
+hash_del(&addr->hnode);
kfree(addr);
+
}
else {
    if (addr->type == QETH_IP_TYPE_NORMAL ||
        addr->type == QETH_IP_TYPE_RXIP)
        addr->ref_counter++;
}

return rc;

@@ -365,9 +359,6 @@
QETH_CARD_TEXT(card, 4, "clearip");

-if (recover && card->options.sniffer)
-return;
-
spin_lock_bh(&card->ip_lock);

hash_for_each_safe(card->ip_htable, i, tmp, addr, hnode) {
    if (addr->disp_flag == QETH_DISP_ADDR_DELETE) {
        qeth_l3_deregister_addr_entry(card, addr);
        hash_del(&addr->hnode);
        kfree(addr);
    } else if (addr->disp_flag == QETH_DISP_ADDR_ADD) {
        if (addr->proto == QETH_PROT_IPV4) {
            addr->in_progress = 1;
            spin_unlock_bh(&card->ip_lock);
        }
    }
}

@@ -404,11 +395,7 @@
spin_lock_bh(&card->ip_lock);

hash_for_each_safe(card->ip_htable, i, tmp, addr, hnode) {
    if (addr->disp_flag == QETH_DISP_ADDR_DELETE) {
        qeth_l3_deregister_addr_entry(card, addr);
        hash_del(&addr->hnode);
        kfree(addr);
    } else if (addr->disp_flag == QETH_DISP_ADDR_ADD) {
        if (addr->proto == QETH_PROT_IPV4) {
            addr->in_progress = 1;
            spin_unlock_bh(&card->ip_lock);
        }
    }
}

@@ -570,9 +557,8 @@
QETH_PROT_IPV4);
if (rc) {
    card->options.route4.type = NO_ROUTER;
    QETH_DBF_MESSAGE(2, "Error (0x%04x) while setting routing type"
        " on %s. Type set to 'no router'.\n", rc,
        QETH_CARD_IFNAME(card));
    +QETH_DBF_MESSAGE(2, "Error (%#06x) while setting routing type on device %x. Type set to 'no router'.\n",
        + rc, CARD_DEVID(card));
    }
    return rc;
}

@@ -595,9 +581,8 @@
QETH_PROT_IPV4);
if (rc) {


card->options.route6.type = NO_ROUTER;
-QETH_DBF_MESSAGE(2, "Error (0x%04x) while setting routing type"
" on %s. Type set to 'no router'.\n", rc,
-QETH_CARD_IFNAME(card));
+QETH_DBF_MESSAGE(2, "Error (%#06x) while setting routing type on device %x. Type set to 'no router'.\n",
+rc, CARD_DEVID(card));
}
#endif
return rc;
@@ -724,12 +709,7 @@
return -ENOMEM;
spin_lock_bh(&card->ip_lock);
-
-if (qeth_l3_ip_from_hash(card, ipaddr))
-rc = -EEXIST;
-else
-qeth_l3_add_ip(card, ipaddr);
-
+rc = qeth_l3_add_ip(card, ipaddr);
spin_unlock_bh(&card->ip_lock);

kfree(ipaddr);
@@ -792,12 +772,7 @@
return -ENOMEM;
spin_lock_bh(&card->ip_lock);
-
-if (qeth_l3_ip_from_hash(card, ipaddr))
-rc = -EEXIST;
-else
-qeth_l3_add_ip(card, ipaddr);
-
+rc = qeth_l3_add_ip(card, ipaddr);
spin_unlock_bh(&card->ip_lock);

kfree(ipaddr);
@@ -839,6 +814,8 @@
int rc = 0;
int cnt = 3;

+if (card->options.sniffer)
+return 0;

if (addr->proto == QETH_PROT_IPV4) {
QETH_CARD_TEXT(card, 2, "setaddr4");
@@ -874,6 +851,9 @@
int rc = 0;
+
+if (card->options.sniffer)
+return 0;
+
+if (addr->proto == QETH_PROT_IPV4) {
QETH_CARD_TEXT(card, 2, "deladdr4");
QETH_CARD_HEX(card, 3, &addr->u.a4.addr, sizeof(int));
@@ -1302,8 +1282,8 @@
} break;
default:
-QETH_DBF_MESSAGE(2, "Unknown sniffer action (0x%04x) on %s\n",
-cmd->data.diagass.action, QETH_CARD_IFNAME(card));
+QETH_DBF_MESSAGE(2, "Unknown sniffer action (%#06x) on device %x\n",
+ cmd->data.diagass.action, CARD_DEVID(card));
}

return 0;
@@ -1405,8 +1385,9 @@
memcpy(tmp->mac, buf, sizeof(tmp->mac));
tmp->is_multicast = 1;
-
ipm = qeth_l3_ip_from_hash(card, tmp);
ipm = qeth_l3_find_addr_by_ip(card, tmp);
if (ipm) {
+/* for mcast, by-IP match means full match */
ipm->disp_flag = QETH_DISP_ADDR_DO NOTHING;
} else {
ipm = qeth_l3_get_addr_buffer(QETH_PROT_IPV4);
@@ -1489,8 +1470,9 @@
ssizeof(struct in6_addr));
tmp->is_multicast = 1;
-
ipm = qeth_l3_ip_from_hash(card, tmp);
ipm = qeth_l3_find_addr_by_ip(card, tmp);
if (ipm) {
+/* for mcast, by-IP match means full match */
ipm->disp_flag = QETH_DISP_ADDR_DO NOTHING;
continue;
} 
@@ -1807,7 +1789,7 @@
default:
 dev_kfree_skb_any(skb);
QETH_CARD_TEXT(card, 3, "inbunkno");
-QETH_DBF_HEX(CTRL, 3, hdr, QETH_DBF_CTRL_LEN);
+QETH_DBF_HEX(CTRL, 3, hdr, sizeof(*hdr));
continue;

work_done++;

qeth_l3_handle_promisc_mode(card);

-static const char *qeth_l3_arp_get_error_cause(int *rc)
+static int qeth_l3_arp_makec(int rc)
{
  -switch (*rc) {
  -case QETH_IPA_ARP_RC_FAILED:
  -*rc = -EIO;
  -return "operation failed";
  +switch (rc) {
  +case IPA_RC_SUCCESS:
  +return 0;
  case QETH_IPA_ARP_RC_NOTSUPP:
  -*rc = -EOPNOTSUPP;
  -return "operation not supported";
  -case QETH_IPA_ARP_RC_OUT_OF_RANGE:
  -*rc = -EINVAL;
  -return "argument out of range";
  -case QETH_IPA_ARP_RC_Q_NOTSUPP:
  -*rc = -EOPNOTSUPP;
  -return "query operation not supported";
  +return -EOPNOTSUPP;
  +case QETH_IPA_ARP_RC_OUT_OF_RANGE:
  +return -EINVAL;
  case QETH_IPA_ARP_RC_Q_NO_DATA:
  -*rc = -ENOENT;
  -return "no query data available";
  +return -ENOENT;
  default:
  -return "unknown error";
  +return -EIO;
  }
  }

static int qeth_l3_arp_set_no_entries(struct qeth_card *card, int no_entries)
{
  -int tmp;
  int rc;

  QETH_CARD_TEXT(card, 3, "arpstnoe");
  @ @ -2021,13 +1996,10 @@
  rc = qeth_send_simple_setassparms(card, IPA_ARP_PROCESSING,
  IPA_CMD_ASS_ARP_SET_NO_ENTRIES,
  no_entries);
if (rc) {
  -tmp = rc;
  -QETH_DBF_MESSAGE(2, "Could not set number of ARP entries on ",
    -"%s: %s (0x%x/%d)
", QETH_CARD_IFNAME(card),
    -qeth_l3_arp_get_error_cause(&rc), tmp, tmp);
-
  -return rc;
  +if (rc)
  +QETH_DBF_MESSAGE(2, "Could not set number of ARP entries on device %x: %#x
",
    +CARD_DEVID(card), rc);
  +return qeth_l3_arp_makerc(rc);
}

static __u32 get_arp_entry_size(struct qeth_card *card,
@@ -2177,7 +2149,6 @@
{
    struct qeth_cmd_buffer *iob;
    struct qeth_ipa_cmd *cmd;
-int tmp;
 int rc;

 QETH_CARD_TEXT_(card, 3, "qarpipv%i", prot);
@@ -2196,15 +2167,10 @@
rc = qeth_l3_send_ipa_arp_cmd(card, iob,
    QETH_SETASS_BASE_LEN+QETH_ARP_CMD_LEN,
    qeth_l3_arp_query_cb, (void *)qinfo);
-if (rc) {
  -tmp = rc;
  -QETH_DBF_MESSAGE(2, "Error while querying ARP cache on %s: %s ",
    -(0x%x/%d)
", QETH_CARD_IFNAME(card),
    -qeth_l3_arp_get_error_cause(&rc), tmp, tmp);
  -}
  -
  -return rc;
+if (rc)
+QETH_DBF_MESSAGE(2, "Error while querying ARP cache on device %x: %#x
",
    +CARD_DEVID(card), rc);
+return qeth_l3_arp_makerc(rc);
}

static int qeth_l3_arp_query(struct qeth_card *card, char __user *udata)
@@ -2260,8 +2226,6 @@
struct qeth_arp_cache_entry *entry)
{
    struct qeth_cmd_buffer *iob;
-char buf[16];
-int tmp;
int rc;

QETH_CARD_TEXT(card, 3, "arpadent");
@@ -2287,14 +2251,10 @@
    sizeof(struct qeth_arp_cache_entry),
    (unsigned long) entry,
    qeth_setassparms_cb, NULL);
-if (rc) {
-    tmp = rc;
-    -qeth_l3_ipaddr4_to_string((u8 *)entry->ipaddr, buf);
-    -QETH_DBF_MESSAGE(2, "Could not add ARP entry for address %s "
-    -" on %s: %s (0x%x/%d)
", buf, QETH_CARD_IFNAME(card),
-    -qeth_l3_arp_get_error_cause(&rc), tmp, tmp);
-}
-return rc;
+if (rc)
+    QETH_DBF_MESSAGE(2, "Could not add ARP entry on device %x: %#x
", 
+    + CARD_DEVID(card), rc);
+    return qeth_l3_arp_makerc(rc);
}

static int qeth_l3_arp_remove_entry(struct qeth_card *card,
@@ -2302,7 +2262,6 @@
{
    struct qeth_cmd_buffer *iob;
    char buf[16] = {0, };
-    int tmp;
-    int rc;
+
    QETH_CARD_TEXT(card, 3, "arprment");
    @@ -2327,21 +2286,15 @@
    rc = qeth_send_setassparms(card, iob, 
       12, (unsigned long)buf,
       qeth_setassparms_cb, NULL);
-    if (rc) {
-        tmp = rc;
-        -memset(buf, 0, 16);
-        -qeth_l3_ipaddr4_to_string((u8 *)entry->ipaddr, buf);
-        -QETH_DBF_MESSAGE(2, "Could not delete ARP entry for address %s"
-        -" on %s: %s (0x%x/%d)
", buf, QETH_CARD_IFNAME(card),
-        -qeth_l3_arp_get_error_cause(&rc), tmp, tmp);
-    }
-    return rc;
+    if (rc)
+        QETH_DBF_MESSAGE(2, "Could not delete ARP entry on device %x: %#x
", 
+        + CARD_DEVID(card), rc);
+        return qeth_l3_arp_makerc(rc);
}
static int qeth_l3_arp_flush_cache(struct qeth_card *card) {
    int rc;
    -int tmp;

    QETH_CARD_TEXT(card, 3, "arpflush");

    @ @ -2357,13 +2310,10 @ @
}
rc = qeth_send_simple_setassparms(card, IPA_ARP_PROCESSING,
    IPA_CMD_ASS_ARP_FLUSH_CACHE, 0);
-if (rc) {
    -tmp = rc;
    -QETH_DBF_MESSAGE(2, "Could not flush ARP cache on %s: %s 
    -."(0x%x/%d)n", QETH_CARD_IFNAME(card),
    -qeth_l3_arp_get_error_cause(&rc), tmp, tmp);
    -}
-return rc;
+if (rc)
+    QETH_DBF_MESSAGE(2, "Could not flush ARP cache on device %x: %#x
    + CARD_DEVID(card), rc);
+return qeth_l3_arp_makerc(rc);
}
static int qeth_l3_do_ioctl(struct net_device *dev, struct ifreq *rq, int cmd)
@@ -2629,11 +2579,12 @@
static int qeth_l3_get_elements_no_tso(struct qeth_card *card,
    struct sk_buff *skb, int extraelems)
{
    addr_t tcpdptr = (addr_t)tcp_hdr(skb) + tcp_hdrlen(skb);
    -int elements = qeth_get_elements_for_range(
    -tcpdptr,
    -(addr_t)skb->data + skb_headlen(skb)) +
    -qeth_get_elements_for_frags(skb);
    +addr_t start = (addr_t)tcp_hdr(skb) + tcp_hdrlen(skb);
    +addr_t end = (addr_t)skb->data + skb_headlen(skb);
    +int elements = qeth_get_elements_for_frags(skb);
    +
    +if (start != end)
    +elements += qeth_get_elements_for_range(start, end);

    if ((elements + extraelems) > QETH_MAX_BUFFER_ELEMENTS(card)) {
        QETH_DBF_MESSAGE(2,
@@ -2860,7 +2811,10 @@
        if (qdio_stop_irq(card->data.ccwdev, 0) >= 0) {
            napi_enable(&card->napi);


local_bh_disable();
napi_schedule(&card->napi);
/* kick-start the NAPI softirq: */
local_bh_enable();
} else
rc = -EIO;
return rc;
@@ -3033,12 +2987,14 @@
struct qeth_card *card = dev_get_drvdata(&gdev->dev);
int rc;

+hash_init(card->ip_hhtable);
+
if (gdev->dev.type == &qeth_generic_devtype) {
rc = qeth_l3_create_device_attributes(&gdev->dev);
if (rc)
return rc;
}

-hash_init(card->ip_hhtable);
+
hash_init(card->ip_mc_hhtable);
card->options.layer2 = 0;
card->info.hwtrap = 0;
@@ -3059,8 +3015,8 @@
qeth_l3_set_offline(cgdev);

if (card->dev) {
-netif_napi_del(&card->napi);
unregister_netdev(card->dev);
+free_netdev(card->dev);
card->dev = NULL;
}

@@ -3139,6 +3095,8 @@
netif_carrier_on(card->dev);
else
netif_carrier_off(card->dev);
+
+qeth_enable_hw_features(card->dev);
if (recover_flag == CARD_STATE_RECOVER) {
rtnl_lock();
if (recovery_mode)
@@ -3146,7 +3104,6 @@
else
dev_open(card->dev);
qeth_l3_set_multicast_list(card->dev);
-qeth_recover_features(card->dev);
rtnl_unlock();


static void __exit smsg_exit(void)
{
    -cpcmd("SET SMSG IUCV", NULL, 0, NULL);
    +cpcmd("SET SMSG OFF", NULL, 0, NULL);
    device_unregister(smsg_dev);
    iucv_unregister(&smsg_handler, 1);
    driver_unregister(&smsg_driver);
}

int zfcp_status_read_refill(struct zfcp_adapter *adapter)
{
    -while (atomic_read(&adapter->stat_miss) > 0)
    +while (atomic_add_unless(&adapter->stat_miss, -1, 0))
    if (zfcp_fsf_status_read(adapter->qdio)) {
        +atomic_inc(&adapter->stat_miss); /* undo add -1 */
        if (atomic_read(&adapter->stat_miss) >=
            adapter->stat_read_buf_num) {
            zfcp_erp_adapter_reopen(adapter, 0, "axsref1");
            return 1;
        }
        break;
    -} else
    -atomic_dec(&adapter->stat_miss);
    +}
    return 0;
}

/*
 * Debug traces for zfcp.
 * *
 * * Copyright IBM Corp. 2002, 2017
 * + * Copyright IBM Corp. 2002, 2018
 */

#define KMSG_COMPONENT "zfcp"

/*
memcpys(rec->u.res.fsf_status_qual, &q_head->fsf_status_qual,
...
FSF_STATUS_QUALIFIER_SIZE);

- if (req->fsf_command != FSF_QTCB_FCP_CMND) {
- rec->pl_len = q_head->log_length;
- zfcp_dbf_pl_write(dbf, (char *)q_pref + q_head->log_start,
- rec->pl_len, "fsf_res", req->req_id);
- } 
+ rec->pl_len = q_head->log_length;
+ zfcp_dbf_pl_write(dbf, (char *)q_pref + q_head->log_start,
+ rec->pl_len, "fsf_res", req->req_id);

dep_event(dbf->hba, level, rec, sizeof(*rec));
spin_unlock_irqrestore(&dbf->hba_lock, flags);
@@ -285,6 +283,8 @@
struct list_head *entry;
unsigned long flags;
+ lockdep_assert_held(&adapter->erp_lock);
+
 if (unlikely(!debug_level_enabled(dbf->rec, level)))
 return;

@@ -308,6 +308,27 @@
spin_unlock_irqrestore(&dbf->rec_lock, flags);
}

+/**
+ * zfcp_dbf_rec_trig_lock - trace event related to triggered recovery with lock
+ * @tag: identifier for event
+ * @adapter: adapter on which the erp_action should run
+ * @port: remote port involved in the erp_action
+ * @sdev: scsi device involved in the erp_action
+ * @want: wanted erp_action
+ * @need: required erp_action
+ *
+ * The adapter->erp_lock must not be held.
+ */
+void zfcp_dbf_rec_trig_lock(char *tag, struct zfcp_adapter *adapter,
+ struct zfcp_port *port, struct scsi_device *sdev,
+ u8 want, u8 need)
+{
+unsigned long flags;
+
+read_lock_irqsave(&adapter->erp_lock, flags);
+zfcp_dbf_rec_trig(tag, adapter, port, sdev, want, need);
+read_unlock_irqrestore(&adapter->erp_lock, flags);
+}
/**
 * zfcp_dbf_scsi_eh() - Trace event for special cases of scsi_eh callbacks.
 * @tag: Identifier for event.
 * @adapter: Pointer to zfcp adapter as context for this event.
 * @scsi_id: SCSI ID/target to indicate scope of task management function (TMF).
 * @ret: Return value of calling function.
 *
 * This SCSI trace variant does not depend on any of:
 * scsi_cmnd, zfcp_fsf_req, scsi_device.
 */
void zfcp_dbf_scsi_eh(char *tag, struct zfcp_adapter *adapter,
	      unsigned int scsi_id, int ret)
{
    struct zfcp_dbf *dbf = adapter->dbf;
    struct zfcp_dbf_scsi *rec = &dbf->scsi_buf;
    unsigned long flags;
    static int const level = 1;

    if (unlikely(!debug_level_enabled(adapter->dbf->scsi, level)))
        return;

    spin_lock_irqsave(&dbf->scsi_lock, flags);
    memset(rec, 0, sizeof(*rec));
    memcpy(rec->tag, tag, ZFCP_DBF_TAG_LEN);
    rec->id = ZFCP_DBF_SCSI_CMND;
    rec->scsi_result = ret; /* re-use field, int is 4 bytes and fits */
    rec->scsi_retries = ~0;
    rec->scsi_allowed = ~0;
    rec->fcp_rsp_info = ~0;
    rec->scsi_id = scsi_id;
    rec->scsi_lun = (u32)ZFCP_DBF_INVALID_LUN;
    rec->scsi_lun_64_hi = (u32)(ZFCP_DBF_INVALID_LUN >> 32);
    rec->host_scribble = ~0;
    memset(rec->scsi_opcode, 0xff, ZFCP_DBF_SCSI_OPCODE);
    debug_event(dbf->scsi, level, rec, sizeof(*rec));
    spin_unlock_irqrestore(&dbf->scsi_lock, flags);
}
static debug_info_t *zfcp_dbf_reg(const char *name, int size, int rec_size)
--- linux-4.15.0.orig/drivers/s390/scsi/zfcp_erp.c
+++ linux-4.15.0/drivers/s390/scsi/zfcp_erp.c
@@ -11,6 +11,7 @@
#define pr_fmt(fmt) KMSG_COMPONENT ": " fmt
#include <linux/kthread.h>
+#include <linux/bug.h>
#include "zfcp_ext.h"
#include "zfcp_reqlist.h"

@ @ -35,11 +36,28 @@
ZFCP_ERP_STEP_LUN_OPENING= 0x2000,
 ];

+/**
+ * enum zfcp_erp_act_type - Type of ERP action object.
+ * @ZFCP_ERP_ACTION_REOPEN_LUN: LUN recovery.
+ * @ZFCP_ERP_ACTION_REOPEN_PORT: Port recovery.
+ * @ZFCP_ERP_ACTION_REOPEN_PORT_FORCED: Forced port recovery.
+ * @ZFCP_ERP_ACTION_REOPEN_ADAPTER: Adapter recovery.
+ * @ZFCP_ERP_ACTION_NONE: Eyecatcher pseudo flag to bitwise or-combine with
+ * either of the first four enum values.
+ * Used to indicate that an ERP action could not be
+ * set up despite a detected need for some recovery.
+ * @ZFCP_ERP_ACTION_FAILED: Eyecatcher pseudo flag to bitwise or-combine with
+ * either of the first four enum values.
+ * Used to indicate that ERP not needed because
+ * the object has ZFCP_STATUS_COMMON_ERP_FAILED.
+ */
enum zfcp_erp_act_type {
 ZFCP_ERP_ACTION_REOPEN_LUN = 1,
 ZFCP_ERP_ACTION_REOPEN_PORT = 2,
 ZFCP_ERP_ACTION_REOPEN_PORT_FORCED = 3,
 ZFCP_ERP_ACTION_REOPEN_ADAPTER = 4,
 +ZFCP_ERP_ACTION_NONE = 0xc0,
 +ZFCP_ERP_ACTION_FAILED = 0xe0,
 ;

 enum zfcp_erp_act_state {
 @@ -126,6 +144,46 @@
 }
int need = want;
struct zfcp_scsi_dev *zsdev;

switch (want) {
case ZFCP_ERP_ACTION_REOPEN_LUN:
    zsdev = sdev_to_zfcp(sdev);
    if (atomic_read(&zsdev->status) & ZFCP_STATUS_COMMON_ERP_FAILED)
        need = 0;
    break;
case ZFCP_ERP_ACTION_REOPEN_PORT_FORCED:
    if (atomic_read(&port->status) & ZFCP_STATUS_COMMON_ERP_FAILED)
        need = 0;
    break;
case ZFCP_ERP_ACTION_REOPEN_PORT:
    if (atomic_read(&port->status) &
        ZFCP_STATUS_COMMON_ERP_FAILED) {
        need = 0;
        /* ensure propagation of failed status to new devices */
        zfcp_erp_set_port_status(
            port, ZFCP_STATUS_COMMON_ERP_FAILED);
    }
    break;
case ZFCP_ERP_ACTION_REOPEN_ADAPTER:
    if (atomic_read(&adapter->status) &
        ZFCP_STATUS_COMMON_ERP_FAILED) {
        need = 0;
        /* ensure propagation of failed status to new devices */
        zfcp_erp_set_adapter_status(
            adapter, ZFCP_STATUS_COMMON_ERP_FAILED);
    }
    break;
}
return need;

static int zfcp_erp_required_act(int want, struct zfcp_adapter *adapter,
    struct zfcp_port *port,
    struct scsi_device *sdev)
{ @ @ -185,6 +243,12 @@
    struct zfcp_erp_action *erp_action;
    struct zfcp_scsi_dev *zfcp_sdev;

    if (WARN_ON_ONCE(need != ZFCP_ERP_ACTION_REOPEN_LUN &&
        need != ZFCP_ERP_ACTION_REOPEN_PORT &&
        need != ZFCP_ERP_ACTION_REOPEN_PORT_FORCED &&
        need != ZFCP_ERP_ACTION_REOPEN_ADAPTER))
        return NULL;
switch (need) {
  case ZFCP_ERP_ACTION_REOPEN_LUN:
    zfcp_sdev = sdev_to_zfcp(sdev);
    int retval = 1, need;
    struct zfcp_erp_action *act;

    if (!adapter->erp_thread)
      return -EIO;
    +need = zfcp_erp_handle_failed(want, adapter, port, sdev);
    +if (!need) {
      +need = ZFCP_ERP_ACTION_FAILED; /* marker for trace */
      +goto out;
    }
    +if (!adapter->erp_thread) {
      +need = ZFCP_ERP_ACTION_NONE; /* marker for trace */
      +retval = -EIO;
      +goto out;
    }
    need = zfcp_erp_required_act(want, adapter, port, sdev);
    if (!need)
      goto out;
    act = zfcp_erp_setup_act(need, act_status, adapter, port, sdev);
    -if (!act)
      need |= ZFCP_ERP_ACTION_NONE; /* marker for trace */
      goto out;
    atomic_or(ZFCP_STATUS_ADAPTER_ERP_PENDING, &adapter->status);
    ++adapter->erp_total_count;
    list_add_tail(&act->list, &adapter->erp_ready_head);
    return retval;
}

+void zfcp_erp_port_forced_no_port_dbf(char *id, struct zfcp_adapter *adapter,
   u64 port_name, u32 port_id)
+
   +unsigned long flags;
   +static /* don't waste stack */ struct zfcp_port tmpport;
   +
   +write_lock_irqsave(&adapter->erp_lock, flags);
   +/* Stand-in zfcp port with fields just good enough for
   + zfcp_dbf_rec_trig() and zfcp_dbf_set_common().
+ * Under lock because tmpport is static.
+ */
+atomic_set(&tmpport.status, -1); /* unknown */
+tmpport.wwpn = port_name;
+tmpport.d_id = port_id;
+zfcp_dbf_rec_trig(id, adapter, &tmpport, NULL,
+ ZFCP_ERP_ACTION_REOPEN_PORT_FORCED,
+ ZFCP_ERP_ACTION_NONE);
+write_unlock_irqrestore(&adapter->erp_lock, flags);
+
+
+static int _zfcp_erp_adapter_reopen(struct zfcp_adapter *adapter,
+ int clear_mask, char *id)
+ {
+ zfcp_erp_adapter_block(adapter, clear_mask);
+ zfcp_scsi_schedule_rports_block(adapter);
+
+ /* ensure propagation of failed status to new devices */
+ -if (atomic_read(&adapter->status) & ZFCP_STATUS_COMMON_ERP_FAILED) {
+ -zfcp_erp_set_adapter_status(adapter,
+ - ZFCP_STATUS_COMMON_ERP_FAILED);
+ -return -EIO;
+ -}
+ return zfcp_erp_action_enqueue(ZFCP_ERP_ACTION_REOPEN_ADAPTER,
+ adapter, NULL, NULL, id, 0);
+ }
@@ -299,12 +388,8 @@
+zfcp_scsi_schedule_rports_block(adapter);
+write_lock_irqsave(&adapter->erp_lock, flags);
+ -if (atomic_read(&adapter->status) & ZFCP_STATUS_COMMON_ERP_FAILED)
+ -zfcp_erp_set_adapter_status(adapter,
+ - ZFCP_STATUS_COMMON_ERP_FAILED);
+ else
+ -zfcp_erp_action_enqueue(ZFCP_ERP_ACTION_REOPEN_ADAPTER, adapter,
+ -NULL, NULL, id, 0);
+ +zfcp_erp_action_enqueue(ZFCP_ERP_ACTION_REOPEN_ADAPTER, adapter,
+ +NULL, NULL, id, 0);
+ write_unlock_irqrestore(&adapter->erp_lock, flags);
+ }
@@ -345,9 +430,6 @@
+zfcp_scsi_schedule_rport_block(port);
+ -if (atomic_read(&port->status) & ZFCP_STATUS_COMMON_ERP FAILED)
+ -return;
+ -
zfcp_erp_action_enqueue(ZFCP_ERP_ACTION_REOPEN_PORT_FORCED, port->adapter, port, NULL, id, 0);
}
//@ -373,12 +455,6 @
zfcp_erp_port_block(port, clear);
zfcp_scsi_schedule_rport_block(port);

@if (atomic_read(&port->status) & ZFCP_STATUS_COMMON_ERP_FAILED) {
-/*! ensure propagation of failed status to new devices */
-zfcp_erp_set_port_status(port, ZFCP_STATUS_COMMON_ERP_FAILED);
-return -EIO;
-}
-
return zfcp_erp_action_enqueue(ZFCP_ERP_ACTION_REOPEN_PORT,
    port->adapter, port, NULL, id, 0);
}
//@ -418,9 +494,6 @

zfcp_erp_lun_block(sdev, clear);

-if (atomic_read(&zfcp_sdev->status) & ZFCP_STATUS_COMMON_ERP_FAILED)
-return;
-
zfcp_erp_action_enqueue(ZFCP_ERP_ACTION_REOPEN_LUN, adapter,
    zfcp_sdev->port, sdev, id, act_status);
}
//@ -531,7 +604,10 @
-ZFCP_STATUS_ERP_TIMEDOUT)) {
    req->status |= ZFCP_STATUS_FSFREQ_DISMISSED;
    zfcp_dbf_rec_run("erscf_1", act);
    req->erp_action = NULL;
    +/*! lock-free concurrent access with
    + * zfcp_erp_timeout_handler()
    + */
    +WRITE_ONCE(req->erp_action, NULL);
    }
if (act->status & ZFCP_STATUS_ERP_TIMEDOUT)
    zfcp_dbf_rec_run("erscf_2", act);
//@ -567,8 +643,14 @
void zfcp_erp_timeout_handler(struct timer_list *t)
{
    struct zfcp_fsf_req *fsf_req = from_timer(fsf_req, t, timer);
    -struct zfcp_erp_action *act = fsf_req->erp_action;
    +struct zfcp_erp_action *act;

    +if (fsf_req->status & ZFCP_STATUS_FSFREQ_DISMISSED)
    +return;
    +/*! lock-free concurrent access with zfcp_erp_strategy_check_fsfreq() */
+act = READ_ONCE(fsf_req->erp_action);
+if (!act)
++return;
+zfcp_erp_notify(act, ZFCP_STATUS_ERP_TIMEDOUT);
}

@@ -586,6 +668,20 @@
add_timer(&erp_action->timer);
}

+void zfcp_erp_port_forced_reopen_all(struct zfcp_adapter *adapter,
++    int clear, char *dbftag)
++{
++unsigned long flags;
++struct zfcp_port *port;
++
++    write_lock_irqsave(&adapter->erp_lock, flags);
++    read_lock(&adapter->port_list_lock);
++    list_for_each_entry(port, &adapter->port_list, list)
++        _zfcp_erp_port_forced_reopen(port, clear, dbftag);
++    read_unlock(&adapter->port_list_lock);
++    write_unlock_irqrestore(&adapter->erp_lock, flags);
++}
++
++ static void _zfcp_erp_port_reopen_all(struct zfcp_adapter *adapter,
++    int clear, char *id)
++{
++    adapter->peer_d_id);
++    if (IS_ERR(port)) /* error or port already attached */
++        return;
++    _zfcp_erp_port_reopen(port, 0, "ereptp1");
++    zfcp_erp_port_reopen(port, 0, "ereptp1");
++}

static int zfcp_erp_adapter_strat_fsf_xconf(struct zfcp_erp_action *erp_action)
@@ -1240,6 +1336,9 @@
    struct zfcp_scsi_dev *zsdev = sdev_to_zfcp(sdev);
    int lun_status;

    +if (sdev->sdev_state == SDEV_DEL ||
++    sdev->sdev_state == SDEV_CANCEL)
++    continue;
++    if (zsdev->port != port)
++        continue;
++    /* LUN under port of interest */
+++ linux-4.15.0.orig/drivers/s390/scsi/zfcp_ext.h
+++ linux-4.15.0/drivers/s390/scsi/zfcp_ext.h
* External function declarations.

* - * Copyright IBM Corp. 2002, 2016
+ * Copyright IBM Corp. 2002, 2018
*/

#ifndef ZFCP_EXT_H
extern void zfcp_dbf_adapter_unregister(struct zfcp_adapter *);
extern void zfcp_dbf_rec_trig(char *, struct zfcp_adapter *,
   struct zfcp_port *, struct scsi_device *, u8, u8);
+extern void zfcp_dbf_rec_trig_lock(char *tag, struct zfcp_adapter *adapter,
   structzfcp_port *, structzfcp_port *,
   structscsi_device *, u8 want, u8 need);
extern void zfcp_dbf_rec_run(char *, struct zfcp_erp_action *);
extern void zfcp_dbf_rec_run_lvl(int level, char *tag,
   structzfcp_erp_action *erp);
#endif ZFCP_EXT_H

/* zfcp_erp.c */
extern void zfcp_erp_set_adapter_status(struct zfcp_adapter *, u32);
extern void zfcp_erp_clear_adapter_status(struct zfcp_adapter *, u32);
+extern void zfcp_erp_port_forced_no_port_dbf(char *id,
   struct zfcp_adapter *adapter,
   u64 port_name, u32 port_id);
extern void zfcp_erp_adapter_reopen(struct zfcp_adapter *, int, char *);
extern void zfcp_erp_adapter_shutdown(struct zfcp_adapter *, int, char *);
extern void zfcp_erp_port_reopen(struct zfcp_port *, int, char *);
+extern void zfcp_erp_port_forced_reopen(struct zfcp_port *, int, char *);
+extern void zfcp_erp_port_forced_reopen_all(struct zfcp_adapter *adapter,
   int clear, char *dbftag);
extern void zfcp_erp_set_lun_status(struct scsi_device *, u32);
extern void zfcp_erp_clear_lun_status(struct scsi_device *, u32);
extern void zfcp_erp_lun_reopen(struct scsi_device *, int, char *);
@@ -151,6 +161,7 @@
extern struct mutex zfcp_sysfs_port_units_mutex;
extern struct device_attribute *zfcp_sysfs_sdev_attrs[];
extern struct device_attribute *zfcp_sysfs_shost_attrs[];

extern void zfcp_dbf_scsi_eh(char *tag, struct zfcp_adapter *adapter,
   unsigned int scsi_id, int ret);
export void zfcp_dbf_scsi(char *, int, struct scsi_cmnd *,
struct zfcp_fsf_req *);
+export void zfcp_dbf_scsi_eh(char *tag, struct zfcp_adapter *adapter,
   structzfcp_port *, structzfcp_port *,
   structscsi_device *, u8 want, u8 need);
+bool zfcp_sysfs_port_is_removing(const struct zfcp_port *const port);

/* zfcp_unit.c */
extern int zfcp_unit_add(struct zfcp_port *, u64);
--- linux-4.15.0.orig/drivers/s390/scsi/zfcp_fc.c
+++ linux-4.15.0/drivers/s390/scsi/zfcp_fc.c
@@ -240,10 +240,6 @@
     list_for_each_entry(port, &adapter->port_list, list) {
         if ((port->d_id & range) == (ntoh24(page->rscn_fid) & range))
             zfcp_fc_test_link(port);
-        if (!port->d_id)
-            zfcp_erp_port_reopen(port,
-                ZFCP_STATUS_COMMON_ERP_FAILED,
-                "fcrscn1");
+    if (!port->d_id)
+        zfcp_erp_port_reopen(port,
+                ZFCP_STATUS_COMMON_ERP_FAILED,
+                "fcrscn1");
         read_unlock_irqrestore(&adapter->port_list_lock, flags);
     }
@@ -251,6 +247,7 @@
 static void zfcp_fc_incoming_rscn(struct zfcp_fsf_req *fsf_req)
 {
     struct fsf_status_read_buffer *status_buffer = (void *)fsf_req->data;
+    struct zfcp_adapter *adapter = fsf_req->adapter;
     struct fc_els_rscn *head;
     struct fc_els_rscn_page *page;
     u16 i;
@@ -264,6 +261,22 @@
     no_entries = be16_to_cpu(head->rscn_plen) /
     sizeof(struct fc_els_rscn_page);

     if (no_entries > 1) {
         /* handle failed ports */
+        unsigned long flags;
+        struct zfcp_port *port;
+        read_lock_irqsave(&adapter->port_list_lock, flags);
+        list_for_each_entry(port, &adapter->port_list, list) {
+            if (port->d_id)
+                continue;
+            zfcp_erp_port_reopen(port,
+                ZFCP_STATUS_COMMON_ERP_FAILED,
+                "fcrscn1");
+        }
         read_unlock_irqrestore(&adapter->port_list_lock, flags);
     } else {
         for (i = 1; i < no_entries; i++) {
             /* skip head and start with 1st element */
         page++;
--- linux-4.15.0.orig/drivers/s390/scsi/zfcp_fsf.c
+++ linux-4.15.0/drivers/s390/scsi/zfcp_fsf.c
@@ -21,6 +21,11 @@
 struct kmem_cache *zfcp_fsf_qtcb_cache;

 +static bool ber_stop = true;
+module_param(ber_stop, bool, 0600);
+MODULE_PARM_DESC(ber_stop,
+ "Shuts down FCP devices for FCP channels that report a bit-error count in excess of its threshold (default on)");
+
 static void zfcp_fsf_request_timeout_handler(struct timer_list *t)
 {
 struct zfcp_fsf_req *fsf_req = from_timer(fsf_req, t, timer);
@@ -230,10 +235,15 @@
 case FSF_STATUS_READ_BIT_ERROR_THRESHOLD:
 -dev_warn(&adapter->ccw_device->dev,
 - "The error threshold for checksum statistics ")
- "has been exceeded\n"));
 zfcp_dbf_hba_bit_err("fssrh_3", req);
+if (ber_stop) {
+dev_warn(&adapter->ccw_device->dev,
+ "All paths over this FCP device are disused because of excessive bit errors\n"));
+zfcp_erp_adapter_shutdown(adapter, 0, "fssrh_b");
+} else {
+dev_warn(&adapter->ccw_device->dev,
+ "The error threshold for checksum statistics has been exceeded\n"));
+}
 break;
 case FSF_STATUS_READ_LINK_DOWN:
 zfcp_fsf_status_read_link_down(req);
@@ -393,7 +403,7 @@
 return;
 }

 -del_timer(&req->timer);
+del_timer_sync(&req->timer);
 zfcp_fsf_protstatus_eval(req);
 zfcp_fsf_fsfsstatus_eval(req);
 req->handler(req);
@@ -738,7 +748,7 @@
 req->qdio_req.qdio_outb_usage = atomic_read(&qdio->req_q_free);
 req->issued = get_tod_clock();
 if (zfcp_qdio_send(qdio, &req->qdio_req)) {
- del_timer(&req->timer);
+del_timer_sync(&req->timer);
/* lookup request again, list might have changed */
zfcp_reqlist_find_rm(adapter->req_list, req_id);
zfcp_erp_adapter_reopen(adapter, 0, "fsrs__1");
@@ -1584,6 +1594,7 @@
{ 
    struct zfcp_qdio *qdio = wka_port->adapter->qdio;
    struct zfcp_fsf_req *req;
    unsigned long req_id = 0;
    int retval = -EIO;

    spin_lock_irq(&qdio->req_q_lock);
    @@ -1606,6 +1617,8 @@
    hton24(req->qtcb->bottom.support.d_id, wka_port->d_id);
    req->data = wka_port;

    +req_id = req->req_id;
    +
zfcp_fsf_start_timer(req, ZFCP_FSF_REQUEST_TIMEOUT);
    retval = zfcp_fsf_req_send(req);
    if (retval)
    @@ -1613,7 +1626,7 @@
        out:
        spin_unlock_irq(&qdio->req_q_lock);
        if (!retval)
            -zfcp_dbf_rec_run_wka("fsowp_1", wka_port, req->req_id);
        +zfcp_dbf_rec_run_wka("fsowp_1", wka_port, req_id);
        return retval;
    }

    @@ -1639,6 +1652,7 @@
    { 
        struct zfcp_qdio *qdio = wka_port->adapter->qdio;
        struct zfcp_fsf_req *req;
        unsigned long req_id = 0;
        int retval = -EIO;

        spin_lock_irq(&qdio->req_q_lock);
        @@ -1661,6 +1675,8 @@
        req->data = wka_port;
        req->qtcb->header.port_handle = wka_port->handle;

        +req_id = req->req_id;
        +
zfcp_fsf_start_timer(req, ZFCP_FSF_REQUEST_TIMEOUT);
        retval = zfcp_fsf_req_send(req);
        if (retval)
        @@ -1668,7 +1684,7 @@
            out:
spin_unlock_irq(&qdio->req_q_lock);
if (!retval)
- zfcp_dbf_rec_run_wka("fscwp_1", wka_port, req->req_id);
+ zfcp_dbf_rec_run_wka("fscwp_1", wka_port, req_id);
return retval;
}

@@ -2075,11 +2091,8 @@
break;
case FSF_CMND_LENGTH_NOT_VALID:
 dev_err(&req->adapter->ccw_device->dev,
- "Incorrect CDB length %d, LUN 0x%016Lx on 
- "port 0x%016Lx closed\n",
- req->qtcb->bottom.io.fcp_cmnd_length,
- (unsigned long long)zfcp_scsi_dev_lun(sdev),
- (unsigned long long)zfcp_sdev->port->wwpn);
+ "Incorrect FCP_CMND length %d, FCP device closed\n",
+ req->qtcb->bottom.io.fcp_cmnd_length);
 zfcp_erp_adapter_shutdown(zfcp_sdev->port->adapter, 0,
 "fssfch4");
 req->status |= ZFCP_STATUS_FSFREQ_ERROR;
--- linux-4.15.0.orig/drivers/s390/scsi/zfcp_scsi.c
+++ linux-4.15.0/drivers/s390/scsi/zfcp_scsi.c
@@ -4,7 +4,7 @@
 *
 * Interface to Linux SCSI midlayer.
 *
- * Copyright IBM Corp. 2002, 2017
+ * Copyright IBM Corp. 2002, 2018
 */

#define KMSG_COMPONENT "zfcp"
@@ -125,6 +125,15 @@
 zfcp_sdev->erp_action.port = port;

+ mutex_lock(&zfcp_sysfs_port_units_mutex);
+ if (zfcp_sysfs_port_is_removing(port)) {
+ /* port is already gone */
+ mutex_unlock(&zfcp_sysfs_port_units_mutex);
+ put_device(&port->dev); /* undo zfcp_get_port_by_wwpn() */
+ return -ENXIO;
+ }
+ mutex_unlock(&zfcp_sysfs_port_units_mutex);
+ unit = zfcp_unit_find(port, zfcp_scsi_dev_lun(sdev));
 if (unit)
 put_device(&unit->dev);
if (abrt_req)
break;

+zfcp_dbf_scsi_abort("abrt_wt", scpnt, NULL);
zfcp_erp_wait(adapter);
ret = fc_block_scsi_eh(scpnt);
if (ret) {
@@ -181,6 +190,7 @@
if (fsf_req)
break;

+zfcp_dbf_scsi_devreset("wait", scpnt, tm_flags, NULL);
zfcp_erp_wait(adapter);
ret = fc_block_scsi_eh(scpnt);
if (ret) {
@@ -277,6 +287,7 @@
{
struct zfcp_scsi_dev *zfcp_sdev = sdev_to_zfcp(scpnt->device);
struct zfcp_adapter *adapter = zfcp_sdev->port->adapter;
-int ret;
+int ret = SUCCESS, fc_ret;

+if (!(adapter->connection_features & FSF_FEATURE_NPIV_MODE)) {
+zfcp_erp_port_forced_reopen_all(adapter, 0, "schrh_p");
+zfcp_erp_wait(adapter);
+}
zfcp_erp_adapter_reopen(adapter, 0, "schrh_1");
zfcp_erp_wait(adapter);
-ret = fc_block_scsi_eh(scpnt);
-if (ret)
-return ret;
+fc_ret = fc_block_scsi_eh(scpnt);
+if (fc_ret)
+ret = fc_ret;

-return SUCCESS;
+zfcp_dbf_scsi_eh("schrh_r", adapter, ~0, ret);
+return ret;
}

struct scsi_transport_template *zfcp_scsi_transport_template;
@@ -602,6 +618,11 @@
if (port) {
zfcp_erp_port_forced_reopen(port, 0, "sctrpi1");
put_device(&port->dev);
+} else {
+zfcp_erp_port_forced_no_port_dbf(
+"sctrpin", adapter,
+rport->port_name /* zfcp_scsi_rport_register */,
+rport->port_id /* zfcp_scsi_rport_register */);
}

@@ -618,9 +639,9 @@
 ids.port_id = port->d_id;
 ids.roles = FC_RPORT_ROLE_FCP_TARGET;

-zfcp_dbf_rec_trig(“scpaddy”, port->adapter, port, NULL,
 - ZFCP_PSEUDO_ERP_ACTION_RPORT_ADD,
 - ZFCP_PSEUDO_ERP_ACTION_RPORT_ADD);
+zfcp_dbf_rec_trig_lock(“scpaddy”, port->adapter, port, NULL,
 + ZFCP_PSEUDO_ERP_ACTION_RPORT_ADD,
 + ZFCP_PSEUDO_ERP_ACTION_RPORT_ADD);
 rport = fc_remote_port_add(port->adapter->scsi_host, 0, &ids);
 if (!rport) {
 dev_err(&port->adapter->ccw_device->dev,
 @@ -642,9 +663,9 @@
 struct fc_rport *rport = port->rport;

 if (rport) {
-zfcp_dbf_rec_trig(“scpdely”, port->adapter, port, NULL,
 - ZFCP_PSEUDO_ERP_ACTION_RPORT_DEL,
 - ZFCP_PSEUDO_ERP_ACTION_RPORT_DEL);
+zfcp_dbf_rec_trig_lock(“scpdely”, port->adapter, port, NULL,
 + ZFCP_PSEUDO_ERP_ACTION_RPORT_DEL,
 + ZFCP_PSEUDO_ERP_ACTION_RPORT_DEL);
 fc_remote_port_delete(rport);
 port->rport = NULL;
 }

--- linux-4.15.0.orig/drivers/s390/scsi/zfcp_sysfs.c
+++ linux-4.15.0/drivers/s390/scsi/zfcp_sysfs.c
@@ -238,6 +238,53 @@
 DEFINE_MUTEX(zfcp_sysfs_port_units_mutex);

+static void zfcp_sysfs_port_set_removing(struct zfcp_port *const port)
 +{
+lockdep_assert_held(&zfcp_sysfs_port_units_mutex);
+atomic_set(&port->units, -1);
+}
+
+bool zfcp_sysfs_port_is_removing(const struct zfcp_port *const port)
 +{
+lockdep_assert_held(&zfcp_sysfs_port_units_mutex);
+return atomic_read(&port->units) == -1;

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static bool zfcp_sysfs_port_in_use(struct zfcp_port *const port)
{
    struct zfcp_adapter *const adapter = port->adapter;
    unsigned long flags;
    struct scsi_device *sdev;
    bool in_use = true;

    mutex_lock(&zfcp_sysfs_port_units_mutex);
    if (atomic_read(&port->units) > 0)
        goto unlock_port_units_mutex; /* zfcp_unit(s) under port */
    spin_lock_irqsave(adapter->scsi_host->host_lock, flags);
    __shost_for_each_device(sdev, adapter->scsi_host) {
        const struct zfcp_scsi_dev *zsdev = sdev_to_zfcp(sdev);
        if (sdev->sdev_state == SDEV_DEL ||
            sdev->sdev_state == SDEV_CANCEL)
            continue;
        if (zsdev->port != port)
            continue;
        /* alive scsi_device under port of interest */
        goto unlock_host_lock;
    }
    /* port is about to be removed, so no more unit_add or slave_alloc */
    zfcp_sysfs_port_set_removing(port);
    in_use = false;

    unlock_host_lock:
    spin_unlock_irqrestore(adapter->scsi_host->host_lock, flags);
    unlock_port_units_mutex:
    mutex_unlock(&zfcp_sysfs_port_units_mutex);
    return in_use;
}

static ssize_t zfcp_sysfs_port_remove_store(struct device *dev, struct device_attribute *attr, const char *buf, size_t count)
{
    mutex_lock(&zfcp_sysfs_port_units_mutex);
    if (atomic_read(&port->units) > 0)
        goto unlock_port_units_mutex; /* zfcp_unit(s) under port */
    spin_lock_irqsave(adapter->scsi_host->host_lock, flags);
    __shost_for_each_device(sdev, adapter->scsi_host) {
        const struct zfcp_scsi_dev *zsdev = sdev_to_zfcp(sdev);
        if (sdev->sdev_state == SDEV_DEL ||
            sdev->sdev_state == SDEV_CANCEL)
            continue;
        if (zsdev->port != port)
            continue;
        /* alive scsi_device under port of interest */
        goto unlock_host_lock;
    }
    /* port is about to be removed, so no more unit_add or slave_alloc */
    zfcp_sysfs_port_set_removing(port);
    in_use = false;

    unlock_host_lock:
    spin_unlock_irqrestore(adapter->scsi_host->host_lock, flags);
    unlock_port_units_mutex:
    mutex_unlock(&zfcp_sysfs_port_units_mutex);
    return 0;
}

mutex_lock(&zfcp_sysfs_port_units_mutex);
if (atomic_read(&port->units) > 0) {
    if (zfcp_sysfs_port_in_use(port)) {
        retval = -EBUSY;
    } else
        retval = 0;

    mutex_unlock(&zfcp_sysfs_port_units_mutex);
}
mutex_unlock(&zfcp_sysfs_port_units_mutex);
+put_device(&port->dev); /* undo zfcp_get_port_by_wwpn() */
goto out;
}

/* port is about to be removed, so no more unit_add */
-atomic_set(&port->units, -1);
-mutex_unlock(&zfcp_sysfs_port_units_mutex);

write_lock_irq(adapter->port_list_lock);
list_del(&port->list);
--- linux-4.15.0.orig/drivers/s390/scsi/zfcp_unit.c
+++ linux-4.15.0/drivers/s390/scsi/zfcp_unit.c
@@ -124,7 +124,7 @@
    int retval = 0;
    mutex_lock(&zfcp_sysfs_port_units_mutex);
    -if (atomic_read(&port->units) == -1) {
-+if (zfcp_sysfs_port_is_removing(port)) {
+    /* port is already gone */
    retval = -ENODEV;
    goto out;
    @@ -168,8 +168,14 @@
    write_lock_irq(&port->unit_list_lock);
    list_add_tail(&unit->list, &port->unit_list);
    write_unlock_irq(&port->unit_list_lock);
+/*
+ * lock order: shost->scan_mutex before zfcp_sysfs_port_units_mutex
+ * due to      zfcp_unit_scsi_scan() => zfcp_scsi_slave_alloc()
+ */
+mutex_unlock(&zfcp_sysfs_port_units_mutex);

zfcp_unit_scsi_scan(unit);
+return retval;

out:
mutex_unlock(&zfcp_sysfs_port_units_mutex);
--- linux-4.15.0.orig/drivers/s390/virtio/virtio_ccw.c
+++ linux-4.15.0/drivers/s390/virtio/virtio_ccw.c
@@ -56,6 +56,7 @@
    unsigned long indicators2;

    unsigned int revision; /* Transport revision */
    wait_queue_head_t wait_q;
    spinlock_t lock;
+    struct mutex io_lock; /* Serializes I/O requests */

    struct list_head virtqueues;
    unsigned long indicators;
    unsigned long indicators2;
@@ -102,7 +103,7 @@
};

/* the highest virtio-ccw revision we support */
-#define VIRTIO_CCW_REV_MAX 1
+#define VIRTIO_CCW_REV_MAX 2

struct virtio_ccw_vq_info {
    struct virtqueue *vq;
    struct airq_iv *aiv;
};

static struct airq_info *airq_areas[MAX_AIRQ_AREAS];
+static DEFINE_MUTEX(airq_areas_lock);

#define CCW_CMD_SET_VQ 0x13
#define CCW_CMD_VDEV_RESET 0x33

unsigned long bit, flags;
for (i = 0; i < MAX_AIRQ_AREAS && !indicator_addr; i++) {
+mutex_lock(&airq_areas_lock);
    if (!airq_areas[i])
        airq_areas[i] = new_airq_info();
    info = airq_areas[i];
+mutex_unlock(&airq_areas_lock);
    if (!info)
        return 0;
    write_lock_irqsave(&info->lock, flags);
    if (!vcdev->airq_info)
+return;
    list_for_each_entry(info, &vcdev->virtqueues, node)
        drop_airq_indicator(info->vq, vcdev->airq_info);
"}
+mutex_lock(&vcdev->io_lock);
    do {
        spin_lock_irqsave(get_ccwdev_lock(vcdev->cdev), flags);
        ret = ccw_device_start(vcdev->cdev, ccw, intparm, 0, 0);
        cpu_relax();
    } while (ret == -EBUSY);
    wait_event(vcdev->wait_q, doing_io(vcdev, flag) == 0);
return ret ? ret : vcdev->err;
+ret = ret ? ret : vcdev->err;
+mutex_unlock(&vcdev->io_lock);
+return ret;
}

static void virtio_ccw_drop_indicator(struct virtio_ccw_device *vcdev,
@@ -409,7 +418,7 @@
ret = ccw_io_helper(vcdev, ccw, VIRTIO_CCW_DOING_READ_VQ_CONF);
if (ret)
return ret;
-return vcdev->config_block->num;
+return vcdev->config_block->num ?: -ENOENT;
}

static void virtio_ccw_del_vq(struct virtqueue *vq, struct ccw1 *ccw)
@@ -828,6 +837,7 @@
int ret;
 struct ccw1 *ccw;
 void *config_area;
+unsigned long flags;

ccw = kzalloc(sizeof(*ccw), GFP_DMA | GFP_KERNEL);
if (!ccw)
@@ -846,11 +856,13 @@
if (ret)
goto out_free;

+spin_lock_irqsave(&vcdev->lock, flags);
memcpy(vcdev->config, config_area, offset + len);
-if (buf)
-memcpy(buf, &vcdev->config[offset], len);
if (vcdev->config_ready < offset + len)
vcdev->config_ready = offset + len;
+spin_unlock_irqrestore(&vcdev->lock, flags);
+if (buf)
+memcpy(buf, config_area + offset, len);

out_free:
kfree(config_area);
@@ -864,6 +876,7 @@
struct virtio_ccw_device *vcdev = to_vc_device(vdev);
struct ccw1 *ccw;
 void *config_area;
+unsigned long flags;

ccw = kzalloc(sizeof(*ccw), GFP_DMA | GFP_KERNEL);
if (!ccw)
/* Make sure we don't overwrite fields. */
if (vcdev->config_ready < offset)
    virtio_ccw_get_config(vdev, 0, NULL, offset);
+spin_lock_irqsave(&vcdev->lock, flags);
memcpy(&vcdev->config[offset], buf, len);
/* Write the config area to the host. */
memcpy(config_area, vcdev->config, sizeof(vcdev->config));
+spin_unlock_irqrestore(&vcdev->lock, flags);
ccw->cmd_code = CCW_CMD_WRITE_CONF;
ccw->flags = 0;
ccw->count = offset + len;
@@ -896,7 +911,7 @@
    u8 old_status = *vcdev->status;
    struct ccw1 *ccw;

-if (vcdev->revision < 1)
+if (vcdev->revision < 2)
    return *vcdev->status;

    ccw = kzalloc(sizeoff(ccw), GFP_DMA | GFP_KERNEL);
@@ -1247,6 +1262,7 @@
    init_waitqueue_head(&vcdev->wait_q);
    INIT_LIST_HEAD(&vcdev->virtqueues);
    spin_lock_init(&vcdev->lock);
    +mutex_init(&vcdev->io_lock);

    spin_lock_irqsave(get_ccwdev_lock(cdev), flags);
    dev_set_drvdata(&cdev->dev, vcdev);
--- linux-4.15.0.orig/drivers/sbus/char/display7seg.c
+++ linux-4.15.0/drivers/sbus/char/display7seg.c
@@ -220,6 +220,7 @@
    dev_set_drvdata(&op->dev, p);
    d7s_device = p;
    err = 0;
+of_node_put(opts);

    out:
    return err;
--- linux-4.15.0.orig/drivers/sbus/char/envctrl.c
+++ linux-4.15.0/drivers/sbus/char/envctrl.c
@@ -910,8 +910,10 @@
    for (len = 0; len < PCF8584_MAX_CHANNELS; ++len) {
        pchild->mon_type[len] = ENVCTRL_NOMON;
    }
+of_node_put(root_node);
    return;
}
/* Get the monitor channels. */
--- linux-4.15.0.orig/drivers/scsi/3w-9xxx.c
+++ linux-4.15.0/drivers/scsi/3w-9xxx.c
@@ -886,6 +886,11 @@
    unsigned int minor_number;
    int retval = TW_IOCTL_ERROR_OSC_NODEDEV;

Ąif (!capable(CAP_SYS_ADMIN)) {
Ą+retval = -EACCES;
Ą+goto out;
Ą+
Ąminor_number = iminor(inode);
Ąif (minor_number >= twa_device_extension_count)
Ągoto out;
Ą@@ -2037,6 +2042,7 @@
if (twa_initialize_device_extension(tw_dev)) {
    TW_PRINTK(tw_dev->host, TW_DRIVER, 0x25, "Failed to initialize device extension");
    +retval = -ENOMEM;
    goto out_free_device_extension;
Ą}
Ą@@ -2059,6 +2065,7 @@
    tw_dev->base_addr = ioremap(mem_addr, mem_len);
    if (!tw_dev->base_addr) {
    TW_PRINTK(tw_dev->host, TW_DRIVER, 0x35, "Failed to ioremap");
    +retval = -ENOMEM;
    goto out_release_mem_region;
Ą}
Ą@@ -2066,8 +2073,10 @@
    TW_DISABLE_INTERRUPTS(tw_dev);

    /* Initialize the card */
    -if (twa_reset_sequence(tw_dev, 0))
Ą+if (twa_reset_sequence(tw_dev, 0)) {
        +retval = -ENOMEM;
        goto out_iounmap;
        +}

    /* Set host specific parameters */
    if ((pdev->device == PCI_DEVICE_ID_3WARE_9650SE))
--- linux-4.15.0.orig/drivers/scsi/3w-sas.c
+++ linux-4.15.0/drivers/scsi/3w-sas.c
if (twl_initialize_device_extension(tw_dev)) {  
    TW_PRINTK(tw_dev->host, TW_DRIVER, 0x1a, "Failed to initialize device extension");  
    +retval = -ENOMEM;  
    goto out_free_device_extension; 
}

/** Initialize the card */
if (twl_reset_sequence(tw_dev, 0)) {  
    TW_PRINTK(tw_dev->host, TW_DRIVER, 0x1d, "Controller reset failed during probe");  
    +retval = -ENOMEM;  
    goto out_iounmap; 
}

if (!capable(CAP_SYS_ADMIN))  
    return -EACCES; 

minor_number = iminor(inode); 
if (minor_number >= tw_device_extension_count)  
    return -ENODEV; 

if (tw_initialize_device_extension(tw_dev)) {  
    printk(KERN_WARNING "3w-xxxx: Failed to initialize device extension.");  
    +retval = -ENOMEM;  
    goto out_free_device_extension; 
}

tw_dev->base_addr = pci_resource_start(pdev, 0); 
if (!tw_dev->base_addr)  
    printk(KERN_WARNING "3w-xxxx: Failed to get io address.");
retval = -ENOMEM;
goto out_release_mem_region;
}

--- linux-4.15.0.orig/drivers/scsi/53c700.c
+++ linux-4.15.0/drivers/scsi/53c700.c
@@ -295,7 +295,7 @@
    if(tpnt->sdev_attrs == NULL)
       tpnt->sdev_attrs = NCR_700_dev_attrs;

-memory = dma_alloc_attrs(hostdata->dev, TOTAL_MEM_SIZE, &pScript,
+memory = dma_alloc_attrs(dev, TOTAL_MEM_SIZE, &pScript,
               GFP_KERNEL, DMA_ATTR_NON_CONSISTENT);
    if(memory == NULL) {
       printk(KERN_ERR "53c700: Failed to allocate memory for driver, detaching\n");

--- linux-4.15.0.orig/drivers/scsi/BusLogic.c
+++ linux-4.15.0/drivers/scsi/BusLogic.c
@@ -3081,11 +3081,11 @@
        ccb->data = (void *)((unsigned int) ccb->dma_handle +
        (unsigned long) &ccb->sglist -
        (unsigned long) ccb);
else
-ccb->data = ccb->sglist;
+ccb->data = virt_to_32bit_virt(ccb->sglist);

    scsi_for_each_sg(command, sg, count, i) {
        ccb->sglist[i].segbetes = sg_dma_len(sg);
@ @ -3605,7 +3605,7 @@
        if (buf[0] != '\n' || len > 1)
            printk("%sscsi%d: %s", blogic_msglevelmap[msglevel], adapter->host_no, buf);
        else
            -printk("%s", buf);
+pr_cont("%s", buf);
    } else {
        if (begin) {
            if (adapter != NULL && adapter->adapter_initd)
@ @ -3613,7 +3613,7 @@
                else
                    printk("%ss%s", blogic_msglevelmap[msglevel], buf);
                else
                    -printk("%s", buf);
+pr_cont("%s", buf);
            } else
                 -printk("%s", buf);
                 +pr_cont("%s", buf);
            }
begin = (buf[len - 1] == '\n');
}

--- linux-4.15.0.orig/drivers/scsi/BusLogic.h
+++ linux-4.15.0/drivers/scsi/BusLogic.h
@@ -821,7 +821,7 @@
 unsigned char cdblen;/* Byte 2 */
 unsigned char sense_datalen;/* Byte 3 */
 u32 datalen;/* Bytes 4-7 */
-void *data;/* Bytes 8-11 */
+u32 data;/* Bytes 8-11 */
 unsigned char;8;/* Byte 12 */
 unsigned char;8;/* Byte 13 */
 enum blogic_adapter_status adapter_status;/* Byte 14 */
--- linux-4.15.0.orig/drivers/scsi/FlashPoint.c
+++ linux-4.15.0/drivers/scsi/FlashPoint.c
@@ -40,7 +40,7 @@
 u16 si_per_targ_no_disc;
 u16 si_per_targ_wide_nego;
 -u16 si_flags;
+u16 si_mflags;
 unsigned char si_card_family;
 unsigned char si_bustype;
 unsigned char si_card_model[3];
@@ -1070,22 +1070,22 @@
 ScamFlg =
     (unsigned char)FPT_utilEERead(ioport, SCAM_CONFIG / 2);

 -pCardInfo->si_flags = 0x0000;
+<pCardInfo->si_mflags = 0x0000;

 if (i & 0x01)
     -pCardInfo->si_flags |= SCSI_PARITY_ENA;
+<pCardInfo->si_mflags |= SCSI_PARITY_ENA;

 if (!i & 0x02)
     -pCardInfo->si_flags |= SOFT_RESET;
+<pCardInfo->si_mflags |= SOFT_RESET;

 if (i & 0x10)
     -pCardInfo->si_flags |= EXTENDED_TRANSLATION;
+<pCardInfo->si_mflags |= EXTENDED_TRANSLATION;

 if (ScamFlg & SCAM_ENABLED)
     -pCardInfo->si_flags |= FLAG_SCAM_ENABLED;
+<pCardInfo->si_mflags |= FLAG_SCAM_ENABLED;

 if (ScamFlg & SCAM_LEVEL2)
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-pCardInfo->si_flags |= FLAG_SCAM_LEVEL2;
+pCardInfo->si_mflags |= FLAG_SCAM_LEVEL2;

j = (RD_HARPOON(ioport + hp_bm_ctrl) & ~SCSI_TERM_ENA_L);
if (i & 0x04) {
  @ @ -1101,7 +1101,7 @@
}

if (!RD_HARPOON(ioport + hp_page_ctrl) & NARROW_SCSI_CARD))

-pCardInfo->si_flags |= SUPPORT_16TAR_32LUN;
+pCardInfo->si_mflags |= SUPPORT_16TAR_32LUN;

pCardInfo->si_card_family = HARPOON_FAMILY;
pCardInfo->si_bustype = BUSTYPE_PCI;
@ @ -1137,15 +1137,15 @@

if (pCardInfo->si_card_model[1] == '3') {
  if (RD_HARPOON(ioport + hp_cntl) & BIT(7))
    -pCardInfo->si_flags |= LOW_BYTE_TERM;
    +pCardInfo->si_mflags |= LOW_BYTE_TERM;
  } else if (pCardInfo->si_card_model[2] == '0') {
    temp = RD_HARPOON(ioport + hp_xfer_pad);
    WR_HARPOON(ioport + hp_xfer_pad, (temp & ~BIT(4)));
    if (RD_HARPOON(ioport + hp_cntl) & BIT(7))
    -pCardInfo->si_flags |= LOW_BYTE_TERM;
    +pCardInfo->si_mflags |= LOW_BYTE_TERM;
    WR_HARPOON(ioport + hp_xfer_pad, (temp | BIT(4)));
    if (RD_HARPOON(ioport + hp_cntl) & BIT(7))
    -pCardInfo->si_flags |= HIGH_BYTE_TERM;
    +pCardInfo->si_mflags |= HIGH_BYTE_TERM;
    WR_HARPOON(ioport + hp_xfer_pad, temp);
  }
  else {
    temp = RD_HARPOON(ioport + hp_cntl);
    @ @ -1163,9 +1163,9 @@
    WR_HARPOON(ioport + hp_cntl, temp);
    WR_HARPOON(ioport + hp_xfer_pad, temp2);
    if (!temp3 & BIT(7))
      -pCardInfo->si_flags |= LOW_BYTE_TERM;
      +pCardInfo->si_mflags |= LOW_BYTE_TERM;
    if (!temp3 & BIT(6))
      -pCardInfo->si_flags |= HIGH_BYTE_TERM;
      +pCardInfo->si_mflags |= HIGH_BYTE_TERM;
  }
}
ARAM_ACCESS(ioport);
@ @ -1272,7 +1272,7 @@
WR_HARPOON(ioport + hp_arb_id, pCardInfo->si_id);
CurrCard->ourId = pCardInfo->si_id;
-i = (unsigned char)pCardInfo->si_flags;
+i = (unsigned char)pCardInfo->si_mflags;
if (i & SCSI_PARITY_ENA)
WR_HARPOON(ioport + hp_portctrl_1, (HOST_MODE8 | CHK_SCSI_P));

@@ -1286,14 +1286,14 @@
    j |= SCSI_TERM_ENA_H;
    WR_HARPOON(ioport + hp_ee_ctrl, j);

-if (!(pCardInfo->si_flags & SOFT_RESET)) {
+if (!(pCardInfo->si_mflags & SOFT_RESET)) {
    FPT_sresb(ioport, thisCard);

    FPT_scini(thisCard, pCardInfo->si_id, 0);
    }

-if (pCardInfo->si_flags & POST_ALL_UNDERRUNS)
+if (pCardInfo->si_mflags & POST_ALL_UNDERRUNS)
    CurrCard->globalFlags |= F_NO_FILTER;

if (pCurrNvRam) {
    --- linux-4.15.0.orig/drivers/scsi/Kconfig
+++ linux-4.15.0/drivers/scsi/Kconfig
@@ -143,15 +143,6 @@
    <file:Documentation/scsi/scsi.txt>.
    The module will be called sr_mod.

-config BLK_DEV_SR_VENDOR
-bool "Enable vendor-specific extensions (for SCSI CDROM)"
-depends on BLK_DEV_SR
-help
-   This enables the usage of vendor specific SCSI commands. This is
-   required to support multisection CDs with old NEC/TOSHIBA cdrom
-   drives (and HP Writers). If you have such a drive and get the first
-   session only, try saying Y here; everybody else says N.
-
-config CHR_DEV_SG
-tristate "SCSI generic support"
.depends on SCSI
@@ -967,7 +958,7 @@

-config 53C700_LE_ON_BE
-bool
-depends on SCSI_LAS1700
+depends on SCSI_LAS1700 || SCSI_SNI_53C710
-default y
config SCSI_STEX
--- linux-4.15.0.orig/drivers/scsi/NCR5380.c
+++ linux-4.15.0/drivers/scsi/NCR5380.c
@@ -129,8 +129,12 @@
#define NCR5380_release_dma_irq(x)
#endif

+static unsigned int disconnect_mask = ~0;
+module_param(disconnect_mask, int, 0444);
+
static int do_abort(struct Scsi_Host *);
static void do_reset(struct Scsi_Host *);
+static void bus_reset_cleanup(struct Scsi_Host *);

 /**<
 * initialize_SCp - init the scsi pointer field
@@ -513,16 +517,15 @@
 if (hostdata->sensing == cmd) {
 /* Autosense processing ends here */
-  if ((cmd->result & 0xff) != SAM_STAT_GOOD) {
+  if (status_byte(cmd->result) != GOOD) {
   scsi_eh_restore_cmnd(cmd, &hostdata->ses);
-  } else
+  } else {
   scsi_eh_restore_cmnd(cmd, &hostdata->ses);
+  set_driver_byte(cmd, DRIVER_SENSE);
+}
 hostdata->sensing = NULL;
 }

-hostdata->busy[scmd_id(cmd)] &= ~(1 << cmd->device->lun);
-cmd->scsi_done(cmd);
 }

@@ -710,6 +713,8 @@
 NCR5380_information_transfer(instance);
 done = 0;
 }
+if (!hostdata->connected)
+NCR5380_write(SELECT_ENABLE_REG, hostdata->id_mask);
 spin_unlock_irq(&hostdata->lock);
 if (!done)
 cond_resched();
@@ -884,7 +889,14 @@
NCR5380_read(RESET_PARITY_INTERRUPT_REG);

-dsprintk(NDEBUG_INTR, instance, "unknown interrupt\n");
+if (sr & SR_RST) {
+  /* Certainly Bus Reset */
+  shost_printk(KERN_WARNING, instance,
+     "bus reset interrupt\n");
+  bus_reset_cleanup(instance);
+} else {
+  dsprintk(NDEBUG_INTR, instance, "unknown interrupt\n");
+
+#ifdef SUN3_SCSI_VME
  dregs->csr |= CSR_DMA_ENABLE;
@endif
@@ -902,20 +914,16 @@
return IRQ_RETVAL(handled);
}

-/* Function : int NCR5380_select(struct Scsi_Host *instance,
- * struct scsi_cmnd *cmd)
+/**
+ * NCR5380_select - attempt arbitration and selection for a given command
+ * @instance: the Scsi_Host instance
+ * @cmd: the scsi_cmnd to execute
+ *
+ * Purpose : establishes I_T_L or I_T_L_Q nexus for new or existing command,
+ * including ARBITRATION, SELECTION, and initial message out for
+ * IDENTIFY and queue messages.
+ *
+ * Inputs : instance - instantiation of the 5380 driver on which this
+ * target lives, cmd - SCSI command to execute.
+ *
+ * Returns cmd if selection failed but should be retried,
+ * NULL if selection failed and should not be retried, or
+ * NULL if selection succeeded (hostdata->connected == cmd).
+ * This routine establishes an I_T_L nexus for a SCSI command. This involves
+ * ARBITRATION, SELECTION and MESSAGE OUT phases and an IDENTIFY message.
+ *
+ * Returns true if the operation should be retried.
+ * Returns false if it should not be retried.
+ *
+ * Side effects :
+ * If bus busy, arbitration failed, etc, NCR5380_select() will exit
+ * @ -923.16 +931.15 @@
+ * SELECT_ENABLE will be set appropriately, the NCR5380
+ * will cease to drive any SCSI bus signals.
* - * If successful: I_T_L or I_T_L_Q nexus will be established,
- * instance->connected will be set to cmd.
+ * If successful: the I_T_L nexus will be established, and
+ * hostdata->connected will be set to cmd.
* SELECT interrupt will be disabled.
*
* If failed (no target): cmd->scsi_done() will be called, and the
* cmd->result host byte set to DID_BAD_TARGET.
*/

static struct scsi_cmnd *NCR5380_select(struct Scsi_Host *instance,
 struct scsi_cmnd *cmd)
__releases(&hostdata->lock) __acquires(&hostdata->lock)
{
    struct NCR5380_hostdata *hostdata = shost_priv(instance);

    unsigned char *data;
    int len;
    int err;
    bool ret = true;
    bool can_disconnect = instance->irq != NO_IRQ &&
    cmd->cmnd[0] != REQUEST_SENSE &&
    (disconnect_mask & BIT(scmd_id(cmd)));

    NCR5380_dprint(NDEBUG_ARBITRATION, instance);
    dsprintf(NDEBUG_ARBITRATION, instance, "starting arbitration, id = %d\n",
@@ -940,6 +947,10 @@

Arbitration and selection phases are slow and involve dropping the
* lock, so we have to watch out for EH. An exception handler may
* change 'selecting' to NULL. This function will then return NULL
+ * change 'selecting' to NULL. This function will then return false
* so that the caller will forget about 'cmd'. (During information
* transfer phases, EH may change 'connected' to NULL.)
+ * so that the caller will forget about 'cmd'. (During information
* transfer phases, EH may change 'connected' to NULL.)
*/
@@ -984,7 +995,7 @@
if (!hostdata->selecting) {
    /* Command was aborted */
    NCR5380_write(MODE_REG, MR_BASE);
    goto out;
    +return false;
}
    if (err < 0) {
        NCR5380_write(MODE_REG, MR_BASE);
        @@ -1033,7 +1044,7 @@
if (!hostdata->selecting) {
NCR5380_write(MODE_REG, MR_BASE);
NCR5380_write(INITIATOR_COMMAND_REG, ICR_BASE);
-goto out;
+return false;
}

dsprintk(NDEBUG_ARBITRATION, instance, "won arbitration\n");
@ @ -1106,8 +1117,6 @@
spin_lock_irq(&hostdata->lock);
NCR5380_write(INITIATOR_COMMAND_REG, ICR_BASE);
NCR5380_reselect(instance);
-if (!hostdata->connected)
-NCR5380_write(SELECT_ENABLE_REG, hostdata->id_mask);
shost_printk(KERN_ERR, instance, "reselection after won arbitration?\n");
goto out;
}@ @ -1115,14 +1124,16 @@
if (err < 0) {
spin_lock_irq(&hostdata->lock);
NCR5380_write(INITIATOR_COMMAND_REG, ICR_BASE);
-NCR5380_write(SELECT_ENABLE_REG, hostdata->id_mask);
+ /* Can't touch cmd if it has been reclaimed by the scsi ML */
+if (hostdata->selecting) {
-cmd->result = DID_BAD_TARGET << 16;
-complete_cmd(instance, cmd);
-dsprintk(NDEBUG_SELECTION, instance, "target did not respond within 250ms\n");
-cmd = NULL;
-}
+if (!hostdata->selecting)
+return false;
+cmd->result = DID_BAD_TARGET << 16;
+complete_cmd(instance, cmd);
+dsprintk(NDEBUG_SELECTION, instance,
+"target did not respond within 250ms\n");
+ret = false;
goto out;
}
@ @ -1150,17 +1161,16 @@
if (err < 0) {
shost_printk(KERN_ERR, instance, "select: REQ timeout\n");
NCR5380_write(INITIATOR_COMMAND_REG, ICR_BASE);
-NCR5380_write(SELECT_ENABLE_REG, hostdata->id_mask);
goto out;
}
if (!hostdata->selecting) {
do_abort(instance);
-goto out;
+return false;
}

dsprintk(NDEBUG_SELECTION, instance, "target %d selected, going into MESSAGE OUT phase \n",
         scmd_id(cmd));
-tmp[0] = IDENTIFY(((instance->irq == NO_IRQ) ? 0 : 1), cmd->device->lun);
+tmp[0] = IDENTIFY(can_disconnect, cmd->device->lun);

len = 1;
data = tmp;
@@ -1171,7 +1181,7 @@
    cmd->result = DID_ERROR << 16;
    complete_cmd(instance, cmd);
    dsprintk(NDEBUG_SELECTION, instance, "IDENTIFY message transfer failed\n");
    -cmd = NULL;
    +ret = false;
    goto out;
}

@@ -1186,13 +1196,13 @@
initialize_SCp(cmd);

    -cmd = NULL;
    +ret = false;

    out:
    if (!hostdata->selecting)
    return NULL;
    hostdata->selecting = NULL;
    -return cmd;
    +return ret;
    }

/*
 @@ -1711,6 +1721,7 @@
    cmd->result = DID_ERROR << 16;
    complete_cmd(instance, cmd);
    hostdata->connected = NULL;
+    hostdata->busy[scmd_id(cmd)] &= ~(1 << cmd->device->lun);
    return;
    #endif
    case PHASE_DATAIN:
    @@ -1793,6 +1804,7 @@
        cmd, scmd_id(cmd), cmd->device->lun);
hostdata->connected = NULL;
+hostdata->busy[scmd_id(cmd)] &= ~(1 << cmd->device->lun);

cmd->result &= ~0xffff;
cmd->result |= cmd->SCp.Status;
@@ -1817,9 +1829,6 @@
 */
 NCR5380_write(TARGET_COMMAND_REG, 0);

-/* Enable reselect interrupts */
-NCR5380_write(SELECT_ENABLE_REG, hostdata->id_mask);
-
maybe_release_dma_irq(instance);
return;
case MESSAGE_REJECT:
@@ -1851,8 +1860,6 @@
 */
 NCR5380_write(TARGET_COMMAND_REG, 0);

-/* Enable reselect interrupts */
-NCR5380_write(SELECT_ENABLE_REG, hostdata->id_mask);
#ifdef SUN3_SCSI_VME
dregs->csr |= CSR_DMA_ENABLE;
#endif
@@ -1951,10 +1958,10 @@
 NCR5380_transfer_pio(instance, &phase, &len, &data);
if (msgout == ABORT) {
    hostdata->connected = NULL;
+    hostdata->busy[scmd_id(cmd)] &= ~(1 << cmd->device->lun);
    cmd->result = DID_ERROR << 16;
    complete_cmd(instance, cmd);
    maybe_release_dma_irq(instance);
-    NCR5380_write(SELECT_ENABLE_REG, hostdata->id_mask);
    return;
}
msgout = NOP;
@@ -2014,8 +2021,11 @@
 NCR5380_write(MODE_REG, MR_BASE);
target_mask = NCR5380_read(CURRENT_SCSI_DATA_REG) & ~(hostdata->id_mask);
-
-dsprintk(NDEBUG_RESELECTION, instance, "reselect\n");
+if (!target_mask || target_mask & (target_mask - 1)) {
+    shost_printk(KERN_WARNING, instance,
+        "reselect: bad target_mask 0x%02x\n", target_mask);
+    return;
+}
/*
 * At this point, we have detected that our SCSI ID is on the bus,
 * @ @ -2029.6 +2039.7 @ @
 NCR5380_write(INITIATOR_COMMAND_REG, ICR_BASE | ICR_ASSERT_BSY);
 if (NCR5380_poll_politely(hostdata,
     STATUS_REG, SR_SEL, 0, 2 * HZ) < 0) {
+shost_printk(KERN_ERR, instance, "reselect: !SEL timeout\n");
 NCR5380_write(INITIATOR_COMMAND_REG, ICR_BASE);
 return;
}
@@ -2040,6 +2051,10 @@
 if (NCR5380_poll_politely(hostdata,
     STATUS_REG, SR_REQ, SR_REQ, 2 * HZ) < 0) {
+if ((NCR5380_read(STATUS_REG) & (SR_BSY | SR_SEL)) == 0)
+/* BUS FREE phase */
+return;
+shost_printk(KERN_ERR, instance, "reselect: REQ timeout\n");
 do_abort(instance);
 return;
}
@@ -2101,13 +2116,16 @@
 dsprintk(NDEBUG_RESELECTION | NDEBUG_QUEUES, instance,
     "reselect: removed %p from disconnected queue\n", tmp);
 } else {
+int target = ffs(target_mask) - 1;
+shost_printk(KERN_ERR, instance, "target bitmask 0x%02x lun %d not in disconnected queue\n",
     target_mask, lun);
 /*
 * Since we have an established nexus that we can't do anything
 * with, we must abort it.
 */
 -do_abort(instance);
+if (do_abort(instance) == 0)
+hostdata->busy[target] &= ~(1 << lun);
 return;
}
@@ -2272,15 +2290,16 @@
 if (list_del_cmd(&hostdata->autosense, cmd)) {
 dsprintk(NDEBUG_ABORT, instance,
     "abort: removed %p from sense queue\n", cmd);
-set_host_byte(cmd, DID_ERROR);
 complete_cmd(instance, cmd);
 }

 out:
if (result == FAILED)
dsprintk(NDEBUG_ABORT, instance, "abort: failed to abort %p\n", cmd);
-else
+else {
+hostdata->busy[scmd_id(cmd)] &= ~(1 << cmd->device->lun);
dsprintk(NDEBUG_ABORT, instance, "abort: successfully aborted %p\n", cmd);
+
}

queue_work(hostdata->work_q, &hostdata->main_task);
maybe_release_dma_irq(instance);
@@ -2290,31 +2309,12 @@

/**
- * NCR5380_host_reset - reset the SCSI host
- * @cmd: SCSI command undergoing EH
- *
- * Returns SUCCESS
- */
-
-static int NCR5380_host_reset(struct scsi_cmnd *cmd)
+static void bus_reset_cleanup(struct Scsi_Host *instance)
{
-struct Scsi_Host *instance = cmd->device->host;
+static void bus_reset_cleanup(struct Scsi_Host *instance)
 struct NCR5380_hostdata *hostdata = shost_priv(instance);
 int i;
 unsigned long flags;
 struct NCR5380_cmd *ncmd;

-spin_lock_irqsave(&hostdata->lock, flags);
-
-#if (NDEBUG & NDEBUG_ANY)
-scmd_printk(KERN_INFO, cmd, __func__);
-#endif
-NCR5380_dprint(NDEBUG_ANY, instance);
-NCR5380_dprint_phase(NDEBUG_ANY, instance);
-
-do_reset(instance);
-
/* reset NCR registers */
NCR5380_write(MODE_REG, MR_BASE);
NCR5380_write(TARGET_COMMAND_REG, 0);
@@ -2326,11 +2326,6 @@
* commands!
*/

-if (list_del_cmd(&hostdata->unissued, cmd)) {
-cmd->result = DID_RESET << 16;
-cmd->scsi_done(cmd);
-}
-
if (hostdata->selecting) {
  hostdata->selecting->result = DID_RESET << 16;
  complete_cmd(instance, hostdata->selecting);
@@ -2348,7 +2343,6 @@
  list_for_each_entry(ncmd, &hostdata->autosense, list) {
    struct scsi_cmnd *cmd = NCR5380_to_scmd(ncmd);

-    set_host_byte(cmd, DID_RESET);
    cmd->scsi_done(cmd);
  }
INIT_LIST_HEAD(&hostdata->autosense);
@@ -2365,6 +2359,41 @@
  queue_work(hostdata->work_q, &hostdata->main_task);
  maybe_release_dma_irq(instance);
+
/**
 + * NCR5380_host_reset - reset the SCSI host
 + * @cmd: SCSI command undergoing EH
 + *
 + * Returns SUCCESS
 + */
 +
+static int NCR5380_host_reset(struct scsi_cmnd *cmd)
+{
+struct Scsi_Host *instance = cmd->device->host;
+struct NCR5380_hostdata *hostdata = shost_priv(instance);
+unsigned long flags;
+struct NCR5380_cmd *ncmd;
+
+spin_lock_irqsave(&hostdata->lock, flags);
+
+if (NDEBUG & NDEBUG_ANY)
+host_printk(KERN_INFO, instance, __func__);
+#endif
+NCR5380_dprint(NDEBUG_ANY, instance);
+NCR5380_dprint_phase(NDEBUG_ANY, instance);
+
+list_for_each_entry(ncmd, &hostdata->unissued, list) {
+    struct scsi_cmnd *scmd = NCR5380_to_scmd(ncmd);
+    
+    scmd->result = DID_RESET << 16;
+    scmd->scsi_done(scmd);
+} +INIT_LIST_HEAD(&hostdata->unissued); + +do_reset(instance); +bus_reset_cleanup(instance); + spin_unlock_irqrestore(&hostdata->lock, flags);

return SUCCESS;
--- linux-4.15.0.orig/drivers/scsi/NCR5380.h
+++ linux-4.15.0/drivers/scsi/NCR5380.h
@@ -235,7 +235,7 @@
#define NCR5380_PIO_CHUNK_SIZE		256
/* Time limit (ms) to poll registers when IRQs are disabled, e.g. during PDMA */
-#define NCR5380_REG_POLL_TIME		15
+#define NCR5380_REG_POLL_TIME		10
static inline struct scsi_cmnd *NCR5380_to_scmd(struct NCR5380_cmd *ncmd_ptr) {
 @ @ -275,7 +275,7 @@
 static void NCR5380_main(struct work_struct *work);
 static const char *NCR5380_info(struct Scsi_Host *instance);
 static void NCR5380_reselect(struct Scsi_Host *instance);
-static struct scsi_cmnd *NCR5380_select(struct Scsi_Host *, struct scsi_cmnd *);
+static bool NCR5380_select(struct Scsi_Host *, struct scsi_cmnd *);
 static int NCR5380_transfer_dma(struct Scsi_Host *instance, unsigned char *phase, int *count, unsigned char **data);
 static int NCR5380_transfer_pio(struct Scsi_Host *instance, unsigned char *phase, int *count, unsigned char **data);
 static int NCR5380_poll_politely2(struct NCR5380_hostdata *,
--- linux-4.15.0.orig/drivers/scsi/aacraid/aachba.c
+++ linux-4.15.0/drivers/scsi/aacraid/aachba.c
@@ -42,6 +42,8 @@
#include <linux/highmem.h> /* For flush_kernel_dcache_page */
#include <linux/module.h>

+//#include <asm/unaligned.h>
+ +
#include <scsi/scsi.h>
#include <scsi/scsi_cmnd.h>
#include <scsi/scsi_device.h>
@@ -913,8 +915,15 @@
memset(str, ' ', sizeof(*str));
if (sup_adap_info->adapter_type_text[0]) {
- char *cp = sup_adap_info->adapter_type_text;
 int c;
+char *cp;
+char *cname = kmemdup(sup_adap_info->adapter_type_text,
+sizeof(sup_adap_info->adapter_type_text),
+GFP_ATOMIC);
+if (!cname)
+return;
+
+cp = cname;
inquirystrcpy("SMC", str->vid);
+else {
@@ -923,7 +932,7 @@
++cp;
 c = *cp;
 *cp = \0';
 -inquirystrcpy(sup_adap_info->adapter_type_text, str->vid);
+inquirystrcpy(cname, str->vid);
+*cp = c;
 while (*cp && *cp != '\n')
++cp;
@@ -931,14 +940,11 @@
while (*cp == '\n')
++cp;
 /* last six chars reserved for vol type */
-c = 0;
-if (strlen(cp) > sizeof(str->pid)) {
-c = cp[sizeof(str->pid)];
+if (strlen(cp) > sizeof(str->pid))
 cp[sizeof(str->pid)] = \0';
-}
 inquirystrcpy (cp, str->vid);
-if (c)
-cp[sizeof(str->pid)] = c;
+}
+kfree(cname);
} else {
 struct aac_driver_ident *mp = aac_get_driver_ident(dev->cardtype);

@@ -1660,213 +1666,381 @@
 (void *) cmd);
 }

-int aac_issue_bmic_identify(struct aac_dev *dev, u32 bus, u32 target)
+static int aac_send_safw_bmic_cmd(struct aac_dev *dev,
+struct aac_srb_unit *srbu, void *xfer_buf, int xfer_len)
+
 -struct fib *fibptr;
 -struct aac_srb *srbcmd;
- struct sgmap64 *sg64;
- struct aac_ciss_identify_pd *identify_resp;
- dma_addr_t addr;
- u32 vbus, vid;
- u16 fibsize, datasize;
- int rcode = -ENOMEM;
+ struct fib*fibptr;
+ dma_addr_t addr;
+ int rcode;
+ int fibsize;
+ struct aac_srb*srb;
+ struct aac_srb_reply *srb_reply;
+ struct sgmap64*sg64;
+ u32 vbus;
+ u32 vid;

+ if (!dev->sa_firmware)
+ return 0;

+/* allocate FIB */
fibptr = aac_fib_alloc(dev);
if (!fibptr)
- goto out;
+ return -ENOMEM;

- fibsize = sizeof(struct aac_srb) -
- sizeof(struct sgentry) + sizeof(struct sgentry64);
- datasize = sizeof(struct aac_ciss_identify_pd);
+ aac_fib_init(fibptr);
+ fibptr->hw_fib_va->header.XferState &=
+ ~cpu_to_le32(FastResponseCapable);

- identify_resp = dma_alloc_coherent(&dev->pdev->dev, datasize, &addr,
- GFP_KERNEL);
- if (!identify_resp)
- goto out;
+ goto fib_error;

- fibsize  = sizeof(struct aac_srb) - sizeof(struct sgentry) +
+ sizeof(struct sgentry64);

- vbus = (u32)le16_to_cpu(dev->supplement_adapter_info.virt_device_bus);
- vid = (u32)le16_to_cpu(dev->supplement_adapter_info.virt_device_target);
+/* allocate DMA buffer for response */
+ addr = dma_map_single(&dev->pdev->dev, xfer_buf, xfer_len,
+ DMA_BIDIRECTIONAL);
+ if (dma_mapping_error(&dev->pdev->dev, addr)) {
+ rcode = -ENOMEM;
+ goto fib_error;
+ }
aac_fib_init(fibptr);
+srb = fib_data(fibptr);
+memcpy(srb, &srbu->srb, sizeof(struct aac_srb));

-srbcmd = (struct aac_srb *) fib_data(fibptr);
-srbcmd->function = cpu_to_le32(SRBF_ExecuteScsi);
-srbcmd->channel = cpu_to_le32(vbus);
-srbcmd->id = cpu_to_le32(vid);
-srbcmd->lun = 0;
-srbcmd->flags = cpu_to_le32(SRB_DataIn);
-srbcmd->timeout = cpu_to_le32(10);
-srbcmd->retry_limit = 0;
-srbcmd->cdb_size = cpu_to_le32(12);
-srbcmd->count = cpu_to_le32(datasize);

+vbus = (u32)le16_to_cpu(dev->supplement_adapter_info.virt_device_bus);
+vid = (u32)le16_to_cpu(dev->supplement_adapter_info.virt_device_target);

-memset(srbcmd->cdb, 0, sizeof(srbcmd->cdb));
-srbcmd->cdb[0] = 0x26;
-srbcmd->cdb[2] = (u8)((AAC_MAX_LUN + target) & 0x00FF);

-sg64 = (struct sgmap64 *)&srbcmd->sg;
-sg64->count = cpu_to_le32(1);
-sg64->sg[0].addr[1] = cpu_to_le32((u32)(@(addr) >> 16) >> 16));
-sg64->sg[0].addr[0] = cpu_to_le32((u32)(addr & 0xffffffff));
-sg64->sg[0].count = cpu_to_le32(datasize);
/* set the common request fields */
+srb->channel = cpu_to_le32(vbus);
+srb->id = cpu_to_le32(vid);
+srb->lun = 0;
+srb->function = cpu_to_le32(SRBF_ExecuteScsi);
+srb->timeout = 0;
+srb->retry_limit = 0;
+srb->cdb_size = cpu_to_le32(16);
+srb->count = cpu_to_le32(xfer_len);
+
+sg64 = (struct sgmap64 *)&srb->sg;
+sg64->count = cpu_to_le32(1);
+sg64->sg[0].addr[1] = cpu_to_le32(upper_32_bits(addr));
+sg64->sg[0].addr[0] = cpu_to_le32(lower_32_bits(addr));
+sg64->sg[0].count = cpu_to_le32(xfer_len);
+
/*
 * Copy the updated data for other dumping or other usage if needed
 */
+ *
+memcpy(&srbu->srb, srb, sizeof(struct aac_srb));
+
+/* issue request to the controller */
+rcode = aac_fib_send(ScsiPortCommand64, fibptr, fibsize, FsaNormal,
+1, 1, NULL, NULL);
+
+if (rcode == -ERESTARTSYS)
+rcode = -ERESTART;
+
+if (unlikely(rcode < 0))
+goto bmic_error;
+
srb_reply = (struct aac_srb_reply *)fib_data(fibptr);
+memcpy(&srbu->srb_reply, srb_reply, sizeof(struct aac_srb_reply));
+
+dma_unmap_single(&dev->pdev->dev, addr, xfer_len, DMA_BIDIRECTIONAL);
+
+fib_error:
+aac_fib_complete(fibptr);
+aac_fib_free(fibptr);
+return rcode;
+
+static void aac_set_safw_target_qd(struct aac_dev *dev, int bus, int target)
+{
+	if (dev->hba_map[bus][target].devtype != AAC_DEVTYPE_NATIVE_RAW)
+		return;
+
+rcode = aac_fib_send(ScsiPortCommand64, fibptr, fibsize, FsaNormal, 1, 1, NULL, NULL);
+
+identify_resp = dev->hba_map[bus][target].safw_identify_resp;
+
+if (identify_resp == NULL) {
+	dev->hba_map[bus][target].qd_limit = 32;
+
+}
+
+struct aac_ciss_identify_pd *identify_resp;
+
+if (dev->hba_map[bus][target].devtype != AAC_DEVTYPE_NATIVE_RAW)
+return;
+
-rcode = aac_fib_send(ScsiPortCommand64, fibptr, fibsize, FsaNormal, 1, 1, NULL, NULL);
+
+identify_resp = dev->hba_map[bus][target].safw_identify_resp;
+
+if (identify_resp == NULL) {
+
+dev->hba_map[bus][target].qd_limit = 32;
+
+}
+
+}
+
+if (identify_resp->current_queue_depth_limit <= 0 ||
+identify_resp->current_queue_depth_limit > 32)
+
+identify_resp->current_queue_depth_limit = 32;
+else
+
+dev->hba_map[bus][target].qd_limit =
+identify_resp->current_queue_depth_limit;
+
+}
static int aac_issue_safw_bmic_identify(struct aac_dev *dev, struct aac_ciss_identify_pd **identify_resp, u32 bus, u32 target)
{
    int rcode = -ENOMEM;
    int datasize;
    struct aac_srb_unit srbu;
    struct aac_srb *srbcmd;
    struct aac_ciss_identify_pd *identify_reply;

    datasize = sizeof(struct aac_ciss_identify_pd);
    identify_reply = kmalloc(datasize, GFP_KERNEL);
    if (!identify_reply)
        goto out;

    memset(&srbu, 0, sizeof(struct aac_srb_unit));
    srbcmd = &srbu.srb;
    srbcmd->flags = cpu_to_le32(SRB_DataIn);
    srbcmd->cdb[0] = 0x26;
    srbcmd->cdb[2] = (u8)((AAC_MAX_LUN + target) & 0x00FF);
    srbcmd->cdb[6] = CISS_IDENTIFY_PHYSICAL_DEVICE;
    rcode = aac_send_safw_bmic_cmd(dev, &srbu, identify_reply, datasize);
    if (unlikely(rcode < 0))
        goto mem_free_all;
    *identify_resp = identify_reply;

    -fib_free_ptr:
    -aac_fib_free(fibptr);
    out:
    return rcode;
    +mem_free_all:
    +kfree(identify_reply);
    +goto out;
    +}
    +
    +static inline void aac_free_safw_ciss_luns(struct aac_dev *dev)
    +{
    +kfree(dev->safw_phys_luns);
    +dev->safw_phys_luns = NULL;
    }

    /**
    - *aac_update hba_map()-update current hba map with data from FW

    -dma_free_coherent(&dev->pdev->dev, datasize, identify_res, addr);
static int aac_get_safw_ciss_luns(struct aac_dev *dev)
{
    int rcode = -ENOMEM;
    int datasize;
    struct aac_srb *srbcmd;
    struct aac_srb_unit srbu;
    struct aac_ciss_phys_luns_resp *phys_luns;
    
    datasize = sizeof(struct aac_ciss_phys_luns_resp) +
    (AAC_MAX_TARGETS - 1) * sizeof(struct _ciss_lun);
    phys_luns = kmalloc(datasize, GFP_KERNEL);
    if (phys_luns == NULL)
        goto out;
    
    memset(&srbu, 0, sizeof(struct aac_srb_unit));
    srbcmd = &srbu.srb;
    srbcmd->flags = cpu_to_le32(SRB_DataIn);
    srbcmd->cdb[0]= CISS_REPORT_PHYSICAL_LUNS;
    srbcmd->cdb[1]= 2; /* extended reporting */
    srbcmd->cdb[8]= (u8)(datasize >> 8);
    srbcmd->cdb[9]= (u8)(datasize);

    rcode = aac_send_safw_bmic_cmd(dev, &srbu, phys_luns, datasize);
    if (unlikely(rcode < 0))
        goto mem_free_all;
    if (phys_luns->resp_flag != 2) {
        rcode = -ENOMSG;
        goto mem_free_all;
    }
    
    dev->safw_phys_luns = phys_luns;
    
    out:
    return rcode;
}

static inline u32 aac_get_safw_phys_lun_count(struct aac_dev *dev)
+{ 
+return get_unaligned_be32(&dev->safw_phys_luns->list_length[0])/24; 
+} 
+
+static inline u32 aac_get_safw_phys_bus(struct aac_dev *dev, int lun) 
+{ 
+return dev->safw_phys_luns->lun[lun].level2[1] & 0x3f; 
+} 
+
+static inline u32 aac_get_safw_phys_target(struct aac_dev *dev, int lun) 
+{ 
+return dev->safw_phys_luns->lun[lun].level2[0]; 
+} 
+
+static inline u32 aac_get_safw_phys_expose_flag(struct aac_dev *dev, int lun) 
+{ 
+return dev->safw_phys_luns->lun[lun].bus >> 6; 
+} 
+
+static inline u32 aac_get_safw_phys_attribs(struct aac_dev *dev, int lun) 
+{ 
+return dev->safw_phys_luns->lun[lun].node_ident[9]; 
+} 
+
+static inline u32 aac_get_safw_phys_nexus(struct aac_dev *dev, int lun) 
+{ 
+return *((u32 *)&dev->safw_phys_luns->lun[lun].node_ident[12]); 
+} 
+
+static inline u32 aac_get_safw_phys_device_type(struct aac_dev *dev, int lun) 
+{ 
+return dev->safw_phys_luns->lun[lun].node_ident[8]; 
+} 
+
+static inline void aac_free_safw_identify_resp(struct aac_dev *dev, 
+int bus, int target) 
+{ 
+kfree(dev->hba_map[bus][target].safw_identify_resp); 
+dev->hba_map[bus][target].safw_identify_resp = NULL; 
+} 
+
+static inline void aac_free_safw_all_identify_resp(struct aac_dev *dev, 
+int lun_count) 
+{ 
+int luns; 
+int i; 
+u32 bus; 
+u32 target;
+luns = aac_get_safw_phys_lun_count(dev);
+
+if (luns < lun_count)
+lun_count = luns;
+else if (lun_count < 0)
+lun_count = luns;
+
+for (i = 0; i < lun_count; i++) {
+    bus = aac_get_safw_phys_bus(dev, i);
+    target = aac_get_safw_phys_target(dev, i);
+
+    aac_free_safw_identify_resp(dev, bus, target);
+
+}
+
+static int aac_get_safw_attr_all_targets(struct aac_dev *dev)
+{
+    int i;
+    int rcode = 0;
+    u32 lun_count;
+    u32 bus;
+    u32 target;
+    struct aac_ciss_identify_pd *identify_resp = NULL;
+
+    lun_count = aac_get_safw_phys_lun_count(dev);
+
+    for (i = 0; i < lun_count; ++i) {
+        bus = aac_get_safw_phys_bus(dev, i);
+        target = aac_get_safw_phys_target(dev, i);
+
+        rcode = aac_issue_safw_bmic_identify(dev,
+            &identify_resp, bus, target);
+
+        if (unlikely(rcode < 0))
+            goto free_identify_resp;
+
+        dev->hba_map[bus][target].safw_identify_resp = identify_resp;
+
+    }
+
+    out:
+    return rcode;
+
+    free_identify_resp:
+    aac_free_safw_all_identify_resp(dev, i);
+    goto out;
+
+}
/**
+ *aac_set_safw_attr_all_targets-update current hba map with data from FW
+ *@dev:aac_dev structure
+ *@phys_luns: FW information from report phys luns
+ +*@rescan: Indicates scan type
+ *
+ *Update our hba map with the information gathered from the FW
+ */
-void aac_update_hba_map(struct aac_dev *dev,
-struct aac_ciss_phys_luns_resp *phys_luns, int rescan)
+static void aac_set_safw_attr_all_targets(struct aac_dev *dev)
{
 /* ok and extended reporting */
 u32 lun_count, nexus;
 u32 i, bus, target;
 u8 expose_flag, attrs;
 -u8 devtype;
 
 lun_count = ((phys_luns->list_length[0] << 24)
 - (phys_luns->list_length[1] << 16)
 - (phys_luns->list_length[2] << 8)
 - (phys_luns->list_length[3])) / 24;
 +lun_count = aac_get_safw_phys_lun_count(dev);
 +
 +dev->scan_counter++;

 for (i = 0; i < lun_count; ++i) {

 -bus = phys_luns->lun[i].level2[1] & 0x3f;
 -target = phys_luns->lun[i].level2[0];
 -expose_flag = phys_luns->lun[i].bus >> 6;
 -attrs = phys_luns->lun[i].node_ident[9];
 -nexus = *((u32 *) &phys_luns->lun[i].node_ident[12]);
 +bus = aac_get_safw_phys_bus(dev, i);
 +target = aac_get_safw_phys_target(dev, i);
 +expose_flag = aac_get_safw_phys_expose_flag(dev, i);
 +attrs = aac_get_safw_phys_attribs(dev, i);
 +nexus = aac_get_safw_phys_nexus(dev, i);

 if (bus >= AAC_MAX_BUSES || target >= AAC_MAX_TARGETS)
 continue;

 -dev->hba_map[bus][target].expose = expose_flag;
 -
 -if (expose_flag != 0) {
 -devtype = AAC_DEVTYPE_RAID_MEMBER;
 -goto update_devtype;
 -+dev->hba_map[bus][target].devtype =

 /* ok and extended reporting */
 u32 lun_count, nexus;
 u32 i, bus, target;
 u8 expose_flag, attrs;
 -u8 devtype;
 
 lun_count = ((phys_luns->list_length[0] << 24)
 - (phys_luns->list_length[1] << 16)
 - (phys_luns->list_length[2] << 8)
 - (phys_luns->list_length[3])) / 24;
 +lun_count = aac_get_safw_phys_lun_count(dev);
 +
 +dev->scan_counter++;

 for (i = 0; i < lun_count; ++i) {

 -bus = phys_luns->lun[i].level2[1] & 0x3f;
 -target = phys_luns->lun[i].level2[0];
 -expose_flag = phys_luns->lun[i].bus >> 6;
 -attrs = phys_luns->lun[i].node_ident[9];
 -nexus = *((u32 *) &phys_luns->lun[i].node_ident[12]);
 +bus = aac_get_safw_phys_bus(dev, i);
 +target = aac_get_safw_phys_target(dev, i);
 +expose_flag = aac_get_safw_phys_expose_flag(dev, i);
 +attrs = aac_get_safw_phys_attribs(dev, i);
 +nexus = aac_get_safw_phys_nexus(dev, i);

 if (bus >= AAC_MAX_BUSES || target >= AAC_MAX_TARGETS)
 continue;

 -dev->hba_map[bus][target].expose = expose_flag;
 -
 -if (expose_flag != 0) {
 -devtype = AAC_DEVTYPE_RAID_MEMBER;
 -goto update_devtype;
 -+dev->hba_map[bus][target].devtype =
+AAC_DEVTYPE_RAID_MEMBER;
+continue;
}

if (nexus != 0 && (attribs & 8)) {
    devtype = AAC_DEVTYPE_NATIVE_RAW;
    dev->hba_map[bus][target].devtype =
    +AAC_DEVTYPE_NATIVE_RAW,
    dev->hba_map[bus][target].rmw_nexus = nexus;
} else
    devtype = AAC_DEVTYPE_ARC_RAW;
-
-if (devtype != AAC_DEVTYPE_NATIVE_RAW)
-goto update_devtype;
+dev->hba_map[bus][target].devtype =
+AAC_DEVTYPE_ARC_RAW;
-
-if (aac_issue_bmic_identify(dev, bus, target) < 0)
-dev->hba_map[bus][target].qd_limit = 32;
+dev->hba_map[bus][target].scan_counter = dev->scan_counter;

-update_devtype:
-if (rescan == AAC_INIT)
-dev->hba_map[bus][target].devtype = devtype;
-else
-dev->hba_map[bus][target].new_devtype = devtype;
+aac_set_safw_target_qd(dev, bus, target);
}
}

/ *
 * aac_report_phys_luns() Process topology change
 * @dev: aac_dev structure
 * @fibptr: fib pointer
 * *
 * Execute a CISS REPORT PHYS LUNS and process the results into
 * the current hba_map.
 * */
int aac_report_phys_luns(struct aac_dev *dev, struct fib *fibptr, int rescan)
+static int aac_setup_safw_targets(struct aac_dev *dev)
{
-int fibsize, datasize;
-struct aac_ciss_phys_luns_resp *phys_luns;
-struct aac_srb *srbcmd;
-struct sgmap64 *sg64;
-dma_addr_t addr;
-u32 vbus, vid;
int rcode = 0;

/* Thor SA Firmware -> CISS_REPORT_PHYSICAL_LUNS */
-fibsize = sizeof(struct aac_srb) - sizeof(struct sgentry)
+ sizeof(struct sgentry64);
-datasize = sizeof(struct aac_ciss_phys_luns_resp)
+(AAC_MAX_TARGETS - 1) * sizeof(struct ciss_lun);
-
-phys_luns = dma_alloc_coherent(&dev->pdev->dev, datasize, &addr,
-    GFP_KERNEL);
-if (phys_luns == NULL) {
-    rcode = -ENOMEM;
-    goto err_out;
-}
-
-vbus = (u32) le16_to_cpu(
    dev->supplement_adapter_info.virt_device_bus);
-vid = (u32) le16_to_cpu(
    dev->supplement_adapter_info.virt_device_target);
-
-aac_fib_init(fibptr);
-
-srbcmd = (struct aac_srb *) fib_data(fibptr);
-srbcmd->function = cpu_to_le32(SRBF_ExecuteScsi);
-srbcmd->channel = cpu_to_le32(vbus);
-srbcmd->id = cpu_to_le32(vid);
-srbcmd->lun = 0;
-srbcmd->flags = cpu_to_le32(SRB_DataIn);
-srbcmd->timeout = cpu_to_le32(10);
-srbcmd->retry_limit = 0;
-srbcmd->cdb_size = cpu_to_le32(12);
-srbcmd->count = cpu_to_le32(datasize);
+rcode = aac_get_containers(dev);
+if (unlikely(rcode < 0))
+    goto out;
+memset(srbcmd->cdb, 0, sizeof(srbcmd->cdb));
-srbcmd->cdb[0] = CISS_REPORT_PHYSICAL_LUNS;
-srbcmd->cdb[1] = 2; /* extended reporting */
-srbcmd->cdb[8] = (u8)(datasize >> 8);
-srbcmd->cdb[9] = (u8)(datasize);
-
-sg64 = (struct sgmap64 *) &srbcmd->sg;
-sg64->count = cpu_to_le32(1);
-sg64->sg[0].addr[1] = cpu_to_le32(upper_32_bits(addr));
-sg64->sg[0].addr[0] = cpu_to_le32(lower_32_bits(addr));
-sg64->sg[0].count = cpu_to_le32(datasize);
-
-rcode = aac_fib_send(ScsiPortCommand64, fibptr, fibsize,
-FsaNormal, 1, 1, NULL, NULL);
-
-/* analyse data */
-if (rcode >= 0 && phys_luns->resp_flag == 2) {
-/* ok and extended reporting */
-aac_update_hba_map(dev, phys_luns, rescan);
-}
+rcode = aac_get_safw_ciss_luns(dev);
+if (unlikely(rcode < 0))
+goto out;

-dma_free_coherent(&dev->pdev->dev, datasize, phys_luns, addr);
-err_out:
+rcode = aac_get_safw_attr_all_targets(dev);
+if (unlikely(rcode < 0))
+goto free_ciss_luns;
+
+aac_set_safw_attr_all_targets(dev);
+
aac_free_safw_all_identify_resp(dev, -1);
+free_ciss_luns:
+aac_free_safw_ciss_luns(dev);
+out:
return rcode;
}

+int aac_setup_safw_adapter(struct aac_dev *dev)
+{
+return aac_setup_safw_targets(dev);
+}
+
+int aac_get_adapter_info(struct aac_dev* dev)
{
struct fib* fibptr;
@@ -1969,12 +2143,6 @@
dev->maximum_num_channels = le32_to_cpu(bus_info->BusCount);
}

-if (!dev->sync_mode && dev->sa_firmware &&
-dev->supplement_adapter_info.virt_device_bus != 0xffff) {
-/* Thor SA Firmware -> CISS_REPORT_PHYSICAL_LUNS */
-rcode = aac_report_phys_luns(dev, fibptr, AAC_INIT);
-}
-
-if (!dev->in_reset) {
+char buffer[16];
tmp = le32_to_cpu(dev->adapter_info.kernelrev);
@@ -2315,13 +2483,13 @@
    scsicmd->result = DID_OK << 16 | COMMAND_COMPLETE << 8 | SAM_STAT_CHECK_CONDITION;
    set_sense(&dev->fsa_dev[cid].sense_data,
        - HARDWARE_ERROR, SENCODE_INTERNAL_TARGET_FAILURE,
        + ILLEGAL_REQUEST, SENCODE_LBA_OUT_OF_RANGE,
            ASENCODE_INTERNAL_TARGET_FAILURE, 0, 0);
    memcpy(scsicmd->sense_buffer, &dev->fsa_dev[cid].sense_data,
        min_t(size_t, sizeof(dev->fsa_dev[cid].sense_data),
            SCSISENSEBUFFERSIZE));
    scsicmd->scsi_done(scsicmd);
    -return 1;
    +return 0;
}

    dprintk((KERN_DEBUG "aac_read[cpu %d]: lba = %llu, t = %ld.\n",
        @ @ -2407,13 +2575,13 @@
    scsicmd->result = DID_OK << 16 | COMMAND_COMPLETE << 8 | SAM_STAT_CHECKCONDITION;
    set_sense(&dev->fsa_dev[cid].sense_data,
        - HARDWARE_ERROR, SENCODEINTERNALTARGETFAILURE,
        + ILLEGALREQUEST, SENCODELBAOUTOF_RANGE,
            ASENCODEINTERNALTARGETFAILURE, 0, 0);
    memcpy(scsicmd->sense_buffer, &dev->fsa_dev[cid].sense_data,
        min_t(size_t, sizeof(dev->fsa_dev[cid].sense_data),
            SCSISENSEBUFFERSIZE));
    scsicmd->scsi_done(scsicmd);
    -return 1;
    +return 0;
}

    dprintk((KERN_DEBUG "aac_write[cpu %d]: lba = %llu, t = %ld.\n",
        @ @ -2739,14 +2907,6 @@
    }
} else { /* check for physical non-dasd devices */
    bus = aac_logical_to_phys(scmd_channel(scsicmd));
    -if (bus < AAC_MAX_BUSES && cid < AAC_MAX_TARGETS &&
    -(dev->hba_map[bus][cid].expose
    -== AAC_HIDE_DISK))
        -if (scsicmd->cmd[0] == INQUIRY) {
        -scsicmd->result = DID_NO_CONNECT << 16;
        -goto scsi_done_ret;
        -}
    }

    if (bus < AAC_MAX_BUSES && cid < AAC_MAX_TARGETS &&
        dev->hba_map[bus][cid].devtype
        --- linux-4.15.0.orig/drivers/scsi/aacraid/aacraid.h
+++ linux-4.15.0/drivers/scsi/aacraid/aacraid.h
@@ -41,6 +41,7 @@
#include <linux/interrupt.h>
#include <linux/pci.h>
+include <scsi/scsi_host.h>

/*------------------------------- DefineS */
@@ -97,7 +98,7 @@
#define PMC_GLOBAL_INT_BIT0		0x00000001
#ifndef AAC_DRIVER_BUILD
-# define AAC_DRIVER_BUILD 50834
+# define AAC_DRIVER_BUILD 50877
# define AAC_DRIVER_BRANCH ";-custom"
#endif
#define MAXIMUM_NUM_CONTAINERS32
@@ -117,9 +118,13 @@
/* Thor: 5 phys. buses: #0: empty, 1-4: 256 targets each */
#define AAC_MAX_BUSES5
#define AAC_MAX_TARGETS256
+#define AAC_BUS_TARGET_LOOP		(AAC_MAX_BUSES * AAC_MAX_TARGETS)
#define AAC_MAX_NATIVE_SIZE		2048
#define FW_ERROR_BUFFER_SIZE		512
+define get_bus_number(x)	(x/AAC_MAX_TARGETS)
+define get_target_number(x)	(x%AAC_MAX_TARGETS)

/* Thor AIF events */
#define SA_AIF_HOTPLUG			(1<<1)
#define SA_AIF_HARDWARE		(1<<2)
@@ -1334,17 +1339,17 @@
#define AAC_DEVTYPE_RAID_MEMBER	1
#define AAC_DEVTYPE_ARC_RAW		2
#define AAC_DEVTYPE_NATIVE_RAW		3
-#define AAC_EXPOSE_DISK		0
-#define AAC_HIDE_DISK		3
+# define AAC_SAFW_RESCAN_DELAY		(10 * HZ)

struct aac_hba_map_info {
  __le32				/* nexus for native HBA devices */
  u8	devtype; /* device type */
-  u8	new_devtype;
-  u8	reset_state; /* 0 - no reset, 1..x - */
+  u8reset_state; /* 0 - no reset, 1..x - */
  /* after xth TM LUN reset */
```c
u16 qd_limit;
-8 expose; /* checks if to expose or not */
+u32 scan_counter;
+struct aac_ciss_identify_pd *safw_identify_resp;
};

/*
@@ -1560,6 +1565,7 @@
spinlock_tfib_lock;

struct mutex_ioctl_mutex;
+struct mutex scan_mutex;
struct aac_queue_block *queues;
/*
* The user API will use an IOCTL to register itself to receive
@@ -1605,6 +1611,7 @@
int maximum_num_channels;
struct fsa_dev_info *fsa_dev;
struct task_struct *thread;
+struct delayed_worksafw_rescan_work;
int cardtype;
/*
* This lock will protect the two 32-bit
@@ -1668,9 +1675,11 @@
atomic_msix_counter;
+u32 scan_counter;
struct msix_entry msixentry[AAC_MAX_MSIX];
struct aac_msix contextoac_msix[AAC_MAX_MSIX]; /* context */
struct aac_hba_map_info hba_map[AAC_MAX_BUSES][AAC_MAX_TARGETS];
+struct aac_ciss_phys_luns_resp *safw_phys_luns;
+struct aac_srb_unit {
+struct aac_srb srb;
+struct aac_srb_reply srb_reply;
+};
+
/*
* SRB Flags
*/
```
return capacity;
}

+static inline int aac_pci_offline(struct aac_dev *dev)
+{
+return pci_channel_offline(dev->pdev) || dev->handle_pci_error;
+}
+
+static inline int aac_adapter_check_health(struct aac_dev *dev)
+{
+if (unlikely(aac_pci_offline(dev)))
+return -1;
+
return (dev)->a_ops.adapter_check_health(dev);
}

+int aac_scan_host(struct aac_dev *dev);
+
+static inline void aac_schedule_safw_scan_worker(struct aac_dev *dev)
+{
+schedule_delayed_work(&dev->safw_rescan_work, AAC_SAFW_RESCAN_DELAY);
+}
+
+static inline void aac_safw_rescan_worker(struct work_struct *work)
+{
+struct aac_dev *dev = container_of(to_delayed_work(work),
+struct aac_dev, safw_rescan_work);
+
+wait_event(dev->scsi_host_ptr->host_wait,
+!scsi_host_in_recovery(dev->scsi_host_ptr));
+
+aac_scan_host(dev);
+}
+
+static inline void aac_cancel_safw_rescan_worker(struct aac_dev *dev)
+{
+if (dev->sa_firmware)
+cancel_delayed_work_sync(&dev->safw_rescan_work);
+}
+
/*/ SCp.phase values */
#define AAC_OWNER_MIDLEVEL 0x101
#define AAC_OWNER_LOWLEVEL 0x102
#define AAC_OWNER_ERROR_HANDLER 0x103
#define AAC_OWNER_FIRMWARE 0x106

+void aac_safw_rescan_worker(struct work_struct *work);
int aac_acquire_irq(struct aac_dev *dev);
void aac_free_irq(struct aac_dev *dev);
-int aac_report_phys_luns(struct aac_dev *dev, struct fib *fibptr, int rescan);
-int aac_issue_bmic_identify(struct aac_dev *dev, u32 bus, u32 target);
+int aac_setup_safw_adapter(struct aac_dev *dev);
const char *aac_driverinfo(struct Scsi_Host *);
void aac_fib_vector_assign(struct aac_dev *dev);
struct fib *aac_fib_alloc(struct aac_dev *dev);
--- linux-4.15.0.orig/drivers/scsi/aacraid/commctrl.c
+++ linux-4.15.0/drivers/scsi/aacraid/commctrl.c
@@ -1052,9 +1052,13 @@
if (copy_from_user((void *)&reset, arg, sizeof(struct aac_reset_iop)))
return -EFAULT;

+dev->adapter_shutdown = 1;
+
+mutex_unlock(&dev->ioctl_mutex);
retval = aac_reset_adapter(dev, 0, reset.reset_type);
-return retval;
+mutex_lock(&dev->ioctl_mutex);

+return retval;
}

int aac_do_ioctl(struct aac_dev * dev, int cmd, void __user *arg)
--- linux-4.15.0.orig/drivers/scsi/aacraid/comminit.c
+++ linux-4.15.0/drivers/scsi/aacraid/comminit.c
@@ -42,6 +42,8 @@

#include <linux/completion.h>
#include <linux/mm.h>
#include <scsi/scsi_host.h>
+#include <scsi/scsi_device.h>
+#include <scsi/scsi_cmnd.h>

#include "aacraid.h"

@@ -284,6 +286,38 @@
q->entries = qsize;
}

+static void aac_wait_for_io_completion(struct aac_dev *aac)
+{
+unsigned long flagv = 0;
+int i = 0;
+for (i = 60; i; --i) {
+struct scsi_device *dev;
+struct scsi_cmnd *command;
+int active = 0;
+
+__shost_for_each_device(dev, aac->scsi_host_ptr) {
+spin_lock_irqsave(&dev->list_lock, flagv);
+list_for_each_entry(command, &dev->cmd_list, list) {
+if (command->SCp.phase == AAC_OWNER_FIRMWARE) {
+active++;
+break;
+}
+
+spin_unlock_irqrestore(&dev->list_lock, flagv);
+if (active)
+break;
+
+/*
+ * We can exit If all the commands are complete
+ */
+if (active == 0)
+break;
+ssleep(1);
+}
+
+/*
+ * aac_send_shutdown-shutdown an adapter
+ *@dev: Adapter to shutdown
+ @ @ -295,12 +329,10 @ @
+ { 
+ struct fib * fibctx;
+ struct aac_close *cmd;
+ int status;
+ int status = 0;
+
+ fibctx = aac_fib_alloc(dev);
+ if (!fibctx)
+ return -ENOMEM;
+ aac_fib_init(fibctx);
+ if (aac_adapter_check_health(dev))
+ return status;
+
+ if (!dev->adapter_shutdown) {
+ mutex_lock(&dev->ioctl_mutex);
+ @ @ -308,6 +340,13 @ @
+ mutex_unlock(&dev->ioctl_mutex);
+ }
+aac_wait_for_io_completion(dev);
+
+fibctx = aac_fib_alloc(dev);
+if (!fibctx)
+    return -ENOMEM;
+aac_fib_init(fibctx);
+
+cmd = (struct aac_close *) fib_data(fibctx);
+cmd->command = cpu_to_le32(VM_CloseAll);
+cmd->cid = cpu_to_le32(0xfffffffe);

--- linux-4.15.0.orig/drivers/scsi/aacraid/commsup.c
+++ linux-4.15.0/drivers/scsi/aacraid/commsup.c
@@ -33,6 +33,7 @@

#include <linux/kernel.h>
#include <linux/init.h>
+#include <linux/crash_dump.h>
#include <linux/types.h>
#include <linux/sched.h>
#include <linux/pci.h>
@@ -672,7 +673,7 @@
    return -ETIMEDOUT;
 }

-if (unlikely(pci_channel_offline(dev->pdev)))
+if (unlikely(aac_pci_offline(dev)))
    return -EFAULT;

if ((blink = aac_adapter_check_health(dev)) > 0) {
    int wait;
    unsigned long flags = 0;
    unsigned long mflags = 0;
    +struct aac_hba_cmd_req *hbacmd = (struct aac_hba_cmd_req *)
    +fibptr->hw_fib_va;
    
    fibptr->flags = (FIB_CONTEXT_FLAG | FIB_CONTEXT_FLAG_NATIVE_HBA);
    if (callback) {
        @ @ -733,16 +736,14 @@
        wait = 1;

        -if (command == HBA_IU_TYPE_SCSI_CMD_REQ) {
        -struct aac_hba_cmd_req *hbacmd =
        -(struct aac_hba_cmd_req *)fibptr->hw_fib_va;
        +hbacmd->iu_type = command;


hbacmd->iu_type = command;
+if (command == HBA_IU_TYPE_SCSI_CMD_REQ) {
    /* bit1 of request_id must be 0 */
    hbacmd->request_id = cpu_to_le32((((u32)(fibptr - dev->fibs)) << 2) + 1);
    fibptr->flags |= FIB_CONTEXT_FLAG_SCSI_CMD;
} else if (command != HBA_IU_TYPE_SCSI_TM_REQ)
    return -EINVAL;

@@ -772,7 +773,7 @@
    spin_unlock_irqrestore(&fibptr->event_lock, flags);

    -if (unlikely(pci_channel_offline(dev->pdev)))
    +if (unlikely(aac_pci_offline(dev)))
        return -EFAULT;
    fibptr->flags |= FIB_CONTEXT_FLAG_WAIT;
@@ -1303,8 +1304,9 @@
            ADD : DELETE;
            break;
        }
        case AifBuManagerEvent:
            -aac_handle_aif_bu(dev, aifcmd);
            +break;
        +case AifBuManagerEvent:
            +aac_handle_aif_bu(dev, aifcmd);
            break;
    }

@@ -1501,9 +1503,10 @@
        host = aac->scsi_host_ptr;
        scsi_block_requests(host);
        aac_adapter_disable_int(aac);
        -if (aac->thread->pid != current->pid) {
            +if (aac->thread && aac->thread->pid != current->pid) {
                spin_unlock_irq(aac->host_lock);
                kthread_stop(aac->thread);
                +aac->thread = NULL;
                jafo = 1;
            }
@@ -1590,6 +1593,7 @@
            if (IS_ERR(aac->thread)) {
                retval = PTR_ERR(aac->thread);
            }


+aac->thread = NULL;
goto out;
}
}
@@ -1629,28 +1633,28 @@
command->scsi_done(command);
}
/*
- * Any Device that was already marked offline needs to be cleaned up
+ * Any Device that was already marked offline needs to be marked
+ * running
 */
__shost_for_each_device(dev, host) {
- if (!scsi_device_online(dev)) {
- sdev_printk(KERN_INFO, dev, "Removing offline device\n");
- scsi_remove_device(dev);
- scsi_device_put(dev);
- }
+ if (!scsi_device_online(dev))
+ scsi_device_set_state(dev, SDEV_RUNNING);
} retval = 0;

out:
aac->in_reset = 0;
scsi_unblock_requests(host);
+
/*
 * Issue bus rescan to catch any configuration that might have
 * occurred
 */
- if (!retval) {
- dev_info(&aac->pdev->dev, "Issuing bus rescan\n");
- scsi_scan_host(host);
- if (!retval && !is_kdump_kernel()) {
- dev_info(&aac->pdev->dev, "Scheduling bus rescan\n");
- aac_schedule_safw_scan_worker(aac);
- }
+ if (jafo) {
+ spin_lock_irq(host->host_lock);
+ }
@ @ -1681,31 +1685,6 @@
/*
host = aac->scsi_host_ptr;
scsi_block_requests(host);
- if (forced < 2) for (retval = 60; retval; --retval) {
- struct scsi_device * dev;
- struct scsi_cmd * command;
- int active = 0;
-
- __shost_for_each_device(dev, host) {
- spin_lock_irqsave(&dev->list_lock, flagv);
- list_for_each_entry(command, &dev->cmd_list, list) {
- if (command->SCp.phase == AAC_OWNER_FIRMWARE) {
- active++;
- break;
- }
- }
- spin_unlock_irqrestore(&dev->list_lock, flagv);
- if (active)
- break;
- }
- /*
- * We can exit If all the commands are complete
- *
- if (active == 0)
- break;
- ssleep(1);
- }

/* Quiesce build, flush cache, write through mode */
if (forced < 2)
@@ -1874,42 +1853,124 @@
return BlinkLED;
}

+static inline int is_safw_raid_volume(struct aac_dev *aac, int bus, int target)
+{
+ return bus == CONTAINER_CHANNEL && target < aac->maximum_num_containers;
+ } 
+
+static struct scsi_device *aac_lookup_safw_scsi_device(struct aac_dev *dev,
+ int bus,
+ int target)
+{
+ if (bus != CONTAINER_CHANNEL)
+ bus = aac_phys_to_logical(bus);
+ 
+ return scsi_device_lookup(dev->scsi_host_ptr, bus, target, 0);
+ }
+ 
+static int aac_add_safw_device(struct aac_dev *dev, int bus, int target)
+{
+ if (bus != CONTAINER_CHANNEL)
bus = aac_phys_to_logical(bus);
+
return scsi_add_device(dev->scsi_host_ptr, bus, target, 0);
+
-
static void aac_resolve_luns(struct aac_dev *dev)
+
static void aac_put_safw_scsi_device(struct scsi_device *sdev)
+
{
+if (sdev)
+scsi_device_put(sdev);
+}
+
+static void aac_remove_safw_device(struct aac_dev *dev, int bus, int target)
{
-int bus, target, channel;
struct scsi_device *sdev;
-u8 devtype;
-u8 new_devtype;

-for (bus = 0; bus < AAC_MAX_BUSES; bus++) {
-for (target = 0; target < AAC_MAX_TARGETS; target++) {
+sdev = aac_lookup_safw_scsi_device(dev, bus, target);
+scsi_remove_device(sdev);
+aac_put_safw_scsi_device(sdev);
+}
+
+static inline int aac_is_safw_scan_count_equal(struct aac_dev *dev,
+int bus, int target)
+{
+return dev->hba_map[bus][target].scan_counter == dev->scan_counter;
+}

-if (bus == CONTAINER_CHANNEL)
-channel = CONTAINER_CHANNEL;
-else
-channel = aac_phys_to_logical(bus);
+
static int aac_is_safw_target_valid(struct aac_dev *dev, int bus, int target)
+
{
+if (is_safw_raid_volume(dev, bus, target))
+return dev->fsa_dev[target].valid;
+else
+return aac_is_safw_scan_count_equal(dev, bus, target);
+}

-devtype = dev->hba_map[bus][target].devtype;
-new_devtype = dev->hba_map[bus][target].new_devtype;
+static int aac_is_safw_device_exposed(struct aac_dev *dev, int bus, int target)
+{
int is_exposed = 0;
struct scsi_device *sdev;

sdev = scsi_device_lookup(dev->scsi_host_ptr, channel, target, 0);
sdev = aac_lookup_safw_scsi_device(dev, bus, target);
if (sdev)
is_exposed = 1;
aac_put_safw_scsi_device(sdev);

if (!sdev && new_devtype)
scsi_add_device(dev->scsi_host_ptr, channel, target, 0);
else if (sdev && new_devtype != devtype)
scsi_remove_device(sdev);
else if (sdev && new_devtype == devtype)
scsi_rescan_device(&sdev->sdev_gendev);
return is_exposed;
}

if (sdev)
scsi_device_put(sdev);
static int aac_update_safw_host_devices(struct aac_dev *dev)
{
int i;
int bus;
int target;
int is_exposed = 0;
int rcode = 0;

dev->hba_map[bus][target].devtype = new_devtype;
rcode = aac_setup_safw_adapter(dev);
if (unlikely(rcode < 0)) {
goto out;
}

for (i = 0; i < AAC_BUS_TARGET_LOOP; i++) {
+bus = get_bus_number(i);
+target = get_target_number(i);
+is_exposed = aac_is_safw_device_exposed(dev, bus, target);
+if (aac_is_safw_target_valid(dev, bus, target) && !is_exposed)
aac_add_safw_device(dev, bus, target);
else if (!aac_is_safw_target_valid(dev, bus, target) &&
is_exposed)
+aac_remove_safw_device(dev, bus, target);
+
+out:
+return rcode;
+
+static int aac_scan_safw_host(struct aac_dev *dev)
+{
+int rcode = 0;
+
+rcode = aac_update_safw_host_devices(dev);
+if (rcode)
+aac_schedule_safw_scan_worker(dev);
+
+return rcode;
+
} +
+
+static int aac_scan_host(struct aac_dev *dev)
+{
+int rcode = 0;
+
+mutex_lock(&dev->scan_mutex);
+if (dev->sa_firmware)
+rcode = aac_scan_safw_host(dev);
+else
+scsi_scan_host(dev->scsi_host_ptr);
+mutex_unlock(&dev->scan_mutex);
+
+return rcode;
+
} +
+
/**
 @@ -1922,10 +1983,8 @@
 */
static void aac_handle_sa_aif(struct aac_dev *dev, struct fib *fibptr)
{
-int i, bus, target, container, rcode = 0;
+int i;
+u32 events = 0;
-struct fib *fib;
-struct scsi_device *sdev;
+
if (fibptr->hbacmd_size & SA_AIF_HOTPLUG)
events = SA_AIF_HOTPLUG;
@@ -1947,44 +2006,8 @@
case SA_AIF_LDEV_CHANGE:
case SA_AIF_BPCFG_CHANGE:
fib = aac_fib_alloc(dev);
if (!fib) {
    pr_err("aac_handle_sa_aif: out of memory\n");
    return;
}
for (bus = 0; bus < AAC_MAX_BUSES; bus++)
    for (target = 0; target < AAC_MAX_TARGETS; target++)
        dev->hba_map[bus][target].new_devtype = 0;
rcode = aac_report_phys_luns(dev, fib, AAC_RESCAN);
if (rcode != -ERESTARTSYS)
aac_fib_free(fib);
aac_resolve_luns(dev);
if (events == SA_AIF_LDEV_CHANGE ||
    events == SA_AIF_BPCFG_CHANGE) {
aac_get_containers(dev);
    for (container = 0; container <
        dev->maximum_num_containers; ++container) {
        sdev = scsi_device_lookup(dev->scsi_host_ptr,
            CONTAINER_CHANNEL,
            container, 0);
        if (dev->fsa_dev[container].valid && !sdev) {
            scsi_add_device(dev->scsi_host_ptr,
                CONTAINER_CHANNEL,
                container, 0);
        } else if (!dev->fsa_dev[container].valid &&
            sdev) {
            scsi_remove_device(sdev);
            scsi_device_put(sdev);
        } else if (sdev) {
            scsi_rescan_device(sdev); &sdev->sdev_gendev);
            scsi_device_put(sdev);
        }
    }
}
else if (!dev->fsa_dev[container].valid &
    sdev) {
    scsi_remove_device(sdev);
    scsi_device_put(sdev);
}
}
}
aac_scan_host(dev);
break;
case SA_AIF_BPSTAT_CHANGE:
    if (chn < AAC_MAX_BUSES && tid < AAC_MAX_TARGETS && aac->sa_firmware) {
        devtype = aac->hba_map[chn][tid].devtype;
    

-if (devtype == AAC_DEVTYPE_NATIVE_RAW)
+if (devtype == AAC_DEVTYPE_NATIVE_RAW) {
  depth = aac->hba_map[chn][tid].qd_limit;
-else if (devtype == AAC_DEVTYPE_ARC_RAW)
+  set_timeout = 1;
+  goto common_config;
+
+  if (devtype == AAC_DEVTYPE_ARC_RAW) {
    set_qd_dev_type = true;
    -
    -set_timeout = 1;
    -goto common_config;
    +set_timeout = 1;
    +goto common_config:
    +}
}

if (aac->jbod && (sdev->type == TYPE_DISK))
@@ -683,6 +686,9 @@
    u32 bus, cid;
    int ret = FAILED;

+if (aac_adapter_check_health(aac))
+return ret;
+
+  bus = aac_logical_to_phys(scmd_channel(cmd));
  cid = scmd_id(cmd);
if (aac->hba_map[bus][cid].devtype == AAC_DEVTYPE_NATIVE_RAW) {
@@ -690,7 +696,6 @@

    struct aac_hba_tm_req *tmf;
    int status;
    u64 address;
-__le32 managed_request_id;

    pr_err("%s: Host adapter abort request (%d,%d,%d,%d)

    AAC_DRIVERNAME,
@@ -703,8 +708,6 @@
      fib->flags & FIB_CONTEXT_FLAG_NATIVE_HBA) &&
      (fib->callback_data == cmd)) {
    found = 1;
-  -managed_request_id = ((struct aac_hba_cmd_req *)
-    -fib->hw_fib_va)-request_id;
    break;
  }
  }
@@ -733,7 +736,11 @@

    status = aac_hba_send(HBA_IU_TYPE_SCSI_TM_REQ, fib,
(fib_callback) aac_hba_callback,
(void *) cmd);
-
+if (status != -EINPROGRESS) {
+aac_fib_complete(fib);
+aac_fib_free(fib);
+return ret;
+)
/* Wait up to 15 secs for completion */
for (count = 0; count < 15; ++count) {
if (cmd->SCp.sent_command) {
@@ -912,11 +919,11 @@

info = &aac->hba_map[bus][cid];

-if (info->devtype != AAC_DEVTYPE_NATIVE_RAW &&
- info->reset_state > 0)
+if (!(info->devtype == AAC_DEVTYPE_NATIVE_RAW &&
+ !info->reset_state > 0)))
return FAILED;

-pr_err("%s: Host adapter reset request. SCSI hang ?n",
+pr_err("%s: Host device reset request. SCSI hang ?n",
 AAC_DRIVERNAME);

fib = aac_fib_alloc(aac);
@@ -931,7 +938,12 @@
status = aac_hba_send(command, fib,
   (fib_callback) aac_tmf_callback,
   (void *) info);
-
+if (status != -EINPROGRESS) {
+info->reset_state = 0;
+aac_fib_complete(fib);
+aac_fib_free(fib);
+return ret;
+}
/* Wait up to 15 seconds for completion */
for (count = 0; count < 15; ++count) {
if (info->reset_state == 0) {
@@ -970,11 +982,11 @@

info = &aac->hba_map[bus][cid]:

-if (info->devtype != AAC_DEVTYPE_NATIVE_RAW &&
- info->reset_state > 0)
+if (!info->devtype == AAC_DEVTYPE_NATIVE_RAW &&
+ !info->reset_state > 0))
return FAILED;

-pr_err("%s: Host adapter reset request. SCSI hang \?n", 
+pr_err("%s: Host target reset request. SCSI hang \?n", 
   AAC_DRIVERNAME);

fib = aac_fib_alloc(aac);
@@ -991,6 +1003,13 @@
    (fib_callback) aac_tmf_callback, 
    (void *) info);

+if (status != -EINPROGRESS) {
+info->reset_state = 0;
+aac_fib_complete(fib);
+aac_fib_free(fib);
+return ret;
+}
+
+/* Wait up to 15 seconds for completion */
for (count = 0; count < 15; ++count) {
if (info->reset_state <= 0) {
@@ -1043,7 +1062,7 @@
}
}

-pr_err("%s: Host adapter reset request. SCSI hang \?n", AAC_DRIVERNAME);
+pr_err("%s: Host bus reset request. SCSI hang \?n", AAC_DRIVERNAME);

/*
 * Check the health of the controller
@@ -1375,18 +1394,15 @@
    const char *buf, size_t count)
{
    int retval = -EACCES;
-    int bled = 0;
-    struct aac_dev *aac;
-
    if (!capable(CAP_SYS_ADMIN))
        return retval;

-aac = (struct aac_dev *)class_to_shost(device)->hostdata;
-bled = buf[0] == '!' ? 1:0;
-reval = aac_reset_adapter(aac, bled, IOP_HWSOFT_RESET);
+retval = aac_reset_adapter(shost_priv(class_to_shost(device)),
+    buf[0] == '!', IOP_HWSOFT_RESET);
if (retval >= 0)
    retval = count;

+ return retval;
}

@@ -1565,6 +1581,7 @@
up(&fib->event_wait);
}
kthread_stop(aac->thread);
+aac->thread = NULL;
}

aac_send_shutdown(aac);
@@ -1603,7 +1620,7 @@
struct Scsi_Host *shost;
struct aac_dev *aac;
struct list_head *insert = &aac_devices;
-int error = -ENODEV;
+int error;
int unique_id = 0;
u64 dmamask;
int mask_bits = 0;
@@ -1628,7 +1645,6 @@
error = pci_enable_device(pdev);
if (error)
goto out;
-error = -ENODEV;

if (!aac_drivers[index].quirks & AAC_QUIRK_SRC) {
error = pci_set_dma_mask(pdev, DMA_BIT_MASK(32));
@@ -1660,8 +1676,10 @@
pici_set_master(pdev);

shost = scsi_host_alloc(&aac_driver_template, sizeof(struct aac_dev));
-if (!shost)
+if (!shost) {
+error = -ENOMEM;

goto out_disable_pdev;
+}

shost->irq = pdev->irq;
shost->unique_id = unique_id;
@@ -1684,17 +1702,25 @@
aac->init_reset = true;

aac->fibs = kzalloc(sizeof(struct fib) * (shost->can_queue + AAC_NUM_MGT_FIB), GFP_KERNEL);
-if (!aac->fibs)
+if (!aac->fibs) {
+error = -ENOMEM;

goto out_free_host;
+
spin_lock_init(&aac->fib_lock);

mutex_init(&aac->ioctl_mutex);
+mutex_init(&aac->scan_mutex);
+
+INIT_DELAYED_WORK(&aac->safw_rescan_work, aac_safw_rescan_worker);
/*
*Map in the registers from the adapter.
*/
aac->base_size = AAC_MIN_FOOTPRINT_SIZE;
-if ((*aac_drivers[index].init)(aac))
+if ((*aac_drivers[index].init)(aac)) {
+error = -ENODEV;
goto out_unmap;
+

if (aac->sync_mode) {
if (aac_sync_mode)
@@ -1792,7 +1818,8 @@
error = scsi_add_host(shost, &pdev->dev);
if (error)
goto out_deinit;
-scsize_scan_host(shost);
+aac_scan_host(aac);
+
pci_enable_pcie_error_reporting(pdev);
pci_save_state(pdev);
@@ -1877,6 +1904,7 @@
struct aac_dev *aac = (struct aac_dev *)shost->hostdata;

scsi_block_requests(shost);
+aac_cancel_safw_rescan_worker(aac);
aac_send_shutdown(aac);

aac_release_resources(aac);
@@ -1935,6 +1963,7 @@
struct Scsi_Host *shost = pci_get_drvdata(pdev);
struct aac_dev *aac = (struct aac_dev *)shost->hostdata;

+aac_cancel_safw_rescan_worker(aac);
scsi_remove_host(shost);

__aac_shutdown(aac);
@@ -1992,6 +2021,7 @@
aac->handle_pci_error = 1;

scsi_block_requests(aac->scsi_host_ptr);
+aac_cancel_safw_rescan_worker(aac);
aac_flush_ios(aac);
aac_release_resources(aac);

@@ -2076,7 +2106,7 @@
if (sdev->sdev_state == SDEV_OFFLINE)
 sdev->sdev_state = SDEV_RUNNING;
 scsi_unblock_requests(aac->scsi_host_ptr);
-scsi_scan_host(aac->scsi_host_ptr);
+aac_scan_host(aac);
pci_save_state(pdev);

dev_err(&pdev->dev, "aacraid: PCI error - resume\n");
--- linux-4.15.0.orig/drivers/scsi/aacraid/sa.c
+++ linux-4.15.0/drivers/scsi/aacraid/sa.c
@@ -329,6 +329,22 @@

instance = dev->id;
name = dev->name;

+/*
+ * Fill in the function dispatch table.
+ */
+
+dev->a_ops.adapter_interrupt = aac_sa_interrupt_adapter;
+dev->a_ops.adapter_disable_int = aac_sa_disable_interrupt;
+dev->a_ops.adapter_enable_int = aac_sa_enable_interrupt;
+dev->a_ops.adapter_notify = aac_sa_notify_adapter;
+dev->a_ops.adapter_sync_cmd = sa_sync_cmd;
+dev->a_ops.adapter_check_health = aac_sa_check_health;
+dev->a_ops.adapter_restart = aac_sa_restart_adapter;
+dev->a_ops.adapter_start = aac_sa_start_adapter;
+dev->a_ops.adapter_intr = aac_sa_intr;
+dev->a_ops.adapter_deliver = aac_rx_deliver_producer;
+dev->a_ops.adapter_ioremap = aac_sa_ioremap;
+
if (aac_sa_ioremap(dev, dev->base_size)) {
    printk(KERN_WARNING "%s: unable to map adapter.\n", name);
    goto error_iounmap;
@@ -363,22 +379,6 @@
}

/*
 - * Fill in the function dispatch table.
 - */
-
- dev->a_ops.adapter_interrupt = aac_sa_interrupt_adapter;
- dev->a_ops.adapter_disable_int = aac_sa_disable_interrupt;
- dev->a_ops.adapter_enable_int = aac_sa_enable_interrupt;
- dev->a_ops.adapter_notify = aac_sa_notify_adapter;
- dev->a_ops.adapter_sync_cmd = sa_sync_cmd;
- dev->a_ops.adapter_check_health = aac_sa_check_health;
- dev->a_ops.adapter_restart = aac_sa_restart_adapter;
- dev->a_ops.adapter_start = aac_sa_start_adapter;
- dev->a_ops.adapter_intr = aac_sa_intr;
- dev->a_ops.adapter_deliver = aac_rx_deliver_producer;
- dev->a_ops.adapter_ioremap = aac_sa_ioremap;

- /*
   * First clear out all interrupts. Then enable the one's that
   * we can handle.
   */

--- linux-4.15.0.orig/drivers/scsi/aic7xxx/aic7770_osm.c
+++ linux-4.15.0/drivers/scsi/aic7xxx/aic7770_osm.c
@@ -91,6 +91,7 @@
ahc = ahc_alloc(&aic7xxx_driver_template, name);
if (ahc == NULL)
  return (ENOMEM);
+ahc->dev = dev;
error = aic7770_config(ahc, aic7770_ident_table + edev->id.driver_data,
  eisaBase);
if (error != 0) {
--- linux-4.15.0.orig/drivers/scsi/aic7xxx/aic7xxx.h
+++ linux-4.15.0/drivers/scsi/aic7xxx/aic7xxx.h
@@ -949,6 +949,7 @@
/* Platform specific device information.
*/
ahc_dev_softc_t dev_softc;
+struct device *dev;
/*
 * Bus specific device information.
--- linux-4.15.0.orig/drivers/scsi/aic7xxx/aic7xxx_core.c
+++ linux-4.15.0/drivers/scsi/aic7xxx/aic7xxx_core.c
@@ -500,7 +500,7 @@
return ((ahc_inb(ahc, port))
    | (ahc_inb(ahc, port+1) << 8)
    | (ahc_inb(ahc, port+2) << 16)
--- linux-4.15.0.orig/drivers/scsi/aic7xxx/aic7xxx_core.c
+++ linux-4.15.0/drivers/scsi/aic7xxx/aic7xxx_core.c
@@ -500,7 +500,7 @@
return ((ahc_inb(ahc, port))
    | (ahc_inb(ahc, port+1) << 8)
    | (ahc_inb(ahc, port+2) << 16)
-    | (ahc_inb(ahc, port+3) << 24)
+    | (((uint64_t)ahc_inb(ahc, port+3)) << 24)
    | (((uint64_t)ahc_inb(ahc, port+4)) << 32)
    | (((uint64_t)ahc_inb(ahc, port+5)) << 40)
    | (((uint64_t)ahc_inb(ahc, port+6)) << 48)
@@ -2321,7 +2321,7 @@

* At some speeds, we only support
* ST transfers.
*/
-if ((syncrate->sxfr_u2 & ST_SXFR) != 0)
+if ((syncrate->sxfr_u2 & ST_SXFR) != 0)
 *ppr_options &= ~MSG_EXT_PPR_DT_REQ;
break;
}
--- linux-4.15.0.orig/drivers/scsi/aic7xxx/aic7xxx_osm.c
+++ linux-4.15.0/drivers/scsi/aic7xxx/aic7xxx_osm.c
@@ -861,8 +861,8 @@
 ahc_dmamem_alloc(struct ahc_softc *ahc, bus_dma_tag_t dmat, void** vaddr,
 int flags, bus_dmamap_t *mapp)
 {
- *vaddr = pci_alloc_consistent(ahc->dev_softc,
- dmat->maxsize, mapp);
+ /* XXX: check if we really need the GFP_ATOMIC and unwind this mess! */
+ *vaddr = dma_alloc_coherent(ahc->dev, dmat->maxsize, mapp, GFP_ATOMIC);
 if (*vaddr == NULL)
  return ENOMEM;
 return 0;
@@ -872,8 +872,7 @@
 ahc_dmamem_free(struct ahc_softc *ahc, bus_dma_tag_t dmat,
 void* vaddr, bus_dmamap_t map)
 {
- pci_free_consistent(ahc->dev_softc, dmat->maxsize,
- vaddr, map);
+ dma_free_coherent(ahc->dev, dmat->maxsize, vaddr, map);
 }

 int
 @@ -1124,8 +1123,7 @@
 host->transportt = ahc_linux_transport_template;

-retval = scsi_add_host(host,
-(ahc->dev_softc ? &ahc->dev_softc->dev : NULL));
+retval = scsi_add_host(host, ahc->dev);
 if (retval) {
 printk(KERN_WARNING "aic7xxx: scsi_add_host failed\n");
 scsi_host_put(host);
--- linux-4.15.0.orig/drivers/scsi/aic7xxx/aic7xxx_osm_pci.c
+++ linux-4.15.0/drivers/scsi/aic7xxx/aic7xxx_osm_pci.c
@@ -250,6 +250,7 @@
 }
 ahc->dev_softc = pci;
 +ahc->dev = &pci->dev;
error = ahc_pci_config(ahc, entry);
if (error != 0) {
    ahc_free(ahc);
    return snprintf(buf, PAGE_SIZE, "%s\n", asd_dev_rev[asd_ha->revision_id]);
}

static DEVICE_ATTR(revision, S_IRUGO, asd_show_dev_rev, NULL);
static DEVICE_ATTR(aic_revision, S_IRUGO, asd_show_dev_rev, NULL);

static ssize_t asd_show_dev_bios_build(struct device *dev,
    struct device_attribute *attr, char *buf)
{
    int err;
    err = device_create_file(&asd_ha->pcidev->dev, &dev_attr_aic_revision);
    if (err)
        return err;
    int err Bio:
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_aic_revision);
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_bios_build);
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_pcba_sn);
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_update_bios);
}

static void asd_remove_dev_attrs(struct asd_ha_struct *asd_ha)
{
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_revision);
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_aic_revision);
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_bios_build);
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_pcba_sn);
    device_remove_file(&asd_ha->pcidev->dev, &dev_attr_update_bios);
}

aic94xx_transport_template =
sas_domain_attach_transport(&aic94xx_transport_functions);
if (!aic94xx_transport_template)
    err = -ENOMEM;
    goto out_destroy_caches;
+}
err = pci_register_driver(&aic94xx_pci_driver);
if (err)
--- linux-4.15.0.orig/drivers/scsi/arcmsr/arcmsr_hba.c
+++ linux-4.15.0/drivers/scsi/arcmsr/arcmsr_hba.c
@@ -3645,9 +3645,9 @
pci_read_config_byte(acb->pdev, i, &value[i]);
} /* hardware reset signal */
-if ((acb->dev_id == 0x1680)) {
+if (acb->dev_id == 0x1680) {
    writel(ARCMSR_ARC1680_BUS_RESET, &pmuA->reserved1[0]);
-} else if ((acb->dev_id == 0x1880)) {
+} else if (acb->dev_id == 0x1880) {
    do {
        count++;
        writel(0xF, &pmuC->write_sequence);
--- linux-4.15.0.orig/drivers/scsi/arm/acornscsi.c
+++ linux-4.15.0/drivers/scsi/arm/acornscsi.c
@@ -2914,8 +2914,10 @
        writel(0xD, &pmuC->write_sequence);
    } while (((readl(&pmuC->host_diagnostic) & ARCMSR_ARC1880_DiagWrite_ENABLE) == 0) && (count < 5));
    writel(ARCMSR_ARC1880_RESET_ADAPTER, &pmuC->host_diagnostic);
-} else if ((acb->dev_id == 0x1214)) {
+} else if (acb->dev_id == 0x1214) {
    writel(0x20, pmuD->reset_request);
} else {
    pci_write_config_byte(acb->pdev, 0x84, 0x20);
--- linux-4.15.0.orig/drivers/scsi/arm/cumana_2.c
+++ linux-4.15.0/drivers/scsi/arm/cumana_2.c
@@ -454,7 +454,7 @
    free_irq(ec->irq, host);
} else {
host->irq = ec->irq;
--- linux-4.15.0.orig/drivers/scsi/arm/cumana_2.c
+++ linux-4.15.0/drivers/scsi/arm/cumana_2.c
@@ -454,7 +454,7 @
    if (info->info.scsi.dma != NO_DMA)
        free_dma(info->info.scsi.dma);
    -free_irq(ec->irq, host);
+free_irq(ec->irq, info);
out_release:
fas216_release(host);
--- linux-4.15.0.orig/drivers/scsi/arm/eesox.c
+++ linux-4.15.0/drivers/scsi/arm/eesox.c
@@ -575,7 +575,7 @@
         if (info->info.scsi.dma != NO_DMA)
             free_dma(info->info.scsi.dma);
         -free_irq(ec->irq, host);
+        free_irq(ec->irq, info);

 out_remove:
fas216_remove(host);
--- linux-4.15.0.orig/drivers/scsi/arm/fas216.c
+++ linux-4.15.0/drivers/scsi/arm/fas216.c
@@ -2011,7 +2011,7 @@
         have valid data in the sense buffer that could
         confuse the higher levels.
         */
-        memset(SCpnt->sense_buffer, 0, sizeof(SCpnt->sense_buffer));
+        memset(SCpnt->sense_buffer, 0, SCSI_SENSE_BUFFERSIZE);
         /*
          printk("scsi%d.%c: sense buffer: ", info->host->host_no, '0' + SCpnt->device->id);
          for (i = 0; i < 32; i++) printk("%02x ", SCpnt->sense_buffer[i]);
          printk("\n"); }
         */
--- linux-4.15.0.orig/drivers/scsi/arm/powertec.c
+++ linux-4.15.0/drivers/scsi/arm/powertec.c
@@ -382,7 +382,7 @@
         if (info->info.scsi.dma != NO_DMA)
             free_dma(info->info.scsi.dma);
         -free_irq(ec->irq, host);
+        free_irq(ec->irq, info);

 out_release:
fas216_release(host);
--- linux-4.15.0.orig/drivers/scsi/ata/ata_scsi.c
+++ linux-4.15.0/drivers/scsi/ata/ata_scsi.c
@@ -751,8 +751,8 @@
         if (setup_can_queue > 0)
             atari_scsi_template.sg_tablesize = SG_ALL;
 } else {
-        atari_scsi_template.can_queue = 1;
-        atari_scsi_template.sg_tablesize = SG_NONE;
+        atari_scsi_template.sg_tablesize = 1;
 }
if (setup_cmd_per_lun > 0)
atari_scsi_template.cmd_per_lun = setup_cmd_per_lun;

-/* Leave sg_tablesize at 0 on a Falcon */
-if (ATARIHW_PRESENT(TT_SCSI) && setup_sg_tablesize >= 0)
+/* Don't increase sg_tablesize on Falcon */
+if (ATARIHW_PRESENT(TT_SCSI) && setup_sg_tablesize > 0)
atari_scsi_template.sg_tablesize = setup_sg_tablesize;

if (setup_hostid >= 0) {
--- linux-4.15.0.orig/drivers/scsi/be2iscsi/be_main.c
+++ linux-4.15.0/drivers/scsi/be2iscsi/be_main.c
@@ -412,7 +412,7 @@
"beiscsi_hba_alloc - iscsi_host_alloc failed"
) return NULL;
}
-shost->max_id = BE2_MAX_SESSIONS;
+shost->max_id = BE2_MAX_SESSIONS - 1;
shost->max_channel = 0;
shost->max_cmd_len = BEISC_SI_MAX_CMD_LEN;
shost->max_lun = BEISC_SI_NUM_MAX_LUN;
@@ -5319,7 +5319,7 @@
/* Re-enable UER. If different TPE occurs then it is recoverable */
beiscsi_set_uer_feature(phba);

-phba->shost->max_id = phba->params.cxns_per_ctrl;
+phba->shost->max_id = phba->params.cxns_per_ctrl - 1;
phba->shost->can_queue = phba->params.ios_per_ctrl;
ret = beiscsi_init_port(phba);
if (ret < 0) {
@@ -5747,6 +5747,7 @@
pci_disable_msix(phba->pcidev);
pci_dev_put(phba->pcidev);
iscsi_host_free(phba->shost);
+pci_disable_pcie_error_reporting(pcidev);
pci_set_drvdata(pcidev, NULL);
disable_pci:
pci_release_regions(pcidev);
--- linux-4.15.0.orig/drivers/scsi/bfa/bfa_fcbuild.c
+++ linux-4.15.0/drivers/scsi/bfa/bfa_fcbuild.c
@@ -1250,8 +1250,8 @@
memset(rspnid, 0, sizeof(struct fcgs_rspnid_req_s));
  rspnid->dap = s_id;
-rspnid->spn_len = (u8) strlen((char *)name);
-strncpy((char *)rspnid->spn, (char *)name, rspnid->spn_len);
+strlcpy(rspnid->spn, name, sizeof(rspnid->spn));
+rspnid->spn_len = (u8) strlen(rspnid->spn);
return sizeof(struct fcgs_rspnid_req_s) + sizeof(struct ct_hdr_s);
}
@@ -1271,8 +1271,8 @@
memset(rsnn_nn, 0, sizeof(struct fcgs_rsnn_nn_req_s));

rsnn_nn->node_name = node_name;
- rsnn_nn->snn_len = (u8) strlen((char *)name);
- strncpy((char *)rsnn_nn->snn, (char *)name, rsnn_nn->snn_len);
+ strlcpy(rsnn_nn->snn, name, sizeof(rsnn_nn->snn));
+ rsnn_nn->snn_len = (u8) strlen(rsnn_nn->snn);

return sizeof(struct fcgs_rsnn_nn_req_s) + sizeof(struct ct_hdr_s);
}
--- linux-4.15.0.orig/drivers/scsi/bfa/bfa_fcs.c
+++ linux-4.15.0/drivers/scsi/bfa/bfa_fcs.c
@@ -769,23 +769,23 @@
bfa_ioc_get_adapter_model(&fabric->fcs->bfa->ioc, model);

/* Model name/number */
- strncpy((char *)&port_cfg->sym_name, model,
- BFA_FCS_PORT_SYMBNAME_MODEL_SZ);
- strncat((char *)&port_cfg->sym_name, BFA_FCS_PORT_SYMBNAME_SEPARATOR,
- sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+ strlcpy(port_cfg->sym_name.symname, model,
+ BFA_SYMNAME_MAXLEN);
+ strlcat(port_cfg->sym_name.symname, BFA_FCS_PORT_SYMBNAME_SEPARATOR,
+ BFA_SYMNAME_MAXLEN);

/* Driver Version */
- strncat((char *)&port_cfg->sym_name, (char *)driver_info->version,
- BFA_FCS_PORT_SYMBNAME_VERSION_SZ);
- strncat((char *)&port_cfg->sym_name, BFA_FCS_PORT_SYMBNAME_SEPARATOR,
- sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+ strlcat(port_cfg->sym_name.symname, driver_info->version,
+ BFA_SYMNAME_MAXLEN);
+ strlcat(port_cfg->sym_name.symname, BFA_FCS_PORT_SYMBNAME_SEPARATOR,
+ BFA_SYMNAME_MAXLEN);

/* Host machine name */
- strncat((char *)&port_cfg->sym_name,
- (char *)driver_info->host_machine_name,
- BFA_FCS_PORT_SYMBNAME_MACHINENAME_SZ);
- strncat((char *)&port_cfg->sym_name, BFA_FCS_PORT_SYMBNAME_SEPARATOR,
- sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+ strlcat(port_cfg->sym_name.symname,
+ driver_info->host_machine_name,
+ BFA_SYMNAME_MAXLEN);
/* Host OS Info : */
@@ -793,24 +793,24 @@
 * OS name string and instead copy the entire OS info string (64 bytes).
 */
 if (driver_info->host_os_patch[0] == '0') {
-    strncat((char *)&port_cfg->sym_name,
-            (char *)driver_info->host_os_name,
-            BFA_FCS_OS_STR_LEN);
-    strncat((char *)&port_cfg->sym_name,
+    strlcat(port_cfg->sym_name.symname,
            driver_info->host_os_name,
+            BFA_SYMNAME_MAXLEN);
    BFA_FCS_PORT_SYMBNAME_SEPARATOR,
-            sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+            BFA_SYMNAME_MAXLEN);
    /* Append host OS Patch Info */
-    strncat((char *)&port_cfg->sym_name,
-            (char *)driver_info->host_os_patch,
-            BFA_FCS_PORT_SYMBNAME_OSPATCH_SZ);
+    strlcat(port_cfg->sym_name.symname,
            driver_info->host_os_patch,
+            BFA_SYMNAME_MAXLEN);
 }
 else {
-    strncat((char *)&port_cfg->sym_name,
-           (char *)driver_info->host_os_name,
-           BFA_FCS_PORT_SYMBNAME_OSINFO_SZ);
-    strncat((char *)&port_cfg->sym_name,
+    strlcat(port_cfg->sym_name.symname,
           driver_info->host_os_name,
+           BFA_SYMNAME_MAXLEN);
+    strlcat(port_cfg->sym_name.symname,
           BFA_FCS_PORT_SYMBNAME_SEPARATOR,
-           sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+           BFA_SYMNAME_MAXLEN);
+    /* Append host OS Patch Info */
+    strlcat(port_cfg->sym_name.symname,
+            driver_info->host_os_patch,
+            BFA_FCS_PORT_SYMBNAME_OSPATCH_SZ);
+    strlcat(port_cfg->sym_name.symname,
+            driver_info->host_os_patch,
+            BFA_SYMNAME_MAXLEN);
 }
/* null terminate */
@@ -830,26 +830,26 @@
bfa_ioc_get_adapter_model(&fabric->fcs->bfa->ioc, model);

/* Model name/number */
-    strncpy((char *)&port_cfg->node_sym_name, model,
-BFA_FCS_PORT_SYMBNAME_MODELSZ);
strncat((char *)&port_cfg->node_sym_name,
+strlcpy(port_cfg->node_sym_name.symname, model,
+BFA_SYMNAMEMAXLEN);
+strlcat(port_cfg->node_sym_name.symname,
BFA_FCS_PORT_SYMBNAME_SEPARATOR,
-sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+BFA_SYMNAMEMAXLEN);

/* Driver Version */
-strncat((char *)&port_cfg->node_sym_name, (char *)driver_info->version,
-BFA_FCS_PORT_SYMBNAME_VERSIONSZ);
-strncat((char *)&port_cfg->node_sym_name,
+strlcpy(port_cfg->node_sym_name.symname, (char *)driver_info->version,
+BFA_SYMNAMEMAXLEN);
+strlcat(port_cfg->node_sym_name.symname,
BFA_FCS_PORT_SYMBNAME_SEPARATOR,
-sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+BFA_SYMNAMEMAXLEN);

/* Host machine name */
-strncat((char *)&port_cfg->node_sym_name,
+(char *)driver_info->host_machine_name,
-BFA_FCS_PORT_SYMBNAME_MACHINENAME_SZ);
-strncat((char *)&port_cfg->node_sym_name,
+strlcat(port_cfg->node_sym_name.symname,
+driver_info->host_machine_name,
+BFA_SYMNAMEMAXLEN);
+strlcat(port_cfg->node_sym_name.symname,
BFA_FCS_PORT_SYMBNAME_SEPARATOR,
-sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
+BFA_SYMNAMEMAXLEN);

/* null terminate */
port_cfg->node_sym_name.symname[BFA_SYMNAMEMAXLEN - 1] = 0;
--- linux-4.15.0.orig/drivers/scsi/bfa/bfa_fcs_lport.c
+++ linux-4.15.0/drivers/scsi/bfa/bfa_fcs_lport.c
@@ -2642,10 +2642,10 @@
bfa_ioc_get_adapter_fw_ver(&port->fcs->bfa->ioc,
bfa_attr->fw_version);
-strncpy(hba_attr->driver_version, (char *)driver_info->version,
+strlcpy(hba_attr->driver_version, (char *)driver_info->version,
+sizeof(hba_attr->driver_version));

-strncpy(hba_attr->os_name, driver_info->host_os_name,
+strlcpy(hba_attr->os_name, driver_info->host_os_name,
+sizeof(hba_attr->os_name));
if (driver_info->host_os_patch[0] != '0') {
    strncat(hba_attr->os_name, BFA_FCS_PORT_SYMBNAME_SEPARATOR,
            sizeof(BFA_FCS_PORT_SYMBNAME_SEPARATOR));
    strncat(hba_attr->os_name, driver_info->host_os_patch,
            sizeof(driver_info->host_os_patch));
    strlcat(hba_attr->os_name, BFA_FCS_PORT_SYMBNAME_SEPARATOR,
            sizeof(hba_attr->os_name));
    strlcat(hba_attr->os_name, driver_info->host_os_patch,
            sizeof(hba_attr->os_name));
}

/* Retrieve the max frame size from the port attr */
bfa_fcs_fdmi_get_portattr(fdmi, &fcs_port_attr);
memcpy(hba_attr->max_ct_pyld, fcs_port_attr.max_frm_size,
        sizeof(hba_attr->max_ct_pyld));

memcpy(hba_attr->node_sym_name.symname,
        port->port_cfg.node_sym_name.symname, BFA_SYMNAME_MAXLEN);
strcpy(hba_attr->vendor_info, "QLogic");
hba_attr->num_ports =
cpu_to_be32(bfa_ioc_get_nports(&port->fcs->bfa->ioc));
memcpy(hba_attr->bios_ver, hba_attr->option_rom_ver, BFA_VERSION_LEN);
memcpy(hba_attr->bios_ver, hba_attr->option_rom_ver, BFA_VERSION_LEN);

/* OS device Name */
memcpy(port_attr->os_device_name, (char *)driver_info->os_device_name,
        sizeof(port_attr->os_device_name));

/* Host name */
memcpy(port_attr->host_name, (char *)driver_info->host_machine_name,
        sizeof(port_attr->host_name));

port_attr->node_name = bfa_fcs_lport_get_nwwn(port);
port_attr->port_name = bfa_fcs_lport_get_pwn(port);

-strncpy(port_attr->port_sym_name.symname,
	(char *)&bfa_fcs_lport_get_psym_name(port), BFA_SYMNAME_MAXLEN);
+strlcpy(port_attr->port_sym_name.symname, 
	bfa_fcs_lport_get_psym_name(port).symname, BFA_SYMNAME_MAXLEN);

bfa_fcs_lport_get_attr(port, &lport_attr);
port_attr->port_type = cpu_to_be32(lport_attr.port_type);
port_attr->scos = pport_attr.cos_supported;
@@ -3229,7 +3229,7 @@
    rsp_str[gmal_entry->len-1] = 0;

    /* copy IP Address to fabric */
    -strncpy(bfa_fcs_lport_get_fabric_ipaddr(port),
    +strlcpy(bfa_fcs_lport_get_fabric_ipaddr(port),
      gmal_entry->ip_addr,
      BFA_FCS_FABRIC_IPADDR_SZ);
    break;
@@ -4667,21 +4667,13 @@
      * to that of the base port.
      */

    -strncpy((char *)psymbl,
      -(char *) &bfa_fcs_lport_get_psym_name
    +strlcpy(symbl,
      +(char *)&(bfa_fcs_lport_get_psym_name
      (bfa_fcs_get_base_port(port->fcs))),
    -strlen((char *)&(bfa_fcs_lport_get_psym_name(bfa_fcs_get_base_port
      - (port->fcs))));
    -
    -/* Ensure we have a null terminating string. */
    -((char *)psymbl)[strlen((char *) &bfa_fcs_lport_get_psym_name(bfa_fcs_get_base_port
    -(port->fcs)))] = 0;
    -strncat((char *)psymbl,
      -(char *) &bfa_fcs_lport_get_psym_name(port),
    -strlen((char *) &bfa_fcs_lport_get_psym_name(port)));
    +sizeof(symbl));
    +
    +strlcat(symbl, (char *)&(bfa_fcs_lport_get_psym_name(port)),
    +sizeof(symbl));
    } else {
      psmbl = (u8 *)&(bfa_fcs_lport_get_psym_name(port));
    }
    @@ -5173,7 +5165,6 @@
    struct fchs_s fchs;
struct bfa_fcxp_s *fcxp;
int len;

/* Avoid sending RSPN in the following states. */
 For Vports, we append the vport’s port symbolic name
to that of the base port.

-strncmp((char *)psymbl, (char *)&(bfa_fcs_lport_get_psym_name
  bfa_fcs_get_base_port(port->fcs)),
    bfa_fcs_lport_get_psym_name(port), strlen((char *)&bfa_fcs_lport_get_psym_name(port));
+strncat((char *)psymbl, (char *)&(bfa_fcs_lport_get_psym_name(port)),
   bfa_fcs_lport_get_psym_name(port));

-strlen((char *)&(bfa_fcs_lport_get_psym_name(port)) = 0;
+sizeof(symbl));

len = fc_rspnid_build(&fchs, bfa_fcxp_get_reqbuf(fcxp),
   bfa_fcs_lport_get_fcid(port), 0, psymbl);
+bfa_fcs_lport_get_fcid(port), 0, symbl);

bfa_fcxp_send(fcxp, NULL, port->fabric->vf_id, port->lp_tag, BFA_FALSE,
   FC_CLASS_3, len, &fchs, NULL, NULL, FC_MAX_PDUSZ, 0);

--- linux-4.15.0.orig/drivers/scsi/bfa/bfa_ioc.c
+++ linux-4.15.0/drivers/scsi/bfa/bfa_ioc.c
@@ -2803,7 +2803,7 @@
bfa_ioc_get_adapter_manufacturer(struct bfa_ioc_s *ioc, char *manufacturer)
 {
   memset((void *)manufacturer, 0, BFA_ADAPTER_MFG_NAME_LEN);
   strcpy(manufacturer, BFA_ADAPTER_MFG_NAME_LEN, BFA_ADAPTER_MFG_NAME_LEN);
-}
port->stats_busy = BFA_FALSE;

if (status == BFA_STATUS_OK) {
    struct timeval tv;
    memcpy(port->stats, port->stats_dma.kva,
          sizeof(union bfa_port_stats_u));
    bfa_port_stats_swap(port, port->stats);
    do_gettimeofday(&tv);
    port->stats->fc.secs_reset = tv.tv_sec - port->stats_reset_time;
    port->stats->fc.secs_reset = ktime_get_seconds() - port->stats_reset_time;
}

if (port->stats_cbfn) {
    port->stats_status = status;
    port->stats_busy = BFA_FALSE;
/
* re-initialize time stamp for stats reset
*/
    do_gettimeofday(&tv);
    port->stats_reset_time = tv.tv_sec;
    port->stats_reset_time = ktime_get_seconds();

if (port->stats_cbfn) {
    port->stats_cbfn(port->stats_cbarg, status);
    WARN_ON(!port);
    port->dev = dev;
    /*
* initialize time stamp for stats reset
*/
    do_gettimeofday(&tv);
    port->stats_reset_time = tv.tv_sec;
+port->stats_reset_time = ktime_get_seconds();

bfa_trc(port, 0);
}
--- linux-4.15.0.orig/drivers/scsi/bfa/bfa_port.h
+++ linux-4.15.0/drivers/scsi/bfa/bfa_port.h
@@ -36,7 +36,7 @@
bfa_port_stats_cbfn_t		stats_cbfn;
void				*stats_cbarg;
bfa_status_t			stats_status;
-\tu32			stats_reset_time;
+\mtime64_t			stats_reset_time;
union bfa_port_stats_u		*stats;
struct bfa_dma_s		stats_dma;
bfa_boolean_t			endis_pending;
--- linux-4.15.0.orig/drivers/scsi/bfa/bfa_svc.c
+++ linux-4.15.0/drivers/scsi/bfa/bfa_svc.c
@@ -350,8 +350,8 @@
lp.eid = event;
lp.log_type = BFA_PL_LOG_TYPE_STRING;
lp.misc = misc;
-\t\tstrncpy(lp.log_entry.string_log, log_str,
-\t\t\tBFA_PL_STRING_LOG_SZ - 1);
+\t\tstrlcpy(lp.log_entry.string_log, log_str,
+\t\t\tBFA_PL_STRING_LOG_SZ);
lp.log_entry.string_log[BFA_PL_STRING_LOG_SZ - 1] = '\0';
bfa_plog_add(plog, &lp);
}
if (complete) {
    struct timeval tv;
    if (fcport->stats_status == BFA_STATUS_OK)
        do_gettimeofday(&tv);
    +time64_t time = ktime_get_seconds();

    list_for_each_safe(qe, qen, &fcport->stats_pending_q) {
        bfa_q_deq(&fcport->stats_pending_q, &qe);
        bfa_fcport_fcoe_stats_swap(&ret->fcoe,
            &fcport->stats->fcoe);
        ret->fcoe.secs_reset =
            -tv.tv_sec - fcport->stats_reset_time;
        +time - fcport->stats_reset_time;
    }
}

bfa_cb_queue_status(fcport->bfa, &cb->hcb_qe,
                struct list_head *qe, *qen;

if (complete) {
    struct timeval tv;

    /*
     * re-initialize time stamp for stats reset
     */
    do_gettimeofday(&tv);
    -fport->stats_reset_time = tv.tv_sec;
    +fcport->stats_reset_time = ktime_get_seconds();
    list_for_each_safe(qe, qen, &fcport->statsclr_pending_q) {
        bfa_q_deq(&fcport->statsclr_pending_q, &qe);
        cb = (struct bfa_cb_pending_q_s *)qe;
        --- linux-4.15.0.orig/drivers/scsi/bfa/bfa_svc.h
        +++ linux-4.15.0/drivers/scsi/bfa/bfa_svc.h
        @@ -505,7 +505,7 @@
        struct list_head *qe, *qen;
    }

    struct list_head stats_pending_q;
    struct list_head statsclr_pending_q;
    bfa_boolean_tstats_qfull;
    -u32stats_reset_time; /* stats reset time stamp */
    +time64_tstats_reset_time; /* stats reset time stamp */
    bfa_boolean_tdiag_busy; /* diag busy status */
    bfa_boolean_tbeacon; /* port beacon status */
    bfa_boolean_tlink_e2e_beacon; /* link beacon status */
    --- linux-4.15.0.orig/drivers/scsi/bfa/bfad.c
    +++ linux-4.15.0/drivers/scsi/bfa/bfad.c
    @@ -981,20 +981,20 @@
/* Fill the driver_info info to fcs*/
memset(&driver_info, 0, sizeof(driver_info));
-strncpy(driver_info.version, BFAD_DRIVER_VERSION,
-sizeof(driver_info.version) - 1);
+strlcpy(driver_info.version, BFAD_DRIVER_VERSION,
+sizeof(driver_info.version));
if (host_name)
-strncpy(driver_info.host_machine_name, host_name,
-sizeof(driver_info.host_machine_name) - 1);
+strlcpy(driver_info.host_machine_name, host_name,
+sizeof(driver_info.host_machine_name));
if (os_name)
-strncpy(driver_info.host_os_name, os_name,
-sizeof(driver_info.host_os_name) - 1);
+strlcpy(driver_info.host_os_name, os_name,
+sizeof(driver_info.host_os_name));
if (os_patch)
-strncpy(driver_info.host_os_patch, os_patch,
-sizeof(driver_info.host_os_patch) - 1);
+strlcpy(driver_info.host_os_patch, os_patch,
+sizeof(driver_info.host_os_patch));
-strncpy(driver_info.os_device_name, bfad->pci_name,
-sizeof(driver_info.os_device_name) - 1);
+strlcpy(driver_info.os_device_name, bfad->pci_name,
+sizeof(driver_info.os_device_name));

/* FCS driver info init */
spin_lock_irqsave(&bfad->bfad_lock, flags);
--- linux-4.15.0.orig/drivers/scsi/bfa/bfad_attr.c
+++ linux-4.15.0/drivers/scsi/bfa/bfad_attr.c
@@ -283,8 +283,10 @@
 rc = bfa_port_get_stats(BFA_FCPORT(&bfad->bfa),
 fcstats, bfad_hcb_comp, &fcomp);
 spin_unlock_irqrestore(&bfad->bfad_lock, flags);
-if (rc != BFA_STATUS_OK)
+if (rc != BFA_STATUS_OK) {
+kfree(fcstats);
 return NULL;
+}

 wait_for_completion(&fcomp.comp);

@@ -843,7 +845,7 @@
 char symname[BFA_SYMNAME_MAXLEN];

 bfa_fcs_lport_get_attr(&bfad->bfa_fcs.fabric.bport, &port_attr);
-strncpy(symname, port_attr.port_cfg.sym_name.symname,
strlcpy(symname, port_attr.port_cfg.sym_name.symname, BFA_SYMNAME_MAXLEN);
return snprintf(buf, PAGE_SIZE, "%s\n", symname);
}
--- linux-4.15.0.orig/drivers/scsi/bfa/bfad_bsg.c
+++ linux-4.15.0/drivers/scsi/bfa/bfad_bsg.c
@@ -127,7 +127,7 @@
    /* fill in driver attr info */
    strcpy(iocmd->ioc_attr.driver_attr.driver, BFAD_DRIVER_NAME);
    -strncpy(iocmd->ioc_attr.driver_attr.driver_ver,
    +strlcpy(iocmd->ioc_attr.driver_attr.driver_ver,
        BFAD_DRIVER_VERSION, BFA_VERSION_LEN);
    strcpy(iocmd->ioc_attr.driver_attr.fw_ver, iocmd->ioc_attr.adapter_attr.fw_ver);
    @@ -315,9 +315,9 @@
    iocmd->attr.port_type = port_attr.port_type;
    iocmd->attr.loopback = port_attr.loopback;
    iocmd->attr.authfail = port_attr.authfail;
    -strncpy(iocmd->attr.port_symname.symname, 
    +strlcpy(iocmd->attr.port_symname.symname, 
        port_attr.port_cfg.sym_name.symname, 
        -sizeof(port_attr.port_cfg.sym_name.symname)); 
    +sizeof(iocmd->attr.port_symname.symname)); 

    iocmd->status = BFA_STATUS_OK;
    return 0;
--- linux-4.15.0.orig/drivers/scsi/bnx2fc/Kconfig
+++ linux-4.15.0/drivers/scsi/bnx2fc/Kconfig
@@ -4,6 +4,7 @@
    depends on (IPV6 || IPV6=n)
    depends on LIBFC
    depends on LIBFCOE
    +depends on MMU
    select NETDEVICES
    select ETHERNET
    select NET_VENDOR_BROADCOM
--- linux-4.15.0.orig/drivers/scsi/bnx2fc/bnx2fc_fcoe.c
+++ linux-4.15.0/drivers/scsi/bnx2fc/bnx2fc_fcoe.c
@@ -1445,7 +1445,7 @@

 static struct bnx2fc_interface *
  bnx2fc_interface_create(struct bnx2fc_hba *hba,
 struct net_device *netdev,
-enum fip_state fip_mode)
+enum fip_mode fip_mode)
 {
 struct fcoe_ctlr_device *ctlr_dev;
 struct bnx2fc_interface *interface;
if (!interface) {
    printk(KERN_ERR PFX "bnx2fc_interface_create failed\n");
    rc = -ENOMEM;
    -goto ifput_err;
+goto netdev_err;
}

if (is_vlan_dev(netdev)) {
    --- linux-4.15.0.orig/drivers/scsi/bnx2fc/bnx2fc_hwi.c
+++ linux-4.15.0/drivers/scsi/bnx2fc/bnx2fc_hwi.c
@@ -830,7 +830,7 @@
((u64)err_entry->data.err_warn_bitmap_hi << 32) |
(u64)err_entry->data.err_warn_bitmap_lo;
for (i = 0; i < BNX2FC_NUM_ERR_BITS; i++) {
    -if (err_warn_bit_map & (u64) (1 << i)) {
    +#if (err_warn_bit_map & ((u64)1 << i)) {
        err_warn = i;
        break;
    }
    --- linux-4.15.0.orig/drivers/scsi/bnx2fc/bnx2fc_io.c
+++ linux-4.15.0/drivers/scsi/bnx2fc/bnx2fc_io.c
@@ -240,6 +240,7 @@
    return NULL;
}
+cmgr->hba = hba;
    cmgr->free_list = kzalloc(sizeof(*cmgr->free_list) *
        arr_sz, GFP_KERNEL);
    if (!cmgr->free_list) {
        @@ -256,7 +257,6 @@
            goto mem_err;
        }
    -cmgr->hba = hba;
    cmgr->cmds = (struct bnx2fc_cmd **)(cmgr + 1);
    for (i = 0; i < arr_sz; i++) {
        @@ -295,7 +295,7 @@
/* Allocate pool of io_bdts - one for each bnx2fc_cmd */
    mem_size = num_ios * sizeof(struct io_bdt *);
    -cmgr->io_bdt_pool = kmalloc(mem_size, GFP_KERNEL);
+cmgr->io_bdt_pool = kzalloc(mem_size, GFP_KERNEL);
    if (!cmgr->io_bdt_pool) {
        printk(KERN_ERR PFX "failed to alloc io_bdt_pool\n");
        goto mem_err;
        @@ -1218,6 +1218,7 @@

was a result from the ABTS request rather than the CLEANUP request */
set_bit(BNX2FC_FLAG_IO_CLEANUP,&io_req->req_flags);
+rc = FAILED;
goto done;
}

@@ -1889,6 +1890,7 @@
/* we will not receive ABTS response for this IO */
BNX2FC_IO_DBG(io_req, "Timer context finished processing 
"this scsi cmd\n");
+return;
}

/* Cancel the timeout_work, as we received IO completion */
--- linux-4.15.0.orig/drivers/scsi/bnx2i/Kconfig
+++ linux-4.15.0/drivers/scsi/bnx2i/Kconfig
@@ -3,6 +3,7 @@
depends on NET
 depends on PCI
 depends on (IPV6 || IPV6=n)
+depends on MMU
 select SCSI_ISCSI_ATTRS
 select NETDEVICES
 select ETHERNET
--- linux-4.15.0.orig/drivers/scsi/bnx2i/bnx2i_hwi.c
+++ linux-4.15.0/drivers/scsi/bnx2i/bnx2i_hwi.c
@@ -2732,6 +2732,8 @@
BNX2X_DOORBELL_PCI_BAR);
reg_off = (1 << BNX2X_DB_SHIFT) * (cid_num & 0x1FFFF);
ep->qp.ctx_base = ioremap_nocache(reg_base + reg_off, 4);
+if (!ep->qp.ctx_base)
+return -ENOMEM;
goto arm_cq;
}

--- linux-4.15.0.orig/drivers/scsi/bnx2i/bnx2i_iscsi.c
+++ linux-4.15.0/drivers/scsi/bnx2i/bnx2i_iscsi.c
@@ -793,7 +793,7 @@
return NULL;
shost->dma_boundary = cnic->pcidev->dma_mask;
shost->transportt = bnx2i_scsi_xport_template;
-+shost->max_id = ISCSI_MAX_CONNS_PER_HBA;
+shost->max_id = ISCSI_MAX_CONNS_PER_HBA - 1;
shost->max_channel = 0;
shost->max_lun = 512;
shost->max_cmd_len = 16;
@@ -915,12 +915,12 @@
INIT_LIST_HEAD(&hba->ep_ofld_list);
INIT_LIST_HEAD(&hba->ep_active_list);
INIT_LIST_HEAD(&hba->ep_destroy_list);
-pci_dev_put(hba->pcidev);

if (hba->regview) {
pci_iounmap(hba->pcidev, hba->regview);
hba->regview = NULL;
}
+pci_dev_put(hba->pcidev);
bnx2i_free_mp_bdt(hba);
bnx2i_release_free_cid_queue(hba);
iscsi_host_free(shost);
--- linux-4.15.0.orig/drivers/scsi/ch.c
+++ linux-4.15.0/drivers/scsi/ch.c
@@ -578,7 +578,6 @@
 scsi_changer *ch = file->private_data;

 scsi_device_put(ch->device);
-ch->device = NULL;
file->private_data = NULL;
kref_put(&ch->ref, ch_destroy);
return 0;
--- linux-4.15.0.orig/drivers/scsi/csiostor/csio_attr.c
+++ linux-4.15.0/drivers/scsi/csiostor/csio_attr.c
@@ -582,12 +582,12 @@
 }

fc_vport_set_state(fc_vport, FC_VPORT_INITIALIZING);
+In->fc_vport = fc_vport;

if (csio_fcoe_alloc_vnp(hw, ln))
goto error;

*(struct csio_inode **)fc_vport->dd_data = ln;
-ln->fc_vport = fc_vport;
if (!fc_vport->node_name)
fc_vport->node_name = wwn_to_u64(csio_ln_wwnn(ln));
if (!fc_vport->port_name)
--- linux-4.15.0.orig/drivers/scsi/csiostor/csio_hw.c
+++ linux-4.15.0/drivers/scsi/csiostor/csio_hw.c
@@ -1997,7 +1997,7 @@
 FW_HDR_FW_VER_MICRO_G(c), FW_HDR_FW_VER_BUILD_G(c),
 FW_HDR_FW_VER_MAJOR_G(k), FW_HDR_FW_VER_MINOR_G(k),
 FW_HDR_FW_VER_MICRO_G(k), FW_HDR_FW_VER_BUILD_G(k));
-ret = EINVAL;
+ret = -EINVAL;
goto bye;
/*
- * Returns -EINVAL if attempts to flash the firmware failed
- * else returns 0,
+ * Returns -EINVAL if attempts to flash the firmware failed,
+ * -ENOMEM if memory allocation failed else returns 0,
- * if flashing was not attempted because the card had the
- * latest firmware ECANCELED is returned
*/
return -EINVAL;
}

/+* allocate memory to read the header of the firmware on the
+ * card
+ */
+card_fw = kmalloc(sizeof(*card_fw), GFP_KERNEL);
+if (!card_fw)
+return -ENOMEM;
+
if (csio_is_t5(pci_dev->device & CSIO_HW_CHIP_MASK))
fw_bin_file = FW_FNAME_T5;
else
@@ -2052,11 +2059,6 @@
fw_size = fw->size;
}

-/* allocate memory to read the header of the firmware on the
- * card
- */
-card_fw = kmalloc(sizeof(*card_fw), GFP_KERNEL);
-
/* upgrade FW logic */
ret = csio_hw_prep_fw(hw, fw_info, fw_data, fw_size, card_fw,
 hw->fw_state, reset);
--- linux-4.15.0.orig/drivers/scsi/csiostor/csio_init.c
+++ linux-4.15.0/drivers/scsi/csiostor/csio_init.c
@@ -649,7 +649,7 @@
if (csio_lnode_init(ln, hw, pln))
goto err_shost_put;

-if (scsi_add_host(shost, dev))
+if (scsi_add_host_with_dma(shost, dev, &hw->pdev->dev))
goto err_lnode_exit;
return ln;
@@ -1263,3 +1263,4 @@
MODULE_VERSION(CSIO_DRV_VERSION);
MODULE_FIRMWARE(FW_FNAME_T5);
MODULE_FIRMWARE(FW_FNAME_T6);
+MODULE_SOFTDEP("pre: cxgb4");
--- linux-4.15.0.orig/drivers/scsi/csiostor/csio_lnode.c
+++ linux-4.15.0/drivers/scsi/csiostor/csio_lnode.c
@@ -301,6 +301,7 @@
         struct fc_fdmi_port_name *port_name;
         uint8_t buf[64];
         uint8_t *fc4_type;
+       unsigned long flags;

         if (fdmi_req->wr_status != FW_SUCCESS) {
           csio_ln_dbg(ln, "WR error:%x in processing fdmi rhba cmd\n",
@@ -377,13 +378,13 @@
         len = (uint32_t)(pld - (uint8_t *)cmd);

         /* Submit FDMI RPA request */
-        spin_lock_irq(&hw->lock);
+        spin_lock_irqsave(&hw->lock, flags);
         if (csio_ln_mgmt_submit_req(fdmi_req, csio_ln_fdmi_done,
            FCOE_CT, &fdmi_req->dma_buf, len)) {
           CSIO_INC_STATS(ln, n_fdmi_err);
           csio_ln_dbg(ln, "Failed to issue fdmi rpa req\n");
         }
-        spin_unlock_irq(&hw->lock);
+        spin_unlock_irqrestore(&hw->lock, flags);
         }

         /*
@@ -404,6 +405,7 @@
         struct fc_fdmi_rpl *reg_pl;
         struct fs_fdmi_attrs *attrib_blk;
         uint8_t buf[64];
+       unsigned long flags;

         if (fdmi_req->wr_status != FW_SUCCESS) {
           csio_ln_dbg(ln, "WR error:%x in processing fdmi dprt cmd\n",
@@ -483,13 +485,13 @@
         attrib_blk->numattrs = htonl(numattrs);

         /* Submit FDMI RHBA request */
-        spin_lock_irq(&hw->lock);
+        spin_lock_irqsave(&hw->lock, flags);
         if (csio_ln_mgmt_submit_req(fdmi_req, csio_ln_fdmi_rhba_cbf,}
FCOE_CT, &(fdmi_req->dma_buf, len))
    } CSIO_INC_STATS(ln, n_fdmi_err);
csio_ln_dbg(ln, "Failed to issue fdmi rhba req\n");
} -spin_unlock_irq(&hw->lock);
+spin_unlock_irqrestore(&hw->lock, flags);
}

/* @ @ -504,6 +506,7 @ @
void *cmd;
struct fc_fdmi_port_name *port_name;
uint32_t len;
+unsigned long flags;

if (fdmi_req->wr_status != FW_SUCCESS) {
    csio_ln_dbg(ln, "WR error:%x in processing fdmi dhba cmd\n",
        @ @ -534,13 +537,13 @ @
    len += sizeof(*port_name);

    /* Submit FDMI request */
    -spin_lock_irq(&hw->lock);
    +spin_lock_irqsave(&hw->lock, flags);
    if (csio_ln_mgmt_submit_req(fdmi_req, csio_ln_fdmi_dprt_cbfn,
            FCOE_CT, &fdmi_req->dma_buf, len))
        } CSIO_INC_STATS(ln, n_fdmi_err);
csio_ln_dbg(ln, "Failed to issue fdmi dprt req\n");
} -spin_unlock_irq(&hw->lock);
+spin_unlock_irqrestore(&hw->lock, flags);
}

/**
--- linux-4.15.0.orig/drivers/scsi/csiostor/csio_scsi.c
+++ linux-4.15.0/drivers/scsi/csiostor/csio_scsi.c
@@ -1383,7 +1383,7 @@
    return -EINVAL;

    /* Delete NPIV lnodes */
    - csio_lnodes_exit(hw, 1);
    +csio_lnodes_exit(hw, 1);

    /* Block upper IOs */
csio_lnodes_block_request(hw);
    @ @ -1713,8 +1713,11 @ @
}

out:
if (req->nsge > 0) {
    scsi_dma_unmap(cmnd);
    if (req->dcopy && (host_status == DID_OK))
        host_status = csio_scsi_copy_to_sgl(hw, req);
}

cmnd->result = (((host_status) << 16) | scsi_status);
cmnd->scsi_done(cmnd);

--- linux-4.15.0.orig/drivers/scsi/cxgbi/cxgb3i/cxgb3i.c
+++ linux-4.15.0/drivers/scsi/cxgbi/cxgb3i/cxgb3i.c
@@ -1144,7 +1144,7 @@
}

static int ddp_setup_conn_pgidx(struct cxgbi_sock *csk,
    unsigned int tid, int pg_idx, bool reply)
+unsigned int tid, int pg_idx)
{
    struct sk_buff *skb = alloc_wr(sizeof(struct cpl_set_tcb_field), 0,
        GFP_KERNEL);
@@ -1160,7 +1160,7 @@
        req = (struct cpl_set_tcb_field *)skb->head;
        req->wr.wr_hi = htonl(V_WR_OP(FW_WROPCODE_FORWARD));
        OPCODE_TID(req) = htonl(MK_OPCODE_TID(CPL_SET_TCB_FIELD, tid));
        -req->reply = V_NO_REPLY(reply ? 0 : 1);
+req->reply = V_NO_REPLY(1);
        req->cpu_idx = 0;
        req->word = htons(31);
        req->mask = cpu_to_be64(0xF0000000);
@@ -1177,11 +1177,10 @@
* @tid: connection id
* @hcrc: header digest enabled
* @dcrc: data digest enabled
- * @reply: request reply from h/w
+ set up the iscsi digest settings for a connection identified by tid
*/
static int ddp_setup_conn_digest(struct cxgbi_sock *csk, unsigned int tid,
    int hcrc, int dcrc, int reply)
+int hcrc, int dcrc)
{
    struct sk_buff *skb = alloc_wr(sizeof(struct cpl_set_tcb_field), 0,
        GFP_KERNEL);
@@ -1197,7 +1196,7 @@
        req = (struct cpl_set_tcb_field *)skb->head;
        req->wr.wr_hi = htonl(V_WR_OP(FW_WROPCODE_FORWARD));
        OPCODE_TID(req) = htonl(MK_OPCODE_TID(CPL_SET_TCB_FIELD, tid));
        -req->reply = V_NO_REPLY(reply ? 0 : 1);
+req->reply = V_NO_REPLY(1);
req->cpu_idx = 0;
req->word = htons(31);
req->mask = cpu_to_be64(0x0F000000);
--- linux-4.15.0.orig/drivers/scsi/cxgbi/cxgb4i/cxgb4i.c
+++ linux-4.15.0/drivers/scsi/cxgbi/cxgb4i/cxgb4i.c
@@ -1517,16 +1517,22 @@
 struct cxgbi_sock *csk;

 csk = lookup_tid(t, tid);
-if (!csk)
+if (!csk) {
 pr_err("can't find conn. for tid \%u\n", tid);
+return;
 +}

 log_debug(1 << CXGBI_DBG_TOE | 1 << CXGBI_DBG SOCK,
 "csk 0x%p,%u,%lx,%u, status 0x%\n", csk, csk->state, csk->flags, csk->tid, rpl->status);

-if (rpl->status != CPL_ERR_NONE)
+if (rpl->status != CPL_ERR_NONE) {
 pr_err("csk 0x%p,%u, SET_TCB_RPL status %u\n", csk, tid, rpl->status);
+csk->err = -EINVAL;
 +}
+complete(&csk->cmpl);

 __kfree_skb(skb);
 }
@@ -1903,7 +1909,7 @@
 }

 static int ddp_setup_conn_pgidx(struct cxgbi_sock *csk, unsigned int tid,
- int pg_idx, bool reply)
+ int pg_idx)
{
 struct sk_buff *skb;
 struct cpl_set_tcb_field *req;
@@ -1919,7 +1925,7 @@
 req = (struct cpl_set_tcb_field *)skb->head;
 INIT_TP_WR(req, csk->tid);
 OPCODE_TID(req) = htonl(MK_OPCODE_TID(CPL_SET_TCB_FIELD, csk->tid));
-req->reply_ctrl = htons(NO_REPLY_V(reply) | QUEUENO_V(csk->rss_qid));
+req->reply_ctrl = htons(NO_REPLY_V(0) | QUEUENO_V(csk->rss_qid));
 req->word_cookie = htons(0);
 req->val = cpu_to_be64(pg_idx << 8);
 req->cpu_idx = 0;
req->word = htons(31);
req->mask = cpu_to_be64(0x0F000000);
log_debug(1 << CXGBI_DBG_TOE | 1 << CXGBI_DBG_SOCK, "csk 0x%p, tid 0x%x, pg_idx %u.%u", csk, csk->tid, pg_idx);

+reinit_completion(&csk->cmpl);
cxgb4_ofld_send(csk->cdev->ports[csk->port_id], skb);
-return 0;
+wait_for_completion(&csk->cmpl);
+
+return csk->err;
}

static int ddp_setup_conn_digest(struct cxgbi_sock *csk, unsigned int tid,
- int hcrc, int dcrc, int reply)
+ int hcrc, int dcrc)
{
 struct sk_buff *skb;
 struct cpl_set_tcb_field *req;
 @@ -1951,7 +1960,7 @@
 req = (struct cpl_set_tcb_field *)skb->head;
 INIT_TP_WR(req, tid);
 OPCODE_TID(req) = htonl(MK_OPCODE_TID(CPL_SET_TCB_FIELD, tid));
 -req->reply_ctrl = htons(NO_REPLY_V(reply) | QUEUENO_V(csk->rss_qid));
+req->reply_ctrl = htons(NO_REPLY_V(0) | QUEUENO_V(csk->rss_qid));
 req->word_cookie = htons(0);
 req->mask = cpu_to_be64(0x3 << 4);
 req->val = cpu_to_be64(((hcrc ? ULP_CRC_HEADER : 0) |
@@ -1961,8 +1970,11 @@
 log_debug(1 << CXGBI_DBG_TOE | 1 << CXGBI_DBG_SOCK, "csk 0x%p, tid 0x%x, crc %d,%d.%u", csk, csk->tid, hcrc, dcrc);

+reinit_completion(&csk->cmpl);
cxgb4_ofld_send(csk->cdev->ports[csk->port_id], skb);
-return 0;
+wait_for_completion(&csk->cmpl);
+
+return csk->err;
}

static struct cxgbi_ppm *cdev2ppm(struct cxgbi_device *cdev)
--- linux-4.15.0.orig/drivers/scsi/cxgbi/libcxgbi.c
+++ linux-4.15.0/drivers/scsi/cxgbi/libcxgbi.c
@@ -121,7 +121,8 @@
 "cdev 0x%p, p# %u.%u", cdev, cdev->nports);
cxgbi_hbas_remove(cdev);
cxgbi_device_portmap_cleanup(cdev);
-<cxgbi_ppm_release(cdev->cdev2ppm(cdev));
+if (cdev->cdev2ppm)
+cxgbi_ppm_release(cdev->cdev2ppm(cdev));
if (cdev->pmap.max_connect)
cxgbi_free_big_mem(cdev->pmap.port_csk);
kfree(cdev);
@@ -338,7 +339,7 @@
EXPORT_SYMBOL_GPL(cxgbi_hbas_remove);

int cxgbi_hbas_add(struct cxgbi_device *cdev, u64 max_lun,
-unsigned int max_id, struct scsi_host_template *sht,
+unsigned int max_conns, struct scsi_host_template *sht,
struct scsi_transport_template *stt)
{
 struct cxgbi_hba *chba;
@@ -358,7 +359,7 @@
 shost->transportt = stt;
 shost->max_lun = max_lun;
- shost->max_id = max_id;
+ shost->max_id = max_conns - 1;
 shost->max_channel = 0;
 shost->max_cmd_len = 16;

@@ -573,6 +574,7 @@
 skb_queue_head_init(&csk->receive_queue);
 skb_queue_head_init(&csk->write_queue);
 timer_setup(&csk->retry_timer, NULL, 0);
+init_completion(&csk->cmpl);
 rwlock_init(&csk->callback_lock);
 csk->cdev = cdev;
csk->flags = 0;
@@ -640,6 +642,10 @@
 if (ndev->flags & IFF_LOOPBACK) {
 ndev = ip_dev_find(&init_net, daddr->sin_addr.s_addr);
+if (!ndev) {
+ err = -ENETUNREACH;
+ goto rel_neigh;
+ }
 mtu = ndev->mtu;
 pr_info("rt dev %s, loopback -> %s, mtu %u\n", 
 n->dev->name, ndev->name, mtu);
@@ -2252,14 +2258,14 @@
 if (!err &
 conn->hdrdgst_en)
 err = csk->cdev->csk_ddp_setup_digest(csk, csk->tid,
 conn->hdrdgst_en,
 -conn->datadgst_en, 0);
+conn->datadgst_en);
 break;
case ISCSI_PARAM_DATADGST_EN:
    err = iscsi_set_param(cls_conn, param, buf, buflen);
    if (!err && conn->datadgst_en)
        err = csk->cdev->csk_ddp_setup_digest(csk, csk->tid,
                                                csk->hdrdgst_en,
                                                conn->datadgst_en, 0);
    break;

case ISCSI_PARAM_MAX_R2T:
    return iscsi_tcp_set_max_r2t(conn, buf);

ppm = csk->cdev->cdev2ppm(csk->cdev);
err = csk->cdev->csk_ddp_setup_pgidx(csk, csk->tid,
    ppm->tformat.pgsz_idx_dflt, 0);  
    ppm->tformat.pgsz_idx_dflt);
if (err < 0)
    return err;

--- linux-4.15.0.orig/drivers/scsi/cxgbi/libcxgbi.h
+++ linux-4.15.0/drivers/scsi/cxgbi/libcxgbi.h
@@ -146,6 +146,7 @@
    struct sk_buff_head receive_queue;
    struct sk_buff_head write_queue;
    struct timer_list retry_timer;
    struct completion cmpl;
    int err;
    rwlock_t callback_lock;
    void *user_data;
@@ -487,9 +488,9 @@
    struct cxgbi_ppm *,
    struct cxgbi_task_tag_info *);
    int (*csk_ddp_setup_digest)(struct cxgbi_sock *
    unsigned int, int, int, int);
    + unsigned int, int, int);
    int (*csk_ddp_setup_pgidx)(struct cxgbi_sock *
        unsigned int, int, bool);
    + unsigned int, int);

    void (*csk_release_offload_resources)(struct cxgbi_sock *);
    int (*csk_rx_pdu_ready)(struct cxgbi_sock *, struct sk_buff *);
--- linux-4.15.0.orig/drivers/cxlflash/Kconfig
+++ linux-4.15.0/drivers/cxlflash/Kconfig
@@ -4,7 +4,7 @@
    config CXLFLASH
        tristate "Support for IBM CAPI Flash"
        -depends on PCI && SCSI && CXL && EEH

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depends on PCI && SCSI && CXL && OCXL && EEH
select IRQ_POLL
default m
help
--- linux-4.15.0.orig/drivers/scsi/cxlflash/Makefile
+++ linux-4.15.0/drivers/scsi/cxlflash/Makefile
@@ -1,2 +1,2 @@
obj-$(CONFIG_CXLFLASH) += cxlflash.o
-cxlflash-y += main.o superpipe.o lunmg.o vlun.o
+cxlflash-y += main.o superpipe.o lunmg.o vlun.o cxl_hw.o ocxl_hw.o
--- linux-4.15.0.orig/drivers/scsi/cxlflash/backend.h
+++ linux-4.15.0/drivers/scsi/cxlflash/backend.h
@@ -0,0 +1,47 @@
+/*
+ * CXL Flash Device Driver
+ *
+ * Written by: Matthew R. Ochs <mrochs@linux.vnet.ibm.com>, IBM Corporation
+ * Uma Krishnan <ukrishan@linux.vnet.ibm.com>, IBM Corporation
+ *
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+ *
+ * This program is free software; you can redistribute it and/or
+ * modify it under the terms of the GNU General Public License
+ * as published by the Free Software Foundation; either version
+ * 2 of the License, or (at your option) any later version.
+ */
+
+extern const struct cxlflash_backend_ops cxlflash_cxl_ops;
+extern const struct cxlflash_backend_ops cxlflash_ocxl_ops;
+
+struct cxlflash_backend_ops {
+struct module *module;
+void __iomem * (*psa_map)(void *ctx_cookie);
+void (*psa_unmap)(void __iomem *addr);
+int (*process_element)(void *ctx_cookie);
+int (*map_afu_irq)(void *ctx_cookie, int num, irq_handler_t handler,
+                    void *cookie, char *name);
+int (*unmap_afu_irq)(void *ctx_cookie, int num, void *cookie);
+u64 (*get_irq_objhndl)(void *ctx_cookie, int irq);
+int (*start_context)(void *ctx_cookie);
+int (*stop_context)(void *ctx_cookie);
+int (*afu_reset)(void *ctx_cookie);
+void (*set_master)(void *ctx_cookie);
+void (*get_context)(struct pci_dev *dev, void *afu_cookie);
+void (*dev_context_init)(struct pci_dev *dev, void *afu_cookie);
+int (*release_context)(void *ctx_cookie);
+void (*perst_reloads_same_image)(void *afu_cookie, bool image);
+size_t (*read_adapter_vpd)(struct pci_dev *dev, void *buf,
+ size_t count);
+int (*allocate_afu_irqs)(void *ctx_cookie, int num);
+void (*free_afu_irqs)(void *ctx_cookie);
+void (*create_afu)(struct pci_dev *dev);
+void (*destroy_afu)(void *afu_cookie);
+struct file * (*get_fd)(void *ctx_cookie, struct file_operations *fops,
+int *fd);
+void * (*fops_get_context)(struct file *file);
+int (*start_work)(void *ctx_cookie, u64 irqs);
+int (*fd_mmap)(struct file *file, struct vm_area_struct *vm);
+int (*fd_release)(struct inode *inode, struct file *file);
+};
--- linux-4.15.0.orig/drivers/scsi/cxlflash/common.h
+++ linux-4.15.0/drivers/scsi/cxlflash/common.h
@@ -25,6 +25,8 @@
#include <scsi/scsi_cmnd.h>
#include <scsi/scsi_device.h>
+#include "backend.h"
+
extern const struct file_operations cxlflash_cxl_fops;

#define MAX_CONTEXT CXLFLASH_MAX_CONTEXT/* num contexts per afu */
@@ -114,6 +116,7 @@
struct cxlflash_cfg {
 struct afu *afu;
+const struct cxlflash_backend_ops *ops;
 struct pci_dev *dev;
 struct pci_device_id *dev_id;
 struct Scsi_Host *host;
@@ -203,12 +206,12 @@
 * fields after this point
 */
 struct afu *afu;
-struct cxl_afu *cxl_afu;
+void *afu_cookie;

 atomic_t recovery_threads;
 struct mutex ctx_recovery_mutex;
@@ -203,12 +206,12 @@
 * fields after this point
 */
 struct afu *afu;
-struct cxl_context *ctx;
-struct cxl_ioctl_start_work work;
+void *ctx_cookie;
 struct sisl_host_map __iomem *host_map;/* MC host map */
struct sisl_ctrl_map __iomem *ctrl_map;/* MC control map */
ctx_hdl_t ctx_hdl;/* master's context handle */
uint32_t index;/* Index of this hwq */
+int num_irqs;/* Number of requests requested for context */
struct list_head pending_cmds;/* Commands pending completion */

atomic_t hsq_credits;
@@ -221,6 +224,7 @@
u64 *hrrq_end;
u64 *hrrq_curr;
bool toggle;
+bool hrrq_online;

s64 room;
@@ -229,8 +233,8 @@
struct afu {
 struct hwq hwqs[CXLFLASH_MAX_HWQS];
-+int (*send_cmd)(struct afu *, struct afu_cmd *);
-+int (*context_reset)(struct hwq *);
+int (*send_cmd)(struct afu *afu, struct afu_cmd *cmd);
+int (*context_reset)(struct hwq *hwq);

 /* AFU HW */
 struct cxlflash_afu_map __iomem *afu_map;/* entire MMIO map */
@@ -270,6 +274,11 @@
 return afu_cap & cap;
 }
+
+static inline bool afu_is_ocxl_lisn(struct afu *afu)
+{
+return afu_has_cap(afu, SISL_INTVER_CAP_OCXL_LISN);
+}
+
+static inline bool afu_is_afu_debug(struct afu *afu)
+
+return afu_has_cap(afu, SISL_INTVER_CAP_AFU_DEBUG);

--- linux-4.15.0.orig/drivers/scsi/cxlflash/cxl_hw.c
+++ linux-4.15.0/drivers/scsi/cxlflash/cxl_hw.c
@@ -0,0 +1,181 @@
+/*
+ * CXL Flash Device Driver
+ * Written by: Matthew R. Ochs <mrochs@linux.vnet.ibm.com>, IBM Corporation
+ * Uma Krishnan <ukrishn@linux.vnet.ibm.com>, IBM Corporation
+ * Copyright (C) 2018 IBM Corporation

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#include <misc/cxl.h>
#include "backend.h"

/* The following routines map the cxlflash backend operations to existing CXL kernel API function and are largely simple shims that provide an abstraction for converting generic context and AFU cookies into cxl_context or cxl_afu pointers.
 */

static void __iomem *cxlflash_psa_map(void *ctx_cookie)
{
    return cxl_psa_map(ctx_cookie);
}

static void cxlflash_psa_unmap(void __iomem *addr)
{
    cxl_psa_unmap(addr);
}

static int cxlflash_process_element(void *ctx_cookie)
{
    return cxl_process_element(ctx_cookie);
}

static int cxlflash_map_afu_irq(void *ctx_cookie, int num,
    irq_handler_t handler, void *cookie, char *name)
{
    return cxl_map_afu_irq(ctx_cookie, num, handler, cookie, name);
}

static void cxlflash_unmap_afu_irq(void *ctx_cookie, int num, void *cookie)
{
    cxl_unmap_afu_irq(ctx_cookie, num, cookie);
}

static u64 cxlflash_get_irq_objhndl(void *ctx_cookie, int irq)
{
    /* Dummy fop for cxl */
    return 0;
static int cxlflash_start_context(void *ctx_cookie)
{
    return cxl_start_context(ctx_cookie, 0, NULL);
}

static int cxlflash_stop_context(void *ctx_cookie)
{
    return cxl_stop_context(ctx_cookie);
}

static int cxlflash_afu_reset(void *ctx_cookie)
{
    return cxl_afu_reset(ctx_cookie);
}

static void cxlflash_set_master(void *ctx_cookie)
{
    cxl_set_master(ctx_cookie);
}

static void *cxlflash_get_context(struct pci_dev *dev, void *afu_cookie)
{
    return cxl_get_context(dev);
}

static void *cxlflash_dev_context_init(struct pci_dev *dev, void *afu_cookie)
{
    return cxl_dev_context_init(dev);
}

static int cxlflash_release_context(void *ctx_cookie)
{
    return cxl_release_context(ctx_cookie);
}

static void cxlflash_perst_reloads_same_image(void *afu_cookie, bool image)
{
    cxl_perst_reloads_same_image(afu_cookie, image);
}

static ssize_t cxlflash_read_adapter_vpd(struct pci_dev *dev,
					 void *buf, size_t count)
{
    return cxl_read_adapter_vpd(dev, buf, count);
}
+static int cxlflash_allocate_afu_irqs(void *ctx_cookie, int num)
+{
+    return cxl_allocate_afu_irqs(ctx_cookie, num);
+}
+
+static void cxlflash_free_afu_irqs(void *ctx_cookie)
+{
+    cxl_free_afu_irqs(ctx_cookie);
+}
+
+static void *cxlflash_create_afu(struct pci_dev *dev)
+{
+    return cxl_pci_to_afu(dev);
+}
+
+static void cxlflash_destroy_afu(void *afu)
+{
+    /* Dummy fop for cxl */
+}
+
+static struct file *cxlflash_get_fd(void *ctx_cookie,
+    struct file_operations *fops, int *fd)
+{
+    return cxl_get_fd(ctx_cookie, fops, fd);
+}
+
+static void *cxlflash_fops_get_context(struct file *file)
+{
+    return cxl_fops_get_context(file);
+}
+
+static int cxlflash_start_work(void *ctx_cookie, u64 irqs)
+{
+    struct cxl_ioctl_start_work work = { 0 };
+    work.num_interrupts = irqs;
+    work.flags = CXL_START_WORK_NUM_IRQS;
+    return cxl_start_work(ctx_cookie, &work);
+}
+
+static int cxlflash_fd_mmap(struct file *file, struct vm_area_struct *vm)
+{
+    return cxl_fd_mmap(file, vm);
+}
+
+static int cxlflash_fd_release(struct inode *inode, struct file *file)
+{
+return cxl_fd_release(inode, file);
+
+const struct cxlflash_backend_ops cxlflash_cxl_ops = {
+    .module= THIS_MODULE,
+    .psa_map= cxlflash_psa_map,
+    .psa_unmap= cxlflash_psa_unmap,
+    .process_element= cxlflash_process_element,
+    .map_afu_irq= cxlflash_map_afu_irq,
+    .unmap_afu_irq= cxlflash_unmap_afu_irq,
+    .get_irq_objhdl= cxlflash_get_irq_objhdl,
+    .start_context= cxlflash_start_context,
+    .stop_context= cxlflash_stop_context,
+    .afu_reset= cxlflash_afu_reset,
+    .set_master= cxlflash_set_master,
+    .get_context= cxlflash_get_context,
+    .dev_context_init= cxlflash_dev_context_init,
+    .release_context= cxlflash_release_context,
+    .perst_reloads_same_image = cxlflash_perst_reloads_same_image,
+    .read_adapter_vpd= cxlflash_read_adapter_vpd,
+    .allocate_afu_irqs= cxlflash_allocate_afu_irqs,
+    .create_afu= cxlflash_create_afu,
+    .destroy_afu= cxlflash_destroy_afu,
+    .get_fd= cxlflash_get_fd,
+    .fops_get_context= cxlflash_fops_get_context,
+    .start_work= cxlflash_start_work,
+    .fd_mmap= cxlflash_fd_mmap,
+    .fd_release= cxlflash_fd_release,
+
};

--- linux-4.15.0.orig/drivers/scsi/cxlflash/main.c
+++ linux-4.15.0/drivers/scsi/cxlflash/main.c
@@ -473,6 +473,7 @@
     struct afu_cmd *cmd = NULL;
     struct device *dev = &cfg->dev->dev;
     struct hwq *hwq = get_hwq(afu, PRIMARY_HWQ);
+    bool needs_deletion = false;
     char *buf = NULL;
     ulong lock_flags;
     int rc = 0;
@@ -527,6 +528,7 @@
         if (!to) {
             dev_err(dev, "%s: TMF timed out\n", __func__);  
             rc = -ETIMEDOUT;
+            needs_deletion = true;
         } else if (cmd->cmd_aborted) {
             dev_err(dev, "%s: TMF aborted\n", __func__);  
             rc = -EAGAIN;
@@ -537,6 +539,12 @@
 } 
 cfg->tmf_active = false; 
 spin_unlock_irqrestore(&cfg->tmf_slock, lock_flags); 
+ if (needs_deletion) {
+ spin_lock_irqsave(&hwq->hsq_slock, lock_flags); 
+ list_del(&cmd->list); 
+ spin_unlock_irqrestore(&hwq->hsq_slock, lock_flags); 
+ } 
 out: 
 kfree(buf); 
 return rc; 
@@ -620,6 +628,7 @@ 
 cmd->parent = afu; 
 cmd->hwq_index = hwq_index; 
+cmd->sa.ioasc = 0; 
 cmd->rcb.ctx_id = hwq->ctx_hdl; 
 cmd->rcb.msi = SISL_MSI_RRQ_UPDATED; 
 cmd->rcb.port_sel = CHAN2PORTMASK(scp->device->channel); 
@@ -710,7 +719,7 @@ 
 } if (likely(afu->afu_map)) {
- cxl_psa_unmap((void __iomem *)afu->afu_map); 
+ cfg->ops->psa_unmap(afu->afu_map); 
 afu->afu_map = NULL; 
 } 
@@ -738,7 +747,7 @@ 
 hwq = get_hwq(afu, index); 
- if (!hwq->ctx) { 
+ if (!hwq->ctx_cookie) { 
 dev_err(dev, "%s: returning with NULL MC\n", __func__); 
 return; 
} 
@@ -747,13 +756,13 @@ 
 case UNMAP_THREE: 
 /* SISL_MSI_ASYNC_ERROR is setup only for the primary HWQ */ 
 if (index == PRIMARY_HWQ) 
- cxl_unmap_afu_irq(hwq->ctx, 3, hwq); 
+ cfg->ops->unmap_afu_irq(hwq->ctx_cookie, 3, hwq); 
 case UNMAP_TWO: 
- cxl_unmap_afu_irq(hwq->ctx, 2, hwq); 
+ cfg->ops->unmap_afu_irq(hwq->ctx_cookie, 2, hwq); 
"
case UNMAP_ONE:
- cxl_unmap_afu_irq(hwq->ctx, 1, hwq);
+ cfg->ops->unmap_afu_irq(hwq->ctx_cookie, 1, hwq);

case FREE_IRQ:
- cxl_free_afu_irqs(hwq->ctx);
+ cfg->ops->free_afu_irqs(hwq->ctx_cookie);

/* fall through */

case UNDO_NOOP:
/* No action required */
@@ -782,15 +791,19 @@

hwq = get_hwq(afu, index);

-if (!hwq->ctx) {
+if (!hwq->ctx_cookie) {
   dev_err(dev, "%s: returning with NULL MC\n", __func__);
   return;
 }

-WARN_ON(cxl_stop_context(hwq->ctx));
+WARN_ON(cfg->ops->stop_context(hwq->ctx_cookie));

if (index != PRIMARY_HWQ)
-WARN_ON(cxl_release_context(hwq->ctx));
- hwq->ctx = NULL;
+WARN_ON(cfg->ops->release_context(hwq->ctx_cookie));
+ hwq->ctx_cookie = NULL;

+spin_lock_irqsave(&hwq->hrrq_slock, lock_flags);
+ hwq->hrrq_online = false;
+spin_unlock_irqrestore(&hwq->hrrq_slock, lock_flags);

spin_lock_irqsave(&hwq->hsq_slock, lock_flags);
flush_pending_cmds(hwq);
@@ -945,9 +958,9 @@

return;
}

-/* If a Task Management Function is active, wait for it to complete
- before continuing with remove.
- */
- /*
-*/
+/* Yield to running recovery threads before continuing with remove */
+wait_event(cfg->reset_waitq, cfg->state != STATE_RESET &&
+     cfg->state != STATE_PROBING);
+spin_lock_irqsave(&cfg->tmf_lock, lock_flags);
+if (cfg->tmf_active)
+    wait_event_interruptible_lock_irq(cfg->tmf_waitq,
@@ -970,6 +983,7 @@
case INIT_STATE_AFU:
term_afu(cfg);
case INIT_STATE_PCI:
+cfg->ops->destroy_afu(cfg->afu_cookie);
pci_disable_device(pdev);
case INIT_STATE_NONE:
  free_mem(cfg);
  for (i = 0; i < afu->num_hwqs; i++) {
    hwq = get_hwq(afu, i);

    writeq_be(SISL_MSI_SYNC_ERROR, &hwq->host_map->ctx_ctrl);
    reg = readq_be(&hwq->host_map->ctx_ctrl);
    WARN_ON((reg & SISL_CTX_CTRL_LISN_MASK) != 0);
    reg |= SISL_MSI_SYNC_ERROR;
    writeq_be(reg, &hwq->host_map->ctx_ctrl);
  }
spin_lock_irqsave(&hwq->hrrq_slock, hrrq_flags);

/* Silently drop spurious interrupts when queue is not online */
+if (!hwq->hrrq_online) {
  spin_unlock_irqrestore(&hwq->hrrq_slock, hrrq_flags);
  return IRQ_HANDLED;
+
if (afu_is_irqpoll_enabled(afu)) {
  irq_poll_sched(&hwq->irqpoll);
  spin_unlock_irqrestore(&hwq->hrrq_slock, hrrq_flags);
}

/**
 - * start_context() - starts the master context
 - * @cfg: Internal structure associated with the host.
 - * @index: Index of the hardware queue.
 - *
 - * Return: A success or failure value from CXL services.
 - */
static int start_context(struct cxlflash_cfg *cfg, u32 index)
-
-struct device *dev = &cfg->dev->dev;
-struct hwq *hwq = get_hwq(cfg->afu, index);
-int rc = 0;
-
-rc = cxl_start_context(hwq->ctx,
- hwq->work.work_element_descriptor,
- NULL);
-
-dev_dbg(dev, "%s: returning rc=%ld\n", __func__, rc);
-return rc;
-}
-
-/**
 * read_vpd() - obtains the WWPNs from VPD
 * @cfg:	Internal structure associated with the host.
 * @wwpn:	Array of size MAX_FC_PORTS to pass back WWPNs
 const char *wwpn_vpd_tags[MAX_FC_PORTS] = { "V5", "V6", "V7", "V8" };

 /* Get the VPD data from the device */
-vpd_size = cxl_read_adapter_vpd(pdev, vpd_data, sizeof(vpd_data));
+vpd_size = cfg->ops->read_adapter_vpd(pdev, vpd_data, sizeof(vpd_data));
 if (unlikely(vpd_size <= 0)) {
   dev_err(dev, "%s: Unable to read VPD (size = %ld)\n",
        __func__, vpd_size);
@@ -1732,6 +1734,7 @@
   struct afu *afu = cfg->afu;
   struct sisl_ctrl_map __iomem *ctrl_map;
   struct hwq *hwq;
+void *cookie;
   int i;

   for (i = 0; i < MAX_CONTEXT; i++) {
@@ -1746,8 +1749,9 @@
     /* Copy frequently used fields into hwq */
     for (i = 0; i < afu->num_hwqs; i++) {
       hwq = get_hwq(afu, i);
+      cookie = hwq->ctx_cookie;
       hwq->ctx_hndl = (u16) cxl_process_element(hwq->ctx);
+hwq->ctx_hndl = (u16) cfg->ops->process_element(cookie);
       hwq->host_map = &afu->afu_map->hosts[hwq->ctx_hndl].host;
       hwq->ctrl_map = &afu->afu_map->ctrls[hwq->ctx_hndl].ctrl;
@@ -1770,6 +1774,8 @@
     u64 wwpn[MAX_FC_PORTS]; /* wwpn of AFU ports */
     int i = 0, num_ports = 0;
     int rc = 0;
+    int j;
+    void *ctx;
     u64 reg;

     rc = read_vpd(cfg, &wwpn[0]);
writeq_be((u64) hwq->hrrq_start, &hmap->rrq_start);
writeq_be((u64) hwq->hrrq_end, &hmap->rrq_end);
+hwq->hrrq_online = true;

if (afu_is_sq_cmd_mode(afu)) {
writeq_be((u64)hwq->hsq_start, &hmap->sq_start);
@@ -1785,6 +1791,7 @@
writeq_be((u64)hwq->hsq_end, &hmap->sq_end);
@@ -1830,6 +1837,25 @@
msleep(100);
}

+if (afu_is_ocxl_lisn(afu)) {
+/* Set up the LISN effective address for each master */
+for (i = 0; i < afu->num_hwqs; i++) {
+hwq = get_hwq(afu, i);
+ctx = hwq->ctx_cookie;
+
+for (j = 0; j < hwq->num_irqs; j++) {
+reg = cfg->ops->get_irq_objhndl(ctx, j);
+writeq_be(reg, &hwq->ctrl_map->lisn_ea[j]);
+
+reg = hwq->ctx_hndl;
+writeq_be(SISL_LISN_PASID(reg, reg),
+ &hwq->ctrl_map->lisn_pasid[0]);
+writeq_be(SISL_LISN_PASID(0UL, reg),
+ &hwq->ctrl_map->lisn_pasid[1]);
+
+
+ /* Set up master's own CTX_CAP to allow real mode, host translation */
+ /* tables, afu cmds and read/write GSCSI cmds. */
+ /* First, unlock ctx_cap write by reading mbox */
@@ -1925,13 +1951,13 @@
struct hwq *hwq)
{
struct device *dev = &cfg->dev->dev;
-struct cxl_context *ctx = hwq->ctx;
+void *ctx = hwq->ctx_cookie;
int rc = 0;
enum undo_level level = UNDO_NOOP;
bool is_primary_hwq = (hwq->index == PRIMARY_HWQ);
-int num_irqs = is_primary_hwq ? 3 : 2;
+int num_irqs = hwq->num_irqs;
-rc = cxl_allocate_afu_irqs(ctx, num_irqs);
+rc = cfg->ops->allocate_afu_irqs(ctx, num_irqs);
if (unlikely(rc)) {
    dev_err(dev, "%s: allocate_afu_irqs failed rc=%d\n", __func__, rc);
    goto out;
}

-rc = cxl_map_afu_irq(ctx, 1, cxlflash_sync_err_irq, hwq,
    "SISL_MSI_SYNC_ERROR");
+rc = cfg->ops->map_afu_irq(ctx, 1, cxlflash_sync_err_irq, hwq,
    "SISL_MSI_SYNC_ERROR");
if (unlikely(rc <= 0)) {
    dev_err(dev, "%s: SISL_MSI_SYNC_ERROR map failed\n", __func__);
    level = FREE_IRQ;
    goto out;
}

-rc = cxl_map_afu_irq(ctx, 2, cxlflash_rrq_irq, hwq,
    "SISL_MSI_RRQ_UPDATED");
+rc = cfg->ops->map_afu_irq(ctx, 2, cxlflash_rrq_irq, hwq,
    "SISL_MSI_RRQ_UPDATED");
if (unlikely(rc <= 0)) {
    dev_err(dev, "%s: SISL_MSI_RRQ_UPDATED map failed\n", __func__);
    level = UNMAP_ONE;
    goto out;
}

if (!is_primary_hwq)
    goto out;

-rc = cxl_map_afu_irq(ctx, 3, cxlflash_async_err_irq, hwq,
    "SISL_MSI_ASYNC_ERROR");
+rc = cfg->ops->map_afu_irq(ctx, 3, cxlflash_async_err_irq, hwq,
    "SISL_MSI_ASYNC_ERROR");
if (unlikely(rc <= 0)) {
    dev_err(dev, "%s: SISL_MSI_ASYNC_ERROR map failed\n", __func__);
    level = UNMAP_TWO;
    goto out;
}

static int init_mc(struct cxlflash_cfg *cfg, u32 index)
{
    struct cxl_context *ctx;
    void *ctx;
    struct device *dev = &cfg->dev->dev;
    struct hwq *hwq = get_hwq(cfg->afu, index);
    int rc = 0;
    +int num_irqs;
    enum undo_level level;

    hwq->afu = cfg->afu;
hwq->index = index;
INIT_LIST_HEAD(&hwq->pending_cmds);

- if (index == PRIMARY_HWQ)
  - ctx = cxl_get_context(cfg->dev);
- else
  - ctx = cxl_dev_context_init(cfg->dev);
- if (unlikely(!ctx)) {
  + if (index == PRIMARY_HWQ) {
    + ctx = cfg->ops->get_context(cfg->dev, cfg->afu_cookie);
    + num_irqs = 3;
  + } else {
    + ctx = cfg->ops->dev_context_init(cfg->dev, cfg->afu_cookie);
    + num_irqs = 2;
  + }
  + if (IS_ERR_OR_NULL(ctx)) {
    rc = -ENOMEM;
    goto err1;
  }
  - WARN_ON(hwq->ctx);
  - hwq->ctx = ctx;
  + WARN_ON(hwq->ctx_cookie);
  + hwq->ctx_cookie = ctx;
  + hwq->num_irqs = num_irqs;

  /* Set it up as a master with the CXL */
  - cxl_set_master(ctx);
  + cfg->ops->set_master(ctx);

  /* Reset AFU when initializing primary context */
  if (index == PRIMARY_HWQ) {
    - rc = cxl_afu_reset(ctx);
    + rc = cfg->ops->afu_reset(ctx);
    if (unlikely(rc)) {
      dev_err(dev, "%%s: AFU reset failed rc=%%d\n",
        __func__, rc);
      @ @ -2020,11 +2051,8 @ @
      goto err2;
    }
  }

  /* This performs the equivalent of the CXL_IOC药业START_WORK. */
  - * The CXL_IOC药业_GET_PROCESS_ELEMENT is implicit in the process
  - * element (pe) that is embedded in the context (ctx)
  - */
  - rc = start_context(cfg, index);
  +/* Finally, activate the context by starting it */
  + rc = cfg->ops->start_context(hwq->ctx_cookie);
if (unlikely(rc)) {
    dev_err(dev, "%s: start context failed rc=%d\n", __func__, rc);
    level = UNMAP_THREE;
    err2:
    term_intr(cfg, level, index);
    if (index != PRIMARY_HWQ)
        cxl_release_context(ctx);
    +cfg->ops->release_context(ctx);
    err1:
    -hwq->ctx = NULL;
    +hwq->ctx_cookie = NULL;
    goto out;
}
#endif

struct hwq *hwq;
int i;
-cxl_perst_reloads_same_image(cfg->cxl_afu, true);
+cfg->ops->perst_reloads_same_image(cfg->afu_cookie, true);

afu->num_hwqs = afu->desired_hwqs;
for (i = 0; i < afu->num_hwqs; i++) {
    /* Map the entire MMIO space of the AFU using the first context */
    hwq = get_hwq(afu, PRIMARY_HWQ);
    -afu->afu_map = cxl_psa_map(hwq->ctx);
    +afu->afu_map = cfg->ops->psa_map(hwq->ctx_cookie);
    if (!afu->afu_map) {
        -dev_err(dev, "%s: cxl_psa_map failed\n", __func__);
        +dev_err(dev, "%s: psa_map failed\n", __func__);
        rc = -ENOMEM;
        goto err1;
    }
}
#endif

/* Map the entire MMIO space of the AFU using the first context */
hwq = get_hwq(afu, PRIMARY_HWQ);
    -afu->afu_map = cxl_psa_map(hwq->ctx);
    +afu->afu_map = cfg->ops->psa_map(hwq->ctx_cookie);
if (!afu->afu_map) {
    -dev_err(dev, "%s: cxl_psa_map failed\n", __func__);
    +dev_err(dev, "%s: psa_map failed\n", __func__);
    rc = -ENOMEM;
    goto err1;
}
#endif
struct device *dev = &cfg->dev->dev;
struct afu_cmd *cmd = NULL;
struct hwq *hwq = get_hwq(afu, PRIMARY_HWQ);
ulong lock_flags;
char *buf = NULL;
int rc = 0;
int nretry = 0;
    -2320,6 +2349,11
    case -ETIMEDOUT:
    rc = afu->context_reset(hwq);
    if (rc) {
/* Delete the command from pending_cmds list */
+spin_lock_irqsave(&hwq->hsq_slock, lock_flags);
+list_del(&cmd->list);
+spin_unlock_irqrestore(&hwq->hsq_slock, lock_flags);
+
+cxlflash_schedule_async_reset(cfg);
break;
}
@@ -3159,7 +3193,8 @@
static struct dev_dependent_vals dev_flash_gt_vals = { CXLFLASH_MAX_SECTORS,
CXLFLASH_NOTIFY_SHUTDOWN };
static struct dev_dependent_vals dev_briard_vals = { CXLFLASH_MAX_SECTORS,
-CXLFLASH_NOTIFY_SHUTDOWN };
+(CXLFLASH_NOTIFY_SHUTDOWN |
+CXLFLASH_OCXL_DEV) };
/

*/
* PCI device binding table
@@ -3659,6 +3694,7 @@
host->max_cmd_len = CXLFLASH_MAX_CDB_LEN;

cfg = shost_priv(host);
+cfg->state = STATE_PROBING;
cfg->host = host;
rc = alloc_mem(cfg);
if (rc) {
@@ -3672,6 +3708,11 @@
cfg->dev = pdev;
cfg->cxl_fops = cxlflash_cxl_fops;
+if (ddv->flags & CXLFLASH_OCXL_DEV)
+cfg->ops = &cxlflash_ocxl_ops;
+else
+cfg->ops = &cxlflash_cxl_ops;
+
/*/  
* Promoted LUNs move to the top of the LUN table. The rest stay on
* the bottom half. The bottom half grows from the end (index = 255),
@@ -3701,8 +3742,6 @@
pci_set_drvdata(pdev, cfg);
-cfg->cxl_afu = cxl_pci_to_afu(pdev);
-
rc = init_pci(cfg);
if (rc) {
  dev_err(dev, "%s: init_pci failed rc=%d\n", __func__, rc);
@@ -3710,6 +3749,13 @@
cfg->init_state = INIT_STATE_PCI;

+cfg->afu_cookie = cfg->ops->create_afu(pdev);
+if (unlikely(!cfg->afu_cookie)) {
+dev_err(dev, "%s: create_afu failed\n", __func__);
+rc = -ENOMEM;
+goto out_remove;
+}
+
+rc = init_afu(cfg);
+if (rc &amp;&amp; !wq_has_sleeper(&amp;cfg-&gt;reset_waitq)) {
+dev_err(dev, "%s: init_afu failed rc=%\d\n", __func__, rc);
+@ @ -3741,6 +3787,7 @@
+return rc;
+
+out_remove:
+cfg-&gt;state = STATE_PROBED;
+cxlflash_remove(pdev);
+goto out;
+
--- linux-4.15.0.orig/drivers/scsi/cxlflash/main.h
+++ linux-4.15.0/drivers/scsi/cxlflash/main.h
@@ -97,6 +97,7 @@
 u64 flags;
 #define CXLFLASH_NOTIFY_SHUTDOWN	0x0000000000000001ULL
 #define CXLFLASH_WWPN_VPD_REQUIRED	0x0000000000000002ULL
+ #define CXLFLASH_OCXL_DEV		0x0000000000000004ULL
};

struct asyc_intr_info {
--- linux-4.15.0.orig/drivers/scsi/cxlflash/ocxl_hw.c
+++ linux-4.15.0/drivers/scsi/cxlflash/ocxl_hw.c
@@ -0,0 +1,1436 @@
+/
+* CXL Flash Device Driver
+*
+* Written by: Matthew R. Ochs <mrochs@linux.vnet.ibm.com>, IBM Corporation
+* Uma Krishnan <ukrishn@linux.vnet.ibm.com>, IBM Corporation
+*
+* Copyright (C) 2018 IBM Corporation
+*
+* This program is free software; you can redistribute it and/or
+* modify it under the terms of the GNU General Public License
+* as published by the Free Software Foundation; either version
+* 2 of the License, or (at your option) any later version.
+* */
+*
#include <linux/file.h>
#include <linux/idr.h>
#include <linux/module.h>
#include <linux/mount.h>
#include <linux/poll.h>
#include <linux/sched/signal.h>

#include <misc/ocxl.h>

#include <uapi/misc/cxl.h>

#include "backend.h"
#include "ocxl_hw.h"

/*
 * Pseudo-filesystem to allocate inodes.
 */

#define OCXLFLASH_FS_MAGIC      0x1697698f

static int ocxlflash_fs_cnt;
static struct vfsmount *ocxlflash_vfs_mount;

static const struct dentry_operations ocxlflash_fs_dops = {
	.d_dname = simple_dname,
};

/*
 * ocxlflash_fs_mount() - mount the pseudo-filesystem
 * @fs_type: File system type.
 * @flags: Flags for the filesystem.
 * @dev_name: Device name associated with the filesystem.
 * @data: Data pointer.
 *
 * Return: pointer to the directory entry structure
 */
static struct dentry *ocxlflash_fs_mount(struct file_system_type *fs_type,
					 int flags, const char *dev_name,
					 void *data)
{
	return mount_pseudo(fs_type, "ocxlflash:", NULL, &ocxlflash_fs_dops,
			    OCXLFLASH_FS_MAGIC);
}

/*
 * @fs_type: File system type.
 * @flags: Flags for the filesystem.
 * @dev_name: Device name associated with the filesystem.
 * @data: Data pointer.
 *
 * Return: pointer to the directory entry structure
 */
static struct dentry *ocxlflash_fs_mount(struct file_system_type *fs_type,
					 int flags, const char *dev_name,
					 void *data)
{
	return mount_pseudo(fs_type, "ocxlflash:", NULL, &ocxlflash_fs_dops,
			    OCXLFLASH_FS_MAGIC);
}

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 * @dev_name: Device name associated with the filesystem.
 * @data: Data pointer.
 *
 * Return: pointer to the directory entry structure
 */
static struct dentry *ocxlflash_fs_mount(struct file_system_type *fs_type,
					 int flags, const char *dev_name,
					 void *data)
{
	return mount_pseudo(fs_type, "ocxlflash:", NULL, &ocxlflash_fs_dops,
			    OCXLFLASH_FS_MAGIC);
}

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 * Return: pointer to the directory entry structure
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static struct dentry *ocxlflash_fs_mount(struct file_system_type *fs_type,
					 int flags, const char *dev_name,
					 void *data)
{
	return mount_pseudo(fs_type, "ocxlflash:", NULL, &ocxlflash_fs_dops,
			    OCXLFLASH_FS_MAGIC);
}

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 * ocxlflash_fs_mount() - mount the pseudo-filesystem
 * @fs_type: File system type.
 * @flags: Flags for the filesystem.
 * @dev_name: Device name associated with the filesystem.
 * @data: Data pointer.
 *
 * Return: pointer to the directory entry structure
 */
static struct dentry *ocxlflash_fs_mount(struct file_system_type *fs_type,
					 int flags, const char *dev_name,
					 void *data)
{
	return mount_pseudo(fs_type, "ocxlflash:", NULL, &ocxlflash_fs_dops,
			    OCXLFLASH_FS_MAGIC);
}
+.kill_sb= kill_anon_super,
+};
+
+/*
+ * ocxlflash_release_mapping() - release the memory mapping
+ * @ctx:Context whose mapping is to be released.
+ */
+static void ocxlflash_release_mapping(struct ocxlflash_context *ctx)
+{
+if (ctx->mapping)
+simple_release_fs(&ocxlflash_vfs_mount, &ocxlflash_fs_cnt);
+ctx->mapping = NULL;
+}
+
+/*
+ * ocxlflash_getfile() - allocate pseudo filesystem, inode, and the file
+ * @dev:Generic device of the host.
+ * @name:Name of the pseudo filesystem.
+ * @fops:File operations.
+ * @priv:Private data.
+ * @flags:Flags for the file.
+ *
+ * Return: pointer to the file on success, ERR_PTR on failure
+ */
+static struct file *ocxlflash_getfile(struct device *dev, const char *name,
+      const struct file_operations *fops,
+      void *priv, int flags)
+{
+struct qstr this;
+struct path path;
+struct file *file;
+struct inode *inode = NULL;
+int rc;
+
+if (fops->owner && !try_module_get(fops->owner)) {
+dev_err(dev, "%s: Owner does not exist\n", __func__);
+rc = -ENOENT;
+goto err1;
+}
+
+rc = simple_pin_fs(&ocxlflash_fs_type, &ocxlflash_vfs_mount,
+           &ocxlflash_fs_cnt);
+if (unlikely(rc < 0)) {
+dev_err(dev, "%s: Cannot mount ocxlflash pseudofs rc=%d\n",
+          __func__, rc);
+goto err2;
+}
inode = alloc_anon_inode(ocxlflash_vfs_mount->mnt_sb);
+if (IS_ERR(inode)) {
+rc = PTR_ERR(inode);
+dev_err(dev, "%s: alloc_anon_inode failed rc=%d\n",
+__func__, rc);
+goto err3;
+
+this.name = name;
+this.len = strlen(name);
+this.hash = 0;
+path.dentry = d_alloc_pseudo(ocxlflash_vfs_mount->mnt_sb, &this);
+if (!path.dentry) {
+dev_err(dev, "%s: d_alloc_pseudo failed\n", __func__);
+rc = -ENOMEM;
+goto err4;
+
+path.mnt = mntget(ocxlflash_vfs_mount);
+d_instantiate(path.dentry, inode);
+
+file = alloc_file(&path, OPEN_FMODE(flags), fops);
+if (IS_ERR(file)) {
+rc = PTR_ERR(file);
+dev_err(dev, "%s: alloc_file failed rc=%d\n",
+__func__, rc);
+goto err5;
+
+file->f_flags = flags & (O_ACCMODE | O_NONBLOCK);
+file->private_data = priv;
+out:
+return file;
+err5:
+path_put(&path);
+err4:
+iput(inode);
+err3:
+simple_release_fs(&ocxlflash_vfs_mount, &ocxlflash_fs_cnt);
+err2:
+module_put(fops->owner);
+err1:
+file = ERR_PTR(rc);
+goto out;
+}
+
+/**
+ * ocxlflash_psa_map() - map the process specific MMIO space
+ */
+ * @ctx_cookie: Adapter context for which the mapping needs to be done.
+ *
+ * Return: MMIO pointer of the mapped region
+ */
+static void __iomem *ocxlflash_psa_map(void *ctx_cookie)
+{
+struct ocxlflash_context *ctx = ctx_cookie;
+struct device *dev = ctx->hw_afu->dev;
+
+mutex_lock(&ctx->state_mutex);
+if (ctx->state != STARTED) {
+dev_err(dev, "%s: Context not started, state=%d\n", __func__,
+ctx->state);
+mutex_unlock(&ctx->state_mutex);
+}
+return NULL;
+}
+mutex_unlock(&ctx->state_mutex);
+
+return ioremap(ctx->psn_phys, ctx->psn_size);
+
+/**
+ * ocxlflash_psa_unmap() - unmap the process specific MMIO space
+ * @addr: MMIO pointer to unmap.
+ */
+static void ocxlflash_psa_unmap(void __iomem *addr)
+{
+iounmap(addr);
+}
+
+/**
+ * ocxlflash_process_element() - get process element of the adapter context
+ * @ctx_cookie: Adapter context associated with the process element.
+ *
+ * Return: process element of the adapter context
+ */
+static int ocxlflash_process_element(void *ctx_cookie)
+{
+struct ocxlflash_context *ctx = ctx_cookie;
+
+return ctx->pe;
+
+/**
+ * afu_map_irq() - map the interrupt of the adapter context
+ * @flags: Flags.
+ * @ctx: Adapter context.
+ * @num: Per-context AFU interrupt number.
+ * @handler: Interrupt handler to register.
+ * @cookie: Interrupt handler private data.
+ * @name: Name of the interrupt.
+ *
+ + * Return: 0 on success, -errno on failure
+ */
+static int afu_map_irq(u64 flags, struct ocxlflash_context *ctx, int num,
+    irq_handler_t handler, void *cookie, char *name)
+{
+    struct ocxl_hw_afu *afu = ctx->hw_afu;
+    struct device *dev = afu->dev;
+    struct ocxlflash_irqs *irq;
+    void __iomem *vtrig;
+    u32 virq;
+    int rc = 0;
+    
+    if (num < 0 || num >= ctx->num_irqs) {
+        dev_err(dev, "%s: Interrupt %d not allocated\n", __func__, num);
+        rc = -ENOENT;
+        goto out;
+    }
+    
+    irq = &ctx->irqs[num];
+    virq = irq_create_mapping(NULL, irq->hwirq);
+    if (unlikely(!virq)) {
+        dev_err(dev, "%s: irq_create_mapping failed\n", __func__);
+        rc = -ENOMEM;
+        goto out;
+    }
+    
+    rc = request_irq(virq, handler, 0, name, cookie);
+    if (unlikely(rc)) {
+        dev_err(dev, "%s: request_irq failed rc=%d\n", __func__, rc);
+        goto err1;
+    }
+    
+    vtrig = ioremap(irq->ptrig, PAGE_SIZE);
+    if (unlikely(!vtrig)) {
+        dev_err(dev, "%s: Trigger page mapping failed\n", __func__);
+        rc = -ENOMEM;
+        goto err2;
+    }
+    
+    irq->virq = virq;
+    irq->vtrig = vtrig;
+out:
+    return rc;
+err2:
+free_irq(virq, cookie);
+err1:
+irq_dispose_mapping(virq);
+goto out;
+
+/**
+ * ocxlflash_map_afu_irq() - map the interrupt of the adapter context
+ * @ctx_cookie:	Adapter context.
+ * @num:	Per-context AFU interrupt number.
+ * @handler:	Interrupt handler to register.
+ * @cookie:	Interrupt handler private data.
+ * @name:	Name of the interrupt.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+static int ocxlflash_map_afu_irq(void *ctx_cookie, int num, 
+ irq_handler_t handler, void *cookie, 
+ char *name)
+{
+return afu_map_irq(0, ctx_cookie, num, handler, cookie, name);
+}
+
+/**
+ * afu_unmap_irq() - unmap the interrupt
+ * @flags:	Flags.
+ * @ctx:	Adapter context.
+ * @num:	Per-context AFU interrupt number.
+ * @cookie:	Interrupt handler private data.
+ */
+static void afu_unmap_irq(u64 flags, struct ocxlflash_context *ctx, int num, 
+ void *cookie)
+{
+struct ocxl_hw_afu *afu = ctx->hw_afu;
+struct device *dev = afu->dev;
+struct ocxlflash_irqs *irq;
+
+if (num < 0 || num >= ctx->num_irqs) {
+dev_err(dev, "%s: Interrupt %d not allocated\n", __func__, num);
+return;
+}
+
+irq = &ctx->irqs[num];
+if (irq->vtrig)
+iounmap(irq->vtrig);
+
+if (irq_find_mapping(NULL, irq->hwirq)) {
+free_irq(irq->virq, cookie);
+}
irq_dispose_mapping(irq->virq);
+
+memset(irq, 0, sizeof(*irq));
+
+/**
+ * ocxlflash_unmap_afu_irq() - unmap the interrupt
+ * @ctx_cookie: Adapter context.
+ * @num: Per-context AFU interrupt number.
+ * @cookie: Interrupt handler private data.
+ */
+static void ocxlflash_unmap_afu_irq(void *ctx_cookie, int num, void *cookie)
+{
+return afu_unmap_irq(0, ctx_cookie, num, cookie);
+
+
+/**
+ * ocxlflash_get_irq_objhndl() - get the object handle for an interrupt
+ * @ctx_cookie: Context associated with the interrupt.
+ * @irq: Interrupt number.
+ *
+ * Return: effective address of the mapped region
+ */
+static u64 ocxlflash_get_irq_objhndl(void *ctx_cookie, int irq)
+{
+struct ocxlflash_context *ctx = ctx_cookie;
+
+if (irq < 0 || irq >= ctx->num_irqs)
+return 0;
+
+return (__force u64)ctx->irqs[irq].vtrig;
+}
+
+/**
+ * ocxlflash_xsl_fault() - callback when translation error is triggered
+ * @data: Private data provided at callback registration, the context.
+ * @addr: Address that triggered the error.
+ * @dsisr: Value of dsisr register.
+ */
+static void ocxlflash_xsl_fault(void *data, u64 addr, u64 dsisr)
+{
+struct ocxlflash_context *ctx = data;
+
+spin_lock(&ctx->slock);
+ctx->fault_addr = addr;
+ctx->fault_dsisr = dsisr;
+ctx->pending_fault = true;
spin_unlock(&ctx->slock);
+
+}
+
+/**
+ * start_context() - local routine to start a context
+ * @ctx:Adapter context to be started.
+ *
+ * Assign the context specific MMIO space, add and enable the PE.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+static int start_context(struct oclxflash_context *ctx)
+{
+    struct oclx_hw_afu *afu = ctx->hw_afu;
+    struct oclx_afu_config *acfg = &afu->acfg;
+    void *link_token = afu->link_token;
+    struct device *dev = afu->dev;
+    bool master = ctx->master;
+    struct mm_struct *mm;
+    int rc = 0;
+    u32 pid;
+    
+    mutex_lock(&ctx->state_mutex);
+    if (ctx->state != OPENED) {
+        dev_err(dev, "%s: Context state invalid, state=%d\n",
+            __func__, ctx->state);
+        rc = -EINVAL;
+        goto out;
+    }
+    
+    if (master) {
+        ctx->psn_size = acfg->global_mmio_size;
+        ctx->psn_phys = afu->gmmio_phys;
+    } else {
+        ctx->psn_size = acfg->pp_mmio_stride;
+        ctx->psn_phys = afu->mmio_phys + (ctx->pe * ctx->psn_size);
+    }
+    
+    /* pid and mm not set for master contexts */
+    if (master) {
+        pid = 0;
+        mm = NULL;
+    } else {
+        pid = current->mm->context.id;
+        mm = current->mm;
+    }
+    
+    wake_up_all(&ctx->wq);
+    
+}
+rc = oclx_link_add_pe(link_token, ctx->pe, pid, 0, 0, mm, ocxlflash_xsl_fault, ctx);
+if (unlikely(rc)) {
+dev_err(dev, "%s: oclx_link_add_pe failed rc=%d\n", __func__, rc);
+goto out;
+
+ctx->state = STARTED;
+}
+out:
+mutex_unlock(&ctx->state_mutex);
+return rc;
+
+/**
 + * ocxlflash_start_context() - start a kernel context
 + * @ctx_cookie:	Adapter context to be started.
 + *
 + * Return: 0 on success, -errno on failure
 + */
+static int ocxlflash_start_context(void *ctx_cookie)
+{
+struct ocxlflash_context *ctx = ctx_cookie;
+
+return start_context(ctx);
+
+/**
 + * ocxlflash_stop_context() - stop a context
 + * @ctx_cookie:	Adapter context to be stopped.
 + *
 + * Return: 0 on success, -errno on failure
 + */
+static int ocxlflash_stop_context(void *ctx_cookie)
+{
+struct ocxlflash_context *ctx = ctx_cookie;
+struct ocxl_hw_afu *afu = ctx->hw_afu;
+struct ocxl_afu_config *acfg = &afu->acfg;
+struct pci_dev *pdev = afu->pdev;
+struct device *dev = afu->dev;
+enum ocxlflash_ctx_state state;
+int rc = 0;
+
+mutex_lock(&ctx->state_mutex);
+state = ctx->state;
+ctx->state = CLOSED;
+mutex_unlock(&ctx->state_mutex);
+if (state != STARTED)
+goto out;
+
+rc = ocxl_config_terminate_pasid(pdev, acfg->dvsec_afu_control_pos, pdev->ctx->pe);
+if (unlikely(rc)) {
+dev_err(dev, "%s: ocxl_config_terminate_pasid failed rc=%d\n", __func__, rc);
+/* If EBUSY, PE could be referenced in future by the AFU */
+if (rc == -EBUSY)
+goto out;
+}
+
+rc = ocxl_link_remove_pe(afu->link_token, ctx->pe);
+if (unlikely(rc)) {
+dev_err(dev, "%s: ocxl_link_remove_pe failed rc=%d\n", __func__, rc);
+goto out;
+}
+out:
+return rc;
+
+/**
+ * ocxlflash_afu_reset() - reset the AFU
+ * @ctx_cookie: Adapter context.
+ */
+static int ocxlflash_afu_reset(void *ctx_cookie)
+{
+struct ocxlflash_context *ctx = ctx_cookie;
+struct device *dev = ctx->hw_afu->dev;
+
+/** Pending implementation from OCXL transport services */
+dev_err_once(dev, "%s: afu_reset() fop not supported\n", __func__);
+
+/* Silently return success until it is implemented */
+return 0;
+
+/**
+ * ocxlflash_set_master() - sets the context as master
+ * @ctx_cookie: Adapter context to set as master.
+ */
+static void ocxlflash_set_master(void *ctx_cookie)
+{
+struct ocxlflash_context *ctx = ctx_cookie;
+
+ctx->master = true;
ocxlflash_get_context() - obtains the context associated with the host
@pdev: PCI device associated with the host.
@afu_cookie: Hardware AFU associated with the host.

Returns the pointer to host adapter context

ocxlflash_get_context(struct pci_dev* pdev, void *afu_cookie)
{
struct ocxl_hw_afu *afu = afu_cookie;
return afu->ocxl_ctx;
}

ocxlflash_dev_context_init() - allocate and initialize an adapter context
@pdev: PCI device associated with the host.
@afu_cookie: Hardware AFU associated with the host.

Returns the adapter context on success, ERR_PTR on failure

ocxlflash_dev_context_init(struct pci_dev* pdev, void *afu_cookie)
{
struct ocxl_hw_afu *afu = afu_cookie;
struct device *dev = afu->dev;
struct ocxlflash_context *ctx;
int rc;

ctx = kzalloc(sizeof(*ctx), GFP_KERNEL);
if (unlikely(!ctx)) {
dev_err(dev, "%s: Context allocation failed", __func__);
rc = -ENOMEM;
goto err1;
}

idr_preload(GFP_KERNEL);
rc = idr_alloc(&afu->idr, ctx, 0, afu->max_pasid, GFP_NOWAIT);
idr_preload_end();
if (unlikely(rc < 0)) {
dev_err(dev, "%s: idr_alloc failed rc=%d", __func__, rc);
goto err2;
}

spin_lock_init(&ctx->slock);
init_waitqueue_head(&ctx->wq);
mutex_init(&ctx->state_mutex);
+ctx->state = OPENED;
+ctx->pe = rc;
+ctx->master = false;
+ctx->mapping = NULL;
+ctx->hw_afu = afu;
+ctx->irq_bitmap = 0;
+ctx->pending_irq = false;
+ctx->pending_fault = false;
+out:
+return ctx;
+err2:
+kfree(ctx);
+err1:
+ctx = ERR_PTR(rc);
+goto out;
+
+/**
+ * ocxlflash_release_context() - releases an adapter context
+ * @ctx_cookie: Adapter context to be released.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+static int ocxlflash_release_context(void *ctx_cookie)
+
+{  
+struct ocxlflash_context *ctx = ctx_cookie;
+struct device *dev;
+int rc = 0;
+
+if (!ctx)
+goto out;
+
+dev = ctx->hw_afu->dev;
+mutex_lock(&ctx->state_mutex);
+if (ctx->state >= STARTED) {
+dev_err(dev, "%s: Context in use, state=%d\n", __func__,
+ctx->state);
+mutex_unlock(&ctx->state_mutex);
+rc = -EBUSY;
+goto out;
+}
+mutex_unlock(&ctx->state_mutex);
+}
 out:
return rc;
+
+/**
+ * ocxlflash_perst_reloads_same_image() - sets the image reload policy
+ * @afu_cookie: Hardware AFU associated with the host.
+ * @image: Whether to load the same image on PERST.
+ */
+static void ocxlflash_perst_reloads_same_image(void *afu_cookie, bool image)
+{
+struct ocxl_hw_afu *afu = afu_cookie;
+
+afu->perst_same_image = image;
+}
+
+/**
+ * ocxlflash_read_adapter_vpd() - reads the adapter VPD
+ * @pdev: PCI device associated with the host.
+ * @buf: Buffer to get the VPD data.
+ * @count: Size of buffer (maximum bytes that can be read).
+ * Return: size of VPD on success, -errno on failure
+ */
+static ssize_t ocxlflash_read_adapter_vpd(struct pci_dev *pdev, void *buf,
+size_t count)
+{
+return pci_read_vpd(pdev, 0, count, buf);
+}
+
+/**
+ * free_afu_irqs() - internal service to free interrupts
+ * @ctx: Adapter context.
+ */
+static void free_afu_irqs(struct ocxlflash_context *ctx)
+{
+struct ocxl_hw_afu *afu = ctx->hw_afu;
+struct device *dev = afu->dev;
+int i;
+
+if (!ctx->irqs) {
+dev_err(dev, "%s: Interrupts not allocated\n", __func__);
+return;
+}
+
+for (i = ctx->num_irqs; i >= 0; i--)
+ocxl_link_free_irq(afu->link_token, ctx->irqs[i].hwirq);
+
kfree(ctx->irqs);
+ctx->irqs = NULL;
+
+/**
+ * alloc_afu_irqs() - internal service to allocate interrupts
+ * @ctx: Context associated with the request.
+ * @num: Number of interrupts requested.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+static int alloc_afu_irqs(struct ocxlflash_context *ctx, int num)
+
+struct ocxl_hw_afu *afu = ctx->hw_afu;
+struct device *dev = afu->dev;
+struct ocxlflash_irqs *irqs;
+u64 addr;
+int rc = 0;
+int hwirq;
+int i;
+
+if (ctx->irqs) {
+dev_err(dev, "%s: Interrupts already allocated
", __func__);  
+rc = -EEXIST;
+goto out;
+} 
+
+if (num > OCXL_MAX_IRQS) {
+dev_err(dev, "%s: Too many interrupts num=%d
", __func__, num);
+rc = -EINVAL;
+goto out;
+} 
+
+irqs = kmalloc(num, sizeof(*irqs), GFP_KERNEL);
+if (unlikely(!irqs)) {
+dev_err(dev, "%s: Context irqs allocation failed
", __func__);
+rc = -ENOMEM;
+goto out;
+} 
+
+for (i = 0; i < num; i++) {  
+rc = ocxl_link_irq_alloc(afu->link_token, &hwirq, &addr);
+if (unlikely(rc)) {
+dev_err(dev, "%s: ocxl_link_irq_alloc failed
", __func__, rc);
+goto err;
+} 
+
+irqs[i].hwirq = hwirq;
+irqs[i].ptrig = addr;
+
+ctx->irqs = irqs;
+ctx->num_irqs = num;
+out:
+return rc;
+err:
+for (i = i-1; i >= 0; i--)
+ocxl_link_free_irq(afu->link_token, irqs[i].hwirq);
+kfree(irqs);
+goto out;
+
+/**
+ * ocxlflash_allocate_afu_irqs() - allocates the requested number of interrupts
+ * @ctx_cookie:	Context associated with the request.
+ * @num:	Number of interrupts requested.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+static int ocxlflash_allocate_afu_irqs(void *ctx_cookie, int num)
+{
+return alloc_afu_irqs(ctx_cookie, num);
+
+/**
+ * ocxlflash_free_afu_irqs() - frees the interrupts of an adapter context
+ * @ctx_cookie:	Adapter context.
+ */
+static void ocxlflash_free_afu_irqs(void *ctx_cookie)
+{
+free_afu_irqs(ctx_cookie);
+
+/**
+ * ocxlflash_unconfig_afu() - unconfigure the AFU
+ * @afu: AFU associated with the host.
+ */
+static void ocxlflash_unconfig_afu(struct ocxl_hw_afu *afu)
+{
+if (afu->gmmio_virt) {
+iounmap(afu->gmmio_virt);
+afu->gmmio_virt = NULL;
+}
+
+/**
+ * ocxlflash_destroy_afu() - destroy the AFU structure
+ * @afu_cookie: AFU to be freed.
+ */
+static void ocxlflash_destroy_afu(void *afu_cookie)
+{
+struct ocxl_hw_afu *afu = afu_cookie;
+int pos;
+
+if (!afu)
+return;
+
+ocxlflash_release_context(afu->ocxl_ctx);
+idr_destroy(&afu->idr);
+
+/* Disable the AFU */
+pos = afu->acfg.dvsec_afu_control_pos;
+ocxl_config_set_afu_state(afu->pdev, pos, 0);
+
+ocxlflash_unconfig_afu(afu);
+kfree(afu);
+
+/**
+ * ocxlflash_config_fn() - configure the host function
+ * @pdev: PCI device associated with the host.
+ * @afu: AFU associated with the host.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+static int ocxlflash_config_fn(struct pci_dev *pdev, struct ocxl_hw_afu *afu)
+{
+struct ocxl_fn_config *fcfg = &afu->fcfg;
+struct device *dev = &pdev->dev;
+u16 base, enabled, supported;
+
+/* Read DVSEC config of the function */
+rc = ocxl_config_read_function(pdev, fcfg);
+
+if (unlikely(rc)) {
+dev_err(dev, "%s: ocxl_config_read_function failed rc=%d\n", __func__, rc);
+goto out;
+
+/* Check if function has AFUs defined, only 1 per function supported */
+if (fcfg->max_afu_index >= 0) {
+afu->is_present = true;
+
+if (fcfg->max_afu_index != 0)
dev_warn(dev, "%s: Unexpected AFU index value %d\n", __func__, fcfg->max_afu_index);
} +
+ rc = ocxl_config_get_actag_info(pdev, &base, &enabled, &supported);
+ if (unlikely(rc)) {
+ dev_err(dev, "%s: ocxl_config_get_actag_info failed rc=%d\n", __func__, rc);
+ goto out;
+ }
+ afu->fn_actag_base = base;
+ afu->fn_actag_enabled = enabled;
+ ocxl_config_set_actag(pdev, fcfg->dvsec_function_pos, base, enabled);
+ dev_dbg(dev, "%s: Function acTag range base=%u enabled=%u\n", __func__, base, enabled);
+ rc = ocxl_link_setup(pdev, 0, &afu->link_token);
+ if (unlikely(rc)) {
+ dev_err(dev, "%s: ocxl_link_setup failed rc=%d\n", __func__, rc);
+ goto out;
+ }
+ rc = ocxl_config_set_TL(pdev, fcfg->dvsec_tl_pos);
+ if (unlikely(rc)) {
+ dev_err(dev, "%s: ocxl_config_set_TL failed rc=%d\n", __func__, rc);
+ goto err;
+ }
+ out:
+ return rc;
+ err:
+ ocxl_link_release(pdev, afu->link_token);
+ goto out;
+}
+/**
+ * ocxlflash_unconfig_fn() - unconfigure the host function
+ * @pdev:	PCI device associated with the host.
+ * @afu:	AFU associated with the host.
+ */
+static void ocxlflash_unconfig_fn(struct pci_dev *pdev, struct ocxl_hw_afu *afu)
+{
+ ocxl_link_release(pdev, afu->link_token);
+}
+/**
+ * ocxlflash_map_mmio() - map the AFU MMIO space
+ * @afu: AFU associated with the host.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+static int ocxlflash_map_mmio(struct ocxl_hw_afu *afu)
+{
+  struct ocxl_afu_config *acfg = &afu->acfg;
+  struct pci_dev *pdev = afu->pdev;
+  struct device *dev = afu->dev;
+  phys_addr_t gmmio, ppmmio;
+  int rc = 0;
+  
+  rc = pci_request_region(pdev, acfg->global_mmio_bar, "ocxlflash");
+  if (unlikely(rc)) {
+    dev_err(dev, "%s: pci_request_region for global failed rc=%d\n", __func__, rc);
+    goto out;
+  }
+  gmmio = pci_resource_start(pdev, acfg->global_mmio_bar);
+  gmmio += acfg->global_mmio_offset;
+  
+  rc = pci_request_region(pdev, acfg->pp_mmio_bar, "ocxlflash");
+  if (unlikely(rc)) {
+    dev_err(dev, "%s: pci_request_region for pp bar failed rc=%d\n", __func__, rc);
+    goto err1;
+  }
+  ppmmio = pci_resource_start(pdev, acfg->pp_mmio_bar);
+  ppmmio += acfg->pp_mmio_offset;
+  
+  afu->gmmio_virt = ioremap(gmmio, acfg->global_mmio_size);
+  if (unlikely(!afu->gmmio_virt)) {
+    dev_err(dev, "%s: MMIO mapping failed\n", __func__);
+    rc = -ENOMEM;
+    goto err2;
+  }
+  
+  afu->gmmio_phys = gmmio;
+  afu->ppmmio_phys = ppmmio;
+  
+  return rc;
+err2:
+  pci_release_region(pdev, acfg->pp_mmio_bar);
+err1:
+  pci_release_region(pdev, acfg->global_mmio_bar);
+out:
static int ocxlflash_config_afu(struct pci_dev *pdev, struct ocxl_hw_afu *afu)
{
  struct ocxl_afu_config *acfg = &afu->acfg;
  struct ocxl_fn_config *fcfg = &afu->fcfg;
  struct device *dev = &pdev->dev;
  int count;
  int base;
  int pos;
  int rc = 0;

  /* This HW AFU function does not have any AFUs defined */
  if (!afu->is_present)
    goto out;

  /* Read AFU config at index 0 */
  rc = ocxl_config_read_afu(pdev, fcfg, acfg, 0);
  if (unlikely(rc))
    
  /* Only one AFU per function is supported, so actag_base is same */
  base = afu->fn_actag_base;
  count = min_t(int, acfg->actag_supported, afu->fn_actag_enabled);
  pos = acfg->dvsec_afu_control_pos;

  /* This HW AFU function does not have any AFUs defined */
  if (!afu->is_present)
    goto out;

  /* Read AFU config at index 0 */
  rc = ocxl_config_read_afu(pdev, fcfg, acfg, 0);
  if (unlikely(rc))
    
  /* Only one AFU per function is supported, so actag_base is same */
  base = afu->fn_actag_base;
  count = min_t(int, acfg->actag_supported, afu->fn_actag_enabled);
  pos = acfg->dvsec_afu_control_pos;

  ocxl_config_set_afu_actag(pdev, pos, base, count);
  dev_dbg(dev, "%s: ocxl_config_read_afu failed rc=%d\n", __func__, rc);
  goto out;

  /* Only one AFU per function is supported, so actag_base is same */
  base = afu->fn_actag_base;
  count = min_t(int, acfg->actag_supported, afu->fn_actag_enabled);
  pos = acfg->dvsec_afu_control_pos;

  ocxl_config_set_afu_actag(pdev, pos, base, count);
  dev_dbg(dev, "%s: ocxl_config_read_afu failed rc=%d\n", __func__, rc);
  goto out;

  /* Only one AFU per function is supported, so actag_base is same */
  base = afu->fn_actag_base;
  count = min_t(int, acfg->actag_supported, afu->fn_actag_enabled);
  pos = acfg->dvsec_afu_control_pos;

  ocxl_config_set_afu_actag(pdev, pos, base, count);
  dev_dbg(dev, "%s: ocxl_config_read_afu failed rc=%d\n", __func__, rc);
  goto out;

  rc = ocxlflash_map_mmio(afu);
  if (unlikely(rc))
    
  ocxlflash_config_afu() - configure the host AFU
  @pdev:PCI device associated with the host.
  @afu:AFU associated with the host.
  *
  * Must be called _after_ host function configuration.
  *
  * Return: 0 on success, -errno on failure
  */

dev_err(dev, "%s: ocxlflash_map_mmio failed rc=%d\n", __func__, rc);
goto out;
}

/* Enable the AFU */
ocxl_config_set_afu_state(pdev, acfg->dvsec_afu_control_pos, 1);
out:
return rc;
}

#define OXLFLASH_CREATE_AFU(dev) ocxlflash_create_afu(dev)

static void *ocxlflash_create_afu(struct pci_dev *pdev)
{
    struct device *dev = &pdev->dev;
    struct ocxlflash_context *ctx;
    struct ocxl_hw_afu *afu;
    int rc;

    afu = kzalloc(sizeof(*afu), GFP_KERNEL);
    if (unlikely(!afu)) {
        dev_err(dev, "%s: HW AFU allocation failed\n", __func__);
        goto out;
    }

    afu->pdev = pdev;
    afu->dev = dev;
    idr_init(&afu->idr);

    rc = ocxlflash_config_fn(pdev, afu);
    if (unlikely(rc)) {
        dev_err(dev, "%s: Function configuration failed rc=%d\n", __func__, rc);
        goto err1;
    }

    rc = ocxlflash_config_afu(pdev, afu);
    if (unlikely(rc)) {
        dev_err(dev, "%s: AFU configuration failed rc=%d\n", __func__, rc);
        goto err2;
    }
ctx = ocxlflash_dev_context_init(pdev, afu);
if (IS_ERR(ctx)) {
    rc = PTR_ERR(ctx);
    dev_err(dev, "%s: ocxlflash_dev_context_init failed rc=%d\n", __func__, rc);
goto err3;
} +
afu->ocxl_ctx = ctx;
out:
return afu;
err3:
ocxlflash_unconfig_afu(afu);
err2:
ocxlflash_unconfig_fn(pdev, afu);
err1:
+idr_destroy(&afu->idr);
+kfree(afu);
+afu = NULL;
+goto out;
+}
+/**
+ * ctx_event_pending() - check for any event pending on the context
+ * @ctx:	Context to be checked.
+ *
+ * Return: true if there is an event pending, false if none pending
+ */
+static inline bool ctx_event_pending(struct ocxlflash_context *ctx)
+
+if (ctx-> pending_irq || ctx-> pending_fault)
+return true;
+
+return false;
+}
+
+/**
+ * afu_poll() - poll the AFU for events on the context
+ * @file:	File associated with the adapter context.
+ * @poll:	Poll structure from the user.
+ *
+ * Return: poll mask
+ */
+static unsigned int afu_poll(struct file *file, struct poll_table_struct *poll)
+
+struct ocxlflash_context *ctx = file->private_data;
+struct device *dev = ctx->hw_afu->dev;
+ulong lock_flags;
int mask = 0;
+
poll_wait(file, &ctx->wq, poll);
+
spin_lock_irqsave(&ctx->slock, lock_flags);
+if (ctx_event_pending(ctx))
+mask |= POLLIN | POLLRDNORM;
+else if (ctx->state == CLOSED)
+mask |= POLLERR;
+spin_unlock_irqrestore(&ctx->slock, lock_flags);
+
+dev_dbg(dev, "%s: Poll wait completed for pe %i mask %i\n", __func__, ctx->pe, mask);
+
+return mask;
+
+/**
+ * afu_read() - perform a read on the context for any event
+ * @file:File associated with the adapter context.
+ * @buf:Buffer to receive the data.
+ * @count:Size of buffer (maximum bytes that can be read).
+ * @off:Offset.
+ *
+ * Return: size of the data read on success, -errno on failure
+ */
+
static ssize_t afu_read(struct file *file, char __user *buf, size_t count, loff_t *off)
+
*{
+struct ocxlflash_context *ctx = file->private_data;
+struct device *dev = ctx->hw_afu->dev;
+struct cxl_event event;
+ulong lock_flags;
+ssize_t esize;
+ssize_t rc;
+int bit;
+DEFINE_WAIT(event_wait);
+
+if (*off != 0) {
+dev_err(dev, "%s: Non-zero offset not supported, off=%ld\n", __func__, *off);
+rc = -EINVAL;
+goto out;
+}
+
+spin_lock_irqsave(&ctx->slock, lock_flags);
+
+for (;;) {
prepare_to_wait(&ctx->wq, &event_wait, TASK_INTERRUPTIBLE);
+
+if (ctx_event_pending(ctx) || (ctx->state == CLOSED))
+break;
+
+if (file->f_flags & O_NONBLOCK) {
+dev_err(dev, "%s: File cannot be blocked on I/O\n", __func__);
+
+rc = -EAGAIN;
+goto err;
+}
+
+if (signal_pending(current)) {
+dev_err(dev, "%s: Signal pending on the process\n", __func__);
+
+rc = -ERESTARTSYS;
+goto err;
+}
+
+spin_unlock_irqrestore(&ctx->slock, lock_flags);
+schedule();
+spin_lock_irqsave(&ctx->slock, lock_flags);
+}
+
+finish_wait(&ctx->wq, &event_wait);
+
+memset(&event, 0, sizeof(event));
+event.header.process_element = ctx->pe;
+event.header.size = sizeof(struct cxl_event_header);
+if (ctx->pending_irq) {
+esize = sizeof(struct cxl_event_afu_interrupt);
+event.header.size += esize;
+event.header.type = CXL_EVENT_AFU_INTERRUPT;
+
+bit = find_first_bit(&ctx->irq_bitmap, ctx->num_irqs);
+clear_bit(bit, &ctx->irq_bitmap);
+event.irq.irq = bit + 1;
+if (!bitmap_empty(&ctx->irq_bitmap, ctx->num_irqs))
+ctx->pending_irq = false;
+
+else if (ctx->pending_fault) {
+event.header.size += sizeof(struct cxl_event_data_storage);
+event.header.type = CXL_EVENT_DATA_STORAGE;
+event.fault.addr = ctx->fault_addr;
+event.fault.dsisr = ctx->fault_dsisr;
+ctx->pending_fault = false;
+
+}
+
+spin_unlock_irqrestore(&ctx->slock, lock_flags);
```c
+ if (copy_to_user(buf, &event, event.header.size)) {
+ dev_err(dev, "%s: copy_to_user failed\n", __func__);
+ rc = -EFAULT;
+ goto out;
+ }
+ 
+ rc = event.header.size;
+ out:
+ return rc;
+ err:
+ finish_wait(&ctx->wq, &event_wait);
+ spin_unlock_irqrestore(&ctx->slock, lock_flags);
+ goto out;
+ }
+
+ /**
+ * afu_release() - release and free the context
+ * @inode: File inode pointer.
+ * @file: File associated with the context.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+ static int afu_release(struct inode *inode, struct file *file)
+ {
+ struct ocxlflash_context *ctx = file->private_data;
+ int i;
+ 
+ /* Unmap and free the interrupts associated with the context */
+ for (i = ctx->num_irqs; i >= 0; i--)
+ afu_unmap_irq(0, ctx, i, ctx);
+ free_afu_irqs(ctx);
+ 
+ return ocxlflash_release_context(ctx);
+ }
+
+ /**
+ * ocxlflash_mmap_fault() - mmap fault handler
+ * @vmf: VM fault associated with current fault.
+ *
+ * Return: 0 on success, -errno on failure
+ */
+ static int ocxlflash_mmap_fault(struct vm_fault *vmf)
+ {
+ struct vm_area_struct *vma = vmf->vma;
+ struct ocxlflash_context *ctx = vma->vm_file->private_data;
+ struct device *dev = ctx->hw_afu->dev;
+ u64 mmio_area, offset;
```
static const struct vm_operations_struct ocxlflash_vmops = {
    .fault = ocxlflash_mmap_fault,
};

/**
 * afu_mmap() - map the fault handler operations
 * @file: File associated with the context.
 * @vma: VM area associated with mapping.
 *
 * Return: 0 on success, -errno on failure
 */
static int afu_mmap(struct file *file, struct vm_area_struct *vma)
{
    struct ocxlflash_context *ctx = file->private_data;

    if ((vma->vm_start + vma->vm_end) >
        (ctx->psn_size >> PAGE_SHIFT))
        return -EINVAL;

    vma->vm_flags |= VM_IO | VM_PFNMAP;
    vma->vm_page_prot = pgprot_noncached(vma->vm_page_prot);
    return 0;
}

static const struct file_operations ocxl_afu_fops = {
    .owner		= THIS_MODULE,
+.*.poll= afu_poll,
+.*.read= afu_read,
+.*.release= afu_release,
+.*.mmap= afu_mmap,
+.*;
+
+##define PATCH_FOPS(NAME)\n+do { if (!fops->NAME) fops->NAME = ocxl_afu_fops.NAME; } while (0)
+
+/**
+ * ocxlflash_get_fd() - get file descriptor for an adapter context
+ * @ctx_cookie:Adapter context.
+ * @fops:File operations to be associated.
+ * @fd:File descriptor to be returned back.
+ *
+ * Return: pointer to the file on success, ERR_PTR on failure
+ */
+static struct file *ocxlflash_get_fd(void *ctx_cookie,
+    struct file_operations *fops, int *fd)
+{
+    struct ocxlflash_context *ctx = ctx_cookie;
+    struct device *dev = ctx->hw_afu->dev;
+    struct file *file;
+    int flags, fdtmp;
+    int rc = 0;
+    char *name = NULL;
+
+    /* Only allow one fd per context */
+    if (ctx->mapping) {
+        dev_err(dev, "%s: Context is already mapped to an fd\n", __func__);
+        __func___);
+        rc = -EEXIST;
+        goto err1;
+    }
+    flags = O_RDWR | O_CLOEXEC;
+    /* This code is similar to anon_inode_getfd() */
+    rc = get_unused_fd_flags(flags);
+    if (unlikely(rc < 0)) {
+        dev_err(dev, "%s: get_unused_fd_flags failed rc=%d\n", __func__, rc);
+        goto err1;
+    }
+    fdtmp = rc;
+
+    /* Patch the file ops that are not defined */
+    if (fops) {
+        PATCH_FOPS(NAME)
+    }
+    /* This code is similar to anon_inode_getfd() */
+    +
+    /* Only allow one fd per context */
+    if (ctx->mapping) {
+        dev_err(dev, "%s: Context is already mapped to an fd\n", __func__);
+        __func___):
+        rc = -EEXIST;
+        goto err1;
+    }
+    flags = O_RDWR | O_CLOEXEC;
+    /* This code is similar to anon_inode_getfd() */
+    rc = get_unused_fd_flags(flags);
+    if (unlikely(rc < 0)) {
+        dev_err(dev, "%s: get_unused_fd_flags failed rc=%d\n", __func__, rc);
+        goto err1;
+    }
+    fdtmp = rc;
+
+    /* Patch the file ops that are not defined */
+    if (fops) {
PATCH_FOPS(poll);
+PATCH_FOPS(read);
+PATCH_FOPS(release);
+PATCH_FOPS(mmap);
+} else /* Use default ops */
+fops = (struct file_operations *)&ocxl_afu_fops;
+
+name = kasprintf(GFP_KERNEL, "ocxlflash:%d", ctx->pe);
+file = ocxlflash_getfile(dev, name, fops, ctx, flags);
+kfree(name);
+if (IS_ERR(file)) {
+rc = PTR_ERR(file);
+dev_err(dev, "%s: ocxlflash_getfile failed rc=%d\n", __func__, rc);
+goto err2;
+}
+
+ctx->mapping = file->f_mapping;
+*fd = fdtmp;
+out:
+return file;
+err2:
+put_unused_fd(fdtmp);
+err1:
+file = ERR_PTR(rc);
+goto out;
+
+/**
+ * ocxlflash_fops_get_context() - get the context associated with the file
+ * @file:	File associated with the adapter context.
+ *
+ * Return: pointer to the context
+ */
+static void *ocxlflash_fops_get_context(struct file *file)
+{
+return file->private_data;
+}
+
+/**
+ * ocxlflash_afu_irq() - interrupt handler for user contexts
+ * @irq:	Interrupt number.
+ * @data:Private data provided at interrupt registration, the context.
+ *
+ * Return: Always return IRQ_HANDLED.
+ */
+static irqreturn_t ocxlflash_afu_irq(int irq, void *data)
+{
+}
struct ocxlflash_context *ctx = data;
struct device *dev = ctx->hw_afu->dev;

int i;

+dev_dbg(dev, "%s: Interrupt raised for pe %i virq %i\n", __func__, ctx->pe, irq);

for (i = 0; i < ctx->num_irqs; i++) {
    if (ctx->irqs[i].virq == irq)
        break;
}

if (unlikely(i >= ctx->num_irqs)) {
    dev_err(dev, "%s: Received AFU IRQ out of range\n", __func__);
    goto out;
}

spin_lock(&ctx->slock);
set_bit(i - 1, &ctx->irq_bitmap);
ctx->pending_irq = true;
spin_unlock(&ctx->slock);

wake_up_all(&ctx->wq);

return IRQ_HANDLED;
}

/**
 * ocxlflash_start_work() - start a user context
 * @ctx_cookie:	Context to be started.
 * @num_irqs:	Number of interrupts requested.
 *
 * Return: 0 on success, -errno on failure
 */
static int ocxlflash_start_work(void *ctx_cookie, u64 num_irqs)
{
    struct ocxlflash_context *ctx = ctx_cookie;
    struct ocxl_hw_afu *afu = ctx->hw_afu;
    struct device *dev = afu->dev;
    char *name;
    int rc = 0;
    int i;

    rc = alloc_afu_irqs(ctx, num_irqs);
    if (unlikely(rc < 0)) {
        dev_err(dev, "%s: alloc_afu_irqs failed rc=%d\n", __func__, rc);
        goto out;
    }

    /*
     * ocxlflash_start_work() - start a user context
     * @ctx_cookie:Context to be started.
     * @num_irqs:Number of interrupts requested.
     *
     * Return: 0 on success, -errno on failure
     */
    static int ocxlflash_start_work(void *ctx_cookie, u64 num_irqs)
    {
        struct ocxlflash_context *ctx = ctx_cookie;
        struct ocxl_hw_afu *afu = ctx->hw_afu;
        struct device *dev = afu->dev;
        char *name;
        int rc = 0;
        int i;

        rc = alloc_afu_irqs(ctx, num_irqs);
        if (unlikely(rc < 0)) {
            dev_err(dev, "%s: alloc_afu_irqs failed rc=%d\n", __func__, rc);
            goto out;
        }

        /*
for (i = 0; i < num_irqs; i++) {
    name = kasprintf(GFP_KERNEL, "ocxlflash-%s-pe%i-%i",
    dev_name(dev), ctx->pe, i);
    rc = afu_map_irq(0, ctx, i, ocxlflash_afu_irq, ctx, name);
    kfree(name);
    if (unlikely(rc < 0)) {
        dev_err(dev, "%s: afu_map_irq failed rc=%d\n",
        __func__, rc);
        goto err;
    }
    rc = start_context(ctx);
    if (unlikely(rc)) {
        dev_err(dev, "%s: start_context failed rc=%d\n",
        __func__, rc);
        goto err;
    }
    out:
    return rc;
err:
    for (i = i-1; i >= 0; i--)
        afu_unmap_irq(0, ctx, i, ctx);
    free_afu_irqs(ctx);
    goto out;
}

/**
 * ocxlflash_fd_mmap() - mmap handler for adapter file descriptor
 * @file: File installed with adapter file descriptor.
 * @vma: VM area associated with mapping.
 *
 * Return: 0 on success, -errno on failure
 */
static int ocxlflash_fd_mmap(struct file *file, struct vm_area_struct *vma)
{
    return afu_mmap(file, vma);
}

/**
 * ocxlflash_fd_release() - release the context associated with the file
 * @inode: File inode pointer.
 * @file: File associated with the adapter context.
 *
 * Return: 0 on success, -errno on failure
 */
static int ocxlflash_fd_release(struct inode *inode, struct file *file)
{
    return afu_release(inode, file);
const struct cxlflash_backend_ops cxlflash_ocxl_ops = { 
	.module			= THIS_MODULE, 
	.psa_map		= ocxlflash_psa_map, 
	.psa_unmap		= ocxlflash_psa_unmap, 
	.process_element	= ocxlflash_process_element, 
	.map_afu_irq		= ocxlflash_map_afu_irq, 
	.unmap_afu_irq		= ocxlflash_unmap_afu_irq, 
	.get_irq_objhndl	= ocxlflash_get_irq_objhndl, 
	.start_context	= ocxlflash_start_context, 
	.stop_context	= ocxlflash_stop_context, 
	.afu_reset	= ocxlflash_afu_reset, 
	.set_master	= ocxlflash_set_master, 
	.get_context	= ocxlflash_get_context, 
	.dev_context_init= ocxlflash_dev_context_init, 
	.release_context	= ocxlflash_release_context, 
	.perst_reloads_same_image = ocxlflash_perst_reloads_same_image, 
	.read_adapter_vpd= ocxlflash_read_adapter_vpd, 
	.allocate_afu_irqs= ocxlflash_allocate_afu_irqs, 
	.free_afu_irqs= ocxlflash_free_afu_irqs, 
	.create_afu= ocxlflash_create_afu, 
	.destroy_afu= ocxlflash_destroy_afu, 
	.get_fd= ocxlflash_get_fd, 
	.fops_get_context= ocxlflash_fops_get_context, 
	.start_work	= ocxlflash_start_work, 
	.fd_mmap	= ocxlflash_fd_mmap, 
	.fd_release= ocxlflash_fd_release, 
	};
+ struct ocxlflash_irqs {
+    int hwirq;
+    u32 virq;
+    u64 ptrig;
+    void __iomem *vtrig;
+};
+
+ /* OCXL hardware AFU associated with the host */
+ struct ocxl_hw_afu {
+    struct ocxlflash_context *ocxl_ctx; /* Host context */
+    struct pci_dev *pdev; /* PCI device */
+    struct device *dev; /* Generic device */
+    bool perst_same_image; /* Same image loaded on perst */
+    struct ocxl_fn_config fcfg; /* DVSEC config of the function */
+    struct ocxl_afu_config acfg; /* AFU configuration data */
+    int fn_actag_base; /* Function acTag base */
+    int fn_actag_enabled; /* Function acTag number enabled */
+    int acfu_actag_base; /* AFU acTag base */
+    int acfu_actag_enabled; /* AFU acTag number enabled */
+    phys_addr_t ppmio_phys; /* Per process MMIO space */
+    phys_addr_t gmmio_phys; /* Global AFU MMIO space */
+    void __iomem *gmmio_virt; /* Global MMIO map */
+    void *link_token; /* Link token for the SPA */
+    struct idr idr; /* IDR to manage contexts */
+    int max_pasid; /* Maximum number of contexts */
+    bool is_present; /* Function has AFUs defined */
+};
+
+ enum ocxlflash_ctx_state {
+    CLOSED,
+    OPENED,
+    STARTED
+};
+
+ struct ocxlflash_context {
+    struct ocxl_hw_afu *hw_afu; /* HW AFU back pointer */
+    struct address_space *mapping; /* Mapping for pseudo filesystem */
+    bool master; /* Whether this is a master context */
+    int pe; /* Process element */
+    phys_addr_t psn_phys; /* Process mapping */
+    u64 psn_size; /* Process mapping size */
+}
+spinlock_t slock;/* Protects irq/fault/event updates */
+wait_queue_head_t wq;/* Wait queue for poll and interrupts */
+struct mutex state_mutex;/* Mutex to update context state */
+enum ocxlflash_ctx_state state;/* Context state */
+
+struct ocxlflash_irqs *irqs;/* Pointer to array of structures */
+int num_irqs;/* Number of interrupts */
+bool pending_irq;/* Pending interrupt on the context */
+ulong irq_bitmap;/* Bits indicating pending irq num */
+
+u64 fault_addr;/* Address that triggered the fault */
+u64 fault_dsisr;/* Value of dsisr register at fault */
+bool pending_fault;/* Pending translation fault */
+};
--- linux-4.15.0.orig/drivers/scsi/cxlflash/sislite.h
+++ linux-4.15.0/drivers/scsi/cxlflash/sislite.h
@@ -258,23 +258,30 @@
* exit since there is no way to tell which
* command caused the error.
*/
-#define SISL_ISTATUS_PERM_ERR_CMDROOM 0x0010ULL /* b59, user error */
-#define SISL_ISTATUS_PERM_ERR_RCB_READ 0x0008ULL /* b60, user error */
-#define SISL_ISTATUS_PERM_ERR_SA_WRITE 0x0004ULL /* b61, user error */
-#define SISL_ISTATUS_PERM_ERR_RRQ_WRITE 0x0002ULL /* b62, user error */
+#define SISL_ISTATUS_PERM_ERR_LISN_3_EA 0x0400ULL /* b53, user error */
+#define SISL_ISTATUS_PERM_ERR_LISN_2_EA 0x0200ULL /* b54, user error */
+#define SISL_ISTATUS_PERM_ERR_LISN_1_EA 0x0100ULL /* b55, user error */
+#define SISL_ISTATUS_PERM_ERR_LISN_3_PASID 0x0080ULL /* b56, user error */
+#define SISL_ISTATUS_PERM_ERR_LISN_2_PASID 0x0040ULL /* b57, user error */
+#define SISL_ISTATUS_PERM_ERR_LISN_1_PASID 0x0020ULL /* b58, user error */
+#define SISL_ISTATUS_PERM_ERR_CMDROOM0x0010ULL /* b59, user error */
+#define SISL_ISTATUS_PERM_ERR_RCB_READ0x0008ULL /* b60, user error */
+#define SISL_ISTATUS_PERM_ERR_SA_WRITE0x0004ULL /* b61, user error */
+#define SISL_ISTATUS_PERM_ERR_RRQ_WRITE0x0002ULL /* b62, user error */
/* Page in wait accessing RCB/IOASA/RRQ is reported in b63.
* Same error in data/LXT/RHT access is reported via IOASA.
*/
-#define SISL_ISTATUS_TEMP_ERR_PAGEIN 0x0001ULL /* b63, can be generated
- * only when AFU auto
- * retry is disabled.
- * If user can determine
- * the command that
- * caused the error, it
- * can be retried.
- */
-#define SISL_ISTATUS_UNMASK (0x001FULL)/* 1 means unmasked */
-#define SISL_ISTATUS_MASK ~(SISL_ISTATUS_UNMASK)/* 1 means masked */
+#define SISL_ISTATUS_TEMP_ERR_PAGEIN0x0001ULL /* b63, can only be
* generated when AFU
* auto retry is
* disabled. If user
* can determine the
* command that caused
* the error, it can
* be retried.
*
/*
+#define SISL_ISTATUS_UNMASK(0x07FFULL)/* 1 means unmasked */
+#define SISL_ISTATUS_MASK--(SISL_ISTATUS_UNMASK)/* 1 means masked */

__be64 intr_clear;
__be64 intr_mask;
@ @ -284.6 +291.7 @ @
__be64 cmd_room;
__be64 ctx_ctrl; /* least significant byte or b56:63 is LISN */
#define SISL_CTX_CTRL_UNMAP_SECTOR0x8000000000000000ULL /* b0 */
+#define SISL_CTX_CTRL_LISN_MASK(0xFFULL)
__be64 mbox_w; /* restricted use */
__be64 sq_start; /* Submission Queue (R/W): write sequence and */
__be64 sq_end; /* inclusion semantics are the same as RRQ */
@ @ -309.6 +317.10 @ @
#define SISL_CTX_CAP_WRITE_CMD0x0000000000000002ULL /* afu_rc 0x21 */
#define SISL_CTX_CAP_READ_CMD0x0000000000000001ULL /* afu_rc 0x21 */
__be64 mbox_r;
+__be64 lisn_pasid[2];
+/* pasid _a arg must be ULL */
+##define SISL_LISN_PASID(_a, _b)(((a) << 32) | (_b))
+__be64 lisn_ea[3];
];

/* single copy global regs */
@ @ -415.6 +427.7 @ @
#define SISL_INTVER_CAP_RESERVED_CMD_MODE_B0x1000000000000000ULL
#define SISL_INTVER_CAP_LUN_PROVISION0x0800000000000000ULL
#define SISL_INTVER_CAP_AFU_DEBUG0x040000000000000ULL
+##define SISL_INTVER_CAP_OCXL_LISN0x0200000000000000ULL
);

#define CXLFLASH_NUM_FC_PORTS_PER_BANK2/* fixed # of ports per bank */
--- linux-4.15.0.orig/drivers/scsi/cxlflash/superpipe.c
+++ linux-4.15.0/drivers/scsi/cxlflash/superpipe.c
@@ -269,6 +269,7 @@
int rc = 0;
struct hwq *hwq = get_hwq(afu, PRIMARY_HWQ);
u64 val;
+int i;
/* Unlock cap and restrict user to read/write cmds in translated mode */
readq_be(&ctrl_map->mbox_r);
@@ -282,6 +283,19 @@
goto out;
}

+if (afu_is_ocxl_lisn(afu)) {
+/* Set up the LISN effective address for each interrupt */
+for (i = 0; i < ctxi->irqs; i++) {
+val = cfg->ops->get irq_objhndl(ctxi->ctx, i);
+writeq_be(val, &ctrl_map->lisn_ea[i]);
+}
+
+/* Use primary HWQ PASID as identifier for all interrupts */
+val = hwq->ctx_hndl;
+writeq_be(SISL_LISN_PASID(val, val), &ctrl_map->lisn_pasid[0]);
+writeq_be(SISL_LISN_PASID(0UL, val), &ctrl_map->lisn_pasid[1]);
+}
+
+/* Set up MMIO registers pointing to the RHT */
writeq_be((u64)ctxi->rht_start, &ctrl_map->rht_start);
val = SISL_RHT_CNT_ID((u64)MAX_RHT_PER_CONTEXT, (u64)(hwq->ctx_hndl));
@@ -810,20 +824,22 @@
* init_context() - initializes a previously allocated context
* @ctxi:Previously allocated context
* @cfg:Internal structure associated with the host.
- * @ctx:Previously obtained CXL context reference.
+ * @ctx:Previously obtained context cookie.
* @ctxid:Previously obtained process element associated with CXL context.
* @file:Previously obtained file associated with CXL context.
* @perms:User-specified permissions.
+ * @irqs:User-specified number of interrupts.
*/
static void init_context(struct ctx_info *ctxi, struct cxlflash_cfg *cfg,
- struct cxl_context *ctx, int ctxid, struct file *file,
- u32 perms)
+ void *ctx, int ctxid, struct file *file, u32 perms,
+ u64 irqs)
{
    struct afu *afu = cfg->afu;

    ctxi->rht_perms = perms;
    ctxi->ctrl_map = &afu->afu_map->ctrls[ctxid].ctrl;
    ctxi->ctxid = ENCODE_CTXID(ctxi, ctxid);
    +ctxi->irqs = irqs;
    ctxi->pid = task_tgid_nr(current); /* tgid = pid */
    ctxi->ctx = ctx;
    ctxi->cfg = cfg;

static int cxlflash_cxl_release(struct inode *inode, struct file *file)
{
-struct cxl_context *ctx = cxl_fops_get_context(file);
struct cxlflash_cfg *cfg = container_of(file->f_op, struct cxlflash_cfg, cxl_fops);
+void *ctx = cfg->ops->fops_get_context(file);
struct device *dev = &cfg->dev->dev;
struct ctx_info *ctxi = NULL;
struct dk_cxlflash_detach detach = { { 0 }, 0 };
@@ -1014,7 +1030,7 @@
enum ctx_ctrl ctrl = CTX_CTRL_ERR_FALLBACK | CTX_CTRL_FILE;
int ctxid;

-ctxid = cxl_process_element(ctx);
+ctxid = cfg->ops->process_element(ctx);
if (unlikely(ctxid < 0)) {
  dev_err(dev, "%s: Context %p was closed ctxid=%d\n",
         __func__, ctx, ctxid);
@@ -1089,9 +1105,9 @@
{
 struct vm_area_struct *vma = vmf->vma;
 struct file *file = vma->vm_file;
-struct cxl_context *ctx = cxl_fops_get_context(file);
+void *ctx = cfg->ops->fops_get_context(file);
struct cxlflash_cfg *cfg = container_of(file->f_op, struct cxlflash_cfg, cxl_fops);
+void *ctx = cfg->ops->fops_get_context(file);
struct device *dev = &cfg->dev->dev;
struct ctx_info *ctxi = NULL;
struct page *err_page = NULL;
@@ -1099,7 +1115,7 @@
int rc = 0;
int ctxid;

-ctxid = cxl_process_element(ctx);
+ctxid = cfg->ops->process_element(ctx);
if (unlikely(ctxid < 0)) {
  dev_err(dev, "%s: Context %p was closed ctxid=%d\n",

static int cxlflash_cxl_mmap(struct file *file, struct vm_area_struct *vma) {
    struct cxl_context *ctx = cxl_fops_get_context(file);
    struct cxlflash_cfg *cfg = container_of(file->f_op, struct cxlflash_cfg, cxl_fops);
    void *ctx = cfg->ops->fops_get_context(file);
    struct device *dev = &cfg->dev->dev;
    struct ctx_info *ctxi = NULL;
    enum ctx_ctrl ctrl = CTX_CTRL_ERR_FALLBACK | CTX_CTRL_FILE;
    int ctxid;
    int rc = 0;

    ctxid = cxl_process_element(ctx);
    ctxid = cfg->ops->process_element(ctx);
    if (unlikely(ctxid < 0)) {
        dev_err(dev, "%s: Context %p was closed ctxid=%d\n", __func__, ctx, ctxid);
    }
    dev_dbg(dev, "%s: mmap for context %d\n", __func__, ctxid);
    rc = cxl_fd_mmap(file, vma);
    if (likely(!rc)) {
        /* Insert ourself in the mmap fault handler path */
        ctxi->cxl_mmap_vmops = vma->vm_ops;
        struct afu *afu = cfg->afu;
        struct llun_info *lli = sdev->hostdata;
        struct glun_info *gli = lli->parent;
        struct cxl_ioctl_start_work *work;
        struct ctx_info *ctxi = NULL;
        struct lun_access *lun_access = NULL;
        int rc = 0;
        u32 perms;
        int ctxid = -1;
        u64 irqs = attach->num_interrupts;
        u64 flags = 0UL;
        u64 rctxid = 0UL;
        struct file *file = NULL;

        struct cxl_context *ctx = NULL;
        void *ctx = NULL;
        int fd = -1;

if (attach->num_interrupts > 4) {
    if (irqs > 4) {
        dev_dbg(dev, "%s: Cannot support this many interrupts %llu
", __func__, attach->num_interrupts);
        __func__, irqs);
        rc = -EINVAL;
        goto out;
    }
    ctx = cxl_dev_context_init(cfg->dev);
    ctx = cfg->ops->dev_context_init(cfg->dev, cfg->afu_cookie);
    if (IS_ERR_OR_NULL(ctx)) {
        dev_err(dev, "%s: Could not initialize context %p\n", __func__, ctx);
        goto err;
    }
    work = &ctxi->work;
    work->num_interrupts = attach->num_interrupts;
    work->flags = CXL_START_WORK_NUM_IRQS;
    -rc = cxl_start_work(ctx, work);
    +rc = cfg->ops->start_work(ctx, irqs);
    if (unlikely(rc)) {
        dev_dbg(dev, "%s: Could not start context rc=%d\n", __func__, rc);
        goto err;
    }
    ctxid = cxl_process_element(ctx);
    ctxid = cfg->ops->process_element(ctx);
    if (unlikely((ctxid >= MAX_CONTEXT) || (ctxid < 0))) {
        dev_err(dev, "%s: ctxid=%d invalid\n", __func__, ctxid);
        rc = -EPERM;
        goto err;
    }
    file = cxl_get_fd(ctx, &cfg->cxl_fops, &fd);
    file = cfg->ops->get_fd(ctx, &cfg->cxl_fops, &fd);
    if (unlikely(fd < 0)) {
        rc = -ENODEV;
        dev_err(dev, "%s: Could not get file descriptor\n", __func__);
        goto err;
    }
}

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perms = SISL_RHT_PERM(attach->hdr.flags + 1);

/* Context mutex is locked upon return */
-init_context(ctxi, cfg, ctx, ctxid, file, perms);
+init_context(ctxi, cfg, ctx, ctxid, file, perms, irqs);

rc = afu_attach(cfg, ctxi);
if (unlikely(rc)) {
@@ -1479,8 +1491,8 @@
err:
/* Cleanup CXL context; okay to 'stop' even if it was not started */
if (!IS_ERR_OR_NULL(ctx)) {
-cxl_stop_context(ctx);
-cxl_release_context(ctx);
+cfg->ops->stop_context(ctx);
+cfg->ops->release_context(ctx);
ctx = NULL;
}

@@ -1529,10 +1541,10 @@
int fd = -1;
int ctxid = -1;
struct file *file;
-struct cxl_context *ctx;
+void *ctx;
struct afu *afu = cfg->afu;

-ctx = cxl_dev_context_init(cfg->dev);
+ctx = cfg->ops->dev_context_init(cfg->dev, cfg->afu_cookie);
if (IS_ERR_OR_NULL(ctx)) {
  dev_err(dev, "%s: Could not initialize context %p\n", __func__, ctx);
@@ -1540,21 +1552,21 @@
goto out;
}

-rc = cxl_start_work(ctx, &ctxi->work);
+rc = cfg->ops->start_work(ctx, ctxi->irqs);
if (unlikely(rc)) {
  dev_dbg(dev, "%s: Could not start context rc=%d\n", __func__, rc);
  goto err1;
}

-ctxid = cxl_process_element(ctx);
+ctxid = cfg->ops->process_element(ctx);
if (unlikely((ctxid >= MAX_CONTEXT) || (ctxid < 0))) {
  dev_err(dev, "%s: ctxid=%d invalid\n", __func__, ctxid);
}
rc = -EPERM;
go to err2;

		file = cxl_get_fd(ctx, &cfg->cxl_fops, &fd);
+file = cfg->ops->get_fd(ctx, &cfg->cxl_fops, &fd);
if (unlikely(fd < 0)) {
rc = -ENODEV;
dev_err(dev, "%s: Could not get file descriptor\n", __func__);
@@ -1601,9 +1613,9 @@
ftpfile);
put_unused_fd(fd);
err2:
-cxl_stop_context(ctx);
+cfg->ops->stop_context(ctx);
err1:
-cxl_release_context(ctx);
+cfg->ops->release_context(ctx);
goto out;
}

--- linux-4.15.0.orig/drivers/scsi/cxlflash/superpipe.h
+++ linux-4.15.0/drivers/scsi/cxlflash/superpipe.h
@@ -96,15 +96,15 @@
struct llun_info **rht_lun;       /* Mapping of RHT entries to LUNs */
u8 *rht_needs_ws; /* User-desired write-same function per RHTE */

-struct cxl_ioctl_start_work work;
u64 ctxid;
+u64 irqs; /* Number of interrupts requested for context */
pid_t pid;
bool initialized;
bool unavail;
bool err_recovery_active;
struct mutex mutex; /* Context protection */
struct kref kref;
-struct cxl_context *ctx;
+void *ctx;
struct cxlflash_cfg *cfg;
struct list_head luns; /* LUNs attached to this context */
const struct vm_operations_struct *cxl_mmap_vmops;
--- linux-4.15.0.orig/drivers/scsi/dc395x.c
+++ linux-4.15.0/drivers/scsi/dc395x.c
@@ -1969,6 +1969,11 @@
xferred -= psge->length;
} else {
+pci_dma_sync_single_for_cpu(srb->dcb->

/* Partial SG entry done */

acb->dev,
srb->sg_bus_addr,
SEGMENTX_LEN,
PCI_DMA_TO_DEVICE);
psge->length -= xferred;
psge->address += xferred;
srb->sg_index = idx;
@@ -3447,14 +3452,12 @@
}
}

-if (dir != PCI_DMA_NONE && scsi_sg_count(cmd))
- pci_dma_sync_sg_for_cpu(acb->dev, scsi_sglist(cmd),
- scsi_sg_count(cmd), dir);
-
ckc_only = 0;
/* Check Error Conditions */
  ckc_e:

+pci_unmap_srb(acb, srb);
+
if (cmd->cmd[0] == INQUIRY) {
 unsigned char *base = NULL;
 struct ScsiInqData *ptr;
@@ -3508,7 +3511,6 @@
 cmd, cmd->result);
srb_free_insert(acb, srb);
}
-pci_unmap_srb(acb, srb);

cmd->scsi_done(cmd);
waiting_process_next(acb);
--- linux-4.15.0.orig/drivers/scsi/device_handler/scsi_dh_alua.c
+++ linux-4.15.0/drivers/scsi/device_handler/scsi_dh_alua.c
@@ -53,6 +53,7 @@
 unsigned int tpg_desc_tbl_off;
 unsigned char orig_transition_tmo;
 unsigned long flags;
+bool transitioning_sense = false;

#define ALUA_FAIILOVER_TIMEOUT60
#define ALUA_FAIILOVER_RETRIES5
#define ALUA_RTPG_DELAY_MSECS5
+#define ALUA_RTPG_RETRY_DELAY2

/* device handler flags */
#define ALUA_OPTIMIZE_STPG0x01
@@ -522,6 +523,7 @@
 unsigned int tpg_desc_tbl_off;
 unsigned char orig_transition_tmo;
 unsigned long flags;
+bool transitioning_sense = false;
if (!pg->expiry) {
unsigned long transition_tmo = ALUA_FAILOVER_TIMEOUT * HZ;
@@ -558,21 +560,28 @@
* even though it shouldn't according to T10.
* The retry without rtpg_ext_hdr_req set
* handles this.
+ * Note: some arrays return a sense key of ILLEGAL_REQUEST
+ * with ASC 00h if they don't support the extended header.
*/
if (!(pg->flags & ALUA_RTPG_EXT_HDR_UNSUPP) &&
    sense_hdr.sense_key == ILLEGAL_REQUEST &&
    sense_hdr.asc == 0x24 && sense_hdr.ascq == 0) {
+    sense_hdr.sense_key == ILLEGAL_REQUEST) {
pg->flags |= ALUA_RTPG_EXT_HDR_UNSUPP;
goto retry;
}
/*
 - * Retry on ALUA state transition or if any
 - * UNIT ATTENTION occurred.
 + * If the array returns with 'ALUA state transition'
 + * sense code here it cannot return RTPG data during
 + * transition. So set the state to 'transitioning' directly.
 */
if (sense_hdr.sense_key == NOT_READY &&
    sense_hdr.asc == 0x04 && sense_hdr.ascq == 0x0a) {
-err = SCSI_DH_RETRY;
}else if (sense_hdr.sense_key == UNIT_ATTENTION) {
+    transitioning_sense = true;
+goto skip_rtpg;
+}
+/*
 + * Retry on any other UNIT ATTENTION occurred.
 + */
+if (sense_hdr.sense_key == UNIT_ATTENTION) {
err = SCSI_DH_RETRY;
if (err == SCSI_DH_RETRY &&
    pg->expiry != 0 && time_before(jiffies, pg->expiry)) {
@@ -645,8 +654,8 @@
rcu_read_lock();
list_for_each_entry_rcu(h, &tmp_pg->dh_list, node) {
-/* h->sdev should always be valid */
-BUG_ON(!h->sdev);
+if (!h->sdev)
+continue;
    h->sdev->access_state = desc[0];
}
rcu_read_unlock();
@@ -660,7 +669,11 @@
     off = 8 + (desc[7] * 4);
 }
 
+skip_rtpg:
 spin_lock_irqsave(&pg->lock, flags);
+if (transitioning_sense)
+pg->state = SCSI_ACCESS_STATE_TRANSITIONING;
 +
 sdev_printk(KERN_INFO, sdev,
 "%s: port group %02x state %c %s supports %c%c%c%c%c%c%c\n",
 ALUA_DH_NAME, pg->group_id, print_alua_state(pg->state),
@@ -677,7 +690,7 @@
case SCSI_ACCESS_STATE_TRANSITIONING:
 if (time_before(jiffies, pg->expiry)) {
 /* State transition, retry */
-    pg->interval = 2;
+    pg->interval = ALUA_RTPG_RETRY_DELAY;
 err = SCSI_DH_RETRY;
 } else {
 struct alua_dh_data *h;
@@ -688,7 +701,8 @@
      h->sdev = NULL;
      if (err == SCSI_DH_RETRY) {
         pg->expiry = 0;
-      rcu_read_lock();
-      list_for_each_entry_rcu(h, &pg->dh_list, node) {
-         BUG_ON(!h->sdev);
-      }
+      list_for_each_entry(h, &pg->dh_list, node) {
+         if (!h->sdev)
+            continue;
+      case SCSI_ACCESS_STATE_TRANSITIONING:
+      if (time_before(jiffies, pg->expiry)) {
+         /* State transition, retry */
+         pg->interval = ALUA_RTPG_RETRY_DELAY;
+         err = SCSI_DH_RETRY;
+      } else {
+         struct alua_dh_data *h;
@@ -802,6 +816,8 @@
      spin_lock_irqsave(&pg->lock, flags);
      if (err == SCSI_DH_RETRY || pg->flags & ALUA_PG_RUN_RTPG) {
         if (!pg->interval && !(pg->flags & ALUA_PG_RUN_RTPG))
-            pg->interval = ALUA_RTPG_RETRY_DELAY;
+            pg->interval = ALUA_RTPG_RETRY_DELAY;
         spin_unlock_irqrestore(&pg->lock, flags);
         queue_delayed_work(kaluad_wq, &pg->rtpg_work,
          pg->interval * HZ);
@@ -813,6 +829,8 @@
      spin_lock_irqsave(&pg->lock, flags);
      if (err == SCSI_DH_RETRY || pg->flags & ALUA_PG_RUN_RTPG) {
         if (!pg->interval && !(pg->flags & ALUA_PG_RUN_RTPG))
-            pg->interval = ALUA_RTPG_RETRY_DELAY;
+            pg->interval = ALUA_RTPG_RETRY_DELAY;
         spin_unlock_irqrestore(&pg->lock, flags);
         queue_delayed_work(kaluad_wq, &pg->rtpg_work,
          pg->interval * HZ);

spin_unlock_irqrestore(&pg->lock, flags);
queue_delayed_work(kaluad_wq, &pg->rtpg_work,
@@ -1120,7 +1138,6 @@
spin_lock(&h->pg_lock);
pg = rcu_dereference_protected(h->pg, lockdep_is_held(&h->pg_lock));
rcu_assign_pointer(h->pg, NULL);
-h->sdev = NULL;
spin_unlock(&h->pg_lock);
if (pg) {
spin_lock_irq(&pg->lock);
@@ -1129,6 +1146,7 @@
kref_put(&pg->kref, release_port_group);
} 
sdev->handler_data = NULL;
+synchronize_rcu();
kfree(h);
}
@@ -1149,10 +1167,8 @@
int r;

kaluad_wq = alloc_workqueue("kaluad", WQ_MEM_RECLAIM, 0);
-if (!kaluad_wq) {
-/* Temporary failure, bypass */
-return SCSI_DH_DEV_TEMP_BUSY;
-}
+if (!kaluad_wq)
+return -ENOMEM;
r = scsi_register_device_handler(&alua_dh);
if (r != 0) {
--- linux-4.15.0.orig/drivers/scsi/device_handler/scsi_dh_rdac.c
+++ linux-4.15.0/drivers/scsi/device_handler/scsi_dh_rdac.c
@@ -453,8 +453,8 @@
if (!h->ctlr)
err = SCSI_DH_RES_TEMP_UNAVAIL;
else {
-list_add_rcu(&h->node, &h->ctlr->dh_list);
-h->sdev = sdev;
+list_add_rcu(&h->node, &h->ctlr->dh_list);
} 
spin_unlock(&list_lock);
err = SCSI_DH_OK;
@@ -546,6 +546,8 @@
spin_unlock(&ctlr->ms_lock);
retry:
+memset(cdb, 0, sizeof(cdb));
+ data_size = rdac_failover_get(ctlr, &list, cdb);

RDAC_LOG(RDAC_LOG_FAILOVER, sdev, "array %s, ctrl %d, ")
spin_lock(&list_lock);
if (h->ctlr) {
    list_del_rcu(&h->node);
    h->sdev = NULL;
    kref_put(&h->ctlr->kref, release_controller);
}
spin_unlock(&list_lock);
sdev->handler_data = NULL;
+synchronize_rcu();
kfree(h);
}

--- linux-4.15.0.orig/drivers/scsi/eata.c
+++ linux-4.15.0/drivers/scsi/eata.c
@@ -1552,8 +1552,11 @@
    tpnt->proc_name = "eata2x";

-    if (strlen(boot_options))
+    if (strlen(boot_options)) {
    +        if (kernel_is_locked_down("Command line-specified device addresses, irqs and dma channels"))
    +            return -EPERM;
    option_setup(boot_options);
    +}  

#define defined(MODULE)
/* io_port could have been modified when loading as a module */
--- linux-4.15.0.orig/drivers/scsi/esas2r/esas2r_flash.c
+++ linux-4.15.0/drivers/scsi/esas2r/esas2r_flash.c
@@ -1197,6 +1197,7 @@
    up(&a->nvram_semaphore);
    return false;
}

--- linux-4.15.0.orig/drivers/scsi/esp_scsi.c
+++ linux-4.15.0/drivers/scsi/esp_scsi.c
@@ -1338,6 +1338,7 @@
    bytes_sent -= ecount;

bytes_sent = esp->data_dma_len;
bytes_sent -= ecount;

+bytes_sent -= esp->send_cmd_residual;

/*
 * The am53c974 has a DMA 'pecularity'. The doc states:
--- linux-4.15.0.orig/drivers/scsi/esp_scsi.h
+++ linux-4.15.0/drivers/scsi/esp_scsi.h
@@ -540,6 +540,8 @@
    void            *dma;
    intdmarev;
    +u32 send_cmd_residual;
    }

/* A front-end driver for the ESP chip should do the following in
--- linux-4.15.0.orig/drivers/scsi/fcoe/fcoe.c
+++ linux-4.15.0/drivers/scsi/fcoe/fcoe.c
@@ -390,7 +390,7 @@
    * Returns: pointer to a struct fcoe_interface or NULL on error
    */
static struct fcoe_interface *fcoe_interface_create(struct net_device *netdev,
    -    enum fip_state fip_mode)
    +    enum fip_mode fip_mode)
    {
        struct fcoe_ctlr_device *ctlr_dev;
        struct fcoe_ctlr *ctlr;
    --- linux-4.15.0.orig/drivers/scsi/fcoe/fcoe_ctlr.c
    +++ linux-4.15.0/drivers/scsi/fcoe/fcoe_ctlr.c
    @@ -147,7 +147,7 @@
    * fcoe_ctlr_init() - Initialize the FCoE Controller instance
    * @fip: The FCoE controller to initialize
    */
    -void fcoe_ctlr_init(struct fcoe_ctlr *fip, enum fip_state mode)
    +void fcoe_ctlr_init(struct fcoe_ctlr *fip, enum fip_mode mode)
    {
        fcoe_ctlr_set_state(fip, FIP_ST_LINK_WAIT);
        fip->mode = mode;
    @@ -267,9 +267,9 @@
    WARN_ON(!fcf_dev);
    new->fcf_dev = NULL;
    fcoe_fcf_device_delete(fcf_dev);
    -kfree(new);
    mutex_unlock(&cdev->lock);
    }
    +kfree(new);
    }

    /**
mutex_unlock(&fip->ctrlr_mutex);
fc_linkup(fip->lp);
} else if (fip->state == FIP_ST_LINK_WAIT) {
    fcoe_ctlr_set_state(fip, fip->mode);
    if (fip->mode == FIP_MODE_NON_FIP)
        fcoe_ctlr_set_state(fip, FIP_ST_NON_FIP);
    else
        fcoe_ctlr_set_state(fip, FIP_ST_AUTO);

    switch (fip->mode) {
    default:
        LIBFCOE_FIP_DBG(fip, "invalid mode \%d\n", fip->mode);
    }
}

 case ELS_LOGO:
    if (fip->mode == FIP_MODE_VN2VN) {
        if (fip->state != FIP_ST_VNMP_UP)
            return -EINVAL;

        if (ntoh24(fh->fh_d_id) == FC_FID_FLOGI)
            return -EINVAL;
    } else {
        if (fip->state != FIP_ST_ENABLED)
            return 0;
    }

 case ELS_OPCODE:
    return fcoe_ctlr_vn_parse(fip, skb);

 case ELS_LOGO:
    return fcoe_ctlr_els_send(skb);

    *static inline struct fcoe_rport *fcoe_ctlr_rport(struct fc_rport_priv *rdata)
    { return (struct fcoe_rport *)(rdata + 1); }

    *static int fcoe_ctlr_vn_parse(struct fcoe_ctlr *fip, struct sk_buff *skb,
struct fip_header *fiph;
struct fip_desc *desc = NULL;
struct fip_wwn_desc *wwn = NULL;
struct fip_vn_desc *vn = NULL;
struct fip_size_desc *size = NULL;
struct fcoe_rport *frport;
size_t rlen;
size_t dlen;
uint32_t desc_mask = 0;
uint32_t dtype;
uint8_t sub;

memset(rdata, 0, sizeof(*rdata) + sizeof(*frport));
frport = fcoe_ctlr_rport(rdata);

fiph = (struct fip_header *)skb->data;
frport->flags = ntohs(fiph->fip_flags);

if (dlen != sizeof(struct fip_wwn_desc))
goto len_err;
wwn = (struct fip_wwn_desc *)desc;
frport->rdata.ids.node_name = get_unaligned_be64(&wwn->fd_wwn);
frport->rdata.ids.port_id = ntoh24(vn->fd_fc_id);
frport->rdata.ids.port_name = get_unaligned_be64(&vn->fd_wwpn);
break;

if (dlen != sizeof(struct fip_vn_desc))
goto len_err;
vn = (struct fip_vn_desc *)desc;
memcpy(frport->vn_mac, vn->fd_mac, ETH_ALEN);
frport->rdata.ids.port_id = ntoh24(vn->fd_fc_id);
frport->rdata.ids.port_name = get_unaligned_be64(&vn->fd_wwpn);
break;

case FIP_DT_FC4F:
if (dlen != sizeof(struct fip_fc4_feat))

{ struct fip_header *fiph;
  enum fip_vn2vn_subcode sub;
  struct {
-struct fc_rport_priv rdata;
-struct fcoe_rport frport;
-} buf;
+struct fcoe_rport frport = { };
int rc, vlan_id = 0;

fiph = (struct fip_header *)skb->data;
@@ -2768,7 +2766,7 @@
goto drop;
}

-rc = fcoe_ctlr_vn_parse(fip, skb, &buf.rdata);
+rc = fcoe_ctlr_vn_parse(fip, skb, &frport);
if (rc) {
LIBFCOE_FIP_DBG(fip, "vn_recv vn_parse error %d\n", rc);
goto drop;
@@ -2777,19 +2775,19 @@
mutex_lock(&fip->ctlr_mutex);
switch (sub) {
  case FIP_SC_VN_PROBE_REQ:
-    fcoe_ctlr_vn_probe_req(fip, &buf.rdata);
+    fcoe_ctlr_vn_probe_req(fip, &frport.rdata);
    break;
  case FIP_SC_VN_PROBE_REP:
-    fcoe_ctlr_vn_probe_reply(fip, &buf.rdata);
+    fcoe_ctlr_vn_probe_reply(fip, &frport.rdata);
    break;
  case FIP_SC_VN_CLAIM_NOTIFY:
-    fcoe_ctlr_vn_claim_notify(fip, &buf.rdata);
+    fcoe_ctlr_vn_claim_notify(fip, &frport.rdata);
    break;
  case FIP_SC_VN_CLAIM_REP:
-    fcoe_ctlr_vn_claim_resp(fip, &buf.rdata);
+    fcoe_ctlr_vn_claim_resp(fip, &frport.rdata);
    break;
  case FIP_SC_VN_Beacon:
-    fcoe_ctlr_vn_beacon(fip, &buf.rdata);
+    fcoe_ctlr_vn_beacon(fip, &frport.rdata);
    break;
  default:
LIBFCOE_FIP_DBG(fip, "vn_recv unknown subcode %d\n", sub);
@@ -2813,22 +2811,18 @@
*/
static int fcoe_ctlr_vlan_parse(struct fcoe_ctlr *fip,
    struct sk_buff *skb,
-    struct fc_rport_priv *rdata)
+    struct fcoe_rport *frport)
{
struct fip_header *fiph;
struct fip_desc *desc = NULL;
struct fip_mac_desc *macd = NULL;
struct fip_wwn_desc *wwn = NULL;
struct fcoe_rport *frport;
size_t rlen;
size_t dlen;
u32 desc_mask = 0;
u32 dtype;
u8 sub;

memset(rdata, 0, sizeof(*rdata) + sizeof(*frport));
frport = fcoe_ctlr_rport(rdata);

fiph = (struct fip_header *)skb->data;
frport->flags = ntohs(fiph->fip_flags);

if (dlen != sizeof(struct fip_wwn_desc))
goto len_err;
wwn = (struct fip_wwn_desc *)desc;
-rdata->ids.node_name = get_unaligned_be64(&wwn->fd_wwn);
+frport->rdata.ids.node_name =
+get_unaligned_be64(&wwn->fd_wwn);
break;
default:
LIBFCOE_FIP_DBG(fip, "unexpected descriptor type %x ")

{ struct fip_header *fiph;
enum fip_vlan_subcode sub;
-struct {
-struct fc_rport_priv rdata;
-struct fcoe_rport frport;
-} buf;
+struct fcoe_rport frport = { };
int rc;

fiph = (struct fip_header *)skb->data;
sub = fiph->fip_subcode;
-rc = fcoe_ctlr_vlan_parse(fip, skb, &buf.rdata);
+rc = fcoe_ctlr_vlan_parse(fip, skb, &frport);
if (rc) {
LIBFCOE_FIP_DBG(fip, "vlan_recv vlan_parse error %d\n", rc);
goto drop;
}
mutex_lock(&fip->ctlr_mutex);
if (sub == FIP_SC_VL_REQ)
fcoe_ctlr_vlan_disc_reply(fip, &buf.rdata);
fcoe_ctlr_vlan_disc_reply(fip, &frport.rdata);
mutex_unlock(&fip->ctlr_mutex);
drop:
--- linux-4.15.0.orig/drivers/scsi/fcoe/fcoe_transport.c
+++ linux-4.15.0/drivers/scsi/fcoe/fcoe_transport.c
@@ -873,7 +873,7 @@
 int rc = -ENODEV;
 struct net_device *netdev = NULL;
 struct fcoe_transport *ft = NULL;
-enum fip_state fip_mode = (enum fip_state)(long)kp->arg;
+enum fip_mode fip_mode = (enum fip_mode)kp->arg;

 mutex_lock(&ft_mutex);

--- linux-4.15.0.orig/drivers/scsi/fnic/fnic_isr.c
+++ linux-4.15.0/drivers/scsi/fnic/fnic_isr.c
@@ -254,7 +254,7 @@
 int vecs = n + m + o + 1;

 if (pci_alloc_irq_vectors(fnic->pdev, vecs, vecs,
-PCI_IRQ_MSIX) < 0) {
+PCI_IRQ_MSIX) == vecs) {
 fnic->rq_count = n;
 fnic->raw_wq_count = m;
 fnic->wq_copy_count = o;
@@ -280,7 +280,7 @@
 fnic->wq_copy_count >= 1 &&
 fnic->cq_count >= 3 &&
 fnic->intr_count >= 1 &&
-pci_alloc_irq_vectors(fnic->pdev, 1, 1, PCI_IRQ_MSI) < 0) {
+pci_alloc_irq_vectors(fnic->pdev, 1, 1, PCI_IRQ_MSI) == 1) {
 fnic->rq_count = 1;
 fnic->raw_wq_count = 1;
 fnic->wq_copy_count = 1;
--- linux-4.15.0.orig/drivers/scsi/fnic/fnic_main.c
+++ linux-4.15.0/drivers/scsi/fnic/fnic_main.c
@@ -746,6 +746,7 @@
 for (i = 0; i < FNIC_IO_LOCKS; i++)
 spin_lock_init(&fnic->io_req_lock[i]);

+err = -ENOMEM;
 fnic->io_req_pool = mempool_create_slab_pool(2, fnic_io_req_cache);
if (!fnic->io_req_pool)
goto err_out_free_resources;
--- linux-4.15.0.orig/drivers/scsi/fnic/fnic_scsi.c
+++ linux-4.15.0/drivers/scsi/fnic/fnic_scsi.c
if (unlikely(fnic_chk_state_flags_locked(fnic, FNIC_FLAGS_IO_BLOCKED)))
  return SCSI_MLQUEUE_HOST_BUSY;

  if (unlikely(fnic_chk_state_flags_locked(fnic, FNIC_FLAGS_FWRESET)))
  return SCSI_MLQUEUE_HOST_BUSY;

+  rport = starget_to_rport(scsi_target(sc->device));
+  if (!rport) {
+    FNIC_SCSI_DBG(KERN_DEBUG, fnic->lport->host,
+    @@ -1031,7 +1034,8 @@
+      atomic64_inc(&fnic_stats->io_stats.io_completions);

      -io_duration_time = jiffies_to_msecs(jiffies) - jiffies_to_msecs(io_req->start_time);
      +io_duration_time = jiffies_to_msecs(jiffies) -
      +jiffies_to_msecs(start_time);

      if(io_duration_time <= 10)
        atomic64_inc(&fnic_stats->io_stats.io_btw_0_to_10_msec);
-- linux-4.15.0.orig/drivers/scsi/fnic/vnic_dev.c
+++ linux-4.15.0/drivers/scsi/fnic/vnic_dev.c
@@ -445,26 +445,26 @@
int vnic_dev_hang_notify(struct vnic_dev *vdev)
{
    -u64 a0, a1;
    +u64 a0 = 0, a1 = 0;
    int wait = 1000;
    return vnic_dev_cmd(vdev, CMD_HANG_NOTIFY, &a0, &a1, wait);
}

int vnic_dev_mac_addr(struct vnic_dev *vdev, u8 *mac_addr)
{
    -u64 a0, a1;
    +u64 a[2] = {};
    int wait = 1000;
    int err, i;

    for (i = 0; i < ETH_ALEN; i++)
        mac_addr[i] = 0;

        err = vnic_dev_cmd(vdev, CMD_MAC_ADDR, &a0, &a1, wait);
        +err = vnic_dev_cmd(vdev, CMD_MAC_ADDR, &a[0], &a[1], wait);
        if (err)
            return err;

        for (i = 0; i < ETH_ALEN; i++)
mac_addr[i] = ((u8 *)&a0)[i];
+mac_addr[i] = ((u8 *)&a)[i];

return 0;
}

@@ -489,30 +489,30 @@

void vnic_dev_add_addr(struct vnic_dev *vdev, u8 *addr)
{
    -u64 a0 = 0, a1 = 0;
    +u64 a[2] = {};
    int wait = 1000;
    int err;
    int i;

    for (i = 0; i < ETH_ALEN; i++)
    -((u8 *)&a0)[i] = addr[i];
    +((u8 *)&a)[i] = addr[i];

    -err = vnic_dev_cmd(vdev, CMD_ADDR_ADD, &a0, &a1, wait);
    +err = vnic_dev_cmd(vdev, CMD_ADDR_ADD, &a[0], &a[1], wait);
    if (err)
        pr_err("Can't add addr [%pM], %d\n", addr, err);
}

void vnic_dev_del_addr(struct vnic_dev *vdev, u8 *addr)
{
    -u64 a0 = 0, a1 = 0;
    +u64 a[2] = {};
    int wait = 1000;
    int err;
    int i;

    for (i = 0; i < ETH_ALEN; i++)
    -((u8 *)&a0)[i] = addr[i];
    +((u8 *)&a)[i] = addr[i];

    -err = vnic_dev_cmd(vdev, CMD_ADDR_DEL, &a0, &a1, wait);
    +err = vnic_dev_cmd(vdev, CMD_ADDR_DEL, &a[0], &a[1], wait);
    if (err)
        pr_err("Can't del addr [%pM], %d\n", addr, err);
}
/* cacheservice defines */
#define SECTOR_SIZE 0x200 /* always 512 bytes per sec. */

/* DPMEM constants */
#define DPMEM_MAGIC 0xC0FFEE11
#define IC_HEADER_BYTES 48

--- linux-4.15.0.orig/drivers/scsi/hisi_sas/Kconfig
+++ linux-4.15.0/drivers/scsi/hisi_sas/Kconfig
@@ -1,6 +1,6 @@
config SCSI_HISI_SAS
tristate "HiSilicon SAS"
-depends on HAS_DMA && HAS_IOMEM
+depends on HAS_IOMEM
depends on ARM64 || COMPILE_TEST
select SCSI_SAS_LIBSAS
select BLK_DEV_INTEGRITY
--- linux-4.15.0.orig/drivers/scsi/hisi_sas/hisi_sas.h
+++ linux-4.15.0/drivers/scsi/hisi_sas/hisi_sas.h
@@ -16,6 +16,7 @@
#include <linux/clk.h>
#include <linux/dmapool.h>
#include <linux/iopoll.h>
+include <linux/lcm.h>
#include <linux/mfd/syscon.h>
#include <linux/module.h>
#include <linux/of_address.h>
@@ -33,6 +34,7 @@
#define HISI_SAS_MAX_DEVICES HISI_SAS_MAX_ITCT_ENTRIES
#define HISI_SAS_RESET_BIT0
#define HISI_SAS_REJECT_CMD_BIT1
+define HISI_SAS_RESERVED_IPTT_CNT 96

#define HISI_SAS_STATUS_BUF_SZ (sizeof(struct hisi_sas_status_buffer))
#define HISI_SAS_COMMAND_TABLE_SZ (sizeof(union hisi_sas_command_table))
@@ -67,6 +69,12 @@
#define HISI_SAS_SATA_PROTOCOL_FPDMA 0x8
#define HISI_SAS_SATA_PROTOCOL_ATAPI 0x10
+define HISI_SAS_DIF_PROT_MASK (SHOST_DIF_TYPE1_PROTECTION \ 
+SHOST_DIF_TYPE2_PROTECTION \ 
+SHOST_DIF_TYPE3_PROTECTION)
+
+#define HISI_SAS_PROT_MASK (HISI_SAS_DIF_PROT_MASK)
+
+struct hisi_hba;
enum {
@@ -99,18 +107,51 @@
const struct hisi_sas_hw_error *sub;
);

+struct hisi_sas_rst {
+struct hisi_hba *hisi_hba;
+struct completion *completion;
+struct work_struct work;
+bool done;
+};
+
+#define HISI_SAS_RST_WORK_INIT(r, c) \
+{	.hisi_hba = hisi_hba, \
+.completion = &c, \
+.work = __WORK_INITIALIZER(r.work, \
+hisi_sas_sync_rst_work_handler), \
+.done = false, \
+}
+
+#define HISI_SAS_DECLARE_RST_WORK_ON_STACK(r) \
+DECLARE_COMPLETION_ONSTACK(c); \
+DECLARE_WORK(w, hisi_sas_sync_rst_work_handler); \
+struct hisi_sas_rst r = HISI_SAS_RST_WORK_INIT(r, c)
+
+enum hisi_sas_bit_err_type {
+HISI_SAS_ERR_SINGLE_BIT_ECC = 0x0,
+HISI_SAS_ERR_MULTI_BIT_ECC = 0x1,
+};
+
+enum hisi_sas_phy_event {
+HISI_PHYE_PHY_UP   = 0U,
+HISI_PHYE_LINK_RESET,
+HISI_PHYES_NUM,
+};
+
+struct hisi_sas_phy {
+struct work_struct works[HISI_PHYES_NUM];
+struct hisi_hba*his_i_hba;
+struct hisi_sas_port*port;
+struct asd_sas PHYsas_phy;
+struct sas_identifyidentify;
+struct work_struct phyup ws;
+struct completion *reset_completion;
+spinlock_t lock;
+u64 port_id; /* from hw */
+u64 dev_sas_addr;
+u64 frame_rcvd_size;
+u8 frame_rcvd[32];
+u8 phy_attached;
-u8 reserved[3];
+u8 in_reset;
+u8 reserved[2];
u32 phy_type;
enum sas_linkrate minimum_linkrate;
enum sas_linkrate maximum_linkrate;
@@ -131,7 +172,7 @@
    struct hisi_sas_dq {
        struct hisi_hba *hisi_hba;
    -struct hisi_sas_slot *slot_prep;
     +struct list_head list;
          spinlock_t lock;
        int wr_point;
          intid;
@@ -143,16 +184,22 @@
    struct completion *completion;
        struct hisi_sas_dq *dq;
        struct list_head list_headlist;
    -u64 attached_phy;
    -atomic64_t running_req;
    enum sas_device_type dev_type;
        int device_id;
        int sata_idx;
        u8 dev_status;
    }
+struct hisi_sas_tmf_task {
+    int force_phy;
+    int phy_id;
+    u8 tmf;
+    u16 tag_of_task_to_be_managed;
+    
+    struct hisi_sas_slot {
        struct list_head entry;
      +struct list_head delivery;
        struct sas_task *task;
        struct hisi_sas_port *port;
        u64 n_elem;
@@ -160,39 +207,36 @@
            intdlvry_queue_slot;
            intcompt_queue;
            intcomplt_queue_slot;
            -intidx;
            intabort;
            -void *buf;
            -dma_addr_t buf_dma;
    
+int ready;
void *cmd_hdr;
dma_addr_t cmd_hdr_dma;
-struct work_struct abort_slot;
struct timer_list internal_abort_timer;
-}
-
-struct hisi_sas_tmf_task {
-u8 tmf;
-u16 tag_of_task_to_be_managed;
+bool is_internal;
+struct hisi_sas_tmf_task *tmf;
+/
* Do not reorder/change members after here */
+void *buf;
+dma_addr_t buf_dma;
+u16 idx;
};

struct hisi_sas_hw {
int (*hw_init)(struct hisi_hba *hisi_hba);
void (*setup_itct)(struct hisi_hba *hisi_hba,
    struct hisi_sas_device *device);
-int (*slot_index_alloc)(struct hisi_hba *hisi_hba, int *slot_idx,
    struct domain_device *device);
-int (*get_free_slot)(struct hisi_hba *hisi_hba, struct hisi_sas_dq *dq);
void (*start_delivery)(struct hisi_sas_dq *dq);
-int (*prep_ssp)(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot, int is_tmf,
    struct hisi_sas_tmf_task *tmf);
-int (*prep_smp)(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot);
-int (*prep_stp)(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot);
+int (*prep_abort)(struct hisi_hba *hisi_hba,
    int device_id, int abort_flag, int tag_to_abort);
int (*slot_complete)(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot,
    int phy_set_linkrate)(struct hisi_hba *hisi_hba, int phy_no,
struct sas_phy_linkrates *linkrates);
enum sas_linkrate (*phy_get_max_linkrate)(void);
-void (*free_device)(struct hisi_hba *hisi_hba,
+void (*clear_itct)(struct hisi_hba *hisi_hba,
    struct hisi_sas_device *dev);
+void (*free_device)(struct hisi_sas_device *sas_dev);
int (*get_wideport_bitmap)(struct hisi_hba *hisi_hba, int port_id);
void (*dereg_device)(struct hisi_hba *hisi_hba,
    struct domain_device *device);
int (*soft_reset)(struct hisi_hba *hisi_hba);
u32 (*get_phys_state)(struct hisi_hba *hisi_hba);
+int (*write_gpio)(struct hisi_hba *hisi_hba, u8 reg_type,
    u8 reg_index, u8 reg_count, u8 *write_data);
+void (*wait_cmds_complete_timeout)(struct hisi_hba *hisi_hba,
    int delay_ms, int timeout_ms);
int max_command_entries;
int complete_hdr_size;
+struct scsi_host_template *sht;}

struct hisi_hba {
    struct pci_dev *pci_dev;
    struct device *dev;
    +int prot_mask;
    +void __iomem *regs;
    +void __iomem *sgpio_regs;
    struct regmap *ctrl;
    u32 ctrl_reset_reg;
    u32 ctrl_reset_sts_reg;
    int n_phy;
    spinlock_t lock;
    +struct semaphore sem;
    
    struct timer_list timer;
    struct workqueue_struct *wq;
    
    int slot_index_count;
    +int last_slot_index;
    +int last_dev_id;
    unsigned long *slot_index_tags;
    unsigned long reject_stp_links_msk;

    @ @ -253,7 +309,6 @ @
int queue_count;

-struct dma_pool *buffer_pool;
struct hisi_sas_devicedevices[HISI_SAS_MAX_DEVICES];
struct hisi_sas_cmd_hdr*cmd_hdr[HISI_SAS_MAX_QUEUES];
dma_addr_t cmd_hdr_dma[HISI_SAS_MAX_QUEUES];
@@ -274,6 +329,9 @@
const struct hisi_sas_hw *hw;/* Low level hw interface */
unsigned long sata_dev_bitmap[BITS_TO_LONGS(HISI_SAS_MAX_DEVICES)];
struct work_struct rst_work;
+u32 phy_state;
+u32 intr_coal_ticks;/* Time of interrupt coalesce in us */
+u32 intr_coal_count;/* Interrupt count to coalesce */
};

/* Generic HW DMA host memory structures */
@@ -377,7 +435,7 @@
union {
    struct {
        struct ssp_command_iu task;
-        u32 prot[6];
+        u32 prot[7];
    }
    struct ssp_tmf_iu ssp_task;
    struct xfer_rdy_iu xfer_rdy;
    @@ -403,27 +461,35 @@
};

extern struct scsi_transport_template *hisi_sas_stt;
-extern struct scsi_host_template *hisi_sas_sht;
-
extern void hisi_sas_stop_phys(struct hisi_hba *hisi_hba);
-extern void hisi_sas_init_add(struct hisi_hba *hisi_hba);
extern int hisi_sas_alloc(struct hisi_hba *hisi_hba, struct Scsi_Host *shost);
extern void hisi_sas_free(struct hisi_hba *hisi_hba);
-extern u8 hisi_sas_get_ata_protocol(u8 cmd, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction);
+extern u8 hisi_sas_get_ata_protocol(struct host_to_dev_fi...
extern int hisi_sas_slave_configure(struct scsi_device *sdev);
extern int hisi_sas_scan_finished(struct Scsi_Host *shost, unsigned long time);
extern void hisi_sas_scan_start(struct Scsi_Host *shost);
extern int hisi_sas_host_reset(struct Scsi_Host *shost, int reset_type);
extern void hisi_sas_phy_down(struct hisi_hba *hisi_hba, int phy_no, int rdy);
extern void hisi_sas_slot_task_free(struct hisi_hba *hisi_hba, struct sas_task *task, struct hisi_sas_slot *slot);
extern void hisi_sas_init_mem(struct hisi_hba *hisi_hba);
extern void hisi_sas_rst_work_handler(struct work_struct *work);
extern void hisi_sas_sync_rst_work_handler(struct work_struct *work);
extern void hisi_sas_release_tasklets(struct hisi_hba *hisi_hba);
extern void hisi_sas_release_tasks(struct hisi_hba *hisi_hba);
extern void hisi_sas_get_prog_phy_linkrate_mask(enum sas_linkrate max);
extern void hisi_sas_controller_reset_prepare(struct hisi_hba *hisi_hba);
extern void hisi_sas_controller_reset_done(struct hisi_hba *hisi_hba);
extern void hisi_sas_notify_phy_event(struct hisi_sas_phy *phy, enum hisi_sas_phy_event event);
extern bool hisi_sas_release_tasks(struct hisi_hba *hisi_hba);
extern void hisi_sas_release_task(struct hisi_hba *hisi_hba, struct domain_device *device);
extern void hisi_sas_dev_gone(struct domain_device *device);

--- linux-4.15.0.orig/drivers/scsi/hisi_sas/hisi_sas_main.c
+++ linux-4.15.0/drivers/scsi/hisi_sas/hisi_sas_main.c
@@ -10,6 +10,7 @@
 */

#include "hisi_sas.h"
#include "../libsas/sas_internal.h"
#define DRV_NAME "hisi_sas"

#define DEV_IS_GONE(dev) \
@@ -22,16 +23,21 @@
 struct domain_device *device,
     int abort_flag, int tag);
static int hisi_sas_softreset_ata_disk(struct domain_device *device);
+static int hisi_sas_control_phy(struct asd_sas_phy *sas_phy, enum phy_func_func, void *funcdata);
+static void hisi_sas_release_task(struct hisi_hba *hisi_hba, struct domain_device *device);
+static void hisi_sas_dev_gone(struct domain_device *device);

-u8 hisi_sas_get_ata_protocol(u8 cmd, int direction)
+u8 hisi_sas_get_ata_protocol(struct host_to_dev_fis *fis, int direction)
{
+switch (cmd) {
+switch (fis->command) {
 case ATA_CMD_FPDMA_WRITE:
 case ATA_CMD_FPDMA_READ:
 case ATA_CMD_FPDMA_RECV:
 case ATA_CMD_FPDMA_SEND:
case ATA_CMD_NCQ_NON_DATA:
    return HISI_SAS_SATA_PROTOCOL_FPDMA;
+    return HISI_SAS_SATA_PROTOCOL_FPDMA;

case ATA_CMD_DOWNLOAD_MICRO:
case ATA_CMD_ID_ATA:
    @ @ -43,7 +49,7 @@
case ATA_CMD_WRITE_LOG_EXT:
case ATA_CMDPIO_WRITE:
case ATA_CMDPIO_WRITE_EXT:
    return HISI_SAS_SATA_PROTOCOLPIO;
+    return HISI_SAS_SATA_PROTOCOLPIO;

case ATA_CMD_DSM:
case ATA_CMD_DOWNLOAD_MICRO_DMA:
    @ @ -62,7 +68,7 @@
case ATA_CMD_WRITE_LOG_DMA_EXT:
case ATA_CMD_WRITE_STREAM_DMA_EXT:
case ATA_CMD_ZAC_MGMT_IN:
    return HISI_SAS_SATA_PROTOCOL_DMA;
+    return HISI_SAS_SATA_PROTOCOL_DMA;

case ATA_CMD_CHK_POWER:
case ATA_CMD_DEV_RESET:
    @ @ -75,12 +81,29 @@
case ATA_CMD_STANDBY:
case ATA_CMD_STANDBYNOW1:
case ATA_CMD_ZAC_MGMT_OUT:
    return HISI_SAS_SATA_PROTOCOL_NONDATA;
+    return HISI_SAS_SATA_PROTOCOL_NONDATA;
+
+    case ATA_CMD_SET_MAX:
+    switch (fis->features) {
+    case ATA_SET_MAX_PASSWD:
+    case ATA_SET_MAX_LOCK:
+        return HISI_SAS_SATA_PROTOCOLPIO;
+    +
+    case ATA_SET_MAX_PASSWD_DMA:
+    case ATA_SET_MAX_UNLOCK_DMA:
+        return HISI_SAS_SATA_PROTOCOL_DMA;
+    +
+    default:
+    +
    default:
    +
    if (direction == DMA_NONE)
return HISI_SAS_SATA_PROTOCOL_NONDATA;
return HISI_SAS_SATA_PROTOCOL_PIO;
}
+	}
}
EXPORT_SYMBOL_GPL(hisi_sas_get_ata_protocol);

@@ -101,20 +124,21 @@
EXPORT_SYMBOL_GPL(hisi_sas_sata_done);

-int hisi_sas_get_ncq_tag(struct sas_task *task, u32 *tag)
+/*
+ * This function assumes linkrate mask fits in 8 bits, which it
+ * does for all HW versions supported.
+ */
+u8 hisi_sas_get_prog_phy_linkrate_mask(enum sas_linkrate max)
{
-struct ata_queued_cmd *qc = task->uldd_task;
+u16 rate = 0;
+int i;

-/* This function assumes linkrate mask fits in 8 bits, which it
- does for all HW versions supported.
- */
+u8 hisi_sas_get_prog_phy_linkrate_mask(enum sas_linkrate max)
{
-struct ata_queued_cmd *qc = task->uldd_task;
+u16 rate = 0;
+int i;

-struct ata_queued_cmd *qc = task->uldd_task;
+u16 rate = 0;
+int i;

-struct ata_queued_cmd *qc = task->uldd_task;
+u16 rate = 0;
+int i;

-if (qc) {
-if (qc->tf.command == ATA_CMD_FPDMA_WRITE ||
-qc->tf.command == ATA_CMD_FPDMA_READ) {
   *

-static struct hihi_hba *dev_to_hisi_hba(struct domain_device *device)
{
@@ -145,7 +169,14 @@
 static struct hisi_hba *dev_to_hisi_hba(struct domain_device *device)
 {
@@ -145,7 +169,14 @@
 static struct hisi_hba *dev_to_hisi_hba(struct domain_device *device)
 {
@@ -145,7 +169,14 @@
 static struct hisi_hba *dev_to_hisi_hba(struct domain_device *device)
 {
static void hisi_sas_slot_index_set(struct hisi_hba *hisi_hba, int slot_idx)
{
    set_bit(slot_idx, bitmap);
}

static int hisi_sas_slot_index_alloc(struct hisi_hba *hisi_hba, int *slot_idx)
{
    unsigned int index;
    void *bitmap = hisi_hba->slot_index_tags;
    unsigned long flags;

    if (scsi_cmnd)
        return scsi_cmnd->request->tag;

   index = find_first_zero_bit(bitmap, hisi_hba->slot_index_count);
    if (index >= hisi_hba->slot_index_count)
        return -SAS_QUEUE_FULL;
    spin_lock_irqsave(&hisi_hba->lock, flags);
    index = find_next_zero_bit(bitmap, hisi_hba->slot_index_count,
                               hisi_hba->last_slot_index + 1);
    if (index >= hisi_hba->slot_index_count) {
        spin_unlock_irqrestore(&hisi_hba->lock, flags);
        return -SAS_QUEUE_FULL;
    }
    hisi_sas_slot_index_set(hisi_hba, index);
    *slot_idx = index;
    return 0;
}
static void hisi_sas_slot_index_init(struct hisi_hba *hisi_hba)
@@ -179,11 +227,11 @@
void hisi_sas_slot_task_free(struct hisi_hba *hisi_hba, struct sas_task *task,
   struct hisi_sas_slot *slot)
{
+  struct hisi_sas_dq *dq = &hisi_hba->dq[slot->dlvry_queue];
+  unsigned long flags;

  if (task) {
      struct device *dev = hisi_hba->dev;
      struct domain_device *device = task->dev;
      struct hisi_sas_device *sas_dev = device->lldd_dev;

      if (!task->lldd_task)
          return;
@@ -192,118 +240,150 @@

      if (!sas_protocol_ata(task->task_proto))
          if (slot->n_elem)
              dma_unmap_sg(dev, task->scatter, slot->n_elem,
+              dma_unmap_sg(dev, task->scatter,
+              task->num_scatter,
+              task->data_dir);
-          -if (sas_dev)
-              atomic64_dec(&sas_dev->running_req);
  }

-  if (slot->buf)
-      dma_pool_free(hisi_hba->buffer_pool, slot->buf, slot->buf_dma);

+  spin_lock_irqsave(&dq->lock, flags);
  list_del_init(&slot->entry);
-  slot->buf = NULL;
-  slot->task = NULL;
-  slot->port = NULL;
-  thisi_sas_slot_index_free(hisi_hba, slot->idx);
+  spin_unlock_irqrestore(&dq->lock, flags);

-  /* slot memory is fully zeroed when it is reused */
+  memset(slot, 0, offsetof(struct hisi_sas_slot, buf));
+  thisi_sas_slot_index_free(hisi_hba, slot->idx);
  }

 EXPORT_SYMBOL_GPL(hisi_sas_slot_task_free);

-static int hisi_sas_task_prep_smp(struct hisi_hba *hisi_hba,
+static void hisi_sas_task_prep_smp(struct hisi_hba *hisi_hba,  
    struct hisi_sas_slot *slot)  
{  
    -return hisi_hba->hw->prep_smp(hisi_hba, slot);  
+hisi_hba->hw->prep_smp(hisi_hba, slot);  
}  

-static int hisi_sas_task_prep_ssp(struct hisi_hba *hisi_hba,  
    struct hisi_sas_slot *slot, int is_tmf,  
    struct hisi_sas_tmf_task *tmf)  
+static void hisi_sas_task_prep_ssp(struct hisi_hba *hisi_hba,  
    struct hisi_sas_slot *slot)  
{  
    -return hisi_hba->hw->prep_ssp(hisi_hba, slot, is_tmf, tmf);  
+hisi_hba->hw->prep_ssp(hisi_hba, slot);  
}  

-static int hisi_sas_task_prep_ata(struct hisi_hba *hisi_hba,  
+static void hisi_sas_task_prep_ata(struct hisi_hba *hisi_hba,  
    struct hisi_sas_slot *slot)  
{  
    -return hisi_hba->hw->prep_stp(hisi_hba, slot);  
+hisi_hba->hw->prep_stp(hisi_hba, slot);  
}  

-static int hisi_sas_task_prep_abort(struct hisi_hba *hisi_hba,  
    struct hisi_sas_slot *slot, int device_id, int abort_flag, int tag_to_abort)  
{  
    -return hisi_hba->hw->prep_abort(hisi_hba, slot, device_id, abort_flag, tag_to_abort);  
+/*  
    - * This function will issue an abort TMF regardless of whether the  
    - * task is in the sdev or not. Then it will do the task complete  
    - * cleanup and callbacks.  
    - */  
    -static void hisi_sas_slot_abort(struct work_struct *work)  
    +static void hisi_sas_dma_unmap(struct hisi_hba *hisi_hba,  
        struct sas_task *task, int n_elem,  
        int n_elem_req, int n_elem_resp)  
    {  
        -struct hisi_sas_slot *abort_slot =  
        -container_of(work, struct hisi_sas_slot, abort_slot);  
        -struct sas_task *task = abort_slot->task;  
        +struct hisi_sas_slot *abort_slot =  
        +container_of(work, struct hisi_sas_slot, abort_slot);  
        +struct sas_task *task = abort_slot->task;  
    }  

/
struct hisi_hba *hisi_hba = dev_to_hisi_hba(task->dev);
struct scsi_cmnd *cmnd = task->uldd_task;
struct hisi_sas_tmf_task tmf_task;
struct scsi_lun lun;
struct device *dev = hisi_hba->dev;
int tag = abort_slot->idx;
unsigned long flags;

-if (!((task->task_proto & SAS_PROTOCOL_SSP)) { 
  dev_err(dev, "cannot abort slot for non-ssp task\n");
  goto out;
+if (!sas_protocol_ata(task->task_proto)) {
  +if (task->num_scatter) {
    +if (n_elem)
      +dma_unmap_sg(dev, task->scatter,
          + task->num_scatter,
          + task->data_dir);
    +} else if (task->task_proto & SAS_PROTOCOL_SMP) {
      +if (n_elem_req)
        +dma_unmap_sg(dev, &task->smp_task.smp_req,
            + 1, DMA_TODEVICE);
      +if (n_elem_resp)
        +dma_unmap_sg(dev, &task->smp_task.smp_resp,
            + 1, DMA_FROMDEVICE);
    +}
  +}
+}

-int_to_scsilun(cmnd->device->lun, &lun);
tmf_task.tmf = TMF_ABORT_TASK;
tmf_task.tag_of_task_to_be_managed = cpu_to_le16(tag);
+static int hisi_sas_dma_map(struct hisi_hba *hisi_hba,
    + struct sas_task *task, int *n_elem,
    + int *n_elem_req, int *n_elem_resp)
+{
  +struct device *dev = hisi_hba->dev;
  +int rc;

  -hisi_sas_debug_issue_ssp_tmf(task->dev, lun.scsi_lun, &tmf_task);
  -out:
  -/* Do cleanup for this task */
  -spin_lock_irqsave(&hisi_hba->lock, flags);
  -hisi_sas_slot_task_free(hisi_hba, task, abort_slot);
  -spin_unlock_irqrestore(&hisi_hba->lock, flags);
  -if (task->task_done)
    -task->task_done(task);
  +if (sas_protocol_ata(task->task_proto)) {
    +*n_elem = task->num_scatter;
} else {
    unsigned int req_len, resp_len;
    
    if (task->num_scatter) {
        *n_elem = dma_map_sg(dev, task->scatter,
           task->num_scatter, task->data_dir);
        if (!*n_elem) {
            rc = -ENOMEM;
            goto prep_out;
        }
    } else if (task->task_proto & SAS_PROTOCOL_SMP) {
        *n_elem_req = dma_map_sg(dev, &task->smp_task.smp_req,
           1, DMA_TO_DEVICE);
        if (!*n_elem_req) {
            rc = -ENOMEM;
            goto prep_out;
        }
        req_len = sg_dma_len(&task->smp_task.smp_req);
        if (req_len & 0x3) {
            rc = -EINVAL;
            goto err_out_dma_unmap;
        }
        *n_elem_resp = dma_map_sg(dev, &task->smp_task.smp_resp,
           1, DMA_FROM_DEVICE);
        if (!*n_elem_resp) {
            rc = -ENOMEM;
            goto err_out_dma_unmap;
        }
        resp_len = sg_dma_len(&task->smp_task.smp_resp);
        if (resp_len & 0x3) {
            rc = -EINVAL;
            goto err_out_dma_unmap;
        }
    }
    if (*n_elem > HISI_SAS_SGE_PAGE_CNT) {
        dev_err(dev, "task prep: n_elem(%d) > HISI_SAS_SGE_PAGE_CNT", *n_elem);
        rc = -EINVAL;
        goto err_out_dma_unmap;
    }
    return 0;
+
+} err_out_dma_unmap:
+    /* It would be better to call dma_unmap_sg() here, but it's messy */
+    hisi_sas_dma_unmap(hisi_hba, task, *n_elem,
       *n_elem_req, *n_elem_resp);
static int hisi_sas_task_prep(struct sas_task *task, struct hisi_sas_dq *dq, int is_tmf, struct hisi_sas_tmf_task *tmf, int *pass)
{
    struct hisi_hba *hisi_hba = dq->hisi_hba;
    struct domain_device *device = task->dev;
    struct hisi_sas_device *sas_dev = device->lldd_dev;
    struct hisi_sas_port *port;
    struct hisi_sas_slot *slot;
    struct hisi_sas_cmd_hdr *cmd_hdr_base;
    struct asd_sas_port *sas_port = device->port;
    struct device *dev = hisi_hba->dev;
    int dlvry_queue_slot, dlvry_queue, n_elem = 0, rc, slot_idx;
    int n_elem_req = 0, n_elem_resp = 0;
    struct hisi_sas_dq *dq;
    unsigned long flags;

    if (!sas_port) {
        struct task_status_struct *ts = &task->task_status;
        ts->resp = SAS_TASK_UNDELIVERED;
        ts->stat = SAS_PHY_DOWN;
        /*
        * libsas will use dev->port, should
        * not call task_done for sata
        */
        if (device->dev_type != SAS_SATA_DEV)
            task->task_done(task);
        return SAS_PHY_DOWN;
    }

    if (DEV_IS_GONE(sas_dev)) {
        if (sas_dev)
            dev_info(dev, "task prep: device %016llx not ready
", SAS_ADDR(device->sas_addr));
    }
    return rc;
}

if (DEV_IS_GONE(sas_dev)) {
    if (sas_dev)
        dev_info(dev, "task prep: device %016llx not ready\n", SAS_ADDR(device->sas_addr));
}
-return SAS_PHY_DOWN;
+ return -ECOMM;
}

/*dq_pointer = dq = sas_dev->dq;
 +
 port = to_hisi_sas_port(sas_port);
if (port && !port->port_attached) {
  dev_info(dev, "task prep: %s port%d not attach device\n",
@@ -323,43 +405,52 @@
    "SATA/STP" : "SAS",
    device->port->id);

-return SAS_PHY_DOWN;
+ return -ECOMM;
}

- if (!sas_protocol_ata(task->task_proto)) {
-  if (task->num_scatter) {
-    n_elem = dma_map_sg(dev, task->scatter,
-      - task->num_scatter, task->data_dir);
-  }
-  } else
-    n_elem = task->num_scatter;
+ rc = hisi_sas_dma_map(hisi_hba, task, &n_elem,
+    &n_elem_req, &n_elem_resp);
+  if (rc < 0)
+    goto prep_out;

- spin_lock_irqsave(&hisi_hba->lock, flags);
+ spin_lock_irqsave(&hisi_hba->lock, flags);
 if (hisi_hba->hw->slot_index_alloc)
  -rc = hisi_hba->hw->slot_index_alloc(hisi_hba, &slot_idx,
  - device);
- else
-  -rc = hisi_sas_slot_index_alloc(hisi_hba, &slot_idx);
-  } if (rc) {
-    spin_unlock_irqrestore(&hisi_hba->lock, flags);
-    goto err_out;
+ rc = hisi_hba->hw->slot_index_alloc(hisi_hba, device);
+  else {
+    struct scsi_cmnd *scsi_cmnd = NULL;
+    if (task->uldd_task) {
+      struct ata_queued_cmd *qc;
+if (dev_is_sata(device)) {
+qc = task->uldd_task;
+scsi_cmnd = qc->scsicmd;
+} else {
+scsi_cmnd = task->uldd_task;
+}
+
+rc = hisi_sas_slot_index_alloc(hisi_hba, scsi_cmnd);
}
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
+if (rc < 0)
+goto err_out_dma_unmap;

-rc = hisi_hba->hw->get_free_slot(hisi_hba, dq);
-if (rc)
+slot_idx = rc;
+slot = &hisi_hba->slot_info[slot_idx];
+
+spin_lock_irqsave(&dq->lock, flags);
+wr_q_index = hisi_hba->hw->get_free_slot(hisi_hba, dq);
+if (wr_q_index < 0) {
+spin_unlock_irqrestore(&dq->lock, flags);
+rc = -EAGAIN;
+goto err_out_tag;
+}
+
+list_add_tail(&slot->delivery, &dq->list);
+list_add_tail(&slot->entry, &sas_dev->list);
+spin_unlock_irqrestore(&dq->lock, flags);

dlvry_queue = dq->id;
-dlvry_queue_slot = dq->wr_point;
-slot = &hisi_hba->slot_info[slot_idx];
-memset(slot, 0, sizeof(struct hisi_sas_slot));
+dlvry_queue_slot = wr_q_index;

-slot->idx = slot_idx;
-slot->n_elem = n_elem;
-slot->dlvry_queue = dlvry_queue;
-slot->dlvry_queue_slot = dlvry_queue_slot;
-@ @ .367,100 +458,104 @ @
-slot->cmd_hdr = &cmd_hdr_base[dlvry_queue_slot];
-slot->task = task;
-slot->port = port;
+slot->tmf = tmf;
+slot->is_internal = is_tmf;
-task->lldd_task = slot;
-INIT_WORK(&slot->abort_slot, hisi_sas_slot_abort);

-slot->buf = dma_pool_alloc(hisi_hba->buffer_pool,
   - GFP_ATOMIC, &slot->buf_dma);
-if (!slot->buf) {
   -rc = -ENOMEM;
   -goto err_out_slot_buf;
   -
   memset(slot->cmd_hdr, 0, sizeof(struct hisi_sas_cmd_hdr));
   memset(hisi_sas_cmd_hdr_addr_mem(slot), 0, HISI_SAS_COMMAND_TABLE_SZ);
   memset(hisi_sas_status_buf_addr_mem(slot), 0, HISI_SAS_STATUS_BUF_SZ);

   switch (task->task_proto) {
       case SAS_PROTOCOL_SMP:
           -rc = hisi_sas_task_prep_smp(hisi_hba, slot);
           +hisi_sas_task_prep_smp(hisi_hba, slot);
           break;
       case SAS_PROTOCOL_SSP:
           -rc = hisi_sas_task_prep_ssp(hisi_hba, slot, is_tmf, tmf);
           +hisi_sas_task_prep_ssp(hisi_hba, slot);
           break;
       case SAS_PROTOCOL_SATA:
       case SAS_PROTOCOL_STP:
       case SAS_PROTOCOL_SATA | SAS_PROTOCOL_STP:
           -rc = hisi_sas_task_prep_ata(hisi_hba, slot);
           +hisi_sas_task_prep_ata(hisi_hba, slot);
           break;
       default:
           dev_err(dev, "task prep: unknown/unsupported proto (0x%x)n",
                   task->task_proto);
           -rc = -EINVAL;
           break;
       }

     -if (rc) {
     -dev_err(dev, "task prep: rc = 0x%x\n", rc);
     -goto err_out_buf;
     -
     -spin_lock_irqsave(&hisi_hba->lock, flags);
     -list_add_tail(&slot->entry, &sas_dev->list);
     -spin_unlock_irqrestore(&hisi_hba->lock, flags);
     task->task_state_flags |= SAS_TASK_AT_INITIATOR;
     spin_unlock_irqrestore(&task->task_state_lock, flags);

     -dq->slot_prep = slot;
atomic64_inc(&sas_dev->running_req);
++(*pass);
WRITE_ONCE(slot->ready, 1);
return 0;

#define ERR_OUT_BUF:
-dma_pool_free(hisi_hba->buffer_pool, slot->buf,
-slot->buf_dma);
#define ERR_OUT_SLOT_BUF:
-/* Nothing to be done */
err_out_tag:
-spin_lock_irqsave(&hisi_hba->lock, flags);
hisisas_slot_index_free(hisi_hba, slot_idx);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
#define ERR_OUT:
-dev_err(dev, "task prep: failed[%d]!", rc);
-if (!sas_protocol_ata(task->task_proto))
-if (n_elem)
-dma_unmap_sg(dev, task->scatter, n_elem,
-   task->data_dir);
+err_out_dma_unmap:
thisisas_dma_unmap(hisi_hba, task, n_elem,
   n_elem_req, n_elem_resp);
-prep_out:
+dev_err(dev, "task prep: failed[%d]!", rc);
return rc;
}

static int hisi_sas_task_exec(struct sas_task *task, gfp_t gfp_flags,
-   int is_tm, struct hisisas_tmf_task *tmf)
+   bool is_tm, struct hisisas_tmf_task *tmf)
{
    u32 rc;
    u32 pass = 0;
    unsigned long flags;
-   struct hisi_hba *hisi_hba = dev_to_hisi_hba(task->dev);
-   struct device *dev = hisi_hba->dev;
+   struct hisi_hba *hisi_hba;
+   struct device *dev;
struct domain_device *device = task->dev;
-   struct hisi_sas_device *sas_dev = device->lldd_dev;
-   struct hisi_sas_dq *dq = sas_dev->dq;
+   struct asd_sas_port *sas_port = device->port;
+   struct hisi_sas_dq *dq = NULL;

-   if (unlikely(test_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags)))
-   return -EINVAL;

-atomic64_inc(&sas_dev->running_req);
++(*pass);
+WRITE_ONCE(slot->ready, 1);

return 0;

#define ERR_OUT_BUF:
-dma_pool_free(hisi_hba->buffer_pool, slot->buf,
-slot->buf_dma);
#define ERR_OUT_SLOT_BUF:
-/* Nothing to be done */
err_out_tag:
-spin_lock_irqsave(&hisi_hba->lock, flags);
hisisas_slot_index_free(hisi_hba, slot_idx);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
#define ERR_OUT:
-dev_err(dev, "task prep: failed[%d]!", rc);
-if (!sas_protocol_ata(task->task_proto))
-if (n_elem)
-dma_unmap_sg(dev, task->scatter, n_elem,
-   task->data_dir);
+err_out_dma_unmap:
thisisas_dma_unmap(hisi_hba, task, n_elem,
   n_elem_req, n_elem_resp);
-prep_out:
+dev_err(dev, "task prep: failed[%d]!", rc);
return rc;
}

static int hisi_sas_task_exec(struct sas_task *task, gfp_t gfp_flags,
-   int is_tm, struct hisisas_tmf_task *tmf)
+   bool is_tm, struct hisisas_tmf_task *tmf)
{
    u32 rc;
    u32 pass = 0;
    unsigned long flags;
-   struct hisi_hba *hisi_hba = dev_to_hisi_hba(task->dev);
-   struct device *dev = hisi_hba->dev;
+   struct hisi_hba *hisi_hba;
+   struct device *dev;
struct domain_device *device = task->dev;
-   struct hisi_sas_device *sas_dev = device->lldd_dev;
-   struct hisi_sas_dq *dq = sas_dev->dq;
+   struct asd_sas_port *sas_port = device->port;
+   struct hisi_sas_dq *dq = NULL;

-   if (unlikely(test_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags)))
-   return -EINVAL;

-atomic64_inc(&sas_dev->running_req);
++(*pass);
+WRITE_ONCE(slot->ready, 1);

return 0;

#define ERR_OUT_BUF:
-dma_pool_free(hisi_hba->buffer_pool, slot->buf,
-slot->buf_dma);
#define ERR_OUT_SLOT_BUF:
-/* Nothing to be done */
err_out_tag:
-spin_lock_irqsave(&hisi_hba->lock, flags);
hisisas_slot_index_free(hisi_hba, slot_idx);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
#define ERR_OUT:
-dev_err(dev, "task prep: failed[%d]!", rc);
-if (!sas_protocol_ata(task->task_proto))
-if (n_elem)
-dma_unmap_sg(dev, task->scatter, n_elem,
-   task->data_dir);
+err_out_dma_unmap:
thisisas_dma_unmap(hisi_hba, task, n_elem,
   n_elem_req, n_elem_resp);
-prep_out:
+dev_err(dev, "task prep: failed[%d]!", rc);
return rc;
}

static int hisi_sas_task_exec(struct sas_task *task, gfp_t gfp_flags,
-   int is_tm, struct hisisas_tmf_task *tmf)
+   bool is_tm, struct hisisas_tmf_task *tmf)
{
    u32 rc;
    u32 pass = 0;
    unsigned long flags;
-   struct hisi_hba *hisi_hba = dev_to_hisi_hba(task->dev);
-   struct device *dev = hisi_hba->dev;
+   struct hisi_hba *hisi_hba;
+   struct device *dev;
struct domain_device *device = task->dev;
-   struct hisi_sas_device *sas_dev = device->lldd_dev;
-   struct hisi_sas_dq *dq = sas_dev->dq;
+   struct asd_sas_port *sas_port = device->port;
+   struct hisi_sas_dq *dq = NULL;

-   if (unlikely(test_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags)))
-   return -EINVAL;
if (!sas_port) {
+ struct task_status_struct *ts = &task->task_status;
+ ts->resp = SAS_TASK_UNDELIVERED;
+ ts->stat = SAS_PHY_DOWN;
+ /*
+ * libsas will use dev->port, should
+ * not call task_done for sata
+ */
+ if (device->dev_type != SAS_SATA_DEV)
+ task->task_done(task);
+ return -ECOMM;
+ }
+
+ hisi_hba = dev_to_hisi_hba(device);
+ dev = hisi_hba->dev;
+
+ if (unlikely(test_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags))) {
+ /*
+ * For IOs from upper layer, it may already disable preempt
+ * in the IO path, if disable preempt again in down(),
+ * function schedule() will report schedule_bug(), so check
+ * preemptible() before goto down().
+ */
+ if (!preemptible())
+ return -EINVAL;
+ }
+
+ down(&hisi_hba->sem);
+ up(&hisi_hba->sem);
+ }

/* protect task_prep and start_delivery sequence */
- spin_lock_irqsave(&dq->lock, flags);
- rc = hisi_sas_task_prep(task, dq, is_tmf, tmf, &pass);
+ rc = hisi_sas_task_prep(task, &dq, is_tmf, tmf, &pass);
if (rc)
 dev_err(dev, "task exec: failed[%d]\n", rc);

-if (likely(pass))
+if (likely(pass)) {
+ spin_lock_irqsave(&dq->lock, flags);
+ hisi_hba->hw->start_delivery(dq);
+ spin_unlock_irqrestore(&dq->lock, flags);
+ }

return rc;
}
struct hisi_hba *hisi_hba = dev_to_hisi_hba(device);
struct hisi_sas_device *sas_dev = NULL;
unsigned long flags;
+int last = hisi_hba->last_dev_id;
+int first = (hisi_hba->last_dev_id + 1) % HISI_SAS_MAX_DEVICES;
int i;

spin_lock_irqsave(&hisi_hba->lock, flags);
- for (i = 0; i < HISI_SAS_MAX_DEVICES; i++) {
+ for (i = first; i != last; i %= HISI_SAS_MAX_DEVICES) {
    if (hisi_hba->devices[i].dev_type == SAS_PHY_UNUSED) {
int queue = i % hisi_hba->queue_count;
struct hisi_sas_dq *dq = &hisi_hba->dq[queue];
    @ @ -529,18 +626,57 @@
INIT_LIST_HEAD(&hisi_hba->devices[i].list);
    break;
    }
+ i++;
    }
+ hisi_hba->last_dev_id = i;
spin_unlock_irqrestore(&hisi_hba->lock, flags);

return sas_dev;
}

+#define HISI_SAS_SRST_ATA_DISK_CNT 3
+static int hisi_sas_init_device(struct domain_device *device)
+{
+ int rc = TMF_RESP_FUNC_COMPLETE;
+ struct scsi_lun lun;
+ struct hisi_sas_tmf_task tmf_task;
+ int retry = HISI_SAS_SRST_ATA_DISK_CNT;
+ struct hisi_hba *hisi_hba = dev_to_hisi_hba(device);
+ switch (device->dev_type) {
+ case SAS_END_DEVICE:
+ int_to_scsilun(0, &lun);
+ switch (device->dev_type) {
+ case SAS_END_DEVICE:
+ int_to_scsilun(0, &lun);
+ case SAS_SATA_DEV:
+ case SAS_SATA_PM:
+ case SAS_SATA_PM_PORT:
case SAS_SATA_PENDING:
    while (retry-- > 0) {
        rc = hisi_sas_softreset_ata_disk(device);
        if (!rc)
            break;
    }
    break;
default:
    break;
}
return rc;
}

static int hisi_sas_dev_found(struct domain_device *device)
{
    struct hisi_hba *hisi_hba = dev_to_hisi_hba(device);
    struct domain_device *parent_dev = device->parent;
    struct hisi_sas_device *sas_dev;
    struct device *dev = hisi_hba->dev;
    int rc;

    if (hisi_hba->hw->alloc_dev)
        sas_dev = hisi_hba->hw->alloc_dev(device);
    for (phy_no = 0; phy_no < phy_num; phy_no++) {
        phy = &parent_dev->ex_dev.ex_phy[phy_no];
        if (SAS_ADDR(phy->attached_sas_addr) ==
            SAS_ADDR(device->sas_addr)) {
            sas_dev->attached_phy = phy_no;
            break;
        }
    }
    if (phy_no == phy_num) {
        dev_info(dev, "dev:0x%016llx at ex:0x%016llx\n",
                  SAS_ADDR(device->sas_addr),
                  SAS_ADDR(parent_dev->sas_addr));
        rc = -EINVAL;
        goto err_out;
    }
    }

    if (phy_no == phy_num) {
        dev_info(dev, "dev:0x%016llx at ex:0x%016llx\n",
                  SAS_ADDR(device->sas_addr),
                  SAS_ADDR(parent_dev->sas_addr));
        -return -EINVAL;
    }
    +rc = -EINVAL;
    +goto err_out;
}
+rc = hisi_sas_init_device(device);
+if (rc)
+    goto err_out;
return 0;
+
+err_out:
+hisi_sas_dev_gone(device);
+return rc;
}

-export_symbol_gpl(hisi_sas_slave_configure);

- static int hisi_sas_slave_configure(struct scsi_device *sdev)
+int hisi_sas_slave_configure(struct scsi_device *sdev)
{}  
struct domain_device *dev = sdev_to_domain_dev(sdev);
int ret = sas_slave_configure(sdev);
@@ -593,15 +738,17 @@
return 0;
}
+export_symbol_gpl(hisi_sas_slave_configure);

- static void hisi_sas_scan_start(struct Scsi_Host *shost)
+void hisi_sas_scan_start(struct Scsi_Host *shost)
{}  
struct hisi_hba *hisi_hba = shost_priv(shost);

hisi_hba->hw->phys_init(hisi_hba);
}
+export_symbol_gpl(hisi_sas_scan_start);

- static int hisi_sas_scan_finished(struct Scsi_Host *shost, unsigned long time)
+int hisi_sas_scan_finished(struct Scsi_Host *shost, unsigned long time)
{}  
struct hisi_hba *hisi_hba = shost_priv(shost);
struct sas_ha_struct *sha = &hisi_hba->sha;
@@ -613,26 +760,57 @@
sas_drain_work(sha);
return 1;
}
+export_symbol_gpl(hisi_sas_scan_finished);

static void hisi_sas_phyup_work(struct work_struct *work)
{}  
 struct hisi_sas_phy *phy =
    container_of(work, struct hisi_sas_phy, phyup_ws);
+container_of(work, typeof(*phy), works[HISI_PHYE_PHY_UP]);
struct hisi_hba *hisi_hba = phy->hisi_hba;
struct asd_sas_phy *sas_phy = &phy->sas_phy;
int phy_no = sas_phy->id;

-hisi_hba->hw->sl_notify(hisi_hba, phy_no); /* This requires a sleep */
+if (phy->identify.target_port_protocols == SAS_PROTOCOL_SSP)
  +hisi_hba->hw->sl_notify_ssp(hisi_hba, phy_no);
hisi_sas_bytes_dmaed(hisi_hba, phy_no);
}

+static void hisi_sas_linkreset_work(struct work_struct *work)
+{
+  +struct hisi_sas_phy *phy =
+  +container_of(work, typeof(*phy), works[HISI_PHYE_LINK_RESET]);
+  +struct asd_sas_phy *sas_phy = &phy->sas_phy;
+  +
+  +hisi_sas_control_phy(sas_phy, PHY_FUNC_LINK_RESET, NULL);
+  +}
+  +
+static const work_func_t hisi_sas_phye_fns[HISI_PHYES_NUM] = {
+  +[HISI_PHYE_PHY_UP] = hisi_sas_phyup_work,
+  +[HISI_PHYE_LINK_RESET] = hisi_sas_linkreset_work,
+  +};
+  +
+bool hisi_sas_notify_phy_event(struct hisi_sas_phy *phy,
+enum hisi_sas_phy_event event)
+{
+  +struct hisi_hba *hisi_hba = phy->hisi_hba;
+  +
+  +if (WARN_ON(event >= HISI_PHYES_NUM))
+    +return false;
+  +
+  +return queue_work(hisi_hba->wq, &phy->works[event]);
+  +}
+EXPORT_SYMBOL_GPL(hisi_sas_notify_phy_event);
+}
+static void hisi_sas_phy_init(struct hisi_hba *hisi_hba, int phy_no)
+{
+  +struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
+  +struct asd_sas_phy *sas_phy = &phy->sas_phy;
+  +int i;

  phy->hisi_hba = hisi_hba;
  phy->port = NULL;
  +phy->minimum_linkrate = SAS_LINK_RATE_1_5_GBPS;
  +phy->maximum_linkrate = hisi_hba->hw->phy_get_max_linkrate();
  sas_phy->enabled = (phy_no < hisi_hba->n_phy) ? 1 : 0;
  sas_phy->class = SAS;
  sas_phy->iproto = SAS_PROTOCOL_ALL;
sas_phy->ha = (struct sas_ha_struct *)hisi_hba->shost->hostdata;
sas_phy->lldd_phy = phy;

-INIT_WORK(&phy->phyup_ws, hisi_sas_phyup_work);
+for (i = 0; i < HISI_PHYES_NUM; i++)
+INIT_WORK(&phy->works[i], hisi_sas_phye_fns[i]);
+
+spin_lock_init(&phy->lock);
}

static void hisi_sas_port_notify_formed(struct asd_sas_phy *sas_phy)
{
struct hisi_hba *hisi_hba = sas_ha->lldd_ha;
struct hisi_sas_phy *phy = sas_phy->lldd_phy;
struct asd_sas_port *sas_port = sas_phy->port;
-struct hisi_sas_port *port = to_hisi_sas_port(sas_port);
+struct hisi_sas_port *port;
unsigned long flags;

if (!sas_port)
return;

+port = to_hisi_sas_port(sas_port);
spin_lock_irqsave(&hisi_hba->lock, flags);
port->port_attached = 1;
port->id = phy->port_id;
@
spin_lock_irqsave(&task->task_state_lock, flags);
task->task_state_flags &=
~(SAS_TASK_STATE_PENDING | SAS_TASK_AT_INITIATOR);
-task->task_state_flags |= SAS_TASK_STATE_DONE;
+if (!slot->is_internal && task->task_proto != SAS_PROTOCOL_SMP)
+task->task_state_flags |= SAS_TASK_STATE_DONE;
spin_unlock_irqrestore(&task->task_state_lock, flags);
}

hisi_sas_slot_task_free(hisi_hba, task, slot);
}

-/* hisi_hba.lock should be locked */
static void hisi_sas_release_task(struct hisi_hba *hisi_hba,
struct domain_device *device)
{
@
hisi_sas_do_release_task(hisi_hba, slot->task, slot);
}
-static void hisi_sas_release_tasks(struct hisi_hba *hisi_hba)
+void hisi_sas_release_tasks(struct hisi_hba *hisi_hba)
{
    struct hisi_sas_device *sas_dev;
    struct domain_device *device;
@@ -719,6 +901,7 @@
hisi_sas_release_task(hisi_hba, device);
}
}
+EXPORT_SYMBOL_GPL(hisi_sas_release_tasks);

static void hisi_sas_dereg_device(struct hisi_hba *hisi_hba,
    struct domain_device *device)
@@ -733,18 +916,25 @@
hisi_hba = dev_to_hisi_hba(device);
    struct device *dev = hisi_hba->dev;

-dev_info(dev, "found dev[\%d:%x] is gone\n",
+dev_info(dev, "dev[\%d:%x] is gone\n",
    sas_dev->device_id, sas_dev->dev_type);

-hisi_sas_internal_task_abort(hisi_hba, device,
+down(&hisi_hba->sem);
+if (!test_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags)) {
+    hisi_sas_internal_task_abort(hisi_hba, device,
+        HISI_SAS_INT_ABT_DEV, 0);

-hisi_sas_dereg_device(hisi_hba, device);
+hisi_sas_dereg_device(hisi_hba, device);
+  +hisi_hba->hw->clear_itct(hisi_hba, sas_dev);
+  device->lldd_dev = NULL;
+}

-hisi_hba->hw->free_device(hisi_hba, sas_dev);
-device->lldd_dev = NULL;
-memset(sas_dev, 0, sizeof(*sas_dev));
+if (hisi_hba->hw->free_device)
+hisi_hba->hw->free_device(sas_dev);
+sas_dev->dev_type = SAS_PHY_UNUSED;
+sas_dev->sas_device = NULL;
+up(&hisi_hba->sem);
}

static int hisi_sas_queue_command(struct sas_task *task, gfp_t gfp_flags)
@@ -752,6 +942,41 @@
return hisi_sas_task_exec(task, gfp_flags, 0, NULL);
+static int hisi_sas_phy_set_linkrate(struct hisi_hba *hisi_hba, int phy_no,
+struct sas_phy_linkrates *r)
+{
+struct sas_phy_linkrates _r;
+
+struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
+struct asd_sas_phy *sas_phy = &phy->sas_phy;
+
+enum sas_linkrate min, max;
+
+if (r->minimum_linkrate > SAS_LINK_RATE_1_5_GBPS)
+return -EINVAL;
+
+if (r->maximum_linkrate == SAS_LINK_RATE_UNKNOWN) {
+max = sas_phy->phy->maximum_linkrate;
+min = r->minimum_linkrate;
+} else if (r->minimum_linkrate == SAS_LINK_RATE_UNKNOWN) {
+max = r->maximum_linkrate;
+min = sas_phy->phy->minimum_linkrate;
+} else
+return -EINVAL;
+
+_r.maximum_linkrate = max;
+_r.minimum_linkrate = min;
+
+sas_phy->phy->maximum_linkrate = max;
+sas_phy->phy->minimum_linkrate = min;
+
+hisi_hba->hw->phy_disable(hisi_hba, phy_no);
+msleep(100);
+hisi_hba->hw->phy_set_linkrate(hisi_hba, phy_no, &_r);
+hisi_hba->hw->phy_start(hisi_hba, phy_no);
+
+return 0;
+}
+
static int hisi_sas_control_phy(struct asd_sas_phy *sas_phy, enum phy_func func, 
void *funcdata)
{
@@ -775,8 +1000,7 @@
break;

case PHY_FUNC_SET_LINK_RATE:
-hisi_hba->hw->phy_set_linkrate(hisi_hba, phy_no, funcdata);
-break;
+return hisi_sas_phy_set_linkrate(hisi_hba, phy_no, funcdata);

case PHY_FUNC_GET_EVENTS:
if (hisi_hba->hw->get_events) {

}
hisi_hba->hw->get_events(hisi_hba, phy_no);
@@ -792,8 +1016,7 @@
static void hisi_sas_task_done(struct sas_task *task)
{
    -if (!del_timer(&task->slow_task->timer))
    -return;
+del_timer(&task->slow_task->timer);
    complete(&task->slow_task->completion);
}
@@ -802,17 +1025,22 @@
struct sas_task_slow *slow = from_timer(slow, t, timer);
struct sas_task *task = slow->task;
unsigned long flags;
+bool is_completed = true;

spin_lock_irqsave(&task->task_state_lock, flags);
-if (!(task->task_state_flags & SAS_TASK_STATE_DONE))
+if (!(task->task_state_flags & SAS_TASK_STATE_DONE)) {
    task->task_state_flags |= SAS_TASK_STATE_ABORTED;
    +is_completed = false;
    +}
spin_unlock_irqrestore(&task->task_state_lock, flags);

-complete(&task->slow_task->completion);
+if (!is_completed)
+complete(&task->slow_task->completion);
}

#define TASK_TIMEOUT 20
#define TASK_RETRY 3
+#define INTERNAL_ABORT_TIMEOUT 6
static int hisi_sas_exec_internal_tmf_task(struct domain_device *device,
    void *parameter, u32 para_len,
    struct hisi_sas_tmf_task *tmf)
@@ -859,12 +1087,21 @@
if (!(task->task_state_flags & SAS_TASK_STATE_DONE)) {
    struct hisi_sas_slot *slot = task->lldd_task;
    -dev_err(dev, "abort tmf: TMF task timeout\n");
    -if (slot)
    +dev_err(dev, "abort tmf: TMF task timeout and not done\n");
    +if (slot) {
        +struct hisi_sas_cq *cq =
        + &hisi_hba->cq[slot->dlvry_queue];
        +/
        + * flush tasklet to avoid free'ing task

+ * before using task in IO completion
+ */
+tasklet_kill(&cq->tasklet);
slot->task = NULL;
+
goto ex_err;
-
+
} else
+					dev_err(dev, "abort tmf: TMF task timeout\n");
+
}

if (task->task_status.resp == SAS_TASK_COMPLETE &&
@@ -937,7 +1174,6 @@
struct hisi_hba *hisi_hba = dev_to_hisi_hba(device);
struct device *dev = hisi_hba->dev;
int s = sizeof(struct host_to_dev_fis);
-unsigned long flags;

ata_for_each_link(link, ap, EDGE) {
int pmp = sata_srst_pmp(link);
@@ -962,11 +1198,8 @@
dev_err(dev, "ata disk reset failed\n");
}
-
-if (rc == TMF_RESP_FUNC_COMPLETE) {
-.spin_lock_irqsave(&hisi_hba->lock, flags);
+if (rc == TMF_RESP_FUNC_COMPLETE)
axis_sas_release_task(hisi_hba, device);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
-
}

return rc;

@@ -985,27 +1218,42 @@
sizeof(ssp_task), tmf);
}
-
-static void hisi_sas_refresh_port_id(struct hisi_hba *hisi_hba,
-struct asd_sas_port *sas_port, enum sas_linkrate linkrate)
+static void hisi_sas_refresh_port_id(struct hisi_hba *hisi_hba)
{
-struct hisi_sas_device *sas_dev;
-struct domain_device *device;
+u32 state = hisi_hba->hw->get_phys_state(hisi_hba);
int i;

for (i = 0; i < HISI_SAS_MAX_DEVICES; i++) {
struct sas_dev = &hisi_hba->devices[i];
struct domain_device *device = sas_dev->sas_device;
struct asd_sas_port *sas_port;
struct hisi_sas_port *port;
struct hisi_sas_phy *phy = NULL;
struct asd_sas_phy *sas_phy;

if ((sas_dev->dev_type == SAS_PHY_UNUSED) || !device || !device->port)
continue;

hisi_hba->hw->free_device(hisi_hba, sas_dev);
sas_port = device->port;
port = to_hisi_sas_port(sas_port);

/* Update linkrate of directly attached device. */
-if (!device->parent)
-device->linkrate = linkrate;
+list_for_each_entry(sas_phy, &sas_port->phy_list, port_phy_el)
+if (state & BIT(sas_phy->id)) {
  phy = sas_phy->lldd_phy;
  +break;
+
-hisi_hba->hw->setup_itct(hisi_hba, sas_dev);
+if (phy) {
  +port->id = phy->port_id;
  +/* Update linkrate of directly attached device. */
  +if (!device->parent)
  +device->linkrate = phy->sas_phy.linkrate;
  +}
+else
  +port->id = 0xff;
+
@
 struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
 struct asd_sas_phy *sas_phy = &phy->sas_phy;
 struct asd_sas_port *sas_port = sas_phy->port;
-struct hisi_sas_port *port = to_hisi_sas_port(sas_port);
bool do_port_check = !(_sas_port != sas_port);
if (!sas_phy->phy->enabled)
continue;

/* Report PHY state change to libsas */
-if (state & (1 << phy_no)) {
-if (do_port_check && sas_port) {
+if (state & BIT(phy_no)) {
+if (do_port_check && sas_port && sas_port->port_dev) {
struct domain_device *dev = sas_port->port_dev;

_sas_port = sas_port;
-port->id = phy->port_id;
-hisi_sas_refresh_port_id(hisi_hba,
-sas_port, sas_phy->linkrate);

if (DEV_IS_EXPANDER(dev->dev_type))
sas_ha->notify_port_event(sas_phy,
@@ -1045,16 +1289,144 @@
hisi_sas_phy_down(hisi_hba, phy_no, 0);
                }
+
+static void hisi_sas_reset_init_all_devices(struct hisi_hba *hisi_hba)
+{
+struct hisi_sas_device *sas_dev;
+struct domain_device *device;
+int i;
+
+for (i = 0; i < HISI_SAS_MAX_DEVICES; i++) {
+sas_dev = &hisi_hba->devices[i];
+device = sas_dev->sas_device;
+
+if ((sas_dev->dev_type == SAS_PHY_UNUSED) || !device)
+continue;
+
+hisi_sas_init_device(device);
+}
+
+static void hisi_sas_send_ata_reset_each_phy(struct hisi_hba *hisi_hba,
+    struct asd_sas_port *sas_port,
+    struct domain_device *device)
+{
+struct hisi_sas_tmf_task tmf_task = { .force_phy = 1 };
+struct ata_port *ap = device->sata_dev.ap;
+struct device *dev = hisi_hba->dev;
+int s = sizeof(struct host_to_dev_fis);
int rc = TMF_RESP_FUNC_FAILED;
struct asd_sas_phy *sas_phy;
struct ata_link *link;

u8 fis[20] = {0};
u32 state;

state = hisi_hba->hw->get_phys_state(hisi_hba);
list_for_each_entry(sas_phy, &sas_port->phy_list, port_phy_el) {
  if (!(state & BIT(sas_phy->id)))
    continue;
}

ata_for_each_link(link, ap, EDGE) {
  int pmp = sata_srst_pmp(link);
  
  tmf_task.phy_id = sas_phy->id;
  hisi_sas_fill_ata_reset_cmd(link->device, 1, pmp, fis);
  rc = hisi_sas_exec_internal_tmf_task(device, fis, s,
      &tmf_task);
  if (rc != TMF_RESP_FUNC_COMPLETE) {
    dev_err(dev, "phy%d ata reset failed rc=%d\n",
        sas_phy->id, rc);
    break;
  }
}

static void hisi_sas_terminate_stp_reject(struct hisi_hba *hisi_hba)
{
  struct device *dev = hisi_hba->dev;
  int port_no, rc, i;

  for (i = 0; i < HISI_SAS_MAX_DEVICES; i++) {
    struct hisi_sas_device *sas_dev = &hisi_hba->devices[i];
    struct domain_device *device = sas_dev->sas_device;
    
    if ((sas_dev->dev_type == SAS_PHY_UNUSED) || !device)
      continue;
    
    rc = hisi_sas_internal_task_abort(hisi_hba, device,
        HISI_SAS_INT_ABT_DEV, 0);
    if (rc < 0)
      dev_err(dev, "STP reject: abort dev failed %d\n", rc);
  }

  for (port_no = 0; port_no < hisi_hba->n_phy; port_no++) {
    struct hisi_sas_port *port = &hisi_hba->port[port_no];
    struct asd_sas_port *sas_port = &port->sas_port;
}
struct domain_device *port_dev = sas_port->port_dev;
struct domain_device *device;

#if (!port_dev || !DEV_IS_EXPANDER(port_dev->dev_type))
continue;
#endif

/* Try to find a SATA device */
list_for_each_entry(device, &sas_port->dev_list, dev_list_node) {
    if (dev_is_sata(device)) {
        hisi_sas_send_ata_reset_each_phy(hisi_hba,
            sas_port,
            device);
        break;
    }
}

void hisi_sas_controller_reset_prepare(struct hisi_hba *hisi_hba) {
    struct Scsi_Host *shost = hisi_hba->shost;
    down(&hisi_hba->sem);
    hisi_hba->phy_state = hisi_hba->hw->get_phys_state(hisi_hba);
    scsi_block_requests(shost);
    hisi_hba->hw->wait_cmds_complete_timeout(hisi_hba, 100, 5000);
    if (timer_pending(&hisi_hba->timer))
        del_timer_sync(&hisi_hba->timer);
    set_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
}

EXPORT_SYMBOL_GPL(hisi_sas_controller_reset_prepare);

void hisi_sas_controller_reset_done(struct hisi_hba *hisi_hba) {
    struct Scsi_Host *shost = hisi_hba->shost;
    u32 state;
    /* Init and wait for PHYs to come up and all libsas event finished. */
    hisi_hba->hw->phys_init(hisi_hba);
    msleep(1000);
    hisi_sas_refresh_port_id(hisi_hba);
    clear_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
    if (hisi_hba->reject_stp_links_msk)
+hisi_sas_terminate_stp_reject(hisi_hba);
+hisi_sas_reset_init_all_devices(hisi_hba);
+up(&hisi_hba->sem);
+scsi_unblock_requests(shost);
+clear_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags);

-drain_workqueue(hisi_hba->shost->work_q);
+state = hisi_hba->hw->get_phys_state(hisi_hba);
+hisi_sas_rescan_topology(hisi_hba, hisi_hba->phy_state, state);
}
+EXPORT_SYMBOL_GPL(hisi_sas_controller_reset_done);

static int hisi_sas_controller_reset(struct hisi_hba *hisi_hba)
{
    struct device *dev = hisi_hba->dev;
    struct Scsi_Host *host = hisi_hba->shost;
    -u32 old_state, state;
    -unsigned long flags;
    int rc;
    
    if (!hisi_hba->hw->soft_reset)
@@ -1063,38 +1435,23 @@
        if (test_and_set_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags))
            return -1;

        -dev_dbg(dev, "controller resetting...
"
        -old_state = hisi_hba->hw->get_phys_state(hisi_hba);
        +dev_info(dev, "controller resetting...
"
        +hisi_sas_controller_reset_prepare(hisi_hba);
        
        -scsi_block_requests(host);
        -set_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
        rc = hisi_hba->hw->soft_reset(hisi_hba);
        if (rc) {
            dev_warn(dev, "controller reset failed (%d)\n", rc);
            clear_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
            -goto out;
            +up(&hisi_hba->sem);
            +scsi_unblock_requests(shost);
            +clear_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags);
            +return rc;
        }
        
        -spin_lock_irqsave(&hisi_hba->lock, flags);
        -hisi_sas_release_tasks(hisi_hba);
        -spin.unlock_irqrestore(&hisi_hba->lock, flags);
        -
        -clear_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
        -
/* Init and wait for PHYs to come up and all libsas event finished. */
-hisi_hba->hw->phys_init(hisi_hba);
-msleep(1000);
-drain_workqueue(hisi_hba->wq);
-drain_workqueue(ghost->work_q);

-state = hisi_hba->hw->get_phys_state(hisi_hba);
-hisi_sas_rescan_topology(hisi_hba, old_state, state);
-dev_dbg(dev, "controller reset complete\n");
+hiisi_sas_controller_reset_done(hisi_hba);
+dev_info(dev, "controller reset complete\n");

-out:
-scusi_unblock_requests(ghost);
-clear_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags);
-
-return rc;
+return 0;
}

static int hisi_sas_abort_task(struct sas_task *task)
@@ -1103,37 +1460,58 @@
struct hisi_sas_tmf_task tmf_task;
struct domain_device *device = task->dev;
struct hisi_sas_device *sas_dev = device->lldd_dev;
-struct hisi_hba *hisi_hba = dev_to_hisi_hba(task->dev);
-struct device *dev = hisi_hba->dev;
+	struct hisi_hba *hisi_hba;
+	struct device *dev;
+int rc = TMF_RESP_FUNC_FAILED;
unsigned long flags;

-if (!sas_dev) {
-dev_warn(dev, "Device has been removed\n");
+if (!sas_dev)
return TMF_RESP_FUNC_FAILED;
-}

+hiisi_hba = dev_to_hisi_hba(task->dev);
+dev = hisi_hba->dev;
+spin_lock_irqsave(&task->task_state_lock, flags);
if (task->task_state_flags & SAS_TASK_STATE_DONE) {
+struct hisi_sas_slot *slot = task->lldd_task;
+struct hisi_sas_cq *cq;
+
+if (slot) {
+/*
flush tasklet to avoid freeing task
before using task in IO completion
+
+cq = &hisi_hba->cq[slot->dlvry_queue];
tasklet_kill(&cq->tasklet);
+
+spin_unlock_irqrestore(&task->task_state_lock, flags);
rc = TMF_RESP_FUNC_COMPLETE;
goto out;
}
task->task_state_flags |= SAS_TASK_STATE_ABORTED;
+spin_unlock_irqrestore(&task->task_state_lock, flags);

sas_dev->dev_status = HISI_SAS_DEV_EH;
if (task->lldd_task && task->task_proto & SAS_PROTOCOL_SSP) {
    struct scsi_cmnd *cmnd = task->uldd_task;
    struct hisi_sas_slot *slot = task->lldd_task;
    u32 tag = slot->idx;
    u16 tag = slot->idx;
    int rc2;
    int_to_scsilun(cmnd->device->lun, &lun);
    tmf_task.tmf = TMF_ABORT_TASK;
    -tmf_task.tag_of_task_to_be_managed = cpu_to_le16(tag);
    +tmf_task.tag_of_task_to_be_managed = tag;
    rc = hisi_sas_debug_issue_ssp_tmf(task->dev, lun.scsi_lun,
    &tmf_task);
    rc2 = hisi_sas_internal_task_abort(hisi_hba, device,
    HISI_SAS_INT_ABT_CMD, tag);
    +if (rc2 < 0) {
        dev_err(dev, "abort task: internal abort (%d)\n", rc2);
        +return TMF_RESP_FUNC_FAILED;
        +
        /*
        * If the TMF finds that the IO is not in the device and also
        * the internal abort does not succeed, then it is safe to
        * @ @ -1142,17 +1520,18 @ @
        * will have already been completed
        */
        if (rc == TMF_RESP_FUNC_COMPLETE && rc2 != TMF_RESP_FUNC_SUCC) {
            -if (task->lldd_task) {
                -spin_lock_irqsave(&hisi_hba->lock, flags);
                +if (task->lldd_task)
                    hisi_sas_do_release_task(hisi_hba, task, slot);
                -spin_unlock_irqrestore(&hisi_hba->lock, flags);
            

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if (task->task_proto & SAS_PROTOCOL_SATA ||
    task->task_proto & SAS_PROTOCOL_STP) {
    if (task->dev->dev_type == SAS_SATA_DEV) {
        hisi_sas_internal_task_abort(hisi_hba, device,
            HISI_SAS_INT_ABT_DEV, 0);
        rc = hisi_sas_internal_task_abort(hisi_hba, device,
            HISI_SAS_INT_ABT_DEV, 0);
        if (rc < 0) {
            dev_err(dev, "abort task: internal abort failed\n");
            goto out;
        }
        hisi_sas_dereg_device(hisi_hba, device);
        rc = hisi_sas_softreset_ata_disk(device);
    }
}
/* SMP */
struct hisi_sas_slot *slot = task->lldd_task;
u32 tag = slot->idx;
+struct hisi_sas_cq *cq = &hisi_hba->cq[slot->dlvry_queue];
    rc = hisi_sas_internal_task Abort(hisi_hba, device,
        HISI_SAS_INT_ABT_CMD, tag);
    -if (rc == TMF_RESP_FUNC_FAILED && task->lldd_task) {
    	-spin_lock_irqsave(&hisi_hba->lock, flags);
    	-hisi_sas_do_release_task(hisi_hba, task, slot);
    	-spin_unlock_irqrestore(&hisi_hba->lock, flags);
    +if ( ((rc < 0) || (rc == TMF_RESP_FUNC_FAILED)) &&
    	+task->lldd_task) {
    +/*
    + * flush tasklet to avoid free'ing task
    + * before using task in IO completion
    + */
    +tasklet_kill(&cq->tasklet);
    +slot->task = NULL;
    }
}

static int hisi_sas_abort_task_set(struct domain_device *device, u8 *lun)
{
    +struct hisi_hba *hisi_hba = dev_to_hisi_hba(device);
    +struct device *dev = hisi_hba->dev;
    struct hisi_sas_tmf_task tmf_task;
    int rc = TMF_RESP_FUNC_FAILED;

```c
+rc = hisi_sas_internal_task_abort(hisi_hba, device,
+HISI_SAS_INT_ABT_DEV, 0);
+if (rc < 0) {
+dev_err(dev, "abort task set: internal abort rc=%d\n", rc);
+return TMF_RESP_FUNC_FAILED;
+}
+hisi_sas_dereg_device(hisi_hba, device);
+
tmf_task.tmf = TMF_ABORT_TASK_SET;
rc = hisi_sas_debug_issue_ssp_tmf(device, lun, &tmf_task);

+if (rc == TMF_RESP_FUNC_COMPLETE)
+hisi_sas_release_task(hisi_hba, device);
+
return rc;
}
```

```c
static int hisi_sas_debug_I_T_nexus_reset(struct domain_device *device)
{
-struct sas_phy *phy = sas_get_local_phy(device);
+struct sas_phy *local_phy = sas_get_local_phy(device);
int rc, reset_type = (device->dev_type == SAS_SATA_DEV ||
(device->dev_proto & SAS_PROTOCOL_STP)) ? 0 : 1;
-rc = sas_phy_reset(phy, reset_type);
-sas_put_localphy(phy);
-msleep(2000);
+struct hisi_hba *hisi_hba = dev_to_hisi_hba(device);
+struct sas_ha_struct *sas_ha = &hisi_hba->sha;
+DECLARE_COMPLETION_ONSTACK(phyreset);
+
+if (scsi_is_sas_phy_local(local_phy)) {
+struct asd_sas_phy *sas_phy =
+sas_ha->sas_phy[local_phy->number];
+struct hisi_sas_phy *phy =
+container_of(sas_phy, struct hisi_sas_phy, sas_phy);
+phy->in_reset = 1;
+phy->reset_completion = &phyreset;
+}
+
+rc = sas_phy_reset(local_phy, reset_type);
+sas_put_localphy(local_phy);
+
+if (scsi_is_sas_phy_local(local_phy)) {
+struct asd_sas_phy *sas_phy =
+sas_ha->sas_phy[local_phy->number];
+struct hisi_sas_phy *phy =
```

```c
+container_of(sas_phy, struct hisi_sas_phy, sas_phy);
+int ret = wait_for_completion_timeout(&phyreset, 2 * HZ);
+unsigned long flags;
+
+spin_lock_irqsave(&phy->lock, flags);
+phy->reset_completion = NULL;
+phy->in_reset = 0;
+spin_unlock_irqrestore(&phy->lock, flags);
+
+// report PHY down if timed out */
+if (!ret)
+  thisi_sas_phy_down(hisi_hba, sas_phy->id, 0);
+} else
+  msleep(2000);
+
+return rc;
}

@@ -1213,24 +1642,26 @@
{

struct hisi_sas_device *sas_dev = device->lldd_dev;
struct hisi_hba *hisi_hba = dev_to_hisi_hba(device);
-unsigned long flags;
+struct device *dev = hisi_hba->dev;

int rc = TMF_RESP_FUNC_FAILED;

if (sas_dev->dev_status != HISI_SAS_DEV_EH)
  return TMF_RESP_FUNC_FAILED;
  sas_dev->dev_status = HISI_SAS_DEV_NORMAL;

-hisi_sas_internal_task_abort(hisi_hba, device,
+rc = hisi_sas_internal_task_abort(hisi_hba, device,
    HISI_SAS_INT_ABT_DEV, 0);
+if (rc < 0) {
+  dev_err(dev, "I\_T nexus reset: internal abort (%d)\n", rc);
+  return TMF_RESP_FUNC_FAILED;
+}
  hisi_sas_dereg_device(hisi_hba, device);

rc = hisi_sas_debug_I\_T_nexus_reset(device);

-if (rc == TMF_RESP_FUNC_COMPLETE) {
-  spin_lock_irqsave(&hisi_hba->lock, flags);
+if ((rc == TMF_RESP_FUNC_COMPLETE) || (rc == -ENODEV))
  hisi_sas_release_task(hisi_hba, device);
-  spin_unlock_irqrestore(&hisi_hba->lock, flags);
-}
+
```

int rc = TMF_RESP_FUNC_FAILED;

unsigned long flags;

/* Clear internal IO and then hardreset */
rc = hisi_sas_internal_task_abort(hisi_hba, device,
                      HISI_SAS_INT_ABTDV.0);
@if (rc == TMF_RESP_FUNC_FAILED)
+if (rc < 0) {
+    dev_err(dev, "lu_reset: internal abort failed\n");
go to out;
+
    +
hisi_sas_dereg_device(hisi_hba, device);

    phy = sas_get_local_phy(device);

    rc = sas_phy_reset(phy, 1);

    -$if (rc == 0) {
    -$spin_lock_irqsave(&hisi_hba->lock, flags);
    +if (rc == 0)
    +hisi_sas_release_task(hisi_hba, device);
    -$spin_unlock_irqrestore(&hisi_hba->lock, flags);
    -} 
    sas_put_local_phy(phy);
} else {
    +rc = hisi_sas_internal_task_abort(hisi_hba, device,
    +HISI_SAS_INT_ABTDV.0);
    +if (rc < 0) {
    +dev.err(dev, "lu_reset: internal abort failed\n");
    +goto out;
    +}
    +hisi_sas_dereg_device(hisi_hba, device);
    +
    +rc = hisi_sas_debug_issue_ssp_tmf(device, lun, &tmf_task);
    -$if (rc == TMF_RESP_FUNC_COMPLETE) {
    -$spin_lock_irqsave(&hisi_hba->lock, flags);
    +$if (rc == TMF_RESP_FUNC_COMPLETE)
hisi_sas_release_task(hisi_hba, device);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
-
\}
}

out:
if (rc != TMF_RESP_FUNC_COMPLETE)
@@ -1283,8 +1717,32 @@
static int hisi_sas_clear_nexus_ha(struct sas_ha_struct *sas_ha)
{
 struct hisi_hba *hisi_hba = sas_ha->lldd_ha;
 +struct device *dev = hisi_hba->dev;
+HISI_SAS_DECLARE_RST_WORK_ON_STACK(r);
+int rc, i;
+queue_work(hisi_hba->wq, &r.work);
+wait_for_completion(r.completion);
+if (!r.done)
+return TMF_RESP_FUNC_FAILED;

-return hisi_sas_controller_reset(hisi_hba);
+for (i = 0; i < HISI_SAS_MAX_DEVICES; i++) {
+struct hisi_sas_device *sas_dev = &hisi_hba->devices[i];
+struct domain_device *device = sas_dev->sas_device;
+
+if ((sas_dev->dev_type == SAS_PHY_UNUSED) || !device ||
+    DEV_IS_EXPANDER(device->dev_type))
+continue;
+
+rc = hisi_sas_debug_I_T_nexus_reset(device);
+if (rc != TMF_RESP_FUNC_COMPLETE)
+dev_info(dev, "clear nexus ha: for device[%d] rc=%d\n",
+    sas_dev->device_id, rc);
+}
+
+hisi_sas_release_tasks(hisi_hba);
+
+return TMF_RESP_FUNC_COMPLETE;
}

static int hisi_sas_query_task(struct sas_task *task)
@@ -1301,7 +1759,7 @@

int_to_scsilun(cmnd->device->lun, &lun);
tmf_task.tmf = TMF_QUERY_TASK;
-tmf_task.tag_of_task_to_be Managed = cpu_to_le16(tag);
+tmf_task.tag_of_task_to_be Managed = tag;

rc = hisi_sas_debug_issue_ssp_tmf(device,
if (unlikely(test_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags)))
    return -EINVAL;
port = to_hisi_sas_port(sas_port);

/* simply get a slot and send abort command */
  -spin_lock_irqsave(&hisi_hba->lock, flags);
  -rc = hisi_sas_slot_index_alloc(hisi_hba, &slot_idx);
  -if (rc) {
      -spin_unlock_irqrestore(&hisi_hba->lock, flags);
      +rc = hisi_sas_slot_index_alloc(hisi_hba, NULL);
      +if (rc < 0)
          goto err_out;
  } +
  +slot_idx = rc;
  +slot = &hisi_hba->slot_info[slot_idx];

  spin_lock_irqsave(&dq->lock, flags_dq);
  -rc = hisi_hba->hw->get_free_slot(hisi_hba, dq);
  -if (rc)
      +wr_q_index = hisi_hba->hw->get_free_slot(hisi_hba, dq);
      +if (wr_q_index < 0) {
          +spin_unlock_irqrestore(&dq->lock, flags_dq);
          +rc = -EAGAIN;
          goto err_out_tag;
      } +
      +list_add_tail(&slot->delivery, &dq->list);
      +spin_unlock_irqrestore(&dq->lock, flags_dq);

  dlvry_queue = dq->id;
  -dlvry_queue_slot = dq->wr_point;
  -
  -slot = &hisi_hba->slot_info[slot_idx];
  -memset(slot, 0, sizeof(struct hisi_sas_slot));
  +dlvry_queue_slot = wr_q_index;

  -slot->idx = slot_idx;
slot->n_elem = n_elem;
slot->dlvry_queue = dlvry_queue;
slot->dlvry_queue_slot = dlvry_queue_slot;
@ @ -1373,49 +1832,30 @@
slot->cmd_hdr = &cmd_hdr_base[dlvry_queue_slot];
slot->task = task;
slot->port = port;
+slot->is_internal = true;
task->lldd_task = slot;

-slot->buf = dma_pool_alloc(hisi_hba->buffer_pool,
-GFP_ATOMIC, &slot->buf_dma);
-if (!slot->buf) {
-rc = -ENOMEM;
-goto err_out_tag;
-}
-
memset(slot->cmd_hdr, 0, sizeof(struct hisi_sas_cmd_hdr));
memset(hisi_sas_cmd_hdr_addr_mem(slot), 0, HISI_SAS_COMMAND_TABLE_SZ);
memset(hisi_sas_status_buf_addr_mem(slot), 0, HISI_SAS_STATUS_BUF_SZ);

-rc = hisi_sas_task_prep_abort(hisi_hba, slot, device_id,
+hisi_sas_task_prep_abort(hisi_hba, slot, device_id,
abort_flag, task_tag);
-if (rc)
-goto err_out_buf;

-spin_lock_irqsave(&hisi_hba->lock, flags);
-list_add_tail(&slot->entry, &sas_dev->list);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
spin_lock_irqsave(&task->task_state_lock, flags);
task->task_state_flags |= SAS_TASK_AT_INITIATOR;
spin_unlock_irqrestore(&task->task_state_lock, flags);
-
-dq->slot_prep = slot;
-
-atomic64_inc(&sas_dev->running_req);
-
+WRITE_ONCE(slot->ready, 1);
/* send abort command to the chip */
+spin_lock_irqsave(&dq->lock, flags);
+list_add_tail(&slot->entry, &sas_dev->list);
hisi_hba->hw->start_delivery(dq);
-spin_unlock_irqrestore(&dq->lock, flags_dq);
+spin_unlock_irqrestore(&dq->lock, flags);
+spin_unlock_irqrestore(&dq->lock, flags);
return 0;
-err_out_buf:
-dma_pool_free(hisi_hba->buffer_pool, slot->buf,
-slot->buf_dma);
err_out_tag:
-spin_lock_irqsave(&hisi_hba->lock, flags);
hiși_sas_slot_index_free(hisi_hba, slot_idx);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
-spin_unlock_irqrestore(&dq->lock, flags_dq);
err_out:
dev_err(dev, "internal abort task prep: failed[%d]!n", rc);

@@ -1441,8 +1881,14 @@
dev = hisi_hba->dev;
int res;

+/*
+ * The interface is not realized means this HW don't support internal
+ * abort, or don't need to do internal abort. Then here, we return
+ * TMF_RESP_FUNC_FAILED and let other steps go on, which depends that
+ * the internal abort has been executed and returned CQ.
+ */
+ if (!hisi_hba->hw->prep_abort)
+ return -EOPNOTSUPP;
+return TMF_RESP_FUNC_FAILED;

task = sas_alloc_slow_task(GFP_KERNEL);
if (!task)
@@ -1452,7 +1898,7 @@
task->task_proto = device->tproto;
task->task_done = hisi_sas_task_done;
task->slow_task->timer.function = hisi_sas_tmf_timedout;
-task->slow_task->timer.expires = jiffies + msecs_to_jiffies(110);
+task->slow_task->timer.expires = jiffies + INTERNAL_ABORT_TIMEOUT*HZ;
add_timer(&task->slow_task->timer);

res = hisi_sas_internal_abort_task_exec(hisi_hba, sas_dev->device_id,
@@ -1471,11 +1917,21 @@
struct hiși_sas_slot *slot = task->lldd_task;

-if (slot)
+if (slot) {
+ struct hiși_sas_cq *cq =
+ &hisi_hba->cq[slot->dlvry_queue];
+/*
+ * flush tasklet to avoid free'ing task
+ * before using task in IO completion
+ */
+tasklet_kill(&cq->tasklet);
slot->task = NULL;
-dev_err(dev, "internal task abort: timeout\n");
+}
+dev_err(dev, "internal task abort: timeout and not done\n");
+res = -EIO;
goto exit;
-
+} else
+dev_err(dev, "internal task abort: timeout\n");
}

if (task->task_status.resp == SAS_TASK_COMPLETE &&
@@ -1507,11 +1963,36 @@
his_i_sas_port_notify_formed(sas_phy);
}

+static void hisi_sas_port_deformed(struct asd_sas_phy *sas_phy)
+{
+     
+     +static int hisi_sas_write_gpio(struct sas_ha_struct *sha, u8 reg_type,
+u8 reg_index, u8 reg_count, u8 *write_data)
+{
+struct hisi_hba *hisi_hba = sha->lldd_ha;
+  
+if (!hisi_hba->hw->write_gpio)
+return -EOPNOTSUPP;
+     
+return hisi_hba->hw->write_gpio(hisi_hba, reg_type,
+reg_index, reg_count, write_data);
+}
+     
+static void hisi_sas_phy_disconnected(struct hisi_sas_phy *phy)
{
+struct asd_sas_phy *sas_phy = &phy->sas_phy;
+struct sas_phy *sphy = sas_phy->phy;
+struct sas_phy_data *d = sphy->hostdata;
+    
phy->phy_attached = 0;
phy->phy_type = 0;
phy->port = NULL;
+}
+if (d->enable)
+sphy->negotiated_linkrate = SAS_LINK_RATE_UNKNOWN;
+else
+sphy->negotiated_linkrate = SAS_PHY_DISABLED;
}
void hisi_sas_phy_down(struct hisi_hba *hisi_hba, int phy_no, int rdy)
@@ -1519,6 +2000,7 @@
    struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
    struct asd_sas_phy *sas_phy = &phy->sas_phy;
    struct sas_ha_struct *sas_ha = &hisi_hba->sha;
+struct device *dev = hisi_hba->dev;

    if (rdy) {
        /* Phy down but ready */
@@ -1527,6 +2009,11 @@
            /* Phy down and not ready */
            sas_ha->notify_phy_event(sas_phy, PHYE_LOSS_OF_SIGNAL);
            sas_phy_disconnected(sas_phy);
+    } else {
+        struct hisi_sas_port *port = phy->port;
+
+        if (test_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags) ||
+            phy->in_reset) {
+            dev_info(dev, "ignore flutter phy%d down\n", phy_no);
+            return;
+        }
        /* Phy down and not ready */
        sas_ha->notify_phy_event(sas_phy, PHYE_LOSS_OF_SIGNAL);
@@ -1561,29 +2048,6 @@
        struct scsi_transport_template *hisi_sas_stt;
        EXPORT_SYMBOL_GPL(hisi_sas_stt);

-        static struct scsi_host_template _hisi_sas_sht = {
-            .module= THIS_MODULE,
-            .name= DRV_NAME,
-            .queuecommand= sas_queuecommand,
-            .target_alloc= sas_target_alloc,
-            .slave_configure= hisi_sas_slave_configure,
-            .scan_finished= hisi_sas_scan_finished,
-            .scan_start= hisi_sas_scan_start,
-            .change_queue_depth= sas_change_queue_depth,
-            .bios_param= sas_bios_param,
-            .can_queue= 1,
-            .this_id= -1,
-            .sg_tablesize= SG_ALL,
-            .max_sectors= SCSI_DEFAULT_MAX_SECTORS,
-            .use_clustering= ENABLE_CLUSTERING,
-            .eh_device_reset_handler = sas_eh_device_reset_handler,
-            .eh_target_reset_handler = sas_eh_target_reset_handler,
-            .target_destroy= sas_target_destroy,
-            .ioctl= sas_ioctl,
-        };
-        struct scsi_host_template *hisi_sas_sht = &_hisi_sas_sht;
-        EXPORT_SYMBOL_GPL(hisi_sas_sht);
static struct sas_domain_function_template hisi_sas_transport_ops = {
    .lldd_dev_found = hisi_sas_dev_found,
    .lldd_dev_gone = hisi_sas_dev_gone,
    .lldd_query_task = hisi_sas_query_task,
    .lldd_clear_nexus_ha = hisi_sas_clear_nexus_ha,
    .lldd_port_formed = hisi_sas_port_formed,
    .lldd_port_deformed = hisi_sas_port_deformed,
    .lldd_write_gpio = hisi_sas_write_gpio,
};

void hisi_sas_init_mem(struct hisi_hba *hisi_hba)
{
    struct device *dev = hisi_hba->dev;
    int i, s, max_command_entries = hisi_hba->hw->max_command_entries;
    int max_command_entries_ru, sz_slot_buf_ru;
    sema_init(&hisi_hba->sem, 1);
    spin_lock_init(&hisi_hba->lock);
    for (i = 0; i < hisi_hba->n_phy; i++) {
        hisi_sas_phy_init(hisi_hba, i);
    }
    /* Delivery queue structure */
    spin_lock_init(&dq->lock);
    INIT_LIST_HEAD(&dq->list);
    cq->hisi_hba = hisi_hba;
    /* Delivery queue */
    s = sizeof(struct hisi_sas_cmd_hdr) * HISI_SAS_QUEUE_SLOTS;
    hisi_hba->cmd_hdr[i] = dma_alloc_coherent(dev, s,
        GFP_KERNEL);
    if (!hisi_hba->cmd_hdr[i])
        goto err_out;
    /* Completion queue */
    s = hisi_hba->hw->complete_hdr_size * HISI_SAS_QUEUE_SLOTS;
    hisi_hba->complete_hdr[i] = dma_alloc_coherent(dev, s,}
-\&hisi_hba->complete_hdr_dma[i], GFP_KERNEL);
\+hisi_hba->complete_hdr[i] = dmam_alloc_coherent(dev, s,
\+\&hisi_hba->complete_hdr_dma[i], 
\+GFP_KERNEL);
if (!\&hisi_hba->complete_hdr[i])
goto err_out;
}

-s = sizeof(struct hisi_sas_slot_buf_table);
-\&hisi_hba->buffer_pool = dma_pool_create("dma_buffer", dev, s, 16, 0);
-\&hisi_hba->buffer_pool
-goto err_out;
-
-s = HISI_SAS_MAX_ITCT_ENTRIES * sizeof(struct hisi_sas_itct);
-\&hisi_hba->itct = dma_alloc_coherent(dev, s, \&hisi_hba->itct_dma,
-\+GFP_KERNEL);
-\&hisi_hba->itct = dma_alloc_coherent(dev, s, \&hisi_hba->itct_dma,
-\+GFP_KERNEL);
if (!\&hisi_hba->itct)
goto err_out;
-
memset(hisi_hba->itct, 0, s);

hisi_hba->slot_info = devm_kcalloc(dev, max_command_entries,
@@ -1694,15 +2161,45 @@
if (!\&hisi_hba->slot_info)
goto err_out;
+
/* roundup to avoid overly large block size */
+max_command_entries_ru = roundup(max_command_entries, 64);
+sz_slot_buf_ru = roundup(sizeof(struct hisi_sas_slot_buf_table), 64);
+s = lcm(max_command_entries_ru, sz_slot_buf_ru);
+blk_cnt = (max_command_entries_ru * sz_slot_buf_ru) / s;
+slots_per_blk = s / sz_slot_buf_ru;
+for (i = 0; i < blk_cnt; i++) {
+struct hisi_sas_slot_buf_table *buf;
+dma_addr_t buf_dma;
+int slot_index = i * slots_per_blk;
+ +
+buf = dmam_alloc_coherent(dev, s, \&buf_dma, GFP_KERNEL);
+if (!buf)
+goto err_out;
+memset(buf, 0, s);
+
+for (j = 0; j < slots_per_blk; j++, slot_index++) {
+struct hisi_sas_slot *slot;
+
+slot = \&hisi_hba->slot_info[slot_index];
+slot->buf = buf;
+slot->buf_dma = buf_dma;
+slot->idx = slot_index;
+
+buf++;
+buf_dma += sizeof(*buf);
+
+s = max_command_entries * sizeof(struct hisi_sas_iost);
-hisi_hba->iost = dma_alloc_coherent(dev, s, &hisi_hba->iost_dma,
-    GFP_KERNEL);
+hisi_hba->iost = dmam_alloc_coherent(dev, s, &hisi_hba->iost_dma,
+    GFP_KERNEL);
if (!hisi_hba->iost)
goto err_out;
+
+s = max_command_entries * sizeof(struct hisi_sas_breakpoint);
-hisi_hba->breakpoint = dma_alloc_coherent(dev, s, &hisi_hba->breakpoint_dma,
-    GFP_KERNEL);
+
if (!hisi_hba->breakpoint)
goto err_out;
+
@@ -1713,19 +2210,23 @@
goto err_out;
+
+s = sizeof(struct hisi_sas_initial_fis) * HISI_SAS_MAX_PHYS;
-hisi_hba->initial_fis = dma_alloc_coherent(dev, s, &hisi_hba->initial_fis_dma,
-    GFP_KERNEL);
+
if (!hisi_hba->initial_fis)
goto err_out;
+
+s = HISI_SAS_MAX_ITCT_ENTRIES * sizeof(struct hisi_sas_sata_breakpoint);
-hisi_hba->sata_breakpoint = dma_alloc_coherent(dev, s, &hisi_hba->sata_breakpoint_dma,
+    GFP_KERNEL);
if (!hisi_hba->sata_breakpoint)
goto err_out;

hisi_sas_init_mem(hisi_hba);
hisi_sas_slot_index_init(hisi_hba);
+hisi_hba->last_slot_index = hisi_hba->hw->max_command_entries -
+HISI_SAS_RESERVED_IPTT_CNT;

hisi_hba->wq = create_singlethread_workqueue(dev_name(dev));
if (!hisi_hba->wq) {
@@ -1741,54 +2242,6 @@

void hisi_sas_free(struct hisi_hba *hisi_hba)
{
-struct device *dev = hisi_hba->dev;
-int i, s, max_command_entries = hisi_hba->hw->max_command_entries;
-
- for (i = 0; i < hisi_hba->queue_count; i++) {
- s = sizeof(struct hisi_sas_cmd_hdr) * HISI_SAS_QUEUE_SLOTS;
- if (hisi_hba->cmd_hdr[i])
- dma_free_coherent(dev, s,
- hisi_hba->cmd_hdr[i],
- hisi_hba->cmd_hdr_dma[i]);
-
- s = hisi_hba->hw->complete_hdr_size * HISI_SAS_QUEUE_SLOTS;
- if (hisi_hba->complete_hdr[i])
- dma_free_coherent(dev, s,
- hisi_hba->complete_hdr[i],
- hisi_hba->complete_hdr_dma[i]);
-}
-
- dma_pool_destroy(hisi_hba->buffer_pool);
-
- s = HISI_SAS_MAX_ITCT_ENTRIES * sizeof(struct hisi_sas_itct);
- if (hisi_hba->itct)
- dma_free_coherent(dev, s,
- hisi_hba->itct, hisi_hba->itct_dma);
-
- s = max_command_entries * sizeof(struct hisi_sas_iost);
- if (hisi_hba->iost)
- dma_free_coherent(dev, s,
- hisi_hba->iost, hisi_hba->iost_dma);
-
- s = max_command_entries * sizeof(struct hisi_sas_breakpoint);
- if (hisi_hba->breakpoint)
- dma_free_coherent(dev, s,
- hisi_hba->breakpoint,
- hisi_hba->breakpoint_dma);
-
-
- s = sizeof(struct hisi_sas_initial_fis) * HISI_SAS_MAX_PHYS;
- if (hisi_hba->initial_fis)
- dma_free_coherent(dev, s,
  - hisi_hba->initial_fis,
  - hisi_hba->initial_fis_dma);
-
  - s = HISI_SAS_MAX_ITCT_ENTRIES * sizeof(struct hisi_sas_sata_breakpoint);
- if (hisi_hba->sata_breakpoint)
  - dma_free_coherent(dev, s,
  - hisi_hba->sata_breakpoint,
  - hisi_hba->sata_breakpoint_dma);
-
  if (hisi_hba->wq)
    destroy_workqueue(hisi_hba->wq);
}@@ -1803,6 +2256,17 @@
}
EXPORT_SYMBOL_GPL(hisi_sas_rst_work_handler);
+
+void hisi_sas_sync_rst_work_handler(struct work_struct *work)
+{
+  struct hisi_sas_rst *rst =
+    container_of(work, struct hisi_sas_rst, work);
+  +
+  +if (!hisi_sas_controller_reset(rst->hisi_hba))
+    rst->done = true;
+  +complete(rst->completion);
  +}
+EXPORT_SYMBOL_GPL(hisi_sas_sync_rst_work_handler);
+
+int hisi_sas_get_fw_info(struct hisi_hba *hisi_hba)
+{
+  struct device *dev = hisi_hba->dev;
+@@ -1879,7 +2343,7 @@
+  struct hisi_hba *hisi_hba;
+  struct device *dev = &pdev->dev;
+  -shost = scsi_host_alloc(hisi_sas_sht, sizeof(*hisi_hba));
+  +shost = scsi_host_alloc(hw->sht, sizeof(*hisi_hba));
+  if (!shost) {
+    dev_err(dev, "scsi host alloc failed\n");
+    return NULL;
+@@ -1909,6 +2373,13 @@
+    if (IS_ERR(hisi_hba->regs))
+      goto err_out;
+  +res = platform_get_resource(pdev, IORESOURCE_MEM, 1);
+  +if (res) {
+    +hisi_hba->sgpio_regs = devm_ioremap_resource(dev, res);
+    +if (IS_ERR(hisi_hba->sgpio_regs))
+      goto err_out;
  +}
  +
  +}
+goto err_out;
+
if (hisi_sas_alloc(hisi_hba, shost)) {
    hisi_sas_free(hisi_hba);
    goto err_out;
}
@@ -1921,19 +2392,8 @@
    return NULL;
}

-void hisi_sas_init_add(struct hisi_hba *hisi_hba)
{ -
    int i;
    -
    for (i = 0; i < hisi_hba->n_phy; i++)
    -memcpy(&hisi_hba->phy[i].dev_sas_addr,
    -    hisi_hba->sas_addr,
    -    SAS_ADDR_SIZE);
    -}
-EXPORT_SYMBOL_GPL(hisi_sas_init_add);
-
int hisi_sas_probe(struct platform_device *pdev,
    const struct hisi_sas_hw *hw)
+
    const struct hisi_sas_hw *hw)
{
    struct Scsi_Host *shost;
    struct hisi_hba *hisi_hba;
    @@ -1969,9 +2429,15 @@
        shost->max_lun = ~0;
        shost->max_channel = 1;
        shost->max_cmd_len = 16;
-        shost->sg_tablesize = min_t(u16, SG_ALL, HISI_SAS_SGE_PAGE_CNT);
-        shost->can_queue = hisi_hba->hw->max_command_entries;
-        shost->cmd_per_lun = hisi_hba->hw->max_command_entries;
+        if (hisi_hba->hw->slot_index_alloc) {
+            shost->can_queue = hisi_hba->hw->max_command_entries;
+            shost->cmd_per_lun = hisi_hba->hw->max_command_entries;
+        } else {
+            shost->can_queue = hisi_hba->hw->max_command_entries -
+                HISI_SAS_RESERVED_IPTT_CNT;
+            shost->cmd_per_lun = hisi_hba->hw->max_command_entries -
+                HISI_SAS_RESERVED_IPTT_CNT;
+        }

    sha->sas_ha_name = DRV_NAME;
    sha->dev = hisi_hba->dev;
    @@ -1985,8 +2451,6 @@
        sha->sas_port[i] = &hisi_hba->port[i].sas_port;
- hisi_sas_init_add(hisi_hba);
-
rc = scsi_add_host(shost, &pdev->dev);
if (rc)
  goto err_out_ha;
@@ -2018,6 +2482,9 @@
  struct hisi_hba *hisi_hba = sha->lldd_ha;
  struct Scsi_Host *shost = sha->core.host;
+
+if (timer_pending(&hisi_hba->timer))
+  del_timer(&hisi_hba->timer);
+
sas_unregister_ha(sha);
sas_remove_host(sha->core.host);

--- linux-4.15.0.orig/drivers/scsi/hisi_sas/hisi_sas_v1_hw.c
+++ linux-4.15.0/drivers/scsi/hisi_sas/hisi_sas_v1_hw.c
@@ -510,6 +510,7 @@
  struct hisi_sas_itct *itct = &hisi_hba->itct[device_id];
  struct asd_sas_port *sas_port = device->port;
  struct hisi_sas_port *port = to_hisi_sas_port(sas_port);
+u64 sas_addr;

  memset(itct, 0, sizeof(*itct));
@@ -534,8 +535,8 @@
    itct->qw0 = cpu_to_le64(qw0);
/* qw1 */
-memcpy(&itct->sas_addr, device->sas_addr, SAS_ADDR_SIZE);
-itct->sas_addr = __swab64(itct->sas_addr);
+memcpy(&sas_addr, device->sas_addr, SAS_ADDR_SIZE);
+itct->sas_addr = cpu_to_le64(__swab64(sas_addr));
/* qw2 */
  itct->qw2 = cpu_to_le64((500ULL << ITCT_HDR_IT_NEXUS_LOSS_TL_OFF) |
@@ -561,7 +562,7 @@
/* static void free_device_v1_hw(struct hisi_hba *hisi_hba,
+static void clear_itct_v1_hw(struct hisi_hba *hisi_hba,
 struct hisi_sas_device *sas_dev)
 {
  u64 dev_id = sas_dev->device_id;
@@ -561,7 +562,7 @@

reg_val &= ~CFG_AGING_TIME_ITCT_REL_MSK;
his_i_sas_write32(hisi_hba, CFG_AGING_TIME, reg_val);

-qw0 = cpu_to_le64(itct->qw0);
+qw0 = le64_to_cpu(itct->qw0);
qw0 &= ~ITCT_HDR_VALID_MSK;
itct->qw0 = cpu_to_le64(qw0);
}
@@ -651,8 +652,10 @@ 
dev_err(dev, "De-reset failed\n");
return -EIO;
}
-} else
+} else {
+dev_warn(dev, "no reset method\n");
+return -EINVAL;
+
return 0;
}
@@ -832,7 +835,7 @@
mod_timer(timer, jiffies + HZ);
}

-static void sl_notify_v1_hw(struct hisi_hba *hisi_hba, int phy_no)
+static void sl_notify_ssp_v1_hw(struct hisi_hba *hisi_hba, int phy_no)
{
 u32 sl_control;

@@ -853,39 +856,12 @@
static void phy_set_linkrate_v1_hw(struct hisi_hba *hisi_hba, int phy_no,
struct sas_phy_linkrates *r)
{
 -u32 prog_phy_link_rate =
-hisi_sas_phy_read32(hisi_hba, phy_no, PROG_PHY_LINK_RATE);
-struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
-struct asd_sas_phy *sas_phy = &phy->sas_phy;
-int i;
-enum sas_linkrate min, max;
-u32 rate_mask = 0;
-
-if (r->maximum_linkrate == SAS_LINK_RATE_UNKNOWN) {
- max = sas_phy->phy->maximum_linkrate;
- min = r->minimum_linkrate;
-} else if (r->minimum_linkrate == SAS_LINK_RATE_UNKNOWN) {
- max = r->maximum_linkrate;
- min = sas_phy->phy->minimum_linkrate;
-} else


sas_phy->phy->maximum_linkrate = max;
sas_phy->phy->minimum_linkrate = min;

min -= SAS_LINK_RATE_1_5_GBPS;
max -= SAS_LINK_RATE_1_5_GBPS;

for (i = 0; i <= max; i++)
    rate_mask |= 1 << (i * 2);

prog_phy_link_rate &= ~0xff;
prog_phy_link_rate |= rate_mask;

enum sas_linkrate max = r->maximum_linkrate;
u32 prog_phy_link_rate = 0x800;

prog_phy_link_rate |= hisi_sas_get_prog_phy_linkrate_mask(max);

hisi_sas_phy_write32(hisi_hba, phy_no, PROG_PHY_LINK_RATE,
    prog_phy_link_rate);

phy_hard_reset_v1_hw(hisi_hba, phy_no);

static int get_wideport_bitmap_v1_hw(struct hisi_hba *hisi_hba, int port_id)
{    
    return 0;
}

static void start_delivery_v1_hw(struct hisi_sas_dq *dq)
{    
    struct hisi_hba *hisi_hba = dq->hisi_hba;
    int dlvry_queue = dq->slot_prep->dlvry_queue;
    int dlvry_queue_slot = dq->slot_prep->dlvry_queue_slot;
    struct hisi_sas_slot *s, *s1, *s2 = NULL;
    int wp;
    +
    +list_for_each_entry_safe(s, s1, &dq->list, delivery) {
        if (!s->ready)
            break;
    }

    /* DQ lock must be taken here */
    /*
    static void start_delivery_v1_hw(struct hisi_sas_dq *dq)
    {
        struct hisi_hba *hisi_hba = dq->hisi_hba;
        int dlvry_queue = dq->slot_prep->dlvry_queue;
        int dlvry_queue_slot = dq->slot_prep->dlvry_queue_slot;
    */
    +/* DQ lock must be taken here */
    static void start_delivery_v1_hw(struct hisi_sas_dq *dq)
    {    
        struct hisi_hba *hisi_hba = dq->hisi_hba;
        int dlvry_queue = dq->slot_prep->dlvry_queue;
        int dlvry_queue_slot = dq->slot_prep->dlvry_queue_slot;
        struct hisi_sas_slot *s, *s1, *s2 = NULL;
        int wp;
        +
        +list_for_each_entry_safe(s, s1, &dq->list, delivery) {
            if (!s->ready)
                break;
        }
s2 = s;
list_del(&s->delivery);
}
+
+if (!s2)
+return;
+
/*
 * Ensure that memories for slots built on other CPUs is observed.
 */
+smp_rmb();
+wp = (s2->dlvry_queue_slot + 1) % HISI_SAS_QUEUE_SLOTS;

-dq->wr_point = ++dlvry_queue_slot % HISI_SAS_QUEUE_SLOTS;
-hisi_sas_write32(hisi_hba, DLVRY_Q_0_WR_PTR + (dlvry_queue * 0x14),
- dq->wr_point);
+hisi_sas_write32(hisi_hba, DLVRY_Q_0_WR_PTR + (dlvry_queue * 0x14), wp);
}

-static int prep_prd_sge_v1_hw(struct hisi_hba *hisi_hba,
+static void prep_prd_sge_v1_hw(struct hisi_hba *hisi_hba,
struct hisi_sas_slot *slot,
struct hisi_sas_cmd_hdr *hdr,
struct scatterlist *scatter,
int n_elem)
{
 struct hisi_sas_sge_page *sge_page = hisi_sas_sge_addr_mem(slot);
 struct device *dev = hisi_hba->dev;
 struct scatterlist *sg;
 int i;

-if (n_elem > HISI_SAS_SGE_PAGE_CNT) {
-dev_err(dev, "prd err: n_elem(%d) > HISI_SAS_SGE_PAGE_CNT",
- n_elem);
-return -EINVAL;
-}
 -
 for_each_sg(scatter, sg, n_elem, i) {
 struct hisi_sas_sge *entry = &sge_page->sge[i];

 @@ -962,48 +949,25 @@
 hdr->prd_table_addr = cpu_to_le64(hisi_sas_sge_addr_dma(slot));

 hdr->sg_len = cpu_to_le32(n_elem << CMD_HDR_DATA_SGL_LEN_off);
-static int prep_smp_v1_hw(struct hisi_hba *hisi_hba,
+static void prep_smp_v1_hw(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot)
{
    struct sas_task *task = slot->task;
    struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
    struct domain_device *device = task->dev;
-struct device *dev = hisi_hba->dev;
+struct scatterlist *sg_req;
    struct hisi_sas_port *port = slot->port;
    struct scatterlist *sg_req, *sg_resp;
    struct hisi_sas_device *sas_dev = device->lldd_dev;
    dma_addr_t req_dma_addr;
-unsigned int req_len, resp_len;
-unsigned int req_len;
+
/* DMA-map SMP request, response buffers */
/* req */
    sg_req = &task->smp_task.smp_req;
    elem = dma_map_sg(dev, sg_req, 1, DMA_TO_DEVICE);
    if (!elem)
        return -ENOMEM;
    req_len = sg_dma_len(sg_req);
    req_dma_addr = sg_dma_address(sg_req);

/* resp */
    sg_resp = &task->smp_task.smp_resp;
    elem = dma_map_sg(dev, sg_resp, 1, DMA_FROM_DEVICE);
    if (!elem) {
        rc = -ENOMEM;
        goto err_out_req;
    }
    resp_len = sg_dma_len(sg_resp);
    if ((req_len & 0x3) || (resp_len & 0x3)) {
        rc = -EINVAL;
        goto err_out_resp;
    }

/* create header */
/* dw0 */
    hdr->dw0 = cpu_to_le32((port->id << CMD_HDR_PORT_OFF) |
@ @ -1023,21 +987,10 @@

hdr->cmd_table_addr = cpu_to_le64(req_dma_addr);
    hdr->sts_buffer_addr = cpu_to_le64(hisi_sas_status_buf_addr_dma(slot));
return 0;
-
-dma_unmap_sg(dev, &slot->task->smp_task.smp_resp, 1,
- DMA_FROM_DEVICE);
-
-dma_unmap_sg(dev, &slot->task->smp_task.smp_req, 1,
- DMA_TO_DEVICE);
-
return rc;
}

static void prep_ssp_v1_hw(struct hisi_hba *hisi_hba,
			  struct hisi_sas_slot *slot)
{
struct sas_task *task = slot->task;
struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
u8 *buf_cmd, fburst = 0;

@@ -1046,7 +999,8 @@
struct hisi_sas_port *port = slot->port;
struct sas_ssp_task *ssp_task = &task->ssp_task;
struct scsi_cmnd *scsi_cmnd = ssp_task->cmd;
-int has_data = 0, rc, priority = is_tmf;
+struct hisi_sas_tmf_task *tmf = slot->tmf;

@@ -1060,7 +1014,7 @@
dw1 = 1 << CMD_HDR_VERIFY_DTL_OFF;

@@ -1081,7 +1035,7 @@
dw1 |= 3 << CMD_HDR_SSP_FRAME_TYPE_OFF;
} else {
switch (scsi_cmnd->sc_data_direction) {
@@ -1081,7 +1035,7 @@
dw1 |= sas_dev->device_id << CMD_HDR_DEVICE_ID_OFF;
hdr->dw1 = cpu_to_le32(dw1);

@@ -1081,7 +1035,7 @@

-if (is_tmf) {
+if (tmf) {

dw2 = ((sizeof(struct ssp_tmf_iu) +
 sizeof(struct ssp_frame_hdr)+3)/4) <<
 CMD_HDR_CFL_OFF;

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hdr->transfer_tags = cpu_to_le32(slot->idx << CMD_HDR_IPTT_OFF);

-if (has_data) {
   -rc = prep_prd_sge_v1_hw(hisi_hba, slot, hdr->scatter,
   +if (has_data)
   +prep_prd_sge_v1_hw(hisi_hba, slot, hdr, task->scatter,
   slot->n_elem);
   -if (rc)
   -return rc;
   -}

hdr->data_transfer_len = cpu_to_le32(task->total_xfer_len);
hdr->cmd_table_addr = cpu_to_le64(hisi_sas_cmd_hdr_addr_dma(slot));
@@ -1115,7 +1066,7 @@
hdr->dw2 = cpu_to_le32(dw2);

memcpy(buf_cmd, &task->ssp_task.LUN, 8);
-if (!is_tmf) {
   +if (!tmf) {
   buf_cmd[9] = fburst | task->ssp_task.task_attr |
   (task->ssp_task.task_prio << 3);
   memcpy(buf_cmd + 12, task->ssp_task.cmd->cmnd,
   @@ -1134,8 +1085,6 @@
break;
   }
   }
   -
   -return 0;
   -}

/* by default, task resp is complete */
@@ -1152,7 +1101,7 @@
case SAS_PROTOCOL_SSP:
{
   int error = -1;
   -u32 dma_err_type = cpu_to_le32(err_record->dma_err_type);
   +u32 dma_err_type = le32_to_cpu(err_record->dma_err_type);
   u32 dma_tx_err_type = ((dma_err_type &
   ERR_HDR_DMA_TX_ERR_TYPE_MSK)) >>
   ERR_HDR_DMA_TX_ERR_TYPE_OFF;
   @@ -1160,9 +1109,9 @@
ERR_HDR_DMA_RX_ERR_TYPE_MSK)) >>
ERR_HDR_DMA_RX_ERR_TYPE_OFF;
   u32 trans_tx_fail_type =
   -cpu_to_le32(err_record->trans_tx_fail_type);
   +le32_to_cpu(err_record->trans_tx_fail_type);
u32 trans_rx_fail_type =
-cpu_to_le32(err_record->trans_rx_fail_type);
+le32_to_cpu(err_record->trans_rx_fail_type);

if (dma_tx_err_type) {
/* dma tx err */
@@ -1351,11 +1300,8 @@
!(cmplt_hdr_data & CMPLT_HDR_RSPNS_XFRD_MSK)) {

slot_err_v1_hw(hisi_hba, task, slot);
-if (unlikely(slot->abort)) {
-queue_work(hisi_hba->wq, &slot->abort_slot);
-/* immediately return and do not complete */
+if (unlikely(slot->abort))
    return ts->stat;
-}
    goto out;
}
@@ -1407,9 +1353,6 @@
}

out:
-if (sas_dev)
-atomic64_dec(&sas_dev->running_req);
-
    hisi_sas_slot_task_free(hisi_hba, task, slot);
    sts = ts->stat;
@@ -1431,6 +1374,7 @@
    u32 *frame_rcvd = (u32 *)sas_phy->frame_rcvd;
    struct sas_identify_frame *id = (struct sas_identify_frame *)frame_rcvd;
    irqreturn_t res = IRQ_HANDLED;
+unsigned long flags;

    irq_value = hisi_sas_phy_read32(hisi_hba, phy_no, CHL_INT2);
    if (!(irq_value & CHL_INT2_SL_PHY_ENA_MSK)) {
@@ -1482,7 +1426,14 @@
        else if (phy->identify.device_type != SAS_PHY_UNUSED)
            phy->identify.target_port_protocols =
                SAS_PROTOCOL_SMP;
-        queue_work(hisi_hba->wq, &phy->phyup_ws);
+        hisi_sas_notify_phy_event(phy, HISI_PHYE_PHY_UP);
+            +spin_lock_irqsave(&phy->lock, flags);
+            if (phy->reset_completion) {
+                phy->in_reset = 0;
+                complete(phy->reset_completion);
+} +spin_unlock_irqrestore(&phy->lock, flags);

end:
hi_sas_phy_write32(hisi_hba, phy_no, CHL_HIT2,
@@ -1519,7 +1470,8 @@ goto end;
} -sha->notify_port_event(sas_phy, PORTE_BROADCAST_RCVD);
+if (!test_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags)) +sha->notify_port_event(sas_phy, PORTE_BROADCAST_RCVD);

end:
hi_sas_phy_write32(hisi_hba, phy_no, CHL_HIT2,
@@ -1607,7 +1559,7 @@ u32 cmplt_hdr_data;
complete_hdr = &complete_queue[rd_point]; -cmplt_hdr_data = cpu_to_le32(complete_hdr->data); +cmplt_hdr_data = le32_to_cpu(complete_hdr->data); idx = (cmplt_hdr_data & CMPLT_HDR_IPTT_MSK) >> CMPLT_HDR_IPTT_OFF; slot = &hisi_hba->slot_info[idx]; @@ -1846,11 +1798,37 @@ return 0;
} +static struct device_attribute *host_attrs_v1_hw[] = {
+&dev_attr_phy_event_threshold,
+NULL +}; + +static struct scsi_host_template sht_v1_hw = {
+.name = DRV_NAME,
+.module = THIS_MODULE,
+.queuecommand = sas_queuecommand,
+.target_alloc = sas_target_alloc,
+.slave_configure = hisi_sas_slave_configure,
+.scan_finished = hisi_sas_scan_finished,
+.scan_start = hisi_sas_scan_start,
+.change_queue_depth = sas_change_queue_depth,
+.bios_param = sas_bios_param,
+.this_id = -1,
+.sg_tablesize = HISI_SAS_SGE_PAGE_CNT,
+.max_sectors = SCSI_DEFAULT_MAX_SECTORS,
+.use_clustering = ENABLE_CLUSTERING,
+.eh_device_reset_handler = sas_eh_device_reset_handler,
static const struct hisi_sas_hw hisi_sas_v1_hw = {
    .hw_init = hisi_sas_v1_init,
    .setup_itct = setup_itct_v1_hw,
    -.sl_notify = sl_notify_v1_hw,
    -.free_device = free_device_v1_hw,
    +.sl_notify_ssp = sl_notify_ssp_v1_hw,
    +.clear_itct = clear_itct_v1_hw,
    .prep_smp = prep_smp_v1_hw,
    .clear_itct = clear_itct_v1_hw,
    .get_free_slot = get_free_slot_v1_hw,
    @ @ -1865,6 +1843,7 @@
    .get_wideport_bitmap = get_wideport_bitmap_v1_hw,
    .max_command_entries = HISI_SAS_COMMAND_ENTRIES_V1_HW,
    .complete_hdr_size = sizeof(struct hisi_sas_complete_v1_hdr),
    +.sht = &sht_v1_hw,
};

static int hisi_sas_v1_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/scsi/hisi_sas/hisi_sas_v2_hw.c
+++ linux-4.15.0/drivers/scsi/hisi_sas/hisi_sas_v2_hw.c
@@ -144,6 +144,7 @@
#define SAS_ECC_INTR_NCQ_MEM3_ECC_1B_OFF	19
#define SAS_ECC_INTR_MSK		0x1ec
#define HGC_ERR_STAT_EN			0x238
+define CQE_SEND_CNT			0x248
#define DLVRY_Q_0_BASE_ADDR_LO		0x260
#define DLVRY_Q_0_BASE_ADDR_HI		0x264
#define DLVRY_Q_0_DEPTH			0x268
@@ -240,7 +241,12 @@
#define CHL_INT1_DMAC_TX_ECC_ERR_MSK(0x1 << CHL_INT1_DMAC_TX_ECC_ERR_OFF)
#define CHL_INT1_DMAC_RX_ECC_ERR_OFF17
#define CHL_INT1_DMAC_RX_ECC_ERR_MSK(0x1 << CHL_INT1_DMAC_RX_ECC_ERR_OFF)
+define CHL_INT1_DMAC_TX_AXI_WR_ERR_OFF19
+define CHL_INT1_DMAC_TX_AXI_RD_ERR_OFF20
+define CHL_INT1_DMAC_RX_AXI_WR_ERR_OFF21
+define CHL_INT1_DMAC_RX_AXI_RD_ERR_OFF22
#define CHL_INT2(PORT_BASE + 0x1bc)
+define CHL_INT2_SL_IDAF_TOUT_CONF_OFF0
#define CHL_INT0_MSK(PORT_BASE + 0x1c0)
#define CHL_INT1_MSK(PORT_BASE + 0x1c4)
#define CHL_INT2_MSK(PORT_BASE + 0x1c8)
@@ -290,6 +296,10 @@
#define CMD_HDR_RESP_REPORT_MSK (0x1 << CMD_HDR_RESP_REPORT_OFF)
#define CMD_HDR_TLR_CTRL_OFF 6
#define CMD_HDR_TLR_CTRL_MSK (0x3 << CMD_HDR_TLR_CTRL_OFF)
+ #define CMD_HDR_PHY_ID_OFF 8
+ #define CMD_HDR_PHY_ID_MSK (0x1ff << CMD_HDR_PHY_ID_OFF)
+ #define CMD_HDR_FORCE_PHY_OFF 17
+ #define CMD_HDR_FORCE_PHY_MSK (0x1 << CMD_HDR_FORCE_PHY_OFF)
#define CMD_HDR_PORT_OFF 18
#define CMD_HDR_PORT_MSK (0xf << CMD_HDR_PORT_OFF)
#define CMD_HDR_PRIORITY_OFF 27

__le32 dma_rx_err_type;
}

+ struct signal_attenuation_s {
+ u32 de_emphasis;
+ u32 preshoot;
+ u32 boost;
+ };
+
+ struct sig_atten_lu_s {
+ const struct signal_attenuation_s *att;
+ u32 sas_phy_ctrl;
+ };
+
+ static const struct hisi_sas_hw_error one_bit_ecc_errors[] = {
+ .irq_msk = BIT(SAS_ECC_INTR_DQE_ECC_1B_OFF),
+       @ @ -749,7 +770,7 @ @

/* This function needs to be protected from pre-emption. */
static int
-slot_index_alloc_quirk_v2_hw(struct hisi_hba *hisi_hba, int *slot_idx,
+slot_index_alloc_quirk_v2_hw(struct hisi_hba *hisi_hba,
       struct domain_device *device)
{  
    int sata_dev = dev_is_sata(device);
    @ @ -757,6 +778,7 @ @
    struct hisi_sas_device *sas_dev = device->lldd_dev;
    int sata_idx = sas_dev->sata_idx;
    int start, end;
    +unsigned long flags;

    if (!sata_dev) {
/*
     @ @ -780,11 +802,14 @ @
    end = 64 * (sata_idx + 2);
   */
}
+spin_lock_irqsave(&hisi_hba->lock, flags);
while (1) {
    start = find_next_zero_bit(bitmap,
    hisi_hba->slot_index_count, start);
    -if (start >= end)
    -spin_unlock_irqrestore(&hisi_hba->lock, flags);
    return -SAS_QUEUE_FULL;
+}

/*
 * SAS IPTT bit0 should be 1, and SATA IPTT bit0 should be 0.
 */
@@ -794,8 +819,8 @@
}
set_bit(start, bitmap);
-*slot_idx = start;
-return 0;
+spin_unlock_irqrestore(&hisi_hba->lock, flags);
+return start;
}

static bool sata_index_alloc_v2_hw(struct hisi_hba *hisi_hba, int *idx)
@@ -909,6 +934,7 @@
struct domain_device *parent_dev = device->parent;
struct asd_sas_port *sas_port = device->port;
struct hisi_sas_port *port = to_hisi_sas_port(sas_port);
+u64 sas_addr;

    memset(itct, 0, sizeof(*itct));
@@ -941,8 +967,8 @@
    itct->qw0 = cpu_to_le64(qw0);

    /* qw1 */
-memcpy(&itct->sas_addr, device->sas_addr, SAS_ADDR_SIZE);
-__swab64(itct->sas_addr);
+memcpy(&sas_addr, device->sas_addr, SAS_ADDR_SIZE);
+cpu_to_le64(__swab64(sas_addr));

    /* qw2 */
    if (!dev_is_sata(device))
@@ -952,7 +978,7 @@
        (0x1ULL << ITCT_HDR_RTOLT_OFF));
    }

-static void free_device_v2_hw(struct hisi_hba *hisi_hba,
static void clear_itct_v2_hw(struct hisi_hba *hisi_hba, 
        struct hisi_sas_device *sas_dev) 
{
    DECLARE_COMPLETION_ONSTACK(completion);
    sas_dev->completion = &completion;

    /* SoC bug workaround */
    if (dev_is_sata(sas_dev->sas_device))
        clear_bit(sas_dev->sata_idx, hisi_hba->sata_dev_bitmap);

    /* clear the itct interrupt state */
    if (ENT_INT_SRC3_ITC_INT_MSK & reg_val)
        hisi_sas_write32(hisi_hba, ENT_INT_SRC3, 
        sas_dev->completion = &completion;
}

/* SoC bug workaround */
static void free_device_v2_hw(struct hisi_sas_device *sas_dev) 
{
    struct hisi_hba *hisi_hba = sas_dev->hisi_hba;

    /* SoC bug workaround */
    if (dev_is_sata(sas_dev->sas_device))
        clear_bit(sas_dev->sata_idx, hisi_hba->sata_dev_bitmap);

    static int reset_hw_v2_hw(struct hisi_hba *hisi_hba) 
{
    int i, reset_val;

    dev_err(dev, "SAS de-reset fail.");
    return -EIO;
    }

    dev_warn(dev, "no reset method\n");
    return -EINVAL;

    return 0;
}
+static const struct signal_attenuation_s x6000 = {9200, 0, 10476};
+static const struct sig_atten_lu_s sig_atten_lu[] = {
+  { &x6000, 0x3016a68 },
+};
+
static void init_reg_v2_hw(struct hisi_hba *hisi_hba)
{
    struct device *dev = hisi_hba->dev;
    u32 sas_phy_ctrl = 0x30b9908;
    u32 signal[3];
    int i;

    /* Global registers init */
    hisi_sas_write32(hisi_hba, AXI_AHB_CLK_CFG, 1);
    hisi_sas_write32(hisi_hba, HYPER_STREAM_ID_EN_CFG, 1);

    /* Get sas_phy_ctrl value to deal with TX FFE issue. */
    if (!device_property_read_u32_array(dev, "hisilicon,signal-attenuation",
            signal, ARRAY_SIZE(signal))) {
        for (i = 0; i < ARRAY_SIZE(sig_atten_lu); i++) {
            const struct sig_atten_lu_s *lookup = &sig_atten_lu[i];
            const struct signal_attenuation_s *att = lookup->att;
            if ((signal[0] == att->de_emphasis) &&
                (signal[1] == att->preshoot) &&
                (signal[2] == att->boost)) {
                sas_phy_ctrl = lookup->sas_phy_ctrl;
                break;
            }
        }
        if (i == ARRAY_SIZE(sig_atten_lu))
            dev_warn(dev, "unknown signal attenuation values, using default PHY ctrl config\n");
    }
    for (i = 0; i < hisi_hba->n_phy; i++) {
        hisi_sas_phy_write32(hisi_hba, i, PROG_PHY_LINK_RATE, 0x855);
        hisi_sas_phy_write32(hisi_hba, i, SAS_PHY_CTRL, 0x30b9908);
        struct hisi_sas_phy *phy = &hisi_hba->phy[i];
        struct asd_sas_phy *sas_phy = &phy->sas_phy;
        u32 prog_phy_link_rate = 0x800;
        enum sas_linkrate max = sas_phy->phy->maximum_linkrate;
        if (!sas_phy->phy || (sas_phy->phy->maximum_linkrate <
            SAS_LINK_RATE_1_5_GBPS)) {
            prog_phy_link_rate = 0x855;
        } else {
            enum sas_linkrate max = sas_phy->phy->maximum_linkrate;
        }
        }
+ prog_phy_link_rate =
+ hisi_sas_get_prog_phy_linkrate_mask(max) |
+ 0x800;
+
+ hisi_sas_phy_write32(hisi_hba, i, PROG_PHY_LINK_RATE, prog_phy_link_rate);
+ hisi_sas_phy_write32(hisi_hba, i, SAS_PHY_CTRL, sas_phy_ctrl);
+ hisi_sas_phy_write32(hisi_hba, i, SL_TOUT_CFG, 0x77d777d7);  
+ hisi_sas_phy_write32(hisi_hba, i, SL_CONTROL, 0x0);
+ hisi_sas_phy_write32(hisi_hba, i, TX_ID_AUTO, 0x2);
+ hisi_sas_phy_write32(hisi_hba, i, CHL_INT1, 0xffffffff);
+ hisi_sas_phy_write32(hisi_hba, i, CHL_INT2, 0xffffffff);
+ hisi_sas_phy_write32(hisi_hba, i, RXOP_CHECK_CFG_H, 0x1000);
+ hisi_sas_phy_write32(hisi_hba, i, CHL_INT1_MSK, 0xffffffff);
+ hisi_sas_phy_write32(hisi_hba, i, CHL_INT2_MSK, 0xffffffff);
+ hisi_sas_phy_write32(hisi_hba, i, CHL_INT1_MSK, 0x8ffffbfe);
+ hisi_sas_phy_write32(hisi_hba, i, CHL_INT2_MSK, 0x8ffffbfe);
+ hisi_sas_phy_write32(hisi_hba, i, SL_CFG, 0x13f801fc);
+ hisi_sas_phy_write32(hisi_hba, i, PHY_CTRL_RDY_MSK, 0x0);
+ hisi_sas_phy_write32(hisi_hba, i, PHYCTRL_NOT_RDY_MSK, 0x0);
+ @ @ -1515.7 +1589.7 @@
+}

static void sl_notify_v2_hw(struct hisi_hba *hisi_hba, int phy_no)
+ static void sl_notify_ssp_v2_hw(struct hisi_hba *hisi_hba, int phy_no)
+ {
+ u32 sl_control;
+
+ @ @ -1536.39 +1610.12 @@
+ static void phy_set_linkrate_v2_hw(struct hisi_hba *hisi_hba, int phy_no,  
+ struct sas_phy_linkrates *r)
+ {
+ - u32 prog_phy_link_rate =
+ - hisi_sas_phy_read32(hisi_hba, phy_no, PROG_PHY_LINK_RATE);
+ - struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
+ - struct asd_sas_phy *sas_phy = &phy->sas_phy;
+ - int i;
+ - enum sas_linkrate min, max;
+ - u32 rate_mask = 0;
+ -
+ - if (r->maximum_linkrate == SAS_LINK_RATE_UNKNOWN) {
+ - max = sas_phy->phy->maximum_linkrate;
+ - min = r->minimum_linkrate;
+ + } else if (r->minimum_linkrate == SAS_LINK_RATE_UNKNOWN) {
+ - max = r->maximum_linkrate;
-min = sas_phy->phy->minimum_linkrate;
-} else
-return;
-
-sas_phy->phy->maximum_linkrate = max;
sas_phy->phy->minimum_linkrate = min;
-
-min -= SAS_LINK_RATE_1_5_GBPS;
-max -= SAS_LINK_RATE_1_5_GBPS;
-
-for (i = 0; i <= max; i++)
-rate_mask |= 1 << (i * 2);
-
-prog_phy_link_rate &= ~0xff;
-prog_phy_link_rate |= rate_mask;
+enum sas_linkrate max = r->maximum_linkrate;
+u32 prog_phy_link_rate = 0x800;

+prog_phy_link_rate |= hisi_sas_get_prog_phy_linkrate_mask(max);
hisi_sas_phy_write32(hisi_hba, phy_no, PROG_PHY_LINK_RATE,
+prog_phy_link_rate);
-
-phy_hard_reset_v2_hw(hisi_hba, phy_no);
+prog_phy_link_rate);
}

static int get_wideport_bitmap_v2_hw(struct hisi_hba *hisi_hba, int port_id)
@@ -1609,42 +1656,53 @@
  r = hisi_sas_read32_relaxed(hisi_hba,
  DLVRY_Q_0_RD_PTR + (queue * 0x14));
  if (r == (w+1) % HISI_SAS_QUEUE_SLOTS) {
-    dev_warn(dev, "full queue=%d r=%d w=%d\n", queue, r, w);
+    dev_warn(dev, "full queue=%d r=%d w=%d\n", queue, r, w);
    return -EAGAIN;
  }
-
-  return 0;
+  dq->wr_point = (dq->wr_point + 1) % HISI_SAS_QUEUE_SLOTS;
+  +return w;
}

+/* DQ lock must be taken here */
static void start_delivery_v2_hw(struct hisi_sas_dq *dq)
{
  struct hisi_hba *hisi_hba = dq->hisi_hba;
  -int dlvr_queue = dq->slot_prep->dlvr_queue;
  +int dlvr_queue = dq->slot_prep->dlvr_queue;

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-int dlvry_queue_slot = dq->slot_prep->dlvry_queue_slot;
+struct hisi_sas_slot *s, *s1, *s2 = NULL;
+int dlvry_queue = dq->id;
+int wp;

dq->wr_point = ++dlvry_queue_slot % HISI_SAS_QUEUE_SLOTS;
-hisi_sas_write32(hisi_hba, DLVRY_Q_0_WR_PTR + (dlvry_queue * 0x14),
 - dq->wr_point);
+list_for_each_entry_safe(s, s1, &dq->list, delivery) {
+if (!s->ready)
+break;
+s2 = s;
+list_del(&s->delivery);
+}
+
+if (!s2)
+return;
+
+/*
 + * Ensure that memories for slots built on other CPUs is observed.
 + */
+smp_rmb();
+wp = (s->dlvry_queue_slot + 1) % HISI_SAS_QUEUE_SLOTS;
+
+hisi_sas_write32(hisi_hba, DLVRY_Q_0_WR_PTR + (dlvry_queue * 0x14), wp);
}

static int prep_prd_sge_v2_hw(struct hisi_hba *hisi_hba,
+static void prep_prd_sge_v2_hw(struct hisi_hba *hisi_hba,
 struct hisi_sas_slot *slot,
 struct hisi_sas_cmd_hdr *hdr,
 struct scatterlist *scatter,
 int n_elem)
{
 struct hisi_sas_sge_page *sge_page = hisi_sas_sge_addr_mem(slot);
-struct device *dev = hisi_hba->dev;
 struct scatterlist *sg;
 int i;

-if (n_elem > HISI_SAS_SGE_PAGE_CNT) {
-dev_err(dev, "prd err: n_elem(%d) > HISI_SAS_SGE_PAGE_CNT",
 -n_elem);
 -return -EINVAL;
 -}
-
 for_each_sg(scatter, sg, n_elem, i) {
 struct hisi_sas_sge *entry = &sge_page->sge[i];
hdr->prd_table_addr = cpu_to_le64(hisi_sas_sge_addr_dma(slot));

hdr->sg_len = cpu_to_le32(n_elem << CMD_HDR_DATA_SGL_LEN_OFF);
-
-return 0;
}

static int prep_smp_v2_hw(struct hisi_hba *hisi_hba,
+static void prep_smp_v2_hw(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot)
{
    struct sas_task *task = slot->task;
    struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
    struct domain_device *device = task->dev;
    struct device *dev = hisi_hba->dev;
    struct hisi_sas_port *port = slot->port;
    struct scatterlist *sg_req, *sg_resp;
    struct hisi_sas_device *sas_dev = device->lldd_dev;
    dma_addr_t req_dma_addr;
    -unsigned int req_len, resp_len;
    -int elem, rc;
+unsigned int req_len;

    /* DMA-map SMP request, response buffers
     */
    /* req */
    sg_req = &task->smp_task.smp_req;
    -elem = dma_map_sg(dev, sg_req, 1, DMA_TO_DEVICE);
    -if (!elem)
        -return -ENOMEM;
    -req_len = sg_dma_len(sg_req);
    -req_dma_addr = sg_dma_address(sg_req);
    -
    /* resp */
    -sg_resp = &task->smp_task.smp_resp;
    -elem = dma_map_sg(dev, sg_resp, 1, DMA_FROM_DEVICE);
    -if (!elem) {
        -rc = -ENOMEM;
        -goto err_out_req;
    -}
    -resp_len = sg_dma_len(sg_resp);
    -if ((req_len & 0x3) || (resp_len & 0x3)) {
        -rc = -EINVAL;
        -goto err_out_resp;
    -}
+req_len = sg_dma_len(&task->smp_task.smp_req);

/* create header */
/* dw0 */
@@ -1719,21 +1754,10 @@
hdr->cmd_table_addr = cpu_to_le64(req_dma_addr);
hdr->sts_buffer_addr = cpu_to_le64(hisi_sas_status_buf_addr_dma(slot));
-
-return 0;
-
-err_out_resp:
-dma_unmap_sg(dev, &slot->task->smp_task.smp_RESP, 1,
-    DMA_FROM_DEVICE);
-err_out_req:
-dma_unmap_sg(dev, &slot->task->smp_task.smp_REQ, 1,
-    DMA_TO_DEVICE);
-return rc;
}

-static int prep_ssp_v2_hw(struct hisi_hba *hisi_hba,
-    struct hisi_sas_slot *slot, int is_tmf,
-    struct hisi_sas_tmf_task *tmf)
+static void prep_ssp_v2_hw(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot)
{
    struct sas_task *task = slot->task;
    struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
    struct hisi_sas_port *port = slot->port;
    struct sas_ssp_task *ssp_task = &task->ssp_task;
    struct scsi_cmnd *scsi_cmnd = ssp_task->cmd;
    int has_data = 0, priority = is_tmf;
    +struct hisi_sas_tmf_task *tmf = slot->tmf;
    +int has_data = 0, priority = !!tmf;
    u8 *buf_cmd;
    u32 dw1 = 0, dw2 = 0;

    @@ -1742,7 +1766,8 @@
    struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
    struct hisi_sas_port *port = slot->port;
    struct sas_ssp_task *ssp_task = &task->ssp_task;
    struct scsi_cmnd *scsi_cmnd = ssp_task->cmd;
    -int has_data = 0, rc, priority = is_tmf;
    +struct hisi_sas_tmf_task *tmf = slot->tmf;
    +int has_data = 0, priority = !!tmf;
    u8 *buf_cmd;
    u32 dw1 = 0, dw2 = 0;

    @@ -1753,7 +1778,9 @@
        (1 << CMD_HDR_CMD_OFF)); /* ssp */
    dw1 = 1 << CMD_HDR_VDTL_OFF;
    -if (is_tmf) {
    +if (tmf) {
        dw1 |= 2 << CMD_HDR_FRAME_TYPE_OFF;
        dw1 |= DIR_NO_DATA << CMD_HDR_DIR_OFF;
    } else {
    @@ -1784,12 +1809,9 @@
hdr->transfer_tags = cpu_to_le32(slot->idx);

  -if (has_data) {
  -rc = prep_prd_sge_v2_hw(hisi_hba, slot, hdr, task->scatter,
  +if (has_data)
  +prep_prd_sge_v2_hw(hisi_hba, slot, hdr, task->scatter,
  slot->n_elem);
  -if (rc)
  -return rc;
  -}

hdr->data_transfer_len = cpu_to_le32(task->total_xfer_len);
hdr->cmd_table_addr = cpu_to_le64(hisi_sas_cmd_hdr_addr_dma(slot));
@@ -1799,7 +1821,7 @@
sizeof(struct ssp_frame_hdr);
memcpy(buf_cmd, &task->ssp_task.LUN, 8);
-  -if (!is_tmf) {
-  +if (!tmf) {
buf_cmd[9] = task->ssp_task.task_attr |
(task->ssp_task.task_prio << 3);
memcpy(buf_cmd + 12, task->ssp_task.cmd->cmd,
@@ -1818,8 +1840,6 @@
break;
} 
}
-
-  -return 0;
}

#define TRANS_TX_ERR0
@@ -2025,11 +2045,11 @@
struct task_status_struct *ts = &task->task_status;
struct hisi_sas_err_record_v2 *err_record =
hisi_sas_status_buf_addr_mem(slot);
-u32 trans_tx_fail_type = cpu_to_le32(err_record->trans_tx_fail_type);
-u32 trans_rx_fail_type = cpu_to_le32(err_record->trans_rx_fail_type);
-u16 dma_tx_err_type = cpu_to_le16(err_record->dma_tx_err_type);
-u16 sipc_rx_err_type = cpu_to_le16(err_record->sipc_rx_err_type);
-u32 dma_rx_err_type = cpu_to_le32(err_record->dma_rx_err_type);
+u32 trans_tx_fail_type = le32_to_cpu(err_record->trans_tx_fail_type);
+u32 trans_rx_fail_type = le32_to_cpu(err_record->trans_rx_fail_type);
+u16 dma_tx_err_type = le16_to_cpu(err_record->dma_tx_err_type);
+u16 sipc_rx_err_type = le16_to_cpu(err_record->sipc_rx_err_type);
+u32 dma_rx_err_type = le32_to_cpu(err_record->dma_rx_err_type);
int error = -1;
if (err_phase == 1) {
    trans_tx_fail_type;
} else if (err_phase == 2) {
    /* error in RX phase, the priority is: DW1 > DW3 > DW2 */
    error = parse_trans_rx_err_code_v2_hw(trans_rx_fail_type);
    if (error == -1) {
        error = parse_dma_rx_err_code_v2_hw(dma_rx_err_type);
    }
    struct device *dev = hisi_hba->dev;
    struct task_status_struct *ts;
    struct domain_device *device;
    struct sas_ha_struct *ha;
    enum exec_status sts;
    struct hisi_sas_complete_v2_hdr *complete_queue =
        hisi_hba->complete_hdr[slot->cmplt_queue];
    struct hisi_sas_complete_v2_hdr *complete_hdr =
        &complete_queue[slot->cmplt_queue_slot];
    unsigned long flags;
    if (unlikely(!task || !task->lldd_task || !task->dev))
        return -EINVAL;
    ts = &task->task_status;
    device = task->dev;
    ha = device->port->ha;
    sas_dev = device->lldd_dev;

    spin_lock_irqsave(&task->task_state_lock, flags);
    aborted = task->task_state_flags & SAS_TASK_STATE_ABORTED;
    task->task_state_flags &= ~
        (SAS_TASK_STATE_PENDING | SAS_TASK_AT_INITIATOR);
    spin_unlock_irqrestore(&task->task_state_lock, flags);
    memset(ts, 0, sizeof(*ts));
    ts->resp = SAS_TASK_COMPLETE;
    if (unlikely(aborted)) {
        ts->stat = SAS_ABORTED_TASK;
        spin_lock_irqsave(&hisi_hba->lock, flags);
        hisi_slot_task_free(hisi_hba, task, slot);
        spin_unlock_irqrestore(&hisi_hba->lock, flags);
-return -1;
-
if (unlikely(!sas_dev)) {
    dev_dbg(dev, "slot complete: port has no device\n");
    ts->stat = SAS_PHY_DOWN;
    @ @ -2370,8 +2383,9 @ @
}

/* Use SAS+TMF status codes */
-switch ((complete_hdr->dw0 & CMPLT_HDR_ABORT_STAT_MSK)
    >>> CMPLT_HDR_ABORT_STAT_OFF) {
    +dw0 = le32_to_cpu(complete_hdr->dw0);
    +switch ((dw0 & CMPLT_HDR_ABORT_STAT_MSK) >>>
        CMPLT_HDR_ABORT_STAT_OFF) {
    case STAT_IO_ABORTED:
        /* this io has been aborted by abort command */
        ts->stat = SAS_ABORTED_TASK;
        @ @ -2396,10 +2410,10 @ @
        break;
    }

    -if (((complete_hdr->dw0 & CMPLT_HDR_ERX_MSK) &&
    -(complete_hdr->dw0 & CMPLT_HDR_RSPNS_XFRD_MSK)) ||
    -u32 err_phase = (complete_hdr->dw0 & CMPLT_HDR_ERR_PHASE_MSK)
    +if ((dw0 & CMPLT_HDR_ERX_MSK) && (!(dw0 & CMPLT_HDR_RSPNS_XFRD_MSK))) {
    +u32 err_phase = (dw0 & CMPLT_HDR_ERR_PHASE_MSK)
    >> CMPLT_HDR_ERR_PHASE_OFF;
    +u32 *error_info = hisi_sas_status_buf_addr_mem(slot);

    /* Analyse error happens on which phase TX or RX */
    if (ERR_ON_TX_PHASE(err_phase))
        @ @ -2407,6 +2421,16 @ @
    else if (ERR_ON_RX_PHASE(err_phase))
        slot_err_v2_hw(hisi_hba, task, slot, 2);

    +if (ts->stat != SAS_DATA_UNDERRUN)
        +dev_info(dev, "erroneous completion iptt=%d task=%p dev id=%d ",
            +"CQ hdr: 0x%x 0x%x 0x%x 0x%x ",
            +"Error info: 0x%x 0x%x 0x%x 0x%x\n",
            +slot->idx, task, sas_dev->device_id,
            +complete_hdr->dw0, complete_hdr->dw1,
            +complete_hdr->act, complete_hdr->dw3,
            +error_info[0], error_info[1],
            +error_info[2], error_info[3]);
    +if (unlikely(slot->abort))
        return ts->stat;
goto out;
@@ -2456,19 +2480,33 @@
}

if (!slot->port->port_attached) {
-dev_err(dev, "slot complete: port %d has removed\n",
+dev_warn(dev, "slot complete: port %d has removed\n",
    slot->port->sas_port.id);
    ts->stat = SAS_PHY_DOWN;
}

out:
+sts = ts->stat;
    spin_lock_irqsave(&task->task_state_lock, flags);
    if (task->task_state_flags & SAS_TASK_STATE_ABORTED) {
+spin_unlock_irqrestore(&task->task_state_lock, flags);
        dev_info(dev, "slot complete: task(%p) aborted\n", task);
        return SAS_ABORTED_TASK;
    }
    if (!is_internal && (task->task_proto != SAS_PROTOCOL_SMP)) {
        spin_lock_irqsave(&device->done_lock, flags);
        if (test_bit(SAS_HA_FROZEN, &ha->state)) {
            spin_unlock_irqrestore(&device->done_lock, flags);
            dev_info(dev, "slot complete: task(%p) ignored\n",
            task);
            return sts;
        }
    }
    spin_unlock_irqrestore(&device->done_lock, flags);
    if (task->task_done)
        task->task_done(task);
@@ -2476,7 +2514,7 @@
    return sts;
}

-static int prep_ata_v2_hw(struct hisi_hba *hisi_hba,
+static void prep_ata_v2_hw(struct hisi_hba *hisi_hba,
    struct sas_task *task)
{ struct sas_task *task = slot->task;
@@ -2486,17 +2524,25 @@
        struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
        struct asd_sas_port *sas_port = device->port;
        struct hisi_sas_port *port = to_hisi_sas_port(sas_port);
+       struct hisi_sas_tmf_task *tmf = slot->tmf;
        u8 *buf_cmd;
        int has_data = 0, rc = 0, hdr_tag = 0;
        u32 dw1 = 0, dw2 = 0;
-       int has_data = 0, hdr_tag = 0;
+       int has_data = 0, hdr_tag = 0;
+       u32 dw0, dw1 = 0, dw2 = 0;

        /* create header */
        /* dw0 */
-       hdr->dw0 = cpu_to_le32(port->id << CMD_HDR_PORT_OFF);
+       dw0 = port->id << CMD_HDR_PORT_OFF;
        if (parent_dev && DEV_IS_EXPANDER(parent_dev->dev_type))
-           hdr->dw0 |= cpu_to_le32(3 << CMD_HDR_CMD_OFF);
+           dw0 |= 3 << CMD_HDR_CMD_OFF;
        else
-           hdr->dw0 |= cpu_to_le32(4 << CMD_HDR_CMD_OFF);
+           dw0 |= 4 << CMD_HDR_CMD_OFF;
+        if (tmf && tmf->force_phy) {
+           dw0 |= CMD_HDR_FORCE_PHY_MSK;
+           dw0 |= (1 << tmf->phy_id) << CMD_HDR_PHY_ID_OFF;
+        }
+        hdr->dw0 = cpu_to_le32(dw0);

        /* dw1 */
        switch (task->data_dir) {
@@ -2517,13 +2563,16 @@
            dw1 |= 1 << CMD_HDR_RESET_OFF;
            dw1 |= (hisi_sas_get_ata_protocol(
-                       task->ata_task.fis.command, task->data_dir))
+                       &task->ata_task.fis, task->data_dir))
                << CMD_HDR_FRAME_TYPE_OFF;
            dw1 |= sas_dev->device_id << CMD_HDR_DEV_ID_OFF;
            hdr->dw1 = cpu_to_le32(dw1);

        /* dw2 */
-       if (task->ata_task.use_ncq && hisi_sas_get_ncq_tag(task, &hdr_tag)) {
+       if (task->ata_task.use_ncq) {
+          struct ata_queued_cmd *qc = task->uldd_task;
+          hdr_tag = qc->tag;
            task->ata_task.fis.sector_count |= (u8) (hdr_tag << 3);
dw2 |= hdr_tag << CMD_HDR_NCQ_TAG_OFF;
}
@@ -2535,12 +2584,9 @@
/* dw3 */
hdr->transfer_tags = cpu_to_le32(slot->idx);

-if (has_data) {
-rc = prep_prd_sge_v2_hw(hisi_hba, slot, hdr->scatter,
+if (has_data)
+prep_prd_sge_v2_hw(hisi_hba, slot, hdr->scatter,
slot->n_elem);
-if (rc)
-return rc;
-
}

hdr->data_transfer_len = cpu_to_le32(task->total_xfer_len);
hdr->cmd_table_addr = cpu_to_le64(hisi_sas_cmd_hdr_addr_dma(slot));
@@ -2552,8 +2598,6 @@
/* C=1: update ATA cmd reg */
/* fill in command FIS */
memcpy(buf_cmd, &task->ata_task.fis, sizeof(struct host_to_dev_fis));
-
-return 0;
}

static void hisi_sas_internal_abort_quirk_timeout(struct timer_list *t)
@@ -2590,7 +2634,7 @@
}

-static int prep_abort_v2_hw(struct hisi_hba *hisi_hba,
+static void prep_abort_v2_hw(struct hisi_hba *hisi_hba,
 struct hisi_sas_slot *slot,
 int device_id, int abort_flag, int tag_to_abort)
{
@@ -2608,7 +2652,7 @@
/* dw0 */
hdr->dw0 = cpu_to_le32((5 << CMD_HDR_CMD_OFF) | /*abort*/
 (port->id << CMD_HDR_PORT_OFF) |
- (dev_is_sata(dev) ? 1:0) <<
+ (dev_is_sata(dev) <<
CMD_HDR_ABORT_DEVICE_TYPE_OFF) |
 (abort_flag << CMD_HDR_ABORT_FLAG_OFF));

@@ -2618,19 +2662,18 @@
/* dw7 */
hdr->dw7 = cpu_to_le32(tag_to_abort << CMD_HDR_ABORT_IPTT_OFF);
hdr->transfer_tags = cpu_to_le32(slot->idx);

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-    return 0;

}

static int phy_up_v2_hw(int phy_no, struct hisi_hba *hisi_hba) {
    int i, res = IRQ_HANDLED;
    u32 port_id, link_rate, hard_phy_linkrate;
    struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
    struct asd_sas_phy *sas_phy = &phy->sas_phy;
    struct device *dev = hisi_hba->dev;
    u32 *frame_rcvd = (u32 *)sas_phy->frame_rcvd;
    struct sas_identify_frame *id = (struct sas_identify_frame *)frame_rcvd;

    unsigned long flags;
    hisi_sas_phy_write32(hisi_hba, phy_no, PHYCTRL_PHY_ENA_MSK, 1);

    @@ -2664,11 +2707,6 @@
            }
            sas_phy->linkrate = link_rate;
            hard_phy_linkrate = hisi_sas_phy_read32(hisi_hba, phy_no, HARD_PHY_LINKRATE);
            -phy->maximum_linkrate = hard_phy_linkrate & 0xf;
            -phy->minimum_linkrate = (hard_phy_linkrate >> 4) & 0xf;
            -
            sas_phy->oob_mode = SAS_OOB_MODE;
            memcpy(sas_phy->attached_sas_addr, &id->sas_addr, SAS_ADDR_SIZE);
            dev_info(dev, "phyup: phy%d link_rate=%d\n", phy_no, link_rate);
            @@ -2687,7 +2725,13 @@
                if (!timer_pending(&hisi_hba->timer))
                    set_link_timer_quirk(hisi_hba);
                }
-            -queue_work(hisi_hba->wq, &phy->phyup_ws);
+            +hisi_sas_notify_phy_event(phy, HISI PHYE PHY_UP);
+            +spin_lock_irqsave(&phy->lock, flags);
+            +if (phy->reset_completion) {
+                +phy->in_reset = 0;
+                +complete(phy->reset_completion);
+            +}
+            +spin_unlock_irqrestore(&phy->lock, flags);

            end:
            hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT0,
            @@ -2713,10 +2757,12 @@
                u32 phy_state, sl_ctrl, txid_auto;
                struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];


struct hisi_sas_port *port = phy->port;
+struct device *dev = hisi_hba->dev;

hisi_sas_phy_write32(hisi_hba, phy_no, PHYCTRL_NOT_RDY_MSK, 1);

phy_state = hisi_sas_read32(hisi_hba, PHY_STATE);
+dev_info(dev, "phydown: phy%d phy_state=0x%x\n", phy_no, phy_state);

hisi_sas_phy_down(hisi_hba, phy_no, (phy_state & 1 << phy_no) ? 1 : 0);

sl_ctrl = hisi_sas_phy_read32(hisi_hba, phy_no, SL_CONTROL);
@@ -2806,13 +2852,41 @@

hisi_sas_phy_write32(hisi_hba, phy_no, SL_RX_BCAST_CHK_MSK, 1);
bcast_status = hisi_sas_phy_read32(hisi_hba, phy_no, RX_PRIMS_STATUS);
-if (bcast_status & RX_BCAST_CHG_MSK)
+if ((bcast_status & RX_BCAST_CHG_MSK) &&
       !test_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags))
   sas_ha->notify_port_event(sas_phy, PORTE_BROADCAST_RCVD);

hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT0, 
   CHL_INT0_SL_RX_BCAST_ACK_MSK);

hisi_sas_phy_write32(hisi_hba, phy_no, SL_RX_BCAST_CHK_MSK, 0);
}

+static const struct hisi_sas_hw_error port_ecc_axi_error[] = {
  +{
    .irq_msk = BIT(CHL_INT1_DMAC_TX_ECC_ERR_OFF),
    .msg = "dmac_tx_ecc_bad_err",
  +},
  +{
    .irq_msk = BIT(CHL_INT1_DMAC_RX_ECC_ERR_OFF),
    .msg = "dmac_rx_ecc_bad_err",
  +},
  +{
    .irq_msk = BIT(CHL_INT1_DMAC_TX_AXI_WR_ERR_OFF),
    .msg = "dma_tx_axi_wr_err",
  +},
  +{
    .irq_msk = BIT(CHL_INT1_DMAC_TX_AXI_RD_ERR_OFF),
    .msg = "dma_tx_axi_rd_err",
  +},
  +{
    .irq_msk = BIT(CHL_INT1_DMAC_RX_AXI_WR_ERR_OFF),
    .msg = "dma_rx_axi_wr_err",
  +},
  +{
    .irq_msk = BIT(CHL_INT1_DMAC_RX_AXI_RD_ERR_OFF),
    .msg = "dma_rx_axi_rd_err",
  +},
};
static irqreturn_t int_chnl_int_v2_hw(int irq_no, void *p)
{
    struct hisi_hba *hisi_hba = p;

    HGC_INVLD_DQE_INFO_FB_CH3_OFF) & 0x1ff;

    while (irq_msk) {
        -if (irq_msk & (1 << phy_no)) {
            u32 irq_value0 = hisi_sas_phy_read32(hisi_hba, phy_no,
                -CHL_INT0);
            u32 irq_value1 = hisi_sas_phy_read32(hisi_hba, phy_no,
                -CHL_INT1);
            u32 irq_value2 = hisi_sas_phy_read32(hisi_hba, phy_no,
                -CHL_INT2);
        }
        -if (irq_value1) {
            -if (irq_value1 & (CHL_INT1_DMAC_RX_ECC_ERR_MSK |
                -CHL_INT1_DMAC_TX_ECC_ERR_MSK))
                -panic("%s: DMAC RX/TX ecc bad error!
                    - (0x%x)",
                -dev_name(dev), irq_value1);
            u32 irq_value0 = hisi_sas_phy_read32(hisi_hba, phy_no,
                +CHL_INT0);
            u32 irq_value1 = hisi_sas_phy_read32(hisi_hba, phy_no,
                +CHL_INT1);
            u32 irq_value2 = hisi_sas_phy_read32(hisi_hba, phy_no,
                +CHL_INT2);
        }
        +if ((irq_msk & (1 << phy_no)) && irq_value1) {
            int i;
            +for (i = 0; i < ARRAY_SIZE(port_ecc_axi_error); i++) {
                const struct hisi_sas_hw_error *error =
                    +port_ecc_axi_error[i];
                +if (!error) return 0;
                +if (!error->irq_msk)
                    +continue;
        }
        -hisi_sas_phy_write32(hisi_hba, phy_no,
            -CHL_INT1, irq_value1);
        +dev_warn(dev, "%s error (phy%d 0x%x) found!
            +error->msg, phy_no, irq_value1);
        +queue_work(hisi_hba->wq, &hisi_hba->rst_work);
    }

    -if (irq_value2)
this_sas_phy_write32(hisi_hba, phy_no, CHL_INT2, irq_value2);
+this_sas_phy_write32(hisi_hba, phy_no, CHL_INT1, irq_value1);
+
+if ((irq_msk & (1 << phy_no)) && irq_value2) {
+struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
+
-if (irq_value0) {
-    if (irq_value0 & CHL_INT0_SL_RX_BCST_ACK_MSK)
-        phy_bcast_v2_hw(phy_no, hisi_hba);
-
-    this_sas_phy_write32(hisi_hba, phy_no, CHL_INT0, irq_value0
-    & (~CHL_INT0_HOTPLUG_TOUT_MSK)
-    & (~CHL_INT0_SL_PHY_ENABLE_MSK)
-    & (~CHL_INT0_NOT_RDY_MSK));
+    if (irq_value2 & BIT(CHL_INT2_SL_IDAF_TOUT_CONF_OFF)) {
+        dev_warn(dev, "phy%d identify timeout", phy_no);
+        this_sas_notify_phy_event(phy, HISI_PHYE_LINK_RESET);
+    } else {
+        this_sas_phy_write32(hisi_hba, phy_no, CHL_INT2, irq_value2);
+
+    }
+
+    if ((irq_msk & (1 << phy_no)) && irq_value0) {
+        dev_warn(dev, ecc_error->msg, irq_value, val);
+        queue_work(hisi_hba->wq, &hisi_hba->rst_work);
+    } else {
+        ph
+        phy_no++;
+        val = hisi_sas_read32(hisi_hba, ecc_error->reg);
+        val &= ecc_error->msk;
+        val >>= ecc_error->shift;
+        dev_warn(dev, ecc_error->msg, irq_value, val);
+        dev_err(dev, ecc_error->msg, irq_value, val);
+        queue_work(hisi_hba->wq, &hisi_hba->rst_work);
for (; sub->msk || sub->msg; sub++) {
if (!err_value & sub->msk)
continue;
-dev_warn(dev, "%s (0x%x) found!\n",
+dev_err(dev, "%s (0x%x) found!\n",
sub->msg, irq_value);
queue_work(hisi_hba->wq, &hisi_hba->rst_work);
}
} else {
-dev_warn(dev, "%s (0x%x) found!\n",
+dev_err(dev, "%s (0x%x) found!\n",
axi_error->msg, irq_value);
queue_work(hisi_hba->wq, &hisi_hba->rst_work);
}
@@ -3051,14 +3140,12 @@
struct hisi_sas_complete_v2_hdr *complete_queue;
rd_point = cq->rd_point, wr_point, dev_id;
int queue = cq->id;
-struct hisi_sas_dq *dq = &hisi_hba->dq[queue];

if (unlikely(hisi_hba->reject_stp_links_msk))
phys_try_accept_stp_links_v2_hw(hisi_hba);

complete_queue = hisi_hba->complete_hdr[queue];

-spin_lock(&dq->lock);
wr_point = hisi_sas_read32(hisi_hba, COMPL_Q_0_WR_PTR +
(0x14 * queue));

/* Check for NCQ completion */
if (complete_hdr->act) {
-unsigned int act_tmp = complete_hdr->act;
+unsigned int act_tmp = le32_to_cpu(complete_hdr->act);
int ncq_tag_count = ffs(act_tmp);
+unsigned int dw1 = le32_to_cpu(complete_hdr->dw1);

-dev_id = (complete_hdr->dw1 & CMPLT_HDR_DEV_ID_MSK) >>
+dev_id = (dw1 & CMPLT_HDR_DEV_ID_MSK) >>
CMPLT_HDR_DEV_ID_OFF;
itct = &hisi_hba->itct[dev_id];

/* The NCQ tags are held in the itct header */
while (ncq_tag_count) {
- __le64 *ncq_tag = &itct->qw4_15[0];
+ __le64 *__ncq_tag = &itct->qw4_15[0], __ncq_tag;
+ u64 ncq_tag;

- ncq_tag_count -= 1;
- iptt = (ncq_tag[ncq_tag_count / 5] >> (ncq_tag_count % 5) * 12) & 0xfff;
+ ncq_tag_count--;
+ __ncq_tag = _ncq_tag[ncq_tag_count / 5];
+ ncq_tag = le64_to_cpu(__ncq_tag);
+ iptt = (ncq_tag >> (ncq_tag_count % 5) * 12) & 0xfff;

slot = &hisi_hba->slot_info[iptt];
slot->cmplt_queue_slot = rd_point;
@@ -3094,7 +3185,9 @@
ncq_tag_count = ffs(act_tmp);
} else {
- iptt = (complete_hdr->dw1) & CMPLT_HDR_IPTT_MSK;
+ u32 dw1 = le32_to_cpu(complete_hdr->dw1);
+ iptt = dw1 & CMPLT_HDR_IPTT_MSK;
slot = &hisi_hba->slot_info[iptt];
slot->cmplt_queue_slot = rd_point;
slot->cmplt_queue = queue;
@@ -3108,7 +3201,6 @@ /* update rd_point */
cq->rd_point = rd_point;
hisi_sas_write32(hisi_hba, COMPL_Q_0_RD_PTR + (0x14 * queue), rd_point);
-spin_unlock(&dq->lock);
} }

static irqreturn_t cq_interrupt_v2_hw(int irq_no, void *p)
@@ -3135,6 +3227,7 @@
 u32 ent_tmp, ent_msk, ent_int, port_id, link_rate, hard_phy_linkrate;
 irqreturn_t res = IRQ_HANDLED;
 u8 attached_sas_addr[SAS_ADDR_SIZE] = {0};
+unsigned long flags;
 int phy_no, offset;

 phy_no = sas_phy->id;
@@ -3160,8 +3253,7 @@
 if (fis->status & ATA_ERR) {
    dev_warn(dev, "sata int: phy%d FIS status: 0x%x\n", phy_no, fis->status);
 -disable_phy_v2_hw(hisi_hba, phy_no);
- enable_phy_v2_hw(hisi_hba, phy_no);
+his_i_sas_notify_phy_event(phy, HISI_PHYE_LINK_RESET);
res = IRQ_NONE;
goto end;
}
@@ -3195,6 +3287,7 @@
sas_phy->oob_mode = SATA_OOB_MODE;
/* Make up some unique SAS address */
  attached_sas_addr[0] = 0x50;
+attached_sas_addr[6] = hisi_hba->shost->host_no;
  attached_sas_addr[7] = phy_no;
memcpy(sas_phy->attached_sas_addr, attached_sas_addr, SAS_ADDR_SIZE);
memcpy(sas_phy->frame_rcvd, fis, sizeof(struct dev_to_host_fis));
@@ -3206,8 +3299,14 @@
phy->identify.device_type = SAS_SATA_DEV;
phy->frame_rcvd_size = sizeof(struct dev_to_host_fis);
phy->identify.target_port_protocols = SAS_PROTOCOL_SATA;
-queue_work(hisi_hba->wq, &phy->phyup_ws);
+his_i_sas_notify_phy_event(phy, HISI_PHYE_PHY_UP);
+spin_lock_irqsave(&phy->lock, flags);
+if (phy->reset_completion) {
+  phy->in_reset = 0;
+  complete(phy->reset_completion);
+}
+spin_unlock_irqrestore(&phy->lock, flags);
end:
  hisi_sas_write32(hisi_hba, ENT_INT_SRC1 + offset, ent_tmp);
  hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK1 + offset, ent_msk);
@@ -3392,7 +3491,7 @@
udelay(10);
if (cnt++ > 10) {
-dev_info(dev, "wait axi bus state to idle timeout!\n");
-dev_err(dev, "wait axi bus state to idle timeout!\n");
return -1;
}
}
@@ -3408,13 +3507,96 @@
return 0;
}
+static int write_gpio_v2_hw(struct hisi_hba *hisi_hba, u8 reg_type,
+u8 reg_index, u8 reg_count, u8 *write_data)
+{
+struct device *dev = hisi_hba->dev;
+int phy_no, count;
+if (!hisi_hba->sgpio_regs)
return -EOPNOTSUPP;
+
+switch (reg_type) {
+    case SAS_GPIO_REG_TX:
+        count = reg_count * 4;
+        count = min(count, hisi_hba->n_phy);
+        for (phy_no = 0; phy_no < count; phy_no++) {
+            /*
+             * GPIO_TX[n] register has the highest numbered drive
+             * of the four in the first byte and the lowest
+             * numbered drive in the fourth byte.
+             * See SFF-8485 Rev. 0.7 Table 24.
+             */
+            void __iomem *reg_addr = hisi_hba->sgpio_regs +
+                reg_index * 4 + phy_no;
+            int data_idx = phy_no + 3 - (phy_no % 4) * 2;
+            writeb(write_data[data_idx], reg_addr);
+        }
+        break;
+    default:
+        dev_err(dev, "write gpio: unsupported or bad reg type %d\n",
+            reg_type);
+        return -EINVAL;
+    }
+    return 0;
+
+static void wait_cmds_complete_timeout_v2_hw(struct hisi_hba *hisi_hba,
+    int delay_ms, int timeout_ms)
+{
+    struct device *dev = hisi_hba->dev;
+    int entries, entries_old = 0, time;
+    for (time = 0; time < timeout_ms; time += delay_ms) {
+        entries = hisi_sas_read32(hisi_hba, CQE_SEND_CNT);
+        if (entries == entries_old)
+            break;
+        entries_old = entries;
+        msleep(delay_ms);
+    }
+    dev_dbg(dev, "wait commands complete %dms\n", time);
+static struct device_attribute *host_attrs_v2_hw[] = {
+&dev_attr_phy_event_threshold,
+NULL
+};
+
+static struct scsi_host_template sht_v2_hw = {
+.name= DRV_NAME,
+.module= THIS_MODULE,
+.queuecommand= sas_queuecommand,
+.target_alloc= sas_target_alloc,
+.slave_configure= hisi_sas_slave_configure,
+.scan_finished= hisi_sas_scan_finished,
+.scan_start= hisi_sas_scan_start,
+.change_queue_depth= sas_change_queue_depth,
+.bios_param= sas_bios_param,
+.this_id= -1,
+.sg_tablesize= HISI_SAS_SGE_PAGE_CNT,
+.max_sectors= SCSI_DEFAULT_MAX_SECTORS,
+.use_clustering= ENABLE_CLUSTERING,
+.eh_device_reset_handler = sas_eh_device_reset_handler,
+.eh_target_reset_handler = sas_eh_target_reset_handler,
+.target_destroy= sas_target_destroy,
+.ioctl= sas_ioctl,
+.shost_attrs= host_attrs_v2_hw,
+};
+
static const struct hisi_sas_hw hisi_sas_v2_hw = {
.hw_init = hisi_sas_v2_init,
.setup_itct = setup_itct_v2_hw,
.slot_index_alloc = slot_index_alloc_quirk_v2_hw,
.alloc_dev = alloc_dev_quirk_v2_hw,
.sl_notify = sl_notify_v2_hw,
+sl_notify_ssp = sl_notify_ssp_v2_hw,
.get_wideport_bitmap = get_wideport_bitmap_v2_hw,
+clear_itct = clear_itct_v2_hw,
.free_device = free_device_v2_hw,
.prep_smp = prep_smp_v2_hw,
.prep_ssp = prep_ssp_v2_hw,
@ @ -3434,6 +3616,9 @@
.complete_hdr_size = sizeof(struct hisi_sas_complete_v2_hdr),
.soft_reset = soft_reset_v2_hw,
.get_phys_state = get_phys_state_v2_hw,
+write_gpio = write_gpio_v2_hw,
+wait_cmds_complete_timeout = wait_cmds_complete_timeout_v2_hw,
+.sht = &sht_v2_hw,
};
static int hisi_sas_v2_probe(struct platform_device *pdev)  
@@ -3458,9 +3643,6 @@
       struct sas_ha_struct *sha = platform_get_drvdata(pdev);
       struct hisi_hba *hisi_hba = sha->lldd_ha;

       -if (timer_pending(&hisi_hba->timer))
       -del_timer(&hisi_hba->timer);

       hisi_sas_kill_tasklets(hisi_hba);

       return hisi_sas_remove(pdev);
-      --- linux-4.15.0.orig/drivers/scsi/hisi_sas/hisi_sas_v3_hw.c
+      +++ linux-4.15.0/drivers/scsi/hisi_sas/hisi_sas_v3_hw.c
+      @@ -42,6 +42,7 @@
+      #define CQ_INT_CONVERGE_EN 0xb0
+      #define CFG_Aging_TIME 0xbc
+      #define HGC_DFX_CFG 0xc0
+      #define CFG_ABT_SET_QUERY_IPTT_done 0xd4
@@ -51,7 +52,6 @@
+      #define CQ_SEND_CNT 0x248
+      #define DLVRY_Q_0_BASE_ADDR_LO 0x260
+      #define DLVRY_Q_0_BASE_ADDR_HI 0x264
@@ -106,6 +107,11 @@
+      #define HILINK_ERR_DFX 0xe04
+      #define SAS_GPIO_CFG_0 0x1000
+      #define SAS_GPIO_CFG_1 0x1004
+      #define SAS_GPIO_TX_0_1 0x1040
+      #define SAS_CFG_DRIVE_VLD 0x1070

      /* phy registers requiring init */
```
#define PORT_BASE(0x2000)  
@ @ -115,16 +121,24 @ @
#define PHY_CFG_ENA_MSK(0x1 << PHY_CFG_ENA_OFF)  
#define PHY_CFG_DC_OPT_MSK2  
#define PHY_CFG_DC_OPT_MSK(0x1 << PHY_CFG_DC_OPT_OFF)  
+#define PHY_CFG_PHY_RST_MSK3  
+#define PHY_CFG_PHY_RST_MSK(0x1 << PHY_CFG_PHY_RST_OFF)  
#define PROG_PHY_LINK_RATE(PORT_BASE + 0x8)  
#define PHY_CTRL(PORT_BASE + 0x14)  
#define PHY_CTRL_RESET_MSK0  
#define PHY_CTRL_RESET_MSK(0x1 << PHY_CTRL_RESET_OFF)  
+#define CMD_HDR_PIR_MSK8  
+#define CMD_HDR_PIR_MSK(0x1 << CMD_HDR_PIR_OFF)  
#define SL_CFG(PORT_BASE + 0x84)  
+#define AIP_LIMIT(PORT_BASE + 0x90)  
#define SL_CONTROL(PORT_BASE + 0x94)  
#define SL_CONTROL_NOTIFY_EN_MSK0  
#define SL_CTA_MSK17  
+#define RX_PRIMS_STATUS(PORT_BASE + 0x98)  
+#define RX_BCAST_CHG_MSK1  
+#define RX_BCAST_CHG_MSK(0x1 << RX_BCAST_CHG_OFF)  
#define TX_ID_DWORD0(PORT_BASE + 0x9c)  
#define TX_ID_DWORD1(PORT_BASE + 0xa0)  
#define TX_ID_DWORD2(PORT_BASE + 0xa4)  
@ @ -140,6 +154,7 @ @
#define RX_IDAF_DWORD0(PORT_BASE + 0xc4)  
#define RX_OP_CHECK_CFG_H(PORT_BASE + 0xc)  
#define STP_LINK_TIMER(PORT_BASE + 0x120)  
+#define STP_LINK_TIMEOUT_STATE(PORT_BASE + 0x124)  
#define CON_CFG_DRIVER(PORT_BASE + 0x130)  
#define SAS_SSP_CON_TIMER_CFG(PORT_BASE + 0x134)  
#define SAS_SMP_CON_TIMER_CFG(PORT_BASE + 0x138)  
@ @ -165,10 +180,14 @ @
#define CHL_INT1_DMAC_RX_AXI_W_ERR_MSK21  
#define CHL_INT1_DMAC_RX_AXI_R_ERR_MSK22  
#define CHL_INT2(PORT_BASE + 0x1bc)  
+#define CHL_INT2_SL_IDAF_TOUT_CONF_MSK0  
+#define CHL_INT2_RX_INVLD_DW_MSK30  
+#define CHL_INT2_STP_LINK_TIMEOUT_MSK31  
#define CHL_INT0_MSK(PORT_BASE + 0x1c0)  
#define CHL_INT1_MSK(PORT_BASE + 0x1c4)  
#define CHL_INT2_MSK(PORT_BASE + 0x1c8)  
#define CHL_INT_COAL_EN(PORT_BASE + 0x1d0)  
+#define SAS_RX_TRAIN_TIMER_MSK0  
#define PHY_CTRL_RDY_MSK(PORT_BASE + 0x2b0)  
#define PHYCTRL_NOT_RDY_MSK(PORT_BASE + 0x2b4)
```
#define PHYCTRL_DWS_RESET_MSK(PORT_BASE + 0x2b8)
@@ -181,6 +200,7 @@
#define DMA_RX_STATUS_BUSY_OFF0
#define DMA_RX_STATUS_BUSY_MSK(0x1 << DMA_RX_STATUS_BUSY_OFF)
+
#define COARSETUNE_TIME(PORT_BASE + 0x304)
#define ERR_CNT_DWS_LOST(PORT_BASE + 0x380)
#define ERR_CNT_RESET_PROB(PORT_BASE + 0x384)
#define ERR_CNT_INVLD_DW(PORT_BASE + 0x390)
@@ -193,6 +214,8 @@
#define AXI_MASTER_CFG_BASE(0x5000)
#define AM_CTRL_GLOBAL(0x0)
+#define AM_CTRL_SHUTDOWN_REQ_OFF0
+#define AM_CTRL_SHUTDOWN_REQ_MSK(0x1 << AM_CTRL_SHUTDOWN_REQ_OFF)
#define AM_CURR_TRANS_RETURN(0x150)

#define AM_CFG_MAX_TRANS(0x5010)
@@ -204,6 +227,16 @@
#define AM_ROB_ECC_MULBIT_ERR_ADDR_OFF8
#define AM_ROB_ECC_MULBIT_ERR_ADDR_MSK(0xff << AM_ROB_ECC_MULBIT_ERR_ADDR_OFF)
+/* RAS registers need init */
+define RAS_BASE(0x6000)
+define SAS_RAS_INTR0(RAS_BASE)
+define SAS_RAS_INTR1(RAS_BASE + 0x04)
+define SAS_RAS_INTR0_MASK(RAS_BASE + 0x08)
+define SAS_RAS_INTR1_MASK(RAS_BASE + 0x0c)
+define CFG_SAS_RAS_INTR_MASK(RAS_BASE + 0x1c)
+define SAS_RAS_INTR2(RAS_BASE + 0x20)
+define SAS_RAS_INTR2_MASK(RAS_BASE + 0x24)
+
+/* HW dma structures */
+/* Delivery queue header */
+/* dw0 */
@@ -302,6 +335,16 @@
#define ITCT_HDR_RTOLT_OFF48
#define ITCT_HDR_RTOLT_MSK(0xffffffffU << ITCT_HDR_RTOLT_OFF)
+struct hisi_sas_protect_iu_v3_hw {
+u32 dw0;
+u32 lbrtcv;
+u32 lbrtgv;
+u32 dw3;
+u32 dw4;
+u32 dw5;
+u32 rsv;
struct hisi_sas_complete_v3_hdr {
    __le32 dw0;
    __le32 dw1;
}

#define HISI_SAS_COMMAND_ENTRIES_V3_HW 4096
#define HISI_SAS_MSI_COUNT_V3_HW 32

-enum {
-    HISI_SAS_PHY_PHY_UPDOWN,
-    HISI_SAS_PHY_CHNL_INT,
-    HISI_SAS_PHY_INT_NR
-};

#define DIR_NO_DATA 0
#define DIR_TO_INI 1
#define DIR_TO_DEVICE 2
#define DIR_RESERVED 3

#define CMD_IS_UNCONSTRAINT(cmd) \    
    ((cmd == ATA_CMD_READ_LOG_EXT) || 
    (cmd == ATA_CMD_READ_LOG_DMA_EXT) || 
    (cmd == ATA_CMD_DEV_RESET))

#define FIS_CMD_IS_UNCONSTRAINED(fis) \    
    ((fis.command == ATA_CMD_READ_LOG_EXT) || 
    (fis.command == ATA_CMD_READ_LOG_DMA_EXT) || 
    ((fis.command == ATA_CMD_DEV_RESET) && 
    ((fis.control & ATA_SRST) != 0)))

#define T10_INSRT_EN_OFF    0
#define T10_INSRT_EN_MSK    (1 << T10_INSRT_EN_OFF)
#define T10_RMV_EN_OFF	    1
#define T10_RMV_EN_MSK	    (1 << T10_RMV_EN_OFF)
#define T10_RPLC_EN_OFF	    2
#define T10_RPLC_EN_MSK	    (1 << T10_RPLC_EN_OFF)
#define T10_CHK_EN_OFF	    3
#define T10_CHK_EN_MSK	    (1 << T10_CHK_EN_OFF)
#define INCR_LBRT_OFF	    5
#define INCR_LBRT_MSK	    (1 << INCR_LBRT_OFF)
#define USR_DATA_BLOCK_SZ_OFF	20
#define USR_DATA_BLOCK_SZ_MSK	(0x3 << USR_DATA_BLOCK_SZ_OFF)
#define T10_CHK_MSK_OFF	    16

static bool hisi_sas_intr_conv;

/* permit overriding the host protection capabilities mask (EEDP/T10 PI) */
+static int prot_mask;
+module_param(prot_mask, int, 0);
+MODULE_PARM_DESC(prot_mask, ” host protection capabilities mask, def=0x0 ”);

static u32 hisi_sas_read32(struct hisi_hba *hisi_hba, u32 off)
{
    return readl(regs);
}

#define hisi_sas_read32_poll_timeout(off, val, cond, delay_us,
    timeout_us)
    ({
        void __iomem *regs = hisi_hba->regs + off;
        readl_poll_timeout(regs, val, cond, delay_us, timeout_us);
    })

#define hisi_sas_read32_poll_timeout_atomic(off, val, cond, delay_us,
    timeout_us)
    ({
        void __iomem *regs = hisi_hba->regs + off;
        readl_poll_timeout_atomic(regs, val, cond, delay_us, timeout_us);
    })

static void init_reg_v3_hw(struct hisi_hba *hisi_hba)
{
    int i;

    /* Global registers init */
    for (i = 0; i < hisi_hba->queue_count - 1; i++)
        hisi_sas_write32(hisi_hba, CFG_MAX_TAG, 0xfff0400);
    hisi_sas_write32(hisi_hba, HGC_SAS_TXFAIL_RETRY_CTRL, 0x108);
    hisi_sas_write32(hisi_hba, CFG_1US_TIMER_TRSH, 0x1);
    hisi_sas_write32(hisi_hba, INT_COAL_EN, 0x1);
    hisi_sas_write32(hisi_hba, OQ_INT_COAL_TIME, 0x1);
    hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK1, 0xfefefefe);
    hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK2, 0xfefefefe);
    hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK3, 0xfffe20ff);
+if (pdev->revision >= 0x21)
  +hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK3, 0xffff7aff);
+else
  +hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK3, 0xffffffe0ff);
  +hisi_sas_write32(hisi_hba, CHNL_PHYUPDOWN_INT_MSK, 0x0);
  +hisi_sas_write32(hisi_hba, CHNL_ENT_INT_MSK, 0x0);
  +hisi_sas_write32(hisi_hba, HGC_COM_INT_MSK, 0x0);
  +@ @ -413,32 +493,50 @@
  +hisi_sas_write32(hisi_hba, QO0_INT_SRC_MSK+0x4*i, 0);

hisi_sas_write32(hisi_hba, HYPER_STREAM_ID_EN_CFG, 1);
-hisi_sas_write32(hisi_hba, AXI_MASTER_CFG_BASE, 0x30000);

for (i = 0; i < hisi_hba->n_phy; i++) {
-hisi_sas_phy_write32(hisi_hba, i, PROG_PHY_LINK_RATE, 0x801);
+struct hisi_sas_phy *phy = &hisi_hba->phy[i];
+struct asd_sas_phy *sas_phy = &phy->sas_phy;
++u32 prog_phy_link_rate = 0x800;
+
+if (!(sas_phy->phy || (sas_phy->phy->maximum_linkrate <
+SAS_LINK_RATE_1_5_GBP)) { 
+ prog_phy_link_rate = 0x855;
+ } else {
+ enum sas_linkrate max = sas_phy->phy->maximum_linkrate;
+ }
+prog_phy_link_rate =
+hisi_sas_get_prog_phy_linkrate_mask(max) |
+0x800;
+
+hisi_sas_phy_write32(hisi_hba, i, PROG_PHY_LINK_RATE,
+hisi_sas_phy_link_rate);
+hisi_sas_phy_write32(hisi_hba, i, SAS_RX_TRAIN_TIMER, 0x13e80);
+hisi_sas_phy_write32(hisi_hba, i, CHL_INT0, 0xffffffff);
+hisi_sas_phy_write32(hisi_hba, i, CHL_INT1, 0xffffffff);
+hisi_sas_phy_write32(hisi_hba, i, CHL_INT2, 0xffffffff);
+hisi_sas_phy_write32(hisi_hba, i, RXOP_CHECK_CFG_H, 0x1000);
+\-hisi_sas_phy_write32(hisi_hba, i, CHL_INT1_MSK, 0xff87ffff);
+\-hisi_sas_phy_write32(hisi_hba, i, CHL_INT2_MSK, 0xffffbfe);
+\+if (pdev->revision >= 0x21)
+\+hisi_sas_phy_write32(hisi_hba, i, CHL_INT1_MSK,
+\+0xffffffff);
+\else
+\+hisi_sas_phy_write32(hisi_hba, i, CHL_INT1_MSK,
+\+0xff87ffff);
+\+hisi_sas_phy_write32(hisi_hba, i, CHL_INT2_MSK, 0xffffffff);
+\+hisi_sas_phy_write32(hisi_hba, i, PHY_CTRL_RDY_MSK, 0x0);
+\+hisi_sas_phy_write32(hisi_hba, i, PHYCTRL_NOT_RDY_MSK, 0x0);
+\+hisi_sas_phy_write32(hisi_hba, i, PHYCTRL_DWS_RESET_MSK, 0x0);
hisi_sas_phy_write32(hisi_hba, i, PHYCTRL_PHY_ENA_MSK, 0x0);
hisi_sas_phy_write32(hisi_hba, i, SL_RX_BCAST_CHK_MSK, 0x0);
-hisi_sas_phy_write32(hisi_hba, i, PHYCTRL_OOB_RESTART_MSK, 0x0);
-hisi_sas_phy_write32(hisi_hba, i, PHY_CTRL, 0x199b4fa);
-hisi_sas_phy_write32(hisi_hba, i, SAS_SSP_CON_TIMER_CFG,
  - 0xa03e8);
-hisi_sas_phy_write32(hisi_hba, i, SAS_STP_CON_TIMER_CFG,
  - 0xa03e8);
-hisi_sas_phy_write32(hisi_hba, i, STP_LINK_TIMER,
  - 0x7f7a120);
-hisi_sas_phy_write32(hisi_hba, i, CON_CFG_DRIVER,
  - 0x2a0a80);
+hisi_sas_phy_write32(hisi_hba, i, PHYCTRL_OOB_RESTART_MSK, 0x1);
+hisi_sas_phy_write32(hisi_hba, i, STP_LINK_TIMER, 0x7f7a120);
+hisi_sas_phy_write32(hisi_hba, i, CON_CFG_DRIVER, 0x2a0a01);
+/* used for 12G negotiate */
+hisi_sas_phy_write32(hisi_hba, i, COARSETUNE_TIME, 0x1e);
+hisi_sas_phy_write32(hisi_hba, i, AIP_LIMIT, 0x2ffff);
}
+
for (i = 0; i < hisi_hba->queue_count; i++) {
/* Delivery queue */
hisi_sas_write32(hisi_hba,
@@ -496,6 +594,20 @@
  upper_32_bits(hisi_hba->initial_fis_dma));
+
/* RAS registers init */
+hisi_sas_write32(hisi_hba, SAS_RAS_INTR0_MASK, 0x0);
+hisi_sas_write32(hisi_hba, SAS_RAS_INTR1_MASK, 0x0);
+hisi_sas_write32(hisi_hba, SAS_RAS_INTR2_MASK, 0x0);
+hisi_sas_write32(hisi_hba, CFG_SAS_RAS_INTR_MASK, 0x0);
+
/* LED registers init */
+hisi_sas_write32(hisi_hba, SAS_CFG_DRIVE_VLD, 0x80000ff);
+hisi_sas_write32(hisi_hba, SAS_GPIO_TX_0_1, 0x80808080);
+hisi_sas_write32(hisi_hba, SAS_GPIO_TX_0_1 + 0x4, 0x80808080);
+/* Configure blink generator rate A to 1Hz and B to 4Hz */
+hisi_sas_write32(hisi_hba, SAS_GPIO_CFG_1, 0x121700);
+hisi_sas_write32(hisi_hba, SAS_GPIO_CFG_0, 0x800000);
}

static void config_phy_opt_mode_v3_hw(struct hisi_hba *hisi_hba, int phy_no)
@@ -547,6 +659,7 @@
  struct domain_device *parent_dev = device->parent;
  struct asd_sas_port *sas_port = device->port;

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struct hisi_sas_port *port = to_hisi_sas_port(sas_port);
+u64 sas_addr;

memset(itct, 0, sizeof(*itct));

@@ -579,8 +692,8 @@
itct->qw0 = cpu_to_le64(qw0);

/* qw1 */
-memcpy(&itct->sas_addr, device->sas_addr, SAS_ADDR_SIZE);
-itct->sas_addr = __swab64(itct->sas_addr);
+memcpy(&sas_addr, device->sas_addr, SAS_ADDR_SIZE);
+itct->sas_addr = cpu_to_le64(__swab64(sas_addr));

/* qw2 */
if (!dev_is_sata(device))
@@ -588,7 +701,7 @@
(0x1ULL << ITCT_HDR_RTOLT_OFF));
}

-static void free_device_v3_hw(struct hisi_hba *hisi_hba,
+static void clear_itct_v3_hw(struct hisi_hba *hisi_hba,
 struct hisi_sas_device *sas_dev)
 {
 DECLARE_COMPLETION_ONSTACK(completion);
@@ -647,8 +760,8 @@
 udelay(50);

 /* Ensure axi bus idle */
 -ret = readl_poll_timeout(hisi_hba->regs + AXI_CFG, val, !val,
-20000, 1000000);
+ret = hisi_sas_read32_poll_timeout(AXI_CFG, val, !val,
+   20000, 1000000);
 if (ret) {
 dev_err(dev, "axi bus is not idle, ret = %d!\n", ret);
 return -EIO;
@@ -662,8 +775,10 @@
 dev_err(dev, "Reset failed!\n");
 return -EIO;
 }
-} else
+} else {
 dev_err(dev, "no reset method!\n");
+return -EINVAL;
+
 return 0;
}
u32 cfg = hisi_sas_phy_read32(hisi_hba, phy_no, PHY_CFG);

cfg |= PHY_CFG_ENA_MSK;
+cfg &=-PHY_CFG_PHY_RST_MSK;
+thisi_sas_phy_write32(hisi_hba, phy_no, PHY_CFG, cfg);
}

static void disable_phy_v3_hw(struct hisi_hba *hisi_hba, int phy_no)
{
+u32 state;
+cfg &= -PHY_CFG_ENA_MSK;
+thisi_sas_phy_write32(hisi_hba, phy_no, PHY_CFG, cfg);
+mdelay(50);
+state = thisi_sas_read32(hisi_hba, PHY_STATE);
+if (state & BIT(phy_no)) {
+cfg |= PHY_CFG_PHY_RST_MSK;
+thisi_sas_phy_write32(hisi_hba, phy_no, PHY_CFG, cfg);
+}
}

static void start_phy_v3_hw(struct hisi_hba *hisi_hba, int phy_no)

@ @ -723,7 +848,7 @ @
start_phy_v3_hw(hisi_hba, phy_no);
}

-enum sas_linkrate phy_get_max_linkrate_v3_hw(void)
+static enum sas_linkrate phy_get_max_linkrate_v3_hw(void)
{
return SAS_LINK_RATE_12_0_GBPS;
}

@ @ -743,7 +868,7 @ @
}

-static void sl_notify_v3_hw(struct hisi_hba *hisi_hba, int phy_no)
+static void sl_notify_ssp_v3_hw(struct hisi_hba *hisi_hba, int phy_no)
{
+u32 sl_control;

@ @ -785,42 +910,52 @ @
r = hisi_sas_read32_relaxed(hisi_hba,
+DLVRY_Q_0_RD_PTR + (queue * 0x14));
+if (r == (w+1) % HISI_SAS_QUEUE_SLOTS) {

static void start_delivery_v3_hw(struct hisi_sas_dq *dq)
{
    struct hisi_hba *hisi_hba = dq->hisi_hba;
    int dlvry_queue = dq->slot_prep->dlvry_queue;
    int dlvry_queue_slot = dq->slot_prep->dlvry_queue_slot;
    struct hisi_sas_slot *s, *s1, *s2 = NULL;
    int dlvry_queue = dq->id;
    int wp;
    if (!s2)
        return;
    list_for_each_entry_safe(s, s1, &dq->list, delivery) {
        if (!s->ready)
            break;
        s2 = s;
        list_del(&s->delivery);
    }
    /*
     * Ensure that memories for slots built on other CPUs is observed.
     */
    smp_rmb();
    wp = (s2->dlvry_queue_slot + 1) % HISI_SAS_QUEUE_SLOTS;
    hisi_sas_write32(hisi_hba, DLVRY_Q_0_WR_PTR + (dlvry_queue * 0x14), wp);
}

static int prep_prd_sge_v3_hw(struct hisi_hba *hisi_hba,
                        struct hisi_sas_slot *slot,
                        struct hisi_sas_cmd_hdr *hdr,
                        scatterlist *scatter,
int n_elem) {
    struct hisi_sas_sge_page *sge_page = hisi_sas_sge_addr_mem(slot);
    struct device *dev = hisi_hba->dev;
    struct scatterlist *sg;
    int i;

    -if (n_elem > HISI_SAS_SGE_PAGE_CNT) {  
    -dev_err(dev, "prd err: n_elem(%d) > HISI_SAS_SGE_PAGE_CNT",  
    -n_elem);
    -return -EINVAL;
    -}
    -
    for_each_sg(scatter, sg, n_elem, i) {
        struct hisi_sas_sge *entry = &sge_page->sge[i];

        @-833,13 +968,62 @-
        hdr->prd_table_addr = cpu_to_le64(hisi_sas_sge_addr_dma(slot));

        hdr->sg_len = cpu_to_le32(n_elem << CMD_HDR_DATA_SGL_LEN_OFF);
    +}

+static u32 get_prot_chk_msk_v3_hw(struct scsi_cmnd *scsi_cmnd)
+{
    +unsigned char prot_flags = scsi_cmnd->prot_flags;
    +
    +if (prot_flags & SCSI_PROT_TRANSFER_PI) {
    +if (prot_flags & SCSI_PROT_REF_CHECK)
    +
    +return 0xc << 16;
    +return 0xfc << 16;
    +}
    +return 0;
    +}

-static int prep_ssp_v3_hw(struct hisi_hba *hisi_hba,
    - struct hisi_sas_slot *slot, int is_tmf,
    - struct hisi_sas_tmfl_task *tmf)
+static void fill_prot_v3_hw(struct scsi_cmnd *scsi_cmnd,
    + struct hisi_sas_protect_iu_v3_hw *prot)
+{
    +unsigned char prot_op = scsi_get_prot_op(scsi_cmnd);
    +unsigned int interval = scsi_prot_interval(scsi_cmnd);
    +u32 lbrt_chk_val = scsi_prot_ref_tag(scsi_cmnd);
    +
    +switch (prot_op) {
    +case SCSI_PROT_READ_STRIP:
    +prot->dw0 |= (T10_RMV_EN_MSK | T10_CHK_EN_MSK);
    +prot->lbrtcv = lbrt_chk_val;
    +}

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+prot->dw4 |= get_prot_chk_msk_v3_hw(scsi_cmnd);
+break;
+case SCSI_PROT_WRITE_INSERT:
+prot->dw0 |= T10_INSRT_EN_MSK;
+prot->lbtrfs = lbtrfs_v = lbrt_chk_val;
+break;
+default:
+WARN(1, "prot_op(0x%lx) is not valid\n", prot_op);
+break;
+
+switch (interval) {
+case 512:
+break;
+case 4096:
+prot->dw0 |= (0x1 << USR_DATA_BLOCK_SZ_OFF);
+break;
+case 520:
+prot->dw0 |= (0x2 << USR_DATA_BLOCK_SZ_OFF);
+break;
+default:
+WARN(1, "protection interval (0x%lx) invalid\n", interval);
+break;
+
+prot->dw0 |= INCR_LBRT_MSK;
+
+static void prep_ssp_v3_hw(struct hisi_hba *hisi_hba,
+struct hisi_sas_slot *slot)
+
{ struct sas_task *task = slot->task;
 struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
   @ @ -848.9 +1032.11 @@
 struct hisi_sas_port *port = slot->port;
 struct sas_ssp_task *ssp_task = &task->ssp_task;
 struct scsi_cmnd *scsi_cmnd = scsi_task->cmd;
 -int has_data = 0, rc, priority = is_tmf;
 +struct hisi_sas_tmf_task *tmf = slot->tmf;
 +unsigned char prot_op = scsi_get_prot_op(scsi_cmnd); 
 +int has_data = 0, priority = !!tmf;
 u8 *buf_cmd;
 -u32 dw1 = 0, dw2 = 0;
 +u32 dw1 = 0, dw2 = 0, len = 0;
 
   hdr->dw0 = cpu_to_le32((1 << CMD_HDR_RESP_REPORT_OFF) |
   (2 << CMD_HDR_TLR_CTRL_OFF) |
dw1 = 1 << CMD_HDR_VDTL_OFF;
-if (is_tmf) {
+if (tmf) {
  dw1 |= 2 << CMD_HDR_FRAME_TYPE_OFF;
  dw1 |= DIR_NO_DATA << CMD_HDR_DIR_OFF;
} else {
  @ @ -880,7 +1066,6 @@

 /* map itct entry */
 dw1 |= sas_dev->device_id << CMD_HDR_DEV_ID_OFF;
 hdr->dw1 = cpu_to_le32(dw1);

 dw2 = (((sizeof(struct ssp_command_iu) + sizeof(struct ssp_frame_hdr)
   + 3) / 4) << CMD_HDR_CFL_OFF) | 
 @ @ -889,14 +1074,10 @@
 hdr->dw2 = cpu_to_le32(dw2);
 hdr->transfer_tags = cpu_to_le32(slot->idx);

 -if (has_data) {
   -rc = prep_prd_sge_v3_hw(hisi_hba, slot, hdr, task->scatter,
   +if (has_data)
     +prep_prd_sge_v3_hw(hisi_hba, slot, hdr, task->scatter,
     slot->n_elem);
   -if (rc)
     -return rc;
  -}

  hdr->data_transfer_len = cpu_to_le32(task->total_xfer_len);
  hdr->cmd_table_addr = cpu_to_le64(hisi_sas_cmd_hdr_addr_dma(slot));
  hdr->sts_buffer_addr = cpu_to_le64(hisi_sas_status_buf_addr_dma(slot));

  @ @ -904,7 +1085,7 @@
  offsetof(struct ssp_frame_hdr);

  memcpy(buf_cmd, &task->ssp_task.LUN, 8);
  -if (!is_tmf) {
   +if (!tmf) {
    buf_cmd[9] = ssp_task->task_attr | (ssp_task->task_prio << 3);
    memcpy(buf_cmd + 12, scsi_cmnd->cmd, scsi_cmnd->cmd_len);
   } else {
    @ @ -922,47 +1103,56 @@
   }
 }

 -return 0;
+if (has_data && (prot_op != SCSI_PROT_NORMAL)) {
+struct hisi_sas_protect_iu_v3_hw prot;
+u8 *buf_cmd_prot;
+
+hdr->dw7 |= cpu_to_le32(1 << CMD_HDR_ADDR_MODE_SEL_OFF);
+dw1 |= CMD_HDR_PIR_MSK;
+buf_cmd_prot = hisi_sas_cmd_hdr_addr_mem(slot) +
+    sizeof(struct ssp_frame_hdr) +
+    sizeof(struct ssp_command_iu);
+
+memset(&prot, 0, sizeof(struct hisi_sas_protect_iu_v3_hw));
+fill_prot_v3_hw(scsi_cmnd, &prot);
+memcpy(buf_cmd_prot, &prot,
+    sizeof(struct hisi_sas_protect_iu_v3_hw));
+
+/*
+ * For READ, we need length of info read to memory, while for
+ * WRITE we need length of data written to the disk.
+ */
+if (prot_op == SCSI_PROT_WRITE_INSERT) {
+unsigned int interval = scsi_prot_interval(scsi_cmnd);
+unsigned int ilog2_interval = ilog2(interval);
+
+    len = (task->total_xfer_len >> ilog2_interval) * 8;
+}
+
+hdr->dw1 = cpu_to_le32(dw1);
+
+hdr->data_transfer_len = cpu_to_le32(task->total_xfer_len + len);
}

static int prep_smp_v3_hw(struct hisi_hba *hisi_hba,
    struct hisi_sas_slot *slot)
{
    struct sas_task *task = slot->task;
    struct hisi_sas_cmd_hdr *hdr = slot->cmd_hdr;
    struct domain_device *device = task->dev;
    struct hisi_sas_port *port = slot->port;
    struct scatterlist *sg_req, *sg_resp;
    struct hisi_sas_device *sas_dev = device->lldd_dev;
    dma_addr_t req_dma_addr;
    unsigned int req_len, resp_len;
    int elem, rc;
unsigned int req_len;

/*
 * DMA-map SMP request, response buffers
 * */
/* req */
sg_req = &task->smp_task.smp_req;
-elem = dma_map_sg(dev, sg_req, 1, DMA_TO_DEVICE);
-if (!elem)
-return -ENOMEM;
req_len = sg_dma_len(sg_req);
req_dma_addr = sg_dma_address(sg_req);

/* resp */
-sg_resp = &task->smp_task.smp_resp;
-elem = dma_map_sg(dev, sg_resp, 1, DMA_FROM_DEVICE);
-if (!elem) {
-rc = -ENOMEM;
-goto err_out_req;
-}
-resp_len = sg_dma_len(sg_resp);
-if (((req_len & 0x3) || (resp_len & 0x3)) {
-rc = -EINVAL;
-goto err_out_resp;
-}
-
/* create header */
/* dw0 */
hdr->dw0 = cpu_to_le32((port->id << CMD_HDR_PORT_OFF) |
@ @ -984,18 +1174,9 @@
hdr->cmd_table_addr = cpu_to_le64(req_dma_addr);
hdr->sts_buffer_addr = cpu_to_le64(hisi_sas_status_buf_addr_dma(slot));

-return 0;
-
-err_out_resp:
-dma_unmap_sg(dev, &slot->task->smp_task.smp_resp, 1,
- DMA_FROM_DEVICE);
-err_out_req:
-dma_unmap_sg(dev, &slot->task->smp_task.smp_req, 1,
- DMA_TO DEVICE);
-return rc;
}

-static int prep_ata_v3_hw(struct hisi_hba *hisi_hba,
+static void prep_ata_v3_hw(struct hisi_hba *hisi_hba,
   struct hisi_sas_slot *slot)
{
struct sas_task *task = slot->task;
@@ -1006,7 +1187,7 @@
struct asd_sas_port *sas_port = device->port;
struct hisi_sas_port *port = to_hisi_sas_port(sas_port);

int has_data = 0, rc = 0, hdr_tag = 0;
+int has_data = 0, hdr_tag = 0;

u32 dw1 = 0, dw2 = 0;

hdr->dw0 = cpu_to_le32(port->id << CMD_HDR_PORT_OFF);
@@ -1033,17 +1214,20 @@
dw1 |= 1 << CMD_HDR_RESET_OFF;

dw1 |= (hisi_sas_get_ata_protocol(
  -task->ata_task.fis.command, task->data_dir)
  +&task->ata_task.fis, task->data_dir))
 << CMD_HDR_FRAME_TYPE_OFF;

dw1 |= sas_dev->device_id << CMD_HDR_DEV_ID_OFF;
-if (CMD_IS_UNCONSTRAIN(task->ata_task.fis.command))
+if (FIS_CMD_IS_UNCONSTRAINED(task->ata_task.fis))

dw1 |= 1 << CMD_HDR_UNCON_CMD_OFF;

hdr->dw1 = cpu_to_le32(dw1);

/* dw2 */
-if (task->ata_task.use_ncq &&
  +struct ata_queued_cmd *qc = task->uldd_task;
      +hisi_sas_get_ncq_tag(task, &hdr_tag)) {
  +if (task->ata_task.use_ncq) {
+nstruct ata_queued_cmd *qc = task->uldd_task;
+    +hdr_tag = qc->tag;
+    task->ata_task.fis.sector_count |= (u8) (hdr_tag << 3);
+    dw2 |= hdr_tag << CMD_HDR_NCQ_TAG_OFF;
  }
@@ -1055,12 +1239,9 @@
/* dw3 */

hdr->transfer_tags = cpu_to_le32(slot->idx);

-if (has_data) {
-rc = prep_prd_sge_v3_hw(hisi_hba, slot, hdr, task->scatter,
+if (has_data)
+  +prep_prd_sge_v3_hw(hisi_hba, slot, hdr, task->scatter,
+    +slot->n_elem);
-    -if (rc)
-      -return rc;
-
}

hdr->data_transfer_len = cpu_to_le32(task->total_xfer_len);
hdr->cmd_table_addr = cpu_to_le64(hisi_sas_cmd_hdr_addr_dma(slot));
@@ -1072,11 +1253,9 @@
task->ata_task.fis.flags |= 0x80; /* C=1: update ATA cmd */
/* fill in command FIS */
memcpy(buf_cmd, &task->ata_task.fis, sizeof(struct host_to_dev_fis));
-
-return 0;
}

-static int prep_abort_v3_hw(struct hisi_hba *hisi_hba,
+static void prep_abort_v3_hw(struct hisi_hba *hisi_hba,
 struct hisi_sas_slot *slot,
 int device_id, int abort_flag, int tag_to_abort)
 {
 @@ -1088,7 +1267,7 @@
/* dw0 */
hdr->dw0 = cpu_to_le32((5 << CMD_HDR_CMD_OFF) | /*abort*/
     (port->id << CMD_HDR_PORT_OFF) |
-    (dev_is_sata(dev) ? 1:0)
+    (dev_is_sata(dev)
 << CMD_HDR_ABORT_DEVICE_TYPE_OFF) |
 abort_flag
    << CMD_HDR_ABORT_FLAG_OFF));
@@ -1101,16 +1280,16 @@
hdr->dw7 = cpu_to_le32(tag_to_abort << CMD_HDR_ABORT_IPTT_OFF);
hdr->transfer_tags = cpu_to_le32(slot->idx);

-return 0;
}

-static int phy_up_v3_hw(int phy_no, struct hisi_hba *hisi_hba)
+static irqreturn_t phy_up_v3_hw(int phy_no, struct hisi_hba *hisi_hba)
 {
-int i, res = 0;
-u32 context, port_id, link_rate, hard_phy_linkrate;
+int i, res;
+u32 context, port_id, link_rate;
 struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
 struct asd_sas_phy *sas_phy = &phy->sas_phy;
 struct device *dev = hisi_hba->dev;
+unsigned long flags;

 hisi_sas_phy_write32(hisi_hba, phy_no, PHYCTRL_PHY_ENA_MSK, 1);
@@ -1125,10 +1304,6 @@
goto end;
}
sas_phy->linkrate = link_rate;

- hard_phy_linkrate = hisi_sas_phy_read32(hisi_hba, phy_no,
- HARD_PHY_LINKRATE);
- phy->maximum_linkrate = hard_phy_linkrate & 0xf;
- phy->minimum_linkrate = (hard_phy_linkrate >> 4) & 0xf;
phy->phy_type &= ~(PORT_TYPE_SAS | PORT_TYPE_SATA);

/ * Check for SATA dev */
@@ -1138,9 +1313,19 @@
struct dev_to_host_fis *fis;
 u8 attached_sas_addr[SAS_ADDR_SIZE] = {0};

- dev_info(dev, "phyup: phy%d link_rate=%d\n", phy_no, link_rate);
+ dev_info(dev, "phyup: phy%d link_rate=%d(sata)\n", phy_no, link_rate);
 initial_fis = &hisi_hba->initial_fis[phy_no];
 fis = &initial_fis->fis;
 +
+ /* check ERR bit of Status Register */
+ if (fis->status & ATA_ERR) {
+ dev_warn(dev, "sata int: phy%d FIS status: 0x%x\n", 
+ phy_no, fis->status);
+ hisi_sas_notify_phy_event(phy, HISI_PHYE_LINK_RESET);
+ res = IRQ_NONE;
+ goto end;
+ }
+ sas_phy->oob_mode = SATA_OOB_MODE;
 attached_sas_addr[0] = 0x50;
 attached_sas_addr[7] = phy_no;
@@ -1181,8 +1366,14 @@
phy->port_id = port_id;
phy->phy_attached = 1;
-queue_work(hisi_hba->wq, &phy->phyup_ws);
-
+hisit_sas_notify_phy_event(phy, HISI_PHYE_PHY_UP);
+res = IRQ_HANDLED;
+spin_lock_irqsafe(&phy->lock, flags);
+if (phy->reset_completion) {
+phy->in_reset = 0;
+complete(phy->reset_completion);
+}
+spin_unlock_irqrestore(&phy->lock, flags);
end:
hisit_sas_phy_write32(hisi_hba, phy_no, CHL_INT0,
- CHL_INT0_SL_PHY_ENABLE_MSK);
@@ -1191,7 +1382,7 @@
return res; 
}
static int phy_down_v3_hw(int phy_no, struct hisi_hba *hisi_hba)
{
    u32 phy_state, sl_ctrl, txid_auto;
    struct device *dev = hisi_hba->dev;
    @ @ -1213,20 +1404,26 @ @
    hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT0, CHL_INT0_NOT_RDY_MSK);
    hisi_sas_phy_write32(hisi_hba, phy_no, PHYCTRL_NOT_RDY_MSK, 0);

    return 0;
    +return IRQ_HANDLED;
}

static void phy_bcast_v3_hw(int phy_no, struct hisi_hba *hisi_hba)
{
    struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
    struct asd_sas_phy *sas_phy = &phy->sas_phy;
    struct sas_ha_struct *sas_ha = &hisi_hba->sha;
    +u32 bcast_status;

    hisi_sas_phy_write32(hisi_hba, phy_no, SL_RX_BCAST_CHK_MSK, 1);
    -sas_ha->notify_port_event(sas_phy, PORTE_BROADCAST_RCVD);
    +bcast_status = hisi_sas_phy_read32(hisi_hba, phy_no, RX_PRIMS_STATUS);
    +if ((bcast_status & RX_BCAST_CHG_MSK) &&
        +!test_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags))
        +sas_ha->notify_port_event(sas_phy, PORTE_BROADCAST_RCVD);
    hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT0,
        CHL_INT0_SL_RX_BCST_ACK_MSK);
    hisi_sas_phy_write32(hisi_hba, phy_no, SL_RX_BCAST_CHK_MSK, 0);

    +return IRQ_HANDLED;
}

static irqreturn_t int_phy_up_down_bcast_v3_hw(int irq_no, void *p)
@@ -1253,7 +1450,9 @@
    if (irq_value & CHL_INT0_SL_RX_BCST_ACK_MSK)
        /* phy bcast */
        -phy_bcast_v3_hw(phy_no, hisi_hba);
        +if (phy_bcast_v3_hw(phy_no, hisi_hba)
        +== IRQ_HANDLED)
        +res = IRQ_HANDLED;
    } else {
        if (irq_value & CHL_INT0_NOT_RDY_MSK)
            /* phy down */
            @@ -1288,53 +1487,92 @@


+static void handle_chl_int1_v3_hw(struct hisi_hba *hisi_hba, int phy_no) {
+  
+  u32 irq_value = hisi_sas_phy_read32(hisi_hba, phy_no, CHL_INT1);
+  u32 irq_msk = hisi_sas_phy_read32(hisi_hba, phy_no, CHL_INT1_MSK);
+  struct device *dev = hisi_hba->dev;
+  int i;
+  
+
+  irq_value &= ~irq_msk;
+  if (!irq_value)
+    return;
+  
+
+  for (i = 0; i < ARRAY_SIZE(port_axi_error); i++) {
+    const struct hisi_sas_hw_error *error = &port_axi_error[i];
+    
+    if (!(irq_value & error->irq_msk))
+      continue;
+    
+    dev_err(dev, "%s error (phy%d 0x%x) found!
", error->msg, phy_no, irq_value);
+    queue_work(hisi_hba->wq, &hisi_hba->rst_work);
+  }
+  
+  hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT1, irq_value);
+}
+
+static void handle_chl_int2_v3_hw(struct hisi_hba *hisi_hba, int phy_no) {
+  
+  u32 irq_msk = hisi_sas_phy_read32(hisi_hba, phy_no, CHL_INT2_MSK);
+  u32 irq_value = hisi_sas_phy_read32(hisi_hba, phy_no, CHL_INT2);
+  struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
+  struct pci_dev *pci_dev = hisi_hba->pci_dev;
+  struct device *dev = hisi_hba->dev;
+  
+  irq_value &= ~irq_msk;
+  if (!irq_value)
+    return;
+  
+
+  if (irq_value & BIT(CHL_INT2_SL_IDAF_TOUT_CONF_OFF)) {
+    dev_warn(dev, "phy%d identify timeout!
", phy_no);
+    hisi_sas_notify_phy_event(phy, HISI_PHYE_LINK_RESET);
+  }
+  
+  if (irq_value & BIT(CHL_INT2_STP_LINK_TIMEOUT_OFF)) {
+    u32 reg_value = hisi_sas_phy_read32(hisi_hba, phy_no,
+      STP_LINK_TIMEOUT_STATE);
+  

+dev_warn(dev, "phy%d stp link timeout (0x%x)\n",
+ phy_no, reg_value);
+if (reg_value & BIT(4))
+hisi_sas_notify_phy_event(phy, HISI_PHYE_LINK_RESET);
+
+
+if ((irq_value & BIT(CHL_INT2_RX_INVLD DW_OFF)) &&
+ (pci_dev->revision == 0x20)) {
+u32 reg_value;
+int rc;
+
+rc = hisi_sas_read32_poll_timeout_atomic(
+HILINK_ERR_DFX, reg_value,
+!(reg_value >> 8) & BIT(phy_no)),
+1000, 10000);
+if (rc)
+hisi_sas_notify_phy_event(phy, HISI_PHYE_LINK_RESET);
+
+
+hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT2, irq_value);
+
+
+static irqreturn_t int_chnl_int_v3_hw(int irq_no, void *p)
{struct hisi_hba *hisi_hba = p;
+struct device *dev = hisi_hba->dev;
+u32 ent_msk, ent_tmp, irq_msk;
+
+ent_msk = hisi_sas_read32(hisi_hba, ENT_INT_SRC_MSK3);
+ent_msk |= ENT_INT_SRC_MSK3_ENT95_MSK_MSK;
+hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK3, ent_msk);
+
+u32 irq_msk;
+int phy_no = 0;
+
+ent_msk = hisi_sas_read32(hisi_hba, ENT_INT_SRC_MSK3);
+ent_msk = ent_msk;
+ent_msk |= ENT_INT_SRC_MSK3_ENT95_MSK_MSK;
+hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK3, ent_msk);
+
+irq_msk = hisi_sas_read32(hisi_hba, CHNL_INT_STATUS)
& 0xeeeeeeee;
+
+while (irq_msk) {
+u32 irq_value0 = hisi_sas_phy_read32(hisi_hba, phy_no,
+ CHL_INT0);
+u32 irq_value1 = hisi_sas_phy_read32(hisi_hba, phy_no,
+- CHL_INT1);
+u32 irq_value2 = hisi_sas_phy_read32(hisi_hba, phy_no,
+- CHL_INT2);
+
+if ((irq_msk & (4 << (phy_no * 4))) &&
irq_value1) {
    int i;
    
    for (i = 0; i < ARRAY_SIZE(port_axi_error); i++) {
        const struct hisi_sas_hw_error *error = &port_axi_error[i];
        
        if (!(irq_value1 & error->irq_msk))
            continue;
        
        dev_warn(dev, "%s error (phy%d 0x%x) found!\n", error->msg, phy_no, irq_value1);
        queue_work(hisi_hba->wq, &hisi_hba->rst_work);
    }
    
    hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT1, irq_value1);
    
    if (irq_msk & (8 << (phy_no * 4)) && irq_value2)
        hisi_sas_phy_write32(hisi_hba, phy_no, CHL_INT2, irq_value2);
    +if (irq_msk & (4 << (phy_no * 4)))
        handle_chl_int1_v3_hw(hisi_hba, phy_no);
    +if (irq_msk & (8 << (phy_no * 4)))
        handle_chl_int2_v3_hw(hisi_hba, phy_no);
    
    if (irq_msk & (2 << (phy_no * 4)) && irq_value0) {
        hisi_sas_phy_write32(hisi_hba, phy_no,
            @ @ -1347.8 +1585.6 @@ phy_no++;
    }
    
    hisi_sas_write32(hisi_hba, ENT_INT_SRC_MSK3, ent_tmp);
    
    return IRQ_HANDLED;
}

u32 irq_value, irq_msk;
struct hisi_hba *hisi_hba = p;
struct device *dev = hisi_hba->dev;
+struct pci_dev *pdev = hisi_hba->pci_dev;
int i;

irq_msk = hisi_sas_read32(hisi_hba, ENT_INT_SRC_MSK3);
hi...
irq_value = hisi_sas_read32(hisi_hba, ENT_INT_SRC3);
+irq_value &= ~irq_msk;

for (i = 0; i < ARRAY_SIZE(fatal_axi_error); i++) {
    const struct hisi_sas_hw_error *error = &fatal_axi_error[i];
    @@ -1432,15 +1670,26 @@
    if (!err_value & sub->msk)
        continue;

    -dev_warn(dev, "%s error (0x%x) found!\n",
    +dev_err(dev, "%s error (0x%x) found!\n",
    sub->msg, irq_value);
    queue_work(hisi_hba->wq, &hisi_hba->rst_work);
]
}
} else {
    -dev_warn(dev, "%s error (0x%x) found!\n",
    +dev_err(dev, "%s error (0x%x) found!\n",
    error->msg, irq_value);
    queue_work(hisi_hba->wq, &hisi_hba->rst_work);
}
+
+if (pdev->revision < 0x21) {
+u32 reg_val;
+
+reg_val = hisi_sas_read32(hisi_hba,
+  AXI_MASTER_CFG_BASE +
+  AM_CTRL_GLOBAL);
+reg_val |= AM_CTRL_SHUTDOWN_REQ_MSK;
+this_sas_write32(hisi_hba, AXI_MASTER_CFG_BASE +
+  AM_CTRL_GLOBAL, reg_val);
+
+
}

if (irq_value & BIT(ENT_INT_SRC3_ITC_INT_OFF)) {
@@ -1471,15 +1720,16 @@
    &complete_queue[slot->cmplt_queue_slot];
    struct hisi_sas_err_record_v3 *record =
    hisi_sas_status_buf_addr_mem(slot);
    -u32 dma_rx_err_type = record->dma_rx_err_type;
    -u32 trans_tx_fail_type = record->trans_tx_fail_type;
    +u32 dma_rx_err_type = le32_to_cpu(record->dma_rx_err_type);
    +u32 trans_tx_fail_type = le32_to_cpu(record->trans_tx_fail_type);
    +u32 dw3 = le32_to_cpu(complete_hdr->dw3);

    switch (task->task_proto) {
        case SAS_PROTOCOL_SSP:
            if (dma_rx_err_type & RX_DATA_LEN_UNDERFLOW_MSK) {
ts->residual = trans_tx_fail_type;
ts->stat = SAS_DATA_UNDERRUN;
-} else if (complete_hdr->dw3 & CMPLT_HDR_IO_IN_TARGET_MSK) {
+} else if (dw3 & CMPLT_HDR_IO_IN_TARGET_MSK) {
ts->stat = SAS_QUEUE_FULL;
slot->abort = 1;
} else {
@@ -1493,7 +1743,7 @@
if (dma_rx_err_type & RX_DATA_LEN_UNDERFLOW_MSK) {
 ts->residual = trans_tx_fail_type;
ts->stat = SAS_DATA_UNDERRUN;
-} else if (complete_hdr->dw3 & CMPLT_HDR_IO_IN_TARGET_MSK) {
+} else if (dw3 & CMPLT_HDR_IO_IN_TARGET_MSK) {
ts->stat = SAS_PHY_DOWN;
slot->abort = 1;
} else {
@@ -1518,36 +1768,31 @@
struct device *dev = hisi_hba->dev;
struct task_status_struct *ts;
struct domain_device *device;
+struct sas_ha_struct *ha;
enum exec_status sts;
struct hisi_sas_complete_v3_hdr *complete_queue =
hisi_hba->complete_hdr[slot->cmplt_queue];
struct hisi_sas_complete_v3_hdr *complete_hdr =
&complete_queue[slot->cmplt_queue_slot];
-int aborted;
unsigned long flags;
+bool is_internal = slot->is_internal;
+u32 dw0, dw1, dw3;

if (unlikely(task || !task->lldd_task || !task->dev))
  return -EINVAL;

  ts = &task->task_status;
device = task->dev;
+ha = device->port->ha;
sas_dev = device->lldd_dev;

spin_lock_irqsave(&task->task_state_lock, flags);
{-aborted = task->task_state_flags & SAS_TASK_STATE_ABORTED;
task->task_state_flags &=
  ~(SAS_TASK_STATE_PENDING | SAS_TASK_AT_INITIATOR);
spin_unlock_irqrestore(&task->task_state_lock, flags);

memset(ts, 0, sizeof(*ts));
st->resp = SAS_TASK_COMPLETE;
-if (unlikely(aborted)) {

if (unlikely(!sas_dev)) {
    dev_dbg(dev, "slot complete: port has not device\n");
    goto out;
}

+dw0 = le32_to_cpu(complete_hdr->dw0);
+dw1 = le32_to_cpu(complete_hdr->dw1);
+dw3 = le32_to_cpu(complete_hdr->dw3);
+
/*
 * Use SAS+TMF status codes
 */
-switch ((complete_hdr->dw0 & CMPLT_HDR_ABORT_STAT_MSK)
       >> CMPLT_HDR_ABORT_STAT_OFF) {
    switch ((dw0 & CMPLT_HDR_ABORT_STAT_MSK) >> CMPLT_HDR_ABORT_STAT_OFF) {
        case STAT_IO_ABORTED:
            /* this IO has been aborted by abort command */
            ts->stat = SAS_ABORTED_TASK;
            goto out;
+
/*
 * check for erroneous completion */
-    if (((complete_hdr->dw0 & CMPLT_HDR_CMPLT_MSK) == 0x3) {
+    if ((dw0 & CMPLT_HDR_CMPLT_MSK) == 0x3) {
+        u32 *error_info = hisi_sas_status_buf_addr_mem(slot);
+        slot_err_v3_hw(hisi_hba, task, slot);
+        if (ts->stat != SAS_DATA_UNDERRUN)
+            dev_info(dev, "erroneous completion iptt=%d task=%p dev id=%d 
+            \"CQ hdr: 0x%x 0x%x 0x%x 0x%x 
+            \"Error info: 0x%x 0x%x 0x%x 0x%x\n", 
+            slot->idx, task, sas_dev->device_id,
+            dw0, dw1, complete_hdr->act, dw3,
+            error_info[0], error_info[1],
+            error_info[2], error_info[3]);
+        if (unlikely(slot->abort))
+            return ts->stat;
+        goto out;
+    }
}
if (!slot->port->port_attached) {
    -dev_err(dev, "slot complete: port %d has removed\n",
    +dev_warn(dev, "slot complete: port %d has removed\n",
    slot->port->sas_port.id);
    ts->stat = SAS_PHY_DOWN;
}

out:
+sts = ts->stat;
spin_lock_irqsave(&task->task_state_lock, flags);
+if ((task->task_state_flags & SAS_TASK_STATE_ABORTED) {
    +spin_unlock_irqrestore(&task->task_state_lock, flags);
    +dev_info(dev, "slot complete: task(%p) aborted\n", task);
    +return SAS_ABORTED_TASK;
}
	task->task_state_flags |= SAS_TASK_STATE_DONE;
spin_unlock_irqrestore(&task->task_state_lock, flags);
-spin_lock_irqsave(&hisi_hba->lock, flags);
+hisi_sas_slot_task_free(hisi_hba, task, slot);
-spin_unlock_irqrestore(&hisi_hba->lock, flags);
-sts = ts->stat;
+
+if (!is_internal && (task->task_proto != SAS_PROTOCOL_SMP)) {
    +spin_lock_irqsave(&device->done_lock, flags);
    +if (test_bit(SAS_HA_FROZEN, &ha->state)) {
        +spin_unlock_irqrestore(&device->done_lock, flags);
        +dev_info(dev, "slot complete: task(%p) ignored\n",
        + task);
        +return sts;
    }
    +spin_unlock_irqrestore(&device->done_lock, flags);
}
+spin_unlock_irqrestore(&device->done_lock, flags);
+
if (task->task_done)
    task->task_done(task);
@@ -1653,56 +1925,32 @@
    struct hisi_sas_cq *cq = (struct hisi_sas_cq *)val;
    struct hisi_hba *hisi_hba = cq->hisi_hba;
    struct hisi_sas_slot *slot;
-struct hisi_sas_itct *itct;
    struct hisi_sas_complete_v3_hdr *complete_queue;
    -u32 rd_point = cq->rd_point, wr_point, dev_id;
    +u32 rd_point = cq->rd_point, wr_point;
    int queue = cq->id;
    -struct hisi_sas_dq *dq = &hisi_hba->dq[queue];
    complete_queue = hisi_hba->complete_hdr[queue];
-spin_lock(&dq->lock);
wr_point = hisi_sas_read32(hisi_hba, COMPL_Q_0_WR_PTR +
   (0x14 * queue));

while (rd_point != wr_point) {
struct hisi_sas_complete_v3_hdr *complete_hdr;
+struct device *dev = hisi_hba->dev;
+u32 dw1;
int iptt;

complete_hdr = &complete_queue[rd_point];
+dw1 = le32_to_cpu(complete_hdr->dw1);

/* Check for NCQ completion */
-if (complete_hdr->act) {
-    u32 act_tmp = complete_hdr->act;
-    int ncq_tag_count = ffs(act_tmp);
-    dev_id = (complete_hdr->dw1 & CMPLT_HDR_DEV_ID_MSK) >>
-        CMPLT_HDR_DEV_ID_OFF;
-    itct = &hisi_hba->itct[dev_id];
-
-/* The NCQ tags are held in the itct header */
-while (ncq_tag_count) {
-    __le64 *ncq_tag = &itct->qw4_15[0];
-    -ncq_tag_count = 1;
-    iptt = (ncq_tag[ncq_tag_count / 5]
-        >> (ncq_tag_count % 5) * 12) & 0xfff;
-    slot = &hisi_hba->slot_info[iptt];
-    slot->cmplt_queue_slot = rd_point;
-    slot->cmplt_queue = queue;
-    slot_complete_v3_hw(hisi_hba, slot);
-    act_tmp &= ~(1 << ncq_tag_count);
-    ncq_tag_count = ffs(act_tmp);
-}
-} else {
-    iptt = (complete_hdr->dw1) & CMPLT_HDR_IPTT_MSK;
+iptt = dw1 & CMPLT_HDR_IPTT_MSK;
+if (likely(iptt < HISI_SAS_COMMAND_ENTRIES_V3_HW)) {
+    slot = &hisi_hba->slot_info[iptt];
+    slot->cmplt_queue_slot = rd_point;
+    slot->cmplt_queue = queue;
+    slot_complete_v3_hw(hisi_hba, slot);
-}
+} else
+dev_err(dev, "IPTT %d is invalid, discard it.", iptt);

if (++rd_point >= HISI_SAS_QUEUE_SLOTS)
  rd_point = 0;
//@ -1711,7 +1959,6 @-
/* update rd_point */
cq->rd_point = rd_point;
hisi_sas_write32(hisi_hba, COMPL_Q_0_RD_PTR + (0x14 * queue), rd_point);
-spin_unlock(&dq->lock);
}

static irqreturn_t cq_interrupt_v3_hw(int irq_no, void *p)
//@ -1773,10 +2020,12 @-
for (i = 0; i < hisi_hba->queue_count; i++) {
  struct hisi_sas_cq *cq = &hisi_hba->cq[i];
  struct tasklet_struct *t = &cq->tasklet;
  +int nr = hisi_sas_intr_conv ? 16 : 16 + i;
  +unsigned long irqflags = hisi_sas_intr_conv ? IRQF_SHARED : 0;
  -rc = devm_request_irq(dev, pci_irq_vector(pdev, i+16),
  -  cq_interrupt_v3_hw, 0,
  -  DRV_NAME " cq", cq);
  +rc = devm_request_irq(dev, pci_irq_vector(pdev, nr),
  +   cq_interrupt_v3_hw, irqflags,
  +   DRV_NAME " cq", cq);
  if (rc) {
    dev_err(dev,
    "could not request cq%d interrupt, rc=%d\n",
    //@ -1793,8 +2042,9 @-
    free_cq_irqs:
    for (k = 0; k < i; k++) {
      struct hisi_sas_cq *cq = &hisi_hba->cq[k];
      +int nr = hisi_sas_intr_conv ? 16 : 16 + k;
      -free_irq(pci_irq_vector(pdev, k+16), cq);
      +free_irq(pci_irq_vector(pdev, nr), cq);
    }
  free_irq(pci_irq_vector(pdev, 11), hisi_hba);
  free_chnl_interrupt:
//@ -1824,39 +2074,12 @-
  static void phy_set_linkrate_v3_hw(struct hisi_hba *hisi_hba, int phy_no,
  struct sas_phy_linkrates *r)
  {
    -u32 prog_phy_link_rate =
    -hisi_sas_phy_read32(hisi_hba, phy_no, PROG_PHY_LINK_RATE);
    -struct hisi_sas_phy *phy = &hisi_hba->phy[phy_no];
    -struct asd_sas_phy *sas_phy = &phy->sas_phy;

int i;
enum sas_linkrate min, max;
u32 rate_mask = 0;

if (r->maximum_linkrate == SAS_LINK_RATE_UNKNOWN) {
    max = sas_phy->phy->maximum_linkrate;
    min = r->minimum_linkrate;
} else if (r->minimum_linkrate == SAS_LINK_RATE_UNKNOWN) {
    max = r->maximum_linkrate;
    min = sas_phy->phy->minimum_linkrate;
} else
    return;

sas_phy->phy->maximum_linkrate = max;
sas_phy->phy->minimum_linkrate = min;

min -= SAS_LINK_RATE_1_5_GBP_S;
max -= SAS_LINK_RATE_1_5_GBP_S;

for (i = 0; i <= max; i++)
    rate_mask |= 1 << (i * 2);

prog_phy_link_rate &= ~0xff;
prog_phy_link_rate |= rate_mask;

static void interrupt_disable_v3_hw(struct hisi_hba *hisi_hba)
{...
interrupt_disable_v3_hw(hisi_hba);

hisi_sas_write32(hisi_hba, DLVRY_QUEUE_ENABLE, 0x0);
@@ -1930,13 +2153,32 @@
mdelay(10);

-hisi_sas_write32(hisi_hba, AXI_MASTER_CFG_BASE + AM_CTRL_GLOBAL, 0x1);
+reg_val = hisi_sas_read32(hisi_hba, AXI_MASTER_CFG_BASE +
+ AM_CTRL_GLOBAL);
+reg_val |= AM_CTRL_SHUTDOWN_REQ_MSK;
+hisi_sas_write32(hisi_hba, AXI_MASTER_CFG_BASE +
+ AM_CTRL_GLOBAL, reg_val);

/* wait until bus idle */
-rc = readl_poll_timeout(hisi_hba->regs + AXI_MASTER_CFG_BASE +
-AM_CURR_TRANS_RETURN, status, status == 0x3, 10, 100);
+rc = hisi_sas_read32_poll_timeout(AXI_MASTER_CFG_BASE +
+ AM_CURR_TRANS_RETURN, status,
+ status == 0x3, 10, 100);
+if (rc) {
+dev_err(dev, "axi bus is not idle, rc=%d\n", rc);
+return rc;
+}
+
+return 0;
+
+static int soft_reset_v3_hw(struct hisi_hba *hisi_hba)
+
+{
+struct device *dev = hisi_hba->dev;
+int rc;
+
+rc = disable_host_v3_hw(hisi_hba);
+if (rc) {
-dev_err(dev, "axi bus is not idle, rc = %d\n", rc);
+dev_err(dev, "soft reset: disable host failed rc=%d\n", rc);
+return rc;
+}

@@ -1945,14 +2187,196 @@
return hw_init_v3_hw(hisi_hba);
}

+static int write_gpio_v3_hw(struct hisi_hba *hisi_hba, u8 reg_type,
+u8 reg_index, u8 reg_count, u8 *write_data)
+{
+struct device *dev = hisi_hba->dev;
+u32 *data = (u32 *)write_data;

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+int i;
+
+switch (reg_type) {
+case SAS_GPIO_REG_TX:
+if ((reg_index + reg_count) > ((hisi_hba->n_phy + 3) / 4)) {
+dev_err(dev, "write gpio: invalid reg range[%d, %d]\n",
+reg_index, reg_index + reg_count - 1);
+return -EINVAL;
+}
+
+for (i = 0; i < reg_count; i++)
+hisi_sas_write32(hisi_hba,
+ SAS_GPIO_TX_0_1 + (reg_index + i) * 4,
+ data[i]);
+break;
+default:
+dev_err(dev, "write gpio: unsupported or bad reg type %d\n",
+reg_type);
+return -EINVAL;
+}
+
+return 0;
+
+static void wait_cmds_complete_timeout_v3_hw(struct hisi_hba *hisi_hba,
+ int delay_ms, int timeout_ms)
+{
+struct device *dev = hisi_hba->dev;
+int entries, entries_old = 0, time;
+
+for (time = 0; time < timeout_ms; time += delay_ms) {
+entries = hisi_sas_read32(hisi_hba, CQE_SEND_CNT);
+if (entries == entries_old)
+break;
+
+entries_old = entries;
+msleep(delay_ms);
+}
+
+dev_dbg(dev, "wait commands complete %dms\n", time);
+}
+
+static ssize_t intr_conv_v3_hw_show(struct device *dev,
+ struct device_attribute *attr, char *buf)
+{
+return scnprintf(buf, PAGE_SIZE, ":%d\n", hisi_sas_intr_conv);
+}
+
+static DEVICE_ATTR_RO(intr_conv_v3_hw);
+static void config_intr_coal_v3_hw(struct hisi_hba *hisi_hba)
+{
+/* config those registers between enable and disable PHYs */
+hisi_sas_stop_phys(hisi_hba);
+
+if (hisi_hba->intr_coal_ticks == 0 ||
+    hisi_hba->intr_coal_count == 0) {
+hisi_sas_write32(hisi_hba, INT_COAL_EN, 0x1);
+hisi_sas_write32(hisi_hba, OQ_INT_COAL_TIME, 0x1);
+hisi_sas_write32(hisi_hba, OQ_INT_COAL_CNT, 0x1);
+} else {
+hisi_sas_write32(hisi_hba, INT_COAL_EN, 0x3);
+hisi_sas_write32(hisi_hba, OQ_INT_COAL_TIME,
+    hisi_hba->intr_coal_ticks);
+hisi_sas_write32(hisi_hba, OQ_INT_COAL_CNT,
+    hisi_hba->intr_coal_count);
+}
+phys_init_v3_hw(hisi_hba);
+}
+
+static ssize_t intr_coal_ticks_v3_hw_show(struct device *dev,
+    struct device_attribute *attr,
+    char *buf)
+{
+struct Scsi_Host *shost = class_to_shost(dev);
+struct hisi_hba *hisi_hba = shost_priv(shost);
+
+return scnprintf(buf, PAGE_SIZE, "%u\n",
+    hisi_hba->intr_coal_ticks);
+}
+
+static ssize_t intr_coal_ticks_v3_hw_store(struct device *dev,
+    struct device_attribute *attr,
+    const char *buf, int_t count)
+{
+struct Scsi_Host *shost = class_to_shost(dev);
+struct hisi_hba *hisi_hba = shost_priv(shost);
+
+u32 intr_coal_ticks;
+int ret;
+
+ret = kstrtou32(buf, 10, &intr_coal_ticks);
+if (ret) {
+dev_err(dev, "Input data of interrupt coalesce unmatch\n");
+return -EINVAL;
+}
+
+if (intr_coal_ticks >= BIT(24)) {
dev_err(dev, "intr_coal_ticks must be less than 2^24\n");
return -EINVAL;
+
+his_i_hba->intr_coal_ticks = intr_coal_ticks;
+
+config_intr_coal_v3_hw(hisi_hba);
+
+return count;
+
+static DEVICE_ATTR_RW(intr_coal_ticks_v3_hw);
+
+static ssize_t intr_coal_count_v3_hw_show(struct device *dev,
+ struct device_attribute
+ *attr, char *buf)
+{
+struct Scsi_Host *shost = class_to_shost(dev);
+struct hisi_hba *hisi_hba = shost_priv(shost);
+
+return scnprintf(buf, PAGE_SIZE, "%u\n",
+ hisi_hba->intr_coal_count);
+}
+
+static ssize_t intr_coal_count_v3_hw_store(struct device *dev,
+struct device_attribute
+ *attr, const char *buf, size_t count)
+
+{
+struct Scsi_Host *shost = class_to_shost(dev);
+struct hisi_hba *hisi_hba = shost_priv(shost);
+u32 intr_coal_count;
+int ret;
+
+ret = kstrtou32(buf, 10, &intr_coal_count);
+if (ret) {
+dev_err(dev, "Input data of interrupt coalesce unmatch\n");
+return -EINVAL;
+}
+
+if (intr_coal_count >= BIT(8)) {
+dev_err(dev, "intr_coal_count must be less than 2^8\n");
+return -EINVAL;
+}
+
+his_i_hba->intr_coal_count = intr_coal_count;
+
+config_intr_coal_v3_hw(hisi_hba);
+
+return count;
static struct device_attribute *host_attrs_v3_hw[] = {
    &dev_attr_phy_event_threshold,
    &dev_attr_intr_conv_v3_hw,
    &dev_attr_intr_coal_ticks_v3_hw,
    &dev_attr_intr_coal_count_v3_hw,
    NULL
};

static struct scsi_host_template sht_v3_hw = {
    .name			= DRV_NAME,
    .module			= THIS_MODULE,
    .queuecommand		= sas_queuecommand,
    .target_alloc		= sas_target_alloc,
    .slave_configure	= hisi_sas_slave_configure,
    .scan_finished		= hisi_sas_scan_finished,
    .scan_start		= hisi_sas_scan_start,
    .change_queue_depth= sas_change_queue_depth,
    .bios_param		= sas_bios_param,
    .this_id		= -1,
    .sg_tablesize		= HISI_SAS_SGE_PAGE_CNT,
    .max_sectors		= SCSI_DEFAULT_MAX_SECTORS,
    .use_clustering= ENABLE_CLUSTERING,
    .eh_device_reset_handler = sas_eh_device_reset_handler,
    .eh_target_reset_handler = sas_eh_target_reset_handler,
    .target_destroy		= sas_target_destroy,
    .ioctl			= sas_ioctl,
    .shost_attrs		= host_attrs_v3_hw,
    .tag_alloc_policy	= BLK_TAG_ALLOC_RR,
};
.get_phys_state = get_phys_state_v3_hw,
.get_events = phy_get_events_v3_hw,
+ .write_gpio = write_gpio_v3_hw,
+ .wait_cmds_complete_timeout = wait_cmds_complete_timeout_v3_hw,
];

static struct Scsi_Host *
@@ -1979,7 +2405,7 @@
struct hisi_hba *hisi_hba;
struct device *dev = &pdev->dev;

-shost = scsi_host_alloc(hisi_sas_sht, sizeof(*hisi_hba));
+shost = scsi_host_alloc(&sht_v3_hw, sizeof(*hisi_hba));
if (!shost) {
    dev_err(dev, "shost alloc failed
");
    return NULL;
@@ -1993,6 +2419,12 @@
    hisi_hba->shost = shost;
    SHOST_TO_SAS_HA(shost) = &hisi_hba->sha;

+if (prot_mask & ~HISI_SAS_PROT_MASK)
+    dev_err(dev, "unsupported protection mask 0x%x, using default (0x0)\n",
+    prot_mask);
+else
+    hisi_hba->prot_mask = prot_mask;
+
    timer_setup(&hisi_hba->timer, NULL, 0);

    if (hisi_sas_get_fw_info(hisi_hba) < 0)
@@ -2031,14 +2463,11 @@
    if (rc)
        goto err_out_disable_device;

-    if ((pci_set_dma_mask(pdev, DMA_BIT_MASK(64)) != 0) ||
-        (pci_set_dma_mask(pdev, DMA_BIT_MASK(32)) != 0)) {
-        dev_err(dev, "No usable DMA addressing method\n"");
-        -rc = -EIO;
-        goto err_out_regions;
-    }
+    if (dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(64)) ||
+        dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(32))) {
+        dev_err(dev, "No usable DMA addressing method\n"");
+        -rc = -EIO;
+        goto err_out_regions;
+    }

shost = hisi_sas_shost_alloc_pci(pdev);
@@ -2077,9 +2506,10 @@
 shost->max_lun = ~0;
 shost->max_channel = 1;
 shost->max_cmd_len = 16;
- shost->sg_tablesize = min_t(u16, SG_ALL, HISI_SAS_SGE_PAGE_CNT);
- shost->can_queue = hisi_hba->hw->max_command_entries;
- shost->cmd_per_lun = hisi_hba->hw->max_command_entries;
+ shost->can_queue = hisi_hba->hw->max_command_entries -
+ HISI_SAS_RESERVED_IPTT_CNT;
+ shost->cmd_per_lun = hisi_hba->hw->max_command_entries -
+ HISI_SAS_RESERVED_IPTT_CNT;

 sha->sas_ha_name = DRV_NAME;
 sha->dev = dev;
@@ -2093,8 +2523,6 @@
 sha->sas_port[i] = &hisi_hba->port[i].sas_port;
 }

 -hisi_sas_init_add(hisi_hba);
 -
 rc = scsi_add_host(shost, dev);
 if (rc)
 goto err_out_ha;
@@ -2107,6 +2535,12 @@
 if (rc)
 goto err_out_register_ha;
 if (hisi_hba->prot_mask) {
+ dev_info(dev, "Registering for DIF/DIX prot_mask=0x%x\n",
+ prot_mask);
+ scsi_host_set_prot(hisi_hba->shost, prot_mask);
+ }
+ scsi_scan_host(shost);

 return 0;
@@ -2133,8 +2567,9 @@
 free_irq(pci_irq_vector(pdev, 11), hisi_hba);
 for (i = 0; i < hisi_hba->queue_count; i++) {
 struct hisi_sas_cq *cq = &hisi_hba->cq[i];
+ int nr = hisi_sas_intr_conv ? 16 : 16 + i;

- free_irq(pci_irq_vector(pdev, i+16), cq);
+ free_irq(pci_irq_vector(pdev, nr), cq);
 }
pci_free_irq_vectors(pdev);
}
struct hisi_hba *hisi_hba = sha->lldd_ha;
struct Scsi_Host *shost = sha->core.shost;

if (timer_pending(&hisi_hba->timer))
  del_timer(&hisi_hba->timer);
+
sas_unregister_ha(sha);
sas_remove_host(sha->core.shost);

static const struct hisi_sas_hw_error sas_ras_intr0_nfe[] = {
  { .irq_msk = BIT(19), .msg = "HILINK_INT" },
  { .irq_msk = BIT(20), .msg = "HILINK_PLL0_OUT_OF_LOCK" },
  { .irq_msk = BIT(21), .msg = "HILINK_PLL1_OUT_OF_LOCK" },
  { .irq_msk = BIT(22), .msg = "HILINK_LOSS_OF_REFCLK0" },
  { .irq_msk = BIT(23), .msg = "HILINK_LOSS_OF_REFCLK1" },
  { .irq_msk = BIT(24), .msg = "DMAC0_TX_POISON" },
  { .irq_msk = BIT(25), .msg = "DMAC1_TX_POISON" },
  { .irq_msk = BIT(26), .msg = "DMAC2_TX_POISON" },
  { .irq_msk = BIT(27), .msg = "DMAC3_TX_POISON" },
  { .irq_msk = BIT(28), .msg = "DMAC4_TX_POISON" },
  { .irq_msk = BIT(29), .msg = "DMAC5_TX_POISON" },
  { .irq_msk = BIT(30), .msg = "DMAC6_TX_POISON" },
  { .irq_msk = BIT(31), .msg = "DMAC7_TX_POISON" },
};

static const struct hisi_sas_hw_error sas_ras_intr1_nfe[] = {
  { .irq_msk = BIT(0), .msg = "RXM_CFG_MEM3_ECC2B_INTR" },
  { .irq_msk = BIT(1), .msg = "RXM_CFG_MEM2_ECC2B_INTR" },
  { .irq_msk = BIT(2), .msg = "RXM_CFG_MEM1_ECC2B_INTR" },
  { .irq_msk = BIT(3), .msg = "RXM_CFG_MEM0_ECC2B_INTR" },
  { .irq_msk = BIT(4), .msg = "HGC_CQE_ECC2B_INTR" },
  { .irq_msk = BIT(5), .msg = "LM_CFG_IOSTL_ECC2B_INTR" },
  { .irq_msk = BIT(6), .msg = "LM_CFG_ITCTL_ECC2B_INTR" },
  { .irq_msk = BIT(7), .msg = "HGC_ITCT_ECC2B_INTR" },
  { .irq_msk = BIT(8), .msg = "HGC_IOST_ECC2B_INTR" },
  { .irq_msk = BIT(9), .msg = "HGC_DQE_ECC2B_INTR" },
  { .irq_msk = BIT(10), .msg = "DMAC0_RAM_ECC2B_INTR" },
  { .irq_msk = BIT(11), .msg = "DMAC1_RAM_ECC2B_INTR" },
  { .irq_msk = BIT(12), .msg = "DMAC2_RAM_ECC2B_INTR" },
  { .irq_msk = BIT(13), .msg = "DMAC3_RAM_ECC2B_INTR" },
  { .irq_msk = BIT(14), .msg = "DMAC4_RAM_ECC2B_INTR" },
  { .irq_msk = BIT(15), .msg = "DMAC5_RAM_ECC2B_INTR" },
  { .irq_msk = BIT(16), .msg = "DMAC6_RAM_ECC2B_INTR" },
}
static const struct hisi_sas_hw_error sas_ras_intr2_nfe[] = {
    { .irq_msk = BIT(0), .msg = "DMAC0_AXI_BUS_ERR" },
    { .irq_msk = BIT(1), .msg = "DMAC1_AXI_BUS_ERR" },
    { .irq_msk = BIT(2), .msg = "DMAC2_AXI_BUS_ERR" },
    { .irq_msk = BIT(3), .msg = "DMAC3_AXI_BUS_ERR" },
    { .irq_msk = BIT(4), .msg = "DMAC4_AXI_BUS_ERR" },
    { .irq_msk = BIT(5), .msg = "DMAC5_AXI_BUS_ERR" },
    { .irq_msk = BIT(6), .msg = "DMAC6_AXI_BUS_ERR" },
    { .irq_msk = BIT(7), .msg = "DMAC7_AXI_BUS_ERR" },
    { .irq_msk = BIT(8), .msg = "DMAC0_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(9), .msg = "DMAC1_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(10), .msg = "DMAC2_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(11), .msg = "DMAC3_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(12), .msg = "DMAC4_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(13), .msg = "DMAC5_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(14), .msg = "DMAC6_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(15), .msg = "DMAC7_FIFO_OMIT_ERR" },
    { .irq_msk = BIT(16), .msg = "HGC_RLSE_SLOT_UNMATCH" },
    { .irq_msk = BIT(17), .msg = "HGC_LM_ADD_FCH_LIST_ERR" },
    { .irq_msk = BIT(18), .msg = "HGC_AXI_BUS_ERR" },
    { .irq_msk = BIT(19), .msg = "HGC_FIFO_OMIT_ERR" },
};

static bool process_non_fatal_error_v3_hw(struct hisi_hba *hisi_hba)
{
    struct device *dev = hisi_hba->dev;
    const struct hisi_sas_hw_error *ras_error;
    bool need_reset = false;
    u32 irq_value;
    int i;
    
    irq_value = hisi_sas_read32(hisi_hba, SAS_RAS_INTR0);

for (i = 0; i < ARRAY_SIZE(sas_ras_intr0_nfe); i++) {
    ras_error = &sas_ras_intr0_nfe[i];
    if (ras_error->irq_msk & irq_value) {
        dev_warn(dev, "SAS_RAS_INTR0: %s(irq_value=0x%x) found.\n",
                 ras_error->msg, irq_value);
        need_reset = true;
    }
}

hisi_sas_write32(hisi_hba, SAS_RAS_INTR0, irq_value);

irq_value = hisi_sas_read32(hisi_hba, SAS_RAS_INTR1);
for (i = 0; i < ARRAY_SIZE(sas_ras_intr1_nfe); i++) {
    ras_error = &sas_ras_intr1_nfe[i];
    if (ras_error->irq_msk & irq_value) {
        dev_warn(dev, "SAS_RAS_INTR1: %s(irq_value=0x%x) found.\n",
                 ras_error->msg, irq_value);
        need_reset = true;
    }
}

hisi_sas_write32(hisi_hba, SAS_RAS_INTR1, irq_value);

irq_value = hisi_sas_read32(hisi_hba, SAS_RAS_INTR2);
for (i = 0; i < ARRAY_SIZE(sas_ras_intr2_nfe); i++) {
    ras_error = &sas_ras_intr2_nfe[i];
    if (ras_error->irq_msk & irq_value) {
        dev_warn(dev, "SAS_RAS_INTR2: %s(irq_value=0x%x) found.\n",
                 ras_error->msg, irq_value);
        need_reset = true;
    }
}

hisi_sas_write32(hisi_hba, SAS_RAS_INTR2, irq_value);

return need_reset;
}

static pci_ers_result_t hisi_sas_error_detected_v3_hw(struct pci_dev *pdev,
    pci_channel_state_t state)
{
    struct sas_ha_struct *sha = pci_get_drvdata(pdev);
    struct hisi_hba *hisi_hba = sha->lldd_ha;
    struct device *dev = hisi_hba->dev;

    dev_info(dev, "PCI error: detected callback, state(%d)!!\n", state);
    if (state == pci_channel_io_perm_failure)
        return PCI_ERS_RESULT_DISCONNECT;
    if (process_non_fatal_error_v3_hw(hisi_hba))
        return PCI_ERS_RESULT_NEED_RESET;

    return need_reset;
+ return PCI_ERS_RESULT_CAN_RECOVER;
+
+ static pci_ers_result_t hisi_sas_mmio_enabled_v3_hw(struct pci_dev *pdev)
+ {
+ return PCI_ERS_RESULT_RECOVERED;
+ }
+
+ static pci_ers_result_t hisi_sas_slot_reset_v3_hw(struct pci_dev *pdev)
+ {
+ struct sas_ha_struct *sha = pci_get_drvdata(pdev);
+ struct hisi_hba *hisi_hba = sha->lldd_ha;
+ struct device *dev = hisi_hba->dev;
+ HISI_SAS_DECLARE_RST_WORK_ON_STACK(r);
+ 
+ dev_info(dev, "PCI error: slot reset callback!!n");
+ queue_work(hisi_hba->wq, &r.work);
+ wait_for_completion(r.completion);
+ if (r.done)
+ return PCI_ERS_RESULT_RECOVERED;
+ 
+ return PCI_ERS_RESULT_DISCONNECT;
+ }
+
+ static void hisi_sas_reset_prepare_v3_hw(struct pci_dev *pdev)
+ {
+ struct sas_ha_struct *sha = pci_get_drvdata(pdev);
+ struct hisi_hba *hisi_hba = sha->lldd_ha;
+ struct device *dev = hisi_hba->dev;
+ int rc;
+ 
+ dev_info(dev, "FLR prepare\n");
+ set_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags);
+ hisi_sas_controller_reset_prepare(hisi_hba);
+ 
+ rc = disable_host_v3_hw(hisi_hba);
+ if (rc)
+ dev_err(dev, "FLR: disable host failed rc=%d\n", rc);
+ }
+
+ static void hisi_sas_reset_done_v3_hw(struct pci_dev *pdev)
+ {
+ struct sas_ha_struct *sha = pci_get_drvdata(pdev);
+ struct hisi_hba *hisi_hba = sha->lldd_ha;
+ struct device *dev = hisi_hba->dev;
+ int rc;
+ 

+hisi_sas_init_mem(hisi_hba);
+
+rc = hw_init_v3_hw(hisi_hba);
+if (rc) {
+dev_err(dev, "FLR: hw init failed rc=%d\n", rc);
+return;
+
+%}
+
+hisi_sas_controller_reset_done(hisi_hba);
+dev_info(dev, "FLR done\n");
+
+enum {
/+ instances of the controller */
+hip08,
+};
+
+static int hisi_sas_v3_suspend(struct pci_dev *pdev, pm_message_t state)
+{
+struct sas_ha_struct *sha = pci_get_drvdata(pdev);
+struct hisi_hba *hisi_hba = sha->lldd_ha;
+struct device *dev = hisi_hba->dev;
+struct Scsi_Host *shost = hisi_hba->shost;
+pci_power_t device_state;
+int rc;
+
+if (!pdev->pm_cap) {
+dev_err(dev, "PCI PM not supported\n");
+return -ENODEV;
+}
+
+if (test_and_set_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags))
+return -1;
+
+scsi_block_requests(shost);
+set_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
+flush_workqueue(hisi_hba->wq);
+
+rc = disable_host_v3_hw(hisi_hba);
+if (rc) {
+dev_err(dev, "PM suspend: disable host failed rc=%d\n", rc);
+clear_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
+clear_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags);
+scsi_unblock_requests(shost);
+return rc;
+}
+
+hisi_sas_init_mem(hisi_hba);
device_state = pci_choose_state(pdev, state);
dev_warn(dev, "entering operating state [D%d]\n",
device_state);
pci_save_state(pdev);
pci_disable_device(pdev);
pci_set_power_state(pdev, device_state);
+
+his_i_sas_release_tasks(hisi_hba);
+
+sas_suspend_ha(sha);
+return 0;
+
+
static int hisi_sas_v3_resume(struct pci_dev *pdev)
+
{ struct sas_ha_struct *sha = pci_get_drvdata(pdev);
+struct hisi_hba *hisi_hba = sha->lldd_ha;
+struct Scsi_Host *shost = hisi_hba->shost;
+struct device *dev = hisi_hba->dev;
+unsigned int rc;
+pci_power_t device_state = pdev->current_state;
+
+dev_warn(dev, "resuming from operating state [D%d]\n",
+device_state);
+pci_set_power_state(pdev, PCI_D0);
+pci_enable_wake(pdev, PCI_D0, 0);
+pci_restore_state(pdev);
+rc = pci_enable_device(pdev);
+if (rc)
+dev_err(dev, "enable device failed during resume (%d)\n", rc);
+
+pci_set_master(pdev);
+scsi_unblock_requests(shost);
+clear_bit(HISI_SAS_REJECT_CMD_BIT, &hisi_hba->flags);
+
+sas_prep_resume_ha(sha);
+init_reg_v3_hw(hisi_hba);
+hisi_hba->hw->phys_init(hisi_hba);
+sas_resume_ha(sha);
+clear_bit(HISI_SAS_RESET_BIT, &hisi_hba->flags);
+
+return 0;
+
+
static const struct pci_device_id sas_v3_pci_table[] = {
 { PCI_VDEVICE(HUAWEI, 0xa230), hip08 },
}
static const struct pci_error_handlers hisi_sas_err_handler = {
    .error_detected = hisi_sas_error_detected_v3_hw,
    .mmio_enabled = hisi_sas_mmio_enabled_v3_hw,
    .slot_reset = hisi_sas_slot_reset_v3_hw,
    .reset_prepare = hisi_sas_reset_prepare_v3_hw,
    .reset_done = hisi_sas_reset_done_v3_hw,
};

static struct pci_driver sas_v3_pci_driver = {
    .name = DRV_NAME,
    .id_table = sas_v3_pci_table,
    .probe = hisi_sas_v3_probe,
    .remove = hisi_sas_v3_remove,
    .suspend = hisi_sas_v3_suspend,
    .resume = hisi_sas_v3_resume,
    .err_handler = &hisi_sas_err_handler,
};

module_pci_driver(sas_v3_pci_driver);
+module_param_named(intr_conv, hisi_sas_intr_conv, bool, 0444);

MODULE_LICENSE("GPL");
MODULE_AUTHOR("John Garry <john.garry@huawei.com>");
MODULE_DESCRIPTION("HISILICON SAS controller v3 hw driver based on pci device");
-MODULE_ALIAS("platform:" DRV_NAME);
+MODULE_ALIAS("pci:" DRV_NAME);
--- linux-4.15.0.orig/drivers/scsi/hosts.c
+++ linux-4.15.0/drivers/scsi/hosts.c
@@ -256,12 +256,11 @@
    device_enable_async_suspend(&shost->shost_dev);

    +get_device(&shost->shost_gendev);
    error = device_add(&shost->shost_dev);
    if (error)
        goto out_del_gendev;

-out_del_dev:
device_del(&shost->shost_dev);
-
-if (shost->transportt->host_size) {
    shost->shost_data = kzalloc(shost->transportt->host_size,
        GFP_KERNEL);
    @@ -298,6 +297,11 @@
        out_del_dev;
        device_del(&shost->shost_dev);
    }
out_del_gendev:
+/*
+ * Host state is SHOST_RUNNING so we have to explicitly release
+ * ->shost_dev.
+ */
+put_device(&shost->shost_dev);
device_del(&shost->shost_gendev);
out_disable_runtime_pm:
device_disable_async_suspend(&shost->shost_gendev);
@@ -318,6 +322,9 @@
    scsi_proc_hostdir_rm(shost->hostt);

    /* Wait for functions invoked through call_rcu(&shost->rcu, ...) */
+rcu_barrier();
+
    if (shost->tmf_work_q)
        destroy_workqueue(shost->tmf_work_q);
    if (shost->ehandler)
@@ -348,7 +355,7 @@
    ida_simple_remove(&host_index_ida, shost->host_no);

    -if (parent)
+if (shost->shost_state != SHOST_CREATED)
        put_device(parent);
        kfree(shost);
    }
@@ -401,8 +408,10 @@
    mutex_init(&shost->scan_mutex);

    index = ida_simple_get(&host_index_ida, 0, 0, GFP_KERNEL);
    -if (index < 0)
    -goto fail_kfree;
+if (index < 0) {
+    kfree(shost);
+    return NULL;
+}
    shost->host_no = index;

    shost->dma_channel = 0xff;
@@ -471,6 +480,7 @@
    shost->dma_boundary = 0xffffffff;

    shost->use_blk_mq = scsi_use_blk_mq;
+shost->use_blk_mq = scsi_use_blk_mq || shost->hostt->force_blk_mq;

    device_initialize(&shost->shost_gendev);
dev_set_name(&shost->shost_gendev, "host%d", shost->host_no);
@@ -489,7 +499,8 @@
 shost_printk(KERN_WARNING, shost,
 "error handler thread failed to spawn, error = %ld\n",
 PTR_ERR(shost->ehandler));
-goto fail_index_remove;
+shost->ehandler = NULL;
+goto fail;
}

shost->tmf_work_q = alloc_workqueue("scsi_tmf_%d",
@@ -498,17 +509,18 @@
 if (!shost->tmf_work_q) {
 shost_printk(KERN_WARNING, shost,
 "failed to create tmf workq\n");
-goto fail_kthread;
+goto fail;
 }
 scsi_proc_hostdir_add(shost->hostt);
 return shost;
+fail:
+/
+ * Host state is still SHOST_CREATED and that is enough to release
+ * ->shost_gendev. scsi_host_dev_release() will free
+ * dev_name(&shost->shost_dev).
+ */
+put_device(&shost->shost_gendev);

 - fail_kthread:
 -kthread_stop(shost->ehandler);
 - fail_index_remove:
 -ida_simple_remove(&host_index_ida, shost->host_no);
 - fail_kfree:
 -kfree(shost);
 return NULL;
}
EXPORT_SYMBOL(scsi_host_alloc);
--- linux-4.15.0.orig/drivers/scsi/hpsa.c
+++ linux-4.15.0/drivers/scsi/hpsa.c
@@ -507,6 +507,12 @@
 return count;
}

+static void hpsa_turn_off_ioaccel_for_device(struct hpsa_scsi_dev_t *device)
+{
+device->offload_enabled = 0;
+device->offload_to_be_enabled = 0;
+}
static ssize_t host_show_firmware_revision(struct device *dev,  
   struct device_attribute *attr, char *buf)
{
    @ @ -901,14 +907,14 @ @
    return snprintf(buf, 20, "%d\n", h->legacy_board ? 1 : 0);
}

- static DEVICE_ATTR(raid_level, S_IRUGO, raid_level_show, NULL);
- static DEVICE_ATTR(lunid, S_IRUGO, lunid_show, NULL);
- static DEVICE_ATTR(unique_id, S_IRUGO, unique_id_show, NULL);
+ static DEVICE_ATTR_RO(raid_level);
+ static DEVICE_ATTR_RO(lunid);
+ static DEVICE_ATTR_RO(unique_id);
static DEVICE_ATTR(rescan, S_IWUSR, NULL, host_store_rescan);
- static DEVICE_ATTR(sas_address, S_IRUGO, sas_address_show, NULL);
+ static DEVICE_ATTR_RO(sas_address);
static DEVICE_ATTR_RO(hp_ssd_smart_path_enabled, S_IRUGO,
    host_show_hp_ssd_smart_path_enabled, NULL);
- static DEVICE_ATTR(path_info, S_IRUGO, path_info_show, NULL);
+ static DEVICE_ATTR_RO(path_info);
static DEVICE_ATTR_RO(hp_ssd_smart_path_status, S_IWUSR|S_IRUGO|S_IROTH,
    host_show_hp_ssd_smart_path_status,
    host_store_hp_ssd_smart_path_status);
    @ @ -1045,11 +1051,7 @ @
c->busaddr |= 1 | (h->blockFetchTable[c->Header.SGList] << 1);
if (unlikely(!h->msix_vectors))
    return;
- if (likely(reply_queue == DEFAULT_REPLY_QUEUE))
- c->Header.ReplyQueue =
- raw_smp_processor_id() % h->nreply_queues;
- else
- c->Header.ReplyQueue = reply_queue % h->nreply_queues;
+ c->Header.ReplyQueue = reply_queue;
}

* Tell the controller to post the reply to the queue for this
* processor. This seems to give the best I/O throughput.
*/
- if (likely(reply_queue == DEFAULT_REPLY_QUEUE))
- cp->ReplyQueue = smp_processor_id() % h->nreply_queues;
- else
- cp->ReplyQueue = reply_queue % h->nreply_queues;
+ cp->ReplyQueue = reply_queue;
/*
 * Set the bits in the address sent down to include:
* - performant mode bit (bit 0)
@@ -1087,10 +1086,7 @@
    /* Tell the controller to post the reply to the queue for this
    * processor. This seems to give the best I/O throughput.
    */
-if (likely(reply_queue == DEFAULT_REPLY_QUEUE))
-    cp->reply_queue = smp_processor_id() % h->nreply_queues;
-else
-    cp->reply_queue = reply_queue % h->nreply_queues;
+    cp->reply_queue = reply_queue;
    /* Set the bits in the address sent down to include:
    * - performant mode bit not used in ioaccel mode 2
    * - pull count (bits 0-3)
    @@ -1109,10 +1105,7 @@
    * Tell the controller to post the reply to the queue for this
    * processor. This seems to give the best I/O throughput.
    */
-if (likely(reply_queue == DEFAULT_REPLY_QUEUE))
-    cp->reply_queue = smp_processor_id() % h->nreply_queues;
-else
-    cp->reply_queue = reply_queue % h->nreply_queues;
+    cp->reply_queue = reply_queue;
    /*
    * Set the bits in the address sent down to include:
    * - performant mode bit not used in ioaccel mode 2
    @@ -1157,6 +1150,8 @@
    { 
        dial_down_lockup_detection_during_fw_flash(h, c);
        atomic_inc(&h->commands_outstanding);
        +        reply_queue = h->reply_map[raw_smp_processor_id()];
        switch (c->cmd_type) {
            case CMD_IOACCEL1:
                set_ioaccel1_performant_mode(h, c, reply_queue);
                @@ -1754,8 +1749,7 @@
                __func__,
                h->scsi_host->host_no, logical_drive->bus,
                logical_drive->target, logical_drive->lun);
    logical_drive->offload_enabled = 0;
    logical_drive->offload_to_be_enabled = 0;
    +hpssa_turn_off_ioaccel_for_device(logical_drive);
    logical_drive->queue_depth = 8;
    }
    }
@@ -2329,6 +2323,8 @@
case IOACCEL2_SERV_RESPONSE_COMPLETE:
    switch (c2->error_data.status) {
        case IOACCEL2_STATUS_SR_TASK_COMP_GOOD:
if (cmd)
+cmd->result = 0;
break;
case IOACCEL2_STATUS_SR_TASK_COMP_CHK_COND:
cmd->result |= SAM_STAT_CHECK_CONDITION;
/* check for good status */
if (likely(c2->error_data.serv_response == 0 &&
-c2->error_data.status == 0))
+cmd->result = 0;
return hpsa_cmd_free_and_done(h, c, cmd);
+
/* Any RAID offload error results in retry which will use
IOACCEL2_SERV_RESPONSE_FAILURE} {
if (c2->error_data.status ==
IOACCEL2_STATUS_SR_IOACCEL_DISABLED) {
-dev->offload_enabled = 0;
-dev->offload_to_be_enabled = 0;
+hpsa_turn_off_ioaccel_for_device(dev);
}
return hpsa_retry_cmd(h, c);
struct ext_report_lun_entry *rle = &rlep->LUN[rle_index];
+u16 bmic_device_index = 0;
+bmic_device_index = GET_BMIC_DRIVE_NUMBER(&rle->lunid[0]);
-encl_dev->sas_address =
+encl_dev->eli =
hpsa_get_enclosure_logical_identifier(h, scsi3addr);
+if (encl_dev->target == -1 || encl_dev->lun == -1) {
rc = IO_OK;
goto out;
this_device->offload_config =
!!(ioaccel_status & OFFLOAD_CONFIGURED_BIT);
if (this_device->offload_config) {
-bool offload_enabled =
!!(ioaccel_status & OFFLOAD_ENABLED_BIT);
-if (hpsa_get_raid_map(h, scsi3addr, this_device))
-this_device->offload_to_be_enabled = 0;
+#
+ /* Check to see if offload can be enabled.
+ */
+if (offload_enabled) {
+rc = hpsa_get_raid_map(h, scsi3addr, this_device);
+if (rc) /* could not load raid_map */
+goto out;
+this_device->offload_to_be_enabled = 1;
+
} }

out:
@@ -4003,8 +4007,7 @@
 } else {
 this_device->raid_level = RAID_UNKNOWN;
 this_device->offload_config = 0;
-this_device->offload_enabled = 0;
-this_device->offload_to_be_enabled = 0;
+hpsa_turn_off_ioaccel_for_device(this_device);
 this_device->hba_ioaccel_enabled = 0;
 this_device->volume_offline = 0;
 this_device->queue_depth = h->nr_cmds;
@@ -4940,7 +4943,7 @@
curr_sg->reserved[0] = 0;
curr_sg->reserved[1] = 0;
curr_sg->reserved[2] = 0;
-curr_sg->chain_indicator = 0x80;
+curr_sg->chain_indicator = IOACCEL2_CHAIN;

curr_sg = h->ioaccel2_cmd_sg_list[c->cmdindex];
}
@@ -4957,6 +4960,11 @@
curr_sg++;
}

+#
+ /* Set the last s/g element bit
+ */
+(*(curr_sg - 1))->chain_indicator = IOACCEL2_LAST_SG;
+
switch (cmd->sc_data_direction) {
 case DMA_TO_DEVICE:
cp->direction &= ~IOACCEL2_DIRECTION_MASK;
@@ -5221,8 +5229,12 @@
/* Handles load balance across RAID 1 members.
* (2-drive R1 and R10 with even # of drives.)
* Appropriate for SSDs, not optimal for HDDs
+ * Ensure we have the correct raid_map.
+/
-BUG_ON(le16_to_cpu(map->layout_map_count) != 2);
+if (le16_to_cpu(map->layout_map_count) != 2) {
+hpsa_turn_off_ioaccel_for_device(dev);
+return IO_ACCEL_INELIGIBLE;
+}
if (dev->offload_to_mirror)
map_index += le16_to_cpu(map->data_disks_per_row);
dev->offload_to_mirror = !dev->offload_to_mirror;
@@ -5230,8 +5242,12 @@
case HPSA_RAID_ADM:
/* Handles N-way mirrors (R1-ADM)
 * and R10 with # of drives divisible by 3.)
+ * Ensure we have the correct raid_map.
+/
-BUG_ON(le16_to_cpu(map->layout_map_count) != 3);
+if (le16_to_cpu(map->layout_map_count) != 3) {
+hpsa_turn_off_ioaccel_for_device(dev);
+return IO_ACCEL_INELIGIBLE;
+}
offload_to_mirror = dev->offload_to_mirror;
raid_map_helper(map, offload_to_mirror,
@@ -5256,7 +5272,10 @@
r5or6_blocks_per_row =
le16_to_cpu(map->strip_size) *
le16_to_cpu(map->data_disks_per_row);
-BUG_ON(r5or6_blocks_per_row == 0);
+if (r5or6_blocks_per_row == 0) {
+hpsa_turn_off_ioaccel_for_device(dev);
+return IO_ACCEL_INELIGIBLE;
+}
stripesize = r5or6_blocks_per_row *
le16_to_cpu(map->layout_map_count);
#if BITS_PER_LONG == 32
@@ -5630,6 +5649,12 @@
c = cmd_tagged_alloc(h, cmd);
/*
+ * This is necessary because the SML doesn't zero out this field during
+ * error recovery.
+ */
+cmd->result = 0;
+*/
* Call alternate submit routine for I/O accelerated commands.
* Retries always go down the normal I/O path.
*/
@@ -7384,6 +7409,26 @@
h->msix_vectors = 0;
}

+static void hpsa_setup_reply_map(struct ctlr_info *h)
+{
+const struct cpumask *mask;
+unsigned int queue, cpu;
+
+for (queue = 0; queue < h->msix_vectors; queue++) {
+mask = pci_irq_get_affinity(h->pdev, queue);
+if (!mask)
+goto fallback;
+
+for_each_cpu(cpu, mask)
+h->reply_map[cpu] = queue;
+}
+return;
+
+fallback:
+for_each_possible_cpu(cpu)
+h->reply_map[cpu] = 0;
+}

/* If MSI/MSI-X is supported by the kernel we will try to enable it on
* controllers that are capable. If not, we use legacy INTx mode.
*/
@@ -7779,6 +7824,10 @@
err = hpsa_interrupt_mode(h);
if (err)
goto clean1;
+
+hpsa_setup_reply_map(h);

err = hpsa_pci_find_memory_BAR(h->pdev, &h->paddr);
if (err)
goto clean2;/* intmode+region, pci */
@@ -8196,7 +8245,7 @@
* Called from monitor controller worker (hpsa_event_monitor_worker)
* - * A Volume (or Volumes that comprise an Array set) may be undergoing a
* A Volume (or Volumes that comprise an Array set) may be undergoing a
* transformation, so we will be turning off ioaccel for all volumes that
* make up the Array.
*/
@@ -8219,6 +8268,9 @@
 * Run through current device list used during I/O requests.
 */
for (i = 0; i < h->ndevices; i++) {
+int offload_to_be_enabled = 0;
+int offload_config = 0;
+device = h->dev[i];

if (!device)
@@ -8238,25 +8290,35 @@
     continue;

ioaccel_status = buf[IOACCEL_STATUS_BYTE];
-device->offload_config =
+*/
+ * Check if offload is still configured on
+ */
+offload_config =
+!!(ioaccel_status & OFFLOAD_CONFIGURED_BIT);
-if (device->offload_config)
-device->offload_to_be_enabled =
+*/
+ * If offload is configured on, check to see if ioaccel
+ * needs to be enabled.
+ */
+if (offload_config)
+offload_to_be_enabled =
+!!(ioaccel_status & OFFLOAD_ENABLED_BIT);

/ *
+ * If ioaccel is to be re-enabled, re-enable later during the
+ * scan operation so the driver can get a fresh raidmap
+ * before turning ioaccel back on.
+ */
+if (offload_to_be_enabled)
+continue;
+
+/*
+ * Immediately turn off ioaccel for any volume the
+ * controller tells us to. Some of the reasons could be:
+ * transformation - change to the LVs of an Array.
+ * degraded volume - component failure
+ *
+ * If ioaccel is to be re-enabled, re-enable later during the
- * scan operation so the driver can get a fresh raidmap
- * before turning ioaccel back on.
- *
- */
-if (!device->offload_to_be_enabled)
-device->offload_enabled = 0;
+hpsa_turn_off_ioaccel_for_device(device);
} }

kfree(buf);
@@ -8490,6 +8552,28 @@
return wq;
}

+static void hpda_free_ctlr_info(struct ctlr_info *h) {
+    +kfree(h->reply_map);
+    +kfree(h);
+    
+    +static struct ctlr_info *hpda_alloc_ctlr_info(void) {
+        +struct ctlr_info *h;
+        
+        +h = kzalloc(sizeof(*h), GFP_KERNEL);
+        
+        +h = hpda_alloc_ctlr_info();
+    
+    +static int hpsa_init_one(struct pci_dev *pdev, const struct pci_device_id *ent) {
+        int dac, rc;
+        @@ -8527,7 +8611,7 @@
+    * the driver. See comments in hpsa.h for more info.
+    */
+BUILD_BUG_ON(sizeof(struct CommandList) % COMMANDLIST_ALIGNMENT);
+    -h = kzalloc(sizeof(*h), GFP_KERNEL);
+    +h = hpda_alloc_ctlr_info();
+    if (!h) {
+    dev_err(&pdev->dev, "Failed to allocate controller head\n");
+    return -ENOMEM;
+    

/* hook into SCSI subsystem */
rc = hpsa_scsi_add_host(h);
if (rc)
    -goto clean7; /* perf, sg, cmd, irq, shost, pci, lu, aer/h */
+goto clean8; /* lastlogicals, perf, sg, cmd, irq, shost, pci, lu, aer/h */

/* Monitor the controller for firmware lockups */
h->heartbeat_sample_interval = HEARTBEAT_SAMPLE_INTERVAL;

HPSA_EVENT_MONITOR_INTERVAL);
return 0;

+clean8: /* lastlogicals, perf, sg, cmd, irq, shost, pci, lu, aer/h */
+kfree(h->lastlogicals);
clean7: /* perf, sg, cmd, irq, shost, pci, lu, aer/h */
hpsa_free_performant_mode(h);
h->access.set_intr_mask(h, HPSA_INTR_OFF);

hpsa_shutdown(pdev)
static void __hpsa_shutdown(struct pci_dev *pdev)
{
    struct ctlr_info *h;

    hpsa_disable_interrupt_mode(h);
    pci_disable_device(pdev);
}

static void hpsa_shutdown(struct pci_dev *pdev)
+
+__hpsa_shutdown(pdev);
+pci_disable_device(pdev);
+
+static void hpsa_free_device_info(struct ctlr_info *h)
{
    int i;
    scsi_remove_host(h->scsi_host);
*/
/* includes hpsa_free_irqs - init_one 4 */
/* includes hpsa_disable_interrupt_mode - pci_init 2 */
-hpsa_shutdown(pdev);
+__hpsa_shutdown(pdev);

hpsa_free_device_info(h); /* scan */
h->lockup_detected = NULL;/* init_one 2 */
/* (void) pci_disable_pciie_error_reporting(pdev); *//* init_one 1 */
-kfree(h);/* init_one 1 */
+hpda_free_ctlr_info(h);/* init_one 1 */
}

static int hpsa_suspend(__attribute__((unused)) struct pci_dev *pdev,
+++ linux-4.15.0.orig/drivers/scsi/hpsa.h
--- linux-4.15.0.orig/drivers/scsi/hpsa.h
+++ linux-4.15.0/drivers/scsi/hpsa.h
@@ -8926,7 +9018,7 @@
    *identifier = rphy->identify.sas_address;
    +struct Scsi_Host *shost = phy_to_shost(rphy);
    +struct ctlr_info *h;
    +struct hpsa_scsi_dev_t *sd;
    +
    +if (!shost)
    +return -ENXIO;
    +
    +h = shost_to_hba(shost);
    +
    +if (!h)
    +return -ENXIO;
    +
    +sd = hpsa_find_device_by_sas_rphy(h, rphy);
    +if (!sd)
    +return -ENXIO;
    +
    +*identifier = sd->eli;
    +
    return 0;
}

--- linux-4.15.0.orig/drivers/scsi/hpsa.h
+++ linux-4.15.0/drivers/scsi/hpsa.h
@@ -68,6 +68,7 @@
    #define RAID_CTLR_LUNID "\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0\0"
    unsigned char device_id[16]; /* from inquiry pg. 0x83 */
    u64 sas_address;
    +u64 eli;/* from report diags. */
    unsigned char vendor[8]; /* bytes 8-15 of inquiry data */
    unsigned char model[16]; /* bytes 16-31 of inquiry data */
    unsigned char rev;/* byte 2 of inquiry data */
@@ -158,6 +159,7 @@
    #pragma pack()
struct ctlr_info {
  unsigned int *reply_map;
  int ctlr;
  char devname[8];
  char *product_name;
}

/*
--- linux-4.15.0.orig/drivers/scsi/hpsa_cmd.h
+++ linux-4.15.0/drivers/scsi/hpsa_cmd.h
@@ -517,6 +517,7 @@
    u8 reserved[3];
    u8 chain_indicator;
#define IOACCEL2_CHAIN 0x80
+#define IOACCEL2_LAST_SG 0x40
    }
*/

if (vhost->action == IBMVF_HOST_ACTION_ALLOC_TGTS)
    vhost->action = action;
    break;
+case IBMVF_HOST_ACTION_REENABLE:
+case IBMVF_HOST_ACTION_RESET:
    vhost->action = action;
    +break;
    case IBMVF_HOST_ACTION_INIT:
    case IBMVF_HOST_ACTION_TGT_DEL:
+    case IBMVF_HOST_ACTION_LOGO:
+    case IBMVF_HOST_ACTION_QUERY_TGTS:
+    case IBMVF_HOST_ACTION_TGT_DEL_FAILED:
+    case IBMVF_HOST_ACTION_NONE:
+    default:
      switch (vhost->action) {
        case IBMVF_HOST_ACTION_RESET:
          @ @ .517,15 +526,6 @ @
          break;
        }
      break;
      -case IBMVF_HOST_ACTION_LOGO:
      -case IBMVF_HOST_ACTION_QUERY_TGTS:
      -case IBMVF_HOST_ACTION_TGT_DEL_FAILED:
      -case IBMVF_HOST_ACTION_NONE:
      -case IBMVF_HOST_ACTION_RESET:
      -case IBMVF_HOST_ACTION_REENABLE:
      default:
          vhost->action = action;
unsigned long flags = 0;

spin_lock_irqsave(host->host_lock, flags);
-if (sdev->type == TYPE_DISK)
+if (sdev->type == TYPE_DISK) {
  sdev->allow_restart = 1;
  blk_queue_rq_timeout(sdev->request_queue, 120 * HZ);
}
spin_unlock_irqrestore(host->host_lock, flags);
return 0;
}
@@ -3579,11 +3581,9 @@
static int ibmvfc_adisc_needs_plogi(struct ibmvfc_passthru_mad *mad,
   struct ibmvfc_target *tgt)
{
-if (memcmp(&mad->fc_iu.response[2], &tgt->ids.port_name,
   - sizeof(tgt->ids.port_name)))
+if (wwn_to_u64((u8 *)&mad->fc_iu.response[2]) != tgt->ids.port_name)
  return 1;
-if (memcmp(&mad->fc_iu.response[4], &tgt->ids.node_name,
   - sizeof(tgt->ids.node_name)))
+if (wwn_to_u64((u8 *)&mad->fc_iu.response[4]) != tgt->ids.node_name)
  return 1;
if (be32_to_cpu(mad->fc_iu.response[6]) != tgt->scsi_id)
  return 1;
@@ -4346,26 +4346,45 @@
case IBMVFC_HOST_ACTION_INIT_WAIT:
  break;
-casex IBMVFC_HOST_ACTION_RESET:
  -vhost->action = IBMVFC_HOST_ACTION_TGT_DEL;
  spin_unlock_irqrestore(vhost->host->host_lock, flags);
  rc = ibmvfc_reset_crq(vhost);
+  spin_lock_irqsave(vhost->host->host_lock, flags);
+  if (rc == H_CLOSED)
+  +if (!rc || rc == H_CLOSED)
+  	vio_enable_interrupts(to_vio_dev(vhost->dev));
+  -if (rc (rc = ibmvfc_send_crq_init(vhost)) ||
+  - (rc = vio_enable_interrupts(to_vio_dev(vhost->dev))))
+  -ibmvfc_link_down(vhost, IBMVFC_LINK_DEAD);
+  -dev_err(vhost->dev, "Error after reset (rc=%d)\n", rc);
+  +if (vhost->action == IBMVFC_HOST_ACTION_RESET) {
+  +/}
The only action we could have changed to would have been reenable, in which case, we skip the rest of this path and wait until we've done the re-enable before sending the crq init.

```c
vhost->action = IBMVFC_HOST_ACTION_TGT_DEL;
+
+if (rc || (rc = ibmvfc_send_crq_init(vhost)) ||
+    (rc = vio_enable_interruptions(to_vio_dev(vhost->dev)))) {
+    ibmvfc_link_down(vhost, IBMVFC_LINK_DEAD);
+    dev_err(vhost->dev, "Error after reset (rc=%d)/n", rc);
+}
}
break;
```

```c
case IBMVFC_HOST_ACTION_REENABLE:
-    vhost->action = IBMVFC_HOST_ACTION_TGT_DEL;
-    spin_unlock_irqrestore(vhost->host->host_lock, flags);
-    rc = ibmvfc_reenable_crq_queue(vhost);
+    spin_lock_irqsave(vhost->host->host_lock, flags);
-    if (rc || (rc = ibmvfc_send_crq_init(vhost))) {
-        ibmvfc_link_down(vhost, IBMVFC_LINK_DEAD);
-        dev_err(vhost->dev, "Error after enable (rc=%d)/n", rc);
+    if (vhost->action == IBMVFC_HOST_ACTION_REENABLE) {
+        /*
+        * The only action we could have changed to would have
+        * been reset, in which case, we skip the rest of this
+        * path and wait until we've done the reset before
+        * sending the crq init.
+        */
+        vhost->action = IBMVFC_HOST_ACTION_TGT_DEL;
+        if (rc || (rc = ibmvfc_send_crq_init(vhost))) {
+            ibmvfc_link_down(vhost, IBMVFC_LINK_DEAD);
+            dev_err(vhost->dev, "Error after enable (rc=%d)/n", rc);
+        }
+    }
+    free_host_mem;
break;
```
spin_lock_irqsave(vhost->host->host_lock, flags);
ibmvfc_purge_requests(vhost, DID_ERROR);
-ibmvfc_free_event_pool(vhost);
spin_unlock_irqrestore(vhost->host->host_lock, flags);
+ibmvfc_free_event_pool(vhost);

ibmvfc_free_mem(vhost);
spin_lock(&ibmvfc_driver_lock);
--- linux-4.15.0.orig/drivers/scsi/ibmvscsi/ibmvfc.h
+++ linux-4.15.0/drivers/scsi/ibmvscsi/ibmvfc.h
@@ -367,7 +367,7 @@
};

struct ibmvfc_fcp_rsp_info {
    __be16 reserved;
+    u8 reserved[3];
    u8 rsp_code;
    u8 reserved[2];
} __attribute__((packed, aligned (2)));
--- linux-4.15.0.orig/drivers/scsi/ibmvscsi/ibmvscsi.c
+++ linux-4.15.0/drivers/scsi/ibmvscsi/ibmvscsi.c
@@ -93,9 +93,10 @@
static int max_events = IBMVSCSI_MAX_REQUESTS_DEFAULT + 2;
static int fast_fail = 1;
static int client_reserve = 1;
static char partition_name[97] = "UNKNOWN";
+static char partition_name[96] = "UNKNOWN";
static unsigned int partition_number = -1;
static LIST_HEAD(ibmvscsi_head);
+static DEFINE_SPINLOCK(ibmvscsi_driver_lock);

static struct scsi_transport_template *ibmvscsi_transport_template;

@@ -262,7 +263,7 @@
ppartition_name = of_get_property(of_root, "ibm,partition-name", NULL);
if (ppartition_name)
    strcpy(partition_name, ppartition_name,
+    strlcpy(partition_name, ppartition_name,
sizeof(partition_name));
    p_number_ptr = of_get_property(of_root, "ibm,partition-no", NULL);
if (p_number_ptr)
    @ @ -428,6 +429,8 @@
       int rc = 0;
       struct vio_dev *vdev = to_vio_dev(hostdata->dev);
+    set_adapter_info(hostdata);
+    +
/* Re-enable the CRQ */
do {
  if (rc)
    @@ -2273,7 +2276,9 @@
}

dev_set_drvdata(&vdev->dev, hostdata);
+spin_lock(&ibmvscsi_driver_lock);
list_add_tail(&hostdata->host_list, &ibmvscsi_head);
+spin_unlock(&ibmvscsi_driver_lock);
return 0;

    add_srp_port_failed:
@@ -2295,15 +2300,23 @@
static int ibmvscsi_remove(struct vio_dev *vdev)
{
    struct ibmvscsi_host_data *hostdata = dev_get_drvdata(&vdev->dev);
    -list_del(&hostdata->host_list);
    -unmap_persist_bufs(hostdata);
    +
    +srp_remove_host(hostdata->host);
    +scsi_remove_host(hostdata->host);
    +
    +purge_requests(hostdata, DID_ERROR);
    release_event_pool(&hostdata->pool, hostdata);
    +
    ibmvscsi_release_crq_queue(&hostdata->queue, hostdata, max_events);

    kthread_stop(hostdata->work_thread);
    -srp_remove_host(hostdata->host);
    -scsi_remove_host(hostdata->host);
    +unmap_persist_bufs(hostdata);
    +
    +spin_lock(&ibmvscsi_driver_lock);
    +list_del(&hostdata->host_list);
    +spin_unlock(&ibmvscsi_driver_lock);
    +
    scsi_host_put(hostdata->host);

    return 0;
    --- linux-4.15.0.orig/drivers/scsi/ibmvscsi_tgt/ibmvscsi_tgt.c
+++ linux-4.15.0/drivers/scsi/ibmvscsi_tgt/ibmvscsi_tgt.c
@@ -3465,11 +3465,10 @@
        vscsi->dds.window[LOCAL].liobn,
        vscsi->dds.window[REMOTE].liobn);

        -strcpy(vscsi->eye, "VSCSI ");
strncat(vscsi->eye, vdev->name, MAX_EYE);
+snprintf(vscsi->eye, sizeof(vscsi->eye), "VSCSI %s", vdev->name);

vscsi->dds.unit_id = vdev->unit_address;
-strncpy(vscsi->dds.partition_name, partition_name,
+strncpy(vscsi->dds.partition_name, partition_name,
sizeof(vscsi->dds.partition_name));
vscsi->dds.partition_num = partition_number;

--- linux-4.15.0.orig/drivers/scsi/ipr.c
+++ linux-4.15.0/drivers/scsi/ipr.c
@@ -3309,6 +3309,65 @@
LEAVE;
 }

+static void ipr_add_remove_thread(struct work_struct *work)
+{
+unsigned long lock_flags;
+struct ipr_resource_entry *res;
+struct scsi_device *sdev;
+struct ipr_ioa_cfg *ioa_cfg =
+container_of(work, struct ipr_ioa_cfg, scsi_add_work_q);
+u8 bus, target, lun;
+int did_work;
+
+ENTER;
+spin_lock_irqsave(ioa_cfg->host->host_lock, lock_flags);
+
+restart:
+do {
+did_work = 0;
+if (!ioa_cfg->hrrq[IPR_INIT_HRRQ].allow_cmds) {
+spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
+return;
+}
+
+list_for_each_entry(res, &ioa_cfg->used_res_q, queue) {
+if (res->del_from_ml && res->sdev) {
+did_work = 1;
+sdev = res->sdev;
+if (!scsi_device_get(sdev)) {
+if (!res->add_to_ml)
+list_move_tail(&res->queue, &ioa_cfg->free_res_q);
+else
+res->del_from_ml = 0;
+spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
+scsi_remove_device(sdev);
+scsi_device_put(sdev);
}
+spin_lock_irqsave(ioa_cfg->host->host_lock, lock_flags);
+
+break;
+
+}
+
+} while (did_work);
+
+list_for_each_entry(res, &ioa_cfg->used_res_q, queue) {
+    if (res->add_to_ml) {
+        bus = res->bus;
+        target = res->target;
+        lun = res->lun;
+        res->add_to_ml = 0;
+        spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
+        scsi_add_device(ioa_cfg->host, bus, target, lun);
+    }
+    spin_lock_irqsave(ioa_cfg->host->host_lock, lock_flags);
+    goto restart;
+    }
+    }
+
+ioa_cfg->scan_done = 1;
+spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
+kobject_uevent(&ioa_cfg->host->shost_dev.kobj, KOBJ_CHANGE);
+LEAVE;
+}
+
/**
 * ipr_worker_thread - Worker thread
 * @work: ioa config struct
 */
static void ipr_worker_thread(struct work_struct *work)
{
    unsigned long lock_flags;
    struct ipr_resource_entry *res;
    struct scsi_device *sdev;
    struct ipr_dump *dump;
    struct ipr_ioa_cfg *ioa_cfg =
        container_of(work, struct ipr_ioa_cfg, work_q);
    -u8 bus, target, lun;
    -int did_work;

    ENTER;
    spin_lock_irqsave(ioa_cfg->host->host_lock, lock_flags);
    @@ -3367,49 +3422,9 @@
    }
    }

    return;
}

-restart:
do {
  did_work = 0;
  if (!ioa_cfg->hrrq[IPR_INIT_HRRQ].allow_cmds) {
    spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
    return;
  }
  schedule_work(&ioa_cfg->scsi_add_work_q);
  list_for_each_entry(res, &ioa_cfg->used_res_q, queue) {
    if (res->del_from_ml && res->sdev) {
      did_work = 1;
      sdev = res->sdev;
      if (!scsi_device_get(sdev)) {
        if (!res->add_to_ml)
          list_move_tail(&res->queue, &ioa_cfg->free_res_q);
        else
          res->del_from_ml = 0;
        spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
        scsi_remove_device(sdev);
        spin_lock_irqsave(ioa_cfg->host->host_lock, lock_flags);
        goto restart;
      }
      break;
    }
  }
  break;
  list_for_each_entry(res, &ioa_cfg->used_res_q, queue) {
    if (res->add_to_ml) {
      bus = res->bus;
      target = res->target;
      lun = res->lun;
      res->add_to_ml = 0;
      spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
      scsi_add_device(ioa_cfg->host, bus, target, lun);
      spin_lock_irqsave(ioa_cfg->host->host_lock, lock_flags);
  }
  goto restart;
  }
  iova_cfg->scan_done = 1;
  spin_unlock_irqrestore(ioa_cfg->host->host_lock, lock_flags);
  kobject_uevent(&ioa_cfg->host->host_dev.kobj, KOBJ_CHANGE);
  LEAVE;
}
@@ -9937,6 +9952,7 @@
INIT_LIST_HEAD(&ioa_cfg->free_res_q);
INIT_LIST_HEAD(&ioa_cfg->used_res_q);
INIT_WORK(&ioa_cfg->work_q, ipr_worker_thread);
+INIT_WORK(&ioa_cfg->scsi_add_work_q, ipr_add_remove_thread);
init_waitqueue_head(&ioa_cfg->reset_wait_q);
init_waitqueue_head(&ioa_cfg->msi_wait_q);
init_waitqueue_head(&ioa_cfg->eeh_wait_q);
@@ -9946,6 +9962,7 @@
ioa_cfg->max_devs_supported = ipr_max_devs;

if (ioa_cfg->sis64) {
+host->max_channel = IPR_MAX_SIS64_BUSES;
host->max_id = IPR_MAX_SIS64_TARGETS_PER_BUS;
host->max_lun = IPR_MAX_SIS64_LUNS_PER_TARGET;
if (ipr_max_devs > IPR_MAX_SIS64_DEVS)
@@ -9954,6 +9971,7 @@
       + ((sizeof(struct ipr_config_table_entry64)
             * ioa_cfg->max_devs_supported));
    } else {
+host->max_channel = IPR_VSET_BUS;
host->max_id = IPR_MAX_NUM_TARGETS_PER_BUS;
host->max_lun = IPR_MAX_NUM_LUNS_PER_TARGET;
if (ipr_max_devs > IPR_MAX_PHYSICAL_DEVS)
@@ -9963,7 +9981,6 @@
       * ioa_cfg->max_devs_supported));
    }

-host->max_channel = IPR_VSET_BUS;
-host->unique_id = host->host_no;
-host->max_cmd_len = IPR_MAX_CDB_LEN;
-host->can_queue = ioa_cfg->max_cmds;
--- linux-4.15.0.orig/drivers/scsi/ipr.h
+++ linux-4.15.0/drivers/scsi/ipr.h
@@ -1306,6 +1306,7 @@
#define IPR_ARRAY_VIRTUAL_BUS			0x1
#define IPR_VSET_VIRTUAL_BUS			0x2
#define IPR_IOAFP_VIRTUAL_BUS			0x3
+#define IPR_MAX_SIS64_BUSES			0x4
#define IPR_GET_RES_PHYS_LOC(res) \
   (((res)->bus << 24) | ((res)->target << 8) | (res)->lun)
@@ -1568,6 +1569,7 @@
u8 saved_mode_page_len;

struct work_struct work_q;
+struct work_struct scsi_add_work_q;
struct workqueue_struct *reset_work_q;

wait_queue_head_t reset_wait_q;

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case START_STOP:
scb->scsi_cmd->result = DID_OK << 16;
+break;

case TEST_UNIT_READY:
case INQUIRY:
--- linux-4.15.0.orig/drivers/scsi/isci/host.c
+++ linux-4.15.0/drivers/scsi/isci/host.c
@@ -2717,9 +2717,9 @@
 * the task management request.
 * @task_request: the handle to the task request object to start.
 */
-enum sci_task_status sci_controller_start_task(struct isci_host *ihost,
-    struct isci_remote_device *idev,
-    struct isci_request *ireq)
+enum sci_status sci_controller_start_task(struct isci_host *ihost,
  struct isci_remote_device *idev,
  struct isci_request *ireq)
 { enum sci_status status;

@@ -2728,7 +2728,7 @@
  "%s: SCIC Controller starting task from invalid "
  "state\n",
  __func__);
-return SCI_TASK_FAILURE_INVALID_STATE;
+return SCI_FAILURE_INVALID_STATE;
 }

status = sci_remote_device_start_task(ihost, idev, ireq);
--- linux-4.15.0.orig/drivers/scsi/isci/init.c
+++ linux-4.15.0/drivers/scsi/isci/init.c
@@ -591,6 +591,13 @@
-enum sci_task_status sci_controller_start_task(
 +enum sci_status sci_controller_start_task(
  struct isci_host *ihost,
  struct isci_remote_device *idev,
  struct isci_request *ireq);
--- linux-4.15.0.orig/drivers/scsi/isci/init.c
+++ linux-4.15.0/drivers/scsi/isci/init.c
@@ -591,6 +591,13 @@

shost->max_lun = ~0;
shost->max_cmd_len = MAX_COMMAND_SIZE;

/* turn on DIF support */
+scsi_host_set_prot(shost,
+   SHOST_DIF_TYPE1_PROTECTION |
+   SHOST_DIF_TYPE2_PROTECTION |
+   SHOST_DIF_TYPE3_PROTECTION);
+scsi_host_set_guard(shost, SHOST_DIX_GUARD_CRC);

err = scsi_add_host(shost, &pdev->dev);
if (err)
goto err_host_alloc;

pci_info->hosts[i] = h;

err = isci_setup_interrupts(pdev);
--- linux-4.15.0.orig/drivers/scsi/isci/port_config.c
+++ linux-4.15.0/drivers/scsi/isci/port_config.c
@@ -291,7 +291,7 @@
    * Note: We have not moved the current phy_index so we will actually
    *       compare the starting phy with itself.
    *       This is expected and required to add the phy to the port. */
-while (phy_index < SCI_MAX_PHYS) {
+for (; phy_index < SCI_MAX_PHYS; phy_index++) {
    sci_phy_get_sas_address(&ihost->phys[phy_index],
    @ @ -311,7 +311,6 @@
    &ihost->phys[phy_index]);

    assigned_phy_mask |= (1 << phy_index);
-phy_index++:
    }

--- linux-4.15.0.orig/drivers/scsi/isci/request.c
+++ linux-4.15.0/drivers/scsi/isci/request.c
if (status == SCI_SUCCESS) {
    if (ireq->stp.rsp.status & ATA_ERR)
        status = SCI_IO_FAILURE_RESPONSE_VALID;
} else {
    status = SCI_IO_FAILURE_RESPONSE_VALID;
}
if (status != SCI_SUCCESS) {

    enum sci_task_status status = SCI_TASK_FAILURE;
    enum sci_status status = SCI_FAILURE;
    struct isci_request *ireq;
    int ret = TMF_RESP_FUNC_FAILED;
    unsigned long flags;

    /* start the TMF io. */
    status = sci_controller_start_task(ihost, idev, ireq);

    -if (status != SCI_TASK_SUCCESS) {
    +if (status != SCI_SUCCESS) {
        dev_dbg(&ihost->pdev->dev,
                "%s: start_io failed - status = 0x%x, request = %p\n",
                __func__,
           hardt Terror C:
+++ linux-4.15.0/drivers/scsi/iscsi_boot_sysfs.c
@@ -360,7 +360,7 @@
        boot_kobj->kobj.kset = boot_kset->kset;
    if (kobject_init_and_add(&boot_kobj->kobj, &iscsi_boot_ktype,
                                NULL, name, index)) {
        -kfree(boot_kobj);
        +kobject_put(&boot_kobj->kobj);
        return NULL;
    }
    boot_kobj->data = data;
-    --- linux-4.15.0.orig/drivers/scsi/iscsi_tcp.c
+    +++ linux-4.15.0/drivers/scsi/iscsi_tcp.c
    @ @ -37.6 +37.7 @@
    #include <linux/kfifo.h>
    #include <linux/scatterlist.h>
}
#include <linux/module.h>
+#include <linux/backing-dev.h>
#include <net/tcp.h>
#include <scsi/scsi_cmnd.h>
#include <scsi/scsi_device.h>
@@ -371,8 +372,16 @@
{
struct iscsi_conn *conn = task->conn;
unsigned int noreclaim_flag;
+struct iscsi_tcp_conn *tcp_conn = conn->dd_data;
+struct iscsi_sw_tcp_conn *tcp_sw_conn = tcp_conn->dd_data;
int rc = 0;

+if (!tcp_sw_conn->sock) {
+    iscsi_conn_putchar(KERN_ERR, conn, +    "Transport not bound to socket!\n");
+    return -EINVAL;
+}
+noreclaim_flag = memalloc_noreclaim_save();

while (iscsi_sw_tcp_xmit_qlen(conn)) {
@@ -797,7 +806,8 @@
return rc;
return iscsi_conn_get_addr_param((struct sockaddr_storage *)
-    &addr, param, buf);
+    &addr,
+    (enum iscsi_param)param, buf);
default:
    return iscsi_host_get_param(shost, param, buf);
}
@@ -880,6 +890,10 @@
static void iscsi_sw_tcp_session_destroy(struct iscsi_cls_session *cls_session)
{
struct Scsi_Host *shost = iscsi_session_to_shost(cls_session);
+struct iscsi_session *session = cls_session->dd_data;
+if (WARN_ON_ONCE(session->leadconn))
+    return;
iscsi_tcp_r2tpool_free(cls_session->dd_data);
iscsi_session_teardown(cls_session);
@@ -952,6 +966,13 @@
static int iscsi_sw_tcp_slave_configure(struct scsi_device *sdev)
{
+struct iscsi_sw_tcp_host *tcp_sw_host = iscsi_host_priv(sdev->host);
+struct iscsi_session *session = tcp_sw_host->session;
+struct iscsi_conn *conn = session->leadconn;
+
+if (conn->datadgst_en)
+sdev->request_queue->backing_dev_info->capabilities
+|= BDI_CAP_STABLE_WRITES;
blk_queue_bounce_limit(sdev->request_queue, BLK_BOUNCE_ANY);
blk_queue_dma_alignment(sdev->request_queue, 0);
return 0;
--- linux-4.15.0.orig/drivers/scsi/jazz_esp.c
+++ linux-4.15.0/drivers/scsi/jazz_esp.c
@@ -170,7 +170,9 @@

if (!esp->command_block)
  goto fail_unmap_regs;

-host->irq = platform_get_irq(dev, 0);
+host->irq = err = platform_get_irq(dev, 0);
+if (err < 0)
+  goto fail_unmap_command_block;
err = request_irq(host->irq, scsi_esp_intr, IRQF_SHARED, "ESP", esp);
if (err < 0)
  goto fail_unmap_command_block;
--- linux-4.15.0.orig/drivers/scsi/libfc/fc_disc.c
+++ linux-4.15.0/drivers/scsi/libfc/fc_disc.c
@@ -294,9 +294,11 @@

* Skip ports which were never discovered. These are the dNS port
* and ports which were created by PLOGI.
+ *
+ * We don't need to use the _rcu variant here as the rport list
+ * is protected by the disc mutex which is already held on entry.
*/
-rcu_read_lock();
-list_for_each_entry_rcu(rdata, &disc->rports, peers) {
+list_for_each_entry(rdata, &disc->rports, peers) {
  if (!kref_get_unless_zero(&rdata->kref))
    continue;
  if (rdata->disc_id) {
@@ -307,7 +309,6 @@
    kref_put(&rdata->kref, fc_rport_destroy);
  }
  -rcu_read_unlock();
-mutex_unlock(&disc->disc_mutex);
  disc->disc_callback(lport, event);
  mutex_lock(&disc->disc_mutex);
@@ -604,8 +605,12 @@
if (PTR_ERR(fp) == -EX_CLOSED)
goto out;
- if (IS_ERR(fp))
- goto redisc;
+ if (IS_ERR(fp)) {
+ mutex_lock(&disc->disc_mutex);
+ fc_disc_restart(disc);
+ mutex_unlock(&disc->disc_mutex);
+ goto out;
+ }

cp = fc_frame_payload_get(fp, sizeof(*cp));
if (!cp)
@@ -632,7 +637,7 @@
new_rdata->disc_id = disc->disc_id;
fcrport_login(new_rdata);
}
- goto out;
+ goto free_fp;
}
rdata->disc_id = disc->disc_id;
mutex_unlock(&rdata->rp_mutex);
@@ -649,6 +654,8 @@
fcdisk_restart(disc);
mutex_unlock(&disc->disc_mutex);
}
+ free_fp:
+ fc_frame_free(fp);
out:
kref_put(&rdata->kref, fc_rport_destroy);
}
--- linux-4.15.0.orig/drivers/scsi/libfc/fc_exch.c
+++ linux-4.15.0/drivers/scsi/libfc/fc_exch.c
@@ -1631,8 +1631,13 @@
rc = fc_exch_done_locked(ep);
WARN_ON(fc_seq_exch(sp) != ep);
spin_unlock_bh(&ep->ex_lock);
- if (!rc)
+ if (!rc) {
fc_exch_delete(ep);
+ } else {
+FC_EXCH_DBG(ep, "ep is completed already,"
+"hence skip calling the resp\n");
+ goto skip_resp;
+ }
}

/*
if (!fc_invoke_resp(ep, sp, fp))
    fc_frame_free(fp);

+skip_resp:
    fc_exch_release(ep);
    return;
rel:
@@ -1651,6 +1656,7 @@
          if (!fc_invoke_resp(ep, sp, fp))
          fc_frame_free(fp);
          +skip_resp:
@@ -1907,10 +1913,16 @@
          if (!rc) {
          fc_exch_delete(ep);
          +} else {
          +FC_EXCH_DBG(ep, "ep is completed already,"
          +"hence skip calling the resp\n");
          +goto skip_resp;
          +}
          fc_invoke_resp(ep, sp, ERR_PTR(-FC_EX_CLOSED));
          +skip_resp:
          fc_seq_set_resp(sp, NULL, ep->arg);
          fc_exch_release(ep);
      }  
@@ -2603,7 +2615,7 @@
          /* lport lock ? */
          if (!lport || lport->state == LPORT_ST_DISABLED) {
          -FC_LPORT_DBG(lport, "Receiving frames for an lport that 
          +FC_LIBFC_DBG("Receiving frames for an lport that 
          "has not been initialized correctly\n");
          fc_frame_free(fp);
          return;
          --- linux-4.15.0.orig/drivers/scsi/libfc/fc_lport.c
          +++ linux-4.15.0/drivers/scsi/libfc/fc_lport.c
          @@ -1743,14 +1743,14 @@
              if (!flp) {
              FC_LPORT DBG(lport, "FLOGI bad response\n");
              fc_lport_error(lport, fp);
          -goto err;
          +goto out;
          }
          flp = fc_frame_payload_get(fp, sizeof(*flp));
          if (!flp) {
              FC_LPORT_DBG(lport, "FLOGI not accepted or bad response\n");
          }
fc_lport_error(lport, fp);
-goto err;
+goto out;
}

mfs = ntohs(flp->fl_csp.sp_bb_data) &
@@ -1758,9 +1758,9 @@

if (mfs < FC_SP_MIN_MAX_PAYLOAD || mfs > FC_SP_MAX_MAX_PAYLOAD) {
   FC_LPORT_DBG(lport, "FLOGI bad mfs:%hu response,"
-"lport->mfs:%hu", mfs, lport->mfs);
+-"lport->mfs:%u", mfs, lport->mfs);
   fc_lport_error(lport, fp);
   -goto err;
   +goto out;
}

if (mfs <= lport->mfs) {
--- linux-4.15.0.orig/drivers/scsi/libfc/fc_rport.c
+++ linux-4.15.0/drivers/scsi/libfc/fc_rport.c
@@ -142,12 +142,17 @@

struct fc_rport_priv *fc_rport_create(struct fc_lport *lport, u32 port_id)
{
   struct fc_rport_priv *rdata;
+size_t rport_priv_size = sizeof(*rdata);
   rdata = fc_rport_lookup(lport, port_id);
   -if (rdata)
   +if (rdata) {
       +kref_put(&rdata->kref, fc_rport_destroy);
       return rdata;
     +}

   -rdata = kzalloc(sizeof(*rdata) + lport->rport_priv_size, GFP_KERNEL);
   +if (lport->rport_priv_size > 0)
     +rport_priv_size = lport->rport_priv_size;
     +rdata = kzalloc(rport_priv_size, GFP_KERNEL);
   if (!rdata)
     return NULL;
@@ -490,10 +495,11 @@

fc_rport_state_enter(rdata, RPORT_ST_DELETE);

- kref_get(&rdata->kref);
- if (rdata->event == RPORT_EV_NONE &&
- !queue_work(rport_event_queue, &rdata->event_work))
- kref_put(&rdata->kref, fc_rport_destroy);
+if (rdata->event == RPORT_EV_NONE) {
+kref_get(&rdata->kref);
+if (!queue_work(rport_event_queue, &rdata->event_work))
+kref_put(&rdata->kref, fc_rport_destroy);
+
+rdata->event = event;
}
@@ -1168,6 +1174,7 @@
resp_code = (pp->spp.spp_flags & FC_SPP_RESP_MASK);
FC_RPORT_DBG(rdata, "PRLI spp_flags = 0x%x spp_type 0x%x\n",
    pp->spp.spp_flags, pp->spp.spp_type);
+
    rdata->spp_type = pp->spp.spp_type;
    if (resp_code != FC_SPP_RESP_ACK) {
        if (resp_code == FC_SPP_RESP_CONF)
@@ -1188,11 +1195,13 @@*/
* Call prli provider if we should act as a target */
-prov = fc_passive_prov[rdata->spp_type];
-if (prov) {
    -memset(&temp_spp, 0, sizeof(temp_spp));
    -prov->prli(rdata, pp->prli.prli_spp_len,
        &pp->spp, &temp_spp);
+if (rdata->spp_type < FC_FC4_PROV_SIZE) {
    +prov = fc_passive_prov[rdata->spp_type];
    +if (prov) {
        +memset(&temp_spp, 0, sizeof(temp_spp));
        +prov->prli(rdata, pp->prli.prli_spp_len,
            &pp->spp, &temp_spp);
++
*/
* Check if the image pair could be established
--- linux-4.15.0.orig/drivers/scsi/libiscsi.c
+++ linux-4.15.0/drivers/scsi/libiscsi.c
@@ -284,11 +284,11 @@*/
if (opcode != ISCSI_OP_SCSI_DATA_OUT) {
    iscsi_conn_printk(KERN_INFO, conn,
        "task [op %x/%x itt "
+"task [op %x itt 
"0x%x/0x%x] "
"rejected:\n",
    - task->hdr->opcode, opcode,
    - task->itt, task->hdr_itt);
+ opcode, task->itt,
+ task->hdr_itt);
return -EACCES;
}
/*
@@ -297,10 +297,10 @@
*/
if (conn->session->fast_abort) {
  iscsi_conn_printk(KERN_INFO, conn,
- "task [op %x/%x itt "+
+ "task [op %x itt "
  "0x%x/0x%x] fast abort\n",
- task->hdr->opcode, opcode,
- task->itt, task->hdr_itt);
+ opcode, task->itt,
+ task->hdr_itt);
return -EACCES;
}
break;
@@ -571,8 +571,8 @@
if (conn->task == task)
conn->task = NULL;

- if (conn->ping_task == task)
- conn->ping_task = NULL;
+ if (READ_ONCE(conn->ping_task) == task)
+ WRITE_ONCE(conn->ping_task, NULL);

/* release get from queueing */
__iscsi_put_task(task);
@@ -781,6 +781,9 @@
    task->conn->session->age);
}

+ if (unlikely(READ_ONCE(conn->ping_task) == INVALID_SCSI_TASK))
+ WRITE_ONCE(conn->ping_task, NULL);
+
+ if (!ihost->workq) {
  if (iscsi_prep_mgmt_task(conn, task))
goto free_task;
@@ -988,8 +991,11 @@
    struct iscsi_nopout hdr;
    struct iscsi_task *task;

- if (!rhdr && conn->ping_task)
- return -EINVAL;
+ if (!rhdr) {
+ if (READ_ONCE(conn->ping_task))
+ return -EINVAL;
  "task [op %x/%x itt "
  "0x%x/0x%x] fast abort\n",
  - task->hdr->opcode, opcode,
  - task->itt, task->hdr_itt);
+ opcode, task->itt,
+ task->hdr_itt);
return -EACCES;
}
WRITE_ONCE(conn->ping_task, INVALID_SCSI_TASK);
+
memset(&hdr, 0, sizeof(struct iscsi_nopout));
hdr.opcode = ISCSI_OP_NOOP_OUT | ISCSI_OP_IMMEDIATE;
@@ -1004,11 +1010,12 @@
task = __iscsi_conn_send_pdu(conn, (struct iscsi_hdr *)&hdr, NULL, 0);
if (!task) {
+if (!rhdr)
+WRITE_ONCE(conn->ping_task, NULL);
iscsi_conn_printk(KERN_ERR, conn, "Could not send nopout\n");
return -EIO;
} else if (!rhdr) {
/* only track our nops */
-conn->ping_task = task;
conn->last_ping = jiffies;
}
@@ -1021,7 +1028,7 @@
struct iscsi_conn *conn = task->conn;
int rc = 0;

-if (conn->ping_task != task) {
+if (READ_ONCE(conn->ping_task) != task) {
/*
 * If this is not in response to one of our
 * nops then it must be from userspace.
@@ -1378,7 +1385,6 @@
 enum iscsi_err err)
{
 struct iscsi_conn *conn;
-struct device *dev;

spin_lock_bh(&session->frwd_lock);
conn = session->leadconn;
@@ -1387,10 +1393,8 @@
return;
}
-dev = get_device(&conn->cls_conn->dev);
+iscsi_get_conn(conn->cls_conn);
spin_unlock_bh(&session->frwd_lock);
-if (!dev)
- return;
/*
 * if the host is being removed bypass the connection
 * recovery initialization because we are going to kill

iscsi_conn_error_event(conn->cls_conn, err);
else
iscsi_conn_failure(conn, err);
-put_device(dev);
+iscsi_put_conn(conn->cls_conn);
}
EXPORT_SYMBOL_GPL(iscsi_session_failure);

if (test_bit(ISCSI_SUSPEND_BIT, &conn->suspend_tx))
return -ENODATA;

+spin_lock_bh(&conn->session->back_lock);
+if (conn->task == NULL) {
+spin_unlock_bh(&conn->session->back_lock);
+return -ENODATA;
+}
__iscsi_get_task(task);
+spin_unlock_bh(&conn->session->back_lock);
spin_unlock_bh(&conn->session->frwd_lock);
rc = conn->session->tt->xmit_task(task);
spin_lock_bh(&conn->session->frwd_lock);
rc = iscsi_prep_scsi_cmd_pdu(conn->task);
if (rc) {
-if (rc == -ENOMEM || rc == -EACCES) {
-spin_lock_bh(&conn->taskqueueunlock);
-list_add_tail(&conn->task->running,
- &conn->cmdqueue);
-conn->task = NULL;
-spin_unlock_bh(&conn->taskqueueunlock);
-goto done;
-} else
+if (rc == -ENOMEM || rc == -EACCES)
+fail_scsi_task(conn->task, DID_IMM_RETRY);
+else
fail_scsi_task(conn->task, DID_ABORT);
spin_lock_bh(&conn->taskqueueunlock);
continue;
}
switch (session->state) {
* case ISCSI_STATE_FAILED:
+ /*
+ * cmds should fail during shutdown, if the session
+ * state is bad, allowing completion to happen
+ */
*
if (unlikely(system_state != SYSTEM_RUNNING)) {
    reason = FAILURE_SESSION_FAILED;
    sc->result = DID_NO_CONNECT << 16;
    break;
}

}  

case ISCSI_STATE_IN_RECOVERY:
    reason = FAILURE_SESSION_IN_RECOVERY;
    sc->result = DID_IMM_RETRY << 16;
    @@ -1944,7 +1958,7 @@
 */
static int iscsi_has_ping_timed_out(struct iscsi_conn *conn)
{
    -if (conn->ping_task &&
    
    +if (READ_ONCE(conn->ping_task) &&
        time_before_eq(conn->last_recv + (conn->recv_timeout * HZ) +
                       (conn->ping_timeout * HZ), jiffies))
    return 1;
    @@ -1966,7 +1980,7 @@
    ISCSI_DBG_EH(session, "scsi cmd %p timedout\n", sc);

    -spin_lock(&session->frwd_lock);
    +spin_lock_bh(&session->frwd_lock);
    task = (struct iscsi_task *)sc->SCp.ptr;
    if (!task) {
        /*
        @@ -1979,6 +1993,19 @@
        if (session->state != ISCSI_STATE_LOGGED_IN) {
            /*
            + * During shutdown, if session is prematurely disconnected,
            + * recovery won't happen and there will be hung cmds. Not
            + * handling cmd would trigger EH, also bad in this case.
            + * Instead, handle cmd, allow completion to happen and let
            + * upper layer to deal with the result.
            + */
            +if (unlikely(system_state != SYSTEM_RUNNING)) {
                +sc->result = DID_NO_CONNECT << 16;
                +ISCSI_DBG_EH(session, "sc on shutdown, handled\n");
                +rc = BLK_EH_HANDLEd;
                +goto done;
                +}
            +/*
            */
            @@ -2066,7 +2093,7 @@
* Checking the transport already or nop from a cmd timeout still
* running
*/
-if (conn->ping_task) {
+if (READ_ONCE(conn->ping_task)) {
 task->have_checked_conn = true;
 rc = BLK_EH_RESET_TIMER;
goto done;
@@ -2080,9 +2107,9 @@
done:
if (task)
task->last_timeout = jiffies;
-spin_unlock(&session->frwd_lock);
+spin_unlock_bh(&session->frwd_lock);
ISCSI_DBG_EH(session, "return %s\n", rc == BLK_EH_RESET_TIMER ?
- "timer reset" : "nh");
+ "timer reset" : "shutdown or nh");
return rc;
}
EXPORT_SYMBOL_GPL(iscsi_eh_cmd_timed_out);
@@ -2392,8 +2419,8 @@
failed:
ISCSI_DBG_EH(session,
   "failing session reset: Could not log back into "
- "%s, %s [age %d]\n", session->targetname,
- conn->persistent_address, session->age);
+ "%s [age %d]\n", session->targetname,
+ session->age);
spin_unlock_bh(&session->frwd_lock);
mutex_unlock(&session->eh_mutex);
return FAILED;
@@ -3329,125 +3356,125 @@
switch(param) {
  case ISCSI_PARAM_FAST_ABORT:
- len = sprintf(buf, "%d\n", session->fast_abort);
+ len = sysfs_emit(buf, "%d\n", session->fast_abort);
 break;
  case ISCSI_PARAM_ABORT_TMO:
- len = sprintf(buf, "%d\n", session->abort_timeout);
+ len = sysfs_emit(buf, "%d\n", session->abort_timeout);
 break;
  case ISCSI_PARAM_LU_RESET_TMO:
- len = sprintf(buf, "%d\n", session->lu_reset_timeout);
+ len = sysfs_emit(buf, "%d\n", session->lu_reset_timeout);
 break;
  case ISCSI_PARAM_TGT_RESET_TMO:
- len = sprintf(buf, "%d\n", session->tgt_reset_timeout);
len = sysfs_emit(buf, "%d\n", session->tgt_reset_timeout);
break;
case ISCSI_PARAM_INITIAL_R2T_EN:
    -len = sprintf(buf, "%d\n", session->initial_r2t_en);
    +len = sysfs_emit(buf, "%d\n", session->initial_r2t_en);
    break;
case ISCSI_PARAM_MAX_R2T:
    -len = sprintf(buf, "%hu\n", session->max_r2t);
    +len = sysfs_emit(buf, "%hu\n", session->max_r2t);
    break;
case ISCSI_PARAM_IMM_DATA_EN:
    -len = sprintf(buf, "%d\n", session->imm_data_en);
    +len = sysfs_emit(buf, "%d\n", session->imm_data_en);
    break;
case ISCSI_PARAM_FIRST_BURST:
    -len = sprintf(buf, "%u\n", session->first_burst);
    +len = sysfs_emit(buf, "%u\n", session->first_burst);
    break;
case ISCSI_PARAM_MAX_BURST:
    -len = sprintf(buf, "%u\n", session->max_burst);
    +len = sysfs_emit(buf, "%u\n", session->max_burst);
    break;
case ISCSI_PARAM_PDU_INORDER_EN:
    -len = sprintf(buf, "%d\n", session->pdu_inorder_en);
    +len = sysfs_emit(buf, "%d\n", session->pdu_inorder_en);
    break;
case ISCSI_PARAM_DATASEQ_INORDER_EN:
    -len = sprintf(buf, "%d\n", session->dataseq_inorder_en);
    +len = sysfs_emit(buf, "%d\n", session->dataseq_inorder_en);
    break;
case ISCSI_PARAM_DEF_TASKMGMT_TMO:
    -len = sprintf(buf, "%d\n", session->def_taskmgmt_tmo);
    +len = sysfs_emit(buf, "%d\n", session->def_taskmgmt_tmo);
    break;
case ISCSI_PARAM_ERL:
    -len = sprintf(buf, "%d\n", session->erl);
    +len = sysfs_emit(buf, "%d\n", session->erl);
    break;
case ISCSI_PARAM_TARGET_NAME:
    -len = sprintf(buf, "%s\n", session->targetname);
    +len = sysfs_emit(buf, "%s\n", session->targetname);
    break;
case ISCSI_PARAM_TARGET_ALIAS:
    -len = sprintf(buf, "%s\n", session->targetalias);
    +len = sysfs_emit(buf, "%s\n", session->targetalias);
    break;
case ISCSI_PARAM_TPGT:
    -len = sprintf(buf, "%d\n", session->tpgt);

+len = sysfs_emit(buf, "%d\n", session->tpgt);
break;
case ISCSI_PARAM_USERNAME:
- len = sprintf(buf, "%s\n", session->username);
+ len = sysfs_emit(buf, "%s\n", session->username);
break;
case ISCSI_PARAM_USERNAME_IN:
- len = sprintf(buf, "%s\n", session->username_in);
+ len = sysfs_emit(buf, "%s\n", session->username_in);
break;
case ISCSI_PARAM_PASSWORD:
- len = sprintf(buf, "%s\n", session->password);
+ len = sysfs_emit(buf, "%s\n", session->password);
break;
case ISCSI_PARAM_PASSWORD_IN:
- len = sprintf(buf, "%s\n", session->password_in);
+ len = sysfs_emit(buf, "%s\n", session->password_in);
break;
case ISCSI_PARAM_IFACE_NAME:
- len = sprintf(buf, "%s\n", session->ifacename);
+ len = sysfs_emit(buf, "%s\n", session->ifacename);
break;
case ISCSI_PARAM_INITIATOR_NAME:
- len = sprintf(buf, "%s\n", session->initiatorname);
+ len = sysfs_emit(buf, "%s\n", session->initiatorname);
break;
case ISCSI_PARAM_BOOT_ROOT:
- len = sprintf(buf, "%s\n", session->boot_root);
+ len = sysfs_emit(buf, "%s\n", session->boot_root);
break;
case ISCSI_PARAM_BOOT_NIC:
- len = sprintf(buf, "%s\n", session->boot_nic);
+ len = sysfs_emit(buf, "%s\n", session->boot_nic);
break;
case ISCSI_PARAM_BOOT_TARGET:
- len = sprintf(buf, "%s\n", session->boot_target);
+ len = sysfs_emit(buf, "%s\n", session->boot_target);
break;
case ISCSI_PARAM_AUTO_SND_TGT_DISABLE:
- len = sprintf(buf, "%u\n", session->auto_snd_tgt_disable);
+ len = sysfs_emit(buf, "%u\n", session->auto_snd_tgt_disable);
break;
case ISCSI_PARAM_DISCOVERY_SESS:
- len = sprintf(buf, "%u\n", session->discovery_sess);
+ len = sysfs_emit(buf, "%u\n", session->discovery_sess);
break;
case ISCSI_PARAM_PORTAL_TYPE:
- len = sprintf(buf, "%s\n", session->portal_type);
+len = sysfs_emit(buf, "%s\n", session->portal_type);
break;
case ISCSI_PARAM_CHAP_AUTH_EN:
  -len = sprintf(buf, "%u\n", session->chap_auth_en);
  +len = sysfs_emit(buf, "%u\n", session->chap_auth_en);
break;
case ISCSI_PARAM_DISCOVERY_LOGOUT_EN:
  -len = sprintf(buf, "%u\n", session->discovery_logout_en);
  +len = sysfs_emit(buf, "%u\n", session->discovery_logout_en);
break;
case ISCSI_PARAM_BIDI_CHAP_EN:
  -len = sprintf(buf, "%u\n", session->bidi_chap_en);
  +len = sysfs_emit(buf, "%u\n", session->bidi_chap_en);
break;
case ISCSI_PARAM_DISCOVERY_AUTH_OPTIONAL:
  -len = sprintf(buf, "%u\n", session->discovery_auth_optional);
  +len = sysfs_emit(buf, "%u\n", session->discovery_auth_optional);
break;
case ISCSI_PARAM_DEF_TIME2WAIT:
  -len = sprintf(buf, "%d\n", session->time2wait);
  +len = sysfs_emit(buf, "%d\n", session->time2wait);
break;
case ISCSI_PARAM_DEF_TIME2RETAIN:
  -len = sprintf(buf, "%d\n", session->time2retain);
  +len = sysfs_emit(buf, "%d\n", session->time2retain);
break;
case ISCSI_PARAM_TSID:
  -len = sprintf(buf, "%u\n", session->tsid);
  +len = sysfs_emit(buf, "%u\n", session->tsid);
break;
case ISCSI_PARAM_ISID:
  -len = sprintf(buf, "%02x%02x%02x%02x%02x%02x\n",
                session->isid[0], session->isid[1],
                session->isid[2], session->isid[3],
                session->isid[4], session->isid[5]);
break;
case ISCSI_PARAM_DISCOVERY_PARENT_IDX:
  -len = sprintf(buf, "%u\n", session->discovery_parent_idx);
  +len = sysfs_emit(buf, "%u\n", session->discovery_parent_idx);
break;
case ISCSI_PARAM_DISCOVERY_PARENT_TYPE:
  if (session->discovery_parent_type)
    -len = sprintf(buf, "%s\n",
                  session->discovery_parent_type);
  +len = sysfs_emit(buf, "%s\n",
                   session->discovery_parent_type);
  else
    -len = sprintf(buf, "\n");
len = sysfs_emit(buf, "\n");
break;
default:
return -ENOSYS;
@@ -3479,16 +3506,16 @@
case ISCSI_PARAM_CONN_ADDRESS:
case ISCSI_HOST_PARAM_IPADDRESS:
    if (sin)
        -len = sprintf(buf, "%pI4\n", &sin->sin_addr.s_addr);
        +len = sysfs_emit(buf, "%pI4\n", &sin->sin_addr.s_addr);
    else
        -len = sprintf(buf, "%pI6\n", &sin6->sin6_addr);
        +len = sysfs_emit(buf, "%pI6\n", &sin6->sin6_addr);
    break;
case ISCSI_PARAM_CONN_PORT:
case ISCSI_PARAM_LOCAL_PORT:
    if (sin)
        -len = sprintf(buf, "%hu\n", be16_to_cpu(sin->sin_port));
        +len = sysfs_emit(buf, "%hu\n", be16_to_cpu(sin->sin_port));
    else
        -len = sprintf(buf, "%hu\n",

        +len = sysfs_emit(buf, "%hu\n",

        be16_to_cpu(sin6->sin6_port));
    break;
default:
@@ -3507,88 +3534,88 @@
switch(param) {
case ISCSI_PARAM_PING_TMO:
    -len = sprintf(buf, "%u\n", conn->ping_timeout);
    +len = sysfs_emit(buf, "%u\n", conn->ping_timeout);
    break;
case ISCSI_PARAM_RECV_TMO:
    -len = sprintf(buf, "%u\n", conn->recv_timeout);
    +len = sysfs_emit(buf, "%u\n", conn->recv_timeout);
    break;
case ISCSI_PARAM_MAX_RECV_DLENGTH:
    -len = sprintf(buf, "%u\n", conn->max_recv_dlength);
    +len = sysfs_emit(buf, "%u\n", conn->max_recv_dlength);
    break;
case ISCSI_PARAM_MAX_XMIT_DLENGTH:
    -len = sprintf(buf, "%u\n", conn->max_xmit_dlength);
    +len = sysfs_emit(buf, "%u\n", conn->max_xmit_dlength);
    break;
case ISCSI_PARAM_HDRDGST_EN:
    -len = sprintf(buf, "%d\n", conn->hdrdgst_en);
    +len = sysfs_emit(buf, "%d\n", conn->hdrdgst_en);
    break;
}
case ISCSI_PARAM_DATADGST_EN:
  -len = sprintf(buf, "%d\n", conn->datadgst_en);
+  len = sysfs_emit(buf, "%d\n", conn->datadgst_en);
  break;

case ISCSI_PARAM_IFMARKER_EN:
  -len = sprintf(buf, "%d\n", conn->ifmarker_en);
+  len = sysfs_emit(buf, "%d\n", conn->ifmarker_en);
  break;

case ISCSI_PARAM_OFMARKER_EN:
  -len = sprintf(buf, "%d\n", conn->ofmarker_en);
+  len = sysfs_emit(buf, "%d\n", conn->ofmarker_en);
  break;

case ISCSI_PARAM_EXP_STATSN:
  -len = sprintf(buf, "%u\n", conn->exp_statsn);
+  len = sysfs_emit(buf, "%u\n", conn->exp_statsn);
  break;

case ISCSI_PARAM_PERSISTENT_PORT:
  -len = sprintf(buf, "%d\n", conn->persistent_port);
+  len = sysfs_emit(buf, "%d\n", conn->persistent_port);
  break;

case ISCSI_PARAM_PERSISTENT_ADDRESS:
  -len = sprintf(buf, "%s\n", conn->persistent_address);
+  len = sysfs_emit(buf, "%s\n", conn->persistent_address);
  break;

case ISCSI_PARAM_STATSN:
  -len = sprintf(buf, "%u\n", conn->statsn);
+  len = sysfs_emit(buf, "%u\n", conn->statsn);
  break;

case ISCSI_PARAM_MAX_SEGMENT_SIZE:
  -len = sprintf(buf, "%u\n", conn->max_segment_size);
+  len = sysfs_emit(buf, "%u\n", conn->max_segment_size);
  break;

case ISCSI_PARAM_KEEPALIVE_TMO:
  -len = sprintf(buf, "%u\n", conn->keepalive_tmo);
+  len = sysfs_emit(buf, "%u\n", conn->keepalive_tmo);
  break;

case ISCSI_PARAM_LOCAL_PORT:
  -len = sprintf(buf, "%u\n", conn->local_port);
+  len = sysfs_emit(buf, "%u\n", conn->local_port);
  break;

case ISCSI_PARAM_TCP_TIMESTAMP_STAT:
  -len = sprintf(buf, "%u\n", conn->tcp_timestamp_stat);
+  len = sysfs_emit(buf, "%u\n", conn->tcp_timestamp_stat);
  break;

case ISCSI_PARAM_TCP_NAGLE_DISABLE:
  -len = sprintf(buf, "%u\n", conn->tcp_nagle_disable);
+  len = sysfs_emit(buf, "%u\n", conn->tcp_nagle_disable);
  break;
case ISCSI_PARAM_TCP_WSF_DISABLE:
- len = sprintf(buf, "%u\n", conn->tcp_wsf_disable);
+ len = sysfs_emit(buf, "%u\n", conn->tcp_wsf_disable);
 break;

case ISCSI_PARAM_TCP_TIMER_SCALE:
- len = sprintf(buf, "%u\n", conn->tcp_timer_scale);
+ len = sysfs_emit(buf, "%u\n", conn->tcp_timer_scale);
 break;

case ISCSI_PARAM_TCP_TIMESTAMP_EN:
- len = sprintf(buf, "%u\n", conn->tcp_timestamp_en);
+ len = sysfs_emit(buf, "%u\n", conn->tcp_timestamp_en);
 break;

case ISCSI_PARAM_IP_FRAGMENT_DISABLE:
- len = sprintf(buf, "%u\n", conn->fragment_disable);
+ len = sysfs_emit(buf, "%u\n", conn->fragment_disable);
 break;

case ISCSI_PARAM_IPV4_TOS:
- len = sprintf(buf, "%u\n", conn->ipv4_tos);
+ len = sysfs_emit(buf, "%u\n", conn->ipv4_tos);
 break;

case ISCSI_PARAM_IPV6_TC:
- len = sprintf(buf, "%u\n", conn->ipv6_traffic_class);
+ len = sysfs_emit(buf, "%u\n", conn->ipv6_traffic_class);
 break;

case ISCSI_PARAM_IPV6_FLOW_LABEL:
- len = sprintf(buf, "%u\n", conn->ipv6_flow_label);
+ len = sysfs_emit(buf, "%u\n", conn->ipv6_flow_label);
 break;

case ISCSI_PARAM_IS_FW_ASSIGNED_IPV6:
- len = sprintf(buf, "%u\n", conn->is_fw_assigned_ipv6);
+ len = sysfs_emit(buf, "%u\n", conn->is_fw_assigned_ipv6);
 break;

case ISCSI_PARAM_TCP_XMIT_WSF:
- len = sprintf(buf, "%u\n", conn->tcp_xmit_wsf);
+ len = sysfs_emit(buf, "%u\n", conn->tcp_xmit_wsf);
 break;

case ISCSI_PARAM_TCP_RECV_WSF:
- len = sprintf(buf, "%u\n", conn->tcp_recv_wsf);
+ len = sysfs_emit(buf, "%u\n", conn->tcp_recv_wsf);
 break;

case ISCSI_PARAM_LOCAL_IPADDR:
- len = sprintf(buf, "%s\n", conn->local_ipaddr);
+ len = sysfs_emit(buf, "%s\n", conn->local_ipaddr);
 break;
 default:
 return -ENOSYS;
@@ -3606,13 +3633,13 @@
switch (param) {
  case ISCSI_HOST_PARAM_NETDEV_NAME:
    len = sprintf(buf, "%s\n", ihost->netdev);
    break;
  case ISCSI_HOST_PARAM_HWADDRESS:
    len = sprintf(buf, "%s\n", ihost->hwaddress);
    break;
  case ISCSI_HOST_PARAM_INITIATOR_NAME:
    len = sprintf(buf, "%s\n", ihost->initiatorname);
    break;
  default:
    return -ENOSYS;
  }

memcpy(task->ata_task.atapi_packet, qc->cdb, qc->dev->cdb_len);
task->total_xfer_len = qc->nbytes;
task->num_scatter = qc->n_elem;
+task->data_dir = qc->dma_dir;
  } else if (qc->tf.protocol == ATA_PROT_NODATA) {
    +task->data_dir = DMA_NONE;
  } else {
    for_each_sg(qc->sg, sg, qc->n_elem, si)
      xfer += sg_dma_len(sg);
      }
  }

  task->total_xfer_len = xfer;
task->num_scatter = si;
  +task->data_dir = qc->dma_dir;
}
-
  -task->data_dir = qc->dma_dir;
task->scatter = qc->sg;
task->ata_task.retry_count = 1;
task->task_state_flags = SAS_TASK_STATE_PENDING;
  @ @ -642,7 +644,7 @@
/* if libata could not bring the link up, don't surface
 * the device */
  -if (ata_dev_disabled(sas_to_ata_dev(dev)))
+if (!ata_dev_enabled(sas_to_ata_dev(dev)))
    sas_fail_probe(dev, __func__, -ENODEV);
  }
  @ @ -730,7 +732,6 @@
  if (res)
return res;

-sas_discover_event(dev->port, DISCE_PROBE);
return 0;
}

--- linux-4.15.0.orig/drivers/scsi/libsas/sas_discover.c
+++ linux-4.15.0/drivers/scsi/libsas/sas_discover.c
@@ -97,12 +97,21 @@
else
    dev->dev_type = SAS_SATA_DEV;
    dev->tproto = SAS_PROTOCOL_SATA;
-} else {
+} else if (port->oob_mode == SAS_OOB_MODE) {
    struct sas_identify_frame *id =
    (struct sas_identify_frame *) dev->frame_rcvd;
    dev->dev_type = id->dev_type;
    dev->tproto = id->target_bits;
    dev->iproto = id->initiator_bits;
} else {
+/* If the oob mode is OOB_NOT_CONNECTED, the port is
+ disconnected due to race with PHY down. We cannot
+ continue to discover this port
+ */
+sas_put_device(dev);
+pr_warn("Port %016llx is disconnected when discovering\n", SAS_ADDR(port->attached_sas_addr));
+return -ENODEV;
}
sas_init_dev(dev);
@@ -212,13 +221,9 @@
}

static void sas_probe_devices(struct work_struct *work)
+static void sas_probe_devices(struct asd_sas_port *port)
{
    struct domain_device *dev, *n;
-    struct sas_discovery_event *ev = to_sas_discovery_event(work);
-    struct asd_sas_port *port = ev->port;
-
-    clear_bit(DISCE_PROBE, &port->disc.pending);

    /* devices must be domain members before link recovery and probe */
    list_for_each_entry(dev, &port->disco_list, disco_list_node) {
        @ @ -294,7 +299,6 @ @
        res = sas_notify_lldd_dev_found(dev);
if (res)
    return res;
-sas_discover_event(dev->port, DISCE_PROBE);

return 0;
}
@@ -353,13 +357,9 @@
sas_put_device(dev);
}

-static void sas_destruct_devices(struct work_struct *work)
+void sas_destruct_devices(struct asd_sas_port *port)
{
    struct domain_device *dev, *n;
-    struct sas_discovery_event *ev = to_sas_discovery_event(work);
-    struct asd_sas_port *port = ev->port;
-    -
-    clear_bit(DISCE_DESTRUCT, &port->disc.pending);

    list_for_each_entry_safe(dev, n, &port->destroy_list, disco_list_node) {
        list_del_init(&dev->disco_list_node);
    }
}

+static void sas_destruct_ports(struct asd_sas_port *port)
+{
+    struct sas_port *sas_port, *p;
+    +
+    list_for_each_entry_safe(sas_port, p, &port->sas_port_del_list, del_list) {
+        list_del_init(&sas_port->del_list);
+        sas_port_delete(sas_port);
+    }
+}
+
void sas_unregister_dev(struct asd_sas_port *port, struct domain_device *dev)
{
    if (!test_bit(SAS_DEV_DESTROY, &dev->state) &&
@@ -384,7 +394,6 @@
        if (!test_and_set_bit(SAS_DEV_DESTROY, &dev->state)) {
            sas_rphy_unlink(dev->rphy);
            list_move_tail(&dev->disco_list_node, &port->destroy_list);
-        sas_discover_event(dev->port, DISCE_DESTRUCT);
        }
    }
@@ -490,6 +499,8 @@
    port->port_dev = NULL;
+sas_probe_devices(port);
+
SAS_DPRINTK("DONE DISCOVERY on port %d, pid:%d, result:%d\n", port->id,
    task_pid_nr(current), error);
}
@@ -523,6 +534,10 @@
    port->id, task_pid_nr(current), res);
 out:
 mutex_unlock(&ha->disco_mutex);
+
+sas_destruct_devices(port);
+sas_destruct_ports(port);
+sas_probe_devices(port);
}

/* ---------- Events ---------- */
@@ -534,7 +549,7 @@
    /* workqueue, or known to be submitted from a context that is
    * not racing against draining
    */
-scsi_queue_work(ha->core.shost, &sw->work);
+queue_work(ha->disco_q, &sw->work);
}

static void sas_chain_event(int event, unsigned long *pending,
@@ -578,10 +593,8 @@
 int sas_queue_work(struct sas_ha_struct *ha, struct sas_work *sw)
 {
    int rc = 0;
+    /* it's added to the defer_q when draining so return succeed */
+    int rc = 1;
if (!test_bit(SAS_HA_REGISTERED, &ha->state))
return 0;
@@ -39,24 +40,20 @@
if (list_empty(&sw->drain_node))
    list_add_tail(&sw->drain_node, &ha->defer_q);
} else
-    rc = scsi_queue_work(ha->core.shost, &sw->work);
+    rc = queue_work(ha->event_q, &sw->work);
return rc;
}

-static int sas_queue_event(int event, unsigned long *pending,
-       struct sas_work *work,
+static int sas_queue_event(int event, struct sas_work *work,
     struct sas_ha_struct *ha)
{
-    int rc = 0;
+    unsigned long flags;
+    int rc;

-    if (!test_and_set_bit(event, pending)) {
-        unsigned long flags;
-        spin_lock_irqsave(&ha->lock, flags);
-        rc = sas_queue_work(ha, work);
-        spin_unlock_irqrestore(&ha->lock, flags);
-    }
+    spin_lock_irqsave(&ha->lock, flags);
+    rc = sas_queue_work(ha, work);
+    spin_unlock_irqrestore(&ha->lock, flags);

    return rc;
} 
@@ -64,21 +61,25 @@

void __sas_drain_work(struct sas_ha_struct *ha)
{
-    struct workqueue_struct *wq = ha->core.shost->work_q;
+    int ret;

    set_bit(SAS_HA_DRAINING, &ha->state);
    /* flush submitters */
    spin_lock_irq(&ha->lock);
    spin_unlock_irq(&ha->lock);

    -drain_workqueue(wq);
+drain_workqueue(ha->event_q);
+drain_workqueue(ha->disco_q);

spin_lock_irq(&ha->lock);
clear_bit(SAS_HA_DRAINING, &ha->state);
list_for_each_entry_safe(sw, _sw, &ha->defer_q, drain_node) {
  list_del_init(&sw->drain_node);
  sas_queue_work(ha, sw);
  if (ret != 1)
    sas_free_event(to_asd_sas_event(&sw->work));
+}
spin_unlock_irq(&ha->lock);
}
@@ -115,33 +116,78 @@
struct asd_sas_port *port = ha->sas_port[i];
const int ev = DISCE_REVALIDATE_DOMAIN;
struct sas_discovery *d = &port->disc;
+struct asd_sas_phy *sas_phy;

if (!test_and_clear_bit(ev, &d->pending))
  continue;

-sas_queue_event(ev, &d->pending, &d->disc_work[ev].work, ha);
+if (list_empty(&port->phy_list))
+  continue;
+
+sas_phy = container_of(port->phy_list.next, struct asd_sas_phy,
+  port_phy_el);
+ha->notify_port_event(sas_phy, PORTE_BROADCAST_RCVD);
} mutex_unlock(&ha->disco_mutex);
}

+
+static void sas_port_event_worker(struct work_struct *work)
+{
+  struct asd_sas_event *ev = to_asd_sas_event(work);
+  +sas_port_event_fns[ev->event](work);
+  sas_free_event(ev); 
+}
+
+static void sas_phy_event_worker(struct work_struct *work)
+{
+  struct asd_sas_event *ev = to_asd_sas_event(work);
+  +
static int sas_notify_port_event(struct asd_sas_phy *phy, enum port_event event) {
    struct asd_sas_event *ev;
    struct sas_ha_struct *ha = phy->ha;
    int ret;

    BUG_ON(event >= PORT_NUM_EVENTS);

    return sas_queue_event(event, &phy->port_events_pending,
                           &phy->port_events[event].work, ha);
    ev = sas_alloc_event(phy);
    if (!ev)
        return -ENOMEM;
    INIT_SAS_EVENT(ev, sas_port_event_worker, phy, event);
    ret = sas_queue_event(event, &ev->work, ha);
    if (ret != 1)
        sas_free_event(ev);
    return ret;
}

int sas_notify_phy_event(struct asd_sas_phy *phy, enum phy_event event) {
    struct asd_sas_event *ev;
    struct sas_ha_struct *ha = phy->ha;
    int ret;

    BUG_ON(event >= PHY_NUM_EVENTS);

    return sas_queue_event(event, &phy->phy_events_pending,
                           &phy->phy_events[event].work, ha);
    ev = sas_alloc_event(phy);
    if (!ev)
        return -ENOMEM;
    INIT_SAS_EVENT(ev, sas_phy_event_worker, phy, event);
    ret = sas_queue_event(event, &ev->work, ha);
    if (ret != 1)
        sas_free_event(ev);
    return ret;
int sas_init_events(struct sas_ha_struct *sas_ha)
--- linux-4.15.0.orig/drivers/scsi/libsas/sas_expander.c
+++ linux-4.15.0/drivers/scsi/libsas/sas_expander.c
@@ -48,17 +48,16 @@
unsigned long flags;
spin_lock_irqsave(&task->task_state_lock, flags);
-if (!((task->task_state_flags & SAS_TASK_STATE_DONE))
+if (!((task->task_state_flags & SAS_TASK_STATE_DONE)) {
    task->task_state_flags |= SAS_TASK_STATE_ABORTED;
+    complete(&task->slow_task->completion);
+}
spin_unlock_irqrestore(&task->task_state_lock, flags);
-
-complete(&task->slow_task->completion);
}

static void smp_task_done(struct sas_task *task)
{
-if (!del_timer(&task->slow_task->timer))
-    return;
+    del_timer(&task->slow_task->timer);
    complete(&task->slow_task->completion);
}

phy->phy->minimum_linkrate = dr->pmin_linkrate;
phy->phy->maximum_linkrate = dr->pmax_linkrate;
phy->phy->negotiated_linkrate = phy->linkrate;
+phy->phy->enabled = (phy->linkrate != SAS_PHY_DISABLED);

skip:
if (new_phy)
@@ -293,6 +292,7 @@
	phy->phy->minimum_linkrate = dr->pmin_linkrate;
	phy->phy->maximum_linkrate = dr->pmax_linkrate;
	phy->phy->negotiated_linkrate = phy->linkrate;
+phy->phy->enabled = (phy->linkrate != SAS_PHY_DISABLED);

res = smp_execute_task(dev, pc_req, PC_REQ_SIZE, pc_resp,PC_RESP_SIZE);
-+if (res) {
+    pr_err("ex %016llx phy%02d PHY control failed: %d\n",
+       SAS_ADDR(dev->sas_addr), phy_id, res);
+}
else if (pc_resp[2] != SMP_RESP_FUNC_ACC) {
    pr_err("ex %016llx phy%02d PHY control failed: function result 0x%x\n",
+       SAS_ADDR(dev->sas_addr), phy_id, pc_resp[2]);
+res = pc_resp[2];
+}
kfree(pc_resp);
kfree(pc_req);
return res;
@@ -686,7 +693,7 @@
res = smp_execute_task(dev, req, RPEL_REQ_SIZE,
    resp, RPEL_RESP_SIZE);

-if (!res)
+if (res)
goto out;

phy->invalid_dword_count = scsi_to_u32(&resp[12]);
@@ -695,6 +702,7 @@
phy->phy_reset_problem_count = scsi_to_u32(&resp[24]);

out:
+kfree(req);
    kfree(resp);
    return res;
@@ -816,6 +824,26 @@

#endif CONFIG_SCSI_SAS_ATA
if ((phy->attached_tproto & SAS_PROTOCOL_STP) || phy->attached_sata_dev) {
+if (child->linkrate > parent->min_linkrate) {
+    struct sas_phy_linkrates rates = {
+        .maximum_linkrate = parent->min_linkrate,
+        .minimum_linkrate = parent->min_linkrate,
+    };
+    int ret;
+    +pr_notice("ex %016llx phy%02d SATA device linkrate > min pathway connection rate, attempting to lower device
+    linkrate\n", +SAS_ADDR(child->sas_addr), phy_id);
+    ret = sas_smp_phy_control(parent, phy_id, +PHY_FUNC_LINK_RESET, &rates);
+    if (ret) {
+        pr_err("ex %016llx phy%02d SATA device could not set linkrate (%d)\n", +SAS_ADDR(child->sas_addr), phy_id, ret);
+        goto out_free;
+    }
+    pr_notice("ex %016llx phy%02d SATA device set linkrate successfully\n", +SAS_ADDR(child->sas_addr), phy_id);
+    child->linkrate = child->min_linkrate;
+}
    res = sas_get_ata_info(child, phy);
    if (res)
        goto out_free;
rphy = sas_end_device_alloc(phy->port);
if (!rphy)
    goto out_free;
+rphy->identify.phy_identifier = phy_id;

child->rphy = rphy;
get_device(&rphy->dev);

child->rphy = rphy;
get_device(&rphy->dev);
+rphy->identify.phy_identifier = phy_id;
sas_fill_in_rphy(child, rphy);

list_add_tail(&child->disco_list_node, &parent->port->disco_list);

list_del(&child->dev_list_node);
spin_unlock_irq(&parent->port->dev_list_lock);
sas_put_device(child);
+sas_port_delete(phy->port);
+phy->port = NULL;
return NULL;
}
list_add_tail(&child->siblings, &parent->ex_dev.children);

if ((SAS_ADDR(sas_addr) == 0) || (res == -ECOMM)) {
    phy->phy_state = PHY_EMPTY;
sas_unregister_devs_sas_addr(dev, phy_id, last);
    /*
     * Even though the PHY is empty, for convenience we discover
     * the PHY to update the PHY info, like negotiated linkrate.
     */
    +sas_ex_phy_discover(dev, phy_id);
    return res;
} else if (SAS_ADDR(sas_addr) == SAS_ADDR(phy->attached_sas_addr) &&
    dev_type_flutter(type, phy->attached_dev_type)) {
    @ @ -2050,14 +2088,11 @@

return res;
}

/* delete the old link */
-if (SAS_ADDR(phy->attached_sas_addr) &&
  - SAS_ADDR(sas_addr) != SAS_ADDR(phy->attached_sas_addr)) {
  -SAS_DPRINTK("ex %016llx phy 0x%x replace %016llx\n",
  - SAS_ADDR(dev->sas_addr), phy_id,
  - SAS_ADDR(phy->attached_sas_addr));
  -sas_unregister_devs_sas_addr(dev, phy_id, last);
-}
+/* we always have to delete the old device when we went here */
+SAS_DPRINTK("ex %016llx phy 0x%x replace %016llx\n",
  + SAS_ADDR(dev->sas_addr), phy_id,
  + SAS_ADDR(phy->attached_sas_addr));
+sas_unregister_devs_sas_addr(dev, phy_id, last);
return sas_discover_new(dev, phy_id);
}
@@ -2122,7 +2157,7 @@
struct domain_device *dev = NULL;

res = sas_find_bcast_dev(port_dev, &dev);
-while (res == 0 && dev) {
+if (res == 0 && dev) {
  struct expander_device *ex = &dev->ex_dev;
  int i = 0, phy_id;

 @@ -2134,9 +2169,6 @@
res = sas_rediscover(dev, phy_id);
  i = phy_id + 1;
 } while (i < ex->num_phys);
-
-dev = NULL;
-res = sas_find_bcast_dev(port_dev, &dev);
} return res;
}
--- linux-4.15.0.orig/drivers/scsi/libsas/sas_init.c
+++ linux-4.15.0/drivers/scsi/libsas/sas_init.c
@@ -39,6 +39,7 @@
#include "./*/scsi_sas_internal.h"

static struct kmem_cache *sas_task_cache;
+static struct kmem_cache *sas_event_cache;

struct sas_task *sas_alloc_task(gfp_t flags)
{
int sas_register_ha(struct sas_ha_struct *sas_ha) {
    char name[64];
    int error = 0;

    mutex_init(&sas_ha->disco_mutex);
    INIT_LIST_HEAD(&sas_ha->defer_q);
    INIT_LIST_HEAD(&sas_ha->eh_dev_q);

    sas_ha->event_thres = SAS_PHY_SHUTDOWN_THRES;
    if (error) {
        printk(KERN_NOTICE "couldn't register sas phys:%d\n", error);
        goto Undo_ports;
    }

    error = -ENOMEM;
    snprintf(name, sizeof(name), "%s_event_q", dev_name(sas_ha->dev));
    sas_ha->event_q = create_singlethread_workqueue(name);
    if (!sas_ha->event_q)
        goto Undo_ports;

    snprintf(name, sizeof(name), "%s_disco_q", dev_name(sas_ha->dev));
    sas_ha->disco_q = create_singlethread_workqueue(name);
    if (!sas_ha->disco_q)
        goto Undo_event_q;

    INIT_LIST_HEAD(&sas_ha->eh_done_q);
    INIT_LIST_HEAD(&sas_ha->eh_ata_q);

    return 0;

    Undo_event_q:
    destroy_workqueue(sas_ha->event_q);
    Undo_ports:
    sas_unregister_ports(sas_ha);
    Undo_phys:
    __sas_drain_work(sas_ha);
    mutex_unlock(&sas_ha->drain_mutex);

    destroy_workqueue(sas_ha->disco_q);
    destroy_workqueue(sas_ha->event_q);
return 0;
}

struct asd_sas_phy *phy = ha->sas_phy[i];

memset(phy->attached_sas_addr, 0, SAS_ADDR_SIZE);
phy->port_events_pending = 0;
phy->phy_events_pending = 0;
phy->frame_rcvd_size = 0;
}
}

static inline ssize_t phy_event_threshold_show(struct device *dev, struct device_attribute *attr, char *buf) {
    struct Scsi_Host *shost = class_to_shost(dev);
    struct sas_ha_struct *sha = SHOST_TO_SAS_HA(shost);
    +
    +return scnprintf(buf, PAGE_SIZE, "%u\n", sha->event_thres);
    +}
    +
    +static inline ssize_t phy_event_threshold_store(struct device *dev, struct device_attribute *attr, const char *buf, size_t count) {
        struct Scsi_Host *shost = class_to_shost(dev);
        struct sas_ha_struct *sha = SHOST_TO_SAS_HA(shost);
        +sha->event_thres = simple_strtol(buf, NULL, 10);
        +/* threshold cannot be set too small */
        +if (sha->event_thres < 32)
            +sha->event_thres = 32;
        +
        +return count;
        +}
        +
        +DEVICE_ATTR(phy_event_threshold, S_IRUGO|S_IWUSR, phy_event_threshold_show, phy_event_threshold_store);
        +EXPORT_SYMBOL_GPL(dev_attr_phy_event_threshold);
struct scsi_transport_template *
sas_domain_attach_transport(struct sas_domain_function_template *dft)
{
    // -555,20 +605,71 //
}
EXPORT_SYMBOL_GPL(sas_domain_attach_transport);

+struct asd_sas_event *sas_alloc_event(struct asd_sas_phy *phy)
+{
+    struct asd_sas_event *event;
+    GFP_T flags = in_interrupt() ? GFP_ATOMIC : GFP_KERNEL;
+    struct sas_ha_struct *sas_ha = phy->ha;
+    struct sas_internal *i =
+        to_sas_internal(sas_ha->core.shost->transport);
+    +event = kmem_cache_zalloc(sas_event_cache, flags);
+    +if (!event)
+        +return NULL;
+    +atomic_inc(&phy->event_nr);
+    +
+    +if (atomic_read(&phy->event_nr) > phy->ha->event_thres) {
+        +if (i->dft->lldd_control_phy) {
+            +if (cmpxchg(&phy->in_shutdown, 0, 1) == 0) {
+                +sas_printk("The phy%02d bursting events, shut it down.
", 
+                    +phy->id);
+                +sas_notify_phy_event(phy, PHYE_SHUTDOWN);
+            +} else {
+                /* Do not support PHY control, stop allocating events */
+                WARN_ONCE(1, "PHY control not supported.");
+                kmem_cache_free(sas_event_cache, event);
+                atomic_dec(&phy->event_nr);
+                event = NULL;
+            } else {
+                /* Do not support PHY control, stop allocating events */
+                WARN_ONCE(1, "PHY control not supported.");
+                kmem_cache_free(sas_event_cache, event);
+                atomic_dec(&phy->event_nr);
+                event = NULL;
+            }
+        } else {
+            /* Do not support PHY control, stop allocating events */
+            WARN_ONCE(1, "PHY control not supported.");
+            kmem_cache_free(sas_event_cache, event);
+            atomic_dec(&phy->event_nr);
+            event = NULL;
+        }
+    } else {
+        +return event;
+    }
+
+void sas_free_event(struct asd_sas_event *event)
+{
+    struct asd_sas_phy *phy = event->phy;
+    +kmem_cache_free(sas_event_cache, event);
+    +atomic_dec(&phy->event_nr);
+}
static int __init sas_class_init(void)
{
    sas_task_cache = KMEM_CACHE(sas_task, SLAB_HWCACHE_ALIGN);
    if (!sas_task_cache)
        return -ENOMEM;
    goto out;
+
    sas_event_cache = KMEM_CACHE(asd_sas_event, SLAB_HWCACHE_ALIGN);
    if (!sas_event_cache)
        goto free_task_kmem;
    return 0;
+
free_task_kmem:
    kmem_cache_destroy(sas_task_cache);
out:
    return -ENOMEM;
}

static void __exit sas_class_exit(void)
{
    kmem_cache_destroy(sas_task_cache);
    kmem_cache_destroy(sas_event_cache);
}

MODULE_AUTHOR("Luben Tuikov <luben_tuikov@adaptec.com>");
--- linux-4.15.0.orig/drivers/scsi/libsas/sas_internal.h
+++ linux-4.15.0/drivers/scsi/libsas/sas_internal.h
@@ -61,6 +61,9 @@
    int sas_register_phys(struct sas_ha_struct *sas_ha);
    void sas_unregister_phys(struct sas_ha_struct *sas_ha);
+
    struct asd_sas_event *sas_alloc_event(struct asd_sas_phy *phy);
    void sas_free_event(struct asd_sas_event *event);
    +
    int sas_register_ports(struct sas_ha_struct *sas_ha);
    void sas_unregister_ports(struct sas_ha_struct *sas_ha);
+
    @ @ -98,6 +101,10 @ @
    void sas_hae_reset(struct work_struct *work);
+
    void sas_free_device(struct kref *kref);
    +void sas_destruct_devices(struct asd_sas_port *port);
    +
    +extern const work_func_t sas_phy_event_fns[PHY_NUM_EVENTS];
    +extern const work_func_t sas_port_event_fns[PORT_NUM_EVENTS];
#ifdef CONFIG_SCSI_SAS_HOST_SMP
extern void sas_smp_host_handler(struct bsg_job *job, struct Scsi_Host *shost);
--- linux-4.15.0.orig/drivers/scsi/libsas/sas_phy.c
+++ linux-4.15.0/drivers/scsi/libsas/sas_phy.c
@@ -35,7 +35,7 @@
 struct asd_sas_event *ev = to_asd_sas_event(work);
 struct asd_sas_phy *phy = ev->phy;

-clear_bit(PHYE_LOSS_OF_SIGNAL, &phy->phy_events_pending);
+phy->in_shutdown = 0;
 phy->error = 0;
 sas_deform_port(phy, 1);
 }
@@ -45,7 +45,7 @@
 struct asd_sas_event *ev = to_asd_sas_event(work);
 struct asd_sas_phy *phy = ev->phy;

-clear_bit(PHYE_OOB_DONE, &phy->phy_events_pending);
+phy->in_shutdown = 0;
 phy->error = 0;
 }
@@ -58,8 +58,6 @@
 struct sas_internal *i =
 to_sas_internal(sas_ha->core.shost->transportt);

-clear_bit(PHYE_OOB_ERROR, &phy->phy_events_pending);
 -
 sas_deform_port(phy, 1);

 if (!port && phy->enabled && i->dft->lldd_control_phy) {
- @ @ -88,8 +86,6 @@
 struct sas_internal *i =
 to_sas_internal(sas_ha->core.shost->transportt);

-clear_bit(PHYE_SPINUP_HOLD, &phy->phy_events_pending);
 -
 phy->error = 0;
 i->dft->lldd_control_phy(phy, PHY_FUNC_RELEASE_SPINUP_HOLD, NULL);
 }
@@ -99,8 +95,6 @@
 struct asd_sas_event *ev = to_asd_sas_event(work);
 struct asd_sas_phy *phy = ev->phy;

-clear_bit(PHYE_RESUME_TIMEOUT, &phy->phy_events_pending);
 -
 /* phew, lldd got the phy back in the nick of time */
if (!phy->suspended) {
  dev_info(&phy->phy->dev, "resume timeout cancelled\n");
  return -113,45 +107,41 @@
}

+static void sas_phye_shutdown(struct work_struct *work)
+{
+  struct asd_sas_event *ev = to_asd_sas_event(work);
+  struct asd_sas_phy *phy = ev->phy;
+  struct sas_ha_struct *sas_ha = phy->ha;
+  struct sas_internal *i =
+    to_sas_internal(sas_ha->core.shost->transport);
+  +
+  if (phy->enabled) {
+    int ret;
+    +
+    +phy->error = 0;
+    +phy->enabled = 0;
+    +ret = i->dft->lldd_control_phy(phy, PHY_FUNC_DISABLE, NULL);
+    +if (ret)
+      sas_printk("lldd disable phy%02d returned %d\n",
+        +phy->id, ret);
+    +} else
+      sas_printk("phy%02d is not enabled, cannot shutdown\n",
+        +phy->id);
+  +}
+
/* ---------- Phy class registration ---------- */

int sas_register_phys(struct sas_ha_struct *sas_ha)
{
  int i;

  -static const work_func_t sas_phy_event_fns[PHY_NUM_EVENTS] = {
    [PHYE_LOSS_OF_SIGNAL] = sas PHYE loss of signal,
    [PHYE_OOB_DONE] = sas PHYE oob done,
    [PHYE_OOB_ERROR] = sas PHYE oob error,
    [PHYE_SPINUP_HOLD] = sas PHYE spinup hold,
    [PHYE_RESUME_TIMEOUT] = sas PHYE resume timeout,
    
    -};
-
-  static const work_func_t sas_port_event_fns[PORT_NUM_EVENTS] = {
    [PORTE_BYTES_DMAED] = sas PORTE bytes dmaed,
    [PORTE_BROADCAST_RCVD] = sas PORTE broadcast rcvd,
    [PORTE_LINK_RESET_ERR] = sas PORTE link reset err,
    [PORTE_TIMER_EVENT] = sas PORTE timer event,
    
    -};

Open Source Used In 5GaaS Edge AC-4 27979
/* Now register the phys. */
for (i = 0; i < sas_ha->num_phys; i++) {
    int k;
    struct asd_sas_phy *phy = sas_ha->sas_phy[i];
    phy->error = 0;
    atomic_set(&phy->event_nr, 0);
    INIT_LIST_HEAD(&phy->port_phy_el);
    for (k = 0; k < PORT_NUM_EVENTS; k++) {
        INIT_SAS_WORK(&phy->port_events[k].work, sas_port_event_fns[k]);
        phy->port_events[k].phy = phy;
    }
    for (k = 0; k < PHY_NUM_EVENTS; k++) {
        INIT_SAS_WORK(&phy->phy_events[k].work, sas_phy_event_fns[k]);
        phy->phy_events[k].phy = phy;
    }
    phy->port = NULL;
    phy->ha = sas_ha;
}
return 0;
}
+
+const work_func_t sas_phy_event_fns[PHY_NUM_EVENTS] = {
    [PHYE_LOSS_OF_SIGNAL] = sas_phye_loss_of_signal,
    [PHYE_OOB_DONE] = sas_phye_oob_done,
    [PHYE_OOB_ERROR] = sas_phye_oob_error,
    [PHYE_SPINUP_HOLD] = sas_phye_spinup_hold,
    [PHYE_RESUME_TIMEOUT] = sas_phye_resume_timeout,
    [PHYE_SHUTDOWN] = sas_phye_shutdown,
};
--- linux-4.15.0.orig/drivers/scsi/libsas/sas_port.c
+++ linux-4.15.0/drivers/scsi/libsas/sas_port.c
@@ -41,7 +41,7 @@
 static void sas_resume_port(struct asd_sas_phy *phy)
 {
-struct domain_device *dev;
+struct domain_device *dev, *n;
    struct asd_sas_port *port = phy->port;
    struct sas_ha_struct *sas_ha = phy->ha;
    struct sas_internal *si = to_sas_internal(sas_ha->core.shost->transportt);
@@ -60,12 +60,13 @@
* 1/ presume every device came back
* 2/ force the next revalidation to check all expander phys
* /
-list_for_each_entry(dev, &port->dev_list, dev_list_node) {
+list_for_each_entry_safe(dev, n, &port->dev_list, dev_list_node) {
  int i, rc;

c = sas_notify_lldd_dev_found(dev);
if (rc) {
  sas_unregister_dev(port, dev);
  +sas_destruct_devices(port);
  continue;
}

@@ -192,6 +193,7 @@
si->dft->lldd_port_formed(phy);

sas_discover_event(phy->port, DISCE_DISCOVER_DOMAIN);
+flush_workqueue(sas_ha->disco_q);
}

/**
@@ -219,6 +221,7 @@
if (port->num_phys == 1) {
  sas_unregister_domain_devices(port, gone);
  +sas_destruct_devices(port);
  sas_port_delete(port->port);
  port->port = NULL;
} else {
@@ -261,8 +264,6 @@
        struct asd_sas_event *ev = to_asd_sas_event(work);
        struct asd_sas_phy *phy = ev->phy;

-        -clear_bit(PORTE_BYTES_DMAED, &phy->port_events_pending);
-        -
        sas_form_port(phy);
    }

@@ -273,14 +274,15 @@
        unsigned long flags;
        u32 prim;

-        -clear_bit(PORTE_BROADCAST_RCVD, &phy->port_events_pending);
-        -
        spin_lock_irqsave(&phy->sas_prim_lock, flags);
        prim = phy->sas_prim;
        spin_unlock_irqrestore(&phy->sas_prim_lock, flags);
SAS_DPRINTK("broadcast received: %d", prim);
sas_discover_event(phy->port, DISCE_REVALIDATE_DOMAIN);
+
+if (phy->port)
+flush_workqueue(phy->port->ha->disco_q);
}

void sas_porte_link_reset_err(struct work_struct *work)
@@ -288,8 +290,6 @@
    struct asd_sas_event *ev = to_asd_sas_event(work);
    struct asd_sas_phy *phy = ev->phy;

    -clear_bit(PORTE_LINK_RESET_ERR, &phy->port_events_pending);
    -
    sas_deform_port(phy, 1);
}

@@ -298,8 +298,6 @@
    struct asd_sas_event *ev = to_asd_sas_event(work);
    struct asd_sas_phy *phy = ev->phy;

    -clear_bit(PORTE_TIMER_EVENT, &phy->port_events_pending);
    -
    sas_deform_port(phy, 1);
}

@@ -308,8 +306,6 @@
    struct asd_sas_event *ev = to_asd_sas_event(work);
    struct asd_sas_phy *phy = ev->phy;

    -clear_bit(PORTE_HARD_RESET, &phy->port_events_pending);
    -
    sas_deform_port(phy, 1);
}

@@ -323,6 +319,7 @@
INIT_LIST_HEAD(&port->dev_list);
INIT_LIST_HEAD(&port->disco_list);
INIT_LIST_HEAD(&port->destroy_list);
+INIT_LIST_HEAD(&port->sas_port_del_list);
spin_lock_init(&port->phy_list_lock);
INIT_LIST_HEAD(&port->phy_list);
port->ha = sas_ha;
@@ -353,3 +350,11 @@
sas_deform_port(sas_ha->sas_phy[i], 0);
}

Open Source Used In 5GaaS Edge AC-4 27982
const work_func_t sas_port_event_fns[PORT_NUM_EVENTS] = {
    [PORTE_BYTES_DMAED] = sas_porte_bytes_dmaed,
    [PORTE_BROADCAST_RCVD] = sas_porte_broadcast_rcvd,
    [PORTE_LINK_RESET_ERR] = sas_porte_link_reset_err,
    [PORTE_TIMER_EVENT] = sas_porte_timer_event,
    [PORTE_HARD_RESET] = sas_porte_hard_reset,
};

static void sas_eh_finish_cmd(struct scsi_cmnd *cmd)
{
    struct sas_ha_struct *sas_ha = SHOST_TO_SAS_HA(cmd->device->host);
    struct domain_device *dev = cmd_to_domain_dev(cmd);
    struct sas_task *task = TO_SAS_TASK(cmd);
    /* At this point, we only get called following an actual abort */
    sas_end_task(cmd, task);

    /* defer commands to libata so that libata EH can handle ata qcs correctly */
    list_move_tail(&cmd->eh_entry, &sas_ha->eh_ata_q);
    return;
}

+static void sas_eh_defer_cmd(struct scsi_cmnd *cmd)
{-
    struct domain_device *dev = cmd_to_domain_dev(cmd);
    struct sas_ha_struct *ha = dev->port->ha;
    struct sas_task *task = TO_SAS_TASK(cmd);
    -if (!dev_is_sata(dev)) {
      scsi_eh_finish_cmd(cmd, &sas_ha->eh_done_q);
    }

    -static void sas_eh_defer_cmd(struct scsi_cmnd *cmd)
    -{
      struct domain_device *dev = cmd_to_domain_dev(cmd);
      struct sas_ha_struct *ha = dev->port->ha;
      struct sas_task *task = TO_SAS_TASK(cmd);
      -if (!dev_is_sata(dev)) {
        sas_eh_finish_cmd(cmd);
        return;
      }
/* report the timeout to libata */
sas_end_task(cmd, task);
list_move_tail(&cmd->eh_entry, &ha->eh_ata_q);
-
-
static void sas_scsi_clear_queue_lu(struct list_head *error_q, struct scsi_cmnd *my_cmd)
{
struct scsi_cmnd *cmd, *n;
@@ -260,7 +253,7 @@
list_for_each_entry_safe(cmd, n, error_q, eh_entry) {
if (cmd->device->sdev_target == my_cmd->device->sdev_target &&
    cmd->device->lun == my_cmd->device->lun)
-    sas_eh_defer_cmd(cmd);
+    sas_eh_finish_cmd(cmd);
}
}

@@ -493,6 +486,9 @@

struct sas_internal *i = to_sas_internal(host->transportt);
unsigned long flags;

+if (current != host->ehandler)
+return FAILED;
+
+if (!i->dft->lldd_abort_task)
+return FAILED;

@@ -630,12 +626,12 @@
case TASK_IS_DONE:
SAS_DPRINTK("%s: task 0x%p is done\n", __func__,
    task);
-    sas_eh_defer_cmd(cmd);
+    sas_eh_finish_cmd(cmd);
    continue;

case TASK_IS_ABORTED:
SAS_DPRINTK("%s: task 0x%p is aborted\n",
    __func__, task);
-    sas_eh_defer_cmd(cmd);
+    sas_eh_finish_cmd(cmd);
    continue;

case TASK_IS_AT_LU:
SAS_DPRINTK("task 0x%p is at LU: lu recover\n", task);
@@ -646,7 +642,7 @@
"recovered\n",
    SAS_ADDR(task->dev),
    cmd->device->lun);
-    sas_eh_defer_cmd(cmd);
+    sas_eh_finish_cmd(cmd);
sas_scsi_clear_queue_lu(work_q, cmd);
goto Again;
}
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc.h
@@ -1,7 +1,7 @@
    /***************************************************************************
    * This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. *
    * * Copyright (C) 2017 Broadcom. All Rights Reserved. The term Broadcom refers to Broadcom Limited and/or its subsidiaries. *
    * * Copyright (C) 2004-2016 Emulex. All rights reserved. *
    * * EMULEX and SLI are trademarks of Emulex. *
    */
    @ @ -55,9 +55,10 @@
#define LPFC_MAX_SG_SLI4_SEG_CNT_DIF 128 /* sg element count per scsi cmd */
#define LPFC_MAX_SG_SEG_CNT_DIF 512/* sg element count per scsi cmd */
#define LPFC_MAX_SG_SEG_CNT4096/* sg element count per scsi cmd */
+#define LPFC_MIN_SG_SEG_CNT32/* sg element count per scsi cmd */
#define LPFC_MAX_SGL_SEG_CNT512/* SGL element count per scsi cmd */
#define LPFC_MAX_BPL_SEG_CNT4096/* BPL element count per scsi cmd */
-#define LPFC_MAX_NVME_SEG_CNT128/* max SGL element cnt per NVME cmd */
+#define LPFC_MAX_NVME_SEG_CNT256/* max SGL element cnt per NVME cmd */

#define LPFC_MAX_SGE_SIZE 0x80000000 /* Maximum data allowed in a SGE */
#define LPFC_IOCB_LIST_CNT250/* list of IOCBs for fast-path usage. */
@@ -491,6 +492,7 @@
struct nvme_fc_local_port *localport;
uint8_t  nvmei_support; /* driver supports NVME Initiator */
uint32_t last_fcp_wqidx;
+uint32_t rcv_flogi_cnt; /* How many unsol FLOGIs ACK'd. */
};

struct hbq_s {
@@ -543,16 +545,10 @@
    #define LPFC_USER_LINK_SPEED_10G10/* 10 Gigabaud */
    #define LPFC_USER_LINK_SPEED_16G16/* 16 Gigabaud */
    #define LPFC_USER_LINK_SPEED_32G32/* 32 Gigabaud */
-    #define LPFC_USER_LINK_SPEED_MAXLPFC_USER_LINK_SPEED_32G
+    #define LPFC_USER_LINK_SPEED_MAX (1ULL << LPFC_USER_LINK_SPEED_32G) | |
-    (1 << LPFC_USER_LINK_SPEED_16G) | |
-    (1 << LPFC_USER_LINK_SPEED_10G) | |
-    (1 << LPFC_USER_LINK_SPEED_8G) | |
-    (1 << LPFC_USER_LINK_SPEED_4G) | |
-    (1 << LPFC_USER_LINK_SPEED_2G) | |
-    (1 << LPFC_USER_LINK_SPEED_1G) | |
-    (1 << LPFC_USER_LINK_SPEED_AUTO))
-    #define LPFC_LINK_SPEED_STRING "0, 1, 2, 4, 8, 10, 16, 32"
```c
#define LPFC_USER_LINK_SPEED_64G 64 /* 64 Gigabaud */
#define LPFC_USER_LINK_SPEED_MAX LPFC_USER_LINK_SPEED_64G
+
#define LPFC_LINK_SPEED_STRING "0, 1, 2, 4, 8, 10, 16, 32, 64"

enum nemb_type {
    nemb_mse = 1,
    @@ -679,7 +675,7 @@
#define LS_NPIV_FAB_SUPPORTED 0x2/* Fabric supports NPIV */
#define LS_IGNORE_ERATT 0x4/* intr handler should ignore ERATT */
#define LS_MDS_LINK_DOWN 0x8/* MDS Diagnostics Link Down */
-#define LS_MDS_LOOPBACK 0x16/* MDS Diagnostics Link Up (Loopback) */
+#define LS_MDS_LOOPBACK 0x10/* MDS Diagnostics Link Up (Loopback) */

uint32_t hba_flag;/* hba generic flags */
#define HBA_ERATT.Handle0x1 /* This flag is set when eratt handled */
@@ -705,7 +701,6 @@
 * capability
 */
#define HBA_NVME_IOQ_FLUSH 0x80000 /* NVME IO queues flushed. */
-#define NVME_XRI_ABORT_EVENT 0x100000

uint32_t fcp_ring_in_use;/* When polling test if intr-hndlr active*/
struct lpfc_dmabuf slim2p;
@@ -760,6 +755,7 @@
uint8_t  mds_diags_support;
uint32_t initial_imax;
uint8_t  bbcredit_support;
+    uint8_t  enab_exp_wqcq_pages;
/* HBA Config Parameters */
uint32_t cfg_ack0;
@@ -787,6 +783,7 @@
    uint32_t cfg_fcp_io_channel;
    uint32_t cfg_suppress_rsp;
    uint32_t cfg_nvme_oas;
+    uint32_t cfg_nvme_embed_cmd;
    uint32_t cfg_nvme_io_channel;
    uint32_t cfg_nvmet_mrq;
    uint32_t cfg_enable_nvmet;
@@ -839,11 +836,14 @@
    uint32_t cfg_enable_SmartSAN;
    uint32_t cfg_enable_mds_diags;
    uint32_t cfg_enable_fc4_type;
-    uint32_t cfg_enable_bbcr;/*Enable BB Credit Recovery*/
+    uint32_t cfg_enable_bbcr;/* Enable BB Credit Recovery */
+    uint32_t cfg_enable_dpp;/* Enable Direct Packet Push */
    uint32_t cfg_xri_split;
```

#define LPFC_ENABLE_FCP  1
#define LPFC_ENABLE_NVME 2
#define LPFC_ENABLE_BOTH 3
+uint32_t nvme_embed_pbde;
+uint32_t fcp_embed_pbde;
uint32_t io_channel_irqs/* number of irqs for io channels */
struct nvmet_fc_target_port *targetport;
lpc_vpd_t vpd/* vital product data */
@@ -945,6 +945,8 @@
struct list_head lpfc_nvme_buf_list_get;
struct list_head lpfc_nvme_buf_list_put;
uint32_t total_nvme_bufs;
+uint32_t get_nvme_bufs;
+uint32_t put_nvme_bufs;
struct list_head lpfc_iocb_list;
uint32_t total_iocbq_bufs;
struct list_head active_rq_list;
@@ -972,7 +974,8 @@
struct list_head port_list;
struct lpfc_vport *pport/* physical lpfc_vport pointer */
uint16_t max_vpi/* Maximum virtual nports */
-#define LPFC_MAX_VPI 0xFFFF/* Max number of VPI supported */
+#define LPFC_MAX_VPI 0xFF/* Max number VPI supported 0 - 0xff */
+#define LPFC_MAX_VPORTS 0x100/* Max vports per port, with pport */
uint16_t max_vports;/* For IOV HBAs max_vpi can change
* after a reset. max_vports is max
@@ -1242,6 +1245,12 @@
static inline struct lpfc_sli_ring *
lpc_phba_elsring(struct lpfc_hba *phba)
{
+/* Return NULL if sli_rev has become invalid due to bad fw */
+if (phba->sli_rev != LPFC_SLI_REV4 &&
+ phba->sli_rev != LPFC_SLI_REV3 &&
+ phba->sli_rev != LPFC_SLI_REV2)
+return NULL;
+
if (phba->sli_rev == LPFC_SLI_REV4) {
if (phba->sli4_hba.els_wq)
return phba->sli4_hba.els_wq->pring;
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_attr.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_attr.c
@@ -1,7 +1,7 @@
/**************************************************************************
* This file is part of the Emulex Linux Device Driver for *
* Fibre Channel Host Bus Adapters. *
* Copyright (C) 2017-2018 Broadcom. All Rights Reserved. The term *
+ Copyright (C) 2017 Broadcom. All Rights Reserved. The term *

lpfc_drvr_version_show(struct device *dev, struct device_attribute *attr, char *buf)
{
    -return snprintf(buf, PAGE_SIZE, LPFC_MODULE_DESC "\n");
+return scnprintf(buf, PAGE_SIZE, LPFC_MODULE_DESC "\n");
}

/**
 * @ -134,9 +134,9 @@
 * static ssize_t
 @@ -148,6 +148,7 @@
 * len += snprintf(buf+len, PAGE_SIZE-len,
 "LS: Xmt %08x Drop %08x Cmpl %08x Err %08x\n",
+"LS: Xmt %08x Drop %08x Cmpl %08x\n",
 atomic_read(&tgtp->xmt_ls_rsp),
 atomic_read(&tgtp->xmt_ls_drop),
-atomic_read(&tgtp->xmt_ls_rsp_cmpl),
+atomic_read(&tgtp->xmt_ls_rsp_cmpl),
+atomic_read(&tgtp->xmt_ls_rsp_aborted),
 atomic_read(&tgtp->xmt_ls_rsp_xb_set),
 atomic_read(&tgtp->xmt_ls_rsp_error));
len += snprintf(buf+len, PAGE_SIZE-len, 
    "FCP Rsp Abort: %08x xb %08x xricqe  %08x\n",
    atomic_read(&tgtp->xmt_fcp_rsp_aborted),
    atomic_read(&tgtp->xmt_fcp_rsp_xb_set),
    atomic_read(&tgtp->xmt_fcp_xri_abort_cqe));
+
len += snprintf(buf + len, PAGE_SIZE - len,
    "ABORT: Xmt %08x Cmpl %08x\n",
    atomic_read(&tgtp->xmt_fcp_abort),
    atomic_read(&tgtp->xmt_fcp_abort_cmpl));
@@ -247,6 +259,12 @@
    atomic_read(&tgtp->xmt_abort_rsp),
    atomic_read(&tgtp->xmt_abort_rsp_error));
+
+/* Calculate outstanding IOs */
tot = atomic_read(&tgtp->rcv_fcp_cmd_drop);
tot += atomic_read(&tgtp->xmt_fcp_release);
@@ -271,6 +289,7 @@
    wwn_to_u64(vport->fc_portname.u.wwn));
return len;
}
+lport = (struct lpfc_nvme_lport *)localport->private;
len = snprintf(buf, PAGE_SIZE, "NVME Initiator Enabled\n");

spin_lock_irq(shost->host_lock);
@@ -347,9 +366,16 @@
    len += snprintf(buf + len, PAGE_SIZE - len,
    "LS: Xmt %016x Cmpl %016x\n",
    atomic_read(&phba->fc4NvmeLsRequests),
    atomic_read(&phba->fc4NvmeLsCmpls));
+
+/* Calculate outstanding IOs */
tot = atomic_read(&phba->fc4NvmeLsRequests);
tot += atomic_read(&phba->fc4NvmeLsCmpls);
    wwn_to_u64(vport->fc_portname.u.wwn));
return len;
}
+"LS XMIT: Err %08x CMPL: xb %08x Err %08x\n",
+atomic_read(&lport->xmt_ls_err),
+atomic_read(&lport->cmpl_ls_xb),
+atomic_read(&lport->cmpl_ls_err));

tot = atomic_read(&phba->fc4NvmeIoCmpls);
data1 = atomic_read(&phba->fc4NvmeInputRequests);
@@ -360,8 +386,22 @@
data1, data2, data3);

len += snprintf(buf+len, PAGE_SIZE-len, -" Cmpl %016llx Outstanding %016llx\n", -tot, (data1 + data2 + data3) - tot);
+" noxri %08x nondlp %08x qdepth %08x "
+"wqerr %08x\n"," +atomic_read(&lport->xmt_fcp_noxri),
+atomic_read(&lport->xmt_fcp_bad_ndlp),
+atomic_read(&lport->xmt_fcp_qdepth),
+atomic_read(&lport->xmt_fcp_wqerr));
+
+len += snprintf(buf + len, PAGE_SIZE - len, +" Cmpl %016llx Outstanding %016llx Abort %08x\n", +tot, ((data1 + data2 + data3) - tot),
+atomic_read(&lport->xmt_fcp_abort));
+
+len += snprintf(buf + len, PAGE_SIZE - len, +"FCP CMPL: xb %08x Err %08x\n", +atomic_read(&lport->cmpl_fcp_xb),
+atomic_read(&lport->cmpl_fcp_err));
return len;
}

@@ -373,14 +413,15 @@
struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
struct lpfc_hba  *phba = vport->phba;

-#if (phba->cfg_enable_bg)
+#if (phba->cfg_enable_bg) {
 if (phba->sli3_options & LPFC_SLI3_BG_ENABLED)
 -return snprintf(buf, PAGE_SIZE, "BlockGuard Enabled\n");
+return scnprintf(buf, PAGE_SIZE, +"BlockGuard Enabled\n");
 else
 -return snprintf(buf, PAGE_SIZE, +return scnprintf(buf, PAGE_SIZE, +"BlockGuard Not Supported\n");
-else
-#}
+} else
+return scnprintf(buf, PAGE_SIZE,
"BlockGuard Disabled\n");
}

@@ -392,7 +433,7 @@
 struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 struct lpfc_hba  *phba = vport->phba;

-return snprintf(buf, PAGE_SIZE, "%llu\n",
+return scnprintf(buf, PAGE_SIZE, "%llu\n",
(unsigned long long)phba->bg_guard_err_cnt);
}

@@ -404,7 +445,7 @@
 struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 struct lpfc_hba  *phba = vport->phba;

-return snprintf(buf, PAGE_SIZE, "%llu\n",
+return scnprintf(buf, PAGE_SIZE, "%llu\n",
(unsigned long long)phba->bg_apptag_err_cnt);
}

@@ -416,7 +457,7 @@
 struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 struct lpfc_hba  *phba = vport->phba;

-return snprintf(buf, PAGE_SIZE, "%llu\n",
+return scnprintf(buf, PAGE_SIZE, "%llu\n",
(unsigned long long)phba->bg_reftag_err_cnt);
}

@@ -434,7 +475,7 @@
 {
 struct Scsi_Host *host = class_to_shost(dev);

-return snprintf(buf, PAGE_SIZE, "%s\n",lpfc_info(host));
+return scnprintf(buf, PAGE_SIZE, "%s\n", lpfc_info(host));
 }

/ *
@@ -453,7 +494,7 @@
 struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 struct lpfc_hba  *phba = vport->phba;

-return snprintf(buf, PAGE_SIZE, "%s\n",phba->SerialNumber);
+return scnprintf(buf, PAGE_SIZE, "%s\n", phba->SerialNumber);
 }
/**
 * @ -475,7 +516,7 @@
 * struct Scsi_Host *host = class_to_host(dev);
 * struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 * struct lpfc_hba *phba = vport->phba;
 -return snprintf(buf, PAGE_SIZE, "%d\n", phba->temp_sensor_support);
 +return scnprintf(buf, PAGE_SIZE, "%d\n", phba->temp_sensor_support);
 }
/**
 * @ -494,7 +535,7 @@
 * struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 * struct lpfc_hba *phba = vport->phba;
 -return snprintf(buf, PAGE_SIZE, "%s\n", phba->ModelDesc);
 +return scnprintf(buf, PAGE_SIZE, "%s\n", phba->ModelDesc);
 }
/**
 * @ -513,7 +554,7 @@
 * struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 * struct lpfc_hba *phba = vport->phba;
 -return snprintf(buf, PAGE_SIZE, "%s\n", phba->ModelName);
 +return scnprintf(buf, PAGE_SIZE, "%s\n", phba->ModelName);
 }
/**
 * @ -532,7 +573,7 @@
 * struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 * struct lpfc_hba *phba = vport->phba;
 -return snprintf(buf, PAGE_SIZE, "%s\n", phba->ProgramType);
 +return scnprintf(buf, PAGE_SIZE, "%s\n", phba->ProgramType);
 }
/**
 * @ -550,7 +591,7 @@
 * struct lpfc_vport *vport = (struct lpfc_vport *)hostdata;
 * struct lpfc_hba *phba = vport->phba;
 -return snprintf(buf, PAGE_SIZE, "%d\n",
 +return scnprintf(buf, PAGE_SIZE, "%d\n",
 (phba->sli.sli_flag & LPFC_MENLO_MAINT));
 }
 @ -570,7 +611,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
struct lpfc_hba   *phba = vport->phba;

-return snprintf(buf, PAGE_SIZE, "\%s\n",phba->Port);
+return scnprintf(buf, PAGE_SIZE, "\%s\n", phba->Port);
}

/**
 @ @ -598,10 +639,10 @@
 sli_family = phba->sli4_hba.pc_sli4_params.sli_family;

 if (phba->sli_rev < LPFC_SLI_REV4)
- len = snprintf(buf, PAGE_SIZE, "\%s, sli-%d\n",
+ len = scnprintf(buf, PAGE_SIZE, "\%s, sli-%d\n",
                   fwrev, phba->sli_rev);
 else
- len = snprintf(buf, PAGE_SIZE, "\%s, sli-%d:%d:%x\n",
+ len = scnprintf(buf, PAGE_SIZE, "\%s, sli-%d:%d:%x\n",
                   fwrev, phba->sli_rev, if_type, sli_family);

 return len;
 @@ -625,7 +666,7 @@
 lpfc_vpd_t *vp = &phba->vpd;

 lpfc_jedec_to_ascii(vp->rev.biuRev, hdw);
- return snprintf(buf, PAGE_SIZE, "\%s\n", hdw);
+ return scnprintf(buf, PAGE_SIZE, "\%s\n", hdw);
 }

 /**
 @ @ -646,10 +687,11 @@
 char fwrev[FW_REV_STR_SIZE];

 if (phba->sli_rev < LPFC_SLI_REV4)
- return snprintf(buf, PAGE_SIZE, "\%s\n", phba->OptionROMVersion);
+ return scnprintf(buf, PAGE_SIZE, "\%s\n", phba->OptionROMVersion);

 lpfc_decode_firmware_rev(phba, fwrev, 1);
- return snprintf(buf, PAGE_SIZE, "\%s\n", fwrev);
+ return scnprintf(buf, PAGE_SIZE, "\%s\n", fwrev);
 }

 /**
 @ @ -680,20 +722,20 @@
case LPFC_LINK_DOWN:
case LPFC_HBA_ERROR:
  if (phba->hba_flag & LINK_DISABLED)
len += snprintf(buf + len, PAGE_SIZE-len, "Link Down - User disabled\n");
else
len += snprintf(buf + len, PAGE_SIZE-len, "Link Down\n");
break;
case LPFC_LINK_UP:
case LPFC_CLEAR_LA:
case LPFC_HBA_READY:
len += snprintf(buf + len, PAGE_SIZE-len, "Link Up - ");
len += snprintf(buf + len, PAGE_SIZE-len, "Link Up - ");

switch (vport->port_state) {
case LPFC_LOCAL_CFG_LINK:
len += snprintf(buf + len, PAGE_SIZE-len, "Configuring Link\n");
break;
case LPFC_FDISC:
break;
case LPFC_NS_QRY:
case LPFC_BUILD_DISC_LIST:
case LPFC_DISC_AUTH:
len += snprintf(buf + len, PAGE_SIZE - len, "Discovery\n");
break;
case LPFC_VPORT_READY:
len += snprintf(buf + len, PAGE_SIZE - len, "Ready\n");
len += snprintf(buf + len, PAGE_SIZE - len, "Ready\n");
break;
case LPFC_VPORT_FAILED:
len += snprintf(buf + len, PAGE_SIZE - len, "Failed\n");
len += snprintf(buf + len, PAGE_SIZE - len, "Failed\n");
break;
case LPFC_VPORT_UNKNOWN:
len += snprintf(buf + len, PAGE_SIZE - len, "Unknown\n");
len += snprintf(buf + len, PAGE_SIZE - len, "Unknown\n");
break;}
}
if (phba->sli.sli_flag & LPFC_MENLO_MAINT)
len += snprintf(buf + len, PAGE_SIZE - len, "Menlo Maint Mode\n");
else if (phba->fc_topology == LPFC_TOPOLOGY_LOOP) {
    if (vport->fc_flag & FC_PUBLIC_LOOP)
        len += snprintf(buf + len, PAGE_SIZE - len, "Public Loop\n");
    else
        len += snprintf(buf + len, PAGE_SIZE - len, "Private Loop\n");
} else {
    if (vport->fc_flag & FC_FABRIC)
        len += snprintf(buf + len, PAGE_SIZE - len, "Fabric\n");
    else
        len += snprintf(buf + len, PAGE_SIZE - len, "Point-2-Point\n");
}

return snprintf(buf, PAGE_SIZE, "unknown\n");

/**
@@ -787,7 +831,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *)shost->hostdata;
struct lpfc_hba *phba = vport->phba;

if (phba->sli_rev < LPFC_SLI_REV4)
    return snprintf(buf, PAGE_SIZE, "fc\n");
+return scnprintf(buf, PAGE_SIZE, "fc\n");

if (phba->sli4_hba.lnk_info.lnk_dv == LPFC_LNK_DAT_VAL) {
    if (phba->sli4_hba.lnk_info.lnk_tp == LPFC_LNK_TYPE_GE)
        return snprintf(buf, PAGE_SIZE, "fcoe\n");
+        return scnprintf(buf, PAGE_SIZE, "fcoe\n");
    if (phba->sli4_hba.lnk_info.lnk_tp == LPFC_LNK_TYPE_FC)
        return snprintf(buf, PAGE_SIZE, "fc\n");
+        return scnprintf(buf, PAGE_SIZE, "fc\n");
}
-return snprintf(buf, PAGE_SIZE, "unknown\n");
+return scnprintf(buf, PAGE_SIZE, "unknown\n");
}

/**
@@ -759,15 +803,15 @@
struct lpfc_hba *phba = vport->phba;

if (phba->sli4_hba.lnk_info.lnk_dv == LPFC_LNK_DAT_VAL) {
    if (phba->sli4_hba.lnk_info.lnk_tp == LPFC_LNK_TYPE_GE)
        return snprintf(buf, PAGE_SIZE, "fcoe\n");
+        return scnprintf(buf, PAGE_SIZE, "fcoe\n");
    if (phba->sli4_hba.lnk_info.lnk_tp == LPFC_LNK_TYPE_FC)
        return snprintf(buf, PAGE_SIZE, "fc\n");
+        return scnprintf(buf, PAGE_SIZE, "fc\n");
}
-return snprintf(buf, PAGE_SIZE, "unknown\n");
+return scnprintf(buf, PAGE_SIZE, "unknown\n");
}

/*@ -787,7 +831,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *)shost->hostdata;
struct lpfc_hba *phba = vport->phba;

-return snprintf(buf, PAGE_SIZE, "%d\n",
+return scnprintf(buf, PAGE_SIZE, "%d\n", phba->sli4_hba.pc_sli4_params.oas_supported);
} 

@@ -845,7 +889,7 @@
 struct Scsi_Host *shost = class_to_shost(dev);
 struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 
-return snprintf(buf, PAGE_SIZE, "%d\n", vport->fc_map_cnt + vport->fc_unmap_cnt);
+return scnprintf(buf, PAGE_SIZE, "%d\n", vport->fc_map_cnt + vport->fc_unmap_cnt);
} 

@@ -871,7 +915,12 @@
 LPFC_MBOXQ_t *pmboxq;
 int mbxstatus = MBXERR_ERROR;
 
+/*
+ * If the link is offline, disabled or BLOCK_MGMT_IO
+ * it doesn't make any sense to allow issue_lip
+ */
 if ((vport->fc_flag & FC_OFFLINE_MODE) ||
     (phba->hba_flag & LINK_DISABLED) ||
     (phba->sli.sli_flag & LPFC_BLOCK_MGMT_IO))
 return -EPERM;

@@ -1173,7 +1222,7 @@
 return -EACCES;
 if ((phba->sli_rev < LPFC_SLI_REV4) ||
    (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) !=
    LPFC_SLI_INTF_IF_TYPE_2))
 return -EPERM;

@@ -1278,7 +1327,7 @@
 struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
 struct lpfc_hba *phba = vport->phba;
 
-return snprintf(buf, PAGE_SIZE, "%d\n", phba->nport_event_cnt);
+return scnprintf(buf, PAGE_SIZE, "%d\n", phba->nport_event_cnt);
} 

/**
 @@ -1307,7 +1356,7 @@
 else
 state = "online";
-return snprintf(buf, PAGE_SIZE, "%s
", state);
+return scnprintf(buf, PAGE_SIZE, "%s
", state);
}

/**
 @ @ -1473,6 +1522,9 @@
 max_vpi = (bf_get(lpfc_mbx_rd_conf_vpi_count, rd_config) > 0) ?
 (bf_get(lpfc_mbx_rd_conf_vpi_count, rd_config) - 1) : 0;

 /* Limit the max we support */
+if (max_vpi > LPFC_MAX_VPI)
+max_vpi = LPFC_MAX_VPI;

 if (mvpi)
 *mvpi = max_vpi;
 if (avpi)
 @@ -1488,8 +1540,13 @@
 *axri = pmb->un.varRdConfig.avail_xri;
                 if (mvpi)
 *mvpi = pmb->un.varRdConfig.max_vpi;
                 -if (avpi)
                 -*avpi = pmb->un.varRdConfig.avail_vpi;
                 +if (avpi) {
                  /* avail_vpi is only valid if link is up and ready */
+                 +if (phba->link_state == LPFC_HBA_READY)
+                 +*avpi = pmb->un.varRdConfig.avail_vpi;
+                 +else
+                 +*avpi = pmb->un.varRdConfig.max_vpi;
+                 +}
                 }

 mempool_free(pmboxq, phba->mbox_mem_pool);
 @ @ -1520,8 +1577,8 @@
 uint32_t cnt;

 if (lpfc_get_hba_info(phba, NULL, NULL, &cnt, NULL, NULL, NULL))
 -return snprintf(buf, PAGE_SIZE, "%d\n", cnt);
 -return snprintf(buf, PAGE_SIZE, "Unknown\n");
+return scnprintf(buf, PAGE_SIZE, "%d\n", cnt);
+return scnprintf(buf, PAGE_SIZE, "Unknown\n");
 }

 /**
 @ @ -1548,8 +1605,8 @@
 uint32_t cnt, acnt;

 if (lpfc_get_hba_info(phba, NULL, NULL, &cnt, &acnt, NULL, NULL))
 -return snprintf(buf, PAGE_SIZE, "%d\n", (cnt - acnt));
 -return snprintf(buf, PAGE_SIZE, "Unknown\n");
uint32_t cnt;
if (lpfc_get_hba_info(phba, &cnt, NULL, NULL, NULL, NULL, NULL))
- return snprintf(buf, PAGE_SIZE, "%d\n", cnt);
- return snprintf(buf, PAGE_SIZE, "Unknown\n");
+ return scnprintf(buf, PAGE_SIZE, "%d\n", cnt);
+ return scnprintf(buf, PAGE_SIZE, "Unknown\n");
}

uint32_t cnt, acnt;
if (lpfc_get_hba_info(phba, NULL, &cnt, &acnt, NULL, NULL, NULL, NULL))
- return snprintf(buf, PAGE_SIZE, "%d\n", (cnt - acnt));
- return snprintf(buf, PAGE_SIZE, "Unknown\n");
+ return scnprintf(buf, PAGE_SIZE, "%d\n", (cnt - acnt));
+ return scnprintf(buf, PAGE_SIZE, "Unknown\n");
}

uint32_t cnt, acnt;
if (lpfc_get_hba_info(phba, NULL, NULL, NULL, NULL, NULL, &cnt, &acnt))
- return snprintf(buf, PAGE_SIZE, "%d\n", (cnt - acnt));
- return snprintf(buf, PAGE_SIZE, "Unknown\n");
+ return scnprintf(buf, PAGE_SIZE, "%d\n", (cnt - acnt));
+ return scnprintf(buf, PAGE_SIZE, "Unknown\n");
}
struct lpfc_hba  *phba = vport->phba;

if (! (phba->max_vpi))
    return snprintf(buf, PAGE_SIZE, "NPIV Not Supported\n");
+return scnprintf(buf, PAGE_SIZE, "NPIV Not Supported\n");
if (vport->port_type == LPFC_PHYSICAL_PORT)
    -return snprintf(buf, PAGE_SIZE, "NPIV Physical\n");
+return scnprintf(buf, PAGE_SIZE, "NPIV Physical\n");
-return snprintf(buf, PAGE_SIZE, "NPIV Virtual (VPI %d)\n", vport->vpi);
+return scnprintf(buf, PAGE_SIZE, "NPIV Virtual (VPI %d)\n", vport->vpi);
}
/**
@@ -1711,7 +1768,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
struct lpfc_hba  *phba = vport->phba;

    return snprintf(buf, PAGE_SIZE, "%#x\n", phba->cfg_poll);
+return scnprintf(buf, PAGE_SIZE, "%#x\n", phba->cfg_poll);
}
/**
@@ -1815,7 +1872,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
struct lpfc_hba  *phba = vport->phba;

    return snprintf(buf, PAGE_SIZE, "%d\n", phba->fips_level);
+return scnprintf(buf, PAGE_SIZE, "%d\n", phba->fips_level);
}
/**
@@ -1834,7 +1910,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
struct lpfc_hba  *phba = vport->phba;

    return snprintf(buf, PAGE_SIZE, "%d\n", phba->fips_spec_rev);
+return scnprintf(buf, PAGE_SIZE, "%d\n", phba->fips_spec_rev);
}
/**
@@ -1686,10 +1743,10 @@
struct lpfc_hba   *phba = vport->phba;

if (! (phba->max_vpi))
    return snprintf(buf, PAGE_SIZE, "NPIV Not Supported\n");
+return scnprintf(buf, PAGE_SIZE, "NPIV Not Supported\n");
if (vport->port_type == LPFC_PHYSICAL_PORT)
    -return snprintf(buf, PAGE_SIZE, "NPIV Physical\n");
+return scnprintf(buf, PAGE_SIZE, "NPIV Physical\n");
-return snprintf(buf, PAGE_SIZE, "NPIV Virtual (VPI %d)\n", vport->vpi);
+return scnprintf(buf, PAGE_SIZE, "NPIV Virtual (VPI %d)\n", vport->vpi);
}
@@ -2260,8 +2317,8 @@
lpfc_num_discovered_ports_show, NULL);
static DEVICE_ATTR(menlo_mgmt_mode, S_IRUGO, lpfc_mlomgmt_show, NULL);
static DEVICE_ATTR(nport_evt_cnt, S_IRUGO, lpfc_nport_evt_cnt_show, NULL);
- static DEVICE_ATTR(lpfc_drvr_version, S_IRUGO, lpfc_drvr_version_show, NULL);
- static DEVICE_ATTR(lpfc_enable_fip, S_IRUGO, lpfc_enable_fip_show, NULL);
+static DEVICE_ATTR_RO(lpfc_drvr_version);
+static DEVICE_ATTR_RO(lpfc_enable_fip);
static DEVICE_ATTR(board_mode, S_IRUGO | S_IWUSR,
    lpfc_board_mode_show, lpfc_board_mode_store);
static DEVICE_ATTR(used_xri, S_IRUGO, NULL, lpfc_used_xri_show);
@@ -2272,12 +2329,11 @@
static DEVICE_ATTR(max_xri, S_IRUGO, lpfc_max_xri_show, NULL);
static DEVICE_ATTR(used_xri, S_IRUGO, lpfc_used_xri_show, NULL);
static DEVICE_ATTR(npi_info, S_IRUGO, lpfc_npi_info_show, NULL);
- static DEVICE_ATTR(lpfc_temp_sensor, S_IRUGO, lpfc_temp_sensor_show, NULL);
- static DEVICE_ATTR(lpfc_fips_level, S_IRUGO, lpfc_fips_level_show, NULL);
- static DEVICE_ATTR(lpfc_fips_rev, S_IRUGO, lpfc_fips_rev_show, NULL);
- static DEVICE_ATTR(lpfc_dss, S_IRUGO, lpfc_dss_show, NULL);
- static DEVICE_ATTR(lpfc_sriov_hw_max_virtfn, S_IRUGO, lpfc_sriov_hw_max_virtfn_show, NULL);
+ static DEVICE_ATTR_RO(lpfc_temp_sensor);
+ static DEVICE_ATTR_RO(lpfc_fips_level);
+ static DEVICE_ATTR_RO(lpfc_fips_rev);
+ static DEVICE_ATTR_RO(lpfc_dss);
+ static DEVICE_ATTR_RO(lpfc_sriov_hw_max_virtfn);
static DEVICE_ATTR(protocol, S_IRUGO, lpfc_sli4_protocol_show, NULL);
static DEVICE_ATTR(lpfc_xlane_supported, S_IRUGO, lpfc_oas_supported_show,
    NULL);
@@ -2385,8 +2441,7 @@
return count;
}
- static DEVICE_ATTR(lpfc_soft_wwn_enable, S_IWUSR, NULL,
-    lpfc_soft_wwn_enable_store);
+ static DEVICE_ATTR_WO(lpfc_soft_wwn_enable);
/**
 * lpfc_soft_wwpn_show - Return the cfg soft ww port name of the adapter
@@ -2404,7 +2459,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
struct lpfc_hba   *phba = vport->phba;
-    return snprintf(buf, PAGE_SIZE, "0x%llx\n",
+    return scnprintf(buf, PAGE_SIZE, "0x%llx\n",
(unsigned long long)phba->cfg_soft_wwpn);
}

return count;
}
- static DEVICE_ATTR(lpfc_soft_wwn_enable, S_IWUSR, NULL,
-    lpfc_soft_wwn_enable_store);
+ static DEVICE_ATTR_WO(lpfc_soft_wwn_enable);

/**
 * lpfc_soft_wwpn_show - Return the cfg soft ww port name of the adapter
@@ -2404,7 +2459,7 @@
struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;
struct lpfc_hba   *phba = vport->phba;
-    return snprintf(buf, PAGE_SIZE, "0x%llx\n",
+    return scnprintf(buf, PAGE_SIZE, "0x%llx\n",
(unsigned long long)phba->cfg_soft_wwpn);
}
"reinit adapter - %d\n", stat2);
return (stat1 || stat2) ? -EIO : count;
}

static DEVICE_ATTR(lpfc_soft_wwpn, S_IRUGO | S_IWUSR,
    lpfc_soft_wwpn_show, lpfc_soft_wwpn_store);
+static DEVICE_ATTR_RW(lpfc_soft_wwpn);

/**
 * lpfc_soft_wwnn_show - Return the cfg soft ww node name for the adapter
 */
@@ -2504,7 +2558,7 @@
{
    struct Scsi_Host *shost = class_to_shost(dev);
    struct lpfc_hba *phba = ((struct lpfc_vport *)shost->hostdata)->phba;
    -return snprintf(buf, PAGE_SIZE, "0x%llx\n",
    +return scnprintf(buf, PAGE_SIZE, "0x%llx\n",
    (unsigned long long)phba->cfg_soft_wwnn);
}

@@ -2549,8 +2603,7 @@
return count;
}

-static DEVICE_ATTR(lpfc_soft_wwnn, S_IRUGO | S_IWUSR,
-static DEVICE_ATTR_RW(lpfc_soft_wwnn);
+static DEVICE_ATTR_RW(lpfc_oas_tgt);

/**
 * lpfc_oas_tgt_show - Return wwpn of target whose luns maybe enabled for
 */
@@ -2569,7 +2622,7 @@
{
    struct Scsi_Host *shost = class_to_shost(dev);
    struct lpfc_hba *phba = ((struct lpfc_vport *)shost->hostdata)->phba;
    -return snprintf(buf, PAGE_SIZE, "0x%llx\n",
    +return scnprintf(buf, PAGE_SIZE, "0x%llx\n",
    wwn_to_u64(phba->cfg_oas_tgt_wwpn);
}

@@ -2637,7 +2690,7 @@
{
    struct Scsi_Host *shost = class_to_shost(dev);
    struct lpfc_hba *phba = ((struct lpfc_vport *)shost->hostdata)->phba;
    -return snprintf(buf, PAGE_SIZE, "%d\n", phba->cfg_oas_priority);
    +return scnprintf(buf, PAGE_SIZE, "%d\n", phba->cfg_oas_priority);
}

/**
 @@ -2700,7 +2753,7 @@
struct Scsi_Host *shost = class_to_shost(dev);
struct lpfc_hba *phba = ((struct lpfc_vport *)shost->hostdata)->phba;

- return snprintf(buf, PAGE_SIZE, "0x%llx\n",
+ return scnprintf(buf, PAGE_SIZE, "0x%llx\n",
    wwn_to_u64(phba->cfg_oas_vpt_wwpn));
}

@@ -2771,7 +2824,7 @@
 struct Scsi_Host *shost = class_to_shost(dev);
 struct lpfc_hba *phba = ((struct lpfc_vport *)shost->hostdata)->phba;
- return snprintf(buf, PAGE_SIZE, "%d\n", phba->cfg_oas_lun_state);
+ return scnprintf(buf, PAGE_SIZE, "%d\n", phba->cfg_oas_lun_state);
}

/**
 @@ -2835,7 +2888,7 @@
 if (!(phba->cfg_oas_flags & OAS_LUN_VALID))
 return -EFAULT;

- return snprintf(buf, PAGE_SIZE, "%d\n", phba->cfg_oas_lun_status);
+ return scnprintf(buf, PAGE_SIZE, "%d\n", phba->cfg_oas_lun_status);
}

static DEVICE_ATTR(lpfc_xlane_lun_status, S_IRUGO,
    lpfc_oas_lun_status_show, NULL);
@@ -2987,7 +3040,7 @@
 if (oas_lun != NOT_OAS_ENABLED_LUN)
 phba->cfg_oas_flags |= OAS_LUN_VALID;

-len += snprintf(buf + len, PAGE_SIZE-len, "0x%llx", oas_lun);
+len += scnprintf(buf + len, PAGE_SIZE-len, "0x%llx", oas_lun);
return len;
}
@@ -3068,7 +3121,7 @@
 " 1 - poll with interrupts enabled"
 " 3 - poll and disable FCP ring interrupts");

- static DEVICE_ATTR(lpfc_poll, S_IRUGO | S_IWUSR,
-     lpfc_poll_show, lpfc_poll_store);
+static DEVICE_ATTR_RW(lpfc_poll);

int lpfc_no_hba_reset_cnt;
unsigned long lpfc_no_hba_reset[MAX_HBAS_NO_RESET] = {
@@ -3122,7 +3174,7 @@
 struct Scsi_Host *shost = class_to_shost(dev);
 struct lpfc_hba *phba = ((struct lpfc_vport *)shost->hostdata)->phba;

-return snprintf(buf, PAGE_SIZE, "\%d\n", phba->iocb_max);
+return scnprintf(buf, PAGE_SIZE, "\%d\n", phba->iocb_max);
}

static DEVICE_ATTR(iocb_hw, S_IRUGO,
@@ -3134,7 +3186,7 @@
 struct lpfc_hba  *phba = ((struct lpfc_vport *) shost->hostdata)->phba;
 struct lpfc_sli_ring *pring = lpfc_phba_elsring(phba);

-return snprintf(buf, PAGE_SIZE, "\%d\n",
+return scnprintf(buf, PAGE_SIZE, "\%d\n",
 pring ? pring->txq_max : 0);
}

@@ -3148,7 +3200,7 @@
 struct lpfc_hba  *phba = ((struct lpfc_vport *) shost->hostdata)->phba;
 struct lpfc_sli_ring *pring = lpfc_phba_elsring(phba);

-return snprintf(buf, PAGE_SIZE, "\%d\n",
+return scnprintf(buf, PAGE_SIZE, "\%d\n",
 pring ? pring->txcmplq_max : 0);
}

@@ -3184,7 +3236,7 @@
 struct Scsi_Host  *shost = class_to_host(dev);
 struct lpfc_vport *vport = (struct lpfc_vport *) shost->hostdata;

-return snprintf(buf, PAGE_SIZE, "\%d\n",vport->cfg_devloss_tmo);
+return scnprintf(buf, PAGE_SIZE, "\%d\n",vport->cfg_devloss_tmo);
}

/**
@@ -3302,8 +3354,7 @@
 lpfc_vport_param_store(nodev_tmo)

-static DEVICE_ATTR(lpfc_nodev_tmo, S_IRUGO | S_IWUSR,
-  lpfc_nodev_tmo_show, lpfc_nodev_tmo_store);
+static DEVICE_ATTR_RW(lpfc_nodev_tmo);

/*
# lpfc_devloss_tmo: If set, it will hold all I/O errors on devices that
@@ -3352,8 +3403,7 @@
 lpfc_vport_param_store(devloss_tmo)

-static DEVICE_ATTR(lpfc_devloss_tmo, S_IRUGO | S_IWUSR,
-  lpfc_devloss_tmo_show, lpfc_devloss_tmo_store);
+static DEVICE_ATTR_RW(lpfc_devloss_tmo);
- lpfc_devloss_tmo_show, lpfc_devloss_tmo_store);
+static DEVICE_ATTR_RW(lpfc_devloss_tmo);

/*
 * lpfc_suppress_rsp: Enable suppress rsp feature is firmware supports it
@@ -3366,12 +3416,13 @@

/*
 * lpfc_nvmet_mrq: Specify number of RQ pairs for processing NVMET cmds
+ * lpfc_nvmet_mrq = 0  driver will calculate optimal number of RQ pairs
 * lpfc_nvmet_mrq = 1  use a single RQ pair
 * lpfc_nvmet_mrq >= 2  use specified RQ pairs for MRQ
 */
+*/
LPFC_ATTR_R(nvmet_mrq,
- 1, 1, 16,
+ LPFC_NVMET_MRQ_AUTO, LPFC_NVMET_MRQ_AUTO, LPFC_NVMET_MRQ_MAX,
   "Specify number of RQ pairs for processing NVMET cmds");

/*
@@ -3430,8 +3481,8 @@
# tgt_queue_depth: This parameter is used to limit the number of outstanding
# commands per target port. Value range is [10,65535]. Default value is 65535.
*/
-LPFC_VPORT_ATTR_R(tgt_queue_depth, 65535, 10, 65535,
+LPFC_VPORT_ATTR_RW(tgt_queue_depth, 65535, 10, 65535,
   "Max number of FCP commands we can queue to a specific target port");

/*
# hba_queue_depth: This parameter is used to limit the number of outstanding
@@ -3545,8 +3596,7 @@
return 0;
}
lpfc_vport_param_store(restrict_login);
-static DEVICE_ATTR(lpfc_restrict_login, S_IRUGO | S_IWUSR,
+static DEVICE_ATTR_RW(lpfc_restrict_login);

/*
# Some disk devices have a "select ID" or "select Target" capability.
@@ -3630,8 +3680,9 @@
val);
return -EINVAL;
}
-if (phba->pcidev->device == PCI_DEVICE_ID_LANCER_G6_FC &&
+val == 4) }
+if ((phba->pcidev->device == PCI_DEVICE_ID_LANCER_G6_FC ||
phba->pcidev->device == PCIDEVICE_ID_LANCER_G7_FC) && val == 4) {
lpfc_printf_vlog(vport, KERN_ERR, LOG_INIT, "3114 Loop mode not supported\n");
return -EINVAL;

lpfc_param_show(topology)
-static DEVICE_ATTR(lpfc_topology, S_IRUGO | S_IWUSR,
-lpfc_topology_show, lpfc_topology_store);
+static DEVICE_ATTR_RW(lpfc_topology);

/**
 * lpfc_static_vport_show: Read callback function for
 */
-static DEVICE_ATTR_RW(lpfc_topology);
+static DEVICE_ATTR_RW(lpfc_topology);

/*
 * Sysfs attribute to control the statistical data collection.
 */
-static DEVICE_ATTR_RW(lpfc_topology);
+static DEVICE_ATTR_RW(lpfc_topology);

/**
 * lpfc_stat_data_ctrl - write call back for lpfc_stat_data_ctrl sysfs file
 */
-static DEVICE_ATTR_RW(lpfc_stat_data_ctrl);
+static DEVICE_ATTR_RW(lpfc_stat_data_ctrl);

/*
 * lpfc_drvr_stat_data: sysfs attr to get driver statistical data.
 */
-uint32_t prev_val, if_type;
+if (if_type == LPFC_SLI_INTF_IF_TYPE_2 &&
   phba->hba_flag & HBA_FORCED_LINK_SPEED)
   return -EPERM;

@ -4080,23 +4128,32 @
   ((val == LPFC_USER_LINK_SPEED_8G) && !(phba->lmt & LMT_8Gb)) ||
   ((val == LPFC_USER_LINK_SPEED_10G) && !(phba->lmt & LMT_10Gb)) ||
   ((val == LPFC_USER_LINK_SPEED_16G) && !(phba->lmt & LMT_16Gb)) ||
((val == LPFC_USER_LINK_SPEED_32G) && !(phba->lmt & LMT_32Gb)) {
    ((val == LPFC_USER_LINK_SPEED_32G) && !(phba->lmt & LMT_32Gb)) ||
    ((val == LPFC_USER_LINK_SPEED_64G) && !(phba->lmt & LMT_64Gb)) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
    "2879 lpfc_link_speed attribute cannot be set "
    "to %d. Speed is not supported by this port.\n", val);
return -EINVAL;
}
-if (val == LPFC_USER_LINK_SPEED_16G &&
    phba->fc_topology == LPFC_TOPOLOGY_LOOP) {
+if (val >= LPFC_USER_LINK_SPEED_16G &&
    phba->fc_topology == LPFC_TOPOLOGY_LOOP) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
    "3112 lpfc_link_speed attribute cannot be set "
    "to %d. Speed is not supported in loop mode.\n", val);
return -EINVAL;
}
-if ((val >= 0) && (val <= LPFC_USER_LINK_SPEED_MAX) &&
    (LPFC_USER_LINK_SPEED_BITMAP & (1 << val))) {
+switch (val) {
+case LPFC_USER_LINK_SPEED_AUTO:
+case LPFC_USER_LINK_SPEED_1G:
+case LPFC_USER_LINK_SPEED_2G:
+case LPFC_USER_LINK_SPEED_4G:
+case LPFC_USER_LINK_SPEED_8G:
+case LPFC_USER_LINK_SPEED_16G:
+case LPFC_USER_LINK_SPEED_32G:
+case LPFC_USER_LINK_SPEED_64G:
prev_val = phba->cfg_link_speed;
phba->cfg_link_speed = val;
if (nolip)
@@ -4106,13 +4163,18 @@
    if (err) {
phba->cfg_link_speed = prev_val;
return -EINVAL;
-} else
    return strlen(buf);
+}
+return strlen(buf);
+default:
+break;
}
+
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
-"0469 lpfc_link_speed attribute cannot be set to %d, "
-"0469 lpfc_link_speed attribute cannot be set to %d, "
"to %d. Speed is not supported by this port.\n", val);
return -EINVAL;
}
"allowed values are ["LPFC_LINK_SPEED_STRING"]\n", val);
"0469 lpfc_link_speed attribute cannot be set to %d, "
"allowed values are [%s]\n",
+val, LPFC_LINK_SPEED_STRING);
return -EINVAL;
+
static int lpfc_link_speed = 0;
@@ -4139,28 +4201,36 @@
static int
lpfc_link_speed_init(struct lpfc_hba *phba, int val)
{
-if (val == LPFC_USER_LINK_SPEED_16G && phba->cfg_topology == 4) {
+if (val >= LPFC_USER_LINK_SPEED_16G && phba->cfg_topology == 4) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT, 
"3111 lpfc_link_speed of %d cannot 
"support loop mode, setting topology to default.\n", 
val);
phba->cfg_topology = 0;
} 
-if ((val >= 0) && (val <= LPFC_USER_LINK_SPEED_MAX) &&
 - (LPFC_USER_LINK_SPEED_BITMAP & (1 << val))) {
+switch (val) {
+case LPFC_USER_LINK_SPEED_AUTO:
+case LPFC_USER_LINK_SPEED_1G:
+case LPFC_USER_LINK_SPEED_2G:
+case LPFC_USER_LINK_SPEED_4G:
+case LPFC_USER_LINK_SPEED_8G:
+case LPFC_USER_LINK_SPEED_16G:
+case LPFC_USER_LINK_SPEED_32G:
+case LPFC_USER_LINK_SPEED_64G:
phba->cfg_link_speed = val;
return 0;
+default:
+lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+"0405 lpfc_link_speed attribute cannot "
+"be set to %d, allowed values are "
+"["LPFC_LINK_SPEED_STRING"]\n", val);
+phba->cfg_link_speed = LPFC_USER_LINK_SPEED_AUTO;
+return -EINVAL;
+
-lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
-"0405 lpfc_link_speed attribute cannot "
-"be set to %d, allowed values are "
-"["LPFC_LINK_SPEED_STRING"]\n", val);
-phba->cfg_link_speed = LPFC_USER_LINK_SPEED_AUTO;
-return -EINVAL;
}

-static DEVICE_ATTR(lpfc_link_speed, S_IRUGO | S_IWUSR,
   - lpfc_link_speed_show, lpfc_link_speed_store);
+static DEVICE_ATTR_RW(lpfc_link_speed);

/*
 * lpfc_aer_support: Support PCIe device Advanced Error Reporting (AER)
 * @ @ -4253,8 +4323,7 @@
 * return rc;
 */

-static DEVICE_ATTR(lpfc_aer_support, S_IRUGO | S_IWUSR,
   - lpfc_aer_support_show, lpfc_aer_support_store);
+static DEVICE_ATTR_RW(lpfc_aer_support);

/**
 * lpfc_aer_cleanup_state - Clean up aer state to the aer enabled device
 * @ @ -4401,8 +4470,7 @@
 * "Enable PCIe device SR-IOV virtual fn");

 lpfc_param_show(sriov_nr_virtfn)
-static DEVICE_ATTR(lpfc_sriov_nr_virtfn, S_IRUGO | S_IWUSR,
   - lpfc_sriov_nr_virtfn_show, lpfc_sriov_nr_virtfn_store);
+static DEVICE_ATTR_RW(lpfc_sriov_nr_virtfn);

/**
 * lpfc_request_firmware_store - Request for Linux generic firmware upgrade
 * @ @ -4576,8 +4644,7 @@
 * return 0;
 */

-static DEVICE_ATTR(lpfc_fcp_imax, S_IRUGO | S_IWUSR,
   - lpfc_fcp_imax_show, lpfc_fcp_imax_store);
+static DEVICE_ATTR_RW(lpfc_fcp_imax);

/*
 * lpfc_auto_imax: Controls Auto-interrupt coalescing values support.
 * @ @ -4613,19 +4680,19 @@

 switch (phba->cfg_fcp_cpu_map) {
 case 0:
   -len += snprintf(buf + len, PAGE_SIZE-len,
   +len += snprintf(buf + len, PAGE_SIZE-len,
 "fcp_cpu_map: No mapping (%d)\n",
   phba->cfg_fcp_cpu_map);
   return len;
case 1:
    len += snprintf(buf + len, PAGE_SIZE-len,
+    len += scnprintf(buf + len, PAGE_SIZE-len,
"fcp_cpu_map: HBA centric mapping (%d): 
"%d online CPUs
",
    phba->cfg_fcp_cpu_map,
    phba->sli4_hba.num_online_cpu);
    break;

case 2:
    len += snprintf(buf + len, PAGE_SIZE-len,
    len += scnprintf(buf + len, PAGE_SIZE-len,
"fcp_cpu_map: Driver centric mapping (%d): 
"%d online CPUs
",
    phba->cfg_fcp_cpu_map,
    phba->sli4_hba.num_online_cpu);
    break;

    len += snprintf(buf + len, PAGE_SIZE-len,
    len += scnprintf(buf + len, PAGE_SIZE-len,
"CPU %02d io_chan %02d 
"physid %d coreid %d
",
    phba->sli4_hba.curr_disp_cpu,
    cpup->channel_id, cpup->phys_id,
    cpup->core_id);
    else
    len += snprintf(buf + len, PAGE_SIZE-len,
    len += scnprintf(buf + len, PAGE_SIZE-len,
"CPU %02d io_chan %02d 
"physid %d coreid %d IRQ %d
",
    phba->sli4_hba.curr_disp_cpu,
    phba->sli4_hba.num_present_cpu &&
    (len >= (PAGE_SIZE - 64))) { 
    -len += snprintf(buf + len, PAGE_SIZE-len, "more...
");
    +len += scnprintf(buf + len, PAGE_SIZE-len, "more...
");
    break;
    }
    }
    @@ -4737,8 +4804,7 @@
    return 0;
    }

-static DEVICE_ATTR(lpfc_fcp_cpu_map, S_IRUGO | S_IWUSR,
    - lpfc_fcp_cpu_map_show, lpfc_fcp_cpu_map_store);
+static DEVICE_ATTR_RW(lpfc_fcp_cpu_map);
# lpfc_fcp_class: Determines FC class to use for the FCP protocol.
@@ -4824,9 +4890,7 @@
     return 0;
 }
 lpfc_vport_param_store(max_scsicmpl_time);
 static DEVICE_ATTR(lpfc_max_scsicmpl_time, S_IRUGO | S_IWUSR,
 -   lpfc_max_scsicmpl_time_show,
 -   lpfc_max_scsicmpl_time_store);
+static DEVICE_ATTR_RW(lpfc_max_scsicmpl_time);
 */

 # lpfc_ack0: Use ACK0, instead of ACK1 for class 2 acknowledgement. Value
@@ -4991,6 +5055,18 @@
     "Use OAS bit on NVME IOs");
 */
+ * lpfc_nvme_embed_cmd: Use the oas bit when sending NVME/NVMET IOs
+ * 0 = Put NVME Command in SGL
+ * 1 = Embed NVME Command in WQE (unless G7)
+ * 2 = Embed NVME Command in WQE (force)
+ *
+ * Value range is [0,2]. Default value is 1.
+ */
+LPFC_ATTR_RW(nvme_embed_cmd, 1, 0, 2,
+    "Embed NVME Command in WQE");
+
+/*
 * lpfc_fcp_io_channel: Set the number of FCP IO channels the driver
 * will advertise it supports to the SCSI layer. This also will map to
 * the number of WQs the driver will create.
@@ -5139,7 +5215,7 @@
 * this parameter will be limited to 128 if BlockGuard is enabled under SLI4
 * and will be limited to 512 if BlockGuard is enabled under SLI3.
 */
-LPFC_ATTR_R(sg_seg_cnt, LPFC_DEFAULT_SG_SEG_CNT, LPFC_DEFAULT_SG_SEG_CNT,
+LPFC_ATTR_R(sg_seg_cnt, LPFC_DEFAULT_SG_SEG_CNT, LPFC_MIN_SG_SEG_CNT,
     LPFC_MAX_SG_SEG_CNT, "Max Scatter Gather Segment Count");
 */
@@ -5158,6 +5234,14 @@
     */
     LPFC_BBCR_ATTR_RW(enable_bbcr, 1, 0, 1, "Enable BBC Recovery");
 */
+ * lpfc_enable_dpp: Enable DPP on G7
+ * 0 = DPP on G7 disabled

1 = DPP on G7 enabled (default)
* Value range is [0,1]. Default value is 1.
*/
+LPFC_ATTR_RW(enable_dpp, 1, 0, 1, "Enable Direct Packet Push");
+
struct device_attribute *lpfc_hba_attrs[] = {
&dev_attr_nvme_info,
&dev_attr_bg_info,
@ @ -5223,6 +5307,7 @@
&dev_attr_lpfc_task_mgmmt_tmo,
&dev_attr_lpfc_use_msi,
&dev_attr_lpfc_nvme_oas,
+&dev_attr_lpfc_nvme_embed_cmd,
&dev_attr_lpfc_auto_imax,
&dev_attr_lpfc_fcp_imax,
&dev_attr_lpfc_fcp_cpu_map,
@ @ -5266,6 +5351,7 @@
&dev_attr_lpfc_xlane_supported,
&dev_attr_lpfc_enable_mds_diags,
&dev_attr_lpfc_enable_bbcr,
+&dev_attr_lpfc_enable_dpp,
NULL,
};
@@ -5679,6 +5765,9 @@
case LPFC_LINK_SPEED_32GHZ:
    fc_host_speed(shost) = FC_PORTSPEED_32GBIT;
    break;
+case LPFC_LINK_SPEED_64GHZ:
    +fc_host_speed(shost) = FC_PORTSPEED_64GBIT;
    +break;
    default:
    fc_host_speed(shost) = FC_PORTSPEED_UNKNOWN;
    break;
@@ -6044,7 +6133,7 @@
    \}
struct fc_rport *rport = transport_class_to_rport(dev);\}
struct lpfc_rport_data *rdata = rport->hostdata;\}
-return snprintf(buf, sz, format_string,\}
+return scnprintf(buf, sz, format_string,\}
    (rdata->target) ? cast rdata->target->field : 0);\}
@@ -6243,6 +6332,7 @@
lpfc_enable_SmartSAN_init(phba, lpfc_enable_SmartSAN);
lpfc_use_msi_init(phba, lpfc_use_msi);
lpfc_nvme_oas_init(phba, lpfc_nvme_oas);
+lpfc_nvme_embed_cmd_init(phba, lpfc_nvme_embed_cmd);
lpfc_auto_imax_init(phba, lpfc_auto_imax);
lpfc_fcp_imax_init(phba, lpfc_fcp_imax);
lpfc_fcp_cpu_map_init(phba, lpfc_fcp_cpu_map);
@@ -6278,6 +6368,7 @@
lpfc_fcp_io_channel_init(phba, lpfc_fcp_io_channel);
lpfc_nvme_io_channel_init(phba, lpfc_nvme_io_channel);
lpfc_enable_bbcr_init(phba, lpfc_enable_bbcr);
+lpfc_enable_dpp_init(phba, lpfc_enable_dpp);

if (phba->sli_rev != LPFC_SLI_REV4) {
    /* NVME only supported on SLI4 */
    @ @ -6362,6 +6453,9 @ @
    phba->cfg_nvmet_fb_size = LPFC_NVMET_FB_SZ_MAX;
}

+if (!phba->cfg_nvmet_mrq)  
+phba->cfg_nvmet_mrq = phba->cfg_nvme_io_channel;
+/* Adjust lpfc_nvmet_mrq to avoid running out of WQE slots */
if (phba->cfg_nvmet_mrq > phba->cfg_nvme_io_channel) {
    phba->cfg_nvmet_mrq = phba->cfg_nvme_io_channel;
    @ @ -6369,10 +6463,13 @ @
    "6018 Adjust lpfc_nvmet_mrq to %d\n",
    phba->cfg_nvmet_mrq);
}
+if (phba->cfg_nvmet_mrq > LPFC_NVMET_MRQ_MAX)  
+phba->cfg_nvmet_mrq = LPFC_NVMET_MRQ_MAX;
+}
} else {
    /* Not NVME Target mode. Turn off Target parameters. */
    phba->nvmet_support = 0;
    -phba->cfg_nvmet_mrq = 0;
    +phba->cfg_nvmet_mrq = LPFC_NVMET_MRQ_OFF;
    phba->cfg_nvmet_fb_size = 0;
}

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_bsg.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_bsg.c
@@ -1,7 +1,7 @@
/*******************************************************************
 * This file is part of the Emulex Linux Device Driver for         *
 * Fibre Channel Host Bus Adapters.                              *
- * Copyright (C) 2017 Broadcom. All Rights Reserved. The term    *
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 * EMULEX and SLI are trademarks of Emulex.                      *
@@ -2221,7 +2221,7 @@
if (phba->sli_rev < LPFC_SLI_REV4)
rc = lpfc_sl3_bsg_diag_loopback_mode(phba, job);
-else if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) ==
+else if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) >=
   LPFC_SLI_INTF_IF_TYPE_2)
rc = lpfc_sl4_bsg_diag_loopback_mode(phba, job);
else
@@ -2261,7 +2261,7 @@
if (phba->sli_rev < LPFC_SLI_REV4)
return -ENODEV;
-if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) !=
+if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) <
   LPFC_SLI_INTF_IF_TYPE_2)
rc = -ENODEV;
goto job_error;
@@ -2353,7 +2353,7 @@
rc = -ENODEV;
goto job_error;
-@@ -3867,7 +3867,7 @@
"ext_buf_cnt:%d", ext_buf_cnt);
} else {
 /* sanity check on interface type for support */
-if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) !=
+if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) <
   LPFC_SLI_INTF_IF_TYPE_2) {
rc = -ENODEV;
goto job_error;
@@ -4053,7 +4053,7 @@
"ext_buf_cnt:%d", ext_buf_cnt);
} else {
 /* sanity check on interface type for support */
-if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) !=
+if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) <
   LPFC_SLI_INTF_IF_TYPE_2)
return -ENODEV;
/* nemb_tp == nemb_hbd */
@@ -4419,12 +4419,6 @@
phba->mbox_ext_buf_ctx.seqNum++;
nemb_tp = phba->mbox_ext_buf_ctx.nembType;
- dd_data = kmalloc(sizeof(struct bsg_job_data), GFP_KERNEL);
- if (!dd_data) {
- rc = -ENOMEM;
- goto job_error;
- }
-
- pbuf = (uint8_t *)dmabuf->virt;
- size = job->request_payload.payload_len;
- sg_copy_to_buffer(job->request_payload.sg_list,
@@ -4461,6 +4455,13 @@
"2968 SLI_CONFIG ext-buffer wr all %d 
"ebuffers received
",
phba->mbox_ext_buf_ctx.numBuf);
+ dd_data = kmalloc(sizeof(struct bsg_job_data), GFP_KERNEL);
+ if (!dd_data) {
+ rc = -ENOMEM;
+ goto job_error;
+ }
+
/* mailbox command structure for base driver */
pmboxq = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
if (!pmboxq) {
@@ -4509,6 +4510,8 @@
return SLI_CONFIG.Handled;

job_error:
+ if (pmboxq)
+ mempool_free(pmboxq, phba->mbox_mem_pool);
lpfc_bsg_dma_page_free(phba, dmabuf);
kfree(dd_data);

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_crtn.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_crtn.h
@@ -1,7 +1,7 @@

/**************************************************************************
* This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. *
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@@ -56,9 +56,6 @@
void lpfc_unreg_vpi(struct lpfc_hba *, uint16_t, LPFC_MBOXQ_t *);
void lpfc_init_link(struct lpfc_hba *, LPFC_MBOXQ_t *, uint32_t, uint32_t);
void lpfc_request_features(struct lpfc_hba *, struct lpfcMboxq *);
-void lpfc_supported_pages(struct lpfcMboxq *);
-void lpfc_pc_sli4_params(struct lpfcMboxq *);
-int lpfc_pc_sli4_params_get(struct lpfc_hba *, LPFC_MBOXQ_t *);
-int lpfc_sli4_mbox_rsrc_extent(struct lpfc_hba *, struct lpfcMboxq *,
   uint16_t, uint16_t, bool);
-int lpfc_get_sli4_parameters(struct lpfc_hba *, LPFC_MBOXQ_t *);
@@ -254,6 +251,9 @@
   struct lpfc_nvmet_ctxbuf *ctxp);
-int lpfc_nvmet_rcv_unsol_abort(struct lpfc_vport *vport, 
   struct fc_frame_header *fc_hdr);
+void lpfc_nvmet_wqfull_process(struct lpfc_hba *phba, struct lpfc_queue *wq);
+void lpfc_sli_flush_nvme_rings(struct lpfc_hba *phba);
+void lpfc_nvme_wait_for_io_drain(struct lpfc_hba *phba);
 void lpfc_sli4_build_dflt_fcf_record(struct lpfc_hba *, struct fcf_record *,
   uint16_t);
-int lpfc_sli4_rq_put(struct lpfc_queue *hq, struct lpfc_queue *dq,
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_ct.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_ct.c
@@ -1,7 +1,7 @@
 /*******************************************************************
 * This file is part of the Emulex Linux Device Driver for         *
 * Fibre Channel Host Bus Adapters.                                *
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@@ -471,6 +471,7 @@
   "Parse GID_FTrsp: did:x%x flg:x%x x%x",
  Did, ndlp->nlp_flag, vport->fc_flag);
  +ndlp->nlp_fc4_type &=- (NLP_FC4_FCP | NLP_FC4_NVME);
 /* By default, the driver expects to support FCP FC4 */
  if (fc4_type == FC_TYPE_FCP)
  ndlp->nlp_fc4_type |= NLP_FC4_FCP;
@@ -685,6 +686,25 @@
  lpfc_els_flush_rscn(vport);
  goto out;
 }}
+
+spin_lock_irq(host->host_lock);
+if (vport->fc_flag & FC_RSCN_DEFERRED) {
+ vport->fc_flag &= ~FC_RSCN_DEFERRED;
+ spin_unlock_irq(host->host_lock);
+}
+/*
+ * Skip processing the NS response
+ * Re-issue the NS cmd
+ */
lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS,
 + "0151 Process Deferred RSCN Data: x%x x%x\n",
 + vport->fc_flag, vport->fc_rscn_id_cnt);
+lpfc_els_handle_rscn(vport);
+
+goto out;
+
+spin_unlock_irq(shost->host_lock);
+
+if (irsp->ulpStatus) {
+- Check for retry */
+if (vport->fc_ns_retry < LPFC_MAX_NS_RETRY) {
@@ -1191,7 +1211,7 @@
 * Name object. NPIV is not in play so this integer
 * value is sufficient and unique per FC-ID.
 */
-n = snprintf(symbol, size, "%d", vport->phba->brd_no);
+n = scnprintf(symbol, size, "%d", vport->phba->brd_no);
+return n;
+
@@ -1205,26 +1225,26 @@
 lpfc_decode_firmware_rev(vport->phba, fwrev, 0);

-n = snprintf(symbol, size, "Emulex %s", vport->phba->ModelName);
+n = scnprintf(symbol, size, "Emulex %s", vport->phba->ModelName);
+if (size < n)
+return n;
+
-n += snprintf(symbol + n, size - n, " FV%s", fwrev);
+n += scnprintf(symbol + n, size - n, " FV%s", fwrev);
+if (size < n)
+return n;
+
-n += snprintf(symbol + n, size - n, " DV%s.",
+n += scnprintf(symbol + n, size - n, " DV%s.",
-    lpfc_release_version);
+n += scnprintf(symbol + n, size - n, " DV%s.",
+    lpfc_release_version);
+if (size < n)
+return n;
+
-n += snprintf(symbol + n, size - n, " HN:%s.",
+n += scnprintf(symbol + n, size - n, " HN:%s.",
      init_utsname()->nodename);
+n += scnprintf(symbol + n, size - n, " HN:%s.",
      init_utsname()->nodename);
+if (size < n)
+return n;
+
/* Note :- OS name is "Linux" */

-n += snprintf(symbol + n, size - n, " OS:%s\n", init_utsname()->sysname);
return n;
}

struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, sizeof(struct lpfc_name));
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

memcpy(&ae->un.AttrWWN, &vport->fc_sparam.nodeName, sizeof(struct lpfc_name));

struct lpfc_fdmi_attr_entry *ae;
uint32_t len, size;
-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

+/* This string MUST be consistent with other FC platforms
+ * supported by Broadcom.
+ */
strncpy(ae->un.AttrString, "Emulex Corporation", sizeof(ae->un.AttrString));

struct lpfc_fdmi_attr_entry *ae;
uint32_t len, size;
-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

strncpy(ae->un.AttrString, phba->SerialNumber, sizeof(ae->un.AttrString));

struct lpfc_fdmi_attr_entry *ae;
uint32_t len, size;
-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

strncpy(ae->un.AttrString, phba->SerialNumber, sizeof(ae->un.AttrString));
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

strncpy(ae->un.AttrString, phba->ModelName,
sizeof(ae->un.AttrString));
@@ -1795,8 +1818,8 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t len, size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

strncpy(ae->un.AttrString, phba->ModelDesc,
sizeof(ae->un.AttrString));
@@ -1818,8 +1841,8 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t i, j, incr, size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

/* Convert JEDEC ID to ascii for hardware version */
incr = vp->rev.biuRev;
@@ -1848,8 +1871,8 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t len, size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

strncpy(ae->un.AttrString, lpfc_release_version,
sizeof(ae->un.AttrString));
@@ -1870,8 +1893,8 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t len, size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

if (phba->sli_rev == LPFC_SLI_REV4)
lpfc_decode_firmware_rev(phba, ae->un.AttrString, 1);
@@ -1895,8 +1918,8 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t len, size;

 -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
 -memset(ae, 0, 256);
 +ae = &ad->AttrValue;
 +memset(ae, 0, sizeof(*ae));

 lpfc_decode_firmware_rev(phba, ae->un.AttrString, 1);
 len = strnlen(ae->un.AttrString, 256);
@@ -1915,8 +1938,8 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t len, size;

 -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
 -memset(ae, 0, 256);
 +ae = &ad->AttrValue;
 +memset(ae, 0, sizeof(*ae));

 snprintf(ae->un.AttrString, sizeof(ae->un.AttrString), "%s %s %s",
 init_utsname()->sysname,
@@ -1938,7 +1961,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

 -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
 +ae = &ad->AttrValue;

 ae->un.AttrInt = cpu_to_be32(LPFC_MAX_CT_SIZE);
 size = FOURBYTES + sizeof(uint32_t);
@@ -1954,8 +1977,8 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t len, size;

 -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
 -memset(ae, 0, 256);
 +ae = &ad->AttrValue;
 +memset(ae, 0, sizeof(*ae));

 len = lpfc_vport_symbolic_node_name(vport,
 ae->un.AttrString, 256);
@@ -1973,7 +1996,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

 -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;

/* Nothing is defined for this currently */
ae->un.AttrInt = cpu_to_be32(0);
@@ -1990,7 +2013,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;

/* Each driver instance corresponds to a single port */
ae->un.AttrInt = cpu_to_be32(1);
@@ -2007,8 +2030,8 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, sizeof(struct lpfc_name));
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

memcpy(&ae->un.AttrWWN, &vport->fabric_nodename,
       sizeof(struct lpfc_name));
@@ -2026,8 +2049,8 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t len, size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

lpfc_decode_firmware_rev(phba, ae->un.AttrString, 1);
len = strlen(ae->un.AttrString,
@@ -2046,7 +2069,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

/* Driver doesn’t have access to this information */
ae->un.AttrInt = cpu_to_be32(0);
@@ -2063,8 +2086,8 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t len, size;
-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

strncpy(ae->un.AttrString, "EMULEX",
sizeof(ae->un.AttrString));
@@ -2085,13 +2108,14 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 32);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

-ae->un.AttrTypes[3] = 0x02; /* Type 1 - ELS */
-ae->un.AttrTypes[2] = 0x01; /* Type 8 - FCP */
-ae->un.AttrTypes[6] = 0x01; /* Type 40 - NVME */
-ae->un.AttrTypes[7] = 0x01; /* Type 32 - CT */
+ae->un.AttrTypes[3] = 0x02; /* Type 0x1 - ELS */
+ae->un.AttrTypes[2] = 0x01; /* Type 0x8 - FCP */
+if (vport->nvmei_support || vport->phba->nvmet_support)
+ae->un.AttrTypes[6] = 0x01; /* Type 0x28 - NVME */
+ae->un.AttrTypes[7] = 0x01; /* Type 0x20 - CT */
size = FOURBYTES + 32;
ad->AttrLen = cpu_to_be16(size);
ad->AttrType = cpu_to_be16(RPRT_SUPPORTED_FC4_TYPES);
@@ -2106,10 +2130,12 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc.fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;

ae->un.AttrInt = 0;
if (!((phba->hba_flag & HBA_FCOE_MODE)) {
+if (phba->lmt & LMT_64Gb)
+ae->un.AttrInt |= HBA_PORTSPEED_64GFC;
if (phba->lmt & LMT_32Gb)
ae->un.AttrInt |= HBA_PORTSPEED_32GFC;
if (phba->lmt & LMT_16Gb)
@@ -2156,7 +2182,7 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;
if (!(phba->hba_flag & HBA_FCOE_MODE)) {
    switch (phba->fc_linkspeed) {
    case LPFC_LINK_SPEED_32GHZ:
        ae->un.AttrInt = HBA_PORTSPEED_32GFC;
        break;
    +case LPFC_LINK_SPEED_64GHZ:
        +ae->un.AttrInt = HBA_PORTSPEED_64GFC;
        +break;
    default:
        ae->un.AttrInt = HBA_PORTSPEED_UNKNOWN;
        break;
    @ @ -2220,7 +2249,7 @@
    struct lpfc_fdmi_attr_entry *ae;
    uint32_t size;

    -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
    +ae = &ad->AttrValue;

    hsp = (struct serv_parm *)&vport->fc_sparm;
    ae->un.AttrInt = (((uint32_t) hsp->cmn.bbRcvSizeMsb) << 8) |
    @ @ -2240,8 +2269,8 @@
    struct lpfc_fdmi_attr_entry *ae;
    uint32_t len, size;

    -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
    -memset(ae, 0, 256);
    +ae = &ad->AttrValue;
    +memset(ae, 0, sizeof(*ae));

    snprintf(ae->un.AttrString, sizeof(ae->un.AttrString),
        "sys/class/scsi_host/host%d", shost->host_no);
    @ @ -2261,8 +2290,8 @@
    struct lpfc_fdmi_attr_entry *ae;
    uint32_t len, size;

    -ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
    -memset(ae, 0, 256);
    +ae = &ad->AttrValue;
    +memset(ae, 0, sizeof(*ae));

    snprintf(ae->un.AttrString, sizeof(ae->un.AttrString), 
        "sys/class/scsi_host/host%d", shost->host_no);
    @ @ -2282,8 +2311,8 @@
    struct lpfc_fdmi_attr_entry *ae;
    uint32_t size;
-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, sizeof(struct lpfc_name));
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

memcpy(&ae->un.AttrWWN, &vport->fc_sparam.nodeName,
        sizeof(struct lpfc_name));
@@ -2300,8 +2329,8 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0,  sizeof(struct lpfc_name));
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

memcpy(&ae->un.AttrString, &vport, fc_sparam.portName,
        sizeof(struct lpfc_name));
@@ -2318,8 +2347,8 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t len, size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 256);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

len = lpfc_vport_symbolic_port_name(vport, ae->un.AttrString, 256);
len += (len & 3) ? (4 - (len & 3)) : 4;
@@ -2337,7 +2366,7 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

if (phba->fc_topology == LPFC_TOPOLOGY_LOOP)
ae->un.AttrInt = cpu_to_be32(LPFC_FDMI_PORTTYPE_NLPORT);
else
@@ -2355,7 +2384,7 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;

ae->un.AttrInt = cpu_to_be32(FC_COS_CLASS2 | FC_COS_CLASS3);
size = FOURBYTES + sizeof(uint32_t);
ad->AttrLen = cpu_to_be16(size);
@@ -2370,8 +2399,8 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, sizeof(struct lpfc_name));
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

memcpy(&ae->un.AttrWWN, &vport->fabric_portname,
       sizeof(struct lpfc_name));
@@ -2388,12 +2417,14 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
-memset(ae, 0, 32);
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

-ae->un.AttrTypes[3] = 0x02; /* Type 1 - ELS */
-ae->un.AttrTypes[2] = 0x01; /* Type 8 - FCP */
-ae->un.AttrTypes[7] = 0x01; /* Type 32 - CT */
+ae->un.AttrTypes[3] = 0x02; /* Type 0x1 - ELS */
+ae->un.AttrTypes[2] = 0x01; /* Type 0x8 - FCP */
+if (vport->phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME)
+    ae->un.AttrTypes[6] = 0x1; /* Type 0x28 - NVME */
+ae->un.AttrTypes[7] = 0x01; /* Type 0x20 - CT */
size = FOURBYTES + 32;
ad->AttrLen = cpu_to_be16(size);
ad->AttrType = cpu_to_be16(RPRT_ACTIVE_FC4_TYPES);
@@ -2407,7 +2438,7 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;
/* Link Up - operational */
    ae->un.AttrInt = cpu_to_be32(LPFC_FDMI_PORTSTATE_ONLINE);
size = FOURBYTES + sizeof(uint32_t);
@@ -2423,7 +2454,7 @@
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;
    vport->fdmi_num_disc = lpfc_find_map_node(vport);
    ae->un.AttrInt = cpu_to_be32(vport->fdmi_num_disc);
size = FOURBYTES + sizeof(uint32_t);

---

Open Source Used In 5GaaS Edge AC-4 28025
struct lpfc_fdmi_attr_entry *ae;
uint32_t size;

-ae = (struct lpfc_fdmi_attr_entry *)&ad->AttrValue;
+ae = &ad->AttrValue;

ae->un.AttrInt = cpu_to_be32(vport->fc_myDID);
size = FOURBYTES + sizeof(uint32_t);
ad->AttrLen = cpu_to_be16(size);

strncpy(ae->un.AttrString, "Smart SAN Initiator",
sizeof(ae->un.AttrString));

memcpy(&ae->un.AttrString, &vport->fc_sparam.nodeName,
sizeof(struct lpfc_name));

strncpy(ae->un.AttrString, "Smart SAN Version 2.0",
sizeof(ae->un.AttrString));
+ae = &ad->AttrValue;
+memset(ae, 0, sizeof(*ae));

strncpy(ae->un.AttrString, phba->ModelName, sizeof(ae->un.AttrString));
@@ -2538,7 +2569,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

@@ -2558,7 +2589,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

@@ -2573,7 +2604,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

/* SRIOV (type 3) is not supported */
if (vport->vpi)
@@ -2589,7 +2621,7 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

/* Registered Port List */
/* One entry (port) per adapter */
rh->rpl.EntryCnt = cpu_to_be32(1);
size = FOURBYTES + sizeof(uint32_t);
ad->AttrLen = cpu_to_be16(size);
@@ -2721,7 +2752,8 @@
 struct lpfc_fdmi_attr_entry *ae;
 uint32_t size;

/* point to the HBA attribute block */
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_debugfs.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_debugfs.c
@@ -1,7 +1,7 @@
*******************************************************************
* This file is part of the Emulex Linux Device Driver for         *
* Fibre Channel Host Bus Adapters.                               *
*******************************************************************
snprintf(buffer, LPFC_DEBUG_TRC_ENTRY_SIZE, "%010d:%010d ms:%s\n", dtp->seq_cnt, ms, dtp->fmt);
-len += snprintf(buf+len, size-len, buffer,
+len += scnprintf(buf+len, size-len, buffer,
dtp->data1, dtp->data2, dtp->data3);
}
for (i = 0; i < index; i++) {
    @ @ -181.7 +181.7 @ @
    snprintf(buffer, LPFC_DEBUG_TRC_ENTRY_SIZE, "%010d:%010d ms:%s\n", dtp->seq_cnt, ms, dtp->fmt);
    -len += snprintf(buf+len, size-len, buffer,
+len += scnprintf(buf+len, size-len, buffer,
dtp->data1, dtp->data2, dtp->data3);
}

@@ -236,7 +236,7 @@
snprintf(buffer, LPFC_DEBUG_TRC_ENTRY_SIZE, "%010d:%010d ms:%s\n", dtp->seq_cnt, ms, dtp->fmt);
-len += snprintf(buf+len, size-len, buffer,
+len += scnprintf(buf+len, size-len, buffer,
dtp->data1, dtp->data2, dtp->data3);
}
for (i = 0; i < index; i++) {
  @ @ -247.7 +247.7 @ @
  snprintf(buffer, LPFC_DEBUG_TRC_ENTRY_SIZE, "%010d:%010d ms:%s\n", dtp->seq_cnt, ms, dtp->fmt);
  -len += snprintf(buf+len, size-len, buffer,
  +len += scnprintf(buf+len, size-len, buffer,
  dtp->data1, dtp->data2, dtp->data3);
}

@@ -307,7 +307,7 @@
i = lpfc_debugfs_last_hbq;

    -len += snprintf(buf+len, size-len, "HBQ %d Info\n", i);
    +len += scnprintf(buf+len, size-len, "HBQ %d Info\n", i);
hbqs = &phba->hbqs[i];
posted = 0;
@@ -315,21 +315,21 @@
posted++;

hip = lpfc_hbq_defs[i];
-len += snprintf(buf+len, size-len,
+len += snprintf(buf+len, size-len,
"idx:%d prof:%d rn:%d bufcnt:%d icnt:%d acnt:%d posted %d\n",
hipster->hbq_index, hip->profile, hip->rn,
hipster->buffer_count, hip->init_count, hip->add_count, posted);

raw_index = phba->hbq_get[i];
getidx = le32_to_cpu(raw_index);
-len += snprintf(buf+len, size-len,
+len += snprintf(buf+len, size-len,
"entries:%d bufcnt:%d Put:%d nPut:%d localGet:%d hbaGet:%d\n",
hbqs->entry_count, hbqs->buffer_count, hbqs->hbqPutIdx,
hbqs->next_hbqPutIdx, hbqs->local_hbqGetIdx, getidx);

hbqe = (struct lpfc_hbq_entry *) phba->hbqs[i].hbq_virt;
for (j=0; j<hbqs->entry_count; j++) {
-len += snprintf(buf+len, size-len,
+len += snprintf(buf+len, size-len,
"%03d: %08x %04x %05x ", j,
le32_to_cpu(hbqe->bde.addrLow),
le32_to_cpu(hbqe->bde.tus.w),
@ @ -341,14 +341,16 @ @
low = hbqs->hbqPutIdx - posted;
if (low >= 0) {
if ((j >= hbqs->hbqPutIdx) || (j < low)) {
-len += snprintf(buf+len, size-len, "Unused\n");
+len += snprintf(buf + len, size - len,
+"Unused\n");
goto skipit;
}
}
else {
if ((j >= hbqs->hbqPutIdx) &&
(j < (hbqs->entry_count+low))) {
-len += snprintf(buf+len, size-len, "Unused\n");
+len += snprintf(buf + len, size - len,
+"Unused\n");
goto skipit;
}
}
@ @ -358,7 +360,7 @ @
hbq_buf = container_of(d_buf, struct hbq_dmabuf, dbuf);
phys = ((uint64_t)hbq_buf->dbuf.phys & 0xffffffff);
if (phys == le32_to_cpu(hbqe->bde.addrLow)) {
        -len += snprintf(buf+len, size-len, "Buf%d: %p %06x\n", i, 
        +len += scnprintf(buf+len, size-len, "Buf%d: %p %06x\n", i, 
        hbq_buf->dbuf.virt, hbq_buf->tag);
        found = 1;
        //@ -367,7 +369,7 @@
        i++;}
if (!found) {
        -len += snprintf(buf+len, size-len, "No DMAinfo?\n");
        +len += scnprintf(buf+len, size-len, "No DMAinfo?\n");
}
skipit:
hbqe++;
//@ -413,7 +415,7 @@
off = 0;
spin_lock_irq(&phba->hbalock);

-len += snprintf(buf+len, size-len, "HBA SLIM\n");
+len += scnprintf(buf+len, size-len, "HBA SLIM\n");
lpcf_memcpy_from_slim(buffer, 
phba->MBslimaddr + lpfc_debugfs_last_hba_slim_off, 1024);
//@ -427,7 +429,7 @@
i = 1024;
while (i > 0) {
        -len += snprintf(buf+len, size-len, 
        +len += scnprintf(buf+len, size-len, 
        "%08x: %08x %08x %08x %08x %08x %08x %08x\n", 
        off, *ptr, *(ptr+1), *(ptr+2), *(ptr+3), *(ptr+4), 
        *(ptr+5), *(ptr+6), *(ptr+7));
//@ -471,11 +473,11 @@
off = 0;
spin_lock_irq(&phba->hbalock);

-len += snprintf(buf+len, size-len, "SLIM Mailbox\n");
+len += scnprintf(buf+len, size-len, "SLIM Mailbox\n");
ptr = (uint32_t *)phba->slim2p.virt;
i = sizeof(MAILBOX_t);
while (i > 0) {
        -len += snprintf(buf+len, size-len, 
        +len += scnprintf(buf+len, size-len, 
        "%08x: %08x %08x %08x %08x %08x %08x %08x\n", 
        off, *ptr, *(ptr+1), *(ptr+2), *(ptr+3), *(ptr+4), 
        *(ptr+5), *(ptr+6), *(ptr+7));
off += (8 * sizeof(uint32_t));
}

len += snprintf(buf+len, size-len, "SLIM PCB\n");
+len += scnprintf(buf+len, size-len, "SLIM PCB\n");
ptr = (uint32_t *)phba->pcb;
i = sizeof(PCB_t);
while (i > 0) {
    len += snprintf(buf+len, size-len, "%08x: %08x %08x %08x %08x %08x %08x %08x\n", off, *ptr, *(ptr+1), *(ptr+2), *(ptr+3), *(ptr+4), *(ptr+5), *(ptr+6), *(ptr+7));
    for (i = 0; i < 4; i++) {
        pgpp = &phba->port_gp[i];
        pring = &psli->sli3_ring[i];
        len += snprintf(buf+len, size-len, "Ring %d: CMD GetInx:%d "
                        "(Max:%d Next:%d "
                        "Local:%d flg:x%x)  ", i, pgpp->cmd_getinx, pgpp->cmd_max, pgpp->cmd_next, pring->local, pgpp->cmd_flag);
        word1 = readl(phba->CAregaddr);
        word2 = readl(phba->HSregaddr);
        word3 = readl(phba->HCregaddr);
        len += snprintf(buf+len, size-len, "HA:%08x CA:%08x HS:%08x "
                        "HC:%08x\n", word0, word1, word2, word3);
    }
}
spin_unlock_irq(&phba->hbalock);

cnt = (LPFC_NODELIST_SIZE / LPFC_NODELIST_ENTRY_SIZE);

len += snprintf(buf+len, size-len, "\nFCP Nodelist Entries ...
");
+len += scnprintf(buf+len, size-len, "\nFCP Nodelist Entries ...
");
spin_lock_irq(shost->host_lock);
list_for_each_entry(ndlp, &vport->fc_nodes, nlp_listp) {
    if (!cnt) {
        len += snprintf(buf+len, size-len, "Missing Nodelist Entries\n");
        break;
    }
}

default:

@@ -484,11 +486,11 @@
@@ -501,7 +503,7 @@
@@ -518,7 +520,7 @@
@@ -555,11 +557,11 @@

Open Source Used In 5GaaS Edge AC-4 28031
statep = "UNKNOWN";
"
len += snprintf(buf+len, size-len, "%s DID:x%06x ",
+len += scnprintf(buf+len, size-len, "%s DID:x%06x ",
statep, ndlp->nlp_DID);
-len += snprintf(buf+len, size-len,
+len += scnprintf(buf+len, size-len,
"WWPN x%llx ",
wwn_to_u64(ndlp->nlp_portname.u.wwn));
-len += snprintf(buf+len, size-len,
+len += scnprintf(buf+len, size-len,
"WWNN x%llx ",
wwn_to_u64(ndlp->nlp_nodename.u.wwn));
if (ndlp->nlp_flag & NLP_RPI_REGISTERED)
-len += snprintf(buf+len, size-len, "RPI:%03d ",
+len += scnprintf(buf+len, size-len, "RPI:%03d ",
ndlp->nlp_rpi);
else
-len += snprintf(buf+len, size-len, "RPI:none ");
-len += snprintf(buf+len, size-len, "flag:x%08x ",
+len += scnprintf(buf+len, size-len, "RPI:none ");
+len += snprintf(buf+len, size-len, "flag:x%08x ",
ndlp->nlp_flag);
if (!ndlp->nlp_type)
-len += snprintf(buf+len, size-len, "UNKNOWN_TYPE ");
+len += scnprintf(buf+len, size-len, "UNKNOWN_TYPE ");
if (ndlp->nlp_type & NLP_FC_NODE)
-len += snprintf(buf+len, size-len, "FC_NODE ");
+len += scnprintf(buf+len, size-len, "FC_NODE ");
if (ndlp->nlp_type & NLP_FABRIC)
-len += snprintf(buf+len, size-len, "FABRIC ");
+len += scnprintf(buf+len, size-len, "FABRIC ");
if (ndlp->nlp_type & NLP_FCP_TARGET)
-len += snprintf(buf+len, size-len, "FCP_TGT sid:%d ",
+len += scnprintf(buf+len, size-len, "FCP_TGT sid:%d ",
ndlp->nlp_sid);
if (ndlp->nlp_type & NLP_FCP_INITIATOR)
-len += snprintf(buf+len, size-len, "FCP_INITIATOR ");
+len += scnprintf(buf+len, size-len, "FCP_INITIATOR ");
if (ndlp->nlp_type & NLP_NVME_TARGET)
-len += snprintf(buf+len, size-len, "NVME_TGT sid:%d ",
+len += snprintf(buf+len, size-len, "NVME_TGT sid:%d ",
NLP_NO_SID);
if (ndlp->nlp_type & NLP_NVME_INITIATOR)
-len += snprintf(buf + len,
+len += snprintf(buf + len,
size - len, "NVME_INITIATOR ");
-len += snprintf(buf+len, size-len, "usgmap:%x ",
+len += snprintf(buf+len, size-len, "usgmap:%x ",
ndlp->nlp_usg_map);
-len += snprintf(buf+len, size-len, "refcnt:%x",
+len += snprintf(buf+len, size-len, "refcnt:%x",
kref_read(&ndlp->kref));
-len += snprintf(buf+len, size-len, "\n");
+len += snprintf(buf+len, size-len, "\n");
}
spin_unlock_irq(shost->host_lock);

if (phba->nvmet_support && phba->targetport && (vport == phba->pport)) {

tgtp = (struct lpfc_nvmet_tgtport *)phba->targetport->private;
-len += snprintf(buf + len, size - len,
+len += snprintf(buf + len, size - len,
"NVME Targetport Entry ...
");

/* Port state is only one of two values for now. */
@@ -646,18 +648,18 @@
statep = "REGISTERED";
else
  statep = "INIT";
-len += snprintf(buf + len, size - len,
+len += snprintf(buf + len, size - len,
"TGT WWNN x%llx WWPN x%llx State %s\n",
wwn_to_u64(vport->fc_nodename.u.wwn),
wwn_to_u64(vport->fc_portname.u.wwn),
statep);
-len += snprintf(buf + len, size - len,
+len += snprintf(buf + len, size - len,
" Targetport DID x%06x\n",
phba->targetport->port_id);
goto out_exit;
}

-localport = vport->localport;
@@ -672,11 +674,11 @@
else
  statep = "UNKNOWN ";

-len += snprintf(buf + len, size - len,
+len += snprintf(buf + len, size - len,
"Lport DID x%06x PortState %s\n",
localport->port_id, statep);
-len += snprintf(buf + len, size - len, "\tRport List:
");
+len += scnprintf(buf + len, size - len, "\tRport List:
");
list_for_each_entry(ndlp, &vport->fc_nodes, nlp_listp) {
 /* local short-hand pointer. */
  if (!ndlp->nrport)
    @ @ -698,32 +700,32 @ @
}

/* Tab in to show lport ownership. */
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"\t%s Port ID:x%06x ",
statep, nrport->port_id);
-len += snprintf(buf + len, size - len, "WWPN x%llx ",
+len += scnprintf(buf + len, size - len, "WWPN x%llx ",
nrport->port_name);
-len += snprintf(buf + len, size - len, "WWNN x%llx ",
+len += scnprintf(buf + len, size - len, "WWNN x%llx ",
nrport->node_name);

/* An NVME rport can have multiple roles. */
if (nrport->port_role & FC_PORT_ROLE_NVME_INITIATOR)
  -len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"INITIATOR ");
if (nrport->port_role & FC_PORT_ROLE_NVME_TARGET)
  -len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"TARGET ");
if (nrport->port_role & FC_PORT_ROLE_NVME_DISCOVERY)
  -len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"DISCSRVC ");
if (nrport->port_role & ~(FC_PORT_ROLE_NVME_INITIATOR |
  FC_PORT_ROLE_NVME_TARGET |
  FC_PORT_ROLE_NVME_DISCOVERY))
  -len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"UNKNOWN ROLE x%x",
nrport->port_role);
/* Terminate the string. */
  -len += snprintf(buf + len, size - len, "\n");
+len += scnprintf(buf + len, size - len, "\n");
}

spin_unlock_irq(shost->host_lock);
@ @ -750,6 +752,8 @ @
struct lpfc_hba  *phba = vport->phba;
struct lpfc_nvmet_tgtport *tgtp;
struct lpfc_nvmet_rcv_ctx *ctxxp, *next_ctxp;
+struct nvme_fc_local_port *localport;
+struct lpfc_nvme_lport *lport;
uint64_t tot, data1, data2, data3;
int len = 0;
int cnt;
@@ -758,30 +762,35 @@
if (!phba->targetport)
    return len;
tgtp = (struct lpfc_nvmet_tgtport *)phba->targetport->private;
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"NVME Targetport Statistics\n");

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"LS: Rcv %08x Drop %08x Abort %08x\n",
atomic_read(&tgtp->rcv_ls_req_in),
atomic_read(&tgtp->rcv_ls_req_drop),
atomic_read(&tgtp->xmt_ls_abort));
if (atomic_read(&tgtp->rcv_ls_req_in) !=
atomic_read(&tgtp->rcv_ls_req_out)) {
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"Rcv LS: in %08x != out %08x\n",
atomic_read(&tgtp->rcv_ls_req_in),
atomic_read(&tgtp->rcv_ls_req_out));
}

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"LS: Xmt %08x Drop %08x Cmpl %08x Err %08x\n",
atomic_read(&tgtp->xmt_ls_rsp),
atomic_read(&tgtp->xmt_ls_drop),
atomic_read(&tgtp->xmt_ls_rsp_cmpl),
atomic_read(&tgtp->xmt_ls_rsp_cmpl));
+len += scnprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"Rcv LS: in %08x != out %08x\n",
atomic_read(&tgtp->rcv_ls_req_in),
atomic_read(&tgtp->rcv_ls_req_out));
}
if (atomic_read(&tgtp->rcv_fcp_cmd_in) != atomic_read(&tgtp->rcv_fcp_cmd_out)) {
    len += snprintf(buf + len, size - len, "Rcv FCP: in %08x != out %08x\n",
    atomic_read(&tgtp->rcv_fcp_cmd_in), atomic_read(&tgtp->rcv_fcp_cmd_out));
}

len += snprintf(buf + len, size - len, "FCP Rsp: read %08x readrsp %08x "
    "write %08x rsp %08x\n",
    atomic_read(&tgtp->xmt_fcp_read), atomic_read(&tgtp->xmt_fcp_write),
    atomic_read(&tgtp->xmt_fcp_rsp));

len += snprintf(buf + len, size - len, "FCP Rsp Cmpl: %08x err %08x drop %08x
",
    atomic_read(&tgtp->xmt_fcp_rsp_cmpl), atomic_read(&tgtp->xmt_fcp_rsp_error),
    atomic_read(&tgtp->xmt_fcp_rsp_drop));

len += snprintf(buf + len, size - len, "ABORT: Xmt %08x Cmpl %08x\n",
    atomic_read(&tgtp->xmt_fcp_abort), atomic_read(&tgtp->xmt_fcp_abort_cmpl));

len += snprintf(buf + len, size - len, "ABORT: Sol %08x Unsol %08x Err %08x Cmpl %08x",
    atomic_read(&tgtp->xmt_abort_sol), atomic_read(&tgtp->xmt_abort_unsol),
    atomic_read(&tgtp->xmt_abort_rsp), atomic_read(&tgtp->xmt_abort_cmpl));
atomic_read(&tgtp->xmt_abort_rsp_error));

-len += snprintf(buf + len, size - len, "\n");
+len += scnprintf(buf + len, size - len, "\n");

cnt = 0;
spin_lock(&phba->sli4_hba.abts_nvme_buf_list_lock);
@@ -834,7 +849,7 @@
spin_unlock(&phba->sli4_hba.abts_nvme_buf_list_lock);
if (cnt) {
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"ABORT: %d ctx entries\n", cnt);
spin_lock(&phba->sli4_hba.abts_nvme_buf_list_lock);
list_for_each_entry_safe(ctxp, next_ctxp,
@@ -842,7 +857,7 @@

list) {
if (len >= (size - LPFC_DEBUG_OUT_LINE_SZ))
break;
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"Entry: oxid %x state %x "
"flag %x\n",
ctxp->oxid, ctxp->state,
@@ -849,7 +864,7 @@
tot += atomic_read(&tgtp->xmt_fcp_release);
tot = atomic_read(&tgtp->rcv_fcp_cmd_in) - tot;

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"IO_CTX: %08x  WAIT: cur %08x tot %08x\n" 
"CTX Outstanding %08llx\n",
phba->sli4_hba.nvmet_xri_cnt,
@@ -856,7 +871,7 @@
if (!(phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME))
return len;

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"\nNVME Lport Statistics\n");

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"LS: Xmt %016x Cmpl %016x\n",
atomic_read(&phba->fc4NvmeLsRequests),
atomic_read(&phba->fc4NvmelSRequests);
@@ -880,13 +895,43 @@
data2 = atomic_read(&phba->fc4NvmeOutputRequests);
data3 = atomic_read(&phba->fc4NvmeControlRequests);

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"FCP: Rd %016llx Wr %016llx IO %016llx\n",
data1, data2, data3);

-tot, (data1 + data2 + data3) - tot);
+len += snprintf(buf + len, size - len,
-" Cmpl %016llx Outstanding %016llx\n",
+" Cmpl %016llx Outstanding %016llx\n",
if (!localport)
return len;
+len += scnprintf(buf + len, size - len,
		(len += snprintf(buf + len, size - len,
"LS Xmt Err: Abrt %08x Err %08x "
+"Cmpl Err: xb %08x Err %08x\n",
atomic_read(&lport->xmt_ls_abort),
atomic_read(&lport->xmt_ls_err),
atomic_read(&lport->cmpl_ls_xb),
atomic_read(&lport->cmpl_ls_err));

+len += scnprintf(buf + len, size - len,
+"FCP Xmt Err: noxri %06x nondlp %06x "
+"qdepth %06x wqerr %06x Abrt %06x\n",
atomic_read(&lport->xmt_fcp_noxri),
atomic_read(&lport->xmt_fcp_bad_ndlp),
atomic_read(&lport->xmt_fcp_qdepth),
atomic_read(&lport->xmt_fcp_wqerr),
atomic_read(&lport->xmt_fcp_abort));

+len += scnprintf(buf + len, size - len,
+"FCP Cmpl Err: xb %08x Err %08x\n",
atomic_read(&lport->cmpl_fcp_xb),
atomic_read(&lport->cmpl_fcp_err));
+
}

return len;
@@ -914,58 +959,58 @@
if (phba->nvmet_support == 0) {
  /* NVME Initiator */
  -len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
"ktime %s: Total Samples: %lld
", (phba->ktime_on ? "Enabled" : "Disabled"), phba->ktime_data_samples);
  if (phba->ktime_data_samples == 0)
    return len;

  -len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
"Segment 1: Last NVME Cmd cmpl -to- Start of next NVME cmd (in driver)\n\n"
  -len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
"Segment 2: Driver start of NVME cmd -to- Firmware WQ doorbell\n"
  -len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
"Segment 3: Firmware WQ doorbell -to- MSI-X ISR cmpl\n"
  -len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
"avg:%08lld min:%08lld max %08lld\n",
  div_u64(phba->ktime_seg1_total, phba->ktime_data_samples),
  phba->ktime_seg1_min,
  phba->ktime_seg1_max);
  -len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
"avg:%08lld min:%08lld max %08lld\n",
  div_u64(phba->ktime_seg2_total, phba->ktime_data_samples),
  phba->ktime_seg2_min,
  phba->ktime_seg2_max);
  -len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
  +len += snprintf(buf + len, PAGE_SIZE - len,
"avg:%08lld min:%08lld max %08lld\n",
  div_u64(phba->ktime_seg3_total, phba->ktime_data_samples),
  phba->ktime_seg3_min,
phba->ktime_seg3_max);
-len += snprintf(buf + len, PAGE_SIZE - len, "Segment 4: MSI-X ISR cmpl -to- NVME cmpl done\n");
+len += scnprintf(buf + len, PAGE_SIZE - len, "Segment 4: MSI-X ISR cmpl -to- NVME cmpl done\n");

len += snprintf(buf + len, PAGE_SIZE - len, "avg:%08lld min:%08lld max %08lld\n", div_u64(phba->ktime_seg4_total, phba->ktime_data_samples), phba->ktime_seg4_min, phba->ktime_seg4_max);
-len += snprintf(buf + len, PAGE_SIZE - len, "avg:%08lld min:%08lld max %08lld\n", div_u64(phba->ktime_seg4_total, phba->ktime_data_samples), phba->ktime_seg4_min, phba->ktime_seg4_max);
+len += scnprintf(buf + len, PAGE_SIZE - len, "Total IO avg time: %08lld\n", div_u64(phba->ktime_seg1_total + @@ -977,7 +1022,7 @@
}

/* NVME Target */
-len += snprintf(buf + len, PAGE_SIZE-len, +len += scnprintf(buf + len, PAGE_SIZE-len, "ktime %s: Total Samples: %lld %lld\n", (phba->ktime_on ? "Enabled" : "Disabled"), phba->ktime_data_samples, @@ -985,46 +1030,46 @@
if (phba->ktime_data_samples == 0)
    return len;

-len += snprintf(buf + len, PAGE_SIZE-len, +len += scnprintf(buf + len, PAGE_SIZE-len, "Segment 1: MSI-X ISR Rcv cmd -to- cmd pass to NVME Layer\n");
-len += snprintf(buf + len, PAGE_SIZE-len, +len += scnprintf(buf + len, PAGE_SIZE-len, "Segment 1: MSI-X ISR Rcv cmd -to- cmd pass to NVME Layer\n");
-len += snprintf(buf + len, PAGE_SIZE-len, +len += scnprintf(buf + len, PAGE_SIZE-len, "Segment 2: cmd pass to NVME Layer- -to- Driver rcv cmd OP (action)\n");
-len += snprintf(buf + len, PAGE_SIZE-len, +len += scnprintf(buf + len, PAGE_SIZE-len, "Segment 2: cmd pass to NVME Layer- -to- Driver rcv cmd OP (action)\n");

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len += scnprintf(buf + len, PAGE_SIZE-len, "avg:%08lld min:%08lld max %08lld\n", div_u64(phba->ktime_seg2_total, phba->ktime_data_samples), phba->ktime_seg2_min, phba->ktime_seg2_max);
len += snprintf(buf + len, PAGE_SIZE-len, "Segment 3: Driver rcv cmd OP -to- " "Firmware WQ doorbell: cmd\n");
len += snprintf(buf + len, PAGE_SIZE-len, "avg:%08lld min:%08lld max %08lld\n", div_u64(phba->ktime_seg3_total, phba->ktime_data_samples), phba->ktime_seg3_min, phba->ktime_seg3_max);
len += snprintf(buf + len, PAGE_SIZE-len, "Segment 4: Firmware WQ doorbell: cmd " "Firmware WQ doorbell: cmd\n")
len += snprintf(buf + len, PAGE_SIZE-len, "avg:%08lld min:%08lld max %08lld\n", div_u64(phba->ktime_seg4_total, phba->ktime_data_samples), phba->ktime_seg4_min, phba->ktime_seg4_max);
len += snprintf(buf + len, PAGE_SIZE-len, "Segment 5: MSI-X ISR for cmd cmpl\n")
len += snprintf(buf + len, PAGE_SIZE-len, "avg:%08lld min:%08lld max %08lld\n", div_u64(phba->ktime_seg5_total, phba->ktime_data_samples), phba->ktime_seg5_min, phba->ktime_seg5_max);

if (phba->ktime_status_samples == 0) {
len += snprintf(buf + len, PAGE_SIZE-len, "Total: cmd received by MSI-X ISR " "Total: cmd received by MSI-X ISR\n")
len += snprintf(buf + len, PAGE_SIZE-len, "-to- cmd completed on wire\n")
len += snprintf(buf + len, PAGE_SIZE-len, "avg:%08lld min:%08lld max %08lld\n"
"max %08lld\n",
div_u64(phba->ktime_seg10_total, 
@@ -1045,46 +1090,46 @@ 
return len;
}

-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "Segment 6: NVME layer passed cmd done 
  "-to- Driver rcv rsp status OP\n")
-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "avg:%08lld min:%08lld max %08lld\n",
div_u64(phba->ktime_seg6_total, 
phba->ktime_status_samples),
phba->ktime_seg6_min,
phba->ktime_seg6_max);
-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "Segment 7: Driver rcv rsp status OP 
  "-to- Firmware WQ doorbell: status\n")
-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "avg:%08lld min:%08lld max %08lld\n",
div_u64(phba->ktime_seg7_total, 
phba->ktime_status_samples),
phba->ktime_seg7_min,
phba->ktime_seg7_max);
-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "Segment 8: Firmware WQ doorbell: status" 
  " -to- MSI-X ISR for status cmpl\n")
-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "avg:%08lld min:%08lld max %08lld\n",
div_u64(phba->ktime_seg8_total, 
phba->ktime_status_samples),
phba->ktime_seg8_min,
phba->ktime_seg8_max);
-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "Segment 9: MSI-X ISR for status cmpl  
  "-to- NVME layer passed status done\n")
-len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
  "avg:%08lld min:%08lld max %08lld\n",
div_u64(phba->ktime_seg9_total, 
phba->ktime_status_samples),
phba->ktime_status_samples),
phba->ktime_status_samples),
phba->ktime_seg9_min,
phba->ktime_seg9_max);
len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
"Total: cmd received by MSI-X ISR -to- 
"cmd completed on wire\n");
len += snprintf(buf + len, PAGE_SIZE-len,
+len += scnprintf(buf + len, PAGE_SIZE-len,
"avg:%08lld min:%08lld max %08lld\n",
div_u64(phba->ktime_seg10_total,
phba->ktime_status_samples),
@@ -1119,7 +1164,7 @@
(phba->nvmeio_trc_size - 1);
skip = phba->nvmeio_trc_output_idx;

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"%s IO Trace %s: next_idx %d skip %d size %d
",
(phba->nvmeio_trc_output_idx >= phba->nvmeio_trc_size) { 
phba->nvmeio_trc_output_idx = 0;
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"Trace Complete\n");
goto out;
}
if (len >= (size - LPFC_DEBUG_OUT_LINE_SZ)) { 
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"Trace Continue (%d of %d)\n",
(phba->nvmeio_trc_output_idx,
phba->nvmeio_trc_size);
@@ -1170,18 +1215,18 @@
if (!dtp->fmt)
continue;

-len += snprintf(buf + len, size - len, dtp->fmt,
+len += scnprintf(buf + len, size - len, dtp->fmt,
if (phba->nvmeio_trc_output_idx >= phba->nvmeio_trc_size) { 
phba->nvmeio_trc_output_idx = 0;
-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
"Trace Complete\n");
goto out;
}
dtp->data1, dtp->data2, dtp->data3);

if (phba->nvmeio_trc_output_idx >= phba->nvmeio_trc_size) {
    phba->nvmeio_trc_output_idx = 0;
    -len += snprintf(buf + len, size - len,
    +len += scnprintf(buf + len, size - len,
    "Trace Complete\n");
    goto out;
}

if (len >= (size - LPFC_DEBUG_OUT_LINE_SZ)) {
    -len += snprintf(buf + len, size - len,
    +len += scnprintf(buf + len, size - len,
    "Trace Continue (%d of %d)\n",
    phba->nvmeio_trc_output_idx,
    phba->nvmeio_trc_size);
    @@ -1189,7 +1234,7 @@
    }
}

-len += snprintf(buf + len, size - len,
+len += scnprintf(buf + len, size - len,
    "Trace Done\n");
out:
    return len;
@@ -1221,39 +1266,39 @@
if (phba->nvmet_support == 0) {
    /* NVME Initiator */
    -len += snprintf(buf + len, PAGE_SIZE - len,
    +len += scnprintf(buf + len, PAGE_SIZE - len,
    "CPUcheck %s
",
    (phba->cpucheck_on & LPFC_CHECK_NVME_IO ?
    "Enabled" : "Disabled"));
    for (i = 0; i < phba->sli4_hba.num_present_cpu; i++) {
        if (i >= LPFC_CHECK_CPU_CNT)
            break;
        -len += snprintf(buf + len, PAGE_SIZE - len,
        +len += scnprintf(buf + len, PAGE_SIZE - len,
        "%02d: xmit x%08x cmpl x%08x\n",
        i, phba->cpucheck_xmt_io[i],
        phba->cpucheck_cmpl_io[i]);
        tot_xmt += phba->cpucheck_xmt_io[i];
        tot_cmpl += phba->cpucheck_cmpl_io[i];
    }
    -len += snprintf(buf + len, PAGE_SIZE - len,
    +len += scnprintf(buf + len, PAGE_SIZE - len,
    "tot:xmit x%08x cmpl x%08x\n",
    tot_xmt, tot_cmpl);
tot_xmt, tot_cmpl);
return len;
}

/* NVME Target */
-len += snprintf(buf + len, PAGE_SIZE - len, "CPUcheck %s 
",
(phba->cpucheck_on & LPFC_CHECK_NVMET_IO ? "IO Enabled - " : "IO Disabled - ");
-len += snprintf(buf + len, PAGE_SIZE - len, "%s
",
(phba->cpucheck_on & LPFC_CHECK_NVMET_RCV ? "Rcv Enabled
" : "Rcv Disabled
"));
for (i = 0; i < phba->sli4_hba.num_present_cpu; i++) {
if (i >= LPFC_CHECK_CPU_CNT)
break;
-len += snprintf(buf + len, PAGE_SIZE - len, "%02d: xmit x%08x ccmpl x%08x cmpl x%08x rcv x%08x
",
i, phba->cpucheck_xmt_io[i],
@@ -1265,7 +1310,7 @@
tot_cmpl += phba->cpucheck_cmpl_io[i];
tot_cmpl += phba->cpucheck_cmpl_io[i];
}
-len += snprintf(buf + len, PAGE_SIZE - len, "%02d: xmit x%08x ccmpl x%08x cmpl x%08x rcv x%08x
",
tot_xmt, tot_ccmpl, tot_cmpl, tot_rcv);
return len;
@@ -1710,28 +1755,29 @@
int cnt = 0;

if (dent == phba->debug_writeGuard)
-cnt = snprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_wgrd_cnt);
+cnt = scnprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_wgrd_cnt);
else if (dent == phba->debug_writeApp)
-cnt = snprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_wapp_cnt);
+cnt = scnprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_wapp_cnt);
else if (dent == phba->debug_writeRef)
-cnt = snprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_wref_cnt);
+cnt = scnprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_wref_cnt);
else if (dent == phba->debug_readGuard)
-cnt = snprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_rgrd_cnt);
+cnt = scnprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_rgrd_cnt);
else if (dent == phba->debug_readApp)
cnt = snprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_rapp_cnt);
+cnt = scnprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_rapp_cnt);
else if (dent == phba->debug_readRef)
- cnt = snprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_rref_cnt);
+ cnt = scnprintf(cbuf, 32, "%u\n", phba->lpfc_injerr_rref_cnt);
else if (dent == phba->debug_InjErrNPortID)
- cnt = snprintf(cbuf, 32, "0x%06x\n", phba->lpfc_injerr_nportid);
+ cnt = scnprintf(cbuf, 32, "0x%06x\n",
+ phba->lpfc_injerr_nportid);
else if (dent == phba->debug_InjErrWWPN) {
 memcpy(&tmp, &phba->lpfc_injerr_wwpn, sizeof(struct lpfc_name));
tmp = cpu_to_be64(tmp);
- cnt = snprintf(cbuf, 32, "0x%016llx\n", tmp);
+ cnt = scnprintf(cbuf, 32, "0x%016llx\n", tmp);
} else if (dent == phba->debug_InjErrLBA) {
if (phba->lpfc_injerr_lba == (sector_t)(-1))
- cnt = snprintf(cbuf, 32, "off\n");
+ cnt = scnprintf(cbuf, 32, "off\n");
else
- cnt = snprintf(cbuf, 32, "0x%llx\n",
+ cnt = scnprintf(cbuf, 32, "0x%llx\n",
(stdint_t) phba->lpfc_injerr_lba);
} else
lpfc_printf_log(phba, KERN_ERR, LOG_INIT, 
@@ -1753,7 +1799,7 @@
 memset(dstbuf, 0, 33);
 size = (nbytes < 32) ? nbytes : 32;
 if (copy_from_user(dstbuf, buf, size))
- return 0;
+ return -EFAULT;

 if (dent == phba->debug_InjErrLBA) {
 if ((buf[0] == 'o') && (buf[1] == 'f') && (buf[2] == 'f'))
@@ -1761,7 +1807,7 @@
 } 
 if ((tmp == 0) && (kstrtoull(dstbuf, 0, &tmp)))
- return 0;
+ return -EINVAL;

 if (dent == phba->debug_writeGuard)
 phba->lpfc_injerr_wgrd_cnt = (uint32_t)tmp;
@@ -2537,17 +2583,17 @@
 switch (count) {
 case SIZE_U8: /* byte (8 bits) */
 pci_read_config_byte(pdev, where, &u8val);
-len += snprintf(pbuffer+len, LPFC_PCI_CFG_SIZE-len, 
+len += scnprintf(pbuffer+len, LPFC_PCI_CFG_SIZE-len, 

/** Read PCI config space **/
[len += snprintf(pbuffer+len, LPFC_PCI_CFG_SIZE-len,
"%03x: ", offset_label); 
while (index > 0) {
pci_read_config_dword(pdev, offset, &u32val);
[len += snprintf(pbuffer+len, LPFC_PCI_CFG_SIZE-len,
"%08x ", u32val);
offset += sizeof(uint32_t);
if (offset >= LPFC_PCI_CFG_SIZE) {
(len += snprintf(pbuffer+len, LPFC_PCI_CFG_SIZE-len,
"\n");
break;
}
index -= sizeof(uint32_t);
if (!index)
+offset_label += (8 * sizeof(uint32_t));
else if (!((index % (8 * sizeof(uint32_t))))) {
+offset_label += (8 * sizeof(uint32_t));
[len += snprintf(pbuffer+len, LPFC_PCI_CFG_SIZE-len,
"\n%03x: ", offset_label);
}
}
@@ -2567,25 +2613,25 @@
offset = offset_label;

if (acc_range == SINGLE_WORD) {
offset_run = offset;
u32val = readdir(mem_mapped_bar + offset_run);
-len += snprintf(pbuffer+len, LPFC_PCI_BAR_RD_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_PCI_BAR_RD_BUF_SIZE-len,
"%05x: %08x\n", offset_run, u32val);
} else
go to baracc_browse;
@@ -2870,35 +2916,35 @@
offset_run = offset_label;

/* Read PCI bar memory mapped space */
-len += snprintf(pbuffer+len, LPFC_PCI_BAR_RD_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_PCI_BAR_RD_BUF_SIZE-len,
"%05x: ", offset_label);
index = LPFC_PCI_BAR_RD_SIZE;
while (index > 0) {
 u32val = readdir(mem_mapped_bar + offset_run);
-len += snprintf(pbuffer+len, LPFC_PCI_BAR_RD_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_PCI_BAR_RD_BUF_SIZE-len,
"%08x ", u32val);
 offset_run += sizeof(uint32_t);
if (acc_range == LPFC_PCI_BAR_BROWSE) {
 if (offset_run >= bar_size) {
 -len += snprintf(pbuffer+len,
+len += snprintf(pbuffer+len,
LPFC_PCI_BAR_RD_BUF_SIZE-len, "\n");
break;
 }
 } else {
 if (offset_run >= offset +
 (acc_range * sizeof(uint32_t))) {
 -len += snprintf(pbuffer+len,
+len += snprintf(pbuffer+len,
LPFC_PCI_BAR_RD_BUF_SIZE-len, "\n");
break;
 }
 }
index -= sizeof(uint32_t);
if (!index)
-len += snprintf(pbuffer+len,
+len += snprintf(pbuffer+len,
LPFC_PCI_BAR_RD_BUF_SIZE-len, "\n");
else if (!index % (8 * sizeof(uint32_t)))) {
 offset_label += (8 * sizeof(uint32_t));
-len += snprintf(pbuffer+len,
+len += snprintf(pbuffer+len,
LPFC_PCI_BAR_RD_BUF_SIZE-len,
"\n%05x: ", offset_label);
if (!qp)
return len;

-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"\t\t%s WQ info: ", qtype);
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"AssocCQID[%04d]: WQ-STAT[oflow:x%e posted:x%llx]\n", 
qp->assoc_qid, qp->q_cnt_1, 
(unsigned long long)qp->q_cnt_4);
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"\t\tWQID[%02d], QE-CNT[%04d], QE-SZ[%04d], 
HST-IDX[%04d], PRT-IDX[%04d], PST[%03d]", 
qp->queue_id, qp->entry_count, 
qp->hba_index, qp->entry_repost);
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"\n");
return len;
}

if (!qp)
return len;

-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"\t\t%s CQ info: ", cqtype);
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"AssocEQID[%02d]: CQ STAT[max:x%e relw:x%e 
xabt:x%e wq:x%llx]\n", 
qp->assoc_qid, qp->q_cnt_1, qp->q_cnt_2, 
(unsigned long long)qp->q_cnt_4);
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"\t\tCQID[%02d], QE-CNT[%04d], QE-SZ[%04d], 
HST-IDX[%04d], PRT-IDX[%04d], PST[%03d]", 
qp->queue_id, qp->entry_count, 
qp->hba_index, qp->entry_repost);
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
"\n");
return len;
return len;
}
@@ -3147,19 +3193,19 @@
if (!qp || !datqp)
    return len;

    -len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
        "\"%s RQ info: ", rqtype);
    -len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
        \"AssocCQID[%02d]: RQ-STAT[nopost:x%x nobuf:x%x "
        \"posted:x%x rev:x%lx]\n",
        qp->assoc_qid, qp->q_cnt_1, qp->q_cnt_2,
        qp->q_cnt_3, (unsigned long long)qp->q_cnt_4);
    -len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
        \"HQID[%02d], QE-CNT[%04d], QE-SZ[%04d], "
        \"HST-IDX[%04d], PRT-IDX[%04d], PST[%03d]\n",
        qp->queue_id, qp->entry_count, qp->entry_size,
        qp->host_index, qp->hba_index, qp->entry_repost);
    -len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
        \"DQID[%02d], QE-CNT[%04d], QE-SZ[%04d], "
        \"HST-IDX[%04d], PRT-IDX[%04d], PST[%03d]\n",
        datqp->queue_id, datqp->entry_count, datqp->entry_size,
    }
+len += scnprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, "EQID[%02d], QE-CNT[%04d], QE-SZ[%04d], ",
"HST-IDX[%04d], PRT-IDX[%04d], PST[%03d],",
qp->queue_id, qp->entry_count, qp->entry_size,
qp->host_index, qp->hba_index, qp->entry_repost);
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, "\n");
+len += scnprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, "\n");
return len;
}
@@ -3312,7 +3358,7 @@
if (phba->cfg_fof == 0)
phba->lpfc_idiag_last_eq = 0;
-len += snprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, 
+len += scnprintf(pbuffer + len, LPFC_QUE_INFO_GET_BUF_SIZE - len, "EQ %d out of %d HBA EQs\n",
"EQ %\d out of %\d HBA EQs\n",
"EQ %d out of %d HBA EQs\n",
x, phba->io_channel_irqs);
@@ -3366,6 +3412,12 @@
if (len >= max_cnt)
goto too_big;
+qp = phba->sli4_hba.hdr_rq;
+len = __lpfc_idiag_print_rqpair(qp, phba->sli4_hba.dat_rq, 
+"ELS RQpair", pbuffer, len);
+if (len >= max_cnt)
+goto too_big;
+/* Slow-path NVME LS response CQ */
qp = phba->sli4_hba.nvmels_cq;
len = __lpfc_idiag_print_cq(qp, "NVME LS",
@@ -3383,12 +3435,6 @@
if (len >= max_cnt)
goto too_big;
-qp = phba->sli4_hba.hdr_rq;
-len = __lpfc_idiag_print_rqpair(qp, phba->sli4_hba.dat_rq,
-"RQpair", pbuffer, len);
-if (len >= max_cnt)
-goto too_big;
-
-goto out;
}
@@ -3425,7 +3471,7 @@
return simple_read_from_buffer(buf, nbytes, ppos, pbuffer, len);
too_big:
-len += snprintf(pbuffer + len,
+len += scnprintf(pbuffer + len,
LPFC_QUE_INFO_GET_BUF_SIZE - len, "Truncated ...
"));
out:
spin_unlock_irq(&phba->hbalock);
@@ -3481,22 +3527,22 @@
return 0;
esize = pque->entry_size;
-len += snprintf(pbuffer+len, LPFC_QUE_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_QUE_ACC_BUF_SIZE-len,
"QE-INDEX[%04d]:
", index);
offset = 0;
pentry = pque->qe[index].address;
while (esize > 0) {
-len += snprintf(pbuffer+len, LPFC_QUE_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_QUE_ACC_BUF_SIZE-len,
"%08x ", *pentry);
pentry++;
offset += sizeof(uint32_t);
esize -= sizeof(uint32_t);
if (esize > 0 && !(offset % (4 * sizeof(uint32_t))))
-len += snprintf(pbuffer+len,
+len += scnprintf(pbuffer+len, LPFC_QUE_ACC_BUF_SIZE-len, "\n"));
}
-len += snprintf(pbuffer+len, LPFC_QUE_ACC_BUF_SIZE-len, "\n"));
+len += scnprintf(pbuffer+len, LPFC_QUE_ACC_BUF_SIZE-len, "\n"));
return len;
}
@@ -3901,23 +3947,28 @@
return 0;
switch (drbregid) {
-case LPFC_DRB_EQCQ:
-len += snprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
-"EQCQ-DRB-REG: 0x%08x\n",
-readl(phba->sli4_hba.EQCQDBregaddr));
+case LPFC_DRB_EQ:
+len += scnprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
+"EQ-DRB-REG: 0x%08x\n",
+readl(phba->sli4_hba.EQDBregaddr));
+break;
+case LPFC_DRB_CQ:
+len += scnprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE - len,
"CQ-DRB-REG: 0x%08x\n",
+readl(phba->sli4_hba.CQDBregaddr));
break;

case LPFC_DRB_MQ:
-len += snprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
"MQ-DRB-REG: 0x%08x\n",
readl(phba->sli4_hba.MQDBregaddr));
break;

case LPFC_DRB_WQ:
-len += snprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
"WQ-DRB-REG: 0x%08x\n",
readl(phba->sli4_hba.WQDBregaddr));
break;

case LPFC_DRB_RQ:
-len += snprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_DRB_ACC_BUF_SIZE-len,
"RQ-DRB-REG: 0x%08x\n",
readl(phba->sli4_hba.RQDBregaddr));
break;

@@ -4043,8 +4094,11 @@
idiag.cmd.opcode == LPFC_IDIAG_CMD_DRBACC_ST ||
idiag.cmd.opcode == LPFC_IDIAG_CMD_DRBACC_CL) {
switch (drb_reg_id) {
-case LPFC_DRB_EQCQ:
-case LPFC_DRB_EQ:
+case LPFC_DRB_EQ:
	+drb_reg = phba->sli4_hba.EQDBregaddr;
+break;
+}
-case LPFC_DRB_CQ:
+case LPFC_DRB_CQ:
+drb_reg = phba->sli4_hba.CQDBregaddr;
+break;
+case LPFC_DRB_MQ:
+drb_reg = phba->sli4_hba.MQDBregaddr;
@@ -4104,37 +4158,37 @@
switch (ctlregid) {
-case LPFC_CTL_PORT_SEM:
-case LPFC_CTL_PORT_STA:
+case LPFC_CTL_PORT_STA:
+}
"Port StaReg:  0x%08x\n",
readl(phba->sli4_hba.conf_regs_memmap_p +
    LPFC_CTL_PORT_STA_OFFSET));
break;
case LPFC_CTL_PORT_CTL:
    -len += snprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
"Port CtlReg:   0x%08x\n",
readl(phba->sli4_hba.conf_regs_memmap_p +
    LPFC_CTL_PORT_CTL_OFFSET));
break;
case LPFC_CTL_PORT_ER1:
    -len += snprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
"Port Er1Reg:   0x%08x\n",
readl(phba->sli4_hba.conf_regs_memmap_p +
    LPFC_CTL_PORT_ER1_OFFSET));
break;
case LPFC_CTL_PORT_ER2:
    -len += snprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
"Port Er2Reg:   0x%08x\n",
readl(phba->sli4_hba.conf_regs_memmap_p +
    LPFC_CTL_PORT_ER2_OFFSET));
break;
case LPFC_CTL_PDEV_CTL:
    -len += snprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_CTL_ACC_BUF_SIZE-len,
"PDev CtlReg:   0x%08x\n",
readl(phba->sli4_hba.conf_regs_memmap_p +
    LPFC_CTL_PDEV_CTL_OFFSET));
@@ -4327,13 +4381,13 @@
mbx_dump_cnt = idiag.cmd.data[IDIAG_MBXACC_DPCNT_INDX];
mbx_word_cnt = idiag.cmd.data[IDIAG_MBXACC_WDCNT_INDX];

    -len += snprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
"mbx_dump_map: 0x%08x\n", mbx_dump_map);
    -len += snprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
"mbx_dump_cnt: %04d\n", mbx_dump_cnt);
    -len += snprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
"mbx_word_cnt: %04d\n", mbx_word_cnt);
    -len += snprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
+    len += scnprintf(pbuffer+len, LPFC_MBX_ACC_BUF_SIZE-len,
"mbx_mbox_cmd: 0x%02x\n", mbx_mbox_cmd);
return len;
@@ -4482,35 +4536,35 @@
{

uint16_t ext_cnt, ext_size;

-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nAvailable Extents Information:\n");
lpfc_sli4_get_avail_extnt_rsrc(phba, LPFC_RSC_TYPE_FCOE_VPI,
 &ext_cnt, &ext_size);
-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"Count %3d, Size %3d\n", ext_cnt, ext_size);

-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nPort Available VFI extents: ");
lpfc_sli4_get_avail_extnt_rsrc(phba, LPFC_RSC_TYPE_FCOE_VFI,
 &ext_cnt, &ext_size);
-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"Count %3d, Size %3d\n", ext_cnt, ext_size);

-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nPort Available RPI extents: ");
lpfc_sli4_get_avail_extnt_rsrc(phba, LPFC_RSC_TYPE_FCOE_RPI,
 &ext_cnt, &ext_size);
-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"Count %3d, Size %3d\n", ext_cnt, ext_size);

-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nPort Available XRI extents: ");
lpfc_sli4_get_avail_extnt_rsrc(phba, LPFC_RSC_TYPE_FCOE_XRI,
 &ext_cnt, &ext_size);
-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"Count %3d, Size %3d\n", ext_cnt, ext_size);

return len;
@@ -4534,55 +4588,55 @@
uint16_t ext_cnt, ext_size;
int rc;

len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nAllocated Extents Information:\n");

len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nHost Allocated VPI extents: ");
rc = lpfc_sli4_get_allocated_extnts(phba, LPFC_RSC_TYPE_FCOE_VPI,
&ext_cnt, &ext_size);
if (!rc)
	len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"Port %d Extent %3d, Size %3d\n",
phba->brd_no, ext_cnt, ext_size);
else
	len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"N/A\n");

len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nHost Allocated VFI extents: ");
rc = lpfc_sli4_get_allocated_extnts(phba, LPFC_RSC_TYPE_FCOE_VFI,
&ext_cnt, &ext_size);
if (!rc)
	len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"Port %d Extent %3d, Size %3d\n",
phba->brd_no, ext_cnt, ext_size);
else
	len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"N/A\n");

len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nHost Allocated RPI extents: ");
rc = lpfc_sli4_get_allocated_extnts(phba, LPFC_RSC_TYPE_FCOE_RPI,
&ext_cnt, &ext_size);
if (!rc)
	len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"Port %d Extent %3d, Size %3d\n",
phba->brd_no, ext_cnt, ext_size);
else
	len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"N/A\n");
len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len, "N/A\n");

len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len, "\tHost Allocated XRI extents: ");
rc = lpfc_sli4_get_allocated_extnts(phba, LPFC_RSC_TYPE_FCOE_XRI,
    &ext_cnt, &ext_size);
if (!rc)
    
    len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
	Port %d Extent %3d, Size %3d\n",
    phba->brd_no, ext_cnt, ext_size);
else
    
    len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len, "N/A\n");

    return len;
@@ -4606,49 +4660,49 @@
struct lpfc_rsrc_blks *rsrc_blks;
int index;

-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nDriver Extents Information:\n");

-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\tVPI extents:\n";
index = 0;
list_for_each_entry(rsrc_blks, &phba->lpfc_vpi_blk_list, list) { 
-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,  
"\t\tBlock %3d: Start %4d, Count %4d\n",
    index, rsrc_blks->rsrc_start,
    rsrc_blks->rsrc_size);
index++;
}
-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\t\tVFI extents:\n";
index = 0;
list_for_each_entry(rsrc_blks, &phba->sli4_hba.lpfc_vfi_blk_list, 
    list) { 
-len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += scnprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len, 
"\t\tBlock %3d: Start %4d, Count %4d\n",

index, rsrclangs->rsrc_start,
rsrclangs->rsrc_size);
index++;
}

len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nRPI extents:\n");
index = 0;
list_for_each_entry(rsrclangs, &phba->sli4_hba.lpfc_rpi_blk_list,
list) {
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\t\tBlock %3d: Start %4d, Count %4d\n",
index, rsrclangs->rsrc_start,
rsrclangs->rsrc_size);
index++;
}

len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\nXRI extents:\n");
index = 0;
list_for_each_entry(rsrclangs, &phba->sli4_hba.lpfc_xri_blk_list,
list) {
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
+len += snprintf(pbuffer+len, LPFC_EXT_ACC_BUF_SIZE-len,
"\t\tBlock %3d: Start %4d, Count %4d\n",
index, rsrclangs->rsrc_start,
rsrclangs->rsrc_size);
@@ -5042,11 +5096,11 @@
if (i != 0)
pr_err("%s\n", line_buf);
len = 0;
+len += snprintf(line_buf+len,
+len += snprintf(line_buf+len,
LPFC_MBX_ACC_LBUF_SZ-len,
"%03d: ", i);
}
+len += snprintf(line_buf+len,
+len += snprintf(line_buf+len,
LPFC_MBX_ACC_LBUF_SZ-len,
"%08x ", (uint32_t)*pword);
pword++;
}@ @ -5109,11 +5163,11 @@
pr_err("%s\n", line_buf);
len = 0;
memset(line_buf, 0, LPFC_MBX_ACC_LBUF_SZ);
len += snprintf(line_buf+len,
        len += scnprintf(line_buf+len,
          LPFC_MBX_ACC_LBUF_SZ-len,
            "%03d: ", i);
        }
len += snprintf(line_buf+len,
        len += scnprintf(line_buf+len,
          LPFC_MBX_ACC_LBUF_SZ-len,
            "%08x ",
          ((uint32_t)*pword) & 0xffffffff);
pword++;
@@ -5132,18 +5186,18 @@
        len = 0;
mempzero(line_buf, 0, LPFC_MBX_ACC_LBUF_SZ);
len += snprintf(line_buf+len,
        len += scnprintf(line_buf+len,
          LPFC_MBX_ACC_LBUF_SZ-len,
            "%03d: ", i);
        }
for (j = 0; j < 4; j++) {
        len += snprintf(line_buf+len,
            len += scnprintf(line_buf+len,
              LPFC_MBX_ACC_LBUF_SZ-len,
                "%02x",
              ((uint8_t)*pbyte) & 0xff);
pbyte++;
        }
len += snprintf(line_buf+len,
        len += scnprintf(line_buf+len,
          LPFC_MBX_ACC_LBUF_SZ-len, " ");
    }
if ((i - 1) % 8)
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_debugfs.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_debugfs.h
@@ -126,12 +126,13 @@
#define LPFC_DRB_ACC_WR_CMD_ARG 2
#define LPFC_DRB_ACC_BUF_SIZE 256
-#define LPFC_DRB_EQCQ 1
+#define LPFC_DRB_EQCQ 1

---
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#define LPFC_DRB_MQ  2
#define LPFC_DRB_WQ  3
#define LPFC_DRB_RQ  4
+#define LPFC_DRB_EQ  1
+#define LPFC_DRB_CQ  2
+#define LPFC_DRB_MQ  3
+#define LPFC_DRB_WQ  4
+#define LPFC_DRB_RQ  5

-#define LPFC_DRB_MAX  4
+#define LPFC_DRB_MAX  5

define IDIAG_DRBACC_REGID_INDX 0
define IDIAG_DRBACC_VALUE_INDX 1
@@ -341,7 +342,7 @@
pword = q->qe[idx].address;

    len = 0;
-    len += snprintf(line_buf+len, LPFC_LBUF_SZ-len, "QE[%04d]: ", idx);
+    len += scnprintf(line_buf+len, LPFC_LBUF_SZ-len, "QE[%04d]: ", idx);
    if (qe_word_cnt > 8)
        printk(KERN_ERR "\%s\n", line_buf);
@@ -352,11 +353,11 @@
    if (qe_word_cnt > 8) {
        len = 0;
        memset(line_buf, 0, LPFC_LBUF_SZ);
-        len += snprintf(line_buf+len, LPFC_LBUF_SZ-len, 
+        len += scnprintf(line_buf+len, LPFC_LBUF_SZ-len, 
                "%03d: ", i);
        }
    }
-    len += snprintf(line_buf+len, LPFC_LBUF_SZ-len, "%08x ",
+    len += scnprintf(line_buf+len, LPFC_LBUF_SZ-len, "%08x ",
         ((uint32_t)*pword) & 0xffffffff);
    pword++;
}

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_disc.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_disc.h
@@ -134,6 +134,8 @@
    struct lpfc_scsicmd_bkt *lat_data; /* Latency data */
    uint32_t fc4_prli_sent;
    uint32_t upcall_flags;
+#define NLP_WAIT_FOR_UNREG    0x1

    uint32_t nvme_fb_size; /* NVME target's supported byte cnt */
#define NVME_FB_BIT_SHIFT 9    /* PRLI Rsp first burst in 512B units. */

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_els.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_els.c
@@ -1,7 +1,7 @@
/*****************************
 * This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. *
 -* Copyright (C) 2017 Broadcom. All Rights Reserved. The term Broadcom refers to Broadcom Limited and/or its subsidiaries. *
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 * EMULEX and SLI are trademarks of Emulex. *
 @ @ -242.6 +242.8 @@
icmd->ulpCommand = CMD_ELS_REQUEST64_CR;
if (elscmd == ELS_CMD_FLOGI)
icmd->ulpTimeout = FF_DEF_RATOV * 2;
+else if (elscmd == ELS_CMD_LOGO)
+icmd->ulpTimeout = phba->fc_ratov;
else
icmd->ulpTimeout = phba->fc_ratov * 2;
] else {
@@ -858,6 +860,9 @@
vport->fc_flag |= FC_PT2PT;
spin_unlock_irq(shost->host_lock);

+/* If we are pt2pt with another NPort, force NPIV off! */
+phba->sli3_options &= ~LPFC_SLI3_NPIV_ENABLED;
+
+/* If physical FC port changed, unreg VFI and ALL VPIs / RPIs */
if ((phba->sli_rev == LPFC_SLI_REV4) && phba->fc_topology_changed) {
lpcf_unregister_fcf_prep(phba);
@@ -916,28 +921,29 @@
sp
+} else {
+mbox = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
+if (!mbox)
+goto fail;
+
+lpfc_config_link(phba, mbox);
+
+mbx_cmpl = lpfc_mbx_cmpl_local_config_link;
+mbx->vport = vport;
+rc = lpfc_sli_issue_mbox(phba, mbox, MBX_NOWAIT);
+if (rc == MBX_NOT_FINISHED) {
+mempool_free(mbox, phba->mbox_mem_pool);
+goto fail;
+} else {
/* This side will wait for the PLOGI, decrement ndlp reference
  * count indicating that ndlp can be released when other
  * references to it are done.
  */
lfc_nlp_put(ndlp);

-/* If we are pt2pt with another NPort, force NPIV off */
-phba->sli3_options &= ~LPFC_SLI3_NPIV_ENABLED;
-
mbox = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
-if (!mbox)
-goto fail;
-
lfc_config_link(phba, mbox);
-
mbox->mbox_cmpl = lfc_mbx_cmpl_local_config_link;
-mbox->vport = vport;
-rc = lfc_sli_issue_mbox(phba, mbox, MBX_NOWAIT);
-if (rc == MBX_NOT_FINISHED) {
-mempool_free(mbox, phba->mbox_mem_pool);
-goto fail;
+/* Start discovery - this should just do CLEAR_LA */
+lfc_disc_start(vport);
}

return 0;
@@ -1030,30 +1036,31 @@

stop_rr_fcf_flogi:
/* FLOGI failure */
-lfc_printf_vlog(vport, KERN_ERR, LOG_ELS,
-"2858 FLOGI failure Status:x%x/x%x TMO:x%x 
-"Data x%x x%x\n",
-irsp->ulpStatus, irsp->un.ulpWord[4],
-irsp->ulpTimeout, phba->hba_flag,
-phba->fcf.fcf_flag);
+if (!(irsp->ulpStatus == IOSTAT_LOCAL_REJECT &&
+  IOERR_LOOP_OPEN_FAILURE)))
+lfc_printf_vlog(vport, KERN_ERR, LOG_ELS,
+"2858 FLOGI failure Status:x%x/x%x 
+"TMO:x%x Data x%x x%x\n",
+irsp->ulpStatus, irsp->un.ulpWord[4],
+irsp->ulpTimeout, phba->hba_flag,
+phba->fcf.fcf_flag);
/* Check for retry */
if (lpfc_els_retry(phba, cmdiocb, rspiocb))
goto out;

/* FLOGI failure */
-lpfc_printf_vlog(vport, KERN_ERR, LOG_ELS,
"0100 FLOGI failure Status:x%x/x%x x%x TMO:x%x\n",
- irsp->ulpStatus, irsp->un.ulpWord[4],
- irsp->ulpTimeout);
-
/* If this is not a loop open failure, bail out */
if (!(irsp->ulpStatus == IOSTAT_LOCAL_REJECT &&
- IOERR_LOOP_OPEN_FAILURE))
goto flogifail;

+lpfc_printf_vlog(vport, KERN_WARNING, LOG_ELS,
+ "0150 FLOGI failure Status:x%x/x%x xri x%x TMO:x%x\n",
+ irsp->ulpStatus, irsp->un.ulpWord[4],
+ cmdiocb->sli4_xritag, irsp->ulpTimeout);
+
/* FLOGI failed, so there is no fabric */
spin_lock_irq(shost->host_lock);
vport->fc_flag &= ~(FC_FABRIC | FC_PUBLIC_LOOP);
@@ -1106,7 +1113,8 @@
/* FLOGI completes successfully */
lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS,
"0101 FLOGI completes successfully, I/O tag:x%x, "
- "Data: x%x x%x x%x xri x%x x%x x%x \n",
- cmdiocb->iotag,
+ "xri x%x Data: x%x x%x x%x x%x x%x \n",
+ cmdiocb->iotag, cmdiocb->sli4_xritag,
+ cmdiocb->sli4_xritag,
+ irsp->un.ulpWord[4], sp->cmn.e_d_tov,
+ sp->cmn.w2.r_a_tov, sp->cmn.edtovResolution,
+ vport->port_state, vport->fc_flag);
@@ -1150,6 +1158,7 @@
phba->fcf.fcf_flag &= ~FCF_DISCOVERY;
phba->hba_flag &= ~(FCF_RR_INPROG | HBA_DEVLOSS_TMO);
spin_unlock_irq(&phba->hbalock);
+phba->fcf.fcf_redisc_attempted = 0; /* reset */
goto out;
}
if (!rc) {
@@ -1164,8 +1173,18 @@
phba->fcf.fcf_flag &= ~FCF_DISCOVERY;
phba->hba_flag &= ~(FCF_RR_INPROG | HBA_DEVLOSS_TMO);
spin_unlock_irq(&phba->hbalock);
+phba->fcf.fcf_redisc_attempted = 0; /* reset */
}}
goto out;
}
} else if (vport->port_state > LPFC_FLOGI &&
+ vport->fc_flag & FC_PT2PT) {
+ /*
+ * In a p2p topology, it is possible that discovery has
+ * already progressed, and this completion can be ignored.
+ * Recheck the indicated topology.
+ */
+ if (!sp->cmn.fPort)
+ goto out;
}

flogifail:
@@ -1333,6 +1352,8 @@
Fabric_DID);

pring = lpfc_phba_elsring(phba);
+if (unlikely(!pring))
+return -EIO;

/*
 * Check the txcmplq for an iocb that matches the nport the driver is
@@ -1546,8 +1567,10 @@
*/
new_ndlp = lpfc_findnode_wwpn(vport, &sp->portName);

+/* return immediately if the WWPN matches ndlp */
if (new_ndlp == ndlp && &NLP_CHK_NODE_ACT(new_ndlp))
    return ndlp;
+
if (phba->sli_rev == LPFC_SLI_REV4) {
    active_rrqs_xri_bitmap = mempool_alloc(phba->active_rrq_pool,
        GFP_KERNEL);
@@ -1556,9 +1579,13 @@
        phba->cfg_rrq_xri_bitmap_sz);
}

-lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS,
    - "3178 PLOGI confirm: ndlp %p x%x: new_ndlp %p\n",
    - ndlp, ndlp->nlp_DID, new_ndlp);
+lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS | LOG_NODE,
+    "3178 PLOGI confirm: ndlp x%x x%x x%x: "
+    "new_ndlp x%x x%x x%x\n",
+    ndlp->nlp_DID, ndlp->nlp_flag, ndlp->nlp_fc4_type,
+    (new_ndlp ? new_ndlp->nlp_DID : 0),
+    (new_ndlp ? new_ndlp->nlp_flag : 0),
+    (new_ndlp ? new_ndlp->nlp_fc4_type : 0));
if (!new_ndlp) {
    rc = memcmp(&ndlp->nlp_portname, name, phba->cfg_rrq_xri_bitmap_sz);
}

/* At this point in this routine, we know new_ndlp will be
* returned. however, any previous GID_FTs that were done
* would have updated nlp_fc4_type in ndlp, so we must ensure
* new_ndlp has the right value.
* */
+if (vport->fc_flag & FC_FABRIC)
+new_ndlp->nlp_fc4_type = ndlp->nlp_fc4_type;
+lpfc_unreg_rpi(vport, new_ndlp);
+new_ndlp->nlp_DID = ndlp->nlp_DID;
+new_ndlp->nlp_prev_state = ndlp->nlp_prev_state;
@@ -1670,6 +1705,7 @@
    /* Two ndlps cannot have the same did on the nodelist */
    ndlp->nlp_DID = keepDID;
    lpfc_nlp_set_state(vport, ndlp, keep_nlp_state);
if (phba->sli_rev == LPFC_SLI_REV4 &&
active_rrqs_xri_bitmap)
    memcpy(ndlp->active_rrqs_xri_bitmap,
@@ -1728,6 +1764,12 @@
    active_rrqs_xri_bitmap)
    mempool_free(active_rrqs_xri_bitmap,
        phba->active_rrq_pool);
  +lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS | LOG_NODE,
    "3173 PLOGI confirm exit: new_ndlp x%x x%x x%x\n",
    new_ndlp->nlp_DID, new_ndlp->nlp_prev_state,
    new_ndlp->nlp_flag);
    return new_ndlp;
}

@@ -2088,6 +2130,10 @@
    ndlp = (struct lpfc_nodelist *) cmdiocb->context1;
    spin_lock_irq(shost->host_lock);
    ndlp->nlp_flag &= ~NLP_PRLI_SND;
+/* Driver supports multiple FC4 types. Counters matter. */
+vport->fc_prli_sent--;
+ndlp->fc4_prli_sent--;
    spin_unlock_irq(shost->host_lock);
lpfc_debugfs_disc_trc(vport, LPFC_DISC_TRC_ELS_CMD,
@@ -2095,9 +2141,6 @@
irsp->ulpStatus, irsp->un.ulpWord[4],
ndlp->nlp_DID);

-/* Ddriver supports multiple FC4 types. Counters matter. */
-vport->fc_prli_sent--;,

- /* PRLI completes to NPort <nlp_DID> */
lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS,
"0103 PRLI completes to NPort x%06x ",
@@ -2111,7 +2154,6 @@
if (irsp->ulpStatus) {
/* Check for retry */
-ndlp->fc4_prli_sent--;,
if (lpfc_els_retry(phba, cmdiocb, rspiocb)) {
 /* ELS command is being retried */
goto out;
@@ -2190,6 +2232,15 @@
ndlp->nlp_fc4_type |= NLP_FC4_NVME;
local_nlp_type = ndlp->nlp_fc4_type;

+/* This routine will issue 1 or 2 PRLIs, so zero all the ndlp
+ * fields here before any of them can complete.
+ */
+ndlp->nlp_type &=~ (NLP_FC4_FCP_TARGET | NLP_FC4_FCP_INITIATOR);
+ndlp->nlp_type &=~ (NLP_NVME_TARGET | NLP_NVME_INITIATOR);
+ndlp->nlp_fcp_info &=~ ~NLP_FC4_2_DEVICE;
+ndlp->nlp_flag &=~ ~NLP_FIRSTBURST;
+ndlp->nvme_fb_size = 0;
+
+ send_next_prli:
if (local_nlp_type & NLP_FC4_FCP) {
/* Payload is 4 + 16 = 20 x14 bytes. */
@@ -2278,10 +2329,11 @@
if (phba->nvmet_support) {
 bf_set(prli_tgt, npr_nvme, 1);
 bf_set(prli_disc, npr_nvme, 1);
-
 } else {
 bf_set(prli_init, npr_nvme, 1);
+bf_set(prli_conf, npr_nvme, 1);
} 

npr_nvme->word1 = cpu_to_be32(npr_nvme->word1);
npr_nvme->word4 = cpu_to_be32(npr_nvme->word4);
elsiocb->iocb_flag |= LPFC_PRLI_NVME_REQ;
@@ -2298,6 +2350,13 @@
elsiocb->iocb_cmpl = lpfc_cmpl_els_prli;
spin_lock_irq(shost->host_lock);
ndlp->nlp_flag |= NLP_PRLI_SND;
+
+/* The vport counters are used for lpfc_scan_finished, but
+ * the ndlp is used to track outstanding PRLIs for different
+ * FC4 types.
+ */
+ vport->fc_prli_sent++;
+ ndlp->fc4_prli_sent++;
spin_unlock_irq(shost->host_lock);
if (lpfc_sli_issue_iocb(phba, LPFC_ELS_RING, elsiocb, 0) ==
@@ -2308,12 +2367,6 @@
return 1;
)
/* The vport counters are used for lpfc_scan_finished, but
 * the ndlp is used to track outstanding PRLIs for different
 * FC4 types.
- */
-vport->fc_prli_sent++;
-ndlp->fc4_prli_sent++;

/* The driver supports 2 FC4 types. Make sure
 * a PRLI is issued for all types before exiting.
@@ -2664,16 +2717,15 @@
goto out;
}
/* The LOGO will not be retried on failure. A LOGO was
 * issued to the remote rport and a ACC or RJT or no Answer are
 * all acceptable. Note the failure and move forward with
 * discovery. The PLOGI will retry.
- */
if (irsp->ulpStatus) {
-/* Check for retry */
-if (lpfc_els_retry(phba, cmdiocb, rspiocb)) {
-/* ELS command is being retried */
-skip_recovery = 1;
-goto out;
-}
/* LOGO failed */
lpfc_printf_vlog(vport, KERN_ERR, LOG_ELS,
- "2756 LOGO failure DID:%06X Status:%x/x/%x/x\n",
+ "2756 LOGO failure, No Retry DID:%06X Status:x/x/x/x\n",
}
ndlp->nlp_DID, irsp->ulpStatus,
irsp->un.ulpWord[4]);
/* Do not call DSM for lpfc_els_abort'ed ELS cmds */
@@ -2719,7 +2771,8 @@ /
* For any other port type, the rpi is unregistered as an implicit
* LOGO.
 */
-if ((ndlp->nlp_type & NLP_FCP_TARGET) && (skip_recovery == 0)) {
+if (ndlp->nlp_type & (NLP_FCP_TARGET | NLP_NVME_TARGET) &&
   skip_recovery == 0) {
lpfc_cancel_retry_delay_tmo(vport, ndlp);
spin_lock_irqsave(shost->host_lock, flags);
ndlp->nlp_flag |= NLP_NPR_2B_DISC;
@@ -2752,6 +2805,8 @@ /
* will be stored into the context1 field of the IOC for the completion
* callback function to the LOGO ELS command.
 *
+ * Callers of this routine are expected to unregister the RPI first
+ *
+ * Return code
+ * 0 - successfully issued logo
+ * 1 - failed to issue logo
@@ -2793,22 +2848,6 @@ /
"Issue LOGO: did:x%x",
ndlp->nlp_DID, 0, 0);

-/*
- * If we are issuing a LOGO, we may try to recover the remote NPort
- * by issuing a PLOGI later. Even though we issue ELS cmds by the
- * VPI, if we have a valid RPI, and that RPI gets unreg'ed while
- * that ELS command is in-flight, the HBA returns a IOERR_INVALID_RPI
- * for that ELS cmd. To avoid this situation, lets get rid of the
- * RPI right now, before any ELS cmd's are sent.
- */
-/*
- -spin_lock_irq(shost->host_lock);
-ndlp->nlp_flag |= NLP_ISSUE_LOGO;
-spin_unlock_irq(shost->host_lock);
-if (lpfc_unreg_rpi(vport, ndlp)) {
-    lpfc_els_free_iocb(phba, elsiocb);
-    return 0;
-}
- phba->fc_stat.elsXmitLOGO++;
elsiocb->iocb_cmpl = lpfc_cmpl_els_logo;
spin_lock_irq(shost->host_lock);
@@ -2816,7 +2855,6 @@
ndlp->nlp_flag &= ~NLP_ISSUE_LOGO;
spin_unlock_irq(shost->host_lock);
rc = lpfc_sli_issue_iocb(phba, LPFC_ELS_RING, elsiocb, 0);
if (rc == IOCB_ERROR) {
spin_lock_irq(shost->host_lock);
ndlp->nlp_flag &= ~NLP_LOGO_SND;
@@ -2824,6 +2862,11 @@
lpfc_els_free_iocb(phba, elsiocb);
return 1;
}
+
+spin_lock_irq(shost->host_lock);
+ndlp->nlp_prev_state = ndlp->nlp_state;
+spin_unlock_irq(shost->host_lock);
+lpfc_nlp_set_state(vport, ndlp, NLP_STE_LOGO_ISSUE);
return 0;
}
@@ -2951,8 +2994,8 @@
/* This will cause the callback-function lpfc_cmpl_els_cmd to
* trigger the release of node.
*/
-lpfc_nlp_put(ndlp);
+if (!(vport->fc_flag & FC_PT2PT))
+lpfc_nlp_put(ndlp);
return 0;
}
@@ -4076,9 +4119,11 @@
mempool_free(mbox, phba->mbox_mem_pool);
}
out:
-if (ndlp && NLP_CHK_NODE_ACT(ndlp)) {
+if (ndlp && NLP_CHK_NODE_ACT(ndlp) && shost) {
spin_lock_irq(shost->host_lock);
-ndlp->nlp_flag &= ~(NLP_ACC_REGLOGIN | NLP_RM_DFLT_RPI);
+if (mbox)
+ndlp->nlp_flag &= ~NLP_ACC_REGLOGIN;
+ndlp->nlp_flag &= ~NLP_RM_DFLT_RPI;
spin_unlock_irq(shost->host_lock);
/* If the node is not being used by another discovery thread,
@@ -4254,14 +4299,6 @@
default:
return 1;
}
-/* Xmit ELS ACC response tag <ulpIoTag> */
-lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS,

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"0128 Xmit ELS ACC response tag x%x, XRI: x%x, "
"DID: x%x, nlp_flag: x%x nlp_state: x%x RPI: x%x "
"fc_flag x%x\n",
elseiocb->iotag, elsiocb->iocb.ulpContext,
- ndlp->nlp_DID, ndlp->nlp_flag, ndlp->nlp_state,
- ndlp->nlp_rpi, vport->fc_flag);
if (ndlp->nlp_flag & NLP_LOGO_ACC) {
spin_lock_irq(shost->host_lock);
if (!(ndlp->nlp_flag & NLP_RPI_REGISTERED ||
@@ -4430,6 +4467,15 @@
lpfc_els_free_iocb(phba, elsiocb);
return 1;
} +/* Xmit ELS ACC response tag <ulpIoTag> */
+lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS,
+"0128 Xmit ELS ACC response Status: x%x, IoTag: x%x, "
+"XRI: x%x, DID: x%x, nlp_flag: x%x nlp_state: x%x "+ "RPI: x%x, fc_flag x%x\n",
+rc, elsiocb->iotag, elsiocb->sli4_xritag,
+ndlp->nlp_DID, ndlp->nlp_flag, ndlp->nlp_state,
+ndlp->nlp_rpi, vport->fc_flag);
return 0;
}
@@ -5253,6 +5299,9 @@
case LPFC_LINK_SPEED_32GHZ:
   rdp_speed = RDP_PS_32GB;
   break;
+case LPFC_LINK_SPEED_64GHZ:
+   rdp_speed = RDP_PS_64GB;
+   break;
   default:
   rdp_speed = RDP_PS_UNKNOWN;
   break;
@@ -5260,6 +5309,8 @@
desc->info.port_speed.speed = cpu_to_be16(rdp_speed);

+if (phba->lmt & LMT_64Gb)
+rdp_cap |= RDP_PS_64GB;
if (phba->lmt & LMT_32Gb)
   rdp_cap |= RDP_PS_32GB;
if (phba->lmt & LMT_16Gb)
@@ -5519,7 +5570,7 @@
struct ls_rjt stat;

if (phba->sli_rev < LPFC_SLI_REV4 ||
bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) !=
+ bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) <
+ LPFC_SLI_INTF_IF_TYPE_2) {
  rjt_err = LSRJT_UNABLE_TPC;
  rjt_expl = LSEXP_REQ_UNSUPPORTED;
  @@ -5674,6 +5725,9 @@
    stat = (struct ls_rjt *)(pcmd + sizeof(uint32_t));
    stat->un.b.lsRjtRsnCode = LSRJT_UNABLE_TPC;

+if (shdr_add_status == ADD_STATUS_OPERATION_ALREADY_ACTIVE)
+stat>un.b.lsRjtRsnCodeExp = LSEXP_CMD_IN_PROGRESS;
+elsiocb->iocb_cmpl = lpfc_cmpl_els_rsp;
  phba->fc_stat.elsXmitLSRJT++;
  rc = lpfc_sli_issue_iocb(phba, LPFC_ELS_RING, elsiocb, 0);
  @@ -6172,9 +6226,6 @@
+lpfc_els_rsp_acc(vport, ELS_CMD_ACC, cmdiocb, ndlp, NULL);
 /* send RECOVERY event for ALL nodes that match RSCN payload */
  lpfc_rscn_recovery_check(vport);
  -spin_lock_irq(shost->host_lock);
  -vport->fc_flag &= ~FC_RSCN_DEFERRED;
  -spin_unlock_irq(shost->host_lock);
  return 0;
}
/* Acking an unsol FLOGI. Count 1 for link bounce
 * work-around.
 */
  +vport->rcv_flogi_cnt++;
  spin_unlock_irq(shost->host_lock);
  lpfc_printf_vlog(vport, KERN_INFO, LOG_ELS,
  "3311 Rcv Flogi PS x%x new PS x%x 
  @ @ -6849,7 +6905,7 @@
return 1;

  pcmd = (uint8_t *) (((struct lpfc_dmabuf *) elsiocb->context2)->virt);
  -*((uint32_t *) (pcmd)) = ELS_CMD_ACC;
  +*((uint32_t *) (pcmd)) = ELS_CMD_ACC;
  pcmd += sizeof(uint32_t); /* Skip past command */
/* use the command's xri in the response */
  @ @ -7048,7 +7104,10 @@
  lpfc_send_rrq(struct lpfc_hba *phba, struct lpfc_node_rrq *rrq)
struct lpfc_nodelist *ndlp = lpfc_findnode_did(rrq->vport, rrq->nlp_DID);
+   rrq->nlp_DID);
+if (!ndlp)
+return 1;
+
if (lpfc_test_rrq_active(phba, ndlp, rrq->xritag))
return lpfc_issue_els_rrq(rrq->vport, ndlp, rrq->nlp_DID, rrq);
@@ -7798,8 +7857,9 @@
struct ls_rjt stat;
uint32_t *payload;
uint32_t cmd, did, newnode;
-uint8_t rjt_exp, rjt_err = 0;
+uint8_t rjt_exp, rjt_err = 0, init_link = 0;
IOCB_t *icmd = &elsiocb->iocb;
+LPFC_MBOXQ_t *mbox;

if (!vport || !(elsiocb->context2))
goto dropit;
@@ -7869,6 +7929,8 @@
spin_lock_irq(shost->host_lock);
if (ndlp->nlp_flag & NLP_IN_DEV_LOSS) {
spin_unlock_irq(shost->host_lock);
+if (newnode)
+lpfc_nlp_put(ndlp);

goto dropit;
}
spin_unlock_irq(shost->host_lock);
@@ -7948,6 +8010,19 @@
did, vport->port_state, ndlp->nlp_flag);

phba->fc_stat.elsRcvFLOGI++;
+ /* If the driver believes fabric discovery is done and is ready,
+ * bounce the link. There is some discrepancy.
+ */
+if (vport->port_state >= LPFC_LOCAL_CFG_LINK &&
+ vport->fc_flag & FC_PT2PT &&
+ vport->rcv_flogi_cnt >= 1) {
+rjt_err = LSRJT_LOGICAL_BSY;
+rjt_exp = LSEXP_NOTHING_MORE;
+init_link++;
+goto lsrjt;
+}
+
lpfc_els_rcv_flogi(vport, elsiocb, ndlp);
if (newnode)
lpfc_nlp_put(ndlp);
@@ -8060,13 +8135,6 @@
     rjt_exp = LSEXPI_NOTHING_MORE;
 break;
 }
-
-/* NVMET accepts NVME PRLI only. Reject FCP PRLI */
-if (cmd == ELS_CMD_PRLI && phba->nvmet_support) {
-    rjt_err = LSRJT_CMD_UNSUPPORTED;
-    rjt_exp = LSEXPI_REQ_UNSUPPORTED;
-    break;
-}
lpfc_disc_state_machine(vport, ndlp, elsiocb, NLP_EVT_RCV_PRLI);
break;
case ELS_CMD_LIRR:
@@ -8149,9 +8217,9 @@
     lpfc_nlp_put(ndlp);
 break;
case ELS_CMD_REC:
    /* receive this due to exchange closed */
-    rjt_err = LSRJT_UNABLE_TPC;
-    rjt_exp = LSEXPI_INVALID_OX_RX;
-/+* receive this due to exchange closed */
+    rjt_err = LSRJT_UNABLE_TPC;
+    rjt_exp = LSEXPI_INVALID_OX_RX;
 break;
default:
lpfc_debugfs_disc_trc(vport, LPFC_DISC_TRC_ELS_UNSOL,
@@ -8183,6 +8251,27 @@
     lpfc_nlp_put(elsiocb->context1);
     elsiocb->context1 = NULL;
+
+/* Special case. Driver received an unsolicited command that
+ * unsupportable given the driver's current state. Reset the
+ * link and start over.
+ */
+if (init_link) {
+    mbox = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
+    if (!mbox)
+        return;
+    lpfc_linkdown(phba);
+    lpfc_init_link(phba, mbox,
+          phba->cfg_topology,
+          phba->cfg_link_speed);
+    mbox->u.mb.un.varInitLnk.lipsr_AL_PA = 0;
+    mbox->mbox_cmpl = lpfc_sli_def_mbox_cmpl;
mbox->vport = vport;
if (lpfc_sli_issue_mbox(phba, mbox, MBX_NOWAIT) ==
    MBX_NOT_FINISHED)
mempool_free(mbox, phba->mbox_mem_pool);
+
+
return;

dropit:
@@ -9458,7 +9547,8 @@
 "rport in state 0x%x\n", ndlp->nlp_state);
 return;
}
-lpfc_printf_log(phba, KERN_INFO, LOG_SLI,
+lpfc_printf_log(phba, KERN_ERR,
 +LOG_ELS | LOG_FCP_ERROR | LOG_NVME_IOERR,
 "3094 Start rport recovery on shost id 0x%x 
" 
"fc_id 0x%06x vpi 0x%x rpi 0x%x state 0x%x 
" 
"flags 0x%x\n",
@@ -9471,8 +9561,8 @@
 */
 spin_lock_irqsave(shost->host_lock, flags);
 ndlp->nlp_fcp_info &= ~NLP_FCP_2_DEVICE;
+ndlp->nlp_flag |= NLP_ISSUE_LOGO;
 spin_unlock_irqrestore(shost->host_lock, flags);
-lpfc_issue_els_logo(vport, ndlp, 0);
-lpfc_nlp_set_state(vport, ndlp, NLP_STE_LOGO_ISSUE);
+lpfc_unreg_rpi(vport, ndlp);
}

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_hbadisc.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_hbadisc.c
@@ -1,7 +1,7 @@

/*******************************************************************
 * This file is part of the Emulex Linux Device Driver for         *
 * Fibre Channel Host Bus Adapters.                               *
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@@ -640,8 +640,6 @@
 lpfc_handle_rrq_active(phba);
 if (phba->hba_flag & FCP_XRI_ABORT_EVENT)
 lpfc_sli4_fcp_xri_abort_event_proc(phba);
@@ -640,8 +640,6 @@
 lpfc_sli4_nvme_xri_abort_event_proc(phba);
 if (phba->hba_flag & ELS_XRI_ABORT_EVENT)
lpfc_sli4_els_xri_abort_event_proc(phba);  
if (phba->hba_flag & ASYNC_EVENT)  
@@ -698,8 +696,9 @@  
phba->hba_flag & HBA_SP_QUEUE_EVT)) {  
if (pring->flag & LPFC_STOP_IOCB_EVENT) {  
/* Set the lpfc data pending flag */  
- set_bit(LPFC_DATA_READY, &phba->data_flags);  
+ /* Preserve legacy behavior. */  
+ if (!(phba->hba_flag & HBA_SP_QUEUE_EVT))  
+ set_bit(LPFC_DATA_READY, &phba->data_flags);  
} else {  
if (phba->link_state >= LPFC_LINK_UP ||  
phba->link_flag & LS_MDS_LOOPBACK) {  
@@ -923,7 +922,11 @@  
}  
}  
lpfc_destroy_vport_work_array(phba, vports);  
-/* Clean up any firmware default rpi's */  
+ /* Clean up any SLI3 firmware default rpi's */  
+if (phba->sli_rev > LPFC_SLI_REV3)  
+goto skip_unreg_did;  
+mb = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);  
+if (mb) {  
lpfc_unreg_did(phba, 0xffff, LPFC_UNREG_ALL_DFLT_RPIs, mb);  
@@ -935,6 +938,7 @@  
}  
}  
+ skip_unreg_did:  
/* Setup myDID for link up if we are in pt2pt mode */  
if (phba->pport->fc_flag & FC_PT2PT) {  
mb = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);  
@@ -949,6 +953,7 @@  
}  
spin_lock_irq(shost->host_lock);  
phba->pport->fc_flag &= ~(FC_PT2PT | FC_PT2PT_PLOGI);  
+phba->pport->rcv_flogi_cnt = 0;  
spin_unlock_irq(shost->host_lock);  
}  
return 0;  
@@ -1019,6 +1024,7 @@  
}  
struct lpfc_vport **vports;  
int i;  
+struct Scsi_Host *shost = lpfc_shost_from_vport(phba->pport);
phba->link_state = LPFC_LINK_UP;

@@ -1032,6 +1038,13 @@
 lpfc_linkup_port(vports[i]);
 lpfc_destroy_vport_work_array(phba, vports);

+/* Clear the pport flogi counter in case the link down was
+ * absorbed without an ACQE. No lock here - in worker thread
+ * and discovery is synchronized.
+ */
+spin_lock_irq(shost->host_lock);
+phba->pport->rcv_flogi_cnt = 0;
+spin_unlock_irq(shost->host_lock);
return 0;
}

@@ -1993,6 +2006,26 @@
         "failover and change port state:x%x/x%x
”,
 phba->pport->port_state, LPFC_VPORT_UNKNOWN);
 phba->pport->port_state = LPFC_VPORT_UNKNOWN;
+
+if (!phba->fcf.fcf_redisc_attempted) {
+  lpfc_unregister_fcf(phba);
+
+  rc = lpfc_sli4_redisc_fcf_table(phba);
+  if (!rc) {
+    lpfc_printf_log(phba, KERN_INFO, LOG_FIP,
+                    "3195 Rediscover FCF table\n”);
+    phba->fcf.fcf_redisc_attempted = 1;
+    lpfc_sli4_clear_fcf_rr_bmask(phba);
+  } else {
+    lpfc_printf_log(phba, KERN_WARNING, LOG_FIP,
+                    "3196 Rediscover FCF table ”
+                    +"failed. Status:x%x\n", rc);
+  }
+} else {
+  lpfc_printf_log(phba, KERN_WARNING, LOG_FIP,
+                    "3197 Already rediscover FCF table ”
+                    +"attempted. No more retry\n”);
+}
  goto stop_flogi_current_fcf;
} else {
  lpfc_printf_log(phba, KERN_INFO, LOG_FIP | LOG_ELS,
@@ -3085,6 +3118,7 @@
 case LPFC_LINK_SPEED_10GHZ:
 case LPFC_LINK_SPEED_16GHZ:
 case LPFC_LINK_SPEED_32GHZ:
+case LPFC_LINK_SPEED_64GHZ:
    break;
default:
    phba->fc_linkspeed = LPFC_LINK_SPEED_UNKNOWN;

if (ndlp->nlp_fc4_type & NLP_FC4_NVME) {
    vport->phba->nport_event_cnt++;
    if (vport->phba->nvmet_support == 0)
        /* Start devloss */
        lpfc_nvme_unregister_port(vport, ndlp);
    else
        +if (vport->phba->nvmet_support == 0) {
            /* Start devloss if target. */
            +if (ndlp->nlp_type & NLP_NVME_TARGET)
                lpfc_nvme_unregister_port(vport, ndlp);
        } else {
            /* NVMET has no upcall. */
            lpfc_nlp_put(ndlp);
        }
}

if (ndlp->nlp_fc4_type & NLP_FC4_NVME) {
    if (vport->phba->nvmet_support == 0) {
        /* Register this rport with the transport.
           * Initiators take the NDLP ref count in
           * the register.
           * Only NVME Target Rports are registered with
           * the transport.
           */
        -vport->phba->nport_event_cnt++;
        -lpfc_nvme_register_port(vport, ndlp);
        +if (ndlp->nlp_type & NLP_NVME_TARGET) {
            +vport->phba->nport_event_cnt++;
            +lpfc_nvme_register_port(vport, ndlp);
        } else {
            /* Just take an NDLP ref count since the
               * target does not register rports.
               */
            @ @ -4742,7 +4780,7 @@
            if (phba->sli_rev == LPFC_SLI_REV4 &&
                (!(vport->load_flag & FC_UNLOADING)) &&
                (bf_get(lpfc_sli_intf_if_type,
                        &phba->sli4_hba.sli_intf) ==
                + &phba->sli4_hba.sli_intf) >=
                LPFC_SLI_INTF_IF_TYPE_2) &&
(kref_read(&ndlp->kref) > 0)) {
  mbox->context1 = lpfc_nlp_get(ndlp);
  @@ -4851,6 +4889,10 @@
  LPFC_MBOXQ_t     *mbox;
  int rc;

  /* Unreg DID is an SLI3 operation. */
  +if (phba->sli_rev > LPFC_SLI_REV3)
  +return;
  +
  mbox = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
  if (mbox) {
    lpfc_unreg_did(phba, vport->vpi, LPFC_UNREG_ALL_DFLT_RPIS,
    @@ -5189,9 +5231,14 @@
    /* If we've already received a PLOGI from this NPort
     * we don't need to try to discover it again.
     */
    -if (ndlp->nlp_flag & NLP_RCV_PLOGI)
    +if (ndlp->nlp_flag & NLP_RCV_PLOGI &&
    +   !(ndlp->nlp_type &
    +   (NLP_FCP_TARGET | NLP_NVME_TARGET)))
    return NULL;

    +ndlp->nlp_prev_state = ndlp->nlp_state;
    +lpfc_nlp_set_state(vport, ndlp, NLP_STE_NPR_NODE);
    +
    spin_lock_irq(shost->host_lock);
    ndlp->nlp_flag |= NLP_NPR_2B_DISC;
    spin_unlock_irq(shost->host_lock);
    @@ -5838,9 +5885,12 @@
    if (filter(ndlp, param)) {
      lpfc_printf_vlog(vport, KERN_INFO, LOG_NODE,
      "3185 FIND node filter %p DID ",
      - "Data: x%p x%x x%x\n",
      + "ndlp %p did x%x flg x%x st x%x ",
      + "xri x%x type x%x rpi x%x\n",
      filter, ndlp, ndlp->nlp_DID,
      - ndlp->nlp_flag);
      + ndlp->nlp_flag, ndlp->nlp_state,
      + ndlp->nlp_xri, ndlp->nlp_type,
      + ndlp->nlp_rpi);
      return ndlp;
    }
  }
}

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_hw.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_hw.h
@@ -1,7 +1,7 @@

/***************************************************************************/
* This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. *
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@@ -1177,6 +1177,9 @@
#define RDP_PS_8GB 0x0800
#define RDP_PS_16GB 0x0400
#define RDP_PS_32GB 0x0200
+#define RDP_PS_64GB 0x0100
+#define RDP_PS_128GB 0x0080
+#define RDP_PS_256GB 0x0040

#define RDP_CAP_USER_CONFIGURED 0x0002
#define RDP_CAP_UNKNOWN 0x0001
@@ -1326,25 +1329,8 @@
 /* lpfc_sli_ct_request defines the CT_IU preamble for FDMI commands */
#define SLI_CT_FDMI_Subtypes 0x10/* Management Service Subtype */

/* Registered Port List Format */
/* Definitions for HBA / Port attribute entries */

-struct lpfc_fdmi_reg_port_list {
-    uint32_t EntryCnt;
-    uint32_t pe;/* Variable-length array */
-};
-
/* Attribute Entry */
struct lpfc_fdmi_attr_entry {
    union {
        /* Defined in TLV format */
        /* Structure is in Big Endian format */
        uint32_t AttrType:16;
        uint32_t AttrLen:16;
        uint32_t AttrValue; /* Marks start of Value (ATTRIBUTE_ENTRY) */
    } un;
};

#define LPFC_FDMI_MAX_AE_SIZE sizeof(struct lpfc_fdmi_attr_entry)
+struct lpfc_fdmi_attr_def { /* Defined in TLV format */
+/* Structure is in Big Endian format */
+uint32_t AttrType;16;
+uint32_t AttrLen;16;
+/* Marks start of Value (ATTRIBUTE_ENTRY) */
+struct lpfc_fdmi_attr_entry AttrValue;
+} __packed;

/*
 * HBA Attribute Block
@@ -1380,12 +1372,19 @@

*/

/*
 * Registered Port List Format
+ */
+struct lpfc_fdmi_reg_port_list {
+uint32_t EntryCnt;
+struct lpfc_fdmi_port_entry pe;
+} __packed;
+
+/*
 * Register HBA(RHBA)
 */
struct lpfc_fdmi_reg_hba {
 struct lpfc_fdmi_hba_ident hi;
-struct lpfc_fdmi_reg_port_list rpl;/* variable-length array */
-/* struct lpfc_fdmi_attr_block ab; */
+struct lpfc_fdmi_reg_port_list rpl;
};

@@ -1580,6 +1579,7 @@
#define PCI_DEVICE_ID_LANCER_FCOE   0xe260
#define PCI_DEVICE_ID_LANCER_FCOE_VF 0xe268
#define PCI_DEVICE_ID_LANCER_G6_FC  0xe300
+#define PCI_DEVICE_ID_LANCER_G7_FC  0xf400
#define PCI_DEVICE_ID_SAT_SMB       0xf011
#define PCI_DEVICE_ID_SAT_MID       0xf015
#define PCI_DEVICE_ID_RFLY          0xf095
@@ -2257,6 +2257,9 @@
#define LINK_SPEED_10G  0x10    /* 10 Gigabaud */
#define LINK_SPEED_16G  0x11    /* 16 Gigabaud */
#define LINK_SPEED_32G  0x14    /* 32 Gigabaud */
+#define LINK_SPEED_64G  0x17    /* 64 Gigabaud */
+#define LINK_SPEED_128G 0x1A    /* 128 Gigabaud */
+#define LINK_SPEED_256G 0x1D    /* 256 Gigabaud */
#define LMT_10Gb 0x100
#define LMT_16Gb 0x200
#define LMT_32Gb 0x400
+#define LMT_64Gb 0x800
+#define LMT_128Gb 0x1000
+#define LMT_256Gb 0x2000

uint32_t rsvd2;
uint32_t rsvd3;
uint32_t max_xri;

#define LPFC_LINK_SPEED_10GHZ 0x40
#define LPFC_LINK_SPEED_16GHZ 0x80
#define LPFC_LINK_SPEED_32GHZ 0x90
+#define LPFC_LINK_SPEED_64GHZ 0xA0
+#define LPFC_LINK_SPEED_128GHZ 0xB0
+#define LPFC_LINK_SPEED_256GHZ 0xC0

/* Structure for MB Command CLEAR_LA (22) */

/* Define SLI4 Alignment requirements. */
#define LPFC_ALIGN_16_BYTE 16
#define LPFC_ALIGN_64_BYTE 64
+#define SLI4_PAGE_SIZE 4096

/* Define SLI4 specific definitions. */
#define LPFC_MQ_CQE_BYTE_OFFSET	256
@@ -565,6 +567,7 @@
/* The following BAR0 register sets are defined for if_type 0 and 2 UCNAs. */
#define LPFC_SLI_INTF0x0058
+#define LPFC_SLI ASIC_VER0x009C

#define LPFC_CTL_PORT_SEM_OFFSET	0x400
#define lpfc_port_smphr_perr_SHIFT	31
@@ -731,11 +734,13 @@
* register sets depending on the UCNA Port's reported if_type
* value. For UCNA ports running SLI4 and if_type 0, they reside in
* BAR4. For UCNA ports running SLI4 and if_type 2, they reside in
- * BAR0. The offsets are the same so the driver must account for
- * any base address difference.
+ * BAR0. For FC ports running SLI4 and if_type 6, they reside in
+ * BAR2. The offsets and base address are different, so the driver
+ * has to compute the register addresses accordingly
*/
#define LPFC_ULP0_RQ_DOORBELL		0x00A0
#define LPFC_ULP1_RQ_DOORBELL		0x00C0
+#define LPFC_IF6_RQ_DOORBELL	0x0080
#define lpfc_rq_db_list_fm_num_posted_SHIFT	24
#define lpfc_rq_db_list_fm_num_posted_MASK	0x00FF
#define lpfc_rq_db_list_fm_num_posted_WORD	word0
@@ -770,6 +775,20 @@
#define lpfc_wq_db_ring_fm_id_MASK              0xFFFF
#define lpfc_wq_db_ring_fm_id_WORD              word0
+#define LPFC_IF6_WQ_DOORBELL	0x0040
+#define lpfc_if6_wq_db_list_fm_num_posted_SHIFT	24
+#define lpfc_if6_wq_db_list_fm_num_posted_MASK0x00FF
+#define lpfc_if6_wq_db_list_fm_num_posted_WORDword0
@@ -805,6 +824,38 @@
#define LPFC_EQCQ_DOORBELL		0x0120
#define lpfc_eqcq_doorbell_se_SHIFT		31
#define lpfc_eqcq_doorbell_se_MASK		0x0001
+#define LPFC_EQCQ_DOORBELL0x0120
+#define lpfc_eqcq_doorbell_se_SHIFT31
+#define lpfc_eqcq_doorbell_se_MASK0x0001
@@ -851,6 +874,3 @@
#define LPFC_CQID_HI_FIELD_SHIFT		10

Open Source Used In 5GaaS Edge AC-4  28082
#define LPFC_EQID_HI_FIELD_SHIFT 9
+#define LPFC_IF6_CQ_DOORBELL 0x00C0
+#define lpfc_if6_cq_doorbell_se_SHIFT 31
+#define lpfc_if6_cq_doorbell_se_MASK 0x0001
+#define lpfc_if6_cq_doorbell_se_WORD word0
+#define LPFC_IF6_CQ_SOLICIT_ENABLE_OFF 0
+#define LPFC_IF6_CQ_SOLICIT_ENABLE_ON 1
+#define lpfc_if6_cq_doorbell_arm_SHIFT 29
+#define lpfc_if6_cq_doorbell_arm_MASK 0x0001
+#define lpfc_if6_cq_doorbell_arm_WORD word0
+#define lpfc_if6_cq_doorbell_num_released_SHIFT 16
+#define lpfc_if6_cq_doorbell_num_released_MASK 0x1FFF
+#define lpfc_if6_cq_doorbell_num_released_WORD word0
+#define lpfc_if6_cq_doorbell_cqid SHIFT 0
+#define lpfc_if6_cq_doorbell_cqid_MASK 0xFFFF
+#define lpfc_if6_cq_doorbell_cqid_WORD word0
+
+#define LPFC_IF6_EQ_DOORBELL 0x0120
+#define lpfc_if6_eq_doorbell_io_SHIFT 31
+#define lpfc_if6_eq_doorbell_io_MASK 0x0001
+#define lpfc_if6_eq_doorbell_io_WORD word0
+#define LPFC_IF6_EQ_INTR_OVERRIDE_OFF 0
+#define LPFC_IF6_EQ_INTR_OVERRIDE_ON 1
+#define lpfc_if6_eq_doorbell_arm_SHIFT 29
+#define lpfc_if6_eq_doorbell_arm_MASK 0x0001
+#define lpfc_if6_eq_doorbell_arm_WORD word0
+#define lpfc_if6_eq_doorbell_num_released SHIFT 16
+#define lpfc_if6_eq_doorbell_num_released_MASK 0x1FFF
+#define lpfc_if6_eq_doorbell_num_released_WORD word0
+#define lpfc_if6_eq_doorbell_eqid SHIFT 0
+#define lpfc_if6_eq_doorbell_eqid_MASK 0x0FFF
+#define lpfc_if6_eq_doorbell_eqid_WORD word0
+
+#define LPFC_BMBX 0x0160
+#define lpfc_bmbx_addr SHIFT 2
+#define lpfc_bmbx_addr_MASK 0x3FFFFFFF
+#define lpfc_bmbx_rdy WORD word0

+#define LPFC_MQ_DOORBELL 0x0140
+#define LPFC_IF6_MQ_DOORBELL 0x0160
+#define lpfc_mq_doorbell_num_posted SHIFT 16
+#define lpfc_mq_doorbell_num_posted_MASK 0x3FFF
+#define lpfc_mq_doorbell_num_posted_WORD word0
+#define lpfc_eq_context_valid SHIFT 29
+#define lpfc_eq_context_valid_MASK 0x00000001
```c
#define lpfc_eq_context_valid_WORD word0
+#define lpfc_eq_context_autovalid_SHIFT 28
+#define lpfc_eq_context_autovalid_MASK 0x00000001
+#define lpfc_eq_context_autovalid_WORD word0
uint32_t word1;
#define lpfc_eq_context_count_SHIFT 26
#define lpfc_eq_context_count_MASK 0x00000003
@@ -1122,6 +1177,10 @@
#define LPFC_CQ_CNT_2560x0
#define LPFC_CQ_CNT_5120x1
#define LPFC_CQ_CNT_10240x2
+#define LPFC_CQ_CNT_WORD70x3
+#define lpfc_eq_context_autovalid_SHIFT 15
+#define lpfc_eq_context_autovalid_MASK 0x00000001
+#define lpfc_eq_context_autovalid_WORD word0
uint32_t word1;
#define lpfc_cq_context_count_SHIFT 15 /* Version 0 Only */
#define lpfc_cq_context_count_MASK 0x00000001
#define lpfc_cq_eq_id_SHIFT 22 /* Version 0 Only */
#define lpfc_cq_eq_id_MASK 0x000000FF
@@ -1129,7 +1188,7 @@
#define LPFC_CQ_CNT_256	0x0
#define LPFC_CQ_CNT_512	0x1
#define LPFC_CQ_CNT_1024	0x2
+#define LPFC_CQ_CNT_2560x3
+#define lpfc_cq_context_autovalid_SHIFT 15
+#define lpfc_cq_context_autovalid_MASK 0x00000001
+#define lpfc_cq_context_autovalid_WORD word0
uint32_t word1;
#define lpfc_cq_eq_id_2_SHIFT 0 /* Version 2 Only */
#define lpfc_cq_eq_id_2_MASK 0x0000FFFF
#define lpfc_cq_eq_id_2_WORD word1
-uint32_t reserved0;
+uint32_t lpfc_cq_context_count;/* Version 2 Only */
uint32_t reserved1;
}

@@ -1180,9 +1239,9 @@
#define lpfc_mbx_cq_create_set_cqe_size_SHIFT 25
#define lpfc_mbx_cq_create_set_cqe_size_MASK 0x00000003
#define lpfc_mbx_cq_create_set_cqe_size_WORD word1
-#define lpfc_mbx_cq_create_set_auto_SHIFT 15
-#define lpfc_mbx_cq_create_set_auto_MASK 0x0000001
-#define lpfc_mbx_cq_create_set_auto_WORD word1
+#define lpfc_mbx_cq_create_set_autovalid_SHIFT 15
+#define lpfc_mbx_cq_create_set_autovalid_MASK 0x0000001
+#define lpfc_mbx_cq_create_set_autovalid_WORD word1
#define lpfc_mbx_cq_create_set_nodelay_SHIFT 14
#define lpfc_mbx_cq_create_set_nodelay_MASK 0x00000001
#define lpfc_mbx_cq_create_set_nodelay_WORD word1
@@ -1193,6 +1252,9 @@
#define lpfc_mbx_cq_create_set_arm_SHIFT 31
#define lpfc_mbx_cq_create_set_arm_MASK 0x00000001
#define lpfc_mbx_cq_create_set_arm_WORD word2
+#define lpfc_mbx_cq_create_set_cq_cnt_SHIFT 16
+#define lpfc_mbx_cq_create_set_cq_cnt_MASK 0x0007FFF
+#define lpfc_mbx_cq_create_set_cq_cnt_WORD word2
#define lpfc_mbx_cq_create_set_num_cq_SHIFT 0
```
#define lpfc_mbx_cq_create_set_num_cq_MASK 0x0000FFFF
#define lpfc_mbx_cq_create_set_num_cq_WORD word2

#define lpfc_mbx_cq_create_page_size_MASK 0x000000FF
#define lpfc_mbx_cq_create_page_size_WORD word1

#define LPFC_WQ_PAGE_SIZE_4096 0x1

#define lpfc_mbx_wq_create_dpp_req_SHIFT 15
#define lpfc_mbx_wq_create_dpp_req_MASK 0x00000001
#define lpfc_mbx_wq_create_dpp_req_WORD word1

#define lpfc_mbx_wq_create_doe_SHIFT 14
#define lpfc_mbx_wq_create_doe_MASK 0x00000001
#define lpfc_mbx_wq_create_doe_WORD word1

#define lpfc_mbx_wq_create_toe_SHIFT 13
#define lpfc_mbx_wq_create_toe_MASK 0x00000001
#define lpfc_mbx_wq_create_toe_WORD word1

#define lpfc_mbx_wq_create_wqe_size_SHIFT 8
#define lpfc_mbx_wq_create_wqe_size_MASK 0x0000000F
#define lpfc_mbx_wq_create_wqe_size_WORD word1

#define lpfc_mbx_wq_create_db_format_MASK 0x0000FFFF
#define lpfc_mbx_wq_create_db_format_WORD word2

} response;

struct {
  uint32_t word0;
#define lpfc_mbx_wq_create_dpp_rsp_SHIFT 31
#define lpfc_mbx_wq_create_dpp_rsp_MASK 0x00000001
#define lpfc_mbx_wq_create_dpp_rsp_WORD word0

#define lpfc_mbx_wq_create_v1_q_id_SHIFT 0
#define lpfc_mbx_wq_create_v1_q_id_MASK 0x0000FFFF
#define lpfc_mbx_wq_create_v1_q_id_WORD word0

  uint32_t word1;
#define lpfc_mbx_wq_create_v1_bar_set_SHIFT 0
#define lpfc_mbx_wq_create_v1_bar_set_MASK 0x0000000F
#define lpfc_mbx_wq_create_v1_bar_set_WORD word1

  uint32_t doorbell_offset;
  uint32_t word3;
#define lpfc_mbx_wq_create_dpp_id_SHIFT 16
#define lpfc_mbx_wq_create_dpp_id_MASK 0x0000001F
#define lpfc_mbx_wq_create_dpp_id_WORD word3

  uint32_t dpp_offset;
} response_1;

} u;

}}

@@ -2150,6 +2243,7 @@
* command.
*/
#define ADD_STATUS_OPERATION_ALREADY_ACTIVE	0x67
#define ADD_STATUS_FW_NOT_SUPPORTED	0xEB

struct lpfc_mbx_sli4_config {
    struct mbox_header header;
    struct lpfc_mbx_rd_rev_vpd mold;
    #define lpfc_mbx_rd_rev_vpd_MASK	0x00000001
    #define lpfc_mbx_rd_rev_vpd_WORD	word1
    uint32_t first_hw_rev;
    #define LPFC_G7_ASIC_1	0xd
    uint32_t second_hw_rev;
    uint32_t word4_rsvd;
    uint32_t third_hw_rev;
    #define lpfc_mbx_rq_ftr_rsp_mrqp_MASK	0x00000001
    #define lpfc_mbx_rq_ftr_rsp_mrqp_WORD	word3
};

-struct lpfc_mbx_supp_pages {
    uint32_t word1;
    #define qs_SHIFT	0
    #define qs_MASK	0x00000001
    #define qs_WORD	word1
    #define wr_SHIFT	1
    #define wr_MASK	0x00000001
    #define wr_WORD	word1
    #define pf_SHIFT	8
    #define pf_MASK	0x00000ff
    #define pf_WORD	word1
    #define cpn_SHIFT	16
    #define cpn_MASK	0x0000ff
    #define cpn_WORD	word1
    uint32_t word2;
    #define list_offset_SHIFT	0
    #define list_offset_MASK	0x0000ff
    #define list_offset_WORD	word2
    #define next_offset_SHIFT	8
    #define next_offset_MASK	0x0000ff
    #define next_offset_WORD	word2
    #define elem_cnt_SHIFT	16
    #define elem_cnt_MASK	0x000ff
    #define elem_cnt_WORD	word2
    uint32_t word3;
    #define pn_0_SHIFT	24
    #define pn_0_MASK	0x000ff
    #define pn_0_WORD	word3
};
```c
#define pn_1_MASK		0x000000ff
#define pn_1_WORD		word3
#define pn_2_SHIFT		8
#define pn_2_MASK		0x000000ff
#define pn_2_WORD		word3
#define pn_3_SHIFT		0
#define pn_3_MASK		0x000000ff
#define pn_3_WORD		word3
#define pn_4_SHIFT		24
#define pn_4_MASK		0x000000ff
#define pn_4_WORD		word4
#define pn_5_SHIFT		16
#define pn_5_MASK		0x000000ff
#define pn_5_WORD		word4
#define pn_6_SHIFT		8
#define pn_6_MASK		0x000000ff
#define pn_6_WORD		word4
#define pn_7_SHIFT		0
#define pn_7_MASK		0x000000ff
#define pn_7_WORD		word4
#define word4;
#define LPFC_SUPP_PAGES	0
#define LPFC_BLOCK_GUARD_PROFILES	1
#define LPFC_SLI4_PARAMETERS	2
};

struct lpfc_mbx_memory_dump_type3 {
  uint32_t word1;
  #define lpfc_mbx_memory_dump_type3_type_SHIFT    0
  @ @ -3060,121 +3099,6 @ @
  uint8_t reserved191[57];
};

-struct lpfc_mbx_pc_sli4_params {
  -uint32_t word1;
  #define qs_SHIFT	0
  #define qs_MASK	0x00000001
  #define qs_WORD	word1
  #define wr_SHIFT	1
  #define wr_MASK	0x00000001
  #define wr_WORD	word1
  #define pf_SHIFT	8
  #define pf_MASK	0x000000ff
  #define pf_WORD	word1
  #define cpn_SHIFT	16
  #define cpn_MASK	0x000000ff
  #define cpn_WORD	word1
```
- uint32_t word2;
- #define if_type SHIFT 0
- #define if_type MASK 0x00000007
- #define if_type WORD word2
- #define sli_rev SHIFT 4
- #define sli_rev MASK 0x0000000f
- #define sli_rev WORD word2
- #define sli_family SHIFT 8
- #define sli_family MASK 0x000000ff
- #define sli_family WORD word2
- #define featurelevel_1 SHIFT 16
- #define featurelevel_1 MASK 0x000000ff
- #define featurelevel_1 WORD word2
- #define featurelevel_2 SHIFT 24
- #define featurelevel_2 MASK 0x0000001f
- #define featurelevel_2 WORD word2
- #define fcoe SHIFT 0
- #define fcoe MASK 0x00000001
- #define fcoe WORD word3
- #define fc SHIFT 1
- #define fc MASK 0x00000001
- #define fc WORD word3
- #define nic SHIFT 2
- #define nic MASK 0x00000001
- #define nic WORD word3
- #define iscsi SHIFT 3
- #define iscsi MASK 0x00000001
- #define iscsi WORD word3
- #define rdma SHIFT 4
- #define rdma MASK 0x00000001
- #define rdma WORD word3
- uint32_t sge_supp_len;
- #define SLI4_PAGE_SIZE 4096
- uint32_t word5;
- #define if_page_sz SHIFT 0
- #define if_page_sz MASK 0x0000ffff
- #define if_page_sz WORD word5
- #define loopbk_scope SHIFT 24
- #define loopbk_scope MASK 0x0000000f
- #define loopbk_scope WORD word5
- #define rq_db_window SHIFT 28
- #define rq_db_window MASK 0x0000000f
- #define rq_db_window WORD word5
- uint32_t word6;
- #define eq_pages SHIFT 0
- #define eq_pages MASK 0x0000000f
- #define eq_pages WORD word6
-#define eqe_size_SHIFT 8
-#define eqe_size_MASK 0x000000ff
-#define eqe_size_WORD word6
-uint32_t word7;
-#define cq_pages_SHIFT 0
-#define cq_pages_MASK 0x000000ff
-#define cq_pages_WORD word7
-#define cqe_size_SHIFT 8
-#define cqe_size_MASK 0x000000ff
-#define cqe_size_WORD word7
-uint32_t word8;
-#define mq_pages_SHIFT 0
-#define mq_pages_MASK 0x000000ff
-#define mq_pages_WORD word8
-#define mqe_size_SHIFT 8
-#define mqe_size_MASK 0x000000ff
-#define mqe_size_WORD word8
-#define mq_elem_cnt_SHIFT 16
-#define mq_elem_cnt_MASK 0x000000ff
-#define mq_elem_cnt_WORD word8
-uint32_t word9;
-#define wq_pages_SHIFT 0
-#define wq_pages_MASK 0x0000ffff
-#define wq_pages_WORD word9
-#define wqe_size_SHIFT 8
-#define wqe_size_MASK 0x000000ff
-#define wqe_size_WORD word9
-uint32_t word10;
-#define rq_pages_SHIFT 0
-#define rq_pages_MASK 0x0000ffff
-#define rq_pages_WORD word10
-#define rqe_size_SHIFT 8
-#define rqe_size_MASK 0x000000ff
-#define rqe_size_WORD word10
-uint32_t word11;
-#define hdr_pages_SHIFT 0
-#define hdr_pages_MASK 0x000000ff
-#define hdr_pages_WORD word11
-#define hdr_size_SHIFT 8
-#define hdr_size_MASK 0x000000ff
-#define hdr_size_WORD word11
-#define hdr_pp_align_SHIFT 16
-#define hdr_pp_align_MASK 0x0000ffff
-#define hdr_pp_align_WORD word11
-uint32_t word12;
-#define sgl_pages_SHIFT 0
-#define sgl_pages_MASK 0x000000ff
-#define sgl_pages_WORD word12
-#define sgl_pp_align_SHIFT	16
-#define sgl_pp_align_MASK	0x0000ffff
-#define sgl_pp_align_WORD	word12
-uint32_t rsd_13_63[51];
-};
#define SLI4_PAGE_ALIGN(addr) (((addr)+((SLI4_PAGE_SIZE)-1))\n&~((SLI4_PAGE_SIZE)-1))

@@ -3203,11 +3127,20 @@
#define cfg_sli_hint_2_MASK	0x0000001f
#define cfg_sli_hint_2_WORD	word1
uint32_t word2;
+#define cfg_eqav_SHIFT	31
+#define cfg_eqav_MASK	0x00000001
+#define cfg_eqav_WORD	word2
uint32_t word3;
uint32_t word4;
#define cfg_cqv_SHIFT	14
#define cfg_cqv_MASK	0x00000003
#define cfg_cqv_WORD	word4
+#define cfg_cqpsize_SHIFT	16
+#define cfg_cqpsize_MASK	0x000000ff
+#define cfg_cqpsize_WORD	word4
+#define cfg_cqav_SHIFT	31
+#define cfg_cqav_MASK	0x00000001
+#define cfg_cqav_WORD	word4
uint32_t word5;
uint32_t word6;
#define cfg_mqv_SHIFT	14
@@ -3286,6 +3219,9 @@
#define cfg_eqdr_SHIFT	8
#define cfg_eqdr_MASK	0x00000001
#define cfg_eqdr_WORD	word19
+#define cfg_nosr_SHIFT	9
+#define cfg_nosr_MASK	0x00000001
+#define cfg_nosr_WORD	word19
#define LPFC_NODELAY_MAX_IO	32
};

@@ -3710,8 +3646,6 @@
struct lpfc_mbx_post_hdr_tmpl hdr_tmpl;
struct lpfc_mbx_query-fw-config query-fw-config;
struct lpfc_mbx_set-beacon-config beacon_config;
-struct lpfc_mbx_supp_pages supp_pages;
-struct lpfc_mbx_pc-sli4_params sli4_params;
struct lpfc_mbx_get-sli4-parameters get_sli4_parameters;
struct lpfc_mbx_set-link-diag-state link_diag_state;
struct lpfc_mbx_set-link-diag-loopback link_diag_loopback;

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#define LPFC_FC_LA_SPEED_10G		0xA
#define LPFC_FC_LA_SPEED_16G		0x10
#define LPFC_FC_LA_SPEED_32G            0x20
+#define LPFC_FC_LA_SPEED_64G            0x21
+#define LPFC_FC_LA_SPEED_128G           0x22
+#define LPFC_FC_LA_SPEED_256G           0x23
#define lpfc_acqe_fc_la_topology_SHIFT16
#define lpfc_acqe_fc_la_topology_MASK0x000000FF
#define lpfc_acqe_fc_la_topology_WORDword0
@@ -3870,6 +3804,9 @@
#define wqe_irsp_SHIFT        4
#define wqe_irsp_MASK         0x00000001
#define wqe_irsp_WORD         word11
+#define wqe_pbde_SHIFT        5
+#define wqe_pbde_MASK         0x00000001
+#define wqe_pbde_WORD         word11
#define wqe_sup_SHIFT         6
#define wqe_sup_MASK         0x00000001
#define wqe_sup_WORD         word11
@@ -4119,6 +4056,9 @@
#define prli_init_SHIFT                 5
#define prli_init_MASK                  0x00000001
#define prli_init_WORD                  word4
-#define prli_recov_SHIFT                8
-#define prli_recov_MASK                 0x00000001
-#define prli_recov_WORD                 word4
+#define prli_conf_SHIFT                 7
+#define prli_conf_MASK                  0x00000001
+#define prli_conf_WORD                  word4
uint32_t word5;
#define prli_fb_sz_SHIFT                0
#define prli_fb_sz_MASK                 0x0000ffff
@@ -4339,9 +4279,9 @@
struct gen_req64_wqe gen_req;
};

-#define LPFC_GROUP_OJECT_MAGIC_G5		0xfeaa0001
-#define LPFC_GROUP_OJECT_MAGIC_G6		0xfeaa0003
-#define LPFC_FILE_TYPE_GROUP			0xf7
-#define LPFC_FILE_ID_GROUP			0xa2
++ struct lpfc_grp_hdr {
uint32_t size;
uint32_t magic_number;
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_ids.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_ids.h
@@ -1,7 +1,7 @@
/***************************************************************************
* This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. *
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@@ -116,6 +116,8 @@
PCI_ANY_ID, PCI_ANY_ID, },
{PCI_VENDOR_ID_EMULEX, PCI_DEVICE_ID_LANCER_G6_FC, PCI_ANY_ID, PCI_ANY_ID, },
{PCI_VENDOR_ID_EMULEX, PCI_DEVICE_ID_LANCER_G7_FC, PCI_ANY_ID, PCI_ANY_ID, },
{PCI_VENDOR_ID_EMULEX, PCI_DEVICE_ID_SKYHAWK, PCI_ANY_ID, PCI_ANY_ID, },
{PCI_VENDOR_ID_EMULEX, PCI_DEVICE_ID_SKYHAWK_VF, PCI_ANY_ID, PCI_ANY_ID, },

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_init.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_init.c
@@ -1,7 +1,7 @@
/*******************************************************************/
*/ This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. */
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@@ -167,7 +167,11 @@
sizeof(phba->wwpn));
}

-phba->sli3_options = 0x0;
+/*
+ * Clear all option bits except LPFC_SLI3_BG_ENABLED,
+ * which was already set in lpfc_get_cfgparam()
+ */
+phba->sli3_options &= (uint32_t)LPFC_SLI3_BG_ENABLED;

/* Setup and issue mailbox READ REV command */
lpc_read_rev(phba, pmb);
@@ -731,7 +735,9 @@
    ((phba->cfg_link_speed == LPFC_USER_LINK_SPEED_16G) && !((phba->lmt & LMT_16Gb)) ||
    ((phba->cfg_link_speed == LPFC_USER_LINK_SPEED_32G) &&
-     !((phba->lmt & LMT_32Gb))) { 
+     !((phba->lmt & LMT_32Gb))) { 
+        !((phba->lmt & LMT_64Gb))) { 
+        !((phba->lmt & LMT_64Gb))) { 

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/* Reset link speed to auto */
lpfc_printf_log(phba, KERN_ERR, LOG_LINK_EVENT,
"1302 Invalid speed for this board:%d ")
@@ -958,6 +964,7 @@
struct lpfc_sli_ring *pring;
LIST_HEAD(completions);
int i;
+struct lpfc_iocbq *piocb, *next_iocb;

if (phba->sli_rev != LPFC_SLI_REV4) {
for (i = 0; i < psli->num_rings; i++) {
@@ -983,6 +990,9 @@
if (!pring)
continue;
spin_lock_irq(&pring->ring_lock);
+list_for_each_entry_safe(piocb, next_iocb,
+ &pring->txcmplq, list)
+piocb->iocb_flag &= ~LPFC_IO_ON_TXCMPLQ;
list_splice_init(&pring->txcmplq, &completions);
pring->txcmplq_cnt = 0;
spin_unlock_irq(&pring->ring_lock);
@@ -1034,6 +1044,7 @@
LIST_HEAD(nvmet_aborts);
unsigned long iflag = 0;
struct lpfc_sglq *sglq_entry = NULL;
+int cnt;
lbtc_sli_hbqbuf_free_all(phba);
@@ -1090,11 +1101,14 @@
spin_unlock_irqrestore(&phba->scsi_buf_list_put_lock, iflag);

if (phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME) {
+cnt = 0;
list_for_each_entry_safe(psb, psb_next, &nvme_aborts, list) {
psb->pCmd = NULL;
psb->status = IOSTAT_SUCCESS;
+cnt++;
}
spin_lock_irqsave(&phba->nvme_buf_list_put_lock, iflag);
+phba->put_nvme_bufs += cnt;
list_splice(&nvme_aborts, &phba->lpfc_nvme_buf_list_put);
spin_unlock_irqrestore(&phba->nvme_buf_list_put_lock, iflag);
@@ -1753,7 +1767,7 @@
int rc:
uint32_t intr_mode;
if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) ==
+ if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) >=
    LPFC_SLI_INTF_IF_TYPE_2) {
/*
 * On error status condition, driver need to wait for port
@@ -1773,7 +1787,12 @@
    lpfc_offline(phba);
/* release interrupt for possible resource change */
    lpfc_sli4_disable_intr(phba);
-    lpfc_sli_brdrestart(phba);
+    rc = lpfc_sli_brdrestart(phba);
+    if (rc) {
+        lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+        /*6309 Failed to restart board
        */
+        +return rc;
+    }
/* request and enable interrupt */
    intr_mode = lpfc_sli4_enable_intr(phba, phba->intr_mode);
if (intr_mode == LPFC_INTR_ERROR) {
@@ -1884,6 +1903,7 @@
    break;

    case LPFC_SLI_INTF_IF_TYPE_2:
+    case LPFC_SLI_INTF_IF_TYPE_6:
        pci_rd_rc1 = lpfc_readl(
            phba->sli4_hba.u.if_type2.STATUSregaddr,
            &portstat_reg.word0);
            @ @ -2265,7 +2285,9 @@
            && descp && descp[0] != '\0')
        return;

        -if (phba->lmt & LMT_32Gb)
        +if (phba->lmt & LMT_64Gb)
        +max_speed = 64;
        +else if (phba->lmt & LMT_32Gb)
        max_speed = 32;
        else if (phba->lmt & LMT_16Gb)
        max_speed = 16;
@@ -2464,6 +2486,9 @@
    case PCI_DEVICE_ID_LANCER_G6_FC:
        m = (typeof(m)){"LPe32000", "PCIe", "Fibre Channel Adapter"};
        break;
+    case PCI_DEVICE_ID_LANCER_G7_FC:
+        m = (typeof(m)){"LPe36000", "PCIe", "Fibre Channel Adapter"};
+        break;
    case PCI_DEVICE_ID_SKYHAWK:
    case PCI_DEVICE_ID_SKYHAWK_VF:
        oneConnect = 1;
list_for_each_entry_safe(lpfc_ncmd, lpfc_ncmd_next, &phba->lpfc_nvme_buf_list_put, list) { list_del(&lpfc_ncmd->list); +phba->put_nvme_bufs--; dma_pool_free(phba->lpfc_sg_dma_pool, lpfc_ncmd->data, lpfc_ncmd->dma_handle); kfree(lpfc_ncmd); } list_for_each_entry_safe(lpfc_ncmd, lpfc_ncmd_next, &phba->lpfc_nvme_buf_list_get, list) { list_del(&lpfc_ncmd->list); +phba->get_nvme_bufs--; dma_pool_free(phba->lpfc_sg_dma_pool, lpfc_ncmd->data, lpfc_ncmd->dma_handle); kfree(lpfc_ncmd); } int rc; uint16_t i, lxri, els_xri_cnt; uint16_t nvme_xri_cnt, nvme_xri_max; LIST_HEAD(nvme_sgl_list); spin_lock_irq(&phba->nvme_buf_list_get_lock); spin_lock_irq(&phba->nvme_buf_list_put_lock); list_splice_init(&phba->lpfc_nvme_buf_list_get, &nvme_sgl_list); list_splice(&phba->lpfc_nvme_buf_list_put, &nvme_sgl_list); spin_unlock_irq(&phba->nvme_buf_list_get_lock);
spin_unlock_irq(&phba->nvme_buf_list_put_lock); }
sizeof fc_host_symbolic_name(shost));

fc_host_supported_speeds(shost) = 0;
+if (phba->lmt & LMT_64Gb)
+fc_host_supported_speeds(shost) |= FC_PORTSPEED_64GBIT;
if (phba->lmt & LMT_32Gb)
fc_host_supported_speeds(shost) |= FC_PORTSPEED_32GBIT;
if (phba->lmt & LMT_16Gb)
@@ -4428,6 +4463,9 @@
case LPFC_FC_LA_SPEED_32G:
    port_speed = 32000;
    break;
+case LPFC_FC_LA_SPEED_64G:
+    port_speed = 64000;
+    break;
    default:
    port_speed = 0;
    }
@@ -5000,7 +5038,7 @@
/* If fast FCF failover rescan event is pending, do nothing */
-    if (phba->fcf.fcf_flag & FCF_REDISC_EVT) {
+    if (phba->fcf.fcf_flag & (FCF_REDISC_EVT | FCF_REDISC_PEND)) {
        spin_unlock_irq(&phba->hbalock);
        break;
    }
@@ -5609,8 +5647,10 @@
/* Initialize the NVME buffer list used by driver for NVME IO */
    spin_lock_init(&phba->nvme_buf_list_get_lock);
    INIT_LIST_HEAD(&phba->lpfc_nvme_buf_list_get);
    +phba->get_nvme_bufs = 0;
spin_lock_init(&phba->nvme_buf_list_put_lock);
    INIT_LIST_HEAD(&phba->lpfc_nvme_buf_list_put);
    +phba->put_nvme_bufs = 0;
} /* Initialize the fabric iocb list */
@@ -5802,10 +5842,9 @@
      LPFC_MBOXQ_t *mboxq;
      MAILBOX_t *mb;
      int rc, i, max_buf_size;
-    uint8_t pn_page[LPFC_MAX_SUPPORTED_PAGES] = {0};
-    struct lpfc_mqe *mqe;
      int longs;
      int fof_vectors = 0;
      +int extra;
      uint64_t wwn;
phba->sli4_hba.num_online_cpu = num_online_cpus();
@@ -5860,13 +5899,21 @@
 */

 /*
 + * 1 for cmd, 1 for rsp, NVME adds an extra one
 + * for boundary conditions in its max_sgl_segment template.
 + */
+extra = 2;
+if (phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME)
+extra++;
+
+/*
+ * It doesn't matter what family our adapter is in, we are
+ * limited to 2 Pages, 512 SGEs, for our SGL.
+ * There are going to be 2 reserved SGEs: 1 FCP cmd + 1 FCP rsp
+ */
max_buf_size = (2 * SLI4_PAGE_SIZE);
-if (phba->cfg_sg_seg_cnt > LPFC_MAX_SGL_SEG_CNT - 2)
-if (phba->cfg_sg_seg_cnt > LPFC_MAX_SGL_SEG_CNT - extra)
+phba->cfg_sg_seg_cnt = LPFC_MAX_SGL_SEG_CNT - extra;

/* Since lpfc_sg_seg_cnt is module param, the sg_dma_buf_size
@@ -5899,14 +5946,14 @@
 */
phba->cfg_sg_dma_buf_size = sizeof(struct fcp_cmnd) +
    sizeof(struct fcp_rsp) +
-(phba->cfg_sg_seg_cnt + 2) *
+((phba->cfg_sg_seg_cnt + extra) *
    sizeof(struct sli4_sge));

/* Total SGEs for scsi_sg_list */

/*
 * NOTE: if (phba->cfg_sg_seg_cnt + 2) <= 256 we only
 * NOTE: if (phba->cfg_sg_seg_cnt + extra) <= 256 we only
 * need to post 1 page for the SGL.
 */
}
@@ -5947,9 +5994,6 @@
INIT_LIST_HEAD(&phba->sli4_hba.lpfc_abts_nvme_buf_list);
INIT_LIST_HEAD(&phba->sli4_hba.lpfc_abts_nvmet_ctx_list);
INIT_LIST_HEAD(&phba->sli4_hba.lpfc_nvmet_io_wait_list);
/* Fast-path XRI aborted CQ Event work queue list */
INIT_LIST_HEAD(&phba->sli4_hba.sp_nvme_xri_aborted_work_queue);

/* This abort list used by worker thread */
@@ -5994,7 +6038,7 @@
    return -ENOMEM;

/* IF Type 2 ports get initialized now. */
-if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) ==
+if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) >=
    LPFC_SLI_INTF_IF_TYPE_2) {
    rc = lpfc_pci_function_reset(phba);
    if (unlikely(rc)) {
@@ -6090,32 +6134,6 @@
    lpfc_nvme_mod_param_dep(phba);

-/* Get the Supported Pages if PORT_CAPABILITIES is supported by port. */
-rc = lpfc_supported_pages(mboxq);
-if (!rc) {
-    mqe = &mboxq->u.mqe;
-    memcpy(&pn_page[0], ((uint8_t *)&mqe->un.supp_pages.word3),
-           LPFC_MAX_SUPPORTED_PAGES);
-    for (i = 0; i < LPFC_MAX_SUPPORTED_PAGES; i++) {
-        switch (pn_page[i]) {
-            case LPFC_SLI4_PARAMETERS:
-                phba->sli4_hba.pc_sli4_params.supported = 1;
-                break;
-            default:
-                break;
-        }
-    }
-}
-/* Read the port's SLI4 Parameters capabilities if supported. */
-if (phba->sli4_hba.pc_sli4_params.supported)
-rc = lpfc_pc_sli4_params_get(phba, mboxq);
-if (rc) {
-    mempool_free(mboxq, phba->mbox_mem_pool);
-    rc = -EIO;
-    goto out_free_bsmbx;
-}
-/*
* Get sli4 parameters that override parameters from Port capabilities.
* If this call fails, it isn't critical unless the SLI4 parameters come
break;
case LPFC_SLI_INTF_IF_TYPE_2:
+case LPFC_SLI_INTF_IF_TYPE_6:
/* Final checks. The port status should be clean. */
if (lpfc_readl(phba->sli4_hba.u.if_type2.STATUSregaddr, &reg_data.word0) ||
@@ -7406,13 +7425,36 @@
phba->sli4_hba.WQDBregaddr = 
phba->sli4_hba.conf_regs_memmap_p + LPFC_ULP0_WQ_DOORBELL;
-phba->sli4_hba.EQCQDBregaddr = 
+phba->sli4_hba.CQDBregaddr = 
phba->sli4_hba.conf_regs_memmap_p + LPFC_EQCQ_DOORBELL;
+phba->sli4_hba.EQCQDBregaddr = phba->sli4_hba.CQDBregaddr;
phba->sli4_hba.MQDBregaddr = 
phba->sli4_hba.conf_regs_memmap_p + LPFC_MQ_DOORBELL;
phba->sli4_hba.BMBXregaddr = 
phba->sli4_hba.conf_regs_memmap_p + LPFC_BMBX;
break;
+case LPFC_SLI_INTF_IF_TYPE_6:
+phba->sli4_hba.u.if_type2.EQDregaddr = 
+phba->sli4_hba.conf_regs_memmap_p + LPFC_CTL_PORT_EQ_DELAY_OFFSET;
+phba->sli4_hba.u.if_type2.ERR1regaddr = 
+phba->sli4_hba.conf_regs_memmap_p + LPFC_CTL_PORT_ER1_OFFSET;
+phba->sli4_hba.u.if_type2.ERR2regaddr = 
+phba->sli4_hba.conf_regs_memmap_p + LPFC_CTL_PORT_ER2_OFFSET;
+phba->sli4_hba.u.if_type2.CTRLregaddr = 
+phba->sli4_hba.conf_regs_memmap_p + LPFC_CTL_PORT_CTL_OFFSET;
+phba->sli4_hba.u.if_type2.STATUSregaddr = 
+phba->sli4_hba.conf_regs_memmap_p + LPFC_CTL_PORT_STA_OFFSET;
+phba->sli4_hba.PSMPHregaddr = 
+phba->sli4_hba.conf_regs_memmap_p + LPFC_CTL_PORT_SEM_OFFSET;
+phba->sli4_hba.BMBXregaddr = 
+phba->sli4_hba.conf_regs_memmap_p + LPFC_BMBX;
+break;

case LPFC_SLI_INTF_IF_TYPE_1:
default:
dev_printk(KERN_ERR, &phba->pcidev->dev, 
@@ -7426,20 +7468,43 @@
lpfc_sli4_bar1_register_memmap - Set up SLI4 BAR1 register memory map.
static void lpfc_sli4_bar1_register_memmap(struct lpfc_hba *phba, uint32_t if_type)
{
    switch (if_type) {
    case LPFC_SLI_INTF_IF_TYPE_0:
        phba->sli4_hba.PSMPHRegaddr = phba->sli4_hba.ctrl_regs_memmap_p + LPFC_SLIPORT_IF0_SMPHR;
        phba->sli4_hba.ISRRegaddr = phba->sli4_hba.ctrl_regs_memmap_p + LPFC_HST_ISR0;
        phba->sli4_hba.IMRRegaddr = phba->sli4_hba.ctrl_regs_memmap_p + LPFC_HST_IMR0;
        phba->sli4_hba.ISCRRegaddr = phba->sli4_hba.ctrl_regs_memmap_p + LPFC_HST_ISCR0;
        break;
    case LPFC_SLI_INTF_IF_TYPE_6:
        phba->sli4_hba.RQDBRegaddr = phba->sli4_hba.drbl_regs_memmap_p + LPFC_IF6_RQ_DOORBELL;
        phba->sli4_hba.WQDBRegaddr = phba->sli4_hba.drbl_regs_memmap_p + LPFC_IF6_WQ_DOORBELL;
        phba->sli4_hba.CQDBRegaddr = phba->sli4_hba.drbl_regs_memmap_p + LPFC_IF6_CQ_DOORBELL;
        phba->sli4_hba.EQDBRegaddr = phba->sli4_hba.drbl_regs_memmap_p + LPFC_IF6_EQ_DOORBELL;
        phba->sli4_hba.MQDBRegaddr = phba->sli4_hba.drbl_regs_memmap_p + LPFC_IF6_MQ_DOORBELL;
        break;
    case LPFC_SLI_INTF_IF_TYPE_2:
    case LPFC_SLI_INTF_IF_TYPE_1:
    default:
        dev_err(&phba->pcidev->dev,
            "FATAL - unsupported SLI4 interface type - %d\n",
            if_type);
/**
 * @ -7464,8 +7529,10 @@
 * phba->sli4_hba.WQDBregaddr = (phba->sli4_hba.drbl_regs_memmap_p +
 * vf * LPFC_VFR_PAGE_SIZE +
 * LPFC_ULP0_WQ_DOORBELL);
 * -phba->sli4_hba.EQCQDBregaddr = (phba->sli4_hba.drbl_regs_memmap_p +
 * -vf * LPFC_VFR_PAGE_SIZE + LPFC_EQCQ_DOORBELL);
 * +phba->sli4_hba.CQDBregaddr = (phba->sli4_hba.drbl_regs_memmap_p +
 * +vf * LPFC_VFR_PAGE_SIZE +
 * +LPFC_EQCQ_DOORBELL);
 * +phba->sli4_hba.EQDBregaddr = phba->sli4_hba.CQDBregaddr;
 * phba->sli4_hba.MQDBregaddr = (phba->sli4_hba.drbl_regs_memmap_p +
 * vf * LPFC_VFR_PAGE_SIZE + LPFC_MQ_DOORBELL);
 * phba->sli4_hba.BMBXregaddr = (phba->sli4_hba.drbl_regs_memmap_p +
 * @@ -7646,6 +7713,9 @@
 * bf_get(lpfc_mbx_rd_conf_xri_base, rd_config);
 * phba->sli4_hba.max_cfg_param.max_vpi =
 * bf_get(lpfc_mbx_rd_conf_vpi_count, rd_config);
 * /* Limit the max we support */
 * +if (phba->sli4_hba.max_cfg_param.max_vpi > LPFC_MAX_VPORTS)
 * +phba->sli4_hba.max_cfg_param.max_vpi = LPFC_MAX_VPORTS;
 * phba->sli4_hba.max_cfg_param.vpi_base =
 * bf_get(lpfc_mbx_rd_conf_vpi_base, rd_config);
 * phba->sli4_hba.max_cfg_param.max_rpi =
 * @@ -7702,7 +7772,7 @@
 * /* Update link speed if forced link speed is supported */
 * if_type = bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf);
 * -if (if_type == LPFC_SLI_INTF_IF_TYPE_2) {
 * +if (if_type >= LPFC_SLI_INTF_IF_TYPE_2) {
 * forced_link_speed =
 * bf_get(lpfc_mbx_rd_conf_link_speed, rd_config);
 * if (forced_link_speed) {
 * @@ -7737,6 +7807,10 @@
 * phba->cfg_link_speed =
 * LPFC_USER_LINK_SPEED_32G;
 * break;
 * +case LINK_SPEED_64G:
 * +phba->cfg_link_speed =
 * +LPFC_USER_LINK_SPEED_64G;
 * +break;
 * case 0xffffffff:
 * phba->cfg_link_speed =
 * LPFC_USER_LINK_SPEED_AUTO;
 */
@@ -7762,7 +7836,7 @@
  phba->cfg_hba_queue_depth = length;
 }

-if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) !=
 +if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) <
     LPFC_SLI_INTF_IF_TYPE_2)
 goto read_cfg_out;

@@ -7876,6 +7950,7 @@
 }
 mempool_free(mboxq, phba->mbox_mem_pool);
 break;
+case LPFC_SLI_INTF_IF_TYPE_6:
 case LPFC_SLI_INTF_IF_TYPE_2:
 case LPFC_SLI_INTF_IF_TYPE_1:
 default:
 @@ -7936,8 +8011,12 @@
 phba->cfg_fcp_io_channel = io_channel;
 if (phba->cfg_nvme_io_channel > io_channel)
 phba->cfg_nvme_io_channel = io_channel;
-if (phba->cfg_nvme_io_channel < phba->cfg_nvmet_mrq)
-  phba->cfg_nvmet_mrq = phba->cfg_nvme_io_channel;
+if (phba->nvmet_support) {
+  if (phba->cfg_nvme_io_channel < phba->cfg_nvmet_mrq)
+    phba->cfg_nvmet_mrq = phba->cfg_nvme_io_channel;
+}
+if (phba->cfg_nvmet_mrq > LPFC_NVMET_MRQ_MAX)
+  phba->cfg_nvmet_mrq = LPFC_NVMET_MRQ_MAX;

 lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
 "2574 IO channels: irqs %d fcp %d nvme %d MRQ: %d\n",
@@ -7958,20 +8037,21 @@
 lpfc_alloc_nvme_wq_cq(struct lpfc_hba *phba, int wqidx)
 {
 struct lpfc_queue *qdesc;
-  int cnt;
+  }

-  qdesc = lpfc_sli4_queue_alloc(phba, phba->sli4_hba.cq_esize,
-  - phba->sli4_hba.cq_ecount);
+  qdesc = lpfc_sli4_queue_alloc(phba, LPFC_EXPANDED_PAGE_SIZE,
+  + phba->sli4_hba.cq_esize,
+  + LPFC_CQE_EXP_COUNT);
  if (!qdesc) {
 lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
 "0508 Failed allocate fast-path NVME CQ (%d)\n", wqidx);
 return 1;
qdesc->qe_valid = 1;
phba->sli4_hba.nvme_cq[wqidx] = qdesc;

-cnt = LPFC_NVME_WQSIZE;
-qdesc = lpfc_sli4_queue_alloc(phba, LPFC_WQE128_SIZE, cnt);
+qdesc = lpfc_sli4_queue_alloc(phba, LPFC_EXPANDED_PAGE_SIZE,
   +LPFC_WQE128_SIZE, LPFC_WQE_EXP_COUNT);
if (!qdesc) {
lpc_printf_log(phba, KERN_ERR, LOG_INIT,
   "0509 Failed allocate fast-path NVME WQ (%d)\n", wqidx);
} else
	qdesc->qe_valid = 1;
phba->sli4_hba.fcp_cq[wqidx] = qdesc;

/* Create Fast Path FCP CQs */
-qdesc = lpfc_sli4_queue_alloc(phba, phba->sli4_hba.cq_esize,
 -phba->sli4_hba.cq_ecount);
+if (phba->enab_exp_wqcq_pages)
+/* Increase the CQ size when WQEs contain an embedded cdb */
+qdesc = lpfc_sli4_queue_alloc(phba, LPFC_EXPANDED_PAGE_SIZE,
   +phba->sli4_hba.cq_esize,
   +LPFC_CQE_EXP_COUNT);
+
+else
+qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
   +phba->sli4_hba.cq_esize,
   +phba->sli4_hba.cq_ecount);
if (!qdesc) {
lpc_printf_log(phba, KERN_ERR, LOG_INIT,
   "0499 Failed allocate fast-path FCP CQ (%d)\n", wqidx);
return 1;
}
+qdesc->qe_valid = 1;
phba->sli4_hba.fcp_cq[wqidx] = qdesc;

/* Create Fast Path FCP WQs */
-wqesize = (phba->fcp_embed_io) ?
-LPFC_WQE128_SIZE : phba->sli4_hba.wq_esize;
-qdesc = lpfc_sli4_queue_alloc(phba, wqesize, phba->sli4_hba.wq_ecount);
+if (phba->enab_exp_wqcq_pages) {
+/* Increase the WQ size when WQEs contain an embedded cdb */
+wqesize = (phba->fcp_embed_io) ?
+LPFC_WQE128_SIZE : phba->sli4_hba.wq_esize;
+qdesc = lpfc_sli4_queue_alloc(phba, LPFC_EXPANDED_PAGE_SIZE,
   +wqesize,
   +LPFC_WQE_EXP_COUNT);
+} else
+qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
+ phba->sli4_hba.wq_esize,
+ phba->sli4_hba.wq_ecount);
+
+ if (!qdesc) {
+ lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+ "0503 Failed allocate fast-path FCP WQ (%d)/\n",
+ @@ -8173,13 +8271,15 @@
+ /* Create HBA Event Queues (EQs) */
+ for (idx = 0; idx < io_channel; idx++) {
+ /* Create EQs */
+ -qdesc = lpfc_sli4_queue_alloc(phba, phba->sli4_hba.eq_esize,
+ +qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
+ + phba->sli4_hba.eq_esize,
+ phba->sli4_hba.eq_ecount);
+ if (!qdesc) {
+ lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+ "0497 Failed allocate EQ (%d)/\n”, idx);
+ goto out_error;
+ } +qdesc->qe_valid = 1;
+ phba->sli4_hba.hba_eq[idx] = qdesc;
+ }
+
+ @@ -8196,14 +8296,16 @@
+ if (phba->nvmet_support) {
+ for (idx = 0; idx < phba->cfg_nvmet_mrq; idx++) {
+ qdesc = lpfc_sli4_queue_alloc(phba,
+ -phba->sli4_hba.cq_esize,
+ + phba->sli4_hba.cq_esize,
+ phba->sli4_hba.cq_ecount);
+ + LPFC_DEFAULT_PAGE_SIZE,
+ + phba->sli4_hba.cq_esize,
+ + phba->sli4_hba.cq_ecount);
+ if (!qdesc) {
+ lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+ "3142 Failed allocate NVME 
" 
"CQ Set (%d)/\n", idx);
+ goto out_error;
+ } +qdesc->qe_valid = 1;
+ phba->sli4_hba.nvmet_cqset[idx] = qdesc;
+ }
+ }
+ @@ -8213,23 +8315,27 @@
+ */
+
+ /* Create slow-path Mailbox Command Complete Queue */
+ -qdesc = lpfc_sli4_queue_alloc(phba, phba->sli4_hba.cq_esize,
+ +qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
+ phba->sli4_hba.cq_esize,
    phba->sli4_hba.cq_ecount);
if (!qdesc) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
    "0500 Failed allocate slow-path mailbox CQ\n”);
goto out_error;
}
+qdesc->qe_valid = 1;
phba->sli4_hba.mbx_cq = qdesc;

/* Create slow-path ELS Complete Queue */
-qdesc = lpfc_sli4_queue_alloc(phba, phba->sli4_hba.cq_esize,
+qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
    phba->sli4_hba.cq_esize,
    phba->sli4_hba.cq_ecount);
if (!qdesc) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
    "0501 Failed allocate slow-path ELS CQ\n”);
goto out_error;
}
+qdesc->qe_valid = 1;
phba->sli4_hba.els_cq = qdesc;

@@ -8239,7 +8345,8 @@
/* Create Mailbox Command Queue */
    phba->sli4_hba.mq_esize,
+ phba->sli4_hba.mq_esize,
    phba->sli4_hba.mq_ecount);
if (!qdesc) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
@@ -8253,7 +8360,8 @@
*/
/* Create slow-path ELS Work Queue */
    phba->sli4_hba.wq_esize,
+ phba->sli4_hba.wq_esize,
    phba->sli4_hba.wq_ecount);
if (!qdesc) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
@@ -8265,17 +8373,20 @@
    if (phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME) {
/* Create NVME LS Complete Queue */
qdesc = lpfc_sli4_queue_alloc(phba, phba->cli4_hba.cq_esize,
qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
  phba->cli4_hba.cq_esize,
  phba->cli4_hba.cq_ecount);
if (!qdesc) {
  lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
  "6079 Failed allocate NVME LS CQ\n");
goto out_error;
}
qdesc->qe_valid = 1;
phba->cli4_hba.nvmels_cq = qdesc;

/* Create NVME LS Work Queue */
qdesc = lpfc_sli4_queue_alloc(phba, phba->cli4_hba.wq_esize,
qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
  phba->cli4_hba.wq_esize,
  phba->cli4_hba.wq_ecount);
if (!qdesc) {
  lpfc_printf_log(phba, KERN_ERR, LOG_INIT,

/* Create Receive Queue for header */
qdesc = lpfc_sli4_queue_alloc(phba, phba->cli4_hba.rq_esize,
qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
  phba->cli4_hba.rq_esize,
  phba->cli4_hba.rq_ecount);
if (!qdesc) {
  lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
  phba->cli4_hba.hdr_rq = qdesc;

/* Create Receive Queue for data */
qdesc = lpfc_sli4_queue_alloc(phba, phba->cli4_hba.rq_esize,
qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
  phba->cli4_hba.rq_esize,
  phba->cli4_hba.rq_ecount);
if (!qdesc) {
  lpfc_printf_log(phba, KERN_ERR, LOG_INIT,

for (idx = 0; idx < phba->cfg_nvmet_mrq; idx++) {
  /* Create NVMET Receive Queue for header */
  qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
    phba->cli4_hba.rq_esize,
    LPFC_NVMET_RQE_DEF_COUNT);
  if (!qdesc) {
    @@ -8393,6 +8507,7 @@
}
/* Create NVMET Receive Queue for data */
qdesc = lpfc_sli4_queue_alloc(phba,
    LPFC_DEFAULT_PAGE_SIZE,
    phba->sli4_hba.rq_esize,
    LPFC_NVMET_RQE_DEF_COUNT);
if (!qdesc) {
  @@ -8437,13 +8552,15 @@
/* Release NVME CQ mapping array */
  lpfc_sli4_release_queue_map(&phba->sli4_hba.nvme_cq_map);
  -lpfc_sli4_release_queues(&phba->sli4_hba.nvmet_cqset,
    -phba->cfg_nvmet_mrq);
  +if (phba->nvmet_support) {
    +lpfc_sli4_release_queues(&phba->sli4_hba.nvmet_cqset,
      + phba->cfg_nvmet_mrq);
  -lpfc_sli4_release_queues(&phba->sli4_hba.nvmet_mrq_hdr,
    -phba->cfg_nvmet_mrq);
  -lpfc_sli4_release_queues(&phba->sli4_hba.nvmet_mrq_data,
    -phba->cfg_nvmet_mrq);
  +lpfc_sli4_release_queues(&phba->sli4_hba.nvmet_mrq_hdr,
    + phba->cfg_nvmet_mrq);
  +lpfc_sli4_release_queues(&phba->sli4_hba.nvmet_mrq_data,
    + phba->cfg_nvmet_mrq);
  +}
/* Release mailbox command work queue */
  __lpfc_sli4_release_queue(&phba->sli4_hba.mbx_wq);
  @@ -8514,6 +8631,7 @@
  qidx, (uint32_t)rc);
  return rc;
  }
  +cq->chann = qidx;

  if (qtype != LPFC_MBOX) {
    /* Setup nvme_cq_map for fast lookup */
    @@ -8533,6 +8651,7 @@
    /* no need to tear down cq - caller will do so */
    return rc;
  }
  +wq->chann = qidx;

  /* Bind this CQ/WQ to the NVME ring */
  pring = wq->pring;
  @@ -8773,6 +8892,8 @@
    "rc = 0x%x", (uint32_t)rc);
    goto out_destroy;
+ phba->sli4_hba.nvme_cqset[0]->chann = 0;
+
lpfc_printf_log(phba, KERN_INFO, LOG_INIT,
"6090 NVMET CQ setup: cq-id=%d, 
"parent eq-id=%d\n",
@@ -8994,19 +9115,22 @@
for (qidx = 0; qidx < phba->cfg_nvme_io_channel; qidx++)
lpfc_cq_destroy(phba, phba->sli4_hba.nvme_cq[qidx]);

-/* Unset NVMET MRQ queue */
-if (phba->sli4_hba.nvmet_mrq_hdr) {
-    for (qidx = 0; qidx < phba->cfg_nvmet_mrq; qidx++)
-        lpfc_rq_destroy(phba,
-    }

-/* Unset NVMET CQ Set complete queue */
-/* Unset NVMET MRQ queue */
+/* Unset NVMET MRQ queue */
+if (phba->sli4_hba.nvmet_mrq_hdr) {
+    for (qidx = 0; qidx < phba->cfg_nvmet_mrq; qidx++)
+        lpfc_rq_destroy(
+    }
+}

-/* Unset NVME CQ Set complete queue */
-/* Unset NVMET MRQ queue */
+/* Unset NVME CQ Set complete queue */
+if (phba->sli4_hba.nvmet_cqset) {
+    for (qidx = 0; qidx < phba->cfg_nvmet_cqset; qidx++)
+        lpfc_cq_destroy(
+    }
+}

/* Unset FCP response complete queue */
/* Pending ELS XRI abort events */
list_splice_init(&phba->sli4_hba.sp_els_xri_aborted_work_queue,
    &cqelist);
-/* Pending NVME XRI abort events */
-/* Pending ELS XRI abort events */
-    if (phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME) {
-        /* Pending NVME XRI abort events */
-        list_splice_init(&phba->sli4_hba.sp_nvme_xri_aborted_work_queue,
-            &cqelist);
-    }
-}

list_splice_init(&phba->sli4_hba.sp_asynce_work_queue, &cqelist);
}
break;
case LPFC_SLI_INTF_IF_TYPE_2:
case LPFC_SLI_INTF_IF_TYPE_6:
wait:
/*
 * Poll the Port Status Register and wait for RDY for
*/
break;
tcase LPFC_SLI_INTF_IF_TYPE_2:
+case LPFC_SLI_INTF_IF_TYPE_6:
wait:
/*
 * Poll the Port Status Register and wait for RDY for
*/
break;
phba->pci_bar0_map = pci_resource_start(pdev, 1);
bar0map_len = pci_resource_len(pdev, 1);
-if (if_type == LPFC_SLI_INTF_IF_TYPE_2) {
+if (if_type >= LPFC_SLI_INTF_IF_TYPE_2) {
dev_printk(KERN_ERR, &pdev->dev, "FATAL - No BAR0 mapping for SLI4, if_type 2\n");
goto out;
@ @ -9421,44 +9541,116 @@
lpfc_sli4_bar0_register_memmap(phba, if_type);
}
-if ((if_type == LPFC_SLI_INTF_IF_TYPE_0) &&
+if (if_type == LPFC_SLI_INTF_IF_TYPE_0) {
+if (pci_resource_start(pdev, PCI_64BIT_BAR2)) {
+/*
+ * Map SLI4 if type 0 HBA Control Register base to a
+ * kernel virtual address and setup the registers.
+ */
+phba->pci_bar1_map = pci_resource_start(pdev,
+PCI_64BIT_BAR2);
+bar1map_len = pci_resource_len(pdev, PCI_64BIT_BAR2);
+phba->sli4_hba.ctrl_regs_memmap_p =
+ioremap(phba->pci_bar1_map,
+bar1map_len);
+if (!phba->pci_bar1_map) {
+dev_err(&pdev->dev,
+"ioremap failed for SLI4 HBA 
+"control registers:\n");
+error = -ENOMEM;
+goto out_iounmap_conf;
+}
+phba->pci_bar2_memmap_p =
+phba->sli4_hba.ctrl_regs_memmap_p;
+lpfc_sli4_bar1_register_memmap(phba, if_type);
+} else {
+phba->pci_bar2_memmap_p =
+phba->sli4_hba.ctrl_regs_memmap_p;
+lpfc_sli4_bar1_register_memmap(phba, if_type);
+}
error = -ENOMEM;
+goto out_iounmap_conf;
+
+if ((if_type == LPFC_SLI_INTF_IF_TYPE_6) &&
    (pci_resource_start(pdev, PCI_64BIT_BAR2))) {
/*
   * Map SLI4 if type 0 HBA Control Register base to a kernel
   * virtual address and setup the registers.
   */
   phba->pci_bar1_map = pci_resource_start(pdev, PCI_64BIT_BAR2);
   bar1map_len = pci_resource_len(pdev, PCI_64BIT_BAR2);
   -phba->sli4_hba.ctrl_regs_memmap_p =
   +phba->sli4_hba.ctrl_regs_memmap_p =
   ioremap(phba->pci_bar1_map, bar1map_len);
   -if (!phba->sli4_hba.ctrl_regs_memmap_p) {
   +if (!phba->sli4_hba.drbl_regs_memmap_p) {
   goto out_iounmap_conf;
   +
   +phba->pci_bar2_memmap_p = phba->sli4_hba.ctrl_regs_memmap_p;
   +phba->pci_bar2_memmap_p = phba->sli4_hba.drbl_regs_memmap_p;
   +lpfc_sli4_bar0_register_memmap(phba, if_type);
   }
   -if ((if_type == LPFC_SLI_INTF_IF_TYPE_0) &&
    - (pci_resource_start(pdev, PCI_64BIT_BAR4))) {
   +if (if_type == LPFC_SLI_INTF_IF_TYPE_0) {
   +if (pci_resource_start(pdev, PCI_64BIT_BAR4)) {
   /*
   + * Map SLI4 if type 0 HBA Doorbell Register base to a kernel virtual address and setup the registers.
   + */
   +phba->pci_bar2_map = pci_resource_start(pdev,
   +PCI_64BIT_BAR4);
   +bar2map_len = pci_resource_len(pdev, PCI_64BIT_BAR4);
   +phba->sli4_hba.drbl_regs_memmap_p =
   +ioremap(phba->pci_bar2_map,
   +bar2map_len);
   +if (!phba->sli4_hba.drbl_regs_memmap_p) {
   +dev_err(&pdev->dev,
   + "ioremap failed for SLI4 HBA")
++ "doorbell registers."
+error = -ENOMEM;
+goto out_iounmap_ctrl;
+
+phba->pci_bar4_memmap_p =
+phba->sli4_hba.drb_reg_memmap_p;
+error = lpfc_sli4_bar2_register_memmap(phba, LPFC_VF0);
+if (error)
+goto out_iounmap_all;
+
+if (if_type == LPFC_SLI_INTF_IF_TYPE_6 &&
+    pci_resource_start(pdev, PCI_64BIT_BAR4)) {
+    /* Map SLI4 if type 0 HBA Doorbell Register base to a kernel
+     * Map SLI4 if type 6 HBA DPP Register base to a kernel
+     * virtual address and setup the registers.
+     */
+    phba->pci_bar2_map = pci_resource_start(pdev, PCI_64BIT_BAR4);
+    bar2map_len = pci_resource_len(pdev, PCI_64BIT_BAR4);
+    phba->sli4_hba.drb_reg_memmap_p =
+    phba->sli4_hba.dpp_reg_memmap_p =
+    ioremap(phba->pci_bar2_map, bar2map_len);
+    if (!phba->sli4_hba.drb_reg_memmap_p) {
+        dev_printk(KERN_ERR, &pdev->dev,
+            "ioremap failed for SLI4 HBA doorbell registers."
+        );
+        if (!phba->sli4_hba.dpp_reg_memmap_p) {
+            dev_err(&pdev->dev,
+                "ioremap failed for SLI4 HBA dpp registers."
+            );
+            goto out_iounmap_ctrl;
+        }
+    }
+    else {
+        phba->pci_bar4_memmap_p = phba->sli4_hba.drb_reg_memmap_p;
+        error = lpfc_sli4_bar2_register_memmap(phba, LPFC_VF0);
+        if (error)
+            goto out_iounmap_all;
+        phba->sli4_hba.sli4_eq_clr_intr = lpfc_sli4_eq_clr_intr;
+        phba->sli4_hba.sli4_eq_release = lpfc_sli4_eq_release;
+    }
+    /* Set up the EQ/CQ register handling functions now */
+    switch (if_type) {
+        case LPFC_SLI_INTF_IF_TYPE_0:
+        case LPFC_SLI_INTF_IF_TYPE_2:
+            phba->sli4_hba.sli4_eq_clr_intr = lpfc_sli4_eq_clr_intr;
+            phba->sli4_hba.sli4_eq_release = lpfc_sli4_eq_release;
phba->sli4_hba.sli4_cq_release = lpfc_sli4_cq_release;
+break;
+case LPFC_SLI_INTF_IF_TYPE_6:
+phba->sli4_hba.sli4_eq_clr_intr = lpfc_sli4_if6_eq_clr_intr;
+phba->sli4_hba.sli4_eq_release = lpfc_sli4_if6_eq_release;
+phba->sli4_hba.sli4_cq_release = lpfc_sli4_if6_cq_release;
+break;
+default:
+break;
}

return 0;
@@ -9495,6 +9687,10 @@
case LPFC_SLI_INTF_IF_TYPE_2:
iounmap(phba->sli4_hba.conf_regs_memmap_p);
break;
+case LPFC_SLI_INTF_IF_TYPE_6:
+    iounmap(phba->sli4_hba.drbl_regs_memmap_p);
+    iounmap(phba->sli4_hba.conf_regs_memmap_p);
+    break;
    case LPFC_SLI_INTF_IF_TYPE_1:
    default:
    dev_printk(KERN_ERR, &phba->pcidev->dev,
@@ -10093,6 +10289,16 @@
    int fcp_xri_cmpl = 1;
    int els_xri_cmpl = list_empty(&phba->sli4_hba.lpfc_abts_els_sgl_list);

    /* Driver just aborted IOs during the hba_unset process. Pause
    * here to give the HBA time to complete the IO and get entries
    * into the abts lists.
    */
    +msleep(LPFC_XRI_EXCH_BUSY_WAIT_T1 * 5);
    +
    +/* Wait for NVME pending IO to flush back to transport. */
    +if (phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME)
    +lpfc_nvme_wait_for_io_drain(phba);
    +
    if (phba->cfg_enable_fc4_type & LPFC_ENABLE_FCP)
        fcp_xri_cmpl =
        list_empty(&phba->sli4_hba.lpfc_abts_scsi_buf_list);
@@ -10219,78 +10425,6 @@
        phba->pport->work_port_events = 0;
    }

-/**
- * lpfc_pc_sli4_params_get - Get the SLI4_PARAMS port capabilities.
- * @phba: Pointer to HBA context object.
- * @mboxq: Pointer to the mailboxq memory for the mailbox command response.

This function is called in the SLI4 code path to read the port's sli4 capabilities.

This function may be be called from any context that can block-wait for the completion. The expectation is that this routine is called typically from probe_one or from the online routine.

```c
int lpfc_pc_sli4_params_get(struct lpfc_hba *phba, LPFC_MBOXQ_t *mboxq) {
    int rc;
    struct lpfc_mqe *mqe;
    struct lpfc_pc_sli4_params *sli4_params;
    uint32_t mbox_tmo;
    
    rc = 0;
    mqe = &mboxq->u.mqe;
    /* Read the port's SLI4 Parameters port capabilities */
    lpfc_pc_sli4_params(mboxq);
    if (!phba->sli4_hba.intr_enable)
        rc = lpfc_sli_issue_mbox(phba, mboxq, MBX_POLL);
    else {
        mbox_tmo = lpfc_mbox_tmo_val(phba, mboxq);
        rc = lpfc_sli_issue_mbox_wait(phba, mboxq, mbox_tmo);
    }
    
    if (unlikely(rc))
        return 1;
    
    sli4_params = &phba->sli4_hba.pc_sli4_params;
    sli4_params->if_type = bf_get(if_type, &mqe->un.sli4_params);
    sli4_params->sli_rev = bf_get(sli_rev, &mqe->un.sli4_params);
    sli4_params->sli_family = bf_get(sli_family, &mqe->un.sli4_params);
    sli4_params->featurelevel_1 = bf_get(featurelevel_1,
        &mqe->un.sli4_params);
    sli4_params->featurelevel_2 = bf_get(featurelevel_2,
        &mqe->un.sli4_params);
    sli4_params->proto_types = mqe->un.sli4_params.word3;
    sli4_params->sge_supp_len = mqe->un.sli4_params.sge_supp_len;
    sli4_params->if_page_sz = bf_get(if_page_sz, &mqe->un.sli4_params);
    sli4_params->rq_db_window = bf_get(rq_db_window, &mqe->un.sli4_params);
    sli4_params->loopbk_scope = bf_get(loopbk_scope, &mqe->un.sli4_params);
    sli4_params->eq_pages_max = bf_get(eq_pages, &mqe->un.sli4_params);
    sli4_params->cq_pages_max = bf_get(cq_pages, &mqe->un.sli4_params);
    sli4_params->cqe_size = bf_get(cqe_size, &mqe->un.sli4_params);
    
    return 0;
}
```
- sli4_params->mq_pages_max = bf_get(mq_pages, &mqe->un.sli4_params);
- sli4_params->mqe_size = bf_get(mqe_size, &mqe->un.sli4_params);
- sli4_params->mq_elem_cnt = bf_get(mq_elem_cnt, &mqe->un.sli4_params);
- sli4_params->wq_pages_max = bf_get(wq_pages, &mqe->un.sli4_params);
- sli4_params->wqe_size = bf_get(wqe_size, &mqe->un.sli4_params);
- sli4_params->rq_pages_max = bf_get(rq_pages, &mqe->un.sli4_params);
- sli4_params->rqe_size = bf_get(rqe_size, &mqe->un.sli4_params);
- sli4_params->hdr_pages_max = bf_get(hdr_pages, &mqe->un.sli4_params);
- sli4_params->hdr_size = bf_get(hdr_size, &mqe->un.sli4_params);
- sli4_params->wq_pages_max = bf_get(wq_pages, &mqe->un.sli4_params);
- sli4_params->loopbk_scope = bf_get(loopbk_scope, mbx_sli4_parameters);
- sli4_params->oas_supported = bf_get(cfg_oas, mbx_sli4_parameters);
- sli4_params->cqv = bf_get(cfg_cqv, mbx_sli4_parameters);
- sli4_params->wqv = bf_get(cfg_wqv, mbx_sli4_parameters);
- sli4_params->rqv = bf_get(cfg_rqv, mbx_sli4_parameters);
- sli4_params->eqav = bf_get(cfg_eqav, mbx_sli4_parameters);
- sli4_params->cqav = bf_get(cfg_cqav, mbx_sli4_parameters);
- sli4_params->wqsize = bf_get(cfg_wqsize, mbx_sli4_parameters);
- sli4_params->sgl_pages_max = bf_get(cfg_sgl_page_cnt, mbx_sli4_parameters);

/* Make sure that sge_supp_len can be handled by the driver */
if (sli4_params->sge_supp_len > LPFC_MAX_SGE_SIZE)
  sli4_params->sge_supp_len = LPFC_MAX_SGE_SIZE;

return rc;
}

/**
* lpfc_get_sli4_parameters - Get the SLI4 Config PARAMETERS.
* @phba: Pointer to HBA context object.
@@ -10311,6 +10445,7 @@
  struct lpfc_pc_sli4_params *sli4_params;
  uint32_t mbox_tmo;
  int length;
+  bool exp_wqcq_pages = true;
  struct lpfc_sli4_parameters *mbx_sli4_parameters;

/*
@@ -10348,12 +10483,15 @@
  else
  phba->sli3_options &= ~LPFC_SLI4_PHWQ_ENABLED;
  sli4_params->sge_supp_len = mbx_sli4_parameters->sge_supp_len;
+  sli4_params->loopbk_scope = bf_get(cfg_loopbk_scope, mbx_sli4_parameters);
  sli4_params->oas_supported = bf_get(cfg_oas, mbx_sli4_parameters);
  sli4_params->cqv = bf_get(cfg_cqv, mbx_sli4_parameters);
  sli4_params->mqv = bf_get(cfg_mqv, mbx_sli4_parameters);
  sli4_params->wqv = bf_get(cfg_wqv, mbx_sli4_parameters);
  sli4_params->rqv = bf_get(cfg_rqv, mbx_sli4_parameters);
+  sli4_params->eqav = bf_get(cfg_eqav, mbx_sli4_parameters);
+  sli4_params->cqav = bf_get(cfg_cqav, mbx_sli4_parameters);
  sli4_params->wqsize = bf_get(cfg_wqsize, mbx_sli4_parameters);
  sli4_params->sgl_pages_max = bf_get(cfg_sgl_page_cnt,
      mbx_sli4_parameters);
phba->nvme_support) {
    phba->nvme_support = 0;
    phba->nvmet_support = 0;
    phba->cfg_nvmet_mrq = 0;
    phba->cfg_nvme_io_channel = 0;
    phba->io_channel_irqs = phba->cfg_fcp_io_channel;
    lpfc_printf_log(phba, KERN_ERR, LOG_INIT | LOG_NVME,
phba->cfg_enable_fc4_type = LPFC_ENABLE_FCP;
}

if (bf_get(cfg_xib, mbx_sli4_parameters) && phba->cfg_suppress_rsp)
/* Only embed PBDE for if_type 6 */
+if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) ==
    LPFC_SLI_INTF_IF_TYPE_6) {
+phba->fcp_embed_pbde = 1;
+phba->nvme_embed_pbde = 1;
+}
+
+/* PBDE support requires xib be set */
+if (!bf_get(cfg_xib, mbx_sli4_parameters)) {
+phba->fcp_embed_pbde = 0;
+phba->nvme_embed_pbde = 0;
+}
+
+/* To support Suppress Response feature we must satisfy 3 conditions.
+ * lpfc Suppress rsp module parameter must be set (default).
+ * In SLI4-Parameters Descriptor:
+ * Extended Inline Buffers (XIB) must be supported.
+ * Suppress Response IU Not Supported (SRIUNS) must NOT be supported
+ * (double negative).
+ */
+if (phba->cfg_suppress_rsp &&
+    !bf_get(cfg_xib, mbx_sli4_parameters) &&
+    !bf_get(cfg_nosr, mbx_sli4_parameters))
phba->sli.sli_flag |= LPFC_SLI_SUPPRESS_RSP;
else
+phba->cfg_suppress_rsp = 0;

if (bf_get(cfg_eqdr, mbx_sli4_parameters))
phba->sli.sli_flag |= LPFC_SLI_USE_EQDR;
else
sli4_params->sge_supp_len = LPFC_MAX_SGE_SIZE;
/*
 * Issue IOs with CDB embedded in WQE to minimized the number
* of DMAs the firmware has to do. Setting this to 1 also forces
* the driver to use 128 bytes WQEs for FCP IOs.
+ * Check whether the adapter supports an embedded copy of the
+ * FCP CMD IU within the WQE for FCP_Ixxx commands. In order
+ * to use this option, 128-byte WQEs must be used.
*/
if (bf_get(cfg_ext_embed_cb, mbx_sli4_parameters))
    phba->fcp_embed_io = 1;
else
    phba->fcp_embed_io = 0;

+lpfc_printf_log(phba, KERN_INFO, LOG_INIT | LOG_NVME,
+"6422 XIB %d: FCP %d %d NVME %d %d %d %d
",
+bf_get(cfg_xib, mbx_sli4_parameters),
+phba->fcp_embed_pbde, phba->fcp_embed_io,
+phba->nvme_support, phba->nvme_embed_pbde,
+phba->cfg_nvme_embed_cmd, phba->cfg_suppress_rsp);
+
+if ((bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) ==
+    LPFC_SLI_INTF_IF_TYPE_2) &&
+    (bf_get(lpfc_sli_intf_sli_family, &phba->sli4_hba.sli_intf) ==
+    LPFC_SLI_INTF_FAMILY_LNCR_A0))
    exp_wqcq_pages = false;
+
+if ((bf_get(cfg_cqpsize, mbx_sli4_parameters) & LPFC_CQ_16K_PAGE_SZ) &&
+    (bf_get(cfg_wqpsize, mbx_sli4_parameters) & LPFC_WQ_16K_PAGE_SZ) &&
+    exp_wqcq_pages &&
+    (sli4_params->wqsize & LPFC_WQ_SZ128_SUPPORT))
    phba->enab_exp_wqcq_pages = 1;
+else
    phba->enab_exp_wqcq_pages = 0;
/*
* Check if the SLI port supports MDS Diagnostics
*/
@@ -11056,6 +11238,27 @@
}

+static void
+lpfc_log_write_firmware_error(struct lpfc_hba *phba, uint32_t offset,
+uint32_t magic_number, uint32_t ftype, uint32_t fid, uint32_t fsize,
+const struct firmware *fw)
+{ 
+if (offset == ADD_STATUS_FW_NOT_SUPPORTED)
+lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+"3030 This firmware version is not supported on ":
+"this HBA model. Device:%x Magic:%x Type:%x ":
+"ID:%x Size %d %d
", Open Source Used In 5GaaS Edge AC-4 28116
+phba->pcidev->device, magic_number, ftype, fid,
+fszie, fw->size);
+else
+lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+"3022 FW Download failed. Device:%x Magic:%x Type:%x "
+"ID:%x Size %d %zd\n",
+phba->pcidev->device, magic_number, ftype, fid,
+fszie, fw->size);
+
/**
 * lpfc_write_firmware - attempt to write a firmware image to the port
 * @fw: pointer to firmware image returned from request_firmware.
 * @@ -11083,20 +11286,10 @@

 magic_number = be32_to_cpu(image->magic_number);
 ftype = bf_get_be32(lpfc_grp_hdr_file_type, image);
ifold = bf_get_be32(lpfc_grp_hdr_id, image),
+fid = bf_get_be32(lpfc_grp_hdr_id, image);
 fsize = be32_to_cpu(image->size);

 INIT_LIST_HEAD(&dma_buffer_list);
-if ((magic_number != LPFC_GROUP_OJECT_MAGIC_G5 &
- magic_number != LPFC_GROUP_OJECT_MAGIC_G6) ||
- ftype != LPFC_FILE_TYPE_GROUP || fsize != fw->size) {
-lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
-"3022 Invalid FW image found. 
-"Magic:%x Type:%x ID:%x Size %d %zd\n",
-magic_number, ftype, fid, fsize, fw->size);
-rc = -EINVAL;
-goto release_out;
-}

 lpfc_decode_firmware_rev(phba, fwrev, 1);
 if (strncmp(fwrev, image->revision, strnlen(image->revision, 16))) {
 lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
 @@ -11137,11 +11330,18 @@
 }
 rc = lpfc_wr_object(phba, &dma_buffer_list,
 (fw->size - offset), &offset);
-if (rc)
+if (rc) {
 +lpfc_log_write_firmware_error(phba, offset,
 +magic_number, ftype, fid, fsize, fw);
 goto release_out;
 +}
 }
 rc = offset;
else
+lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+"3029 Skipped Firmware update, Current "
+"Version:%s New Version:%s/u",
+fwrev, image->revision);

release_out:
list_for_each_safe(dmabuf, next, &dma_buffer_list, list) {
@@ -11172,7 +11372,7 @@
@@ -11172,7 +11372,7 @@
 const struct firmware *fw;
 /* Only supported on SLI4 interface type 2 for now */
-if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) !=
+if (bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) <
+LPFC_SLI_INTF_IF_TYPE_2)
return -EPERM;

/* Remove FC host and then SCSI host with the physical port */
fc_remove_host(shost);
scsi_remove_host(shost);
/* - * Bring down the SLI Layer. This step disables all interrupts,
- * clears the rings, discards all mailbox commands, and resets
- * the HBA FCoE function.
- */
-lpfc_debugfs_terminate(vport);
-lpfc_sli4_hba_unset(phba);

/* Perform ndlp cleanup on the physical port. The nvme and nvmet
 * localports are destroyed after to cleanup all transport memory.
@@ -11427,6 +11620,13 @@
lpfc_nvmet_destroy_targetport(phba);
lpfc_nvme_destroy_localport(vport);
+/*
+ * Bring down the SLI Layer. This step disables all interrupts,
+ * clears the rings, discards all mailbox commands, and resets
+ * the HBA FCoE function.
+ */
+lpfc_debugfs_terminate(vport);
+lpfc_sli4_hba_unset(phba);

lpfc_stop_hba_timers(phba);
spin_lock_irq(&phba->hbalock);
@@ -11616,6 +11816,10 @@
/* Flush all driver's outstanding SCSI I/Os as we are to reset */
lpfc_sli_flush_fcp_rings(phba);

/*! Flush the outstanding NVME I/Os if fc4 type enabled. */
+ if (phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME)
+ lpfc_sli_flush_nvme_rings(phba);
+
/*! stop all timers */
lpcf_stop_hba_timers(phba);

@@ -11647,6 +11851,10 @@

/* Clean up all driver's outstanding SCSI I/Os */
lpfc_sli_flush_fcp_rings(phba);
+
/* Flush the outstanding NVME I/Os if fc4 type enabled. */
+ if (phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME)
+ lpfc_sli_flush_nvme_rings(phba);
}

/**
 @@ -12141,28 +12349,47 @@

uint32_t wqesize;

/* Create FOF EQ */
-qdesc = lpfc_sli4_queue_alloc(phba, phba->sli4_hba.eq_esize,
+qdesc = lpfc_sli4_queue_alloc(phba, LPFC_DEFAULT_PAGE_SIZE,
+ phba->sli4_hba.eq_esize,
 phba->sli4_hba.eq_ecount);
if (!qdesc)
go to qdesc_error;

+qdesc->qe_valid = 1;
phba->sli4_hba.fof_eq = qdesc;

if (phba->cfg_fof) {

/* Create OAS CQ */
-qdesc = lpfc_sli4_queue_alloc(phba, phba->sli4_hba.cq_esize,
+if (phba->enab_exp_wqcq_pages)
+qdesc = lpfc_sli4_queue_alloc(phba,
 + LPFC_EXPANDED_PAGE_SIZE,
 + phba->sli4_hba.cq_esize,
 + LPFC_CQE_EXP_COUNT);
+else
+ qdesc = lpfc_sli4_queue_alloc(phba,
 + LPFC_DEFAULT_PAGE_SIZE,
 + phba->sli4_hba.cq_esize,
 phba->sli4_hba.cq_ecount);
if (!qdesc)
goto out_error;

+qdesc->qe_valid = 1;
phba->sli4_hba.oas_cq = qdesc;

/* Create OAS WQ */
-wqesize = (phba->fcp_embed_io) ?
+if (phba->enab_exp_wqcq_pages) {
+wqesize = (phba->fcp_embed_io) ?
LPFC_WQE128_SIZE : phba->sli4_hba.wq_esize;
-qdesc = lpfc_sli4_queue_alloc(phba, wqesize,
- phba->sli4_hba.wq_ecount);
+qdesc = lpfc_sli4_queue_alloc(phba,
+ LPFC_EXPANDED_PAGE_SIZE,
+ wqesize,
+ LPFC_WQE_EXP_COUNT);
+} else
+qdesc = lpfc_sli4_queue_alloc(phba,
+ LPFC_DEFAULT_PAGE_SIZE,
+ phba->sli4_hba.wq_esize,
+ phba->sli4_hba.wq_ecount);

if (!qdesc)
goto out_error;

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_mbox.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_mbox.c
@@ -1,7 +1,7 @@
/****************************
 *
 * This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters.
 *
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@@ -139,7 +193,7 @@
 /* Failover is not tried for Lancer G6 */
 +if ((phba->pcidev->device == PCI_DEVICE_ID_LANCER_G6_FC ||
 +cb->un.varInitLnk.link_flags & FLAGS_TOPOLOGY_MODE_LOOP) {
 mb->un.varInitLnk.link_flags = FLAGS_TOPOLOGY_MODE_PT_PT;
 phba->cfg_topology = FLAGS_TOPOLOGY_MODE_PT_PT;

```c
mb->un.varInitLnk.link_flags |= FLAGS_LINK_SPEED;
mb->un.varInitLnk.link_speed = LINK_SPEED_32G;
break;
+case LPFC_USER_LINK_SPEED_64G:
+mb->un.varInitLnk.link_flags |= FLAGS_LINK_SPEED;
+mb->un.varInitLnk.link_speed = LINK_SPEED_64G;
+break;

case LPFC_USER_LINK_SPEED_AUTO:
default:
mb->un.varInitLnk.link_speed = LINK_SPEED_AUTO;
		case LPFC_USER_LINK_SPEED_64G:
			mb->un.varInitLnk.link_flags |= FLAGS_LINK_SPEED;
			mb->un.varInitLnk.link_speed = LINK_SPEED_64G;
			break;

/* Only FC supports upd bit */
if ((phba->sli4_hba.lnk_info.lnk_tp == LPFC_LNK_TYPE_FC) &&
    (!phba->fc_topology_changed)) {
    (!phba->fc_topology_changed)) {
-bf_set(lpfc_reg_vfi_vp, reg_vfi, 0);
+bf_set(lpfc_reg_vfi_upd, reg_vfi, 1);
}

bf_set(lpfc_reg_vfi_bbcr, reg_vfi, 0);
bf_set(lpfc_reg_vfi_bbcsn, reg_vfi, 0);
		case LPFC_USER_LINK_SPEED_AUTO;
	@@ -2170,10 +2174,8 @@
	/* Only FC supports upd bit */
 if ((phba->sli4_hba.lnk_info.lnk_tp == LPFC_LNK_TYPE_FC) &&
     (vport->fc_flag & FC_VFI_REGISTERED) &&
     (!phba->fc_topology_changed)) {
     (!phba->fc_topology_changed)) {
-bf_set(lpfc_reg_vfi_vp, reg_vfi, 0);
+bf_set(lpfc_reg_vfi_upd, reg_vfi, 1);
     }

-bf_set(lpfc_reg_vfi_bbcr, reg_vfi, 0);
-bf_set(lpfc_reg_vfi_bbcsn, reg_vfi, 0);
@@ -2620,39 +2622,3 @@
 resume_rpi->event_tag = ndlp->phba->fc_eventTag;
 }

-/**
- * lpfc_supported_pages - Initialize the PORT_CAPABILITIES supported pages
- * mailbox command.
- * @mbox: pointer to lpfc mbox command to initialize.
- *
- * The PORT_CAPABILITIES supported pages mailbox command is issued to
- * retrieve the particular feature pages supported by the port.
- **/
-void
-lpfc_supported_pages(struct lpfcMboxq *mbox)
-{
-struct lpfc_mbx_supp_pages *supp_pages;
-  
-  memset(mbox, 0, sizeof(*mbox));
-  supp_pages = &mbox->u.mqe.un.supp_pages;
-  bf_set(lpfce_mqe_command, &mbox->u.mqe, MBX_PORT_CAPABILITIES);
-  bf_set(cpn, supp_pages, LPFC_SUPP_PAGES);
-  }
- /*
-  * lpfc_supported_pages - Initialize the PORT_CAPABILITIES supported pages
-  * mailbox command.
-  * @mbox: pointer to lpfc mbox command to initialize.
-  *
-  * The PORT_CAPABILITIES supported pages mailbox command is issued to
-  * retrieve the particular feature pages supported by the port.
-  **/
-void
-lpfc_supported_pages(struct lpfcMboxq *mbox)
-{
-struct lpfc_mbx_supp_pages *supp_pages;
-  
-  memset(mbox, 0, sizeof(*mbox));
-  supp_pages = &mbox->u.mqe.un.supp_pages;
-  bf_set(lpfce_mqe_command, &mbox->u.mqe, MBX_PORT_CAPABILITIES);
-  bf_set(cpn, supp_pages, LPFC_SUPP_PAGES);
-  }
- */
- */
```
- * lpfc_pc_sli4_params - Initialize the PORT_CAPABILITIES SLI4 Params mbox cmd.
- * @mbox: pointer to lpfc mbox command to initialize.
- *
- * The PORT_CAPABILITIES SLI4 parameters mailbox command is issued to
- * retrieve the particular SLI4 features supported by the port.
- *
---

```c
void lpfc_pc_sli4_params(struct lpfcMboxq *mbox)
{
    struct lpfc_mbx_pc_sli4_params *sli4_params;

    memset(mbox, 0, sizeof(*mbox));
    sli4_params = &mbox->u.mqe.un.sli4_params;
    bf_set(lpfc_mqe_command, &mbox->u.mqe, MBX_PORT_CAPABILITIES);
    bf_set(cpn, sli4_params, LPFC_SLI4_PARAMETERS);
}
```

---

```
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_mem.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_mem.c
@@ -1,7 +1,7 @@
    /*******************************************************************
-   * This file is part of the Emulex Linux Device Driver for         *
+   * This file is part of the Emulex Linux Device Driver for         *
    * Fibre Channel Host Bus Adapters.                               *
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+   * EMULEX and SLI are trademarks of Emulex.                       *
@@ -559,8 +559,6 @@
    Description: Allocates a DMA-mapped receive buffer from the lpfc_hrb_pool PCI
    pool along a non-DMA-mapped container for it.
    *
-   * Notes: Not interrupt-safe. Must be called with no locks held.
-   *
-   * Returns:
-   *   pointer to HBQ on success  
-   *   NULL on failure           
{ 
    struct rqb_dmabuf *dma_buf;

    -dma_buf = kzalloc(sizeof(struct rqb_dmabuf), GFP_KERNEL);
+dma_buf = kzalloc(sizeof(*dma_buf), GFP_KERNEL);
    if (!dma_buf)
        return NULL;

    rc = lpfc_sli4_rq_put(rqb_entry->hrq, rqb_entry->drq, &hrqe, &drqe);
    if (rc < 0) {
```
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
"6409 Cannot post to RQ %d: %x %x\n",
"6409 Cannot post to HRQ %d: %x %x %x DRQ %x %x\n",
rqb_entry->hrq->queue_id,
rqb_entry->hrq->host_index,
rqb_entry->hrq->hba_index);
+rqb_entry->hrq->entry_count,
rqb_entry->drq->host_index,
rqb_entry->drq->hba_index);
(rqbp->rqb_free_buffer)(phba, rqb_entry);
} else {
    list_add_tail(&rqb_entry->hbuf.list, &rqbp->rqb_buffer_list);
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_nportdisc.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_nportdisc.c
@@ -1,7 +1,7 @@
- /*******************************************************************
+ /*******************************************************************
* This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. *
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@@ -390,6 +390,11 @@
break;
}
+ndlp->nlp_type &= ~(NLP_FCP_TARGET | NLP_FCP_INITIATOR);
+ndlp->nlp_type &= ~(NLP_NVME_TARGET | NLP_NVME_INITIATOR);
+ndlp->nlp_fcp_info &= ~NLP_FCP_2_DEVICE;
+ndlp->nlp_flag &= ~NLP_FIRSTBURST;
+
/* Check for Nport to NPort pt2pt protocol */
if ((vport->fc_flag & FC_PT2PT) &&
    !(vport->fc_flag & FC_PT2PT_PLOGI)) {
  @ @ -478,8 +483,10 @ @
  * single discovery thread, this will cause a huge delay in *
  * discovery. Also this will cause multiple state machines
  * running in parallel for this node.
  * This only applies to a fabric environment.
  */
  -if (ndlp->nlp_state == NLP_STE_PLOGI_ISSUE) {
  +if ((ndlp->nlp_state == NLP_STE_PLOGI_ISSUE) &&
     (vport->fc_flag & FC_FABRIC)) {
     /* software abort outstanding PLOGI */
lpfc_els_abort(phba, ndlp);
}
@@ -701,9 +708,14 @@
} else if (!(ndlp->nlp_type & NLP_FABRIC) &&
 ((ndlp->nlp_type & NLP_FCP_TARGET) ||
 -(ndlp->nlp_type & NLP_FCP_INITIATOR)) ||
 +(ndlp->nlp_type & NLP_NVME_TARGET) ||
 +((vport->fc_flag & FC_PT2PT)) ||
 (ndlp->nlp_state == NLP_STE_ADISC_ISSUE)) { /* Only try to re-login if this is NOT a Fabric Node */
 +/* Only try to re-login if this is NOT a Fabric Node
 + * AND the remote NPORT is a FCP/NVME Target or we
 + * are in pt2pt mode. NLP_STE_ADISC_ISSUE is a special
 + * case for LOGO as a response to ADISC behavior.
 + */
 mod_timer(&ndlp->nlp_delayfunc,
 jiffies + msecs_to_jiffies(1000 * 1));
 spin_lock_irq(shost->host_lock);
@@ -727,6 +739,41 @@
 return 0;
 }
+
+static uint32_t
+lpfc_rcv_prli_support_check(struct lpfc_vport *vport,
+ struct lpfc_nodelist *ndlp,
+ struct lpfc_iocbq *cmdiocb)
+{
+struct ls_rjt stat;
+uint32_t *payload;
+uint32_t cmd;
+*payload = ((struct lpfc_dmabuf *)cmdiocb->context2)->virt;
+cmd = *payload;
+if (vport->phba->nvmet_support) {
+/* Must be a NVME PRLI */
+if (cmd == ELS_CMD_PRLI) goto out;
+} else {
+/* Initiator mode. */
+if (!vport->nvmei_support && (cmd == ELS_CMD_NVMEPRI))
+goto out;
+}
+return 1;
+out:
+lpfc_printf_vlog(vport, KERN_WARNING, LOG_NVME_DISC,
+ "6115 Rcv PRLI (%x) check failed: ndlp rpi %d 
+ "state x%x flags x%x
",
+ cmd, ndlp->nlp_rpi, ndlp->nlp_state,
+ ndlp->nlp_flag);
+memset(&stat, 0, sizeof(struct ls_rjt));
+stat.un.b.lsRjtRsnCode = LSRJT_CMD_UNSUPPORTED;
+stat.un.b.lsRjtRsnCodeExp = LSEXP_REQ_UNSUPPORTED;
+lpfc_els_rsp_reject(vport, stat.un.lsRjtError, cmdiocb,
+    ndlp, NULL);
+return 0;
+
+}
+
static void
lpfc_rcv_prli(struct lpfc_vport *vport, struct lpfc_nodelist *ndlp,
    struct lpfc_iocbq *cmdiocb)
{@@ -742,9 +789,6 @@
lp = (uint32_t *) pcmd->virt;
npr = (PRLI *) ((uint8_t *) lp + sizeof (uint32_t));
-
-ndlp->nlp_type &= ~(NLP_FCP_TARGET | NLP_FCP_INITIATOR);
-ndlp->nlp_fcp_info &= ~NLP_FCP_2_DEVICE;
-ndlp->nlp_flag &= ~NLP_FIRSTBURST;
if ((npr->prliType == PRLI_FCP_TYPE) ||
    (npr->prliType == PRLI_NVME_TYPE)) {
if (npr->initiatorFunc) {
    @ @ -742.9 +789.6 @@
* type. Target mode does not issue gft_id so doesn't get
* the fc4 type set until now.
*/
-} 
-if ((phba->nvmet_support) && (npr->prliType == PRLI_NVME_TYPE))
+if (phba->nvmet_support && (npr->prliType == PRLI_NVME_TYPE)) {
ndlp->nlp_fc4_type |= NLP_FC4_NVME;
+lpfc_nlp_set_state(vport, ndlp, NLP_STE_UNMAPPED_NODE);
+}
+if (npr->prliType == PRLI_FCP_TYPE)
+ndlp->nlp_fc4_type |= NLP_FC4_FCP;
}
if (rport) {
/* We need to update the rport role values */
@ @ -795.22 +843.27 @@
struct Scsi_Host *shost = lpfc_host_from_vport(vport);

if (!((ndlp->nlp_flag & NLP_RPL_REGISTERED)) {
+spin_lock_irq(shost->host_lock);
ndlp->nlp_flag &= ~NLP_NPR_ADISC;
+spin_unlock_irq(shost->host_lock);
return 0;
}

if (!((vport->fc_flag & FC_PT2PT)) {


/* Check config parameter use-adisc or FCP-2 */
-if (vport->cfg_use_adisc && (vport->fc_flag & FC_RSCN_MODE))
+if ((vport->cfg_use_adisc && (vport->fc_flag & FC_RSCN_MODE))
   && (nlp->nlp_type & NLP_FCP_2_DEVICE)) {
    spin_lock_irq(shost->host_lock);
    nlp->nlp_flag |= NLP_NPR_ADISC;
    spin_unlock_irq(shost->host_lock);
    return 1;
}
+}

 spin_lock_irq(shost->host_lock);
 nlp->nlp_flag &= ~NLP_NPR_ADISC;
 spin_unlock_irq(shost->host_lock);
 lpfc_unreg_rpi(vport, ndlp);
 return 0;
}
@@ -1373,7 +1426,8 @@
 {
 struct lpfc_iocbq *cmdiocb = (struct lpfc_iocbq *) arg;

- lpfc_els_rsp_prli_acc(vport, cmdiocb, ndlp);
+if (lpfc_rcv_prli_support_check(vport, ndlp, cmdiocb))
+lpfc_els_rsp_prli_acc(vport, cmdiocb, ndlp);
 return ndlp->nlp_state;
}
@@ -1544,6 +1598,9 @@
 struct lpfc_iocbq *cmdiocb = (struct lpfc_iocbq *) arg;
 struct ls_rjt stat;

+if (!lpfc_rcv_prli_support_check(vport, ndlp, cmdiocb)) {
+return ndlp->nlp_state;
+}
 if (vport->phba->nvmet_support) {
 /* NVME Target mode. Handle and respond to the PRLI and
 * transition to UNMAPPED provided the RPI has completed
 @@ -1552,28 +1609,22 @@
 if (nlp->nlp_flag & NLP_RPI_REGISTERED) {
 lpfc_rcv_prli(vport, ndlp, cmdiocb);
 lpfc_els_rsp_prli_acc(vport, cmdiocb, ndlp);
 lpfc_nlp_set_state(vport, ndlp, NLP_STE_UNMAPPED_NODE);
 } else {
 /* RPI registration has not completed. Reject the PRLI
 * to prevent an illegal state transition when the
 * rpi registration does complete.
lpfc_printf_vlog(vport, KERN_WARNING, LOG_NVME_DISC,
   "6115 NVMET ndlp rpi %d state ",
   ndlp->nlp_rpi, ndlp->nlp_state,
   ndlp->nlp_flag);
memset(&stat, 0, sizeof(struct ls_rjt));
stat.un.b.lsRjtRsnCode = LSRJT_UNABLE_TPC;
stat.un.b.lsRjtRsnCodeExp = LSEXP_CMD_IN_PROGRESS;
+stat.un.b.lsRjtRsnCode = LSRJT_LOGICAL_BSY;
+stat.un.b.lsRjtRsnCodeExp = LSEXP_NOTHING_MORE;
lpfc_els_rsp_reject(vport, stat.un.lsRjtError, cmdiocb,
   ndlp, NULL);
return ndlp->nlp_state;
} else {
/* Initiator mode. */
lpfc_els_rsp_prli_acc(vport, cmdiocb, ndlp);
}
return ndlp->nlp_state;
}
@@ -1689,8 +1740,6 @@
ndlp->nlp_last_elscmd = ELS_CMD_PLOGI;
lpc_els_rsp_logo(vport, ndlp, 0);
-ndlp->nlp_prev_state = NLP_STE_REG_LOGIN_ISSUE;
-ndlp->nlp_set_state(vport, ndlp, NLP_STE_NPR_NODE);
return ndlp->nlp_state;
}
@@ -1819,6 +1868,8 @@
{
struct lpfc_iocbq *cmdiocb = (struct lpfc_iocbq *) arg;
+if (!lpfc_rcv_prli_support_check(vport, ndlp, cmdiocb))
+return ndlp->nlp_state;
lpc_els_rsp_prli_acc(vport, cmdiocb, ndlp);
return ndlp->nlp_state;
}
@@ -1922,13 +1973,6 @@
return ndlp->nlp_state;
}
/* Check out PRLI rsp */
-ndlp->nlp_type &= ~(NLP_FCP_TARGET | NLP_FCP_INITIATOR);
-ndlp->nlp_fcp_info &= ~(NLP_FCP_2_DEVICE);
- ndlp->nlp_flag &= ~NLP_FIRSTBURST;
- ndlp->nvme_fb_size = 0;
if (npr && (npr->acceptRspCode == PRLI_REQ_EXECUTED) &&
    (npr->prliType == PRLI_FCP_TYPE)) {
    lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_DISC,
        @ @ -1945,8 +1989,6 @@
    if (npr->Retry)
        ndlp->nlp_fcp_info |= NLP_FCP_2_DEVICE;

    /* NVME or FCP first burst must be negotiated for each PRLI. */
    ndlp->fc4_prli_sent--;
} else if (nvpr &&
    (bf_get_be32(prli_acc_rsp_code, nvpr) ==
        PRLI_REQ_EXECUTED) &&
        @ @ -1966,8 +2008,14 @@
    ndlp->nlp_type |= NLP_NVME_TARGET;
if (bf_get_be32(prli_disc, nvpr))
    ndlp->nlp_type |= NLP_NVME_DISCOVERY;
+
*/
+ * If prli_fba is set, the Target supports FirstBurst.
+ * If prli_fb_sz is 0, the FirstBurst size is unlimited,
+ * otherwise it defines the actual size supported by
+ * the NVME Target.
+ */
    if ((bf_get_be32(prli_fba, nvpr) == 1) &&
        - (bf_get_be32(prli_fb_sz, nvpr) > 0) &&
            (phba->cfg_nvme_enable_fb) &&
            (!phba->nvmet_support)) {
    /* Both sides support FB. The target's first
        @ @ -1976,12 +2024,16 @@
    ndlp->nlp_flag |= NLP_FIRSTBURST;
    ndlp->nvme_fb_size = bf_get_be32(prli_fb_sz, nvpr);
    +/* Expressed in units of 512 bytes */
    +if (ndlp->nvme_fb_size)
       +ndlp->nvme_fb_size <<=
            +LPFC_NVME_FB_SHIFT;
    +else
    +ndlp->nvme_fb_size = LPFC_NVME_MAX_FB;
    }
    }

    -if (bf_get_be32(prli_recov, nvpr))
    -ndlp->nlp_fcp_info |= NLP_FCP_2_DEVICE;
- lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_DISC,
  "6029 NVME PRLI Cmpl w1 x%08x \\
  "w4 x%08x w5 x%08x flag x%x, \\
  @@ -1991,8 +2043,6 @@
  be32_to_cpu(nvpr->word5),
  ndlp->nlp_flag, ndlp->nlp_fcp_info,
  ndlp->nlp_type);
  /* PRLI completed. Decrement count */
  -ndlp->fc4_prli_sent--;
  }
  if (!(ndlp->nlp_type & NLP_FCP_TARGET) &&
       (vport->port_type == LPFC_NPIV_PORT) &&
  @@ -2016,7 +2066,8 @@
  ndlp->nlp_prev_state = NLP_STE_PRLI_ISSUE;
  if (ndlp->nlp_type & (NLP_FCP_TARGET | NLP_NVME_TARGET))
    lpfc_nlp_set_state(vport, ndlp, NLP_STE_MAPPED_NODE);
  -else
  +else if (ndlp->nlp_type &
  +   (NLP_FCP_INITIATOR | NLP_NVME_INITIATOR))
    lpfc_nlp_set_state(vport, ndlp, NLP_STE_UNMAPPED_NODE);
  } else
  lpfc_printf_vlog(vport,
  @@ -2241,6 +2292,9 @@
  {  
    struct lpfc_iocbq *cmdiocb = (struct lpfc_iocbq *) arg;

    +if (!lpfc_rcv_prli_support_check(vport, ndlp, cmdiocb))
    +  return ndlp->nlp_state;
    +
    lpfc_rcv_prli(vport, ndlp, cmdiocb);
    lpfc_els_rsp_prli_acc(vport, cmdiocb, ndlp);  
    return ndlp->nlp_state;
    @@ -2310,6 +2364,8 @@
  }  
    struct lpfc_iocbq *cmdiocb = (struct lpfc_iocbq *) arg;

    +if (!lpfc_rcv_prli_support_check(vport, ndlp, cmdiocb))
    +  return ndlp->nlp_state;
    +
    lpfc_els_rsp_prli_acc(vport, cmdiocb, ndlp);  
    return ndlp->nlp_state;
  }
  @ @ -2828,8 +2884,9 @@
  /* DSM in event <evt> on NPort <nlp_DID> in state <cur_state> */
  lpfc_printf_vlog(vport, KERN_INFO, LOG_DISCOVERY,
  "0211 DSM in event x%x on NPort x%x in ">
  - "state %d Data: x%x\n",
  - evt, ndlp->nlp_DID, cur_state, ndlp->nlp_flag);
lpc debugfs_disc_trc(vport, LPFC_DISC_TRC_DSM,
"DSM in:   evt:%d ste:%d did:x%x",
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_nvme.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_nvme.c
@@ -1,7 +1,7 @@
@@ -57,11 +57,13 @@
/* NVME initiator-based functions */

static struct lpfc_nvme_buf *
-lpfc_get_nvme_buf(struct lpfc_hba *hba, struct lpfc_nodelist *ndlp);
+lpfc_get_nvme_buf(struct lpfc_hba *phba, struct lpfc_nodelist *ndlp, 
+    int expedite);

static void
lpfc_release_nvme_buf(struct lpfc_hba *, struct lpfc_nvme_buf *);

+static struct nvme_fc_port_template lpfc_nvme_template;

/**
   * lpfc_nvme_create_queue -
   @ @ -88.6 +90.9 @@
   struct lpfc_nvme_qhandle *qhandle;
   char *str;

   +if (!pnvme_lport->private)
   +return -ENOMEM;
   +
   lport = (struct lpfc_nvme_lport *)pnvme_lport->private;
   vport = lport->vport;
   qhandle = kzalloc(sizeof(struct lpfc_nvme_qhandle), GFP_KERNEL);
   @ @ -140,11 +145,14 @@
   struct lpfc_nvme_lport *lport;
   struct lpfc_vport *vport;

   +if (!pnvme_lport->private)
   +return;
lport = (struct lpfc_nvme_lport *)pnvme_lport->private;
vport = lport->vport;

lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME,
"6001 ENTER. lpfc_pnvme %p, qidx x%xi qhandle %p\n",
lport, qidx, handle);
kfree(handle);
}
@@ -154,8 +162,13 @@
{
 struct lpfc_nvme_lport *lport = localport->private;

+lpfc_printf_vlog(lport->vport, KERN_INFO, LOG_NVME,
+"6173 localport %p delete complete\n",
+lport);
+
+/* release any threads waiting for the unreg to complete */
+complete(&lport->lport_unreg_done);
+if (lport->vport->localport)
+complete(lport->lport_unreg_cmp);
}

/* lpfc_nvme_remoteport_delete */
@@ -189,16 +202,19 @@
 * calling state machine to remove the node.
 */
lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_DISC,
"6146 remoteport delete complete %p\n",
remoteport);
+spin_lock_irq(&vport->phba->hbalock);
ndlp->nrport = NULL;
+spin_unlock_irq(&vport->phba->hbalock);
+
+/* Remove original register reference. The host transport
+ won't reference this rport/remoteport any further.
+ */
lpfc_nlp_put(ndlp);

rport_err:
/* This call has to execute as long as the rport is valid.
 * Release any threads waiting for the unreg to complete.
 */
-complete(&rport->rport_unreg_done);
+return;
}
static void
@@ -206,6 +222,7 @@
struct lpfc_vport *vport = cmdwqe->vport;
+struct lpfc_nvme_lport *lport;
 uint32_t status;
 struct nvmefc_ls_req *pnvme_lsreq;
 struct lpfc_dmabuf *buf_ptr;
@@ -215,13 +232,21 @@
 pnvme_lsreq = (struct nvmefc_ls_req *)cmdwqe->context2;
 status = bf_get(lpfc_wcqe_c_status, wcqe) & LPFC_IOCB_STATUS_MASK;
 +if (status) {
+    lport = (struct lpfc_nvme_lport *)vport->localport->private;
+    if (bf_get(lpfc_wcqe_c_xb, wcqe))
+        atomic_inc(&lport->cmpl_ls_xb);
+    atomic_inc(&lport->cmpl_ls_err);
+}
+ndlp = (struct lpfc_nodelist *)cmdwqe->context1;
 lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_DISC,
 "6047 nvme cmpl Enter "
 - "Data %p DID %x Xri: %x status %x cmd:%p lsreg:%p "
 - "bmp:%p ndlp:%p\n",
 + "Data %p DID %x Xri: %x status %x reason x%x cmd:%p "
 + "lsreg:%p bmp:%p ndlp:%p\n",
 pnvme_lsreq, ndlp ? ndlp->nlp_DID : 0,
 cmdwqe->sli4_xritag, status,
 + (wcqe->parameter & 0xffff),
 cmdwqe, pnvme_lsreq, cmdwqe->context3, ndlp);

 lpfc_nvmeio_data(phba, "NVME LS  CMPL: xri x%x stat x%x parm x%x\n",
@@ -396,6 +421,7 @@
 int ret = 0;
 struct lpfc_nvme_lport *lport;
 +struct lpfc_nvme_rport *rport;
 struct lpfc_vport *vport;
 struct lpfc_nodelist *ndlp;
 struct ulp_bde64 *bpl;
@@ -414,16 +440,18 @@*/

 lport = (struct lpfc_nvme_lport *)pnvme_lport->private;
+rport = (struct lpfc_nvme_rport *)pnvme_rport->private;
 vport = lport->vport;
if (vport->load_flag & FC_UNLOADING)
return -ENODEV;
-ndlp = lpfc_findnode_did(vport, pnvme_rport->port_id);
+/* Need the ndlp. It is stored in the driver's rport. */
+ndlp = rport->ndlp;
if (!ndlp || !NLP_CHK_NODE_ACT(ndlp)) {
lpfc_printf_vlog(vport, KERN_ERR, LOG_NODE | LOG_NVME_IOERR,
- "6051 DID x%06x not an active rport.\n",
- pnvme_rport->port_id);
+ "6051 Remoteport %p, rport has invalid ndlp. "
+ "Failing LS Req\n", pnvme_rport);
return -ENODEV;
}
@@ -474,8 +502,9 @@
/* Expand print to include key fields. */
lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_DISC,
- "6149 ENTER. lport %p, rport %p lsreq%p rqstlen:%d "
- "rsplen:%d %pad %pad\n",
+ "6149 Issue LS Req to DID 0x%06x lport %p, rport %p "
+ "lsreq%p rqstlen:%d rsplen:%d %pad %pad\n",
+ ndlp->nlp_DID,
pnvme_lport, pnvme_rport,
pnvme_lsreq, pnvme_lsreq->rqstlen,
pnvme_lsreq->rsplen, &pnvme_lsreq->rqstdma,
@@ -490,7 +519,8 @@
pnvme_lsreq, lpfc_nvme_cmpl_gen_req,
ndlp, 2, 30, 0);
if (ret != WQE_SUCCESS) {
-lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_DISC,
+atomic_inc(&lport->xmt_ls_err);
+lpfc_printf_vlog(vport, KERN_ERR, LOG_NVME_DISC,
"6052 EXIT. issue ls wqe failed lport %p, "
"rport %p lsreq%p Status %x DID %x\n",
pnvme_lport, pnvme_rport, pnvme_lsreq,
@@ -534,6 +564,9 @@
vport = lport->vport;
phba = vport->phba;
+if (vport->load_flag & FC_UNLOADING)
+return;
+
ndlp = lpfc_findnode_did(vport, pnvme_rport->port_id);
if (!ndlp) {
lpfc_printf_vlog(vport, KERN_ERR, LOG_NVME_ABTS,

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/* Abort the targeted IOs and remove them from the abort list. */
list_for_each_entry_safe(wqe, next_wqe, &abort_list, dlist) {
    atomic_inc(&lport->xmt_ls_abort);
    spin_lock_irq(&phba->hbalock);
    list_del_init(&wqe->dlist);
    lpfc_sli_issue_abort_iotag(phba, pring, wqe);
}

/*
 * Get a local pointer to the built-in wq and correct
 * the cmd size to match NVME's 96 bytes and fix
 * the dma address.
 * */
+wqe = (union lpfc_wqe128 *)&lpfc_ncmd->cur_iocbq.wqe;
+wqe = (union lpfc_wqe128 *)&lpfc_ncmd->cur_iocbq.wqe;
+wqe = (union lpfc_wqe128 *)&lpfc_ncmd->cur_iocbq.wqe;
+wqe = (union lpfc_wqe128 *)&lpfc_nvme_buf *lpfc_ncmd;
+wqe = (union lpfc_wqe128 *)&lpfc_nvme_buf *lpfc_ncmd,
+struct nvmefc_fcp_req *nCmd)
{
+struct lpfc_nvme_buf *lpfc_nvme_buf
+struct lpfc_hba *phba = vport->phba;
+struct sle4_sge *sgl;
+union lpfc_wqe128 *wqe;
+uintptr_t *wptr, *dptr;
+
/*
 * Adjust the FCP_CMD and FCP_RSP DMA data and sge_len to
 * match NVME. NVME sends 96 bytes. Also, use the
 * nvme commands command and response dma addresses
 */
+sgl = lpfc_nvme_buf->nvme_sgl;
+sgl->sge_len = cpu_to_le32(nCmd->cmdlen);
+if (phba->cfg_nvme_embed_cmd) {
+    sgl->addr_hi = 0;
+    sgl->addr_lo = 0;
+    /* Word 0-2 - NVME CMND IU (embedded payload) */
+    +wqe->generic.bde.tus.f.bdeFlags = BUFF_TYPE_BDE_IMMED;
+    +wqe->generic.bde.tus.f.bdeSize = 56;
+    +wqe->generic.bde.addrHigh = 0;
+    +wqe->generic.bde.addrLow = 64; /* Word 16 */
+} else {
+    sgl->addr_hi = cpu_to_le32(putPaddrHigh(nCmd->cmddma));
+    sgl->addr_lo = cpu_to_le32(putPaddrLow(nCmd->cmddma));
+    /* Word 0-2 - NVME CMND IU Inline BDE */
*/

/*
 * Adjust the FCP_CMD and FCP_RSP DMA data and sge_len to
 * match NVME. NVME sends 96 bytes. Also, use the
 * nvme commands command and response dma addresses
 */
+sgl = lpfc_nvme_buf->nvme_sgl;
+sgl->sge_len = cpu_to_le32(nCmd->cmdlen);
+if (phba->cfg_nvme_embed_cmd) {
+    sgl->addr_hi = 0;
+    sgl->addr_lo = 0;
+    /* Word 0-2 - NVME CMND IU (embedded payload) */
+    +wqe->generic.bde.tus.f.bdeFlags = BUFF_TYPE_BDE_IMMED;
+    +wqe->generic.bde.tus.f.bdeSize = 56;
+    +wqe->generic.bde.addrHigh = 0;
+    +wqe->generic.bde.addrLow = 64; /* Word 16 */
+} else {
+    sgl->addr_hi = cpu_to_le32(putPaddrHigh(nCmd->cmddma));
+    sgl->addr_lo = cpu_to_le32(putPaddrLow(nCmd->cmddma));
+    /* Word 0-2 - NVME CMND IU Inline BDE */
*/
+wqe->generic.bde.tus.f.bdeFlags = BUFF_TYPE_BDE_64;
+wqe->generic.bde.tus.f.bdeSize = nCmd->cmdlen;
+wqe->generic.bde.addrHigh = sgl->addr_hi;
+wqe->generic.bde.addrLow = sgl->addr_lo;
+
sgl++;

@@ -611,27 +674,19 @@
  sgl->word2 = cpu_to_le32(sgl->word2);
 sgl->sge_len = cpu_to_le32(nCmd->rsplen);

 /*
 * Get a local pointer to the built-in wqe and correct
 * the cmd size to match NVME's 96 bytes and fix
 * the dma address.
 */
-
-/* 128 byte wqe support here */
-wqe = (union lpfc_wqe128 *)&lpfc_ncmd->cur_iocbq.wqe;
-
-/* Word 0-2 - NVME CMND IU (embedded payload) */
-wqe->generic.bde.tus.f.bdeFlags = BUFF_TYPE_BDE_IMMED;
-wqe->generic.bde.tus.f.bdeSize = 60;
-wqe->generic.bde.addrHigh = 0;
-wqe->generic.bde.addrLow = 64; /* Word 16 */
-
-/* Word 3 */
 bf_set(payload_offset_len, &wqe->fcp_icmd,
 (nCmd->rsplen + nCmd->cmdlen));

 /* Word 10 */
 bf_set(wqe_nvme, &wqe->fcp_icmd.wqe_com, 1);
 +
+if (!phba->cfg_nvme_embed_cmd) {
+  bf_set(wqe_dbde, &wqe->generic.wqe_com, 1);
+  bf_set(wqe_wqes, &wqe->fcp_icmd.wqe_com, 0);
+  return;
+}
+bf_set(wqe_dbde, &wqe->generic.wqe_com, 0);
  bf_set(wqe_wqes, &wqe->fcp_icmd.wqe_com, 1);

 /*
@@ -774,8 +829,9 @@
       struct lpfc_nvme_rport *rport;
       struct lpfc_nodelist *ndlp;
       struct lpfc_nvme_fcpreq_priv *freqpriv;
+      struct lpfc_nvme_lport *lport;


unsigned long flags;
-uint32_t code;
+uint32_t code, status;
uint16_t cid, sqhd, data;
uint32_t *ptr;

@@ -790,10 +846,17 @@

nCmd = lpfc_ncmd->nvmeCmd;
    rport = lpfc_ncmd->nrport;
+    status = bf_get(lpfc_wcqe_c_status, wcqe);
    if (status) {
+        lport = (struct lpfc_nvme_lport *)vport->localport->private;
        if (bf_get(lpfc_wcqe_c_xb, wcqe))
            atomic_inc(&lport->cmpl_fcp_xb);
            atomic_inc(&lport->cmpl_fcp_err);
+    }

lpfc_nvmeio_data(phba, "NVME FCP CMPL: xri x%x stat x%x parm x%x\n", 
    lpfc_ncmd->cur_iocbq.sli4_xritag,
    -bf_get(lpfc_wcqe_c_status, wcqe), wcqe->parameter);
+    status, wcqe->parameter);
/*
    * Catch race where our node has transitioned, but the
    * transport is still transitioning.
    @@ -851,8 +914,7 @@
    nCmd->rcv_rsplen = LPFC_NVME_ERSP_LEN;
    nCmd->transferred_length = nCmd->payload_length;
    } else {
-lpfc_ncmd->status = (bf_get(lpfc_wcqe_c_status, wcqe) &
-    LPFC_IOCB_STATUS_MASK);
-    lpfc_ncmd->status = (status & LPFC_IOCB_STATUS_MASK);
    lpfc_ncmd->result = (wcqe->parameter & IOERR_PARAM_MASK);
    */
    /* For NVME, the only failure path that results in an
    @@ -942,14 +1004,17 @@
    phba->cpucheck_cmpl_io[lpfc_ncmd->cpu]++;
    }
#endif
-freqpriv = nCmd->private;
-freqpriv->nvme_buf = NULL;

/* NVME targets need completion held off until the abort exchange
   * completes.
   + * completes unless the NVME Rport is getting unregistered.
   */
    -if (!(lpfc_ncmd->flags & LPFC_SBUF_XBUSY))
    +
if (!(lpfc_ncmd->flags & LPFC_SBUF_XBUSY)) {
    freqpriv = nCmd->private;
    freqpriv->nvme_buf = NULL;
    nCmd->done(nCmd);
    lpfc_ncmd->nvmeCmd = NULL;
}

spin_lock_irqsave(&phba->hbalock, flags);
lpfc_ncmd->nrport = NULL;

struct sli4_sge *sgl = lpfc_ncmd->nvme_sgl;
struct scatterlist *data_sg;
struct sli4_sge *first_data_sgl;

uint32_t num_bde = 0;
dma_addr_t physaddr;

first_data_sgl = sgl;
lpfc_ncmd->seg_cnt = nCmd->sg_cnt;
-if (lpfc_ncmd->seg_cnt > phba->cfg_nvme_seg_cnt + 1) {
+if (lpfc_ncmd->seg_cnt > lpfc_nvme_template.max_sgl_segments) {
    lpfc_printf_log(phba, KERN_ERR, LOG_NVME_IOERR,
    "6058 Too many sg segments from ")
    "NVME Transport. Max %d, ",
    data_sg = sg_next(data_sg);
    sgl++;
}

+if (phba->nvme_embed_pbde) {
    /* Use PBDE support for first SGL only, offset == 0 */
    /* Words 13-15 */
    +bde = (struct ulp_bde64 *)
    +&wqe->words[13];
    +bde->addrLow = first_data_sgl->addr_lo;
    +bde->addrHigh = first_data_sgl->addr_hi;
    +bde->tus.f.bdeSize =
    +le32_to_cpu(first_data_sgl->sge_len);
    +bde->tus.f.bdeFlags = BUFF_TYPE_BDE_64;
    +bde->tus.w = cpu_to_le32(bde->tus.w);
    +bf_set(wqe_pbde, &wqe->generic.wqe_com, 1);
} else {
    +bf_set(wqe_pbde, &wqe->generic.wqe_com, 0);
    +bf_set(wqe_pbde, &wqe->generic.wqe_com, 0);
}
int expedite = 0;
struct lpfc_nvme_lport *lport;
struct lpfc_vport *vport;
struct lpfc_hba *phba;

tstruct lpfc_nvme_buf *lpfc_ncmd;
struct lpfc_nvme_rport *rport;
struct lpfc_nvme_buf *lpfc_buf;
-struct lpfc_nvme_fcpreq_priv *freqpriv = pnvme_fcreq->private;
+struct lpfc_nvme_fcpreq_priv *freqpriv;
+struct nvme_common_command *sqe;
#ifdef CONFIG_SCSI_LPFC_DEBUG_FS
uint64_t start = 0;
#endif

+/* Validate pointers. LLDD fault handling with transport does
+ * have timing races.
+ */

lport = (struct lpfc_nvme_lport *)pnvme_lport->private;
+if (unlikely(!lport)) {
+ret = -EINVAL;
+goto out_fail;
+}
+
vport = lport->vport;
+
+if (unlikely(!hw_queue_handle)) {
+lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_ABTS,
+ "6129 Fail Abort, NULL hw_queue_handle\n");
+ret = -EINVAL;
+goto out_fail;
+}
+
phba = vport->phba;

if (vport->load_flag & FC_UNLOADING) {
@@ -1396,6 +1330,30 @@
@@ -1246,13 +1330,30 @@
/* For this clause to be valid, the payload_length
* and sg_cnt must zero.
*/
-if (!pnvme_lport || !pnvme_rport || !freqpriv) {
-lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_IOERR | LOG_NODE,
- "6117 No Send:IO submit ptrs NULL, lport %p, ",
- "rport %p fcreq_priv %p\n",
- pnvme_lport, pnvme_rport, freqpriv);
+if (vport->load_flag & FC_UNLOADING) {
  ret = -ENODEV;
  goto out_fail;
}

+freqpriv = pnvme_fcreq->private;
+if (unlikely(!freqpriv)) {
  +ret = -EINVAL;
  +goto out_fail;
  +}
+
#ifdef CONFIG_SCSI_LPFC_DEBUG_FS
  if (phba->ktime_on)
  start = ktime_get_ns();
@@ -1293,6 +1395,7 @@
  lpfc_printf_vlog(vport, KERN_ERR, LOG_NVME_IOERR,
  "6066 Missing node for DID %x\n",
  pnvme_rport->port_id);
+atomic_inc(&lport->xmt_fcp_bad_ndlp);
  ret = -ENODEV;
  goto out_fail;
}
@@ -1306,21 +1409,36 @@
  "IO. State x%x, Type x%x\n",
  rport, pnvme_rport->port_id,
  ndlp->nlp_state, ndlp->nlp_type);
+atomic_inc(&lport->xmt_fcp_bad_ndlp);
  ret = -ENODEV;
  goto out_fail;
}

+/* Currently only NVME Keep alive commands should be expedited
  + if the driver runs out of a resource. These should only be
  + issued on the admin queue, qidx 0
  +*/
+if (!lpfc_queue_info->qidx && !pnvme_fcreq->sg_cnt) {
  +sqe = &((struct nvme_fc_cmd_iu *)
  +pnvme_fcreq->cmdaddr)->sqe.common;
  +if (sqe->opcode == nvme_admin_keep_alive)
  +expedite = 1;
  +}
  +
/* The node is shared with FCP IO, make sure the IO pending count does
 * not exceed the programmed depth.
 */

-#if (atomic_read(&ndlp->cmd_pending) >= ndlp->cmd_qdepth) {
+if ((atomic_read(&ndlp->cmd_pending) >= ndlp->cmd_qdepth) &&
+    !expedite) {
+atomic_inc(&lport->xmt_fcp_qdepth);
ret = -EBUSY;
goto out_fail;
}

-lpfc_ncmd = lpfc_get_nvme_buf(phba, ndlp);
+lpfc_ncmd = lpfc_get_nvme_buf(phba, ndlp, expedite);
if (lpfc_ncmd == NULL) {
+atomic_inc(&lport->xmt_fcp_noxri);
lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_IOERR,
"6065 driver's buffer pool is empty, ",
"IO failed\n\n");
@@ -1373,6 +1491,7 @@
ret = lpfc_sli4_issue_wqe(phba, LPFC_FCP_RING, &lpfc_ncmd->cur_iocbq);
if (ret) {
+atomic_inc(&lport->xmt_fcp_wqerr);
atomic_dec(&ndlp->cmd_pending);
lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_IOERR,
"6113 FCP could not issue WQE err %x ",
@@ -1473,19 +1592,36 @@
struct lpfc_nvme_lport *lport;
struct lpfc_vport *vport;
struct lpfc_hba *phba;
-struct lpfc_nvme_rport *rport;
struct lpfc_nvme_buf *lpfc_nbuf;
struct lpfc_iocbq *abts_buf;
struct lpfc_iocbq *nvmereq_wqe;
-struct lpfc_nvme_fcpreq_priv *freqpriv = pnvme_fcreq->private;
+struct lpfc_nvme_fcpreq_priv *freqpriv;
union lpfc_wqe *abts_wqe;
unsigned long flags;
int ret_val;

+/* Validate pointers. LLDD fault handling with transport does
+ * have timing races.
+ */
lport = (struct lpfc_nvme_lport *)pnvme_lport->private;
-rport = (struct lpfc_nvme_rport *)pnvme_rport->private;
+if (unlikely(!lport))
+return;
+

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vport = lport->vport;
+
+if (unlikely(!hw_queue_handle)) {
+lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_ABTS,
+ "6129 Fail Abort, HW Queue Handle NULL\n");
+return;
+}
+
+phba = vport->phba;
+frequpriv = pnvme_fcreq->private;
+
+if (unlikely(!freqpriv))
+return;
+if (vport->load_flag & FC_UNLOADING)
+return;

/* Announce entry to new IO submit field. */
lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_ABTS,
@@ -1552,6 +1688,7 @@
return;
}

+atomic_inc(&lport->xmt_fcp_abort);
lpfc_nvmeio_data(phba, "NVME FCP ABORT: xri x%x id %d to %06x\n",
 nvmereq_wqe->sli4_xritag,
 nvmereq_wqe->hba_wqidx, pnvme_rport->port_id);
@@ -1591,7 +1728,6 @@
bf_set(abort_cmd_criteria, &abts_wqe->abort_cmd, T_XRI_TAG);

/* word 7 */
-bf_set(wqe_ct, &abts_wqe->abort_cmd.wqe_com, 0);
bf_set(wqe_cmnd, &abts_wqe->abort_cmd.wqe_com, CMD_ABORT_XRI_CX);
bf_set(wqe_class, &abts_wqe->abort_cmd.wqe_com,
   nvmereq_wqe->iowcb.ulpClass);
@@ -1606,7 +1742,6 @@
   abts_buf->iostag);

/* word 10 */
-bf_set(wqe_wqid, &abts_wqe->abort_cmd.wqe_com, nvmereq_wqe->hba_wqidx);
bf_set(wqe_qosd, &abts_wqe->abort_cmd.wqe_com, 1);
bf_set(wqe_lenloc, &abts_wqe->abort_cmd.wqe_com, LPFC_WQE_LENLOC_NONE);

@@ -1931,6 +2066,8 @@
spin_lock(&phba->nvme_buf_list_put_lock);
list_splice_init(&phba->lpfc_nvme_buf_list_get, &post_nblist);
list_splice(&phba->lpfc_nvme_buf_list_put, &post_nblist);
+phba->get_nvme_bufs = 0;
+phba->put_nvme_bufs = 0;
spin_unlock(&phba->nvme_buf_list_put_lock);
spin_unlock_irq(&phba->nvme_buf_list_get_lock);

@@ -2067,6 +2204,20 @@
return num_posted;
}

+static inline struct lpfc_nvme_buf *
+lpfc_nvme_buf(struct lpfc_hba *phba)
+{
+struct lpfc_nvme_buf *lpfc_ncmd, *lpfc_ncmd_next;
+
+list_for_each_entry_safe(lpfc_ncmd, lpfc_ncmd_next,
+ &phba->lpfc_nvme_buf_list_get, list) {
+list_del_init(&lpfc_ncmd->list);
+phba->get_nvme_bufs--;
+return lpfc_ncmd;
+}
+return NULL;
+
/**
 * lpfc_get_nvme_buf - Get a nvme buffer from lpfc_nvme_buf_list of the HBA
 * @phba: The HBA for which this call is being executed.
 @@ -2079,35 +2230,27 @@
 *   Pointer to lpfc_nvme_buf - Success
 **/
 static struct lpfc_nvme_buf *
-lpfc_get_nvme_buf(struct lpfc_hba *phba, struct lpfc_nodelist *ndlp)
+lpfc_get_nvme_buf(struct lpfc_hba *phba, struct lpfc_nodelist *ndlp,
 + int expedite)
 {
-struct lpfc_nvme_buf *lpfc_ncmd, *lpfc_ncmd_next;
+struct lpfc_nvme_buf *lpfc_ncmd = NULL;
unsigned long iflag = 0;
-int found = 0;

 spin_lock_irqsave(&phba->nvme_buf_list_get_lock, iflag);
-list_for_each_entry_safe(lpfc_ncmd, lpfc_ncmd_next,
- &phba->lpfc_nvme_buf_list_get, list) {
- list_del_init(&lpfc_ncmd->list);
- found = 1;
- break;
- }
- if (!found) {
+if (phba->get_nvme_bufs > LPFC_NVME_EXPEDITE_XRICNT || expedite)
+lpfc_ncmd = lpfc_nvme_buf(phba);
+ if (!lpfc_ncmd) {
spin_lock(&phba->nvme_buf_list_put_lock);
list_splice(&phba->lpfc_nvme_buf_list_put,
   &phba->lpfc_nvme_buf_list_get);
+phba->get_nvme_bufs += phba->put_nvme_bufs;
INIT_LIST_HEAD(&phba->lpfc_nvme_buf_list_put);
+phba->put_nvme_bufs = 0;
spin_unlock(&phba->nvme_buf_list_put_lock);
-list_for_each_entry_safe(lpfc_ncmd, lpfc_ncmd_next,
   &phba->lpfc_nvme_buf_list_get, list) {
   -list_del_init(&lpfc_ncmd->list);
   -found = 1;
   -break;
-}
+if (phba->get_nvme_bufs > LPFC_NVME_EXPEDITE_XRICNT || expedite)
+lpfc_ncmd = lpfc_nvme_buf(phba);
}
spin_unlock_irqrestore(&phba->nvme_buf_list_get_lock, iflag);
-if (!found)
-return NULL;
return lpfc_ncmd;
}

@@ -2145,6 +2288,7 @@
lpfc_ncmd->cur_iocbq.iocb_flag = LPFC_IO_NVME;
spin_lock_irqsave(&phba->nvme_buf_list_put_lock, iflag);
list_add_tail(&lpfc_ncmd->list, &phba->lpfc_nvme_buf_list_put);
+phba->put_nvme_bufs++;
spin_unlock_irqrestore(&phba->nvme_buf_list_put_lock, iflag);
}
}
@@ -2197,15 +2341,15 @@
lpfc_nvme_template.max_sgl_segments = phba->cfg_nvme_seg_cnt + 1;
lpfc_nvme_template.max_hw_queues = phba->cfg_nvme_io_channel;

+if (!IS_ENABLED(CONFIG_NVME_FC))
+return ret;
+
/* localport is allocated from the stack, but the registration
 * call allocates heap memory as well as the private area.
 */
-#if (IS_ENABLED(CONFIG_NVME_FC))
+ret = nvme_fc_register_localport(&nfcp_info, &lpfc_nvme_template,
   &vport->phba->pcidev->dev, &localport);
-#else
-#endif
-if (!ret) {

lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME | LOG_NVME_DISC,
"6005 Successfully registered local 
"
@@ -2221,6 +2365,18 @@
lport->vport = vport;
vport->nvmei_support = 1;

    atomic_set(&lport->xmt_fcp_noxri, 0);
+    atomic_set(&lport->xmt_fcp_badndl, 0);
+    atomic_set(&lport->xmt_fcp_qdepth, 0);
+    atomic_set(&lport->xmt_fcp_wqerr, 0);
+    atomic_set(&lport->xmt_fcp_abort, 0);
+    atomic_set(&lport->xmt_fcp_wqerr, 0);
+    atomic_set(&lport->xmt_fcp_abort, 0);
+    atomic_set(&lport->xmt_fcp_qdepth, 0);
+    atomic_set(&lport->xmt_fcp_wqerr, 0);
+    atomic_set(&lport->xmt_fcp_abort, 0);
+    atomic_set(&lport->xmt_fcp_noxri, 0);
+    atomic_set(&lport->xmt_fcp_badndl, 0);
+    atomic_set(&lport->xmt_fcp_qdepth, 0);
+    atomic_set(&lport->xmt_fcp_wqerr, 0);
+    atomic_set(&lport->xmt_fcp_abort, 0);
+    atomic_set(&lport->xmt_fcp_abort, 0);
+    atomic_set(&lport->xmt_fcpAbort, 0);
+    atomic_set(&lport->xmt_fcpAbort, 0);
+    atomic_set(&lport->xmt_fcpAbort, 0);
++
+/* Don't post more new bufs if repost already recovered
   * the nvme sgls.
+*/
@@ -2234,6 +2390,47 @@
    return ret;
 }

+/* lpfc_nvme_lport_unreg_wait - Wait for the host to complete an lport unreg.
+ *
+ * The driver has to wait for the host nvme transport to callback
+ * indicating the localport has successfully unregistered all
+ * resources. Since this is an uninterruptible wait, loop every ten
+ * seconds and print a message indicating no progress.
+ *
+ * An uninterruptible wait is used because of the risk of transport-to-
+ * driver state mismatch.
+ */
+void
+lpfc_nvme_lport_unreg_wait(struct lpfc_vport *vport,
+ struct lpfc_nvme_lport *lport,
+ struct completion *lport_unreg_cmp)
+{
+    #if (IS_ENABLED(CONFIG_NVME_FC))
+    u32 wait_tmo;
+    int ret;
+    +/* Host transport has to clean up and confirm requiring an indefinite
+    * wait. Print a message if a 10 second wait expires and renew the
+    * wait. This is unexpected.
+    */
wait_tmo = msecs_to_jiffies(LPFC_NVME_WAIT_TMO * 1000);
while (true) {
    ret = wait_for_completion_timeout(lport_unreg_cmp, wait_tmo);
    if (unlikely(!ret)) {
        lpfc_printf_vlog(vport, KERN_ERR, LOG_NVME_IOERR,
             "6176 Lport %p Localport %p wait ",
             "timed out. Renewing.\n",
             lport, vport->localport);
        continue;
    }
    break;
}
lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME_IOERR,
             "6177 Lport %p Localport %p Complete Success\n",
             lport, vport->localport);
#endif

/**
 * lpfc_nvme_destroy_localport - Destroy lpfc_nvme bound to nvme transport.
 * @pnvme: pointer to lpfc_nvme data structure.
 @@ -2251,12 +2448,12 @@
 struct nvme_fc_local_port *localport;
 struct lpfc_nvme_lport *lport;
 int ret;
 DECLARE_COMPLETION_ONSTACK(lport_unreg_cmp);

 if (vport->nvmei_support == 0)
 return;

 localport = vport->localport;
 vport->localport = NULL;
 lport = (struct lpfc_nvme_lport *)localport->private;

 lpfc_printf_vlog(vport, KERN_INFO, LOG_NVME,
 @@ -2266,9 +2463,14 @@
 /* lport's rport list is clear. Unregister
 * lport and release resources.
 */
- init_completion(&lport->lport_unreg_done);
+ lport->lport_unreg_cmp = &lport_unreg_cmp;
 ret = nvme_fc_unregister_localport(localport);
 -wait_for_completion_timeout(&lport->lport_unreg_done, 5);
 +
+/* Wait for completion. This either blocks
 + * indefinitely or succeeds
 + */
+lpfc_nvme_lport_unreg_wait(vport, lport, &lport_unreg_cmp);
+vport->localport = NULL;

/* Regardless of the unregister upcall response, clear
* nvmei_support. All rports are unregistered and the
@@ -2365,6 +2567,9 @@*/

rpinfo.port_name = wwn_to_u64(ndlp->nlp_portname.u.wwn);
rpinfo.node_name = wwn_to_u64(ndlp->nlp_nodename.u.wwn);
+if (!ndlp->nrport)
+lpfc_nlp_get(ndlp);
+
ret = nvme_fc_register_remoteport(localport, &rpinfo, &remote_port);
if (!ret) {
/* If the ndlp already has an nrport, this is just
@@ -2373,23 +2578,33 @@*/

rport = remote_port->private;
if (ndlp->nrport) {
- lpfc_printf_vlog(ndlp->vport, KERN_INFO,
- LOG_NVME_DISC,
- "6014 Rebinding lport to ",
- "rport wwpn 0x%llx, ",
- "Data: x%x x%x x%x x%06x\n",
- remote_port->port_name,
- remote_port->port_id,
- remote_port->port_role,
- ndlp->nlp_type,
- ndlp->nlp_DID);
+if (ndlp->nrport == remote_port->private) {
+/* Same remoteport. Just reuse. */
+lpfc_printf_vlog(ndlp->vport, KERN_INFO,
+ LOG_NVME_DISC,
+ "6014 Rebinding lport to ",
+ "remoteport %p wwpn 0x%llx, ",
+ "Data: x%x x%x %p x%x x%06x\n",
+ remote_port,
+ remote_port->port_name,
+ remote_port->port_id,
+ remote_port->port_role,
+ ndlp,
+ ndlp->nlp_type,
+ ndlp->nlp_DID);
+return 0;
+}
prev_ndlp = rport->ndlp;

-/* Sever the ndlp<rport connection before dropping
- * the ndlp ref from register.

--- Open Source Used In 5GasS Edge AC-4 28146
---
 Sever the ndlp<rport association before dropping the ndlp ref from register.
*/
+
+spin_lock_irq(&vport->phba->hbalock);
ndlp->nrport = NULL;
+spin_unlock_irq(&vport->phba->hbalock);
rport->ndlp = NULL;
rport->remoteport = NULL;
if (prev_ndlp)
lpc_nlp_put(ndlp);
}@@ -2397,19 +2612,20 @@
/* Clean bind the rport to the ndlp. */
rport->remoteport = remote_port;
rport->lport = lport;
rport->ndlp = lpfc_nlp_get(ndlp); 
-if (!rport->ndlp)
-return -1;
+rport->ndlp = ndlp;
+spin_lock_irq(&vport->phba->hbalock);
ndlp->nrport = rport;
+spin_unlock_irq(&vport->phba->hbalock);
lpc_printf_vlog(vport, KERN_INFO, LOG_NVME_DISC | LOG_NODE, "6022 Binding new rport to ", "lport %p Rport WWNN 0x%llx, "+ "lport %p Remoteport %p WWNN 0x%llx, "+ "Rport WWPN 0x%llx DID ", "x%x06x Role x%x"n", 
-rport, +lport, +x%x06x Role x%nx, ndlp %p%n", +lport, remote_port, rpinfo.node_name, rpinfo.port_name, -rpinfo.port_id, rpinfo.port_role); +rpinfo.port_id, rpinfo.port_role, +ndlp):
} else {
lpc_printf_vlog(vport, KERN_ERR, LOG_NVME_DISC | LOG_NODE, @@ -2473,20 +2689,20 @@
/* Sanity check ndlp type. Only call for NVME ports. Don't clear any rport state until the transport calls back. */
-if (ndlp->nlp_type & (NLP_NVME_TARGET | NLP_NVME_INITIATOR)) {
-init_completion(&rport->rport_unreg_done);
+if (ndlp->nlp_type & NLP_NVME_TARGET) {


/* No concern about the role change on the nvme remoteport. */
+ndlp->upcall_flags |= NLP_WAIT_FOR_UNREG;
ret = nvme_fc_unregister_remoteport(remoteport);
if (ret != 0) {
  lpfc_nlp_put(ndlp);
  lpfc_printf_vlog(vport, KERN_ERR, LOG_NVME_DISC,
    "6167 NVME unregister failed %d ",
    ret, remoteport->port_state);
} -
}
return;

@@ -2545,8 +2761,11 @@
 * before the abort exchange command fully completes.
 * Once completed, it is available via the put list.
 /*
-  nvme_cmd = lpfc_ncmd->nvmeCmd;
-  nvme_cmd->done(nvme_cmd);
+  if (lpfc_ncmd->nvmeCmd) {
+    nvme_cmd = lpfc_ncmd->nvmeCmd;
+    nvme_cmd->done(nvme_cmd);
+    lpfc_ncmd->nvmeCmd = NULL;
  }
  lpfc_release_nvme_buf(phba, lpfc_ncmd);
  return;
 }
@@ -2558,3 +2777,48 @@
 "6312 XRI Aborted xri x%x not found\n", xri);
}
+
+/**
+ * lpfc_nvme_wait_for_io_drain - Wait for all NVME wqes to complete
+ * @phba: Pointer to HBA context object.
+ * This function flushes all wqes in the nvme rings and frees all resources
+ * in the txcmplq. This function does not issue abort wqes for the IO
+ * commands in txcmplq, they will just be returned with
+ * IOERR_SLI_DOWN. This function is invoked with EEH when device's PCI
+ * slot has been permanently disabled.
+ ***/
+void
+lpfc_nvme_wait_for_io_drain(struct lpfc_hba *phba)
+{
struct lpfc_sli_ring *pring;
+u32 i, wait_cnt = 0;
+
+if (phba->sli_rev < LPFC_SLI_REV4 || !phba->sli4_hba.nvme_wq)
+return;
+
+/* Cycle through all NVME rings and make sure all outstanding
+ * WQE's have been removed from the txcmplqs.
+ */
+for (i = 0; i < phba->cfg_nvme_io_channel; i++) {
+pring = phba->sli4_hba.nvme_wq[i]->pring;
+
+if (!pring)
+continue;
+
+/* Retrieve everything on the txcmplq */
+while (!list_empty(&pring->txcmplq)) {
+msleep(LPFC_XRI_EXCH_BUSY_WAIT_T1);
+wait_cnt++;
+
+/* The sleep is 10mS. Every ten seconds,
+ * dump a message. Something is wrong.
+ */
+if ((wait_cnt % 1000) == 0) {
+lpfc_printf_log(phba, KERN_ERR, LOG_NVME_IOERR,
+"6178 NVME IO not empty, ",
+"cnt %d\n", wait_cnt);
+}
+}
+
+}
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_nvme.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_nvme.h
@@ -22,10 +22,14 @@
********************************************************************/
#define LPFC_NVME_DEFAULT_SEGS	(64 + 1) /* 256K IOs */
-#define LPFC_NVME_WQSIZE	256
+#define LPFC_NVME_WAIT_TMO              10
+#define LPFC_NVME_EXPEDITE_XRICNT8
+#define LPFC_NVME_FB_SHIFT	9
+#define LPFC_NVME_MAX_FB	(1 << 20) /* 1M */
+
+struct lpfc_nvme_qhandle {
+uint32_t index; /* WQ index to use */
uint32_t qidx;/* queue index passed to create */
@@ -35,8 +39,19 @@
 /* Declare nvme-based local and remote port definitions. */
 struct lpfc_nvme_lport {
 struct lpfc_vport *vport;
-struct completion lport_unreg_done;
-/* Add stats counters here */
+struct completion *lport_unreg_cmp;
+/* Add stats counters here */
+atomic_t xmt_fcp_noxri;
+atomic_t xmt_fcp_bad_ndlp;
+atomic_t xmt_fcp_qdepth;
+atomic_t xmt_fcp_wqerr;
+atomic_t xmt_fcp_abort;
+atomic_t xmt_ls_abort;
+atomic_t xmt_ls_err;
+atomic_t cmpl_fcp_xb;
+atomic_t cmpl_fcp_err;
+atomic_t cmpl_ls_xb;
+atomic_t cmpl_ls_err;
+};

 struct lpfc_nvme_rport {
 --- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_nvmet.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_nvmet.c
@@ -1,7 +1,7 @@
 /*******************************************************************
 * This file is part of the Emulex Linux Device Driver for         *
 * Fibre Channel Host Bus Adapters.                             *
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@@ -36,8 +36,9 @@
 #include <scsi/scsi_transport_fc.h>
 #include <scsi/fc/fc_fs.h>

 -#include <../drivers/nvme/host/nvme.h>
+##include <linux/nvme.h>
 #include <linux/nvme-fc-driver.h>
+##include <linux/nvme-fc.h>

 #include "lpfc_version.h"
 #include "lpfc_hw4.h"
@@ -70,6 +71,8 @@
 static int lpfc_nvmet_unsol_ls_issue_abort(struct lpfc_hba *,
  struct lpfc_nvmet_rcv_ctx *,
uint32_t, uint16_t);
+static void lpfc_nvmet_wqfull_flush(struct lpfc_hba *, struct lpfc_queue *,
+    struct lpfc_nvmet_rcv_ctx *);

void
lpfc_nvmet_defer_release(struct lpfc_hba *phba, struct lpfc_nvmet_rcv_ctx *ctxp)
@@ -126,10 +129,17 @@
tgtp = (struct lpfc_nvmet_tgtport *)phba->targetport->private;

-if (status)
-atomic_inc(&tgtp->xmt_ls_rsp_error);
-else
-atomic_inc(&tgtp->xmt_ls_rsp_cmpl);
+if (tgtp) {
+    if (status) {
+        atomic_inc(&tgtp->xmt_ls_rsp_error);
+        if (result == IOERR_ABORT_REQUESTED)
+            atomic_inc(&tgtp->xmt_ls_rsp_aborted);
+        if (bf_get(lpfc_wcqe_c_xb, wcqe))
+            atomic_inc(&tgtp->xmt_ls_rsp_xb_set);
+    } else {
+        atomic_inc(&tgtp->xmt_ls_rsp_cmpl);
+    }
+
out:
    rsp = &ctxp->ctx.ls_req;
@@ -218,6 +228,7 @@
    ctxp->entry_cnt = 1;
    ctxp->flag = 0;
    ctxp->ctxbuf = ctx_buf;
+ctxp->rqb_buffer = (void *)nvmebuf;
    spin_lock_init(&ctxp->ctxlock);

#ifdef CONFIG_SCSI_LPFC_DEBUG_FS
@@ -248,11 +259,21 @@
    /* Process FCP command */
    if (rc == 0) {
        ctxp->rqb_buffer = NULL;
-atomic_inc(&tgtp->rcv_fcp_cmd_out);
+atomic_inc(&tgtp->rcv_fcp_cmd_out);
    nvmebuf->hrq->rqbp->rqb_free_buffer(phba, nvmebuf);
    return;
    }

+/* Processing of FCP command is deferred */
+if (rc == -EOVERFLOW) {

+lpfc_nvmeio_data(phba,
+ "NVMET RCV BUSY: xri x%x sz %d 
+ "from %06x\n",
+ oxid, size, sid);
+atomic_inc(&tgtp->rcv_fcp_cmd_out);
+return;
+
atomic_inc(&tgtp->rcv_fcp_cmd_drop);
lpfc_printf_log(phba, KERN_ERR, LOG_NVME_IOERR,
"2582 FCP Drop IO x%x: err x%x: x%x x%x x%x\n",
@@ -519,8 +540,11 @@
if (status) {
    rsp->fcp_error = NVME_SC_DATA_XFER_ERROR;
    rsp->transferred_length = 0;
    -if (tgtp)
+    if (tgtp) {
        atomic_inc(&tgtp->xmt_fcp_rsp_error);
+        if (result == IOERR_ABORT_REQUESTED)
+            atomic_inc(&tgtp->xmt_fcp_rsp_aborted);
+    }

    logerr = LOG_NVME_IOERR;

@@ -528,6 +552,8 @@
   } else {
       ctpx->flag &= ~LPFC_NVMET_XBUSY;
@@ -635,6 +661,9 @@
    return -ENODEV;
+    if (phba->pport->load_flag & FC_UNLOADING)
+        return -ENODEV;
+    lpfc_printf_log(phba, KERN_INFO, LOG_NVME_DISC,
+"6023 NVMET LS rsp oxid x%x\n", ctpx->oxid);

    ctpx->flag &= ~LPFC_NVMET_XBUSY;
    @@ -635,6 +661,9 @@
    return -ENODEV;
+    if (phba->pport->load_flag & FC_UNLOADING)
+        return -ENODEV;
+    struct lpfc_nvmet_rcv_ctx *ctpx =
    container_of(rsp, struct lpfc_nvmet_rcv_ctx, ctx.fcp_req);
    struct lpfc_hba *phba = ctpx->phba;
+    struct lpfc_queue *wq;
+    struct lpfc_iocbq *nvmewqeq;
+struct lpfc_sli_ring *pring;
+unsigned long iflags;
+int rc;

if (phba->pport->load_flag & FC_UNLOADING) {
    goto aerr;
}

+if (phba->pport->load_flag & FC_UNLOADING) {
    rc = -ENODEV;
    goto aerr;
+}
+
#ifdef CONFIG_SCSI_LPFC_DEBUG_FS
if (ctxp->ts_cmd_nvme) {
    if (rsp->op == NVMET_FCOP_RSP)
        return 0;
}
#endif

+if (rc == -EBUSY) {
+    /*
+     * WQ was full, so queue nvmeweq to be sent after
+     * WQE release CQE
+     */
+    ctxp->flag |= LPFC_NVMET_DEFER_WQFULL;
+wq = phba->sli4_hba.nvme_wq[rsp->hwqid];
+pring = wq->pring;
+spin_lock_irqsave(&pring->ring_lock, iflags);
+list_add_tail(&nvmewqeq->list, &wq->wqfull_list);
+wq->q_flag |= HBA_NVMET_WQFULL;
+spin_unlock_irqrestore(&pring->ring_lock, iflags);
+atomic_inc(&lpfc_nvmep->defer_wqfull);
+return 0;
+}
+
/* Give back resources */
atomic_inc(&lpfc_nvmep->xmt_fcp_drop);
lpcfc_printf_log(phba, KERN_ERR, LOG_NVME_IOERR, ...
-807,7 +860,8 @@
struct lpfc_nvmet_tgtport *tport = targetport->private;

/* release any threads waiting for the unreg to complete */
-complete(&tport->tport_unreg_done);
+if (tport->phba->targetport)
+complete(tport->tport_unreg_cmp);
}
static void
@@ -818,11 +872,15 @@
struct lpfc_nvmet_rcv_ctx *ctxp =
    container_of(req, struct lpfc_nvmet_rcv_ctx, ctx.fcp_req);
struct lpfc_hba *phba = ctxp->phba;
+struct lpfc_queue *wq;
unsigned long flags;

if (phba->pport->load_flag & FC_UNLOADING)
    return;
+
+if (phba->pport->load_flag & FC_UNLOADING)
+    return;
+
    lpfc_printf_log(phba, KERN_INFO, LOG_NVME_ABTS,
    "6103 NVMET Abort op: oxri x%x flg x%x ste %d\n",
    ctxp->oxid, ctxp->flag, ctxp->state);
@@ -844,6 +902,15 @@
} ctxp->flag |= LPFC_NVMET_ABORT_OP;

+if (ctxp->flag & LPFC_NVMET_DEFER_WQFULL) {
+    lpfc_nvmet_unsol_fcp_issue_abort(phba, ctxp, ctxp->sid,
+        +ctxp->oxid);
+    wq = phba->sli4_hba.nvme_wq[ctxp->wqeq->hba_wqidx];
+    spin_unlock_irqrestore(&ctxp->ctxlock, flags);
+    lpfc_nvmet_wqfull_flush(phba, wq, ctxp);
+    return;
+} 
+
/* An state of LPFC_NVMET_STE_RCV means we have just received
 * the NVME command and have not started processing it.
 * (by issuing any IO WQEs on this exchange yet)
@@ -908,9 +975,20 @@
 lpfc_nvmeio_data(phba, "NVMET DEFERRCV: xri x%x sz %d CPU %02x\n",
    ctxp->oxid, ctxp->size, smp_processor_id());

+if (!nvmebuf) {
+    lpfc_printf_log(phba, KERN_INFO, LOG_NVME_IOERR,
+        "6425 Defer rcv: no buffer xri x%x: ",
+        +ctxp->oxid, ctxp->flag, ctxp->state);
+    return;
+} 
+
tgtp = phba->targetport->private;
-atomic_inc(&tgtp->rcv_fcp_cmd_defer);
lpfc_rq_buf_free(phba, &nvmebuf->hbuf); /* repost */
+if (tgtp)
+atomic_inc(&tgtp->rcv_fcp_cmd_defer);
+
+/* Free the nvmebuf since a new buffer already replaced it */
+nvmebuf->hrq->rqhp->rqb_free_buffer(phba, nvmebuf);
}

static struct nvmet_fc_target_template lpfc_tgttemplate = {
@@ -1125,15 +1203,14 @@
    idx = 0;
 }

-infop = phba->sli4_hba.nvmet_ctx_info;
-for (j = 0; j < phba->cfg_nvmet_mrq; j++) {
-    for (i = 0; i < phba->sli4_hba.num_present_cpu; i++) {
+    for (i = 0; i < phba->sli4_hba.num_present_cpu; i++) {
+        for (j = 0; j < phba->cfg_nvmet_mrq; j++) {
+            infop = lpfc_get_ctx_list(phba, i, j);
lpfc_printf_log(phba, KERN_INFO, LOG_NVME | LOG_INIT,
"6408 TOTAL NVMET ctx for CPU %d "
"MRQ %d: cnt %d nextcpu %p\n",
                i, j, infop->nvmet_ctx_list_cnt,
                infop->nvmet_ctx_next_cpu);
-infop++;
    }

return 0;
@@ -1216,6 +1293,19 @@
        atomic_set(&tgtp->xmt_fcp_rsp, 0);
        atomic_set(&tgtp->xmt_fcp_rsp_drop, 0);
        atomic_set(&tgtp->xmt_fcp_rsp_error, 0);
+        atomic_set(&tgtp->xmt_fcp_rsp_xb_set, 0);
+        atomic_set(&tgtp->xmt_fcp_rsp_aborted, 0);
        atomic_set(&tgtp->xmt_fcp_rsp_cmpl, 0);
        atomic_set(&tgtp->rcv_fcp_cmd_in, 0);
        atomic_set(&tgtp->rcv_fcp_cmd_out, 0);
@@ -1228,13 +1307,19 @@
        atomic_set(&tgtp->xmt_fcp_release, 0);
        atomic_set(&tgtp->xmt_fcp_rsp_cmpl, 0);
        atomic_set(&tgtp->xmt_fcp_rsp_error, 0);
+        atomic_set(&tgtp->xmt_fcp_rsp_xb_set, 0);
+        atomic_set(&tgtp->xmt_fcp_rsp_aborted, 0);
        atomic_set(&tgtp->xmt_fcp_rsp_drop, 0);
+        atomic_set(&tgtp->xmt_fcp_xri_abort_cqe, 0);
        atomic_set(&tgtp->xmt_fcp_abort, 0);
        atomic_set(&tgtp->xmt_fcp_abort_cmpl, 0);
        atomic_set(&tgtp->xmt_abort_unsol, 0);
atomic_set(&tgtp->xmt_abort_sol, 0);
atomic_set(&tgtp->xmt_abort_rsp, 0);
atomic_set(&tgtp->xmt_abort_rsp_error, 0);
+atomic_set(&tgtp->defer_ctx, 0);
+atomic_set(&tgtp->defer_fod, 0);
+atomic_set(&tgtp->defer_wqfull, 0);
}
return error;
}
@@ -1270,6 +1355,7 @@
uint16_t xri = bf_get(lpfc_wcqe_xa_xri, axri);
uint16_t rxid = bf_get(lpfc_wcqe_xa_remote_xid, axri);
struct lpfc_nvmet_rcv_ctx *ctxp, *next_ctxp;
+struct lpfc_nvmet_tgtport *tgtp;
struct lpfc_nodelist *ndlp;
unsigned long iflag = 0;
int rrq_empty = 0;
@@ -1280,6 +1366,12 @@
if (!(phba->cfg_enable_fc4_type & LPFC_ENABLE_NVME))
    return;
+if (phba->targetport) {
+    tgtp = (struct lpfc_nvmet_tgtport *)phba->targetport->private;
+    atomic_inc(&tgtp->xmt_fcp_xri_abort_cqe);
+}
+spin_lock_irqsave(&phba->hbalock, iflag);
spin_lock(&phba->sli4_hba.abts_nvme_buf_list_lock);
list_for_each_entry_safe(ctxp, next_ctxp,
@@ -1383,19 +1475,111 @@
    return 0;
}
+static void
+lpfc_nvmet_wqfull_flush(struct lpfc_hba *phba, struct lpfc_queue *wq,
+    struct lpfc_nvmet_rcv_ctx *ctxp)
+{
+    struct lpfc_sli_ring *pring;
+    struct lpfc_iocbq *nvmewqeq;
+    struct lpfc_iocbq *next_nvmewqeq;
+    unsigned long ilflags;
+    struct lpfc_wcqe_complete wcqe;
+    struct lpfc_wcqe_complete *wcqep;
+    pring = wq->pring;
+    wcqep = &wcqe;
+    }
/* Fake an ABORT error code back to cmpl routine */
memset(wcqep, 0, sizeof(struct lpfc_wcqe_complete));
bf_set(lpfc_wcqe_c_status, wcqep, IOSTAT_LOCAL_REJECT);
wqep->parameter = IOERR_ABORT_REQUESTED;

+spin_lock_irqsave(&pring->ring_lock, iflags);
+list_for_each_entry_safe(nvmewqeq, next_nvmewqeq, &wq->q_full_list, list) {
  +if (ctxp) {
    +/* Checking for a specific IO to flush */
    +if (nvmewqeq->context2 == ctxp) {
      +list_del(&nvmewqeq->list);
      +spin_unlock_irqrestore(&pring->ring_lock, iflags);
      +lpfc_nvmet_xmt_fcp_op_cmp(phba, nvmewqeq, wcqep);
      +return;
    } +continue;
  } else {
    +/* Flush all IOs */
    +list_del(&nvmewqeq->list);
    +spin_unlock_irqrestore(&pring->ring_lock, iflags);
    +lpfc_nvmet_xmt_fcp_op_cmp(phba, nvmewqeq, wcqep);
    +spin_lock_irqsave(&pring->ring_lock, iflags);
    +}
  +}
+}
+}
+if (!ctxp)
+wq->q_flag &= ~HBA_NVMET_WQFULL;
+spin_unlock_irqrestore(&pring->ring_lock, iflags);
+
+void
+lpfc_nvmet_qfull_process(struct lpfc_hba *phba,
  + struct lpfc_queue *wq)
+{
+if (IS_ENABLED(CONFIG_NVME_TARGET_FC))
+struct lpfc_sli_ring *pring;
+struct lpfc_iocbq *nvmewqeq;
+unsigned long iflags;
+int rc;
+
+/*
+ * Some WQE slots are available, so try to re-issue anything
+ * on the WQ qfull_list.
+ */
+pring = wq->pring;
+spin_lock_irqsave(&pring->ring_lock, iflags);
while (!list_empty(&wq->wqfull_list)) {
    struct lpfc_iocbq *nvmewqeq, list;
    list_remove_head(&wq->wqfull_list, nvmewqeq, struct lpfc_iocbq,
        list);
    spin_unlock_irqrestore(&pring->ring_lock, iflags);
    rc = lpfc_sli4_issue_wqe(phba, LPFC_FCP_RING, nvmewqeq);
    spin_lock_irqsave(&pring->ring_lock, iflags);
    if (rc == -EBUSY) {
        /* WQ was full again, so put it back on the list */
        list_add(&nvmewqeq->list, &wq->wqfull_list);
        spin_unlock_irqrestore(&pring->ring_lock, iflags);
        return;
    }
    wq->q_flag &= ~HBA_NVMET_WQFULL;
    spin_unlock_irqrestore(&pring->ring_lock, iflags);
}

#if !defined(CONFIG_NVME_TARGET_FC)
void
lpfc_nvmet_destroy_targetport(struct lpfc_hba *phba)
{
#if (IS_ENABLED(CONFIG_NVME_TARGET_FC))
    struct lpfc_nvmet_tgtport *tgtp;
    struct lpfc_queue *wq;
    uint32_t qidx;
    DECLARE_COMPLETION_ONSTACK(tport_unreg_cmp);
    if (phba->nvmet_support == 0)
        return;
    if (phba->targetport) {
        tgtp = (struct lpfc_nvmet_tgtport *)phba->targetport->private;
        -init_completion(&tgtp->tport_unreg_done);
        for (qidx = 0; qidx < phba->cfg_nvme_io_channel; qidx++) {
            wq = phba->sli4_hba.nvme_wq[qidx];
            lpfc_nvmet_wqfull_flush(phba, wq, NULL);
        }
        tgtp->tport_unreg_cmp = &tport_unreg_cmp;
        nvmet_fc_unregister_targetport(phba->targetport);
        -wait_for_completion_timeout(&tgtp->tport_unreg_done, 5);
        if (!wait_for_completion_timeout(&tport_unreg_cmp,
            msecs_to_jiffies(LPFC_NVMET_WAIT_TMO)))
            lpfc_printf_log(phba, KERN_ERR, LOG_NVME,
                "6179 Unreg targetport %p timeout ",
                phba->targetport);
        lpfc_nvmet_cleanup_io_context(phba);
    }
    phba->targetport = NULL;
}
#endif

Open Source Used In 5GaaS Edge AC-4 28158
lpfc_nvmeio_data(phba, "NVMET FCP RCV: xri x%x sz %d CPU %02x\n", oxid, size, smp_processor_id());

+tgtp = (struct lpfc_nvmet_tgtport *)phba->targetport->private;
+
+if (!ctx_buf) {
    /* Queue this NVME IO to process later */
    spin_lock_irqsave(&phba->sli4_hba.nvmet_io_wait_lock, iflag);
    lpfc_post_rq_buffer(phba, phba->sli4_hba.nvmet_mrq_hdr[qno], phba->sli4_hba.nvmet_mrq_data[qno], 1, qno);
    +atomic_inc(&tgtp->defer_ctx);
    return;
}

-tgtp = (struct lpfc_nvmet_tgtport *)phba->targetport->private;
payload = (uint32_t *)(nvmebuf->dbuf.virt);
sid = sli4_sid_from_fc_hdr(fc_hdr);

ctxp->entry_cnt = 1;
ctxp->flag = 0;
ctxp->ctxbuf = ctx_buf;
+ctxp->rqb_buffer = (void *)nvmebuf;
spin_lock_init(&ctxp->ctxlock);

#ifdef CONFIG_SCSI_LPFC_DEBUG_FS
ctxp->entry_cnt = 1;
ctxp->flag = 0;
ctxp->ctxbuf = ctx_buf;
+ctxp->rqb_buffer = (void *)nvmebuf;
spin_lock_init(&ctxp->ctxlock);

/* Process FCP command */
if (rc == 0) {
    +ctxp->rqb_buffer = NULL;
    atomic_inc(&tgtp->rcv_fcp_cmd_out);
    lpfc_rq_buf_free(phba, &nvmebuf->hbuf); /* repost */
    return;
}

/* Processing of FCP command is deferred */
if (rc == -EOVERFLOW) {
    /* Post a brand new DMA buffer to RQ and defer
    + * freeing rcv buffer till .defer_rcv callback
    + */
    +qno = nvmebuf->idx;
    +lpfc_post_rq_buffer(sectors, 0, phba, &nvmebuf->dbuf); /* repost */
    return;

*/

}
Open Source Used In 5GaaS Edge AC-4  28160

+phba, phba->sli4_hba.nvmet_mrq_hdr[qno],
+phba->sli4_hba.nvmet_mrq_data[qno], 1, qno);

lpfc_nvmeio_data(phba,
"NVMET RCV BUSY: xri x%x sz %d from %06x\n",
oxid, size, sid);
-/* defer reposting rcv buffer till .defer_rcv callback */
-ctxp->rqb_buffer = nvmebuf;
atomic_inc(&tgtp->rcv_fcp_cmd_out);
+atomic_inc(&tgtp->defer_fod);
return;
}
+ctxp->rqb_buffer = nvmebuf;

atomic_inc(&tgtp->rcv_fcp_cmd_drop);
lpfc_printf_log(phba, KERN_ERR, LOG_NVME_IOERR,
@@ -1968,9 +2166,11 @@
struct lpfc_iocbq *nvmewqe;
struct scatterlist *sgel;
union lpfc_wqe128 *wqe;
+struct ulp_bde64 *bde;
uint32_t *txrdy;
dma_addr_t physaddr;
int i, cnt;
+int do_pbde;
int xc = 1;

if (!lpfc_is_link_up(phba)) {
@@ -1992,7 +2192,7 @@
return NULL;
}

-if (rsp->sg_cnt > phba->cfg_nvme_seg_cnt) {
+if (rsp->sg_cnt > lpfc_tgttemplate.max_sgl_segments) {
lpfc_printf_log(phba, KERN_ERR, LOG_NVME_IOERR,
"6109 NVMET prep FCP wqe: seg cnt err: 
"NPORT x%x oxid x%x ste %d cnt %d\n",
@@ -2061,6 +2261,7 @@
/* Word 7 */
bf_set(wqe_pu, &wqe->fcp_tsend.wqe_com, 1);
bf_set(wqe_cmnd, &wqe->fcp_tsend.wqe_com, CMD_FCP_TSEND64_WQE);
+do_pbde = 0;
 /* Word 8 */
wqe->fcp_tsend.wqe_com.abort_tag = nvmewqe->iotag;
@@ -2108,9 +2309,10 @@
if (rsp->op == NVMET_FCOP_READDATA_RSP) {
atomic_inc(&tgtp->xmt_fcp_read_rsp);
bf_set(wqe_ar, &wqe->fcp_tsend.wqe_com, 1);
-if (ndlp->nlp_flag & NLP_SUPPRESS_RSP) &
- (rsp->rsplen == 12) { 
  -bf_set(wqe_sup, &wqe->fcp_tsend.wqe_com, 1);
  +if (rsp->rsplen == LPFC_NVMET_SUCCESS_LEN) { 
  +bf_set(wqe_sup,
  + &wqe->fcp_tsend.wqe_com, 1);
  +bf_set(wqe_wqes, &wqe->fcp_tsend.wqe_com, 0);
  +bf_set(wqe_irsp, &wqe->fcp_tsend.wqe_com, 0);
  +bf_set(wqe_irsplen, &wqe->fcp_tsend.wqe_com, 0);
  +@ @ -2172.6 +2374.10 @ @
  +bf_set(wqe_ar, &wqe->fcp_treceive.wqe_com, 0);
  +bf_set(wqe_cmnd, &wqe->fcp_treceive.wqe_com,
  + CMD_FCP_TRECEIVE64_WQE);
  +if (phba->nvme_embed_pbde)
  +do_pbde = 1;
  +else
  +do_pbde = 0;
  /* Word 8 */
  wqe->fcp_treceive.wqe_com.abort_tag = nvmewqe->iotag;
  @ @ -2255.6 +2461.7 @ @
  bf_set(wqe_pu, &wqe->fcp_trsp.wqe_com, 0);
  bf_set(wqe_ag, &wqe->fcp_trsp.wqe_com, 1);
  bf_set(wqe_cmnd, &wqe->fcp_trsp.wqe_com, CMD_FCP_TRSP64_WQE);
  +do_pbde = 0;
  /* Word 8 */
  wqe->fcp_trsp.wqe_com.abort_tag = nvmewqe->iotag;
  @ @ -2325.9 +2532.25 @ @
  bf_set(lpfc_sli4_sge_last, sgl, 1);
  sgl->word2 = cpu_to_le32(sgl->word2);
  sgl->sge_len = cpu_to_le32(cnt);
  +if (do_pbde && i == 0) { 
  +bde = (struct ulp_bde64 *)&wqe->words[13];
  +memset(bde, 0, sizeof(struct ulp_bde64));
  +/* Words 13-15 (PBDE)*/
  +bde->addrLow = sgl->addr_lo;
  +bde->addrHigh = sgl->addr_hi;
  +bde->tus.f.bdeSize =
  +le32_to_cpu(sgl->sge_len);
  +bde->tus.f.bdeFlags = BUFF_TYPE_BDE_64;
  +bde->tus.w = cpu_to_le32(bde->tus.w);
  +}
  sgl++;
  ctxp->offset += cnt;
  }
```c
if (do_pbde)
    bf_set(wqe_pbde, &wqe->generic.wqe_com, 1);
else
    bf_set(wqe_pbde, &wqe->generic.wqe_com, 0);
ctxp->state = LPFC_NVMET_STE_DATA;
ctxp->entry_cnt++;
return nvmewqe;
@@ -2602,7 +2825,6 @@
    bf_set(wqe_dbde, &wqe_abts->xmit_sequence.wqe_com, 1);
/* Word 10 */
    bf_set(wqe_dbde, &wqe_abts->xmit_sequence.wqe_com, 1);
    bf_set(wqe_iowd, &wqe_abts->xmit_sequence.wqe_com, LPFC_WQE_IOD_WRITE);
    bf_set(wqe_lenloc, &wqe_abts->xmit_sequence.wqe_com, LPFC_WQE_LENLOC_WORD12);
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_nvmet.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_nvmet.h
@@ -1,7 +1,7 @@
  /*******************************************************************
  * This file is part of the Emulex Linux Device Driver for        *
  * Fibre Channel Host Bus Adapters.                              *
  * Copyright (C) 2017 Broadcom. All Rights Reserved. The term     *
  * Broadcom refers to Broadcom Limited and/or its subsidiaries.   *
  * Copyright (C) 2004-2016 Emulex. All rights reserved.          *
  * EMULEX and SLI are trademarks of Emulex.                      *
  @@ -25,10 +25,16 @@
#define LPFC_NVMET_RQE_DEF_COUNT	512
#define LPFC_NVMET_SUCCESS_LEN	12
+#define LPFC_NVMET_MRQ_OFF		0xffff
+#define LPFC_NVMET_MRQ_AUTO		0
+#define LPFC_NVMET_MRQ_MAX		16
+ /* Used for NVME Target */
 struct lpfc_nvmet_tgtport {
     struct lpfc_hba *phba;
-    struct completion tport_unreg_done;
+    struct completion *tport_unreg_cmp;

 /* Stats counters - lpfc_nvmet_unsol_ls_buffer */
 atomic_t rcv_ls_req_in;
@@ -43,6 +49,8 @@
 /* Stats counters - lpfc_nvmet_xmt_ls_rsp_cmp */
```

atomic_t xmt_ls_rsp_error;
+atomic_t xmt_ls_rsp_aborted;
+atomic_t xmt_ls_rsp_xb_set;
atomic_t xmt_ls_rsp_cmpl;

/* Stats counters - lpfc_nvmet_unsol_fcp_buffer */
@@ -60,18 +68,25 @@
atomic_t xmt_fcp_rsp;

/* Stats counters - lpfc_nvmet_xmt_fcp_op_cmp */
+atomic_t xmt_fcp_rsp_xb_set;
atomic_t xmt_fcp_rsp_cmpl;
atomic_t xmt_fcp_rsp_error;
+atomic_t xmt_fcp_rsp_aborted;
atomic_t xmt_fcp_rsp_drop;

- /* Stats counters - lpfc_nvmet_xmt_fcp_abort */
+/* Stats counters - defer IO */
+atomic_t defer_ctx;
+atomic_t defer_fod;
+atomic_t defer_wqfull;
};

struct lpfc_nvmet_ctx_info {
@@ -122,6 +137,7 @@
#define LPFC_NVMET_CTX_RLS		0x8  /* ctx free requested */
struct rqb_dmabuf *rqb_buffer;
struct lpfc_nvmet_ctxbuf *ctxbuf;
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_scsi.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_scsi.c
@@ -1,7 +1,7 @@
/*******************************************************************
* This file is part of the Emulex Linux Device Driver for
* Fibre Channel Host Bus Adapters.
* - * Copyright (C) 2017 Broadcom. All Rights Reserved. The term
int datasegcnt, protsegcnt, datadir = scsi_cmnd->sc_data_direction;
int prot_group_type = 0;
int fcpdl;
	struct lpfc_vport *vport = phba->pport;

/*
 * Start the lpfc command prep by bumping the bpl beyond fcp_cmnd
*/
oiocb_cmd->un.fcpi.fcpi_parm = fcpdl;

+/*
+ * For First burst, we may need to adjust the initial transfer
+ * length for DIF
+ */
+if (iocb_cmd->un.fcpi.fcpi_XRdy &&
+ (fcpdl < vport->cfg_first_burst_size))
+iocb_cmd->un.fcpi.fcpi_XRdy = fcpdl;
+
return 0;
err:
if (lpfc_cmd->seg_cnt)
@@ -3304,8 +3313,12 @@
dma_offset += dma_len;
 sgl++;
 }
-/* setup the performance hint (first data BDE) if enabled */
-if (phba->sli3_options & LPFC_SLI4_PERFH_ENABLED) { 
+/*
+ * Setup the first Payload BDE. For FCoE we just key off
+ * Performance Hints, for FC we utilize fcp_embed_pbde.
+ */
+if ((phba->sli3_options & LPFC_SLI4_PERFH_ENABLED) ||
+ phba->fcp_embed_pbde) {
+ bde = (struct ulp_bde64 *)
+((iocb_cmd->unsli3.sli3Words[5]));
bde->addrLow = first_data_sgl->addr_lo;
@@ -3371,6 +3384,7 @@
 int datasegcnt, protsegcnt, datadir = scsi_cmnd->sc_data_direction;
 int prot_group_type = 0;
 int fcpdl;
+struct lpfc_vport *vport = phba->pport;
/*
 * Start the lpfc command prep by bumping the sgl beyond fcp_cmd
 @@ -3487,6 +3501,14 @@
 iocb_cmd->un.fcpi.fcpi_parm = fcpdl;
 */

/*
 + * For First burst, we may need to adjust the initial transfer
 + * length for DIF
 + */
+ if (iocb_cmd->un.fcpi.fcpi_XRdy &&
+ (fcpdl < vport->cfg_first_burst_size))
+ iocb_cmd->un.fcpi.fcpi_XRdy = fcpdl;
+
+/*
 * If the OAS driver feature is enabled and the lun is enabled for
 * OAS, set the oas iocb related flags.
 */
@@ -3772,20 +3794,18 @@
 scsi_set_resid(cmnd, be32_to_cpu(fcprsp->rspResId));

lpfc_printf_vlog(vport, KERN_INFO, LOG_FCP_UNDER,
- "9025 FCP Read Underrun, expected %d, ",
+ "9025 FCP Underrun, expected %d, ",
 "residual %d Data: x%x x%x x%x\n",
 fcpDl,
 scsi_get_resid(cmnd), fcpi_parm, cmnd->cmnd[0],
 cmnd->underflow);

/*
 - * If there is an under run check if under run reported by
 + * If there is an under run, check if under run reported by
 * storage array is same as the under run reported by HBA.
 * If this is not same, there is a dropped frame.
 */
- if ((cmnd->sc_data_direction == DMA_FROM_DEVICE) &&
- fcpi_parm &&
- (scsi_get_resid(cmnd) != fcpi_parm)) {
+ if (fcpi_parm && (scsi_get_resid(cmnd) != fcpi_parm)) {
 lpfc_printf_vlog(vport, KERN_WARNING,
 LOG_FCP | LOG_FCP_ERROR,
 "9026 FCP Read Check Error ",
@@ -3926,7 +3946,6 @@
 struct lpfc_rport_data *rdata = lpfc_cmd->rdata;
 struct lpfc_nodelist *pnode = rdata->pnode;
 struct scsi_cmnd *cmd;
-int depth;
 unsigned long flags;
 struct lpfc_fast_path_event *fast_path_evt;
struct Scsi_Host *shost;
@@ -4132,16 +4151,11 @@
 } else if (pnode && NLP_CHK_NODE_ACT(pnode)) {
   -if ((pnode->cmd_qdepth < vport->cfg_tgt_queue_depth) &&
   -   time_after(jiffies, pnode->last_change_time +
   +if ((pnode->cmd_qdepth != vport->cfg_tgt_queue_depth) &&
     + time_after(jiffies, pnode->last_change_time +
     msecs_to_jiffies(LPFC_TGTQ_INTERVAL)))) {
      spin_lock_irqsave(shost->host_lock, flags);
      -depth = pnode->cmd_qdepth * LPFC_TGTQ_RAMPUP_PCENT
      -100;
      -depth = depth ? depth : 1;
      -pnode->cmd_qdepth += depth;
      -if (pnode->cmd_qdepth > vport->cfg_tgt_queue_depth)
      +pnode->cmd_qdepth = vport->cfg_tgt_queue_depth;
      +pnode->last_change_time = jiffies;
      spin_unlock_irqrestore(shost->host_lock, flags);
   }
@@ -4149,9 +4163,17 @@
  lpfc_scsi_unprep_dma_buf(phba, lpfc_cmd);

  -spin_lock_irqsave(&phba->hbaloack, flags);
  -lpfc_cmd->pCmd = NULL;
  -spin_unlock_irqrestore(&phba->hbaloack, flags);
  +/* If pCmd was set to NULL from abort path, do not call scsi_done */
  +if (xchg(&lpfc_cmd->pCmd, NULL) == NULL) {
  +  lpfc_printf_vlog(vport, KERN_INFO, LOG_FCP,
  +   "5688 FCP cmd already NULL, sid: 0x%06x,",
  +   "did: 0x%06x, oxid: 0x%04x\n",
  +   vport->fc_myDID,
  +   (pnode) ? pnode->nlp_DID : 0,
  +   phba->sli_rev == LPFC_SLI_REV4 ?
  +   lpfc_cmd->cur_iocbq.sli4_xritag : 0xffff);
  +return;
  +}

  /* The sdev is not guaranteed to be valid post scsi_done upcall. */
  cmd->scsi_done(cmd);
@@ -4564,9 +4586,32 @@
   */
   cmd->scsi_done(cmd);
   @ @ -4564,9 +4586,32 @@
  */
  if (!ndlp || !NLP_CHK_NODE_ACT(ndlp))
    goto out_tgt_busy;
  -if (atomic_read(&ndlp->cmd_pending) >= ndlp->cmd_qdepth)
  +if (atomic_read(&ndlp->cmd_pending) >= ndlp->cmd_qdepth) {
lpfc_printf_vlog(vport, KERN_INFO, LOG_FCP_ERROR, "+" 3377 Target Queue Full, scsi Id:%d Qdepth:%d"
+" Pending command:%d"
+" WNNN:%02x:%02x:%02x:%02x:%02x:%02x:%02x:",
+WNNP:%02x:%02x:%02x:%02x:%02x:%02x:%02x:",
+ ndlp->nlp_sid, ndlp->cmd_qdepth,
+ atomic_read(&ndlp->cmd_pending),
+ ndlp->nlp_nodename.u.wwn[0],
+ ndlp->nlp_nodename.u.wwn[1],
+ ndlp->nlp_nodename.u.wwn[2],
+ ndlp->nlp_nodename.u.wwn[3],
+ ndlp->nlp_nodename.u.wwn[4],
+ ndlp->nlp_nodename.u.wwn[5],
+ ndlp->nlp_nodename.u.wwn[6],
+ ndlp->nlp_nodename.u.wwn[7],
+ ndlp->nlp_portname.u.wwn[0],
+ ndlp->nlp_portname.u.wwn[1],
+ ndlp->nlp_portname.u.wwn[2],
+ ndlp->nlp_portname.u.wwn[3],
+ ndlp->nlp_portname.u.wwn[4],
+ ndlp->nlp_portname.u.wwn[5],
+ ndlp->nlp_portname.u.wwn[6],
+ ndlp->nlp_portname.u.wwn[7]);
goto out_tgt_busy;
-
+}
lpfccmd = lpfc_get_scsi_buf(phba, ndlp);
if (lpfc_cmd == NULL) {
lpcrampdown_queue_depth(phba);
---linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_sli.c
+++linux-4.15.0/drivers/scsi/lpfc/lpfc_sli.c
@@-1,8+1,7@@
-
/**************************************************************************
* This file is part of the Emulex Linux Device Driver for Fibre Channel  *
* Host Bus Adapters.                                                   *
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@@-36,6+35,9@@
#include <scsi/scsi_transport_fc.h>
#include <scsi/fc/fc_fs.h>
#include <linux/aer.h>
#ifdef CONFIG_X86
#include <asm/set_memory.h>
#endif

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#include <linux/nvme-fc-driver.h>

@@ -113,6 +115,8 @@
 struct lpfc_register doorbell;
 uint32_t host_index;
 uint32_t idx;
+uint32_t i = 0;
+uint8_t *tmp;

 /* sanity check on queue memory */
 if (unlikely(!q))
@@ -129,10 +133,25 @@
 /* set consumption flag every once in a while */
 if (!((q->host_index + 1) % q->entry_repost))
 bf_set(wqe_wqec, &wqe->generic.wqe_com, 1);
+else
+    bf_set(wqe_wqec, &wqe->generic.wqe_com, 0);
 if (q->phba->sli3_options & LPFC_SLI4_PHWQ_ENABLED)
 bf_set(wqe_wqid, &wqe->generic.wqe_com, q->queue_id);
 lpfc_sli_pcimem_bcopy(wqe, temp_wqe, q->entry_size);
-/* ensure WQE bcopy flushed before doorbell write */
+if (q->dpp_enable && q->phba->cfg_enable_dpp) {
+    /* write to DPP aperture taking advantage of Combined Writes */
+    tmp = (uint8_t*)temp_wqe;
+    #ifdef __raw_writeq
+        for (i = 0; i < q->entry_size; i += sizeof(uint64_t))
+            __raw_writeq(*((uint64_t *)(tmp + i)),
+                        q->dpp_regaddr + i);
+    #else
+        for (i = 0; i < q->entry_size; i += sizeof(uint32_t))
+            __raw_writel(*((uint32_t *)(tmp + i)),
+                        q->dpp_regaddr + i);
+    #endif
+} /* ensure WQE bcopy and DPP flushed before doorbell write */
 wmb();

 /* Update the host index before invoking device */
@@ -143,9 +162,18 @@
 /* Ring Doorbell */
 doorbell.word0 = 0;
 if (q->db_format == LPFC_DB_LIST_FORMAT) {
-    bf_set(lpfc_wq_db_list_fm_num_posted, &doorbell, 1);
-    bf_set(lpfc_wq_db_list_fm_index, &doorbell, host_index);
-    bf_set(lpfc_wq_db_list_fm_id, &doorbell, q->queue_id);
+    if (q->dpp_enable && q->phba->cfg_enable_dpp) {
+        bf_set(lpfc_if6_wq_db_list_fm_num_posted, &doorbell, 1);
+    }
 }
+bf_set(lpfc_if6_wq_db_list_fm_dpp, &doorbell, 1);
+bf_set(lpfc_if6_wq_db_list_fm_dpp_id, &doorbell,
+ q->dpp_id);
+bf_set(lpfc_if6_wq_db_list_fm_id, &doorbell,
+ q->queue_id);
+} else {
+bf_set(lpfc_wq_db_list_fm_num_posted, &doorbell, 1);
+bf_set(lpfc_wq_db_list_fm_index, &doorbell, host_index);
+bf_set(lpfc_wq_db_list_fm_id, &doorbell, q->queue_id);
+}
} else if (q->db_format == LPFC_DB_RING_FORMAT) {
bf_set(lpfc_wq_db_ring_fm_num_posted, &doorbell, 1);
bf_set(lpfc_wq_db_ring_fm_index, &doorbell, q->queue_id);
@@ -262,16 +290,18 @@
static struct lpfc_eqe *
lpfc_sli4_eq_get(struct lpfc_queue *q)
{
+struct lpfc_hba *phba;
struct lpfc_eqe *eqe;
uint32_t idx;

/* sanity check on queue memory */
if (unlikely(!q))
    return NULL;
+phba = q->phba;
    eqe = q->qe[q->hba_index].eqe;

/* If the next EQE is not valid then we are done */
-if (!bf_get_le32(lpfc_eqe_valid, eqe))
+if (bf_get_le32(lpfc_eqe_valid, eqe) != q->qe_valid)
    return NULL;
/* If the host has not yet processed the next entry then we are done */
    idx = ((q->hba_index + 1) % q->entry_count);
@@ -279,6 +309,10 @@
    return NULL;

    q->hba_index = idx;
+/* if the index wrapped around, toggle the valid bit */
+if (phba->sli4_hba.pc_sli4_params.eqav && !q->hba_index)
+    q->qe_valid = (q->qe_valid) ? 0 : 1;
+
/* insert barrier for instruction interlock : data from the hardware
@@ -298,7 +332,7 @@
* @q: The Event Queue to disable interrupts
* */
static inline void
lpfc_sli4_eq_clr_intr(struct lpfc_queue *q)
{
    struct lpfc_register doorbell;
    @ @ -309,7 +343,22 @@
    bf_set(lpfc_eqcq_doorbell_eqid_hi, &doorbell,
            (q->queue_id >> LPFC_EQID_HI_FIELD_SHIFT));
    bf_set(lpfc_eqcq_doorbell_eqid_lo, &doorbell, q->queue_id);
    -writel(doorbell.word0, q->phba->sli4_hba.EQCQDBregaddr);
    +writel(doorbell.word0, q->phba->sli4_hba.EQDBregaddr);
+
+/**
+ * lpfc_sli4_if6_eq_clr_intr - Turn off interrupts from this EQ
+ * @q: The Event Queue to disable interrupts
+ *
+ **/
+inline void
+lpfc_sli4_if6_eq_clr_intr(struct lpfc_queue *q)
+{
+    struct lpfc_register doorbell;
+    
+    doorbell.word0 = 0;
+    bf_set(lpfc_if6_eq_doorbell_eqid, &doorbell, q->queue_id);
+    +writel(doorbell.word0, q->phba->sli4_hba.EQDBregaddr);
+}
+}
+/**
@@ -331,17 +380,21 @@
lpfc_sli4_eq_release(struct lpfc_queue *q, bool arm)
{
    uint32_t released = 0;
    +struct lpfc_hba *phba;
    struct lpfc_eqe *temp_eqe;
    struct lpfc_register doorbell;

    /* sanity check on queue memory */
    if (unlikely(!q))
        return 0;
    +phba = q->phba;

    /* while there are valid entries */
    while (q->hba_index != q->host_index) {
        -temp_eqe = q->qe[q->host_index].eqe;
        -bf_set_1e32(lpfc_eqe_valid, temp_eqe, 0);
        +if (!phba->sli4_hba.pc_sli4_params.eqav) {
            +temp_eqe = q->qe[q->host_index].eqe;
            return 0;
        }
+bf_set_le32(lpfc_eqe_valid, temp_eqe, 0);
+
released++;
q->host_index = ((q->host_index + 1) % q->entry_count);
}
@@ -359,10 +412,63 @@
bf_set(lpfc_eqcq_doorbell_eqid_hi, &doorbell, (q->queue_id >> LPFC_EQID_HI_FIELD_SHIFT));
bf_set(lpfc_eqcq_doorbell_eqid_lo, &doorbell, q->queue_id);
-writel(doorbell.word0, q->phba->sli4_hba.EQCQDBregaddr);
+t#writel(doorbell.word0, q->phba->sli4_hba.EQDBregaddr);
+/* PCI read to flush PCI pipeline on re-arming for INTx mode */
if ((q->phba->intr_type == INTx) && (arm == LPFC_QUEUE_REARM))
-readl(q->phba->sli4_hba.EQCQDBregaddr);
+readl(q->phba->sli4_hba.EQDBregaddr);
+return released;
+
+/**
+ * lpfc_sli4_if6_eq_release - Indicates the host has finished processing an EQ
+ * @q: The Event Queue that the host has completed processing for.
+ * @arm: Indicates whether the host wants to arms this CQ.
+ *
+ * This routine will mark all Event Queue Entries on @q, from the last
+ * known completed entry to the last entry that was processed, as completed
+ * by clearing the valid bit for each completion queue entry. Then it will
+ * notify the HBA, by ringing the doorbell, that the EQEs have been processed.
+ * The internal host index in the @q will be updated by this routine to indicate
+ * that the host has finished processing the entries. The @arm parameter
+ * indicates that the queue should be rearmed when ringing the doorbell.
+ *
+ * This function will return the number of EQEs that were popped.
+ ***/
+uint32_t
+lpfc_sli4_if6_eq_release(struct lpfc_queue *q, bool arm)
+{
+uint32_t released = 0;
+struct lpfc_hba *phba;
+struct lpfc_eqe *temp_eqe;
+struct lpfc_register doorbell;
+
+/* sanity check on queue memory */
+if (unlikely(!q))
+return 0;
+phba = q->phba;
+
+/* while there are valid entries */
+while (q->hba_index != q->host_index) {

if (!phba->sli4_hba.pc_sli4_params.eqav) {
  temp_eqe = q->qe[q->host_index].eqe;
  bf_set_le32(lpfc_eqe_valid, temp_eqe, 0);
}
released++;
q->host_index = ((q->host_index + 1) % q->entry_count);
if (unlikely(released == 0 && !arm))
  return 0;
/* ring doorbell for number popped */
doorbell.word0 = 0;
if (arm)
  bf_set(lpfc_if6_eq_doorbell_arm, &doorbell, 1);
  bf_set(lpfc_if6_eq_doorbell_num_released, &doorbell, released);
  bf_set(lpfc_if6_eq_doorbell_eqid, &doorbell, q->queue_id);
  writel(doorbell.word0, q->phba->sli4_hba.EQDBregaddr);
  /* PCI read to flush PCI pipeline on re-arming for INTx mode */
  if ((q->phba->intr_type == INTx) && arm == LPFC_QUEUE_REARM)
    readl(q->phba->sli4_hba.EQDBregaddr);
  return released;
}
static struct lpfc_cqe *
lpfc_sli4_cq_get(struct lpfc_queue *q)
{
  struct lpfc_hba *phba;
  struct lpfc_cqe *cqe;
  uint32_t idx;

  /* sanity check on queue memory */
  if (unlikely(!q))
    return NULL;
  phba = q->phba;
  cqe = q->qe[q->hba_index].cqe;

  /* If the next CQE is not valid then we are done */
  if (!bf_get_le32(lpfc_cqe_valid, q->qe[q->hba_index].cqe))
    return NULL;

  /* If the host has not yet processed the next entry then we are done */
  idx = ((q->hba_index + 1) % q->entry_count);
  if (idx == q->host_index)
    return NULL;

  cqe = q->qe[q->hba_index].cqe;
  q->hba_index = idx;
/* if the index wrapped around, toggle the valid bit */
+if (phba->sli4_hba.pc_sli4_params.cqav && !q->hba_index)
+a->qe_valid = (q->qe_valid) ? 0 : 1;

/* insert barrier for instruction interlock : data from the hardware */
lpcf_sli4_cq_release(struct lpfc_queue *q, bool arm)
{
    int released = 0;
+struct lpfc_hba *phba;
    struct lpfc_cqe *temp_qe;
    struct lpfc_register doorbell;

    /* sanity check on queue memory */
    if (unlikely(!q))
        return 0;
+phba = q->phba;

    /* while there are valid entries */
    while (q->hba_index != q->host_index)
    {
        /* temp_qe = q->qe[q->host_index].cqe; */
        if (!phba->sli4_hba.pc_sli4_params.cqav) {
            /* temp_qe = q->qe[q->host_index].cqe; */
            if (!phba->sli4_hba.pc_sli4_params.cqav) {
                temp_qe = q->qe[q->host_index].cqe;
                bf_set_le32(lpfc_cqe_valid, temp_qe, 0);
            }
        }
        released++;
        q->host_index = ((q->host_index + 1) % q->entry_count);
    }
    bset(lpfc_eqcq_doorbell_cqid_hi, &doorbell, (q->queue_id >> LPFC_CQID_HI_FIELD_SHIFT));
    bset(lpfc_eqcq_doorbell_cqid_lo, &doorbell, q->queue_id);
    -writel(doorbell.word0, q->phba->sli4_hba.EQCQDBRegaddr);
    +return released;
}
+ * The internal host index in the @q will be updated by this routine to indicate
+ * that the host has finished processing the entries. The @arm parameter
+ * indicates that the queue should be rearmed when ringing the doorbell.
+ *
+ * This function will return the number of CQEs that were released.
+ ***/
+uint32_t
+lpfc_sli4_if6_cq_release(struct lpfc_queue *q, bool arm)
+{
+uint32_t released = 0;
+struct lpfc_hba *phba;
+struct lpfc_cqe *temp_qe;
+struct lpfc_register doorbell;
+
+/* sanity check on queue memory */
+if (unlikely(!q))
+return 0;
+phba = q->phba;
+
+/* while there are valid entries */
+while (q->hba_index != q->host_index) {
+if (!phba->sli4_hba.pc_sli4_params.cqav) {
+temp_qe = q->qe[q->host_index].cqe;
+bf_set_le32(lpfc_cqe_valid, temp_qe, 0);
+}
+released++;
+q->host_index = ((q->host_index + 1) % q->entry_count);
+}
+if (unlikely(released == 0 && !arm))
+return 0;
+
+/* ring doorbell for number popped */
+doorbell.word0 = 0;
+if (arm)
+bf_set(lpfc_if6_cq_doorbell_arm, &doorbell, 1);
+bf_set(lpfc_if6_cq_doorbell_num_released, &doorbell, released);
+bf_set(lpfc_if6_cq_doorbell_cqid, &doorbell, q->queue_id);
+writel(doorbell.word0, q->phba->sli4_hba.CQDBregaddr);
+return released;
}
/* sanity check on queue memory */
if (unlikely(!hq) || unlikely(!dq))
    return -ENOMEM;
-put_index = hq->host_index;
-temp_hrqe = hq->qe[put_index].rqe;
-temp_drqe = dq->qe[dq->host_index].rqe;
+hq_put_index = hq->host_index;
+dq_put_index = dq->host_index;
+temp_hrqe = hq->qe[hq_put_index].rqe;
+temp_drqe = dq->qe[dq_put_index].rqe;

if (hq->type != LPFC_HRQ || dq->type != LPFC_DRQ)
    return -EINVAL;
-if (put_index != dq->host_index)
-+if (hq_put_index != dq_put_index)
    return -EINVAL;

/* If the host has not yet processed the next entry then we are done */
-if (((put_index + 1) % hq->entry_count) == hq->hba_index)
+if (((hq_put_index + 1) % hq->entry_count) == hq->hba_index)
    return -EBUSY;
lpfc_sli_pcimem_bcopy(hrqe, temp_hrqe, hq->entry_size);
lpfc_sli_pcimem_bcopy(drqe, temp_drqe, dq->entry_size);

/* Update the host index to point to the next slot */
-hq->host_index = ((put_index + 1) % hq->entry_count);
-dq->host_index = ((dq->host_index + 1) % dq->entry_count);
+hq->host_index = ((hq_put_index + 1) % hq->entry_count);
+dq->host_index = ((dq_put_index + 1) % dq->entry_count);

/* Ring The Header Receive Queue Doorbell */
@@ -517,7 +685,7 @@
    writel(doorbell.word0, hq->db_regaddr);
}
-return put_index;
+return hq_put_index;
}

/*@ -2269,6 +2437,8 @*/
!pmb->u.mb.mbStatus) {
    rpi = pmb->u.mb.un.varWords[0];
    vpi = pmb->u.mb.un.varRegLogin.vpi;
+if (phba->sli_rev == LPFC_SLI_REV4)
+vpi -= phba->sli4_hba.max_cfg_param.vpi_base;
lpfc_unreg_login(phba, vpi, rpi, pmb);
pmb->vport = vport;
pmb->mbox_cmpl = lpfc_sli_def_mbox_cmpl;
@@ -2328,7 +2498,7 @@
    if (pmb->u.mb.mbxCommand == MBX_UNREG_LOGIN) {
        if (phba->sli_rev == LPFC_SLI_REV4 &&
            (bf_get(lpfc_sli_intf_if_type,
-                &phba->sli4_hba.sli_intf) ==
+                &phba->sli4_hba.sli_intf) >=
                LPFC_SLI_INTF_IF_TYPE_2)) {
            if (ndlp) {
                lpfc_printf_vlog(vport, KERN_INFO, LOG_SLI,
@@ -3590,6 +3760,7 @@
              struct hbq_dmabuf *dmabuf;
              struct lpfc_cq_event *cq_event;
              unsigned long iflag;
+              int count = 0;

              spin_lock_irqsave(&phba->hbalock, iflag);
              phba->hba_flag &= ~HBA_SP_QUEUE_EVT;
@@ -3611,16 +3782,22 @@
              if (irspiocbq)
                lpfc_sli_sp_handle_rspiocb(phba, pring,
                irspiocbq);
+              count++;
              break;
              case CQE_CODE_RECEIVE:
              case CQE_CODE_RECEIVE_V1:
                dmabuf = container_of(cq_event, struct hbq_dmabuf,
                cq_event);
                lpfc_sli4_handle_received_buffer(phba, dmabuf);
+              count++;
              break;
              default:
                break;
              }
+ /* Limit the number of events to 64 to avoid soft lockups */
+   if (count == 64)
+     break;
          }
@@ -3774,6 +3951,7 @@
        struct lpfc_sli *psli = &phba->sli;
        struct lpfc_sli_ring *pring;
        uint32_t i;
+        struct lpfc_iocbq *piocb, *next_iocb;
spin_lock_irq(&phba->hbalock);
/* Indicate the I/O queues are flushed */
@@ -3788,6 +3966,9 @@
    spin_lock_irq(&pring->ring_lock);
/* Retrieve everything on txq */
    list_splice_init(&pring->txq, &txq);
+    list_for_each_entry_safe(piocb, next_iocb,
+                            &pring->txcmplq, list)
+    piocb->iocb_flag &= ~LPFC_IO_ON_TXCMPLQ;
/* Retrieve everything on the txcmplq */
    list_splice_init(&pring->txcmplq, &txcmplq);
    pring->txq_cnt = 0;
@@ -3809,6 +3990,9 @@
    spin_lock_irq(&phba->hbalock);
/* Retrieve everything on txq */
    list_splice_init(&pring->txq, &txq);
+    list_for_each_entry_safe(piocb, next_iocb,
+                            &pring->txcmplq, list)
+    piocb->iocb_flag &= ~LPFC_IO_ON_TXCMPLQ;
/* Retrieve everything on the txcmplq */
    list_splice_init(&pring->txcmplq, &txcmplq);
    pring->txcmplq_cnt = 0;
@@ -3840,6 +4024,7 @@
    LIST_HEAD(txcmplq);
    struct lpfc_sli_ring *pring;
    uint32_t i;
    +struct lpfc_iocbq *piocb, *next_iocb;

    if (phba->sli_rev < LPFC_SLI_REV4)
        return;
@@ -3856,8 +4041,11 @@
        for (i = 0; i < phba->cfg_nvme_io_channel; i++) {
            pring = phba->sli4_hba nvme_wq[i]->pring;
-
-/* Retrieve everything on the txcmplq */
-    spin_lock_irq(&pring->ring_lock);
-    +list_for_each_entry_safe(piocb, next_iocb,
-                                &pring->txcmplq, list)
-    piocb->iocb_flag &= ~LPFC_IO_ON_TXCMPLQ;
-/* Retrieve everything on the txcmplq */
-    +list_splice_init(&pring->txcmplq, &txcmplq);
-    pring->txcmplq_cnt = 0;
-    spin_unlock_irq(&pring->ring_lock);
@@ -4419,6 +4607,8 @@
        hba_aer_enabled = phba->hba_flag & HBA_AER_ENABLED;

        rc = lpfc_sli4_brdreset(phba);
+        if (rc)
return rc;

spin_lock_irq(&phba->hbalock);
phba->pport->stopped = 0;
@@ -4744,7 +4934,6 @@
phba->sli3_options &= ~(LPFC_SLI3_NPIV_ENABLED |
 LPFC_SLI3_HBQ_ENABLED |
 LPFC_SLI3_CRP_ENABLED |
-LPFC_SLI3_BG_ENABLED |
 LPFC_SLI3_DSS_ENABLED);
if (rc != MBX_SUCCESS) {
lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
@@ -5288,41 +5477,42 @@
lpfc_sli4_arm_cqeq_intr(struct lpfc_hba *phba) {

int qidx;
+struct lpfc_sli4_hba *sli4_hba = &phba->sli4_hba;

-lpfc_sli4_cq_release(phba->sli4_hba.mbx_cq, LPFC_QUEUE_REARM);
-lpfc_sli4_cq_release(phba->sli4_hba.els_cq, LPFC_QUEUE_REARM);
-if (phba->sli4_hba.nvmels_cq)
-lpfc_sli4_cq_release(phba->sli4_hba.nvmels_cq,
+sli4_hba->sli4_cq_release(sli4_hba->mbx_cq, LPFC_QUEUE_REARM);
+sli4_hba->sli4_cq_release(sli4_hba->els_cq, LPFC_QUEUE_REARM);
-if (sli4_hba->nvmels_cq)
+sli4_hba->sli4_cq_release(sli4_hba->nvmels_cq,
 LPFC_QUEUE_REARM);

-if (phba->sli4_hba.fcp_cq)
+if (sli4_hba->fcp_cq)
 for (qidx = 0; qidx < phba->cfg_fcp_io_channel; qidx++)
-lpfc_sli4_cq_release(phba->sli4_hba.fcp_cq[qidx],
+sli4_hba->sli4_cq_release(sli4_hba->fcp_cq[qidx],
 LPFC_QUEUE_REARM);

-if (phba->sli4_hba.nvme_cq)
+if (sli4_hba->nvme_cq)
 for (qidx = 0; qidx < phba->cfg_nvme_io_channel; qidx++)
-lpfc_sli4_cq_release(phba->sli4_hba.nvme_cq[qidx],
+sli4_hba->sli4_cq_release(sli4_hba->nvme_cq[qidx],
 LPFC_QUEUE_REARM);

if (phba->cfg_fof)
-lpfc_sli4_cq_release(phba->sli4_hba.oas_cq, LPFC_QUEUE_REARM);
+sli4_hba->sli4_cq_release(sli4_hba->oas_cq, LPFC_QUEUE_REARM);

-if (phba->sli4_hba.hba_eq)
+if (sli4_hba->hba_eq)
for (qidx = 0; qidx < phba->io_channel_irqs; qidx++)
- lpfc_sli4_eq_release(phba->sli4_hba.eq[qidx],
  - LPFC_QUEUE_REARM);
+ sli4_hba->sli4_eq_release(sli4_hba->eq[qidx],
  + LPFC_QUEUE_REARM);

if (phba->nvmet_support) {
for (qidx = 0; qidx < phba->cfg_nvmet_mrq; qidx++) {
- lpfc_sli4_cq_release(
  - phba->sli4_hba.nvmet_cqset[qidx],
  + sli4_hba->sli4_cq_release(
  + sli4_hba->nvmet_cqset[qidx],
  LPFC_QUEUE_REARM);
}
}

if (phba->cfg_fof)
- lpfc_sli4_eq_release(phba->sli4_hba.fof_eq, LPFC_QUEUE_REARM);
+ sli4_hba->sli4_eq_release(sli4_hba->fof_eq, LPFC_QUEUE_REARM);
}

/**
 @@ -6531,14 +6721,20 @@
 struct lpfc_rq e hrqe;
 struct lpfc_rq e drqe;
 struct lpfc_rq *rqbp;
+ unsigned long flags;
 struct rqb_dmabuf *rqb_buffer;
 LIST_HEAD(rqb_buf_list);

 rqbp = hrq->rqbp;
 for (i = 0; i < count; i++) {
+ spin_lock_irqsave(&phba->hbalock, flags);
 /* IF RQ is already full, don’t bother */
- if (rqbp->buffer_count + i >= rqbp->entry_count - 1)
+ if (rqbp->buffer_count + i >= rqbp->entry_count - 1) {
+ spin_unlock_irqrestore(&phba->hbalock, flags);
 break;
 +}
+ spin_unlock_irqrestore(&phba->hbalock, flags);
 +
 rqb_buffer = rqbp->rqb_alloc_buffer(phba);
 if (!rqb_buffer)
 break;
@@ -6547,6 +6743,8 @@
 rqb_buffer->idx = idx;
 list_add_tail(&rqb_buffer->hbuf.list, &rqb_buf_list);
 }
+spin_lock_irqsave(&phba->hbalock, flags);
while (!list_empty(&rqb_buf_list)) {
    list_remove_head(&rqb_buf_list, rqb_buffer, struct rqb_dmabuf,
        hbuf.list);
    @ @ -6557,6 +6755,15 @@
        drqe.address_hi = putPaddrHigh(rqb_buffer->dbuf.phys);
        rc = lpfc_sli4_rq_put(hrq, drq, &hrqe, &drqe);
        if (rc < 0) {
            +lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
            +"6421 Cannot post to HRQ %d: %x %x %x "
            +"DRQ %x %x\n",
            +hrq->queue_id,
            +hrq->host_index,
            +hrq->hba_index,
            +hrq->entry_count,
            +drq->host_index,
            +drq->hba_index);
            rqbp->rqb_free_buffer(phba, rqb_buffer);
        } else {
            list_add_tail(&rqb_buffer->hbuf.list,
                @@ -6564,6 +6771,7 @@
                rqbp->buffer_count++;
        }
    }
+spin_unlock_irqrestore(&phba->hbalock, flags);
return 1;
}

/* Save information as VPD data */
phba->vpd.rev.biuRev = mqe->un.read_rev.first_hw_rev;
phba->vpd.rev.smRev = mqe->un.read_rev.second_hw_rev;
+
+/*
+ * This is because first G7 ASIC doesn't support the standard
+ * 0x5a NVME cmd descriptor type/subtype
+ */
+if ((bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf) ==
+LPFC_SLI_intf_IF_TYPE_6) &&
+    (phba->vpd.rev.biuRev == LPFC_G7_ASIC_1) &&
+    (phba->vpd.rev.smRev == 0) &&
+    (phba->cfg_nvme_embed_cmd == 1))
+phba->cfg_nvme_embed_cmd = 0;
+phba->vpd.rev.endecRev = mqe->un.read_rev.third_hw_rev;
phba->vpd.rev.fcphHigh = bf_get(lpfc_mbx_rd_rev_fcph_high,
        &mqe->un.read_rev);
+/* Performance Hints are ONLY for FCoE */
+if (phba->hba_flag & HBA_FCOE_MODE) {
+  if (bf_get(lpfc_mbx_rq_ftr_rsp_perfh, &mqe->un.req_ftrs))
+    phba->sli3_options |= LPFC_SLI4_PERFH_ENABLED;
+  else
+    phba->sli3_options &= ~LPFC_SLI4_PERFH_ENABLED;
+}
+
+/* If the port cannot support the host's requested features
* then turn off the global config parameters to disable the
*/
"0393 Error %d during rpi post operation\n",
rc);
rc = -ENODEV;
goto out_destroy_queue;
goto out_free_iocblist;
} 
lpfc_sli4_node_prep(phba);

out_unset_queue:
/* Unset all the queues set up in this routine when error out */
lpfc_sli4_queue_unset(phba);
-out_destroy_queue:
+out_free_iocblist:
lpfc_free_iocb_list(phba);
+out_destroy_queue:
lpfc_sli4_queue_destroy(phba);
out_stop_timers:
lpfc_stop_hba_timers(phba);

if (unlikely(!phba) || (phba->sli_rev != LPFC_SLI_REV4))
  return false;
mcq = phba->sli4_hba.mbx_cq;
idx = mcq->hba_index;
-while (bf_get_le32(lpfc_cqe_valid, mcq->qe[idx].cqe)) {
  qe_valid = mcq->qe_valid;
  while (bf_get_le32(lpfc_cqe_valid, mcq->qe[idx].cqe) == qe_valid) {
    mcqe = (struct lpfc_mcqe *)mcq->qe[idx].cqe;
    if (bf_get_le32(lpfc_trailer_completed, mcqe) &&
        (!bf_get_le32(lpfc_trailer_async, mcqe))) {
      mcq->hba_index = (idx + 1) % mcq->entry_count;
      if (mcq->hba_index == idx)
        break;
      qe_valid = (qe_valid) ? 0 : 1;
    }
  }
return pending_completions;

bool
lpfc_sli4_process_missed_mbox_completions(struct lpfc_hba *phba)
{
  struct lpfc_sli4_hba *sli4_hba = &phba->sli4_hba;
  uint32_t eqidx;
  struct lpfc_queue *fpeq = NULL;
  struct lpfc_eqe *eqe;
  /* Find the eq associated with the mcq */
  /* if the index wrapped around, toggle the valid bit */
  +if (phba->sli4_hba.pc_sli4_params.cqav && !idx)
    qe_valid = (qe_valid) ? 0 : 1;
  }
return pending_completions;

bool
lpfc_sli4_process_missed_mbox_completions(struct lpfc_hba *phba)
{
  struct lpfc_sli4_hba *sli4_hba = &phba->sli4_hba;
  uint32_t eqidx;
  struct lpfc_queue *fpeq = NULL;
  struct lpfc_eqe *eqe;
  /* Find the eq associated with the mcq */
  /* if the index wrapped around, toggle the valid bit */
/* Turn off interrupts from this EQ */

-lpfc_sli4_eq_clr_intr(fpeq);
+sli4_hba->sli4_eq_clr_intr(fpeq);

/* Check to see if a mbox completion is pending */

@@ -7288,7 +7520,7 @@
/* Always clear and re-arm the EQ */

-lpfc_sli4_eq_release(fpeq, LPFC_QUEUE_REARM);
+sli4_hba->sli4_eq_release(fpeq, LPFC_QUEUE_REARM);

return mbox_pending;

@@ -8098,7 +8330,7 @@
 } else if (flag == MBX_POLL) {
 lpfc_printf_log(phba, KERN_WARNING, LOG_MBOX | LOG_SLI,
 "(%d):2542 Try to issue mailbox command "
-"x%x (x%x/x%x) synchronously ahead of async"
+"x%x (x%x/x%x) synchronously ahead of async "
 "mailbox command queue: x%x x%x\n",
 mboxq->vport ? mboxq->vport->vpi : 0,
 mboxq->u.mb.mbxCommand,
-@@ -8765,7 +9100,12 @@
+if_type = bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf);
+if (if_type == LPFC_SLI_INTF_IF_TYPE_2) {
+if (if_type >= LPFC_SLI_INTF_IF_TYPE_2) {
 if_type = bf_get(lpfc_sli_intf_if_type, &phba->sli4_hba.sli_intf);
 change to LPFC_SLI_INTF_IF_TYPE_2??
 if (if_type != LPFC_SLI_INTF_IF_TYPE_2) {
+*pcmd = ELS_CMD_FLOGI;
+*pcmd = ELS_CMD_SCR;
+*pcmd = ELS_CMD_FDISC;
@@ -8868,6 +9100,12 @@
 /* Note, word 10 is already initialized to 0 */
 +/* Don't set PBDE for Perf hints, just fcp_embed_pbde */
+if (phba->fcp_embed_pbde)
+bf_set(wqe_pbde, &wqe->fcp_iwrite.wqe_com, 1);
+else
+bf_set(wqe_pbde, &wqe->fcp_iwrite.wqe_com, 0);
+if (phba->fcp_embed_io) {
 struct lpfc_scsi_buf *lpfc_cmd;
 struct sli4_sge *sgl;
-@@ -8890,6 +9128,7 @@

wqe128->generic.bde.addrLow = 88; /* Word 22 */

bf_set(wqewqes, &wqe128->fcps_write.wqe_com, 1);
+bf_set(wqedbde, &wqe128->fcps_write.wqe_com, 0);

/* Word 22-29 FCP CMND Payload */
ptr = &wqe128->words[22];
@ @ -8927,6 +9166,12 @ @
} /* Note, word 10 is already initialized to 0 */

+/* Don't set PBDE for Perf hints, just fcp_embed_pbde */
+if (phba->fcp_embed_pbde)
+bf_set(wqepbde, &wqe128->fcps_read.wqe_com, 1);
+else
+bf_set(wqepbde, &wqe128->fcps_read.wqe_com, 0);
+
+if (phba->fcp_embed_io) {
++struct lpfc_scsi_buf *lpfc_cmd;
++struct sli4_sge *sgl;
++@ @ -8949,6 +9194,7 @@
+wqe128->generic.bde.addrLow = 88; /* Word 22 */

bf_set(wqewqes, &wqe128->fcps_read.wqe_com, 1);
+bf_set(wqedbde, &wqe128->fcps_read.wqe_com, 0);

/* Word 22-29 FCP CMND Payload */
ptr = &wqe128->words[22];
@ @ -9007,6 +9253,7 @@
wqe128->generic.bde.addrLow = 88; /* Word 22 */

bf_set(wqewqes, &wqe128->fcps_cmd.wqe_com, 1);
+bf_set(wqedbde, &wqe128->fcps_cmd.wqe_com, 0);

/* Word 22-29 FCP CMND Payload */
ptr = &wqe128->words[22];
@ @ -9062,7 +9309,7 @@

if_type = bf_get(lpfc_sli_intf_if_type,
&phba->sli4_hba.sli_intf);
-if (if_type == LPFC_SLI_INTF_IF_TYPE_2) {
+if (if_type >= LPFC_SLI_INTF_IF_TYPE_2) {
+if (iocq->vport->fc_flag & FC_PT2PT) {
+bf_set(els_rsp64_sp, &wqe->xmit_els_rsp, 1);
+bf_set(els_rsp64_sid, &wqe->xmit_els_rsp,
@@ -9468,7 +9715,7 @@
fpeq = phba->sli4_hba.hba_eq[idx];
/* Turn off interrupts from this EQ */
-lpfc_sli4_eq_clr_intr(fpeq);
+phba->sli4_hba.sli4_eq_clr_intr(fpeq);

/* Always clear and re-arm the EQ */
-lpfc_sli4_eq_release(fpeq,
+phba->sli4_hba.sli4_eq_release(fpeq,
LPFC_QUEUE_REARM);
}
atomic_inc(&hba_eq_hdl->hba_eq_in_use);

/* Complete prepping the abort wqe and issue to the FW. */
abts_wqe = &abtsiocbp->wqe;
-bf_set(abort_cmd_ia, &abts_wqe->abort_cmd, 0);
-bf_set(abort_cmd_criteria, &abts_wqe->abort_cmd, T_XRI_TAG);

-/* Explicitly set reserved fields to zero. */
-abts_wqe->abort_cmd.rsrvd4 = 0;
-abts_wqe->abort_cmd.rsrvd5 = 0;
-
-/* WQE Common - word 6.  Context is XRI tag.  Set 0. */
-bf_set(wqe_xri_tag, &abts_wqe->abort_cmd.wqe_com, 0);
-bf_set(wqe_ctxt_tag, &abts_wqe->abort_cmd.wqe_com, 0);
+/* Clear any stale WQE contents */
+memset(abts_wqe, 0, sizeof(union lpfc_wqe));
+b奉set(abort_cmd_criteria, &abts_wqe->abort_cmd, T_XRI_TAG);

/* word 7 */
-bf_set(wqe_et, &abts_wqe->abort_cmd.wqe_com, 0);
b_set(wqe_cmnd, &abts_wqe->abort_cmd.wqe_com, CMD_ABORT_XRI_CX);
b_set(wqe_class, &abts_wqe->abort_cmd.wqe_com,
/cmdiocb->iocb.ulpClass);
@@ -10745,7 +10985,6 @@
    abtsiocbp->iotag);

/* word 10 */
-bf_set(wqe_wqid, &abts_wqe->abort_cmd.wqe_com, cmdiocb->hba_wqidx);
b_set(wqe_qosd, &abts_wqe->abort_cmd.wqe_com, 1);
b_set(wqe_lenloc, &abts_wqe->abort_cmd.wqe_com, LPFC_WQE_LENLOC_NONE);

@@ -11646,6 +11885,7 @@
}
break;

 case LPFC_SLI_INTF_IF_TYPE_2:
 +case LPFC_SLI_INTF_IF_TYPE_6:
 if (lpfc_readl(phba->sli4_hba.u.if_type2.STATUSregaddr, &portstat_reg.word0) ||
 lpfc_readl(phba->sli4_hba.PSMPHRregaddr, @@ -12318,41 +12558,6 @@
 }

 /**
   * lpfc_sli4_nvme_xri_abort_event_proc - Process nvme xri abort event
   * @phba: pointer to lpfc hba data structure.
   *
   * This routine is invoked by the worker thread to process all the pending
   * SLI4 NVME abort XRI events.
   **/

-void lpfc_sli4_nvme_xri_abort_event_proc(struct lpfc_hba *phba)
{
-struct lpfc_cq_event *cq_event;
-
-/* First, declare the fcp xri abort event has been handled */
-spin_lock_irq(&phba->hbalock);
-phba->hba_flag &=-NVME_XRI_ABORT_EVENT;
-spin_unlock_irq(&phba->hbalock);
-/* Now, handle all the fcp xri abort events */
-while (!list_empty(&phba->sli4_hba.sp_nvme_xri_aborted_work_queue)) {
-/* Get the first event from the head of the event queue */
-spin_lock_irq(&phba->hbalock);
-list_remove_head(&phba->sli4_hba.sp_nvme_xri_aborted_work_queue,
-    cq_event, struct lpfc_cq_event, list);
-spin_unlock_irq(&phba->hbalock);
-/* Notify aborted XRI for NVME work queue */
-if (phba->nvmet_support) {
-lpfc_sli4_nvmet_xri_aborted(phba,
-    &cq_event->cqe.wcqe_axri);
-} else {
-lpfc_sli4_nvme_xri_aborted(phba,
-    &cq_event->cqe.wcqe_axri);
-}
-/* Free the event processed back to the free pool */
-lpfc_sli4_cq_event_release(phba, cq_event);
-}
-}

-/**
   * lpfc_sli4_els_xri_abort_event_proc - Process els xri abort event
   * @phba: pointer to lpfc hba data structure.
   *
@@ -12548,6 +12753,24 @@
 return irspio.cbq;
 }

+inline struct lpfc_cq_event *
+lpfc_cq_event_setup(struct lpfc_hba *phba, void *entry, int size)
+{
+struct lpfc_cq_event *cq_event;
+
+/* Allocate a new internal CQ_EVENT entry */
+cq_event = lpfc_sli4_cq_event_alloc(phba);
+if (!cq_event) {
+lpfc_printf_log(phba, KERN_ERR, LOG_SLI,
+"0602 Failed to alloc CQ_EVENT entry\n");
+return NULL;
+}
+
+/* Move the CQE into the event */
+memcpy(&cq_event->cqe, entry, size);
+return cq_event;
+
/**
 * lpfc_sli4_sp_handle_async_event - Handle an asynchronous event
 * @phba: Pointer to HBA context object.
@@ -12569,16 +12792,9 @@
 "word2:x%x, word3:x%xn", mcqe->word0,
 mcqe->mcqe_tag0, mcqe->mcqe_tag1, mcqe->trailer);
-/* Allocate a new internal CQ_EVENT entry */
-cq_event = lpfc_sli4_cq_event_alloc(phba);
-if (!cq_event) {
-lpfc_printf_log(phba, KERN_ERR, LOG_SLI,
-"0394 Failed to allocate CQ_EVENT entry\n");
+cq_event = lpfc_cq_event_setup(phba, mcqe, sizeof(struct lpfc_mcqe));
+if (!cq_event)
return false;
-}
-
-/* Move the CQE into an asynchronous event entry */
-memcpy(&cq_event->cqe, mcqe, sizeof(struct lpfc_mcqe));
-spin_lock_irqsave(&phba->hbalock, iflags);
-list_add_tail(&cq_event->list, &phba->sli4_hba.sp_asynce_work_queue);
/* Set the async event flag */
@@ -12693,13 +12909,19 @@
phba->sli.sli_flag &= ~LPFC_SLI_MBOX_ACTIVE;
/* Setting active mailbox pointer need to be in sync to flag clear */
phba->sli.mbox_active = NULL;
+if (bf_get(lpfc_trailer_consumed, mcqe))
+lpfc_sli4_mq_release(phba->sli4_hba.mbx_wq);
+spin_unlock_irqrestore(&phba->hbalock, iflags);
/* Wake up worker thread to post the next pending mailbox command */
lpfc_worker_wake_up(phba);
+return workposted;
+
out_no_mqe_complete:
+spun_lock_irqsave(&phba->hbalock, iflags);
if (bf_get(lpfc_trailer_consumed, mcqe))
lpfc_sli4_mq_release(phba->sli4_hba.mbx_wq);
return workposted;
+spin_unlock_irqrestore(&phba->hbalock, iflags);
+return false;
}

/**
@@ -12824,18 +13046,12 @@
struct lpfc_cq_event *cq_event;
unsigned long iflags;

-/* Allocate a new internal CQ_EVENT entry */
-cq_event = lpfc_sli4_cq_event_alloc(phba);
-if (!cq_event) {
- lpfc_printf_log(phba, KERN_ERR, LOG_SLI,
- "0602 Failed to allocate CQ_EVENT entry\n");
- return false;
-}
-
-/* Move the CQE into the proper xri abort event list */
-memcpy(&cq_event->cqe, wcqe, sizeof(struct sli4_wcqe_xri_aborted));
-switch (cq->subtype) {
 case LPFC_FCP:
+cq_event = lpfc_cq_event_setup(
+ phba, wcqe, sizeof(struct sli4_wcqe_xri_aborted));
+if (!cq_event)
+ return false;
+spin_lock_irqsave(&phba->hbalock, iflags);
+list_add_tail(&cq_event->list,
+ &phba->sli4_hba.sp_fcp_xri_aborted_work_queue);
@@ -12844,7 +13060,12 @@
 spin_unlock_irqrestore(&phba->hbalock, iflags);
 workposted = true;
 break;
+case LPFC_NVME_LS: /* NVME LS uses ELS resources */
 case LPFC_ELS:
+cq_event = lpfc_cq_event_setup(
+ phba, wcqe, sizeof(struct sli4_wcqe_xri_aborted));
if (!cq_event) return false;
spin_lock_irqsave(&phba->hbalock, iflags);
list_add_tail(&cq_event->list, &phba->sli4_hba.sp_els_xri_aborted_work_queue);
workposted = true;
break;
case LPFC_NVME:
sp
lock_irqsave(&phba->hbalock, iflags);
list_add_tail(&cq_event->list, &phba->sli4_hba.sp_nvme_xri_aborted_work_queue);
/* Set the nvme xri abort event flag */
-phba->hba_flag |= NVME_XRI_ABORT_EVENT;
-spin_unlock_irqrestore(&phba->hbalock, iflags);
-workposted = true;
+/* Notify aborted XRI for NVME work queue */
+if (phba->nvmet_support)
+lpfc_sli4_nvmet_xri_aborted(phba, wcqe);
+else
+lpfc_sli4_nvme_xri_aborted(phba, wcqe);
+workposted = false;
break;
default:
lpfc_printf_log(phba, KERN_ERR, LOG_SLI,
"%08x %08x %08x %08x
",
-cq->subtype, wcqe->word0, wcqe->parameter,
-wcqe->word2, wcqe->word3);
 lpfc_sli4_cq_event_release(phba, cq_event);
workposted = false;
break;
}

lpfc_printf_log(phba, KERN_ERR, LOG_SLI,
"2537 Receive Frame Truncated!!\n");
case FC_STATUS_RQ_SUCCESS:
lpfc_sli4_rq_release(hrq, drq);
sp
lock_irqsave(&phba->hbalock, iflags);
+ lpfc_sli4_rq_release(hrq, drq);
dma_buf = lpfc_sli_hbqbuf_get(&phba->hbqs[0].hbq_buffer_list);
if (!dma_buf) {
hrq->RQ_no_buf_found++;
"(x%x), type (%d)\n", cq->queue_id, cq->type);
/* In any case, flash and re-arm the RCQ */

-lpfc_sli4_cq_release(cq, LPFC_QUEUE_REARM);
+phba->sli4_hba.sli4_cq_release(cq, LPFC_QUEUE_REARM);

/* wake up worker thread if there are works to be done */
if (workposted)
@@ -13254,6 +13474,8 @@
if (childwq->queue_id == hba_wqid) {
    lpfc_sli4_wq_release(childwq,
    bf_get(lpfc_wcqe_r_wqe_index, wcqe));
+if (childwq->q_flag & HBA_NVMET_WQFULL)
+    lpfc_nvmet_wqfull_process(phba, childwq);
    wqid_matched = true;
    break;
}
@@ -13316,8 +13538,8 @@
"6126 Receive Frame Truncated!!\n"
/* Drop thru */
case FC_STATUS_RQ_SUCCESS:
-    lpfc_sli4_rq_release(hrq, drq);
+    lpfc_sli4_rq_release(hrq, drq);
    spin_lock_irqsave(&phba->hbalock, iflags);
+    lpfc_sli4_rq_release(hrq, drq);
    dma_buf = lpfc_sli_rqbuf_get(phba, hrq);
    if (!dma_buf) {
        hrq->RQ_no_buf_found++;
@@ -13566,7 +13788,7 @@
        "queue fcpcqid=%d\n", cq->queue_id);

/* In any case, flash and re-arm the CQ */
-    lpfc_sli4_cq_release(cq, LPFC_QUEUE_REARM);
+    lpfc_sli4_hba.sli4_cq_release(cq, LPFC_QUEUE_REARM);

/* wake up worker thread if there are works to be done */
if (workposted)
@@ -13583,7 +13805,7 @@
;

/* Clear and re-arm the EQ */
-    lpfc_sli4_eq_release(eq, LPFC_QUEUE_REARM);
+    lpfc_sli4_hba.sli4_eq_release(eq, LPFC_QUEUE_REARM);
}

@@ -13731,7 +13953,7 @@
}
}
/* Always clear and re-arm the fast-path EQ */
-    lpfc_sli4_eq_release(eq, LPFC_QUEUE_REARM);
+    lpfc_sli4_hba.sli4_eq_release(eq, LPFC_QUEUE_REARM);
return IRQ_HANDLED;
}

@@ -13789,7 +14011,7 @@
}

if (lpfc_fcp_look_ahead) {
    if (atomic_dec_and_test(&hba_eq_hdl->hba_eq_in_use))
        lpfc_sli4_eq_clr_intr(fpeq);
    else {
        atomic_inc(&hba_eq_hdl->hba_eq_in_use);
        return IRQ_NONE;
    }
    atomic_dec_and_test(&hba_eq_hdl->hba_eq_in_use);
@@ -13824,7 +14046,7 @@
    fpeq->EQ_max_eqe = ecount;

    /* Always clear and re-arm the fast-path EQ */
    lpfc_sli4_eq_release(fpeq, LPFC_QUEUE_REARM);
    phba->sli4_hba.sli4_eq_release(fpeq, LPFC_QUEUE_REARM);

    if (unlikely(ecount == 0)) {
        fpeq->EQ_no_entry++;
        @@ -13919,7 +14141,7 @@
        while (!list_empty(&queue->page_list)) {
            list_remove_head(&queue->page_list, dmabuf, struct lpfc_dmabuf,
                list);
            dma_free_coherent(&queue->phba->pcidev->dev, SLI4_PAGE_SIZE,
                dma_free_coherent(&queue->phba->pcidev->dev, queue->page_size,
                    dmabuf->virt, dmabuf->phys);
            kfree(dmabuf);
        }
    }
    @@ -13938,6 +14160,7 @@
    /**
     * lpfc_sli4_queue_alloc - Allocate and initialize a queue structure
     * @phba: The HBA that this queue is being created on.
    */
    struct lpfc_queue *
    lpfc_sli4_queue_alloc(struct lpfc_hba *phba, uint32_t entry_size,
        @page_size: The size of a queue page
        @entry_size: The size of each queue entry for this queue.
        @entry count: The number of entries that this queue will handle.
    *
    @@ -13946,8 +14169,8 @@
    * queue on the HBA.
    **/
    struct lpfc_queue *
    lpfc_sli4_queue_alloc(struct lpfc_hba *phba, uint32_t entry_size,
        @entry size, uint32_t entry_count) {
        struct lpfc_queue *queue;
struct lpfc_dmabuf *dmabuf;
@@ -13956,7 +14179,7 @@
    uint32_t hw_page_size = phba->sli4_hba.pc_sli4_params.if_page_sz;

    if (!phba->sli4_hba.pc_sli4_params.supported)
-      hw_page_size = SLI4_PAGE_SIZE;
+      hw_page_size = page_size;

    queue = kzalloc(sizeof(struct lpfc_queue) +
                      (sizeof(union sli4_qe) * entry_count), GFP_KERNEL);
@@ -13966,13 +14189,24 @@

    hw_page_size))/hw_page_size;

    /* If needed, Adjust page count to match the max the adapter supports */
    -if (queue->page_count > phba->sli4_hba.pc_sli4_params.wqpcnt)
    +if (phba->sli4_hba.pc_sli4_params.wqpcnt &&
        +  (queue->page_count > phba->sli4_hba.pc_sli4_params.wqpcnt))
        queue->page_count = phba->sli4_hba.pc_sli4_params.wqpcnt;

    INIT_LIST_HEAD(&queue->list);
    INIT_LIST_HEAD(&queue->wq_list);
    +INIT_LIST_HEAD(&queue->wqfull_list);
    INIT_LIST_HEAD(&queue->page_list);
    INIT_LIST_HEAD(&queue->child_list);
    +
    +/* Set queue parameters now. If the system cannot provide memory
    + * resources, the free routine needs to know what was allocated.
    + */
    +queue->entry_size = entry_size;
    +queue->entry_count = entry_count;
    +queue->page_size = hw_page_size;
    +queue->phba = phba;
    +
    for (x = 0, total_qe_count = 0; x < queue->page_count; x++) {
      dmabuf = kzalloc(sizeof(struct lpfc_dmabuf), GFP_KERNEL);
      if (!dmabuf)
@@ -13994,9 +14228,6 @@
        queue->qe[total_qe_count].address = dma_pointer;
      } } 
-queue->entry_size = entry_size;
-queue->entry_count = entry_count;
-queue->phba = phba;
+INIT_WORK(&queue->irqwork, lpfc_sli4_hba_process_cq);
+INIT_WORK(&queue->spwork, lpfc_sli4_sp_process_cq);

@@ -14190,11 +14421,21 @@
    LPFC_MBOX_OPCODE_EQ_CREATE,
length, LPFC_SLI4_MBX_EMBED);

eq_create = &mbox->mqueue.un.eq_create;
+shdr = (union lpfc_sli4_cfg_shdr *) &eq_create->header.cfg_shdr;
bf_set(lpfc_mbx_eq_create_num_pages, &eq_create->u.request,
    eq->page_count);
bf_set(lpfc_eq_context_size, &eq_create->u.request.context,
    LPFC_EQE_SIZE);
bf_set(lpfc_eq_context_valid, &eq_create->u.request.context, 1);
+
+/* Use version 2 of CREATE_EQ if eqav is set */
+if (phba->sli4_hba.pc_sli4_params.eqav) {
    +bf_set(lpfc_mbox_hdr_version, &shdr->request,
        +LPFC_Q_CREATE_VERSION_2);
    +bf_set(lpfc_eq_context_autovalid, &eq_create->u.request.context,
        +phba->sli4_hba.pc_sli4_params.eqav);
    +}
+ /* don't setup delay multiplier using EQ_CREATE */
dmult = 0;
bf_set(lpfc_eq_context_delay_multi, &eq_create->u.request.context,
    @ @ -14299,7 +14480,6 @@
mbox->mbox_cmpl = lpfc_sli_def_mbox_cmpl;
mbox->context1 = NULL;
rc = lpfc_sli_issue_mbox(phba, mbox, MBX_POLL);
-shdr = (union lpfc_sli4_cfg_shdr *) &eq_create->header.cfg_shdr;
shdr_status = bf_get(lpfc_mbox_hdr_status, &shdr->response);
shdr_add_status = bf_get(lpfc_mbox_hdr_add_status, &shdr->response);
if (shdr_status || shdr_add_status || rc) {
    @ @ -14299,7 +14539,7 @@
    if (!cq || !eq)
        return -ENODEV;
    if (!phba->sli4_hba.pc_sli4_params.supported)
        -hw_page_size = SLI4_PAGE_SIZE;
        +hw_page_size = cq->page_size;

    mbox = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
    if (!mbox)
        @ @ -14318,15 +14558,29 @@
        bf_set(lpfc_mbox_hdr_version, &shdr->request,
            phba->sli4_hba.pc_sli4_params.cqv);
        if (phba->sli4_hba.pc_sli4_params.cqv == LPFC_Q_CREATE_VERSION_2) {
            /* FW only supports 1. Should be PAGE_SIZE/SLI4_PAGE_SIZE */
            -bf_set(lpfc_mbx_cq_create_page_size, &cq_create->u.request, 1);
            +bf_set(lpfc_mbx_cq_create_page_size, &cq_create->u.request,
                (cq->page_size / SLI4_PAGE_SIZE));
            bf_set(lpfc_cq_eq_id_2, &cq_create->u.request.context,
                eq->queue_id);
            bf_set(lpfc_cq_context_autovalid, &cq_create->u.request.context,
phba->sli4_hba.pc_sli4_params.cqav); } else {
    bf_set(lpfc_cq_eq_id, &cq_create->u.request.context,
          eq->queue_id);
}

switch (cq->entry_count) {
+case 2048:
+case 4096:
+if (phba->sli4_hba.pc_sli4_params.cqv ==
   +  LPFC_Q_CREATE_VERSION_2) {
    +cq_create->u.request.context.lpfc_cq Context_count =
    +cq->entry_count;
    +bf_set(lpfc_cq_context_count,
    +&cq_create->u.request.context,
    +LPFC_CQ_CNT_WORD7);
    +break;
    +}
+ /* Fall Thru */
default:
    lpfc_printf_log(phba, KERN_ERR, LOG_SLI,
   "0361 Unsupported CQ count: 
@@ -14352,7 +14606,7 @@
    break;
}
list_for_each_entry(dmabuf, &cq->page_list, list) {
    -memset(dmabuf->virt, 0, hw_page_size);
    +memset(dmabuf->virt, 0, cq->page_size);
    cq_create->u.request.page[dmabuf->buffer_tag].addr_lo =
    putPaddrLow(dmabuf->phys);
    cq_create->u.request.page[dmabuf->buffer_tag].addr_hi =
@@ -14433,8 +14717,6 @@
   numcq = phba->cfg_nvmet_mrq;
   if (!cqp || !eqp || !numcq)
      return -ENODEV;
-    -if (!phba->sli4_hba.pc_sli4_params.supported) 
-    -hw_page_size = SLI4_PAGE_SIZE;

    mbox = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
    if (!mbox)
@@ -14465,6 +14749,8 @@
       status = -ENOMEM;
       goto out;
    }
    +if (!phba->sli4_hba.pc_sli4_params.supported)
    +hw_page_size = cq->page_size;

    switch (idx) {
    case 0:
&cq_set->u.request, 0);
bf_set(lpfc_mbx_cq_create_set_num_cq,
       &cq_set->u.request, numcq);
+bf_set(lpfc_mbx_cq_create_set_autovalid,
       &cq_set->u.request,
       phba->sli4_hba.pc_sli4_params.cqav);
switch (cq->entry_count) {
+case 2048:
+case 4096:
+if (phba->sli4_hba.pc_sli4_params.cqv ==
    LPFC_Q_CREATE_VERSION_2) {
+if (phba->sli4_hba.pc_sli4_params.cqv ==
    LPFC_Q_CREATE_VERSION_2) {
    +bf_set(lpfc_mbx_cq_create_set_cqe_cnt,
             &cq_set->u.request,
             cq->entry_count);
    +bf_set(lpfc_mbx_cq_create_set_cqe_cnt,
             &cq_set->u.request,
             LPFC_CQ_CNT_WORD7);
    +break;
+}
+/* Fall Thru */
default:
lpfc_printf_log(phba, KERN_ERR, LOG_SLI,
               "3118 Bad CQ count. (%d)\n",
               @ @ -14578.6 +14848.7 @ @
cq->host_index = 0;
cq->hba_index = 0;
cq->entry_repost = LPFC_CQ_REPOST;
cq->chann = idx;
rc = 0;
list_for_each_entry(dmabuf, &cq->page_list, list) {
void __iomem *bar_memmap_p;
uint32_t db_offset;
uint16_t pci_barset;
+uint8_t dpp_barset;
+uint32_t dpp_offset;
+unsigned long pg_addr;
+uint8_t wq_create_version;
/* sanity check on queue memory */
if ((!wq || !cq))
    return -ENODEV;
if (!phba->sli4_hba.pc_sli4_params.supported)
    -hw_page_size = SLI4_PAGE_SIZE;
    +hw_page_size = wq->page_size;

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mbox = mempool_alloc(phba->mbox_mem_pool, GFP_KERNEL);
if (!mbox)
@@ -14898,38 +15173,19 @@
    phba->sli4_hba.pc_sli4_params.wqv);

-switch (phba->sli4_hba.pc_sli4_params.wqv) {
-case LPFC_Q_CREATE_VERSION_0:
-switch (wq->entry_size) {
    -default:
    -case 64:
    -/* Nothing to do, version 0 ONLY supports 64 byte */
    -page = wq_create-&gt;u.request.page;
    -break;
    -case 128:
    -if (!(phba-&gt;sli4_hba.pc_sli4_params.wqsize &
       - LPFC_WQ_SZ128_SUPPORT)) {
        -status = -ERANGE;
        -goto out;
    -}
    -/* If we get here the HBA MUST also support V1 and
    -* we MUST use it
    -*
    -bf_set(lpfc_mbox_hdr_version, &shdr-&gt;request,
       - LPFC_Q_CREATE_VERSION_1);
    +if ((phba-&gt;sli4_hba.pc_sli4_params.wqsize & LPFC_WQ_SZ128_SUPPORT) ||
    + (wq-&gt;page_size &gt; SLI4_PAGE_SIZE))
    +wq_create_version = LPFC_Q_CREATE_VERSION_1;
    +else
    +wq_create_version = LPFC_Q_CREATE_VERSION_0;

    -bf_set(lpfc_mbx_wq_create_wqe_count,
       - &wq_create-&gt;u.request_1, wq-&gt;entry_count);
    -bf_set(lpfc_mbx_wq_create_wqe_size,
       - &wq_create-&gt;u.request_1,
       - LPFC_WQ_WQE_SIZE_128);
    -bf_set(lpfc_mbx_wq_create_page_size,
       - &wq_create-&gt;u.request_1,
       - LPFC_WQ_PAGE_SIZE_4096);
    -page = wq_create-&gt;u.request_1.page;
    -break;
    -}
    -break;
    +
    +if (phba-&gt;sli4_hba.pc_sli4_params.wqsize & LPFC_WQ_SZ128_SUPPORT)
    +wq_create_version = LPFC_Q_CREATE_VERSION_1;
    +else
    +wq_create_version = LPFC_Q_CREATE_VERSION_0;
+switch (wq_create_version) {
    case LPFC_Q_CREATE_VERSION_1:
        bf_set(lpfc_mbx_wq_create_wqe_count, &wq_create->u.request_1,
               wq->entry_count);
        default:
            status = -ERANGE;
            goto out;
        break;
        case 128:
            break;
        case 128:
            -if (!(phba->sli4_hba.pc_sli4_params.wqsize &
                  LPFC_WQ_SZ128_SUPPORT)) {
                -status = -ERANGE;
                -goto out;
                -}
            bf_set(lpfc_mbx_wq_create_wqe_size,
                   &wq_create->u.request_1,
                   LPFC_WQ_WQE_SIZE_128);
            break;
        +/* Request DPP by default */
        +bf_set(lpfc_mbx_wq_create_dpp_req, &wq_create->u.request_1, 1);
        bf_set(lpfc_mbx_wq_create_page_size,
               &wq_create->u.request_1,
               LPFC_WQ_PAGE_SIZE_4096);
        + (wq->page_size / SLI4_PAGE_SIZE));
        page = wq_create->u.request_1.page;
        break;
        default:
            -status = -ERANGE;
            -goto out;
            +page = wq_create->u.request.page;
            +break;
        }

    list_for_each_entry(dmabuf, &wq->page_list, list) {
        @@ -14985,52 +15238,120 @@
        status = -ENXIO;
        goto out;
    }
    -wq->queue_id = bf_get(lpfc_mbx_wq_create_q_id, &wq_create->u.response);
    +
    +if (wq_create_version == LPFC_Q_CREATE_VERSION_0)
    +wq->queue_id = bf_get(lpfc_mbx_wq_create_q_id,
    +&wq_create->u.response);
    +else
    +wq->queue_id = bf_get(lpfc_mbx_wq_create_v1_q_id,
    +&wq_create->u.response_1);
if (wq->queue_id == 0xFFFF) {
    status = -ENXIO;
    goto out;
}
-if (phba->sli4_hba-fw_func_mode & LPFC_DUA_MODE) {
-    wq->db_format = bf_get(lpfc_mbx_wq_create_db_format,
-        &wq_create->u.response);
-    if ((wq->db_format != LPFC_DB_LIST_FORMAT) &
-        (wq->db_format != LPFC_DB_RING_FORMAT)) {
-        lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
-            "3265 WQ[%d] doorbell format not 
-            "supported: x%x\n", wq->queue_id,
-            wq->db_format);
-        status = -EINVAL;
-        goto out;
-    }
-    pci_barset = bf_get(lpfc_mbx_wq_create_bar_set,
-        &wq_create->u.response);
-    bar_memmap_p = lpfc_dual_chute_pci_bar_map(phba, pci_barset);
-    if (!bar_memmap_p) {
-        lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
-            "3263 WQ[%d] failed to memmap pci 
-            "barset:x%x\n", wq->queue_id,
-            pci_barset);
-        status = -ENOMEM;
-        goto out;
-    }
-    db_offset = wq_create->u.response.doorbell_offset;
-    if ((db_offset != LPFC_ULP0_WQ_DOORBELL) &&
-        (db_offset != LPFC_ULP1_WQ_DOORBELL)) {
-        lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
-            "3252 WQ[%d] doorbell offset not 
-            "supported: x%x\n", wq->queue_id,
-            db_offset);
-        status = -EINVAL;
-        goto out;
-    }
-    wq->db_regaddr = bar_memmap_p + db_offset;
-    lpfc_printf_log(phba, KERN_INFO, LOG_INIT,
-        "3264 WQ[%d]: barset:x%x, offset:x%x, 
-        "format:x%x\n", wq->queue_id, pci_barset,
-        db_offset, wq->db_format);
+    +wq->db_format = LPFC_DB_LIST_FORMAT;
+    if (wq_create_version == LPFC_Q_CREATE_VERSION_0) {
+        if (phba->sli4_hba-fw_func_mode & LPFC_DUA_MODE) {
+            +wq->db_format = bf_get(lpfc_mbx_wq_create_db_format,
+            +    &wq_create->u.response);
if ((wq->db_format != LPFC_DB_LIST_FORMAT) &&
    (wq->db_format != LPFC_DB_RING_FORMAT)) {
        lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
"3265 WQ[%d] doorbell format "
"not supported: x%x
",
+wq->queue_id, wq->db_format);
+status = -EINVAL;
+goto out;
+}
+pci_barset = bf_get(lpfc_mbx_wq_create_bar_set,
+ &wq_create->u.response);
+bar_memmap_p = lpfc_dual_chute_pci_bar_map(phba,
+ pci_barset);
+if (!bar_memmap_p) {
+lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+"3263 WQ[%d] failed to memmap "
+"pci barset:x%x
",
+wq->queue_id, pci_barset);
+status = -ENOMEM;
+goto out;
+}
+db_offset = wq_create->u.response.doorbell_offset;
+if ((db_offset != LPFC_ULP0_WQ_DOORBELL) &&
    (db_offset != LPFC_ULP1_WQ_DOORBELL)) {
+lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
+"3252 WQ[%d] doorbell offset "
+"not supported: x%x
",
+wq->queue_id, db_offset);
+status = -EINVAL;
+goto out;
+}
+wq->db_regaddr = bar_memmap_p + db_offset;
+lpfc_printf_log(phba, KERN_INFO, LOG_INIT,
+"3264 WQ[%d]: barset:x%x, offset:x%x, "
+"format:x%x
",
+wq->queue_id, wq->db_format);
+} else
+wq->db_regaddr = phba->sli4_hba.WQDBregaddr;
] else {
- wq->db_format = LPFC_DB_LIST_FORMAT;
- wq->db_regaddr = phba->sli4_hba.WQDBregaddr;
+ /* Check if DPP was honored by the firmware */
+wq->dpp_enable = bf_get(lpfc_mbx_wq_create_dpp_rsp,
+ &wq_create->u.response_1);
+if (wq->dpp_enable) {
+pci_barset = bf_get(lpfc_mbx_wq_create_v1_bar_set,
+ &wq_create->u.response_1);
+bar_memmap_p = lpfc_dual_chute_pci_bar_map(phba,
+ pci_barset);
+if (!bar_memmap_p) {
  +lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
  +"3267 WQ[%d] failed to memmap 
  +"pci barset:x%x\n",
  +wq->queue_id, pci_barset);
  +status = -ENOMEM;
  +goto out;
  +}
  +db_offset = wq_create->u.response_1.doorbell_offset;
  +wq->db_regaddr = bar_memmap_p + db_offset;
  +wq->dpp_id = bf_get(lpfc_mbx_wq_create_dpp_id,
  + &wq_create->u.response_1);
  +dpp_barset = bf_get(lpfc_mbx_wq_create_dpp_bar,
  + &wq_create->u.response_1);
  +bar_memmap_p = lpfc_dual_chute_pci_bar_map(phba,
  + dpp_barset);
  +if (!bar_memmap_p) {
  +lpfc_printf_log(phba, KERN_ERR, LOG_INIT,
  +"3268 WQ[%d] failed to memmap 
  +"pci barset:x%x\n",
  +wq->queue_id, dpp_barset);
  +status = -ENOMEM;
  +goto out;
  +}
  +dpp_offset = wq_create->u.response_1.dpp_offset;
  +wq->dpp_regaddr = bar_memmap_p + dpp_offset;
  +lpfc_printf_log(phba, KERN_INFO, LOG_INIT,
  +"3271 WQ[%d]: barset:x%x, offset:x%x, 
  +"dpp_id:x%x dpp_barset:x%x 
  +"dpp_offset:x%x\n",
  +wq->queue_id, pci_barset, db_offset,
  +wq->dpp_id, dpp_barset, dpp_offset);
  +
  +/* Enable combined writes for DPP aperture */
  +pg_addr = (unsigned long)(wq->dpp_regaddr) & PAGE_MASK;
  +#ifdef CONFIG_X86
  +rc = set_memory_wc(pg_addr, 1);
  +#ifdef CONFIG_X86
  +
  +else
  +phba->cfg_enable_dpp = 0;
  +#endif
  +phba->cfg_enable_dpp = 0;
  +#endif

  +/* Enable combined writes for DPP aperture */
  +pg_addr = (unsigned long)(wq->dpp_regaddr) & PAGE_MASK;
  +#ifdef CONFIG_X86
  +rc = set_memory_wc(pg_addr, 1);
  +#ifdef CONFIG_X86
  +
  +else
  +phba->cfg_enable_dpp = 0;
  +#endif
  +phba->cfg_enable_dpp = 0;
  +#endif

  +/* Enable combined writes for DPP aperture */
  +pg_addr = (unsigned long)(wq->dpp_regaddr) & PAGE_MASK;
  +#ifdef CONFIG_X86
  +rc = set_memory_wc(pg_addr, 1);
  +#ifdef CONFIG_X86
  +
  +else
  +phba->cfg_enable_dpp = 0;
  +#endif
  +phba->cfg_enable_dpp = 0;
  +#endif

  +/* Enable combined writes for DPP aperture */
  +pg_addr = (unsigned long)(wq->dpp_regaddr) & PAGE_MASK;
  +#ifdef CONFIG_X86
  +rc = set_memory_wc(pg_addr, 1);
  +#ifdef CONFIG_X86
  +
  +else
  +phba->cfg_enable_dpp = 0;
  +#endif
  +phba->cfg_enable_dpp = 0;
  +#endif

  +/* Enable combined writes for DPP aperture */
  +pg_addr = (unsigned long)(wq->dpp_regaddr) & PAGE_MASK;
  +#ifdef CONFIG_X86
  +rc = set_memory_wc(pg_addr, 1);
  +#ifdef CONFIG_X86
  +
  +else
  +phba->cfg_enable_dpp = 0;
  +#endif
  +phba->cfg_enable_dpp = 0;
  +#endif
+} else
+wq->db_regaddr = phba->sli4_hba.WQDBregaddr;

} else
	(wq->prin = kzalloc(sizeof(struct lpfc_sli_ring), GFP_KERNEL);
if (wq->prin == NULL) {
@@ -16661,7 +16982,6 @@
if (cmd_iocbq) {
   ndlp = (struct lpfc_nodelist *)cmd_iocbq->context1;
   lpfc_nlp_put(ndlp);
-   lpfc_nlp_not_used(ndlp);
   lpfc_sli_release_iocbq(phba, cmd_iocbq);
}

@@ -17062,6 +17382,10 @@
   list_add_tail(&iocbq->list, &first_iocbq->list);
   }
    }
+/* Free the sequence's header buffer */
+if (!first_iocbq)
+   lpfc_in_buf_free(vport->phba, &seq_dmabuf->dbuf);
+
   return first_iocbq;
}

@@ -17518,6 +17842,13 @@
static void
__lpfc_sli4_free_rpi(struct lpfc_hba *phba, int rpi)
{
+/*
 + * if the rpi value indicates a prior unreg has already
 + * been done, skip the unreg.
 + */
+if (rpi == LPFC_RPI_ALLOC_ERROR)
+   return;
+
   if (test_and_clear_bit(rpi, phba->sli4_hba.rpi_bmask)) {
      phba->sli4_hba.rpi_count--;
      phba->sli4_hba.max_cfg_param.rpi_used--;
@@ -18082,15 +18413,8 @@
   goto initial_priority;
   lpfc_printf_log(phba, KERN_WARNING, LOG_FIP,
   "3063 Only FCF available idx %d, flag %x\n",
   @ @ -18082,15 +18413,8 @@
   return LPFC_FCOE_FCF_NEXT_NONE;
   -else {
      -lpfc_printf_log(phba, KERN_WARNING, LOG_FIP,
      -"2844 No roundrobin failover FCF available\n");
      -if (next_fcf_index >= LPFC_SLI4_FCF_TBL_INDX_MAX)
      -return LPFC_FCOE_FCF_NEXT_NONE;
      -else {
         -"3063 Only FCF available idex %d, flag %x\n",
         -next_fcf_index,
phba->fcf.fcf_pri[next_fcf_index].fcf_rec.flag);
return next_fcf_index;
}
+
+return LPFC_FCOE_FCF_NEXT_NONE;
}

if (next_fcf_index < LPFC_SLI4_FCF_TBL_INDX_MAX &&
    rc = -ENXIO;
    return next_fcf_index;
} else
    return shdr_add_status;

*offset += wr_object->u.response.actual_write_length;

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_sli4.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_sli4.h
@@ -1,7 +1,7 @@

/*******************************************************************
 * This file is part of the Emulex Linux Device Driver for          *
 * Fibre Channel Host Bus Adapters.                               *
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 * EMULEX and SLI are trademarks of Emulex.                       *
@@ -145,6 +145,7 @@
struct lpfc_queue {
    struct list_head list;
    struct list_head wq_list;
+    struct list_head wqfull_list;
    enum lpfc_sli4_queue_type type;
    enum lpfc_sli4_queue_subtype subtype;
    struct lpfc_hba *phba;
@@ -161,7 +162,6 @@

#define LPFC_RELEASE_NOTIFICATION_INTERVAL 32 /* For WQs */
uint32_t queue_id;/* Queue ID assigned by the hardware */
uint32_t assoc_qid; /* Queue ID associated with, for CQ/WQ/MQ */
    -uint32_t page_count;/* Number of pages allocated for this queue */
uint32_t host_index;/* The host’s index for putting or getting */
uint32_t hba_index;/* The last known hba index for get or put */

    return shdr_add_status;
} else
    *offset += wr_object->u.response.actual_write_length;

--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_sli4.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_sli4.h
@@ -1,7 +1,7 @@

/*******************************************************************
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 * EMULEX and SLI are trademarks of Emulex.                       *
@@ -145,6 +145,7 @@
struct lpfc_queue {
    struct list_head list;
    struct list_head wq_list;
+    struct list_head wqfull_list;
    enum lpfc_sli4_queue_type type;
    enum lpfc_sli4_queue_subtype subtype;
    struct lpfc_hba *phba;
@@ -161,7 +162,6 @@

#define LPFC_RELEASE_NOTIFICATION_INTERVAL 32 /* For WQs */
uint32_t queue_id;/* Queue ID assigned by the hardware */
uint32_t assoc_qid; /* Queue ID associated with, for CQ/WQ/MQ */
    -uint32_t page_count;/* Number of pages allocated for this queue */
uint32_t host_index;/* The host’s index for putting or getting */
uint32_t hba_index;/* The last known hba index for get or put */

    return shdr_add_status;
} else
    *offset += wr_object->u.response.actual_write_length;
+uint16_t page_count;/* Number of pages allocated for this queue */
+uint16_t page_size;/* size of page allocated for this queue */
+#define LPFC_EXPANDED_PAGE_SIZE16384
+#define LPFC_DEFAULT_PAGE_SIZE4096
+uint16_t chann;/* IO channel this queue is associated with */
+uint8_t db_format;
+#define LPFC_DB_RING_FORMAT0x01
+#define LPFC_DB_LIST_FORMAT0x02
+uint8_t q_flag;
+#define HBA_NVMET_WQFULL0x01 /* We hit WQ Full condition for NVMET */
void __iomem *db_regaddr;
+uint16_t dpp_enable;
+uint16_t dpp_id;
+void __iomem *dpp_regaddr;
+
/* For q stats */
uint32_t q_cnt_1;
uint32_t q_cnt_2;
@@ -205,6 +216,7 @@
struct work_struct spwork;

uint64_t isr_timestamp;
+uint8_t qe_valid;
struct lpfc_queue *assoc_qp;
union sli4_qe qe[1];/* array to index entries (must be last) */
};
@@ -267,6 +279,7 @@
#define FCF_REDISC_EVT0x100 /* FCF rediscovery event to worker thread */
#define FCF_REDISC_FOV0x200 /* Post FCF rediscovery fast failover */
#define FCF_REDISC_PROG (FCF_REDISC_PEND | FCF_REDISC_EVT)
+uint16_t fcf_redisc_attempted;
uint32_t addr_mode;
uint32_t eligible_fcf_cnt;
struct lpfc_fcf_rec current_rec;
@@ -366,9 +379,9 @@
#define LPFC_EQE_DEF_COUNT1024
#define LPFC_CQE_DEF_COUNT 1024
+#define LPFC_CQE_EXP_COUNT 4096
#define LPFC_WQE_DEF_COUNT 256
-#define LPFC_WQE128_DEF_COUNT 128
-#define LPFC_WQE128_MAX_COUNT 256
+#define LPFC_WQE_EXP_COUNT 1024
#define LPFC_MQE_DEF_COUNT 16
#define LPFC_RQE_DEF_COUNT512

@@ -475,12 +488,19 @@
uint8_t mqv;


uint8_t wqv;
uint8_t rqv;
+uint8_t eqv;
+uint8_t cqv;
uint8_t wqsize;
#define LPFC_WQ_SZ64_SUPPORT 1
#define LPFC_WQ_SZ128_SUPPORT 2

 struct lpfc iov {
    uint32_t pf_number;
    uint32_t vf_number;
    @ -512,11 +532,17 @
/* SLI4 HBA data structure entries */
struct lpfc_sli4_hba {
    void __iomem *conf_regs_memmap_p; /* Kernel memory mapped address for
        - PCI BAR0, config space registers */
    + * config space registers
    + */
    void __iomem *ctrl_regs_memmap_p; /* Kernel memory mapped address for
        - PCI BAR1, control registers */
    + * control registers
    + */
    void __iomem *drbl_regs_memmap_p; /* Kernel memory mapped address for
        - PCI BAR2, doorbell registers */
    + * doorbell registers
    + */
    +void __iomem *dpp_regs_memmap_p; /* Kernel memory mapped address for
        + * dpp registers
        + */
    union {
        struct {
            /* IF Type 0, BAR 0 PCI cfg space reg mem map */
            @ -557,7 +583,8 @
            /* IF type 0, BAR 0 and if type 2, BAR 0 doorbell register memory map */
            void __iomem *RQDBregaddr;/* RQ_DOORBELL register */
            void __iomem *WQDBregaddr;/* WQ_DOORBELL register */
            -void __iomem *EQCQDBregaddr;/* EQCQ_DOORBELL register */
            +void __iomem *CQDBregaddr;/* CQ_DOORBELL register */
            +void __iomem *EQDBregaddr;/* EQ_DOORBELL register */
            void __iomem *MQDBregaddr;/* MQ_DOORBELL register */
            void __iomem *BMBXregaddr;/* BootStrap MBX register */
    }/* IF Type 0, BAR 0 PCI cfg space reg mem map */
    @ -557,7 +583,8 @
    /* IF type 0, BAR 0 and if type 2, BAR 0 doorbell register memory map */
    void __iomem *RQDBregaddr;/* RQ_DOORBELL register */
    void __iomem *WQDBregaddr;/* WQ_DOORBELL register */
    -void __iomem *EQCQDBregaddr;/* EQCQ_DOORBELL register */
    +void __iomem *CQDBregaddr;/* CQ_DOORBELL register */
    +void __iomem *EQDBregaddr;/* EQ_DOORBELL register */
    void __iomem *MQDBregaddr;/* MQ_DOORBELL register */
    void __iomem *BMBXregaddr;/* BootStrap MBX register */
}
struct lpfc_bbscn_params bbscn_params;
struct lpfc_hba_eq_hdl *hba_eq_hdl; /* HBA per-WQ handle */
+void (*sli4_eq_clr_intr)(struct lpfc_queue *q);
+uint32_t (*sli4_eq_release)(struct lpfc_queue *q, bool arm);
+uint32_t (*sli4_cq_release)(struct lpfc_queue *q, bool arm);
+
/* Pointers to the constructed SLI4 queues */
struct lpfc_queue **hba_eq; /* Event queues for HBA */
struct lpfc_queue **fcp_cq; /* Fast-path FCP compl queue */
int lpfc_sli4_fcf_scan_read_fcf_rec(struct lpfc_hba *, uint16_t);
int lpfc_sli4_fcf_rr_read_fcf_rec(struct lpfc_hba *, uint16_t);
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_version.h
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_version.h
@@ -1,7 +1,7 @@
/** *
 * This file is part of the Emulex Linux Device Driver for Fibre Channel Host Bus Adapters. *
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 * included with this package. *
 */
--- linux-4.15.0.orig/drivers/scsi/lpfc/lpfc_vport.c
+++ linux-4.15.0/drivers/scsi/lpfc/lpfc_vport.c
@@ -653,27 +653,16 @@
 vport->port_state < LPFC_VPORT_READY)
 return -EAGAIN;
 }
+/
+/*
- * This is a bit of a mess. We want to ensure the shost doesn't get torn down until we're done with the embedded lpfc_vport structure.
- * Beyond holding a reference for this function, we also need a reference for outstanding I/O requests we schedule during delete processing. But once we scsi_remove_host() we can no longer obtain a reference through scsi_host_get().
- * So we take two references here. We release one reference at the
- * bottom of the function -- after delinking the vport. And we
- * release the other at the completion of the unreg_vpi that get's
- * initiated after we've disposed of all other resources associated
- * with the port.
+ * Take early refcount for outstanding I/O requests we schedule during
+ * delete processing for unreg_vpi. Always keep this before
+ * scsi_remove_host() as we can no longer obtain a reference through
+ * scsi_host_get() after scsi_host_remove as shost is set to SHOST_DEL.
+ */
if (!scsi_host_get(shost))
    return VPORT_INVAL;
    -if (!scsi_host_get(shost)) {
-    -scsi_host_put(shost);
-    -return VPORT_INVAL;
-    
+    +lpfc_free_sysfs_attr(vport);
    }
lpcp_debugfs_terminate(vport);
@@ -820,8 +809,9 @@
if (!(vport->vpi_state & LPFC_VPI_REGISTERED) ||
    lpfc_mbx_unreg_vpi(vport))
    scsi_host_put(shost);
-} else
+} else {
    scsi_host_put(shost);
    +
lpcp_free_vpi(phba, vport->vpi);
    vport->work_port_events = 0;
--- linux-4.15.0.orig/drivers/scsi/mac_esp.c
+++ linux-4.15.0/drivers/scsi/mac_esp.c
@@ -427,6 +427,8 @@
    scsi_esp_cmd(esp, ESP_CMD_TI);
    }
    }
+    +esp->send_cmd_residual = esp_count;
    }

static int mac_esp_irq_pending(struct esp *esp)
--- linux-4.15.0.orig/drivers/scsi/mac_scsi.c
+++ linux-4.15.0/drivers/scsi/mac_scsi.c
@@ -3,6 +3,8 @@
    scsi_esp_cmd(esp, ESP_CMD_TI);
    }
    }
+    +* Copyright 1998, Michael Schmitz <mschmitz@lbl.gov>
+    *
+    +* Copyright 2019 Finn Thain
+#include <linux/delay.h>
#include <linux/types.h>
#include <linux/module.h>
#include <linux/ioport.h>

module_param(setup_cmd_per_lun, int, 0);
static int setup_sg_tablesize = -1;
module_param(setup_sg_tablesize, int, 0);
static int setup_use_pdma = -1;
module_param(setup_use_pdma, int, 0);
static int setup_hostid = -1;
module_param(setup_hostid, int, 0);

__setup("mac5380=", mac_scsi_setup);
#endif /* !MODULE */

/* Pseudo DMA asm originally by Ove Edlund */
+
+ * According to "Inside Macintosh: Devices", Mac OS requires disk drivers to
+ * specify the number of bytes between the delays expected from a SCSI target.
+ * This allows the operating system to "prevent bus errors when a target fails
+ * to deliver the next byte within the processor bus error timeout period."
+ * Linux SCSI drivers lack knowledge of the timing behaviour of SCSI targets
+ * so bus errors are unavoidable.
+ *
+ * If a MOVE.B instruction faults, we assume that zero bytes were transferred
+ * and simply retry. That assumption probably depends on target behaviour but
+ * seems to hold up okay. The NOP provides synchronization: without it the
+ * fault can sometimes occur after the program counter has moved past the
+ * offending instruction. Post-increment addressing can't be used.
+ */
+
+#define MOVE_BYTE(operands) |
+asm volatile ( |
+"1: moveb " operands " \n"
+"11: nop \n"
+" addq #1,%0 \n"
+" subq #1,%1 \n"
+"40: \n"

/* */
* Copyright 1995, Russell King
*/
+"\n"
+".section .fixup,"ax"\n+".even\n+"90:  movel #1, %2\n+"   jra 40b\n+".previous\n+"\n+".section __ex_table,"a"\n+".align  4\n+".long  1b,90b\n+".long  11b,90b\n+".previous\n+": "a" (addr), "+r" (n), "+r" (result) : "a" (io))

#define CP_IO_TO_MEM(s,d,n)  
      __asm__ __volatile__  
        ("    cmp.w  #4,%2
"     "    bls    8f
"     "    move.w %1,%%d0
"     "    neg.b  %%d0
"     "    and.w  #3,%%d0
"     "    sub.w  %%d0,%2
"     "    bra    2f
"  1: move.b (%0),(%1)+
"  2: dbf    %%d0,1b
"     "    move.w %2,%%d0
"     "    lsr.w  #5,%%d0
"     "    bra    4f
"  3: move.l (%0),(%1)+
" 31: move.l (%0),(%1)+
" 32: move.l (%0),(%1)+
" 33: move.l (%0),(%1)+
" 34: move.l (%0),(%1)+
" 35: move.l (%0),(%1)+
" 36: move.l (%0),(%1)+
" 37: move.l (%0),(%1)+
"  4: dbf    %d0,3b
"     "    movel #2,%0
"     "    lsr.w  #2,%%d0
"     "    and.w  #7,%%d0
"     "    bra    6f
"  5: move.l (%0),(%1)+
"  6: dbf    %d0,5b
"     "    and.w  #3,%%d0
"     "    bra    8f
"  7: move.b (%0),(%1)+
"  8: dbf    %d0,7b
"     "    moveq.l #0, %2
"
/*
 * If a MOVE.W (or MOVE.L) instruction faults, it cannot be retried because
 * the residual byte count would be uncertain. In that situation the MOVE_WORD
 * macro clears n in the fixup section to abort the transfer.
 */

#define MOVE_WORD(operands) \
	asm volatile ( \
		"1:     movew " operands "     
" \
		"11:    nop                    
" \
		"       subq #2,%1             
" \
		"40:                           
" \
		"                              
" \
		".section .fixup,"ax"        
" \
		".even                         
" \
		"90:    movel #0, %1           
" \
		"       movel #2, %2           
" \
		"       jra 40b                
" \
		".previous                     
" \
		"                              
" \
		".section __ex_table,"a"     
" \
		".align  4                     
" \
		".long   1b,90b                
")


```c
#define MOVE_16_WORDS(operands) 
asm volatile ( 
  "1:     movew " operands " \n\n" 
  "2:     movew " operands " \n\n" 
  "3:     movew " operands " \n\n" 
  "4:     movew " operands " \n\n" 
  "5:     movew " operands " \n\n" 
  "6:     movew " operands " \n\n" 
  "7:     movew " operands " \n\n" 
  "8:     movew " operands " \n\n" 
  "9:     movew " operands " \n\n" 
  "10:    movew " operands " \n\n" 
  "11:    movew " operands " \n\n" 
  "12:    movew " operands " \n\n" 
  "13:    movew " operands " \n\n" 
  "14:    movew " operands " \n\n" 
  "15:    movew " operands " \n\n" 
  "16:    movew " operands " \n\n" 
  "17:    nop \n\n" 
  "    subl #32,%1 \n\n" 
  "40:    \n\n" 
  "90:    movel #0, %1 \n\n" 
  "    movel #2, %2 \n\n" 
  "    jra 40b \n\n" 
  "   .section .fixup,"ax" \n\n" 
  "3, .previous \n\n" 
  "   .section __ex_table,"a" \n\n" 
  "   .align  4 \n\n" 
  "   .long   1b,90b \n\n" 
  "   .long   2b,90b \n\n" 
  "   .long   3b,90b \n\n" 
  "   .long   4b,90b \n\n" 
  "   .long   5b,90b \n\n" 
  "   .long   6b,90b \n\n" 
  "   .long   7b,90b \n\n" 
  "   .long   8b,90b \n\n" 
  "   .long   9b,90b \n\n" 
  "   .long  10b,90b \n\n" 
  "   .long  11b,90b \n\n" 
  "   .long  12b,90b \n\n" 
  "   .long  13b,90b \n\n" 
  
```

```c
```
```
#define MAC_PDMA_DELAY		32

static inline int mac_pdma_recv(void __iomem *io, unsigned char *start, int n)
{
    unsigned char *addr = start;
    int result = 0;

    if (n >= 1) {
        MOVE_BYTE("%3@,%0@");
        if (result)
            goto out;
    }

    if (n >= 1 && ((unsigned long)addr & 1)) {
        MOVE_BYTE("%3@,%0@");
        if (result)
            goto out;
    }

    while (n >= 32)
        MOVE_16_WORDS("%3@,%0@++");

    while (n >= 2)
        MOVE_WORD("%3@,%0@++");

    if (result)
        return start - addr; /* Negated to indicate uncertain length */

    if (n == 1)
        MOVE_BYTE("%3@,%0@");

out:
    return addr - start;
}

static inline int mac_pdma_send(unsigned char *start, void __iomem *io, int n)
{
    unsigned char *addr = start;
    int result = 0;

    if (n >= 1) {
        MOVE_BYTE("%0@,%3@");
        if (result)
            goto out;
    }

    if (n >= 1 && ((unsigned long)addr & 1)) {
        MOVE_BYTE("%0@,%3@");
    }

    while (n >= 32)
        MOVE_16_WORDS("%0@,%3@++");

    while (n >= 2)
        MOVE_WORD("%0@,%3@++");

    if (result)
        return start - addr; /* Negated to indicate uncertain length */

    if (n == 1)
        MOVE_BYTE("%0@,%3@");

out:
    return addr - start;
}
+if (result)
+goto out;
+
+while (n >= 32)
+MOVE_16_WORDS("%0@+,%3@");
+while (n >= 2)
+MOVE_WORD("%0@+,%3@");
+if (result)
+return start - addr; /* Negated to indicate uncertain length */
+if (n == 1)
+MOVE_BYTE("%0@,%3@");
+out:
+return addr - start;
+
static inline int macscsi_pread(struct NCR5380_hostdata *hostdata,
    unsigned char *dst, int len)
{
    u8 __iomem *s = hostdata->pdma_io + (INPUT_DATA_REG << 4);
    unsigned char *d = dst;
    int n = len;
    int transferred;
    +
    +hostdata->pdma_residual = len;

    while (!NCR5380_poll_politely(hostdata, BUS_AND_STATUS_REG,
        BASR_DRQ | BASR_PHASE_MATCH,
        BASR_DRQ | BASR_PHASE_MATCH, HZ / 64)) {
        -CP_IO_TO_MEM(s, d, n);
        +int bytes;
        +
        +bytes = mac_pdma_recv(s, d, min(hostdata->pdma_residual, 512));

        -transferred = d - dst - n;
        -hostdata->pdma_residual = len - transferred;
        +if (bytes > 0) {
            +d += bytes;
            +hostdata->pdma_residual -= bytes;
            +
        }

        /* No bus error. */
        -if (n == 0)
        +if (hostdata->pdma_residual == 0)
        return 0;

        /* Target changed phase early? */
        if (NCR5380_poll_politely2(hostdata, STATUS_REG, SR_REQ, SR_REQ,
            -BUS_AND_STATUS_REG, BASR_ACK, BASR_ACK, HZ / 64) < 0)
```c
+scmd_printk(KERN_ERR, hostdata->connected,
+    "\%s: !REQ and !ACK\n", __func__);  
+if (!(NCR5380_read(BUS_AND_STATUS_REG) & BASR_PHASE_MATCH))
+    return 0;  
+if (bytes == 0)
+    udelay(MAC_PDMA_DELAY);  
+    if (bytes >= 0)
+        continue;  
+    dsprintk(NDEBUG_PSEUDO_DMA, hostdata->host,
+        "\%s: bus error (%d/%d)\n", __func__, d - dst, len);
+    return -1;  
```

- `#define CP_MEM_TO_IO(s,d,n)`

```
-__asm__ __volatile__

-  (" cmp.w #4,%2\n"
-  " bls  8f\n"
-  " move.w %0,%d0n\n"
-  " neg.b %d0n\n"
-  " and.w #3,%d0n\n"
-  " sub.w %d0,%2\n"
-  " bra  2f\n"
-  " 1: move.b (%0)+,%1n\n"
-  " 2: dbf %d0,1b\n"
-  " move.w %2,%d0n\n"
-  " lsr.w #5,%d0n\n"
-  " bra  4f\n"
-  " 3: move.l (%0)+,%1n\n"
-  "31: move.l (%0)+,%1n\n"
-  "32: move.l (%0)+,%1n\n"
-  "33: move.l (%0)+,%1n\n"
-  "34: move.l (%0)+,%1n\n"
```

Open Source Used In 5GaaS Edge AC-4  28214
static inline int macscsi_pwrite(struct NCR5380_hostdata *hostdata, unsigned char *src, int len)
{
    unsigned char *s = src;
    u8 __iomem *d = hostdata->pdma_io + (OUTPUT_DATA_REG << 4);
    int n = len;
    int transferred;

    

+hostdata->pdma_residual = len;

while (!NCR5380_poll_politely(hostdata, BUS_AND_STATUS_REG, BASR_DRQ | BASR_PHASE_MATCH, BASR_DRQ | BASR_PHASE_MATCH, HZ / 64)) {
  -transferred = s - src - n;
  -hostdata->pdma_residual = len - transferred;
  +bytes = mac_pdma_send(s, d, min(hostdata->pdma_residual, 512));

  /* Target changed phase early? */
  -if (NCR5380_poll_politely2(hostdata, STATUS_REG, SR_REQ, SR_REQ, -
    BUS_AND_STATUS_REG, BASR_ACK, BASR_ACK, HZ / 64) < 0)
    -scmd_printk(KERN_ERR, hostdata->connected,
    -"%s: !REQ and !ACK\n", __func__);
  -if (!!(NCR5380_read(BUS_AND_STATUS_REG) & BASR_PHASE_MATCH))
    return 0;
  +if (bytes > 0) {
    +s += bytes;
    +hostdata->pdma_residual -= bytes;
    +}

  /* No bus error. */
  -if (n == 0) {
    +if (hostdata->pdma_residual == 0) {
      if (NCR5380_poll_politely(hostdata, TARGET_COMMAND_REG,
        TCR_LAST_BYTE_SENT,
        TCR_LAST_BYTE_SENT, HZ / 64) < 0)
        @@ -287,17 +340,29 @@
        return 0;
    }

    +if (NCR5380_poll_politely2(hostdata, STATUS_REG, SR_REQ, SR_REQ,
      +BUS_AND_STATUS_REG, BASR_ACK,
      +BASR_ACK, HZ / 64) < 0)
      +scmd_printk(KERN_DEBUG, hostdata->connected,
      +"%s: !REQ and !ACK\n", __func__);
    +if (!!(NCR5380_read(BUS_AND_STATUS_REG) & BASR_PHASE_MATCH))
      +return 0;
    +
    +if (bytes == 0)
      +udelay(MAC_PDMA_DELAY);
    +
    +if (bytes >= 0)
      +continue;
dsprintk(NDEBUG_PSEUDO_DMA, hostdata->host,
    "%s: bus error (%d/%d)
", __func__, transferred, len);
NCR5380_dprint(NDEBUG_PSEUDO_DMA, hostdata->host);
}

scmd_printk(KERN_ERR, hostdata->connected,
    "%s: phase mismatch or !DRQ\n", __func__);
NCR5380_dprint(NDEBUG_PSEUDO_DMA, hostdata->host);
-
  return -1;
}

@@ -305,7 +370,7 @@
  struct scsi_cmnd *cmd)
{
  if (hostdata->flags & FLAG_NO_PSEUDO_DMA ||
-    cmd->SCp.this_residual < 16)
+    cmd->SCp.this_residual < setup_use_pdma)
    return 0;
  return cmd->SCp.this_residual;
@@ -364,7 +429,7 @@
  mac_scsi_template.can_queue = setup_can_queue;
  if (setup_cmd_per_lun > 0)
    mac_scsi_template.cmd_per_lun = setup_cmd_per_lun;
-  if (setup_sg_tablesize >= 0)
+  if (setup_sg_tablesize > 0)
    mac_scsi_template.sg_tablesize = setup_sg_tablesize;
  if (setup_hostid >= 0)
    mac_scsi_template.this_id = setup_hostid & 7;
--- linux-4.15.0.orig/drivers/scsi/megaraid.c
+++ linux-4.15.0/drivers/scsi/megaraid.c
@@ -4199,6 +4199,9 @@
    int irq, i, j;
    int error = -ENODEV;

+if (hba_count >= MAX_CONTROLLERS)
  goto out;
+
  if (pci_enable_device(pdev))
    goto out;
  pci_set_master(pdev);
@@ -4218,11 +4221,11 @@
if (pdev->subsystem_vendor == PCI_VENDOR_ID_COMPAQ &&
    pdev->subsystem_device == 0xC000)
-    return -ENODEV;
+    goto out_disable_device;
/* Now check the magic signature byte */
pci_read_config_word(pdev, PCI_CONF_AMISIG, &magic);
if (magic != HBA_SIGNATURE_471 && magic != HBA_SIGNATURE)
-    return -ENODEV;
+    goto out_disable_device;
/* Ok it is probably a megaraid */
}

--- linux-4.15.0.orig/drivers/scsi/megaraid/megaraid_mm.c
+++ linux-4.15.0/drivers/scsi/megaraid/megaraid_mm.c
@@ -250,7 +250,7 @@
    mimd_t mimd;
    uint32_t adapno;
    int iterator;
-    +bool is_found;
    
    if (copy_from_user(&mimd, umimd, sizeof(mimd_t))) {
      *rval = -EFAULT;
@@ -266,12 +266,16 @@
    adapter = NULL;
    iterator = 0;
    +is_found = false;

    list_for_each_entry(adapter, &adapters_list_g, list) {
      -if (iterator++ == adapno) break;
      +if (iterator++ == adapno) {
          +is_found = true;
          +break;
        +}
    }

    -if (!adapter) {
      +if (!is_found) { 
        *rval = -ENODEV;
        return NULL;
      }
    } @ @ -737,6 +741,7 @ @
    uint32_t adapno;
    int iterator;
    mraid_mmadp_t*adapter;
+    bool is_found;
/*  * When the kioc returns from driver, make sure it still doesn't  @ @ -759,19 +764,23 @@  iterator= 0;  adapter= NULL;  adapno= kioc->adapno;  +is_found= false;  */  
con_log(CL_ANN, ( KERN_WARNING "megaraid cmm: completed "  "ioctl that was timedout before\n");  
list_for_each_entry(adapter, &adapters_list_g, list) {  -if (iterator++ == adapno) break;  +if (iterator++ == adapno) {  +is_found = true;  +break;  +}  +}  
kioc->timedout = 0;  
-if (adapter) {  +if (is_found)  mraid_mm_dealloc_kioc( adapter, kioc );  -}  +}  
else {  wake_up(&wait_q);  --- linux-4.15.0.orig/drivers/scsi/megaraid/megaraid_sas.h  +++ linux-4.15.0/drivers/scsi/megaraid/megaraid_sas.h  @@ -2107,6 +2107,7 @@  struct megasas_instance {  +unsigned int *reply_map;  __le32 *producer;  dma_addr_t producer_h;  __le32 *consumer;  --- linux-4.15.0.orig/drivers/scsi/megaraid/megaraid_sas_base.c  +++ linux-4.15.0/drivers/scsi/megaraid/megaraid_sas_base.c  @@ -3012,6 +3012,7 @@  u32 size;  unsigned long buff_addr;  unsigned long dmachunk = CRASH_DMA_BUF_SIZE;  +unsigned long chunk_left_bytes;  unsigned long src_addr;
unsigned long flags;
u32 buff_offset;
@@ -3037,6 +3038,8 @@
 size = (instance->fw_crash_buffer_size * dmachunk) - buff_offset;
+chunk_left_bytes = dmachunk - (buff_offset % dmachunk);
+size = (size > chunk_left_bytes) ? chunk_left_bytes : size;
 size = (size >= PAGE_SIZE) ? (PAGE_SIZE - 1) : size;

 src_addr = (unsigned long)instance->crash_buf[buff_offset / dmachunk] +
 @@ -3860,12 +3863,12 @@
 /*
  * The cur_state should not last for more than max_wait secs
  */
-  for (i = 0; i < (max_wait * 1000); i++) {
+  for (i = 0; i < max_wait * 50; i++) {
    curr_abs_state = instance->instancet->
    read_fw_status_reg(instance->reg_set);

    if (abs_state == curr_abs_state) {
-      msleep(1);
-      msleep(20);
-    } else
-      break;
+      break;
    }
@@ -4125,6 +4128,7 @@
 if (megasas_create_frame_pool(instance)) {
   if (megasas_create_frame_pool(instance)) {
     dev_printk(KERN_DEBUG, &instance->pdev->dev, "Error creating frame DMA pool\n");
+    return -ENOMEM;
   } else if (instance->adapter_type == MFI_SERIES)
     return KILL_ADAPTER;
   else if (instance->unload ||
@@ -4143,7 +4147,8 @@
     return IGNORE_TIMEOUT;
 else
   return INITIATE_OCR;
@@ -5140,6 +5145,26 @@
 instance->use_seqnum_jbod_fp = false;
}

return 0;
@@ -4143,7 +4147,8 @@
  if (instance->adapter_type == MFI_SERIES)
    return KILL_ADAPTER;
  else if (instance->unload ||
@@ -4143,7 +4147,8 @@
    return IGNORE_TIMEOUT;
  else
    return INITIATE_OCR;
@@ -5140,6 +5145,26 @@

+static void megasas_setup_reply_map(struct megasas_instance *instance) {
+  const struct cpumask *mask;
+  unsigned int queue, cpu;
+
+  for (queue = 0; queue < instance->msix_vectors; queue++) {
+    mask = pci_irq_get_affinity(instance->pdev, queue);
+    if (!mask)
+      goto fallback;
+    for_each_cpu(cpu, mask)
+      instance->reply_map[cpu] = queue;
+  }
+  return;
+
+fallback:
  for_each_possible_cpu(cpu)
  instance->reply_map[cpu] = cpu % instance->msix_vectors;
+
/**
 * megasas_init_fw -Initializes the FW
 * @instance: Adapter soft state
@@ -5151,7 +5176,7 @@
 {
   u32 max_sectors_1;
   u32 max_sectors_2, tmp_sectors, msix_enable;
-   u32 scratch_pad_2, scratch_pad_3, scratch_pad_4;
+   u32 scratch_pad_2, scratch_pad_3, scratch_pad_4, status_reg;
   resource_size_t base_addr;
   struct megasas_register_set __iomem *reg_set;
   struct megasas_ctrl_info *ctrl_info = NULL;
@@ -5159,6 +5184,7 @@
   int i, j, loop, fw_msix_count = 0;
   struct IOV_111 *iovPtr;
   struct fusion_context *fusion;
+  bool do_adp_reset = true;

   fusion = instance->ctrl_context;

@@ -5207,19 +5233,29 @@
 
 if (megasas_transition_to_ready(instance, 0)) {
   -atomic_set(&instance->fw_reset_no_pci_access, 1);
-  instance->instance->adp_reset
-  -(instance, instance->reg_set);
-  atomic_set(&instance->fw_reset_no_pci_access, 0);
-dev_info(&instance->pdev->dev, 
-"FW restarted successfully from %s\n",
-_func__);
+if (instance->adapter_type >= INVADER_SERIES) {
+status_reg = instance->instancet->read_fw_status_reg(
+instance->reg_set);
+do_adp_reset = status_reg & MFI_RESET_ADAPTER;
+}
+
+if (do_adp_reset) {
+atomic_set(&instance->fw_reset_no_pci_access, 1);
+instance->instancet->adp_reset 
+(instance, instance->reg_set);
+atomic_set(&instance->fw_reset_no_pci_access, 0);
+dev_info(&instance->pdev->dev, 
+"FW restarted successfully from %s\n",
+_func__);

-/#waiting for about 30 second before retry*/
-ssleep(30);
+/*waiting for about 30 second before retry*/
+ssleep(30);

-if (megasas_transition_to_ready(instance, 0))
+if (megasas_transition_to_ready(instance, 0))
+goto fail_ready_state;
+} else {
+ goto fail_ready_state;
+}
}

megasas_init_ctrl_params(instance);
@@ -5258,12 +5294,29 @@
-instance->msix_vectors = (scratch_pad_2 
 & MR_MAX_REPLY_QUEUES_OFFSET) + 1;
-fw_msix_count = instance->msix_vectors;
-} else { /* Invader series supports more than 8 MSI-x vectors*/
+} else {
+instance->msix_vectors = ((scratch_pad_2 
 & MR_MAX_REPLY_QUEUES_EXT_OFFSET) 
 >> MR_MAX_REPLY_QUEUES_EXT_OFFSET_SHIFT) + 1;
-} else { /* Invader series supports more than 8 MSI-x vectors*/
+} else {
+instance->msix_vectors = (scratch_pad_2 
 & MR_MAX_REPLY_QUEUES_EXT_OFFSET) 
 >> MR_MAX_REPLY_QUEUES_EXT_OFFSET_SHIFT) + 1;
-if (instance->msix_vectors > 16)
-instance->msix_combined = true;
+
+/*
+ * For Invader series, > 8 MSI-x vectors
+ * supported by FW/HW implies combined
+ * reply queue mode is enabled.
+ * For Ventura series, > 16 MSI-x vectors
+ * supported by FW/HW implies combined
+ * reply queue mode is enabled.
+ */
+switch (instance->adapter_type) {
+case INVADER_SERIES:
+if (instance->msix_vectors > 8)
+instance->msix_combined = true;
+break;
+case VENTURA_SERIES:
+if (instance->msix_vectors > 16)
+instance->msix_combined = true;
+break;
+}

if (rdpq_enable)
instance->is_rdpq = (scratch_pad_2 & MR_RDPQ_MODE_OFFSET) ?
@ @ -5315,9 +5368,11 @@
if (!instance->msix_vectors) {
    i = pci_alloc_irq_vectors(instance->pdev, 1, 1, PCI_IRQ_LEGACY);
    if (i < 0)
        goto fail_setup_irqs;
    goto fail_init_adapter;
} +megasas_setup_reply_map(instance);
+ dev_info(&instance->pdev->dev,
"firmware supports msix\t: (%d)", fw_msix_count);
    } @ @ -5522,9 +5577,8 @@

fail_get_ld_pd_list:
instance->instancet->disable_intr(instance);
-fail_init_adapter:
    megasas_destroy_irqs(instance);
-fail_setup_irqs:
+fail_init_adapter:
    if (instance->msix_vectors)
        pci_free_irq_vectors(instance->pdev);
    instance->msix_vectors = 0;
@@ -5793,7 +5847,8 @@
    int ret;
    struct megasas_cmd *cmd;
    struct megasas_dcmd_frame *dcmd;
-tu16 targetId = (sdev->channel % 2) + sdev->id;
+tu16 targetId = ((sdev->channel % 2) * MEGASAS_MAX_DEV_PER_CHANNEL) +
+sdev->id;
cmd = megasas_get_cmd(instance);

@@ -5955,13 +6010,13 @@
 * @instance:		Adapter soft state
 * Description:
 *
- * For Ventura, driver/FW will operate in 64bit DMA addresses.
+ * For Ventura, driver/FW will operate in 63bit DMA addresses.
 *
 * For invader-
 * By default, driver/FW will operate in 32bit DMA addresses
 * for consistent DMA mapping but if 32 bit consistent
- *DMA mask fails, driver will try with 64 bit consistent
- *mask provided FW is true 64bit DMA capable
+ *DMA mask fails, driver will try with 63 bit consistent
+ *mask provided FW is true 63bit DMA capable
 *
 * For older controllers(Thunderbolt and MFI based adapters)-
 *driver/FW will operate in 32 bit consistent DMA addresses.
@@ -5975,14 +6030,14 @@
 pdev = instance->pdev;
 consistent_mask = (instance->adapter_type == VENTURA_SERIES) ?
 -DMA_BIT_MASK(64) : DMA_BIT_MASK(32);
+DMA_BIT_MASK(63) : DMA_BIT_MASK(32);

 if (IS_DMA64) {
- if (dma_set_mask(&pdev->dev, DMA_BIT_MASK(64)) &&
+ if (dma_set_mask(&pdev->dev, DMA_BIT_MASK(63)) &&
    dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(32))) {
    goto fail_set_dma_mask;

  - if ((*pdev->dev.dma_mask == DMA_BIT_MASK(64)) &&
+  if ((*pdev->dev.dma_mask == DMA_BIT_MASK(63)) &&
      (dma_set_coherent_mask(&pdev->dev, consistent_mask) &&
       dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(32)))) {
    /*
      @@ -5995,7 +6050,7 @@
      if (!(scratch_pad_2 & MR_CAN_HANDLE_64_BIT_DMA_OFFSET))
      goto fail_set_dma_mask;
    else if (dma_set_mask_and_coherent(&pdev->dev,
  - DMA_BIT_MASK(64)))
+  DMA_BIT_MASK(63)))
      goto fail_set_dma_mask;
    }
  } else if (dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(32)))
@@ -6007,8 +6062,8 @@
instance->consistent_mask_64bit = true;

dev_info(&pdev->dev, "%s bit DMA mask and %s bit consistent mask\n",
- ((pdev->dev.dma_mask == DMA_BIT_MASK(64)) ? "64" : "32"),
- (instance->consistent_mask_64bit ? "64" : "32"));
+ ((pdev->dev.dma_mask == DMA_BIT_MASK(64)) ? "63" : "32"),
+ (instance->consistent_mask_64bit ? "63" : "32"));

return 0;

@@ -6094,20 +6149,29 @@
*/
static int megasas_alloc_ctrl_mem(struct megasas_instance *instance)
{
+instance->reply_map = kzalloc(sizeof(unsigned int) * nr_cpu_ids,
+            GFP_KERNEL);
+if (!instance->reply_map)
+    return -ENOMEM;
+
+switch (instance->adapter_type) {
+case MFI_SERIES:
+if (megasas_alloc_mfi_ctrl_mem(instance))
+    return -ENOMEM;
+    goto fail;
+break;
+case VENTURA_SERIES:
+case THUNDERBOLT_SERIES:
+case INVADER_SERIES:
+if (megasas_alloc_fusion_context(instance))
+    return -ENOMEM;
+    goto fail;
+break;
+
+} return 0;
+ fail:
+    kfree(instance->reply_map);
+    instance->reply_map = NULL;
+    return -ENOMEM;
}

/*
@@ -6119,6 +6183,7 @@
*/
static inline void megasas_free_ctrl_mem(struct megasas_instance *instance)
{
+    kfree(instance->reply_map);
+    instance->reply_map = NULL;
+    return -ENOMEM;
}

/*
@@ -6119,6 +6183,7 @@
*/
if (instance->producer)
pci_free_consistent(instance->pdev, sizeof(u32),
@@ -6512,7 +6577,6 @@
pci_free_irq_vectors(instance->pdev);
fail_init_mfi:
  scsi_host_put(host);
-
  fail_alloc_instance:
  pci_disable_device(pdev);
@@ -6717,6 +6781,8 @@
  if (rval < 0)
    goto fail_reenable_msix;

+megasas_setup_reply_map(instance);
 +
  if (instance->adapter_type != MFI_SERIES) {
    megasas_reset_reply_desc(instance);
    if (megasas_ioc_init_fusion(instance)) {
@@ -6733,6 +6799,9 @@
      goto fail_init_mfi;
  }

+if (megasas_get_ctrl_info(instance) != DCMD_SUCCESS)
+  goto fail_init_mfi;
+  tasklet_init(&instance->isr_tasklet, instance->instance->tasklet,
+    (unsigned long)instance);
@@ -6822,7 +6891,6 @@
u32 pd_seq_map_sz;

  instance = pci_get_drvdata(pdev);
-  instance->unload = 1;
  host = instance->host;
  fusion = instance->ctrl_context;
@@ -6833,6 +6901,7 @@
if (instance->fw_crash_state != UNAVAILABLE)
  megasas_free_host_crash_buffer(instance);
  scsi_remove_host(instance->host);
+  instance->unload = 1;

  if (megasas_wait_for_adapter_operational(instance))
    goto skip_firing_dcmds;
@@ -7076,7 +7145,7 @@
in
int error = 0, i;
void *sense = NULL;
dma_addr_t sense_handle;
-unsigned long *sense_ptr;
+void *sense_ptr;

u32 opcode = 0;

memset(kbuff_arr, 0, sizeof(kbuff_arr));
@@ -7191,6 +7260,13 @@
}

if (ioc->sense_len) {
+/* make sure the pointer is part of the frame */
+if (ioc->sense_off >
+ (sizeof(union megasas_frame) - sizeof(__le64))) {
+error = -EINVAL;
+goto out;
+}
+
+sense = dma_alloc_coherent(&instance->pdev->dev, ioc->sense_len,
+ &sense_handle, GFP_KERNEL);
if (!sense) {
@@ -7198,12 +7274,9 @@

goto out;
}

-sense_ptr =
-((unsigned long *) ((unsigned long)cmd->frame + ioc->sense_off);
-if (instance->consistent_mask_64bit)
-*sense_ptr = cpu_to_le64(sense_handle);
-else
-*sense_ptr = cpu_to_le32(sense_handle);
+/* always store 64 bits regardless of addressing */
+sense_ptr = (void *)cmd->frame + ioc->sense_off;
+put_unaligned_le64(sense_handle, sense_ptr);
}

/*
@@ -7494,6 +7567,9 @@

get_user(user_sense_off, &cioc->sense_off))
return -EFAULT;

+if (local_sense_off != user_sense_off)
+return -EINVAL;
+
+if (local_sense_len) {
 void __user **sense_ioc_ptr =
 (void __user *)(u8 *)((unsigned long)&ioc->frame.raw) + local_sense_off);
--- linux-4.15.0.orig/drivers/scsi/megaraid/megaraid_sas_fp.c
+++ linux-4.15.0/drivers/scsi/megaraid/megaraid_sas_fp.c
/*
 * This function will Populate Driver Map using firmware raid map
 */

void MR_PopulateDrvRaidMap(struct megasas_instance *instance)
{
    struct fusion_context *fusion = instance->ctrl_context;
    struct MR_FW_RAID_MAP_ALL *fw_map_old = NULL;
    u16 ld_count = (u16)le16_to_cpu(fw_map_ext->ldCount);
    if (ld_count > MAX_LOGICAL_DRIVES_EXT) {
        dev_dbg(&instance->pdev->dev, "megaraid_sas: LD count exposed in RAID map in not valid\n");
        return;
    }
    pDrvRaidMap->ldCount = (__le16)cpu_to_le16(ld_count);
    fusion->ld_map[(instance->map_id & 1)];
    pFwRaidMap = &fw_map_old->raidMap;
    ld_count = (u16)le32_to_cpu(pFwRaidMap->ldCount);
    if (ld_count > MAX_LOGICAL_DRIVES) {
        dev_dbg(&instance->pdev->dev, "LD count exposed in RAID map in not valid\n");
        return 1;
    }
    pDrvRaidMap->totalSize = pFwRaidMap->totalSize;
    pDrvRaidMap->ldCount = (__le16)cpu_to_le16(ld_count);
    pDrvRaidMap->fpPdIoTimeoutSec = pFwRaidMap->fpPdIoTimeoutSec;
    sizeof(struct MR_DEV_HANDLE_INFO) *
    MAX_RAIDMAP_PHYSICAL_DEVICES);
}

/*
 u16 ld;
 u32 expected_size;

- MR_PopulateDrvRaidMap(instance);
+if (MR_PopulateDrvRaidMap(instance))
+return 0;
fusion = instance->ctrl_context;
drv_map = fusion->ld_drv_map[(instance->map_id & 1)];
@@ -1258,7 +1266,7 @@
 for (ldCount = 0; ldCount < MAX_LOGICAL_DRIVES_EXT; ldCount++) {
 ld = MR_TargetIdToLdGet(ldCount, drv_map);
- if (ld >= MAX_LOGICAL_DRIVES_EXT) {
-+ if (ld >= MAX_LOGICAL_DRIVES_EXT - 1) {
 lbInfo[ldCount].loadBalanceFlag = 0;
 continue;
 }
 --- linux-4.15.0.orig/drivers/scsi/megaraid/megaraid_sas_fusion.c
+++ linux-4.15.0/drivers/scsi/megaraid/megaraid_sas_fusion.c
@@ -216,36 +216,30 @@
 /**
 * megasas_fire_cmd_fusion - Sends command to the FW
 * @instance: Adapter soft state
- * @req_desc: 32 bit or 64 bit Request descriptor
-+ * @req_desc: 64 bit Request descriptor
 *
- * Perform PCI Write. Ventura supports 32 bit Descriptor.
- * Prior to Ventura (12G) MR controller supports 64 bit Descriptor.
-+ * Perform PCI Write.
 */

 static void
 megasas_fire_cmd_fusion(struct megasas_instance *instance,
 union MEGASAS_REQUEST_DESCRIPTOR_UNION *req_desc)
 { 
- if (instance->adapter_type == VENTURA_SERIES) 
- writel(le32_to_cpu(req_desc->u.low), 
- &instance->reg_set->inbound_single_queue_port);
- else 
-#if defined(writeq) && defined(CONFIG_64BIT)
- u64 req_data = (((u64)le32_to_cpu(req_desc->u.high) << 32) | 
- le32_to_cpu(req_desc->u.low));
+ u64 req_data = (((u64)le32_to_cpu(req_desc->u.high) << 32) | 
+ le32_to_cpu(req_desc->u.low));

- writeq(req_data, &instance->reg_set->inbound_low_queue_port);
+ writeq(req_data, &instance->reg_set->inbound_low_queue_port);
 #else 
- unsigned long flags;
- spin_lock_irqsave(&instance->hba_lock, flags);
- writel(le32_to_cpu(req_desc->u.low), 
- &instance->reg_set->inbound_low_queue_port);
- writel(le32_to_cpu(req_desc->u.high), 

unsigned long flags;
spin_lock_irqsave(&instance->hba_lock, flags);

writel(le32_to_cpu(req_desc->u.low),
	&instance->reg_set->inbound_low_queue_port);
+writel(le32_to_cpu(req_desc->u.high),
	&instance->reg_set->inbound_high_queue_port);
+mmiowb();
+spin_unlock_irqrestore(&instance->hba_lock, flags);
#endif
-
}
}

/**
@@ -536,7 +530,8 @@
 fusion->io_request_frames =
dma_pool_alloc(fusion->io_request_frames_pool,
    -GFP_KERNEL, &fusion->io_request_frames_phys);
    +GFP_KERNEL | __GFP_NOWARN,
    +&fusion->io_request_frames_phys);
 if (!fusion->io_request_frames) {
    if (instance->max_fw_cmds >= (MEGASAS_REDUCE_QD_COUNT * 2)) {
@@ -574,7 +569,7 @@
 fusion->io_request_frames =
dma_pool_alloc(fusion->io_request_frames_pool,
    -GFP_KERNEL,
    +GFP_KERNEL | __GFP_NOWARN,
    +&fusion->io_request_frames_phys);
    
 if (!fusion->io_request_frames) {
@@ -982,7 +977,6 @@
 const char *sys_info;
 MFI_CAPABILITIES *drv_ops;
 u32 scratch_pad_2;
@@ -1121,14 +1115,7 @@
 break;
 }

/* For Ventura also IOC INIT required 64 bit Descriptor write. */
-spin_lock_irqsave(&instance->hba_lock, flags);
-writel(le32_to_cpu(req_desc.u.low),
  - &instance->reg_set->inbound_low_queue_port);
-writel(le32_to_cpu(req_desc.u.high),
  - &instance->reg_set->inbound_high_queue_port);
-mmiowb();
-spin_unlock_irqrestore(&instance->hba_lock, flags);
+megasas_fire_cmd_fusion(instance, &req_desc);

wait_and_poll(instance, cmd, MFI_POLL_TIMEOUT_SECS);

@@ -1138,12 +1125,12 @@
goto fail_fw_init;
}
-ret = 0;
+return 0;

fail_fw_init:
-dev_err(&instance->pdev->dev,
  - "Init cmd return status %s for SCSI host %d\n",
  - "FAILED" : "SUCCESS", instance->host->host_no);
+"Init cmd return status FAILED for SCSI host %d\n",
+instance->host->host_no);

return ret;
}
@@ -2655,11 +2642,8 @@
fp_possible = (io_info.fpOkForIo > 0) ? true : false;
}

-/* Use raw_smp_processor_id() for now until cmd->request->cpu is CPU
- id by default, not CPU group id, otherwise all MSI-X queues won't
- be utilized */
-cmd->request_desc->SCSIIO.MSIxIndex = instance->msix_vectors ?
-raw_smp_processor_id() % instance->msix_vectors : 0;
+cmd->request_desc->SCSIIO.MSIxIndex =
+instance->reply_map[raw_smp_processor_id()];

praid_context = &io_request->RaidContext;

@@ -2846,7 +2830,7 @@
device_id < instance->fw_supported_vd_count)) {

    ld = MR_TargetIdToLdGet(device_id, local_map_ptr);
-    if (ld >= instance->fw_supported_vd_count)
+    if (ld >= instance->fw_supported_vd_count - 1)
      fp_possible = 0;
else {
raid = MR_LdRaidGet(id, local_map_ptr);
@@ -2981,10 +2965,9 @@
}

cmd->request_desc->SCSIIO.DevHandle = io_request->DevHandle;
-cmd->request_desc->SCSIIO.MSIxIndex =
-instance->msix_vectors ?
-(raw_smp_processor_id() % instance->msix_vectors) : 0;
+	cmd->request_desc->SCSIIO.MSIxIndex =
+instance->reply_map[raw_smp_processor_id()];

if (!fp_possible) {
/* system pd firmware path */
@@ -2995,6 +2978,9 @@
pRAID_Context->timeout_value = cpu_to_le16(os_timeout_value);
pRAID_Context->virtual_disk_tgt_id = cpu_to_le16(device_id);
} else {
+if (os_timeout_value)
+os_timeout_value++;
+
/* system pd Fast Path */
io_request->Function = MPI2_FUNCTION_SCSI_IO_REQUEST;
timeout_limit = (scmd->device->type == TYPE_DISK) ?
@@ -4529,6 +4515,7 @@
if (instance->requestorId && !instance->skip_heartbeat_timer_del)
del_timer_sync(&instance->sriov_heartbeat_timer);
set_bit(MEGASAS_FUSION_IN_RESET, &instance->reset_flags);
+set_bit(MEGASAS_FUSION_OCR_NOT_POSSIBLE, &instance->reset_flags);
atomic_set(&instance->adprecovery, MEGASAS_ADPRESET_SM_POLLING);
instance->instancet->disable_intr(instance);
megasas_sync_irqs((unsigned long)instance);
@@ -4710,7 +4697,7 @@
atomic_set(&instance->adprecovery, MEGASAS_HBA_OPERATIONAL);
}
out:
-clear_bit(MEGASAS_FUSION_IN_RESET, &instance->reset_flags);
+clear_bit(MEGASAS_FUSION_OCR_NOT_POSSIBLE, &instance->reset_flags);
mutex_unlock(&instance->reset_mutex);
return retval;
}
--- linux-4.15.0.orig/drivers/scsi/megaraid/megaraid_sas_fusion.h
+++ linux-4.15.0/drivers/scsi/megaraid/megaraid_sas_fusion.h
@@ -102,6 +102,7 @@
#define MEGASAS_FP_CMD_LEN 16
#define MEGASAS_FUSION_IN_RESET 0
+#define MEGASAS_FUSION_OCR_NOT_POSSIBLE 1
#define THRESHOLD_REPLY_COUNT 50
#define RAID_1_PEER_CMDS 2
#define JBOD_MAPS_COUNT 2
--- linux-4.15.0.orig/drivers/scsi/mesh.c
+++ linux-4.15.0/drivers/scsi/mesh.c
@@ -1044,6 +1044,8 @@
 while ((in_8(&mr->bus_status1) & BS1_RST) != 0)
     udelay(1);
     printk("done\n");
    if (ms->dma_started)
+    halt_dma(ms);
    handle_reset(ms);
/* request_q is empty, no point in mesh_start() */
return;
@@ -1356,7 +1358,8 @@
 ms->conn_tgt, ms->data_ptr, scsi_bufflen(cmd),
     ms->tgts[ms->conn_tgt].data_goes_out);
 } -scsi_dma_unmap(cmd);
+if (cmd)
+scoli_dma_unmap(cmd);
 ms->dma_started = 0;
}

@@ -1711,6 +1714,9 @@
 spin_lock_irqsave(ms->host->host_lock, flags);

+if (ms->dma_started)
+halt_dma(ms);
+
/* Reset the controller & dbdma channel */
out_le32(&md->control, (RUN|PAUSE|FLUSH|WAKE) << 16);/* stop dma */
out_8(&mr->exception, 0xff);/* clear all exception bits */
--- linux-4.15.0.orig/drivers/scsi/mpt3sas/mpt3sas_base.c
+++ linux-4.15.0/drivers/scsi/mpt3sas/mpt3sas_base.c
@@ -2190,9 +2190,11 @@
 {
 struct sysinfo s;
 u64 consistent_dma_mask;
+/* Set 63 bit DMA mask for all SAS3 and SAS35 controllers */
+int dma_mask = (ioc->hba_mpi_version_belonged > MPI2_VERSION) ? 63 : 64;

 if (ioc->dma_mask)
-consistent_dma_mask = DMA_BIT_MASK(64);
+consistent_dma_mask = DMA_BIT_MASK(dma_mask);
 else

consistent_dma_mask = DMA_BIT_MASK(32);

@@ -2200,11 +2202,11 @@
 const uint64_t required_mask =
     dma_get_required_mask(&pdev->dev);
 if ((required_mask > DMA_BIT_MASK(32)) &&
-    !pci_set_dma_mask(pdev, DMA_BIT_MASK(64)) &&
+    !pci_set_dma_mask(pdev, DMA_BIT_MASK(dma_mask)) &&
    !pci_set_consistent_dma_mask(pdev, consistent_dma_mask)) {

@@ -2230,7 +2232,7 @@
 _base_change_consistent_dma_mask(struct MPT3SAS_ADAPTER *ioc,
     struct pci_dev *pdev)
 {
-    if (pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(64))) {
+    if (pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(ioc->dma_mask))) {
        if (pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(32)))
            return -ENODEV;
    }
@@ -2387,8 +2389,11 @@
    for_each_cpu(cpu, mask)
    +for_each_cpu_and(cpu, mask, cpu_online_mask) {
    +    if (cpu >= ioc->cpu_msix_table_sz)
    +        break;
    ioc->cpu_msix_table[cpu] = reply_q->msix_index;
    +}
    return;
    }
@@ -2524,10 +2529,9 @@
 _base_free_irq(ioc);
 _base_disable_msix(ioc);

-    if (ioc->combined_reply_queue) {
-        kfree(ioc->replyPostRegisterIndex);
-        ioc->replyPostRegisterIndex = NULL;
-    }
+    kfree(ioc->replyPostRegisterIndex);
+    ioc->replyPostRegisterIndex = NULL;

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if (ioc->chip_phys) {
    iounmap(ioc->chip);
    @ @ -2634.7 +2638.7 @@
/* Use the Combined reply queue feature only for SAS3 C0 & higher
 * revision HBAs and also only when reply queue count is greater than 8
 */
    -if (ioc->combined_reply_queue && ioc->reply_queue_count > 8) {
        +if (ioc->combined_reply_queue) {
/* Determine the Supplemental Reply Post Host Index Registers
 * Address. Supplemental Reply Post Host Index Registers
 * starts at offset MPI25_SUP_REPLY_POST_HOST_INDEX_OFFSET and
 @ @ -2658.8 +2662.7 @@
    MPI25_SUP_REPLY_POST_HOST_INDEX_OFFSET +
    (i * MPT3_SUP_REPLY_POST_HOST_INDEX_REG_OFFSET));
    }
    -} else
    -ioc->combined_reply_queue = 0;
    +}

if (ioc->is_warpdrive) {
    ioc->reply_post_host_index[0] = (resource_size_t __iomem *)
    @ @ -3677.7 +3680.7 @@
* flag unset in NVDATA.
*/
    mpt3sas_config_get_manufacturing_pg11(ioc, &mpi_reply, &ioc->manu_pg11);
    -if (ioc->manu_pg11.EEDPTagMode == 0) {
        +if (!ioc->is_gen35_ioc && ioc->manu_pg11.EEDPTagMode == 0) {
            pr_err("%s: overriding NVDATA EEDPTagMode setting\n",
                ioc->name);
            ioc->manu_pg11.EEDPTagMode &= ~0x3;
    @ @ -3811.7 +3814.9 @@
        ioc->scsi_lookup = NULL;
    }
    kfree(ioc->hpr_lookup);
    +ioc->hpr_lookup = NULL;
    kfree(ioc->internal_lookup);
    +ioc->internal_lookup = NULL;
    if (ioc->chain_lookup) {
        for (i = 0; i < ioc->chain_depth; i++) {
            if (ioc->chain_lookup[i].chain_buffer)
                @ @ -4035.7 +4040.7 @@
                total_sz += sz;
            } while (ioc->rdpq_array_enable && (++i < ioc->reply_queue_count));
    -if (ioc->dma_mask == 64) {
        +if (ioc->dma_mask > 32) {
if (_base_change_consistent_dma_mask(ioc, ioc->pdev) != 0) {
    pr_warn(MPT3SAS_FMT
        "no suitable consistent DMA mask for %s\n",
    
    facts->WhoInit = mpi_reply.WhoInit;
    facts->NumberOfPorts = mpi_reply.NumberOfPorts;
    facts->MaxMSIxVectors = mpi_reply.MaxMSIxVectors;
    +if (ioc->msix_enable && (facts->MaxMSIxVectors <=
        + MAX_COMBINED_MSIX_VECTORS(ioc->is_gen35_ioc)))
        +ioc->combined_reply_queue = 0;
    facts->RequestCredit = le16_to_cpu(mpi_reply.RequestCredit);
    facts->MaxReplyDescriptorPostQueueDepth =
        le16_to_cpu(mpi_reply.MaxReplyDescriptorPostQueueDepth);
}

r = _base_handshake_req_reply_wait(ioc,
    sizeof(Mpi2IOCInitRequest_t), (u32 *)&mpi_request,
    - sizeof(Mpi2IOCInitReply_t), (u16 *)&mpi_reply, 10);
+    sizeof(Mpi2IOCInitReply_t), (u16 *)&mpi_reply, 30);

if (r != 0) {
    pr_err(MPT3SAS_FMT "%s: handshake failed (r=%d)\n",
@@ -6071,14 +6079,18 @@
    ioc->pend_os_device_add_sz++;
    ioc->pend_os_device_add = kzalloc(ioc->pend_os_device_add_sz,
        GFP_KERNEL);
    -if (!ioc->pend_os_device_add)
        +if (!ioc->pend_os_device_add) { 
            +r = -ENOMEM;
            goto out_free_resources;
            +}

        ioc->device_remove_in_progress_sz = ioc->pend_os_device_add_sz;
        ioc->device_remove_in_progress =
            kzalloc(ioc->device_remove_in_progress_sz, GFP_KERNEL);
        -if (!ioc->device_remove_in_progress)
            +if (!ioc->device_remove_in_progress) { 
                +r = -ENOMEM;
                goto out_free_resources;
                +}

        ioc->fwfault_debug = mpt3sas_fwfault_debug;

@@ -6289,14 +6301,14 @@

/**
    - * _wait_for_commands_to_complete - reset controller
+ static void _wait_for_commands_to_complete(struct MPT3SAS_ADAPTER *ioc)
+ {
+ u32 ioc_state;
+ unsigned long flags;
+ if (r)
+ MPT3_IOC_FAULT = 1;
+ _base_reset_handler(ioc, MPT3_IOC_PRE_RESET);
+ _wait_for_commands_to_complete(ioc);
+ _base_mask_interrupts(ioc);
+ _base_make_ioc_ready(ioc, type);
+ if (r)
+ --- linux-4.15.0.orig/drivers/scsi/mpt3sas/mpt3sas_base.h
++  linux-4.15.0/drivers/scsi/mpt3sas/mpt3sas_base.h
@@ -6375,7 +6387,7 @@
@@ -1435,6 +1436,9 @@
 int mpt3sas_port_enable(struct MPT3SAS_ADAPTER *ioc);
 +
+ /* scsih shared API */
+ u8 mpt3sas_scsih_event_callback(struct MPT3SAS_ADAPTER *ioc, u8 msix_index,
+ --- linux-4.15.0.orig/drivers/scsi/mpt3sas/mpt3sas_config.c
+++ linux-4.15.0/drivers/scsi/mpt3sas/mpt3sas_config.c
@@ -692,10 +692,6 @@
@@ -1435,6 +1435,9 @@
 int mpt3sas_port_enable(struct MPT3SAS_ADAPTER *ioc);
 +
+ /* scsih shared API */
+ u8 mpt3sas_scsih_event_callback(struct MPT3SAS_ADAPTER *ioc, u8 msix_index,
-mpi_request.Action = MPI2_CONFIG_ACTION_PAGE_WRITE_NVRAM;
-r = _config_request(ioc, &mpi_request, mpi_reply,
- MPT3_CONFIG_PAGE_DEFAULT_TIMEOUT, config_page,
- sizeof(*config_page));
out:
return r;
}
--- linux-4.15.0.orig/drivers/scsi/mpt3sas/mpt3sas_ctl.c
+++ linux-4.15.0/drivers/scsi/mpt3sas/mpt3sas_ctl.c
@@ -1582,7 +1582,8 @@

" for diag buffers, requested size(%d)
”,
 ioc->name, __func__, request_data_sz);
 mpt3sas_base_free_smid(ioc, smid);
-return -ENOMEM;
+rc = -ENOMEM;
+goto out;
}
}
oioc->diag_buffer[buffer_type] = request_data;
oioc->diag_buffer_sz[buffer_type] = request_data_sz;
--- linux-4.15.0.orig/drivers/scsi/mpt3sas/mpt3sas_scsih.c
+++ linux-4.15.0/drivers/scsi/mpt3sas/mpt3sas_scsih.c
@@ -2998,7 +2998,8 @@

" device been deleted! scmd(%p)”, scmd);
scmd->result = DID_NO_CONNECT << 16;
@@ -3060,7 +3061,8 @@

" device been deleted! scmd(%p)”, scmd);
scmd->result = DID_NO_CONNECT << 16;
@@ -3122,7 +3124,8 @@

" device been deleted! scmd(%p)”, scmd);
scmd->result = DID_NO_CONNECT << 16;
@@ -3184,7 +3186,8 @@

" device been deleted! scmd(%p)”, scmd);
scmd->result = DID_NO_CONNECT << 16;
@@ -3246,7 +3248,8 @@

" device been deleted! scmd(%p)”, scmd);
scmd->result = DID_NO_CONNECT << 16;
starget_printk(KERN_INFO, starget, "target been deleted! scmd(%p)\n", scmd);
scmd->result = DID_NO_CONNECT << 16;
@@ -3179,7 +3182,7 @@
io->name, scmd);
scsi_print_command(scmd);

- if (ioc->is_driver_loading) {
+ if (ioc->is_driver_loading || ioc->remove_host) {
    pr_info(MPT3SAS_FMT "Blocking the host reset\n", ioc->name);
    r = FAILED;
@@ -3904,6 +3907,40 @@
    return _scsih_check_for_pending_tm(ioc, smid);
    }

+/** _scsih_allow_scmd_to_device - check whether scmd needs to
+ * issue to IOC or not.
+ * @ioc: per adapter object
+ * @scmd: pointer to scsi command object
+ *
+ * Returns true if scmd can be issued to IOC otherwise returns false.
+ */
+inline bool _scsih_allow_scmd_to_device(struct MPT3SAS_ADAPTER *ioc, 
+struct scsi_cmnd *scmd) 
+{
+    if (ioc->pci_error_recovery)
+        return false;
+    if (ioc->hba_mpi_version_belonged == MPI2_VERSION) {
+        if (ioc->remove_host)
+            return false;
+    }
+    return true;
+}
+    
+if (ioc->remove_host) 
+    +switch (scmd->cmd[0]) 
+    +case SYNCHRONIZE_CACHE:
+    +case START_STOP:
+        return true;
+    +default:
+        return false;
+    +}
+    +}
+    +}
return true;
+
*/
/*
 * _scsih_sas_control_complete - completion routine
@@ -4611,7 +4648,7 @@
 _scsih_set_satl_pending(scmd, false);
mpt3sas_base_free_smid(ioc, smid);
scsi_dma_unmap(scmd);
-if (ioc->pci_error_recovery)
+if (ioc->pci_error_recovery || ioc->remove_host)
scmd->result = DID_NO_CONNECT << 16;
else
scmd->result = DID_RESET << 16;
@@ -4752,25 +4789,12 @@
return 0;
}

-if (ioc->pci_error_recovery || ioc->remove_host) {
+if (!(_scsih_allow_scmd_to_device(ioc, scmd))) {
scmd->result = DID_NO_CONNECT << 16;
scmd->scsi_done(scmd);
return 0;
}

-/*
- * Bug work around for firmware SATL handling. The loop
- * is based on atomic operations and ensures consistency
- * since we're lockless at this point
- */
-*/
-do {
-if (test_bit(0, &sas_device_priv_data->ata_command_pending)) {
-scmd->result = SAM_STAT_BUSY;
-scmd->scsi_done(scmd);
-return 0;
-}
-} while (_scsih_set_satl_pending(scmd, true));
-
sas_target_priv_data = sas_device_priv_data->sas_target;

/* invalid device handle */
@@ -4796,6 +4820,19 @@
        return SCSI_MLQUEUE_DEVICE_BUSY;

+/* Bug work around for firmware SATL handling. The loop
+ * is based on atomic operations and ensures consistency

+ * since we're lockless at this point
+ */
+do {
+if (test_bit(0, &sas_device_priv_data->ata_command_pending)) {
+scmd->result = SAM_STAT_BUSY;
+scmd->scsi_done(scmd);
+return 0;
+}
+} while (_scsih_set_satl_pending(scmd, true));
+
+ if (scmd->sc data direction == DMA_FROM_DEVICE)
+ mpi_control = MPI2_SCSIIO_CONTROL_READ;
+ else if (scmd->sc data direction == DMA_TO_DEVICE)
+ @@ -4823,6 +4860,7 @@
+ if (!smid) {
+ pr_err(MPT3SAS_FMT "%s: failed obtaining a smid\n", 
+ ioc->name, __func__); 
+ _scsih_set_satl_pending(scmd, false);
+ goto out;
+ }
+ mpi_request = mpt3sas_base_get_msg_frame(ioc, smid);
+@@ -4854,6 +4892,7 @@
+ pcie_device = sas_target_priv_data->pcie dev;
+ if (ioc->build sg scmd(ioc, scmd, smid, pcie_device)) {
+ mpt3sas_base_free_smid(ioc, smid);
+ _scsih_set_satl_pending(scmd, false);
+ goto out;
+ }
+} else
@@ -5859,8 +5898,10 @@
+ handle, parent_handle, (unsigned long long)
+ sas expander->sas address, sas expander->num phys);
+
-!sas expander->num phys) 
+!sas expander->num phys) {
+rc = -1;
+ goto out fail;
+}
+sas expander->phy = kcalloc(sas expander->num phys,
+ sizeof(struct _sas phy), GFP_KERNEL);
+ if (!sas expander->phy) {
+ @@ -9901,6 +9942,10 @@
+ unsigned long flags;
+
+ ioc->remove_host = 1;
+ +
+ if (!pci_device_is present(pdev))
+ _scsih flush running cmds(ioc);
+
+  _scsih_fw_event_cleanup_queue(ioc);

spin_lock_irqsave(&ioc->fw_event_lock, flags);
@@ -9912,6 +9957,7 @@ /* release all the volumes */
+  _scsih_ir_shutdown(ioc);
+  sas_remove_host(shost);
list_for_each_entry_safe(raid_device, next, &ioc->raid_device_list, list) {
    if (raid_device->starget) {
      @@ -9954,7 +10000,6 @@
        ioc->sas_hba.num_phys = 0;
    }

+sas_remove_host(shost);
  mpt3sas_base_detach(ioc);
  spin_lock(&gioc_lock);
  list_del(&ioc->list);
@@ -9977,6 +10022,10 @@ unsigned long flags;
  ioc->remove_host = 1;
  +
  +if (!pci_device_is_present(pdev))
  +  _scsih_flush_running_cmds(ioc);
  +  _scsih_fw_event_cleanup_queue(ioc);

spin_lock_irqsave(&ioc->fw_event_lock, flags);
@@ -10707,7 +10756,7 @@ snprintf(ioc->firmware_event_name, sizeof(ioc->firmware_event_name),
    "fw_event_%s%d", ioc->driver_name, ioc->id);
  ioc->firmware_event_thread = alloc_ordered_workqueue(
    - ioc->firmware_event_name, WQ_MEM_RECLAIM);
  + ioc->firmware_event_name, 0);
  if (!ioc->firmware_event_thread) {
    pr_err(MPT3SAS_FMT "failure at %s:%d/%s()!
",
      ioc->name, __FILE__, __LINE__, __func__);
--- linux-4.15.0.orig/drivers/scsi/mpt3sas/mpt3sas_transport.c
+++ linux-4.15.0/drivers/scsi/mpt3sas/mpt3sas_transport.c
@@ -846,10 +846,13 @@ mpt3sas_port->remote_identify.sas_address,
      mpt3sas_phy->phy_id);
    mpt3sas_phy->phy_belongs_to_port = 0;
    -sas_delete_phy(mpt3sas_port->port, mpt3sas_phy->phy);
    +if (!ioc->remove_host)
+sas_port_delete_phy(mpt3sas_port->port,
+mpt3sas_phy->phy);
list_del(&mpt3sas_phy->port_siblings);
}
-sas_port_delete(mpt3sas_port->port);
+if (!ioc->remove_host)
+sas_port_delete(mpt3sas_port->port);
kfree(mpt3sas_port);
}

@@ -1936,12 +1939,12 @@
    pr_info(MPT3SAS_FMT "%s: host reset in progress!\n",
+    __func__, ioc->name);
    rc = -EFAULT;
    -goto out;
+    goto job_done;
    }

rc = mutex_lock_interruptible(&ioc->transport_cmds.mutex);
if (rc)
    -goto out;
+    goto job_done;

if (ioc->transport_cmds.status != MPT3_CMD_NOT_USED) {
    pr_err(MPT3SAS_FMT "%s: transport_cmds in use\n", ioc->name,
    @ @ -2066,6 +2069,7 @@
    out:
    ioc->transport_cmds.status = MPT3_CMD_NOT_USED;
    mutex_unlock(&ioc->transport_cmds.mutex);
+    job_done:
    bsg_job_done(job, rc, reslen);
    }

--- linux-4.15.0.orig/drivers/scsi/mvsas/mv_94xx.c
+++ linux-4.15.0/drivers/scsi/mvsas/mv_94xx.c
@@ -1080,16 +1080,16 @@
    void __iomem *regs = mvi->regs_ex - 0x10200;

    int drive = (i/3) & (4-1); /* drive number on host */
-    u32 block = mr32(MVS_SGPIO_DCTRL +
+    int driveshift = drive * 8; /* bit offset of drive */
+    u32 block = ioread32be(regs + MVS_SGPIO_DCTRL +
MVS_SGPIO_HOST_OFFSET * mvi->id);

-    /*
-     * if bit is set then create a mask with the first
-     * bit of the drive set in the mask ...
-    */


/*
- u32 bit = (write_data[i/8] & (1 << (i & (8-1))))?
- 1<<(24-drive*8) : 0;
+ u32 bit = get_unaligned_be32(write_data) & (1 << i)?
+ 1 << driveshift : 0;
*/

/* ... and then shift it to the right position based
@@ -1098,26 +1098,27 @@
switch (i%3) {
  case 0: /* activity */
    block &= ~((0x7 << MVS_SGPIO_DCTRL_ACT_SHIFT)
-        << (24-drive*8));
+        << driveshift);
    /* hardwire activity bit to SOF */
    block |= LED_BLINKA_SOF << (MVS_SGPIO_DCTRL_ACT_SHIFT +
-        (24-drive*8));
+        driveshift);
    break;
  case 1: /* id */
    block &= ~((0x3 << MVS_SGPIO_DCTRL_LOC_SHIFT)
-        << (24-drive*8));
+        << driveshift);
    block |= bit << MVS_SGPIO_DCTRL_LOC_SHIFT;
    break;
  case 2: /* fail */
    block &= ~((0x7 << MVS_SGPIO_DCTRL_ERR_SHIFT)
-        << (24-drive*8));
+        << driveshift);
    block |= bit << MVS_SGPIO_DCTRL_ERR_SHIFT;
    break;
}

-mw32(MVS_SGPIO_DCTRL + MVS_SGPIO_HOST_OFFSET * mvi->id,
-       block);
+ iowrite32be(block,
+         regs + MVS_SGPIO_DCTRL +
+         MVS_SGPIO_HOST_OFFSET * mvi->id);
}

@@ -1132,7 +1133,7 @@
void __iomem *regs = mvi->regs_ex - 0x10200;

mw32(MVS_SGPIO_DCTRL + MVS_SGPIO_HOST_OFFSET * mvi->id,
-       be32_to_cpu((u32 *) write_data)[i]);
+       ((u32 *) write_data)[i]);
} return reg_count;

--- linux-4.15.0.orig/drivers/scsi/mvumi.c
+++ linux-4.15.0/drivers/scsi/mvumi.c
@@ -2439,6 +2439,7 @@
if (IS_ERR(mhba->dm_thread)) {
    dev_err(&mhba->pdev->dev,
    "failed to create device scan thread\n");
+ret = PTR_ERR(mhba->dm_thread);
mutex_unlock(&mhba->sas_discovery_mutex);
goto fail_create_thread;
}

--- linux-4.15.0.orig/drivers/scsi/pm8001/pm8001_hwi.c
+++ linux-4.15.0/drivers/scsi/pm8001/pm8001_hwi.c
@@ -1479,6 +1479,12 @@
} else {
    u32 producer_index;
    void *pi_virt = circularQ->pi_virt;
+/* spurious interrupt during setup if
  +  kexec-ing and driver doing a doorbell access
+  +  with the pre-kexec oq interrupt setup
+  +*/
+if (!pi_virt)
+    break;
/* Update the producer index from SPC */
    producer_index = pm8001_read_32(pi_virt);
    circularQ->producer_index = cpu_to_le32(producer_index);
--- linux-4.15.0.orig/drivers/scsi/pm8001/pm8001_init.c
+++ linux-4.15.0/drivers/scsi/pm8001/pm8001_init.c
@@ -1059,7 +1059,8 @@
    pm8001_init_sas_add(pm8001_ha);
 /* phy setting support for motherboard controller */
-    if (pm8001_configure_phy_settings(pm8001_ha))
+    rc = pm8001_configure_phy_settings(pm8001_ha);
+    if (rc)
    goto err_out_shost;
    pm8001_post_sas_ha_init(shost, chip);
--- linux-4.15.0.orig/drivers/scsi/pm8001/pm8001_sas.c
+++ linux-4.15.0/drivers/scsi/pm8001/pm8001_sas.c
@@ -374,6 +374,13 @@
    return 0;
}

pm8001_ha = pm8001_find_ha_by_dev(task->dev);
+if (pm8001_ha->controller_fatal_error) {
+    struct task_status_struct *ts = &t->task_status;

+ts->resp = SAS_TASK_UNDELIVERED;
+t->task_done(t);
+return 0;
+
+}
PM8001_IO_DBG(pm8001_ha, pm8001_printk("pm8001_task_exec device \
");
spin_lock_irqsave(&pm8001_ha->lock, flags);

do {
@@ -466,7 +473,7 @@
    dev_printk(KERN_ERR, pm8001_ha->dev, "pm8001 exec failed[%d]!\n", rc);
    if (!sas_protocol_ata(t->task_proto))
    if (n_elem)
-        dma_unmap_sg(pm8001_ha->dev, t->scatter, n_elem,
+        dma_unmap_sg(pm8001_ha->dev, t->scatter, t->num_scatter,
        t->data_dir);
    out_done:
spin_unlock_irqrestore(&pm8001_ha->lock, flags);
@@ -787,7 +794,7 @@
    res = pm8001_tag_alloc(pm8001_ha, &ccb_tag);
    if (res)
        goto ex_err;
    ccb = &pm8001_ha->ccb_info[ccb_tag];
    ccb->device = pm8001_dev;
    ccb->ccb_tag = ccb_tag;
    spin_unlock_irqrestore(&pm8001_ha->lock, flags);
    @@ -859,6 +866,8 @@
    pm8001_exec_internal_task_abort(pm8001_ha, pm8001_dev ,
    dev, 1, 0);
    +while (pm8001_dev->running_req)
    +msleep(20);
    spin_lock_irqsave(&pm8001_ha->lock, flags);
    }
PM8001_CHIP_DISP->dereg_dev_req(pm8001_ha, device_id);
@@ -1175,8 +1184,8 @@
    pm8001_ha = pm8001_find_ha_by_dev(dev);
    device_id = pm8001_dev->device_id;
    phy_id = pm8001_dev->attached_phy;
-    rc = pm8001_find_tag(task, &tag);
-    if (rc == 0) {
+    ret = pm8001_find_tag(task, &tag);
+    if (ret == 0) {
        pm8001_printk("no tag for task:%p\n", task);
        return TMF_RESP_FUNC_FAILED;
    }
@@ -1214,25 +1223,51 @@

/* 2. Send Phy Control Hard Reset */
reinit_completion(&completion);
phy->port_reset_status = PORT_RESET_TMO;
phy->reset_success = false;
phy->enable_completion = &completion;
phy->reset_completion = &completion_reset;
ret = PM8001_CHIP_DISP->phy_ctl_req(pm8001_ha, phy_id,
PHY_HARD_RESET);
-if (ret)
-goto out;
-PM8001_MSG_DBG(pm8001_ha,
-pm8001_printk("Waiting for local phy ctl\n");
-wait_for_completion(&completion);
-if (!phy->reset_success)
+if (ret) {
+phy->enable_completion = NULL;
+phy->reset_completion = NULL;
+goto out;
+}

-/* 3. Wait for Port Reset complete / Port reset TMO */
+/* In the case of the reset timeout/fail we still
+ * abort the command at the firmware. The assumption
+ * here is that the drive is off doing something so
+ * that it's not processing requests, and we want to
+ * avoid getting a completion for this and either
+ * leaking the task in libsas or losing the race and
+ * getting a double free.
+ */
PM8001_MSG_DBG(pm8001_ha,
+pm8001_printk("Waiting for local phy ctl\n");
+ret = wait_for_completion_timeout(&completion,
+PM8001_TASK_TIMEOUT * HZ);
+if (!ret || !phy->reset_success) {
+phy->enable_completion = NULL;
+phy->reset_completion = NULL;
+} else {
+/* 3. Wait for Port Reset complete or
+ * Port reset TMO
+ */
+PM8001_MSG_DBG(pm8001_ha,
+pm8001_printk("Waiting for Port reset\n");
-wait_for_completion(&completion_reset);
-if (phy->port_reset_status)
-goto out;
+ret = wait_for_completion_timeout(
+&completion_reset,
+PM8001_TASK_TIMEOUT * HZ);
+if (!ret)
+phy->reset_completion = NULL;
+WARN_ON(phy->port_reset_status ==
+PORT_RESET_TMO);
+if (phy->port_reset_status == PORT_RESET_TMO) {
+pm8001_dev_gone_notify(dev);
+goto out;
+}
+

/*
4. SATA Abort ALL
--- linux-4.15.0.orig/drivers/scsi/pm8001/pm8001_sas.h
+++ linux-4.15.0/drivers/scsi/pm8001/pm8001_sas.h
@@ -538,6 +538,7 @@
 u32	logging_level;
 u32	fw_status;
 u32	mp_exp_mode;
+bool	controller_fatal_error;
 const struct firmware *fw_image;
 struct isr_param irq_vector[PM8001_MAX_MSIX_VEC];
 u32reset_in_progress;
--- linux-4.15.0.orig/drivers/scsi/pm8001/pm80xx_hwi.c
+++ linux-4.15.0/drivers/scsi/pm8001/pm80xx_hwi.c
@@ -577,6 +577,9 @@
 pm8001_ha->main_cfg_tbl.pm80xx_tbl.pcs_event_log_size);
 pm8001_mw32(address, MAIN_PCS_EVENT_LOG_OPTION,
 pm8001_ha->main_cfg_tbl.pm80xx_tbl.pcs_event_log_severity);
+/* Update Fatal error interrupt vector */
+pm8001_ha->main_cfg_tbl.pm80xx_tbl.fatal_err_interrupt |=
+((pm8001_ha->number_of_intr - 1) << 8);
 pm8001_mw32(address, MAIN_FATAL_ERROR_INTERRUPT,
 pm8001_ha->main_cfg_tbl.pm80xx_tbl.fatal_err_interrupt);
 pm8001_mw32(address, MAIN_EVENT_CRC_CHECK,
 @@ -601,7 +604,7 @@
 pm8001_ha->main_cfg_tbl.pm80xx_tbl.port_recovery_timer &=
 0x0000ffff;
 pm8001_ha->main_cfg_tbl.pm80xx_tbl.port_recovery_timer |=
 -0x140000;
+CHIP_8006_PORT_RECOVERY_TIMEOUT;
 }
 pm8001_mw32(address, MAIN
 pm8001_ha->main_cfg_tbl.pm80xx_tbl.port_recovery_timer);
 @@ -1110,6 +1113,9 @@
 return -EBUSY;
 }

+/* Initialize the controller fatal error flag */
+ pm8001_ha->controller_fatal_error = false;
+
+ /* Initialize pci space address eg: mpi offset */
+ init_pci_device_addresses(pm8001_ha);
+ init_default_table_values(pm8001_ha);
+ @ @ -1218,13 +1224,17 @ @
+ u32 bootloader_state;
+ u32 ibutton0, ibutton1;
+
-/* Check if MPI is in ready state to reset */
-if (mpi_uninit_check(pm8001_ha) != 0) {
-PM8001_FAIL_DBG(pm8001_ha,
-pm8001_printk("MPI state is not ready\n");
-return -1;
+
-/* Process MPI table uninitialization only if FW is ready */
+if (!pm8001_ha->controller_fatal_error) {
+/* Check if MPI is in ready state to reset */
+if (mpi_uninit_check(pm8001_ha) != 0) {
+regval = pm8001_cr32(pm8001_ha, 0, MSGU_SCRATCH_PAD_1);
+PM8001_FAIL_DBG(pm8001_ha, pm8001_printk(
+"MPI state is not ready scratch1 :0x%x\n",
+regval));
+return -1;
+
-/* checked for reset register normal state; 0x0 */
-regval = pm8001_cr32(pm8001_ha, 0, SPC_REG_SOFT_RESET);
+PM8001_INIT_DBG(pm8001_ha,
@@ -2372,6 +2382,8 @@
+ t, status, ts->resp, ts->stat));
+if (t->slow_task)
+ complete(&t->slow_task->completion);
+ pm8001_ccb_task_free(pm8001_ha, t, ccb, tag);
+} else {
+ spin_unlock_irqrestore(&t->task_state_lock, flags);
+ @ @ -3752,6 +3764,46 @ @
+
+/* static void print_scratchpad_registers(struct pm8001_hba_info *pm8001_ha)
+ *
+ "
+ +PM8001_FAIL_DBG(pm8001_ha,
+ +pm8001_printk("MSGU_SCRATCH_PAD_0: 0x%\n",
+ +pm8001_cr32(pm8001_ha, 0, MSGU_SCRATCH_PAD_0));
+ +PM8001_FAIL_DBG(pm8001_ha,
pm8001_printf("MSGU_SCRATCH_PAD_1: 0x%x\n",
    pm8001_cr32(pm8001_ha, 0, MSGU_SCRATCH_PAD_1)));
PM8001_FAIL_DBG(pm8001_ha,
    pm8001_printf("MSGU_SCRATCH_PAD_2: 0x%x\n",
    pm8001_cr32(pm8001_ha, 0, MSGU_SCRATCH_PAD_2)));
PM8001_FAIL_DBG(pm8001_ha,
    pm8001_printf("MSGU_SCRATCH_PAD_3: 0x%x\n",
    pm8001_cr32(pm8001_ha, 0, MSGU_SCRATCH_PAD_3)));
PM8001_FAIL_DBG(pm8001_ha,
    pm8001_printf("MSGU_HOST_SCRATCH_PAD_0: 0x%x\n",
    pm8001_cr32(pm8001_ha, 0, MSGU_HOST_SCRATCH_PAD_0)));
PM8001_FAIL_DBG(pm8001_ha,
    pm8001_printf("MSGU_HOST_SCRATCH_PAD_1: 0x%x\n",
    pm8001_cr32(pm8001_ha, 0, MSGU_HOST_SCRATCH_PAD_1)));
+ PM8001_FAIL_DBG(pm8001_ha, pm8001_printk(  
+ "Firmware Fatal error! Regval:0x%xn", regval));  
+ print_scratchpad_registers(pm8001_ha);  
+ return ret;  
+ }  
+ }  
spin_lock_irqsave(&pm8001_ha->lock, flags);  
circularQ = &pm8001_ha->outbnd_q_tbl[vec];  
do {  
  /* spurious interrupt during setup if kexec-ing and  
  * driver doing a doorbell access w/ the pre-kexec oq  
  * interrupt setup.  
  */  
  if (!circularQ->pi_virt)  
    break;  
  ret = pm8001_mpi_msg_consume(pm8001_ha, circularQ, &pMsg1, &bc);  
  if (MPI_IO_STATUS_SUCCESS == ret) {  
    /* process the outbound message */  
  }  
}  
/* Port recovery timeout, 10000 ms for PM8006 controller */  
#define PORT_RECOVERY_TIMEOUT 0x640000

/* boot loader state */  
#define SCRATCH_PAD1_BOOTSTATE_MASK 0x70 /* Bit 4-6 */  
/* define SCRATCH_PAD1_BOOTSTATE_MASK 0x70/* Bit 4-6 */  
--- linux-4.15.0.orig/drivers/scsi/qedf/qedf_els.c  
+++ linux-4.15.0/drivers/scsi/qedf/qedf_els.c  
@@ -23,8 +23,6 @@  
int rc = 0;  
uint32_t did, sid;  
uint16_t xid;  
-#ifndef __LITTLE_ENDIAN_BITFIELD  
+uint32_t start_time = jiffies / HZ;  
-struct fcoe_wqe *sqe;  
+uint32_t current_time;  
struct fcoe_wqe *sqe;  

#define SAS_MAX_AIP 0x200000  
#define IT_NEXUS_TIMEOUT 0x7D0  
#define PORT_RECOVERY_TIMEOUT ((IT_NEXUS_TIMEOUT/100) + 30)  
#define CHIP_8006_PORT_RECOVERY_TIMEOUT 0x640000

#define SCRATCH_PAD_BOOT_LOAD_SUCCESS 0x0  
#define SCRATCH_PAD_IOP0_READY 0xC00  
#define SCRATCH_PAD_IOP1_READY 0x3000  
#define SCRATCH_PAD_MIPSALL_READY (SCRATCH_PAD_IOP1_READY |  
  
  SCRATCH_PAD_IOP0_READY |  
  
  SCRATCH_PAD_RAAE_READY)  
/* boot loader state */  
#define SCRATCH_PAD1_BOOTSTATE_MASK 0x70/* Bit 4-6 */  
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+++ linux-4.15.0/drivers/scsi/qedf/qedf_els.c  
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+uint32_t start_time = jiffies / HZ;  
-struct fcoe_wqe *sqe;  
+uint32_t current_time;  
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@@ -23,8 +23,6 @@  
int rc = 0;  
uint32_t did, sid;  
uint16_t xid;  
-#ifndef __LITTLE_ENDIAN_BITFIELD  
+uint32_t start_time = jiffies / HZ;  
-struct fcoe_wqe *sqe;  
+uint32_t current_time;  
struct fcoe_wqe *sqe;  

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+++ linux-4.15.0/drivers/scsi/qedf/qedf_els.c  
@@ -23,8 +23,6 @@  
int rc = 0;  
uint32_t did, sid;  
uint16_t xid;  
-#ifndef __LITTLE_ENDIAN_BITFIELD  
+uint32_t start_time = jiffies / HZ;  
-struct fcoe_wqe *sqe;  
+uint32_t current_time;  
struct fcoe_wqe *sqe;  

#define SCRATCH_PAD1_BOOTSTATE_MASK 0x70/* Bit 4-6 */  
--- linux-4.15.0.orig/drivers/scsi/qedf/qedf_els.c  
+++ linux-4.15.0/dr...
unsigned long flags;
u16 sqe_idx;
@@ -50,18 +48,12 @@
goto els_err;
}

-retry_els:
els_req = qedf_alloc_cmd(fcport, QEDF_ELS);
if (!els_req) {
-    current_time = jiffies / HZ;
-    if ((current_time - start_time) > 10) {
-        QEDF_INFO(&(qedf->dbg_ctx), QEDF_LOG_ELS,
-                "els: Failed els 0x%x\n", op);
-        rc = -ENOMEM;
-        goto els_err;
-    }
-    mdelay(20 * USEC_PER_MSEC);
-    goto retry_els;
+    QEDF_INFO(&qedf->dbg_ctx, QEDF_LOG_ELS,
+            "Failed to alloc ELS request 0x%x\n", op);
+    rc = -ENOMEM;
+    goto els_err;
}

QEDF_INFO(&qedef->dbg_ctx, QEDF_LOG_ELS, "initiate_els els_req = ")
--- linux-4.15.0.orig/drivers/scsi/qedf/qedf_io.c
+++ linux-4.15.0/drivers/scsi/qedf/qedf_io.c
@@ -883,6 +883,7 @@
if (!test_bit(QEDF_RPORT_SESSION_READY, &fcport->flags)) {
    QEDF_ERR(&(qedf->dbg_ctx), "Session not offloaded yet.\n");
    kref_put(&io_req->refcount, qedf_release_cmd);
    +return -EINVAL;
}

/* Obtain free SQE */
--- linux-4.15.0.orig/drivers/scsi/qedf/qedf_main.c
+++ linux-4.15.0/drivers/scsi/qedf/qedf_main.c
@@ -1382,7 +1382,7 @@
static void qedf_fcoe_ctlr_setup(struct qedf_ctx *qedf)
{
    -fcoe_ctlr_init(&qedef->ctrlr, FIP_ST_AUTO);
    +fcoe_ctlr_init(&qedef->ctrlr, FIP_MODE_AUTO);

    qedef->ctrlr.send = qedf_fip_send;
    qedef->ctrlr.get_src_addr = qedf_get_src_mac;
    @@ -1649,6 +1649,15 @@
    struct Scsi_Host *shost = vport_to_shost(vport);
struct fc_lport *n_port = shost_priv(shost);
struct fc_lport *vn_port = vport->dd_data;
+struct qedf_ctx *qedf = lport_priv(vn_port);
+
+if (!qedf) {
+QEDF_ERR(NULL, "qedf is NULL.");
+goto out;
+}
+
+/* Set unloading bit on vport qedf_ctx to prevent more I/O */
+set_bit(QEDF_UNLOADING, &qedf->flags);

mutex_lock(&n_port->lp_mutex);
list_del(&vn_port->list);
@@ -1675,6 +1684,7 @@
if (vn_port->host)
scsi_host_put(vn_port->host);

+out:
return 0;
}

@@ -3230,6 +3240,11 @@
init_completion(&qedf->flogi_compl);

+status = qed_ops->common->update_drv_state(qedf->cdev, true);
+if (status)
+QEDF_ERR(& qedf->dbg_ctx),
+"Failed to send drv state to MFW.");
+
memset(&link_params, 0, sizeof(struct qed_link_params));
link_params.link_up = true;
status = qed_ops->common->set_link(qedf->cdev, &link_params);
@@ -3278,6 +3293,7 @@
static void __qedf_remove(struct pci_dev *pdev, int mode)
{
struct qedf_ctx *qedf;
+int rc;

if (!pdev) {
QEDF_ERR(NULL, "pdev is NULL.");
@@ -3372,6 +3388,12 @@
qed_ops->common->set_power_state(qedf->cdev, PCI_D0);
pci_set_drvdata(pdev, NULL);
}
+rc = qed_ops->common->update_drv_state(qedf->cdev, false);
+if (rc)
+QEDF_ERR(&(qedf->dbg_ctx),
+"Failed to send drv state to MFW
");
+
qed_ops->common->slowpath_stop(qedf->cdev);
qed_ops->common->remove(qedf->cdev);

--- linux-4.15.0.orig/drivers/scsi/qedi/qedi.h
+++ linux-4.15.0/drivers/scsi/qedi/qedi.h
@@ -77,6 +77,11 @@
QEDI_NVM_TGT_SEC,

+struct qedi_nvm_iscsi_image {
+struct nvm_iscsi_cfg iscsi_cfg;
+u32 crc;
+};
+
+struct qedi_uio_ctrl {
+/* meta data */
+u32 uio_hsi_version;
@@ -294,7 +299,7 @@
void *bdq_pbl_list;
dma_addr_t bdq_pbl_list_dma;
u8 bdq_pbl_list_num_entries;
-struct nvm_iscsi_cfg *iscsi_cfg;
+struct qedi_nvm_iscsi_image *iscsi_image;
dma_addr_t nvm_buf_dma;
void __iomem *bdq_primary_prod;
void __iomem *bdq_secondary_prod;
--- linux-4.15.0.orig/drivers/scsi/qedi/qedi_dbg.c
+++ linux-4.15.0/drivers/scsi/qedi/qedi_dbg.c
@@ -16,10 +16,6 @@
{
va_list va;
struct va_format vaf;
-char nfunc[32];
-
-memset(nfunc, 0, sizeof(nfunc));
-memcpy(nfunc, func, sizeof(nfunc) - 1);

va_start(va, fmt);
@@ -28,9 +24,9 @@

if (likely(qedi) && likely(qedi->pdev))
pr_err("[%s]:[%s:%d]:%d: %pV", dev_name(qede->pdev),
- nfunc, line, qedf->host_no, &vaf);
func, line, qedi->host_no, &vaf);
else
    pr_err("[0000:00:00.0]:[%s:%d]: %pV", func, line, &vaf);
    pr_err("[0000:00:00.0]:[%s:%d]: %pV", func, line, &vaf);
va_end(va);
}
@@ -41,10 +37,6 @@
{
    va_list va;
    struct va_format vaf;
    char nfunc[32];
    -memset(nfunc, 0, sizeof(nfunc));
    -memcpy(nfunc, func, sizeof(nfunc) - 1);
    va_start(va, fmt);
@@ -56,9 +48,9 @@
if (likely(qedi) && likely(qedi->pdev))
    pr_warn("[%s]:[%s:%d]:%d: %pV", dev_name(&qedi->pdev->dev),
        func, line, qedi->host_no, &vaf);
else
    pr_warn("[0000:00:00.0]:[%s:%d]: %pV", func, line, &vaf);
ret:
va_end(va);
@@ -70,10 +62,6 @@
{
    va_list va;
    struct va_format vaf;
    char nfunc[32];
    -memset(nfunc, 0, sizeof(nfunc));
    -memcpy(nfunc, func, sizeof(nfunc) - 1);
    va_start(va, fmt);
@@ -85,10 +73,10 @@
if (likely(qedi) && likely(qedi->pdev))
    pr_notice("[%s]:[%s:%d]:%d: %pV", dev_name(&qedi->pdev->dev),
        func, line, qedi->host_no, &vaf);
    dev_name(&qedi->pdev->dev), func, line,
    qedi->host_no, &vaf);
else
- pr_notice("[0000:00:00.0]:[\%s:\%d]: %pV", nfunc, line, &vaf);
+ pr_notice("[0000:00:00.0]:[\%s:\%d]: %pV", func, line, &vaf);

ret:
 va_end(va);
@@ -100,10 +88,6 @@
 |
 va_list va;
 struct va_format vaf;
- char nfunc[32];
 -
- memset(nfunc, 0, sizeof(nfunc));
- memcpy(nfunc, func, sizeof(nfunc) - 1);

 va_start(va, fmt);
@@ -115,9 +99,9 @@
 if (likely(qedi) && likely(qedi->pdev))
 pr_info("[%s]:[%s:%d]:%d: %pV", dev_name(&qedi->pdev->dev),
- nfunc, line, qedi->host_no, &vaf);
+ func, line, qedi->host_no, &vaf);
 else
- pr_info("[0000:00:00.0]:[\%s:\%d]: %pV", nfunc, line, &vaf);
+ pr_info("[0000:00:00.0]:[\%s:\%d]: %pV", func, line, &vaf);

 ret:
 va_end(va);
--- linux-4.15.0.orig/drivers/scsi/qedi/qedi_fw.c
+++ linux-4.15.0/drivers/scsi/qedi/qedi_fw.c
@@ -62,6 +62,7 @@
 "Freeing tid=0x%x for cid=0x%\n",
 cmd->task_id, qedi_conn->iscsi_conn_id);
+
+spin_lock(&qedi_conn->list_lock);
 if (likely(cmd->io_cmd_in_list)) {
 cmd->io_cmd_in_list = false;
 list_del_init(&cmd->io_cmd);
@@ -72,6 +73,7 @@
 cmd->task_id, qedi_conn->iscsi_conn_id, &cmd->io_cmd);
 }
+spin_unlock(&qedi_conn->list_lock);

 cmd->state = RESPONSE_RECEIVED;
 qedi_clear_task_idx(qedi, cmd->task_id);
@@ -125,6 +127,7 @@
"Freeing tid=0x%x for cid=0x%x\n",
cmd->task_id, qedi_conn->iscsi_conn_id);

+spin_lock(&qedi_conn->list_lock);
if (likely(cmd->io_cmd_in_list)) {
    cmd->io_cmd_in_list = false;
    list_del_init(&cmd->io_cmd);
    cmd->task_id, qedi_conn->iscsi_conn_id,
    &cmd->io_cmd);
}
+spin_unlock(&qedi_conn->list_lock);

cmd->state = RESPONSE_RECEIVED;
qedi_clear_task_idx(qedi, cmd->task_id);
@@ -227,11 +231,13 @@

if (((tmf_hdr->flags & ISCSI_FLAG_TM_FUNC_MASK) ==
    ISCSI_TM_FUNC_LOGICAL_UNIT_RESET) ||
    ISCSI_LOGIN_RESPONSE_HDR_DATA_SEG_LEN_MASK;
qedi_conn->gen_pdu.resp_wr_ptr = qedi_conn->gen_pdu.resp_buf + pld_len;

+spin_lock(&qedi_conn->list_lock);
if (likely(cmd->io_cmd_in_list)) {
    cmd->io_cmd_in_list = false;
    list_del_init(&cmd->io_cmd);
    qedi_conn->active_cmd_count--;
}
+spin_unlock(&qedi_conn->list_lock);

memset(task_ctx, '\0', sizeof(*task_ctx));
@@ -761,6 +769,11 @@

iscsi_cid = cqe->conn_id;
qedi_conn = qedi->cid_que.conn_cid_tbl[iscsi_cid];
+if (qedi_conn) {


+QEDI_INFO(&qedi->dbg_ctx, QEDI_LOG_INFO,
+ "icid not found 0x%\x'n", cqe->conn_id);
+return;
+
/* Based on this itt get the corresponding qedi_cmd */

spin_lock_bh(&qedi_conn->tmf_work_lock);
@@ -823,8 +836,11 @@
qedi_clear_task_idx(qedi_conn->qedi, rtid);

spin_lock(&qedi_conn->list_lock);
- list_del_init(&dbg_cmd->io_cmd);
- qedi_conn->active_cmd_count--;
+ if (likely(dbg_cmd->io_cmd_in_list)) {
+ dbg_cmd->io_cmd_in_list = false;
+ list_del_init(&dbg_cmd->io_cmd);
+ qedi_conn->active_cmd_count--;
+ }

spin_unlock(&qedi_conn->list_lock);
qedi_cmd->state = CLEANUP_RECV;
wake_up_interruptible(&qedi_conn->wait_queue);
@@ -1241,6 +1257,7 @@
qedi_conn->cmd_cleanup_req++;
qedi_iscsi_cleanup_task(ctask, true);

+cmd->io_cmd_in_list = false;
list_del_init(&cmd->io_cmd);
qedi_conn->active_cmd_count--;
QEDI_WARN(&qedi->dbg_ctx,
@@ -1446,7 +1463,7 @@
ldel_exit:
spin_lock_bh(&qedi_conn->tmf_work_lock);
- if (!qedi_cmd->list_tmf_work) {
- list_del_init(&list_work->list);
- qedi_cmd->list_tmf_work = NULL;
- kfree(list_work);
- }
@@ -1454,8 +1471,11 @@
spin_unlock_bh(&qedi_conn->tmf_work_lock);

spin_lock(&qedi_conn->list_lock);
- list_del_init(&cmd->io_cmd);
- qedi_conn->active_cmd_count--;
+ if (likely(cmd->io_cmd_in_list)) {
+ cmd->io_cmd_in_list = false;
+ list_del_init(&cmd->io_cmd);
+ qedi_conn->active_cmd_count--;


clear_bit(QEDI_CONN_FW_CLEANUP, &qedi_conn->flags);
--- linux-4.15.0.orig/drivers/scsi/qedi/qedi_iscsi.c
+++ linux-4.15.0/drivers/scsi/qedi/qedi_iscsi.c
@@ -817,8 +817,6 @@
 struct qedi_endpoint *qedi_ep;
 struct sockaddr_in *addr;
 struct sockaddr_in6 *addr6;
-struct qed_dev *cdev  =  NULL;
-struct qedi_uio_dev *udev = NULL;
 struct iscsi_path path_req;
 u32 msg_type = ISCSI_KEVENT_IF_DOWN;
 u32 iscsi_cid = QEDI_CID_RESERVED;
@@ -838,8 +836,6 @@
 }

device = iscsi_host_priv(shost);
-cdev = qedi->cdev;
-udev = qedi->udev;

if (test_bit(QEDI_IN_OFFLINE, &qedi->flags) ||
    test_bit(QEDI_IN_RECOVERY, &qedi->flags)) {
@@ -961,6 +957,7 @@

device_ep = ep->dd_data;
if (device_ep->state == EP_STATE_IDLE ||
    device_ep->state == EP_STATE_OFLDCONN_NONE ||
    device_ep->state == EP_STATE_OFLDCONN_FAILED)
return -1;
@@ -986,11 +983,13 @@
{
 struct qedi_cmd *cmd, *cmd_tmp;

+spin_lock(&qedi_conn->list_lock);
list_for_each_entry_safe(cmd, cmd_tmp, &qedi_conn->active_cmd_list,
    io_cmd) {
    list_del_init(&cmd->io_cmd);
    qedi_conn->active_cmd_count--;
} 
+spin_unlock(&qedi_conn->list_lock);

static void qedi_ep_disconnect(struct iscsi_endpoint *ep)
@@ -1007,7 +1006,11 @@
qedi_ep = ep->dd_data;

spin_unlock(&qedi_conn->list_lock);

qedi = qedi_ep->qedi;

-flush_work(&qedi_ep->offload_work);
+if (qedi_ep->state == EP_STATE_OFLDCONN_START) 
+goto ep_exit_recover;
+
+if (qedi_ep->state != EP_STATE_OFLDCONN_NONE) 
+flush_work(&qedi_ep->offload_work);

if (qedi_ep->conn) {
    qedi_conn = qedi_ep->conn;
    @@ -1043,6 +1046,7 @@

        switch (qedi_ep->state) {
            case EP_STATE_OFLDCONN_START:
                +case EP_STATE_OFLDCONN_NONE:
                    goto ep_release_conn;
            case EP_STATE_OFLDCONN_FAILED:
                    break;
            @@ -1070,6 +1074,9 @@
                break;
        }

        if (!abrt_conn)
            +wait_delay += qedi->pf_params.iscsi_pf_params.two_msl_timer;
        +qedi_ep->state = EP_STATE_DISCONN_START;
        ret = qedi_ops->destroy_conn(qedi->cdev, qedi_ep->handle, abrt_conn);
    if (ret) {
@@ -1223,6 +1230,10 @@
            iscsi_cid = (u32)path_data->handle;
        +if (iscsi_cid >= qedi->max_active_conns) {
            +ret = -EINVAL;
            +goto set_path_exit;
        }
        qedi_ep = qedi->ep_tbl[iscsi_cid];
        QEDI_INFO(&qedi->dbg_ctx, QEDI_LOG_INFO,
            "iscsi_cid=0x%x, qedi_ep=%p\n", iscsi_cid, qedi_ep);
@@ -1233,6 +1244,7 @@
            } QEDI_NOTICE(&qedi->dbg_ctx, "dst mac NOT VALID\n");
        +qedi_ep->state = EP_STATE_OFLDCONN_NONE;
            ret = -EIO;
            goto set_path_exit;
    }
--- linux-4.15.0.orig/drivers/scsi/qedi/qedi_iscsi.h
+++ linux-4.15.0/drivers/scsi/qedi/qedi_iscsi.h
@@ -59,6 +59,7 @@
 EP_STATE_OFLDCONN_FAILED = 0x2000,
 EP_STATE_CONNECT_FAILED = 0x4000,
 EP_STATE_DISCONN_TIMEDOUT = 0x8000,
+EP_STATE_OFLDCONN_NONE = 0x10000,
 }

 struct qedi_conn;
--- linux-4.15.0.orig/drivers/scsi/qedi/qedi_main.c
+++ linux-4.15.0/drivers/scsi/qedi/qedi_main.c
@@ -628,7 +628,7 @@
 goto exit_setup_shost;
 }

-shost->max_id = QEDI_MAX_ISCSI_CONNS_PER_HBA;
+shost->max_id = QEDI_MAX_ISCSI_CONNS_PER_HBA - 1;
 shost->max_channel = 0;
 shost->max_lun = ~0;
 shost->max_cmd_len = 16;
@@ -1147,23 +1147,26 @@
 static void qedi_free_nvm_iscsi_cfg(struct qedi_ctx *qedi)
 {
- if (qedi->iscsi_cfg)
+ if (qedi->iscsi_image)
     dma_free_coherent(&qedi->pdev->dev,
- sizeof(struct nvm_iscsi_cfg),
- qedi->iscsi_cfg, qedi->nv_buf_dma);
+ sizeof(struct qedi_nvm_iscsi_image),
+ qedi->iscsi_image, qedi->nv_buf_dma);
 }

 static int qedi_alloc_nvm_iscsi_cfg(struct qedi_ctx *qedi)
 { 
- qedi->iscsi_cfg = dma_zalloc_coherent(&qedi->pdev->dev,
- sizeof(struct nvm_iscsi_cfg),
- &qedi->nv_buf_dma, GFP_KERNEL);
- if (!qedi->iscsi_cfg) {
+ struct qedi_nvm_iscsi_image nvm_image;
+ qedi->iscsi_image = dma_zalloc_coherent(&qedi->pdev->dev,
+ sizeof(nvm_image),
+ &qedi->nv_buf_dma,
+ GFP_KERNEL);
+ if (!qedi->iscsi_image) {
 QEDI_ERR(&qedi->dbg_ctx, "Could not allocate NVM BUF:\n");
}
return -ENOMEM;
}
QEDI_INFO(&qedi->dbg_ctx, QEDI_LOG_INFO,
- "NVM BUF addr=0x%p dma=0x%llx\n", qedi->iscsi_cfg,
+ "NVM BUF addr=0x%p dma=0x%llx\n", qedi->iscsi_image,
qedi->nvm_buf_dma);

return 0;
@@ -1299,7 +1302,7 @@
{
  u32 *list;
  int i;
-  int status = 0, rc;
+  int status;
  u32 *pbl;
  dma_addr_t page;
  int num_pages;
@@ -1310,14 +1313,14 @@
/*
if (!qedi->num_queues) {
  QEDI_ERR(&qedi->dbg_ctx, "No MSI-X vectors available!\n");
-  return 1;
+  return -ENOMEM;
  }
*/
/* Make sure we allocated the PBL that will contain the physical
 * addresses of our queues
 */
if (!qedi->p_cpuq) {
-  status = 1;
+  status = -EINVAL;
  goto mem_alloc_failure;
}
/* Allocate DMA coherent buffers for BDQ */
-rc = qedi_alloc_bdq(qedi);
- if (rc)
+status = qedi_alloc_bdq(qedi);
+ if (status)
  goto mem_alloc_failure;
/* Allocate DMA coherent buffers for NVM_ISCSI_CFG */
-rc = qedi_alloc_nvm_iscsi_cfg(qedi);
- if (rc)
+status = qedi_alloc_nvm_iscsi_cfg(qedi);
+ if (status)
+if (status)
goto mem_alloc_failure;
/* Allocate a CQ and an associated PBL for each MSI-X
 @@ -1351,6 +1354,7 @@
if (!qedi->global_queues[i]) {
 QEDI_ERR(&qedi->dbg_ctx,
 "Unable to allocation global queue %d\n", i);
+status = -ENOMEM;
goto mem_alloc_failure;
}
@@ -1716,7 +1720,7 @@
 struct nvm_iscsi_block *block;

 pf = qedi->dev_info.common.abs_pf_id;
- block = &qedi->iscsi_cfg->block[0];
+ block = &qedi->iscsi_image->iscsi_cfg.block[0];
for (i = 0; i < NUM_OF_ISCSI_PF_SUPPORTED; i++, block++) {
    flags = ((block->id) & NVM_ISCSI_CFG_BLK_CTRL_FLAG_MASK) >>
    NVM_ISCSI_CFG_BLK_CTRL_FLAG_OFFSET;
@@ -1840,8 +1844,8 @@
 switch (type) {
 case ISCSI_BOOT_INI_INITIATOR_NAME:
-    rc = snprintf(str, NVM_ISCSI_CFG_ISCSI_NAME_MAX_LEN, "%s\n",
-              initiator->initiator_name.byte);
+    rc = sprintf(str, "%.*s\n", NVM_ISCSI_CFG_ISCSI_NAME_MAX_LEN,
+              initiator->initiator_name.byte);
    break;
    default:
    rc = 0;
@@ -1908,8 +1912,8 @@
 switch (type) {
 case ISCSI_BOOT_TGT_NAME:
-    rc = snprintf(str, NVM_ISCSI_CFG_ISCSI_NAME_MAX_LEN, "%s\n",
-              block->target[idx].target_name.byte);
+    rc = sprintf(str, "%.*s\n", NVM_ISCSI_CFG_ISCSI_NAME_MAX_LEN,
+              block->target[idx].target_name.byte);
    break;
    case ISCSI_BOOT_TGT_IP_ADDR:
    if (ipv6_en)
@@ -1930,20 +1934,20 @@
 break;
    case ISCSI_BOOT_TGT_CHAP_NAME:
-    rc = snprintf(str, NVM_ISCSI_CFG_CHAP_NAME_MAX_LEN, "%s\n",
-              block->target[idx].lun.value[0]);
+    rc = sprintf(str, "%.*s\n", NVM_ISCSI_CFG_CHAP_NAME_MAX_LEN,
+              block->target[idx].lun.value[0]);
    break;
-     chap_name);
+rc = sprintf(str, "%.s
", NVM_ISCSI_CFG_CHAP_NAME_MAX_LEN,
 +     chap_name);
break;
case ISCSI_BOOT_TGT_CHAP_SECRET:
-rc = snprintf(str, NVM_ISCSI_CFG_CHAP_PWD_MAX_LEN, "%.s
",
 -     chap_secret);
+rc = sprintf(buf, "%.s
", NVM_ISCSI_CFG_CHAP_PWD_MAX_LEN,
 +     chap_secret);
break;
case ISCSI_BOOT_TGT_REV_CHAP_NAME:
-rc = snprintf(str, NVM_ISCSI_CFG_CHAP_NAME_MAX_LEN, "%.s
",
 -     mchap_name);
+rc = sprintf(str, "%.s
", NVM_ISCSI_CFG_CHAP_NAME_MAX_LEN,
 +     mchap_name);
break;
case ISCSI_BOOT_TGT_REV_CHAP_SECRET:
-rc = snprintf(str, NVM_ISCSI_CFG_CHAP_PWD_MAX_LEN, "%.s
",
 -     mchap_secret);
+rc = sprintf(buf, "%.s
", NVM_ISCSI_CFG_CHAP_PWD_MAX_LEN,
 +     mchap_secret);
break;
case ISCSI_BOOT_TGT_FLAGS:
rc = snprintf(str, 3, "%hhd\n", SYSFS_FLAG_FW_SEL_BOOT);
@@ -2008,15 +2012,14 @@
static int qedi_get_boot_info(struct qedi_ctx *qedi)
{
    int ret = 1;
-u16 len;
-    -len = sizeof(struct nvm_iscsi_cfg);
+    struct qedi_nvm_iscsi_image nvm_image;

QEDI_INFO(&qedi->dbg_ctx, QEDI_LOG_INFO,
    "Get NVM iSCSI CFG image\n");
ret = qedi_ops->common->nvm_get_image(qedi->cdev,
    QED_NVM_IMAGE_ISCSI_CFG,
    -    (char *)qedi->iscsi_cfg, len);
+    (char *)qedi->iscsi_image,
+    sizeof(nvm_image));
if (ret)
QEDI_ERR(&qedi->dbg_ctx,
    "Could not get NVM image. ret = %d\n", ret);
@@ -2087,6 +2090,7 @@
static void __qedi_remove(struct pci_dev *pdev, int mode)
{
    struct qedi_ctx *qedi = pci_get_drvdata(pdev);
    rval =
if (qedi->tmf_thread) {
    flush_workqueue(qedi->tmf_thread);
    @ @ -2116,6 +2120,10 @@
if (mode == QEDI_MODE_NORMAL)
    qedi_free_iscsi_pf_param(qedi);

    rval = qedi_ops->common->update_drv_state(qedi->cdev, false);
    +if (rval)
    +QEDI_ERR(&qedi->dbg_ctx, "Failed to send drv state to MFW\n");
    +if (!test_bit(QEDI_IN_OFFLINE, &qedi->flags)) {
        qedi_ops->common->slowpath_stop(qedi->cdev);
        qedi_ops->common->remove(qedi->cdev);
        @ @ -2380,7 +2388,7 @@
        QEDI_ERR(&qedi->dbg_ctx,
                "Unable to start offload thread!\n");
        rc = -ENODEV;
        -goto free_cid_que;
        +goto free_tmf_thread;
    }

    /* F/w needs 1st task context memory entry for performance */
    @ @ -2390,10 +2398,18 @@
if (qedi_setup_boot_info(qedi))
    QEDI_ERR(&qedi->dbg_ctx,
            "No iSCSI boot target configured!\n");
    +rc = qedi_ops->common->update_drv_state(qedi->cdev, true);
    +if (rc)
    +QEDI_ERR(&qedi->dbg_ctx,
            "Failed to send drv state to MFW!\n");
    +}

return 0;

+free_tmf_thread:
+destroy_workqueue(qedi->tmf_thread);
free_cid_que:
qedi_release_cid_que(qedi);
free_uio:
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_attr.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_attr.c
@@ -345,7 +345,7 @@
        }

ha->optrom_region_start = start;
ha->optrom_region_size = start + size;
ha->optrom_region_size = size;

ha->optrom_state = QLA_SREADING;
ha->optrom_buffer = vmalloc(ha->optrom_region_size);
@@ -418,7 +418,7 @@
}

ha->optrom_region_start = start;
ha->optrom_region_size = start + size;
ha->optrom_region_size = size;

ha->optrom_state = QLA_SWRITING;
ha->optrom_buffer = vmalloc(ha->optrom_region_size);
@@ -652,7 +652,8 @@
break;
} else {
/* Make sure FC side is not in reset */
-qla2x00_wait_for_hba_online(vha);
+WARN_ON_ONCE(qla2x00_wait_for_hba_online(vha) !=
+QLA_SUCCESS);

/* Issue MPI reset */
scsi_block_requests(vha->host);
@@ -1913,6 +1914,8 @@
vha->qla_stats.jiffies_at_last_reset = get_jiffies_64();

if (IS_FW12_CAPABLE(ha)) {
  int rval;
  +
  stats = dma_alloc_coherent(&ha->pdev->dev,
    sizeof(*stats), &stats_dma, GFP_KERNEL);
  if (!stats) {
@@ -1922,7 +1925,11 @@
    /* reset firmware statistics */
-qla24xx_get_isp_stats(base_vha, stats, stats_dma, BIT_0);
+rval = qla24xx_get_isp_stats(base_vha, stats, stats_dma, BIT_0);
+if (rval != QLA_SUCCESS)
+qlog(ql_log_warn, vha, 0x70de,
+     "Resetting ISP statistics failed: rval = %d\n",
+     rval);

dma_free_coherent(&ha->pdev->dev, sizeof(*stats),
  stats, stats_dma);
@@ -2142,6 +2149,7 @@
msleep(1000);
qla24xx_disable_vp(vha);
+qla2x00_wait_for_sess_deletion(vha);

vha->flags.delete_progress = 1;

@@ -2170,6 +2178,8 @@
dma_free_coherent(&ha->pdev->dev, vha->gnl.size, vha->gnl,
vha->gnl.ldma);

+vha->gnl.l = NULL;
+if (vha->qpair && vha->qpair->vp_idx == vha->vp_idx) {
if (qla2xxx_delete_qpair(vha, vha->qpair) != QLA_SUCCESS)
ql_log(ql_log_warn, vha, 0x7087,
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_bsg.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_bsg.c
@@ -19,10 +19,11 @@
struct bsg_job *bsg_job = sp->u.bsg_job;
struct fc_bsg_reply *bsg_reply = bsg_job->reply;
+sp->free(sp);
+bsg_reply->result = res;
bsg_job_done(bsg_job, bsg_reply->result,
    bsg_reply->reply_payload_rcv_len);
-sp->free(sp);
}

void
@@ -258,7 +259,7 @@
srb_t *sp;
const char *type;
int req_sg_cnt, rsp_sg_cnt;
-int rval =  (DRIVER_ERROR << 16);
+int rval =  (DID_ERROR << 16);
uint16_t nextlid = 0;

if (bsg_request->msgcode == FC_BSG_RPT_ELS) {
@@ -342,6 +343,8 @@
dma_map_sg(&ha->pdev->dev, bsg_job->request_payload.sg_list,
bsg_job->request_payload.sg_cnt, DMA_TO_DEVICE);
if (!req_sg_cnt) {
    dma_unmap_sg(&ha->pdev->dev, bsg_job->request_payload.sg_list,
+        bsg_job->request_payload.sg_cnt, DMA_TO_DEVICE);
    rval = -ENOMEM;
goto done_free_fcport;
}
rsp_sg_cnt = dma_map_sg(&ha->pdev->dev, bsg_job->reply_payload.sg_list, bsg_job->reply_payload.sg_cnt, DMA_FROM_DEVICE);
    if (!rsp_sg_cnt) {
        dma_unmap_sg(&ha->pdev->dev, bsg_job->reply_payload.sg_list, bsg_job->reply_payload.sg_cnt, DMA_FROM_DEVICE);
        rval = -ENOMEM;
        goto done_free_fcport;
    }

struct Scsi_Host *host = fc_bsg_to_host(bsg_job);
scsi_qla_host_t *vha = shost_priv(host);
struct qla_hw_data *ha = vha->hw;
-int rval = (DRIVER_ERROR << 16);
+int rval = (DID_ERROR << 16);
int req_sg_cnt, rsp_sg_cnt;
uint16_t loop_id;
struct fc_port *fcport;

/* Check the type of the adapter */
if (!IS_BIDI_CAPABLE(ha)) {
    req_data_len = bsg_job->request_payload.payload_len;
    rsp_data_len = bsg_job->reply_payload.payload_len;
    if (req_data_len != rsp_data_len) {
        rval = EXT_STATUS_BUSY;
        ql_log(ql_log_warn, vha, 0x70aa,
                req_data_len, rsp_data_len);
        goto done_unmap_sg;
    }

    req_data_len = bsg_job->request_payload.payload_len;
    rsp_data_len = bsg_job->reply_payload.payload_len;
    if (req_data_len != rsp_data_len) {
        rval = EXT_STATUS_BUSY;
        ql_log(ql_log_warn, vha, 0x70aa,
                req_data_len, rsp_data_len);
        goto done_unmap_sg;
    }

    /* Alloc SRB structure */
sp = qla2x00_get_sp(vha, &(vha->bidir_fcport), GFP_KERNEL);
if (!sp) {
	@@ -1950,7 +1954,7 @@
	struct Scsi_Host *host = fc_bsg_to_shost(bsg_job);
	scsi_qla_host_t *vha = shost_priv(host);
	struct qla_hw_data *ha = vha->hw;
	-int rval = (DRIVER_ERROR << 16);
+ int rval = (DID_ERROR << 16);
	struct qla_mt_iocb_rqst_fx00 *piocb_rqst;

srb_t *sp;
int req_sg_cnt = 0, rsp_sg_cnt = 0;
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_dbg.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_dbg.c
@@ -2517,12 +2517,6 @@
/*                         Driver Debug Functions.                          */
****************************************************************************/
- static inline int
- ql_mask_match(uint32_t level)
- {
- return (level & ql2xextended_error_logging) == level;
- }
- 
- /*
- * This function is for formatting and logging debug information.
- * It is to be used when vha is available. It formats the message
- --- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_dbg.h
- +++ linux-4.15.0/drivers/scsi/qla2xxx/qla_dbg.h
- @@ -374,3 +374,9 @@
- extern void qla24xx_pause_risc(struct device_reg_24xx __iomem *,
- struct qla_hw_data *);
- extern int qla24xx_soft_reset(struct qla_hw_data *);
+ static inline int
+ ql_mask_match(uint level)
+ {
+ return (level & ql2xextended_error_logging) == level;
+ }
+ 
+ /*
+ * This function is for formatting and logging debug information.
+ * It is to be used when vha is available. It formats the message
+ --- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_def.h
+ +++ linux-4.15.0/drivers/scsi/qla2xxx/qla_def.h
+ @@ -261,9 +261,9 @@
+ struct name_list_extended {
+ struct get_name_list_extended *l;
+ dma_addr_t		ldma;
- struct list_head 	fcports;	/* protect by sess_list */
+ struct list_head fcports;
+ spinlock_t_fcports_lock;
        u32size;

---
Timeout timer counts in seconds

To identify if a srb is of T10-CRC type. @sp => srb_t pointer */
#define IS_PROT_IO(sp)(sp->flags & SRB_CRC_CTX_DSD_VALID)

/*
 * 24 bit port ID type definition.
 */
typedef union {
    uint32_t b24 : 24;
    
    struct {
        union {
            #ifdef __BIG_ENDIAN
                uint8_t domain;
                uint8_t area;
                uint8_t al_pa;
            #elif defined(__LITTLE_ENDIAN)
                uint8_t al_pa;
                uint8_t area;
                uint8_t domain;
            #else
                #error "__BIG_ENDIAN or __LITTLE_ENDIAN must be defined!"
            #endif
            uint8_t rsvd_1;
        } b;
    } b;
    
    #define INVALID_PORT_ID 0xFFFFFF
}

struct els_logo_payload {
    uint8_t opcode;
    uint8_t rsvd[3];
    u32 rsp_size;
    void* req;
    void*rsp;
    port_id_t id;
};

const char *name;
int iocbs;
struct qla_qpair *qpair;

u32 gen1;/* scratch */
u32 gen2;  /* scratch */
union {
    @ @ -2164.28 +2189.6 @ @
#define REQUEST_ENTRY_SIZE(sizeof(request_t))

/*
 * 24 bit port ID type definition.
 */
- typedef union {
    - uint32_t b24 : 24;
    -
    - struct {
        - #ifdef __BIG_ENDIAN
        - uint8_t domain;
        - uint8_t area;
        - uint8_t al_pa;
        - #elif defined(__LITTLE_ENDIAN)
        - uint8_t al_pa;
        - uint8_t area;
        - uint8_t domain;
        - #else
        - #error "__BIG_ENDIAN or __LITTLE_ENDIAN must be defined!"
        - #endif
        - uint8_t rsvd_1;
        - }
    - b;
    - }
    - port_id_t;
- #define INVALID_PORT_ID 0xFFFFFF

/
 * Switch info gathering structure.
 @ @ -2315.6 +2318.7 @ @

unsigned int conf_compl_supported:1;
unsigned int deleted:2;
+unsigned int free_pending:1;
unsigned int local:1;
unsigned int logout_on_delete:1;
unsigned int logo_ack_needed:1;
@ @ -2434.6 +2438.7 @ @
#define FCF_FCP2_DEVICEBIT_2
#define FCF_ASYNC_SENTBIT_3
#define FCF_CONF_COMP_SUPPORTED BIT_4
+define FCF_ASYNC_ACTIVEBIT_5

/* No loop ID flag. */
#define FC_NO_LOOP_ID0x1000
@ @ -3494.6 +3499.7 @ @
uint32_t detected_lr_sfp:1;
uint32_t using_lr_setting:1;
+uint32_t trida_fmt2:1;
} flags;

uint16_t long_range_distance; /* 32G & above */
@@ -4107,6 +4113,7 @@
#define LOOP_READY 5
#define LOOP_DEAD 6
+
unsigned long relogin_jif;
unsigned long dpc_flags;
#define RESET_MARKER_NEEDED0/* Send marker to ISP. */
#define RESET_ACTIVE1
@@ -4252,6 +4259,7 @@
uint8_t n2n_node_name[WWN_SIZE];
uint8_t n2n_port_name[WWN_SIZE];
uint16_t tn2n_id;
+struct list_head gpnid_list;
}saci_qla_host_t;

struct qla27xx_image_status {
@@ -4511,6 +4519,16 @@
#define USER_CTRL_IRQ(_ha) (ql2xuctrlirq && QLA_TGT_MODE_ENABLED() && (IS_QLA27XX(_ha) || IS_QLA83XX(_ha)));
+
#define SAVE_TOPO(_ha) {
+  if (_ha->current_topology)
+    _ha->prev_topology = _ha->current_topology;
+}
+
#define N2N_TOPO(ha) 
+(ha->prev_topology == ISP_CFG_N && !ha->current_topology) ||
+  ha->current_topology == ISP_CFG_N ||
+  !ha->current_topology)
+
#include "qla_target.h"
#include "qla_gbl.h"
#include "qla_dbg.h"
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_fw.h
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_fw.h
@@ -1392,7 +1392,7 @@
uint8_t port_name[8];
uint8_t node_name[8];
-  uint32_t remote_nport_id;
+  uint8_t remote_nport_id[4];
uint32_t reserved_5;
} f2;
} u;
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_gbl.h
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_gbl.h
@@ -203,6 +203,7 @@
uint16_t *);
int qla24xx_post_gnl_work(struct scsi_qla_host *, fc_port_t *);
int qla24xx_async_abort_cmd(srb_t *);
+void qla2x00_wait_for_sess_deletion(scsi_qla_host_t *);
/*
 * Global Functions in qla_mid.c source file.
@@ -864,8 +865,7 @@
void qlt_plogi_ack_link(struct scsi_qla_host *, struct qlt_plogi_ack_t *,
struct fc_port *, enum qlt_plogi_link_t);
void qlt_plogi_ack_unref(struct scsi_qla_host *, struct qlt_plogi_ack_t *);
-extern void qlt_schedule_sess_for_deletion(struct fc_port *, bool);
-extern void qlt_schedule_sess_for_deletion_lock(struct fc_port *);
+extern void qlt_schedule_sess_for_deletion(struct fc_port *);
extern struct fc_port *qlt_find_sess_invalidate_other(scsi_qla_host_t *,
uint64_t wwn, port_id_t port_id, uint16_t loop_id, struct fc_port **);
void qla24xx_delete_sess_fn(struct work_struct *);
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_gs.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_gs.c
@@ -175,6 +175,9 @@
set_bit(LOCAL_LOOP_UPDATE, &vha->dpc_flags);
}
break;
+case CS_TIMEOUT:
+rval = QLA_FUNCTION_TIMEOUT;
+/* drop through */
default:
ql_dbg(ql_dbg_disc, vha, 0x2033,
"%s failed, completion status (%x) on port_id: 
@@ -2833,11 +2836,11 @@
else { /* fcport->d_id.b24 != ea->id.b24 */
fcport->d_id.b24 = ea->id.b24;
-if (fcport->deleted == QLA_SESS_DELETED) {
+if (fcport->deleted != QLA_SESS_DELETED) {
ql_dbg(ql_dbg_disc, vha, 0x2033,
"%s %d %8phC post del sess\n",
__func__, __LINE__, fcport->port_name);
-qlt_schedule_sess_for_deletion_lock(fcport);
+qlt_schedule_sess_for_deletion(fcport);
}
} else { /* ea->sp->gen1 != fcport->rscn_gen */
    @@ -2854,7 +2857,7 @@
    ql_dbg(ql_dbg_disc, vha, 0x2042,
          "%.s %d %8phC post del sess\n", __func__,
          __LINE__, fcport->port_name);
-qlt_schedule_sess_for_deletion_lock(fcport);
+qlt_schedule_sess_for_deletion(fcport);
    } else {
    ql_dbg(ql_dbg_disc, vha, 0x2045,
          "%.s %d %8phC login\n", __func__, __LINE__,
          @ @ -2878,7 +2881,7 @@
          u8 *id = fcport->ct_desc.ct_sns->p.rsp.rsp.gid_pn.port_id;
    struct event_arg ea;

    -fcport->flags &= ~FCF_ASYNC_SENT;
+fcport->flags &= ~(FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE);

    memset(&ea, 0, sizeof(ea));
    ea.fcport = fcport;
    @ @ -2889,9 +2892,22 @@
    ea.rc = res;
    ea.event = FCME_GIDPN_DONE;

    -ql_dbg(ql_dbg_disc, vha, 0x204f,
    -   "Async done-%s res %x, WWPN %8phC ID %3phC \n",
    +if (res == QLA_FUNCTION_TIMEOUT) {
        -sp->name, res, fcport->port_name, id);
        +ql_dbg(ql_dbg_disc, sp->vha, 0xffff,
        +   "Async done-%s WWPN %8phC timed out: \n",
        +   sp->name, fcport->port_name);
        +qla24xx_post_gidpn_work(sp->vha, fcport);
        +sp->free(sp);
        +return;
        +} else if (res) {
        +ql_dbg(ql_dbg_disc, sp->vha, 0xffff,
        +   "Async done-%s fail res %x, WWPN %8phC\n",
        +   sp->name, res, fcport->port_name);
        +} else {
        +ql_dbg(ql_dbg_disc, vha, 0x204f,
        +   "Async done-%s good WWPN %8phC ID %3phC\n",
        +   sp->name, fcport->port_name, id);
        +}
    }

    qla2x00_fcport_event_handler(vha, &ea);
    @ @ -2974,6 +2990,7 @@
    return QLA_FUNCTION_FAILED;


e->u.fcport.fcport = fcport;
+fcport->flags |= FCF_ASYNC_ACTIVE;
return qla2x00_post_work(vha, e);
}

@@ -2986,6 +3003,7 @@
return QLA_FUNCTION_FAILED;

e->u.fcport.fcport = fcport;
+fcport->flags |= FCF_ASYNC_ACTIVE;
return qla2x00_post_work(vha, e);
}

@@ -3004,7 +3022,7 @@
 "Async done-%s res %x, WWPN %8phC \n",
 sp->name, res, fcport->port_name);
-fcport->flags &= ~FCF_ASYNC_SENT;
+fcport->flags &= ~(FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE);

if (res == (DID_ERROR << 16)) {
    /* entry status error */
@@ -3017,7 +3035,7 @@
ql_dbg(ql_dbg_disc, vha, 0x2019,
    "GPSC command unsupported, disabling query.\n");
ha->flags.gpsc_supported = 0;
-res = QLA_SUCCESS;
+goto done;
} else {
switch (be16_to_cpu(ct_rsp->rsp.gpsc.speed)) {
@@ -3050,13 +3068,13 @@
    be16_to_cpu(ct_rsp->rsp.gpsc.speeds),
    be16_to_cpu(ct_rsp->rsp.gpsc.speed));
}
-done:
memset(&ea, 0, sizeof(ea));
ea.event = FCME_GPSC_DONE;
ea.rc = res;
ea.fcport = fcport;
qla2x00_fcport_event_handler(vha, &ea);

+done:
sp->free(sp);
}

@@ -3100,15 +3118,15 @@
sp->u.iocb_cmd.timeout = qla2x00_async_iocb_timeout;
sp->done = qla24xx_async_gpsc_sp_done;
-rval = qla2x00_start_sp(sp);
-if (rval != QLA_SUCCESS)
-goto done_free_sp;
ql_dbg(ql_dbg_disc, vha, 0x205e,
"Async-%s %8phC hdl=%x loopid=%x portid=%02x%02x%02x.\n",
sp->name, fcport->port_name, sp->handle,
fcport->loop_id, fcport->d_id.b.domain,
fcport->d_id.b.area, fcport->d_id.b.al_pa);
+
+rval = qla2x00_start_sp(sp);
+if (rval != QLA_SUCCESS)
+goto done_free_sp;
return rval;
done_free_sp:
@@ -3155,43 +3173,135 @@
void qla24xx_handle_gpnid_event(scsi_qla_host_t *vha, struct event_arg *ea)
{
-fc_port_t *fcport;
-unsigned long flags;
+fc_port_t *fcport, *conflict, *t;
-spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
-fcport = qla2x00_find_fcport_by_wwpn(vha, ea->port_name, 1);
-spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
-if (fcport) {
-/* cable moved. just plugged in */
-fcport->rscn_gen++;
-fcport->d_id = ea->id;
-fcport->scan_state = QLA_FCPORT_FOUND;
-fcport->flags |= FCF_FABRIC_DEVICE;
-switch (fcport->disc_state) {
-case DSC_DELETED:
-ql_dbg(ql_dbg_disc, vha, 0x210d,
- "%s %d %8phC login\n", __func__, __LINE__,
- fcport->port_name);
-qla24xx_fcport_handle_login(vha, fcport);
-break;
-case DSC_DELETE_PEND:
-break;
-default:
-ql_dbg(ql_dbg_disc, vha, 0x2064,

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"%s %d %8phC post del sess\n",
__func__, __LINE__, fcport->port_name);
qlt_schedule_sess_for_deletion_lock(fcport);
break;
+ql_dbg(ql_dbg_disc, vha, 0xffff,
+ "%s %d port_id: %06x\n",
+ __func__, __LINE__, ea->id.b24);
+
+if (ea->rc) {
+/* cable is disconnected */
+list_for_each_entry_safe(fcport, t, &vha->vp_fcports, list) {
+if (fcport->d_id.b24 == ea->id.b24) {
+ql_dbg(ql_dbg_disc, vha, 0xffff,
+ "%s %d %8phC DS %d
",
+ __func__, __LINE__,
+ fcport->port_name,
+ fcport->disc_state);
+fcport->scan_state = QLA_FCPORT_SCAN;
+switch (fcport->disc_state) {
+case DSC_DELETED:
+case DSC_DELETE_PEND:
+break;
+default:
+ql_dbg(ql_dbg_disc, vha, 0xffff,
+ "%s %d %8phC post del sess\n",
+ __func__, __LINE__,
+ fcport->port_name);
+qlt_schedule_sess_for_deletion(fcport);
+break;
+}
+
} else {
-/* create new fcport */
-ql_dbg(ql_dbg_disc, vha, 0x2065,
- "%s %d %8phC post new sess\n",
- __func__, __LINE__, ea->port_name);
+/* cable is connected */
+fcport = qla2x00_find_fcport_by_wwpn(vha, ea->port_name, 1);
+if (fcport) {
+list_for_each_entry_safe(conflict, t, &vha->vp_fcports,
+ list) {
+if ((conflict->d_id.b24 == ea->id.b24) &&
+ (fcport != conflict)) {
+/* 2 fcports with conflict Nport ID or
+ * an existing fcport is having nport ID
+ * conflict with new fcport.
+ */
+}
ql_dbg(ql_dbg_disc, vha, 0xffff, "%s %d %8phC DS %d\n", __func__, __LINE__, conflict->port_name, conflict->disc_state);
conflict->scan_state = QLA_FCPORT_SCAN;
switch (conflict->disc_state) {
case DSC_DELETED:
+case DSC_DELETE_PEND:
+break;
+default:
    ql_dbg(ql_dbg_disc, vha, 0xffff, "%s %d %8phC post del sess\n", __func__, __LINE__, conflict->port_name);
    qlt_schedule_sess_for_deletion +(conflict);
+break;
+
+fcport->rscn_gen++;
+fcport->scan_state = QLA_FCPORT_FOUND;
+fcport->flags |= FCF_FABRIC_DEVICE;
+switch (fcport->disc_state) {
+    case DSC_LOGIN_COMPLETE:
+        /* recheck session is still intact. */
+        ql_dbg(ql_dbg_disc, vha, 0x210d, "%s %d %8phC revalidate session with ADISC\n", __func__, __LINE__, fcport->port_name);
+        qla24xx_post_gpdb_work(vha, fcport, PDO_FORCE_ADISC);
+break;
+case DSC_DELETED:
+    ql_dbg(ql_dbg_disc, vha, 0x210d, "%s %d %8phC login\n", __func__, __LINE__, fcport->port_name);
+    fcport->d_id = ea->id;
+    qla24xx_fcport_handle_login(vha, fcport);
+break;
+case DSC_DELETE_PEND:
+    fcport->d_id = ea->id;
+break;
+default:
+    fcport->d_id = ea->id;
+break;
+} + (conflict)};
+} else { 
+list_for_each_entry_safe(conflict, t, &vha->vp_fcports, 
+    list) {
+if (conflict->d_id.b24 == ea->id.b24) {
+/* 2 fcports with conflict Nport ID or
+/* an existing fcport is having nport ID
+/* conflict with new fcport.
+*/
+qla24xx_post_newsess_work(vha, &ea->id, ea->port_name, NULL); 
+switch (conflict->disc_state) {
+case DSC_DELETED:
+case DSC_DELETE_PEND:
+break;
+default:
+qla24xx_post_newsess_work(vha, &ea->id, ea->port_name, NULL); 
+}
+
-qla24xx_post_newsess_work(vha, &ea->id, ea->port_name, NULL);
+/* create new fcport */
+qla24xx_post_newsess_work(vha, &ea->id, ea->port_name, NULL);
+}
+
@@ -3205,11 +3315,18 @@
+(*struct ct_sns_rsp *)sp->u.iocb_cmd.u.ctarg.rsp;
+struct event_arg ea;
+struct qla_work_evt *e;
+unsigned long flags;
+}
"Async done-%s res %x ID %3phC. %8phC\n",
- if (res)
  "Async done-%s fail res %x rscn gen %d ID %3phC. %8phC\n",
  + if (res == QLA_FUNCTION_TIMEOUT) {
    + qla24xx_post_gpnid_work(sp->vha, &ea.id);
    + return;
  + } else if (sp->gen1) {
    + /* There was another RSCN for this Nport ID */
    + qla24xx_post_gpnid_work(sp->vha, &ea.id);
    + return;
  + }
  + qla2x00_fcport_event_handler(vha, &ea);

  c = qla2x0x00_alloc_work(vha, QLA_EVT_GPNID_DONE);
  @ @ -3253.8 +3387.9 @ @
  {
    int rval = QLA_FUNCTION_FAILED;
    struct ct_sns_req *ct_req;
    -srb_t *sp;
    +srb_t *sp, *tsp;
struct ct_sns_pkt *ct_sns;
+unsigned long flags;

if (!vha->flags.online)
  goto done;
@@ -3265,8 +3400,22 @@

  sp->type = SRB_CT_PTHRU_CMD;
  sp->name = "gpnid";
  +sp->u.iocb_cmd.u.ctarg.id = *id;
  +sp->gen1 = 0;
  qla2x00_init_timer(sp, qla2x00_get_async_timeout(vha) + 2);

  +spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
  +list_for_each_entry(tsp, &vha->gpnid_list, elem) {
  +  if (tsp->u.iocb_cmd.u.ctarg.id.b24 == id->b24) {
  +    tsp->gen1++;
  +    spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
  +    sp->free(sp);
  +    goto done;
  +  }
  +}
  +}
  +list_add_tail(&sp->elem, &vha->gpnid_list);
  +spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
  +
  sp->u.iocb_cmd.u.ctarg.req = dma_alloc_coherent(&vha->hw->pdev->dev,
 sizeof(struct ct_sns_pkt), &sp->u.iocb_cmd.u.ctarg.req_dma,
 GFP_KERNEL);
@@ -3304,16 +3453,21 @@
  sp->u.iocb_cmd.timeout = qla2x00_async_iocb_timeout;
  sp->done = qla2x00_async_gpnid_sp_done;

  +ql_dbg(ql_dbg_disc, vha, 0x2067,
     + "Async-%s hdl=%x ID %3phC\n", sp->name,
     + sp->handle, ct_req->req.port_id.port_id);
  +
  rval = qla2x00_start_sp(sp);
  if (rval != QLA_SUCCESS)
    goto done_free_sp;

-ql_dbg(ql_dbg_disc, vha, 0x2067,
- "Async-%s hdl=%x ID %3phC\n", sp->name,
- sp->handle, ct_req->req.port_id.port_id);
return rval;

done_free_sp:
+spin_lock_irqsave(&vha->hw->vport_slock, flags);
+list_del(&sp->elem);
+spin_unlock_irqrestore(&vha->hw->vport_slock, flags);
++
if (sp->u.iocb_cmd.u.ctarg.req) {
    dma_free_coherent(&vha->hw->pdev->dev,
    sizeof(struct ct_sns_pkt),
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_init.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_init.c
@@ -58,7 +58,6 @@
    req->outstanding_cmds[sp->handle] = NULL;
    iocb = &sp->u.iocb_cmd;
    iocb->timeout(sp);
-    sp->free(sp);
    spin_unlock_irqrestore(&vha->hw->hardware_lock, flags);
}

@@ -100,13 +99,17 @@
    vha_t *sp = data;
    fc_port_t *fcpport = sp->fcpport;
    struct srb_iocb *lio = &sp->u.iocb_cmd;
-    struct event_arg ea;
-    ql_dbg(ql_dbg_disc, fcpport->vha, 0x2071,
-        "Async-%s timeout - hdl=%x portid=%06x %8phC:\n",
-        sp->name, sp->handle, fcpport->d_id.b24, fcpport->port_name);
+    if (fcpport) {
+        ql_dbg(ql_dbg_disc, fcpport->vha, 0x2071,
+            "Async-%s timeout - hdl=%x portid=%06x %8phC:\n",
+            sp->name, sp->handle, fcpport->d_id.b24, fcpport->port_name);
+    }
+    fcpport->flags &= ~FCF_ASYNC_SENT;
+    fcpport->flags &= ~(FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE);
+} else {
+    pr_info("Async-%s timeout - hdl=%x\n", 
+        sp->name, sp->handle);
+}

switch (sp->type) {
    case SRB_LOGIN_CMD:
        @@ -114,17 +117,9 @@
        lio->u.logio.data[0] = MBS_COMMAND_ERROR;
        lio->u.logio.data[1] = lio->u.logio.flags & SRB_LOGIN_RETRIED ?
        QLA_LOGIO_LOGIN_RETRIED : 0;
-        memset(&ea, 0, sizeof(ea));
-        ea.event = FCME_PLOGI_DONE;
-        ea.fcpport = sp->fcpport;
-        ea.data[0] = lio->u.logio.data[0];
-        ea.data[1] = lio->u.logio.data[1];
-        ea.sp = sp;
-qla24xx_handle_plogi_done_event(fcport->vha, &ea);
+sp->done(sp, QLA_FUNCTION_TIMEOUT);
break;
case SRB_LOGOUT_CMD:
-qlt_logo_completion_handler(fcport, QLA_FUNCTION_TIMEOUT);
-break;
case SRB_CT_PTHRU_CMD:
case SRB_MB_IOCBI:
case SRB_NACK_PLOGI:
@@ -146,7 +141,8 @@
ql_dbg(ql_dbg_disc, vha, 0x20dd,
    "%s %8phC res %d \n", __func__, sp->fcport->port_name, res);

-sp->fcport->flags &= ~FCF_ASYNC_SENT;
+sp->fcport->flags &= ~(FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE);
+
if (!test_bit(UNLOADING, &vha->dpc_flags)) {
    memset(&ea, 0, sizeof(ea));
    ea.event = FCME_PLOGI_DONE;
@@ -173,11 +169,6 @@
if (!vha->flags.online)
goto done;

-if ((fcport->fw_login_state == DSC_LS_PLOGI_PEND) ||
-    (fcport->fw_login_state == DSC_LS_PLOGI_COMP) ||
-    (fcport->fw_login_state == DSC_LS_PRLI_PEND))
-goto done;
-sp = qla2x00_get_sp(vha, fcport, GFP_KERNEL);
if (!sp)
goto done;
@@ -207,11 +198,6 @@
goto done_free_sp;
}

-ql_dbg(ql_dbg_disc, vha, 0x2072,
    "Async-login - %8phC hdl=%x, loopid=%x portid=%02x%02x%02x ",
    "retries=%d,\n", fcport->port_name, sp->handle, fcport->loop_id,
    fcport->d_id.b.domain, fcport->d_id.b.area, fcport->d_id.b.al_pa,
    fcport->login_retry);
return rval;

done_free_sp:
@@ -225,12 +211,10 @@
qla2x00_async_logout_sp_done(void *ptr, int res)
{
    srb_t *sp = ptr;
-struct srb_iocb *lio = &sp->u.iocb_cmd;


- sp->fcport->flags &= ~FCF_ASYNC_SENT;
- if (!test_bit(UNLOADING, &sp->vha->dpc_flags))
  - qla2x00_post_async_logout_done_work(sp->vha, sp->fcport, 
    - lio->u.logio.data);
+ sp->fcport->flags &= ~(FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE);
+ sp->fcport->login_gen++;
+ qlt_logo_completion_handler(sp->fcport, res);
 sp->free(sp);
}

@@ -254,15 +238,16 @@
 lio = &sp->u.iocb_cmd;
 lio->timeout = qla2x00_async_iocb_timeout;
 sp->done = qla2x00_async_logout_sp_done;
-rval = qla2x00_start_sp(sp);
-if (rval != QLA_SUCCESS)
-goto done_free_sp;

ql_dbg(ql_dbg_disc, vha, 0x2070,
   "Async-loginout - hdl=%x loop-id=%x portid=%02x%02x%02x %8phC\n",
   sp->handle, fcport->loop_id, fcport->d_id.b.domain,
   fcport->d_id.b.area, fcport->d_id.b.al_pa,
   fcport->port_name);
+
+rval = qla2x00_start_sp(sp);
+if (rval != QLA_SUCCESS)
+goto done_free_sp;
{return rval;

done_free_sp:
@@ -308,14 +293,16 @@
 sp->done = qla2x00_async_adisc_sp_done;
 if (data[1] & QLA_LOGIO_LOGIN_RETRIED)
   lio->u.logio.flags |= SRB_LOGIN_RETRIED;
-rval = qla2x00_start_sp(sp);
-if (rval != QLA_SUCCESS)
-goto done_free_sp;

ql_dbg(ql_dbg_disc, vha, 0x206f,
   "Async-adisc - hdl=%x loopid=%x portid=%02x%02x%02x %8phC\n",
   sp->handle, fcport->loop_id, fcport->d_id.b.domain,
   fcport->d_id.b.area, fcport->d_id.b.al_pa);
+
+rval = qla2x00_start_sp(sp);
+if (rval != QLA_SUCCESS)
+goto done_free_sp;
+"
return rval;

done_free_sp:
@@ -400,7 +387,7 @@
 ql_dbg(ql_dbg_disc, vha, 0x20e3,
     "%s %d %8phC post del sess\n",
     __func__, __LINE__, fcport->port_name);
-qlt_schedule_sess_for_deletion(fcport, 1);
+qlt_schedule_sess_for_deletion(fcport);
return;
}

@@ -471,7 +458,7 @@
     __func__, __LINE__,
     conflict_fcport->port_name);
 qlt_schedule_sess_for_deletion
-(conflict_fcport, 1);
+(conflict_fcport);
}

if (fcport->loop_id == loop_id) {
@@ -529,8 +516,7 @@
     spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
     vha->gnl.sent = 0;
     spin_lock_irqsave(&vha->gnl.fcports_lock, flags);

     INIT_LIST_HEAD(&h);
     fcport = tf = NULL;
@@ -539,13 +525,15 @@
     list_for_each_entry_safe(fcport, tf, &h, gnl_entry) {
         list_del_init(&fcport->gnl_entry);
-        fcport->flags &= ~FCF_ASYNC_SENT;
+        spin_lock(&vha->hw->tgt.sess_lock);
+        fcport->flags &= ~(FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE);
+        spin_unlock(&vha->hw->tgt.sess_lock);
         ea.fcport = fcport;

         qla2x00_fcport_event_handler(vha, &ea);
     }

     -spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
     +spin_unlock_irqrestore(&vha->gnl.fcports_lock, flags);

     sp->free(sp);
ql_dbg(ql_dbg_disc, vha, 0x20d9, "Async-gnlist WWPN %8phC \n", fcport->port_name);

- spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
+ spin_lock_irqsave(&vha->gnl.fcports_lock, flags);
+ if (!list_empty(&fcport->gnl_entry)) {
+ spin_unlock_irqrestore(&vha->gnl.fcports_lock, flags);
+ rval = QLA_SUCCESS;
+ goto done;
+ }
+
+ spin_lock([&vha->hw->tgt.sess_lock);
fcport->flags |= FCF_ASYNC_SENT;
fcpport->disc_state = DSC_GNL;
fcpport->last_rscn_gen = fcport->rscn_gen;
fcpport->last_login_gen = fcport->login_gen;
+ spin_unlock(&vha->hw->tgt.sess_lock);

list_add_tail(&fcport->gnl_entry, &vha->gnl.fcports);
- if (vha->gnl.sent) {
- spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
- rval = QLA_SUCCESS;
- goto done;
- }
- vha->gnl.sent = 1;
- spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
+ spin_unlock_irqrestore(&vha->gnl.fcports_lock, flags);

sp = qla2x00_get_sp(vha, fcport, GFP_KERNEL);
if (!sp)
@@ -604,6 +594,12 @@

sp->done = qla24xx_async_gnl_sp_done;

+ ql_dbg(ql_dbg_disc, vha, 0x2072,
+ "Async-login - %8phC hdl=%x, loopid=%x portid=%02x%02x%02x ",
+ "retries=%d\n", fcport->port_name, sp->handle, fcport->loop_id,
+ fcport->d_id.b.domain, fcport->d_id.b.area, fcport->d_id.b.al_pa,
+ fcport->login_retry);
+
+ rval = qla2x00_start_sp(sp);
if (rval != QLA_SUCCESS)
goto done_free_sp;
@@ -630,6 +626,8 @@
return QLA_FUNCTION_FAILED;
e->u.fcport.fcport = fcport;
+fcport->flags |= FCF_ASYNC_ACTIVE;
+fcport->disc_state = DSC_LOGIN_PEND;
return qla2x00_post_work(vha, e);
}

@@ -649,7 +647,7 @@
    "Async done-%s res %x, WWPN %8phC mb[1]=%x mb[2]=%x \n",
    sp->name, res, fcport->port_name, mb[1], mb[2]);

-fcport->flags &= ~FCF_ASYNC_SENT;
+fcport->flags &= ~(FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE);

if (res) {
    rval = res;
@@ -783,6 +781,7 @@
    e->u.fcport.fcport = fcport;
    e->u.fcport.opt = opt;
    +fcport->flags |= FCF_ASYNC_ACTIVE;
return qla2x00_post_work(vha, e);
}

@@ -836,14 +835,13 @@
    sp->done = qla24xx_async_gpdb_sp_done;

-rval = qla2x00_start_sp(sp);
-if (rval != QLA_SUCCESS)
-goto done_free_sp;
-
ql_dbg(ql_dbg_disc, vha, 0x20dc,
    "Async-%s %8phC hndl %x opt %x\n",
    sp->name, fcport->port_name, sp->handle, opt);

+rval = qla2x00_start_sp(sp);
+if (rval != QLA_SUCCESS)
+goto done_free_sp;
return rval;

done_free_sp:
@@ -863,6 +861,7 @@
    int rval = ea->rc;
    fc_port_t *fcport = ea->fcport;
    unsigned long flags;
+u16 opt = ea->sp->u.iocb_cmd.u.mbx.out_mb[10];

    fcport->flags &= ~FCF_ASYNC_SENT;
@@ -888,12 +887,13 @@
if (rval != QLA_SUCCESS) {
  qla_dbg(ql_dbg_disc, vha, 0x20d5, "%s %d %8phC post del sess\n",
          __func__, __LINE__, fcport->port_name);
-  qlt_schedule_sess_for_deletion_lock(fcport);
+  qlt_schedule_sess_for_deletion(fcport);
  return;
}

spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
- ea->fcport->login_gen++;
+ if (opt != PDO_FORCE_ADISC)
+  ea->fcport->login_gen++;  
ea->fcport->deleted = 0;
ea->fcport->logout_on_delete = 1;

@@ -917,10 +917,57 @@
qla24xx_post_gpsc_work(vha, fcport);
 }
+} else if (ea->fcport->login_succ) {
+  /*
+   * We have an existing session. A late RSCN delivery
+   * must have triggered the session to be re-validate.
+   * Session is still valid.
+   */
+  qla_dbg(qla_dbg_disc, vha, 0x20d6,
+          "%s %d %8phC session revalidate success\n",
+          __func__, __LINE__, fcport->port_name);
+  fcport->disc_state = DSC_LOGIN_COMPLETE;
+} }

spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
} /* gpdb event */

+static void qla_chk_n2n_b4_login(struct scsi_qla_host *vha, fc_port_t *fcport)
+{
+  u8 login = 0;
+  +if (qla_tgt_mode_enabled(vha))
+    return;
+  +if (qla_dual_mode_enabled(vha)) {
+    +if (N2N_TOPO(vha->hw)) {
+      u64 mywwn, wwn;
+      +mywwn = wwn_to_u64(vha->port_name);  

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+ wwn = wwn_to_u64(fcport->port_name);
+ if (mywwn > wwn)
+ login = 1;
+ else if ((fcport->fw_login_state == DSC_LS_PLOGI_COMP)
+ && time_after_eq(jiffies,
+ fcport->plogi_nack_done_deadline))
+ login = 1;
+ } else {
+ login = 1;
+ }
+ } else {
+ /* initiator mode */
+ login = 1;
+ }
+ }
+
+ if (login) {
+ ql_dbg(ql_dbg_disc, vha, 0x20bf,
+ "%s %d %8phC post login\n",
+ __func__, __LINE__, fcport->port_name);
+ fcport->disc_state = DSC_LOGIN_PEND;
+ qla2x00_post_async_login_work(vha, fcport, NULL);
+ }
+ }
+
+ int qla24xx_fcport_handle_login(struct scsi qla_host *vha, fc_port_t *fcport) {
+ if (fcport->login_retry == 0)
+ return 0;
+ if (fcport->fw_login_state == DSC_LS_PLOGI_COMP) {
- if (time_before_eq(jiffies, fcport->plogi_nack_done_deadline))
+ if (time_before_eq(jiffies, fcport->plogi_nack_done_deadline)) {
+ set_bit(RELOGIN_NEEDED, &vha->dpc_flags);
+ return 0;
+ }
+ }
+ /* for pure Target Mode. Login will not be initiated */
+ ql_dbg(ql_dbg_disc, vha, 0x20bf,
+ "%s %d %8phC post gnl\n",
+ __func__, __LINE__, fcport->port_name);
- qla24xx_async_gnl(vha, fcport);
+ qla24xx_post_gnl_work(vha, fcport);
} else {
- ql_dbg(ql_dbg_disc, vha, 0x20bf,
- "%s %d %8phC post login\n",
- __func__, __LINE__, fcpport->port_name);
-fcpport->disc_state = DSC_LOGIN_PEND;
-qla2x00_post_async_login_work(vha, fcpport, NULL);
+qla_chk_n2n_b4_login(vha, fcpport);
 }
 break;

@@ -981,31 +1026,17 @@
 break;
 }

-if (fcpport->flags & FCF_FCP2_DEVICE) {
- u8 opt = PDO_FORCE_ADISC;
- -ql_dbg(ql_dbg_disc, vha, 0x20c9,
- - "%s %d %8phC post gpdb\n",
- - __func__, __LINE__, fcpport->port_name);
- -fcpport->disc_state = DSC_GPDB;
- -qla24xx_post_gpdb_work(vha, fcpport, opt);
- } else {
- -ql_dbg(ql_dbg_disc, vha, 0x20cf,
- - "%s %d %8phC post login\n",
- - __func__, __LINE__, fcpport->port_name);
- -fcpport->disc_state = DSCLOGIN_PEND;
- -qla2x00_post_async_login_work(vha, fcpport, NULL);
- }
- 
+qla_chk_n2n_b4_login(vha, fcpport);
break;

 case DSC_LOGIN_FAILED:
 ql_dbg(ql_dbg_disc, vha, 0x20d0,
 "%s %d %8phC post gidpn\n",
 __func__, __LINE__, fcpport->port_name);
 -
-qla24xx_post_gidpn_work(vha, fcpport);
+if (N2N_TOPO(vha->hw))
+qla_chk_n2n_b4_login(vha, fcpport);
+else
+qla24xx_post_gidpn_work(vha, fcpport);
break;

 case DSC_LOGIN_COMPLETE:
 @@ -1040,9 +1071,8 @@
 switch (fcpport->disc_state) {
 case DSC_DELETED:
 case DSCLOGIN_COMPLETE:
-qla24xx_post_gidpn_work(fcport->vha, fcport);
+qla24xx_post_gpnid_work(fcport->vha, &ea->id);
break;
-
default:
break;
}
@@ -1113,8 +1143,10 @@
return;

if (fcport->fw_login_state == DSC_LS_PLOGI_COMP) {
- if (time_before_eq(jiffies, fcport->plogi_nack_done_deadline))
+ if (time_before_eq(jiffies, fcport->plogi_nack_done_deadline)) {
+ set_bit(RELOGIN_NEEDED, &vha->dpc_flags);
return;
+ }
}

if (fcport->flags & FCF_ASYNC_SENT) {
@@ -1132,7 +1164,7 @@
ql_dbg(ql_dbg_disc, vha, 0x20e9, "%s %d %8phC post gidpn\n",
- __func__, __LINE__, fcport->port_name);
+ __func__, __LINE__, fcport->port_name);
-qla24xx_async_gidpn(vha, fcport);
+qla24xx_post_gidpn_work(vha, fcport);
return;
}

@@ -1296,22 +1328,20 @@
tm_iocb->timeout = qla2x00_tmf_iocb_timeout;
init_completion(&tm_iocb->u.tmf.comp);

-rval = qla2x00_start_sp(sp);
-if (rval != QLA_SUCCESS)
-goto done_free_sp;
-
ql_dbg(ql_dbg_taskm, vha, 0x802f,
   "Async-tmf hdl=%x loop-id=%x portid=%02x%02x%02x\n",
   sp->handle, fcport->loop_id, fcport->d_id.b.domain,
   fcport->d_id.b.area, fcport->d_id.b.al_pa);

+rval = qla2x00_start_sp(sp);
+if (rval != QLA_SUCCESS)
+goto done_free_sp;
wait_for_completion(&tm_iocb->u.tmf.comp);

-rval = tm_iocb->u.tmf.comp_status == CS_COMPLETE ?
- QLA_SUCCESS : QLA_FUNCTION_FAILED;

+rval = tm_iocb->u.tmf.data;

-if ((rval != QLA_SUCCESS) || tm_iocb->u.tmf.data) {
-ql_dbg(ql_dbg_taskm, vha, 0x8030,
+if (rval != QLA_SUCCESS) {
+ql_log(ql_log_warn, vha, 0x8030,
"TM IOCB failed (%x)\n", rval);
}

@@ -1347,7 +1377,8 @@
srb_t *sp = ptr;
struct srb_iocb *abt = &sp->u.iocb_cmd;

-complete(&abt->u.abt.comp);
+if (del_timer(&sp->u.iocb_cmd.timer))
+complete(&abt->u.abt.comp);
}

int
@@ -1372,14 +1403,14 @@
abt_iocb->timeout = qla24xx_abort_iocb_timeout;
init_completion(&abt_iocb->u.abt.comp);

-rval = qla2x00_start_sp(sp);
-if (rval != QLA_SUCCESS)
-goto done_free_sp;
-ql_dbg(ql_dbg_async, vha, 0x507c,
"Abort command issued - hdl=%x, target_id=%x\n",
 cmd_sp->handle, fcport->tgt_id);

+rval = qla2x00_start_sp(sp);
+if (rval != QLA_SUCCESS)
+goto done_free_sp;
+wait_for_completion(&abt_iocb->u.abt.comp);

rval = abt_iocb->u.abt.comp_status == CS_COMPLETE ?
@@ -1387,6 +1418,7 @@
done_free_sp:
 sp->freet(sp);
+sp->fcport->flags &= ~FCF_ASYNC_SENT;
 done:
 return rval;
}
@@ -1452,6 +1484,8 @@
qla24xx_handle_plogi_done_event(struct scsi_qla_host *vha, struct event_arg *ea)
{ 
port_id_t cid; /* conflict Nport id */
+u16 lid;
+struct fc_port *conflict_fcport;

switch (ea->data[0]) {
  case MBS_COMMAND_COMPLETE:
@@ -1467,8 +1501,12 @@
    qla24xx_post_prli_work(vha, ea->fcport);
  } else {
    ql_dbg(ql_dbg_disc, vha, 0x20ea,
-"%s %d %8phC post gpdb\n",
-__func__, __LINE__, ea->fcport->port_name);
+"%s %d %8phC LoopID 0x%x in use with %06x. post gnl\n",
+__func__, __LINE__, ea->fcport->port_name,
+ea->fcport->loop_id, ea->fcport->d_id.b24);
+
+set_bit(ea->fcport->loop_id, vha->hw->loop_id_map);
+ea->fcport->loop_id = FC_NO_LOOP_ID;
+ea->fcport->chip_reset = vha->hw->base_qpair->chip_reset;
+ea->fcport->logout_on_delete = 1;
+ea->fcport->send_els_logo = 0;
@@ -1494,27 +1532,47 @@
    cid.b.rsvid_1 = 0;

    ql_dbg(ql_dbg_disc, vha, 0x20ec,
-"%s %d %8phC LoopID 0x%x in use post gnl\n",
+"%s %d %8phC lid %x in use with pid %06x post gnl\n",
+__func__, __LINE__, ea->fcport->port_name,
+ea->fcport->loop_id, cid.b24);
-
-else {
-  qla2x00_clear_loop_id(ea->fcport);
-}
+if (IS_SW_RESV_ADDR(cid)) {
+  set_bit(ea->fcport->loop_id, vha->hw->loop_id_map);
+  ea->fcport->loop_id = FC_NO_LOOP_ID;
+} else {
+  qla2x00_clear_loop_id(ea->fcport);
+}

+set_bit(ea->fcport->loop_id, vha->hw->loop_id_map);
+ea->fcport->loop_id = FC_NO_LOOP_ID;
+break;
  case MBS_PORT_ID_USED:
-ql_dbg(ql_dbg_disc, vha, 0x20ed,
-"%s %d %8phC NPortId %02x%02x%02x inuse post gidp\n",
-__func__, __LINE__, ea->fcport->port_name,
-ea->fcport->d_id.b.domain, ea->fcport->d_id.b.area,
-ea->fcport->d_id.b.al_pa);
lid = ea->iop[1] & 0xffff;
+qlt_find_sess_invalidate_other(vha, 
+    wwn_to_u64(ea->fcport->port_name), 
+    ea->fcport->d_id, lid, &conflict_fcport);

-qla2x00_clear_loop_id(ea->fcport);
-qla24xx_post_gidpn_work(vha, ea->fcport);
+if (conflict_fcport) {
+  /*
+   * Another fcport share the same loop_id/nport id.
+   * Conflict fcport needs to finish cleanup before this
+   * fcport can proceed to login.
+   */
+conflict_fcport->conflict = ea->fcport;
+ea->fcport->login_pause = 1;
+
+  ql_dbg(ql_dbg_disc, vha, 0x20ed,
+      "%s %d %8phC NPortId %06x inuse with loopid 0x%x. post gidpn\n",
+      __func__, __LINE__, ea->fcport->port_name,
+      ea->fcport->d_id.b24, lid);
+  qla2x00_clear_loop_id(ea->fcport);
+  qla24xx_post_gidpn_work(vha, ea->fcport);
+} else {
+  ql_dbg(ql_dbg_disc, vha, 0x20ed,
+      "%s %d %8phC NPortId %06x inuse with loopid 0x%x. sched delete\n",
+      __func__, __LINE__, ea->fcport->port_name,
+      ea->fcport->d_id.b24, lid);
+
+  qla2x00_clear_loop_id(ea->fcport);
+  set_bit(lid, vha->hw->loop_id_map);
+  ea->fcport->loop_id = lid;
+  ea->fcport->keep_nport_handle = 0;
+  qlt_schedule_sess_for_deletion(ea->fcport);
+}
break;
}
return;
@@ -4199,6 +4257,7 @@
    fcport->loop_id = FC_NO_LOOP_ID;
    qla2x00_set_fcport_state(fcport, FCS_UNCONFIGURED);
    fcport->supported_classes = FC_COS_UNSPECIFIED;
+fcport->fp_speed = PORT_SPEED_UNKNOWN;

    fcport->ct_desc.ct_sns = dma_alloc_coherent(&vha->hw->pdev->dev,
        sizeof(struct ct_sns_pkt), &fcport->ct_desc.ct_sns_dma,
        @@ -4214,7 +4273,7 @@
            ql_log(ql_log_warn, vha, 0xd049,
                "Failed to allocate ct_sns request.\n");


kfree(fcport);
-fcport = NULL;
+return NULL;
}
INIT_WORK(&fcport->del_work, qla24xx_delete_sess_fn);
INIT_LIST_HEAD(&fcport->gnl_entry);
@@ -4293,6 +4352,21 @@
}
else if (ha->current_topology == ISP_CFG_N) {
  clear_bit(RSCN_UPDATE, &flags);
  +if (ha->flags.rida_fmt2) {
  +/* With Rida Format 2, the login is already triggered.
  + * We know who is on the other side of the wire.
  + * No need to login to do login to find out or drop into
  + * qla2x00_configure_local_loop().
  + */
  +clear_bit(LOCAL_LOOP_UPDATE, &flags);
  +set_bit(RELOGIN_NEEDED, &vha->dpc_flags);
  +} else {
  +if (qla_tgt_mode_enabled(vha)) {
  +/* allow the other side to start the login */
  +clear_bit(LOCAL_LOOP_UPDATE, &flags);
  +set_bit(RELOGIN_NEEDED, &vha->dpc_flags);
  +}
  +}
}
else if (ha->current_topology == ISP_CFG_NL) {
  clear_bit(RSCN_UPDATE, &flags);
  set_bit(LOCAL_LOOP_UPDATE, &flags);
@@ -4337,19 +4411,10 @@
  */
  if (qla_tgt_mode_enabled(vha)) {
   qla_dual_mode_enabled(vha)) {
  -if (IS_QLA27XX(ha) || IS_QLA83XX(ha)) {
  -spin_lock_irqsave(&ha->tgt.atio_lock,
  - flags);
  -qlt_24xx_process_atio_queue(vha, 0);
  -spin_unlock_irqrestore(
  - &ha->tgt.atio_lock, flags);
  -} else {
  -spin_lock_irqsave(&ha->hardware_lock,
  - flags);
  -qlt_24xx_process_atio_queue(vha, 1);
  -spin_unlock_irqrestore(
  - &ha->hardware_lock, flags);
  -}
  +spin_lock_irqsave(&ha->tgt.atio_lock, flags);
  +qlt_24xx_process_atio_queue(vha, 0);
  +spin_unlock_irqrestore(&ha->tgt.atio_lock,
flags);
}

flags);
}
}
@@ -4521,6 +4586,10 @@
    int ha->gid_list,
    entries * sizeof(struct gid_list_info));

+list_for_each_entry(fcport, &vha->vp_fcports, list) {
+    fcport->scan_state = QLA_FCPORT_SCAN;
+
/* Allocate temporary fcport for any new fcports discovered. */
new_fcport = qla2x00_alloc_fcport(vha, GFP_KERNEL);
if (new_fcport == NULL) {
    @ @ -4531,22 +4600,6 @@
    }
new_fcport->flags &= ~FCF_FABRIC_DEVICE;

-/* Mark local devices that were present with FCF_DEVICE_LOST for now. */
-/*
-list_for_each_entry(fcport, &vha->vp_fcports, list) {
-if (atomic_read(&fcport->state) == FCS_ONLINE &&
-    fcport->port_type != FCT_BROADCAST &&
-    (fcport->flags & FCF_FABRIC_DEVICE) == 0) {
-
-    ql_dbg(ql_dbg_disc, vha, 0x2096,
-        "Marking port lost loop_id=0x%04x,\n",
-    fcport->loop_id);
-
-    qla2x00_mark_device_lost(vha, fcport, 0, 0);
-
    }
    }
 */

/* Inititae N2N login. */
if (test_and_clear_bit(N2N_LOGIN_NEEDED, &vha->dpc_flags)) {
    rval = qla24xx_n2n_handle_login(vha, new_fcport);
    @ @ -4589,6 +4642,7 @@
    new_fcport->d_id.b.area = area;
    new_fcport->d_id.b.al_pa = al_pa;
    new_fcport->loop_id = loop_id;
    +new_fcport->scan_state = QLA_FCPORT_FOUND;

rval2 = qla2x00_get_port_database(vha, new_fcport, 0);
if (rval2 != QLA_SUCCESS) {
    @ @ -4620,13 +4674,7 @@
    fcport->d_id.b24 = new_fcport->d_id.b24;
memcpy(fcport->node_name, new_fcport->node_name, WWN_SIZE);
-
-if (!fcport->login_succ) {
-vha->fcport_count++;
-fcport->login_succ = 1;
-fcport->disc_state = DSC_LOGIN_COMPLETE;
-}
-
+fcport->scan_state = QLA_FCPORT_FOUND;
found++;
break;
}
@@ -4637,11 +4685,6 @@

/* Allocate a new replacement fcport. */
fport = new_fcpport;
-if (!fcport->login_succ) {
-vha->fcport_count++;
-fcport->login_succ = 1;
-fcport->disc_state = DSC_LOGIN_COMPLETE;
-}
-
spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);

@@ -4662,11 +4705,38 @@

/* Base iIDMA settings on HBA port speed. */
fport->fp_speed = ha->link_data_rate;
-
-qla2x00_update_fcpport(vha, fcport);
-
+ list_for_each_entry(fcport, &vha->vp_fcpports, list) {
+ if (test_bit(LOOP_RESYNC_NEEDED, &vha->dpc_flags))
+ break;
+ +
+ if (fcport->scan_state == QLA_FCPORT_SCAN) {
+ if ((qla_dual_mode_enabled(vha) ||
+ qa_ini_mode_enabled(vha)) &&
+ atomic_read(&fcport->state) == FCS_ONLINE) {
+ qa2x00_mark_device_lost(vha, fcport,
+ q2xplogiabsentdevice, 0);
+ if (fcport->loop_id != FC_NO_LOOP_ID &&
+ (fcport->flags & FCF_FCP2_DEVICE) == 0 &&
+ fcport->port_type != FCT_INITIATOR &&
+ fcport->port_type != FCT_BROADCAST) {
if (fcport->scan_state == QLA_FCPORT_FOUND)
+qla24xx_fcport_handle_login(vha, fcport);
+
+cleanup_allocation:
kfree(new_fcport);

@@ -4692,7 +4762,8 @@
return;

if (fcport->fp_speed == PORT_SPEED_UNKNOWN ||
- fcport->fp_speed > ha->link_data_rate)
+ fcport->fp_speed > ha->link_data_rate ||
+ !ha->flags.gpsc_supported)
return;

rval = qla2x00_set_idma_speed(vha, fcport->loop_id, fcport->fp_speed,
@@ -5219,8 +5290,7 @@
if (test_bit(LOOP_RESYNC_NEEDED, &vha->dpc_flags))
break;

-if ((fcport->flags & FCF_FABRIC_DEVICE) == 0 ||
- (fcport->flags & FCF_LOGIN_NEEDED) == 0)
+if ((fcport->flags & FCF_FABRIC_DEVICE) == 0)
continue;

if (fcport->scan_state == QLA_FCPORT_SCAN) {
@@ -5237,15 +5307,14 @@
"%s %d %8phC post del sess\n",
+func__, __LINE__,
+ fcport->port_name);
-
-qlt_schedule_sess_for_deletion_lock
-(fcport);
+qlt_schedule_sess_for_deletion(fcport);
continue;
}
if (fcport->scan_state == QLA_FCPORT_FOUND)
+if (fcport->scan_state == QLA_FCPORT_FOUND &&
+    (fcport->flags & FCF_LOGIN_NEEDED) != 0)
qla24xx_fcport_handle_login(vha, fcport);
} return (rval);

if (!IS_P3P_TYPE(ha))
ha->isp_ops->reset_chip(vha);

+ha->link_data_rate = PORT_SPEED_UNKNOWN;
+SAVE_TOPO(ha);
+ha->flags.rida_fmt2 = 0;
ha->flags.n2n_ae = 0;
ha->flags.lip_ae = 0;
ha->current_topology = 0;
@@ -5974,6 +6043,9 @@
    vha->flags.process_response_queue = 0;
    if (ha->zio_mode != QLA_ZIO_DISABLED) {
        ha->zio_mode = QLA_ZIO_MODE_6;
    } /* enable RIDA Format2 */
    icb->firmware_options_2 |= cpu_to_le32(
        (uint32_t)ha->zio_mode);
    icb->interrupt_delay_timer = cpu_to_le16(ha->zio_timer);
    -vha->flags.process_response_queue = 1;
    /* The next call disables the board completely. */
-    -ha->isp_ops->reset_adapter(vha);
+    qla2x00_abort_isp_cleanup(vha);
    vha->flags.online = 0;
clear_bit(ISP_ABORT_RETRY,
        &vha->dpc_flags);
@@ -7656,7 +7728,6 @@
} icb->firmware_options_2 &= cpu_to_le32(
    ~(BIT_3 | BIT_2 | BIT_1 | BIT_0));
-vha->flags.process_response_queue = 0;
if (ha->zio_mode != QLA_ZIO_DISABLED) {
    ha->zio_mode = QLA_ZIO_MODE_6;
    icb->firmware_options_2 |= cpu_to_le32(
        (uint32_t)ha->zio_mode);
    icb->interrupt_delay_timer = cpu_to_le16(ha->zio_timer);
    vha->flags.process_response_queue = 1;
}
if (!vha->flags.qpairs_req_created && !vha->flags.qpairs_rsp_created)
goto fail;
qpair->delete_in_progress = 1;
while (atomic_read(&qpair->ref_count))
msleep(500);

ret = qla25xx_delete_req_que(vha, qpair->req);
if (ret != QLA_SUCCESS)
goto fail;
+
ret = qla25xx_delete_rsp_que(vha, qpair->rsp);
if (ret != QLA_SUCCESS)
goto fail;

--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_inline.h
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_inline.h
@@ -221,6 +221,8 @@
sp->fcport = fcport;
sp->iocbs = 1;
sp->vha = qpair->vha;
+INIT_LIST_HEAD(&sp->elem);
+
done:
if (!sp)
QLA_QPAIR_MARK_NOT_BUSY(qpair);
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_iocb.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_iocb.c
@@ -1524,12 +1524,6 @@
/* Set chip new ring index. */
WRT_REG_DWORD(req->req_q_in, req->ring_index);
-RD_REG_DWORD_RELAXED(&ha->iobase->isp24.hccr);
-
-/* Manage unprocessed RIO/ZIO commands in response queue. */
-if (vha->flags.process_response_queue &&
-rsp->ring_ptr->signature != RESPONSE_PROCESSED)
-qla24xx_process_response_queue(vha, rsp);
+
spin_unlock_irqrestore(&ha->hardware_lock, flags);
return QLA_SUCCESS;
@@ -1723,12 +1717,6 @@
- rsp->ring_ptr->signature != RESPONSE_PROCESSED)
- qla24xx_process_response_queue(vha, rsp);

spin_unlock_irqrestore(&ha->hardware_lock, flags);

@@ -1878,11 +1866,6 @@
/* Set chip new ring index. */
WRT_REG_DWORD(req->req_q_in, req->ring_index);

- /* Manage unprocessed RIO/ZIO commands in response queue. */
- if (vha->flags.process_response_queue &&
- rsp->ring_ptr->signature != RESPONSE_PROCESSED)
- qla24xx_process_response_queue(vha, rsp);
- spin_unlock_irqrestore(&qpair->qp_lock, flags);
return QLA_SUCCESS;

@@ -2128,34 +2111,11 @@
req_cnt = 1;
handle = 0;

- if (!sp)
- goto skip_cmd_array;
-
- /* Check for room in outstanding command list. */
- handle = req->current_outstanding_cmd;
- for (index = 1; index < req->num_outstanding_cmds; index++) {
- handle++;
- if (handle == req->num_outstanding_cmds)
- handle = 1;
- if (!req->outstanding_cmds[handle])
- break;
- }
- if (index == req->num_outstanding_cmds) {
- ql_log(ql_log_warn, vha, 0x700b,
- "No room on outstanding cmd array.\n");
- goto queuing_error;
- }
-
-/* Prep command array. */
-req->current_outstanding_cmd = handle;
-req->outstanding_cmds[handle] = sp;
-sp->handle = handle;
-
-/* Adjust entry-counts as needed. */
- if (sp->type != SRB_SCSI_CMD)
+ if (sp && (sp->type != SRB_SCSI_CMD)) {
+ /* Adjust entry-counts as needed. */

req_cnt = sp->iocbs;
+
-skip_cmd_array:
"*/ Check for room on request queue. */
if (req->cnt < req_cnt + 2) {
if (ha->mqenable || IS_QLA83XX(ha) || IS_QLA27XX(ha))
@@ -2179,6 +2139,28 @@
if (req->cnt < req_cnt + 2)
goto queuing_error;
+
+if (sp) {
+"/* Check for room in outstanding command list. */
+handle = req->current_outstanding_cmd;
+for (index = 1; index < req->num_outstanding_cmds; index++) {
+handle++;
+if (handle == req->num_outstanding_cmds)
+handle = 1;
+if (!req->outstanding_cmds[handle])
+break;
+}
+if (index == req->num_outstanding_cmds) {
+ql_log(ql_log_warn, vha, 0x700b,
+" No room on outstanding cmd array.\n");
goto queuing_error;
+}
+"*/ Prep command array. */
+req->current_outstanding_cmd = handle;
+req->outstanding_cmds[handle] = sp;
+sp->handle = handle;
+}
+
/* Prep packet */
req->cnt -= req_cnt;
pkt = req->ring_ptr;
@@ -2191,6 +2173,8 @@
pkt->handle = handle;
}

+return pkt;
+
queuing_error:
qpair->tgt_counters.num_alloc_iocb_failed++;
return pkt;
@@ -2392,26 +2376,13 @@
srb_t *sp = data;
fcp_port_t *fcpport = sp->fcpport;

struct scsi_qla_host *vha = sp->vha;
struct qla_hw_data *ha = vha->hw;
struct srb_iocb *lio = &sp->u.iocb_cmd;
unsigned long flags = 0;

ql_dbg(ql_dbg_io, vha, 0x3069, "%s Timeout, hdl=%x, portid=%02x%02x%02x\n",
    sp->name, sp->handle, fcport->d_id.b.domain, fcport->d_id.b.area,
    fcport->d_id.b.al_pa);

/* Abort the exchange */
-spin_lock_irqsave(&ha->hardware_lock, flags);
-if (ha->isp_ops->abort_command(sp)) {
-ql_dbg(ql_dbg_io, vha, 0x3070,
    "mbx abort_command failed.\n");
} else {
-ql_dbg(ql_dbg_io, vha, 0x3071,
    "mbx abort_command success.\n");
}
-spin_unlock_irqrestore(&ha->hardware_lock, flags);
-
-complete(&lio->u.els_logo.comp);
}

@@ -2558,7 +2529,8 @@
ql_dbg(ql_dbg_io + ql_dbg_buffer, vha, 0x3073,
    "PLOGI ELS IOCB:\n");
ql_dump_buffer(ql_log_info, vha, 0x0109,
    (uint8_t *)els_iocb, 0x70);
+ (uint8_t *)els_iocb,
+ sizeof(*els_iocb));
} else {
els_iocb->tx_byte_count = sizeof(struct els_logo_payload);
els_iocb->tx_address[0] =
@@ -2703,7 +2675,8 @@
ql_dbg(ql_dbg_io + ql_dbg_buffer, vha, 0x3073, "PLOGI buffer:\n");
ql_dump_buffer(ql_dbg_io + ql_dbg_buffer, vha, 0x0109,
    (uint8_t *)elsio->u.els_plogi.els_plogi_pyld, 0x70);
+ (uint8_t *)elsio->u.els_plogi.els_plogi_pyld,
+ sizeof(*elsio->u.els_plogi.els_plogi_pyld));

init_completion(&elsio->u.els_plogi.comp);
rval = qla2x00_start_sp(sp);
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_isr.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_isr.c
@@ -272,7 +272,8 @@
struct device_reg_2xxx __iomem *reg = &ha->iobase->isp;
/* Read all mbox registers? */
- mboxes = (1 << ha->mbx_count) - 1;
+ WARN_ON_ONCE(ha->mbx_count > 32);
+ mboxes = (1ULL << ha->mbx_count) - 1;
if (!ha->mcp)
ql_dbg(ql_dbg_async, vha, 0x5001, "MBX pointer ERROR\n");
else
@@ -809,6 +810,7 @@
break;

case MBA_LOOP_DOWN: /* Loop Down Event */
+ SAVE_TOPO(ha);
ha->flags.n2n_ae = 0;
ha->flags.lip_ae = 0;
ha->current_topology = 0;
@@ -922,7 +924,6 @@
set_bit(REGISTER_FC4_NEEDED, &vha->dpc.flags);
set_bit(REGISTER_FDMI_NEEDED, &vha->dpc.flags);

-ha->flags.gpsc_supported = 1;
vha->flags.management_server_logged_in = 0;
break;

@@ -1009,7 +1010,6 @@
if (qla_ini_mode_enabled(vha)) {
qla2x00_mark_device_lost(fcport->vha, fcport, 1, 1);
fcport->logout_on_delete = 0;
- qlt_schedule_sess_for_deletion_lock(fcport);
+ qlt_schedule_sess_for_deletion(fcport);
}
break;

@@ -1046,8 +1047,6 @@
ql_dbg(ql_dbg_async, vha, 0x5011,
    "Asynchronous PORT UPDATE ignored \%04x/\%04x/\%04x\n",
    mb[1], mb[2], mb[3]);
- qlt_async_event(mb[0], vha, mb);
break;
} 

@@ -1060,13 +1059,9 @@
* /
atomic_set(&vha->loop_state, LOOP_UP);

-qla2x00_mark_all_devices_lost(vha, 1);
set_bit(LOOP_RESYNC_NEEDED, &vha->dpc_flags);
set_bit(LOCAL_LOOP_UPDATE, &vha->dpc_flags);
set_bit(VP_CONFIG_OK, &vha->vp_flags);
-
-qlt_async_event(mb[0], vha, mb);
break;

case MBA_RSCN_UPDATE: /* State Change Registration */
@@ -1574,7 +1569,7 @@
 /* borrowing sts_entry_24xx.comp_status.
   same location as ct_entry_24xx.comp_status */
-  res = qla2x00_chk_ms_status(vha, (ms_iocb_entry_t *)pkt,
+  res = qla2x00_chk_ms_status(sp->vha, (ms_iocb_entry_t *)pkt,
   (struct ct_sns_rsp *)sp->u.iocb_cmd.u.ctargrsp,
   sp->name);
   sp->done(sp, res);
@@ -1884,6 +1879,18 @@
   inbuf = (uint32_t *)&sts->nvme_ersp_data;
   outbuf = (uint32_t *)fd->rspaddr;
   iocb->u.nvme.rsp_pyld_len = le16_to_cpu(sts->nvme_rsp_pyld_len);
+  if (unlikely(iocb->u.nvme.rsp_pyld_len >
+    sizeof(struct nvme_fc_ersp_iu))) {
+    if (ql_mask_match(ql_dbg_io)) {
+      WARN_ONCE(1, "Unexpected response payload length %u\n",
+        iocb->u.nvme.rsp_pyld_len);
+      ql_log(ql_log_warn, fcport->vha, 0x5100,
+        "Unexpected response payload length %u\n",
+        iocb->u.nvme.rsp_pyld_len);
+    }
+    iocb->u.nvme.rsp_pyld_len =
+    sizeof(struct nvme_fc_ersp_iu);
+  }
+  iter = iocb->u.nvme.rsp_pyld_len >> 2;
  for (; iter; iter--)
      *outbuf++ = swab32(*inbuf++);
@@ -2369,7 +2376,6 @@
   int res = 0;
   uint16_t state_flags = 0;
   uint16_t retry_delay = 0;
-  uint8_t no_logout = 0;
   sts = (sts_entry_t *) pkt;
   sts24 = (struct sts_entry_24xx *) pkt;
@@ -2482,8 +2488,12 @@
   ox_id = le16_to_cpu(sts24->ox_id);
   par_sense_len = sizeof(sts24->data);
/* Valid values of the retry delay timer are 0x1-0xffef */
- if (sts24->retry_delay > 0 && sts24->retry_delay < 0xfff1)
  - retry_delay = sts24->retry_delay;
+ if (sts24->retry_delay > 0 && sts24->retry_delay < 0xfff1) {
+   retry_delay = sts24->retry_delay & 0x3fff;
+   ql_dbg(ql_dbg_io, sp->vha, 0x3033,
+     "\%s: scope=%#x retry_delay=%#x\n", __func__,
+     sts24->retry_delay >> 14, retry_delay);
+ }
} else {
  if (scsi_status & SS_SENSE_LEN_VALID)
    sense_len = le16_to_cpu(sts->req_sense_length);
@@ -2640,7 +2650,6 @@
    break;
 case CS_PORT_LOGGED_OUT:
  no_logout = 1;
 case CS_PORT_CONFIG_CHG:
 case CS_PORT_BUSY:
 case CS_INCOMPLETE:
@@ -2671,11 +2680,8 @@
    port_state_str[atomic_read(&fcport->state)],
    comp_status);
@@ -2820,6 +2826,7 @@
 case ELS_IOCB_TYPE:
 case ABORT_IOCB_TYPE:
 case MBX_IOCB_TYPE:
+default:
    sp = qla2x00_get_sp_from_handle(vha, func, req, pkt);
    if (sp) {
      sp->done(sp, res);
@@ -2830,7 +2837,6 @@
 case ABTS_RESP_24XX:
 case CTIO_TYPE7:
 case CTIO_CRC2:
+default:
    return 1;
} 
fatal:
struct device_reg_24xx __iomem *reg = &ha->iobase->isp24;

/* Read all mbox registers? */
-mboxes = (1 << ha->mbx_count) - 1;
+WARN_ON_ONCE(ha->mbx_count > 32);
+mboxes = (1ULL << ha->mbx_count) - 1;
if (!ha->mcp)
ql_dbg ql_dbg_async, vha, 0x504e, "MBX pointer ERROR\n";
else
@@ -3098,6 +3105,7 @@
uint16_t mb[8];
struct rsp_que *rsp;
unsigned long flags;
+bool process_atio = false;

rsp = (struct rsp_que *) dev_id;
if (!rsp) {
@@ -3158,22 +3166,13 @@
qla24xx_process_response_queue(vha, rsp);
break;
case INTR_ATIO_QUE_UPDATE_27XX:
- case INTR_ATIO_QUE_UPDATE: {
- unsigned long flags2;
- spin_lock_irqsave(&ha->tgt.atio_lock, flags2);
- qlt_24xx_process_atio_queue(vha, 1);
- spin_unlock_irqrestore(&ha->tgt.atio_lock, flags2);
- +case INTR_ATIO_QUE_UPDATE:
+ process_atio = true;
break;
- }
- case INTR_ATIO_RSP_QUEUE_27XX:
- unsigned long flags2;
- spin_lock_irqsave(&ha->tgt.atio_lock, flags2);
- qlt_24xx_process_atio_queue(vha, 1);
- spin_unlock_irqrestore(&ha->tgt.atio_lock, flags2);
- +case INTR_ATIO_RSP_QUEUE_27XX:
+ process_atio = true;
break;
- }
default:
ql_dbg ql_dbg_async, vha, 0x504f,
"Unrecognized interrupt type (%d).\n", stat * 0xff);
@@ -3187,6 +3196,12 @@
qla2x00_handle_mbx_completion(ha, status);
spin_unlock_irqrestore(&ha->hardware_lock, flags);
+if (process_atio) {
+spin_lock_irqsave(&ha->tgt.atio_lock, flags);
+qlt_24xx_process_atio_queue(vha, 0);
+spin_unlock_irqrestore(&ha->tgt.atio_lock, flags);
+}
+
+return IRQ_HANDLED;
}

@@ -3233,6 +3238,7 @@
uint32_t	 hccr;
uint16_t	 mb[8];
unsigned long flags;
+bool process_atio = false;

rsp = (struct rsp_que *) dev_id;
if (!rsp) {
@@ -3289,22 +3295,13 @@
qla24xx_process_response_queue(vha, rsp);
break;

- case INTR_ATIO_QUEUE_UPDATE_27XX:
- case INTR_ATIO_QUEUE_UPDATE:{
- unsigned long flags2;
- spin_lock_irqsave(&ha->tgt.atio_lock, flags2);
- qlt_24xx_process_atio_queue(vha, 1);
- spin_unlock_irqrestore(&ha->tgt.atio_lock, flags2);
+ case INTR_ATIO_QUEUE_UPDATE:
+ process_atio = true;
 break;
- }
- case INTR_ATIO_RSP_QUEUE_UPDATE: {
- unsigned long flags2;
- spin_lock_irqsave(&ha->tgt.atio_lock, flags2);
- qlt_24xx_process_atio_queue(vha, 1);
- spin_unlock_irqrestore(&ha->tgt.atio_lock, flags2);
- }
+ case INTR_ATIO_RSP_QUEUE_UPDATE:
+ process_atio = true;
 qla24xx_process_response_queue(vha, rsp);
break;
- }

default:
ql_dbg(ql_dbg_async, vha, 0x5051,
    "Unrecognized interrupt type (%d).\n", stat & 0xff);
@@ -3315,6 +3312,12 @@
qla2x00_handle_mbx_completion(ha, status);
spin_unlock_irqrestore(&ha->hardware_lock, flags);
+if (process_atio) {
+    spin_lock_irqsave(&ha->tgt.atio_lock, flags);
+    qlt_24xx_process_atio_queue(vha, 0);
+    spin_unlock_irqrestore(&ha->tgt.atio_lock, flags);
+}
+
+return IRQ_HANDLED;
}

@@ -3399,10 +3402,8 @@
   ha->msix_count, ret);
 goto msix_out;
 } else if (ret < ha->msix_count) {
-    ql_log(ql_log_warn, vha, 0x00c6, 
-        "MSI-X: Failed to enable support 
-        with %d vectors, using %d vectors.\n",
-        ha->msix_count, ret);
+    ql_log(ql_log_info, vha, 0x00c6, 
+        "MSI-X: Using %d vectors\n", ret);
   ha->msix_count = ret;
 /* Recalculate queue values */
   if (ha->mqiobase && (ql2xmqsupport || ql2xnvmeenable)) {
-      @@ -3425,7 +3426,7 @@
-      ql_log(ql_log_fatal, vha, 0x00c8, 
-          "Failed to allocate memory for ha->msix_entries.\n");
-      ret = -ENOMEM;
+      goto free_irqs;
      goto msix_out;
-      +goto free_irqs;
+  }
   ha->flags.msix_enabled = 1;

@@ -3508,6 +3509,10 @@

 msix_out:
 return ret;
 +
+free_irqs:
+pci_free_irq_vectors(ha->pdev);
+goto msix_out;
 }

int @@ -3555,7 +3560,7 @@

 skip_msix:

 ql_log(ql_log_info, vha, 0x0037, 
 "Falling back-to MSI mode -%d.\n", ret);
+ "Falling back-to MSI mode -- ret=%d\n", ret);

if (!IS_QLA24XX(ha) && !IS_QLA2532(ha) && !IS_QLA8432(ha) &&
   !IS_QLA8001(ha) && !IS_P3P_TYPE(ha) && !IS_QLAFX00(ha) &&
   @@ -3563,13 +3568,13 @@
goto skip_msi;

ret = pci_alloc_irq_vectors(ha->pdev, 1, 1, PCI_IRQ_MSI);
-if (!ret) {
+if (ret > 0) {
   ql_dbg(ql_dbg_init, vha, 0x0038,
       "MSI: Enabled.\n");
   ha->flags.msi_enabled = 1;
 } else
   ql_log(ql_log_warn, vha, 0x0039,
      "Falling back-to INTa mode -- %d.\n", ret);
 skip_msi:
/* Skip INTx on ISP82xx. */
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_mbx.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_mbx.c
@@ -624,6 +624,7 @@
    mcp->mb[2] = LSW(risc_addr);
    mcp->mb[3] = 0;
    mcp->mb[4] = 0;
+   mcp->mb[11] = 0;
    ha->flags.using_lr_setting = 0;
    if (IS_QLA25XX(ha) || IS_QLA81XX(ha) || IS_QLA83XX(ha) ||
       IS_QLA27XX(ha)) {
      @@ -667,7 +668,7 @@
         mcp->out_mb |= MBX_4 | MBX_3 | MBX_2 | MBX_1;
      } else {
         mcp->mb[1] = LSW(risc_addr);
-      qI_log(ql_log_warn, vha, 0x0039,
+      ql_dbg(ql_dbg_mbx + ql_dbgVerbose, vha, 0x108c,
          "Entered %s.\n", __func__);

-      if (vha->flags.qpairs_available && sp->qpair)
+      if (sp->qpair)
         req = sp->qpair->req;

      if (ql2xasynctmfenable)
mcp->mb[0] = MBC_PORT_PARAMS;
mcp->mb[1] = loop_id;
mcp->mb[2] = BIT_0;
@if (IS_CNA_CAPABLE(vha->hw))
  mcp->mb[3] = port_speed & (BIT_5|BIT_4|BIT_3|BIT_2|BIT_1|BIT_0);
-else
  mcp->mb[3] = port_speed & (BIT_2|BIT_1|BIT_0);
+  mcp->mb[3] = port_speed & (BIT_5|BIT_4|BIT_3|BIT_2|BIT_1|BIT_0);
  mcp->out_mb = MBX_9|MBX_3|MBX_2|MBX_1|MBX_0;
  mcp->in_mb = MBX_3|MBX_1|MBX_0;
@end

unsigned long   flags;
int found;
port_id_t id;
+struct fc_port *fcport;

ql_dbg(ql_dbg_mbx + ql_dbg_verbose, vha, 0x10b6,
   "Entered %s\n", __func__);
@@ -3757,7 +3756,7 @@
   "Primary port id %02x%02x%02x\n",
   rptid_entry->port_id[2], rptid_entry->port_id[1],
   rptid_entry->port_id[0]);
-
+  ha->current_topology = ISP_CFG_NL;
  qlt_update_host_map(vha, id);

} else if (rptid_entry->format == 1) {
@@ -3863,8 +3863,8 @@
   vha->flags.bbcr_enable = (rptid_entry->u.f1.bbcr & 0xf) != 0;
@@ -3870,6 +3870,37 @@
spin_lock_irqsave(&ha->vport_slock, flags);
qlt_update_vp_map(vha, SET_AL_PA);
spin_unlock_irqrestore(&ha->vport_slock, flags);
+
+list_for_each_entry(fcport, &vha->vp_fcports, list) {
+fcport->scan_state = QLA_FCPORT_SCAN;
+
+fcport = qla2x00_find_fcport_by_wwpn(vha,
+  rptid_entry->u.f2.port_name, 1);
+
+if (fcport) {
+fcport->plogi_nack_done_deadline = jiffies + HZ;
+fcport->scan_state = QLA_FCPORT_FOUND;
+switch (fcport->disc_state) {
+case DSC_DELETED:
+ql_dbg(ql_dbg_disc, vha, 0x210d,
+    __func__, __LINE__, fcport->port_name);
+qla24xx_fcport_handle_login(vha, fcport);
+break;
+case DSC_DELETE_PEND:
+break;
+default:
+qlt_schedule_sess_for_deletion(fcport);
+break;
+} 
+} else {
+id.b.al_pa  = rptid_entry->u.f2.remote_nport_id[0];
+id.b.area   = rptid_entry->u.f2.remote_nport_id[1];
+id.b.domain = rptid_entry->u.f2.remote_nport_id[2];
+qla24xx_post_newsess_work(vha, &id,
+  rptid_entry->u.f2.port_name, NULL);
+
}
}

@@ -5938,9 +5972,8 @@
mcp->mb[7] = LSW(MSD(req_dma));
mcp->mb[8] = MSW(addr);
/* Setting RAM ID to valid */
-mcp->mb[10] |= BIT_7;
/* For MCTP RAM ID is 0x40 */
-mcp->mb[10] |= 0x40;
+mcp->mb[10] = BIT_7 | 0x40;

mcp->out_mb |= MBX_10|MBX_8|MBX_7|MBX_6|MBX_5|MBX_4|MBX_3|MBX_2|MBX_1|
    MBX_0;
/* Check for logged in state. */
-if (current_login_state != PDS_PRLI_COMPLETE &&
    last_login_state != PDS_PRLI_COMPLETE) {
+if (current_login_state != PDS_PRLI_COMPLETE) {
  ql_dbg(ql_dbg_mbx, vha, 0x119a,
      "Unable to verify login-state (%x/%x) for loop_id %x,\n",
      current_login_state, last_login_state, fcport->loop_id);
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_mid.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_mid.c
@@ -6160,8 +6193,7 @@}
{ unsigned long flags;
 int ret;
 +fc_port_t *fcport;

 ret = qla24xx_control_vp(vha, VCE_COMMAND_DISABLE_VPS_LOGO_ALL);
 atomic_set(&vha->loop_state, LOOP_DOWN);
 atomic_set(&vha->loop_down_timer, LOOP_DOWN_TIME);
+list_for_each_entry(fcport, &vha->vp_fcports, list)
 +fcport->logout_on_delete = 0;
 +
+qla2x00_mark_all_devices_lost(vha, 0);
/* Remove port id from vp target map */
spin_lock_irqsave(&vha->hw->vport_slock, flags);
@@ -343,15 +348,21 @@
 "FCPort update end.\n");
}

@if ((test_and_clear_bit(RELOGIN_NEEDED, &vha->dpc_flags)) &&
    !test_bit(LOOP_RESYNC_NEEDED, &vha->dpc_flags)) &&
    atomic_read(&vha->loop_state) != LOOP_DOWN) {
 -
-ql_dbg(ql_dbg_dpc, vha, 0x4018,
+qla2x00_relogin(vha);
-ql_dbg(ql_dbg_dpc, vha, 0x4018,
+"Relogin needed scheduled.\n");
-qla2x00_mark_all_devices_lost(vha, 0);
+ "Relogin needed end.\n");
+if (test_bit(RELOGIN_NEEDED, &vha->dpc_flags) &&
 +!test_bit(LOOP_RESYNC_NEEDED, &vha->dpc_flags) &&
 +atomic_read(&vha->loop_state) != LOOP_DOWN) {
 +
 +if (!vha->relogin_jif ||
 + time_after_eq(jiffies, vha->relogin_jif)) {
 +vha->relogin_jif = jiffies + HZ;

```c
+clear_bit(RELOGIN_NEEDED, &vha->dpc_flags);
+
+ql_dbg(ql_dbg_dpc, vha, 0x4018,
+    "Relogin needed scheduled.
"
+qla2x00_relogin(vha);
+ql_dbg(ql_dbg_dpc, vha, 0x4019,
+    "Relogin needed end.
"
+
if (test_and_clear_bit(RESET_MARKER_NEEDED, &vha->dpc_flags) &&
@
int qla25xx_delete_req_que(struct scsi_qla_host *vha, struct req_que *req)
{
    -int ret = -1;
+int ret = QLA_SUCCESS;

    -if (req) {
+    if (req && vha->flags.qpairs_req_created) {
        req->options |= BIT_0;
        ret = qla25xx_init_req_que(vha, req);
    -}
    -if (ret == QLA_SUCCESS)
+    if (ret != QLA_SUCCESS)
        return QLA_FUNCTION_FAILED;
+
        qla25xx_free_req_que(vha, req);
    +}

    return ret;
}
@@ -584,14 +597,16 @@
int qla25xx_delete_rsp_que(struct scsi_qla_host *vha, struct rsp_que *rsp)
{
    -int ret = -1;
+int ret = QLA_SUCCESS;

    -if (rsp) {
+    if (rsp && vha->flags.qpairs_rsp_created) {
        rsp->options |= BIT_0;
        ret = qla25xx_init_rsp_que(vha, rsp);
    -}
    -if (ret == QLA_SUCCESS)
+    if (ret != QLA_SUCCESS)
        return QLA_FUNCTION_FAILED;
+
        qla25xx_free_rsp_que(vha, rsp);
    +}
```
qla25xx_free_rsp_que(vha, rsp);
+
return ret;

--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_nvme.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_nvme.c
@@ -88,8 +88,9 @@
    struct qla_hw_data *ha;
    struct qla_qpair *qpair;

-    if (!qidx)
-        qidx++;
+    /* Map admin queue and 1st IO queue to index 0 */
+    if (qidx)
+        qidx--;

    vha = (struct scsi_qla_host *)lport->private;
    ha = vha->hw;
    @@ -507,6 +508,11 @@

    priv = fd->private;
    +if (!priv) {
      +/* nvme association has been torn down */
/+return rval;
    +}
      +
fcpport = rport->private;
    if (!fcpport) {
      ql_log(ql_log_warn, NULL, 0x210e, "No fcport ptr\n");
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_nx.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_nx.c
@@ -1107,7 +1107,8 @@
        return ret;
    }

-    if (qla82xx_flash_set_write_enable(ha))
+    ret = qla82xx_flash_set_write_enable(ha);
      +if (ret < 0)
        goto done_write;

    qla82xx_wr_32(ha, QLA82XX_ROMUSB_ROM_WDATA, data);
    @@ -1605,8 +1606,7 @@
        return (u8 *)&ha->hablob->fw->data[offset];
    }

-    static __le32
-qla82xx_get_fw_size(struct qla_hw_data *ha)
+static u32 qla82xx_get_fw_size(struct qla_hw_data *ha)
{
    struct qla82xx_uri_data_desc *uri_desc = NULL;

    @@ -1617,7 +1617,7 @@
    return cpu_to_le32(uri_desc->size);
}

-return cpu_to_le32(*(u32 *)&ha->hablob->fw->data[FW_SIZE_OFFSET]);
+return get_unaligned_le32(&ha->hablob->fw->data[FW_SIZE_OFFSET]);
}

static u8 *
@@ -1808,7 +1808,7 @@
    }

    for (i = 0; i < size; i++) {
        --- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_os.c
        +++ linux-4.15.0/drivers/scsi/qla2xxx/qla_os.c
        @@ -449,7 +449,7 @@
        ha->req_q_map[0] = req;
        set_bit(0, ha->rsp_qid_map);
        set_bit(0, ha->req_qid_map);
        -return 1;
        +return 0;

    fail_qpair_map:
    kfree(ha->base_qpair);
    @@ -1143,7 +1143,7 @@
    * qla2x00_wait_for_sess_deletion can only be called from remove_one.
    * it has dependency on UNLOADING flag to stop device discovery
    */
-static void
+void
    qla2x00_wait_for_sess_deletion(scsi_qla_host_t *vha)
    {
        qla2x00_mark_all_devices_lost(vha, 0);
        @@ -1717,6 +1717,8 @@
        struct qla_tgt_cmd *cmd;
        uint8_t trace = 0;

        +if (!ha->req_q_map)
return;
spin_lock_irqsave(&ha->hardware_lock, flags);
for (que = 0; que < ha->max_req_queues; que++) {
    req = ha->req_q_map[que];
}@@ -1974,6 +1976,11 @@
/* Determine queue resources */
ha->max_req_queues = ha->max_rsp_queues = 1;
ha->msix_count = QLA_BASE_VECTORS;
+
+/* Check if FW supports MQ or not */
+if (!(ha->fw_attributes & BIT_6))
goto mqiobase_exit;
+
if (!ql2xmqsupport || !ql2xnvmenable ||
    (!IS_QLA25XX(ha) && !IS_QLA81XX(ha)))
goto mqiobase_exit;
@@ -3011,9 +3018,6 @@
base_vha = qla2x00_create_host(sht, ha);
if (!base_vha) {
    ret = -ENOMEM;
-    qla2x00_mem_free(ha);
-    qla2x00_free_req_que(ha, req);
-    qla2x00_free_rsp_que(ha, rsp);
    goto probe_hw_failed;
}@@ -3074,14 +3078,15 @@
/* Set up the irqs */
ret = qla2x00_request_irqs(ha, rsp);
if (ret)
    goto probe_init_failed;
+    goto probe_failed;
/* Alloc arrays of request and response ring ptrs */
-if (!qla2x00_alloc_queues(ha, req, rsp)) {
+ret = qla2x00_alloc_queues(ha, req, rsp);
+if (ret) {
ql_log(ql_log_fatal, base_vha, 0x003d,
      "Failed to allocate memory for queue pointers...",
      "aborting.\n");
    goto probe_init_failed;
+    goto probe_failed;
}

if (ha->mqenable && shost_use_blk_mq(host)) {
@@ -3193,10 +3198,15 @@
    host->can_queue, base_vha->req,
    base_vha->mgmt_svr_loop_id, host->sg_tablesize);
+ha->wq = alloc_workqueue("qla2xxx_wq", WQ_MEM_RECLAIM, 0);
+if (unlikely(!ha->wq)) {
+ret = -ENOMEM;
+goto probe_failed;
+
+if (ha->mqenable) {
+bool mq = false;
+bool startit = false;
+-ha->wq = alloc_workqueue("qla2xxx_wq", WQ_MEM_RECLAIM, 0);
+
if (QLA_TGT_MODE_ENABLED()) {
mq = true;
@@ -3365,16 +3375,13 @@
return 0;

-probe_init_failed:
-qla2x00_free_req_que(ha, req);
-ha->req_q_map[0] = NULL;
-clear_bit(0, ha->req_qid_map);
-qla2x00_free_rsp_que(ha, rsp);
-ha->rsp_q_map[0] = NULL;
-clear_bit(0, ha->rsp_qid_map);
-ha->max_req_queues = ha->max_rsp_queues = 0;
-
+probe_failed:
+if (base_vha->gnl.l) {
+dma_free_coherent(&ha->pdev->dev, base_vha->gnl.size,
+base_vha->gnl.l, base_vha->gnl.ldma);
+base_vha->gnl.l = NULL;
+}
+
+if (base_vha->timer_active)
+qla2x00_stop_timer(base_vha);
+base_vha->flags.online = 0;
@@ -3386,10 +3393,20 @@
}

qla2x00_free_device(base_vha);
-
-scsi_host_put(base_vha->host);
+/*
+ * Need to NULL out local req/rsp after
+ * qla2x00_free_device => qla2x00_free_queues frees
+ * what these are pointing to. Or else we'll
+ * fall over below in qla2x00_free_req/rsp_que.
probe_hw_failed:
+qla2x00_mem_free(ha);
+qla2x00_free_req_que(ha, req);
+qla2x00_free_rsp_que(ha, rsp);
qla2x00_clear_drv_active(ha);

iospace_config_failed:
@@ -3451,6 +3468,10 @@

/* Stop currently executing firmware. */
qla2x00_try_to_stop_firmware(vha);

+/* Disable timer */
+if (vha->timer_active)
+qla2x00_stop_timer(vha);
+
+/* Turn adapter off line */

vha->flags.online = 0;

@@ -3587,7 +3608,7 @@

if (!atomic_read(&pdev->enable_cnt)) {
    dma_free_coherent(&ha->pdev->dev, base_vha->gnl.size,
            base_vha->gnl.l, base_vha->gnl.ldma);
-
+base_vha->gnl.l = NULL;
    scsi_host_put(base_vha->host);
    kfree(ha);
    pci_set_drvdata(pdev, NULL);
@@ -3595,6 +3616,8 @@
}
qla2x00_wait_for_hba_ready(base_vha);

+qla2x00_wait_for_sess_deletion(base_vha);
+
+/*
 + if UNLOAD flag is already set, then continue unload,
 + where it was set first.
@@ -3609,6 +3632,8 @@

dma_free_coherent(&ha->pdev->dev,
            base_vha->gnl.size, base_vha->gnl.l, base_vha->gnl.ldma);

+base_vha->gnl.l = NULL;
+
if (IS_QLAFX00(ha))
qlafx00_driver_shutdown(base_vha, 20);
list_for_each_entry(fcport, &vha->vp_fcports, list) {
    fcport->scan_state = 0;
-    qlt_schedule_sess_for_deletion_lock(fcport);
+    qlt_schedule_sess_for_deletion(fcport);

    if (vha->vp_idx != 0 && vha->vp_idx != fcport->vha->vp_idx)
        continue;
    (@ @ -4077,6 +4102,7 @@
     (*rsp)->dma = 0;
    fail_rsp_ring:
        kfree(*rsp);
    +    *rsp = NULL;
    fail_rsp:
        dma_free_coherent(&ha->pdev->dev, ((*req)->length + 1) *
        sizeof(request_t), (*req)->ring, (*req)->dma);
    (@ @ -4084,6 +4110,7 @@
     (*req)->dma = 0;
    fail_req_ring:
        kfree(*req);
    +    *req = NULL;
    fail_req:
        dma_free_coherent(&ha->pdev->dev, sizeof(struct ct_sns_pkt),
        ha->ct_sns, ha->ct_sns_dma);
    (@ @ -4450,6 +4477,7 @@
    if (ha->init_cb)
        dma_free_coherent(&ha->pdev->dev, ha->init_cb_size,
        ha->init_cb, ha->init_cb_dma);
    +    vfree(ha->optrom_buffer);
    kfree(ha->nvram);
    kfree(ha->npiv_info);
    (@ @ -4470,6 +4498,15 @@
    ha->ex_init_cb_dma = 0;
    ha->async_pd = NULL;
    ha->async_pd_dma = 0;
    +ha->loop_id_map = NULL;
    +ha->npiv_info = NULL;
    +ha->optrom_buffer = NULL;
    +ha->swl = NULL;
    +ha->nvram = NULL;
    +ha->mctp_dump = NULL;
    +ha->dcbx_tlv = NULL;
    +ha->xgmac_data = NULL;
    +ha->sfp_data = NULL;
ha->s_dma_pool = NULL;
ha->dl_dma_pool = NULL;
@@ -4514,9 +4551,11 @@
 INIT_LIST_HEAD(&vha->qp_list);
 INIT_LIST_HEAD(&vha->gnl.fcports);
 INIT_LIST_HEAD(&vha->nvme_rport_list);
+INIT_LIST_HEAD(&vha->gpnid_list);

 spin_lock_init(&vha->work_lock);
 spin_lock_init(&vha->cmd_list_lock);
+spin_lock_init(&vha->gnl.fcports_lock);
 init_waitqueue_head(&vha->fcport_waitQ);
 init_waitqueue_head(&vha->vref_waitq);

 @@ -4546,6 +4585,9 @@
 struct qla_work_evt *e;
 uint8_t bail;

+if (test_bit(UNLOADING, &vha->dpc_flags))
+return NULL;
+
QLA_VHA_MARK_BUSY(vha, bail);
if (bail)
return NULL;
@@ -4623,6 +4665,7 @@
e->u.logio.data[0] = data[0];
 e->u.logio.data[1] = data[1];
}					
+fcport->flags |= FCF_ASYNC_ACTIVE;
return qla2x00_post_work(vha, e);
}

@@ -4700,6 +4743,10 @@
 (struct qlt_plogi_ack_t *)e->u.new_sess.pla;
 uint8_t free_fcport = 0;

+ql_dbg(ql_dbg_disc, vha, 0xffff,
+"%s %d %8phC enter\n",
+__func__, __LINE__, e->u.new_sess.port_name);
+
spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
fcport = qla2x00_find_fcport_by_wwpn(vha, e->u.new_sess.port_name, 1);
if (fcport) {
 @@ -4748,20 +4795,77 @@
 } else {
 list_add_tail(&fcport->list, &vha->vp_fcports);

-if (pla) {
- qlt_plogi_ack_link(vha, pla, fcport,
  -  QLT_PLOGI_LINKSAME_WWN);
- pla->ref_count--;
- }
+ }
+ if (pla) {
+ qlt_plogi_ack_link(vha, pla, fcport,
+  + QLT_PLOGI_LINKSAME_WWN);
+ pla->ref_count--;
+ }
spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);

if (fcport) {
  -if (pla)
  +if (N2N_TOPO(vha->hw))
  +fcport->flags &= ~FCF_FABRIC_DEVICE;
  +
  +if (pla) {
  +if (pla->iocb.u.isp24.status_subcode == ELS_PRLI) {
  +u16 wd3_lo;
  +
  +fcport->fw_login_state = DSC_LS_PRLI_PEND;
  +fcport->local = 0;
  +fcport->loop_id =
  +le16_to_cpu(
    + pla->iocb.u.isp24.nport_handle);
  +fcport->fw_login_state = DSC_LS_PRLI_PEND;
  +wd3_lo =
    + le16_to_cpu(
      + pla->iocb.u.isp24.u.prli.wd3_lo);
  +
  +if (wd3_lo & BIT_7)
  +fcport->conf_compl_supported = 1;
  +
  +if ((wd3_lo & BIT_4) == 0)
  +fcport->port_type = FCT_INITIATOR;
  +else
  +fcport->port_type = FCT_TARGET;
  +}
  qlt_plogi_ack_unref(vha, pla);
  -else
  -qla24xx_async_gffid(vha, fcport);
  +} else {
  +fc_port_t *dfcp = NULL;
  +
  +spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
  +tfcp = qla2x00_find_fcp_by_nportid(vha,
&e->u.new_sess.id, 1);
+if (tfcp && (tfcp != fcport)) {
+/*
+ * We have a conflict fcport with same NportID.
+ */
+
+ql_dbg(ql_dbg_disc, vha, 0xffff,
+ "%s %8phC found conflict b4 add. DS %d LS %dn",
+ __func__, tfcp->port_name, tfcp->disc_state,
+ tfcp->fw_login_state);
+
+switch (tfcp->disc_state) {
+case DSC_DELETED:
+break;
+case DSC_DELETE_PEND:
+fcport->login_pause = 1;
+tfcp->conflict = fcport;
+break;
+default:
+fcport->login_pause = 1;
+tfcp->conflict = fcport;
+dfcp = tfcp;
+break;
+}
+
+spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
+if (dfcp)
+qlt_schedule_sess_for_deletion(tfcp);
+
+qla24xx_async_gnl(vha, fcport);
+}
}

if (free_fcpport) {
@@ -4868,14 +4972,14 @@
struct event_arg ea;

list_for_each_entry(fcport, &vha->vp_fcports, list) {
-/*
- * If the port is not ONLINE then try to login
- * to it if we haven't run out of retries.
- */
-*/
+/*
+ * If the port is not ONLINE then try to login
+ * to it if we haven't run out of retries.
+ */
+if (atomic_read(&fcport->state) != FCS_ONLINE &
- fcport->login_retry && !(fcport->flags & FCF_ASYNC_SENT)) {
- fcport->login_retry--;
+ @ @ -4868,14 +4972,14 @ @
if (fcport->flags & FCF_FABRIC_DEVICE) {
    if (fcport->login_retry &&
        !(fcport->flags & (FCF_ASYNC_SENT | FCF_ASYNC_ACTIVE))) {
        if (vha->hw->current_topology != ISP_CFG_NL) {
            %s 8phC DS %d LS %d
            fcport->port_name, fcport->disc_state,
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->loginretry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            ea.event = FCME_RELOGIN;
            ea.fcport = fcport;
            qla2x00_fcport_event_handler(vha, &ea);
        } else {
        } else if (vha->hw->current_topology == ISP_CFG_NL) {
            fcport->login_retry--;
            status = qla2x00_local_device_login(vha, fcport);
            if (do_reset && !(test_and_set_bit(ABORT_ISP_ACTIVE,
                &base_vha->dpc_flags))) {
            }
+base_vha->flags.online = 1;
+ql_dbg(ql_dbg_dpc, base_vha, 0x4007,
+    "ISP abort scheduled.");
if (ha->isp_ops->abort_isp(base_vha)) {
    /* failed. retry later */
    set_bit(ISP_ABORT_NEEDED,
            ha->isp_ops->aborted, ha);
}
clear_bit(ABORT_ISP_ACTIVE,
            &base_vha->dpc_flags);
+ql_dbg(ql_dbg_dpc, base_vha, 0x4008,
    "ISP abort end.");
-	ql_dbg(ql_dbg_dpc, base_vha, 0x4008,
-	    "ISP abort end.");
}

if (test_and_clear_bit(FCPORT_UPDATE_NEEDED,
            &base_vha->dpc_flags)) {
    /* Retry each device up toLOGIN retry count */
    -if ((test_and_clear_bit(RELOGIN_NEEDED,
            &base_vha->dpc_flags)) &&
     +if (test_bit(RELOGIN_NEEDED, &base_vha->dpc_flags) &&
        test_bit(LOOP_RESYNC_NEEDED, &base_vha->dpc_flags) &&
        atomic_read(&base_vha->loop_state) != LOOP_DOWN) {
        -ql_dbg(ql_dbg_dpc, base_vha, 0x400d,
            "Relogin scheduled.");
+qla2x00_relogin(base_vha);
        -ql_dbg(ql_dbg_dpc, base_vha, 0x400c,
            "Relogin end.");
+if (!base_vha->relogin_jif ||
+    time_after_eq(jiffies, base_vha->relogin_jif)) {
+    base_vha->relogin_jif = jiffies + HZ;
+    clear_bit(RELOGIN_NEEDED, &base_vha->dpc_flags);
+}
+ql_dbg(ql_dbg_dpc, base_vha, 0x400d,
            "Relogin scheduled.");
+qla2x00_relogin(base_vha);
+ql_dbg(ql_dbg_dpc, base_vha, 0x400e,
            "Relogin end.");
+
        }
    }
}
loop_resync_check:
if (test_and_clear_bit(LOOP_RESYNC_NEEDED,
@@ -6608,9 +6734,14 @@
static int qla2xxx_map_queues(struct Scsi_Host *shost)
{
+int rc;
scsi_qla_host_t *vha = (scsi_qla_host_t *)shost->hostdata;

- return blk_mq_pci_map_queues(&shost->tag_set, vha->hw->pdev);
+ if (USER_CTRL_IRQ(vha->hw))
+ rc = blk_mq_map_queues(&shost->tag_set);
+ else
+ rc = blk_mq_pci_map_queues(&shost->tag_set, vha->hw->pdev);
+ return rc;
}

static const struct pci_error_handlers qla2xxx_err_handler = {
@@ -6684,8 +6815,7 @@
/* Initialize target kmem_cache and mem_pools */
ret = qlt_init();
if (ret < 0) {
-kmem_cache_destroy(srb_cachep);
-return ret;
+goto destroy_cache;
} else if (ret > 0) {
/*
 * If initiator mode is explicitely disabled by qlt_init(),
@@ -6706,11 +6836,10 @@
qla2xxx_transport_template =
 fc_attach_transport(&qla2xxx_transport_functions);
if (!qla2xxx_transport_template) {
-kmem_cache_destroy(srb_cachep);
ql_log(ql_log_fatal, NULL, 0x0002,
"fc_attach_transport failed...Failing load!\n");
-qlt_exit();
-return -ENODEV;
+ret = -ENODEV;
+goto qlt_exit;
}

apidev_major = register_chrdev(0, QLA2XXX_APIDEV, &apidev_fops);
@@ -6722,27 +6851,37 @@
qla2xxx_transport_vport_template =
 fc_attach_transport(&qla2xxx_transport_vport_functions);
if (!qla2xxx_transport_vport_template) {
-kmem_cache_destroy(srb_cachep);
-qlt_exit();
-fc_release_transport(qla2xxx_transport_template);
ql_log(ql_log_fatal, NULL, 0x0004,
   "fc_attach_transport vport failed...Failing load!\n")
-return -ENODEV;
+ret = -ENODEV;
+goto unreg_chrdev;
}
ql_log(ql_log_info, NULL, 0x0005,
   "QLogic Fibre Channel HBA Driver: %s\n",
   qla2x00_version_str);
ret = pci_register_driver(&qla2xxx_pci_driver);
if (ret) {
-kmem_cache_destroy(srb_cachep);
-qlt_exit();
-fc_release_transport(qla2xxx_transport_template);
-fc_release_transport(qla2xxx_transport_vport_template);
ql_log(ql_log_fatal, NULL, 0x0006,
   "pci_register_driver failed...ret=%d Failing load!\n", ret);
+goto release_vport_transport;
}
return ret;
+
+release_vport_transport:
+fc_release_transport(qla2xxx_transport_vport_template);
+
+unreg_chrdev:
+if (apidev_major >= 0)
+unregister_chrdev(apidev_major, QLA2XXX_APIDEV);
+fc_release_transport(qla2xxx_transport_template);
+
+qlt_exit:
+qlt_exit();
+
+destroy_cache:
+kmem_cache_destroy(srb_cachep);
+return ret;
}
/**
 --- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_target.c
 +++ linux-4.15.0/drivers/scsi/qla2xxx/qla_target.c
 @@ -606,7 +606,7 @@
 __func__, __LINE__,
 sp->fcport->port_name,
 vha->fcport_count);
-+sp->fcport->disc_state = DSC_UPD_FCPORT;
 qla24xx_post_upd_fcpport_work(vha, sp->fcport);
} else {
ql_dbg(ql_dbg_disc, vha, 0x20f5,
@@ -665,7 +665,7 @@
qla2x00_init_timer(sp, qla2x00_get_async_timeout(vha)+2);

sp->u.iocb_cmd.u.nack.ntfy = ntfy;
-
+sp->u.iocb_cmd.timeout = qla2x00_async_iocb_timeout;
sp->done = qla2x00_async_nack_sp_done;

rval = qla2x00_start_sp(sp);
@@ -688,7 +688,6 @@
void qla24xx_do_nack_work(struct scsi_qla_host *vha, struct qla_work_evt *e)
{
    fc_port_t *t;
-    unsigned long flags;

    switch (e->u.nack.type) {
    case SRB_NACK_PRLI:
        @@ -698,10 +697,8 @@
if (t) {
            ql_log(ql_log_info, vha, 0xd034,
"%s create sess success %p", __func__, t);
-        spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
/* create sess has an extra kref */
        vha->hw->tgt.tgt_ops->put_sess(e->u.nack.fcport);
-        spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
            }
        break;
    }
    @@ -713,9 +710,6 @@
    }
fc_port_t *fcport = container_of(work, struct fc_port, del_work);
struct qla_hw_data *ha = fcport->vha->hw;
-    unsigned long flags;
-    
-    spin_lock_irqsave(&ha->tgt.sess_lock, flags);
    if (fcport->se_sess) {
ha->tgt.tgt_ops->shutdown_sess(fcport);
@@ -723,7 +717,6 @@
    } else {
        qlt_unreg_sess(fcport);
    }
    spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
}
/*
fcport->port_name, sess->loop_id);
sess->local = 0;
}
-ha->tgt.tgt_ops->put_sess(sess);
spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
+ha->tgt.tgt_ops->put_sess(sess);
}
/*
@@ -861,7 +855,10 @@
fcport->loop_id = loop_id;
fcport->d_id = port_id;
-qla24xx_post_nack_work(vha, fcport, iocb, SRB_NACK_PLOGI);
+if (iocb->u.isp24.status_subcode == ELS_PLOGI)
+qla24xx_post_nack_work(vha, fcport, iocb, SRB_NACK_PLOGI);
+else
+qla24xx_post_nack_work(vha, fcport, iocb, SRB_NACK_PRLI);

list_for_each_entry(fcport, &vha->vp_fcports, list) {
  if (fcport->plogi_link[QLT_PLOGI_LINK_SAME_WWN] == pla)
    @ @ -890,6 +887,17 @@
iocb->u.isp24.port_id[1], iocb->u.isp24.port_id[0],
    pla->ref_count, pla, link);
+
+if (link == QLT_PLOGI_LINK_CONFLICT) {
+  switch (sess->disc_state) {
+  case DSC_DELETED:
+  case DSC_DELETE_PEND:
+    pla->ref_count--;
+    return;
+    default:
+    break;
+  +
+  +}
+  +
+  if (sess->plogi_link[link])
+  qlt_plogi_ack_unref(vha, sess->plogi_link[link]);

bool logout_started = false;
struct event_arg ea;
scsi_qla_host_t *base_vha;
+struct qlt_plogi_ack_t *own =
+sess->plogi_link[QLT_PLOGI_LINK_SAME_WWN];
ql_dbg(ql_dbg_tgt_mgt, vha, 0xf084,
"%s: se_sess %p / sess %p from port %8phC loop_id %#04x"
@@ -971,19 +981,36 @@
logo.id = sess->d_id;
logo.cmd_count = 0;
-qlt_send_first_logo(vha, &logo);
+if (!own)
+qlt_send_first_logo(vha, &logo);
+sess->send_els_logo = 0;
}
-if (sess->logout_on_delete) {
+if (sess->logout_on_delete && sess->loop_id != FC_NO_LOOP_ID) {
   int rc;

   -rc = qla2x00_post_async_logout_work(vha, sess, NULL);
   -if (rc != QLA_SUCCESS)
   --ql_log(ql_log_warn, vha, 0xf085,
   -- "Schedule logo failed sess %p rc %d
n",
   -- sess, rc);
   -else
   -logout_started = true;
   +if (!own ||
   + (own &&
   + (own->iocb.u.isp24.status_subcode == ELS_PLOGI)) ) {
   +rc = qla2x00_post_async_logout_work(vha, sess,
   + NULL);
   +if (rc != QLA_SUCCESS)
   +ql_log(ql_log_warn, vha, 0xf085,
   + "Schedule logo failed sess %p rc %d
n",
   + sess, rc);
   +else
   +logout_started = true;
   +} else if (own && (own->iocb.u.isp24.status_subcode ==
   +ELS_PRL1) && ha->flags.rida_fmt2) {
   +rc = qla2x00_post_async_logout_work(vha, sess,
   + NULL);
   +if (rc != QLA_SUCCESS)
   +ql_log(ql_log_warn, vha, 0xf085,
   + "Schedule PRLO failed sess %p rc %d
n",
   + sess, rc);
   +else
   +logout_started = true;
   +}
   }
}
if (logout_started) {
    bool traced = false;
    u16 cnt = 0;

    while (!READ_ONCE(sess->logout_completed)) {
        if (!traced) {
            traced = true;
            msleep(100);
            cnt++;
            if (cnt > 200)
                break;
        }

        ql_dbg(ql_dbg_disc, vha, 0xf087,
                "%s: sess %p logout completed\n", __func__, sess);
    }

    if (sess->logo_ack_needed) {
        sess->login_succ = 0;
    }

    -if (sess->chip_reset != ha->base_qpair->chip_reset)
        -qla2x00_clear_loop_id(sess);
        +qla2x00_clear_loop_id(sess);
    if (sess->conflict) {
        sess->conflict->login_pause = 0;
    }

    -struct qlt_plogi_ack_t *own =
        -sess->plogi_link[QLT_PLOGI_LINKSAME_WWN];
    struct qlt_plogi_ack_t *con =
        -sess->plogi_link[QLT_PLOGI_LINKCONFlict];
    struct imm_ntfy_from_isp *iocb;
    @ @ -1076,6 +1104,7 @@
    sess->plogi_link[QLT_PLOGI_LINKSAME_WWN] = NULL;
    }
}

spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
ql_dbg(ql_dbg_tgt_mgt, vha, 0xf001,  
@@ -1089,6 +1118,9 @@  
 wake_up_all(&vha->fcport_waitQ);

 base_vha = pci_get_drvdata(ha->pdev);
+ sess->free_pending = 0;
+ if (test_bit(PFLG_DRIVER_REMOVING, &base_vha->pci_flags))
 return;

 @@ -1100,15 +1132,23 @@}
 }
 }

-/* ha->tgt.sess_lock supposed to be held on entry */
 void qlt_unreg_sess(struct fc_port *sess) {
 struct scsi_qla_host *vha = sess->vha;
 unsigned long flags;

 ql_dbg(ql_dbg_disc, sess->vha, 0x210a,  
 "%s sess %p for deletion %8phC\n",  
 __func__, sess, sess->port_name);

 +spin_lock_irqsave(&sess->vha->work_lock, flags);
 +if (sess->free_pending) {
 +spin_unlock_irqrestore(&sess->vha->work_lock, flags);
 +return;
 +}
 +sess->free_pending = 1;
 +spin_unlock_irqrestore(&sess->vha->work_lock, flags);
 + if (sess->se_sess)
 vha->hw->tgt.tgt_ops->clear_nacl_from_fcport_map(sess);

 @@ -1174,47 +1214,46 @@
 }
 }

-/* ha->tgt.sess_lock supposed to be held on entry */
-void qlt_schedule_sess_for_deletion(struct fc_port *sess,  
-bool immediate)  
+void qlt_schedule_sess_for_deletion(struct fc_port *sess) {
 struct qla_tgt *tgt = sess->tgt;
 +unsigned long flags;
if (sess->disc_state == DSC_DELETE_PEND)
    return;

if (sess->disc_state == DSC_DELETED) {
    if (tgt && tgt->tgt_stop && (tgt->sess_count == 0))
        wake_up_all(&tgt->waitQ);
    if (sess->vha->fcport_count == 0)
        wake_up_all(&sess->vha->fcport_waitQ);
    if (!sess->plogi_link[QLT_PLOGI_LINK_SAME_WWN] &&
        !sess->plogi_link[QLT_PLOGI_LINK_CONFLICT]) {
        if (tgt && tgt->tgt_stop && tgt->sess_count == 0)
            wake_up_all(&tgt->waitQ);
        if (sess->vha->fcport_count == 0)
            wake_up_all(&sess->vha->fcport_waitQ);
        return;
    }
    sess->disc_state = DSC_DELETE_PEND;
    if (sess->deleted == QLA_SESS_DELETED)
        sess->logout_on_delete = 0;

    spin_lock_irqsave(&sess->vha->work_lock, flags);
    if (sess->deleted == QLA_SESS_DELETION_IN_PROGRESS) {
        spin_unlock_irqrestore(&sess->vha->work_lock, flags);
        return;
    }
    sess->deleted = QLA_SESS_DELETION_IN_PROGRESS;
    spin_unlock_irqrestore(&sess->vha->work_lock, flags);
    sess->disc_state = DSC_DELETE_PEND;
    qla24xx_chk_fcp_state(sess);

    q1_dbg(q1_dbg_tgt, sess->vha, 0xe001,
        "Scheduling sess %p for deletion\n", sess);
    "Scheduling sess %p for deletion %8phC\n",
    sess, sess->port_name);

    schedule_work(&sess->del_work);
-
-

void qlt_schedule_sess_for_deletion_lock(struct fc_port *sess)
unsigned long flags;
struct qla_hw_data *ha = sess->vha->hw;
spin_lock_irqsave(&ha->tgt.sess_lock, flags);
qlt_schedule_sess_for_deletion(sess, 1);
spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
+WARN_ON(!queue_work(sess->vha->hw->wq, &sess->del_work));
}

/* ha->tgt.sess_lock supposed to be held on entry */
@@ -1225,7 +1264,7 @@
list_for_each_entry(sess, &vha->vp_fcports, list) {
 if (sess->se_sess)
 -qlt_schedule_sess_for_deletion(sess, 1);
 +qlt_schedule_sess_for_deletion(sess);
 }

/* At this point tgt could be already dead */
@@ -1400,7 +1439,7 @@
ql_dbg(ql_dbg_tgt_mgt, vha, 0xf008, "qla_tgt_fc_port_deleted %p", sess);

 sess->local = 1;
 -qlt_schedule_sess_for_deletion(sess, false);
 +qlt_schedule_sess_for_deletion(sess);
 spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
}

@@ -1461,10 +1500,8 @@
 * Lock is needed, because we still can get an incoming packet.
 */
mutex_lock(&vha->vha_tgt.tgt_mutex);
-spin_lock_irqsave(&ha->tgt.sess_lock, flags);
tgt->tgt_stop = 1;
qlt_clear_tgt_db(tgt);
-spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
mutex_unlock(&vha->vha_tgt.tgt_mutex);
mutex_unlock(&qla_tgt_mutex);

@@ -1512,10 +1549,12 @@
 return;
 }

+mutex_lock(&tgt->ha->optrom_mutex);
mutex_lock(&vha->vha_tgt.tgt_mutex);
tgt->tgt_stop = 0;
tgt->tgt_stopped = 1;
mutex_unlock(&vha->vha_tgt.tgt_mutex);
mutex_unlock(&tgt->ha->optrom_mutex);

ql_dbg(ql_dbg_tgt_mgt, vha, 0xf00c, "Stop of tgt %p finished\n", tgt);
@@ -1560,8 +1599,11 @@
 btree_destroy64(&tgt->lun_qpair_map);
-if (ha->tgt.tgt_ops && ha->tgt.tgt_ops->remove_target)
-  ha->tgt.tgt_ops->remove_target(vha);
+  if (vha->vp_idx)
+    if (ha->tgt.tgt_ops &&
+        ha->tgt.tgt_ops->remove_target &&
+        vha->vha_tgt.target_lport_ptr)
+      ha->tgt.tgt_ops->remove_target(vha);

vha->vha_tgt.qla_tgt = NULL;
@@ -2114,14 +2156,14 @@
-  /* Response code and sense key */
-  put_unaligned_le32(((0x70 << 24) | (sense_key << 8)),
-                      (&ctio->u.status1.sense_data)[0]);
+  /* Fixed format sense data. */
+  ctio->u.status1.sense_data[0] = 0x70;
+  ctio->u.status1.sense_data[2] = sense_key;
/* Additional sense length */
-  put_unaligned_le32(0x0a, (&ctio->u.status1.sense_data)[1]);
+  ctio->u.status1.sense_data[7] = 0xa;
/* ASC and ASCQ */
-  put_unaligned_le32((asc << 24) | (ascq << 16)),
-                      (&ctio->u.status1.sense_data)[3]);
+  ctio->u.status1.sense_data[12] = asc;
+  ctio->u.status1.sense_data[13] = ascq;
/* Memory Barrier */
 wmb();
@@ -2171,10 +2213,10 @@
 mcmd->orig_iocb.imm_ntfy.u.isp24.status_subcode ==
 ELS_TPRLO) {
 ql_dbg(ql_dbg_disc, vha, 0x2106,
-  "TM response logo %phC status %#x state %#x",
+  "TM response logo %phC status %#x state %#x",
       mcmd->sess->port_name, mcmd->fc_tm_rsp, mcmd->flags);
-qlt_schedule_sess_for_deletion_lock(mcmd->sess);
+qlt_schedule_sess_for_deletion(mcmd->sess);
} else {
    qlt_send_notify_ack(vha->hw->base_qpair,
        &mcmd->orig_iocb.imm_ntfy, 0, 0, 0, 0, 0, 0);
@@ -3708,7 +3750,7 @@
term = 1;

    if (term)
        qlt_term_ctio_exchange(qpair, ctio, cmd, status);
+qlt_send_term_exchange(qpair, cmd, &cmd->atio, 1, 0);

    return term;
}
@@ -3869,7 +3911,7 @@
    __func__, __LINE__, cmd->sess->port_name);

-qlt_schedule_sess_for_deletion_lock(cmd->sess);
+qlt_schedule_sess_for_deletion(cmd->sess);
}
break;
}
@@ -4026,9 +4068,7 @@*/
/*
 * Drop extra session reference from qla_tgt_handle_cmd_for_atio()
 */
-spin_lock_irqsave(&ha->tgt.sess_lock, flags);
    ha->tgt.tgt_ops->put_sess(sess);
-spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
    return;

out_term:
@@ -4045,9 +4085,7 @@
    percpu_ida_free(&sess->se_sess->sess_tag_pool, cmd->se_cmd.map_tag);
    spin_unlock_irqrestore(qpair->qp_lock_ptr, flags);

-spin_lock_irqsave(&ha->tgt.sess_lock, flags);
    ha->tgt.tgt_ops->put_sess(sess);
-spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
}

static void qlt_do_work(struct work_struct *work)
@@ -4333,9 +4371,7 @@
    if (!cmd) {
        ql_dbg(ql_dbg_io, vha, 0x3062,
            "qla_target(%d): Allocation of cmd failed\n", vha->vp_idx);
-spin_lock_irqsave(&ha->tgt.sess_lock, flags);
        ha->tgt.tgt_ops->put_sess(sess);
spin_unlock_irqrestore(&ha->tgt.sess_lock, flags);
return -ENOMEM;
}

@@ -4574,7 +4610,7 @@
* might have cleared it when requested this session
* deletion, so don't touch it
*/
-qlt_schedule_sess_for_deletion(other_sess, true);
+qlt_schedule_sess_for_deletion(other_sess);
} else {
    /*
    * Another wwn used to have our s_id/loop_id
    @@ -4584,11 +4620,10 @@
        "Invalidating sess %p loop_id %d wwn %llx\n",
        other_sess, other_sess->loop_id, other_wwn);

- other_sess->keep_nport_handle = 1;
- *conflict_sess = other_sess;
- qlt_schedule_sess_for_deletion(other_sess,
-    true);
+ if (other_sess->disc_state != DSC_DELETED)
+    *conflict_sess = other_sess;
+ qlt_schedule_sess_for_deletion(other_sess);
    }
    continue;
    }
@@ -4602,7 +4637,7 @@

 /* Same loop_id but different s_id
 * Ok to kill and logout */
-qlt_schedule_sess_for_deletion(other_sess, true);
+qlt_schedule_sess_for_deletion(other_sess);
}
}

@@ -4652,6 +4687,137 @@
return count;
}

+static int qlt_handle_login(struct scsi qla_host *vha,
+ struct imm_nfty_from_isp *iocb)
+{
+ struct fc_port *sess = NULL, *conflict_sess = NULL;
+ uint64_t wwn;
+ port_id_t port_id;
+ uint16_t loop_id, wd3_lo;

 /*
 */
+int res = 0;
+struct qlt_plogi_ack_t *pla;
+unsigned long flags;
+
+wvn = wvn_to_u64(iocb->u.isp24.port_name);
+
+port_id.b.domain = iocb->u.isp24.port_id[2];
+port_id.b.area = iocb->u.isp24.port_id[1];
+port_id.b.al_pa = iocb->u.isp24.port_id[0];
+port_id.b.rsvd_1 = 0;
+
+loop_id = le16_to_cpu(iocb->u.isp24.nport_handle);
+
+/* Mark all stale commands sitting in qla_tgt_wq for deletion */
+abort_cmds_for_s_id(vha, &port_id);
+
+if (wwn) {
+spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
+sess = qlt_find_sess_invalidate_other(vha, wvn,
+    port_id, loop_id, &conflict_sess);
+spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
+} else {
+ql_dbg(ql_dbg_disc, vha, 0xffff,
+    "%s %d Term INOT due to WWN=0 lid=%d, NportID %06X ",
+    __func__, __LINE__, loop_id, port_id.b24);
+qlt_send_term_imm_notif(vha, iocb, 1);
+goto out;
+}
+
+if (IS_SW_RESV_ADDR(port_id)) {
+res = 1;
+goto out;
+}
+
+pla = qlt_plogi_ack_find_add(vha, &port_id, iocb);
+if (!pla) {
+qlt_send_term_imm_notif(vha, iocb, 1);
+goto out;
+}
+
+if (conflict_sess) {
+conflict_sess->login_gen++;
+qlt_plogi_ack_link(vha, pla, conflict_sess,
+    QLT_PLOGI_LINK_CONFLICT);
+}
+
+if (!sess) {
+pla->ref_count++;
+}
ql_dbg(ql_dbg_disc, vha, 0xffff,
+ "\%s \%d \%8phC post new sess\n",
+ __func__, __LINE__, iocb->u.isp24.port_name);
qla24xx_post_newsess_work(vha, &port_id,
+ iocb->u.isp24.port_name, pla);
goto out;
+
qlt_plogi_ack_link(vha, pla, sess, QLT_PLOGI_LINKSAME_WWN);
sess->d_id = port_id;
sess->login_gen++;
+
if (iocb->u.isp24.status_subcode == ELS_PRLI) {
+ sess->fw_login_state = DSC_LS_PRLI_PEND;
+ sess->local = 0;
+ sess->loop_id = loop_id;
+ sess->d_id = port_id;
+ sess->fw_login_state = DSC_LS_PRLI_PEND;
+ wd3_lo = le16_to_cpu(iocb->u.isp24.u.prli.wd3_lo);
+
+ if (wd3_lo & BIT_7)
+ sess->conf_compl_supported = 1;
+
+ if ((wd3_lo & BIT_4) == 0)
+ sess->port_type = FCT_INITIATOR;
+ else
+ sess->port_type = FCT_TARGET;
+
+ } else
+ sess->fw_login_state = DSC_LS_PLOGI_PEND;
+
+ +ql_dbg(ql_dbg_disc, vha, 0x20f9,
+ "\%s \%d \%8phC  DS %d
",
+ __func__, __LINE__, sess->port_name, sess->disc_state);
+
+ switch (sess->disc_state) {
+ case DSC_DELETED:
+ case DSC_LOGIN_PEND:
+ qlt_plogi_ack_unref(vha, pla);
+ break;
+
+ default:
+ /*
+ * Under normal circumstances we want to release nport handle
+ * during LOGO process to avoid nport handle leaks inside FW.
+ * The exception is when LOGO is done while another PLOGI with
+ * the same nport handle is waiting as might be the case here.
+ */
+ }
Note: there is always a possibility of a race where session deletion has already started for other reasons (e.g. ACL removal) and now PLOGI arrives:

1. If PLOGI arrived in FW after nport handle has been freed, FW must have assigned this PLOGI a new/same handle and we can proceed ACK'ing it as usual when session deletion completes.

2. If PLOGI arrived in FW before LOGO with LCF_FREE_NPORT bit reached it, the handle has now been released. We'll get an error when we ACK this PLOGI. Nothing will be sent back to initiator. Initiator should eventually retry PLOGI and situation will correct itself.

```c
(sess->loop_id == loop_id) &&
(sess->d_id.b24 == port_id.b24));
```

```c
+qlt_schedule_sess_for_deletion(sess);
+bret;
+}
+return res;
+}
+/
+ Mark all stale commands in qla_tgt_wq for deletion */
```
-if (wwn) {
  spin_lock_irqsave(&tgt->ha->tgt.sess_lock, flags);
  sess = qlt_find_sess_invalidate_other(vha, wwn,
  -port_id, loop_id, &conflict_sess);
  spin_unlock_irqrestore(&tgt->ha->tgt.sess_lock, flags);
-}
-
-if (IS_SW_RESV_ADDR(port_id)) {
  res = 1;
  break;
-}
-
-pla = qlt_plogi_ack_find_add(vha, &port_id, iocb);
-if (!pla) {
  qlt_send_term_imm_notif(vha, iocb, 1);
  break;
-}
-
-res = 0;
-
-if (conflict_sess) {
  conflict_sess->login_gen++;
  qlt_plogi_ack_link(vha, pla, conflict_sess,
  -QLT_PLOGI_LINK_CONFLICT);
-}
-
-if (!sess) {
  pla->ref_count++;
  qla24xx_post_newsess_work(vha, &port_id,
  -iocb->u.isp24.port_name, pla);
  res = 0;
  break;
-}
-
-qlt_plogi_ack_link(vha, pla, sess, QLT_PLOGI_LINKSAME_WWN);
- sess->fw_login_state = DSC_LS_PLOGI_PEND;
- sess->d_id = port_id;
- sess->login_gen++;
-
-switch (sess->disc_state) {
  case DSC_DELETED:
    qlt_plogi_ack_unref(vha, pla);
    break;
  -
  default:
    /*
    * Under normal circumstances we want to release nport handle
    */
- * during LOGO process to avoid nport handle leaks inside FW.
- * The exception is when LOGO is done while another PLOGI with
- * the same nport handle is waiting as might be the case here.
- * Note: there is always a possibly of a race where session
- * deletion has already started for other reasons (e.g. ACL
- * removal) and now PLOGI arrives:
- * 1. if PLOGI arrived in FW after nport handle has been freed,
- *  FW must have assigned this PLOGI a new/same handle and we
- *  can proceed ACK'ing it as usual when session deletion
- *  completes.
- * 2. if PLOGI arrived in FW before LOGO with LCF_FREE_NPORT
- *  bit reached it, the handle has now been released. We'll
- *  get an error when we ACK this PLOGI. Nothing will be sent
- *  back to initiator. Initiator should eventually retry
- *  PLOGI and situation will correct itself.
- */
-sess->keep_nport_handle = ((sess->loop_id == loop_id) &&
 - (sess->d_id.b24 == port_id.b24));
-
-ql_dbg(ql_dbg_disc, vha, 0x20f9,
 - "%s %d %8phC post del sess\n",
- __func__, __LINE__, sess->port_name);
-
+case ELS_PRLI:
+if (N2N_TOPO(ha)) {
+ sess = qla2x00_find_fcport_by_wwpn(vha,
+ iocb->u.isp24.port_name, 1);
+
+ if (sess && sess->plogi_link[QLT_PLOGI_LINK_SAME_WWN]) {
+ ql_dbg(ql_dbg_disc, vha, 0xffff,
+ "%s %d %8phC Term PRLI due to PLOGI ACK not completed\n",
+ __func__, __LINE__,
+ iocb->u.isp24.port_name);
+ qlt_send_term_imm_notif(vha, iocb, 1);
+ break;
+ }
+
- qlt_schedule_sess_for_deletion_lock(sess);
+ res = qlt_handle_login(vha, iocb);
break;
}
-
-case ELS_PRLI:
wd3_lo = le16_to_cpu(iocb->u.isp24.u.prli.wd3_lo);

if (wwn) {
if (conflict_sess) {
    ql_dbg(ql_dbg_tgt_mgt, vha, 0xf09b,
    "PRLI with conflicting sess %p port %8phCn",
    conflict_sess, conflict_sess->port_name);
    qlt_send_term_imm_notif(vha, iocb, 1);
    res = 0;
    break;
    +switch (conflict_sess->disc_state) {
    +case DSC_DELETED:
    +case DSC_DELETE_PEND:
    +break;
    +default:
    +ql_dbg(ql_dbg_tgt_mgt, vha, 0xf09b,
    "PRLI with conflicting sess %p port %8phCn",
    conflict_sess, conflict_sess->port_name);
    +conflict_sess->fw_login_state =
    +DSC_LS_PORT_UNAVAIL;
    +qlt_send_term_imm_notif(vha, iocb, 1);
    +res = 0;
    +break;
    +}
}

if (sess != NULL) {
    qlt_schedule_sess_for_deletion_lock(sess);
    res = 0;
} else {
    /* cmd did not go to upper layer. */
if (sess) {
    qlt_schedule_sess_for_deletion_lock(sess);
    qlt_schedule_sess_for_deletion(sess);
    res = 0;
}
/* else logo will be ack */
break;
}

+ql_dbg(ql_dbg_disc, vha, 0xf026,
+"qla_target(%d): Exit ELS opcode: 0x%02x res %d\n",
+vha->vp_idx, iocb->u.isp24.status_subcode, res);
+
return res;
}

@@ -5178,11 +5294,7 @@
se_sess = sess->se_sess;

tag = percpu_ida_alloc(&se_sess->sess_tag_pool, TASK_RUNNING);
-if (tag < 0)
-return;
-
-cmd = &((struct qla_tgt_cmd *)se_sess->sess_cmd_map)[tag];
-if (!cmd) {
+if (tag < 0) {
ql_dbg(ql_dbg_io, vha, 0x3009, "qla_target(%d): %s: Allocation of cmd failed\n", vha->vp_idx, __func__);@@ -5197,6 +5309,7 @@
return;
}
+cmand = &((struct qla_tgt_cmd *)se_sess->sess_cmd_map)[tag];
memset(cmd, 0, sizeof(struct qla_tgt_cmd));

qlt_incr_num_pend_cmds(vha);
@@ -5755,7 +5868,7 @@
unsigned long flags;
u8 newfcport = 0;

-fcport = kzalloc(sizeof(*fcport), GFP_KERNEL);
+fcport = qla2x00_alloc_fcport(vha, GFP_KERNEL);
if (!fcport) {
ql_dbg(ql_dbg_tgt_mgt, vha, 0xf06f, "qla_target(%d): Allocation of tmp FC port failed",
@@ -5784,6 +5897,7 @@
tfcp->port_type = fcport->port_type;
tfcp->supported_classes = fcport->supported_classes;
tfcp->flags |= fcport->flags;
+tfcp->scan_state = QLA_FCPORT_FOUND;

del = fcport;
fcpport = tfcp;
@@ -5908,7 +6022,6 @@
struct qla_hw_data *ha = vha->hw;
struct fc_port *sess = NULL;
unsigned long flags = 0, flags2 = 0;
-uint32_t be_s_id;
s_id[1] = prm->abts.fcp_hdr_le.s_id[1];
s_id[2] = prm->abts.fcp_hdr_le.s_id[0];

s_id[1] = prm->abts.fcp_hdr_le.s_id[1];
s_id[2] = prm->abts.fcp_hdr_le.s_id[0];
- sess = ha->tgt.tgt_ops->find_sess_by_s_id(vha,
- (unsigned char *)&be_s_id);
+ sess = ha->tgt.tgt_ops->find_sess_by_s_id(vha, s_id);
if (!sess) {
    spin_unlock_irqrestore(&ha->tgt.sess_lock, flags2);

    @@ -5948,17 +6060,19 @@
}

rc = __qlt_24xx_handle_abts(vha, &prm->abts, sess);
-ha->tgt.tgt_ops->put_sess(sess);
spin_unlock_irqrestore(&ha->tgt.sess_lock, flags2);

+ha->tgt.tgt_ops->put_sess(sess);
+
+ if (rc != 0)
+    goto out_term;
+    return;
+
+out_term2:
+spin_unlock_irqrestore(&ha->tgt.sess_lock, flags2);
+    if (sess)
+        ha->tgt.tgt_ops->put_sess(sess);
+    spin_unlock_irqrestore(&ha->tgt.sess_lock, flags2);

out_term:
spin_lock_irqsave(&ha->hardware_lock, flags);
@@ -6018,9 +6132,10 @@
scsilun_to_int((struct scsi_lun *)&a->u.isp24.fcp_cmnd.lun);

rc = qlt_issue_task_mgmt(sess, unpacked_lun, fn, iocb, 0);
-ha->tgt.tgt_ops->put_sess(sess);
spin_unlock_irqrestore(&ha->tgt.sess_lock, flags2);

+ha->tgt.tgt_ops->put_sess(sess);
+
+ if (rc != 0)
+    goto out_term;
+    return;
+
+out_term2:
+spin_unlock_irqrestore(&ha->tgt.sess_lock, flags2);
+    if (sess)
+        ha->tgt.tgt_ops->put_sess(sess);
+    spin_unlock_irqrestore(&ha->tgt.sess_lock, flags2);

out_term:
spin_lock_irqsave(&ha->hardware_lock, flags);
@@ -6386,7 +6501,8 @@
    else {
        set_bit(ISP_ABORT_NEEDED, &base_vha->dpc_flags);
        qla2xxx_wake_dpc(base_vha);
-qla2x00_wait_for_hba_online(base_vha);
+WARN_ON_ONCE(qla2x00_wait_for_hba_online(base_vha) !=
       + QLA_SUCCESS);
EXPORT_SYMBOL(qlt_enable_vha);
@@ -6416,7 +6532,9 @@
 set_bit(ISP_ABORT_NEEDED, &vha->dpc_flags);
 qla2xxx_wake_dpc(vha);
-qla2x00_wait_for_hba_online(vha);
+if (qla2x00_wait_for_hba_online(vha) != QLA_SUCCESS)
+    qla_dbg(qla_dbg_tgt, vha, 0xe081,
+        "qla2x00_wait_for_hba_online() failed\n");
}
/*
@@ -6574,6 +6692,7 @@
 qlt_24xx_config_nvram_stage1(struct scsi_qla_host *vha, struct nvram_24xx *nv)
 {
 struct qla_hw_data *ha = vha->hw;
+    u32 tmp;

 if (!QLA_TGT_MODE_ENABLED())
   return;
@@ -6625,6 +6744,14 @@
   nv->firmware_options_1 &= cpu_to_le32(~BIT_15);
 /* Enable target PRLI control */
   nv->firmware_options_2 |= cpu_to_le32(BIT_14);
+    if (IS_QLA25XX(ha)) {
+        /* Change Loop-prefer to Pt-Pt */
+        tmp = ~(BIT_4|BIT_5|BIT_6);
+        nv->firmware_options_2 &= cpu_to_le32(tmp);
+        tmp = P2P << 4;
+        nv->firmware_options_2 |= cpu_to_le32(tmp);
+    } else {
    if (ha->tgt.saved_set) {
       nv->exchange_count = ha->tgt.saved_exchange_count;
@@ -6679,6 +6806,7 @@
 qlt_81xx_config_nvram_stage1(struct scsi_qla_host *vha, struct nvram_81xx *nv)
 {
 struct qla_hw_data *ha = vha->hw;
+    u32 tmp;

 if (!QLA_TGT_MODE_ENABLED())
   return;
@@ -6729,6 +6857,12 @@
   nv->host_p &= cpu_to_le32(~BIT_10);
 /* Enable target PRLI control */
nv->firmware_options_2 |= cpu_to_le32(BIT_14);
+
+/* Change Loop-prefer to Pt-Pt */
+tmp = ~(BIT_4|BIT_5|BIT_6);
+nv->firmware_options_2 &= cpu_to_le32(tmp);
+tmp = P2P << 4;
+nv->firmware_options_2 |= cpu_to_le32(tmp);
} else {
if (ha->tgt.saved_set) {

nv->exchange_count = ha->tgt.saved_exchange_count;
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_target.h
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_target.h
@@ -124,7 +124,6 @@
(min(1270, ((ql) > 0) ? (QLA_TGT_DATASEGS_PER_CMD_24XX + 
 QLA_TGT_DATASEGS_PER_CONT_24XX* ((ql) - 1)) : 0))
 #endif
-#endif

#define GET_TARGET_ID(ha, iocb) ((HAS_EXTENDED_IDS(ha))
    ? le16_to_cpu((iocb)->u.isp2x.target.extended)
@@ -257,6 +256,7 @@
#define ATIO_TYPE7 0x06 /* Accept target I/O entry for 24xx */
+#endif

struct fcp_hdr {
uint8_t r_ctl;
@@ -374,8 +374,8 @@
static inline int fcpcmd_is_corrupted(struct atio *atio)
 {
 if (atio->entry_type == ATIO_TYPE7 &&
-    (le16_to_cpu(atio->attr_n_length & FCP_CMD_LENGTH_MASK) <
-    FCP_CMD_LENGTH_MIN))
+    ((le16_to_cpu(atio->attr_n_length) & FCP_CMD_LENGTH_MASK) <
+     FCP_CMD_LENGTH_MIN))
 return 1;
 else
 return 0;
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_tmpl.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_tmpl.c
@@ @ -897,7 +897,8 @@
static inline int qla27xx_verify_template_checksum(struct qla27xx_fwdt_template *tmp)
 {
 -return qla27xx_template_checksum(tmp, tmp->template_size) == 0;
+return qla27xx_template_checksum(tmp, 
+le32_to_cpu(tmp->template_size)) == 0;
static inline int
@@ -913,7 +914,7 @@
ulong len;

if (qla27xx_fwdt_template_valid(tmp)) {
  -len = tmp->template_size;
  +len = le32_to_cpu(tmp->template_size);
  tmp = memcpy(vha->hw->fw_dump, tmp, len);
  ql27xx_edit_template(vha, tmp);
  qla27xx_walk_template(vha, tmp, &len);
@@ -929,7 +930,7 @@
ulong len = 0;

if (qla27xx_fwdt_template_valid(tmp)) {
  -len = tmp->template_size;
  +len = le32_to_cpu(tmp->template_size);
  qla27xx_walk_template(vha, tmp, NULL, &len);
}
@@ -941,7 +942,7 @@
{
 struct qla27xx_fwdt_template *tmp = p;

  -return tmp->template_size;
  +return le32_to_cpu(tmp->template_size);
}

ulong
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/qla_tmpl.h
+++ linux-4.15.0/drivers/scsi/qla2xxx/qla_tmpl.h
@@ -13,7 +13,7 @@
struct __packed qla27xx_fwdt_template {
    uint32_t template_type;
    uint32_t entry_offset;
    -uint32_t template_size;
    +__le32 template_size;
    uint32_t reserved_1;

    uint32_t entry_count;
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/tcm_qla2xxx.c
+++ linux-4.15.0/drivers/scsi/qla2xxx/tcm_qla2xxx.c
@@ -351,7 +351,6 @@
 if (!sess)
     return;

-assert_spin_locked(&sess->vha->hw->tgt.sess_lock);
kref_put(&sess->sess_kref, tcm_qla2xxx_release_session);
}

@@ -366,8 +365,9 @@
spin_lock_irqsave(&vha->hw->tgt.sess_lock, flags);
target_sess_cmd_list_set_waiting(se_sess);
-tcm_qla2xxx_put_sess(sess);
spin_unlock_irqrestore(&vha->hw->tgt.sess_lock, flags);
+
+tcm_qla2xxx_put_sess(sess);
}

static u32 tcm_qla2xxx_sess_get_index(struct se_session *se_sess)
@@ -391,6 +391,8 @@
cmd->se_cmd.transport_state,
cmd->se_cmd.t_state,
cmd->se_cmd.se_cmd_flags);
+transport_generic_request_failure(&cmd->se_cmd,
+TCM_CHECK_CONDITION_ABORT_CMD);
return 0;
}
cmd->trc_flags |= TRC_XFR_RDY;
@@ -693,10 +695,6 @@
cmd->offset = 0;
cmd->dma_data_direction = target_reverse_dma_direction(se_cmd);
-if (cmd->trc_flags & TRC_XMIT_STATUS) {
-    pr_crit("Multiple calls for status = %p,\n", cmd);
-    dump_stack();
-}

cmd->trc_flags |= TRC_XMIT_STATUS;

if (se_cmd->data_direction == DMA_FROM_DEVICE) {
@@ -808,7 +806,6 @@
static void tcm_qla2xxx_shutdown_sess(struct fc_port *sess)
{
-assert_spin_locked(&sess->vha->hw->tgt.sess_lock);
target_sess_cmd_list_set_waiting(sess->se_sess);
}

@@ -904,38 +901,14 @@
atomic_read(&tpg->lport_tpg_enabled));
}

-static void tcm_qla2xxx_depend_tpg(struct work_struct *work)
-{

struct tcm_qla2xxx_tpg *base_tpg = container_of(work, 
struct tcm_qla2xxx_tpg, tpg_base_work);
struct se_portal_group *se_tpg = &base_tpg->se_tpg;
struct scsi_qla_host *base_vha = base_tpg->lport->qla_vha;

if (!target_depend_item(&se_tpg->tpg_group.cg_item)) {
  atomic_set(&base_tpg->lport_tpg_enabled, 1);
  qlt_enable_vha(base_vha);
}
complete(&base_tpg->tpg_base_comp);

-

static void tcm_qla2xxx_undepend_tpg(struct work_struct *work)
{
struct tcm_qla2xxx_tpg *base_tpg = container_of(work, 
struct tcm_qla2xxx_tpg, tpg_base_work);
struct se_portal_group *se_tpg = &base_tpg->se_tpg;
struct scsi_qla_host *base_vha = base_tpg->lport->qla_vha;

if (!qlt_stop_phase1(base_vha->vha_tgt.qla_tgt)) {
  atomic_set(&base_tpg->lport_tpg_enabled, 0);
  target_undepend_item(&se_tpg->tpg_group.cg_item);
}
complete(&base_tpg->tpg_base_comp);

-

static ssize_t tcm_qla2xxx_tpg_enable_store(struct config_item *item, 
const char *page, size_t count)
{
struct se_portal_group *se_tpg = to_tpg(item);
struct se_wwn *se_wwn = se_tpg->se_tpg_wwn;
struct tcm_qla2xxx_lport *lport = container_of(se_wwn, 
struct tcm_qla2xxx_lport, lport_wwn);
struct scsi_qla_host *vha = lport->qla_vha;
struct tcm_qla2xxx_tpg *tpg = container_of(se_tpg, 
struct tcm_qla2xxx_tpg, se_tpg);
unsigned long op;
@@ -954,24 +927,17 @@
if (atomic_read(&tpg->lport_tpg_enabled))
return -EEXIST;

-INIT_WORK(&tpg->tpg_base_work, tcm_qla2xxx_depend_tpg);
+atomic_set(&tpg->lport_tpg_enabled, 1);
+qlt_enable_vha(vha);
} else {
  if (!atomic_read(&tpg->lport_tpg_enabled))
return count;
-INIT_WORK(&tpg->tpg_base_work, tcm_qla2xxx_undepend_tpg);
+atomic_set(&tpg->lport_tpg_enabled, 0);
+qlt_stop_phase1(vha->vha_tgt.qla_tgt);
+qlt_stop_phase2(vha->vha_tgt.qla_tgt);
}  
-init_completion(&tpg->tpg_base_comp);
-schedule_work(&tpg->tpg_base_work);
-wait_for_completion(&tpg->tpg_base_comp);

-if (op) {
- if (!atomic_read(&tpg->lport_tpg_enabled))
- return -ENODEV;
} else {
- if (atomic_read(&tpg->lport_tpg_enabled))
- return -EPERM;
}  
return count;

atomic_set(&tpg->lport_tpg_enabled, 0);
qlt_stop_phase1(vha->vha_tgt.qla_tgt);
+qlt_stop_phase2(vha->vha_tgt.qla_tgt);
}

return count;
--- linux-4.15.0.orig/drivers/scsi/qla2xxx/tcm_qla2xxx.h
+++ linux-4.15.0/drivers/scsi/qla2xxx/tcm_qla2xxx.h
@@ -48,9 +48,6 @@
 struct tcm_qla2xxx_tpg_attrib tpg_attrib;
 /* Returned by tcm_qla2xxx_make_tpg() */
 struct se_portal_group se_tpg;
-/* Items for dealing with configfs_depend_item */
-struct completion tpg_base_comp;
-struct work_struct tpg_base_work;
-};

 struct tcm_qla2xxx_fc_loopid {
--- linux-4.15.0.orig/drivers/scsi/qla4xxx/ql4_def.h
+++ linux-4.15.0/drivers/scsi/qla4xxx/ql4_def.h
@@ -168,6 +168,8 @@
 #define DEV_DB_NON_PERSISTENT 0
 #define DEV_DB_PERSISTENT1

+#define QL4_ISP_REG_DISCONNECT 0xffffffffU
+
#ifdefine COPY_ISID(dst_isid, src_isid) {


```c
int i, j;
for (i = 0, j = ISID_SIZE - 1; i < ISID_SIZE;)
--- linux-4.15.0.orig/drivers/scsi/qla4xxx/ql4_mbx.c
+++ linux-4.15.0/drivers/scsi/qla4xxx/ql4_mbx.c
@@ -641,9 +641,6 @@
if (qla4xxx_get_ifcb(ha, &mbox_cmd[0], &mbox_sts[0], init_fw_cb_dma) !=
   QLA_SUCCESS) {
   -dma_free_coherent(&ha->pdev->dev,
   -    sizeof(struct addr_ctrl_blk),
   -    init_fw_cb, init_fw_cb_dma);
   goto exit_init_fw_cb;
}
--- linux-4.15.0.orig/drivers/scsi/qla4xxx/ql4_os.c
+++ linux-4.15.0/drivers/scsi/qla4xxx/ql4_os.c
@@ -262,6 +262,24 @@
static struct scsi_transport_template *qla4xxx_scsi_transport;
+static int qla4xxx_isp_check_reg(struct scsi_qla_host *ha)
+{
+  u32 reg_val = 0;
+  int rval = QLA_SUCCESS;
+  +
+  +if (is qla8022(ha))
+    +reg_val = readl(&ha->qla4_82xx_reg->host_status);
+  +else if (is qla8032(ha) || is qla8042(ha))
+    +reg_val = qla4_8xxx_rd_direct(ha, QLA8XXX_PEG_ALIVE_COUNTER);
+  +else
+    +reg_val = readw(&ha->reg->ctrl_status);
+  +
+  +if (reg_val == QL4_ISP_REG_DISCONNECT)
+    +rval = QLA_ERROR;
+  +
+  +return rval;
+  +}
+static int qla4xxx_send_ping(struct Scsi_Host *shost, uint32_t iface_num,
    uint32_t iface_type, uint32_t payload_size, uint32_t pid, struct sockaddr *dst_addr)
@@ -1205,7 +1223,7 @
le64_to_cpu(ql_iscsi_stats->iscsi_sequence_error);
exit_host_stats:
if (ql_iscsi_stats)
   -dma_free_coherent(&ha->pdev->dev, host_stats_size,
   +dma_free_coherent(&ha->pdev->dev, stats_size,
      ql_iscsi_stats, iscsi_stats_dma);
```

ql4_printk(KERN_INFO, ha, "%s: Get host stats done\n",
@@ -3189,6 +3207,8 @@
  if (iscsi_conn_bind(cls_session, cls_conn, is_leading))
 return -EINVAL;
 ep = iscsi_lookup_endpoint(transport_fd);
+if (!ep)
+  return -EINVAL;
 conn = cls_conn->dd_data;
 qla_conn = conn->dd_data;
 qla_conn->qla_ep = ep->dd_data;
@@ -4129,7 +4149,7 @@
 dma_free_coherent(&ha->pdev->dev, ha->queues_len, ha->queues,
 ha->queues_dma);
- if (ha->fw_dump)
+if (ha->fw_dump)
  vfree(ha->fw_dump);

 ha->queues_len = 0;
@@ -4264,7 +4284,6 @@
 return QLA_SUCCESS;
 mem_alloc_error_exit:
- qla4xxx_mem_free(ha);
 return QLA_ERROR;
 }
@@ -5919,7 +5938,7 @@
 val = rd_nvram_byte(ha, sec_addr);
 if (val & BIT_7)
  ddb_index[1] = (val & 0x7f);
- +goto exit_boot_info;
 } else if (is_qla80XX(ha)) {
  buf = dma_alloc_coherent(&ha->pdev->dev, size,
  &buf_dma, GFP_KERNEL);
@@ -7223,6 +7242,8 @@
 rc = qla4xxx_copy_from_fwddb_param(fnode_sess, fnode_conn,
     fw_ddb_entry);
+ if (rc)
+  goto free_sess;

 ql4_printk(KERN_INFO, ha, "%s: sysfs entry %s created\n",
@@ -9188,10 +9209,17 @@
 struct srb *srb = NULL;
int ret = SUCCESS;
tint wait = 0;
int rval;

ql4_printk(KERN_INFO, ha, "scsi%ld:%d:%llu: Abort command issued cmd=%p, cdb=0x%x\n",
            ha->host_no, id, lun, cmd, cmd->cmd[0]);

+rval = qla4xxx_isp_check_reg(ha);
+if (rval != QLA_SUCCESS) {
+ql4_printk(KERN_INFO, ha, "PCI/Register disconnect, exiting.\n");
+return FAILED;
+
spin_lock_irqsave(&ha->hardware_lock, flags);
srb = (struct srb *) CMD_SP(cmd);
if (!srb) {
@@ -9243,6 +9271,7 @@
    struct scsi_qla_host *ha = to_qla_host(cmd->device->host);
    struct ddb_entry *ddb_entry = cmd->device->hostdata;
    int ret = FAILED, stat;
    +int rval;

    if (!ddb_entry)
        return ret;
@@ -9262,6 +9291,12 @@
        cmd->request->timeout / HZ,
        ha->dpc_flags, cmd->result, cmd->allowed));

+rval = qla4xxx_isp_check_reg(ha);
+if (rval != QLA_SUCCESS) {
+ql4_printk(KERN_INFO, ha, "PCI/Register disconnect, exiting.\n");
+return FAILED;
+
/* FIXME: wait for hba to go online */
stat = qla4xxx_reset_lun(ha, ddb_entry, cmd->device->lun);
if (stat != QLA_SUCCESS) {
@@ -9305,6 +9340,7 @@
    struct scsi_qla_host *ha = to_qla_host(cmd->device->host);
    struct ddb_entry *ddb_entry = cmd->device->hostdata;
    int stat, ret;
    +int rval;

    if (!ddb_entry)
        return FAILED;
@@ -9322,6 +9358,12 @@
        ha->host_no, cmd, jiffies, cmd->request->timeout / HZ,
        ha->dpc_flags, cmd->result, cmd->allowed));

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+rval = qla4xxx_isp_check_reg(ha);
+if (rval != QLA_SUCCESS) {
+    ql4 printk(KERN_INFO, ha, "PCI/Register disconnect, exiting.
+    return FAILED;
+} +
+
+stat = qla4xxx_reset_target(ha, ddb_entry);
if (stat != QLA_SUCCESS) {
    starget printk(KERN_INFO, scsi_target(cmd->device),
    int return_status = FAILED;
    struct scsi qla_host *ha;
+int rval;

    ha = to qla_host(cmd->device->host);

    +rval = qla4xxx_isp_check_reg(ha);
    +if (rval != QLA_SUCCESS) {
    +    ql4 printk(KERN_INFO, ha, "PCI/Register disconnect, exiting.
    +    return FAILED;
    +} +
    +
    if ((is qla8032(ha) || is qla8042(ha)) && q14xdontresethba)
qla4_83xx_set_idc_dontreset(ha);

    --- linux-4.15.0.orig/drivers/scsi/raid_class.c
+++ linux-4.15.0/drivers/scsi/raid_class.c
@@ -63,8 +63,7 @@
* emulated RAID devices, so start with SCSI */
struct raid_internal *i = ac_to_raid_internal(cont);

-#if defined(CONFIG_SCSI) || defined(CONFIG_SCSI_MODULE)
-#if (scsi_is_sdev_device(dev)) {
+if (IS_ENABLED(CONFIG_SCSI) && scsi_is_sdev_device(dev)) {
    struct scsi_device *sdev = to scsi_device(dev);

    if (i->f->cookie != sdev->host->hostt)
    @ @ -72,7 +71,6 @@

    return i->f->is_raid(dev);
    }
    #endif
    /* FIXME: look at other subsystems too */
    return 0;
    }
--- linux-4.15.0.orig/drivers/scsi/scsi_debug.c
+++ linux-4.15.0/drivers/scsi/scsi_debug.c
@@ -678,7 +678,7 @@
 (sdebug_lbpws || sdebug_lbpws10);
 }

-static void *fake_store(unsigned long long lba)
+static void *lba2fake_store(unsigned long long lba)
 {
   lba = do_div(lba, sdebug_store_sectors);

@@ -2393,8 +2393,8 @@
 return ret;
 }

-/* If fake_store(lba,num) compares equal to arr(num), then copy top half of
-* arr into fake_store(lba,num) and return true. If comparison fails then
+/* If lba2fake_store(lba,num) compares equal to arr(num), then copy top half of
+* arr into lba2fake_store(lba,num) and return true. If comparison fails then
* return false. */
static bool comp_write_worker(u64 lba, u32 num, const u8 *arr)
 {
   @@ -2522,7 +2522,7 @@
 if (sdt->app_tag == cpu_to_be16(0xffff))
      continue;

-  ret = dif_verify(sdt, fake_store(sector), sector, ei_lba);
+  ret = dif_verify(sdt, lba2fake_store(sector), sector, ei_lba);
   if (ret) {
    dif_errors++;
    return ret;
@@ -2973,10 +2973,12 @@
 static int resp_write_same(struct scsi_cmnd *scp, u64 lba, u32 num,
     u32 ei_lba, bool unmap, bool ndob)
 {
+  int ret;
   unsigned long iflags;
   unsigned long long i;
-  int ret;
-  u64 lba_off;
+  u32 lb_size = sdebug_sector_size;
+  u64 block, lbaa;
+  u8 *fs1p;

   ret = check_device_access_params(scp, lba, num);
   if (ret)
@@ -2988,31 +2990,30 @@
    unmap_region(lba, num);
   goto out;

lba_off = lba * sdebug_sector_size;
+lbaa = lba;
+block = do_div(lbaa, sdebug_store_sectors);
/* if ndob then zero 1 logical block, else fetch 1 logical block */
+fs1p = fake_storep + (block * lb_size);
if (ndob) {
-memset(fake_storep + lba_off, 0, sdebug_sector_size);
+memset(fs1p, 0, lb_size);
ret = 0;
} else
-ret = fetch_to_dev_buffer(scp, fake_storep + lba_off,
- sdebug_sector_size);
+ret = fetch_to_dev_buffer(scp, fs1p, lb_size);
if (-1 == ret) {
  write_unlock_irqrestore(&atomic_rw, iflags);
  return DID_ERROR << 16;
} else if (sdebug_verbose && !ndob && (ret < sdebug_sector_size))
+} else if (sdebug_verbose && !ndob && (ret < lb_size))
sdev_printk(KERN_INFO, scp->device,
    "%s: %s: lb size=%u, IO sent=%d bytes\n",
    my_name, "write same",\
    sdebug_sector_size, ret);
+} else if (my_name, "write same", lb_size, ret);
/* Copy first sector to remaining blocks */
-for (i = 1 ; i < num ; i++)
-memcpy(fake_storep + ((lba + i) * sdebug_sector_size),
- fake_storep + lba_off,
- sdebug_sector_size);
-
+for (i = 1 ; i < num ; i++) {
  lbaa = lba + i;
+block = do_div(lbaa, sdebug_store_sectors);
+memmove(fake_storep + (block * lb_size), fs1p, lb_size);
+}
if (scsi_debug_lbp())
map_region(lba, num);
out:
@@ -4969,6 +4970,11 @@
return -EINVAL;
} 
@if (sdebug_num_tgts < 0) {
+pr_err("num_tgts must be >= 0\n");
+return -EINVAL;
}````
if (sdebug_guard > 1) {
    pr_err("guard must be 0 or 1\n");
    return -EINVAL;
}

if ((sdebug_max_queue > SDEBUG_CANQUEUE) || (sdebug_max_queue < 1)) {
    pr_err("max_queue must be in range [1, %d], SDEBUG_CANQUEUE\n");
    return -EINVAL;
}

sdebug_q_arr = kmalloc(submit_queues, sizeof(struct sdebug_queue), GFP_KERNEL);
if (sdebug_q_arr == NULL)
    return -ENOMEM;

stop_all_queued();
-free_all_queued();
for (; k; k--)
sdebug_remove_adapter();
+free_all_queued();
driver_unregister(&sdebug_driverfs_driver);
bunregister(&pseudo_lld_bus);
root_device_unregister(pseudo_primary);
--- linux-4.15.0.orig/drivers/scsi/scsi_devinfo.c
+++ linux-4.15.0/drivers/scsi/scsi_devinfo.c
@@ -108,8 +108,8 @@
*/
"SEAGATE", "controller", which causes SCSI code to reset bus.
*/
"HP", "C1750A", "3226", BLIST_NOLUN],/* scanjet iic */
-"HP", "C1790A", ",", BLIST_NOLUN],/* scanjet iip */
-"HP", "C2500A", ",", BLIST_NOLUN],/* scanjet iicx */
+"HP", "C1790A", NULL, BLIST_NOLUN],/* scanjet iip */
+"HP", "C2500A", NULL, BLIST_NOLUN],/* scanjet iicx */
+"MEDIAVIS", "CDR-H93MV", "1.31", BLIST_NOLUN],/* locks up */
+"MICROTEK", "ScanMaker II", "5.61", BLIST_NOLUN],/* responds to all lun */
+"MITSUMI", "CD-R CR-2201CS", "6119", BLIST_NOLUN],/* locks up */
@ -119.7 +119.7 @
+"QUANTUM", "FIREBALL ST4.3S", "0F0C", BLIST_NOLUN],/* locks up */
+"RELIYS", "Scorpio", NULL, BLIST_NOLUN],/* responds to all lun */
+"SANKYO", "CP525", "6.64", BLIST_NOLUN],/* causes failed REQ SENSE, extra reset */
+"TEXEL", "CD-ROM", "1.06", BLIST_NOLUN],
+"TEXEL", "CD-ROM", "1.06", BLIST_NOLUN | BLIST_BORKEN],
{"transtec", "T5008", "0001", BLIST_NOREPORTLUN },
{"YAMAHA", "CDR100", "1.00", BLIST_NOLUN} /* locks up */
{"YAMAHA", "CDR102", "1.00", BLIST_NOLUN} /* locks up */
@@ -181,12 +181,13 @@
{"HITACHI", "6586-", "*", BLIST_SPARSELUN | BLIST_LARGELUN],
{"HITACHI", "6588-", "*", BLIST_SPARSELUN | BLIST_LARGELUN],
{"HP", "A6189A", NULL, BLIST_SPARSELUN | BLIST_LARGELUN} /* HP VA7400 */
-{"HP", "OPEN-", "*", BLIST_REPORTLUN2}, /* HP XP Arrays */
+{"HP", "OPEN-", "*", BLIST_REPORTLUN2 | BLIST_TRY_VPD_PAGES}, /* HP XP Arrays */
{"HP", "NetRAID-4M", NULL, BLIST_FORCELUN},
{"HP", "HSV100", NULL, BLIST_REPORTLUN2 | BLIST_NOSTARTONADD},
{"HP", "C1557A", NULL, BLIST_FORCELUN},
{"HP", "C3323-300", "4269", BLIST_NOTQ},
{"HP", "C5713A", NULL, BLIST_NOREPORTLUN},
+{"HPE", "OPEN-", "*", BLIST_REPORTLUN2 | BLIST_TRY_VPD_PAGES},
{"HP", "DF400", "*", BLIST_SPARSELUN | BLIST_LARGELUN},
{"HP", "DF500", "*", BLIST_SPARSELUN | BLIST_LARGELUN},
{"HP", "DF600", "*", BLIST_SPARSELUN | BLIST_LARGELUN},
@@ -249,13 +250,13 @@
{"NETAPP", "Universal Xport", "*", BLIST_NO_ULD_ATTACH},
{"LSI", "Universal Xport", "*", BLIST_NO_ULD_ATTACH},
{"ENGENIO", "Universal Xport", "*", BLIST_NO_ULD_ATTACH},
+{"LENOVO", "Universal Xport", "*", BLIST_NO_ULD_ATTACH},
{"SMSC", "USB 2 HS-CF", NULL, BLIST_SPARSELUN | BLIST_INQUIRY_36},
{"SONY", "CD-ROM CDU-8001", NULL, BLIST_BORKEN},
{"SONY", "TSL", NULL, BLIST_FORCELUN} /* DDS3 & DDS4 autoloaders */
{"ST650211", "CF", NULL, BLIST_RETRY_HWERROR},
{"SUN", "T300", "*", BLIST_SPARSELUN},
{"SUN", "T4", "*", BLIST_SPARSELUN},
-{"TEXEL", "CD-ROM", "1.06", BLIST_BORKEN},
{"Tornado-", "F4", "*", BLIST_NOREPORTLUN},
{"TOSHIBA", "CDROM", NULL, BLIST_ISROM},
{"TOSHIBA", "CD-ROM", NULL, BLIST_ISROM},
@@ -590,17 +591,12 @@
int key)
{
    struct scsi_dev_info_list *devinfo;
    -int err;

    devinfo = scsi_dev_info_list_find(vendor, model, key);
    if (!IS_ERR(devinfo))
        return devinfo->flags;

    -err = PTR_ERR(devinfo);
    -if (err != -ENOENT)
        return err;
    -
    /* nothing found, return nothing */
    

/* key or device not found: return nothing */
if (key != SCSI_DEVINFO_GLOBAL)
return 0;

--- linux-4.15.0.orig/drivers/scsi/scsi_dh.c
+++ linux-4.15.0/drivers/scsi/scsi_dh.c
@@ -56,10 +56,16 @@
{"IBM", "1815", "rdac", },
{"IBM", "1818", "rdac", },
{"IBM", "3526", "rdac", },
-{"SGI", "TP9", "rdac", },
+{"IBM", "3542", "rdac", },
+{"IBM", "3552", "rdac", },
+{"SGI", "TP9300", "rdac", },
+{"SGI", "TP9400", "rdac", },
+{"SGI", "TP9500", "rdac", },
+{"SGI", "TP9700", "rdac", },
+{"SGI", "IS", "rdac", },
-{"STK", "OPENstorage D280", "rdac", },
+{"STK", "OPENstorage", "rdac", },
{"STK", "FLEXLINE 380", "rdac", },
+{"STK", "BladeCtrl", "rdac", },
{"SUN", "CSM", "rdac", },
{"SUN", "LCSM100", "rdac", },
{"SUN", "STK6580_6780", "rdac", },
@@ -69,6 +75,7 @@
{"NETAPP", "INF-01-00", "rdac", },
{"LSI", "INF-01-00", "rdac", },
{"ENGENIO", "INF-01-00", "rdac", },
+{"LENOVO", "DE_Series", "rdac", },
{NULL, NULL,NULL },
};

--- linux-4.15.0.orig/drivers/scsi/scsi_error.c
+++ linux-4.15.0/drivers/scsi/scsi_error.c
@@ -220,6 +220,18 @@
}
}

+static void scsi_eh_inc_host_failed(struct rcu_head *head)
+{
+struct scsi_cmnd *scmd = container_of(head, typeof(*scmd), rcu);
+struct Scsi_Host *shost = scmd->device->host;
+unsigned long flags;
+spin_lock_irqsave(shost->host_lock, flags);
+scsi_eh_wakeup(shost);

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spin_unlock_irqrestore(shost->host_lock, flags);
} +
/**
 * scsi_eh_scmd_add - add scsi cmd to error handling.
 * @scmd:
 * @scmd:scmd to run eh on.
@@ -242,9 +254,12 @@
 scsi_eh_reset(scmd);
 list_add_tail(&scmd->eh_entry, &shost->eh_cmd_q);
- host_failed++;  
- scsi_eh_wakeup(shost);
+/*
+ * Ensure that all tasks observe the host state change before the
+ * host_failed change.
+ */
+call_rcu(&scmd->rcu, scsi_eh_inc_host_failed);
}

/**
@@ -927,6 +942,7 @@
 ses->sdb = scmd->sdb;
 ses->next_rq = scmd->request->next_rq;
 ses->result = scmd->result;
+ses->resid_len = scmd->req.resid_len;
 ses->underflow = scmd->underflow;
 ses->prot_op = scmd->prot_op;
 ses->eh_eflags = scmd->eh_eflags;
 @ @ -938,6 +954,7 @@
 memset(&scmd->sdb, 0, sizeof(scmd->sdb));
 scmd->request->next_rq = NULL;
 scmd->result = 0;
+scmd->req.resid_len = 0;

 if (sense_bytes) {
 scmd->sdb.length = min_t(unsigned, SCSI_SENSE_BUFFERSIZE,
 @@ -991,6 +1008,7 @@
 scmd->sdb = ses->sdb;
 scmd->request->next_rq = ses->next_rq;
 scmd->result = ses->result;
+scmd->req.resid_len = ses->resid_len;
 scmd->underflow = ses->underflow;
 scmd->prot_op = ses->prot_op;
 scmd->eh_eflags = ses->eh_eflags;
--- linux-4.15.0.orig/drivers/scsi/scsi_lib.c
+++ linux-4.15.0/drivers/scsi/scsi_lib.c
 @@ -71,11

struct kmem_cache *cache;
int ret = 0;

+mutex_lock(&scsi_sense_cache_mutex);
cache = scsi_select_sense_cache(shost->unchecked_isa_dma);
if (cache)
  -return 0;
+goto exit;

-mutex_lock(&scsi_sense_cache_mutex);
if (shost->unchecked_isa_dma) {
  scsi_sense_isadma_cache =
kmem_cache_create("scsi_sense_cache(DMA)",
@@ -90,7 +90,7 @@
if (!scsi_sense_cache)
  ret = -ENOMEM;
}
-
+ exit:
mutex_unlock(&scsi_sense_cache_mutex);
return ret;
}
@@ -318,22 +318,39 @@
cmd->cmd_len = scsi_command_size(cmd->cmd);
}

-void scsi_device_unbusy(struct scsi_device *sdev)
+/**
+ * Decrement the host_busy counter and wake up the error handler if necessary.
+ * Avoid as follows that the error handler is not woken up if shost->host_busy
+ * == host->host_failed: use call_rcu() in scsi_eh_scmd_add() in combination
+ * with an RCU read lock in this function to ensure that this function in its
+ * entirety either finishes before scsi_eh_scmd_add() increases the
+ * host_failed counter or that it notices the shost state change made by
+ * scsi_eh_scmd_add().
+ */
+static void scsi_dec_host_busy(struct Scsi_Host *shost)
{
-struct Scsi_Host *shost = sdev->host;
-struct scsi_target *starget = scsi_target(sdev);
unsigned long flags;

+rcu_read_lock();
atomic_dec(&shost->host_busy);
-if (starget->can_queue > 0)
  -atomic_dec(&starget->target_busy);
-
-if (unlikely(scsi_host_in_recovery(shost) &&

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if (unlikely(scsi_host_in_recovery(shost))) {
    spin_lock_irqsave(shost->host_lock, flags);
    scsi_eh_wakeup(shost);
    if (shost->host_failed || shost->host_eh_scheduled)
        scsi_eh_wakeup(shost);
    spin_unlock_irqrestore(shost->host_lock, flags);
}
rcu_read_unlock();
+
+void scsi_device_unbusy(struct scsi_device *sdev)
+{
+struct Scsi_Host *shost = sdev->host;
+struct scsi_target *starget = scsi_target(sdev);
+
+scsi_dec_host_busy(shost);
+
+if (starget->can_queue > 0)
+atomic_dec(&starget->target_busy);
+
atomic_dec(&sdev->device_busy);
}
if (!blk_rq_is_scsi(req)) {
    WARN_ON_ONCE(!(cmd->flags & SCMD_INITIALIZED));
    cmd->flags &= ~SCMD_INITIALIZED;
    destroy_rcu_head(&cmd->rcu);
}
if (req->mq_ctx) {
    scsi_mq_uninit_cmd(cmd);
*/
/*
scsi_mq_uninit_cmd(cmd);
*/
+ /* queue is still alive, so grab the ref for preventing it
+ * from being cleaned up during running queue.
+ */
+percpu_ref_get(&q->q_usage_counter);
+
__blk_mq_end_request(req, error);
if (scsi_target(sdev)->single_lun ||
    kblockd_schedule_work(&sdev->requeue_work);
else
    blk_mq_run_hw_queues(q, true);
+ percpu_ref_put(&q->q_usage_counter);
} else {
  unsigned long flags;

@@ -708,6 +734,7 @@
  set_host_byte(cmd, DID_OK);
  return BLK_STS_TARGET;
 case DID_NEXUS_FAILURE:
+  set_host_byte(cmd, DID_OK);
  return BLK_STS_NEXUS;
 case DID_ALLOC_FAILURE:
  set_host_byte(cmd, DID_OK);
@@ -837,6 +864,17 @@
  /* for passthrough error may be set */
  error = BLK_STS_OK;
 }
+/*
+ * Another corner case: the SCSI status byte is non-zero but 'good'.
+ * Example: PRE-FETCH command returns SAM_STAT_CONDITION_MET when
+ * it is able to fit nominated LBs in its cache (and SAM_STAT_GOOD
+ * if it can't fit). Treat SAM_STAT_CONDITION_MET and the related
+ * intermediate statuses (both obsolete in SAM-4) as good.
+ */
+if (status_byte(result) && scsi_status_is_good(result)) {
+  result = 0;
+  error = BLK_STS_OK;
+}
+
  /* special case: failed zero length commands always need to
@@ -933,6 +971,7 @@
  case 0x07: /* operation in progress */
  case 0x08: /* Long write in progress */
  case 0x09: /* self test in progress */
+  case 0x11: /* notify (enable spinup) required */
  case 0x14: /* space allocation in progress */
  action = ACTION_DELAYED_RETRY;
  break;
@@ -1133,6 +1172,7 @@
  struct scsi_cmnd *cmd = blk_mq_rq_to_pdu(rq);

  scsi_req_init(&cmd->req);
+  init_rcu_head(&cmd->rcu);
  cmd->jiffies_at_alloc = jiffies;
  cmd->retries = 0;
 }
list_add_tail(&sdev->starved_entry, &shost->starved_list);
spin_unlock_irq(shost->host_lock);
out_dec:
-atomic_dec(&shost->host_busy);
+scsi_dec_host_busy(shost);
return 0;
}

@@ -2020,7 +2060,7 @@
return BLK_STS_OK;

out_dec_host_busy:
- atomic_dec(&shost->host_busy);
+scsi_dec_host_busy(shost);
out_dec_target_busy:
if (scsi_target(sdev)->can_queue > 0)
atomic_dec(&scsi_target(sdev)->target_busy);
@@ -2030,13 +2070,17 @@
case BLK_STS_OK:
    break;
case BLK_STS_RESOURCE:
    -if (atomic_read(&sdev->device_busy) == 0 &&
    - !scsi_device_blocked(sdev))
    -blk_mq_delay_run_hw_queue(hctx, SCSI_QUEUE_DELAY);
    +if (atomic_read(&sdev->device_busy) ||
    + scsi_device_blocked(sdev))
    +ret = BLK_STS_DEV_RESOURCE;
    break;
default:
    +if (unlikely(!scsi_device_online(sdev)))
    +scsi_req(req)->result = DID_NO_CONNECT << 16;
    +else
    +scsi_req(req)->result = DID_ERROR << 16;
    /*
    - * Make sure to release all allocated resources when
    + * Make sure to release all allocated resources when
    * we hit an error, as we will never see this command
    * again.
    */
    @@ -2260,7 +2304,8 @@
    {
    unsigned int cmd_size, sgl_size;

    -sgl_size = scsi_mq_sgl_size(shost);
    +sgl_size = max_t(unsigned int, sizeof(struct scatterlist),
    +scsi_mq_sgl_size(shost));
    cmd_size = sizeof(struct scsi_cmnd) + shost->hostt->cmd_size + sgl_size;
    if (scsi_host_get_prot(shost))
cmd_size += sizeof(struct scsi_data_buffer) + sgl_size;
@@ -3001,7 +3046,6 @@
 * device deleted during suspend)
 */
mutex_lock(&sdev->state_mutex);
-WARN_ON_ONCE(!sdev->quiesced_by);
sdev->quiesced_by = NULL;
blk_clear_preempt_only(sdev->request_queue);
if (sdev->sdev_state == SDEV_QUIESCE)
@@ -3330,6 +3374,78 @@
 }
EXPORT_SYMBOL(sdev_enable_disk_events);

+static unsigned char designator_prio(const unsigned char *d)
+{
+if (d[1] & 0x30)
+/* not associated with LUN */
+return 0;
+
+if (d[3] == 0)
+/* invalid length */
+return 0;
+
+/* Order of preference for lun descriptor:
+ * - SCSI name string
+ * - NAA IEEE Registered Extended
+ * - EUI-64 based 16-byte
+ * - EUI-64 based 12-byte
+ * - NAA IEEE Registered
+ * - NAA IEEE Extended
+ * - EUI-64 based 8-byte
+ * - SCSI name string (truncated)
+ * - T10 Vendor ID
+ * as longer descriptors reduce the likelyhood
+ * of identification clashes.
+ */
+
+switch (d[1] & 0xf) {
+case 8:
+/* SCSI name string, variable-length UTF-8 */
+return 9;
+case 3:
+switch (d[4] >> 4) {
+case 6:
+/* NAA registered extended */
+return 8;
+case 5:
/* NAA registered */
+return 5;
+case 4:
/* NAA extended */
+return 4;
+case 3:
/* NAA locally assigned */
+return 1;
+default:
+break;
+
+break;
+case 2:
+switch (d[3]) {
+case 16:
/* EUI64-based, 16 byte */
+return 7;
+case 12:
/* EUI64-based, 12 byte */
+return 6;
+case 8:
/* EUI64-based, 8 byte */
+return 3;
+default:
+break;
+
+break;
+case 1:
/* T10 vendor ID */
+return 1;
+default:
+break;
+
+return 0;
+
+
/**
 * scsi_vpd_lun_id - return a unique device identification
 * @sdev: SCSI device
 @@ -3346,7 +3462,7 @@
 */
 int scsi_vpd_lun_id(struct scsi_device *sdev, char *id, size_t id_len)
 {
-u8 cur_id_type = 0xff;
+u8 cur_id_prio = 0;
 u8 cur_id_size = 0;
 const unsigned char *d, *cur_id_str;
const struct scsi_vpd *vpd_pg83;
@@ -3359,20 +3475,6 @@ return -ENXIO;
 }

-/*
- * Look for the correct descriptor.
- * Order of preference for lun descriptor:
- * - SCSI name string
- * - NAA IEEE Registered Extended
- * - EUI-64 based 16-byte
- * - EUI-64 based 12-byte
- * - NAA IEEE Registered
- * - NAA IEEE Extended
- * - T10 Vendor ID
- * as longer descriptors reduce the likelyhood
- * of identification clashes.
- */
-
-/* The id string must be at least 20 bytes + terminating NULL byte */
if (id_len < 21) {
    rcu_read_unlock();
@@ -3382,8 +3484,9 @@
    memset(id, 0, id_len);
    d = vpd_pg83->data + 4;
    while (d < vpd_pg83->data + vpd_pg83->len) {
-        /* Skip designators not referring to the LUN */
-        if ((d[1] & 0x30) != 0x00)
+        u8 prio = designator_prio(d);
+        if (prio == 0 || cur_id_prio > prio)
            goto next_desig;
    switch (d[1] & 0xf) {
    /* T10 Vendor ID */
@@ -3391,28 +3494,19 @@
        if (cur_id_size > d[3])
            break;
-        /* Prefer anything */
-        -if (cur_id_type > 0x01 && cur_id_type != 0xff)
-            -break;
+        +cur_id_prio = prio;
+        cur_id_size = d[3];
        if (cur_id_size + 4 > id_len)
            cur_id_size = id_len - 4;
        cur_id_str = d + 4;
-        -cur_id_type = d[1] & 0xf;
+        -cur_id_type = d[1] & 0xf;
        id_size = snprintf(id, id_len, "t10.%*pE",
cur_id_size, cur_id_str);
break;
case 0x2:
    /* EUI-64 */
    if (cur_id_size > d[3])
        break;
    /* Prefer NAA IEEE Registered Extended */
    if (cur_id_type == 0x3 &&
        cur_id_size == d[3])
        break;
    cur_id_prio = prio;
    cur_id_size = d[3];
    cur_id_str = d + 4;
    cur_id_type = d[1] & 0xf;
    switch (cur_id_size) {
    case 8:
        id_size = snprintf(id, id_len,
                           cur_id_str);
        break;
    default:
        cur_id_size = 0;
        break;
    }
break;
case 0x3:
    /* NAA */
    if (cur_id_size > d[3])
        break;
    cur_id_prio = prio;
    cur_id_size = d[3];
    cur_id_str = d + 4;
    cur_id_type = d[1] & 0xf;
    switch (cur_id_size) {
    case 8:
        id_size = snprintf(id, id_len,
                           cur_id_str);
        break;
    default:
        cur_id_size = 0;
        break;
    }
break;
case 0x8:
    /* SCSI name string */
    if (cur_id_size + 4 > d[3])
        if (cur_id_size > d[3])
break;
/* Prefer others for truncated descriptor */
-if (cur_id_size && d[3] > id_len)
-break;
+if (d[3] > id_len) {
  +prio = 2;
  +if (cur_id_prio > prio)
  +break;
  +}
  +cur_id_prio = prio;
-cur_id_size = id_size = d[3];
cur_id_str = d + 4;
-cur_id_type = d[1] & 0xf;
if (cur_id_size >= id_len)
cur_id_size = id_len - 1;
mempcpy(id, cur_id_str, cur_id_size);
-/* Decrease priority for truncated descriptor */
-if (cur_id_size != id_size)
-cur_id_size = 6;
break;
default:
break;
--- linux-4.15.0.orig/drivers/scsi/scsi_logging.c
+++ linux-4.15.0/drivers/scsi/scsi_logging.c
@@ -16,57 +16,15 @@
#include <scsi/scsi_eh.h>
#include <scsi/scsi_dbg.h>
#define SCSI_LOG_SPOOLSIZE 4096
-#if (SCSI_LOG_SPOOLSIZE / SCSI_LOG_BUFSIZE) > BITS_PER_LONG
-#warning SCSI logging bitmask too large
-#endif
-
-struct scsi_log_buf {
- char buffer[SCSI_LOG_SPOOLSIZE];
- unsigned long map;
-};
-
-static DEFINE_PER_CPU(struct scsi_log_buf, scsi_format_log);
- static char *scsi_log_reserve_buffer(size_t *len)
{ 
  struct scsi_log_buf *buf;
  unsigned long map_bits = sizeof(buf->buffer) / SCSI_LOG_BUFSIZE;
  unsigned long idx = 0;
  preempt_disable();
buf = this_cpu_ptr(&scsi_format_log);
idx = find_first_zero_bit(&buf->map, map_bits);
-if (likely(idx < map_bits)) {
  while (test_and_set_bit(idx, &buf->map)) {
    idx = find_next_zero_bit(&buf->map, map_bits, idx);
  }
  break;
}
-if (WARN_ON(idx >= map_bits)) {
  preempt_enable();
  return NULL;
}
*len = SCSI_LOG_BUFSIZE;
return buf->buffer + idx * SCSI_LOG_BUFSIZE;
+len = 128;
return kmalloc(*len, GFP_ATOMIC);
}
static void scsi_log_release_buffer(char *bufptr)
{
  struct scsi_log_buf *buf;
  unsigned long idx;
  int ret;

  buf = this_cpu_ptr(&scsi_format_log);
  if (bufptr >= buf->buffer &
    bufptr < buf->buffer + SCSI_LOG_SPOOLSIZE) {
    idx = (bufptr - buf->buffer) / SCSI_LOG_BUFSIZE;
    ret = test_and_clear_bit(idx, &buf->map);
    WARN_ON(!ret);
  }
  preempt_enable();
  kfree(bufptr);
}
static inline const char *scmd_name(const struct scsi_cmnd *scmd)
--- linux-4.15.0.orig/drivers/scsi/scsi_pm.c
+++ linux-4.15.0/drivers/scsi/scsi_pm.c
@@ -79,8 +79,22 @@
      pm_runtime_set_active(dev);
      err = pm_runtime_set_active(dev);
      pm_runtime_enable(dev);
+      /*}
      if (err == 0) {
        pm_runtime_disable(dev);
        -pm_runtime_set_active(dev);
        +err = pm_runtime_set_active(dev);
        pm_runtime_enable(dev);
        +*/
Forcibly set runtime PM status of request queue to "active"
to make sure we can again get requests from the queue
(see also blk_pm_peek_request()).

The resume hook will correct runtime PM status of the disk.

if (!err && scsi_is_sdev_device(dev)) {
    struct scsi_device *sdev = to_scsi_device(dev);
    if (sdev->request_queue->dev)
        blk_set_runtime_active(sdev->request_queue);
}

return err;

else
    fn = NULL;

/*
 * Forcibly set runtime PM status of request queue to "active" to
 * make sure we can again get requests from the queue (see also
 * blk_pm_peek_request()).
 * The resume hook will correct runtime PM status of the disk.
 */

if (scsi_is_sdev_device(dev) && pm_runtime_suspended(dev))
    blk_set_runtime_active(to_scsi_device(dev)->request_queue);

if (fn) {
    async_schedule_domain(fn, dev, &scsi_sd_pm_domain);

--- linux-4.15.0.orig/drivers/scsi/scsi_scan.c
+++ linux-4.15.0/drivers/scsi/scsi_scan.c
@@ -220,7 +220,7 @@
 struct Scsi_Host *shost = dev_to_shost(starget->dev.parent);
 sdev = kzalloc(sizeof(*sdev) + shost->transportt->device_size,
                 GFP_ATOMIC);
-    GFP_ATOMIC);
+    GFP_KERNEL);
    if (!sdev)
        goto out;

@@ -462,7 +462,8 @@
 error = shost->hostt->target_alloc(starget);

if(error) {
    -dev_printk(KERN_ERR, dev, "target allocation failed, error %d\n", error);
    error = shost->hostt->target_alloc(starget);

if(error) {
    -dev_printk(KERN_ERR, dev, "target allocation failed, error %d\n", error);
    error = shost->hostt->target_alloc(starget);

if(error) {
    -dev_printk(KERN_ERR, dev, "target allocation failed, error %d\n", error);
    error = shost->hostt->target_alloc(starget);

if(error) {
+if (error != -ENXIO)
+dev_err(dev, "target allocation failed, error %d\n", error);
/* don't want scsi_target_reap to do the final
 * put because it will be under the host lock */
scsi_target_destroy(target);
@@ -796,7 +797,7 @@
*/
sdev->inquiry = kmemdup(inq_result,
max_t(size_t, sdev->inquiry_len, 36),
-GFP_ATOMIC);
+GFP_KERNEL);
if (sdev->inquiry == NULL)
return SCSI_SCAN_NO_RESPONSE;
@@ -1087,7 +1088,7 @@
if (!sdev)
goto out;

-result = kmalloc(result_len, GFP_ATOMIC |
+result = kmalloc(result_len, GFP_KERNEL |
((shost->unchecked_isa_dma) ? __GFP_DMA : 0));
if (!result)
goto out_free_sdev;
@@ -1722,15 +1723,16 @@
*/
static struct async_scan_data *scsi_prep_async_scan(struct Scsi_Host *shost)
{
-struct async_scan_data *data;
+struct async_scan_data *data = NULL;
unsigned long flags;

if (strncmp(scsi_scan_type, "sync", 4) == 0)
return NULL;
+mutex_lock(&shost->scan_mutex);
if (shost->async_scan) {
shost_printk(KERN_DEBUG, shost, "%s called twice\n", __func__);
-return NULL;
+goto err;
}
data = kmalloc(sizeof(*data), GFP_KERNEL);
@@ -1741,7 +1743,6 @@
init_completion(&data->prev_finished);
-mutex_lock(&shost->scan_mutex);
spin_lock_irqsave(shost->host_lock, flags);

shost->async_scan = 1;
spin_unlock_irqrestore(shost->host_lock, flags);
@@ -1756,6 +1757,7 @@
    return data;

    err:
+    mutex_unlock(&shost->scan_mutex);
    kfree(data);
    return NULL;
}
--- linux-4.15.0.orig/drivers/scsi/scsi_sysfs.c
+++ linux-4.15.0/drivers/scsi/scsi_sysfs.c
@@ -722,8 +722,33 @@
 sdev_store_delete(struct device *dev, struct device_attribute *attr,
         const char *buf, size_t count)
 {
-    if (device_remove_file_self(dev, attr))
-        scsi_remove_device(to_scsi_device(dev));
+    struct kernfs_node *kn;
+    struct scsi_device *sdev = to_scsi_device(dev);
+    
+    /*
+     * We need to try to get module, avoiding the module been removed
+     * during delete.
+     */
+    if (scsi_device_get(sdev))
+        return -ENODEV;
+    
+    kn = sysfs_break_active_protection(&dev->kobj, &attr->attr);
+    WARN_ON_ONCE(!kn);
+    /*
+     * Concurrent writes into the "delete" sysfs attribute may trigger
+     * concurrent calls to device_remove_file() and scsi_remove_device().
+     * device_remove_file() handles concurrent removal calls by
+     * serializing these and by ignoring the second and later removal
+     * attempts. Concurrent calls of scsi_remove_device() are
+     * serialized. The second and later calls of scsi_remove_device() are
+     * ignored because the first call of that function changes the device
+     * state into SDEV_DEL.
+     */
+    device_remove_file(dev, attr);
+    scsi_remove_device(sdev);
+    if (kn)
+        sysfs_unbreak_active_protection(kn);
+    scsi_device_put(sdev);
+    return count;
+};
static DEVICE_ATTR(delete, S_IWUSR, NULL, sdev_store_delete);
--- linux-4.15.0.orig/drivers/scsi/scsi_trace.c
+++ linux-4.15.0/drivers/scsi/scsi_trace.c
@@ -21,7 +21,7 @@
 #include <trace/events/scsi.h>

#define SERVICE_ACTION16(cdb) (cdb[1] & 0x1f)
-#define SERVICE_ACTION32(cdb) ((cdb[8] << 8) | cdb[9])
+#define SERVICE_ACTION32(cdb) (get_unaligned_be16(&cdb[8]))

static const char *
scsi_trace_misc(struct trace_seq *, unsigned char *, int);
@@ -30,15 +30,18 @@
 scsi_trace_rw6(struct trace_seq *p, unsigned char *cdb, int len)
{
 const char *ret = trace_seq_buffer_ptr(p);
-sector_t lba = 0, txlen = 0;
+u32 lba = 0, txlen;

 lba |= ((cdb[1] & 0x1F) << 16);
 lba |= (cdb[2] << 8);
 lba |=  cdb[3];
 -txlen = cdb[4];
+/*
+ * From SBC-2: a TRANSFER LENGTH field set to zero specifies that 256
+ * logical blocks shall be read (READ(6)) or written (WRITE(6)).
+ */

 -trace_seq_printf(p, "lba=%llu txlen=%llu",
- (unsigned long long)lba, (unsigned long long)txlen);
+trace_seq_printf(p, "lba=%u txlen=%u", lba, txlen);
 trace_seq_putc(p, 0);
 return ret;
@@ -48,17 +51,12 @@
 scsi_trace_rw10(struct trace_seq *p, unsigned char *cdb, int len)
{
 const char *ret = trace_seq_buffer_ptr(p);
-sector_t lba = 0, txlen = 0;
+u32 lba, txlen;

 -lba |= (cdb[2] << 24);
 -lba |= (cdb[3] << 16);
 -lba |= (cdb[4] << 8);
 -lba |=  cdb[5];
 -txlen |= (cdb[7] << 8);
 -txlen |=  cdb[8];
+lba = get_unaligned_be32(&cdb[2]);

+txlen = get_unaligned_be16(&cdb[7]);

-trace_seq_printf(p, "lba=%llu txlen=%llu protect=%u",
+ (unsigned long long)lba, (unsigned long long)txlen,
+trace_seq_printf(p, "lba=%u txlen=%u protect=%u", lba, txlen,
    cdb[1] >> 5);

if (cdb[0] == WRITE_SAME)
@@ -73,19 +71,12 @@
scsi_trace_rw12(struct trace_seq *p, unsigned char *cdb, int len)
{
    const char *ret = trace_seq_buffer_ptr(p);
    -sector_t lba = 0, txlen = 0;
+u32 lba, txlen;

    -lba |= (cdb[2] << 24);
    -lba |= (cdb[3] << 16);
    -lba |= (cdb[4] << 8);
    -lba |=  cdb[5];
    -txlen |= (cdb[6] << 24);
    -txlen |= (cdb[7] << 16);
    -txlen |= (cdb[8] << 8);
    -txlen |=  cdb[9];
    +lba = get_unaligned_be32(&cdb[2]);
    +txlen = get_unaligned_be32(&cdb[6]);

    -trace_seq_printf(p, "lba=%llu txlen=%llu protect=%u",
     (unsigned long long)lba, (unsigned long long)txlen,
     cdb[1] >> 5);
    trace_seq_putc(p, 0);

@@ -96,23 +87,13 @@
scsi_trace_rw16(struct trace_seq *p, unsigned char *cdb, int len)
{
    const char *ret = trace_seq_buffer_ptr(p);
    -sector_t lba = 0, txlen = 0;
+u64 lba;
    +u32 txlen;

    -lba |= ((u64)cdb[2] << 56);
    -lba |= ((u64)cdb[3] << 48);
    -lba |= ((u64)cdb[4] << 40);
    -lba |= ((u64)cdb[5] << 32);
    -lba |=  (cdb[6] << 24);
    -lba |=  (cdb[7] << 16);
    -lba |=  (cdb[8] << 8);
    -lba |=  cdb[9];

-txlen |= (cdb[10] << 24);
-txlen |= (cdb[11] << 16);
-txlen |= (cdb[12] << 8);
-txlen |=  cdb[13];
+lba = get_unaligned_be64(&cdb[2]);
+txlen = get_unaligned_be32(&cdb[10]);

-trace_seq_printf(p, "lba=%llu txlen=%llu protect=%u",
-       (unsigned long long)lba, (unsigned long long)txlen,
+trace_seq_printf(p, "lba=%llu txlen=%u protect=%u", lba, txlen,
    cdb[1] >> 5);

if (cdb[0] == WRITE_SAME_16)
@@ -127,8 +108,8 @@
scsi_trace_rw32(struct trace_seq *p, unsigned char *cdb, int len)
{
    const char *ret = trace_seq_buffer_ptr(p), *cmd;
    -sector_t lba = 0, txlen = 0;
+u64 lba;
    +u32 ei_lbrt = 0;
    +u64 lba;
    +u32 ei_lbrt, txlen;

    switch (SERVICE_ACTION32(cdb)) {
    case READ_32:
@@ -148,26 +129,12 @@
        goto out;
    }

    -lba |= ((u64)cdb[12] << 56);
    -lba |= ((u64)cdb[13] << 48);
    -lba |= ((u64)cdb[14] << 40);
    -lba |= ((u64)cdb[15] << 32);
    -lba |= (cdb[16] << 24);
    -lba |= (cdb[17] << 16);
    -lba |= (cdb[18] << 8);
    -lba |=  cdb[19];
    -ei_lbrt |= (cdb[20] << 24);
    -ei_lbrt |= (cdb[21] << 16);
    -ei_lbrt |= (cdb[22] << 8);
    -ei_lbrt |=  cdb[23];
    -txlen |= (cdb[28] << 24);
    -txlen |= (cdb[29] << 16);
    -txlen |= (cdb[30] << 8);
    -txlen |=  cdb[31];

    -trace_seq_printf(p, "%s_32 lba=%llu txlen=%llu protect=%u ei_lbrt=%u",
        cmd, (unsigned long long)lba,
        (unsigned long long)txlen, cdb[10] >> 5, ei_lbrt);
+lba = get_unaligned_be64(&cdb[2]);
+ei_lbrt = get_unaligned_be32(&cdb[20]);
+txlen = get_unaligned_be32(&cdb[28]);
+
+trace_seq_printf(p, "%s_32 lba=%llu txlen=%u protect=%u ei_lbrt=%u",
+ cmd, lba, txlen, cdb[10] >> 5, ei_lbrt);

if (SERVICE_ACTION32(cdb) == WRITE_SAME_32)
trace_seq_printf(p, " unmap=%u", cdb[10] >> 3 & 1);
@@ -182,7 +149,7 @@
scsi_trace_unmap(struct trace_seq *p, unsigned char *cdb, int len)
{
    const char *ret = trace_seq_buffer_ptr(p);
-    unsigned int regions = cdb[7] << 8 | cdb[8];
+    unsigned int regions = get_unaligned_be16(&cdb[7]);

    trace_seq_printf(p, "regions=%u", (regions - 8) / 16);
    trace_seq_putchar(p, 0);
@@ -194,8 +161,8 @@
scsi_trace_service_action_in(struct trace_seq *p, unsigned char *cdb, int len)
{
    const char *ret = trace_seq_buffer_ptr(p), *cmd;
-    sector_t lba = 0;
-    u32 alloc_len = 0;
+    u64 lba;
+    u32 alloc_len;

    switch (SERVICE_ACTION16(cdb)) {
    case SAI_READ_CAPACITY_16:
@@ -209,21 +176,10 @@
goto out;
    }

-    lba |= ((u64)cdb[2] << 56);
-    lba |= ((u64)cdb[3] << 48);
-    lba |= ((u64)cdb[4] << 40);
-    lba |= ((u64)cdb[5] << 32);
-    lba |= (cdb[6] << 24);
-    lba |= (cdb[7] << 16);
-    lba |= (cdb[8] << 8);
-    lba |= cdb[9];
-    alloc_len |= (cdb[10] << 24);
-    alloc_len |= (cdb[11] << 16);
-    alloc_len |= (cdb[12] << 8);
-    alloc_len |= cdb[13];
+    lba = get_unaligned_be64(&cdb[2]);
+    alloc_len = get_unaligned_be32(&cdb[10]);
- trace_seq_printf(p, "%s lba=%llu alloc_len=%u", cmd,
  (unsigned long long)lba, alloc_len);
+ trace_seq_printf(p, "%s lba=%llu alloc_len=%u", cmd, lba, alloc_len);

out:
trace_seq_putchar(p, 0);
--- linux-4.15.0.orig/drivers/scsi/scsi_transport_fc.c
+++ linux-4.15.0/drivers/scsi/scsi_transport_fc.c
@@ -267,8 +267,8 @@
 { FC_PORTSPEED_50GBIT,"50 Gbit" },
 { FC_PORTSPEED_100GBIT,"100 Gbit" },
 { FC_PORTSPEED_25GBIT,"25 Gbit" },
-{ FC_PORTSPEED_64BIT,"64 Gbit" },
-{ FC_PORTSPEED_128BIT,"128 Gbit" },
+{ FC_PORTSPEED_64GBIT,"64 Gbit" },
+{ FC_PORTSPEED_128GBIT,"128 Gbit" },
 { FC_PORTSPEED_NOT_NEGOTIATED,"Not Negotiated" },
};
fc_bitfield_name_search(port_speed, fc_port_speed_names)
--- linux-4.15.0.orig/drivers/scsi/scsi_transport_iscsi.c
+++ linux-4.15.0/drivers/scsi/scsi_transport_iscsi.c
@@ -37,6 +37,8 @@
 #define ISCSI_TRANSPORT_VERSION "2.0-870"

 +#define ISCSI_SEND_MAX_ALLOWED 10
 +
 static int dbg_session;
 module_param_named(debug_session, dbg_session, int,
   S_IRUGO | S_IWUSR);
@@ -117,7 +119,11 @@
 struct iscsi_internal *priv = dev_to_iscsi_internal(dev);
-{ return sprintf(buf, "%llu\n", (unsigned long long)iscsi_handle(priv->iscsi_transport));
+ if (! capable(CAP_SYS_ADMIN))
+ return -EACCES;
+ return sysfs_emit(buf, "%llu\n",
+ (unsigned long long)iscsi_handle(priv->iscsi_transport));
} static DEVICE_ATTR(handle, S_IRUGO, show_transport_handle, NULL);

@@ -127,7 +133,7 @@
 struct device_attribute *attr,char *buf)		
 { struct iscsi_internal *priv = dev_to_iscsi_internal(dev);
- return sprintf(buf, "%llu\n", (unsigned long long)iscsi_handle(priv->iscsi_transport));
+ if (! tablefmt

 struct device_attribute *attr,char *buf)\n { struct iscsi_internal *priv = dev_to_iscsi_internal(dev)\n- return sprintf(buf, format"\n", priv->iscsi_transport->name);\n
+return sysfs_emit(buf, format"\n", priv->iscsi_transport->name);
}\
static DEVICE_ATTR(name, S_IRUGO, show_transport_##name, NULL);

@@ -168,7 +174,7 @@
show_ep_handle(struct device *dev, struct device_attribute *attr, char *buf)
{
    struct iscsi_endpoint *ep = iscsi_dev_to_endpoint(dev);
    return printf(buf, "%llu\n", (unsigned long long) ep->id);
+    return sysfs_emit(buf, "%llu\n", (unsigned long long) ep->id);
}
static ISCSI_ATTR(ep, handle, S_IRUGO, show_ep_handle, NULL);

@@ -421,40 +427,9 @@
struct device *dev = container_of(kobj, struct device, kobj);
struct iscsi_iface *iface = iscsi_dev_to_iface(dev);
struct iscsi_transport *t = iface->transport;
-int param;
-int param_type;
+int param = -1;

-if (attr == &dev_attr_iface_enabled.attr)
-    param = ISCSI_NET_PARAM_IFACE_ENABLE;
-else if (attr == &dev_attr_iface_vlan_id.attr)
-    param = ISCSI_NET_PARAM_VLAN_ID;
-else if (attr == &dev_attr_iface_vlan_priority.attr)
-    param = ISCSI_NET_PARAM_VLAN_PRIORITY;
-else if (attr == &dev_attr_iface_vlan_enabled.attr)
-    param = ISCSI_NET_PARAM_VLAN_ENABLED;
-else if (attr == &dev_attr_iface_mtu.attr)
-    param = ISCSI_NET_PARAM_MTU;
-else if (attr == &dev_attr_iface_port.attr)
-    param = ISCSI_NET_PARAM_PORT;
-else if (attr == &dev_attr_iface_delayed_ack_en.attr)
-    param = ISCSI_NET_PARAM_DELAYED_ACK_EN;
-else if (attr == &dev_attr_iface_tcp_nagle_disable.attr)
-    param = ISCSI_NET_PARAM_TCP_NAGLE_DISABLE;
-else if (attr == &dev_attr_iface_tcp_wsf_disable.attr)
-    param = ISCSI_NET_PARAM_TCP_WSF_DISABLE;
-else if (attr == &dev_attr_iface_cache_id.attr)
-param = ISCSI_NET_PARAM_CACHE_ID;
-else if (attr == &dev_attr_iface_redirect_en.attr)
-param = ISCSI_NET_PARAM_REDIRECT_EN;
-else if (attr == &dev_attr_iface_def_taskmgmt_tmo.attr)
+if (attr == &dev_attr_iface_def_taskmgmt_tmo.attr)
  param = ISCSI_IFACE_PARAM_DEF_TASKMGMT_TMO;
else if (attr == &dev_attr_iface_header_digest.attr)
-param = ISCSI_IFACE_PARAM_HDRDGST_EN;
+param = ISCSI_IFACE_PARAM_HDRDGST_EN;
@@ -490,6 +465,40 @@
-param = ISCSI_IFACE_PARAM_STRICT_LOGIN_COMP_EN;
+param = ISCSI_IFACE_PARAM_STRICT_LOGIN_COMP_EN;
else if (attr == &dev_attr_iface_initiator_name.attr)
-param = ISCSI_IFACE_PARAM_INITIATOR_NAME;
+  param = ISCSI_IFACE_PARAM_INITIATOR_NAME;
+
+if (param != -1)
+  return t->attr_is_visible(ISCSI_IFACE_PARAM, param);
+
+if (attr == &dev_attr_iface_enabled.attr)
+-param = ISCSI_NET_PARAM_IFACE_ENABLE;
+param = ISCSI_NET_PARAM_IFACE_ENABLE;
+else if (attr == &dev_attr_iface_vlan_id.attr)
+param = ISCSI_NET_PARAM_VLAN_ID;
+else if (attr == &dev_attr_iface_vlan_priority.attr)
+param = ISCSI_NET_PARAM_VLAN_PRIORITY;
+else if (attr == &dev_attr_iface_vlan_enabled.attr)
+param = ISCSI_NET_PARAM_VLAN_ENABLED;
+else if (attr == &dev_attr_iface_mtu.attr)
+param = ISCSI_NET_PARAM_MTU;
+else if (attr == &dev_attr_iface_port.attr)
+param = ISCSI_NET_PARAM_PORT;
+else if (attr == &dev_attr_iface_ipaddress_state.attr)
+param = ISCSI_NET_PARAM_IPADDR_STATE;
+else if (attr == &dev_attr_iface_delayed_ack_en.attr)
+param = ISCSI_NET_PARAM_DELAYED_ACK_EN;
+else if (attr == &dev_attr_iface_tcp_nagle_disable.attr)
+param = ISCSI_NET_PARAM_TCP_NAGLE_DISABLE;
+else if (attr == &dev_attr_iface_tcp_wsf_disable.attr)
+param = ISCSI_NET_PARAM_TCP_WSF_DISABLE;
+else if (attr == &dev_attr_iface_tcp_wsf.attr)
+param = ISCSI_NET_PARAM_TCP_WSF;
+else if (attr == &dev_attr_iface_tcp_timer_scale.attr)
+param = ISCSI_NET_PARAM_TCP_TIMER_SCALE;
+else if (attr == &dev_attr_iface_tcp_timestamp_en.attr)
+param = ISCSI_NET_PARAM_TCP_TIMESTAMP_EN;
+else if (attr == &dev_attr_iface_cache_id.attr)
+param = ISCSI_NET_PARAM_CACHE_ID;
+else if (attr == &dev_attr_iface_redirect_en.attr)
+param = ISCSI_NET_PARAM_REDIRECT_EN;
else if (iface->iface_type == ISCSI_IFACE_TYPE_IPV4) {
  if (attr == &dev_attr_ipv4_iface_ipaddress.attr)
param = ISCSI_NET_PARAM_IPV4_ADDR;
@@ -580,32 +589,7 @@ return 0;
}

-switch (param) {
- case ISCSI_IFACE_PARAM_DEF_TASKMGMT_TMO:
- case ISCSI_IFACE_PARAM_HDRDGST_EN:
- case ISCSI_IFACE_PARAM_DATADGST_EN:
- case ISCSI_IFACE_PARAM_IMM_DATA_EN:
- case ISCSI_IFACE_PARAM_INITIAL_R2T_EN:
- case ISCSI_IFACE_PARAM_DATASEQ_INORDER_EN:
- case ISCSI_IFACE_PARAM_PDU_INORDER_EN:
- case ISCSI_IFACE_PARAM_ERL:
- case ISCSI_IFACE_PARAM_MAX_RECV_DLENGTH:
- case ISCSI_IFACE_PARAM_FIRST_BURST:
- case ISCSI_IFACE_PARAM_MAX_R2T:
- case ISCSI_IFACE_PARAM_MAX_BURST:
- case ISCSI_IFACE_PARAM_CHAP_AUTH_EN:
- case ISCSI_IFACE_PARAM_BIDI_CHAP_EN:
- case ISCSI_IFACE_PARAM_DISCOVERY_AUTH_OPTIONAL:
- case ISCSI_IFACE_PARAM_DISCOVERY_LOGOUT_EN:
- case ISCSI_IFACE_PARAM.Strict_LOGIN_COMP_EN:
- case ISCSI_IFACE_PARAM_INITIATOR_NAME:
- param_type = ISCSI_IFACE_PARAM;
- break;
- default:
- param_type = ISCSI_NET_PARAM;
- }
-
- return t->attr_is_visible(param_type, param);
+
+return t->attr_is_visible(ISCSI_NET_PARAM, param);
}

static struct attribute *iscsi_iface_attrs[] = {
@@ -2008,7 +1992,7 @@
 if (session->target_id == ISCSI_MAX_TARGET) {
 spin_unlock_irqrestore(&session->lock, flags);
 mutex_unlock(&ihost->mutex);
- goto unbind_session_exit;
+  return;
  }
}

static struct attribute *iscsi_iface_attrs[] = {
@@ -2020,6 +2004,8 @@
    target_id = session->target_id;
    ida_simple_remove(&iscsi_sess_ida, target_id);
    scsi_remove_target(&session->dev);

unbind_session_exit:
iscsi_session_event(session, ISCSI_KEVENT_UNBIND_SESSION);
ISCSI_DBG_TRANS_SESSION(session, "Completed target removal");
}@ -2185,6 +2171,8 @
scsi_target_unblock(&session->dev, SDEV_TRANSPORT_OFFLINE);
/* flush running scans then delete devices */
flush_work(&session->scan_work);
+/* flush running unbind operations */
+flush_work(&session->unbind_work);
__iscsi_unbind_session(&session->unbind_work);
/* hw iscsi may not have removed all connections from session */
}@ -2296,6 +2284,18 @
EXPORT_SYMBOL_GPL(iscsi_destroy_conn);

+void iscsi_put_conn(struct iscsi_cls_conn *conn)
+{
+put_device(&conn->dev);
+}
+EXPORT_SYMBOL_GPL(iscsi_put_conn);
+
+void iscsi_get_conn(struct iscsi_cls_conn *conn)
+{
+get_device(&conn->dev);
+}
+EXPORT_SYMBOL_GPL(iscsi_get_conn);
+
/*
 * iscsi interface functions
 */
}@ -2322,6 +2322,12 @
return nlmmsg_multicast(nls, skb, 0, group, gfp);
}

+static int
+iscsi_unicast_skb(struct sk_buff *skb, u32 portid)
+{
+return nlmmsg_unicast(nls, skb, portid);
+}
+
+ int iscsi_recv_pdu(struct iscsi_cls_conn *conn, struct iscsi_hdr *hdr,
+ char *data, uint32_t data_size)
+{ 
+EXPORT_SYMBOL_GPL(iscsi_ping_comp_event);
static int
iscsi_if_send_reply(uint32_t group, int seq, int type, int done, int multi,
void *payload, int size)
{
struct sk_buff *skb;
struct nlmsghdr *nlh;
int len = nlmsg_total_size(size);
int flags = multi ? NLM_F_MULTI : 0;
int t = done ? NLMSG_DONE : type;

skb = alloc_skb(len, GFP_ATOMIC);
if (!skb) {
    return -ENOMEM;
}

nlh = __nlmsg_put(skb, 0, 0, t, (len - sizeof(*nlh)), 0);
nlh->nlmsg_flags = flags;
memcpy(nlmsg_data(nlh), payload, size);
return iscsi_multicast_skb(skb, group, GFP_ATOMIC);
}

static int
iscsi_session_lookup(ev->u.set_param.sid);
conn = iscsi_conn_lookup(ev->u.set_param.sid, ev->u.set_param.cid);
if (!conn || !session)
    return -ENOSYS;

shost = scsi_host_lookup(ev->u.set_host_param.host_no);
if (!shost) {
    printk(KERN_ERR "set_host_param could not find host no %u\n", ev->u.set_host_param.host_no);
    return -EINVAL;
}

if (ev->u.set_host_param.len > PAGE_SIZE)
    return -EINVAL;

session = iscsi_session_lookup(ev->u.set_param.sid);
conn = iscsi_conn_lookup(ev->u.set_param.sid, ev->u.set_param.cid);
if (!conn || !session)
    return -ENOSYS;

if (ev->u.set_host_param.len > PAGE_SIZE)
    return -EINVAL;

shost = scsi_host_lookup(ev->u.set_host_param.host_no);
if (!shost) {
    printk(KERN_ERR "set_host_param could not find host no %u\n", ev->u.set_host_param.host_no);
    return -EINVAL;
}
+static int iscsi_session_has_conns(int sid)
+{
+struct iscsi_cls_conn *conn;
+unsigned long flags;
+int found = 0;
+
+spin_lock_irqsave(&connlock, flags);
+list_for_each_entry(conn, &connlist, conn_list) {
+if (iscsi_conn_get_sid(conn) == sid) {
+found = 1;
+break;
+}
+}
+spin_unlock_irqrestore(&connlock, flags);
+
+return found;
+}

static int
iscsi_set_iface_params(struct iscsi_transport *transport,
struct iscsi_uevent *ev, uint32_t len)
{  
    u32 portid;
    u32 pdu_len;
    struct iscsi_uevent *ev = nlmsg_data(nlh);
    struct iscsi_transport *transport = NULL;
    struct iscsi_internal *priv;
    struct iscsi_cls_conn *conn;
    struct iscsi_endpoint *ep = NULL;

    if (!netlink_capable(skb, CAP_SYS_ADMIN))
        return -EPERM;

    idx = ev->u.set_flashnode.flashnode_idx;
    iscsi_if_recv_msg(skb, &nlh, uint32_t *group)
    {
        int err = 0;
        +u32 portid;
        +u32 pdu_len;
    struct iscsi_transport *transport = NULL;
    struct iscsi_internal *priv;
    struct iscsi_cls_conn *conn;
    struct iscsi_endpoint *ep = NULL;

    +if (!netlink_capable(skb, CAP_SYS_ADMIN))
        return -EPERM;
if (nlh->nlmsg_type == ISCSI_UEVENT_PATH_UPDATE)
    *group = ISCSI_NL_GRP_UIP;
else
    @@ -3490,10 +3521,12 @@
    if (!try_module_get(transport->owner))
        return -EINVAL;
+
    portid = NETLINK_CB(skb).portid;
+
    switch (nlh->nlmsg_type) {
    case ISCSI_UEVENT_CREATE_SESSION:
        err = iscsi_if_create_session(priv, ep, ev,
            portid,
            ev->u.c_session.initial_cmdsn,
            ev->u.c_session.cmds_max,
            ev->u.c_session.queue_depth);
        @@ -3506,17 +3539,19 @@
            break;
        case ISCSI_UEVENT_DESTROY_SESSION:
            session = iscsi_session_lookup(ev->u.d_session.sid);
            if (!session)
                err = -EINVAL;
            else if (iscsi_session_has_conns(ev->u.d_session.sid))
                err = -EBUSY;
            else
                +transport->destroy_session(session);
                break;
        case ISCSI_UEVENT_UNBIND_SESSION:
            session = iscsi_session_lookup(ev->u.d_session.sid);
            if (!session)
                err = -EINVAL;
            +else if (iscsi_session_has_conns(ev->u.d_session.sid))
                +err = -EBUSY;
            +else
                +transport->destroy_session(session);
                break;
        case ISCSI_UEVENT_SEND_PDU:
            pdu_len = nlh->nlmsg_len - sizeof(*nlh) - sizeof(*ev);
if ((ev->u.send_pdu.hdr_size > pdu_len) ||
    (ev->u.send_pdu.data_size > (pdu_len - ev->u.send_pdu.hdr_size))) {
    err = -EINVAL;
    break;
}

conn = iscsi_conn_lookup(ev->u.send_pdu.sid, ev->u.send_pdu.cid);
if (conn)
    ev->r.retcode = transport->send_pdu(conn,
@@ -3664,6 +3707,8 @@
static void
    iscsi_if_rx(struct sk_buff *skb)
    {
+u32 portid = NETLINK_CB(skb).portid;
+    mutex_lock(&rx_queue_mutex);
    while (skb->len >= NLMSG_HDRLEN) {
        int err;
@@ -3671,6 +3716,7 @@
            struct nlmsghdr*nlh;
            struct iscsi_uevent *ev;
            uint32_t group;
+            int retries = ISCSI_SEND_MAX_ALLOWED;

            nlh = nlmsg_hdr(skb);
        if (nlh->nlmsg_len < sizeof(*nlh) + sizeof(*ev))
@@ -3699,8 +3745,12 @@
            break;
        if (ev->type == ISCSI_UEVENT_GET_CHAP && !err)
            break;
        -err = iscsi_if_send_reply(group, nlh->nlmsg_seq,
-        nlh->nlmsg_type, 0, 0, ev, sizeof(*ev));
+        err = iscsi_if_send_reply(portid, nlh->nlmsg_type,
+            ev, sizeof(*ev));
+        if (err == -EAGAIN && --retries < 0) {
+            printk(KERN_WARNING "Send reply failed, error %d\n", err);
+            break;
+        }
    } while (err < 0 && err != -ECONNREFUSED && err != -ESRCH);
    skb_pull(skb, rlen);
}
@@ -3758,7 +3808,6 @@
    iscsi_conn_attr(tcp_recv_wsf, ISCSI_PARAM_TCP_RECV_WSF);
    iscsi_conn_attr(local_ipaddr, ISCSI_PARAM_LOCAL_IPADDR);

    #define iscsi_conn_ep_attr_show(param)
static ssize_t show_conn_ep_param_##param(struct device *dev,
struct device_attribute *attr,\n@@ -3979,7 +4028,7 @@
 char *buf)\n {\n struct iscsi_cls_session *session = iscsi_dev_to_session(dev->parent);\n-return sprintf(buf, "%s\n", iscsi_session_state_name(session->state));\n+-return sysfs_emit(buf, "%s\n", iscsi_session_state_name(session->state));\n }\n static ISCSI_CLASS_ATTR(priv_sess, state, S_IRUGO, show_priv_session_state,\n NULL);\n@@ -3988,7 +4037,7 @@
 char *buf)\n {\n struct iscsi_cls_session *session = iscsi_dev_to_session(dev->parent);\n-return sprintf(buf, "%d\n", session->creator);\n+-return sysfs_emit(buf, "%d\n", session->creator);\n }\n static ISCSI_CLASS_ATTR(priv_sess, creator, S_IRUGO, show_priv_session_creator,\n NULL);\n@@ -3997,7 +4046,7 @@
 char *buf)\n {\n struct iscsi_cls_session *session = iscsi_dev_to_session(dev->parent);\n-return sprintf(buf, format"\n", session->field);\n+-return sysfs_emit(buf, format"\n", session->field);\n }\n static ISCSI_CLASS_ATTR(priv_sess, target_id, S_IRUGO,\n show_priv_session_target_id, NULL);\n@@ -4010,8 +4059,8 @@
 struct iscsi_cls_session *session = \n iscsi_dev_to_session(dev->parent);\n if (session->field == -1)\n-return sprintf(buf, "off\n");\n+-return sysfs_emit(buf, "off\n");\n }\n #define iscsi_priv_session_attr_store(field)\n --- linux-4.15.0.orig/drivers/scsi/scsi_transport_spi.c\n +++ linux-4.15.0/drivers/scsi/scsi_transport_spi.c\n @@ -351,7 +351,7 @@
 struct spi_transport_attrs *tp\n = (struct spi_transport_attrs *)&starget->starget_data;\n \-if (i->f->set_##field)\n+if (!i->f->set_##field)\n return -EINVAL;\n}
val = simple_strtoul(buf, NULL, 0);
if (val > tp->max_##field)
--- linux-4.15.0.orig/drivers/scsi/scsi_transport_srp.c
+++ linux-4.15.0/drivers/scsi/scsi_transport_srp.c
@@ -51,6 +51,8 @@
struct transport_container rport_attr_cont;
};

+static int scsi_is_srp_rport(const struct device *dev);
+
#define to_srp_internal(tmpl) container_of(tmpl, struct srp_internal, t)
#define dev_to_rport(d) container_of(d, struct srp_rport, dev)
@@ -60,9 +62,24 @@
return dev_to_shost(r->dev.parent);
}

+static int find_child_rport(struct device *dev, void *data)
+{
+struct device **child = data;
+
+if (scsi_is_srp_rport(dev)) {
+WARN_ON_ONCE(*child);
+*child = dev;
+
+}
+return 0;
+} 
+
+static inline struct srp_rport *shost_to_rport(struct Scsi_Host *shost)
+{ 
-transport_class_to_srp_rport(&shost->shost_gendev);
+struct device *child = NULL;
+
+WARN_ON_ONCE(device_for_each_child(&shost->shost_gendev, &child, 
+find_child_rport) < 0);
+return child ? dev_to_rport(child) : NULL;
}

/**
@@ -538,7 +555,14 @@
res = mutex_lock_interruptible(&rport->mutex);
if (res)
goto out;
-scsi_target_block(&shost->shost_gendev);
+if (rport->state != SRP_RPORT_FAIL_FAST && rport->state != SRP_RPORT_LOST)
+/*
+ * sdev state must be SDEV_TRANSPORT_OFFLINE, transition
+ * to SDEV_BLOCK is illegal. Calling scsi_target_unblock
*/
* later is ok though, scsi_internal_device_unblock_nowait()
+ * treats SDEV_TRANSPORT_OFFLINE like SDEV_BLOCK.
+ */
+scsi_target_block(&shost->shost_gendev);
res = rport->state != SRP_RPORT_LOST ? i->f->reconnect(rport) : -ENODEV;
pr_debug("%s (state %d): transport.reconnect() returned %d\n",
dev_name(&shost->shost_gendev), rport->state, res);
@@ -600,7 +624,8 @@
struct srp_rport *rport = shost_to_rport(shost);
pr_debug("timeout for sdev %s\n", dev_name(&sdev->sdev_gendev));
-return rport->fast_io_fail_tmo < 0 && rport->dev_loss_tmo < 0 &&
+return rport && rport->fast_io_fail_tmo < 0 &&
+rport->dev_loss_tmo < 0 &&
i->f->reset_timer_if_blocked && scsi_device_blocked(sdev) ?
BLK_EH_RESET_TIMER : BLK_EH_NOT_HANDLED;
}
--- linux-4.15.0.orig/drivers/scsi/sd.c
+++ linux-4.15.0/drivers/scsi/sd.c
@@ -133,6 +133,7 @@
static struct kmem_cache *sd_cdb_cache;
static mempool_t *sd_cdb_pool;
+static mempool_t *sd_page_pool;
static const char *sd_cache_types[] = {
"write through", "none", "write back",
@@ -205,6 +206,12 @@
sp = buffer_data[0] & 0x80 ? 1 : 0;
buffer_data[0] &= ~0x80;
+/*
+ * Ensure WP, DPOFU A, and RESERVED fields are cleared in
+ * received mode parameter buffer before doing MODE SELECT.
+ */
+data.device_specific = 0;
+
if (scsi_mode_select(sd p, 1, sp, 8, buffer_data, len, SD_TIMEOUT,
SD_MAX_RETRIES, &data, &sshdr)) {
if (scsi_sense_valid(&sshdr))
@@ -759,9 +766,10 @@
unsigned int data_len = 24;
char *buf;
-rq->special_vec.bv_page = alloc_page(GFP_ATOMIC | __GFP_ZERO);
+rq->special_vec.bv_page = mempool_alloc(sd_page_pool, GFP_ATOMIC);
if (!rq->special_vec.bv_page)
return BLKPREP_DEFER;
clear_highpage(rq->special_vec.bv_page);
rq->special_vec.bv_offset = 0;
rq->special_vec.bv_len = data_len;
rq->rq_flags |= RQF_SPECIAL_PAYLOAD;
@@ -792,9 +800,10 @@
u32 nr_sectors = blk_rq_sectors(rq) >> (ilog2(sdp->sector_size) - 9);
u32 data_len = sdp->sector_size;
-rq->special_vec.bv_page = alloc_page(GFP_ATOMIC | __GFP_ZERO);
+rq->special_vec.bv_page = mempool_alloc(sd_page_pool, GFP_ATOMIC);
if (!rq->special_vec.bv_page)
    return BLKPREP_DEFER;
+clear_highpage(rq->special_vec.bv_page);
rq->special_vec.bv_offset = 0;
rq->special_vec.bv_len = data_len;
rq->rq_flags |= RQF_SPECIAL_PAYLOAD;
@@ -822,9 +831,10 @@
u32 nr_sectors = blk_rq_sectors(rq) >> (ilog2(sdp->sector_size) - 9);
u32 data_len = sdp->sector_size;
-rq->special_vec.bv_page = alloc_page(GFP_ATOMIC | __GFP_ZERO);
+rq->special_vec.bv_page = mempool_alloc(sd_page_pool, GFP_ATOMIC);
if (!rq->special_vec.bv_page)
    return BLKPREP_DEFER;
+clear_highpage(rq->special_vec.bv_page);
rq->special_vec.bv_offset = 0;
rq->special_vec.bv_len = data_len;
rq->rq_flags |= RQF_SPECIAL_PAYLOAD;
@@ -1305,7 +1315,8 @@
case REQ_OP_ZONE_RESET:
        return sd_zbc_setup_reset_cmnd(cmd);
default:
        -BUG();
+WARN_ON_ONCE(1);
+return BLKPREP_KILL;
    }

@@ -1318,7 +1329,6 @@
sd_zbc_write_unlock_zone(SCpnt);

if (rq->rq_flags & RQF_SPECIAL_PAYLOAD)
-    __free_page(rq->special_vec.bv_page);
+    mempool_free(rq->special_vec.bv_page, sd_page_pool);

if (SCpnt->cmd != scsi_req(rq)->cmd) {
    cmd = SCpnt->cmd;
@@ -1429,11 +1440,6 @@
scsi_set_medium_removal(sdev, SCSI_REMOVAL_ALLOW);
}

-/*
- * XXX and what if there are packets in flight and this close()
- * XXX is followed by a "rmmod sd_mod"?
- */
-
scsi_disk_put(sdkp);
}

@@ -1672,7 +1678,8 @@
/* we need to evaluate the error return */
if (scsi_sense_valid(sshdr) &&
 (sshdr->asc == 0x3a || /* medium not present */
 - sshdr->asc == 0x20))/* invalid command */
+ sshdr->asc == 0x20 ||
+ (sshdr->asc == 0x74 && sshdr->ascq == 0x71)))/* drive is password locked */
/* this is no error here */
return 0;

@@ -1710,20 +1717,30 @@
static int sd_compat_ioctl(struct block_device *bdev, fmode_t mode,
         unsigned int cmd, unsigned long arg)
{
 -struct scsi_device *sdev = scsi_disk(bdev->bd_disk)->device;
 +struct gendisk *disk = bdev->bd_disk;
 +struct scsi_disk *sdkp = scsi_disk(disk);
 +struct scsi_device *sdev = sdkp->device;
 +void __user *p = compat_ptr(arg);
 int error;

 +error = scsi_verify_blk_ioctl(bdev, cmd);
 +if (error < 0)
 +return error;
 +
 error = scsi_ioctl_block_when_processing_errors(sdev, cmd,
 (mode & FMODE_NDELAY) != 0);
 if (error)
 return error;
 +
 +if (is_sed_ioctl(cmd))
 +return sed_ioctl(sdkp->opal_dev, cmd, p);

 /*
 * Let the static ioctl translation table take care of it.
 */
 if (!sdev->host->hostt->compat_ioctl)
return -ENOIOCTLCMD;
-return sdev->host->hostt->compat_ioctl(sdev, cmd, (void __user *)arg);
+return sdev->host->hostt->compat_ioctl(sdev, cmd, p);
}
#endif

@@ -1984,9 +2001,13 @@
} break;

case REQ_OP_ZONE_REPORT:
+/* To avoid that the block layer performs an incorrect
+ * bio_advance() call and restart of the remainder of
+ * incomplete report zone BIOs, always indicate a full
+ * completion of REQ_OP_ZONE_REPORT.
+ */
if (!result) {
- good_bytes = scsi_bufflen(SCpnt)
- scsi_get_resid(SCpnt);
+ good_bytes = scsi_bufflen(SCpnt);  
scsi_set_resid(SCpnt, 0);
} else {
    good_bytes = 0;
@@ -2152,6 +2173,8 @@
 break; /* standby */
 if (sshdr.asc == 4 && sshdr.ascq == 0xc)  
 break; /* unavailable */
+if (sshdr.asc == 4 && sshdr.ascq == 0x1b)  
+break; /* sanitize in progress */
/*
 * Issue command to spin up drive when not ready
 */
@@ -2217,8 +2240,10 @@
 u8 type;
 int ret = 0;

-if (scsi_device_protection(sdp) == 0 || (buffer[12] & 1) == 0)
+if (scsi_device_protection(sdp) == 0 || (buffer[12] & 1) == 0) {
+ sdkp->protection_type = 0;
 return ret;
+}

type = ((buffer[12] >> 1) & 7) + 1; /* P_TYPE 0 = Type 1 */

@@ -2515,6 +2540,8 @@ sector_size = old_sector_size;
 goto got_data;
}
+/* Remember that READ CAPACITY(16) succeeded */
sdp->try_rc_10_first = 0;
}
}

sdkp->security = 1;
}

+/*
 + * Determine the device's preferred I/O size for reads and writes
 + * unless the reported value is unreasonably small, large, not a
 + * multiple of the physical block size, or simply garbage.
 + */
+static bool sd_validate_opt_xfer_size(struct scsi_disk *sdkp,
+        unsigned int dev_max)
+{
+struct scsi_device *sdp = sdkp->device;
+unsigned int opt_xfer_bytes =
+logical_to_bytes(sdp, sdkp->opt_xfer_blocks);
+
+if (sdkp->opt_xfer_blocks == 0)
+    return false;
+
+if (sdkp->opt_xfer_blocks > dev_max) {
+    sd_first_printk(KERN_WARNING, sdkp,
+        "Optimal transfer size %u logical blocks > dev_max (%u logical blocks)
+        \n", sdkp->opt_xfer_blocks, dev_max);
+    sdkp->opt_xfer_blocks, dev_max);
+    return false;
+}
+
+if (sdkp->opt_xfer_blocks > SD_DEF_XFER_BLOCKS) {
+    sd_first_printk(KERN_WARNING, sdkp,
+        "Optimal transfer size %u logical blocks > sd driver limit (%u logical blocks)\n",
+        sdkp->opt_xfer_blocks, SD_DEF_XFER_BLOCKS);
+    return false;
+}
+
+if (opt_xfer_bytes < PAGE_SIZE) {
+    sd_first_printk(KERN_WARNING, sdkp,
+        "Optimal transfer size %u bytes < PAGE_SIZE (%u bytes)\n",
+        opt_xfer_bytes, (unsigned int)PAGE_SIZE);
+    return false;
+}
+
+if (opt_xfer_bytes & (sdkp->physical_block_size - 1)) {
+    sd_first_printk(KERN_WARNING, sdkp,
+        "Optimal transfer size %u bytes AND %u physical block size \n",
+        opt_xfer_bytes, sdkp->physical_block_size);
+    return false;
+}
+}
sd_first_printk(KERN_WARNING, sdkp,
"Optimal transfer size %u bytes not a " \n"multiple of physical block size (%u bytes)\n",
opt_xfer_bytes, sdkp->physical_block_size);
return false;
}
+
sd_first_printk(KERN_INFO, sdkp, "Optimal transfer size %u bytes\n",
opt_xfer_bytes);
return true;
+
/**
 * sd_revalidate_disk - called the first time a new disk is seen,
 * performs disk spin up, read_capacity, etc.
 */
@@ -3150,20 +3229,14 @@
dev_max = min_not_zero(dev_max, sdkp->max_xfer_blocks);
q->limits.max_dev_sectors = logical_to_sectors(sdp, dev_max);

-/*
- * Determine the device's preferred I/O size for reads and writes
- * unless the reported value is unreasonably small, large, or
- * garbage.
- */
-#if (sdkp->opt_xfer_blocks &&
- sdkp->opt_xfer_blocks <= dev_max &&
- sdkp->opt_xfer_blocks <= SD_DEF_XFER_BLOCKS &&
- logical_to_bytes(sdp, sdkp->opt_xfer_blocks) >= PAGE_SIZE) {
+if (sd_validate_opt_xfer_size(sdkp, dev_max)) {
    q->limits.io_opt = logical_to_bytes(sdp, sdkp->opt_xfer_blocks);
    rw_max = logical_to_sectors(sdp, sdkp->opt_xfer_blocks);
-} else
+} else {
    q->limits.io_opt = 0;
    rw_max = min_not_zero(logical_to_sectors(sdp, dev_max),
        (sector_t)BLK_DEF_MAX_SECTORS);
+
} /* Do not exceed controller limit */
rw_max = min(rw_max, queue_max_hw_sectors(q));
@@ -3401,15 +3474,16 @@
}

device_initialize(&sdkp->dev);
sdkp->dev.parent = dev;
+sdkp->dev.parent = get_device(dev);
sdkp->dev.class = &sd_disk_class;
dev_set_name(&sdkp->dev, "%s", dev_name(dev));
error = device_add(&sdkp->dev);
- if (error)
- goto out_free_index;
+ if (error) {
+ put_device(&sdkp->dev);
+ goto out;
+ }

- get_device(dev);
dev_set_drvdata(dev, sdkp);

get_device(&sdkp->dev); /* prevent release before async_schedule */
@@ -3484,11 +3558,23 @@
{
 struct scsi_disk *sdkp = to_scsi_disk(dev);
 struct gendisk *disk = sdkp->disk;
-
+ struct request_queue *q = disk->queue;
+ spin_lock(&sd_index_lock);
 ida_remove(&sd_index_ida, sdkp->index);
 spin_unlock(&sd_index_lock);

+/*
+ * Wait until all requests that are in progress have completed.
+ * This is necessary to avoid that e.g. scsi_end_request() crashes
+ * due to clearing the disk->private_data pointer. Wait from inside
+ * scsi_disk_release() instead of from sd_release() to avoid that
+ * freezing and unfreezing the request queue affects user space I/O
+ * in case multiple processes open a /dev/sd... node concurrently.
+ */
+ blk_mq_freeze_queue(q);
+ blk_mq_unfreeze_queue(q);
+ disk->private_data = NULL;
+ put_disk(disk);
+ put_device(&sdkp->device->sdev_gendev);
@g @ -3669,6 +3755,13 @@
goto err_out_cache;
}

+sd_page_pool = mempool_create_page_pool(SD_MEMPOOL_SIZE, 0);
+ if (!sd_page_pool) {
+ printk(KERN_ERR "sd: can't init discard page pool\n");
+ err = -ENOMEM;
+ goto err_out_ppool;
+ }
+ err = scsi_register_driver(&sd_template.gendrv);
if (err)
goto err_out_driver;
@@ -3676,6 +3769,9 @@
return 0;

err_out_driver:
+mempool_destroy(sd_page_pool);
+
+err_out_ppool:
mempool_destroy(sd_cdb_pool);

err_out_cache:
@@ -3702,6 +3798,7 @@
scsi_unregister_driver(&sd_template.gendrv);
mempool_destroy(sd_cdb_pool);
+mempool_destroy(sd_page_pool);
kmem_cache_destroy(sd_cdb_cache);

class_unregister(&sd_disk_class);
--- linux-4.15.0.orig/drivers/scsi/sd_zbc.c
+++ linux-4.15.0/drivers/scsi/sd_zbc.c
@@ -483,20 +483,21 @@
* Check that all zones of the device are equal. The last zone can however
* be smaller. The zone size must also be a power of two number of LBAs.
+ *
+ * Returns the zone size in number of blocks upon success or an error code
+ * upon failure.
+ */
-static int sd_zbc_check_zone_size(struct scsi_disk *sdkp)
+static s64 sd_zbc_check_zone_size(struct scsi_disk *sdkp)
{
 -u64 zone_blocks;
 +u64 zone_blocks = 0;
 sector_t block = 0;
 unsigned char *buf;
 unsigned char *rec;
 unsigned int buf_len;
 unsigned int list_length;
-int ret;
 +s64 ret;
 u8 same;

 -sdkp->zone_blocks = 0;
 -
/* Get a buffer */
buf = kmalloc(SD_ZBC_BUF_SIZE, GFP_KERNEL);
if (!buf)
    @@ -504,10 +505,8 @@

/* Do a report zone to get the same field */
ret = sd_zbc_report_zones(sdkp, buf, SD_ZBC_BUF_SIZE, 0);
    -if (ret) {
    -zone_blocks = 0;
    -goto out;
    -}
    +if (ret)
    +goto out_free;

same = buf[4] & 0x0f;
if (same > 0) {
    @@ -530,16 +529,17 @@
        /* Parse zone descriptors */
        while (rec < buf + buf_len) {
            -zone_blocks = get_unaligned_be64(&rec[8]);
            -if (sdkp->zone_blocks == 0) {
                -sdkp->zone_blocks = zone_blocks;
                -} else if (zone_blocks != sdkp->zone_blocks &&
                    - (block + zone_blocks < sdkp->capacity
                    - || zone_blocks > sdkp->zone_blocks)) {
                +u64 this_zone_blocks = get_unaligned_be64(&rec[8]);
                +
                +if (zone_blocks == 0) {
                +zone_blocks = this_zone_blocks;
                +} else if (this_zone_blocks != zone_blocks &&
                    + (block + this_zone_blocks < sdkp->capacity
                    + || this_zone_blocks > zone_blocks)) {
                zone_blocks = 0;
                goto out;
            }
        }
    -block += zone_blocks;
    +block += this_zone_blocks;
    rec += 64;
    }

    @@ -547,64 +547,77 @@
    ret = sd_zbc_report_zones(sdkp, buf,
        SD_ZBC_BUF_SIZE, block);
    if (ret)
        -return ret;
        +goto out_free;
    }
while (block < sdkp->capacity);

-zone_blocks = sdkp->zone_blocks;
-
out:
-kfree(buf);
-
if (!zone_blocks) {
  if (sdkp->first_scan)
    sd_printk(KERN_NOTICE, sdkp,
            "Devices with non constant zone "
            "size are not supported\n");
    return -ENODEV;
  }
-
  if (!is_power_of_2(zone_blocks)) {
    ret = -ENODEV;
  } else if (!is_power_of_2(zone_blocks)) {
    if (sdkp->first_scan)
      sd_printk(KERN_NOTICE, sdkp,
              "Devices with non power of 2 zone "
              "size are not supported\n");
      return -ENODEV;
  } else {  
    ret = zone_blocks;
  }
-
-sdkp->zone_blocks = zone_blocks;
-sdkp->zone_shift = ilog2(zone_blocks);
+out_free:
+kfree(buf);
-
-return 0;
+return ret;
}
+static int sd_zbc_setup(struct scsi_disk *sdkp, u32 zone_blocks) {
    -/* READ16/WRITE16 is mandatory for ZBC disks */
    -sdkp->device->use_16_for_rw = 1;
    -sdkp->device->use_10_for_rw = 0;
    +struct request_queue *q = sdkp->disk->queue;
    +u32 zone_shift = ilog2(zone_blocks);
    +u32 nr_zones;

    /* chunk_sectors indicates the zone size */
    -blk_queue_chunk_sectors(sdkp->disk->queue,
       -logical_to_sectors(sdkp->device, sdkp->zone_blocks));
    -sdkp->nr_zones =
       -round_up(sdkp->capacity, sdkp->zone_blocks) >> sdkp->zone_shift;
    -
    -if (!sdkp->zones_wlock) {
       -sdkp->zones_wlock = kcalloc(BITS_TO_LONGS(sdkp->nr_zones),
          -sizeof(unsigned long),
          -GFP_KERNEL);
       -if (!sdkp->zones_wlock)
          -return -ENOMEM;
    +
    +/*
    + * Initialize the disk zone write lock bitmap if the number
    + * of zones changed.
    + */
    +if (nr_zones != sdkp->nr_zones) {
       +unsigned long *zones_wlock = NULL;
       +
       +if (nr_zones) {
          +zones_wlock = kcalloc(BITS_TO_LONGS(nr_zones),
             +sizeof(unsigned long),
             +GFP_KERNEL);
          +if (!zones_wlock)
             +return -ENOMEM;
      }
    
    blk_mq_freeze_queue(q);
    +sdkp->zone_blocks = zone_blocks;
    +sdkp->zone_shift = zone_shift;
    +sdkp->nr_zones = nr_zones;
    +swap(sdkp->zones_wlock, zones_wlock);
    +blk_mq_unfreeze_queue(q);
kfree(zones_wlock);
+
+/* READ16/ WRITE16 is mandatory for ZBC disks */
+sdkp->device->use_16_for_rw = 1;
+sdkp->device->use_10_for_rw = 0;
}

return 0;
@@ -612,6 +625,7 @@
int sd_zbc_read_zones(struct scsi_disk *sdkp, unsigned char *buf)
{
    int64_t zone_blocks;

    int ret;

    if (!sd_is_zoned(sdkp))
@@ -648,12 +662,16 @@
    * Check zone size: only devices with a constant zone size (except
    * an eventual last runt zone) that is a power of 2 are supported.
    */
    -ret = sd_zbc_check_zone_size(sdkp);
    -if (ret)
    +zone_blocks = sd_zbc_check_zone_size(sdkp);
    +ret = -EFBIG;
    +if (zone_blocks != (u32)zone_blocks)
    +goto err;
    +ret = zone_blocks;
    +if (ret < 0)
    goto err;

    /* The drive satisfies the kernel restrictions: set it up */
    -ret = sd_zbc_setup(sdkp);
    +ret = sd_zbc_setup(sdkp, zone_blocks);
    if (ret)
    goto err;

    @ @ -669,6 +687,7 @@
    }
    kfree(sdkp->zones_wlock);
    sdkp->zones_wlock = NULL;
    +sdkp->nr_zones = 0;
    }

void sd_zbc_print_zones(struct scsi_disk *sdkp)
--- linux-4.15.0.orig/drivers/scsi/ses.c
+++ linux-4.15.0/drivers/scsi/ses.c
@@ -103,9 +103,16 @@

unsigned char recv_page_code;
+unsigned int retries = SES_RETRIES;
+struct scsi_sense_hdr sshdr;
+
+do {
+ret = scsi_execute_req(sdev, cmd, DMA_FROM_DEVICE, buf, bufflen,
+    &sshdr, SES_TIMEOUT, 1, NULL);
+} while (ret > 0 && --retries && scsi_sense_valid(&sshdr) &&
+    (sshdr.sense_key == NOT_READY ||
+    (sshdr.sense_key == UNIT_ATTENTION && sshdr.asc == 0x29));

-ret = scsi_execute_req(sdev, cmd, DMA_FROM_DEVICE, buf, bufflen,
-    NULL, SES_TIMEOUT, SES_RETRIES, NULL);
if (unlikely(ret))
    return ret;

@@ -127,7 +134,7 @@
static int ses_send_diag(struct scsi_device *sdev, int page_code,
    void *buf, int bufflen)
{
    unsigned char cmd[] = {
        SEND_DIAGNOSTIC,
@@ -137,9 +144,16 @@
        bufflen & 0xff,
        0
    };
+struct scsi_sense_hdr sshdr;
+unsigned int retries = SES_RETRIES;
+
+do {
+    result = scsi_execute_req(sdev, cmd, DMA_TO_DEVICE, buf, bufflen,
+        &sshdr, SES_TIMEOUT, 1, NULL);
+} while (result > 0 && --retries && scsi_sense_valid(&sshdr) &&
+    (sshdr.sense_key == NOT_READY ||
+    (sshdr.sense_key == UNIT_ATTENTION && sshdr.asc == 0x29));

-result = scsi_execute_req(sdev, cmd, DMA_TO_DEVICE, buf, bufflen,
-    NULL, SES_TIMEOUT, SES_RETRIES, NULL);
if (result)
    sdev_printk(KERN_ERR, sdev, "SEND DIAGNOSTIC result: %8x\n",
        result);
@@ -615,13 +629,16 @@
static void ses_match_to_enclosure(struct enclosure_device *edev,
-  struct scsi_device *sdev)
+  struct scsi_device *sdev,
+  int refresh)
{
+struct scsi_device *edev_sdev = to_scsi_device(edev->edev.parent);
struct efd efd = {
  .addr = 0,
};

-ses_enclosure_data_process(edev, to_scsi_device(edev->edev.parent), 0);
+if (refresh)
+ses_enclosure_data_process(edev, edev_sdev, 0);

if (scsi_is_sas_rphy(sdev->sdev_target->dev.parent))
  efd.addr = sas_get_address(sdev);
@@ -652,7 +669,7 @@
struct enclosure_device *prev = NULL;

while ((edev = enclosure_find(&sdev->host->shost_gendev, prev)) != NULL) {
-  ses_match_to_enclosure(edev, sdev);
+  ses_match_to_enclosure(edev, sdev, 1);
  prev = edev;
} 
return -ENODEV;
@@ -768,7 +785,7 @@
shost_for_each_device(tmp_sdev, sdev->host) {
if (tmp_sdev->lun != 0 || scsi_device_enclosure(tmp_sdev))
  continue;
-ses_match_to_enclosure(edev, tmp_sdev);
+ses_match_to_enclosure(edev, tmp_sdev, 0);
}

return 0;
--- linux-4.15.0.orig/drivers/scsi/sg.c
+++ linux-4.15.0/drivers/scsi/sg.c
@@ -51,6 +51,7 @@
#include <linux/ratelimit.h>
#include <linux/uio.h>
+#include <linux/cred.h> /* for sg_check_file_access() */

#include "scsi.h"
#include <scsi/scsi_dbg.h>
@@ -210,6 +211,33 @@
sdev_prefix_printk(prefix, (sdp)->device,		\(sdp)->disk->disk_name, fmt, ##a)

return 0;
+/*
+ * The SCSI interfaces that use read() and write() as an asynchronous variant of
+ * ioctl(..., SG_IO, ...) are fundamentally unsafe, since there are lots of ways
+ * to trigger read() and write() calls from various contexts with elevated
+ * privileges. This can lead to kernel memory corruption (e.g. if these
+ * interfaces are called through splice()) and privilege escalation inside
+ * userspace (e.g. if a process with access to such a device passes a file
+ * descriptor to a SUID binary as stdin/stdout/stderr).
+*
+ * This function provides protection for the legacy API by restricting the
+ * calling context.
+ */
+static int sg_check_file_access(struct file *filp, const char *caller)
+{
+if (filp->f_cred != current_real_cred()) {
+pr_err_once("%s: process %d (%s) changed security contexts after opening file descriptor, this is not allowed.\n",
+caller, task_tgid_vnr(current), current->comm);
+return -EPERM;
+}
+if (uaccess_kernel()) {
+pr_err_once("%s: process %d (%s) called from kernel context, this is not allowed.\n",
+caller, task_tgid_vnr(current), current->comm);
+return -EACCES;
+}
+return 0;
+}
+
static int sg_allow_access(struct file *filp, unsigned char *cmd)
{
struct sg_fd *sfp = filp->private_data;
@@ -394,6 +422,14 @@
struct sg_header *old_hdr = NULL;
int retval = 0;
+/*
+ * This could cause a response to be stranded. Close the associated
+ * file descriptor to free up any resources being held.
+ */
+retval = sg_check_file_access(filp, __func__);
+if (retval)
+return retval;
+
if ((!(sfp = (Sg_fd *) filp->private_data)) || (!(sdp = sfp->parentdp)))
return -ENXIO;
SCSI_LOG_TIMEOUT(3, sg_printk(KERN_INFO, sdp,
@@ -581,9 +617,11 @@
struct sg_header old_hdr;
sg_io_hdr_t *hp;

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unsigned char cmdn[SG_MAX_CDB_SIZE];
int retval;

if (unlikely(uaccess_kernel()))
    return -EINVAL;
retval = sg_check_file_access(filp, __func__);
if (retval)
    return retval;

if (!(sfp = (Sg_fd *) filp->private_data)) || (!(sdp = sfp->parentdp))
    return -ENXIO;

if ((__copy_from_user(cmnd, buf, cmd_size))
    sg_remove_request(sfp, srp);
return -EFAULT;
/*
 * SG_DXFER_TO_FROM_DEV is functionally equivalent to SG_DXFER_FROM_DEV,
 * but is is possible that the app intended SG_DXFER_TO_DEV, because there
 */
if (hp->dxfer_len >= SZ_256M)
    sg_remove_request(sfp, srp);
return -EINVAL;

k = sg_start_req(srp, cmdn);
if (k) {
    num = (rem_sz > scatter_elem_sz_prev) ?
    scatter_elem_sz_prev : rem_sz;
    -schp->pages[k] = alloc_pages(gfp_mask, order);
    +schp->pages[k] = alloc_pages(gfp_mask | __GFP_ZERO, order);
    if (!schp->pages[k])
        goto out;

    write_lock_irqsave(&sdp->sfd_lock, iflags);
    if (atomic_read(&sdp->detaching)) {
        write_unlock_irqrestore(&sdp->sfd_lock, iflags);
        return -EINVAL;
    }
    /*
     * sg_common_write: scsi opcode=0x%02x, cmd_size=%d
     */
    for (k = 0; k < SFP_MAX_CMD; k++)
        schp->pages[k] = alloc_pages(gfp_mask, order);
    write_lock_irqsave(&sdp->sfd_lock, iflags);
    if (atomic_read(&sdp->detaching))
        write_unlock_irqrestore(&sdp->sfd_lock, iflags);
}

out:
+kfree(sfp);
return ERR_PTR(-ENODEV);
}
list_add_tail(&sfp->sfd_siblings, &sdp->sfds);
--- linux-4.15.0.orig/drivers/scsi/smartpqi/Makefile
+++ linux-4.15.0/drivers/scsi/smartpqi/Makefile
@@ -1,3 +1,3 @@
 ccflags-y += -I.
-obj-m		+= smartpqi.o
+obj-$(CONFIG_SCSI_SMARTPQI) += smartpqi.o
smartpqi-objs := smartpqi_init.o smartpqi_sis.o smartpqi_sas_transport.o
--- linux-4.15.0.orig/drivers/scsi/smartpqi/smartpqi_init.c
+++ linux-4.15.0/drivers/scsi/smartpqi/smartpqi_init.c
@@ -653,6 +653,7 @@
 u8	driver_version_tag[2];
 __le16	driver_version_length;
 char	driver_version[32];
+u8	dont_write_tag[2];
 u8end_tag[2];
};
@@ -682,6 +683,8 @@
 strcpy(buffer->driver_version, "Linux " DRIVER_VERSION,
 sizeof(buffer->driver_version) - 1);
 buffer->driver_version[sizeof(buffer->driver_version) - 1] = '0';
+buffer->dont_write_tag[0] = 'D';
+buffer->dont_write_tag[1] = 'W';
 buffer->end_tag[0] = 'Z';
 buffer->end_tag[1] = 'Z';
@@ -1181,6 +1184,9 @@
 if (rc)
goto out;
+if (vpd->page_code != CISS_VPD_LV_STATUS)
+goto out;
+page_length = offsetof(struct ciss_vpd_logical_volume_status,
 volume_status) + vpd->page_length;
 if (page_length < sizeof(*vpd))
@@ -2709,6 +2715,9 @@
 switch (response->header.iu_type) {
 case PQI_RESPONSE_IU_RAID_PATH_IO_SUCCESS:
 case PQI_RESPONSE_IU_AIO_PATH_IO_SUCCESS:
+if (io_request->scmd)
+io_request->scmd->result = 0;
+/* fall through */
 case PQI_RESPONSE_IU_GENERAL_MANAGEMENT:
break;
case PQI_RESPONSE_IU_TASK_MANAGEMENT:
@@ -3676,8 +3685,10 @@
            return -ETIMEDOUT;
msecs_blocked =
jiffies_to_msecs(jiffies - start_jiffies);
-    if (msecs_blocked >= timeout_msecs)
-        return -ETIMEDOUT;
+    if (msecs_blocked >= timeout_msecs) {
+        rc = -ETIMEDOUT;
+        goto out;
+    }
timeout_msecs -= msecs_blocked;
}
}
@@ -6382,7 +6393,7 @@
            else
            mask = DMA_BIT_MASK(32);

            -rc = dma_set_mask(&ctrl_info->pci_dev->dev, mask);
+rc = dma_set_mask_and_coherent(&ctrl_info->pci_dev->dev, mask);
    if (rc) {
        dev_err(&ctrl_info->pci_dev->dev, "failed to set DMA mask\n");
goto disable_device;
@@ -6699,6 +6710,7 @@
            * storage.
            */
            rc = pqi_flush_cache(ctrl_info, SHUTDOWN);
+            pqi_free_interrupts(ctrl_info);
            pqi_reset(ctrl_info);
    if (rc == 0)
        return;
--- linux-4.15.0.orig/drivers/scsi/smartpqi/smartpqi_sas_transport.c
+++ linux-4.15.0/drivers/scsi/smartpqi/smartpqi_sas_transport.c
@@ -50,9 +50,9 @@
            struct sas_phy *phy = pqi_sas_phy->phy;

            sas_port_delete_phy(pqi_sas_phy->parent_port->port, phy);
            -sas_phy_free(phy);
            if (pqi_sas_phy->added_to_port)
                list_del(&pqi_sas_phy->phy_list_entry);
            +sas_phy_delete(phy);
                kfree(pqi_sas_phy);
        }
--- linux-4.15.0.orig/drivers/scsi/smartpqi/smartpqi_sis.c
+++ linux-4.15.0/drivers/scsi/smartpqi/smartpqi_sis.c
@@ -59,7 +59,7 @@
#define SIS_CTRL_KERNEL_UP		0x80
#define SIS_CTRL_KERNEL_PANIC	0x100
-#define SIS_CTRL_READY_TIMEOUT_SECS	30
+#define SIS_CTRL_READY_TIMEOUT_SECS	180
#define SIS_CTRL_READY_RESUME_TIMEOUT_SECS	90
#define SIS_CTRL_READY_POLL_INTERVAL_MSECS	10

--- linux-4.15.0.orig/drivers/scsi/sni_53c710.c
+++ linux-4.15.0/drivers/scsi/sni_53c710.c
@@ -71,6 +71,7 @@
 struct NCR_700_Host_Parameters *hostdata;
 struct Scsi_Host *host;
 struct resource *res;
+int rc;

 res = platform_get_resource(dev, IORESOURCE_MEM, 0);
 if (!res)
 @@ -78,10 +79,8 @@
 base = res->start;
 hostdata = kmalloc(sizeof(*hostdata), GFP_KERNEL);
 -if (!hostdata) {
-\tdev_printk(KERN_ERR, dev, "Failed to allocate host data\n");
+if (!hostdata)
 \treturn -ENOMEM;
-\} 
+\}

 hostdata->dev = &dev->dev;
dma_set_mask(&dev->dev, DMA_BIT_MASK(32));
@@ -98,7 +97,9 @@
goto out_kfree;
 host->this_id = 7;
 host->base = base;
-host->irq = platform_get_irq(dev, 0);
+host->irq = rc = platform_get_irq(dev, 0);
+if (rc < 0)
+goto out_put_host;
+if(request_irq(host->irq, NCR_700_intr, IRQF_SHARED, "snirm710", host)) {
 printk(KERN_ERR "snirm710: request_irq failed!\n");
goto out_put_host;
--- linux-4.15.0.orig/drivers/scsi/sr.c
+++ linux-4.15.0/drivers/scsi/sr.c
@@ -216,6 +216,8 @@
 return DISK_EVENT_EJECT_REQUEST;
 else if (med->media_event_code == 2)
 return DISK_EVENT_MEDIA_CHANGE;
+else if (med->media_event_code == 3)
@@ -523,16 +525,26 @@
static int sr_block_open(struct block_device *bdev, fmode_t mode)
{
struct scsi_cd *cd;
+struct scsi_device *sdev;
int ret = -ENXIO;

-mutex_lock(&sr_mutex);
 cd = scsi_cd_get(bdev->bd_disk);
-if (cd) {
 -ret = cdrom_open(&cd->cdi, bdev, mode);
-if (ret)
-scsi_cd_put(cd);
-}
+if (!cd)
+goto out;
 +
+sdev = cd->device;
+scsi_autopm_get_device(sdev);
+check_disk_change(bdev);
 +
+mutex_lock(&sr_mutex);
+ret = cdrom_open(&cd->cdi, bdev, mode);
 mutex_unlock(&sr_mutex);
 +
+scsi_autopm_put_device(sdev);
+if (ret)
+scsi_cd_put(cd);
 +
+out:
return ret;
}

@@ -560,6 +572,8 @@
if (ret)
go_to out;

+scsi_autopm_get_device(sdev);
 +
/*
 * Send SCSI addressing ioctls directly to mid level, send other
 * ioctls to cdrom/block level.
-@@ -568,15 +582,18 @@
case SCSI_IOCTL_GET_IDLUN:
case SCSI_IOCTL_GET_BUS_NUMBER:
    ret = scsi_ioctl(sdev, cmd, argp);
    -goto out;
    +goto put;
}

ret = cdrom_ioctl(&cd->cdi, bdev, mode, cmd, arg);
if (ret != -ENOSYS)
    -goto out;
    +goto put;
ret = scsi_ioctl(sdev, cmd, argp);
+put:
+scsi_autopm_put_device(sdev);
 +
out:
mutex_unlock(&sr_mutex);
return ret;
@@ -585,18 +602,28 @@
static unsigned int sr_block_check_events(struct gendisk *disk,
    unsigned int clearing)
{
-    struct scsi_cd *cd = scsi_cd(disk);
+    unsigned int ret = 0;
+    struct scsi_cd *cd;

-    if (atomic_read(&cd->device->disk_events_disable_depth))
+    if (!atomic_read(&cd->device->disk_events_disable_depth))
+        ret = cdrom_check_events(&cd->cdi, clearing);
+    scsi_cd_put(cd);
    return ret;

-    return cdrom_check_events(&cd->cdi, clearing);
+    return cdrom_check_events(&cd->cdi, clearing);
+    scsi_cd_put(cd);
+return ret;
}

static int sr_block_revalidate_disk(struct gendisk *disk)
{
-    struct scsi_cd *cd = scsi_cd(disk);
+    struct scsi_sense_hdr sshdr;
+    struct scsi_cd *cd;
+    
+    cd = scsi_cd_get(disk);
+    if (!cd)

/* if the unit is not ready, nothing more to do */
if (scsi_test_unit_ready(cd->device, SR_TIMEOUT, MAX_RETRIES, &sshdr))
    return -ENXIO;

if (scsi_test_unit_ready(cd->device, SR_TIMEOUT, MAX_RETRIES, &sshdr))
    sr_cd_check(&cd->cdi);
    get_sectorsize(cd);
    out:
    +scsi_cd_put(cd);
    return 0;
}

cd->cdi.disk = disk;

if (register_cdrom(&cd->cdi))
    goto fail_put;
    +goto fail_minor;

/*
 * Initialize block layer runtime PM stuffs before the
*/
return 0;

+fail_minor:
+spin_lock(&sr_index_lock);
+clear_bit(minor, sr_index_bits);
+spin_unlock(&sr_index_lock);
fail_put:
    put_disk(disk);
fail_free:
--- linux-4.15.0.orig/drivers/scsi/sr_ioctl.c
+++ linux-4.15.0/drivers/scsi/sr_ioctl.c
@@ -188,9 +188,13 @@
struct scsi_device *SDev;
struct scsi_sense_hdr sshdr;
    int result, err = 0, retries = 0;
+unsigned char sense_buffer[SCSI_SENSE_BUFFERSIZE], *senseptr = NULL;
SDev = cd->device;

+if (cgc->sense)
+senseptr = sense_buffer;
+    retry:
if (!scsi_block_when_processing_errors(SDev)) {
    err = -ENODEV;

result = scsi_execute(SDev, cgc->cmd, cgc->data_direction,
-      cgc->buffer, cgc->buflen,
-      (unsigned char *)cgc->sense, &sshdr,
+      cgc->buffer, cgc->buflen, senseptr, &sshdr,
      cgc->timeout, IOCTL_RETRIES, 0, 0, NULL);

+if (cgc->sense)
+memcpy(cgc->sense, sense_buffer, sizeof(*cgc->sense));
+
/* Minimal error checking. Ignore cases we know about, and report the rest. */
if (driver_byte(result) != 0) {
  switch (sshdr.sense_key) {
--- linux-4.15.0.orig/drivers/scsi/sr_vendor.c
+++ linux-4.15.0/drivers/scsi/sr_vendor.c
@@ -66,9 +66,6 @@
 void sr_vendor_init(Scsi_CD *cd)
 {
-#ifndef CONFIG_BLK_DEV_SR_VENDOR
-  cd->vendor = VENDOR_SCSI3;
-#else
-  const char *vendor = cd->device->vendor;
-  const char *model = cd->device->model;
+  cd->vendor = VENDOR_TOSHIBA;

@@ -100,7 +97,6 @@
 cd->vendor = VENDOR_TOSHIBA;
 }
-#endif
}

@@ -114,10 +110,8 @@
 struct ccc_modesel_head *modesel;
 int rc, density = 0;

-#ifndef CONFIG_BLK_DEV_SR_VENDOR
if (cd->vendor == VENDOR_TOSHIBA)
  density = (blocklength > 2048) ? 0x81 : 0x83;
-#endif

buffer = kmalloc(512, GFP_KERNEL | GFP_DMA);
if (!buffer)
@@ -205,7 +199,6 @@
break;

-#ifdef CONFIG_BLK_DEV_SR_VENDOR

case VENDOR_NEC:

unsigned long min, sec, frame;
cgc.cmd[0] = 0xde;
@@ -298,7 +291,6 @@

    (buffer[9] << 16) + (buffer[8] << 24);
break;
-#endif /* CONFIG_BLK_DEV_SR_VENDOR */

default:
/* should not happen */
--- linux-4.15.0.orig/drivers/scsi/st.c
+++ linux-4.15.0/drivers/scsi/st.c
@@ -1268,8 +1268,8 @@

spin_lock(&st_use_lock);
if (STp->in_use) {
    spin_unlock(&st_use_lock);
-    scsi_tape_put(STp);
+    scsi_tape_put(STp);
    return (-EBUSY);
}

--- linux-4.15.0.orig/drivers/scsi/storvsc_drv.c
+++ linux-4.15.0/drivers/scsi/storvsc_drv.c
@@ -658,13 +658,22 @@

static void  handle_multichannel_storage(struct hv_device *device, int max_chns)
{
    struct storvsc_device *stor_device;
    -int num_cpus = num_online_cpus();
    int num_sc;
    struct storvsc_cmd_request *request;
    struct vstor_packet *vstor_packet;
    int ret, t;

    -num_sc = ((max_chns > num_cpus) ? num_cpus : max_chns);
    +/*
    + * If the number of CPUs is artificially restricted, such as
    + * with maxcpus=1 on the kernel boot line, Hyper-V could offer
    + * sub-channels >= the number of CPUs. These sub-channels
    + * should not be created. The primary channel is already created
    + * and assigned to one CPU, so check against # CPUs - 1.
    + */
    +num_sc = min((int)(num_online_cpus() - 1), max_chns);
    +if (!num_sc)
+return;
+
stor_device = get_out_stor_device(device);
if (!stor_device)
    return;
@@ -1657,7 +1666,7 @@
    .eh_timed_out = storvsc_eh_timed_out,
    .slave_alloc = storvsc_device_alloc,
    .slave_configure = storvsc_device_configure,
-    .cmd_per_lun = 255,
+    .cmd_per_lun = 2048,
    .this_id = -1,
    .use_clustering = ENABLE_CLUSTERING,
/* Make sure we don't get a sg segment crosses a page boundary */
@@ -1721,11 +1730,14 @@
    max_targets = STORVSC_MAX_TARGETS;
    max_channels = STORVSC_MAX_CHANNELS;
/*
- * On Windows8 and above, we support sub-channels for storage.
- * On Windows8 and above, we support sub-channels for storage
+ * On Windows8 and above, we support sub-channels for storage
+ * on SCSI and FC controllers.
+ * The number of sub-channels offered is based on the number of
+ * VCPUs in the guest.
+ */
-    max_sub_channels = (num_cpus / storvsc_vcpus_per_sub_channel);
+    if (!dev_is_ide)
+        max_sub_channels =
+        (num_cpus - 1) / storvsc_vcpus_per_sub_channel;
+
    scsi_driver.can_queue = (max_outstanding_req_per_channel * 
@@ -1795,6 +1807,12 @@
    * from the host.
    */
    host->sg_tablesize = (stor_device->max_transfer_bytes >> PAGE_SHIFT);
+    #ifdef(CONFIG_X86_32)
+        dev_warn(&device->device, "adjusting sg_tablesize 0x%x -> 0x%x",
+                host->sg_tablesize, MAX_MULTIPAGE_BUFFER_COUNT);
+    #endif
    +
    /*
     * Set the number of HW queues we are supporting.
     */
@@ -1834,8 +1852,10 @@
    fc_host_node_name(host) = stor_device->node_name;
    fc_host_port_name(host) = stor_device->port_name;
    stor_device->rport = fc_remote_port_add(host, 0, &ids);
-if (!stor_device->rport)
+if (!stor_device->rport) {
+ret = -ENOMEM;
goto err_out4;
+}
}
#endif
return 0;

--- linux-4.15.0.orig/drivers/scsi/sun3_scsi.c
+++ linux-4.15.0/drivers/scsi/sun3_scsi.c
@@ -498,7 +498,7 @@
 .eh_host_reset_handler = sun3scsi_host_reset,
 .can_queue = 16,
 .this_id = 7,
- .sg_tablesize = SG_NONE,
+ .sg_tablesize = 1,
 .cmd_per_lun = 2,
 .use_clustering = DISABLE_CLUSTERING,
 .cmd_size = NCR5380_CMD_SIZE,
@@ -520,7 +520,7 @@
sun3_scsi_template.can_queue = setup_can_queue;
 if (setup_cmd_per_lun > 0)
 sun3_scsi_template.cmd_per_lun = setup_cmd_per_lun;
- if (setup_sg_tablesize >= 0)
+ if (setup_sg_tablesize > 0)
 sun3_scsi_template.sg_tablesize = setup_sg_tablesize;
 if (setup_hostid >= 0)
 sun3_scsi_template.this_id = setup_hostid & 7;
 --- linux-4.15.0.orig/drivers/scsi/sun3x_esp.c
--- linux-4.15.0.orig/drivers/scsi/sym53c8xx_2/sym_hipd.c
+++ linux-4.15.0/drivers/scsi/sun3x_esp.c
+++ linux-4.15.0/drivers/scsi/sym53c8xx_2/sym_hipd.c
@@ -233,7 +233,9 @@
 if (!esp->command_block)
 goto fail_unmap_regs_dma;

- host->irq = platform_get_irq(dev, 0);
+ host->irq = err = platform_get_irq(dev, 0);
+ if (err < 0)
+ goto fail_unmap_command_block;
err = request_irq(host->irq, scsi_esp_intr, IRQF_SHARED,
 "SUN3X ESP", esp);
 if (err < 0)
--- linux-4.15.0.orig/drivers/scsi/sym53c8xx_2/sym_hipd.c
+++ linux-4.15.0/drivers/scsi/sym53c8xx_2/sym_hipd.c
@@ -536,7 +536,7 @@
  * Look for the greatest clock divisor that allows an
  * input speed faster than the period.
  */
-while (div-- > 0)
while (--div > 0)
if (kpc >= (div_10M[div] << 2)) break;

/*
@@ -4371,6 +4371,13 @@
OUTB(np, HS_PRT, HS_BUSY);
}

#define sym_printk(lvl, tp, cp, fmt, v...) do { \
+if (cp)							\n+scmd_printk(lvl, cp->cmd, fmt, ##v);\n+else\n+starget_printk(lvl, tp->starget, fmt, ##v);\n+} while (0)
+
/*
 *  chip exception handler for programmed interrupts.
 */
@@ -4416,7 +4423,7 @@
 *  been selected with ATN. We do not want to handle that.
 */
case SIR_SEL_ATN_NO_MSG_OUT:
-scmd_printk(KERN_WARNING, cp->cmd,
+s sym_printk(KERN_WARNING, tp, cp,
"No MSG OUT phase after selection with ATN\n");
goto out_stuck;
/*
@@ -4424,7 +4431,7 @@
 *  having reselected the initiator.
 */
case SIR_RESEL_NO_MSG_IN:
-scmd_printk(KERN_WARNING, cp->cmd,
+s sym_printk(KERN_WARNING, tp, cp,
"No MSG IN phase after reselection\n");
goto out_stuck;
/*
@@ -4432,7 +4439,7 @@
 *  an IDENTIFY.
 */
case SIR_RESEL_NO_IDENTIFY:
-scmd_printk(KERN_WARNING, cp->cmd,
+s sym_printk(KERN_WARNING, tp, cp,
"No IDENTIFY after reselection\n");
goto out_stuck;
/*
@@ -4461,7 +4468,7 @@
case SIR_RESEL_ABORTED:
np->lastmsg = np->msgout[0];
np->msgout[0] = M_NOOP;
-scmd_printk(KERN_WARNING, cp->cmd,
+sym_printk(KERN_WARNING, tp, cp,
"message %x sent on bad reselection\n", np->lastmsg);
goto out;
/*
--- linux-4.15.0.orig/drivers/scsi/ufs/ufs-qcom.c
+++ linux-4.15.0/drivers/scsi/ufs/ufs-qcom.c
@@ -1098,7 +1098,7 @@
hba->quirks |= UFSHCD_QUIRK_BROKEN_LCC;
}

-if (host->hw_ver.major >= 0x2) {
+if (host->hw_ver.major == 0x2) {
   hba->quirks |= UFSHCD_QUIRK_BROKEN_UFS_HCI_VERSION;

 if (!ufs_qcom_cap_qunipro(host))
  /*@ -1590,9 +1590,6 @@
 */
 mask <<= offset;
-
-pm_runtime_get_sync(host->hba->dev);
-ufshcd_hold(host->hba, false);
-ufshcd_rmwl(host->hba, TEST_BUS_SEL,
-    (u32)host->testbus.select_major << 19,
-    REG_UFS_CFG1);
-/*@ -1605,8 +1602,6 @@
 * committed before returning.
 */
 mb();
-ufshcd_release(host->hba);
-pm_runtime_put_sync(host->hba->dev);

 return 0;
} 
/*@ -1644,11 +1639,11 @@

/* sleep a bit intermittently as we are dumping too much data */
ufs_qcom_print_hw_debug_reg_all(hba, NULL, ufs_qcom_dump_regs_wrapper);
-usleep_range(1000, 1100);
+udelay(1000);
 ufs_qcom_testbus_read(hba);
-usleep_range(1000, 1100);
+udelay(1000);
 ufs_qcom_print_unipro_testbus(hba);
-usleep_range(1000, 1100);
+udelay(1000);
QUERY_DESC_CONFIGURATION_DEF_SIZE = 0x90,
QUERY_DESC_UNIT_DEF_SIZE = 0x23,
QUERY_DESC_INTERCONNECT_DEF_SIZE = 0x06,
-QUERY_DESC_GEOMETRY_DEF_SIZE = 0x44,
+QUERY_DESC_GEOMETRY_DEF_SIZE = 0x48,
QUERY.Desc_POWER_DEF_SIZE = 0x62,
};

--- linux-4.15.0.orig/drivers/scsi/ufs/ufs_quirks.h
+++ linux-4.15.0/drivers/scsi/ufs/ufs_quirks.h
@@ -21,6 +21,7 @@
#define UFS_ANY_VENDOR 0xFFFF
#define UFS_ANY_MODEL "ANY_MODEL"
+
#define UFS_VENDOR_MICRON      0x12C
#define UFS_VENDOR_TOSHIBA     0x198
#define UFS_VENDOR_SAMSUNG     0x1CE
#define UFS_VENDOR_SKHYNIX     0x1AD
--- linux-4.15.0.orig/drivers/scsi/ufs/ufshcd-pci.c
+++ linux-4.15.0/drivers/scsi/ufs/ufshcd-pci.c
@@ -97,6 +97,30 @@
{
    return ufshcd_system_resume(dev_get_drvdata(dev));
}
+
+/**
+ * ufshcd_pci_poweroff - suspend-to-disk poweroff function
+ * @dev: pointer to PCI device handle
+ *
+ * Returns 0 if successful
+ * Returns non-zero otherwise
+ */
+static int ufshcd_pci_poweroff(struct device *dev)
+{
+    struct ufs_hba *hba = dev_get_drvdata(dev);
+    int spm lvl = hba->spm_lvl;
+    int ret;
+    
+    +/*
+    + * For poweroff we need to set the UFS device to PowerDown mode.
+    + * Force spm_lvl to ensure that.
+    +*/
+*/
hba->spm_lvl = 5;
ret = ufshcd_system_suspend(hba);
hba->spm_lvl = spm_lvl;
return ret;
}

#endif /* !CONFIG_PM_SLEEP */

#ifdef CONFIG_PM
@@ -191,8 +215,14 @@
}
static const struct dev_pm_ops ufshcd_pci_pm_ops = {
-SET_SYSTEM_SLEEP_PM_OPS(ufshcd_pci_suspend,
-ufshcd_pci_resume)
+#ifdef CONFIG_PM_SLEEP
+.suspend = ufshcd_pci_suspend,
+.resume = ufshcd_pci_resume,
+.freeze = ufshcd_pci_suspend,
+.thaw = ufshcd_pci_resume,
+.poweroff = ufshcd_pci_poweroff,
+.restore = ufshcd_pci_resume,
+#endif
SET_RUNTIME_PM_OPS(ufshcd_pci_runtime_suspend,
    ufshcd_pci_runtime_resume,
    ufshcd_pci_runtime_idle)
--- linux-4.15.0.orig/drivers/scsi/ufs/ufshcd-pltfrm.c
+++ linux-4.15.0/drivers/scsi/ufs/ufshcd-pltfrm.c
@@ -340,24 +340,21 @@
goto dealloc_host;
}

-pm_runtime_set_active(&pdev->dev);
pm_runtime_enable(&pdev->dev);

ufshcd_init_lanes_per_dir(hba);

err = ufshcd_init(hba, mmio_base, irq);
if (err) {
    dev_err(dev, "Initialization failed\n");
    goto disable_rpm;
    goto dealloc_host;
}

platform_set_drvdata(pdev, hba);

+pm_runtime_set_active(&pdev->dev);
+pm_runtime_enable(&pdev->dev);
static struct ufs_dev_fix ufs_fixups[] = {
/* UFS cards deviations table */
+UFS_FIX(UFS_VENDOR_MICRON, UFS_ANY_MODEL,
+UFS_DEVICE_QUIRK_DELAY_BEFORE_LPM),
UFS_FIX(UFS_VENDOR_SAMSUNG, UFS_ANY_MODEL,
UFS_DEVICE_QUIRK_DELAY_BEFORE_LPM),
UFS_FIX(UFS_VENDOR_SAMSUNG, UFS_ANY_MODEL, UFS_DEVICE_NO_VCCQ),
//@ -1215,8 +1217,15 @@
}
}

static void ufshcd_dealloc_host(struct ufs_hba *hba)
{
spin_unlock_irqrestore(hba->host->host_lock, irq_flags);

+pm_runtime_get_noresume(hba->dev);
+if (!pm_runtime_active(hba->dev)) {
+pm_runtime_put_noidle(hba->dev);
+ret = -EAGAIN;
+goto out;
+
} start = ktime_get();
ret = ufshcd_devfreq_scale(hba, scale_up);
+pm_runtime_put(hba->dev);

trace_ufshcd_profile_clk_scaling(dev_name(hba->dev),
(scale_up ? "up" : "down"),
//@ -1425,6 +1434,7 @@
int ufshcd_hold(struct ufs_hba *hba, bool async)
{
int rc = 0;
+bool flush_result;
unsigned long flags;

if (!ufshcd_is_clkgating_allowed(hba))
//@ -1450,8 +1460,15 @@
*/
if (ufshcd_can_hibern8_during_gating(hba) &&
    ufshcd_is_link_hibern8(hba)) {
+if (async) {
+rc = -EAGAIN;
+hba->clk_gating.active_reqs--;
+break;
+}
spin_unlock_irqrestore(hba->host->host_lock, flags);
-flush_work(&hba->clk_gating.ungate_work);
+flush_result = flush_work(&hba->clk_gating.ungate_work);
+if (hba->clk_gating.is_suspended && !flush_result)
+go to out;
spin_lock_irqsave(hba->host->host_lock, flags);
} goto start;
}
@@ -1469,11 +1486,11 @@
*/
case CLKS_OFF:
-scsci_block_requests(hba->host);
+hba->clk_gating.state = REQ_CLKS_ON;
trace_ufshcd_clk_gating(dev_name(hba->dev),
-hba->clk_gating.state);
+schedule_work(&hba->clk_gating.ungate_work);
+if (schedule_work(&hba->clk_gating.ungate_work))
+scsi_block_requests(hba->host);
/*
 * fall through to check if we should wait for this
 * work to be done or not.
@@ -1749,12 +1766,12 @@
{
hba->lrb[task_tag].issue_time_stamp = ktime_get();
hba->lrb[task_tag].compl_time_stamp = ktime_set(0, 0);
+ufshcd_add_command_trace(hba, task_tag, "send");
ufshcd_clk_scaling_start_busy(hba);
__set_bit(task_tag, &hba->outstanding_reqs);
ufshcd_writel(hba, 1 << task_tag, REG_UTP_TRANSFER_REQ_DOOR_BELL);
/* Make sure that doorbell is committed immediately */
wmb();
-ufshcd_add_command_trace(hba, task_tag, "send");
}
/**
@@ -1791,7 +1808,8 @@
memcpy(&query_res->upiu_res, &lrbp->ucd_rsp_ptr->qr, QUERY_OSF_SIZE);
/* Get the descriptor */
-if (lrbp->ucd_rsp_ptr->qr.opcode == UPIU_QUERY_OPCODE_READ_DESC) {
+if (hba->dev_cmd.query.descriptor &&
+ lrbp->ucd_rsp_ptr->qr.opcode == UPIU_QUERY_OPCODE_READ_DESC) {
u8 *decp = (u8 *)lrbp->ucd_rsp_ptr + GENERAL_UPIU_REQUEST_SIZE;

err = ufshcd_map_sg(hba, lrbp);
if (err) {
    ufshcd_release(hba);
    lrbp->cmd = NULL;
clear_bit_unlock(tag, &hba->lr_in_use);
goto out;
}

-hba->dev_cmd.query.descriptor = NULL;
*buf_len = be16_to_cpu(response->upiu_res.length);

out_unlock:
+hba->dev_cmd.query.descriptor = NULL;
mutex_unlock(&hba->dev_cmd.lock);
out:
ufshcd_release(hba);

if (ret) {
    int err;
    +
    dev_err(hba->dev, "%s: hibern8 enter failed. ret = %d\n", __func__, ret);
/
    - * If link recovery fails then return error so that caller
    - * don't retry the hibern8 enter again.
    + * If link recovery fails then return error code returned from
    + * ufshcd_link_recovery().
    + * If link recovery succeeds then return -EAGAIN to attempt
    + * hibern8 enter retry again.
    */
    -if (ufshcd_link_recovery(hba))
    -ret = -ENOLINK;
    +err = ufshcd_link_recovery(hba);
    +if (err) {
    +dev_err(hba->dev, "%s: link recovery failed", __func__);,
    +ret = err;
    +} else {
    +ret = -EAGAIN;
}
+} } else
    ufs(hcd_vops_hibern8_notify(hba, UIC_CMD_DME_HIBER_ENTER,
    POST_CHANGE);
@@ -3708,7 +3736,7 @@
      for (retries = UIC_HIBERN8_ENTER_RETRIES; retries > 0; retries--) {
    ret = __ufs(hcd_uic_hibern8_enter(hba);
-      if (!ret || ret == -ENOLINK)
+      if (!ret)
        goto out;
      } out:
@@ -4352,6 +4380,8 @@
      /* REPORT SUPPORTED OPERATION CODES is not supported */
    sdev->no_report_opcodes = 1;

      /* WRITE_SAME command is not supported */
+    sdev->no_write_same = 1;

    ufs(hcd_set_queue_depth(sdev);
@@ -4571,7 +4601,7 @@
      break;
    } /* end of switch */

    -if (host_byte(result) != DID_OK)
+    if ((host_byte(result) != DID_OK) && !hba->silence_err_logs)
      ufs(hcd_print_trs(hba, 1 << lrhp->task_tag, true);
      return result;
    } @@ -4805,6 +4835,7 @@

    hba->auto_bkops_enabled = false;
    trace_ufs(hcd_auto_bkops_state(dev_name(hba->dev), "Disabled");
+    hba->is_urgent_bkops_lvl_checked = false;
    out:
    return err;
    } @@ -4829,6 +4860,7 @@

    hba->ee_ctrl_mask &= ~MASK_EE_URGENT_BKOPS;
    ufs(hcd_disable_auto_bkops(hba);
    } +hba->is_urgent_bkops_lvl_checked = false;
    }

static inline int ufs(hcd_get_bkops_status(struct ufs *hba, u32 *status)
@@ -4952,6 +4984,7 @@
hba = container_of(work, struct ufs_hba, eeh_work);

pm_runtime_get_sync(hba->dev);
+scsi_block_requests(hba->host);
err = ufshcd_get_ee_status(hba, &status);
if (err) {
  dev_err(hba->dev, "%s: failed to get exception status %d\n",
@@ -4965,6 +4998,7 @@
  ufshcd_bkops_exception_event_handler(hba);
}
out:
+scsi_unblock_requests(hba->host);
pm_runtime_put_sync(hba->dev);
return;
}
@@ -5097,8 +5131,8 @@
/*
 * if host reset is required then skip clearing the pending
 - * transfers forcefully because they will automatically get
 - * cleared after link startup.
 + * transfers forcefully because they will get cleared during
 + * host reset and restore
 */
if (needs_reset)
goto skip_pending_xfer_clear;
@@ -5351,22 +5385,33 @@
*/
static irqreturn_t ufshcd_intr(int irq, void *__hba)
{
  u32 intr_status, enabled_intr_status;
+u32 intr_status, enabled_intr_status = 0;
  irqreturn_t retval = IRQ_NONE;
  struct ufs_hba *hba = __hba;
+int retries = hba->nutrs;

  spin_lock(hba->host->host_lock);
  intr_status = ufshcd_readl(hba, REG_INTERRUPT_STATUS);
-  enabled_intr_status =
-  -intr_status & ufshcd_readl(hba, REG_INTERRUPT_ENABLE);
+  enabled_intr_status =
+  -intr_status & ufshcd_readl(hba, REG_INTERRUPT_ENABLE);

  -if (intr_status)
  -ufshcd_writel(hba, intr_status, REG_INTERRUPT_STATUS);
+/*
+ * There could be max of hba->nutrs reqs in flight and in worst case
+ * if the reqs get finished 1 by 1 after the interrupt status is
+ * read, make sure we handle them by checking the interrupt status
+ * again in a loop until we process all of the reqs before returning.
while (intr_status && retries--) {
    enabled_intr_status = intr_status & ufshcd_readl(hba, REG_INTERRUPT_ENABLE);
    if (enabled_intr_status) {
        ufshcd_sl_intr(hba, enabled_intr_status);
        retval = IRQ_HANDLE;
    }
}

-ufshcd_sl_intr(hba, enabled_intr_status);
-reval = IRQ_HANDLE;
+intr_status = ufshcd_readl(hba, REG_INTERRUPT_STATUS);
}
+
spin_unlock(hba->host->host_lock);
return retval;
}

struct Scsi_Host *host;
struct ufs_hba *hba;
-unsigned int tag;
pos;
in err;
-u8 resp = 0xF;
-struct ufshcd_lrb *lrbp;
+u8 resp = 0xF, lun;
unsigned long flags;

host = cmd->device->host;
hba = shost_priv(host);
tag = cmd->request->tag;
-lrbp = &hba->lrb[tag];
-err = ufshcd_issue_tm_cmd(hba, lrbp->lun, 0, UFS_LOGICAL_RESET, &resp);
+lun = ufshcd_scsi_to_upiu_lun(cmd->device->lun);
+err = ufshcd_issue_tm_cmd(hba, lun, 0, UFS_LOGICAL_RESET, &resp);
if (err || resp != UPIU_TASK_MANAGEMENT_FUNC_COMPL) {
    if (!err)
        err = resp;
        @ @ -5517,7 +5559,7 @@
/* clear the commands that were pending for corresponding LUN */
for_each_set_bit(pos, &hba->outstanding_reqs, hba->nutrs) {
    if (hba->lrb[pos].lun == lrbp->lun) {
/* clear the commands that were pending for corresponding LUN */
for_each_set_bit(pos, &hba->outstanding_reqs, hba->nutrs) {
    if (hba->lrb[pos].lun == lrbp->lun) {
if (hba->lrb[pos].lun == lun) {
    err = ufshcd_clear_cmd(hba, pos);
    if (err)
        break;
}
/* command completed already */
dev_err(hba->dev, "\%s: cmd at tag \%d successfully cleared from DB.\n", __func__, tag);
-goto out;
+goto cleanup;
} else {
    dev_err(hba->dev, "\%s: no response from device. tag = \%d, err \%d\n", __func__, tag, err);
    goto out;
}
+cleanup:
    scsi_dma_unmap(cmd);

spin_lock_irqsave(host->host_lock, flags);
/* scale up clocks to max frequency before full reinitialization */
static int ufshcd_reset_and_restore(struct ufs_hba *hba) {
    int err = 0;
    unsigned long flags;
    retries = MAX_HOST_RESET_RETRIES;
    do {
        err = ufshcd_host_reset_and_restore(hba);
    } while (err &
        --retries);
After reset the door-bell might be cleared, complete outstanding requests in s/w here.

spin_lock_irqsave(hba->host->host_lock, flags);
ufshcd_transfer_req_compl(hba);
ufshcd_tmc_handler(hba);
spin_unlock_irqrestore(hba->host->host_lock, flags);
return err;

if (hba->vreg_info.vcc && hba->vreg_info.vcc->max_uA)
icc_level = ufshcd_get_max_icc_level(hba->vreg_info.vcc->max_uA,
POWER_DESC_MAX_ACTV_ICC_LVLS - 1,
&desc_buf[PWR_DESC_ACTIVE_LVL_LO_VCC]);

if (hba->vreg_info.vccq && hba->vreg_info.vccq->max_uA)
icc_level = ufshcd_get_max_icc_level(hba->vreg_info.vccq->max_uA,
icc_level,
&desc_buf[PWR_DESC_ACTIVE_LVL_LO_VCCQ]);

if (hba->vreg_info.vccq2 && hba->vreg_info.vccq2->max_uA)
icc_level = ufshcd_get_max_icc_level(hba->vreg_info.vccq2->max_uA,
icc_level,
ufshcd_init_icc_levels(hba);

/* Add required well known logical units to scsi mid layer */
ret = ufshcd_scsi_add_wlus(hba);
goto out;

/* Initialize devfreq after UFS device is detected */
if (!vreg)
return 0;

+/
+ * "set_load" operation shall be required on those regulators
+ * which specifically configured current limitation. Otherwise
+ * zero max_uA may cause unexpected behavior when regulator is
+ * enabled or set as high power mode.
+ */
+if (!vreg->max_uA)
+return 0;
+
+ ret = regulator_set_load(vreg->reg, ua);
+ if (ret < 0) {
+ dev_err(dev, "%s: %s set load (ua=%d) failed, err=%d\n",
+      __func__, name, ret);
+ goto out;
+ }
+
+ if (regulator_count_voltages(reg) > 0) {
+  -min_uV = on ? vreg->min_uV : 0;
+  -ret = regulator_set_voltage(reg, min_uV, vreg->max_uV);
+  -if (ret) {
+    -dev_err(dev, "%s: %s set voltage failed, err=%d\n",
+        __func__, name, ret);
+    -goto out;
+  }
+  
+  -uA_load = on ? vreg->max_uA : 0;
+  @ @ -6763,9 +6815,16 @ @
+  if (list_empty(head))
+  goto out;
+  
+  -ret = ufshcd_vops_setup_clocks(hba, on, PRE_CHANGE);
+  -if (ret)
+  -return ret;
+  +/
+  + * vendor specific setup_clocks ops may depend on clocks managed by
+  + * this standard driver hence call the vendor specific setup_clocks
+  + * before disabling the clocks managed here.
+  + */
+  +if (!on) {
+  +
+ret = ufshcd_vops_setup_clocks(hba, on, PRE_CHANGE);
+if (ret)
+return ret;
+
/list_for_each_entry(clki, head, list) {
    if (!IS_ERR_OR_NULL(clki->clk)) {
        return ret;
    }
}

 ret = ufshcd_vops_setup_clocks(hba, on, POST_CHANGE);
-if (ret)
-return ret;
+/
+ * vendor specific setup_clocks ops may depend on clocks managed by
+ * this standard driver hence call the vendor specific setup_clocks
+ * after enabling the clocks managed here.
+ */
+if (on) {
    ret = ufshcd_vops_setup_clocks(hba, on, POST_CHANGE);
+if (ret)
+-return ret;
+
out:
if (ret) {
    trace_ufshcd_system_resume(dev_name(hba->dev), ret,
    ktime_to_us(ktime_sub(ktime_get(), start)),
    hba->curr_dev_pwr_mode, hba->uic_link_state);
+if (!ret)
+-hba->is_sys_suspended = false;
return ret;
}
EXPORT_SYMBOL(ufshcd_system_resume);

int ret = 0;

+if (!hba->is_powered)
+goto out;
+
if (ufshcd_is_ufs_dev_poweroff(hba) && ufshcd_is_link_off(hba))
goto out;

-if (pm_runtime_suspended(hba->dev)) {
-ret = ufshcd_runtime_resume(hba);
if (ret)
    goto out;
}

pm_runtime_get_sync(hba->dev);

ret = ufshcd_suspend(hba, UFS_SHUTDOWN_PM);
out:
--- linux-4.15.0.orig/drivers/scsi/ufs/ufshcd.h
+++ linux-4.15.0/drivers/scsi/ufs/ufshcd.h
@@ -487,6 +487,7 @@
    * @uic_error: UFS interconnect layer error status
    * @saved_err: sticky error mask
    * @saved_uic_err: sticky UIC error mask
    + * @silence_err_logs: flag to silence error logs
    * @dev_cmd: ufs device management command information
    * @last_dme_cmd_tstamp: time stamp of the last completed DME command
    * @auto_bkops_enabled: to track whether bkops is enabled in device
    @@ -623,6 +624,7 @@
    u32 saved_err;
    u32 saved_uic_err;
    struct ufs_stats ufs_stats;
    /* Device management request data */
    struct ufs_dev_cmd dev_cmd;
--- linux-4.15.0.orig/drivers/scsi/ufs/unipro.h
+++ linux-4.15.0/drivers/scsi/ufs/unipro.h
@@ -52,7 +52,7 @@
    #define RX_HS_UNTERMINATED_ENABLE		0x00A6
    #define RX_ENTER_HIBERN80x00A7
    #define RX_BYPASS_8B10B_ENABLE		0x00A8
-    #define RX_TERMINATION_FORCE_ENABLE		0x0089
+    #define RX_TERMINATION_FORCE_ENABLE		0x00A9
    #define RX_MIN_ACTIVATETIME_CAPABILITY		0x008F
    #define RX_HIBERN8TIME_CAPABILITY		0x0092
    #define RX_REFCLKFREQ				0x00EB
--- linux-4.15.0.orig/drivers/scsi/virtio_scsi.c
+++ linux-4.15.0/drivers/scsi/virtio_scsi.c
@@ -91,9 +91,6 @@
    struct virtio_scsi_vq *req_vq;
    /* Count of outstanding requests. */
    -atomic_t reqs;
    -
    /* Currently active virtqueue for requests sent to this target. */
    struct virtio_scsi_vq *req_vq;
};
struct virtio_scsi_cmd *cmd = buf;
struct scsi_cmnd *sc = cmd->sc;
struct virtio_scsi_cmd_resp *resp = &cmd->resp.cmd;
-struct virtio_scsi_target_state *tgt =
-scsi_target(sc->device)->hostdata;

dev_dbg(&sc->device->sdev_gendev,
"cmd %p response %u status %#02x sense_len %u\n",
@@ -210,8 +205,6 @@
}
sc->scsi_done(sc);
-
-atomic_dec(&tgt->reqs);
}

static void virtscsi_vq_done(struct virtio_scsi *vscsi,
@@ -343,7 +336,7 @@
} break;
default:
-pr_info("Unsupport virtio scsi event reason %x\n", event->reason);
+pr_info("Unsupported virtio scsi event reason %x\n", event->reason);
} }
}

@@ -396,7 +389,7 @@
virtscsi_handle_param_change(vscsi, event);
break;
default:
-default:
+-pr_err("Unsupport virtio scsi event reason %x\n", event->event);
+-pr_err("Unsupported virtio scsi event reason %x\n", event->event);
} virtscsi_kick_event(vscsi, event_node);
}@@ -529,11 +522,20 @@
@endif

-struct int virtscsi_queuecommand(struct virtio_scsi *vscsi,
-    struct virtio_scsi_vq *req_vq,
+static struct virtio_scsi_vq *virtscsi_pick_vq_mq(struct virtio_scsi *vscsi,
+    struct scsi_cmnd *sc)
+{
+  u32 tag = blk_mq_unique_tag(sc->request);
+  u16 hwq = blk_mq_unique_tag_to_hwq(tag);
+  tag = 0;

+return &vscsi->req_vqs[hwq];
+
+static int virtscsi_queuecommand(struct Scsi_Host *shost,  
   struct scsi_cmnd *sc)
+
+-struct Scsi_Host *shost = virtio_scsi_host(vscsi->vdev);
+-struct virtio_scsi *vscsi = shost_priv(shost);
+-struct virtio_scsi_vq *req_vq = virtscsi_pick_vq_mq(vscsi, sc);
+struct virtio_scsi_cmd *cmd = scsi_cmd_priv(sc);
+int req_size;
@@ -576,79 +578,6 @@
   return 0;
 }

-static int virtscsi_queuecommand_single(struct Scsi_Host *sh,  
-struct scsi_cmnd *sc)
-
-{-
-struct virtio_scsi *vscsi = shost_priv(sh);
-struct virtio_scsi_target_state *tgt =
-scsi_target(sc->device)->hostdata;
-  
-atomic_inc(&tgt->reqs);
-return virtscsi_queuecommand(vscsi, &vscsi->req_vqs[0], sc);
-}
-
-static struct virtio_scsi_vq *virtscsi_pick_vq_mq(struct virtio_scsi *vscsi,  
- struct scsi_cmnd *sc)
-{
-  u32 tag = blk_mq_unique_tag(sc->request);
-  u16 hwq = blk_mq_unique_tag_to_hwq(tag);
-  
-return &vscsi->req_vqs[hwq];
-}
-
-static struct virtio_scsi_vq *virtscsi_pick_vq(struct virtio_scsi *vscsi,  
- struct virtio_scsi_target_state *tgt)
-{
-struct virtio_scsi_vq *vq;
-unsigned long flags;
-u32 queue_num;
-  
-local_irq_save(flags);
-if (atomic_inc_return(&tgt->reqs) > 1) {
-unsigned long seq;
-  
-do {
- seq = read_seqcount_begin(&tgt->tgt_seq);
- vq = tgt->req_vq;
- } while (read_seqcount_retry(&tgt->tgt_seq, seq));
- } else {
  /* no writes can be concurrent because of atomic_t */
  write_seqcount_begin(&tgt->tgt_seq);
  /* keep previous req_vq if a reader just arrived */
  if (unlikely(atomic_read(&tgt->reqs) > 1)) {
    vq = tgt->req_vq;
    goto unlock;
  }
  /* todo: use per-scnum queues */
  queue_num = smp_processor_id();
  while (unlikely(queue_num >= vscsi->num_queues))
    queue_num -= vscsi->num_queues;
  tgt->req_vq = vq = &vscsi->req_vqs[queue_num];
  unlock:
  write_seqcount_end(&tgt->tgt_seq);
  }
  local_irq_restore(flags);
  return vq;
  }

  static int virtscsi_queuecommand_multi(struct Scsi_Host *sh,
       struct scsi_cmnd *sc)
  {
    struct virtio_scsi *vscsi = shost_priv(sh);
    struct virtio_scsi_target_state *tgt =
      scsi_target(sc->device)->hostdata;
    struct virtio_scsi_vq *req_vq;
    
    -if (shost_use_blk_mq(sh))
      req_vq = virtscsi_pick_vq_mq(vscsi, sc);
    -else
      req_vq = virtscsi_pick_vq(vscsi, tgt);
    
    -return virtscsi_queuecommand(vscsi, req_vq, sc);
    -}
  }

  static int virtscsi_tmf(struct virtio_scsi *vscsi, struct virtio_scsi_cmd *cmd)
  {
    DECLARE_COMPLETION_ONSTACK(comp);
    memset(cmd, 0, sizeof(*cmd));
    return FAILED;
    @ @ -692,7 +621,6 @ @
-cmd->sc = sc;
cmd->req.tmf = (struct virtio_scsi_ctrl_tmf_req){
  .type = VIRTIO_SCSI_T_TMF,
  .subtype = cpu_to_virtio32(vscsi->vdev,
@@ -751,7 +679,6 @@
return FAILED;
memset(cmd, 0, sizeof(*cmd));
-cmd->sc = sc;
cmd->req.tmf = (struct virtio_scsi_ctrl_tmf_req){
  .type = VIRTIO_SCSI_T_TMF,
  .subtype = VIRTIO_SCSI_T_TMF_ABORT_TASK,
@@ -775,7 +702,6 @@
return -ENOMEM;
seqcount_init(&tgt->tgt_seq);
-atomic_set(&tgt->reqs, 0);
tgt->req_vq = &vscsi->req_vqs[0];

starget->hostdata = tgt;
@@ -805,33 +731,13 @@
return BLK_EH_RESET_TIMER;
}

-static struct scsi_host_template virtscsi_host_template_single = {
+static struct scsi_host_template virtscsi_host_template = {
  .module = THIS_MODULE,
  .name = "Virtio SCSI HBA",
  .proc_name = "virtio_scsi",
  .this_id = -1,
  .cmd_size = sizeof(struct virtio_scsi_cmd),
  .queuecommand = virtscsi_queuecommand_single,
  .change_queue_depth = virtscsi_change_queue_depth,
  .eh_abort_handler = virtscsi_abort,
  .eh_device_reset_handler = virtscsi_device_reset,
  .eh_timed_out = virtscsi_eh_timed_out,
  .slave_alloc = virtscsi_device_alloc,
  
  .dma_boundary = UINT_MAX,
  .use_clustering = ENABLE_CLUSTERING,
  .target_alloc = virtscsi_target_alloc,
  .target_destroy = virtscsi_target_destroy,
  .track_queue_depth = 1,
  
};
-
-static struct scsi_host_template virtscsi_host_template_multi = {
  .module = THIS_MODULE,
  .name = "Virtio SCSI HBA",

- proc_name = "virtio_scsi",
- this_id = -1,
- cmd_size = sizeof(struct virtio_scsi_cmd),
- queuecommand = virtscsi_queuecommand_multi,
+ queuecommand = virtscsi_queuecommand,
 .change_queue_depth = virtscsi_change_queue_depth,
 .eh_abort_handler = virtscsi_abort,
 .eh_device_reset_handler = virtscsi_device_reset,
@@ -844,6 +750,7 @@
 .target_destroy = virtscsi_target_destroy,
 .map_queues = virtscsi_map_queues,
 .track_queue_depth = 1,
+.force_blk_mq = 1;
   
 #define virtscsi_config_get(vdev, fld) \
@@ -936,7 +843,6 @@
 u32 sg elems, num_targets;
 u32 cmd per lun;
 u32 num queues;
-struct scsi host template *hostt;
+struct scsi host template *hostt = virtscsi_host_template;

 if (!vdev->config->get) {
  dev_err(&vdev->dev, "%s failure: config access disabled\n",
@@ -949,12 +855,7 @@
    num_targets = virtscsi_config_get(vdev, max_target) + 1;

  -if (num_queues == 1)
-    hostt = &virtscsi_host_template_single;
  -else
-    hostt = &virtscsi_host_template_multi;
-  
-  shost = scsi_host alloc(hostt,
+shost = scsi_host alloc(&virtscsi_host_template,
    sizeof(*vscsi) + sizeof(vscsi->req_vqs[0]) * num_queues);
  if (!shost)
    return -ENOMEM;
--- linux-4.15.0.orig/drivers/scsi/vmw_pvscsi.c
+++ linux-4.15.0/drivers/scsi/vmw_pvscsi.c
@@ -561,15 +561,26 @@
    (btstat == BTSTAT_SUCCESS ||
    btstat == BTSTAT_LINKED_COMMAND_COMPLETED ||
    btstat == BTSTAT_LINKED_COMMAND_COMPLETED_WITH_FLAG)) {
-cmd->result = (DID_OK << 16) | sdstat;
-if (sdstat == SAM_STAT_CHECK_CONDITION &amp; cmd-&gt;sense_buffer)
-cmd-&gt;result |= (DRIVER SENSE &lt;&lt; 24);
+if (sdstat == SAM_STAT_COMMAND_TERMINATED) {

cmd->result = (DID_RESET << 16);
} else {
    cmd->result = (DID_OK << 16) | sdstat;
}
if (sdstat == SAM_STAT_CHECK_CONDITION &&
    cmd->sense_buffer)
    cmd->result |= (DRIVER_SENSE << 24);
}
} else
switch (btstat) {
    case BTSTAT_SUCCESS:
    case BTSTAT_LINKED_COMMAND_COMPLETED:
    case BTSTAT_LINKED_COMMAND_COMPLETED_WITH_FLAG:
        /* If everything went fine, let's move on.. */
        /*
        * Commands like INQUIRY may transfer less data than
        * requested by the initiator via bufflen. Set residual
        * count to make upper layer aware of the actual amount
        * of data returned.
        *
        */
        scsi_set_resid(cmd, scsi_bufflen(cmd) - e->dataLen);
        cmd->result = (DID_OK << 16);
        break;
    case BTSTAT_ABORTQUEUE:
        /* Aborted commands do not return any meaningful data. */
        /* The residual count is set to indicate data returned.
        */
        cmd->result = (DID_ABORT << 16);
        break;
    case BTSTAT_SCSIPARITY:

        struct pvscsi_adapter *adapter = host_priv(host);
        struct pvscsi_ctx *ctx;
        unsigned long flags;
        unsigned char op;

        spin_lock_irqsave(&adapter->hw_lock, flags);

        cmd->scsi_done = done;
        op = cmd->cmnd[0];
        dev_dbg(&cmd->device->sdev_gendev,
                "queued cmd %p, ctx %p, op=%x\n", cmd, ctx,
                cmd->cmnd[0]);
    spin_unlock_irq(&adapter->hw_lock);
    break;
}
spin_unlock_irqrestore(&adapter->hw_lock, flags);

-pvscsi_kick_io(adapter, cmd->cmd[0]);
+pvscsi_kick_io(adapter, op);

return 0;
}
@@ -1197,8 +1210,6 @@
static void pvscsi_release_resources(struct pvscsi_adapter *adapter)
{
-pvscsi_shutdown_intr(adapter);
-
if (adapter->workqueue)
destroy_workqueue(adapter->workqueue);

@@ -1530,6 +1541,7 @@
out_reset_adapter:
ll_adapter_reset(adapter);
out_release_resources:
+pvscsi_shutdown_intr(adapter);
pvscsi_release_resources(adapter);
scsi_host_put(host);
out_disable_device:
@@ -1538,6 +1550,7 @@
return error;

out_release_resources_and_disable:
+pvscsi_shutdown_intr(adapter);
pvscsi_release_resources(adapter);
goto out_disable_device;
}
--- linux-4.15.0.orig/drivers/scsi/xen-scsifront.c
+++ linux-4.15.0/drivers/scsi/xen-scsifront.c
@@ -654,10 +654,17 @@
static int scsifront_sdev_configure(struct scsi_device *sdev)
{
 struct vscsifrnt_info *info = shost_priv(sdev->host);
+int err;
-if (info && current == info->curr) {
-xenbus_printf(XBT_NIL, info->dev->nodename,
+if (info && current == info->curr) {
+err = xenbus_printf(XBT_NIL, info->dev->nodename,
info->dev_state_path, "%d", XenbusStateConnected);
+if (err) {
+xenbus_dev_error(info->dev, err,
+"%s: writing dev_state_path", __func__); 
+return err;
+
}
}
return 0;
}
@@ -665,10 +672,15 @@
static void scsifront_sdev_destroy(struct scsi_device *sdev)
{
    struct vscsifrnt_info *info = shost_priv(sdev->host);
+    int err;
-
    if (info && current == info->curr)
    {
        err = xenbus_printf(XBT_NIL, info->dev->nodename,
+                        info->dev_state_path, "%d", XenbusStateClosed);
        if (err)
            xenbus_dev_error(info->dev, err,
+                        "%s: writing dev_state_path", __func__); 
    }
}

static struct scsi_host_template scsifront_sht = {
@@ -1003,9 +1015,12 @@

if (scsi_add_device(info->host, chn, tgt, lun)) {
    dev_err(&dev->dev, "scsi_add_device
-				xenbus_printf(XBT_NIL, dev->nodename,
+    {
+        err = xenbus_printf(XBT_NIL, dev->nodename,
+                        info->dev_state_path, "%d", XenbusStateClosed);
+        if (err)
            xenbus_dev_error(dev, err,
+                        "%s: writing dev_state_path", __func__); 
    }
break;
    case VSCSIFRONT_OP_DEL_LUN:
@@ -1019,10 +1034,14 @@

break;
    case VSCSIFRONT_OP_READD_LUN:
        -if (device_state == XenbusStateConnected)
-            xenbus_printf(XBT_NIL, dev->nodename,
+        {
+            err = xenbus_printf(XBT_NIL, dev->nodename,
+                        device_state == XenbusStateConnected) 
+                xenbus_dev_error(dev, err,
+                        "%s: writing dev_state_path", __func__); 
        }
break;
info->dev_state_path,
"%d", XenbusStateConnected);
+if (err)
+xenbus_dev_error(dev, err,
+"%s: writing dev_state_path", __func__);
+}
break;
default:
break;
--- linux-4.15.0.orig/drivers/soc/Makefile
+++ linux-4.15.0/drivers/soc/Makefile
@@ -12,7 +12,7 @@
obj-$(CONFIG_ARCH_MXC)+= imx/
obj-$(CONFIG_SOC_XWAY)+= lantiq/
obj-y+= mediatek/
-obj-$(CONFIG_ARCH_MESON)+= amlogic/
+obj-y+= amlogic/
obj-$(CONFIG_ARCH_QCOM)+= qcom/
obj-y+= renesas/
obj-$(CONFIG_ARCH_ROCKCHIP)+= rockchip/
--- linux-4.15.0.orig/drivers/soc/amlogic/meson-gx-pwrc-vpu.c
+++ linux-4.15.0/drivers/soc/amlogic/meson-gx-pwrc-vpu.c
@@ -54,12 +54,12 @@
/* Power Down Memories */
for (i = 0; i < 32; i += 2) {
regmap_update_bits(pd->regmap_hhi, HHI_VPU_MEM_PD_REG0,
- 0x2 << i, 0x3 << i);
+ 0x3 << i, 0x3 << i);
udelay(5);
}
for (i = 0; i < 32; i += 2) {
regmap_update_bits(pd->regmap_hhi, HHI_VPU_MEM_PD_REG1,
- 0x2 << i, 0x3 << i);
+ 0x3 << i, 0x3 << i);
udelay(5);
}
for (i = 8; i < 16; i++) {
@@ -108,13 +108,13 @@
/* Power Up Memories */
for (i = 0; i < 32; i += 2) {
regmap_update_bits(pd->regmap_hhi, HHI_VPU_MEM_PD_REG0,
- 0x2 << i, 0);
+ 0x3 << i, 0);
udelay(5);
}
for (i = 0; i < 32; i += 2) {
regmap_update_bits(pd->regmap_hhi, HHI_VPU_MEM_PD_REG1,

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- 0x2 << i, 0);
+ 0x3 << i, 0);
udelay(5);
}

@@ -224,7 +224,11 @@
static void meson_gx_pwrc_vpu_shutdown(struct platform_device *pdev)
{
- meson_gx_pwrc_vpu_power_off(&vpu_hdmi_pd.genpd);
+ bool powered_off;
 +
+ powered_off = meson_gx_pwrc_vpu_get_power(&vpu_hdmi_pd);
+ if (!powered_off)
+ meson_gx_pwrc_vpu_power_off(&vpu_hdmi_pd.genpd);
}

static const struct of_device_id meson_gx_pwrc_vpu_match_table[] = {
--- linux-4.15.0.orig/drivers/soc/atmel/soc.c
+++ linux-4.15.0/drivers/soc/atmel/soc.c
@@ -254,8 +254,21 @@
return soc_dev;
}

+static const struct of_device_id at91_soc_allowed_list[] __initconst = {
+ { .compatible = "atmel,at91rm9200", },
+ { .compatible = "atmel,at91sam9", },
+ { .compatible = "atmel,sama5", },
+ { .compatible = "atmel,samv7", },
+ { }
+};
+ static int __init atmel_soc_device_init(void)
+{
+ struct device_node *np = of_find_node_by_path("/");
+ +if (!of_match_node(at91_soc_allowed_list, np))
+ return 0;
+ at91_soc_init(soecs);
+
return 0;
--- linux-4.15.0.orig/drivers/soc/bcm/brcmstb/common.c
+++ linux-4.15.0/drivers/soc/bcm/brcmstb/common.c
@@ -31,13 +31,17 @@
boot soc_is_brcmstb(void)
{
+const struct of_device_id *match;
struct device_node *root;

root = of_find_node_by_path("/");
if (!root)
  return false;

-return of_match_node(brcmstb_machine_match, root) != NULL;
+match = of_match_node(brcmstb_machine_match, root);
+of_node_put(root);
+
+return match != NULL;
}

u32 brcmstb_get_family_id(void)
--- linux-4.15.0.orig/drivers/soc/bcm/brcmstb/pm/pm-arm.c
+++ linux-4.15.0/drivers/soc/bcm/brcmstb/pm/pm-arm.c
@@ -404,7 +404,7 @@
{
  struct brcmstb_s3_params *params = ctrl.s3_params;
  dma_addr_t params_pa = ctrl.s3_params_pa;
-  phys_addr_t reentry = virt_to_phys(&cpu_resume);
+-  phys_addr_t reentry = virt_to_phys(&cpu_resume_arm);
  enum bsp_initiate_command cmd;
  u32 flags;

--- linux-4.15.0.orig/drivers/soc/bcm/raspberrypi-power.c
+++ linux-4.15.0/drivers/soc/bcm/raspberrypi-power.c
@@ -45,7 +45,7 @@
 struct rpi_power_domain_packet {
   u32 domain;
   u32 on;
-} __packet;
+};

/*
 * Asks the firmware to enable or disable power on a specific power
--- linux-4.15.0.orig/drivers/soc/fsl/qbman/qman.c
+++ linux-4.15.0/drivers/soc/fsl/qbman/qman.c
@@ -184,7 +184,7 @@
 __be32 tag;
 struct qm_fd fd;
 u8 __reserved3[32];
-} __packed;
+} __packed __aligned(8);
#define QM_EQCR_VERB_VBIT		0x80
#define QM_EQCR_VERB_CMD_MASK		0x61	/* but only one value; */
#define QM_EQCR_VERB_CMD_ENQUEUE	0x01
static irqreturn_t portal_isr(int irq, void *ptr)
{
struct qman_portal *p = ptr;

- u32 clear = QM_DQAVAIL_MASK | p->irq_sources;
 u32 is = qm_in(&p->p, QM_REG_ISR) & p->irq_sources;
+ u32 clear = 0;

if (unlikely(!is))
    return IRQ_NONE;

    /* DQRR-handling if it's interrupt-driven */
 if (is & QM_PIRQ_DQRI)
+ if (is & QM_PIRQ_DQRI) {
+     __poll_portal_fast(p, QMAN_POLL_LIMIT);
+     clear = QM_DQAVAIL_MASK | QM_PIRQ_DQRI;
+ }

    /* Handling of anything else that's interrupt-driven */
- clear = __poll_portal_slow(p, is);
+ clear = __poll_portal_slow(p, is) & QM_PIRQ_SLOW;
 qm_out(&p->p, QM_REG_ISR, clear);
 return IRQ_HANDLED;
}

static int qman_delete_cgr_thread(void *p)
+static void qman_delete_cgr_smp_call(void *p)
{
    struct cgr_comp *cgr_comp = (struct cgr_comp *)p;
    int ret;
    
    -ret = qman_delete_cgr(cgr_comp->cgr);
    -complete(&cgr_comp->completion);
    
    -return ret;
+qman_delete_cgr(struct qman_cgr *)p);
}

void qman_delete_cgr_safe(struct qman_cgr *cgr)
{
    struct task_struct *thread;
    struct cgr_comp cgr_comp;
    
    preempt_disable();
    if (qman_cgr_cpus[cgr->cgrid] != smp_processor_id()) {

    }
init_completion(&cgr_comp.completion);
cgr_comp.cgr = cgr;
thread = kthread_create(qman_delete_cgr_thread, &cgr_comp,
"cgr_del");
-
-if (IS_ERR(thread))
-goto out;
-
-kthread_bind(thread, qman_cgr_cpus[cgr->cgrid]);
-wake_up_process(thread);
-wait_for_completion(&cgr_comp.completion);
+smp_call_function_single(qman_cgr_cpus[cgr->cgrid],
+ qman_delete_cgr_smp_call, cgr, true);
preempt_enable();
return;
}
-out:
+qman_delete_cgr(cgr);
preempt_enable();
}
@@ -2746,6 +2729,9 @@
{
unsigned long addr;
-if (!p)
+return -ENODEV;
+addr = gen_pool_alloc(p, cnt);
if (!addr)
return -ENOMEM;
--- linux-4.15.0.orig/drivers/soc/fsl/qe/gpio.c
+++ linux-4.15.0/drivers/soc/fsl/qe/gpio.c
@@ -152,8 +152,10 @@
if (err < 0)
goto err0;
gc = gpio_to_chip(err);
-if (WARN_ON(!gc))
+if (WARN_ON(!gc)) {
+err = -ENODEV;
goto err0;
+
if (!of_device_is_compatible(gc->of_node, "fsl,mpc8323-qe-pario-bank")) {
pr_debug("%s: tried to get a non-qe pin\n", __func__);
u32 shift;

-shift = (mode == COMM_DIR_RX) ? RX_SYNC_SHIFT_BASE : RX_SYNC_SHIFT_BASE;
+shift = (mode == COMM_DIR_RX) ? RX_SYNC_SHIFT_BASE : TX_SYNC_SHIFT_BASE;
shift -= tdm_num * 2;

return shift;
--- linux-4.15.0.orig/drivers/soc/imx/gpc.c
+++ linux-4.15.0/drivers/soc/imx/gpc.c
@@ -27,9 +27,16 @@
#define GPC_PGC_SW2ISO_SHIFT	0x8
#define GPC_PGC_SW_SHIFT	0x0
+#define GPC_PGC_PCI_PDN		0x200
+#define GPC_PGC_PCI_SR		0x20c
+
#define GPC_PGC_GPU_PDN		0x260
#define GPC_PGC_GPU_PUPSCR	0x264
#define GPC_PGC_GPU_PDNSCR	0x268
+#define GPC_PGC_GPU_SR		0x26c
+
+#define GPC_PGC_DISP_PDN	0x240
#define GPC_PGC_DISP_SR		0x24c

#define GPU_VPU_PUP_REQ		BIT(1)
#define GPU_VPU_PDN_REQ		BIT(0)
@@ -66,7 +73,7 @@
return -EBUSY;
/* Read ISO and ISO2SW power down delays */
-regmap_read(pd->regmap, pd->reg_offs + GPC_PGC_PUPSCR_OFFS, &val);
+regmap_read(pd->regmap, pd->reg_offs + GPC_PGC_PDNSCR_OFFS, &val);
iso = val & 0x3f;
iso2sw = (val >> 8) & 0x3f;
@@ -90,8 +97,8 @@
static int imx6_pm_domain_power_on(struct generic_pm_domain *genpd)
} {
 struct imx_pm_domain *pd = to_imx_pm_domain(genpd);
-int i, ret, sw, sw2iso;
-u32 val;
+int i, ret;
+sint val, req;

 if (pd->supply) {
 ret = regulator_enable(pd->supply);
 @@ -110,17 +117,18 @@

regmap_update_bits(pd->regmap, pd->reg_offs + GPC_PGC_CTRL_OFFS, 0x1, 0x1);

"/* Read ISO and ISO2SW power up delays */
-regmap_read(pd->regmap, pd->reg_offs + GPC_PGC_PUPSCR_OFFS, &val);
-sw = val & 0x3f;
-sw2iso = (val >> 8) & 0x3f;
-
-"/* Request GPC to power up domain */
-val = BIT(pd->cntr_pdn_bit + 1);
-regmap_update_bits(pd->regmap, GPC_CNTR, val, val);
+req = BIT(pd->cntr_pdn_bit + 1);
+regmap_update_bits(pd->regmap, GPC_CNTR, req, req);

-"/* Wait ISO + ISO2SW IPG clock cycles */
-udelay(DIV_ROUND_UP(sw + sw2iso, pd->ipg_rate_mhz));
+"/* Wait for the PGC to handle the request */
+ret = regmap_read_poll_timeout(pd->regmap, GPC_CNTR, val, !(val & req),
+     1, 50);
+if (ret)
+    pr_err("powerup request on domain %s timed out\n", genpd->name);
+
+"/* Wait for reset to propagate through peripherals */
+usleep_range(5, 10);

/* Disable reset clocks for all devices in the domain */
for (i = 0; i < pd->num_clks; i++)
 { }
static struct generic_pm_domain *imx_gpc_onecell_domains[] = {
    &access_table,
    .max_register = 0x2ac,
    .fast_io = true,
};

static struct generic_pm_domain *imx_gpc_onecell_domains[] = {

static int imx_gpc_remove(struct platform_device *pdev)
{
    struct device_node *pgc_node;
    int ret;

    pgc_node = of_get_child_by_name(pdev->dev.of_node, "pgc");
    +
    /* bail out if DT too old and doesn’t provide the necessary info */
    +if (!of_property_read_bool(pdev->dev.of_node, "#power-domain-cells") &&
        !pgc_node)
    +return 0;
    +
    /*
     * If the old DT binding is used the toplevel driver needs to
     * de-register the power domains
     */
    -if (!of_get_child_by_name(pdev->dev.of_node, "pgc")) {
        +if (!pgc_node) {
            of_genpd_del_provider(pdev->dev.of_node);
            ret = pm_genpd_remove(&imx_gpc_domains[GPC_PGC_DOMAIN_PU].base);
            --- linux-4.15.0.orig/drivers/soc/imx/gpcv2.c
            +++ linux-4.15.0/drivers/soc/imx/gpcv2.c
            @@ -39,10 +39,15 @@
            #define GPC_M4_PU_PDN_FLG 0x1bc

            -
            -#define PGC_M4I4
            -#define PGC_PCIE5
            -#define PGC_USB_HSIC8
            +/
            + * The PGC offset values in Reference Manual
            + * (Rev. 1, 01/2018 and the older ones) GPC chapter's
            + * GPC_PGC memory map are incorrect, below offset
            + * values are from design RTL.
            + */
            +#define PGC_MIPI16
            +#define PGC_PCIE17
            +#define PGC_USB_HSIC20

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#define GPC_PGC_CTRL(n)(0x800 + (n) * 0x40)
#define GPC_PGC_SR(n)(GPC_PGC_CTRL(n) + 0xc)

return imx7_gpc_pu_pgc_sw_pxx_req(genpd, false);
}

static const struct imx7_pgc_domain imx7_pgc_domains[] = {
    [IMX7_POWER_DOMAIN_MIPI_PHY] = {
        .genpd = {
            .name      = "mipi-phy",
        }
    }
};

domain = &imx7_pgc_domains[domain_index];
domain->regmap = regmap;
domain->genpd.power_on  = imx7_gpc_pu_pgc_sw_pup_req;
domain->genpd.power_off = imx7_gpc_pu_pgc_sw_pdn_req;

pd_pdev = platform_device_alloc("imx7-pgc-domain",
domain_index);
if (!pd_pdev) {
    return -ENOMEM;
}
	pd_pdev->dev.platform_data = domain;
+    ret = platform_device_add_data(pd_pdev,
+        &imx7_pgc_domains[domain_index],
+        sizeof(imx7_pgc_domains[domain_index]));
+    if (ret) {
+        platform_device_put(pd_pdev);
+        of_node_put(np);
+        return ret;
+    }
+    domain = pd_pdev->dev.platform_data;
+    domain->regmap = regmap;
+    domain->genpd.power_on  = imx7_gpc_pu_pgc_sw_pup_req;
+    domain->genpd.power_off = imx7_gpc_pu_pgc_sw_pdn_req;
+    pd_pdev->dev.parent = dev;
    pd_pdev->dev.of_node = np;

--- linux-4.15.0.orig/drivers/soc/lantiq/gphy.c
+++ linux-4.15.0/drivers/soc/lantiq/gphy.c
struct clk *gphy_clk_gate;
struct reset_control *gphy_reset;
struct reset_control *gphy_reset2;
struct notifier_block gphy_reboot_nb;
void __iomem *membase;
char *fw_name;
};

static struct xway_gphy_priv *to_xway_gphy_priv(struct notifier_block *nb)
{
	return container_of(nb, struct xway_gphy_priv, gphy_reboot_nb);
}

static int xway_gphy_reboot_notify(struct notifier_block *reboot_nb,
				   unsigned long code, void *unused)
{
	struct xway_gphy_priv *priv = to_xway_gphy_priv(reboot_nb);

	if (priv) {
		reset_control_assert(priv->gphy_reset);
		reset_control_assert(priv->gphy_reset2);
	}

	return NOTIFY_DONE;
}

static int xway_gphy_load(struct device *dev, struct xway_gphy_priv *priv,
   dma_addr_t *dev_addr)
{
	reset_control_deassert(priv->gphy_reset);
reset_control_deassert(priv->gphy_reset2);

	/* assert the gphy reset because it can hang after a reboot: */
-priv->gphy_reboot_nb.notifier_call = xway_gphy_reboot_notify;
-priv->gphy_reboot_nb.priority = -1;
-
-ret = register_reboot_notifier(&priv->gphy_reboot_nb);
-if (ret)
-dev_warn(dev, "Failed to register reboot notifier\n");
-
platform_set_drvdata(pdev, priv);

return ret;
static int xway_gphy_remove(struct platform_device *pdev) {
    struct device *dev = &pdev->dev;
    struct xway_gphy_priv *priv = platform_get_drvdata(pdev);
    int ret;

    reset_control_assert(priv->gphy_reset);
    reset_control_assert(priv->gphy_reset2);

    iowrite32be(0, priv->membase);

    clk_disable_unprepare(priv->gphy_clk_gate);

    ret = unregister_reboot_notifier(&priv->gphy_reboot_nb);
    if (ret)
        dev_warn(dev, "Failed to unregister reboot notifier\n");
    return 0;
}

--- linux-4.15.0.orig/drivers/soc/mediatek/mtk-pmic-wrap.c
+++ linux-4.15.0/drivers/soc/mediatek/mtk-pmic-wrap.c
@@ -1054,7 +1054,7 @@
static int pwrap_init_cipher(struct pmic_wrapper *wrp) {
    int ret;
    u32 rdata;
    +u32 rdata = 0;

    pwrap_writel(wrp, 0x1, PWRAP_CIPHER_SWRST);
    pwrap_writel(wrp, 0x0, PWRAP_CIPHER_SWRST);

--- linux-4.15.0.orig/drivers/soc/mediatek/mtk-scpsys.c
+++ linux-4.15.0/drivers/soc/mediatek/mtk-scpsys.c
@@ -471,6 +471,7 @@
for (i = 0; i < num; i++) {
    struct scp_domain *scpd = &scp->domains[i];
    struct generic_pm_domain *genpd = &scpd->genpd;
+    bool on;

    /*
     * Initially turn on all domains to make the domains usable
     @@ -478,9 +479,9 @@
     * software. The unused domains will be switched off during
     * late_init time.
     */
-    genpd->power_on(genpd);
+on = !WARN_ON(genpd->power_on(genpd) < 0);

-pm_genpd_init(genpd, NULL, false);
+pm_genpd_init(genpd, NULL, !on);
}
/*
@@ -882,7 +883,7 @@
    pd_data = &scp->pd_data;

    -for (i = 0, sd = soc->subdomains ; i < soc->num_subdomains ; i++) {
    +for (i = 0, sd = soc->subdomains; i < soc->num_subdomains; i++, sd++) {
        ret = pm_genpd_add_subdomain(pd_data->domains[sd->origin],
                                    pd_data->domains[sd->subdomain]);
        if (ret && IS_ENABLED(CONFIG_PM))
--- linux-4.15.0.orig/drivers/soc/qcom/mdt_loader.c
+++ linux-4.15.0/drivers/soc/qcom/mdt_loader.c
@@ -174,6 +174,14 @@
        break;
    }

    +if (phdr->p_filesz > phdr->p_memsz) {
    +dev_err(dev,
    +"refusing to load segment %d with p_filesz > p_memsz\n",
    +i);
    +ret = -EINVAL;
    +break;
    +}

    ptr = mem_region + offset;

    if (phdr->p_filesz) {
@@ -185,6 +193,15 @@
        break;
    }

    +if (seg_fw->size != phdr->p_filesz) {
    +dev_err(dev,
    +"failed to load segment %d from truncated file %s\n",
    +i, fw_name);
    +release_firmware(seg_fw);
    +ret = -EINVAL;
    +break;
    +}

    release_firmware(seg_fw);
}
--- linux-4.15.0.orig/drivers/soc/qcom/qcom_gsbi.c
+++ linux-4.15.0/drivers/soc/qcom/qcom_gsbi.c
@@ -138,7 +138,7 @@
 struct resource *res;
 void __iomem *base;
 struct gsbi_info *gsbi;
-int i;
+int i, ret;
 u32 mask, gsbi_num;
 const struct crci_config *config = NULL;

 @@ -221,7 +221,10 @@
 platform_set_drvdata(pdev, gsbi);
 -return of_platform_populate(node, NULL, NULL, &pdev->dev);
 +ret = of_platform_populate(node, NULL, NULL, &pdev->dev);
 +if (ret)
 +clk_disable_unprepare(gsbi->hclk);
 +return ret;
 }

 static int gsbi_remove(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/soc/qcom/rmtfs_mem.c
+++ linux-4.15.0/drivers/soc/qcom/rmtfs_mem.c
@@ -180,6 +180,7 @@
 device_initialize(&rmtfs_mem->dev);
 rmtfs_mem->dev.parent = &pdev->dev;
 rmtfs_mem->dev.groups = qcom_rmtfs_mem_groups;
+rmtfs_mem->dev.release = qcom_rmtfs_mem_release_device;
 rmtfs_mem->base = devm_memremap(&rmtfs_mem->dev, rmtfs_mem->addr,
 rmtfs_mem->size, MEMREMAP_WC);
@@ -202,8 +203,6 @@
 goto put_device;
 }

 -rmtfs_mem->dev.release = qcom_rmtfs_mem_release_device;
-dev_set_drvdata(&pdev->dev, rmtfs_mem);

 return 0;
@@ -267,3 +266,7 @@
 unregister_chrdev_region(qcom_rmtfs_mem_major, QCOM_RMTFS_MEM_DEV_MAX);
 }
 module_exit(qcom_rmtfs_mem_exit);
+

+MODULE_AUTHOR("Linaro Ltd");
+MODULE_DESCRIPTION("Qualcomm Remote Filesystem memory driver");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/soc/qcom/smem.c
+++ linux-4.15.0/drivers/soc/qcom/smem.c
@@ -362,13 +362,8 @@
cached = phdr_to_last_cached_entry(phdr);

while (hdr < end) {
- if (hdr->canary != SMEM_PRIVATE_CANARY) {
- dev_err(smem->dev,
- "Found invalid canary in hosts %d:%d partition\n",
- phdr->host0, phdr->host1);
- return -EINVAL;
- }
-
- if (hdr->canary != SMEM_PRIVATE_CANARY)
+ goto bad_canary;
  if (le16_to_cpu(hdr->item) == item)
    return -EEXIST;
@@ -397,6 +392,11 @@
le32_add_cpu(&phdr->offset_free_uncached, alloc_size);

return 0;
+bad_canary:
+dev_err(smem->dev, "Found invalid canary in hosts %hu:%hu partition\n",
+le16_to_cpu(phdr->host0), le16_to_cpu(phdr->host1));
+ return -EINVAL;
} 

static int qcom_smem_alloc_global(struct qcom_smem *smem,
@@ -560,8 -560,8 @@
return ERR_PTR(-ENOENT);

invalid_canary:
- dev_err(smem->dev, "Found invalid canary in hosts %d:%d partition\n",
- phdr->host0, phdr->host1);
+ dev_err(smem->dev, "Found invalid canary in hosts %hu:%hu partition\n",
+ le16_to_cpu(phdr->host0), le16_to_cpu(phdr->host1));

return ERR_PTR(-EINVAL);
}
@@ -695,9 +695,10 @@
static int qcom_smem_set_global_partition(struct qcom_smem *smem)
{
 struct smem_partition_header *header;

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struct smem_ptable_entry *entry = NULL;
+struct smem_ptable_entry *entry;
struct smem_ptable *ptable;
u32 host0, host1, size;
+bool found = false;
int i;

ptable = qcom_smem_get_ptable(smem);
@@ -709,11 +710,13 @@
		if (host0 == SMEM_GLOBAL_HOST && host0 == host1)
+if (host0 == SMEM_GLOBAL_HOST && host0 == host1) {
			found = true;
break;
+} 
	}

-if (!entry) {
+if (!found) {
  dev_err(smem->dev, "Missing entry for global partition\n");
  return -EINVAL;
}
--- linux-4.15.0.orig/drivers/soc/qcom/smp2p.c
+++ linux-4.15.0/drivers/soc/qcom/smp2p.c
@@ -314,15 +314,16 @@
 static int smp2p_update_bits(void *data, u32 mask, u32 value)
 {
 struct smp2p_entry *entry = data;
+unsigned long flags;
 u32 orig;
 u32 val;

 -spin_lock(&entry->lock);
 +spin_lock_irqsave(&entry->lock, flags);
 val = orig = readl(entry->value);
 val &= ~mask;
 val |= value;
 writel(val, entry->value);
 -spin_unlock(&entry->lock);
 +spin_unlock_irqrestore(&entry->lock, flags);

 if (val != orig)
  qcom_smp2p_kick(entry->smp2p);
--- linux-4.15.0.orig/drivers/soc/qcom/smsm.c
+++ linux-4.15.0/drivers/soc/qcom/smsm.c
@@ -117,7 +117,7 @@

DECLARE_BITMAP(irq_enabled, 32);
DECLARE_BITMAP(irq_rising, 32);
DECLARE_BITMAP(irq_falling, 32);

u32 last_value;
+unsigned long last_value;

u32 *remote_state;
unsigned long *subscription;
@@ -212,8 +212,7 @@

u32 val;

val = readl(entry->remote_state);
-changed = val ^ entry->last_value;
-entry->last_value = val;
+changed = val ^ xchg(&entry->last_value, val);

for_each_set_bit(i, entry->irq_enabled, 32) {
  if ((changed & BIT(i)))
@@ -274,6 +273,12 @@

  set_bit(irq, entry->irq_enabled);
+
  set_bit(irq, entry->irq_enabled);

  /* Make sure our last cached state is up-to-date */
  +if (readl(entry->remote_state) & BIT(irq))
  +set_bit(irq, &entry->last_value);
  +else
  +clear_bit(irq, &entry->last_value);
  +
  if (entry->subscription) {
@@ -496,8 +501,10 @@

    if (!smsm->hosts)
      return -ENOMEM;
-    local_node = of_find_node_with_property(of_node_get(pdev->dev.of_node),
-      "#qcom,smem-state-cells");
+    for_each_child_of_node(pdev->dev.of_node, local_node) {
+      if (of_find_property(local_node, "#qcom,smem-state-cells", NULL))
+        break;
+    }
    if (!local_node) {
      dev_err(&pdev->dev, "no state entry\n");
      return -EINVAL;
--- linux-4.15.0.orig/drivers/soc/qcom/wcnss_ctrl.c
+++ linux-4.15.0/drivers/soc/qcom/wcnss_ctrl.c
@@ -249,7 +249,7 @@

/* Increment for next fragment */
req->seq++;

-data += req->hdr.len;
+data += NV_FRAGMENT_SIZE;
left -= NV_FRAGMENT_SIZE;
} while (left > 0);

@@ -281,7 +281,7 @@
struct rpmsg_channel_info chinfo;
struct wcns_ctrl *wcns = wcns;
-strncpy(chinfo.name, name, sizeof(chinfo.name));
+strncpy(chinfo.name, name, sizeof(chinfo.name));
chinfo.src = RPMSG_ADDR_ANY;
chinfo.dst = RPMSG_ADDR_ANY;
--- linux-4.15.0.orig/drivers/soc/renesas/r8a77970-sysc.c
+++ linux-4.15.0/drivers/soc/renesas/r8a77970-sysc.c
@@ -25,12 +25,12 @@

{ "cr7",0x240, 0, R8A77970_PD_CR7,R8A77970_PD_ALWAYS_ON },
{ "a3ir",0x180, 0, R8A77970_PD_A3IR,R8A77970_PD_ALWAYS_ON },
- { "a2ir0",0x400, 0, R8A77970_PD_A2IR0,R8A77970_PD_ALWAYS_ON },
- { "a2ir1",0x400, 1, R8A77970_PD_A2IR1,R8A77970_PD_A2IR0 },
- { "a2ir2",0x400, 2, R8A77970_PD_A2IR2,R8A77970_PD_A2IR0 },
- { "a2ir3",0x400, 3, R8A77970_PD_A2IR3,R8A77970_PD_A2IR0 },
- { "a2sc0",0x400, 4, R8A77970_PD_A2SC0,R8A77970_PD_ALWAYS_ON },
- { "a2sc1",0x400, 5, R8A77970_PD_A2SC1,R8A77970_PD_A2SC0 },
+ { "a2ir0",0x400, 0, R8A77970_PD_A2IR0,R8A77970_PD_A3IR },
+ { "a2ir1",0x400, 1, R8A77970_PD_A2IR1,R8A77970_PD_A3IR },
+ { "a2dp",0x400, 2, R8A77970_PD_A2DP,R8A77970_PD_A3IR },
+ { "a2cn",0x400, 3, R8A77970_PD_A2CN,R8A77970_PD_A3IR },
+ { "a2sc0",0x400, 4, R8A77970_PD_A2SC0,R8A77970_PD_A3IR },
+ { "a2sc1",0x400, 5, R8A77970_PD_A2SC1,R8A77970_PD_A3IR },
};

const struct rcar_sysc_info r8a77970_sysc_info __initconst = {
--- linux-4.15.0.orig/drivers/soc/renesas/renesas-soc.c
+++ linux-4.15.0/drivers/soc/renesas/renesas-soc.c
@@ -250,6 +250,12 @@

if (chipid) {
    product = readl(chipid);
iounmap(chipid);
+/* R-Car M3-W ES1.1 incorrectly identifies as ES2.0 */
+if ((product & 0x7fff) == 0x5210)
+product ^= 0x11;
+/* R-Car M3-W ES1.3 incorrectly identifies as ES2.1 */
+if ((product & 0x7fff) == 0x5211)
+product ^= 0x12;
if (soc->id && ((product >> 8) & 0xff) != soc->id) {
    pr_warn("SoC mismatch (product = 0x%x)/n", product);
    return -EINVAL;
}

--- linux-4.15.0.orig/drivers/soc/rockchip/Kconfig
+++ linux-4.15.0/drivers/soc/rockchip/Kconfig
@@ -5,8 +5,8 @@
#
config ROCKCHIP_GRF
-bool
-default y
+bool "Rockchip General Register Files support" if COMPILE_TEST
+default y if ARCH_ROCKCHIP
help
    The General Register Files are a central component providing
    special additional settings registers for a lot of soc-components.
--- linux-4.15.0.orig/drivers/soc/rockchip/grf.c
+++ linux-4.15.0/drivers/soc/rockchip/grf.c
@@ -44,9 +44,11 @@
    
#define RK3288_GRF_SOC_CON0		0x244
+#define RK3288_GRF_SOC_CON2		0x24c
static const struct rockchip_grf_value rk3288_defaults[] __initconst = {
    { "jtag switching", RK3288_GRF_SOC_CON0, HIWORD_UPDATE(0, 1, 12) },
+    { "pwm select", RK3288_GRF_SOC_CON2, HIWORD_UPDATE(1, 1, 0) },
};

#define RK3288_GRF_SOC_CON0x244
+#define RK3288_GRF_SOC_CON20x24c

static const struct rockchip_grf_info rk3288_grf __initconst = {
    --- linux-4.15.0.orig/drivers/soc/rockchip/pm_domains.c
+++ linux-4.15.0/drivers/soc/rockchip/pm_domains.c
@@ -255,7 +255,7 @@
    return;
    else if (pd->info->pwr_w_mask)
        regmap_write(pmu->regmap, pmu->info->pwr_offset,
-            on ? pd->info->pwr_mask :
+            on ? pd->info->pwr_w_mask :
                (pd->info->pwr_mask | pd->info->pwr_w_mask));
    else
        regmap_update_bits(pmu->regmap, pmu->info->pwr_offset,
            --- linux-4.15.0.orig/drivers/soc/sunxi/Kconfig
+++ linux-4.15.0/drivers/soc/sunxi/Kconfig
@@ -4,6 +4,7 @@
c
        config SUNXI_SRAM
        bool
        default ARCH_SUNXI

Say y here to enable the SRAM controller support. This device is responsible on mapping the SRAM in the sunXi SoCs
--- linux-4.15.0.orig/drivers/soc/tegra/common.c
+++ linux-4.15.0/drivers/soc/tegra/common.c
@@ -22,11 +22,15 @@

bool soc_is_tegra(void)
{
+const struct_device_id *match;
struct_device_node *root;

    root = of_find_node_by_path("/");
    if (!root)
        return false;

-    return of_match_node(tegra_machine_match, root) != NULL;
+    match = of_match_node(tegra_machine_match, root);
+    of_node_put(root);
+    return match != NULL;
}
--- linux-4.15.0.orig/drivers/soc/tegra/fuse/fuse-tegra.c
+++ linux-4.15.0/drivers/soc/tegra/fuse/fuse-tegra.c
@@ -133,13 +133,17 @@

    res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    fuse->base = devm_ioremap_resource(&pdev->dev, res);
    if (IS_ERR(fuse->base)) {
        err = PTR_ERR(fuse->base);
        fuse->base = base;
        +return err;
    }

    fuse->clk = devm_clk_get(&pdev->dev, "fuse");
    if (IS_ERR(fuse->clk)) {
        dev_err(&pdev->dev, "failed to get FUSE clock: %ld", PTR_ERR(fuse->clk));
        fuse->base = base;
        return PTR_ERR(fuse->clk);
    }

    @@ -148,8 +152,10 @@

    if (fuse->soc->probe) {


err = fuse->soc->probe(fuse);
-if (err < 0)
+if (err < 0) {
+fuse->base = base;
+return err;
+}
}

if (tegra_fuse_create_sysfs(&pdev->dev, fuse->soc->info->size,
--- linux-4.15.0.orig/drivers/soc/tegra/fuse/speedo-tegra210.c
+++ linux-4.15.0/drivers/soc/tegra/fuse/speedo-tegra210.c
@@ -105,7 +105,7 @@
unsigned int i;

for (i = 0; i < num; i++)
-if (value < speedos[num])
+if (value < speedos[i])
    return i;

    return -EINVAL;
--- linux-4.15.0.orig/drivers/soc/tegra/fuse/tegra-apbmisc.c
+++ linux-4.15.0/drivers/soc/tegra/fuse/tegra-apbmisc.c
@@ -134,7 +134,7 @@
apbmisc.flags = IORESOURCE_MEM;

    /* strapping options */
    -if (tegra_get_chip_id() == TEGRA124) {
      +if (of_machine_is_compatible("nvidia,tegra124")) {
        straps.start = 0x7000e864;
        straps.end = 0x7000e867;
      } else {
--- linux-4.15.0.orig/drivers/soc/tegra/pmc.c
+++ linux-4.15.0/drivers/soc/tegra/pmc.c
@@ -521,16 +521,10 @@
 /* int tegra_powergate_is_powered(unsigned int id)
 {  
     -int status;
       -
     if (!tegra_powergate_is_valid(id))
         return -EINVAL;

         -mutex_lock(&pmc->powergates_lock);
         -status = tegra_powergate_state(id);
         -mutex_unlock(&pmc->powergates_lock);
-        
-        +return tegra_powergate_state(id);
int tegra_powergate_sequence_power_up(unsigned int id, struct clk *clk, struct reset_control *rst)
{
    struct tegra_powergate pg;
    struct tegra_powergate *pg;
    int err;

    if (!tegra_powergate_is_available(id))
        return -EINVAL;

    -pg.id = id;
    -pg.clks = &clk;
    -pg.num_clks = 1;
    -pg.resets = &rst;
    -pg.num_resets = 1;

    +pg = kzalloc(sizeof(*pg), GFP_KERNEL);
    if (!pg)
        return -ENOMEM;

    +pg->id = id;
    +pg->clks = &clk;
    +pg->num_clks = 1;
    +pg->resets = &rst;
    +pg->num_resets = 1;

    -err = tegra_powergate_power_up(&pg, false);
    +err = tegra_powergate_power_up(pg, false);

    if (err)
        pr_err("failed to turn on partition %d: %d\n", id, err);

    +kfree(pg);
    +
    return err;
}

EXPORT_SYMBOL(tegra_powergate_sequence_power_up);

if (!pmc->soc->has_tsense_reset)
    return;

    -np = of_find_node_by_name(pmc->dev->of_node, "i2c-thermtrip");
    +np = of_get_child_by_name(pmc->dev->of_node, "i2c-thermtrip");
    if (!np) {
        dev_warn(dev, "i2c-thermtrip node not found, %s\n", disabled);
        return;
    }
pm_runtime_enable(kdev->dev);
ret = pm_runtime_get_sync(kdev->dev);
if (ret < 0) {
    pm_runtime_put_noidle(kdev->dev);
    dev_err(kdev->dev, "unable to enable pktdma, err %d\n", ret);
    -return ret;
    +goto err_pm_disable;
}
/* Initialise all packet dmas */
if (list_empty(&kdev->list)) {
    dev_err(dev, "no valid dma instance\n");
    -return -ENODEV;
    +ret = -ENODEV;
    +goto err_put_sync;
}

devfs_create_file("knav_dma", S_IFREG | S_IRUGO, NULL, NULL,
    &knav_dma_debug_ops);

return ret;
+
+err_put_sync:
+pm_runtime_put_sync(kdev->dev);
+err_pm_disable:
+pm_runtime_disable(kdev->dev);
+
+return ret;
}

knav_dma_remove(struct platform_device *pdev)
struct knav_range_info {
--- linux-4.15.0.orig/drivers/soc/ti/knav_qmss_acc.c
+++ linux-4.15.0/drivers/soc/ti/knav_qmss_acc.c
@@ -205,18 +205,18 @@
{
    struct knav_device *kdev = range->kdev;
    struct knav_acc_channel *acc;
    -unsigned long cpu_map;
    +struct cpumask *cpu_mask;
    int ret = 0, irq;
    u32 old, new;

    if (range->flags & RANGE_MULTI_QUEUE) {
        acc = range->acc;
        irq = range->irqs[0].irq;
        -cpu_map = range->irqs[0].cpu_map;
        +cpu_mask = range->irqs[0].cpu_mask;
    } else {
        acc = range->acc + queue;
        irq = range->irqs[queue].irq;
        -cpu_map = range->irqs[queue].cpu_map;
        +cpu_mask = range->irqs[queue].cpu_mask;
    }

    old = acc->open_mask;
@@ -239,8 +239,8 @@
    acc->name, acc->name);
    ret = request_irq(irq, knav_acc_int_handler, 0, acc->name,
                      range);
    -if (!ret && cpu_map) {
    -ret = irq_set_affinity_hint(irq, to_cpumask(&cpu_map));
    +if (!ret && cpu_mask) {
    +ret = irq_set_affinity_hint(irq, cpu_mask);
    if (ret) {
        dev_warn(range->kdev->dev,
         "Failed to set IRQ affinity\n");
--- linux-4.15.0.orig/drivers/soc/ti/knav_qmss_queue.c
+++ linux-4.15.0/drivers/soc/ti/knav_qmss_queue.c
@@ -102,19 +102,17 @@
    } else {
        struct knav_queue_inst *inst)
{
    unsigned queue = inst->id - range->queue_base;
    -unsigned long cpu_map;
    int ret = 0, irq;

    if (range->flags & RANGE_HAS_IRQ) {
        irq = range->irqs[queue].irq;
        -cpu_map = range->irqs[queue].cpu_map;
        +cpu_mask = range->irqs[queue].cpu_mask;

ret = request_irq(irq, knav_queue_int_handler, 0, 
inst->irq_name, inst);
if (ret)
return ret;
disable_irq(irq);
-if (cpu_map) {
- ret = irq_set_affinity_hint(irq, to_cpumask(&cpu_map));
+ if (range->irqs[queue].cpu_mask) {
+ ret = irq_set_affinity_hint(irq, range->irqs[queue].cpu_mask);
if (ret) {
    dev_warn(range->kdev->dev, 
    "Failed to set IRQ affinity\n");
    @@ -1222,9 +1220,19 @@
}

range->num_irqs++;

-if (IS_ENABLED(CONFIG_SMP) && oirq.args_count == 3)
-range->irqs[i].cpu_map =
- (oirq.args[2] & 0x0000ff00) >> 8;
+if (IS_ENABLED(CONFIG_SMP) && oirq.args_count == 3) {
+unsigned long mask;
+int bit;
+range->irqs[i].cpu_mask = devm_kzalloc(dev,
+cpu_mask_size(), GFP_KERNEL);
+if (!range->irqs[i].cpu_mask)
+    return -ENOMEM;
+    mask = (oirq.args[2] & 0x0000ff00) >> 8;
+    for_each_set_bit(bit, &mask, BITS_PER_LONG)
+        cpumask_set_cpu(bit, range->irqs[i].cpu_mask);
+}

range->num_irqs = min(range->num_irqs, range->num_queues);
@@ -1711,6 +1719,7 @@
pm_runtime_enable(&pdev->dev);
ret = pm_runtime_get_sync(&pdev->dev);
if (ret < 0) {
    pm_runtime_put_noidle(&pdev->dev);
    dev_err(dev, "Failed to enable QMSS\n");
    return ret;
}
@@ -1778,9 +1787,10 @@
if (ret)
go to err;
-regions = of_get_child_by_name(node, "descriptor-regions");
+regions = of_get_child_by_name(node, "descriptor-regions");
if (!regions) {
    dev_err(dev, "descriptor-regions not specified\n");
    ret = -ENODEV;
    goto err;
}
ret = knav_queue_setup_regions(kdev, regions);
--- linux-4.15.0.orig/drivers/soc/ti/wkup_m3_ipc.c
+++ linux-4.15.0/drivers/soc/ti/wkup_m3_ipc.c
@@ -375,6 +375,8 @@
ret = rproc_boot(m3_ipc->rproc);
if (ret)
    dev_err(dev, "rproc_boot failed\n");
+else
    m3_ipc_state = m3_ipc;

do_exit(0);
}
@@ -461,8 +463,6 @@
err_put_rproc:
--- linux-4.15.0.orig/drivers/spi/Kconfig
+++ linux-4.15.0/drivers/spi/Kconfig
@@ -830,4 +830,7 @@
endif # SPI_SLAVE
+config SPI_DYNAMIC
+def_bool ACPI || OF_DYNAMIC || SPI_SLAVE
+
endif # SPI
--- linux-4.15.0.orig/drivers/spi/spi-armada-3700.c
+++ linux-4.15.0/drivers/spi/spi-armada-3700.c
@@ -615,6 +615,11 @@
if (xfer->rx_buf) {
    /* Clear WFIFO, since it's last 2 bytes are shifted out during
     * a read operation
     */
    +spireg_write(a3700_spi, A3700_SPI_DATA_OUT_REG, 0);
+}
/* Set read data length */
spireg_write(a3700_spi, A3700_SPI_IF_DIN_CNT_REG,
    a3700_spi->buf_len);
--- linux-4.15.0.orig/drivers/spi/spi-atmel.c
+++ linux-4.15.0/drivers/spi/spi-atmel.c
@@ -301,7 +301,6 @@
    keep_cs;
    fifo_size;
}
@@ -1150,10 +1149,8 @@
    as = spi_master_get_devdata(spi->master);

/* see notes above re chipselect */
-if (!atmel_spi_is_v2(as)
-&& spi->chip_select == 0
-&& (spi->mode & SPI_CS_HIGH)) {
-dev_dbg(&spi->dev, "setup: can't be active-high\n");
+if (!as->use_cs_gpios && (spi->mode & SPI_CS_HIGH)) {
+dev_warn(&spi->dev, "setup: non GPIO CS can't be active-high\n");
    return -EINVAL;
}
@@ -1340,11 +1337,9 @@
    as->keep_cs = true;
 } else {
    -as->cs_active = !as->cs_active;
-    -if (as->cs_active)
-    -cs_activate(as, msg->spi);
-    else
-    -cs_deactivate(as, msg->spi);
+    cs_deactivate(as, msg->spi);
+    +udelay(10);
+    +cs_activate(as, msg->spi);
    }
}
@@ -1367,7 +1362,6 @@
atmel_spi_lock(as);
cs_activate(as, spi);
-as->cs_active = true;
-as->keep_cs = false;
msg->status = 0;
@@ -1489,6 +1483,11 @@
    
    spi_writel(as, CR, SPI_BIT(SWRST));
    spi_writel(as, CR, SPI_BIT(SWRST)); /* AT91SAM9263 Rev B workaround */
+    */ It is recommended to enable FIFOs first thing after reset */
+    if (as->fifo_size)
+        spi_writel(as, CR, SPI_BIT(FIFOEN));
+    
    if (as->caps.has_wdrbt) {
        spi_writel(as, MR, SPI_BIT(WDRBT) | SPI_BIT(MODFDIS)
            | SPI_BIT(MSTR));
        @@ -1499,9 +1498,6 @@
            if (as->use_pdc)
                spi_writel(as, PTCR, SPI_BIT(RXTDIS) | SPI_BIT(TXTDIS));
        spi_writel(as, CR, SPI_BIT(SPIEN));
-    -if (as->fifo_size)
-    -spi_writel(as, CR, SPI_BIT(FIFOEN));
    }

    static int atmel_spi_probe(struct platform_device *pdev)
    @@ -1586,7 +1582,7 @@
        if (ret == 0) {
            as->use_dma = true;
        } else if (ret == -EPROBE_DEFER) {
            return ret;
        } else if (as->caps.has_pdc_support) {
            as->use_pdc = true;
            --- linux-4.15.0.orig/drivers/spi/spi-bcm-qspi.c
+++ linux-4.15.0/drivers/spi/spi-bcm-qspi.c
        @@ -88,7 +88,7 @@
#define BSPI_BPP_MODE_SELECT_MASK		BIT(8)
#define BSPI_BPP_ADDR_SELECT_MASK		BIT(16)
/* MSPI register offsets */
#define MSPI_SPCR0_LSB				0x000
#define BSPI_READ_LENGTH512
#define BSPI_READ_LENGTH256

static void bcm_qspi_enable_bspi(struct bcm_qspi *qspi)
{  
    -if (!has_bspi(qspi) || (qspi->bspi_enabled))
+if (!has_bspi(qspi))
    return;

qspi->bspi_enabled = 1;
@@ -505,7 +505,7 @@
static void bcm_qspi_disable_bspi(struct bcm_qspi *qspi)
{
    -if (!has_bspi(qspi) || (!qspi->bspi_enabled))
+    if (!has_bspi(qspi))
        return;

    qspi->bspi_enabled = 0;
@@ -519,16 +519,19 @@
static void bcm_qspi_chip_select(struct bcm_qspi *qspi, int cs)
{
    -u32 data = 0;
    +u32 rd = 0;
    +u32 wr = 0;

    -if (qspi->curr_cs == cs)
        return;
    if (qspi->base[CHIP_SELECT]) {
    -data = bcm_qspi_read(qspi, CHIP_SELECT, 0);
    -data = (data & ~0xff) | (1 << cs);
    -bcm_qspi_write(qspi, CHIP_SELECT, 0, data);
    +rd = bcm_qspi_read(qspi, CHIP_SELECT, 0);
    +wr = (rd & ~0xff) | (1 << cs);
    +if (rd == wr)
        return;
    +bcm_qspi_write(qspi, CHIP_SELECT, 0, wr);
    usleep_range(10, 20);
    }
    +dev_dbg(&qspi->pdev->dev, "using cs:%d\n", cs);
    qspi->curr_cs = cs;
}

@@ -680,7 +683,7 @@
if (buf)
    buf[tp.byte] = read_rxram_slot_u8(qspi, slot);
    dev_dbg(&qspi->pdev->dev, "RD %02x\n",
    -buf ? buf[tp.byte] : 0xff);
    +buf ? buf[tp.byte] : 0x0);
} else {
    u16 *buf = tp.trans->rx_buf;

buf[tp.byte / 2] = read_rxram_slot_u16(qspi, slot);
dev_dbg(&qspi->pdev->dev, "RD %04x\n", -buf ? buf[tp.byte] : 0xffff);
+buf ? buf[tp.byte / 2] : 0x0);
}

update_qspi_trans_byte_count(qspi, &tp,
while (!tstatus && slot < MSPI_NUM_CDRAM) {
if (tp.trans->bits_per_word <= 8) {
    const u8 *buf = tp.trans->tx_buf;
    u8 val = buf ? buf[tp.byte] : 0xff;
    write_txram_slot_u8(qspi, slot, val);
    dev_dbg(&qspi->pdev->dev, "WR %02x\n", val);
} else {
    const u16 *buf = tp.trans->tx_buf;
    u16 val = buf ? buf[tp.byte / 2] : 0xffff;
    write_txram_slot_u16(qspi, slot, val);
    dev_dbg(&qspi->pdev->dev, "WR %04x\n", val);
}
}

mspi_cDRAM = MSPI_CDRAM_CONT_BIT;
-mspi_cDRAM |= (~(1 << spi->chip_select) &
    MSPI_CDRAM_PCS);
+if (has_bspi(qspi))
+mspi_cDRAM &= ~1;
+else
+mspi_cDRAM |= (~(1 << spi->chip_select) &
    MSPI_CDRAM_PCS);
+
mspi_cDRAM |= ((tp.trans->bits_per_word <= 8) ? 0 :
    MSPI_CDRAM_BITSE_BIT);

if (!of_match_node(bcm_qspi_of_match, dev->of_node))
    return -ENODEV;

master = spi_alloc_master(dev, sizeof(struct bcm_qspi));
+master = devm_spi_alloc_master(dev, sizeof(struct bcm_qspi));
if (!master) {
    dev_err(dev, "error allocating spi_master\n");
    return -ENOMEM;
if (res) {
    qspi->base[MSPI] = devm_ioremap_resource(dev, res);
    if (IS_ERR(qspi->base[MSPI])) {
        ret = PTR_ERR(qspi->base[MSPI]);
        goto qspi_probe_err;
    }
    if (IS_ERR(qspi->base[MSPI]))
        return PTR_ERR(qspi->base[MSPI]);
    if (IS_ERR(qspi->base[BSPI]))
        return PTR_ERR(qspi->base[BSPI]);
    qspi->bspi_mode = true;
} else {
    qspi->bspi_mode = false;
    res = platform_get_resource_byname(pdev, IORESOURCE_MEM, "bspi");
    if (res) {
        qspi->base[BSPI] = devm_ioremap_resource(dev, res);
        if (IS_ERR(qspi->base[BSPI])) {
            ret = PTR_ERR(qspi->base[BSPI]);
            goto qspi_resource_err;
        }
        if (IS_ERR(qspi->base[BSPI]))
            return PTR_ERR(qspi->base[BSPI]);
        qspi->bspi_mode = true;
    } else {
        qspi->bspi_mode = false;
    }
    res = platform_get_resource_byname(pdev, IORESOURCE_MEM, "cs_reg");
    if (res) {
        qspi->base[CHIP_SELECT] = devm_ioremap_resource(dev, res);
        if (IS_ERR(qspi->base[CHIP_SELECT])) {
            ret = PTR_ERR(qspi->base[CHIP_SELECT]);
            goto qspi_resource_err;
        }
        if (IS_ERR(qspi->base[CHIP_SELECT]))
            return PTR_ERR(qspi->base[CHIP_SELECT]);
    }
    qspi->dev_ids = kcalloc(num_irqs, sizeof(struct bcm_qspi_dev_id), GFP_KERNEL);
    if (!qspi->dev_ids)
        return -ENOMEM;
}
for (val = 0; val < num_irqs; val++) {
   irq = -1;
    @ @ -1357,7 +1357,7 @ @
    qspi->xfer_mode.addrlen = -1;
    qspi->xfer_mode.hp = -1;

    -ret = devm_spi_register_master(&pdev->dev, master);
    +ret = spi_register_master(master);
    if (ret < 0) {
        dev_err(dev, "can't register master\n");
goto qspi_reg_err;
        @ @ -1370,8 +1370,6 @ @
    clk_disable_unprepare(qspi->clk);
    qspi_probe_err:
    kfree(qspi->dev_ids);
    -qspi_resource_err:
    -spi_master_put(master);
    return ret;
}
/* probe function to be called by SoC specific platform driver */
@ @ -1381,10 +1379,10 @ @
{
struct bcm_qspi *qspi = platform_get_drvdata(pdev);

    +spi_unregister_master(qspi->master);
    bcm_qspi_hw_uninit(qspi);
    clk_disable_unprepare(qspi->clk);
    kfree(qspi->dev_ids);
    -spi_unregister_master(qspi->master);

    return 0;
}
--- linux-4.15.0.orig/drivers/spi/spi-bcm2835.c
+++ linux-4.15.0/drivers/spi/spi-bcm2835.c
@@ -88,7 +88,7 @
    u8 *rx_buf;
    int tx_len;
    int rx_len;
    -bool dma_pending;
    +unsigned int dma_pending;
};

static inline u32 bcm2835_rd(struct bcm2835_spi *bs, unsigned reg)
@@ -155,8 +155,7 @
/* Write as many bytes as possible to FIFO */
    bcm2835_wr_fifo(bs);

    /* based on flags decide if we can finish the transfer */
if (bcm2835_rd(bs, BCM2835_SPI_CS) & BCM2835_SPI_CS_DONE) {
    if (!bs->rx_len) {
        /* Transfer complete - reset SPI HW */
        bcm2835_spi_reset_hw(master);
        /* wake up the framework */
        @ @ -233,10 +232,9 @ @
        /* is called the tx-dma must have finished - can't get to this */
        * situation otherwise... */
        -dmaengine_terminate_all(master->dma_tx);
        -
        -/* mark as no longer pending */
        -bs->dma_pending = 0;
        +#if (cmpxchg(&bs->dma_pending, true, false)) {
        +dmaengine_terminate_all(master->dma_tx);
        +}
        /* and mark as completed */;
        complete(&master->xfer_completion);
        @ @ -342,6 +340,7 @ @
        if (ret) {
            /* need to reset on errors */
            dmaengine_terminate_all(master->dma_tx);
            +bs->dma_pending = false;
            bcm2835_spi_reset_hw(master);
            return ret;
        }
        @ @ -555,7 +554,8 @ @
        bcm2835_wr(bs, BCM2835_SPI_CLK, cdiv);
        /* handle all the 3-wire mode */
        -if ((spi->mode & SPI_3WIRE) && (tfr->rx_buf))
        +#if (spi->mode & SPI_3WIRE && tfr->rx_buf &&
        +tfr->rx_buf != master->dummy_rx)
        cs |= BCM2835_SPI_CS_REN;
        else
        cs &= ~BCM2835_SPI_CS_REN;
        @ @ -617,10 +617,9 @ @
        struct bcm2835_spi *bs = spi_master_get_devdata(master);
        /* if an error occurred and we have an active dma, then terminate */
        -if (bs->dma_pending) {
        +#if (cmpxchg(&bs->dma_pending, true, false)) {
        dmaengine_terminate_all(master->dma_tx);
        dmaengine_terminate_all(master->dma_rx);
        -bs->dma_pending = 0;
        }
        /* and reset */
bcm2835_spi_reset_hw(master);
@@ -738,7 +737,7 @@
 struct resource *res;
 int err;

 -master = spi_alloc_master(&pdev->dev, sizeof(*bs));
 +master = devm_spi_alloc_master(&pdev->dev, sizeof(*bs));
 if (!master) {
   dev_err(&pdev->dev, "spi_alloc_master() failed\n");
   return -ENOMEM;
@@ -760,23 +759,20 @@
 res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
 bs->regs = devm_ioremap_resource(&pdev->dev, res);
 -if (IS_ERR(bs->regs)) {
-  -err = PTR_ERR(bs->regs);
-  -goto out_master_put;
-}
-+if (IS_ERR(bs->regs))
+  return PTR_ERR(bs->regs);
+}
+ return PTR_ERR(bs->regs);

 bs->clk = devm_clk_get(&pdev->dev, NULL);
 if (IS_ERR(bs->clk)) {
   err = PTR_ERR(bs->clk);
   dev_err(&pdev->dev, "could not get clk: %d\n", err);
   -goto out_master_put;
+  return err;
 }

 bs->irq = platform_get_irq(pdev, 0);
 if (bs->irq <= 0) {
   dev_err(&pdev->dev, "could not get IRQ: %d\n", bs->irq);
   -err = bs->irq ? bs->irq : -ENODEV;
   -goto out_master_put;
+  return bs->irq ? bs->irq : -ENODEV;
 }

 clk_prepare_enable(bs->clk);
@@ -791,21 +787,20 @@
   dev_name(&pdev->dev), master);
 if (err) {
   dev_err(&pdev->dev, "could not request IRQ: %d\n", err);
   -goto out_clk_disable;
+  goto out_dma_release;
 }

 -err = devm_spi_register_master(&pdev->dev, master);
 +err = spi_register_master(master);
if (err) {
    dev_err(&pdev->dev, "could not register SPI master: %d\n", err);
    goto out_clk_disable;
    +goto out_dma_release;
}

return 0;

-out_clk_disable:
+out_dma_release:
+bcm2835_dma_release(master);
clk_disable_unprepare(bs->clk);
-out_master_put:
-spi_master_put(master);
return err;
}

@@ -814,6 +809,8 @@
     struct spi_master *master = platform_get_drvdata(pdev);
     struct bcm2835_spi *bs = spi_master_get_devdata(master);

     +spi_unregister_master(master);
     +
     /* Clear FIFOs, and disable the HW block */
     bcm2835_wr(bs, BCM2835_SPI_CS,
     BCM2835_SPI_CS_CLEAR_RX | BCM2835_SPI_CS_CLEAR_TX);
--- linux-4.15.0.orig/drivers/spi/spi-bcm2835aux.c
+++ linux-4.15.0/drivers/spi/spi-bcm2835aux.c
@@ -178,19 +178,14 @@
     BCM2835_AUX_SPI_CNTL0_CLEARFIFO);
 }

-static irqreturn_t bcm2835aux_spi_interrupt(int irq, void *dev_id)
+static void bcm2835aux_spi_transfer_helper(struct bcm2835aux_spi *bs)
{
    -struct spi_master *master = dev_id;
    -struct bcm2835aux_spi *bs = spi_master_get_devdata(master);
    -irqreturn_t ret = IRQ_NONE;
    +u32 stat = bcm2835aux_rd(bs, BCM2835_AUX_SPI_STAT);
    /* check if we have data to read */
    -while (bs->rx_len &&
    -    (!(bcm2835aux_rd(bs, BCM2835_AUX_SPI_STAT) &
    -     BCM2835_AUX_SPI_STAT_RX_EMPTY))) [
    +for (; bs->rx_len && (stat & BCM2835_AUX_SPI_STAT_RX_LVL);
    +     stat = bcm2835aux_rd(bs, BCM2835_AUX_SPI_STAT))
     bcm2835aux_rd_fifo(bs);
     -ret = IRQ_HANDLED;
/* check if we have data to write */
while (bs->tx_len &&
      (!(bcm2835aux_rd(bs, BCM2835_AUX_SPI_STAT) &
        BCM2835_AUX_SPI_STAT_TX_FULL))) {
    bcm2835aux_wr_fifo(bs);
    ret = IRQ_HANDLED;
}
+
-/* and check if we have reached "done" */
-while (bs->rx_len &&
-       (!(bcm2835aux_rd(bs, BCM2835_AUX_SPI_STAT) &
-        BCM2835_AUX_SPI_STAT_BUSY))) {
-    bcm2835aux_rd_fifo(bs);
-    ret = IRQ_HANDLED;
-}
+static irqreturn_t bcm2835aux_spi_interrupt(int irq, void *dev_id)
+
+{  
+    struct spi_master *master = dev_id;
+    struct bcm2835aux_spi *bs = spi_master_get_devdata(master);
+    
+    /* IRQ may be shared, so return if our interrupts are disabled */
+    if (!(bcm2835aux_rd(bs, BCM2835_AUX_SPI_CNTL1) &
+        (BCM2835_AUX_SPI_CNTL1_TXEMPTY | BCM2835_AUX_SPI_CNTL1_IDLE)))
+        return IRQ_NONE;
+    
+    /* do common fifo handling */
+    bcm2835aux_spi_transfer_helper(bs);
+
+    if (!bs->tx_len) {
+        /* disable tx fifo empty interrupt */
+        complete(&master->xfer_completion);
+    }
+    
+    /* and return */
+    return ret;
+}
+
+return IRQ_HANDLED;
}

static int __bcm2835aux_spi_transfer_one_irq(struct spi_master *master,


}
-u32 stat;

/* configure spi */
bcm2835aux_wr(bs, BCM2835_AUX_SPI_CNTL1, bs->cntl[1]);
@@ -279,24 +277,9 @@
/* loop until finished the transfer */
while (bs->rx_len) {
  /* read status */
  -stat = bcm2835aux_rd(bs, BCM2835_AUX_SPI_STAT);

  /* fill in tx fifo with remaining data */
  -if ((bs->tx_len) && (!(stat & BCM2835_AUX_SPI_STAT_TX_FULL))) {
    bcm2835aux_wr_fifo(bs);
    continue;
  } -

  -/* read data from fifo for both cases */
  -if (!(stat & BCM2835_AUX_SPI_STAT_RX_EMPTY)) {
    bcm2835aux_rd_fifo(bs);
    continue;
  }

  -/* do common fifo handling */
  bcm2835aux_spi_transfer_helper(bs);

/* there is still data pending to read check the timeout */
if (bs->rx_len && time_after(jiffies, timeout)) {
@@ -424,7 +407,18 @@
unsigned long clk_hz;
int err;

-master = spi_alloc_master(&pdev->dev, sizeof(*bs));
+master = devm_spi_alloc_master(&pdev->dev, sizeof(*bs));
if (!master) {
  dev_err(&pdev->dev, "spi_alloc_master() failed\n");
  return -ENOMEM;
@@ -433,7 +416,18 @@
platform_set_drvdata(pdev, master);
-master->mode_bits = (SPI_CPOL | SPI_CS_HIGH | SPI_NO_CS);
+master->bits_per_word_mask = SPI_BPW_MASK(8);
-master->num_chipselect = -1;
+/* even though the driver never officially supported native CS
+ * allow a single native CS for legacy DT support purposes when
+ * no cs-gpio is configured.
+ * Known limitations for native cs are:
+ *  multiple chip-selects: cs0-cs2 are all simultaneously asserted
+ *  whenever there is a transfer - this even includes SPI_NO_CS
+ *  SPI_CS_HIGH: is ignores - cs are always asserted low
+ *  cs_change: cs is deasserted after each spi_transfer
+ *  cs_delay_usec: cs is always deasserted one SCK cycle after
+ *  a spi_transfer
+ */
+master->num_chipselect = 1;
master->transfer_one = bcm2835aux_spi_transfer_one;
master->handle_err = bcm2835aux_spi_handle_err;
master->prepare_message = bcm2835aux_spi_prepare_message;
@@ -445,30 +439,27 @@ /* the main area */
res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
bs->regs = devm_ioremap_resource(&pdev->dev, res);
-if (IS_ERR(bs->regs)) {
-err = PTR_ERR(bs->regs);
-goto out_master_put;
-}
+if (IS_ERR(bs->regs))
+return PTR_ERR(bs->regs);

bs->clk = devm_clk_get(&pdev->dev, NULL);
if (!bs->clk || (IS_ERR(bs->clk))) {
 err = PTR_ERR(bs->clk);
 dev_err(&pdev->dev, "could not get clk: %d\n", err);
-goto out_master_put;
+return err;
}
bs->irq = platform_get_irq(pdev, 0);
if (bs->irq <= 0) {
 dev_err(&pdev->dev, "could not get IRQ: %d\n", bs->irq);
-err = bs->irq ? bs->irq : -ENODEV;
-goto out_master_put;
+return bs->irq ? bs->irq : -ENODEV;
}

/* this also enables the HW block */
err = clk_prepare_enable(bs->clk);
if (err) {
 dev_err(&pdev->dev, "could not prepare clock: %d\n", err);
-goto out_master_put;
+return err;
}

/* just checking if the clock returns a sane value */
goto out_clk_disable;
}

-devm_spi_register_master(&pdev->dev, master);
+spi_register_master(master);
if (err) {
  dev_err(&pdev->dev, "could not register SPI master: %d\n", err);
  goto out_clk_disable;
@@ -501,8 +492,6 @@
out_clk_disable:
  clk_disable_unprepare(bs->clk);
  -out_master_put:
  -spi_master_put(master);
  return err;
}

struct spi_master *master = platform_get_drvdata(pdev);
struct bcm2835aux_spi *bs = spi_master_get_devdata(master);
+spi_unregister_master(master);
+
bcm2835aux_spi_reset_hw(bs);
/* disable the HW block by releasing the clock */
--- linux-4.15.0.orig/drivers/spi/spi-bitbang.c
+++ linux-4.15.0/drivers/spi/spi-bitbang.c
@@ -392,7 +392,7 @@
  if (ret)
    spi_master_put(master);
-  return 0;
+  return ret;
}
EXPORT_SYMBOL_GPL(spi_bitbang_start);

--- linux-4.15.0.orig/drivers/spi/spi-cadence.c
+++ linux-4.15.0/drivers/spi/spi-cadence.c
@@ -119,6 +119,7 @@
  void __iomem *regs;
  struct clk *ref_clk;
  structclk *pclk;
+unsigned int clk_rate;
  u32 speed_hz;
  const u8 *txbuf;
  u8 *rxbuff;
@@ -258,7 +259,7 @@
 unsigned long frequency;

 -frequency = clk_get_rate(xspi->ref_clk);
+frequency = xspi->clk_rate;

 ctrl_reg = cdns_spi_read(xspi, CDNS_SPI_CR);

@@ -313,6 +314,14 @@

 +
 }
+/* When xspi in busy condition, bytes may send failed,
+ * then spi control didn't work thoroughly, add one byte delay
+ */
+if (cdns_spi_read(xspi, CDNS_SPI_ISR) &
+ CDNS_SPI_IXR_TXFULL)
+ utdelay(10);
+ if (xspi->txbuf)
+ cdns_spi_write(xspi, CDNS_SPI_TXD, *xspi->txbuf++);
 else
@@ -578,6 +587,7 @@
 pm_runtime_use_autosuspend(&pdev->dev);
 pm_runtime_set_autosuspend_delay(&pdev->dev, SPI_AUTOSUSPEND_TIMEOUT);
+pm_runtime_get_noresume(&pdev->dev);
 pm_runtime_set_active(&pdev->dev);
 pm_runtime_enable(&pdev->dev);

@@ -595,9 +605,6 @@
 /* SPI controller initializations */
 cdns_spi_init_hw(xspi);

@@ -623,12 +630,16 @@
 master->auto_runtime_pm = true;
 master->mode_bits = SPI_CPOL | SPI_CPHA;
+ xspi->clk_rate = clk_get_rate(xspi->ref_clk);
+ /* Set to default valid value */
- master->max_speed_hz = clk_get_rate(xspi->ref_clk) / 4;
+ master->max_speed_hz = xspi->clk_rate / 4;
xspi->speed_hz = master->max_speed_hz;

master->bits_per_word_mask = SPI_BPW_MASK(8);

+ pm_runtime_mark_last_busy(&pdev->dev);
+ pm_runtime_put_autosuspend(&pdev->dev);
+
ret = spi_register_master(master);
if (ret) {
    dev_err(&pdev->dev, "spi_register_master failed
");  
--- linux-4.15.0.orig/drivers/spi/spi-cavium-thunderx.c
+++ linux-4.15.0/drivers/spi/spi-cavium-thunderx.c
@@ -81,6 +81,7 @@
error:
    clk_disable_unprepare(p->clk);
    +pci_release_regions(pdev);
    spi_master_put(master);
    return ret;
}  
@@ -95,6 +96,7 @@
return;

    clk_disable_unprepare(p->clk);
    +pci_release_regions(pdev);
/* Put everything in a known state. */
writeq(0, p->register_base + OCTEON_SPI_CFG(p));
}  
--- linux-4.15.0.orig/drivers/spi/spi-davinci.c
+++ linux-4.15.0/drivers/spi/spi-davinci.c
@@ -217,7 +217,7 @@
    pdata = &dspi->pdata;
/* program delay transfers if tx_delay is non zero */
-if (spicfg->wdelay)
+if (spicfg && spicfg->wdelay)
    spidat1 |= SPIDAT1_WDEL;

/*
@@ -1085,13 +1085,13 @@
    spi_bitbang_stop(&dspi->bitbang);

    clk_disable_unprepare(dspi->clk);
    -spi_master_put(master);

    if (dspi->dma_rx) {

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dma_release_channel(dspi->dma_rx);
dma_release_channel(dspi->dma_tx);
}

+spi_master_put(master);
return 0;
}

--- linux-4.15.0.orig/drivers/spi/spi-dln2.c
+++ linux-4.15.0/drivers/spi/spi-dln2.c
@@ -783,7 +783,7 @@
static int dln2_spi_remove(struct platform_device *pdev)
{
-struct spi_master *master = spi_master_get(platform_get_drvdata(pdev));
+struct spi_master *master = platform_get_drvdata(pdev);
    struct dln2_spi *dln2 = spi_master_get_devdata(master);

    pm_runtime_disable(&pdev->dev);
--- linux-4.15.0.orig/drivers/spi/spi-dw-mid.c
+++ linux-4.15.0/drivers/spi/spi-dw-mid.c
@@ -155,6 +155,7 @@
    if (!xfer->tx_buf)
        return NULL;

+    memset(&txconf, 0, sizeof(txconf));
    txconf.direction = DMA_MEM_TO_DEV;
    txconf.dst_addr = dws->dma_addr;
    txconf.dst_maxburst = 16;
@@ -201,6 +202,7 @@
    if (!xfer->rx_buf)
        return NULL;

+    memset(&rxconf, 0, sizeof(rxconf));
    rxconf.direction = DMA_DEV_TO_MEM;
    rxconf.src_addr = dws->dma_addr;
    rxconf.src_maxburst = 16;
@@ -226,19 +228,23 @@

static int mid_spi_dma_setup(struct dw_spi *dws, struct spi_transfer *xfer)
{
-    u16 dma_ctrl = 0;
+    u16 imr = 0, dma_ctrl = 0;

    dw_writel(dws, DW_SPI_DMARDLR, 0xf);
    dw_writel(dws, DW_SPI_DMATDLR, 0x10);

    if (xfer->tx_buf)
        return NULL;

    if (xfer->rx_buf)
        return NULL;

    static int dln2_spi_remove(struct platform_device *pdev)
    {
        struct spi_master *master = spi_master_get(platform_get_drvdata(pdev));
        struct dln2_spi *dln2 = spi_master_get_devdata(master);

        pm_runtime_disable(&pdev->dev);
    }

    --- linux-4.15.0.orig/drivers/spi/spi-dln2.c
    +++ linux-4.15.0/drivers/spi/spi-dln2.c
    @@ -783,7 +783,7 @@
    static int dln2_spi_remove(struct platform_device *pdev)
    {
        struct spi_master *master = spi_master_get(platform_get_drvdata(pdev));
        struct dln2_spi *dln2 = spi_master_get_devdata(master);

        pm_runtime_disable(&pdev->dev);
    }

    --- linux-4.15.0.orig/drivers/spi/spi-dw-mid.c
    +++ linux-4.15.0/drivers/spi/spi-dw-mid.c
    @@ -155,6 +155,7 @@
    if (!xfer->tx_buf)
        return NULL;

        memset(&txconf, 0, sizeof(txconf));
        txconf.direction = DMA_MEM_TO_DEV;
        txconf.dst_addr = dws->dma_addr;
        txconf.dst_maxburst = 16;
    @@ -201,6 +202,7 @@
    if (!xfer->rx_buf)
        return NULL;

        memset(&rxconf, 0, sizeof(rxconf));
        rxconf.direction = DMA_DEV_TO_MEM;
        rxconf.src_addr = dws->dma_addr;
        rxconf.src_maxburst = 16;
    @@ -226,19 +228,23 @@

    static int mid_spi_dma_setup(struct dw_spi *dws, struct spi_transfer *xfer)
    {
        u16 dma_ctrl = 0;
        u16 imr = 0, dma_ctrl = 0;

        dw_writel(dws, DW_SPI_DMARDLR, 0xf);
        dw_writel(dws, DW_SPI_DMATDLR, 0x10);

        -if (xfer->tx_buf)
+if (xfer->tx_buf) {
    dma_ctrl |= SPI_DMA_TDMAE;
-    if (xfer->rx_buf)
+    imr |= SPI_INT_TXOI;
+    }
+    if (xfer->rx_buf) {
        dma_ctrl |= SPI_DMA_RDMAE;
+        imr |= SPI_INT_RXUI | SPI_INT_RXOI;
+    }
    dw_writel(dws, DW_SPI_DMACR, dma_ctrl);

    /* Set the interrupt mask */
    -spi_umask_intr(dws, SPI_INT_TXOI | SPI_INT_RXUI | SPI_INT_RXOI);
+    spi_umask_intr(dws, imr);

dws->transfer_handler = dma_transfer;

    @ @ -268,7 +274,7 @@
    dma_async_issue_pending(dws->txchan);
    }
    -return 0;
    +return 1;
    }

static void mid_spi_dma_stop(struct dw_spi *dws)
--- linux-4.15.0.orig/drivers/spi/spi-dw.c
+++ linux-4.15.0/drivers/spi/spi-dw.c
@@ -180,9 +180,11 @@
static void dw_writer(struct dw_spi *dws)
{
    -u32 max = tx_max(dws);
+u32 max;
    spin_lock(&dws->buf_lock);
    max = tx_max(dws);
    while (max--) {
/* Set the tx word if the transfer's original "tx" is not null */
    if (dws->tx_end - dws->len) {
        @ @ -194,13 +196,16 @@
        dw_write_io_reg(dws, DW_SPI_DR, txw);
        dws->tx += dws->n_bytes;
    }
+    spin_unlock(&dws->buf_lock);
    }
static void dw_reader(struct dw_spi *dws)
{
    u32 max = rx_max(dws);
    u32 max;
    u16 rxw;

    +spin_lock(&dws->buf_lock);
    max = rx_max(dws);
    while (max--) {
        rxw = dw_read_io_reg(dws, DW_SPI_DR);
    /* Care rx only if the transfer's original "rx" is not null */
        @ @ -212,6 +217,7 @ @
    }
    dws->rx += dws->n_bytes;
    }
    +spin_unlock(&dws->buf_lock);
}

static void int_error_stop(struct dw_spi *dws, const char *msg)
@@ -284,18 +290,23 @@
{
    struct dw_spi *dws = spi_master_get_devdata(master);
    struct chip_data *chip = spi_get_ctldata(spi);
    unsigned long flags;
    u8 imask = 0;
    u16 txlevel = 0;
    u32 cr0;
    int ret;

    dws->dma_mapped = 0;
    -
    +spin_lock_irqsave(&dws->buf_lock, flags);
    dws->tx = (void *)transfer->tx_buf;
    dws->tx_end = dws->tx + transfer->len;
    dws->rx = transfer->rx_buf;
    dws->rx_end = dws->rx + transfer->len;
    dws->len = transfer->len;
    +spin_unlock_irqrestore(&dws->buf_lock, flags);
    +/* Ensure dw->rx and dw->rx_end are visible */
    +smp_mb();

    spi_enable_chip(dws, 0);
    @@ -373,11 +384,8 @@

    spi_enable_chip(dws, 1);
if (dws->dma_mapped) {
    ret = dws->dma_ops->dma_transfer(dws, transfer);
    if (ret < 0)
        return ret;
}

if (dws->dma_mapped)
    return dws->dma_ops->dma_transfer(dws, transfer);

if (chip->poll_mode)
    return poll_transfer(dws);

if (dws->type = SSI_MOTO_SPI;
    dws->dma_inited = 0;
    dws->dma_addr = (dma_addr_t)(dws->paddr + DW_SPI_DR);
    spin_lock_init(&dws->buf_lock);
    +
    +spi_master_set_devdata(master, dws);

    ret = request_irq(dws->irq, dw_spi_irq, IRQF_SHARED, dev_name(dev),
                      master);
}

} else {
    master->can_dma = dws->dma_ops->can_dma;
    +master->flags |= SPI_CONTROLLER_MUST_TX;
}

-spi_master_set_devdata(master, dws);
-ret = devm_spi_register_master(dev, master);
+ret = spi_register_master(master);
if (ret) {
    dev_err(&master->dev, "problem registering spi master\n");
goto err_dma_exit;
}

dw_spi_debugfs_remove(dws);

+spi_unregister_master(dws->master);
+
if (dws->dma_ops && dws->dma_ops->dma_exit)
    dws->dma_ops->dma_exit(dws);

--- linux-4.15.0.orig/drivers/spi/spi-dw.h
+++ linux-4.15.0/drivers/spi/spi-dw.h
@@ -117,6 +117,7 @@
    size_t			len;
    void			*tx;


void*tx_end;
+spinlock_tbuf_lock;
void*rx;
void*rx_end;
intdma_mapped;
--- linux-4.15.0.orig/drivers/spi/spi-ep93xx.c
+++ linux-4.15.0/drivers/spi/spi-ep93xx.c
@@ -246,6 +246,19 @@
 return -EINPROGRESS;
 }

+static enum dma_transfer_direction
+ep93xx_dma_data_to_trans_dir(enum dma_data_direction dir)
+{*
+switch (dir) {
+case DMA_TO_DEVICE:*
+return DMA_MEM_TO_DEV;
+case DMA_FROM_DEVICE:*
+return DMA_DEV_TO_MEM;
+default:*
+return DMA_TRANS_NONE;
+}
+}
+
/**
 * ep93xx_spi_dma_prepare() - prepares a DMA transfer
 * @master: SPI master
 @@ -257,7 +270,7 @@*/
 static struct dma_async_tx_descriptor *
 ep93xx_spi_dma_prepare(struct spi_master *master,
 - enum dma_transfer_direction dir)
 + enum dma_data_direction dir)
 {
 struct ep93xx_spi *espi = spi_master_get_devdata(master);
 struct spi_transfer *xfer = master->cur_msg->state;
 @@ -277,9 +290,9 @@
 buswidth = DMA_SLAVE_BUSWIDTH_1_BYTE;

 memset(&conf, 0, sizeof(conf));
 -conf.direction = dir;
 +conf.direction = ep93xx_dma_data_to_trans_dir(dir);
 
 -if (dir == DMA_DEV_TO_MEM) {
 +if (dir == DMA_FROM_DEVICE) {
 chan = espi->dma_rx;
 buf = xfer->rx_buf;
 sgt = &espi->rx_sgt;

if (!nents)
    return ERR_PTR(-ENOMEM);

-td = dmaengine_prep_slave_sg(chan, sgl->sgl, nents, dir, DMA_CTRL_ACK);
+td = dmaengine_prep_slave_sg(chan, sgl->sgl, nents, conf.direction, 
    + DMA_CTRL_ACK);
if (!td) {
    dma_unmap_sg(chan->device->dev, sgl->sgl, sgl->nents, dir);
    return ERR_PTR(-ENOMEM);
}

static void ep93xx_spi_dma_finish(struct spi_master *master,
    -enum dma_transfer_direction dir)
+enum dma_data_direction dir)
{
struct ep93xx_spi *espi = spi_master_get_devdata(master);
struct dma_channel *chan;
struct sg_table *sgt;

-    if (dir == DMA_DEV_TO_MEM) {
+    if (dir == DMA_FROM_DEVICE) {
        chan = espi->dma_rx;
        sgt = &espi->rx_sgt;
    } else {
        @@ -381,8 +395,8 @@
    }
    struct spi_master *master = callback_param;

-    ep93xx_spi_dma_finish(master, DMA_MEM_TO_DEV);
-    ep93xx_spi_dma_finish(master, DMA_DEV_TO_MEM);
+    ep93xx_spi_dma_prepare(master, DMA_DEV_TO_MEM);
+    ep93xx_spi_dma_prepare(master, DMA_FROM_DEVICE);

    spi_finalize_current_transfer(master);
}

rxd = ep93xx_spi_dma_prepare(master, DMA_DEV_TO_MEM);
+rxd = ep93xx_spi_dma_prepare(master, DMA_FROM_DEVICE);
if (IS_ERR(rxd)) {
    dev_err(&master->dev, "DMA RX failed: %ld\n", PTR_ERR(rxd));
    return PTR_ERR(rxd);
}
- txd = ep93xx_spi_dma_prepare(master, DMA_MEM_TO_DEV);
+ txd = ep93xx_spi_dma_prepare(master, DMA_TO_DEVICE);
if (IS_ERR(txd)) {
- ep93xx_spi_dma_finish(master, DMA_DEV_TO_MEM);
+ ep93xx_spi_dma_finish(master, DMA_FROM_DEVICE);
dev_err(&master->dev, "DMA TX failed: %ld", PTR_ERR(txd));
return PTR_ERR(txd);
}
--- linux-4.15.0.orig/drivers/spi/spi-fsl-dspi.c
+++ linux-4.15.0/drivers/spi/spi-fsl-dspi.c
@@ -50,6 +50,9 @@
#define SPI_MCR_PCSIS		(0x3F << 16)
#define SPI_MCR_CLR_TXF	(1 << 11)
#define SPI_MCR_CLR_RXF	(1 << 10)
+#define SPI_MCR_DIS_TXF		(1 << 13)
+#define SPI_MCR_DIS_RXF		(1 << 12)
+#define SPI_MCR_HALT		(1 << 0)
#define SPI_TCR			0x08
#define SPI_TCR_GET_TCNT(x)(((x) & 0xffff0000) >> 16)
#define SPI_SR			0x2c
#define SPI_SR_EOQF		0x10000000
#define SPI_SR_TCFQF		0x80000000
-#define SPI_SR_CLEAR		0xdaad0000
+#define SPI_SR_CLEAR		0x9aaf0000
#define SPI_RSER_TFFFE		BIT(25)
#define SPI_RSER_TFFFD		BIT(24)
@@ -397,6 +400,7 @@
goto err_rx_dma_buf;
}
+memset(&cfg, 0, sizeof(cfg));
cfg.src_addr = phy_addr + SPI_POPR;
cfg.dst_addr = phy_addr + SPI_PUSHR;
cfg.src_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
@@ -897,9 +901,11 @@
}
+return IRQ_HANDLED;
}

-return IRQ_HANDLED;
+return IRQ_NONE;
}
static const struct of_device_id fsl_dspi_dt_ids[] = {
    "fsl_dspi", 0,
};

struct spi_master *master = dev_get_drvdata(dev);
struct fsl_dspi *dspi = spi_master_get_drvdata(master);

if (dspi->irq)
    disable_irq(dspi->irq);
spi_master_suspend(master);
clk_disable_unprepare(dspi->clk);

if (ret)
    return ret;
spi_master_resume(master);
if (dspi->irq)
    enable_irq(dspi->irq);

return 0;
}

dspi->clk = devm_clk_get(&pdev->dev, "dspi");
if (IS_ERR(dspi->clk)) {
    ret = PTR_ERR(dspi->clk);
    dev_err(&pdev->dev, "unable to get clock\n");
    goto out_master_put;
}
ret = clk_prepare_enable(dspi->clk);
if (ret)
    goto out_master_put;
dspi_init(dspi);
dspi->irq = platform_get_irq(pdev, 0);
if (dspi->irq < 0) {
    dev_err(&pdev->dev, "can't get platform irq\n");
    ret = dspi->irq;
    goto out_master_put;
    goto out_clk_put;
}
ret = clk_prepare_enable(dspi->clk);
if (ret)
    goto out_master_put;

if (pdev->driver->irq)
    ret = request_threaded_irq(dspi->irq, dspi_interrupt, NULL,
        IRQF_SHARED, pdev->name, dspi);
if (ret < 0) {
dev_err(&pdev->dev, "Unable to attach DSPI interrupt\n");
-goto out_master_put;
-
-dspi->clk = devm_clk_get(&pdev->dev, "dspi");
-if (IS_ERR(dspi->clk)) {
-ret = PTR_ERR(dspi->clk);
-dev_err(&pdev->dev, "unable to get clock\n");
-goto out_master_put;
+goto out_clk_put;
}
-ret = clk_prepare_enable(dspi->clk);
-if (ret)
-goto out_master_put;

if (dspi->devtype_data->trans_mode == DSPI_DMA_MODE) {
ret = dspi_request_dma(dspi, res->start);
if (ret < 0) {
-dev_err(&pdev->dev, "can't get dma channels\n");
-goto out_clk_put;
+goto out_free_irq;
}
}

@@ -1072,11 +1082,16 @@
ret = spi_register_master(master);
if (ret != 0) {
-dev_err(&pdev->dev, "Problem registering DSPI master\n");
-goto out_clk_put;
+goto out_release_dma;
}

return ret;

+out_release_dma:
+dspi_release_dma(dspi);
+out_free_irq;
+if (dspi->irq)
+free_irq(dspi->irq, dspi);
+out_clk_put:
+clk_disable_unprepare(dspi->clk);
+out_master_put:
@@ -1091,13 +1106,29 @@
struct fsl_dspi *dspi = spi_master_get_devdata(master);

/* Disconnect from the SPI framework */
+spi_unregister_controller(dspi->master);
/* Disable RX and TX */
regmap_update_bits(dspi->regmap, SPI_MCR, 
+ SPI_MCR_DIS_TXF | SPI_MCR_DIS_RXF, 
+ SPI_MCR_DIS_TXF | SPI_MCR_DIS_RXF);
+
/* Stop Running */
regmap_update_bits(dspi->regmap, SPI_MCR, SPI_MCR_HALT, SPI_MCR_HALT);
+
dspi_release_dma(dspi);
+if (dspi->irq)
+free_irq(dspi->irq, dspi);
clk_disable_unprepare(dspi->clk);
-spi_unregister_master(dspi->master);

return 0;
}
+
+static void dspi_shutdown(struct platform_device *pdev)
+{
+dspi_remove(pdev);
+}
+
+static struct platform_driver fsl_dspi_driver = {
+ .driver.name = DRIVER_NAME,
+ .driver.of_match_table = fsl_dspi_dt_ids,
+ @ @ .driver.of_match_table = fsl_dspi_dt_ids,
+ @ @ -1105.6 +1136.7 @ @
+ .driver.pm = &dspi_pm,
+ .probe = dspi_probe,
+ .remove = dspi_remove,
+ .shutdown = dspi_shutdown,
+};
module_platform_driver(fsl_dspi_driver);

--- linux-4.15.0.orig/drivers/spi/spi-fsl-espi.c
+++ linux-4.15.0/drivers/spi/spi-fsl-espi.c
@@ -556,13 +556,14 @@
static irqreturn_t fsl_espi_irq(s32 irq, void *context_data)
{
struct fsl_espi *espi = context_data;
-u32 events;
+u32 events, mask;

spin_lock(&espi->lock);

/* Get interrupt events(tx/rx) */
events = fsl_espi_read_reg(espi, ESPI_SPIE);
-if (!events) {
+mask = fsl_espi_read_reg(espi, ESPI_SPIM);
+if (!(events & mask)) {
    spin_unlock(&espi->lock);
    return IRQ_NONE;
}
--- linux-4.15.0.orig/drivers/spi/spi-fsl-lpspi.c
+++ linux-4.15.0/drivers/spi/spi-fsl-lpspi.c
@@ -287,7 +287,7 @@
    fsl_lpspi_set_watermark(fsl_lpspi);
-    temp = CFGR1_PCSCFG | CFGR1_MASTER | CFGR1_NOSTALL;
+    temp = CFGR1_PCSCFG | CFGR1_MASTER;
    if (fsl_lpspi->config.mode & SPI_CS_HIGH)
        temp |= CFGR1_PCSPOL;
    writel(temp, fsl_lpspi->base + IMX7ULP_CFGR1);
--- linux-4.15.0.orig/drivers/spi/spi-fsl-spi.c
+++ linux-4.15.0/drivers/spi/spi-fsl-spi.c
@@ -407,7 +407,6 @@
    }}
    m->status = status;
-    spi_finalize_current_message(master);
    if (status || !cs_change) {
        ndelay(nsecs);
        @@ -415,6 +414,7 @@
    }
    fsl_spi_setup_transfer(spi, NULL);
    +spi_finalize_current_message(master);
    return 0;
}
@@ -832,9 +832,9 @@
    if (ret) goto err;
    irq = irq_of_parse_and_map(np, 0);
-    if (!irq) {
-        ret = -EINVAL;
+    if (irq < 0) {
+        ret = irq;
            goto err;
    }
    @@ -847,7 +847,6 @@
    return 0;
err:
-irq_dispose_mapping(irq);
if (type == TYPE_FSL)
of_fsl_spi_free_chipselects(dev);
return ret;
--- linux-4.15.0.orig/drivers/spi/spi-img-spfi.c
+++ linux-4.15.0/drivers/spi/spi-img-spfi.c
@@ -673,6 +673,8 @@
dma_release_channel(spfi->tx_ch);
if (spfi->rx_ch)
dma_release_channel(spfi->rx_ch);
+spfi->tx_ch = NULL;
+spfi->rx_ch = NULL;
dev_warn(spfi->dev, "Failed to get DMA channels, falling back to PIO mode\n");
} else {
master->dma_tx = spfi->tx_ch;
@@ -769,8 +771,10 @@
int ret;
ret = pm_runtime_get_sync(dev);
-if (ret)
+if (ret) {
+pm_runtime_put_noidle(dev);
return ret;
+
spfi_reset(spfi);
pm_runtime_put(dev);

--- linux-4.15.0.orig/drivers/spi/spi-imx.c
+++ linux-4.15.0/drivers/spi/spi-imx.c
@@ -1403,7 +1403,7 @@
/* flush rxffifo before transfer */
while (spi_imx->devtype_data->rx_available(spi_imx))
-spi_imx->rx(spi_imx);
+readl(spi_imx->base + MXC_CSPIRXDATA);
if (spi_imx->slave_mode)
return spi_imx_pio_transfer_slave(spi, transfer);
@@ -1622,6 +1622,11 @@
spi_imx->devtype_data->intctrl(spi_imx, 0);

master->dev.of_node = pdev->dev.of_node;
+ret = spi_bitbang_start(&spi_imx->bitbang);
+if (ret) {
+dev_err(&pdev->dev, "bitbang start failed with %d\n", ret);
+goto out_clk_put;
/* Request GPIO CS lines, if any */
if (!spi_imx->slave_mode && master->cs_gpios) {
	/**
@@ -1640,12 +1645,6 @@
	retval = spi_bitbang_start(&spi_imx->bitbang);
	if (retval) {
-dev_err(&pdev->dev, "bitbang start failed with %d\n", ret);
-goto out_clk_put;
-}
-
-dev_info(&pdev->dev, "probed\n");

clk_disable(spi_imx->clk_ipg);
@@ -1668,12 +1667,23 @@
{
struct spi_master *master = platform_get_drvdata(pdev);
struct spi_imx_data *spi_imx = spi_master_get_devdata(master);
+int ret;

spi_bitbang_stop(&spi_imx->bitbang);
+ret = clk_enable(spi_imx->clk_per);
+if (ret)
+return ret;
+
+ret = clk_enable(spi_imx->clk_ipg);
+if (ret) {
+clk_disable(spi_imx->clk_per);
+return ret;
+
+writel(0, spi_imx->base + MXC_CSPICRTL);
-clk_unprepare(spi_imx->clk_ipg);
-clk_unprepare(spi_imx->clk_per);
+clk_disable_unprepare(spi_imx->clk_ipg);
+clk_disable_unprepare(spi_imx->clk_per);
spi_imx_sdma_exit(spi_imx);
spi_master_put(master);

--- linux-4.15.0.orig/drivers/spi/spi-lantiq-ssc.c
+++ linux-4.15.0/drivers/spi/spi-lantiq-ssc.c
@@ -187,6 +187,7 @@
unsigned int			tx_fifo_size;
unsigned int			rx_fifo_size;


unsigned int base_cs;
+unsigned int fdx_tx_level;
};

static u32 lantiq_ssc_readl(const struct lantiq_ssc_spi *spi, u32 reg)
@@ -484,6 +485,7 @@
    u32 data;
    unsigned int tx_free = tx_fifo_free(spi);

    +spi->fdx_tx_level = 0;
    while (spi->tx_todo && & tx_free) {
        switch (spi->bits_per_word) {
            case 2 ... 8:
@@ -512,6 +514,7 @@

    lantiq_ssc_writel(spi, data, LTQ_SPI_TB);
    tx_free--;
    +spi->fdx_tx_level++;
    }
    }

@@ -526,6 +528,13 @@
    u32 data;
    unsigned int rx_fill = rx_fifo_level(spi);

    +/*
    + * Wait until all expected data to be shifted in.
    + * Otherwise, rx overrun may occur.
    + */
    +while (rx_fill != spi->fdx_tx_level)
    +rx_fill = rx_fifo_level(spi);
    +
    while (rx_fill) {
        data = lantiq_ssc_readl(spi, LTQ_SPI_RB);

        --- linux-4.15.0.orig/drivers/spi/spi-loopback-test.c
        +++ linux-4.15.0/drivers/spi/spi-loopback-test.c
        @@ -99,7 +99,7 @@
    }
    .description = "tx/rx-transfer - crossing PAGE_SIZE",
    .fill_option = FILL_COUNT_8,
    -.iterate_len = { ITERATE_MAX_LEN },
    +.iterate_len = { ITERATE_LEN },
    .iterate_tx_align = ITERATE_ALIGN,
    .iterate_rx_align = ITERATE_ALIGN,
    .transfer_count = 1,
    @@ -877,7 +877,7 @@
    test.transfers[i].len = len;
if (test.transfers[i].tx_buf)
    test.transfers[i].tx_buf += tx_off;
-if (test.transfers[i].tx_buf)
+if (test.transfers[i].rx_buf)
    test.transfers[i].rx_buf += rx_off;
}

--- linux-4.15.0.orig/drivers/spi/spi-meson-spicc.c
+++ linux-4.15.0/drivers/spi/spi-meson-spicc.c
@@ -574,10 +574,15 @@
master->max_speed_hz = rate >> 2;

    ret = devm_spi_register_master(&pdev->dev, master);
-    if (!ret)
-        return 0;
+    if (ret) {
+        dev_err(&pdev->dev, "spi master registration failed\n");
+        goto out_clk;
+    }

-dev_err(&pdev->dev, "spi master registration failed\n");
+    return 0;
+}
+out_clk:
+    clk_disable_unprepare(spicc->core);

    out_master:
    spi_master_put(master);
    @ @ -594,6 +599,8 @ @

    clk_disable_unprepare(spicc->core);

    +spi_master_put(spicc->master);
    +
    return 0;
    }

--- linux-4.15.0.orig/drivers/spi/spi-mt65xx.c
+++ linux-4.15.0/drivers/spi/spi-mt65xx.c
@@ -41,7 +41,6 @@
#define SPI_CFG0_SCK_LOW_OFFSET           8
#define SPI_CFG0_CS_HOLD_OFFSET           16
#define SPI_CFG0_CS_SETUP_OFFSET         24
-#define SPI_ADJUST_CFG0_SCK_LOW_OFFSET 16
#define SPI_ADJUST_CFG0_CS_HOLD_OFFSET  0
#define SPI_ADJUST_CFG0_CS_SETUP_OFFSET 16

//@ -53,6 +52,8 @@
#define SPI_CFG1_CS_IDLE_MASK             0xff
#define SPI_CFG1_PACKET_LOOP_MASK         0xff00
#define SPI_CFG1_PACKET_LENGTH_MASK       0x3ff0000
+#define SPI_CFG2_SCK_HIGH_OFFSET          0
+#define SPI_CFG2_SCK_LOW_OFFSET           16

#define SPI_CMD_ACT                  BIT(0)
define SPI_CMD_RESUME               BIT(1)
@@ -98,6 +99,7 @@
struct clk *parent_clk, *sel_clk, *spi_clk;
struct spi_transfer *cur_transfer;
  u32 xfer_len;
+u32 num_xfered;
  struct scatterlist *tx_sgl, *rx_sgl;
  u32 tx_sgl_len, rx_sgl_len;
  const struct mtk_spi_compatible *dev_comp;
@@ -258,7 +260,7 @@
static void mtk_spi_prepare_transfer(struct spi_master *master,
   struct spi_transfer *xfer)
{
-  u32 spi_clk_hz, div, sck_time, cs_time, reg_val = 0;
+  u32 spi_clk_hz, div, sck_time, cs_time, reg_val;
  struct mtk_spi *mdata = spi_master_get_devdata(master);

  spi_clk_hz = clk_get_rate(mdata->spi_clk);
  @ @ -271,18 +273,18 @@
  cs_time = sck_time * 2;

  if (mdata->dev_comp->enhance_timing) {
    +reg_val |= (((sck_time - 1) & 0xffff)
    +  << SPI_CFG2_SCK_HIGH_OFFSET);
    reg_val |= (((sck_time - 1) & 0xffff)
    -  << SPI_CFG0_SCK_HIGH_OFFSET);
    -reg_val |= (((cs_time - 1) & 0xffff)
    +  << SPI_CFG2_SCK_LOW_OFFSET);
    reg_val |= (((cs_time - 1) & 0xffff)
    +  << SPI_CFG0_SCK_LOW_OFFSET);
    reg_val = spi_clk_hz, div, sck_time, cs_time, reg_val = 0;
    +u32 num_xfered;
    struct scatterlist *tx_sgl, *rx_sgl;
    u32 tx_sgl_len, rx_sgl_len;
    const struct mtk_spi_compatible *dev_comp;
    @ @ -258,7 +260,7 @@
    static void mtk_spi_prepare_transfer(struct spi_master *master,
      struct spi_transfer *xfer)
    {
      -u32 spi_clk_hz, div, sck_time, cs_time, reg_val = 0;
      +u32 spi_clk_hz, div, sck_time, cs_time, reg_val;
      struct mtk_spi *mdata = spi_master_get_devdata(master);

      spi_clk_hz = clk_get_rate(mdata->spi_clk);
      @ @ -271,18 +273,18 @@
      cs_time = sck_time * 2;

      if (mdata->dev_comp->enhance_timing) {
        +reg_val |= (((sck_time - 1) & 0xffff)
        +  << SPI_CFG2_SCK_HIGH_OFFSET);
        reg_val |= (((sck_time - 1) & 0xffff)
        -  << SPI_CFG0_SCK_HIGH_OFFSET);
        -reg_val |= (((cs_time - 1) & 0xffff)
        +  << SPI_CFG2_SCK_LOW_OFFSET);
        reg_val |= (((cs_time - 1) & 0xffff)
        +  << SPI_CFG0_SCK_LOW_OFFSET);
        reg_val = spi_clk_hz, div, sck_time, cs_time, reg_val = 0;
        +u32 num_xfered;
        struct scatterlist *tx_sgl, *rx_sgl;
        u32 tx_sgl_len, rx_sgl_len;
        const struct mtk_spi_compatible *dev_comp;
        @ @ -258,7 +260,7 @@
        static void mtk_spi_prepare_transfer(struct spi_master *master,
          struct spi_transfer *xfer)
        {
          -u32 spi_clk_hz, div, sck_time, cs_time, reg_val = 0;
          +u32 spi_clk_hz, div, sck_time, cs_time, reg_val;
          struct mtk_spi *mdata = spi_master_get_devdata(master);

          spi_clk_hz = clk_get_rate(mdata->spi_clk);
          @ @ -271,18 +273,18 @@
          cs_time = sck_time * 2;

          if (mdata->dev_comp->enhance_timing) {
            +reg_val |= (((sck_time - 1) & 0xffff)
            +  << SPI_CFG2_SCK_HIGH_OFFSET);
            reg_val |= (((sck_time - 1) & 0xffff)
            -  << SPI_CFG0_SCK_HIGH_OFFSET);
            -reg_val |= (((cs_time - 1) & 0xffff)
            +  << SPI_CFG2_SCK_LOW_OFFSET);
            reg_val |= (((cs_time - 1) & 0xffff)
            +  << SPI_CFG0_SCK_LOW_OFFSET);
reg_val |= (((cs_time - 1) & 0xff) << SPI_CFG0_CS_HOLD_OFFSET);
@@ -385,17 +387,19 @@
mdata->cur_transfer = xfer;
mdata->xfer_len = min(MTK_SPI_MAX_FIFO_SIZE, xfer->len);
+mdata->num_xfered = 0;
mtk_spi_prepare_transfer(master, xfer);
mtk_spi_setup_packet(master);
-
cnt = xfer->len / 4;
iowrite32_rep(mdata->base + SPI_TX_DATA_REG, xfer->tx_buf, cnt);
-
-remainder = xfer->len % 4;
-if (remainder > 0) {
-    reg_val = 0;
-    memcpy(&reg_val, xfer->tx_buf + (cnt * 4), remainder);
-    writel(reg_val, mdata->base + SPI_TX_DATA_REG);
+    if (xfer->tx_buf) {
+        cnt = xfer->len / 4;
+        iowrite32_rep(mdata->base + SPI_TX_DATA_REG, xfer->tx_buf, cnt);
+        remainder = xfer->len % 4;
+        if (remainder > 0) {
+            reg_val = 0;
+            memcpy(&reg_val, xfer->tx_buf + (cnt * 4), remainder);
+            writel(reg_val, mdata->base + SPI_TX_DATA_REG);
+        }
    }
}

mtk_spi_enable_transfer(master);
@@ -415,6 +419,7 @@
mdata->tx_sgl_len = 0;
mdata->rx_sgl_len = 0;
mdata->cur_transfer = xfer;
+mdata->num_xfered = 0;
mtk_spi_prepare_transfer(master, xfer);

static irqreturn_t mtk_spi_interrupt(int irq, void *dev_id)
{
    -u32 cmd, reg_val, cnt, remainder;
    +u32 cmd, reg_val, cnt, remainder, len;
    struct spi_master *master = dev_id;
    struct mtk_spi *mdata = spi_master_get_devdata(master);
    struct spi_transfer *trans = mdata->cur_transfer;
    @@ -497,36 +502,38 @@
    if (trans->rx_buf) {
cnt = mdata->xfer_len / 4;
ioread32_rep(mdata->base + SPI_RX_DATA_REG, 
-    trans->rx_buf, cnt);
+    trans->rx_buf + mdata->num_xfered, cnt);
remainder = mdata->xfer_len % 4;
if (remainder > 0) {
    reg_val = readl(mdata->base + SPI_RX_DATA_REG);
    -memcpy(trans->rx_buf + (cnt * 4),
-        &reg_val, remainder);
+memcpy(trans->rx_buf +
+    mdata->num_xfered +
+    (cnt * 4),
+    &reg_val,
+    remainder);
}
}

-trans->len -= mdata->xfer_len;
-if (!trans->len) {
+    mdata->num_xfered += mdata->xfer_len;
+    if (mdata->num_xfered == trans->len) {
        spi_finalize_current_transfer(master);
        return IRQ_HANDLED;
    }
}

-if (trans->tx_buf)
-trans->tx_buf += mdata->xfer_len;
-if (trans->rx_buf)
-trans->rx_buf += mdata->xfer_len;
-
-mdata->xfer_len = min(MTK_SPI_MAX_FIFO_SIZE, trans->len);
+len = trans->len - mdata->num_xfered;
+mdata->xfer_len = min(MTK_SPI_MAX_FIFO_SIZE, len);
mtk_spi_setup_packet(master);

cnt = trans->len / 4;
iowrite32_rep(mdata->base + SPI_TX_DATA_REG, trans->tx_buf, cnt);
+cnt = mdata->xfer_len / 4;
iowrite32_rep(mdata->base + SPI_TX_DATA_REG,
+    trans->tx_buf + mdata->num_xfered, cnt);

-remainder = trans->len % 4;
+remainder = mdata->xfer_len % 4;
if (remainder > 0) {
    reg_val = 0;
    -memcpy(&reg_val, trans->tx_buf + (cnt * 4), remainder);
+memcpy(&reg_val,
+    trans->tx_buf + (cnt * 4) + mdata->num_xfered,
writel(reg_val, mdata->base + SPI_TX_DATA_REG);

--- linux-4.15.0.orig/drivers/spi/spi-mxs.c
+++ linux-4.15.0/drivers/spi/spi-mxs.c
@@ -615,6 +615,7 @@
 ret = pm_runtime_get_sync(ssp->dev);
 if (ret < 0) {
     pm_runtime_put_noidle(ssp->dev);
-dev_err(ssp->dev, "runtime_get_sync failed\n");
goto out_pm_runtime_disable;
 }
--- linux-4.15.0.orig/drivers/spi/spi-omap-100k.c
+++ linux-4.15.0/drivers/spi/spi-omap-100k.c
@@ -251,7 +251,7 @@
 else
     word_len = spi->bits_per_word;

-if (spi->bits_per_word > 32)
+if (word_len > 32)
     return -EINVAL;
     cs->word_len = word_len;

-    @ @ -435,7 +435,7 @@

static int omap1_spi100k_remove(struct platform_device *pdev)
{
    -struct spi_master *master = spi_master_get(platform_get_drvdata(pdev));
+struct spi_master *master = platform_get_drvdata(pdev);
    struct omap1_spi100k *spi100k = spi_master_get_devdata(master);

pm_runtime_disable(&pdev->dev);
-    @ @ -449,7 +449,7 @@
+ifdef CONFIG_PM
static int omap1_spi100k_runtime_suspend(struct device *dev)
{
    -struct spi_master *master = spi_master_get(dev_get_drvdata(dev));
+struct spi_master *master = dev_get_drvdata(dev);
    struct omap1_spi100k *spi100k = spi_master_get_devdata(master);

clock_disable_unprepare(spi100k->ick);
-    @ @ -460,7 +460,7 @@

static int omap1_spi100k_runtime_resume(struct device *dev)
{
    -struct spi_master *master = spi_master_get(dev_get_drvdata(dev));
+struct spi_master *master = dev_get_drvdata(dev);
    struct omap1_spi100k *spi100k = spi_master_get_devdata(master);
+struct spi_master *master = dev_get_drvdata(dev);
struct omap1_spi100k *spi100k = spi_master_get_devdata(master);
int ret;

--- linux-4.15.0.orig/drivers/spi/spi-omap2-mcspi.c
+++ linux-4.15.0/drivers/spi/spi-omap2-mcspi.c
@@ -298,7 +298,7 @@
struct omap2_mcspi_cs *cs = spi->controller_state;
struct omap2_mcspi *mcspi;
unsigned int wcnt;
-int max_fifo_depth, fifo_depth, bytes_per_word;
+int max_fifo_depth, bytes_per_word;
u32 chconf, xferlevel;

mcspi = spi_master_get_devdata(master);
@@ -314,10 +314,6 @@
else
    max_fifo_depth = OMAP2_MCSPI_MAX_FIFODEPTH;

-fifo_depth = gcd(t->len, max_fifo_depth);
-if (fifo_depth < 2 || fifo_depth % bytes_per_word != 0)
    goto disable_fifo;
-wcnt = t->len / bytes_per_word;
if (wcnt > OMAP2_MCSPI_MAX_FIFOWCNT)
goto disable_fifo;
@@ -601,7 +598,6 @@
mcspi_write_reg(master, OMAP2_MCSPI_XFERLEVEL, xferlevel);
mcspi_write_chconf0(spi, chconf);
-mcspi->fifo_depth = fifo_depth;
+mcspi->fifo_depth = max_fifo_depth;

return;
}
struct dma_slave_config cfg;
enum dma_slave_buswidth width;
unsigned es;
-uburst;
void __iomem *chstat_reg;
void __iomem *irqstat_reg;
int wait_res;
}
}
}
count = xfer->len;
-burst = 1;
-
-if (mcspi->fifo_depth > 0) {
-if (count > mcspi->fifo_depth)
-burst = mcspi->fifo_depth / es;
-else
-burst = count / es;
-}
memset(&cfg, 0, sizeof(cfg));
cfg.src_addr = cs->phys + OMAP2_MCSPI_RX0;
cfg.dst_addr = cs->phys + OMAP2_MCSPI_TX0;
cfg.src_addr_width = width;
cfg.dst_addr_width = width;
-cfg.src_maxburst = burst;
-cfg.dst_maxburst = burst;
+cfg.src_maxburst = 1;
+cfg.dst_maxburst = 1;
rx = xfer->rx_buf;
tx = xfer->tx_buf;
--- linux-4.15.0.orig/drivers/spi/spi-pic32.c
+++ linux-4.15.0/drivers/spi/spi-pic32.c
@@ -320,7 +320,7 @@
desc_rx = dmaengine_prep_slave_sg(master->dma_rx,
 xfer->rx_sg.sgl,
 xfer->rx_sg.nents,
 - DMA_FROM_DEVICE,
+ DMA_DEV_TO_MEM,
 DMA_PREP_INTERRUPT | DMA_CTRL_ACK);
if (!desc_rx) {
 ret = -EINVAL;
@@ -330,7 +330,7 @@
desc_tx = dmaengine_prep_slave_sg(master->dma_tx,
 xfer->tx_sg.sgl,
 xfer->tx_sg.nents,
 - DMA_TO_DEVICE,
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DMA_MEM_TO_DEV,
DMA_PREP_INTERRUPT | DMA_CTRL_ACK);
if (!desc_tx) {
  ret = -EINVAL;
}
struct dma_slave_config cfg;
int ret;

memset(&cfg, 0, sizeof(cfg));
cfg.device_fc = true;
cfg.src_addr = pic32s->dma_base + buf_offset;
cfg.dst_addr = pic32s->dma_base + buf_offset;
return 0;

err_bailout:
+pic32_spi_dma_unprep(pic32s);
clk_disable_unprepare(pic32s->clk);
err_master:
+spi_master_put(master);
--- linux-4.15.0.orig/drivers/spi/spi-pxa2xx-pci.c
+++ linux-4.15.0/drivers/spi/spi-pxa2xx-pci.c
@@ -21,7 +21,8 @@
   PORT_BSW1,
   PORT_BSW2,
   PORT_CE4100,
-  PORT_LPT,
+  PORT_LPT0,
+  PORT_LPT1,
  }

struct pxa_spi_info {
  @ @ -55,8 +56,10 @ @
  static struct dw_dma_slave bsw2_tx_param = { .dst_id = 8 };
  static struct dw_dma_slave bsw2_rx_param = { .src_id = 9 };
  -static struct dw_dma_slave lpt_tx_param = { .dst_id = 0 };
  -static struct dw_dma_slave lpt_rx_param = { .src_id = 1 };
+static struct dw_dma_slave lpt1_tx_param = { .dst_id = 0 };
+static struct dw_dma_slave lpt1_rx_param = { .src_id = 1 };
+static struct dw_dma_slave lpt0_tx_param = { .dst_id = 2 };
+static struct dw_dma_slave lpt0_rx_param = { .src_id = 3 };

  static bool lpss_dma_filter(struct dma_chan *chan, void *param) {
    @ @ -182,12 +185,19 @ @
    .num_chipselect = 1,
    .max_clk_rate = 50000000,


},
-[PORT_LPT] = {
+[PORT_LPT0] = {
 .type = LPSS_LPT_SSP,
 .port_id = 0,
 .setup = lpss_spi_setup,
 -.tx_param = &lpt_tx_param,
 -.rx_param = &lpt_rx_param,
 +.tx_param = &lpt0_tx_param,
 +.rx_param = &lpt0_rx_param,
 +},
+[PORT_LPT1] = {
 +.type = LPSS_LPT_SSP,
 +.port_id = 1,
 +.setup = lpss_spi_setup,
 +.tx_param = &lpt1_tx_param,
 +.rx_param = &lpt1_rx_param,
 },
];

@@ -281,8 +291,9 @@
 { PCI_VDEVICE(INTEL, 0x2290), PORT_BSW1 },
 { PCI_VDEVICE(INTEL, 0x22ac), PORT_BSW2 },
 { PCI_VDEVICE(INTEL, 0x2e6a), PORT_CE4100 },
- { PCI_VDEVICE(INTEL, 0x9ce6), PORT_LPT },
- { },
+ { PCI_VDEVICE(INTEL, 0x9ce5), PORT_LPT0 },
+ { PCI_VDEVICE(INTEL, 0x9ce6), PORT_LPT1 },
+ { }
};

MODULE_DEVICE_TABLE(pci, pxa2xx_spi_pci_devices);

--- linux-4.15.0.orig/drivers/spi/spi-pxa2xx.c
+++ linux-4.15.0/drivers/spi/spi-pxa2xx.c
@@ -76,6 +76,10 @@
#define LPSS_CAPS_CS_EN_SHIFT			9
#define LPSS_CAPS_CS_EN_MASK			(0xf << LPSS_CAPS_CS_EN_SHIFT)
+ #define LPSS_PRIV_CLOCK_GATE 0x38
+ #define LPSS_PRIV_CLOCK_GATE_CLK_CTL_MASK 0x3
+ #define LPSS_PRIV_CLOCK_GATE_CLK_CTL_FORCE_ON 0x3
+
 struct lpss_config {
 /* LPSS offset from drv_data->ioaddr */
 unsigned offset;
@@ -92,6 +96,8 @@@
 unsigned cs_sel_shift;
 unsigned cs_sel_mask;

unsigned cs_num;
+/* Quirks */
+unsigned cs_clk_stays_gated : 1;
};

/* Keep these sorted with enum pxa_ssp_type */
@@ -150,6 +156,7 @@,
    .tx_threshold_hi = 48,
    .cs_sel_shift = 8,
    .cs_sel_mask = 3 << 8,
+    .cs_clk_stays_gated = true,
};

+/* LPSS_CN0_SSP */
    .offset = 0x200,
@@ -162,6 +169,7 @@,
    .tx_threshold_hi = 56,
    .cs_sel_shift = 8,
    .cs_sel_mask = 3 << 8,
+    .cs_clk_stays_gated = true,
};

@@ -385,6 +393,22 @@
else
    value |= LPSS_CS_CONTROL_CS_HIGH;
    __lpss_ssp_write_priv(drv_data, config->reg_cs_ctrl, value);
+    if (config->cs_clk_stays_gated) {
+        u32 clkgate;
+        
+        /* Changing CS alone when dynamic clock gating is on won't
+        * actually flip CS at that time. This ruins SPI transfers
+        * that specify delays, or have no data. Toggle the clock mode
+        * to force on briefly to poke the CS pin to move.
+        */
+        clkgate = __lpss_ssp_read_priv(drv_data, LPSS_PRIV_CLOCK_GATE);
+        value = (clkgate & ~LPSS_PRIV_CLOCK_GATE_CLK_CTL_MASK) |
+               LPSS_PRIV_CLOCK_GATE_CLK_CTL_FORCE_ON;
+        
+        __lpss_ssp_write_priv(drv_data, LPSS_PRIV_CLOCK_GATE, value);
+        __lpss_ssp_write_priv(drv_data, LPSS_PRIV_CLOCK_GATE, clkgate);
+    }

static void cs_assert(struct driver_data *drv_data)
@@ -938,10 +962,14 @@
    rate = min_t(int, ssp_clk, rate);

rate = min_t(int, ssp_clk, rate);
/*
 * Calculate the divisor for the SCR (Serial Clock Rate), avoiding
 * that the SSP transmission rate can be greater than the device rate
 */
if (ssp->type == PXA25x_SSP || ssp->type == CE4100_SSP)
-    return (ssp_clk / (2 * rate) - 1) & 0xff;
+    return (DIV_ROUND_UP(ssp_clk, 2 * rate) - 1) & 0xff;
else
-    return (ssp_clk / rate - 1) & 0xfff;
+    return (DIV_ROUND_UP(ssp_clk, rate) - 1) & 0xfff;
}

static unsigned int pxa2xx_ssp_get_clk_div(struct driver_data *drv_data,
@@ -1480,6 +1508,10 @@
{ PCI_VDEVICE(INTEL, 0x31c2), LPSS_BXT_SSP },
{ PCI_VDEVICE(INTEL, 0x31c4), LPSS_BXT_SSP },
{ PCI_VDEVICE(INTEL, 0x31c6), LPSS_BXT_SSP },
+/* ICL-LP */
+{ PCI_VDEVICE(INTEL, 0x34aa), LPSS_CNL_SSP },
+{ PCI_VDEVICE(INTEL, 0x34ab), LPSS_CNL_SSP },
+{ PCI_VDEVICE(INTEL, 0x34fb), LPSS_CNL_SSP },
/* APL */
{ PCI_VDEVICE(INTEL, 0x5ac2), LPSS_BXT_SSP },
{ PCI_VDEVICE(INTEL, 0x5ac4), LPSS_BXT_SSP },
@ @ -1480.6 +1508.10 @ @
{ PCI_VDEVICE(INTEL, 0xa32a), LPSS_CNL_SSP },
{ PCI_VDEVICE(INTEL, 0xa32b), LPSS_CNL_SSP },
{ PCI_VDEVICE(INTEL, 0xa37b), LPSS_CNL_SSP },
+/* CML-LP */
+{ PCI_VDEVICE(INTEL, 0x02aa), LPSS_CNL_SSP },
+{ PCI_VDEVICE(INTEL, 0x02ab), LPSS_CNL_SSP },
+{ PCI_VDEVICE(INTEL, 0x02fb), LPSS_CNL_SSP },
/* CML-LP */
{ PCI_VDEVICE(INTEL, 0x02aa), LPSS_CNL_SSP },
{ PCI_VDEVICE(INTEL, 0x02ab), LPSS_CNL_SSP },
{ PCI_VDEVICE(INTEL, 0x02fb), LPSS_CNL_SSP },

static bool pxa2xx_spi_idma_filter(struct dma_chan *chan, void *param)
{
    struct device *dev = param;
    -
    -if (dev != chan->device->dev->parent)
    -    return false;
    -
    return true;
    +return param == chan->device->dev;
}

static struct pxa2xx_spi_master *
ssp->clk = devm_clk_get(&pdev->dev, NULL);
+if (IS_ERR(ssp->clk))
+return NULL;
+
ssp->irq = platform_get_irq(pdev, 0);
+if (ssp->irq < 0)
+return NULL;
+
ssp->type = type;
ssp->pdev = pdev;
ssp->port_id = pxa2xx_spi_get_port_id(adev);
} else {

platform_info->enable_dma = false;
} else {
master->can_dma = pxa2xx_spi_can_dma;
+master->max_dma_len = MAX_DMA_LEN;
}
}

/* Register with the SPI framework */
platform_set_drvdata(pdev, drv_data);
-status = devm_spi_register_master(&pdev->dev, master);
+status = spi_register_master(master);
if (status != 0) {
    dev_err(pdev->dev, "cannot alloc spi_master\n");
    pxa_ssp_free(ssp);
    goto out_error_master_alloc:
}
out_error_master_alloc:
-spi_master_put(master);
pxa_ssp_free(ssp);
return status;
}
pm_runtime_get_sync(&pdev->dev);

+spi_unregister_master(drv_data->master);
+
/* Disable the SSP at the peripheral and SOC level */
pxa2xx_spi_write(drv_data, SSCR0, 0);
clk_disable_unprepare(ssp->clk);
--- linux-4.15.0.orig/drivers/spi/spi-pxa2xx.h
+++ linux-4.15.0/drivers/spi/spi-pxa2xx.h
@@ -38,7 +38,7 @@
/* SSP register addresses */
void __iomem *ioaddr;
-u32 ssdr_physical;
+phys_addr_t ssdr_physical;

/* SSP masks*/
u32 dma_cr1;
--- linux-4.15.0.orig/drivers/spi/spi-qup.c
+++ linux-4.15.0/drivers/spi/spi-qup.c
@@ -1190,6 +1190,11 @@
struct spi_qup *controller = spi_master_get_devdata(master);
int ret;

+if (pm_runtime_suspended(device)) {
+ret = spi_qup_pm_resume_runtime(device);
+if (ret)
+return ret;
+}
ret = spi_master_suspend(master);
if (ret)
return ret;
@@ -1198,10 +1203,8 @@
if (ret)
return ret;

-]}
-if (!pm_runtime_suspended(device)) {
-clk_disable_unprepare(controller->cclk);
-clk_disable_unprepare(controller->iclk);
-}
+clk_disable_unprepare(controller->cclk);
+clk_disable_unprepare(controller->iclk);
return 0;
}
--- linux-4.15.0.orig/drivers/spi/spi-rb4xx.c
if (IS_ERR(spi_base))
    return PTR_ERR(spi_base);

    master = spi_alloc_master(&pdev->dev, sizeof(*rbspi));
+    master = devm_spi_alloc_master(&pdev->dev, sizeof(*rbspi));
    if (!master)
        return -ENOMEM;

--- linux-4.15.0.orig/drivers/spi/spi-rockchip.c
+++ linux-4.15.0/drivers/spi/spi-rockchip.c
@@ -445,6 +445,9 @@
    spin_lock_irqsave(&rs->lock, flags);
    rs->state &= ~RXBUSY;
    rs->state &= ~TXBUSY;
--- linux-4.15.0.orig/drivers/spi/spi-rspi.c
+++ linux-4.15.0/drivers/spi/spi-rspi.c
@@ -279,7 +279,8 @@
 /* Sets parity, interrupt mask */
    rspi_write8(rspi, 0x00, RSPI_SPCR2);

-/* Sets SPCMD */
+-/* Resets sequencer */
+    rspi_write8(rspi, 0, RSPI_SPSCR);
    rspi->spcmd |= SPCMD_SPB_8_TO_16(access_size);
    rspi_write16(rspi, rspi->spcmd, RSPI_SPCMD0);

 @@ -323,7 +324,8 @@
 /* Sets buffer to allow normal operation */
    rspi_write8(rspi, 0x00, RSPI_SSLND);
    rspi_write8(rspi, 0x00, RSPI_SPND);

-/* Sets SPCMD */
+-/* Resets sequencer */
+    rspi_write8(rspi, 0, RSPI_SPSCR);
    rspi->spcmd |= SPCMD_SPB_8_TO_16(access_size);
    rspi_write16(rspi, rspi->spcmd, RSPI_SPCMD0);

 @@ -374,7 +376,8 @@
 /* Sets buffer to allow normal operation */
    rspi_write8(rspi, 0x00, QSPI_SPBFCR);
/* Sets SPCMD */
+/* Resets sequencer */
+rspi_write8(rspi, 0, RSPI_SPSCR);
rspi_write16(rspi, rspi->spcmd, RSPI_SPCMD0);

/* Sets RSPI mode */
@@ -598,11 +601,13 @@
ret = wait_event_interruptible_timeout(rspi->wait,
    rspi->dma_callbacked, HZ);
-if (ret > 0 && rspi->dma_callbacked)
+if (ret > 0 && rspi->dma_callbacked) {
    ret = 0;
-else if (!ret) {
-    dev_err(&rspi->master->dev, "DMA timeout\n");
-    ret = -ETIMEDOUT;
+} else {
+    if (!ret) {
+        dev_err(&rspi->master->dev, "DMA timeout\n");
+        ret = -ETIMEDOUT;
+    }
} else 
    if (tx)
        dmaengine_terminate_all(rspi->master->dma_tx);
if (rx)
@@ -1350,12 +1355,36 @@
MODULE_DEVICE_TABLE(platform, spi_driver_ids);

+ifdef CONFIG_PM_SLEEP
+static int rspi_suspend(struct device *dev)
+{
+    struct platform_device *pdev = to_platform_device(dev);
+    struct rspi_data *rspi = platform_get_drvdata(pdev);
+    +
+    +
+    +return spi_master_suspend(rspi->master);
+    +
+    +
+    +static int rspi_resume(struct device *dev)
+    +{
+    +    struct platform_device *pdev = to_platform_device(dev);
+    +    struct rspi_data *rspi = platform_get_drvdata(pdev);
+    +    +
+    +    +return spi_master_resume(rspi->master);
+    +
+    +
+    +#define DEV_PM_OPS&rspi_pm_ops
+    +#else

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```c
+    +#define DEV_PM_OPS_NULL
+    +endif /* CONFIG_PM_SLEEP */
+    +
+    static struct platform_driver rspi_driver = {
+        .probe = rspi_probe,
+        .remove = rspi_remove,
+        .id_table = rspi_driver_ids,
+        .driver = {
+            .name = "renesas_spi",
+            .pm = DEV_PM_OPS,
+            .of_match_table = of_match_ptr(rspi_of_match),
+        },
+    };
```

```
--- linux-4.15.0.orig/drivers/spi/spi-s3c24xx-fiq.S
+++ linux-4.15.0/drivers/spi/spi-s3c24xx-fiq.S
@@ -36,7 +36,6 @@
@@ -50,7 +49,7 @@
@@ -62,7 +61,6 @@
@@ -62,7 +61,6 @@
```

```
ENTRY(s3c24xx_spi_fiq_rx)
-s3c24xx_spi_fiq_rx:
    .word fiq_rx_end - fiq_rx_start
    .word fiq_rx_irq_ack - fiq_rx_start
    fiq_rx_start:
        @ @ -50,7 +49,7 @@
    strbf iq_rtmp, [ fiq_rspi, #S3C2410_SPTDAT ]
```

```
subsf iq_rcount, fiq_rcount, #1
-subsne pc, lr, #4@@ return, still have work to do
+subsne pc, lr, #4@@ return, still have work to do
```

```
@@ -62,7 +61,6 @@
@@ -62,7 +61,6 @@
```

```
ENTRY(s3c24xx_spi_fiq_txrx)
-s3c24xx_spi_fiq_txrx:
    .word fiq_txrx_end - fiq_txrx_start
    .word fiq_txrx_irq_ack - fiq_txrx_start
    fiq_txrx_start:
        @ @ -77,7 +75,7 @@
    strbf iq_rtmp, [ fiq_rspi, #S3C2410_SPTDAT ]
```

```
subsf iq_rcount, fiq_rcount, #1
-subsne pc, lr, #4@@ return, still have work to do
+subsne pc, lr, #4@@ return, still have work to do
```

```
@@ -62,7 +61,6 @@
@@ -62,7 +61,6 @@
```

```
ENTRY(s3c24xx_spi_fiq_txrx)
-s3c24xx_spi_fiq_txrx:
    .word fiq_txrx_end - fiq_txrx_start
    .word fiq_txrx_irq_ack - fiq_txrx_start
    fiq_txrx_start:
        @ @ -77,7 +75,7 @@
    strbf iq_rtmp, [ fiq_rspi, #S3C2410_SPTDAT ]
```

```
subsf iq_rcount, fiq_rcount, #1
-subsne pc, lr, #4@@ return, still have work to do
+subsne pc, lr, #4@@ return, still have work to do
```

```
@@ -62,7 +61,6 @@
@@ -62,7 +61,6 @@
```

```
movf iq_rtmp, #0
        @ @ -62,7 +61,6 @@
    fiq_rx_end:
```

```
ENTRY(s3c24xx_spi_fiq_txrx)
-s3c24xx_spi_fiq_txrx:
    .word fiq_txrx_end - fiq_txrx_start
    .word fiq_txrx_irq_ack - fiq_txrx_start
    fiq_txrx_start:
        @ @ -77,7 +75,7 @@
    strbf iq_rtmp, [ fiq_rspi, #S3C2410_SPTDAT ]
```

```
subsf iq_rcount, fiq_rcount, #1
-subsne pc, lr, #4@@ return, still have work to do
+subsne pc, lr, #4@@ return, still have work to do
```

```
movf iq_rtmp, #0
```

```
```
ENTRY(s3c24xx_spi_fiq_tx)
-s3c24xx_spi_fix_tx:
.word fiq_tx_end - fiq_tx_start
.word fiq_tx_irq_ack - fiq_tx_start
fiq_tx_start:
@@ -102,7 +99,7 @@
strbfiq_rtmp, [ fiq_rspi, # S3C2410_SPTDAT ]

subsfq_rcount, fiq_rcount, #1
-subnespc, lr, #4@@ return, still have work to do
+subsnepc, lr, #4@@ return, still have work to do

movfiq_rtmp, #0
strfiq_rtmp, [ fiq_rirq, # S3C2410_INTMOD - S3C24XX_VA_IRQ ]
--- linux-4.15.0.orig/drivers/spi/spi-s3c64xx.c
+++ linux-4.15.0/drivers/spi/spi-s3c64xx.c
@@ -677,11 +677,11 @@
sdd->state &= ~RXBUSY;
sdd->state &= ~TXBUSY;
-enable_datapath(sdd, spi, xfer, use_dma);
-
-/* Start the signals */
s3c64xx_spi_set_cs(spi, true);

+enable_datapath(sdd, spi, xfer, use_dma);
+
+spin_unlock_irqrestore(&sdd->lock, flags);

if (use_dma)
@@ -1270,8 +1270,6 @@
return ret;

-s3c64xx_spi_hwinitsdd, port_id);
-
return spi_master_resume(master);
} #endif /* CONFIG_PM_SLEEP */
@@ -1309,6 +1307,8 @@
if (ret != 0)
goto err_disable_src_clk;
+s3c64xx_spi_hwinitsdd, port_id);
+ return 0;

err_disable_src_clk:
--- linux-4.15.0.orig/drivers/spi/spi-sc18is602.c
+++ linux-4.15.0/drivers/spi/spi-sc18is602.c
@@ -248,13 +248,12 @@
 struct sc18is602_platform_data *pdata = dev_get_platdata(dev);
 struct sc18is602 *hw;
 struct spi_master *master;
-int error;
 if (!i2c_check_functionality(client->adapter, I2C_FUNC_I2C |
   I2C_FUNC_SMBUS_WRITE_BYTE_DATA))
 return -EINVAL;

-master = spi_alloc_master(dev, sizeof(struct sc18is602));
+master = devm_spi_alloc_master(dev, sizeof(struct sc18is602));
 if (!master)
  return -ENOMEM;

master->min_speed_hz = hw->freq / 128;
master->max_speed_hz = hw->freq / 4;

-error = devm_spi_register_master(dev, master);
-if (error)
  goto error_reg;
-
-return 0;
-
-error_reg:
-spi_master_put(master);
-return error;
+return devm_spi_register_master(dev, master);
}

static const struct i2c_device_id sc18is602_id[] = {
--- linux-4.15.0.orig/drivers/spi/spi-sh-msofi.c
+++ linux-4.15.0/drivers/spi/spi-sh-msofi.c
@@ -55,6 +55,8 @@
 void *rx_dma_page;
dma_addr_t tx_dma_addr;
dma_addr_t rx_dma_addr;
+bool native_cs_inited;
+bool native_cs_high;
 bool slave_aborted;
};
k = min_t(int, k, ARRAY_SIZE(sh_msiof_spi_div_table) - 1);
brps = min_t(int, brps, 32);

scr = sh_msiof_spi_div_table[k].brdv | SCR_BRPS(brps);
sh_msiof_write(p, TSCR, scr);

static void sh_msiof_reset_str(struct sh_msiof_spi_priv *p)
{
    sh_msiof_write(p, STR, sh_msiof_read(p, STR));
    +sh_msiof_write(p, STR,

    +sh_msiof_read(p, STR) & ~(STR_TDREQ | STR_RDREQ));
}

static void sh_msiof_spi_write_fifo_8(struct sh_msiof_spi_priv *p,
{
    struct device_node* np = spi->master->dev.of_node;
    struct sh_msiof_spi_priv *p = spi_master_get_devdata(spi->master);
    
    +pm_runtime_get_sync(&p->pdev->dev);
    +u32 clr, set, tmp;

    if (!np) {
        /*
        @ @ -539,19 +542,33 @ @
        spi->cs_gpio = (uintptr_t)spi->controller_data;
        }
        
        /* Configure pins before deasserting CS */
        -sh_msiof_spi_set_pin_regs(p, !!(spi->mode & SPI_CPOL),
        -  !!(spi->mode & SPI_CPHA),
        -  !!(spi->mode & SPI_3WIRE),
        -  !!(spi->mode & SPI_LSB_FIRST),
        -  !!(spi->mode & SPI_CS_HIGH));

        -if (spi->cs_gpio >= 0)
        +if (spi->cs_GPIO >= 0) {
            gpio_set_value(spi->cs_gpio, !(spi->mode & SPI_CS_HIGH));
            +return 0;
        +}

        +if (spi_controller_is_slave(p->master))
        +return 0;
pm_runtime_put(&p->pdev->dev);
+if (p->native_cs_inited &&
  + (p->native_cs_high == !(spi->mode & SPI_CS_HIGH)))
  +return 0;

+/* Configure native chip select mode/polarity early */
+clr = MDR1_SYNCMD_MASK;
+set = MDR1_SYNCMD_SPI;
+if (spi->mode & SPI_CS_HIGH)
+  +clr |= BIT(MDR1_SYNCAC_SHIFT);
+else
+  +set |= BIT(MDR1_SYNCAC_SHIFT);
+pm_runtime_get_sync(&p->pdev->dev);
+tmp = sh_msiof_read(p, TMDR1) & ~clr;
+sh_msiof_write(p, TMDR1, tmp | set | MDR1_TRMD | TMDR1_PCON);
+tmp = sh_msiof_read(p, RMDR1) & ~clr;
+sh_msiof_write(p, RMDR1, tmp | set);
+pm_runtime_put(&p->pdev->dev);
+p->native_cs_high = spi->mode & SPI_CS_HIGH;
+p->native_cs_inited = true;
return 0;
}

@@ -784,11 +801,21 @@
goto stop_dma;
}

-/* wait for tx fifo to be emptied / rx fifo to be filled */
+/* wait for tx/rx DMA completion */
ret = sh_msiof_wait_for_completion(p);
if (ret)
goto stop_reset;

+if (!rx) {
+  +reinit_completion(&p->done);
+  +sh_msiof_write(p, IER, IER_TEOFE);
+  +#/ wait for tx fifo to be emptied */
+  +ret = sh_msiof_wait_for_completion(p);
+  +if (ret)
+    +goto stop_reset;
+  +}
+}

/* clear status bits */
sh_msiof_reset_str(p);

@@ -1254,8 +1281,8 @@
```c
i = platform_get_irq(pdev, 0);
if (i < 0) {
    -dev_err(&pdev->dev, "cannot get platform IRQ\n");
    -ret = -ENOENT;
    +dev_err(&pdev->dev, "cannot get IRQ\n");
    +ret = i;
    goto err1;
}

?,?,-1333,12 +1360,37 ??
};
MODULE_DEVICE_TABLE(platform, spi_driver_ids);

+#ifdef CONFIG_PM_SLEEP
+static int sh_msiof_spi_suspend(struct device *dev)
+{
+    struct platform_device *pdev = to_platform_device(dev);
+    struct sh_msiof_spi_priv *p = platform_get_drvdata(pdev);
+    +return spi_master_suspend(p->master);
+}
+
+static int sh_msiof_spi_resume(struct device *dev)
+{
+    struct platform_device *pdev = to_platform_device(dev);
+    struct sh_msiof_spi_priv *p = platform_get_drvdata(pdev);
+    +return spi_master_resume(p->master);
+}
+
+static SIMPLE_DEV_PM_OPS(sh_msiof_spi_pm_ops, sh_msiof_spi_suspend,
+    + sh_msiof_spi_resume);
+#define DEV_PM_OPS&sh_msiof_spi_pm_ops
+#else
+#define DEV_PM_OPSNULL
+#endif /* CONFIG_PM_SLEEP */
+
static struct platform_driver sh_msiof_spi_drv = {
    .probe= sh_msiof_spi_probe,
    .remove= sh_msiof_spi_remove,
    .id_table= spi_driver_ids,
    .driver= {
        .name= "spi_sh_msiof",
        .pm= DEV_PM_OPS,
        .of_match_table = of_match_ptr(sh_msiof_match),
    },
};
```
--- linux-4.15.0.orig/drivers/spi/spi-sh.c
+++ linux-4.15.0/drivers/spi/spi-sh.c
@@ -450,7 +450,7 @@
     return irq;
 }

(master = spi_alloc_master(&pdev->dev, sizeof(struct spi_sh_data)));
+master = devm_spi_alloc_master(&pdev->dev, sizeof(struct spi_sh_data));
 if (master == NULL) {
     dev_err(&pdev->dev, "spi_alloc_master error\n");
     return -ENOMEM;
@@ -468,16 +468,14 @@
     break;
     default:
     dev_err(&pdev->dev, "No support width\n");
     -ret = -ENODEV;
-    goto error1;
+    return -ENODEV;
 }  ss->irq = irq;
 ss->master = master;
 ss->addr = devm_ioremap(&pdev->dev, res->start, resource_size(res));
 if (ss->addr == NULL) {
     dev_err(&pdev->dev, "ioremap error\n");
-    ret = -ENOMEM;
-    goto error1;
+    return -ENOMEM;
 }  INIT_LIST_HEAD(&ss->queue);
 spin_lock_init(&ss->lock);
@@ -487,7 +485,7 @@
 ret = request_irq(irq, spi_sh_irq, 0, "spi_sh", ss);
 if (ret < 0) {
     dev_err(&pdev->dev, "request_irq error\n");
-    goto error1;
+    return ret;
 }

 master->num_chipselect = 2;
@@ -506,9 +504,6 @@
 error3:
 free_irq(irq, ss);
    - error1:
-    -spi_master_put(master);
-    
    return ret;
 }
--- linux-4.15.0.orig/drivers/spi/spi-st-ssc4.c
+++ linux-4.15.0/drivers/spi/spi-st-ssc4.c
@@ -379,11 +379,13 @@
 ret = devm_spi_register_master(&pdev->dev, master);
 if (ret) {
   dev_err(&pdev->dev, "Failed to register master\n");
-  goto clk_disable;
+  goto rpm_disable;
+rpm_disable:
+    pm_runtime_disable(&pdev->dev);
  clk_disable:
    clk_disable_unprepare(spi_st->clk);
  put_master:
@@ -396,6 +398,8 @@
 struct spi_master *master = platform_get_drvdata(pdev);
 struct spi_st *spi_st = spi_master_get_devdata(master);

+pm_runtime_disable(&pdev->dev);
 +
 clk_disable_unprepare(spi_st->clk);

 pinctrl_pm_select_sleep_state(&pdev->dev);
--- linux-4.15.0.orig/drivers/spi/spi-stm32.c
+++ linux-4.15.0/drivers/spi/spi-stm32.c
@@ -254,7 +254,8 @@
 { u32 div, mbrdiv;
 
-  div = DIV_ROUND_UP(spi->clk_rate, speed_hz);
+  /* Ensure spi->clk_rate is even */
+  div = DIV_ROUND_UP(spi->clk_rate & ~0x1, speed_hz);
  /* SPI framework set xfer->speed_hz to master->max_speed_hz if
@@ -298,9 +299,9 @@
  /* align packet size with data registers access */
 if (spi->cur_bpw > 8)
-    fthlv -= (fthlv % 2); /* multiple of 2 */
+    fthlv += (fthlv % 2) ? 1 : 0;
  else
-    fthlv -= (fthlv % 4); /* multiple of 4 */
+    fthlv += (fthlv % 4) ? (4 - (fthlv % 4)) : 0;
 */
/* SPI framework set xfer->speed_hz to master->max_speed_hz if
@@ -298,9 +299,9 @@
  /* align packet size with data registers access */
 if (spi->cur_bpw > 8)
-    fthlv -= (fthlv % 2); /* multiple of 2 */
+    fthlv += (fthlv % 2) ? 1 : 0;
  else
-    fthlv -= (fthlv % 4); /* multiple of 4 */
+    fthlv += (fthlv % 4) ? (4 - (fthlv % 4)) : 0;
 */
return fthlv;
}
@@ -991,6 +992,10 @@
struct stm32_spi *spi = spi_master_get_devdata(master);

int ret;

+/* Don't do anything on 0 bytes transfers */
+if (transfer->len == 0)
+return 0;
+
spi->tx_buf = transfer->tx_buf;
spi->rx_buf = transfer->rx_buf;
spi->tx_len = spi->tx_buf ? transfer->len : 0;
--- linux-4.15.0.orig/drivers/spi/spi-sun6i.c
+++ linux-4.15.0/drivers/spi/spi-sun6i.c
@@ -202,7 +202,7 @@
{
struct sun6i_spi *sspi = spi_master_get_devdata(master);
  
-unsigned int mclk_rate, div, timeout;
+unsigned int mclk_rate, div, div_cdr1, div_cdr2, timeout;
unsigned int start, end, tx_time;
unsigned int trig_level;
unsigned int tx_len = 0;
@@ -291,18 +291,20 @@
  /* First try CDR2, and if we can't reach the expected
   * frequency, fall back to CDR1.
   */
-  div = mclk_rate / (2 * tfr->speed_hz);
-  if (div <= (SUN6I_CLK_CTL_CDR2_MASK + 1)) {
-    if (div > 0)
-      div--;
-    -
-      -reg = SUN6I_CLK_CTL_CDR2(div) | SUN6I_CLK_CTL_DRS;
+    div_cdr1 = DIV_ROUND_UP(mclk_rate, tfr->speed_hz);
+    div_cdr2 = DIV_ROUND_UP(div_cdr1, 2);
+    if (div_cdr2 <= (SUN6I_CLK_CTL_CDR2_MASK + 1)) {
+      reg = SUN6I_CLK_CTL_CDR2(div_cdr2 - 1) | SUN6I_CLK_CTL_DRS;
+    } else {
+      div = ilog2(mclk_rate) - ilog2(tfr->speed_hz);
+      div = min(SUN6I_CLK_CTL_CDR1_MASK, order_base_2(div_cdr1));
+      reg = SUN6I_CLK_CTL_CDR1(div);
+    }
+
  sun6i_spi_write(sspi, SUN6I_CLK_CTL_CDR2, reg);
  +/* Finally enable the bus - doing so before might raise SCK to HIGH */
  +reg = sun6i_spi_read(sspi, SUN6I_GBL_CTL_CDR1);
+reg |= SUN6I_GBL_CTL_BUS_ENABLE;
sun6i_spi_write(sspi, SUN6I_GBL_CTL_REG, reg);

/* Setup the transfer now... */
if (sspi->tx_buf)
@@ -411,7 +413,7 @@
}
sun6i_spi_write(sspi, SUN6I_GBL_CTL_REG,
-SUN6I_GBL_CTL_BUS_ENABLE | SUN6I_GBL_CTL_MASTER | SUN6I_GBL_CTL_TP);
+ SUN6I_GBL_CTL_MASTER | SUN6I_GBL_CTL_TP);
return 0;
@@ -541,7 +543,7 @@
static int sun6i_spi_remove(struct platform_device *pdev)
{
-pm_runtime_disable(&pdev->dev);
+pm_runtime_force_suspend(&pdev->dev);

return 0;
}
--- linux-4.15.0.orig/drivers/spi/spi-tegra114.c
+++ linux-4.15.0/drivers/spi/spi-tegra114.c
@@ -307,10 +307,16 @@
x |= (u32)(*tx_buf++) << (i * 8);
tegra_spi_writel(tspi, x, SPI_TX_FIFO);
}
+
+tspi->cur_tx_pos += written_words * tspi->bytes_per_word;
} else {
+unsigned int write_bytes;
max_n_32bit = min(tspi->curr_dma_words, tx_empty_count);
written_words = max_n_32bit;
nbytes = written_words * tspi->bytes_per_word;
+if (nbytes > t->len - tspi->cur_pos)
+nbytes = t->len - tspi->cur_pos;
+write_bytes = nbytes;
for (count = 0; count < max_n_32bit; count++) {
u32 x = 0;

@@ -319,8 +325,10 @@
x |= (u32)(*tx_buf++) << (i * 8);
tegra_spi_writel(tspi, x, SPI_TX_FIFO);
}
+
+tspi->cur_tx_pos += write_bytes;
for (i = 0; len && (i < 4); i++, len--)
    *rx_buf++ = (x >> i*8) & 0xFF;
}
tspi->cur_rx_pos += tspi->curr_dma_words * tspi->bytes_per_word;
read_words += tspi->curr_dma_words;
tspi->cur_rx_pos += tspi->curr_dma_words * tspi->bytes_per_word;
} else {
    u32 rx_mask = (((u32)1 << t->bits_per_word) - 1);
    u8 bytes_per_word = tspi->bytes_per_word;
    unsigned int read_bytes;

    len = rx_full_count * bytes_per_word;
    if (len > t->len - tspi->cur_pos)
        len = t->len - tspi->cur_pos;
    read_bytes = len;
    for (count = 0; count < rx_full_count; count++) {
        u32 x = tegra_spi_readl(tspi, SPI_RX_FIFO) & rx_mask;

        for (i = 0; len && (i < bytes_per_word); i++, len--)
            *rx_buf++ = (x >> (i*8)) & 0xFF;
    }
tspi->cur_rx_pos += rx_full_count * tspi->bytes_per_word;
read_words += rx_full_count;
tspi->cur_rx_pos += read_bytes;
} +
return read_words;
}

unsigned len = tspi->curr_dma_words * tspi->bytes_per_word;
memcpy(tspi->tx_dma_buf, t->tx_buf + tspi->cur_pos, len);
tspi->cur_tx_pos += tspi->curr_dma_words * tspi->bytes_per_word;
} else {
    unsigned int i;
    unsigned int count;
    u8 *tx_buf = (u8 *)t->tx_buf + tspi->cur_tx_pos;
    unsigned consume = tspi->curr_dma_words * tspi->bytes_per_word;
    unsigned int write_bytes;

+if (consume > t->len - tspi->cur_pos)
+consume = t->len - tspi->cur_pos;
+write_bytes = consume;
for (count = 0; count < tspi->curr_dma_words; count++) {
    u32 x = 0;

    @ @ -386.8 +406.9 @ @
x |= (u32)(*tx_buf++) << (i * 8);
tspi->tx_dma_buf[count] = x;
} +
+tspi->cur_tx_pos += write_bytes;
}
-tspi->cur_tx_pos += tspi->curr_dma_words * tspi->bytes_per_word;

/* Make the dma buffer to read by dma */
dma_sync_single_for_device(tspi->dev, tspi->tx_dma_phys,
@@ -405,20 +426,28 @@
unsigned len = tspi->curr_dma_words * tspi->bytes_per_word;
memcpy(t->rx_buf + tspi->cur_rx_pos, tspi->rx_dma_buf, len);
+tspi->cur_rx_pos += tspi->curr_dma_words * tspi->bytes_per_word;
} else {
    unsigned int i;
    unsigned int count;
    unsigned char *rx_buf = t->rx_buf + tspi->cur_rx_pos;
    u32 rx_mask = ((u32)1 << t->bits_per_word) - 1;
    +unsigned consume = tspi->curr_dma_words * tspi->bytes_per_word;
    +unsigned int read_bytes;

    +if (consume > t->len - tspi->cur_pos)
        +consume = t->len - tspi->cur_pos;
        +read_bytes = consume;
    for (count = 0; count < tspi->curr_dma_words; count++) {
        u32 x = tspi->rx_dma_buf[count] & rx_mask;

        -for (i = 0; (i < tspi->bytes_per_word); i++)
            +for (i = 0; consume && (i < tspi->bytes_per_word);
                +i++, consume--)
                *
                +rx_buf++ = (x >> (i*8)) & 0xFF;
    } +
    +tspi->cur_rx_pos += read_bytes;
}
-tspi->cur_rx_pos += tspi->curr_dma_words * tspi->bytes_per_word;

/* Make the dma buffer to read by dma */
static int tegra_spi_start_dma_based_transfer(
    struct tegra_spi_data *tspi, struct spi_transfer *t)
+
static int tegra_spi_flush_fifos(struct tegra_spi_data *tspi)
{
    u32 val;
    unsigned int len;
    int ret = 0;
    unsigned long timeout = jiffies + HZ;
    u32 status;

    /* Make sure that Rx and Tx fifo are empty */
    status = tegra_spi_readl(tspi, SPI_FIFO_STATUS);
    if ((status & SPI_FIFO_EMPTY) != SPI_FIFO_EMPTY) {
        dev_err(tspi->dev, "Rx/Tx fifo are not empty status 0x%08x\n",
          (unsigned)status);
        return -EIO;
    }

    status |= SPI_RX_FIFO_FLUSH | SPI_TX_FIFO_FLUSH;
    tegra_spi_writel(tspi, status, SPI_FIFO_STATUS);
    while ((status & SPI_FIFO_EMPTY) != SPI_FIFO_EMPTY) {
        status = tegra_spi_readl(tspi, SPI_FIFO_STATUS);
        if (time_after(jiffies, timeout)) {
            dev_err(tspi->dev,
                "timeout waiting for fifo flush\n");
            return -EIO;
        }
        udelay(1);
    }

    return 0;
}

+static int tegra_spi_start_dma_based_transfer(
    struct tegra_spi_data *tspi, struct spi_transfer *t)
+
{ +
    u32 val;
    unsigned int len;
    int ret = 0;
    u8 dma_burst;
    struct dma_slave_config dma_sconfig = {0};
    +
    val = SPI_DMA_BLK_SET(tspi->curr_dma_words - 1);
tegra_spi_writel(tspi, val, SPI_DMA_BLK);

@@ -496,12 +542,16 @@
 len = tspi->curr_dma_words * 4;

 /* Set attention level based on length of transfer */
 -if (len & 0xF)
 +if (len & 0xF) {
   val |= SPI_TX_TRIG_1 | SPI_RX_TRIG_1;
 -else if (((len) >> 4) & 0x1)
 +  dma_burst = 1;
 +} else if (((len) >> 4) & 0x1) {
   val |= SPI_TX_TRIG_4 | SPI_RX_TRIG_4;
 -else
   +  dma_burst = 4;
 +} else {
   val |= SPI_TX_TRIG_8 | SPI_RX_TRIG_8;
 +  dma_burst = 8;
 +}

 if (tspi->cur_direction & DATA_DIR_TX)
  val |= SPI_IE_TX;
@@ -512,7 +562,18 @@
 tegra_spi_writel(tspi, val, SPI_DMA_CTL);
 tspi->dma_control_reg = val;

 +  dma_sconfig.device_fc = true;
 if (tspi->cur_direction & DATA_DIR_TX) {
 +  dma_sconfig.dst_addr = tspi->phys + SPI_TX_FIFO;
 +  dma_sconfig.dst_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
 +  dma_sconfig.dst_maxburst = dma_burst;
 +  ret = dmaengine_slave_config(tspi->tx_dma_chan, &dma_sconfig);
 +  if (ret < 0) {
 +    dev_err(tspi->dev,
 +    +"DMA slave config failed: \%d\n", ret);
 +    return ret;
 +  }
 +  tegra_spi_copy_client_txbuf_to_spi_txbuf(tspi, t);
  ret = tegra_spi_start_tx_dma(tspi, len);
 if (ret < 0) {
@@ -523,6 +584,16 @@
 }

 if (tspi->cur_direction & DATA_DIR_RX) {
 +  dma_sconfig.src_addr = tspi->phys + SPI_RX_FIFO;
 +  dma_sconfig.src_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
 +  dma_sconfig.src_maxburst = dma_burst;

+ret = dmaengine_slave_config(tspi->rx_dma_chan, &dma_sconfig);
+if (ret < 0) {
+dev_err(tspi->dev,
+"DMA slave config failed: %d\n", ret);
+return ret;
+}
+
/* Make the dma buffer to read by dma */
dma_sync_single_for_device(tspi->dev, tspi->rx_dma_phys,
tspi->dma_buf_size, DMA_FROM_DEVICE);
@@ -582,7 +653,6 @@
 u32 *dma_buf;
dma_addr_t dma_phys;
int ret;
-struct dma_slave_config dma_sconfig:

dma_chan = dma_request_slave_channel_reason(tspi->dev,
dma_to_memory ? "rx" : "tx");
@@ -603,19 +673,6 @@
} 

if (dma_to_memory) {
-dma_sconfig.src_addr = tspi->phys + SPI_RX_FIFO;
-dma_sconfig.src_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
-dma_sconfig.src_maxburst = 0;
-} else {
-dma_sconfig.dst_addr = tspi->phys + SPI_TX_FIFO;
-dma_sconfig.dst_addr_width = DMA_SLAVE_BUSWIDTH_4_BYTES;
-dma_sconfig.dst_maxburst = 0;
-}
-
-ret = dmaengine_slave_config(dma_chan, &dma_sconfig);
-if (ret)
-goto scrub;
-if (dma_to_memory) {
 tspi->rx_dma_chan = dma_chan;
tspi->rx_dma_buf = dma_buf;
tspi->rx_dma_phys = dma_phys;
@@ -625,11 +682,6 @@
tspi->tx_dma_phys = dma_phys;
}
return 0;
-
-scrub:
-dma_free_coherent(tspi->dev, tspi->dma_buf_size, dma_buf, dma_phys);
-dma_release_channel(dma_chan);
-return ret;
}
static void tegra_spi_deinit_dma_param(struct tegra_spi_data *tspi,
    @@ -730,6 +782,8 @@
    if (tspi->is_packed)
        command1 |= SPI_PACKED;
    +else
    +command1 &= ~SPI_PACKED;

    command1 &= ~(SPI_CS_SEL_MASK | SPI_TX_EN | SPI_RX_EN);
    tspi->cur_direction = 0;
    @@ -748,6 +802,9 @@
    dev_dbg(tspi->dev, "The def 0x%x and written 0x%x\n",
    tspi->def_command1_reg, (unsigned)command1);

    +ret = tegra_spi_flush_fifos(tspi);
    +if (ret < 0)
    +return ret;
    if (total_fifo_words > SPI_FIFO_DEPTH)
        ret = tegra_spi_start_dma_based_transfer(tspi, t);
    else
        @@ -770,6 +827,7 @@
    ret = pm_runtime_get_sync(tspi->dev);
    if (ret < 0) {
        +pm_runtime_put_noidle(tspi->dev);
        dev_err(tspi->dev, "pm runtime failed, e = %d\n", ret);
        return ret;
    }
    @@ -838,7 +896,17 @@
    if (WARN_ON(ret == 0)) {
        dev_err(tspi->dev,
            "spi transfer timeout, err %d\n", ret);
        +if (tspi->is_curr_dma_xfer &&
            (tspi->cur_direction & DATA_DIR_TX))
            +dmaengine_terminate_all(tspi->tx_dma_chan);
        +if (tspi->is_curr_dma_xfer &&
            (tspi->cur_direction & DATA_DIR_RX))
            +dmaengine_terminate_all(tspi->rx_dma_chan);
        ret = -EIO;
        +tegra_spi_flush_fifos(tspi);
        +reset_control_assert(tspi->rst);
        +udelay(2);
        +reset_control_deassert(tspi->rst);
        goto complete_xfer;
    }
    @@ -889,6 +957,7 @@


tspi->status_reg);
dev_err(tspi->dev, "CpuXfer 0x%08x:0x%08x\n",
tspi->command1_reg, tspi->dma_control_reg);
+tegra_spi_flush_fifos(tspi);
reset_control_assert(tspi->rst);
udelay(2);
reset_control_deassert(tspi->rst);
@@ -961,6 +1030,7 @@
tspi->status_reg);
dev_err(tspi->dev, "DmaXfer 0x%08x:0x%08x\n",
tspi->command1_reg, tspi->dma_control_reg);
+tegra_spi_flush_fifos(tspi);
reset_control_assert(tspi->rst);
udelay(2);
reset_control_deassert(tspi->rst);
@@ -1067,27 +1137,19 @@
spi_irq = platform_get_irq(pdev, 0);
tspi->irq = spi_irq;
-ret = request_threaded_irq(tspi->irq, tegra_spi_isr,
-ret	tegra_spi_isr_thread, IRQF_ONESHOT,
-ret	dev_name(&pdev->dev), tspi);
-if (ret < 0) {
-ret	dev_err(&pdev->dev, "Failed to register ISR for IRQ %d\n",
-ret		tspi->irq);
-goto exit_free_master;
-

tspi->clk = devm_clk_get(&pdev->dev, "spi");
if (IS_ERR(tspi->clk)) {

dev_err(&pdev->dev, "can not get clock\n");
ret = PTR_ERR(tspi->clk);
-goto exit_free_irq;
+goto exit_free_master;
}

tspi->rst = devm_reset_control_get_exclusive(&pdev->dev, "spi");
if (IS_ERR(tspi->rst)) {

dev_err(&pdev->dev, "can not get reset\n");
ret = PTR_ERR(tspi->rst);
-goto exit_free_irq;
+goto exit_free_master;
}

tspi->max_buf_size = SPI_FIFO_DEPTH << 2;
@@ -1095,7 +1157,7 @@
ret = tegra_spi_init_dma_param(tspi, true);
if (ret < 0)
    -goto exit_free_irq;
+goto exit_free_master;
ret = tegra_spi_init_dma_param(tspi, false);
if (ret < 0)
    goto exit_rx_dma_free;
@@ -1117,18 +1179,32 @@
dev_err(&pdev->dev, "pm runtime get failed, e = %d\n", ret);
go to exit_pm_disable;
} 
+
+reset_control_assert(tspi->rst);
+udelay(2);
+reset_control_deassert(tspi->rst);
tspi->def_command1_reg = SPI_M_S;
tegra_spi_writel(tspi, tspi->def_command1_reg, SPI_COMMAND1);
pm_runtime_put(&pdev->dev);
+ret = request_threaded_irq(tspi->irq, tegra_spi_isr,
  +tegra_spi_isr_thread, IRQF_ONESHOT,
  +dev_name(&pdev->dev), tspi);
+if (ret < 0) {
+  dev_err(&pdev->dev, "Failed to register ISR for IRQ %d\n",
+    +tspi->irq);
+  goto exit_pm_disable;
+}

master->dev.of_node = pdev->dev.of_node;
ret = devm_spi_register_master(&pdev->dev, master);
if (ret < 0) {
  dev_err(&pdev->dev, "can not register to master err %d\n", ret);
  -goto exit_pm_disable;
+goto exit_free_irq;
} 

return ret;

+exit_free_irq:
+free_irq(spi_irq, tspi);
exit_pm_disable:
pm_runtime_disable(&pdev->dev);
if (!pm_runtime_status_suspended(&pdev->dev))
@@ -1136,8 +1212,6 @@
tegra_spi_deinit_dma_param(tspi, false);
exit_rx_dma_free:
tegra_spi_deinit_dma_param(tspi, true);
-exit_free_irq:
+-free_irq(spi_irq, tspi);
exit_free_master:
spi_master_put(master);
return ret;
@@ -1179,6 +1253,7 @@
ret = pm_runtime_get_sync(dev);
if (ret < 0) {
+pm_runtime_put_noidle(dev);
    dev_err(dev, "pm runtime failed, e = %d\n", ret);
    return ret;
}
--- linux-4.15.0.orig/drivers/spi/spi-tegra20-sflash.c
+++ linux-4.15.0/drivers/spi/spi-tegra20-sflash.c
@@ -564,6 +564,7 @@
ret = pm_runtime_get_sync(dev);
if (ret < 0) {
+pm_runtime_put_noidle(dev);
    dev_err(dev, "pm runtime failed, e = %d\n", ret);
    return ret;
}
--- linux-4.15.0.orig/drivers/spi/spi-tegra20-slink.c
+++ linux-4.15.0/drivers/spi/spi-tegra20-slink.c
@@ -761,6 +761,7 @@
ret = pm_runtime_get_sync(tspi->dev);
if (ret < 0) {
+pm_runtime_put_noidle(tspi->dev);
    dev_err(tspi->dev, "pm runtime failed, e = %d\n", ret);
    return ret;
}
@@ -1063,6 +1064,24 @@
goto exit_free_master;
}

+/
+* disabled clock may cause interrupt storm upon request *
+tspi->clk = devm_clk_get(&pdev->dev, NULL);
+if (IS_ERR(tspi->clk)) {
+    ret = PTR_ERR(tspi->clk);
+    dev_err(&pdev->dev, "Can not get clock %d\n", ret);
+    goto exit_free_master;
+}
+ret = clk_prepare(tspi->clk);
+if (ret < 0) {
+    dev_err(&pdev->dev, "Clock prepare failed %d\n", ret);
+    goto exit_free_master;
+}
+ret = clk_enable(tspi->clk);
+if (ret < 0) {
+    dev_err(&pdev->dev, "Clock enable failed %d\n", ret);
+}
goto exit_clk_unprepare;
+
spi_irq = platform_get_irq(pdev, 0);
tspi->irq = spi_irq;
ret = request_threaded_irq(tspi->irq, tegra_slink_isr,
@@ -1071,14 +1090,7 @@
if (ret < 0) {
  dev_err(&pdev->dev, "Failed to register ISR for IRQ %d\n",
  tspi->irq);
-goto exit_free_master;
-goto exit_clk_disable;
-
-tspi->clk = devm_clk_get(&pdev->dev, NULL);
-if (IS_ERR(tspi->clk)) {
-  dev_err(&pdev->dev, "can not get clock\n");
-  ret = PTR_ERR(tspi->clk);
-  goto exit_free_irq;
+  goto exit_clk_disable;
+}
}

++tspi->rst = devm_reset_control_get_exclusive(&pdev->dev, "spi");
@@ -1138,6 +1150,10 @@
tegra_slink_deinit_dma_param(tspi, true);
exit_free_irq:
  free_irq(spi_irq, tspi);
  +exit_clk_disable:
  +clk_disable(tspi->clk);
  +exit_clk_unprepare:
  +clk_unprepare(tspi->clk);
  exit_free_master:
  spi_master_put(master);
  return ret;
@@ -1150,6 +1166,9 @@
   free_irq(tspi->irq, tspi);
   +clk_disable(tspi->clk);
   +clk_unprepare(tspi->clk);
   +
   if (tspi->tx_dma_chan)
   tegra_slink_deinit_dma_param(tspi, false);
@@ -1179,6 +1198,7 @@
   ret = pm_runtime_get_sync(dev);
   if (ret < 0) {
     +pm_runtime_put_noidle(dev);
dev_err(dev, "pm runtime failed, e = %d\n", ret);
return ret;
}
@@ -1190,7 +1210,7 @@
}
#endif

- static int tegra_slink_runtime_suspend(struct device *dev)
+ static int __maybe_unused tegra_slink_runtime_suspend(struct device *dev)
 {
 struct spi_master *master = dev_get_drvdata(dev);
 struct tegra_slink_data *tspi = spi_master_get_devdata(master);
@@ -1202,7 +1222,7 @@
 return 0;
 }

- static int tegra_slink_runtime_resume(struct device *dev)
+ static int __maybe_unused tegra_slink_runtime_resume(struct device *dev)
 {
 struct spi_master *master = dev_get_drvdata(dev);
 struct tegra_slink_data *tspi = spi_master_get_devdata(master);
--- linux-4.15.0.orig/drivers/spi/spi-ti-qspi.c
+++ linux-4.15.0/drivers/spi/spi-ti-qspi.c
@@ -180,6 +180,7 @@
 ret = pm_runtime_get_sync(qspi->dev);
 if (ret < 0) {
 + pm_runtime_put_noidle(qspi->dev);
 dev_err(qspi->dev, "pm_runtime_get_sync() failed\n");
 return ret;
 }
@@ -490,8 +491,8 @@
 ti_qspi_write(qspi, MM_SWITCH, QSPI_SPI_SWITCH_REG);
 if (qspi->ctrl_base) {
 regmap_update_bits(qspi->ctrl_base, qspi->ctrl_reg,
-    MEM_CS_EN(spi->chip_select),
-    MEM_CS_MASK);
+    MEM_CS_MASK,
+    MEM_CS_EN(spi->chip_select));
 }
 qspi->mmap_enabled = true;
)
@@ -503,7 +504,7 @@
 ti_qspi_write(qspi, 0, QSPI_SPI_SWITCH_REG);
 if (qspi->ctrl_base)
 regmap_update_bits(qspi->ctrl_base, qspi->ctrl_reg,
-    0, MEM_CS_MASK);
+    MEM_CS_MASK, 0);
qspi->mmap_enabled = false;
}

@@ -642,6 +643,17 @@
return 0;
}

+static void ti_qspi_dma_cleanup(struct ti_qspi *qspi)
+{
+  +if (qspi->rx_bb_addr)
+    +dma_free_coherent(qspi->dev, QSPI_DMA_BUFFER_SIZE,
+      +qspi->rx_bb_addr,
+      +qspi->rx_bb_dma_addr);
+
+  +if (qspi->rx_chan)
+    +dma_release_channel(qspi->rx_chan);
+}

static const struct of_device_id ti_qspi_match[] = {
  {.compatible = "ti,dra7xxx-qspi" },
  {.compatible = "ti,am4372-qspi" },
@@ -793,6 +805,8 @@
if (!ret)
    return 0;

  +ti_qspi_dma_cleanup(qspi);
+
  pm_runtime_disable(&pdev->dev);
free_master:
  spi_master_put(master);
@@ -811,12 +825,7 @@
  pm_runtime_put_sync(&pdev->dev);
  pm_runtime_disable(&pdev->dev);

-  -if (qspi->rx_bb_addr)
-    -dma_free_coherent(qspi->dev, QSPI_DMA_BUFFER_SIZE,
-      -qspi->rx_bb_addr,
-      -qspi->rx_bb_dma_addr);
-  -if (qspi->rx_chan)
-    -dma_release_channel(qspi->rx_chan);
-
  +ti_qspi_dma_cleanup(qspi);

return 0;
}
/* Definition for ML7213/ML7223/ML7831 by LAPIS Semiconductor */
#define PCI_VENDOR_ID_ROHM		0x10DB
#define PCI_DEVICE_ID_ML7213_SPI	0x802c
#define PCI_DEVICE_ID_ML7223_SPI	0x800F
#define PCI_DEVICE_ID_ML7831_SPI	0x8816

if (data->pkt_rx_buff) {
    if (!data->pkt_rx_buff) {
        kfree(data->pkt_tx_buff);
        data->pkt_tx_buff = NULL;
    }
}

if (!data->pkt_rx_buff) {
    dma->sg_rx_p = kcalloc(num, sizeof(*dma->sg_rx_p), GFP_ATOMIC);
    sg_init_table(dma->sg_rx_p, num); /* Initialize SG table */
    /* offset, length setting */
    sg = dma->sg_rx_p;
    dma->rx_buf_virt, dma->rx_buf_dma);
}

dma->sg_tx_p = kcalloc(num, sizeof(*dma->sg_tx_p), GFP_ATOMIC);
sg_init_table(dma->sg_tx_p, num); /* Initialize SG table */
/* offset, length setting */
sg = dma->sg_tx_p;

static void pch_alloc_dma_buf(struct pch_spi_board_data *board_dat, struct pch_spi_board_data *board_dat, struct pch_spi_data *data)
{ struct pch_spi_dma_ctrl *dma;
+int ret;
dma = &data->dma;
+ret = 0;
/* Get Consistent memory for Tx DMA */
dma->tx_buf_virt = dma_alloc_coherent(&board_dat->pdev->dev,
PCH_BUF_SIZE, &dma->tx_buf_dma, GFP_KERNEL);
+if (!dma->tx_buf_virt)
+ret = -ENOMEM;
+
/* Get Consistent memory for Rx DMA */
dma->rx_buf_virt = dma_alloc_coherent(&board_dat->pdev->dev,
PCH_BUF_SIZE, &dma->rx_buf_dma, GFP_KERNEL);
+if (!dma->rx_buf_virt)
+ret = -ENOMEM;
+
+return ret;
}

static int pch_spi_pd_probe(struct platform_device *plat_dev)
@@ -1382,7 +1398,9 @@
if (use_dma) {
		pch_alloc_dma_buf(board_dat, data);
++
+ret = pch_alloc_dma_buf(board_dat, data);
++
+if (ret)
+goto err_spi_register_master;
}
ret = spi_register_master(master);
--- linux-4.15.0.orig/drivers/spi/spi-zynqmp-gqspi.c
+++ linux-4.15.0/drivers/spi/spi-zynqmp-gqspi.c
@@ -415,9 +415,6 @@
 zynqmp_gqspi_write(xqspi, GQSPI_GEN_FIFO_OFST, genfifoentry);

-/* Dummy generic FIFO entry */
-zynqmp_gqspi_write(xqspi, GQSPI_GEN_FIFO_OFST, 0x0);
-
/* Manually start the generic FIFO command */
zynqmp_gqspi_write(xqspi, GQSPI_CONFIG_OFST,
zynqmp_gqspi_read(xqspi, GQSPI_CONFIG_OFST) |
--- linux-4.15.0.orig/drivers/spi/spi.c
+++ linux-4.15.0/drivers/spi/spi.c
@@ -357,9 +357,11 @@
 ret = dev_pm_domain_attach(dev, true);
 if (ret != -EPROBE_DEFER) {

-ret = sdrv->probe(spi);
-if (ret)
-dev_pm_domain_detach(dev, true);
+  if (sdrv->probe) {
+  ret = sdrv->probe(spi);
+  if (ret)
+  dev_pm_domain_detach(dev, true);
+ }
}

return ret;
@@ -368,9 +370,10 @@
static int spi_drv_remove(struct device *dev)
{
  const struct spi_driver *sdrv = to_spi_driver(dev->driver);
-int ret;
+int ret = 0;

  -ret = sdrv->remove(to_spi_device(dev));
  +if (sdrv->remove)
  +ret = sdrv->remove(to_spi_device(dev));
  dev_pm_domain_detach(dev, true);

  return ret;
@@ -395,10 +398,8 @@
  }
  sdrv->driver.owner = owner;
  sdrv->driver.bus = &spi_bus_type;
  -if (sdrv->probe)  
  -sdrv->driver.probe = spi_drv_probe;
  +sdrv->driver.probe = spi_drv_probe;
  -if (sdrv->remove)  
  -sdrv->driver.remove = spi_drv_remove;
  +sdrv->driver.remove = spi_drv_remove;
  +sdrv->driver.remove = spi_drv_remove;
  if (sdrv->shutdown)  
  sdrv->driver.shutdown = spi_drv_shutdown;
  return driver_register(&sdrv->driver);
@@ -428,6 +429,12 @@
 */
 static DEFINE_MUTEX(board_lock);
+
+/*
+ * Prevents addition of devices with same chip select and
+ * addition of devices below an unregistering controller.
+ */
+static DEFINE_MUTEX(spi_add_lock);
+
+/**
* spi_alloc_device - Allocate a new SPI device
* @ctrller: Controller to which device is connected
@@ -506,7 +513,6 @@
*/
int spi_add_device(struct spi_device *spi)
{
- static DEFINE_MUTEX(spi_add_lock);
struct spi_controller *ctrller = spi->controller;
struct device *dev = ctrller->dev.parent;
int status;
@@ -534,6 +540,13 @@
goto done;
}

+ /* Controller may unregister concurrently */
+if (IS_ENABLED(CONFIG_SPI_DYNAMIC) &&
+ device_is_registered(&ctrller->dev)) {
+ status = -ENODEV;
+ goto done;
+ }
+
+ if (ctrller->cs_gpios)
spi->cs_gpio = ctrller->cs_gpios[spi->chip_select];

@@ -779,8 +792,14 @@
for (i = 0; i < sgs; i++) {
    if (vmalloced_buf || kmap_buf) {
-        min = min_t(size_t, len, desc_len - offset_in_page(buf));
+        /* Next scatterlist entry size is the minimum between
+         * the desc_len and the remaining buffer length that
+         * fits in a page.
+         */
+        min = min_t(size_t, desc_len,
+                    min_t(size_t, len,
+                       PAGE_SIZE - offset_in_page(buf)));
        if (vmalloced_buf)
vm_page = vmalloc_to_page(buf);
else
@@ -985,6 +1004,8 @@
if (max_tx || max_rx) {
    list_for_each_entry(xfer, &msg->transfers,
                        transfer_list) {
+    if (!xfer->len)
+        continue;
    if (!xfer->tx_buf)
xfer->tx_buf = ctrlr->dummy_tx;
if (!xfer->rx_buf)
    @@ -1105,8 +1126,6 @@
if (msg->status && ctrlr->handle_err)
    ctrlr->handle_err(ctrlr, msg);

-spi_res_release(ctrlr, msg);
-
spi_finalize_current_message(ctrlr);

return ret;
@@ -1216,6 +1235,7 @@
if (!was_busy && ctrlr->auto_runtime_pm) {
    ret = pm_runtime_get_sync(ctrlr->dev.parent);
if (ret < 0) {
    +pm_runtime_put_noidle(ctrlr->dev.parent);
    dev_err(&ctrlr->dev, "Failed to power device: %d\n", 
    ret);
mutex_unlock(&ctrlr->io_mutex);
@@ -1363,6 +1383,13 @@
spi_unmap_msg(ctrlr, msg);

+/* In the prepare_messages callback the spi bus has the opportunity to 
+ * split a transfer to smaller chunks. 
+ * Release splited transfers here since spi_map_msg is done on the 
+ * splited transfers. 
+ */
+spi_res_release(ctrlr, msg);
+
if (ctrlr->cur_msg_prepared && ctrlr->unprepare_message) {
    ret = ctrlr->unprepare_message(ctrlr, msg);
    if (ret) {
        @@ -1644,6 +1671,7 @@
        /* Store a pointer to the node in the device structure */
        of_node_get(nc);
        spi->dev.of_node = nc;
        +spi->dev.fwnode = of_fwnode_handle(nc);

        /* Register the new device */
        rc = spi_add_device(spi);
        @@ -2017,6 +2045,50 @@
    }
EXPORT_SYMBOL_GPL(__spi_alloc_controller);

+static void devm_spi_release_controller(struct device *dev, void *ctlr)
+{
+    spi_controller_put(*(struct spi_controller **)ctlr);
/**
 * __devm_spi_alloc_controller - resource-managed __spi_alloc_controller()
 * @dev: physical device of SPI controller
 * @size: how much zeroed driver-private data to allocate
 * @slave: whether to allocate an SPI master (false) or SPI slave (true)
 * Context: can sleep
 * +
 * Allocate an SPI controller and automatically release a reference on it
 * when @dev is unbound from its driver. Drivers are thus relieved from
 * having to call spi_controller_put().
 * +
 * + The arguments to this function are identical to __spi_alloc_controller().
 * +
 * Return: the SPI controller structure on success, else NULL.
 * +/
 * struct spi_controller *__devm_spi_alloc_controller(struct device *dev,
 * unsigned int size,
 * bool slave)
 *
 * struct spi_controller **ptr, *ctlr;
 *
 * ptr = devres_alloc(devm_spi_release_controller, sizeof(*ptr),
 * GFP_KERNEL);
 * if (!ptr)
 * return NULL;
 *
 * ctlr = __spi_alloc_controller(dev, size, slave);
 * if (ctlr) {
 * ctlr->devm_allocated = true;
 * ptr = ctlr;
 * devres_add(dev, ptr);
 * } else {
 * devres_free(ptr);
 * }
 *
 * return ctlr;
 */

EXPORT_SYMBOL_GPL(__devm_spi_alloc_controller);

#ifdef CONFIG_OF
static int of_spi_register_master(struct spi_controller *ctlr)
{
if (ctlr->num_chipselect == 0)
return -EINVAL;
#endif

ifdef CONFIG_OF
static int of_spi_register_master(struct spi_controller *ctlr)
{
@@ -2101,8 +2173,17 @@
*}
if (ctlr->num_chipselect == 0)
return -EINVAL;

-/* allocate dynamic bus number using Linux idr */
-if ((ctlr->bus_num < 0) && ctlr->dev.of_node) {
+if (ctlr->bus_num >= 0) {
  /* devices with a fixed bus num must check-in with the num */
  mutex_lock(&board_lock);
  +id = idr_alloc(&spi_master_idr, ctlr, ctlr->bus_num,
  +ctlr->bus_num + 1, GFP_KERNEL);
  mutex_unlock(&board_lock);
  +if (WARN(id < 0, "couldn't get idr"))
  +return id == -ENOSPC ? -EBUSY : id;
  +ctlr->bus_num = id;
+} else if (ctlr->dev.of_node) {
+/* allocate dynamic bus number using Linux idr */
  id = of_alias_get_id(ctlr->dev.of_node, "spi");
  if (id >= 0) {
    ctlr->bus_num = id;
  } else {
    /* Prevent addition of new devices, unregister existing ones */
    +if (IS_ENABLED(CONFIG_SPI_DYNAMIC))
    +mutex_lock(&spi_add_lock);
    +device_for_each_child(&ctlr->dev, NULL, __unregister);
   篾*/ First make sure that this controller was ever added */
    mutex_lock(&board_lock);
    found = idr_find(&spi_master_idr, id);
    mutex_unlock(&board_lock);
    -if (found != ctlr) {
    -dev_dbg(&ctlr->dev,
    -"attempting to delete unregistered controller [%s]n",
    -dev_name(&ctlr->dev));
    -return;
    -}
    if (ctlr->queued) {
      if (spi_destroy_queue(ctlr))
        dev_err(&ctlr->dev, "queue remove failed\n");
      list_del(&ctlr->list);
      mutex_unlock(&board_lock);
      /* First make sure that this controller was ever added */
      mutex_lock(&board_lock);
      found = idr_find(&spi_master_idr, id);
      mutex_unlock(&board_lock);
      -if (found != ctlr) {
      -dev_dbg(&ctlr->dev,
      -"attempting to delete unregistered controller [%s]n",
      -dev_name(&ctlr->dev));
      -return;
      -}
      if (ctlr->queued) {
        if (spi_destroy_queue(ctlr))
          dev_err(&ctlr->dev, "queue remove failed\n");
        list_del(&ctlr->list);
        mutex_unlock(&board_lock);
        -dummy = device_for_each_child(&ctlr->dev, NULL, __unregister);
        -device_unregister(&ctlr->dev);
        +device_del(&ctlr->dev);
        }
/* Release the last reference on the controller if its driver has not yet been converted to devm_spi_alloc_master/slave(). */

if (!ctlr->devm_allocated)
    put_device(&ctlr->dev);

/* free bus id */
mutex_lock(&board_lock);
-idr_remove(&spi_master_idr, id);
+if (found == ctlr)
+    idr_remove(&spi_master_idr, id);
mutex_unlock(&board_lock);

+if (IS_ENABLED(CONFIG_SPI_DYNAMIC))
+mutex_unlock(&spi_add_lock);
}
EXPORT_SYMBOL_GPL(spi_unregister_controller);

--- linux-4.15.0.orig/drivers/spi/spidev.c
+++ linux-4.15.0/drivers/spi/spidev.c
@@ -232,6 +232,11 @@
    for (n = n_xfers, k_tmp = k_xfers, u_tmp = u_xfers;
    n;
    n--, k_tmp++, u_tmp++) {
+    /* Ensure that also following allocations from rx_buf/tx_buf will meet DMA alignment requirements. */
+    unsigned int len_aligned = ALIGN(u_tmp->len, ARCH_KMALLOC_MINALIGN);
+k_tmp->len = u_tmp->len;

    total += k_tmp->len;
@@ -247,17 +252,17 @@
    if (u_tmp->tx_buf) {
        /* this transfer needs space in RX bounce buffer */
        -rx_total += k_tmp->len;
+rx_total += len_aligned;
        if (rx_total > bufsiz) {
            status = -EMSGSIZE;
            goto done;
        }
        k_tmp->rx_buf = rx_buf;
        -rx_buf += k_tmp->len;
+rx_buf += len_aligned;
    }
    if (u_tmp->tx_buf) {

/* this transfer needs space in TX bounce buffer */
-tx_total += k_tmp->len;
+tx_total += len_aligned;
if (tx_total > bufsiz) {
    status = -EMSGSIZE;
goto done;
@@ -267,7 +272,7 @@
    (uintptr_t) u_tmp->tx_buf,
    u_tmp->len))
goto done;
-tx_buf += k_tmp->len;
+tx_buf += len_aligned;
}

k_tmp->cs_change = !!u_tmp->cs_change;
@@ -297,16 +302,16 @@
goto done;

/* copy any rx data out of bounce buffer */
-rx_buf = spidev->rx_buffer;
-for (n = n_xfers, u_tmp = u_xfers; n--; u_tmp++) {
+for (n = n_xfers, k_tmp = k_xfers, u_tmp = u_xfers;
     +n;
     +n--; k_tmp++, u_tmp++) {
    if (u_tmp->rx_buf) {
        if (copy_to_user((u8 __user *)
-rx_buf = spidev->rx_buffer;
  for (n = n_xfers, u_tmp = u_xfers; n--; u_tmp++) {
+for (n = n_xfers, k_tmp = k_xfers, u_tmp = u_xfers;
      +n;
      +n--; k_tmp++, u_tmp++) {
        if (u_tmp->rx_buf) {
            if (copy_to_user((u8 __user *)
-rx_buf = spidev->rx_buffer;
  for (n = n_xfers, u_tmp = u_xfers; n--; u_tmp++) {
+for (n = n_xfers, k_tmp = k_xfers, u_tmp = u_xfers;
      +n;
      +n--; k_tmp++, u_tmp++) {
        if (u_tmp->rx_buf) {
            if (copy_to_user((u8 __user *)

static int spidev_release(struct inode *inode, struct file *filp)
{
    struct spidev_data *spidev;
    +intofree;

    mutex_lock(&device_list_lock);
    spidev = filp->private_data;
    filp->private_data = NULL;

    +spin_lock_irq(&spidev->spi_lock);
    */" ... after we unbound from the underlying device? */
+dofree = (spidev->spi == NULL);
+spin_unlock_irq(&spidev->spi_lock);
+
/* last close? */
spidev->users--;
if (!spidev->users) {
    int dofree;
    kfree(spidev->tx_buffer);
    spidev->tx_buffer = NULL;
    spin_lock_irq(&spidev->spi_lock);
    if (spidev->spi)
        spidev->speed_hz = spidev->spi->max_speed_hz;
    /* ... after we unbound from the underlying device? */
    dofree = (spidev->spi == NULL);
    spin_unlock_irq(&spidev->spi_lock);
    if (dofree)
        kfree(spidev);
    else
        spidev->speed_hz = spidev->spi->max_speed_hz;
}  
#ifdef CONFIG_SPI_SLAVE
    if (!dofree)
        spi_slave_abort(spidev->spi);
#endif
mutex_unlock(&device_list_lock);
return 0;
#ifdef CONFIG_SPI_SLAVE
    if (!dofree)
        +spidev_probe_acpi(spi);
#endif
*/
 /* compatible string, it is a Linux implementation thing
 * rather than a description of the hardware.
 */
-if (spi->dev.of_node && !of_match_device(spidev_dt_ids, &spi->dev)) {
    dev_err(&spi->dev, "buggy DT: spidev listed directly in DT\n");
    WARN_ON(spi->dev.of_node &&
            !of_match_device(spidev_dt_ids, &spi->dev));
}  
+WARN(spi->dev.of_node &&
        of_device_is_compatible(spi->dev.of_node, "spidev"),
        "%pOF: buggy DT: spidev listed directly in DT\n", spi->dev.of_node);
spidev_probe_acpi(spi);
@@ -781,13 +787,13 @@
struct spidev_data*spidev = spi_get_drvdata(spi);

+/* prevent new opens */
+mutex_lock(&device_list_lock);
+/* make sure ops on existing fds can abort cleanly */
spin_lock_irq(&spidev->spi_lock);
spidev->spi = NULL;
spin_unlock_irq(&spidev->spi_lock);

-/* prevent new opens */
-mutex_lock(&device_list_lock);
list_del(&spidev->device_entry);
device_destroy(spidev_class, spidev->devt);
clear_bit(MINOR(spidev->devt), minors);
--- linux-4.15.0.orig/drivers/ssb/Kconfig
+++ linux-4.15.0/drivers/ssb/Kconfig
@@ -32,7 +32,7 @@
config SSB_PCIHOST_POSSIBLE
bool
-depends on SSB && (PCI = y || PCI = SSB) && PCI_DRIVERS_LEGACY
+depends on SSB && (PCI = y || PCI = SSB) && (PCI_DRIVERS_LEGACY || !MIPS)
default y

config SSB_PCIHOST
--- linux-4.15.0.orig/drivers/ssb/bridge_pcmcia_80211.c
+++ linux-4.15.0/drivers/ssb/bridge_pcmcia_80211.c
@@ -113,16 +113,21 @@
resume		= ssb_host_pcmcia_resume,
        }
+
+static int pcmcia_init_failed;
+
+/*
+ * These are not module init/exit functions!
+ * The module_pcmcia_driver() helper cannot be used here.
+ */
+int ssb_host_pcmcia_init(void)
+{
+return pcmcia_register_driver(&ssb_host_pcmcia_driver);
+pcmcia_init_failed = pcmcia_register_driver(&ssb_host_pcmcia_driver);
+}
+return pcmcia_init_failed;
+}
void ssb_host_pcmcia_exit(void)
{
- pcmcia_unregister_driver(&ssb_host_pcmcia_driver);
+ if (!pcmcia_init_failed)
+ pcmcia_unregister_driver(&ssb_host_pcmcia_driver);
}
--- linux-4.15.0.orig/drivers/ssb/scan.c
+++ linux-4.15.0/drivers/ssb/scan.c
@@ -325,6 +325,7 @@
if (bus->nr_devices > ARRAY_SIZE(bus->devices)) {
 ssb_err("More than %d ssb cores found (%d)\n",
 SSB_MAX_NR_CORES, bus->nr_devices);
+ err = -EINVAL;
 goto err_unmap;
}
ret = -EINVAL;
goto out;
+mutex_unlock(&ashmem_mutex);
+return -EINVAL;
}

if (!asma->file) {
  -ret = -EBADF;
  -goto out;
  +mutex_unlock(&ashmem_mutex);
  +return -EBADF;
}

+mutex_unlock(&ashmem_mutex);
+
ret = vfs_llseek(asma->file, offset, origin);
if (ret < 0)
  -goto out;
  +return ret;
*/ Copy f_pos from backing file, since f_ops->llseek() sets it */
file->f_pos = asma->file->f_pos;
-
-out:
-mutex_unlock(&ashmem_mutex);
return ret;
}

@@ -362,8 +370,23 @@
  _calc_vm_trans(prot, PROT_EXEC, VM_MAYEXEC);
 }

+static int ashmem_vmfile_mmap(struct file *file, struct vm_area_struct *vma)
+{
+  /* do not allow to mmap ashmem backing shmem file directly */
+  +return -EPERM;
+}
+
+static unsigned long
+ashmem_vmfile_get_unmapped_area(struct file *file, unsigned long addr,
+unsigned long len, unsigned long pgoff,
+unsigned long flags)
+{
+  +return current->mm->get_unmapped_area(file, addr, len, pgoff, flags);
+}
+static int ashmem_mmap(struct file *file, struct vm_area_struct *vma)
{
static struct file_operations vmfile_fops;
struct ashmem_area *asma = file->private_data;
int ret = 0;

goto out;
}

/* requested mapping size larger than object size */
if (vma->vm_end - vma->vm_start > PAGE_ALIGN(asma->size)) {
    ret = -EINVAL;
    goto out;
}

/* requested protection bits must match our allowed protection mask */
if (unlikely((vma->vm_flags & ~calc_vm_prot_bits(asma->prot_mask, 0)) &
    calc_vm_prot_bits(PROT_MASK, 0))) {
    if (!asma->file) {
        char *name = ASHMEM_NAME_DEF;
        struct file *vmfile;
        +struct inode *inode;

        if (asma->name[ASHMEM_NAME_PREFIX_LEN] != '\0')
            name = asma->name;
    }
    vmfile->f_mode |= FMODE_LSEEK;
    +inode = file_inode(vmfile);
    +lockdep_set_class(&inode->i_rwlock, &backing_shmem_inode_class);
    asma->file = vmfile;
    */
    + * override mmap operation of the vmfile so that it can't be
    + * remapped which would lead to creation of a new vma with no
    + * asma permission checks. Have to override get_unmapped_area
    + * as well to prevent VM_BUG_ON check for f_ops modification.
    + */
    +if (!vmfile_fops.mmap) {
        +vmfile_fops = *vmfile->f_op;
        +vmfile_fops.mmap = ashmem_vmfile_mmap;
        +vmfile_fops.get_unmapped_area =
        +ashmem_vmfile_get_unmapped_area;
    }

    +vmfile->f_op = &vmfile_fops;
    get_file(asma->file);
size_t pgstart, pgend;
int ret = -EINVAL;

@if (unlikely(!asma->file))
@return -EINVAL;
-
@if (unlikely(copy_from_user(&pin, p, sizeof(pin))))
@return -EFAULT;
+
mutex_lock(&ashmem_mutex);
+
@if (unlikely(!asma->file))
@goto out_unlock;
+
/* per custom, you can pass zero for len to mean "everything onward" */
@if (!pin.len)
pin.len = PAGE_ALIGN(asma->size) - pin.offset;

@if (unlikely((pin.offset | pin.len) & ~PAGE_MASK))
истем
@if (unlikely(((__u32)-1) - pin.offset < pin.len))
@return -EINVAL;
+goto out_unlock;
+
@if (unlikely(PAGE_ALIGN(asma->size) < pin.offset + pin.len))
@return -EINVAL;
+goto out_unlock;

pgstart = pin.offset / PAGE_SIZE;
pgend = pgstart + (pin.len / PAGE_SIZE) - 1;

mutex_lock(&ashmem_mutex);
-
switch (cmd) {
 case ASHMEM_PIN:
 ret = ashmem_pin(asma, pgstart, pgend);
 @ @ -746,6 +791,7 @ @
 break;
}
+out_unlock:
mutex_unlock(&ashmem_mutex);

return ret;
--- linux-4.15.0.orig/drivers/staging/android/ion/ion-ioctl.c
void ion_buffer_destroy(struct ion_buffer *buffer)
{
    if (WARN_ON(buffer->kmap_cnt > 0))
        if (buffer->kmap_cnt > 0) {
            pr_warn_once("%s: buffer still mapped in the kernel\n", __func__);
            buffer->heap->ops->unmap_kernel(buffer->heap, buffer);
        }
    buffer->heap->ops->free(buffer);
    kfree(buffer);
}

--- linux-4.15.0.orig/drivers/staging/android/ion/ion_cma_heap.c
+++ linux-4.15.0/drivers/staging/android/ion/ion_cma_heap.c
@@ -21,6 +21,7 @@
 #include <linux/err.h>
 #include <linux/cma.h>
 #include <linux/scatterlist.h>
+#include <linux/highmem.h>

 kfree(a);
}
--- linux-4.15.0.orig/drivers/staging/android/ion/ion.c
+++ linux-4.15.0/drivers/staging/android/ion/ion.c
@@ -129,8 +129,11 @@
 void ion_buffer_destroy(struct ion_buffer *buffer)
 {
     -if (WARN_ON(buffer->kmap_cnt > 0))
@@ -252,10 +255,10 @@
     struct ion_dma_buf_attachment *a = attachment->priv;
     struct ion_buffer *buffer = dmabuf->priv;
     -free_duped_table(a->table);
@@ -70,8 +70,10 @@
     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -256,14 +259,14 @@
     +free_duped_table(a->table);
     kfree(a);
 }
--- linux-4.15.0.orig/drivers/staging/android/ion/ion_ioctl.c
+++ linux-4.15.0/drivers/staging/android/ion_ioctl.c
@@ -70,8 +70,10 @@
     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
     memset(&data, 0, sizeof(data));
 --- linux-4.15.0.orig/drivers/staging/android/ion/ion.c
+++ linux-4.15.0/drivers/staging/android/ion/ion.c
@@ -129,8 +129,11 @@
 void ion_buffer_destroy(struct ion_buffer *buffer)
 {
     -if (WARN_ON(buffer->kmap_cnt > 0))
@@ -252,10 +255,10 @@
     struct ion_dma_buf_attachment *a = attachment->priv;
     struct ion_buffer *buffer = dmabuf->priv;
     -free_duped_table(a->table);
     mutex_lock(&buffer->lock);
     list_del(&a->list);
@@ -70,8 +70,10 @@
     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
     memset(&data, 0, sizeof(data));
 --- linux-4.15.0.orig/drivers/staging/android/ion/ion_ioctl.c
+++ linux-4.15.0/drivers/staging/android/ion_ioctl.c
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     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
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     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
     memset(&data, 0, sizeof(data));
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+++ linux-4.15.0/drivers/staging/android/ion_ioctl.c
@@ -70,8 +70,10 @@
     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
     memset(&data, 0, sizeof(data));

 if (!dir & _IOC_WRITE)
     memset(&data, 0, sizeof(data));

--- linux-4.15.0.orig/drivers/staging/android/ion/ion.c
+++ linux-4.15.0/drivers/staging/android/ion/ion.c
@@ -129,8 +129,11 @@
 void ion_buffer_destroy(struct ion_buffer *buffer)
 {
     -if (WARN_ON(buffer->kmap_cnt > 0))
@@ -252,10 +255,10 @@
     struct ion_dma_buf_attachment *a = attachment->priv;
     struct ion_buffer *buffer = dmabuf->priv;
     -free_duped_table(a->table);
     mutex_lock(&buffer->lock);
     list_del(&a->list);
@@ -70,8 +70,10 @@
     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
     memset(&data, 0, sizeof(data));
 --- linux-4.15.0.orig/drivers/staging/android/ion/ion_ioctl.c
+++ linux-4.15.0/drivers/staging/android/ion_ioctl.c
@@ -70,8 +70,10 @@
     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
     memset(&data, 0, sizeof(data));
 --- linux-4.15.0.orig/drivers/staging/android/ion/ion_ioctl.c
+++ linux-4.15.0/drivers/staging/android/ion_ioctl.c
@@ -70,8 +70,10 @@
     ret = validate_ioctl_arg(cmd, &data);
     -if (WARN_ON_ONCE(ret))
@@ -761,8 +764,10 @@
     memset(&data, 0, sizeof(data));
#include "ion.h"

@@ -51,6 +52,22 @@
 if (!pages)
 return -ENOMEM;

+if (PageHighMem(pages)) {
+unsigned long nr_clear_pages = nr_pages;
+struct page *page = pages;
+ +
+ while (nr_clear_pages > 0) {
+ void *vaddr = kmap_atomic(page);
+ +
+ memset(vaddr, 0, PAGE_SIZE);
+ kunmap_atomic(vaddr);
+ page++;
+ nr_clear_pages--;
+ +}
+ else {
+ memset(page_address(pages), 0, size);
+ +}
+ +
+ table = kmalloc(sizeof(*table), GFP_KERNEL);
+ if (!table)
+ goto err;
- --- linux-4.15.0.orig/drivers/staging/android/ion/ion_heap.c
+ +++ linux-4.15.0/drivers/staging/android/ion/ion_heap.c
 @@ -38,7 +38,7 @@
 struct page **tmp = pages;
 if (!pages)
 -return NULL;
+return ERR_PTR(-ENOMEM);

 if (buffer->flags & ION_FLAG_CACHED)
 ppgprot = PAGE_KERNEL;
 @@ -105,12 +105,12 @@
 static int ion_heap_clear_pages(struct page **pages, int num, pgprot_t pgprot)
 { }
-void *addr = vm_map_ram(pages, num, -1, ppgprot);
+void *addr = vmap(pages, num, VM_MAP, ppgprot);

 if (!addr)
 return -ENOMEM;
 memset(addr, 0, PAGE_SIZE * num);
-vm_unmap_ram(addr, num);
+vunmap(addr);
return 0;
}

--- linux-4.15.0.orig/drivers/staging/android/ion/ion_page_pool.c
+++ linux-4.15.0/drivers/staging/android/ion/ion_page_pool.c
@@ -22,11 +22,14 @@
#include <linux/init.h>
#include <linux/slab.h>
#include <linux/swap.h>
+#include <linux/sched/signal.h>
#include "ion.h"

static void *ion_page_pool_alloc_pages(struct ion_page_pool *pool)
{
+if (fatal_signal_pending(current))
+return NULL;
struct page *page = alloc_pages(pool->gfp_mask, pool->order);

if (!page)
--- linux-4.15.0.orig/drivers/staging/android/ion/ion_system_heap.c
+++ linux-4.15.0/drivers/staging/android/ion/ion_system_heap.c
@@ -298,10 +298,10 @@

#define cached)
{
  int i;
  -gfp_t gfp_flags = low_order_gfp_flags;
  +gfp_t gfp_flags = low_order_gfp_flags;

  for (i = 0; i < NUM_ORDERS; i++) {
    struct ion_page_pool *pool;
    +gfp_t gfp_flags = low_order_gfp_flags;

    if (orders[i] > 4)
      gfp_flags = high_order_gfp_flags;
-@ @ -371,7 +371,7 @ @
      unsigned long i;
      int ret;
      -page = alloc_pages(low_order_gfp_flags, order);
      +page = alloc_pages(low_order_gfp_flags | __GFP_NOWARN, order);
      if (!page)
        return -ENOMEM;
      
--- linux-4.15.0.orig/drivers/staging/board/board.c
+++ linux-4.15.0/drivers/staging/board/board.c
@@ -139,6 +139,7 @@

 static int board_staging_add_dev_domain(struct platform_device *pdev,
      const char *domain)
```c
struct device *dev = &pdev->dev;
struct of_phandle_args pd_args;
struct device_node *np;

pd_args.np = np;
pd_args.args_count = 0;

return of_genpd_add_device(&pd_args, &pdev->dev);
/+* Initialization similar to device_pm_init_common() */
+spin_lock_init(&dev->power.lock);
+dev->power.early_init = true;
+
+return of_genpd_add_device(&pd_args, dev);
}
#else
static inline int board_staging_add_dev_domain(struct platform_device *pdev,
--- linux-4.15.0.orig/drivers/staging/ccree/cc_hw_queue_defs.h
+++ linux-4.15.0/drivers/staging/ccree/cc_hw_queue_defs.h
@@ -467,8 +467,7 @@
*/ @pdesc: pointer HW descriptor struct
* @mode: Any one of the modes defined in [CC7x-DESC]
*/
-static inline void set_cipher_mode(struct cc_hw_desc *pdesc,
-    enum drv_cipher_mode mode)
+static inline void set_cipher_mode(struct cc_hw_desc *pdesc, int mode)
{
    pdesc->word[4] |= FIELD_PREP(WORD4_CIPHER_MODE, mode);
}
@@ -479,8 +478,7 @@
*/ @pdesc: pointer HW descriptor struct
* @mode: Any one of the modes defined in [CC7x-DESC]
*/
-static inline void set_cipher_config0(struct cc_hw_desc *pdesc,
-    enum drv_cipher_config0 mode)
+static inline void set_cipher_config0(struct cc_hw_desc *pdesc, int mode)
{
    pdesc->word[4] |= FIELD_PREP(WORD4_CIPHER_CONF0, mode);
}
--- linux-4.15.0.orig/drivers/staging/ccree/ssi_buffer_mgr.c
+++ linux-4.15.0/drivers/staging/ccree/ssi_buffer_mgr.c
@@ -469,7 +469,8 @@
    DMA_TO_DEVICE);
}
/* Release pool */
-if (req_ctx->dma_buf_type == SSI_DMA_BUF_MLLI) {
+if (req_ctx->dma_buf_type == SSI_DMA_BUF_MLLI &&
```
+ req_ctx->mlli_params.mlli_virt_addr) {
  dma_pool_free(req_ctx->mlli_params.curr_pool,
    req_ctx->mlli_params.mlli_virt_addr,
    req_ctx->mlli_params.mlli_dma_addr);
}

--- linux-4.15.0.orig/drivers/staging/ccree/ssi_cipher.c
+++ linux-4.15.0/drivers/staging/ccree/ssi_cipher.c
@@ -908,6 +908,7 @@
scatterwalk_map_and_copy(req_ctx->backup_info, req->src,
  (req->nbytes - ivsize), ivsize, 0);
 req_ctx->is_giv = false;
+#req_ctx->backup_info = NULL;
return ssi_blkcipher_process(tfm, req_ctx, req->dst, req->src, req->nbytes, req->info, ivsize, (void *)req,
DRV_CRYPTO_DIRECTION_DECRYPT);
}

--- linux-4.15.0.orig/drivers/staging/ccree/ssi_driver.c
+++ linux-4.15.0/drivers/staging/ccree/ssi_driver.c
@@ -117,7 +117,7 @@
irr &= ~SSI_COMP_IRQ_MASK;
complete_request(drvdata);
}
-#ifdef CC_SUPPORT_FIPS
+#ifdef CONFIG_CRYPTO_FIPS
/* TEE FIPS interrupt */
if (likely((irr & SSI_GPR0_IRQ_MASK) != 0)) {
/* Mask interrupt - will be unmasked in Deferred service handler */
--- linux-4.15.0.orig/drivers/staging/ccree/ssi_hash.c
+++ linux-4.15.0/drivers/staging/ccree/ssi_hash.c
@@ -1769,7 +1769,7 @@
struct device *dev = drvdata_to_dev(ctx->drvdata);
struct ahash_req_ctx *state = ahash_request_ctx(req);
  u32 tmp;
-  int rc = 0;
+  int rc;

  memcpy(&tmp, in, sizeof(u32));
  if (tmp != CC_EXPORT_MAGIC) {
-    goto out;
+    return ssi_hash_init(state, ctx);

-/* call init() to allocate bufs if the user hasn’t */
-  if (!state->digest_buff) {
-    rc = ssi_hash_init(state, ctx);
-    if (rc)
-      goto out;
-  }
+  return ssi_hash_init(state, ctx);

  /* call init() to allocate bufs if the user hasn’t */
  if (!state->digest_buff) {
    rc = ssi_hash_init(state, ctx);
    if (rc)
      goto out;
  }
+  return ssi_hash_init(state, ctx);
if (rc)
    goto out;

dma_sync_single_for_cpu(dev, state->digest_buff_dma_addr,
ctx->inter_digestsize, DMA_BIDIRECTIONAL);
--- linux-4.15.0.orig/drivers/staging/comedi/comedi_fops.c
+++ linux-4.15.0/drivers/staging/comedi/comedi_fops.c
@@ -2603,8 +2603,10 @@
}
cfp = kzalloc(sizeof(*cfp), GFP_KERNEL);
-if (!cfp)
+if (!cfp) {
+    comedi_dev_put(dev);
return -ENOMEM;
+
}
cfp->dev = dev;

--- linux-4.15.0.orig/drivers/staging/comedi/comedidev.h
+++ linux-4.15.0/drivers/staging/comedi/comedidev.h
@@ -992,6 +992,8 @@
    unsigned int mask);

unsigned int comedi_dio_update_state(struct comedi_subdevice *s,
    unsigned int *data);
+unsigned int comedi_bytes_per_scan_cmd(struct comedi_subdevice *s,
+    struct comedi_cmd *cmd);

unsigned int comedi_bytes_per_scan(struct comedi_subdevice *s);

unsigned int comedi_nscans_left(struct comedi_subdevice *s,
    unsigned int nscans);
--- linux-4.15.0.orig/drivers/staging/comedi/drivers.c
+++ linux-4.15.0/drivers/staging/comedi/drivers.c
@@ -390,11 +390,13 @@
EXPORT_SYMBOL_GPL(comedi_dio_update_state);

/**
- * comedi_bytes_per_scan() - Get length of asynchronous command "scan" in bytes
+ * comedi_bytes_per_scan_cmd() - Get length of asynchronous command "scan" in
+ * bytes
+ * @s: COMEDI subdevice.
+ * @cmd: COMEDI command.
+ *
+ * Determines the overall scan length according to the subdevice type and the
+ * number of channels in the scan.
+ * number of channels in the scan for the specified command.
+ *
+ * For digital input, output or input/output subdevices, samples for
+ * multiple channels are assumed to be packed into one or more unsigned

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unsigned int comedi_bytes_per_scan(struct comedi_subdevice *s)
{
  struct comedi_cmd *cmd = &s->async->cmd;
  unsigned int num_samples;
  unsigned int bits_per_sample;

  return comedi_samples_to_bytes(s, num_samples);
}

EXPORT_SYMBOL_GPL(comedi_bytes_per_scan);

static unsigned int __comedi_nscans_left(struct comedi_subdevice *s,
                                          struct comedi_cmd *cmd);

if (cmd->stop_src == TRIG_COUNT) {
  unsigned int nscans = nsamples / cmd->scan_end_arg;
  unsigned int scans_left = __comedi_nscans_left(s, nscans);
}

static unsigned int __comedi_nscans_left(struct comedi_subdevice *s,
                                          struct comedi_cmd *cmd) {
  struct comedi_cmd *cmd = &s->async->cmd;
  return comedi_bytes_per_scan_cmd(s, cmd);
}

EXPORT_SYMBOL_GPL(comedi_bytes_per_scan_cmd);
unsigned int scans_left = __comedi_nscans_left(s, cmd->stop_arg);
unsigned int scan_pos =
    comed_i_bytes_to_samples(s, async->scan_progress);
unsigned long long samples_left = 0;
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/addi_apci_1032.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/addi_apci_1032.c
@@ -115,14 +115,22 @@
unsigned int *data)
{
    struct apci1032_private *devpriv = dev->private;
-    unsigned int shift, oldmask;
+    unsigned int shift, oldmask, himask, lomask;
    switch (data[0]) {
    case INSNN_CONFIG_DIGITAL_TRIG:
        if (data[1] != 0)
            return -EINVAL;
        shift = data[3];
        -oldmask = (1U << shift) - 1;
+if (shift < 32) {
+    oldmask = (1U << shift) - 1;
+    himask = data[4] << shift;
+    lomask = data[5] << shift;
+} else {
+    oldmask = 0xffffffffu;
+    himask = 0;
+    lomask = 0;
+}
        switch (data[2]) {
    case COMEDI_DIGITAL_TRIG_DISABLE:
            devpriv->ctrl = 0;
@@ -145,8 +153,8 @@
            devpriv->mode2 &= oldmask;
        }
/* configure specified channels */
-        devpriv->mode1 |= data[4] << shift;
+        devpriv->mode1 |= himask;
+        devpriv->mode2 |= lomask;
        break;
    case COMEDI_DIGITAL_TRIG_ENABLE_LEVELS:
        if (devpriv->ctrl != (APCI1032_CTRL_INT_ENA |
@@ -163,8 +171,8 @@
            devpriv->mode2 &= oldmask;
        }
/* configure specified channels */
-        devpriv->mode1 |= data[4] << shift;
+devpriv->mode1 |= himask;
+devpriv->mode2 |= lomask;
break;
default:
return -EINVAL;
@@ -261,6 +269,7 @@
struct apci1032_private *devpriv = dev->private;
struct comedi_subdevice *s = dev->read_subdev;
unsigned int ctrl;
+unsigned short val;

    /* check interrupt is from this device */
    if ((inl(devpriv->amcc_iobase + AMCC_OP_REG_INTCSR) &
            @ @ -261.6 +269.7 @@
        outl(ctrl & ~APCI1032_CTRL_INT_ENA, dev->iobase + APCI1032_CTRL_REG);

    s->state = inl(dev->iobase + APCI1032_STATUS_REG) & 0xffff;
-comedi_buf_write_samples(s, &s->state, 1);
+val = s->state;
+comedi_buf_write_samples(s, &val, 1);
comedi_handle_events(dev, s);

    /* enable the interrupt */
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/addi_apci_1500.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/addi_apci_1500.c
@@ -217,7 +217,7 @@
struct apci1500_private *devpriv = dev->private;
struct comedi_subdevice *s = dev->read_subdev;
-unsigned int status = 0;
+unsigned short status = 0;
unsigned int val;
val = inl(devpriv->amcc + AMCC_OP_REG_INTCSR);
@@ -247,14 +247,14 @@
- * 0x00000100  Counter/timer 1 has run down (not implemented)
- * 0x00001000  Counter/timer 2 has run down (not implemented)
- * 0x00010000  Counter 3 has run down (not implemented)
- * 0x00100000  Watchdog has run down (not implemented)
- * 0x01000000  Voltage error
- * 0x10000000  Short-circuit error
+ * 0b00000001  Event 1 has occurred
+ * 0b00000010  Event 2 has occurred
+ 0b000000100 Counter/timer 1 has run down (not implemented)
+ 0b000001000 Counter/timer 2 has run down (not implemented)
+ 0b000010000 Counter 3 has run down (not implemented)
+ 0b001000000 Watchdog has run down (not implemented)
+ 0b010000000 Voltage error
+ 0b100000000 Short-circuit error
*/
comedi_buf_write_samples(s, &status, 1);
comedi_handle_events(dev, s);
@@ -461,13 +461,14 @@
struct apci1500_private *devpriv = dev->private;
unsigned int trig = data[1];
unsigned int shift = data[3];
-unsigned int hi_mask = data[4] << shift;
-unsigned int lo_mask = data[5] << shift;
-unsigned int chan_mask = hi_mask | lo_mask;
-unsigned int old_mask = (1 << shift) - 1;
-unsigned int pm = devpriv->pm[trig] & old_mask;
-unsigned int pt = devpriv->pt[trig] & old_mask;
-unsigned int pp = devpriv->pp[trig] & old_mask;
+unsigned int hi_mask;
+unsigned int lo_mask;
+unsigned int chan_mask;
+unsigned int old_mask;
+unsigned int pm;
+unsigned int pt;
+unsigned int pp;
+unsigned int invalid_chan;

if (trig > 1) {
    dev_dbg(dev->class_dev,
    @@ -475,11 +476,28 @@
    return -EINVAL;
}
-    if (chan_mask > 0xffff) {
-        if (shift <= 16) {
-            hi_mask = data[4] << shift;
-            lo_mask = data[5] << shift;
-            old_mask = (1 << shift) - 1;
-            invalid_chan = (data[4] | data[5]) >> (16 - shift);
-        } else {
-            hi_mask = 0;
-            lo_mask = 0;
-            old_mask = 0xffff;
-            invalid_chan = data[4] | data[5];
-        }
+    chan_mask = hi_mask | lo_mask;
if (invalid_chan) {
    dev_dbg(dev->class_dev, "invalid digital trigger channel\n");
    return -EINVAL;
}

pm = devpriv->pm[trig] & old_mask;
pt = devpriv->pt[trig] & old_mask;
pp = devpriv->pp[trig] & old_mask;

switch (data[2]) {
    case COMEDI_DIGITAL_TRIG_DISABLE:
        /* clear trigger configuration */
        
        switch (data[2]) {
            case COMEDI_DIGITAL_TRIG_DISABLE:
                devpriv->ctrl = 0;
        }
        /* configure specified channels */
        -devpriv->mode1 |= data[4] << shift;
        +devpriv->mode1 |= himask;
        +devpriv->mode2 |= lomask;
        
        switch (data[0]) {
            case INSN_CONFIG_DIGITAL_TRIG:
                if (data[1] != 0)
                    return -EINVAL;
                shift = data[3];
                -oldmask = (1U << shift) - 1;
                +if (shift < 32) {
                    +oldmask = (1U << shift) - 1;
                    +himask = data[4] << shift;
                    +lomask = data[5] << shift;
                } else {
                    +oldmask = 0xffffffffu;
                    +himask = 0;
                    +lomask = 0;
                }
        }
        switch (data[2]) {
            case COMEDI_DIGITAL_TRIG_DISABLE:
                devpriv->mode2 &= oldmask;
        }
break;
case COMEDI_DIGITAL_TRIG_ENABLE_LEVELS:
if (devpriv->ctrl != (APCI1564_DI_IRQ_ENA |
@@ -389,8 +397,8 @@
devpriv->mode2 &= oldmask;
} /* configure specified channels */
-devpriv->mode1 |= data[4] << shift;
+devpriv->mode1 |= himask;
+devpriv->mode2 |= lomask;
breach;
default:
return -EINVAL;
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/adv_pci1710.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/adv_pci1710.c
@@ -45,8 +45,8 @@
#define PCI171X_RANGE_UNI	BIT(4)
#define PCI171X_RANGE_GAIN(x)(((x) & 0x7) << 0)
#define PCI171X_MUX_REG		0x04	/* W:   A/D multiplexor control */
-#define PCI171X_MUX_CHANH(x)(((x) & 0xf) << 8)
-#define PCI171X_MUX_CHANL(x)(((x) & 0xf) << 0)
+#define PCI171X_MUX_CHANH(x)(((x) & 0xff) << 8)
+#define PCI171X_MUX_CHANL(x)(((x) & 0xff) << 0)
#define PCI171X_MUX_CHAN(x)(PCI171X_MUX_CHANH(x) | PCI171X_MUX_CHANL(x))
#define PCI171X_STATUS_REG	0x06	/* R:   status register */
#define PCI171X_STATUS_IRQ	BIT(11)	/* 1=IRQ occurred */
@@ -299,11 +299,11 @@
static int pci1710_ai_read_sample(struct comedi_device *dev,
-struct comedi_subdevice *s,
+struct comedi_device *dev,
    unsigned int cur_chan,
    unsigned int *val)
{ /*
    const struct boardtype *board = dev->board_ptr;
    struct pci1710_private *devpriv = dev->private;
-unsigned int sample;
+unsigned short sample;
/* start conversion */
outw(0, dev->iobase + PCI171X_SOFTTRG_REG);
@@ -394,7 +394,7 @@
    }
    struct comedi_cmd *cmd = &s->async->cmd;
    unsigned int status;
-    unsigned int val;
+    unsigned short val;
    int ret;

    status = inw(dev->iobase + PCI171X_STATUS_REG);
@@ -454,7 +454,7 @@
}
for (i = 0; i < devpriv->max_samples; i++) {
    unsigned int val;
+    unsigned short val;
    int ret;

    ret = pci1710_ai_read_sample(dev, s, s->async->cur_chan, &val);
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/amplc_pci230.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/amplc_pci230.c
@@ -2339,7 +2339,8 @@
        devpriv->intr_running = false;
    spin_unlock_irqrestore(&devpriv->isr_spinlock, irqflags);

-comedi_handle_events(dev, s_ao);
+if (s_ao)
+    comedi_handle_events(dev, s_ao);
    comedi_handle_events(dev, s_ai);

    return IRQ_HANDLED;
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/cb_pcidas.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/cb_pcidas.c
@@ -1290,7 +1290,7 @@
        devpriv->amcc + AMCC_OP_REG_INTCSR);

    ret = request_irq(pcidev->irq, cb_pcidas_interrupt, IRQF_SHARED,
-        dev->board_name, dev);
+        "cb_pcidas", dev);
    if (ret) {
        dev_dbg(dev->class_dev, "unable to allocate irq %d\n",
            pcidev->irq);
@@ -1351,6 +1351,7 @@
        if (dev->irq && board->has_ao_fifo) {
            dev->write_subdev = s;
            s->subdev_flags|= SDF_CMD_WRITE;
+            s->len_chanlist= s->n_chan;

---
s->do_cmdtest= cb_pcidas_ao_cmdtest;
s->do_cmd= cb_pcidas_ao_cmd;
s->cancel= cb_pcidas_ao_cancel;
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/cb_pcidas64.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/cb_pcidas64.c
@@ -4032,7 +4032,7 @@
(init_stc_registers(dev);

retval = request_irq(pcidev->irq, handle_interrupt, IRQF_SHARED,
-        dev->board_name, dev);
+        "cb_pcidas64", dev);
if (retval) {
    dev_dbg(dev->class_dev, "unable to allocate irq %u\n",
        pcidev->irq);
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/das6402.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/das6402.c
@@ -195,7 +195,7 @@
    } else if (status & DAS6402_STATUS_FFNE) {
        -unsigned int val;
        +unsigned short val;

        val = das6402_ai_read_sample(dev, s);
        comedi_buf_write_samples(s, &val, 1);
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/das800.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/das800.c
@@ -436,7 +436,7 @@
    struct comedi_cmd *cmd;
    unsigned long irq_flags;
    unsigned int status;
    -unsigned int val;
    +unsigned short val;
    bool fifo_empty;
    bool fifo_overflow;
    int i;
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/dmm32at.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/dmm32at.c
@@ -413,7 +413,7 @@
    { 
        struct comedi_device *dev = d;
        unsigned char intstat;
        -unsigned int val;
        +unsigned short val;
        int i;

        if (!dev->attached) {
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/dt2815.c
int ret;

for (i = 0; i < insn->n; i++) {
    /* FIXME: lo bit 0 chooses voltage output or current output */
    lo = ((data[i] & 0x0f) << 4) | (chan << 1) | 0x01;
    hi = (data[i] & 0xff0) >> 4;

    @ @ -114,6 +115,8 @@
    if (ret)
        return ret;

    +outb(hi, dev->iobase + DT2815_DATA);
    +devpriv->ao_readback[chan] = data[i];
}
return i;

#ifdef
comedi_handle_events(dev, s);
#endif
-comedi_handle_events(dev, s_ao);
+if (s_ao)
+comedi_handle_events(dev, s_ao);

return IRQ_RETVAL(handled);
}

static int dt3k_ns_to_timer(unsigned int timer_base, unsigned int *nanosec,
                             unsigned int flags)
{
    unsigned int divider, base, prescale;
    /* This function needs improvement */
    /* Don't know if divider==0 works. */

    for (prescale = 0; prescale < 16; prescale++) {
        @ @ -367,7 +367,7 @@
        divider = (*nanosec) / base;
        break;
    }
    case CMDF_ROUND_UP:
- divider = (*nanosec) / base;
+ divider = DIV_ROUND_UP(*nanosec, base);
 break;
 }
 if (divider < 65536) {
 @@ -377,7 +377,7 @@
 }

 prescale = 15;
- base = timer_base * (1 << prescale);
+ base = timer_base * (prescale + 1);
 divider = 65535;
 *nanosec = divider * base;
 return (prescale << 16) | (divider);
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/gsc_hpdi.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/gsc_hpdi.c
@@ -632,6 +632,11 @@
 dma_alloc_coherent(&pcidev->dev, DMA_BUFFER_SIZE,
 &devpriv->dio_buffer_phys_addr[i],
 GFP_KERNEL);
+if (!devpriv->dio_buffer[i]) {
+ dev_warn(dev->class_dev,
+ "failed to allocate DMA buffer\n");
+ return -ENOMEM;
+ }
 /* allocate dma descriptors */
 devpriv->dma_desc = dma_alloc_coherent(&pcidev->dev,
 @@ -639,6 +644,11 @@
 NUM_DMA_DESCRIPTORS,
 &devpriv->dma_desc_phys_addr,
 GFP_KERNEL);
+if (!devpriv->dma_desc) {
+ dev_warn(dev->class_dev,
+ "failed to allocate DMA descriptors\n");
+ return -ENOMEM;
+ }
 if (devpriv->dma_desc_phys_addr & 0xf) {
 dev_warn(dev->class_dev,
 " dma descriptors not quad-word aligned (bug)\n");
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/me4000.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/me4000.c
@@ -933,7 +933,7 @@
 struct comedi_subdevice *s = dev->read_subdev;
 int i;
 int c = 0;
-unsigned int lval;
+unsigned short lval;

if (!dev->attached)
return IRQ_NONE;

--- linux-4.15.0.orig/drivers/staging/comedi/drivers/mf6x4.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/mf6x4.c
@@ -121,8 +121,9 @@
struct mf6x4_private *devpriv = dev->private;
 unsigned int status;
+/* EOLC goes low at end of conversion. */
status = ioread32(devpriv->gpioc_reg);
-if (status & MF6X4_GPIOC_EOLC)
+if ((status & MF6X4_GPIOC_EOLC) == 0)
return 0;
return -EBUSY;

--- linux-4.15.0.orig/drivers/staging/comedi/drivers/ni_6527.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/ni_6527.c
@@ -341,7 +341,7 @@
case COMEDI_DIGITAL_TRIG_ENABLE_EDGES:
 /* check shift amount */
 shift = data[3];
-if (shift >= s->n_chan) {
+if (shift >= 32) {
  mask = 0;
  rising = 0;
  falling = 0;
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/ni_660x.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/ni_660x.c
@@ -611,6 +611,7 @@
case NI_660X_PFI_OUTPUT_DIO:
if (chan > 31)
return -EINVAL;
+break;
default:
return -EINVAL;

--- linux-4.15.0.orig/drivers/staging/comedi/drivers/ni_mio_common.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/ni_mio_common.c
@@ -1284,6 +1284,8 @@
ack |= NISTC_INTA_ACK_AI_START;
if (a_status & NISTC_AI_STATUS1_STOP)
ack |= NISTC_INTA_ACK_AI_STOP;
+ack |= NISTC_INTA_ACK_AI_ERR;
if (ack)
ni_stc_writew(dev, ack, NISTC_INTA_ACK_REG);
}
static int ni_cdio_cmdtest(struct comedi_device *dev,
    struct comedi_subdevice *s, struct comedi_cmd *cmd)
{
    unsigned int bytes_per_scan;
    int err = 0;
    int tmp;

    err |= comedi_check_trigger_arg_is(&cmd->convert_arg, 0);
    err |= comedi_check_trigger_arg_is(&cmd->scan_end_arg,
        cmd->chanlist_len);
    -err |= comedi_check_trigger_arg_max(&cmd->stop_arg,
        -s->async->prealloc_bufsz /
        -comedi_bytes_per_scan(s));
    +bytes_per_scan = comedi_bytes_per_scan_cmd(s, cmd);
    +if (bytes_per_scan) {
        +err |= comedi_check_trigger_arg_max(&cmd->stop_arg,
            +s->async->prealloc_bufsz /
            +bytes_per_scan);
    +}

    if (err)
        return 3;
    @ -4985,7 +4991,10 @@
    case NI_RTSI_OUTPUT_G_SRC0:
    case NI_RTSI_OUTPUT_G_GATE0:
    case NI_RTSI_OUTPUT_RGOUT0:
        -case NI_RTSI_OUTPUT_RTSI_BRD_0:
        +case NI_RTSI_OUTPUT_RTSI_BRD(0):
        +case NI_RTSI_OUTPUT_RTSI_BRD(1):
        +case NI_RTSI_OUTPUT_RTSI_BRD(2):
        +case NI_RTSI_OUTPUT_RTSI_BRD(3):
            return 1;
    case NI_RTSI_OUTPUT_RTSI_OSC:
        return (devpriv->is_m_series) ? 1 : 0;
    @ -5006,11 +5015,18 @@
    devpriv->rtsi_trig_a_output_reg |= NISTC_RTSI_TRIG(chan, src);
    ni_stc_writew(dev, devpriv->rtsi_trig_a_output_reg,
        NISTC_RTSI_TRIGA_OUT_REG);
    -} else if (chan < 8) {
    +} else if (chan < NISTC_RTSI_TRIG_NUM_CHAN(devpriv->is_m_series)) {
    devpriv->rtsi_trig_b_output_reg &= ~NISTC_RTSI_TRIG_MASK(chan);
    devpriv->rtsi_trig_b_output_reg |= NISTC_RTSI_TRIG(chan, src);
    ni_stc_writew(dev, devpriv->rtsi_trig_b_output_reg,
        NISTC_RTSI_TRIGB_OUT_REG);
    +} else if (chan != NISTC_RTSI_TRIG_OLD_CLK_CHAN) {
    +/* probably should never reach this, since the
+ * ni_valid_rtsi_output_source above errors out if chan is too
+ * high
+ */
+dev_err(dev->class_dev, "%s: unknown rtsi channel\n", __func__);
+return -EINVAL;
} return 2;
}
@@ -5026,12 +5042,12 @@
} else if (chan < NISTC_RTSI_TRIG_NUM_CHAN(devpriv->is_m_series)) {
return NISTC_RTSI_TRIG_TO_SRC(chan,
    devpriv->rtsi_trig_b_output_reg);
-} else {
-    if (chan == NISTC_RTSI_TRIG_OLD_CLK_CHAN)
-        return NI_RTSI_OUTPUT_RTSI_OSC;
-    dev_err(dev->class_dev, "bug! should never get here?\n");
-    return 0;
+} else if (chan == NISTC_RTSI_TRIG_OLD_CLK_CHAN) {
+    return NI_RTSI_OUTPUT_RTSI_OSC;
}
+	dev_err(dev->class_dev, "%s: unknown rtsi channel\n", __func__);
+return -EINVAL;
}

static int ni_rtsi_insn_config(struct comedi_device *dev,
@@ -5451,11 +5467,11 @@
/* Digital I/O (PFI) subdevice */
s = &dev->subdevices[NI_PFI_DIO_SUBDEV];
s->type	= COMEDI_SUBD_DIO;
s->subdev_flags	= SDF_READABLE | SDF_WRITABLE | SDF_INTERNAL;
s->maxdata	= 1;
if (devpriv->is_m_series) {
    s->n_chan	= 16;
+    s->subdev_flags	= SDF_READABLE | SDF_WRITABLE | SDF_INTERNAL;
    ni_writew(dev, s->state, NI_M_PFI_DO_REG);
    for (i = 0; i < NUM_PFI_OUTPUT_SELECT_REGS; ++i) {
@@ -5464,6 +5480,7 @@
    } else {
    s->n_chan	= 10;
+    s->subdev_flags	= SDF_INTERNAL;
    }
    s->insn_config	= ni_pfi_insn_config;

--- linux-4.15.0.orig/drivers/staging/comedi/drivers/ni_usb6501.c
size = usb_endpoint_maxp(devpriv->ep_tx);
devpriv->usb_tx_buf = kzalloc(size, GFP_KERNEL);
-if (!devpriv->usb_tx_buf) {
-kfree(devpriv->usb_rx_buf);
+if (!devpriv->usb_tx_buf)
    return -ENOMEM;
-}

return 0;
}
@@ -527,6 +525,9 @@
if (!devpriv)
    return -ENOMEM;

+mutex_init(&devpriv->mut);
+usb_set_intfdata(intf, devpriv);
+
ret = ni6501_find_endpoints(dev);
if (ret)
    return ret;
@@ -535,9 +536,6 @@
if (ret)
    return ret;

-mutex_init(&devpriv->mut);
-usb_set_intfdata(intf, devpriv);
-
ret = comedi_alloc_subdevices(dev, 2);
if (ret)
    return ret;
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/pcl711.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/pcl711.c
@@ -193,7 +193,7 @@
struct comedi_device *dev = d;
struct comedi_subdevice *s = dev->read_subdev;
struct comedi_cmd *cmd = &s->async->cmd;
-unsigned int data;
+unsigned short data;
if (!dev->attached) {
    dev_err(dev->class_dev, "spurious interrupt\n");
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/pcl818.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/pcl818.c
@@ -422,7 +422,7 @@
struct comedi_device *dev = d;
struct comedi_subdevice *s = dev->read_subdev;
struct comedi_cmd *cmd = &s->async->cmd;
-unsigned int data;
+unsigned short data;
if (!dev->attached) {
    dev_err(dev->class_dev, "spurious interrupt\n");
static bool pcl818_ai_write_sample(struct comedi_device *dev,
    struct comedi_subdevice *s,
-    unsigned int chan, unsigned int val)
+    unsigned int chan, unsigned short val)
{
    struct pcl818_private *devpriv = dev->private;
    struct comedi_cmd *cmd = &s->async->cmd;

--- linux-4.15.0.orig/drivers/staging/comedi/drivers/quatech_daqp_cs.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/quatech_daqp_cs.c
@@ -642,7 +642,7 @@
    /* Make sure D/A update mode is direct update */
    outb(0, dev->iobase + DAQP_AUX_REG);

--- linux-4.15.0.orig/drivers/staging/comedi/drivers/usbduxfast.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/usbduxfast.c
@@ -1,5 +1,5 @@
/*
- *  Copyright (C) 2004-2014 Bernd Porr, mail@berndporr.me.uk
+ *  Copyright (C) 2004-2019 Bernd Porr, mail@berndporr.me.uk
 *  This program is free software; you can redistribute it and/or modify
 *  it under the terms of the GNU General Public License as published by
@@ -17,7 +17,7 @@
     * 1.0: Fixed a rounding error in usbduxfast_ai_cmdtest
     * 0.9: Dropping the first data packet which seems to be from the last transfer.
     * Buffer overflows in the FX2 are handed over to comedi.
@@ -359,6 +360,7 @@
     * Revision history:
+     * 1.0: Fixed a rounding error in usbduxfast_ai_cmdtest
* 0.9: Dropping the first data packet which seems to be from the last transfer.
* Buffer overflows in the FX2 are handed over to comedi.
+ * 0.92: Dropping now 4 packets. The quad buffer has to be emptied.
@@ -359,6 +360,7 @@
     * Revision history:
+     * 1.0: Fixed a rounding error in usbduxfast_ai_cmdtest
* 0.9: Dropping the first data packet which seems to be from the last transfer.
* Buffer overflows in the FX2 are handed over to comedi.
+ * 0.92: Dropping now 4 packets. The quad buffer has to be emptied.
}
+int err2 = 0;
unsigned int steps;
unsigned int arg;

@@ -408,11 +410,16 @@
 *
 steps = (cmd->convert_arg * 30) / 1000;
 if (cmd->chanlist_len != 1)
- err |= comedi_check_trigger_arg_min(&steps,
-   MIN_SAMPLING_PERIOD);
- err |= comedi_check_trigger_arg_max(&steps, MAX_SAMPLING_PERIOD);
- arg = (steps * 1000) / 30;
- err |= comedi_check_trigger_arg_is(&cmd->convert_arg, arg);
+err2 |= comedi_check_trigger_arg_min(&steps, 1);
+ else
+   err2 |= comedi_check_trigger_arg_min(&steps, 1);
+ err2 |= comedi_check_trigger_arg_max(&steps, MAX_SAMPLING_PERIOD);
+if (err2) {
+   err |= err2;
+   arg = (steps * 1000) / 30;
+   err |= comedi_check_trigger_arg_is(&cmd->convert_arg, arg);
+   }

   if (cmd->stop_src == TRIG_COUNT)
 err |= comedi_check_trigger_arg_min(&cmd->stop_arg, 1);
--- linux-4.15.0.orig/drivers/staging/comedi/drivers/vmk80xx.c
+++ linux-4.15.0/drivers/staging/comedi/drivers/vmk80xx.c
@@ -676,6 +676,9 @@
 if (!devpriv->ep_rx || !devpriv->ep_tx)
 return -ENODEV;

+if (!usb_endpoint_maxp(devpriv->ep_rx) || !usb_endpoint_maxp(devpriv->ep_tx))
+ return -EINVAL;
+ return 0;
+
@@ -691,10 +694,8 @@

   size = usb_endpoint_maxp(devpriv->ep_tx);
   devpriv->usb_tx_buf = kzalloc(size, GFP_KERNEL);
   -if (!devpriv->usb_tx_buf) {
-   -kfree(devpriv->usb_rx_buf);
+ if (!devpriv->usb_tx_buf)
+ return -ENOMEM;
- }
return 0;
}
@@ -809,6 +810,8 @@
    devpriv->model = board->model;

+sema_init(&devpriv->limit_sem, 8);
+
    ret = vmk80xx_find_usb_endpoints(dev);
    if (ret)
        return ret;
@@ -817,8 +820,6 @@
    if (ret)
        return ret;

-sema_init(&devpriv->limit_sem, 8);
-
    usb_set_intfdata(intf, devpriv);

    if (devpriv->model == VMK8055_MODEL)
        --- linux-4.15.0.orig/drivers/staging/emxx_udc/emxx_udc.c
+++ linux-4.15.0/drivers/staging/emxx_udc/emxx_udc.c
@@ -2159,7 +2159,7 @@
    struct nbu2ss_ep *ep,
    int status)
    {
+struct nbu2ss_req *req, *n;
+struct nbu2ss_req *req, *n;

    /* Endpoint Disable */
    _nbu2ss_epn_exit(udc, ep);
@@ -2171,7 +2171,7 @@
    return 0;

    /* called with irqs blocked */
-    list_for_each_entry(req, &ep->queue, queue) {
+    list_for_each_entry_safe(req, n, &ep->queue, queue) {
        _nbu2ss_ep_done(ep, req, status);
    }

    --- linux-4.15.0.orig/drivers/staging/fbtft/fbtft-core.c
+++ linux-4.15.0/drivers/staging/fbtft/fbtft-core.c
@@ -780,7 +780,7 @@
    fb_deferred_io = fbtft_deferred_io;
f_b_deferred_io_init(info);

-    strncpy(info->fix.id, dev->driver->name, 16);
+    snprintf(info->fix.id, sizeof(info->fix.id), "%s", dev->driver->name);
info->fix.type =   FB_TYPE_PACKED_PIXELS;
info->fix.visual =   FB_VISUAL_TRUECOLOR;
info->fix.xpanstep =   0;
@@ -828,7 +828,7 @@
if (par->gamma.curves && gamma) {
    if (fbftt_gamma_parse_str(par,
        par->gamma.curves, gamma, strlen(gamma)))
        -goto alloc_fail;
+goto release_framebuf;
    }

/* Transmit buffer */
@@ -845,7 +845,7 @@
if (txbuflen > 0) {
    txbuf = devm_kzalloc(par->info->device, txbuflen, GFP_KERNEL);
    if (!txbuf)
        -goto alloc_fail;
+goto release_framebuf;
    par->txbuf.buf = txbuf;
    par->txbuf.len = txbuflen;
}     @@ -881,6 +881,9 @@
return info;

+release_framebuf:
+framebuffer_release(info);
+
alloc_fail:
vfree(vmem);

--- linux-4.15.0.orig/drivers/staging/fsl-dpaa2/ethernet/dpaa2-eth.c
+++ linux-4.15.0/drivers/staging/fsl-dpaa2/ethernet/dpaa2-eth.c
@@ -249,7 +249,7 @@
vaddr = dpaa2_iova_to_virt(priv->iommu_domain, addr);
dma_unmap_single(dev, addr, DPAA2_ETH_RX_BUF_SIZE, DMA_FROM_DEVICE);

-fas = dpaa2_get_fas(vaddr);
+fas = dpaa2_get_fas(vaddr, false);
prefetch(fas);
buf_data = vaddr + dpaa2_fd_get_offset(fd);
prefetch(buf_data);
@@ -322,7 +322,7 @@
 }

 fd = dpaa2_dq_fd(dq);
-fq = (struct dpaa2_eth_fq *)dpaa2_dq_fqd_ctx(dq);
+fq = (struct dpaa2_eth_fq *)uintptr_t(dpaa2_dq_fqd_ctx(dq));

Open Source Used In 5GaaS Edge AC-4  28568
fq->stats.frames++;  

fq->consume(priv, ch, fd, &ch->napi);  
@@ -373,19 +373,19 @@  /* Prepare the HW SGT structure */  
sgt_buf_size = priv->tx_data_offset +  
    sizeof(struct dpaa2_sg_entry) * (1 + num_dma_bufs);  
-sgt_buf = kzalloc(sgt_buf_size + DPAA2_ETH_TX_BUF_ALIGN, GFP_ATOMIC);  
+sgt_buf = netdev_alloc_frag(sgt_buf_size + DPAA2_ETH_TX_BUF_ALIGN);  
if (unlikely(!sgt_buf)) {  
    err = -ENOMEM;  
goto sgt_buf_alloc_failed;  
}  
-sgt_buf = PTR_ALIGN(sgt_buf, DPAA2_ETH_TX_BUF_ALIGN);  
+memset(sgt_buf, 0, sgt_buf_size);  
/* PTA from egress side is passed as is to the confirmation side so  
 * we need to clear some fields here in order to find consistent values  
 * on TX confirmation. We are clearing FAS (Frame Annotation Status)  
 * field from the hardware annotation area  
 */  
-fas = dpaa2_get_fas(sgt_buf);  
+fas = dpaa2_get_fas(sgt_buf, true);  
memset(fas, 0, DPAA2_FAS_SIZE);  
sgt = (struct dpaa2_sg_entry *) (sgt_buf + priv->tx_data_offset);  
@@ -430,7 +430,7 @@ 
return 0;  

dma_map_single_failed:  
-kfree(sgt_buf);  
+skb_free_frag(sgt_buf);  
sgt_buf_alloc_failed:  
    dma_unmap_sgd(dev, scl, num_sg, DMA_BIDIRECTIONAL);  
    dma_map_sg_failed:  
@@ -458,7 +458,7 @@  /* on TX confirmation. We are clearing FAS (Frame Annotation Status)  
 * field from the hardware annotation area  
 */  
-fas = dpaa2_get_fas(buffer_start);  
+fas = dpaa2_get_fas(buffer_start, true);  
memset(fas, 0, DPAA2_FAS_SIZE);  
/* Store a backpointer to the skb at the beginning of the buffer  
@@ -510,7 +510,7 @@ 
fd_addr = dpaa2_fd_get_addr(fd);  
skBh = dpaa2_iova_to_virt(priv->iommu_domain, fd_addr);
- fas = dpaa2_get_fas(skbh);
+ fas = dpaa2_get_fas(skbh, true);

    if (fd_format == dpaa2_fd_single) {
        skb = *skbh;
@@ -550,9 +550,9 @@
        if (status)
            *status = le32_to_cpu(fas->status);

- /* Free SGT buffer kmalloc'ed on tx */
+ /* Free SGT buffer allocated on tx */
        if (fd_format != dpaa2_fd_single)
            skb_free(skbh);
            skb_free_frag(skbh);

    /* Move on with skb release */
    dev_kfree_skb(skb);
@@ -744,7 +744,7 @@
    for (i = 0; i < count; i++) {
        vaddr = dpaa2_iova_to_virt(priv->iommu_domain, buf_array[i]);
        dma_unmap_single(dev, buf_array[i], DPAA2_ETH_RX_BUF_SIZE,
- DMA_BIDIRECTIONAL);
+ DMA_FROM_DEVICE);
        skb_free_frag(vaddr);
    }

    queue.destination.id = fq->channel->dpcon_id;
    queue.destination.type = DPNI_DEST_DPCON;
    queue.destination.priority = 1;
-    queue.user_context = (u64)fq;
+    queue.user_context = (u64)(uintptr_t)fq;
    err = dpni_set_queue(priv->mc_io, 0, priv->mc_token,
                      DPNI_QUEUE_RX, 0, fq->flowid,
                      DPNI_QUEUE_OPT_USER_CTX | DPNI_QUEUE_OPT_DEST,
@@ -1924,7 +1924,7 @@
    queue.destination.id = fq->channel->dpcon_id;
    queue.destination.type = DPNI_DEST_DPCON;
    queue.destination.priority = 0;
-    queue.user_context = (u64)fq;
+    queue.user_context = (u64)(uintptr_t)fq;
    err = dpni_set_queue(priv->mc_io, 0, priv->mc_token,
                      DPNI_QUEUE_TX_CONFIRM, 0, fq->flowid,
                      DPNI_QUEUE_OPT_USER_CTX | DPNI_QUEUE_OPT_DEST,
--- linux-4.15.0.orig/drivers/staging/fsl-dpaa2/ethernet/dpaa2-eth.h
+++ linux-4.15.0/drivers/staging/fsl-dpaa2/ethernet/dpaa2-eth.h
@@ -153,10 +153,15 @@
 #define DPAA2_FAS_SIZE(sizeof(struct dpaa2_fas))
/* Accessors for the hardware annotation fields that we use */
#define dpaa2_get_hwa(buf_addr) 
	((void *)(buf_addr) + DPAA2_ETH_SWA_SIZE)
#define dpaa2_get_fas(buf_addr) 
	(struct dpaa2_fas *)(dpaa2_get_hwa(buf_addr) + DPAA2_FAS_OFFSET)
+static inline void *dpaa2_get_hwa(void *buf_addr, bool swa)
+{
+return buf_addr + (swa ? DPAA2_ETH_SWA_SIZE : 0);
+
+ +
+static inline struct dpaa2_fas *dpaa2_get_fas(void *buf_addr, bool swa)
+{
+return dpaa2_get_hwa(buf_addr, swa) + DPAA2_FAS_OFFSET;
+

/* Error and status bits in the frame annotation status word */
/* Debug frame, otherwise supposed to be discarded */
--- linux-4.15.0.orig/drivers/staging/fsl-mc/bus/Kconfig
+++ linux-4.15.0/drivers/staging/fsl-mc/bus/Kconfig
@@ -8,7 +8,7 @@
config FSL_MC_BUS
.bool "QorIQ DPAA2 fsl-mc bus driver"
-depend on OF && (ARCH_LAYERSCAPE || (COMPILE_TEST && (ARM || ARM64 || X86 || PPC)))
+depends on OF && (ARCH_LAYERSCAPE || (COMPILE_TEST && (ARM || ARM64 || X86_LOCAL_APIC || PPC)))
select GENERIC_MSI_IRQ_DOMAIN
help
 Driver to enable the bus infrastructure for the QorIQ DPAA2
--- linux-4.15.0.orig/drivers/staging/fsl-mc/bus/dpio/dpio-driver.c
+++ linux-4.15.0/drivers/staging/fsl-mc/bus/dpio/dpio-driver.c
@@ -77,7 +77,7 @@
struct dpio_priv *priv;
int error;
struct fsl_mc_device_irq *irq;
-tpumask_t mask;
-struct fsl_mc_device_irq *irq;
-priv = dev_get_drvdata(&dpio_dev->dev);
@@ -96,9 +95,7 @@
/* set the affinity hint */
-tpumask_clear(&mask);
-tpumask_set_cpu(cpu, &mask);
-if (irq_set_affinity_hint(irq->msi_desc->irq, &mask))
+if (irq_set_affinity_hint(irq->msi_desc->irq, cpumask_of(cpu)))
dev_err(&dpio_dev->dev,
"irq_set_affinity failed irq %d cpu %d\n",
irq->msi_desc->irq, cpu);
--- linux-4.15.0.orig/drivers/staging/fsl-mc/bus/fsl-mc-allocator.c
+++ linux-4.15.0/drivers/staging/fsl-mc/bus/fsl-mc-allocator.c
@@ -295,8 +295,10 @@
goto error;
mc_adev = resource->data;
-if (WARN_ON(!mc_adev))
+if (WARN_ON(!mc_adev)) {
+error = -EINVAL;
goto error;
+}
*new_mc_adev = mc_adev;
return 0;
--- linux-4.15.0.orig/drivers/staging/fsl-mc/bus/irq-gic-v3-its-fsl-mc-msi.c
+++ linux-4.15.0/drivers/staging/fsl-mc/bus/irq-gic-v3-its-fsl-mc-msi.c
@@ -75,6 +75,8 @@
for (np = of_find_matching_node(NULL, its_device_id); np;
np = of_find_matching_node(np, its_device_id)) {
+if (!of_device_is_available(np))
+continue;
if (!of_property_read_bool(np, "msi-controller"))
continue;
--- linux-4.15.0.orig/drivers/staging/fsl-mc/bus/mc-io.c
+++ linux-4.15.0/drivers/staging/fsl-mc/bus/mc-io.c
@@ -166,7 +166,12 @@
*/
void fsl_destroy_mc_io(struct fsl_mc_io *mc_io)
{
-struct fsl_mc_device *dpmcp_dev = mc_io->dpmcp_dev;
+struct fsl_mc_device *dpmcp_dev;
+
+if (!mc_io)
+return;
+
+dpmcp_dev = mc_io->dpmcp_dev;
if (dpmcp_dev)
fsl_mc_io_unset_dpmcp(mc_io);
--- linux-4.15.0.orig/drivers/staging/fwserial/fwserial.c
+++ linux-4.15.0/drivers/staging/fwserial/fwserial.c
@@ -2241,6 +2241,7 @@
err = fw_core_add_address_handler(&port->rx_handler,

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&fw_high_memory_region);
if (err) {
  tty_port_destroy(&port->port);
kfree(port);
goto free_ports;
}
@@ -2323,6 +2324,7 @@
 free_ports:
 for (--i; i >= 0; --i) {
    fw_core_remove_address_handler(&serial->ports[i]->rx_handler);
tty_port_destroy(&serial->ports[i]->port);
kfree(serial->ports[i]);
}
--- linux-4.15.0.orig/drivers/staging/gdm724x/gdm_lte.c
+++ linux-4.15.0/drivers/staging/gdm724x/gdm_lte.c
@@ -619,10 +619,12 @@
    ether_addr_copy(nic->dest_mac_addr, addr);
  
    int offset = sizeof(struct iphdr) +
+  sizeof(struct udphdr) +
+  offsetof(struct dhcp_packet, chaddr);
+  if (offset + ETH_ALEN > len)
+    return;
  ether_addr_copy(nic->dest_mac_addr, buf + offset);
}
@@ -685,6 +687,12 @@
 struct sdu *sdu = NULL;
 struct gdm_endian *endian = phy_dev->get_endian(phy_dev->priv_dev);
 u8 *data = (u8 *)multi_sdu->data;
+  int copied;
  u16 i = 0;
  u16 num_packet;
  u16 hci_len;
@@ -696,6 +699,12 @@
  num_packet = gdm_dev16_to_cpu(endian, multi_sdu->num_packet);
  for (i = 0; i < num_packet; i++) {
+    copied = data - multi_sdu->data;
+    if (len < copied + sizeof(*sdu)) {
+      pr_err("rx prevent buffer overflow");
  

+return;
+
+sdru = (struct sdu *)data;

cmd_evt = gdm_dev16_to_cpu(endian, sdu->cmd_evt);
@@ -706,7 +715,8 @@
    pr_err("rx sdu wrong hci %04x\n", cmd_evt);
    return;
    }
-if (hci_len < 12) {
+if (hci_len < 12 ||
    len < copied + sizeof(*sdu) + (hci_len - 12)) {
    pr_err("rx sdu invalid len %d\n", hci_len);
    return;
    }
--- linux-4.15.0.orig/drivers/staging/greybus/audio_codec.c
+++ linux-4.15.0/drivers/staging/greybus/audio_codec.c
@@ -489,6 +489,7 @@
    if (ret) {
        dev_err_ratelimited(dai->dev, "%d: Error during set_config\n",
        ret);
+        gb_pm_runtime_put_noidle(bundle);
        mutex_unlock(&codec->lock);
        return ret;
    }
@@ -565,6 +566,7 @@
        break;
    }
    if (ret) {
+        gb_pm_runtime_put_noidle(bundle);
        mutex_unlock(&codec->lock);
        dev_err_ratelimited(dai->dev, "set_data_size failed:%d\n",
        ret);
--- linux-4.15.0.orig/drivers/staging/greybus/audio_manager.c
+++ linux-4.15.0/drivers/staging/greybus/audio_manager.c
@@ -89,8 +89,8 @@
    list_for_each_entry_safe(module, next, &modules_list, list) {
        list_del(&module->list);
        -kobject_put(&module->kobj);
+        kobject_put(&module->kobj);
        ida_simple_remove(&module_id, module->id);
        +kobject_put(&module->kobj);
    }

    is_empty = list_empty(&modules_list);
--- linux-4.15.0.orig/drivers/staging/greybus/audio_topology.c
+++ linux-4.15.0/drivers/staging/greybus/audio_topology.c
val = ucontrol->value.integer.value[0] & mask;
connect = !!val;

+ret = gb_pm_runtime_get_sync(bundle);
+if (ret)
+return ret;
+
+ret = gb_audio_gb_get_control(module->mgmt_connection, data->ctl_id,
+    GB_AUDIO_INVALID_INDEX, &gbvalue);
+if (ret)
+goto exit;
+
/* update ucontrol */
if (gbvalue.value.integer.value[0] != val) {
    for (wi = 0; wi < wlist->num_widgets; wi++) {
        gbvalue.value.integer.value[0] =
cpu_to_le32(ucontrol->value.integer.value[0]);

    -ret = gb_pm_runtime_get_sync(bundle);
    -if (ret)
    -return ret;
    -
    ret = gb_audio_gb_set_control(module->mgmt_connection,
        data->ctl_id,
        GB_AUDIO_INVALID_INDEX, &gbvalue);
    -
    -gb_pm_runtime_put_autosuspend(bundle);
    -
    -if (ret) {
    -dev_err_ratelimited(codec->dev,
        "%%d:Error in %%s for %s\n", ret,
        __func__, kcontrol->id.name);
    -return ret;
    -}
    }

    -return 0;
}

# define SOC_DAPM_MIXER_GB(xname, kcount, data) \\
light->channels_count = conf.channel_count;
light->name = kstrndup(conf.name, NAMES_MAX, GFP_KERNEL);
-
+if (!light->name)
+    return -ENOMEM;
light->channels = kcalloc(light->channels_count,
    sizeof(struct gb_channel), GFP_KERNEL);
if (!light->channels)
@@ -1098,21 +1099,21 @@
static void gb_lights_light_release(struct gb_light *light)
{
    int i;
    -int count;

    light->ready = false;

    -count = light->channels_count;
    -
    +if (light->has_flash)
    gb_lights_light_v4l2_unregister(light);
    +light->has_flash = false;

    -for (i = 0; i < count; i++) {
    +for (i = 0; i < light->channels_count; i++)
    gb_lights_channel_release(&light->channels[i]);
    -light->channels_count--;
    -}
    +light->channels_count = 0;
    +
kfree(light->channels);
    +light->channels = NULL;
    kfree(light->name);
    +light->name = NULL;
}

static void gb_lights_release(struct gb_lights *glights)
--- linux-4.15.0.orig/drivers/staging/greybus/power_supply.c
+++ linux-4.15.0/drivers/staging/greybus/power_supply.c
@@ -520,7 +520,7 @@
    op = gb_operation_create(connection,
    GB_POWER_SUPPLY_TYPE_GET_PROP_DESCRPTORS,
    - sizeof(req), sizeof(*resp) + props_count *
    + sizeof(*req), sizeof(*resp) + props_count *
sizeof(struct gb_power_supply_props_desc),
GFP_KERNEL);
if (!op)
--- linux-4.15.0.orig/drivers/staging/greybus/sdio.c
+++ linux-4.15.0/drivers/staging/greybus/sdio.c
@@ -411,6 +411,7 @@
    struct gb_sdio_command_request request = {0};
    struct gb_sdio_command_response response;
    struct mmc_data *data = host->mrq->data;
+    unsigned int timeout_ms;
    u8 cmd_flags;
    u8 cmd_type;
    int i;
@@ -469,9 +470,12 @@
        request.data_blksz = cpu_to_le16(data->blksz);
    }

    -ret = gb_operation_sync(host->connection, GB_SDIO_TYPE_COMMAND,
    -&request, sizeof(request), &response,
    -sizeof(response));
    +timeout_ms = cmd->busy_timeout ? cmd->busy_timeout :
    +GB_OPERATION_TIMEOUT_DEFAULT;
    +
    +ret = gb_operation_sync_timeout(host->connection, GB_SDIO_TYPE_COMMAND,
    +&request, sizeof(request), &response,
    +sizeof(response), timeout_ms);
    if (ret < 0)
        goto out;

    --- linux-4.15.0.orig/drivers/staging/greybus/tools/loopback_test.c
+++ linux-4.15.0/drivers/staging/greybus/tools/loopback_test.c
@@ -21,6 +21,7 @@
 #include <signal.h>
 #define MAX_NUM_DEVICES 10
 +#define MAX_SYSFS_PREFIX 0x80
 #define MAX_SYSFS_PATH	0x200
 #define CSV_MAX_LINE	0x1000
 #define SYSFS_MAX_INT	0x20
@@ -69,7 +70,7 @@
        &request, &response,
        timeout_ms);
    if (ret < 0)
        goto out;

    --- linux-4.15.0.orig/drivers/staging/greybus/tools/loopback_test.c
+++ linux-4.15.0/drivers/staging/greybus/tools/loopback_test.c
@@ -21,6 +21,7 @@
 #include <signal.h>
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 +#define MAX_SYSFS_PREFIX 0x80
 #define MAX_SYSFS_PATH	0x200
 #define CSV_MAX_LINE	0x1000
 #define SYSFS_MAX_INT	0x20
@@ -69,7 +70,7 @@
        &request, &response,
        timeout_ms);
    if (ret < 0)
        goto out;

    struct loopback_device {
    -char name[MAX_SYSFS_PATH];
    +char name[MAX_STR_LEN];
    char sysfs_entry[MAX_SYSFS_PATH];
    char debugfs_entry[MAX_SYSFS_PATH];
    struct loopback_results results;


```
int stop_all;
int poll_count;
char test_name[MAX_STR_LEN];
- char sysfs_prefix[MAX_SYSFS_PATH];
- char debugfs_prefix[MAX_SYSFS_PATH];
+ char sysfs_prefix[MAX_SYSFS_PREFIX];
+ char debugfs_prefix[MAX_SYSFS_PREFIX];
struct timespec poll_timeout;
struct loopback_device devices[MAX_NUM_DEVICES];
struct loopback_results aggregate_results;
static int open_poll_files(struct loopback_test *t)
{
    struct loopback_device *dev;
    - char buf[MAX_STR_LEN];
    + char buf[MAX_SYSFS_PATH + MAX_STR_LEN];
    char dummy;
    int fds_idx = 0;
    int i;
    @ @ -915,10 +916,10 @@
t.iteration_max = atoi(optarg);
    break;
    case 'S':
        - snprintf(t.sysfs_prefix, MAX_SYSFS_PATH, "%s", optarg);
        + snprintf(t.sysfs_prefix, MAX_SYSFS_PREFIX, "%s", optarg);
        break;
    case 'D':
        - snprintf(t.debugfs_prefix, MAX_SYSFS_PATH, "%s", optarg);
        + snprintf(t.debugfs_prefix, MAX_SYSFS_PREFIX, "%s", optarg);
        break;
    case 'm':
        t.mask = atol(optarg);
        @ @ -969,10 +970,10 @@
}

if (!strcmp(t.sysfs_prefix, ""))
    - snprintf(t.sysfs_prefix, MAX_SYSFS_PATH, "%s", sysfs_prefix);
    + snprintf(t.sysfs_prefix, MAX_SYSFS_PREFIX, "%s", sysfs_prefix);

if (!strcmp(t.debugfs_prefix, ""))
    - snprintf(t.debugfs_prefix, MAX_SYSFS_PATH, "%s", debugfs_prefix);
    + snprintf(t.debugfs_prefix, MAX_SYSFS_PREFIX, "%s", debugfs_prefix);

ret = find_loopback_devices(&t);
if (ret)
    --- linux-4.15.0.orig/drivers/staging/greybus/uart.c
    +++ linux-4.15.0/drivers/staging/greybus/uart.c
```
if (C_CRTSCTS(tty) && C_BAUD(tty) != B0)
    newline.flow_control |= GB_SERIAL_AUTO_RTSCTS_EN;
+newline.flow_control = GB_SERIAL_AUTO_RTSCTS_EN;
else
    newline.flow_control &= ~GB_SERIAL_AUTO_RTSCTS_EN;
+newline.flow_control = 0;

if (memcmp(&gb_tty->line_coding, &newline, sizeof(newline))) {
    memcpy(&gb_tty->line_coding, &newline, sizeof(newline));
    @@ -656,8 +656,6 @@
    if ((close_delay != gb_tty->port.close_delay) ||
        (closing_wait != gb_tty->port.closing_wait))
        retval = -EPERM;
    -else
    -retval = -EOPNOTSUPP;
} else {
    gb_tty->port.close_delay = close_delay;
    gb_tty->port.closing_wait = closing_wait;
    @@ -801,6 +799,17 @@
    gbphy_runtime_put_autosuspend(gb_tty->gbphy_dev);
    }

+static void gb_tty_port_destruct(struct tty_port *port)
+{
+    struct gb_tty *gb_tty = container_of(port, struct gb_tty, port);
+    +if (gb_tty->minor != GB_NUM_MINORS)
+        release_minor(gb_tty);
+    +kfifo_free(&gb_tty->write_fifo);
+    +kfree(gb_tty->buffer);
+    +kfree(gb_tty);
+}
+
+static const struct tty_operations gb_ops = {
+.install =gb_tty_install,
+.open =gb_tty_open,
+@ @ -824,6 +833,7 @@
+.dtr_rts =gb_tty_dtr_rts,
+.activate =gb_tty_port_activate,
+.shutdown =gb_tty_port_shutdown,
+ .destruct =gb_tty_port_destruct,
+};

static int gb_uart_probe(struct gbphy_device *gbphy_dev,
    @@ -836,17 +846,11 @@
int retval;
int minor;

-gb_tty = kzalloc(sizeof(*gb_tty), GFP_KERNEL);
-if (!gb_tty)
-return -ENOMEM;
-
connection = gb_connection_create(gbphy_dev->bundle,
    le16_to_cpu(gbphy_dev->cport_desc->id),
    gb_uart_request_handler);
-if (IS_ERR(connection)) {
    retval = PTR_ERR(connection);
    goto exit_tty_free;
    -}
+if (IS_ERR(connection))
+return PTR_ERR(connection);
+
max_payload = gb_operation_get_payload_size_max(connection);
if (max_payload < sizeof(struct gb_uart_send_data_request)) {
    goto exit_connection_destroy;
    }
+gb_tty = kzalloc(sizeof(*gb_tty), GFP_KERNEL);
+if (!gb_tty) {
    retval = -ENOMEM;
    goto exit_connection_destroy;
    +}
+
+tty_port_init(&gb_tty->port);
+gb_tty->port.ops = &gb_port_ops;
+gb_tty->minor = GB_NUM_MINORS;
+
    gb_tty->buffer_payload_max = max_payload -
    sizeof(struct gb_uart_send_data_request);

    gb_tty->buffer = kzalloc(gb_tty->buffer_payload_max, GFP_KERNEL);
    if (!gb_tty->buffer) {
        retval = -ENOMEM;
        goto exit_connection_destroy;
        +goto exit_put_port;
    }

    INIT_WORK(&gb_tty->tx_work, gb_uart_tx_write_work);
    retval = kfifo_alloc(&gb_tty->write_fifo, GB_UART_WRITE_FIFO_SIZE,
        GFP_KERNEL);
    if (retval)
-goto exit_buf_free;
+goto exit_put_port;

gb_tty->credits = GB_UART_FIRMWARE_CREDITS;
init_completion(&gb_tty->credits_complete);
@@ -882,7 +896,7 @@
 } else {
 retval = minor;
 }
-goto exit_kfifo_free;
+goto exit_put_port;
}

retval = gb_connection_enable_tx(connection);
if (retval)
-goto exit_release_minor;
+goto exit_put_port;

send_control(gb_tty, gb_tty->ctrlout);
@@ -928,16 +939,10 @@

exit_connection_disable:
exit_release_minor:
-release_minor(gb_tty);
-exit_kfifo_free:
-kfifo_free(&gb_tty->write_fifo);
-exit,buf_free:
-kfree(gb_tty->buffer);
+exit_put_port:
+tty_port_put(&gb_tty->port);
exit_connection_destroy:
exit_kfifo_free:
exit_buf_free:
exit_connection_destroy:
-goto tty_free;

- kfree(gb_tty);

return retval;
}
@@ -968,15 +973,10 @@
    gb_connection_disable_rx(connection);
    tty_unregister_device(gb_tty_driver, gb_tty->minor);

    /* FIXME - free transmit / receive buffers */
    - gb_connection_disable(connection);
    - tty_port_destroy(&gb_tty->port);
    - gb_connection_destroy(connection);
    - release_minor(gb_tty);
    - kfifo_free(&gb_tty->write_fifo);
    - kfree(gb_tty->buffer);
    - kfree(gb_tty);
    +
    + tty_port_put(&gb_tty->port);
}

static int gb_tty_init(void)
--- linux-4.15.0.orig/drivers/staging/iio/adc/ad7192.c
+++ linux-4.15.0/drivers/staging/iio/adc/ad7192.c
@@ -109,10 +109,10 @@
    #define AD7193_CH_AIN1P_AIN2M 0x001  /* AIN1(+) - AIN2(-) */
    #define AD7193_CH_AIN3P_AIN4M 0x002  /* AIN3(+) - AIN4(-) */
    #define AD7193_CH_AIN5P_AIN6M 0x004  /* AIN5(+) - AIN6(-) */
    #define AD7193_CH_AIN7P_AIN8M 0x008  /* AIN7(+) - AIN8(-) */
    #define AD7193_CH_TEMP 0x100 /* Temp sensor */
    #define AD7193_CH_AIN2P_AIN2M 0x200 /* AIN2(+) - AIN2(-) */
    #define AD7193_CH_AIN10x401 0x1001 /* AIN10x401 */
    @ @ -109,10 +109,10 @@
    #define AD7192_CH_AIN3BIT(6) /* AIN3 - AINCOM */
    #define AD7192_CH_AIN4BIT(7) /* AIN4 - AINCOM */

    -#define AD7192_EXT_FREQ_MHZ_MIN 2457600
    -#define AD7192_EXT_FREQ_MHZ_MAX 5120000
    +#define AD7192_EXT_FREQ_MHZ_MIN 2457600
    +#define AD7192_EXT_FREQ_MHZ_MAX 5120000
    +#define AD7192_INT_FREQ_MHZ 4915200

    /* NOTE:
static inline bool ad7192_valid_external_frequency(u32 freq) {
+return (freq >= AD7192_EXT_FREQ_MHZ_MIN && 
+freq <= AD7192_EXT_FREQ_MHZ_MAX);
+
+static int ad7192_setup(struct ad7192_state *st, 
+const struct ad7192_platform_data *pdata) 
+{ 
+switch (pdata->clock_source_sel) { 
+case AD7192_CLK_EXT_MCLK1_2: 
+case AD7192_CLK_EXT_MCLK2: 
+st->mclk = AD7192_INT_FREQ_MHZ; 
+break;
+case AD7192_CLK_INT: 
+case AD7192_CLK_INT_CO: 
+if (pdata->ext_clk_hz) 
+st->mclk = pdata->ext_clk_hz; 
+else 
+st->mclk = AD7192_INT_FREQ_MHZ; 
+st->mclk = AD7192_INT_FREQ_MHZ; 
+break;
+case AD7192_CLK_EXT_MCLK1_2: 
+case AD7192_CLK_EXT_MCLK2: 
+if (ad7192_valid_external_frequency(pdata->ext_clk_hz)) { 
+st->mclk = pdata->ext_clk_hz; 
+break;
+} 
+dev_err(&st->sd.spi->dev, "Invalid frequency setting %u\n", 
+pdata->ext_clk_hz); 
+ret = -EINVAL; 
+goto out; 
+default: 
+ret = -EINVAL; 
+goto out; 
+++ linux-4.15.0/drivers/staging/iio/adc/ad7280a.c 
@@ -256,9 +256,9 @@
+if (ret) 
+return ret;
ad7280_delay(st);

if (ad7280_check_crc(st, tmp))
    return -EIO;
@@ -294,7 +296,9 @@
ad7280_delay(st);

for (i = 0; i < cnt; i++) {
    __ad7280_read32(st, &tmp);
    if (ret)
        return ret;
    if (ad7280_check_crc(st, tmp))
        return -EIO;
@@ -327,7 +331,9 @@
for (n = 0; n <= AD7280A_MAX_CHAIN; n++) {
    __ad7280_read32(st, &val);
    if (ret)
        return ret;
    if (val == 0)
        return n - 1;

--- linux-4.15.0.orig/drivers/staging/iio/adc/ad7606.c
+++ linux-4.15.0/drivers/staging/iio/adc/ad7606.c
@@ -26,9 +26,12 @@

#include "ad7606.h"

/* Scales are computed as 2.5/2**16 and 5/2**16 respectively */
Scales are computed as 5000/32768 and 10000/32768 respectively, so that when applied to the raw values they provide mV values:

```
static const unsigned int scale_avail[2][2] = {
    {0, 38147}, {0, 76294}
    {0, 152588}, {0, 305176}
};
```

```
static int ad7606_reset(struct ad7606_state *st)
{
    struct ad7780_state *st = iio_priv(indio_dev);
    int voltage_uv;
    switch (m) {
        case IIO_CHAN_INFO_RAW:
            return ad_sigma_delta_single_conversion(indio_dev, chan, val);
        case IIO_CHAN_INFO_SCALE:
            *val = st->int_vref_mv * st->gain;
            voltage_uv = regulator_get_voltage(st->reg);
            if (voltage_uv < 0)
                return voltage_uv;
            *val = (voltage_uv / 1000) * st->gain;
            *val2 = chan->scan_type.realbits - 1;
            return IIO_VAL_FRACTIONAL_LOG2;
        case IIO_CHAN_INFO_OFFSET:
            return ret;
    }
    *data = ret;
    return 0;
}
```

```
#define ADT7516_MSB_AIN3		0xA
#define ADT7516_MSB_AIN4		0xB
#define ADT7316_DA_DATA_BASE		0x10
#define ADT7316_DA_10_BIT_LSB_SHIFT	6
```
```c
#define ADT7316_DA_12_BIT_LSB_SHIFT 4
#define ADT7316_DA_MSB_DATA_REGS 4
#define ADT7316_LSB_DAC_A 0x10
#define ADT7316_MSB_DAC_A 0x11

ldac_config = chip->ldac_config & ~ADT7516_DAC_IN_VREF_MASK;
if (data & 0x1)
    ldac_config |= ADT7516_DAC_AB_IN_VREF;
else if (data & 0x2)
    ldac_config |= ADT7516_DAC_CD_IN_VREF;
} else {
    ret = kstrtou8(buf, 16, &data);
    @ -1408.7 +1410.7 @

static ssize_t adt7316_show_DAC(struct adt7316_chip_info *chip,
    int channel, char *buf)
{
    u16 data = 0;
    u8 msb, lsb, offset;
    int ret;

    @ -1433.7 +1435.11 @
    if (ret)
        return -EIO;

    -data = (msb << offset) + (lsb & ((1 << offset) - 1));
    +if (chip->dac_bits == 12)
        +data = lsb >> ADT7316_DA_12_BIT_LSB_SHIFT;
    +else if (chip->dac_bits == 10)
        +data = lsb >> ADT7316_DA_10_BIT_LSB_SHIFT;
    +data |= msb << offset;

    return sprintf(buf, "%d\n", data);
}
@ -1441.7 +1447.7 @

static ssize_t adt7316_store_DAC(struct adt7316_chip_info *chip,
    int channel, const char *buf, size_t len)
{
    u8 msb, lsb, lsb_reg, offset;
    u16 data;
    int ret;

    @ -1459.9 +1465.13 @
    return EINVAL;

    if (chip->dac_bits > 8) {
        
    
```
- lsb = data & (1 << offset);
+ lsb = data & ((1 << offset) - 1);
+ if (chip->dac_bits == 12)
+ lsb_reg = lsb << ADT7316_DA_12_BIT_LSB_SHIFT;
+ else
+ lsb_reg = lsb << ADT7316_DA_10_BIT_LSB_SHIFT;
ret = chip->bus.write(chip->bus.client,
- ADT7316_DA_DATA_BASE + channel * 2, lsb);
+ ADT7316_DA_DATA_BASE + channel * 2, lsb_reg);
if (ret)
return -EIO;
}
--- linux-4.15.0.orig/drivers/staging/iio/cdc/ad7150.c
+++ linux-4.15.0/drivers/staging/iio/cdc/ad7150.c
@@ -6,6 +6,7 @@
* Licensed under the GPL-2 or later.
*/

+#include <linux/bitfield.h>
#include <linux/interrupt.h>
#include <linux/device.h>
#include <linux/kernel.h>
@@ -129,7 +130,7 @@
{
int ret;
uchar threshtype;
-bool adaptive;
+bool thrfixed;
struct ad7150_chip_info *chip = iio_priv(indio_dev);

ret = i2c_smbus_read_byte_data(chip->client, AD7150_CFG);
@@ -137,21 +138,23 @@
return ret;

threshtype = (ret >> 5) & 0x03;
-adaptive = !(ret & 0x80);
+thrfixed = FIELD_GET(AD7150_CFG_FIX, ret);
switch (type) {
 case IIO_EV_TYPE_MAG_ADAPTIVE:
 if (dir == IIO_EV_DIR_RISING)
- return adaptive && (threshtype == 0x1);
- return adaptive && (threshtype == 0x0);
+ return !thrfixed && (threshtype == 0x1);
+ return !thrfixed && (threshtype == 0x0);
 case IIO_EV_TYPE_THRESH_ADAPTIVE:
if (dir == IIO_EV_DIR_RISING)
-return adaptive && (threshtype == 0x3);
-return adaptive && (threshtype == 0x2);
+return !thrfixed && (threshtype == 0x3);
+return !thrfixed && (threshtype == 0x2);
case IIO_EV_TYPE_THRESH:
if (dir == IIO_EV_DIR_RISING)
-return !adaptive && (threshtype == 0x1);
-return !adaptive && (threshtype == 0x0);
+return thrfixed && (threshtype == 0x1);
+return thrfixed && (threshtype == 0x0);
default:
break;
}
--- linux-4.15.0.orig/drivers/staging/iio/cdc/ad7746.c
+++ linux-4.15.0/drivers/staging/iio/cdc/ad7746.c
@@ -702,7 +702,6 @@
indio_dev->num_channels = ARRAY_SIZE(ad7746_channels);
else
indio_dev->num_channels = ARRAY_SIZE(ad7746_channels) - 2;
-indio_dev->num_channels = ARRAY_SIZE(ad7746_channels);
indio_dev->modes = INDIO_DIRECT_MODE;
if (pdata) {
--- linux-4.15.0.orig/drivers/staging/iio/impedance-analyzer/ad5933.c
+++ linux-4.15.0/drivers/staging/iio/impedance-analyzer/ad5933.c
@@ -648,8 +648,6 @@
/* Ring buffer functions - here trigger setup related */
indio_dev->setup_ops = &ad5933_ring_setup_ops;
-indio_dev->modes |= INDIO_BUFFER_HARDWARE;
return 0;
}
@@ -762,7 +760,7 @@
indio_dev->dev.parent = &client->dev;
indio_dev->info = &ad5933_info;
indio_dev->name = id->name;
-indio_dev->modes = INDIO_DIRECT_MODE;
+indio_dev->modes = (INDIO_BUFFER_SOFTWARE | INDIO_DIRECT_MODE);
indio_dev->channels = ad5933_channels;
indio_dev->num_channels = ARRAY_SIZE(ad5933_channels);
--- linux-4.15.0.orig/drivers/staging/iio/meter/ade7854.c
+++ linux-4.15.0/drivers/staging/iio/meter/ade7854.c
@@ -269,7 +269,7 @@
static IIO_DEV_ATTR_IPEAK(0644,

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ade7854_read_32bit,
ade7854_write_32bit,
ADE7854_VPEAK);
+ADE7854_IPEAK);
static IIO_DEV_ATTR_APHCAL(0644,
ade7854_read_16bit,
ade7854_write_16bit,
--- linux-4.15.0.orig/drivers/staging/iio/resolver/ad2s1210.c
+++ linux-4.15.0/drivers/staging/iio/resolver/ad2s1210.c
@@ -126,17 +126,24 @@
static int ad2s1210_config_read(struct ad2s1210_state *st,
                             unsigned char address)
{
    struct spi_transfer xfer = {
       .len = 2,
       .rx_buf = st->rx,
       .tx_buf = st->tx,
    +struct spi_transfer xfers[] = {
    +{       
       +.len = 1,
       +.rx_buf = &st->rx[0],
       +.tx_buf = &st->tx[0],
       +.cs_change = 1,
    +}, {       
       +.len = 1,
       +.rx_buf = &st->rx[1],
       +.tx_buf = &st->tx[1],
    +};
    int ret = 0;

    ad2s1210_set_mode(MOD_CONFIG, st);
    st->tx[0] = address | AD2S1210_MSB_IS_HIGH;
    st->tx[1] = AD2S1210_REG_FAULT;
    -ret = spi_sync_transfer(st->sdev, &xfer, 1);
    +ret = spi_sync_transfer(st->sdev, xfers, 2);
    if (ret < 0)
        return ret;
    st->old_data = true;
--- linux-4.15.0.orig/drivers/staging/iio/resolver/ad2s90.c
+++ linux-4.15.0/drivers/staging/iio/resolver/ad2s90.c
@@ -85,7 +85,12 @@
    /* need 600ms between CS and the first falling edge of SCLK */
    spi->max_speed_hz = 830000;
    spi->mode = SPI_MODE_3;
    -spi_setup(spi);
    +ret = spi_setup(spi);
    +
+if (ret < 0) {
+dev_err(&spi->dev, "spi_setup failed!\n");
+return ret;
+}

return 0;
}
--- linux-4.15.0.orig/drivers/staging/irda/net/af_irda.c
+++ linux-4.15.0/drivers/staging/irda/net/af_irda.c
@@ -775,6 +775,13 @@
return -EINVAL;

lock_sock(sk);
+
+/* Ensure that the socket is not already bound */
+if (self->ias_obj) {
+err = -EINVAL;
+goto out;
+}
+
+#ifdef CONFIG_IRDA_ULTRA
/* Special care for Ultra sockets */
if ((sk->sk_type == SOCK_DGRAM) &&
@@ -2012,7 +2019,11 @@
err = -EINVAL;
goto out;
}
-irias_insert_object(ias_obj);
+
+/* Only insert newly allocated objects */
+if (free_ias)
+irias_insert_object(ias_obj);
+
+kfree(ias_opt);
break;
case IRLMP_IAS_DEL:
--- linux-4.15.0.orig/drivers/staging/ks7010/ks7010_sdio.c
+++ linux-4.15.0/drivers/staging/ks7010/ks7010_sdio.c
@@ -668,8 +668,11 @@
/* Firmware running ? */
ret = ks7010_sdio_readb(priv, GCR_A, &byte);
+if (ret)
+goto release_host_and_free;
if (byte == GCR_A_RUN) {
DPRINTK(0, "MAC firmware running ...\n");
+ret = -EBUSY;
goto release_host_and_free;
memset(&priv->wstats, 0, sizeof(priv->wstats));

/* sleep mode */
atomic_set(&priv->sleepstatus.status, 0);
atomic_set(&priv->sleepstatus.doze_request, 0);
atomic_set(&priv->sleepstatus.wakeup_request, 0);
-atomic_set(&priv->sleepstatus.wakeup_request, 0);

trx_device_init(priv);
hostif_init(priv);

while (bsize > offset) {
    switch (*bp) { /* Information Element ID */
    case WLAN_EID_SSID:
        if (*(bp + 1) <= SSID_MAX_SIZE) {
            ap->ssid.size = *(bp + 1);
        } else {
            offset = 0;
        }
        memcpy(ap->ssid.body, bp + 2, ap->ssid.size);
        break;
    case 1: /* rate */
    case 50: /* ext rate */
    case WLAN_EID_SUPP_RATES:
    case WLAN_EID_EXT_SUPP_RATES:
        if ((*(bp + 1) + ap->rate_set.size) <= RATE_SET_MAX_SIZE) {
            memcpy(&ap->rate_set.body[ap->rate_set.size],
                   ( RATE_SET_MAX_SIZE - ap->rate_set.size );
        } else {
            offset = 0;
        }
        break;
    case 3: /* DS parameter */
    case WLAN_EID_DS_PARAMS:
        break;
    case 48: /* RSN(WPA2) */
    case WLAN_EID_RSN:
        ap->rsn_ie.id = *bp;
        break;
    default:
        break;
    }
}
if (*(bp + 1) <= RSN_IE_BODY_MAX) {
  ap->rsn_ie.size = *(bp + 1);
  memcpy(ap->rsn_ie.body, bp + 2, ap->rsn_ie.size);
  break;
-
-    case 221:/* WPA */
-    if (memcmp(bp + 2, "\x00\x50\xf2\x01", 4) == 0) {/* WPA OUI check */
+    case WLAN_EID_VENDOR_SPECIFIC: /* WPA */
+    if (memcmp(bp + 2, "\x00\x50\xf2\x01", 4) == 0) { /* WPA OUI check */
      ap->wpa_ie.id = *bp;
      if (*(bp + 1) <= RSN_IE_BODY_MAX) {
        ap->wpa_ie.size = *(bp + 1);
        break;
      }
    }

    case 2:/* FH parameter */
    case 4:/* CF parameter */
    case 5:/* TIM */
    case 6:/* IBSS parameter */
    case 7:/* Country */
    case 42:/* ERP information */
    case 47:/* Reserve ID 47 Broadcom AP */
    +case WLAN_EID_FH_PARAMS:
    +case WLAN_EID_CF_PARAMS:
    +case WLAN_EID_TIM:
    +case WLAN_EID_IBSS_PARAMS:
    +case WLAN_EID_COUNTRY:
    +case WLAN_EID_ERP_INFO:
  break;
  default:
    DPRINTK(4, "unknown Element ID=%d\n", *bp);
    break;
}
+
offset += 2;/* id & size field */
offset += *(bp + 1);/* +size offset */
bp += *(bp + 1) + 2;/* pointer update */
--- linux-4.15.0.orig/drivers/staging/ks7010/ks_hostif.h
+++ linux-4.15.0/drivers/staging/ks7010/ks_hostif.h
@@ -13,6 +13,7 @@
#define _KS_HOSTIF_H_

#include <linux/compiler.h>
+include <linux/ieee80211.h>

/*
* HOST-MAC I/F events
--- linux-4.15.0.orig/drivers/staging/ks7010/ks_wlan_net.c
+++ linux-4.15.0/drivers/staging/ks7010/ks_wlan_net.c
@@ -1299,6 +1299,7 @@
{
  struct ks_wlan_private *priv = netdev_priv(dev);
  struct iw_scan_req *req = NULL;
  +int len;

  DPRINTK(2, "n");

@@ -1310,8 +1311,9 @@
 if (wrqu->data.length == sizeof(struct iw_scan_req) &&
     wrqu->data.flags & IW_SCAN_THIS_ESSID) {
    req = (struct iw_scan_req *)extra;
-   priv->scan_ssid_len = req->essid_len;
-   memcpy(priv->scan_ssid, req->essid, priv->scan_ssid_len);
+   len = min_t(int, req->essid_len, IW_ESSID_MAX_SIZE);
+   priv->scan_ssid_len = len;
+   memcpy(priv->scan_ssid, req->essid, len);
  } else {
    priv->scan_ssid_len = 0;
  }
--- linux-4.15.0.orig/drivers/staging/lustre/lnet/klnds/o2iblnd/o2iblnd.c
+++ linux-4.15.0/drivers/staging/lustre/lnet/klnds/o2iblnd/o2iblnd.c
@@ -826,14 +826,15 @@
 return conn;
failed_2:
-  kiblnd_destroy_conn(conn, true);
+  kiblnd_destroy_conn(conn);
+  LIBCFS_FREE(conn, sizeof(*conn));
 failed_1:
  LIBCFS_FREE(init_qp_attr, sizeof(*init_qp_attr));
 failed_0:
 return NULL;
}

-void kiblnd_destroy_conn(struct kib_conn *conn, bool free_conn)
+void kiblnd_destroy_conn(struct kib_conn *conn)
{
  struct rdma_cm_id *cmid = conn->ibc_cmid;
  struct kib_peer *peer = conn->ibc_peer;
@@ -896,8 +897,6 @@
 rdma_destroy_id(cmid);
 atomic_dec(&net->ibn_nconns);
 }

LIBCFS_FREE(conn, sizeof(*conn));

int kiblnd_close_peer_conns_locked(struct kib_peer *peer, int why)
    @ @ -1712.7 +1711.7 @@
return 0;
}
spin_unlock(&fps->fps_lock);
-rc = -EBUSY;
+rc = -EAGAIN;
}

spin_lock(&fps->fps_lock);
--- linux-4.15.0.orig/drivers/staging/lustre/lnet/klnds/o2iblnd/o2iblnd.h
+++ linux-4.15.0/drivers/staging/lustre/lnet/klnds/o2iblnd/o2iblnd.h
@@ -1016,7 +1016,7 @@
struct kib_conn *kiblnd_create_conn(struct kib_peer *peer,
    struct rdma_cm_id *cmid,
    int state, int version);
-void kiblnd_destroy_conn(struct kib_conn *conn, bool free_conn);
+void kiblnd_destroy_conn(struct kib_conn *conn);
void kiblnd_close_conn(struct kib_conn *conn, int error);
void kiblnd_close_conn_locked(struct kib_conn *conn, int error);

--- linux-4.15.0.orig/drivers/staging/lustre/lnet/klnds/o2iblnd/o2iblnd_cb.c
+++ linux-4.15.0/drivers/staging/lustre/lnet/klnds/o2iblnd/o2iblnd_cb.c
@@ -48,7 +48,7 @@

static void kiblnd_check_sends_locked(struct kib_conn *conn);
static void
@@ -66,7 +66,7 @@
 LASSERT(!tx->tx_waiting); /* mustn't be awaiting peer response */
 LASSERT(tx->tx_pool);

-kiblnd_unmap_tx(ni, tx);
+static void kiblnd_check_sends_locked(struct kib_conn *conn);

static void
@@ -591,13 +591,9 @@
 return 0;
}
/* tx may have up to 2 lnet msgs to finalise */
Lntmsg[0] = tx->tx_lntmsg[0]; tx->tx_lntmsg[0] = NULL;
@@ -591,13 +591,9 @@
return 0;
}
static void kiblnd_unmap_tx(struct lnet_ni *ni, struct kib_tx *tx)
{
-struct kib_net *net = ni->ni_data;
-
-LASSERT(net);
-
-if (net->ibn_fmr_ps)
+if (tx->fmr.fmr_pfmr || tx->fmr.fmr_frd)
    kiblnd_fmr_pool_unmap(&tx->fmr, tx->tx_status);

if (tx->tx_nfrags) {
    goto failed2;
}

-LASSERT(cmid->device);
-CDEBUG(D_NET, "%s: connection bound to %s:%pI4h:%s\n",
    libcfs_nid2str(peer->ibp_nid), dev->ibd_ifname,
    &dev->ibd_ifip, cmid->device->name);

return;

failed2:
@@ -2996,8 +2987,19 @@
    return 0;
+    */ Can't initiate route resolution */
+CERROR("Can't resolve route for %s: %d\n",
    libcfs_nid2str(peer->ibp_nid), rc);
@@ -3314,11 +3316,13 @@
    spin_unlock_irqrestore(lock, flags);
    dropped_lock = 1;
- kiblnd_destroy_conn(conn, !peer);
+ kiblnd_destroy_conn(conn);

spin_lock_irqsave(lock, flags);
-if (!peer)
+ if (!peer) {
+kfree(conn);
+ continue;
+
+}

conn->ibc_peer = peer;
if (peer->ibp_reconnected < KIB_RECONN_HIGH_RACE)
--- linux-4.15.0.orig/drivers/staging/lnet/libcfs/linux/linux-cpu.c
+++ linux-4.15.0/drivers/staging/lnet/libcfs/linux/linux-cpu.c
@@ -529,19 +529,20 @@
int
cfs_cpt_current(struct cfs_cpt_table *cptab, int remap)
{
- int cpu = smp_processor_id();
- int cpt = cptab->ctb_cpu2cpt[cpu];
+ int cpu;
+ int cpt;

- if (cpt < 0) {
- if (!remap)
- return cpt;
- preempt_disable();
+ preempt_disable();
+ cpu = smp_processor_id();
+ cpt = cptab->ctb_cpu2cpt[cpu];

+ if (cpt < 0 && remap) {
+ /* don't return negative value for safety of upper layer,
+ instead we shadow the unknown cpu to a valid partition ID
+ */
+ cpt = cpu % cptab->ctb_nparts;
+ }
+
+ preempt_enable();
return cpt;
}
EXPORT_SYMBOL(cfs_cpt_current);
+ .cra_flags= CRYPTO_ALG_OPTIONAL_KEY,
  .cra_blocksize= CHKSUM_BLOCK_SIZE,
  .cra_contextsize= sizeof(u32),
  .cra_module= THIS_MODULE,
--- linux-4.15.0.orig/drivers/staging/lustre/lnet/lnet/config.c
+++ linux-4.15.0/drivers/staging/lustre/lnet/lnet/config.c
@@ -355,8 +355,7 @@
CERROR("Can't allocate net interface name\n");
goto failed;
}
- strncpy(ni->ni_interfaces[niface], iface,
- strlen(iface));
+ strcpy(ni->ni_interfaces[niface], iface);
niface++;
iface = comma;
} while (iface);
--- linux-4.15.0.orig/drivers/staging/lustre/lustre/include/obd.h
+++ linux-4.15.0/drivers/staging/lustre/lustre/include/obd.h
@@ -191,7 +191,7 @@
 struct sptlrpc_flavor cl_flvr_mgc; /* fixed flavor of mgc->mgs */

 /* the grant values are protected by loi_list_lock below */
-unsigned long cl_dirty_pages; /* all _dirty_ in pages */
+unsigned long cl_dirty_pages; /* all _dirty_ in pages */
 unsigned long cl_dirty_max_pages; /* allowed w/o rpc */
 unsigned long cl_dirty_transit; /* dirty synchronous */
 unsigned long cl_avail_grant; /* bytes of credit for ost */
--- linux-4.15.0.orig/drivers/staging/lustre/lustre/ldlm/ldlm_lock.c
+++ linux-4.15.0/drivers/staging/lustre/lustre/ldlm/ldlm_lock.c
@@ -1573,8 +1573,10 @@
 return ERR_CAST(res);

 lock = ldlm_lock_new(res);
- if (!lock) {
+ if (!lock) {
+ ldlm_resource_putref(res);
 return ERR_PTR(-ENOMEM);
+ }

 lock->l_req_mode = mode;
 lock->last_data = data;
@@ -1617,6 +1617,8 @@
 return ERR_PTR(rc);
 }

 +
 +
 /**

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* Enqueue (request) a lock.
* On the client this is called from ldlm_cli_enqueue_fini
--- linux-4.15.0.orig/drivers/staging/lustre/lustre/llite/xattr.c
+++ linux-4.15.0/drivers/staging/lustre/lustre/llite/xattr.c
@@ -94,7 +94,11 @@
  __u64 valid;
  int rc;

-    if (flags == XATTR_REPLACE) {
+    /* When setxattr() is called with a size of 0 the value is
+       unconditionally replaced by "". When removexattr() is
+       called we get a NULL value and XATTR_REPLACE for flags.
+    */
+    if (!value && flags == XATTR_REPLACE) {
ll_stats_ops_tally(ll_i2sbi(inode), LPROC_LL_REMOVEXATTR, 1);
valid = OBD_MD_FLXATTRRM;
    } else {
--- linux-4.15.0.orig/drivers/staging/lustre/lustre/lmv/lmv_obd.c
+++ linux-4.15.0/drivers/staging/lustre/lustre/lmv/lmv_obd.c
@@ -646,7 +646,7 @@
               ori_gf->gf_path));
 -strncpy(ptr, gf->gf_path, strlen(gf->gf_path));
 +strcpy(ptr, gf->gf_path);
 ptr += strlen(gf->gf_path);
 *ptr = '/';
 }
@@ -2695,7 +2695,7 @@
 if (lsm && !lmm) {
     int i;

-    for (i = 1; i < lsm->lsm_md_stripe_count; i++) {
+    for (i = 0; i < lsm->lsm_md_stripe_count; i++) {
/ *
 * For migrating inode, the master stripe and master
 * object will be the same, so do not need iput, see
--- linux-4.15.0.orig/drivers/staging/lustre/lustre/osc/osc_cache.c
+++ linux-4.15.0/drivers/staging/lustre/lustre/osc/osc_cache.c
@@ -1530,7 +1530,7 @@
     if (rc < 0)
         return 0;

-    if (cli->cl_dirty_pages <= cli->cl_dirty_max_pages &&
+    if (cli->cl_dirty_pages < cli->cl_dirty_max_pages &&
         atomic_long_read(&obd_dirty_pages) + 1 <= obd_max_dirty_pages) {
         osc_consume_write_grant(cli, &oap->oap_brw_page);
     if (transient) {
struct i2c_client *client = v4l2_get_subdevdata(sd);
struct ov2680_device *dev = to_ov2680_sensor(sd);

u16 vts,hts;
int ret,exp_val;

dev_dbg(&client->dev,
"+++++++__ov2680_set_exposure coarse_itg %d, gain %d, digitgain %d++\n",
coarse_itg, gain, digitgain);

hts = ov2680_res[dev->fmt_idx].pixels_per_line;
vts = ov2680_res[dev->fmt_idx].lines_per_frame;

/* group hold */
revision = (u8) high & 0x0f;

-dev_info(&client->dev, "sensor_revision id = 0x%x\n", id);
+dev_info(&client->dev, "sensor_revision id = 0x%x, rev= %d\n",
+ id, revision);

return 0;

}
static struct gc2235_reg const gc2235_1600_900_30fps[] = {
    { GC2235_8BIT, 0x8b, 0xa0 },
    @@ -388,6 +394,7 @@
    { GC2235_8BIT, 0xfe, 0x00 }, /* switch to P0 */
    { GC2235_TOK_TERM, 0, 0 }
};
+#endif

static struct gc2235_reg const gc2235_1600_900_30fps[] = {
    { GC2235_8BIT, 0x8b, 0xa0 },
    @-575.6 +582.7 @-
};
#define N_RES_PREVIEW (ARRAY_SIZE(gc2235_res_preview))

+#if ENABLE_NON_PREVIEW
static struct gc2235_resolution gc2235_res_still[] = {
    {
        .desc = "gc2235_1600_900_30fps",
--- linux-4.15.0.orig/drivers/staging/media/atomisp/i2c/ov2680.h
+++ linux-4.15.0/drivers/staging/media/atomisp/i2c/ov2680.h
 @@ -296,6 +296,7 @@
    
};

+#if 0 /* None of the definitions below are used currently */
/
* 176x144 30fps VBlanking 1lane 10Bit (binning)
 */
@@ -514,7 +515,6 @@
    {OV2680_8BIT, 0x5081, 0x41},
    {OV2680_TOK_TERM, 0, 0}
};
- *
/
* 800x600 30fps VBlanking 1lane 10Bit (binning)
 */
@@ -686,6 +686,7 @@
 // {OV2680_8BIT, 0x5090, 0x0c},
    {OV2680_TOK_TERM, 0, 0}
};
+#endif
/
* 1616x916 30fps VBlanking 1lane 10bit
@@ -735,6 +736,7 @@
* 1612x1212 30fps VBlanking 1lane 10Bit
 */
static struct ov2680_reg const ov2680_1616x1082_30fps[] = {
    {OV2680_8BIT, 0x3086, 0x00},
    {OV2680_8BIT, 0x3501, 0x48},
    @ -774.6 +776.7 @
    {OV2680_8BIT, 0x5081, 0x41},
    {OV2680_TOK_TERM, 0, 0}
};

static struct ov2722_reg const ov2722_QVGA_30fps[] = {
    {OV2722_8BIT, 0x3718, 0x10},
    {OV2722_8BIT, 0x3702, 0x0c},
    @ -581.6 +582.7 @
    {OV2722_8BIT, 0x3509, 0x10},
    {OV2722_TOK_TERM, 0, 0},
};

static struct ov2722_reg const ov2722_1632_1024_30fps[] = {
    {OV2722_8BIT, 0x3021, 0x03}, /* For stand wait for
    @ -890.6 +893.7 @
    {OV2722_8BIT, 0x3509, 0x10},
    {OV2722_TOK_TERM, 0, 0}
};

static struct ov2722_reg const ov2722_1080p_30fps[] = {
    {OV2722_8BIT, 0x3021, 0x03}, /* For stand wait for a whole
    @ -996.6 +1000.7 @
    {OV2722_TOK_TERM, 0, 0}
);+#if 0 /* Currently unused */
static struct ov2722_reg const ov2722_720p_30fps[] = {
    {OV2722_8BIT, 0x3021, 0x03},
    {OV2722_8BIT, 0x3718, 0x10},
    @ @ -1095.6 +1100.7 @@
    {OV2722_8BIT, 0x3509, 0x00},
    {OV2722_TOK_TERM, 0, 0},
};
+#endif

struct ov2722_resolution ov2722_res_preview[] = {
    --- linux-4.15.0.orig/drivers/staging/media/atomisp/i2c/ov5693/ov5693.h
    +++ linux-4.15.0/drivers/staging/media/atomisp/i2c/ov5693/ov5693.h
    @ @ -31.6 +31.12 @@

    #include "../include/linux/atomisp_platform.h"

    */
    + * FIXME: non-preview resolutions are currently broken
    + */
    +#define ENABLE_NON_PREVIEW0
    +
    +
    #define OV5693_POWER_UP_RETRY_NUM 5

    /* Defines for register writes and register array processing */
    @ @ -.503.6 +509.7 @@
    {OV5693_TOK_TERM, 0, 0}
};

+#if ENABLE_NON_PREVIEW
/
* 654x496 30fps 17ms VBlanking 2lane 10Bit (Scaling)
* /
    @ @ -695.6 +702.7 @@
    {OV5693_8BIT, 0x0100, 0x01},
    {OV5693_TOK_TERM, 0, 0}
};
+#endif

/*
static struct ov5693_reg const ov5693_736x496[] = {
    @ @ -727.6 +735.7 @@
/*
* 976x556 30fps 8.8ms VBlanking 2lane 10Bit (Scaling)
/*
+if ENABLE_NON_PREVIEW
static struct ov5693_reg const ov5693_976x556[] = {
    {OV5693_8BIT, 0x3501, 0x7b},
    {OV5693_8BIT, 0x3502, 0x00},
    // @ -819.6 +828.7 @
    {OV5693_8BIT, 0x0100, 0x01},
    {OV5693_TOK_TERM, 0, 0}
};
+endif

static struct ov5693_reg const ov5693_1616x1216_30fps[] = {
    {OV5693_8BIT, 0x3501, 0x7b},
    {OV5693_8BIT, 0x3502, 0x00},
    @@ -819,6 +828,7 @@
    {OV5693_8BIT, 0x0100, 0x01},
    {OV5693_TOK_TERM, 0, 0}
};
+endif

+if ENABLE_NON_PREVIEW
static struct ov5693_reg const ov5693_1940x1096[] = {
    {OV5693_8BIT, 0x3501, 0x7b},
    {OV5693_8BIT, 0x3502, 0x00},
    @@ -916,6 +927,7 @@
    {OV5693_8BIT, 0x5002, 0x00},
    {OV5693_TOK_TERM, 0, 0}
};
+endif

+if ENABLE_NON_PREVIEW
static struct ov5693_reg const ov5693_2576x1456_30fps[] = {
    {OV5693_8BIT, 0x3501, 0x7b},
    {OV5693_8BIT, 0x3502, 0x00},
    @@ -951,6 +963,7 @@
    {OV5693_8BIT, 0x0100, 0x01},
    {OV5693_TOK_TERM, 0, 0}
};
+endif

+if ENABLE_NON_PREVIEW
static struct ov5693_reg const ov5693_2592x1944_30fps[] = {
    {OV5693_8BIT, 0x3501, 0x7b},
    {OV5693_8BIT, 0x3502, 0x00},
    @@ -977,6 +990,7 @@
    {OV5693_8BIT, 0x0100, 0x01},
    {OV5693_TOK_TERM, 0, 0}
};
+endif

/*
    * 11:9 Full FOV Output, expected FOV Res: 2346x1920
    @ @ -985.6 +999.7 @ @
    *
    * WA: Left Offset: 8, Hor scal: 64
/*
+#if ENABLE_NON_PREVIEW
static struct ov5693_reg const ov5693_1424x1168_30fps[] = {
    [OV5693_8BIT, 0x3501, 0x3b], /* long exposure[15:8] */
    [OV5693_8BIT, 0x3502, 0x80], /* long exposure[7:0] */
    [OV5693_8BIT, 0x0100, 0x01],
    [OV5693_TOK_TERM, 0, 0]
};
+#endif
/

* 3:2 Full FOV Output, expected FOV Res: 2560x1706
@@ -1019,6 +1034,7 @@
    [OV5693_8BIT, 0x0100, 0x01],
    [OV5693_TOK_TERM, 0, 0]
};
#define N_RES_PREVIEW (ARRAY_SIZE(ov5693_res_preview))

+#if ENABLE_NON_PREVIEW
struct ov5693_resolution ov5693_res_still[] = {
    {
        .desc = "ov5693_736x496_30fps",
--- linux-4.15.0.orig/drivers/staging/media/atomisp/pci/atomisp2/atomisp_compat_ioctl32.c
+++ linux-4.15.0/drivers/staging/media/atomisp/pci/atomisp2/atomisp_compat_ioctl32.c
@@ -77,7 +77,7 @@
        get_user(kp->flags, &up->flags))
    return -EFAULT;
    }
    -kp->base = compat_ptr(tmp);
    +kp->base = (void __force *)compat_ptr(tmp);
    get_v4l2_pix_format((struct v4l2_pix_format *)&kp->fmt, &up->fmt);
    return 0;
    }
@@ -228,10 +228,10 @@
    get_user(ycoords_uv, &up->ycoords_uv))
    return -EFAULT;

    -kp->xcoords_y = compat_ptr(xcoords_y);
    +kp->xcoords_y = (void __force *)compat_ptr(xcoords_y);
    -kp->xcoords_uv = compat_ptr(xcoords_uv);
    +kp->xcoords_uv = (void __force *)compat_ptr(xcoords_uv);
    return 0;
    }
@@ -292,7 +292,7 @@
return -EFAULT;

kp->data = compat_ptr(data);
-kp->effective_width = compat_ptr(effective_width);
+k->effective_width = (void __force *)compat_ptr(effective_width);
return 0;
}

@@ -356,7 +356,7 @@
return -EFAULT;

kp->data = compat_ptr(data);
-kp->effective_width = compat_ptr(effective_width);
+k->effective_width = (void __force *)compat_ptr(effective_width);
return 0;
}

@@ -433,7 +433,7 @@
get_user(kp->overlay_start_x, &up->overlay_start_y))
return -EFAULT;

-kp->frame = compat_ptr(frame);
+k->frame = (void __force *)compat_ptr(frame);
return 0;
}

@@ -477,7 +477,7 @@
get_user(calb_grp_values, &up->calb_grp_values))
return -EFAULT;

-kp->calb_grp_values = compat_ptr(calb_grp_values);
+k->calb_grp_values = (void __force *)compat_ptr(calb_grp_values);
return 0;
}

@@ -699,8 +699,8 @@
while (n >= 0) {
-compat_uptr_t *src = (compat_uptr_t *)up + n;
-uintptr_t *dst = (uintptr_t *)kp + n;
+compat_uptr_t __user *src = ((compat_uptr_t __user *)up) + n;
+uintptr_t *dst = ((uintptr_t *)__user *)kp) + n;

if (get_user(*dst, src))
return -EFAULT;
@@ -747,12 +747,12 @@ #endif
return -EFAULT;

-kp->shading_table = user_ptr + offset;
+kp->shading_table = (void __force *)user_ptr + offset;
offset = sizeof(struct atomisp_shading_table);
if (!kp->shading_table)
return -EFAULT;

-if (copy_to_user(kp->shading_table,
+if (copy_to_user((void __user *)kp->shading_table,
   &karg.shading_table,
   sizeof(struct atomisp_shading_table)))
return -EFAULT;
  @@ -773,13 +773,14 @@
@endif
return -EFAULT;

-kp->morph_table = user_ptr + offset;
+kp->morph_table = (void __force *)user_ptr + offset;
offset += sizeof(struct atomisp_morph_table);
if (!kp->morph_table)
return -EFAULT;

-if (copy_to_user(kp->morph_table, &karg.morph_table,
 - sizeof(struct atomisp_morph_table)))
+if (copy_to_user((void __user *)kp->morph_table,
 + &karg.morph_table,
 + sizeof(struct atomisp_morph_table)))
return -EFAULT;
}

@@ -798,13 +799,14 @@
@endif
return -EFAULT;

-kp->dvs2_coefs = user_ptr + offset;
+kp->dvs2_coefs = (void __force *)user_ptr + offset;
offset += sizeof(struct atomisp_dis_coefficients);
if (!kp->dvs2_coefs)
return -EFAULT;

-if (copy_to_user(kp->dvs2_coefs, &karg.dvs2_coefs,
 -sizeof(struct atomisp_dis_coefficients)))
+if (copy_to_user((void __user *)kp->dvs2_coefs,
 + &karg.dvs2_coefs,
 + sizeof(struct atomisp_dis_coefficients)))
return -EFAULT;
}
/* handle dvs 6axis configuration */
@@ -822,13 +824,14 @@
#endif
return -EFAULT;

-kp->dvs_6axis_config = user_ptr + offset;
+k->dvs_6axis_config = (void __force *)user_ptr + offset;
offset += sizeof(struct atomisp_dvs_6axis_config);
if (!kp->dvs_6axis_config)
return -EFAULT;

-if (copy_to_user(kp->dvs_6axis_config, &karg.dvs_6axis_config,
-sizeof(struct atomisp_dvs_6axis_config)))
+if (copy_to_user((void __user *)kp->dvs_6axis_config,
+ &karg.dvs_6axis_config,
+ sizeof(struct atomisp_dvs_6axis_config)))
return -EFAULT;
}
}

get_user(lut, &up->lut))
return -EFAULT;

-kp->lut = compat_ptr(lut);
+k->lut = (void __force *)compat_ptr(lut);
return 0;
}

--- linux-4.15.0.orig/drivers/staging/media/atomisp/pci/atomisp2/atomisp_fops.c
+++ linux-4.15.0/drivers/staging/media/atomisp/pci/atomisp2/atomisp_fops.c
@@ -1279,7 +1279,10 @@
.mmap = atomisp_mmap,
.unlocked_ioctl = video_ioctl2,
#ifdef CONFIG_COMPAT
+/*
+ * There are problems with this code. Disable this for now.
+.compat_ioctl32 = atomisp_compat_ioctl32,
+ */
#endif
.poll = atomisp_poll,
};
@@ -1291,7 +1294,10 @@
.mmap = atomisp_file_mmap,
.unlocked_ioctl = video_ioctl2,
#ifdef CONFIG_COMPAT
+/*
+ * There are problems with this code. Disable this for now.
+.compat_ioctl32 = atomisp_compat_ioctl32,
+ */
#endif
```c
/*
 * endif
 * poll = atomisp_poll,
 */
--- linux-4.15.0.orig/drivers/staging/media/atomisp/pci/atomisp2/css2400/runtime/debug/src/ia_css_debug.c
+++ linux-4.15.0/drivers/staging/media/atomisp/pci/atomisp2/css2400/runtime/debug/src/ia_css_debug.c
@@ -2860,9 +2860,7 @@
 if (l <= ENABLE_LINE_MAX_LENGTH) {
 /* It fits on one line, copy string and init */
 /* other helper strings with empty string */
-strcpy_s(enable_info,
--+strncpy(enable_info, ei, sizeof(enable_info));
 } else {
 /* Too big for one line, find last comma */
 p = ENABLE_LINE_MAX_LENGTH;
--- linux-4.15.0.orig/drivers/staging/media/davinci_vpfe/vpfe_video.c
+++ linux-4.15.0/drivers/staging/media/davinci_vpfe/vpfe_video.c
@@ -422,6 +422,9 @@
 /* If decoder is not initialized. Initialize it */
 if (!video->initialized && vpfe_update_pipe_state(video)) {
 mutex_unlock(&video->lock);
+-v4l2_fh_del(&handle->vfh);
+-v4l2_fh_exit(&handle->vfh);
+kfree(handle);
 return -ENODEV;
 }
/* Increment device users counter */
--- linux-4.15.0.orig/drivers/staging/media/imx/imx-ic-prpencvf.c
+++ linux-4.15.0/drivers/staging/media/imx/imx-ic-prpencvf.c
@@ -210,6 +210,7 @@
 done = priv->active_vb2_buf[priv->ipu_buf_num];
 if (done) {
 +done->vbuf.field = vdev->fmt.fmt.pix.field;
+vb = &done->vbuf.vb2_buf;
 vb->timestamp = ktime_get_ns();
 vb2_buffer_done(vb, priv->nfb4eof ?
 @ @ -675,12 +676,23 @ @
goto out_free_nfb4eof_irq;
 }
/* start upstream */
+-ret = v4l2_subdev_call(priv->src_sd, video, s_stream, 1);
+ret = (ret && ret != -ENOIOCTLCMD) ? ret : 0;
+if (ret) {
+v4l2_err(&ic_priv->sd,
```

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"upstream stream on failed: %d\n", ret);
+goto out_free_eof_irq;
+

/* start the EOF timeout timer */
mod_timer(&priv->eof_timeout_timer,
    jiffies + msecs_to_jiffies(IMX_MEDIA_EOF_TIMEOUT));

return 0;

+out_free_eof_irq:
+devm_free_irq(ic_priv->dev, priv->eof_irq, priv);
out_free_nfb4eof_irq:
devm_free_irq(ic_priv->dev, priv->nfb4eof_irq, priv);
out_unsetup:
@@ -712,6 +724,12 @@
if (ret == 0)
  v4l2_warn(&ic_priv->sd, "wait last EOF timeout'\n");

+/* stop upstream */
+ret = v4l2_subdev_call(priv->src_sd, video, s_stream, 0);
+if (ret && ret != -ENOIOCTLCMD)
+  v4l2_warn(&ic_priv->sd,
+    "upstream stream off failed: %d\n", ret);
+
devm_free_irq(ic_priv->dev, priv->eof_irq, priv);
devm_free_irq(ic_priv->dev, priv->nfb4eof_irq, priv);

@@ -1143,15 +1161,6 @@
if (ret)
  goto out;
update_count:
priv->stream_count += enable ? 1 : -1;
if (priv->stream_count < 0)
  -- linux-4.15.0.orig/drivers/staging/media/imx/imx-media-capture.c
+++ linux-4.15.0/drivers/staging/media/imx/imx-media-capture.c
@@ -685,7 +685,7 @@
/* setup default format */
fmt_src.pad = priv->src_sd_pad;
fmt_src.which = V4L2_SUBDEV_FORMAT_ACTIVE;
-v4l2_subdev_call(sd, pad, get_fmt, NULL, &fmt_src);
+ret = v4l2_subdev_call(sd, pad, get_fmt, NULL, &fmt_src);
if (ret) {
 v4l2_err(sd, "failed to get src_sd format\n");
goto unreg;
--- linux-4.15.0.orig/drivers/staging/media/imx/imx-media-csi.c
+++ linux-4.15.0/drivers/staging/media/imx/imx-media-csi.c
@@ -171,6 +171,7 @@
done = priv->active_vb2_buf[priv->ipu_buf_num];
if (done) {
+ done->vbuf.field = vdev->fmt.fmt.pix.field;
 vb = &done->vbuf.vb2_buf;
 vb->timestamp = ktime_get_ns();
 vb2_buffer_done(vb, priv->nfb4eof ?
@@ -537,7 +538,7 @@
 return ret;
 }
-static void csi_idmac_stop(struct csi_priv *priv)
+static void csi_idmac_wait_last_eof(struct csi_priv *priv)
 {
 unsigned long flags;
 int ret;
@@ -554,7 +555,10 @@
 &priv->last_eof_comp, msecs_to_jiffies(IMX_MEDIA_EOF_TIMEOUT));
 if (ret == 0)
 v4l2_warn(&priv->sd, "wait last EOF timeout\n");
+
+static void csi_idmac_stop(struct csi_priv *priv)
 +{
 devm_free_irq(priv->dev, priv->eof_irq, priv);
 devm_free_irq(priv->dev, priv->nfb4eof_irq, priv);
@@ -644,10 +648,16 @@
 usleep_range(delay_usec, delay_usec + 1000);
 }
+/* start upstream */
+ret = v4l2_subdev_call(priv->src_sd, video, s_stream, 1);
+ret = (ret && ret != -ENOIOCTLCMD) ? ret : 0;
+if (ret)
+return ret;
+
 if (priv->dest == IPU_CSI_DEST_IDMAC) {


ret = csi_idmac_start(priv);
if (ret)
    return ret;
+goto stop_upstream;
}

ret = csi_setup(priv);
@@ -675,11 +685,26 @@
idmac_stop:
if (priv->dest == IPU_CSI_DEST_IDMAC)
csi_idmac_stop(priv);
+stop_upstream:
+v4l2_subdev_call(priv->src_sd, video, s_stream, 0);
return ret;
}

static void csi_stop(struct csi_priv *priv)
{
+if (priv->dest == IPU_CSI_DEST_IDMAC)
+csi_idmac_wait_last_eof(priv);
+
+/*
+ * Disable the CSI asap, after syncing with the last EOF.
+ * Doing so after the IDMA channel is disabled has shown to
+ * create hard system-wide hangs.
+ */
+iwu_csi_disable(priv->csi);
+
+/* stop upstream */
+v4l2_subdev_call(priv->src_sd, video, s_stream, 0);
+
if (priv->dest == IPU_CSI_DEST_IDMAC) {
csi_idmac_stop(priv);
@@ -687,8 +712,6 @@
if (priv->fim)
imx_media_fim_set_stream(priv->fim, NULL, false);
}
-ihu_csi_disable(priv->csi);
}

static const struct csi_skip_desc csi_skip[12] = {
@@ -849,23 +872,13 @@
goto update_count;
if (enable) {
-/* upstream must be started first, before starting CSI */
- ret = v4l2_subdev_call(priv->src_sd, video, s_stream, 1);
- ret = (ret && ret != -ENOIOCTLCMD) ? ret : 0;
- if (ret)
- goto out;
-
- dev_dbg(priv->dev, "stream ON\n");
ret = csi_start(priv);
- if (ret) {
- v4l2_subdev_call(priv->src_sd, video, s_stream, 0);
+ if (ret)
+ goto out;
- }
} else {
- dev_dbg(priv->dev, "stream OFF\n");
/* CSI must be stopped first, then stop upstream */
- csi_stop(priv);
- v4l2_subdev_call(priv->src_sd, video, s_stream, 0);
} }

update_count:
--- linux-4.15.0.orig/drivers/staging/media/imx/imx6-mipi-csi2.c
+++ linux-4.15.0/drivers/staging/media/imx/imx6-mipi-csi2.c
@@ -247,7 +247,7 @@
}
/* Waits for low-power LP-11 state on data and clock lanes. */
- static int csi2_dphy_wait_stopstate(struct csi2_dev *csi2)
+ static void csi2_dphy_wait_stopstate(struct csi2_dev *csi2)
{
  u32 mask, reg;
  int ret;
  @@ -258,11 +258,9 @@
  ret = readl_poll_timeout(csi2->base + CSI2_PHY_STATE, reg, (reg & mask) == mask, 0, 500000);
  if (ret) {
- v4l2_err(&csi2->sd, "LP-11 timeout, phy_state = 0x%08x\n", reg);
- return ret;
+ v4l2_warn(&csi2->sd, "LP-11 wait timeout, likely a sensor driver bug, expect capture failures.\n");
 v4l2_warn(&csi2->sd, "phy_state = 0x%08x\n", reg);
} -
 - return 0;
}
/* Wait for active clock on the clock lane. */
@@ -320,9 +318,7 @@
csi2_enable(csi2, true);
/* Step 5 */
ret = csi2_dphy_wait_stopstate(csi2);
if (ret)
    goto err_assert_reset;

/* Step 6 */
ret = v4l2_subdev_call(csi2->src_sd, video, s_stream, 1);

--- linux-4.15.0.orig/drivers/staging/media/lirc/lirc_zilog.c
+++ linux-4.15.0/drivers/staging/media/lirc/lirc_zilog.c
@@ -287,7 +287,7 @@
struct IR_tx *tx = container_of(ref, struct IR_tx, ref);
struct IR *ir = tx->ir;

-ir->l->features &= ~LIRC_CAN_SEND_LIRCCODE;
+ir->l->features &= ~LIRC_CAN_SEND_PULSE;
/* Don't put_ir_device(tx->ir) here, so our lock doesn't get freed */
ir->tx = NULL;
kfree(tx);
@@ -1227,6 +1227,7 @@
    dev_dbg(ir->dev, "%s result = %s\n", __func__,
    ret ? "POLLIN|POLLRDNORM" : "none");
+put_ir_rx(rx, false);
    return ret;

@@ -1266,14 +1267,14 @@
    if (!(features & LIRC_CAN_SEND_MASK))
        return -ENOTTY;

-result = put_user(LIRC_MODE_LIRCCODE, uptr);
+result = put_user(LIRC_MODE_PULSE, uptr);
    break;
    case LIRC_SET_SEND_MODE:
    if (!(features & LIRC_CAN_SEND_MASK))
        return -ENOTTY;

    result = get_user(mode, uptr);
-    if (!result && mode != LIRC_MODE_LIRCCODE)
+    if (!result && mode != LIRC_MODE_PULSE)
        return -EINVAL;
    break;
    default:
        @ @ -1481,7 +1482,7 @@
kref_init(&tx->ref);
    ir->tx = tx;
-ir->l->features |= LIRC_CAN_SEND_LIRCCODE;
+ir->l->features |= LIRC_CAN_SEND_PULSE;
mutex_init(&tx->client_lock);

tx->c = client;

-- linux-4.15.0.orig/drivers/staging/media/omap4iss/iss.c
+++ linux-4.15.0/drivers/staging/media/omap4iss/iss.c
@@ -1244,8 +1244,10 @@
    if (ret < 0)
    goto error;

-if (!omap4iss_get(iss))
+if (!omap4iss_get(iss)) {
+    ret = -EINVAL;
    goto error;
+}

    ret = iss_reset(iss);
    if (ret < 0)
--- linux-4.15.0.orig/drivers/staging/media/omap4iss/iss_video.c
+++ linux-4.15.0/drivers/staging/media/omap4iss/iss_video.c
@@ -11,7 +11,6 @@
 * (at your option) any later version.
 */

+#include <asm/cacheflush.h>
#include <linux/clk.h>
#include <linux/mm.h>
#include <linux/pagemap.h>
@@ -24,6 +23,8 @@
#include <media/v4l2-ioctl.h>
#include <media/v4l2-mc.h>
+#include <asm/cacheflush.h>
+
#include "iss_video.h"
#include "iss.h"

--- linux-4.15.0.orig/drivers/staging/most/aim-cdev/cdev.c
+++ linux-4.15.0/drivers/staging/most/aim-cdev/cdev.c
@@ -455,7 +455,9 @@
c->devno = MKDEV(major, current_minor);
cdev_init(&c->cdev, &channel_fops);
c->cdev.owner = THIS_MODULE;
-        cdev_add(&c->cdev, c->devno, 1);
+        retval = cdev_add(&c->cdev, c->devno, 1);
+        if (retval < 0)
+        goto err_free_c;
c->iface = iface;
c->cfg = cfg;
c->channel_id = channel_id;
list_del(&c->list);
error_alloc_kfifo:
cdev_del(&c->cdev);
+err_free_c:
kfree(c);
error_alloc_channel:
ida_simple_remove(&minor_id, current_minor);
unsigned int payload_len = skb->len - ETH_HLEN;
unsigned int mdp_len = payload_len + MDP_HDR_LEN;
+if (mdp_len < skb->len) {
+pr_err("drop: too large packet! (%u)\n", skb->len);
+return -EINVAL;
+}
+
if (mbo->buffer_length < mdp_len) {
pr_err("drop: too small buffer! (%d for %d)\n",
    mbo->buffer_length, mdp_len);
@
if (mep_len < skb->len) {
+pr_err("drop: too large packet! (%u)\n", skb->len);
+return -EINVAL;
+}
+
if (mbo->buffer_length < mep_len) {
pr_err("drop: too small buffer! (%d for %d)\n",
    mbo->buffer_length, mep_len);
}
for (i = 0; i < ARRAY_SIZE(ch_data_type); i++) {
    if (c->cfg.data_type & ch_data_type[i].most_ch_data_type)
        return snprintf(buf, PAGE_SIZE, ch_data_type[i].name);
} return snprintf(buf, PAGE_SIZE, "unconfigured');

--- linux-4.15.0.orig/drivers/staging/octeon/ethernet-mdio.c
+++ linux-4.15.0/drivers/staging/octeon/ethernet-mdio.c
@@ -155,12 +155,6 @@
phy_node = of_parse_phandle(priv->of_node, "phy-handle", 0);
if (!phy_node && of_phy_is_fixed_link(priv->of_node)) {
    int rc;
    -rc = of_phy_register_fixed_link(priv->of_node);
    -if (rc)
    -return rc;
    phy_node = of_node_get(priv->of_node);
} if (!phy_node)
--- linux-4.15.0.orig/drivers/staging/octeon/ethernet-rx.c
+++ linux-4.15.0/drivers/staging/octeon/ethernet-rx.c
@@ -83,15 +83,17 @@
    else
        port = work->word1.cn38xx.ipprt;
    -if ((work->word2.snoip.err_code == 10) && (work->word1.len <= 64)) {
    +if ((work->word2.snoip.err_code == 10) && (work->word1.len <= 64))
        /*
         * Ignore length errors on min size packets. Some
         * equipment incorrectly pads packets to 64+4FCS
         * instead of 60+4FCS. Note these packets still get
         * counted as frame errors.
         */
        -} else if (work->word2.snoip.err_code == 5 ||
        - work->word2.snoip.err_code == 7) {
        +return 0;
        +
        +if (work->word2.snoip.err_code == 5 ||
        +  work->word2.snoip.err_code == 7) {
        /*
         * We received a packet with either an alignment error
or a FCS error. This may be signalling that we are
/* Port received 0xd5 preamble */
work->packet_ptr.s.addr += i + 1;
work->word1.len -= i + 5;
} else if ((*ptr & 0xf) == 0xd) {
+return 0;
+
+if ((*ptr & 0xf) == 0xd) {
/* Port received 0xd preamble */
work->packet_ptr.s.addr += i;
work->word1.len -= i + 4;
@@ -132,21 +137,20 @@
     ((*(ptr + 1) & 0xf) << 4);
ptr++;
} -} else {
-printk_ratelimited("Port %d unknown preamble, packet dropped\n",
-    port);
-cvm_oct_free_work(work);
-return 1;
+printf("Port %d unknown preamble, packet dropped\n", port);
+cvm_oct_free_work(work);
+return 1;
+
+printf("Port %d unknown preamble, packet dropped\n", port);
+cvm_oct_free_work(work);
+return 1;
+
+printf("Port %d unknown preamble, packet dropped\n", port);
+cvm_oct_free_work(work);
+return 1;
+
-return 0;
+printf("Port %d receive error code %d, packet dropped\n", port, work->word2.snoip.err_code);
-cvm_oct_free_work(work);
-return 1;
+
-cvm_oct_free_work(work);
+return 1;
+
-cvm_oct_free_work(work);
+return 1;
+

static void copy_segments_to_skb(cvmx_wqe_t *work, struct sk_buff *skb)
--- linux-4.15.0.orig/drivers/staging/octeon/ethernet.c
+++ linux-4.15.0/drivers/staging/octeon/ethernet.c
@@ -16,6 +16,7 @@
#include <linux/phy.h>
#include <linux/slab.h>
#include <linux/interrupt.h>
#include <linux/of_mdio.h>
#include <linux/of_net.h>
#include <linux/if_ether.h>
#include <linux/if_vlan.h>

if (!dev->netdev_ops) {
    free_netdev(dev);
} else if (register_netdev(dev) < 0) {
    --- linux-4.15.0.orig/drivers/staging/olpc_dcon/Kconfig
    +++ linux-4.15.0/drivers/staging/olpc_dcon/Kconfig
    @@ -2,6 +2,7 @@
    tristate "One Laptop Per Child Display CONtroller support"
    depends on OLPC & FB
    depends on I2C
    +depends on BACKLIGHT_LCD_SUPPORTED
    depends on (GPIO_CS5535 || GPIO_CS5535=n)
    select BACKLIGHT_CLASSDEVICE
    ---help---
    --- linux-4.15.0.orig/drivers/staging/pi433/pi433_if.c
    +++ linux-4.15.0/drivers/staging/pi433/pi433_if.c
    @@ -765,6 +765,7 @@
    int retval = 0;
    struct pi433_instance*instance;
    struct pi433_device*device;
    +struct pi433_tx_cfgtx_cfg;
    void __user *argp = (void __user *)(arg);

    /* Check type and command number */
    @ @ -787,9 +788,11 @@
    return -EFAULT;
    break;
    case PI433_IOC_WR_TX_CFG:
    -if (copy_from_user(&instance->tx_cfg, argp,
    -sizeof(struct pi433_tx_cfg)))
if (copy_from_user(&tx_cfg, argp, sizeof(struct pi433_tx_cfg)))
  return -EFAULT;
mutex_lock(&device->tx_fifo_lock);
memcpy(&instance->tx_cfg, &tx_cfg, sizeof(struct pi433_tx_cfg));
mutex_unlock(&device->tx_fifo_lock);
break;
case PI433_IOC_RD_RX_CFG:
  if (copy_to_user(argp, &device->rx_cfg, 
    @ @ -1134,6 +1137,10 @@
/* create cdev */
  device->cdev = cdev_alloc();
  if (!device->cdev) {
    dev_dbg(device->dev, "allocation of cdev failed");
    goto cdev_failed;
  }
  device->cdev->owner = THIS_MODULE;
cdev_init(device->cdev, &pi433_fops);
  retval = cdev_add(device->cdev, device->devt, 1);
--- linux-4.15.0.orig/drivers/staging/rtl8188eu/core/rtw_ap.c
+++ linux-4.15.0/drivers/staging/rtl8188eu/core/rtw_ap.c
@@ -912,6 +912,7 @@
/* SSID */
p = rtw_get_ie(ie + _BEACON_IE_OFFSET_, _SSID_IE_, &ie_len, (pbss_network->IELength -
  _BEACON_IE_OFFSET_));
  if (p && &ie_len > 0) {
    +ie_len = min_t(int, ie_len, sizeof(struct ndis_802_11_ssid));
    memset(&pbss_network->Ssid, 0, sizeof(struct ndis_802_11_ssid));
    memcpy(pbss_network->Ssid, p + 2, ie_len);
    pbss_network->SsidLength = ie_len;
    @ @ -930,6 +931,7 @@
/* get supported rates */
p = rtw_get_ie(ie + _BEACON_IE_OFFSET_, _SUPPORTEDRATES_IE_, &ie_len, (pbss_network->IELength -
  _BEACON_IE_OFFSET_));
  if (p) {
    +ie_len = min_t(int, ie_len, NDIS_802_11_LENGTH_RATES_EX);
    memcpy(supportRate, p + 2, ie_len);
    supportRateNum = ie_len;
  }
  @ @ -937,6 +939,8 @@
/* get ext_supported rates */
p = rtw_get_ie(ie + _BEACON_IE_OFFSET_, _EXT_SUPPORTEDRATES_IE_, &ie_len, pbss_network->
  IELength -_BEACON_IE_OFFSET_);
  if (p) {
    +ie_len = min_t(int, ie_len, NDIS_802_11_LENGTH_RATES_EX - supportRateNum);
    memcpy(supportRate + supportRateNum, p + 2, ie_len);
    supportRateNum += ie_len;
pht_cap->mcs.rx_mask[0] = 0xff;
pht_cap->mcs.rx_mask[1] = 0x0;
+ie_len = min_t(int, ie_len, sizeof(pmlmepriv->htpriv.ht_cap));
memcpy(&pmlmepriv->htpriv.ht_cap, p+2, ie_len);
}

--- linux-4.15.0.orig/drivers/staging/rtl8188eu/core/rtw_recv.c
+++ linux-4.15.0/drivers/staging/rtl8188eu/core/rtw_recv.c
@@ -1548,21 +1548,14 @@
/* Allocate new skb for releasing to upper layer */
sub_skb = dev_alloc_skb(nSubframe_Length + 12);
- if (sub_skb) {
- skb_reserve(sub_skb, 12);
- skb_put_data(sub_skb, pdata, nSubframe_Length);
- } else {
- sub_skb = skb_clone(prframe->pkt, GFP_ATOMIC);
- if (sub_skb) {
- sub_skb->data = pdata;
- sub_skb->len = nSubframe_Length;
- skb_set_tail_pointer(sub_skb, nSubframe_Length);
- } else {
- DBG_88E("skb_clone() Fail!!! , nr_subframes=%d"n", nr_subframes);
- break;
- }
-+ if (!sub_skb) {
+ DBG_88E("dev_alloc_skb() Fail!!! , nr_subframes=%d"n", nr_subframes);
+ break;
+ }
+ skb_reserve(sub_skb, 12);
+ skb_put_data(sub_skb, pdata, nSubframe_Length);
+ subframes[nr_subframes++] = sub_skb;

if (nr_subframes >= MAX_SUBFRAME_COUNT) {
--- linux-4.15.0.orig/drivers/staging/rtl8188eu/core/rtw_xmit.c
+++ linux-4.15.0/drivers/staging/rtl8188eu/core/rtw_xmit.c
@@ -188,7 +188,9 @@
pxmitpriv->free_xmit_extbuf_cnt = num_xmit_extbuf;
  -rtw_alloc_hwxmits(padapter);
+res = rtw_alloc_hwxmits(padapter);
+if (res == _FAIL)
+goto exit;
rtw_init_hwxmits(pxmitpriv->hwxmits, pxmitpriv->hwxmit_entry);

for (i = 0; i < 4; i++)
@@ -803,7 +805,7 @@
memcpy(pwlanhdr->addr2, get_bssid(pmlmepriv), ETH_ALEN);
memcpy(pwlanhdr->addr3, pattrib->src, ETH_ALEN);

-if (psta->qos_option)
+if (psta && psta->qos_option)
qos_option = true;
} else if (check_fwstate(pmlmepriv, WIFI_ADHOC_STATE) ||
check_fwstate(pmlmepriv, WIFI_ADHOC_MASTER_STATE)) {
@@ -811,7 +813,7 @@
memcpy(pwlanhdr->addr2, pattrib->src, ETH_ALEN);
memcpy(pwlanhdr->addr3, get_bssid(pmlmepriv), ETH_ALEN);

-if (psta->qos_option)
+if (psta && psta->qos_option)
qos_option = true;
} else {
RT_TRACE(_module_rtl871x_xmit_c_, _drv_err_, ("fw_state:%x is not allowed to xmit frame\n",
get_fwstate(pmlmepriv)));
@@ -1573,7 +1575,7 @@
return res;
}

void rtw_alloc_hwxmits(struct adapter *padapter)
+s32 rtw_alloc_hwxmits(struct adapter *padapter)
{
struct hw_xmit *hwxmits;
struct xmit_priv *pxmitpriv = &padapter->xmitpriv;
@@ -1582,6 +1584,8 @@
pxmitpriv->hwxmits = kcalloc(pxmitpriv->hwxmit_entry,
                    sizeof(struct hw_xmit), GFP_KERNEL);
+if (!pxmitpriv->hwxmits)
+return _FAIL;

hwxmits = pxmitpriv->hwxmits;

@@ -1589,6 +1593,7 @@
hwxmits[1].sta_queue = &pxmitpriv->vi_pending;
hwxmits[2].sta_queue = &pxmitpriv->be_pending;
hwxmits[3].sta_queue = &pxmitpriv->bk_pending;
+return _SUCCESS;
}
void rtw_free_hwxmits(struct adapter *padapter)
--- linux-4.15.0.orig/drivers/staging/rtl8188eu/include/rtw_xmit.h
+++ linux-4.15.0/drivers/staging/rtl8188eu/include/rtw_xmit.h
@@ -346,7 +346,7 @@
     void rtw_init_hwxmits(struct hw_xmit *phwxmit, int entry);
     __s32 _rtw_init_xmit_priv(struct xmit_priv *pxmitpriv, struct adapter *padapter);
     void _rtw_free_xmit_priv(struct xmit_priv *pxmitpriv);
-s32 rtw_alloc_hwxmits(struct adapter *padapter);
+s32 rtw_alloc_hwxmits(struct adapter *padapter);
     void rtw_free_hwxmits(struct adapter *padapter);
     __s32 rtw_xmit(struct adapter *padapter, struct sk_buff **pkt);

--- linux-4.15.0.orig/drivers/staging/rtl8188eu/os_dep/ioctl_linux.c
+++ linux-4.15.0/drivers/staging/rtl8188eu/os_dep/ioctl_linux.c
@@ -238,18 +238,21 @@
     /* parsing WPA/WPA2 IE */
     {
     -u8 buf[MAX_WPA_IE_LEN];
+u8 *buf;
     u8 wpa_ie[255], rsn_ie[255];
     u16 wpa_len = 0, rsn_len = 0;
     u8 *p;

+buf = kzalloc(MAX_WPA_IE_LEN, GFP_ATOMIC);
+if (!buf)
     +return start;
     +rtw_get_sec_ie(pnetwork->network.IEs, pnetwork->network.IELength, rsn_ie, &rsn_len, wpa_ie, &wpa_len);
     RT_TRACE(_module_rtl871x_mlme_c_, _drv_info_, ("rtw_wx_get_scan: ssid =%s\n", pnetwork-
     ->network.Ssid.Ssid));
     RT_TRACE(_module_rtl871x_mlme_c_, _drv_info_, ("rtw_wx_get_scan: wpa_len =%d rsn_len =%d\n", wpa_len,
     rsn_len));

     if (wpa_len > 0) {
         p = buf;
         -memset(buf, 0, MAX_WPA_IE_LEN);
         p += sprintf(p, "wpa_ie=");
         for (i = 0; i < wpa_len; i++)
             p += sprintf(p, "%02x", wpa_ie[i]);
@@ -266,7 +269,6 @@
     }
     if (rsn_len > 0) {
         p = buf;
         -memset(buf, 0, MAX_WPA_IE_LEN);
         p += sprintf(p, "rsn_ie=");
         for (i = 0; i < rsn_len; i++)
             p += sprintf(p, "%02x", rsn_ie[i]);
iwe.u.data.length = rsn_len;
start = iwe_stream_add_point(info, start, stop, &iwe, rsn_ie);
}
+kfree(buf);
}

{" parsing WPS IE */
@g @ -1169,9 +1172,11 @@
break;
}
sec_len = *(pos++); len -= 1;
-if (sec_len > 0 && sec_len <= len) {
+if (sec_len > 0 &&
+ sec_len <= len &&
+ sec_len <= 32) {
    ssid[ssid_index].SsidLength = sec_len;
-memcpy(ssid[ssid_index].Ssid, pos, ssid[ssid_index].SsidLength);
+memcpy(ssid[ssid_index].Ssid, pos, sec_len);
    ssid_index++;
}
pos += sec_len;
@g @ -2051,7 +2056,7 @@
struct ieee_param *param;
uint ret = 0;

-if (p->length < sizeof(struct ieee_param) || !p->pointer) {
+if (!p->pointer || p->length != sizeof(struct ieee_param)) {
    ret = -EINVAL;
    goto out;
}
@g @ -2856,7 +2861,7 @@
goto out;
}

-if (!p->pointer) {
+if (!p->pointer || p->length != sizeof(struct ieee_param)) {
    ret = -EINVAL;
    goto out;
}

--- linux-4.15.0.orig/drivers/staging/rtl8188eu/os_dep/usb_intf.c
+++ linux-4.15.0/drivers/staging/rtl8188eu/os_dep/usb_intf.c
@@ -40,11 +40,16 @@
/****** 8188EUS *******/*
 {USB_DEVICE(0x056e, 0x4008)}, /* Elecom WDC-150SU2M */
 {USB_DEVICE(0x07b8, 0x8179)}, /* Abocom - Abocom */
 +{USB_DEVICE(0x0B05, 0x18F0)}, /* ASUS USB-N10 Nano B1 */
 {USB_DEVICE(0x2001, 0x330F)}, /* DLink DWA-125 REV D1 */
{USB_DEVICE(0x2001, 0x3310)}, /* Dlink DWA-123 REV D1 */
{USB_DEVICE(0x2001, 0x3311)}, /* DLink GO-USB-N150 REV B1 */
{USB_DEVICE(0x2001, 0x331B)}, /* D-Link DWA-121 rev B1 */
{USB_DEVICE(0x2357, 0x010c)}, /* TP-Link TL-WN722N v2 */
{USB_DEVICE(0x2357, 0x0111)}, /* TP-Link TL-WN727N v5.21 */
{USB_DEVICE(0x2C4E, 0x0102)}, /* MERCUSYS MW150US v2 */
{USB_DEVICE(0x0df6, 0x0076)}, /* Sitecom N150 v2 */
{USB_DEVICE(0x7392, 0xb811)}, /* Edimax EW-7811UN V2 */
{USB_DEVICE(USB_VENDER_ID_REALTEK, 0xffef)}, /* Rosewill RNX-N150NUB */
{ /* Terminating entry */
};
@
@@ -77,7 +82,7 @@
phost_conf = pusbd->actconfig;
 pconf_desc = &phost_conf->desc;

-phost_iface = &usb_intf->altsetting[0];
+phost_iface = usb_intf->cur_altsetting;
 piface_desc = &phost_iface->desc;

 pdvobjpriv->NumInterfaces = pconf_desc->bNumInterfaces;
 @@ -356,8 +361,10 @@
 /* step read_chip_version */
 rtw_hal_read_chip_version(padapter);
-@ @ -77,7 +82,7 @@
if (!padapter->HalData)
-DBG_88E("cant not alloc memory for HAL DATA\n");
+DBG_88E("Failed to allocate memory for HAL data\n");
+goto free_adapter;
+
 /* step read_chip_version */
 rtw_hal_read_chip_version(padapter);
--- linux-4.15.0.orig/drivers/staging/rtl8192e/rtl8192e/rtl_core.c
+++ linux-4.15.0/drivers/staging/rtl8192e/rtl8192e/rtl_core.c
 @@ -1627,14 +1627,15 @@
 skb_push(skb, priv->rtllib->tx_headroom);
 ret = _rtl92e_tx(dev, skb);
-@ @ -1627,14 +1627,15 @@
 if (queue_index != MGNT_QUEUE) {
 priv->rtllib->stats.tx_bytes += (skb->len -
 priv->rtllib->tx_headroom);
 priv->rtllib->stats.tx_packets++;
 }
+

static int _rtl92e_hard_start_xmit(struct sk_buff *skb, struct net_device *dev)

--- linux-4.15.0.orig/drivers/staging/rtl8192e/rtl8192e/rtl_wx.c
+++ linux-4.15.0/drivers/staging/rtl8192e/rtl8192e/rtl_wx.c
@@ -419,9 +419,10 @@
 struct iw_scan_req *req = (struct iw_scan_req *)b;

 if (req->essid_len) {
-        ieee->current_network.ssid_len = req->essid_len;
-        memcpy(ieee->current_network.ssid, req->essid,
-               req->essid_len);
+        int len = min_t(int, req->essid_len, IW_ESSID_MAX_SIZE);
+        ieee->current_network.ssid_len = len;
+        memcpy(ieee->current_network.ssid, req->essid, len);
    }

 --- linux-4.15.0.orig/drivers/staging/rtl8192e/rtllib.h
+++ linux-4.15.0/drivers/staging/rtl8192e/rtllib.h
@@ -1110,7 +1110,7 @@
 bool	bWithAironetIE;
 bool	bCkipSupported;
 bool	bCcxRmEnable;
-u16	CcxRmState[2];
+u8	CcxRmState[2];
 bool	bMBssidValid;
 u8	MBssidMask;
 u8	MBssid[ETH_ALEN];
--- linux-4.15.0.orig/drivers/staging/rtl8192e/rtllib_rx.c
+++ linux-4.15.0/drivers/staging/rtl8192e/rtllib_rx.c
@@ -1979,7 +1979,7 @@
 info_element->data[2] == 0x96 &&
             info_element->data[3] == 0x01) {
    if (info_element->len == 6) {
-        memcpy(network->CcxRmState, &info_element[4], 2);
+        memcpy(network->CcxRmState, &info_element->data[4], 2);
        if (network->CcxRmState[0] != 0)
            network->bCcxRmEnable = true;
    else
--- linux-4.15.0.orig/drivers/staging/rtl8192u/ieee80211/ieee80211_rx.c
+++ linux-4.15.0/drivers/staging/rtl8192u/ieee80211/ieee80211_rx.c
@@ -598,7 +598,7 @@
 IEEE80211_DEBUG(IEEE80211_DL_REORDER,"%s(): Seq is %d,pTS->RxIndicateSeq is %d, WinSize is %d
            __func__,SeqNum,pTS->RxIndicateSeq,WinSize);
prxbIndicateArray = kmalloc(sizeof(struct ieee80211_rxb *) *
-REORDER_WIN_SIZE, GFP_KERNEL);
+REORDER_WIN_SIZE, GFP_ATOMIC);
if (!prxbIndicateArray)
return;

--- linux-4.15.0.orig/drivers/staging/rtl8192u/r8192U_core.c
+++ linux-4.15.0/drivers/staging/rtl8192u/r8192U_core.c
@@ -1506,7 +1506,7 @@

struct usb_device *udev = priv->udev;
int pend;
-int status;
+int status, rt = -1;
struct urb *tx_urb = NULL, *tx_urb_zero = NULL;
unsigned int idx_pipe;

@@ -1650,8 +1650,10 @@
}
if (bSend0Byte) {
    tx_urb_zero = usb_alloc_urb(0, GFP_ATOMIC);
-    if (!tx_urb_zero)
+    if (!tx_urb_zero) {
+        rt = -ENOMEM;
+        goto error;
    }
    usb_fill_bulk_urb(tx_urb_zero, udev,
        usb_sndbulkpipe(udev, idx_pipe),
        &zero, 0, tx_zero_isr, dev);
@@ -1661,7 +1663,7 @@
    "Error TX URB for zero byte %d, error %d",
    atomic_read(&priv->tx_pending[tcb_desc->queue_index]),
    status);
-    return -1;
+    goto error;
}
} usb_fill_bulk_urb(tx_urb_zero, udev,
    usb_sndbulkpipe(udev, idx_pipe),
    &zero, 0, tx_zero_isr, dev);
@@ -1661,7 +1663,7 @@
    "Error TX URB for zero byte %d, error %d",
    atomic_read(&priv->tx_pending[tcb_desc->queue_index]),
    status);
-    return -1;
+    goto error;
}
} usb_fill_bulk_urb(tx_urb_zero, udev,
    usb_sndbulkpipe(udev, idx_pipe),
    &zero, 0, tx_zero_isr, dev);
@@ -1661,7 +1663,7 @@
    "Error TX URB for zero byte %d, error %d",
    atomic_read(&priv->tx_pending[tcb_desc->queue_index]),
    status);
-    return -1;
+    goto error;
}
}
+usb_free_urb(tx_urb);
+usb_free_urb(tx_urb_zero);
+return rt;
}

static short rtl8192_usb_initendpoints(struct net_device *dev)
@@ -1706,6 +1713,8 @@
        priv->rx_urb[16] = usb_alloc_urb(0, GFP_KERNEL);
        priv->oldaddr = kmalloc(16, GFP_KERNEL);
        +if (!priv->oldaddr)
@@ -2514,7 +2523,7 @@
        else
            priv->EEPROMTxPowerLevelCCK = 0x10;
        RT_TRACE(COMP_EPROM, "CCK Tx Power Levl: 0x%02x\n", priv->EEPROMTxPowerLevelCCK);
@@ -3409,7 +3418,7 @@
        *TotalRxDataNum)
        {
            u16SlotIndex;
@@ -333,8 +333,10 @@
            struct iw_scan_req *req = (struct iw_scan_req *)b;

            if (req->essid_len) {
                -ieee->current_network.ssid_len = req->essid_len;
-memcpy(ieee->current_network.ssid, req->essid, req->essid_len);
+int len = min_t(int, req->essid_len, IW_ESSID_MAX_SIZE);
+    +ieee->current_network.ssid_len = len;
+    memcpy(ieee->current_network.ssid, req->essid, len);
            }
        }
--- linux-4.15.0.orig/drivers/staging/rtl8712/mlme_linux.c
+++ linux-4.15.0/drivers/staging/rtl8712/mlme_linux.c
@@ -158,7 +158,7 @@
p = buff;
p += sprintf(p, "ASSOCINFO(ReqIEs=");
len = sec_ie[1] + 2;
-len = (len < IW_CUSTOM_MAX) ? len : IW_CUSTOM_MAX - 1;
+    len = (len < IW_CUSTOM_MAX) ? len : IW_CUSTOM_MAX;
    for (i = 0; i < len; i++)
p += sprintf(p, "%02x", sec_ie[i]);
p += sprintf(p, ");
--- linux-4.15.0.orig/drivers/staging/rtl8712/rtl8712_cmd.c
+++ linux-4.15.0/drivers/staging/rtl8712/rtl8712_cmd.c
@@ -159,17 +159,9 @@
static u8 read_bbreg_hdl(struct _adapter *padapter, u8 *pbuf)
{
    u32 val;
    -void (*pcmd_callback)(struct _adapter *dev, struct cmd_obj *pcmd);
    struct cmd_obj *pcmd = (struct cmd_obj *)(pbuf);

    -if (pcmd->rsp && &pcmd->rspsz > 0)
    -memcpy(pcmd->rsp, (u8 *)&val, pcmd->rspsz);
    -pcmd_callback = cmd_callback[pcmd->cmdcode].callback;
    -if (!pcmd_callback)
    -r8712_free_cmd_obj(pcmd);
    -else
    -r8712_free_cmd_obj(pcmd);
    return H2C_SUCCESS;
}
--- linux-4.15.0.orig/drivers/staging/rtl8712/rtl8712_cmd.h
+++ linux-4.15.0/drivers/staging/rtl8712/rtl8712_cmd.h
@@ -152,7 +152,7 @@
static struct _cmd_callback cmd_callback[] = {
    {GEN_CMD_CODE(_Read_MACREG), NULL}, /*0*/
    {GEN_CMD_CODE(_Write_MACREG), NULL},
    -{GEN_CMD_CODE(_Read_BBREG), &r8712_getbbrfreg_cmdrsp_callback},
    +{GEN_CMD_CODE(_Read_BBREG), NULL},
    {GEN_CMD_CODE(_Write_BBREG), NULL},
    {GEN_CMD_CODE(_Read_RFREG), &r8712_getbbrfreg_cmdrsp_callback},
    {GEN_CMD_CODE(_Write_RFREG), NULL}, /*5*/
--- linux-4.15.0.orig/drivers/staging/rtl8712/rtl871x_cmd.c
+++ linux-4.15.0/drivers/staging/rtl8712/rtl871x_cmd.c
@@ -242,8 +242,10 @@
psurveyPara->ss_ssidlen = 0;
    memset(psurveyPara->ss_ssid, 0, IW_ESSID_MAX_SIZE + 1);
if ((pssid != NULL) && (pssid->SsidLength)) {
    memcpy(psurveyPara->ss_ssid, pssid->Ssid, pssid->SsidLength);
    psurveyPara->ss_ssidlen = cpu_to_le32(pssid->SsidLength);
    int len = min_t(int, pssid->SsidLength, IW_ESSID_MAX_SIZE);
    memcpy(psurveyPara->ss_ssid, pssid->Ssid, len);
    psurveyPara->ss_ssidlen = cpu_to_le32(len);
}

set_fwstate(pmlmepriv, _FW_UNDER_SURVEY);
r8712_enqueue_cmd(pcmdpriv, ph2c);
--- linux-4.15.0.orig/drivers/staging/rtl8712/rtl871x_ioctl_linux.c
+++ linux-4.15.0/drivers/staging/rtl8712/rtl871x_ioctl_linux.c
@@ -137,10 +137,91 @@
}
}

-static noinline_for_stack char *translate_scan(struct _adapter *padapter,
-    struct iw_request_info *info,
-    struct wlan_network *pnetwork,
-    char *start, char *stop)
+static noinline_for_stack char *translate_scan_wpa(struct iw_request_info *info,
+    struct wlan_network *pnetwork,
+    struct iw_event *iwe,
+    char *start, char *stop)
  {
  /* parsing WPA/WPA2 IE */
  u8 buf[MAX_WPA_IE_LEN];
  u8 wpa_ie[255], rsn_ie[255];
  u16 wpa_len = 0, rsn_len = 0;
  int n, i;
  +r8712_get_sec_ie(pnetwork->network.IEs,
  +  pnetwork->network.IELength, rsn_ie, &rsn_len,
  +  wpa_ie, &wpa_len);
  +if (wpa_len > 0) {
  +    memset(buf, 0, MAX_WPA_IE_LEN);
  +    n = sprintf(buf, "wpa_ie=");
  +    for (i = 0; i < wpa_len; i++) {
  +        n += snprintf(buf + n, MAX_WPA_IE_LEN - n,
  +            "\x%02x", wpa_ie[i]);
  +    }
  +    memset(iwe, 0, sizeof(*iwe));
  +    iwe->cmd = IWEVCUSTOM;
  +    iwe->u.data.length = (u16)strlen(buf);
  +    start = iwe_stream_add_point(info, start, stop,
  +      iwe, buf);
+memset(iwe, 0, sizeof(*iwe));
+iwe->cmd = IWEVGENIE;
+iwe->u.data.length = (u16)wpa_len;
+start = iwe_stream_add_point(info, start, stop,
+iwe, wpa_ie);
+
+if (rsn_len > 0) {
+memset(buf, 0, MAX_WPA_IE_LEN);
+n = sprintf(buf, "rsn_ie=");
+for (i = 0; i < rsn_len; i++) {
+n += snprintf(buf + n, MAX_WPA_IE_LEN - n,
+"%02x", rsn_ie[i]);
+if (n >= MAX_WPA_IE_LEN)
+break;
+}
+memset(iwe, 0, sizeof(*iwe));
+iwe->cmd = IWEVCUSTOM;
+iwe->u.data.length = strlen(buf);
+start = iwe_stream_add_point(info, start, stop,
+iwe, buf);
+memset(iwe, 0, sizeof(*iwe));
+iwe->cmd = IWEVGENIE;
+iwe->u.data.length = rsn_len;
+start = iwe_stream_add_point(info, start, stop, iwe,
+rsn_ie);
+
+return start;
+
+static noinline_for_stack char *translate_scan_wps(struct iw_request_info *info,
+struct wlan_network *pnetwork,
+struct iw_event *iwe,
+char *start, char *stop)
+{
+/* parsing WPS IE */
+u8 wps_ie[512];
+uint wps_ielen;
+
+if (r8712_get_wps_ie(pnetwork->network.IEs,
+pnetwork->network.IELength,
+wps_ie, &wps_ielen)) {
+if (wps_ielen > 2) {
+iwe->cmd = IWEVGENIE;
+iwe->u.data.length = (u16)wps_ielen;
+start = iwe_stream_add_point(info, start, stop,
+iwe, wps_ie);
+}
+}
+
+return start;
+
+
+static char *translate_scan(struct _adapter *padapter,
+    struct iw_request_info *info,
+    struct wlan_network *pnetwork,
+    char *start, char *stop)
+
+
+{
+
+struct iw_event iwe;
+struct ieee80211_ht_cap *pht_capie;
+
+/* Check if we added any event */
+if ((current_val - start) > iwe_stream_lcp_len(info))
+    start = current_val;
+
+/* parsing WPA/WPA2 IE */
+{
+    u8 buf[MAX_WPA_IE_LEN];
+    u8 wpa_ie[255], rsn_ie[255];
+    u16 wpa_len = 0, rsn_len = 0;
+    int n;
+    
+    r8712_get_sec_ie(pnetwork->network.IEs,
+                    pnetwork->network.IELength, rsn_ie, &rsn_len,
+                    wpa_ie, &wpa_len);
+    if (wpa_len > 0) {
+        memset(buf, 0, MAX_WPA_IE_LEN);
+        n = sprintf(buf, "wpa_ie=");
+        for (i = 0; i < wpa_len; i++) {
+            n += snprintf(buf + n, MAX_WPA_IE_LEN - n,
+                            "%02x", wpa_ie[i]);
+            if (n >= MAX_WPA_IE_LEN)
+                break;
+        }
+        memset(&iwe, 0, sizeof(iwe));
+        iwe.cmd = IWEVCUSTOM;
+        iwe.u.data.length = (u16)strlen(buf);
+        start = iwe_stream_add_point(info, start, stop,
+                                      &iwe, buf);
+        memset(&iwe, 0, sizeof(iwe));
+        iwe.cmd = IWEVGENIE;
+        iwe.u.data.length = (u16)wpa_len;
+        start = iwe_stream_add_point(info, start, stop,
+                                      &iwe, wpa_ie);
+    }
+    if (rsn_len > 0) {
+        memset(buf, 0, MAX_WPA_IE_LEN);
+        n = sprintf(buf, "rsn_ie=");
+        for (i = 0; i < rsn_len; i++) {
+            n += snprintf(buf + n, MAX_WPA_IE_LEN - n,
+                            "%02x", rsn_ie[i]);
+            if (n >= MAX_WPA_IE_LEN)
+                break;
+        }
+        memset(&iwe, 0, sizeof(iwe));
+        iwe.cmd = IWEVCUSTOM;
+        iwe.u.data.length = (u16)strlen(buf);
+        start = iwe_stream_add_point(info, start, stop,
+                                      &iwe, buf);
+        memset(&iwe, 0, sizeof(iwe));
+        iwe.cmd = IWEVGENIE;
+        iwe.u.data.length = (u16)rsn_len;
+        start = iwe_stream_add_point(info, start, stop,
+                                      &iwe, rsn_ie);
+    }
+}
-n = sprintf(buf, "rsn_ie=");
-for (i = 0; i < rsn_len; i++) {
-  n += snprintf(buf + n, MAX_WPA_IE_LEN - n,
-    "%02x", rsn_ie[i]);
-  if (n >= MAX_WPA_IE_LEN)
-    break;
-}
-memset(&iwe, 0, sizeof(iwe));
-iwe.cmd = IWEVCUSTOM;
-iwe.u.data.length = strlen(buf);
-start = iwe_stream_add_point(info, start, stop,
-  &iwe, buf);
-memset(&iwe, 0, sizeof(iwe));
-iwe.cmd = IWEVGENIE;
-iwe.u.data.length = rsn_len;
-start = iwe_stream_add_point(info, start, stop, &iwe,
-    rsn_ie);
-
-
-} /* parsing WPS IE */
-u8 wps_ie[512];
-uint wps_ielen;
-
-if (r8712_get_wps_ie(pnetwork->network.IEs,
-    pnetwork->network.IELength,
-    wps_ie, &wps_ielen)) {
-  if (wps_ielen > 2) {
-    iwe.cmd = IWEVGENIE;
-    iwe.u.data.length = (u16)wps_ielen;
-    start = iwe_stream_add_point(info, start, stop,
-       &iwe, wps_ie);
-  }
-}
-
+
+start = translate_scan_wpa(info, pnetwork, &iwe, start, stop);
+start = translate_scan_wps(info, pnetwork, &iwe, start, stop);
+ /* Add quality statistics */
iwe.cmd = IWEVQUAL;
-rssi = r8712_signal_scale_mapping(pnetwork->network.Rssi);
-@@ -927,7 +946,7 @@
-struct iw_point *dwrq = (struct iw_point *)awrq;
-
-len = dwrq->length;
-extend = memdup_user(dwrq->pointer, len);
+extend = strndup_user(dwrq->pointer, len);
if (IS_ERR(ext))
    return PTR_ERR(ext);

--- linux-4.15.0.orig/drivers/staging/rtl8712/rtl871x_mlme.c
+++ linux-4.15.0/drivers/staging/rtl8712/rtl871x_mlme.c
@@ -1361,7 +1361,7 @@
     u8 *out_ie, uint in_len)
 {
     u8 authmode = 0, match;
-    u8 sec_ie[255], uncst_oui[4], bkup_ie[255];
+    u8 sec_ie[IW_CUSTOM_MAX], uncst_oui[4], bkup_ie[255];
     u8 wpa_oui[4] = {0x0, 0x50, 0xf2, 0x01};
     uint ielength, cnt, remove_cnt;
     int iEntry;
--- linux-4.15.0.orig/drivers/staging/rtl8712/usb_intf.c
+++ linux-4.15.0/drivers/staging/rtl8712/usb_intf.c
@@ -275,7 +275,7 @@
     pdvobjpriv->padapter = padapter;
     pdvobjpriv->padapter->EepromAddressSize = 6;
     -phost_iface = &pintf->altsetting[0];
+    phost_iface = pintf->cur_altsetting;
     piface_desc = &phost_iface->desc;
     pdvobjpriv->nr_endpoint = piface_desc->bNumEndpoints;
     if (pusbd->speed == USB_SPEED_HIGH) {
--- linux-4.15.0.orig/drivers/staging/rtl8712/wifi.h
+++ linux-4.15.0/drivers/staging/rtl8712/wifi.h
@@ -468,7 +468,7 @@
     /* block-ack parameters */
     #define IEEE80211_ADDBA_PARAM_POLICY_MASK 0x0002
     #define IEEE80211_ADDBA_PARAM_TID_MASK 0x003C
-    #define IEEE80211_ADDBA_PARAM_BUF_SIZE_MASK 0xFFA0
+    #define IEEE80211_ADDBA_PARAM_BUF_SIZE_MASK 0xFFC0
     #define IEEE80211_DELBA_PARAM_TID_MASK 0xF000
     #define IEEE80211_DELBA_PARAM_INITIATOR_MASK 0x0800

     @ @ -562,13 +562,6 @@
     #define IEEE80211_HT_IE_NON_GF_STA_PRSNT0x0004
     #define IEEE80211_HT_IE_NON_HT_STA_PRSNT0x0010

     -/* block-ack parameters */
-    #define IEEE80211_ADDBA_PARAM_POLICY_MASK 0x0002
-    #define IEEE80211_ADDBA_PARAM_TID_MASK 0x003C
-    #define IEEE80211_ADDBA_PARAM_BUF_SIZE_MASK 0xFFA0
-    #define IEEE80211_DELBA_PARAM_TID_MASK 0xF000
-    #define IEEE80211_DELBA_PARAM_INITIATOR_MASK 0x0800
 "
 */

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* A-PMDU buffer sizes
  * According to IEEE802.11n spec size varies from 8K to 64K (in powers of 2)

--- linux-4.15.0.orig/drivers/staging/rtl8723bs/core/rtw_ap.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/core/rtw_ap.c
@@ -1059,7 +1059,7 @@
 return _FAIL;

@if (len > MAX_IE_SZ)
+if (len < 0 || len > MAX_IE_SZ)
 return _FAIL;

pbss_network->IELength = len;
--- linux-4.15.0.orig/drivers/staging/rtl8723bs/core/rtw_mlme_ext.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/core/rtw_mlme_ext.c
@@ -1572,7 +1572,7 @@
 if (pstat->aid > 0) {
 DBG_871X(" old AID %d\n", pstat->aid);
 } else {
-+for (pstat->aid = 1; pstat->aid < NUM_STA; pstat->aid++)
+for (pstat->aid = 1; pstat->aid <= NUM_STA; pstat->aid++)
 if (pstapriv->sta_aid[pstat->aid - 1] == NULL)
 break;

--- linux-4.15.0.orig/drivers/staging/rtl8723bs/core/rtw_wlan_util.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/core/rtw_wlan_util.c
@@ -1904,12 +1904,14 @@
 pIE = (struct ndis_80211_var_ie *)rtw_get_ie(pvar_ie, _SUPPORTEDRATES_IE_, &ie_len, var_ie_len);
 if (pIE == NULL)
 return _FAIL;
+if (ie_len > sizeof(pmlmeinfo->FW_sta_info[cam_idx].SupportedRates))
+return _FAIL;

 memcpy(pmlmeinfo->FW_sta_info[cam_idx].SupportedRates, pIE->data, ie_len);

 supportRateNum = ie_len;
 pIE = (struct ndis_80211_var_ie *)rtw_get_ie(pvar_ie, _EXT_SUPPORTEDRATES_IE_, &ie_len, var_ie_len);
-+if (pIE)
+if (pIE && (ie_len <= sizeof(pmlmeinfo->FW_sta_info[cam_idx].SupportedRates) - supportRateNum))
 mempcpy((pmlmeinfo->FW_sta_info[cam_idx].SupportedRates + supportRateNum), pIE->data, ie_len);

 return _SUCCESS;
--- linux-4.15.0.orig/drivers/staging/rtl8723bs/core/rtw_xmit.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/core/rtw_xmit.c
@@ -268,7 +268,9 @@
 }
 }

-rtw_alloc_hwxmits(padapter);
+res = rtw_alloc_hwxmits(padapter);
+if (res == _FAIL)
+goto exit;

rtw_init_hwxmits(pxmitpriv->hwxmits, pxmitpriv->hwxmit_entry);

for (i = 0; i < 4; i++) {
@@ -2154,7 +2156,7 @@
    return res;
 }

-void rtw_alloc_hwxmits(struct adapter *padapter)
+s32 rtw_alloc_hwxmits(struct adapter *padapter)
{
    struct hw_xmit *hwxmits;
    struct xmit_priv *pxmitpriv = &padapter->xmitpriv;
    @@ -2165,10 +2167,8 @@
    pxmitpriv->hwxmits = rtw_zmalloc(sizeof(struct hw_xmit) * pxmitpriv->hwxmit_entry);

    -if (pxmitpriv->hwxmits == NULL) {
        -DBG_871X("alloc hwxmits fail!...
        -return;
        -}
    +if (!pxmitpriv->hwxmits)
    +return _FAIL;

    hwxmits = pxmitpriv->hwxmits;

    @@ -2214,7 +2214,7 @@

    }

    -
    +return _SUCCESS;
    }

void rtw_free_hwxmits(struct adapter *padapter)
--- linux-4.15.0.orig/drivers/staging/rtl8723bs/hal/odm.h
+++ linux-4.15.0/drivers/staging/rtl8723bs/hal/odm.h
@@ -209,10 +209,7 @@

#define AVG_THERMAL_NUM		8
#define IQK_Matrix_REG_NUM	8
-#define IQK_Matrix_Settings_NUM	(14 + 24 + 21) /* Channels_2_4G_NUM
-*/ + Channels_2_4G_NUM
-*/ + Channels_5G_20M_NUM
-*/ + Channels_5G
-*/
#define IQK_Matrix_Settings_NUM /* Channels_2_4G_NUM */

#defineDM_Type_ByFW0
#defineDM_Type_ByDriver1

--- linux-4.15.0.orig/drivers/staging/rtl8723bs/hal/rtl8723bs_xmit.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/hal/rtl8723bs_xmit.c
@@ -486,14 +486,13 @@
s32 ret;
 struct adapter *padapter;
 struct xmit_priv *pxmitpriv;
-u8 thread_name[20] = "RTWHALXT";
-+
+u8 thread_name[20];

 ret = _SUCCESS;
 padapter = context;
 pxmitpriv = &padapter->xmitpriv;

-rtw_sprintf(thread_name, 20, "%s-"ADPT_FMT, thread_name, ADPT_ARG(padapter));
+rtw_sprintf(thread_name, 20, "RTWHALXT-" ADPT_FMT, ADPT_ARG(padapter));
 thread_enter(thread_name);

DBG_871X("start "FUNC_ADPT_FMT"
", FUNC_ADPT_ARG(padapter));

--- linux-4.15.0.orig/drivers/staging/rtl8723bs/hal/sdio_ops.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/hal/sdio_ops.c
@@ -1118,6 +1118,8 @@
} else {
 rtw_c2h_wk_cmd(padapter, (u8 *)c2h_evt);
 }
+} else {
+kfree(c2h_evt);
+}
+else {
 /* Error handling for malloc fail */
--- linux-4.15.0.orig/drivers/staging/rtl8723bs/include/ieee80211.h
+++ linux-4.15.0/drivers/staging/rtl8723bs/include/ieee80211.h
@@ -1008,18 +1008,18 @@
#define IP_FMT "%pI4"
#define IP_ARG(x) (x)

-extern __inline int is_multicast_mac_addr(const u8 *addr)
+static inline int is_multicast_mac_addr(const u8 *addr)
{ 
    return ((addr[0] != 0xff) && (0x01 & addr[0]));
}

-extern __inline int is_broadcast_mac_addr(const u8 *addr)
+static inline int is_broadcast_mac_addr(const u8 *addr)
{ 
    return ((addr[0] != 0xff) && (0x01 & addr[0]));
}
\begin{verbatim}
{
}

-extern __inline int is_zero_mac_addr(const u8 *addr)
+static inline int is_zero_mac_addr(const u8 *addr)
{
return ((addr[0] == 0x00) && (addr[1] == 0x00) && (addr[2] == 0x00) && (addr[3] == 0x00) && (addr[4] == 0x00) && (addr[5] == 0x00));

--- linux-4.15.0.orig/drivers/staging/rtl8723bs/include/rtw_xmit.h
+++ linux-4.15.0/drivers/staging/rtl8723bs/include/rtw_xmit.h
@@ -494,7 +494,7 @@
void _rtw_free_xmit_priv (struct xmit_priv *pxmitpriv);

-void rtw_alloc_hwxmits(struct adapter *padapter);
+int rtw_alloc_hwxmits(struct adapter *padapter);

void rtw_free_hwxmits(struct adapter *padapter);

--- linux-4.15.0.orig/drivers/staging/rtl8723bs/os_dep/ioctl_cfg80211.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/os_dep/ioctl_cfg80211.c
@@ -1291,7 +1291,7 @@
sinfo->filled |= BIT(NL80211_STA_INFO_TX_PACKETS);
sinfo->tx_packets = psta->sta_stats.tx_pkts;
-
+    sinfo->filled |= BIT_ULL(NL80211_STA_INFO_TX_FAILED);
}

/* for Ad-Hoc/AP mode */
@@ -2430,7 +2430,7 @@
DBG_871X(FUNC_ADPT_FMT"\n", FUNC_ADPT_ARG(padapter));

{
-    struct station_info sinfo;
+    struct station_info sinfo = {};
    u8 ie_offset;
    if (GetFrameSubType(pmgmt_frame) == WIFI_ASSOCREQ)
        ie_offset = _ASOCREQ_IE_OFFSET_;
--- linux-4.15.0.orig/drivers/staging/rtl8723bs/os_dep/ioctl_linux.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/os_dep/ioctl_linux.c
@@ -2381,7 +2381,7 @@
exit:
    kfree(ptmp);
-
    -return 0;
\end{verbatim}
static int rtw_wx_write32(struct net_device *dev,
@@ -3493,7 +3493,7 @@
/* down(&ieee->wx_sem); */

    if (!p->pointer || p->length != sizeof(struct ieee_param)) {
        ret = -EINVAL;
    goto out;
    }
@@ -4329,7 +4329,7 @@
/* if (p->length < sizeof(struct ieee_param) || !p->pointer) { */
    if (!p->pointer || p->length != sizeof(*param)) {
        ret = -EINVAL;
    goto out;
    }
--- linux-4.15.0.orig/drivers/staging/rtl8723bs/os_dep/sdio_intf.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/os_dep/sdio_intf.c
@@ -25,18 +25,14 @@
static const struct sdio_device_id sdio_ids[] =
{ SDIO_DEVICE(0x024c, 0x0523), },
+{ SDIO_DEVICE(0x024c, 0x0525), },
{ SDIO_DEVICE(0x024c, 0x0623), },
{ SDIO_DEVICE(0x024c, 0x0626), },
+{ SDIO_DEVICE(0x024c, 0x0627), },
{ SDIO_DEVICE(0x024c, 0xb723), },
{ /* end: all zeroes */				},
};
-static const struct acpi_device_id acpi_ids[] = {
-"OBDA8723", 0x0000},
-};
-};
-MODULE_DEVICE_TABLE(sdio, sdio_ids);
-MODULE_DEVICE_TABLE(acpi, acpi_ids);

static int rtw_drv_init(struct sdio_func *func, const struct sdio_device_id *id);
static void rtw_dev_remove(struct sdio_func *func);
--- linux-4.15.0.orig/drivers/staging/rtl8723bs/os_dep/wifi_regd.c
+++ linux-4.15.0/drivers/staging/rtl8723bs/os_dep/wifi_regd.c
@@ -39,7 +39,7 @@

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static const struct ieee80211_regdomain rtw_regdom_rd = {
    .n_reg_rules = 3,
    +.n_reg_rules = 2,
    .alpha2 = "99",
    .reg_rules = {
        RTW_2GHZ_CH01_11,
        --- linux-4.15.0.orig/drivers/staging/rtlwifi/Kconfig
        +++ linux-4.15.0/drivers/staging/rtlwifi/Kconfig
        @ @ -17,6 +17,6 @@
        default m

        config RTLWIFI_DEBUG_ST
        -boolean
        +bool "Debugging output for Realtek RTL8822BE driver"
        depends on R8822BE
        -default y
        +default n
        --- linux-4.15.0.orig/drivers/staging/rtlwifi/halmac/halmac_88xx/halmac_func_88xx.c
        +++ linux-4.15.0/drivers/staging/rtlwifi/halmac/halmac_88xx/halmac_func_88xx.c
        @@ -17,6 +17,6 @@
        segment_size = (u8)PSD_DATA_GET_SEGMENT_SIZE(c2h_buf);
        psd_set->data_size = total_size;

        -if (!psd_set->data)
        +if (!psd_set->data) {
        psd_set->data = kzalloc(psd_set->data_size, GFP_KERNEL);
        +if (!psd_set->data)
        +return HALMAC_RET_MALLOC_FAIL;
        +}

        if (segment_id == 0)
        psd_set->segment_size = segment_size;
        --- linux-4.15.0.orig/drivers/staging/rtlwifi/phydm/rtl_phydm.c
        +++ linux-4.15.0/drivers/staging/rtlwifi/phydm/rtl_phydm.c
        @@ -191,6 +191,8 @@

        rtlpriv->phydm.internal =
        kzalloc(sizeof(struct phy_dm_struct), GFP_KERNEL);
        +if (!rtlpriv->phydm.internal)
        +return 0;

        _rtl_phydm_init_com_info(rtlpriv, ic, params);

        --- linux-4.15.0.orig/drivers/staging/rtlwifi/ps.c
        +++ linux-4.15.0/drivers/staging/rtlwifi/ps.c
        @@ -768,7 +768,7 @@
noa_len);
return;
}

noa_num = (noa_len - 2) / 13;
+noa_num = min((noa_len - 2) / 13, P2P_MAX_NOA_NUM);
noa_index = ie[3];
if (rtlpriv->psc.p2p_ps_info.p2p_ps_mode ==
P2P_PS_NONE || noa_index != p2pinfo->noa_index) {
    \ @@ -861,7 +861,7 @@
    noa_num = (noa_len - 2) / 13;
    +noa_num = min((noa_len - 2) / 13, P2P_MAX_NOA_NUM);
    noa_index = ie[3];
    if (rtlpriv->psc.p2p_ps_info.p2p_ps_mode ==
P2P_PS_NONE || noa_index != p2pinfo->noa_index) {

int count;

skb = dev_alloc_skb(size);
+if (!skb)
+return false;
memcpy((u8 *)skb_put(skb, size), buf, size);

if (!rtl8822bee_send_bcn_or_cmd_packet(rtlpriv->hw, skb, BEACON_QUEUE))
    \ @@ -750,6 +752,8 @@
    u1_rsvd_page_loc, 3);

skb = dev_alloc_skb(totalpacketlen);
+if (!skb)
+return;
memcpy((u8 *)skb_put(skb, totalpacketlen), &reserved_page_packet,
totalpacketlen);

--- linux-4.15.0.orig/drivers/staging/rtlwifi/rtl8822be/hw.c
+++ linux-4.15.0/drivers/staging/rtlwifi/rtl8822be/hw.c
@@ -814,7 +814,7 @@

return;

pci_read_config_byte(rtlpci->pdev, 0x70f, &tmp);
-pci_write_config_byte(rtlpci->pdev, 0x70f, tmp | BIT(7));
+pci_write_config_byte(rtlpci->pdev, 0x70f, tmp | ASPM_L1_LATENCY << 3);

pci_read_config_byte(rtlpci->pdev, 0x719, &tmp);
pci_write_config_byte(rtlpci->pdev, 0x719, tmp | BIT(3) | BIT(4));
--- linux-4.15.0.orig/drivers/staging/rtlwifi/wifi.h
+++ linux-4.15.0/drivers/staging/rtlwifi/wifi.h
@@ -99,6 +99,7 @@
 #define RTL_USB_MAX_RX_COUNT 100
 #define QBSS_LOAD_SIZE 5
 #define MAX_WMMELE_LENGTH 64
+#define ASPM_L1_LATENCY 7

 #define TOTAL_CAM_ENTRY 32

--- linux-4.15.0.orig/drivers/staging/rts5208/rtsx_scsi.c
+++ linux-4.15.0/drivers/staging/rts5208/rtsx_scsi.c
@@ -3026,10 +3026,10 @@
 } else {
-.buf_len = 0x6A;
- data_len = 0x6A;
+ buf_len = 0x6C;
+ data_len = 0x6A;
 }
@@ -3081,11 +3081,7 @@
 }

 rtsx_stor_set_xfer_buf(buf, buf_len, srb);
- if (dev_info_id == 0x15) {
- .buf_len = 0x3A;
- +buf_len = 0x3C;
- data_len = 0x3A;
- } else {
- .buf_len = 0x6A;
- +buf_len = 0x6C;
- data_len = 0x6A;
- }

- @ @ -3081,11 +3081,7 @@
-
- rtsx_stor_set_xfer_buf(buf, buf_len, srb);
- .
- if (dev_info_id == 0x15)
- .scsi_set_resid(srb, scsi_bufflen(srb) - 0x3C);
- else
- .scsi_set_resid(srb, scsi_bufflen(srb) - 0x6C);
- +scsi_set_resid(srb, scsi_bufflen(srb) - buf_len);

 kfree(buf);
 return STATUS_SUCCESS;
--- linux-4.15.0.orig/drivers/staging/rts5208/sd.c
+++ linux-4.15.0/drivers/staging/rts5208/sd.c
@@ -4996,7 +4996,7 @@
 goto sd_execute_write_cmd_failed;
 }

- rtsx_write_register(chip, SD_BYTE_CNT_L, 0xFF, 0x00);
+retval = rtsx_write_register(chip, SD_BYTE_CNT_L, 0xFF, 0x00);
 if (retval != STATUS_SUCCESS) {
 rtsx_trace(chip);

---
goto sd_execute_write_cmd_failed;
--- linux-4.15.0.orig/drivers/staging/signature-inclusion
+++ linux-4.15.0/drivers/staging/signature-inclusion
@@ -0,0 +1,19 @@
+#
++# This file lists the staging drivers that are safe for signing
++# and loading in a secure boot environment with signed module enforcement.
++#
+rtl8192c-common.ko
+rtl8192ce.ko
+rtl8192cu.ko
+rtl8192de.ko
+rtl8192ee.ko
+rtl8192se.ko
+r8188eu.ko
+r8192e_pci.ko
+r8192u_usb.ko
+r8712u.ko
+r8822be.ko
+rtllib_crypt_ccmp.ko
+rtllib_crypt_tkip.ko
+rtllib_crypt_wep.ko
+rtllib.ko
--- linux-4.15.0.orig/drivers/staging/sm750fb/sm750.c
+++ linux-4.15.0/drivers/staging/sm750fb/sm750.c
@@ -899,6 +899,7 @@
     break;
     case 16:
+     case 24:
     case 32:
     fix->visual = FB_VISUAL_PSEUDOCOLOR;
     break;
--- linux-4.15.0.orig/drivers/staging/speakup/kobjects.c
+++ linux-4.15.0/drivers/staging/speakup/kobjects.c
@@ -387,7 +387,7 @@
     len = strlen(buf);
     if (len < 2 || len > 9)
     return -EINVAL;
-    strncpy(new_synth_name, buf, len);
+    memcpy(new_synth_name, buf, len);
     if (new_synth_name[len - 1] == '
' )
     len--;
     new_synth_name[len] = '\0';
     @ @ -518,7 +518,7 @@
     return -EINVAL;
   }
- strncpy(punc_buf, buf, x);
+ memcpy(punc_buf, buf, x);

while (x && punc_buf[x - 1] == '\n')
   x--;
--- linux-4.15.0.orig/drivers/staging/speakup/main.c
+++ linux-4.15.0/drivers/staging/speakup/main.c
@@ -567,7 +567,7 @@
   return 0;
 } else if (tmpx < vc->vc_cols - 2 &&
            (ch == SPACE || ch == 0 || (ch < 0x100 && IS_WDLM(ch))) &&
-       get_char(vc, (u_short *)&tmp_pos + 1, &temp) > SPACE) {
+       get_char(vc, (u_short *)tmp_pos + 1, &temp) > SPACE) {
   tmp_pos += 2;
   tmpx++;
 } else
--- linux-4.15.0.orig/drivers/staging/speakup/speakup_dectlk.c
+++ linux-4.15.0/drivers/staging/speakup/speakup_dectlk.c
@@ -46,7 +46,7 @@
 static int in_escape;
 static int is_flushing;

- static spinlock_t flush_lock;
+ static DEFINE_SPINLOCK(flush_lock);
 static DECLARE_WAIT_QUEUE_HEAD(flush);

 static struct var_t vars[] = {
--- linux-4.15.0.orig/drivers/staging/speakup/speakup_soft.c
+++ linux-4.15.0/drivers/staging/speakup/speakup_soft.c
@@ -207,18 +207,25 @@
   chars_sent = 0;
   char __user *cp;
   char *init;
+   size_t bytes_per_ch = unicode ? 3 : 1;
   u16 ch;
   int empty;
   unsigned long flags;
 DECLARE_WAIT_QUEUE_HEAD(wait);

+ if (count < bytes_per_ch)
+ return -EINVAL;
+ spin_lock_irqsave(&speakup_info.spinlock, flags);
+ synth_soft.alive = 1;
   while (1) {
      prepare_to_wait(&speakup_event, &wait, TASK_INTERRUPTIBLE);
- if (!unicode)
- synth_buffer_skip_nonlatin1();

---
-if (!synth_buffer_empty() || speakup_info.flushing)
-break;
+if (synth_current() == &synth_soft) {
  +if (!unicode)
    +synth_buffer_skip_nonlatin1();
  +if (!synth_buffer_empty() || speakup_info.flushing)
    +break;

spin_unlock_irqrestore(&speakup_info.spinlock, flags);
if (fp->flags & O_NONBLOCK) {
  finish_wait(&speakup_event, &wait);
  @@ -237,7 +244,9 @@
  init = get_initstring();

    /* Keep 3 bytes available for a 16bit UTF-8-encoded character */
-while (chars_sent <= count - 3) {
-while (chars_sent <= count - bytes_per_ch) {
  +if (synth_current() != &synth_soft)
    +break;
  if (speakup_info.flushing) {
    speakup_info.flushing = 0;
    ch = \x18';
    @@ -334,7 +343,8 @@
    poll_wait(fp, &speakup_event, wait);

spin_lock_irqsave(&speakup_info.spinlock, flags);
-if (!synth_buffer_empty() || speakup_info.flushing)
+if (synth_current() == &synth_soft &&
  +(!synth_buffer_empty() || speakup_info.flushing))
  ret = POLLIN | POLLRDNORM;
spin_unlock_irqrestore(&speakup_info.spinlock, flags);
return ret;
--- linux-4.15.0.orig/drivers/staging/speakup/spk_priv.h
+++ linux-4.15.0/drivers/staging/speakup/spk_priv.h
@@ -80,6 +80,7 @@
int synth_release_region(unsigned long start, unsigned long n);
int synth_add(struct spk_synth *in_synth);
void synth_remove(struct spk_synth *in_synth);
+struct spk_synth *synth_current(void);

extern struct speakup_info_t speakup_info;

--- linux-4.15.0.orig/drivers/staging/speakup/spk_ttyio.c
+++ linux-4.15.0/drivers/staging/speakup/spk_ttyio.c
@@ -46,9 +46,12 @@
{
  struct spk_ldisc_data *ldisc_data;
+if (tty != speakup_tty)
+/* Somebody tried to use this line discipline outside speakup */
+return -ENODEV;
+
+if (tty->ops->write == NULL)
    return -EOPNOTSUPP;
-speakup_tty = tty;

ldisc_data = kmalloc(sizeof(struct spk_ldisc_data), GFP_KERNEL);
if (!ldisc_data)
    sema_init(&ldisc_data->sem, 0);
ldisc_data->buf_free = true;
-speakup_tty->disc_data = ldisc_data;
+tty->disc_data = ldisc_data;

return 0;
}

tty_unlock(tty);

+mutex_lock(&speakup_tty_mutex);
+speakup_tty = tty;
ret = tty_set_ldisc(tty, N_SPEAKUP);
if (ret)
    pr_err("speakup: Failed to set N_SPEAKUP on tty\n");
+speakup_tty = NULL;
+mutex_unlock(&speakup_tty_mutex);
+
+if (!ret)
    /* Success */
    return 0;
+
+pr_err("speakup: Failed to set N_SPEAKUP on tty\n");
+
+tty_lock(tty);
+if (tty->ops->close)
    tty->ops->close(tty, NULL);
+tty_unlock(tty);
+
+tty_kclose(tty);

return ret;
}

@@ -245,7 +264,8 @@
return;

- speakup_tty->ops->send_xchar(speakup_tty, ch);
+ if (speakup_tty->ops->send_xchar)
+ speakup_tty->ops->send_xchar(speakup_tty, ch);
mutex_unlock(&speakup_tty_mutex);
}

@@ -257,7 +277,8 @@
return;
}

- speakup_tty->ops->tiocmset(speakup_tty, set, clear);
+ if (speakup_tty->ops->tiocmset)
+ speakup_tty->ops->tiocmset(speakup_tty, set, clear);
mutex_unlock(&speakup_tty_mutex);
}

--- linux-4.15.0.orig/drivers/staging/speakup/synth.c
+++ linux-4.15.0/drivers/staging/speakup/synth.c
@@ -477,4 +477,10 @@
}
 EXPORT_SYMBOL_GPL(synth_remove);

+ struct spk_synth *synth_current(void)
+ {
+ return synth;
+ }
+ EXPORT_SYMBOL_GPL(synth_current);
+
short spk_punc_masks[] = { 0, SOME, MOST, PUNC, PUNC | B_SYM };
--- linux-4.15.0.orig/drivers/staging/typec/tcpci.c
+++ linux-4.15.0/drivers/staging/typec/tcpci.c
@@ -28,6 +28,15 @@
#define PD_RETRY_COUNT 3

+#define tcpc_presenting_cc1_rd(reg) \  
+ (! (TCPC_ROLE_CTRL_DRP & (reg)) && \  
+ ((reg) & (TCPC_ROLE_CTRL_CC1_MASK << TCPC_ROLE_CTRL_CC1_SHIFT)) == \  
+ (TCPC_ROLE_CTRL_CC_RD << TCPC_ROLE_CTRL_CC1_SHIFT)) )
+ #define tcpc_presenting_cc2_rd(reg) \  
+ (! (TCPC_ROLE_CTRL_DRP & (reg)) && \  
+ ((reg) & (TCPC_ROLE_CTRL_CC2_MASK << TCPC_ROLE_CTRL_CC2_SHIFT)) == \  
+ (TCPC_ROLE_CTRL_CC_RD << TCPC_ROLE_CTRL_CC2_SHIFT)) )
+
+ struct tcpci {
+ struct device *dev;
struct i2c_client *client;
@@ -150,19 +159,25 @@
        enum typec_cc_status *cc1, enum typec_cc_status *cc2)
 {
     struct tcpci *tcpci = tcpc_to_tcpci(tcpc);
-    unsigned int reg;
+    unsigned int reg, role_control;
     int ret;

+    ret = regmap_read(tcpci->regmap, TCPC_ROLE_CTRL, &role_control);
+    if (ret < 0)
+        return ret;
+    
    ret = regmap_read(tcpci->regmap, TCPC_CC_STATUS, &reg);
    if (ret < 0)
        return ret;

     *cc1 = tcpci_to_typec_cc((reg >> TCPC_CC_STATUS_CC1_SHIFT) &
                              TCPC_CC_STATUS_CC1_MASK,
-                          reg & TCPC_CC_STATUS_TERM);
+                          reg & TCPC_CC_STATUS_TERM ||
+                          tcpc_presenting_cc1_rd(role_control));
     *cc2 = tcpci_to_typec_cc((reg >> TCPC_CC_STATUS_CC2_SHIFT) &
                              TCPC_CC_STATUS_CC2_MASK,
-                          reg & TCPC_CC_STATUS_TERM);
+                          reg & TCPC_CC_STATUS_TERM ||
+                          tcpc_presenting_cc2_rd(role_control));

 return 0;
 }
@@ -492,6 +507,12 @@
 static int tcpci_remove(struct i2c_client *client)
 {
     struct tcpci *tcpci = i2c_get_clientdata(client);
+    int err;
+    
+    /* Disable chip interrupts before unregistering port */
     +err = tcpci_write16(tcpci, TCPC_ALERT_MASK, 0);
     +if (err < 0)
     +    return err;

tcpm_unregister_port(tcpci->port);

--- linux-4.15.0.orig/drivers/staging/unisys/visorbus/visorchipset.c
+++ linux-4.15.0/drivers/staging/unisys/visorbus/visorchipset.c
@@ -1218,14 +1218,17 @@
 {
     struct controlvm_message local_crash_bus_msg;
struct controlvm_message local_crash_dev_msg;
-struct controlvm_message msg;
+struct controlvm_message msg = {
  +.hdr.id = CONTROLVM_CHIPSET_INIT,
  +.cmd.init_chipset = {
    +.bus_count = 23,
    +.switch_count = 0,
  },
};

u32 local_crash_msg_offset;
u16 local_crash_msg_count;

/* send init chipset msg */
-msg.hdr.id = CONTROLVM_CHIPSET_INIT;
-msg.cmd.init_chipset.bus_count = 23;
-msg.cmd.init_chipset.switch_count = 0;
chipset_init(&msg);

/* get saved message count */
if (visorchannel_read(chipset_dev->controlvm_channel,
@@ -1566,7 +1569,7 @@
static int visorchipset_init(struct acpi_device *acpi_device)
 {
-  int err = -ENODEV;
+  int err = -ENOMEM;
struct visorchannel *controlvm_channel;

chipset_dev = kzalloc(sizeof(*chipset_dev), GFP_KERNEL);
@@ @ 1589.8 +1592.10 @ @
"controlvm",
sizeof(struct visor_controlvm_channel),
VISOR_CONTROLVM_CHANNEL_VERSIONID,
- VISOR_CHANNEL_SIGNATURE))
+ VISOR_CHANNEL_SIGNATURE)) { 
+err = -ENOMEM;
goto error_delete_groups;
+}

/* if booting in a crash kernel */
if (is_kdump_kernel())
  INIT_DELAYED_WORK(&chipset_dev->periodic_controlvm_work,
--- linux-4.15.0.orig/drivers/staging/vc04_services/bcm2835-audio/bcm2835-vchiq.c
+++ linux-4.15.0/drivers/staging/vc04_services/bcm2835-audio/bcm2835-vchiq.c
@@ @ -438,16 +438,16 @@
my_workqueue_init(alsa_stream);
ret = bcm2835_audio_open_connection(alsa_stream);
-if (ret) {
-ret = -1;
goto exit;
-
+if (ret)
+ goto free_wq;
+
instance = alsa_stream->instance;
LOG_DBG(" instance (%p)
", instance);

if (mutex_lock_interruptible(&instance->vchi_mutex)) {
LOG_DBG("Interrupted whilst waiting for lock on (%d)
", instance->num_connections);
- return -EINTR;
+ ret = -EINTR;
+ goto free_wq;
}

vchi_service_use(instance->vchi_handle[0]);

unlock:
vchi_service_release(instance->vchi_handle[0]);
mutex_unlock(&instance->vchi_mutex);
-exit:
+
+free_wq:
+if (ret)
+destroy_workqueue(alsa_stream->my_wq);
+
return ret;
}

--- linux-4.15.0.orig/drivers/staging/vc04_services/bcm2835-audio/bcm2835.c
+++ linux-4.15.0/drivers/staging/vc04_services/bcm2835-audio/bcm2835.c
@@ -36,6 +36,10 @@
 static void snd_devrm_unregister_child(struct device *dev, void *res)
 {
 struct device *childdev = *(struct device **)res;
-struct bcm2835_chip *chip = dev_get_drvdata(childdev);
+struct snd_card *card = chip->card;
 +
+snd_card_free(card);

device_unregister(childdev);
 }
@@ -61,6 +65,13 @@
 return 0;
 }

+static void snd_bcm2835_release(struct device *dev)
+{
+struct bcm2835_chip *chip = dev_get_drvdata(dev);
+
+kfree(chip);
+
+}
+
+static struct device *
+snd_create_device(struct device *parent,
+struct device_driver *driver,
+device_initialize(device);
+device->parent = parent;
+device->driver = driver;
+device->release = snd_bcm2835_release;
+
+dev_set_name(device, "%s", name);
+
+}
+
-static int snd_bcm2835_free(struct bcm2835_chip *chip)
-{
-    kfree(chip);
-    return 0;
-}
-
-/* component-destructor
 * (see "Management of Cards and Components")
 */
-static int snd_bcm2835_dev_free(struct snd_device *device)
{
    -return snd_bcm2835_free(device->device_data);
+struct bcm2835_chip *chip = device->device_data;
+struct snd_card *card = chip->card;
+    /* TODO: free pcm, ctl */
+    +snd_device_free(card, chip);
+    +return 0;
+}
+
+/* chip-specific constructor
+ @ @ -122,7 +135,7 @ @
+
+err = snd_device_new(card, SNDRV_DEV_LOWLEVEL, chip, &ops);
+if (err) {
+    snd_bcm2835_free(chip);
+kfree(chip);
return err;
}

@@ -130,31 +143,14 @@
return 0;
}

-static void snd_devm_card_free(struct device *dev, void *res)
+static struct snd_card *snd_bcm2835_card_new(struct device *dev)
{
-struct snd_card *snd_card = *(struct snd_card **)res;
-
-snd_card_free(snd_card);
-}
-
static struct snd_card *snd_devm_card_new(struct device *dev)
{
-struct snd_card **dr;

struct snd_card *card;
int ret;

-dr = devres_alloc(snd_devm_card_free, sizeof(*dr), GFP_KERNEL);
-if (!dr)
  return ERR_PTR(-ENOMEM);
-
ret = snd_card_new(dev, -1, NULL, THIS_MODULE, 0, &card);
-if (ret) {
-devres_free(dr);
+if (ret)
    return ERR_PTR(ret);
  }

-*dr = card;
-devres_add(dev, dr);

return card;
}
@@ -271,7 +267,7 @@
return PTR_ERR(child);
}

-card = snd_devm_card_new(child);
+card = snd_bcm2835_card_new(child);
if (IS_ERR(card)) {
  dev_err(child, "Failed to create card");
  return PTR_ERR(card);
@@ -313,7 +309,7 @@
return err;
}
-dev_set_drvdata(child, card);
+dev_set_drvdata(child, chip);
dev_info(child, "card created with %d channels\n", numchans);
return 0;
--- linux-4.15.0.orig/drivers/staging/vc04_services/bcm2835-camera/bcm2835-camera.c
+++ linux-4.15.0/drivers/staging/vc04_services/bcm2835-camera/bcm2835-camera.c
@@ -49,6 +49,7 @@
MODULE_AUTHOR("Vincent Sanders");
MODULE_LICENSE("GPL");
MODULE_VERSION(BM2835_MMAL_VERSION);
+MODULE_ALIAS("platform:bcm2835-camera");
int bcm2835_v4l2_debug;
module_param_named(debug, bcm2835_v4l2_debug, int, 0644);
@@ -580,7 +581,9 @@
static void stop_streaming(struct vb2_queue *vq)
{
int ret;
+unsigned long timeout;
struct bm2835_mmal_dev *dev = vb2_get_drv_priv(vq);
+struct vchiq_mmal_port *port = dev->capture.port;
v4l2_dbg(1, bcm2835_v4l2_debug, &dev->v4l2_dev, "%s: dev:%p\n",
__func__, dev);
@@ -604,12 +607,6 @@
&dev->capture.frame_count,
sizeof(dev->capture.frame_count));
-/* wait for last frame to complete */
-ret = wait_for_completion_timeout(&dev->capture.frame_cmplt, HZ);
-if (ret <= 0)
-v4l2_err(&dev->v4l2_dev,
- "error %d waiting for frame completion\n", ret);
v4l2_dbg(1, bcm2835_v4l2_debug, &dev->v4l2_dev,
"disabling connection\n");
@@ -624,6 +621,21 @@
ret);
}
+/* wait for all buffers to be returned */
+while (atomic_read(&port->buffers_with_vpu)) {
+v4l2_dbg(1, bcm2835_v4l2_debug, &dev->v4l2_dev,

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timeout = wait_for_completion_timeout(&dev->capture.frame_cmplt, HZ);
+if (timeout == 0) {
  v4l2_err(&dev->v4l2_dev, "%s: Timeout waiting for buffers to be returned - %d outstanding\n",
           _func__, atomic_read(&port->buffers_with_vpu));
  break;
}
if (disable_camera(dev) < 0)
  v4l2_err(&dev->v4l2_dev, "Failed to disable camera\n");
num_cameras = get_num_cameras(instance,
                   resolutions,
                   MAX_BCM2835_CAMERAS);
+if (num_cameras < 1) {
  ret = -ENODEV;
  goto cleanup_mmal;
}
+if (num_cameras > MAX_BCM2835_CAMERAS)
  num_cameras = MAX_BCM2835_CAMERAS;
pr_info("%s: error %d while loading driver\n", BM2835_MMAL_MODULE_NAME, ret);

 cleanup_mmal:
  vchiq_mmal_finalise(instance);
  return ret;
}
static int ctrl_set_colfx(struct bm2835_mmal_dev *dev,
    @ @ -603,7 +603,7 @@
    "%s: After: mmal_ctrl:%p ctrl id:0x%x ctrl val:%d ret %d(%d)n",
    __func__, mmal_ctrl, ctrl->id, ctrl->val, ret,
    (ret == 0 ? 0 : -EINVAL));
    -return (ret == 0 ? 0 : EINVAL);
    +return (ret == 0 ? 0 : -EINVAL);
}

static int ctrl_set_bitrate(struct bm2835_mmal_dev *dev,
    --- linux-4.15.0.orig/drivers/staging/vc04_services/bcm2835-camera/mmal-vchiq.c
    +++ linux-4.15.0/drivers/staging/vc04_services/bcm2835-camera/mmal-vchiq.c
    @@ -315,6 +315,8 @@
    struct mmal_msg_context *msg_context =
        container_of(work, struct mmal_msg_context, u.bulk.work);

        +atomic_dec(&msg_context->u.bulk.port->buffers_with_vpu);
        +
        msg_context->u.bulk.port->buffer_cb(msg_context->u.bulk.instance,
            msg_context->u.bulk.port,
            msg_context->u.bulk.status,
            @@ -521,6 +523,8 @@
            /* initialise work structure ready to schedule callback */
            INIT_WORK(&msg_context->u.bulk.work, buffer_work_cb);

            +atomic_inc(&port->buffers_with_vpu);
            +
            /* prep the buffer from host message */
            memset(&m, 0xbc, sizeof(m)); /* just to make debug clearer */

            @@ -834,6 +838,7 @@
            {
                struct mmal_msg_context *msg_context;
                int ret;
                +unsigned long timeout;

                /* payload size must not cause message to exceed max size */
                if (payload_len >
                    @@ -872,11 +877,11 @@
                    return ret;
                }

                -ret = wait_for_completion_timeout(&msg_context->u.sync.cmplt, 3 * HZ);
                -if (ret <= 0) {
                    -pr_err("error %d waiting for sync completion\n", ret);
                    -if (ret == 0)
                    -ret = -ETIME;
                    +timeout = wait_for_completion_timeout(&msg_context->u.sync.cmplt,


+ 3 * HZ);
+if (timeout == 0) {
+pr_err("timed out waiting for sync completion\n");
+ret = -ETIME;
/* todo: what happens if the message arrives after aborting */
release_msg_context(msg_context);
return ret;
@@ -1521,16 +1526,6 @@
if (port->enabled)
return 0;

-/* ensure there are enough buffers queued to cover the buffer headers */
-if (port->buffer_cb) {
-hdr_count = 0;
-list_for_each(buf_head, &port->buffers) {
-hdr_count++;
-}
-if (hdr_count < port->current_buffer.num)
-return -ENOSPC;
-}
-
-ret = port_action_port(instance, port,

  MMAL_MSG_PORT_ACTION_TYPE_ENABLE);
if (ret)
--- linux-4.15.0.orig/drivers/staging/vc04_services/bcm2835-camera/mmal-vchiq.h
+++ linux-4.15.0/drivers/staging/vc04_services/bcm2835-camera/mmal-vchiq.h
@@ -86,6 +86,9 @@
*/
int buffer_underflow;
+
+/* Count of buffers the VPU has yet to return */
+atomic_t buffers_with_vpu;
/* callback on buffer completion */
vchiq_mmal_buffer_cb buffer_cb;
/* callback context */
--- linux-4.15.0.orig/drivers/staging/vc04_services/interface/vchiq_arm/vchiq_2835_arm.c
+++ linux-4.15.0/drivers/staging/vc04_services/interface/vchiq_arm/vchiq_2835_arm.c
@@ -206,6 +206,9 @@
struct vchiq_2835_state *platform_state;

state->platform_state = kzalloc(sizeof(*platform_state), GFP_KERNEL);
+if (!state->platform_state)
+return VCHIQ_ERROR;
+
+platform_state = (struct vchiq_2835_state *)state->platform_state;

platform_state->inited = 1;
int dma_buffers;
dma_addr_t dma_addr;

@if (count >= INT_MAX - PAGE_SIZE)
+return NULL;
+
+offset = ((unsigned int)(unsigned long)buf & (PAGE_SIZE - 1));
+num_pages = DIV_ROUND_UP(count + offset, PAGE_SIZE);
+
@if (num_pages > (SIZE_MAX - sizeof(PAGELIST_T) -
+sizeof(struct vchiq_pagelist_info)) /
+(sizeof(u32) + sizeof(pages[0]) +
+sizeof(struct scatterlist)))
+return NULL;
+
+pagelist_size = sizeof(PAGELIST_T) +
+(num_pages * sizeof(u32)) +
+(num_pages * sizeof(pages[0]) +
--- linux-4.15.0.orig/drivers/staging/vc04_services/interface/vchiq_arm/vchiq_arm.c
+++ linux-4.15.0/drivers/staging/vc04_services/interface/vchiq_arm/vchiq_arm.c
@@ -1440,6 +1440,7 @@
struct vchiq_await_completion32 args32;
struct vchiq_completion_data32 completion32;
unsigned int *msgbufcount32;
+unsigned int msbufcount_native;
compat_uptr_t msbuf32;
void *msbuf;
void **msbufptr;
@@ -1551,7 +1552,11 @@
sizeof(completion32))
return -EFAULT;
-args32.msgbufcount--;
+if (get_user(msgbufcount_native, &args->msgbufcount))
+return -EFAULT;
+
+if (!msbufcount_native)
+args32.msgbufcount--;

msgbufcount32 =
&((struct vchiq_await_completion32 __user *)arg)->msgbufcount;
--- linux-4.15.0.orig/drivers/staging/vc04_services/interface/vchiq_arm/vchiq_core.c
+++ linux-4.15.0/drivers/staging/vc04_services/interface/vchiq_arm/vchiq_core.c
@@ -600,6 +600,7 @@
}

if (tx_pos == (state->slot_queue_available * VCHIQ_SLOT_SIZE)) {
+up(&state->slot_available_event);
pr_warn("%s: invalid tx_pos: %d\n", __func__, tx_pos);
return NULL;
}
@@ -2527,6 +2528,8 @@
local->debug[DEBUG_ENTRIES] = DEBUG_MAX;

status = vchiq_platform_init_state(state);
+if (status != VCHIQ_SUCCESS)
+return VCHIQ_ERROR;

/*
 * bring up slot handler thread
--- linux-4.15.0.orig/drivers/staging/vt6655/device_main.c
+++ linux-4.15.0/drivers/staging/vt6655/device_main.c
@@ -973,8 +973,6 @@
return;
 }

-MACvIntDisable(priv->PortOffset);
-
spin_lock_irqsave(&priv->lock, flags);

/* Read low level stats */
@@ -1062,8 +1060,6 @@
}

spin_unlock_irqrestore(&priv->lock, flags);
-
-MACvIntEnable(priv->PortOffset, IMR_MASK_VALUE);
}

static void vnt_interrupt_work(struct work_struct *work)
@@ -1073,14 +1069,17 @@
if (priv->vif)
vnt_interrupt_process(priv);
+
+MACvIntEnable(priv->PortOffset, IMR_MASK_VALUE);
}

static irqreturn_t vnt_interrupt(int irq, void *arg)
{
struct vnt_private *priv = arg;

-if (priv->vif)
-schedule_work(&priv->interrupt_work);
+schedule_work(&priv->interrupt_work);


+MACvIntDisable(priv->PortOffset);

return IRQ_HANDLED;
}
@@ -1669,8 +1668,10 @@

priv->hw->max_signal = 100;

-if (vnt_init(priv))
+if (vnt_init(priv)) {
+device_free_info(priv);
return -ENODEV;
+

device_print_info(priv);
pci_set_drvdata(pcid, priv);
--- linux-4.15.0.orig/drivers/staging/vt6656/device.h
+++ linux-4.15.0/drivers/staging/vt6656/device.h
@@ -62,6 +62,8 @@
#define RATE_AUTO	12
#define MAX_RATE			12
+#define VNT_B_RATES (BIT(RATE_1M) | BIT(RATE_2M) |
+BIT(RATE_5M) | BIT(RATE_11M))

/*
 * device specific
@@ -269,6 +271,7 @@
     u8 mac_hw;
 /* netdev */
 struct usb_device *usb;
+struct usb_interface *intf;

u64 tsf_time;
u8 rx_rate;
--- linux-4.15.0.orig/drivers/staging/vt6656/dpc.c
+++ linux-4.15.0/drivers/staging/vt6656/dpc.c
@@ -140,7 +140,7 @@
 vnt_rf_rssi_to_dbm(priv, *rssi, &rx_dbm);

-priv->bb_pre_ed_rssi = (u8)rx_dbm + 1;
+priv->bb_pre_ed_rssi = (u8)-rx_dbm + 1;
 priv->current_rssi = priv->bb_pre_ed_rssi;

frame = skb_data + 8;
--- linux-4.15.0.orig/drivers/staging/vt6656/int.c
info->status.rates[0].count = tx_retry;

- if (!(tsr & (TSR_TMO | TSR_RETRYTMO))) {
  + if (!(tsr & TSR_TMO)) {
    info->status.rates[0].idx = idx;
    -info->flags |= IEEE80211_TX_STAT_ACK;
    + if (!(info->flags & IEEE80211_TX_CTL_NO_ACK))
      +info->flags |= IEEE80211_TX_STAT_ACK;
  }
}

ieee80211_tx_status_irqsafe(priv->hw, context->skb);
priv->wake_up_count =
priv->hw->conf.listen_interval;

/* Turn on wake up to listen next beacon */
if (priv->wake_up_count == 1)
  case VNT_KEY_PAIRWISE:
    key_mode |= mode;
    key_inx = 4;
    /* Don't save entry for pairwise key for station mode */
  -if (priv->op_mode == NL80211_IFTYPE_STATION)
    -clear_bit(entry, &priv->key_entry_inuse);
    break;
  default:
    return -EINVAL;
  return -EINVAL;
  @ @ -117,7 +114,6 @@
int vnt_set_keys(struct ieee80211_hw *hw, struct ieee80211_sta *sta,
  struct ieee80211_vif *vif, struct ieee80211_key_conf *key)
}{
  struct ieee80211_bss_conf *conf = &vif->bss_conf;
  struct vnt_private *priv = hw->priv;
  u8 *mac_addr = NULL;
  u8 key_dec_mode = 0;
  @ @ -159,16 +155,12 @@
  key->flags |= IEEE80211_KEY_FLAG_GENERATE_IV;
-if (key->flags & IEEE80211_KEY_FLAG_PAIRWISE) {
+if (key->flags & IEEE80211_KEY_FLAG_PAIRWISE)
  vnt_set_keymode(hw, mac_addr, key, VNT_KEY_PAIRWISE,
    key_dec_mode, true);
  } else {
    vnt_set_keymode(hw, mac_addr, key, VNT_KEY_DEFAULTKEY,
    +else
    +vnt_set_keymode(hw, mac_addr, key, VNT_KEY_GROUP_ADDRESS,
        key_dec_mode, true);
    }
  }
  return 0;

--- linux-4.15.0.orig/drivers/staging/vt6656/main_usb.c
+++ linux-4.15.0/drivers/staging/vt6656/main_usb.c
@@ -412,16 +412,19 @@
  kfree(priv->int_buf.data_buf);
}

-static bool vnt_alloc_bufs(struct vnt_private *priv)
+static int vnt_alloc_bufs(struct vnt_private *priv)
{
+  int ret = 0;
  struct vnt_usb_send_context *tx_context;
  struct vnt_rcb *rcb;
  int ii;

  for (ii = 0; ii < priv->num_tx_context; ii++) {
    tx_context = kmalloc(sizeof(*tx_context), GFP_KERNEL);
    -if (!tx_context)
+    -if (!tx_context) {
+      ret = -ENOMEM;
+      goto free_tx;
+    }
    priv->tx_context[ii] = tx_context;
    tx_context->priv = priv;
    @@ -429,8 +432,10 @@
 */ allocate UR Bs */
    tx_context->urb = usb_alloc_urb(0, GFP_KERNEL);
    -if (!tx_context->urb)
+    -if (!tx_context->urb) {
+      ret = -ENOMEM;
+      goto free_tx;
+    }

goto free_tx;
+
}

tx_context->in_use = false;
@
@@ -438,6 +443,7 @@
for (ii = 0; ii < priv->num_rcb; ii++) {
    priv->rcb[ii] = kzalloc(sizeof(*priv->rcb[ii]), GFP_KERNEL);
    if (!priv->rcb[ii]) {
+        ret = -ENOMEM;
            dev_err(&priv->usb->dev, "failed to allocate rcb no %d\n", ii);
            goto free_rx_tx;
    }
    /* allocate URBs */
    rcb->urb = usb_alloc_urb(0, GFP_KERNEL);
    -if (!rcb->urb)
+    if (!rcb->urb) {
+        ret = -ENOMEM;
+        goto free_rx_tx;
+    }
    rcb->skb = dev_alloc_skb(priv->rx_buf_sz);
    -if (!rcb->skb)
+    if (!rcb->skb) {
+        ret = -ENOMEM;
+        goto free_rx_tx;
+    }
    rcb->in_use = false;
    /* submit rx urb */
    -if (vnt_submit_rx_urb(priv, rcb))
+    ret = vnt_submit_rx_urb(priv, rcb);
+    if (ret)
+        goto free_rx_tx;
    }
    priv->interrupt_urb = usb_alloc_urb(0, GFP_KERNEL);
    -if (!priv->interrupt_urb)
+    if (!priv->interrupt_urb) {
+        ret = -ENOMEM;
+        goto free_rx_tx;
+    }
    priv->int_buf.data_buf = kmalloc(MAX_INTERRUPT_SIZE, GFP_KERNEL);
    if (!priv->int_buf.data_buf)}
static void vnt_tx_80211(struct ieee80211_hw *hw, priv->op_mode = vif->type;
-vnt_set_bss_mode(priv);
-
/* LED blink on TX */
vnt_mac_set_led(priv, LEDSTS_STS, LEDSTS_INTER);

priv->basic_rates = conf->basic_rates;

vnt_update_top_rates(priv);
-vnt_set_bss_mode(priv);

dev_dbg(&priv->usb->dev, "basic rates %x\n", conf->basic_rates);
}
@@ -594,8 +607,6 @@
priv->basic_rates = conf->basic_rates;

vnt_update_top_rates(priv);
-vnt_set_bss_mode(priv);

dev_dbg(&priv->usb->dev, "basic rates %x\n", conf->basic_rates);
}
@@ -682,7 +693,6 @@
vnt_set_short_slot_time(priv);
-vnt_set_bss_mode(priv);

dev_dbg(&priv->usb->dev, "basic rates %x\n", conf->basic_rates);
}
@@ -711,11 +721,14 @@
priv->short_slot_time = false;
-vnt_set_short_slot_time(priv);
-vnt_set_bss_mode(priv);

dev_dbg(&priv->usb->dev, "basic rates %x\n", conf->basic_rates);
}
+if (changed & (BSS_CHANGED_BASIC_RATES | BSS_CHANGED_ERP_PREAMBLE |
+             BSS_CHANGED_ERP_SLOT))
vnt_set_bss_mode(priv);
+
if (changed & BSS_CHANGED_TXPOWER)
vnt_rf_setpower(priv, priv->current_rate,
conf->chandef.chan->hw_value);
@@ -739,12 +752,15 @@
    vnt_adjust_tsf(priv, conf->beacon_rate->hw_value,
    - conf->sync_tsf, priv->current_tsf);
    -
vnt_mac_set_beacon_interval(priv, conf->beacon_int);

vnt_reset_next_tbtt(priv, conf->beacon_int);
+
+vnt_adjust_tsf(priv, conf->beacon_rate->hw_value,
    + conf->sync_tsf, priv->current_tsf);
+
+vnt_update_next_tbtt(priv,
    + conf->sync_tsf, conf->beacon_int);
} else {
    vnt_clear_current_tsf(priv);

@@ -779,15 +795,11 @@
{
    struct vnt_private *priv = hw->priv;
    u8 rx_mode = 0;
-    int rc;

    *total_flags &= FIF_ALLMULTI | FIF_OTHER_BSS | FIF_BCN_PRBRESP_PROMISC;

    -rc = vnt_control_in(priv, MESSAGE_TYPE_READ, MAC_REG_RCR,
        - MESSAGE_REQUEST_MACREG, sizeof(u8), &rx_mode);
    -
    -if (!rc)
        -rx_mode = RCR_MULTICAST | RCR_BROADCAST;
    +vnt_control_in(priv, MESSAGE_TYPE_READ, MAC_REG_RCR,
        + MESSAGE_REQUEST_MACREG, sizeof(u8), &rx_mode);

    dev_dbg(&priv->usb->dev, "rx mode in = \%x\n", rx_mode);

    @@ -828,8 +840,12 @@
        return -EOPNOTSUPP;
    break;
    case DISABLE_KEY:
if (test_bit(key->hw_key_idx, &priv->key_entry_inuse)) {
    clear_bit(key->hw_key_idx, &priv->key_entry_inuse);
    vnt_mac_disable_keyentry(priv, key->hw_key_idx);
}

default:
    break;

priv = hw->priv;
priv->hw = hw;
priv->usb = udev;
+priv->intf = intf;

vnt_set_options(priv);

--- linux-4.15.0.orig/drivers/staging/vt6656/rxtx.c
+++ linux-4.15.0/drivers/staging/vt6656/rxtx.c
@@ -288,11 +288,9 @@
    PK_TYPE_11B, &buf->b);

    /* Get Duration and TimeStamp */
-    if (ieee80211_is_pspoll(hdr->frame_control)) {
-        __le16 dur = cpu_to_le16(priv->current_aid | BIT(14) | BIT(15));
-        
-        -buf->duration_a = dur;
-        -buf->duration_b = dur;
+    if (ieee80211_is_nullfunc(hdr->frame_control)) {
+        +buf->duration_a = hdr->duration_id;
+        +buf->duration_b = hdr->duration_id;
    } else {
        buf->duration_a = vnt_get_duration_le(priv,
            tx_context->pkt_type, need_ack);
        @@ -381,10 +379,8 @@
            tx_context->pkt_type, &buf->ab);

    /* Get Duration and TimeStampOff */
-    if (ieee80211_is_pspoll(hdr->frame_control)) {

- _le16 dur = cpu_to_le16(priv->current_aid | BIT(14) | BIT(15));
- 
- buf->duration = dur;
+ if (ieee80211_is_nullfunc(hdr->frame_control)) {
+ buf->duration = hdr->duration_id;
} else {
    buf->duration = vnt_get_duration_le(priv, tx_context->pkt_type,
        need_ack);
} 

if (info->band == NL80211_BAND_5GHZ) {
   (pkt_type = PK_TYPE_11A;
} else {
    -if (tx_rate->flags & IEEE80211_TX_RC_USE_CTS_PROTECT)
    -pkt_type = PK_TYPE_11GB;
    -else
    -pkt_type = PK_TYPE_11GA;
    +if (tx_rate->flags & IEEE80211_TX_RC_USE_CTS_PROTECT) {
    +if (priv->basic_rates & VNT_B_RATES)
    +pkt_type = PK_TYPE_11GB;
    +else
    +pkt_type = PK_TYPE_11GA;
    +} else {
    +pkt_type = PK_TYPE_11A;
    +}
} } 
} else {
    pkt_type = PK_TYPE_11B;
"
/* If fail all ends TODO retry */
dev_err(&priv->usb->dev, "failed to start\n");
+usb_set_intfdata(priv->intf, NULL);
ieee80211_free_hw(priv->hw);
return;
"
} 

"--- linux-4.15.0.orig/drivers/staging/wilc1000/linux_wlan.c
+++ linux-4.15.0/drivers/staging/wilc1000/linux_wlan.c
@@ -741,17 +741,17 @@
goto _fail_locks_;
"

"-if (wl->gpio >= 0 && init_irq(dev)) {
    -ret = -EIO;
    -goto _fail_locks_;
-} 
-"
ret = wlan_initialize_threads(dev);
if (ret < 0) {
    ret = -EIO;
    goto _fail_wlrc_wlan_
}

+if (wl->gpio >= 0 && init_irq(dev)) {
+ret = -EIO;
+goto fail_threads;
+}
+
if (!wl->dev_irq_num &&
    wl->hif_func->enable_interrupt &&
    wl->hif_func->enable_interrupt(wl)) {
    @ @ -807,7 +807,7 @@
    _fail_irq_init_:
    if (wl->dev_irq_num)
        deinit_irq(dev);
    -
    +fail_threads:
    wlan_deinitialize_threads(dev);
    _fail_wlrc_wlan_:
    wlc_wlan_cleanup(dev);
    @ @ -1238,8 +1238,8 @@
    vif->wlrc = *wlrc;
    vif->ndev = ndev;
    wl->vif[i] = vif;
    -wl->vif_num = i;
    -vif->idx = wl->vif_num;
    +wl->vif_num = i + 1;
    +vif->idx = i;
    ndev->netdev_ops = &wlrc_netdev_ops;

--- linux-4.15.0.orig/drivers/staging/wilc1000/wilc_sdio.c
+++ linux-4.15.0/drivers/staging/wilc1000/wilc_sdio.c
@@ -823,6 +823,7 @@
    if (!g_sdio.irq_gpio) {
        int i;
        +cmd.read_write = 0;
        cmd.function = 1;
        cmd.address = 0x04;
        cmd.data = 0;
--- linux-4.15.0.orig/drivers/staging/wlan-ng/cfg80211.c
+++ linux-4.15.0/drivers/staging/wlan-ng/cfg80211.c
@@ @ @ -823,6 +823,7 @@
    if (!g_sdio.irq_gpio) {
        int i;
        +cmd.read_write = 0;
        cmd.function = 1;
        cmd.address = 0x04;
        cmd.data = 0;
/* Set the encryption - we only support wep */
if (is_wep) {
    if (sme->key) {
        if (sme->key_idx >= NUM_WEPKEYS) {
            -err = -EINVAL;
            -goto exit;
        }
        +if (sme->key_idx >= NUM_WEPKEYS)
        +return -EINVAL;
    }
    result = prism2_domibset_uint32(wlandev, DIDmib_dot11smt_dot11PrivacyTable_dot11WEPDefaultKeyID,
    --- linux-4.15.0.orig/drivers/staging/wlan-ng/hfa384x_usb.c
    +++ linux-4.15.0/drivers/staging/wlan-ng/hfa384x_usb.c
    @@ -531,13 +531,8 @@ */
    void hfa384x_create(struct hfa384x *hw, struct usb_device *usb)
    {
        -memset(hw, 0, sizeof(*hw));
        hw->usb = usb;

        -/* set up the endpoints */
        -hw->endp_in = usb_rcvbulkpipe(usb, 1);
        -hw->endp_out = usb_sndbulkpipe(usb, 2);
        -
        /* Set up the waitq */
        init_waitqueue_head(&hw->cmdq);

        @@ -3116,7 +3111,9 @@ break;
        +/* Save values from the RX URB before reposting overwrites it. */
        +urb_status = urb->status;
        +usbin = (union hfa384x_usbin *)urb->transfer_buffer;

        if (action != ABORT) {
            /* Repost the RX URB */
            @@ -3133,7 +3130,6 @@ /* Note: the check of the sw_support field, the type field doesn't
            */
            type = le16_to_cpu(usbin->type); 
            if (HFA384x_USB_ISRXFRM(type)) {
                if (action == HANDLE) {
                    @@ -3491,6 +3487,8 @@
                    WLAN_HDR_A4_LEN + WLAN_DATA_MAXLEN + WLAN_CRC_LEN)) {
                        pr_debug("overlen frm: len=%zd\n",
skblen = sizeof(struct p80211_caphdr));
+
+return;
}

skb = dev_alloc_skb(skblen);
--- linux-4.15.0.orig/drivers/staging/wlan-ng/prism2mgmt.c
+++ linux-4.15.0/drivers/staging/wlan-ng/prism2mgmt.c
@@ -947,7 +947,7 @@
}
}

-return 0;
+return result;
}

/*----------------------------------------------------------------
--- linux-4.15.0.orig/drivers/staging/wlan-ng/prism2usb.c
+++ linux-4.15.0/drivers/staging/wlan-ng/prism2usb.c
@@ -61,11 +61,16 @@
      bulk_in, *bulk_out;
      struct usb_host_interface *iface_desc = interface->cur_altsetting;
      struct wlandevice *wlandev = NULL;
      struct hfa384x *hw = NULL;
      int result = 0;

+result = usb_find_common_endpoints(iface_desc, &bulk_in, &bulk_out, NULL, NULL);
+if (result)
+    goto failed;
+
    dev = interface_to_usbdev(interface);
    wlandev = create_wlan();
    if (!wlandev) {
@@ -82,6 +87,8 @@
        hw->endp_in = usb_rcvbulkpipe(dev, bulk_in->bEndpointAddress);
        hw->endp_out = usb_sndbulkpipe(dev, bulk_out->bEndpointAddress);
        hfa384x_create(hw, dev);
@@ -180,6 +187,7 @@

/* Initialize the hw data */
+hw->endp_in = usb_rcvbulkpipe(dev, bulk_in->bEndpointAddress);
+hw->endp_out = usb_sndbulkpipe(dev, bulk_out->bEndpointAddress);
    hfa384x_create(hw, dev);
    hw->wlandev = wlandev;
@@ -180,6 +187,7 @@

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cancel_work_sync(&hw->link_bh);
cancel_work_sync(&hw->commsqual_bh);
+cancel_work_sync(&hw->usb_work);

/* Now we complete any outstanding commands
* and tell everyone who is waiting for their
--- linux-4.15.0.orig/drivers/target/iscsi/cxgbit/cxgbit_cm.c
+++ linux-4.15.0/drivers/target/iscsi/cxgbit/cxgbit_cm.c
@@ -598,9 +598,12 @@
mutex_unlock(&cdev_list_lock);
}

+static void __cxgbit_free_conn(struct cxgbit_sock *csk);
+
void cxgbit_free_np(struct iscsi_np *np)
{
struct cxgbit_np *cnp = np->np_context;
+struct cxgbit_sock *csk, *tmp;

cnp->com.state = CSK_STATE_DEAD;
if (cnp->com.cdev)
@@ -608,6 +611,13 @@
else
    cxgbit_free_all_np(cnp);

+spin_lock_bh(&cnp->np_accept_lock);
+list_for_each_entry_safe(csk, tmp, &cnp->np_accept_list, accept_node) {
+    list_del_init(&csk->accept_node);
+    __cxgbit_free_conn(csk);
+}
+spin_unlock_bh(&cnp->np_accept_lock);
+
    np->np_context = NULL;
    cxgbit_put_cnp(cnp);
}
@@ -631,8 +641,11 @@
static void cxgbit_arp_failure_discard(void *handle, struct sk_buff *skb)
{
+struct cxgbit_sock *csk = handle;
+pr_debug("%s cxgbit_device %p\n", __func__, handle);
kfree_skb(skb);
+cxgbit_put_csk(csk);
}

static void cxgbit_abort_arp_failure(void *handle, struct sk_buff *skb)
@@ -705,9 +718,9 @@
void cxgbit_free_conn(struct iscsi_conn *conn)
+static void __cxgbit_free_conn(struct cxgbit_sock *csk)
{
-struct cxgbit_sock *csk = conn->context;
+struct iscsi_conn *conn = csk->conn;
bool release = false;

pr_debug("%s: state %d\n",
@@ -716,7 +729,7 @@
spin_lock_bh(&csk->lock);
switch (csk->com.state) {
  case CSK_STATE_ESTABLISHED:
-    if (conn->conn_state == TARG_CONN_STATE_IN_LOGOUT) {
+    if (conn && (conn->conn_state == TARG_CONN_STATE_IN_LOGOUT)) {
        csk->com.state = CSK_STATE_CLOSING;
        cxgbit_send_halfclose(csk);
    } else {
@@ -741,6 +754,11 @@
cxgbit_put_csk(csk);
}

+void cxgbit_free_conn(struct iscsi_conn *conn)
+{
+__cxgbit_free_conn(conn->context);
+}
+
+static void cxgbit_set_emss(struct cxgbit_sock *csk, u16 opt)
{  
  csk->emss = csk->com.cdev->lldi.mtus[TCPOPT_MSS_G(opt)] -
@@ -803,6 +821,7 @@
spin_unlock_bh(&cdev->cskq.lock);

cxgbit_free_skb(csk);
+cxgbit_put_cnp(csk->cnp);
+cxgbit_put_cdev(cdev);

kfree(csk);
@@ -1187,7 +1206,7 @@
rpl5->opt0 = cpu_to_be64(opt0);
rpl5->opt2 = cpu_to_be32(opt2);
set_wr_tq(skb, CPL_PRIORITY_SETUP, csk->ctrlq_idx);
-t4_set_arp_err_handler(skb, NULL, cxgbit_arp_failure_discard);
+t4_set_arp_err_handler(skb, csk, cxgbit_arp_failure_discard);
cxgbit_l2t_send(csk->com.cdev, skb, csk->l2t);
}
goto rel_skb;
}

+cxgbit_get_cnp(cnp);
+cxgbit_get_cdev(cdev);
spin_lock(&cdev->cskq.lock);

while (credits) {
    struct sk_buff *p = cxgbit_sock_peek_wr(csk);
    -const u32 csum = (__force u32)p->csum;
    +u32 csum;

    if (unlikely(!p)) {
        pr_err("csk 0x%p,%u, cr %u,%u+%u, empty.
", csk,  csk->tid,
        @@ -1818,6 +1838,7 @@
            break;
        }

        +csum = (__force u32)p->csum;
    if (unlikely(credits < csum)) {
        pr_warn("csk 0x%p,%u, cr %u,%u+%u, < %u.
", csk,  csk->tid,
        --- linux-4.15.0.orig/drivers/target/iscsi/cxgbit/cxgbit_main.c
        +++ linux-4.15.0/drivers/target/iscsi/cxgbit/cxgbit_main.c
        @@ -58,6 +58,7 @@
            return ERR_PTR(-ENOMEM);

            kref_init(&cdev->kref);
        +spin_lock_init(&cdev->np_lock);

        cdev->lldi = *lldi;

        --- linux-4.15.0.orig/drivers/target/iscsi/cxgbit/cxgbit_target.c
        +++ linux-4.15.0/drivers/target/iscsi/cxgbit/cxgbit_target.c
        @@ -652,6 +652,7 @@
            struct iscsi_param *param;
    u32 mrdsl, mbl;
    u32 max_npdu, max_iso_npdu;
    +u32 max_iso_payload;

if (conn->login->leading_connection) {
    param = iscsi_find_param_from_key(MAXBURSTLENGTH,
    @@ -670,8 +671,10 @@
            mrdsl = conn_ops->MaxRecvDataSegmentLength;
max_npdu = mbl / mrdsl;

-max_iso_npdu = CXGBT_MAX_ISO_PAYLOAD /
-(ISCSI_HDR_LEN + mrdsl +
+max_iso_payload = rounddown(CXGBT_MAX_ISO_PAYLOAD, csk->emss);
 +
 +max_iso_npdu = max_iso_payload /
 + (ISCSI_HDR_LEN + mrdsl + cxgbit_digest_len[csk->submode]);

csk->max_iso_npdu = min(max_npdu, max_iso_npdu);
@@ -741,6 +744,9 @@
if (conn_ops->MaxRecvDataSegmentLength > cdev->mdsl)
 conn_ops->MaxRecvDataSegmentLength = cdev->mdsl;

+if (cxgbit_set_digest(csk))
+return -1;
+
if (conn->login->leading_connection) {
    param = iscsi_find_param_from_key(ERRORRECOVERYLEVEL,
        conn->param_list);
@@ -764,7 +770,7 @@
if (is_t5(cdev->lldi.adapter_type))
    goto enable_ddp;
else
-    goto enable_digest;
+    return 0;
}

if (test_bit(CDEV_ISO_ENABLE, &cdev->flags)) {
@@ -781,10 +787,6 @@
}

-enable_digest:
-if (cxgbit_set_digest(csk))
-return -1;
-
return 0;
}

--- linux-4.15.0.orig/drivers/target/iscsi/iscsi_target.c
+++ linux-4.15.0/drivers/target/iscsi/iscsi_target.c
@@ -492,8 +492,7 @@

void iscsit_aborted_task(struct iscsi_conn *conn, struct iscsi_cmd *cmd)
{
    spin_lock_bh(&conn->cmd_lock);
-if (!list_empty(&cmd->i_conn_node) &

- !(cmd->se_cmd.transport_state & CMD_T_FABRIC_STOP))
+if (!list_empty(&cmd->i_conn_node))
    list_del_init(&cmd->i_conn_node);
spin_unlock_bh(&conn->cmd_lock);

@@ -1383,14 +1382,27 @@
    sg = cmd->first_data_sg;
    page_off = cmd->first_data_sg_off;

    +if (data_length && & page_off) {
    +struct scatterlist first_sg;
    +u32 len = min_t(u32, data_length, sg->length - page_off);
    +
    +sg_init_table(&first_sg, 1);
    +sg_set_page(&first_sg, sg_page(sg), len, sg->offset + page_off);
    +
    +ahash_request_set_crypt(hash, &first_sg, NULL, len);
    +crypto_ahash_update(hash);
    +
    +data_length -= len;
    +sg = sg_next(sg);
    +}
    +while (data_length) {
- u32 cur_len = min_t(u32, data_length, (sg->length - page_off));
+ u32 cur_len = min_t(u32, data_length, sg->length);
    ahash_request_set_crypt(hash, sg, NULL, cur_len);
    crypto_ahash_update(hash);

    data_length -= cur_len;
    -page_off = 0;
 /* iscsit_map_iovec has already checked for invalid sg pointers */
    sg = sg_next(sg);
 }
@@ -1418,7 +1430,8 @@

    sg_init_table(sg, ARRAY_SIZE(sg));
    sg_set_buf(sg, buf, payload_length);
- sg_set_buf(sg + 1, pad_bytes, padding);
+ if (padding)
+ sg_set_buf(sg + 1, pad_bytes, padding);

    ahash_request_set_crypt(hash, sg, data_crc, payload_length + padding);

@@ -3937,10 +3950,14 @@

 static void iscsit_get_rx_pdu(struct iscsi_conn *conn)
 {

---

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int ret;
-u8 buffer[ISCSI_HDR_LEN], opcode;
+u8 *buffer, opcode;
u32 checksum = 0, digest = 0;
struct kvec iov;

+buffer = kcalloc(ISCSI_HDR_LEN, sizeof(*buffer), GFP_KERNEL);
+if (!buffer)
+return;
+
while (!kthread_should_stop()) {
/*
 * Ensure that both TX and RX per connection kthreads
@@ -3948,7 +3965,6 @@
 */
 iscsit_thread_check_cpumask(conn, current, 0);

-memset(buffer, 0, ISCSI_HDR_LEN);
memset(&iov, 0, sizeof(struct kvec));

 iov.iov_base = buffer;
@@ -3957,7 +3973,7 @@
 ret = rx_data(conn, &iov, 1, ISCSI_HDR_LEN);
 if (ret != ISCSI_HDR_LEN) {
 iscsit_rx_thread_wait_for_tcp(conn);
-return;
+break;
 }

 if (conn->conn_ops->HeaderDigest) {
@@ -3967,7 +3983,7 @@
 ret = rx_data(conn, &iov, 1, ISCSI_CRC_LEN);
 if (ret != ISCSI_CRC_LEN) {
 iscsit_rx_thread_wait_for_tcp(conn);
-return;
+break;
 }

 iscsit_do_crypto_hash_buf(conn->conn_rx_hash, buffer,
@@ -3991,7 +4007,7 @@
 }

 if (conn->conn_state == TARG_CONN_STATE_IN_LOGOUT)
 -return;
+break;

 opcode = buffer[0] & ISCSI_OPCODE_MASK;
"while in Discovery Session, rejecting."
iscsit_add_reject(conn, ISCSI_REASON_PROTOCOL_ERROR, buffer);
return;
+break;
}

ret = iscsi_target_rx_opcode(conn, buffer);
if (ret < 0)
- return;
+ break;
}
+kfree(buffer);
}

int iscsi_target_rx_thread(void *arg)
@@ -4062,13 +4080,23 @@
 spin_lock_bh(&conn->cmd_lock);
 list_splice_init(&conn->conn_cmd_list, &tmp_list);

 -list_for_each_entry(cmd, &tmp_list, i_conn_node) {
+ list_for_each_entry_safe(cmd, cmd_tmp, &tmp_list, i_conn_node) {
 struct se_cmd *se_cmd = &cmd->se_cmd;

 if (se_cmd->se_tfo != NULL) {
- spin_lock(&se_cmd->t_state_lock);
- se_cmd->transport_state |= CMD_T_FABRIC_STOP;
- spin_unlock(&se_cmd->t_state_lock);
+ spin_lock_irq(&se_cmd->t_state_lock);
+ if (se_cmd->transport_state & CMD_T_ABORTED) {
+/*
+ * LIO's abort path owns the cleanup for this,
+ * so put it back on the list and let
+ * aborted_task handle it.
+ */
+ list_move_tail(&cmd->i_conn_node,
+ &conn->conn_cmd_list);
+ } else {
+ se_cmd->transport_state |= CMD_T_FABRIC_STOP;
+ }
+ spin_unlock_irq(&se_cmd->t_state_lock);
 }

 spin_unlock_bh(&conn->cmd_lock);
@@ -4235,22 +4263,15 @@
 crypto_free_ahash(tfm);
free_cpumask_var(conn->conn_cpumask);
-
-kfree(conn->conn_ops);
-conn->conn_ops = NULL;
-
if (conn->sock)
sock_release(conn->sock);

if (conn->conn_transport->iscsit_free_conn)
conn->conn_transport->iscsit_free_conn(conn);

-iscsit_put_transport(conn->conn_transport);
-
pr_debug("Moving to TARG_CONN_STATE_FREE\n");
conn->conn_state = TARG_CONN_STATE_FREE;
-kfree(conn);
+iscsit_free_conn(conn);

spin_lock_bh(&sess->conn_lock);
atomic_dec(&sess->nconn);
@@ -4303,30 +4324,37 @@
if (!atomic_read(&sess->session_reinstatement) &&
        atomic_read(&sess->session_fall_back_to_erl0)) {
    spin_unlock_bh(&sess->conn_lock);
+complete_all(&sess->session_wait_comp);
    iscsit_close_session(sess);

    return 0;
} else if (atomic_read(&sess->session_logout)) {
    pr_debug("Moving to TARG_SESS_STATE_FREE\n");
    sess->session_state = TARG_SESS_STATE_FREE;
    spin_unlock_bh(&sess->conn_lock);
-
-    if (atomic_read(&sess->sleep_on_sess_wait_comp))
-        complete(&sess->session_wait_comp);
-    +if (atomic_read(&sess->session_close)) {
-        spin_unlock_bh(&sess->conn_lock);
-        complete_all(&sess->session_wait_comp);
-        +iscsit_close_session(sess);
-        +} else {
-            spin_unlock_bh(&sess->conn_lock);
-            +}

    return 0;
} else {
    pr_debug("Moving to TARG_SESS_STATE_FAILED\n");
sess->session_state = TARG_SESS_STATE_FAILED;

- if (!atomic_read(&sess->session_continuation)) {
- spin_unlock_bh(&sess->conn_lock);
+ if (!atomic_read(&sess->session_continuation))
  iscsit_start_time2retain_handler(sess);
- } else
- spin_unlock_bh(&sess->conn_lock);

- if (atomic_read(&sess->sleep_on_sess_wait_comp))
- complete(&sess->session_wait_comp);
+ if (atomic_read(&sess->session_close)) {
+ spin_unlock_bh(&sess->conn_lock);
+ complete_all(&sess->session_wait_comp);
+ iscsit_close_session(sess);
+ } else {
+ spin_unlock_bh(&sess->conn_lock);
+
return 0;
}
@@ -4370,8 +4398,7 @@
 * restart the timer and exit.
 */
 if (!in_interrupt()) {
- if (iscsit_check_session_usage_count(sess) == 1)
- iscsit_stop_session(sess, 1, 1);
+ iscsit_check_session_usage_count(sess);
 } else {
 if (iscsit_check_session_usage_count(sess) == 2) {
 atomic_set(&sess->session_logout, 0);
@@ -4435,9 +4462,9 @@
 complete(&conn->conn_logout_comp);

 iscsit_dec_conn_usage_count(conn);
+ atomic_set(&sess->session_close, 1);
 iscsit_stop_session(sess, sleep, sleep);
 iscsit_dec_session_usage_count(sess);
- iscsit_close_session(sess);
 }

 static void iscsit_logout_post_handler_samecid(
 @ @ -4572,49 +4599,6 @@
 sess->session_state = TARG_SESS_STATE_FAILED;
 }

 -int iscsit_free_session(struct iscsi_session *sess)
-{
-
- u16 conn_count = atomic_read(&sess->nconn);
- struct iscsi_conn *conn, *conn_tmp = NULL;
- int is_last;
-
- spin_lock_bh(&sess->conn_lock);
- atomic_set(&sess->sleep_on_sess_wait_comp, 1);
-
- list_for_each_entry_safe(conn, conn_tmp, &sess->sess_conn_list,
- conn_list) {
- if (conn_count == 0)
- break;
-
- if (list_is_last(&conn->conn_list, &sess->sess_conn_list)) {
- is_last = 1;
- } else {
- iscsit_inc_conn_usage_count(conn_tmp);
- is_last = 0;
- }
- iscsit_inc_conn_usage_count(conn);
-
- spin_unlock_bh(&sess->conn_lock);
- iscsit_cause_connection_reinstatement(conn, 1);
- spin_lock_bh(&sess->conn_lock);
-
- iscsit_dec_conn_usage_count(conn);
- if (is_last == 0)
- iscsit_dec_conn_usage_count(conn_tmp);
-
- conn_count--;
- }
-
- if (atomic_read(&sess->nconn)) {
- spin_unlock_bh(&sess->conn_lock);
- wait_for_completion(&sess->session_wait_comp);
- } else
- spin_unlock_bh(&sess->conn_lock);
-
- iscsit_close_session(sess);
- return 0;
-
- void iscsit_stop_session(
 struct iscsi_session *sess,
 int session_sleep,
 @ @ -4625,8 +4609,6 @@
 int is_last;

 spin_lock_bh(&sess->conn_lock);
-if (session_sleep)
-atomic_set(&sess->sleep_on_sess_wait_comp, 1);

if (connection_sleep) {
    list_for_each_entry_safe(conn, conn_tmp, &sess->sess_conn_list,
        @ @ -4684,12 +4666,15 @ @
    spin_lock(&sess->conn_lock);
    if (atomic_read(&sess->session_fall_back_to_erl0) ||
        atomic_read(&sess->session_logout) ||
        atomic_read(&sess->session_close) ||
        (sess->time2retain_timer_flags & ISCSI_TF_EXPIRED)) {
        spin_unlock(&sess->conn_lock);
        continue;
    }
    +iscsit_inc_session_usage_count(sess);
    atomic_set(&sess->session_reinstatement, 1);
    atomic_set(&sess->session_fall_back_to_erl0, 1);
    +atomic_set(&sess->session_close, 1);
    spin_unlock(&sess->conn_lock);

    list_move_tail(&se_sess->sess_list, &free_list);
        @ @ -4699,7 +4684,9 @ @
    list_for_each_entry_safe(se_sess, se_sess_tmp, &free_list, sess_list) {
        sess = (struct iscsi_session *)se_sess->fabric_sess_ptr;

        -iscsit_free_session(sess);
        +list_del_init(&se_sess->sess_list);
        +iscsit_stop_session(sess, 1, 1);
        +iscsit_dec_session_usage_count(sess);
        session_count++;
    }

--- linux-4.15.0.orig/drivers/target/iscsi/iscsi_target.h
+++ linux-4.15.0/drivers/target/iscsi/iscsi_target.h
@@ -43,7 +43,6 @@
    extern int iscsit_close_connection(struct iscsi_conn *);
    extern int iscsit_close_session(struct iscsi_session *);
    extern void iscsit_fail_session(struct iscsi_session *);
-extern int iscsit_free_session(struct iscsi_session *);
    extern void iscsit_stop_session(struct iscsi_session *, int, int);
    extern int iscsit_release_sessions_for_tpg(struct iscsi_portal_group *, int);

--- linux-4.15.0.orig/drivers/target/iscsi/iscsi_target_auth.c
+++ linux-4.15.0/drivers/target/iscsi/iscsi_target_auth.c
@@ -26,27 +26,6 @@
    #include "iscsi_target_auth.h"
    #include "iscsi_target_auth.h"
-static int chap_string_to_hex(unsigned char *dst, unsigned char *src, int len) 
-{
-int j = DIV_ROUND_UP(len, 2), rc;
-
-rc = hex2bin(dst, src, j);
-if (rc < 0)
-pr_debug("CHAP string contains non hex digit symbols\n");
-
-dst[j] = '0';
-return j;
-}
-
-static void chap_binaryhex_to_asciihex(char *dst, char *src, int src_len) 
-{
-int i;
-
-for (i = 0; i < src_len; i++) {
-sprintf(&dst[i*2], "%02x", (int) src[i] & 0xff);
-}
-}
-
static int chap_gen_challenge(
struct iscsi_conn *conn,
int caller,
@@ -62,7 +41,7 @@
ret = get_random_bytes_wait(chap->challenge, CHAP_CHALLENGE_LENGTH);
if (unlikely(ret))
return ret;
-chap_binaryhex_to_asciihex(challenge_asciihex, chap->challenge,
+bin2hex(challenge_asciihex, chap->challenge,
CHAP_CHALLENGE_LENGTH);
/*
 * Set CHAP_C, and copy the generated challenge into c_str.
@@ -99,7 +78,7 @@
if (!token)
goto out;

-if (!strncmp(token, "5", 1)) {
+if (!strcmp(token, "5")) {
-pr_debug("Selected MD5 Algorithm\n");
kfree(orig);
return CHAP_DIGEST_MD5;
@@ -110,6 +89,12 @@
return CHAP_DIGEST_UNKNOWN;
}

+static void chap_close(struct iscsi_conn *conn)
+{
static struct iscsi_chap *chap_server_open(
    struct iscsi_conn *conn,
    struct iscsi_node_auth *auth,
    case CHAP_DIGEST_UNKNOWN:
        default:
            pr_err("Unsupported CHAP_A value\n");
            -kfree(conn->auth_protocol);
            +chap_close(conn);
            return NULL;
    }

    @ @ -162,19 +147,13 @@
    * Generate Challenge.
    */
    if (chap_gen_challenge(conn, 1, aic_str, aic_len) < 0) {
        -kfree(conn->auth_protocol);
        +chap_close(conn);
        return NULL;
    }

    return chap;
}

- static void chap_close(struct iscsi_conn *conn)
- {
-     -kfree(conn->auth_protocol);
-     -conn->auth_protocol = NULL;
- }
-
- static int chap_server_compute_md5(
    struct iscsi_conn *conn,
    struct iscsi_node_auth *auth,
    @ @ -248,9 +227,16 @@
    pr_err("Could not find CHAP_R\n");
    goto out;
} +if (strlen(chap_r) != MD5_SIGNATURE_SIZE * 2) {
    +pr_err("Malformed CHAP_R\n");
    +goto out;
    +}
    +if (hex2bin(client_digest, chap_r, MD5_SIGNATURE_SIZE) < 0) {
    +pr_err("Malformed CHAP_R\n");
    +goto out;
pr_debug("[server] Got CHAP_R=%s\n", chap_r);
-chap_string_to_hex(client_digest, chap_r, strlen(chap_r));

tfm = crypto_alloc_shash("md5", 0, 0);
if (IS_ERR(tfm)) {
    pr_debug("[server] Got CHAP_R=%s\n", chap_r);
    goto out;
}

-chap_binaryhex_to_asciihex(response, server_digest, MD5_SIGNATURE_SIZE);
+bin2hex(response, server_digest, MD5_SIGNATURE_SIZE);
pr_debug("[server] MD5 Server Digest: %s\n", response);

if (memcmp(server_digest, client_digest, MD5_SIGNATURE_SIZE) != 0) {
    pr_err("Could not find CHAP_C\n");
    goto out;
}
-pr_debug("[server] Got CHAP_C=%s\n", challenge);
-challenge_len = chap_string_to_hex(challenge_binhex, challenge,
    -strlen(challenge));
+challenge_len = DIV_ROUND_UP(strlen(challenge), 2);
if (!challenge_len) {
    pr_err("Unable to convert incoming challenge\n");
    goto out;
    @ @ -360,6 +344,11 @@
    pr_err("CHAP_C exceeds maximum binary size of 1024 bytes\n");
    goto out;
}
+if (hex2bin(challenge_binhex, challenge, challenge_len) < 0) {
    +pr_err("Malformed CHAP_C\n");
    +goto out;
    +}
+pr_debug("[server] Got CHAP_C=%s\n", challenge);
/*
 * During mutual authentication, the CHAP_C generated by the
 * initiator must not match the original CHAP_C generated by
 * @ @ -413,7 +402,7 @@
 */
/*
 * Convert response from binary hex to ascii hext.
 */
-chap_binaryhex_to_asciihex(response, digest, MD5_SIGNATURE_SIZE);
+bin2hex(response, digest, MD5_SIGNATURE_SIZE);
*nr_out_len += sprintf(nr_out_ptr + *nr_out_len, "CHAP_R=0x%s",
    response);
*nr_out_len += 1;
auth_ret = 0;
out:
kzfree(desc);
crypto_free_shash(tfm);
if (tfm)
crypto_free_shash(tfm);
kfree(challenge);
kfree(challenge_binhex);
return auth_ret;

--  linux-4.15.0.orig/drivers/target/iscsi/iscsi_target_configfs.c
+++ linux-4.15.0/drivers/target/iscsi/iscsi_target_configfs.c
@@ -1503,20 +1503,23 @@
    (sess->time2retain_timer_flags & ISCSI_TF_EXPIRED)) {
        spin_unlock(&sess->conn_lock);
spin_unlock_bh(&se_tpg->session_lock);
return;
    }
+iscsit_inc_session_usage_count(sess);
atomic_set(&sess->session_reinstatement, 1);
atomic_set(&sess->session_close, 1);
spin_unlock(&sess->conn_lock);

iscsit_stop_time2retain_timer(sess);
spin_unlock_bh(&se_tpg->session_lock);

iscsit_stop_session(sess, 1, 1);
-iscsit_close_session(sess);
+iscsit_dec_session_usage_count(sess);
}

static u32 lio_tpg_get_inst_index(struct se_portal_group *se_tpg)
--- linux-4.15.0.orig/drivers/target/iscsi/iscsi_target_login.c
+++ linux-4.15.0/drivers/target/iscsi/iscsi_target_login.c
@@ -67,45 +67,10 @@
goto out_req_buf;
}

-conn->conn_ops = kzalloc(sizeof(struct iscsi_conn_ops), GFP_KERNEL);
-if (!conn->conn_ops) {
-    pr_err("Unable to allocate memory for
-" struct iscsi_conn_ops.
-"");
-goto out_rsp_buf;
}
- init_waitqueue_head(&conn->queues_wq);
- INIT_LIST_HEAD(&conn->conn_list);
- INIT_LIST_HEAD(&conn->conn_cmd_list);
- INIT_LIST_HEAD(&conn->immed_queue_list);
- INIT_LIST_HEAD(&conn->response_queue_list);
- init_completion(&conn->conn_post_wait_comp);
- init_completion(&conn->conn_wait_comp);
- init_completion(&conn->conn_wait_rcfr_comp);
- init_completion(&conn->conn_waiting_on_uc_comp);
- init_completion(&conn->conn_logout_comp);
- init_completion(&conn->rx_half_close_comp);
- init_completion(&conn->tx_half_close_comp);
- init_completion(&conn->rx_login_comp);
- spin_lock_init(&conn->cmd_lock);
- spin_lock_init(&conn->conn_usage_lock);
- spin_lock_init(&conn->immed_queue_lock);
- spin_lock_init(&conn->nopin_timer_lock);
- spin_lock_init(&conn->response_queue_lock);
- spin_lock_init(&conn->state_lock);

if (!zalloc_cpumask_var(&conn->conn_cpumask, GFP_KERNEL)) {
    pr_err("Unable to allocate conn->conn_cpumask\n");
goto out_conn_ops;
}

conn->conn_login = login;

return login;

-out_conn_ops:
-kfree(conn->conn_ops);
-out_rsp_buf:
-kfree(login->rsp_buf);
out_req_buf:
kfree(login->req_buf);
out_login:
@@ -199,6 +164,7 @@
spin_lock(&sess_p->conn_lock);
if (atomic_read(&sess_p->session_fall_back_to_erl0) ||
    atomic_read(&sess_p->session_logout) ||
    atomic_read(&sess_p->session_close) ||
+   (sess_p->time2retain_timer_flags & ISCSI_TF_EXPIRED)) {
spin_unlock(&sess_p->conn_lock);
continue;
@@ -209,6 +175,7 @@
(sess_p->sess_ops->SessionType == sessiontype))) {
    atomic_set(&sess_p->session_reinstatement, 1);
atomic_set(&sess_p->session_fall_back_to_erl0, 1);
+atomic_set(&sess_p->session_close, 1);
spin_unlock(&sess_p->conn_lock);
iscsit_inc_session_usage_count(sess_p);
iscsit_stop_time2retain_timer(sess_p);
@@ -233,7 +200,6 @@
if (sess->session_state == TARG_SESS_STATE_FAILED) {
    spin_unlock_bh(&sess->conn_lock);
    iscsi_dec_session_usage_count(sess);
    -iscsit_close_session(sess);
    return 0;
}
spin_unlock_bh(&sess->conn_lock);
@@ -241,7 +207,6 @@
iscsit_stop_session(sess, 1, 1);
iscsit_dec_session_usage_count(sess);
    -iscsit_close_session(sess);
    return 0;
}
@@ -310,11 +275,9 @@
    return -ENOMEM;
}
-ret = iscsi_login_set_conn_values(sess, conn, pdu->cid);
-if (unlikely(ret)) {
    -kfree(sess);
    -return ret;
    -}
    +if (iscsi_login_set_conn_values(sess, conn, pdu->cid))
    +goto free_sess;
    +
    sess->init_task_tag = pdu->itt;
    memcpy(&sess->isid, pdu->isid, 6);
    sess->exp_cmd_sn = be32_to_cpu(pdu->cmdsn);
    @@ -348,8 +311,7 @@
    pr_err("idr_alloc() for sess_idr failed
    iscsi_tx_login_rsp(conn, ISCSI_STATUS_CLS_TARGET_ERR,
    ISCSI_LOGIN_STATUS_NO_RESOURCES);
    -kfree(sess);
    -return -ENOMEM;
    +goto free_sess;
    }
    sess->creation_time = get_jiffies_64();
    @@ -365,20 +327,28 @@
    ISCSI_LOGIN_STATUS_NO_RESOURCES);
pr_err("Unable to allocate memory for \
" struct iscsi_sess_ops.
");
-kfree(sess);
-return -ENOMEM;
+goto remove_idr;
}

sess->se_sess = transport_init_session(TARGET_PROT_NORMAL);
if (IS_ERR(sess->se_sess)) {
  iscsit_tx_login_rsp(conn, ISCSI_STATUS_CLS_TARGET_ERR,
  ISCSI_LOGIN_STATUS_NO_RESOURCES);
  -kfree(sess->sess_ops);
  -kfree(sess);
  -return -ENOMEM;
  +goto free_ops;
}

return 0;
+
+free_ops:
+kfree(sess->sess_ops);
+remove_idr:
+spin_lock_bh(&sess_idr_lock);
+idr_remove(&sess_idr, sess->session_index);
+spin_unlock_bh(&sess_idr_lock);
+free_sess:
+kfree(sess);
+conn->sess = NULL;
+return -ENOMEM;
}

static int iscsi_login_zero_tsih_s2(
@@ -532,6 +502,7 @@
 sess_p = (struct iscsi_session *)se_sess->fabric_sess_ptr;
 if (atomic_read(&sess_p->session_fall_back_to_erl0) ||
 atomic_read(&sess_p->session_logout) ||
@@ -1150,8 +1121,77 @@
 return 0;
}

+static struct iscsi_conn *iscsit_alloc_conn(struct iscsi_np *np)
+{
+static struct iscsi_conn *conn;
+conn = kzalloc(sizeof(struct iscsi_conn), GFP_KERNEL);
+if (!conn) {
  +pr_err("Could not allocate memory for new connection\n");
  +return NULL;
+}
+pr_debug("Moving to TARG_CONN_STATE_FREE.\n");
+conn->conn_state = TARG_CONN_STATE_FREE;
+
  +init_waitqueue_head(&conn->queues_wq);
+INIT_LIST_HEAD(&conn->conn_list);
+INIT_LIST_HEAD(&conn->conn_cmd_list);
+INIT_LIST_HEAD(&conn->immed_queue_list);
+INIT_LIST_HEAD(&conn->response_queue_list);
+init_completion(&conn->conn_post_wait_comp);
+init_completion(&conn->conn_wait_comp);
+init_completion(&conn->conn_wait_rcfr_comp);
+init_completion(&conn->conn_waiting_on_uc_comp);
+init_completion(&conn->conn_logout_comp);
+init_completion(&conn->rx_half_close_comp);
+init_completion(&conn->tx_half_close_comp);
+init_completion(&conn->rx_login_comp);
+spin_lock_init(&conn->cmd_lock);
+spin_lock_init(&conn->conn_usage_lock);
+spin_lock_init(&conn->immed_queue_lock);
+spin_lock_init(&conn->nopin_timer_lock);
+spin_lock_init(&conn->response_queue_lock);
+spin_lock_init(&conn->state_lock);
+
  +timer_setup(&conn->nopin_response_timer,
  +iscsit_handle_nopin_response_timeout, 0);
+timer_setup(&conn->nopin_timer, iscsit_handle_nopin_timeout, 0);
+
  +if (iscsit_conn_set_transport(conn, np->np_transport) < 0)
  +goto free_conn;
+
  +conn->conn_ops = kzalloc(sizeof(struct iscsi_conn_ops), GFP_KERNEL);
+if (!conn->conn_ops) {
  +pr_err("Unable to allocate memory for struct iscsi_conn_ops.\n");
  +goto put_transport;
+}
+
  +if (!zalloc_cpumask_var(&conn->conn_cpumask, GFP_KERNEL)) {
  +pr_err("Unable to allocate conn->conn_cpumask\n");
  +goto free_mask;
+}
+
  +return conn;
+
+free_mask:
+free_cpumask_var(conn->conn_cpumask);
+put_transport:
+iscsit_put_transport(conn->conn_transport);
+free_conn:
+kfree(conn);
+return NULL;
+
+void iscsit_free_conn(struct iscsi_conn *conn)
+{
+free_cpumask_var(conn->conn_cpumask);
+kfree(conn->conn_ops);
+iscsit_put_transport(conn->conn_transport);
+kfree(conn);
+
}
+
void iscsi_target_login_sess_out(struct iscsi_conn *conn, 
-struct iscsi_np *np, bool zero_tsih, bool new_sess)
+bool zero_tsih, bool new_sess)
{
if (!new_sess)
goto old_sess_out;
@@ -1161,19 +1201,18 @@
ISCSI_LOGIN_STATUS_INIT_ERR);
if (!zero_tsih || !conn->sess)
goto old_sess_out;
-if (conn->sess->se_sess)
-transport_free_session(conn->sess->se_sess);
-if (conn->sess->session_index != 0) {
-spin_lock_bh(&sess_idr_lock);
-idr_remove(&sess_idr, conn->sess->session_index);
-spin_unlock_bh(&sess_idr_lock);
-}
+
transport_free_session(conn->sess->se_sess);
+
+spin_lock_bh(&sess_idr_lock);
+idr_remove(&sess_idr, conn->sess->session_index);
+spin_unlock_bh(&sess_idr_lock);
+
+kfree(conn->sess->sess_ops);
+kfree(conn->sess);
conn->sess = NULL;
old_sess_out:
-iscsi_stop_login_thread_timer(np);
/*
* If login negotiation fails check if the Time2Retain timer needs to be restarted.
@@ -1203,10 +1242,6 @@
crypto_free_ahash(tfm);
}

-free_cpumask_var(conn->conn_cpumask);
-
-kfree(conn->conn_ops);
-
-if (conn->param_list) {
  iscsi_release_param_list(conn->param_list);
  conn->param_list = NULL;
  @ @ -1224,8 +1259,7 @@
  if (conn->conn_transport->iscsit_free_conn)
    conn->conn_transport->iscsit_free_conn(conn);

  -iscsit_put_transport(conn->conn_transport);
  -kfree(conn);
  +iscsit_free_conn(conn);
}

static int __iscsi_target_login_thread(struct iscsi_np *np)
@@ -1255,31 +1289,16 @@
    &np->np_thread_lock);

    -conn = kzalloc(sizeof(struct iscsi_conn), GFP_KERNEL);
    +conn = iscsit_alloc_conn(np);
    if (!conn) {
      -pr_err("Could not allocate memory for"
      -* new connection\n");
      /* Get another socket */
      return 1;
    }
    -pr_debug("Moving to TARG_CONN_STATE_FREE.\n");
    -conn->conn_state = TARG_CONN_STATE_FREE;
    -
    -timer_setup(&conn->nopin_response_timer,
      -  iscsit_handle_nopin_response_timeout, 0);
    -timer_setup(&conn->nopin_timer, iscsit_handle_nopin_timeout, 0);
    -
    -if (iscsit_conn_set_transport(conn, np->np_transport) < 0) {
      -kfree(conn);
      -return 1;
    -}

    rc = np->np_transport->iscsit_accept_np(np, conn);
if (rc == -ENOSYS) {
    complete(&np->np_restart_comp);
    -iscsit_put_transport(conn->conn_transport);
    -kfree(conn);
    -conn = NULL;
    +iscsit_free_conn(conn);
    goto exit;
} else if (rc < 0) {
    spin_lock_bh(&np->np_thread_lock);
    @ @ -1287,17 +1306,13 @ @
    np->np_thread_state = ISCSI_NP_THREAD_ACTIVE;
    spin_unlock_bh(&np->np_thread_lock);
    complete(&np->np_restart_comp);
    -iscsit_put_transport(conn->conn_transport);
    -kfree(conn);
    -conn = NULL;
    +iscsit_free_conn(conn);
    /* Get another socket */
    return 1;
}
spin_unlock_bh(&np->np_thread_lock);
-iscsit_put_transport(conn->conn_transport);
-kfree(conn);
-conn = NULL;
+iscsit_free_conn(conn);
/* Perform the remaining iSCSI connection initialization items.. */
@@ -1437,8 +1452,9 @@
    new_sess = true;
    old_sess_out:
    +iscsi_stop_login_thread_timer(np);
    tpg_np = conn->tpg_np;
    -iscsi_target_login_sess_out(conn, np, zero_tsih, new_sess);
    +iscsi_target_login_sess_out(conn, zero_tsih, new_sess);
    new_sess = false;

    if (tpg) {
        @@ -1447,7 +1463,6 @@
        tpg_np = NULL;
    }

    -out:
    return 1;

exit:
--- linux-4.15.0.orig/drivers/target/iscsi/iscsi_target_login.h
+++ linux-4.15.0/drivers/target/iscsi/iscsi_target_login.h
@@ -19,11 +19,10 @@
 extern int iscsit_accept_np(struct iscsi_np *, struct iscsi_conn *);
 extern int iscsit_get_login_rx(struct iscsi_conn *, struct iscsi_login *);
 extern int iscsit_put_login_tx(struct iscsi_conn *, struct iscsi_login *, u32);
 extern int iscsit_free_conn(struct iscsi_conn *);
 extern int iscsit_start_kthreads(struct iscsi_conn *);
 extern void iscsit_free_conn(struct iscsi_conn *);
 extern void iscsi_post_login_handler(struct iscsi_np *, struct iscsi_conn *, u8);
 extern void iscsi_target_login_sess_out(struct iscsi_conn *, struct iscsi_np *,
				bool, bool);
 extern int iscsi_target_login_thread(void *);
 extern void iscsi_target_login_sess_out(struct iscsi_conn *, bool, bool);
 extern void iscsi_target_login_sess_out(struct iscsi_conn *, struct iscsi_np *,
				bool, bool);
 extern int iscsi_target_login_sess_out(struct iscsi_conn *, bool, bool);
 extern void iscsi_handle_login_thread_timeout(struct timer_list *t);

--- linux-4.15.0.orig/drivers/target/iscsi/iscsi_target_nego.c
+++ linux-4.15.0/drivers/target/iscsi/iscsi_target_nego.c
@@ -432,6 +432,9 @@
 if (test_and_set_bit(LOGIN_FLAGS_READ_ACTIVE, &conn->login_flags)) {
     write_unlock_bh(&sk->sk_callback_lock);
     pr_debug("Got LOGIN_FLAGS_READ_ACTIVE=1, conn: %p >>>>
@@ -551,12 +554,11 @@
 static void iscsi_target_login_drop(struct iscsi_conn *conn, struct iscsi_login *login)
 {
     struct iscsi_np *np = login->np;
-    bool zero_tsih = login->zero_tsih;
     iscsi_remove_failed_auth_entry(conn);
     iscsi_target_nego_release(conn);
-    iscsi_target_login_sess_out(conn, np, zero_tsih, true);
+    iscsi_target_login_sess_out(conn, zero_tsih, true);
     +extern void iscsi_target_login_sess_out(struct iscsi_conn *, bool, bool);
     extern void iscsi_target_login_sess_out(struct iscsi_conn *, struct iscsi_np *,
@@ -554,11 +561,11 @@
 static void iscsi_target_login_drop(struct iscsi_conn *conn, struct iscsi_login *login)
 {
     struct iscsi_np *np = login->np;
-    bool zero_tsih = login->zero_tsih;
     iscsi_remove_failed_auth_entry(conn);
     iscsi_target_nego_release(conn);
-    iscsi_target_login_sess_out(conn, np, zero_tsih, true);
+    iscsi_target_login_sess_out(conn, zero_tsih, true);
     +extern void iscsi_target_login_sess_out(struct iscsi_conn *, bool, bool);
     return;
 }
goto out;
-strncat(buf1, ",", strlen(","));
-strncat(buf1, NONE, strlen(NONE));
+strlcat(buf1, ",", NONE, sizeof(buf1));
if (iscsi_update_param_value(param, buf1) < 0)
    return -EINVAL;
}
--- linux-4.15.0.orig/drivers/target/target_core_device.c
+++ linux-4.15.0/drivers/target/target_core_device.c
@@ -85,7 +85,7 @@
goto out_unlock;
}

-se_cmd->se_lun = rcu_dereference(deve->se_lun);
+se_cmd->se_lun = se_lun;
se_cmd->pr_res_key = deve->pr_res_key;
se_cmd->orig_fe_lun = unpacked_lun;
se_cmd->se_cmd_flags |= SCF_SE_LUN_CMD;
@@ -176,7 +176,7 @@
goto out_unlock;
}

-se_cmd->se_lun = rcu_dereference(deve->se_lun);
+se_cmd->se_lun = se_lun;
se_cmd->pr_res_key = deve->pr_res_key;
se_cmd->orig_fe_lun = unpacked_lun;
se_cmd->se_cmd_flags |= SCF_SE_LUN_CMD;
@@ -904,14 +904,20 @@
EXPORT_SYMBOL(target_find_device);

struct devices_idr_iter {
    +struct config_item *prev_item;
    int (*fn)(struct se_device *dev, void *data);
    void *data;
};

static int target_devices_idr_iter(int id, void *p, void *data)
+ __must_hold(&device_mutex)
{
    struct devices_idr_iter *iter = data;
    struct se_device *dev = p;
    +int ret;
    +
    +config_item_put(iter->prev_item);
    +iter->prev_item = NULL;

    /*
     * We add the device early to the idr, so it can be used
if (!(dev->dev_flags & DF_CONFIGURED))
    return 0;

- return iter->fn(dev, iter->data);
+ iter->prev_item = config_item_get_unless_zero(&dev->dev_group.cg_item);
+ if (!iter->prev_item)
+ return 0;
+ mutex_unlock(&device_mutex);
+
+ ret = iter->fn(dev, iter->data);
+ mutex_lock(&device_mutex);
+ return ret;
}

/**
@@ -936,15 +950,13 @@
int target_for_each_device(int (*fn)(struct se_device *dev, void *data),
    void *data)
{
    struct devices_idr_iter iter = { .fn = fn, .data = data ];
    int ret;

    - iter.fn = fn;
    - iter.data = data;
    - mutex_lock(&device_mutex);
    ret = idr_for_each(&devices_idr, target_devices_idr_iter, &iter);
    mutex_unlock(&device_mutex);
    config_item_put(iter.prev_item);
    return ret;
}

@@ -1140,27 +1152,6 @@
unsigned int size;

    /*
    - * Clear a lun set in the cdb if the initiator talking to use spoke
    - * and old standards version, as we can't assume the underlying device
    - * won't choke up on it.
    - */
    - switch (cdb[0]) {
    - case READ_10: /* SBC - RDProtect */
    - case READ_12: /* SBC - RDProtect */
    - case READ_16: /* SBC - RDProtect */
    - case SEND_DIAGNOSTIC: /* SPC - SELF-TEST Code */

-case VERIFY: /* SBC - VRProtect */
-case VERIFY_16: /* SBC - VRProtect */
-case WRITE_VERIFY: /* SBC - VRProtect */
-case WRITE_VERIFY_12: /* SBC - VRProtect */
-case MAINTENANCE_IN: /* SPC - Parameter Data Format for SA RTPG */
-break;
-default:
-cdb[1] &= 0x1f; /* clear logical unit number */
-break;
-
-/*
 * For REPORT LUNS we always need to emulate the response, for everything
 * else, pass it up.
 */
-/*
--- linux-4.15.0.orig/drivers/target/target_core_fabric_lib.c
+++ linux-4.15.0/drivers/target/target_core_fabric_lib.c
@@ -76,7 +76,7 @@
 * encoded TransportID.
 */
 ptr = &se_nacl->initiatorname[0];
-for (i = 0; i < 24; ) {
 +for (i = 0; i < 23; ) {
 if (!strncmp(&ptr[i], ":", 1)) {
   i++;
 continue;
@@ -131,7 +131,7 @@
 memset(buf + 8, 0, leading_zero_bytes);
 rc = hex2bin(buf + 8 + leading_zero_bytes, p, count);
 if (rc < 0) {
-pr_debug("hex2bin failed for %s: %d\n", __func__, rc);
 +pr_debug("hex2bin failed for %s: %d\n", p, rc);
 return rc;
 }
--- linux-4.15.0.orig/drivers/target/target_core_iblock.c
+++ linux-4.15.0/drivers/target/target_core_iblock.c
@@ -427,8 +427,8 @@
{
 struct se_device *dev = cmd->se_dev;
 struct scatterlist *sg = &cmd->t_data_sg[0];
-unsigned char *buf, zero = 0x00, *p = &zero;
-int rc, ret;
+unsigned char *buf, *not_zero;
+int ret;

 buf = kmmap(sg_page(sg)) + sg->offset;
 if (!buf)
* Fall back to block_execute_write_same() slow-path if
  * incoming WRITESAME payload does not contain zeros.
* -rc = memcmp(buf, p, cmd->data_length);
  +not_zero = memchr_inv(buf, 0x00, cmd->data_length);
  +kunmap(sg_page(sg));

  -if (rc)
  +if (not_zero)
  return TCM_LOGICAL_UNIT_COMMUNICATION_FAILURE;

  ret = blkdev_issue_zeroout(bdev, target_to_linux_sector(dev, cmd->t_task_lba),
  +target_to_linux_sector(dev, sbc_get_write_same_sectors(cmd)),
  +GFP_KERNEL, false);
  +GFP_KERNEL, BLKDEV_ZERO_NOUNMAP);
  if (ret)
  return TCM_LOGICAL_UNIT_COMMUNICATION_FAILURE;

--- linux-4.15.0.orig/drivers/target/target_core_pr.c
+++ linux-4.15.0/drivers/target/target_core_pr.c
@@ -3727,11 +3727,16 @@
  * Check for overflow of 8byte PRI READ_KEYS payload and
  * next reservation key list descriptor.
  */
-  -if ((add_len + 8) > (cmd->data_length - 8))
  -break;
  -
  -put_unaligned_be64(pr_reg->pr_res_key, &buf[off]);
  -off += 8;
  +if (off + 8 <= cmd->data_length) {
  +put_unaligned_be64(pr_reg->pr_res_key, &buf[off]);
  +off += 8;
  +}
  +/*
  + * SPC5r17: 6.16.2 READ KEYS service action
  + * The ADDITIONAL LENGTH field indicates the number of bytes in
  + * the Reservation key list. The contents of the ADDITIONAL
  + * LENGTH field are not altered based on the allocation length
  + */
  add_len += 8;
  }
  spin_unlock(&dev->t10_pr.registration_lock);
unsigned char *buf;

buf = transport_kmap_data_sg(cmd);
-if (!buf)
+if (!buf) {
   /* XXX: TCM_LOGICAL_UNIT_COMMUNICATION_FAILURE */
+
}

if (cdb[0] == MODE_SENSE_10) {
   if (!buf[3] & 0x80)
   bytes = min(bytes, data_len);

   if (!bio) {
+new_bio:
      nr_vecs = min_t(int, BIO_MAX_PAGES, nr_pages);
      nr_pages -= nr_vecs;
      /*
      @ -931,6 +933,7 @@
      * be allocated with pscsi_get_bio() above.
      */
      bio = NULL;
      +goto new_bio;
   }

data_len -= bytes;
@@ -947,6 +950,14 @@

  return 0;
 fail:
+if (bio)
+bio_put(bio);
+while (req->bio) {
+bio = req->bio;
+req->bio = bio->bi_next;
+bio_put(bio);
+}
+req->biotail = NULL;
 return TCM_LOGICAL_UNIT_COMMUNICATION_FAILURE;
 }

--- linux-4.15.0.orig/drivers/target/target_core_sbc.c
+++ linux-4.15.0/drivers/target/target_core_sbc.c
@@ -38,7 +38,7 @@
 #include "target_core_alua.h"

 static sense_reason_t
-sbc_check_prot(struct se_device *, struct se_cmd *, unsigned char *, u32, bool);
+sbc_check_prot(struct se_device *, struct se_cmd *, unsigned char, u32, bool);
static sense_reason_t sbc_execute_unmap(struct se_cmd *cmd);

static sense_reason_t  
@@ -292,14 +292,14 @@
}

static sense_reason_t
-sbc_setup_write_same(struct se_cmd *cmd, unsigned char *flags, struct sbc_ops *ops)
+sbc_setup_write_same(struct se_cmd *cmd, unsigned char flags, struct sbc_ops *ops)
{  
    struct se_device *dev = cmd->se_dev;
    sector_t end_lba = dev->transport->get_blocks(dev) + 1;
    unsigned int sectors = sbc_get_write_same_sectors(cmd);
    sense_reason_t ret;

    -if ((flags[0] & 0x04) || (flags[0] & 0x02)) {  
    +if ((flags & 0x04) || (flags & 0x02)) {  
        pr_err("WRITE_SAME PBDATA and LBDATA"
    " bits not supported for Block Discard"
    " Emulation\n");
@@ -321,7 +321,7 @@
}
/* We always have ANC_SUP == 0 so setting ANCHOR is always an error */
-if (flags[0] & 0x10) {  
    +if (flags & 0x10) {  
        pr_warn("WRITE SAME with ANCHOR not supported\n");
    return TCM_INVALID_CDB_FIELD;
    }
@@ -329,7 +329,7 @@
    */
-if (flags[0] & 0x08) {  
    +if (flags & 0x08) {  
        if (!ops->execute_unmap)
    return TCM_UNSUPPORTED_SCSI_OPCODE;
@@ -344,7 +344,7 @@
    if (!ops->execute_write_same)
    return TCM_UNSUPPORTED_SCSI_OPCODE;

    -ret = sbc_check_prot(dev, cmd, &cmd->t_task_cdb[0], sectors, true);
    +ret = sbc_check_prot(dev, cmd, flags >> 5, sectors, true);
    if (ret)
    return ret;

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static sense_reason_t
sbc_check_prot(struct se_device *dev, struct se_cmd *cmd, unsigned char *cdb,
            u32 sectors, bool is_write)
{
    u8 protect = cdb[1] >> 5;
    int sp_ops = cmd->se_sess->sup_prot_ops;
    int pi_prot_type = dev->dev_attrib.pi_prot_type;
    bool fabric_prot = false;
    /* Fallthrough */
    default:
        pr_err("Unable to determine pi_prot_type for CDB: 0x%02x "
               "PROTECT: 0x%02x\n", cdb[0], protect);
    return TCM_INVALID_CDB_FIELD;
}

if (sbc_check_dpofua(dev, cmd, cdb))
    return TCM_INVALID_CDB_FIELD;

    ret = sbc_check_prot(dev, cmd, cdb, sectors, false);
+ret = sbc_check_prot(dev, cmd, cdb[1] >> 5, sectors, false);
    if (ret)
        return ret;

if (sbc_check_dpofua(dev, cmd, cdb))
    return TCM_INVALID_CDB_FIELD;

    ret = sbc_check_prot(dev, cmd, cdb, sectors, false);
+ret = sbc_check_prot(dev, cmd, cdb[1] >> 5, sectors, false);
    if (ret)
        return ret;

if (sbc_check_dpofua(dev, cmd, cdb))
    return TCM_INVALID_CDB_FIELD;

    ret = sbc_check_prot(dev, cmd, cdb, sectors, false);
+ret = sbc_check_prot(dev, cmd, cdb[1] >> 5, sectors, false);
    if (ret)
        return ret;

if (sbc_check_dpofua(dev, cmd, cdb))
    return TCM_INVALID_CDB_FIELD;

    ret = sbc_check_prot(dev, cmd, cdb, sectors, false);
+ret = sbc_check_prot(dev, cmd, cdb[1] >> 5, sectors, false);
    if (ret)
        return ret;
if (sbc_check_dpofua(dev, cmd, cdb))
return TCM_INVALID_CDB_FIELD;

if (sbc_check_dpofua(dev, cmd, cdb))
return TCM_INVALID_CDB_FIELD;

if (sbc_check_dpofua(dev, cmd, cdb))
return TCM_INVALID_CDB_FIELD;

size = sbc_get_size(cmd, 1);
cmd->t_task_lba = get_unaligned_be64(&cdb[12]);

if (sbc_check_dpofua(dev, cmd, cdb))
return TCM_INVALID_CDB_FIELD;

if (sbc_check_dpofua(dev, cmd, cdb))
return TCM_INVALID_CDB_FIELD;

* Follow sbcr26 with WRITE_SAME (10) and check for the existence
* of byte 1 bit 3 UNMAP instead of original reserved field
/*
-ret = sbc_setup_write_same(cmd, &cdb[1], ops);
+ret = sbc_setup_write_same(cmd, cdb[1], ops);
if (ret)
    return ret;
break;
--- linux-4.15.0.orig/drivers/target/target_core_spc.c
+++ linux-4.15.0/drivers/target/target_core_spc.c
@@ -108,12 +108,17 @@
    buf[7] = 0x2; /* CmdQue=1 */

-memcpy(&buf[8], "LIO-ORG ", 8);
-memset(&buf[16], 0x20, 16);
+/*
+ * ASCII data fields described as being left-aligned shall have any
+ * unused bytes at the end of the field (i.e., highest offset) and the
+ * unused bytes shall be filled with ASCII space characters (20h).
+ */
+memset(&buf[8], 0x20, 8 + 16 + 4);
+memcpy(&buf[8], "LIO-ORG", sizeof("LIO-ORG") - 1);
memcpys(&buf[16], dev->t10_wwn.model,
    min_t(size_t, strlen(dev->t10_wwn.model), 16));
+    strnlen(dev->t10_wwn.model, 16));
memcpys(&buf[32], dev->t10_wwn.revision,
    min_t(size_t, strlen(dev->t10_wwn.revision), 4));
+    strnlen(dev->t10_wwn.revision, 4));
buf[4] = 31; /* Set additional length to 31 */

return 0;
@@ -251,7 +256,9 @@
    buf[off] = 0x2; /* ASCII */
buf[off+1] = 0x1; /* T10 Vendor ID */
buf[off+2] = 0x0;
-memcpy(&buf[off+4], "LIO-ORG", 8);
+/* left align Vendor ID and pad with spaces */
+memset(&buf[off+4], 0x20, 8);
+memcpy(&buf[off+4], "LIO-ORG", sizeof("LIO-ORG") - 1);
 /* Extra Byte for NULL Terminator */
 id_len++;
 /* Identifier Length */
--- linux-4.15.0.orig/drivers/target/target_core_transport.c
+++ linux-4.15.0/drivers/target/target_core_transport.c
@@ -316,6 +316,7 @@
    \{
    const struct target_core_fabric_ops *tfo = se_tpg->se_tpg_tfo;
    unsigned char buf[PR_REG_ISID_LEN];
+    unsigned long flags;

se_sess->se_tpg = se_tpg;
se_sess->fabric_sess_ptr = fabric_sess_ptr;
@@ -352,7 +353,7 @@
se_sess->sess_bin_isid = get_unaligned_be64(&buf[0]);
}

-spin_lock_irq(&se_nacl->nacl_sess_lock);
+spin_lock_irqsave(&se_nacl->nacl_sess_lock, flags);
/**
 * The se_nacl->nacl_sess pointer will be set to the
 * last active I_T Nexus for each struct se_node_acl.
@@ -361,7 +362,7 @@
 list_add_tail(&se_sess->sess_acl_list,
               &se_nacl->acl_sess_list);
-spin_unlock_irq(&se_nacl->nacl_sess_lock);
+spin_unlock_irqrestore(&se_nacl->nacl_sess_lock, flags);
 }
 list_add_tail(&se_sess->sess_list, &se_tpg->tpg_sess_list);

@@ -2950,9 +2951,7 @@
 __releases(&cmd->t_state_lock)
 __acquires(&cmd->t_state_lock)
 {
-   -
WARN_ON_ONCE(!irqs_disabled());
+lockdep_assert_held(&cmd->t_state_lock);

if (fabric_stop)
    cmd->transport_state |= CMD_T_FABRIC_STOP;
--- linux-4.15.0.orig/drivers/target/target_core_user.c
+++ linux-4.15.0/drivers/target/target_core_user.c
@@ -88,6 +88,7 @@
#define TCMU_GLOBAL_MAX_BLOCKS (512 * 1024)

static u8 tcmu_kern_cmd_reply_supported;
+static u8 tcmu_netlink_blocked;

static struct device *tcmu_root_device;

@@ -97,9 +98,16 @@
#define TCMU_CONFIG_LEN 256

+static DEFINE_MUTEX(tcmu_nl_cmd_mutex);
+static LIST_HEAD(tcmu_nl_cmd_list);
```c
+struct tcmu_dev;
+
struct tcmu_nl_cmd {
    /* wake up thread waiting for reply */
    struct completion complete;
    struct list_head nl_list;
    struct tcmu_dev *udev;
    int cmd;
    int status;
};
@@ -144,10 +152,7 @@
    struct timer_list timeout;
    unsigned int cmd_time_out;

    -spinlock_t nl_cmd_lock;
    struct tcmu_nl_cmd curr_nl_cmd;
    /* wake up threads waiting on curr_nl_cmd */
-    wait_queue_head_t nl_cmd_wq;

    char dev_config[TCMU_CONFIG_LEN];
@@ -185,6 +190,92 @@

    static struct kmem_cache *tcmu_cmd_cache;

    +static int tcmu_get_block_netlink(char *buffer,
        +  const struct kernel_param *kp)
    +{
        +return sprintf(buffer, "%s\n", tcmu_netlink_blocked ?
            +  "blocked" : "unblocked");
        +}
    +
    +static int tcmu_set_block_netlink(const char *str,
        +  const struct kernel_param *kp)
    +{
        +int ret;
        +u8 val;
        +
        +ret = kstrtoiu8(str, 0, &val);
        +if (ret < 0)
            +return ret;
        +return -EINVAL;
        +}
```
+tcmu_netlink_blocked = val;
+return 0;
+
+static const struct kernel_param_ops tcmu_block_netlink_op = {
+.set = tcmu_set_block_netlink,
+.get = tcmu_get_block_netlink,
+};
+
+static const struct kernel_param_ops tcmu_block_netlink_op = {
+.set = tcmu_set_block_netlink,
+.get = tcmu_get_block_netlink,
+};
+
+module_param_cb(block_netlink, &tcmu_block_netlink_op, NULL, S_IWUSR | S_IRUGO);
+MODULE_PARM_DESC(block_netlink, "Block new netlink commands.");
+
+static int tcmu_fail_netlink_cmd(struct tcmu_nl_cmd *nl_cmd)
+{
+struct tcmu_dev *udev = nl_cmd->udev;
+
+if (!tcmu_netlink_blocked) {
+pr_err("Could not reset device’s netlink interface. Netlink is not blocked.\n");
+return -EBUSY;
+}
+
+if (nl_cmd->cmd != TCMU_CMD_UNSPEC) {
+pr_debug("Aborting nl cmd %d on %s\n", nl_cmd->cmd, udev->name);
+nl_cmd->status = -EINVAL;
+list_del(&nl_cmd->nl_list);
+complete(&nl_cmd->complete);
+}
+return 0;
+
+
+static int tcmu_set_reset_netlink(const char *str,
				  const struct kernel_param *kp)
+{
+struct tcmu_nl_cmd *nl_cmd, *tmp_cmd;
+int ret;
+u8 val;
+
+ret = kstrtol(str, 0, &val);
+if (ret < 0)
+return ret;
+
+if (val != 1) {
+pr_err("Invalid reset netlink value %u\n", val);
+return -EINVAL;
+}
+
+mutex_lock(&tcmu_nl_cmd_mutex);
+list_for_each_entry_safe(nl_cmd, tmp_cmd, &tcmu_nl_cmd_list, nl_list) {

+ret = tcmu_fail_netlink_cmd(nl_cmd);
+if (ret)
+break;
+}
+mutex_unlock(&tcmu_nl_cmd_mutex);
+
+return ret;
+
+static const struct kernel_param_ops tcmu_reset_netlink_op = {
+.set = tcmu_set_reset_netlink,
+};
+
+module_param_cb(reset_netlink, &tcmu_reset_netlink_op, NULL, S_IWUSR);
+MODULE_PARM_DESC(reset_netlink, "Reset netlink commands.");
+
+ /* multicast group */
+enum tcmu_multicast_groups {
+TCMU_MCGRP_CONFIG,
+}
+
+static int tcmu_genl_cmd_done(struct genl_info *info, int completed_cmd)
+{ 
+-struct se_device *dev;
+-struct tcmu_dev *udev;
+*struct tcmu_dev *udev = NULL;
+struct tcmu_nl_cmd *nl_cmd;
+int dev_id, rc, ret = 0;
+-bool is_removed = (completed_cmd == TCMU_CMD_REMOVED_DEVICE);
+
+if (!info->attrs[TCMU_ATTR_CMD_STATUS] ||
+!info->attrs[TCMU_ATTR_DEVICE_ID]) {
+@ @ -219,33 +308,37 @@
+dev_id = nla_get_u32(info->attrs[TCMU_ATTR_DEVICE_ID]);
+rc = nla_get_s32(info->attrs[TCMU_ATTR_CMD_STATUS]);
+
+-dev = target_find_device(dev_id, !is_removed);
+-if (!dev) {
+-printk(KERN_ERR "tcmu nl cmd %u/%u completion could not find device with dev id %u\n",
+- completed_cmd, rc, dev_id);
+-return -ENODEV;
+-mutex_lock(&tcmu_nl_cmd_mutex);
+-list_for_each_entry(nl_cmd, &tcmu_nl_cmd_list, nl_list) {
+-if (nl_cmd->udev->se_dev.dev_index == dev_id) {
+udev = nl_cmd->udev;
+break;
+}
+}
-udev = TCMU_DEV(dev);

-spin_lock(&udev->nl_cmd_lock);
-nl_cmd = &udev->curr_nl_cmd;
+if (!udev) {
  +pr_err(KERN_ERR "tcmu nl cmd %u/%d completion could not find device with dev id %u.
", completed_cmd, rc, dev_id);
  +ret = -ENODEV;
  +goto unlock;
+}
+list_del(&nl_cmd->nl_list);

-pr_debug("genl cmd done got id %d curr %d done %d rc %d\n", dev_id, nl_cmd->cmd, completed_cmd, rc);
+pr_debug("%s genl cmd done got id %d curr %d done %d rc %d stat %d\n", udev->name, dev_id, nl_cmd->cmd, completed_cmd, rc, nl_cmd->status);

if (nl_cmd->cmd != completed_cmd) {
-pr_err(KERN_ERR "Mismatched commands (Expecting reply for %d. Current %d).\n", completed_cmd, nl_cmd->cmd);
+pr_err("Mismatched commands on %s (Expecting reply for %d. Current %d).\n", udev->name, completed_cmd, nl_cmd->cmd);
  ret = -EINVAL;
} else {
  -nl_cmd->status = rc;
  +goto unlock;
}

-spin_unlock(&udev->nl_cmd_lock);
-if (!is_removed)
  -target_undepend_item(&dev->dev_group.cg_item);
  -if (!ret)
    -complete(&nl_cmd->complete);
    +nl_cmd->status = rc;
    +complete(&nl_cmd->complete);
    +unlock:
    +mutex_unlock(&tcmu_nl_cmd_mutex);
    return ret;
}

@@ -528,15 +621,17 @@
void *from, *to = NULL;
size_t copy_bytes, to_offset, offset;
struct scatterlist *sg;
-struct page *page;
+struct page *page = NULL;

@@ -528,15 +621,17 @@
void *from, *to = NULL;
size_t copy_bytes, to_offset, offset;
struct scatterlist *sg;
-struct page *page;
+struct page *page = NULL;

for_each_sg(data_sg, sg, data_nents, i) {
    int sg_remaining = sg->length;
    from = kmap_atomic(sg_page(sg)) + sg->offset;
    while (sg_remaining > 0) {
        if (block_remaining == 0) {
            if (to)
                +if (to) {
                    +flush_dcache_page(page);
                    kunmap_atomic(to);
                +}
        } else {
            memcpy(to + offset, from + sg->length - sg_remaining, copy_bytes);
        -tcmu_flush_dcache_range(to, copy_bytes);
        }
        sg_remaining -= copy_bytes;
        block_remaining -= copy_bytes;
    }
    kunmap_atomic(from - sg->offset);
    }
    -if (to)
    +if (to) {
        +flush_dcache_page(page);
        kunmap_atomic(to);
    +}

    return 0;
}
@@ -618,11 +714,11 @@
dbi = tcmu_cmd_get_dbi(cmd);
 page = tcmu_get_block_page(udev, dbi);
 from = kmap_atomic(page);
 +flush_dcache_page(page);
 }
 copy_bytes = min_t(size_t, sg_remaining, block_remaining);
 offset = DATA_BLOCK_SIZE - block_remaining;
 -tcmu_flush_dcache_range(from, copy_bytes);
-memcpy(to + sg->length - sg_remaining, from + offset, copy_bytes);
@@ -805,6 +901,13 @@
 int ret;
 DEFINE_WAIT(__wait);
+/*
+ * Don't leave commands partially setup because the unmap
+ * thread might need the blocks to make forward progress.
+ */
+tcmu_cmd_free_data(tcmu_cmd, tcmu_cmd->dbi_cur);
tcmu_cmd_reset_dbi_cur(tcmu_cmd);
+
prepare_to_wait(&udev->wait_cmdr, &__wait, TASK_INTERRUPTIBLE);

pr_debug("sleeping for ring space\n");
entry->hdr.cmd_id = 0; /* not used for PAD */
entry->hdr.kflags = 0;
entry->hdr.uflags = 0;
-tcmu_flush_dcache_range(entry, sizeof(*entry));
+tcmu_flush_dcache_range(entry, sizeof(entry->hdr));

UPDATE_HEAD(mb->cmd_head, pad_size, udev->cmdr_size);
tcmu_flush_dcache_range(mb, sizeof(*mb));
cdb_off = CMDR_OFF + cmd_head + base_command_size;
memcpy((void *) mb + cdb_off, se_cmd->t_task_cdb, scsi_command_size(se_cmd->t_task_cdb));
entry->req.cdb_off = cdb_off;
-tcmu_flush_dcache_range(entry, sizeof(*entry));
+tcmu_flush_dcache_range(entry, command_size);

UPDATE_HEAD(mb->cmd_head, command_size, udev->cmdr_size);
tcmu_flush_dcache_range(mb, sizeof(*mb));

tcmu_free_cmd(cmd);
}

-static unsigned int tcmu_handle_completions(struct tcmu_dev *udev)
+static bool tcmu_handle_completions(struct tcmu_dev *udev)
{
struct tcmu_mailbox *mb;
int handled = 0;

cmdb_off = CMDR_OFF + cmd_head + base_command_size;
memcpy((void *) mb + cdb_off, se_cmd->t_task_cdb, scsi_command_size(se_cmd->t_task_cdb));
entry->req.cdb_off = cdb_off;
-tcmu_flush_dcache_range(entry, sizeof(*entry));
+tcmu_flush_dcache_range(entry, command_size);

UPDATE_HEAD(mb->cmd_head, command_size, udev->cmdr_size);
tcmu_flush_dcache_range(mb, sizeof(*mb));
+ udev->cmdr_size);  
+ tcmu_flush_dcache_range(entry, ring_left < sizeof(*entry) ?  
+ ring_left : sizeof(*entry));

if (tcmu_hdr_get_op(entry->hdr.len_op) == TCMU_OP_PAD) {
  UPDATE_HEAD(udev->cmdr_last_cleaned,  
  @@ -1018,7 +1128,7 @@
  if (!cmd) {  
    pr_err("cmd_id not found, ring is broken\n");  
    set_bit(TCMU_DEV_BIT_BROKEN, &udev->flags);  
    -break;
    +return false;
  }
}
tcmu_handle_completion(cmd, entry);
@@ -1119,9 +1229,6 @@
  timer_setup(&udev->timeout, tcmu_device_timedout, 0);

  -init_waitqueue_head(&udev->nl_cmd_wq);
  -spin_lock_init(&udev->nl_cmd_lock);
  -
  INIT_RADIX_TREE(&udev->data_blocks, GFP_KERNEL);

  return &udev->se_dev;
@@ -1356,38 +1463,48 @@
  return 0;
}

  -static void tcmu_init_genl_cmd_reply(struct tcmu_dev *udev, int cmd)
  +static int tcmu_init_genl_cmd_reply(struct tcmu_dev *udev, int cmd)
  {
    struct tcmu_nl_cmd *nl_cmd = &udev->curr_nl_cmd;

    if (tcmu_kern_cmd_reply_supported)  
      -return;
    +return 0;

    if (udev->nl_reply_supported <= 0)  
      -return;
    +return 0;

    -relock:
    -spin_lock(&udev->nl_cmd_lock);
    +mutex_lock(&tcmu_nl_cmd_mutex);
    +
    +if (tcmu_netlink_blocked) {
    +mutex_unlock(&tcmu_nl_cmd_mutex);
if (nl_cmd->cmd != TCMU_CMD_UNSPEC) {
    spin_unlock(&udev->nl_cmd_lock);
    pr_debug("sleeping for open nl cmd\n");
    wait_event(udev->nl_cmd_wq, (nl_cmd->cmd == TCMU_CMD_UNSPEC));
    goto relock;
}

memset(nl_cmd, 0, sizeof(*nl_cmd));
nl_cmd->cmd = cmd;
+nl_cmd->udev = udev;
init_completion(&nl_cmd->complete);
+INIT_LIST_HEAD(&nl_cmd->nl_list);

-spin_unlock(&udev->nl_cmd_lock);
+list_add_tail(&nl_cmd->nl_list, &tcmu_nl_cmd_list);
+mutex_unlock(&tcmu_nl_cmd_mutex);
+return 0;
}

static int tcmu_wait_genl_cmd_reply(struct tcmu_dev *udev) {
    struct tcmu_nl_cmd *nl_cmd = &udev->curr_nl_cmd;
    int ret;

    if (!tcmu_kern_cmd_reply_supported)
        return 0;
    pr_debug("sleeping for nl reply\n");
    wait_for_completion(&nl_cmd->complete);

-spin_lock(&udev->nl_cmd_lock);
+mutex_lock(&tcmu_nl_cmd_mutex);
    nl_cmd->cmd = TCMU_CMD_UNSPEC;
    ret = nl_cmd->status;
    -nl_cmd->status = 0;
-spin_unlock(&udev->nl_cmd_lock);
+mutex_unlock(&tcmu_nl_cmd_mutex);
+return -EBUSY;
}
- wake_up_all(&udev->nl_cmd_wq);
-
- return ret;
+ return ret;
}

static int tcmu_netlink_event(struct tcmu_dev *udev, enum tcmu_genl_cmd cmd,
@@ -1460,7 +1574,11 @@
genlmsg_end(skb, msg_header);

- tcmu_init_genl_cmd_reply(udev, cmd);
+ ret = tcmu_init_genl_cmd_reply(udev, cmd);
+ if (ret) {
+ nlmsg_free(skb);
+ return ret;
+ }

 ret = genlmsg_multicast_allns(&tcmu_genl_family, skb, 0,
 TCMU_MCGRP_CONFIG, GFP_KERNEL);
--- linux-4.15.0.orig/drivers/target/target_core_xcopy.c
+++ linux-4.15.0/drivers/target/target_core_xcopy.c
@@ -55,60 +55,83 @@
 return 0;
 }

- struct xcopy_dev_search_info {
- const unsigned char *dev_wwn;
- struct se_device *found_dev;
- }
- 
- /**
- * target_xcopy_locate_se_dev_e4_iter - compare XCOPY NAA device identifiers
- *
- * @se_dev: device being considered for match
- * @dev_wwn: XCOPY requested NAA dev_wwn
- * @return: 1 on match, 0 on no-match
- */
- static int target_xcopy_locate_se_dev_e4_iter(struct se_device *se_dev,
- 						void *data)
- {
- const unsigned char *dev_wwn)
- }

- struct xcopy_dev_search_info *info = data;

 unsigned char tmp_dev_wwn[XCOPY_NAA_IEEE_REGEX_LEN];
 int rc;

- if (!se_dev->dev_attrib emulate_3pc)
+if (!se_dev->dev_attrib.emulate_3pc) {
+pr_debug("XCOPY: emulate_3pc disabled on se_dev %p\n", se_dev);
+return 0;
+
(memset(&tmp_dev_wwn[0], 0, XCOPY_NAA_IEEE_REGEX_LEN);
target_xcopy_gen_naa_ieee(se_dev, &tmp_dev_wwn[0]);

-rc = memcmp(&tmp_dev_wwn[0], info->dev_wwn, XCOPY_NAA_IEEE_REGEX_LEN);
-if (rc != 0)
-return 0;
-
-info->found_dev = se_dev;
-pr_debug("XCOPY 0xe4: located se_dev: %p\n", se_dev);
-
-rc = target_depend_item(&se_dev->dev_group.cg_item);
+rc = memcmp(&tmp_dev_wwn[0], dev_wwn, XCOPY_NAA_IEEE_REGEX_LEN);
-if (rc != 0) { 
-pr_err("configfs_depend_item attempt failed: %d for se_dev: %p\n", 
- rc, se_dev);
-return rc;
+
+pr_debug("XCOPY: skip non-matching: %*ph\n", 
+ XCOPY_NAA_IEEE_REGEX_LEN, tmp_dev_wwn);
+return 0;
+}
+pr_debug("XCOPY 0xe4: located se_dev: %p\n", se_dev);

-pr_debug("Called configfs_depend_item for se_dev: %p se_dev->se_dev_group: %p\n", 
- se_dev, &se_dev->dev_group);
-return 1;
+
-static int target_xcopy_locate_se_dev_e4(const unsigned char *dev_wwn,
-struct se_device **found_dev)
+static int target_xcopy_locate_se_dev_e4(struct se_session *sess,
+const unsigned char *dev_wwn,
+struct se_device **found_dev,
+struct percpu_ref **_found_lun_ref)
{
-struct xcopy_dev_search_info info;
-int ret;
-
-memset(&info, 0, sizeof(info));
-info.dev_wwn = dev_wwn;
-
-ret = target_for_each_device(target_xcopy_locate_se_dev_e4_iter, &info);
-if (ret == 1) {
-*found_dev = info.found_dev;
return 0;
} else {
    pr_debug_ratelimited("Unable to locate 0xe4 descriptor for EXTENDED_COPY\n");
    return -EINVAL;
}

+struct se_dev_entry *deve;
+struct se_node_acl *nacl;
+struct se_lun *this_lun = NULL;
+struct se_device *found_dev = NULL;
+
+/* cmd with NULL sess indicates no associated $FABRIC_MOD */
+if (!sess)
+    goto err_out;
+
+    /* XCOPY 0xe4: searching for: %*ph\n", 
+    XCOPY_NAA_IEEE_REGEX_LEN, dev_wwn);
+
+    nacl = sess->se_node_acl;
+    rcu_read_lock();
+    hlist_for_each_entry_rcu(deve, &nacl->lun_entry_hlist, link) {
+        struct se_device *this_dev;
+        int rc;
+        
+        this_lun = rcu_dereference(deve->se_lun);
+        this_dev = rcu_dereference_raw(this_lun->lun_se_dev);
+        
+        rc = target_xcopy_locate_se_dev_e4_iter(this_dev, dev_wwn);
+        if (rc) {
+            if (percpu_ref_tryget_live(&this_lun->lun_ref))
+                found_dev = this_dev;
+            break;
+        }
+    }
+    rcu_read_unlock();
+    if (found_dev == NULL)
+        goto err_out;
+
+    pr_debug("lun_ref held for se_dev: %p se_dev->se_dev_group: %p\n",
+        found_dev, &found_dev->dev_group);
+    +found_dev, &found_dev->dev_group);
+    +found_dev = found_dev;
+    +found_lun_ref = &this_lun->lun_ref;
+    +return 0;
+err_out:
+    pr_debug_ratelimited("Unable to locate 0xe4 descriptor for EXTENDED_COPY\n");
+    return -EINVAL;
}

static int target_xcopy_parse_tiddesc_e4(struct se_cmd *se_cmd, struct xcopy_op *xop,
@@ -255,12 +278,16 @@
switch (xop->op_origin) {  
case XCOL_SOURCE_RECV_OP:  
-rc = target_xcopy_locate_se_dev_e4(xop->dst_tid_wwn,  
-&xop->dst_dev);  
+rc = target_xcopy_locate_se_dev_e4(se_cmd->se_sess,  
+xop->dst_tid_wwn,  
+&xop->dst_dev,  
+&xop->remote_lun_ref);  
break;  
case XCOL_DEST_RECV_OP:  
-rc = target_xcopy_locate_se_dev_e4(xop->src_tid_wwn,  
-&xop->src_dev);  
+rc = target_xcopy_locate_se_dev_e4(se_cmd->se_sess,  
+xop->src_tid_wwn,  
+&xop->src_dev,  
+&xop->remote_lun_ref);  
break;  
default:  
pr_err("XCOPY CSCD descriptor IDs not found in CSCD list - ")  
@@ -412,18 +439,12 @@

static void xcopy_pt_undepend_remotedev(struct xcopy_op *xop)  
{  
-struct se_device *remote_dev;  
-  
if (xop->op_origin == XCOL_SOURCE_RECV_OP)  
-remote_dev = xop->dst_dev;  
+pr_debug("putting dst lun_ref for %p\n", xop->dst_dev);  
else  
-remote_dev = xop->src_dev;  
-  
-pr_debug("Calling configfs_undepend_item for"  
-"remote_dev: %p remote_dev->dev_group: %p\n",  
-remote_dev, &remote_dev->dev_group.cg_item);  
+pr_debug("putting src lun_ref for %p\n", xop->src_dev);  

-target_undepend_item(&remote_dev->dev_group.cg_item);  
+percpu_ref_put(xop->remote_lun_ref);  
}  

static void xcopy_pt_release_cmd(struct se_cmd *se_cmd)  
--- linux-4.15.0.orig/drivers/target/target_core_xcopy.h  
+++ linux-4.15.0/drivers/target/target_core_xcopy.h  
@@ -29,6 +29,7 @@
struct se_device *dst_dev;  
unsigned char dst_tid_wwn[XCOPY_NAA_IEEE_REGEX_LEN];  
unsigned char local_dev_wwn[XCOPY_NAA_IEEE_REGEX_LEN];  


struct percpu_ref *remote_lun_ref;

sector_t src_lba;
sector_t dst_lba;
--- linux-4.15.0.orig/drivers/tc/tc.c
+++ linux-4.15.0/drivers/tc/tc.c
@@ -2,7 +2,7 @@
 * TURBOchannel bus services.
 *
 * Copyright (c) Harald Koerfgen, 1998
- * Copyright (c) 2001, 2003, 2005, 2006  Maciej W. Rozycki
+ * Copyright (c) 2001, 2003, 2005, 2006, 2018  Maciej W. Rozycki
 * Copyright (c) 2005  James Simmons
 *
 * This file is subject to the terms and conditions of the GNU
 @@ -10,6 +10,7 @@
 * directory of this archive for more details.
 */
#include <linux/compiler.h>
+#include <linux/dma-mapping.h>
#include <linux/errno.h>
#include <linux/init.h>
#include <linux/ioport.h>
@@ -92,6 +93,11 @@
tdev->dev.bus = &tc_bus_type;
tdev->slot = slot;

+/* TURBOchannel has 34-bit DMA addressing (16GiB space). */
+tdev->dma_mask = DMA_BIT_MASK(34);
+tdev->dev.dma_mask = &tdev->dma_mask;
+tdev->coherent_dma_mask = DMA_BIT_MASK(34);
+
 for (i = 0; i < 8; i++) {
 tdev->firmware[i] =
 readb(module + offset + TC_FIRM_VER + 4 * i);
--- linux-4.15.0.orig/drivers/tee/optee/Kconfig
+++ linux-4.15.0/drivers/tee/optee/Kconfig
@@ -2,6 +2,7 @@
 config OPTEE
 tristate "OP-TEE"
 depends on HAVE_ARM_SMCCC
+depends on MMU
 help
 This implements the OP-TEE Trusted Execution Environment (TEE)
 driver.
--- linux-4.15.0.orig/drivers/tee/optee/core.c
+++ linux-4.15.0/drivers/tee/optee/core.c
@@ -86,16 +86,6 @@
return rc;
p->u.memref.shm_offs = mp->u.tmem.buf_ptr - pa;
p->u.memref.shm = shm;
-
-/* Check that the memref is covered by the shm object */
-if (p->u.memref.size) {
- size_t o = p->u.memref.shm_offs +
- p->u.memref.size - 1;
-
-rc = tee_shm_get_pa(shm, o, NULL);
-if (rc)
- return rc;
-}
break;
default:
return -EINVAL;
@@ -590,8 +580,10 @@
return -ENODEV;
np = of_find_matching_node(fw_np, optee_match);
-if (!np)
+if (!np || !of_device_is_available(np)) {
+ of_node_put(np);
return -ENODEV;
+}
optee = optee_probe(np);
of_node_put(np);
--- linux-4.15.0.orig/drivers/tee/tee_core.c
+++ linux-4.15.0/drivers/tee/tee_core.c
@@ -181,6 +181,17 @@
if (IS_ERR(shm))
return PTR_ERR(shm);
+
+ /* Ensure offset + size does not overflow offset
+ * and does not overflow the size of the referred
+ * shared memory object.
+ */
+if ((ip.a + ip.b) < ip.a ||
+ (ip.a + ip.b) > shm->size) {
+tee_shm_put(shm);
+return -EINVAL;
+}
+
+params[n].u.memref.shm_offs = ip.a;
params[n].u.memref.size = ip.b;
params[n].u.memref.shm = shm;
--- linux-4.15.0.orig/drivers/tee/tee_shm.c
+++ linux-4.15.0/drivers/tee/tee_shm.c
@@ -203,9 +203,10 @@
 if ((shm->flags & req_flags) != req_flags)
     return -EINVAL;
+
     get_dma_buf(shm->dmabuf);
 fd = dma_buf_fd(shm->dmabuf, O_CLOEXEC);
-    if (fd >= 0)
-        get_dma_buf(shm->dmabuf);
+    if (fd < 0)
+        dma_buf_put(shm->dmabuf);
 return fd;
 }

--- linux-4.15.0.orig/drivers/thermal/broadcom/bcm2835_thermal.c
+++ linux-4.15.0/drivers/thermal/broadcom/bcm2835_thermal.c
@@ -27,6 +27,8 @@
 #include <linux/platform_device.h>
 #include <linux/thermal.h>
+
 #include "../thermal_hwmon.h"
 +
 #define BCM2835_TS_TSENSCTL			0x00
 #define BCM2835_TS_TSENSSTAT			0x04
 @@ -126,8 +128,7 @@
 static void bcm2835_thermal_debugfs(struct platform_device *pdev)
 {
-    struct thermal_zone_device *tz = platform_get_drvdata(pdev);
-    struct bcm2835_thermal_data *data = tz->devdata;
+    struct bcm2835_thermal_data *data = platform_get_drvdata(pdev);
     struct debugfs_regset32 *regset;
     data->debugfsdir = debugfs_create_dir("bcm2835_thermal", NULL);
     rate = clk_get_rate(data->clk);
     if ((rate < 1920000) || (rate > 5000000))
         dev_warn(&pdev->dev,
-          "Clock %pCn running at %pCr Hz is outside of the recommended range: 1.92 to 5MHz\n",
-          data->clk, data->clk);
+          "Clock %pCn running at %lu Hz is outside of the recommended range: 1.92 to 5MHz\n",
+          data->clk, rate);
 
     /* register of thermal sensor and get info from DT */
     tz = thermal_zone_of_sensor_register(&pdev->dev, 0, data,
@@ -273,7 +274,16 @@
data->tz = tz;

-platformat_set_drvdata(pdev, tz);
+platform_set_drvdata(pdev, data);
+
+/*
+ * Thermal zone doesn't enable hwmon as default,
+ * enable it here
+ */
+tz->tzp->no_hwmon = false;
+err = thermal_add_hwmon_sysfs(tz);
+if (err)
+goto err_tz;
+bcm2835_thermal_debugfs(pdev);

@@ -288,8 +298,8 @@
static int bcm2835_thermal_remove(struct platform_device *pdev)
 {
-struct thermal_zone_device *tz = platform_get_drvdata(pdev);
-struct bcm2835_thermal_data *data = tz->devdata;
+struct bcm2835_thermal_data *data = platform_get_drvdata(pdev);
+struct thermal_zone_device *tz = data->tz;

debugfs_remove_recursive(data->debugfsdir);
thermal_zone_of_sensor_unregister(&pdev->dev, tz);
--- linux-4.15.0.orig/drivers/thermal/broadcom/brcmbstm Thermal.c
+++ linux-4.15.0/drivers/thermal/broadcom/brcmbstm Thermal.c
@@ -58,7 +58,7 @@
 #define AVS_TMON_TP_TEST_ENABLE	0x20
 /* Default coefficients */
-#define AVS_TMON_TEMP_SLOPE	-487
+#define AVS_TMON_TEMP_SLOPE	487
 #define AVS_TMON_TEMP_OFFSET	410040
/* HW related temperature constants */
@@ -117,23 +117,12 @@
struct thermal_zone_device *thermal;
};

-static void avs_tmon_get_coeffs(struct thermal_zone_device *tz, int *slope,
- int *offset)
-{
- *slope = thermal_zone_get_slope(tz);
-*offset = thermal_zone_get_offset(tz);
/* Convert a HW code to a temperature reading (millidegree celsius) */
static inline int avs_tmon_code_to_temp(struct thermal_zone_device *tz,
    u32 code)
{
    int val = code & AVS_TMON_TEMP_MASK;
    int slope, offset;

    avs_tmon_get_coeffs(tz, &slope, &offset);

    return slope * val + offset;
+ return (AVS_TMON_TEMP_OFFSET -
+ (int)((code & AVS_TMON_TEMP_MAX) * AVS_TMON_TEMP_SLOPE));
}

static inline u32 avs_tmon_temp_to_code(struct thermal_zone_device *tz,
    int temp, bool low)
{
    int slope, offset;

    if (temp < AVS_TMON_TEMP_MIN)
        return AVS_TMON_TEMP_MAX; /* Maximum code value */

    avs_tmon_get_coeffs(tz, &slope, &offset);

    if (temp >= offset)
        return 0; /* Minimum code value */
    else
        return (u32)((AVS_TMON_TEMP_OFFSET - temp) / AVS_TMON_TEMP_SLOPE);
}

static int brcmstb_get_temp(void *data, int *temp)
--- linux-4.15.0.orig/drivers/thermal/cpu_cooling.c
+++ linux-4.15.0/drivers/thermal/cpu_cooling.c
@@ -280,11 +280,11 @@
    int i;

    i;
struct freq_table *freq_table = cpufreq_cdev->freq_table;

- for (i = 1; i <= cpufreq_cdev->max_level; i++)
- if (power > freq_table[i].power)
+ for (i = 0; i < cpufreq_cdev->max_level; i++)
+ if (power >= freq_table[i].power)
    break;

- return freq_table[i - 1].frequency;
+ return freq_table[i].frequency;

/**
 @ @ -514,7 +514,7 @ @
 load = 0;

total_load += load;
- if (trace_thermal_power_cpu_limit_enabled() && load_cpu)
+ if (load_cpu)
    load_cpu[i] = load;

i++;
--- linux-4.15.0.orig/drivers/thermal/da9062-thermal.c
+++ linux-4.15.0/drivers/thermal/da9062-thermal.c
@@ -106,7 +106,7 @@
 THERMAL_EVENT_UNSPECIFIED);

delay = msecs_to_jiffies(thermal->zone->passive_delay);
- schedule_delayed_work(&thermal->work, delay);
+ queue_delayed_work(system_freezable_wq, &thermal->work, delay);
 return;
 }

@@ -125,7 +125,7 @@
 struct da9062_thermal *thermal = data;

disable_irq_nosync(thermal->irq);
- schedule_delayed_work(&thermal->work, 0);
+ queue_delayed_work(system_freezable_wq, &thermal->work, 0);

 return IRQ_HANDLED;
 }
--- linux-4.15.0.orig/drivers/thermal/fair_share.c
+++ linux-4.15.0/drivers/thermal/fair_share.c
@@ -94,6 +94,8 @@
 int total_instance = 0;
 int cur_trip_level = get_trip_level(tz);
mutex_lock(&tz->lock);
+
list_for_each_entry(instance, &tz->thermal_instances, tz_node) {
    if (instance->trip != trip)
        continue;
@@ -122,6 +124,8 @@
    mutex_unlock(&instance->cdev->lock);
    thermal_cdev_update(cdev);
}
+    mutex_unlock(&tz->lock);
return 0;
}

--- linux-4.15.0.orig/drivers/thermal/hisi_thermal.c
+++ linux-4.15.0/drivers/thermal/hisi_thermal.c
@@ -527,7 +527,7 @@
static int hisi_thermal_probe(struct platform_device *pdev)
{
    struct hisi_thermal_data *data;
    -int const (*platform_probe)(struct hisi_thermal_data *);
    +int (*platform_probe)(struct hisi_thermal_data *);
    struct device *dev = &pdev->dev;
    int ret;

--- linux-4.15.0.orig/drivers/thermal/imx_thermal.c
+++ linux-4.15.0/drivers/thermal/imx_thermal.c
@@ -465,7 +465,10 @@
    ret = nvmem_cell_read_u32(&pdev->dev, "calib", &val);
    if (ret)
        return ret;
    -imx_init_calib(pdev, val);
    +
    +ret = imx_init_calib(pdev, val);
    +if (ret)
    +return ret;

    ret = nvmem_cell_read_u32(&pdev->dev, "temp_grade", &val);
    if (ret)
        ret = devm_request_threaded_irq(&pdev->dev, data->irq,
        imx_thermal_alarm_irq, imx_thermal_alarm_irq_thread,
0, "imx_thermal", data);
@@ -657,9 +663,6 @@
    return ret;
-    data->irq_enabled = true;
    data->mode = THERMAL_DEVICE_ENABLED;
-
    return 0;
}

--- linux-4.15.0.orig/drivers/thermal/int340x_thermal/int3400_thermal.c
+++ linux-4.15.0/drivers/thermal/int340x_thermal/int3400_thermal.c
@@ -22,6 +22,13 @@
    INT3400_THERMAL_PASSIVE_1,
    INT3400_THERMAL_ACTIVE,
    INT3400_THERMAL_CRITICAL,
+    INT3400_THERMAL_ADAPTIVE_PERFORMANCE,
+    INT3400_THERMAL_EMERGENCY_CALL_MODE,
+    INT3400_THERMAL_PASSIVE_2,
+    INT3400_THERMAL_POWER_BOSS,
+    INT3400_THERMAL_VIRTUAL_SENSOR,
+    INT3400_THERMAL_COOLING_MODE,
+    INT3400_THERMAL_HARDWARE_DUTY_CYCLING,
    INT3400_THERMAL_MAXIMUM_UUID,
};

@@ -29,6 +36,13 @@
    "42A441D6-AE6A-462b-A84B-4A8CE79027D3",
    "3A95C389-E4B8-4629-A526-C52C88626BAE",
    "97C68AE7-1F5A-499c-B8C9-5DA81D606E0A",
+    "63BE270F-1C11-48FD-A6F7-3AF253FF3E2D",
+    "5349962F-71E6-431D-9A8E-0A635B710AEE",
+    "9E04115A-AE87-4D1C-9500-0F3E340BFE75",
+    "F5A35014-C209-46A4-993A-EB56DE7530A1",
+    "6ED722A7-9240-48A5-B479-31EE723D7CF",
+    "16CAF1B7-DD38-40ED-B1C1-1B8A1913D531",
+    "BE84BABF-C4D4-403D-B495-3128FD44dAC1",
    ]);

struct int3400_thermal_priv {
@@ -302,10 +316,9 @@
    platform_set_drvdata(pdev, priv);

    if (priv->uuid_bitmap & 1 << INT3400_THERMAL_PASSIVE_1) {
-        int3400_thermal_ops.get_mode = int3400_thermal_get_mode;
-        int3400_thermal_ops.set_mode = int3400_thermal_set_mode;

+int3400_thermal_ops.get_mode = int3400_thermal_get_mode;
+int3400_thermal_ops.set_mode = int3400_thermal_set_mode;

priv->thermal = thermal_zone_device_register("INT3400 Thermal", 0, 0,
priv, &int3400_thermal_ops,
&int3400_thermal_params, 0, 0);
@@ -319,17 +332,21 @@
result = sysfs_create_group(&pdev->dev.kobj, &uuid_attribute_group);
if (result)
-goto free_zone;
+goto free_rel_misc;

result = acpi_install_notify_handler(
priv->adev->handle, ACPI_DEVICE_NOTIFY, int3400_notify,
(void *)priv);
if (result)
-goto free_zone;
+goto free_sysfs;

return 0;

-free_zone:
+free_sysfs:
+sysfs_remove_group(&pdev->dev.kobj, &uuid_attribute_group);
+free_rel_misc:
+if (!priv->rel_misc_dev_res)
+acpi_thermal_rel_misc_device_remove(priv->adev->handle);
thermal_zone_device_unregister(priv->thermal);
free_art_trt:
kfree(priv->trts);
--- linux-4.15.0.orig/drivers/thermal/int340x_thermal/int3403_thermal.c
+++ linux-4.15.0/drivers/thermal/int340x_thermal/int3403_thermal.c
@@ -194,6 +194,7 @@
return -EFAULT;
}

+priv->priv = obj;
obj->max_state = p->package.count - 1;
obj->cdev =
thermal_cooling_device_register(acpi_device_bid(priv->adev),
@@ -201,8 +202,6 @@
if (IS_ERR(obj->cdev))
result = PTR_ERR(obj->cdev);

-priv->priv = obj;
-
kfree(buf.pointer);
/* TODO: add ACPI notification support */

--- linux-4.15.0.orig/drivers/thermal/int340x_thermal/processor_thermal_device.c
+++ linux-4.15.0/drivers/thermal/int340x_thermal/processor_thermal_device.c
@@ -43,6 +43,9 @@
#define PCI_DEVICE_ID_PROC_BXTX_THERMAL 0x4A8C
#define PCI_DEVICE_ID_PROC_BXTP_THERMAL 0x5A8C

+/* GeminiLake thermal reporting device */
+#define PCI_DEVICE_ID_PROC_GLK_THERMAL 0x318C
+
struct power_config {
    u32 index;
    u32 min_uw;
@@ -81,7 +84,12 @@
    struct pci_dev *pci_dev;
    struct platform_device *pdev;
    struct proc_thermal_device *proc_dev;
-    
+    
+    if (proc_thermal_emum_mode == PROC_THERMAL_NONE) {
+        dev_warn(dev, "Attempted to get power limit before device was initialized!\n" );
+        return 0;
+    }
+    
+    if (proc_thermal_emum_mode == PROC_THERMAL_PLATFORM_DEV) {
        pdev = to_platform_device(dev);
        proc_dev = platform_get_drvdata(pdev);
@@ -266,7 +274,7 @@
            THERMAL_DEVICE_POWER_CAPABILITY_CHANGED);
        break;
    }
    default:
-    -dev_err(proc_priv->dev, "Unsupported event [0x%x]n", event);
+    +dev_dbg(proc_priv->dev, "Unsupported event [0x%x]n", event);
        break;
    }
    
@ -295,11 +303,6 @@
    *priv = proc_priv;

    ret = proc_thermal_read_ppcc(proc_priv);
    -if (!ret) {
    -    ret = sysfs_create_group(&dev->kobj,
    - &power_limit_attribute_group);
    -}
    if (ret)
return ret;

    @@ -313,8 +316,7 @@
    proc_priv->int340x_zone = int340x_thermal_zone_add(adev, ops);
    if (IS_ERR(proc_priv->int340x_zone)) {
        -ret = PTR_ERR(proc_priv->int340x_zone);
        -goto remove_group;
        +return PTR_ERR(proc_priv->int340x_zone);
    } else
    ret = 0;

    @@ -328,9 +330,6 @@
    remove_zone:
    int340x_thermal_zone_remove(proc_priv->int340x_zone);
    -remove_group:
    -sysfs_remove_group(&proc_priv->dev->kobj,
    -    &power_limit_attribute_group);

    return ret;
    }
    @@ -361,7 +360,10 @@
    platform_set_drvdata(pdev, proc_priv);
    proc_thermal_emum_mode = PROC_THERMAL_PLATFORM_DEV;

    -return 0;
    +dev_info(&pdev->dev, "Creating sysfs group for PROC_THERMAL_PLATFORM_DEV
    +
    +return sysfs_create_group(&pdev->dev.kobj,
    +    &power_limit_attribute_group);
    }

    static int int3401_remove(struct platform_device *pdev)
    @@ -420,7 +422,7 @@
    proc_priv->soc_dts = intel_soc_dts_iosf_init(
        INTEL_SOC_DTS_INTERRUPT_MSI, 2, 0);

    -if (proc_priv->soc_dts && pdev->irq) {
    +if (!IS_ERR(proc_priv->soc_dts) && pdev->irq) {
        ret = pci_enable_msi(pdev);
        if (!ret) {
            ret = request_threaded_irq(pdev->irq, NULL,
                @@ -438,7 +440,10 @@
                dev_err(pdev->dev, "No auxiliary DTSs enabled\n");
            }

            -return 0;
+dev_info(&pdev->dev, "Creating sysfs group for PROC_THERMAL_PCI\n");
+
+return sysfs_create_group(&pdev->dev.kobj,
+&power_limit_attribute_group);
}

static void  proc_thermal_pci_remove(struct pci_dev *pdev)
{
    pci_device(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_PROC_BXTP_THERMAL),
    pci_device(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_PROC_CNL_THERMAL),
    pci_device(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_PROC_CFL_THERMAL),
    +pci_device(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_PROC_GLK_THERMAL),
    0, },
    
};

--- linux-4.15.0.orig/drivers/thermal/intel_powerclamp.c
+++ linux-4.15.0/drivers/thermal/intel_powerclamp.c
@@ -101,7 +101,7 @@
    bool clamping;
    
    -static struct powerclamp_worker_data *__percpu worker_data;
+static struct powerclamp_worker_data __percpu *worker_data;
    static struct thermal_cooling_device *cooling_dev;
    static unsigned long *cpu_clamping_mask; /* bit map for tracking per cpu
        * clamping kthread worker
@@ -494,7 +494,7 @@
    struct powerclamp_worker_data *w_data = per_cpu_ptr(worker_data, cpu);
    struct kthread_worker *worker;

    -worker = kthread_create_worker_on_cpu(cpu, 0, "kidle_inject/%ld", cpu);
+worker = kthread_create_worker_on_cpu(cpu, 0, "kidle_inj/%ld", cpu);
    if (IS_ERR(worker))
        return;

--- linux-4.15.0.orig/drivers/thermal/intel_soc_dts_thermal.c
+++ linux-4.15.0/drivers/thermal/intel_soc_dts_thermal.c
@@ -43,7 +43,7 @@
 }

 static const struct x86_cpu_id soc_thermal_ids[] = {
    -{ X86_VENDOR_INTEL, 6, INTEL_FAM6_ATOM_SILVERMONT1, 0,
+    { X86_VENDOR_INTEL, 6, INTEL_FAM6_ATOM_SILVERMONT, 0,
     BYT_SOC_DTS_APIC_IRQ},
    }
    
--- linux-4.15.0.orig/drivers/thermal/of-thermal.c
+++ linux-4.15.0/drivers/thermal/of-thermal.c

mutex_lock(&tz->lock);

- if (mode == THERMAL_DEVICE_ENABLED)
+ if (mode == THERMAL_DEVICE_ENABLED) {
    tz->polling_delay = data->polling_delay;
    - else
    + tz->passive_delay = data->passive_delay;
    + } else {
    tz->polling_delay = 0;
    + tz->passive_delay = 0;
    + }

mutex_unlock(&tz->lock);

--- linux-4.15.0.orig/drivers/thermal/power_allocator.c
+++ linux-4.15.0/drivers/thermal/power_allocator.c
@@ -523,6 +523,7 @@
    struct thermal_instance *instance;
    struct power_allocator_params *params = tz->governor_data;

+    mutex_lock(&tz->lock);
    list_for_each_entry(instance, &tz->thermal_instances, tz_node) {
        if ((instance->trip != params->trip_max_desired_temperature) ||
            (!cdev_is_power_actor(instance->cdev)))
            mutex_unlock(&instance->cdev->lock);
        thermal_cdev_update(instance->cdev);
    }
+    mutex_unlock(&tz->lock);
    }

/**
--- linux-4.15.0.orig/drivers/thermal/qcom/tsens.c
+++ linux-4.15.0/drivers/thermal/qcom/tsens.c
@@ -162,7 +162,8 @@
        if (tmdev->ops->calibrate) {
            ret = tmdev->ops->calibrate(tmdev);
            if (ret < 0) {
-            dev_err(dev, "tsens calibration failed\n");
+            if (ret != -EPROBE_DEFER)
+                dev_err(dev, "tsens calibration failed\n");
            return ret;
        }
    }
--- linux-4.15.0.orig/drivers/thermal/rcar_gen3_thermal.c
+++ linux-4.15.0/drivers/thermal/rcar_gen3_thermal.c
```
#include <linux/of_device.h>
#include <linux/platform_device.h>
#include <linux/pm_runtime.h>
#include <linux/spinlock.h>
#include <linux/sys_soc.h>
#include <linux/thermal.h>

struct rcar_gen3_thermal_priv {
  struct rcar_gen3_thermal_tsc *tscs[TSC_MAX_NUM];
  unsigned int num_tscs;
  spinlock_t lock; /* Protect interrupts on and off */
}

void (*thermal_init)(struct rcar_gen3_thermal_tsc *tsc);

static irqreturn_t rcar_gen3_thermal_irq_thread(int irq, void *data)
{
  struct rcar_gen3_thermal_priv *priv = data;
  u32 status;
  int i, ret = IRQ_HANDLED;

  -spin_lock(&priv->lock);
  for (i = 0; i < priv->num_tscs; i++) {
    status = rcar_gen3_thermal_read(priv->tscs[i], REG_GEN3_IRQSTR);
    rcar_gen3_thermal_write(priv->tscs[i], REG_GEN3_IRQSTR, 0);
    if (status)
      ret = IRQ_WAKE_THREAD;
    thermal_zone_device_update(priv->tscs[i]->zone,
                                THERMAL_EVENT_UNSPECIFIED);
  }

  -if (ret == IRQ_WAKE_THREAD)
    -rcar_thermal_irq_set(priv, false);
  -spin_unlock(&priv->lock);
  -return ret;
}

static irqreturn_t rcar_gen3_thermal irq_thread(int irq, void *data)
{
  struct rcar_gen3_thermal_priv *priv = data;
  unsigned long flags;
  int i;

  -for (i = 0; i < priv->num_tscs; i++)
```
thermal_zone_device_update(priv->tscs[i]->zone,
- THERMAL_EVENT_UNSPECIFIED);
-
-spin_lock_irqsave(&priv->lock, flags);
-rcar_thermal_irq_set(priv, true);
-spin_unlock_irqrestore(&priv->lock, flags);
-
return IRQ_HANDLED;
}

static int rcar_gen3_thermal_remove(struct platform_device *pdev)
{
    struct device *dev = &pdev->dev;
+
+    struct rcar_gen3_thermal_priv *priv = dev_get_drvdata(dev);
+
+    rcar_thermal_irq_set(priv, false);

    pm_runtime_put(dev);
    pm_runtime_disable(dev);
@@ -369,8 +348,6 @@
    if (soc_device_match(r8a7795es1))
        priv->thermal_init = rcar_gen3_thermal_init_r8a7795es1;

    -spin_lock_init(&priv->lock);
    -
    platform_set_drvdata(pdev, priv);

    /*
@@ -388,9 +365,9 @@
    if (!irqname)
        return -ENOMEM;
    return -ENOMEM;

    -ret = devm_request_threaded_irq(dev, irq, rcar_gen3_thermal_irq,
    -rcar_gen3_thermal_irq_thread,
    -IRQF_SHARED, irqname, priv);
+ret = devm_request_threaded_irq(dev, irq, NULL,
+rcar_gen3_thermal_irq,
+IRQF_ONESHOT, irqname, priv);
    if (ret)
        return ret;
}
--- linux-4.15.0.orig/drivers/thermal/rcar_thermal.c
+++ linux-4.15.0/drivers/thermal/rcar_thermal.c
@@ -401,8 +401,8 @@
    rcar_thermal_for_each_priv(priv, common) {
        if (rcar_thermal_had_changed(priv, status)) {
            rcar_thermal_irq_disable(priv);
clk_enable(data->clk);
data->tmu_control(pdev, on);
+data->enabled = on;
clk_disable(data->clk);
mutex_unlock(&data->lock);
}
@@ -595,6 +598,7 @@
threshold_code = temp_to_code(data, temp);

rising_threshold = readl(data->base + rising_reg_offset);
+rising_threshold &= ~(0xff << j * 8);
rising_threshold |= (threshold_code << j * 8);
writel(rising_threshold, data->base + rising_reg_offset);

@@ -889,19 +893,24 @@
static int exynos_get_temp(void *p, int *temp)
{
 struct exynos_tmu_data *data = p;
+int value, ret = 0;

 -if (!data || !data->tmu_read)
 +if (!data || !data->tmu_read || !data->enabled)
 return -EINVAL;

 mutex_lock(&data->lock);
 clk_enable(data->clk);

 -*temp = code_to_temp(data, data->tmu_read(data)) * MCELSIUS;
 +value = data->tmu_read(data);
 +if (value < 0)
 +ret = value;
 +else
 +*temp = code_to_temp(data, value) * MCELSIUS;

 clk_disable(data->clk);
 mutex_unlock(&data->lock);

 -return 0;
 +return ret;
 }

 #ifdef CONFIG_THERMAL_EMULATION
 @@ -1362,6 +1371,7 @@
data->sclk = devm_clk_get(&pdev->dev, "tmu_sclk");
 if (IS_ERR(data->sclk)) {
 dev_err(&pdev->dev, "Failed to get sclk\n");
 +ret = PTR_ERR(data->sclk);
 goto err_clk;
 

static int gadc_thermal_adc_to_temp(struct gadc_thermal_info *gti, int val)
{
    int temp, adc_hi, adc_lo;
    int temp_hi, temp_lo, adc_hi, adc_lo;
    int i;

    for (i = 0; i < gti->nlookup_table; i++) {
        @ @ -36,13 +36,17 @ @

        if (i == 0) {
            temp = gti->lookup_table[0];
            -} else if (i >= (gti->nlookup_table - 1)) {
            +} else if (i >= gti->nlookup_table) {
                temp = gti->lookup_table[2 * (gti->nlookup_table - 1)];
            } else {
                adc_hi = gti->lookup_table[2 * i - 1];
                adc_lo = gti->lookup_table[2 * i + 1];
                -temp = gti->lookup_table[2 * i];
                -temp -= ((val - adc_lo) * 1000) / (adc_hi - adc_lo);
                +temp_hi = gti->lookup_table[2 * i - 2];
                +temp_lo = gti->lookup_table[2 * i];
                +temp = temp_hi + mult_frac(temp_lo - temp_hi, val - adc_hi,
                +adc_lo - adc_hi);
            }

        return temp;

        -} else {
            ret = clk_prepare_enable(data->sclk);
            --- linux-4.15.0.orig/drivers/thermal/thermal-generic-adc.c
            +++ linux-4.15.0/drivers/thermal/thermal-generic-adc.c
            @@ -26,7 +26,7 @@

            static int gadc_thermal_adc_to_temp(struct gadc_thermal_info *gti, int val)
            {
                int temp, adc_hi, adc_lo;
                +int temp, temp_hi, temp_lo, adc_hi, adc_lo;
                int i;

                for (i = 0; i < gti->nlookup_table; i++) {
                    @ @ -36,13 +36,17 @ @

                    if (i == 0) {
                        temp = gti->lookup_table[0];
                        -} else if (i >= (gti->nlookup_table - 1)) {
                        +} else if (i >= gti->nlookup_table) {
                            temp = gti->lookup_table[2 * (gti->nlookup_table - 1)];
                        } else {
                            adc_hi = gti->lookup_table[2 * i - 1];
                            adc_lo = gti->lookup_table[2 * i + 1];
                            -temp = gti->lookup_table[2 * i];
                            -temp -= ((val - adc_lo) * 1000) / (adc_hi - adc_lo);
                            +temp_hi = gti->lookup_table[2 * i - 2];
                            +temp_lo = gti->lookup_table[2 * i];
                            +temp = temp_hi + mult_frac(temp_lo - temp_hi, val - adc_hi,
                            +adc_lo - adc_hi);
                        }

                    return temp;

                    -} else {
                        ret = clk_prepare_enable(data->sclk);
                        --- linux-4.15.0.orig/drivers/thermal/thermal-generic-adc.c
                        +++ linux-4.15.0/drivers/thermal/thermal-generic-adc.c
                        @@ -26,7 +26,7 @@

                        static int gadc_thermal_adc_to_temp(struct gadc_thermal_info *gti, int val)
                        {
                            int temp, adc_hi, adc_lo;
                            +int temp, temp_hi, temp_lo, adc_hi, adc_lo;
                            int i;

                            for (i = 0; i < gti->nlookup_table; i++) {
                                @ @ -36,13 +36,17 @ @

                                if (i == 0) {
                                    temp = gti->lookup_table[0];
                                    -} else if (i >= (gti->nlookup_table - 1)) {
                                    +} else if (i >= gti->nlookup_table) {
                                        temp = gti->lookup_table[2 * (gti->nlookup_table - 1)];
                                    } else {
                                        adc_hi = gti->lookup_table[2 * i - 1];
                                        adc_lo = gti->lookup_table[2 * i + 1];
                                        -temp = gti->lookup_table[2 * i];
                                        -temp -= ((val - adc_lo) * 1000) / (adc_hi - adc_lo);
                                        +temp_hi = gti->lookup_table[2 * i - 2];
                                        +temp_lo = gti->lookup_table[2 * i];
                                        +temp = temp_hi + mult_frac(temp_lo - temp_hi, val - adc_hi,
                                        +adc_lo - adc_hi);
                                    }

                                return temp;

                                -} else {
                                    ret = clk_prepare_enable(data->sclk);
                                    --- linux-4.15.0.orig/drivers/thermal/thermal-generic-adc.c
                                    +++ linux-4.15.0/drivers/thermal/thermal-generic-adc.c
                                    @@ -26,7 +26,7 @@
mutex_unlock(&thermal_governor_lock);

tz->last_temperature, tz->temperature);

static void thermal_zone_device_reset(struct thermal_zone_device *tz)
{
    struct thermal_instance *pos;

    tz->temperature = THERMAL_TEMP_INVALID;
    tz->passive = 0;
    list_for_each_entry(pos, &tz->thermal_instances, tz_node)
pos->initialized = false;
}

static void thermal_zone_device_init(struct thermal_zone_device *tz)
{
tz->passive = 0;
thermal_zone_device_init(tz);
}

void thermal_zone_device_update(struct thermal_zone_device *tz,enum thermal_notify_event event)
{
    void thermal_zone_device_set_polling(tz, 0);
cancel_delayed_work_sync(&tz->poll_queue);
thermal_set_governor(tz, NULL);

EXPORT_SYMBOL_GPL(thermal_zone_device_register);

/**
 * thermal_device_unregister - removes the registered thermal zone device
 * @tz: the thermal zone device to remove
 */
void thermal_zone_device_unregister(struct thermal_zone_device *tz)
{
    mutex_unlock(&thermal_list_lock);

-thermal_zone_device_set_polling(tz, 0);
cancel_delayed_work_sync(&tz->poll_queue);
thermal_set_governor(tz, NULL);
case PM_POST_SUSPEND:
    atomic_set(&in_suspend, 0);
    list_for_each_entry(tz, &thermal_tz_list, node) {
        -thermal_zone_device_reset(tz);
        +thermal_zone_device_init(tz);
        thermal_zone_device_update(tz,
            THERMAL_EVENT_UNSPECIFIED);
    }
--- linux-4.15.0.orig/drivers/thermal/thermal_hwmon.c
+++ linux-4.15.0/drivers/thermal/thermal_hwmon.c
@@ -110,13 +110,17 @@
    mutex_lock(&thermal_hwmon_list_lock);
    -list_for_each_entry(hwmon, &thermal_hwmon_list, node)
        if (!strcmp(hwmon->type, tz->type)) {
        +list_for_each_entry(hwmon, &thermal_hwmon_list, node) {
        +strcpy(type, tz->type);
        +strreplace(type, '-', '_');
        +if (!strcmp(hwmon->type, type)) {
            mutex_unlock(&thermal_hwmon_list_lock);
            return hwmon;
        }
        +}
    mutex_unlock(&thermal_hwmon_list_lock);

    return NULL;
@@ -165,6 +169,7 @@
 INIT_LIST_HEAD(&hwmon->tz_list);
 strlcpy(hwmon->type, tz->type, THERMAL_NAME_LENGTH);
 +strreplace(hwmon->type, '.', '_');
 hwmon->device = hwmon_device_register(NULL);
 if (IS_ERR(hwmon->device)) {
    result = PTR_ERR(hwmon->device);
--- linux-4.15.0.orig/drivers/thermal/thermal_hwmon.h
+++ linux-4.15.0/drivers/thermal/thermal_hwmon.h
@@ -34,13 +34,13 @@
     int thermal_add_hwmon_sysfs(struct thermal_zone_device *tz);
     void thermal_remove_hwmon_sysfs(struct thermal_zone_device *tz);
 #else
     -static int
     +static inline int
thermal_add_hwmon_sysfs(struct thermal_zone_device *tz)
{
    return 0;
}

- static void
+ static inline void 
thermal_remove_hwmon_sysfs(struct thermal_zone_device *tz)
{
    return 0;
}
--- linux-4.15.0.orig/drivers/thermal/thermal_sysfs.c
+++ linux-4.15.0/drivers/thermal/thermal_sysfs.c
@@ -317,7 +317,7 @@
     return ret ? ret : count;
 }
- static DEVICE_ATTR(emul_temp, S_IWUSR, NULL, emul_temp_store);
+ static DEVICE_ATTR_WO(emul_temp);
 #endif

 static ssize_t
@@ -396,16 +396,15 @@ *
     * All the attributes created for tzp (create_s32_tzp_attr) also are always
     * present on the sysfs interface.
     */
- static DEVICE_ATTR(type, 0444, type_show, NULL);
- static DEVICE_ATTR(temp, 0444, temp_show, NULL);
- static DEVICE_ATTR(policy, S_IRUGO | S_IWUSR, policy_show, policy_store);
- static DEVICE_ATTR(available_policies, S_IRUGO, available_policies_show, NULL);
- static DEVICE_ATTR(sustainable_power, S_IWUSR | S_IRUGO, sustainable_power_show,
+ static DEVICE_ATTR_RO(type);
+ static DEVICE_ATTR_RO(temp);
+ static DEVICE_ATTR_RW(policy);
+ static DEVICE_ATTR_RW(available_policies);
+ static DEVICE_ATTR_RW(sustainable_power);

 /* These thermal zone device attributes are created based on conditions */
- static DEVICE_ATTR(mode, 0644, mode_show, mode_store);
- static DEVICE_ATTR(passive, S_IRUGO | S_IWUSR, passive_show, passive_store);
+ static DEVICE_ATTR_RW(mode);
+ static DEVICE_ATTR_RW(passive);

 /* These attributes are unconditionally added to a thermal zone */
 static struct attribute *thermal_zone_dev_attrs[] = {
 --- linux-4.15.0.orig/drivers/thermal/ti-soc-thermal/omap4-thermal-data.c
+++ linux-4.15.0/drivers/thermal/ti-soc-thermal/omap4-thermal-data.c
@@ -49,20 +49,21 @@
/*
 * Temperature values in milli degree celsius
 * ADC code values from 530 to 923
 + * ADC code values from 13 to 107, see TRM
 + * "18.4.10.2.3 ADC Codes Versus Temperature".
 */

static const int
omap4430_adc_to_temp[OMAP4430_ADC_END_VALUE - OMAP4430_ADC_START_VALUE + 1] = {
-38000, -35000, -32000, -30000, -28000, -26000, -24000, -22000,
-20000, -18000, -17000, -15000, -13000, -12000, -10000, -8000, -6000,
-5000, -3000, -1000, 0, 2000, 3000, 5000, 6000, 8000, 10000, 12000,
-13000, 15000, 17000, 19000, 21000, 23000, 25000, 27000, 28000, 30000,
-32000, 33000, 35000, 37000, 38000, 40000, 42000, 43000, 45000, 47000,
-48000, 50000, 52000, 53000, 55000, 57000, 58000, 60000, 62000, 64000,
-66000, 68000, 70000, 71000, 73000, 75000, 77000, 78000, 80000, 82000,
-83000, 85000, 87000, 88000, 90000, 92000, 93000, 95000, 97000, 98000,
-100000, 102000, 103000, 105000, 107000, 109000, 111000, 113000, 115000,
-117000, 118000, 120000, 122000, 123000,
+40000, -38000, -35000, -34000, -32000, -30000, -28000, -26000, -24000,
+22000, -20000, -18500, -17000, -15000, -13500, -12000, -10000, -8000,
+6500, -5000, -3500, -3000, 0, 2000, 3500, 5000, 6500, 8500, 10000,
+12000, 13500, 15000, 17000, 19000, 21000, 23000, 25000, 27000, 28500,
+30000, 32000, 33500, 35000, 37000, 38500, 40000, 42000, 43500, 45000,
+47000, 48500, 50000, 52000, 53500, 55000, 57000, 58500, 60000, 62000,
+64000, 66000, 68000, 70000, 71500, 73500, 75000, 77000, 78500, 80000,
+82000, 83500, 85000, 87000, 88500, 90000, 92000, 93500, 95000, 97000,
+98500, 100000, 102000, 103500, 105000, 107000, 109000, 111000, 113000,
+115000, 117000, 118500, 120000, 122000, 123500, 125000,
};

/* OMAP4430 data */
--- linux-4.15.0.orig/drivers/thermal/ti-soc-thermal/omap4xxx-bandgap.h
+++ linux-4.15.0/drivers/thermal/ti-soc-thermal/omap4xxx-bandgap.h
@@ -67,9 +67,13 @@
 * and thresholds for OMAP4430.
 */

-/* ADC conversion table limits */
#define OMAP4430_ADC_START_VALUE0
#define OMAP4430_ADC_END_VALUE127
+/*
 + * ADC conversion table limits. Ignore values outside the TRM listed
 + * range to avoid bogus thermal shutdowns. See omap4430 TRM chapter
 + * "18.4.10.2.3 ADC Codes Versus Temperature".
 + */
+#define OMAP4430_ADC_START_VALUE13
+#define OMAP4430_ADC_END_VALUE107
/* bandgap clock limits (no control on 4430) */
#define OMAP4430_MAX_FREQ 32768
#define OMAP4430_MIN_FREQ 32768
--- linux-4.15.0.orig/drivers/thermal/ti-soc-thermal/ti-thermal-common.c
+++ linux-4.15.0/drivers/thermal/ti-soc-thermal/ti-thermal-common.c
@@ -183,7 +183,7 @@
data = ti_bandgap_get_sensor_data(bgp, id);

- if (!data || IS_ERR(data))
+ if (IS_ERR_OR_NULL(data))
data = ti_thermal_build_data(bgp, id);

 if (!data)
@@ -210,7 +210,7 @@
data = ti_bandgap_get_sensor_data(bgp, id);

- if (data && data->ti_thermal) {
+ if (!IS_ERR_OR_NULL(data) && data->ti_thermal) {
  if (data->our_zone)
    thermal_zone_device_unregister(data->ti_thermal);
 }  
@@ -276,7 +276,7 @@
data = ti_bandgap_get_sensor_data(bgp, id);

- if (data) {
+ if (!IS_ERR_OR_NULL(data)) {
    cpufreq_cooling_unregister(data->cool_dev);
    if (data->policy)
      cpufreq_cpu_put(data->policy);
--- linux-4.15.0.orig/drivers/thunderbolt/dma_port.c
+++ linux-4.15.0/drivers/thunderbolt/dma_port.c
@@ -170,24 +170,22 @@
dma_find_port(struct tb_switch *sw)
{
  -int port, ret;
  -u32 type;
+static const int ports[] = { 3, 5, 7 };
  +int i;

  /*
   - * The DMA (NHI) port is either 3 or 5 depending on the
   - * controller. Try both starting from 5 which is more common.
   + * The DMA (NHI) port is either 3, 5 or 7 depending on the
   + * controller. Try all of them.
/*
- port = 5;
- ret = dma_port_read(sw->tb->ctl, &type, tb_route(sw), port, 2, 1,
- DMA_PORT_TIMEOUT);
- if (!ret && (type & 0xffffffff) == TB_TYPE_NHI)
  return port;
-
- port = 3;
- ret = dma_port_read(sw->tb->ctl, &type, tb_route(sw), port, 2, 1,
- DMA_PORT_TIMEOUT);
- if (!ret && (type & 0xffffffff) == TB_TYPE_NHI)
  return port;
+
+ for (i = 0; i < ARRAY_SIZE(ports); i++) {
+ u32 type;
+ int ret;
+ 
+ ret = dma_port_read(sw->tb->ctl, &type, tb_route(sw), ports[i],
+ 2, 1, DMA_PORT_TIMEOUT);
+ if (!ret && (type & 0xffffffff) == TB_TYPE_NHI)
+ return ports[i];
+ }

return -ENODEV;
}
@@ -369,15 +367,15 @@

void *buf, size_t size)
{
  unsigned int retries = DMA_PORT_RETRIES;
-unsigned int offset;
-  
-  offset = address & 3;
-  address = address & ~3;

  do {
- u32 nbytes = min_t(u32, size, MAIL_DATA_DWORDS * 4);
+ unsigned int offset;
+ size_t nbytes;
  int ret;

+ offset = address & 3;
+ nbytes = min_t(size_t, size + offset, MAIL_DATA_DWORDS * 4);
+ ret = dma_port_flash_read_block(dma, address, dma->buf,
  ALIGN(nbytes, 4));
  if (ret) {
@@ -389,6 +387,7 @@
  return ret;
  }

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nbytes -= offset;
memcpy(buf, dma->buf + offset, nbytes);

size -= nbytes;
--- linux-4.15.0.orig/drivers/thunderbolt/domain.c
+++ linux-4.15.0/drivers/thunderbolt/domain.c
@@ -10,8 +10,11 @@
 */

#include <linux/device.h>
+include <linux/dmar.h>
#include <linux/idr.h>
+include <linux/iommu.h>
#include <linux/module.h>
+include <linux/pm_runtime.h>
#include <linux/slab.h>
#include <linux/random.h>
#include <linux/random.h>
@@ -117,23 +120,180 @@

[TB_SECURITY_USER] = "user",
[TB_SECURITY_SECURE] = "secure",
[TB_SECURITY_DPONLY] = "dponly",
+[TB_SECURITY_USBONLY] = "usbonly",
};

+static ssize_t boot_acl_show(struct device *dev, struct device_attribute *attr,
+    char *buf)
+{
+    struct tb *tb = container_of(dev, struct tb, dev);
+    uuid_t *uuids;
+    ssize_t ret;
+    int i;
+    +uuids = kmalloc(tb->nboot_acl, sizeof(uuid_t), GFP_KERNEL);
+    +if (!uuids)
+        +return -ENOMEM;
+    +pm_runtime_get_sync(&tb->dev);
+    +if (mutex_lock_interruptible(&tb->lock)) {
+        +ret = -ERESTARTSYS;
+        +goto out;
+    }
+    +ret = tb->cm_ops->get_boot_acl(tb, uuids, tb->nboot_acl);
+    +if (ret) {
+        +mutex_unlock(&tb->lock);
+        +goto out;
+    }

Open Source Used In 5GaaS Edge AC-4 28738
mutex_unlock(&tb->lock);
+
+for (ret = 0, i = 0; i < tb->nboot_acl; i++) {
+    if (!uuid_is_null(&uuids[i]))
+        ret += snprintf(buf + ret, PAGE_SIZE - ret, "%pUb",
+            &uuids[i]);
+    ret += snprintf(buf + ret, PAGE_SIZE - ret, "%s",
+        i < tb->nboot_acl - 1 ? "," : "\n");
+}
+
+out:
+    pm_runtime_mark_last_busy(&tb->dev);
+    pm_runtime_put_autosuspend(&tb->dev);
+    kfree(uuids);
+
+    return ret;
+}
+
+static ssize_t boot_acl_store(struct device *dev, struct device_attribute *attr,
+                        const char *buf, size_t count)
+{
+    struct tb *tb = container_of(dev, struct tb, dev);
+    char *str, *s, *uuid_str;
+    ssize_t ret = 0;
+    uuid_t *acl;
+    int i = 0;
+
+    /*
+     * Make sure the value is not bigger than tb->nboot_acl * UUID
+     * length + commas and optional \"\n\". Also the smallest allowable
+     * string is tb->nboot_acl * ",\".
+     */
+    if (count > (UUID_STRING_LEN + 1) * tb->nboot_acl + 1)
+        return -EINVAL;
+    if (count < tb->nboot_acl - 1)
+        return -EINVAL;
+    str = kstrdup(buf, GFP_KERNEL);
+    if (!str)
+        return -ENOMEM;
+    acl = kcalloc(tb->nboot_acl, sizeof(uuid_t), GFP_KERNEL);
+    if (!acl) {
+        ret = -ENOMEM;
+        goto err_free_str;
+    }
+  +uuid_str = strim(str);
+  while ((s = strsep(&uuid_str, ",")) != NULL && i < tb->nboot_acl) {
+    size_t len = strlen(s);
+    +if (len) {
+      +if (len != UUID_STRING_LEN) {
+        ret = -EINVAL;
+        goto err_free_acl;
+      }
+      ret = uuid_parse(s, &acl[i]);
+      +if (ret)
+        goto err_free_acl;
+    }
+    i++;
+  }
+  +if (s || i < tb->nboot_acl) {
+    ret = -EINVAL;
+    goto err_free_acl;
+  }
+  +pm_runtime_get_sync(&tb->dev);
+  +if (mutex_lock_interruptible(&tb->lock)) {
+    ret = -ERESTARTSYS;
+    goto err_rpm_put;
+  }
+  ret = tb->cm_ops->set_boot_acl(tb, acl, tb->nboot_acl);
+  +if (!ret) {
+    /* Notify userspace about the change */
+    kobject_uevent(&tb->dev.kobj, KOBJ_CHANGE);
+  }
+  mutex_unlock(&tb->lock);
+  +err_rpm_put:
+  pm_runtime_mark_last_busy(&tb->dev);
+  pm_runtime_put_autosuspend(&tb->dev);
+  err_free_acl:
+  kfree(acl);
+  err_free_str:
+  kfree(str);
+  +return ret ?: count;
+}
+static DEVICE_ATTR_RW(boot_acl);
+static ssize_t iommu_dma_protection_show(struct device *dev,
+ struct device_attribute *attr,
+ char *buf)
+{
+ /*
+ * Kernel DMA protection is a feature where Thunderbolt security is
+ * handled natively using IOMMU. It is enabled when IOMMU is
+ * enabled and ACPI DMAR table has DMAR_PLATFORM_OPT_IN set.
+ */
+return sprintf(buf, "%d\n",
+ iommu_present(&pci_bus_type) && dmar_platform_optin());
+
+static DEVICE_ATTR_RO(iommu_dma_protection);
+
+static ssize_t security_show(struct device *dev, struct device_attribute *attr,
+char *buf)
+
 struct tb *tb = container_of(dev, struct tb, dev);
+const char *name = "unknown";
+-return sprintf(buf, "%s\n", tb_security_names[tb->security_level]);
+if (tb->security_level < ARRAY_SIZE(tb_security_names))
+name = tb_security_names[tb->security_level];
+return sprintf(buf, "%s\n", name);
+}
+static DEVICE_ATTR_RO(security);
+
static struct attribute *domain_attrs[] = {
+&dev_attr_boot_acl.attr,
+&dev_attr_iommu_dma_protection.attr,
+&dev_attr_security.attr,
+NULL,
+};
+
+static umode_t domain_attr_is_visible(struct kobject *kobj,
+ struct attribute *attr, int n)
+{
+struct device *dev = container_of(kobj, struct device, kobj);
+struct tb *tb = container_of(dev, struct tb, dev);
+
+if (attr == &dev_attr_boot_acl.attr) {
+if (tb->nboot_acl &&
+ tb->cm_ops->get_boot_acl &&
+ tb->cm_ops->set_boot_acl)
+return attr->mode;
+}
+return 0;
+}
+return attr->mode;
+
static struct attribute_group domain_attr_group = {
+is_visible = domain_attr_is_visible,
.attrs = domain_attrs,
};

@@ -298,6 +458,13 @@
 /* This starts event processing */
 mutexUnlock(&tb->lock);

+pm_runtime_no_callbacks(&tb->dev);
+pm_runtime_set_active(&tb->dev);
+pm_runtime_enable(&tb->dev);
+pm_runtime_set_autosuspend_delay(&tb->dev, TB_AUTOSUSPEND_DELAY);
+pm_runtime_mark_last_busy(&tb->dev);
+pm_runtime_use_autosuspend(&tb->dev);
+
return 0;

err_domain_del:
@@ -377,26 +544,35 @@

int tb_domain_suspend(struct tb *tb)
{
-int ret;
+return tb->cm_ops->suspend ? tb->cm_ops->suspend(tb) : 0;
+
-mutex_lock(&tb->lock);
-if (tb->cm_ops->suspend) {
-ret = tb->cm_ops->suspend(tb);
-if (ret) {
-mutex_unlock(&tb->lock);
+void tb_domain_complete(struct tb *tb)
+
+if (tb->cm_ops->complete)
+tb->cm_ops->complete(tb);
+
+int tb_domain_runtime_suspend(struct tb *tb)
+
+if (tb->cm_ops->runtime_suspend) {
+int ret = tb->cm_ops->runtime_suspend(tb);
+if (ret)
return ret;
mutex_unlock(&tb->lock);
+tb_ctl_stop(tb->ctl);
return 0;
}

-void tb_domain_complete(struct tb *tb)
+int tb_domain_runtime_resume(struct tb *tb)
{
-mutex_lock(&tb->lock);
-if (tb->cm_ops->complete)
-tb->cm_ops->complete(tb);
-mutex_unlock(&tb->lock);
+tb_ctl_start(tb->ctl);
+if (tb->cm_ops->runtime_resume) {
+int ret = tb->cm_ops->runtime_resume(tb);
+if (ret)
+return ret;
+}
+return 0;
}

/**
--- linux-4.15.0.orig/drivers/thunderbolt/icm.c
+++ linux-4.15.0/drivers/thunderbolt/icm.c
@@ -15,6 +15,7 @@
#include <linux/delay.h>
#include <linux/mutex.h>
#include <linux/pci.h>
+#include <linux/pm_runtime.h>
#include <linux/platform_data/x86/apple.h>
#include <linux/sizes.h>
#include <linux/slab.h>
@@ -41,7 +42,8 @@
#define PHY_PORT_CS1_LINK_STATE_MASK GENMASK(29, 26)
#define PHY_PORT_CS1_LINK_STATE_SHIFT 26
#define ICM_TIMEOUT			5000 /* ms */
#define ICM_APPROVE_TIMEOUT		10000 /* ms */
#define ICM_MAX_LINK			4
#define ICM_MAX_DEPTH			6
@@ -55,9 +57,13 @@
 * @vnd_cap: Vendor defined capability where PCIe2CIO mailbox resides
 * (only set when @upstream_port is not %NULL)
 * @safe_mode: ICM is in safe mode
+ * @max_boot_acl: Maximum number of preboot ACL entries (%0 if not supported)
+ * @rpm: Does the controller support runtime PM (RTD3)
* @is_supported: Checks if we can support ICM on this controller
* @get_mode: Read and return the ICM firmware mode (optional)
* @get_route: Find a route string for given switch
+ * @save_devices: Ask ICM to save devices to ACL when suspending (optional)
+ * @driver_ready: Send driver ready message to ICM
* @device_connected: Handle device connected ICM message
* @device_disconnected: Handle device disconnected ICM message
* @xdomain_connected: Handle XDomain connected ICM message
 @@ -67,11 +73,17 @@
 struct mutex request_lock;
 struct delayed_work rescan_work;
 struct pci_dev *upstream_port;
+size_t max_boot_acl;
 int vnd_cap;
 bool safe_mode;
 +bool rpm;
 bool (*is_supported)(struct tb *tb);
 int (*get_mode)(struct tb *tb);
 int (*get_route)(struct tb *tb, u8 link, u8 depth, u64 *route);
+void (*save_devices)(struct tb *tb);
+int (*driver_ready)(struct tb *tb,
+ enum tb_security_level *security_level,
+ size_t *nboot_acl, bool *rpm);
 void (*device_connected)(struct tb *tb,
 const struct icm_pkg_header *hdr);
 void (*device_disconnected)(struct tb *tb,
 @@ -88,6 +100,47 @@
 struct tb *tb;
 };

+struct ep_name_entry {
+u8 len;
+u8 type;
+u8 data[0];
+};
+
+#define EP_NAME_INTEL_VSS0x10
+
+/* Intel Vendor specific structure */
+struct intel_vss {
+u16 vendor;
+u16 model;
+u8 mc;
+u8 flags;
+u16 pci_devid;
+u32 nvm_version;

+};
+
+#define INTEL_VSS_FLAGS_RTD3BIT(0)
+
+static const struct intel_vss *parse_intel_vss(const void *ep_name, size_t size)
+{
+    const void *end = ep_name + size;
+
+    while (ep_name < end) {
+        const struct ep_name_entry *ep = ep_name;
+
+        if (!ep->len)
+            break;
+        if (ep_name + ep->len > end)
+            break;
+
+        if (ep->type == EP_NAME_INTEL_VSS)
+            return (const struct intel_vss *)ep->data;
+
+        ep_name += ep->len;
+    }

+    return NULL;
+}

+static inline struct tb *icm_to_tb(struct icm *icm)
{
    return ((void *)icm - sizeof(struct tb));
}

+static inline u64 get_parent_route(u64 route)
{
    int depth = tb_route_length(route);
    return (u64)route_hi << 32 | route_lo;
}

+static inline u64 get_parent_route(u64 route)
{
    int depth = tb_route_length(route);
    return depth ? route & ~(0xffULL << (depth - 1) * TB_ROUTE_SHIFT) : 0;
}

+static bool icm_match(const struct tb_cfg_request *req,
            const struct ctl_pkg *pkg)
{
    return ret;
}

+static void icm_fr_save_devices(struct tb *tb)
{
    nhi_mailbox_cmd(tb->nhi, NHI_MAILBOX_SAVE_DEVS, 0);
static int icm_fr_driver_ready(struct tb *tb, enum tb_security_level *security_level,
    size_t *nboot_acl, bool *rpm)
{
    struct icm_fr_pkg_driver_ready_response reply;
    struct icm_pkg_driver_ready request = {
        .hdr.code = ICM_DRIVER_READY,
    };
    int ret;

    memset(&reply, 0, sizeof(reply));
    ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
                      1, ICM_TIMEOUT);
    if (ret)
        return ret;

    if (security_level)
        *security_level = reply.security_level & ICM_FR_SLEVEL_MASK;
    return 0;
}

static int icm_fr_approve_switch(struct tb *tb, struct tb_switch *sw)
{
    struct icm_fr_pkg_approve_device request;
    memset(&reply, 0, sizeof(reply));
    /* Use larger timeout as establishing tunnels can take some time */
    ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
                      1, ICM_APPROVE_TIMEOUT);
    if (ret)
        return ret;

    *security_level = reply.security_level & ICM_FR_SLEVEL_MASK;
    return 0;
}

static int icm_fr_driver_ready(struct *tb, enum *security_level,
    size_t *nboot_acl, bool *rpm)
{
    struct icm_fr_pkg_driver_ready_response reply;
    struct icm_pkg_driver_ready request = {
        .hdr.code = ICM_DRIVER_READY,
    };
    int ret;

    memset(&reply, 0, sizeof(reply));
    ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
                      1, ICM_TIMEOUT);
    if (ret)
        return ret;

    if (security_level)
        *security_level = reply.security_level & ICM_FR_SLEVEL_MASK;
    return 0;
}

static void add_switch(struct tb_switch *parent_sw, u64 route,
    const uuid_t *uuid, const u8 *ep_name,
    size_t ep_name_size, u8 connection_id, u8 connection_key,
    u8 link, u8 depth, enum tb_security_level security_level,
    bool authorized, bool boot)
{
    const struct intel_vss *vss;
    struct tb_switch *sw;
+ pm_runtime_get_sync(&parent_sw->dev);
+ 
+ sw = tb_switch_alloc(parent_sw->tb, &parent_sw->dev, route);
+ if (!sw)
+ goto out;
+ 
+ sw->uuid = kmemdup(uuid, sizeof(*uuid), GFP_KERNEL);
+ if (!sw->uuid) {
+ tb_sw_warn(sw, "cannot allocate memory for switch'\n");
+ tb_switch_put(sw);
+ goto out;
+ }
+ sw->connection_id = connection_id;
+ sw->connection_key = connection_key;
+ sw->link = link;
+ sw->depth = depth;
+ sw->authorized = authorized;
+ sw->security_level = security_level;
+ sw->boot = boot;
+ 
+ vss = parse_intel_vss(ep_name, ep_name_size);
+ if (vss)
+ sw->rpm = !!((vss->flags & INTEL_VSS_FLAGS_RTD3));
+ +/-* Link the two switches now */
+ tb_port_at(route, parent_sw)->remote = tb_upstream_port(sw);
+ tb_upstream_port(sw)->remote = tb_port_at(route, parent_sw);
+ 
+ if (tb_switch_add(sw)) {
+ tb_port_at(tb_route(sw), parent_sw)->remote = NULL;
+ tb_switch_put(sw);
+ }
+ 
+ out:
+ pm_runtime_mark_last_busy(&parent_sw->dev);
+ pm_runtime_put_autosuspend(&parent_sw->dev);
+ }
+ 
+ static void update_switch(struct tb_switch *parent_sw, struct tb_switch *sw,
+ u64 route, u8 connection_id, u8 connection_key,
+ u8 link, u8 depth, bool boot)
+ {
+ /* Disconnect from parent */
+ tb_port_at(tb_route(sw), parent_sw)->remote = NULL;
+ /* Re-connect via updated port*/
+ tb_port_at(route, parent_sw)->remote = tb_upstream_port(sw);
+ 

/** Update with the new addressing information */
+sw->config.route_hi = upper_32_bits(route);
+sw->config.route_lo = lower_32_bits(route);
+sw->connection_id = connection_id;
+sw->connection_key = connection_key;
+sw->link = link;
+sw->depth = depth;
+sw->boot = boot;
+
+/* This switch still exists */
+sw->is_unplugged = false;
+
static void remove_switch(struct tb_switch *sw)
{
    struct tb_switch *parent_sw;
    @ @ -383,15 +538,58 @@
    tb_switch_remove(sw);
}

+static void add_xdomain(struct tb_switch *sw, u64 route,
+    const uuid_t *local_uuid, const uuid_t *remote_uuid,
+    u8 link, u8 depth)
+{
+    struct tb_xdomain *xd;
+    +pm_runtime_get_sync(&sw->dev);
+    +xd = tb_xdomain_alloc(sw->tb, &sw->dev, route, local_uuid, remote_uuid);
+    +if (!xd)
+        goto out;
+    +xd->link = link;
+    +xd->depth = depth;
+    +tb_port_at(route, sw)->xdomain = xd;
+    +tb_xdomain_add(xd);
+}
+out:
    +pm_runtime_mark_last_busy(&sw->dev);
    +pm_runtime_put_autosuspend(&sw->dev);
+
+static void update_xdomain(struct tb_xdomain *xd, u64 route, u8 link)
+{
+    +xd->link = link;
+    +xd->route = route;
+xd->is_unplugged = false;
+
+static void remove_xdomain(struct tb_xdomain *xd)
+{
+struct tb_switch *sw;
+
+sw = tb_to_switch(xd->dev.parent);
+tb_port_at(xd->route, sw)->xdomain = NULL;
+tb_xdomain_remove(xd);
+
+}
+
static void icm_fr_device_connected(struct tb *tb, const struct icm_pkg_header *hdr)
{
const struct icm_fr_event_device_connected *pkg =
(const struct icm_fr_event_device_connected *)hdr;
enum tb_security_level security_level;
struct tb_switch *sw, *parent_sw;
struct icm *icm = tb_priv(tb);
bool authorized = false;
+struct tb_xdomain *xd;
}

int ret;

@@ -399,11 +597,13 @@
depth = (pkg->link_info & ICM_LINK_INFO_DEPTH_MASK) >>
ICM_LINK_INFO_DEPTH_SHIFT;
authorized = pkg->link_info & ICM_LINK_INFO_APPROVED;
-
-RET = icm->get_route(tb, link, depth, &route);
-if (ret) {
-b_err(tb, "failed to find route string for switch at %u.%u\n",
-  link, depth);
+security_level = (pkg->hdr.flags & ICM_FLAGS_SLEVEL_MASK) >>
+  ICM_FLAGS_SLEVEL_SHIFT;
+boot = pkg->link_info & ICM_LINK_INFO_BOOT;
+
+if (pkg->link_info & ICM_LINK_INFO_REJECTED) {
+tb_info(tb, "switch at %u.%u was rejected by ICM firmware because topology limit exceeded\n",
+  link, depth);
return;
}

@@ -412,8 +612,8 @@
u8 phy_port, sw phy_port;

parent_sw = tb_to_switch(sw->dev.parent);
-sw_phy_port = phy_port_from_route(tb_route(sw), sw->depth);
-phy_port = phy_port_from_route(route, depth);
+sw_phy_port = tb_phy_port_from_link(sw->link);
+phy_port = tb_phy_port_from_link(link);

/*
 * On resume ICM will send us connected events for the
 @@ -425,16 +625,24 @@
 */
 if (sw->depth == depth && sw_phy_port == phy_port &&
     !sw->authorized == authorized) {
   -tb_port_at(tb_route(sw), parent_sw)->remote = NULL;
   -tb_port_at(route, parent_sw)->remote =
     -tb_upstream_port(sw);
   -sw->config.route_hi = upper_32_bits(route);
   -sw->config.route_lo = lower_32_bits(route);
   -sw->connection_id = pkg->connection_id;
   -sw->connection_key = pkg->connection_key;
   -sw->link = link;
   -sw->depth = depth;
   -sw->is_unplugged = false;
   +/*
   + * It was enumerated through another link so update
   + * route string accordingly.
   + */
   +if (sw->link != link) {
     +ret = icm->get_route(tb, link, depth, &route);
     +if (ret) {
       +tb_err(tb, "failed to update route string for switch at %u.%u\n",
             +link, depth);
       +tb_switch_put(sw);
       +return;
       +}
     +} else {
     +route = tb_route(sw);
     +}
   +update_switch(parent_sw, sw, route, pkg->connection_id,
     +pkg->connection_key, link, depth, boot);
   tb_switch_put(sw);
   return;
 }
/* Remove existing XDomain connection if found */
+xd = tb_xdomain_find_by_link_depth(tb, link, depth);
+if (xd) {
+remove_xdomain(xd);
+tb_xdomain_put(xd);
+}
+
+parent_sw = tb_switch_find_by_link_depth(tb, link, depth - 1);
+if (!parent_sw) {
+tb_err(tb, "failed to find parent switch for %u.%u\n",
@@ -474,30 +689,19 @@
+       ret = icm->get_route(tb, link, depth, &route);
+       if (ret) {
+       tb_err(tb, "failed to find route string for switch at %u.%u\n",
+               link, depth);
+       return;
+       }
+
+-sw = tb_switch_alloc(tb, &parent_sw->dev, route);
-+if (!sw) {
-+ret = icm->get_route(tb, link, depth, &route);
-+if (ret) {
-+tb_err(tb, "failed to find route string for switch at %u.%u\n",
-       +       link, depth);
-+tb_switch_put(parent_sw);
-+return;
+}
+
-sw->uuid = kmemdup(&pkg->ep_uuid, sizeof(pkg->ep_uuid), GFP_KERNEL);
-sw->connection_id = pkg->connection_id;
-sw->connection_key = pkg->connection_key;
-sw->link = link;
-sw->depth = depth;
-sw->authorized = authorized;
-sw->security_level = (pkg->hdr.flags & ICM_FLAGS_SLEVEL_MASK) >>
-ICM_FLAGS_SLEVEL_SHIFT;
+add_switch(parent_sw, route, &pkg->ep_uuid, (const u8 *)pkg->ep_name,
+          sizeof(pkg->ep_name), pkg->connection_id,
+          pkg->connection_key, link, depth, security_level,
+          authorized, boot);
+
-/* Link the two switches now */
-
-tb_port_at(route, parent_sw)->remote = tb_upstream_port(sw);
-tb_upstream_port(sw)->remote = tb_port_at(route, parent_sw);
-
-ret = tb_switch_add(sw);
-+if (ret) {
-+tb_port_at(tb_route(sw), parent_sw)->remote = NULL;
-+tb_switch_put(sw);
-+}
+tb_switch_put(parent_sw);
+}
static void remove_xdomain(struct tb_xdomain *xd)
{
    struct tb_switch *sw;
    -sw = tb_to_switch(xd->dev.parent);
    -tb_port_at(xd->route, sw)->xdomain = NULL;
    -tb_xdomain_remove(xd);
}

static void icm_fr_xdomain_connected(struct tb *tb, const struct icm_pkg_header *hdr)
{
    bool approved;
    u64 route;

    /*
    * After NVM upgrade adding root switch device fails because we
    * initiated reset. During that time ICM might still send
    * XDomain connected message which we ignore here.
    *
    */
    -if (!tb->root_switch)
        -return;
    
    link = pkg->link_info & ICM_LINK_INFO_LINK_MASK;
    depth = (pkg->link_info & ICM_LINK_INFO_DEPTH_MASK) >> ICM_LINK_INFO_DEPTH_SHIFT;
    phy_port = phy_port_from_route(route, depth);

    if (xd->depth == depth && xd_phy_port == phy_port) {
        -xd->link = link;
        -xd->route = route;
        -xd->is_unplugged = false;
        +update_xdomain(xd, route, link);
        tb_xdomain_put(xd);
    }
    return;
}

*/

/*
 * connected another host to the same port, remove the switch
 * first.
 */

-sw = get_switch_at_route(tb->root_switch, route);
if (sw) {
  sw = tb_switch_find_by_route(tb, route);
  if (sw) {
    remove_switch(sw);
    tb_switch_put(sw);
  }
}

sw = tb_switch_find_by_link_depth(tb, link, depth);
if (!sw) {
  return;
}

xd = tb_xdomain_alloc(sw->tb, &sw->dev, route,
  &pkg->local_uuid, &pkg->remote_uuid);
if (!xd) {
  tb_switch_put(sw);
  return;
}

xd->link = link;
xd->depth = depth;

_tb_port_at(route, sw)->xdomain = xd;

_tb_xdomain_add(xd);
add_xdomain(sw, route, &pkg->local_uuid, &pkg->remote_uuid, link,
  depth);
tb_switch_put(sw);
}

static int
icm_tr_driver_ready(struct tb *tb, enum tb_security_level *security_level,
  size_t *nboot_acl, bool *rpm) {
  struct icm_tr_pkg_driver_ready_response reply;
  struct icm_pkg_driver_ready request = {
    .hdr.code = ICM_DRIVER_READY,
  };
  int ret;
  memset(&reply, 0, sizeof(reply));
  ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
    1, 20000);
+if (ret)
+return ret;
+
+if (security_level)
+*security_level = reply.info & ICM_TR_INFO_SLEVEL_MASK;
+if (nboot_acl)
+*nboot_acl = (reply.info & ICM_TR_INFO_BOOT_ACL_MASK) >>
+ICM_TR_INFO_BOOT_ACL_SHIFT;
+if (rpm)
+*rpm = !(reply.hdr.flags & ICM_TR_FLAGS_RTD3);
+
+return 0;
+
+static int icm_tr_approve_switch(struct tb *tb, struct tb_switch *sw)
+{
+struct icm_tr_pkg_approve_device request;
+struct icm_tr_pkg_approve_device reply;
+int ret;
+
+memset(&request, 0, sizeof(request));
++memcpys(&request.ep_uuid, sw->uuid, sizeof(request.ep_uuid));
+request.hdr.code = ICM_APPROVE_DEVICE;
+request.route_lo = sw->config.route_lo;
+request.route_hi = sw->config.route_hi;
+request.connection_id = sw->connection_id;
+
+memset(&reply, 0, sizeof(reply));
+ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+ 1, ICM_APPROVE_TIMEOUT);
+if (ret)
+return ret;
+
+if (reply.hdr.flags & ICM_FLAGS_ERROR) {
+tb_warn(tb, "PCIe tunnel creation failed\n");
+return -EIO;
+
+}
+
+return 0;
+
+static int icm_tr_add_switch_key(struct tb *tb, struct tb_switch *sw)
+{
+struct icm_tr_pkg_add_device_key_response reply;
+struct icm_tr_pkg_add_device_key request;
+int ret;
+
+memset(&request, 0, sizeof(request));
memcpy(&request.ep_uuid, sw->uuid, sizeof(request.ep_uuid));
+request.hdr.code = ICM_ADD_DEVICE_KEY;
+request.route_lo = sw->config.route_lo;
+request.route_hi = sw->config.route_hi;
+request.connection_id = sw->connection_id;
+memcpy(request.key, sw->key, TB_SWITCH_KEY_SIZE);
+
+memset(&reply, 0, sizeof(reply));
+ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+ 1, ICM_TIMEOUT);
+if (ret)
+return ret;
+
+if (reply.hdr.flags & ICM_FLAGS_ERROR) {
+tb_warn(tb, "Adding key to switch failed\n");
+return -EIO;
+}
+
+return 0;
+
+static int icm_tr_challenge_switch_key(struct tb *tb, struct tb_switch *sw,
+  const u8 *challenge, u8 *response)
+{
+struct icm_tr_pkg_challenge_device_response reply;
+struct icm_tr_pkg_challenge_device request;
+int ret;
+
+memset(&request, 0, sizeof(request));
+memcpy(&request.ep_uuid, sw->uuid, sizeof(request.ep_uuid));
+request.hdr.code = ICM_CHALLENGE_DEVICE;
+request.route_lo = sw->config.route_lo;
+request.route_hi = sw->config.route_hi;
+request.connection_id = sw->connection_id;
+memcpy(request.challenge, challenge, TB_SWITCH_KEY_SIZE);
+
+memset(&reply, 0, sizeof(reply));
+ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+ 1, ICM_TIMEOUT);
+if (ret)
+return ret;
+
+if (reply.hdr.flags & ICM_FLAGS_ERROR)
+return -EKEYREJECTED;
+if (reply.hdr.flags & ICM_FLAGS_NO_KEY)
+return -ENOKEY;
+
+memcpy(response, reply.response, TB_SWITCH_KEY_SIZE);
+return 0;
+
+static int icm_tr_approve_xdomain_paths(struct tb *tb, struct tb_xdomain *xd)
+{
+struct icm_tr_pkg_approve_xdomain_response reply;
+struct icm_tr_pkg_approve_xdomain request;
+int ret;
+
+memset(&request, 0, sizeof(request));
+request.hdr.code = ICM_APPROVE_XDOMAIN;
+request.route_hi = upper_32_bits(xd->route);
+request.route_lo = lower_32_bits(xd->route);
+request.transmit_path = xd->transmit_path;
+request.transmit_ring = xd->transmit_ring;
+request.receive_path = xd->receive_path;
+request.receive_ring = xd->receive_ring;
+memcpy(&request.remote_uuid, xd->remote_uuid, sizeof(*xd->remote_uuid));
+
+memset(&reply, 0, sizeof(reply));
+ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+ 1, ICM_TIMEOUT);
+if (ret)
+return ret;
+
+if (reply.hdr.flags & ICM_FLAGS_ERROR)
+return -EIO;
+
+return 0;
+
+static int icm_tr_xdomain_tear_down(struct tb *tb, struct tb_xdomain *xd,
+    int stage)
+{
+struct icm_tr_pkg_disconnect_xdomain_response reply;
+struct icm_tr_pkg_disconnect_xdomain request;
+int ret;
+
+memset(&request, 0, sizeof(request));
+request.hdr.code = ICM_DISCONNECT_XDOMAIN;
+request.stage = stage;
+request.route_hi = upper_32_bits(xd->route);
+request.route_lo = lower_32_bits(xd->route);
+memcpy(&request.remote_uuid, xd->remote_uuid, sizeof(*xd->remote_uuid));
+
+memset(&reply, 0, sizeof(reply));
+ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+ 1, ICM_TIMEOUT);
+ 1, ICM_TIMEOUT);
+if (ret)
+return ret;
+
+if (reply.hdr.flags & ICM_FLAGS_ERROR)
+return -EIO;
+
+return 0;
+
+static int icm_tr_disconnect_xdomain_paths(struct tb *tb, struct tb_xdomain *xd)
+
+int ret;
+
+ret = icm_tr_xdomain_tear_down(tb, xd, 1);
+if (ret)
+return ret;
+
+usleep_range(10, 50);
+return icm_tr_xdomain_tear_down(tb, xd, 2);
+
+static void
+icm_tr_device_connected(struct tb *tb, const struct icm_pkg_header *hdr)
+
+const struct icm_tr_event_device_connected *pkg =
+(const struct icm_tr_event_device_connected *)hdr;
+enum tb_security_level security_level;
+struct tb_switch *sw, *parent_sw;
+struct tb_xdomain *xd;
+bool authorized, boot;
+u64 route;
+
+/*
+ * Currently we don't use the QoS information coming with the
+ * device connected message so simply just ignore that extra
+ * packet for now.
+ */
+if (pkg->hdr.packet_id)
+return;
+
+route = get_route(pkg->route_hi, pkg->route_lo);
+authorized = pkg->link_info & ICM_LINK_INFO_APPROVED;
+security_level = (pkg->hdr.flags & ICM_FLAGS_SLEVEL_MASK) >>
+ICM_FLAGS_SLEVEL_SHIFT;
+boot = pkg->link_info & ICM_LINK_INFO_BOOT;
+
+if (pkg->link_info & ICM_LINK_INFO_REJECTED) {


+tb_info(tb, "switch at %llx was rejected by ICM firmware because topology limit exceeded\n", +route);
+return;
+
+sw = tb_switch_find_by_uuid(tb, &pkg->ep_uuid);
+if (sw) {
+    /* Update the switch if it is still in the same place */
+    if (tb_route(sw) == route && !!sw->authorized == authorized) {
+        parent_sw = tb_to_switch(sw->dev.parent);
+        update_switch(parent_sw, sw, route, pkg->connection_id,
+          0, 0, 0, boot);
+        tb_switch_put(sw);
+        return;
+    }
+    remove_switch(sw);
+    tb_switch_put(sw);
+}
+
+    /* Another switch with the same address */
+    sw = tb_switch_find_by_route(tb, route);
+    if (sw) {
+        remove_switch(sw);
+        tb_switch_put(sw);
+    }
+
+    /* XDomain connection with the same address */
+    xd = tb_xdomain_find_by_route(tb, route);
+    if (xd) {
+        remove_xdomain(xd);
+        tb_xdomain_put(xd);
+    }
+
+    parent_sw = tb_switch_find_by_route(tb, get_parent_route(route));
+    if (!parent_sw) {
+        tb_err(tb, "failed to find parent switch for %llx\n", route);
+        return;
+    }
+    add_switch(parent_sw, route, &pkg->ep_uuid, (const u8 *)pkg->ep_name,
+      sizeof(pkg->ep_name), pkg->connection_id,
+      0, 0, 0, security_level, authorized, boot);
+    tb_switch_put(parent_sw);
+}
+
+static void
+icm_tr_device_disconnected(struct tb *tb, const struct icm_pkg_header *hdr)
+{
+const struct icm_tr_event_device_disconnected *pkg =
+(const struct icm_tr_event_device_disconnected *)hdr;
+struct tb_switch *sw;
+u64 route;
+
+route = get_route(pkg->route_hi, pkg->route_lo);
+
+sw = tb_switch_find_by_route(tb, route);
+if (!sw) {
+tb_warn(tb, "no switch exists at %llx, ignoring\n", route);
+return;
+}
+
+remove_switch(sw);
+tb_switch_put(sw);
+}
+
+static void
+icm_tr_xdomain_connected(struct tb *tb, const struct icm_pkg_header *hdr)
+{
+const struct icm_tr_event_xdomain_connected *pkg =
+(const struct icm_tr_event_xdomain_connected *)hdr;
+struct tb_xdomain *xd;
+struct tb_switch *sw;
+u64 route;
+
+if (!tb->root_switch)
+return;
+
+route = get_route(pkg->local_route_hi, pkg->local_route_lo);
+
+xd = tb_xdomain_find_by_uuid(tb, &pkg->remote_uuid);
+if (xd) {
+if (xd->route == route) {
+update_xdomain(xd, route, 0);
+tb_xdomain_put(xd);
+return;
+}
+
+remove_xdomain(xd);
+tb_xdomain_put(xd);
+}
+
+/* An existing xdomain with the same address */
+xd = tb_xdomain_find_by_route(tb, route);
+if (xd) {

+remove_xdomain(xd);
+tb_xdomain_put(xd);
+
+/*
+ * If the user disconnected a switch during suspend and
+ * connected another host to the same port, remove the switch
+ * first.
+ */
+sw = tb_switch_find_by_route(tb, route);
+if (sw) {
+remove_switch(sw);
+tb_switch_put(sw);
+}
+
+sw = tb_switch_find_by_route(tb, get_parent_route(route));
+if (!sw) {
+tb_warn(tb, "no switch exists at %llx, ignoring\n", route);
+return;
+}
+
+add_xdomain(sw, route, &pkg->local_uuid, &pkg->remote_uuid, 0, 0);
+tb_switch_put(sw);
+
+static void
+icm_tr_xdomain_disconnected(struct tb *tb, const struct icm_pkg_header *hdr)
+{
+const struct icm_tr_event_xdomain_disconnected *pkg =
+(const struct icm_tr_event_xdomain_disconnected *)hdr;
+struct tb_xdomain *xd;
+u64 route;
+
+route = get_route(pkg->route_hi, pkg->route_lo);
+
+xd = tb_xdomain_find_by_route(tb, route);
+if (xd) {
+remove_xdomain(xd);
+tb_xdomain_put(xd);
+}
+
+static struct pci_dev *get_upstream_port(struct pci_dev *pdev)
+{
+struct pci_dev *parent;
+}@ @ .728,14 +1247,14 @@
+static int icm_ar_get_mode(struct tb *tb)
+{
struct tb_nhi *nhi = tb->nhi;
-int retries = 5;
+int retries = 60;
u32 val;

do {
    val = ioread32(nhi->iobase + REG_FW_STS);
    if (val & REG_FW_STS_NVM_AUTH_DONE)
        break;
-msleep(30);
+msleep(50);
} while (--retries);

if (!retries) {
@@ -746,6 +1265,33 @@
    return nhi_mailbox_mode(nhi);
 }

+static int
+icm_ar_driver_ready(struct tb *tb, enum tb_security_level *security_level,
+    size_t *nboot_acl, bool *rpm)
+{
+    struct icm_ar_pkg_driver_ready_response reply;
+    struct icm_pkg_driver_ready request = {
+        .hdr.code = ICM_DRIVER_READY,
+    };
+    int ret;
+    +memset(&reply, 0, sizeof(reply));
+    ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+        1, ICM_TIMEOUT);
+    +if (ret)
+        return ret;
+    +return ret;
+    +if (security_level)
+        +security_level = reply.info & ICM_AR_INFO_SLEVEL_MASK;
+    +if (nboot_acl && (reply.info & ICM_AR_INFO_BOOT_ACL_SUPPORTED))
+        +nboot_acl = (reply.info & ICM_AR_INFO_BOOT_ACL_MASK) >>
+            ICM_AR_INFO_BOOT_ACL_SHIFT;
+    +ICM_AR_INFO_BOOT_ACL_SHIFT;
+    +if (rpm)
+        +rpm = (!(reply.hdr.flags & ICM_AR_FLAGS_RTD3));
+    +return 0;
+}
+static int icm_ar_get_route(struct tb *tb, u8 link, u8 depth, u64 *route)
+{
+    struct icm_ar_pkg_get_route_response reply;

@@ -768,6 +1314,87 @@

 return 0;
 }

+static int icm_ar_get_boot_acl(struct tb *tb, uuid_t *uuids, size_t nuuids)
+{
+    struct icm_ar_pkg_preboot_acl_response reply;
+    struct icm_ar_pkg_preboot_acl request = {
+        .hdr = {.code = ICM_PREBOOT_ACL },
+    };
+    int ret, i;
+    
+    memset(&reply, 0, sizeof(reply));
+    ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+                      ICM_TIMEOUT);
+    if (ret)
+        return ret;
+    if (reply.hdr.flags & ICM_FLAGS_ERROR)
+        return -EIO;
+    for (i = 0; i < nuuids; i++) {
+        u32 *uuid = (u32 *)&uuids[i];
+        uuid[0] = reply.acl[i].uuid_lo;
+        uuid[1] = reply.acl[i].uuid_hi;
+        if (uuid[0] == 0xffffffff && uuid[1] == 0xffffffff) {
+            /* Map empty entries to null UUID */
+            uuid[0] = 0;
+            uuid[1] = 0;
+        } else if (uuid[0] != 0 || uuid[1] != 0) {
+            /* Upper two DWs are always one's */
+            uuid[2] = 0xffffffff;
+            uuid[3] = 0xffffffff;
+        }
+    }
+    return ret;
+}
+
+static int icm_ar_set_boot_acl(struct tb *tb, const uuid_t *uuids,
+        size_t nuuids)
+{
+    struct icm_ar_pkg_preboot_acl_response reply;
+    struct icm_ar_pkg_preboot_acl request = {
+        .hdr = {
+            .code = ICM_PREBOOT_ACL,
+        },
+    };
+    int ret, i;
+    
+    memset(&reply, 0, sizeof(reply));
+    ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+                      ICM_TIMEOUT);
+    if (ret)
+        return ret;
+    if (reply.hdr.flags & ICM_FLAGS_ERROR)
+        return -EIO;
+    for (i = 0; i < nuuids; i++) {
+        u32 *uuid = (u32 *)&uuids[i];
+        uuid[0] = reply.acl[i].uuid_lo;
+        uuid[1] = reply.acl[i].uuid_hi;
+        if (uuid[0] == 0xffffffff && uuid[1] == 0xffffffff) {
+            /* Map empty entries to null UUID */
+            uuid[0] = 0;
+            uuid[1] = 0;
+        } else if (uuid[0] != 0 || uuid[1] != 0) {
+            /* Upper two DWs are always one's */
+            uuid[2] = 0xffffffff;
+            uuid[3] = 0xffffffff;
+        }
+    }
+    return ret;
+}

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flags = ICM_FLAGS_WRITE,
+}
+};
+int ret, i;
+
+for (i = 0; i < nuuids; i++) {
+const u32 *uuid = (const u32 *)&uuids[i];
+
+if (uuid_is_null(&uuids[i])) {
+/*
+ * Map null UUID to the empty (all one) entries
+ * for ICM.
+ */
+request.acl[i].uuid_lo = 0xffffffff;
+request.acl[i].uuid_hi = 0xffffffff;
+} else {
+/* Two high DWs need to be set to all one */
+return -EINVAL;
+
+request.acl[i].uuid_lo = uuid[0];
+request.acl[i].uuid_hi = uuid[1];
+}
+
+memset(&reply, 0, sizeof(reply));
+ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
+1, ICM_TIMEOUT);
+if (ret)
+return ret;
+
+if (reply.hdr.flags & ICM_FLAGS_ERROR)
+return -EIO;
+
+return 0;
+
+}
+
+static void icm_handle_notification(struct work_struct *work)
+
+switch (n->pkg->code) {
+case ICM_EVENT_DEVICE_CONNECTED:
+icm->device_connected(tb, n->pkg);
+break;
+}}
+}
case ICM_EVENT_DEVICE_DISCONNECTED:
-icm->device_disconnected(tb, n->pkg);
break;

case ICM_EVENT_XDOMAIN_CONNECTED:
-icm->xdomain_connected(tb, n->pkg);
break;

case ICM_EVENT_XDOMAIN_DISCONNECTED:
-icm->xdomainDisconnected(tb, n->pkg);
break;

+/
+ * When the domain is stopped we flush its workqueue but before
+ * that the root switch is removed. In that case we should treat
+ * the queued events as being canceled.
+ */
+if (tb->root_switch) {
+switch (n->pkg->code) {
+case ICM_EVENT_DEVICE_CONNECTED:
+icm->device_connected(tb, n->pkg);
+break;
+case ICM_EVENTDEVICE_DISCONNECTED:
+icm->deviceDisconnected(tb, n->pkg);
+break;
+case ICM_EVENT_XDOMAIN_CONNECTED:
+icm->xdomain_connected(tb, n->pkg);
+break;
+case ICM_EVENT_XDOMAIN_DISCONNECTED:
+icm->xdomainDisconnected(tb, n->pkg);
+break;
+}
}

mutex_unlock(&tb->lock);
@@ -814,23 +1448,18 @@

static int
-__icm_driver_ready(struct tb *tb, enum tb_security_level *security_level)
+__icm_driver_ready(struct tb *tb, enum tb_security_level *security_level,
+    size_t *nboot_acl, bool *rpm)
{
-struct icm_pkg_driver_ready_response reply;
-struct icm_pkg_driver_ready request = {
-.hdr.code = ICM_DRIVER_READY,
-};
-unsigned int retries = 10;
+struct icm *icm = tb_priv(tb);
+unsigned int retries = 50;
int ret;
-memset(&reply, 0, sizeof(reply));
-ret = icm_request(tb, &request, sizeof(request), &reply, sizeof(reply),
- 1, ICM_TIMEOUT);
-if (ret)
+ret = icm->driver_ready(tb, security_level, nboot_acl, rpm);
+if (ret) {
+tb_err(tb, "failed to send driver ready to ICM\n");
return ret;
-
-if (security_level)
-*security_level = reply.security_level & 0xf;
+
}

/*
 * Hold on here until the switch config space is accessible so
@@ -848,6 +1477,7 @@
msleep(50);
} while (--retries);
+tb_err(tb, "failed to read root switch config space, giving up\n");
return -ETIMEDOUT;
}
@@ -915,6 +1545,9 @@
struct icm *icm = tb_priv(tb);
u32 val;
+if (!icm->upstream_port)
+return -ENODEV;
+
/* Put ARC to wait for CIO reset event to happen */
val = ioread32(nhi->iobase + REG_FW_STS);
val |= REG_FW_STS_CIO_RESET_REQ;
@@ -1054,6 +1687,9 @@
break;

default:
+if (ret < 0)
+return ret;
+
tb_err(tb, "ICM firmware is in wrong mode: %u\n", ret);
return -ENODEV;
}
@@ -1089,18 +1725,29 @@
return 0;
}
-return __icm_driver_ready(tb, &tb->security_level);
+ret = __icm_driver_ready(tb, &tb->security_level, &tb->nboot_acl, &icm->rpm);
+if (ret)
+return ret;
+
+/*
+ * Make sure the number of supported preboot ACL matches what we
+ * expect or disable the whole feature.
+ */
+if (tb->nboot_acl > icm->max_boot_acl)
+tb->nboot_acl = 0;
+
+return 0;
}

static int icm_suspend(struct tb *tb)
{
-int ret;
+struct icm *icm = tb_priv(tb);

-ret = nhi_mailbox_cmd(tb-> nhi, NHI_MAILBOX_SAVE_DEVS, 0);
-if (ret)
-tb->info(tb, "Ignoring mailbox command error (%d) in %s\n", ret, __func__);}
+if (icm->save_devices)
+icm->save_devices(tb);

+nhi_mailbox_cmd(tb-> nhi, NHI_MAILBOX_DRV_UNLOADS, 0);
return 0;
}

@@ -1185,7 +1832,7 @@
 * Now all existing children should be resumed, start events
 * from ICM to get updated status.
 */
-__icm_driver_ready(tb, NULL);
+__icm_driver_ready(tb, NULL, NULL, NULL);

/*
 * We do not get notifications of devices that have been
@@ -1195,6 +1842,22 @@
 queue_delayed_work(tb->wq, &icm->rescan_work, msecs_to_jiffies(500));
 }

+static int icm_runtime_suspend(struct tb *tb)
+{
+nhi_mailbox_cmd(tb-> nhi, NHI_MAILBOX_DRV_UNLOADS, 0);

+return 0;
+
+static int icm_runtime_resume(struct tb *tb)
+{
+  /*
+   * We can reuse the same resume functionality than with system
+   * suspend.
+   */
+  icm_complete(tb);
+  return 0;
+
+}
+
+static int icm_start(struct tb *tb)
{
  struct icm *icm = tb_priv(tb);
  @@ -1213,6 +1876,7 @@
      * prevent root switch NVM upgrade on Macs for now.
      */
  tb->root_switch->no_nvm_upgrade = x86_apple_machine;
  +tb->root_switch->rpm = icm->rpm;
  
  ret = tb_switch_add(tb->root_switch);
  if (ret) {
    @@ -1238,7 +1902,7 @@
    return nhi_mailbox_cmd(tb->nhi, NHI_MAILBOX_DISCONNECT_PCIE_PATHS, 0);
  }
  
  /*
-   * Falcon Ridge and Alpine Ridge */
+  /* Falcon Ridge */
  static const struct tb_cm_ops icm_fr_ops = {
     .driver_ready = icm_driver_ready,
     .start = icm_start,
     @@ -1254,6 +1918,46 @@
       .disconnect_xdomain_paths = icm_fr_disconnect_xdomain_paths,
  };

+  /* Alpine Ridge */
+static const struct tb_cm_ops icm_ar_ops = {
+  .driver_ready = icm_driver_ready,
+  .start = icm_start,
+  .stop = icm_stop,
+  .suspend = icm_suspend,
+  .complete = icm_complete,
+  .runtime_suspend = icm_runtime_suspend,
+  .runtime_resume = icm_runtime_resume,
+  .handle_event = icm_handle_event,
+  .get_boot_acl = icm_ar_get_boot_acl,
+ set_boot_acl = icm_ar_set_boot_acl,
+ approve_switch = icm_fr_approve_switch,
+ add_switch_key = icm_fr_add_switch_key,
+ challenge_switch_key = icm_fr_challenge_switch_key,
+ disconnect_pcie_paths = icm_disconnect_pcie_paths,
+ approve_xdomain_paths = icm_fr_approve_xdomain_paths,
+ disconnect_xdomain_paths = icm_fr_disconnect_xdomain_paths,
+
+ /* Titan Ridge */
+ static const struct tb_cm_ops icm_tr_ops = {
+ driver_ready = icm_tr_driver_ready,
+ start = icm_start,
+ stop = icm_stop,
+ suspend = icm_suspend,
+ complete = icm_complete,
+ runtime_suspend = icm_runtime_suspend,
+ runtime_resume = icm_runtime_resume,
+ handle_event = icm_handle_event,
+ get_boot_acl = icm_ar_get_boot_acl,
+ set_boot_acl = icm_ar_set_boot_acl,
+ approve_switch = icm_tr_approve_switch,
+ add_switch_key = icm_tr_add_switch_key,
+ challenge_switch_key = icm_tr_challenge_switch_key,
+ disconnect_pcie_paths = icm_disconnect_pcie_paths,
+ approve_xdomain_paths = icm_tr_approve_xdomain_paths,
+ disconnect_xdomain_paths = icm_tr_disconnect_xdomain_paths,
+
+ struct tb *icm_probe(struct tb nhi *
+ {
+ struct icm *
+ icm;
+ case PCI_DEVICE_ID_INTEL_FALCON_RIDGE_4C_NHI:
+ icm->is_supported = icm_fr_is_supported;
+ icm->get_route = icm_fr_get_route;
+ icm->save_devices = icm_fr_save_devices;
+ icm->driver_ready = icm_fr_driver_ready;
+ icm->device_connected = icm_fr_device_connected;
+ icm->device_disconnected = icm_fr_device_disconnected;
+ icm->xdomain_connected = icm_fr_xdomain_connected;
+ case PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_LP_NHI:
+ case PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_C_4C_NHI:
+ case PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_C_2C_NHI:
+ icm->max_boot_acl = ICM_AR_PREBOOT_ACL_ENTRIES;
+ icm->is_supported = icm_ar_is_supported;
+ icm->get_mode = icm_ar_get_mode;
icm->get_route = icm_ar_get_route;
+icm->save_devices = icm_fr_save_devices;
+icm->driver_ready = icm_ar_driver_ready;
icm->device_connected = icm_fr_device_connected;
icm->device_disconnected = icm_fr_device_disconnected;
icm->xdomain_connected = icm_fr_xdomain_connected;
icm->xdomain_disconnected = icm_fr_xdomain_disconnected;
-tb->cm_ops = &icm_fr_ops;
+tb->cm_ops = &icm_ar_ops;
+break;
+
+case PCI_DEVICE_ID_INTEL_TITAN_RIDGE_2C_NHI:
+case PCI_DEVICE_ID_INTEL_TITAN_RIDGE_4C_NHI:
+icm->max_boot_acl = ICM_AR_PREBOOT_ACL_ENTRIES;
+icm->is_supported = icm_ar_is_supported;
+icm->get_mode = icm_ar_get_mode;
+icm->driver_ready = icm_tr_driver_ready;
+icm->device_connected = icm_tr_device_connected;
+icm->device_disconnected = icm_tr_device_disconnected;
+icm->xdomain_connected = icm_tr_xdomain_connected;
+icm->xdomain_disconnected = icm_tr_xdomain_disconnected;
+tb->cm_ops = &icm_tr_ops;
break;
}

--- linux-4.15.0.orig/drivers/thunderbolt/nhi.c
+++ linux-4.15.0/drivers/thunderbolt/nhi.c
@@ -142,9 +142,20 @@
return io;
}

-#static void ring_iowrite16desc(struct tb_ring *ring, u32 value, u32 offset)
+static void ring_iowrite_cons(struct tb_ring *ring, u16 cons)
{
    -iowrite16(value, ring_desc_base(ring) + offset);
    +/*
    + * The other 16-bits in the register is read-only and writes to it
    + * are ignored by the hardware so we can save one ioread32() by
    + * filling the read-only bits with zeroes.
    + */
    +iowrite32(cons, ring_desc_base(ring) + 8);
    +}
    +
    +static void ring_iowrite_prod(struct tb_ring *ring, u16 prod)
    +{
    +/* See ring_iowrite_cons() above for explanation */
    +iowrite32(prod << 16, ring_desc_base(ring) + 8);
    +}
static void ring_iowrite32desc(struct tb_ring *ring, u32 value, u32 offset)
@@ -196,7 +207,10 @@
descriptor->sof = frame->sof;
}
ring->head = (ring->head + 1) % ring->size;
-ring_iowrite16desc(ring, ring->head, ring->is_tx ? 10 : 8);
+if (ring->is_tx)
+    ring_iowrite_prod(ring, ring->head);
+else
+    ring_iowrite_cons(ring, ring->head);
}
}

@@ -394,12 +408,23 @@
ring->vector = ret;

-ring->irq = pci_irq_vector(ring-> nhi->pdev, ring->vector);
-if (ring->irq < 0)
-return ring->irq;
+ret = pci_irq_vector(ring-> nhi->pdev, ring->vector);
+if (ret < 0)
+    goto err_ida_remove;
+
+ring->irq = ret;

irqflags = no_suspend ? IRQF_NO_SUSPEND : 0;
-return request_irq(ring->irq, ring_msix, irqflags, "thunderbolt", ring);
+ret = request_irq(ring->irq, ring_msix, irqflags, "thunderbolt", ring);
+if (ret)
+    goto err_ida_remove;
+
+return 0;
+
+err_ida_remove:
+ida_simple_remove(& nhi->msix_ida, ring->vector);
+
+return ret;
}

static void ring_release_msix(struct tb_ring *ring)
@@ -660,7 +685,7 @@
ring_iowrite32options(ring, 0, 0);
+ring_iowrite32desc(ring, 0, 8);
ring_iowrite32desc(ring, 0, 12);
ring->head = 0;
ring->tail = 0;
@@ -900,7 +925,32 @@
struct pci_dev *pdev = to_pci_dev(dev);
struct tb *tb = pci_get_drvdata(pdev);

-tb_domain_complete(tb);
+/*
+ * If we were runtime suspended when system suspend started,
+ * schedule runtime resume now. It should bring the domain back
+ * to functional state.
+ */
+if (pm_runtime_suspended(&pdev->dev))
+pm_runtime_resume(&pdev->dev);
+else
+tb_domain_complete(tb);
+
+static int nhi_runtime_suspend(struct device *dev)
+{
+struct pci_dev *pdev = to_pci_dev(dev);
+struct tb *tb = pci_get_drvdata(pdev);
+
+return tb_domain_runtime_suspend(tb);
+}
+
+static int nhi_runtime_resume(struct device *dev)
+{
+struct pci_dev *pdev = to_pci_dev(dev);
+struct tb *tb = pci_get_drvdata(pdev);
+
+nhi_enable_int_throttling(tb->nhi);
+return tb_domain_runtime_resume(tb);
}

static void nhi_shutdown(struct tb_nhi * nhi)
@@ -1015,6 +1065,14 @@

spin_lock_init(& nhi->lock);

+res = dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(64));
+if (res)
+res = dma_set_mask_and_coherent(&pdev->dev, DMA_BIT_MASK(32));
+if (res) {
+dev_err(&pdev->dev, "failed to set DMA mask\n");
+return res;
+}
pci_set_master(pdev);

tb = icm_probe(nhi);
@@ -1036,10 +1094,15 @@*/
tb_domain_put(tb);
nhi_shutdown(nhi);
-return -EIO;
+return res;
}
pci_set_drvdata(pdev, tb);

+pm_runtime_allow(&pdev->dev);
+pm_runtime_set_autosuspend_delay(&pdev->dev, TB_AUTOSUSPEND_DELAY);
+pm_runtime_use_autosuspend(&pdev->dev);
+pm_runtime_put_autosuspend(&pdev->dev);
+
return 0;
}
@@ -1048,6 +1111,10 @@
struct tb *tb = pci_get_drvdata(pdev);
struct tb_nhi * nhi = tb-> nhi;

+pm_runtime_get_sync(&pdev->dev);
+pm_runtime_dont_use_autosuspend(&pdev->dev);
+pm_runtime_forbid(&pdev->dev);
+
tb_domain_remove(tb);
nhi_shutdown(nhi);
}
@@ -1064,11 +1131,14 @@
 */
+.thaw_noirq = nhi_resume_noirq,
 .restore_noirq = nhi_resume_noirq,
 .suspend = nhi_suspend,
 .freeze = nhi_suspend,
 .poweroff = nhi_suspend,
 .complete = nhi_complete,
+.runtime_suspend = nhi_runtime_suspend,
+.runtime_resume = nhi_runtime_resume,
};

static struct pci_device_id nhi_ids[] = {
@@ -1110,6 +1180,8 @@
{ PCI_VDEVICE(INTEL, PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_C_2C_NHI) },
{ PCI_VDEVICE(INTEL, PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_C_4C_NHI) },
{ PCI_VDEVICE(INTEL, PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_C_USBONLY_NHI) },
+{ PCI_VDEVICE(INTEL, PCI_DEVICE_ID_INTEL_TITAN_RIDGE_2C_NHI) },
+{ PCI_VDEVICE(INTEL, PCI_DEVICE_ID_INTEL_TITAN_RIDGE_4C_NHI) },

{ 0. }
);
@@ -1144,5 +1216,5 @@
tb_domain_exit();
}

-fs_initcall(nhi_init);
+rootfs_initcall(nhi_init);
module_exit(nhi_unload);
--- linux-4.15.0.orig/drivers/thunderbolt/nhi.h
+++ linux-4.15.0/drivers/thunderbolt/nhi.h
@@ -45,5 +45,10 @@
#define PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_LP_USBONLY_NHI 0x15dc
#define PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_USBONLY_NHI 0x15dd
#define PCI_DEVICE_ID_INTEL_ALPINE_RIDGE_C_USBONLY_NHI 0x15de
+#define PCI_DEVICE_ID_INTEL_TITAN_RIDGE_2C_BRIDGE 0x15e7
+#define PCI_DEVICE_ID_INTEL_TITAN_RIDGE_2C_NHI 0x15e8
+#define PCI_DEVICE_ID_INTEL_TITAN_RIDGE_4C_BRIDGE 0x15ea
+#define PCI_DEVICE_ID_INTEL_TITAN_RIDGE_4C_NHI 0x15eb
+#define PCI_DEVICE_ID_INTEL_TITAN_RIDGE_DD_BRIDGE 0x15ef

#endif
--- linux-4.15.0.orig/drivers/thunderbolt/property.c
+++ linux-4.15.0/drivers/thunderbolt/property.c
@@ -551,6 +551,11 @@
     property->length = size / 4;
     property->value.data = kzalloc(size, GFP_KERNEL);
+     if (!property->value.data) {
+         kfree(property);
+         return -ENOMEM;
+     }
+
     memcpy(property->value.data, buf, buflen);
     list_add_tail(&property->list, &parent->properties);
@@ -581,7 +586,12 @@
     return -ENOMEM;
     property->length = size / 4;
-    property->value.data = kzalloc(size, GFP_KERNEL);
+    property->value.text = kzalloc(size, GFP_KERNEL);
+if (!property->value.text) {
+kfree(property);
+return -ENOMEM;
+
+strcpy(property->value.text, text);
+
+list_add_tail(&property->list, &parent->properties);
--- linux-4.15.0.orig/drivers/thunderbolt/switch.c
+++ linux-4.15.0/drivers/thunderbolt/switch.c
@@ -8,15 +8,14 @@
#include <linux/delay.h>
#include <linux/idr.h>
#include <linux/nvmem-provider.h>
+#include <linux/pm_runtime.h>
+#include <linux/sched/signal.h>
#include <linux/sizes.h>
#include <linux/slab.h>
#include <linux/vmalloc.h>

#include "tb.h"

-/* Switch authorization from userspace is serialized by this lock */
-static DEFINE_MUTEX(switch_lock);
-
-/* Switch NVM support */

#define NVM_DEVID		0x05
@@ -168,7 +167,7 @@
static int nvm_authenticate_host(struct tb_switch *sw)
{
-int ret;
+int ret = 0;

/*
 * Root switch NVM upgrade requires that we disconnect the
@@ -176,6 +175,8 @@
 * already).
 */
 if (!sw->safe_mode) {
+u32 status;
+ret = tb_domain_disconnect_all_paths(sw->tb);
 if (ret)
 return ret;
@@ -184,7 +185,16 @@
 * everything goes well so getting timeout is expected.
ret = dma_port_flash_update_auth(sw->dma_port);
-return ret == -ETIMEDOUT ? 0 : ret;
+if (ret || ret == -ETIMEDOUT)
+return 0;
+
+/*
+ * Any error from update auth operation requires power
+ * cycling of the host router.
+ */
tb_sw_warn(sw, "failed to authenticate NVM, power cycling\n");
+if (dma_port_flash_update_auth_status(sw->dma_port, &status) > 0)
+nvm_set_auth_status(sw, status);
}
/*
@@ -192,7 +202,7 @@
*/
switch.
*/
dma_port_power_cycle(sw->dma_port);
-return 0;
+return ret;
}

static int nvm_authenticate_device(struct tb_switch *sw)
@@ -200,8 +210,16 @@
int ret, retries = 10;

ret = dma_port_flash_update_auth(sw->dma_port);
-if (ret && ret != -ETIMEDOUT)
+switch (ret) {
+case 0:
+case -ETIMEDOUT:
+case -EACCES:
+case -EINVAL:
+/* Power cycle is required */
+break;
+default:
+return ret;
+}
+
+/*
+ * Poll here for the authentication status. It takes some time
@@ -236,8 +254,20 @@
size_t bytes)
{
 struct tb_switch *sw = priv;
+int ret;

+pm_runtime_get_sync(&sw->dev);
+ret = dma_port_flash_read(sw->dma_port, offset, val, bytes);
+pm_runtime_mark_last_busy(&sw->dev);
+pm_runtime_put_autosuspend(&sw->dev);

-dma_port_flash_read(sw->dma_port, offset, val, bytes);
+return ret;
+
+static int tb_switch_nvm_no_read(void *priv, unsigned int offset, void *val,
+                                  size_t bytes)
+{
+  return -EPERM;
+
+static int tb_switch_nvm_write(void *priv, unsigned int offset, void *val,
      size_t bytes)
+{
+  return -EPERM;
    }

    static int tb_switch_nvm_write(void *priv, unsigned int offset, void *val,
        size_t bytes)
      @ @ -246.8 +276.8 @ @
    struct tb_switch *sw = priv;
    int ret = 0;

    -if (mutex_lock_interruptible(&switch_lock))
      -return -ERESTARTSYS;
    +if (!mutex_trylock(&sw->tb->lock))
      +return restart_syscall();

    /*
     * Since writing the NVM image might require some special steps,
      @ @ -267.7 +297.7 @ @
    memcpy(sw->nvm->buf + offset, val, bytes);

    unlock:
    -mutex_unlock(&switch_lock);
    +mutex_unlock(&sw->tb->lock);

    return ret;
    }
    @ @ -285,6 +315,7 @ @
    config.read_only = true;
  } else {
    config.name = "nvm_non_active";
    +config.reg_read = tb_switch_nvm_no_read;
    config.reg_write = tb_switch_nvm_write;
    config.root_only = true;
  }
    @ @ -356,10 +387,7 @ @
  }
  nvm->non_active = nvm_dev;
mutex_lock(&switch_lock);
sw->nvm = nvm;
mutex_unlock(&switch_lock);

return 0;

err_nvm_active:
@@ -376,10 +404,8 @@
{
    struct tb_switch_nvm *nvm;

    mutex_lock(&switch_lock);
    nvm = sw->nvm;
    sw->nvm = NULL;
    mutex_unlock(&switch_lock);

    if (!nvm)
        return;
@@ -638,24 +664,6 @@
    return res.err;
}

-struct tb_switch *get_switch_at_route(struct tb_switch *sw, u64 route)
{-
    u8 next_port = route; /*
    -   * Routes use a stride of 8 bits,
    -   * eventhough a port index has 6 bits at most.
    -   */
    -if (route == 0)
        return sw;
    -if (next_port > sw->config.max_port_number)
        return NULL;
    -if (tb_is_upstream_port(&sw->ports[next_port]))
        return NULL;
    -if (!sw->ports[next_port].remote)
        return NULL;
    -return get_switch_at_route(sw->ports[next_port].remote->sw,
        -route >> TB_ROUTE_SHIFT);
    -}
    -
/**
 * tb_plug_events_active() - enable/disable plug events on a switch
 * @
@@ -710,12 +718,20 @@
{ int ret = -EINVAL;

if (mutex_lock_interruptible(&switch_lock))
    return -ERESTARTSYS;
@if (!mutex_trylock(&sw->tb->lock))
    return restart_syscall();

if (sw->authorized)
goto unlock;

/*
 * Make sure there is no PCIe rescan ongoing when a new PCIe
 * tunnel is created. Otherwise the PCIe rescan code might find
 * the new tunnel too early.
 */
+pci_lock_rescan_remove();
+pm_runtime_get_sync(&sw->dev);
+
switch (val) {
    /* Approve switch */
    case 1:
        break;
}

+pm_runtime_mark_last_busy(&sw->dev);
+pm_runtime_put_autosuspend(&sw->dev);
+pci_unlock_rescan_remove();
+
if (!ret) {
    sw->authorized = val;
    /* Notify status change to the userspace */
        }
unlock:
    mutex_unlock(&switch_lock);
    mutex_unlock(&sw->tb->lock);
    return ret;
}

static DEVICE_ATTR_RW(authorized);
return sprintf(buf, "%lu\n", sw->boot);
}
+static DEVICE_ATTR_RO(boot);
+
static ssize_t device_show(struct device *dev, struct device_attribute *attr,
    char *buf)
{
    if (mutex_lock_interruptible(&switch_lock))
        return -ERESTARTSYS;
    if (!mutex_trylock(&sw->tb->lock))
        return restart_syscall();

    struct tb_switch *sw = tb_to_switch(dev);
    ssize_t ret;

    if (sw->key)
        ret = sprintf(buf, "%*phN\n", TB_SWITCH_KEY_SIZE, sw->key);
    else
        ret = sprintf(buf, "\n");

    mutex_unlock(&switch_lock);
    mutex_unlock(&sw->tb->lock);
    return ret;
}
@@ -815,8 +844,8 @@
else if (hex2bin(key, buf, sizeof(key)))
    return -EINVAL;

    if (mutex_lock_interruptible(&switch_lock))
        return -ERESTARTSYS;
    if (!mutex_trylock(&sw->tb->lock))
        return restart_syscall();

    if (sw->authorized) {
        ret = -EBUSY;
        @@ -831,11 +860,35 @@
    }
}

    mutex_unlock(&switch_lock);
    mutex_unlock(&sw->tb->lock);
    return ret;
} static DEVICE_ATTR(key, 0600, key_show, key_store);

+static void nvmAuthenticate_start(struct tb_switch *sw)
+{  
+ struct pci_dev *root_port;  
+  
+ /*  
+ * During host router NVM upgrade we should not allow root port to  
+ * go into D3cold because some root ports cannot trigger PME  
+ * itself. To be on the safe side keep the root port in D0 during  
+ * the whole upgrade process.  
+ */  
+ root_port = pci_find_pcie_root_port(sw->tb-> nhi->pdev);  
+ if (root_port)  
+ pm_runtime_get_noresume(&root_port->dev);  
+ }  
+  
+ static void nvm_authenticate_complete(struct tb_switch *sw)  
+ {  
+ struct pci_dev *root_port;  
+  
+ root_port = pci_find_pcie_root_port(sw->tb-> nhi->pdev);  
+ if (root_port)  
+ pm_runtime_put(&root_port->dev);  
+ }  
+  
+ static ssize_t nvm_authenticate_show(struct device *dev,  
+ struct device_attribute *attr, char *buf)  
+ {  
+ @ @ -853.8 +906.8 @ @  
+ bool val;  
+ int ret;  
+  
- if (mutex_lock_interruptible(&switch_lock))  
- return -ERESTARTSYS;  
+ if (!mutex_trylock(&sw->tb->lock))  
+ return restart_syscall();  
+  
+ /* If NVMen devices are not yet added */  
+ if (!sw->nvm) {  
+ @ @ -870.20 +923.37 @ @  
+ nvm_clear_auth_status(sw);  
+  
+ if (val) {  
+ if (!sw->nvm->buf) {  
+ ret = -EINVAL;  
+ goto exit_unlock;  
+ }  
+  
+ pm_runtime_get_sync(&sw->dev);  
+ ret = nvm_validate_and_write(sw);  
+  
+}
-if (ret)
+if (ret) {
+pm_runtime_mark_last_busy(&sw->dev);
+pm_runtime_put_autosuspend(&sw->dev);
+}

sw->nvm->authenticating = true;

-if (!tb_route(sw))
+if (!tb_route(sw)) {
+/*
+ * Keep root port from suspending as long as the
+ * NVM upgrade process is running.
+ */
+nvm_authenticate_start(sw);
+ret = nvm_authenticate_host(sw);
+} else {
+ret = nvm_authenticate_device(sw);
+}
+pm_runtime_mark_last_busy(&sw->dev);
+pm_runtime_put_autosuspend(&sw->dev);
+
exit_unlock:
}-mutex_unlock(&switch_lock);
+mutex_unlock(&sw->tb->lock);

if (ret)
return ret;
@@ -897,8 +967,8 @@
struct tb_switch *sw = tb_to_switch(dev);
int ret;

-if (mutex_lock_interruptible(&switch_lock))
-return -ERESTARTSYS;
+if (!mutex_trylock(&sw->tb->lock))
+return restart_syscall();

if (sw->safe_mode)
ret = -ENODATA;
@@ -907,7 +977,7 @@
else
ret = sprintf(buf, "%x.%x\n", sw->nvm->major, sw->nvm->minor);

-mutex_unlock(&switch_lock);
+mutex_unlock(&sw->tb->lock);
return ret;
}
@@ -942,6 +1012,7 @@
static struct attribute *switch_attrs[] = {
&dev_attr_authorized.attr,
+&dev_attr_boot.attr,
&dev_attr_device.attr,
&dev_attr_device_name.attr,
&dev_attr_key.attr,
}@ @ -970,6 +1041,10 @@
if (sw->dma_port)
return attr->mode;
return 0;
+} else if (attr == &dev_attr_boot.attr) {
+if (tb_route(sw))
+return attr->mode;
+return 0;
}

return sw->safe_mode ? 0 : attr->mode;
@@ -1000,9 +1075,29 @@
kfree(sw);
}

+/*
+ * Currently only need to provide the callbacks. Everything else is handled
+ * in the connection manager.
+ */
+static int __maybe_unused tb_switch_runtime_suspend(struct device *dev)
+{
+return 0;
+
+static int __maybe_unused tb_switch_runtime_resume(struct device *dev)
+{
+return 0;
+
+static const struct dev_pm_ops tb_switch_pm_ops = {
+SET_RUNTIME_PM_OPS(tb_switch_runtime_suspend, tb_switch_runtime_resume,
+ NULL)
+};
+
+struct device_type tb_switch_type = {
.name = "thunderbolt_device",
.release = tb_switch_release,
}
static int tb_switch_get_generation(struct tb_switch *sw)
{
    /*
     * The newer controllers include fused UUID as part of link
     * @ @ -1211,7 +1310,9 @@
     */
    u32 uuid[4];
    int cap, ret;

    /*
     * ICM generates UUID based on UID and fills the upper
     * @ @ -1226,6 +1327,9 @@
     */
    sw->uuid = kmemdup(uuid, sizeof(uuid), GFP_KERNEL);
    if (!sw->uuid)
+ret = -ENOMEM;
+return ret;
}

static int tb_switch_add_dma_port(struct tb_switch *sw)
@@ -1234,13 +1338,16 @@
int ret;

switch (sw->generation) {
- case 3:
- break;
-
 case 2:
 /* Only root switch can be upgraded */
 if (tb_route(sw))
 return 0;
+
+/* fallthrough */
+case 3:
+ret = tb_switch_set_uuid(sw);
+if (ret)
+return ret;
break;

default:
@@ -1261,6 +1368,19 @@
return 0;

/*
+ * If there is status already set then authentication failed
+ * when the dma_port_flash_update_auth() returned. Power cycling
+ * is not needed (it was done already) so only thing we do here
+ * is to unblock runtime PM of the root port.
+ */
+nvm_get_auth_status(sw, &status);
+if (status) {
+if (!tb_route(sw))
+nvm_authenticate_complete(sw);
+return 0;
+}
+
+/*
 * Check status of the previous flash authentication. If there
 * is one we need to power cycle the switch in any case to make
 * it functional again.
@@ -1269,9 +1389,12 @@
if (ret <= 0)
return ret;

/* Now we can allow root port to suspend again */
+if (!tb_route(sw))
+nvm_authenticate_complete(sw);
+
+if (status) {
+tb_sw_info(sw, "switch flash authentication failed\n");
-tb_switch_set_uuid(sw);
+nvm_set_auth_status(sw, status);
+}
@@ -1321,7 +1444,9 @@
+tb_sw_info(sw, "uid: %#llx\n", sw->uid);

-tb_switch_set_uuid(sw);
+ret = tb_switch_set_uuid(sw);
+if (ret)
+return ret;

for (i = 0; i <= sw->config.max_port_number; i++) {
if (sw->ports[i].disabled) {
@@ -1339,10 +1464,21 @@
return ret;

ret = tb_switch_nvm_add(sw);
-if (ret)
+if (ret) {
+device_del(&sw->dev);
+return ret;
+}

-return ret;
+pm_runtime_set_active(&sw->dev);
+if (sw->rpm) {
+pm_runtime_set_autosuspend_delay(&sw->dev, TB_AUTOSUSPEND_DELAY);
+pm_runtime_use_autosuspend(&sw->dev);
+pm_runtime_mark_last_busy(&sw->dev);
+pm_runtime_enable(&sw->dev);
+pm_request_autosuspend(&sw->dev);
+}
+
+return 0;
+
/**
@@ -1357,6 +1493,11 @@
int i;

if (sw->rpm) {
    pm_runtime_get_sync(&sw->dev);
    pm_runtime_disable(&sw->dev);
}

/* port 0 is the switch itself and never has a remote */
for (i = 1; i <= sw->config.max_port_number; i++) {
    if (tb_is_upstream_port(&sw->ports[i]))
        @ @ -1470,6 +1611,7 @@
    u8 link;
    u8 depth;
    const uuid_t *uuid;
    +u64 route;
}

static int tb_switch_match(struct device *dev, void *data)
    @ @ -1485,6 +1627,11 @@
if (lookup->uuid)
return memcmp(sw->uuid, lookup->uuid, sizeof(*lookup->uuid));

    +if (lookup->route) {
        +return sw->config.route_lo == lower_32_bits(lookup->route) &&
           +    sw->config.route_hi == upper_32_bits(lookup->route);
    } +

    /* Root switch is matched only by depth */
    if (!lookup->depth)
return !sw->depth;
    @ @ -1519,7 +1666,7 @@
}

/**
- * tb_switch_find_by_link_depth() - Find switch by UUID
+ * tb_switch_find_by_uuid() - Find switch by UUID
* @tb: Domain the switch belongs
* @uuid: UUID to look for
*
    @ @ -1537,6 +1684,33 @@

    dev = bus_find_device(&tb_bus_type, NULL, &lookup, tb_switch_match);
if (dev)
    +return tb_to_switch(dev);
+
    +return NULL;
+} +
/**
 * tb_switch_find_by_route() - Find switch by route string
 * @tb: Domain the switch belongs
 * @route: Route string to look for
 *
 * Returned switch has reference count increased so the caller needs to
 * call tb_switch_put() when done with the switch.
 */

struct tb_switch *tb_switch_find_by_route(struct tb *tb, u64 route)
{
    struct tb_sw_lookup lookup;
    struct device *dev;

    if (!route)
        return tb_switch_get(tb->root_switch);

    memset(&lookup, 0, sizeof(lookup));
    lookup.tb = tb;
    lookup.route = route;

    dev = bus_find_device(&tb_bus_type, NULL, &lookup, tb_switch_match);
    if (dev)
        return tb_to_switch(dev);

    return NULL;

return NULL;

--- linux-4.15.0.orig/drivers/thunderbolt/tb.c
+++ linux-4.15.0/drivers/thunderbolt/tb.c
@@ -258,7 +258,7 @@
 if (!tcm->hotplug_active)
     goto out; /* during init, suspend or shutdown */

-sw = get_switch_at_route(tb->root_switch, ev->route);
+sw = tb_switch_find_by_route(tb, ev->route);

    if (!sw) {
        tb_warn(tb,
"hotplug event from non existent switch %llx:%x (unplug: %d)\n",
@@ -269,14 +269,14 @@
"
        tb_warn(tb,
"hotplug event from non existent port %llx:%x (unplug: %d)\n",
-ev->route, ev->port, ev->unplug);
-goto out;
+goto put_sw;
    }
}

    port = &sw->ports[ev->port];
    if (tb_is_upstream_port(port)) {
        tb_warn(tb,
"hotplug event for upstream port %llx:%x (unplug: %d)\n",
-ev->route, ev->port, ev->unplug);
- goto out;
+ goto put_sw;
}
if (ev->unplug) {
if (port->remote) {
@@ -306,6 +306,9 @@
tb_activate_pcie_devices(tb);
}
}
+
+ put_sw:
+ tb_switch_put(sw);
out:
mutex_unlock(&tb->lock);
kfree(ev);
--- linux-4.15.0.orig/drivers/thunderbolt/tb.h
+++ linux-4.15.0/drivers/thunderbolt/tb.h
@@ -66,6 +66,8 @@
* @nvm: Pointer to the NVM if the switch has one (%NULL otherwise)
* @no_nvm_upgrade: Prevent NVM upgrade of this switch
* @safe_mode: The switch is in safe-mode
+ * @boot: Whether the switch was already authorized on boot or not
+ * @rpm: The switch supports runtime PM
* @authorized: Whether the switch is authorized by user or policy
* @work: Work used to automatically authorize a switch
* @security_level: Switch supported security level
@@ -77,8 +79,7 @@
* @depth: Depth in the chain this switch is connected (ICM only)
*
* When the switch is being added or removed to the domain (other
- * switches) you need to have domain lock held. For switch authorization
- * internal switch_lock is enough.
+ * switches) you need to have domain lock held.
*/
struct tb_switch {
struct device dev;
@@ -99,6 +100,8 @@
struct tb_switch_nvm *nvm;
bool no_nvm_upgrade;
bool safe_mode;
+bool boot;
+bool rpm;
unsigned int authorized;
struct work_struct work;
enum tb_security_level security_level;
@@ -197,7 +200,11 @@
* @resume_noirq: Connection manager specific resume_noirq
* @suspend: Connection manager specific suspend
* @complete: Connection manager specific complete
+ * @runtime_suspend: Connection manager specific runtime_suspend
+ * @runtime_resume: Connection manager specific runtime_resume
* @handle_event: Handle thunderbolt event
+ * @get_boot_acl: Get boot ACL list
+ * @set_boot_acl: Set boot ACL list
* @approve_switch: Approve switch
* @add_switch_key: Add key to switch
* @challenge_switch_key: Challenge switch using key
@@ -213,8 +220,12 @@ int (*resume_noirq)(struct tb *tb);
    int (*suspend)(struct tb *tb);
    void (*complete)(struct tb *tb);
+    int (*runtime_suspend)(struct tb *tb);
+    int (*runtime_resume)(struct tb *tb);
    void (*handle_event)(struct tb *tb, enum tb_cfg_pkg_type,
        const void *buf, size_t size);
+    int (*get_boot_acl)(struct tb *tb, uuid_t *uuids, size_t nuuids);
+    int (*set_boot_acl)(struct tb *tb, const uuid_t *uuids, size_t nuuids);
    int (*approve_switch)(struct tb *tb, struct tb_switch *sw);
    int (*add_switch_key)(struct tb *tb, struct tb_switch *sw);
    int (*challenge_switch_key)(struct tb *tb, struct tb_switch *sw,
@@ -229,6 +240,8 @@ return (void *)tb->privdata;
}

+#define TB_AUTOSUSPEND_DELAY 15000 /* ms */
+
/* helper functions & macros */

/**
@@ -358,6 +371,8 @@
    int tb_domain_resume_noirq(struct tb *tb);
    int tb_domain_suspend(struct tb *tb);
    void tb_domain_complete(struct tb *tb);
+    int tb_domain_runtime_suspend(struct tb *tb);
+    int tb_domain_runtime_resume(struct tb *tb);
    int tb_domain_approve_switch(struct tb *tb, struct tb_switch *sw);
    int tb_domain_approve_switch_key(struct tb *tb, struct tb_switch *sw);
    int tb_domain_challenge_switch_key(struct tb *tb, struct tb_switch *sw);
@@ -382,10 +397,17 @@
    int tb_switch_resume(struct tb_switch *sw);
    int tb_switch_reset(struct tb *tb, u64 route);
    void tb_sw_set_unplugged(struct tb_switch *sw);
-    struct tb_switch *get_switch_at_route(struct tb_switch *sw, u64 route);
+    struct tb_switch *tb_switch_find_by_link_depth(struct tb *tb, u8 link,
+        u8 depth);
+    struct tb_switch *tb_switch_find_by_uuid(struct tb *tb, const uuid_t *uuid);
+ */
+struct tb_switch *tb_switch_find_by_route(struct tb *tb, u64 route);
+
+static inline struct tb_switch *tb_switch_get(struct tb_switch *sw)
+{
+    if (sw)
+        get_device(&sw->dev);
+    return sw;
+
}

static inline void tb_switch_put(struct tb_switch *sw)
{
    --- linux-4.15.0.orig/drivers/thunderbolt/tb_msgs.h
    +++ linux-4.15.0/drivers/thunderbolt/tb_msgs.h
    @@ -102,6 +102,8 @@
    ICM_ADD_DEVICE_KEY = 0x6,
    ICM_GET_ROUTE = 0xa,
    ICM_APPROVE_XDOMAIN = 0x10,
    +ICM_DISCONNECT_XDOMAIN = 0x11,
    +ICM_PREBOOT_ACL = 0x18,
    
};

enum icm_event_code {
    @@ -122,18 +124,23 @@
    #define ICM_FLAGS_NO_KEY BIT(1)
    #define ICM_FLAGS_SLEVEL_SHIFT 3
    #define ICM_FLAGS_SLEVEL_MASK GENMASK(4, 3)
    +#define ICM_FLAGS_WRITE BIT(7)
    
    struct icm_pkg_driver_ready {
        struct icm_pkg_header hdr;
    };

    -struct icm_pkg_driver_ready_response {
    +/* Falcon Ridge only messages */
    +
    +struct icm_fr_pkg_driver_ready_response {
            struct icm_pkg_header hdr;
            u8 romver;
            u8 ramver;
            u16 security_level;
    +};

    +#define ICM_FR_SLEVEL_MASK 0xf
    +
    /* Falcon Ridge & Alpine Ridge common messages */

    struct icm_fr_pkg_get_topology {
    @@ -176,6 +183,8 @@

#define ICM_LINK_INFO_DEPTH_SHIFT4
#define ICM_LINK_INFO_DEPTH_MASK GENMASK(7, 4)
#define ICM_LINK_INFO_APPROVED BIT(8)
+#define ICM_LINK_INFO_REJECTED BIT(9)
+#define ICM_LINK_INFO_BOOTBIT(10)

struct icm_fr_pkg_approve_device {
    struct icm_pkg_header hdr;
    @ @ -270,6 +279,20 @ @

/* Alpine Ridge only messages */

+struct icm_ar_pkg_driver_ready_response {
    struct icm_pkg_header hdr;
    +u8 romver;
    +u8 ramver;
    +u16 info;
    +};
    +
+define ICM_AR_FLAGS_RTD3BIT(6)
    +
+define ICM_AR_INFO_SLEVEL_MASK GENMASK(3, 0)
+define ICM_AR_INFO_BOOT_ACL_SHIFT7
+define ICM_AR_INFO_BOOT_ACL_MASK GENMASK(11, 7)
+define ICM_AR_INFO_BOOT_ACL_SUPPORTED BIT(13)
    +
struct icm_ar_pkg_get_route {
    struct icm_pkg_header hdr;
    u16 reserved;
    @ @ -284,6 +307,165 @ @
    u32 route_lo;
};

+structure icm_ar_boot_acl_entry {
    +u32 uuid_lo;
    +u32 uuid_hi;
    +};
    +
+define ICM_AR_PREBOOT_ACL_ENTRIES16
    +
+structure icm_ar_pkg_preboot_acl {
    +structure icm_pkg_header hdr;
    +structure icm_ar_boot_acl_entry acl[ICM_AR_PREBOOT_ACL_ENTRIES];
    +};
    +
+structure icm_ar_pkg_preboot_acl_response {
    +structure icm_pkg_header hdr;
    +structure icm_ar_boot_acl_entry acl[ICM_AR_PREBOOT_ACL_ENTRIES];
}
+};
+
+/* Titan Ridge messages */
+
+struct icm_tr(pkg_driver_ready_response {
+struct icm_pkg_header hdr;
+u16 reserved1;
+u16 info;
+u32 nvm_version;
+u16 device_id;
+u16 reserved2;
+};
+
+#define ICM_TR_FLAGS_RTD3BIT(6)
+
+define ICM_TR_INFO_SLEVEL_MASK GENMASK(2, 0)
+define ICM_TR_INFO_BOOT_ACL_SHIFT 7
+define ICM_TR_INFO_BOOT_ACL_MASK GENMASK(12, 7)
+
+struct icm_tr(event_device_connected {
+struct icm_pkg_header hdr;
+uuid_t ep_uuid;
+u32 route_hi;
+u32 route_lo;
+u8 connection_id;
+u8 reserved;
+u16 link_info;
+u32 ep_name[55];
+};
+
+struct icm_tr(event_device_disconnected {
+struct icm_pkg_header hdr;
+u32 route_hi;
+u32 route_lo;
+};
+
+struct icm_tr(event_xdomain_connected {
+struct icm_pkg_header hdr;
+u16 reserved;
+u16 link_info;
+uuid_t remote_uuid;
+uuid_t local_uuid;
+u32 local_route_hi;
+u32 local_route_lo;
+u32 remote_route_hi;
+u32 remote_route_lo;
+};
+
+}
+struct icm_tr_event_xdomain_disconnected {
+    struct icm_pkg_header hdr;
+    u32 route_hi;
+    u32 route_lo;
+    uuid_t remote_uuid;
+};
+
+struct icm_tr_pkg_approve_device {
+    struct icm_pkg_header hdr;
+    uuid_t ep_uuid;
+    u32 route_hi;
+    u32 route_lo;
+    u8 connection_id;
+    u8 reserved1[3];
+};
+
+struct icm_tr_pkg_add_device_key {
+    struct icm_pkg_header hdr;
+    uuid_t ep_uuid;
+    u32 route_hi;
+    u32 route_lo;
+    u8 connection_id;
+    u8 reserved[3];
+    u32 key[8];
+};
+
+struct icm_tr_pkg_challenge_device {
+    struct icm_pkg_header hdr;
+    uuid_t ep_uuid;
+    u32 route_hi;
+    u32 route_lo;
+    u8 connection_id;
+    u8 reserved[3];
+    u32 challenge[8];
+};
+
+struct icm_tr_pkg_approve_xdomain {
+    struct icm_pkg_header hdr;
+    u32 route_hi;
+    u32 route_lo;
+    uuid_t remote_uuid;
+    u16 transmit_path;
+    u16 transmit_ring;
+    u16 receive_path;
+    u16 receive_ring;
+};
+
+struct icm_tr_pkg_disconnect_xdomain {
+struct icm_pkg_header hdr;
+u8 stage;
+u8 reserved[3];
+u32 route_hi;
+u32 route_lo;
+uuid_t remote_uuid;
+};
+
+struct icm_tr_pkg_challenge_device_response {
+struct icm_pkg_header hdr;
+uuid_t ep_uuid;
+u32 route_hi;
+u32 route_lo;
+u8 connection_id;
+u8 reserved[3];
+u32 challenge[8];
+u32 response[8];
+};
+
+struct icm_tr_pkg_add_device_key_response {
+struct icm_pkg_header hdr;
+u32 route_hi;
+u32 route_lo;
+u32 connection_id;
+u8 reserved[3];
+};
+
+struct icm_tr_pkg_approve_xdomain_response {
+struct icm_pkg_header hdr;
+u32 route_hi;
+u32 route_lo;
+uuid_t remote_uuid;
+u16 transmit_path;
+u16 transmit_ring;
+u16 receive_path;
+u16 receive_ring;
+};
+
+struct icm_tr_pkg_disconnect_xdomain_response {
+struct icm_pkg_header hdr;
+u8 stage;
+u8 reserved[3];
+u32 route_hi;
+u32 route_lo;
+uuid_t remote_uuid;
+};
/* XDomain messages */

struct tb_xdomain_header {
   --- linux-4.15.0.orig/drivers/thunderbolt/xdomain.c
   +++ linux-4.15.0/drivers/thunderbolt/xdomain.c
   @@ -13,6 +13,7 @@
      #include <linux/device.h>
      #include <linux/kmod.h>
      #include <linux/module.h>
      +#include <linux/pm_runtime.h>
      #include <linux/utsname.h>
      #include <linux/uuid.h>
      #include <linux/workqueue.h>
   @@ -742,6 +743,7 @@
      struct tb_service *svc;
      struct tb_property *p;
      struct device *dev;
      +int id;

   /*
      * First remove all services that are not available anymore in
      @@ -770,7 +772,13 @@
      break;
   }

   -svc->id = ida_simple_get(&xd->service_ids, 0, 0, GFP_KERNEL);
   +#id = ida_simple_get(&xd->service_ids, 0, 0, GFP_KERNEL);
   +#if (id < 0) {
   +#kfree(svc->key);
   +#kfree(svc);
   +#break;
   +#}
   +#svc->id = id;
   svc->dev.bus = &tb_bus_type;
   svc->dev.type = &tb_service_type;
   svc->dev.parent = &xd->dev;
   @@ -1129,6 +1137,14 @@
      xd->dev.groups = xdomain_attr_groups;
      dev_set_name(&xd->dev, "%u-%llx", tb->index, route);

      +/*
      + * This keeps the DMA powered on as long as we have active
      + * connection to another host.
      + */
      +pm_runtime_set_active(&xd->dev);
      +pm_runtime_get_noresume(&xd->dev);
      +pm_runtime_enable(&xd->dev);
      +
device_for_each_child_reverse(&xd->dev, xd, unregister_service);

/*
 * Undo runtime PM here explicitly because it is possible that
 * the XDomain was never added to the bus and thus device_del()
 * is not called for it (device_del() would handle this otherwise).
 */

pm_runtime_disable(&xd->dev);
pm_runtime_put_noidle(&xd->dev);
pm_runtime_set_suspended(&xd->dev);

if (!device_is_registered(&xd->dev))
    put_device(&xd->dev);
else
    const uuid_t *uuid;
    u8 link;
    u8 depth;
    +u64 route;
};

static struct tb_xdomain *switch_find_xdomain(struct tb_switch *sw,
    const uuid_t *uuid;
    u8 link;
    u8 depth;
    +u64 route;
}

if (lookup->uuid) {
    if (uuid_equal(xd->remote_uuid, lookup->uuid))
        return xd;
    -} else if (lookup->link == xd->link &&
    +} else if (lookup->link &&
        lookup->depth == xd->depth) {
        return xd;
    +} else if (lookup->route &&
        lookup->route == xd->route) {
        +return xd;
    }
} else if (port->remote) {
    xd = switch_find_xdomain(port->remote->sw, lookup);
    lookup.uuid = uuid;
    xd = switch_find_xdomain(tb->root_switch, &lookup);
-if (xd) {
    -get_device(&xd->dev);
- return xd;
-
- return NULL;
+ return tb_xdomain_get(xd);
}
EXPORT_SYMBOL_GPL(tb_xdomain_find_by_uuid);

@@ -1349,13 +1374,36 @@
lookup.depth = depth;

xd = switch_find_xdomain(tb->root_switch, &lookup);
- if (xd) {
- get_device(&xd->dev);
- return xd;
- }
+ return tb_xdomain_get(xd);
+}
+ return NULL;
+
/**
 + * tb_xdomain_find_by_route() - Find an XDomain by route string
 + * @tb: Domain where the XDomain belongs to
 + * @route: XDomain route string
 + *
 + * Finds XDomain by walking through the Thunderbolt topology below @tb.
 + * The returned XDomain will have its reference count increased so the
 + * caller needs to call tb_xdomain_put() when it is done with the
 + * object.
 + *
 + * This will find all XDomains including the ones that are not yet added
 + * to the bus (handshake is still in progress).
 + *
 + * The caller needs to hold @tb->lock.
 + */
+struct tb_xdomain *tb_xdomain_find_by_route(struct tb *tb, u64 route)
+{
+ struct tb_xdomain_lookup lookup;
+ struct tb_xdomain *xd;
+ memset(&lookup, 0, sizeof(lookup));
+ lookup.route = route;
+ xd = switch_find_xdomain(tb->root_switch, &lookup);
+ return tb_xdomain_get(xd);
+}
+EXPORT_SYMBOL_GPL(tb_xdomain_find_by_route);
bool tb_xdomain_handle_request(struct tb *tb, enum tb_cfg_pkg_type type,
    const void *buf, size_t size)
--- linux-4.15.0.orig/drivers/tty/Kconfig
+++ linux-4.15.0/drivers/tty/Kconfig
@@ -394,10 +394,14 @@
depends on GOLDFISH
select SERIAL_CORE
select SERIAL_CORE_CONSOLE
-select SERIAL_EARLYCON
+requires help
  Console and system TTY driver for the Goldfish virtual platform.

+config GOLDFISH_TTY_EARLY_CONSOLE
+bool
+default y if GOLDFISH_TTY=y
+select SERIAL_EARLYCON
+
config DA_TTY
bool "DA TTY"
depends on METAG_DA
@@ -463,4 +467,28 @@
depends on SUN_LDOMS
help
  Support for Sun logical domain consoles.
+
+config LDISC_AUTOLOAD
+bool "Automatically load TTY Line Disciplines"
+default y
+help
  Historically the kernel has always automatically loaded any
  line discipline that is in a kernel module when a user asks
  for it to be loaded with the TIOCSETD ioctl, or through other
  means. This is not always the best thing to do on systems
  where you know you will not be using some of the more
  "ancient" line disciplines, so prevent the kernel from doing
  this unless the request is coming from a process with the
  CAP_SYS_MODULE permissions.
+
  Say "Y" here if you trust your userspace users to do the right
  thing, or if you have only provided the line disciplines that
  you know you will be using, or if you wish to continue to use
  the traditional method of on-demand loading of these modules
  by any user.
+
  This functionality can be changed at runtime with the
  dev.tty.ldisc_autoload sysctl, this configuration option will
  only set the default value of this functionality.
+
endif # TTY
--- linux-4.15.0.orig/drivers/tty/ehv_bytechan.c
+++ linux-4.15.0/drivers/tty/ehv_bytechan.c
@@ -136,6 +136,21 @@
     return 1;
 }

+static unsigned int local_ev_byte_channel_send(unsigned int handle,
+    unsigned int *count,
+    const char *p)
+{  
+    char buffer[EV_BYTE_CHANNEL_MAX_BYTES];
+    unsigned int c = *count;
+    ++
+    if (c < sizeof(buffer)) {
+        memcpy(buffer, p, c);
+        memset(&buffer[c], 0, sizeof(buffer) - c);
+        p = buffer;
+    }
+    return ev_byte_channel_send(handle, count, p);
+}
+
+/*************************** EARLY CONSOLE DRIVER ***************************/

#ifdef CONFIG_PPC_EARLY_DEBUG_EHV_BC
@@ -154,7 +169,7 @@
    do {
        count = 1;
        -ret = ev_byte_channel_send(CONFIG_PPC_EARLY_DEBUG_EHV_BC_HANDLE,
+ret = local_ev_byte_channel_send(CONFIG_PPC_EARLY_DEBUG_EHV_BC_HANDLE,
               &count, &data);
    } while (ret == EV_EAGAIN);
    }
@@ -221,7 +236,7 @@
    while (count) {
        len = min_t(unsigned int, count, EV_BYTE_CHANNEL_MAX_BYTES);
        do {
+ret = local_ev_byte_channel_send(handle, &len, s);
 retreated = local_ev_byte_channel_send(handle, &len, s);
        } while (ret == EV_EAGAIN);
        count -= len;
        s += len;
    }
@@ -401,7 +416,7 @@
    CIRC_CNT_TO_END(bc->head, bc->tail, BUF_SIZE),
    EV_BYTE_CHANNEL_MAX_BYTES);

    -ret = ev_byte_channel_send(bc->handle, &len, bc->buf + bc->tail);
    -ret = ev_byte_channel_send(bc->handle, &len, bc->buf + bc->tail);

ifdef CONFIG_PPC_EARLY_DEBUG_EHV_BC
@@ -154,7 +169,7 @@
+ret = local_ev_byte_channel_send(bc->handle, &len, bc->buf + bc->tail);

/* 'len' is valid only if the return code is 0 or EV_EAGAIN */
if (!ret || (ret == EV_EAGAIN))
    return 0;
}

#ifdef CONFIG_GOLDFISH_TTY_EARLY_CONSOLE
static void gf_early_console_putchar(struct uart_port *port, int ch)
{
    __raw_writel(ch, port->membase);
}
#endif

OF_EARLYCON_DECLARE(early_gf_tty, "google,goldfish-tty", gf_earlycon_setup);

static const struct of_device_id goldfish_tty_of_match[] = {
    { .compatible = "google,goldfish-tty", },

    hvc_check_console(index);

    if (! (last_hvc < index))
        last_hvc = index;

    /* check if we need to re-register the kernel console */
    tty_port_tty_set(&hp->port, NULL);
    tty->driver_data = NULL;
    tty_port_put(&hp->port);
    printk(KERN_ERR "hvc_open: request_irq failed with rc %d\n", rc);
    return;
} else
    { /* We are ready... raise DTR/RTS */
        if (C_BAUD(tty))
            if (hp->ops->dtr_rts)
hp->ops->dtr_rts(hp, 1);
+tty_port_set_initialized(&hp->port, true);
+

/* Force wakeup of the polling thread */
hvc_kick();
@@ -366,22 +361,12 @@
static void hvc_close(struct tty_struct *tty, struct file * filp)
{
-struct hvc_struct *hp;
+struct hvc_struct *hp = tty->driver_data;
    unsigned long flags;
    if (tty_hung_up_p(filp))
        return;

-/*
-* No driver_data means that this close was issued after a failed
-* hvc_open by the tty layer's release_dev() function and we can just
-* exit cleanly because the kref reference wasn't made.
-* */
-if (!tty->driver_data)
-    return;
-
hp = tty->driver_data;
-    spin_lock_irqsave(&hp->port.lock, flags);

    if (--hp->port.count == 0) {
        /* We are done with the tty pointer now. */
        tty_port_tty_set(&hp->port, NULL);

+if (!tty_port_initialized(&hp->port))
+    return;
+
+if (C_HUPCL(tty))
    if (hp->ops->dtr_rts)
        hp->ops->dtr_rts(hp, 0);
    * waking periodically to check chars_in_buffer().
-*/
tty_wait_until_sent(tty, HVC_CLOSE_WAIT);
+tty_port_set_initialized(&hp->port, false);
} else {
    if (hp->port.count < 0)
        printk(KERN_ERR "hvc_close %X: oops, count is %d\n",
/* no matching slot, just use a counter */
-if (i >= MAX_NR_HVC_CONSOLES)
  i = ++last_hvc;
+if (i >= MAX_NR_HVC_CONSOLES) {
  +
  /* find 'empty' slot for console */
  +for (i = 0; i < MAX_NR_HVC_CONSOLES && vtermnos[i] != -1; i++) {
    +
    +
    /* no matching slot, just use a counter */
    +if (i == MAX_NR_HVC_CONSOLES)
      i = ++last_hvc + MAX_NR_HVC_CONSOLES;
  +}

  hp->index = i;
  -cons_ops[i] = ops;
  -vtermnos[i] = vtermno;
  +if (i < MAX_NR_HVC_CONSOLES) {
    +cons_ops[i] = ops;
    +vtermnos[i] = vtermno;
  +}

  list_add_tail(&hp->next), &hvc_structs);
  spin_unlock(&hvc_structs_lock);

--- linux-4.15.0.orig/drivers/tty/hvc/hvc_opal.c
+++ linux-4.15.0/drivers/tty/hvc/hvc_opal.c
@@ -318,7 +318,6 @@
  
  udbg_putc = udbg_opal_putc;
  udbg_getc = udbg_opal_getc;
-  tb_ticks_per_usec = 0x200; /* Make udelay not suck */
  }

void __init hvc_opal_init_early(void)
--- linux-4.15.0.orig/drivers/tty/hvc/hvc_vio.c
+++ linux-4.15.0/drivers/tty/hvc/hvc_vio.c
@@ -318,7 +318,6 @@
  
  hvterm_raw_put_chars: send characters to firmware for given vterm adapter
  + * @vtermno: The virtual terminal number.
  + * @buf: The characters to send. Because of the underlying hypercall in
static int hvterm_raw_put_chars(uint32_t vtermno, const char *buf, int count)
{
    struct hvterm_priv *pv = hvterm_privs[vtermno];
    /*
     * hvterm_raw_put_chars requires at least a 16-byte
     * buffer, so go via the bounce buffer
     */
    bounce_buffer[0] = c;
    count = hvterm_raw_put_chars(0, bounce_buffer, 1);
    /*
     * hvterm_raw_put_chars requires at least a 16-byte
     * buffer, so go via the bounce buffer
     */
    count = hvterm_raw_put_chars(0, bounce_buffer, 1);
    break;
    case HV_PROTOCOL_HVSI:
    count = hvterm_hvsi_put_chars(0, &c, 1);
    tty_wait_until_sent(tty, HVCS_CLOSE_WAIT);
    /*
     * This line is important because it tells hvcs_open that this
     * device needs to be re-configured the next time hvcs_open is
     * called.
     */
    tty->driver_data = NULL;
    free_irq(irq, hvcsd);
    return;
}
/*
 * This line is important because it tells hvcs_open that this
 * device needs to be re-configured the next time hvcs_open is
 * called.
 */
tty->driver_data = NULL;

tty_port_put(&hvcsd->port);

--- linux-4.15.0.orig/drivers/tty/hvc/hvsi.c
+++ linux-4.15.0/drivers/tty/hvc/hvsi.c
@@ -1038,7 +1038,7 @@
static int __init hvsi_init(void)
{
    int i;
    int i, ret;

    hvsi_driver = alloc_tty_driver(hvsi_count);
    if (!hvsi_driver)
        @ @ -1069,12 +1069,25 @@
    }
    hvsi_wait = wait_for_state; /* irqs active now */

    -if (tty_register_driver(hvsi_driver))
-    panic("Couldn't register hvsi console driver\n");
+ret = tty_register_driver(hvsi_driver);
+if (ret) {
+    pr_err("Couldn't register hvsi console driver\n");
+    goto err_free_irq;
+}

    printk(KERN_DEBUG "HVSI: registered %i devices\n", hvsi_count);

    return 0;
+err_free_irq:
+hvsi_wait = poll_for_state;
+for (i = 0; i < hvsi_count; i++) {
+    struct hvsi_struct *hp = &hvsi_ports[i];
+    +free_irq(hp->virq, hp);
+}
+tty_driver_kref_put(hvsi_driver);
+
+return ret;
}
device_initcall(hvsi_init);

--- linux-4.15.0.orig/drivers/tty/ipwireless/hardware.c
+++ linux-4.15.0/drivers/tty/ipwireless/hardware.c
@@ -1516,6 +1516,8 @@
     sizeof(struct ipw_setup_get_version_query_packet),
     ADDR_SETUP_PROT, TL_PROTOCOLID_SETUP,
     TL_SETUP_SIGNO_GET_VERSION_QRY);
+if (!ver_packet)
+return;
ver_packet->header.length = sizeof(struct tl_setup_get_version_qry);

/*
--- linux-4.15.0.orig/drivers/tty/ipwireless/main.c
+++ linux-4.15.0/drivers/tty/ipwireless/main.c
@@ -114,6 +114,10 @@
     ipw->common_memory = ioremap(p_dev->resource[2]->start,
     resource_size(p_dev->resource[2]));
+if (!ipw->common_memory) {
+ret = -ENOMEM;
+goto exit1;
+}
    if (!request_mem_region(p_dev->resource[2]->start,
     resource_size(p_dev->resource[2]),
     IPWIRELESS_PCCARD_NAME)) {
@@ -134,6 +138,10 @@
     ipw->attr_memory = ioremap(p_dev->resource[3]->start,
     resource_size(p_dev->resource[3]));
+if (!ipw->attr_memory) {
+ret = -ENOMEM;
+goto exit3;
+}
    if (!request_mem_region(p_dev->resource[3]->start,
     resource_size(p_dev->resource[3]),
     IPWIRELESS_PCCARD_NAME)) {
--- linux-4.15.0.orig/drivers/tty/ipwireless/network.c
+++ linux-4.15.0/drivers/tty/ipwireless/network.c
@@ -117,7 +117,7 @@
     skb->len,
     notify_packet_sent,
     network);
-If (ret == -1) {
+If (ret < 0) {
     skb_pull(skb, 2);
     return 0;
    }
notify_packet_sent,

notify_packet_sent,

吓得(buf);
-
+if (ret < 0)
-returns 0;
+
} kfree_skb(skb);
--- linux-4.15.0.orig/drivers/tty/ipwireless/tty.c
+++ linux-4.15.0/drivers/tty/ipwireless/tty.c
@@ -218,7 +218,7 @@
ret = ipwireless_send_packet(tty->hardware, IPW_CHANNEL_RAS,
  buf, count,
  ipw_write_packet_sent_callback, tty);
-if (ret == -1) {
+if (ret < 0) {
  mutex_unlock(&tty->ipw_tty_mutex);
  return 0;
}
--- linux-4.15.0.orig/drivers/tty/n_gsm.c
+++ linux-4.15.0/drivers/tty/n_gsm.c
@@ -121,6 +121,9 @@

/* Link layer */
+int mode;
+#define DLCI_MODE_ABM		0	/* Normal Asynchronous Balanced Mode */
+#define DLCI_MODE_ADM		1	/* Asynchronous Disconnected Mode */
spinlock_t lock;/* Protects the internal state */
struct timer_list t1;/* Retransmit timer for SABM and UA */
int retries;
@@ -662,11 +665,10 @@
  *FIXME: lock against link layer control transmissions
  */

static void gsm_data_kick(struct gsm_mux *gsm)
+static void gsm_data_kick(struct gsm_mux *gsm, struct gsm_dlci *dlci) {
  int len;
  int skip_sof = 0;

  list_for_each_entry_safe(msg, nmsg, &gsm->tx_list, list) {
    if (gsm->constipated && msg->addr)
gsm->txframe, len);
-
-if (gsm->output(gsm, gsm->txframe + skip_sof,
-len - skip_sof) < 0)
+if (gsm->output(gsm, gsm->txframe, len) < 0)
  break;
/* FIXME: Can eliminate one SOF in many more cases */
gsm->tx_bytes -= msg->len;
/* For a burst of frames skip the extra SOF within the
 burst */
skip_sof = 1;

list_del(&msg->list);
kfree(msg);
+
+if (dlci) {
+tty_port_tty_wakeup(&dlci->port);
+} else {
+int i = 0;
+
+for (i = 0; i < NUM_DLCI; i++)
+if (gsm->dlci[i])
+tty_port_tty_wakeup(&gsm->dlci[i]->port);
+
}
}

@@ -751,7 +758,7 @@
/* Add to the actual output queue */
list_add_tail(&msg->list, &gsm->tx_list);
gsm->tx_bytes += msg->len;
-gsm_data_kick(gsm);
+gsm_data_kick(gsm, dlci);
}

@@ -1212,7 +1219,7 @@
gsm_control_reply(gsm, CMD_FCON, NULL, 0);
/* Kick the link in case it is idling */
spin_lock_irqsave(&gsm->tx_lock, flags);
-gsm_data_kick(gsm);
+gsm_data_kick(gsm, NULL);
spin_unlock_irqrestore(&gsm->tx_lock, flags);
break;
case CMD_FCOFF:
@@ -1364,7 +1371,13 @@
ctrl->data = data;
ctrl->len = clen;

gsm->pending_cmd = ctrl;
gsm->cretries = gsm->n2;
+
+/* If DLCI0 is in ADM mode skip retries, it won't respond */
+if (gsm->dlci[0]->mode == DLCI_MODE_ADM)
+gsm->cretries = 1;
+else
+gsm->cretries = gsm->n2;
+
+mod_timer(&gsm->t2_timer, jiffies + gsm->t2 * HZ / 100);
gsm_control_transmit(gsm, ctrl);
spin_unlock_irqrestore(&gsm->control_lock, flags);
@@ -1451,6 +1464,10 @@
in which case an opening port goes back to closed and a closing port
* is simply put into closed state (any further frames from the other
* end will get a DM response)
+ *
+ *Some control dlci can stay in ADM mode with other dlci working just
+ *fine. In that case we can just keep the control dlci open after the
* DLCLI_OPENING retries time out.
+ */

static void gsm_dlci_t1(struct timer_list *t)
@@ -1464,8 +1481,16 @@
if (dlci->retries) {
gsm_command(dlci->gsm, dlci->addr, SABM|PF);
mod_timer(&dlci->t1, jiffies + gsm->t1 * HZ / 100);
-} else
-} else if (!dlci->addr && gsm->control == (DM | PF)) {
+} else if (!dlci->addr && gsm->control == (DM | PF)) {
+if (debug & 8)
+pr_info("DLCI %d opening in ADM mode:\n",
dlci->addr);
+dlci->mode = DLCI_MODE_ADM;
+gsm_dlci_open(dlci);
+} else {
gsm_dlci_close(dlci);
+}
+
break;
case DLCI_CLOSING:
dlci->retries--;
@@ -1483,8 +1508,8 @@
*
* Commence opening a DLCI from the Linux side. We issue SABM messages
- * to the modem which should then reply with a UA, at which point we
- * will move into open state. Opening is done asynchronously with retry
+ * to the modem which should then reply with a UA or ADM, at which point
+ *we will move into open state. Opening is done asynchronously with retry
+ *running off timers and the responses.
+ */

@@ -2391,7 +2416,7 @@
 /* Queue poll */
 clear_bit(TTY_DO_WRITE_WAKEUP, &tty->flags);
 spin_lock_irqsave(&gsm->tx_lock, flags);
-gsm_data_kick(gsm);
+gsm_data_kick(gsm, NULL);
 if (gsm->tx_bytes < TX_THRESH_LO) {
     gsm_dlci_data_sweep(gsm);
 }
@@ -2850,11 +2875,22 @@
 static int gsm_carrier_raised(struct tty_port *port)
 {
     struct gsm_dlci *dlci = container_of(port, struct gsm_dlci, port);
+     struct gsm_mux *gsm = dlci->gsm;
+     
+     /* Not yet open so no carrier info */
     if (dlci->state != DLCI_OPEN)
         return 0;
     if (debug & 2)
         return 1;
+     +
+     /*
+     * Basic mode with control channel in ADM mode may not respond
+     * to CMD_MSC at all and modem_rx is empty.
+     */
+     +if (gsm->encoding == 0 && gsm->dlci[0]->mode == DLCI_MODE_ADM &&
+         !dlci->modem_rx)
+         return 1;
+     +
     return dlci->modem_rx & TIOCM_CD;
 }
--- linux-4.15.0.orig/drivers/tty/n_hdlc.c
+++ linux-4.15.0/drivers/tty/n_hdlc.c
@@ -597,6 +597,7 @@
     /* too large for caller's buffer */
     ret = -EOVERFLOW;
     */
@@ -612,7 +613,7 @@
 }
/* no data */
-if (file->f_flags & O_NONBLOCK) {
+if (tty_io_nonblock(tty, file)) {
    ret = -EAGAIN;
    break;
}
@@ -679,7 +680,7 @@
    if (tbuf)
    break;

-if (file->f_flags & O_NONBLOCK) {
+if (tty_io_nonblock(tty, file)) {
    error = -EAGAIN;
    break;
}
@@ -967,6 +968,11 @@
    /* end of init_module() */

+#ifdef CONFIG_SPARC
+#undef __exitdata
+#define __exitdata
+#endif
+
+static const char hdlc_unregister_ok[] __exitdata =
+KERN_INFO "N_HDLC: line discipline unregistered"
;
static const char hdlc_unregister_fail[] __exitdata =
--- linux-4.15.0.orig/drivers/tty/n_r3964.c
+++ linux-4.15.0/drivers/tty/n_r3964.c
@@ -1078,7 +1078,7 @@
     pMsg = remove_msg(pInfo, pClient);
     if (pMsg == NULL) {
/* no messages available. */
-if (file->f_flags & O_NONBLOCK) {
+if (tty_io_nonblock(tty, file)) {
    ret = -EAGAIN;
    goto unlock;
}
--- linux-4.15.0.orig/drivers/tty/n_tty.c
+++ linux-4.15.0/drivers/tty/n_tty.c
@@ -124,6 +124,8 @@
     struct mutex output_lock;
 }
--- linux-4.15.0.orig/drivers/tty/n_tty.c
+++ linux-4.15.0/drivers/tty/n_tty.c
@@ -124,6 +124,8 @@
     struct mutex output_lock;
 }:

+#define MASK(x) ((x) & (N_TTY_BUF_SIZE - 1))
+
+static inline size_t read_cnt(struct n_tty_data *ldata)
static inline unsigned char echo_buf(struct n_tty_data *ldata, size_t i)
{
    +smp_rmb(); /* Matches smp_wmb() in add_echo_byte(). */
    return ldata->echo_buf[i & (N_TTY_BUF_SIZE - 1)];
}

/* If we are not echoing the data, perhaps this is a secret so erase it */
+static void zero_buffer(struct tty_struct *tty, u8 *buffer, int size)
+{
    +bool icanon = !!L_ICANON(tty);
    +bool no_echo = !L_ECHO(tty);
    +
    +if (icanon & no_echo)
        +memset(buffer, 0x00, size);
    +
    +
    +static int tty_copy_to_user(struct tty_struct *tty, void __user *to,
    +    size_t tail, size_t n)
    {
        struct n_tty_data *ldata = tty->disc_data;
        size_t size = N_TTY_BUF_SIZE - tail;
        -const void *from = read_buf_addr(ldata, tail);
        +void *from = read_buf_addr(ldata, tail);
        int uncopied;

        if (n > size) {
            tty_audit_add_data(tty, from, size);
            uncopied = copy_to_user(to, from, size);
            +zero_buffer(tty, from, size - uncopied);
            if (uncopied)
                return uncopied;
            to += size;
        }
        ttyAuditAddData(tty, from, n);
        -return copy_to_user(to, from, n);
        +uncopied = copy_to_user(to, from, n);
        +zero_buffer(tty, from, n - uncopied);
        +return uncopied;
    }
static void reset_buffer_flags(struct n_tty_data *ldata)
{
    ldata->read_head = ldata->canon_head = ldata->read_tail = 0;
    ldata->echo_head = ldata->echo_tail = ldata->echo_commit = 0;
    ldata->commit_head = 0;
    ldata->echo_mark = 0;
    ldata->line_start = 0;
    ldata->erasing = 0;

    old_space = space = tty_write_room(tty);

tail = ldata->echo_tail;
-    while (ldata->echo_commit != tail) {
+    while (MASK(ldata->echo_commit) != MASK(tail)) {
        c = echo_buf(ldata, tail);
        if (c == ECHO_OP_START) {
            unsigned char op;
            int no_space_left = 0;

            /*
             * Since add_echo_byte() is called without holding
             * output_lock, we might see only portion of multi-byte
             * operation.
             */
            +if (MASK(ldata->echo_commit) == MASK(tail + 1))
+            goto not_yet_stored;
+        /
            * If the buffer byte is the start of a multi-byte
            * operation, get the next byte, which is either the
            * op code or a control character value.
            @@ -634,6 +655,8 @@
            unsigned int num_chars, num_bs;

case ECHO_OP_ERASE_TAB:
    +if (MASK(ldata->echo_commit) == MASK(tail + 2))
    +goto not_yet_stored;
    +/
    * of echo overrun before the next commit), then discard enough
    * data at the tail to prevent a subsequent overrun */

    /*
    @@ -728,7 +751,8 @@
    /* If the echo buffer is nearly full (so that the possibility exists
while (ldata->echo_commit - tail >= ECHO_DISCARD_WATERMARK) {
    while (ldata->echo_commit > tail &&
           ldata->echo_commit - tail >= ECHO_DISCARD_WATERMARK) {
        if (echo_buf(ldata, tail) == ECHO_OP_START) {
            if (echo_buf(ldata, tail + 1) == ECHO_OP_ERASE_TAB)
                tail += 3;
        }
    }
    not_yet_stored:
    ldata->echo_tail = tail;
    return old_space - space;
}
    * is over the threshold (and try again each time another
    * block is accumulated) */
size_t nr, old, echoed;
size_t head;

mutex_lock(&ldata->output_lock);
head = ldata->echo_head;
ldata->echo_mark = head;
old = ldata->echo_commit - ldata->echo_tail;

* is over the threshold (and try again each time another
* block is accumulated) */
mtx_lock(&ldata->output_lock);
head = ldata->echo_head;
old = ldata->echo_commit - ldata->echo_tail;
if (nr < ECHO_COMMIT_WATERMARK || (nr % ECHO_BLOCK > old % ECHO_BLOCK)) {
    mutex_unlock(&ldata->output_lock);
    return;
}

mutex_lock(&ldata->output_lock);
head = ldata->echo_head;
echoed = __process_echoes(tty);
mutex_unlock(&ldata->output_lock);
}

static inline void add_echo_byte(unsigned char c, struct n_tty_data *ldata) {
    *echo_buf_addr(ldata, ldata->echo_head++) = c;
    smp_wmb(); /* Matches smp_rmb() in echo_buf(). */
    ldata->echo_head++;
}

/**
seen_alnums = 0;
-while (ldata->read_head != ldata->canon_head) {
+while (MASK(ldata->read_head) != MASK(ldata->canon_head)) {
    head = ldata->read_head;

    /* erase a single possibly multibyte character */
    do {
        head--;
        c = read_buf(ldata, head);
        -} while (is_continuation(c, tty) && head != ldata->canon_head);
        +} while (is_continuation(c, tty) &&
        +MASK(head) != MASK(ldata->canon_head));

    /* do not partially erase */
    if (is_continuation(c, tty))
        @@ -1027,7 +1058,7 @@
        * This info is used to go back the correct
        * number of columns.
        */
-while (tail != ldata->canon_head) {
+while (MASK(tail) != MASK(ldata->canon_head)) {
    tail--;
    c = read_buf(ldata, tail);
    if (c == '\t') {
        @@ -1302,7 +1333,7 @@
        finish_erasing(ldata);
        echo_char(c, tty);
        echo_char_raw('\n', ldata);
-while (tail != ldata->read_head) {
+while (MASK(tail) != MASK(ldata->read_head)) {
            echo_char(read_buf(ldata, tail), tty);
        tail++;
    }
@@ -1671,7 +1702,7 @@

down_read(&tty->termios_rwsem);

-while (1) {
+do {
    /*
        * When PARMRK is set, each input char may take up to 3 chars
        * in the read buf; reduce the buffer space avail by 3x
        */
        @ @ -1713,7 +1744,7 @@
        fp += n;
        count -= n;
rcvd += n;
-
+} while (!test_bit(TTY_LDISC_CHANGING, &tty->flags));

tty->receive_room = room;

@@ -1878,30 +1909,21 @@
 struct n_tty_data *ldata;

 /* Currently a malloc failure here can panic */
-ldata = vmalloc(sizeof(*ldata));
+ldata = vzalloc(sizeof(*ldata));
 if (!ldata)
 -goto err;
+return -ENOMEM;

 ldata->overrun_time = jiffies;
 mutex_init(&ldata->atomic_read_lock);
 mutex_init(&ldata->output_lock);

tty->disc_data = ldata;
-reset_buffer_flags(tty->disc_data);
-ldata->column = 0;
-ldata->canon_column = 0;
-ldata->num_overrun = 0;
-ldata->no_room = 0;
-ldata->lnext = 0;
+reset_buffer_flags(tty->disc_data);
tty->closing = 0;
/* indicate buffer work may resume */
clear_bit(TTY_LDISC_HALTED, &tty->flags);
n_tty_set_termios(tty, NULL);
tty_unthrottle(tty);
-
+err:
+return -ENOMEM;
}

static inline int input_available_p(struct tty_struct *tty, int poll)
@@ -1951,11 +1973,12 @@
 n = min(head - ldata->read_tail, N_TTY_BUF_SIZE - tail);
 n = min(*nr, n);
 if (n) {
-const unsigned char *from = read_buf_addr(ldata, tail);
+unsigned char *from = read_buf_addr(ldata, tail);
 retval = copy_to_user(*b, from, n);
 n -= retval;
 is_eof = n == 1 && *from == EOF_CHAR(tty);
tty_audit_add_data(tty, from, n);
+zero_buffer(tty, from, n);
smp_store_release(&ldata->read_tail, ldata->read_tail + n);

/* Turn single EOF into zero-length read */
if (L_EXTPROC(tty) && ldata->icanon && is_eof &&
@@ -2180,9 +2203,15 @@
}
if (tty_hung_up_p(file))
break;
+/*
+ * Abort readers for ttys which never actually
+ * get hung up. See __tty_hangup().
+ */
+if (test_bit(TTY_HUPPING, &tty->flags))
+break;
if (!timeout)
break;
-if (file->f_flags & O_NONBLOCK) {
+if (tty_io_nonblock(tty, file)) {
    retval = -EAGAIN;
    break;
}
@@ -2336,7 +2365,7 @@
    break;
-if (file->f_flags & O_NONBLOCK) {
+if (tty_io_nonblock(tty, file)) {
    retval = -EAGAIN;
    break;
}
@@ -2405,7 +2434,7 @@
tail = ldata->read_tail;
nr = head - tail;
/* Skip EOF-chars.. */
-while (head != tail) {
+while (MASK(head) != MASK(tail)) {
    if (test_bit(tail & (N_TTY_BUF_SIZE - 1), ldata->read_flags) &&
        read_buf(ldata, tail) == __DISABLED_CHAR)
        nr--;
--- linux-4.15.0.orig/drivers/tty/nozomi.c
+++ linux-4.15.0/drivers/tty/nozomi.c
@@ -1403,7 +1403,7 @@
    --- linux-4.15.0.orig/drivers/tty/nozomi.c
    +++ linux-4.15.0/drivers/tty/nozomi.c
    if (unlikely(ret)) {
        dev_err(&pdev->dev, "can't request irq %d\n", pdev->irq);
        goto err_free_all_kfifo;
        goto err_free_kfifo;

DBG1("base_addr: %p", dc->base_addr);
@@ -1441,12 +1441,15 @@
    for (i--; i >= 0; i--) {
    tty_unregister_device(ntty_driver, dc->index_start + i);
    tty_port_destroy(&dc->port[i].port);
  }
  free_irq(pdev->irq, dc);
+  err_free_all_kfifo:
+  i = MAX_PORT;
  err_free_kfifo:
  for (i = 0; i < MAX_PORT; i++)
+  for (i--; i >= PORT_MDM; i--)
  kfifo_free(&dc->port[i].fifo_ul);
  err_free_sbuf:
  kfree(dc->send_buf);
--- linux-4.15.0.orig/drivers/tty/pty.c
+++ linux-4.15.0/drivers/tty/pty.c
@@ -28,6 +28,7 @@
 #include <linux/mount.h>
 #include <linux/file.h>
 #include <linux/ioctl.h>
+#include <linux/compat.h>

 #undef TTY_DEBUG_HANGUP
 #ifdef TTY_DEBUG_HANGUP
@@ -110,13 +111,16 @@
 static int pty_write(struct tty_struct *tty, const unsigned char *buf, int c)
 {
   struct tty_struct *to = tty->link;
+  unsigned long flags;
   if (tty->stopped)
     return 0;

   if (c > 0) {
+    spin_lock_irqsave(&to->port->lock, flags);
/* Stuff the data into the input queue of the other end */
    c = tty_insert_flip_string(to->port, buf, c);
+    spin_unlock_irqrestore(&to->port->lock, flags);
/* And shovel */
    if (c)
      tty_flip_buffer_push(to->port);
return -ENOIOCTLCMD;
}

#else
#define pty_bsd_compat_ioctl NULL
#endif

static int legacy_count = CONFIG_LEGACY_PTY_COUNT;
/*
 * PTY ioctls don't require any special translation between 32-bit and
 * 64-bit userspace, they are already compatible.
 */
-return pty_bsd_ioctl(tty, cmd, arg);
+return pty_bsd_ioctl(tty, cmd, (unsigned long)compat_ptr(arg));
}
+#else
+#define pty_bsd_compat_ioctl NULL
+#endif

static long pty_bsd_compat_ioctl(struct tty_struct *tty, unsigned int cmd, unsigned long arg)
{
  PTY ioctls don't require any special translation between 32-bit and
  64-bit userspace, they are already compatible.
  */
  -return pty_bsd_ioctl(tty, cmd, arg);
  +return pty_bsd_ioctl(tty, cmd, (unsigned long)compat_ptr(arg));
}

static long pty_unix98_compat_ioctl(struct tty_struct *tty, unsigned int cmd, unsigned long arg)
{
  * PTY ioctls don't require any special translation between 32-bit and
  * 64-bit userspace, they are already compatible.
  */
  -return pty_unix98_ioctl(tty, cmd, arg);
  +return pty_unix98_ioctl(tty, cmd, (unsigned long)compat_ptr(arg));
}

#include <linux/pty命名空间/compat.h>

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+endum

/**
 *  ptm_unix98_lookup - find a pty master
 --- linux-4.15.0.orig/drivers/tty/rocket.c
+++ linux-4.15.0/drivers/tty/rocket.c
@@ -266,7 +266,7 @@
module_param_array(pc104_4, ulong, NULL, 0);
MODULE_PARM_DESC(pc104_4, "set interface types for ISA(PC104) board #4 (e.g.
 pc104_4=232,232,485,485,...");

-static int rp_init(void);
+static int __init rp_init(void);
 static void rp_cleanup_module(void);

module_init(rp_init);
@@ -632,18 +632,21 @@
tty_port_init(&info->port);
 info->port.ops = &rocket_port_ops;
 info->flags &= ~ROCKET_MODE_MASK;
-switch (pc104[board][line]) {
-    case 422:
-        info->flags |= ROCKET_MODE_RS422;
-        break;
-    case 485:
-        info->flags |= ROCKET_MODE_RS485;
-        break;
-    case 232:
-    default:
-        if (board < ARRAY_SIZE(pc104) && line < ARRAY_SIZE(pc104_1))
-            switch (pc104[board][line]) {
-                case 422:
-                    info->flags |= ROCKET_MODE_RS422;
-                    break;
-                case 485:
-                    info->flags |= ROCKET_MODE_RS485;
-                    break;
-                case 232:
-                default:
-                    info->flags |= ROCKET_MODE_RS232;
-                    break;
-            }
-        else
-            info->flags |= ROCKET_MODE_RS232;
            break;
-        }

 info->intmask = RXF_TRIG | TXFIFO_MT | SRC_INT | DELTA_CD | DELTA_CTS | DELTA_DSR;
if (sInitChan(ctlp, &info->channel, aiop, chan) == 0) {
    ByteIO_t UPCIRingInd = 0;

    if (!dev || !pci_match_id(rocket_pci_ids, dev))
        pci_enable_device(dev);
    else
        pci_enable_device(dev) || i >= NUM_BOARDS)
    return 0;

    rcktpt_io_addr[i] = pci_resource_start(dev, 0);

--- linux-4.15.0.orig/drivers/tty/serdev/core.c
+++ linux-4.15.0/drivers/tty/serdev/core.c
@@ -54,6 +54,11 @@
        /* TODO: platform modalias */
        +
        +/* ACPI enumerated controllers do not have a modalias */
+if (!dev->of_node & dev->type == &serdev_ctrl_type)
+    return 0;
+
    rc = acpi_device_uevent_modalias(dev, env);
    if (rc != -ENODEV)
        return rc;

@@ -442,6 +447,12 @@
        return AE_OK;
    }

+static const struct acpi_device_id serdev_acpi_devices_blacklist[] = {
    +{ "INT3511", 0 },
    +{ "INT3512", 0 },
    +{ },
    +};
+
    static acpi_status acpi_serdev_add_device(acpi_handle handle, u32 level,
        void *data, void **return_value)
        
            return AE_OK;

        +/* Skip if black listed */
        +if (!acpi_match_device_ids(adev, serdev_acpi_devices_blacklist))
            return AE_OK;
+
    return acpi_serdev_register_device(ctrl, adev);
}
static void __exit serdev_exit(void)
{
    bus_unregister(&serdev_bus_type);
    ida_destroy(&ctrl_ida);
}

module_exit(serdev_exit);

--- linux-4.15.0.orig/drivers/tty/serdev/serdev-ttypor.c
+++ linux-4.15.0/drivers/tty/serdev/serdev-ttypor.c
@@ -237,7 +237,6 @@
    struct device *parent,
    struct tty_driver *drv, int idx)
{
-    const struct tty_port_client_operations *old_ops;
    struct serdev_controller *ctrl;
    struct serport *serport;
    int ret;
@@ -256,7 +255,6 @@
    ctrl->ops = &ctrl_ops;
-    old_ops = port->client_ops;
    port->client_ops = &client_ops;
    port->client_data = ctrl;
@@ -269,7 +267,6 @@
    err_reset_data:
    port->client_data = NULL;
-    port->client_ops = old_ops;
    port->client_ops = &tty_port_default_client_ops;
    serdev_controller_put(ctrl);
    return ERR_PTR(ret);
@@ -284,8 +282,8 @@
    return -ENODEV;
    serdev_controller_remove(ctrl);
    -port->client_ops = NULL;
    port->client_data = NULL;
+port->client_ops = &tty_port_default_client_ops;
    serdev_controller_put(ctrl);
    return 0;
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_aspeed_vuart.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_aspeed_vuart.c
@@ -252,7 +252,6 @@

port.port.line = rc;

port.port.irq = irq_of_parse_and_map(np, 0);
-port.port.irqflags = IRQF_SHARED;
port.port.iotype = UPIO_MEM;
port.port.type = PORT_16550A;
port.port.uartclk = clk;
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_bcm2835aux.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_bcm2835aux.c
@@ -115,7 +115,7 @@
{
    struct bcm2835aux_data *data = platform_get_drvdata(pdev);

    -serial8250_unregister_port(data->uart.port.line);
    +serial8250_unregister_port(data->line);
    clk_disable_unprepare(data->clk);

    return 0;
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_core.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_core.c
@@ -177,7 +177,7 @@
{
    struct hlist_head *h;
    struct hlist_node *n;
    struct irq_info *i;
-    int ret, irq_flags = up->port.flags & UPF_SHARE_IRQ ? IRQF_SHARED : 0;
+    int ret;

    mutex_lock(&hash_mutex);

    @ @ -212.9 +212.8 @@
    INIT_LIST_HEAD(&up->list);
    i->head = &up->list;
    spin_unlock_irq(&i->lock);
    -irq_flags |= up->port.irqflags;
    ret = request_irq(up->port.irq, serial8250_interrupt,
    - irq_flags, up->port.name, i);
    + up->port.irqflags, up->port.name, i);
    if (ret < 0)
        serial_do_unlink(i, up);
    }
    @ @ -528.6 +527.7 @@
    */
up->mcr_mask = ~ALPHA_KLUDGE_MCR;
up->mcr_force = ALPHA_KLUDGE_MCR;
+serial8250_set_defaults(up);
}

/* chain base port ops to support Remote Supervisor Adapter */
port->membase = old_serial_port[i].iomem_base;
port->iotype = old_serial_port[i].io_type;
port->regshift = old_serial_port[i].iomem_reg_shift;

port->irqflags |= irqflag;
if (serial8250_isa_config != NULL)
    return NULL;

+static void serial_8250_overrun_backoff_work(struct work_struct *work)
+{
+    struct uart_8250_port *up =
+        container_of(to_delayed_work(work), struct uart_8250_port,
+            overrun_backoff);
+    struct uart_port *port = &up->port;
+    unsigned long flags;
+
+    spin_lock_irqsave(&port->lock, flags);
+    up->ier |= UART_IER_RLSI | UART_IER_RDI;
+    up->port.read_status_mask |= UART_LSR_DR;
+    serial_out(up, UART_IER, up->ier);
+    spin_unlock_irqrestore(&port->lock, flags);
+}
+
+  /*
+   * serial8250_register_8250_port - register a serial port
+   * @up: serial port template
+   */
+  @up: serial port template
+  @ @ -1005,8 +1058,10 @@
+serial8250_apply_quirks(uart);
+ret = uart_add_one_port(&serial8250_reg,
+    &uart->port);
+  -if (ret == 0)
+  -ret = uart->port.line;
+  +if (ret)
+  goto err;
+  +ret = uart->port.line;
+} else {
+    dev_info(uart->port.dev,
+        "skipping CIR port at 0x%lx / 0x%llx, IRQ %d\n",
+        @ @ -1055,10 +1071,26 @@
+
ret = 0;
}
/* Initialise interrupt backoff work if required */
+if (up->overrun_backoff_time_ms > 0) {
+uart->overrun_backoff_time_ms =
+up->overrun_backoff_time_ms;
+INIT_DELAYED_WORK(&uart->overrun_backoff,
+serial_8250_overrun_backoff_work);
+} else {
+uart->overrun_backoff_time_ms = 0;
+
+
+mutex_unlock(&serial_mutex);

return ret;
+
+err:
+uart->port.dev = NULL;
+mutex_unlock(&serial_mutex);
+return ret;
}
EXPORT_SYMBOL(serial8250_register_8250_port);

--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_dw.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_dw.c
@@ -252,31 +252,25 @@
struct ktermios *old)
{
    unsigned int baud = tty_termios_baud_rate(termios);
    unsigned int target_rate, min_rate, max_rate;
    struct dw8250_data *d = p->private_data;
    long rate;
    int i, ret;
    +int ret;

-    if (IS_ERR(d->clk) || !old)
-        goto out;

-* Find a clk rate within +/-1.6% of an integer multiple of baudx16 */
-*target_rate = baud * 16;
-*min_rate = target_rate - (target_rate >> 6);
-*max_rate = target_rate + (target_rate >> 6);
-
-*for (i = 1; i <= UART_DIV_MAX; i++) {
-*rate = clk_round_rate(d->clk, i * target_rate);
-*if (rate >= i * min_rate && rate <= i * max_rate)
-*break;
-*}

if (i <= UART_DIV_MAX) {
  clk_disable_unprepare(d->clk);
  rate = clk_round_rate(d->clk, baud * 16);
  if (rate < 0)
    ret = rate;
  else if (rate == 0)
    ret = -ENOENT;
  else
    ret = clk_set_rate(d->clk, rate);
  clk_prepare_enable(d->clk);
  if (!ret)
    p->uartclk = rate;
}
+clk_prepare_enable(d->clk);
+if (!ret)
  p->uartclk = rate;

out:
p->status &= ~UPSTAT_AUTOCTS;
@@ -317,7 +311,7 @@
static bool dw8250_idma_filter(struct dma_chan *chan, void *param)
{
  -return param == chan->device->dev->parent;
++return param == chan->device->dev;
}

static void dw8250_quirks(struct uart_port *p, struct dw8250_data *data)
@@ -358,7 +352,7 @@
/* Platforms with iDMA */
/* Platforms with iDMA 64-bit */
if (platform_get_resource_byname(to_platform_device(p->dev),
  IORESOURCE_MEM, "lpss_priv")) {
  data->dma.rx_param = p->dev->parent;
  @ @ -515,7 +509,8 @ @
/* If no clock rate is defined, fail. */
if (!p->uartclk) {
  dev_err(dev, "clock rate not defined\n");
  -return -EINVAL;
++err = -EINVAL;
  goto err_clk;
}
data->pclk = devm_clk_get(dev, "apb_pclk");
@@ -673,6 +668,7 @@
 { "APMC0D08", 0},
 { "AMD0020", 0 },
 { "AMDI0020", 0 },
+{ "BRCM2032", 0 },
 { "HISI0031", 0 },
 { },
};
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_exar.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_exar.c
@@ -24,6 +24,14 @@
 #include "8250.h"

 +#define PCI_DEVICE_ID_ACCES_COM_2S0x1052
 +#define PCI_DEVICE_ID_ACCES_COM_4S0x105d
 +#define PCI_DEVICE_ID_ACCES_COM_8S0x106c
 +#define PCI_DEVICE_ID_ACCES_COM232_80x10a8
 +#define PCI_DEVICE_ID_ACCES_COM_2SM0x10d2
 +#define PCI_DEVICE_ID_ACCES_COM_4SM0x10db
 +#define PCI_DEVICE_ID_ACCES_COM_8SM0x10ea
 +
 #define PCIDEVICE_ID_COMMTECH_4224PCI335	0x0002
 #define PCI_DEVICE_ID_COMMTECH_4222PCI335	0x0004
 #define PCI_DEVICE_ID_COMMTECH_2324PCI335	0x000a
@@ -34,6 +42,7 @@
 #define PCI_DEVICE_ID_EXAR_XR17V4358		0x4358
 #define PCI_DEVICE_ID_EXAR_XR17V8358		0x8358

+#define UART_EXAR_INT0		0x80
#define UART_EXAR_8XMODE	0x88	/* 8X sampling rate select */

#define UART_EXAR_FCTR0x08/* Feature Control Register */
@@ -121,6 +130,7 @@
 struct exar8250 {
 unsigned int nr;
 struct exar8250_board*board;
+void __iomem*virt;
 intline[0];
 });

@@ -131,12 +141,9 @@
 struct exar8250_board *board = priv->board;
 unsigned int bar = 0;

-if (!pcim_iomap_table(pcidev)[bar] && !pcim_iomap(pcidev, bar, 0))
 -return -ENOMEM;

```c
port->port.iotype = UPIO_MEM;
port->port.mapbase = pci_resource_start(pcidev, bar) + offset;
-port->port.membase = pcim_iomap_table(pcidev)[bar] + offset;
+port->port.membase = priv->virt + offset;
port->port.regshift = board->reg_shift;

return 0;
@@ -219,7 +226,17 @@
* devices will export them as GPIOs, so we pre-configure them safely
* as inputs.
*/
-u8 dir = pcidev->vendor == PCI_VENDOR_ID_EXAR ? 0xff : 0x00;
+
+u8 dir = 0x00;
+
+if  ((pcidev->vendor == PCI_VENDOR_ID_EXAR) &&
+  (pcidev->subsystem_vendor != PCI_VENDOR_ID_SEALEVEL)) {
+  // Configure GPIO as inputs for Commtech adapters
+  dir = 0xff;
+} else {
+  // Configure GPIO as outputs for SeaLevel adapters
+  dir = 0x00;
+
+}

writeb(0x00, p + UART_EXAR_MPIOINT_7_0);
writeb(0x00, p + UART_EXAR_MPIOLVL_7_0);
@@ -420,6 +437,29 @@
.port->port.private_data = NULL;
}

+/*
+ * These Exar UARTs have an extra interrupt indicator that could fire for a
+ * few interrupts that are not presented/cleared through IIR. One of which is
+ * a wakeup interrupt when coming out of sleep. These interrupts are only
+ * cleared by reading global INT0 or INT1 registers as interrupts are
+ * associated with channel 0. The INT[3:0] registers are accessible from each
+ * channel's address space, but for the sake of bus efficiency we register a
+ * dedicated handler at the PCI device level to handle them.
+ */
+static irqreturn_t exar_misc_handler(int irq, void *data)
+{
+  struct exar8250 *priv = data;
+
+  /* Clear all PCI interrupts by reading INT0. No effect on IIR */
+  readb(priv->virt + UART_EXAR_INT0);
+
+  /* Clear INT0 for Expansion Interface slave ports, too */
```

---

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+if (priv->board->num_ports > 8)
+readb(priv->virt + 0x2000 + UART_EXAR_INT0);
+
+return IRQ_HANDLED;
+
static int
exar_pci_probe(struct pci_dev *pcidev, const struct pci_device_id *ent)
{

priv->board = board;
+priv->virt = pcim_iomap(pcidev, bar, 0);
+if (!priv->virt)
+return -ENOMEM;

pci_set_master(pcidev);

uart.port.irq = pci_irq_vector(pcidev, 0);
uart.port.dev = &pcidev->dev;

+rc = devm_request_irq(&pcidev->dev, uart.port.irq, exar_misc_handler,
+ IRQF_SHARED, "exar_uart", priv);
+if (rc)
+return rc;
+
for (i = 0; i < nr_ports && i < maxnr; i++) {
rc = board->setup(priv, pcidev, &uart, i);
if (rc) {

static SIMPLE_DEV_PM_OPS(exar_pci_pm, exar_suspend, exar_resume);

+static const struct exar8250_board acces_com_2x = {
+.num_ports= 2,
+.setup= pci_xr17c154_setup,
+};
+
+static const struct exar8250_board acces_com_4x = {
+.num_ports= 4,
+.setup= pci_xr17c154_setup,
+};
+
+static const struct exar8250_board acces_com_8x = {
+.num_ports= 8,
+.setup= pci_xr17c154_setup,
+};
static const struct exar8250_board pbn_fastcom335_2 = {
    .num_ports = 2,
    .setup = pci_fastcom335_setup,
    .exit = pci_xr17v35x_exit,
};

static const struct exar8250_board pbn_fastcom35x_2 = {
    .num_ports = 2,
    .setup = pci_xr17v35x_setup,
    .exit = pci_xr17v35x_exit,
};

static const struct exar8250_board pbn_fastcom35x_4 = {
    .num_ports = 4,
    .setup = pci_xr17v35x_setup,
    .exit = pci_xr17v35x_exit,
};

static const struct exar8250_board pbn_fastcom35x_8 = {
    .num_ports = 8,
    .setup = pci_xr17v35x_setup,
    .exit = pci_xr17v35x_exit,
};

static const struct exar8250_board pbn_exar_XR17V4358 = {
    .num_ports = 12,
    .has_slave = true,
    .exit = pci_xr17v35x_exit,
};

static const struct pci_device_id exar_pci_tbl[] = {
    EXAR_DEVICE(ACCESSIO, ACCES_COM_2S, acces_com_2x),
    EXAR_DEVICE(ACCESSIO, ACCES_COM_4S, acces_com_4x),
    EXAR_DEVICE(ACCESSIO, ACCES_COM_8S, acces_com_8x),
    EXAR_DEVICE(ACCESSIO, ACCES_COM232_8, acces_com_8x),
    EXAR_DEVICE(ACCESSIO, ACCES_COM_2SM, acces_com_2x),
    EXAR_DEVICE(ACCESSIO, ACCES_COM_4SM, acces_com_4x),
    EXAR_DEVICE(ACCESSIO, ACCES_COM_8SM, acces_com_8x),
    CONNECT_DEVICE(XR17C152, UART_2_232, pbn_connect),
    CONNECT_DEVICE(XR17C154, UART_4_232, pbn_connect),
    CONNECT_DEVICE(XR17C158, UART_8_232, pbn_connect),
};
EXAR_DEVICE(EXAR, EXAR_XR17V358, pbn_exar_XR17V35x),
EXAR_DEVICE(EXAR, EXAR_XR17V4358, pbn_exar_XR17V4358),
EXAR_DEVICE(EXAR, EXAR_XR17V8358, pbn_exar_XR17V8358),
-EXAR_DEVICE(COMMTECH, COMMTECH_4222PCIE, pbn_exar_XR17V35x),
-EXAR_DEVICE(COMMTECH, COMMTECH_4224PCIE, pbn_exar_XR17V35x),
-EXAR_DEVICE(COMMTECH, COMMTECH_4228PCIE, pbn_exar_XR17V35x),
+EXAR_DEVICE(COMMTECH, COMMTECH_4222PCIE, pbn_fastcom35x_2),
+EXAR_DEVICE(COMMTECH, COMMTECH_4224PCIE, pbn_fastcom35x_4),
+EXAR_DEVICE(COMMTECH, COMMTECH_4228PCIE, pbn_fastcom35x_8),

EXAR_DEVICE(COMMTECH, COMMTECH_4222PCIE335, pbn_fastcom335_2),
EXAR_DEVICE(COMMTECH, COMMTECH_4224PCIE335, pbn_fastcom335_4),
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_fsl.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_fsl.c
@@ -45,8 +45,29 @@

lsr = orig_lsr = up->port.serial_in(&up->port, UART_LSR);

-/* Process incoming characters first */
+/* Process incoming characters first */
+if ((lsr & (UART_LSR_DR | UART_LSR_BI)) &&
  (up->ier & (UART_IER_RLSI | UART_IER_RDI))) {
lsr = serial8250_rx_chars(up, lsr);
+}
+
+/* Stop processing interrupts on input overrun */
+if (((orig_lsr & UART_LSR_OE) && (up->overrun_backoff_time_ms > 0)) {
+unsigned long delay;
+
+up->ier = port->serial_in(port, UART_IER);
+if (up->ier & (UART_IER_RLSI | UART_IER_RDI)) {
+port->ops->stop_rx(port);
+} else {
+    /* Keep restarting the timer until
+    * the input overrun subsides.
+    */
+       cancel_delayed_work(&up->overrun_backoff);
+    } +delay = msecs_to_jiffies(up->overrun_backoff_time_ms);
+schedule_delayed_work(&up->overrun_backoff, delay);
+}

serial8250_modem_status(up);

--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_mtk.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_mtk.c
@@ -36,7 +36,20 @@
unsigned long flags;
unsigned int baud, quot;

-serial8250_do_set_termios(port, termios, old);
+/
+ * Store the requested baud rate before calling the generic 8250
+ * set_termios method. Standard 8250 port expects bauds to be
+ * no higher than (uartclk / 16) so the baud will be clamped if it
+ * gets out of that bound. Mediatek 8250 port supports speed
+ * higher than that, therefore we'll get original baud rate back
+ * after calling the generic set_termios method and recalculate
+ * the speed later in this method.
+ */
+baud = tty_termios_baud_rate(termios);
+
+serial8250_do_set_termios(port, termios, NULL);
+
+tty_termios_encode_baud_rate(termios, baud, baud);

/*
 * Mediatek UARTs use an extra highspeed register (UART_MTK_HIGHS)
@@ -76,6 +89,11 @@
 */
spin_lock_irqsave(&port->lock, flags);

+/
+ * Update the per-port timeout.
+ */
+uart_update_timeout(port, termios->c_cflag, baud);
+
+ /* set DLAB we have cval saved in up->lcr from the call to the core */
serial_port_out(port, UART_LCR, up->lcr | UART_LCR_DLAB);
serial_dl_write(up, quot);
@@ -213,17 +231,17 @@
platform_set_drvdata(pdev, data);

-pm_runtime_enable(&pdev->dev);
-if (!pm_runtime_enabled(&pdev->dev)) {
-err = mtk8250_runtime_resume(&pdev->dev);
-if (err)
-return err;
-}
+err = mtk8250_runtime_resume(&pdev->dev);
+if (err)
+return err;

data->line = serial8250_register_8250_port(&uart);
if (data->line < 0)
return data->line;

+pm_runtime_set_active(&pdev->dev);
+pm_runtime_enable(&pdev->dev);
+
return 0;
}

@@ -234,13 +252,11 @@
pm_runtime_get_sync(&pdev->dev);

serial8250_unregister_port(data->line);
+mtk8250_runtime_suspend(&pdev->dev);

pm_runtime_disable(&pdev->dev);
pm_runtime_put_noidle(&pdev->dev);

-if (!pm_runtime_status_suspended(&pdev->dev))
-mtk8250_runtime_suspend(&pdev->dev);
-
return 0;
}

--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_of.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_of.c
@@ -100,6 +100,10 @@
if (of_property_read_u32(np, "reg-offset", &prop) == 0)
port->mapbase += prop;
+	/* Compatibility with the deprecated pxa driver and 8250_pxa drivers. */
+if (of_device_is_compatible(np, "mrvl,mmp-uart"))
+port->regshift = 2;
+
/* Check for registers offset within the devices address range */
if (of_property_read_u32(np, "reg-shift", &prop) == 0)
port->regshift = prop;
@@ -136,8 +140,11 @@
info->rst = devm_reset_control_get_optional_shared(&ofdev->dev, NULL);
-if (IS_ERR(info->rst))
+if (IS_ERR(info->rst)) { 
+ret = PTR_ERR(info->rst);
goto err_dispose;
+
ret = reset_control_deassert(info->rst);
if (ret)
goto err_dispose;
@@ -220,6 +227,11 @@
if (of_property_read_bool(ofdev->dev.of_node, "auto-flow-control"))
port8250.capabilities |= UART_CAP_AFE;

+if (of_property_read_u32(ofdev->dev.of_node, "+"overrun-throttle-ms",
+&port8250.overrun_backoff_time_ms) != 0)
+port8250.overrun_backoff_time_ms = 0;
+
ret = serial8250_register_8250_port(&port8250);
if (ret < 0)
goto err_dispose;
@@ -313,6 +325,7 @@
{
	{ .compatible = "mrvl,mmp-uart", 
	.data = (void *)PORT_XSCALE, },
	{ .compatible = "ti,da830-uart", .data = (void *)PORT_DA830, },
+{ .compatible = "nuvoton,ncpm750-uart", .data = (void *)PORT_NPCM, },
/* end of list */,
};
MODULE_DEVICE_TABLE(of, of_platform_serial_table);
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_omap.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_omap.c
@@ -162,11 +162,6 @@
struct omap8250_priv *priv)
{
	u8 timeout = 255;
-\u8 old_mdr1;
-\-
-old_mdr1 = serial_in(up, UART_OMAP_MDR1);
-if (old_mdr1 == priv->mdr1)
-return;

serial_out(up, UART_OMAP_MDR1, priv->mdr1);
udelay(2);
@@ -774,7 +769,10 @@
dmaengine_tx_status(dma->rxchan, dma->rx_cookie, &state);

count = dma->rx_size - state.residue;
-
+if (count < dma->rx_size)
+dmaengine_terminate_async(dma->rxchan);
+if (!count)
+goto unlock;
ret = tty_insert_flip_string(tty_port, dma->rx_buf, count);

p->port.icount.rx += ret;
spin_unlock_irqrestore(&priv->rx_dma_lock, flags);

__dma_rx_do_complete(p);
dmaengine_terminate_all(dma->rxchan);
}

static int omap_8250_rx_dma(struct uart_8250_port *p)
return 0;
}

+static const u8 omap4_habit = UART_ERRATA_CLOCK_DISABLE;
static const u8 am3352_habit = OMAP_DMA_TX_KICK | UART_ERRATA_CLOCK_DISABLE;
static const u8 dra742_habit = UART_ERRATA_CLOCK_DISABLE;

static const struct_device_id omap8250_dt_ids[] = {
& .compatible = "ti,omap2-uart" },
& .compatible = "ti,omap3-uart" },
- & .compatible = "ti,omap4-uart" },
+& .compatible = "ti,omap4-uart", .data = &omap4_habit, },
& .compatible = "ti,am3352-uart", .data = &am3352_habit, },
& .compatible = "ti,am4372-uart", .data = &am3352_habit, },
& .compatible = "ti,dra742-uart", .data = &dra742_habit, },
& @ -1216,11 +1214,11 @@
spin_lock_init(&priv->rx_dma_lock);

device_init_wakeup(&pdev->dev, true);
+pm_runtime_enable(&pdev->dev);
pm_runtime_use_autosuspend(&pdev->dev);
pm_runtime_set_autosuspend_delay(&pdev->dev, -1);

pm_runtime_irq_safe(&pdev->dev);
-pm_runtime_enable(&pdev->dev);

pm_runtime_get_sync(&pdev->dev);

@@ -1344,6 +1342,19 @@
int sysc;
int sysss;

+/
+ * At least on omap4, unused uarts may not idle after reset without
+ * a basic scr dma configuration even with no dma in use. The
+ * module clkctrl status bits will be 1 instead of 3 blocking idle
+ * for the whole clockdomain. The softreset below will clear scr,
+ * and we restore it on resume so this is safe to do on all SoCs
+ * needing omap8250_soft_reset() quirk. Do it in two writes as
+ * recommended in the comment for omap250_update_scr().
+ */
+serial_out(up, UART_OMAP_SCR, OMAP_UART_SCR_DMAMODE_1);
+serial_out(up, UART_OMAP_SCR,
  OMAP_UART_SCR_DMAMODE_1 | OMAP_UART_SCR_DMAMODE_CTL);
+
syss = serial_in(up, UART_OMAP_SYSC);

/* softreset the UART */
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_pci.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_pci.c
@@ -70,7 +70,7 @@
static int
    setup_port(struct serial_private *priv, struct uart_8250_port *port,
       int bar, int offset, int regshift)
+    u8 bar, unsigned int offset, int regshift)
{
    struct pci_dev *dev = priv->dev;

@@ -1637,6 +1637,30 @@
return pci_default_setup(priv, board, port, idx);
}

+static int
+pci_sunix_setup(struct serial_private *priv,
+    const struct pciserial_board *board,
+    struct uart_8250_port *port, int idx)
+{
+    int bar;
+    int offset;
+
+    port->port.flags |= UPF_FIXED_TYPE;
+    port->port.type = PORT_SUNIX;
+
+    if (idx < 4) {
+        bar = 0;
+        offset = idx * board->uart_offset;
+    } else {
+        bar = 1;
+        idx -= 4;
+        idx = div_s64_rem(idx, 4, &offset);
+        offset = idx * 64 + offset * board->uart_offset;
+    }
+
+    return setup_port(priv, port, bar, offset, 0);
+}
```c
#define PCI_VENDOR_ID_SBSMODULARIO	0x124B
#define PCI_SUBVENDOR_ID_SBSMODULARIO	0x124B
#define PCI_DEVICE_ID_OCTPRO		0x0001
#define PCIE_DEVICE_ID_WCH_CH384_4S0x3470
#define PCIE_DEVICE_ID_WCH_CH382_2S0x3253

#define PCI_VENDOR_ID_PERICOM		0x12D8
#define PCI_DEVICE_ID_PERICOM_PI7C9X79510x7951
#define PCI_DEVICE_ID_PERICOM_PI7C9X79520x7952
#define PCI_DEVICE_ID_PERICOM_PI7C9X79540x7954
#define PCI_DEVICE_ID_PERICOM_PI7C9X79580x7958

#define PCI_VENDOR_ID_ACCESIO		0x494f
#define PCI_DEVICE_ID_ACCESIO_PCIE_COM_2SDB	0x1051
#define PCI_DEVICE_ID_ACCESIO_MPCIE_COM_2S0x1053
#define pci_default_setup,
#define pci_plx9050_exit,

+	{
		.vendor = PCI_VENDOR_ID_ACCESIO,
		.device = PCI_DEVICE_ID_ACCESIO_PCIE_COM_4SDB,
		.subvendor = PCI_ANY_ID,
		.subdevice = PCI_ANY_ID,
		.setup = pci_pericom_setup,
	},

+	{
		.vendor = PCI_VENDOR_ID_ACCESIO,
		.device = PCI_DEVICE_ID_ACCESIO_MPCIE_COM_4S,
		.subvendor = PCI_ANY_ID,
		.subdevice = PCI_ANY_ID,
		.setup = pci_pericom_setup,
	},

+	{
		.vendor = PCI_VENDOR_ID_ACCESIO,
		.device = PCI_DEVICE_ID_ACCESIO_PCIE_COM232_4DB,
		.subvendor = PCI_ANY_ID,
		.subdevice = PCI_ANY_ID,
		.setup = pci_pericom_setup,
	},

+	{
		.vendor = PCI_VENDOR_ID_ACCESIO,
		.device = PCI_DEVICE_ID_ACCESIO_MPCIE_COM232_4,
		.subvendor = PCI_ANY_ID,
		.subdevice = PCI_ANY_ID,
		.setup = pci_pericom_setup,
	},
```
+
  +.vendor = PCI_VENDOR_ID_ACCESIO,
  +.device = PCI_DEVICE_ID_ACCESIO_PCIE_COM_4SMDB,
  +.subvendor = PCI_ANY_ID,
  +.subdevice = PCI_ANY_ID,
  +.setup = pci_pericom_setup,
+},
+
  +.vendor = PCI_VENDOR_ID_ACCESIO,
  +.device = PCI_DEVICE_ID_ACCESIO_PCIE_COM_4SM,
  +.subvendor = PCI_ANY_ID,
  +.subdevice = PCI_ANY_ID,
  +.setup = pci_pericom_setup,
+},
+
  +.vendor = PCI_VENDOR_ID_ACCESIO,
  +.device = PCI_DEVICE_ID_ACCESIO_PCIE_ICM_4S,
  +.subvendor = PCI_ANY_ID,
  +.subdevice = PCI_ANY_ID,
  +.setup = pci_pericom_setup,
+],
  +.device = PCI_DEVICE_ID_ACCESIO_PCIE_ICM232_4,
  +.subvendor = PCI_ANY_ID,
  +.subdevice = PCI_ANY_ID,
  +.setup = pci_pericom_setup,
+],
  +.vendor = PCI_VENDOR_ID_ACCESIO,
  +.device = PCI_DEVICE_ID_ACCESIO_PCIE_ICM485_4,
  +.subvendor = PCI_ANY_ID,
  +.subdevice = PCI_ANY_ID,
  +.setup = pci_pericom_setup,
+],
  +.vendor = PCI_VENDOR_ID_ACCESIO,
  +.device = PCI_DEVICE_ID_ACCESIO_PCIE_ICM232_4,
  +.subvendor = PCI_ANY_ID,
  +.subdevice = PCI_ANY_ID,
  +.setup = pci_pericom_setup,
+],
  +.vendor = PCI_VENDOR_ID_ACCESIO,
  +.device = PCI_DEVICE_ID_ACCESIO_PCIE_COM422_4,
  +.subvendor = PCI_ANY_ID,
  +.subdevice = PCI_ANY_ID,
  +.setup = pci_pericom_setup,
+, vendor = PCI_VENDOR_ID_ACCESIO,
+device = PCI_DEVICE_ID_ACCESIO_PCIE_COM485_4,
+subvendor = PCI_ANY_ID,
+subdevice = PCI_ANY_ID,
+setup = pci_pericom_setup,
+
+vendor = PCI_VENDOR_ID_ACCESIO,
+device = PCI_DEVICE_ID_ACCESIO_PCIE_COM232_4,
+subvendor = PCI_ANY_ID,
+subdevice = PCI_ANY_ID,
+setup = pci_pericom_setup,
+
+vendor = PCI_VENDOR_ID_ACCESIO,
+device = PCI_DEVICE_ID_ACCESIO_PCIE_COM_4SM,
+subvendor = PCI_ANY_ID,
+subdevice = PCI_ANY_ID,
+setup = pci_pericom_setup,
+
+vendor = PCI_VENDOR_ID_ACCESIO,
+device = PCI_DEVICE_ID_ACCESIO_PCIE_ICM_4SM,
+subvendor = PCI_ANY_ID,
+subdevice = PCI_ANY_ID,
+setup = pci_pericom_setup,
+
/*
 SBS Technologies, Inc., PMC-OCTALPRO 232
*/
@@ -2126,21 +2249,14 @@
 .setup = pci_timedia_setup,
+
 /*
 - SUNIX (Timedia) cards
 - Do not "probe" for these cards as there is at least one combination
 - card that should be handled by parport_pc that doesn't match the
 - rule in pci_timedia_probe.
 - It is part number is MIO5079A but its subdevice ID is 0x0102.
 - There are some boards with part number SER5037AL that report
 - subdevice ID 0x0002.
 + Sunix PCI serial boards
 */
{
  .vendor = PCI_VENDOR_ID_SUNIX,
  .device = PCI_DEVICE_ID_SUNIX_1999,
.subvendor= PCI_VENDOR_ID_SUNIX,
.subdevice= PCI_ANY_ID,
.init= pci_timedia_init,
.setup= pci_timedia_setup,
+setup= pci_sunix_setup,
},
/*
* Xircom cards
@@ -2594,6 +2710,11 @@
pbn_pericom_PI7C9X7952,
pbn_pericom_PI7C9X7954,
pbn_pericom_PI7C9X7958,
pbn_sunix_pci_1s,
pbn_sunix_pci_2s,
pbn_sunix_pci_4s,
pbn_sunix_pci_8s,
pbn_sunix_pci_16s,
];
*/
@@ -3331,6 +3452,31 @@
.base_baud = 921600,
.uart_offset= 0x8,
],
+[pbn_sunix_pci_1s] = {
+.num_ports= 1,
+.base_baud = 921600,
+uart_offset= 0x8,
+
+[pbn_sunix_pci_2s] = {
+.num_ports= 2,
+base_baud = 921600,
+uart_offset= 0x8,
+
+[pbn_sunix_pci_4s] = {
+num_ports= 4,
+base_baud = 921600,
+uart_offset= 0x8,
+
+[pbn_sunix_pci_8s] = {
+num_ports= 8,
+base_baud = 921600,
+uart_offset= 0x8,
+
+[pbn_sunix_pci_16s] = {
+num_ports= 16,
+base_baud = 921600,
+uart_offset= 0x8,
static const struct pci_device_id blacklist[] = {
    @ @ -3342,9 +3488,7 @ @
/* multi-io cards handled by parport_serial */
    { PCI_DEVICE(0x4348, 0x7053), }, /* WCH CH353 2S1P */
    { PCI_DEVICE(0x4348, 0x5053), }, /* WCH CH353 1S1P */
    -{ PCI_DEVICE(0x4348, 0x7173), }, /* WCH CH355 4S */
    { PCI_DEVICE(0x1c00, 0x3250), }, /* WCH CH382 2S1P */
    -{ PCI_DEVICE(0x1c00, 0x3470), }, /* WCH CH384 4S */

    /* Moxa Smartio MUE boards handled by 8250_moxa */
    { PCI_VDEVICE(MOXA, 0x1024), },
    @ @ -3387,11 +3531,9 @ @
/*
    * If it is not a communications device or the programming
    * interface is greater than 6, give up.
    * *
    * (Should we try to make guesses for multiport serial devices
    *  later?)
    */
    if ((((dev->class >> 8) != PCI_CLASS_COMMUNICATION_SERIAL) &&
        + ((dev->class >> 8) != PCI_CLASS_COMMUNICATION_MULTISERIAL) &&
        (dev->class & 0xff) > 6)
    return -ENODEV;
    @ @ -3427,6 +3569,17 @ @
serial_pci_guess_board(struct pci_dev *dev, struct pciserial_board *board)
    { int num_iomem, num_port, first_port = -1, i;
      +int rc;
      +
      +rc = serial_pci_is_class_communication(dev);
      +if (rc)
      +return rc;
      +
      +/*
      + * Should we try to make guesses for multiport serial devices later?
      + */
      +if ((dev->class >> 8) == PCI_CLASS_COMMUNICATION_MULTISERIAL)
        return -ENODEV;
      num_iomem = num_port = 0;
      for (i = 0; i < PCI_NUM_BAR_RESOURCES; i++) {
        @ @ -3648,10 +3801,6 @ @
        board = &pci_boards[ent->driver_data];
-rc = serial_pci_is_class_communication(dev);
-if (rc)
-rc = serial_pci_is_blacklisted(dev);
-rc = serial_pci_is_blacklisted(dev);
-if (rc)
-return rc;
@@ -4381,17 +4530,29 @@
pbn_b0_bt_1_921600 },
/*
- * SUNIX (TIMEDIA)
+ * Sunix PCI serial boards
 */
{PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999,
-PCI_VENDOR_ID_SUNIX, PCI_ANY_ID,
-PCI_CLASS_COMMUNICATION_SERIAL << 8, 0xffff00,
-pbn_b0_bt_1_921600 },
-
+PCI_VENDOR_ID_SUNIX, 0x0001, 0, 0,
+pbn_sunix_pci_1s },
{PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999,
-PCI_VENDOR_ID_SUNIX, PCI_ANY_ID,
-PCI_CLASS_COMMUNICATION_MULTISERIAL << 8, 0xffff00,
-pbn_b0_bt_1_921600 },
+PCI_VENDOR_ID_SUNIX, 0x0002, 0, 0,
+pbn_sunix_pci_2s },
{PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999,
+PCI_VENDOR_ID_SUNIX, 0x0004, 0, 0,
+pbn_sunix_pci_4s },
{PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999,
+PCI_VENDOR_ID_SUNIX, 0x0008, 0, 0,
+pbn_sunix_pci_8s },
{PCI_VENDOR_ID_SUNIX, PCI_DEVICE_ID_SUNIX_1999,
+PCI_VENDOR_ID_SUNIX, 0x0010, 0, 0,
+pbn_sunix_pci_16s },
/*
+ AFAVLAB serial card, from Harald Welte <laforge@gnumonks.org>
@@ -4575,10 +4736,10 @@
 */

{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM_2SDB, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7952 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_MPCIE_COM_2S, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7952 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM_4SDB, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_pericom_PI7C9X7954 },
@@ -4587,10 +4748,10 @@ pbn_pericom_PI7C9X7954 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM232_2DB, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7952 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_MPCIE_COM232_2, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7952 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM232_4DB, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_pericom_PI7C9X7954 },
@@ -4599,10 +4760,10 @@ pbn_pericom_PI7C9X7954 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM_2SMDB, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7952 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_MPCIE_COM_2SM, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7952 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM_4SMDB, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_pericom_PI7C9X7954 },
@@ -4611,13 +4772,13 @@ pbn_pericom_PI7C9X7954 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_MPCIE_ICM485_1, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7951 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_MPCIE_ICM422_2, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7954 },
+ pbn_pericom_PI7C9X7952 }.
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_MPCIE_ICM485_2,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
-pbn_pericom_PI7C9X7954 ),
+pbn_pericom_PI7C9X7952 ),
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_MPCIE_ICM422_4,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
pbn_pericom_PI7C9X7954 },
@@ -4626,16 +4787,16 @@
pbn_pericom_PI7C9X7954 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_ICM_2S,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
-pbn_pericom_PI7C9X7954 ),
+pbn_pericom_PI7C9X7952 ),
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_ICM_4S,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
pbn_pericom_PI7C9X7954 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_ICM232_2,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
-pbn_pericom_PI7C9X7954 ),
+pbn_pericom_PI7C9X7952 ),
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_ICM232_4,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
pbn_pericom_PI7C9X7954 },
@@ -4644,13 +4805,13 @@
pbn_pericom_PI7C9X7954 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_ICM_2SM,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
-pbn_pericom_PI7C9X7954 ),
+pbn_pericom_PI7C9X7952 ),
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM422_4,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
pbn_pericom_PI7C9X7954 },
@@ -4659,19 +4820,19 @@
pbn_pericom_PI7C9X7954 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM232_4,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
pbn_pericom_PI7C9X7954 },
-pbn_pericom_PI7C9X7958 ),
+pbn_pericom_PI7C9X7954 ),
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM485_4,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
-pbn_pericom_PI7C9X7958 ),
+pbn_pericom_PI7C9X7954 ),
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM422_8,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
pbn_pericom_PI7C9X7958 },
@@ -4659,19 +4820,19 @@
pbn_pericom_PI7C9X7958 },
{PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM232_4,
PCI_ANY_ID, PCI_ANY_ID, 0, 0,
-pbn_pericom_PI7C9X7958 },

Open Source Used In 5GaaS Edge AC-4  28843
+pbn_pericom_PI7C9X7954 },
{ PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM232_8, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_pericom_PI7C9X7958 },
{ PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM_4SM, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7958 },
{ PCI_VENDOR_ID_PROFUSE, PCI_DEVICE_ID_PROFUSE_PCIE_COM_4SM, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_pericom_PI7C9X7958 },
{ PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_COM_8SM, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_pericom_PI7C9X7958 },
{ PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_ICM_4SM, PCI_ANY_ID, PCI_ANY_ID, 0, 0, -pbn_pericom_PI7C9X7958 },
{ PCI_VENDOR_ID_ACCESIO, PCI_DEVICE_ID_ACCESIO_PCIE_ICM_8SM, PCI_ANY_ID, PCI_ANY_ID, 0, 0, +pbn_pericom_PI7C9X7954 },

/*
 * Topic TP560 Data/Fax/Voice 56k modem (reported by Evan Clarke)
 */
@@ -4699,6 +4860,17 @@
 PCI_ANY_ID, PCI_ANY_ID, 0, 0,   /* 135a.0dc0 */
pbn_b2_4_115200 },
/
+ * BrainBoxes UC-260
+ */
+{ PCI_VENDOR_ID_INTASHIELD, 0x0D21, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_b2_4_115200 },
+{ PCI_VENDOR_ID_INTASHIELD, 0x0E34, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_b2_4_115200 },
+/*
 * Perle PCI-RAS cards
 */
{ PCI_VENDOR_ID_PLX, PCI_DEVICE_ID_PLX_9030, 0x5b6, 0x5298.17 @ @
 PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_wch384_4 },
/
+ /* Realtek RealManage */
+ */
+{ PCI_VENDOR_ID_REALTEK, 0x816a, PCI_ANY_ID, PCI_ANY_ID, 0, 0, pbn_b0_1_115200 },
+{ PCI_VENDOR_ID_REALTEK, 0x816b,
/* Fintek PCI serial cards */
{ PCI_DEVICE(0x1c29, 0x1104), .driver_data = pbn_fintek_4 },
{ PCI_DEVICE(0x1c29, 0x1108), .driver_data = pbn_fintek_8 },
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_port.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_port.c
@@ -47,6 +47,10 @@
#define UART_EXAR_SLEEP		0x8b	/* Sleep mode */
#define UART_EXAR_DVID		0x8d	/* Device identification */

+/* Nuvoton NPCM timeout register */
+#define UART_NPCM_TOR 7
+#define UART_NPCM_TOIE BIT(7) /* Timeout Interrupt Enable */
+
+/* Debugging. */
@@ -86,8 +90,7 @@
.fcr		= UART_FCR_ENABLE_FIFO | UART_FCR_R_TRIG_10 |
+ .fcr		= UART_FCR_ENABLE_FIFO | UART_FCR_R_TRIG_01,
  .rxtrig_bytes	= {16, 32, 112, 120},
  .flags	= UART_CAP_FIFO,
],
@@ -129,7 +132,8 @@
  .fcr		= UART_FCR_ENABLE_FIFO | UART_FCR_R_TRIG_10 | UART_FCR_CLEAR_XMIT,
  .flags	= UART_CAP_FIFO | UART_CAP_SLEEP,
],
+[PORT_NPCM] = {
  .name	= "Nuvoton 16550",
  .fifo_size= 16,
  .tx_loadsz= 16,
  .fcr	= UART_FCR_ENABLE_FIFO | UART_FCR_R_TRIG_10 |
+ UART_FCR_CLEAR_RCVR | UART_FCR_CLEAR_XMIT,
+ .rxtrig_bytes = {1, 4, 8, 14},
+ .flags = UART_CAP_FIFO,
+ },
+ [PORT_SUNIX] = {
+ .name = "Sunix",
+ .fifo_size = 128,
+ .tx_loadsz = 128,
+ .fcr = UART_FCR_ENABLE_FIFO | UART_FCR_R_TRIG_10,
+ .rxtrig_bytes = {1, 32, 64, 112},
+ .flags = UART_CAP_FIFO | UART_CAP_SLEEP,
+ },
];

/* Uart divisor latch read */
static int default_serial_dl_read(struct uart_8250_port *up)
{
    return serial_in(up, UART_DLL) | serial_in(up, UART_DLM) << 8;
}

/* Uart divisor latch write */
static int exar_handle_irq(struct uart_port *port);

static void set_io_from_upio(struct uart_port *p)
{
    serial_out(up, UART_LCR, 0);
    serial_out(up, UART_FCR, UART_FCR_ENABLE_FIFO);
    -scratch = serial_in(up, UART_IIR) >> 6;

    -switch (scratch) {
        /* Assign this as it is to truncate any bits above 7. */
        +scratch = serial_in(up, UART_IIR);
        +
        +switch (scratch >> 6) {
            case 0:
                autoconfig_8250(up);
                break;
        }
unsigned char status;
unsigned long flags;
struct uart_8250_port *up = up_to_u8250p(port);
bool skip_rx = false;

if (iir & UART_IIR_NO_INT)
    return 0;

status = serial_port_in(port, UART_LSR);

-if (status & (UART_LSR_DR | UART_LSR_BI)) {
+/*
+ * If port is stopped and there are no error conditions in the
+ * FIFO, then don't drain the FIFO, as this may lead to TTY buffer
+ * overflow. Not servicing, RX FIFO would trigger auto HW flow
+ * control when FIFO occupancy reaches preset threshold, thus
+ * halting RX. This only works when auto HW flow control is
+ * available.
+ */
+if (!(status & (UART_LSR_FIFOE | UART_LSR_BRK_ERROR_BITS)) &&
+ (port->status & (UPSTAT_AUTOCTS | UPSTAT_AUTORTS)) &&
+ !(port->read_status_mask & UART_LSR_DR))
+skip_rx = true;
+
+if (status & (UART_LSR_DR | UART_LSR_BI) && !skip_rx) {
+if (!up->dma || handle_rx_dma(up, iir))
status = serial8250_rx_chars(up, status);
+
+serial8250_modem_status(up);
-if ((!up->dma || up->dma->tx_err) && (status & UART_LSR_THRE))
+if ((!up->dma || up->dma->tx_err) && (status & UART_LSR_THRE)) &&
+(up->ier & UART_IER_THRI)
serial8250_tx_chars(up);

spin_unlock_irqrestore(&port->lock, flags);

/*
- * These Exar UARTs have an extra interrupt indicator that could
- * fire for a few unimplemented interrupts. One of which is a
- * wakeup event when coming out of sleep. Put this here just
- * to be on the safe side that these interrupts don't go unhandled.
- */
-static int exar_handle_irq(struct uart_port *port)
-{
unsigned int iir = serial_port_in(port, UART_IIR);
-int ret = 0;
-
-if (((port->type == PORT_XR17V35X) || (port->type == PORT_XR17D15X)) &&
-    serial_port_in(port, UART_EXAR_INT0) != 0)
-ret = 1;
-
-ret |= serial8250_handle_irq(port, iir);
-
-return ret;
-
-/*
- * Newer 16550 compatible parts such as the SC16C650 & Altera 16550 Soft IP
- * have a programmable TX threshold that triggers the THRE interrupt in
- * the IIR register. In this case, the THRE interrupt indicates the FIFO
-@@ -2161,6 +2182,15 @@ UART_DA830_PWREMU_MGMT_FREE);
 }
+
+if (port->type == PORT_NPCM) {
+/*
+ * Nuvoton calls the scratch register 'UART_TOR' (timeout
+ * register). Enable it, and set TIOC (timeout interrupt
+ * comparator) to be 0x20 for correct operation.
+ */
+serial_port_out(port, UART_NPCM_TOR, UART_NPCM_TOIE | 0x20);
+}
+
+#ifdef CONFIG_SERIAL_8250_RSA
/*
 * If this is an RSA port, see if we can kick it up to the
@@ -2250,8 +2280,16 @@
 }
 */

+/* Check if we need to have shared IRQs */
+if (port->irq && (up->port.flags & UPF_SHARE_IRQ))
+up->port.irqflags |= IRQF_SHARED;
+
+if (port->irq && !(up->port.flags & UPF_NO_THRE_TEST)) {
+unsigned char iir1;
+
+if (port->irqflags & IRQF_SHARED)
+disable_irq_nosync(port->irq);
+
+/*
 * Test for UARTs that do not reassert THRE when the
* transmitter is idle and the interrupt has already
  * allow register changes to become visible.
*/
spin_lock_irqsave(&port->lock, flags);
-if (up->port.irqflags & IRQF_SHARED)
  disable_irq_nosync(port->irq);

wait_for_xmitr(up, UART_LSR_THRE);
serial_port_out_sync(port, UART_IER, UART_IER_THRI);
+iir = serial_port_in(port, UART_IIR);
serial_port_out(port, UART_IER, 0);

+spin_unlock_irqrestore(&port->lock, flags);
+
if (port->irqflags & IRQF_SHARED)
  enable_irq(port->irq);
+-spin_unlock_irqrestore(&port->lock, flags);

/*
* If the interrupt is not reasserted, or we otherwise
@@ -2483,6 +2520,15 @@
return quot_16 >> 4;
}

+/* Nuvoton NPCM UARTs have a custom divisor calculation */
+static unsigned int npcm_get_divisor(struct uart_8250_port *up,
+unsigned int baud)
+{
+struct uart_port *port = &up->port;
+
+return DIV_ROUND_CLOSEST(port->uartclk, 16 * baud + 2) - 2;
+}
+
static unsigned int serial8250_get_divisor(struct uart_8250_port *up,
  unsigned int baud,
  unsigned int *frac)
@@ -2503,6 +2549,8 @@
quot = 0x8002;
else if (up->port.type == PORT_XR17V35X)
  quot = xr17v35x_get_divisor(up, baud, frac);
+else if (up->port.type == PORT_NPCM)
+  quot = npcm_get_divisor(up, baud);
else
  quot = uart_get_divisor(port, baud);
@@ -2590,15 +2638,30 @@
struct ktermios *termios,
struct ktermios *old)
{
    unsigned int tolerance = port->uartclk / 100;
    unsigned int min;
    unsigned int max;
    /*
     * Handle magic divisors for baud rates above baud_base on SMSC
     * Super I/O chips. Enable custom rates of clk/4 and clk/8, but
     * disable divisor values beyond 32767, which are unavailable.
     */
    if (port->flags & UPF_MAGIC_MULTIPLIER) {
        min = port->uartclk / 16 / UART_DIV_MAX >> 1;
        max = (port->uartclk + tolerance) / 4;
    } else {
        min = port->uartclk / 16 / UART_DIV_MAX;
        max = (port->uartclk + tolerance) / 16;
    }
    /*
     * Ask the core to calculate the divisor for us.
     * Allow 1% tolerance at the upper limit so uart clks marginally
     * slower than nominal still match standard baud rates without
     * causing transmission errors.
     */
    return uart_get_baud_rate(port, termios, old,
                              port->uartclk / 16 / UART_DIV_MAX,
                              port->uartclk);
    return uart_get_baud_rate(port, termios, old, min, max);
}

void
@@ -3067,11 +3130,6 @@
if (port->type == PORT_UNKNOWN)
    serial8250_release_std_resource(up);

-/* Fixme: probably not the best place for this */
-if ((port->type == PORT_XR17V35X) ||
    (port->type == PORT_XR17D15X))
    port->handle_irq = exar_handle_irq;
>
    register_dev_spec_attr_grp(up);
    up->fcr = uart_config[up->port.type].fcr;
}
if (ret)
return ret;

+ret = of_alias_get_id(pdev->dev.of_node, "serial");
+if (ret >= 0)
+uart.port.line = ret;
+
uart.port.type = PORT_XSCALE;
uart.port.iotype = UPIO_MEM32;
uart.port.mapbase = mmres->start;
--- linux-4.15.0.orig/drivers/tty/serial/8250/8250_uniphier.c
+++ linux-4.15.0/drivers/tty/serial/8250/8250_uniphier.c
@@ -250,12 +250,13 @@
     up.dl_read = uniphier_serial_dl_read;
 up.dl_write = uniphier_serial_dl_write;

-priv->line = serial8250_register_8250_port(&up);
-if (priv->line < 0) {
+ret = serial8250_register_8250_port(&up);
+if (ret < 0) {
    dev_err(dev, "failed to register 8250 port\n");
    clk_disable_unprepare(priv->clk);
    return ret;
 }
+priv->line = ret;

platform_set_drvdata(pdev, priv);

--- linux-4.15.0.orig/drivers/tty/serial/8250/serial_cs.c
+++ linux-4.15.0/drivers/tty/serial/8250/serial_cs.c
@@ -306,6 +306,7 @@
 static int serial_probe(struct pcmcia_device *link)
 }
 struct serial_info *info;
+int ret;

 dev_dbg(&link->dev, "serial_attach\n");

 @@ -320,7 +321,15 @@
 if (do_sound)
 link->config_flags |= CONF_ENABLE_SPKR;

-return serial_config(link);
+ret = serial_config(link);
+if (ret)
+goto free_info;
+
+return 0;
static void serial_detach(struct pcmcia_device *link) {
    link->has_func_id &&
    (link->socket->pcmcia_pfc == 0) &&
    ((link->func_id == CISTPL_FUNCID_MULTI) ||
     (link->func_id == CISTPL_FUNCID_SERIAL))
    pcmcia_loop_config(link, serial_check_for_multi, info);
    if (pcmcia_loop_config(link, serial_check_for_multi, info))
        goto failed;
}

/*
 * Apply any multi-port quirk.
 */
PCMCIA_DEVICE_PROD_ID12("Multi-Tech", "MT2834LT", 0x5f733be51, 0x4cd7c09e),
PCMCIA_DEVICE_PROD_ID12("OEM      ", "C288MX     ", 0xb572d360, 0xd2385b7a),
PCMCIA_DEVICE_PROD_ID12("Option International", "V34bis GSM/PSTN Data/Fax Modem", 0x9d7cd6f5, 0x5cb8bf41),
+PCMCIA_DEVICE_PROD_ID12("Option International", "GSM-Ready 56K/ISDN", 0x9d7cd6f5, 0xb23844aa),
PCMCIA_DEVICE_PROD_ID12("PCMCIA   ", "C336MX     ", 0x99bcafe9, 0xaa25bcab),
PCMCIA_DEVICE_PROD_ID12("Quatech Inc", "PCMCIA Dual RS-232 Serial Port Card", 0xc4420b35, 0x92abe92f),
PCMCIA_DEVICE_PROD_ID12("Quatech Inc", "Dual RS-232 Serial Port PC Card", 0xc4420b35, 0x031a380d),
PCMCIA_DEVICE_CIS_PROD_ID12("ADVANTECH", "COMpad-32/85B-4", 0x96913a85, 0x8bece6f102, 
    "cis/COMpad4.cis"),
PCMCIA_DEVICE_CIS_PROD_ID12("ADVANTECH", "COMpad-32/85", "1.0", 0x96913a85, 0x8bece6f102, 
    "cis/COMpad2.cis"),
PCMCIA_DEVICE_CIS_PROD_ID2("RS-COM 2P", 0xad20b156, "cis/RS-COM-2P.cis"),
-PCMCIA_DEVICE_CIS_MANF_CARD(0x0013, 0x0000, "cis/GLOBETROTTER.cis"),
PCMCIA_DEVICE_PROD_ID12("ELAN DIGITAL SYSTEMS LTD, c1997.", "SERIAL CARD: SL100 1.00.", 
    0x19ca78af, 0x9f64f42b),
PCMCIA_DEVICE_PROD_ID12("ELAN DIGITAL SYSTEMS LTD, c1997.", "SERIAL CARD: SL100", 
    0x19ca78af, 0x71d98e83),
PCMCIA_DEVICE_PROD_ID12("ELAN DIGITAL SYSTEMS LTD, c1997.", "SERIAL CARD: SL232 1.00.", 
    0x19ca78af, 0x69fb7490),
--- linux-4.15.0.orig/drivers/tty/serial/Kconfig
+++ linux-4.15.0/drivers/tty/serial/Kconfig
@@ -9,6 +9,7 @@
config SERIAL_EARLYCON
bool
+depends on SERIAL_CORE
help
Support for early consoles with the earlycon parameter. This enables
the console before standard serial driver is probed. The console is
--- linux-4.15.0.orig/drivers/tty/serial/altera_uart.c
+++ linux-4.15.0/drivers/tty/serial/altera_uart.c
@@ -327,7 +327,7 @@
 /* Enable RX interrupts now */
 pp->imr = ALTERA_UART_CONTROL_RRDY_MSK;
 -writel(pp->imr, port->membase + ALTERA_UART_CONTROL_REG);
+altera_uart_writel(port, pp->imr, ALTERA_UART_CONTROL_REG);

 spin_unlock_irqrestore(&port->lock, flags);

 @@ -343,7 +343,7 @@
 /* Disable all interrupts now */
 pp->imr = 0;
 -writel(pp->imr, port->membase + ALTERA_UART_CONTROL_REG);
+altera_uart_writel(port, pp->imr, ALTERA_UART_CONTROL_REG);

 spin_unlock_irqrestore(&port->lock, flags);

 @@ -343,7 +343,7 @@
 ALTERA_UART_STATUS_TRDY_MSK))
 cpu_relax();

 -writel(c, port->membase + ALTERA_UART_TXDATA_REG);
+altera_uart_writel(port, c, ALTERA_UART_TXDATA_REG);
 }

 static void altera_uart_console_write(struct console *co, const char *s,
 @@ -502,13 +502,13 @@
 return -ENODEV;
 /* Enable RX interrupts now */
 -writel(ALTERA_UART_CONTROL_RRDY_MSK, 
- port->membase + ALTERA_UART_CONTROL_REG);
+altera_uart_writel(port, ALTERA_UART_CONTROL_RRDY_MSK, 
+ ALTERA_UART_CONTROL_REG);

 if (dev->baud) {
 unsigned int baudclk = port->uartclk / dev->baud;

 -writel(baudclk, port->membase + ALTERA_UART_DIVISOR_REG);
+altera_uart_writel(port, baudclk, ALTERA_UART_DIVISOR_REG);


dev->con->write = altera_uart_earlycon_write;
--- linux-4.15.0.orig/drivers/tty/serial/amba-pl011.c
+++ linux-4.15.0/drivers/tty/serial/amba-pl011.c
@@ -313,9 +313,10 @@
*/
static int pl011_fifo_to_tty(struct uart_amba_port *uap)
{
- u16 status;
+ unsigned int ch, flag, max_count = 256;
+ int fifotaken = 0;
+ int sysrq;
+ u16 status;

  while (max_count--) {
    status = pl011_read(uap, REG_FR);
@@ -351,10 +352,12 @@
    flag = TTY_FRAME;
    if (uart_handle_sysrq_char(&uap->port, ch & 255))
-      continue;
+      spin_unlock(&uap->port.lock);
+      sysrq = uart_handle_sysrq_char(&uap->port, ch & 255);
+      spin_lock(&uap->port.lock);

    if (!sysrq)
      uart_insert_char(&uap->port, ch, UART011_DR_OE, ch, flag);
- if (uart_insert_char(&uap->port, UART011_DR_OE, ch, flag));
  }

  return fifotaken;
@@ -815,10 +818,8 @@
 if (!uap->using_tx_dma)
   return;

- /* Avoid deadlock with the DMA engine callback */
- spin_unlock(&uap->port.lock);
- dmaengine_terminate_all(uap->dmatx.chan);
- spin_lock(&uap->port.lock);
+ if (uap->dmatx.queued) {
+   dma_unmap_sg(uap->dmatx.chan->device->dev, &uap->dmatx.sg, 1,
+                DMA_TO_DEVICE);
@@ -1731,10 +1732,26 @@
   dmaengine_terminate_async(uap->dmatx.chan);
   if (uap->dmatx.queued) {
     dma_unmap_sg(uap->dmatx.chan->device->dev, &uap->dmatx.sg, 1,
                    DMA_TO_DEVICE);
@@ -1731,10 +1732,26 @@
   dmaengine_terminate_async(uap->dmatx.chan);
   if (uap->dmatx.queued) {
     dma_unmap_sg(uap->dmatx.chan->device->dev, &uap->dmatx.sg, 1,
                    DMA_TO_DEVICE);
@@ -1731,10 +1732,26 @@
   dmaengine_terminate_async(uap->dmatx.chan);
   if (uap->dmatx.queued) {
     dma_unmap_sg(uap->dmatx.chan->device->dev, &uap->dmatx.sg, 1,
static void pl011_enable_interrupts(struct uart_amba_port *uap) {
  unsigned int i;
  
  spin_lock_irq(&uap->port.lock);

  /* Clear out any spuriously appearing RX interrupts */
  pl011_write(UART011_RTIS | UART011_RXIS, uap, REG_ICR);

  /* RXIS is asserted only when the RX FIFO transitions from below
   * to above the trigger threshold. If the RX FIFO is already
   * full to the threshold this can't happen and RXIS will now be
   * stuck off. Drain the RX FIFO explicitly to fix this:
   */
  for (i = 0; i < uap->fifosize * 2; ++i) {
    if (pl011_read(uap, REG_FR) & UART01x_FR_RXFE)
      break;
    
    pl011_read(uap, REG_DR);
  }

  uap->im = UART011_RTIM;
  if (!pl011_dma_rx_running(uap))
    uap->im |= UART011_RXIM;
}

-static void __init
-pl011_console_get_options(struct uart_amba_port *uap, int *baud,
-  int *parity, int *bits)
+static void pl011_console_get_options(struct uart_amba_port *uap, int *baud,
+  int *parity, int *bits)
{
  if (pl011_read(uap, REG_CR) & UART01x_CR_UARTEN) {
    unsigned int lcr_h, ibrd, fbrd;
    @@ -2277,7 +2293,7 @@
    clk_disable(uap->clk);
  }

  -static void __init
-  pl011_console_setup(struct console *co, char *options)
+static __init pl011_console_setup(struct console *co, char *options)
{
  struct uart_amba_port *uap;
  int baud = 38400;
-@@ -2345,8 +2361,8 @@
+*
Returns 0 if console matches; otherwise non-zero to use default matching
*/
- static int __init pl011_console_match(struct console *co, char *name, int idx,
-     char *options)
+ static int pl011_console_match(struct console *co, char *name, int idx,
+     char *options)
{
    unsigned char iotype;
    resource_size_t addr;
    uap->port.fifosize = uap->fifosize;
    uap->port.flags = UPF_BOOT_AUTOCONF;
    uap->port.line = index;
+    spin_lock_init(&uap->port.lock);

    amba_ports[index] = uap;

    /* Ensure interrupts from this UART are masked and cleared */
    pl011_write(0, uap, REG_IMSC);
    if (ret < 0) {
        dev_err(uap->port.dev,
                "Failed to register AMBA-PL011 driver\n");
+        for (i = 0; i < ARRAY_SIZE(amba_ports); i++)
+            if (amba_ports[i] == uap)
+                amba_ports[i] = NULL;
        return ret;
    }

    .name = "sbsa-uart",
    .of_match_table = of_match_ptr(sbsa_uart_of_match),
    .acpi_match_table = ACPI_PTR(sbsa_uart_acpi_match),
+    .suppress_bind_attrs = IS_BUILTIN(CONFIG_SERIAL_AMBA_PL011),
    };
}

@ @ -2768,6 +2788,7 @ @
    .name = "sbsa-uart",
    .of_match_table = of_match_ptr(sbsa_uart_of_match),
    .acpi_match_table = ACPI_PTR(sbsa_uart_acpi_match),
+    .suppress_bind_attrs = IS_BUILTIN(CONFIG_SERIAL_AMBA_PL011),
    };
}

@ @ -2796,6 +2817,7 @ @
    .name = "uart-pl011",
    .pm = &pl011_dev_pm_ops,
struct clk *clk;

- static inline bool ar933x_uart_console_enabled(void)
- {
-  return IS_ENABLED(CONFIG_SERIAL_AR933X_CONSOLE);
- }

static inline unsigned int ar933x_uart_read(struct ar933x_uart_port *up,
  int offset)
{
  ar933x_uart_rmw_set(up, AR933X_UART_CS_REG,
    AR933X_UART_CS_HOST_INT_EN);

  /* enable RX and TX ready override */
  ar933x_uart_rmw_set(up, AR933X_UART_CS_REG,
    AR933X_UART_CS_TX_READY_ORIDE | AR933X_UART_CS_RX_READY_ORIDE);
  
  /* reenable the UART */
  ar933x_uart_rmw(up, AR933X_UART_CS_REG,
    AR933X_UART_CS_IF_MODE_M << AR933X_UART_CS_IF_MODE_S,
    @ @ -423,6 +422,10 @ @
  ar933x_uart_rmw_set(up, AR933X_UART_CS_REG,
    AR933X_UART_CS_HOST_INT_EN);

  /* enable RX and TX ready override */
  ar933x_uart_rmw_set(up, AR933X_UART_CS_REG,
    AR933X_UART_CS_TX_READY_ORIDE | AR933X_UART_CS_RX READY ORIDE);
  
  /* Enable RX interrupts */
  up->ier = AR933X_UART_INT_RX_VALID;
  ar933x_uart_write(up, AR933X_UART_INT_EN_REG, up->ier);
  @ @ -508,6 +511,7 @ @
 .verify_port= ar933x_uart_verify_port,
};

#if defined CONFIG_SERIAL_AR933X_CONSOLE
 static struct ar933x_uart_port *
 ar933x_console_ports[CONFIG_SERIAL_AR933X_NR_UARTS];
static struct uart_driver ar933x_uart_driver = {
    .owner = THIS_MODULE,
    .index = -1,
    .data = &ar933x_uart_driver,
};

- static void ar933x_uart_add_console_port(struct ar933x_uart_port *up)
  -{
  -if (!ar933x_uart_console_enabled())
  -return;
  -
  -ar933x_console_ports[up->port.line] = up;
  -}
  +#endif /* CONFIG_SERIAL_AR933X_CONSOLE */

static struct uart_driver ar933x_uart_driver = {
    .owner = THIS_MODULE,
    .index = -700,7 +697,9 
    baud = ar933x_uart_get_baud(port->uartclk, 0, AR933X_UART_MAX_STEP);
    up->max_baud = min_t(unsigned int, baud, AR933X_UART_MAX_BAUD);
}

-ar933x_uart_add_console_port(up);
+#ifdef CONFIG_SERIAL_AR933X_CONSOLE
+ar933x_console_ports[up->port.line] = up;
+#endif

ret = uart_add_one_port(&ar933x_uart_driver, &up->port);
if (ret)
  @@ -749,8 +748,9 @@
{
  int ret;

  -if (ar933x_uart_console_enabled())
  -ar933x_uart_driver.cons = &ar933x_uart_console;
  +#ifdef CONFIG_SERIAL_AR933X_CONSOLE
  +ar933x_uart_driver.cons = &ar933x_uart_console;
  +#endif

  ret = uart_register_driver(&ar933x_uart_driver);
  if (ret)
    --- linux-4.15.0.orig/drivers/tty/serial/arc_uart.c
    +++ linux-4.15.0/drivers/tty/serial/arc_uart.c
    @@ -593,6 +593,11 @@
    if (dev_id < 0)
    dev_id = 0;

    +if (dev_id >= ARRAY_SIZE(arc_uart_ports)) {
    +dev_err(&pdev->dev, "serial%d out of range\n", dev_id);
    +return -EINVAL;

    ret = uart_register_driver(&ar933x_uart_driver);
    if (ret)
      --- linux-4.15.0.orig/drivers/tty/serial/arc_uart.c
      +++ linux-4.15.0/drivers/tty/serial/arc_uart.c
      @@ -593,6 +593,11 @@
      if (dev_id < 0)
      dev_id = 0;

      +if (dev_id >= ARRAY_SIZE(arc_uart_ports)) {
      +dev_err(&pdev->dev, "serial%d out of range\n", dev_id);
      +return -EINVAL;


uart = &arc_uart_ports[dev_id];
port = &uart->port;

--- linux-4.15.0.orig/drivers/tty/serial/atmel_serial.c
+++ linux-4.15.0/drivers/tty/serial/atmel_serial.c
@@ -163,6 +163,8 @@
 unsigned int			pending_status;
 spinlock_t			lock_suspended;

+bool			hd_start_rx; /* can start RX during half-duplex operation */
+
#ifndef CONFIG_PM
struct {
 u32		cr;
@@ -225,6 +227,12 @@
 __raw_writeb(value, port->membase + ATMEL_US_THR);
 }

 static inline int atmel_uart_is_half_duplex(struct uart_port *port)
{
+return (port->rs485.flags & SER_RS485_ENABLED) &&
+!(port->rs485.flags & SER_RS485_RX_DURING_TX);
+
} +
+ #ifdef CONFIG_SERIAL_ATMEL_PDC
static bool atmel_use_pdc_rx(struct uart_port *port)
{
@@ -481,9 +489,10 @@
/* Disable interrupts */
atmel_uart_writel(port, ATMEL_US_IDR, atmel_port->tx_done_mask);

 -if ((port->rs485.flags & SER_RS485_ENABLED) &&
- !(port->rs485.flags & SER_RS485_RX_DURING_TX))
-atmel_start_rx(port);
+if (atmel_uart_is_half_duplex(port))
+if (!atomic_read(&atmel_port->tasklet_shutdown))
+atmel_start_rx(port);
+
}

 /*
 @@ -500,8 +509,7 @@
return;

 if (atmel_use_pdc_tx(port) || atmel_use_dma_tx(port))
 -if ((port->rs485.flags & SER_RS485_ENABLED) &&
- !(port->rs485.flags & SER_RS485_RX_DURING_TX))
+if (atmel_uart_is_half_duplex(port))
atmel_stop_rx(port);

if (atmel_use_pdc_tx(port))
  @@ -799,10 +807,14 @@
 */
 if (!uart_circ_empty(xmit))
atmel_tasklet_schedule(atmel_port, &atmel_port->tasklet_tx);
 else if ((port->rs485.flags & SER_RS485_ENABLED) &&
 - !(port->rs485.flags & SER_RS485_RX_DURING_TX)) {
-/* DMA done, stop TX, start RX for RS485 */
-atmel_start_rx(port);
+else if (atmel_uart_is_half_duplex(port)) {
+/*
+ * DMA done, re-enable TXEMPTY and signal that we can stop
+ * TX and start RX for RS485
+ */
+atmel_port->hd_start_rx = true;
+atmel_uart_writel(port, ATMEL_US_IER,
+                atmel_port->tx_done_mask);
}

spin_unlock_irqrestore(&port->lock, flags);
@@ -1156,6 +1168,10 @@
 sg_dma_len(&atmel_port->sg_rx)/2,
 DMA_DEV_TO_MEM,
 DMA_PREP_INTERRUPT);
+if (!desc) {
+  dev_err(port->dev, "Preparing DMA cyclic failed\n");
+  goto chan_err;
+}
 desc->callback = atmel_complete_rx_dma;
 desc->callback_param = port;
atmel_port->desc_rx = desc;
@@ -1244,9 +1260,19 @@
 struct atmel_uart_port *atmel_port = to_atmel_uart_port(port);

if (pending & atmel_port->tx_done_mask) {
-/* Either PDC or interrupt transmission */
+/* Start RX if flag was set and FIFO is empty */
+if (atmel_port->hd_start_rx) {
+  if (!(atmel_uart_readl(port, ATMEL_US_CSR)
+        & ATMEL_US_TXEMPTY))
+    dev_warn(port->dev, "Should start RX, but TX fifo is not empty\n");

+ atmel_port->hd_start_rx = false;
+ atmel_start_rx(port);
+ }
+ atmel_tasklet_schedule(atmel_port, &atmel_port->tasklet_tx);
+ }
+ }
@@ -1373,8 +1399,7 @@
atmel_uart_writel(port, ATMEL_US_IER,
    atmel_port->tx_done_mask);
} else {
- if ((port->rs485.flags & SER_RS485_ENABLED) &&
-     !(port->rs485.flags & SER_RS485_RX_DURING_TX)) {
-     if (atmel_uart_is_half_duplex(port)) {
+ if (atmel_uart_is_half_duplex(port)) {
     /* DMA done, stop TX, start RX for RS485 */
     atmel_start_rx(port);
     }
@@ -1734,6 +1759,7 @@
switch (version) {
case 0x302:
    case 0x10213:  
+     case 0x10302: 
        dev_dbg(port->dev, "This version is usart\n");
    atmel_port->has_frac_baudrate = true;
    atmel_port->has_hw_timer = true;
@@ -1756,7 +1782,6 @@
{struct platform_device *pdev = to_platform_device(port->dev);
struct atmel_uart_port *atmel_port = to_atmel_uart_port(port);
-struct tty_struct *tty = port->state->port.tty;
+int retval;
        struct platform_device *pdev = to_platform_device(port->dev);
        struct atmel_uart_port *atmel_port = to_atmel_uart_port(port);
        struct tty_struct *tty = port->state->port.tty;
        int retval;
        /*
@@ -1771,8 +1796,8 @@
        * Allocate the IRQ
        */
        retval = request_irq(port->irq, atmel_interrupt,
            -IRQF_SHARED | IRQF_COND_SUSPEND,
            -tty->name : "atmel_serial", port);
+ IRQF_SHARED | IRQF_COND_SUSPEND,
+    dev_name(&pdev->dev), port);
        if (retval) {
        dev_err(port->dev, "atmel_startup - Can't get irq\n");
        return retval;
@@ -2130,27 +2155,6 @@
        mode |= ATMEL_US_USMODE_NORMAL;
        }
/* set the mode, clock divisor, parity, stop bits and data size */
atmel_uart_writel(port, ATMEL_US_MR, mode);

/* when switching the mode, set the RTS line state according to the
 * new mode, otherwise keep the former state */

if ((old_mode & ATMEL_US_USMODE) != (mode & ATMEL_US_USMODE)) {
    unsigned int rts_state;

    if ((mode & ATMEL_US_USMODE) == ATMEL_US_USMODE_HWHS) {
        /* let the hardware control the RTS line */
        rts_state = ATMEL_US_RTSDIS;
    } else {
        /* force RTS line to low level */
        rts_state = ATMEL_US_RTSEN;
    }

    atmel_uart_writel(port, ATMEL_US_CR, rts_state);
}

/*
 * Set the baud rate:
 * Fractional baudrate allows to setup output frequency more
 @@ -2176,6 +2180,28 @@
 quot = cd | fp << ATMEL_US_FP_OFFSET;

 atmel_uart_writel(port, ATMEL_US_BRGR, quot);
 +
 +/* set the mode, clock divisor, parity, stop bits and data size */
 +atmel_uart_writel(port, ATMEL_US_MR, mode);
 +
 +/*
 + * when switching the mode, set the RTS line state according to the
 + * new mode, otherwise keep the former state 
 + */
 +if ((old_mode & ATMEL_US_USMODE) != (mode & ATMEL_US_USMODE)) {
 +    unsigned int rts_state;
 +
 +    if ((mode & ATMEL_US_USMODE) == ATMEL_US_USMODE_HWHS) {
 +        /* let the hardware control the RTS line */
 +        rts_state = ATMEL_US_RTSDIS;
 +    } else {
 +        /* force RTS line to low level */
 +        rts_state = ATMEL_US_RTSEN;
 +    }
 +
 +
 +*/
atmel_uart_writel(port, ATMEL_US_CR, rts_state);
+
+atmel_uart_writel(port, ATMEL_US_CR, ATMEL_US_RSTSTA | ATMEL_US_RSTRX);
atmel_uart_writel(port, ATMEL_US_CR, ATMEL_US_TXEN | ATMEL_US_RXEN);
atmel_port->tx_stopped = false;
--- linux-4.15.0.orig/drivers/tty/serial/cpm_uart/cpm_uart_core.c
+++ linux-4.15.0/drivers/tty/serial/cpm_uart/cpm_uart_core.c
@@ -407,7 +407,16 @@
    clrbits16(&pinfo->sccp->scc_sccm, UART_SCCM_RX);
    cpm_UART_initbd(pinfo);
    -if (IS_SMC(pinfo)) {
-+    out_be32(&pinfo->smcup->smc_rstate, 0);
-+    out_be32(&pinfo->smcup->smc_tstate, 0);
-+    out_be16(&pinfo->smcup->smc_rbptr,
-+            in_be16(&pinfo->smcup->smc_rbase));
-+    out_be16(&pinfo->smcup->smc_tbptr,
-+            in_be16(&pinfo->smcup->smc_tbase));
-+} else {
-+    cpm_line_cr_cmd(pinfo, CPM_CR_INIT_TRX);
-+}
/* Install interrupt handler. */
retval = request_irq(port->irq, cpm_uart_int, 0, "cpm_uart", port);
@@ -861,16 +870,14 @@
    out_be16(&up->smcup->smc_rbase));
    out_be16(&up->smcup->smc_tbase);
    out_be32(&up->smc_rstate, 0);
    out_be32(&up->smc_tstate, 0);
    out_be16(&up->smc_brkcr, 1);              /* number of break chars */
    out_be16(&up->smc_brkec, 0);
-#endif

/* Set up the uart parameters in the
 * parameter ram.
@@ -884,8 +891,6 @@
    out_be16(&up->smc_brkdec, 0);
    out_be16(&up->smc_brkcr, 1);
*/
/* Set UART mode, 8 bit, no parity, one stop. */
/* Enable receive and transmit. */
@@ -1054,8 +1059,8 @@
/* Get the address of the host memory buffer. */
@@ -1090,7 +1095,11 @@
poll_chars = 0;
} if (poll_chars <= 0) {
-poll_chars = poll_wait_key(poll_buf, pinfo);
+int ret = poll_wait_key(poll_buf, pinfo);
+if (ret == NO_POLL_CHAR)
+return ret;
+poll_chars = ret;
pollp = poll_buf;
}
poll_chars--;
--- linux-4.15.0.orig/drivers/tty/serial/digicolor-usart.c
+++ linux-4.15.0/drivers/tty/serial/digicolor-usart.c
@@ -541,7 +541,11 @@
if (ret)
return ret;
-return platform_driver_register(&digicolor_uart_platform);
+ret = platform_driver_register(&digicolor_uart_platform);
+if (ret)
+uart_unregister_driver(&digicolor_uart);
+
+return ret;
} module_init(digicolor_uart_init);
--- linux-4.15.0.orig/drivers/tty/serial/earlycon.c
+++ linux-4.15.0/drivers/tty/serial/earlycon.c
@@ -169,7 +169,7 @@
*/
int __init setup_earlycon(char *buf)
{
-const struct earlycon_id *match;
+const struct earlycon_id **p_match;

if (!buf || !buf[0])
return -EINVAL;
@@ -177,7 +177,9 @@
if (early_con.flags & CON_ENABLED)
return -EALREADY;

-for (match = __earlycon_table; match < __earlycon_table_end; match++) {
+for (p_match = __earlycon_table; p_match < __earlycon_table_end;
+     p_match++) {
+const struct earlycon_id *match = *p_match;
size_t len = strlen(match->name);

if (strncmp(buf, match->name, len))
@@ -249,12 +251,12 @@
return -ENXIO;
}

port->mapbase = addr;
-port->uartclk = BASE_BAUD * 16;
-port->membase = earlycon_map(port->mapbase, SZ_4K);

val = of_get_flat_dt_prop(node, "reg-offset", NULL);
if (val)
port->mapbase += be32_to_cpu(*val);
+port->membase = earlycon_map(port->mapbase, SZ_4K);
+
val = of_get_flat_dt_prop(node, "reg-shift", NULL);
if (val)
port->regshift = be32_to_cpu(*val);
@@ -283,6 +285,10 @@
early_console_dev.baud = be32_to_cpu(*val);

+val = of_get_flat_dt_prop(node, "clock-frequency", NULL);
+if (val)
+port->uartclk = be32_to_cpu(*val);
+
if (options) {
early_console_dev.baud = simple_strtoul(options, NULL, 0);
strlcpy(early_console_dev.options, options,
--- linux-4.15.0.orig/drivers/tty/serial/fsl_lpuart.c
+++ linux-4.15.0/drivers/tty/serial/fsl_lpuart.c
@@ -376,8 +376,8 @@
}
sport->dma_tx_desc = dmaengine_prep_slave_sg(sport->dma_tx_chan, sgl,
-sport->dma_tx_nents,
-DMA_MEM_TO_DEV, DMA_PREP_INTERRUPT);
+ret, DMA_MEM_TO_DEV,
+DMA_PREP_INTERRUPT);
if (!sport->dma_tx_desc) {
  dma_unmap_sg(dev, sgl, sport->dma_tx_nents, DMA_TO_DEVICE);
  dev_err(dev, "Cannot prepare TX slave DMA!\n");
@@ -528,26 +528,26 @@
  spin_lock_irqsave(&sport->port.lock, flags);

/* Disable Rx & Tx */
 -writel(0, sport->port.membase + UARTCTRL);
 +lpuart32_write(&sport->port, UARTCTRL, 0);

-temp = readl(sport->port.membase + UARTFIFO);
+temp = lpuart32_read(&sport->port, UARTFIFO);
+temp = lpuart32_read(&sport->port, UARTFIFO);

/* Enable Rx and Tx FIFO */
 -writel(temp | UARTFIFO_RXFE | UARTFIFO_TXFE,
 -sport->port.membase + UARTFIFO);
 +lpuart32_write(&sport->port, UARTFIFO,
 +temp | UARTFIFO_RXFE | UARTFIFO_TXFE);

/* flush Tx and Rx FIFO */
 -writel(UARTFIFO_TXFLUSH | UARTFIFO_RXFLUSH,
 -sport->port.membase + UARTFIFO);
 +lpuart32_write(&sport->port, UARTFIFO,
 +UARTFIFO_TXFLUSH | UARTFIFO_RXFLUSH);

/* explicitly clear RDRF */
 -if (readl(sport->port.membase + UARTSTAT) & UARTSTAT_RDRF) {
 -readl(sport->port.membase + UARTDATA);
 -writel(UARTFIFO_RXUF, sport->port.membase + UARTFIFO);
 +if (lpuart32_read(&sport->port, UARTSTAT) & UARTSTAT_RDRF) {
 +lpuart32_read(&sport->port, UARTDATA);
 +lpuart32_write(&sport->port, UARTFIFO, UARTFIFO_RXUF);
 }

/* Enable Rx and Tx */
 -writel(UARTCTRL_RE | UARTCTRL_TE, sport->port.membase + UARTCTRL);
 +lpuart32_write(&sport->port, UARTCTRL, UARTCTRL_RE | UARTCTRL_TE);
 spin_unlock_irqrestore(&sport->port.lock, flags);

return 0;
@@ -555,18 +555,18 @@
static void lpuart32_poll_put_char(struct uart_port *port, unsigned char c)  
{  
-while (!(readl(port->membase + UARTSTAT) & UARTSTAT_TDRE)) 
+while (!(lpuart32_read(port, UARTSTAT) & UARTSTAT_TDRE)) 
    barrier();  

-writel(c, port->membase + UARTDATA);  
+lpuart32_write(port, UARTDATA, c);  
}  
static int lpuart32_poll_get_char(struct uart_port *port)  
{  
-if (!(readl(port->membase + UARTSTAT) & UARTSTAT_RDRF)) 
+if (!(lpuart32_read(port, UARTWATER) >> UARTWATER_RXCNT_OFF)) 
    return NO_POLL_CHAR;  

-return readl(port->membase + UARTDATA);  
+return lpuart32_read(port, UARTDATA);  
}  
#endif

@@ -979,7 +979,8 @@
struct circ_buf *ring = &sport->rx_ring;
int ret, nent;
int bits, baud;
-struct tty_struct *tty = tty_port_tty_get(&sport->port.state->port);
+struct tty_port *port = &sport->port.state->port;
+struct tty_struct *tty = port->tty;
struct ktermios *termios = &tty->termios;

baud = tty_get_baud_rate(tty);  
@@ -1476,6 +1477,8 @@
else  
  cr1 &= ~UARTCR1_PT;
}  
+} else {  
+  cr1 &= ~UARTCR1_PE;
}  
/* ask the core to calculate the divisor */  
@@ -1687,10 +1690,12 @@
else  
  ctrl &= ~UARTCTRL_PT;
}  
+} else {  
+  ctrl &= ~UARTCTRL_PE;
}
/* ask the core to calculate the divisor */
-baud = uart_get_baud_rate(port, termios, old, 50, port->uartclk / 16);
+baud = uart_get_baud_rate(port, termios, old, 50, port->uartclk / 4);

spin_lock_irqsave(&sport->port.lock, flags);

@@ -1987,6 +1992,9 @@
bd = lpuart32_read(&sport->port, UARTBAUD);
bd &= UARTBAUD_SBR_MASK;
+if (!bd)
+  return;
+
  sbr = bd;
uartclk = clk_get_rate(sport->clk);
/*
 @@ -2145,6 +2153,10 @@
      dev_err(&pdev->dev, "failed to get alias id, errno %d\n", ret);
      return ret;
  }
+if (ret >= ARRAY_SIZE(lpuart_ports)) {
+    dev_err(&pdev->dev, "serial%d out of range\n", ret);
+    return -EINVAL;
+  }
sport->port.line = ret;
res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
sport->port.membase = devm_ioremap_resource(&pdev->dev, res);
@@ -2152,7 +2164,7 @@
  return PTR_ERR(sport->port.membase);

sport->port.membase += sdata->reg_off;
-sport->port.mapbase = res->start;
+sport->port.mapbase = res->start + sdata->reg_off;
sport->port.dev = &pdev->dev;
sport->port.type = PORT_LPUART;
ret = platform_get_irq(pdev, 0);
--- linux-4.15.0.orig/drivers/tty/serial/ifx6x60.c
+++ linux-4.15.0/drivers/tty/serial/ifx6x60.c
@@ -1230,6 +1230,9 @@
   struct ifx_spi_device *ifx_dev = spi_get_drvdata(spi);
   /* stop activity */
   tasklet_kill(&ifx_dev->io_work_tasklet);
+   pm_runtime_disable(&spi->dev);
+   /* free irq */
   free_irq(gpio_to_irq(ifx_dev->gpio.reset_out), ifx_dev);
   free_irq(gpio_to_irq(ifx_dev->gpio.srdy), ifx_dev);
--- linux-4.15.0.orig/drivers/tty/serial/imx.c
+++ linux-4.15.0/drivers/tty/serial/imx.c
@@ -71,7 +71,7 @@
#define UCR1_IDEN (1<<12) /* Idle condition interrupt */
#define UCR1_IDCD_REG(x) (((x) & 3) << 10) /* idle condition detect */
#define UCR1_RRDYEN (1<<9) /*Recv ready interrupt enable */
-#define UCR1_RDMAEN (1<<8) /* Recv ready DMA enable */
+#define UCR1_RXDMAEN (1<<8) /* Recv ready DMA enable */
#define UCR1_IREN (1<<7) /* Infrared interface enable */
#define UCR1_TXMPTYEN (1<<6) /* Transmitter empty interrupt enable */
#define UCR1_RTSDEN (1<<5) /* RTS delta interrupt enable */
@@ -346,6 +346,30 @@
/* interrupts disabled on entry */
+static void imx_start_rx(struct uart_port *port)
+{
+    struct imx_port *sport = (struct imx_port *)port;
+    unsigned int ucr1, ucr2;
+    ucr1 = readl(port->membase + UCR1);
+    ucr2 = readl(port->membase + UCR2);
+    ucr2 |= UCR2_RXEN;
+    if (sport->dma_is_enabled) {
+        ucr1 |= UCR1_RXDMAEN | UCR1_ATDMAEN;
+    } else {
+        ucr1 |= UCR1_RRDYEN;
+    }
+    /* Write UCR2 first as it includes RXEN */
+    writel(ucr2, port->membase + UCR2);
+    writel(ucr1, port->membase + UCR1);
+}
+
+/* Write UCR2 first as it includes RXEN */
+static void imx_stop_tx(struct uart_port *port)
+{
+    struct imx_port *sport = (struct imx_port *)port;
+    writel(sport->membase + UCR2);
+    writel(sport->membase + UCR1);
+}
+ /* * interrupts disabled on entry */
+static void imx_stop_tx(struct uart_port *port)
+{
+    struct imx_port *sport = (struct imx_port *)port;
+    writel(sport->membase + UCR2);
+    writel(sport->membase + UCR1);
+}
+/* * interrupts disabled on entry */
+static void imx_stop_tx(struct uart_port *port)
+{
+    struct imx_port *sport = (struct imx_port *)port;
+    writel(sport->membase + UCR2);
+    writel(sport->membase + UCR1);
+}
+/* * interrupts disabled on entry */
+static void imx_stop_tx(struct uart_port *port)
+{
+    struct imx_port *sport = (struct imx_port *)port;
+    writel(sport->membase + UCR2);
+    writel(sport->membase + UCR1);
+}
+/* * interrupts disabled on entry */
+static void imx_stop_tx(struct uart_port *port)
+{
+    struct imx_port *sport = (struct imx_port *)port;
+    writel(sport->membase + UCR2);
+    writel(sport->membase + UCR1);
+}
+/* * interrupts disabled on entry */
+static void imx_stop_tx(struct uart_port *port)
+{
+    struct imx_port *sport = (struct imx_port *)port;
+    writel(sport->membase + UCR2);
+    writel(sport->membase + UCR1);
+}
+imx_start_rx(port);
+
temp = readl(port->membase + UCR4);
temp &= ~UCR4_TCEN;
writel(temp, port->membase + UCR4);
@@ -384,7 +409,7 @@
static void imx_stop_rx(struct uart_port *port)
{
struct imx_port *sport = (struct imx_port *)port;
-unsigned long temp;
+
unsigned long ucr1, ucr2;

if (sport->dma_is_enabled && sport->dma_is_rxing) {
  if (sport->port.suspended) {
    @@ -395,12 +420,18 @@
     }
  }
   
-   temp = readl(sport->port.membase + UCR2);
-   writel(temp & ~UCR2_RXEN, sport->port.membase + UCR2);
+ucr1 = readl(sport->port.membase + UCR1);
+ucr2 = readl(sport->port.membase + UCR2);

-/* disable the `Receiver Ready Interrupt` */
-temp = readl(sport->port.membase + UCR1);
-writel(temp & ~UCR1_RRDYEN, sport->port.membase + UCR1);
+if (sport->dma_is_enabled) {
   +ucr1 &= ~(UCR1_RXDMAEN | UCR1_ATDMAEN);
   +} else {
      +ucr1 &= ~UCR1_RRDYEN;
      +}
   +writel(ucr1, port->membase + UCR1);
   +
   +ucr2 &~ ~UCR2_RXEN;
   +writel(ucr2, port->membase + UCR2);
 }

/*
@@ -498,6 +529,11 @@
   if (!uart_circ_empty(xmit) && !uart_tx_stopped(&port))
     imx_dma_tx(sport);
+else if (sport->port.rs485.flags & SER_RS485_ENABLED) {
+  +temp = readl(sport->port.membase + UCR4);
+  +temp |= UCR4_TCEN;
+  +writel(temp, sport->port.membase + UCR4);
+}
spin_unlock_irqrestore(&sport->port.lock, flags);  
}  
@@ -515,9 +551,13 @@  
if (sport->dma_is_txing)  
    return;  
+temp = readl(sport->port.membase + UCR4);  
+temp &= ~UCR4_TCEN;  
+writel(temp, sport->port.membase + UCR4);  
+sport->tx_bytes = uart_circ_chars_pending(xmit);  
-if (xmit->tail < xmit->head) {  
+    if (xmit->tail < xmit->head || xmit->head == 0) {  
        sport->dma_tx_nents = 1;  
        sg_init_one(sgl, xmit->buf + xmit->tail, sport->tx_bytes);  
    } else {  
        @@ -533,7 +573,7 @@  
        dev_err(dev, "DMA mapping error for TX.
        return;  
    }  
-desc = dmaengine_prep_slave_sg(chan, sgl, sport->dma_tx_nents,  
-desc = dmaengine_prep_slave_sg(chan, sgl, ret,  
DMA_MEM_TO_DEV, DMA_PREP_INTERRUPT);  
if (!desc) {  
    dma_unmap_sg(dev, sgl, sport->dma_tx_nents,  
        @@ -572,14 +612,20 @@  
        imx_port_rts_active(sport, &temp);  
        else  
        imx_port_rts_inactive(sport, &temp);  
-if (!!(port->rs485.flags & SER_RS485_RX_DURING_TX))  
-temp &= ~UCR2_RXEN;  
-writel(temp, port->membase + UCR2);  
-/* enable transmitter and shifter empty irq */  
-temp = readl(port->membase + UCR4);  
-temp |= UCR4_TCEN;  
-writel(temp, port->membase + UCR4);  
+if (!(port->rs485.flags & SER_RS485_RX_DURING_TX))  
+imx_stop_rx(port);  
+  
+/*  
+ * Enable transmitter and shifter empty irq only if DMA is off.  
+ * In the DMA case this is done in the tx-callback.  
+ */  
+if (!sport->dma_is_enabled) {  
+temp = readl(port->membase + UCR4);
+temp |= UCR4_TCEN;
+writel(temp, port->membase + UCR4);
+
}
}

if (!sport->dma_is_enabled) {
    return IRQ_HANDLED;
}

-static void imx_disable_rx_int(struct imx_port *sport)
{-
    unsigned long temp;
    -
    /* disable the receiver ready and aging timer interrupts */
    -temp = readl(sport->port.membase + UCR1);
    -temp &= ~(UCR1_RRDYEN);
    -writel(temp, sport->port.membase + UCR1);
    -
    -temp = readl(sport->port.membase + UCR2);
    -temp &= ~(UCR2_ATEN);
    -writel(temp, sport->port.membase + UCR2);
    -
    /* disable the rx errors interrupts */
    -temp = readl(sport->port.membase + UCR4);
    -temp &= ~(UCR4_OREN);
    -writel(temp, sport->port.membase + UCR4);
    -}

static void clear_rx_errors(struct imx_port *sport);

/*
@@ -777,30 +804,55 @@
static irqreturn_t imx_int(int irq, void *dev_id)
{
    struct imx_port *sport = dev_id;
    -unsigned int sts;
    -unsigned int sts2;
    +unsigned int usr1, usr2, ucr1, ucr2, ucr3, ucr4;
    irqreturn_t ret = IRQ_NONE;
    
    -sts = readl(sport->port.membase + USR1);
    -sts2 = readl(sport->port.membase + USR2);
    +usr1 = readl(sport->port.membase + USR1);
    +usr2 = readl(sport->port.membase + USR2);
    +ucr1 = readl(sport->port.membase + UCR1);
    +ucr2 = readl(sport->port.membase + UCR2);
    +ucr3 = readl(sport->port.membase + UCR3);
+ucr4 = readl(sport->port.membase + UCR4);

-if (!sport->dma_is_enabled && (sts & (USR1_RRDY | USR1_AGTIM))) {
  /*
   * Even if a condition is true that can trigger an irq only handle it if
   * the respective irq source is enabled. This prevents some undesired
   * actions, for example if a character that sits in the RX FIFO and that
   * should be fetched via DMA is tried to be fetched using PIO. Or the
   * receiver is currently off and so reading from URXD0 results in an
   * exception. So just mask the (raw) status bits for disabled irqs.
   */
  +/
  +if ((ucr1 & UCR1_RRDYEN) == 0)
  +usr1 &= ~USR1_RRDY;
  +if ((ucr2 & UCR2_ATEN) == 0)
  +usr1 &= ~USR1_AGTIM;
  +if ((ucr1 & UCR1_TXMPTYEN) == 0)
  +usr1 &= ~USR1_TRDY;
  +if ((ucr4 & UCR4_TCEN) == 0)
  +usr2 &= ~USR2_TXDC;
  +if ((ucr3 & UCR3_DTRDEN) == 0)
  +usr1 &= ~USR1_DTRD;
  +if ((ucr1 & UCR1_RTSDEN) == 0)
  +usr1 &= ~USR1_RTSD;
  +if ((ucr3 & UCR3_AWAKEN) == 0)
  +usr1 &= ~USR1_AWAKE;
  +if ((ucr4 & UCR4_OREN) == 0)
  +usr2 &= ~USR2_ORE;
  +
  +if (usr1 & (USR1_RRDY | USR1_AGTIM)) {
    imx_rxint(irq, dev_id);
    ret = IRQ_HANDLED;
  }

  -if ((sts & USR1_TRDY &&
    -readl(sport->port.membase + UCR1 & UCR1_TXMPTYEN) ||
    -(sts2 & USR2_TXDC &&
    -readl(sport->port.membase + UCR4 & UCR4_TCEN)) {
      imx_txint(irq, dev_id);
      ret = IRQ_HANDLED;
    }

  -if (sts & USR1_DTRD) {
  +if (usr1 & USR1_DTRD) {
    unsigned long flags;

  -if (sts & USR1_DTRD)
  +if (usr1 & USR1_DTRD)
writel(USR1_DTRD, sport->port.membase + USR1);

spin_lock_irqsave(&sport->port.lock, flags);
@@ -810,17 +862,17 @@
ret = IRQ_HANDLED;
}

-if (sts & USR1_RTSD) {
+if (usr1 & USR1_RTSD) {
  imx_rtsint(irq, dev_id);
ret = IRQ_HANDLED;
}

-if (sts & USR1_AWAKE) {
+if (usr1 & USR1_AWAKE) {
  writel(USR1_AWAKE, sport->port.membase + USR1);
ret = IRQ_HANDLED;
}

-if (sts2 & USR2_ORE) {
+if (usr2 & USR2_ORE) {
  sport->port.icount.overrun++;
  writel(USR2_ORE, sport->port.membase + USR2);
  ret = IRQ_HANDLED;
  @@ -1170,7 +1222,7 @@
/* set UCR1 */
  temp = readl(sport->port.membase + UCR1);
-  temp |= UCR1_RDMAEN | UCR1_TDMAEN | UCR1_ATDMAEN;
+  temp |= UCR1_RXDMAEN | UCR1_TDMAEN | UCR1_ATDMAEN;
  writel(temp, sport->port.membase + UCR1);

  imx_setup_ufr(sport, TXTL_DMA, RXTL_DMA);
  @@ -1184,7 +1236,7 @@
/* clear UCR1 */
  temp = readl(sport->port.membase + UCR1);
-  temp &= ~(UCR1_RDMAEN | UCR1_TDMAEN | UCR1_ATDMAEN);
+  temp &= ~(UCR1_RXDMAEN | UCR1_TDMAEN | UCR1_ATDMAEN);
  writel(temp, sport->port.membase + UCR1);

/* clear UCR2 */
@@ -1249,11 +1301,9 @@
  writel(USR1_RTSD | USR1_DTRD, sport->port.membase + USR1);
  writel(USR2_ORE, sport->port.membase + USR2);

-     if (sport->dma_is_inited && !sport->dma_is_enabled)
-      imx_enable_dma(sport);
temp = readl(sport->port.membase + UCR1);
-temp |= UCR1_RRDYEN | UCR1_UARTEN;
+temp &= ~UCR1_RRDYEN;
+temp |= UCR1_UARTEN;
if (sport->have_rtscts)
temp |= UCR1_RTSDEN;

/*
 * Start RX DMA immediately instead of waiting for RX FIFO interrupts.
 * In our iMX53 the average delay for the first reception dropped from
 * approximately 35000 microseconds to 1000 microseconds.
 */
-if (sport->dma_is_enabled) {
-    imx_disable_rx_int(sport);
+    if (sport->dma_is_inited) {
+        imx_enable_dma(sport);
start_rx_dma(sport);
+    } else {
+        temp = readl(sport->port.membase + UCR1);
+        temp |= UCR1_RRDYEN;
+        writel(temp, sport->port.membase + UCR1);
    }
}

spin_unlock_irqrestore(&sport->port.lock, flags);

spin_lock_irqsave(&sport->port.lock, flags);
temp = readl(sport->port.membase + UCR1);
-temp &= ~(UCR1_TXMPTYEN | UCR1_RRDYEN | UCR1_RTSDEN | UCR1_UARTEN);
+temp &= ~(UCR1_TXMPTYEN | UCR1_RRDYEN | UCR1_RTSDEN | UCR1_UARTEN |
+    UCR1_RXDMAEN | UCR1_ATDMAEN);

writel(temp, sport->port.membase + UCR1);
spin_unlock_irqrestore(&sport->port.lock, flags);

{ struct imx_port *sport = (struct imx_port *)port;
  unsigned long flags;
  -unsigned long temp;
  +unsigned long ucr1, ucr2;
  int retval;

  retval = clk_prepare_enable(sport->clk_ipg);
spin_lock_irqsave(&sport->port.lock, flags);

-temp = readl(sport->port.membase + UCR1);
+ /*
+ * Be careful about the order of enabling bits here. First enable the
+ * receiver (UARTEN + RXEN) and only then the corresponding irqs.
+ * This prevents that a character that already sits in the RX fifo is
+ * triggering an irq but the try to fetch it from there results in an
+ * exception because UARTEN or RXEN is still off.
+ */
+ucr1 = readl(port->membase + UCR1);
+ucr2 = readl(port->membase + UCR2);
+
+if (is_imx1_uart(sport))
+ucr1 |= IMX1_UCR1_UARTCLKEN;
+ucr2 |= UCR2_RXEN;
-writel(ucr1, sport->port.membase + UCR1);
+writel(ucr2, sport->port.membase + UCR2);
+
+-temp = readl(sport->port.membase + UCR2);
+-temp |= UCR2_RXEN;
+writel(temp, sport->port.membase + UCR2);
+ucr1 |= UCR1_UARTEN;
+ucr1 &= ~(UCR1_TXMPTYEN | UCR1_RTSDEN | UCR1_RRDYEN);
+
+ucr2 |= UCR2_RXEN;
+
+writel(ucr1, sport->port.membase + UCR1);
+writel(ucr2, sport->port.membase + UCR2);
+
+ /* now enable irqs */
+writel(ucr1 | UCR1_RRDYEN, sport->port.membase + UCR1);

spin_unlock_irqrestore(&sport->port.lock, flags);

/*@ -1706,11 +1769,8 @*/

/* Make sure Rx is enabled in case Tx is active with Rx disabled */
if (!((rs485conf->flags & SER_RS485_ENABLED) ||
    rs485conf->flags & SER_RS485_RX_DURING_TX)) {
    -temp = readl(sport->port.membase + UCR2);
    -temp |= UCR2_RXEN;
    -writel(temp, sport->port.membase + UCR2);
} + rs485conf->flags & SER_RS485_RX_DURING_TX)
imx_start_rx(port);

port->rs485 = *rs485conf;

@@ -1764,16 +1824,6 @@
unsigned int ucr1;
unsigned long flags = 0;
int locked = 1;
-int retval;
-
-reval = clk_enable(sport->clk_per);
-if (retval)
-return;
-reval = clk_enable(sport->clk_ipg);
-if (retval) {
-clk_disable(sport->clk_per);
-return;
-}

if (sport->port.sysrq)
locked = 0;
@@ -1809,9 +1859,6 @@

if (locked)
spin_unlock_irqrestore(&sport->port.lock, flags);
-
-clk_disable(sport->clk_ipg);
-clk_disable(sport->clk_per);
}

/*
@@ -1912,13 +1959,12 @@

retval = uart_set_options(&sport->port, co, baud, parity, bits, flow);

-clk_disable(sport->clk_ipg);
if (retval) {
-clk_unprepare(sport->clk_ipg);
+clk_disable_unprepare(sport->clk_ipg);
goto error_console;
}

-reval = clk_prepare(sport->clk_per);
+retval = clk_prepare_enable(sport->clk_per);
if (retval)
clk_disable_unprepare(sport->clk_ipg);

@@ -2062,6 +2108,12 @@
else if (ret < 0)
    return ret;

    +if (sport->port.line >= ARRAY_SIZE(imx_ports)) {
    +dev_err(&pdev->dev, "serial%d out of range"
    +sport->port.line);
    +return -EINVAL;
    +}
    +
    res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    base = devm_ioremap_resource(&pdev->dev, res);
    if (IS_ERR(base))
      @@ -2170,6 +2222,14 @@
        ret);
        return ret;
    }
    +
    +ret = devm_request_irq(&pdev->dev, rtsirq, imx_rtsint, 0,
    +  dev_name(&pdev->dev), sport);
    +if (ret) {
    +dev_err(&pdev->dev, "failed to request rts irq: %d"
    +ret);
    +return ret;
    +}
    +
    ret = devm_request_irq(&pdev->dev, rxirq, imx_int, 0,
    +dev_name(&pdev->dev), sport);
    @@ -2238,12 +2298,14 @@
    val &= ~UCR3_AWAKEN;
    writel(val, sport->port.membase + UCR3);

    -val = readl(sport->port.membase + UCR1);
    -if (on)
    -val |= UCR1 RTSDEN;
    -else
    -val &= ~UCR1 RTSDEN;
    -writel(val, sport->port.membase + UCR1);
    +if (sport->have_rtscts) {
    +val = readl(sport->port.membase + UCR1);
    +if (on)
    +val |= UCR1 RTSDEN;
    +else
    +val &= ~UCR1 RTSDEN;
    +writel(val, sport->port.membase + UCR1);
    +}
    }
}

static int imx_serial_port_suspend_noirq(struct device *dev)
/* Parse any modem signal changes */

jsm_dbg(INTR, &ch->ch_bd->pci_dev,
"MOD_STAT: sending to parse_modem_sigs\n");

+spin_lock_irqsave(&ch->uart_port.lock, lock_flags);
neo_parse_modem(ch, readb(&ch->ch_neo_uart->msr));
+spin_unlock_irqrestore(&ch->uart_port.lock, lock_flags);
}
}

--- linux-4.15.0.orig/drivers/tty/serial/jsm/jsm_tty.c
+++ linux-4.15.0/drivers/tty/serial/jsm/jsm_tty.c
@@ -187,6 +187,7 @@

static int jsm_tty_open(struct uart_port *port)
{
+unsigned long lock_flags;
struct jsm_board *brd;
struct jsm_channel *channel =
container_of(port, struct jsm_channel, uart_port);
@@ -240,6 +241,7 @@
channel->ch_cached_lsr = 0;
channel->ch_stops_sent = 0;
+spin_lock_irqsave(&port->lock, lock_flags);
termios = &port->state->port.tty->termios;
channel->ch_c_cflag = termios->c_cflag;
channel->ch_c_iflag = termios->c_iflag;
@@ -259,6 +261,7 @@
jsm_carrier(channel);

channel->ch_open_count++;
+spin_unlock_irqrestore(&port->lock, lock_flags);

jsm_dbg(OPEN, &channel->ch_bd->pci_dev, "finish\n");
return 0;
--- linux-4.15.0.orig/drivers/tty/serial/kgdboc.c
+++ linux-4.15.0/drivers/tty/serial/kgdboc.c
@@ -128,19 +128,6 @@
#define kgdboc_restore_input()
#endif /* ! CONFIG_KDB_KEYBOARD */

-kstatic int kgdboc_option_setup(char *opt)
-{
-if (strlen(opt) >= MAX_CONFIG_LEN) {
-printk(KERN_ERR "kgdboc: config string too long\n");

-}
return -ENOSPC;
-
strcpy(config, opt);
-
return 0;
-
__setup("kgdboc=", kgdboc_option_setup);
-
static void cleanup_kgdboc(void)
{
    if (kgdb_unregister_nmi_console())
        @ @ -154,15 +141,15 @@
    {
        struct tty_driver *p;
        int tty_line = 0;
        -int err;
        +int err = -ENODEV;
        char *cptr = config;
        struct console *cons;

        -err = kgdboc_option_setup(config);
        -if (err || !strlen(config) || isspace(config[0]))
        +if (!strlen(config) || isspace(config[0])) {
            +err = 0;
            goto noconfig;
        +}

        -err = -ENODEV;
        kgdboc_io_ops.is_console = 0;
        kgdb_tty_driver = NULL;
    }
    @ @ -245,7 +232,7 @@

    static int param_set_kgdboc_var(const char *kmessage,
        const struct kernel_param *kp)
    {
        -int len = strlen(kmessage);
        +size_t len = strlen(kmessage);

        if (len >= MAX_CONFIG_LEN) {
            printk(KERN_ERR "kgdboc: config string too long\n");
            @ @ -267,7 +254,7 @@

            strcpy(config, kmessage);
            /* Chop out \n char as a result of echo */
            -if (config[len - 1] == '\n')
            +if (len && config[len - 1] == '\n')
                config[len - 1] = '\0';
if (configured == 1)
#endif CONFIG_KGDB_SERIAL_CONSOLE
+
static int kgdboc_option_setup(char *opt)
+
+if (!opt) {
+-pr_err("config string not provided\n");
+return -EINVAL;
+}
+
+if (strlen(opt) >= MAX_CONFIG_LEN) {
+-pr_err("config string too long\n");
+return -ENOSPC;
+}
+strcpy(config, opt);
+
+return 0;
+
+__setup("kgdboc=", kgdboc_option_setup);
+
/* This is only available if kgdboc is a built in for early debugging */
static int __init kgdboc_early_init(char *opt)
{
--- linux-4.15.0.orig/drivers/tty/serial/max310x.c
+++ linux-4.15.0/drivers/tty/serial/max310x.c
@@ -490,37 +490,48 @@
static int max310x_set_baud(struct uart_port *port, int baud)
{
-unsigned int mode = 0, clk = port->uartclk, div = clk / baud;
+unsigned int mode = 0, div = 0, frac = 0, c = 0, F = 0;

-/* Check for minimal value for divider */
-if (div < 16)
-div = 16;
-
-if (clk % baud && (div / 16) < 0x8000) {
+/*
+ * Calculate the integer divisor first. Select a proper mode
+ * in case if the requested baud is too high for the pre-defined
+ * clocks frequency.
+ */
+div = port->uartclk / baud;
+if (div < 8) {
+/* Mode x4 */
+c = 4;
+mode = MAX310X_BRGCFG_4XMODE_BIT;
+} else if (div < 16) {
+/* Mode x2 */
+c = 8;
+mode = MAX310X_BRGCFG_2XMODE_BIT;
-clk = port->uartclk * 2;
-div = clk / baud;
-
-if (clk % baud && (div / 16) < 0x8000) {
-/* Mode x4 */
-mode = MAX310X_BRGCFG_4XMODE_BIT;
-clk = port->uartclk * 4;
-div = clk / baud;
-}
+} else {
+c = 16;
}

-max310x_port_write(port, MAX310X_BRGDIVMSB_REG, (div / 16) >> 8);
-max310x_port_write(port, MAX310X_BRGDIVLSB_REG, div / 16);
-max310x_port_write(port, MAX310X_BRGCFG_REG, (div % 16) | mode);
+/* Calculate the divisor in accordance with the fraction coefficient */
+div /= c;
+F = c*baud;
+
+/* Calculate the baud rate fraction */
+if (div > 0)
+frac = (16*(port->uartclk % F)) / F;
+else
+div = 1;

-DIV_ROUND_CLOSEST(clk, div);
+max310x_port_write(port, MAX310X_BRGDIVMSB_REG, div >> 8);
+max310x_port_write(port, MAX310X_BRGDIVLSB_REG, div);
+max310x_port_write(port, MAX310X_BRGCFG_REG, frac | mode);
+
+/* Return the actual baud rate we just programmed */
+return (16*port->uartclk) / (c*(16*div + frac));
}

static int max310x_update_best_err(unsigned long f, long *besterr) {
/* Use baudrate 115200 for calculate error */
-long err = f % (115200 * 16);
-long err = f % (460800 * 16);
if ((*besterr < 0) || (*besterr > err)) {
*besterr = err;
@@ -575,7 +586,7 @@
}

/* Configure clock source */
-clksrc = xtal ? MAX310X_CLKSRC_CRYST_BIT : MAX310X_CLKSRC_EXTCLK_BIT;
+clksrc = MAX310X_CLKSRC_EXTCLK_BIT | (xtal ? MAX310X_CLKSRC_CRYST_BIT : 0);

/* Configure PLL */
if (pllcfg) {
@@ -754,12 +765,9 @@
}

static unsigned int max310x_tx_empty(struct uart_port *port)
{
-unsigned int lvl, sts;
-
-lvl = max310x_port_read(port, MAX310X_TXFIFOLVL_REG);
-sts = max310x_port_read(port, MAX310X_IRQSTS_REG);
+u8 lvl = max310x_port_read(port, MAX310X_TXFIFOLVL_REG);

-return ((sts & MAX310X_IRQ_TXEMPTY_BIT) && !lvl) ? TIOCSER_TEMT : 0;
+return lvl ? 0 : TIOCSER_TEMT;
}

static unsigned int max310x_get_mctrl(struct uart_port *port)
@@ -1319,6 +1327,12 @@
if (spi->dev.of_node) {
    const struct of_device_id *of_id =
    of_match_device(max310x_dt_ids, &spi->dev);
+    if (!of_id)
+        return -ENODEV;
} else {
@@ -1371,10 +1381,12 @@
    return ret;

#ifdef CONFIG_SPI_MASTER
-    spi_register_driver(&max310x_spi_driver);
+    ret = spi_register_driver(&max310x_spi_driver);
+    if (ret)
+        uart_unregister_driver(&max310x_uart);
#endif

-return 0;
+return ret;
static inline void msm_wait_for_xmit(struct uart_port *port) {
    +unsigned int timeout = 500000;
    +
    while (!(msm_read(port, UART_SR) & UART_SR_TX_EMPTY)) {
        if (msm_read(port, UART_ISR) & UART_ISR_TX_READY)
            break;
        udelay(1);
        +if (!timeout--)
            +break;
    }
    msm_write(port, UART_CR_CMD_RESET_TX_READY, UART_CR);
}

@@ -860,6 +864,7 @@
    struct circ_buf *xmit = &msm_port->uart.state->xmit;
    struct msm_dma *dma = &msm_port->tx_dma;
    unsigned int pio_count, dma_count, dma_min;
    +char buf[4] = { 0 };
    void __iomem *tf;
    int err = 0;

    @@ -869,10 +874,12 @@
        +buf[0] = port->x_char;
        +
        if (msm_port->is_uartdm)
            msm_reset_dm_count(port, 1);
    }
    -iowrite8_rep(tf, &port->x_char, 1);
    +iowrite32_rep(tf, buf, 1);
    port->icount.tx++;
    port->x_char = 0;
    return;
    @@ -973,6 +980,7 @@
    static void msm_reset(struct uart_port *port) {
        struct msm_port *msm_port = UART_TO_MSM(port);
        +unsigned int mr;
/* reset everything */
msm_write(port, UART_CR_CMD_RESET_RX, UART_CR);
msm_write(port, UART_CR_CMD_RESET_ERR, UART_CR);
msm_write(port, UART_CR_CMD_RESET_BREAK_INT, UART_CR);
msm_write(port, UART_CR_CMD_RESET_CTS, UART_CR);
msm_write(port, UART_CR_CMD_SET_RFR, UART_CR);
msm_write(port, UART_CR_CMD_RESET_RFR, UART_CR);
	mr = msm_read(port, UART_MR1);
	mr &= ~UART_MR1_RX_RDY_CTL;
+msm_write(port, mr, UART_MR1);

/* Disable DM modes */
if (msm_port->is_uartdm)
@@ -1569,6 +1580,7 @@
    num_newlines = 0;
    bool replaced = false;
    void __iomem *tf;
+    int locked = 1;

    if (is_uartdm)
        tf = port->membase + UARTDM_TF;
@@ -1581,7 +1593,13 @@
        num_newlines++;
        count += num_newlines;
        -spin_lock(&port->lock);
        +if (port->sysrq)
        +locked = 0;
        +else if (oops_in_progress)
        +locked = spin_trylock(&port->lock);
        +else
        +spin_lock(&port->lock);
        +
        if (is_uartdm)
            msm_reset_dm_count(port, count);

        @@ -1617,7 +1635,9 @@
            iowrite32_rep(tf, buf, 1);
            i += num_chars;
        }
    -spin_unlock(&port->lock);
    +
    +if (locked)
    +spin_unlock(&port->lock);
    }

static void msm_console_write(struct console *, co, const char *,

--- linux-4.15.0.orig/drivers/tty/serial/mvebu-uart.c
+++ linux-4.15.0/drivers/tty/serial/mvebu-uart.c
@@ -146,7 +146,7 @@
     st = readl(port->membase + UART_STAT);
     spin_unlock_irqrestore(&port->lock, flags);

-    return (st & STAT_TX_FIFO_EMP) ? TIOCSER_TEMT : 0;
+    return (st & STAT_TX_EMP) ? TIOCSER_TEMT : 0;
 }

static unsigned int mvebu_uart_get_mctrl(struct uart_port *port)
@@ -455,7 +455,7 @@
 {
     unsigned long flags;
-    unsigned int baud;
+    unsigned int baud, min_baud, max_baud;

     spin_lock_irqsave(&port->lock, flags);
@@ -474,16 +474,21 @@
     port->ignore_status_mask |= STAT_RX_RDY(port) | STAT_BRK_ERR;

-/*
- * Maximal divisor is 1023 * 16 when using default (x16) scheme.
- * Maximum achievable frequency with simple baudrate divisor is 230400.
- * Since the error per bit frame would be of more than 15%, achieving
- * higher frequencies would require to implement the fractional divisor
- * feature.
- */
- baud = uart_get_baud_rate(port, termios, old, 0, 230400);
+min_baud = DIV_ROUND_UP(port->uartclk, 1023 * 16);
+max_baud = 230400;
+ baud = uart_get_baud_rate(port, termios, old, min_baud, max_baud);
     if (mvebu_uart_baud_rate_set(port, baud)) {
-        /* No clock available, baudrate cannot be changed */
-        if (old)
-            baud = uart_get_baud_rate(port, old, NULL, 0, 230400);
-        baud = uart_get_baud_rate(port, old, NULL, 
+        min_baud, max_baud);
+            } else {
+                tty_termios_encode_baud_rate(termios, baud, baud);
+                uart_update_timeout(port, termios->c_cflag, baud);
+            }
     }

termios->c_iflag |= old->c_iflag & ~(INPCK | IGNPAR);
termios->c_iflag &= CREAD | CBAUD;
termios->c_oflag |= old->c_oflag & ~(CSTOPB | CLOCAL);
termios->c_cflag &= CREAD | CBAUD;
termios->c_lflag = old->c_lflag;
+termios->c_cflag |= CS8;
}

spin_unlock_irqrestore(&port->lock, flags);
@@ -618,6 +623,14 @@
u32 val;

readl_poll_timeout_atomic(port->membase + UART_STAT, val,
+  (val & STAT_TX_RDY(port)), 1, 10000);
+
+static void wait_for_xmite(struct uart_port *port)
+/ {
+  u32 val;
+  
+  +readl_poll_timeout_atomic(port->membase + UART_STAT, val,
+                  (val & STAT_TX_EMP), 1, 10000);
+}

@@ -648,7 +661,7 @@

uart_console_write(port, s, count, mvebu_uart_console_putchar);

-wait_for_xmitr(port);
+wait_for_xmite(port);

if (ier)
  writel(ier, port->membase + UART_CTRL(port));
@@ -776,7 +789,7 @@

port->membase = devm_ioremap_resource(&pdev->dev, reg);
if (IS_ERR(port->membase))
  -return -PTR_ERR(port->membase);
+return PTR_ERR(port->membase);

mvuart = devm_kzalloc(&pdev->dev, sizeof(struct mvebu_uart),
  GFP_KERNEL);
--- linux-4.15.0.orig/drivers/tty/serial/mxs-auart.c
+++ linux-4.15.0/drivers/tty/serial/mxs-auart.c
@@ -1635,8 +1635,9 @@

/*
 * If something went wrong, rollback.
 * + * Be careful: i may be unsigned.
 * */
-while (err && (--i >= 0))
+while (err && (i-- > 0))
if (irq[i] >= 0)
free_irq(irq[i], s);

@@ -1646,6 +1665,10 @@
s->port.line = pdev->id < 0 ? 0 : pdev->id;
else if (ret < 0)
    return ret;
+if (s->port.line >= ARRAY_SIZE(auart_port)) {
    +dev_err(&pdev->dev, "serial%d out of range\n", s->port.line);
    +return -EINVAL;
    +}

if (of_id) {
pdev->id_entry = of_id->data;
@@ -1680,6 +1685,10 @@
s->port.mapbase = r->start;
s->port.membase = ioremap(r->start, resource_size(r));
+if (!s->port.membase) {
    +ret = -ENOMEM;
    +goto out_disable_clks;
    +}
    s->port.ops = &mxs_auart_ops;
    s->port.iotype = UPIO_MEM;
    s->port.fifosize = MXS_AUART_FIFO_SIZE;
--- linux-4.15.0.orig/drivers/tty/serial/owl-uart.c
+++ linux-4.15.0/drivers/tty/serial/owl-uart.c
@@ -742,7 +742,7 @@
    return ret;
-
 static void __init owl_uart_exit(void)
+static void __exit owl_uart_exit(void)
{
    platform_driver_unregister(&owl_uart_platform_driver);
    uart_unregister_driver(&owl_uart_driver);
--- linux-4.15.0.orig/drivers/tty/serial/pch_uart.c
+++ linux-4.15.0/drivers/tty/serial/pch_uart.c
@@ -192,8 +192,6 @@
#define PCH_UART_HAL_LOOP		(PCH_UART_MCR_LOOP)
#define PCH_UART_HAL_AFE		(PCH_UART_MCR_AFE)
#define PCI_VENDOR_ID_ROHM		0x10DB
-#define BOTH_EMPTY (UART_LSR_TEMT | UART_LSR_THRE)
#define DEFAULT_UARTCLK   1843200 /*   1.8432 MHz */
@@ -235,6 +233,7 @@

-#define PCI_VENDOR_ID_ROHM0x10DB
-
#define BOTH_EMPTY (UART_LSR_TEMT | UART_LSR_THRE)

#define DEFAULT_UARTCLK   1843200 /*   1.8432 MHz */
@@ -235,6 +233,7 @@
struct dma_chan *chan_rx;
struct scatterlist *sg_tx_p;
int nent;
+int orig_nent;
struct scatterlist *sg_rx;
nent_dma_use;
void *rx_buf_virt;
@@ -789,9 +788,10 @@
}
xmit->tail &= UART_XMIT_SIZE - 1;
async_tx_ack(priv->desc_tx);
-dma_unmap_sg(port->dev, sg, priv->nent, DMA_TO_DEVICE);
+dma_unmap_sg(port->dev, sg, priv->orig_nent, DMA_TO_DEVICE);
priv->tx_dma_use = 0;
priv->nent = 0;
+priv->orig_nent = 0;
kfree(priv->sg_tx_p);
pch_uart_hal_enable_interrupt(priv, PCH_UART_HAL_TX_INT);
}
@@ -1015,6 +1015,7 @@
dev_err(priv->port.dev, "%s:dma_map_sg Failed\n", __func__);
return 0;
}
+priv->orig_nent = num;
priv->nent = nent;

for (i = 0; i < nent; i++, sg++) {
--- linux-4.15.0.orig/drivers/tty/serial/pic32_uart.c
+++ linux-4.15.0/drivers/tty/serial/pic32_uart.c
@@ -919,6 +919,7 @@
 .driver = {
   .name = PIC32_DEV_NAME,
   .of_match_table = of_match_ptr(pic32_serial_dt_ids),
+  .suppress_bind_attrs = IS_BUILTIN(CONFIG_SERIAL_PIC32),
   },
   
   
--- linux-4.15.0.orig/drivers/tty/serial/rp2.c
+++ linux-4.15.0/drivers/tty/serial/rp2.c
@@ -195,7 +195,6 @@
 void __iomem *bar0;
 void __iomem *bar1;
 spinlock_t card_lock;
-struct completion *fw_loaded;
   
#define RP_ID(prod) PCI_VDEVICE(RP, (prod))
@@ -664,17 +663,10 @@
static void rp2_fw_cb(const struct firmware *fw, void *context)
+static int rp2_load_firmware(struct rp2_card *card, const struct firmware *fw)
{
-struct rp2_card *card = context;
resource_size_t phys_base;
-int i, rc = -ENOENT;
-
-if (!fw) {
-dev_err(&card->pdev->dev, "cannot find '%s' firmware image\n",
-RP2_FW_NAME);
-goto no_fw;
-
}
+int i, rc = 0;

phys_base = pci_resource_start(card->pdev, 1);

@@ -720,23 +712,13 @@
card->initialized_ports++;
}

-release_firmware(fw);
-no_fw:
-/*
 - * rp2_fw_cb() is called from a workqueue long after rp2_probe()
 - * has already returned success. So if something failed here,
 - * we'll just leave the now-dormant device in place until somebody
 - * unbinds it.
 - */
-endif (rc)
-dev_warn(&card->pdev->dev, "driver initialization failed\n");
-
-complete(&card->fw_loaded);
+return rc;
}

static int rp2_probe(struct pci_dev *pdev,
 const struct pci_device_id *id)
{
+const struct firmware *fw;
 struct rp2_card *card;
 struct rp2_uart_port *ports;
 void __iomem * const *bars;
 @ @ -747,7 +729,6 @@
 return -ENOMEM;
 pci_set_drvdata(pdev, card);
spin_lock_init(&card->card_lock);
-init_completion(&card->fw_loaded);

rc = pcim_enable_device(pdev);
if (rc)
@@ -780,21 +761,23 @@
return -ENOMEM;
card->ports = ports;

-rc = devm_request_irq(&pdev->dev, pdev->irq, rp2_uart_interrupt,
 - IRQF_SHARED, DRV_NAME, card);
-if (rc)
+rc = request_firmware(&fw, RP2_FW_NAME, &pdev->dev);
+if (rc < 0) {
++dev_err(&pdev->dev, "cannot find '%s' firmware image\n",
++RP2_FW_NAME);
return rc;
+
+/*
- * Only catastrophic errors (e.g. ENOMEM) are reported here.
- * If the FW image is missing, we'll find out in rp2_fw_cb()
- * and print an error message.
- */
-rc = request_firmware_nowait(THIS_MODULE, 1, RP2_FW_NAME, &pdev->dev,
- GFP_KERNEL, card, rp2_fw_cb);
+rc = rp2_load_firmware(card, fw);
+
+release_firmware(fw);
+if (rc < 0)
+return rc;
+
+rc = devm_request_irq(&pdev->dev, pdev->irq, rp2_uart_interrupt,
 + IRQF_SHARED, DRV_NAME, card);
if (rc)
return rc;
-dev_dbg(&pdev->dev, "waiting for firmware blob...\n");

return 0;
}
@@ -803,7 +786,6 @@
{
 struct rp2_card *card = pci_get_drvdata(pdev);

-wait_for_completion(&card->fw_loaded);
rp2_remove_ports(card);
}
--- linux-4.15.0.orig/drivers/tty/serial/samsung.c
+++ linux-4.15.0/drivers/tty/serial/samsung.c
@@ -862,15 +862,12 @@
dma->rx_conf.direction = DMA_DEV_TO_MEM;
dma->rx_conf.src_addr_width = DMA_SLAVE_BUSWIDTH_1_BYTE;
dma->rx_conf.src_addr = p->port.mapbase + S3C2410_URXH;
-dma->rx_conf.src_maxburst = 16;
+dma->rx_conf.src_maxburst = 1;
dma->tx_conf.direction = DMA_MEM_TO_DEV;
dma->tx_conf.dst_addr_width = DMA_SLAVE_BUSWIDTH_1_BYTE;
dma->tx_conf.dst_addr = p->port.mapbase + S3C2410_UTXH;
-if (dma_get_cache_alignment() >= 16)
-dma->tx_conf.dst_maxburst = 16;
-else
-dma->tx_conf.dst_maxburst = 1;
+dma->tx_conf.dst_maxburst = 1;

dma->rx_chan = dma_request_chan(p->port.dev, "rx");

@@ -1165,14 +1162,14 @@
struct s3c24xx_uart_info *info = ourport->info;
struct clk *clk;
unsigned long rate;
-unsigned int cnt, baud, quot, clk_sel, best_quot = 0;
+unsigned int cnt, baud, quot, best_quot = 0;
char clkname[MAX_CLK_NAME_LENGTH];
int calc_deviation, deviation = (1 << 30) - 1;

-clk_sel = (ourport->cfg->clk_sel) ? ourport->cfg->clk_sel :
-ourport->info->def_clk_sel;
+ourport->cfg->clk_sel &&
+!(ourport->cfg->clk_sel & (1 << cnt)))
 continue;

-sprintf(clkname, "clk_uart_baud%d", cnt);
@@ -1343,11 +1340,14 @@
wr_regl(port, S3C2410_ULCON, ulcon);
wr_regl(port, S3C2410_UBRDIV, quot);

+port->status &= ~UPSTAT_AUTOCTS;
+
umcon = rd_regl(port, S3C2410_UMCON);
if (termios->c_cflag & CRTSCTS) {
    umcon |= S3C2410_UMCOM_AFC;

/* Disable RTS when RX FIFO contains 63 bytes */
umcon &= -S3C2412_UMCON_AFC_8;
+port->status = UPSTAT_AUTOCTS;
} else {
    umcon &= -S3C2410_UMCOM_AFC;
}
@@ -1730,9 +1730,11 @@
ourport->tx_irq = ret + 1;
}

-ret = platform_get_irq(platdev, 1);
-if (ret > 0)
-ourport->tx_irq = ret;
+if (!s3c24xx_serial_has_interrupt_mask(port)) {
+    ret = platform_get_irq(platdev, 1);
+    if (ret > 0)
+        ourport->tx_irq = ret;
+}
+
/*
* DMA is currently supported only on DT platforms, if DMA properties
* are specified.
@@ -1818,6 +1820,10 @@
ourport = &s3c24xx_serial_ports[index];

ourport->drv_data = s3c24xx_get_driver_data(pdev);
@@ -1915,7 +1921,11 @@
if (port) {
    clk_prepare_enable(ourport->clk);
    +if (!IS_ERR(ourport->baudclk))
        +clk_prepare_enable(ourport->baudclk);
    s3c24xx_serial_resetport(port, s3c24xx_port_to_cfg(port));
    +if (!IS_ERR(ourport->baudclk))
        +clk_disable_unprepare(ourport->baudclk);
    clk_disable_unprepare(ourport->clk);
    uart_resume_port(&s3c24xx_uart_drv, port);
@@ -1938,7 +1948,11 @@
    if (rx_enabled(port))
        uintm &= ~S3C64XX_UINTM_RXD_MSK;
    clk_prepare_enable(ourport->clk);
if (!IS_ERR(ourport->baudclk))
    clk_prepare_enable(ourport->baudclk);
wr_regl(port, S3C64XX_UINTM, uintm);
if (!IS_ERR(ourport->baudclk))
    clk_disable_unprepare(ourport->baudclk);
    clk_disable_unprepare(ourport->clk);
}
}
--- linux-4.15.0.orig/drivers/tty/serial/sc16is7xx.c
+++ linux-4.15.0/drivers/tty/serial/sc16is7xx.c
@@ -328,6 +328,7 @@
struct kthread_worker	kworker;
struct task_struct	kworker_task;
struct kthread_work	irq_work;
+struct mutex			efr_lock;
struct sc16is7xx_one		p[0];
};
@@ -499,6 +500,21 @@
div /= 4;
}
/* In an amazing feat of design, the Enhanced Features Register shares
 + the address of the Interrupt Identification Register, and is
 + switched in by writing a magic value (0xbf) to the Line Control
 + Register. Any interrupt firing during this time will see the EFR
 + where it expects the IIR to be, leading to "Unexpected interrupt"
 + messages.
 + Prevent this possibility by claiming a mutex while accessing the
 + EFR, and claiming the same mutex from within the interrupt handler.
 + This is similar to disabling the interrupt, but that doesn't work
 + because the bulk of the interrupt processing is run as a workqueue
 + job in thread context.
 +*/
+mutex_lock(&s->efr_lock);
+
lcr = sc16is7xx_port_read(port, SC16IS7XX_LCR_REG);
/* Open the LCR divisors for configuration */
@@ -514,6 +530,8 @@
sc16is7xx_port_write(port, SC16IS7XX_LCR_REG, lcr);
+mutex_unlock(&s->efr_lock);
+
sc16is7xx_port_update(port, SC16IS7XX_MCR_REG,
  SC16IS7XX_MCR_CLKSEL_BIT,
static void sc16is7xx_ist(struct kthread_work *ws)
{
    struct sc16is7xx_port *s = to_sc16is7xx_port(ws, irq_work);
    int i;
    for (i = 0; i < s->devtype->nr_uart; ++i)
        sc16is7xx_port_irq(s, i);
    mutex_lock(&s->efr_lock);
    while (1) {
        bool keep_polling = false;
        int i;
        for (i = 0; i < s->devtype->nr_uart; ++i)
            keep_polling |= sc16is7xx_port_irq(s, i);
        if (!keep_polling)
            break;
        }
    mutex_unlock(&s->efr_lock);

    static void sc16is7xx_port_irq(struct sc16is7xx_port *s, int portno)
    {
        struct uart_port *port = &s->p[portno].port;

        iir = sc16is7xx_port_read(port, SC16IS7XX_IIR_REG);
        if (iir & SC16IS7XX_IIR_NO_INT_BIT)
            break;
        return false;
    }

    iir &= SC16IS7XX_IIR_ID_MASK;

    port->line, iir);
    break;
    } while (1);
    return true;

    static bool sc16is7xx_port_irq(struct sc16is7xx_port *s, int portno)
    {
        struct uart_port *port = &s->p[portno].port;

        iir = sc16is7xx_port_read(port, SC16IS7XX_IIR_REG);
        if (iir & SC16IS7XX_IIR_NO_INT_BIT)
            break;
        return false;
    }

    iir &= SC16IS7XX_IIR_ID_MASK;

    port->line, iir);
    break;
    } while (0);
    return true;

    static void sc16is7xx_port_irq(struct sc16is7xx_port *s, int portno)
    {
        struct uart_port *port = &s->p[portno].port;

        iir = sc16is7xx_port_read(port, SC16IS7XX_IIR_REG);
        if (iir & SC16IS7XX_IIR_NO_INT_BIT)
            break;
        return false;
    }

    iir &= SC16IS7XX_IIR_ID_MASK;

    port->line, iir);
    break;
    } while (1);
    return true;
static irqreturn_t sc16is7xx_irq(int irq, void *dev_id)
@@ -892,6 +921,9 @@
    if (!(termios->c_cflag & CREAD))
        port->ignore_status_mask |= SC16IS7XX_LSR_BRK_ERROR_MASK;

/* As above, claim the mutex while accessing the EFR. */
+mutex_lock(&s->efr_lock);
+
sc16is7xx_port_write(port, SC16IS7XX_LCR_REG,
    SC16IS7XX_LCR_CONF_MODE_B);

/* Update LCR register */
sc16is7xx_port_write(port, SC16IS7XX_LCR_REG, lcr);

+mutex_unlock(&s->efr_lock);
+
/* Get baud rate generator configuration */
baud = uart_get_baud_rate(port, termios, old,
    port->uartclk / 16 / 4 / 0xffff,
@@ -913,6 +945,8 @@
    s->regmap = regmap;
    s->devtype = devtype;
    dev_set_drvdata(dev, s);
+mutex_init(&s->efr_lock);

kthread_init_worker(&s->kworker);
kthread_init_work(&s->irq_work, sc16is7xx_ist);
@@ -1471,7 +1506,7 @@
        ret = i2c_add_driver(&sc16is7xx_i2c_uart_driver);
        if (ret < 0) {
            pr_err("failed to init sc16is7xx i2c --> %d\n", ret);
@@ -1479,10 +1514,20 @@
        ret = spi_register_driver(&sc16is7xx_spi_uart_driver);
        if (ret < 0) {
            pr_err("failed to init sc16is7xx spi --> %d\n", ret);
@@ -1821,7 +1966,7 @@
    return ret;

Open Source Used In 5GaaS Edge AC-4 28896
```c
#ifdef CONFIG_SERIAL_SC16IS7XX_SPI
+err_spi:
#endif
#ifdef CONFIG_SERIAL_SC16IS7XX_I2C
+i2c_del_driver(&sc16is7xx_i2c_uart_driver);
+endif
+endif
+err_i2c:
+uart_unregister_driver(&sc16is7xx_uart);
+return ret;
}
module_init(sc16is7xx_init);

--- linux-4.15.0.orig/drivers/tty/serial/serial_core.c
+++ linux-4.15.0/drivers/tty/serial/serial_core.c
@@ -182,6 +182,7 @@
{
    struct uart_port *uport = uart_port_check(state);
    unsigned long page;
    +unsigned long flags = 0;
    int retval = 0;

    if (uport->type == PORT_UNKNOWN)
@@ -196,14 +197,22 @@
        * Initialise and allocate the transmit and temporary
        * buffer.
        */
    -if (!state->xmit.buf) {
    -* This is protected by the per port mutex */
    -=page = get_zeroed_page(GFP_KERNEL);
    -*if (!page)
    -=return -ENOMEM;
    +page = get_zeroed_page(GFP_KERNEL);
    +if (!page)
    +return -ENOMEM;

    +uart_port_lock(state, flags);
    +if (!state->xmit.buf) {
    state->xmit.buf = (unsigned char *) page;
    uart_circ_clear(&state->xmit);
    +uart_port_unlock(uport, flags);
    +} else {
    +uart_port_unlock(uport, flags);
    +/*
    + * Do not free() the page under the port lock, see
    + * uart_shutdown().
    + */
    +free_page(page);
```
retval = uport->ops->startup(uport);
{
struct uart_port *uport = uart_port_check(state);
struct tty_port *port = &state->port;
unsigned long flags = 0;
char *xmit_buf = NULL;

/*
 * Set the TTY IO error marker
@@ -293,12 +304,18 @@
tty_port_set_suspended(port, 0);
 */
- * Free the transmit buffer page.
- */
-if (state->xmit.buf) {
- free_page((unsigned long)state->xmit.buf);
- state->xmit.buf = NULL;
- }
+ * Do not free() the transmit buffer page under the port lock since
+ * this can create various circular locking scenarios. For instance,
+ * console driver may need to allocate/free a debug object, which
+ * can end up in printk() recursion.
+ */
+uart_port_lock(state, flags);
+xmit_buf = state->xmit.buf;
+state->xmit.buf = NULL;
+uart_port_unlock(uport, flags);
+
+if (xmit_buf)
+free_page((unsigned long)xmit_buf);
}

/**
@@ -533,10 +550,12 @@
int ret = 0;

circ = &state->xmit;
-if (!circ->buf)
+port = uart_port_lock(state, flags);
+if (!circ->buf) {
+uart_port_unlock(port, flags);
+return 0;
+}
port = uart_port_lock(state, flags);
if (port & uart_circ_chars_free(circ) != 0) {
circ->buf[circ->head] = c;
circ->head = (circ->head + 1) & (UART_XMIT_SIZE - 1);
return -EL3HLT;
}

port = uart_port_lock(state, flags);
circ = &state->xmit;
if (!circ->buf) {
    uart_port_unlock(port, flags);
    return 0;
}

port = uart_port_lock(state, flags);
while (port) {
c = CIRC_SPACE_TO_END(circ->head, circ->tail, UART_XMIT_SIZE);
if (count < c)
    new_flags = (__force upf_t)new_info->flags;
    old_custom_divisor = uport->custom_divisor;

+if ((change_port || change_irq) &&
+    kernel_is_locked_down("Using TIOCSSERIAL to change device addresses, irqs and dma channels")) {
+    retval = -EPERM;
+    goto exit;
+}
+
+if (!capable(CAP_SYS_ADMIN)) {
    retval = -EPERM;
    if (change_irq || change_port ||
        kernel_is_locked_down("Using TIOCSSERIAL to change device addresses, irqs and dma channels")) {
        goto exit;
    }
}
else {
    retval = uart_startup(tty, state, 1);
    if (retval == 0)
        tty_port_set_initialized(port, true);
    if (retval > 0)
        retval = 0;
}
if (!uport)
go to out;

-if (uport->type != PORT_UNKNOWN)
+if (uport->type != PORT_UNKNOWN & & uport->ops->break_ctl)
**Open Source Used In 5GaaS Edge AC-4**

```c
uport->ops->break_ctl(uport, break_state);
ret = 0;
out:
@@ -1142,6 +1171,8 @@
    ret = uart_startup(tty, state, 1);
    +if (ret == 0)
    +tty_port_set_initialized(port, true);
    if (ret > 0)
    ret = 0;
}
@@ -1396,6 +1427,10 @@
{
    struct uart_state *state = tty->driver_data;
    struct uart_port *uport;
    +struct tty_port *port = &state->port;
    +
    +if (!tty_port_initialized(port))
    +return;

    mutex_lock(&state->port.mutex);
    uport = uart_port_check(state);
@@ -1689,11 +1724,8 @@
    /*
    static int uart_open(struct tty_struct *tty, struct file *filp)
    {
    -struct uart_driver *drv = tty->driver->driver_state;
    -int retval, line = tty->index;
    -struct uart_state *state = drv->state + line;
    -
    -tty->driver_data = state;
    +struct uart_state *state = tty->driver_data;
    +int retval;

        retval = tty_port_open(&state->port, tty, filp);
        if (retval > 0)
@@ -1706,6 +1738,7 @@
            {
            struct uart_state *state = container_of(port, struct uart_state, port);
            struct uart_port *uport;
            +int ret;

                uport = uart_port_check(state);
                if (!uport || uport->flags & UPF_DEAD)
@@ -1716,7 +1749,11 @@
                /*
                * Start up the serial port.
```
return uart_startup(tty, state, 0);
ret = uart_startup(tty, state, 0);
if (ret > 0)
tty_port_set_active(port, 1);
return ret;
}

static const char *uart_type(struct uart_port *port)
@end -2387.7 +2424.18 @@
#endif

static int uart_install(struct tty_driver *driver, struct tty_struct *tty)
{+
struct uart_driver *drv = driver->driver_state;
struct uart_state *state = drv->state + tty->index;
+
tty->driver_data = state;
+
return tty_standard_install(driver, tty);
}
+
static const struct tty_operations uart_ops = {
.install= uart_install,
.open= uart_open,
.close= uart_close,
.write= uart_write,
@end -2758.6 +2806.7 @@
if (uport->cons && uport->dev)
of_console_check(uport->dev->of_node, uport->cons->name, uport->line);
+
tty_port_link_device(port, drv->tty_driver, uport);
uart_configure_port(drv, state, uport);
+
port->console = uart_console(uport);
--- linux-4.15.0.orig/drivers/tty/serial/serial_mctrl_gpio.c
+++ linux-4.15.0/drivers/tty/serial/serial_mctrl_gpio.c
@@ -12,6 +12,7 @@
#include <linux/termios.h>
#include <linux/serial_core.h>
#include <linux/module.h>
+#include <linux/property.h>

#include "serial_mctrl_gpio.h"

@@ -59,6 +60,9 @@
struct gpio_desc *mctrl_gpio_to_gpiod(struct mctrl_gpios *gpios,
    enum mctrl_gpio_idx gidx)
{
    +if (gpios == NULL)
    +return NULL;
    +return gpios->gpio[gidx];
}  
EXPORT_SYMBOL_GPL(mctrl_gpio_to_gpiod);
@@ -115,6 +119,19 @@
    for (i = 0; i < UART_GPIO_MAX; i++) {
        enum gpiod_flags flags;
        +char *gpio_str;
        +bool present;
        +
        +/* Check if GPIO property exists and continue if not */
        +gpio_str = kasprintf(GFP_KERNEL, "%s-gpios",
            +mctrl_gpios_desc[i].name);
        +if (!gpio_str)
        +continue;
        +
        +#ifdef ENABLE_SERIAL_TXX9_PCI
        ret = pci_register_driver(&serial_txx9_pci_driver);
        +#ifdef ENABLE_SERIAL_TXX9_PCI
        +if (ret) {
        +platform_driver_unregister(&serial_txx9_plat_driver);
        +}
        +#endif
        if (ret == 0)
            goto out;
        ctrl &= ~SCSCR_TIE;
        +serial_port_out(port, SCSCR, ctrl);
        +
#ifdef CONFIG_SERIAL_SH_SCI_DMA
+if (to_sci_port(port)->chan_tx &&
  !dma_submit_error(to_sci_port(port)->cookie_tx)) {
+dmaengine_terminate_async(to_sci_port(port)->chan_tx);
+to_sci_port(port)->cookie_tx = -EINVAL;
+}
+#endif

static void sci_start_rx(struct uart_port *port)
@@ -805,19 +813,9 @@
if (uart_circ_chars_pending(xmit) < WAKEUP_CHARS)
  uart_write_wakeup(port);
-if (uart_circ_empty(xmit)) {
-+if (uart_circ_empty(xmit))
sci_stop_tx(port);
-} else {
-  ctrl = serial_port_in(port, SCSCR);
-  
-  -if (port->type != PORT_SCI) {
-    serial_port_in(port, SCxSR); /* Dummy read */
-    sci_clear_SCxSR(port, SCxSR_TDxE_CLEAR(port));
-  }
-}
-  ctrl |= SCSCR_TIE;
-  serial_port_out(port, SCSCR, ctrl);
-}
 }
 /* On SH3, SCIF may read end-of-break as a space->mark char */
@@ -850,9 +848,16 @@
tty_insert_flip_char(tport, c, TTY_NORMAL);
 } else {
  for (i = 0; i < count; i++) {
-    +    char c = serial_port_in(port, SCxRDR);
+    c = serial_port_in(port, SCxRDR);
+    status = serial_port_in(port, SCxSR);
+    if (uart_handle_sysrq_char(port, c)) {
-    +    status = serial_port_in(port, SCxSR);
+    +    if (port->type == PORT_SCIF ||
+    +      port->type == PORT_HSCIF) {
+      status = serial_port_in(port, SCxSR);
+      c = serial_port_in(port, SCxRDR);
+      } else {
+      c = serial_port_in(port, SCxRDR);
+      status = serial_port_in(port, SCxSR);
+      }
count--; i--; 
continue;
@@ -885,6 +890,8 @@
/* Tell the rest of the system the news. New characters! */
tty_flip_buffer_push(tport);
} else {
+/* TTY buffers full; read from RX reg to prevent lockup */
+serial_port_in(port, SCxRDR);
serial_port_in(port, SCxSR); /* dummy read */
sci_clear_SCxSR(port, SCxSR_RDxF_CLEAR(port));
}
@@ -994,10 +1001,10 @@
{ 
unsigned int bits;

+if (rx_trig >= port->fifosize)
 +rx_trig = port->fifosize - 1;
if (rx_trig < 1)
 rx_trig = 1;
-if (rx_trig >= port->fifosize)
 -rx_trig = port->fifosize;

/* HSCIF can be set to an arbitrary level. */
if (sci_getreg(port, HSRTRGR)->size) {
@@ -1144,7 +1151,7 @@
 return count;
 }

-static DEVICE_ATTR(rx_fifo_timeout, 0644, rx_fifo_timeout_show, rx_fifo_timeout_store);
+static DEVICE_ATTR_RW(rx_fifo_timeout);

#ifdef CONFIG_SERIAL_SH_SCI_DMA
@@ -1333,7 +1340,7 @@
 dmaengine_terminate_all(chan);
 for (i = 0; i < 2; i++)
 s->cookie_rx[i] = -EINVAL;
-s->active_rx = -EINVAL;
+s->active_rx = 0;
sci_rx_dma_release(s, true);
}

@@ -1345,6 +1352,7 @@
 struct uart_port *port = &s->port;
 struct circ_buf *xmit = &port->state->xmit;
 dma_addr_t buf;
+int head, tail;

#endif CONFIG_SERIAL_SH_SCI_DMA
@@ -1333,7 +1340,7 @@
dmaengine_terminate_all(chan);
 for (i = 0; i < 2; i++)
 s->cookie_rx[i] = -EINVAL;
-s->active_rx = -EINVAL;
+s->active_rx = 0;
sci_rx_dma_release(s, true);
}

@@ -1345,6 +1352,7 @@
 struct uart_port *port = &s->port;
 struct circ_buf *xmit = &port->state->xmit;
 dma_addr_t buf;
+int head, tail;
/*
* DMA is idle now.
@@ -1354,16 +1362,23 @@
* consistent xmit buffer state.
*/
spin_lock_irq(&port->lock);
buf = s->tx_dma_addr + (xmit->tail & (UART_XMIT_SIZE - 1));
+head = xmit->head;
+tail = xmit->tail;
+buf = s->tx_dma_addr + (tail & (UART_XMIT_SIZE - 1));
s->tx_dma_len = min_t(unsigned int,
- CIRC_CNT(xmit->head, xmit->tail, UART_XMIT_SIZE),
- CIRC_CNT_TO_END(xmit->head, xmit->tail, UART_XMIT_SIZE));
- spin_unlock_irq(&port->lock);
+ CIRC_CNT(head, tail, UART_XMIT_SIZE),
+ CIRC_CNT_TO_END(head, tail, UART_XMIT_SIZE));
+ if (!s->tx_dma_len) {
+ /* Transmit buffer has been flushed */
+ spin_unlock_irq(&port->lock);
+ return;
+ }
+
+
desc = dmaengine_prep_slave_single(chan, buf, s->tx_dma_len,
 DMA_MEM_TO_DEV,
 DMA_PREP_INTERRUPT | DMA_CTRL_ACK);
if (!desc) {
+ spin_unlock_irq(&port->lock);
 dev_warn(port->dev, "Failed preparing Tx DMA descriptor\n");
 /* switch to PIO */
 sci_tx_dma_release(s, true);
@@ -1373,20 +1388,20 @@
dma_sync_single_for_device(chan->device->dev, buf, s->tx_dma_len,
 DMA_TO_DEVICE);
-
- spin_lock_irq(&port->lock);
 desc->callback = sci_dma_tx_complete;
desc->callback_param = s;
- spin_unlock_irq(&port->lock);
 s->cookie_tx = dmaengine_submit(desc);
 if (dma_submit_error(s->cookie_tx)) {
+ spin_unlock_irq(&port->lock);
 dev_warn(port->dev, "Failed submitting Tx DMA descriptor\n");
 /* switch to PIO */
 sci_tx_dma_release(s, true);
 return;
 }

+ spin_unlock_irq(&port->lock);
dev_dbg(port->dev, "%s: %p: %d...%d, cookie %d
", __func__, xmit->buf, xmit->tail, xmit->head, s->cookie_tx);

+__func__, xmit->buf, tail, head, s->cookie_tx);

dma_async_issue_pending(chan);
}
@@ -1505,6 +1520,13 @@
dev_dbg(port->dev, "%s: port %d
", __func__, port->line);

+/*
+ * DMA on console may interfere with Kernel log messages which use
+ * plain putchar(). So, simply don't use it with a console.
+ */
+if (uart_console(port))
+return;
+
+if (!port->dev->of_node)
+return;
@@ -1590,11 +1612,18 @@
static void sci_flush_buffer(struct uart_port *port)
{
+struct sci_port *s = to_sci_port(port);
+
+/*
+ * In uart_flush_buffer(), the xmit circular buffer has just been
+- * cleared, so we have to reset tx_dma_len accordingly.
+ * cleared, so we have to reset tx_dma_len accordingly, and stop any
+ * pending transfers
+ */
-\to_sci_port(port)->tx_dma_len = 0;
+s->tx_dma_len = 0;
+if (s->chan_tx) {
+dmaengine_terminate_async(s->chan_tx);
+s->cookie_tx = -EINVAL;
+}
+
+}
#else /* !CONFIG_SERIAL_SH_SCI_DMA */
static inline void sci_request_dma(struct uart_port *port)
@@ -1841,7 +1870,7 @@
static void sci_free_irq(struct sci_port *port)
{
-int i;
+int i, j;
/*
 * Intentionally in reverse order so we iterate over the muxed
 * @ @ -1857.6 +1886.13 @ @
 * if (unlikely(irq < 0))
 * continue;

+/* Check if already freed (irq was muxed) */
+for (j = 0; j < i; j++)
+if (port->irqs[j] == irq)
+j = i + 1;
+if (j > i)
+continue;
+
free_irq(port->irqs[i], port);
kfree(port->irqstr[i]);

@@ -2083,6 +2119,8 @@
 }
 #endif

+if (s->rx_trigger > 1 && s->rx_fifo_timeout > 0)
+del_timer_sync(&s->rx_fifo_timer);
sci_free_irq(s);
sci_free_dma(port);
}
@@ -2689,8 +2727,8 @@
dev_dbg(dev, "failed to get %s (%ld)\n", clk_names[i],
PTR_ERR(clk));
else
-dev_dbg(dev, "clk %s is %pC rate %pCr\n", clk_names[i],
-clk, clk);
+dev_dbg(dev, "clk %s is %lu rate %lu\n", clk_names[i],
+clk, clk_get_rate(clk));
sci_port->clks[i] = IS_ERR(clk) ? NULL : clk;
}
return 0;
@@ -2875,16 +2913,15 @@
unsigned long flags;
int locked = 1;

-local_irq_save(flags);
#if defined(SUPPORT_SYSRQ)
if (port->sysrq)
locked = 0;
else
#endif
if (oops_in_progress)
-locked = spin_trylock(&port->lock);
locked = spin_trylock_irqsave(&port->lock, flags);
else
    spin_lock(&port->lock);
+    spin_lock_irqsave(&port->lock, flags);

/* first save SCSCR then disable interrupts, keep clock source */
ctrl = serial_port_in(port, SCSCR);
@@ -2904,8 +2941,7 @@
    serial_port_out(port, SCSCR, ctrl);

if (locked)
-    spin_unlock(&port->lock);
-    local_irq_restore(flags);
+    spin_unlock_irqrestore(&port->lock, flags);
}

static int serial_console_setup(struct console *co, char *options)
@@ -3010,6 +3046,7 @@
static int sci_remove(struct platform_device *dev)
{
    struct sci_port *port = platform_get_drvdata(dev);
+    unsigned int type = port->port.type; /* uart_remove_... clears it */

    uart_remove_one_port(&sci_uart_driver, &port->port);
@@ -3019,6 +3056,10 @@
    sysfs_remove_file(&dev->dev.kobj,
        &dev_attr_rx_fifo_trigger.attr);
}
-if (port->port.type == PORT_SCIFA || port->port.type == PORT_SCIFB ||
-    port->port.type == PORT_HSCIF) {
+if (type == PORT_SCIFA || type == PORT_SCIFB || type == PORT_HSCIF) {
    sysfs_remove_file(&dev->dev.kobj,
        &dev_attr_rx_fifo_timeout.attr);
}
@@ -3096,6 +3132,10 @@
dev_err(&pdev->dev, "failed to get alias id (%d)\n", id);
    return NULL;
}
+if (id >= ARRAY_SIZE(sci_ports)) {
+    dev_err(&pdev->dev, "serial%d out of range\n", id);
+    return NULL;
+}

sp = &sci_ports[id];
*dev_id = id;
--- linux-4.15.0.orig/drivers/tty/serial/sprd_serial.c
+++ linux-4.15.0/drivers/tty/serial/sprd_serial.c
if (lsr & (SPRD_LSR_BI | SPRD_LSR_PE | SPRD_LSR_FE | SPRD_LSR_OE))
  -if (handle_lsr_errors(port, &lsr, &flag))
  +if (handle_lsr_errors(port, &flag, &lsr))
    continue;
if (uart_handle_sysrq_char(port, ch))
  continue;
--- linux-4.15.0.orig/drivers/tty/serial/stm32-usart.c
+++ linux-4.15.0/drivers/tty/serial/stm32-usart.c
@@ -87,8 +87,8 @@
  return 0;
}

static unsigned long
-static unsigned long
+static unsigned long
  stm32_get_char(struct uart_port *port, u32 *sr, int *last_res)
+  stm32_get_char(struct uart_port *port, u32 *sr,
+    int *last_res)
{
  struct stm32_port *stm32_port = to_stm32_port(port);
  struct stm32_usart_offsets *ofs = &stm32_port->info->ofs;
@@ -98,10 +98,13 @@
    c = stm32_port->rx_buf[RX_BUF_L - (*last_res)--];
  if ((*last_res) == 0)
    *last_res = RX_BUF_L;
  -return c;
  +return c;
  }
  -return readl_relaxed(port->membase + ofs->rdr);
  +c = readl_relaxed(port->membase + ofs->rdr);
  +/* apply RDR data mask */
  +c &= stm32_port->rdr_mask;
  }
  +
  +return c;
}

static void stm32_receive_chars(struct uart_port *port, bool threaded)
@@ -118,35 +121,51 @@
while (stm32_pending_rx(port, &sr, &stm32_port->last_res, threaded)) {
  sr |= USART_SR_DUMMY_RX;
  c = stm32_get_char(port, &sr, &stm32_port->last_res);
  flag = TTY_NORMAL;
  -port->icount.rx++;
  +/*
  + * Status bits has to be cleared before reading the RDR:
In FIFO mode, reading the RDR will pop the next data (if any) along with its status bits into the SR. Not doing so leads to misalignment between RDR and SR, and clear status bits of the next rx data.

Clear errors flags for stm32f7 and stm32h7 compatible devices. On stm32f4 compatible devices, the error bit is cleared by the sequence [read SR - read DR].

```c
if ((sr & USART_SR_ERR_MASK) && ofs->icr != UNDEF_REG)
    writel_relaxed(sr & USART_SR_ERR_MASK, port->membase + ofs->icr);
```

```c
c = stm32_get_char(port, &sr, &stm32_port->last_res);
```

```c
if (sr & USART_SR_ERR_MASK) {
    if (sr & USART_SR_LBD) {
        port->icount.brk++;
        if (uart_handle_break(port))
            continue;
    } else if (sr & USART_SR_ORE) {
        if (ofs->icr != UNDEF_REG)
            writel_relaxed(USART_ICR_ORECF, port->membase + ofs->icr);
    }
} else if (sr & USART_SR_ORE) {
    port->icount.overrun++;
} else if (sr & USART_SR_PE) {
    port->icount.parity++;
} else if (sr & USART_SR_FE) {
    /* Break detection if character is null */
    if (!c) {
        port->icount.brk++;
        if (uart_handle_break(port))
            continue;
    } else {
        port->icount.frame++;
    }
}
```

```c
sr &= port->read_status_mask;
```

```c
-if (sr & USART_SR_LBD)
flag = TTY_BREAK;
-else if (sr & USART_SR_PE)
+if (sr & USART_SR_PE) {
flag = TTY_PARITY;
```
-else if (sr & USART_SR_FE)
-flag = TTY_FRAME;
+
} else if (sr & USART_SR_FE) {
+if (c)
+flag = TTY_BREAK;
+else
+flag = TTY_FRAME;
+
}

if (uart_handle_sysrq_char(port, c))
@@ -164,21 +183,6 @@
struct uart_port *port = arg;
struct stm32_port *stm32port = to_stm32_port(port);
struct stm32_usart_offsets *ofs = &stm32port->info->ofs;
-unsigned int isr;
-int ret;
-
-ret = readl_relaxed_poll_timeout_atomic(port->membase + ofs->isr,
-islr,
- (isr & USART_SR_TC),
-10, 100000);
-}
-if (ret)
-dev_err(port->dev, "terminal count not set\n");
-
-if (ofs->icr == UNDEF_REG)
-stm32_clr_bits(port, ofs->isr, USART_SR_TC);
-else
-stm32_set_bits(port, ofs->icr, USART_CR_TC);

stm32_clr_bits(port, ofs->cr3, USART_CR3_DMAT);
stm32port->tx_dma_busy = false;
@@ -270,7 +274,6 @@
/* Issue pending DMA TX requests */
dma_async_issue_pending(stm32port->tx_ch);

-stm32_clr_bits(port, ofs->isr, USART_SR_TC);
-stm32_set_bits(port, ofs->cr3, USART_CR3_DMAT);

xmit->tail = (xmit->tail + count) & (UART_XMIT_SIZE - 1);
@@ -294,15 +297,15 @@
return;
}
-
-if (uart_tx_stopped(port)) {
-stm32_stop_tx(port);
+if (uart_circ_empty(xmit) || uart_tx_stopped(port)) {
stm32_clr_bits(port, ofs->cr1, USART_CR1_TXEIE);
return;
}

if (uart_circ_empty(xmit)) {
stm32_stop_tx(port);
return;
}

if (ofs->icr == UNDEF_REG)
stm32_clr_bits(port, ofs->isr, USART_SR_TC);
else
writel_relaxed(USART_ICR_TCCF, port->membase + ofs->icr);

if (stm32_port->tx_ch)
stm32_transmit_chars_dma(port);

uart_write_wakeup(port);

stm32_set_mctrl(struct uart_port *port, unsigned int mctrl)
{
struct stm32_port *stm32_port = to_stm32_port(port);
struct stm32_usart_offsets *ofs = &stm32_port->info->ofs;

if (ret)
return ret;
-if (cfg->has_wakeup && stm32_port->wakeirq >= 0) {
-ret = dev_pm_set_dedicated_wake_irq(port->dev,
-    stm32_port->wakeirq);
-if (ret) {
-    free_irq(port->irq, port);
-    return ret;
-} 
-
-val = USART_CR1_RXNEIE | USART_CR1_TE | USART_CR1_RE;
-if (stm32_port->fifoen)
-val |= USART_CR1_FIFOEN;
@@ -480,29 +476,68 @@
struct stm32_port *stm32_port = to_stm32_port(port);
struct stm32_usart_offsets *ofs = &stm32_port->info->ofs;
struct stm32_usart_config *cfg = &stm32_port->info->cfg;
-u32 val;
+u32 val, isr;
+int ret;

-val = USART_CR1_TXEIE | USART_CR1_RXNEIE | USART_CR1_TE | USART_CR1_RE;
-val |= BIT(cfg->uart_enable_bit);
-if (stm32_port->fifoen)
-val |= USART_CR1_FIFOEN;
 +
+-ret = readl_relaxed_poll_timeout(port->membase + ofs->isr,
+-    isr, (isr & USART_SR_TC),
+-    10, 100000);
 +
+-if (ret)
+-    dev_err(port->dev, "transmission complete not set\n");
 +
-stm32_clr_bits(port, ofs->cr1, val);

-dev_pm_clear_wake_irq(port->dev);
-free_irq(port->irq, port);
}

+unsigned int stm32_get.databits(struct ktermios *termios)
+{
+    unsigned int bits;
+    +
+    +tcflag_t cflag = termios->c_cflag;
+    +
+    +switch (cflag & CSIZE) {
+    +/*
+    + * CSIZE settings are not necessarily supported in hardware.
+    + * CSIZE unsupported configurations are handled here to set word length

+ * to 8 bits word as default configuration and to print debug message.
+ */
+case CS5:
+bits = 5;
+break;
+case CS6:
+bits = 6;
+break;
+case CS7:
+bits = 7;
+break;
+/* default including CS8 */
+default:
+bits = 8;
+break;
+
+return bits;
+
+static void stm32_set_termios(struct uart_port *port, struct ktermios *termios,
   struct ktermios *old)
{
    struct stm32_port *stm32_port = to_stm32_port(port);
    struct stm32_usart_offsets *ofs = &stm32_port->info->ofs;
    struct stm32_usart_config *cfg = &stm32_port->info->cfg;
    unsigned int baud;
    unsigned int baud, bits;
    u32 usartdiv, mantissa, fraction, oversampling;
    tcflag_t cflag = termios->c_cflag;
    -u32 cr1, cr2, cr3;
    +u32 cr1, cr2, cr3, isr;
    unsigned long flags;
    +int ret;

    if (!stm32_port->hw_flow_control)
      cflag &= ~CRTSCTS;
      @@ -511,6 +546,15 @@
      spin_lock_irqsave(&port->lock, flags);

      +ret = readl_relaxed_poll_timeout_atomic(port->membase + ofs->isr,
      +isr,
      +*(isr & USART_SR_TC),
      +10, 100000);
      +
      +/* Send the TC error message only when ISR_TC is not set. */
      +if (ret)
+dev_err(port->dev, "Transmission is not complete\n");
+
/* Stop serial port and reset value */
write_relaxed(0, port->membase + ofs->cr1);

@@ -524,16 +568,29 @@
if (cflag & CSTOPB)
  cr2 |= USART_CR2_STOP_2B;

+bits = stm32_get.databits(termios);
+stm32_port->rdr_mask = (BIT(bits) - 1);
+
  if (cflag & PARENB) {
    +bits++;
    cr1 |= USART_CR1_PCE;
+    if ((cflag & CSIZE) == CS8) {
+      if (cfg->has_7bits_data)
+        cr1 |= USART_CR1_M0;
+      else
+        cr1 |= USART_CR1_M1;
+    }
  }

+/*
+ * Word length configuration:
+ * CS8 + parity, 9 bits word aka [M1:M0] = 0b01
+ * CS7 or (CS6 + parity), 7 bits word aka [M1:M0] = 0b10
+ * CS8 or (CS7 + parity), 8 bits word aka [M1:M0] = 0b00
+ * M0 and M1 already cleared by cr1 initialization.
+ */
+if (bits == 9)
+  cr1 |= USART_CR1_M0;
+else if ((bits == 7) && cfg->has_7bits_data)
+  cr1 |= USART_CR1_M1;
+else if (bits != 8)
+  dev_dbg(port->dev, "Unsupported data bits config: %u bits\n"
+    +, bits);
+
if (cflag & PARODD)
  cr1 |= USART_CR1_PS;

@@ -569,14 +626,14 @@
if (termios->c_iflag & INPCK)
  port->read_status_mask |= USART_SR_PE | USART_SR_FE;
if (termios->c_iflag & (IGNBRK | BRKINT | PARMRK))
  -port->read_status_mask |= USART_SR_LBD;
+port->read_status_mask |= USART_SR_FE;
/* Characters to ignore */
port->ignore_status_mask = 0;
if (termios->c_iflag & IGNPAR)
    port->ignore_status_mask = USART_SR_PE | USART_SR_FE;
if (termios->c_iflag & IGNBRK) {
    port->ignore_status_mask |= USART_SR_LBD;
    port->ignore_status_mask |= USART_SR_FE;
/*
 * If we're ignoring parity and break indicators,
 * ignore overruns too (for real raw support).
@@ -892,11 +949,18 @@
ret = device_init_wakeup(&pdev->dev, true);
if (ret)
goto err_uninit;
+
+ret = dev_pm_set_dedicated_wake_irq(&pdev->dev,
+    stm32port->wakeirq);
+if (ret)
goto err_nowup;
+
+device_set_wakeup_enable(&pdev->dev, false);
}

ret = uart_add_one_port(&stm32_usart_driver, &stm32port->port);
if (ret)
goto err_nowup;
+ret = err_wirq;

ret = stm32_of_dma_rx_probe(stm32port, pdev);
if (ret)
@@ -910,6 +974,10 @@
return 0;
+
+err_wirq:
+if (stm32port->info->cfg.has_wakeup && stm32port->wakeirq >= 0)
+    dev_pm_clear_wake_irq(&pdev->dev);
+
+err_nowup:
if (stm32port->info->cfg.has_wakeup && stm32port->wakeirq >= 0)
device_init_wakeup(&pdev->dev, false);
@@ -947,8 +1015,10 @@
    TX_BUF_L, stm32_port->tx_buf,
    stm32_port->tx_dma_buf);

    -if (cfg->has_wakeup && stm32_port->wakeirq >= 0)
    +if (cfg->has_wakeup && stm32_port->wakeirq >= 0) {
    +    dev_pm_clear_wake_irq(&pdev->dev);
device_init_wakeup(&pdev->dev, false);
+

clk_disable_unprepare(stm32_port->clk);

--- linux-4.15.0.orig/drivers/tty/serial/stm32-usart.h
+++ linux-4.15.0/drivers/tty/serial/stm32-usart.h
@@ -108,7 +108,6 @@
#define USART_SR_RXNEBIT(5)
#define USART_SR_TCBIT(6)
#define USART_SR_TXEBIT(7)
-#define USART_SR_LBDBIT(8)
#define USART_SR_CTSIFBIT(9)
#define USART_SR_CTSBIT(10)/ F7 */
#define USART_SR_RTOFBIT(11)/ F7 */
@@ -120,14 +119,10 @@
#define USART_SR_SBKFBIT(18)/ F7 */
#define USART_SR_WUFBIT(20)/ H7 */
#define USART_SR_TEACKBIT(21)/ F7 */
-#define USART_SR_ERR_MASK(USART_SR_LBD | USART_SR_ORE |
- USART_SR_FE | USART_SR_PE)
+#define USART_SR_ERR_MASK(USART_SR_ORE | USART_SR_FE | USART_SR_PE)
/* Dummy bits */
#define USART_SR_DUMMY_RXBIT(16)

-/* USART_ICR (F7) */
-#define USART_CR_TCBIT(6)
-
-/* USART_DR */
#define USART_DR_MASK(8, 0)

@@ -150,8 +145,7 @@
#define USART_CR1_PSBIT(9)
#define USART_CR1_PCEBIT(10)
#define USART_CR1_WAKEBIT(11)
-#define USART_CR1_MBIT(12)
-#define USART_CR1_M0BIT(12)/ F7 */
+#define USART_CR1_M0BIT(12)/ F7 (CR1_M for F4) */
#define USART_CR1_MMEMBIT(13)/ F7 */
#define USART_CR1_CMIEBIT(14)/ F7 */
#define USART_CR1_OVER8BIT(15)
@@ -166,8 +160,6 @@
/* USART_CR2 */
#define USART_CR2_ADD_MASKE(3, 0)/ F4 */
#define USART_CR2_ADDM7BIT(4)/ F7 */
-#define USART_CR2_LBDLBIT(5)
-#define USART_CR2_LBDIEBIT(6)
#define USART_CR2_LBCLBIT(8)
#define USART_CR2_CPHA		BIT(9)
#define USART_CR2_CPOL		BIT(10)
#define USART_ICR_PECF		BIT(0)
#define USART_ICR_FFECF		BIT(1)
#define USART_ICR_NCF		BIT(2)
#define USART_ICR_ORECF		BIT(3)
#define USART_ICR_IDLECF	BIT(4)
#define USART_ICR_TCCF		BIT(6)
#define USART_ICR_LBDCF		BIT(8)
#define USART_ICR_CTSCF		BIT(9)
#define USART_ICR_RTOCF		BIT(11)
#define USART_ICR_EOBCF		BIT(12)

/* USART_ICR */
#define USART_ICR_PECFBit(0)* F7 */
#define USART_ICR_FFECFBit(1)* F7 */
#define USART_ICR_NCFBit(2)* F7 */
#define USART_ICR_ORECFBit(3)* F7 */
#define USART_ICR_IDLECFBit(4)* F7 */
#define USART_ICR_TCCFBit(6)* F7 */
#define USART_ICR_LBDCFBit(8)* F7 */
#define USART_ICR_CTSCFBit(9)* F7 */
#define USART_ICR_RTOCFBit(11)* F7 */
#define USART_ICR_EOBCFBit(12)* F7 */

struct stm32_port
{
    bool hw_flow_control;
    bool fifoen;
    int wakeirq;
    +int rdr_mask;/* receive data register mask */
};

static struct stm32_port stm32_ports[STM32_MAX_PORTS];
--- linux-4.15.0.orig/drivers/tty/serial/suncore.c
+++ linux-4.15.0/drivers/tty/serial/suncore.c
@@ -112,6 +112,7 @@
        mode = of_get_property(dp, mode_prop, NULL);
        if (!mode)
            mode = "9600,8,n,1,-";
+        of_node_put(dp);
    }

cflag = CREAD | HUPCL | CLOCAL;
--- linux-4.15.0.orig/drivers/tty/serial/sunhv.c
+++ linux-4.15.0/drivers/tty/serial/sunhv.c
@@ -397,7 +397,7 @@
 static struct uart_driver sunhv_reg = {
     .owner		= THIS_MODULE,
     .driver_name	= "sunhv",
-    .dev_name	= "ttyS",
+    .dev_name	= "ttyHV",
     .major		= TTY_MAJOR,
 };
static enum su_type su_get_type(struct device_node *dp)
{
  struct device_node *ap = of_find_node_by_path("aliases");
  enum su_type rc = SU_PORT_PORT;

  if (ap) {
    const char *keyb = of_get_property(ap, "keyboard", NULL);
    const char *ms = of_get_property(ap, "mouse", NULL);
    struct device_node *match;

    if (keyb) {
      if (dp == of_find_node_by_path(keyb))
        return SU_PORT_KBD;
      match = of_find_node_by_path(keyb);
      /*
      * The pointer is used as an identifier not
      * as a pointer, we can drop the refcount on
      * the of__node immediately after getting it.
      */
      of_node_put(match);
      if (dp == match) {
        rc = SU_PORT_KBD;
        goto out;
      }
    }
    if (ms) {
      if (dp == of_find_node_by_path(ms))
        return SU_PORT_MS;
      match = of_find_node_by_path(ms);
      of_node_put(match);
      if (dp == match) {
        rc = SU_PORT_MS;
        goto out;
      }
    }
  }

  return SU_PORT_PORT;
}

out:
  of_node_put(ap);
  return rc;
}

static int su_probe(struct platform_device *op)
--- linux-4.15.0.orig/drivers/tty/serial/uartlite.c
+++ linux-4.15.0/drivers/tty/serial/uartlite.c
@@ -743,7 +743,8 @@
 static void __exit ulite_exit(void)
 {
 platform_driver_unregister(&ulite_platform_driver);
-	+uart_unregister_driver(&ulite_uart_driver);
+if (ulite_uart_driver.state)
++uart_unregister_driver(&ulite_uart_driver);
 }

 module_init(ulite_init);
--- linux-4.15.0.orig/drivers/tty/serial/xilinx_uartps.c
+++ linux-4.15.0/drivers/tty/serial/xilinx_uartps.c
@@ -26,6 +26,7 @@
 #include <linux/of.h>
 #include <linux/module.h>
 #include <linux/pm_runtime.h>
+#include <linux/iopoll.h>
 #define CDNS_UART_TTY_NAME	"ttyPS"
 #define CDNS_UART_NAME	"xuartps"
 @@ -34,6 +35,7 @@
 #define CDNS_UART_NR_PORTS	2
 #define CDNS_UART_FIFO_SIZE	64	/* FIFO size */
 #define CDNS_UART_REGISTER_SPACE	0x1000
+#define TX_TIMEOUT	500000
 /* Rx Trigger level */
 static int rx_trigger_level = 56;
@@ -125,7 +127,7 @@
 #define CDNS_UART_IXR_RXTRIG	0x00000001 /* RX FIFO trigger interrupt */
 #define CDNS_UART_IXR_RXFULL	0x00000004 /* RX FIFO full interrupt. */
 #define CDNS_UART_IXR_RXEMPTY0x00000002 /* RX FIFO empty interrupt. */
-#define CDNS_UART_IXR_MASK	0x00001FFF /* Valid bit mask */
+#define CDNS_UART_IXR_RXMASK	0x000021e7 /* Valid RX bit mask */
 /*
 * Do not enable parity error interrupt for the following
@@ -361,7 +363,13 @@
 cdns_uart_handle_tx(dev_id);
 isrstatus &= ~CDNS_UART_IXR_TXEMPTY;
 }
-+if (isrstatus & CDNS_UART_IXR_MASK)
+ +/*
+ * Skip RX processing if RX is disabled as RXEMPTY will never be set
+ * as read bytes will not be removed from the FIFO.
+ */
/* */
+if (isrstatus & CDNS_UART_IXR_RXMASK &&
+    !(readl(port->membase + CDNS_UART_CR) & CDNS_UART_CR_RX_DIS))
cdns_uart_handle_rx(dev_id, isrstatus);

spin_unlock(&port->lock);
@@ -674,18 +682,21 @@
unsigned int cval = 0;
unsigned int baud, minbaud, maxbaud;
unsigned long flags;
-unsigned int ctrl_reg, mode_reg;
-
-unsigned int ctrl_reg, mode_reg, val;
-int err;

/* Wait for the transmit FIFO to empty before making changes */
if (!(readl(port->membase + CDNS_UART_CR) &
    CDNS_UART_CR_TX_DIS)) {
-    while (!(readl(port->membase + CDNS_UART_SR) &
-        CDNS_UART_SR_TXEMPTY)) {
-        cpu_relax();
-    }
+    err = readl_poll_timeout(port->membase + CDNS_UART_SR,
+        val, (val & CDNS_UART_SR_TXEMPTY),
+        1000, TX_TIMEOUT);
+    if (err) {
+        dev_err(port->dev, "timed out waiting for tx empty");
+        return;
+    }
} 
+spin_lock_irqsave(&port->lock, flags);

/* Disable the TX and RX to set baud rate */
ctrl_reg = readl(port->membase + CDNS_UART_CR);
@@ -1110,7 +1121,7 @@
struct uart_port *port;

/* Try the given port id if failed use default method */
-    if (cdns_uart_port[id].mapbase != 0) {
+    if (id < CDNS_UART_NR_PORTS && cdns_uart_port[id].mapbase != 0) {
        /* Find the next unused port */
        for (id = 0; id < CDNS_UART_NR_PORTS; id++)
            if (cdns_uart_port[id].mapbase == 0)
                @ @ -1259,13 +1270,14 @ @
* 
* Return: 0 on success, negative errno otherwise.
* /
-    static int __init cdns_uart_console_setup(struct console *co, char *options)
+static int cdns_uart_console_setup(struct console *co, char *options)
{
    struct uart_port *port = &cdns_uart_port[co->index];
    int baud = 9600;
    int bits = 8;
    int parity = 'n';
    int flow = 'n';
    unsigned long time_out;

    if (co->index < 0 || co->index >= CDNS_UART_NR_PORTS)
        return -EINVAL;

    if (options)
        uart_parse_options(options, &baud, &parity, &bits, &flow);

/+* Wait for tx_empty before setting up the console */
+time_out = jiffies + usecs_to_jiffies(TX_TIMEOUT);
+
+while (time_before(jiffies, time_out) &&
+      cdns_uart_tx_empty(port) != TIOCSER_TEMT)
+    cpu_relax();
+
    return uart_set_options(port, co, baud, parity, bits, flow);
}

static int cdns_uart_suspend(struct device *device)
{
    struct uart_port *port = dev_get_drvdata(device);
    struct tty_struct *tty;
    struct device *tty_dev;
    int may_wake = 0;
    /* Get the tty which could be NULL so don't assume it's valid */
    tty = tty_port_tty_get(&port->state->port);
    if (tty) {
        tty_dev = tty->dev;
        may_wake = device_may_wakeup(tty_dev);
        tty_kref_put(tty);
    }
    /* Call the API provided in serial_core.c file which handles */
    /* the suspend. */
    /* */
    uart_suspend_port(&cdns_uart_uart_driver, port);
    if (!console_suspend_enabled && !may_wake) {
may_wake = device_may_wakeup(device);
+
+if (console_suspend_enabled && may_wake) {
unsigned long flags = 0;

spin_lock_irqsave(&port->lock, flags);
@@ -1363,7 +1369,11 @@
spin_unlock_irqrestore(&port->lock, flags);
}

-return 0;
+/*
+ * Call the API provided in serial_core.c file which handles
+ * the suspend.
+ */
+return uart_suspend_port(&cdns_uart_uart_driver, port);
}

/*
@@ -1377,17 +1387,9 @@
struct uart_port *port = dev_get_drvdata(device);
unsigned long flags = 0;
u32 ctrl_reg;
-struct tty_struct *tty;
-struct device *tty_dev;
-int may_wake = 0;
-
-/* Get the tty which could be NULL so don't assume it's valid */
-tty = tty_port_tty_get(&port->state->port);
-if (tty) {
-tty_dev = tty->dev;
-may_wake = device_may_wakeup(tty_dev);
-tty_kref_put(tty);
-}
+int may_wake;
+
may_wake = device_may_wakeup(device);

if (console_suspend_enabled && !may_wake) {
struct cdns_uart *cdns_uart = port->private_data;
@@ -1639,6 +1641,7 @@
 .name = CDNS_UART_NAME,
 .of_match_table = cdns_uart_of_match,
 .pm = &cdns_uart_dev_pm_ops,
+ .suppress_bind_attrs = IS_BUILTIN(CONFIG_SERIAL_XILINX_PS_UART),
 },
};
static struct tty_driver *serial_driver;

- static int open(struct tty_struct *tty, struct file * filp);
- static void close(struct tty_struct *tty, struct file * filp);
- static void hangup(struct tty_struct *tty);
- static void set_termios(struct tty_struct *tty, struct ktermios *old_termios);

- static int write(struct tty_struct *tty, const unsigned char *buf, int count);
- static int put_char(struct tty_struct *tty, unsigned char ch);
- static void send_xchar(struct tty_struct *tty, char ch);

static void wait_until_sent(struct tty_struct *tty, int timeout);
- static int write_room(struct tty_struct *tty);
- static void flush_chars(struct tty_struct *tty);
- static void flush_buffer(struct tty_struct *tty);
- static void tx_hold(struct tty_struct *tty);
- static void tx_release(struct tty_struct *tty);

- static int ioctl(struct tty_struct *tty, unsigned int cmd, unsigned long arg);
- static int chars_in_buffer(struct tty_struct *tty);
- static void throttle(struct tty_struct * tty);
- static void unthrottle(struct tty_struct * tty);
- static int set_break(struct tty_struct *tty, int break_state);

/*
- * generic HDLC support and callbacks
+ * generic HDLC support
*/
- #if SYNCLINK_GENERIC_HDLC
+ #ifdef SYNCLINK_GENERIC_HDLC
#define dev_to_port(D) (dev_to_hdlc(D)->priv)
- static void hdledv_tx_done(struct slgt_info *info);
- static void hdledv_rx(struct slgt_info *info, char *buf, int size);
- static int hdledv_init(struct slgt_info *info);
- static void hdledv_exit(struct slgt_info *info);
+ #endif
*/

wait_queue_entry_t wait;
unsigned int data;
}
- static void init_cond_wait(struct cond_wait *w, unsigned int data);
+ static void add_cond_wait(struct cond_wait **head, struct cond_wait *w);
- static void remove_cond_wait(struct cond_wait **head, struct cond_wait *w);
static void flush_cond_wait(struct cond_wait **head);

/*
@@ -443,12 +417,8 @@
 static void program_hw(struct slgt_info *info);
 static void change_params(struct slgt_info *info);

-static int register_test(struct slgt_info *info);
-static int irq_test(struct slgt_info *info);
-static int loopback_test(struct slgt_info *info);
 static int adapter_test(struct slgt_info *info);

-static void reset_adapter(struct slgt_info *info);
 static void reset_port(struct slgt_info *info);
 static void async_mode(struct slgt_info *info);
 static void sync_mode(struct slgt_info *info);
@@ -457,41 +427,23 @@
 static void rx_start(struct slgt_info *info);
 static void free_rbufs(struct slgt_info *info);
 static void free_tbufs(struct slgt_info *info, unsigned int first, unsigned int last);
 static void rdma_reset(struct slgt_info *info);
 static bool rx_get_frame(struct slgt_info *info);
 static bool rx_get_buf(struct slgt_info *info);

 static void tx_start(struct slgt_info *info);
 static void tx_stop(struct slgt_info *info);
 static void tx_set_idle(struct slgt_info *info);
 static unsigned int free_tbuf_count(struct slgt_info *info);
 static unsigned int tbuf_bytes(struct slgt_info *info);
 static void reset_tbufs(struct slgt_info *info);
 static void tdma_reset(struct slgt_info *info);
 static bool tx_load(struct slgt_info *info, const char *buf, unsigned int count);

-static void get_signals(struct slgt_info *info);
-static void set_signals(struct slgt_info *info);
-static void enable_loopback(struct slgt_info *info);
+static void get_gtsignals(struct slgt_info *info);
+static void set_gtsignals(struct slgt_info *info);
 static void set_rate(struct slgt_info *info, u32 data_rate);

-static void bh_action(struct slgt_info *info);
-static void bh_handler(struct work_struct *work);
 static void bh_transmit(struct slgt_info *info);
-static void isr_serial(struct slgt_info *info);
-static void isr_rdma(struct slgt_info *info);
 static void isr_txeom(struct slgt_info *info, unsigned short status);
-static void isr_tdma(struct slgt_info *info);
-static int alloc_dma_bufs(struct slgt_info *info);
-static void free_dma_bufs(struct slgt_info *info);
-static int alloc_desc(struct slgt_info *info);
-static void free_desc(struct slgt_info *info);
-static int alloc_bufs(struct slgt_info *info, struct slgt_desc *bufs, int count);
-static void free_bufs(struct slgt_info *info, struct slgt_desc *bufs, int count);
-
-static int alloc_tmp_rbuf(struct slgt_info *info);
-static void free_tmp_rbuf(struct slgt_info *info);

static void tx_timeout(struct timer_list *t);
static void rx_timeout(struct timer_list *t);
@@ -509,10 +461,6 @@
static int rx_enable(struct slgt_info *info, int enable);
static int modem_input_wait(struct slgt_info *info, int int_arg);
static int wait_msgsl_event(struct slgt_info *info, int __user *mask_ptr);
-static int tiocmget(struct tty_struct *tty);
-static int tiocmset(struct tty_struct *tty, unsigned int set, unsigned int clear);
-static int set_break(struct tty_struct *tty, int break_state);
static int get_interface(struct slgt_info *info, int __user *if_mode);
static int set_interface(struct slgt_info *info, int if_mode);
static int set_gpio(struct slgt_info *info, struct gpio_desc __user *gpio);
@@ -526,9 +474,6 @@
*/
* driver functions
*/
-static void add_device(struct slgt_info *info);
-static void device_init(int adapter_num, struct pci_dev *pdev);
-static int claim_resources(struct slgt_info *info);
static void release_resources(struct slgt_info *info);

/*
@@ -776,7 +721,7 @@
if ((old_termios->c_cflag & CBAUD) && !C_BAUD(tty)) {
 info->signals &= ~(SerialSignal_RTS | SerialSignal_DTR);
 spin_lock_irqsave(&info->lock,flags);
- set_signals(info);
+ set_gtsignals(info);
 spin_unlock_irqrestore(&info->lock,flags);
 }

@@ -786,7 +731,7 @@
if (!C_CRTSCTS(tty) || !tty_throttled(tty))
 info->signals |= SerialSignal_RTS;
 spin_lock_irqsave(&info->lock,flags);
- set_signals(info);
+ set_gtsignals(info);
}
spin_unlock_irqrestore(&info->lock,flags);
}

@@ -1186,14 +1131,13 @@
 unsigned int cmd, unsigned long arg)
 {
 struct slgt_info *info = tty->driver_data;
-  int rc = -ENOIOCTLCMD;
+  int rc;
 if (sanity_check(info, tty->name, "compat_ioctl"))
 return -ENODEV;
 DBGINFO("%s compat_ioctl() cmd=%08X\n", info->device_name, cmd);

 switch (cmd) {
-  case MGSL_IOCSPARAMS32:
+  default:
+    rc = ioctl(tty, cmd, (unsigned long)compat_ptr(arg));
  break;
-  case MGSL_IOCWAITGPIO:
-    case MGSL_IOCGXSYNC:
-    case MGSL_IOCGXCTRL:
-      case MGSL_IOCTXIDLE:
-    case MGSL_IOCTXENABLE:
-    case MGSL_IOCRXENABLE:
-    case MGSL_IOCTXABORT:
-      case TIOCMIWAIT:
-      case MGSL_IOCSIF:
-      case MGSL_IOCSXSYNC:
-      case MGSL_IOCSXCTRL:
-        rc = ioctl(tty, cmd, arg);
+  break;
+    +rc = ioctl(tty, cmd, (unsigned long)compat_ptr(arg));
  break;
+    +default:
+    +rc = ioctl(tty, cmd, arg);
  }

 DBGINFO("%s compat_ioctl() cmd=%08X rc=%d\n", info->device_name, cmd, rc);
 return rc;
 }
@@ -1246,7 +1183,7 @@

 /* output current serial signal states */
 spin_lock_irqsave(&info->lock,flags);
-  get_signals(info);
+  get_gtsignals(info);
 spin_unlock_irqrestore(&info->lock,flags);

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stat_buf[0] = 0;
@@ -1356,10 +1293,10 @@
 DBGINFO("%s throttle\n", info->device_name));
 if (I_IXOFF(tty))
     send_xchar(tty, STOP_CHAR(tty));
- if (C_CRTSCTS(tty)) {
+ if (C_CRTSCTS(tty)) {
     spin_lock_irqsave(&info->lock, flags);
     info->signals &= ~SerialSignal_RTS;
     - set_signals(info);
+ set_gtsignals(info);
     spin_unlock_irqrestore(&info->lock, flags);
     }
 }
@@ -1381,10 +1318,10 @@
 else
     send_xchar(tty, START_CHAR(tty));
 }
- if (C_CRTSCTS(tty)) {
+ if (C_CRTSCTS(tty)) {
     spin_lock_irqsave(&info->lock, flags);
     info->signals |= SerialSignal_RTS;
     - set_signals(info);
+ set_gtsignals(info);
     spin_unlock_irqrestore(&info->lock, flags);
     }
 }
@@ -1556,7 +1493,7 @@
 /* inform generic HDLC layer of current DCD status */
 spin_lock_irqsave(&info->lock, flags);
- get_signals(info);
+ get_gtsignals(info);
 spin_unlock_irqrestore(&info->lock, flags);
 if (info->signals & SerialSignal_DCD)
     netif_carrier_on(dev);
@@ -2312,7 +2249,7 @@
 if (info->params.mode != MGSL_MODE_ASYNC & info->drop_rts_on_tx_done) {
     info->signals &= ~SerialSignal_RTS;
     info->drop_rts_on_tx_done = false;
- set_signals(info);
+ set_gtsignals(info);
 }

 #if SYNCLOCK_GENERIC_HDLC
@@ -2477,7 +2414,7 @@
 if (info->params.mode != MGSL_MODE_ASYNC & info->drop_rts_on_tx_done) {
     info->signals &= ~SerialSignal_RTS;
     info->drop_rts_on_tx_done = false;
- set_signals(info);
+ set_gtsignals(info);
 }

 #if SYNCLOCK_GENERIC_HDLC
if (!info->port.tty || info->port.tty->termios.c_cflag & HUPCL) {
    info->signals &=- (SerialSignal_RTS | SerialSignal_DTR);
    -set_signals(info);
    +set_gtsignals(info);
}

flush_cond_wait(&info->gpio_wait_q);
@@ -2505,7 +2442,7 @@
else
    async_mode(info);

    -set_signals(info);
    +set_gtsignals(info);

    info->dcd_chkcount = 0;
    info->cts_chkcount = 0;
    @ @ -2513,7 +2450,7 @@
    info->dsr_chkcount = 0;

    slgt_irq_on(info, IRQ_DCD | IRQ_CTS | IRQ_DSR | IRQ_RI);
    -get_signals(info);
    +get_gtsignals(info);

    if (info->netcount ||
        (info->port.tty && info->port.tty->termios.c_cflag & CREAD))
    @ @ -2582,8 +2519,8 @@
    info->read_status_mask = IRQ_RXOVER;
    if (I_INPCK(info->port.tty))
        info->read_status_mask |= MASK_PARITY | MASK_FRAMING;
    - if (I_BRKINT(info->port.tty) || I_PARMRK(info->port.tty))
    - info->read_status_mask |= MASK_BREAK;
    +if (I_BRKINT(info->port.tty) || I_PARMRK(info->port.tty))
    +info->read_status_mask |= MASK_BREAK;
    if (I_IGNPAR(info->port.tty))
        info->ignore_status_mask |= MASK_PARITY | MASK_FRAMING;
    if (I_IGNBRK(info->port.tty)) {
        @ @ -2757,7 +2694,7 @@
        spin_lock_irqsave(&info->lock,flags);

        /* return immediately if state matches requested events */
        -get_signals(info);
        +get_gtsignals(info);
        s = info->signals;

        events = mask &
        @ @ -.3175,7 +3112,7 @@

        unsigned long flags;
spin_lock_irqsave(&info->lock,flags);
- get_signals(info);
+ get_gtsignals(info);
spin_unlock_irqrestore(&info->lock,flags);

result = ((info->signals & SerialSignal_RTS) ? TIOCM_RTS:0) +
@@ -3214,7 +3151,7 @@ info->signals &= ~SerialSignal_DTR;

spin_lock_irqsave(&info->lock,flags);
- set_signals(info);
+ set_gtsignals(info);
spin_unlock_irqrestore(&info->lock,flags);
return 0;
}
@@ -3225,7 +3162,7 @@
struct slgt_info *info = container_of(port, struct slgt_info, port);

spin_lock_irqsave(&info->lock,flags);
- get_signals(info);
+ get_gtsignals(info);
spin_unlock_irqrestore(&info->lock,flags);
return (info->signals & SerialSignal_DCD) ? 1 : 0;
}
@@ -3240,7 +3177,7 @@
info->signals |= SerialSignal_RTS | SerialSignal_DTR;
else
info->signals &= ~(SerialSignal_RTS | SerialSignal_DTR);
- set_signals(info);
+ set_gtsignals(info);
spin_unlock_irqrestore(&info->lock,flags);
}

@@ -4039,10 +3976,10 @@
if (info->params.mode != MGSL_MODE_ASYNC) {
    if (info->params.flags & HDLC_FLAG_AUTO_RTS) {
        -get_signals(info);
+get_gtsignals(info);
        if (!((info->signals & SerialSignal_RTS)) {
            info->signals |= SerialSignal_RTS;
-        set_signals(info);
+        set_gtsignals(info);
            info->drop_rts_on_tx_done = true;
        }
    }
}
@@ -4096,7 +4033,7 @@
rx_stop(info);
info->signals &= ~(SerialSignal_RTS | SerialSignal_DTR);
-set_signals(info);
+set_gtsignals(info);

slgt_irq_off(info, IRQ_ALL | IRQ_MASTER);
}
@@ -4518,7 +4455,7 @@
/*
 * get state of V24 status (input) signals
 */
-static void get_signals(struct slgt_info *info)
+static void get_gtsignals(struct slgt_info *info)
 {
  unsigned short status = rd_reg16(info, SSR);

@@ -4580,7 +4517,7 @@
/*
 * set state of V24 control (output) signals
 */
-static void set_signals(struct slgt_info *info)
+static void set_gtsignals(struct slgt_info *info)
 {
  unsigned char val = rd_reg8(info, VCR);
  if (info->signals & SerialSignal_DTR)
  spin_lock_irqsave(&info->lock,flags);
  info->serial_signals &= ~SerialSignal_RTS;
- 	 	set_signals(info);
+    set_signals(info);
  spin_unlock_irqrestore(&info->lock,flags);
  if (I_IXOFF(tty))
    send_xchar(tty, STOP_CHAR(tty));

- if (C_CRTSCTS(tty)) {
+if (C_CRTSCTS(tty)) {
spin_lock_irqsave(&info->lock,flags);
info->serial_signals &= ~SerialSignal_RTS;
- set_signals(info);
+set_signals(info);
spin_unlock_irqrestore(&info->lock,flags);
}
}
@@ -1496,10 +1496,10 @@
send_xchar(tty, START_CHAR(tty));
}

- if (C_CRTSCTS(tty)) {
+if (C_CRTSCTS(tty)) {
spin_lock_irqsave(&info->lock,flags);
info->serial_signals |= SerialSignal_RTS;

if (debug_level >= DEBUG_LEVEL_ISR)
    printk("CTS tx start...");
- info->port.tty->hw_stopped = 0;
+ info->port.tty->hw_stopped = 0;
    tx_start(info);
    info->pending_bh |= BH_TRANSMIT;
    return;
@@ -2493,7 +2493,7 @@
if (!(status & SerialSignal_CTS)) {
    if (debug_level >= DEBUG_LEVEL_ISR)
        printk("CTS tx stop...");
- info->port.tty->hw_stopped = 1;
+ info->port.tty->hw_stopped = 1;
    tx_stop(info);
}
}
@@ -2820,8 +2820,8 @@
if (I_INPCK(info->port.tty))
    info->read_status_mask2 |= PE | FRME;
- if (I_BRKINT(info->port.tty) || I_PARMRK(info->port.tty))
-     info->read_status_mask1 |= BRKD;
+ if (I_BRKINT(info->port.tty) || I_PARMRK(info->port.tty))
+     info->read_status_mask1 |= BRKD;
if (I_IGNPAR(info->port.tty)) {
    @@ -3191,7 +3191,7 @@
    unsigned long flags;

    spin_lock_irqsave(&info->lock,flags);
- get_signals(info);
+ get_signals(info);
    spin_unlock_irqrestore(&info->lock,flags);

    result = ((info->serial_signals & SerialSignal_RTS) ? TIOCM_RTS : 0) |
    @@ -3229,7 +3229,7 @@
     info->serial_signals &= ~SerialSignal_DTR;

    spin_lock_irqsave(&info->lock,flags);
- set_signals(info);
+set_signals(info);
spin_unlock_irqrestore(&info->lock,flags);

return 0;
@@ -3241,7 +3241,7 @@
unsigned long flags;
spin_lock_irqsave(&info->lock,flags);
-get_signals(info);
+get_signals(info);
spin_unlock_irqrestore(&info->lock,flags);

return (info->serial_signals & SerialSignal_DCD) ? 1 : 0;
@@ -3257,7 +3257,7 @@
info->serial_signals |= SerialSignal_RTS | SerialSignal_DTR;
else
info->serial_signals &= ~(SerialSignal_RTS | SerialSignal_DTR);
-set_signals(info);
+set_signals(info);
spin_unlock_irqrestore(&info->lock,flags);
}

--- linux-4.15.0.orig/drivers/tty/sysrq.c
+++ linux-4.15.0/drivers/tty/sysrq.c
@@ -546,7 +546,6 @@
*/
orig_log_level = console_loglevel;
console_loglevel = CONSOLE_LOGLEVEL_DEFAULT;
-pr_info("SysRq :");

     op_p = __sysrq_get_key_op(key);
    if (op_p) {
@@ -555,14 +554,15 @@
* should not) and is the invoked operation enabled? */
    if (!check_mask || sysrq_on_mask(op_p->enable_mask)) {
-        pr_cont("%s
", op_p->action_msg);
+        pr_info("%s
", op_p->action_msg);
        console_loglevel = orig_log_level;
        op_p->handler(key);
    } else {
-        pr_cont("This sysrq operation is disabled.\n");
+        pr_info("This sysrq operation is disabled.\n");
+        console_loglevel = orig_log_level;
    }
} else {
    -pr_cont("HELP : ");
+pr_info("HELP : ");
/* Only print the help msg once per handler */
for (i = 0; i < ARRAY_SIZE(sysrq_key_table); i++) {
    if (sysrq_key_table[i]) {
        --- linux-4.15.0.orig/drivers/tty/tty_baudrate.c
        +++ linux-4.15.0/drivers/tty/tty_baudrate.c
        @ @ -77,7 +77,7 @ @
        else
            cbaud += 15;
        }
        -return baud_table[cbaud];
        +return cbaud >= n_baud_table ? 0 : baud_table[cbaud];
    }
    EXPORT_SYMBOL(tty_termios_baud_rate);
}
@ @ -113,7 +113,7 @ @
else
    cbaud += 15;
    }
    -return baud_table[cbaud];
    +return cbaud >= n_baud_table ? 0 : baud_table[cbaud];
    #else
    return tty_termios_baud_rate(termios);
    #endif
    @ @ -157,18 +157,25 @ @
    termios->c_ospeed = obaud;
    #ifdef BOTHER
    +if (((termios->c_cflag >> IBSHIFT) & CBAUD)
        +ibinput = 1;/* An input speed was specified */
        +
        /* If the user asked for a precise weird speed give a precise weird
         answer. If they asked for a Bfoo speed they may have problems
digesting non-exact replies so fuzz a bit */
        -if (((termios->c_cflag & CBAUD) == BOTHER)
            -ibinput = 1; /* An input speed was specified */
            +#ifdef IBSHIFT
            +#ifdef IBSHIFT
            +termios->c_cflag &= ~(CBAUD << IBSHIFT);
/*
 * Our goal is to find a close match to the standard baud rate
--- linux-4.15.0.orig/drivers/tty/tty_buffer.c
+++ linux-4.15.0/drivers/tty/tty_buffer.c
@@ -26,7 +26,7 @@
 * Byte threshold to limit memory consumption for flip buffers.
 * The actual memory limit is > 2x this amount.
 */
#define TTYB_DEFAULT_MEM_LIMIT	65536
+#define TTYB_DEFAULT_MEM_LIMIT(640 * 1024UL)

/*
 * We default to dicing tty buffer allocations to this many characters
@@ -468,11 +468,15 @@
 {
     unsigned char *p = char_buf_ptr(head, head->read);
     char *f = NULL;
+    int n;

     if (~head->flags & TTYB_NORMAL)
         f = flag_buf_ptr(head, head->read);

-    return port->client_ops->receive_buf(port, p, f, count);
+    n = port->client_ops->receive_buf(port, p, f, count);
+    if (n > 0)
+        memset(p, 0, n);
+    return n;
 }

/*
--- linux-4.15.0.orig/drivers/tty/tty_io.c
+++ linux-4.15.0/drivers/tty/tty_io.c
@@ -408,7 +408,7 @@
     mutex_lock(&tty_mutex);
/* Search through the tty devices to look for a match */
list_for_each_entry(p, &tty_drivers, tty_drivers) {
    -if (strncmp(name, p->name, len) != 0)
    +if (!len || strncmp(name, p->name, len) != 0)
        continue;
    stp = str;
    if (*stp == ',')
@@ -512,6 +512,8 @@
 static DEFINE_SPINLOCK(redirct_lock);
 static struct file *redirect;

+extern void tty_sysctl_init(void);
+ /*
 + * tty_wakeup - request more data
 + * @tty: terminal
 + */
+ return;
+
+/*
+ * Some console devices aren't actually hung up for technical and
+ * historical reasons, which can lead to indefinite interruptible
+ * sleep in n_tty_read(). The following explicitly tells
+ * n_tty_read() to abort readers.
+ */
+ set_bit(TTY_HUPPING, &tty->flags);
+
+ /* inuse_filps is protected by the single tty lock,
+ this really needs to change if we want to flush the
+ workqueue with the lock held */
@@ -640,6 +650,7 @@
* from the ldisc side, which is now guaranteed.
 */
 set_bit(TTY_HUPPED, &tty->flags);
+clear_bit(TTY_HUPPING, &tty->flags);
 tty_unlock(tty);

if (f)
@@ -1246,6 +1257,8 @@
 static int tty_reopen(struct tty_struct *tty)
 {
 struct tty_driver *driver = tty->driver;
+ struct tty_ldisc *ld;
+ int retval = 0;

 if (driver->type == TTY_DRIVER_TYPE_PTY &&
     driver->subtype == PTY_TYPE_MASTER)
@@ -1257,12 +1270,23 @@
 if (test_bit(TTY_EXCLUSIVE, &tty->flags) && !capable(CAP_SYS_ADMIN))
     return -EBUSY;

 -tty->count++; 
+ld = tty_ldisc_ref_wait(tty); 
+if (ld) {
+     tty_ldisc_deref(ld);
+ } else {
+     retval = tty_ldisc_lock(tty, 5 * HZ);
+     if (retval)
+         return retval;
         
+return retval;
if (!tty->ldisc)
    return tty_ldisc_reinit(tty, tty->termios.c_line);
+retval = tty_ldisc_reinit(tty, tty->termios.c_line);
+tty_ldisc_unlock(tty);
+
    return 0;
+if (retval == 0)
    tty->count++;
+
    return retval;
}

/**
 @@ -1323,6 +1347,9 @@
 "%s: %s driver does not set tty->port. This will crash the kernel later. Fix the driver!\n",
 __func__, tty->driver->name);

+retval = tty_ldisc_lock(tty, 5 * HZ);
+if (retval)
+    goto err_release_lock;
	tty->port->itty = tty;

tty->port->itty = tty;

*/
@@ -1333,6 +1360,7 @@
 retval = tty_ldisc_setup(tty, tty->link);
 if (retval)
     goto err_release_tty;
+tty_ldisc_unlock(tty);
 /* Return the tty locked so that it cannot vanish under the caller */
 return tty;

@@ -1345,14 +1373,22 @@
 /* call the tty release_tty routine to clean out this slot */
 err_release_tty:
 -tty_unlock(tty);
+tty_ldisc_unlock(tty);
 tty_info_ratelimited(tty, "ldisc open failed (%d), clearing slot %d\n",
                    retval, idx);
+err_release_lock:
+tty_unlock(tty);
 release_tty(tty, idx);
 return ERR_PTR(retval);


static void tty_free_termios(struct tty_struct *tty)
+/**
+ * tty_save_termios() - save tty termios data in driver table
+ * @tty: tty whose termios data to save
+ *
+ * Locking: Caller guarantees serialisation with tty_init_termios().
+ */
+void tty_save_termios(struct tty_struct *tty)
{
    struct ktermios *tp;
    int idx = tty->index;
    @ @ -1371,6 +1407,7 @@
    }
    *tp = tty->termios;
}
+EXPORT_SYMBOL_GPL(tty_save_termios);

/**
 * tty_flush_works-flush all works of a tty/pty pair
 @ @ -1470,12 +1507,14 @@
 WARN_ON(!mutex_is_locked(&tty_mutex));
 if (tty->ops->shutdown)
     tty->ops->shutdown(tty);
 -tty_free_termios(tty);
 +tty_save_termios(tty);
 tty_driver_remove_tty(tty->driver, tty);
 tty->port->itty = NULL;
 if (tty->link)
     tty->link->port->itty = NULL;
 tty_buffer_cancel_work(tty->port);
 +if (tty->link)
 +tty_buffer_cancel_work(tty->link->port);

 tty_kref_put(tty->link);
 tty_kref_put(tty);
 @ @ -2134,8 +2173,6 @@
 *Locking:
 *Called functions take tty_ldiscs_lock
 *current->signal->tty check is safe without locks
 _ *
 - *FIXME: may race normal receive processing
 */

 static int tiocsti(struct tty_struct *tty, char __user *p)
 @ @ -2151,7 +2188,10 @@
 ld = tty_ldisc_ref_wait(tty);
 if (!ld)
     return -EIO;
ld->ops->receive_buf(tty, &ch, &mbz, 1);
+tty_buffer_lock_exclusive(tty->port);
+if (ld->ops->receive_buf)
+ld->ops->receive_buf(tty, &ch, &mbz, 1);
+tty_buffer_unlock_exclusive(tty->port);
tty_ldisc_deref(ld);
return 0;
}

static int tty_tiocmget(struct tty_struct *tty, int __user *p)
{
    int retval = -EINVAL;
    if (tty->ops->tiocmget) {
        retval = tty->ops->tiocmget(tty);
        if (retval != -EINVAL)
            *p = retval;
    }
    return retval;
}

static int tty_tiocmset(struct tty_struct *tty, int __user *p)
{
    unsigned int set, clear, val;
    if (tty->ops->tiocmset == NULL)
        return -EINVAL;
    retval = get_user(val, p);
    if (retval)
        return retval;
    set = tty->ops->tiocmset & 0x7f;
    clear = tty->ops->tiocmset & 0x80;
    retval = ioctl(tty->fd, TIOCSETM, (unsigned long) (set | clear));
    if (retval)
        return retval;
    return 0;
}

struct task_struct *g, *p;
struct pid *session;
int	i;
+unsigned long flags;

if (!tty)
return;

+spin_lock_irqsave(&tty->ctrl_lock, flags);
+session = get_pid(tty->session);
+spin_unlock_irqrestore(&tty->ctrl_lock, flags);

tty_ldisc_flush(tty);

kref_init(&tty->kref);
tty->magic = TTY_MAGIC;
-tty_ldisc_init(tty);
+if (tty_ldisc_init(tty)) {
+kfree(tty);
+return NULL;
+
} ttty->session = NULL;
tty->pgrp = NULL;

kref_init(&tty->kref);
tty->magic = TTY_MAGIC;
-tty_ldisc_init(tty);
+if (tty_ldisc_init(tty)) {
+kfree(tty);
+return NULL;
+
} ttty->session = NULL;
tty->pgrp = NULL;
mutex_init(&tty->legacy_mutex);

/*
int __init tty_init(void)
{
+tty_sysctl_init();
cdev_init(&tty_cdev, &tty_fops);
if (cdev_add(&tty_cdev, MKDEV(TTYAUX_MAJOR, 0), 1) ||
    register_chrdev_region(MKDEV(TTYAUX_MAJOR, 0), 1, "/dev/tty") < 0)
--- linux-4.15.0.orig/drivers/tty/tty_jobctrl.c
+++ linux-4.15.0/drivers/tty/tty_jobctrl.c
@@ -103,8 +103,8 @@
put_pid(tty->session);
put_pid(tty->pgrp);
tty->pgrp = get_pid(task_pgrp(current));
-spin_unlock_irqrestore(&tty->ctrl_lock, flags);
tty->session = get_pid(task_session(current));
+spin_unlock_irqrestore(&tty->ctrl_lock, flags);
if (current->signal->tty) {
    tty_debug(tty, "current tty %s not NULL!!\n", 
        current->signal->tty->name); 
    @@ -293,20 +293,23 @@ 
    spin_lock_irq(&current->sighand->siglock); 
    put_pid(current->signal->tty_old_pgrp); 
    current->signal->tty_old_pgrp = NULL; 
    -
    tty = tty_kref_get(current->signal->tty); 
    +spin_unlock_irq(&current->sighand->siglock); 
    +
    if (tty) {
        unsigned long flags;
        +
        +tty_lock(tty);
        spin_lock_irqsave(&tty->ctrl_lock, flags); 
        put_pid(tty->session); 
        put_pid(tty->pgrp); 
        tty->session = NULL; 
        tty->pgrp = NULL; 
        spin_unlock_irqrestore(&tty->ctrl_lock, flags); 
        +tty_unlock(tty); 
        tty_kref_put(tty); 
        }
    -spin_unlock_irq(&current->sighand->siglock); 
    /* Now clear signal->tty under the lock */ 
    read_lock(&tasklist_lock); 
    session_clear_tty(task_session(current)); 
    @@ -477,14 +480,19 @@
    return -ENOTTY;
    if (retval)
        return retval;
    -if (!current->signal->tty ||
    -    (current->signal->tty != real_tty) ||
    -    (real_tty->session != task_session(current)))
    -return -ENOTTY;
    +
    if (get_user(pgrp_nr, p))
        return -EFAULT;
    if (pgrp_nr < 0)
        return -EINVAL;
    +
    +spin_lock_irq(&real_tty->ctrl_lock);
    +if (!current->signal->tty ||
    +    (current->signal->tty != real_tty) ||
    +    (real_tty->session != task_session(current))) {
    +retval = -ENOTTY;
    }
goto out_unlock_ctrl;
rcu_read_lock();
pgrp = find_vpid(pgrp_nr);
retval = -ESRCH;
if (session_of_pgrp(pgrp) != task_session(current))
goto out_unlock;
retval = 0;
spin_lock_irq(&tty->ctrl_lock);
put_pid(real_tty->pgrp);
real_tty->pgrp = get_pid(pgrp);
spin_unlock_irq(&tty->ctrl_lock);
out_unlock:
rcu_read_unlock();
+spin_unlock_irq(&real_tty->ctrl_lock);
return retval;
}

static int tiocgsid(struct tty_struct *tty, struct tty_struct *real_tty, pid_t __user *p)
{
unsigned long flags;

	unsigned long flags;
+unsigned long flags;
+pid_t sid;
+
	/*
	*(tty == real_tty) is a cheap way of
	* testing if the tty is NOT a master pty.
	*/
+if (tty == real_tty && current->signal->tty != real_tty)
return -ENOTTY;
+
+spin_lock_irqsave(&real_tty->ctrl_lock, flags);
if (!real_tty->session)
	goto err;
+spin_unlock_irqrestore(&real_tty->ctrl_lock, flags);
	return put_user(pid_vnr(real_tty->session), p);
+return put_user(sid, p);
spin_unlock_irqrestore(&real_tty->ctrl_lock, flags);
return -ENOTTY;
}

/**
--- linux-4.15.0.orig/drivers/tty/tty_ldisc.c
+++ linux-4.15.0/drivers/tty/tty_ldisc.c
@@ -156,6 +156,13 @@
*takes tty_ldiscs_lock to guard against ldisc races
*/

#if defined(CONFIG_LDISC_AUTOLOAD)
#define INITIAL_AUTOLOAD_STATE	1
#else
#define INITIAL_AUTOLOAD_STATE	0
#endif
static int tty_ldisc_autoload = INITIAL_AUTOLOAD_STATE;
+
static struct tty_ldisc *tty_ldisc_get(struct tty_struct *tty, int disc)
{
  struct tty_ldisc *ld;
  @ @ -170,18 +177,19 @@
  */
  ldops = get_ldops(disc);
  if (IS_ERR(ldops)) {
    if (!capable(CAP_SYS_MODULE) && !tty_ldisc_autoload)
      ERR_PTR(-EPERM);
    request_module("tty-ldisc-%d", disc);
    ldops = get_ldops(disc);
    if (IS_ERR(ldops))
      return ERR_CAST(ldops);
  }
  
  ld = kmalloc(sizeof(struct tty_ldisc), GFP_KERNEL);
  -if (ld == NULL) {
    put_ldops(ldops);
    -return ERR_PTR(-ENOMEM);
  }
  
  ld->ops = ldops;
  ld->tty = tty;
  
  /* There is no way to handle allocation failure of only 16 bytes.
  * Let's simplify error handling and save more memory.
  */
  ld = kmalloc(sizeof(struct tty_ldisc), GFP_KERNEL | __GFP_NOFAIL);
  ld->ops = ldops;
  ld->tty = tty;
ldsem_up_write(&tty->ldisc_sem);

-static int tty_ldisc_lock(struct tty_struct *tty, unsigned long timeout)
+int tty_ldisc_lock(struct tty_struct *tty, unsigned long timeout)
{
    int ret;

    /* Kindly asking blocked readers to release the read side */
+    set_bit(TTY_LDISC_CHANGING, &tty->flags);
+    wake_up_interruptible_all(&tty->read_wait);
+    wake_up_interruptible_all(&tty->write_wait);
+    ret = __tty_ldisc_lock(tty, timeout);
    if (!ret)
        return -EBUSY;
@@ -348,9 +361,11 @@
return 0;
}

-static void tty_ldisc_unlock(struct tty_struct *tty)
+void tty_ldisc_unlock(struct tty_struct *tty)
{
    clear_bit(TTY_LDISC_HALTED, &tty->flags);
    /* Can be cleared here - ldisc_unlock will wake up writers firstly */
+    clear_bit(TTY_LDISC_CHANGING, &tty->flags);
    __tty_ldisc_unlock(tty);
}

static void tty_ldisc_restore(struct tty_struct *tty, struct tty_ldisc *old)
{
    /* There is an outstanding reference here so this is safe */
-    old = tty_ldisc_get(tty, old->ops->num);
-    WARN_ON(IS_ERR(old));
-    tty->ldisc = old;
-    tty_set_termios_ldisc(tty, old->ops->num);
-    if (tty_ldisc_open(tty, old) < 0) {
-        tty_ldisc_put(old);
-        if (tty_ldisc_failto(tty, old->ops->num) < 0) {
-            const char *name = tty_name(tty);
-            pr_warn("Falling back ldisc for \%s\n", name);
-            /* The traditional behaviour is to fall back to N_TTY, we
-               want to avoid falling back to N_NULL unless we have no
-               choice to avoid the risk of breaking anything */
+    old = tty_ldisc_get(tty, old->ops->num);
+    WARN_ON(IS_ERR(old));
+    tty->ldisc = old;
+    tty_set_termios_ldisc(tty, old->ops->num);
+    if (tty_ldisc_open(tty, old) < 0) {
+        tty_ldisc_put(old);
+        if (tty_ldisc_failto(tty, old->ops->num) < 0) {
+            const char *name = tty_name(tty);
+            pr_warn("Falling back ldisc for \%s\n", name);
+            /* The traditional behaviour is to fall back to N_TTY, we
+               want to avoid falling back to N_NULL unless we have no
+               choice to avoid the risk of breaking anything */
if (tty_ldisc_failto(tty, N_TTY) < 0 &&
     tty_ldisc_failto(tty, N_NULL) < 0)
        panic("Couldn't open N_NULL ldisc for %s.",
              tty_name(tty));
+panic(" Couldn't open N_NULL ldisc for %s.", name);
}
}
}

@@ -824,12 +836,13 @@
/*
 * the tty structure is not completely set up when this call is made.
 */

-void tty_ldisc_init(struct tty_struct *tty)
+int tty_ldisc_init(struct tty_struct *tty)
 {
     struct tty_ldisc *ld = tty_ldisc_get(tty, N_TTY);
     if (IS_ERR(ld))
-        panic("n_tty: init_tty");
+        return PTR_ERR(ld);
     tty->ldisc = ld;
+    return 0;
 }

 /**
 @@ -845,3 +858,41 @@
 tty_ldisc_put(tty->ldisc);
 tty->ldisc = NULL;
 }
+static int zero;
+static int one = 1;
+static struct ctl_table tty_table[] = {
+{
    .procnname = "ldisc_autoload",
    .data = &tty_ldisc_autoload,
    .maxlen = sizeof(tty_ldisc_autoload),
    .mode = 0644,
    .proc_handler = proc_dointvec,
    .extra1 = &zero,
    .extra2 = &one,
+},
+{
},
+};
+
+static struct ctl_table tty_dir_table[] = {
+{
    .procnname = "tty",
    .mode = 0555,
    .data = &tty_table[0],
    .maxlen = sizeof(tty_table[0]),
    .mode = 0644,
    .proc_handler = tty_dointvec,
    .extra1 = &zero,
    .extra2 = &one,
+},
+{
},
+};
static struct ctl_table tty_root_table[] = {
    {
        .procname = "dev",
        .mode = 0555,
        .child = tty_dir_table,
    },
    {
    },
};

void tty_sysctl_init(void)
{
    register_sysctl_table(tty_root_table);
}

--- linux-4.15.0.orig/drivers/tty/tty_ldsem.c
+++ linux-4.15.0/drivers/tty/tty_ldsem.c
@@ -137,8 +137,7 @@
    list_for_each_entry_safe(waiter, next, &sem->read_wait, list) {
        tsk = waiter->task;
        -smp_mb();
-    -waiter->task = NULL;
+    -smp_store_release(&waiter->task, NULL);
        wake_up_process(tsk);
        put_task_struct(tsk);
    }
@@ -233,7 +232,7 @@
    for (;;) {
        set_current_state(TASK_UNINTERRUPTIBLE);

        -if (!waiter.task)
+if (!smp_load_acquire(&waiter.task))
            break;
        if (!timeout)
            break;
@@ -305,6 +304,16 @@
            list_del(&waiter.list);
            +/
+ * In case of timeout, wake up every reader who gave the right of way
+ * to writer. Prevent separation readers into two groups:
+ * one that holds semaphore and another that sleeps.
+ * (in case of no contention with a writer)
+ */
+if (!locked && list_empty(&sem->write_wait))
+  __ldsem_wake_readers(sem);
+
raw_spin_unlock_irq(&sem->wait_lock);

__set_current_state(TASK_RUNNING);
--- linux-4.15.0.orig/drivers/tty/tty_port.c
+++ linux-4.15.0/drivers/tty/tty_port.c
@@ -52,10 +52,11 @@
}
}
-
-static const struct tty_port_client_operations default_client_ops = {
+const struct tty_port_client_operations tty_port_default_client_ops = {
         .receive_buf = tty_port_defaultReceive_buf,
         .write_wakeup = tty_port_default_wakeup,
    };
+EXPORT_SYMBOL_GPL(tty_port_default_client_ops);

void tty_port_init(struct tty_port *port)
{
  spin_lock_init(&port->lock);
  port->close_delay = (50 * HZ) / 100;
  port->closing_wait = (3000 * HZ) / 100;
-  port->client_ops = &default_client_ops;
+  port->client_ops = &tty_port_default_client_ops;
  kref_init(&port->kref);
}
EXPORT_SYMBOL(tty_port_init);
@@ -640,7 +641,8 @@
   tty_port_close_end(port, tty);
   tty_port_tty_set(port, NULL);
}
--- linux-4.15.0.orig/drivers/tty/vcc.c
+++ linux-4.15.0/drivers/tty/vcc.c
@@ -604,6 +604,7 @@
   port->index = vcc_table_add(port);
   if (port->index == -1) {
     pr_err("VCC: no more TTY indices left for allocation\n");
  ```
+rv = -ENOMEM;
goto free_ldc;
}

--- linux-4.15.0.orig/drivers/tty/vt/consolemap.c
+++ linux-4.15.0/drivers/tty/vt/consolemap.c
@@ -494,7 +494,7 @@
p2[unicode & 0x3f] = fontpos;
-p->sum += (fontpos << 20) + unicode;
+p->sum += (fontpos << 20U) + unicode;
return 0;
}

--- linux-4.15.0.orig/drivers/tty/vt/keyboard.c
+++ linux-4.15.0/drivers/tty/vt/keyboard.c
@@ -123,10 +123,15 @@
static struct input_handler kbd_handler;
static DEFINE_SPINLOCK(kbd_event_lock);
static DEFINE_SPINLOCK(led_lock);
+static DEFINE_SPINLOCK(func_buf_lock); /* guard 'func_buf' and friends */
static unsigned long key_down[BITS_TO_LONGS(KEY_CNT)];/* keyboard key bitmap */
static unsigned char shift_down[NR_SHIFT]; /* shift state counters.. */
static bool dead_key_next;
-static int npadch = -1;/* -1 or number assembled on pad */
+static int npadch = -1;/* -1 or number assembled on pad */
+/* Handles a number being assembled on the number pad */
+static bool npadch_active;
+static unsigned int npadch_value;
+
static unsigned int diacr;
static char rep;/* flag telling character repeat */

@@ -709,8 +714,13 @@
return;

if ((unsigned)value < ARRAY_SIZE(func_table)) {
+unsigned long flags;
+spin_lock_irqsave(&func_buf_lock, flags);
if (func_table[value])
puts_queue(vc, func_table[value]);
+spin_unlock_irqrestore(&func_buf_lock, flags);
+} else
pr_err("k_fn called with value=\%d\n", value);
}
shift_state &= ~(1 << value);

/* kludge */
-if (up_flag && & shift_state != old_state & & npadch != -1) {
+if (up_flag && & shift_state != old_state & & npadch_active) {
if (kbd->kbdmode == VC_UNICODE)
-to_utf8(vc, npadch);
+to_utf8(vc, npadch_value);
else
-put_queue(vc, npadch & 0xff);
-npadch = -1;
+put_queue(vc, npadch_value & 0xff);
+npadch_active = false;
}
}

static void k_ascii(struct vc_data *vc, unsigned char value, char up_flag)
{
-int base;
+unsigned int base;

if (up_flag)
return;
@@ -853,10 +863,12 @@
base = 16;
}

-if (npadch == -1)
-npadch = value;
-else
-npadch = npadch * base + value;
+if (!npadch_active) {
+npadch_value = 0;
+npadch_active = true;
+}
+npadch_value = npadch_value * base + value;
}

static void k_lock(struct vc_data *vc, unsigned char value, char up_flag)
@@ -1460,7 +1472,7 @@
if (event_type == EV_MSC & & event_code == MSC_RAW & & HW_RAW(handle->dev))
kbd_rawcode(value);
-if (event_type == EV_KEY)
+if (event_type == EV_KEY && event_code <= KEY_MAX)
kbd_keycode(event_code, value, HW_RAW(handle->dev));
spin_unlock(&kbd_event_lock);
@@ -1953,18 +1965,17 @@
#undef s
#undef v
-/* FIXME: This one needs untangling and locking */
+/* FIXME: This one needs untangling */
int vt_do_kdgkb_ioctl(int cmd, struct kbsentry __user *user_kdgkb, int perm)
{
struct kbsentry *kbs;
-char *p;
u_char *q;
-u_char __user *up;
-int sz;
+int sz, fnw_sz;
int delta;
char *first_free, *fj, *fnw;
int i, j, k;
int ret;
+unsigned long flags;
if (!capable(CAP_SYS_TTY_CONFIG))
perm = 0;
@@ -1984,30 +1995,33 @@
i = kbs->kb_func;
switch (cmd) {
-case KDGKBSENT:
-sz = sizeof(kbs->kb_string) - 1; /* sz should have been
- a struct member */
-up = user_kdgkb->kb_string;
-p = func_table[i];
-if(p)
-for ( ; *p && sz; p++, sz--)
-if (put_user(*p, up++)) {
-ret = -EFAULT;
-goto reterr;
-}
-if (put_user('\0', up)) {
-ret = -EFAULT;
-goto reterr;
-}
-kfree(kbs);
-return ((p && *p) ? -EOVERFLOW : 0);
+case KDGKBSENT: {

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/* size should have been a struct member */
ssize_t len = sizeof(user_kdgkb->kb_string);

spin_lock_irqsave(&func_buf_lock, flags);
len = strlcpy(kbs->kb_string, func_table[j] ? : "", len);
spin_unlock_irqrestore(&func_buf_lock, flags);

ret = copy_to_user(user_kdgkb->kb_string, kbs->kb_string, 
				len + 1) ? -EFAULT : 0;

goto reterr;
}

case KDSKBSENT:
if (!perm) {
    ret = -EPERM;
    goto reterr;
}

fnw = NULL;
fnw_sz = 0;

/* race against other writers */
again:
    spin_lock_irqsave(&func_buf_lock, flags);
    q = func_table[i];

    /* fj pointer to next entry after 'q' */
    first_free = funcbufptr + (funcbufsize - funcbufleft);
    for (j = i+1; j < MAX_NR_FUNC && !func_table[j]; j++)
        ;
    fj = func_table[j];
else
    fj = first_free;
-
    /* buffer usage increase by new entry */
    delta = (q ? -strlen(q) : 1) + strlen(kbs->kb_string);
    +
    if (delta <= funcbufleft) { /* it fits in current buf */
        if (j < MAX_NR_FUNC) {
            /* make enough space for new entry at 'fj' */
            memmove(fj + delta, fj, first_free - fj);
            for (k = j; k < MAX_NR_FUNC; k++)
                if (func_table[k])
                    ;
        }
        sz = 256;
        while (sz < funcbufsize - funcbufleft + delta)
            sz <<= 1;
        fnw = kmalloc(sz, GFP_KERNEL);
    }
if(!fnw) {
    ret = -ENOMEM;
    goto reterr;
} else if (fnw_sz != sz) {
    spin_unlock_irqrestore(&func_buf_lock, flags);
    kfree(fnw);
    fnw = kmalloc(sz, GFP_KERNEL);
    fnw_sz = sz;
    if (!fnw) {
        ret = -ENOMEM;
        goto reterr;
    }
    goto again;
}

if (!q)
    func_table[i] = fj;
+ /* copy data before insertion point to new location */
    if (fj > funcbufptr)
        memmove(fnw, funcbufptr, fj - funcbufptr);
    for (k = 0; k < j; k++)
        if (func_table[k])
            func_table[k] = fnw + (func_table[k] - funcbufptr);
+ /* copy data after insertion point to new location */
    if (first_free > fj) {
        memmove(fnw + (fj - funcbufptr) + delta, fj, first_free - fj);
        for (k = j; k < MAX_NR_FUNC; k++)
            funcbufleft = funcbufleft - delta + sz - funcbufsize;
            funcbufsize = sz;
    }
+ /* finally insert item itself */
    strcpy(func_table[i], kbs->kb_string);
+ spin_unlock_irqrestore(&func_buf_lock, flags);
    break;
} else {
    ret = 0;
}

--- linux-4.15.0.orig/drivers/tty/vt/selection.c
+++ linux-4.15.0/drivers/tty/vt/selection.c
@@ -14,6 +14,7 @@
#include <linux/tty.h>
#include <linux/sched.h>
#include <linux/mm.h>
+include <linux/mutex.h>
#include <linux/slab.h>
#include <linux/types.h>
#include <linux/console.h>
#include <linux/tty_flip.h>

#include <linux/sched/signal.h>

/* Don't take this from <ctype.h>: 011-015 on the screen aren't spaces */
#define isspace(c)(c) == ' ')

static int sel_end;
static int sel_buffer_lth;
static char *sel_buffer;
+static DEFINE_MUTEX(sel_lock);

/* clear_selection, highlight and highlight_pointer can be called
   from interrupt (via scrollback/front) */

+bool vc_is_sel(struct vc_data *vc)
+{
+return vc == sel_cons;
+}
+
/*
 * User settable table: what characters are to be considered alphabetic?
 * 128 bits. Locked by the console lock.
 */
-int set_selection(const struct tiocl_selection __user *sel, struct tty_struct *tty)
+static int __set_selection(const struct tiocl_selection __user *sel, struct tty_struct *tty)
{
struct vc_data *vc = vc_cons[fg_console].d;
int new_sel_start, new_sel_end, spc;
@-161,7 +170,7 @@
char *bp, *obp;
int i, ps, pe, multiplier;
u16 c;
-int mode;
+int mode, ret = 0;

poke_blanked_console();
if (copy_from_user(&v, sel, sizeof(*sel)))
@-313,7 +322,21 @@}
```c
int set_selection(const struct tiocl_selection __user *v, struct tty_struct *tty)
{
    int ret = 0;

    mutex_lock(&sel_lock);
    console_lock();
    ret = __set_selection(v, tty);
    console_unlock();
    mutex_unlock(&sel_lock);

    return ret;
}

/* Insert the contents of the selection buffer into the 
   unsigned int count;
   struct tty_ldisc *ld;
   DECLARE_WAITQUEUE(wait, current);
   int ret = 0;

   console_lock();
   pokeblanked Console();
   tty_buffer_lock_exclusive(&vc->port);

   add_wait_queue(&vc->paste_wait, &wait);
   mutex_lock(&sel_lock);
   while (sel_buffer && sel_buffer_lth > pasted) {
       set_current_state(TASK_INTERRUPTIBLE);
       if (signal_pending(current)) {
           ret = -EINTR;
           break;
       }
       if (tty_throttled(tty)) {
           mutex_unlock(&sel_lock);
           schedule();
           mutex_lock(&sel_lock);
           continue;
       }
       __set_current_state(TASK_RUNNING);
   }
   __set_current_state(TASK_RUNNING);
```
@@ -353,10 +384,11 @@
count);
pasted += count;
}
+mutex_unlock(&sel_lock);
remove_wait_queue(&vc->paste_wait, &wait);
__set_current_state(TASK_RUNNING);

tty_buffer_unlock_exclusive(&vc->port);
tty_ldisc_deref(ld);
-return 0;
+return ret;
}
--- linux-4.15.0.orig/drivers/tty/vt/vt.c
+++ linux-4.15.0/drivers/tty/vt/vt.c
@@ -104,6 +104,7 @@
#include <linux/kdb.h>
#include <linux/ctype.h>
#include <linux/bsearch.h>
+#include <linux/screen_info.h>
#define MAX_NR_CON_DRIVER 16

@@ -148,7 +149,7 @@
static int con_open(struct tty_struct *, struct file *
static void vc_init(struct vc_data *vc, unsigned int rows,
-    unsigned int cols, int do_clear);
+    unsigned int cols, int do_clear, int mode);
static void gotoxy(struct vc_data *vc, int new_x, int new_y);
static void save_cur(struct vc_data *vc);
static void reset_terminal(struct vc_data *vc, int do_clear);
@@ -172,6 +173,9 @@
static int cur_default = CUR_DEFAULT;
module_param(cur_default, int, S_IRUGO | S_IWUSR);
+int vt_handoff = 0;
+module_param_named(handoff, vt_handoff, int, S_IRUGO | S_IWUSR);
+/*
 * ignore_poke: don't unblank the screen when things are typed.  This is
 * mainly for the privacy of braille terminal users.
 @@ -586,8 +590,9 @@
hide_cursor(struct vc_data *vc)
{
-if (vc == sel_cons)
+if (vc_is_sel(vc))

clear_selection();
+
vc->vc_sw->con_cursor(vc, CM_ERASE);
hide_softcursor(vc);
}
@@ -597,7 +602,7 @@
if (!con_is_fg(vc) || console_blanked || vc->vc_mode == KD_GRAPHICS)
        return;
if (vc->vc_deccm) {
    -if (vc == sel_cons)
+    if (vc_is_sel(vc))
        clear_selection();
    add_softcursor(vc);
    if ((vc->vc_cursor_type & 0x0f) != 1)
@@ -677,6 +682,13 @@
} else {
    hide_cursor(vc);
    redraw = 1;
@@ -752,10 +764,37 @@
    vc->vc_screenbuf_size = vc->vc_rows * vc->vc_size_row;
}
+
+static void visual_deinit(struct vc_data *vc)
+{
+    +vc->vc_sw->con_deinit(vc);
+    module_put(vc->vc_sw->owner);
+}
+
+static void vc_port_destruct(struct tty_port *port)
+{
+    struct vc_data *vc = container_of(port, struct vc_data, port);
+    kfree(vc);
+}
+
+static const struct tty_port_operations vc_port_ops = {
+    .destruct = vc_port_destruct,
+ */
+ * Change # of rows and columns (0 means unchanged/the size of fg_console)
+ * [this is to be used together with some user program
+ * like resize that changes the hardware videomode]
+ */
+#define VC_MAXCOL (32767)
+#define VC_MAXROW (32767)
+
int vc_allocate(unsigned int currcons)/* return 0 on success */
{
struct vt_notifier_param param;
struct vc_data *vc;
+int err;

WARN_CONSOLE_UNLOCKED();

@@ -777,6 +816,7 @@
vc_cons[currcons].d = vc;
tty_port_init(&vc->port);
+vc->port.ops = &vc_port_ops;
INIT_WORK(&vc_cons[currcons].SAK_work, vc_SAK);

visual_init(vc, currcons, 1);
@@ -784,7 +824,12 @@
if (!*vc->vc_uni_pagedir_loc)
con_set_default_unimap(vc);

-vc->vc_screenbuf = kmalloc(vc->vc_screenbuf_size, GFP_KERNEL);
+err = -EINVAL;
+if (vc->vc_cols > VC_MAXCOL || vc->vc_rows > VC_MAXROW \\
+    || vc->vc_screenbuf_size > KMALLOC_MAX_SIZE || !vc->vc_screenbuf_size)
+goto err_free;
+err = -ENOMEM;
+vc->vc_screenbuf = kzalloc(vc->vc_screenbuf_size, GFP_KERNEL);
if (!vc->vc_screenbuf)
    goto err_free;
@@ -793,15 +838,16 @@
if (global_cursor_default == -1)
global_cursor_default = 1;

-vc_init(vc, vc->vc_rows, vc->vc_cols, 1);
+vc_init(vc, vc->vc_rows, vc->vc_cols, 1, KD_TEXT);
vcs_make_sysfs(currcons);
atomic_notifier_call_chain(&vt_notifier_list, VT_ALLOCATE, &param);
return 0;
err_free:
+visual_deinit(vc);
kfree(vc);
vc_cons[currcons].d = NULL;
return -ENOMEM;
+return err;
}

static inline int resize_screen(struct vc_data *vc, int width, int height,
@@ -810,20 +856,12 @@
/* Resizes the resolution of the display adapter */
int err = 0;

-if (vc->vc_mode != KD_GRAPHICS && vc->vc_sw->con_resize)
+if (vc->vc_sw->con_resize)
err = vc->vc_sw->con_resize(vc, width, height, user);

return err;
}

-/*
- * Change # of rows and columns (0 means unchanged/the size of fg_console)
- * [this is to be used together with some user program
- * like resize that changes the hardware videomode]
- */
-#define VC_RESIZE_MAXCOL (32767)
-#define VC_RESIZE_MAXROW (32767)
-
-/**
- *vc_do_resize-resizing method for the tty
- *@tty: tty being resized
- @@ -848,7 +886,7 @@
unsigned int old_rows, old_row_size;
unsigned int new_cols, new_rows, new_row_size, new_screen_size;
unsigned int user;
-unsigned short *newscreen;
+unsigned short *oldscreens, *newscreen;

WARN_CONSOLE_UNLOCKED();

@@ -858,7 +896,7 @@
user = vc->vc_resize_user;
vc->vc_resize_user = 0;

-if (cols > VC_RESIZE_MAXCOL || lines > VC_RESIZE_MAXROW)
+if (cols > VC_MAXCOL || lines > VC_MAXROW)
return -EINVAL;

new_cols = (cols ? cols : vc->vc_cols);
@@ -866,16 +904,33 @@
new_row_size = new_cols << 1;
new_screen_size = new_row_size * new_rows;

- if (new_cols == vc->vc_cols && new_rows == vc->vc_rows)
- return 0;
+ if (new_cols == vc->vc_cols && new_rows == vc->vc_rows) {
+ /* This function is being called here to cover the case
+  * where the userspace calls the FBIOPUT_VSCREENINFO twice,
+  * passing the same fb_var_screeninfo containing the fields
+  * yres/xres equal to a number non-multiple of vc_font.height
+  * and yres_virtual/xres_virtual equal to number lesser than the
+  * vc_font.height and yres/xres.
+  * In the second call, the struct fb_var_screeninfo isn't
+  * being modified by the underlying driver because of the
+  * if above, and this causes the fbcon_display->vrows to become
+  * negative and it eventually leads to out-of-bound
+  * access by the imageblit function.
+  * To give the correct values to the struct and to not have
+  * to deal with possible errors from the code below, we call
+  * the resize_screen here as well.
+  */
+ return resize_screen(vc, new_cols, new_rows, user);
+ }

- if (new_screen_size > (4 << 20))
+ if (new_screen_size > KMALLOC_MAX_SIZE || !new_screen_size)
 return -EINVAL;
- newscreen = kmalloc(new_screen_size, GFP_USER);
+ newscreen = kzalloc(new_screen_size, GFP_USER);
 if (!newscreen)
 return -ENOMEM;
- if (vc == sel_cons)
+ if (vc_is_sel(vc))
 clear_selection();

 old_rows = vc->vc_rows;
@@ -930,10 +985,11 @@
 if (new_scr_end > new_origin)
 scr_memsetw((void *)new_origin, vc->vc_video_erase_char,
    new_scr_end - new_origin);
- kfree(vc->vc_screenbuf);
+ oldscreen = vc->vc_screenbuf;
vc->vc_screenbuf = newscreen;
vc->vc_screenbuf_size = new_screen_size;
set_origin(vc);
+kfree(oldscreen);

/* do part of a reset_terminal() */
vc->vc_top = 0;
@@ -955,6 +1011,7 @@
if (con_is_visible(vc))
update_screen(vc);
vt_event_post(VT_EVENT_RESIZE, vc->vc_num, vc->vc_num);
+notify_update(vc);
return err;
}

@@ -1010,9 +1067,9 @@
param.vc = vc = vc_cons[currcons].d;
atomic_notifier_call_chain(&vt_notifier_list, VT_DEALLOCATE, &param);
vcs_remove_sysfs(currcons);
-vc->vc_sw->con_deinit(vc);
+visual_deinit(vc);
+con_free_unimap(vc);
put_pid(vc->vt_pid);
-module_put(vc->vc_sw->owner);
kfree(vc->vc_screenbuf);
vc_cons[currcons].d = NULL;
}
@@ -1354,6 +1411,11 @@
case 3:
vc->vc_italic = 1;
break;
+case 21:
+/*
 + * No console drivers support double underline, so
 + * convert it to a single underline.
 + */
 case 4:
vc->vc_underline = 1;
break;
@@ -1389,7 +1451,6 @@
vc->vc_intensity = 1;
bREAK;
+case 21:
+/*
default_attr(vc);
update_attr(vc);

-vc->vc_tab_stop[0]= 0x01010100;
+vc->vc_tab_stop[0]=
vc->vc_tab_stop[1]=
vc->vc_tab_stop[2]=
vc->vc_tab_stop[3]=
@@ -1771,7 +1832,7 @@
vc->vc_pos -= (vc->vc_x << 1);
while (vc->vc_x < vc->vc_cols - 1) {
vc->vc_x++;
-vc->vc_tab_stop[vc->vc_x >> 5] & (1 << (vc->vc_x & 31))
+vc->vc_tab_stop[7 & (vc->vc_x >> 5)] & (1 << (vc->vc_x & 31))
break;
}
vc->vc_pos += (vc->vc_x << 1);
@@ -1798,7 +1859,7 @@
lf(vc);
return;
case 'H':
-vc->vc_tab_stop[vc->vc_x >> 5] |= (1 << (vc->vc_x & 31));
+vc->vc_tab_stop[7 & (vc->vc_x >> 5)] |= (1 << (vc->vc_x & 31));
return;
case 'Z':
respond_ID(tty);
@@ -2024,7 +2085,7 @@
return;
case 'g':
if (!vc->vc_par[0])
-vc->vc_tab_stop[vc->vc_x >> 5] &= ~(1 << (vc->vc_x & 31));
+vc->vc_tab_stop[7 & (vc->vc_x >> 5)] &= ~(1 << (vc->vc_x & 31));
else if (vc->vc_par[0] == 3) {
vc->vc_tab_stop[0] =
vc->vc_tab_stop[1] =
@@ -2430,8 +2491,8 @@
}
con_flush(vc, draw_from, draw_to, &draw_x);
console_conditional_schedule();
-console_unlock();
notify_update(vc);
+console_unlock();
return n;
}

@@ -2683,9 +2744,7 @@
switch (type)
case TIOCL_SETSEL:
  -console_lock();
  ret = set_selection((struct tiocl_selection __user *)(p+1), tty);
  -console_unlock();
  break;

case TIOCL_PASTESEL:
  ret = paste_selection(tty);
  @ @ -2891,6 +2950,7 @ @

  tty->driver_data = vc;
  vc->port.tty = tty;
  +tty_port_get(&vc->port);

  if (!tty->winsize.ws_row && !tty->winsize.ws_col) {
    tty->winsize.ws_row = vc_cons[currcons].d->vc_rows;
    @ @ -2926,6 +2986,13 @ @
    console_unlock();
  }

  +static void con_cleanup(struct tty_struct *tty)
  +{
    +struct vc_data *vc = tty->driver_data;
    +
    +tty_port_put(&vc->port);
    +}
    +
    +
    static int default_color = 7; /* white */
    static int default_italic_color = 2; /* green (ASCII) */
    static int default_underline_color = 3; /* cyan (ASCII) */
    @ @ -2934,7 +3001,7 @ @
    module_param_named(underline, default_underline_color, int, S_IRUGO | S_IWUSR);

    static void vc_init(struct vc_data *vc, unsigned int rows,
      - unsigned int cols, int do_clear)
      + unsigned int cols, int do_clear, int mode)
      {
        int j, k ;

        @ @ -2945,7 +3012,7 @ @

        set_origin(vc);
        vc->vc_pos = vc->vc_origin;
        -reset_vc(vc);
        +reset_vc(vc, mode);
        for (j=k=0; j<16; j++) {
          vc->vc_palette[k++] = default_red[j] ;
          vc->vc_palette[k++] = default_grn[j] ;
          @ @ -3002,16 +3069,33 @ @

          case TIOCL_SETSEL:
          -console_lock();
          ret = set_selection((struct tiocl_selection __user *)(p+1), tty);
          -console_unlock();
          break;
          case TIOCL_PASTESEL:
          ret = paste_selection(tty);
          @ @ -2891,6 +2950,7 @ @

          tty->driver_data = vc;
          vc->port.tty = tty;
          +tty_port_get(&vc->port);

          if (!tty->winsize.ws_row && !tty->winsize.ws_col) {
            tty->winsize.ws_row = vc_cons[currcons].d->vc_rows;
            @ @ -2926,6 +2986,13 @ @
            console_unlock();
          }

          +static void con_cleanup(struct tty_struct *tty)
          +{
            +struct vc_data *vc = tty->driver_data;
            +
            +tty_port_put(&vc->port);
            +}
            +
            +
            static int default_color = 7; /* white */
            static int default_italic_color = 2; /* green (ASCII) */
            static int default_underline_color = 3; /* cyan (ASCII) */
            @ @ -2934,7 +3001,7 @ @
            module_param_named(underline, default_underline_color, int, S_IRUGO | S_IWUSR);

            static void vc_init(struct vc_data *vc, unsigned int rows,
              - unsigned int cols, int do_clear)
              + unsigned int cols, int do_clear, int mode)
              {
                int j, k ;

                @ @ -2945,7 +3012,7 @ @

                set_origin(vc);
                vc->vc_pos = vc->vc_origin;
                -reset_vc(vc);
                +reset_vc(vc, mode);
                for (j=k=0; j<16; j++) {
                  vc->vc_palette[k++] = default_red[j] ;
                  vc->vc_palette[k++] = default_grn[j] ;
                  @ @ -3002,16 +3069,33 @ @
mod_timer(&console_timer, jiffies + (blankinterval * HZ));
}

if (vt_handoff > 0 && vt_handoff <= MAX_NR_CONSOLES) {
  currcons = vt_handoff - 1;
  for (currcons = 0; currcons < MIN_NR_CONSOLES; currcons++) {
    vc_cons[currcons].d = vc = kzalloc(sizeof(struct vc_data), GFP_NOWAIT);
    INIT_WORK(&vc_cons[currcons].SAK_work, vc_SAK);
    tty_port_init(&vc->port);
    visual_init(vc, currcons, 1);
    vc->vc_screenbuf = kzalloc(vc->vc_screenbuf_size, GFP_NOWAIT);
    vc_init(vc, vc->vc_rows, vc->vc_cols, 0, KD_TRANSPARENT);
  }
  for (currcons = 0; currcons < MIN_NR_CONSOLES; currcons++) {
    if (currcons == vt_handoff - 1)
      continue;
    vc_cons[currcons].d = vc = kzalloc(sizeof(struct vc_data), GFP_NOWAIT);
    INIT_WORK(&vc_cons[currcons].SAK_work, vc_SAK);
    tty_port_init(&vc->port);
    visual_init(vc, currcons, 1);
    /* Assuming vc->vc_{cols,rows,screenbuf_size} are sane here. */
    vc->vc_screenbuf = kzalloc(vc->vc_screenbuf_size, GFP_NOWAIT);
    vc_init(vc, vc->vc_rows, vc->vc_cols,
      currcons || !vc->vc_sw->con_save_screen);
    vc->vc_screenbuf = kzalloc(vc->vc_screenbuf_size, GFP_NOWAIT);
    vc_init(vc, vc->vc_rows, vc->vc_cols,
      currcons || !vc->vc_sw->con_save_screen, KD_TEXT);
    currcons = fg_console = 0;
    if (vt_handoff > 0) {
      printk(KERN_INFO "vt handoff: transparent VT on vt#%d\n",
        vt_handoff);
      currcons = fg_console = vt_handoff - 1;
    }
    master_display_fg = vc = vc_cons[currcons].d;
    set_origin(vc);
    save_screen(vc);
    cdev = vc0_cdev;
    .throttle = con_throttle,
    .unthrottle = con_unthrottle,
    .resize = vt_resize,
    .shutdown = con_shutdown
    .cleanup = con_cleanup,
  }
}

static struct cdev vc0_cdev;
return;
-if (blank_state != blank_normal_wait)
-return;
blank_state = blank_off;

/* don't blank graphics */
@@ -4203,27 +4286,6 @@
return rc;
}

-static int con_font_copy(struct vc_data *vc, struct console_font_op *op)
-{
-int con = op->height;
-int rc;
-
-console_lock();
-if (vc->vc_mode != KD_TEXT)
-rc = -EINVAL;
-else if (!vc->vc_sw->con_font_copy)
-rc = -ENOSYS;
-else if (con < 0 || !vc_cons_allocated(con))
-rc = -ENOTTY;
-else if (con == vc->vc_num)/* nothing to do */
-rc = 0;
-else
-rc = vc->vc_sw->con_font_copy(vc, con);
-console_unlock();
-return rc;
-}

int con_font_op(struct vc_data *vc, struct console_font_op *op)
{
switch (op->op) {
@@ -4234,7 +4296,8 @@
case KD_FONT_OP_SET_DEFAULT:
return con_font_default(vc, op);
case KD_FONT_OP_COPY:
-\t\treturn con_font_copy(vc, op);
+\t\t/* was buggy and never really used */
+\t\treturn -EINVAL;
}
return -ENOSYS;
}
--- linux-4.15.0.orig/drivers/tty/vt/vt_ioctl.c
+++ linux-4.15.0/drivers/tty/vt/vt_ioctl.c
@@ -32,16 +32,39 @@
#include <asm/io.h>
#include <linux/uaccess.h>
+`#include <linux/nospec.h>
+
+#include <linux/kbd_kern.h>
+#include <linux/vt_kern.h>
+#include <linux/kbd_diacr.h>
+#include <linux/selection.h>
+
-`char vt_dont_switch;
-`extern struct tty_driver *console_driver;
+`bool vt_dont_switch;
+
+static inline bool vt_in_use(unsigned int i)
+{
+    const struct vc_data *vc = vc_cons[i].d;
+    
+    /*
+    * console_lock must be held to prevent the vc from being deallocated
+    * while we're checking whether it's in-use.
+    */
+    WARN_CONSOLE_UNLOCKED();
+    
+    return vc && kref_read(&vc->port.kref) > 1;
+}
+
+static inline bool vt_busy(int i)
+{
+    if (vt_in_use(i))
+        return true;
+    if (i == fg_console)
+        return true;
+    if (vc_is_sel(vc_cons[i].d))
+        return true;
+
+    return false;
+}
+
-`#define VT_IS_IN_USE(i) (console_driver->ttys[i] && console_driver->ttys[i]->count)
-`#define VT_BUSY(i) (VT_IS_IN_USE(i) || i == fg_console || vc_cons[i].d == sel_cons)
+
*/

* Console (vt and kd) routines, as defined by USL SVR4 manual, and by
@@ -221,7 +244,7 @@

static inline int
    `-do_fontx_ioctl(int cmd, struct consolefontdesc __user *user_cfd, int perm, struct console_font_op *op)
+`do_fontx_ioctl(struct vc_data *vc, int cmd, struct consolefontdesc __user *user_cfd, int perm, struct console_font_op *op)
{  
struct consolefontdesc cfdarg;
int i;
@@ -239,15 +262,16 @@
op->height = cfdarg.charheight;
op->charcount = cfdarg.charcount;
op->data = cfdarg.chardata;
return con_font_op(vc_cons[fg_console].d, op);
-case GIO_FONTX: {
+return con_font_op(vc, op);
+
+case GIO_FONTX:
op->op = KD_FONT_OP_GET;
op->flags = KD_FONT_FLAG_OLD;
op->width = 8;
op->height = cfdarg.charheight;
op->charcount = cfdarg.charcount;
op->data = cfdarg.chardata;
\t\ti = con_font_op(vc_cons[fg_console].d, op);
+i = con_font_op(vc, op);
if (i)
return i;
cfdarg.charheight = op->height;
@@ -255,7 +279,6 @@
if (copy_to_user(user_cfd, &cfdarg, sizeof(struct consolefontdesc)))
return -EFAULT;
return 0;
-
}
return -EINVAL;
}
@@ -287,16 +310,14 @@
int ret = 0;

console_lock();
@if (VT_BUSY(vc_num))
+if (vt_busy(vc_num))
\tret = -EBUSY;
else if (vc_num)
vc = vc_deallocate(vc_num);
console_unlock();

-if (vc && vc_num >= MIN_NR_CONSOLES) {
-tty_port_destroy(&vc->port);
-kfree(vc);
-
+if (vc && vc_num >= MIN_NR_CONSOLES)
tty_port_put(&vc->port);
return ret;
}
@@ -309,17 +330,15 @@
console_lock();
for (i = 1; i < MAX_NR_CONSOLES; i++)
- if (!VT_BUSY(i))
+ if (!vt_busy(i))
 vc[i] = vc_deallocate(i);
 else
 vc[i] = NULL;
console_unlock();

for (i = 1; i < MAX_NR_CONSOLES; i++) {
- if (vc[i] && i >= MIN_NR_CONSOLES) {
+ if (vc[i] && i >= MIN_NR_CONSOLES)
   tty_port_destroy(&vc[i]->port);
   kfree(vc[i]);
- }
+ tty_port_put(&vc[i]->port);
}
}

@@ -333,22 +352,13 @@
{
struct vc_data *vc = tty->driver_data;
struct console_font_op op;/* used in multiple places here */
- unsigned int console;
+ unsigned int console = vc->vc_num;
 unsigned char ucval;
 unsigned int uival;
 void __user *up = (void __user *)arg;
 int i, perm;
 int ret = 0;

- console = vc->vc_num;
- 
- -if (!vc_cons_allocated(console)) {
-/* impossible? */
- ret = -ENOIOCTLCMD;
- goto out;
- }
- 
- /*
- * To have permissions to do most of the vt ioctls, we either have
- * to be the owner of the tty, or have CAP_SYS_TTY_CONFIG.
- */

ret = -EINVAL;
goto out;
}

/* FIXME: this needs the console lock extending */
-if (vc->vc_mode == (unsigned char) arg)
+console_lock();
+if (vc->vc_mode == (unsigned char) arg) {
+console_unlock();
break;
+}
vc->vc_mode = (unsigned char) arg;
-if (console != fg_console)
+if (console != fg_console) {
+console_unlock();
break;
+}

/*
* explicitly blank/unblank the screen if switching modes
*/

-else {
+console_lock(); /* required by vt_in_use() */
for (i = 0, mask = 2; i < MAX_NR_CONSOLES && mask;
++i, mask <<= 1)
	-if (VT_IS_IN_USE(i))
+if (vt_in_use(i))
state |= mask;
+console_unlock();
ret = put_user(state, &vtstat->v_state);
}
break;

/* Review: FIXME: Console lock ? */
if (put_user(fg_console + 1, &vtstat->v_active))
ret = -EFAULT;
else {
state = 1; /* /dev/tty0 is always open */
+console_lock(); /* required by vt_in_use() */
for (i = 0, mask = 2; i < MAX_NR_CONSOLES && mask;
++i, mask <<= 1)
	-if (VT_IS_IN_USE(i))
+if (vt_in_use(i))
state |= mask;
+console_unlock();
ret = put_user(state, &vtstat->v_state);
}
break;

/* Returns the first available (non-opened) console. */

/* FIXME: locking ? - but then this is a stupid API */

+console_lock(); /* required by vt_in_use() */
for (i = 0; i < MAX_NR_CONSOLES; ++i)
-if (! VT_IS_IN_USE(i))
+if (!vt_in_use(i))
  break;
+console_unlock();
uival = i < MAX_NR_CONSOLES ? (i+1) : -1;
goto setint;

@@ -700,6 +715,8 @@
if (vsa.console == 0 || vsa.console > MAX_NR_CONSOLES)
  ret = -ENXIO;
else {
  vsa.console = array_index_nospec(vsa.console,
+MAX_NR_CONSOLES + 1);
  vsa.console--;
  console_lock();
  ret = vc_allocate(vsa.console);
@@ -872,15 +889,30 @@
return -EINVAL;

for (i = 0; i < MAX_NR_CONSOLES; i++) {
+struct vc_data *vcp;  
+
  if (!vc_cons[i].d)
    continue;
  console_lock();
  -if (v.v_vlin)
  -vc_cons[i].d->vc_scan_lines = v.v_vlin;
  -if (v.v_clin)
  -vc_cons[i].d->vc_font.height = v.v_clin;
  -vc_cons[i].d->vc_resize_user = 1;
  -vc_resize(vc_cons[i].d, v.v_cols, v.v_rows);
+  vcp = vc_cons[i].d;
+  if (vcp) {
+    int ret;
+    int save_scan_lines = vcp->vc_scan_lines;
+    int save_cell_height = vcp->vc_cell_height;
+    +if (v.v_vlin)
+      vcp->vc_scan_lines = v.v_vlin;
+    +if (v.v_clin)
+      vcp->vc_cell_height = v.v_clin;
+    +vcp->vc_resize_user = 1;
+    +ret = vc_resize(vcp, v.v_cols, v.v_rows);
+    +if (ret) {
+      vcp->vc_scan_lines = save_scan_lines;
+      vcp->vc_cell_height = save_cell_height;
+console_unlock();
+return ret;
+
} +
} +
console_unlock();
}
break;
@@ -895,7 +927,7 @@
   op.height = 0;
   op.charcount = 256;
   op.data = up;
-  ret = con_font_op(vc_cons[fg_console].d, &op);
+  ret = con_font_op(vc, &op);
   break;
}

@@ -906,7 +938,7 @@
   op.height = 32;
   op.charcount = 256;
   op.data = up;
-  ret = con_font_op(vc_cons[fg_console].d, &op);
+  ret = con_font_op(vc, &op);
   break;
}

@@ -923,7 +955,7 @@
case PIO_FONTX:
    case GIO_FONTX:
-    ret = do_fontx_ioctl(cmd, up, perm, &op);
+    ret = do_fontx_ioctl(vc, cmd, up, perm, &op);
    break;

    case PIO_FONTRESET:
    @@ -940,11 +972,11 @@
      {
      op.op = KD_FONT_OP_SET_DEFAULT;
      op.data = NULL;
-     ret = con_font_op(vc_cons[fg_console].d, &op);
+     ret = con_font_op(vc, &op);
      if (ret)
         break;
      console_lock();
-     con_set_default_unimap(vc_cons[fg_console].d);
+     con_set_default_unimap(vc);
      console_unlock();
      break;
    }
case VT_LOCKSWITCH:
    if (!capable(CAP_SYS_TTY_CONFIG))
        return -EPERM;
    vt_dont_switch = 1;
    break;
    case VT_UNLOCKSWITCH:
    if (!capable(CAP_SYS_TTY_CONFIG))
        return -EPERM;
    vt_dont_switch = 0;
    break;
    case VT_GETHIFONTMASK:
    ret = put_user(vc->vc_hi_font_mask,
    return ret;
}

void reset_vc(struct vc_data *vc)
    vt_reset_unicode(vc->vc_num);
    vc->vt_mode.mode = VT_AUTO;
    vc->vt_mode.waitv = 0;

/*
    if (tty)
__do_SAK(tty);
    reset_vc(vc);
    console_unlock();
    }

static inline int
    compat_fontx_ioctl(int cmd, struct compat_consolefontdesc __user *user_cfd,
    - int perm, struct console_font_op *op)
    compat_fontx_ioctl(struct vc_data *vc, int cmd,
    + struct compat_consolefontdesc __user *user_cfd,
    + int perm, struct console_font_op *op)
    {
    struct compat_consolefontdesc cfdarg;
    int i:
@@ -1090,7 +1123,8 @@
     op->height = cfdarg.charheight;
     op->charcount = cfdarg.charcount;
     op->data = compat_ptr(cfdarg.chardata);
-    	    return con_font_op(vc_cons[fg_console].d, op);
+    	    return con_font_op(vc, op);
+    
    case GIO_FONTX:
    op->op = KD_FONT_OP_GET;
    op->flags = KD_FONT_FLAG_OLD;
@@ -1098,7 +1132,7 @@
     op->height = cfdarg.charheight;
     op->charcount = cfdarg.charcount;
     op->data = compat_ptr(cfdarg.chardata);
-    i = con_font_op(vc_cons[fg_console].d, op);
+    i = con_font_op(vc, op);
    if (i)
     return i;
    cfdarg.charheight = op->height;
@@ -1171,18 +1205,10 @@
 {
    struct vc_data *vc = tty->driver_data;
    struct console_font_op op;/* used in multiple places here */
-    unsigned int console;
-    void __user *up = (void __user *)arg;
-    int perm;
-    int ret = 0;

-    console = vc->vc_num;
-    
-    if (!vc_cons_allocated(console)) { /* impossible? */
-        ret = -ENOIOCTL;
-        goto out;
-    }
-    
-    /*
-     * To have permissions to do most of the vt ioctls, we either have
-     * to be the owner of the tty, or have CAP_SYS_TTY_CONFIG.
-    @@ -1197,7 +1223,7 @@ */
    case PIO_FONTX:
    case GIO_FONTX:
-    ret = compat_fontx_ioctl(cmd, up, perm, &op);
+    ret = compat_fontx_ioctl(vc, cmd, up, perm, &op);
    break;

    case KDFONTOP:
@@ -1242,7 +1268,7 @@
arg = (unsigned long)compat_ptr(arg);
goto fallback;
}
-out:
+ return ret;

fallback:
@@ -1310,7 +1336,7 @@
  * this outside of VT_PROCESS but there is no single process
  * to account for and tracking tty count may be undesirable.
  */
  -reset_vc(vc);
+reset_vc(vc, KD_TEXT);

if (old_vc_mode != vc->vc_mode) {
  if (vc->vc_mode == KD_TEXT)
@@ -1382,7 +1408,7 @@
  * this outside of VT_PROCESS but there is no single process
  * to account for and tracking tty count may be undesirable.
  */
  -reset_vc(vc);
+reset_vc(vc, KD_TEXT);

/ *
  * Fall through to normal (VT_AUTO) handling of the switch...
--- linux-4.15.0.orig/drivers/uio/uio.c
+++ linux-4.15.0/drivers/uio/uio.c
@@ -215,7 +215,20 @@
       struct device_attribute *attr, char *buf)
 {
       struct uio_device *idev = dev_get_drvdata(dev);
-      return sprintf(buf, "%s\n", idev->info->name);
+      int ret;
+      mutex_lock(&idev->info_lock);
+      if (!idev->info) {
+        ret = -EINVAL;
+        dev_err(dev, "the device has been unregistered\n");
+        goto out;
+      }
+      ret = sprintf(buf, "%s\n", idev->info->name);
+      out:
+      mutex_unlock(&idev->info_lock);
+      return ret;
  }
static DEVICE_ATTR_RO(name);

static DEVICE_ATTR_RO(version);

bool uio_class_registered;

/*
 * device functions
 */

if (!map_found) {
    map_found = 1;
    idev->map_dir = kobject_create_and_add("maps", 
        &idev->dev->kobj);
    if (!idev->map_dir) {
        ret = -ENOMEM;
        goto err_map;
    }
}

if (!portio_found) {
    portio_found = 1;
    idev->portio_dir = kobject_create_and_add("portio", 
        &idev->dev->kobj);
    if (!idev->portio_dir) {
        ret = -ENOMEM;
        goto err_portio;
    }
}
if (!idev->portio_dir) {
    ret = -ENOMEM;
    goto err_portio;
}@@ -342,7 +370,7 @@
kobject_put(&map->kobj);
    }
kobject_put(idev->map_dir);
-dev_err(idev->dev, "error creating sysfs files (%d)\n", ret);
+dev_err(&idev->dev, "error creating sysfs files (%d)\n", ret);
    return ret;
}
}@@ -379,17 +407,17 @@
idev->minor = retval;
retval = 0;
} else if (retval == -ENOSPC) {
-dev_err(idev->dev, "too many uio devices\n");
+dev_err(&idev->dev, "too many uio devices\n");
    retval = -EINVAL;
}
mutex_unlock(&minor_lock);
return retval;
}

-static void uio_free_minor(struct uio_device *idev)
+static void uio_free_minor(unsigned long minor)
{
    mutex_lock(&minor_lock);
-dev_idr_remove(&uio_idr, idev->minor);
+idr_remove(&uio_idr, minor);
    mutex_unlock(&minor_lock);
}
}@@ -415,8 +443,9 @@
static irqreturn_t uio_interrupt(int irq, void *dev_id)
{
    struct uio_device *idev = (struct uio_device *)dev_id;
-dev_irqreturn_t ret = idev->info->handler(irq, idev->info);
+irqreturn_t ret;
    +ret = idev->info->handler(irq, idev->info);
    if (ret == IRQ_HANDLED)
        uio_event_notify(idev->info);
}@@ -442,9 +471,11 @@
goto out;
}
+get_device(&idev->dev);
+
+if (!try_module_get(idev->owner)) {
  ret = -ENODEV;
  -goto out;
  +goto err_module_get;
  }

listener = kmalloc(sizeof(*listener), GFP_KERNEL);
@@ -457,11 +488,19 @@
listener->event_count = atomic_read(&idev->event);
filep->private_data = listener;

-if (idev->info->open) {
  -ret = idev->info->open(idev->info, inode);
  -if (ret)
  -  goto err_infoopen;
  +mutex_lock(&idev->info_lock);
  +if (!idev->info) {
  +  mutex_unlock(&idev->info_lock);
  +  ret = -EINVAL;
  +  goto err_alloc_listener;
  +}
  +if (idev->info && idev->info->open)
  +  ret = idev->info->open(idev->info, inode);
  +mutex_unlock(&idev->info_lock);
  +if (ret)
  +  goto err_infoopen;
  +
  return 0;

err_infoopen:
@@ -470,6 +509,9 @@
err_alloc_listener:
module_put(idev->owner);

+err_module_get:
+put_device(&idev->dev):
+
+out:
return ret;
}
@@ -488,11 +530,14 @@
struct uio_listener *listener = filep->private_data;
struct uio_device *idev = listener->dev;

-if (idev->info->release)
mutex_lock(&idev->info_lock);
if (idev->info && idev->info->release)
ret = idev->info->release(idev->info, inode);
mutex_unlock(&idev->info_lock);
module_put(idev->owner);
kfree(listener);
put_device(&idev->dev);
return ret;
}

// @@ -500,9 +545,15 @@
{
  struct uio_listener *listener = filep->private_data;
  struct uio_device *idev = listener->dev;
  unsigned int ret = 0;
  +
  +mutex_lock(&idev->info_lock);
  +if (!idev->info || !idev->info->irq)
  +ret = -EIO;
  +mutex_unlock(&idev->info_lock);
  ...
- if (!idev->info->irq)
- return -EIO;
+ if (ret)
+ return ret;
+ return ret;

poll_wait(filep, &idev->wait, wait);
if (listener->event_count != atomic_read(&idev->event))
//@ @ -516,11 +567,16 @@
  struct uio_listener *listener = filep->private_data;
  struct uio_device *idev = listener->dev;
  DECLARE_WAITQUEUE(wait, current);
  ssize_t retval;
  ssize_tretval = 0;
s32 event_count;
  ...
- if (!idev->info->irq)
- return -EIO;
+ mutex_lock(&idev->info_lock);
+ if (!idev->info || !idev->info->irq)
+ retval = -EIO;
+ mutex_unlock(&idev->info_lock);
  +
  + if (retval)
  + return retval;
  ...
if (count != sizeof(s32))
return -EINVAL;
@@ -568,20 +624,32 @@
    ssize_t retval;
    s32 irq_on;

    -if (!idev->info->irq)
    -return -EIO;
    -
    if (count != sizeof(s32))
    return -EINVAL;

    -if (!idev->info->irqcontrol)
    -return -ENOSYS;
    -
    if (copy_from_user(&irq_on, buf, count))
    return -EFAULT;

    +mutex_lock(&idev->info_lock);
    +if (!idev->info) {
    +    retval = -EINVAL;
    +    goto out;
    +}
    +
    +if (!idev->info || !idev->info->irq) {
    +    retval = -EIO;
    +    goto out;
    +}
    +
    +if (!idev->info->irqcontrol) {
    +    retval = -ENOSYS;
    +    goto out;
    +}
    +
    retval = idev->info->irqcontrol(idev->info, irq_on);

    +out:
    +mutex_unlock(&idev->info_lock);
    return retval ? retval : sizeof(s32);
}

@@ -603,10 +671,20 @@
 struct page *page;
 unsigned long offset;
 void *addr;
+
 int ret = 0;
 int mi;
+
 -int mi = uio_find_mem_index(vmf->vma);
-if (mi < 0)
-return VM_FAULT_SIGBUS;
+mutex_lock(&idev->info_lock);
+if (!idev->info) {
+ret = VM_FAULT_SIGBUS;
+goto out;
+} 
+
+mi = uio_find_mem_index(vmf->vma);
+if (mi < 0) {
+ret = VM_FAULT_SIGBUS;
+goto out;
+} 

/*
 * We need to subtract mi because userspace uses offset = N*PAGE_SIZE
@@ -621,7 +699,11 @@
page = vmalloc_to_page(addr);
get_page(page);
vmf->page = page;
-return 0;
+
+out:
+mutex_unlock(&idev->info_lock);
+ 
+return ret;
}

static const struct vm_operations_struct uio_logical_vm_ops = {
@@ -646,6 +728,7 @@
struct uio_device *idev = vma->vm_private_data;
int mi = uio_find_mem_index(vma);
struct uio_mem *mem;
+if (mi < 0)
 return -EINVAL;
 mem = idev->info->mem + mi;
@@ -687,30 +770,46 @@

vmf->vm_private_data = idev;

+mutex_lock(&idev->info_lock);
+if (!idev->info) {
+ret = -EINVAL;
+goto out;
+} 
+
+mi = uio_find_mem_index(vma);
if (mi < 0) {
    return -EINVAL;
}
if (mi < 0) {
    ret = -EINVAL;
    goto out;
}
requested_pages = vma_pages(vma);
actual_pages = ((idev->info->mem[mi].addr & ~PAGE_MASK) + idev->info->mem[mi].size + PAGE_SIZE -1) >> PAGE_SHIFT;
if (requested_pages > actual_pages) {
    ret = -EINVAL;
    goto out;
}
if (idev->info->mmap) {
    ret = idev->info->mmap(idev->info, vma);
    -return ret;
    +goto out;
}
switch (idev->info->mem[mi].memtype) {
    case UIO_MEM_PHYS:
        -return uio_mmap_physical(vma);
        +ret = uio_mmap_physical(vma);
        +break;
    case UIO_MEM_LOGICAL:
    case UIO_MEM_VIRTUAL:
        -return uio_mmap_logical(vma);
        +ret = uio_mmap_logical(vma);
        +break;
    default:
        -return -EINVAL;
        +ret = -EINVAL;
    }
+out:
    mutex_unlock(&idev->info_lock);
    +return ret;
}

static const struct file_operations uio_fops = {
    ...
+uio_class_registered = true;
+
return 0;

err_class_register:
@@ -790,10 +892,18 @@

static void release_uio_class(void)
{
+uio_class_registered = false;
class_unregister(&uio_class);
uio_major_cleanup();
}

+static void uio_device_release(struct device *dev)
+{
+struct uio_device *idev = dev_get_drvdata(dev);
+
+kfree(idev);
+
+/**
 * uio_register_device - register a new userspace IO device
 * @owner:	module that creates the new device
@@ -809,33 +919,45 @@

struct uio_device *idev;
int ret = 0;

+if (!uio_class_registered)
+return -EPROBE_DEFER;
+
+if (!parent || !info || !info->name || !info->version)
return -EINVAL;

info->uio_dev = NULL;

-idev = devm_kzalloc(parent, sizeof(*idev), GFP_KERNEL);
+idev = kzalloc(sizeof(*idev), GFP_KERNEL);
if (!idev) {
return -ENOMEM;
}

idev->owner = owner;
idev->info = info;
+mutex_init(&idev->info_lock);
init_waitqueue_head(&idev->wait);
atomic_set(&idev->event, 0);
ret = uio_get_minor(idev);
- if (ret)
+ if (ret) {
+ kfree(idev);
 return ret;
+ }
+
+ device_initialize(&idev->dev);
+ idev->dev.devt = MKDEV(uio_major, idev->minor);
+ idev->dev.class = &uio_class;
+ idev->dev.parent = parent;
+ idev->dev.release = uio_device_release;
+ dev_set_drvdata(&idev->dev, idev);
-
- idev->dev = device_create(&uio_class, parent,
- MKDEV(uio_major, idev->minor), idev,
- "uio%d", idev->minor);
- if (IS_ERR(idev->dev)) {
- printk(KERN_ERR "UIO: device register failed\n");
- ret = PTR_ERR(idev->dev);
+ ret = dev_set_name(&idev->dev, "uio%d", idev->minor);
+ if (ret)
+ goto err_device_create;
+
+ ret = device_add(&idev->dev);
+ if (ret)
+ goto err_device_create;
+}

ret = uio_dev_add_attributes(idev);
if (ret)
@@ -854,8 +976,10 @@
 return 0;
@@ -863,9 +987,10 @@
* 
ret = request_irq(info->irq, uio_interrupt,
 info->irq_flags, info->name, idev);
- if (ret)
+ if (ret) {
+ info->uio_dev = NULL;
 goto err_request_irq;
+ }
+
}

return 0;
@@ -863,9 +987,10 @@
err_request_irq:
 uio_dev_del_attributes(idev);
err_uio_dev_add_attributes:

device_destroy(&uio_class, MKDEV(uio_major, idev->minor));
+device_del(&idev->dev);
err_device_create:
-uio_free_minor(idev);
+uio_free_minor(idev->minor);
+put_device(&idev->dev);
return ret;
}
EXPORT_SYMBOL_GPL(__uio_register_device);
@@ -878,20 +1003,26 @@
void uio_unregister_device(struct uio_info *info)
{
 struct uio_device *idev;
+unsigned long minor;

 if (!info || !info->uio_dev)
 return;

 idev = info->uio_dev;
+minor = idev->minor;

-uio_free_minor(idev);
-
+mutex_lock(&idev->info_lock);
uio_dev_del_attributes(idev);
-if (info->irq && info->irq != UIO_IRQ_CUSTOM)
 free_irq(info->irq, idev);

-device_destroy(&uio_class, MKDEV(uio_major, idev->minor));
+idev->info = NULL;
+mutex_unlock(&idev->info_lock);
+
+device_unregister(&idev->dev);
+
+uio_free_minor(minor);

 return;
}
--- linux-4.15.0.orig/drivers/uio/uio_dmem_genirq.c
+++ linux-4.15.0/drivers/uio/uio_dmem_genirq.c
@@ -135,11 +135,13 @@
if (irq_on) {
 if (test_and_clear_bit(0, &priv->flags))
 enable_irq(dev_info->irq);
-
+spin_unlock_irqrestore(&priv->lock, flags);
 } else {
-if (!test_and_set_bit(0, &priv->flags))


+if (!test_and_set_bit(0, &priv->flags)) {
+spin_unlock_irqrestore(&priv->lock, flags);
+disable_irq(dev_info->irq);
+}
}-spin_unlock_irqrestore(&priv->lock, flags);

return 0;
}
--- linux-4.15.0.orig/drivers/uio/uio_hv_generic.c
+++ linux-4.15.0/drivers/uio/uio_hv_generic.c
@@ -124,6 +124,13 @@
if (ret)
goto fail;

+/* Communicating with host has to be via shared memory not hypercall */
+if (!dev->channel->offermsg.monitor_allocated) {
+dev_err(&dev->device, "vmbus channel requires hypercall\n");
+ret = -ENOTSUPP;
+goto fail_close;
+}
+
+dev->channel->inbound.ring_buffer->interrupt_mask = 1;
+set_channel_read_mode(dev->channel, HV_CALL_DIRECT);

--- linux-4.15.0.orig/drivers/uio/uio_pdrv_genirq.c
+++ linux-4.15.0/drivers/uio/uio_pdrv_genirq.c
@@ -148,7 +148,7 @@
if (!uioinfo->irq) {
    ret = platform_get_irq(pdev, 0);
    uioinfo->irq = ret;
-if (ret == -ENXIO && pdev->dev.of_node)
+if (ret == -ENXIO)
    uioinfo->irq = UIO_IRQ_NONE;
else if (ret < 0) {
    dev_err(&pdev->dev, "failed to get IRQ\n");
--- linux-4.15.0.orig/drivers/usb/Kconfig
+++ linux-4.15.0/drivers/usb/Kconfig
@@ -19,6 +19,14 @@
config USB_EHCI_BIG_ENDIAN_DESC
  bool
+config USB_UHCI_BIG_ENDIAN_MMIO
+bool
+default y if SPARC_LEON
+
+config USB_UHCI_BIG_ENDIAN_DESC
+bool
default y if SPARC_LEON
+
menuconfig USB_SUPPORT
bool "USB support"
depends on HAS_IOMEM
@@ -167,8 +175,7 @@
config USB_LED_TRIG
bool "USB LED Triggers"
-depends on LEDS_CLASS && LEDS_TRIGGERS
-select USB_COMMON
+depends on LEDS_CLASS && USB_COMMON && LEDS_TRIGGERS
help
  This option adds LED triggers for USB host and/or gadget activity.

--- linux-4.15.0.orig/drivers/usb/atm/ueagle-atm.c
+++ linux-4.15.0/drivers/usb/atm/ueagle-atm.c
@@ -2168,10 +2168,11 @@
/*
 * Start the modem : init the data and start kernel thread
 */
-static int uea_boot(struct uea_softc *sc)
+static int uea_boot(struct uea_softc *sc, struct usb_interface *intf)
{
-int ret, size;
-struct intr_pkt *intr;
+int ret = -ENOMEM;
+int size;

 uea_enters(INS_TO_USBDEV(sc));

@@ -2196,6 +2197,11 @@
 if (UEA_CHIP_VERSION(sc) == ADI930)
 load_XILINX_firmware(sc);

+if (intf->cur_altsetting->desc.bNumEndpoints < 1) {
+ ret = -ENODEV;
+ goto err0;
+ }
+ intr = kmalloc(size, GFP_KERNEL);
+ if (!intr)
+ goto err0;
@@ -2207,8 +2213,7 @@
 usb_fill_int_urb(sc->urb_int, sc->usb_dev,
 usb_rcvintpipe(sc->usb_dev, UEA_INTR_PIPE),
 intr, size, uea_intr, sc,
- sc->usb_dev->actconfig->interface[0]->altsetting[0].
ret = usb_submit_urb(sc->urb_int, GFP_KERNEL);
if (ret < 0) {
    if (ret < 0) {
        if (-2223,6 +2228,7 @@
            c67x00_release_urb(c67x00, urb);
        usb_hcd_unlink_urb_from_ep(c67x00_hcd_to_hcd(c67x00), urb);
        spin_unlock(&c67x00->lock);
        -usb_hcd_giveback_urb(c67x00_hcd_to_hcd(c67x00), urb, urbp->status);
        +usb_hcd_giveback_urb(c67x00_hcd_to_hcd(c67x00), urb, status);
        spin_lock(&c67x00->lock);
    }

    -- linux-4.15.0.orig/drivers/usb/c67x00/c67x00-sched.c
    +++ linux-4.15.0/drivers/usb/c67x00/c67x00-sched.c
    @@ -486,7 +486,7 @@
    -usb_hcd_giveback_urb(c67x00_hcd_to_hcd(c67x00), urb, urbp->status);
    +usb_hcd_giveback_urb(c67x00_hcd_to_hcd(c67x00), urb, status);
    spin_lock(&c67x00->lock);
}

--- linux-4.15.0.orig/drivers/usb/chipidea/ci_hdrc_imx.c
+++ linux-4.15.0/drivers/usb/chipidea/ci_hdrc_imx.c
@@ -58,7 +58,8 @@
    static const struct ci_hdrc_imx_platform_flag imx6ul_usb_data = {
        .flags = CL_HDRC_SUPPORTEDS_RUNTIME_PM |
static const struct ci_hdrc_platform_flag imx7d_usb_data = {
    +CI_HDRC_TURN_VBUS_EARLY_ON |
    +CI_HDRC_DISABLE_DEVICE_STREAMING,
};

if (!misc_pdev) {
    put_device(&misc_pdev->dev);
    return ERR_PTR(-EPROBE_DEFER);
}

data->dev = &misc_pdev->dev;

struct tegra_udc *udc = platform_get_drvdata(pdev);
usb_phy_set_suspend(udc->phy, 1);
clk_disable_unprepare(udc->clk);

--- linux-4.15.0.orig/drivers/usb/chipidea/core.c
+++ linux-4.15.0/drivers/usb/chipidea/core.c
@@ -935,8 +935,15 @@
   else if (ci->platdata->usb_phy) {
       ci->usb_phy = ci->platdata->usb_phy;
   } else {
+		ci->usb_phy = devm_usb_get_phy_by_phandle(dev->parent, "phys",
+							0);
       ci->phy = devm_phy_get(dev->parent, "usb-phy");
       -ci->usb_phy = devm_usb_get_phy(dev->parent, USB_PHY_TYPE_USB2);
+/* Fallback to grabbing any registered USB2 PHY */
+if (IS_ERR(ci->usb_phy) &&
+    PTR_ERR(ci->usb_phy) != -EPROBE_DEFER)
+    ci->usb_phy = devm_usb_get_phy(dev->parent,
+    +USB_PHY_TYPE_USB2);
/* if both generic PHY and USB PHY layers aren't enabled */
if (PTR_ERR(ci->phy) == -ENOSYS &&
    PTR_ERR(ci->vbus) == -ENOSYS &&
    PTR_ERR(ci->wakeup) == -ENOSYS)
    enable_irq(ci->irq);
}

+/*
+ * Handle the wakeup interrupt triggered by extcon connector
+ * We need to call ci_irq again for extcon since the first
+ * interrupt (wakeup int) only let the controller be out of
+ * low power mode, but not handle any interrupts.
+ */
+static void ci_extcon_wakeup_int(struct ci_hdrc *ci)
+{
+    struct ci_hdrc_cable *cable_id, *cable_vbus;
+    u32 otgsc = hw_read_otgsc(ci, ~0);
+    +
+    +    +
+    +    +
+    +    +
+    +
+    +
+    +
+    +
+    +
+static int ci_controller_resume(struct device *dev)
+{
+    struct ci_hdrc *ci = dev_get_drvdata(dev);
+    enable_irq(ci->irq);
+    if (ci_otg_is_fsm_mode(ci))
+        ci_otg_fsm_wakeup_by_srp(ci);
+    if (ci->is_otg)
+        ci_irq(ci->irq, ci);
+}
+return 0;

--- linux-4.15.0.orig/drivers/usb/chipidea/host.c
+++ linux-4.15.0/drivers/usb/chipidea/host.c
@@ -25,6 +25,7 @@
    struct ehci_ci_priv {
    struct regulator *reg_vbus;
    +bool enabled;
    

static int ehci_ci_portpower(struct usb_hcd *hcd, int portnum, bool enable)
@@ -36,7 +37,7 @@
int ret = 0;
int port = HCS_N_PORTS(ehci->hcs_params);

-if (priv->reg_vbus) {
+if (priv->reg_vbus && enable != priv->enabled) {
  if (port > 1) {
    dev_warn(dev,
    "Not support multi-port regulator control\n");
@@ -52,6 +53,7 @@
enable ? "enable" : "disable", ret);
  return ret;
 }
+priv->enabled = enable;
 }

if (enable && (ci->platdata->phy_mode == USBPHY_INTERFACE_MODE_HSIC)) {
  --- linux-4.15.0.orig/drivers/usb/chipidea/otg.c
+++ linux-4.15.0/drivers/usb/chipidea/otg.c
@@ -203,14 +203,17 @@
  pm_runtime_get_sync(ci->dev);
  +
  if (ci->id_event) {
-    ci->id_event = false;
-    ci_handle_id_switch(ci);
-  } else if (ci->b_sess_valid_event) {
-    +
+    +
+    +if (ci->b_sess_valid_event) {
+      ci->b_sess_valid_event = false;
+      ci_handle_vbus_change(ci);
+    } else
+    -dev_err(ci->dev, "unexpected event occurs at %s\n", __func__);  
+    +
+    pm_runtime_put_sync(ci->dev);
    enable_irq(ci->irq);
  --- linux-4.15.0.orig/drivers/usb/chipidea/otg.h
+++ linux-4.15.0/drivers/usb/chipidea/otg.h
@@ -17,7 +17,8 @@
  static inline void ci_otg_queue_work(struct ci_hdrc *ci)
  {
    disable_irq_nosync(ci->irq);
-queue_work(ci->wq, &ci->work);
+if (queue_work(ci->wq, &ci->work) == false)
+enable_irq(ci->irq);
}

#endif /* __DRIVERS_USB_CHIPIDEA_OTG_H */
--- linux-4.15.0.orig/drivers/usb/chipidea/udc.c
+++ linux-4.15.0/drivers/usb/chipidea/udc.c
@@ -708,12 +708,6 @@
struct_ci_hdrc  *ci = container_of(gadget, struct_ci_hdrc, gadget);
unsigned long flags;

-spin_lock_irqsave(&ci->lock, flags);
-ci->gadget.speed = USB_SPEED_UNKNOWN;
-ci->remote_wakeup = 0;
-ci->suspended = 0;
-spin_unlock_irqrestore(&ci->lock, flags);
-
/* flush all endpoints */
gadget_for_each_ep(ep, gadget) { 
  usb_ep_fifo_flush(ep);
@@ -731,6 +725,12 @@
ci->status = NULL;
}
+spin_lock_irqsave(&ci->lock, flags);
+ci->gadget.speed = USB_SPEED_UNKNOWN;
+ci->remote_wakeup = 0;
+ci->suspended = 0;
+spin_unlock_irqrestore(&ci->lock, flags);
+
return 0;
}

@@ -1302,6 +1302,10 @@
return -EBUSY;

spin_lock_irqsave(hwep->lock, flags);
+if (hwep->ci->gadget.speed == USB_SPEED_UNKNOWN) {
+spin_unlock_irqrestore(hwep->lock, flags);
+return 0;
+}

/* only internal SW should disable ctrl endpts */

@@ -1391,6 +1395,10 @@
return -EINVAL;
spin_lock_irqsave(hwep->lock, flags);
+if (hwep->ci->gadget.speed == USB_SPEED_UNKNOWN) {
+spin_unlock_irqrestore(hwep->lock, flags);
+return 0;
+}
retval = _ep_queue(ep, req, gfp_flags);
spin_unlock_irqrestore(hwep->lock, flags);
return retval;
@@ -1414,8 +1422,8 @@
return -EINVAL;

spin_lock_irqsave(hwep->lock, flags);
-
-hw_ep_flush(hwep->ci, hwep->num, hwep->dir);
+if (hwep->ci->gadget.speed != USB_SPEED_UNKNOWN)
+hw_ep_flush(hwep->ci, hwep->num, hwep->dir);

list_for_each_entry_safe(node, tmpnode, &hwreq->tds, td) {
  dma_pool_free(hwep->td_pool, node->ptr, node->dma);
@@ -1486,6 +1494,10 @@
}

spin_lock_irqsave(hwep->lock, flags);
+if (hwep->ci->gadget.speed == USB_SPEED_UNKNOWN) {
+spin_unlock_irqrestore(hwep->lock, flags);
+return;
+}

hw_ep_flush(hwep->ci, hwep->num, hwep->dir);

@@ -1558,6 +1570,10 @@
int ret = 0;

spin_lock_irqsave(&ci->lock, flags);
+if (ci->gadget.speed == USB_SPEED_UNKNOWN) {
+spin_unlock_irqrestore(&ci->lock, flags);
+return 0;
+}
if (!ci->remote_wakeup) {
  ret = -EOPNOTSUPP;
  goto out;
@@ -1621,6 +1637,25 @@
static int ci_udc_start(struct usb_gadget *gadget,
  struct usb_gadget_driver *driver);
static int ci_udc_stop(struct usb_gadget *gadget);
+
+/* Match ISOC IN from the highest endpoint */
+static struct usb_ep *ci_udc_match_ep(struct usb_gadget *gadget,
+ struct usb_endpoint_descriptor *desc,
+ struct usb_ss_ep_comp_descriptor *comp_desc)
+ {
+ struct ci_hdrc *ci = container_of(gadget, struct ci_hdrc, gadget);
+ struct usb_ep *ep;
+
+ if (usb_endpoint_xfer_isoc(desc) && usb_endpoint_dir_in(desc)) {
+ list_for_each_entry_reverse(ep, &ci->gadget.ep_list, ep_list) {
+ if (ep->caps.dir_in && !ep->claimed)
+ return ep;
+ }
+ return NULL;
+ }
+
+ /* Device operations part of the API to the USB controller hardware,
* which don't involve endpoints (or i/o)
@@ -1634,6 +1669,7 @@
 .vbus_draw= ci_udc_vbus_draw,
 .udc_start= ci_udc_start,
 .udc_stop= ci_udc_stop,
+.match_ep = ci_udc_match_ep,
  
};

static int init_eps(struct ci_hdrc *ci)
--- linux-4.15.0.orig/drivers/usb/chipidea/usbmisc_imx.c
+++ linux-4.15.0/drivers/usb/chipidea/usbmisc_imx.c
@@ -337,6 +337,8 @@
 } else if (data->oc_polarity == 1) {
 /* High active */
 reg &= ~(MX6_BM_OVER_CUR_DIS | MX6_BM_OVER_CUR_POLARITY);
+} else {
+reg &= ~(MX6_BM_OVER_CUR_DIS);
 }]
 writel(reg, usbmisc->base + data->index * 4);

--- linux-4.15.0.orig/drivers/usb/class/cdc-acm.c
+++ linux-4.15.0/drivers/usb/class/cdc-acm.c
@@ -147,17 +147,29 @@
 #define acm_send_break(acm, ms) \
 acm_ctrl_msg(acm, USB_CDC_REQ_SEND_BREAK, ms, NULL, 0)

-static void acm_kill_urbs(struct acm *acm)
+static void acm_poison_urbs(struct acm *acm)
 {  
 int i;
usb_kill_urb(acm->ctrlurb);
+usb_poison_urb(acm->ctrlurb);
for (i = 0; i < ACM_NW; i++)
-usb_kill_urb(acm->wb[i].urb);
+usb_poison_urb(acm->wb[i].urb);
for (i = 0; i < acm->rx_buflimit; i++)
-usb_kill_urb(acm->read_urbs[i]);
+usb_poison_urb(acm->read_urbs[i]);
+
+static void acm_unpoison_urbs(struct acm *acm)
+{
+int i;
+
+for (i = 0; i < acm->rx_buflimit; i++)
+usb_unpoison_urb(acm->read_urbs[i]);
+for (i = 0; i < ACM_NW; i++)
+usb_unpoison_urb(acm->wb[i].urb);
+usb_unpoison_urb(acm->ctrlurb);
+
+}
/*
 * Write buffer management.
 * All of these assume proper locks taken by the caller.
@@ -174,6 +186,7 @@
 wb = &acm->wb[wbn];
 if (!wb->use) {
 wb->use = 1;
+wb->len = 0;
 return wbn;
 }
 wbn = (wbn + 1) % ACM_NW;
@@ -224,9 +237,10 @@
 rc = usb_submit_urb(wb->urb, GFP_ATOMIC);
 if (rc < 0) {
 -dev_err(&acm->data->dev,
-"%s - usb_submit_urb(write bulk) failed: %d\n",
-__func__, rc);
+if (rc != -EPERM)
+dev_err(&acm->data->dev,
+"%s - usb_submit_urb(write bulk) failed: %d\n",
+__func__, rc);
 acm_write_done(acm, wb);
 }
 return rc;
if (difference & ACM_CTRL_DSR)
  acm->iocount.dsr++;
-if (difference & ACM_CTRL_BRK)
  acm->iocount.brk++;
-if (difference & ACM_CTRL_RI)
  acm->iocount.rng++;
if (difference & ACM_CTRL_DCD)
  acm->iocount.dcd++;
-if (difference & ACM_CTRL_FRAMING)
+if (newctrl & ACM_CTRL_BRK) {
+  acm->iocount.brk++;
  tty_insert_flip_char(&acm->port, 0, TTY_BREAK);
+}
+if (newctrl & ACM_CTRL_RI)
  acm->iocount.rng++;
+if (newctrl & ACM_CTRL_FRAMING)
  acm->iocount.frame++;
-if (difference & ACM_CTRL_PARITY)
+if (newctrl & ACM_CTRL_PARITY)
  acm->iocount.parity++;
-if (difference & ACM_CTRL_OVERRUN)
+if (newctrl & ACM_CTRL_OVERRUN)
  acm->iocount.overrun++;
spin_unlock(&acm->read_lock);
+
+if (newctrl & ACM_CTRL_BRK)
  tty_flip_buffer_push(&acm->port);
+
if (difference)
  wake_up_all(&acm->wioctl);

@@ -353,7 +394,7 @@
case -ENOENT:
case -ESHUTDOWN:
/* this urb is terminated, clean up */
-  acm->nb_index = 0;
-dev_dbg(&acm->control->dev,
"%s - urb shutting down with status: %d\n",
  __func__, status);
@@ -377,21 +419,6 @@
  if (current_size < expected_size) {
  /* notification is transmitted fragmented, reassemble */
  if (acm->nb_size < expected_size) {
  -if (acm->nb_size) {
  -kfree(acm->notification_buffer);
  -acm->nb_size = 0;


new_buffer = kmalloc(alloc_size, GFP_ATOMIC);
if (!new_buffer) {
    acm->nb_index = 0;
    goto exit;
}
acm->notification_buffer = new_buffer;
acm->nb_size = alloc_size;

dr = (struct usb_cdc_notification *)acm->notification_buffer;
}

copy_size = min(current_size, 
@@ -411,9 +427,12 @@
exit:
retval = usb_submit_urb(urb, GFP_ATOMIC);
-if (retval && retval != -EPERM)
+if (retval && retval != -EPERM && retval != -ENODEV)
    dev_err(&acm->control->dev,
            "%s - usb_submit_urb failed: %d\n", __func__, retval);
+else
    +dev_vdbg(&acm->control->dev,
              "control resubmission terminated %d\n", retval);
}

static int acm_submit_read_urb(struct acm *acm, int index, gfp_t mem_flags)
@@ -425,10 +444,12 @@
res = usb_submit_urb(acm->read_urbs[index], mem_flags);
if (res) {
    -if (res != -EPERM) {
+if (res != -EPERM && res != -ENODEV) {
        dev_err(&acm->data->dev,
                "urb %d failed submission with %d\n", 
                index, res);
static void acm_process_read_urb(struct acm *acm, struct urb *urb)
{
    unsigned long flags;
    if (!urb->actual_length)
        return;
    spin_lock_irqsave(&acm->read_lock, flags);
tty_insert_flip_string(&acm->port, urb->transfer_buffer, urb->actual_length);
    spin_unlock_irqrestore(&acm->read_lock, flags);
    tty_flip_buffer_push(&acm->port);
}

switch (status) {
    case 0:
        break;
    case -EPIPE:
        set_bit(EVENT_RX_STALL, &acm->flags);
        schedule_work(&acm->work);
        break;
    default:
        return;
    }

switch (status) {
    case 0:
        usb_mark_last_busy(acm->dev);
        break;
    case -EPIPE:
        set_bit(EVENT_RX_STALL, &acm->flags);
        schedule_work(&acm->work);
        break;
    default:
        return;
    }

    -set_bit(rb->index, &acm->read_urbs_free);
    -if (!acm->dev) {
        dev_dbg(&acm->data->dev, "%s - disconnected\n", __func__);
        return;
    }

    dev_vdbg(&acm->data->dev, "got urb %d, len %d, status %d\n", rb->index, urb->actual_length, status);
    -set_bit(rb->index, &acm->read_urbs_free);
    -if (!acm->dev) {
        dev_dbg(&acm->data->dev, "%s - disconnected\n", __func__);
        return;
    }

    switch (status) {
        case 0:
            usb_mark_last_busy(acm->dev);
            break;
        case -EPIPE:
            set_bit(EVENT_RX_STALL, &acm->flags);
            schedule_work(&acm->work);
            break;
        default:
            return;
        }

    if (urb->actual_length)
        tty_insert_flip_string(&acm->port, urb->transfer_buffer, urb->actual_length);
    tty_flip_buffer_push(&acm->port);
}
-return;
+stalled = true;
+break;
 case -ENOENT:
 case -ECONNRESET:
 case -ESHUTDOWN:
 dev_dbg(&acm->data->dev,
 "%s - urb shutting down with status: %d\n",
 __func__, status);
 -return;
+stopped = true;
+break;
+case -EOVERFLOW: 
+case -EPROTO:
+dev_dbg(&acm->data->dev,
+"%s - cooling babbling device\n", __func__);
+usb_mark_last_busy(acm->dev);
+set_bit(rb->index, &acm->urbs_in_error_delay);
+set_bit(ACM_ERROR_DELAY, &acm->flags);
+cooldown = true;
+break;
+default:
+dev_dbg(&acm->data->dev,
+"%s - nonzero urb status received: %d\n",
+__func__,__func__, status);
+default: 
}{
/*
 - * Unthrottle may run on another CPU which needs to see events
 - * in the same order. Submission has an implicit barrier
 + * Make sure URB processing is done before marking as free to avoid
 + * racing with unthrottle() on another CPU. Matches the barriers
 + * implied by the test_and_clear_bit() in acm_submit_read_urb().
 */
 smp_mb__before_atomic();
+set_bit(rb->index, &acm->read_urbs_free);
+/*
 + * Make sure URB is marked as free before checking the throttled flag
 + * to avoid racing with unthrottle() on another CPU. Matches the
 + * smp_mb() in unthrottle().
 + */
+smp_mb__after_atomic();
+
+if (stopped || stalled || cooldown) {
+if (stalled)
+schedule_delayed_work(&acm->dwork, 0);
+else if (cooldown)
+schedule_delayed_work(&acm->dwork, HZ / 2);
/* throttle device if requested by tty */
spin_lock_irqsave(&acm->read_lock, flags);
@@ -538,29 +586,33 @@
acm_write_done(acm, wb);
spin_unlock_irqrestore(&acm->write_lock, flags);
set_bit(EVENT_TTY_WAKEUP, &acm->flags);
-schedule_work(&acm->work);
+schedule_delayed_work(&acm->dwork, 0);
}

static void acm_softint(struct work_struct *work)
{
    int i;
    struct acm *acm = container_of(work, struct acm, work);
+    struct acm *acm = container_of(work, struct acm, dwork.work);

    if (test_bit(EVENT_RX_STALL, &acm->flags)) {
-        if (!(usb_autopm_get_interface(acm->data))) {
+        if (!acm->susp_count) {
            for (i = 0; i < acm->rx_buflimit; i++)
                usb_kill_urb(acm->read_urbs[i]);
            usb_clear_halt(acm->dev, acm->in);
            acm_submit_read_urbs(acm, GFP_KERNEL);
-            usb_autopm_put_interface(acm->data);
+            clear_bit(EVENT_RX_STALL, &acm->flags);
        }
-        clear_bit(EVENT_RX_STALL, &acm->flags);
-    }
-    if (test_bit(EVENT_TTY_WAKEUP, &acm->flags)) {
-        tty_port_tty_wakeup(&acm->port);
-        clear_bit(EVENT_TTY_WAKEUP, &acm->flags);
-    }
-    if (test_and_clear_bit(ACM_ERROR_DELAY, &acm->flags)) {
-        for (i = 0; i < acm->rx_buflimit; i++)
-            if (test_and_clear_bit(i, &acm->urbs_in_error_delay))
-                acm_submit_read_urb(acm, i, GFP_KERNEL);
-    }
+    if (test_and_clear_bit(EVENT_TTY_WAKEUP, &acm->flags)) {
+        tty_port_tty_wakeup(&acm->port);
+    }
+    if (test_and_clear_bit(EVENT_TTY_WAKEUP, &acm->flags)) {
+        tty_port_tty_wakeup(&acm->port);
+    }

    /*
if (retval)
goto error_init_termios;

+/
+ * Suppress initial echoing for some devices which might send data
+ * immediately after acm driver has been installed.
+ */
+if (acm->quirks & DISABLE_ECHO)
tty->termios.c_lflag &= ~ECHO;
+
tty->driver_data = acm;

return 0;
@@ -612,7 +671,8 @@
res = acm_set_control(acm, val);
if (res &\& (acm->ctrl_caps & \USB_CDC_CAP_LINE))
-dev_err(&acm->control->dev, "failed to set dtr/rts\n");
+/* This is broken in too many devices to spam the logs */
+dev_dbg(&acm->control->dev, "failed to set dtr/rts\n");
} } 

static int acm_port_activate(struct tty_port *port, struct tty_struct *tty)
@@ -697,6 +757,7 @@
* Need to grab write_lock to prevent race with resume, but no need to
* hold it due to the tty-port initialised flag.
*/
+acm_poison_urbs(acm);
spin_lock_irq(&acm->write_lock);
spin_unlock_irq(&acm->write_lock);

@@ -713,7 +774,8 @@
usb_autopm_put_interface_async(acm->control);
} }

-acm_kill_urbs(acm);
+acm_unpoison_urbs(acm);
+
}

static void acm_tty_cleanup(struct tty_struct *tty)
@@ -778,20 +840,9 @@

if (acm->Susp_count) {
-   if (acm->putbuffer) {
-      /* now to preserve order */
-      -usb_anchor_urb(acm->putbuffer->urb, &acm->delayed);

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- acm->putbuffer = NULL;
-
usb_anchor_urb(wb->urb, &acm->delayed);
spin_unlock_irqrestore(&acm->write_lock, flags);
return count;
-
} else {
- if (acm->putbuffer) {
-/* at this point there is no good way to handle errors */
-acm_start_wb(acm, acm->putbuffer);
-acm->putbuffer = NULL;
-}
}

stat = acm_start_wb(acm, wb);
@@ -802,64 +853,6 @@
return count;
}

-static void acm_tty_flush_chars(struct tty_struct *tty)
-{ ...
-struct acm *acm = tty->driver_data;
-struct acm_wb *cur = acm->putbuffer;
-int err;
-unsigned long flags;
-
-if (!cur) /* nothing to do */
-return;
-
-acm->putbuffer = NULL;
-err = usb_autopm_get_interface_async(acm->control);
-spin_lock_irqsave(&acm->write_lock, flags);
-if (err < 0) {
-cur->use = 0;
-acm->putbuffer = cur;
-goto out;
-}
-
-if (acm->susp_count)
-usb_anchor_urb(cur->urb, &acm->delayed);
-else
-acm_start_wb(acm, cur);
-out:
-spin_unlock_irqrestore(&acm->write_lock, flags);
-return;
-}
-
-static int acm_tty_put_char(struct tty_struct *tty, unsigned char ch)
-struct acm *acm = tty->driver_data;
-struct acm_wb *cur;
-int wbn;
-unsigned long flags;
-
-overflow:
-curr = acm->putbuffer;
-if (!cur) {
-.spin_lock_irqsave(&acm->write_lock, flags);
-wbn = acm_wb_alloc(acm);
-if (wbn >= 0) {
-curr = &acm->wb[wbn];
-acm->putbuffer = curr;
-}
-spin_unlock_irqrestore(&acm->write_lock, flags);
-if (!curr)
-return 0;
-}
-
-if (cur->len == acm->writesize) {
-acm tty flush_chars(tty);
-goto overflow;
-}
-
-curr->buf[cur->len++] = ch;
-return 1;
-}
-
static int acm tty write room(struct tty_struct *tty)
{
 struct acm *acm = tty->driver_data;
@@ -905,6 +898,9 @@
 acm->throttle_req = 0;
 spin_unlock_irq(&acm->read_lock);

         /* Matches the smp_mb__after_atomic() in acm_read_bulk_callback(). */
+        smp_mb();
+        if (was_throttled)
        acm submit_read_urbs(acm, GFP_KERNEL);
     }
@@ -959,10 +955,10 @@
 memset(&tmp, 0, sizeof(tmp));
tmp.xmit_fifo_size = acm->writesize;
tmp.baud_base = le32_to_cpu(acm->line.dwDTERate);
-tmp.close_delay = acm->port.close_delay / 10;
+tmp.close_delay = jiffies_to_msecs(acm->port.close_delay) / 10;
tmp.closing_wait = acm->port.closing_wait == Async_CLOSING_WAIT_NONE ?
ASYNC_CLOSING_WAIT_NONE : 
-acm->port.closing_wait / 10;
+jiffies_to_msecs(acm->port.closing_wait) / 10;

if (copy_to_user(info, &tmp, sizeof(tmp)))
    return -EFAULT;
@@ -975,23 +971,29 @@
{
    struct serial_struct new_serial;
    unsigned int closing_wait, close_delay;
+    unsigned int old_closing_wait, old_close_delay;
    int retval = 0;

    if (copy_from_user(&new_serial, newinfo, sizeof(new_serial)))
        return -EFAULT;

-    close_delay = new_serial.close_delay * 10;
+    close_delay = msecs_to_jiffies(new_serial.close_delay * 10);
    closing_wait = new_serial.closing_wait == ASYNC_CLOSING_WAIT_NONE ?
-ASYNC_CLOSING_WAIT_NONE : new_serial.closing_wait * 10;
+ASYNC_CLOSING_WAIT_NONE :
+    msecs_to_jiffies(new_serial.closing_wait * 10);
+    /* we must redo the rounding here, so that the values match */
    old_close_delay = jiffies_to_msecs(acm->port.close_delay) / 10;
    old_closing_wait = acm->port.closing_wait == ASYNC_CLOSING_WAIT_NONE ?
+ASYNC_CLOSING_WAIT_NONE :
+    jiffies_to_msecs(acm->port.closing_wait) / 10;

    mutex_lock(&acm->port.mutex);

    if (!capable(CAP_SYS_ADMIN)) {
-        if ((close_delay != acm->port.close_delay) ||
-            (closing_wait != acm->port.closing_wait))
-            retval = -EPERM;
-    } else {
-        acm->port.close_delay = close_delay;
-        acm->port.closing_wait = closing_wait;
+    int class = -1;
+    }
+}
+

data_intf_num = union_header->bSlaveInterface0;
control_interface = usb_ifnum_to_if(usb_dev, union_header->bMasterInterface0);
data_interface = usb_ifnum_to_if(usb_dev, data_intf_num);
+
+if (control_interface)
+class = control_interface->cur_altsetting->desc.bInterfaceClass;
+
+if (class != USB_CLASS_COMM && class != USB_CLASS_CDC_DATA) {
+dev_dbg(&intf->dev, "Broken union descriptor, assuming single interface\n");
+combined_interfaces = 1;
+control_interface = data_interface = intf;
+goto look_for_collapsed_interface;
+}
}

if (!control_interface || !data_interface) {
@@ -1375,10 +1389,6 @@
if (acm == NULL)
goto alloc_fail;

-minor = acm_alloc_minor(acm);
-if (minor < 0)
-goto alloc_fail1;
-
-ctrlsize = usb_endpoint_maxp(epctrl);
-readsize = usb_endpoint_maxp(epread) *
-(quirks == SINGLE_RX_URB ? 1 : 2);
-@@ -1386,6 +1396,13 @@
acm->writesize = usb_endpoint_maxp(epwrite) * 20;
acm->control = control_interface;
acm->data = data_interface;
+
+usb_get_intf(acm->control); /* undone in destruct() */
+
+minor = acm_alloc_minor(acm);
+if (minor < 0)
+goto alloc_fail1;
+
+acm->minor = minor;
+acm->dev = usb_dev;
-if (h.usb_cdc_acm_descriptor)
-@@ -1395,7 +1412,7 @@
acm->ctrlsize = ctrlsize;
acm->readsize = readsize;
acm->rx_buflimit = num_rx_buf;
-INIT_WORK(&acm->work, acm_softint);
+INIT_DELAYED_WORK(&acm->dwork, acm_softint);
init_waitqueue_head(&acm->woctrl);
spin_lock_init(&acm->write_lock);
spin_lock_init(&acm->read_lock);
@@ -1534,7 +1551,6 @@
usb_driver_claim_interface(&acm_driver, data_interface, acm);
usb_set_intfdata(data_interface, acm);

-usb_get_intf(control_interface);
tty_dev = tty_port_register_device(&acm->port, acm_tty_driver, minor,
&control_interface->dev);
if (IS_ERR(tty_dev)) {
@@ -1549,6 +1565,11 @@
return 0;
alloc_fail8:
+if (!acm->combined_interfaces) {
+/* Clear driver data so that disconnect() returns early. */
+usb_set_intfdata(data_interface, NULL);
+usb_driver_release_interface(&acm_driver, data_interface);
+}
if (acm->country_codes) {
device_remove_file(&acm->control->dev,
&dev_attr_wCountryCodes);
@@ -1582,13 +1603,20 @@
{ 
struct acm *acm = usb_get_intfdata(intf);
struct tty_struct *tty;
+int i;

/* sibling interface is already cleaning up */
if (!acm)
return;

-mutex_lock(&acm->mutex);
acm->disconnected = true;
+/*
+ * there is a circular dependency. acm_softint() can resubmit
+ * the URBs in error handling so we need to block any
+ * submission right away
+ */
+acm_poison_urbs(acm);
+mutex_lock(&acm->mutex);
if (acm->country_codes) {
device_remove_file(&acm->control->dev,
&dev_attr_wCountryCodes);
@@ -1607,11 +1635,15 @@
tty_kref_put(tty);
}
-acm_killUrbs(acm);
cancel_work_sync(&acm->work);
+cancel_delayed_work_sync(&acm->dwork);

tty_unregister_device(acm_tty_driver, acm->minor);

+usb_free_urb(acm->ctrlurb);
+for (i = 0; i < ACM_NW; i++)
+usb_free_urb(acm->wb[i].urb);
+for (i = 0; i < acm->rx_buflimit; i++)
+usb_free_urb(acm->read_urbs[i]);
acm_write_buffers_free(acm);
usb_free_coherent(acm->dev, acm->ctrlsize, acm->ctrl_buffer, acm->ctrl_dma);
acm_read_buffers_free(acm);
@@ -1644,8 +1676,9 @@
if (cnt)
return 0;

-acm_killUrbs(acm);
cancel_work_sync(&acm->work);
+acm_poisonUrbs(acm);
+cancel_delayed_work_sync(&acm->dwork);
+acm->urbs_in_error_delay = 0;

return 0;
}
@@ -1661,6 +1694,8 @@
if (--acm->susp_count)
goto out;

+acm_unpoisonUrbs(acm);
+
if (tty_port_initialized(&acm->port)) {
rv = usb_submit_urb(acm->ctrlurb, GFP_ATOMIC);
@@ -1704,6 +1739,7 @@
struct acm *acm = usb_get_intfdata(intf);

clear_bit(EVENT_RX_STALL, &acm->flags);
+acm->nb_index = 0; /* pending control transfers are lost */

return 0;
}
@@ -1724,6 +1760,8 @@

static const struct usb_device_id acm_ids[] = {
/* quirky and broken devices */
+{ USB_DEVICE(0x0424, 0x274e), /* Microchip Technology, Inc. (formerly SMSC) */
+ .driver_info = DISABLE_ECHO, /* DISABLE ECHO in termios flag */
{ USB_DEVICE(0x076d, 0x0006), /* Denso Cradle CU-321 */
  .driver_info = NO_UNION_NORMAL, } /* has no union descriptor */
{ USB_DEVICE(0x17ef, 0x7000), /* Lenovo USB modem */
  @ @ -1731.9 +1769.21 @@
{ USB_DEVICE(0x0870, 0x0001), /* Metricom GS Modem */
  .driver_info = NO_UNION_NORMAL, /* has no union descriptor */
  },
+{ USB_DEVICE(0x045b, 0x023c), /* Renesas USB Download mode */
  .driver_info = DISABLE_ECHO, /* Don't echo banner */
  +},
+{ USBDEVICE(0x045b, 0x0248), /* Renesas USB Download mode */
  .driver_info = DISABLE_ECHO, /* Don't echo banner */
  +},
+{ USB_DEVICE(0x045b, 0x024D), /* Renesas USB Download mode */
  .driver_info = DISABLE_ECHO, /* Don't echo banner */
  +},
{ USB_DEVICE(0x0e8d, 0x0003), /* FIREFLY, MediaTek Inc; andrey.arapov@gmail.com */
  .driver_info = NO_UNION_NORMAL, /* has no union descriptor */
  },
+{ USB_DEVICE(0x0e8d, 0x2000), /* MediaTek Inc Preloader */
  .driver_info = DISABLE_ECHO, /* DISABLE ECHO in termios flag */
  +},
{ USB_DEVICE(0x0ace, 0x1611), /* ZyDAS 56K USB MODEM - new version */
  .driver_info = SINGLE_RX_URB, /* firmware bug */
  },
+{ USB_DEVICE(0x11ca, 0x0201), /* VeriFone Mx870 Gadget Serial */
  .driver_info = SINGLE_RX_URB,
  +},
+{ USBDEVICE(0x1965, 0x0018), /* Uniden UBC125XLT */
  .driver_info = NO_UNION_NORMAL, /* has no union descriptor */
  +},
{ USB_DEVICE(0x22b8, 0x7000), /* Motorola Q Phone */
  .driver_info = NO_UNION_NORMAL, /* has no union descriptor */
  },
@@ -1752,6 +1802,12 @@
{ USB DEVICE(0x0572, 0x1328), /* Shiro / Aztech USB MODEM UM-3100 */
  .driver_info = QUIRK_CONTROL_LINE_STATE, },

/*GW Instek AFG-2225 */
@ @ -1822.6 +1881.9 @@
/*Elatec GmbH TWN3 */
.driver_info = NO_UNION_NORMAL /* has misplaced union descriptor */
},
+{ USB_DEVICE(0x0ca6, 0xa050), /* Castles VEGA3000 */
+    driver_info = NO_UNION_NORMAL /* reports zero length descriptor */
+
{ USB_DEVICE(0x2912, 0x0001), /* ATOL FPrint */
   driver_info = CLEAR_HALT_CONDITIONS,
   @ @ -1908.6 +1970.10 @@
{ USB_DEVICE(0x04d8, 0x0083), /* Bootloader mode */
   driver_info = IGNORE_DEVICE,
   },
+{ USB_DEVICE(0x04d8, 0xf58b),
   driver_info = IGNORE_DEVICE,
   +}
#endif
/*Samsung phone in firmware update mode */
@ @ -1920.6 +1986.48 @@
   driver_info = IGNORE_DEVICE,
   },
+/* Exclude Exar USB serial ports */
+{ USB_DEVICE(0x04e2, 0x1400), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1401), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1402), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1403), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1410), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1411), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1412), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1414), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1420), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1421), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1422), driver_info = IGNORE_DEVICE, },
+{ USB_DEVICE(0x04e2, 0x1424), driver_info = IGNORE_DEVICE, },
+/* Exclude ETAS ES58x */
+{ USB_DEVICE(0x108c, 0x0159), /* ES581.4 */
   driver_info = IGNORE_DEVICE,
   +},
+{ USB_DEVICE(0x108c, 0x0168), /* ES582.1 */
   driver_info = IGNORE_DEVICE,
   +},
+{ USB_DEVICE(0x108c, 0x0169), /* ES584.1 */
   }
+ .driver_info = IGNORE_DEVICE,
+ },
+
+ { USB_DEVICE(0x1bc7, 0x0021), /* Telit 3G ACM only composition */
+ .driver_info = SEND_ZERO_PACKET,
+ },
+
+ { USB_DEVICE(0x1bc7, 0x0023), /* Telit 3G ACM + ECM composition */
+ .driver_info = SEND_ZERO_PACKET,
+ },
+
+ /* Exclude Goodix Fingerprint Reader */
+ { USB_DEVICE(0x27c6, 0x5395),
+ .driver_info = IGNORE_DEVICE,
+ },
+
+ /* Exclude Heimann Sensor GmbH USB appset demo */
+ { USB_DEVICE(0x32a7, 0x0000),
+ .driver_info = IGNORE_DEVICE,
+ },
+
+ /* control interfaces without any protocol set */
+ { USB_INTERFACE_INFO(USB_CLASS_COMM, USB_CDC_SUBCLASS_ACM,
+ USB_CDC_PROTO_NONE) },

--- linux-4.15.0.orig/drivers/usb/class/cdc-acm.h
+++ linux-4.15.0/drivers/usb/class/cdc-acm.h
@@ -96,7 +96,6 @@
 unsigned long read_urbs_free;
 struct urb *read_urb[ACM_NR];
 struct acm_rb read_buffers[ACM_NR];
-struct acm_wb *putbuffer; /* for acm_tty_put_char() */
 int rx_buflimit;
 spinlock_t read_lock;
 u8 *notification_buffer /* to reassemble fragmented notifications */
@@ -109,8 +108,10 @@
 unsigned long flags;
 #define EVENT_TTY_WAKEUP0
 #define EVENT_RXSTALL1
+#define ACM_ERROR_DELAY3
+unsigned long urbs_in_error_delay; /* these need to be restarted after a delay */
struct usb_cdc_line_coding line; /* bits, stop, parity */
-struct work_struct work; /* work queue entry for line discipline waking up */
+struct delayed_work dwork; /* work queue entry for various purposes */
unsigned int ctrlin; /* input control lines (DCD, DSR, RI, break, overruns) */
unsigned int ctrlout; /* output control lines (DTR, RTS) */
struct async_iocount iocount; /* counters for control line changes */
@@ -141,3 +142,4 @@
#define QUIRK_CONTROL_LINE_STATEBIT(6)
#define CLEAR_HALT_CONDITIONSBIT(7)
#define SEND_ZERO_PACKETBIT(8)
+#define DISABLE_ECHO BIT(9)
--- linux-4.15.0.orig/drivers/usb/class/cdc-wdm.c
+++ linux-4.15.0/drivers/usb/class/cdc-wdm.c
@@ -58,6 +58,9 @@
#define WDM_MAX 16
+/* we cannot wait forever at flush() */
+#define WDM_FLUSH_TIMEOUT(30 * HZ)
+/* CDC-WMC r1.1 requires wMaxCommand to be "at least 256 decimal (0x100)" */
#define WDM_DEFAULT_BUFSIZE 256
@@ -148,7 +151,7 @@
kfree(desc->outbuf);
desc->outbuf = NULL;
clear_bit(WDM_IN_USE, &desc->flags);
-wake_up(&desc->wait);
+wake_up_all(&desc->wait);
}

/* forward declaration */
@@ -316,12 +319,23 @@
}

static void kill_urbs(struct wdm_device *desc)
+static void poison_urbs(struct wdm_device *desc)
{
/* the order here is essential */
-usb_kill_urb(desc->command);
-usb_kill_urb(desc->validity);
-usb_kill_urb(desc->response);
+usb_poison_urb(desc->command);
+usb_poison_urb(desc->validity);
+usb_poison_urb(desc->response);
+}
+}
+static void unpoison_urbs(struct wdm_device *desc)
+{
+ /*
+ *  the order here is not essential
+ *  it is symmetrical just to be nice
+ */
+usb_unpoison_urb(desc->response);
+usb_unpoison_urb(desc->validity);
+usb_unpoison_urb(desc->command);
+}

static void free_urbs(struct wdm_device *desc)
@@ -391,6 +405,9 @@
if (test_bit(WDM_RESETTING, &desc->flags))
r = -EIO;

+if (test_bit(WDM_DISCONNECTING, &desc->flags))
+r = -ENODEV;
+
if (r < 0) {
rv = r;
goto out_free_mem_pm;
@@ -422,6 +439,7 @@
if (rv < 0) {
desc->outbuf = NULL;
clear_bit(WDM_IN_USE, &desc->flags);
+wake_up_all(&desc->wait); /* for wdm_wait_for_response() */
dev_err(&desc->intf->dev, "Tx URB error: %d\n", rv);
rv = usb_translate_errors(rv);
goto out_free_mem_pm;
@@ -456,13 +474,23 @@
if (!desc->resp_count || !--desc->resp_count)
goto out;

+if (test_bit(WDM_DISCONNECTING, &desc->flags)) {
+rv = -ENODEV;
+goto out;
+}
+if (test_bit(WDM_RESETTING, &desc->flags)) {
+rv = -EIO;
+goto out;
+}
+
set_bit(WDM_RESPONDING, &desc->flags);
spin_unlock_irq(&desc->iuspin);
rv = usb_submit_urb(desc->response, GFP_KERNEL);
spin_lock_irq(&desc->iuspin);
if (rv) {

if (!test_bit(WDM_DISCONNECTING, &desc->flags))
+dev_err(&desc->intf->dev,
+"usb_submit_urb failed with result %d\n", rv);

/* make sure the next notification trigger a submit */
clear_bit(WDM_RESPONDING, &desc->flags);

return rv;
}

- static int wdm_flush(struct file *file, fl_owner_t id)
+ static int wdm_wait_for_response(struct file *file, long timeout)
{
struct wdm_device *desc = file->private_data;
+ long rv; /* Use long here because (int) MAX_SCHEDULE_TIMEOUT < 0. */
+
+/*
+ * Needs both flags. We cannot do with one because resetting it would
+ * cause a race with write() yet we need to signal a disconnect.
+ */
+rv = wait_event_interruptible_timeout(desc->wait,
+ !test_bit(WDM_IN_USE, &desc->flags) ||
+ test_bit(WDM_DISCONNECTING, &desc->flags),
+ timeout);

- wait_event(desc->wait, !test_bit(WDM_IN_USE, &desc->flags));
+ /*
+ * To report the correct error. This is best effort.
+ * We are inevitably racing with the hardware.
+ */
+if (test_bit(WDM_DISCONNECTING, &desc->flags))
+ return -ENODEV;
+if (!rv)
+ return -EIO;
+if (rv < 0)
+ return -EINTR;
+
+ spin_lock_irq(&desc->iuspin);
+rv = desc->werr;
+desc->werr = 0;
+ spin_unlock_irq(&desc->iuspin);

- /* cannot dereference desc->intf if WDM_DISCONNECTING */
- if (desc->werr < 0 && !test_bit(WDM_DISCONNECTING, &desc->flags))
- dev_err(&desc->intf->dev, "Error in flush path: %d\n",
- desc->werr);
return usb_translate_errors(rv);

-usb_translate_errors(desc->werr);
+
+/*
+ * You need to send a signal when you react to malicious or defective hardware.
+ * Also, don't abort when fsync() returned -EINVAL, for older kernels which do
+ * not implement wdm_flush() will return -EINVAL.
+ */
+static int wdm_fsync(struct file *file, loff_t start, loff_t end, int datasync)
+{
+return wdm_wait_for_response(file, MAX_SCHEDULE_TIMEOUT);
+}
+
+/*
+ * Same with wdm_fsync(), except it uses finite timeout in order to react to
+ * malicious or defective hardware which ceased communication after close() was
+ * implicitly called due to process termination.
+ */
+static int wdm_flush(struct file *file, fl_owner_t id)
+{
+return wdm_wait_for_response(file, WDM_FLUSH_TIMEOUT);
+
static unsigned int wdm_poll(struct file *file, struct poll_table_struct *wait)
@@ -682,11 +750,12 @@
if (!desc->count) {
    if (!test_bit(WDM_DISCONNECTING, &desc->flags)) {
        dev_dbg(&desc->intf->dev, "wdm_release: cleanup\n");
-kills urbs(desc);
+unpoisson urbs(desc);
    spin_lock_irq(&desc->iuspin);
    desc->resp_count = 0;
    spin_unlock_irq(&desc->iuspin);
    desc->manage_power(desc->intf, 0);
    unpoison urbs(desc);
} else {
 /* must avoid dev_printk here as desc->intf is invalid */
 pr_debug(KERNoNAME " Ready to work", __func__);
 @@ -717,6 +786,7 @@
 .owner =THIS_MODULE,
 .read =wdm_read,
 .write =wdm_write,
+ .fsync =wdm_fsync,
 .open =wdm_open,
 .flush =wdm_flush,
 .release =wdm_release,
spin_lock_irqsave(&desc->iuspin, flags);
set_bit(WDM_DISCONNECTING, &desc->flags);
set_bit(WDM_READ, &desc->flags);
/* to terminate pending flushes */
-clear_bit(WDM_IN_USE, &desc->flags);
spin_unlock_irqrestore(&desc->iuspin, flags);
wake_up_all(&desc->wait);
mutex_lock(&desc->rlock);
mutex_lock(&desc->wlock);
-kill_urbs(desc);
+poison_urbs(desc);
cancel_work_sync(&desc->rxwork);
mutex_unlock(&desc->wlock);
mutex_unlock(&desc->rlock);
@@ -1004,8 +1072,9 @@
set_bit(WDM_SUSPENDING, &desc->flags);
spin_unlock_irq(&desc->iuspin);
/* callback submits work - order is essential */
-kill_urbs(desc);
+poison_urbs(desc);
+unpoison_urbs(desc);
+unpoison_urbs(desc);
if (!PMSG_IS_AUTO(message)) {
mutex_unlock(&desc->wlock);
@@ -1063,7 +1132,7 @@
wake_up_all(&desc->wait);
mutex_lock(&desc->rlock);
mutex_lock(&desc->wlock);
-kill_urbs(desc);
+poison_urbs(desc);
cancel_work_sync(&desc->rxwork);
+unpoison_urbs(desc);
}
if (PMSG_IS_AUTO(message)) {
mutex_unlock(&desc->wlock);
@@ -1073,12 +1142,13 @@
wake_up_all(&desc->wait);
mutex_lock(&desc->rlock);
mutex_lock(&desc->wlock);
-kill_urbs(desc);
+poison_urbs(desc);
cancel_work_sync(&desc->rxwork);
return 0;
}
@@ -1073,12 +1142,13 @@
struct wdm_device *desc = wdm_find_device(intf);
int rv;
+unpoison_urbs(desc);
clear_bit(WDM_OVERFLOW, &desc->flags);
clear_bit(WDM_RESETTING, &desc->flags);
rv = recover_from_urb_loss(desc);
mutex_unlock(&desc->wlock);
mutex_unlock(&desc->rlock);
-return 0;
+return rv;
}
static struct usb_driver wdm_driver = {
--- linux-4.15.0.orig/drivers/usb/class/usblp.c
+++ linux-4.15.0/drivers/usb/class/usblp.c
@@ -274,8 +274,25 @@
#define usblp_reset(usblp)
    usblp_ctrl_msg(usblp, USBLP_REQ_RESET, USB_TYPE_CLASS, USB_DIR_OUT, USB_RECIP_OTHER, 0, NULL, 0)

-#define usblp_hp_channel_change_request(usblp, channel, buffer) \
-usblp_ctrl_msg(usblp, USBLP_REQ_HP_CHANNEL_CHANGE_REQUEST, USB_TYPE_VENDOR, 
+static int usblp_hp_channel_change_request(struct usblp *usblp, int channel, u8 *new_channel)
+{
+    u8 *buf;
+    int ret;
+    buf = kzalloc(1, GFP_KERNEL);
+    if (!buf)
+        return -ENOMEM;
+    ret = usblp_ctrl_msg(usblp, USBLP_REQ_HP_CHANNEL_CHANGE_REQUEST,
+        USB_TYPE_VENDOR, USB_DIR_IN, USB_RECIP_INTERFACE, channel, buf, 1);
+    if (ret == 0)
+        *new_channel = buf[0];
+    kfree(buf);
+    return ret;
+}

/*
 * See the description for usblp_select_alts() below for the usage
 @@ -443,6 +460,7 @@
kfree(usblp->readbuf);
kfree(usblp->device_id_string);
kfree(usblp->statusbuf);
+usb_put_intf(usblp->intf);
kfree(usblp);
}

@@ -459,11 +477,14 @@
mutex_lock(&usblp_mutex);
    usblp->used = 0;
    if (usblp->present) {
+    if (usblp->present)
usblp_unlink_urbs(usblp);
-usb_autopm_put_interface(usblp->inf);
} else/* finish cleanup from disconnect */
-usblp_cleanup(usblp);
+
+usb_autopm_put_interface(usblp->inf);
+
+if (!usblp->present)/* finish cleanup from disconnect */
+usblp_cleanup(usblp);/* any URBs must be dead */
+
mutex_unlock(&usblp_mutex);
return 0;
}
@@ -821,6 +842,11 @@
if (rv < 0)
return rv;

+if (!usblp->present) {
+count = -ENODEV;
+goto done;
+}
+
if ((avail = usblp->rstatus) < 0) {
printk(KERN_ERR "usblp%d: error %d reading from printer\n", 
       usblp->minor, (int)avail);
@@ -1103,7 +1129,7 @@
-init_waitqueue_head(&usblp->wwait);
-init_usb_anchor(&usblp->urbs);
-usblp->ifnum = intf->cur_altsetting->desc.bInterfaceNumber;
-usb_put_intf(usblp->inf);
+usb_put_intf(usblp->inf); 
/* Malloc device ID string buffer to the largest expected length, 
 * since we can re-query it on an ioctl and a dynamic string 
@@ -1192,6 +1218,7 @@
kfree(usblp->readbuf);
kfree(usblp->statusbuf);
kfree(usblp->device_id_string);
+usb_put_intf(usblp->inf);
kfree(usblp);
abort_ret:
return retval;
@@ -1298,14 +1325,17 @@
if (protocol < USBLP_FIRST_PROTOCOL || protocol > USBLP_LAST_PROTOCOL)
return -EINVAL;

-alts = usblp->protocol[protocol].alt_setting;
-if (alts < 0)
-return -EINVAL;
-r = usb_set_interface(usblp->dev, usblp->ifnum, alts);
-if (r < 0) {
-printk(KERN_ERR "usblp: can't set desired altsetting %d on interface %d\n",
-alts, usblp->ifnum);
-return r;
+ /* Don't unnecessarily set the interface if there's a single alt. */
+ if (usblp->intf->num_altsetting > 1) {
+ alts = usblp->protocol[protocol].alt_setting;
+ if (alts < 0)
+ return -EINVAL;
+ r = usb_set_interface(usblp->dev, usblp->ifnum, alts);
+ if (r < 0) {
+ printk(KERN_ERR "usblp: can't set desired altsetting %d on interface %d\n",
+ alts, usblp->ifnum);
+ return r;
+}
}
}

usblp->bidir = (usblp->protocol[protocol].epread != NULL);
@@ -1369,9 +1399,11 @@

usblp_unlink_urbs(usblp);
mutex_unlock(&usblp->mut);
+usb_poison_anchored_urbs(&usblp->urbs);

if (!usblp->used)
usblp_cleanup(usblp);
+
mutex_unlock(&usblp_mutex);
}

--- linux-4.15.0.orig/drivers/usb/class/usbtmc.c
+++ linux-4.15.0/drivers/usb/class/usbtmc.c
@@ -307,7 +307,8 @@

-static int usbtmc_ioctl_abort_bulk_out(struct usbtmc_device_data *data)
+static int usbtmc_ioctl_abort_bulk_out_tag(struct usbtmc_device_data *data,
+ u8 tag)
{
struct device *dev;

u8 *buffer;
@@ -324,8 +325,8 @@

usb_rcvctrlpipe(data->usb_dev, 0),
    USBTMC_REQUEST_INITIATE_ABORT_BULK_OUT,
    USB_DIR_IN | USB_TYPE_CLASS | USB_RECIP_ENDPOINT,
- data->bTag_last_write, data->bulk_out,
- buffer, 2, USBTMC_TIMEOUT);
+ tag, data->bulk_out,
+ buffer, 2, USB_CTRL_GET_TIMEOUT);

if (rv < 0) {
    dev_err(dev, "usb_control_msg returned %d\n", rv);
    @ @ -344,12 +345,14 @ @
    n = 0;
}

usbtmc_abort_bulk_out_check_status:
+/* do not stress device with subsequent requests */
+msleep(50);
rv = usb_control_msg(data->usb_dev,
    usbcntrelpipe(data->usb_dev, 0),
    USBTMC_REQUEST_CHECK_ABORT_BULK_OUT_STATUS,
    USB_DIR_IN | USB_TYPE_CLASS | USB_RECIP_ENDPOINT,
    0, data->bulk_out, buffer, 0x08,
- USBTMC_TIMEOUT);
+ USB_CTRL_GET_TIMEOUT);
n++;
if (rv < 0) {
    dev_err(dev, "usb_control_msg returned %d\n", rv);
    @ @ -383,6 +386,11 @ @
    return rv;
}

+static int usbtmc_ioctl_abort_bulk_out(struct usbtmc_device_data *data)
+{
+    return usbtmc_ioctl_abort_bulk_out_tag(data, data->bTag_last_write);
+}
+
+static int usbtmc488_ioctl_read_stb(struct usbtmc_device_data *data,
    void __user *arg)
{
    @ @ -938,6 +946,7 @ @
do {
    dev_dbg(dev, "Reading from bulk in EPn");

+actual = 0;
rv = usb_bulk_msg(data->usb_dev,
    usbcntrelpipe(data->usb_dev,
    data->bulk_in),
    @ @ -1332,16 +1341,10 @ @
    dev_err(dev, "overflow with length %d, actual length is %d\n",
    data->iin_wMaxPacketSize, urb->actual_length);
/* fall through */
-case -ECONNRESET:
case -ENOENT:
case -ESHUTDOWN:
case -EILSEQ:
case -ETIME:
default:
  /* urb terminated, clean up */
dev_dbg(dev, "urb terminated, status: %d\n", status);
return;
default:
  -dev_err(dev, "unknown status received: %d\n", status);
}
exit:
rv = usb_submit_urb(urb, GFP_ATOMIC);
--- linux-4.15.0.orig/drivers/usb/common/common.c
+++ linux-4.15.0/drivers/usb/common/common.c
@@ -145,6 +145,8 @@
do {
  controller = of_find_node_with_property(controller, "phys");
  +if (!of_device_is_available(controller))
  +continue;
  index = 0;
  do {
    if (arg0 == -1) {
--- linux-4.15.0.orig/drivers/usb/common/usb-otg-fsm.c
+++ linux-4.15.0/drivers/usb/common/usb-otg-fsm.c
@@ -193,7 +193,11 @@
if (!fsm->host_req_flag)
  return;
+  INIT_DELAYED_WORK(&fsm->hnp_polling_work, otg_hnp_polling_work);
+  if (!fsm->hnp_work_inited) {
+    INIT_DELAYED_WORK(&fsm->hnp_polling_work, otg_hnp_polling_work);
+    fsm->hnp_work_inited = true;
+  }
+  +schedule_delayed_work(&fsm->hnp_polling_work,
+  msecs_to_jiffies(T_HOST_REQ_POLL));
  }
--- linux-4.15.0.orig/drivers/usb/core/config.c
+++ linux-4.15.0/drivers/usb/core/config.c
@@ -191,7 +191,9 @@
static const unsigned short high_speed_maxpacket_maxes[4] = {
  [USB_ENDPOINT_XFER_CONTROL] = 64,
  [USB_ENDPOINT_XFER_ISOC] = 1024,
-  [USB_ENDPOINT_XFER_BULK] = 512,
  +  static const unsigned short high_speed_maxpacket_maxes[4] = {
  [USB_ENDPOINT_XFER_BULK] = 512,
  +/* Bulk should be 512, but some devices use 1024: we will warn below */
static int usb_parse_endpoint(struct device *ddev, int cfgno, int inum,
    int asnum, struct usb_host_interface *ifp, int num_ep,
    unsigned char *buffer, int size)
{
    static const unsigned short super_speed_maxpacket_maxes[4] = {
        0x2010, 0x2036, 0x2090, 0x2134
    };
    
    static bool endpoint_is_duplicate(struct usb_endpoint_descriptor *e1,
        struct usb_endpoint_descriptor *e2)
    {
        if (e1->bEndpointAddress == e2->bEndpointAddress)
            return true;
        if (usb_endpoint_xfer_control(e1) || usb_endpoint_xfer_control(e2)) {
            if (usb_endpoint_num(e1) == usb_endpoint_num(e2))
                return true;
        }
        return false;
    }

    /*
    * Check for duplicate endpoint addresses in other interfaces and in the
    * altsetting currently being parsed.
    */
    static bool config_endpoint_is_duplicate(struct usb_host_config *config,
        int inum, int asnum, struct usb_endpoint_descriptor *d)
    {
        struct usb_endpoint_descriptor *epd;
        struct usb_interface_cache *intfc;
        struct usb_host_interface *alt;
        int i, j, k;

        for (i = 0; i < config->desc.bNumInterfaces; ++i) {
            intfc = config->intf_cache[i];
            for (j = 0; j < intfc->num_altsetting; ++j) {
                alt = &intfc->altsetting[j];
                if (alt->desc.bInterfaceNumber == inum &&
                    alt->desc.bAlternateSetting != asnum)
                    continue;
                for (k = 0; k < alt->desc.bNumEndpoints; ++k) {
epd = &alt->endpoint[k].desc;
+
+if (endpoint_is_duplicate(epd, d))
+return true;
+
+

@end
@end -240,11 +292,18 @@

goto skip_to_next_endpoint_or_interface_descriptor;

} /* Check for duplicate endpoint addresses */
- for (i = 0; i < ifp->desc.bNumEndpoints; ++i) {
- if (ifp->endpoint[i].desc.bEndpointAddress ==
- d->bEndpointAddress) {
- dev_warn(ddev, "config %d interface %d altsetting %d has a duplicate endpoint with address 0x%X, skipping\n",
- cfgno, inum, asnum, d->bEndpointAddress);
- +if (config_endpoint_is_duplicate(config, inum, asnum, d)) {
- +dev_warn(ddev, "config %d interface %d altsetting %d has a duplicate endpoint with address 0x%X, skipping\n",
- +cfgno, inum, asnum, d->bEndpointAddress);
- +goto skip_to_next_endpoint_or_interface_descriptor;
- +}
- +
- /* Ignore blacklisted endpoints */
- +if (udev->quirks & USB_QUIRK_ENDPOINT_BLACKLIST) {
- +if (usb_endpoint_is_blacklisted(udev, ifp, d)) {
- +dev_warn(ddev, "config %d interface %d altsetting %d has a blacklisted endpoint with address 0x%X, skipping\n",
- +cfgno, inum, asnum,
- +d->bEndpointAddress);
- goto skip_to_next_endpoint_or_interface_descriptor;
- }
- }
- } /* Check for duplicate endpoint addresses */
- for (i = 0; i < ifp->desc.bNumEndpoints; ++i) {
- if (ifp->endpoint[i].desc.bEndpointAddress ==
- d->bEndpointAddress) {
- dev_warn(ddev, "config %d interface %d altsetting %d has a duplicate endpoint with address 0x%X, skipping\n",
- cfgno, inum, asnum, d->bEndpointAddress);
- +if (config_endpoint_is_duplicate(config, inum, asnum, d)) {
- +dev_warn(ddev, "config %d interface %d altsetting %d has a duplicate endpoint with address 0x%X, skipping\n",
- +cfgno, inum, asnum, d->bEndpointAddress);
- +goto skip_to_next_endpoint_or_interface_descriptor;
- +}
- +
- /* Ignore blacklisted endpoints */
- +if (udev->quirks & USB_QUIRK_ENDPOINT_BLACKLIST) {
- +if (usb_endpoint_is_blacklisted(udev, ifp, d)) {
- +dev_warn(ddev, "config %d interface %d altsetting %d has a blacklisted endpoint with address 0x%X, skipping\n",
- +cfgno, inum, asnum,
- +d->bEndpointAddress);
- goto skip_to_next_endpoint_or_interface_descriptor;
- }
- }
@end -344,8 +403,17 @@
endpoint->desc.wMaxPacketSize = cpu_to_le16(8);
}
/* Validate the wMaxPacketSize field */

/* Validate the wMaxPacketSize field.
 Some devices have isochronous endpoints in altsetting 0;
 the USB-2 spec requires such endpoints to have wMaxPacketSize = 0
 (see the end of section 5.6.3), so don't warn about them.
 */

maxp = usb_endpoint_maxp(&endpoint->desc);
if (maxp == 0 && !(usb_endpoint_xfer_isoc(d) && asnum == 0)) {
    dev_warn(ddev, "config %d interface %d altsetting %d endpoint 0x%X has invalid wMaxPacketSize 0\n",
        cfgno, inum, asnum, d->bEndpointAddress);
}

/* Find the highest legal maxpacket size for this endpoint */
i = 0; /* additional transactions per microframe */

if (((struct usb_descriptor_header *) buffer)->bDescriptorType
     == USB_DT_INTERFACE)
    break;

retval = usb_parse_endpoint(ddev, cfgno, inum, asnum, alt,
-    num_ep, buffer, size);
+    retval = usb_parse_endpoint(ddev, config, inum, asnum, alt, num_ep, buffer, size);
if (retval < 0)
    return retval;
++n;

struct usb_bos_descriptor *bos;
struct usb_dev_cap_header *cap;
struct usb_ssp_cap_descriptor *ssp_cap;
unsigned char *buffer;
unsigned char *buffer0;
int length, total_len, num, i, ssac;
__u8 cap_type;
int ret;

/* Get BOS descriptor */
ret = usb_get_descriptor(dev, USB_DT_BOS, 0, bos, USB_DT_BOS_SIZE);
-    if (ret < USB_DT_BOS_SIZE) {
+    if (ret < USB_DT_BOS_SIZE || bos->bLength < USB_DT_BOS_SIZE) {
        dev_err(ddev, "unable to get BOS descriptor\n\n");
    }
if (ret >= 0)
    ret = -ENOMSG;
kfree(bos);

/* Get BOS descriptor */
ret = usb_get_descriptor(dev, USB_DT_BOS, 0, bos, USB_DT_BOS_SIZE);
-    if (ret < USB_DT_BOS_SIZE) {
+    if (ret < USB_DT_BOS_SIZE || bos->bLength < USB_DT_BOS_SIZE) {
        dev_err(ddev, "unable to get BOS descriptor or descriptor too short\n\n");
    }
if (ret >= 0)
    ret = -ENOMSG;
goto err;
}
+
+buffer0 = buffer;
total_len -= length;
+buffer += length;

for (i = 0; i < num; i++) {
-    buffer += length;
cap = (struct usb_dev_cap_header *)buffer;

if (total_len < sizeof(*cap) || total_len < cap->bLength) {
@@ -985,8 +1055,6 @@
    break;
}

-    total_len -= length;
-
    if (cap->bDescriptorType != USB_DT_DEVICE_CAPABILITY) {
        dev_warn(ddev, "descriptor type invalid, skip\n");
        continue;
@@ -1021,7 +1089,11 @@
        default:
        break;
    }
+
+    total_len -= length;
+    buffer += length;
}
+    dev->bos->desc->wTotalLength = cpu_to_le16(buffer - buffer0);

return 0;

--- linux-4.15.0.orig/drivers/usb/core/devio.c
+++ linux-4.15.0/drivers/usb/core/devio.c
@@ -465,11 +465,11 @@
if (userurb) { /* Async */
    if (when == SUBMIT)
        -    dev_info(&udev->dev, "userurb %pK, ep%d %s-%s, ",
+    dev_info(&udev->dev, "userurb %px, ep%d %s-%s, ",
      "length %u\n",
      userurb, ep, t, d, length);
    else
        -    dev_info(&udev->dev, "userurb %pK, ep%d %s-%s, ",
+    dev_info(&udev->dev, "userurb %px, ep%d %s-%s, ",
      "actual_length %u status %d\n",
      userurb, ep, t, d, length,


timeout_or_status);
@@ -742,8 +742,15 @@
 intf = usb_ifnum_to_if(dev, ifnum);
 if (!intf)
 err = -ENOENT;
 else
+else {
 +unsigned int old_suppress;
 +
+/* suppress uevents while claiming interface */
+old_suppress = dev_get_uevent_suppress(&intf->dev);
+dev_set_uevent_suppress(&intf->dev, 1);
 err = usb_driver_claim_interface(&usbfs_driver, intf, ps);
+dev_set_uevent_suppress(&intf->dev, old_suppress);
+
 if (err == 0)
 set_bit(ifnum, &ps->ifclaimed);
 return err;
@@ -763,7 +770,13 @@
 if (!intf)
 err = -ENOENT;
 else if (test_and_clear_bit(ifnum, &ps->ifclaimed)) {
+unsigned int old_suppress;
+
+/* suppress uevents while releasing interface */
+old_suppress = dev_get_uevent_suppress(&intf->dev);
+dev_set_uevent_suppress(&intf->dev, 1);
 usb_driver_release_interface(&usbfs_driver, intf);
+dev_set_uevent_suppress(&intf->dev, old_suppress);
 err = 0;
 }
 return err;
@@ -1180,7 +1193,12 @@
 ret = usbfs_increase_memory_usage(len1 + sizeof(struct urb));
 if (ret)
 return ret;
-tbuf = kmalloc(len1, GFP_KERNEL);
+
+/*
+ * len1 can be almost arbitrarily large. Don't WARN if it's
+ * too big, just fail the request.
+ */
+tbbuf = kmalloc(len1, GFP_KERNEL | __GFP_NOWARN);
 if (!tbuf) {
 ret = -ENOMEM;
 goto done;
@@ -1438,10 +1456,13 @@
 struct async *as = NULL;

struct usb_ctrlrequest *dr = NULL;
unsigned int u, totlen, isofrmlen;

int i, ret, is_in, num_sgs = 0, ifnum = -1;
int number_of_packets = 0;
unsigned int stream_id = 0;
void *buf;

bool is_in;
bool allow_short = false;
bool allow_zero = false;

unsigned long mask = USBDEVFS_URB_SHORT_NOT_OK |
USBDEVFS_URB_BULK_CONTINUATION |
USBDEVFS_URB_NO_FSBR |

is_in = 0;
uurb->endpoint &= ~USB_DIR_IN;
}

if (is_in)
+allow_short = true;
snoop(&ps->dev->dev, "control urb: bRequestType=\%02x "
"bRequest=\%02x wValue=\%04x "
"wIndex=\%04x wLength=\%04x\"n",
@ @ -1504,6 +1525,8 @@
is_in = 0;
uurb->endpoint &= ~USB_DIR_IN;
}

if (!is_in)
+allow_zero = true;
else
+allow_short = true;

switch (usb_endpoint_type(&ep->desc)) {

case USBDEVFS_URB_TYPE_BULK:
+if (!is_in)
+allow_zero = true;
+else
+allow_short = true;

switch (usb_endpoint_type(&ep->desc)) {

case USB_ENDPOINT_XFER_CONTROL:
case USB_ENDPOINT_XFER_ISOCH:
	@end -1535,6 +1562,10 @@

if (!usb_endpoint_xfer_int(&ep->desc))
return -EINVAL;
iinterrupt_urb:
	@end -1608,7 +1639,7 @@

if (num_sgs) {

as->urb->sg = kmalloc(num_sgs * sizeof(struct scatterlist),
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- GFP_KERNEL;
+ GFP_KERNEL | __GFP_NOWARN);
if (!as->urb->sg) {
    ret = -ENOMEM;
    goto error;
@@ -1643,7 +1674,7 @@
    (uurb_start - as->usbm->vm_start);
} else {
    as->urb->transfer_buffer = kmalloc(uurb->buffer_length,
-     GFP_KERNEL);
+     GFP_KERNEL | __GFP_NOWARN);
    if (!as->urb->transfer_buffer) {
        ret = -ENOMEM;
        goto error;
@@ -1679,16 +1710,21 @@
        u = (is_in ? URB_DIR_IN : URB_DIR_OUT);
        if (uurb->flags & USBDEVFS_URB_ISO_ASAP)
            u |= URB_ISO_ASAP;
-        if (uurb->flags & USBDEVFS_URB_SHORT_NOT_OK && is_in)
+        if (allow_short && uurb->flags & USBDEVFS_URB_SHORT_NOT_OK)
        u |= URB_SHORT_NOT_OK;
        if (uurb->flags & USBDEVFS_URB_NO_FSBR)
            u |= URB_NO_FSBR;
-        if (uurb->flags & USBDEVFS_URB_ZERO_PACKET)
+        if (allow_zero && uurb->flags & USBDEVFS_URB_ZERO_PACKET)
        u |= URB_ZERO_PACKET;
        if (uurb->flags & USBDEVFS_URB_NO_INTERRUPT)
            u |= URB_NO_INTERRUPT;
        as->urb->transfer_flags = u;
+if (!allow_short && uurb->flags & USBDEVFS_URB_SHORT_NOT_OK)
+    dev_warn(&ps->dev->dev, "Requested nonsensical USBDEVFS_URB_SHORT_NOT_OK.\n");
+if (!allow_zero && uurb->flags & USBDEVFS_URB_ZERO_PACKET)
+    dev_warn(&ps->dev->dev, "Requested nonsensical USBDEVFS_URB_ZERO_PACKET.\n");
    as->urb->transfer_buffer_length = uurb->buffer_length;
    as->urb->setup_packet = (unsigned char *)dr;
    dr = NULL;
@@ -1780,8 +1816,6 @@
    return 0;

    error:
-    if (as && as->usbm)
-        dec_usb_memory_use_count(as->usbm, &as->usbm->urb_use_count);
    kfree(isopkt);
    kfree(dr);
    if (as)
@@ -1904,7 +1938,7 @@
if (as) {
    int retval;

    -snoop(&ps->dev->dev, "reap %pK\n", as->userurb);
    +snoop(&ps->dev->dev, "reap %px\n", as->userurb);
    retval = processcompl(as, (void __user * __user *)arg);
    free_async(as);
    return retval;
}

as = async_getcompleted(ps);
if (as) {
    -snoop(&ps->dev->dev, "reap %pK\n", as->userurb);
    +snoop(&ps->dev->dev, "reap %px\n", as->userurb);
    retval = processcompl_compat(as, (void __user * __user *)arg);
    free_async(as);
} else {
    @@ -2047,7 +2081,7 @@
    if (as) {
        int retval;

        -snoop(&ps->dev->dev, "reap %pK\n", as->userurb);
        +snoop(&ps->dev->dev, "reap %px\n", as->userurb);
        retval = processcompl_compat(as, (void __user * __user *)arg);
        free_async(as);
        return retval;
    }
    @@ -2064,7 +2098,7 @@

    as = async_getcompleted(ps);
    if (as) {
        -snoop(&ps->dev->dev, "reap %pK\n", as->userurb);
        +snoop(&ps->dev->dev, "reap %px\n", as->userurb);
        retval = processcompl_compat(as, (void __user * __user *)arg);
        free_async(as);
    } else {
        @@ -2489,7 +2523,7 @@
        #endif

    case USBDEVFS_DISCARDURB:
        -snoop(&dev->dev, "%s: DISCARDURB %pK\n", __func__, p);
        +snoop(&dev->dev, "%s: DISCARDURB %px\n", __func__, p);
        ret = proc_unlinkurb(ps, p);
        break;

        --- linux-4.15.0.org/drivers/usb/core/driver.c
        +++ linux-4.15.0/drivers/usb/core/driver.c
        @@ -473,11 +473,6 @@
        pm_runtime_disable(dev);
pm_runtime_set_suspended(dev);

-/* Undo any residual pm_autopm_get_interface_* calls */
-#for (r = atomic_read(&intf->pm_usage_cnt); r > 0; --r)
-#    usb_autopm_put_interface_no_suspend(intf);
-#atomic_set(&intf->pm_usage_cnt, 0);
-
-if (!error)
    usb_autosuspend_device(udev);

@@ -512,7 +507,6 @@
    struct device *dev;
    struct usb_device *udev;
    int retval = 0;
-int lpm_disable_error = -ENODEV;

if (!iface)
    return -ENODEV;
@@ -533,16 +527,6 @@
    iface->condition = USB_INTERFACE_BOUND;

-/* See the comment about disabling LPM in ush_probe_interface(). */
-#if (driver->disable_hub_initiated_lpm) {
-#    lpm_disable_error = usb_unlocked_disable_lpm(udev);
-#    if (lpm_disable_error) {
-#        dev_err(&iface->dev, "%s Failed to disable LPM for driver %s\n."
-#                __func__, driver->name);
-#        return -ENOMEM;
-#    }
-#}
-#
-/* Claimed interfaces are initially inactive (suspended) and
- runtime-PM-enabled, but only if the driver has autosuspend
- support. Otherwise they are marked active, to prevent the
@@ -561,9 +545,20 @@
    if (device_is_registered(dev))
        retval = device_bind_driver(dev);

-/* Attempt to re-enable USB3 LPM, if the disable was successful. */
-#if (!lpm_disable_error)
-    usb_unlocked_enable_lpm(udev);
-#if (retval) {
-    dev->driver = NULL;
-    usb_set_intfdata(iface, NULL);
-    iface->needs_remote_wakeup = 0;
-    iface->condition = USB_INTERFACE_UNBOUND;
-
+/*
+ * Unbound interfaces are always runtime-PM-disabled
+ * and runtime-PM-suspended
+ */
+if (driver->supports_autosuspend)
+pm_runtime_disable(dev);
+pm_runtime_set_suspended(dev);
+
return retval;
}
@@ -1070,7 +1065,7 @@
if (!intf->dev.power.is_prepared) {
 intf->needs_binding = 0;
 rc = device_attach(&intf->dev);
-if (rc < 0)
+if (rc < 0 && rc != -EPROBE_DEFER)
 dev_warn(&intf->dev, "rebind failed: %d\n", rc);
 }
 }
@@ -1636,7 +1631,6 @@
 usb_mark_last_busy(udev);
-atomic_dec(&intf->pm_usage_cnt);
 status = pm_runtime_put_sync(&intf->dev);
 dev_vdbg(&intf->dev, "%s: cnt %d -> %d\n", __func__,
         atomic_read(&intf->dev.power.usage_count),
@@ -1665,7 +1659,6 @@
 usb_mark_last_busy(udev);
-atomic_dec(&intf->pm_usage_cnt);
 status = pm_runtime_put(&intf->dev);
 dev_vdbg(&intf->dev, "%s: cnt %d -> %d\n", __func__,
         atomic_read(&intf->dev.power.usage_count),
@@ -1687,7 +1680,6 @@
 struct usb_device *udev = interface_to_usbdev(intf);

 usb_mark_last_busy(udev);
-atomic_dec(&intf->pm_usage_cnt);
 status = pm_runtime_put_noidle(&intf->dev);
} 
EXPORT_SYMBOL_GPL(usb_autopm_put_interface_no_suspend);
@@ -1718,8 +1710,6 @@
 status = pm_runtime_get_sync(&intf->dev);
 if (status < 0)
 pm_runtime_put_sync(&intf->dev);
-else
-atomic_inc(&intf->pm_usage_cnt);
dev_vdbg(&intf->dev, "%s: cnt %d -> %d\n",
__func__, atomic_read(&intf->dev.power.usage_count),
status);
@@ -1753,8 +1743,6 @@
status = pm_runtime_get(&intf->dev);
if (status < 0 && status != -EINPROGRESS)
pm_runtime_put_noidle(&intf->dev);
-else
-atomic_inc(&intf->pm_usage_cnt);
dev_vdbg(&intf->dev, "%s: cnt %d -> %d\n",
__func__, atomic_read(&intf->dev.power.usage_count),
status);
@@ -1778,7 +1766,6 @@
struct usb_device*udev = interface_to_usbdev(intf);

usb_mark_last_busy(udev);
-atomic_inc(&intf->pm_usage_cnt);
pm_runtime_get_noresume(&intf->dev);
}
EXPORT_SYMBOL_GPL(usb_autopm_get_interface_no_resume);
@@ -1899,14 +1886,11 @@
return -EBUSY;
}

-int usb_set_usb2_hardware_lpm(struct usb_device *udev, int enable)
+static int usb_set_usb2_hardware_lpm(struct usb_device *udev, int enable)
{
 struct usb_hcd *hcd = bus_to_hcd(udev->bus);
 int ret = -EPERM;

 -if (enable && !udev->usb2_hw_lpm_allowed)
 -return 0;
 -
 if (hcd->driver->set_usb2_hw_lpm) {
 ret = hcd->driver->set_usb2_hw_lpm(hcd, udev, enable);
 if (!ret)
@@ -1916,6 +1900,24 @@
 return ret;
 }

 +int usb_enable_usb2_hardware_lpm(struct usb_device *udev)
+{
+if (!udev->usb2_hw_lpm_capable ||
+ !udev->usb2_hw_lpm_allowed ||
+ udev->usb2_hw_lpm_enabled)
+return 0;
+return usb_set_usb2_hardware_lpm(udev, 1);
+
+int usb_disable_usb2_hardware_lpm(struct usb_device *udev)
+{
+if (!udev->usb2_hw_lpm_enabled)
+return 0;
+
+return usb_set_usb2_hardware_lpm(udev, 0);
+}
+
#endif /* CONFIG_PM */

struct bus_type usb_bus_type = {
--- linux-4.15.0.orig/drivers/usb/core/file.c
+++ linux-4.15.0/drivers/usb/core/file.c
@@ -193,9 +193,10 @@

intf->minor = minor;
break;
}
-up_write(&minor_rwsem);
-if (intf->minor < 0)
+if (intf->minor < 0) {
+up_write(&minor_rwsem);
return -EXFULL;
+
} /* create a usb class device for this usb interface */
snprintf(name, sizeof(name), class_driver->name, minor - minor_base);
@@ -203,12 +204,11 @@
MKDEV(USB_MAJOR, minor), class_driver,
       "%s", kbasename(name));
if (IS_ERR(intf->usb_dev)) {
-    down_write(&minor_rwlock);
usb_minors[minor] = NULL;
intf->minor = -1;
-    up_write(&minor_rwlock);
retval = PTR_ERR(intf->usb_dev);
} }
+up_write(&minor_rwlock);
return retval;
}
 EXPORT_SYMBOL_GPL(usb_register_dev);
@@ -234,12 +234,12 @@
return;

dev_dbg(&intf->dev, "removing %d minor\n", intf->minor);
device_destroy(usb_class->class, MKDEV(USB_MAJOR, intf->minor));

down_write(&minor_rwsem);
usb_minors[intf->minor] = NULL;
up_write(&minor_rwsem);

device_destroy(usb_class->class, MKDEV(USB_MAJOR, intf->minor));
intf->usb_dev = NULL;
intf->minor = -1;
destroy_usb_class();

/* Non-root devices don't need to do anything for FREEZE or PRETHAW */
else if (msg.event == PM_EVENT_FREEZE || msg.event == PM_EVENT_PRETHAW)
  
  /* Non-root USB2 devices don't need to do anything for FREEZE
  * or PRETHAW. USB3 devices don't support global suspend and
  * needs to be selectively suspended.
  */
  else if ((msg.event == PM_EVENT_FREEZE || msg.event == PM_EVENT_PRETHAW)
    && (udev->speed < USB_SPEED_SUPER))
    rc = 0;
  else
    rc = usb_port_suspend(udev, msg);

  /* EHCI, OHCI */
  if (!request_mem_region(hcd->rsrc_start, hcd->rsrc_len,
    driver->description)) {
    +hcd->regs = devm_ioremap_nocache(&dev->dev, hcd->rsrc_start,
    +hcd->rsrc_len, driver->description)) {
      dev_dbg(&dev->dev, "controller already in use\n");
      retval = -EBUSY;
      goto put_hcd;
    } else
      hcd->regs = ioremap_nocache(hcd->rsrc_start, hcd->rsrc_len);
  +hcd->regs = devm_ioremap_nocache(&dev->dev, hcd->rsrc_start,
  +hcd->rsrc_len); if (hcd->regs == NULL) {
    dev_dbg(&dev->dev, "error mapping memory\n");
    retval = -EFAULT;

--- linux-4.15.0.orig/drivers/usb/core/generic.c
+++ linux-4.15.0/drivers/usb/core/generic.c
@@ -210,8 +210,13 @@
 if (!udev->parent)
  
 if (!request_mem_region(hcd->rsrc_start, hcd->rsrc_len,
    driver->description)) {
    +dev_m_request_mem_region(&dev->dev, hcd->rsrc_start,
    +hcd->rsrc_len, driver->description)) {
      dev_dbg(&dev->dev, "controller already in use\n");
      retval = -EBUSY;
      goto put_hcd;
    } else
      hcd->regs = ioremap_nocache(hcd->rsrc_start, hcd->rsrc_len);
  +hcd->regs = devm_ioremap_nocache(&dev->dev, hcd->rsrc_start,
  +hcd->rsrc_len); if (hcd->regs == NULL) {
    dev_dbg(&dev->dev, "error mapping memory\n");
    retval = -EFAULT;

--- linux-4.15.0.orig/drivers/usb/core/hcd-pci.c
+++ linux-4.15.0/drivers/usb/core/hcd-pci.c
@@ -216,17 +216,18 @@
 /* EHCI, OHCI */
card->rsrc_start = pci_resource_start(dev, 0);
card->rsrc_len = pci_resource_len(dev, 0);
-if (!request_mem_region(card->rsrc_start, card->rsrc_len,
-    driver->description)) {
+if (!devm_request_mem_region(&dev->dev, card->rsrc_start,
+    card->rsrc_len, driver->description)) {
    dev_dbg(&dev->dev, "controller already in use\n");
    retval = -EBUSY;
    goto put_hcd;
  }
-#ifdef DEBUG
-  if (card->regs)
-    ioremap_nocache(card->rsrc_start, card->rsrc_len);
-#endif
-#ifdef DEBUG
+#ifdef DEBUG
+  if (card->regs)
+    devm_ioremap_nocache(&dev->dev, card->rsrc_start,
+        card->rsrc_len);
+  #endif
  if (card->regs == NULL) {
    dev_dbg(&dev->dev, "error mapping memory\n");
    retval = -EFAULT;

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goto release_mem_region;
goto put_hcd;
}

hcd->rsrc_start = pci_resource_start(dev, region);
hcd->rsrc_len = pci_resource_len(dev, region);
if (request_region(hcd->rsrc_start, hcd->rsrc_len,
    driver->description))
+if (devm_request_region(&dev->dev, hcd->rsrc_start,
    +hcd->rsrc_len, driver->description))
    break;
if (region == PCI_ROM_RESOURCE) {

if (retval != 0)
    goto unmap_registers;
goto put_hcd;
device_wakeup_enable(hcd->self.controller);

if (pci_dev_run_wake(dev))
    pm_runtime_put_noidle(&dev->dev);
return retval;

-unmap_registers:
-if (driver->flags & HCD_MEMORY) {
    -iounmap(hcd->regs);
    -release_mem_region:
    -release_mem_region(hcd->rsrc_start, hcd->rsrc_len);
    } else
    -release_region(hcd->rsrc_start, hcd->rsrc_len);
put_hcd:
usb_put_hcd(hcd);
disable_pci:
    @ @ -347,14 +341,6 @@
dev_set_drvdata(&dev->dev, NULL);
up_read(&companions_rwlock);
}

-if (hcd->driver->flags & HCD_MEMORY) {
    -iounmap(hcd->regs);
    -release_mem_region(hcd->rsrc_start, hcd->rsrc_len);
    } else {
    -release_region(hcd->rsrc_start, hcd->rsrc_len);
usb_put_hcd(hcd);
pci_disable_device(dev);
}
@@ -515,8 +501,6 @@
event == PM_EVENT_RESTORE);
if (retval) {
    dev_err(dev, "PCI post-resume error %d\n", retval);
-    if (hcd->shared_hcd)
-        usb_hc_died(hcd->shared_hcd);
    usb_hc_died(hcd);
}
--- linux-4.15.0.orig/drivers/usb/core/hcd.c
+++ linux-4.15.0/drivers/usb/core/hcd.c
@@ -2365,6 +2365,7 @@
    spin_lock_irqsave (&hcd_root_hub_lock, flags);
    if (hcd->rh_registered) {
        pm_wakeup_event(&hcd->self.root_hub->dev, 0);
    set_bit(HCD_FLAG_WAKEUP_PENDING, &hcd->flags);
    queue_work(pm_wq, &hcd->wakeup_work);
}
@@ -3039,6 +3040,9 @@
{
struct usb_hcd *hcd = platform_get_drvdata(dev);

+/* No need for pm_runtime_put(), we're shutting down */
+pm_runtime_get_sync(&dev->dev);
+if (hcd->driver->shutdown)
  hcd->driver->shutdown(hcd);
}
--- linux-4.15.0.orig/drivers/usb/core/hub.c
+++ linux-4.15.0/drivers/usb/core/hub.c
@@ -36,7 +36,12 @@
#include "otg_whitelist.h"
#define USB_VENDOR_GENESYS_LOGIC	0x05e3
+#define USB_VENDOR_SMSC	0x0424
+#define USB_PRODUCT_USB5534B	0x5534
+#define USB_VENDOR_CYPRESS	0x04b4
+#define USB_PRODUCT_CY7C65632	0x6570
#define HUB_QUIRK_CHECK_PORT_AUTOSUSPEND	0x01
+#define HUB_QUIRK_DISABLE_AUTOSUSPEND	0x02
/* Protect struct usb_device->state and ->children members

static void hub_release(struct kref *kref);
static int usb_reset_and_verify_device(struct usb_device *udev);
static int hub_port_disable(struct usb_hub *hub, int port1, int set_state);
+static bool hub_port_warm_reset_required(struct usb_hub *hub, int port1, u16 portstatus);

static inline char *portspeed(struct usb_hub *hub, int portstatus)
{
    unsigned int portnum)
    {
    struct usb_hub *hub;
    +struct usb_port *port_dev;

    if (!hdev)
        return;

    hub = usb_hub_to_struct_hub(hdev);
    if (hub) {
        +port_dev = hub->ports[portnum - 1];
        +if (port_dev && port_dev->child)
        +pm_wakeup_event(&port_dev->child->dev, 0);
        +
        set_bit(portnum, hub->wakeup_bits);
        kick_hub_wq(hub);
    }
    
    * Return: 0 if successful. A negative error code otherwise. */
    -int usb_hub_set_port_power(struct usb_device *hdev, struct usb_hub *hub,
    -    int port1, bool set)
    +int usb_hub_set_port_power(struct usb_hub *hub, int port1, bool set)
    {
        +struct usb_device *hdev = hub->hdev;
        int ret;

        if (set)
            return -EINVAL;

    if (!udev->parent)/* Can't remove a root hub */
hub = usb_hub_to_struct_hub(udev->parent);
inf = to_usb_interface(hub->intfdev);

-usb_autopm_get_interface(inf);
+ret = usb_autopm_get_interface(inf);
+if (ret < 0)
+return ret;
+
set_bit(udev->portnum, hub->removed_bits);
hub_port_logical_disconnect(hub, udev->portnum);
usb_autopm_put_interface(inf);
@@ -1105,6 +1121,21 @@
     USB_PORT_FEAT_ENABLE);
 }

+/* Make sure a warm-reset request is handled by port_event */
+if (type == HUB_RESUME &&
  + hub_port_warm_reset_required(hub, port1, portstatus))
+set_bit(port1, hub->event_bits);
+
+/*
+ * Add debounce if USB3 link is in polling/link training state.
+ * Link will automatically transition to Enabled state after
+ * link training completes.
+ */
+if (hub_is_superspeed(hdev) &&
  + ((portstatus & USB_PORT_STAT_LINK_STATE) ==
    +USB_SS_PORT_LS_POLLING))
+need_debounce_delay = true;
+
/* Clear status-change flags; we'll debounce later */
if (portchange & USB_PORT_STAT_C_CONNECTION) { need_debounce_delay = true;
  @@ -1136,10 +1167,15 @@

if (!udev || udev->state == USB_STATE_NOTATTACHED) {
 /* Tell hub_wq to disconnect the device or
- * check for a new connection
+ * check for a new connection or over current condition.
+ * Based on USB2.0 Spec Section 11.12.5,
+ * C_PORT_OVER_CURRENT could be set while
+ * PORT_OVER_CURRENT is not. So check for any of them.
+ */
if (udev || (portstatus & USB_PORT_STAT_CONNECTION) ||
  - (portstatus & USB_PORT_STAT_OVERCURRENT))
+ (portchange & USB_PORT_STAT_C_CONNECTION) ||
+ (portstatus & USB_PORT_STAT_OVERCURRENT) ||
+ (portchange & USB_PORT_STAT_C_OVERCURRENT))
```c
set_bit(port1, hub->change_bits);

} else if (portstatus & USB_PORT_STAT_ENABLE) {
//@ -1658,6 +1694,10 @@
kfree(hub->buffer);

pm_suspend_ignore_children(&intf->dev, false);
+
+if (hub->quirk_disable_autosuspend)
+usb_autopm_put_interface(intf);
+
kref_put(&hub->kref, hub_release);
}
//@ -1788,6 +1828,11 @@
if (id->driver_info & HUB_QUIRK_CHECK_PORT_AUTOSUSPEND)
hub->quirk_check_port_auto_suspend = 1;

+if (id->driver_info & HUB_QUIRK_DISABLE_AUTOSUSPEND) {
+hub->quirk_disable_autosuspend = 1;
+usb_autopm_get_interface_no_resume(intf);
+}
+
+if (hub_configure(hub, &desc->endpoint[0].desc) >= 0)
return 0;
//@ -2222,7 +2267,7 @@
/* descriptor may appear anywhere in config */
err = __usb_get_extra_descriptor(udev->rawdescriptors[0],
le16_to_cpu(udev->config[0].desc.wTotalLength),
-USB_DT_OTG, (void **) &desc);
+USB_DT_OTG, (void **) &desc, sizeof(*desc));
if (err || !(desc->bmAttributes & USB_OTG_HNP))
return 0;
//@ -2654,6 +2699,39 @@
|| link_state == USB_SS_PORT_LS_COMP_MOD;
}

+static bool hub_port_power_cycle_required(struct usb_hub *hub, int port1,
+u16 portstatus)
+{
+u16 link_state;
+
+if (!hub_is_superspeed(hub->hdev))
+return false;
+
+link_state = portstatus & USB_PORT_STAT_LINK_STATE;
```
+return link_state == USB_SS_PORT_LS_SS_DISABLED;
+
+static void hub_port_power_cycle(struct usb_hub *hub, int port1)
+{
+    struct usb_port *port_dev = hub->ports[port1 - 1];
+    int ret;
+    
+    ret = usb_hub_set_port_power(hub, port1, false);
+    if (ret) {
+        dev_info(&port_dev->dev, "failed to disable port power\n");
+        return;
+    }
+    
+    msleep(2 * hub_power_on_good_delay(hub));
+    ret = usb_hub_set_port_power(hub, port1, true);
+    if (ret) {
+        dev_info(&port_dev->dev, "failed to enable port power\n");
+        return;
+    }
+    
+    msleep(hub_power_on_good_delay(hub));
+}
+
+static int hub_port_wait_reset(struct usb_hub *hub, int port1,
+    struct usb_device *udev, unsigned int delay, bool warm)
+{
+    int i, status;
+    u16 portchange, portstatus;
+    struct usb_port *port_dev = hub->ports[port1 - 1];
+    int reset_recovery_time;
+
+    if (!hub_is_superspeed(hub->hdev)) {
+        if (warm) {
+            USB_PORT_FEAT_C_BH_PORT_RESET);
+            usb_clear_port_feature(hub->hdev, port1,
+            USB_PORT_FEAT_C_PORT_LINK_STATE);
+            -usb_clear_port_feature(hub->hdev, port1,
+            +if (udev)
+            +usb_clear_port_feature(hub->hdev, port1,
+            USB_PORT_FEAT_C_CONNECTION);
+            /*
+             @@ -2843,7 +2924,14 @@
+             done:
+            */

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if (status == 0) {
    /* TRSTRCY = 10 ms; plus some extra */
    -msleep(10 + 40);
    +reset_recovery_time = 10 + 40;
    +
    +/* Hub needs extra delay after resetting its port. */
    +if (hub->hdev->quirks & USB_QUIRK_HUB_SLOW_RESET)
        +reset_recovery_time += 100;
    +
    +msleep(reset_recovery_time);
    +
    if (udev) {
        struct usb_hcd *hcd = bus_to_hcd(udev->bus);

        @ @ -2969.6 +3057.15 @@
        if (portchange & USB_PORT_STAT_C_ENABLE)
            usb_clear_port_feature(hub->hdev, port1, USB_PORT_FEAT_C_ENABLE);
            +
            +/*
            + * Whatever made this reset-resume necessary may have
            + * turned on the port1 bit in hub->change_bits. But after
            + * a successful reset-resume we want the bit to be clear;
            + * if it was on it would indicate that something happened
            + * following the reset-resume.
            + */
            +clear_bit(port1, hub->change_bits);
            }

        return status;
        @ @ -3153.8 +3250.7 @@
    }

    /* disable USB2 hardware LPM */
    -if (udev->usb2_hw_lpm_enabled == 1)
        -usb_set_usb2_hardware_lpm(udev, 0);
        +usb_disable_usb2_hardware_lpm(udev);

    if (usb_disable_ltm(udev)) {
        dev_err(&udev->dev, "Failed to disable LTM before suspend.");
        @ @ -3192.8 +3288.7 @@
        usb_enable_ltm(udev);
        err_ltm:
        /* Try to enable USB2 hardware LPM again */
        -if (udev->usb2_hw_lpm_capable == 1)
            -usb_set_usb2_hardware_lpm(udev, 1);
            +usb_enable_usb2_hardware_lpm(udev);
if (udev->do_remote_wakeup)
(void) usb_disable_remote_wakeup(udev);
@@ -3352,6 +3447,10 @@
while (delay_ms < 2000) {
if (status || *portstatus & USB_PORT_STAT_CONNECTION)
  break;
+if (!port_is_power_on(hub, *portstatus)) {
+  status = -ENODEV;
+  break;
+}
  msleep(20);
  delay_ms += 20;
status = hub_port_status(hub, *port1, portstatus, portchange);
@@ -3415,8 +3514,11 @@
/* Skip the initial Clear-Suspend step for a remote wakeup */
status = hub_port_status(hub, port1, &portstatus, &portchange);
-if (status == 0 && !port_is_suspended(hub, portstatus)) {
+if (status == 0 && !port_is_suspended(hub, portstatus)) {
+  if (portchange & USB_PORT_STAT_C_SUSPEND)
+    pm_wakeup_event(&udev->dev, 0);
  goto SuspendCleared;
+}
/* see 7.1.7.7; affects power usage, but not budgeting */
if (hub_is_superspeed(hub->hdev))
@@ -3437,9 +3539,6 @@
  * sequence.
/*
status = hub_port_status(hub, port1, &portstatus, &portchange);
- -/* TRSMRCY = 10 msec */
-  msleep(10);
}
SuspendCleared:
@@ -3454,6 +3553,9 @@
usb_clear_port_feature(hub->hdev, port1,
  USB_PORT_FEAT_C_SUSPEND);
} 
+ /* TRSMRCY = 10 msec */
+  msleep(10);
}
if (udev->persist_enabled)
@@ -3467,10 +3569,13 @@
if (status < 0) {
dev_dbg(&udev->dev, "can't resume, status %d\n", status);
hub_port_logical_disconnect(hub, port1);
+if (hub_port_power_cycle_required(hub, port1, portstatus)) {
+dev_dbg(&udev->dev, "device in disabled state, attempt power cycle\n");
+hub_port_power_cycle(hub, port1);
+}
} else {

/* Try to enable USB2 hardware LPM */
-if (udev->usb2_hw_lpm_capable == 1)
-usb_set_usb2_hardware_lpm(udev, 1);
+usb_enable_usb2_hardware_lpm(udev);

/* Try to enable USB3 LTM */
usb_enable_ltm(udev);
@@ -3507,6 +3612,7 @@
   struct usb_device *hdev;
   struct usb_device *udev;
   int connect_change = 0;
+u16 link_state;
   int ret;

   hdev = hub->hdev;
   @@ -3516,9 +3622,11 @@
   return 0;
   usb_clear_port_feature(hdev, port, USB_PORT_FEAT_C_SUSPEND);
   } else {
+link_state = portstatus & USB_PORT_STAT_LINK_STATE;
   if (!udev || udev->state != USB_STATE_SUSPENDED ||
- (portstatus & USB_PORT_STAT_LINK_STATE) !=
- USB_SS_PORT_LS_U0)
+ (link_state != USB_SS_PORT_LS_U0 &&
+ link_state != USB_SS_PORT_LS_U1 &&
+ link_state != USB_SS_PORT_LS_U2))
   return 0;
   }

   @@ -3841,6 +3949,47 @@
   }

   /*
   + * Don't allow device intiated U1/U2 if the system exit latency + one bus
   + * interval is greater than the minimum service interval of any active
   + * periodic endpoint. See USB 3.2 section 9.4.9
   + */
   +static bool usb_device_may_initiate_lpm(struct usb_device *udev,
   +enum usb3_link_state state)
   +{
   +unsigned int sel;/* us */
   

```c
int i, j;
+
+if (state == USB3_LPM_U1)
+sel = DIV_ROUND_UP(udev->u1_params.sel, 1000);
+else if (state == USB3_LPM_U2)
+sel = DIV_ROUND_UP(udev->u2_params.sel, 1000);
+else
+return false;
+
+for (i = 0; i < udev->actconfig->desc.bNumInterfaces; i++) {
+struct usb_interface *intf;
+struct usb_endpoint_descriptor *desc;
+unsigned int interval;
+
+intf = udev->actconfig->interface[i];
+if (!intf)
+continue;
+
+for (j = 0; j < intf->cur_altsetting->desc.bNumEndpoints; j++) {
+desc = &intf->cur_altsetting->endpoint[j].desc;
+
+if (usb_endpoint_xfer_int(desc) ||
+    usb_endpoint_xfer_isoc(desc)) {
+    interval = (1 << (desc->bInterval - 1)) * 125;
+    if (sel + 125 > interval)
+        return false;
+}
+}
+
+return true;
+}
```
hcd->driver->disable_usb3_lpm_timeout(hcd, udev, state);
-} else {

-/* Only a configured device will accept the Set Feature
  - * U1/U2_ENABLE
  - */
-}
-if (udev->actconfig)
-usb_set_device_initiated_lpm(udev, state, true);
+return;
+
-/* As soon as usb_set_lpm_timeout(timeout) returns 0, the
- * hub-initiated LPM is enabled. Thus, LPM is enabled no
- * matter the result of usb_set_device_initiated_lpm().
- * The only difference is whether device is able to initiate
- * LPM.
- */
-}
-if (state == USB3_LPM_U1)
-udev->usb3_lpm_u1_enabled = 1;
-else if (state == USB3_LPM_U2)
-udev->usb3_lpm_u2_enabled = 1;
+/* Only a configured device will accept the Set Feature
+ * U1/U2_ENABLE
+ */
+if (udev->actconfig &&
  + usb_device_may_initiate_lpm(udev, state)) {
+if (usb_set_device_initiated_lpm(udev, state, true)) {
+/*
+ * Request to enable device initiated U1/U2 failed,
+ * better to turn off lpm in this case.
+ */
+usb_set_lpm_timeout(udev, state, 0);    
+hcd->driver->disable_usb3_lpm_timeout(hcd, udev, state);
+return;
+}
+}
+
+if (state == USB3_LPM_U1)
+udev->usb3_lpm_u1_enabled = 1;
+else if (state == USB3_LPM_U2)
+udev->usb3_lpm_u2_enabled = 1;
+
+/*
 * Disable the hub-initiated U1/U2 idle timeouts, and disable device-initiated
 * U1/U2 entry.
 @@ -4319,7 +4475,7 @@
 if ((udev->bos->ext_cap->bmAttributes & cpu_to_le32(USB_BESL_SUPPORT)) ||
connect_type == USB_PORT_CONNECT_TYPE_HARD_WIRED) {
    udev->usb2_hw_lpm_allowed = 1;
-    usb_set_usb2_hardwared_lpm(udev, 1);
+    usb_enable_usb2_hardwared_lpm(udev);
}
}

@@ -4524,7 +4680,9 @@
    * reset. But only on the first attempt,
    * lest we get into a time out/reset loop
    */
-    if (r == 0 || (r == -ETIMEDOUT && retries == 0))
+    if (r == 0 || (r == -ETIMEDOUT &&
+            retries == 0 &&
+            udev->speed > USB_SPEED_FULL))
    break;
}
udev->descriptor.bMaxPacketSize0 =
@@ -4952,10 +5110,7 @@
    /* When halfway through our retry count, power-cycle the port */
    if (i == (SET_CONFIG_TRIES / 2) - 1) {
        dev_info(&port_dev->dev, "attempt power cycle\n");
-        usb_hub_set_port_power(hdev, hub, port1, false);
-        msleep(2 * hub_power_on_good_delay(hub));
-        usb_hub_set_port_power(hdev, hub, port1, true);
-        msleep(hub_power_on_good_delay(hub));
+        hub_port_power_cycle(hub, port1);
    }
}
if (hub->hdev->parent ||
@@ -5265,6 +5420,18 @@
    static const struct usb_device_id hub_id_table[] = {
        { .match_flags = USB_DEVICE_ID_MATCH_VENDOR
            + | USB_DEVICE_ID_MATCH_PRODUCT
            + | USB_DEVICE_ID_MATCH_INT_CLASS,
            + .idVendor = USB_VENDOR_SMSC,
            + .idProduct = USB_PRODUCT_USB5534B,
            + .bInterfaceClass = USB_CLASS_HUB,
            + .driver_info = HUB_QUIRK_DISABLE_AUTOSUSPEND},
+        { .match_flags = USB_DEVICE_ID_MATCH_VENDOR
            + | USB_DEVICE_ID_MATCH_PRODUCT,
            + .idVendor = USB_VENDOR_CYPRESS,
            + .idProduct = USB_PRODUCT_CY7C65632,
            + .driver_info = HUB_QUIRK_DISABLE_AUTOSUSPEND},
+        { .match_flags = USB_DEVICE_ID_MATCH_VENDOR
            + | USB_DEVICE_ID_MATCH_INT_CLASS,
            .idVendor = USB_VENDOR_GENESYS_LOGIC,
bInterfaceClass = USB_CLASS_HUB,
@@ -5474,25 +5641,17 @@
/* Disable USB2 hardware LPM.
 * It will be re-enabled by the enumeration process.
 */
-if (udev->usb2_hw_lpm_enabled == 1)
-usb_set_usb2硬件_lpm(udev, 0);
+usb_disable_usb2_hardware_lpm(udev);

-/* Disable LPM and LTM while we reset the device and reinstall the alt
- * settings. Device-initiated LPM settings, and system exit latency
- * settings are cleared when the device is reset, so we have to set
- * them up again.
+/* Disable LPM while we reset the device and reinstall the alt settings.
+ * Device-initiated LPM, and system exit latency settings are cleared
+ * when the device is reset, so we have to set them up again.
 */
-ret = usb_unlocked_disable_lpm(udev);
-if (ret) {
-dev_err(&udev->dev, "%s Failed to disable LPM\n.", __func__);
goto re_enumerate_no_bos;
}
-ret = usb_disable_ltm(udev);
-if (ret) {
-dev_err(&udev->dev, "%s Failed to disable LTM\n.",
-__func__);
goto re_enumerate_no_bos;
}

bos = udev->bos;
udev->bos = NULL;
@@ -5585,7 +5744,7 @@
done:
/* Now that the alt settings are re-installed, enable LTM and LPM. */
-usb_set_usb2硬件_lpm(udev, 1);
+usb_enable_usb2_hardware_lpm(udev);
usb_unlocked_enable_lpm(udev);
usb_enable_ltm(udev);
usb_release_bos_descriptor(udev);
@@ -5603,7 +5762,7 @@
/**
 * usb_reset_device - warn interface drivers and perform a USB port reset
- * @udev: device to reset (not in SUSPENDED or NOTATTACHED state)
+ * @udev: device to reset (not in NOTATTACHED state)
 *
 * Warns all drivers bound to registered interfaces (using their pre_reset
* method), performs the port reset, and then lets the drivers know that

```c
struct usb_host_config *config = udev->actconfig;
struct usb_hub *hub = usb_hub_to_struct_hub(udev->parent);
```

-If (udev->state == USB_STATE_NOTATTACHED ||
-udev->state == USB_STATE_SUSPENDED) {
+if (udev->state == USB_STATE_NOTATTACHED) {

dev_dbg(&udev->dev, "device reset not allowed in state %d\n",
udev->state);
return -EINVAL;
```
```c
+if (udev->state == USB_STATE_NOTATTACHED) {

dev_dbg(&udev->dev, "device reset not allowed in state %d\n",
udev->state);
return -EINVAL;
```
-return max(delay, 100U);
+if (!hub->hdev->parent) /* root hub */
+return delay;
+else /* Wait at least 100 msec for power to become stable */
+return max(delay, 100U);
}

static inline int hub_port_debounce_be_connected(struct usb_hub *hub,}
--- linux-4.15.0.orig/drivers/usb/core/ledtrig-usbport.c
+++ linux-4.15.0/drivers/usb/core/ledtrig-usbport.c
@@ -137,11 +137,17 @@
if (!led_np)
return false;
-/* Get node of port being added */
+/* Get node of port being added */
+ * FIXME: This is really the device node of the connected device
+ */
port_np = usb_of_get_child_node(usb_dev->dev.of_node, port1);
if (!port_np)
return false;
+of_node_put(port_np);
+
 /* Amount of trigger sources for this LED */
count = of_count_phandle_with_args(led_np, "trigger-sources",
 "#trigger-source-cells");
--- linux-4.15.0.orig/drivers/usb/core/message.c
+++ linux-4.15.0/drivers/usb/core/message.c
@@ -150,6 +150,10 @@
ret = usb_internal_control_msg(dev, pipe, dr, data, size, timeout);
+ /* Linger a bit, prior to the next control message. */
+if (dev->quirks & USB_QUIRK_DELAY_CTRL_MSG)
+msleep(200);
+kfree(dr);

return ret;
@@ -582,12 +586,13 @@
int i, retval;

spin_lock_irqsave(&io->lock, flags);
-if (io->status) {
+if (io->status || io->count == 0) {
+}
spin_unlock_irqrestore(&io->lock, flags);
return;

/* shut everything down */
io->status = -ECONNRESET;
+io->count++; /* Keep the request alive until we're done */
spin_unlock_irqrestore(&io->lock, flags);

for (i = io->entries - 1; i >= 0; --i) {
	dev_warn(&io->dev->dev, "%s, unlink --> %d
",
	__func__, retval);
}
+
+spin_lock_irqsave(&io->lock, flags);
+io->count--;
+if (!io->count)
+complete(&io->complete);
+spin_unlock_irqrestore(&io->lock, flags);
} 
EXPORT_SYMBOL_GPL(usb_sg_cancel);

if (dev->state == USB_STATE_SUSPENDED)
return -EHOSTUNREACH;
-if (size <= 0 || !buf || !index)
+if (size <= 0 || !buf)
return -EINVAL;
buf[0] = 0;
+if (index <= 0 || index >= 256)
+return -EINVAL;
+tbuf = kmalloc(256, GFP_NOIO);
if (!tbuf)
return -ENOMEM;

if (usb_endpoint_out(epaddr)) {
ep = dev->ep_out[epnum];
-if (reset_hardware)
+if (reset_hardware && epnum != 0)
dev->ep_out[epnum] = NULL;
} else {
ep = dev->ep_in[epnum];
-if (reset_hardware)
+if (reset_hardware && epnum != 0)
dev->ep_in[epnum] = NULL;
}
if (ep) {
    @ @ -1165,6 +1178,34 @@
}
}

+/*
+ * usb_disable_device_endpoints -- Disable all endpoints for a device
+ * @dev: the device whose endpoints are being disabled
+ * @skip_ep0: 0 to disable endpoint 0, 1 to skip it.
+ */
+static void usb_disable_device_endpoints(struct usb_device *dev, int skip_ep0)
+{
+    struct usb_hcd *hcd = bus_to_hcd(dev->bus);
+    int i;
+    +if (hcd->driver->check_bandwidth) {
+        /* First pass: Cancel URBs, leave endpoint pointers intact. */
+        for (i = skip_ep0; i < 16; ++i) {
+            usb_disable_endpoint(dev, i, false);
+            usb_disable_endpoint(dev, i + USB_DIR_IN, false);
+        }
+        /* Remove endpoints from the host controller internal state */
+        mutex_lock(hcd->bandwidth_mutex);
+        usb_hcd_alloc_bandwidth(dev, NULL, NULL, NULL);
+        mutex_unlock(hcd->bandwidth_mutex);
+    }
+    /* Second pass: remove endpoint pointers */
+    for (i = skip_ep0; i < 16; ++i) {
+        usb_disable_endpoint(dev, i, true);
+        usb_disable_endpoint(dev, i + USB_DIR_IN, true);
+    }
+    +}
+    +}
+    +}
+
+/**
 * usb_disable_device - Disable all the endpoints for a USB device
 * @dev: the device whose endpoints are being disabled
 @ @ -1178,7 +1219,6 @@
 void usb_disable_device(struct usb_device *dev, int skip_ep0)
 {
    int i;
    -struct usb_hcd *hcd = bus_to_hcd(dev->bus);

    /* getting rid of interfaces will disconnect
 * any drivers bound to them (a key side effect)
 @ @ -1213,8 +1253,7 @@
    dev->actconfig->interface[i] = NULL;
    }
}
dev_dbg(&dev->dev, "\%s nuking \%s URBs\n", __func__,
skip_ep0 ? "non-ep0" : "all");
-if (hcd->driver->check_bandwidth) {
    /* First pass: Cancel URBS, leave endpoint pointers intact. */
    -for (i = skip_ep0; i < 16; ++i) {
        -usb_disable_endpoint(dev, i, false);
        -usb_disable_endpoint(dev, i + USB_DIR_IN, false);
    }
    /* Remove endpoints from the host controller internal state */
    -mutex_lock(hcd->bandwidth_mutex);
    -usb_hcd_alloc_bandwidth(dev, NULL, NULL, NULL);
    -mutex_unlock(hcd->bandwidth_mutex);
    /* Second pass: remove endpoint pointers */
    -for (i = skip_ep0; i < 16; ++i) {
        -usb_disable_endpoint(dev, i, true);
        -usb_disable_endpoint(dev, i + USB_DIR_IN, true);
    }
    +
    +usb_disable_device_endpoints(dev, skip_ep0);
} 

/*
 @@ -1311,6 +1336,11 @@
 * is submitted that needs that bandwidth. Some other operating systems
 * allocate bandwidth early, when a configuration is chosen.
 * + * xHCI reserves bandwidth and configures the alternate setting in
 * + * usb_hcd_alloc_bandwidth(). If it fails the original interface altsetting
 * + * may be disabled. Drivers cannot rely on any particular alternate
 * + * setting being in effect after a failure.
 * + *
 * + * This call is synchronous, and may not be used in an interrupt context.
 * Also, drivers must not change altsettings while urbs are scheduled for
 * endpoints in that interface; all such urbs must first be completed
 @@ -1346,6 +1376,12 @@
 alternate);
 return -EINVAL;
} 
+/*
usb3 hosts configure the interface in usb_hcd_alloc_bandwidth, including freeing dropped endpoint ring buffers. Make sure the interface endpoints are flushed before that.

usb_disable_interface(dev, iface, false);

Make sure we have enough bandwidth for this alternate interface. Remove the current alt setting and add the new alt setting.
The caller must own the device lock.

Return: Zero on success, else a negative error code.

If this routine fails the device will probably be in an unusable state with endpoints disabled, and interfaces only partially enabled.

int usb_reset_configuration(struct usb_device *dev)
{
    for (i = 1; i < 16; ++i) {
        usb_disable_endpoint(dev, i, true);
        usb_disable_endpoint(dev, i + USB_DIR_IN, true);
    }
    usb_disable_device_endpoints(dev, 1); /* skip ep0*/

    config = dev->actconfig;
    retval = 0;
    for (i = 0; i < config->desc.bNumInterfaces; i++) {
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
        if (!alt)
            alt = &intf->altsetting[0];
    }
    mutex_unlock(hcd->bandwidth_mutex);
    return -ENOMEM;
}
/* Make sure we have enough bandwidth for each alternate setting 0 */
for (i = 0; i < config->desc.bNumInterfaces; i++) {
    struct usb_interface *intf = config->interface[i];
    struct usb_host_interface *alt = usb_altnum_to_altsetting(intf, 0);
    if (!alt)
        alt = &intf->altsetting[0];
    if (alt != intf->cur_altsetting)
       retval = usb_hcd_alloc_bandwidth(dev, NULL,
            intf->cur_altsetting, alt);
    if (retval < 0)
        break;
}
/* If not, reinstate the old alternate settings */
+/* xHCI adds all endpoints in usb_hcd_alloc_bandwidth */
+retval = usb_hcd_alloc_bandwidth(dev, config, NULL, NULL);
if (retval < 0) {
    reset_old_alts:
    for (i--; i >= 0; i--) {
        struct usb_interface *intf = config->interface[i];
        struct usb_host_interface *alt;
        -
        -alt = usb_altnum_to_altsetting(intf, 0);
        -if (!alt)
        -alt = &intf->altsetting[0];
        -if (alt != intf->cur_altsetting)
        -usb_hcd_alloc_bandwidth(dev, NULL,
        -alt, intf->cur_altsetting);
    }
    usb_enable_lpm(dev);
    mutex_unlock(hcd->bandwidth_mutex);
    return retval;
}@@ -1539,8 +1551,12 @@
    USB_REQ_SET_CONFIGURATION, 0,
    config->desc.bConfigurationValue, 0,
    NULL, 0, USB_CTRL_SET_TIMEOUT);
-    if (retval < 0)
-        goto reset_old_alts;
+    if (retval < 0) {
+        usb_hcd_alloc_bandwidth(dev, NULL, NULL, NULL);
+        usb_enable_lpm(dev);
+        mutex_unlock(hcd->bandwidth_mutex);
+        return retval;
+    }
    mutex_unlock(hcd->bandwidth_mutex);

    /* re-init hc/hcd interface/endpoint state */
@@ -2162,14 +2178,14 @@
    (struct usb_cdc_dmm_desc *)buffer;
    break;
    case USB_CDC_MDLM_TYPE:
-        if (elength < sizeof(struct usb_cdc_mdlm_desc *))
+        if (elength < sizeof(struct usb_cdc_mdlm_desc))
            goto next_desc;
    if (desc)
        return -EINVAL;
    desc = (struct usb_cdc_mdlm_desc *)buffer;
    break;
    case USB_CDC_MDLM_DETAIL_TYPE:
-        if (elength < sizeof(struct usb_cdc_mdlm_detail_desc *))
+        if (elength < sizeof(struct usb_cdc_mdlm_detail_desc))
            goto next_desc;
    if (desc)
        return -EINVAL;
    desc = (struct usb_cdc_mdlm_desc *)buffer;
    break;
goto next_desc;
if (detail)
    return -EINVAL;
--- linux-4.15.0.orig/drivers/usb/core/port.c
+++ linux-4.15.0/drivers/usb/core/port.c
@@ -170,8 +170,11 @@
    if (!port_dev->is_superspeed && peer)
        pm_runtime_get_sync(&peer->dev);

        -usb_autopm_get_interface(intf);
        -retval = usb_hub_set_port_power(hdev, hub, port1, true);
        +retval = usb_autopm_get_interface(intf);
        +if (retval < 0)
        +return retval;
        +
        +retval = usb_hub_set_port_power(hub, port1, true);
        msleep(hub_power_on_good_delay(hub));
        if (udev && !retval) {
            /*
            @@ -223,8 +226,11 @@
            if (usb_port_block_power_off)
                return -EBUSY;

            -usb_autopm_get_interface(intf);
            -retval = usb_hub_set_port_power(hdev, hub, port1, false);
            +retval = usb_autopm_get_interface(intf);
            +if (retval < 0)
            +return retval;
            +
            +retval = usb_hub_set_port_power(hub, port1, false);
            usb_clear_port_feature(hdev, port1, USB_PORT_FEAT_C_CONNECTION);
            if (!port_dev->is_superspeed)
                usb_clear_port_feature(hdev, port1, USB_PORT_FEAT_C_ENABLE);
            @@ -242,6 +248,14 @@
        }
        #endif

        +static void usb_port_shutdown(struct device *dev)
        +{
        +    struct usb_port *port_dev = to_usb_port(dev);
        +
        +    if (port_dev->child)
        +        usb_disable_usb2_hardware_lpm(port_dev->child);
        +}
        +
        static const struct dev_pm_ops usb_port_pm_ops = {
            #ifdef CONFIG_PM
            .runtime_suspend =usb_port_runtime_suspend,
static struct device_driver usb_port_driver = {
    .name = "usb",
    .owner = THIS_MODULE,
    .shutdown = usb_port_shutdown,
};

static int link_peers(struct usb_port *left, struct usb_port *right)
--- linux-4.15.0.orig/drivers/usb/core/quirks.c
+++ linux-4.15.0/drivers/usb/core/quirks.c
@@ -6,11 +6,169 @@
    * Copyright (c) 2007 Greg Kroah-Hartman <gregkh@suse.de>
 */

+#include <linux/moduleparam.h>
#include <linux/usb.h>
#include <linux/usb/quirks.h>
#include <linux/usb/hcd.h>
#include "usb.h"

+struct quirk_entry {
+    u16 vid;
+    u16 pid;
+    u32 flags;
+};
+
+static DEFINE_MUTEX(quirk_mutex);
+
+static struct quirk_entry *quirk_list;
+static unsigned int quirk_count;
+
+static char quirks_param[128];
+
+static int quirks_param_set(const char *value, const struct kernel_param *kp)
+{
+    char *val, *p, *field;
+    u16 vid, pid;
+    u32 flags;
+    uint_t i;
+    int err;
+    +val = kstrdup(value, GFP_KERNEL);
+    +if (!val)
+        return -ENOMEM;
+    +err = param_set_copystring(val, kp);
+    +if (err) {
+        kfree(val);
+        return ERR_OK;
+    }
+    for (i = 0; i < sizeof(quirks_param); i++)
+        quirks_param[i] = vid;
+    return ERR_OK;
+}
+}
+return err;
+

mutex_lock(&quirk_mutex);
+
+if (!*val) {
+quirk_count = 0;
+kfree(quirk_list);
+quirk_list = NULL;
+goto unlock;
+}
+
+for (quirk_count = 1, i = 0; val[i]; i++)
+if (val[i] == ',')
+quirk_count++;
+
+if (quirk_list) {
+kfree(quirk_list);
+quirk_list = NULL;
+}
+
+quirk_list = kmalloc(quirk_count, sizeof(struct quirk_entry),
+        GFP_KERNEL);
+if (!quirk_list) {
+quirk_count = 0;
+mutex_unlock(&quirk_mutex);
+kfree(val);
+return -ENOMEM;
+}
+
+for (i = 0, p = val; p && *p;) {
+  /* Each entry consists of VID:PID:flags */
+  field = strsep(&p, ":");
+  if (!field)
+    break;
+  if (kstrtou16(field, 16, &vid))
+    break;
+  field = strsep(&p, ":");
+  if (!field)
+    break;
+  if (kstrtou16(field, 16, &pid))
+    break;
+  field = strsep(&p, ":");
+  if (!field || !field)
+break;
+
+/* Collect the flags */
+for (flags = 0; *field; field++) {
+    switch (*field) {
+    case 'a':
+        flags |= USB_QUIRK_STRING_FETCH_255;
+        break;
+    case 'b':
+        flags |= USB_QUIRK_RESET_RESUME;
+        break;
+    case 'c':
+        flags |= USB_QUIRK_NO_SET_INTF;
+        break;
+    case 'd':
+        flags |= USB_QUIRK_CONFIG_INTF_STRINGS;
+        break;
+    case 'e':
+        flags |= USB_QUIRK_RESET;
+        break;
+    case 'f':
+        flags |= USB_QUIRK_HONOR_BNUMINTERFACES;
+        break;
+    case 'g':
+        flags |= USB_QUIRK_DELAY_INIT;
+        break;
+    case 'h':
+        flags |= USB_QUIRK_LINEAR_UFRAME_INTR_BINTERVAL;
+        break;
+    case 'i':
+        flags |= USB_QUIRK_DEVICE_QUALIFIER;
+        break;
+    case 'j':
+        flags |= USB_QUIRK_IGNORE_REMOTE_WAKEUP;
+        break;
+    case 'k':
+        flags |= USB_QUIRK_NO_LPM;
+        break;
+    case 'l':
+        flags |= USB_QUIRK_LINEAR_FRAME_INTR_BINTERVAL;
+        break;
+    case 'm':
+        flags |= USB_QUIRK_DISCONNECT_SUSPEND;
+        break;
+    case 'n':
+        flags |= USB_QUIRK_DELAY_CTRL_MSG;
+        break;
+    case 'o':
flags |= USB_QUIRK_HUB_SLOW_RESET;
+break;
+/* Ignore unrecognized flag characters */
+}
+
+quirk_list[i++] = (struct quirk_entry)
+{ .vid = vid, .pid = pid, .flags = flags };
+
+if (i < quirk_count)
+quirk_count = i;
+
+unlock:
+mutex_unlock(&quirk_mutex);
+kfree(val);
+
+return 0;
+
+static const struct kernel_param_ops quirks_param_ops = {
+    .set = quirks_param_set,
+    .get = param_get_string,
+};
+
+static struct kparam_string quirks_param_string = {
+    .maxlen = sizeof(quirks_param),
+    .string = quirks_param,
+};
+
+device_param_cb(quirks, &quirks_param_ops, &quirks_param_string, 0644);
+
/* Lists of quirky USB devices, split in device quirks and interface quirks.
 * Device quirks are applied at the very beginning of the enumeration process,
 * right after reading the device descriptor. They can thus only match on device
@@ -32,6 +190,10 @@
 "Add/modify USB quirks by specifying quirks=vendorID:productID:quirks");
 /* CBM - Flash disk */
{ USB_DEVICE(0x0204, 0x6025), .driver_info = USB_QUIRK_RESET_RESUME },
+/* WORLDDE Controller KS49 or Prodipe MIDI 49C USB controller */
+{ USB_DEVICE(0x0218, 0x0201), .driver_info =
+    USB_QUIRK_CONFIG_INTF_STRINGS },
+/* WORLDDE easy key (easykey.25) MIDI controller */
{ USB_DEVICE(0x0218, 0x0401), .driver_info =
    USB_QUIRK_CONFIG_INTF_STRINGS },
@@ -65,7 +335,7 @@
{ USB_DEVICE(0x03f0, 0x0701), .driver_info = USB_QUIRK_STRING_FETCH_255 },

+/* HP v222w 16GB Mini USB Drive */
+{ USB_DEVICE(0x03f0, 0x3f40), .driver_info = USB_QUIRK_DELAY_INIT },

+/* Creative SB Audigy 2 NX */
+{ USB_DEVICE(0x041e, 0x0770), .driver_info = USB_QUIRK_RESET_RESUME },

@@ -52,11 +217,21 @@
+/* Microsoft LifeCam-VX700 v2.0 */
+{ USB_DEVICE(0x045e, 0x07c6), .driver_info = USB_QUIRK_NO_LPM },
+
+/* Cherry Stream G230 2.0 (G85-231) and 3.0 (G85-232) */
+{ USB_DEVICE(0x046a, 0x0023), .driver_info = USB_QUIRK_RESET_RESUME },
+
+/* Logitech HD Webcam C270 */
+{ USB_DEVICE(0x046d, 0x0825), .driver_info = USB_QUIRK_RESET_RESUME },
+
+/* Logitech HD Pro Webcams C920, C920-C, C925e and C930e */
+{ USB_DEVICE(0x046d, 0x0841), .driver_info = USB_QUIRK_DELAY_INIT },
+{ USB_DEVICE(0x046d, 0x0843), .driver_info = USB_QUIRK_DELAY_INIT },
+{ USB_DEVICE(0x046d, 0x085b), .driver_info = USB_QUIRK_DELAY_INIT },
+{ USB_DEVICE(0x046d, 0x085c), .driver_info = USB_QUIRK_DELAY_INIT },

/* Logitech ConferenceCam CC3000e */
{ USB_DEVICE(0x046d, 0x0847), .driver_info = USB_QUIRK_DELAY_INIT },
@@ -65,6 +240,9 @@
/* Logitech PTZ Pro Camera */
{ USB_DEVICE(0x046d, 0x0853), .driver_info = USB_QUIRK_DELAY_INIT },

+/* Logitech Screen Share */
+{ USB_DEVICE(0x046d, 0x086c), .driver_info = USB_QUIRK_NO_LPM },
+
+/* Logitech Quickcam Fusion */
+{ USB_DEVICE(0x046d, 0x08c1), .driver_info = USB_QUIRK_RESET_RESUME },

@@ -164,15 +342,26 @@
{ USB_DEVICE(0x06a3, 0x0006), .driver_info = USB_QUIRK_CONFIG_INTF_STRINGS },

+/* Agfa SNAPSCAN 1212U */
+{ USB_DEVICE(0x06bd, 0x0001), .driver_info = USB_QUIRK_RESET_RESUME },

Open Source Used In 5GaaS Edge AC-4 29057
+ /* Guillemot Webcam Hercules Dualpix Exchange (2nd ID) */
{ USB_DEVICE(0x06f8, 0x0804), .driver_info = USB_QUIRK_RESET_RESUME },

/*! Guillemot Webcam Hercules Dualpix Exchange*/
{ USB_DEVICE(0x06f8, 0x3005), .driver_info = USB_QUIRK_RESET_RESUME },

+/* Guillemot Hercules DJ Console audio card (BZ 208357) */
+{ USB_DEVICE(0x06f8, 0xb000), .driver_info =
+USB_QUIRK_ENDPOINT_BLACKLIST },
+
/*! Midiman M-Audio Keystation 88es */
{ USB_DEVICE(0x0763, 0x0192), .driver_info = USB_QUIRK_RESET_RESUME },

+/* SanDisk Ultra Fit and Ultra Flair */
+{ USB_DEVICE(0x0781, 0x5583), .driver_info = USB_QUIRK_NO_LPM },
+{ USB_DEVICE(0x0781, 0x5591), .driver_info = USB_QUIRK_NO_LPM },
+
/*! M-Systems Flash Disk Pioneers */
{ USB_DEVICE(0x0904, 0x6103), .driver_info =
USB_QUIRK_LINEAR_FRAME_INTR_BINTERVAL },

+/* Sound Devices USBPre2 */
+{ USB_DEVICE(0x0926, 0x0202), .driver_info =
+USB_QUIRK_ENDPOINT_BLACKLIST },
+
+/* Sound Devices MixPre-D */
+{ USB_DEVICE(0x0926, 0x0208), .driver_info =
+USB_QUIRK_ENDPOINT_BLACKLIST },
+
/*! Keytouch QWERTY Panel keyboard */
{ USB_DEVICE(0x0926, 0x3333), .driver_info =
USB_QUIRK_CONFIG_INTF_STRINGS },

+/* Kingston DataTraveler 3.0 */
+{ USB_DEVICE(0x0951, 0x1666), .driver_info = USB_QUIRK_NO_LPM },
+
/*! X-Rite/Gretag-Macbeth Eye-One Pro display colorimeter */
{ USB_DEVICE(0x0971, 0x2000), .driver_info = USB_QUIRK_NO_SET_INTF },

+/* ELMO L-12F document camera */
+{ USB_DEVICE(0x099a1, 0x0028), .driver_info = USB_QUIRK_DELAY_CTRL_MSG },
+
/*! Broadcom BCM92035DGROM BT dongle */
{ USB_DEVICE(0x099a5c, 0x4c2021), .driver_info = USB_QUIRK_RESET_RESUME },

---
@@ -201,10 +404,24 @@
{ USB_DEVICE(0x0b05, 0x17e0), .driver_info = USB_QUIRK_IGNORE_REMOTE_WAKEUP },

+/* Realtek hub in Dell WD19 (Type-C) */
+{ USB_DEVICE(0x0b05, 0x0487), .driver_info = USB_QUIRK_NO_LPM },
+{ USB_DEVICE(0x0b05, 0x5487), .driver_info = USB_QUIRK_RESET_RESUME },
+
+/* Generic RTL8153 based ethernet adapters */
+{ USB_DEVICE(0x0bda, 0x0487), .driver_info = USB_QUIRK_NO_LPM },
+{ USB_DEVICE(0x0bda, 0x5487), .driver_info = USB_QUIRK_RESET_RESUME },
+
+/* Generic RTL8153 based ethernet adapters */
+{ USB_DEVICE(0x0bda, 0x8153), .driver_info = USB_QUIRK_NO_LPM },
+
+/* SONiX USB DEVICE Touchpad */
+{ USB_DEVICE(0x0c45, 0x7056), .driver_info = USB_QUIRK_IGNORE_REMOTE_WAKEUP },
+
/* Action Semiconductor flash disk */
{ USB_DEVICE(0x10d6, 0x2200), .driver_info = USB_QUIRK_STRING_FETCH_255 },
+
+/* novation SoundControl XL */
+{ USB_DEVICE(0x1235, 0x0061), .driver_info = USB_QUIRK_RESET_RESUME },
+
+/* Huawei 4G LTE module */
{ USB_DEVICE(0x12d1, 0x15bb), .driver_info = USB_QUIRK_DISCONNECT_SUSPEND },
@@ -218,6 +435,13 @@
{ USB_DEVICE(0x1a0a, 0x0200), .driver_info = USB_QUIRK_LINEAR_UFRAME_INTR_BINTERVAL },
+
+/* Lenovo ThinkCenter A630Z TI024Gen3 usb-audio */
+{ USB_DEVICE(0x17ef, 0xa012), .driver_info = USB_QUIRK_DISCONNECT_SUSPEND },
+
+/* Lenovo ThinkPad USB-C Dock Gen2 Ethernet (RTL8153 GigE) */
+{ USB_DEVICE(0x17ef, 0xa387), .driver_info = USB_QUIRK_NO_LPM },
+
+/* BUILDWIN Photo Frame */
{ USB_DEVICE(0x1a0a, 0x0200), .driver_info = USB_QUIRK_LINEAR_UFRAME_INTR_BINTERVAL },
+
+/* Terminus Technology Inc. Hub */
+{ USB_DEVICE(0x1a0a, 0x0116), .driver_info = USB_QUIRK_LINEAR_UFRAME_INTR_BINTERVAL },
+
+/* Corsair K70 RGB */
/* Corsair Strafe */
+{ USB_DEVICE(0x1b1c, 0x1b13), .driver_info = USB_QUIRK_DELAY_INIT |
  + USB_QUIRK_DELAY_CTRL_MSG },
+
  /* Corsair Strafe RGB */
-{ USB_DEVICE(0x1b1c, 0x1b20), .driver_info = USB_QUIRK_DELAY_INIT |
  + USB_QUIRK_DELAY_CTRL_MSG },
+
  /* Corsair Strafe */
+{ USB_DEVICE(0x1b1c, 0x1b15), .driver_info = USB_QUIRK_DELAY_INIT |
  + USB_QUIRK_DELAY_CTRL_MSG },
+
  /* Corsair K70 LUX RGB */
+{ USB_DEVICE(0x1b1c, 0x1b20), .driver_info = USB_QUIRK_DELAY_INIT |
  + USB_QUIRK_DELAY_CTRL_MSG },
+
  /* Corsair K70 LUX */
{ USB_DEVICE(0x1b1c, 0x1b36), .driver_info = USB_QUIRK_DELAY_INIT },
+
  /* Corsair K70 RGB RAPDIFIRE */
+{ USB_DEVICE(0x1b1c, 0x1b38), .driver_info = USB_QUIRK_DELAY_INIT |
  + USB_QUIRK_DELAY_CTRL_MSG },
+
  /* MIDI keyboard WORLDE MINI */
{ USB_DEVICE(0x1c75, 0x0204), .driver_info =
  USB_QUIRK_CONFIG_INTF_STRINGS },
@@ -249,6 +492,16 @@
{ USB_DEVICE(0x2040, 0x7200), .driver_info =
  USB_QUIRK_CONFIG_INTF_STRINGS },
+
  /* Raydium Touchscreen */
+{ USB_DEVICE(0x2386, 0x3114), .driver_info = USB_QUIRK_NO_LPM },
+
  /* Raydium Touchscreen */
+{ USB_DEVICE(0x2386, 0x3119), .driver_info = USB_QUIRK_NO_LPM },
+
  /* Raydium Touchscreen */
+{ USB_DEVICE(0x2386, 0x350e), .driver_info = USB_QUIRK_NO_LPM },
+
  /* DJI CineSSD */
+{ USB_DEVICE(0x2ca3, 0x0031), .driver_info = USB_QUIRK_NO_LPM },
+
  /* INTEL VALUE SSD */
{ USB_DEVICE(0x8086, 0xf1a5), .driver_info = USB_QUIRK_RESET_RESUME },
@@ -279,6 +532,42 @@
{ }  /* terminating entry must be last */
];
+
  /* Entries for blacklisted endpoints that should be ignored when parsing
+ * configuration descriptors.
+ *
+ * Matched for devices with USB_QUIRK_ENDPOINT_BLACKLIST.
+ */
+static const struct usb_device_id usb_endpoint_blacklist[] = {
+    { USBDEVICEINTERFACE(0x06f8, 0xb000, 5), .driver_info = 0x01 },
+    { USBDEVICEINTERFACE(0x06f8, 0xb000, 5), .driver_info = 0x81 },
+    { USBDEVICEINTERFACE(0x0926, 0x0202, 1), .driver_info = 0x85 },
+    { USBDEVICEINTERFACE(0x0926, 0x0208, 1), .driver_info = 0x85 },
+    { }
+};
+
bool usb_endpoint_is_blacklisted(struct usb_device *udev,
    struct usb_host_interface *intf,
    struct usb_endpoint_descriptor *epd)
{
    const struct usb_device_id *id;
    unsigned int address;

    for (id = usb_endpoint_blacklist; id->match_flags; ++id) {
        if (!usb_match_device(udev, id))
            continue;

        if (!usb_match_one_id_intf(udev, intf, id))
            continue;

        address = id->driver_info;
        if (address == epd->bEndpointAddress)
            return true;
    }

    return false;
}

static bool usb_match_any_interface(struct usb_device *udev,
    const struct usb_device_id *id)
{
    @ @ -317,8 +606,8 @@
    return 0;
}

-static u32 __usb_detect_quirks(struct usb_device *udev,
    const struct usb_device_id *id)
+static u32 usb_detect_static_quirks(struct usb_device *udev,
    const struct usb_device_id *id)
{ u32 quirks = 0;
return quirks;
}

+static u32 usb_detect_dynamic_quirks(struct usb_device *udev)
+{
+u16 vid = le16_to_cpu(udev->descriptor.idVendor);
+u16 pid = le16_to_cpu(udev->descriptor.idProduct);
+int i, flags = 0;
+
+mutex_lock(&quirk_mutex);
+
+for (i = 0; i < quirk_count; i++) {
+if (vid == quirk_list[i].vid && pid == quirk_list[i].pid) {
+flags = quirk_list[i].flags;
+break;
+}
+}
+
+mutex_unlock(&quirk_mutex);
+
+return flags;
+}
+
+static u32 usb_detect_static_quirks(struct usb_device *udev, struct usb_quirk_list *quirk_list)
+
+{ return quirks;
+}
+
+if (udev->quirks)
+dev_dbg(&udev->dev, "USB quirks for this device: %x\n", udev->quirks);
+@@ -369,7 +680,7 @@
+}
u32 quirks;

-quirks = __usb_detect_quirks(udev, usb_interface_quirk_list);
+quirks = usb_detect_static_quirks(udev, usb_interface_quirk_list);
if (quirks == 0)
return;

@@ -377,3 +688,11 @@ quirks);
udev->quirks |= quirks;
}
+
+void usb_release_quirk_list(void)
+{
+  +mutex_lock(&quirk_mutex);
+  +kfree(quirk_list);
+  +quirk_list = NULL;
+  +mutex_unlock(&quirk_mutex);
+}
--- linux-4.15.0.orig/drivers/usb/core/sysfs.c
+++ linux-4.15.0/drivers/usb/core/sysfs.c
@@ -508,7 +508,10 @@
if (!ret) {
  udev->usb2_hw_lpm_allowed = value;
-  ret = usb_set_usb2_hardware_lpm(udev, value);
+  if (value)
+    ret = usb_enable_usb2_hardware_lpm(udev);
+  else
+    ret = usb_disable_usb2_hardware_lpm(udev);
}

usb_unlock_device(udev);
@@ -863,7 +866,11 @@
size_t srclen, n;
ip cfgno;
void *src;
+int retval;
+
+retval = usb_lock_device_interruptible(udev);
+if (retval < 0)
+return -EINTR;
/* The binary attribute begins with the device descriptor.
 * Following that are the raw descriptor entries for all the
 * configurations (config plus subsidiary descriptors).
@@ -888,6 +895,7 @@
off -= srclen;
}
if (urb) {
    memset(urb, 0, sizeof(*urb));
    kref_init(&urb->kref);
    INIT_LIST_HEAD(&urb->urb_list);
    INIT_LIST_HEAD(&urb->anchor_list);
}

void usb_kill_anchored_urbs(struct usb_anchor *anchor)
{
    struct urb *victim;
    int surely_empty;

    spin_lock_irq(&anchor->lock);
    while (!list_empty(&anchor->urb_list)) {
        victim = list_entry(anchor->urb_list.prev, struct urb, anchor_list);
        /* we must make sure the URB isn't freed before we kill it*/
        usb_get_urb(victim);
        spin_unlock_irq(&anchor->lock);
        /* this will unanchor the URB */
        usb_kill_urb(victim);
        usb_put_urb(victim);
        +do {
spin_lock_irq(&anchor->lock);
-
-spin_unlock_irq(&anchor->lock);
+while (!list_empty(&anchor->urb_list)) {
+victim = list_entry(urb_list.prev,
+struct urb, anchor_list);
+/* make sure the URB isn't freed before we kill it */
+usb_get_urb(victim);
+spin_unlock_irq(&anchor->lock);
+/* this will unanchor the URB */
+usb_kill_urb(victim);
+usb_put_urb(victim);
+spin_lock_irq(&anchor->lock);
+} 
+surely_empty = usb_anchor_check_wakeup(anchor);
+
+spin_unlock_irq(&anchor->lock);
+cpu_relax();
+} while (!surely_empty);
}
EXPORT_SYMBOL_GPL(usb_kill_anchored_urbs);

void usb_poison_anchored_urbs(struct usb_anchor *anchor)
{
struct urb *victim;
+int surely_empty;

-spin_lock_irq(&anchor->lock);
-anchor->poisoned = 1;
-while (!list_empty(&anchor->urb_list)) {
-victim = list_entry(urb_list.prev, struct urb,
-struct urb, anchor_list);
-/* we must make sure the URB isn't freed before we kill it */
-usb_get_urb(victim);
-spin_unlock_irq(&anchor->lock);
-/* this will unanchor the URB */
-usb_poison_urb(victim);
-usb_put_urb(victim);
+do {
spin_lock_irq(&anchor->lock);
-
-spin_unlock_irq(&anchor->lock);
+anchor->poisoned = 1;
+while (!list_empty(&anchor->urb_list)) {
+victim = list_entry(urb_list.prev,
+struct urb, anchor_list);
+/* make sure the URB isn't freed before we kill it */
+usb_get_urb(victim);
+spin_unlock_irq(&anchor->lock);
+/* this will unanchor the URB */
+usb_poison_urb(victim);
+usb_put_urb(victim);
+spin_lock_irq(&anchor->lock);
+
+sSurely_empty = usb_anchor_check_wakeup(anchor);
+
+spin_unlock_irq(&anchor->lock);
+cpu_relax();
+} while (!surely_empty);
}

EXPORT_SYMBOL_GPL(usb_poison_anchored_urbs);

@@ -965,14 +979,20 @@
{
    struct urb *victim;
    unsigned long flags;
+    int surely_empty;

    spin_lock_irqsave(&anchor->lock, flags);
    while (!list_empty(&anchor->urb_list)) {
        victim = list_entry(anchor->urb_list.prev, struct urb, anchor_list);
        __usb_unanchor_urb(victim, anchor);
    }
    spin_unlock_irqrestore(&anchor->lock, flags);
+
    do {
        spin_lock_irqsave(&anchor->lock, flags);
        while (!list_empty(&anchor->urb_list)) {
            victim = list_entry(anchor->urb_list.prev, struct urb, anchor_list);
            __usb_unanchor_urb(victim, anchor);
        }
        surely_empty = usb_anchor_check_wakeup(anchor);
        
        spin_unlock_irqrestore(&anchor->lock, flags);
        cpu_relax();
        } while (!surely_empty);
    }

EXPORT_SYMBOL_GPL(usb_scuttle_anchored_urbs);
--- linux-4.15.0.orig/drivers/usb/core/usb.c
+++ linux-4.15.0/drivers/usb/core/usb.c
@@ -228,6 +228,8 @@
struct usb_interface_cache *intf_cache = NULL;
 int i;

 struct usb_interface_cache *intf_cache = NULL;
 int i;
+if (!config)
+return NULL;
for (i = 0; i < config->desc.bNumInterfaces; i++) {
if (config->intf_cache[i]->altsetting[0].desc.bInterfaceNumber
== iface_num) {
@@ -831,14 +833,14 @@
/*

int __usb_get_extra_descriptor(char *buffer, unsigned size,
-    unsigned char type, void **ptr)
+    unsigned char type, void **ptr, size_t minsize)
{
struct usb_descriptor_header *header;

while (size >= sizeof(struct usb_descriptor_header)) {
  header = (struct usb_descriptor_header *)buffer;

-  if (header->bLength < 2) {
+  if (header->bLength < 2 || header->bLength > size) {
    printk(KERN_ERR
      "\%s: bogus descriptor, type \%d length \%d\n",
     usbcore_name,
@@ -847,7 +849,7 @@
    return -1;
  }

-  if (header->bDescriptorType == type) {
+  if (header->bDescriptorType == type && header->bLength >= minsize) {
    *ptr = header;
    return 0;
  }
@@ -1260,6 +1262,7 @@
if (usb_disabled())
  return;

+usb_release_quirk_list();
usb_deregister_device_driver(&usb_generic_driver);
usb_major_cleanup();
usb_deregister(&usbfs_driver);
--- linux-4.15.0.orig/drivers/usb/core/usb.h
+++ linux-4.15.0/drivers/usb/core/usb.h
@@ -36,6 +36,10 @@
  extern void usb_authorize_interface(struct usb_interface *);
  extern void usb_determine_quirks(struct usb_device *udev);
  extern void usb_determine_interface_quirks(struct usb_device *udev);
+extern void usb_release_quirk_list( void);
+extern bool usb_endpoint_is_blacklisted(struct usb_device *udev,
+struct usb_host_interface *intf,
+struct usb_endpoint_descriptor *epd);
extern int usb_remove_device(struct usb_device *udev);

extern int usb_get_device_descriptor(struct usb_device *dev,
@@ -90,7 +94,8 @@
extern int usb_runtime_suspend(struct device *dev);
extern int usb_runtime_resume(struct device *dev);
extern int usb_runtime_idle(struct device *dev);
-extern int usb_set_usb2_hardware_lpm(struct usb_device *udev, int enable);
+extern int usb_enable_usb2_hardware_lpm(struct usb_device *udev);
+extern int usb_disable_usb2_hardware_lpm(struct usb_device *udev);

#else

@@ -110,7 +115,12 @@
return 0;
}

-extern inline int usb_set_usb2_hardware_lpm(struct usb_device *udev, int enable)
+static inline int usb_enable_usb2_hardware_lpm(struct usb_device *udev)
+{
+return 0;
+
+static inline int usb_disable_usb2_hardware_lpm(struct usb_device *udev)
{ return 0;
}
--- linux-4.15.0.orig/drivers/usb/dwc2/core.h
+++ linux-4.15.0/drivers/usb/dwc2/core.h
@@ -167,6 +167,7 @@
 * @lock: State lock to protect contents of endpoint.
 * @dir_in: Set to true if this endpoint is of the IN direction, which
 *          means that it is sending data to the Host.
+ * @map_dir: Set to the value of dir_in when the DMA buffer is mapped.
 * @index: The index for the endpoint registers.
 * @mc: Multi Count - number of transactions per microframe
 * @interval - Interval for periodic endpoints, in frames or microframes.
@@ -215,9 +216,10 @@

unsigned short fifo_index;
unsigned char dir_in;
+unsigned char map_dir;
unsigned char index;
unsigned char mc;
-unsigned char interval;
+u16 interval;
unsigned int       halted:1;
unsigned int       periodic:1;
@@ -881,6 +883,7 @@
 * @frame_list_sz:      Frame list size
 * @desc_gen_cache:     Kmem cache for generic descriptors
 * @desc_hsisoc_cache:  Kmem cache for hs isochronous descriptors
+ * @unaligned_cache:    Kmem cache for DMA mode to handle non-aligned buf
 * 
 * These are for peripheral mode:
 *
@@ -1013,6 +1016,8 @@
 u32 frame_list_sz;
 struct kmem_cache *desc_gen_cache;
 struct kmem_cache *desc_hsisoc_cache;
+struct kmem_cache *unaligned_cache;
+#define DWC2_KMEM_UNALIGNED_BUF_SIZE 1024

#ifdef DEBUG
u32 frrem_samples;
--- linux-4.15.0.orig/drivers/usb/dwc2/core_intr.c
+++ linux-4.15.0/drivers/usb/dwc2/core_intr.c
@@ -365,10 +365,13 @@
if (ret && (ret != -ENOTSUPP))
    dev_err(hsotg->dev, "exit hibernation failed\n");

+/* Change to L0 state */
+hsotg->lx_state = DWC2_L0;
call_gadget(hsotg, resume);
+} else {
+    /* Change to L0 state */
+    hsotg->lx_state = DWC2_L0;
    }
-/* Change to L0 state */
-hsotg->lx_state = DWC2_L0;
} else {
    if (hsotg->params.hibernation)
        return;
--- linux-4.15.0.orig/drivers/usb/dwc2/gadget.c
+++ linux-4.15.0/drivers/usb/dwc2/gadget.c
@@ -372,7 +372,7 @@
{
    struct usb_request *req = &hs_req->req;
    
-usb_gadget_unmap_request(&hsotg->gadget, req, hs_ep->dir_in);
+usb_gadget_unmap_request(&hsotg->gadget, req, hs_ep->map_dir);
    }
static unsigned int dwc2_gadget_get_chain_limit(struct dwc2_hsotg_ep *hs_ep) {
    const struct usb_endpoint_descriptor *ep_desc = hs_ep->ep.desc;
    int is_isoc = hs_ep->isochronous;
    unsigned int maxsize;
    u32 mps = hs_ep->ep.maxpacket;
    int dir_in = hs_ep->dir_in;

    if (is_isoc)
        maxsize = hs_ep->dir_in ? DEV_DMA_ISOC_TX_NBYTES_LIMIT :
                             @ @ -675,6 +678,11 @@
        /* Above size of one descriptor was chosen, multiple it */
        maxsize *= MAX_DMA_DESC_NUM_GENERIC;

    /* Interrupt OUT EP with mps not multiple of 4 */
    +if (hs_ep->index)
        +if (usb_endpoint_xfer_int(ep_desc) && !dir_in && (mps % 4))
            +maxsize = mps * MAX_DMA_DESC_NUM_GENERIC;
        +
        return maxsize;
    }

    @ @ -690,11 +698,14 @@
    * ISOchronous - descriptor rx/tx bytes bitfield limit,
    * Control In/Bulk/Interrupt - multiple of mps. This will allow to not
    * have concatenations from various descriptors within one packet.
    + * Interrupt OUT - if mps not multiple of 4 then a single packet corresponds
    + * to a single descriptor.
    *
    + * Selects corresponding mask for RX/TX bytes as well.
    */
    static u32 dwc2_gadget_get_desc_params(struct dwc2_hsotg_ep *hs_ep, u32 *mask) {
        const struct usb_endpoint_descriptor *ep_desc = hs_ep->ep.desc;
        u32 mps = hs_ep->ep.maxpacket;
        int dir_in = hs_ep->dir_in;
        u32 desc_size = 0;
        @@ -718,6 +729,13 @@
        desc_size -= desc_size % mps;
    }

    /* Interrupt OUT EP with mps not multiple of 4 */
    +if (hs_ep->index)
        +if (usb_endpoint_xfer_int(ep_desc) && !dir_in && (mps % 4)) {
            +desc_size = mps;
mask = DEV_DMA_NBYTES_MASK;
+
+
return desc_size;
}

maxsize = dwc2_gadget_get_desc_params(hs_ep, &mask);
if (len > maxsize) {
	(@@ -807.6 825.7 @@)

	u32 index;
	u32 maxsize = 0;
	u32 mask = 0;
+u8 pid = 0;

maxsize = dwc2_gadget_get_desc_params(hs_ep, &mask);
if (len > maxsize) {
	(@@ -852.7 871.11 @@)

	((len << DEV_DMA_NBYTES_SHIFT) & mask));

if (hs_ep->dir_in) {
-desc->status |= ((hs_ep->mc << DEV_DMA_ISOC_PID_SHIFT) &
+if (len)
+pids = DIV_ROUND_UP(len, hs_ep->ep.maxpacket);
+else
+pid = 1;
+desc->status |= ((pid << DEV_DMA_ISOC_PID_SHIFT) &
+DEV_DMA_ISOC_PID_MASK) |

((len % hs_ep->ep.maxpacket) ?

DEV_DMA_SHORT : 0) |

}@ -891.6 +914.7 @@

u32 ctdl;

if (list_empty(&hs_ep->queue)) {
+hs_ep->target_frame = TARGET_FRAME_INITIAL;

dev_dbg(hsotg->dev, "%s: No requests in queue\n", __func__);
return;
}

}@ -1002.11 +1026.6 @@
else
packets = 1;/* send one packet if length is zero. */

-if (hs_ep->isochronous && length > (hs_ep->mc * hs_ep->ep.maxpacket)) {
-dev_err(hsotg->dev, "req length > maxpacket*mc\n");
-return;
-}
-
if (dir_in && index != 0)
if (hs_ep->isochronous)
epsize = DXEPTSIZ_MC(packets);
@ -1047.13 +1066.7 @@
length += (mps - (length % mps));

/ * If more data to send, adjust DMA for EP0 out data stage.
 * ureq->dma stays unchanged, hence increment it by already
 * passed passed data count before starting new transaction.
 */
-if (!index && hsotg->ep0_state == DWC2_EP0_DATA_OUT &&
 - continuing)
+if (continuing)
  offset = ureq->actual;

/* Fill DDMA chain entries */
@@ -1154,6 +1167,7 @@

 { int ret;

+hs_ep->map_dir = hs_ep->dir_in;
  ret = usb_gadget_map_request(&hsotg->gadget, req, hs_ep->dir_in);
  if (ret)
@@ -1307,6 +1321,13 @@
  req->actual = 0;
  req->status = -EINPROGRESS;

+/* Don't queue ISOC request if length greater than mps*mc */
+if (hs_ep->isochronous &&
   + req->length > (hs_ep->mc * hs_ep->ep.maxpacket)) {
@@ -1411,7 +1432,6 @@ static struct dwc2_hsotg_ep *ep_from_windex(struct dwc2_hsotg *hsotg,
     
 static struct dwc2_hsotg_ep *ep_from_windex(struct dwc2_hsotg *hsotg,
       u32 windex)
 { -struct dwc2_hsotg_ep *ep;
   int dir = (windex & USB_DIR_IN) ? 1 : 0;
   int idx = windex & 0x7F;

@@ -1421,12 +1441,7 @@
   if (idx > hsotg->num_of_eps)
     return NULL;
ep = index_to_ep(hsotg, idx, dir);
-
-if (idx && ep->dir_in != dir)
-return NULL;
-
-return ep;
+return index_to_ep(hsotg, idx, dir);
}

/**
@@ -2213,22 +2228,37 @@
*/
static unsigned int dwc2_gadget_get_xfersize_ddma(struct dwc2_hsotg_ep *hs_ep)
{
+const struct usb_endpoint_descriptor *ep_desc = hs_ep->ep.desc;
struct dwc2_hsotg *hsotg = hs_ep->parent;
unsigned int bytes_rem = 0;
+unsigned int bytes_rem_correction = 0;
struct dwc2_dma_desc *desc = hs_ep->desc_list;
int i;
+u32 mps = hs_ep->ep.maxpacket;
+int dir_in = hs_ep->dir_in;

if (!desc)
return -EINVAL;
+/* Interrupt OUT EP with mps not multiple of 4 */
+if (hs_ep->index)
+if (usb_endpoint_xfer_int(ep_desc) && !dir_in && (mps % 4))
+bytes_rem_correction = 4 - (mps % 4);
+
+for (i = 0; i < hs_ep->desc_count; ++i) {
+status = desc->status;
+bytes_rem += status & DEV_DMA_NBYTES_MASK;
+.bytes_rem -= bytes_rem_correction;
+
+if (status & DEV_DMA_STS_MASK)
+dev_err(hsotg->dev, "descriptor %d closed with %x\n",
+i, status & DEV_DMA_STS_MASK);
+}
+
+if (status & DEV_DMA_STS_MASK)
+dev_err(hsotg->dev, "descriptor %d closed with %x\n",
+i, status & DEV_DMA_STS_MASK);
+
+if (status & DEV_DMA_L)
+break;
+
+desc++;
}

return bytes_rem;
/* Zlp for all endpoints, for ep0 only in DATA IN stage */
/* Zlp for all endpoints in non DDMA, for ep0 only in DATA IN stage */
if (hs_ep->send_zlp) {
  -dwc2_hsocg_program_zlp(hsocg, hs_ep);
  hs_ep->send_zlp = 0;
  /* transfer will be completed on next complete interrupt */
  return;
}
if (hs_ep->index == 0 && hsocg->ep0_state == DWC2_EP0_DATA_IN) {
  -dwc2_hsocg_enqueue_setup(hsocg);
  -dev_dbg(hsocg->dev, "EP0: DIEPCTL0=0x%08x, DOEPCTL0=0x%08x\n",
          -dwc2_readl(hsocg->regs + DIEPCTL0),
          -dwc2_readl(hsocg->regs + DOEPCTL0));
  -
  /* clear global NAKs */
  val = DCTL(CGOUTNAK | DCTL_CGNPINNAK);
  if (!is_usb_reset)
    -dev_dbg(hsocg->dev, "EP0: DIEPCTL0=0x%08x, DOEPCTL0=0x%08x\n",
           -dwc2_readl(hsocg->regs + DIEPCTL0),
           -dwc2_readl(hsocg->regs + DOEPCTL0));
  +dev_dbg(hsocg->dev, "EP0: DIEPCTL0=0x%08x, DOEPCTL0=0x%08x\n",
          +dwc2_readl(hsocg->regs + DIEPCTL0),
          +dwc2_readl(hsocg->regs + DOEPCTL0));
}
static void dwc2_hsocg_core_disconnect(struct dwc2_hsocg *hsocg)
  @ @ -3887,11 +3919,12 @ @
  * a unique tx-fifo even if it is non-periodic.
*/
if (dir_in && hsotg->dedicated_fifos) {
    unsigned fifo_count = dwc2_hsotg_tx_fifo_count(hsotg);
    u32 fifo_index = 0;
    u32 fifo_size = UINT_MAX;

    size = hs Ep->ep.maxpacket * hs Ep->mc;
    for (i = 1; i < hsotg->num_of_eps; ++i) {
        for (i = 1; i <= fifo_count; ++i) {
            if (hsotg->fifo_map & (1 << i))
                continue;
            val = dwc2_readl(hsotg->regs + DPTXFSIZN(i));
            @ @ -4681.10 +4714.6 @@
            epnum, 0);
        }
    }
    ret = usb_add_gadget_udc(dev, &hsotg->gadget);
    if (ret)
        return ret;
    dwc2_hsotg_dump(hsotg);
}

return 0;
@@ -4697,6 +4726,7 @@
int dwc2_hsotg_remove(struct dwc2_hsotg *hsotg)
{
    usb_del_gadget_udc(&hsotg->gadget);
+    dwc2_hsotg_ep_free_request(&hsotg->eps_out[0]->ep, hsotg->ctrl_req);

    return 0;
}
--- linux-4.15.0.orig/drivers/usb/dwc2/hcd.c
+++ linux-4.15.0/drivers/usb/dwc2/hcd.c
@@ -985,6 +985,24 @@
if (dbg_hc(chan))
    dev_vdbg(hsotg->dev, "%s\\n", __func__);
+
+ /*
+  * In buffer DMA or external DMA mode channel can't be halted
+  * for non-split periodic channels. At the end of the next
+  * uframe/frame (in the worst case), the core generates a channel
+  * halted and disables the channel automatically.
+  */
+  if ((hsotg->params.g_dma && !hsotg->params.g_dma_desc) ||
+      hsotg->hw_params.arch == GHWCFG2_EXT_DMA_ARCH) {
+    if (!chan->do_split &&
+        (chan->ep_type == USB_ENDPOINT_XFER_ISOC ||
+         chan->ep_type == USB_ENDPOINT_XFER_INT)) {

Open Source Used In 5GaaS Edge AC-4 29075
+dev_err(hsotg->dev, "%s() Channel can't be halted\n",
+__func__); +return; +} +} +

if (halt_status == DWC2_HC_XFER_NO_HALT_STATUS)
dev_err(hsotg->dev, "!!! halt_status = %d !!!\n", halt_status);

@@ -1478,19 +1496,20 @@
if (num_packets > max_hc_pkt_count) {
    num_packets = max_hc_pkt_count;
    chan->xfer_len = num_packets * chan->max_packet;
+} else if (chan->ep_is_in) {
+/*
+ * Always program an integral # of max packets
+ * for IN transfers.
+ * Note: This assumes that the input buffer is
+ * aligned and sized accordingly.
+ */
+chan->xfer_len = num_packets * chan->max_packet;
+}
} else {
    /* Need 1 packet for transfer length of 0 */
    num_packets = 1;
}

-if (chan->ep_is_in)
-/*
- * Always program an integral # of max packets for IN
- * transfers
- */
-chan->xfer_len = num_packets * chan->max_packet;
-
-if (chan->ep_type == USB_ENDPOINT_XFER_INT ||
    chan->ep_type == USB_ENDPOINT_XFER_ISOC)
/*
@@ -1532,11 +1551,20 @@
}

if (hsotg->params.host_dma) {
    -dwc2_writel((u32)chan->xfer_dma,
    -hsotg->regs + HCDMA(chan->hc_num));
    +dma_addr_t dma_addr;
    +
    +if (chan->align_buf) {
    +if (dbg_hc(chan))
    +dev_vdbg(hsotg->dev, "align_buf\n");

Open Source Used In 5GaaS Edge AC-4 29076
dma_addr = chan->align_buf;
} else {
    dma_addr = chan->xfer_dma;
}
dwc2_writel((u32)dma_addr, hsotg->regs + HCDMA(chan->hc_num));
if (dbg_hc(chan))
dev_vdbg(hsotg->dev, "Wrote %08lx to HCDMA(%d)\n",
    (unsigned long)dma_addr, chan->hc_num);
/* Start the split */
static void dwc2_core_host_init(struct dwc2_hsotg *hsotg)
{
    u32 hcfg, hfir, otgctl;
    hcfg = dwc2_readl(hsotg->regs + GUSBCFG);
    hcfg |= GUSBCFG_TOUTCAL(7);
    dwc2_writel(hcfg, hsotg->regs + GUSBCFG);
    /* Restart the Phy Clock */
dwc2_writel(0, hsotg->regs + PCGCTL);
}
#endif
#define DWC2_USB_DMA_ALIGN 4
static int dwc2_alloc_split_dma_aligned_buf(struct dwc2_hsotg *hsotg,
    struct dwc2_qh *qh,
    struct dwc2_host_chan *chan) {
    if (!hsotg->unaligned_cache ||
        chan->max_packet > DWC2_KMEM_UNALIGNED_BUF_SIZE)
+return -ENOMEM;

-struct dma_aligned_buffer {
    void *kmalloc_ptr;
    void *old_xfer_buffer;
    u8 data[0];
};

+if (!qh->dw_align_buf) {
+    qh->dw_align_buf = kmem_cache_alloc(hsotg->unaligned_cache,
+    GFP_ATOMIC | GFP_DMA);
+    if (!qh->dw_align_buf)
+        return -ENOMEM;
+
+    qh->dw_align_buf_dma = dma_map_single(hsotg->dev, qh->dw_align_buf,
+        DWC2_KMEM_UNALIGNED_BUF_SIZE,
+        DMA_FROM_DEVICE);
+
+    if (dma_mapping_error(hsotg->dev, qh->dw_align_buf_dma)) {
+        dev_err(hsotg->dev, "can't map align_buf
");
+        ch->align_buf = 0;
+        return -EINVAL;
+    }
+
+    ch->align_buf = qh->dw_align_buf_dma;
+    return 0;
+
+}
+
+/* Restore urb->transfer_buffer from the end of the allocated area */
+memcpy(&stored_xfer_buffer,
       PTR_ALIGN(urb->transfer_buffer + urb->transfer_buffer_length,
	        dma_get_cache_alignment()),
         sizeof(urb->transfer_buffer));

static void dwc2_free_dma_aligned_buffer(struct urb *urb)
{
    -struct dma_aligned_buffer *temp;
    +void *stored_xfer_buffer;

    if (!((urb->transfer_flags & URB_ALIGNED_TEMP_BUFFER))
        return;

    -temp = container_of(urb->transfer_buffer,
        struct dmaAlignedBuffer, data);
    +/* Restore urb->transfer_buffer from the end of the allocated area */
    +memcpy(&stored_xfer_buffer,
             PTR_ALIGN(urb->transfer_buffer + urb->transfer_buffer_length,
          dma_get_cache_alignment()),
             sizeof(urb->transfer_buffer));

    if (usb_urb_dir_in(urb))
        memcpy(temp->old_xfer_buffer, temp->data,
memcpy(stored_xfer_buffer, urb->transfer_buffer, urb->transfer_buffer_length);
-urb->transfer_buffer = temp->old_xfer_buffer;
-kfree(temp->kmalloc_ptr);
+kfree(urb->transfer_buffer);
+urb->transfer_buffer = stored_xfer_buffer;

urb->transfer_flags &= ~URB_ALIGNED_TEMP_BUFFER;
}

static int dwc2_alloc_dma_aligned_buffer(struct urb *urb, gfp_t mem_flags)
{
-struct dma_aligned_buffer *temp, *kmalloc_ptr;
+void *kmalloc_ptr;
size_t kmalloc_size;

if (urb->num_sgs || urb->sg ||
    !((uintptr_t)urb->transfer_buffer & (DWC2_USB_DMA_ALIGN - 1)))
return 0;

/* Allocate a buffer with enough padding for alignment */
/+*
+ * Allocate a buffer with enough padding for original transfer_buffer
+ * pointer. This allocation is guaranteed to be aligned properly for
+ * DMA
+ */
kmalloc_size = urb->transfer_buffer_length +
-sizeof(struct dma_aligned_buffer) + DWC2_USB_DMA_ALIGN - 1;
+(dma_get_cache_alignment() - 1) +
+sizeof(urb->transfer_buffer);

kmalloc_ptr = kmalloc(kmalloc_size, mem_flags);
if (!kmalloc_ptr)
return -ENOMEM;

/* Position our struct dma_aligned_buffer such that data is aligned */
-temp = PTR_ALIGN(kmalloc_ptr + 1, DWC2_USB_DMA_ALIGN) - 1;
-temp->kmalloc_ptr = kmalloc_ptr;
-temp->old_xfer_buffer = urb->transfer_buffer;
/+*
+ * Position value of original urb->transfer_buffer pointer to the end
+ * of allocation for later referencing
+ */
+memcpy(PTR_ALIGN(kmalloc_ptr + urb->transfer_buffer_length, +dma_get_cache_alignment()),
+ &urb->transfer_buffer, sizeof(urb->transfer_buffer));
if (usb_urb_dir_out(urb))
-memcpy(temp->data, urb->transfer_buffer,
+memcpy(kmalloc_ptr, urb->transfer_buffer,
    urb->transfer_buffer_length);
-urb->transfer_buffer = temp->data;
+urb->transfer_buffer = kmalloc_ptr;

urb->transfer_flags |= URB_ALIGNED_TEMP_BUFFER;

@@ -2711,7 +2786,7 @@
chan->dev_addr = dwc2_hcd_get_dev_addr(&urb->pipe_info);
chan->ep_num = dwc2_hcd_get_ep_num(&urb->pipe_info);
chan->speed = qh->dev_speed;
-chan->max_packet = dwc2_max_packet(qh->maxp);
+chan->max_packet = qh->maxp;

chan->xfer_started = 0;
chan->halt_status = DWC2_HC_XFER_NO_HALT_STATUS;
@@ -2757,13 +2832,39 @@
/* Set the transfer attributes */
dwc2_hc_init_xfer(hsotg, chan, qtd);

+/* For non-dword aligned buffers */
+if (hsotg->params.host_dma && qh->do_split &&
+    chan->ep_is_in && (chan->xfer_dma & 0x3)) {
+    dev_vdbg(hsotg->dev, "Non-aligned buffer\n");
+    if (dwc2_alloc_split_dma_aligned Buf(hsotg, qh, chan)) {
+        dev_err(hsotg->dev,
+            "Failed to allocate memory to handle non-aligned buffer\n");
+    } else {
+        /* Add channel back to free list */
+        chan->align_buf = 0;
+        chan->multi_count = 0;
+        list_add_tail(&chan->hc_list_entry,
+            &hsotg->free_hc_list);
+        qtd->in_process = 0;
+        qh->channel = NULL;
+        return -ENOMEM;
+    }
+} else {
+    /* We assume that DMA is always aligned in non-split
+    * case or split out case. Warn if not.
+    */
+    WARN_ONCE(hsotg->params.host_dma &&
+        chan->xfer_dma & 0x3);
+    chan->align_buf = 0;
+}
if (chan->ep_type == USB_ENDPOINT_XFER_INT ||
    chan->ep_type == USB_ENDPOINT_XFER_ISOC) /*
 * This value may be modified when the transfer is started
 * to reflect the actual transfer length
 */
-    chan->multi_count = dwc2_hb_mult(qh->maxp);
+    chan->multi_count = qh->maxp_mult;

if (hsotg->params.dma_desc_enable) {
    chan->desc_list_addr = qh->desc_list_dma;
@@ -3862,19 +3963,21 @@

static void dwc2_hcd_urb_set_pipeinfo(struct dwc2_hsotg *hsotg,
    struct dwc2_hcd_urb *urb, u8 dev_addr,
-        u8 ep_num, u8 ep_type, u8 ep_dir, u16 mps)
+        u8 ep_num, u8 ep_type, u8 ep_dir,
+        u16 maxp, u16 maxp_mult)
{
    if (dbg_perio() ||
        ep_type == USB_ENDPOINT_XFER_BULK ||
        ep_type == USB_ENDPOINT_XFER_CONTROL)
    dev_vdbg(hsotg->dev,
        -        "addr=%d, ep_num=%d, ep_dir=%1x, ep_type=%1x, mps=%d\n",
        -        "dev_addr, ep_num, ep_dir, ep_type, mps);,
+        "addr=%d, ep_num=%d, ep_dir=%1x, ep_type=%1x, maxp=%d (%d mult)\n",
+        "dev_addr, ep_num, ep_dir, ep_type, maxp, maxp_mult);,
urb->pipe_info.dev_addr = dev_addr;
urb->pipe_info.ep_num = ep_num;
urb->pipe_info.pipe_type = ep_type;
urb->pipe_info.pipe_dir = ep_dir;
-urb->pipe_info.mps = mps;
+urb->pipe_info.maxp = maxp;
+urb->pipe_info.maxp_mult = maxp_mult;
}

/*
@@ -3965,8 +4068,9 @@
dwc2_hcd_is_pipe_in(&urb->pipe_info) ?
"IN" : "OUT")
    dev_dbg(hsotg->dev,
        -        "Max packet size: %d\n",
        -        "dwc2_hcd_get_mps(&urb->pipe_info));,
+        "Max packet size: %d (%d mult)\n",
+        '+dwc2_hcd_get_maxp(&urb->pipe_info),
+        '+dwc2_hcd_get_maxp_mult(&urb->pipe_info));
    dev_dbg(hsotg->dev,
        -        "transfer_buffer: %p\n",
        -

urb->buf);
@@ -4579,8 +4683,10 @@
    dev_vdbg(hsotg->dev, "  Speed: %s
", speed);
    -dev_vdbg(hsotg->dev, "  Max packet size: %d
",
    -usb_maxpacket(urb->dev, urb->pipe, usb_pipeout(urb->pipe));
    +dev_vdbg(hsotg->dev, "  Max packet size: %d (%d mult)\n",
    +usb_endpoint_maxp(&urb->ep->desc),
    +usb_endpoint_maxp_mult(&urb->ep->desc));
    +
    dev_vdbg(hsotg->dev, "  Data buffer length: %d\n",
    urb->transfer_buffer_length);
    dev_vdbg(hsotg->dev, "  Transfer buffer: %p, Transfer DMA: %08lx\n",
@@ -5129,6 +5235,10 @@
    hcd->has_tt = 1;
    res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
    +if (!res) {
    +  retval = -EINVAL;
    +  goto error1;
    +}
    hcd->rsrc_start = res->start;
    hcd->rsrc_len = resource_size(res);
    @@ -5250,6 +5360,19 @@
    }
if (!hsotg->unaligned_cache) {
    dev_err(hsotg->dev, "unable to create dwc2 unaligned cache\n");
}

hsotg->otg_port = 1;
hsotg->frame_list = NULL;
hsotg->frame_list_dma = 0;

error4:
-kmem_cache_destroy(hsotg->desc_gen_cache);
+kmem_cache_destroy(hsotg->unaligned_cache);
-kmem_cache_destroy(hsotg->desc_hsisoc_cache);
+kmem_cache_destroy(hsotg->desc_gen_cache);
error3:
dwc2_hcd_release(hsotg);
error2:
@@ -5326,8 +5450,9 @@
    usb_remove_hcd(hcd);
    hsotg->priv = NULL;

    -kmem_cache_destroy(hsotg->desc_gen_cache);
    +kmem_cache_destroy(hsotg->unaligned_cache);
    -kmem_cache_destroy(hsotg->desc_hsisoc_cache);
    +kmem_cache_destroy(hsotg->desc_gen_cache);

dwc2_hcd_release(hsotg);
usb_put_hcd(hcd);

--- linux-4.15.0.orig/drivers/usb/dwc2/hcd.h
+++ linux-4.15.0/drivers/usb/dwc2/hcd.h
@@ -76,6 +76,8 @@
    (micro)frame
    * @xfer_buf: Pointer to current transfer buffer position
    * @xfer_dma: DMA address of xfer_buf
+  * @align_buf: In Buffer DMA mode this will be used if xfer_buf is not
+    DWORD aligned
    * @xfer_len: Total number of bytes to transfer
    * @xfer_count: Number of bytes transferred so far
    * @start_pkt_count: Packet count at start of transfer
@@ -133,6 +135,7 @@
    u8 *xfer_buf;
    dma_addr_t xfer_dma;
+    dma_addr_t align_buf;
    u32 xfer_len;
    u32 xfer_count;
u16 start_pkt_count;
@@ -168,7 +171,8 @@
u8 ep_num;
u8 pipe_type;
u8 pipe_dir;
-u16 mps;
+u16 maxp;
+u16 maxp_mult;
};

struct dwc2_hcd_iso_packet_desc {
@@ -261,6 +265,7 @@
* @ep_is_in:           Endpoint direction
* @maxp:               Value from wMaxPacketSize field of Endpoint Descriptor
+ * @maxp_mult:          Multiplier for maxp
* @dev_speed:          Device speed. One of the following values:
*                       - USB_SPEED_LOW
*                       - USB_SPEED_FULL
@@ -303,6 +308,9 @@
*                           is tightly packed.
* @ls_duration_us:     Duration on the low speed bus schedule.
* @ntd:                Actual number of transfer descriptors in a list
+ * @dw_align_buf:       Used instead of original buffer if its physical address
+ * is not dword-aligned
+ * @dw_align_buf_dma:   DMA address for dw_align_buf
* @qtd_list:           List of QTDs for this QH
* @channel:            Host channel currently processing transfers for this QH
* @qh_list_entry:      Entry for QH in either the periodic or non-periodic
@@ -330,6 +338,7 @@
  u8 ep_type;
u8 ep_is_in;
u16 maxp;
+u16 maxp_mult;
u8 dev_speed;
u8 data_toggle;
u8 ping_state;
@@ -482,9 +493,14 @@
return pipe->pipe_type;

u32 ls_start_schedule_slice;
u16 ntd;
+u8 *dw_align_buf;
+dma_addr_t dw_align_buf_dma;
struct list_head qtd_list;
struct dwc2_host_chan *channel;
struct list_head qh_list_entry;
@@ -482,9 +493,14 @@
return pipe->pipe_type;
-static inline u16 dwc2_hcd_get_mps(struct dwc2_hcd_pipe_info *pipe)  
+static inline u16 dwc2_hcd_get_maxp(struct dwc2_hcd_pipe_info *pipe)  
+{
+  return pipe->maxp;
+}
+  
+static inline u16 dwc2_hcd_get_maxp_mult(struct dwc2_hcd_pipe_info *pipe)  
{
  -return pipe->mps;
+return pipe->maxp_mult;
}

static inline u8 dwc2_hcd_get_dev_addr(struct dwc2_hcd_pipe_info *pipe)  
@@ -599,12 +615,6 @@  
static inline bool dbg_perio(void) { return false; }  
#endif

/* High bandwidth multiplier as encoded in highspeed endpoint descriptors */
#define dwc2_hb_mult(wmaxpacketsize) (1 + (((wmaxpacketsize) >> 11) & 0x03))
-
-/* Packet size for any kind of endpoint descriptor */
-#define dwc2_max_packet(wmaxpacketsize) ((wmaxpacketsize) & 0x07ff)
-
/* Returns true if frame1 index is greater than frame2 index. The comparison  
* is done modulo FRLISTEN_64_SIZE. This accounts for the rollover of the  
--- linux-4.15.0.orig/drivers/usb/dwc2/hcd_intr.c  
+++ linux-4.15.0/drivers/usb/dwc2/hcd_intr.c  
@@ -488,7 +488,7 @@
   &short_read);

if (urb->actual_length + xfer_length > urb->length) {
  -dev_warn(hsotg->dev, "%s(): trimming xfer length\n", __func__);
+dev_dbg(hsotg->dev, "%s(): trimming xfer length\n", __func__);
  xfer_length = urb->length - urb->actual_length;
}
@@ -924,14 +924,21 @@

frame_desc = &qtd->urb->iso_descs[qtd->isoc_frame_index];
len = dwc2_get_actual_xfer_length(hsotg, chan, chnum, qtd,  
  DWC2_HC_XFER_COMPLETE, NULL);
-if (!len) {
+if (!len && !qtd->isoc_split_offset) {
    qtd->complete_split = 0;
    -qtd->isoc_split_offset = 0;
    return 0;
  }
frame_desc->actual_length += len;

+if (chan->align_buf) {
+dev_vdbg(hsotg->dev, "non-aligned buffer\n");
+dma_unmap_single(hsotg->dev, chan->qh->dw_align_buf_dma,
+ DWC2_KMEM_UNALIGNED_BUF_SIZE, DMA_FROM_DEVICE);
+memcpy(qtd->urb->buf + (chan->xfer_dma - qtd->urb->dma),
+ chan->qh->dw_align_buf, len);
+}
+
+qtd->isoc_split_offset += len;

hctsiz = dwc2_readl(hsotg->regs + HCTSIZ(chnum));
@@ -1573,8 +1580,9 @@

dev_err(hsotg->dev, "Speed: %s\n", speed);
-dev_err(hsotg->dev, " Max packet size: %d\n",
-dev2_hcd_get_mps(&urb->pipe_info));
+dev_err(hsotg->dev, " Max packet size: %d (mult %d)\n",
+ dwc2_hcd_get_maxp(&urb->pipe_info),
+ dwc2_hcd_get_maxp_mult(&urb->pipe_info));
-dev_err(hsotg->dev, " Data buffer length: %d\n", urb->length);
-dev_err(hsotg->dev, " Transfer buffer: %p, Transfer DMA: %08lx\n",
 urb->buf, (unsigned long)urb->dma);
@@ -1932,6 +1940,18 @@
 qtd->error_count++;
 dwc2_update_urb_state_abn(hsotg, chan, chnum, qtd->urb,
     qtd, DWC2_HC_XFER_XACT_ERR);
+/*
+ * We can get here after a completed transaction
+ * (urb->actual_length >= urb->length) which was not reported
+ * as completed. If that is the case, and we do not abort
+ * the transfer, a transfer of size 0 will be enqueued
+ * subsequently. If urb->actual_length is not DMA-aligned,
+ * the buffer will then point to an unaligned address, and
+ * the resulting behavior is undefined. Bail out in that
+ * situation.
+ */
+if (qtd->urb->actual_length >= qtd->urb->length)
+qtd->error_count = 3;
+dwc2_hcd_save_data_toggle(hsotg, chan, chnum, qtd);
+dwc2_halt_channel(hsotg, chan, qtd, DWC2_HC_XFER_XACT_ERR);
}
--- linux-4.15.0.orig/drivers/usb/dwc2/hcd_queue.c
+++ linux-4.15.0/drivers/usb/dwc2/hcd_queue.c
/* Get the map and adjust if this is a multi_tt hub */
map = qh->dwc_tt->periodic_bitmaps;
if (qh->dwc_tt->usb_tt->multi)
- map += DWC2_ELEMENTS_PER_LS_BITMAP * qh->ttport;
+ map += DWC2_ELEMENTS_PER_LS_BITMAP * (qh->ttport - 1);
return map;
}
static int dwc2_ulframe_schedule_split(struct dwc2_hsotg *hsotg, 
    struct dwc2_qh *qh)
{
-int bytecount = dwc2_hb_mult(qh->maxp) * dwc2_max_packet(qh->maxp);
+int bytecount = qh->maxp_mult * qh->maxp;
int ls_search_slice;
int err = 0;
int host_interval_in_sched;
@@ -1328,7 +1328,7 @@
    u32 max_channel_xfer_size;
    int status = 0;

    -max_xfer_size = dwc2_max_packet(qh->maxp) * dwc2_hb_mult(qh->maxp);
+max_xfer_size = qh->maxp * qh->maxp_mult;
    max_channel_xfer_size = hsotg->params.max_transfer_size;

    if (max_xfer_size > max_channel_xfer_size) {
@@ -1461,8 +1461,9 @@
    u32 prtspd = (hprt & HPRT0_SPD_MASK) >> HPRT0_SPD_SHIFT;
    bool do_split = (prtspd == HPRT0_SPD_HIGH_SPEED &&
        dev_speed != USB_SPEED_HIGH);
    -int maxp = dwc2_hcd_get_maxp(&urb->pipe_info);
    -int bytecount = dwc2_hb_mult(maxp) * dwc2_max_packet(maxp);
+int maxp = dwc2_hcd_get_maxp(&urb->pipe_info);
+int maxp_mult = dwc2_hcd_get_maxp_mult(&urb->pipe_info);
    +int bytecount = maxp_mult * maxp;
    char *speed, *type;

    /* Initialize QH */
@@ -1473,6 +1474,7 @@
    qh->data_toggle = DWC2_HC_PID_DATA0;
    qh->maxp = maxp;
    +qh->maxp_mult = maxp_mult;
    INIT_LIST_HEAD(&qh->qtd_list);
    INIT_LIST_HEAD(&qh->qh_list_entry);

    @ @ -1632,6 +1634,9 @@
if (qh->desc_list)
dwc2_hcd_qh_free_dma(hsocg, qh);
+else if (hsocg->unaligned_cache && qh->dw_align_buf)
+kmem_cache_free(hsocg->unaligned_cache, qh->dw_align_buf);
+
kfree(qh);
}

--- linux-4.15.0.orig/drivers/usb/dwc2/params.c
+++ linux-4.15.0/drivers/usb/dwc2/params.c
@@ -137,7 +137,7 @@
p->activate_stm_fs_transceiver = true;
}

-static void dwc2_set_stm32f7xx_hsotg_params(struct dwc2_hsotg *hsotg)
+static void dwc2_set_stm32f7_hsotg_params(struct dwc2_hsotg *hsotg)
{
 struct dwc2_core_params *p = &hsotg->params;

@@ -164,8 +164,8 @@
 {
 },
-{
+.compatible = "st,stm32f4x9-hsotg",
- .data = dwc2_set_stm32f4x9_hsotg_params },
+ .data = dwc2_set_stm32f7_hsotg_params },
 },
{},
]
MODULE_DEVICE_TABLE(of, dwc2_of_match_table);
@@ -735,7 +735,7 @@

 int dwc2_init_params(struct dwc2_hsotg *hsotg)
 {
 const struct of_device_id *match;
-void (*set_params)(void *data);
+void (*set_params)(struct dwc2_hsotg *data);

dwc2_set_default_params(hsocg);

dwc2_get_device_properties(hsocg);
--- linux-4.15.0.orig/drivers/usb/dwc2/platform.c
+++ linux-4.15.0/drivers/usb/dwc2/platform.c
@@ -339,7 +339,8 @@
 {
 struct dwc2_hsotg *hsotg = platform_get_drvdata(dev);
- disable_irq(hsocg->irq);
+ dwc2_disable_global_interrupts(hsocg);
+synchronize_irq(hsotg->irq);
}

/**
 @ @ -453,10 +454,23 @@
 if (hsotg->dr_mode == USB_DR_MODE_PERIPHERAL)
dwc2_lowlevel_hw_disable(hsotg);

+if IS_ENABLED(CONFIG_USB_DWC2_PERIPHERAL) ||
+IS_ENABLED(CONFIG_USB_DWC2_DUAL_ROLE)
+/** Postponed adding a new gadget to the udc class driver list */
+if (hsotg->gadget_enabled) {
+retval = usb_add_gadget_udc(hsotg->dev, &hsotg->gadget);
+if (retval) {
+hsotg->gadget.udc = NULL;
+dwc2_hsotg_remove(hsotg);
+goto error;
+}
+}
+#endif /* CONFIG_USB_DWC2_PERIPHERAL || CONFIG_USB_DWC2_DUAL_ROLE */
return 0;

error:
-dwc2_lowlevel_hw_disable(hsotg);
+if (hsotg->dr_mode != USB_DR_MODE_PERIPHERAL)
+dwc2_lowlevel_hw_disable(hsotg);
return retval;
}

--- linux-4.15.0.orig/drivers/usb/dwc3/Makefile
+++ linux-4.15.0/drivers/usb/dwc3/Makefile
@@ -6,7 +6,7 @@
dwc3-y					:= core.o
-ifneq ($(CONFIG_FTRACE),)
+ifneq ($(CONFIG_TRACING),)
dwc3-y				+= trace.o
endif
--- linux-4.15.0.orig/drivers/usb/dwc3/core.c
+++ linux-4.15.0/drivers/usb/dwc3/core.c
@@ -100,6 +100,8 @@
reg &= ~(DWC3_GCTL_PRTCAPDIR(DWC3_GCTL_PRTCAP_OTG));
dwc3Write(dwc->regs, DWC3_GCTRL, reg);
+dwc->current_dr_role = mode;
static void __dwc3_set_mode(struct work_struct *work)

  if (dwc->dr_mode != USB_DR_MODE_OTG)
    return;

  if (dwc->desired_dr_role == DWC3_GCTL_PRTCAP_OTG)
    return;

  switch (dwc->current_dr_role) {
    case DWC3_GCTL_PRTCAP_HOST:
      dwc3_host_exit(dwc);

  }

  switch (dwc->desired_dr_role) {
    case DWC3_GCTL_PRTCAP_HOST:
      spin_unlock_irqrestore(&dwc->lock, flags);

      queue_work(system_power_efficient_wq, &dwc->drd_work);
      queue_work(system_freezable_wq, &dwc->drd_work);
    }

  return 0;

  if (dwc->dr_mode == USB_DR_MODE_HOST)
    return 0;

  reg = dwc3_readl(dwc->regs, DWC3_DCTL);
  do {
    reg = dwc3_readl(dwc->regs, DWC3_DCTL);
    if (!(reg & DWC3_DCTL_CSFTRST))
      return 0;
    goto done;
  } while (1);

  udelay(1);
while (--retries);

phy_exit(dwc->usb3_generic_phy);
phy_exit(dwc->usb2_generic_phy);
+
return -ETIMEDOUT;
+
+done:
+/*
+ * For DWC_usb31 controller, once DWC3_DCTL_CSFRST bit is cleared,
+ * we must wait at least 50ms before accessing the PHY domain
+ * (synchronization delay). DWC_usb31 programming guide section 1.3.2.
+ */
+if (dwc3_is_usb31(dwc))
+msleep(50);
+
+return 0;
}

/*
@@ -253,8 +270,7 @@
reg = dwc3_readl(dwc->regs, DWC3_GFLADJ);
dft = reg & DWC3_GFLADJ_30MHZ_MASK;
-if (!dev_WARN_ONCE(dwc->dev, dft == dwc->fladj,
- "request value same as default, ignoring\n")) {
+if (dft != dwc->fladj) {
reg &= ~DWC3_GFLADJ_30MHZ_MASK;
reg |= DWC3_GFLADJ_30MHZ_SDBND_SEL | dwc->fladj;
dwc3_writel(dwc->regs, DWC3_GFLADJ, reg);
@@ -482,6 +498,22 @@
parms->hwparams8 = dwc3_readl(dwc->regs, DWC3_GHWPARAMS8);
}

+static int dwc3_core_ulpi_init(struct dwc3 *dwc)
+{
+int intf;
+int ret = 0;
+
+intf = DWC3_GHWPARAMS3_HSPHY_IFC(dwc->hwparams.hwparams3);
+
+if (intf == DWC3_GHWPARAMS3_HSPHY_IFC_HPI ||
+ (intf == DWC3_GHWPARAMS3_HSPHY_IFC_HPI_ULPI &&
+ dwc->hsphy_interface &&
+ !strcmp(dwc->hsphy_interface, "ulpi", 4)))
+ret = dwc3_ulpi_init(dwc);
+
+return ret;
/**
 * dwc3_phy_setup - Configure USB PHY Interface of DWC3 Core
 * @dwc: Pointer to our controller context structure
 *
 static int dwc3_phy_setup(struct dwc3 *dwc)
 {
  u32 reg;
  
  reg = dwc3_readl(dwc->regs, DWC3_GUSB3PIPECTL(0));
  
  @ @ -564,9 +595,6 @@
 }
 /* FALLTHROUGH */
 case DWC3_GHWPARAMS3_HSPHY_IFC_ULPI:
  ret = dwc3_ulpi_init(dwc);
  if (ret)
   return ret;
 /* FALLTHROUGH */
 default:
  break;
  @ @ -723,6 +751,7 @@
 }

 static int dwc3_core_get_phy(struct dwc3 *dwc);
 +static int dwc3_core_ulpi_init(struct dwc3 *dwc);
 
 /**
 * dwc3_core_init - Low-level initialization of DWC3 Core
 @ @ -754,17 +783,27 @@
 dwc->maximum_speed = USB_SPEED_HIGH;
 }

 -ret = dwc3_core_get_phy(dwc);
 +ret = dwc3_phy_setup(dwc);
 if (ret)
  goto err0;

 -ret = dwc3_core_soft_reset(dwc);
 -if (ret)
 -goto err0;
 +if (!dwc->ulpi_ready) {
 +ret = dwc3_core_ulpi_init(dwc);
 +if (ret)
 +goto err0;
 +dwc->ulpi_ready = true;
Open Source Used In 5GaaS Edge AC-4  29093

ret = dwc3_phy_setup(dwc);
if (!dwc->phys_ready) {
    ret = dwc3_core_get_phy(dwc);
    if (ret)
        goto err0a;
    dwc->phys_ready = true;
} +
+ret = dwc3_core_soft_reset(dwc);
if (ret)
    goto err0;
+goto err0a;

dwc3_core_setup_global_control(dwc);
dwc3_core_num_eps(dwc);
@@ -816,6 +855,9 @@
if (dwc->dis_tx_ipgap_linecheck_quirk)
    reg |= DWC3_GUCTL1_TX_IPGAP_LINECHECK_DIS;

+if (dwc->parkmode_disable_ss_quirk)
    +reg |= DWC3_GUCTL1_PARKMODE_DISABLE_SS;
+
dwc3_writel(dwc->regs, DWC3_GUCTL1, reg);
}
@@ -837,6 +879,9 @@
phy_exit(dwc->usb2_generic_phy);
phy_exit(dwc->usb3_generic_phy);

+err0a:
+dwc3_ulpi_exit(dwc);
+
err0:
return ret;
}
@@ -915,7 +960,6 @@
switch (dwc->dr_mode) {
    case USB_DR_MODE_PERIPHERAL:
        -dwc->current_dr_role = DWC3_GCTRL_PRTCAP_DEVICE;
        dwc3_set_prtcaps(dwc, DWC3_GCTRL_PRTCAP_DEVICE);

        if (dwc->usb2_phy)
            @@ -931,7 +975,6 @@
        } break;
case USB_DR_MODE_HOST:
    DWC->current_dr_role = DWC3_GCTL_PRTCAP_HOST;
    dwc3_set_prtcap(dwc, DWC3_GCTL_PRTCAP_HOST);

    if (dwc->usb2_phy)
    @ @ -979,6 +1022,9 @@
    /* do nothing */
    break;
    }
    +
    +/* de-assert DRVVBUS for HOST and OTG mode */
    +dwc3_set_prtcap(dwc, DWC3_GCTL_PRTCAP_DEVICE);
}

static void dwc3_get_properties(struct dwc3 *dwc)
@@ -989,7 +1035,7 @@
    u8			hird_threshold;
    /* default to highest possible threshold */
    -lpm_nyet_threshold = 0xff;
    +lpm_nyet_threshold = 0xf;

    /* default to -3.5dB de-emphasis */
    tx_de_emphasis = 1;
    @@ -1052,6 +1098,8 @@
    "snps,dis-del-phy-power-chg-quirk");
    dwc->dis_tx_ipgap_linecheck_quirk = device_property_read_bool(dev,
    "snps,dis-tx-ipgap-linecheck-quirk");
    +dwc->parkmode_disable_ss_quirk = device_property_read_bool(dev,
    +"snps,parkmode-disable-ss-quirk");

    dwc->tx_de_emphasis_quirk = device_property_read_bool(dev,
    "snps,tx_de_emphasis_quirk");
    @@ -1062,6 +1110,9 @@
    device_property_read_u32(dev, "snps,quirk-frame-length-adjustment",
    &dwc->fladj);

    +dwc->dis_metastability_quirk = device_property_read_bool(dev,
    +"snps,dis_metastability_quirk");
    +
    dwc->lpm_nyet_threshold = lpm_nyet_threshold;
    dwc->tx_de_emphasis = tx_de_emphasis;

    @@ -1206,7 +1257,8 @@
    ret = dwc3_core_init(dwc);
    if (ret) {
    -dev_err(dev, "failed to initialize core\n");
if (ret != -EPROBE_DEFER)
	dev_err(dev, "failed to initialize core: %d\n", ret);
goto err4;
}

@@ -1224,12 +1276,23 @@
err5:
dwc3_event_buffers_cleanup(dwc);

+usb_phy_shutdown(dwc->usb2_phy);
+usb_phy_shutdown(dwc->usb3_phy);
+phy_exit(dwc->usb2_generic_phy);
+phy_exit(dwc->usb3_generic_phy);
+
+
+usb_phy_set_suspend(dwc->usb2_phy, 1);
+usb_phy_set_suspend(dwc->usb3_phy, 1);
+phy_power_off(dwc->usb2_generic_phy);
+phy_power_off(dwc->usb3_generic_phy);
+
+dwc3_ulpi_exit(dwc);
+
err4:
dwc3_free_scratch_buffers(dwc);

err3:
dwc3_free_event_buffers(dwc);
-dwc3_ulpi_exit(dwc);

err2:

pm_runtime_allow(&pdev->dev);
@@ -1262,15 +1325,15 @@
/*
res->start -= DWC3_GLOBALS_REGS_START;

-dwc3_debugfs_exit(dwc);
-dwc3_core_exit_mode(dwc);
+dwc3_debugfs_exit(dwc);

-dwc3_core_exit(dwc);
-dwc3_ulpi_exit(dwc);

-pm_runtime_put_sync(&pdev->dev);
-pm_runtime_allow(&pdev->dev);
-pm_runtime_disable(&pdev->dev);
+pm_runtime_put_noidle(&pdev->dev);
+pm_runtime_set_suspended(&pdev->dev);

-dwc3_free_event_buffers(dwc);
dwc3_free_scratch_buffers(dwc);
//@ -1279.7 +1342.7 @@
}

#ifdef CONFIG_PM
-static int dwc3_suspend_common(struct dwc3 *dwc)
+static int dwc3_suspend_common(struct dwc3 *dwc, pm_message_t msg)
{
    unsigned long flags;

    //@ -1291.6 +1354.10 @@
    dwc3_core_exit(dwc);
    break;
    case DWC3_GCTL_PRTCAP_HOST:
        /* do nothing during host runtime_suspend */
        +if (!PMSG_IS_AUTO(msg))
            +dwc3_core_exit(dwc);
            +break;
            default:
                /* do nothing */
                break;
    //@ -1299.7 +1366.7 @@
    return 0;
    }

-static int dwc3_resume_common(struct dwc3 *dwc)
+static int dwc3_resume_common(struct dwc3 *dwc, pm_message_t msg)
{
    unsigned long flags;
    int ret;

    //@ -1315.6 +1382.13 @@
    spin_unlock_irqrestore(&dwc->lock, flags);
    break;
    case DWC3_GCTL_PRTCAP_HOST:
        /* nothing to do on host runtime_resume */
        +if (!PMSG_IS_AUTO(msg)) {
            +ret = dwc3_core_init(dwc);
            +if (ret)
                +return ret;
            +}
            +break;
            default:
                /* do nothing */
                break;
    //@ -1326.12 +1400.11 @@
    static int dwc3_runtime_checks(struct dwc3 *dwc)
    {
        switch (dwc->current_dr_role) {
-case USB_DR_MODE_PERIPHERAL:
- case USB_DR_MODE_OTG:
+ case DWC3_GCTL_PRTCAP_DEVICE:
    if (dwc->connected)
        return -EBUSY;
    break;
- case USB_DR_MODE_HOST:
+ case DWC3_GCTL_PRTCAP_HOST:
    default:
        /* do nothing */
    break;
@@ -1348,7 +1421,7 @@
    if (dwc3_runtime_checks(dwc))
        return -EBUSY;
-
+ret = dwc3_suspend_common(dwc);
+ret = dwc3_suspend_common(dwc, PMSG_AUTO_SUSPEND);
    if (ret)
        return ret;
    @@ -1364,7 +1437,7 @@
    device_init_wakeup(dev, false);
-
+ret = dwc3_resume_common(dwc);
+ret = dwc3_resume_common(dwc, PMSG_AUTO_RESUME);
    if (ret)
        return ret;
    @@ -1411,7 +1484,7 @@
    struct dwc3*dwc = dev_get_drvdata(dev);
    intret;
-
+ret = dwc3_suspend_common(dwc);
+ret = dwc3_suspend_common(dwc, PMSG_SUSPEND);
    if (ret)
        return ret;
    @@ -1427,7 +1500,7 @@
    pinctrl_pm_select_default_state(dev);
-
+ret = dwc3_resume_common(dwc);
+ret = dwc3_resume_common(dwc, PMSG_RESUME);
    if (ret)
        return ret;
    --- linux-4.15.0.orig/drivers/usb/dwc3/core.h
+++ linux-4.15.0/drivers/usb/dwc3/core.h
@@ -158,13 +158,15 @@
#define DWC3_GDBGFIFOSPACE_TYPE(n) (((n) << 5) & 0x1e0)
#define DWC3_GDBGFIFOSPACE_SPACE_AVAILABLE(n) (((n) >> 16) & 0xffff)
-#define DWC3_TXFIFOQ		1
-#define DWC3_RXFIFOQ		3
-#define DWC3_TXREQQ		5
-#define DWC3_RXREQQ		7
-#define DWC3_RXINFOQ		9
-#define DWC3_DESCFETCHQ		13
-#define DWC3_EVENTQ15
+#define DWC3_TXFIFOQ		0
+#define DWC3_RXFIFOQ		1
+#define DWC3_TXREQQ		2
+#define DWC3_RXREQQ		3
+#define DWC3_RXINFOQ		4
+#define DWC3_PSTATQ		5
+#define DWC3_DESCFETCHQ		6
+#define DWC3_EVENTQ7
+#define DWC3_AUXEVENTQ8

/* Global RX Threshold Configuration Register */
#define DWC3_GRXTHRCFG_MAXRXBURSTSIZE(n) (((n) & 0x1f) << 19)
@@ -196,6 +198,7 @@
#define DWC3_GCTL_DSBLCLKGTNG	BIT(0)
/* Global User Control 1 Register */
+#define DWC3_GUCTL1_PARKMODE_DISABLE_SSBIT	BIT(17)
#define DWC3_GUCTL1_TX_IPGAP_LINECHECK_DISBIT	BIT(28)
#define DWC3_GUCTL1_DEV_L1_EXIT_BY_HWBIT	BIT(24)
@@ -216,6 +219,7 @@
/* Global USB2 PHY Vendor Control Register */
#define DWC3_GUSB2PHYACC_NEWREGREQBIT	BIT(25)
+#define DWC3_GUSB2PHYACC_DONE	BIT(24)
#define DWC3_GUSB2PHYACC_BUSY	BIT(23)
#define DWC3_GUSB2PHYACC_WRITE	BIT(22)
#define DWC3_GUSB2PHYACC_ADDR(n) (n << 16)
@@ -239,6 +243,8 @@
#define DWC31_GTXFIFOSIZ_TXFRAMNUM	BIT(15)	/* DWC_usb31 only */
#define DWC31_GTXFIFOSIZ_TXFDEF(n) ((n) & 0x7fff)	/* DWC_usb31 only */
#define DWC3_GTXFIFOSIZ_TXFSTADDR(n) ((n) & 0xffff0000)

/* Global TX Fifo Size Register */
+//#define DWC31_GTXFIFOSIZ_TXFRAMNUMBIT(15)/* DWC_usb31 only */
+//#define DWC31_GTXFIFOSIZ_TXFDEF(n) & 0x7fff)/* DWC_usb31 only */
#define DWC3_GTXFIFOSIZ_TXFDEF(n) & 0xffff)
#define DWC3_GTXFIFOSIZ_TXFSTADDR(n) & 0xffff0000)
* @usb3_phy: pointer to USB3 PHY
* @usb2_generic_phy: pointer to USB2 PHY
* @usb3_generic_phy: pointer to USB3 PHY
+ * @phys_ready: flag to indicate that PHYs are ready
* @ulpi: pointer to ulpi interface
+ * @ulpi_ready: flag to indicate that ULPI is initialized
* @isoch_delay: wValue from Set Isochronous Delay request;
* @u2sel: parameter from Set SEL request.
* @u2pel: parameter from Set SEL request.
@@ -795,7 +801,9 @@
+ * @phys_ready: flag to indicate that PHYs are ready
* @ulpi: pointer to ulpi interface
+ * @ulpi_ready: flag to indicate that ULPI is initialized
* @isoch_delay: wValue from Set Isochronous Delay request;
* @u2sel: parameter from Set SEL request.
* @u2pel: parameter from Set SEL request.
@@ -851,12 +859,15 @@
* @dis_tx_ipgap_linecheck_quirk: set if we disable u2mac linestate
+ check during HS transmit.
+ * @parkmode_disable_ss_quirk: set if we need to disable all SuperSpeed
+ * instances in park mode.
+ * @tx_de_emphasis_quirk: set if we enable Tx de-emphasis quirk
* @tx_de_emphasis: Tx de-emphasis value
* 0- -6dB de-emphasis
* 1- -3.5dB de-emphasis
* 2- No de-emphasis
* 3- Reserved
+ * @dis_metastability_quirk: set to disable metastability quirk.
* @imod_interval: set the interrupt moderation interval in 250ns
* increments or 0 to disable.
*/
@@ -893,7 +904,10 @@
struct phy*usb2_generic_phy;
struct phy*usb3_generic_phy;

+boolphys_ready;
+
struct ulpi*ulpi;
+boolulpi_ready;

void __iomem*regs;
size_tregs_size;
@@ -1006,10 +1020,13 @@
unsigneddis_u2_freeclk_exists_quirk:1;
unsigneddis_del_phy_power_chg_quirk:1;
unsigneddis_tx_ipgap_linecheck_quirk:1;
+unsignedparkmode_disable_ss_quirk:1;

unsignedtx_de_emphasis_quirk:1;
unsignedtx_de_emphasis:2;
+unsigneddis_metastability_quirk:1;

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u16 imod_interval;
};

/**
 * dwc3_gadget_hs_link_string - returns highspeed and below link name
 * @link_state: link state code
 */
static inline const char *
dwc3_gadget_hs_link_string(enum dwc3_link_state link_state)
{
    switch (link_state) {
    case DWC3_LINK_STATE_U0:
        return "On";
    case DWC3_LINK_STATE_U2:
        return "Sleep";
    case DWC3_LINK_STATE_U3:
        return "Suspend";
    case DWC3_LINK_STATE_S4_DIS:
        return "Disconnected";
    case DWC3_LINK_STATE_RX_DET:
        return "Early Suspend";
    case DWC3_LINK_STATE_RECOV:
        return "Recovery";
    case DWC3_LINK_STATE_RESET:
        return "Reset";
    case DWC3_LINK_STATE_RESUME:
        return "Resume";
    default:
        return "UNKNOWN link state\n";
    }
}
+u8 speed;

spin_lock_irqsave(&dwc->lock, flags);
reg = dwc3_readl(dwc->regs, DWC3_DSTS);
state = DWC3_DSTS_USBLNKST(reg);
spin_unlock_irqrestore(&dwc->lock, flags);
+speed = reg & DWC3_DSTS_CONNECTSPD;
+seq_printf(s, "%s
", dwc3_gadget_link_string(state));
+seq_printf(s, "%s
", (speed >= DWC3_DSTS_SUPERSPEED) ?
  +  dwc3_gadget_link_string(state) :
  +  dwc3_gadget_hs_link_string(state));
+spin_unlock_irqrestore(&dwc->lock, flags);
return 0;
}

@@ -452,6 +456,8 @@
unsigned long flags;
enum dwc3_link_state state = 0;
char buf[32];
+u32 reg;
+u8 speed;
if (copy_from_user(&buf, ubuf, min_t(size_t, sizeof(buf) - 1, count)))
  return -EFAULT;
@@ -472,6 +478,15 @@
return -EINVAL;
spin_lock_irqsave(&dwc->lock, flags);
+reg = dwc3_readl(dwc->regs, DWC3_DSTS);
+speed = reg & DWC3_DSTS_CONNECTSPD;
+if (speed < DWC3_DSTS_SUPERSPEED &&
+  state != DWC3_LINK_STATE_RECOV) {
+  spin_unlock_irqrestore(&dwc->lock, flags);
+  return -EINVAL;
+}
+dwc3_gadget_set_link_state(dwc, state);
spin_unlock_irqrestore(&dwc->lock, flags);

--- linux-4.15.0.orig/drivers/usb/dwc3/dwc3-of-simple.c
+++ linux-4.15.0/drivers/usb/dwc3/dwc3-of-simple.c
@@ -143,12 +143,14 @@
    clk_disable_unprepare(simple->clks[i]);
    clk_put(simple->clks[i]);
  }
+  simple->num_clocks = 0;
reset_control_assert(simple->resets);
reset_control_put(simple->resets);

-pm_runtime_put_sync(dev);
pm_runtime_disable(dev);
+pm_runtime_put_noidle(dev);
+pm_runtime_set_suspended(dev);

return 0;
}

@@ -195,6 +197,7 @@
{
	{ .compatible = "xlnx,zynqmp-dwc3" },
	{ .compatible = "cavium,octeon-7130-usb-uctl" },
	{ .compatible = "sprd,sc9860-dwc3" },
+	{ .compatible = "hisilicon,hi3670-dwc3" },
	/* Sentinel */
};
MODULE_DEVICE_TABLE(of, of_dwc3_simple_match);
--- linux-4.15.0.orig/drivers/usb/dwc3/dwc3-omap.c
+++ linux-4.15.0/drivers/usb/dwc3/dwc3-omap.c
@@ -432,8 +432,13 @@
if (extcon_get_state(edev, EXTCON_USB) == true)
dwc3_omap_set_mailbox(omap, OMAP_DWC3_VBUS_VALID);
+else
+dwc3_omap_set_mailbox(omap, OMAP_DWC3_VBUS_OFF);
+if (extcon_get_state(edev, EXTCON_USB_HOST) == true)
dwc3_omap_set_mailbox(omap, OMAP_DWC3_ID_GROUND);
+else
+dwc3_omap_set_mailbox(omap, OMAP_DWC3_ID_FLOAT);

omap->edev = edev;
}
@@ -582,9 +587,25 @@
return 0;
}

+static void dwc3_omap_complete(struct device *dev)
+{
+struct dwc3_omap*omap = dev_get_drvdata(dev);
+if (extcon_get_state(omap->edev, EXTCON_USB))
+dwc3_omap_set_mailbox(omap, OMAP_DWC3_VBUS_VALID);
+else
+dwc3_omap_set_mailbox(omap, OMAP_DWC3_VBUS_OFF);
+}
if (extcon_get_state(omap->edev, EXTCON_USB_HOST))
    dwc3_omap_set_mailbox(omap, OMAP_DWC3_ID_GROUND);
else
    dwc3_omap_set_mailbox(omap, OMAP_DWC3_ID_FLOAT);
}

static const struct dev_pm_ops dwc3_omap_dev_pm_ops = {
    .set_power = dwc3_omap_suspend,
    .pm_power_state = dwc3_omap_pwr_state,
    .complete = dwc3_omap_complete,
};
#define DEV_PM_OPS(&dwc3_omap_dev_pm_ops)
--- linux-4.15.0.orig/drivers/usb/dwc3/dwc3-pci.c
+++ linux-4.15.0/drivers/usb/dwc3/dwc3-pci.c
@@ -34,6 +34,7 @@
#endif

#define PCI_DEVICE_ID_INTEL_GLK		0x31aa
#define PCI_DEVICE_ID_INTEL_CNPLP		0x9dee
+#define PCI_DEVICE_ID_INTEL_ICLLP		0x34ee
#define PCI_INTEL_BXT_DSM_GUID"732b85d5-b7a7-4a1b-9ba0-4bbd00ff5d11"
#define PCI_INTEL_BXT_FUNC_PMU_PWR4
@@ -176,8 +177,10 @@
    pm_runtime_get_sync(&dwc3->dev);
    if (ret)
        pm_runtime_put_sync_autosuspend(&dwc3->dev);
    return;
+
    pm_runtime_mark_last_busy(&dwc3->dev);
    pm_runtime_put_sync_autosuspend(&dwc3->dev);
    if (ret) {
        dev_err(dev, "couldn't add resources to dwc3 device\n");
        return ret;
        goto err;
    }

dwc->pci = pci;
@@ -289,6 +292,7 @@
};
}
{ PCI_DEVICE(PCI_VENDOR_ID_INTEL, PCI_DEVICE_ID_INTEL_ICLLP), },
{ PCI_DEVICE(PCI_VENDOR_ID_AMD, PCI_DEVICE_ID_AMD_NL_USB), },
{ }/* Terminating Entry */
};
--- linux-4.15.0.orig/drivers/usb/dwc3/ep0.c
+++ linux-4.15.0/drivers/usb/dwc3/ep0.c
@@ -294,6 +294,9 @@
    epnum |= 1;
    dep = dwc->eps[epnum];
+    if (dep == NULL)
+        return NULL;
+    if (dep->flags & DWC3_EP_ENABLED)
    return dep;

@@ -858,7 +861,12 @@
    trb++;
    trb->ctrl &= ~DWC3_TRB_CTRL_HWO;
    trace_dwc3_complete_trb(ep0, trb);
-    ep0->trb_enqueue = 0;
+    if (r->direction)
+        dwc->eps[1]->trb_enqueue = 0;
+    else
+        dwc->eps[0]->trb_enqueue = 0;
    dwc->ep0_bounced = false;
}
@@ -936,12 +944,16 @@
 static void __dwc3_ep0_do_control_data(struct dwc3 *dwc,
 struct dwc3_ep *dep, struct dwc3_request *req)
 {
+    unsigned int trb_length = 0;
    int ret;
    req->direction = !!dep->number;

    if (req->request.length == 0) {
        -dwc3_ep0_prepare_one_trb(dep, dwc->ep0_trb_addr, 0,
+    if (!req->direction)
+        trb_length = dep->endpoint.maxpacket;
+    else
        +dwc3_ep0_prepare_one_trb(dep, dwc->bounce_addr, trb_length,
        DWC3_TRBCTRL_CONTROL_DATA, false);
        ret = dwc3_ep0_start_trans(dep);
    } else if (!IS_ALIGNED(req->request.length, dep->endpoint.maxpacket)
req->trb = &dwc->ep0_trb[dep->trb_enqueue - 1];

+if (!req->direction)
+trb_length = dep->endpoint.maxpacket;
+
/* Now prepare one extra TRB to align transfer size */
dwc3_ep0_prepare_one_trb(dep, dwc->bounce_addr,
 - 0, DWC3_TRBCTL_CONTROL_DATA,
 + trb_length, DWC3_TRBCTL_CONTROL_DATA,
false);
ret = dwc3_ep0_start_trans(dep); } else {
@@ -1114,6 +1129,9 @@

void dwc3_ep0_interrupt(struct dwc3 *dwc,
 const struct dwc3_event_depevt *event)
 {
 +struct dwc3_ep*dep = dwc->eps[event->endpoint_number];
 +u8cmd;
 +
 switch (event->endpoint_event) {
 case DWC3_DEPEVT_XFERCOMPLETE:
 dwc3_ep0_xfer_complete(dwc, event);
@@ -1126,7 +1144,12 @@
 case DWC3_DEPEVT_XFERINPROGRESS:
 case DWC3_DEPEVT_RXTXFIFOEVT:
 case DWC3_DEPEVT_STREAMEVT:
+break;
 case DWC3_DEPEVT_EPCMDCMPLT:
 +cmd = DEPEVT_PARAMETER_CMD(event->parameters);
 +
 +if (cmd == DWC3_DEPCMD_ENDTRANSFER)
 +dep->flags &= ~DWC3_EP_TRANSFER_STARTED;
 break;
 }

--- linux-4.15.0.orig/drivers/usb/dwc3/gadget.c
+++ linux-4.15.0/drivers/usb/dwc3/gadget.c
@@ -166,42 +166,51 @@
dwc3_ep_inc_trb(&dep->trb_dequeue);
}

/**
- * dwc3_gadget_giveback - call struct usb_request's ->complete callback
- * @dep: The endpoint to whom the request belongs to
- * @req: The request we're giving back
- * @status: completion code for the request

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void dwc3_gadget_giveback(struct dwc3_ep *dep, struct dwc3_request *req, int status)
{
    struct dwc3*dwc = dep->dwc;

    req->started = false;
    list_del(&req->list);
    req->remaining = 0;
    req->unaligned = false;
    req->zero = false;

    if (req->request.status == -EINPROGRESS)
        req->request.status = status;

    if (req->trb)
    {
        if (dep->number > 1)
            pm_runtime_put(dwc->dev);

        usb_gadget_unmap_request_by_dev(dwc->sysdev,
            &req->request, req->direction);
    }

    req->trb = NULL;

    trace_dwc3_gadget_giveback(req);

    +if (dep->number > 1)
        +pm_runtime_put(dwc->dev);
    +}
    +/
    +* dwc3_gadget_giveback - call struct usb_request's ->complete callback
    + * @dep: The endpoint to whom the request belongs to
    + * @req: The request we're giving back
    + * @status: completion code for the request
    + *
    + * Must be called with controller's lock held and interrupts disabled. This
    + * function will unmap @req and call its ->complete() callback to notify upper
    + * layers that it has completed.
    + */

+void dwc3_gadget_del_and_unmap_request(struct dwc3_ep *dep,
    +struct dwc3_request *req, int status)
+{
+    struct dwc3*dwc = dep->dwc;
+ dwc3_gadget_del_and_unmap_request(dep, req, status);
+ spin_unlock(&dwc->lock);
usb_gadget_giveback_request(&dep->endpoint, &req->request);
spin_lock(&dwc->lock);
-
-if (dep->number > 1)
-pm_runtime_put(dwc->dev);
}

/**
 @@ -259,38 +268,46 @@
 {
 const struct usb_endpoint_descriptor *desc = dep->endpoint.desc;
 struct dwc3*dwc = dep->dwc;
-u32 timeout = 1000;
+u32 timeout = 5000;
+u32 saved_config = 0;
 u32reg;

 intcmd_status = 0;
-intsusphy = false;
 intret = -EINVAL;

 /*
- * Synopsys Databook 2.60a states, on section 6.3.2.5,[1-8], that if
- * we're issuing an endpoint command, we must check if
- * GUSB2PHYCFG.SUSPHY bit is set. If it is, then we need to clear it.
+ * When operating in USB 2.0 speeds (HS/FS), if GUSB2PHYCFG.ENBLSLPM or
+ * GUSB2PHYCFG.SUSPHY is set, it must be cleared before issuing an
+ * endpoint command.
+ *
- * We will also set SUSPHY bit to what it was before returning as stated
- * by the same section on Synopsys databook.
+ * Save and clear both GUSB2PHYCFG.ENBLSLPM and GUSB2PHYCFG.SUSPHY
+ * settings. Restore them after the command is completed.
+ *
+ * DWC_usb3 3.30a and DWC_usb31 1.90a programming guide section 3.2.2
+ */
if (dwc->gadget.speed <= USB_SPEED_HIGH) {
 reg = dwc3_readl(dwc->regs, DWC3_GUSB2PHYCFG(0));
 if (unlikely(reg & DWC3_GUSB2PHYCFG_SUSPHY)) {
- susphy = true;
+ saved_config |= DWC3_GUSB2PHYCFG_SUSPHY;
 reg &= ~DWC3_GUSB2PHYCFG_SUSPHY;
-dwc3_writel(dwc->regs, DWC3_GUSB2PHYCFG_SUSPHY, reg);
}
+if (reg & DWC3_GUSB2PHYCFG_ENBLSLPM) {
  +saved_config |= DWC3_GUSB2PHYCFG_ENBLSLPM;
+reg &= ~DWC3_GUSB2PHYCFG_ENBLSLPM;
+}
+
+if (saved_config)
+dwc3_writel(dwc->regs, DWC3_GUSB2PHYCFG(0), reg);
}

if (DWC3_DEPCMD_CMD(cmd) == DWC3_DEPCMD_STARTTRANSFER) {
-int needs_wakeup;

-needs_wakeup = (dwc->link_state == DWC3_LINK_STATE_U1 ||
  -dwc->link_state == DWC3_LINK_STATE_U2 ||
  -dwc->link_state == DWC3_LINK_STATE_U3);
+int link_state;

-if (unlikely(needs_wakeup)) {
+link_state = dwc3_gadget_get_link_state(dwc);
+if (link_state == DWC3_LINK_STATE_U1 ||
+    link_state == DWC3_LINK_STATE_U2 ||
+    link_state == DWC3_LINK_STATE_U3) {
ret = __dwc3_gadget_wakeup(dwc);
  dev_WARN_ONCE(dwc->dev, ret, "wakeup failed --> %d
", ret);
@@ -378,9 +395,9 @@
}
}

- if (unlikely(susphy)) {
+ if (saved_config) {
reg = dwc3_readl(dwc->regs, DWC3_GUSB2PHYCFG(0));
-reg |= DWC3_GUSB2PHYCFG_SUSPHY;
+reg |= saved_config;
-dwc3_writel(dwc->regs, DWC3_GUSB2PHYCFG(0), reg);
}

@@ -580,8 +597,23 @@
params.param0 |= DWC3_DEPCFG_FIFO_NUMBER(dep->number >> 1);

if (desc->bInterval) {
-params.param1 |= DWC3_DEPCFG_BINTERVAL_M1(desc->bInterval - 1);
-dep->interval = 1 << (desc->bInterval - 1);
+u8 bInterval_m1;
+
+ /*
+ * Valid range for DEPCFG.bInterval_m1 is from 0 to 13, and it
+ * must be set to 0 when the controller operates in full-speed.
+ */
+ bInterval_m1 = min_t(u8, desc->bInterval - 1, 13);
+ if (dwc->gadget.speed == USB_SPEED_FULL)
+ bInterval_m1 = 0;
+ 
+ if (usb_endpoint_type(desc) == USB_ENDPOINT_XFER_INT &&
+ dwc->gadget.speed == USB_SPEED_FULL)
+ dep->interval = desc->bInterval;
+ else
+ dep->interval = 1 << (desc->bInterval - 1);
+ 
+ params.param1 |= DWC3_DEPCFG_BINTERVAL_M1(bInterval_m1);
}

return dwc3_send_gadget_ep_cmd(dep, DWC3_DEPCMD_SETEPCONFIG, &params);
@@ -873,8 +905,6 @@
struct usb_gadget *gadget = &dwc->gadget;
enum usb_device_speed speed = gadget->speed;
- 
- dwc3_ep_inc_enq(dep);
- 
- trb->size = DWC3_TRB_SIZE_LENGTH(length);
- trb->bpl = lower_32_bits(dma);
- trb->bph = upper_32_bits(dma);
- @ @ -944,16 +974,20 @@
- usb_endpoint_type(dep->endpoint.desc));
- }
-
- /* always enable Continue on Short Packet */
+ /*
+ * Enable Continue on Short Packet
+ * when endpoint is not a stream capable
+ */
+ if (usb_endpoint_dir_out(dep->endpoint.desc)) {
+ trb->ctrl |= DWC3_TRB_CTRL_CSP;
+ if (!dep->stream_capable)
+ trb->ctrl |= DWC3_TRB_CTRL_CSP;
+
+ if (short_not_ok)
+ trb->ctrl |= DWC3_TRB_CTRL_ISP_IMI;
+ }
+
+ if (!(no_interrupt && !chain) ||
+ !(dwc3_calc_trbs_left(dep) == 0))
+ +(dwc3_calc_trbs_left(dep) == 1))
+ trb->ctrl |= DWC3_TRB_CTRL_IOC;
if (chain)
@@ -964,6 +998,8 @@
    trb->ctrl |= DWC3_TRB_CTRL_HWO;
    
    +dwc3_ep_inc_enq(dep);
    +
    trace_dwc3_prepare_trb(dep, trb);
    }
@@ -1018,19 +1054,19 @@
 static u32 dwc3_calc_trbs_left(struct dwc3_ep *dep)
 {
    struct dwc3_trb *tmp;
    u8 trbs_left;
    
    /*
    * - * If enqueue & dequeue are equal than it is either full or empty.
    * - *
    * - * One way to know for sure is if the TRB right before us has HWO bit
    * - * set or not. If it has, then we're definitely full and can't fit any
    * - * more transfers in our ring.
    * + * If the enqueue & dequeue are equal then the TRB ring is either full
    * + * or empty. It's considered full when there are DWC3_TRB_NUM-1 of TRBs
    * + * pending to be processed by the driver.
    */
    if (dep->trb_enqueue == dep->trb_dequeue) {
        tmp = dwc3_ep_prev_trb(dep, dep->trb_enqueue);
        if (tmp->ctrl & DWC3_TRB_CTRL_HWO)
            
            /* If there is any request remained in the started_list at
            * this point, that means there is no TRB available.
            */
            +if (!list_empty(&dep->started_list))
            return 0;
    
    return DWC3_TRB_NUM - 1;
@@ -1073,7 +1109,7 @@
 /* Now prepare one extra TRB to align transfer size */
 trb = &dep->trb_pool[dep->trb_enqueue];
    __dwc3_prepare_one_trb(dep, trb, dwc->bounce_addr,
-maxp - rem, false, 0,
+maxp - rem, false, 1,
    req->request.stream_id,
    req->request.short_not_ok,
    req->request.no_interrupt);
@@ -1093,7 +1129,7 @@
unsigned int maxp = usb_endpoint_maxp(dep->endpoint.desc);
unsigned int rem = length % maxp;

-if (rem && usb_endpoint_dir_out(dep->endpoint.desc)) {
+if (!length || rem) && usb_endpoint_dir_out(dep->endpoint.desc)) {
   struct dwc3*dwc = dep->dwc;
   struct dwc3_trb*trb;

   /* Now prepare one extra TRB to align transfer size */
   trb = &dep->trb_pool[dep->trb_enqueue];
   __dwc3_prepare_one_trb(dep, trb, dwc->bounce_addr, maxp - rem,
     -false, 0, req->request.stream_id,
 +false, 1, req->request.stream_id,
   req->request.short_not_ok,
   req->request.no_interrupt);
   } else if (req->request.zero && req->request.length &&
     @ @ -1121,7 +1157,7 @@
   /* Now prepare one extra TRB to handle ZLP */
   trb = &dep->trb_pool[dep->trb_enqueue];
   __dwc3_prepare_one_trb(dep, trb, dwc->bounce_addr, 0,
     -false, 0, req->request.stream_id,
 +false, 1, req->request.stream_id,
   req->request.short_not_ok,
   req->request.no_interrupt);
   } else {
     @ @ -1227,7 +1263,7 @@
   if (req->trb)
      memset(req->trb, 0, sizeof(struct dwc3_trb));
   dep->queued_requests--;
   -dwc3_gadget_giveback(dep, req, ret);
 +dwc3_gadget_del_and_unmap_request(dep, req, ret);
   return ret;
   }

   @@ -1417,7 +1453,7 @@
   dwc->lock);

   if (!r->trb)
      goto out1;
+   goto out0;

   if (r->num_pending_sgs) {
      struct dwc3_trb *trb;
     @ @ -1484,9 +1520,6 @@
      unsigned transfer_in_flight;
      unsigned started;

   /* Now prepare one extra TRB to handle ZLP */
if (dep->flags & DWC3_EP_STALL)
    return 0;

if (dep->number > 1)
    trb = dwc3_ep_prev_trb(dep, dep->trb_enqueue);
else
    dep->flags |= DWC3_EP_STALL;
} else {
    if (!(dep->flags & DWC3_EP_STALL))
        return 0;

    ret = dwc3_send_clear_stall_ep_cmd(dep);
    if (ret)
        @ @ -1604,7 +1635,6 @ @
    u32
    reg;

    u8
    link_state;
    -u8
    speed;

    /*
     * According to the Databook Remote wakeup request should
    @ @ -1614,16 +1644,15 @ @
    */
    reg = dwc3_readl(dwc->regs, DWC3_DSTS);

    -speed = reg & DWC3_DSTS_CONNECTSPD;
    -if ((speed == DWC3_DSTS_SUPERSPEED) ||
        (speed == DWC3_DSTS_SUPERSPEED_PLUS))
        -return 0;
    -
    link_state = DWC3_DSTS_USBLNKST(reg);

    switch (link_state) {
        +case DWC3_LINK_STATE_RESET:
        case DWC3_LINK_STATE_RX_DET/* in HS, means Early Suspend */
        case DWC3_LINK_STATE_U3/* in HS, means SUSPEND */
        +case DWC3_LINK_STATE_U2/* in HS, means Sleep (L1) */
        +case DWC3_LINK_STATE_U1:
        +case DWC3_LINK_STATE_RESUME:
            break;
        default:
            return -EINVAL;
    @ @ -1750,10 +1779,8 @ @

    ret = wait_for_completion_timeout(&dwc->ep0_in_setup,
msecs_to_jiffies(DWC3_PULL_UP_TIMEOUT));
if (ret == 0) {
    dev_err(dwc->dev, "timed out waiting for SETUP phase\n");
    return -ETIMEDOUT;
}
+if (ret == 0)
+    dev_warn(dwc->dev, "timed out waiting for SETUP phase\n");
}

spin_lock_irqsave(&dwc->lock, flags);
if (dwc->revision < DWC3_REVISION_250A)
    reg |= DWC3_DEVTEN_ULSTCNGEN;
+/* On 2.30a and above this bit enables U3/L2-L1 Suspend Events */
+if (dwc->revision >= DWC3_REVISION_230A)
+    reg |= DWC3_DEVTEN_EOPFEN;
+    dwc3_writel(dwc->regs, DWC3_DEV_BIST, reg);
}

/* begin to receive SETUP packets */
dwc->ep0state = EP0_SETUP_PHASE;
+dwc->link_state = DWC3_LINK_STATE_SS_DIS;
+dwc->delayed_status = false;
dwc3_ep0_out_start(dwc);

dwc3_gadget_enable_irq(dwc);

/* STAR#9000525659: Clock Domain Crossing on DCTL in USB 2.0 Mode */
-if (dwc->revision < DWC3_REVISION_220A) {
+if (dwc->revision < DWC3_REVISION_220A &&
    !dwc->dis_metastability_quirk) {
    reg |= DWC3_DCFG_SUPERSPEED;
} else {
    switch (speed) {
        @ @ -2222.7 +2256.7 @@
    * with one TRB pending in the ring. We need to manually clear HWO bit
    * from that TRB.
    */
        -if ((req->zero || req->unaligned) && (trb->ctrl & DWC3_TRB_CTRL_HWO)) {
+        if ((req->zero || req->unaligned) && !(trb->ctrl & DWC3_TRB_CTRL_CHN)) {
            trb->ctrl &= ~DWC3_TRB_CTRL_HWO;
            return 1;
        }
dwc->connected = true;

/*
 * Ideally, dwc3_reset_gadget() would trigger the function
 * drivers to stop any active transfers through ep disable.
 * However, for functions which defer ep disable, such as mass
 * storage, we will need to rely on the call to stop active
 * transfers here, and avoid allowing of request queuing.
 */
dwc->connected = false;

/* WORKAROUND: DWC3 revisions <1.88a have an issue which
 * would cause a missing Disconnect Event if there's a
 * pending Setup Packet in the FIFO.
 */
break;
}
dwc->eps[1]->endpoint.maxpacket = dwc->gadget.ep0->maxpacket;
+
/* Enable USB2 LPM Capability */
if ((dwc->revision > DWC3_REVISION_194A) &&
    dwc->gadget.speed= USB_SPEED_UNKNOWN;
dwc->gadget.sg_supported= true;
dwc->gadget.name= "dwc3-gadget";
-dwc->gadget.is_otg= dwc->dr_mode == USB_DR_MODE_OTG;
+
/* FIXME We might be setting max_speed to <SUPER, however versions
 * is less than super speed because we don't have means, yet, to tell
 * composite.c that we are USB 2.0 + LPM ECN.
 */
-if (dwc->revision < DWC3_REVISION_220A)
+if (dwc->revision < DWC3_REVISION_220A &&
    !dwc->dis_metastability_quirk)
dev_info(dwc->dev, "changing max_speed on rev %08x\n",
    dwc->revision);

 goto err4;
 }
+dwc3_gadget_set_speed(&dwc->gadget, dwc->maximum_speed);
return 0;

err4:
@@ -3287,6 +3334,8 @@
dwc3_disconnect_gadget(dwc);
 __dwc3_gadget_stop(dwc);

+ synchronize_irq(dwc->irq_gadget);
+
+ return 0;
}

--- linux-4.15.0.orig/drivers/usb/dwc3/gadget.h
+++ linux-4.15.0/drivers/usb/dwc3/gadget.h
@@ -25,7 +25,7 @@
#define DWC3_DEPCFG_XFER_IN_PROGRESS_EN (BIT(9)
#define DWC3_DEPCFG_XFER_NOT_READY_EN (BIT(10)
#define DWC3_DEPCFG_FIFO_ERROR_EN (BIT(11)
-#define DWC3_DEPCFG_STREAM_EVENT_EN (BIT(12)
+#define DWC3_DEPCFG_STREAM_EVENT_EN (BIT(13)
#define DWC3_DEPCFG_BINTERVAL_M1(n) (((n) & 0xff) << 16)
#define DWC3_DEPCFG_STREAM_EVENT_ENBIT(13)
#define DWC3_DEPCFG_BINTERVAL_M1(n)(((n) & 0xff) << 16)
#define DWC3_DEPCFG_STREAM_CAPABLEBIT(24)
#define DWC3_DEPCFG_EP_NUMBER(n)(((n) & 0x1f) << 25)
--- linux-4.15.0.orig/drivers/usb/dwc3/trace.h
+++ linux-4.15.0/drivers/usb/dwc3/trace.h
@@ -254,9 +254,11 @@
s = "2x ";
 break;
 case 3:
+default:
 s = "3x ";
 break;
 }
+break;
 default:
 s = "";
} s;

--- linux-4.15.0.orig/drivers/usb/dwc3/ulpi.c
+++ linux-4.15.0/drivers/usb/dwc3/ulpi.c
@@ -7,6 +7,8 @@
* Author: Heikki Krogerus <heikki.krogerus@linux.intel.com>
 */

+#include <linux/delay.h>
+#include <linux/time64.h>
#include <linux/ulpi/regs.h>
```c
#include "core.h"

// Adjusted code snippet from the original
DWC3_GUSB2PHYACC_ADDR(ULPI_ACCESS_EXTENDED) | \nDWC3_GUSB2PHYACC_EXTEND_ADDR(a) : DWC3_GUSB2PHYACC_ADDR(a))

-static int dwc3_ulpi_busyloop(struct dwc3 *dwc)
+static int dwc3_ulpi_busyloop(struct dwc3 *dwc, u8 addr, bool read)
{
    -unsigned count = 1000;
    +unsigned long ns = 5L * DWC3_ULPI_BASE_DELAY;
    +unsigned int count = 1000;

    u32 reg;

    +if (addr >= ULPI_EXT_VENDOR_SPECIFIC)
    +ns += DWC3_ULPI_BASE_DELAY;
    +if (read)
    +ns += DWC3_ULPI_BASE_DELAY;

    while (count--) {
        ndelay(ns);
        reg = dwc3_readl(dwc->regs, DWC3_GUSB2PHYACC(0));
        -if (!(reg & DWC3_GUSB2PHYACC_BUSY))
        +if (reg & DWC3_GUSB2PHYACC_DONE)
            return 0;
    cpu_relax();
    }

    reg = DWC3_GUSB2PHYACC_NEWREGREQ | DWC3_ULPI_ADDR(addr);
    dwc3_writel(dwc->regs, DWC3_GUSB2PHYACC(0), reg);

    -ret = dwc3_ulpi_busyloop(dwc);
    +ret = dwc3_ulpi_busyloop(dwc, addr, true);

    if (ret)
        return ret;

    --- linux-4.15.0.orig/drivers/usb/early/xhci-dbc.c
```
case COMP_USB_TRANSACTION_ERROR:
case COMPSTALL_ERROR:
default:
    -if (ep_id == XDBC_EPID_OUT)
    +if (ep_id == XDBC_EPID_OUT || ep_id == XDBC_EPID_OUT_INTEL)
        xdbc.flags |= XDBC_FLAGS_OUT_STALL;
    -if (ep_id == XDBC_EPID_IN)
    +if (ep_id == XDBC_EPID_IN || ep_id == XDBC_EPID_IN_INTEL)
        xdbc.flags |= XDBC_FLAGS_IN_STALL;
    xdbc_trace("endpoint %d stalled\n", ep_id);
    break;
}

-#define XDBC_EPID_OUT	2
-#define XDBC_EPID_IN	3
+/*
+ * These are the "Endpoint ID" (also known as "Context Index") values for the
+ * OUT Transfer Ring and the IN Transfer Ring of a Debug Capability Context data
+ * structure.
+ * According to the "eXtensible Host Controller Interface for Universal Serial
+ * Bus (xHCI)" specification, section "7.6.3.2 Endpoint Contexts and Transfer
+ * Rings", these should be 0 and 1, and those are the values AMD machines give
+ * you; but Intel machines seem to use the formula from section "4.5.1 Device
+ * Context Index", which is supposed to be used for the Device Context only.
+ * Luckily the values from Intel don't overlap with those from AMD, so we can
+ * just test for both.
+ */
+#define XDBC_EPID_OUT0
+#define XDBC_EPID_IN1
+#define XDBC_EPID_OUT_INTEL2
```c
#define XDBC_EPID_IN_INTEL	3

struct xdbc_state {
  u16 vendor;
};
```

```bash
@@ -264,6 +264,7 @@
depends on NET
select USB_U_ETHER
select USB_F_NCM
+select CRC32
help
NCM is an advanced protocol for Ethernet encapsulation, allows grouping of several ethernet frames into one USB transfer and
@@ -313,6 +314,7 @@
depends on NET
select USB_U_ETHER
select USB_F_EEM
+select CRC32
help
CDC EEM is a newer USB standard that is somewhat simpler than CDC ECM and therefore can be supported by more hardware. Technically ECM and
@@ -96,40 +96,43 @@
}
return NULL;
}

/
- * for_each_ep_desc()- iterate over endpoint descriptors in the
- *descriptors list
- * @start:pointer within descriptor array.
- * @ep_desc:endpoint descriptor to use as the loop cursor
+ * for_each_desc() - iterate over desc_type descriptors in the
+ * descriptors list
+ * @start: pointer within descriptor array.
+ * @iter_desc: desc_type descriptor to use as the loop cursor
+ * @desc_type: wanted descriptor type
*/
#define for_each_ep_desc(start, ep_desc) \
	for (ep_desc = next_ep_desc(start); \
	      ep_desc; ep_desc = next_ep_desc(ep_desc+1))
#define for_each_desc(start, iter_desc, desc_type) \
	for (iter_desc = next_desc(start, desc_type); \
	     iter_desc; iter_desc = next_desc(iter_desc + 1, desc_type))

/**
- * config_ep_by_speed() - configures the given endpoint
+ * config_ep_by_speed_and_alt() - configures the given endpoint
* according to gadget speed.
* @g: pointer to the gadget
* @f: usb function
* @_ep: the endpoint to configure
+ * @alt: alternate setting number
*
* Return: error code, 0 on success
*
@@ -142,11 +145,13 @@
* Note: the supplied function should hold all the descriptors
* for supported speeds
*/
-int config_ep_by_speed(struct usb_gadget *g, 
-struct usb_function *f, 
-struct usb_ep * _ep)
+int config_ep_by_speed_and_alt(struct usb_gadget *g, 
+struct usb_function *f, 
+struct usb_ep * _ep, 
+u8 alt)
{ 
    struct usb_endpoint_descriptor *chosen_desc = NULL;
    +struct usb_interface_descriptor *int_desc = NULL;
    struct usb_descriptor_header **speed_desc = NULL;

    ...
struct usb_ss_ep_comp_descriptor *comp_desc = NULL;
@@ -182,8 +187,21 @@
default:
speed_desc = f->fs_descriptors;
} +
+/* find correct alternate setting descriptor */
+for_each_desc(speed_desc, d_spd, USB_DT_INTERFACE) {
+int_desc = (struct usb_interface_descriptor *)d_spd;
+if (int_desc->bAlternateSetting == alt) {
+speed_desc = d_spd;
+goto intf_found;
+}
+}
+return -EIO;
+
+intf_found:
/* find descriptors */
- for_each_ep_desc(speed_desc, d_spd) {
+ for_each_desc(speed_desc, d_spd, USB_DT_ENDPOINT) {
chosen_desc = (struct usb_endpoint_descriptor *)d_spd;
if (chosen_desc->bEndpointAddress == _ep->address)
goto ep_found;
@@ -237,6 +255,32 @@
} return 0;
}
+EXPORT_SYMBOL_GPL(config_ep_by_speed_and_alt);
+
+/**
+ * config_ep_by_speed() - configures the given endpoint
+ * according to gadget speed.
+ * @g: pointer to the gadget
+ * @f: usb function
+ * @_ep: the endpoint to configure
+ *
+ * Return: error code, 0 on success
+ *
+ * This function chooses the right descriptors for a given
+ * endpoint according to gadget speed and saves it in the
+ * endpoint desc field. If the endpoint already has a descriptor
+ * assigned to it - overwrites it with currently corresponding
+ * descriptor. The endpoint maxpacket field is updated according
+ * to the chosen descriptor.
+ * Note: the supplied function should hold all the descriptors
+ * for supported speeds
int config_ep_by_speed(struct usb_gadget *g, 
struct usb_function *f, 
struct usb_ep *_ep) 
{ 
+return config_ep_by_speed_and_alt(g, f, _ep, 0); 
+} 
EXPORT_SYMBOL_GPL(config_ep_by_speed);

/** 
@@ -348,8 +392,11 @@ 
spin_lock_irqsave(&cdev->lock, flags); 

-if (cdev->deactivations == 0) 
+if (cdev->deactivations == 0) { 
+spin_unlock_irqrestore(&cdev->lock, flags); 
status = usb_gadget_deactivate(cdev->gadget); 
+spin_lock_irqsave(&cdev->lock, flags); 
+} 
if (status == 0) 
cdev->deactivations++; 
@@ -380,8 +427,11 @@ 
status = -EINVAL; 
else { 
cdev->deactivations--; 
-if (cdev->deactivations == 0) 
+if (cdev->deactivations == 0) { 
+spin_unlock_irqrestore(&cdev->lock, flags); 
status = usb_gadget_activate(cdev->gadget); 
+spin_lock_irqsave(&cdev->lock, flags); 
+} 
} 
spin_unlock_irqrestore(&cdev->lock, flags); 
@@ -431,18 +481,20 @@ 
} 
unsigned val; 

-if (c->MaxPower) 
+if (c->MaxPower || (c->bmAttributes & USB_CONFIG_ATT_SELFPOWER)) 
val = c->MaxPower; 
else 
val = CONFIG_USB_GADGET_VBUS_DRAW; 
if (!val) 
return 0; 
-switch (speed) {

case USB_SPEED_SUPER:
    return DIV_ROUND_UP(val, 8);
-default:
    return DIV_ROUND_UP(val, 2);
-
    if (speed < USB_SPEED_SUPER)
    return min(val, 500U) / 2;
    else
    /*
    * USB 3.x supports up to 900mA, but since 900 isn't divisible
    * by 8 the integral division will effectively cap to 896mA.
    * /
    return min(val, 900U) / 8;

static int config_buf(struct usb_configuration *config,
@@ -839,8 +891,21 @@
    done:
    if (power <= USB_SELF_POWER_VBUS_MAX_DRAW)
        usb_gadget_set_selfpowered(gadget);
    else
        usb_gadget_clear_selfpowered(gadget);
+
    usb_gadget_vbus_draw(gadget, power);
    if (result >= 0 && cdev->delayed_status)
        result = USB_GADGET_DELAYED_STATUS;
@@ -1016,7 +1081,7 @@
        while (*sp) {
            s = *sp;
            language = cpu_to_le16(s->language);
            -for (tmp = buf; *tmp && tmp < &buf[126]; tmp++) {
            +for (tmp = buf; *tmp && tmp < &buf[USB_MAX_STRING_LEN]; tmp++) {
                if (*tmp == language)
                    goto repeat;
            }


```
@@ -1091,7 +1156,7 @@
    collect_langs(sp, s->wData);
 }

-for (len = 0; len <= 126 && s->wData[len]; len++)
+for (len = 0; len <= USB_MAX_STRING_LEN && s->wData[len]; len++)
    continue;
    if (!len)
        return -EINVAL;
@@ -1422,7 +1487,7 @@
    return res;
 }

-static void fill_ext_compat(struct usb_configuration *c, u8 *buf)
+static int fill_ext_compat(struct usb_configuration *c, u8 *buf)
{
    int i, count;

@@ -1449,10 +1514,12 @@
        buf += 23;
    }
    count += 24;
-if (count >= 4096)
-    return;
+if (count + 24 >= USB_COMP_EP0_OS_DESC_BUFSIZE)
+    return count;
    }
    }
+    
+    return count;
 }

static int count_ext_prop(struct usb_configuration *c, int interface)
@@ -1497,25 +1564,20 @@
    struct usb_os_desc *d;
    struct usb_os_desc_ext_prop *ext_prop;
    int j, count, n, ret;
-    u8 *start = buf;

    f = c->interface[interface];
    +count = 10; /* header length */
    for (j = 0; j < f->os_desc_n; ++j) {  
        if (interface != f->os_desc_table[j].if_id)
            continue;
        d = f->os_desc_table[j].os_desc;
        if (d)
            list_for_each_entry(ext_prop, &d->ext_prop, entry) {
-/* 4kB minus header length */
```
- n = buf - start;
- if (n >= 4086)
  - return 0;
-
  - count = ext_prop->data_len +
  + n = ext_prop->data_len +
  ext_prop->name_len + 14;
  - if (count > 4086 - n)
    - return -EINVAL;
  - usb_ext_prop_put_size(buf, count);
  + if (count + n >= USB_COMP_EP0_OS_DESC_BUFSIZE)
    + return count;
  + usb_ext_prop_put_size(buf, n);
  usb_ext_prop_put_type(buf, ext_prop->type);
  ret = usb_ext_prop_put_name(buf, ext_prop->name,
    ext_prop->name_len);
@@ -1541,11 +1603,12 @@
  default:
    return -EINVAL;
  }
- buf += count;
+ buf += n;
+ count += n;
  }
  }
  
  - return 0;
  + return count;
  }
  
  /*
@@ -1719,6 +1782,8 @@
  */
  if (w_value && !f->get_alt)
    break;
+  +spin_lock(&cdev->lock);
    value = f->set_alt(f, w_index, w_value);
    if (value == USB_GADGET_DELAYED_STATUS) {
      DBG(cdev,
@@ -1728,6 +1793,7 @@
        delayed_status count %d
      cdev->delayed_status);
    }
+  +spin_unlock(&cdev->lock);
    break;
  case USB_REQ_GET_INTERFACE:
    if (ctrl->bRequestType != (USB_DIR_IN|USB_RECIP_INTERFACE))
if (cdev->use_os_string && cdev->os_desc_config &&
    (ctrl->bRequestType & USB_TYPE_VENDOR) &&
    ctrl->bRequest == cdev->b_vendor_code) {
-    struct usb_request* req;
struct usb_configuration* os_desc_cfg;
    u8* buf;
    int interface;
    @ @ -1827,6 +1892,7 @@
    req->complete = composite_setup_complete;
    buf = req->buf;
    os_desc_cfg = cdev->os_desc_config;
+    w_length = min_t(u16, w_length, USB_COMP_EP0_OS_DESC_BUFSIZE);
    memset(buf, 0, w_length);
    buf[5] = 0x01;
    switch (ctrl->bRequestType & USB_RECIP_MASK) {
@@ -1850,8 +1916,6 @@count += 16; /* header */
    put_unaligned_le32(count, buf);
    buf += 16;
-    fill_ext_compat(os_desc_cfg, buf);
-    value = w_length;
+    value = fill_ext_compat(os_desc_cfg, buf);
+    value = min_t(u16, w_length, value);
    }
    break;
    case USB_RECIP_INTERFACE:
@@ -1880,8 +1946,8 @@interface, buf);if (value < 0)return value;
-    -value = w_length;
+    -value = min_t(u16, w_length, value);
    }
    break;
}
@@ -2004,6 +2069,7 @@* disconnect callbacks? */
spin_lock_irqsave(&cdev->lock, flags);
+cdev->suspended = 0;if (cdev->config)reset_config(cdev);
if (cdev->driver->disconnect)
@ @ -2156,8 +2222,8 @@goto end;}
/* OS feature descriptor length <= 4kB */
cdev->os_desc_req->buf = kmalloc(4096, GFP_KERNEL);
+cdev->os_desc_req->buf = kmalloc(USB_COMP_EP0_OS_DESC_BUFSIZE,
+ GFP_KERNEL);
if (!cdev->os_desc_req->buf) {
ret = -ENOMEM;
usb_ep_free_request(ep0, cdev->os_desc_req);
@@ -2182,14 +2248,18 @@
usb_ep_dequeue(cdev->gadget->ep0, cdev->os_desc_req);
}
kfree(cdev->os_desc_req->buf);
+cdev->os_desc_req->buf = NULL;
usb_ep_free_request(cdev->gadget->ep0, cdev->os_desc_req);
+cdev->os_desc_req = NULL;
} 
if (cdev->req) {
  if (cdev->setup_pending)
    usb_ep_dequeue(cdev->gadget->ep0, cdev->req);
}
kfree(cdev->req->buf);
+cdev->req->buf = NULL;
usb_ep_free_request(cdev->gadget->ep0, cdev->req);
+cdev->req = NULL;
}
cdev->next_string_id = 0;
device_remove_file(&cdev->gadget->dev, &dev_attr_suspended);
@@ -2266,6 +2336,7 @@
cdev->suspended = 1;

+usb_gadget_set_selfpowered(gadget);
usb_gadget_vbus_draw(gadget, 2);
}

@@ -2273,7 +2358,17 @@
{ 
struct usb_composite_dev*cdev = get_gadget_data(gadget);
struct usb_function*f;
-unsigned maxpower;
+unsigned maxpower;

  /* REVISIT: should we have config level 
   * suspend/resume callbacks? 
@@ -2287,10 +2358,17 @@
f->resume(f);
}
- maxpower = cdev->config->MaxPower;
+ maxpower = cdev->config->MaxPower ?
+ cdev->config->MaxPower : CONFIG_USB_GADGET_VBUS_DRAW;
+ if (gadget->speed < USB_SPEED_SUPER)
+ maxpower = min(maxpower, 500U);
+ else
+ maxpower = min(maxpower, 900U);
+ 
+ if (maxpower > USB_SELF_POWER_VBUS_MAX_DRAW)
+ usb_gadget_clear_selfpowered(gadget);

- usb_gadget_vbus_draw(gadget, maxpower ?
- maxpower : CONFIG_USB_GADGET_VBUS_DRAW);
+ usb_gadget_vbus_draw(gadget, maxpower);
}
cdev->suspended = 0;
--- linux-4.15.0.orig/drivers/usb/gadget/config.c
+++ linux-4.15.0/drivers/usb/gadget/config.c
@@ -164,6 +164,14 @@
{
 struct usb_gadget *g = f->config->cdev->gadget;

+/* super-speed-plus descriptor falls back to super-speed one,
+ * if such a descriptor was provided, thus avoiding a NULL
+ * pointer dereference if a 5gbps capable gadget is used with
+ * a 10gbps capable config (device port + cable + host port)
+ */
+if (!ssp)
+ssp = ss;
+
+ if (fs) {
+ f->fs_descriptors = usb_copy_descriptors(fs);
+ if (!f->fs_descriptors)
+@@ -194,9 +202,13 @@
+ void usb_free_all_descriptors(struct usb_function *f)
+
+usb_free_descriptors(f->fs_descriptors);
+ f->fs_descriptors = NULL;
+usb_free_descriptors(f->hs_descriptors);
+ f->hs_descriptors = NULL;
+usb_free_descriptors(f->ss_descriptors);
+ f->ss_descriptors = NULL;
+usb_free_descriptors(f->ssp_descriptors);
+ f->ssp_descriptors = NULL;
+
EXPORT_SYMBOL_GPL(usb_free_all_descriptors);
--- linux-4.15.0.orig/drivers/usb/gadget/configfs.c
+++ linux-4.15.0/drivers/usb/gadget/configfs.c
@@ -61,6 +61,8 @@
    bool use_os_desc;
    char b_vendor_code;
    char qw_sign[OS_STRING_QW_SIGN_LEN];
+   spinlock_t spinlock;
+   bool unbind;
    }

 static inline struct gadget_info *to_gadget_info(struct config_item *item)
@@ -107,21 +109,27 @@
    struct list_head list;
    }

+#define USB_MAX_STRING_WITH_NULL_LEN (USB_MAX_STRING_LEN+1)
+
 static int usb_string_copy(const char *s, char **s_copy)
{
    int ret;
    char *str;
    char *copy = *s_copy;
    ret = strlen(s);
    -if (ret > 126)
+   if (ret > USB_MAX_STRING_LEN)
       return -EOVERFLOW;

    -str = kstrdup(s, GFP_KERNEL);
    -if (!str)
+   if (copy) {
+      str = copy;
+  } else {
+      str = kmalloc(USB_MAX_STRING_WITH_NULL_LEN, GFP_KERNEL);
+      if (!str)
+         return -ENOMEM;
+      }
          strcpy(str, s);
     if (str[ret - 1] == '\n')
         str[ret - 1] = '\0';
-    kfree(copy);
+   *s_copy = str;
    return 0;
}  
@@ -231,9 +239,16 @@

 static ssize_t gadget_dev_desc_UDC_show(struct config_item *item, char *page)
{
struct gadget_info *gi = to_gadget_info(item);

char *udc_name = gi->composite.gadget_driver.udc_name;

mutex_lock(&gi->lock);
udc_name = gi->composite.gadget_driver.udc_name;
ret = sprintf(page, "%s\n", udc_name ?: "");
mutex_unlock(&gi->lock);

return ret;

static int unregister_gadget(struct gadget_info *gi)
{
    char *name;
    int ret;

    if (strlen(page) < len)
        return -EOVERFLOW;

    name = kstrdup(page, GFP_KERNEL);
    if (!name)
        return -ENOMEM;

    list_for_each_entry_safe_reverse(f, tmp, &c->functions, list) {
        list_move(&f->list, &cfg->func_list);
        if (f->unbind)
            dev_dbg(&gi->cdev.gadget->dev,
"unbind function '%s'/%p\n",
@@ -1244,6 +1262,7 @@
            int ret;

            /* the gi->lock is hold by the caller */
+            gi->unbind = 0;
        cdev->gadget = gadget;
        set_gadget_data(gadget, cdev);
        ret = composite_dev_prepare(composite, cdev);
@@ -1376,33 +1395,130 @@
        }
        struct usb_composite_dev *cdev;


struct gadget_info *gi;
+unsigned long flags;

/* the gi->lock is hold by the caller */

cdev = get_gadget_data(gadget);
+gi = container_of(cdev, struct gadget_info, cdev);
+spin_lock_irqsave(&gi->spinlock, flags);
+gi->unbind = 1;
+spin_unlock_irqrestore(&gi->spinlock, flags);

kfree(otg_desc[0]);
otg_desc[0] = NULL;
purge_configs_funcs(gi);
composite_dev_cleanup(cdev);
usb_ep_autoconfig_reset(cdev->gadget);
+spin_lock_irqsave(&gi->spinlock, flags);
cdev->gadget = NULL;
+spin_unlock_irqrestore(&gi->spinlock, flags);
+
+static int configfs_composite_setup(struct usb_gadget *gadget,
+const struct usb_ctrlrequest *ctrl)
+{
+struct usb_composite_dev *cdev;
+struct gadget_info *gi;
+unsigned long flags;
+int ret;
+
cdev = get_gadget_data(gadget);
+if (!cdev)
+return 0;
+
+gi = container_of(cdev, struct gadget_info, cdev);
+spin_lock_irqsave(&gi->spinlock, flags);
cdev = get_gadget_data(gadget);
+if (!cdev || gi->unbind) {
+spin_unlock_irqrestore(&gi->spinlock, flags);
+return 0;
+
+ret = composite_setup(gadget, ctrl);
+spin_unlock_irqrestore(&gi->spinlock, flags);
+return ret;
+
+static void configfs_composite_disconnect(struct usb_gadget *gadget)
struct usb_composite_dev *cdev;
struct gadget_info *gi;
unsigned long flags;

cdev = get_gadget_data(gadget);
if (!cdev)
    return;

gi = container_of(cdev, struct gadget_info, cdev);
spin_lock_irqsave(&gi->spinlock, flags);
cdev = get_gadget_data(gadget);
if (!cdev || gi->unbind) {
    spin_unlock_irqrestore(&gi->spinlock, flags);
    return;
}

composite_disconnect(gadget);
spin_unlock_irqrestore(&gi->spinlock, flags);

static void configfs_composite_suspend(struct usb_gadget *gadget)
{
    struct usb_composite_dev *cdev;
    struct gadget_info *gi;
    unsigned long flags;

cdev = get_gadget_data(gadget);
if (!cdev)
    return;

    gi = container_of(cdev, struct gadget_info, cdev);
    spin_lock_irqsave(&gi->spinlock, flags);
cdev = get_gadget_data(gadget);
    if (!cdev || gi->unbind) {
        spin_unlock_irqrestore(&gi->spinlock, flags);
        return;
    }

    composite_suspend(gadget);
    spin_unlock_irqrestore(&gi->spinlock, flags);

    static void configfs_composite_resume(struct usb_gadget *gadget)
    {
        struct usb_composite_dev *cdev;
        struct gadget_info *gi;
        unsigned long flags;

        cdev = get_gadget_data(gadget);
        if (!cdev)
            return;

        gi = container_of(cdev, struct gadget_info, cdev);
        spin_lock_irqsave(&gi->spinlock, flags);
cdev = get_gadget_data(gadget);
        if (!cdev || gi->unbind) {
            spin_unlock_irqrestore(&gi->spinlock, flags);
            return;
        }

        composite_suspend(gadget);
        spin_unlock_irqrestore(&gi->spinlock, flags);
    }
+ cdev = get_gadget_data(gadget);
+ if (!cdev)
+ return;
+
+ gi = container_of(cdev, struct gadget_info, cdev);
+ spin_lock_irqsave(&gi->spinlock, flags);
+ cdev = get_gadget_data(gadget);
+ if (!cdev || gi->unbind) {
+ spin_unlock_irqrestore(&gi->spinlock, flags);
+ return;
+ }
+
+ composite_resume(gadget);
+ spin_unlock_irqrestore(&gi->spinlock, flags);
}

static const struct usb_gadget_driver configfs_driver_template = {
    .bind           = configfs_composite_bind,
    .unbind         = configfs_composite_unbind,

    .setup          = composite_setup,
    .reset          = composite_disconnect,
    .disconnect     = composite_disconnect,
    +.setup          = configfs_composite_setup,
    +.reset          = configfs_composite_disconnect,
    +.disconnect     = configfs_composite_disconnect,

    -.suspend	= composite_suspend,
    -.resume		= composite_resume,
    +.suspend	= configfs_composite_suspend,
    +.resume		= configfs_composite_resume,

    -.max_speed	= USB_SPEED_SUPER,
    +.max_speed	= USB_SPEED_SUPER_PLUS,
    .driver = {
        .owner          = THIS_MODULE,
        .name		= "configfs-gadget",
        @@ -1442,8 +1558,9 @@
        gi->composite.unbind = configfs_do_nothing;
        gi->composite.suspend = NULL;
        gi->composite.resume = NULL;
        -gi->composite.max_speed = USB_SPEED_SUPER;
        +gi->composite.max_speed = USB_SPEED_SUPER_PLUS;

        +spin_lock_init(&gi->spinlock);
        mutex_init(&gi->lock);
        INIT_LIST_HEAD(&gi->string_list);
INIT_LIST_HEAD(&gi->available_func);
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_acm.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_acm.c
@@ -684,7 +684,7 @@
    acm_ss_out_desc.bEndpointAddress = acm_fs_out_desc.bEndpointAddress;
    status = usb_assign_descriptors(f, acm_fs_function, acm_hs_function,
    -acm_ss_function, NULL);
    +acm_ss_function, acm_ss_function);
    if (status)
    goto fail;

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_ecm.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_ecm.c
@@ -52,6 +52,7 @@
    struct usb_ep*notify;
    struct usb_request*notify_req;
    u8
    +atomic_t notify_count;
    bool is_open;
    /* FIXME is_open needs some irq-ish locking
    @@ -380,7 +381,7 @@
    int status;
    /* notification already in flight? */
    -if (!req)
    +if (atomic_read(&ecm->notify_count))
        return;
    event = req->buf;
    @@ -420,10 +421,10 @@
    event->bmRequestType = 0xA1;
    event->wIndex = cpu_to_le16(ecm->ctrl_id);
    -ecm->notify_req = NULL;
    +atomic_inc(&ecm->notify_count);
    status = usb_ep_queue(ecm->notify, req, GFP_ATOMIC);
    if (status < 0) {
        -ecm->notify_req = req;
        +atomic_dec(&ecm->notify_count);
        DBG(cdev, "$notify --> %d\n", status);
    }
    }
    @@ -448,17 +449,19 @@
    switch (req->status) {
        case 0:
        /* no fault */
atomic_dec(&ecm->notify_count);
break;

-ECONNRESET:
case -ESHUTDOWN:
atomic_set(&ecm->notify_count, 0);
ecm->notify_state = ECM_NOTIFY_NONE;
break;
default:
DBG(cdev, "event %02x --> %d\n",
event->bNotificationType, req->status);
atomic_dec(&ecm->notify_count);
break;
 default:

atomic_dec(&ecm->notify_count);
break;

atomic_set(&ecm->notify_count, 0);
ecm->notify_state = ECM_NOTIFY_NONE;
break;
default:
DBG(cdev, "event %02x --> %d\n",
event->bNotificationType, req->status);
atomic_dec(&ecm->notify_count);
break;
default:
DBG(cdev, "ecm deactivated\n");

if (ecm->port.in_ep->enabled) {
gether_disconnect(&ecm->port);
} else {
ecm->port.in_ep->desc = NULL;
ecm->port.out_ep->desc = NULL;
}

usb_ep_disable(ecm->notify);
ecm->notify->desc = NULL;

status = usb_assign_descriptors(f, ecm_fs_function, ecm_hs_function,
ecm_ss_function, NULL);
usb_ep_disable(ecm->notify);
ecm->notify->desc = NULL;

status = usb_assign_descriptors(f, ecm_fs_function, ecm_hs_function,
ecm_ss_function, ecm_ss_function);
if (status) {
goto fail;

usb_free_all_descriptors(f);

if (atomic_read(&ecm->notify_count)) {
usb_ep_dequeue(ecm->notify, ecm->notify_req);
atomic_set(&ecm->notify_count, 0);
}

kfree(ecm->notify_req->buf);
usb_ep_free_request(ecm->notify, ecm->notify_req);
}
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_eem.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_eem.c
@@ -30,6 +30,11 @@
 u8ctrl_id;
};

+struct in_context {
+struct sk_buff *skb;
+struct usb_ep *ep;
+};
+
+static inline struct f_eem *func_to_eem(struct usb_function *f)
+{
+ return container_of(f, struct f_eem, port.func);
+}
@@ -305,7 +310,7 @@
eem_ss_out_desc.bEndpointAddress = eem_fs_out_desc.bEndpointAddress;

 status = usb_assign_descriptors(f, eem_fs_function, eem_hs_function,
- eem_ss_function, NULL);
+ eem_ss_function, eem_ss_function);
 if (status)
 goto fail;
@@ -323,9 +328,12 @@
eem_cmd_complete(struct usb_ep *ep, struct usb_request *req)
{
- struct sk_buff *skb = (struct sk_buff *)req->context;
+ struct in_context *ctx = req->context;

- dev_kfree_skb_any(skb);
+ dev_kfree_skb_any(ctx->skb);
+ kfree(req->buf);
+ usb_ep_free_request(ctx->ep, req);
+ kfree(ctx);
}

/*
@@ -413,7 +421,9 @@
 * b15:bmType (0 == data, 1 == command)
 */
 if (header & BIT(15)) {
- struct usb_request *req = cdev->req;
+ struct usb_request *req;
+struct in_context*ctx;
+struct usb_ep*ep;
u16bmEEMCmd;

/* EEM command packet format:
@@ -442,11 +452,36 @@
skb_trim(skb2, len);
put_unaligned_le16(BIT(15) | BIT(11) | len,
skb_push(skb2, 2));
+
+ep = port->in_ep;
+req = usb_ep_alloc_request(ep, GFP_ATOMIC);
+if (!req) {
+dev_kfree_skb_any(skb2);
+goto next;
+}
+
+req->buf = kmalloc(skb2->len, GFP_KERNEL);
+if (!req->buf) {
+usb_ep_free_request(ep, req);
+dev_kfree_skb_any(skb2);
+goto next;
+}
+
+ctx = kmalloc(sizeof(*ctx), GFP_KERNEL);
+if (!ctx) {
+kfree(req->buf);
+usb_ep_free_request(ep, req);
+dev_kfree_skb_any(skb2);
+goto next;
+}
+
+skb_copy_bits(skb2, 0, req->buf, skb2->len);
+req->length = skb2->len;
+req->complete = eem_cmd_complete;
+req->zero = 1;
-req->context = skb2;
+req->context = ctx;
if (usb_ep_queue(port->in_ep, req, GFP_ATOMIC))
DBG(cdev, "echo response queue fail\n");
break;
@@ -498,7 +533,7 @@
skb2 = skb_clone(skb, GFP_ATOMIC);
if (unlikely(!skb2)) {
DBG(cdev, "unable to unframe EEM packet\n");
-continue;
+goto next;
}
skb_trim(skb2, len - ETH_FCS_LEN);

@@ -509,7 +544,7 @@
if (unlikely(!skb3)) {
    DBG(cdev, "unable to realign EEM packet\n");
    dev_kfree_skb_any(skb2);
    -continue;
    +goto next;
}
    dev_kfree_skb_any(skb2);
skb_queue_tail(list, skb3);
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_fs.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_fs.c
@@ -243,8 +243,8 @@
static struct ffs_dev *_ffs_find_dev(const char *name);
static struct ffs_dev *_ffs_alloc_dev(void);
static void _ffs_free_dev(struct ffs_dev *dev);
-static void *ffs_acquire_dev(const char *dev_name);
-static void ffs_release_dev(struct ffs_data *ffs_data);
+static int ffs_acquire_dev(const char *dev_name, struct ffs_data *ffs_data);
+static void ffs_release_dev(struct ffs_dev *ffs_dev);
static int ffs_ready(struct ffs_data *ffs);
static void ffs_closed(struct ffs_data *ffs);

@@ -755,9 +755,13 @@
    bool kiocb_has_eventfd = io_data->kiocb->ki_flags & IOCB_EVENTFD;

    if (io_data->read && ret > 0) {
        +mm_segment_t oldfs = get_fs();
        +set_fs(USER_DS);
        use_mm(io_data->mm);
        ret = ffs_copy_to_iter(io_data->buf, ret, &io_data->data);
        unuse_mm(io_data->mm);
        +set_fs(oldfs);
    }

    io_data->kiocb->ki_complete(io_data->kiocb, ret, ret);
@@ -1001,6 +1005,7 @@
        * condition with req->complete callback.
        */
    usb_ep_dequeue(ep->ep, req);
    +wait_for_completion(&done);
    interrupted = ep->status < 0;
    }
@@ -1028,6 +1033,7 @@
        ret = usb_ep_queue(ep->ep, req, GFP_ATOMIC);
        if (unlikely(ret)) {
            +io_data->req = NULL;
-usb_ep_free_request(ep->ep, req);
        goto error_lock;
        }
@@ -1069,18 +1075,19 @@
    }
    struct ffs_io_data *io_data = kiocb->private;
-struct ffs_epfile *epfile = kiocb->ki_filp->private_data;
+unsigned long flags;
    int value;

    ENTER();

-    -spin_lock_irq(&epfile->ffs->eps_lock);
+    spin_lock_irqsave(&epfile->ffs->eps_lock, flags);

    if (likely(io_data && io_data->ep && io_data->req))
        value = usb_ep_dequeue(io_data->ep, io_data->req);
    else
        value = -EINVAL;

-    -spin_unlock_irq(&epfile->ffs->eps_lock);
+    spin_unlock_irqrestore(&epfile->ffs->eps_lock, flags);

    return value;
    }
@@ -1093,11 +1100,12 @@
        ENTER();

        if (!is_sync_kiocb(kiocb)) {
-            p = kmalloc(sizeof(io_data), GFP_KERNEL);
+            p = kzmalloc(sizeof(io_data), GFP_KERNEL);
            if (unlikely(!p))
                return -ENOMEM;
            p->aio = true;
-        } else {
+        } else {
            memset(p, 0, sizeof(*p));
            p->aio = false;
        }
@@ -1129,11 +1137,12 @@
        ENTER();

        if (!is_sync_kiocb(kiocb)) {
-            -p = kmalloc(sizeof(io_data), GFP_KERNEL);
+            -p = kzmalloc(sizeof(io_data), GFP_KERNEL);
            if (unlikely(!p))
                return -ENOMEM;
            p->aio = true;
@@ -1139,6 +1147,7 @@
        } else {
            +memset(p, 0, sizeof(*p));
            p->aio = false;
        }

        @ @ -1129,11 +1137,12 @ @
        ENTER();

        if (!is_sync_kiocb(kiocb)) {
-p = kmalloc(sizeof(io_data), GFP_KERNEL);
+p = kzalloc(sizeof(io_data), GFP_KERNEL);
if (unlikely(!p))
  return -ENOMEM;
p->aio = true;
} else {
  memset(p, 0, sizeof(*p));
p->aio = false;
}

@ @ -1231,10 +1240,11 @@
case FUNCTIONFS_ENDPOINT_DESC:
  {
    int desc_idx;
-struct usb_endpoint_descriptor *desc;
+struct usb_endpoint_descriptor desc1, *desc;

    switch (epfile->ffs->gadget->speed) {
      case USB_SPEED_SUPER:
        +case USB_SPEED_SUPER_PLUS:
          desc_idx = 2;
          break;
      case USB_SPEED_HIGH:
        @@ -1243,10 +1253,12 @@
          default:
          desc_idx = 0;
          }
+        desc = epfile->ep->descs[desc_idx];
+        memcpy(&desc1, desc, desc->bLength);

    spin_unlock_irq(&epfile->ffs->eps_lock);
-    ret = copy_to_user((void *)value, desc, desc->bLength);
+    ret = copy_to_user((void *)value, &desc1, desc1.bLength);
    if (ret)
      ret = -EFAULT;
    return ret;
@@ -1489,7 +1501,6 @@
  }
  struct dentry *rv;
  int ret;
-void *ffs_dev;
struct ffs_data*ffs;

ENTER();
@@ -1510,19 +1521,16 @@
return ERR_PTR(-ENOMEM);
}
-ffs_dev = ffs_acquire_dev(dev_name);
-if (IS_ERR(ffs_dev)) {
+ret = ffs_acquire_dev(dev_name, ffs);
+if (ret) {
 ffs_data_put(ffs);
-return ERR_CAST(ffs_dev);
+return ERR_PTR(ret);
}
-ffs->private_data = ffs_dev;
data.ffs_data = ffs;

rv = mount_nodev(t, flags, &data, ffs_sb_fill);
-if (IS_ERR(rv) && data.ffs_data) {
-ffs_release_dev(data.ffs_data);
+if (IS_ERR(rv) && data.ffs_data)
 ffs_data_put(data.ffs_data);
-}
return rv;
}

@@ -1532,11 +1540,8 @@
ENTER();

kill_litter_super(sb);
-if (sb->s_fs_info) {
-ffs_release_dev(sb->s_fs_info);
+if (sb->s_fs_info)
 ffs_data_closed(sb->s_fs_info);
-ffs_data_put(sb->s_fs_info);
-}
}

static struct file_system_type ffs_fs_type = {
@@ -1605,6 +1610,7 @@
if (unlikely(refcount_dec_and_test(&ffs->ref))) {
 pr_info("%s(): freeing\n", __func__);
 ffs_data_clear(ffs);
+ffs_release_dev(ffs->private_data);
 BUG_ON(waitqueue_active(&ffs->ev.wait) ||
     waitqueue_active(&ffs->ep0req_completion.wait) ||
     waitqueue_active(&ffs->wait));
@@ -1715,6 +1721,10 @@
 ffs->state = FFS_READ DESCRIPTORS;
 ffs->setup_state = FFS_NO SETUP;
 ffs->flags = 0;
+    ffs->ms_os_descs_ext_prop_count = 0;

spin_lock_irqsave(&func->ffs->eps_lock, flags);
while(count--) {
    struct usb_endpoint_descriptor *ds;
    struct usb_ss_ep_comp_descriptor *comp_desc = NULL;
    int needs_comp_desc = false;
    int desc_idx;
    
    if (ffs->gadget->speed == USB_SPEED_SUPER) {
        desc_idx = 2;
        needs_comp_desc = true;
    } else if (ffs->gadget->speed == USB_SPEED_HIGH)
        desc_idx = 1;
    else
        desc_idx = 0;

    /* fall-back to lower speed if desc missing for current speed */
    do {
        ds = ep->descs[desc_idx];
    } while (!ds && --desc_idx >= 0);

    if (!ds) {
        ret = -EINVAL;
        break;
    }

    ep->ep->driver_data = ep;
    ep->ep->desc = ds;

    if (needs_comp_desc) {
        comp_desc = (struct usb_ss_ep_comp_descriptor *)(ds +
            USB_DT_ENDPOINT_SIZE);
        ep->ep->maxburst = comp_desc->bMaxBurst + 1;
        ep->ep->comp_desc = comp_desc;
        +ret = config_ep_by_speed(func->gadget, &func->function, ep->ep);
        +if (ret) {
            +pr_err("%s: config_ep_by_speed(%s) returned %d'\n",
                __func__, ep->ep->name, ret);
            +break;
        }
    }

    ret = usb_ep_enable(ep->ep);
if (likely(!ret)) {
    epfile->ep = ep;
    epfile->in = usb_endpoint_dir_in(ds);
    epfile->isoc = usb_endpoint_xfer_isoc(ds);
    epfile->in = usb_endpoint_dir_in(ep->ep->desc);
    epfile->isoc = usb_endpoint_xfer_isoc(ep->ep->desc);
} else {
    break;
}
@@ -2548,6 +2534,7 @@

    do { /* lang_count > 0 so we can use do-while */
    unsigned needed = needed_count;
    +u32 str_per_lang = str_count;

    if (unlikely(len < 3))
        goto error_free;
    @@ -2583,7 +2570,7 @@

    data += length + 1;
    len -= length + 1;
    -} while (--str_count);
    +} while (--str_per_lang);

    s->id = 0; /* terminator */
    s->s = NULL;
    @@ -2928,6 +2915,7 @@

    struct ffs_function *func = ffs_func_from_usb(f);
    struct f_fs_opts *ffs_opts =
    container_of(f->fi, struct f_fs_opts, func_inst);
    +struct ffs_data *ffs_data;
    int ret;

    ENTER();
    @@ -2942,12 +2930,13 @@
    if (!ffs_opts->no_configfs)
        ffs_dev_lock();
    ret = ffs_opts->dev->desc_ready ? 0 : -ENODEV;
    -func->ffs = ffs_opts->dev->ffs_data;
    +ffs_data = ffs_opts->dev->ffs_data;
    if (!ffs_opts->no_configfs)
        ffs_dev_unlock();
    if (ret)
        return ERR_PTR(ret);

    +func->ffs = ffs_data;
    func->conf = c;
    func->gadget = c->cdev->gadget;
struct ffs_data *ffs = func->ffs;

const int full = !!func->ffs->fs_descs_count;
const int high = gadget_is_dualspeed(func->gadget) &&
    func->ffs->hs_descs_count;
const int super = gadget_is_superspeed(func->gadget) &&
    func->ffs->ss_descs_count;
+const int high = !!func->ffs->hs_descs_count;
+const int super = !!func->ffs->ss_descs_count;

int fs_len, hs_len, ss_len, ret, i;
struct ffs_ep *eps_ptr;
}

if (likely(super)) {
-    func->function.ss_descriptors = vla_ptr(vlabuf, d, ss_descs);
+    func->function.ss_descriptors = func->function.ssp_descriptors =
+        vla_ptr(vlabuf, d, ss_descs);
    ss_len = ffs_do_descs(ffs->ss_descs_count,
        vla_ptr(vlabuf, d, raw_descs) + fs_len + hs_len,
        d_raw_descs__sz - fs_len - hs_len,
-    return 0;
+    return creq->wLength == 0 ? USB_GADGET_DELAYED_STATUS : 0;
}

static bool ffs_func_req_match(struct usb_function *f,
    struct _ffs *opts;

opts = to_f_fs_opts(f);
+ffs_release_dev(opts->dev);
ffs_dev_lock();
_ffs_free_dev(opts->dev);
ffs_dev_unlock();
}

+/* Drain any pending AIO completions */
+drain_workqueue(ffs->io_completion_wq);
+
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if (!--opts->refcnt)
functionfs_unbind(ffs);

@@ -3485,6 +3477,7 @@
func->function.fs_descriptors = NULL;
func->function.hs_descriptors = NULL;
func->function.ss_descriptors = NULL;
+func->function.ssp_descriptors = NULL;
func->interfaces_nums = NULL;

ffs_event_add(ffs, FUNCTIONFS_UNBIND);
@@ -3586,47 +3579,48 @@
{
list_del(&dev->entry);

-/* Clear the private_data pointer to stop incorrect dev access */
-if (dev->ffs_data)
-dev->ffs_data->private_data = NULL;
-
kfree(dev);
if (list_empty(&ffs_devices))
functionfs_cleanup();
}

-static void *ffs_acquire_dev(const char *dev_name)
+static int ffs_acquire_dev(const char *dev_name, struct ffs_data *ffs_data)
{
+int ret = 0;
struct ffs_dev *ffs_dev;

ENTER();
ffs_dev_lock();

ffs_dev = _ffs_find_dev(dev_name);
-if (!ffs_dev)
-ffs_dev = ERR_PTR(-ENOENT);
-else if (ffs_dev->mounted)
-ffs_dev = ERR_PTR(-EBUSY);
-else if (ffs_dev->ffs_acquire_dev_callback &&
- ffs_dev->ffs_acquire_dev_callback(ffs_dev))
-ffs_dev = ERR_PTR(-ENOENT);
-else
+if (!ffs_dev) {
+ret = -ENOENT;
+} else if (ffs_dev->mounted) {
+ret = -EBUSY;
+} else if (ffs_dev->ffs_acquire_dev_callback &&
+ ffs_dev->ffs_acquire_dev_callback(ffs_dev)) {
ret = -ENOENT;
} else {
    ffs_dev->mounted = true;
    ffs_dev->ffs_data = ffs_data;
    ffs_data->private_data = ffs_dev;
}

ffs_dev_unlock();
return ffs_dev;
return ret;
}

static void ffs_release_dev(struct ffs_data *ffs_data)
{
    struct ffs_dev *ffs_dev;
    ENTER();
    ffs_dev_lock();

    if (ffs_dev) {
        if (ffs_dev->mounted) {
            ffs_dev->mounted = false;
            if (ffs_dev->ffs_data) {
                ffs_data->private_data = NULL;
                ffs_data = NULL;
            }
        }
    }

    if (ffs_dev->ffs_release_dev_callback)
        ffs_dev->ffs_release_dev_callback(ffs_dev);
    /* -3654,7 +3648,6 */
}

ffs_obj->desc_ready = true;
-ffs_obj->ffs_data = ffs;

if (ffs_obj->ffs_ready_callback) {
    ret = ffs_obj->ffs_ready_callback(ffs);
    /* -3682,7 +3675,6 */
goto done;
}

ffs_obj->desc_ready = false;
-ffs_obj->ffs_data = NULL;

if (test_and_clear_bit(FFS_FL_CALL_CLOSED_CALLBACK, &ffs->flags) &&
    ffs_obj->ffs_closed_callback)
    /* -3700,7 +3692,8 */
ci = opts->func_inst.group.cg_item.ci_parent->ci_parent;
ffs_dev_unlock();

-unregister_gadget_item(ci);
+if (test_bit(FFS_FL_BOUND, &ffs->flags))
+unregister_gadget_item(ci);
return;

done:
ffs_dev_unlock();

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_hid.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_hid.c
@@ -41,6 +41,7 @@
unsigned char			bInterfaceSubClass;
unsigned char			bInterfaceProtocol;
unsigned char			protocol;
+unsigned char			idle;
unsigned short			report_desc_length;
char				*report_desc;
unsigned short			report_length;
@@ -88,7 +89,7 @@
static struct hid_descriptor hidg_desc = {
    .bLength			= sizeof hidg_desc,
    .bDescriptorType		= HID_DT_HID,
-    .bcdHID				= 0x0101,
+    .bcdHID				= cpu_to_le16(0x0101),
    .bCountryCode			= 0x00,
    .bNumDescriptors		= 0x1,
    /*.desc[0].bDescriptorType= DYNAMIC */
@@ -344,6 +370,14 @@
spin_lock_irqsave(&hidg->write_spinlock, flags);

+if (!hidg->req) {
+spin_unlock_irqrestore(&hidg->write_spinlock, flags);
+return -ESHUTDOWN;
+}
+
+#define WRITE_COND (!hidg->write_pending)

try_again:
/* write queue */
@@ -364,8 +370,14 @@
count  = min_t(unsigned, count, hidg->report_length);

spin_unlock_irqrestore(&hidg->write_spinlock, flags);
-status = copy_from_user(req->buf, buffer, count);

+if (!req) {
+ERROR(hidg->func.config->cdev, "hidg->req is NULL");

status = -ESHUTDOWN;
go to release_write_pending;
+
+status = copy_from_user(req->buf, buffer, count);
if (status != 0) {
    ERROR(hidg->func.config->cdev, "copy_from_user error\n");
    @ @ -391,20 +403,23 @@
    req->complete = f_hidg_req_complete;
    req->context = hidg;
+
+spin_unlock_irqrestore(&hidg->write_spinlock, flags);
+
+if (!hidg->in_ep->enabled) {
+    ERROR(hidg->func.config->cdev, "in_ep is disabled\n");
+    status = -ESHUTDOWN;
+    goto release_write_pending;
+}
+
+status = usb_ep_queue(hidg->in_ep, req, GFP_ATOMIC);
-if (status < 0) {
    -ERROR(hidg->func.config->cdev, "usb_ep_queue error on int endpoint %zd\n", status);
    -goto release_write_pending_unlocked;
    -} else {
    +if (status < 0)
    +goto release_write_pending;
    +else
    status = count;
    -}
-spin_unlock_irqrestore(&hidg->write_spinlock, flags);

return status;
release_write_pending:
spin_lock_irqsave(&hidg->write_spinlock, flags);
-release_write_pending_unlocked:
hidg->writePending = 0;
spin_unlock_irqrestore(&hidg->write_spinlock, flags);

@@ -529,6 +544,14 @@
goto respond;
break;

+case (((USB_DIR_IN | USB_TYPE_CLASS | USB_RECIP_INTERFACE) << 8
+    | HID_REQ_GET_IDLE):
+VDBG(cdev, "get_idle\n");
+length = min_t(unsigned int, length, 1);
+
+(u8 *) req->buf)[0] = hidg->idle;
+goto respond;
+break;
+
+case ((USB_DIR_OUT | USB_TYPE_CLASS | USB_RECIP_INTERFACE) << 8
+| HID_REQ_SET_REPORT):
VDBG(cdev, "set_report | wLength=%d\n", ctrl->wLength);
@@ -552,6 +575,14 @@
goto stall;
break;
+
+case ((USB_DIR_OUT | USB_TYPE_CLASS | USB_RECIP_INTERFACE) << 8
+| HID_REQ_SET_IDLE):
+VDBG(cdev, "set_idle\n");
+length = 0;
+hidg->idle = value >> 8;
+goto respond;
+break;
+
+case ((USB_DIR_IN | USB_TYPE_STANDARD | USB_RECIP_INTERFACE) << 8
+| USB_REQ_GET_DESCRIPTOR):
switch (value >> 8) {
@@ -779,6 +810,7 @@
hidg_interface_desc.bInterfaceSubClass = hidg->bInterfaceSubClass;
hidg_interface_desc.bInterfaceProtocol = hidg->bInterfaceProtocol;
hidg->protocol = HID_REPORT_PROTOCOL;
+hidg->idle = 1;
hidg_ss_in_ep_desc.wMaxPacketSize = cpu_to_le16(hidg->report_length);
hidg_ss_in_comp_desc.wBytesPerInterval =
@@ -808,7 +840,8 @@
hidg_fs_out_ep_desc.bEndpointAddress;
status = usb_assign_descriptors(f, hidg_fs_descriptors,
-hidg_hs_descriptors, hidg_ss_descriptors, NULL);
+hidg_hs_descriptors, hidg_ss_descriptors,
+hidg_ss_descriptors);
if (status)
goto fail;

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_loopback.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_loopback.c
@@ -207,7 +207,7 @@
ss_loop_sink_desc.bEndpointAddress = fs_loop_sink_desc.bEndpointAddress;
ret = usb_assign_descriptors(f, fs_loopback_descs, hs_loopback_descs,
-ss_loopback_descs, NULL);
+ss_loopback_descs, ss_loopback_descs);
if (ret)
return ret;
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_mass_storage.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_mass_storage.c
@@ -222,6 +222,8 @@
#include <linux/usb/gadget.h>
#include <linux/usb/composite.h>
+#include <linux/nospec.h>
+
#include "configfs.h"

@@ -260,7 +262,7 @@
struct fsg_common {
struct usb_gadget*gadget;
struct usb_composite_dev *cdev;
-struct fsg_dev*fsg, *new_fsg;
+struct fsg_dev*fsg;
wait_queue_head_tio_wait;
wait_queue_head_tfsg_wait;
@@ -289,6 +291,7 @@
unsigned intbulk_out_maxpacket;
enum fsg_statestate;/* For exception handling */
unsigned intexception_req_tag;
+void*exception_arg;
enum data_directiondata_dir;
u32data_size;
@@ -392,7 +395,8 @@
/* These routines may be called in process context or in_irq */
-static void raise_exception(struct fsg_common *common, enum fsg_state new_state)
+static void __raise_exception(struct fsg_common *common, enum fsg_state new_state,
+
void *arg)
{
unsigned longflags;
@@ -405,6 +409,7 @@
if (common->state <= new_state) {
common->exception_req_tag = common->ep0_req_tag;
common->state = new_state;
+common->exception_arg = arg;
if (common->thread_task)
send_sig_info(SIGUSR1, SEND_SIG_FORCED,

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static void raise_exception(struct fsg_common *common, enum fsg_state new_state)
{
    __raise_exception(common, new_state, NULL);
}

/*-------------------------------------------------------------------------*/

static void fsg_disable(struct usb_function *f)
{
    struct fsg_dev *fsg = fsg_from_func(f);
    fsg->common->new_fsg = NULL;
    raise_exception(fsg->common, FSG_STATE_CONFIG_CHANGE);
}

enum fsg_state old_state;
struct fsg_lun *curlun;
unsigned int exception_req_tag;
+struct fsg_dev *new_fsg;

/*
 * Clear the existing signals. Anything but SIGUSR1 is converted
 * @ @ -2361,6 +2371,7 @@
 * common->next_buffhd_to_fill = &common->buffhds[0];
 * common->next_buffhd_to_drain = &common->buffhds[0];
 * exception_req_tag = common->exception_req_tag;
 +new_fsg = common->exception_arg;
 * old_state = common->state;
 * common->state = FSG_STATE_NORMAL;
 */

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case FSG_STATE_CONFIG_CHANGE:
    do_set_interface(common, common->new_fsg);
    if (common->new_fsg)
        usb_composite_setup_continue(common->cdev);
    break;

DBG(fsg, "unbind\n");
if (fsg->common->fsg == fsg) {
    fsg->common->new_fsg = NULL;
    raise_exception(fsg->common, FSG_STATE_CONFIG_CHANGE);
    __raise_exception(fsg->common, FSG_STATE_CONFIG_CHANGE, NULL);
    /* FIXME: make interruptible or killable somehow? */
    wait_event(common->fsg_wait, common->fsg != fsg);
}

mutex_lock(&fsg_opts->lock);
if (fsg_opts->refcnt || fsg_opts->common->luns[num]) {
    if (gadget_is_superspeed_plus(c->cdev->gadget)) {
        if (err) {
            ERROR(midi, "%s: couldn't enqueue request: %d\n",
                midi->out_ep->name, err);
            free_ep_req(midi->out_ep, req);
            if (req->buf != NULL)
                free_ep_req(midi->out_ep, req);
            return err;
        }
        f->ss_descriptors = usb_copy_descriptors(midi_function);
        if (!f->ss_descriptors)
            goto fail_f_midi;
        if (gadget_is_superspeed_plus(c->cdev->gadget)) {
f->ssp_descriptors = usb_copy_descriptors(midi_function);
if (!f->ssp_descriptors)
    goto fail_f_midi;
}
}
kfree(midi_function);

midi->id = kstrdup(opts->id, GFP_KERNEL);
if (opts->id && !midi->id) {
    status = -ENOMEM;
    goto setup_fail;
    goto midi_free;
}
midi->in_ports = opts->in_ports;
midi->out_ports = opts->out_ports;

status = kfifo_alloc(&midi->in_req_fifo, midi->qlen, GFP_KERNEL);
if (status)
    goto setup_fail;
    goto midi_free;
spin_lock_init(&midi->transmit_lock);

return &midi->func;

midi_free:
if (midi)
    kfree(midi->id);
kfree(midi);
setup_fail:
mutex_unlock(&opts->lock);
kfree(midi);
return ERR_PTR(status);
}

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_ncm.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_ncm.c
@@ -54,6 +54,7 @@
 struct usb_ep *notify;
 struct usb_request *notify_req;
 u8 notify_state;
+atomic_t notify_count;
 bool is_open;
const struct ndp_parser_opts*parser_opts;
@@ -87,8 +88,10 @@
/* peak (theoretical) bulk transfer rate in bits-per-second */
static inline unsigned ncm_bitrate(struct usb_gadget *g)
{
    if (gadget_is_superspeed(g) && g->speed == USB_SPEED_SUPER)
        return 13 * 1024 * 8 * 1000 * 8;
    +if (gadget_is_superspeed(g) && g->speed >= USB_SPEED_SUPER_PLUS)
        return 4250000000U;
    +else if (gadget_is_superspeed(g) && g->speed == USB_SPEED_SUPER)
        return 3750000000U;
    else if (gadget_is_dualspeed(g) && g->speed == USB_SPEED_HIGH)
        return 13 * 512 * 8 * 1000 * 8;
    else
        @@ -549,7 +552,7 @@
        int status;

        /* notification already in flight? */
        -if (!req)
            +if (atomic_read(&ncm->notify_count))
                return;
        event = req->buf;
        @@ -582,14 +585,15 @@
        data[0] = cpu_to_le32(ncm_bitrate(cdev->gadget));
        data[1] = data[0];

        -DBG(cdev, "notify speed %d\n", ncm_bitrate(cdev->gadget));
        +DBG(cdev, "notify speed %u\n", ncm_bitrate(cdev->gadget));
        ncm->notify_state = NCM_NOTIFY_CONNECT;
        break;
    }
    event->bmRequestType = 0xA1;
    event->wIndex = cpu_to_le16(ncm->ctrl_id);

    -ncm->notify_req = NULL;
    +atomic_inc(&ncm->notify_count);
    +
    /*
    * In double buffering if there is a space in FIFO,
    * completion callback can be called right after the call,
    @@ -599,7 +603,7 @@
    status = usb_ep_queue(ncm->notify, req, GFP_ATOMIC);
    spin_lock(&ncm->lock);
    if (status < 0) {
        -ncm->notify_req = req;
        +atomic_dec(&ncm->notify_count);
DBG(cdev, "notify --> %d\n", status);
}
}

@@ -634,17 +638,19 @@
case 0:
    VDBG(cdev, "Notification %02x sent\n",
         event->bNotificationType);
    +atomic_dec(&ncm->notify_count);
    break;
    case -ECONNRESET:
    case -ESHUTDOWN:
    +atomic_set(&ncm->notify_count, 0);
    ncm->notify_state = NCM_NOTIFY_NONE;
    break;
    default:
    DBG(cdev, "event %02x --> %d\n",
         event->bNotificationType, req->status);
    +atomic_dec(&ncm->notify_count);
    break;
    }
    -ncm->notify_req = req;
    ncm_do_notify(ncm);
    spin_unlock(&ncm->lock);
    }
    @ @ -1100,11 +1106,11 @ @
    ncm->ndp_dgram_count = 1;

    /* Note: we skip opts->next_ndp_index */
    -}
    
    /* Delay the timer. */
    -hrtimer_start(&ncm->task_timer, TX_TIMEOUT_NSECS,
        - HRTIMER_MODE_REL);
    +/* Start the timer. */
    +hrtimer_start(&ncm->task_timer, TX_TIMEOUT_NSECS,
        + HRTIMER_MODE_REL);
    +}

    /* Add the datagram position entries */
    nth_ndp = skb_put_zero(ncm->skb_tx_ndp, dgram_idx_len);
    @ @ -1194,9 +1200,11 @ @
    intndp_index;
    unsigneddg_len, dg_len2;
    unsignedndp_len;
    +unsignedblock_len;
    struct sk_buff*skb2;
    intret = -EINVAL;
    -unsignedmax_size = le32_to_cpu(ntb_parameters.dwNtbOutMaxSize);
unsigned ntb_max = le32_to_cpu(ntb_parameters.dwNtbOutMaxSize);
unsigned frame_max = le16_to_cpu(ecm_desc.wMaxSegmentSize);
const struct ndp_parser_opts *opts = ncm->parser_opts;
unsigned crc_len = ncm->is_crc ? sizeof(uint32_t) : 0;
int dgram_counter;
@@ -1218,8 +1226,9 @@

 block_len = get_ncm(&tmp, opts->block_length);
 /* (d)wBlockLength */
 -if (get_ncm(&tmp, opts->block_length) > max_size) {  
 +if (block_len > ntb_max) {  
 INFO(port->func.config->cdev, "OUT size exceeded
");
 goto err;
 }
 @@ -1228,15 +1237,23 @@
 /* Run through all the NDP's in the NTB */
do {
 -/* NCM 3.2 */
 -if (((ndp_index % 4) != 0) &&  
 -(ndp_index < opts->nth_size)) {
 +/*
 + * NCM 3.2  
 + * dwNdpIndex
 + */
 +if (((ndp_index % 4) != 0) ||
 +(ndp_index < opts->nth_size) ||  
 +(ndp_index > (block_len -  
 + opts->ndp_size))) {  
 INFO(port->func.config->cdev, "Bad index: %#X\n",  
 ndp_index);
 goto err;
 }
 -/* walk through NDP */
 -/+*
 + * walk through NDP
 + * dwSignature
 + */
tmp = (void *)skb->data + ndp_index;
if (get_unaligned_le32(tmp) != ncm->ndp_sign) {
 INFO(port->func.config->cdev, "Wrong NDP SIGN\n");
 @@ -1247,14 +1264,15 @@
 ndp_len = get_unaligned_le16(tmp++);
 /*
 + NCM 3.3.1
 */
+) wLength
* entry is 2 items
* item size is 16/32 bits, opts->dgram_item_len * 2 bytes
* minimal: struct usb_cdc_ncm_ndpX + normal entry + zero entry
* Each entry is a dgram index and a dgram length.
*/
if ((ndp_len < opts->ndp_size
    + 2 * 2 * (opts->dgram_item_len * 2))
    && (ndp_len % opts->ndplen_align != 0)) {
    INFO(port->func.config->cdev, "Bad NDP length: %#X",
         ndp_len);
    goto err;
}
@@ -1271,8 +1289,21 @@
do {
    index = index2;
    /* wDatagramIndex[0] */
+if ((index < opts->nth_size) ||
+    (index > block_len - opts->dpe_size)) {
+    INFO(port->func.config->cdev,
+         "Bad index: %#X", index);
+    goto err;
+}
+
dg_len = dg_len2;
-if (dg_len < 14 + crc_len) { /* ethernet hdr + crc */
+/* ethernet hdr + crc */
+  /* wDatagramLength[0]
+  * ethernet hdr + crc or larger than max frame size
+  */
+if (((dg_len < 14 + crc_len))
+    || (dg_len > frame_max)) {
INFO(port->func.config->cdev,
       "Bad dgram length: %#X", dg_len);
    goto err;
    @@ -1296,6 +1327,13 @@
    index2 = get_ncm(&tmp, opts->dgram_item_len);
    dg_len2 = get_ncm(&tmp, opts->dgram_item_len);
+
+/* wDatagramIndex[1] */
+if (index2 > block_len - opts->dpe_size) {
+    INFO(port->func.config->cdev,
+         "Bad index: %#X", index2);
+    goto err;
+}
+}
/*
 * Copy the data into a new skb.
 * This ensures the truesize is correct
 * @ -1312.7 +1350.6 @@
 * ndp_len -= 2 * (opts->dgram_item_len * 2);
 *
 * dgram_counter++;
 *
 * if (index2 == 0 || dg_len2 == 0)
 * break;
 * } while (ndp_len > 2 * (opts->dgram_item_len * 2));
 * @ -1500.7 +1537.7 @@
 * fs_ncm_notify_desc.bEndpointAddress;
 *
 * status = usb_assign_descriptors(f, ncm_fs_function, ncm_hs_function,
 * -ncm_ss_function, NULL);
 * +ncm_ss_function, ncm_ss_function);
 * if (status)
 * goto fail;
 *
 * @ -1628.6 +1665.11 @@
 * ncm_string_defs[0].id = 0;
 * usb_free_all_descriptors(f);
 *
 * +if (atomic_read(&ncm->notify_count)) {
 * +usb_ep_dequeue(ncm->notify, ncm->notify_req);
 * +atomic_set(&ncm->notify_count, 0);
 * +}
 * +
 * kfree(ncm->notify_req->buf);
 * usb_ep_free_request(ncm->notify, ncm->notify_req);
 * }
 * --- linux-4.15.0.orig/drivers/usb/gadget/function/f_printer.c
 * +++ linux-4.15.0/drivers/usb/gadget/function/f_printer.c
 * @ -31.6 +31.7 @@
 * #include <linux/types.h>
 * #include <linux/ctype.h>
 * #include <linux/cdev.h>
 * +#include <linux/kref.h>
 *
 * +#include <asm/byteorder.h>
 * #include <linux/io.h>
 * @ -64.7 +65.7 @@
 * struct usb_gadget*gadget;
 * s8interface;
 * struct usb_ep*in_ep, *out_ep;
 * -
 * +struct kref kref;
struct list_head trx_reqs; /* List of free RX structs */
struct list_head trx_reqs_active; /* List of Active RX xfers */
struct list_head trx_buffers; /* List of completed xfers */
@@ -218,6 +219,13 @@

/*-------------------------------------------------------------------------*/
+static void printer_dev_free(struct kref *kref)
+{
+struct printer_dev *dev = container_of(kref, struct printer_dev, kref);
+    kfree(dev);
+}
+
+static struct usb_request *
printer_req_alloc(struct usb_ep *ep, unsigned len, gfp_t gfp_flags)
{
@@ -348,6 +356,7 @@
    spin_unlock_irqrestore(&dev->lock, flags);

+    kref_get(&dev->kref);
    DBG(dev, "printer_open returned %x\n", ret);
    return ret;
}    
@@ -365,6 +374,7 @@
dev->printer_status &= ~PRINTER_SELECTED;
    spin_unlock_irqrestore(&dev->lock, flags);

+    kref_put(&dev->kref, printer_dev_free);
    DBG(dev, "printer_close\n");

    return 0;
@@ -631,19 +641,19 @@
return -EAGAIN;
}
    
    list_add(&req->list, &dev->tx_reqs_active);
+ /* here, we unlock, and only unlock, to avoid deadlock. */
    spin_unlock(&dev->lock);
    value = usb_ep_queue(dev->in_ep, req, GFP_ATOMIC);
    spin_lock(&dev->lock);
    if (value) {
    +    list_del(&req->list);
    list_add(&req->list, &dev->tx_reqs);
    spin_unlock_irqrestore(&dev->lock, flags);
    mutex_unlock(&dev->lock_printer_io);
return -EAGAIN;

- list_add(&req->list, &dev->tx_reqs_active);
-
}

spin_unlock_irqrestore(&dev->lock, flags);

ss_ep_out_desc.bEndpointAddress = fs_ep_out_desc.bEndpointAddress;

ret = usb_assign_descriptors(f, fs_printer_function,
    -hs_printer_function, ss_printer_function, NULL);
    +hs_printer_function, ss_printer_function,
    +ss_printer_function);
if (ret)
    return ret;

printer_req_free(dev->in_ep, req);
}

+usb_free_all_descriptors(f);
return ret;

struct f_printer_opts *opts;

opts = container_of(f->fi, struct f_printer_opts, func_inst);
-kfree(dev);
+
+kref_put(&dev->kref, printer_dev_free);
mutex_lock(&opts->lock);
--opts->refcnt;
mutex_unlock(&opts->lock);
@ @ -1419.6 +1432.7 @@
return ERR_PTR(-ENOMEM);
}

+kref_init(&dev->kref);
++opts->refcnt;
dev->minor = opts->minor;
dev->pnp_string = opts->pnp_string;
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_rndis.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_rndis.c
@@ -87,8 +87,10 @@
/* peak (theoretical) bulk transfer rate in bits-per-second */
static unsigned int bitrate(struct usb_gadget *g) {
  if (gadget_is_superspeed(g) && g->speed >= USB_SPEED_SUPER_PLUS)
    return 4250000000U;
  if (gadget_is_superspeed(g) && g->speed == USB_SPEED_SUPER)
    return 13 * 1024 * 8 * 1000 * 8;
  return 3750000000U;
} else if (gadget_is_dualspeed(g) && g->speed == USB_SPEED_HIGH)
  return 13 * 512 * 8 * 1000 * 8;
else
  @ @ -618,6 +620,7 @@
  gether_disconnect(&rndis->port);

  usb_ep_disable(rndis->notify);
  +rndis->notify->desc = NULL;
}

/*-------------------------------------------------------------------------*/
@@ -786,7 +789,7 @@
  ss_notify_desc.bEndpointAddress = fs_notify_desc.bEndpointAddress;

  status = usb_assign_descriptors(f, eth_fs_function, eth_hs_function,
    -eth_ss_function, NULL);
++ eth_ss_function, eth_ss_function);
    if (status)
      goto fail;

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_serial.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_serial.c
@@ -233,7 +233,7 @@
  gser_ss_out_desc.bEndpointAddress = gser_fs_out_desc.bEndpointAddress;

  status = usb_assign_descriptors(f, gser_fs_function, gser_hs_function,
    -gser_ss_function, NULL);
++ gser_ss_function, gser_ss_function);
    if (status)
      goto fail;
  dev_dbg(&cdev->gadget->dev, "generic ttyGS%d: %s speed IN/%s OUT/%s\n",

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_sourcesink.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_sourcesink.c
@@ -431,7 +431,8 @@
  ss_iso_sink_desc.bEndpointAddress = fs_iso_sink_desc.bEndpointAddress;

  ret = usb_assign_descriptors(f, fs_source_sink_descs,
    -hs_source_sink_descs, ss_source_sink_descs, NULL);
++ hs_source_sink_descs, ss_source_sink_descs,
++ ss_source_sink_descs);
    if (ret)
return ret;

@@ -838,7 +839,7 @@
    ss = kzalloc(sizeof(*ss), GFP_KERNEL);
    if (!ss)
        return NULL;
++ return ERR_PTR(-ENOMEM);

    ss_opts = container_of(fi, struct f_ss_opts, func_inst);

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_subset.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_subset.c
@@ -358,7 +358,7 @@
    fs_subset_out_desc.bEndpointAddress;

    status = usb_assign_descriptors(f, fs_eth_function, hs_eth_function,
        -ss_eth_function, NULL);
++ ss_eth_function, ss_eth_function);
    if (status)
        goto fail;

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_tcm.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_tcm.c
@@ -751,12 +751,13 @@
    err_sts:
        usb_ep_free_request(fu->ep_status, stream->req_status);
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_tcm.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_tcm.c
@@ -2071,7 +2072,8 @@
    uasp_fs_cmd_desc.bEndpointAddress = uasp_ss_cmd_desc.bEndpointAddress;

    ret = usb_assign_descriptors(f, uasp_fs_function_desc,
        -uasp_hs_function_desc, uasp_ss_function_desc, NULL);
++ uasp_hs_function_desc, uasp_ss_function_desc,
++ uasp_ss_function_desc);
if (ret)
goto ep_fail;

--- linux-4.15.0.orig/drivers/usb/gadget/function/f_uac1.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_uac1.c
@@ -19,6 +19,9 @@
#include "u_audio.h"
#include "u_uac1.h"
+/* UAC1 spec: 3.7.2.3 Audio Channel Cluster Format */
+struct f_uac1 {
 struct g_audio g_audio;
 u8 ac_intf, as_in_intf, as_out_intf;
 @@ -30,6 +33,11 @@
return container_of(f, struct f_uac1, g_audio.func);
}

+static inline struct f_uac1_opts *g_audio_to_uac1_opts(struct g_audio *audio)
+{
+return container_of(audio->func.fi, struct f_uac1_opts, func_inst);
+}
+
+/*
 * DESCRIPTORS ... most are static, but strings and full
 * configuration descriptors are built on demand.
 @@ -499,16 +507,48 @@
uac1->as_out_alt = 0;
uac1->as_in_alt = 0;

 +u_audio_stop_playback(&uac1->g_audio);
u_audio_stop_capture(&uac1->g_audio);
}

/*---------------------------------------------------------------*/

+static int f_audio_validate_opts(struct g_audio *audio, struct device *dev)
+{
+struct f_uac1_opts *opts = g_audio_to_uac1_opts(audio);
+
+if (!opts->p_chmask && !opts->c_chmask) {
+dev_err(dev, "Error: no playback and capture channels\n");
+return -EINVAL;
+} else if (opts->p_chmask & ~UAC1_CHANNEL_MASK) {
+dev_err(dev, "Error: unsupported playback channels mask\n");
+return -EINVAL;
+} else if (opts->c_chmask & ~UAC1_CHANNEL_MASK) {
+dev_err(dev, "Error: unsupported capture channels mask\n");
+return -EINVAL;
+} else if ((opts->p_ssize < 1) || (opts->p_ssize > 4)) {
+dev_err(dev, "Error: incorrect playback sample size\n");
+return -EINVAL;
+} else if ((opts->c_ssize < 1) || (opts->c_ssize > 4)) {
+dev_err(dev, "Error: incorrect capture sample size\n");
+return -EINVAL;
+} else if (!opts->p_srate) {
+dev_err(dev, "Error: incorrect playback sampling rate\n");
+return -EINVAL;
+} else if (!opts->c_srate) {
+dev_err(dev, "Error: incorrect capture sampling rate\n");
+return -EINVAL;
+
+return 0;
+
+/* audio function driver setup/binding */
static int f_audio_bind(struct usb_configuration *c, struct usb_function *f)
{
struct usb_composite_dev*cdev = c->cdev;
struct usb_gadget*gadget = cdev->gadget;
+struct device*dev = &gadget->dev;
struct f_uac1*uac1 = func_to_uac1(f);
struct g_audio*audio = func_to_g_audio(f);
struct f_uac1_opts*audio_opts;
@@ -518,6 +558,10 @@
int				status;
int					status;
+status = f_audio_validate_opts(audio, dev);
+if (status)
+return status;
+
+audio_opts = container_of(f->fi, struct f_uac1_opts, func_inst);

us = usb_gstrings_attach(cdev, uac1_strings, ARRAY_SIZE(strings_uac1));
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_uac1_legacy.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_uac1_legacy.c
@@ -338,7 +338,9 @@
/* Copy buffer is full, add it to the play_queue */
if (audio_buf_size - copy_buf->actual < req->actual) {
+spin_lock_irq(&audio->lock);
list_add_tail(&copy_buf->list, &audio->play_queue);
+spin_unlock_irq(&audio->lock);
schedule_work(&audio->playback_work);
copy_buf = f_audio_buffer_alloc(audio_buf_size);
if (IS_ERR(copy_buf))
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_uac2.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_uac2.c
@@ -275,7 +275,7 @@
    .bEndpointAddress = USB_DIR_OUT,
    .bmAttributes = USB_ENDPOINT_XFER_ISOC | USB_ENDPOINT_SYNC_ASYNC,
    -.wMaxPacketSize = cpu_to_le16(1023),
+/* .wMaxPacketSize = DYNAMIC */
    .bInterval = 1,
    ];
@@ -284,7 +284,7 @@
    .bDescriptorType = USB_DT_ENDPOINT,
    .bmAttributes = USB_ENDPOINT_XFER_ISOC | USB_ENDPOINT_SYNC_ASYNC,
    -.wMaxPacketSize = cpu_to_le16(1024),
+/* .wMaxPacketSize = DYNAMIC */
    .bInterval = 4,
    ];
@@ -352,7 +352,7 @@
    .bDescriptorType = USB_DT_ENDPOINT,
    .bmAttributes = USB_ENDPOINT_XFER_ISOC | USB_ENDPOINT_SYNC_ASYNC,
    -.wMaxPacketSize = cpu_to_le16(1023),
+/* .wMaxPacketSize = DYNAMIC */
    .bInterval = 1,
    ];
@@ -361,7 +361,7 @@
    .bDescriptorType = USB_DT_ENDPOINT,
    .bmAttributes = USB_ENDPOINT_XFER_ISOC | USB_ENDPOINT_SYNC_ASYNC,
    -.wMaxPacketSize = cpu_to_le16(1024),
+/* .wMaxPacketSize = DYNAMIC */
    .bInterval = 4,
    ];
@@ -438,22 +438,38 @@
struct cntrl_cur_lay3 {
    __u32	dCUR;
+__le32	dCUR;
};
struct cntrl_range_lay3 {
-  __u16 wNumSubRanges;
-  __u32 dMIN;
-  __u32 dMAX;
-  __u32 dRES;
+  __le16 wNumSubRanges;
+  __le32 dMIN;
+  __le32 dMAX;
+  __le32 dRES;
} __packed;

- static void set_ep_max_packet_size(const struct f_uac2_opts *uac2_opts,
+ static int set_ep_max_packet_size(const struct f_uac2_opts *uac2_opts,
 struct usb_endpoint_descriptor *ep_desc,
-   unsigned int factor, bool is_playback)
+   enum usb_device_speed speed, bool is_playback)
{
  int chmask, srate, ssize;
-  u16 max_packet_size;
+  u16 max_size_bw, max_size_ep;
+  unsigned int factor;
  +
  +switch (speed) {
  +case USB_SPEED_FULL:
  +max_size_ep = 1023;
  +factor = 1000;
  +break;
  +
  +case USB_SPEED_HIGH:
  +max_size_ep = 1024;
  +factor = 8000;
  +break;
  +
  +default:
  +return -EINVAL;
  +}

  if (is_playback) {
    chmask = uac2_opts->p_chmask;
    @@ -465,10 +481,12 @@
    ssize = uac2_opts->c_ssize;
  }

-  max_packet_size = num_channels(chmask) * ssize *
-  DIV_ROUND_UP(srate, factor / (1 << (ep_desc->bInterval - 1)));
-  ep_desc->wMaxPacketSize = cpu_to_le16(min_t(u16, max_packet_size,
-    le16_to_cpu(ep_desc->wMaxPacketSize));
+  max_size_bw = num_channels(chmask) * ssize *
+  DIV_ROUND_UP(srate, factor / (1 << (ep_desc->bInterval - 1)));
+  ep_desc->wMaxPacketSize = cpu_to_le16(min_t(u16, max_size_bw,
+    le16_to_cpu(ep_desc->wMaxPacketSize));
```c
max_size_bw = num_channels(chmask) * ssize *
+((srate / (factor / (1 << (ep_desc->bInterval - 1))) + 1);
+ep_desc->wMaxPacketSize = cpu_to_le16(min_t(u16, max_size_bw,
    + max_size_ep));
+
+return 0;
}

static int
@@ -524,6 +542,8 @@
dev_err(dev, "%s:%d Error!
”, __func__, __LINE__);
return ret;
}
+iad_desc.bFirstInterface = ret;
+
std_ac_if_desc.bInterfaceNumber = ret;
uac2->ac_intf = ret;
uac2->ac_alt = 0;
@@ -549,21 +569,44 @@
uac2->as_in_alt = 0;
/* Calculate wMaxPacketSize according to audio bandwidth */
-set_ep_max_packet_size(uac2_opts, &fs_epin_desc, 1000, true);
-set_ep_max_packet_size(uac2_opts, &fs_epout_desc, 1000, false);
-set_ep_max_packet_size(uac2_opts, &hs_epin_desc, 8000, true);
-set_ep_max_packet_size(uac2_opts, &hs_epout_desc, 8000, false);
+ret = set_ep_max_packet_size(uac2_opts, &fs_epin_desc, USB_SPEED_FULL,
    + true);
+if (ret < 0) {
    +dev_err(dev, "%s:%d Error!
”, __func__, __LINE__);
    +return ret;
    +}
+
+ret = set_ep_max_packet_size(uac2_opts, &fs_epout_desc, USB_SPEED_FULL,
    + false);
+if (ret < 0) {
    +dev_err(dev, "%s:%d Error!
”, __func__, __LINE__);
    +return ret;
    +}
+
+ret = set_ep_max_packet_size(uac2_opts, &hs_epin_desc, USB_SPEED_HIGH,
    + true);
+if (ret < 0) {
    +dev_err(dev, "%s:%d Error!
”, __func__, __LINE__);
    +return ret;
    +}
+
+ret = set_ep_max_packet_size(uac2_opts, &hs_epout_desc, USB_SPEED_HIGH,
```

---

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---
+false);
+if (ret < 0) {
+dev_err(dev, "%s:%d Error!\n", __func__, __LINE__);
+return ret;
+
}

agdev->out_ep = usb_ep_autoconfig(gadget, &fs_epout_desc);
if (!agdev->out_ep) {
    dev_err(dev, "%s:%d Error!\n", __func__, __LINE__);
    return ret;
    return -ENODEV;
} 

agdev->in_ep = usb_ep_autoconfig(gadget, &fs_epin_desc);
if (!agdev->in_ep) {
    dev_err(dev, "%s:%d Error!\n", __func__, __LINE__);
    return ret;
    return -ENODEV;
}

agdev->in_ep_maxpsize = max_t(u16,
@ -701,9 +744,9 @@
    memset(&c, 0, sizeof(struct cntrl_cur_lay3));

    if (entity_id == USB_IN_CLK_ID)
        -c.dCUR = p_srate;
        +c.dCUR = cpu_to_le32(p_srate);
    else if (entity_id == USB_OUT_CLK_ID)
        -c.dCUR = c_srate;
        +c.dCUR = cpu_to_le32(c_srate);

    value = min_t(unsigned, w_length, sizeof c);
    memcpy(req->buf, &c, value);
@ -740,15 +783,15 @@

    if (control_selector == UAC2_CS_CONTROL_SAM_FREQ) {
        if (entity_id == USB_IN_CLK_ID)
            -r.dMIN = p_srate;
            +r.dMIN = cpu_to_le32(p_srate);
        else if (entity_id == USB_OUT_CLK_ID)
            -r.dMIN = c_srate;
            +r.dMIN = cpu_to_le32(c_srate);
        else
            return -EOPNOTSUPP;

    r.dMAX = r.dMIN;
    r.dRES = 0;
    -r.wNumSubRanges = 1;
value = min_t(unsigned, w_length, sizeof r);
memcpy(req->buf, &r, value);
--- linux-4.15.0.orig/drivers/usb/gadget/function/f_uvc.c
+++ linux-4.15.0/drivers/usb/gadget/function/f_uvc.c
@@ -621,7 +621,12 @@
  uvc_hs_streaming_ep.wMaxPacketSize = cpu_to_le16(max_packet_size | ((max_packet_mult - 1) << 11));
- uvc_hs_streaming_ep.bInterval = opts->streaming_interval;
+ */ A high-bandwidth endpoint must specify a bInterval value of 1 */
+ if (max_packet_mult > 1)
+ uvc_hs_streaming_ep.bInterval = 1;
+ else
+ uvc_hs_streaming_ep.bInterval = opts->streaming_interval;

  uvc_ss_streaming_ep.wMaxPacketSize = cpu_to_le16(max_packet_size);
  uvc_ss_streaming_ep.bInterval = opts->streaming_interval;
--- linux-4.15.0.orig/drivers/usb/gadget/function/u_audio.c
+++ linux-4.15.0/drivers/usb/gadget/function/u_audio.c
@@ -32,9 +32,6 @@
 struct uac_rtd_params {
  struct snd_uac_chip *uac; /* parent chip */
  bool ep_enabled; /* if the ep is enabled */
- /* Size of the ring buffer */
- size_t dma_bytes;
- unsigned char *dma_area;

 struct snd_pcm_substream *ss;

@@ -43,8 +40,6 @@
 void *rbuf;

 -size_t period_size;
- unsigned max_psize;/* MaxPacketSize of endpoint */
 struct uac_req *ureq;

@@ -84,17 +79,22 @@
 static void u_audio_iso_complete(struct usb_ep *ep, struct usb_request *req)
 {
  unsigned pending;
- unsigned long flags;
+ unsigned long flags, flags2;
  unsigned int hw_ptr;


-bool update_alsa = false;
int status = req->status;
struct uac_req *ur = req->context;
struct snd_pcm_substream *substream;
+struct snd_pcm_runtime *runtime;
struct uac_rtd_params *prm = ur->pp;
struct snd_uac_chip *uac = prm->uac;

/* if shutting down */
-if (!prm->ep_enabled || req->status == -ESHUTDOWN)
+if (!prm->ep_enabled) {
  +usb_ep_free_request(ep, req);
  +return;
  +}
  +
  +if (req->status == -ESHUTDOWN)
  return;
  
  /*
     @ @ -111,6 +111,14 @ @
    if (!substream)
    goto exit;
    
    +snd_pcm_stream_lock_irqsave(substream, flags2);
    +
    +runtime = substream->runtime;
    +if (!runtime || !snd_pcm_running(substream)) {
    +snd_pcm_stream_unlock_irqrestore(substream, flags2);
    +goto exit;
    +}
    +
    +spin_lock_irqsave(&prm->lock, flags);
  
  if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK) {
    @ @ -137,43 +145,46 @ @
    req->actual = req->length;
  }

  -pending = prm->hw_ptr % prm->period_size;
  -pending += req->actual;
  -if (pending >= prm->period_size)
  -update_alsa = true;
  -
  hw_ptr = prm->hw_ptr;
  -prm->hw_ptr = (prm->hw_ptr + req->actual) % prm->dma_bytes;
  spin_unlock_irqrestore(&prm->lock, flags);
/* Pack USB load in ALSA ring buffer */
-pending = prm->dma_bytes - hw_ptr;
+pending = runtime->dma_bytes - hw_ptr;

if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK) {
    if (unlikely(pending < req->actual)) {
        -memcpy(req->buf, prm->dma_area + hw_ptr, pending);
        -memcpy(req->buf + pending, prm->dma_area,
        +memcpy(req->buf, runtime->dma_area + hw_ptr, pending);
        +memcpy(req->buf + pending, runtime->dma_area,
             req->actual - pending);
    } else {
        -memcpy(req->buf, prm->dma_area + hw_ptr, req->actual);
        +memcpy(req->buf, runtime->dma_area + hw_ptr,
             + req->actual);
    }
} else {
    if (unlikely(pending < req->actual)) {
        -memcpy(prm->dma_area + hw_ptr, req->buf, pending);
        -memcpy(prm->dma_area, req->buf + pending,
        +memcpy(runtime->dma_area + hw_ptr, req->buf, pending);
        +memcpy(runtime->dma_area, req->buf + pending,
             req->actual - pending);
    } else {
        -memcpy(prm->dma_area + hw_ptr, req->buf, req->actual);
        +memcpy(runtime->dma_area + hw_ptr, req->buf,
             + req->actual);
    }
}

+spin_lock_irqsave(&prm->lock, flags);
*/ /* update hw_ptr after data is copied to memory */
+prm->hw_ptr = (hw_ptr + req->actual) % runtime->dma_bytes;
+hw_ptr = prm->hw_ptr;
+spin_unlock_irqrestore(&prm->lock, flags);
+snd_pcm_stream_unlock_irqrestore(substream, flags2);
+
+if ((hw_ptr % snd_pcm_lib_period_bytes(substream)) < req->actual)
+snd_pcm_period_elapsed(substream);
+
+exit:
+if (usb_ep_queue(ep, req, GFP_ATOMIC))
+dev_err(uac->card->dev, ”%d Error!\n”, __LINE__);
+
- if (update_alsa)
- snd_pcm_period_elapsed(substream);
}
static int uac_pcm_trigger(struct snd_pcm_substream *substream, int cmd)
@@ -236,40 +247,12 @@ static int uac_pcm_hw_params(struct snd_pcm_substream *substream,
  struct snd_pcm_hw_params *hw_params)
 {
  struct snd_uac_chip *uac = snd_pcm_substream_chip(substream);
  struct uac_rtd_params *prm;
  int err;
  
  if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK)
    prm = &uac->p_prm;
  else
    prm = &uac->c_prm;
  
  err = snd_pcm_lib_malloc_pages(substream,
  +params_buffer_bytes(hw_params));
  if (err >= 0) {
    prm->dma_bytes = substream->runtime->dma_bytes;
    prm->dma_area = substream->runtime->dma_area;
    prm->period_size = params_period_bytes(hw_params);
  }
  
  return err;
} 

static int uac_pcm_hw_free(struct snd_pcm_substream *substream)
{
  struct snd_uac_chip *uac = snd_pcm_substream_chip(substream);
  struct uac_rtd_params *prm;
  
  if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK)
    prm = &uac->p_prm;
  else
    prm = &uac->c_prm;
  
  prm->dma_area = NULL;
  prm->dma_bytes = 0;
  prm->period_size = 0;
  
  return snd_pcm_lib_free_pages(substream);
}

@@ -366,24 +349,29 @@
      if (!prm->ep_enabled)
        return;

      prm->ep_enabled = false;
audio_dev = uac->audio_dev;
params = &audio_dev->params;

for (i = 0; i < params->req_number; i++) {
    if (prm->ureq[i].req) {
        if (usb_ep_dequeue(ep, prm->ureq[i].req))
            usb_ep_free_request(ep, prm->ureq[i].req);
    }
}

prm->ureq[i].req = NULL;
}

prm->ep_enabled = false;
if (usb_ep_disable(ep))
dev_err(uac->card->dev, "%d Error\n", __func__, __LINE__);

int u_audio_start_capture(struct g_audio *audio_dev)
{
    struct snd_uac_chip *uac = audio_dev->uac;
    @ @ .595,15 +583,15 @@
    if (err < 0)
        goto snd_fail;

    strcpy(pcm->name, pcm_name);
    strlcpy(pcm->name, pcm_name, sizeof(pcm->name));
    pcm->private_data = uac;
    uac->pcm = pcm;

    snd_pcm_set_ops(pcm, SNDRV_PCM_STREAM_PLAYBACK, &uac_pcm_ops);
    snd_pcm_set_ops(pcm, SNDRV_PCM_STREAM_CAPTURE, &uac_pcm_ops);

    strcpy(card->driver, card_name);
    strlcpy(card->shortname, card_name, sizeof(card->shortname));
    sprintf(card->longname, "%s %i", card_name, card->dev->id);
}
snd_pcm_lib_preallocate_pages_for_all(pcm, SNDRV_DMA_TYPE_CONTINUOUS, --- linux-4.15.0.orig/drivers/usb/gadget/function/u_ether.c +++ linux-4.15.0/drivers/usb/gadget/function/u_ether.c @@ -45,9 +45,10 @@ #define UETH__VERSION"29-May-2008"

/* Experiments show that both Linux and Windows hosts allow up to 16k
- * frame sizes. Set the max size to 15k+52 to prevent allocating 32k
+ * frame sizes. Set the max MTU size to 15k+52 to prevent allocating 32k
 * blocks and still have efficient handling. */
-#define GETHER_MAX_ETH_FRAME_LEN 15412
+#define GETHER_MAX_MTU_SIZE 15412
+#define GETHER_MAX_ETH_FRAME_LEN (GETHER_MAX_MTU_SIZE + ETH_HLEN)

struct eth_dev {
/* lock is held while accessing port_usb
@@ -93,7 +94,7 @@
static inline int qlen(struct usb_gadget *gadget, unsigned qmult) {
    if (gadget_is_dualspeed(gadget) && (gadget->speed == USB_SPEED_HIGH ||
-        gadget->speed == USB_SPEED_SUPER))
+        gadget->speed >= USB_SPEED_SUPER))
        return qmult * DEFAULT_QLEN;
    else
        return DEFAULT_QLEN;
@@ -186,11 +187,12 @@
    out = dev->port_usb->out_ep;
    else
        out = NULL;
-spin_unlock_irqrestore(&dev->lock, flags);

        if (!out)
        +{
            spin_unlock_irqrestore(&dev->lock, flags);
            return -ENOTCONN;
            -
            +

        /* Padding up to RX_EXTRA handles minor disagreements with host.
        * Normally we use the USB "terminate on short read" convention;
        @@ -214,6 +216,7 @@

            if (dev->port_usb->is_fixed)
                size = max_t(size_t, size, dev->port_usb->fixed_out_len);
            +spin_unlock_irqrestore(&dev->lock, flags);

                skb = __netdev_alloc_skb(dev->net, size + NET_IP_ALIGN, gfp_flags);
                if (skb == NULL) {
static void rx_fill(struct eth_dev *dev, gfp_t gfp_flags)
{
    struct usb_request *req;
    struct usb_request *tmp;
    unsigned long flags;

    /* fill unused rxq slots with some skb */
    spin_lock_irqsave(&dev->req_lock, flags);
    list_for_each_entry_safe(req, tmp, &dev->rx_reqs, list) {
        while (!list_empty(&dev->rx_reqs)) {
            req = list_first_entry(&dev->rx_reqs, struct usb_request, list);
            list_del_init(&req->list);
            spin_unlock_irqrestore(&dev->req_lock, flags);

        }
    }
    spin_unlock_irqrestore(&dev->lock, flags);

    if (skb && !in) {
        dev_kfree_skb_any(skb);
        if (!in) {
            if (skb)
                dev_kfree_skb_any(skb);
        }
        return NETDEV_TX_OK;
    }

    /* MTU range: 14 - 15412 */
    net->min_mtu = ETH_HLEN;
    net->max_mtu = GETHER_MAX_MTU_SIZE;

    dev->gadget = g;
    SET_NETDEV_DEV(net, &g->dev);
    @ @ -844,6 +848,10 @@
    net->ethtool_ops = &ops;
    SET_NETDEV_DEVTYPE(net, &gadget_type);

    /* MTU range: 14 - 15412 */
    +net->min_mtu = ETH_HLEN;
    +net->max_mtu = GETHER_MAX_MTU_SIZE;
    +
    return net;
}

EXPORT_SYMBOL_GPL(gether_setup_name_default);
@@ -1121,7 +1129,6 @@
struct eth_dev *dev = link->ioport;
struct usb_request *req;
-struct usb_request *tmp;

WARN_ON(!dev);
if (!dev)
	@ @ -1138,7 +1145,8 @@
 *
 usb_ep_disable(link->in_ep);
 spin_lock(&dev->req_lock);
-list_for_each_entry_safe(req, tmp, &dev->tx_reqs, list) {
 +while (!list_empty(&dev->tx_reqs)) {
 +req = list_first_entry(&dev->tx_reqs, struct usb_request, list);
 list_del(&req->list);
 spin_unlock(&dev->req_lock);
 @@ -1150,7 +1158,8 @@
 usb_ep_disable(link->out_ep);
 spin_lock(&dev->req_lock);
-list_for_each_entry_safe(req, tmp, &dev->rx_reqs, list) {
 +while (!list_empty(&dev->rx_reqs)) {
 +req = list_first_entry(&dev->rx_reqs, struct usb_request, list);
 list_del(&req->list);
 spin_unlock(&dev->req_lock);
 --- linux-4.15.0.orig/drivers/usb/gadget/function/u_ether_configfs.h
 +++ linux-4.15.0/drivers/usb/gadget/function/u_ether_configfs.h
 @@ -169,12 +169,11 @@
 size_t len) {
 struct f_##_##_opts *opts = to_f_##_##_opts(item);
-int ret;
+int ret = -EINVAL;
 u8 val;

 mutex_lock(&opts->lock);
 -ret = sscanf(page, "%02hhx", &val);
 -if (ret > 0) {
 +if (sscanf(page, "%02hhx", &val) > 0) {
 opts->n_ = val;
 ret = len;
 }
 --- linux-4.15.0.orig/drivers/usb/gadget/function/u_serial.c
 +++ linux-4.15.0/drivers/usb/gadget/function/u_serial.c
 @@ -712,8 +712,10 @@
 port->n_read = 0;
started = gs_start_rx(port);

/* unblock any pending writes into our circular buffer */
if (started) {
    gs_start_tx(port);
    /* Unblock any pending writes into our circular buffer, in case
     * we didn't in gs_start_tx() */
    tty_wakeup(port->port.tty);
} else {
    gs_free_requests(ep, head, &port->read_allocated);
    __func__, port_num, PTR_ERR(tty_dev));
}

ret = PTR_ERR(tty_dev);
+mutex_lock(&ports[port_num].lock);
port = ports[port_num].port;
ports[port_num].port = NULL;
+mutex_unlock(&ports[port_num].lock);
gserial_free_port(port);
goto err;
}
--- linux-4.15.0.orig/drivers/usb/gadget/function/uvc_configfs.c
+++ linux-4.15.0/drivers/usb/gadget/function/uvc_configfs.c
@@ -540,6 +540,7 @@
unlock:
mutex_unlock(&opts->lock);
out:
+config_item_put(header);
mutex_unlock(su_mutex);
return ret;
}
@@ -575,6 +576,7 @@
unlock:
mutex_unlock(&opts->lock);
out:
+config_item_put(header);
mutex_unlock(su_mutex);
}

@@ -760,6 +762,7 @@
out:
mutex_unlock(&opts->lock);
}

@ @ -760,6 +762,7 @@
format_ptr->fmt = target_fmt;
list_add_tail(&format_ptr->entry, &src_hdr->formats);
++src_hdr->num_fmt;
+++target_fmt->linked;

out:
mutex_unlock(&opts->lock);
@ @ -797,6 +800,8 @@
break;
}

--target_fmt->linked;
+
out:
mutex_unlock(&opts->lock);
mutex_unlock(su_mutex);
@@ -2034,6 +2039,7 @@
unlock:
mutex_unlock(&opts->lock);
out:
+config_item_put(header);
mutex_unlock(su_mutex);
return ret;
}
@@ -2074,6 +2080,7 @@
unlock:
mutex_unlock(&opts->lock);
out:
+config_item_put(header);
mutex_unlock(su_mutex);
}

--- linux-4.15.0.orig/drivers/usb/gadget/function/uvc_video.c
+++ linux-4.15.0/drivers/usb/gadget/function/uvc_video.c
@@ -125,6 +125,21 @@
/* Request handling
 */

+static int uvcg_video_ep_queue(struct uvc_video *video, struct usb_request *req)
+{
+int ret;
+
+ret = usb_ep_queue(video->ep, req, GFP_ATOMIC);
+if (ret < 0) {
+printk(KERN_INFO "Failed to queue request (%d).\n", ret);
+/* Isochronous endpoints can't be halted. */
+if (usb_endpoint_xfer_bulk(video->ep->desc))
+usb_ep_set_halt(video->ep);
+}
+
+return ret;
+}
+
/*
 * I somehow feel that synchronisation won't be easy to achieve here. We have
 * three events that control USB requests submission:
video->encode(req, video, buf);

- if ((ret = usb_ep_queue(ep, req, GFP_ATOMIC)) < 0) {
- printk(KERN_INFO "Failed to queue request (%d)\n", ret);
- usb_ep_set_halt(ep);
- spin_unlock_irqrestore(&video->queue.irqlock, flags);
- ret = uvcg_video_ep_queue(video, req);
+ ret = uvcg_video_ep_queue(video, req);
+ spin_unlock_irqrestore(&video->queue.irqlock, flags);
+ if (ret < 0) {
+ uvcg_queue_cancel(queue, 0);
+ goto requeue;
} - spin_unlock_irqrestore(&video->queue.irqlock, flags);

return;

@ -189,14 +204,13 @@
video->encode(req, video, buf);

/* Queue the USB request */
- ret = usb_ep_queue(video->ep, req, GFP_ATOMIC);
+ ret = uvcg_video_ep_queue(video, req);
+ spin_unlock_irqrestore(&queue->irqlock, flags);
+ if (ret < 0) {
+ printk(KERN_INFO "Failed to queue request (%d)\n", ret);
+ usb_ep_set_halt(video->ep);
+ spin_unlock_irqrestore(&queue->irqlock, flags);
+ uvcg_queue_cancel(queue, 0);
+ break;
} - spin_unlock_irqrestore(&queue->irqlock, flags);
}

spin_lock_irqsave(&video->req_lock, flags);
--- linux-4.15.0.orig/drivers/usb/gadget/legacy/acm_ms.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/acm_ms.c
@@ -203,8 +203,10 @@
 struct usb_descriptor_header *usb_desc;

usb_desc = usb_otg_descriptor_alloc(gadget);
- if (!usb_desc)
+ if (!usb_desc) {
+ status = -ENOMEM;
+ goto fail_string_ids;
+status = -ENOMEM;

---
usb_otg_descriptor_init(gadget, usb_desc);
  otg_desc[0] = usb_desc;
  otg_desc[1] = NULL;
--- linux-4.15.0.orig/drivers/usb/gadget/legacy/audio.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/audio.c
@@ -302,8 +302,10 @@
struct usb_descriptor_header *usb_desc;

usb_desc = usb_otg_descriptor Alloc(cdev->gadget);
-if (!usb_desc)
+if (!usb_desc)
+status = -ENOMEM;
  goto fail;
+
usb_otg_descriptor_init(cdev->gadget, usb_desc);
  otg_desc[0] = usb_desc;
  otg_desc[1] = NULL;
--- linux-4.15.0.orig/drivers/usb/gadget/legacy/cdc2.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/cdc2.c
@@ -179,8 +179,10 @@
struct usb_descriptor_header *usb_desc;

usb_desc = usb_otg_descriptor Alloc(gadget);
-if (!usb_desc)
+if (!usb_desc)
+status = -ENOMEM;
  goto fail1;
+
usb_otg_descriptor_init(gadget, usb_desc);
  otg_desc[0] = usb_desc;
  otg_desc[1] = NULL;
@@ -225,7 +227,7 @@
    .name		= "g_cdc",
    .dev		= &device_desc,
    .strings	= dev_strings,
--- linux-4.15.0.orig/drivers/usb/gadget/legacy/ether.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/ether.c
@@ -403,8 +403,10 @@
struct usb_descriptor_header *usb_desc;

usb_desc = usb_otg_descriptor Alloc(gadget);
-if (!usb_desc)
if (!usb_desc) {
    status = -ENOMEM;
    goto fail1;
}  
usb_otg_descriptor_init(gadget, usb_desc);

otg_desc[0] = usb_desc;
otg_desc[1] = NULL;
--- linux-4.15.0.orig/drivers/usb/gadget/legacy/g_ffs.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/g_ffs.c
@@ -149,7 +149,7 @@
    .name= DRIVER_NAME,
    .dev= &gfs_dev_desc,
    .strings= gfs_dev_strings,
--- linux-4.15.0.orig/drivers/usb/gadget/legacy/hid.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/hid.c
@@ -171,8 +171,10 @@
    struct usb_descriptor_header *usb_desc;

usb_desc = usb_otg_descriptor_alloc(gadget);
-if (!usb_desc)
+if (!usb_desc) {
    status = -ENOMEM;
    goto put;
}  
usb_otg_descriptor_init(gadget, usb_desc);

req->buf = dev->rbuf;
req->context = NULL;
-value = -EOPNOTSUPP;
switch (ctrl->bRequest) {
    case USB_REQ_GET_DESCRIPTOR:
@@ -1784,7 +1783,7 @@
dev_config (struct file *fd, const char __user *buf, size_t len, loff_t *ptr)
{
    struct dev_data *dev = fd->private_data;
-value = -EOPNOTSUPP;
+value = len;
    ssize_t_tvalue = len, length = len;
+ssize_t_tvalue, length = len;
unsigned total;
    u32 tag;
    char *kbuf;
    return 0;

Enomem:
    kfree(CHIP);
    CHIP = NULL;
    return -ENOMEM;
}

--- linux-4.15.0.orig/drivers/usb/gadget/legacy/multi.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/multi.c
@@ -482,7 +482,7 @@
    .name = "g_multi",
    .dev = &device_desc,
    .strings = dev_strings,
-    .max_speed = USB_SPEED_HIGH,
+    .max_speed = USB_SPEED_SUPER,
    .bind = multi_bind,
    .unbind = multi_unbind,
    .needs_serial = 1,
--- linux-4.15.0.orig/drivers/usb/gadget/legacy/ncm.c
+++ linux-4.15.0/drivers/usb/gadget/legacy/ncm.c
@@ -158,8 +158,10 @@
    struct usb_descriptor_header *usb_desc;

    usb_desc =usb_otg_descriptor_alloc(gadget);
-    if (!usb_desc)
-        status = -ENOMEM;
-    goto fail;
+    }
    usb_otg_descriptor_init(gadget, usb_desc);
    otg_desc[0] = usb_desc;
    otg_desc[1] = NULL;
    return 0;

--- linux-4.15.0.orig/drivers/usb/gadget/u_f.h
#include <linux/overflow.h>

/* Variable Length Array Macros **********************************************/
#define vla_group(groupname) size_t groupname##_next = 0
#define vla_item(groupname, type, name, n)  
    size_t groupname_##name##_offset = ({
        size_t align_mask = __alignof__(type) - 1;
        size_t size = (n) * sizeof(type);
        groupname##_next = offset + size;
        offset;
    })
#define vla_item_with_sz(groupname, type, name, n)  
    size_t groupname_##name##_sz = array_size(n, sizeof(type));
    size_t groupname_##name##_offset = ({
        size_t offset = 0;
        if (groupname##_next != SIZE_MAX) {
            size_t align_mask = __alignof__(type) - 1;
            size_t size = array_size(n, sizeof(type));
            offset = (groupname##_next + align_mask) & ~align_mask;
            if (check_add_overflow(offset, size, &groupname##_next)) {
                groupname##_next = SIZE_MAX;
                offset = 0;
            }
        }
    })
#define vla_item_with_sz(groupname, type, name, n)  
    size_t groupname_##name##_sz = array_size(n, sizeof(type));
    size_t groupname_##name##_offset = ({
        size_t offset = 0;
        if (groupname##_next != SIZE_MAX) {
            size_t align_mask = __alignof__(type) - 1;
            size_t size = array_size(n, sizeof(type));
            offset = (groupname##_next + align_mask) & ~align_mask;
            if (check_add_overflow(offset, groupname_##name##_sz,
                &groupname##_next)) {
                groupname##_next = SIZE_MAX;
                offset = 0;
            }
        }
    })

#include <linux/usb/gadget.h>
#define vla_ptr(ptr, groupname, name) \
@@ -61,7 +77,9 @@
/* Frees a usb_request previously allocated by alloc_ep_req() */
static inline void free_ep_req(struct usb_ep *ep, struct usb_request *req) 
{ 
+WARN_ON(req->buf == NULL); 
kfree(req->buf); 
+req->buf = NULL; 
usb_ep_free_request(ep, req); 
}

--- linux-4.15.0.orig/drivers/usb/gadget/udc/amd5536udc_pci.c
+++ linux-4.15.0/drivers/usb/gadget/udc/amd5536udc_pci.c
@@ -154,6 +154,11 @@
pci_set_master(pdev);
pci_try_set_mwi(pdev);
+dev->phys_addr = resource;
+dev->irq = pdev->irq;
+dev->pdev = pdev;
+dev->dev = &pdev->dev;
+
+/* init dma pools */
+if (use_dma) {
+retval = init_dma_pools(dev);
@@ -161,11 +166,6 @@
goto err_dma;
-dev->phys_addr = resource;
-dev->irq = pdev->irq;
-dev->pdev = pdev;
-dev->dev = &pdev->dev;
-
-/* general probing */
-if (udc_probe(dev)) {
-reval = -ENODEV;
--- linux-4.15.0.orig/drivers/usb/gadget/udc/at91_udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/at91_udc.c
@@ -1891,7 +1891,9 @@

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clk_disable(udc->iclk);

/* request UDC and maybe VBUS irqs */
-udc->udp_irq = platform_get_irq(pdev, 0);
+udc->udp_irq = retval = platform_get_irq(pdev, 0);
+if (retval < 0)
  +goto err_unprepare_iclk;
retval = devm_request_irq(dev, udc->udp_irq, at91_udc_irq, 0,
  +driver_name, udc);
if (retval) {
  --- linux-4.15.0.orig/drivers/usb/gadget/udc/atmel_usba_udc.c
  +++ linux-4.15.0/drivers/usb/gadget/udc/atmel_usba_udc.c
  @@ -485,9 +485,11 @@
  next_fifo_transaction(ep, req);
  if (req->last_transaction) {
    usba_ep_writel(ep, CTL_DIS, USBA_TX_PK_RDY);
  } else {
    usba_ep_writel(ep, CTL_DIS, USBA_TX_COMPLETE);
  }
@@ -907,7 +909,7 @@
  u32 status;
  DBG(DBG_GADGET | DBG_QUEUE, "ep_dequeue: %s, req %p\n",
    -ep->ep.name, req);
    +ep->ep.name, _req);

  spin_lock_irqsave(&udc->lock, flags);
  @@ -2069,6 +2071,8 @@
  udc->errata = match->data;
  udc->pmc = syscon_regmap_lookup_by_compatible("atmel,at91sam9g45-pmc");
  if (IS_ERR(udc->pmc))
    +udc->pmc = syscon_regmap_lookup_by_compatible("atmel,at91sam9rl-pmc");
    +if (IS_ERR(udc->pmc))
      udc->pmc = syscon_regmap_lookup_by_compatible("atmel,at91sam9x5-pmc");
  if (udc->errata && IS_ERR(udc->pmc))
    return ERR_CAST(udc->pmc);
    --- linux-4.15.0.orig/drivers/usb/gadget/udc/bdc/Kconfig
    +++ linux-4.15.0/drivers/usb/gadget/udc/bdc/Kconfig
    @@ -15,7 +15,7 @@
    comment "Platform Support"
configUSB_BDC_PCI
tristate "BDC support for PCIe based platforms"
-depends on USB_PCI
+depends on USB_PCI && BROKEN
default USB_BDC_UDC

help

Enable support for platforms which have BDC connected through PCIe, such as Lego3 FPGA platform.

--- linux-4.15.0.orig/drivers/usb/gadget/udc/bdc/bdc_core.c
+++ linux-4.15.0/drivers/usb/gadget/udc/bdc/bdc_core.c
@@ -283,6 +283,7 @@
/* in that case reinit is passed as 1 */
if (reinit) {
+int i;
/* Enable interrupts */
temp = bdc_readl(bdc->regs, BDC_BDCSC);
temp |= BDC_GIE;
@@ -292,6 +293,9 @@
/* Initialize SRR to 0 */
memset(bdc->srr.sr_bds, 0,
NUM_SR_ENTRIES * sizeof(struct bdc_bd));
+/* clear ep flags to avoid post disconnect stops/deconfigs */
+for (i = 1; i < bdc->num_eps; ++i)
+ bdc->bdc_ep_array[i]->flags = 0;
} else {
/* One time initialization only */
/* Enable status report function pointers */
@@ -564,7 +568,8 @@
if (ret) {
 dev_err(dev, "No suitable DMA config available, abort\n");
- return -ENOTSUPP;
+ ret = -ENOTSUPP;
+ goto phycleanup;
}
dev_dbg(dev, "Using 32-bit address\n");
}
@@ -604,9 +609,14 @@
static int bdc_suspend(struct device *dev)
{
 struct bdc *bdc = dev_get_drvdata(dev);
+ int ret;
- clk_disable_unprepare(bdc->clk);
- return 0;
+ /* Halt the controller */
+ ret = bdc_stop(bdc);
+ if (!ret)
+clk_disable_unprepare(bdc->clk);
+
+return ret;
}

static int bdc_resume(struct device *dev)
--- linux-4.15.0.orig/drivers/usb/gadget/udc/bdc/bdc_ep.c
+++ linux-4.15.0/drivers/usb/gadget/udc/bdc/bdc_ep.c
@@ -541,7 +541,7 @@
{
    struct bdc *bdc = ep->bdc;

    if (req == NULL || &req->queue == NULL || &req->usb_req == NULL)
+    if (req == NULL)
        return;
    dev_dbg(bdc->dev, "%s ep:%s status:%d\n", __func__, ep->name, status);
@@ -616,7 +616,6 @@
} bdc_dbg_bd_list(bdc, ep);
/* only for ep0: config ep is called for ep0 from connect event */
-ep->flags |= BDC_EP_ENABLED;
if (ep->ep_num == 1)
    return ret;

@@ -760,10 +759,13 @@
__func__, ep->name, start_bdi, end_bdi);
    dev_dbg(bdc->dev, "ep_dequeue ep=%p ep->desc=%p\n", ep, (void *)ep->usb_ep.desc);
-/* Stop the ep to see where the HW is ? */
-    ret = bdc_stop_ep(bdc, ep->ep_num);
-/* if there is an issue with stopping ep, then no need to go further */
-    if (ret)
-        return 0;
+    /* if still connected, stop the ep to see where the HW is ? */
+    if (!(bdc_readl(bdc->regs, BDC_USPC) & BDC_PST_MASK)) {
+        ret = bdc_stop_ep(bdc, ep->ep_num);
+        /* if there is an issue, then no need to go further */
+        if (ret)
+            return 0;
+    } else
+    return 0;

/*
 @@ -1912,7 +1914,9 @@
 __func__, ep->name, ep->flags);

 if (!(ep->flags & BDC_EP_ENABLED)) {
     -dev_warn(bdc->dev, "%s is already disabled\n", ep->name);
+if (bdc->gadget.speed != USB_SPEED_UNKNOWN)
+dev_warn(bdc->dev, "%s is already disabled\n", 
+ ep->name);
return 0;
}
spin_lock_irqsave(&bdc->lock, flags);
--- linux-4.15.0.orig/drivers/usb/gadget/udc/bdc/bdc_pci.c
+++ linux-4.15.0/drivers/usb/gadget/udc/bdc/bdc_pci.c
@@ -77,6 +77,7 @@
if (ret) {
    dev_err(&pci->dev, 
"couldn't add resources to bdc device\n");
+platform_device_put(bdc);
    return ret;
}
--- linux-4.15.0.orig/drivers/usb/gadget/udc/core.c
+++ linux-4.15.0/drivers/usb/gadget/udc/core.c
@@ -96,6 +96,17 @@
    if (ep->enabled)
        goto out;

+/* UDC drivers can't handle endpoints with maxpacket size 0 */
+if (usb_endpoint_maxp(ep->desc) == 0) {
+    /* We should log an error message here, but we can't call
+     * dev_err() because there's no way to find the gadget
+     * given only ep.
+     */
+    ret = -EINVAL;
+    goto out;
+
ret = ep->ops->enable(ep, ep->desc);
if (ret)
go to out;
@@ -180,8 +191,8 @@
void usb_ep_free_request(struct usb_ep *ep, 
    struct usb_request *req)
{
    -ep->ops->free_request(ep, req);
    trace_usb_ep_free_request(ep, req, 0);
+ep->ops->free_request(ep, req);
}
EXPORT_SYMBOL_GPL(usb_ep_free_request);

@@ -238,6 +249,9 @@
* arranges to poll once per interval, and the gadget driver usually will
* have queued some data to transfer at that time.
*
+ Note that @req's ->complete() callback must never be called from
+ within usb_ep_queue() as that can create deadlock situations.
+
* Returns zero, or a negative error code. Endpoints that are not enabled
* report errors; errors will also be
* reported when the usb peripheral is disconnected.
@@ -912,7 +926,7 @@ return 0;

/* "high bandwidth" works only at high speed */
-if (!gadget_is_dualspeed(gadget) && usb_endpoint_maxp(desc) & (3<<11))
+if (!gadget_is_dualspeed(gadget) && usb_endpoint_maxp_mult(desc) > 1) return 0;

switch (type) {
 @@ -1111,7 +1125,7 @@
 dev_name(&udc->dev)) == 0) {
   ret = udc_bind_to_driver(udc, driver);
   if (ret != -EPROBE_DEFER)
-dev_del(&driver->pending);
+list_del_init(&driver->pending);
   break;
 }

@@ -1433,10 +1447,13 @@
 struct device_attribute *attr, const char *buf, size_t n)
 {
   struct usb_udc *udc = container_of(dev, struct usb_udc, dev);
+   ssize_t ret;
+
+   mutex_lock(&udc_lock);
   if (!udc->driver) {
     dev_err(dev, "soft-connect without a gadget driver\n");
-dev_del_init(&driver->pending);
+list_del_init(&driver->pending);
   break;
   }
-
@@ -1448,10 +1465,14 @@
 if (sysfs_streq(buf, "connect")) {
    dev_err(dev, "unsupported command "buf", buf);
    -return -EINVAL;
+ret = -EINVAL;
+goto out;
 }

if (sysfs_streq(buf, "connect")) {
@@ -1448,10 +1465,14 @@
 usb_gadget_udc_stop(udc);
 } else {
   dev_err(dev, "unsupported command "buf", buf);
    -return -EINVAL;
+ret = -EINVAL;
+goto out;

return n;
+ret = n;
+out:
+mutex_unlock(&udc_lock);
+return ret;
}
static DEVICE_ATTR(soft_connect, S_IWUSR, NULL, usb_udc_softconn_store);

--- linux-4.15.0.orig/drivers/usb/gadget/udc/dummy_hcd.c
+++ linux-4.15.0/drivers/usb/gadget/udc/dummy_hcd.c
@@ -48,6 +48,7 @@
#define DRIVER_VERSION "02 May 2005"
#define POWER_BUDGET 500 /* in mA; use 8 for low-power port testing */
+#define POWER_BUDGET_3 900 /* in mA */

static const char *driver_name[] = "dummy_hcd";
static const char *driver_desc[] = "USB Host+Gadget Emulator";
@@ -913,6 +914,21 @@
spin_lock_irqsave(&dum->lock, flags);
dum->pullup = (value != 0);
set_link_state(dum_hcd);
+if (value == 0) {
+*/
+ * Emulate synchronize_irq(): wait for callbacks to finish.
+ * This seems to be the best place to emulate the call to
+ * synchronize_irq() that's in usb_gadget_remove_driver().
+ * Doing it in dummy_udc_stop() would be too late since it
+ * is called after the unbind callback and unbind shouldn't
+ * be invoked until all the other callbacks are finished.
+ */
+while (dum->callback_usage > 0) {
+spin_unlock_irqrestore(&dum->lock, flags);
+usleep_range(1000, 2000);
+spin_lock_irqsave(&dum->lock, flags);
+}
spin_unlock_irqrestore(&dum->lock, flags);

usb_hcd_poll_rh_status(dummy_hcd_to_hcd(dum_hcd));
@@ -991,8 +1007,18 @@
struct dummy_hcd*dum_hcd = gadget_to_dummy_hcd(g);
struct dummy*dum = dum_hcd->dum;

-if (driver->max_speed == USB_SPEED_UNKNOWN)
+switch (g->speed) {

/* All the speeds we support */
case USB_SPEED_LOW:
case USB_SPEED_FULL:
case USB_SPEED_HIGH:
case USB_SPEED_SUPER:
	break;
=default:
	dev_err(dummy_dev(dum_hcd), "Unsupported driver max speed \%d\n",
		driver->max_speed);
return -EINVAL;
+
*/

/* SLAVE side init ... the layer above hardware, which
spin_lock_irq(&dum->lock);
dum->ints_enabled = 0;
stop_activity(dum);
-
/* emulate synchronize_irq(): wait for callbacks to finish */
-while (dum->callback_usage > 0) {
-spin_unlock_irq(&dum->lock);
-usleep_range(1000, 2000);
-spin_lock_irq(&dum->lock);
-}
-
dum->driver = NULL;
spin_unlock_irq(&dum->lock);

u32 this_sg;
bool next_sg;

-to_host = usb_pipein(urb->pipe);
+to_host = usb_urb_dir_in(urb);
rbuf = req->req.buf + req->req.actual;

if (!urb->num_sgs) {

/* FIXME update emulated data toggle too */

-to_host = usb_pipein(urb->pipe);
+to_host = usb_urb_dir_in(urb);
if (unlikely(len == 0))
is_short = 1;
else {

/* Bus speed is 500000 bytes/ms, so use a little less */
total = 490000;
break;
-default:
+default;/* Can't happen */
dev_err(dummy_dev(dum_hcd), "bogus device speed\n");
-return;
+total = 0;
+break;
}

/*@ FIXME if HZ != 1000 this will probably misbehave ... */
@@ -1840,11 +1859,11 @@
/* Used up this frame's bandwidth? */
if (total <= 0)
-@-break;
+@-continue;
/* find the gadget's ep for this request (if configured) */
a=usb_pipeendpoint (urb->pipe);
-if (usb_pipein(urb->pipe))
+if (usb_urb_dir_in(urb))
+if (usb_urb_dir_in(urb))
address | USB_DIR_IN;
ep = find_endpoint(dum, address);
if (!ep) {
@@ -2401,7 +2420,7 @@
s = "?";
break;
} s; },
-ep, ep ? (usb_pipein(urb->pipe) ? "in" : "out") : "",
+ep, ep ? (usb_urb_dir_in(urb) ? "in" : "out") : "",
({ char *s; \
switch (usb_pipetype(urb->pipe)) { \ 
case PIPE_CONTROL:\ 
@@ -2449,7 +2468,7 @@
dum_hcd->rh_state = DUMMY_RH_RUNNING;
dum_hcd->stream_en_ep = 0;
INIT_LIST_HEAD(&dum_hcd->urbp_list);
-dummy_hcd_to_hcd(dum_hcd)->power_budget = POWER_BUDGET;
+dummy_hcd_to_hcd(dum_hcd)->power_budget = POWER_BUDGET_3;
dummy_hcd_to_hcd(dum_hcd)->state = HC_STATE_RUNNING;
dummy_hcd_to_hcd(dum_hcd)->uses_new_polling = 1;
#ifdef CONFIG_USB_OTG
@@ -2741,7 +2760,7 @@
};

/*-----------------------------*/
```c
#define MAX_NUM_UDC2
#define MAX_NUM_UDC32
static struct platform_device *the_udc_pdev[MAX_NUM_UDC];
static struct platform_device *the_hcd_pdev[MAX_NUM_UDC];

@@ -2749,7 +2768,7 @@
}{
    retval = -ENOMEM;
    inti;
    -struct dummy *dum[MAX_NUM_UDC];
+    struct dummy *dum[MAX_NUM_UDC] = {};

    if (usb_disabled())
        return -ENODEV;
--- linux-4.15.0.orig/drivers/usb/gadget/udc/fotg210-udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/fotg210-udc.c
@@ -337,15 +337,16 @@
} else {
    buffer = req->req.buf + req->req.actual;
    length = ioread32(ep->fotg210->reg +
-        FOTG210_FIBCR(ep->epnum - 1));
-    length &= FIBCR_BCFX;
+        FOTG210_FIBCR(ep->epnum - 1)) & FIBCR_BCFX;
+    if (length > req->req.length - req->req.actual)
+        length = req->req.length - req->req.actual;
    }
} else {
    buffer = req->req.buf + req->req.actual;
    if (req->req.length - req->req.actual > ep->ep.maxpacket)
        length = ep->ep.maxpacket;
    else
        -length = req->req.length;
+        length = req->req.length - req->req.actual;
    }

d = dma_map_single(NULL, buffer, length,
@@ -382,8 +383,7 @@
}
if (ep->dir_in) { /* if IN */
    fotg210_start_dma(ep, req);
-    if (((req->req.length == req->req.actual) ||
-        (req->req.actual < ep->ep.maxpacket))
+    if (req->req.length == req->req.actual)
        fotg210_done(ep, req, 0);
    } else { /* OUT */
    u32 value = ioread32(ep->fotg210->reg + FOTG210_DMISGR0);
@@ -741,7 +741,7 @@
fotg210->ep0_req->length = 2;
```

spin_unlock(&fotg210->lock);
-fotg210_ep_queue(fotg210->gadget.ep0, fotg210->ep0_req, GFP_KERNEL);
+fotg210_ep_queue(fotg210->gadget.ep0, fotg210->ep0_req, GFP_ATOMIC);
spin_lock(&fotg210->lock);
}

@@ -824,7 +824,7 @@
if (req->req.length)
    fotg210_start_dma(ep, req);

-    if ((req->req.length - req->req.actual) < ep->ep.maxpacket)
+    if (req->req.actual == req->req.length)
        fotg210_done(ep, req, 0);
    } else {
    fotg210_set_cxdone(fotg210);
    }
@@ -853,12 +853,16 @@
    struct fotg210_request *req = list_entry(ep->queue.next,
                                struct fotg210_request, queue);
    int disgr1 = ioread32(ep->fotg210->reg + FOTG210_DISGR1);

    fotg210_start_dma(ep, req);

-    /* finish out transfer */
+    /* Complete the request when it's full or a short packet arrived.
+     * Like other drivers, short_not_ok isn't handled.
+     */
+    
+    if (req->req.length == req->req.actual ||
-        req->req.actual < ep->ep.maxpacket)
+        (disgr1 & DISGR1_SPK_INT(ep->epnum - 1))
        fotg210_done(ep, req, 0);
    }

@@ -1031,6 +1035,12 @@
    value &= ~DMCR_GLINT_EN;
    iowrite32(value, fotg210->reg + FOTG210_DMCR);

+    /* enable only grp2 irqs we handle */
+    iowrite32(~(DISGR2_DMA_ERROR | DISGR2_RX0BYTE_INT | DISGR2_TX0BYTE_INT
+               | DISGR2_ISO_SEQ_ABORT_INT | DISGR2_ISO_SEQ_ERR_INT
+               | DISGR2_RESM_INT | DISGR2_SUSP_INT | DISGR2_USB_RST_INT),
+               fotg210->reg + FOTG210_DMISGR2);
+    /* disable all fifo interrupt */
    iowrite32(~(u32)0, fotg210->reg + FOTG210_DMISGR1);
static int fotg210_udc_remove(struct platform_device *pdev)
{
    struct fotg210_udc *fotg210 = platform_get_drvdata(pdev);

    int i;

    usb_del_gadget_udc(&fotg210->gadget);
    iounmap(fotg210->reg);
    free_irq(platform_get_irq(pdev, 0), fotg210);

    fotg210_ep_free_request(&fotg210->ep[0]->ep, fotg210->ep0_req);
    for (i = 0; i < FOTG210_MAX_NUM_EP; i++)
        kfree(fotg210->ep[i]);
    kfree(fotg210);

    return 0;

    /* initialize udc */
    fotg210 = kzalloc(sizeof(struct fotg210_udc), GFP_KERNEL);
    if (fotg210 == NULL)
        goto err;
    for (i = 0; i < FOTG210_MAX_NUM_EP; i++) {
        _ep[i] = kzalloc(sizeof(struct fotg210_ep), GFP_KERNEL);
        fotg210->reg = ioremap(res->start, resource_size(res));
        if (fotg210->reg == NULL)
            pr_err("ioremap error.
        -goto err_alloc;
        +goto err;

        fotg210->ep0_req = fotg210_ep_alloc_request(&fotg210->ep[0]->ep,
                                                 GFP_KERNEL);
        if (fotg210->ep0_req == NULL)
            -goto err_req;
            +goto err_map;
            +goto err_alloc;
        }

        spin_lock_init(&fotg210->lock);
        fotg210->ep0_req = fotg210_ep_alloc_request(&fotg210->ep[0]->ep,
                                                 GFP_KERNEL);
        if (fotg210->ep0_req == NULL)
            -goto err_req;
            +goto err_map;

        fotg210_init(fotg210);

        fotg210_ep_free_request(&fotg210->ep[0]->ep, fotg210->ep0_req);

        err_map:
            -if (fotg210->reg)
- iounmap(fotg210->reg);
+ iounmap(fotg210->reg);

err_alloc:
+for (i = 0; i < FOTG210_MAX_NUM_EP; i++)
+kfree(fotg210->ep[i]);
kfree(fotg210);

+err:
+return ret;
}

--- linux-4.15.0.orig/drivers/usb/gadget/udc/fsl_udc_core.c
+++ linux-4.15.0/drivers/usb/gadget/udc/fsl_udc_core.c
@@ -1305,7 +1305,7 @@
{
 struct fsl_ep *ep = get_ep_by_pipe(udc, pipe);

- if (ep->name)
+ if (ep->ep.name)
 nuke(ep, -ESHUTDOWN);
 }

@@ -1693,7 +1693,7 @@
 curr_ep = get_ep_by_pipe(udc, i);

/* If the ep is configured */
- if (curr_ep->name == NULL) {
+ if (!curr_ep->ep.name) {
 WARNING("Invalid EP?");
 continue;
 }
@@ -2260,8 +2260,10 @@
 udc->phy_mode = pdata->phy_mode;

 udc->eps = kzalloc(sizeof(struct fsl_ep) * udc->max_ep, GFP_KERNEL);
- if (!udc->eps)
- return -1;
+ if (!udc->eps) {
+ ERR("kzalloc udc endpoint status failed\n");
+ goto eps_alloc_failed;
+ }

/* initialized QHs, take care of alignment */
 size = udc->max_ep * sizeof(struct ep_queue_head);
@@ -2275,8 +2277,7 @@
 &udc->ep_qh_dma, GFP_KERNEL);
 if (!udc->ep_qh) {

ERR("malloc QHs for udc failed\n");
-kfree(udc->eps);
-return -1;
+goto ep_queue_alloc_failed;
}

udc->ep_qh_size = size;
@@ -2285,8 +2286,17 @@
/* FIXME: fsl_alloc_request() ignores ep argument */
udc->status_req = container_of(fsl_alloc_request(NULL, GFP_KERNEL),
struct fsl_req, req);
+if (!udc->status_req) {
+ERR("kzalloc for udc status request failed\n");
+goto udc_status_alloc_failed;
+
+/* allocate a small amount of memory to get valid address */
udc->status_req->req.buf = kmalloc(8, GFP_KERNEL);
+if (!udc->status_req->req.buf) {
+ERR("kzalloc for udc request buffer failed\n");
+goto udc_req_buf_alloc_failed;
+
udc->resume_state = USB_STATE_NOTATTACHED;
udc->usb_state = USB_STATE_POWERED;
@@ -2294,6 +2304,18 @@
udc->remote_wakeup = 0;/* default to 0 on reset */

return 0;
+
+udc_req_buf_alloc_failed:
+kfree(udc->status_req);
+udc_status_alloc_failed:
+kfree(udc->ep_qh);
+udc->ep_qh_size = 0;
+ep_queue_alloc_failed:
+kfree(udc->eps);
+eps_alloc_failed:
+udc->phy_mode = 0;
+return -1;
+
*/

/*------------------------------------------------------------------------*/
@@ -2565,7 +2587,7 @@
dma_pool_destroy(udc_controller->td_pool);
free_irq(udc_controller->irq, udc_controller);
iounmap(dr_regs);
if (pdata->operating_mode == FSL_USB2_DR_DEVICE)
+if (res && (pdata->operating_mode == FSL_USB2_DR_DEVICE))
release_mem_region(res->start, resource_size(res));

/* free udc --wait for the release() finished */
--- linux-4.15.0.orig/drivers/usb/gadget/udc/fusb300_udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/fusb300_udc.c
@@ -1342,12 +1342,15 @@
 static int fusb300_remove(struct platform_device *pdev)
 {
  struct fusb300 *fusb300 = platform_get_drvdata(pdev);
+int i;

 usb_del_gadget_udc(&fusb300->gadget);
 iounmap(fusb300->reg);
 free_irq(platform_get_irq(pdev, 0), fusb300);

 fusb300_free_request(&fusb300->ep[0]->ep, fusb300->ep0_req);
+for (i = 0; i < FUSB300_MAX_NUM_EP; i++)
+kfree(fusb300->ep[i]);
kfree(fusb300);

 return 0;
@@ -1491,6 +1494,8 @@
 if (reg)
 --- linux-4.15.0.orig/drivers/usb/gadget/udc/goku_udc.c
 +++ linux-4.15.0/drivers/usb/gadget/udc/goku_udc.c
@@ -1773,6 +1773,7 @@
 goto err;
 }
+pci_set_drvdata(pdev, dev);
 spin_lock_init(&dev->lock);
 dev->pdev = pdev;
 dev->gadget.ops = &goku_ops;
@@ -1806,7 +1807,6 @@
 }
 dev->regs = (struct goku_udc_regs __iomem *) base;

 -pci_set_drvdata(pdev, dev);
INFO(dev, "%s\n", driver_desc);
INFO(dev, "version: " DRIVER_VERSION " \%s\n", dmastr());
INFO(dev, "irq %d, pci mem %p\n", pdev->irq, base);
--- linux-4.15.0.orig/drivers/usb/gadget/udc/goku_udc.h
+++ linux-4.15.0/drivers/usb/gadget/udc/goku_udc.h
@@ -25,7 +25,7 @@
#define INT_EP1DATASET 0x00040
#define INT_EP2DATASET 0x00080
#define INT_EP3DATASET 0x00100
-#define INT_EPnNAK(n) (0x00100 < (n)) /* 0 < n < 4 */
+#define INT_EPnNAK(n) (0x00100 << (n)) /* 0 < n < 4 */
#define INT_EP1NAK 0x00200
#define INT_EP2NAK 0x00400
#define INT_EP3NAK 0x00800
--- linux-4.15.0.orig/drivers/usb/gadget/udc/gr_udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/gr_udc.c
@@ -1996,9 +1996,12 @@
if (num == 0) {
    _req = gr_alloc_request(&ep->ep, GFP_ATOMIC);
    +if (!_req)
    +return -ENOMEM;
    +
    buf = devm_kzalloc(dev->dev, PAGE_SIZE, GFP_DMA | GFP_ATOMIC);
    -if (!buf) {
    -    /* possible _req freed by gr_probe via gr_remove */
    +if (!buf) {
    +    gr_free_request(&ep->ep, _req);
    return -ENOMEM;
    }
    @ @ -2196,8 +2199,6 @@
return -ENOMEM;
}

-spin_lock(&dev->lock);
-
-/* Inside lock so that no gadget can use this udc until probe is done */
retval = usb_add_gadget_udc(dev->dev, &dev->gadget);
if (retval) {
    @@ -2206,15 +2207,21 @@
}
dev->added = 1;

+spin_lock(&dev->lock);
+
+retval = gr_udc_init(dev);
+if (retval)
+if (retval) {

spin_unlock(&dev->lock);
goto out;
-
-gr_dfs_create(dev);
+
	gr_dfs_create(dev);
+
retval = gr_request_irq(dev, dev->irq);
if (retval) {
    dev_err(dev->dev, "Failed to request irq %d\n", dev->irq);
    dev_info(dev->dev, "regs: %p, irq %d\n", dev->regs, dev->irq);
out:
-spin_unlock(&dev->lock);
-
if (retval)
    gr_remove(pdev);

--- linux-4.15.0.orig/drivers/usb/gadget/udc/lpc32xx_udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/lpc32xx_udc.c
@@ -922,8 +922,7 @@
dma_addr_t		dma;
struct lpc32xx_usbd_dd_gad	*dd;
-dd = (struct lpc32xx_usbd_dd_gad *) dma_pool_alloc(
-d->dd_cache, (GFP_KERNEL | GFP_DMA), &dma);
+dd = dma_pool_alloc(d->dd_cache, GFP_ATOMIC | GFP_DMA, &dma);
if (dd)
    dd->this_dma = dma;
@@ -1166,11 +1165,11 @@
tmp = readl(USBD_RXDATA(udc->udp_baseaddr));

bl = bytes - n;
-if (bl > 3)
-  bl = 3;
+if (bl > 4)
+  bl = 4;

for (i = 0; i < bl; i++)
-data[n + i] = (u8) ((tmp >> (n * 8)) & 0xFF);
@@ -1603,17 +1602,17 @@
    const struct usb_endpoint_descriptor *desc)
 {
     struct lpc32xx_ep *ep = container_of(_ep, struct lpc32xx_ep, ep);
-    struct lpc32xx_udc *udc = ep->udc;
+    struct lpc32xx_udc *udc;
     u16 maxpacket;
     u32 tmp;
     unsigned long flags;
     /* Verify EP data */
     if (!(_ep) || (!ep) || (!desc) ||
-        (desc->bDescriptorType != USB_DT_ENDPOINT)) {
-            dev_dbg(udc->dev, "bad ep or descriptor\n");
+        (desc->bDescriptorType != USB_DT_ENDPOINT))
         return -EINVAL;
     }
+    }
+    udc = ep->udc;
     maxpacket = usb_endpoint_maxp(desc);
     if ((maxpacket == 0) || (maxpacket > ep->maxpacket)) {
         dev_dbg(udc->dev, "bad ep descriptor's packet size\n");
-    @ @ -1861,7 +1860,7 @@
 static int lpc32xx_ep_set_halt(struct usb_ep *ep, int value)
 {
     struct lpc32xx_ep *ep = container_of(_ep, struct lpc32xx_ep, ep);
-    struct lpc32xx_udc *udc = ep->udc;
+    struct lpc32xx_udc *udc;
     unsigned long flags;
     if (!(ep) || (ep->hwp_num <= 1))
-    @ @ -1871,6 +1870,7 @@
     if (ep->is_in)
         return -EAGAIN;
+    }
+    udc = ep->udc;
     spin_lock_irqsave(&udc->lock, flags);
     if (value == 1) {
         --- linux-4.15.0.orig/drivers/usb/gadget/udc/m66592-udc.c
         +++ linux-4.15.0/drivers/usb/gadget/udc/m66592-udc.c
-    @ @ -1667,7 +1667,7 @@
         err_add_udc:
m66592_free_request(&m66592->ep[0].ep, m66592->ep0_req);
-
+ m66592->ep0_req = NULL;

clean_up3:
if (m66592->pdata->on_chip) {
    clk_disable(m66592->clk);
--- linux-4.15.0.orig/drivers/usb/gadget/udc/mv_u3d_core.c
+++ linux-4.15.0/drivers/usb/gadget/udc/mv_u3d_core.c
@@ -1922,14 +1922,6 @@
    goto err_get_irq;
}
    u3d->irq = r->start;
-    if (request_irq(u3d->irq, mv_u3d_irq,
-        IRQF_SHARED, driver_name, u3d)) {
-        u3d->irq = 0;
-        -dev_err(&dev->dev, "Request irq %d for u3d failed\n",
-        -u3d->irq);
-        retval = -ENODEV;
-        goto err_request_irq;
-    }
+    mv_u3d_eps_init(u3d);
+    if (request_irq(u3d->irq, mv_u3d_irq,
+        IRQF_SHARED, driver_name, u3d)) {
+        u3d->irq = 0;
+        -dev_err(&dev->dev, "Request irq %d for u3d failed\n",
+        +u3d->irq);
+        +retval = -ENODEV;
+        +goto err_request_irq;
+    }
+    /* external vbus detection */
    if (u3d->vbus) {
        u3d->clock_gating = 1;
        @ @ -1965,8 +1966,8 @@

        err_unregister:
        free_irq(u3d->irq, u3d);
-        -err_request_irq:
-        err_get_irq:
+            +err_request_irq:
        kfree(u3d->status_req);
        err_alloc_status_req:


kfree(u3d->eps);
--- linux-4.15.0.orig/drivers/usb/gadget/udc/mv_udc_core.c
+++ linux-4.15.0/drivers/usb/gadget/udc/mv_udc_core.c
@@ -2313,7 +2313,8 @@
     return 0;
     err_create_workqueue:
     -destroy_workqueue(udc->qwork);
+++ linux-4.15.0/drivers/usb/gadget/udc/mv_udc_core.c
@@ -2313,7 +2313,8 @@
     +if (udc->qwork)
     +destroy_workqueue(udc->qwork);
     err_destroy_dma:
     dma_pool_destroy(udc->dtd_pool);
     err_free_dma:
--- linux-4.15.0.orig/drivers/usb/gadget/udc/net2272.c
+++ linux-4.15.0/drivers/usb/gadget/udc/net2272.c
@@ -945,6 +945,7 @@
     break;
     }
     if (&req->req != _req) {
@@ -2083,7 +2084,7 @@
       +# defined(PLX_PCI_RDK2)
       /* see if PCI int for us by checking irqstat */
       intcsr = readl(dev->rdk2.fpga_base_addr + RDK2_IRQSTAT);
@@ -2652,6 +2653,8 @@
     err_req:
     release_mem_region(base, len);
     err:
     +kfree(dev);
     +
     return ret;
     }
--- linux-4.15.0.orig/drivers/usb/gadget/udc/net2280.c
+++ linux-4.15.0/drivers/usb/gadget/udc/net2280.c
@@ -866,9 +866,6 @@
     (void) readl(&ep->dev->pci->pcimstctl);
     writel(BIT(DMA_START), &dma->dmastat);
     -
if (!ep->is_in)
  stop_out_naking(ep);
}

static void start_dma(struct net2280_ep *ep, struct net2280_request *req)
{   
    writel(BIT(DMA_START), &dma->dmastat);
    return;
}

    +stop_out_naking(ep);
}

tmp = dmactl_default;

break;
}
if (&req->req != _req) {
    +ep->stopped = stopped;
    spin_unlock_irqrestore(&ep->dev->lock, flags);
    -dev_err(&ep->dev->pdev->dev, "%s: Request mismatch\n",
             __func__);
    +ep_dbg(ep->dev, "%s: Request mismatch\n", __func__);
    return -EINVAL;
}

writel(tmp | BIT(USB_DETECT_ENABLE), &dev->usb->usbctl);
} else {
    writel(tmp & ~BIT(USB_DETECT_ENABLE), &dev->usb->usbctl);
    -stop_activity(dev, dev->driver);
    +stop_activity(dev, NULL);
}

spin_unlock_irqrestore(&dev->lock, flags);

+if (!is_on && dev->driver)
+dev->driver->disconnect(&dev->gadget);
+
return 0;
}

nuke(&dev->ep[i]);

/* report disconnect; the driver is already quiesced */
-if (driver)
+if (driver) {
+    spin_unlock(&dev->lock);
}
driver->disconnect(&dev->gadget);
+spin_lock(&dev->lock);
+
}

usb_reinit(dev);
}
@@ -3341,6 +3345,8 @@
        BIT(PCI_RETRY_ABORT_INTERRUPT))

static void handle_stat1_irqs(struct net2280 *dev, u32 stat)
+__releases(dev->lock)
+__acquires(dev->lock)
{
    struct net2280_ep*ep;
    u32 tmp, num, mask, scratch;
    @@ -3381,12 +3387,14 @@
    if (disconnect || reset) {
        stop_activity(dev, dev->driver);
        ep0_start(dev);
        +spin_unlock(&dev->lock);
        if (reset)
            usb_gadget_udc_reset
            (&dev->gadget, dev->driver);
        else
            (dev->driver->disconnect)
            (&dev->gadget);
        +spin_lock(&dev->lock);
        return;
    }
}
@@ -3405,6 +3413,7 @@
tmp = BIT(SUSPEND_REQUEST_CHANGE_INTERRUPT);
    if (stat & tmp) {
        writel(tmp, &dev->regs->irqstat1);
        +spin_unlock(&dev->lock);
        if (stat & BIT(SUSPEND_REQUEST_INTERRUPT)) {
            if (dev->driver->suspend)
                dev->driver->suspend(&dev->gadget);
        @ @ -3415,6 +3424,7 @@
            dev->driver->resume(&dev->gadget);
        /* at high speed, note erratum 0133 */
        }
        +spin_lock(&dev->lock);
        stat &= ~tmp;
    }
@@ -3772,8 +3782,10 @@
    return 0;
done:
-\tif (dev)
+\tif (dev) {
  net2280_remove(pdev);
+\t\t\t\tkfree(dev);
+\t\t\t\t}
return retval;
}

--- linux-4.15.0.orig/drivers/usb/gadget/udc/omap_udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/omap_udc.c
@@ -2033,6 +2033,7 @@
{ return machine_is_omap_innovator()
  || machine_is_omap_osk()
  || machine_is_omap_palmtree()
+|| machine_is_sx1()
/* No known omap7xx boards with vbus sense */
  || cpu_is_omap7xx();
@@ -2041,7 +2042,7 @@
static int omap_udc_start(struct usb_gadget *g,
struct usb_gadget_driver *driver)
{
-\t\t\t\tstatus = -ENODEV;
+\t\t\t\tstatus;
struct omap_ep*ep;
unsigned longflags;

@@ -2079,6 +2080,7 @@
go to done;
} else {
+\t\t\t\tstatus = 0;
if (can_pullup(udc))
pullup_enable(udc);
else
@@ -2606,9 +2608,22 @@
static void omap_udc_release(struct device *dev)
{
-\t\t\t\t\t\tcomplete(udc->done);
+\t\t\t\t\t\tpullup_disable(udc);
+\t\t\t\t\t\tif (!IS_ERR_OR_NULL(udc->transceiver)) {
+\t\t\t\t\t\t\t\t\tusb_put_phy(udc->transceiver);
+\t\t\t\t\t\t\t\tu dc->transceiver = NULL;
+\t\t\t\t\t\t\t\t}
+\t\t\t\t\tomap_writew(0, UDC_SYSCON1);

---
+remove_proc_file();
+if (udc->dc_clk) {
+if (udc->clk_requested)
+omap_udc_enable_clock(0);
+clk_put(udc->hhc_clk);
+clk_put(udc->dc_clk);
+
+if (udc->done)
+complete(udc->done);
+kfree(udc);
-udc = NULL;
}

static int
@@ -2640,6 +2655,7 @@
udc->gadget.speed = USB_SPEED_UNKNOWN;
udc->gadget.max_speed = USB_SPEED_FULL;
udc->gadget.name = driver_name;
+udc->gadget.quirk_ep_outAligned_size = 1;
udc->transceiver = xceiv;

/* ep0 is special; put it right after the SETUP buffer */
@@ -2880,8 +2896,8 @@
udc->clr_halt = UDC_RESET_EP;

/* USB general purpose IRQ: ep0, state changes, dma, etc */
-stat = request_irq(pdev->resource[1].start, omap_udc_irq,
-stat, 0, driver_name, udc);
+stat = devm_request_irq(&pdev->dev, pdev->resource[1].start,
+ omap_udc_irq, 0, driver_name, udc);
if (stat != 0) {
ERR("can't get irq %d, err %d\n",
(int) pdev->resource[1].start, status);
@@ -2889,20 +2905,20 @@
}

/* USB "non-iso" IRQ (PIO for all but ep0) */
-stat = request_irq(pdev->resource[2].start, omap_udc_pio_irq,
-stat, 0, "omap_udc pio", udc);
+stat = devm_request_irq(&pdev->dev, pdev->resource[2].start,
+ omap_udc_pio_irq, 0, "omap_udc pio", udc);
if (stat != 0) {
ERR("can't get irq %d, err %d\n",
(int) pdev->resource[2].start, status);
-goto cleanup2;
+goto cleanup1;
}
#ifdef USE_ISO

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-status = request_irq(pdev->resource[3].start, omap_udc_iso_irq, 
-0, "omap_udc iso", udc);
+status = devm_request_irq(&pdev->dev, pdev->resource[3].start, 
+omap_udc_iso_irq, 0, "omap_udc iso", udc);
if (status != 0) {
    ERR("can't get irq %d, err %d\n", 
    (int) pdev->resource[3].start, status);
    goto cleanup3;
    +goto cleanup1;
}
#endif
if (cpu_is_omap16xx() || cpu_is_omap7xx()) {
    @@ -2913,23 +2929,8 @@
    }
    create_proc_file();
    -status = usb_add_gadget_udc_release(&pdev->dev, &udc->gadget, 
    -omap_udc_release);
    -if (status)
    -goto cleanup4;
    -
    -return 0;
    -
    -cleanup4:
    -remove_proc_file();
    -
    -#ifdef USE_ISO
    -cleanup3:
    -free_irq(pdev->resource[2].start, udc);
    -#endif
    -
    -cleanup2:
    -free_irq(pdev->resource[1].start, udc);
    +return usb_add_gadget_udc_release(&pdev->dev, &udc->gadget, 
    +omap_udc_release);

    cleanup1:
    kfree(udc);
    @@ -2956,42 +2957,15 @@
    {
    DECLARE_COMPLETION_ONSTACK(done);

    -if (!udc)
    -return -ENODEV;
    -
    -usb_del_gadget_udc(&udc->gadget);
    -if (udc->driver)
    -return -EBUSY;
udc->done = &done;

-pullup_disable(udc);
-if (!IS_ERR_OR_NULL(udc->transceiver)) {
-usb_put_phy(udc->transceiver);
-udc->transceiver = NULL;
-}
-omap_writew(0, UDC_SYSCON1);
-
-remove_proc_file();
-
-#ifdef USE_ISO
-free_irq(pdev->resource[3].start, udc);
-#endif
-
-free_irq(pdev->resource[2].start, udc);
-free_irq(pdev->resource[1].start, udc);
+usb_del_gadget_udc(&udc->gadget);
-
-if (udc->dc_clk) {
-if (udc->clk_requested)
-omap_udc_enable_clock(0);
-clk_put(udc->hhc_clk);
-clk_put(udc->dc_clk);
-}
+wait_for_completion(&done);

release_mem_region(pdev->resource[0].start,
pdev->resource[0].end - pdev->resource[0].start + 1);
-
-wait_for_completion(&done);
-
return 0;
}

--- linux-4.15.0.orig/drivers/usb/gadget/udc/pch_udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/pch_udc.c
@@ -368,7 +368,6 @@
#define PCI_DEVICE_ID_INTEL_QUARK_X1000_UDC	0x0939
#define PCI_DEVICE_ID_INTEL_EG20T_UDC	0x8808

-static inline void pch_udc_vbus_session(struct pch_udc_dev *dev,
-int is_active)
{ 
+unsigned long iflags;
+
+spin_lock_irqsave(&dev->lock, iflags);
if (is_active) {
    pch_udc_reconnect(dev);
    dev->vbus_session = 1;
} else {
    if (dev->driver && dev->driver->disconnect) {
-    spin_lock(&dev->lock);
+    spin_unlock_irqrestore(&dev->lock, iflags);
    dev->driver->disconnect(&dev->gadget);
-    spin_unlock(&dev->lock);
+    spin_lock_irqsave(&dev->lock, iflags);
    }
pch_udc_set_disconnect(dev);
    dev->vbus_session = 0;
} 
+spin_unlock_irqrestore(&dev->lock, iflags);
}

/**
@@ -1169,20 +1172,25 @@
static int pch_udc_pcd_pullup(struct usb_gadget *gadget, int is_on)
{ 
    struct pch_udc_dev*dev;
    +unsigned long iflags;

    if (!gadget)
        return -EINVAL;
    +
    dev = container_of(gadget, struct pch_udc_dev, gadget);
    +
+    spin_lock_irqsave(&dev->lock, iflags);
    if (is_on) {
        pch_udc_reconnect(dev);
    } else {
        if (dev->driver && dev->driver->disconnect) {
-        spin_lock(&dev->lock);
+        spin_unlock_irqrestore(&dev->lock, iflags);
        dev->driver->disconnect(&dev->gadget);
-        spin_unlock(&dev->lock);
+        spin_lock_irqsave(&dev->lock, iflags);
        }
pch_udc_set_disconnect(dev);
    }
+    spin_unlock_irqrestore(&dev->lock, iflags);
}
return 0;
}
@@ -1520,7 +1528,6 @@
td = phys_to_virt(addr);
addr2 = (dma_addr_t)td->next;
dma_pool_free(dev->data_requests, td, addr);
-td->next = 0x00;
addr = addr2;
}
req->chain_len = 1;
@@ -1775,7 +1782,7 @@
/* prevent from using desc. - set HOST BUSY */
dma_desc->status |= PCH_UDC_BS_HST_BSY;
-dma_desc->dataptr = cpu_to_le32(DMA_ADDR_INVALID);
+dma_desc->dataptr = lower_32_bits(DMA_ADDR_INVALID);
req->td_data = dma_desc;
req->td_data_last = dma_desc;
req->chain_len = 1;
@@ -2318,6 +2325,21 @@
pch_udc_set_dma(dev, DMA_DIR_RX);
}

+static int pch_udc_gadget_setup(struct pch_udc_dev *dev)
+__must_hold(&dev->lock)
+{
+int rc;
+
+/* In some cases we can get an interrupt before driver gets setup */
+if (!dev->driver)
+return -ESHUTDOWN;
+spin_unlock(&dev->lock);
+if (!dev->driver->setup(&dev->gadget, &dev->setup_data))
+spin_lock(&dev->lock);
+return rc;
+
/**
 * pch_udc_svc_control_in() - Handle Control IN endpoint interrupts
 * @dev:	Reference to the device structure
 @@ -2389,15 +2411,12 @@
dev->gadget.ep0 = &dev[UDC_EP0IN_IDX].ep;
 else /* OUT */
 dev->gadget.ep0 = &ep->ep;
-spin_lock(&dev->lock);
/* If Mass storage Reset */
if ((dev->setup_data.bRequestType == 0x21) &&
(dev->setup_data.bRequest == 0xFF))
dev->prot_stall = 0;
/* call gadget with setup data received */
setup_supported = dev->driver->setup(&dev->gadget,
&&dev->setup_data);
spin_unlock(&dev->lock);
+setup_supported = pch_udc_gadget_setup(dev);

if (dev->setup_data.bRequestType & USB_DIR_IN) {
ep->td_data->status = (ep->td_data->status &
&& -2645,9 +2664,7 @@
dev->ep[i].halted = 0;
}
dev->stall = 0;
-spin_unlock(&dev->lock);
-dev->driver->setup(&dev->gadget, &dev->setup_data);
-spin_lock(&dev->lock);
+pch_udc_gadget_setup(dev);
}
/**
@@ -2682,9 +2699,7 @@
dev->stall = 0;
/* call gadget zero with setup data received */
-spin_unlock(&dev->lock);
-dev->driver->setup(&dev->gadget, &dev->setup_data);
-spin_lock(&dev->lock);
+pch_udc_gadget_setup(dev);
}
/**
@@ -2958,7 +2973,7 @@
dev->dma_addr = dma_map_single(&dev->pdev->dev, ep0out_buf,
 UDC_EP0OUT_BUFF_SIZE * 4,
 DMA_FROM_DEVICE);
-return 0;
+return dma_mapping_error(&dev->pdev->dev, dev->dma_addr);
}
static int pch_udc_start(struct usb_gadget *g,
--- linux-4.15.0.orig/drivers/usb/gadget/udc/r8a66597-udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/r8a66597-udc.c
@@ -832,11 +832,11 @@
r8a66597_bset(r8a66597, XCKE, SYSCFG0);

-msleep(3);
```
+mdelay(3);

r8a66597_bset(r8a66597, PLLC, SYSCFG0);

-msleep(1);
+mdelay(1);

r8a66597_bset(r8a66597, SCKE, SYSCFG0);

@@ -1190,7 +1190,7 @@
r8a66597->ep0_req->length = 2;
/* AV: what happens if we get called again before that gets through? */
spin_unlock(&r8a66597->lock);
-r8a66597_queue(r8a66597->gadget.ep0, r8a66597->ep0_req, GFP_KERNEL);
+r8a66597_queue(r8a66597->gadget.ep0, r8a66597->ep0_req, GFP_ATOMIC);
spin_lock(&r8a66597->lock);
} }
@@ -1250,7 +1250,7 @@
do {
    tmp = r8a66597_read(r8a66597, INTSTS0) & CTSQ;
    udelay(1);
-} while (tmp != CS_IDST || timeout-- > 0);
+} while (tmp != CS_IDST && timeout-- > 0);

if (tmp == CS_IDST)
    r8a66597_bset(r8a66597,
@@ -1852,6 +1852,8 @@
    return PTR_ERR(reg);
+if (!ires)
+return -EINVAL;
irq = ires->start;
irq_trigger = ires->flags & IRQF_TRIGGER_MASK;

--- linux-4.15.0.orig/drivers/usb/gadget/udc/renesas_usb3.c
+++ linux-4.15.0/drivers/usb/gadget/udc/renesas_usb3.c
@@ -19,6 +19,7 @@
 #include <linux/pm_runtime.h>
 #include <linux/sizes.h>
 #include <linux/slab.h>
+##include <linux/string.h>
 #include <linux/sys_soc.h>
 #include <linux/uaccess.h>
 #include <linux/usb/ch9.h>
@@ -333,6 +334,7 @@
 struct extcon_dev *extcon;
```
struct work_struct extcon_work;
struct phy *phy;
+struct dentry *dentry;

struct renesas_usb3_ep *usb3_ep;
int num_usb3_eps;
@@ -350,6 +352,7 @@
bool extcon_host;/* check id and set EXTCON_USB_HOST */
bool extcon_usb;/* check vbus and set EXTCON_USB */
bool forced_b_device;
+bool start_to_connect;
};

#define gadget_to_renesas_usb3(_gadget)
@@ -468,7 +471,8 @@
static void usb3_init_epc_registers(struct renesas_usb3 *usb3)
{
    usb3_write(usb3, ~0, USB3_USB_INT_STA_1);
-    usb3_enable_irq_1(usb3, USB_INT_1_VBUS_CNG);
+    if (!usb3->workaround_for_vbus)
+        usb3_enable_irq_1(usb3, USB_INT_1_VBUS_CNG);
    usb3_enable_irq_1(usb3, USB_INT_1_VBUS_CNG);
}

static bool usb3_wakeup_usb2_phy(struct renesas_usb3 *usb3)
@@ -622,6 +626,13 @@
    usb3_disable_irq_1(usb3, USB_INT_1_B2_RSUM | USB_INT_1_B3_PLLWKUP |
    + USB_INT_1_B3_LUPSUCS | USB_INT_1_B3_DISABLE |
    + USB_INT_1_SPEED | USB_INT_1_B3_WMRST |
    + USB_INT_1_B3_HOTRST | USB_INT_1_B2_SPND |
    + USB_INT_1_B2_L1SPND | USB_INT_1_B2_USBRSST);
    +usb3_clear_bit(usb3, USB_COM_CON_SPD_MODE, USB3_USB_COM_CON);
    +usb3_init_epc_registers(usb3);

if (usb3->driver)
    usb3->driver->disconnect(&usb3->gadget);
@@ -667,8 +678,7 @@
    usb3_set_mode(usb3, host);
    usb3_vbus_out(usb3, a_dev);
    /* for A-Peripheral or forced B-device mode */
-    if (((!host & & a_dev) ||
-        (usb3->workaround_for_vbus & & usb3->forced_b_device))
+    if ((!host & & a_dev) || usb3->start_to_connect)
        usb3_connect(usb3);
    spin_unlock_irqrestore(&usb3->lock, flags);
}
switch (speed) {  
case USB_STA_SPEED_SS:  
    usb3->gadget.speed = USB_SPEED_SUPER;  
+    usb3->gadget.ep0->maxpacket = USB3_EP0_SS_MAX_PACKET_SIZE;  
    break;  
case USB_STA_SPEED_HS:  
    usb3->gadget.speed = USB_SPEED_HIGH;  
+    usb3->gadget.ep0->maxpacket = USB3_EP0_HSFS_MAX_PACKET_SIZE;  
    break;  
case USB_STA_SPEED_FS:  
    usb3->gadget.speed = USB_SPEED_FULL;  
+    usb3->gadget.ep0->maxpacket = USB3_EP0_HSFS_MAX_PACKET_SIZE;  
    break;  
default:  
    usb3->gadget.speed = USB_SPEED_UNKNOWN;  
@@ -1428,7 +1441,7 @@  
        struct renesas_usb3_request *usb3_req)  
    }  
    struct renesas_usb3 *usb3 = usb3_ep_to_usb3(usb3_ep);  
-    struct renesas_usb3_request *usb3_req_first = usb3_get_request(usb3_ep);  
+    struct renesas_usb3_request *usb3_req_first;  
    unsigned long flags;  
    int ret = -EAGAIN;  
    u32 enable_bits = 0;  
@@ -1436,7 +1449,8 @@  
        spin_lock_irqsave(&usb3->lock, flags);  
        if (usb3_ep->halt || usb3_ep->started)  
            goto out;  
-        if (usb3_req != usb3_req_first)  
+        if (!usb3_req_first || usb3_req != usb3_req_first)  
            goto out;  
        if (usb3_pn_change(usb3, usb3_ep->num) < 0)  
@@ -2306,9 +2320,9 @@  
            if (usb3->forced_b_device)  
                return -EBUSY;  
            -if (!strcmp(buf, "host", strlen("host"))))  
+            if (sysfs_streq(buf, "host"))  
                new_mode_is_host = true;  
-            else if (!strcmp(buf, "peripheral", strlen("peripheral")))  
+            else if (sysfs_streq(buf, "peripheral"))  
                new_mode_is_host = false;  
            else  
                return -EINVAL;  
@@ -2361,12 +2375,19 @@
if (copy_from_user(&buf, ubuf, min_t(size_t, sizeof(buf) - 1, count)))
    return -EFAULT;

-if (!strncmp(buf, "1", 1))
    usb3->start_to_connect = false;
+if (usb3->workaround_for_vbus && usb3->forced_b_device &&
    !strncmp(buf, "2", 1))
    usb3->start_to_connect = true;
+else if (!strncmp(buf, "1", 1))
    usb3->forced_b_device = true;
else
    usb3->forced_b_device = false;

-/* Let this driver call usb3_connect() anyway */
+if (usb3->workaround_for_vbus)
    usb3_disconnect(usb3);
+
+/* Let this driver call usb3_connect() if needed */
    usb3_check_id(usb3);

return count;
@@ -2393,8 +2414,12 @@
file = debugfs_create_file("b_device", 0644, root, usb3,
    &renesas_usb3_b_device_fops);
-if (!file)
+if (!file) {
    dev_info(dev, "%s: Can't create debugfs mode\n", __func__);
    +debugfs_remove_recursive(root);
    +} else {
    +usb3->dentry = root;
    +}
}

/\------- platform_driver --------------------------------------------*/
@@ -2402,15 +2427,14 @@
struct renesas_usb3 *usb3 = platform_get_drvdata(pdev);

+debugfs_remove_recursive(usb3->dentry);
device_remove_file(&pdev->dev, &dev_attr_role);

usb_del_gadget_udc(&usb3->gadget);
renesas_usb3_dma_free_prd(usb3, &pdev->dev);
__renesas_usb3_ep_free_request(usb3->ep0_req);
-if (usb3->phy)
-phy_put(usb3->phy);
- pm_runtime_disable(usb3_to_dev(usb3));
+ pm_runtime_disable(&pdev->dev);

   return 0;
 }
 @@ -2451,7 +2475,7 @@
  /* for control pipe */
  usb3->gadget.ep0 = &usb3_ep->ep;
  usb_ep_set_maxpacket_limit(&usb3_ep->ep,
- USB3_EP0_HSFS_MAX_PACKET_SIZE);
+ USB3_EP0_SS_MAX_PACKET_SIZE);
  usb3_ep->ep.caps.type_control = true;
  usb3_ep->ep.caps.dir_in = true;
  usb3_ep->ep.caps.dir_out = true;
  @ @ -2628,6 +2652,17 @@
  if (ret < 0)
    goto err_alloc_prd;

  /*
   + * This is optional. So, if this driver cannot get a phy,
   + * this driver will not handle a phy anymore.
   + */
+ usb3->phy = devm_phy_optional_get(&pdev->dev, "usb");
+ if (IS_ERR(usb3->phy)) {
+   ret = PTR_ERR(usb3->phy);
+   goto err_add_udc;
+ }
+ pm_runtime_enable(&pdev->dev);
ret = usb_add_gadget_udc(&pdev->dev, &usb3->gadget);
  if (ret < 0)
    goto err_add_udc;
  @ @ -2636,20 +2671,11 @@
  if (ret < 0)
    goto err_dev_create;

  /*
   - * This is an optional. So, if this driver cannot get a phy,
   - * this driver will not handle a phy anymore.
   - */
- usb3->phy = devm_phy_get(&pdev->dev, "usb");
- if (IS_ERR(usb3->phy))
-   usb3->phy = NULL;
-
  usb3->workaround_for_vbus = priv->workaround_for_vbus;

  renesas_usb3_debugfs_init(usb3, &pdev->dev);
dev_info(&pdev->dev, "probed\%s\n", usb3->phy ? " with phy" : "");
-pm_runtime_enable(usb3_to_dev(usb3));

return 0;

--- linux-4.15.0.orig/drivers/usb/gadget/udc/s3c2410_udc.c
+++ linux-4.15.0/drivers/usb/gadget/udc/s3c2410_udc.c
@@ -264,10 +264,6 @@
static void s3c2410_udc_nuke(struct s3c2410_udc *udc,
struct s3c2410_ep *ep, int status)
{
-/* Sanity check */
-if (&ep->queue == NULL)
-return;
-
while (!list_empty(&ep->queue)) {
struct s3c2410_request *req;
 req = list_entry(ep->queue.next, struct s3c2410_request,
--- linux-4.15.0.orig/drivers/usb/gadget/udc/snps_udc_plat.c
+++ linux-4.15.0/drivers/usb/gadget/udc/snps_udc_plat.c
@@ -114,8 +114,8 @@
res = platform_get_resource(pdev, IORESOURCE_MEM, 0);
udc->virt_addr = devm_ioremap_resource(dev, res);
-if (IS_ERR(udc->regs))
-return PTR_ERR(udc->regs);
+
if (IS_ERR(udc->virt_addr))
+return PTR_ERR(udc->virt_addr);

/* udc csr registers base */
udc->csr = udc->virt_addr + UDC_CSR_ADDR;
--- linux-4.15.0.orig/drivers/usb/gadget/usbstring.c
+++ linux-4.15.0/drivers/usb/gadget/usbstring.c
@@ -55,9 +55,9 @@
return -EINVAL;
/* string descriptors have length, tag, then UTF16-LE text */
-len = min ((size_t) 126, strlen (s->s));
+len = min((size_t)USB_MAX_STRING_LEN, strlen(s->s));
 len = utf8s_to_utf16s(s->s, len, UTF16_LITTLE_ENDIAN,
-(wchar_t *) &buf[2], 126);
+(wchar_t *) &buf[2], USB_MAX_STRING_LEN);
if (len < 0)
return -EINVAL;
buf[0] = (len + 1) * 2;
--- linux-4.15.0.orig/drivers/usb/host/Kconfig
+++ linux-4.15.0/drivers/usb/host/Kconfig
@@ -27,6 +27,14 @@
module will be called xhci-hcd.

if USB_XHCI_HCD
+config USB_XHCI_DBGCAP
+bool "xHCI support for debug capability"
+depends on TTY
+---help---
+  Say 'Y' to enable the support for the xHCI debug capability. Make
+  sure that your xHCI host supports the extended debug capability and
+  you want a TTY serial device based on the xHCI debug capability
+  before enabling this option. If unsure, say 'N'.

config USB_XHCI_PCI
  tristate
  @@ -625,14 +633,6 @@
      bool
      default y if ARCH_ASPEED

-config USB_UHCI_BIG_ENDIAN_MMIO
-bool
-default y if SPARC_LEON
-
-config USB_UHCI_BIG_ENDIAN_DESC
-bool
-default y if SPARC_LEON
-
-config USB_FHCI_HCD
tristate "Freescale QE USB Host Controller support"
depends on OF_GPIO && QE_GPIO && QUICC_ENGINE
--- linux-4.15.0.orig/drivers/usb/host/Makefile
+++ linux-4.15.0/drivers/usb/host/Makefile
@@ -14,6 +14,11 @@
xhci-hcd-y := xhci.o xhci-mem.o
xhci-hcd-y += xhci-ring.o xhci-hub.o xhci-dbg.o
xhci-hcd-y += xhci-trace.o
+
+ifneq ($(CONFIG_USB_XHCI_DBGCAP), )
xhci-hcd-y += xhci-dbgcap.o xhci-dbgtty.o
+endif
+
+ifneq ($(CONFIG_USB_XHCI_MTK), )
xhci-hcd-y += xhci-mtk-sch.o
endif
--- linux-4.15.0.orig/drivers/usb/host/ehci-exynos.c
+++ linux-4.15.0/drivers/usb/host/ehci-exynos.c
@@ -194,9 +194,8 @@
hcd->rsrc_len = resource_size(res);
irq = platform_get_irq(pdev, 0);
-if (!irq) {
-dev_err(&pdev->dev, "Failed to get IRQ\n");
-err = -ENODEV;
+if (irq < 0) {
+err = irq;
goto fail_io;
}

--- linux-4.15.0.orig/drivers/usb/host/ehci-hcd.c
+++ linux-4.15.0/drivers/usb/host/ehci-hcd.c
@@ -22,6 +22,7 @@
#include <linux/interrupt.h>
#include <linux/usb.h>
#include <linux/usb/hcd.h>
+#include <linux/usb/otg.h>
#include <linux/moduleparam.h>
#include <linux/dma-mapping.h>
#include <linux/debugfs.h>
@@ -573,6 +574,7 @@
struct ehci_hcd*ehci = hcd_to_ehci (hcd);
 u32 temp;
 u32 hcc_params;
+intrc;

hcd->uses_new_polling = 1;

@@ -628,9 +630,20 @@
down_write(&ehci Cf_port reset rwsem);
ehci->rh_state = EHCI_RH_RUNNING;
ehci_writel(ehci, FLAG_CF, &ehci->regs->configured_flag);
+
+/* Wait until HC become operational */
ehci_readl(ehci, &ehci->regs->command);/* unblock posted writes */
msleep(5);
+rc = ehci_handshake(ehci, &ehci->regs->status, STS_HALT, 0, 100 * 1000);
+
+up_write(&ehci Cf_port reset rwsem);
+
+if (rc) {
+ehci_err(ehci, "USB %x.%x, controller refused to start: %d\n",
+ ((ehci->sbrn & 0xf0)>>4), (ehci->sbrn & 0x0f), rc);
+return rc;
+}
+ehci->last_periodic_enable = ktime_get_real();

temp = HC_VERSION(ehci, ehci_readl(ehci, &ehci->caps->he_capbase));
--- linux-4.15.0.orig/drivers/usb/host/ehci-hub.c
+++ linux-4.15.0/drivers/usb/host/ehci-hub.c
@@ -14,7 +14,6 @@
 */

 /*------------------------------------------*/
-#include <linux/usb/otg.h>
#define PORT_WAKE_BITS (PORT_WKOC_E|PORT_WKDISC_E|PORT_WKCONN_E)
@@ -346,6 +345,9 @@
 unlink_empty_async_suspended(ehci);
+    /* Some Synopsys controllers mistakenly leave IAA turned on */
+    ehci_writel(ehci, STS_IAA, &ehci->regs->status);
+    
+    /* Any IAA cycle that started before the suspend is now invalid */
+    end_iaa_cycle(ehci);
+    ehci_handle_start_intr_unlinks(ehci);
@@ -774,12 +776,12 @@
atomic_inc(&urb->use_count);
atomic_inc(&urb->dev->urbnum);
urb->setup_dma = dma_map_single(
    -hcd->self.controller,
+    hcd->self.sysdev,
urb->setup_packet,
    sizeof(struct usb_ctrlrequest),
DMA_TO_DEVICE);
urb->transfer_dma = dma_map_single(
    -hcd->self.controller,
+    hcd->self.sysdev,
urb->transfer_buffer,
urb->transfer_buffer_length,
DMA_FROM_DEVICE);
--- linux-4.15.0.orig/drivers/usb/host/ehci-mv.c
+++ linux-4.15.0/drivers/usb/host/ehci-mv.c
@@ -192,12 +192,10 @@
hcd->rsrc_len = resource_size(r);
hcd->regs = ehci_mv->op_regs;
-hcd->irq = platform_get_irq(pdev, 0);
+retval = platform_get_irq(pdev, 0);
    if (!hcd->irq) {
        -dev_err(&pdev->dev, "Cannot get irq.");
        -retval = -ENODEV;
+        retval = platform_get_irq(pdev, 0);
        +if (retval < 0)
+        goto err_disable_clk;

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+hcd->irq = retval;

ehci = hcd_to_ehci(hcd);

-irq = platform_get_irq(pdev, 0);
+if (irq < 0)
+return irq;

hcd = usb_create_hcd(&ehci_mxc_hc_driver, dev, dev_name(dev));
if (!hcd)

-phy = devm_usb_get_phy_dev(dev, i);
-if (IS_ERR(phy)) {
-/* Don't bail out if PHY is not absolutely necessary */
-if (pdata->port_mode[i] != OMAP_EHCI_PORT_MODE_PHY)
+ret = PTR_ERR(phy);
+if (ret == -ENODEV) { /* no PHY */
+phy = NULL;
+continue;
+} 

-ret = PTR_ERR(phy);
-dev_err(dev, "Can't get PHY device for port %d: %d
", i, ret);
-goto err_phy;
-@ @ -223,6 +224,7 @ @ 

err_pm_runtime:
-pm_runtime_put_sync(dev);
+pm_runtime_disable(dev);

err_phy:
for (i = 0; i < omap->nports; i++) {
-/* the clock does not exists.
 */
-priv->clk = devm_clk_get(&pdev->dev, NULL);
if (!IS_ERR(priv->clk))
    clk_prepare_enable(priv->clk);
+if (!IS_ERR(priv->clk)) {
    +err = clk_prepare_enable(priv->clk);
    +if (err)
    +goto err_put_hcd;
+}

priv->phy = devm_phy_optional_get(&pdev->dev, "usb");
if (IS_ERR(priv->phy)) {
    @@ -312,6 +315,7 @@
    err_phy_get:
    if (!IS_ERR(priv->clk))
    clk_disable_unprepare(priv->clk);
    +err_put_hcd:
    usb_put_hcd(hcd);
    err:
    dev_err(&pdev->dev, "init %s fail, %d
",
--- linux-4.15.0.orig/drivers/usb/host/ehci-pci.c
+++ linux-4.15.0/drivers/usb/host/ehci-pci.c
@@ -216,6 +216,13 @@
    ehci_info(ehci, "applying MosChip frame-index workaround
n");
    ehci->frame_index_bug = 1;
    break;
+case PCI_VENDOR_ID_HUAWEI:
+    /* Synopsys HC bug */
+    if (pdev->device == 0xa239) {
+        ehci_info(ehci, "applying Synopsys HC workaround
n");
+        ehci->has_synopsys_hc_bug = 1;
+    }
+    +break;
}
/* optional debug port, normally in the first BAR */
@@ -291,6 +298,9 @@
    if (pdev->vendor == PCI_VENDOR_ID_STMICRO
        && pdev->device == PCI_DEVICE_ID_STMICRO_USB_HOST)
    ;/* ConneXT has no sbrn register */
+else if (pdev->vendor == PCI_VENDOR_ID_HUAWEI
+    +& pdev->device == 0xa239)
+    ;/* HUAWEI Kunpeng920 USB EHCI has no sbrn register */
    else
    pci_read_config_byte(pdev, 0x60, &ehci->sbrn);

--- linux-4.15.0.orig/drivers/usb/host/ehci-platform.c
+++ linux-4.15.0/drivers/usb/host/ehci-platform.c
@@ -30,6 +30,8 @@
 #include <linux/phy/phy.h>
```c
#include <linux/platform_device.h>
#include <linux/reset.h>
+#include <linux/sys_soc.h>
+#include <linux/timer.h>
#include <linux/usb.h>
#include <linux/usb/hcd.h>
#include <linux/usbd/hcd.h>
@@ -47,6 +49,9 @@
struct phy **phys;
int num_phys;
bool reset_on_resume;
+bool quirk_poll;
+struct timer_list poll_timer;
+struct delayed_work poll_work;
};

static const char hcd_name[] = "ehci-platform";
@@ -142,6 +147,111 @@
   .power_off = ehci_platform_power_off,
 ];

+/**
+ * quirk_poll_check_port_status - Poll port_status if the device sticks
+ * @ehci: the ehci hcd pointer
+ *
+ * Since EHCI/OHCI controllers on R-Car Gen3 SoCs are possible to be getting
+ * stuck very rarely after a full/low usb device was disconnected. To
+ * detect such a situation, the controllers require a special way which poll
+ * the EHCI PORTSC register.
+ *
+ * Return: true if the controller's port_status indicated getting stuck
+ */
+static bool quirk_poll_check_port_status(struct ehci_hcd *ehci)
+{
+    u32 port_status = ehci_readl(ehci, &ehci->regs->port_status[0]);
+    +if (!(port_status & PORT_OWNER) &&
+        (port_status & PORT_POWER) &&
+        !(port_status & PORT_CONNECT) &&
+        (port_status & PORT_LS_MASK))
+        return true;
+    +return false;
+}
+/**
+ * quirk_poll_rebind_companion - rebind companion device to recover
+ * @ehci: the ehci hcd pointer
+ */
```

+ * Since EHCI/OHCI controllers on R-Car Gen3 SoCs are possible to be getting
+ * stuck very rarely after a full/low usb device was disconnected. To
+ * recover from such a situation, the controllers require changing the OHCI
+ * functional state.
+ */
+
+static void quirk_poll_rebind_companion(struct ehci_hcd *ehci)
+{
+struct device *companion_dev;
+struct usb_hcd *hcd = ehci_to_hcd(ehci);
+
+companion_dev = usb_of_get_companion_dev(hcd->self.controller);
+if (!companion_dev)
+    return;
+
+device_release_driver(companion_dev);
+if (device_attach(companion_dev) < 0)
+    ehci_err(ehci, "%s: failed
", __func__);
+
+put_device(companion_dev);
+}
+
+static void quirk_poll_work(struct work_struct *work)
+{
+struct ehci_platform_priv *priv =
+container_of(to_delayed_work(work), struct ehci_platform_priv,
+    poll_work);
+struct ehci_hcd *ehci = container_of((void *)priv, struct ehci_hcd,
+    priv);
+
+/* check the status twice to reduce misdetection rate */
+if (!quirk_poll_check_port_status(ehci))
+    return;
+udelay(10);
+if (!quirk_poll_check_port_status(ehci))
+    return;
+
+ehci_dbg(ehci, "%s: detected getting stuck. rebind now!
", __func__);
+quirk_poll_rebind_companion(ehci);
+}
+
+static void quirk_poll_timer(struct timer_list *t)
+{
+struct ehci_platform_priv *priv = from_timer(priv, t, poll_timer);
+struct ehci_hcd *ehci = container_of((void *)priv, struct ehci_hcd,
+    priv);
+
+if (quirk_poll_check_port_status(ehci)) {
/*
 * Now scheduling the work for testing the port more. Note that
 * updating the status is possible to be delayed when
 * reconnection. So, this uses delayed work with 5 ms delay
 * to avoid misdetection.
 */
scheduleDelayedWork(&priv->poll_work, msecsToJiffies(5));

modTimer(&priv->poll_timer, jiffies + HZ);

static void quirkPollInit(struct ehci_platform_priv *priv)
{
INIT_DELAYED_WORK(&priv->poll_work, quirk_poll_work);
timerSetup(&priv->poll_timer, quirk_poll_timer, 0);
modTimer(&priv->poll_timer, jiffies + HZ);

static void quirkPollEnd(struct ehci_platform_priv *priv)
{
delTimerSync(&priv->poll_timer);
cancelDelayedWork(&priv->poll_work);

static const struct soc_device_attribute quirk_poll_match[] = {
{ .family = "R-Car Gen3" },
{ /* sentinel*/ }
};

static int ehci_platform_probe(struct platform_device *dev)
{
struct usb_hcd *hcd;
@if (-225.6 +335.9 @@
}

if (soc_device_match(quirk_poll_match))
priv->quirk_poll = true;

for (clk = 0; clk <EHCI_MAX_CLKS; clk++) {
priv->clks[clk] = of_clk_get(dev->dev.of_node, clk);
if (IS_ERR(priv->clks[clk])) {
@ @ -296.6 +409.9 @@
deviceEnableAsyncSuspend(hcd->self.controller);
platformSetDrvdata(dev, hcd);

@if (priv->quirk_poll)
+quirk_poll_init(priv);
+
return err;

err_power:
@@ -322,6 +438,9 @@
struct ehci_platform_priv *priv = hcd_to_ehci_priv(hcd);
int clk;

+if (priv->quirk_poll)
+quirk_poll_end(priv);
+
usb_remove_hcd(hcd);

if (pdata->power_off)
@@ -346,9 +465,13 @@
struct usb_hcd *hcd = dev_get_drvdata(dev);
struct usb_ehci_pdata *pdata = dev_get_platdata(dev);
struct platform_device *pdev = to_platform_device(dev);
+struct ehci_platform_priv *priv = hcd_to_ehci_priv(hcd);
bool do_wakeup = device_may_wakeup(dev);
int ret;

+if (priv->quirk_poll)
+quirk_poll_end(priv);
+
ret = ehci_suspend(hcd, do_wakeup);
if (ret)
return ret;
@@ -380,6 +503,10 @@
}

ehci_resume(hcd, priv->reset_on_resume);
+
+if (priv->quirk_poll)
+quirk_poll_init(priv);
+
return 0;
}
#endif /* CONFIG_PM_SLEEP */
--- linux-4.15.0.orig/drivers/usb/host/ehci-q.c
+++ linux-4.15.0/drivers/usb/host/ehci-q.c
@@ -27,6 +27,10 @@
/*-------------------------------------------------------------------------*/
+/* PID Codes that are used here, from EHCI specification, Table 3-16. */
+#define PID_CODE_IN    1

/*---------------------------------------------------------------*/
+\#define PID_CODE_SETUP 2
+
/* fill a qtd, returning how much of the buffer we were able to queue up */

static int
@@ -190,7 +194,7 @@
@ @ -190,7 +194,7 @@
instatus = -EINVAL;

/* count IN/OUT bytes, not SETUP (even short packets) */
@if (likely (QTD_PID (token) != 2))
+if (likely(QTD_PID(token) != PID_CODE_SETUP))
urb->actual_length += length - QTD_LENGTH (token);

/* don't modify error codes */
@ @ -206,6 +210,13 @@
if (token & QTD_STS_BABBLE) {
/* FIXME "must" disable babbling device's port too */
status = -EAGAIN;
+/*
+ * When MMF is active and PID Code is IN, queue is halted.
+ * EHCI Specification, Table 4-13.
+ */
+} else if ((token & QTD_STS_MMF) &&
+(QTD_PID(token) == PID_CODE_IN)) {
+status = -EPROTOCOL;
+/* CERR nonzero + halt --> stall */
各式各样} else if (QTD_CERR(token)) {
status = -EPIPE;
--- linux-4.15.0.orig/drivers/usb/host/fotg210-hcd.c
+++ linux-4.15.0/drivers/usb/host/fotg210-hcd.c
@@ -1639,6 +1639,10 @@
/* see what we found out */
temp = check_reset_complete(fotg210, wIndex, status_reg,
fotg210_readl(fotg210, status_reg));
+
+/* restart schedule */
+fotg210->command |= CMD_RUN;
+fotg210_writel(fotg210, fotg210->command, &fotg210->regs->command);
+
if (!(temp & (PORT_RESUME|PORT_RESET))) {
@@ -2519,11 +2523,6 @@
return count;
}

-/* high bandwidth multiplier, as encoded in highspeed endpoint descriptors */
-\#define hb_mult(wMaxPacketSize) (1 + (((wMaxPacketSize) >> 11) & 0x03))
-/* ... and packet size, for any kind of endpoint descriptor */
#define max_packet(wMaxPacketSize) ((wMaxPacketSize) & 0x07ff)

/* reverse of qh_urb_transaction: free a list of TDs.
 * used for cleanup after errors, before HC sees an URB's TDs.
 */
@@ -2609,7 +2608,7 @@
token |= (1 /* "in" */ << 8);
/* else it's already initted to "out" pid (0 << 8) */

-maxpacket = max_packet(usb_maxpacket(urb->dev, urb->pipe, !is_input));
+maxpacket = usb_maxpacket(urb->dev, urb->pipe, !is_input);

/*
 * buffer gets wrapped in one or more qtds;
 @@ -2723,9 +2722,11 @@
gfp_t flags)
 {
 struct fotg210_qh *qh = fotg210_qh_alloc(fotg210, flags);
+struct usb_host_endpoint *ep;
 u32 info1 = 0, info2 = 0;
 int is_input, type;
 int maxp = 0;
+int mult;
 struct usb_tt *tt = urb->dev->tt;
 struct fotg210_qh_hw *hw;

@@ -2740,14 +2741,15 @@
is_input = usb_pipein(urb->pipe);
type = usb_pipetype(urb->pipe);
-maxp = usb_maxpacket(urb->dev, urb->pipe, !is_input);
+ep = usb_pipe_endpoint(urb->dev, urb->pipe);
+maxp = usb_endpoint_maxp(&ep->desc);
+mult = usb_endpoint_maxp_mult(&ep->desc);

/* 1024 byte maxpacket is a hardware ceiling. High bandwidth
 * acts like up to 3KB, but is built from smaller packets.
 */
-if (max_packet(maxp) > 1024) {
-fotg210_dbg(fotg210, "bogus qh maxpacket %d\n",
-max_packet(maxp));
+if (maxp > 1024) {
+fotg210_dbg(fotg210, "bogus qh maxpacket %d\n", maxp);
 goto done;
 }

@@ -2761,8 +2763,7 @@
 */
if (type == PIPE_INTERRUPT) {
  qh->usecs = NS_TO_US(usb_calc_bus_time(USB_SPEED_HIGH,
    -is_input, 0,
    -hb_mult(maxp) * max_packet(maxp)));  
  +is_input, 0, mult * maxp));
  qh->start = NO_FRAME;

  if (urb->dev->speed == USB_SPEED_HIGH) {
@@ -2799,7 +2800,7 @@
          think_time = tt ? tt->think_time : 0;
          qh->tt_usecs = NS_TO_US(think_time +
            usb_calc_bus_time(urb->dev->speed,
@@ -2862,11 +2863,11 @@
          * to help them do so.  So now people expect to use
          * such nonconformant devices with Linux too; sigh.
          */
@@ -3936,6 +3937,7 @@
    int is_input;
    long bandwidth;
    unsigned multi;
+    struct usb_host_endpoint *ep;

    /*
    * this might be a "high bandwidth" highspeed endpoint,
@@ -3943,14 +3945,14 @@
         epnum = usb_pipeendpoint(pipe);
         is_input = usb_pipein(pipe) ? USB_DIR_IN : 0;
@@ -5420,13 +5422,13 @@
    if (is_input)
buf1 = (1 << 11);
else
    buf1 = 0;

    -maxp = max_packet(maxp);
    -multi = hb_mult(maxp);
+multi = usb_endpoint_maxp_mult(&ep->desc);
    buf1 |= maxp;
    maxp *= multi;

@@ -4472,13 +4474,12 @@

    /* HC need not update length with this error */
    if (!(t & FOTG210_ISOC_BABBLE)) {
        -desc->actual_length =
        -fotg210_itdlen(urb, desc, t);
        +desc->actual_length = FOTG210_ITD_LENGTH(t);
        urb->actual_length += desc->actual_length;
    }
} else if (likely((t & FOTG210_ISOC_ACTIVE) == 0)) {
    desc->status = 0;
    -desc->actual_length = fotg210_itdlen(urb, desc, t);
    +desc->actual_length = FOTG210_ITD_LENGTH(t);
    urb->actual_length += desc->actual_length;
} else {
    /* URB was too late */
@@ -5581,7 +5582,7 @@
    struct usb_hcd *hcd;
    struct resource *res;
    int irq;
    -int retval = -ENODEV;
    +int retval;
    struct fotg210_hcd *fotg210;

    if (usb_disabled())
@@ -5601,7 +5602,7 @@
        hcd = usb_create_hcd(&fotg210_fotg210_hc_driver, dev, 
        dev_name(dev));
    if (!hcd) {
        -dev_err(dev, "failed to create hcd with err %d\n", retval);
        +dev_err(dev, "failed to create hcd\n");
        retval = -ENOMEM;
        goto fail_create_hcd;
    }
--- linux-4.15.0.org/drivers/usb/host/fotg210.h
+++ linux-4.15.0/drivers/usb/host/fotg210.h
@@ -683,11 +683,6 @@
 return fotg210_readl(fotg210, &fotg210->regs->frame_index);
```c
#define fotg210_itdlen(urb, desc, t) ({
			usb_pipein((urb)->pipe) ?
				(desc)->length - FOTG210_ITD_LENGTH(t) :
				FOTG210_ITD_LENGTH(t);
	})
/*........................................................................*/
#endif /* __LINUX_FOTG210_H */
--- linux-4.15.0.orig/drivers/usb/host/fsl-mph-dr-of.c
+++ linux-4.15.0/drivers/usb/host/fsl-mph-dr-of.c
@@ -94,10 +94,13 @@
pdev->dev.coherent_dma_mask = ofdev->dev.coherent_dma_mask;

-if (!pdev->dev.dma_mask)
+if (!pdev->dev.dma_mask) {
    pdev->dev.dma_mask = &ofdev->dev.coherent_dma_mask;
-else
-    dma_set_mask(&pdev->dev, DMA_BIT_MASK(32));
+} else {
+    retval = dma_set_mask(&pdev->dev, DMA_BIT_MASK(32));
+    if (retval)
+        goto error;
+}

    retval = platform_device_add_data(pdev, pdata, sizeof(*pdata));
    if (retval)
--- linux-4.15.0.orig/drivers/usb/host/hwa-hc.c
+++ linux-4.15.0/drivers/usb/host/hwa-hc.c
@@ -159,7 +159,7 @@
    result = __usb_get_extra_descriptor(usb_dev->rawdescriptors[index],
        le16_to_cpu(usb_dev->actconfig->desc.wTotalLength),
-    USB_DT_SECURITY, (void **) &secd);
+    USB_DT_SECURITY, (void **) &secd, sizeof(*secd));
    if (result == -1) {
        dev_warn(dev, "BUG? WUSB host has no security descriptors\n");
    }
```
return 0;
--- linux-4.15.0.orig/drivers/usb/host/max3421-hcd.c
+++ linux-4.15.0/drivers/usb/host/max3421-hcd.c
@@ -153,8 +153,6 @@
 struct urb *curr_urb;
 enum scheduling_pass sched_pass;
-struct usb_device *loaded_dev;/* dev that's loaded into the chip */
-struct usb_device *old_dev; /* dev whose toggles are loaded */
 int urb_done;/* > 0 -> no errors, < 0: errno */
 int loaded_epnum;/* epnum whose toggles are loaded */
 size_t curr_len;
 u8 hien;
@@ -492,39 +490,17 @@
 * Caller must NOT hold HCD spinlock.
 */
 static void
-max3421_set_address(struct usb_hcd *hcd, struct usb_device *dev, int epnum,
-struct usb_device *old_dev, int force_toggles)
-max3421_set_address(struct usb_hcd *hcd, struct usb_device *dev, int epnum)
 {  
 struct max3421_hcd *max3421_hcd = hcd_to_max3421(hcd);
-int old_epnum, same_ep, rcvtog, sndtog;  
 struct usb_device *old_dev;  
+int rcvtog, sndtog;  
 u8 hctl;
-old_dev = max3421_hcd->loaded_dev;
-old_epnum = max3421_hcd->loaded_epnum;
-same_ep = (dev == old_dev && epnum == old_epnum);
-if (same_ep && !force_toggles)
-return;
-
-if (old_dev && !same_ep) {
-/* save the old end-points toggles: */
- u8 hrsl = spi_rd8(hcd, MAX3421_REG_HRSL);
-  
-rcvtog = (hrsl >> MAX3421_HRSL_RCVTOGRD_BIT) & 1;
-sndtog = (hrsl >> MAX3421_HRSL_SNDTOGRD_BIT) & 1;
-  
-/* no locking: HCD (i.e., we) own toggles, don't we? */
-usb_settoggle(old_dev, old_epnum, 0, rcvtog);
-usb_settoggle(old_dev, old_epnum, 1, sndtog);
-}
/* setup new endpoint's toggle bits: */
 rcvtog = usb_gettoggle(dev, epnum, 0);  
 sndtog = usb_gettoggle(dev, epnum, 1);  
 hctl = (BIT(rcvtog + MAX3421_HCTL_RCVTOG0_BIT) |
BIT(sndtog + MAX3421_HCTL_SNDTOG0_BIT));

-max3421_hcd->loaded_epnum = epnum;
spi_wr8(hcd, MAX3421_REG_HCTL, hctl);

/*
@@ -532,7 +508,6 @@
 * address-assignment so it's best to just always load the
 * address whenever the end-point changed/was forced.
 */
-max3421_hcd->loaded_dev = dev;
spi_wr8(hcd, MAX3421_REG_PERADDR, dev->devnum);
}

@@ -667,7 +642,7 @@
struct max3421_hcd *max3421_hcd = hcd_to_max3421(hcd);
struct urb *urb, *curr_urb = NULL;
struct max3421_ep *max3421_ep;
-int epnum, force_toggles = 0;
+int epnum;
struct usb_host_endpoint *ep;
struct list_head *pos;
unsigned long flags;
@@ -777,7 +752,6 @@
usb_settoggle(urb->dev, epnum, 0, 1);
usb_settoggle(urb->dev, epnum, 1, 1);
max3421_ep->pkt_state = PKT_STATE_SETUP;
-force_toggles = 1;
} else
max3421_ep->pkt_state = PKT_STATE_TRANSFER;
}
@@ -785,7 +759,7 @@
spin_unlock_irqrestore(&max3421_hcd->lock, flags);

max3421_ep->last_active = max3421_hcd->frame_number;
-max3421_set_address(hcd, urb->dev, epnum, force_toggles);
+max3421_set_address(hcd, urb->dev, epnum);
max3421_set_speed(hcd, urb->dev);
max3421_next_transfer(hcd, 0);
return 1;
@@ -1380,6 +1354,16 @@
status = 0;
urb = max3421_hcd->curr_urb;
if (urb) {
+/* save the old end-points toggles: */
+u8 hrsl = spi_rd8(hcd, MAX3421_REG_HRSL);
+int rcvtog = (hrsl >> MAX3421_HRSL_RCVTOGRD_BIT) & 1;
+int sndtog = (hrsl >> MAX3421_HRSL_SNDTOGRD_BIT) & 1;

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+int epnum = usb_endpoint_num(&urb->ep->desc);
+
+/* no locking: HCD (i.e., we) own toggles, don't we? */
+usb_settoggle(urb->dev, epnum, 0, rcvtog);
+usb_settoggle(urb->dev, epnum, 1, sndtog);
+
+max3421_hcd->curr_urb = NULL;
+spin_lock_irqsave(&max3421_hcd->lock, flags);
+usb_hcd_unlink_urb_from_ep(hcd, urb);
+
+-int retval = -ENOMEM;
+int retval;
+
+if (spi_setup(spi) < 0) {
+  dev_err(&spi->dev, "Unable to setup SPI bus");
+  goto error;
+}
+
+-int retval = -ENOMEM;
+hcd = usb_create_hcd(&max3421_hcd_desc, &spi->dev,
+  dev_name(&spi->dev));
+if (!hcd) {
+  --- linux-4.15.0.orig/drivers/usb/host/ohci-at91.c
+  +++ linux-4.15.0/drivers/usb/host/ohci-at91.c
+  @@ -551,6 +551,8 @@
+          pdata->overcurrent_pin[i] =
+          devm_gpiod_get_index_optional(&pdev->dev, "atmel,oc",
+            i, GPIOD_IN);
+  if (!pdata->overcurrent_pin[i])
+    continue;
+  if (IS_ERR(pdata->overcurrent_pin[i])) {
+    err = PTR_ERR(pdata->overcurrent_pin[i]);
+    --- linux-4.15.0.orig/drivers/usb/host/ohci-exynos.c
+    +++ linux-4.15.0/drivers/usb/host/ohci-exynos.c
+    @@ -161,9 +161,8 @@
+    hcd->rsrc_len = resource_size(res);
+    irq = platform_get_irq(pdev, 0);
+    if (!irq) {
+      -dev_err(&pdev->dev, "Failed to get IRQ\n");
+      -err = -ENODEV;
+    
+    }
goto fail_io;
}

--- linux-4.15.0.orig/drivers/usb/host/ohci-hcd.c
+++ linux-4.15.0/drivers/usb/host/ohci-hcd.c
@@ -74,6 +74,7 @@
 #define STATECHANGE_DELAY msecs_to_jiffies(300)
 #define IO_WATCHDOG_DELAY msecs_to_jiffies(275)
+#define IO_WATCHDOG_OFF 0xffffff00

#include "ohci.h"
#include "pci-quirks.h"
@@ -100,7 +101,7 @@
 /* Some boards misreport power switching/overcurrent */
-static bool distrust_firmware = true;
+static bool distrust_firmware;
 module_param (distrust_firmware, bool, 0);
 MODULE_PARM_DESC (distrust_firmware,
 "true to distrust firmware power/overcurrent setup");
@@ -231,7 +232,7 @@
 /* Start up the I/O watchdog timer, if it's not running */
- if (!timer_pending(&ohci->io_watchdog) &&
+ if (ohci->prev_frame_no == IO_WATCHDOG_OFF &&
     list_empty(&ohci->eds_in_use) &&
! (ohci->flags & OHCI_QUIRK_QEMU)) {
    ohci->prev_frame_no = ohci_frame_no(ohci);
@@ -417,6 +418,7 @@
 */
- static void
- ohci_shutdown (struct usb_hcd *hcd)
+ static void _ohci_shutdown(struct usb_hcd *hcd)
{ struct ohci_hcd *ohci;

@@ -434,6 +434,16 @@
 ohci->rh_state = OHCI_RH_HALTED;
 }

+ static void ohci_shutdown(struct usb_hcd *hcd)
+{ struct ohci_hcd*ohci = hcd_to_ohci(hcd);
unsigned long flags;

spin_lock_irqsave(&ohci->lock, flags);
_ohci_shutdown(hcd);
spin_unlock_irqrestore(&ohci->lock, flags);
}

/*-------------------------------------------------------------------------*
* HC functions
*-------------------------------------------------------------------------*/

struct usb_hcd *hcd = ohci_to_hcd(ohci);

/* Accept arbitrarily long scatter-gather lists */
-hcd->self.sg_tablesize = ~0;
+if (!(hcd->driver->flags & HCD_LOCAL_MEM))
+hcd->self.sg_tablesize = ~0;

if (distrust_firmware)
ohci->flags |= OHCI_QUirk_HUB_POWER;

return 0;

timer_setup(&ohci->io_watchdog, io_watchdog_func, 0);
+ohci->prev_frame_no = IO_WATCHDOG_OFF;

ohci->hcca = dma_alloc_coherent (hcd->self.controller,
sizeof(*ohci->hcca), &ohci->hcca_dma, GFP_KERNEL);

/* handle root hub init quirks ... */
val = roothub_a (ohci);
-val &= ~(RH_A_PSM | RH_A_OCPM);
+/* Configure for per-port over-current protection by default */
+val &= ~RH_A_NOCP;
+val |= RH_A_OCPM;
if (ohci->flags & OHCI_QUirk_SUPERIO) {
-/* NSC 87560 and maybe others */
+/* NSC 87560 and maybe others.
+ * Ganged power switching, no over-current protection.
+ */
+val |= RH_A_NOCP;
-val &= ~(RH_A_POTPGT | RH_A_NPS);
-ohci_writel (ohci, val, &ohci->regs->roothub.a);
+val &= ~(RH_A_POTPGT | RH_A_NPS | RH_A_PSM | RH_A_OCPM);
} else if ((ohci->flags & OHCI_QUirk_AMD756) ||
(ohci->flags & OHCI_QUirk_HUB_POWER)) {
/* hub power always on; required for AMD-756 and some
- * Mac platforms. ganged overcurrent reporting, if any.
+ * Mac platforms.

 */
val |= RH_A_NPS;
ohci_writel (ohci, val, &ohci->regs->roothub.a);
+ohci_writel(ohci, val, &ohci->regs->roothub.a);
+ohci_writel (ohci, RH_HS_LPSC, &ohci->regs->roothub.status);
ohci_writel (ohci, (val & RH_A_NPS) ? 0 : RH_B_PPCM,
&ohci->regs->roothub.b);
@ @ -730,7 +746,7 @@ 
u32 head;
struct ed* ed;
struct td* td, *td_start, *td_next;
unsigned frame_no;
unsigned frame_no, prev_frame_no = IO_WATCHDOG_OFF;
unsigned longflags;

spin_lock_irqsave(&ohci->lock, flags);
@ @ -749,7 +765,7 @@
died:
usb_hc_died(ohci_to_hcd(ohci));
ohci_dump(ohci);
-ohci_shutdown(ohci_to_hcd(ohci));
+_ohci_shutdown(ohci_to_hcd(ohci));
goto done;
} else {
/* No write back because the done queue was empty */
@ @ -835,7 +851,7 @@
}
}
if (!list_empty(&ohci->eds_in_use)) {
-ohci->prev_frame_no = frame_no;
+prev_frame_no = frame_no;
ohci->prev_wdh_cnt = ohci->wdh_cnt;
ohci->prev_donehead = ohci_readl(ohci,
&ohci->regs->donehead);
@ @ -845,6 +861,7 @@
}

done:
+ohci->prev_frame_no = prev_frame_no;
spin_unlock_irqrestore(&ohci->lock, flags);
}

@ @ -973,6 +990,7 @@
if (quirk_nec(ohci))
flush_work(&ohci->nec_work);
del_timer_sync(&ohci->io_watchdog);
+ohci->prev_frame_no = IO_WATCHDOG_OFF;

ohci_writel (ohci, OHCI_INTR_MIE, &ohci->regs->intrdisable);
ohci_usb_reset(ohci);
--- linux-4.15.0.orig/drivers/usb/host/ohci-hub.c
+++ linux-4.15.0/drivers/usb/host/ohci-hub.c
@@ -311,8 +311,10 @@
rc = ohci_rh_suspend (ohci, 0);
spin_unlock_irq (&ohci->lock);

-if (rc == 0)
+if (rc == 0) {
   del_timer_sync(&ohci->io_watchdog);
+   ohci->prev_frame_no = IO_WATCHDOG_OFF;
+}
   return rc;
}

--- linux-4.15.0.orig/drivers/usb/host/ohci-q.c
+++ linux-4.15.0/drivers/usb/host/ohci-q.c
@@ -1019,6 +1019,8 @@
* have modified this list. normally it's just prepending
* entries (which we'd ignore), but paranoia won't hurt.
*/
+*last = ed->ed_next;
+ed->ed_next = NULL;
modified = 0;
/* unlink urbs as requested, but rescan the list after
@@ -1077,21 +1079,22 @@
goto rescan_this;

/*
- * If no TDs are queued, take ED off the ed_rm_list.
+ * If no TDs are queued, ED is now idle.
- * If no TDs are queued, ED is now idle.
- * Otherwise, if the HC is running, reschedule.
- * If not, leave it on the list for further dequeues.
+ * If the HC isn't running, add ED back to the
+ * start of the list for later processing.
+*/
if (list_empty(&ed->td_list)) {
   -*last = ed->ed_next;
   -ed->ed_next = NULL;
   ed->state = ED_IDLE;
   list_del(&ed->in_use_list);
} else if (ohci->rh_state == OHCI_RH_RUNNING) {
*last = ed->ed_next;
-ed->ed_next = NULL;
ed_schedule(ohci, ed);
} else {
-last = &ed->ed_next;
+ed->ed_next = ohci->ed_rm_list;
+ohci->ed_rm_list = ed;
+/* Don't loop on the same ED */
+if (last == &ohci->ed_rm_list)
+last = &ed->ed_next;
}

if (modified)
--- linux-4.15.0.orig/drivers/usb/host/ohci-sm501.c
+++ linux-4.15.0/drivers/usb/host/ohci-sm501.c
@@ -196,6 +196,7 @@
        struct resource *mem;

        usb_remove_hcd(hcd);
+        iounmap(hcd->regs);
        release_mem_region(hcd->rsr_start, hcd->rsr_len);
        usb_put_hcd(hcd);
        dma_release_declared_memory(&pdev->dev);
--- linux-4.15.0.orig/drivers/usb/host/ohci-tmio.c
+++ linux-4.15.0/drivers/usb/host/ohci-tmio.c
@@ -199,6 +199,9 @@
        if (!cell)
            return -EINVAL;
+        if (irq < 0)
+            return irq;
+        hcd = usb_create_hcd(&ohci_tmio_hc_driver, &dev->dev, dev_name(&dev->dev));
        if (!hcd) {
            ret = -ENOMEM;
--- linux-4.15.0.orig/drivers/usb/host/oxu210hp-hcd.c
+++ linux-4.15.0/drivers/usb/host/oxu210hp-hcd.c
@@ -3719,8 +3719,10 @@
          ret = 0; /* if otg */
        }
        return ERR_PTR(ret);

        device_wakeup_enable(hcd->self.controller);
return hcd;
--- linux-4.15.0.orig/drivers/usb/host/pci-quirks.c
+++ linux-4.15.0/drivers/usb/host/pci-quirks.c
@@ -66,6 +66,23 @@
#define AX_INDXC		0x30
#define AX_DATAC		0x34
+#define PT_ADDR_INDEX		0xE8
+#define PT_READ_INDEX		0xE4
+#define PT_SIG_1_ADDR		0xA520
+#define PT_SIG_2_ADDR		0xA521
+#define PT_SIG_3_ADDR		0xA522
+#define PT_SIG_4_ADDR		0xA523
+#define PT_SIG_1_DATA		0x78
+#define PT_SIG_2_DATA		0x56
+#define PT_SIG_3_DATA		0x34
+#define PT_SIG_4_DATA		0x12
+#define PT4_P1_REG		0xB521
+#define PT4_P2_REG		0xB522
+#define PT2_P1_REG		0xD520
+#define PT2_P2_REG		0xD521
+#define PT1_P1_REG		0xD522
+#define PT1_P2_REG		0xD523
+#define NB_PCIE_INDEX_ADDR	0xe0
+#define NB_PCIE_INDEX_DATA	0xe4
+#define PCIe_P_CNTL		0x10040
@@ -188,7 +205,7 @@
{
  unsigned long flags;
  struct amd_chipset_info info;
-  int ret;
+  int need_pll_quirk = 0;

  spin_lock_irqsave(&amd_lock, flags);

@@ -202,21 +219,28 @@
spin_unlock_irqrestore(&amd_lock, flags);

  if (!amdchipset_sb_type_init(&info)) {
-    ret = 0;
-    goto commit;
  }

  unsigned long flags;
  struct amd_chipset_info info;
-  int ret;
+  int need_pll_quirk = 0;

  spin_lock_irqsave(&amd_lock, flags);

@@ -202,21 +219,28 @@
spin_unlock_irqrestore(&amd_lock, flags);

  if (!amdchipset_sb_type_init(&info)) {
-    ret = 0;
-    goto commit;
  }

/* Below chipset generations needn't enable AMD PLL quirk */
  -if (info.sb_type.gen == AMD_CHIPSET_UNKNOWN ||
  -info.sb_type.gen == AMD_CHIPSET_SB600 ||
  -info.sb_type.gen == AMD_CHIPSET_YANGTZE ||
-(info.sb_type.gen == AMD_CHIPSET_SB700 &&
- info.sb_type.rev > 0x3b)) { [91x791]}
+switch (info.sb_type.gen) {
+ case AMD_CHIPSET_SB700:
+ need_pll_quirk = info.sb_type.rev <= 0x3B;
+ break;
+ case AMD_CHIPSET_SB800:
+ case AMD_CHIPSET_HUDSON2:
+ case AMD_CHIPSET_BOLTON:
+ need_pll_quirk = 1;
+ break;
+ default:
+ need_pll_quirk = 0;
+ break;
+ } [91x731] [+]
+ if (!need_pll_quirk) {
+ if (info.smbus_dev) {
+ pci_dev_put(info.smbus_dev);
+ info.smbus_dev = NULL;
+ }
- ret = 0;
- goto commit; [91x221] [-]
} [91x206] [91x541] [+]
- ret = info.probe_result = 1;
+ need_pll_quirk = info.probe_result = 1;
printf(KERN_DEBUG "QUIRK: Enable AMD PLL fix\n");

commit:
@@ -246,7 +270,7 @@
/* Mark that we where here */
amd_chipset.probe_count++;
- ret = amd_chipset.probe_result;
+ need_pll_quirk = amd_chipset.probe_result;

spin_unlock_irqrestore(&amd_lock, flags);

@@ -260,7 +284,7 @@
spin_unlock_irqrestore(&amd_lock, flags);
} [91x146] [91x86] [-]
- return ret;
+return need_pll_quirk;
}
EXPORT_SYMBOL_GPL(usb_amd_find_chipset_info);

@@ -513,6 +537,98 @@
EXPORT_SYMBOL_GPL(usb_amd_dev_put);

/*
+ * Check if port is disabled in BIOS on AMD Promontory host.
+ * BIOS Disabled ports may wake on connect/disconnect and need
+ * driver workaround to keep them disabled.
+ * Returns true if port is marked disabled.
+ */
+bool usb_amd_pt_check_port(struct device *device, int port)
+{
+unsigned char value, port_shift;
+struct pci_dev *pdev;
+u16 reg;
+
+pdev = to_pci_dev(device);
+pci_write_config_word(pdev, PT_ADDR_INDX, PT_SIG_1_ADDR);
+
+pci_read_config_byte(pdev, PT_READ_INDX, &value);
+if (value != PT_SIG_1_DATA)
+return false;
+
+pci_write_config_word(pdev, PT_ADDR_INDX, PT_SIG_2_ADDR);
+
+pci_read_config_byte(pdev, PT_READ_INDX, &value);
+if (value != PT_SIG_2_DATA)
+return false;
+
+pci_write_config_word(pdev, PT_ADDR_INDX, PT_SIG_3_ADDR);
+
+pci_read_config_byte(pdev, PT_READ_INDX, &value);
+if (value != PT_SIG_3_DATA)
+return false;
+
+pci_write_config_word(pdev, PT_ADDR_INDX, PT_SIG_4_ADDR);
+
+pci_read_config_byte(pdev, PT_READ_INDX, &value);
+if (value != PT_SIG_4_DATA)
+return false;
+
+/* Check disabled port setting, if bit is set port is enabled */
+switch (pdev->device) {
+case 0x43b9:
+case 0x43ba:
+/
+ * device is AMD_PROMONTORYA_4(0x43b9) or PROMONTORYA_3(0x43ba)
+ * PT4_P1_REG[7..1] represents USB2.0 ports 6 to 0
+ * PT4_P2_REG[6..0] represents ports 13 to 7
+ */
+if (port > 6) {
+reg = PT4_P2_REG;
+port_shift = port - 7;
+} else {
+reg = PT4_P1_REG;
+port_shift = port + 1;
+}
+break;
+case 0x43bb:
+/
+ * device is AMD_PROMONTORYA_2(0x43bb)
+ * PT2_P1_REG[7..5] represents USB2.0 ports 2 to 0
+ * PT2_P2_REG[6..0] represents ports 9 to 3
+ */
+if (port > 2) {
+reg = PT2_P2_REG;
+port_shift = port - 3;
+} else {
+reg = PT2_P1_REG;
+port_shift = port + 5;
+}
+break;
+case 0x43bc:
+/
+ * device is AMD_PROMONTORYA_1(0x43bc)
+ * PT1_P1_REG[7..4] represents USB2.0 ports 3 to 0
+ * PT1_P2_REG[5..0] represents ports 9 to 4
+ */
+if (port > 3) {
+reg = PT1_P2_REG;
+port_shift = port - 4;
+} else {
+reg = PT1_P1_REG;
+port_shift = port + 4;
+}
+break;
+default:
+return false;
+}
+pci_write_config_word(pdev, PT_ADDR_INDX, reg);
+pci_read_config_byte(pdev, PT_READ_INDX, &value);
+
+return !(value & BIT(port_shift));
+*/
+*/
+*/
+*/
+*/
+*/
* Make sure the controller is completely inactive, unable to
* generate interrupts or do DMA.
+*/
--- linux-4.15.0.orig/drivers/usb/host/pci-quirks.h
+++ linux-4.15.0/drivers/usb/host/pci-quirks.h
@@ -17,6 +17,7 @@
void usb_disable_xhci_ports(struct pci_dev *xhci_pdev);
void sb800_prefetch(struct device *dev, int on);
bool usb_xhci_needs_pci_reset(struct pci_dev *pdev);
+bool usb_amd_pt_check_port(struct device *device, int port);
#else
struct pci_dev;
static inline void usb_amd_quirk_pll_disable(void) {}
@@ -25,6 +26,10 @@
static inline void usb_amd_dev_put(void) {}
static inline void usb_disable_xhci_ports(struct pci_dev *xhci_pdev) {}
static inline void sb800_prefetch(struct device *dev, int on) {}
+static inline bool usb_amd_pt_check_port(struct device *device, int port)
+{
+\treturn false;
+}
#endif  /* CONFIG_USB_PCI */

#endif  /* __LINUX_USB_PCI_QUIRKS_H */
--- linux-4.15.0.orig/drivers/usb/host/r8a66597-hcd.c
+++ linux-4.15.0/drivers/usb/host/r8a66597-hcd.c
@@ -1979,6 +1979,8 @@
static void r8a66597_endpoint_disable(struct usb_hcd *hcd,
    struct r8a66597 *r8a66597 = hcd_to_r8a66597(hcd);
    struct r8a66597_pipe *pipe = (struct r8a66597_pipe *)hep->hpriv;
    @ @ -1991,13 +1993,14 @@
    return;
    pipenum = pipe->info.pipenum;
    +spin_lock_irqsave(&r8a66597->lock, flags);
    if (pipenum == 0) {
        kfree(hep->hpriv);
        hep->hpriv = NULL;
        +spin_unlock_irqrestore(&r8a66597->lock, flags);
spin_lock_irqsave(&r8a66597->lock, flags);
pipe_stop(r8a66597, pipe);
pipe_irq_disable(r8a66597, pipenum);
disable_irq_empty(r8a66597, pipenum);
--- linux-4.15.0.orig/drivers/usb/host/sl811-hcd.c
+++ linux-4.15.0/drivers/usb/host/sl811-hcd.c
@@ -1287,11 +1287,10 @@
goto error;
put_unaligned_le32(sl811->port1, buf);

#ifndef VERBOSE
-#if (*((u16*)(buf+2))/* only if wPortChange is interesting */
-#endif
-dev_dbg(hcd->self.controller, "GetPortStatus %08x\n",
-sl811->port1);
+if (__is_defined(VERBOSE) || *(u16*)(buf+2)) /* only if wPortChange is interesting */
+dev_dbg(hcd->self.controller, "GetPortStatus %08x\n",
+sl811->port1);
break;
case SetPortFeature:
if (wIndex != 1 || wLength != 0)
--- linux-4.15.0.orig/drivers/usb/host/u132-hcd.c
+++ linux-4.15.0/drivers/usb/host/u132-hcd.c
@@ -2555,7 +2555,7 @@
} else {
    int frame = 0;
    dev_err(&u132->platform_dev->dev, "TODO: u132_get_frame\n");
-    msleep(100);
+    mdelay(100);
    return frame;
}
}
@@ -3204,6 +3204,9 @@
printk(KERN_INFO "driver %s\n", hcd_name);
workqueue = create_singlethread_workqueue("u132");
retval = platform_driver_register(&u132_platform_driver);
+if (retval)
+destroy_workqueue(workqueue);
+return retval;
}

--- linux-4.15.0.orig/drivers/usb/host/xhci-dbgcap.c
+++ linux-4.15.0/drivers/usb/host/xhci-dbgcap.c
#include <linux/dma-mapping.h>
#include <linux/slab.h>
#include <linux/nls.h>

#include "xhci.h"
#include "xhci-trace.h"
#include "xhci-dbгcap.h"

static inline void *
dbc_dma_alloc_coherent(struct xhci_hcd *xhci, size_t size,
		       dma_addr_t *dma_handle, gfp_t flags)
{
    void		*vaddr;

    vaddr = dma_alloc_coherent(xhci_to_hcd(xhci)->self.sysdev,
				   size, dma_handle, flags);
    memset(vaddr, 0, size);
    return vaddr;
}

static inline void
dbc_dma_free_coherent(struct xhci_hcd *xhci, size_t size,
		      void *cpu_addr, dma_addr_t dma_handle)
{
    if (cpu_addr)
	dma_free_coherent(xhci_to_hcd(xhci)->self.sysdev,
				  size, dma_handle, flags);
    memset(vaddr, 0, size);
    return vaddr;
}

static u32 xhci_dbc_populate_strings(struct dbc_str_descs *strings)
{
    struct usb_string_descriptor*s_desc;
    u32string_length;

    /* Serial string: */
    s_desc = (struct usb_string_descriptor *)strings->serial;
    utf8s_to_utf16s(DBC_STRING_SERIAL, strlen(DBC_STRING_SERIAL),
			UTF16_LITTLE_ENDIAN, (wchar_t *)s_desc->wData,
			DBC_MAX_STRING_LENGTH);
+\s_desc->bLength= (strlen(DBC_STRING_SERIAL) + 1) * 2;
+s_desc->bDescriptorType= USB_DT_STRING;
+string_length= s_desc->bLength;
+string_length<<= 8;
+
+/* Product string: */
+\s_desc = (struct usb_string_descriptor *)strings->product;
+utf8s_to_utf16s(DBC_STRING_PRODUCT, strlen(DBC_STRING_PRODUCT),
+UTF16_LITTLE_ENDIAN, (wchar_t *)s_desc->wData,
+DBC_MAX_STRING_LENGTH);
+
+\s_desc->bLength= (strlen(DBC_STRING_PRODUCT) + 1) * 2;
+s_desc->bDescriptorType= USB_DT_STRING;
+string_length+= s_desc->bLength;
+string_length<<= 8;
+
+/* Manufacture string: */
+\s_desc = (struct usb_string_descriptor *)strings->manufacturer;
+utf8s_to_utf16s(DBC_STRING_MANUFACTURER, strlen(DBC_STRING_MANUFACTURER),
+UTF16_LITTLE_ENDIAN, (wchar_t *)s_desc->wData,
+DBC_MAX_STRING_LENGTH);
+
+\s_desc->bLength= (strlen(DBC_STRING_MANUFACTURER) + 1) * 2;
+s_desc->bDescriptorType= USB_DT_STRING;
+string_length+= s_desc->bLength;
+string_length<<= 8;
+
+/* String0: */
+strings->string0[0]= 4;
+strings->string0[1]= USB_DT_STRING;
+strings->string0[2]= 0x09;
+strings->string0[3]= 0x04;
+string_length+= 4;
+
+return string_length;
+
+static void xhci dbc_init_contexts(struct xhci_hcd *xhci, u32 string_length)
+{ 
+\struct xhci dbc dbc;
+\struct dbc_info_context info;
+\struct xhci_ep_ctx ep_ctx;
+\u32 dev info;
+\dma_addr_t tdeq, dma;
+\unsigned int max_burst;
+
+\dbc = xhci->dbc;
+if (!dbc)
+return;
+
+/* Populate info Context: */
+info= (struct dbc_info_context *)dbc->ctx->bytes;
+dma= dbc->string_dma;
+info->string0= cpu_to_le64(dma);
+info->manufacturer= cpu_to_le64(dma + DBC_MAX_STRING_LENGTH);
+info->product= cpu_to_le64(dma + DBC_MAX_STRING_LENGTH * 2);
+info->serial= cpu_to_le64(dma + DBC_MAX_STRING_LENGTH * 3);
+info->length= cpu_to_le32(string_length);
+
+/* Populate bulk out endpoint context: */
+ep_ctx= dbc_bulkout_ctx(dbc);
+max_burst= DBC_CTRL_MAXBURST(readl(&dbc->regs->control));
+deq= dbc_bulkout_enq(dbc);
+ep_ctx->ep_info= 0;
+ep_ctx->ep_info2= dbc_epctx_info2(BULK_OUT_EP, 1024, max_burst);
+ep_ctx->deq= cpu_to_le64(deq | dbc->ring_out->cycle_state);
+
+/* Populate bulk in endpoint context: */
+ep_ctx= dbc_bulkin_ctx(dbc);
+deq= dbc_bulkin_enq(dbc);
+ep_ctx->ep_info= 0;
+ep_ctx->ep_info2= dbc_epctx_info2(BULK_IN_EP, 1024, max_burst);
+ep_ctx->deq= cpu_to_le64(deq | dbc->ring_in->cycle_state);
+
+/* Set DbC context and info registers: */
+xhci_write_64(xhci, dbc->ctx->dma, &dbc->regs->dccp);
+
+dev_info= cpu_to_le32((DBC_VENDOR_ID << 16) | DBC_PROTOCOL);
+writel(dev_info, &dbc->regs->devinfo1);
+
+dev_info= cpu_to_le32((DBC_DEVICE_REV << 16) | DBC_PRODUCT_ID);
+writel(dev_info, &dbc->regs->devinfo2);
+
+static void xhci_dbc_giveback(struct dbc_request *req, int status)
+{
+__releases(&dbc->lock)
+__acquires(&dbc->lock)
+
+struct dbc_ep*dep = req->dep;
+struct xhci dbc*:dbc = dep->dbc;
+struct xhci hdc*xhci = dbc->xhci;
+struct device*dev = xhci_to_hcd(dbc->xhci)->self.sysdev;
+
+list_del_init(&req->list_pending);
+req->trb_dma = 0;
req->trb = NULL;
+
+if (req->status == -EINPROGRESS)
+req->status = status;
+
+trace_xhci_dbc_giveback_request(req);
+
+dma_unmap_single(dev, 
+ req->dma, 
+ req->length, 
+ dbc_ep_dma_direction(dep));
+
+"" Give back the transfer request: */
+spin_unlock(&dbc->lock);
+req->complete(xhci, req);
+spin_lock(&dbc->lock);
+
+static void xhci_dbc_flush_single_request(struct dbc_request *req)
+{
+union xhci_trb*trb = req->trb;
+
+trb->generic.field[0]= 0;
+trb->generic.field[1]= 0;
+trb->generic.field[2]= 0;
+trb->generic.field[3]&= cpu_to_le32(TRB_CYCLE);
+trb->generic.field[3]|= cpu_to_le32(TRB_TYPE(TRB_TR_NOOP));
+
xhci_dbc_giveback(req, -ESHUTDOWN);
+}
+
+static void xhci_dbc_flush_endpoint_requests(struct dbc_ep *dep)
+{
+struct dbc_request*req, *tmp;
+
+list_for_each_entry_safe(req, tmp, &dep->list_pending, list_pending)
+xhci_dbc_flush_single_request(req);
+}
+
+static void xhci_dbc_flush_requests(struct xhci_dbc *dbc)
+{
+xhci_dbc_flush_endpoint_requests(&dbc->eps[BULK_OUT]);
+xhci_dbc_flush_endpoint_requests(&dbc->eps[BULK_IN]);
+
+
+struct dbc_request *
+dbc_alloc_request(struct dbc_ep *dep, gfp_t gfp_flags)
+{
struct dbc_request *req;

req = kzalloc(sizeof(*req), gfp_flags);
if (!req)
    return NULL;
req->dep = dep;
INIT_LIST_HEAD(&req->list_pending);
INIT_LIST_HEAD(&req->list_pool);
req->direction = dep->direction;
trace_xhci_dbc_alloc_request(req);
return req;
}

void
dbc_free_request(struct dbc_ep *dep, struct dbc_request *req)
{
trace_xhci_dbc_free_request(req);
kfree(req);
}

static void
xhci_dbc_queue_trb(struct xhci_ring *ring, u32 field1,
   u32 field2, u32 field3, u32 field4)
{
union xhci_trb *trb, *next;
trb = ring->enqueue;
trb->generic.field[0] = cpu_to_le32(field1);
trb->generic.field[1] = cpu_to_le32(field2);
trb->generic.field[2] = cpu_to_le32(field3);
trb->generic.field[3] = cpu_to_le32(field4);
trace_xhci_dbc_gadget_ep_queue(ring, &trb->generic);
ring->num_trbs_free--;
next = ++(ring->enqueue);
if (TRB_TYPE_LINK_LE32(next->link.control)) {
    next->link.control ^= cpu_to_le32(TRB_CYCLE);
    ring->enqueue = ring->enq_seg->trbs;
    ring->cycle_state ^= 1;
}
static int xhci_dbc_queue_bulk_tx(struct dbc_ep *dep,
+ struct dbc_request *req)
+{
+u64 addr;
+union xhci_trb *trb;
+unsigned int num_trbs;
+struct xhci dbc *dbc = dep->dbc;
+struct xhci_ring *ring = dep->ring;
+u32 length, control, cycle;
+
+num_trbs = count_trbs(req->dma, req->length);
+WARN_ON(num_trbs != 1);
+if (ring->num_trbs_free < num_trbs)
+return -EBUSY;
+
+addr = req->dma;
+trb = ring->enqueue;
+cycle = ring->cycle_state;
+length = TRB_LEN(req->length);
+control = TRB_TYPE(TRB_NORMAL) | TRB_IOC;
+
+if (cycle)
+control &= cpu_to_le32(~TRB_CYCLE);
+else
+control |= cpu_to_le32(TRB_CYCLE);
+
+req->trb = ring->enqueue;
+req->trb_dma = xhci_trb_virt_to_dma(ring->enq_seg, ring->enqueue);
+xhci_dbc_queue_trb(ring,
+    lower_32_bits(addr),
+    upper_32_bits(addr),
+    length, control);
+
+/*
+ * Add a barrier between writes of trb fields and flipping
+ * the cycle bit:
+ */
+wmb();
+
+if (cycle)
+trb->generic.field[3] |= cpu_to_le32(TRB_CYCLE);
+else
+trb->generic.field[3] &= cpu_to_le32(~TRB_CYCLE);
+
+writel(DBC_DOOR_BELL_TARGET(dep->direction), &dbc->regs->doorbell);
+
+return 0;
+}
```c
+static int
dbc_ep_do_queue(struct dbc_ep *dep, struct dbc_request *req)
+
+int ret;
+struct device*dev;
+struct xhci_dbc*dbc = dep->dbc;
+struct xhci_hcd*xhci = dbc->xhci;
+
+dev = xhci_to_hcd(xhci)->self.sysdev;
+
+if (!req->length || !req->buf)
+return -EINVAL;
+
+req->actual= 0;
+req->status= -EINPROGRESS;
+
+req->dma = dma_map_single(dev,
+ req->buf,
+ req->length,
+ dbc_ep_dma_direction(dep));
+if (dma_mapping_error(dev, req->dma)) {
+xhci_err(xhci, "failed to map buffer\n");
+return -EFAULT;
+
+ret = xhci_dbc_queue_bulk_tx(dep, req);
+if (ret) {
+xhci_err(xhci, "failed to queue trbs\n");
+dma_unmap_single(dev,
+ req->dma,
+ req->length,
+ dbc_ep_dma_direction(dep));
+return -EFAULT;
+
+list_add_tail(&req->list_pending, &dep->list_pending);
+
+return 0;
+}
+
+int dbc_ep_queue(struct dbc_ep *dep, struct dbc_request *req,
+ gfp_t gfp_flags)
+
+unsigned longflags;
+struct xhci_dbc*dbc = dep->dbc;
+int ret = -ESHUTDOWN;
+
+spin_lock_irqsave(&dbc->lock, flags);
```
+if (dbc->state == DS_CONFIGURED)
+ret = dbc_ep_do_queue(dep, req);
+spin_unlock_irqrestore(&dbc->lock, flags);
+
+modDelayedWork(system_wq, &dbc->event_work, 0);
+
+trace_xhci_dbc_queue_request(req);
+
+return ret;
+
+
+static inline void xhci_dbc_do_eps_init(struct xhci_hcd *xhci, bool direction)
+{
+struct dbc_ep*dep;
+struct xhci_dbc*dbc = xhci->dbc;
+
+dep = &dbc->eps[direction];
+dep->dbc = dbc;
+dep->direction = direction;
+dep->ring = direction ? dbc->ring_in : dbc->ring_out;
+
+INIT_LIST_HEAD(&dep->list_pending);
+}
+
+
+static void xhci_dbc_eps_init(struct xhci_hcd *xhci)
+{
+xhci_dbc_do_eps_init(xhci, BULK_OUT);
+xhci_dbc_do_eps_init(xhci, BULK_IN);
+
+
+static void xhci_dbc_eps_exit(struct xhci_hcd *xhci)
+{
+struct xhci_dbc*dbc = xhci->dbc;
+
+memset(dbc->eps, 0, ARRAY_SIZE(dbc->eps));
+}
+
+
+static int xhci_dbc_mem_init(struct xhci_hcd *xhci, gfp_t flags)
+{
+intret;
+dma_addr_tdeq;
+u32string_length;
+struct xhci_dbc*dbc = xhci->dbc;
+
+/* Allocate various rings for events and transfers: */
+dbc->ring_evt = xhci_ring_alloc(xhci, 1, 1, TYPE_EVENT, 0, flags);
+
+if (!dbc->ring_evt)
+goto evt_fail;
+dbc->ring_in = xhci_ring_alloc(xhci, 1, 1, TYPE_BULK, 0, flags);
+if (!dbc->ring_in)
+goto in_fail;
+
+dbc->ring_out = xhci_ring_alloc(xhci, 1, 1, TYPE_BULK, 0, flags);
+if (!dbc->ring_out)
+goto out_fail;
+
+/* Allocate and populate ERST: */
+ret = xhci_alloc_erst(xhci, dbc->ring_evt, &dbc->erst, flags);
+if (ret)
+goto erst_fail;
+
+/* Allocate context data structure: */
+dbc->ctx = xhci_alloc_container_ctx(xhci, XHCI_CTX_TYPE_DEVICE, flags);
+if (!dbc->ctx)
+goto ctx_fail;
+
+/* Allocate the string table: */
+dbc->string_size = sizeof(struct dbc_str_descs);
+dbc->string = dbc_dma_alloc_coherent(xhci,
+  dbc->string_size,
+  &dbc->string_dma,
+  flags);
+if (!dbc->string)
+goto string_fail;
+
+/* Setup ERST register: */
+writel(dbc->erst.erst_size, &dbc->regs->ersts);
+xhci_write_64(xhci, dbc->erst.dma_addr, &dbc->regs->erstba);
+deq = xhci_trb_virt_to_dma(dbc->ring_evt->deq_seg,
+  dbc->ring_evt->dequeue);
+xhci_write_64(xhci, deq, &dbc->regs->erdp);
+
+/* Setup strings and contexts: */
+string_length = xhci_dbc_populate_strings(dbc->string);
+xhci_dbc_init_contexts(xhci, string_length);
+
+mmiowb();
+
+xhci_dbc_eps_init(xhci);
+dbc->state = DS_INITIALIZED;
+
+return 0;
+
+string_fail:
+xhci_free_container_ctx(xhci, dbc->ctx);
+dbc->ctx = NULL;
+ctx_fail:
+xhci_free_erst(xhci, &dbc->erst);
+erst_fail:
+xhci_ring_free(xhci, dbc->ring_out);
+dbc->ring_out = NULL;
+out_fail:
+xhci_ring_free(xhci, dbc->ring_in);
+dbc->ring_in = NULL;
+in_fail:
+xhci_ring_free(xhci, dbc->ring_evt);
+dbc->ring_evt = NULL;
+evt_fail:
+return -ENOMEM;
+
+static void xhci_dbc_mem_cleanup(struct xhci_hcd *xhci)
+{
+struct xhci_dbc*dbc = xhci->dbc;
+
+if (!dbc)
+return;
+
+xhci_dbc_eps_exit(xhci);
+
+if (dbc->string) {
+dbc_dma_free_coherent(xhci,
+    dbc->string_size,
+    dbc->string, dbc->string_dma);
+dbc->string = NULL;
+}
+
+xhci_free_container_ctx(xhci, dbc->ctx);
+dbc->ctx = NULL;
+
+xhci_free_erst(xhci, &dbc->erst);
+xhci_ring_free(xhci, dbc->ring_out);
+xhci_ring_free(xhci, dbc->ring_in);
+xhci_ring_free(xhci, dbc->ring_evt);
+dbc->ring_out = NULL;
+dbc->ring_in = NULL;
+dbc->ring_evt = NULL;
+}
+
+static int xhci_do_dbc_start(struct xhci_hcd *xhci)
+{
+int ret;
+u32 ctrl;
+struct xhci_dbc*dbc = xhci->dbc;
+
+if (dbc->state != DS_DISABLED)
+return -EINVAL;
+
+writel(0, &dbc->regs->control);
+ret = xhci_handshake(&dbc->regs->control,
+    DBC_CTRL_DBC_ENABLE,
+    0, 1000);
+if (ret)
+return ret;
+
+ret = xhci_dbc_mem_init(xhci, GFP_ATOMIC);
+if (ret)
+return ret;
+
+ctrl = readl(&dbc->regs->control);
+writel(ctrl | DBC_CTRL_DBC_ENABLE | DBC_CTRL_PORT_ENABLE,
+    &dbc->regs->control);
+ret = xhci_handshake(&dbc->regs->control,
+    DBC_CTRL_DBC_ENABLE,
+    DBC_CTRL_DBC_ENABLE, 1000);
+if (ret)
+return ret;
+
+dbc->state = DS_ENABLED;
+return 0;

+static int xhci_do_dbc_stop(struct xhci_hcd *xhci)
+{
+struct xhci_dbc*dbc = xhci->dbc;
+
+if (dbc->state == DS_DISABLED)
+return -1;
+
+writel(0, &dbc->regs->control);
+dbc->state = DS_DISABLED;
+
+return 0;
+
+static int xhci_dbc_start(struct xhci_hcd *xhci)
+{
+intret;
+unsigned longflags;
+struct xhci_dbc*dbc = xhci->dbc;
WARN_ON(!dbc);

pm_runtime_get_sync(xhci_to_hcd(xhci)->self.controller);

spin_lock_irqsave(&dbc->lock, flags);
ret = xhci_do_dbc_start(xhci);
spin_unlock_irqrestore(&dbc->lock, flags);

if (ret) {
    pm_runtime_put(xhci_to_hcd(xhci)->self.controller);
    return ret;
}

return modDelayedWork(system_wq, &dbc->event_work, 1);

static void xhci_dbc_stop(struct xhci_hcd *xhci)
{
    int ret;
    unsigned long flags;
    struct xhci_dbc *dbc = xhci->dbc;
    struct dbc_port *port = &dbc->port;

    WARN_ON(!dbc);
    cancelDelayedWorkSync(&dbc->event_work);
    if (port->registered)
        xhci_dbc_tty_unregister_device(xhci);
    spin_lock_irqsave(&dbc->lock, flags);
    ret = xhci_do_dbc_stop(xhci);
    spin_unlock_irqrestore(&dbc->lock, flags);
    if (!ret) {
        xhci_dbc_mem_cleanup(xhci);
        pm_runtime_put_sync(xhci_to_hcd(xhci)->self.controller);
    }
    
    
    static void
    xhci_dbc_stop(struct xhci_hcd *xhci)
    {
        u32 portsc;
        struct xhci_dbc *dbc = xhci->dbc;
        
        portsc = readl(&dbc->regs->portsc);
if (portsc & DBC_PORTSC_CONN_CHANGE)
    xhci_info(xhci, "DbC port connect change\n");
+
if (portsc & DBC_PORTSC_RESET_CHANGE)
    xhci_info(xhci, "DbC port reset change\n");
+
if (portsc & DBC_PORTSC_LINK_CHANGE)
    xhci_info(xhci, "DbC port link status change\n");
+
if (portsc & DBC_PORTSC_CONFIG_CHANGE)
    xhci_info(xhci, "DbC config error change\n");
+
/* Port reset change bit will be cleared in other place: */
+writel(portsc & ~DBC_PORTSC_RESET_CHANGE, &dbc->regs->portsc);
+
+static void dbc_handle_xfer_event(struct xhci_hcd *xhci, union xhci_trb *event)
+{
+    struct dbc_ep *dep;
+    struct xhci_ring *ring;
+    int ep_id;
+    int status;
+    u32 comp_code;
+    size_t remain_length;
+    struct dbc_request *req = NULL, *r;
+
+    comp_code = GET_COMP_CODE(le32_to_cpu(event->generic.field[2]));
+    remain_length = EVENT_TRB_LEN(le32_to_cpu(event->generic.field[2]));
+    ep_id = TRB_TO_EP_ID(le32_to_cpu(event->generic.field[3]));
+    dep = (ep_id == EPID_OUT) ?
        get_out_ep(xhci) : get_in_ep(xhci);
+    ring = dep->ring;
+
+    switch (comp_code) {
+        case COMP_SUCCESS:
+            remain_length = 0;
+    /* FALLTHROUGH */
+        case COMP_SHORT_PACKET:
+            status = 0;
+            break;
+        case COMP_TRB_ERROR:
+        case COMP_BABBLE_DETECTED_ERROR:
+        case COMP_USB_TRANSACTION_ERROR:
+        case COMP_STALL_ERROR:
+            xhci_warn(xhci, "tx error %d detected\n", comp_code);
+            status = -comp_code;
+            break;
+        default:

}
+xhci_err(xhci, "unknown tx error \%d\n", comp_code);
+status = -comp_code;
+break;
+}
+
+/* Match the pending request: */
+list_for_each_entry(r, &dep->list_pending, list_pending) {
+if (r->trb_dma == event->trans_event.buffer) {
+req = r;
+break;
+}
+}
+
+if (!req) {
+xhci_warn(xhci, "no matched request\n");
+return;
+}
+
+/* Match the pending request: */
+list_for_each_entry(r, &dep->list_pending, list_pending) {
+if (r->trb_dma == event->trans_event.buffer) {
+req = r;
+break;
+}
+}
+
+if (!req) {
+xhci_warn(xhci, "no matched request\n");
+return;
+}
+
+trace_xhci_dbc_handle_transfer(ring, &req->trb->generic);
+
+ring->num_trbs_free++;
+req->actual = req->length - remain_length;
+xhci_dbc_giveback(req, status);
+
+static enum evtreturn xhci_dbc_do_handle_events(struct xhci_dbc *dbc)
+{
+dma_addr_t deq;
+struct dbc_ep*dep;
+union xhci_trb*evt;
+u32ctrl, portsc;
+struct xhci_hcd*xhci = dbc->xhci;
+boolupdate_erdp = false;
+
+/* DbC state machine: */
+switch (dbc->state) {
+case DS_DISABLED:
+case DS_INITIALIZED:
+return EVT_ERR;
+case DS_ENABLED:
+portsc = readl(&dbc->regs->portsc);
+if (portsc & DBC_PORTSC_CONN_STATUS) {
+dbc->state = DS_CONNECTED;
+xhci_info(xhci, "DbC connected\n");
+}
+
+return EVT_DONE;
case DS_CONNECTED:
    ctrl = readl(&dbc->regs->control);
    if (ctrl & DBC_CTRL_DBC_RUN) {
        dbc->state = DS_CONFIGURED;
        xhci_info(xhci, "DbC configured\n");
        portsc = readl(&dbc->regs->portsc);
        writel(portsc, &dbc->regs->portsc);
        return EVT_GSER;
    }
    return EVT_DONE;

case DS_CONFIGURED:
    /* Handle cable unplug event: */
    portsc = readl(&dbc->regs->portsc);
    if (!(portsc & DBC_PORTSC_PORT_ENABLED) &&
        !(portsc & DBC_PORTSC_CONN_STATUS)) {
        xhci_info(xhci, "DbC cable unplugged\n");
        dbc->state = DS_ENABLED;
        xhci_dbc_flush_requests(dbc);
        return EVT_DISC;
    }

    /* Handle debug port reset event: */
    if (portsc & DBC_PORTSC_RESET_CHANGE) {
        xhci_info(xhci, "DbC port reset\n");
        writel(portsc, &dbc->regs->portsc);
        dbc->state = DS_ENABLED;
        xhci_dbc_flush_requests(dbc);
        return EVT_DISC;
    }

    /* Handle endpoint stall event: */
    ctrl = readl(&dbc->regs->control);
    if ((ctrl & DBC_CTRL_HALT_IN_TR) ||
        (ctrl & DBC_CTRL_HALT_OUT_TR)) {
        xhci_info(xhci, "DbC Endpoint stall\n");
        dbc->state = DS_STALLED;
        if (ctrl & DBC_CTRL_HALT_IN_TR) {
            dep = get_in_ep(xhci);
            xhci_dbc_flush_endpoint_requests(dep);
        }
        if (ctrl & DBC_CTRL_HALT_OUT_TR) {
            dep = get_out_ep(xhci);
            xhci_dbc_flush_endpoint_requests(dep);
        }
+} +
+return EVT_DONE;
+
+/* Clear DbC run change bit: */
+if (ctrl & DBC_CTRL_DBC_RUN_CHANGE) {
+writel(ctrl, &dbc->regs->control);
+ctrl = readl(&dbc->regs->control);
+}
+
+break;
+case DS_STALLED:
+ctrl = readl(&dbc->regs->control);
+if (!(ctrl & DBC_CTRL_HALT_IN_TR) &&
+    !(ctrl & DBC_CTRL_HALT_OUT_TR) &&
+    (ctrl & DBC_CTRL_DBC_RUN)) {
+    dbc->state = DS_CONFIGURED;
+    break;
+}
+
+return EVT_DONE;
+
+default:
+xhci_err(xhci, "Unknown DbC state %d\n", dbc->state);
+break;
+}
+
+/* Handle the events in the event ring: */
+evt = dbc->ring_evt->dequeue;
+while ((le32_to_cpu(evt->event_cmd.flags) & TRB_CYCLE) ==
+    dbc->ring_evt->cycle_state) {
+    /* Add a barrier between reading the cycle flag and any
+    * reads of the event's flags/data below:
+    */
+rmb();
+
+trace_xhci_dbc_handle_event(dbc->ring_evt, &evt->generic);
+
+switch (le32_to_cpu(evt->event_cmd.flags) & TRB_TYPE_BITMASK) {
+case TRB_TYPE(TRB_PORT_STATUS):
+dbc_handle_port_status(xhci, evt);
+break;
+case TRB_TYPE(TRB_TRANSFER):
+dbc_handle_xfer_event(xhci, evt);
+break;
+default:
+break;
+}  
+  
+inc_deq(xhci, dbc->ring_evt);  
+evt = dbc->ring_evt->dequeue;  
+update_erdp = true;  
+}  
+ /* Update event ring dequeue pointer: */  
+if (update_erdp) {  
+deq = xhci_trb_virt_to_dma(dbc->ring_evt->deq_seg,  
+ dbc->ring_evt->dequeue);  
+xhci_write_64(xhci, deq, &dbc->regs->erdp);  
+}  
+  
+return EVT_DONE;  
+}  
+  
+static void xhci_dbc_handle_events(struct work_struct *work)  
+{  
+intret;  
+enum evtreturn evtr;  
+struct xhci_dbc *dbc;  
+unsigned long flags;  
+struct xhci_hcd *xhci;  
+  
+dbc = container_of(to_delayed_work(work), struct xhci_dbc, event_work);  
+xhci = dbc->xhci;  
+  
+spin_lock_irqsave(&dbc->lock, flags);  
+evtr = xhci_dbc_do_handle_events(dbc);  
+spin_unlock_irqrestore(&dbc->lock, flags);  
+  
+switch (evtr) {  
+case EVT_GSER:  
+ret = xhci_dbc_tty_register_device(xhci);  
+if (ret) {  
+xhci_err(xhci, "failed to alloc tty device\n");  
+break;  
+}  
+  
+xhci_info(xhci, "DbC now attached to /dev/ttyDBC0\n");  
+break;  
+case EVT_DISC:  
+xhci_dbc_tty_unregister_device(xhci);  
+break;  
+case EVT_DONE:  
+break;  
+default:  
+}


```c
+xhci_info(xhci, "stop handling dbc events\n");
+return;
+
+modDelayedWork(systemWq, &dbc->eventWork, 1);
+
+
+static void xhciDoDbcExit(struct xhci_hcd *xhci)
+{
+unsigned long flags;
+
+spinLockIrqsave(&xhci->lock, flags);
+kfree(xhci->dbc);
+xhci->dbc = NULL;
+spinUnlockIrqrestore(&xhci->lock, flags);
+
+
+static int xhciDoDbcInit(struct xhci_hcd *xhci)
+{
+u32 reg;
+struct xhci_dbc *dbc;
+unsigned long flags;
+void __iomem *base;
+int dbc_cap_offs;
+
+base = &xhci->cap_regs->hc_capbase;
+dbc_cap_offs = xhci_find_next_ext_cap(base, 0, XHCI_EXT_CAPS_DEBUG);
+if (!dbc_cap_offs)
+return -ENODEV;
+
+dbc = kzalloc(sizeof(*dbc), GFP_KERNEL);
+if (!dbc)
+return -ENOMEM;
+
+dbc->regs = base + dbc_cap_offs;
+
+/* We will avoid using DbC in xhci driver if it's in use. */
+reg = readl(&dbc->regs->control);
+if (reg & DBC_CTRL_DBC_ENABLE) {
+kfree(dbc);
+return -EBUSY;
+}
+
+spinLockIrqsave(&xhci->lock, flags);
+if (xhci->dbc) {
+spinUnlockIrqrestore(&xhci->lock, flags);
+kfree(dbc);
+return -EBUSY;
+
```

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+xhci->dbc = dbc;
+spin_unlock_irqrestore(&xhci->lock, flags);
+
+dbc->xhci = xhci;
+INIT_DELAYED_WORK(&dbc->event_work, xhci_dbc_handle_events);
+spin_lock_init(&dbc->lock);
+
+return 0;
+
+
+static ssize_t dbc_show(struct device *dev,
+struct device_attribute *attr,
+char *buf)
+{
+const char*p;
+struct xhci_dbc*dbc;
+struct xhci_hcd*xhci;
+
+xhci = hcd_to_xhci(dev_get_drvdata(dev));
+dbc = xhci->dbc;
+
+switch (dbc->state) {
+case DS_DISABLED:
+p = "disabled";
+break;
+case DS_INITIALIZED:
+p = "initialized";
+break;
+case DS_ENABLED:
+p = "enabled";
+break;
+case DS_CONNECTED:
+p = "connected";
+break;
+case DS_CONFIGURED:
+p = "configured";
+break;
+case DS_STALLED:
+p = "stalled";
+break;
+default:
+p = "unknown";
+}
+
+return sprintf(buf, "%s\n", p);
+}
+static ssize_t dbc_store(struct device *dev,  
+struct device_attribute *attr,  
+const char *buf, size_t count)
+{
+struct xhci_dbc*dbc;  
+struct xhci_hcd*xhci;
+
+xhci = hcd_to_xhci(dev_get_drvdata(dev));
+dbc = xhci->dbc;
+
+if (!strncmp(buf, "enable", 6))
+xhci_dbc_start(xhci);
+else if (!strncmp(buf, "disable", 7))
+xhci_dbc_stop(xhci);
+else
+return -EINVAL;
+
+return count;
+
+static DEVICE_ATTR(dbc, 0644, dbc_show, dbc_store);
+
+int xhci_dbc_init(struct xhci_hcd *xhci)
+{
+int ret;
+struct device*dev = xhci_to_hcd(xhci)->self.controller;
+
+ret = xhci_do_dbc_init(xhci);
+if (ret)
+goto init_err3;
+
+ret = xhci_dbc_tty_register_driver(xhci);
+if (ret)
+goto init_err2;
+
+ret = device_create_file(dev, &dev_attr_dbc);
+if (ret)
+goto init_err1;
+
+return 0;
+
+init_err1:
+xhci_dbc_tty_unregister_driver();
+init_err2:
+xhci_do_dbc_exit(xhci);
+init_err3:
+return ret;
+}
void xhci_dbc_exit(struct xhci_hcd *xhci)
{
    struct device *dev = xhci_to_hcd(xhci)->self.controller;
    
    if (!xhci->dbc)
        return;
    
    device_remove_file(dev, &dev_attr_dbc);
    xhci_dbc_tty_unregister_driver();
    xhci_dbc_stop(xhci);
    xhci_do dbc_exit(xhci);
}

#ifdef CONFIG_PM
int xhci_dbc_suspend(struct xhci_hcd *xhci)
{
    struct xhci dbc *dbc = xhci->dbc;
    
    if (!dbc)
        return 0;
    
    if (dbc->state == DS_CONFIGURED)
        dbc->resume_required = 1;
    
    xhci_dbc_stop(xhci);
    
    return 0;
}

int xhci_dbc_resume(struct xhci_hcd *xhci)
{
    int ret = 0;
    struct xhci dbc *dbc = xhci->dbc;
    
    if (!dbc)
        return 0;
    
    if (dbc->resume_required) {
        dbc->resume_required = 0;
        xhci dbc_start(xhci);
    }
    
    return ret;
}
#endif /* CONFIG_PM */
+/**
+ * xhci-dbgcap.h - xHCI debug capability support
+ *
+ * Copyright (C) 2017 Intel Corporation
+ *
+ * Author: Lu Baolu <baolu.lu@linux.intel.com>
+ */
+#ifndef __LINUX_XHCI_DBGCAP_H
+#define __LINUX_XHCI_DBGCAP_H
+
+#include <linux/tty.h>
+#include <linux/kfifo.h>
+
+struct dbc_regs {
+__le32 capability;
+__le32 doorbell;
+__le32ersts;/* Event Ring Segment Table Size*/
+__le32__reserved_0;/* 0c~0f reserved bits */
+__le64erstba;/* Event Ring Segment Table Base Address */
+__le64erdp;/* Event Ring Dequeue Pointer */
+__le32control;
+__le32status;
+__le32portsc;/* Port status and control */
+__le32__reserved_1;/* 2b~28 reserved bits */
+__le64dccp;/* Debug Capability Context Pointer */
+__le32devinf01;/* Device Descriptor Info Register 1 */
+__le32devinf02;/* Device Descriptor Info Register 2 */
+};
+
+struct dbc_info_context {
+__le64string0;
+__le64manufacturer;
+__le64product;
+__le64serial;
+__le32length;
+__le32__reserved_0[7];
+};
+
+#define DBC_CTRL_DBC_RUNBIT(0)
+#define DBC_CTRL_PORT_ENABLEBIT(1)
+#define DBC_CTRL_HALTOUT_TRBIT(2)
+#define DBC_CTRL_HALTIN_TRBIT(3)
+#define DBC_CTRL_DBC_RUN_CHANGEBIT(4)
+#define DBC_CTRL_DBC_ENABLEBIT(31)
+#define DBC_CTRL_MAXBURST(p)(((p) >> 16) & 0xff)
+#define DBC_DOOR_BELL_TARGET(p)(((p) & 0xff) << 8)
+  /* Port status: */
+  +*/
+  +#define DBC_PORTSC_CONN_STATUS BIT(0)
+  +#define DBC_PORTSC_PORT_ENABLED BIT(1)
+  +#define DBC_PORTSC_CONN_CHANGE BIT(17)
+  +#define DBC_PORTSC_RESET_CHANGE BIT(21)
+  +#define DBC_PORTSC_LINK_CHANGE BIT(22)
+  +#define DBC_PORTSC_CONFIG_CHANGE BIT(23)
+
+  struct dbc_str_descs {
+    char string0[DBC_MAX_STRING_LENGTH];
+    char manufacturer[DBC_MAX_STRING_LENGTH];
+    char product[DBC_MAX_STRING_LENGTH];
+    char serial[DBC_MAX_STRING_LENGTH];
+  };
+
+  +#define DBC_PROTOCOL /* GNU Remote Debug Command */
+  +#define DBC_VENDOR_ID 0x1d6b /* Linux Foundation 0x1d6b */
+  +#define DBC_PRODUCT_ID 0x0010 /* device 0010 */
+  +#define DBC_DEVICE_REV 0x0010/* 0.10 */
+
+  enum dbc_state {
+    DS_DISABLED = 0,
+    DS_INITIALIZED,
+    DS_ENABLED,
+    DS_CONNECTED,
+    DS_CONFIGURED,
+    DS_STALLED,
+  };
+
+  struct dbc_request {
+    void *buf;
+    unsigned int length;
+    dma_addr_t dma;
+    void (*complete)(struct xhci_hcd *xhci,
+                     struct dbc_request *req);
+    struct list_head list_pool;
+    int status;
+    unsigned int actual;
+  };

---

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struct dbc_ep
{
    struct xhci dbc dbc;
    struct list_head list_pending;
    struct xhci_ring ring;
    unsigned direction:1;
};

#define DBC_QUEUE_SIZE 16
#define DBC_WRITE_BUF_SIZE 8192

/*
 * Private structure for DbC hardware state:
 */
struct dbc_port
{
    struct tty_port port;
    spinlock_t port_lock;/* port access */
    struct list_head read_pool;
    struct list_head read_queue;
    unsigned int n_read;
    struct tasklet_struct push;
    struct list_head write_pool;
    struct kfifo write_fifo;
    bool registered;
    struct dbc_ep in;
    struct dbc_ep out;
};

struct xhci dbc
{
    spinlock_t lock;/* device access */
    struct xhci_hcd xhci;
    struct xhci_REGS __iomem*regs;
    struct xhci_ring ring_evt;
    struct xhci_ring ring_in;
    struct xhci_ring ring_out;
    struct xhci_ersterst;
    struct xhci_container_ctx*ctx;
};
+struct dbc_str_descs*string;
+dma_addr_tstring_dma;
+size_tstring_size;
+
+enum dbc_state;
+struct delayed_workevent_work;
+unsigned resume_required:1;
+struct dbc_epeps[2];
+
+struct dbc_port;
+};
+
+#define dbc_bulkout_ctx(d)
+((struct xhci_ep_ctx *)((d)->ctx->bytes + DBC_CONTEXT_SIZE))
+#define dbc_bulkin_ctx(d)
+((struct xhci_ep_ctx *)((d)->ctx->bytes + DBC_CONTEXT_SIZE * 2))
+#define dbc_bulkout_enq(d)
+xhci_trb_virt_to_dma((d)->ring_out->enq_seg, (d)->ring_out->enqueue)
+#define dbc_bulkin_enq(d)
+xhci_trb_virt_to_dma((d)->ring_in->enq_seg, (d)->ring_in->enqueue)
+#define dbc_epctx_info2(t, p, b)
+cpu_to_le32(EP_TYPE(t) | MAX_PACKET(p) | MAX_BURST(b))
+#define dbc_ep_dma_direction(d)
+((d)->direction ? DMA_FROM_DEVICE : DMA_TO_DEVICE)
+
+#define BULK_OUT
+#define BULK_IN
+#define EPID_OUT
+#define EPID_IN
+
+enum evtreturn {
+EVT_ERR= -1,
+EVT_DONE,
+EVT_GSER,
+EVT_DISC,
+};
+
+static inline struct dbc_ep*get_in_ep(struct xhci_hcd *xhci)
+{
+struct xhci_dbc*dbc = xhci->dbc;
+
+return &dbc->eps[BULK_IN];
+}
+
+static inline struct dbc_ep*out_ep(struct xhci_hcd *xhci)
+{
+struct xhci_dbc*dbc = xhci->dbc;
+
+return &dbc->eps[BULK_OUT];
+}
+return &dbc->eps[BULK_OUT];
+
+ifdef CONFIG_USB_XHCIDBGCAP
+int xhci_dbc_init(struct xhci_hcd *xhci);
+void xhci_dbc_exit(struct xhci_hcd *xhci);
+int xhci_dbc_tt_register_driver(struct xhci_hcd *xhci);
+void xhci_dbc_tt_unregister_driver(void);
+int xhci_dbc_tt_register_device(struct xhci_hcd *xhci);
+void xhci_dbc_tt_unregister_device(struct xhci_hcd *xhci);
+struct dbc_request *dbc_alloc_request(struct dbc_ep *dep, gfp_t gfp_flags);
+void dbc_free_request(struct dbc_ep *dep, struct dbc_request *req);
+int dbc_ep_queue(struct dbc_ep *dep, struct dbc_request *req, gfp_t gfp_flags);
+endif /* CONFIG_USB_XHCIDBGCAP */
+
+ifdef CONFIG_PM
+int xhci_dbc_suspend(struct xhci_hcd *xhci);
+int xhci_dbc_resume(struct xhci_hcd *xhci);
+endif /* CONFIG_PM */
+
+else
+static inline int xhci_dbc_init(struct xhci_hcd *xhci)
+{
+    return 0;
+}
+
+static inline void xhci_dbc_exit(struct xhci_hcd *xhci)
+{
+}
+
+static inline int xhci_dbc_suspend(struct xhci_hcd *xhci)
+{
+    return 0;
+}
+
+static inline int xhci_dbc_resume(struct xhci_hcd *xhci)
+{
+    return 0;
+}
+
+endif /* CONFIG_USB_XHCIDBGCAP */
+endif /* LINUX_XHCIDBGCAP_H */
--- linux-4.15.0.orig/drivers/usb/host/xhci-dbgtty.c
+++ linux-4.15.0/drivers/usb/host/xhci-dbgtty.c
@@ -0,0 +1,503 @@
+/**
+ * xhci-dbgtty.c - tty glue for xHCI debug capability
+ *  
+ * Copyright (C) 2017 Intel Corporation
+ *  
+ * Author: Lu Baolu <baolu.lu@linux.intel.com>
+ */
+include <linux/slab.h>
+include <linux/tty.h>
+include <linux/tty_flip.h>
+
+include "xhci.h"
+include "xhci-dbgcaps.h"
+
+static unsigned int
+dbc_send_packet(struct dbc_port *port, char *packet, unsigned int size)
+{
+unsigned intlen;
+
+len = kfifo_len(&port->write_fifo);
+if (len < size)
+size = len;
+if (size != 0)
+size = kfifo_out(&port->write_fifo, packet, size);
+return size;
+}

+static int dbc_start_tx(struct dbc_port *port)
+__releases(&port->port_lock)
+__acquires(&port->port_lock)
+{
+intlen;
+struct dbc_request*req;
+intstatus = 0;
+booldo_tty_wake = false;
+struct list_head*pool = &port->write_pool;
+
+while (!list_empty(pool)) {
+req = list_entry(pool->next, struct dbc_request, list_pool);
+len = dbc_send_packet(port, req->buf, DBC_MAX_PACKET);
+if (len == 0)
+break;
+do_tty_wake = true;
+
+req->length = len;
+list_del(&req->list_pool);
+
+spin_unlock(&port->port_lock);
+status = dbc_ep_queue(port->out, req, GFP_ATOMIC);
+spin_lock(&port->port_lock);
+
+if (status) {
+list_add(&req->list_pool, pool);
+break;
+}
+
+if (do_tty_wake && port->porttty)
+tty_wakeup(port->porttty);
+
+return status;
+}
+
+static void dbc_start_rx(struct dbc_port *port)
+{__releases(&port->port_lock)
+__acquires(&port->port_lock)
+
+struct dbc_request*req;
+int status;
+struct list_head*pool = &port->read_pool;
+
+while (!list_empty(pool)) {
+if (!port->porttty)
+break;
+
+req = list_entry(pool->next, struct dbc_request, list_pool);
+list_del(&req->list_pool);
+req->length = DBC_MAX_PACKET;
+
+spin_unlock(&port->port_lock);
+status = dbc_ep_queue(port->in, req, GFP_ATOMIC);
+spin_lock(&port->port_lock);
+
+if (status) {
+list_add(&req->list_pool, pool);
+break;
+}
+
+static void
+dbc_read_complete(struct xhci_hcd *xhci, struct dbc_request *req)
+{
+unsigned long flags;
+struct xhci dbc=sys->dbc;
+struct dbc_port*port = &dbc->port;
+
+spin_lock_irqsave(&port->port_lock, flags);
+list_add_tail(&req->list_pool, &port->read_queue);
+tasklet_schedule(&port->push);
+spin_unlock_irqrestore(&port->port_lock, flags);
+}
+static void dbc_write_complete(struct xhci_hcd *xhci, struct dbc_request *req)
+{
+unsigned long flags;
+struct xhci_dbc *dbc = xhci->dbc;
+struct dbc_port *port = &dbc->port;
+
+spin_lock_irqsave(&port->port_lock, flags);
+list_add(&req->list_pool, &port->write_pool);
+switch (req->status) {
+case 0:
+dbc_start_tx(port);
+break;
+case -ESHUTDOWN:
+break;
+default:
+xhci_warn(xhci, "unexpected write complete status %d\n",
+ req->status);
+break;
+
+spin_unlock_irqrestore(&port->port_lock, flags);
+
+
+void xhci_dbc_free_req(struct dbc_ep *dep, struct dbc_request *req)
+{
+kfree(req->buf);
+dbc_free_request(dep, req);
+}
+
+static int 
+xhci_dbc_alloc_requests(struct dbc_ep *dep, struct list_head *head,
+void (*fn)(struct xhci_hcd *, struct dbc_request *))
+{
+int i;
+struct dbc_request *req;
+
+for (i = 0; i < DBC_QUEUE_SIZE; i++) {
+req = dbc_alloc_request(dep, GFP_ATOMIC);
+if (!req)
+break;
+
+req->length = DBC_MAX_PACKET;
+req->buf = kmalloc(req->length, GFP_KERNEL);
+if (!req->buf) {
+xhci_dbc_free_req(dep, req);
+break;
+}
+}
req->complete = fn;
list_add_tail(&req->list_pool, head);
}
+
+return list_empty(head) ? -ENOMEM : 0;
+
+static void
+__hci_dbc_free_requests(struct dbc_ep *dep, struct list_head *head)
+{
+struct dbc_request*req;
+
+while (!list_empty(head)) {
+ req = list_entry(head->next, struct dbc_request, list_pool);
+list_del(&req->list_pool);
+__hci_dbc_free_req(dep, req);
+}
+
+
+static int dbc_tty_install(struct tty_driver *driver, struct tty_struct *tty)
+{
+struct dbc_port*port = driver->driver_state;
+
tty->driver_data = port;
+
+return tty_port_install(&port->port, driver, tty);
+}
+
+static int dbc_tty_open(struct tty_struct *tty, struct file *file)
+{
+struct dbc_port*port = tty->driver_data;
+
+return tty_port_open(&port->port, tty, file);
+}
+
+static void dbc_tty_close(struct tty_struct *tty, struct file *file)
+{
+struct dbc_port*port = tty->driver_data;
+
+tty_port_close(&port->port, tty, file);
+}
+
+static int dbc_tty_write(struct tty_struct *tty,
+const unsigned char *buf,
+int count)
+{
+struct dbc_port*port = tty->driver_data;
+unsigned longflags;
spin_lock_irqsave(&port->port_lock, flags);
if (count)
    count = kfifo_in(&port->write_fifo, buf, count);
dbc_start_tx(port);
spin_unlock_irqrestore(&port->port_lock, flags);
return count;
}

static int dbc_tty_put_char(struct tty_struct *tty, unsigned char ch)
{
    struct dbc_port *port = tty->driver_data;
    unsigned long flags;
    int status;
    spin_lock_irqsave(&port->port_lock, flags);
    status = kfifo_put(&port->write_fifo, ch);
    spin_unlock_irqrestore(&port->port_lock, flags);
    return status;
}

static void dbc_tty_flush_chars(struct tty_struct *tty)
{
    struct dbc_port *port = tty->driver_data;
    unsigned long flags;
    spin_lock_irqsave(&port->port_lock, flags);
dbc_start_tx(port);
spin_unlock_irqrestore(&port->port_lock, flags);
}

static int dbc_tty_write_room(struct tty_struct *tty)
{
    struct dbc_port *port = tty->driver_data;
    unsigned long flags;
    int room = 0;
    spin_lock_irqsave(&port->port_lock, flags);
    room = kfifo_avail(&port->write_fifo);
    spin_unlock_irqrestore(&port->port_lock, flags);
    return room;
}

static int dbc_tty_chars_in_buffer(struct tty_struct *tty)
{
+struct dbc_port*port = tty->driver_data;
+unsigned longflags;
+intchars = 0;
+
+spin_lock_irqsave(&port->port_lock, flags);
+chars = kfifo_len(&port->write_fifo);
+spin_unlock_irqrestore(&port->port_lock, flags);
+
+return chars;
+
+static void dbc_tty_unthrottle(struct tty_struct *tty)
+{
+struct dbc_port*port = tty->driver_data;
+unsigned longflags;
+
+spin_lock_irqsave(&port->port_lock, flags);
+tasklet_schedule(&port->push);
+spin_unlock_irqrestore(&port->port_lock, flags);
+
+static const struct tty_operations dbc_tty_ops = {
+.install= dbc_tty_install,
+.open= dbc_tty_open,
+.close= dbc_tty_close,
+.write= dbc_tty_write,
+.put_char= dbc_tty_put_char,
+.flush_chars= dbc_tty_flush_chars,
+.write_room= dbc_tty_write_room,
+.chars_in_buffer= dbc_tty_chars_in_buffer,
+.unthrottle= dbc_tty_unthrottle,
+};
+
+static struct tty_driver *dbc_tty_driver;
+
+int xhci_dbc_tty_register_driver(struct xhci_hcd *xhci)
+{
+intstatus;
+struct xhci_dbc*dbc = xhci->dbc;
+
+dbc_tty_driver = tty_alloc_driver(1, TTY_DRIVER_REAL_RAW |
+TTY_DRIVER_DYNAMIC_DEV);
+if (IS_ERR(dbc_tty_driver)) {
+status = PTR_ERR(dbc_tty_driver);
+dbc_tty_driver = NULL;
+return status;
+}
+}
```
+dbc tty_driver->driver_name = "dbc_serial";
+dbc tty_driver->name = "ttyDBC";
+
+dbc tty_driver->type = TTY_DRIVER_TYPE_SERIAL;
+dbc tty_driver->subtype = SERIAL_TYPE_NORMAL;
+dbc tty_driver->init_termios = tty_std_termios;
+dbc tty_driver->init_termios.c_cflag =
+B9600 | CS8 | CREAD | HUPCL | CLOCAL;
+dbc tty_driver->init_termios.c_ispeed = 9600;
+dbc tty_driver->init_termios.c_ospeed = 9600;
+dbc tty_driver->driver_state = &dbc->port;
+
+tty_set_operations(dbc tty_driver, &dbc tty_ops);
+
+status = tty_register_driver(dbc tty_driver);
+if (status) {
+xhci_err(xhci,
+"can't register dbc tty driver, err %d", status);
+put tty_driver(dbc tty_driver);
+dbc tty_driver = NULL;
+}
+
+return status;
+
+
+void xhci dbc tty_unregister_driver(void)
+{
+if (dbc tty_driver) {
+tty_unregister_driver(dbc tty_driver);
+put tty_driver(dbc tty_driver);
+dbc tty_driver = NULL;
+}
+
+
+static void dbc rx_push(unsigned long _port)
+{
+struct dbc_request*req;
+struct tty_struct*tty;
+unsigned longflags;
+boolold push = false;
+boolold disconnect = false;
+struct dbc_port*port = (void*)_port;
+struct list_head*queue = &port->read_queue;
+
+spin lock irqsave(&port->port lock, flags);
+tty = port->port tty;
+while (!list empty(queue)) {
+req = list first entry(queue, struct dbc_request, list pool);
```
+ if (tty && tty_throttled(tty))
+ break;
+
+ switch (req->status) {
+ case 0:
+ break;
+ case -ESHUTDOWN:
+ disconnect = true;
+ break;
+ default:
+ pr_warn("ttyDBC0: unexpected RX status %d\n",
+ req->status);
+ break;
+ }
+
+ if (req->actual) {
+ char* packet = req->buf;
+ unsigned int n, size = req->actual;
+ int count;
+
+ n = port->n_read;
+ if (n) {
+ packet += n;
+ size -= n;
+ }
+
+ count = tty_insert_flip_string(&port->port, packet,
+ size);
+ if (count)
+ do_push = true;
+ if (count != size) {
+ port->n_read += count;
+ break;
+ }
+ port->n_read = 0;
+ }
+
+ list_move(&req->list_pool, &port->read_pool);
+ }
+
+ if (do_push)
+ tty_flip_buffer_push(&port->port);
+
+ if (!list_empty(queue) && tty) {
+ if (!tty_throttled(tty)) {
+ if (do_push)
+ tasklet_schedule(&port->push);
else
  pr_warn("ttyDBC0: RX not scheduled\n");
+
+
+if (!disconnect)
+dbc_start_rx(port);
+
+spin_unlock_irqrestore(&port->port_lock, flags);
+
+
+static int dbc_port_activate(struct tty_port *port, struct tty_struct *tty)
+{
+  unsigned long flags;
+  struct dbc_port *port = container_of(port, struct dbc_port, port);
+  spin_lock_irqsave(&port->port_lock, flags);
+  dbc_start_rx(port);
+  spin_unlock_irqrestore(&port->port_lock, flags);
+  return 0;
+}
+
+static const struct tty_port_operations dbc_port_ops = {
+  .activate = dbc_port_activate,
+};
+
+static void
+xhci_dbc_tty_init_port(struct xhci_hcd *xhci, struct dbc_port *port)
+{
+  tty_port_init(&port->port);
+  spin_lock_init(&port->port_lock);
+  tasklet_init(&port->push, dbc_rx_push, (unsigned long)port);
+  INIT_LIST_HEAD(&port->read_pool);
+  INIT_LIST_HEAD(&port->read_queue);
+  INIT_LIST_HEAD(&port->write_pool);
+  port->in = get_in_ep(xhci);
+  port->out = get_out_ep(xhci);
+  port->port.ops = &dbc_port_ops;
+  port->n_read = 0;
+}
+
+static void
+xhci_dbc_tty_exit_port(struct dbc_port *port)
+{
+  tasklet_kill(&port->push);
+  tty_port_destroy(&port->port);
int xhci dbc tty_register_device(struct xhci_hcd *xhci)
{
   int ret;
   struct device *tty_dev;
   struct xhci dbc dbc = xhci->dbc;
   struct dbc_port *port = &dbc->port;
   
   xhci dbc tty_init port(xhci, port);
   tty_dev = tty_port_register_device(&port->port, dbc tty_driver, 0, NULL);
   ret = IS_ERR OR NULL(tty_dev);
   if (ret)
      goto register fail;
   
   ret = kfifo_alloc(&port->write fifo, DBC_WRITE_BUF_SIZE, GFP_KERNEL);
   if (ret)
      goto buf alloc fail;
   
   ret = xhci dbc alloc requests(port->in, &port->read pool,
   + dbc_read_complete);
   if (ret)
      goto request fail;
   
   ret = xhci dbc alloc requests(port->out, &port->write pool,
   + dbc_write_complete);
   if (ret)
      goto request fail;
   
   port->registered = true;
   
   return 0;

request fail:
   xhci dbc free requests(port->in, &port->read pool);
   xhci dbc free requests(port->out, &port->write pool);
   kfifo free(&port->write fifo);
   
buf alloc fail:
   tty_unregister_device(dbc tty_driver, 0);
   
register fail:
   xhci dbc tty exit port(port);
   
   xhci err(xhci, "can't register tty port, err %d\n", ret);
   
   return ret;
void xhci_dbc_tty_unregister_device(struct xhci_hcd *xhci) {
	struct xhci_dbc		*dbc = xhci->dbc;
	struct dbc_port		*port = &dbc->port;


tty_unregister_device(dbc_tty_driver, 0);
+xhci_dbc_tty_exit_port(port);
+port->registered = false;
+
+kfifo_free(&port->write_fifo);
+xhci_dbc_free_requests(get_out_ep(xhci), &port->read_pool);
+xhci_dbc_free_requests(get_out_ep(xhci), &port->read_queue);
+xhci_dbc_free_requests(get_in_ep(xhci), &port->write_pool);
+
--- linux-4.15.0.orig/drivers/usb/host/xhci-debugfs.c
+++ linux-4.15.0/drivers/usb/host/xhci-debugfs.c
@@ -201,17 +201,17 @@
+trb = &seg->trbs[i];
+dma = seg->dma + i * sizeof(*trb);
+seq_printf(s, ",%pad: %s\n", &dma,
- xhci_decode_trb(trb->generic.field[0],
- trb->generic.field[1],
- trb->generic.field[2],
- trb->generic.field[3]));
+ xhci_decode_trb(le32_to_cpu(trb->generic.field[0]),
+ le32_to_cpu(trb->generic.field[1]),
+ le32_to_cpu(trb->generic.field[2]),
+ le32_to_cpu(trb->generic.field[3]));
}
}
static int xhci_ring_trb_show(struct seq_file *s, void *unused) {
int i;

-struct xhci_ring*ring = s->private;
+struct xhci_ring*ring = *(struct xhci_ring **)s->private;
struct xhci_segment*seg = ring->first_seg;

for (i = 0; i < ring->num_segs; i++) {
@@ -262,17 +262,17 @@
xhci = hcd_to_xhci(bus_to_hcd(dev->udev->bus));
slot_ctx = xhci_get_slot_ctx(xhci, dev->out_ctx);
seq_printf(s, ",%pad: %s\n", &dev->out_ctx->dma,
- xhci_decode_slot_context(slot_ctx->dev_info,
- dev->out_ctx->dma,
- slot_ctx->tt_info,
- -slot_ctx->tt_info,
static int xhci_endpoint_context_show(struct seq_file *s, void *unused) {
    int dci;
    dma_addr_t dma;
    struct xhci_hcd *xhci;
    struct xhci_ep_ctx *ep_ctx;
    int ep_index;
    xhci = hcd_to_xhci(bus_to_hcd(dev->udev->bus));
    for (dci = 1; dci < 32; dci++) {
        ep_ctx = xhci_get_ep_ctx(xhci, dev->out_ctx, dci);
        dma = dev->out_ctx->dma + dci * CTX_SIZE(xhci->hcc_params);
        for (ep_index = 0; ep_index < 31; ep_index++) {
            ep_ctx = xhci_get_ep_ctx(xhci, dev->out_ctx, ep_index);
            dma = dev->out_ctx->dma + (ep_index + 1) * CTX_SIZE(xhci->hcc_params);
            seq_printf(s, "%pad: %s
", &dma,
                xhci_decode_ep_context(le32_to_cpu(ep_ctx->ep_info),
                le32_to_cpu(ep_ctx->ep_info2),
                le64_to_cpu(ep_ctx->deq),
                le32_to_cpu(ep_ctx->tx_info));
        }
    }
    return 0;
}
snprintf(epriv->name, sizeof(epriv->name), "ep%02d", ep_index);
epriv->root = xhci_debugfs_create_ring_dir(xhci,
-   &dev->eps[ep_index].new_ring,
+   &dev->eps[ep_index].ring,
   epriv->name,
   spriv->root);
spriv->eps[ep_index] = epriv;
--- linux-4.15.0.orig/drivers/usb/host/xhci-ext-caps.h
+++ linux-4.15.0/drivers/usb/host/xhci-ext-caps.h
@@ -7,8 +7,9 @@*/
* Author: Sarah Sharp
* Some code borrowed from the Linux EHCI driver.
*/
-/* Up to 16 ms to halt an HC */
-#define XHCI_MAX_HALT_USEC (16*1000)
+
+/* HC should halt within 16 ms, but use 32 ms as some hosts take longer */
+#define XHCI_MAX_HALT_USEC (32 * 1000)
/* HC not running - set to 1 when run/stop bit is cleared. */
#define XHCI_STS_HALT (1<<0)
--- linux-4.15.0.orig/drivers/usb/host/xhci-hub.c
+++ linux-4.15.0/drivers/usb/host/xhci-hub.c
@@ -354,7 +354,7 @@
                if (!xhci->devs[i] || !xhci->devs[i]->udev)
                continue;
                speed = xhci->devs[i]->udev->speed;
if (((speed >= USB_SPEED_SUPER) == (hcd->speed >= HCD_USB3))
    @@ -738,15 +738,6 @@
 { u32 pls = status_reg & PORT_PLS_MASK;

    /* resume state is a xHCI internal state.
    * Do not report it to usb core, instead, pretend to be U3,
    * thus usb core knows it's not ready for transfer
    * */
    -if (pls == XDEV_RESUME) {
    -*status |= USB_SS_PORT_LS_U3;
    -return;
    -}
    *
    /* When the CAS bit is set then warm reset
plhs |= USB_PORT_STAT_CONNECTION;
} else {
/*
 * Resume state is an xHCI internal state. Do not report it to
 * usb core, instead, pretend to be U3, thus usb core knows
 * it's not ready for transfer.
 * */
+if (plhs == XDEV_RESUME) {
+*status |= USB_SS_PORT_LS_U3;
+return;
+}
+
+/*
 * If CAS bit isn't set but the Port is already at
 * Compliance Mode, fake a connection so the USB core
 * notices the Compliance state and resets the port.
 */
+if (bus_state->port_remote_wakeup & (1 << wIndex) &&
+    (raw_port_status & PORT_PLS_MASK) != XDEV_RESUME &&
+    (raw_port_status & PORT_PLS_MASK) != XDEV_RECOVERY) {
+    bus_state->port_remote_wakeup &= ~(1 << wIndex);
+    usb_hcd_end_port_resume(&hcd->self, wIndex);
+}
+
+if (hcd->speed < HCD_USB3) {
+    if (raw_port_status & PORT_PLS_MASK) == XDEV_RESUME &&
+        !(raw_port_status & PORT_PLS_MASK) == XDEV_RECOVER &&
+        !DEV_SUPER_SPEED_ANY(raw_port_status)) {
+        /* USB3 remote wake resume signaling completed */
+        +if (bus_state->port_remote_wakeup & (1 << wIndex))
+            +bus_state->port_remote_wakeup &= ~(1 << wIndex);
+            +usb_hcd_end_port_resume(&hcd->self, wIndex);
+        +}
+    }
+}
+!DEV_SUPERSPEED_ANY(raw_port_status) & & hcd->speed < HCD_USB3) {
if ((raw_port_status & PORT_RESET) ||
!(raw_port_status & PORT_PE))
return 0xffffffff;
@@ -925,12 +934,12 @@
xhci_set_link_state(xhci, port_array, wIndex,
XDEV_U0);

-spin_unlock_irqrestore(&xhci->lock, flags);
+spin_unlock_irqrestore(&xhci->lock, *flags);
 time_left = wait_for_completion_timeout(
 &bus_state->rexit_done[wIndex],
 msecs_to_jiffies(
-XHCI_MAX_REXIT_TIMEOUT));
-spin_lock_irqsave(&xhci->lock, flags);
+spin_lock_irqsave(&xhci->lock, *flags);

if (time_left) {
 slot_id = xhci_find_slot_id_by_port(hcd,
@@ -943,7 +952,7 @@
} else {
 int port_status = readl(port_array[wIndex]);
xhci_warn(xhci, "Port resume took longer than %i msec, port status = 0x%x\n",
-XHCI_MAX_REXIT_TIMEOUT,
+XHCI_MAX_REXIT_TIMEOUT_MS,
 port_status);
 status |= USB_PORT_STAT_SUSPEND;
clear_bit(wIndex, &bus_state->rexit_ports);
@@ -1078,7 +1087,7 @@
break;
} else {
 status = xhci_get_port_status(hcd, bus_state, port_array,
@@ -1224,17 +1233,17 @@@
 port_li = readl(port_array[wIndex] + PORTLI);
 status = xhci_get_ext_port_status(temp, port_li);
 -put_unaligned_le32(cpus_to_le32(status), &buf[4]);
+put_unaligned_le32(status, &buf[4]);
 }
break;
}
case SetPortFeature:
@@ -1224,17 +1233,17 @@
temp = readl(port_array[wIndex]);
break;
-
/* Software should not attempt to set
 * port link state above '3' (U3) and the port
 * must be enabled.
 */
-if ((temp & PORT_PE) == 0 ||
 (link_state > USB_SS_PORT_LS_U3)) {
xhci_warn(xhci, "Cannot set link state.\n");
+/* Port must be enabled */
+if (!(!(temp & PORT_PE))) {
+retval = -ENODEV;
+break;
+
+/* Can't set port link state above '3' (U3) */
+if (link_state > USB_SS_PORT_LS_U3) {
+xhci_warn(xhci, "Cannot set port %d link state %d\n",
+wIndex, link_state);
+goto error;
+
-} else {
+if (link_state == USB_SS_PORT_LS_U3) {
+slot_id = xhci_find_slot_id_by_port(hcd, xhci,
+wIndex + 1);
+}
+
if (link_state == USB_SS_PORT_LS_U3) {
    slot_id = xhci_find_slot_id_by_port(hcd, xhci,
    wIndex + 1);
    * Inform the usbcore about resume-in-progress by returning
    * a non-zero value even if there are no status changes.
+
+spin_lock_irqsave(&xhci->lock, flags);
+
status = bus_state->resuming_ports;

mask = PORT_CSC | PORT_PEC | PORT_OCC | PORT_PLC | PORT_WRC | PORT_CEC;

-spin_lock_irqsave(&xhci->lock, flags);
/* For each port, did anything change? If so, set that bit in buf. */
    for (i = 0; i < max_ports; i++) {
        temp = readl(port_array[i]);
    }
    if ((temp & PORT_RC))
        reset_change = true;
    +if (temp & PORT_OC)
        +status = 1;
    }
    if (!status && !reset_change) {
xhci_dbg(xhci, "%s: stopping port polling\n", __func__);
@@ -1470,13 +1482,16 @@
 __le32 __iomem **port_array;
 struct xhci_bus_state *bus_state;
 unsigned long flags;
+u32 portsc_buf[USB_MAXCHILDREN];
+bool wake_enabled;

 max_ports = xhci_get_ports(hcd, &port_array);
 bus_state = &xhci->bus_state[hcd_index(hcd)];
+wake_enabled = hcd->self.root_hub->do_remote_wakeup;

 spin_lock_irqsave(&xhci->lock, flags);

-if (hcd->self.root_hub->do_remote_wakeup) {
+if (wake_enabled) {
 if (bus_state->resuming_ports ||	/* USB2 */
     bus_state->port_remote_wakeup) /* USB3 */
 spin_unlock_irqrestore(&xhci->lock, flags);
@@ -1484,26 +1499,49 @@
 return -EBUSY;
 }
 }
-}

-portal_index = max_ports;
+/*
+ * Prepare ports for suspend, but don't write anything before all ports
+ * are checked and we know bus suspend can proceed
+ */
 bus_state->bus_suspended = 0;
+portal_index = max_ports;
 while (portal_index--) {
-/* suspend the port if the port is not suspended */
+u32 t1, t2;
-         int slot_id;
+-
+int retries = 10;
+retry:
 t1 = readl(port_array[portal_index]);
 t2 = xhci_port_state_to_neutral(t1);
+portsc_buf[portal_index] = 0;

 -if (!(t1 & PORT_PE) && !(t1 & PORT_PLS_MASK)) {
 -xhci_dbg(xhci, "port %d not suspended\n", portal_index);
-slot_id = xhci_find_slot_id_by_port(hcd, xhci,
-portal_index + 1);
-    if (slot_id) {
+/*
Give a USB3 port in link training time to finish, but don't prevent suspend as port might be stuck

```c
if ((hcd->speed >= HCD_USB3) && retries-- &&
    ((t1 & PORT_PLS_MASK) == XDEV_POLLING) {
    spin_unlock_irqrestore(&xhci->lock, flags);
    msleep(XHCI_PORT_POLLING_LFPS_TIME);
    spin_lock_irqsave(&xhci->lock, flags);
    xhci_dbg(xhci, "port %d polling in bus suspend, waiting\n",
             port_index);
    goto retry;
}
/* bail out if port detected a over-current condition */
if ((t1 & PORT_OC) {
    bus_state->bus_suspended = 0;
    spin_unlock_irqrestore(&xhci->lock, flags);
    xhci_dbg(xhci, "Bus suspend bailout, port over-current detected\n");
    return -EBUSY;
}
/* suspend ports in U0, or bail out for new connect changes */
if (((t1 & PORT_PE) && (t1 & PORT_PLS_MASK) == XDEV_U0) {
    if (((t1 & PORT_CSC) && wake_enabled) {
        bus_state->bus_suspended = 0;
        spin_unlock_irqrestore(&xhci->lock, flags);
        xhci_stop_device(xhci, slot_id, 1);
        spin_lock_irqsave(&xhci->lock, flags);
        xhci_dbg(xhci, "Bus suspend bailout, port connect change\n");
        return -EBUSY;
    }
    xhci_dbg(xhci, "port %d not suspended\n", port_index);
    t2 &= ~PORT_PLS_MASK;
    t2 |= PORT_LINK_STROBE | XDEV_U3;
    set_bit(port_index, &bus_state->bus_suspended);
    @ @ -1512.7 +1550.7 @@
    * including the USB 3.0 roothub, but only if CONFIG_PM
    * is enabled, so also enable remote wake here.
    */
-if (hcd->self.root_hub->do_remote_wakeup) {
    if (wake_enabled) {
        if ((t1 & PORT_CONNECT) {
            t2 |= PORT_WKOC_E | PORT_WKDISC_E;
            t2 &= ~PORT_WKCONN_E;
            @ @ -1520.16 +1558.46 @@
            t2 |= PORT_WKOC_E | PORT_WKCONN_E;
            t2 &= ~PORT_WKDISC_E;
        }
        +if ((xhci->quirks & XHCI_U2_DISABLE_WAKE) &&
```
(hcd->speed < HCD_USB3)) {
    if (usb_amd_pt_check_port(hcd->self.controller,
        port_index))
        t2 &= ~PORT_WAKE_BITS;
    }
} else
    t2 &= ~PORT_WAKE_BITS;

    t1 = xhci_port_state_to_neutral(t1);
    if (t1 != t2)
        -writel(t2, port_array[port_index]);
        +portsc_buf[port_index] = t2;
    +
    +/* write port settings, stopping and suspending ports if needed */
    +port_index = max_ports;
    +while (port_index--) {
        +if (!portsc_buf[port_index])
            continue;
        +if (test_bit(port_index, &bus_state->bus_suspended)) {
            +int slot_id;
            +
            +slot_id = xhci_find_slot_id_by_port(hcd, xhci,
                port_index + 1);
            +if (slot_id) {
                +spin_unlock_irqrestore(&xhci->lock, flags);
                +xhci_stop_device(xhci, slot_id, 1);
                +spin_lock_irqsave(&xhci->lock, flags);
                +
                +writel(portsc_buf[port_index], port_array[port_index]);
            }
        }
    }
    hcd->state = HC_STATE_SUSPENDED;
    bus_state->next_statechange = jiffies + msecs_to_jiffies(10);
    spin_unlock_irqrestore(&xhci->lock, flags);
    +
    +if (bus_state->bus_suspended)
        usleep_range(5000, 10000);
    +
    return 0;
}
-static struct xhci_ring *xhci_ring_alloc(struct xhci_hcd *xhci,
+struct xhci_ring *xhci_ring_alloc(struct xhci_hcd *xhci,
  unsigned int num_segs, unsigned int cycle_state,
  enum xhci_ring_type type, unsigned int max_packet, gfp_t flags)
{
  @ @ -454,7 +454,7 @@
  return 0;
}

-static struct xhci_container_ctx *xhci_alloc_container_ctx(struct xhci_hcd *xhci,
+struct xhci_container_ctx *xhci_alloc_container_ctx(struct xhci_hcd *xhci,
    int type, gfp_t flags)
{
  struct xhci_container_ctx *ctx;
  @ @ -479,7 +479,7 @@
  return ctx;
}

-static void xhci_free_container_ctx(struct xhci_hcd *xhci,
+void xhci_free_container_ctx(struct xhci_hcd *xhci,
    struct xhci_container_ctx *ctx)
{
  if (!ctx)
    @ @ -591,7 +591,7 @@
  if (!ep->stream_info)
    return NULL;

  -if (stream_id > ep->stream_info->num_streams)
  +if (stream_id >= ep->stream_info->num_streams)
    return NULL;
  return ep->stream_info->stream_rings[stream_id];
  @ @ -878,12 +878,12 @@

dev = xhci->devs[slot_id];

-trace_xhci_free_virt_device(dev);
  -
  xhci->dcbaa->dev_context_ptrs[slot_id] = 0;
  if (!dev)
    return;

  +trace_xhci_free_virt_device(dev);
  +
  if (dev->tt_info)
    old_active_eps = dev->tt_info->active_eps;
  @ @ -913,6 +913,8 @@
if (dev->out_ctx)
xhci_free_container_ctx(xhci, dev->out_ctx);

+if (dev->udev && dev->udev->slot_id)
+dev->udev->slot_id = 0;
+kfree(xhci->devs[slot_id]);
xhci->devs[slot_id] = NULL;
}
@@ -1466,9 +1468,15 @@
/* Allow 3 retries for everything but isoc, set CErr = 3 */
if (!usb_endpoint_xfer_isoc(&ep->desc))
  err_count = 3;
-/* Some devices get this wrong */
-if (usb_endpoint_xfer_bulk(&ep->desc) && udev->speed == USB_SPEED_HIGH)
-  max_packet = 512;
+/* HS bulk max packet should be 512, FS bulk supports 8, 16, 32 or 64 */
+if (usb_endpoint_xfer_bulk(&ep->desc)) {
+  if (udev->speed == USB_SPEED_HIGH)
+    max_packet = 512;
+  if (udev->speed == USB_SPEED_FULL) {
+    max_packet = rounddown_pow_of_two(max_packet);
+    max_packet = clamp_val(max_packet, 8, 64);
+  }
+  }
+}
*/
/* xHCI 1.0 and 1.1 indicates that ctrl ep avg TRB Length should be 8 */
if (usb_endpoint_xfer_control(&ep->desc) && xhci->hci_version >= 0x100)
  avg_trb_len = 8;
@@ -1604,6 +1612,10 @@
in_ep_ctx->ep_info2 = out_ep_ctx->ep_info2;
in_ep_ctx->deq = out_ep_ctx->deq;
in_ep_ctx->tx_info = out_ep_ctx->tx_info;
+if (xhci->quirks & XHCI_MTK_HOST) {
+  in_ep_ctx->reserved[0] = out_ep_ctx->reserved[0];
+  in_ep_ctx->reserved[1] = out_ep_ctx->reserved[1];
+}
}
/* Copy output xhci_slot_ctx to the input xhci_slot_ctx.*/
@@ -1764,21 +1776,61 @@
kfree(command);
}

+int xhci_alloc_erst(struct xhci_hcd *xhci,
+  struct xhci_ring *evt_ring,
+  struct xhci_erst *erst,
+  gfp_t flags)
+{
+    size_t size;
unsigned int val;
+struct xhci_segment *seg;
+struct xhci_erst_entry *entry;
+
+size = sizeof(struct xhci_erst_entry) * evt_ring->num_segs;
+erst->entries = dma_alloc_coherent(xhci_to_hcd(xhci)->self.sysdev,
+  size,
+  &erst->erst_dma_addr,
+  flags);
+if (!erst->entries)
+return -ENOMEM;
+
+memset(erst->entries, 0, size);
+erst->num_entries = evt_ring->num_segs;
+
+seg = evt_ring->first_seg;
+for (val = 0; val < evt_ring->num_segs; val++) {
+  entry = &erst->entries[val];
+  entry->seg_addr = cpu_to_le64(seg->dma);
+  entry->seg_size = cpu_to_le32(TRBS_PER_SEGMENT);
+  entry->rsvd = 0;
+  seg = seg->next;
+}
+
+return 0;
+
+void xhci_free_erst(struct xhci_hcd *xhci, struct xhci_erst *erst)
+{ 
+  size_t size;
+  struct device *dev = xhci_to_hcd(xhci)->self.sysdev;
+  
+  size = sizeof(struct xhci_erst_entry) * (erst->num_entries);
+  if (erst->entries)
+    dma_free_coherent(dev, size,
+       erst->entries,
+       &erst->erst_dma_addr);
+  erst->entries = NULL;
+}
+
+void xhci_mem_cleanup(struct xhci_hcd *xhci)
{ 
  struct device* dev = xhci_to_hcd(xhci)->self.sysdev;
  -int size;
  int i, j, num_ports;

  cancel_delayed_work_sync(&xhci->cmd_timer);
/* Free the Event Ring Segment Table and the actual Event Ring */
-size = sizeof(struct xhci_erst_entry)*(xhci->erst.num_entries);
-if (xhci->erst.entries)
-dma_free_coherent(dev, size,
-xhci->erst.entries, xhci->erst.erst_dma_addr);
-xhci->erst.entries = NULL;
-xhci_dbg_trace(xhci, trace_xhci_dbg_init, "Freed ERST");
+xhci_free_erst(xhci, &xhci->erst);
+
if (xhci->event_ring)
  xhci_ring_free(xhci, xhci->event_ring);
  xhci->event_ring = NULL;
@@ -1852,10 +1904,14 @@
kfree(xhci->port_array);
kfree(xhci->rh_bw);
kfree(xhci->ext_caps);
+kfree(xhci->usb2_rhub.psi);
+kfree(xhci->usb3_rhub.psi);

  xhci->usb2_ports = NULL;
  xhci->usb3_ports = NULL;
  xhci->port_array = NULL;
+xhci->usb2_rhub.psi = NULL;
+xhci->usb3_rhub.psi = NULL;
  xhci->rh_bw = NULL;
  xhci->ext_caps = NULL;
@@ -2061,6 +2117,15 @@

  if (major_revision == 0x03) {
    rhub = &xhci->usb3_rhub;
    /*
+  * Some hosts incorrectly use sub-minor version for minor
+  * version (i.e. 0x02 instead of 0x20 for bcdUSB 0x320 and 0x01
+  * for bcdUSB 0x310). Since there is no USB release with sub
+  * minor version 0x301 to 0x309, we can assume that they are
+  * incorrect and fix it here.
+  */
+  
+if (minor_revision > 0x00 && minor_revision < 0x10)
+    minor_revision <<= 4;
  } else if (major_revision <= 0x02) {
    rhub = &xhci->usb2_rhub;
  } else {
@@ -2315,9 +2380,8 @@
  struct device*dev = xhci_to_hcd(xhci)->self.sysdev;
  unsigned intval, val2;
  u64val_64;
-struct xhci_segment*seg;
u32 page_size, temp;
-int i;
+u32 page_size, temp;
+int, ret;

INIT_LIST_HEAD(&xhci->cmd_list);

@@ -2456,32 +2520,9 @@
if (xhci_check_trb_in_td_math(xhci) < 0)
goto fail;

-xhci->erst.entries = dma_alloc_coherent(dev,
-sizeof(struct xhci_erst_entry) * ERST_NUM_SEGS, &dma,
-flags);
-if (!xhci->erst.entries)
+ret = xhci_alloc_erst(xhci, xhci->event_ring, &xhci->erst, flags);
+if (ret)
goto fail;
-xhci_dbg_trace(xhci, trace_xhci_dbg_init,
-"// Allocated event ring segment table at 0x%llx",
-(unsigned long long)dma);
-
-memset(xhci->erst.entries, 0, sizeof(struct xhci_erst_entry)*ERST_NUM_SEGS);
-xhci->erst.num_entries = ERST_NUM_SEGS;
-xhci->erst.dma_addr = dma;
-xhci_dbg_trace(xhci, trace_xhci_dbg_init,
-"Set ERST to 0; private num segs = %i, virt addr = %p, dma addr = 0x%llx",
-xhci->erst.num_entries,
-xhci->erst.entries,
-(unsigned long long)xhci->erst.dma_addr);
-
-/* set ring base address and size for each segment table entry */
-for (val = 0, seg = xhci->event_ring->first_seg; val < ERST_NUM_SEGS; val++) {
-\struct xhci_erst_entry *entry = &xhci->erst.entries[val];
-\entry->seg_addr = cpu_to_le64(seg->dma);
-\entry->seg_size = cpu_to_le32(TRBS_PER_SEGMENT);
-\entry->rsvd = 0;
-\seg = seg->next;
-}

/* set ERST count with the number of entries in the segment table */
val = readl(&xhci->ir_set->erst_size);
--- linux-4.15.0.orig/drivers/usb/host/xhci-mtk-sch.c
+++ linux-4.15.0/drivers/usb/host/xhci-mtk-sch.c
@@ -113,7 +113,9 @@
}

if (ep_type == ISOC_IN_EP || ep_type == ISOC_OUT_EP) {
if (esit_pkts <= sch_ep->esit)
+if (sch_ep->esit == 1)
+sch_ep->pkts = esit_pkts;
+else if (esit_pkts <= sch_ep->esit)
+sch_ep->pkts = 1;
else
+sch_ep->pkts = roundup_pow_of_two(esit_pkts)
@@ -273,6 +275,10 @@
+if (is_fs_or_ls(speed) && !has_tt)
+return false;

+/* skip endpoint with zero maxpkt */
+if (usb_endpoint_maxp(&ep->desc) == 0)
+return false;
+
+return true;
}

--- linux-4.15.0.orig/drivers/usb/host/xhci-mtk.c
+++ linux-4.15.0/drivers/usb/host/xhci-mtk.c
@@ -511,6 +511,15 @@
xhci->quirks |= XHCI_SPURIOUS_SUCCESS;
+if (mtk->lpm_support)
+xhci->quirks |= XHCI_LPM_SUPPORT;
+if (mtk->u2_lpm_disable)
+  xhci->quirks |= XHCI_HW_LPM_DISABLE;
+/*
+ * MTK xHCI 0.96: PSA is 1 by default even if doesn't support stream,
+ * and it's 3 when support it.
+ */
+if (xhci->hci_version < 0x100 && HCC_MAX_PSA(xhci->hcc_params) == 4)
+  xhci->quirks |= XHCI_BROKEN_STREAMS;
}

/* called during probe() after chip reset completes */
@@ -578,6 +587,7 @@
return ret;

mtk->lpm_support = of_property_read_bool(node, "usb3-lpm-capable");
+mtk->u2_lpm_disable = of_property_read_bool(node, "usb2-lpm-disable");
/* optional property, ignore the error if it does not exist */
of_property_read_u32(node, "mediatek,u3p-dis-msk",
  &mtk->u3p_dis_msk);
@@ -685,7 +695,8 @@
if (ret)
goto put_usb3_hcd;
if (HCC_MAX_PSA(xhci->hcc_params) >= 4) ||
if (HCC_MAX_PSA(xhci->hcc_params) >= 4 &&
    !(xhci->quirks & XHCI_BROKEN_STREAMS))
xhci->shared_hcd->can_doStreams = 1;

structure xhci_hcd_mtk *mtk = platform_get_drvdata(dev);
structure usb_hcd *hcd = mtk->hcd;
structure xhci_hcd *xhci = hcd_to_xhci(hcd);
+structure usb_hcd *shared_hcd = xhci->shared_hcd;

-usb_remove_hcd(xhci->shared_hcd);
+pm_runtime_put_noidle(&dev->dev);
+pm_runtime_disable(&dev->dev);
+
+usb_remove_hcd(shared_hcd);
+xhci->shared_hcd = NULL;
xhci_mtk_phy_power_off(mtk);
xhci_mtk_phy_exit(mtk);
device_init_wakeup(&dev->dev, false);

usb_remove_hcd(hcd);
-usb_put_hcd(xhci->shared_hcd);
+usb_put_hcd(shared_hcd);
usb_put_hcd(hcd);
xhci_mtk_sch_exit(mtk);
xhci_mtk_clks_disable(mtk);
xhci_mtk_idos_disable(mtk);
-pm_runtime_put_sync(&dev->dev);
-pm_runtime_disable(&dev->dev);

return 0;
}
@@ -784,10 +798,10 @@
xhci_mtk_host_enable(mtk);

xhci_dbg(xhci, "%s: restart port polling\n", __func__);
-set_bit(HCD_FLAG_POLL_RH, &hcd->flags);
-usb_hcd_poll_rh_status(hcd);
-set_bit(HCD_FLAG_POLL_RH, &xhci->shared_hcd->flags);
usb_hcd_poll_rh_status(xhci->shared_hcd);
+set_bit(HCD_FLAG_POLL_RH, &hcd->flags);
+usb_hcd_poll_rh_status(hcd);
return 0;
}
+++ linux-4.15.0/drivers/usb/host/xhci-mtk.h
@@ -124,6 +124,7 @@
    int num_phys;
    int wakeup_src;
    bool lpm_support;
+    bool u2_lpm_disable;
    
};

static inline struct xhci_hcd_mtk *hcd_to_mtk(struct usb_hcd *hcd)
--- linux-4.15.0.orig/drivers/usb/host/xhci-pci.c
+++ linux-4.15.0/drivers/usb/host/xhci-pci.c
@@ -21,11 +21,14 @@
#define SSIC_PORT_CFG2_OFFSET	0x30
#define PROG_DONE		(1 << 30)
#define SSIC_PORT_UNUSED	(1 << 31)
+#define SPARSE_DISABLED_BIT	17
+#define SPARSE_CNTL_ENABLE	0xC12C
/* Device for a quirk */
#define PCI_VENDOR_ID_FRESCO_LOGIC0x1b73
#define PCI_DEVICE_ID_FRESCO_LOGIC_PDK0x1000
#define PCI_DEVICE_ID_FRESCO_LOGIC_FL10090x1009
+    #define PCI_DEVICE_ID_FRESCO_LOGIC_FL11000x1100
+    #define PCI_DEVICE_ID_FRESCO_LOGIC_FL14000x1400

#define PCI_VENDOR_ID_ETRON		0x1b6f
@@ -41,8 +44,17 @@
#define PCI_DEVICE_ID_INTEL_BROXTON_B_XHCI0x1aa8
#define PCI_DEVICE_ID_INTEL_DNV_XHCI0x19d0
+    #define PCI_DEVICE_ID_INTEL_CML_XHCI0xa3af

+    #define PCI_DEVICE_ID_AMD_PROMONTORYA_40x43b9
+    #define PCI_DEVICE_ID_AMD_PROMONTORYA_30x43ba
+    #define PCI_DEVICE_ID_AMD_PROMONTORYA_20x43bb
+    #define PCI_DEVICE_ID_AMD_PROMONTORYA_10x43bc
+    #define PCI_DEVICE_ID_ASMEDIA_1042_XHCI0x1042
+    #define PCI_DEVICE_ID_ASMEDIA_1042A_XHCI0x1142
+    #define PCI_DEVICE_ID_ASMEDIA_1142_XHCI0x1242
+    #define PCI_DEVICE_ID_ASMEDIA_2142_XHCI0x2142
+    #define PCI_DEVICE_ID_ASMEDIA_3242_XHCI0x3242

static const char hcd_name[] = "xhci_hcd";
@@ -78,6 +90,7 @@
/* Look for vendor-specific quirks */
if (pdev->vendor == PCI_VENDOR_ID_FRESCO_LOGIC &&
(pdev->device == PCI_DEVICE_ID_FRESCO_LOGIC_PDK ||
if (pdev->device == PCI_DEVICE_ID_FRESCO_LOGIC_FL1100 ||
    pdev->device == PCI_DEVICE_ID_FRESCO_LOGIC_FL1400)) {
    if (pdev->device == PCI_DEVICE_ID_FRESCO_LOGIC_PDK &&
        pdev->revision == 0x0) {
        if (pdev->vendor == PCI_VENDOR_ID_AMD && usb_amd_find_chipset_info())
            xhci->quirks |= XHCI_AMD_PLL_FIX;
+
        if (pdev->vendor == PCI_VENDOR_ID_AMD &&
            (pdev->device == 0x145c ||
             pdev->device == 0x15e0 ||
             pdev->device == 0x15e1 ||
             pdev->device == 0x43bb))
            xhci->quirks |= XHCI_SUSPEND_DELAY;
+
        if (pdev->vendor == PCI_VENDOR_ID_AMD &&
            (pdev->device == 0x15e0 || pdev->device == 0x15e1))
            xhci->quirks |= XHCI_SNPS_BROKEN_SUSPEND;
+
        if (pdev->vendor == PCI_VENDOR_ID_AMD && pdev->device == 0x15e5) {
            xhci->quirks |= XHCI_DISABLE_SPARSE;
            xhci->quirks |= XHCI_RESET_ON_RESUME;
            }
+
        if (pdev->vendor == PCI_VENDOR_ID_AMD) {
            xhci->quirks |= XHCI_TRUST_TX_LENGTH;
+
        if ((pdev->vendor == PCI_VENDOR_ID_AMD) &&
            (pdev->device == PCI_DEVICE_ID_AMD_PROMONTORYA_4) ||
            (pdev->device == PCI_DEVICE_ID_AMD_PROMONTORYA_3) ||
            (pdev->device == PCI_DEVICE_ID_AMD_PROMONTORYA_2) ||
            (pdev->device == PCI_DEVICE_ID_AMD_PROMONTORYA_1)))
            xhci->quirks |= XHCI_U2_DISABLE_WAKE;
+
        if (pdev->vendor == PCI_VENDOR_ID_INTEL) {
            xhci->quirks |= XHCI_LPM_SUPPORT;
            xhci->quirks |= XHCI_INTEL_HOST;
            }
+
        pdev->device == PCI_DEVICE_ID_INTEL_BROXTON_M_XHCI ||
        pdev->device == PCI_DEVICE_ID_INTEL_BROXTON_B_XHCI ||
        pdev->device == PCI_DEVICE_ID_INTEL_APL_XHCI ||
        pdev->device == PCI_DEVICE_ID_INTEL_DNV_XHCI) {
            xhci->quirks |= XHCI_PME_STUCK_QUIRK;
        }
    }
}
if (pdev->vendor == PCI_VENDOR_ID_INTEL &&
    pdev->device == PCI_DEVICE_ID_INTEL_CHERRYVIEW_XHCI ||
    pdev->device == PCI_DEVICE_ID_INTEL_SUNRISEPOINT_LP_XHCI ||
    pdev->device == PCI_DEVICE_ID_INTEL_SUNRISEPOINT_H_XHCI ||
    pdev->device == PCI_DEVICE_ID_INTEL_APL_XHCI ||
    pdev->device == PCI_DEVICE_ID_INTEL_DNV_XHCI)
    xhci->quirks |= XHCI_MISSING_CAS;
@@ -192,11 +231,18 @@
    xhci->quirks |= XHCI_BROKEN_STREAMS;
if (pdev->vendor == PCI_VENDOR_ID_ASMEDIA &&
    pdev->device == 0x1042)
    +pdev->device == PCI_DEVICE_ID_ASMEDIA_1042_XHCI)
xhci->quirks |= XHCI_BROKEN_STREAMS;
if (pdev->vendor == PCI_VENDOR_ID_ASMEDIA &&
    pdev->device == 0x1142)
    +pdev->device == PCI_DEVICE_ID_ASMEDIA_1142_XHCI) {
    +xhci->quirks |= XHCI_TRUST_TX_LENGTH;
    +xhci->quirks |= XHCI_NO_64BIT_SUPPORT;
    +}
    +if (pdev->vendor == PCI_VENDOR_ID_ASMEDIA &&
        +pdev->device == PCI_DEVICE_ID_ASMEDIA_1042A_XHCI) {
        +xhci->quirks |= XHCI_NO_64BIT_SUPPORT;
    +}
    +if (pdev->vendor == PCI_VENDOR_ID_ASMEDIA &&
        pdev->device == PCI_DEVICE_ID_ASMEDIA_1042A_XHCI)
        @@ -205,6 +251,11 @@
    +if ((pdev->vendor == PCI_VENDOR_ID_BROADCOM ||
        pdev->vendor == PCI_VENDOR_ID_CAVIUM) &&
        pdev->device == 0x9026)
    +xhci->quirks |= XHCI_RESET_PLL_ON_DISCONNECT;
    +
    +if (xhci->quirks & XHCI_RESET_ON_RESUME)
    xhci_dbg_trace(xhci, trace_xhci_dbg_quirks,
    "QUIRK: Resetting on resume");
    @@ -244,6 +295,9 @@
    if (!usb_hcd_is_primary_hcd(hcd))
    return 0;
    +if (xhci->quirks & XHCI_PME_STUCK_OUIRK)
    +xhci_pme_acpi_rtd3_enable(pdev);
    +
xhci_dbg(xhci, "Got SBRN %u\n", (unsigned int) xhci->sbrn);

/* Find any debug ports */
@@ -304,9 +358,6 @@
HCC_MAX_PSA(xhci->hcc_params) >= 4)
xhci->shared_hcd->can_do_streams = 1;

- if (xhci->quirks & XHCI_PME_STUCK_QUIRK)
-xhci_pme_acpi_rtd3_enable(dev);
-
/* USB-2 and USB-3 roothubs initialized, allow runtime pm suspend */
pm_runtime_put_noidle(&dev->dev);

@@ -330,6 +381,7 @@
if (xhci->shared_hcd) {
usb_remove_hcd(xhci->shared_hcd);
usb_put_hcd(xhci->shared_hcd);
+xhci->shared_hcd = NULL;
}

/* Workaround for spurious wakeups at shutdown with HSW */
@@ -394,6 +446,15 @@
readl(reg);
}

+static void xhci_sparse_control_quirk(struct usb_hcd *hcd)
+{
+  u32 reg;
+  
+  reg = readl(hcd->regs + SPARSE_CNTL_ENABLE);
+  reg &= ~BIT(SPARSE_DISABLE_BIT);
+  writel(reg, hcd->regs + SPARSE_CNTL_ENABLE);
+}
+
static int xhci_pci_suspend(struct usb_hcd *hcd, bool do_wakeup)
{
  struct xhci_hcd*xhci = hcd_to_xhci(hcd);
  @@ -413,6 +474,9 @@
  if (xhci->quirks & XHCI_SSIC_PORT_UNUSED)
    xhci_ssic_port_unused_quirk(hcd, true);

+  if (xhci->quirks & XHCI_DISABLE_SPARSE)
+    xhci_sparse_control_quirk(hcd);
+  
  ret = xhci_suspend(xhci, do_wakeup);
  if (ret && (xhci->quirks & XHCI_SSIC_PORT_UNUSED))
    xhci_ssic_port_unused_quirk(hcd, false);
  @@ -456,6 +520,18 @@
retval = xhci_resume(xhci, hibernated);
return retval;
}
+
+static void xhci_pci_shutdown(struct usb_hcd *hcd)
+
+{
+struct xhci_hcd *xhci = hcd_to_xhci(hcd);
+struct pci_dev *pdev = to_pci_dev(hcd->self.controller);
+
+xhci_shutdown(hcd);
+
+/* Yet another workaround for spurious wakeups at shutdown with HSW */
+if (xhci->quirks & XHCI_SPURIOUS_WAKEUP)
+pcai_set_power_state(pdev, PCI_D3hot);
+
} #endif /* CONFIG_PM */

/*.........................................................*/
@@ -493,6 +569,7 @@
#ifdef CONFIG_PM
xhci_pci_hc_driver.pci_suspend = xhci_pci_suspend;
xhci_pci_hc_driver.pci_resume = xhci_pci_resume;
+xhci_pci_hc_driver.shutdown = xhci_pci_shutdown;
#endif
return pci_register_driver(&xhci_pci_driver);
}
--- linux-4.15.0.orig/drivers/usb/host/xhci-plat.c
+++ linux-4.15.0/drivers/usb/host/xhci-plat.c
@@ -332,21 +332,25 @@
struct usb_hcd *hcd = platform_get_drvdata(dev);
struct xhci_hcd *xhci = hcd_to_xhci(hcd);
struct clk *clk = xhci->clk;
+struct usb_hcd *shared_hcd = xhci->shared_hcd;
+pm_runtime_get_sync(&dev->dev);

xhci->xhc_state |= XHCI_STATE_REMOVING;
-usb_remove_hcd(xhci->shared_hcd);
+usb_remove_hcd(shared_hcd);
+xhci->shared_hcd = NULL;
usb_phy_shutdown(hcd->usb_phy);
usb_remove_hcd(hcd);
-usb_put_hcd(xhci->shared_hcd);
+usb_put_hcd(shared_hcd);

if (!IS_ERR(clk))
clk_disable_unprepare(clk);
usb_put_hcd(hcd);

-pm_runtime_set_suspended(&dev->dev);
pm_runtime_disable(&dev->dev);
+pm_runtime_put_noidle(&dev->dev);
+pm_runtime_set_suspended(&dev->dev);

return 0;
}
@@ -355,7 +359,6 @@
{
struct usb_hcd*hcd = dev_get_drvdata(dev);
struct xhci_hcd*xhci = hcd_to_xhci(hcd);
-int ret;

/*
 * xhci_suspend() needs `do_wakeup` to know whether host is allowed
 @ @ -365,12 +368,7 @@
 * reconsider this when xhci_plat_suspend enlarges its scope, e.g.,
 * also applies to runtime suspend.
 */
-ret = xhci_suspend(xhci, device_may_wakeup(dev));
-
-if (!device_may_wakeup(dev) && !IS_ERR(xhci->clk))
-clk_disable_unprepare(xhci->clk);
-
-return ret;
+return xhci_suspend(xhci, device_may_wakeup(dev));
}

static int __maybe_unused xhci_plat_resume(struct device *dev)
@@ -379,9 +377,6 @@
struct xhci_hcd*xhci = hcd_to_xhci(hcd);
int ret;

-if (!device_may_wakeup(dev) && !IS_ERR(xhci->clk))
-clk_prepare_enable(xhci->clk);
-
-ret = xhci_priv_resume_quirk(hcd);
if (ret)
return ret;
@@ -423,7 +418,7 @@
static struct platform_driver usb_xhci_driver = {
 .probe=xhci_plat_probe,
 .remove=xhci_plat_remove,
-.shutdown= usb_hcd_platform_shutdown,
+shutdown = usb_hcd_platform_shutdown,
 .driver= {
.name = "xhci-hcd",
.pm = &xhci_plat_pm_ops,
--- linux-4.15.0.orig/drivers/usb/host/xhci-rcar.c
+++ linux-4.15.0/drivers/usb/host/xhci-rcar.c
@@ -83,6 +83,10 @@
   .soc_id = "r8a7796",
   .data = (void *)RCAR_XHCI_FIRMWARE_V3,
 },
+{
+  .soc_id = "r8a77965",
+  .data = (void *)RCAR_XHCI_FIRMWARE_V3,
+ },
+/* sentinel */,
+};

@@ -106,7 +110,7 @@
 return of_device_is_compatible(node, "renesas,xhci-r8a7790") ||
of_device_is_compatible(node, "renesas,xhci-r8a7791") ||
of_device_is_compatible(node, "renesas,xhci-r8a7793") ||
-of_device_is_compatible(node, "renesas,rcar-gen2-xhci");
+of_device_is_compatible(node, "renesas,rcar-gen2-xhci");
 }

static int xhci_rcar_is_gen3(struct device *dev)
@@ -145,6 +149,13 @@
     const struct soc_device_attribute *attr;
     const char *firmware_name;

+/*
+ * According to the datasheet, "Upon the completion of FW Download,
+ * there is no need to write or reload FW".
+ */
+if (readl(regs + RCAR_USB3_DL_CTRL) & RCAR_USB3_DL_CTRL_FW_SUCCESS)
+    return 0;
+
     attr = soc_device_match(rcar_quirks_match);
     if (attr)
         quirks = (uintptr_t)attr->data;
@@ -224,11 +235,17 @@
 * pointers. So, this driver clears the AC64 bit of xhci->hcc_params
 * to call dma_set_coherent_mask(dev, DMA_BIT_MASK(32)) in
 * xhci_gen_setup().
+ */
+ * And, since the firmware/internal CPU control the USBSTS.STS_HALT
+ * and the process speed is down when the roothub port enters U3,
+ * long delay for the handshake of STS_HALT is neeed in xhci_suspend().
+ */
     if (xhci_rcar_is_gen2(hcd->self.controller) ||
- xhci_rcar_is_gen3(hcd->self.controller))
- xhci->quirks |= XHCI_NO_64BIT_SUPPORT;
+ xhci->quirks |= XHCI_NO_64BIT_SUPPORT | XHCI_SLOW_SUSPEND;
+
+ xhci->quirks |= XHCI_TRUST_TX_LENGTH;
return xhci_rcar_download_firmware(hcd);
}

--- linux-4.15.0.orig/drivers/usb/host/xhci-ring.c
+++ linux-4.15.0/drivers/usb/host/xhci-ring.c
@@ -153,7 +153,7 @@
 * See Cycle bit rules. SW is the consumer for the event ring only.
 * Don't make a ring full of link TRBs. That would be dumb and this would loop.
 */
- static void inc_deq(struct xhci_hcd *xhci, struct xhci_ring *ring)
+ void inc_deq(struct xhci_hcd *xhci, struct xhci_ring *ring)
{
 /* event ring doesn't have link trbs, check for last trb */
 if (ring->type == TYPE_EVENT) {
@@ -339,16 +339,22 @@
 /* Must be called with xhci->lock held, releases and aquires lock back */
 static int xhci_abort_cmd_ring(struct xhci_hcd *xhci, unsigned long flags)
 { 
- u64 temp_64;
+ u32 temp_32;
 int ret;

 xhci_dbg(xhci, "Abort command ring\n");

 reinit_completion(&xhci->cmd_ring_stop_completion);
-
- temp_64 = xhci_read_64(xhci, &xhci->op_regs->cmd_ring);
- xhci_write_64(xhci, temp_64 | CMD_RING_ABORT, 
- &xhci->op_regs->cmd_ring);
+ /*
+ * The control bits like command stop, abort are located in lower
+ * dword of the command ring control register. Limit the write
+ * to the lower dword to avoid corrupting the command ring pointer
+ * in case if the command ring is stopped by the time upper dword
+ * is written.
+ */
+ temp_32 = readl(&xhci->op_regs->cmd_ring);
+ writel(temp_32 | CMD_RING_ABORT, &xhci->op_regs->cmd_ring);

 /* Section 4.6.1.2 of xHCI 1.0 spec says software should also time the
 * completion of the Command Abort operation. If CRR is not negated in 5
- static struct xhci_virt_ep *xhci_get_virt_ep(struct xhci_hcd *xhci,  
  + unsigned int slot_id,  
  + unsigned int ep_index)  
{  
  +if (slot_id == 0 || slot_id >= MAX_HC_SLOTS) {  
  +xhci_warn(xhci, "Invalid slot_id %u\n", slot_id);  
  +return NULL;  
  +}  
  +if (ep_index >= EP_CTX_PER_DEV) {  
  +xhci_warn(xhci, "Invalid endpoint index %u\n", ep_index);  
  +return NULL;  
  +}  
  +if (!xhci->devs[slot_id]) {  
  +xhci_warn(xhci, "No xhci virt device for slot_id %u\n", slot_id);  
  +return NULL;  
  +}  
  +return &xhci->devs[slot_id]->eps[ep_index];  
+}  
+  
+/* Get the right ring for the given slot_id, ep_index and stream_id.  
* If the endpoint supports streams, boundary check the URB’s stream ID.  
* If the endpoint doesn’t support streams, return the singular endpoint ring.  
@@ -443,7 +469,10 @@  
{  
struct xhci_virt_ep *ep;  
-ep = &xhci->devs[slot_id]->eps[ep_index];  
+ep = xhci_get_virt_ep(xhci, slot_id, ep_index);  
+if (!ep)  
+return NULL;  
+  
+/* Common case: no streams */  
if (!(ep->ep_state & EP_HAS_STREAMS))  
return ep->ring;  
@@ -656,6 +685,7 @@  
struct device *dev = xhci_to_hcd(xhci)->self.controller;  
struct xhci_segment *seg = td->bounce_seg;  
struct urb *urb = td->urb;  
+size_t len;  

if (!ring || !seg || !urb)  
return;  
@@ -666,11 +696,19 @@

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return;

/* for in transfers we need to copy the data from bounce to sg */
sg_pcopy_from_buffer(urb->sg, urb->num_mapped_sgs, seg->bounce_buf,
    seg->bounce_len, seg->bounce_offs);
dma_unmap_single(dev, urb->bounce_dma, ring->bounce_buf_len,
    DMA_FROM_DEVICE);
/* for in transfers we need to copy the data from bounce to sg */
if (urb->num_sgs) {
    len = sg_pcopy_from_buffer(urb->sg, urb->num_sgs, seg->bounce_buf,
        seg->bounce_len, seg->bounce_offs);
    if (len != seg->bounce_len)
        xhci_warn(xhci, "WARN Wrong bounce buffer read length: %zu != %d\n",
            len, seg->bounce_len);
} else {
    memcpy(urb->transfer_buffer + seg->bounce_offs, seg->bounce_buf,
        seg->bounce_len);
}
seg->bounce_len = 0;
seg->bounce_offs = 0;
}
memset(&deq_state, 0, sizeof(deq_state));
ep_index = TRB_TO_EP_INDEX(le32_to_cpu(trb->generic.field[3]));

+ep = xhci_get_virt_ep(xhci, slot_id, ep_index);
+if (!ep)
    +return;
+vdev = xhci->devs[slot_id];
ep_ctx = xhci_get_ep_ctx(xhci, vdev->out_ctx, ep_index);
trace_xhci_handle_cmd_stop_ep(ep_ctx);

-ep = &xhci->devs[slot_id]->eps[ep_index];
last_unlinked_td = list_last_entry(&ep->cancelled_td_list,
    struct xhci_td, cancelled_td_list);
memset(&deq_state, 0, sizeof(deq_state));
ep_index = TRB_TO_EP_INDEX(le32_to_cpu(trb->generic.field[3]));
stream_id = TRB_TO_STREAM_ID(le32_to_cpu(trb->generic.field[2]));
-dev = xhci->devs[slot_id];
-ep = &dev->eps[ep_index];
+ep = xhci_get_virt_ep(xhci, slot_id, ep_index);
+if (!ep)
    +return;
dev = xhci->devs[slot_id];
ep_ring = xhci_stream_id_to_ring(dev, ep_index, stream_id);
if (!ep_ring) {
xhci_warn(xhci, "WARN Set TR deq ptr command for freed stream ID \%u\n",
@@ -1109,9 +1152,9 @@
}

cleanup:
-dev->eps[ep_index].ep_state &= ~SET_DEQ_PENDING;
-dev->eps[ep_index].queued_deq_seg = NULL;
-dev->eps[ep_index].queued_deq_ptr = NULL;
+ep->ep_state &= ~SET_DEQ_PENDING;
+ep->queued_deq_seg = NULL;
+ep->queued_deq_ptr = NULL;
/* Restart any rings with pending UR Bs */
ring_doorbell_for_active_rings(xhci, slot_id, ep_index);
}
@@ -1120,10 +1163,15 @@
union xhci_trb *trb, u32 cmd_comp_code)
 {
 struct xhci_virt_device *vdev;
+struct xhci_virt_ep *ep;
 struct xhci_ep_ctx *ep_ctx;
 unsigned int ep_index;

 ep_index = TRB_TO_EP_INDEX(le32_to_cpu(trb->generic.field[3]));
+ep = xhci_get_virt_ep(xhci, slot_id, ep_index);
+if (!ep)
+return;
+ vdev = xhci->devs[slot_id];
+ep_ctx = xhci_get_ep_ctx(xhci, vdev->out_ctx, ep_index);
 trace_xhci_handle_cmd_reset_ep(ep_ctx);
@@ -1153,7 +1201,7 @@
xhci_ring_cmd_db(xhci);
 } else {
 /* Clear our internal halted state */
-<xhci->devs[slot_id]->eps[ep_index].ep_state &= ~EP_HALTED;
+ep->ep_state &= ~EP_HALTED;
 } } }

@@ -1554,6 +1602,35 @@
usb_wakeup_notification(udev->parent, udev->portnum);
}

+/*
+ * Quirk hanlder for errata seen on Cavium ThunderX2 processor XHCI
+ */

+ * Controller.
+ * As per ThunderX2errata-129 USB 2 device may come up as USB 1
+ * If a connection to a USB 1 device is followed by another connection
+ * to a USB 2 device.
+ *
+ * Reset the PHY after the USB device is disconnected if device speed
+ * is less than HCD_USB3.
+ * Retry the reset sequence max of 4 times checking the PLL lock status.
+ *
+ */
+ static void xhci_cavium_reset_phy_quirk(struct xhci_hcd *xhci)
+ {
+ struct usb_hcd *hcd = xhci_to_hcd(xhci);
+ u32 pll_lock_check;
+ u32 retry_count = 4;
+ 
+ do {
+ /* Assert PHY reset */
+ writel(0x6F, hcd->regs + 0x1048);
+ udelay(10);
+ /* De-assert the PHY reset */
+ writel(0x7F, hcd->regs + 0x1048);
+ udelay(200);
+ pll_lock_check = readl(hcd->regs + 0x1070);
+ } while (!!(pll_lock_check & 0x1) && --retry_count);
+ }
+ 
+ static void handle_port_status(struct xhci_hcd *xhci,
union xhci_trb *event)
{
@@ -1593,6 +1670,12 @@
if ((major_revision == 0x03) != (hcd->speed >= HCD_USB3))
hcd = xhci->shared_hcd;

+if (!hcd) {
+xhci_dbg(xhci, "No hcd found for port %u event\n", port_id);
+bogus_port_status = true;
+goto cleanup;
+}
+
+ if (major_revision == 0) {
+ xhci_warn(xhci, "Event for port %u not in 
+ "Extended Capabilities. ignoring.\n",
@@ -1593,6 +1715,6 @@
+usb_hcd_resume_root_hub(hcd);
+
+} 
-
-if (hcd->speed >= HCD_USB3 && (portsc & PORT_PLS_MASK) == XDEV_INACTIVE)
if ((portsc & PORT_PLC) && (portsc & PORT_PLS_MASK) == XDEV_RESUME) {
    xhci_dbg(xhci, "port resume event for port %d\n", port_id);

    bus_state->port_remote_wakeup |= 1 << faked_port_index;
    xhci_test_and_clear_bit(xhci, port_array, faked_port_index, PORT_PLC);
    usb_hcd_start_port_resume(&hcd->self, faked_port_index);
    xhci_set_link_state(xhci, port_array, faked_port_index, XDEV_U0);
    /* Need to wait until the next link state change */
}

if ((portsc & PORT_PLC) && (portsc & PORT_PLS_MASK) == XDEV_U0 &&
    DEV_SUPERSPEED_ANY(portsc)) {
    if ((portsc & PORT_PLC) &&
        DEV_SUPERSPEED_ANY(portsc) &&
        (portsc & PORT_PLS_MASK) == XDEV_U0 ||
        (portsc & PORT_PLS_MASK) == XDEV_U1 ||
        (portsc & PORT_PLS_MASK) == XDEV_U2)) {
        xhci_dbg(xhci, "resume SS port %d finished\n", port_id);
    }/* We've just brought the device into U0 through either the */
    */ We've just brought the device into U0/1/2 through either the
    * Resume state after a device remote wakeup, or through the
    * U3Exit state after a host-initiated resume. If it's a device
    * initiated remote wake, don't pass up the link state change,
    */
    if (slot_id && xhci->devs[slot_id])
        xhci_ring_device(xhci, slot_id);
    if (bus_state->port_remote_wakeup & (1 << faked_port_index)) {
        -bus_state->port_remote_wakeup &=
            ~(1 << faked_port_index);
        xhci_test_and_clear_bit(xhci, port_array, faked_port_index, PORT_PLC);
        usb_wakeup_notification(hcd->self.root_hub,
            @ @ -1708,7 +1790,7 @@
            * RExit to a disconnect state). If so, let the the driver know it's
            * out of the RExit state.
        */
        -if (!DEV_SUPERSPEED_ANY(portsc) &&
            +if (!DEV_SUPERSPEED_ANY(portsc) && hcd->speed < HCD_USB3 &&
                test_and_clear_bit(faked_port_index, &bus_state->rexit_ports)) {
                complete(&bus_state->rexit_done[faked_port_index]);
goto cleanup;
}

- if (hcd->speed < HCD_USB3)
+ if (hcd->speed < HCD_USB3) {
  xhci_test_and_clear_bit(xhci, port_array, faked_port_index,
  PORT_PLL);
+ if ((xhci->quirks & XHCI_RESET_PLL_ON_DISCONNECT) &&
+ (portsc & PORT_CSC) && !(portsc & PORT_CONNECT))
+ xhci_cavium_reset_phy_quirk(xhci);
+
  cleanup:
/* Update event ring dequeue pointer before dropping the lock */
@@ -2296,14 +2382,13 @@
  trb_comp_code = GET_COMP_CODE(le32_to_cpu(event->transfer_len));
  ep_trb_dma = le64_to_cpu(event->buffer);

- xdev = xhci->devs[slot_id];
- if (!xdev) {
-   xhci_err(xhci, "ERROR Transfer event pointed to bad slot %u\n",
-    slot_id);
+ ep = xhci_get_virt_ep(xhci, slot_id, ep_index);
+ if (!ep) {
+   xhci_err(xhci, "ERROR Invalid Transfer event\n");
  goto err_out;
  }

- ep = &xdev->eps[ep_index];
- xdev = xhci->devs[slot_id];
  ep_ring = xhci_dma_to_transfer_ring(ep, ep_trb_dma);
  ep_ctx = xhci_get_ep_ctx(xhci, xdev->out_ctx, ep_index);

@@ -2326,6 +2411,7 @@
 goto cleanup;
 case COMP_RING_UNDERRUN:
 case COMP_RING_OVERRUN:
+ case COMP_STOPPED_LENGTH_INVALID:
 goto cleanup;
 default:
 xhci_err(xhci, "ERROR Transfer event for unknown stream ring slot %u ep %u\n",
@@ -2348,7 +2434,8 @@
 case COMP_SUCCESS:
 if (EVENT_TRB_LEN(le32_to_cpu(event->transfer_len)) == 0)
 break;
- if (xhci->quirks & XHCI_TRUST_TX_LENGTH)
+ if (xhci->quirks & XHCI_TRUST_TX_LENGTH ||
+ ep_ring->last_td_was_short)
trb_comp_code = COMP_SHORT_PACKET;
else
xhci_warn_ratelimited(xhci,
@@ -2712,6 +2799,42 @@
}
/*
 + * Update Event Ring Dequeue Pointer:
 + * - When all events have finished
 + * - To avoid "Event Ring Full Error" condition
 + */
+static void xhci_update_erst_dequeue(struct xhci_hcd *xhci,
+union xhci_trb *event_ring_deq)
+{
+u64 temp_64;
+dma_addr_t deq;
+
+temp_64 = xhci_read_64(xhci, &xhci->ir_set->erst_dequeue);
+/* If necessary, update the HW's version of the event ring deq ptr. */
+if (event_ring_deq != xhci->event_ring->dequeue) {
+deq = xhci_trb_virt_to_dma(xhci->event_ring->deq_seg,
+xhci->event_ring->dequeue);
+if (deq == 0)
+xhci_warn(xhci, "WARN something wrong with SW event ring dequeue ptr\n");
+/*
 + * Per 4.9.4, Software writes to the ERDP register shall
 + * always advance the Event Ring Dequeue Pointer value.
 + */
+if (((temp_64 & (u64) ~ERST_PTR_MASK) ==
+((u64) deq & (u64) ~ERST_PTR_MASK))
+return;
+
+/* Update HC event ring dequeue pointer */
+temp_64 &= ERST_PTR_MASK;
+temp_64 |= (u64) deq & (u64) ~ERST_PTR_MASK);
+}
+
+/* Clear the event handler busy flag (RW1C) */
+temp_64 |= ERST_EHB;
+xhci_write_64(xhci, temp_64, &xhci->ir_set->erst_dequeue);
+}
+
+/*
 + xHCI spec says we can get an interrupt, and if the HC has an error condition,
 + we might get bad data out of the event ring. Section 4.10.2.7 has a list of
 + indicators of an event TRB error, but we check the status "first" to be safe.
@@ -2722,9 +2845,9 @@
union xhci_trb *event_ring_deq;
irqreturn_t ret = IRQ_NONE;
unsigned long flags;
-dma_addr_t deq;
u64 temp_64;
u32 status;
+int event_loop = 0;

spin_lock_irqsave(&xhci->lock, flags);

/* Check if the xHC generated the interrupt, or the irq is shared */
@@ -2778,24 +2901,14 @@

/* FIXME this should be a delayed service routine */
* that clears the EHB.
*/
-while (xhci_handle_event(xhci) > 0) {}
-
-temp_64 = xhci_read_64(xhci, &xhci->ir_set->erst_dequeue);
-/* If necessary, update the HW's version of the event ring deq ptr. */
-if (event_ring_deq != xhci->event_ring->dequeue) {
-deq = xhci_trb_virt_to_dma(xhci->event_ring->deq_seg,
-xhci->event_ring->dequeue);
-if (deq == 0)
-xhci_warn(xhci, "WARN something wrong with SW event "
-"ring deq ptr\n"");
-/* Update HC event ring dequeue pointer */
-temp_64 &= ERST_PTR_MASK;
-temp_64 |= ((u64) deq & (u64) ~ERST_PTR_MASK);
+while (xhci_handle_event(xhci) > 0) {
+if (event_loop++ < TRBS_PER_SEGMENT / 2)
+continue;
+xhci_update_erst_dequeue(xhci, event_ring_deq);
+event_loop = 0;
}

-/* Clear the event handler busy flag (RW1C); event ring is empty. */
-temp_64 |= ERST_EHB;
-xhci_write_64(xhci, temp_64, &xhci->ir_set->erst_dequeue);
+xhci_update_erst_dequeue(xhci, event_ring_deq);
ret = IRQ_HANDLED;

out:
@@ -2828,6 +2941,8 @@
trb->field[0] = cpu_to_le32(field1);
trb->field[1] = cpu_to_le32(field2);
trb->field[2] = cpu_to_le32(field3);
+/* make sure TRB is fully written before giving it to the controller */
+wmb();
trb->field[3] = cpu_to_le32(field4);
trace_xhci_queue_trb(ring, trb);
@@ -2965,7 +3080,7 @@
         return 0;
 }

-static unsigned int count_trbs(u64 addr, u64 len)
+unsigned int count_trbs(u64 addr, u64 len)
 {
     unsigned int num_trbs;

@@ -3140,6 +3255,7 @@
     unsigned int unalign;
     unsigned int max_pkt;
     u32 new_buff_len;
+  size_t len;
     max_pkt = usb_endpoint_maxp(&urb->ep->desc);
     unalign = (enqd_len + *trb_buff_len) % max_pkt;
@@ -3170,8 +3286,16 @@
     /* create a max max_pkt sized bounce buffer pointed to by last trb */
     if (usb_urb_dir_out(urb)) {
         -sg_pcopy_to_buffer(urb->sg, urb->num_mapped_sgs,
+         seg->bounce_buf, new_buff_len, enqd_len);
         +if (urb->num_sgs) {
             +len = sg_pcopy_to_buffer(urb->sg, urb->num_sgs,
+              seg->bounce_buf, new_buff_len, enqd_len);
+             +if (len != new_buff_len)
+                 xhci_warn(xhci, "WARN Wrong bounce buffer write length: %zu != %d
",
+                  len, new_buff_len);
+         } else {
+             memcpy(seg->bounce_buf, urb->transfer_buffer + enqd_len, new_buff_len);
+         }
+         seg->bounce_dma = dma_map_single(dev, seg->bounce_buf,
+                max_pkt, DMA_TO_DEVICE);
    } else {
@@ -3319,8 +3443,8 @@
     /* New sg entry */
     --num_sgs;
     sent_len -= block_len;
-     -if (num_sgs != 0) {
-         -sg = sg_next(sg);
-         +sg = sg_next(sg);
+     } else if (num_sgs != 0 && sg) {
+         block_len = sg_dma_len(sg);
+         addr = (u64) sg_dma_address(sg);
addr += sent_len;
--- linux-4.15.0.orig/drivers/usb/host/xhci-tegra.c
+++ linux-4.15.0/drivers/usb/host/xhci-tegra.c
@@ -479,7 +479,7 @@
unsigned long mask;
unsigned int port;
bool idle, enable;
-int err;
+int err = 0;

memset(&rsp, 0, sizeof(rsp));

@@ -576,6 +576,13 @@
enable);
if (err < 0)
break;
+
+/*
+ * wait 500us for LFPS detector to be disabled before
+ * sending ACK
+ */
+if (!enable)
+usleep_range(500, 1000);
}

if (err < 0) {
@@ -1175,6 +1182,7 @@
usb_remove_hcd(xhci->shared_hcd);
usb_put_hcd(xhci->shared_hcd);
+xhci->shared_hcd = NULL;
usb_remove_hcd(tegra->hcd);
usb_put_hcd(tegra->hcd);

--- linux-4.15.0.orig/drivers/usb/host/xhci-trace.h
+++ linux-4.15.0/drivers/usb/host/xhci-trace.h
@@ -23,6 +23,7 @@

#include <linux/tracepoint.h>
#include "xhci.h"
+##include "xhci-dbgsnap.h"

#define XHCI_MSG_MAX 500

@@ -155,6 +156,52 @@
TP_ARGS(ring, trb)
);
+DEFINE_EVENT(xhci_log_trb, xhci_dbc_handle_event,
+TP_PROTO(struct xhci_ring *ring, struct xhci_generic_trb *trb),
+TP_ARGS(ring, trb))
+
+DEFINE_EVENT(xhci_log_trb, xhci_dbc_handle_transfer,
+TP_PROTO(struct xhci_ring *ring, struct xhci_generic_trb *trb),
+TP_ARGS(ring, trb))
+
+DEFINE_EVENT(xhci_log_trb, xhci_dbc_gadget_ep_queue,
+TP_PROTO(struct xhci_ring *ring, struct xhci_generic_trb *trb),
+TP_ARGS(ring, trb))
+
+DECLARE_EVENT_CLASS(xhci_log_free_virt_dev,
+TPPROTO(struct xhci_virt_device *vdev),
+TP_ARGS(vdev),
+TP_STRUCT__entry(
+__field(void *, vdev)
+__field(unsigned long long, out_ctx)
+__field(unsigned long long, in_ctx)
+__field(u8, fake_port)
+__field(u8, real_port)
+__field(u16, current_mel)
+),
+TP_fast_assign(
+__entry->vdev = vdev;
+__entry->in_ctx = (unsigned long long) vdev->in_ctx->dma;
+__entry->out_ctx = (unsigned long long) vdev->out_ctx->dma;
+__entry->fake_port = (u8) vdev->fake_port;
+__entry->real_port = (u8) vdev->real_port;
+__entry->current_mel = (u16) vdev->current_mel;
+),
+TP_printk("vdev %p ctx %llx | %llx fake_port %d real_port %d current_mel %d",
+__entry->vdev, __entry->in_ctx, __entry->out_ctx,
+__entry->fake_port, __entry->real_port, __entry->current_mel
+);}
+
+DEFINE_EVENT(xhci_log_free_virt_dev, xhci_free_virt_device,
+TP_PROTO(struct xhci_virt_device *vdev),
+TP_ARGS(vdev))
+
+DECLARE_EVENT_CLASS(xhci_log_virt_dev,
TPPROTO(struct xhci_virt_device *vdev),
TP_ARGS(vdev),
@@ -192,11 +239,6 @@
TP_ARGS(vdev)
);
-DEFINE_EVENT(xhci_log_virt_dev, xhci_free_virt_device,
-TP_PROTO(struct xhci_virt_device *vdev),
-TP_ARGS(vdev)
-);
DEFINE_EVENT(xhci_log_virt_dev, xhci_setup_device,
TP_PROTO(struct xhci_virt_device *vdev),
TP_ARGS(vdev)
@@ -247,23 +289,12 @@
),
TP_printk("ep%d%s-%s: urb %p pipe %u slot %d length %d/%d sgs %d/%d stream %d flags %08x",
__entry->epnum, __entry->dir_in ? "in" : "out",
-({ char *s;
-switch (__entry->type) {
-case USB_ENDPOINT_XFER_INT:
-s = "intr";
-break;
-case USB_ENDPOINT_XFER_CONTROL:
-s = "control";
-break;
-case USB_ENDPOINT_XFER_BULK:
-s = "bulk";
-break;
-case USB_ENDPOINT_XFER_ISOC:
-s = "isoc";
-break;
-default:
-s = "UNKNOWN";
-} s; }), __entry->urb, __entry->pipe, __entry->slot_id,
+__print_symbolic(__entry->type,
+ { USB_ENDPOINT_XFER_INT,"intr" },
+ { USB_ENDPOINT_XFER_CONTROL,"control" },
+ { USB_ENDPOINT_XFER_BULK,"bulk" },
+ { USB_ENDPOINT_XFER_ISOC,"isoc" }),
+__entry->urb, __entry->pipe, __entry->slot_id,
__entry->actual, __entry->length, __entry->num_mapped_sgs,
__entry->num_sgs, __entry->stream, __entry->flags
)
@@ -478,6 +509,49 @@
TP_ARGS(portnum, portsc)
);
+DECLARE_EVENT_CLASS(xhci_dbc_log_request,

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+TP_PROTO(struct dbc_request *req),
+TP_ARGS(req),
+TP_STRUCT__entry(
+__field(struct dbc_request *, req)
+__field(bool, dir)
+__field(unsigned int, actual)
+__field(unsigned int, length)
+__field(int, status)
+),
+TP_fast_assign(
+__entry->req = req;
+__entry->dir = req->direction;
+__entry->actual = req->actual;
+__entry->length = req->length;
+__entry->status = req->status;
+),
+TP_printk("%s: req %p length %u/%u ==> %d",
+__entry->dir ? "bulk-in" : "bulk-out",
+__entry->req, __entry->actual,
+__entry->length, __entry->status
+)
+);

+DEFINE_EVENT(xhci_dbc_log_request, xhci_dbc_alloc_request,
+TP_PROTO(struct dbc_request *req),
+TP_ARGS(req)
+);

+DEFINE_EVENT(xhci_dbc_log_request, xhci_dbc_free_request,
+TP_PROTO(struct dbc_request *req),
+TP_ARGS(req)
+);

+DEFINE_EVENT(xhci_dbc_log_request, xhci_dbc_queue_request,
+TP_PROTO(struct dbc_request *req),
+TP_ARGS(req)
+);

+DEFINE_EVENT(xhci_dbc_log_request, xhci_dbc_giveback_request,
+TP_PROTO(struct dbc_request *req),
+TP_ARGS(req)
+);

#define /*__XHCI_TRACE_H */

/* this part must be outside header guard */
--- linux-4.15.0.orig/drivers/usb/host/xhci.c
+++ linux-4.15.0/drivers/usb/host/xhci.c
@@ -9,6 +9,7 @@
#include <linux/pci.h>
+#include <linux/iopoll.h>
#include <linux/irq.h>
#include <linux/log2.h>
#include <linux/module.h>
@@ -21,6 +22,7 @@
#include "xhci-trace.h"
#include "xhci-mtk.h"
#include "xhci-debugfs.h"
+#include "xhci-dbgcap.h"

#define DRIVER_AUTHOR "Sarah Sharp"
#define DRIVER_DESC "eXtensible' Host Controller (xHC) Driver"
@@ -32,11 +34,25 @@
module_param(link_quirk, int, S_IRUGO | S_IWUSR);
MODULE_PARM_DESC(link_quirk, "Don't clear the chain bit on a link TRB");

-static unsigned int quirks;
-module_param(quirks, uint, S_IRUGO);
+static unsigned long long quirks;
+module_param(quirks, ullong, S_IRUGO);
MODULE_PARM_DESC(quirks, "Bit flags for quirks to be enabled as default");

-/* TODO: copied from ehci-hcd.c - can this be refactored? */
+static bool td_on_ring(struct xhci_td *td, struct xhci_ring *ring)
+{
+struct xhci_segment *seg = ring->first_seg;
+  
+  if (!td || !td->start_seg)
+    return false;
+  do {
+    if (seg == td->start_seg)
+      return true;
+    seg = seg->next;
+  } while (seg && seg != ring->first_seg);
+  +
+  return false;
+} 
+
+/*
 * xhci_handshake - spin reading hc until handshake completes or fails
 * @ptr: address of hc register to be read
 @@ -53,18 +69,16 @@
 int xhci_handshake(void __iomem *ptr, u32 mask, u32 done, int usec)
 { 
    u32 result;
+int ret;

-do {
  -result = readl(ptr);
  -if (result == ~(u32)0)/* card removed */
  -return -ENODEV;
  -result &= mask;
  -if (result == done)
    -return 0;
  -udelay(1);
  -usec--;
  -} while (usec > 0);
  -return -ETIMEDOUT;
+ret = readl_poll_timeout_atomic(ptr, result,
+  (result & mask) == done ||
+  result == U32_MAX,
+  1, usec);
+if (result == U32_MAX)/* card removed */
+return -ENODEV;
+
+return ret;
}

/x*
@@ -622,6 +636,8 @@
  xhci_dbg_trace(xhci, trace_xhci_dbg_init,
  "Finished xhci_run for USB2 roothub");

+xhci dbc_init(xhci);
+
+ xhci debugfs_init(xhci);

return 0;

 @@ -646,13 +662,11 @@
/* Only halt host and free memory after both hcds are removed */
 if (!usb hcd_is_primary_hcd(hcd)) {
-/* usb core will free this hcd shortly, unset pointer */
-xhci->shared_hcd = NULL;
  mutex_unlock(&xhci->mutex);
  return;
 }

-xhci debugfs_exit(xhci);
+xhci dbc_exit(xhci);

 spin_lock_irq(&xhci->lock);
 xhci->xhc_state |= XHCI STATE_HALT ED;
xhci_dbg_trace(xhci, trace_xhci_dbg_init, "cleaning up memory");
xhci_mem_cleanup(xhci);
+xhci_debugfs_exit(xhci);
xhci_dbg_trace(xhci, trace_xhci_dbg_init,
"xhci_stop completed - status = %x",
readl(&xhci->op_regs->status));
@@ -700,7 +715,7 @@
     * This will only ever be called with the main usb_hcd (the USB3 roothub).
     */
-void xhci_shutdown(struct usb_hcd *hcd)
+xhci_shutdown(struct usb_hcd *hcd)
{
    struct xhci_hcd *xhci = hcd_to_xhci(hcd);

    xhci_dbg_trace(xhci, trace_xhci_dbg_init,
"xhci_shutdown completed - status = %x",
readl(&xhci->op_regs->status));

    /* Yet another workaround for spurious wakeups at shutdown with HSW */
-if (xhci->quirks & XHCI_SPURIOUS_WAKEUP)
-if (xhci->quirks & XHCI_SPURIOUS_WAKEUP)
    -pci_set_power_state(to_pci_dev(hcd->self.sysdev), PCI_D3hot);
    +EXPORT_SYMBOL_GPL(xhci_shutdown);

#ifdef CONFIG_PM
static void xhci_save_registers(struct xhci_hcd *xhci)
@@ -850,6 +862,41 @@
        spin_unlock_irqrestore(&xhci->lock, flags);
    }

    +static bool xhci_pending_portevent(struct xhci_hcd *xhci)
    +{
    +    __le32 __iomem **port_array;
    +    int port_index;
    +    u32 status;
    +    u32 portsc;
    +    
    +    status = readl(&xhci->op_regs->status);
    +    if (status & STS_EINT)
    +        return true;
    +    /*
    +     * Checking STS_EINT is not enough as there is a lag between a change
    +     * bit being set and the Port Status Change Event that it generated
    +     * being written to the Event Ring. See note in xhci 1.1 section 4.19.2.
    +*/

    #ifdef CONFIG_PM
static void xhci_save_registers(struct xhci_hcd *xhci)
@@ -850,6 +862,41 @@
        spin_unlock_irqrestore(&xhci->lock, flags);
    }

    +static bool xhci_pending_portevent(struct xhci_hcd *xhci)
    +{
    +    __le32 __iomem **port_array;
    +    int port_index;
    +    u32 status;
    +    u32 portsc;
    +    
    +    status = readl(&xhci->op_regs->status);
    +    if (status & STS_EINT)
    +        return true;
    +    /*
    +     * Checking STS_EINT is not enough as there is a lag between a change
    +     * bit being set and the Port Status Change Event that it generated
    +     * being written to the Event Ring. See note in xhci 1.1 section 4.19.2.
+ */
+
+port_index = xhci->num_usb2_ports;
+port_array = xhci->usb2_ports;
+while (port_index--) {
+  portsc = readl(port_array[port_index]);
+  if (portsc & PORT_CHANGE_MASK ||
+      (portsc & PORT_PLS_MASK) == XDEV_RESUME)
+    return true;
+}
+port_index = xhci->num_usb3_ports;
+port_array = xhci->usb3_ports;
+while (port_index--) {
+  portsc = readl(port_array[port_index]);
+  if (portsc & PORT_CHANGE_MASK ||
+      (portsc & PORT_PLS_MASK) == XDEV_RESUME)
+    return true;
+}
+return false;
+
+/*
 * Stop HC (not bus-specific)
 *
@@ -859,9 +906,10 @@
 int xhci_suspend(struct xhci_hcd *xhci, bool do_wakeup)
 {
   intrc = 0;
-  unsigned int delay = XHCI_MAX_HALT_USEC;
+  unsigned int delay = XHCI_MAX_HALT_USEC * 2;
   struct usb_hcd*hcd = xhci_to_hcd(xhci);
   u32command;
   +u32res;

   if (!hcd->state)
     return 0;
@@ -874,6 +922,11 @@
   if (!do_wakeup)
     xhci_disable_port_wake_on_bits(xhci);
+
+  if (!HCD_HW_ACCESSIBLE(hcd))
+    return 0;
+  +xhci_dbc_suspend(xhci);
+  /* Don't poll the roothubs on bus suspend. */
+  xhci_dbg(xhci, "%s: stopping port polling.%n", __func__);}
clear_bit(HCD_FLAG_POLL_RH, &hcd->flags);
@@ -881,6 +934,9 @@
clear_bit(HCD_FLAG_POLL_RH, &xhci->shared_hcd->flags);
del_timer_sync(&xhci->shared_hcd->rh_timer);
+	if (xhci->quirks & XHCI_SUSPEND_DELAY)
+    usleep_range(1000, 1500);
+
    spin_lock_irq(&xhci->lock);
clear_bit(HCD_FLAG_HW_ACCESSIBLE, &hcd->flags);
clear_bit(HCD_FLAG_HW_ACCESSIBLE, &xhci->shared_hcd->flags);
@@ -910,11 +966,28 @@
    command = readl(&xhci->op_regs->command);
    command |= CMD_CSS;
    writel(command, &xhci->op_regs->command);
+xhci->broken_suspend = 0;
    if (xhci_handshake(&xhci->op_regs->status,
        -STS_SAVE, 0, 10 * 1000)) {
        -xhci_warn(xhci, "WARN: xHC save state timeout\n");
        -spin_unlock_irq(&xhci->lock);
        -return -ETIMEDOUT;
        +STS_SAVE, 0, 20 * 1000)) {
        +/*
        + * AMD SNPS xHC 3.0 occasionally does not clear the
        + * SSS bit of USBSTS and when driver tries to poll
        + * to see if the xHC clears BIT(8) which never happens
        + * and driver assumes that controller is not responding
        + * and times out. To workaround this, its good to check
        + * if SRE and HCE bits are not set (as per xhci
        + * Section 5.4.2) and bypass the timeout.
        + */
        +res = readl(&xhci->op_regs->status);
        +if (((xhci->quirks & XHCI_SNPS_BROKEN_SUSPEND) &&
        +    (((res & STS_SRE) == 0) &&
        +    ((res & STS_HCE) == 0))) {
        +    xhci->broken_suspend = 1;
        +} else {
        +    xhci_warn(xhci, "WARN: xHC save state timeout\n");
        +    spin_unlock_irq(&xhci->lock);
        +    return -ETIMEDOUT;
        +}
        }
    spin_unlock_irq(&xhci->lock);

@@ -946,11 +1019,12 @@
*/
int xhci_resume(struct xhci_hcd *xhci, bool hibernated)
{
    -u32command, temp = 0, status;
+u32 command, temp = 0;
struct usb_hcd*hcd = xhci_to_hcd(xhci);
struct usb_hcd*secondary_hcd;
int retval = 0;
bool comp_timer_running = false;
+bool pending_portevent = false;

if (!hcd->state)
    return 0;
@@ -967,10 +1041,22 @@
set_bit(HCD_FLAG_HW_ACCESSIBLE, &xhci->shared_hcd->flags);

spin_lock_irq(&xhci->lock);
@if (xhci->quirks & XHCI_RESET_ON_RESUME)
+if ((xhci->quirks & XHCI_RESET_ON_RESUME) || xhci->broken_suspend)
    hibernated = true;

if (!hibernated) {
+/*
+ * Some controllers might lose power during suspend, so wait
+ * for controller not ready bit to clear, just as in xHC init.
+ */
+retval = xhci_handshake(&xhci->op_regs->status,
+STS_CNR, 0, 10 * 1000 * 1000);
+if (retval) {
+xhci_warn(xhci, "Controller not ready at resume %d\n",
+        retval);
+spin_unlock_irq(&xhci->lock);
+return retval;
+}
/* step 1: restore register */
xhci_restore_registers(xhci);
/* step 2: initialize command ring buffer */
@@ -980,8 +1066,13 @@
command = readl(&xhci->op_regs->command);
command |= CMD_CRS;
+/*
+ * Some controllers take up to 55+ ms to complete the controller
+ * restore so setting the timeout to 100ms. Xhci specification
+ * doesn't mention any timeout value.
+ */
if (xhci_handshake(&xhci->op_regs->status,
-    STS_RESTORE, 0, 10 * 1000)) {
+    STS_RESTORE, 0, 100 * 1000)) {
    xhci_warn(xhci, "WARN: xHC restore state timeout\n");
    spin_unlock_irq(&xhci->lock);
    return -ETIMEDOUT;
xhci_dbg(xhci, "Stop HCD\n");
xhci_halt(xhci);
-xhci_reset(xhci);
+retval = xhci_reset(xhci);
spin_unlock_irq(&xhci->lock);
+if (retval)
+return retval;
xhci_cleanup_msix(xhci);

xhci_dbg(xhci, "/Disabling event ring interrupts\n");
@@ -1018,6 +1111,7 @@
xhci_dbg(xhci, "cleaning up memory\n");
xhci_mem_cleanup(xhci);
+xhci_debugfs_exit(xhci);
xhci_dbg(xhci, "xhci_stop completed - status = %x\n",
     readl(&xhci->op_regs->status));

@@ -1065,16 +1159,26 @@
spin_unlock_irq(&xhci->lock);
+xhci_dbc_resume(xhci);
+
+done:
+if (retval == 0) {
+ /* Resume root hubs only when have pending events. */
+ status = readl(&xhci->op_regs->status);
+ -if (status & STS_EINT) {
+     /* Resume root hubs only if there are pending events.
+     * USB 3 devices resend U3 LFPS wake after a 100ms delay if
+     * the first wake signalling failed, give it that chance.
+     */
+     pending_portevent = xhci_pending_portevent(xhci);
+     -if (!pending_portevent) {
+         msleep(120);
+         pending_portevent = xhci_pending_portevent(xhci);
+     }
+ +}
+ +}
+usb_hcd_resume_root_hub(xhci->shared_hcd);
+usb_hcd_resume_root_hub(hcd);
}
/*  
* If system is subject to the Quirk, Compliance Mode Timer needs to  
* be re-initialized Always after a system resume. Ports are subject  
@@ -1212,7 +1316,7 @@  
* we need to issue an evaluate context command and wait on it.  
*/
static int xhci_check_maxpacket(struct xhci_hcd *xhci, unsigned int slot_id,  
unsigned int ep_index, struct urb *urb)  
unsigned int ep_index, struct urb *urb, gfp_t mem_flags)  
{  
struct xhci_container_ctx *out_ctx;  
struct xhci_input_control_ctx *ctrl_ctx;  
@@ -1243,7 +1347,7 @@  
* changes max packet sizes.  
*/  
-command = xhci_alloc_command(xhci, false, true, GFP_KERNEL);  
+command = xhci_alloc_command(xhci, false, true, mem_flags);  
if (!command)  
return -ENOMEM;  
@@ -1260,6 +1364,7 @@  
xhci->devs[slot_id]->out_ctx, ep_index);  
ep_ctx = xhci_get_ep_ctx(xhci, command->in_ctx, ep_index);  
+ep_ctx->ep_info &= cpu_to_le32(~EP_STATE_MASK);/* must clear */  
ep_ctx->ep_info2 &= cpu_to_le32(~MAX_PACKET_MASK);  
ep_ctx->ep_info2 |= cpu_to_le32(MAX_PACKET(max_packet_size));  
@@ -1333,7 +1438,7 @@  
*/  
if (urb->dev->speed == USB_SPEED_FULL) {  
ret = xhci_check_maxpacket(xhci, slot_id,  
-ep_index, urb);  
+ep_index, urb, mem_flags);  
if (ret < 0) {  
xhci_urb_free_priv(urb_priv);  
urb->hcpriv = NULL;  
@@ -1463,6 +1568,21 @@  
goto done;  
}  
+/*  
+ * check ring is not re-allocated since URB was enqueued. If it is, then  
+ * make sure none of the ring related pointers in this URB private data  
+ * are touched, such as td_list, otherwise we overwrite freed data  
+ */  
+if (!td_on_ring(&urb_priv->td[0], ep_ring)) {
+xhci_err(xhci, "Canceled URB td not found on endpoint ring");
+for (i = urb_priv->num_tds_done; i < urb_priv->num_tds; i++) {
+td = &urb_priv->td[i];
+if (!list_empty(&td->cancelled_td_list))
+list_del_init(&td->cancelled_td_list);
+
+goto err_giveback;
+
+}
+
+if (xhci->xhc_state & XHCI_STATE_HALTED) {
+xhci_dbg_trace(xhci, trace_xhci_dbg_cancel_urb,
+"HC halted, freeing TD manually.");
@@ -3551,12 +3671,11 @@
virt_dev->eps[i].ep_state &= ~EP_STOP_CMD_PENDING;
del_timer_sync(&virt_dev->eps[i].stop_cmd_timer);
}
-
+xhci_debugfs_remove_slot(xhci, udev->slot_id);
+virt_dev->udev = NULL;
ret = xhci_disable_slot(xhci, udev->slot_id);
-if (ret) {
-xhci_debugfs_remove_slot(xhci, udev->slot_id);
+if (ret)
 xhci_free_virt_device(xhci, udev->slot_id);
-}
+
}

int xhci_disable_slot(struct xhci_hcd *xhci, u32 slot_id)
@@ -4060,6 +4179,9 @@
inthird, exit_latency;
intret;
+
+if (xhci->quirks & XHCI_HW_LPM_DISABLE)
+return -EPERM;
+
+if (hcd->speed >= HCD_USB3 || !xhci->hw_lpm_support ||
 !udev->lpm_capable)
return -EPERM;
@@ -4078,18 +4200,18 @@
 pm_addr = port_array[port_num] + PORTPMSC;
 pm_val = readl(pm_addr);
 hlpm_addr = port_array[port_num] + PORTHLPMC;
-field = le32_to_cpu(udev->bos->ext_cap->bmAttributes);

+xhci_dbg(xhci, "%s port %d USB2 hardware LPM\n", 
 enable ? "enable" : "disable", port_num + 1);
-
-if (enable && !(xhci->quirks & XHCI_HW_LPM_DISABLE)) {

/* Host supports BESL timeout instead of HIRD */
if (udev->usb2_hw_lpm_besl_capable) {
    /* if device doesn't have a preferred BESL value use a
     * default one which works with mixed HIRD and BESL
     * systems. See XHCI_DEFAULT_BESL definition in xhci.h
     */
    field = le32_to_cpu(udev->bos->ext_cap->bmAttributes);
    if ((field & USB_BESL_SUPPORT) &&
        (field & USB_BESL_BASELINE_VALID))
        hird = USB_GET_BESL_BASELINE(field);

    mutex_lock(hcd->bandwidth_mutex);
    xhci_change_max_exit_latency(xhci, udev, 0);
    mutex_unlock(hcd->bandwidth_mutex);
    readl_poll_timeout(port_array[port_num], pm_val,
                       (pm_val & PORT_PLS_MASK) == XDEV_U0,
                       100, 10000);
    return 0;
}

/* Prevent U1 if service interval is shorter than U1 exit latency */
if (usb_endpoint_xfer_int(desc) || usb_endpoint_xfer_isoc(desc)) {
    if (xhci_service_interval_to_ns(desc) <= udev->u1_params.mel) {
        dev_dbg(&udev->dev, "Disable U1, ESIT shorter than exit latency\n");
        return USB3_LPM_DISABLED;
    }
}

if (xhci->quirks & XHCI_INTEL_HOST)
    timeout_ns = xhci_calculate_intel_u1_timeout(udev, desc);
else
    unsigned long long timeout_ns;

/* Prevent U2 if service interval is shorter than U2 exit latency */
if (usb_endpoint_xfer_int(desc) || usb_endpoint_xfer_isoc(desc)) {
    if (xhci_service_interval_to_ns(desc) <= udev->u2_params.mel) {
        dev_dbg(&udev->dev, "Disable U2, ESIT shorter than exit latency\n");
        return USB3_LPM_DISABLED;
    }
}
if (xhci->quirks & XHCI_INTEL_HOST)
    timeout_ns = xhci_calculate_intel_u2_timeout(udev, desc);
else
@@ -4401,12 +4542,12 @@
    alt_timeout = xhci_call_host_update_timeout_for_endpoint(xhci, udev,
                        desc, state, timeout);

    /* If we found we can’t enable hub-initiated LPM, or
    + If we found we can’t enable hub-initiated LPM, and
    * the U1 or U2 exit latency was too high to allow
    - device-initiated LPM as well, just stop searching.
    + device-initiated LPM as well, then we will disable LPM
    + for this device, so stop searching any further.
    */
    -if (alt_timeout == USB3_LPM_DISABLED ||
        -alt_timeout == USB3_LPM_DEVICE_INITIATED) {
        +if (alt_timeout == USB3_LPM_DISABLED) {
            *timeout = alt_timeout;
            return -E2BIG;
    }
@@ -4517,10 +4658,12 @@
    if (intf->dev.driver) {
        driver = to_usb_driver(intf->dev.driver);
        if (driver && driver->disable_hub_initiated_lpm) {
            -dev_dbg(&udev->dev, "Hub-initiated %s disabled ",
                        -state_name, driver->name);
            -return xhci_get_timeout_no_hub_lpm(udev, state);
            +dev_dbg(&udev->dev, "Hub-initiated %s disabled at request of driver %s\n",
                        +state_name, driver->name);
            +timeout = xhci_get_timeout_no_hub_lpm(udev,
                        +state);
            +if (timeout == USB3_LPM_DISABLED)
            +return timeout;
        }
    }

    @@ -4774,6 +4917,7 @@
    */ quirks
    */
    struct device* dev = hcd->self.sysdev;
    +unsigned int minor_rev;
    intretval;

    /* Accept arbitrarily long scatter-gather lists */
    @@ -4801,12 +4945,19 @@
    */
    hcd->has_tt = 1;
} else {
-/* Some 3.1 hosts return sbrn 0x30, can't rely on sbrn alone */
-if (xhci->sbrn == 0x31 || xhci->usb3_rhub.min_rev >= 1) {
-  xhci_info(xhci, "Host supports USB 3.1 Enhanced SuperSpeed\n");
+/*
+ * Some 3.1 hosts return sbrn 0x30, use xhci supported protocol
+ * minor revision instead of sbrn
+ */
+minor_rev = xhci->usb3_rhub.min_rev;
+if (minor_rev) {
    hcd->speed = HCD_USB31;
    hcd->self.root_hub->speed = USB_SPEED_SUPER_PLUS;
}
+  xhci_info(xhci, "Host supports USB 3.%x %s SuperSpeed\n",
+            minor_rev,
+            minor_rev ? "Enhanced" : "");
+
/* xHCI private pointer was set in xhci_pci_probe for the second
 * registered roothub.
*/
@@ -4888,7 +5039,7 @@ return retval;
  xhci_dbg(xhci, "Called HCD init\n");
-xhci_info(xhci, "hcc params 0x%08x hci version 0x%x quirks 0x%08x\n",
+  xhci_info(xhci, "hcc params 0x%08x hci version 0x%x quirks 0x%016llx\n",
             xhci->hcc_params, xhci->hci_version, xhci->quirks);

  return 0;
--- linux-4.15.0.orig/drivers/usb/host/xhci.h
+++ linux-4.15.0/drivers/usb/host/xhci.h
@@ -382,6 +382,10 @@

+#define PORT_PLC  (1 << 22)
/* port configure error change - port failed to configure its link partner */
+#define PORT_CEC  (1 << 23)
+#define PORT_CHANGE_MASK(PORT_CSC | PORT_PEC | PORT_WRC | PORT_OCC | PORT_RC | PORT_PLC | PORT_CEC)
+
/* Cold Attach Status - xHC can set this bit to report device attached during
 * Sx state. Warm port reset should be perfomed to clear this bit and move port
 * to connected state.
@@ -448,6 +452,14 @@ */

+#define XHCI_DEFAULT_BESL4
+
+/* USB3 specification define a 360ms tPollingLFPSTimeout for USB3 ports
*/
}
+ * to complete link training. usually link training completes much faster
+ * so check status 10 times with 36ms sleep in places we need to wait for
+ * polling to complete.
+ */
+#define XHCI_PORT_POLLING_LFPS_TIME 36
+
/**
 * struct xhci_intr_reg - Interrupt Register Set
 * @irq_pending:	IMAN - Interrupt Management Register. Used to enable
@@ -704,7 +716,7 @@
 * 4 - TRB error
 * 5-7 - reserved
 */
-#define EP_STATE_MASK	(0xf)
+#define EP_STATE_MASK	(0x7)
#define EP_STATE_DISABLED	0
#define EP_STATE_RUNNING	1
#define EP_STATE_HALTED	2
@@ -718,11 +730,12 @@
 /* bits 10:14 are Max Primary Streams */
 /* bit 15 is Linear Stream Array */
 /* Interval - period between requests to an endpoint - 125u increments. */
-#define EP_INTERVAL(p)		(((p) & 0xff) << 16)
-#define EP_INTERVAL_TO_UFRAMES(p)		(1 << (((p) >> 16) & 0xff))
-#define CTX_TO_EP_INTERVAL(p)	(((p) >> 16) & 0xff)
-#define EP_MAXPSTREAMS_MASK	(0x1f << 10)
-#define EP_MAXPSTREAMS(p)	(((p) << 10) & EP_MAXPSTREAMS_MASK)
+#define EP_INTERVAL(p)			(((p) & 0xff) << 16)
+#define EP_INTERVAL_TO_UFRAMES(p)	(1 << (((p) >> 16) & 0xff))
+#define CTX_TO_EP_INTERVAL(p)		(((p) >> 16) & 0xff)
+#define EP_MAXPSTREAMS_MASK		(0x1f << 10)
+#define EP_MAXPSTREAMS(p)		(((p) << 10) & EP_MAXPSTREAMS_MASK)
#
/* Endpoint is set up with a Linear Stream Array (vs. Secondary Stream Array) */
#define EP_HAS_LSA	(1 << 15)
/* hosts with LEC=1 use bits 31:24 as ESIT high bits. */
@@ -976,6 +989,7 @@
 unsigned int	ss_bw_out;
};

+#define EP_CTX_PER_DEV	31

struct xhci_virt_device {
 struct usb_device*udev;
@@ -990,7 +1004,7 @@
 struct xhci_container_ctx       *out_ctx;
 /* Used for addressing devices and configuration changes */
 struct xhci_container_ctx       *in_ctx;
struct xhci_virt_ep eps[31];
+struct xhci_virt_ep eps[EP_CTX_PER_DEV];
u8 fake_port;
u8 real_port;
struct xhci_interval_bw_table *bw_table;
@@ -1671,7 +1685,7 @@
/* It can take up to 20 ms to transition from RExit to U0 on the
 * Intel Lynx Point LP xHCI host.
 */
-#define XHCI_MAX_REXIT_TIMEOUT (20 * 1000)
+#define XHCI_MAX_REXIT_TIMEOUT_MS 20

static inline unsigned int hcd_index(struct usb_hcd *hcd)
{
    @ @ -1671.7 +1685.7 @@
#define XHCI_STATE_DYING (1 << 0)
#define XHCI_STATE_HALTED (1 << 1)
#define XHCI_STATE_REMOVING (1 << 2)
-unsigned int quirks;
-#define XHCI_LINK_TRB_QUIRK (1 << 0)
-#define XHCI_RESET_EP_QUIRK (1 << 1)
-#define XHCI_NEC_HOST (1 << 2)
-#define XHCI_AMD_PLL_FIX (1 << 3)
-#define XHCI_SPURIOUS_SUCCESS (1 << 4)
+unsigned long long quirks;
+#define XHCI_LINK_TRB_QUIRK BIT_ULL(0)
+#define XHCI_RESET_EP_QUIRK BIT_ULL(1)
+#define XHCI_NEC_HOST BIT_ULL(2)
+#define XHCI_AMD_PLL_FIX BIT_ULL(3)
+#define XHCI_SPURIOUS_SUCCESS BIT_ULL(4)
/*
 * Certain Intel host controllers have a limit to the number of endpoint
 * contexts they can handle. Ideally, they would signal that they can't handle
 @ @ -1781.12 +1795.12 @@
 * commands, reset device commands, disable slot commands, and address device
 * commands.
 */
-#define XHCI_EP_LIMIT_QUIRK (1 << 5)
-#define XHCI_BROKEN_MSI (1 << 6)
-#define XHCI_RESET_ON_RESUME (1 << 7)
-#define XHCI_SW_BW_CHECKING (1 << 8)
-#define XHCI_AMD_0x96_HOST (1 << 9)
-#define XHCI_LPM_SUPPORT (1 << 11)
-#define XHCI_INTEL_HOST (1 << 12)
-#define XHCI_SPURIOUS_REBOOT (1 << 13)
-#define XHCI_COMP_MODE_QUIRK (1 << 14)
-#define XHCI_AVOID_BEI (1 << 15)
-#define XHCI_PLAT (1 << 16)
-#define XHCI_SLOW_SUSPEND (1 << 17)
-#define XHCI_SPURIOUS_WAKEUP (1 << 18)
+#define XHCI_EP_LIMIT_QUIRK BIT_ULL(5)
+#define XHCI_BROKEN_MSIBIT_ULL(6)
+#define XHCI_RESET_ON_RESUME_QUIRKBIT_ULL(7)
+#define XHCI_SW_BW_CHECKINGBIT_ULL(8)
+#define XHCI_AMD_0x96_HOSTBIT_ULL(9)
+#define XHCI_TRUST_TX_LENGTHBIT_ULL(10)
+#define XHCI_LPM_SUPPORTBIT_ULL(11)
+#define XHCI_INTEL_HOSTBIT_ULL(12)
+#define XHCI_SPURIOUS_REBOOTBIT_ULL(13)
+#define XHCI_COMP_MODE_QUIRKBIT_ULL(14)
+#define XHCI_AVOID_BEIBIT_ULL(15)
+#define XHCI_PATBIT_ULL(16)
+#define XHCI_SLOW_SUSPENDBIT_ULL(17)
+#define XHCI_SPURIOUS_WAKEUPBIT_ULL(18)

/* For controllers with a broken beyond repair streams implementation */
-#define XHCI_BROKEN_STREAMS (1 << 19)
-#define XHCI_PME_STUCK_QUIRK (1 << 20)
-#define XHCI_MTK_HOST (1 << 21)
-#define XHCI_SSIC_PORT_UNUSED (1 << 22)
-#define XHCI_NO_64BIT_SUPPORT (1 << 23)
-#define XHCI_MISSING_CAS (1 << 24)
+##define XHCI_BROKEN_STREAMS BIT_ULL(19)
+##define XHCI_PME_STUCK_QUIRK BIT_ULL(20)
+##define XHCI_MTK_HOST BIT_ULL(21)
+##define XHCI_SSIC_PORT_UNUSED BIT_ULL(22)
+##define XHCI_NO_64BIT_SUPPORT BIT_ULL(23)
+##define XHCI_MISSING_CAS BIT_ULL(24)

/* For controller with a broken Port Disable implementation */
-#define XHCI_BROKEN_PORT_PED (1 << 25)
-#define XHCI_LIMIT_ENDPOINT_INTERVAL_7 (1 << 26)
-/* Reserved. It was XHCI_U2_DISABLE_WAKE */
-#define XHCI_ASMEDIA_MODIFY_FLOWCONTROL (1 << 28)
-#define XHCI_HW_LPM_DISABLE (1 << 29)
+##define XHCI_BROKEN_PORT_PED BIT_ULL(25)
+##define XHCI_LIMIT_ENDPOINT_INTERVAL_7BIT_ULL(26)
+##define XHCI_U2_DISABLE_WAKEBIT_ULL(27)
+##define XHCI_ASMEDIA_MODIFY_FLOWCONTROLBIT_ULL(28)
+##define XHCI_HW_LPM_DISABLEBIT_ULL(29)
+##define XHCI_SUSPEND_DELAYBIT_ULL(30)
+##define XHCI_RESET_PLL_ON_DISCONNECTBIT_ULL(34)
+##define XHCI_SNPS_BROKEN_SUSPEND BIT_ULL(35)
+##define XHCI_DISABLE_SPARSEBIT_ULL(38)

unsigned int num_active_eps;
unsigned int limit_active_eps;
unsigned sw_lpm_support:1;
/* support xHCI 1.0 spec USB2 hardware LPM */
unsigned hw_lpm_support:1;
/* Broken Suspend flag for SNPS Suspend resume issue */
unsigned broken_suspend:1;
/* cached usb2 extened protocol capabilities */
u32 *ext_caps;
unsigned int num_ext_caps;
unsigned sw_lpm_support:1;
/* support xHCI 1.0 spec USB2 hardware LPM */
unsigned hw_lpm_support:1;
/* Broken Suspend flag for SNPS Suspend resume issue */
unsigned broken_suspend:1;
/* cached usb2 extended protocol capabilities */
void *dbc;
/* platform-specific data -- must come last */
unsigned long priv[0] __aligned(sizeof(s64));
};
int xhci_endpoint_init(struct xhci_hcd *xhci, struct xhci_virt_device *virt_dev,
struct usb_device *udev, struct usb_host_endpoint *ep,
gfp_t mem_flags);
+struct xhci_ring *xhci_ring_alloc(struct xhci_hcd *xhci,
+unsigned int num_segs, unsigned int cycle_state,
+enum xhci_ring_type type, unsigned int max_packet, gfp_t flags);
void xhci_ring_free(struct xhci_hcd *xhci, struct xhci_ring *ring);
int xhci_ring_expansion(struct xhci_hcd *xhci, struct xhci_ring *ring,
-unsigned int num_trbs, gfp_t flags);
+unsigned int num_trbs, gfp_t flags);
+int xhci_alloc_erst(struct xhci_hcd *xhci,
+struct xhci_ring *evt_ring,
+struct xhci_erst *erst,
+gfp_t flags);
+void xhci_free_erst(struct xhci_hcd *xhci, struct xhci_erst *erst);
void xhci_free_command(struct xhci_hcd *xhci,
+struct xhci_command *command);
+struct xhci_container_ctx *xhci_alloc_container_ctx(struct xhci_hcd *xhci,
+int type, gfp_t flags);
+void xhci_free_container_ctx(struct xhci_hcd *xhci,
+struct xhci_container_ctx *ctx);

/* xHCI host controller glue */
typedef void (*xhci_get_quirks_t)(struct device *, struct xhci_hcd *);

int xhci_reset(struct xhci_hcd *xhci);
int xhci_run(struct usb_hcd *hcd);
int xhci_gen_setup(struct usb_hcd *hcd, xhci_get_quirks_t get_quirks);
+void xhci_shutdown(struct usb_hcd *hcd);
void xhci_init_driver(struct hc_driver *drv,
    const struct xhci_driver_overrides *over);
int xhci_disable_slot(struct xhci_hcd *xhci, u32 slot_id);
@@ -2070,6 +2104,8 @@
    void xhci_ring_ep_doorbell(struct xhci_hcd *xhci, unsigned int slot_id,
        unsigned int ep_index, unsigned int stream_id);
void xhci_cleanup_command_queue(struct xhci_hcd *xhci);
+void inc_deq(struct xhci_hcd *xhci, struct xhci_ring *ring);
+unsigned int count_trbs(u64 addr, u64 len);

/* xHCI roothub code */
void xhci_set_link_state(struct xhci_hcd *xhci, __le32 __iomem *port_array,
@@ -2537,21 +2573,22 @@
    u8 burst;
    u8 cerr;
    u8 mult;
-    u8 lsa;
-    u8 hid;
+    bool lsa;
+    bool hid;

    esit = CTX_TO_MAX_ESIT_PAYLOAD_HI(info) << 16 |
    CTX_TO_MAX_ESIT_PAYLOAD(tx_info);

    ep_state = info & EP_STATE_MASK;
-    max_pstr = info & EP_MAXPSTREAMS_MASK;
+    max_pstr = CTX_TO_EP_MAXPSTREAMS(info);
    interval = CTX_TO_EP_INTERVAL(info);
    mult = CTX_TO_EP_MULT(info) + 1;
-    lsa = info & EP_HAS_LSA;
+    lsa = !!(info & EP_HAS_LSA);

    cerr = (info2 & (3 << 1)) >> 1;
    ep_type = CTX_TO_EP_TYPE(info2);
-    hid = info2 & (1 << 7);
+    hid = !!(info2 & (1 << 7));
    burst = CTX_TO_MAX_BURST(info2);
    maxp = MAX_PACKET_DECODED(info2);

--- linux-4.15.0.orig/drivers/usb/image/microtek.c
+++ linux-4.15.0/drivers/usb/image/microtek.c
@@ -721,6 +721,10 @@
if (ep_in_current != &ep_in_set[2]) {
+ MTS_WARNING("couldn't find two input bulk endpoints. Bailing out.");
+ return -ENODEV;
+
}  

if (ep_out == -1) {
MTS_WARNING("couldn't find an output bulk endpoint. Bailing out.");
--- linux-4.15.0.orig/drivers/usb/misc/Kconfig
+++ linux-4.15.0/drivers/usb/misc/Kconfig
@@ -46,16 +46,6 @@
To compile this driver as a module, choose M here: the
module will be called usbsevseg.

-config USB_RIO500
-tristate "USB Diamond Rio500 support"
-help
- Say Y here if you want to connect a USB Rio500 mp3 player to your
- computer's USB port. Please read <file:Documentation/usb/rio.txt>
- for more information.
-
- To compile this driver as a module, choose M here: the
- module will be called rio500.
-
-config USB_LEGOTOWER
-tristate "USB Lego Infrared Tower support"
-help
--- linux-4.15.0.orig/drivers/usb/misc/Makefile
+++ linux-4.15.0/drivers/usb/misc/Makefile
@@ -17,7 +17,6 @@
obj-$(CONFIG_USB_LCD)	+= usblcd.o
obj-$(CONFIG_USB_LD)	+= ldusb.o
-obj-$(CONFIG_USB_RIO500)	+= rio500.o
-obj-$(CONFIG_USB_TEST)	+= usbtest.o
obj-$(CONFIG_USB_AGSET_TEST_FIXTURE)	+= chset.o
obj-$(CONFIG_USB_TRANCEVIBRATOR)	+= trancevibrator.o
--- linux-4.15.0.orig/drivers/usb/misc/adutux.c
+++ linux-4.15.0/drivers/usb/misc/adutux.c
@@ -75,6 +75,7 @@
char	serial_number[8];

int open_count; /* number of times this port has been opened */
+unsigned long disconnected:1;

char*read_buffer_primary;
int read_buffer_length;

---
unsigned long flags;

-if (dev->udev == NULL)
+if (dev->disconnected)
    return;

/* shutdown transfer */
@@ -146,6 +147,7 @@
kfree(dev->read_buffer_secondary);
kfree(dev->interrupt_in_buffer);
kfree(dev->interrupt_out_buffer);
+usb_put_dev(dev->udev);
kfree(dev);
}
@@ -203,6 +205,7 @@
    if ((status != -ENOENT) &&
        (status != -ESHUTDOWN) &&
        (status != -ECONNRESET)) {
 dev_dbg(&dev->udev->dev,
    "%s :nonzero status received: %d", __func__,
@@ -239,7 +242,7 @@
    dev = usb_get_intfdata(interface);
-    if (!dev || !dev->udev) {
+    if (!dev) {
        retval = -ENODEV;
        goto exit_no_device;
    }
@@ -322,7 +325,7 @@
    adu_release_internal(dev);
-    if (dev->udev == NULL) {
+    if (dev->disconnected) {
        /* the device was unplugged before the file was released */
        if (!dev->open_count)/* ... and we're the last user */
            adu_delete(dev);
@@ -351,7 +354,7 @@
            return -ERESTARTSYS;

/* verify that the device wasn't unplugged */
-    if (dev->udev == NULL) {
+    if (dev->disconnected) {
+if (dev->disconnected) {
    retval = -ENODEV;
    pr_err("No device or device unplugged \%d\n", retval);
    goto exit;
    @@ -516,7 +519,7 @@
    goto exit_nolock;

    /* verify that the device wasn't unplugged */
    -if (dev->udev == NULL) {
    +if (dev->disconnected) {
        retval = -ENODEV;
        pr_err("No device or device unplugged \%d\n", retval);
        goto exit;
        @@ -661,11 +664,11 @@

        mutex_init(&dev->mtx);
        spin_lock_init(&dev->buflock);
        -dev->udev = udev;
        +dev->udev = usb_get_dev(udev);
        init_waitqueue_head(&dev->read_wait);
        init_waitqueue_head(&dev->write_wait);

        -res = usb_find_common_endpoints_reverse(&interface->altsetting[0],
        +res = usb_find_common_endpoints_reverse(interface->cur_altsetting,
            NULL, NULL,
            &dev->interrupt_in_endpoint,
            &dev->interrupt_out_endpoint);
        @@ -760,14 +763,18 @@

        dev = usb_get_intfdata(interface);

        -mutex_lock(&dev->mtx);/* not interruptible */
        -dev->udev = NULL;/* poison */
        usb_deregister_dev(interface, &adu_class);
        -mutex_unlock(&dev->mtx);
        +usb_poison_urb(dev->interrupt_in_urb);
        +usb_poison_urb(dev->interrupt_out_urb);

        mutex_lock(&adutux_mutex);
        usb_set_intfdata(interface, NULL);

        +mutex_lock(&dev->mtx);/* not interruptible */
        +dev->disconnected = 1;
        +mutex_unlock(&dev->mtx);
        +
        /* if the device is not opened, then we clean up right now */
        if (!dev->open_count)
adu_delete(dev);
--- linux-4.15.0.orig/drivers/usb/misc/appledisplay.c
+++ linux-4.15.0/drivers/usb/misc/appledisplay.c
@@ -50,6 +50,8 @@
     { APPLEDISPLAY_DEVICE(0x9219) },
     { APPLEDISPLAY_DEVICE(0x921c) },
     { APPLEDISPLAY_DEVICE(0x921d) },
+    { APPLEDISPLAY_DEVICE(0x9222) },
+    { APPLEDISPLAY_DEVICE(0x9226) },
     { APPLEDISPLAY_DEVICE(0x9236) },
/* Terminating entry */
@@ -145,8 +147,11 @@
            pdata->msgdata, 2,
            ACD_USB_TIMEOUT);
mutex_unlock(&pdata->sysfslock);
-
-    return retval;
+
+    if (retval < 0)
+        return retval;
+    else
+        return 0;
+
}

static int appledisplay_bl_get_brightness(struct backlight_device *bd)
@@ -164,7 +169,12 @@
            pdata->msgdata, 2,
            ACD_USB_TIMEOUT);
            brightness = pdata->msgdata[1];
+    if (retval < 2) {
+        if (retval >= 0)
+            retval = -EMSGSIZE;
+    } else {
+        brightness = pdata->msgdata[1];
+    }
mutex_unlock(&pdata->sysfslock);

    if (retval < 0)
@@ -299,6 +309,7 @@
            if (pdata) {
                if (pdata->urb) {
                    usb_kill_urb(pdata->urb);
+                cancel_delayed_work_sync(&pdata->work);
                    if (pdata->urbdata)
                        usb_free_coherent(pdata->udev, ACD_URB_BUFFER_LEN,
                        pdata->urbdata, pdata->urb->transfer_dma);
--- linux-4.15.0.orig/drivers/usb/misc/chaoskey.c
+++
@@ -98,6 +98,7 @@
     usb_free_urb(dev->urb);
    kfree(dev->name);
    kfree(dev->buf);
+   usb_put_intf(dev->interface);
    kfree(dev);
 }

@@ -145,6 +146,8 @@
      if (dev == NULL) goto out;
+    dev->interface = usb_get_intf(interface);
+    dev->buf = kmalloc(size, GFP_KERNEL);

      if (dev->buf == NULL) @@ -178,8 +181,6 @@
      strcat(dev->name, udev->serial);
    }

-dev->interface = interface;
-    dev->in_ep = in_ep;

      if (le16_to_cpu(udev->descriptor.idVendor) != ALEA_VENDOR_ID) @ @ -387,13 +388,17 @@
         !(dev->reading,
         (started ? NAK_TIMEOUT : ALEA_FIRST_TIMEOUT) );

-if (result < 0)
+if (result < 0) {
     ush_kill_urb(dev->urb);
    goto out;
+  }

-if (result == 0)
+if (result == 0) {
    result = -ETIMEDOUT;
   -else
+    ush_kill_urb(dev->urb);
+  } else {
    result = dev->valid;
+  }
out:
   /* Let the device go back to sleep eventually */
static int chaoskey_resume(struct usb_interface *interface)
{
+struct chaoskey *dev;
+struct usb_device *udev = interface_to_usbdev(interface);
+
usb_dbg(interface, "resume");
+dev = usb_get_intfdata(interface);
+
+/*
+ * We may have lost power.
+ * In that case the device that needs a long time
+ * for the first requests needs an extended timeout
+ * again
+ */
+if (le16_to_cpu(udev->descriptor.idVendor) == ALEA_VENDOR_ID)
+dev->reads_started = false;
+
return 0;
}
#else
--- linux-4.15.0.orig/drivers/usb/misc/idmouse.c
+++ linux-4.15.0/drivers/usb/misc/idmouse.c
@@ -337,7 +337,7 @@
int result;
 /* check if we have gotten the data or the hid interface */
 iface_desc = &interface->altsetting[0];
+iface_desc = interface->cur_altsetting;
if (iface_desc->desc.bInterfaceClass != 0x0A)
return -ENODEV;

--- linux-4.15.0.orig/drivers/usb/misc/iowarrior.c
+++ linux-4.15.0/drivers/usb/misc/iowarrior.c
@@ -2,8 +2,9 @@
/*
 * Native support for the I/O-Warrior USB devices
 *
-* Copyright (c) 2003-2005 Code Mercenaries GmbH
-* written by Christian Lucht <lucht@codemercs.com>
+* Copyright (c) 2003-2005, 2020 Code Mercenaries GmbH
+* written by Christian Lucht <lucht@codemercs.com> and
+* Christoph Jung <jung@codemercs.com>
* 
* based on
```c
#define USB_DEVICE_ID_CODEMERCS_IOWPV1	0x1501
/* full speed iowarrior */
#define USB_DEVICE_ID_CODEMERCS_IOWPV2	0x1512
/* full speed iowarrior */
#define USB_DEVICE_ID_CODEMERCS_IOW56	0x1503
/* fuller speed iowarrior */
#define USB_DEVICE_ID_CODEMERCS_IOW28	0x1504
#define USB_DEVICE_ID_CODEMERCS_IOW28L	0x1505
#define USB_DEVICE_ID_CODEMERCS_IOW100	0x1506
+
+#define USB_DEVICE_ID_CODEMERCS_IOW24SAG	0x158a
#define USB_DEVICE_ID_CODEMERCS_IOW56AM	0x158b
/* OEMed devices */

/* Get a minor range for your devices from the usb maintainer */
#endif

char chip_serial[9]; /* the serial number string of the chip connected */
int report_size; /* number of bytes in a report */
struct usb_anchor submitted;

/* Get a minor range for your devices from the usb maintainer */
#define CONFIG_USB_DYNAMIC_MINORS
@@ -88,6 +97,7 @@
char chip_serial[9]; /* the serial number string of the chip connected */
int report_size; /* number of bytes in a report */
struct usb_anchor submitted;
};

/* Get a minor range for your devices from the usb maintainer */
#define CONFIG_USB_DYNAMIC_MINORS
@@ -137,6 +147,11 @@
  ],
  [USB_DEVICE(USB_VENDOR_ID_CODEMERCS, USB_DEVICE_ID_CODEMERCS_IOW24SAG)],
  [USB_DEVICE(USB_VENDOR_ID_CODEMERCS, USB_DEVICE_ID_CODEMERCS_IOW28)],
+  [USB_DEVICE(USB_VENDOR_ID_CODEMERCS, USB_DEVICE_ID_CODEMERCS_IOW28L)],
+  [USB_DEVICE(USB_VENDOR_ID_CODEMERCS, USB_DEVICE_ID_CODEMERCS_IOW100)],
  [];/* Terminating entry */
};

MODULE_DEVICE_TABLE(usb, iowarrior_ids);
@@ -247,6 +262,7 @@
kfree(dev->int_in_buffer);
usb_free_urb(dev->int_in_urb);
kfree(dev->read_queue);
+usb_put_intf(dev->interface);
kfree(dev);
}
@@ -363,6 +379,7 @@
}
switch (dev->product_id) {
  case USB_DEVICE_ID_CODEMERCS_IOW24:
+  case USB_DEVICE_ID_CODEMERCS_IOW24SAG:
```

case USB_DEVICE_ID_CODEMERCS_IOWPV1:
case USB_DEVICE_ID_CODEMERCS_IOWPV2:
case USB_DEVICE_ID_CODEMERCS_IOW40:
@@ -377,6 +394,10 @@
goto exit;
break;
case USB_DEVICE_ID_CODEMERCS_IOW56:
+case USB_DEVICE_ID_CODEMERCS_IOW56AM:
+case USB_DEVICE_ID_CODEMERCS_IOW28:
+case USB_DEVICE_ID_CODEMERCS_IOW28L:
+case USB_DEVICE_ID_CODEMERCS_IOW100:
/* The IOW56 uses asynchronous IO and more urbs */
if (atomic_read(&dev->write_busy) == MAX_WRITES_IN_FLIGHT) {
/* Wait until we are below the limit for submitted urbs */
@@ -428,11 +449,13 @@
    retval = -EFAULT;
    goto error;
}  
+usb_anchor_urb(int_out_urb, &dev->submitted);
retval = usb_submit_urb(int_out_urb, GFP_KERNEL);
if (retval) {
    dev_dbg(&dev->interface->dev,
    "submit error %d for urb nr.%d"
    ,retval, atomic_read(&dev->write_busy));
    +usb_unanchor_urb(int_out_urb);
    goto error;
}
/* submit was ok */
@@ -499,6 +522,7 @@
    switch (cmd) {
    case IOW_WRITE:
if (dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW24 ||
+    dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW24SAG ||
    dev->product_id == USB_DEVICE_ID_CODEMERCS_IOWPV1 ||
    dev->product_id == USB_DEVICE_ID_CODEMERCS_IOWPV2 ||
    dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW40) {
@@ -769,11 +793,13 @@
    init_waitqueue_head(&dev->write_wait);

dev->udev = udev;
-dev->interface = interface;
+dev->interface = usb_get_intf(interface);

    iface_desc = interface->cur_altsetting;
    dev->product_id = le16_to_cpu(udev->descriptor.idProduct);

    +init_usb_anchor(&dev->submitted);
    +
res = usb_find_last_int_in_endpoint(iface_desc, &dev->int_in_endpoint);
if (res) {
    dev_err(&interface->dev, "no interrupt-in endpoint found\n");
    goto error;
}

-if (dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW56) {
+if ((dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW56) ||
    (dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW56AM) ||
    (dev->product_id == USBDEVICE_ID_CODEMERCS_IOW28) ||
    (dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW28L) ||
    (dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW100)) {
    res = usb_find_last_int_out_endpoint(iface_desc, &dev->int_out_endpoint);
    if (res) {
        goto error;
    }
}

/* we have to check the report_size often, so remember it in the endianness suitable for our machine */
dev->report_size = usb_endpoint_maxp(dev->int_in_endpoint);
-if ((dev->interface->cur_altsetting->desc.bInterfaceNumber == 0) &&
    (dev->product_id == USB_DEVICE_ID_CODEMERCS_IOW56))
    /* IOWarrior56 has wMaxPacketSize different from report size */
    -dev->report_size = 7;
+
+/*
+ * Some devices need the report size to be different than the
+ * endpoint size.
+ */
+if (dev->interface->cur_altsetting->desc.bInterfaceNumber == 0) {
    switch (dev->product_id) {
+case USB_DEVICE_ID_CODEMERCS_IOW56:
+case USB_DEVICE_ID_CODEMERCS_IOW56AM:
+    dev->report_size = 7;
+    break;
+    
+case USB_DEVICE_ID_CODEMERCS_IOW28:
+case USB_DEVICE_ID_CODEMERCS_IOW28L:
+    dev->report_size = 4;
+    break;
+    
+case USB_DEVICE_ID_CODEMERCS_IOW100:
+    dev->report_size = 13;
+    break;
+    
+}
+
/* create the urb and buffer for reading */
dev->int_in_urb = usb Alloc_urb(0, GFP_KERNEL);
@@ -873,8 +921,9 @@
usb_set_intfdata(interface, NULL);

minor = dev->minor;
+mutex_unlock(&iowarrior_open_disc_lock);
+/* give back our minor - this will call close() locks need to be dropped at this point */

-/* give back our minor */
usb_deregister_dev(interface, &iowarrior_class);

mutex_lock(&dev->mutex);
@ @ -882,19 +931,19 @@
/* prevent device read, write and ioctl */
dev->present = 0;

mutex_unlock(&dev->mutex);
mutex_unlock(&iowarrior_open_disc_lock);
-
if (dev->opened) {
 /* There is a process that holds a file descriptor to the device, 
 so we only shutdown read-/write-ops going on.
 Deleting the device is postponed until close() was called. */
 usb_kill_urb(dev->int_in_urb);
+usb_kill_anchored_urb(&dev->submitted);
 wake_up_interruptible(&dev->read_wait);
 wake_up_interruptible(&dev->write_wait);
+mutex_unlock(&dev->mutex);
 } else {
 /* no process is using the device, cleanup now */
+mutex_unlock(&dev->mutex);
 iowarrior_delete(dev);
}

--- linux-4.15.0.orig/drivers/usb/misc/ldusb.c
+++ linux-4.15.0/drivers/usb/misc/ldusb.c
@@ -42,6 +42,9 @@
#define USB_DEVICE_ID_LD_MICROCASSYTIME 0x1033 /* USB Product ID of Micro-CASSY Time (reserved) */
#define USB DEVICE ID_LD_MICROCASSYTEMPERATURE 0x1035 /* USB Product ID of Micro-CASSY Temperature */
#define USB DEVICE ID_LD_MICROCCA SYPH 0x1038 /* USB Product ID of Micro-CASSY pH */
+#define USB DEVICE ID_LD_POWERANALYS ERCASSY 0x1040 /* USB Product ID of Power Analyser CASSY */
+#define USB DEVICE ID_LD CONVERTERCONTROLL ERCASSY 0x1042 /* USB Product ID of Converter Controller CASSY */
+#define USB DEVICE ID_LD_MACHIN ETESTCASSY 0x1043 /* USB Product ID of Machine Test CASSY */

```c
#define USB_DEVICE_ID_LD_JWM	0x1080	/* USB Product ID of Joule and Wattmeter */
#define USB_DEVICE_ID_LD_DMMP	0x1081	/* USB Product ID of Digital Multimeter P (reserved) */
#define USB_DEVICE_ID_LD_UMIP	0x1090	/* USB Product ID of UMI P */
	{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYTEMPERATURE) },
	{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MICROCASSYPH) },
+{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_POWERANALYSERCASSY) },
+{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_CONVERTERCONTROLLERCASSY) },
+{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_MACHINETESTCASSY) },
	{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_JWM) },
	{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_DMMP) },
	{ USB_DEVICE(USB_VENDOR_ID_LD, USB_DEVICE_ID_LD_UMIP) },
@@ -147,6 +153,7 @@
struct ld_usb {
    struct mutex mutex;/* locks this structure */
    struct usb_interface *intf;/* save off the usb interface pointer */
+    unsigned long disconnected:1;

    int open_count;/* number of times this port has been opened */

    @ @ -186,12 +193,10 @ @
/* shutdown transfer */
    if (dev->interrupt_in_running) {
        dev->interrupt_in_running = 0;
-        if (dev->intf)
-            usb_kill_urb(dev->interrupt_in_urb);
+            usb_kill_urb(dev->interrupt_in_urb);
    }
    if (dev->interrupt_out_busy)
-        if (dev->intf)
-            usb_kill_urb(dev->interrupt_out_urb);
+            usb_kill_urb(dev->interrupt_out_urb);
    }
/**
 @ @ -199,8 +204,6 @ @
 */
static void ld_usb_delete(struct ld_usb *dev)
{
    -ld_usb_abort_transfers(dev);
-
/* free data structures */
    usb_free_urb(dev->interrupt_in_urb);
    usb_free_urb(dev->interrupt_out_urb);
@@ -256,7 +259,7 @@
RESUBMIT:
```
OPEN SOURCE USED IN 5GaaS EDGE AC-4

/* resubmit if we're still running */
- if (dev->interrupt_in_running && !dev->buffer_overflow && dev->intf) {
+ if (dev->interrupt_in_running && !dev->buffer_overflow) {
    retval = usb_submit_urb(dev->interrupt_in_urb, GFP_ATOMIC);
    if (retval) {
        dev_err(&dev->intf->dev,
                retv @ @ .-376,16 +379,13 @@
        goto exit;
    }
}

- if (mutex_lock_interruptible(&dev->mutex)) {
-     retval = -ERESTARTSYS;
-     goto exit;
- }
+ mutex_lock(&dev->mutex);

    if (dev->open_count != 1) {
            retval = -ENODEV;
        goto unlock_exit;
    }

- if (dev->intf == NULL) {
+ if (dev->disconnected) {
            /* the device was unplugged before the file was released */
            mutex_unlock(&dev->mutex);
            /* unlock here as ld_usb_delete frees dev */
            retv @ @ .-416,7 +416,7 @@
            dev = file->private_data;

- if (!dev->intf)
+ if (dev->disconnected)
    return POLLERR | POLLHUP;

    poll_wait(file, &dev->read_wait, wait);
              retv @ @ .-455,7 +455,7 @@
}

    /* verify that the device wasn't unplugged */
- if (dev->intf == NULL) {
+ if (dev->disconnected) {
        retval = -ENODEV;
        printk(KERN_ERR "ldusb: No device or device unplugged \%d\n", retval);
        goto unlock_exit;
    }

    /* wait for data */
    spin_lock_irq(&dev->rbsl);
    if (dev->ring_head == dev->ring_tail) {


while (dev->ring_head == dev->ring_tail) {
    dev->interrupt_in_done = 0;
    spin_unlock_irq(&dev->rbsl);
    if (file->f_flags & O_NONBLOCK) {
        retval = wait_event_interruptible(dev->read_wait, dev->interrupt_in_done);
        if (retval < 0)
            goto unlock_exit;
        else {
            spin_unlock_irq(&dev->rbsl);
            spin_lock_irq(&dev->rbsl);
        }
        spin_unlock_irq(&dev->rbsl);
    } else {
        spin_unlock_irq(&dev->rbsl);
    }
}

/* actual_buffer contains actual_length + interrupt_in_buffer */
actual_buffer = (size_t *)(dev->ring_buffer + dev->ring_tail * (sizeof(size_t)+dev->interrupt_in_endpoint_size));
if (*actual_buffer > dev->interrupt_in_endpoint_size) {
    retval = -EIO;
    goto unlock_exit;
} else {
    bytes_to_read = min(count, *actual_buffer);
    if (bytes_to_read < *actual_buffer)
        dev_warn(&dev->intf->dev, "Read buffer overflow, %zu bytes dropped\n", *actual_buffer-bytes_to_read);
    /* copy one interrupt_in_buffer from ring_buffer into userspace */
    retval = -EFAULT;
    goto unlock_exit;
} else {
    dev->ring_tail = (dev->ring_tail+1) % ring_buffer_size;
    retval = bytes_to_read;
    spin_lock_irq(&dev->rbsl);
    dev->ring_tail = (dev->ring_tail + 1) % ring_buffer_size;
    if (dev->buffer_overflow) {
        dev->buffer_overflow = 0;
        spin_unlock_irq(&dev->rbsl);
    }
}
/* verify that the device wasn't unplugged */
if (dev->intf == NULL) {
    dev_warn(&dev->intf->dev, "Read buffer overflow, %zd bytes dropped\n", dev->interrupt_in_endpoint_size);
    dev->buffer_overflow = 0;
    spin_unlock_irq(&dev->rbsl);
    spin_lock_irq(&dev->rbsl);
} else {
    dev->buffer_overflow = 0;
    spin_unlock_irq(&dev->rbsl);
    spin_lock_irq(&dev->rbsl);
    dev->buffer_overflow = 0;
    spin_unlock_irq(&dev->rbsl);
    spin_lock_irq(&dev->rbsl);
    dev->buffer_overflow = 0;
    spin_unlock_irq(&dev->rbsl);
    spin_lock_irq(&dev->rbsl);
    dev->buffer_overflow = 0;
    spin_unlock_irq(&dev->rbsl);
    spin_lock_irq(&dev->rbsl);
    dev->buffer_overflow = 0;
}
retval = -ENODEV;
printk(KERN_ERR "ldusb: No device or device unplugged \%d\n", retval);
goto unlock_exit;
@@ -556,8 +561,9 @@
/* write the data into interrupt_out_buffer from userspace */
bytes_to_write = min(count, write_buffer_size*dev->interrupt_out_endpoint_size);
if (bytes_to_write < count)
- dev_warn(&dev->intf->dev, "Write buffer overflow, \%zd bytes dropped\n", count-bytes_to_write);
- dev_dbg(&dev->intf->dev, "%s: count = \%zd, bytes_to_write = \%zd\n",
+ dev_warn(&dev->intf->dev, "Write buffer overflow, \%zu bytes dropped\n",
+ count - bytes_to_write);
+ dev_dbg(&dev->intf->dev, "%s: count = \%zu, bytes_to_write = \%zu\n",
__func__, count, bytes_to_write);
if (copy_from_user(dev->interrupt_out_buffer, buffer, bytes_to_write)) {
  @@ -574,7 +580,7 @@
  1 << 8, 0,
  dev->interrupt_out_buffer,
  bytes_to_write,
  - USB_CTRL_SET_TIMEOUT * HZ);
  + USB_CTRL_SET_TIMEOUT);
  if (retval < 0)
    dev_err(&dev->intf->dev,
    "Couldn't submit HID_REQ_SET_REPORT \%d\n",
    @@ -689,7 +695,9 @@
    dev_warn(&intf->dev, "Interrupt out endpoint not found (using control endpoint instead)\n")

    dev->interrupt_in_endpoint_size = usb_endpoint_maxp(dev->interrupt_in_endpoint);
    - dev->ring_buffer = kmalloc(ring_buffer_size*(sizeof(size_t)+dev->interrupt_in_endpoint_size), GFP_KERNEL);
    + dev->ring_buffer = kcalloc(ring_buffer_size,
    + sizeof(size_t) + dev->interrupt_in_endpoint_size,
    + GFP_KERNEL);
    if (!dev->ring_buffer)
      goto error;
    dev->interrupt_in_buffer = kmalloc(dev->interrupt_in_endpoint_size, GFP_KERNEL);
    @@ -752,6 +760,9 @@
    /* give back our minor */
    usb_deregister_dev(intf, &ld_usb_class);

    +usb_poison_urb(dev->interrupt_in_urb);
    +usb_poison_urb(dev->interrupt_out_urb);
    +mutex_lock(&dev->mutex);

    /* if the device is not opened, then we clean up right now */
    @@ -759,7 +770,7 @@
    mutex_unlock(&dev->mutex);
    ld_usb_delete(dev);
} else {
-dev->intf = NULL;
+dev->disconnected = 1;
 */ wake up pollers */
wake_up_interruptible_all(&dev->read_wait);
wake_up_interruptible_all(&dev->write_wait);
--- linux-4.15.0.orig/drivers/usb/misc/legousbtower.c
+++ linux-4.15.0/drivers/usb/misc/legousbtower.c
@@ -179,7 +179,6 @@
};

MODULE_DEVICE_TABLE (usb, tower_table);
-static DEFINE_MUTEX(open_disc_mutex);

#define LEGO_USB_TOWER_MINOR_BASE	160
@@ -191,6 +190,7 @@
 unsigned char		minor;		/* the starting minor number for this device */
 intopen_count;/* number of times this port has been opened */
 +unsigned long disconnected:1;

 char*read_buffer;
 size_tread_buffer_length;/* this much came in */
 @@ -290,14 +290,13 @@*/
 */
 static inline void tower_delete (struct lego_usb_tower *dev)
 { 
 -tower_abort_transfers (dev);
 -
 /* free data structures */
 usb_free_urb(dev->interrupt_in_urb);
 usb_free_urb(dev->interrupt_out_urb);
 kfree (dev->read_buffer);
 kfree (dev->interrupt_in_buffer);
 kfree (dev->interrupt_out_buffer);
 +usb_put_dev(dev->udev);
 kfree (dev);
 }
@@ -332,18 +331,14 @@
goto exit;
}

-mutex_lock(&open_disc_mutex);
 dev = usb_get_intfdata(interface);
 -
 if (!dev) {
mutex_unlock(&open_disc_mutex);
retval = -ENODEV;
goto exit;
}

/* lock this device */
if (mutex_lock_interruptible(&dev->lock)) {
    mutex_unlock(&open_disc_mutex);
    retval = -ERESTARTSYS;
    goto exit;
}

/* allow opening only once */
if (dev->open_count) {
    mutex_unlock(&open_disc_mutex);
    retval = -EBUSY;
    goto unlock_exit;
}
    dev->open_count = 1;
    mutex_unlock(&open_disc_mutex);

/* reset the tower */
result = usb_control_msg (dev->udev,
    "Couldn't submit interrupt_in_urb %d\n", retval);
    dev->interrupt_in_running = 0;
    dev->open_count = 0;
    goto unlock_exit;
}
/* save device in the file's private structure */
file->private_data = dev;

+dev->open_count = 1;
+
unlock_exit:
mutex_unlock(&dev->lock);

if (dev == NULL) {
    retval = -ENODEV;
    -goto exit_nolock;
if (mutex_lock_interruptible(&dev->lock)) {
    retval = -ERESTARTSYS;
goto exit;
}

+mutex_lock(&dev->lock);
+
if (dev->open_count != 1) {
    dev_dbg(&dev->udev->dev, "%s: device not opened exactly once\n", __func__); 
    retval = -ENODEV;
goto unlock_exit;
}
-if (dev->udev == NULL) {
    +
    +if (dev->disconnected) {
*/ the device was unplugged before the file was released */

unlock_exit:
mutex_unlock(&dev->lock);
-
exit:
-mutex_unlock(&open_disc_mutex);
-exit_nolock:
return retval;
}

if (dev->interrupt_in_running) {
    dev->interrupt_in_running = 0;
    mb();
    -if (dev->udev)
        -usb_kill_urb(dev->interrupt_in_urb);
    +usb_kill_urb(dev->interrupt_in_urb);
    }
-if (dev->interrupt_out_busy && dev->udev)
    +if (dev->interrupt_out_busy)
        usb_kill_urb(dev->interrupt_out_urb);
    }

dev = file->private_data;
-
-if (!dev->udev)
+if (dev->disconnected)
return POLLERR | POLLHUP;

poll_wait(file, &dev->read_wait, wait);
@@ -563,7 +549,7 @@
}
/* verify that the device wasn't unplugged */
-if (dev->udev == NULL) {
+if (dev->disconnected) {
retval = -ENODEV;
pr_err("No device or device unplugged \%d\n", retval);
goto unlock_exit;
@@ -649,7 +635,7 @@
}
/* verify that the device wasn't unplugged */
-if (dev->udev == NULL) {
+if (dev->disconnected) {
retval = -ENODEV;
pr_err("No device or device unplugged \%d\n", retval);
goto unlock_exit;
@@ -758,7 +744,7 @@
resubmit:
/* resubmit if we're still running */
-if (dev->interrupt_in_running && dev->udev) {
+if (dev->interrupt_in_running) {
retval = usb_submit_urb (dev->interrupt_in_urb, GFP_ATOMIC);
if (retval)
dev_err(&dev->udev->dev, 
@@ -821,8 +807,9 @@
mutex_init(&dev->lock);

-dev->udev = udev;
+dev->udev = usb_get_dev(udev);
dev->open_count = 0;
+dev->disconnected = 0;

dev->read_buffer = NULL;
dev->read_buffer_length = 0;
@@ -890,8 +877,10 @@
get_version_reply,
  sizeof(*get_version_reply),
  1000);
-if (result < 0) {
-dev_err(dev, "LEGO USB Tower get version control request failed\n");

+if (result != sizeof(*get_version_reply)) {
+if (result >= 0)
+result = -EIO;
+dev_err(idev, "get version request failed: \%d\n", result);
+retval = result;
+goto error;
}
@@ -909,7 +898,6 @@
    if (retval) {
        /* something prevented us from registering this driver */
        dev_err(idev, "Not able to get a minor for this device:\n");
-    usb_set_intfdata (interface, NULL);
    goto error;
    }
    dev->minor = interface->minor;
@@ -941,23 +929,24 @@
    int minor;

    dev = usb_get_intfdata (interface);
-    mutex_lock(&open_disc_mutex);
-    usb_set_intfdata (interface, NULL);
-    usb_set_intfdata (interface, NULL);

    minor = dev->minor;

-    /* give back our minor */
+    /* give back our minor and prevent further open() */
    usb_deregister_dev (interface, &tower_class);

+    /* stop I/O */
+    usb_poison_urb(dev->interrupt_in_urb);
+    usb_poison_urb(dev->interrupt_out_urb);
+    mutex_lock(&dev->lock);
-    mutex_unlock(&open_disc_mutex);
    /* if the device is not opened, then we clean up right now */
    if (!dev->open_count) {
        mutex_unlock(&dev->lock);
        tower_delete (dev);
    } else {
        -dev->udev = NULL;
+    dev->disconnected = 1;
        /* wake up pollers */
        wake_up_interruptible_all(&dev->read_wait);
        wake_up_interruptible_all(&dev->write_wait);
--- linux-4.15.0.orig/drivers/usb/misc/lvstest.c
+++ linux-4.15.0/drivers/usb/misc/lvstest.c
@@ -429,7 +429,7 @@
USB_DT_SS_HUB_SIZE, USB_CTRL_GET_TIMEOUT);
if (ret < (USB_DT_HUB_NONVAR_SIZE + 2)) {
    dev_err(&hdev-&gt;dev, "wrong root hub descriptor read %d\n", ret);
    -return ret;
    +return ret < 0 ? ret : -EINVAL;
}

/* submit urb to poll interrupt endpoint */
--- linux-4.15.0.orig/drivers/usb/misc/sisusbvga/Kconfig
+++ linux-4.15.0/drivers/usb/misc/sisusbvga/Kconfig
@@ -15,7 +15,7 @@
 config USB_SISUSBVGA_CON
 bool "Text console and mode switching support" if USB_SISUSBVGA
 -depends on VT
+depends on VT &amp; BROKEN
 select FONT_8x16
 ---help---
    Say Y here if you want a VGA text console via the USB dongle or
--- linux-4.15.0.orig/drivers/usb/misc/sisusbvga/sisusb.c
+++ linux-4.15.0/drivers/usb/misc/sisusbvga/sisusb.c
@@ -761,7 +761,7 @@
     -char buf[4];
    +u8 buf[4];
 /* if neither kernbuffer not userbuffer are given, assume
     * data in obuf
@@ -1199,18 +1199,18 @@
 /* High level: Gfx (indexed) register access */

 #ifdef INCL_SISUSB_CON
-#int sisusb_setreg(struct sisusb_usb_data *sisusb, int port, u8 data)
+int sisusb_setreg(struct sisusb_usb_data *sisusb, u32 port, u8 data)
 { return sisusb_write_memio_byte(sisusb, SISUSB_TYPE_IO, port, data); }

-#int sisusb_getreg(struct sisusb_usb_data *sisusb, int port, u8 *data)
+int sisusb_getreg(struct sisusb_usb_data *sisusb, u32 port, u8 *data)
 { return sisusb_read_memio_byte(sisusb, SISUSB_TYPE_IO, port, data); }
 #endif

 -int sisusb_setidxreg(struct sisusb_usb_data *sisusb, int port,
+int sisusb_setidxreg(struct sisusb_usb_data *sisusb, u32 port,
   u8 index, u8 data)
{
    int ret;
    @@ -1220,7 +1220,7 @@
    return ret;
}

-int sisusb_getidxreg(struct sisusb_usb_data *sisusb, int port,
    u8 index, u8 *data)
{
    int ret;
    @@ -1230,7 +1230,7 @@
    return ret;
}

-int sisusb_setidxregandor(struct sisusb_usb_data *sisusb, int port, u8 idx,
   u8 myand, u8 myor)
{
    int ret;
    @@ -1245,7 +1245,7 @@
    return ret;
}

static int sisusb_setidxregmask(struct sisusb_usb_data *sisusb,
   u32 port, u8 idx, u8 data, u8 mask)
{
    int ret;
    u8 tmp;
    @@ -1258,13 +1258,13 @@
    return ret;
}

-int sisusb_setidxregor(struct sisusb_usb_data *sisusb, int port,
   u8 index, u8 myor)
{
    return sisusb_setidxregandor(sisusb, port, index, 0xff, myor);
}

-int sisusb_setidxregand(struct sisusb_usb_data *sisusb, int port,
   u8 idx, u8 myand)
{
    return sisusb_setidxregandor(sisusb, port, idx, myand, 0x00);
    @@ -2787,8 +2787,8 @@
static int sisusb_handle_command(struct sisusb_usb_data *sisusb,
struct sisusb_command *y, unsigned long arg)
{
    int retval, port, length;
    u32 address;
    +int retval, length;
    +u32 port, address;

    /* All our commands require the device
     * to be initialized.
     @ @ -3029.6 +3029.13 @@
     mutex_init(&sisusb->lock));

    +sisusb->sisusb_dev = dev;
    +sisusb->vrambase = SISUSB_PCI_MEMBASE;
    +sisusb->mmiobase = SISUSB_PCI_MMIOBASE;
    +sisusb->mmiosize = SISUSB_PCI_MMIOSIZE;
    +sisusb->ioportbase = SISUSB_PCI_IOPORTBASE;
    +/* Everything else is zero */
    +
    /* Register device */
    retval = usb_register_dev(intf, &usb_sisusb_class);
    if (retval) {
        @@ -3039.13 +3046.7 @@
        goto error_1;
    }

    -sisusb->sisusb_dev = dev;
    -sisusb->minor = intf->minor;
    -sisusb->vrambase = SISUSB_PCI_MEMBASE;
    -sisusb->mmiobase = SISUSB_PCI_MMIOBASE;
    -sisusb->mmiosize = SISUSB_PCI_MMIOSIZE;
    -sisusb->ioportbase = SISUSB_PCI_IOPORTBASE;
    -* Everything else is zero */
    +sisusb->minor = intf->minor;

    /* Allocate buffers */
    sisusb->ibufsize = SISUSB_IBUF_SIZE;
    --- linux-4.15.0.orig/drivers/usb/misc/sisusbvga/sisusb_init.h
    +++ linux-4.15.0/drivers/usb/misc/sisusbvga/sisusb_init.h
    @@ -812.17 +812.17 @@
    int SiSUSBSetMode(struct SiS_Private *SiS_Pr, unsigned short ModeNo);
    int SiSUSBSetVESAMode(struct SiS_Private *SiS_Pr, unsigned short VModeNo);

    -extern int sisusb_setreg(struct sisusb_usb_data *sisusb, int port, u8 data);
    -extern int sisusb_getreg(struct sisusb_usb_data *sisusb, int port, u8 * data);
    -extern int sisusb_setidxreg(struct sisusb_usb_data *sisusb, int port,
+extern int sisusb_setreg(struct sisusb_USB_data *sisusb, u32 port, u8 data);
+extern int sisusb_getreg(struct sisusb_USB_data *sisusb, u32 port, u8 * data);
+extern int sisusb_setidxreg(struct sisusb_USB_data *sisusb, u32 port,
    u8 index, u8 data);
-extern int sisusb_getidxreg(struct sisusb_USB_data *sisusb, int port,
+extern int sisusb_getidxreg(struct sisusb_USB_data *sisusb, u32 port,
    u8 index, u8 * data);
-extern int sisusb_setidxregandor(struct sisusb_USB_data *sisusb, int port,
+extern int sisusb_setidxregandor(struct sisusb_USB_data *sisusb, u32 port,
    u8 idx, u8 myand, u8 myor);
-extern int sisusb_setidxregor(struct sisusb_USB_data *sisusb, int port,
+extern int sisusb_setidxregor(struct sisusb_USB_data *sisusb, u32 port,
    u8 index, u8 myor);
-extern int sisusb_setidxregand(struct sisusb_USB_data *sisusb, int port,
+extern int sisusb_setidxregand(struct sisusb_USB_data *sisusb, u32 port,
    u8 idx, u8 myand);

void sisusb_delete(struct kref *kref);
--- linux-4.15.0.orig/drivers/usb/misc/trancevibrator.c
+++ linux-4.15.0/drivers/usb/misc/trancevibrator.c
@@ -59,9 +59,9 @@
 /* Set speed */
  retval = usb_control_msg(tv->udev, usb_sndctrlpipe(tv->udev, 0),
     0x01, /* vendor request: set speed */
-    USB_DIR_IN | USB_TYPE_VENDOR | USB_RECIP_OTHER,
+    USB_DIR_OUT | USB_TYPE_VENDOR | USB_RECIP_OTHER,
    tv->speed, /* speed value */
-    0, NULL, 0, USB_CTRL_GET_TIMEOUT);
+    0, NULL, 0, USB_CTRL_SET_TIMEOUT);
  if (retval) {
     tv->speed = old;
     dev_dbg(&tv->udev->dev, "retval = %d\n", retval);
--- linux-4.15.0.orig/drivers/usb/misc/usb251xb.c
+++ linux-4.15.0/drivers/usb/misc/usb251xb.c
@@ -601,7 +601,7 @@
     dev);
 int err;

-    if (np) {
+    if (np && of_id) {
        err = usb251xb_get_ofdata(hub,
            (struct usb251xb_data *)of_id->data);
        if (err) {
--- linux-4.15.0.orig/drivers/usb/misc/usblcd.c
+++ linux-4.15.0/drivers/usb/misc/usblcd.c
@@ -18,6 +18,7 @@
 #include <linux/slab.h>
 #include <linux/errno.h>
```c
#include <linux/mutex.h>
#include <linux/rwsem.h>
#include <linux/uaccess.h>
#include <linux/usb.h>

using up all RAM */
struct usb_anchorsubmitted/* URBs to wait for
   before suspend */
+struct rw_semaphore io_rwsem;
+unsigned long disconnected:1;
};
#define to_lcd_dev(d) container_of(d, struct usb_lcd, kref)

dev = file->private_data;
+down_read(&dev->io_rwsem);
+if (dev->disconnected) {
+retval = -ENODEV;
+goto out_up_io;
+}
+/
+/* do a blocking bulk read to get data from the device */
retval = usb_bulk_msg(dev->udev,
    usb_rcvbulkpipe(dev->udev,
    retval = bytes_read;
}
+out_up_io:
+up_read(&dev->io_rwsem);
+return retval;
}

if (r < 0)
return -EINTR;
+down_read(&dev->io_rwsem);
+if (dev->disconnected) {
+retval = -ENODEV;
+goto err_up_io;
+}
```
/* create a urb, and a buffer for it, and copy the data to the urb */
urb = usb_alloc_urb(0, GFP_KERNEL);
if (!urb) {
    retval = -ENOMEM;
    goto err_no_buf;
    goto err_up Io;
}

buf = usb_alloc_coherent(dev->udev, count, GFP_KERNEL,
@@ -278,6 +298,7 @@
    the USB core will eventually free it entirely */
usb_free_urb(urb);

+up_read(&dev->io_rwsem);
exit:
    return count;
    error_unanchor:
@@ -285,7 +306,8 @@
    error:
    usb_free_coherent(dev->udev, count, buf, urb->transfer_dma);
    usb_free_urb(urb);
    -err_no_buf:
    +err_up_io:
    +up_read(&dev->io_rwsem);
    up(&dev->limit_sem);
    return retval;
}
@@ -325,6 +347,7 @@

kref_init(&dev->kref);
sema_init(&dev->limit_sem, USB_LCD_CONCURRENT_WRITES);
+init_rwsem(&dev->io_rwsem);
init_usb_anchor(&dev->submitted);

dev->udev = usb_get_dev(interface_to_usbdev(interface));
@@ -422,6 +445,12 @@
/* give back our minor */
    usb_deregister_dev(interface, &lcd_class);

    +down_write(&dev->io_rwsem);
    +dev->disconnected = 1;
    +up_write(&dev->io_rwsem);
    +
    +usb_kill_anchored_urbs(&dev->submitted);
    +
    /* decrement our usage count */
    kref_put(&dev->kref, lcd_delete);
--- linux-4.15.0.orig/drivers/usb/misc/usbtest.c
+++ linux-4.15.0/drivers/usb/misc/usbtest.c
@@ -2778,6 +2778,7 @@
     usb_set_intfdata(intf, NULL);
     dev_dbg(&intf->dev, "disconnect\n");
     +kfree(dev->buf);
     kfree(dev);
 }
--- linux-4.15.0.orig/drivers/usb/misc/uss720.c
+++ linux-4.15.0/drivers/usb/misc/uss720.c
@@ -369,7 +369,7 @@
     mask &= 0x0f;
     val &= 0x0f;
     d = (priv->reg[1] & (~mask)) ^ val;
-    if (set_1284_register(pp, 2, d, GFP_KERNEL))
+    if (set_1284_register(pp, 2, d, GFP_ATOMIC))
         return 0;
     priv->reg[1] = d;
     return d & 0xf;
@@ -379,7 +379,7 @@
     }
     unsigned char ret;
     -if (get_1284_register(pp, 1, &ret, GFP_KERNEL))
+    if (get_1284_register(pp, 1, &ret, GFP_ATOMIC))
         return 0;
     return ret & 0xf8;
 }
@@ -736,6 +736,7 @@
     parport_announce_port(pp);

     usb_set_intfdata(intf, pp);
     +usb_put_dev(usbdev);
     return 0;

probe_abort:
--- linux-4.15.0.orig/drivers/usb/misc/yurex.c
+++ linux-4.15.0/drivers/usb/misc/yurex.c
@@ -60,6 +60,7 @@
     struct kref kref;
     struct mutex io_mutex;
     +unsigned long disconnected:1;
     struct fasync_struct*async_queue;
     wait_queue_head_t waitq;
dev_dbg(&dev->interface->dev, "%s
", __func__);  

usb_put_dev(dev->udev);  
if (dev->cntl_urb) { 
    usb_kill_urb(dev->cntl_urb);  
kfree(dev->cntl_req);  
    dev->int_buffer, dev->urb->transfer_dma);  
    usb_free_urb(dev->urb);  
}  
+usb_put_intf(dev->interface);  
+usb_put_dev(dev->udev);  
kfree(dev);  
}  

switch (status) {  
    case 0: /*success*/  
        break;  
    /* The device is terminated or messed up, give up */  
    case -EOVERFLOW:  
        dev_err(&dev->interface->dev,  
            "%s - overflow with length %d, actual length is %d\n",  
            __func__, status);  
        goto exit;  
    case -ENOENT:  
        case -ESHUTDOWN:  
        case -EILSEQ:  
            /* The device is terminated, clean up */  
            case -EPROTO:  
            case -ETIME:  
                return;  
        default:  
            dev_err(&dev->interface->dev,  
                "%s - unknown status received: %d\n", __func__, status);  
            goto exit;  
            +return;  
    }  
/* handle received message */  
    @ @ -177,7 +181,6 @ @  
    break;  
}  

-exit:  
retval = usb_submit_urb(dev->urb, GFP_ATOMIC);
if (retval) {
    dev_err(&dev->interface->dev, "%s - usb_submit_urb failed: %d\n",
            dev->interface, retval);
    init_waitqueue_head(&dev->waitq);
}

dev->udev = usb_get_dev(interface_to_usbdev(interface));
-dev->interface = interface;
+dev->interface = usb_get_intf(interface);

/* set up the endpoint information */
iface_desc = interface->cur_altsetting;
@@ -204,7 +207,7 @@
init_waitqueue_head(&dev->waitq);
-dev->interface = interface;
+dev->interface = usb_get intf(interface);

/* prevent more I/O from starting */
+usb_poison_urb(dev->urb);
+usb_poison_urb(dev->cntl_urb);
mutex_lock(&dev->io_mutex);
-dev->interface = NULL;
+dev->disconnected = 1;
mutex_unlock(&dev->io_mutex);

/* wakeup waiters */
@@ -396,35 +401,27 @@
    loff_t *ppos)
{
    struct usb_yurex *dev;
-int retval = 0;
-int bytes_read = 0;
+int len = 0;
    char in_buffer[20];
unsigned long flags;

    dev = file->private_data;

    mutex_lock(&dev->io_mutex);
    -if (!dev->interface) { /* already disconnected */
+if (dev->disconnected) { /* already disconnected */
        retval = -ENODEV;
        goto exit;
    }
    mutex_unlock(&dev->io_mutex);
+return -ENODEV;
}

    spin_lock_irqsave(&dev->lock, flags);
    -bytes_read = snprintf(in_buffer, 20, "%lld\n", dev->bbu);
+len = snprintf(in_buffer, 20, "%lld\n", dev->bbu);
    spin_unlock_irqrestore(&dev->lock, flags);

mutex_unlock(&dev->io_mutex);

-if (*ppos < bytes_read) {
-if (copy_to_user(buffer, in_buffer + *ppos, bytes_read - *ppos))
-retval = -EFAULT;
-else {
-retval = bytes_read - *ppos;
-*ppos += bytes_read;
-}
-}
+if (WARN_ON_ONCE(len >= sizeof(in_buffer)))
+return -EIO;

-exit:
-mutex_unlock(&dev->io_mutex);
-return retval;
+return simple_read_from_buffer(buffer, count, ppos, in_buffer, len);
}

static ssize_t yurex_write(struct file *file, const char __user *user_buffer,
@@ -432,13 +429,13 @@
{
 struct usb_yurex *dev;
 int i, set = 0, retval = 0;
-char buffer[16];
+char buffer[16 + 1];
 char *data = buffer;
 unsigned long long c, c2 = 0;
 signed long timeout = 0;
 DEFINE_WAIT(wait);

-count = min(sizeof(buffer), count);
+count = min(sizeof(buffer) - 1, count);
 dev = file->private_data;

 /* verify that we actually have some data to write */
 @@ -446,7 +443,7 @@
goto error;
 mutex_lock(&dev->io_mutex);
-if (!dev->interface) { /* already disconnected */
+if (dev->disconnected) { /* already disconnected */
 mutex_unlock(&dev->io_mutex);
-retval = -ENODEV;
 goto error;
 @@ -457,6 +454,7 @@
-retval = -EFAULT;
 goto error;
+buffer[count] = 0;
memset(dev->cntl_buffer, CMD_PADDING, YUREX_BUF_SIZE);

switch (buffer[0]) {
    @@ -494,11 +492,14 @@
        prepare_to_wait(&dev->waitq, &wait, TASK_INTERRUPTIBLE);
        dev_dbg(&dev->interface->dev, "%s - submit %c\n", __func__,
                dev->cntl_buffer[0]);
-    retval = usb_submit_urb(dev->cntl_urb, GFP_KERNEL);
+    retval = usb_submit_urb(dev->cntl_urb, GFP_ATOMIC);
        if (retval >= 0)
            timeout = schedule_timeout(YUREX_WRITE_TIMEOUT);
        finish_wait(&dev->waitq, &wait);

        /* make sure URB is idle after timeout or (spurious) CMD_ACK */
+    usb_kill_urb(dev->cntl_urb);
    +
    mutex_unlock(&dev->io_mutex);

    if (retval < 0) {
        --- linux-4.15.0.orig/drivers/usb/mon/mon_bin.c
        +++ linux-4.15.0/drivers/usb/mon/mon_bin.c
@@ -1038,12 +1038,18 @@
        mutex_lock(&rp->fetch_lock);
        spin_lock_irqsave(&rp->b_lock, flags);
-            mon_free_buff(rp->b_vec, rp->b_size/CHUNK_SIZE);
-            kfree(rp->b_vec);
-            rp->b_vec  = vec;
-            rp->b_size = size;
-            rp->b_read = rp->b_in = rp->b_out = rp->b_cnt = 0;
-            rp->cnt_lost = 0;
+            if (rp->mmap_active) {
+                mon_free_buff(vec, size/CHUNK_SIZE);
+                kfree(vec);
+                ret = -EBUSY;
+            } else {
+                mon_free_buff(rp->b_vec, rp->b_size/CHUNK_SIZE);
+                kfree(rp->b_vec);
+                rp->b_vec  = vec;
+                rp->b_size = size;
+                rp->b_read = rp->b_in = rp->b_out = rp->b_cnt = 0;
+                rp->cnt_lost = 0;
+            }
        spin_unlock_irqrestore(&rp->b_lock, flags);
        mutex_unlock(&rp->fetch_lock);
    }
static void mon_bin_vma_open(struct vm_area_struct *vma) {
    struct mon_reader_bin *rp = vma->vm_private_data;
+    unsigned long flags;
+    spin_lock_irqsave(&rp->b_lock, flags);
    rp->mmap_active++;
+    spin_unlock_irqrestore(&rp->b_lock, flags);
}

static void mon_bin_vma_close(struct vm_area_struct *vma) {
+    unsigned long flags;
+    struct mon_reader_bin *rp = vma->vm_private_data;
+    spin_lock_irqsave(&rp->b_lock, flags);
    rp->mmap_active--;
+    spin_unlock_irqrestore(&rp->b_lock, flags);
}
/*
@@ -1233,16 +1247,12 @@
    unsigned long offset, chunk_idx;
    struct page *pageptr;

    mutex_lock(&rp->fetch_lock);
    offset = vmf->pgoff << PAGE_SHIFT;
    -if (offset >= rp->b_size) {
    -mutex_unlock(&rp->fetch_lock);
    +if (offset >= rp->b_size)
        return VM_FAULT_SIGBUS;
    -}
    chunk_idx = offset / CHUNK_SIZE;
    pageptr = rp->b_vec[chunk_idx].pg;
    get_page(pageptr);
    mutex_unlock(&rp->fetch_lock);
    vmf->page = pageptr;
    return 0;
} 
--- linux-4.15.0.orig/drivers/usb/mon/mon_text.c
+++ linux-4.15.0/drivers/usb/mon/mon_text.c
@@ -85,6 +85,8 @@

    wait_queue_head_t wait;
    int printf_size;
+    size_t printf_offset;
+    size_t printf_togo;
char *printf_buf;
struct mutex printf_lock;

@@ -376,75 +378,103 @@
 return rc;
 }

-/*
- * For simplicity, we read one record in one system call and throw out
- * what does not fit. This means that the following does not work:
- *  
dd if=/dbg/usbmon/0t bs=10
- * Also, we do not allow seeks and do not bother advancing the offset.
- */
+static ssize_t mon_text_copy_to_user(struct mon_reader_text *rp,
+    char __user * const buf, const size_t nbytes)
+
+{ 
+    const size_t togo = min(nbytes, rp->printf_togo);
+    
+    if (copy_to_user(buf, &rp->printf_buf[rp->printf_offset], togo))
+        return -EFAULT;
+    rp->printf_togo -= togo;
+    rp->printf_offset += togo;
+    return togo;
+}

+/* ppos is not advanced since the llseek operation is not permitted. */
static ssize_t mon_text_read_t(struct file *file, char __user *buf,
-    size_t nbytes, loff_t *ppos)
+    size_t nbytes, loff_t *ppos)
{
struct mon_reader_text *rp = file->private_data;
struct mon_event_text *ep;
struct mon_text_ptr ptr;

    ssize_t ret;

    ep = mon_text_read_wait(rp, file);
-    if (IS_ERR(ep))
-        return PTR_ERR(ep);
    mutex_lock(&rp->printf_lock);
-    ptr.cnt = 0;
-    ptr.pbuf = rp->printf_buf;
-    ptr.limit = rp->printf_size;
-    -mon_text_read_head_t(rp, &ptr, ep);
-    -mon_text_read_statset(rp, &ptr, ep);
-    ptr.cnt += snprintf(ptr.pbuf + ptr.cnt, ptr.limit - ptr.cnt,
-        " %d", ep->length);
-    -mon_text_read_data(rp, &ptr, ep);


-if (copy_to_user(buf, rp->printf_buf, ptr.cnt))
-ptr.cnt = -EFAULT;
+if (rp->printf_togo == 0) {
 +
+ep = mon_text_read_wait(rp, file);
+if (IS_ERR(ep)) {
+mutex_unlock(&rp->printf_lock);
+return PTR_ERR(ep);
+}
+ptr.cnt = 0;
+ptr.pbuf = rp->printf_buf;
+ptr.limit = rp->printf_size;
+
+mon_text_read_head_t(rp, &ptr, ep);
+mon_text_read_statset(rp, &ptr, ep);
+ptr.cnt += snprintf(ptr.pbuf + ptr.cnt, ptr.limit - ptr.cnt,
+    " %d", ep->length);
+mon_text_read_data(rp, &ptr, ep);
+
+rp->printf_togo = ptr.cnt;
+rp->printf_offset = 0;
+
+kmem_cache_free(rp->e_slab, ep);
+
+ret = mon_text_copy_to_user(rp, buf, nbytes);
 mutex_unlock(&rp->printf_lock);
 -kmem_cache_free(rp->e_slab, ep);
 -return ptr.cnt;
 +return ret;
}

/* ppos is not advanced since the llseek operation is not permitted. */
static ssize_t mon_text_read_u(struct file *file, char __user *buf,
    size_t nbytes, loff_t *ppos);
+

-ep = mon_text_read_wait(rp, file);
-if (IS_ERR(ep))
-mutex_lock(&rp->printf_lock);
-ptr.cnt = 0;

ptr.pbuf = rp->printf_buf;
ptr.limit = rp->printf_size;

-mon_text_read_head_u(rp, &ptr, ep);
-if (ep->type == 'E') {
-mon_text_read_statset(rp, &ptr, ep);
} else if (ep->xfertype == USB_ENDPOINT_XFER_ISOC) {
-mon_text_read_isostat(rp, &ptr, ep);
-mon_text_read_isodesc(rp, &ptr, ep);
} else if (ep->xfertype == USB_ENDPOINT_XFER_INT) {
-mon_text_read_intstat(rp, &ptr, ep);
} else {
-mon_text_read_statset(rp, &ptr, ep);
+if (rp->printf_togo == 0) {
+  +ep = mon_text_read_wait(rp, file);
+  +if (IS_ERR(ep)) {
+    +mutex_unlock(&rp->printf_lock);
+    +return PTR_ERR(ep);
+  }
+  +ptr.cnt = 0;
+  +ptr.pbuf = rp->printf_buf;
+  +ptr.limit = rp->printf_size;
+  +mon_text_read_head_u(rp, &ptr, ep);
+  +if (ep->type == 'E') {
+    +mon_text_read_statset(rp, &ptr, ep);
+  } else if (ep->xfertype == USB_ENDPOINT_XFER_ISOC) {
+    +mon_text_read_isostat(rp, &ptr, ep);
+    +mon_text_read_isodesc(rp, &ptr, ep);
+  } else if (ep->xfertype == USB_ENDPOINT_XFER_INT) {
+    +mon_text_read_intstat(rp, &ptr, ep);
+  } else {
+    +mon_text_read_statset(rp, &ptr, ep);
+  }
+  +ptr.cnt += snprintf(ptr.pbuf + ptr.cnt, ptr.limit - ptr.cnt,
+    + "%d", ep->length);
+  +mon_text_read_data(rp, &ptr, ep);
+
+  +rp->printf_togo = ptr.cnt;
+  +rp->printf_offset = 0;
+  +kmem_cache_free(rp->e_slab, ep);
} }
+ptr.cnt += snprintf(ptr.pbuf + ptr.cnt, ptr.limit - ptr.cnt,
+  " %d", ep->length);
-mon_text_read_data(rp, &ptr, ep);
-if (copy_to_user(buf, rp->printf_buf, ptr.cnt))
  -ptr.cnt = -EFAULT;
+ret = mon_text_copy_to_user(rp, buf, nbytes);
mutex_unlock(&rp->printf_lock);
-kmem_cache_free(rp->e_slab, ep);
-return ptr.cnt;
+return ret;
}

static struct mon_event_text *mon_text_read_wait(struct mon_reader_text *rp,
--- linux-4.15.0.orig/drivers/usb/mtu3/Kconfig
+++ linux-4.15.0/drivers/usb/mtu3/Kconfig
@@ -4,6 +4,7 @@
tristate "MediaTek USB3 Dual Role controller"
depends on EXTCON & (USB || USB_GADGET) && HAS_DMA
depends on ARCH_MEDIATEK || COMPILE_TEST
+depends on EXTCON || !EXTCON
select USB_XHCI_MTK if USB_SUPPORT && USB_XHCI_HCD
help
 Say Y or M here if your system runs on MediaTek SoCs with
--- linux-4.15.0.orig/drivers/usb/mtu3/mtu3_core.c
+++ linux-4.15.0/drivers/usb/mtu3/mtu3_core.c
@@ -107,8 +107,12 @@
 (SSUSB_U2_PORT_DIS | SSUSB_U2_PORT_PDN | SSUSB_U2_PORT_HOST_SEL));

-if (mtu->ssusb->dr_mode == USB_DR_MODE_OTG)
+if (mtu->ssusb->dr_mode == USB_DR_MODE_OTG) {
    mtu3_setbits(ibase, SSUSB_U2_CTRL(0), SSUSB_U2_PORT_OTG_SEL);
+    if (mtu->is_u3_ip)
+        mtu3_setbits(ibase, SSUSB_U3_CTRL(0),
+            SSUSB_U3_PORT_DUAL_MODE);
+
    return ssusb_check_clocks(mtu->ssusb, check_clk);
  }
@@ -124,8 +128,12 @@
    mtu3_setbits(ibase, SSUSB_U2_CTRL(0),
    SSUSB_U2_PORT_DIS | SSUSB_U2_PORT_PDN);

-if (mtu->ssusb->dr_mode == USB_DR_MODE_OTG)
+if (mtu->ssusb->dr_mode == USB_DR_MODE_OTG) {
    mtu3_clrbits(ibase, SSUSB_U2_CTRL(0), SSUSB_U2_PORT_OTG_SEL);
+    if (mtu->is_u3_ip)
+        mtu3_clrbits(ibase, SSUSB_U3_CTRL(0),
+            SSUSB_U3_PORT_DUAL_MODE);
+}
if (mtu->is_u3_ip) {
/* Enable U3 LTSSM interrupts */
-value = HOT_RST_INTR | WARM_RST_INTR | VBUS_RISE_INTR |
- VBUS_FALL_INTR | ENTER_U3_INTR | EXIT_U3_INTR;
+value = HOT_RST_INTR | WARM_RST_INTR |
+ENTER_U3_INTR | EXIT_U3_INTR;
mtu3_writel(mbase, U3D_LTSSM_INTR_ENABLE, value);
}

@@ -564,8 +572,10 @@
if (mtu->is_u3_ip) {
/* disable LGO_U1/U2 by default */
mtu3_clrbits(mbase, U3D_LINK_POWER_CONTROL,
-SW_U1_ACCEPT_ENABLE | SW_U2_ACCEPT_ENABLE |
SW_U1_REQUEST_ENABLE | SW_U2_REQUEST_ENABLE);
/+* enable accept LGO_U1/U2 link command from host */
+mtu3_setbits(mbase, U3D_LINK_POWER_CONTROL,
+SW_U1_ACCEPT_ENABLE | SW_U2_ACCEPT_ENABLE);
/* device responses to u3_exit from host automatically */
mtu3_clrbits(mbase, U3D_LTSSM_CTRL, SOFT_U3_EXIT_EN);
/* automatically build U2 link when U3 detect fail */
--- linux-4.15.0.orig/drivers/usb/mtu3/mtu3_gadget.c
+++ linux-4.15.0/drivers/usb/mtu3/mtu3_gadget.c
@@ -69,14 +69,12 @@
u32 interval = 0;
u32 mult = 0;
u32 burst = 0;
-int max_packet;
int ret;

desc = mep->desc;
comp_desc = mep->comp_desc;
mep->type = usb_endpoint_type(desc);
-max_packet = usb_endpoint_maxp(desc);
-mep->maxp = max_packet & GENMASK(10, 0);
+mtu3_setbits(mbase, U3D_LTSSM_INTR_ENABLE, value);
}

@@ -181,8 +189,8 @@
if (mtu->is_u3_ip) {
/* Enable U3 LTSSM interrupts */
-value = HOT_RST_INTR | WARM_RST_INTR | VBUS_RISE_INTR |
- VBUS_FALL_INTR | ENTER_U3_INTR | EXIT_U3_INTR;
+value = HOT_RST_INTR | WARM_RST_INTR |
+ENTER_U3_INTR | EXIT_U3_INTR;
mtu3_writel(mbase, U3D_LTSSM_INTR_ENABLE, value);
}
+ mult = usb_endpoint_maxp_mult(desc) - 1;
}  break;
default:
@@ -573,6 +571,7 @@
spin_unlock_irqrestore(&mtu->lock, flags);
+ synchronize_irq(mtu->irq);
return 0;
}
@@ -585,6 +584,16 @@
.udc_stop = mtu3_gadget_stop,
};
+static void mtu3_state_reset(struct mtu3 *mtu)
+{
+ mtu->address = 0;
+ mtu->ep0_state = MU3D_EP0_STATE_SETUP;
+ mtu->may_wakeup = 0;
+ mtu->u1_enable = 0;
+ mtu->u2_enable = 0;
+ mtu->delayed_status = false;
+}
+
+ static void init_hw_ep(struct mtu3 *mtu, struct mtu3_ep *mep,
+ u32 epnum, u32 is_in)
+{
+ @@ -706,6 +715,7 @@
spin_lock(&mtu->lock);
}
+mtu3_state_reset(mtu);
usb_gadget_set_state(&mtu->g, USB_STATE_NOTATTACHED);
}
@@ -716,11 +726,6 @@
/* report disconnect, if we didn't flush EP state */
if (mtu->g.speed != USB_SPEED_UNKNOWN)
mtu3_gadget_disconnect(mtu);
-
-mtu->address = 0;
-mtu->ep0_state = MU3D_EP0_STATE_SETUP;
-mtu->may_wakeup = 0;
-mtu->u1_enable = 0;
-mtu->u2_enable = 0;
-mtu->delayed_status = false;
+else
+mtu3_state_reset(mtu);
}

--- linux-4.15.0.orig/drivers/usb/mtu3/mtu3_gadget_ep0.c
+++ linux-4.15.0/drivers/usb/mtu3/mtu3_gadget_ep0.c
@@ -326,9 +326,9 @@
lpc = mtu3_readl(mbase, U3D_LINK_POWER_CONTROL);
  if (set)
    -lpc |= SW_U1_ACCEPT_ENABLE;
    +lpc |= SW_U1_REQUEST_ENABLE;
  else
    -lpc &= ~SW_U1_ACCEPT_ENABLE;
    +lpc &= ~SW_U1_REQUEST_ENABLE;
  mtu3_writel(mbase, U3D_LINK_POWER_CONTROL, lpc);

  mtu->u1_enable = !!set;
  @@ -341,9 +341,9 @@
lpc = mtu3_readl(mbase, U3D_LINK_POWER_CONTROL);
  if (set)
    -lpc |= SW_U2_ACCEPT_ENABLE;
    +lpc |= SW_U2_REQUEST_ENABLE;
  else
    -lpc &= ~SW_U2_ACCEPT_ENABLE;
    +lpc &= ~SW_U2_REQUEST_ENABLE;
  mtu3_writel(mbase, U3D_LINK_POWER_CONTROL, lpc);

  mtu->u2_enable = !!set;
  --- linux-4.15.0.orig/drivers/usb/mtu3/mtu3_hw_regs.h
  +++ linux-4.15.0/drivers/usb/mtu3/mtu3_hw_regs.h
  @@ -459,6 +459,7 @@

  /* U3D_SSUSB_U3_CTRL_0P */
  #define SSUSB_U3_PORT_SSP_SPEEDBIT(9)
  +#define SSUSB_U3_PORT_DUAL_MODEBIT(7)
  #define SSUSB_U3_PORT_HOST_SELBIT(2)
  #define SSUSB_U3_PORT_PDNBIT(1)
  #define SSUSB_U3_PORT_DISBIT(0)
  --- linux-4.15.0.orig/drivers/usb/mtu3_qmu.c
  +++ linux-4.15.0/drivers/usb/mtu3_qmu.c
  @@ -427,7 +427,7 @@
  return;
}

-dev_dbg(mtu->dev, "%s send ZLP for req=%p\n", __func__, mreq);
+dev_dbg(mtu->dev, "%s send ZLP for req=%p\n", __func__, req);
mtu3_clrbit( mbase, MU3D_EP_TXCR0( mep->epnum ), TX_DMAREQEN );

--- linux-4.15.0.orig/drivers/usb/musb/Kconfig
+++ linux-4.15.0/drivers/usb/musb/Kconfig
@@ -69,7 +69,7 @@
depends on NOP_USB_XCEIV
 depends on PHY_SUN4I_USB
 depends on EXTCON
 -depends on GENERIC_PHY
 +select GENERIC_PHY
 select SUNXI_SRAM

 config USB_MUSB_DAVINCI
 --- linux-4.15.0.orig/drivers/usb/musb/musb_core.c
+++ linux-4.15.0/drivers/usb/musb/musb_core.c
@@ -1756,6 +1756,7 @@
int		vbus;
unsigned char devctl;
+pm_runtime_get_sync(dev);
spin_lock_irqsave(&musb->lock, flags);
val = musb->a_wait_bcon;
vbus = musb_platform_get_vbus_status(musb);
@@ -1769,6 +1770,7 @@
vbus = 0;
} spin_unlock_irqrestore(&musb->lock, flags);
+pm_runtime_put_sync(dev);

return sprintf(buf, "Vbus %s, timeout %lu msec\n",
vbus ? "on" : "off", val);
@@ -1812,6 +1814,15 @@
define MUSB_QUIRK_B_INVALID_VBUS_91( MUSB_DEVCTL_BDEVICE | 
( 2 << MUSB_DEVCTL_VBUS_SHIFT) | 
MUSB_DEVCTL_SESSION)
+#define MUSB_QUIRK_B_DISCONNECT_99( MUSB_DEVCTL_BDEVICE | 
+ ( 3 << MUSB_DEVCTL_VBUS_SHIFT) | 
+ MUSB_DEVCTL_SESSION)
#define MUSB_QUIRK_A_DISCONNECT_19(( 3 << MUSB_DEVCTL_VBUS_SHIFT) | 
MUSB_DEVCTL_SESSION)
@@ -1834,6 +1839,15 @@
s = MUSB_DEVCTL_FSDEV | MUSB_DEVCTL_LSDEV | MUSB_DEVCTL_HR;
switch (devctl & ~s) {
+case MUSB_QUIRK_B_DISCONNECT_99:
+if (musb->quirk_retries && !musb->flush_irq_work) {
+musb_dbg(musb, "Poll devctl in case of suspend after disconnect\n");

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+schedule_delayed_work(&musb->irq_work,
+    msecs_to_jiffies(1000));
+musb->quirk_retries--;
+break;
+
+/* fall through */
+case MUSB_QUIRK_B_INVALID_VBUS_91:
    if (musb->quirk_retries && !musb->flush_irq_work) {
        musb_dbg(musb,
        struct musb_pending_work *w;
        unsigned long flags;
        bool is_suspended;
        int error;
        
        if (WARN_ON(!callback))
            return -EINVAL;

        -if (pm_runtime_active(musb->controller))
            return callback(musb, data);
        -spin_lock_irqsave(&musb->list_lock, flags);
        +is_suspended = musb->is_runtime_suspended;
        
        -w = devm_kzalloc(musb->controller, sizeof(*w), GFP_ATOMIC);
        -if (!w)
            return -ENOMEM;
        +w = devm_kzalloc(musb->controller, sizeof(*w), GFP_ATOMIC);
        +if (!w) {
            +error = -ENOMEM;
            +goto out_unlock;
            +}
        ++w->callback = callback;
        +w->data = data;
        -w->callback = callback;
        -w->data = data;
        -spin_lock_irqsave(&musb->list_lock, flags);
        -if (musb->is_runtime_suspended) {
            list_add_tail(&w->node, &musb->pending_list);
            error = 0;
        -} else {
            -dev_err(musb->controller, "could not add resume work \%p\n",
                -callback);
            -devm_kfree(musb->controller, w);
            -error = -EINPROGRESS;
            
            out_unlock:}
    }
}
spin_unlock_irqrestore(&musb->list_lock, flags);

if (!is_suspended)
error = callback(musb, data);
return error;
}
EXPORT_SYMBOL_GPL(musb_queue_resume_work);

musb_disable_interruptions(musb);
musb_write(musb->mregs, MUSB_DEVCTL, 0);

/* MUSB_POWER_SOFTCONN might be already set, JZ4740 does this. */
musb_write(musb->mregs, MUSB_POWER, 0);

/* Init IRQ workqueue before request_irq */
INIT_DELAYED_WORK(&musb->irq_work, musb_irq_work);
INIT_DELAYED_WORK(&musb->deassert_reset_work, musb_deassert_reset);

musb_disable_interruptions(musb);
musb_write(musb->mregs, MUSB_DEVCTL, 0);
spin_unlock_irqrestore(&musb->lock, flags);
musb_platform_exit(musb);

pm_runtime_dont_use_autosuspend(musb->controller);
pm_runtime_put_sync(musb->controller);
pm_runtime_disable(musb->controller);
-musb_platform_exit(musb);
musb_phy_callback = NULL;

if (musb->dma_controller)
musb_dma_controller_destroy(musb->dma_controller);

if ((devctl & mask) != (musb->context.devctl & mask))
musb->port1_status = 0;

-musb_start(musb);
+musb_enable_interruptions(musb);
+musb_platform_enable(musb);

/* session might be disabled in suspend */
+if (musb->port_mode == MUSB_HOST &&
+!(musb->ops->quirks & MUSB_PRESERVE_SESSION)) {
+devctl |= MUSB_DEVCTL_SESSION;
+musb_write(musb->mregs, MUSB_DEVCTL, devctl);
+}

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spin_lock_irqsave(&musb->lock, flags);
error = musb_run_resume_work(musb);

--- linux-4.15.0.orig/drivers/usb/musb/musb_debugfs.c
+++ linux-4.15.0/drivers/usb/musb/musb_debugfs.c
@@ -181,6 +181,11 @@
      test;
      charbuf[24];

+memset(buf, 0x00, sizeof(buf));
+if (copy_from_user(buf, ubuf, min_t(size_t, sizeof(buf) - 1, count)))
+return -EFAULT;
+
pm_runtime_get_sync(musb->controller);
test = musb_readb(musb->mregs, MUSB_TESTMODE);
if (test) {
@@ -189,11 +194,6 @@
goto ret;
}

-memset(buf, 0x00, sizeof(buf));
-
-if (copy_from_user(buf, ubuf, min_t(size_t, sizeof(buf) - 1, count)))
-return -EFAULT;
-
if (strstarts(buf, "force host full-speed"))
test = MUSB_TEST_FORCE_HOST | MUSB_TEST_FORCE_FS;

--- linux-4.15.0.orig/drivers/usb/musb/musb_dsps.c
+++ linux-4.15.0/drivers/usb/musb/musb_dsps.c
@@ -181,9 +181,11 @@

musb_writel(reg_base, wrp->epintr_set, epmask);
musb_writel(reg_base, wrp->coreintr_set, coremask);
/* start polling for ID change in dual-role idle mode */
-if (musb->xceiv->otg->state == OTG_STATE_B_IDLE &&
-musb->port_mode == MUSB_PORT_MODE_DUAL_ROLE)
+/*
+ * start polling for runtime PM active and idle,
+ * and for ID change in dual-role idle mode.
+ */
+if (musb->xceiv->otg->state == OTG_STATE_B_IDLE)
dsp_mod_timer(glue, -1);
}
@@ -227,8 +229,13 @@

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switch (musb->xceiv->otg->state) {
  case OTG_STATE_A_WAIT_VRISE:
    -dsps_mod_timer Optional(glue);
    -break;
    +if (musb->port_mode == MUSB_HOST) {
    +musb->xceiv->otg->state = OTG_STATE_A_WAIT_BCON;
    +dsps_mod_timer Optional(glue);
    +break;
    +}
    +/* fall through */
    +
  case OTG_STATE_A_WAIT_BCON:
    /* keep VBUS on for host-only mode */
    if (musb->port_mode == MUSB_PORT_MODE_HOST) {
      @ @ -249,6 +256,10 @@
      musb->xceiv->otg->state = OTG_STATE_A_IDLE;
      MUSB_HST_MODE(musb);
    }
    +
    +if (musb->port_mode == MUSB_PERIPHERAL)
    +skip_session = 1;
    +
    if (!(devctl & MUSB_DEVCTL_SESSION) && !skip_session)
    musb_writeb(mregs, MUSB_DEVCTL,
          MUSB_DEVCTL_SESSION);
    @ @ -669,16 +680,6 @@
    return controller;
}

- static void dsps_dma_controller_destroy(struct dma_controller *c)
  -{
    -struct musb *musb = c->musb;
    -struct dsps_glue *glue = dev_get_drvdata(musb->controller->parent);
    -void __iomem *usbss_base = glue->usbss_base;
    -
    -musb_writel(usbss_base, USBSS_IRQ_CLEARR, USBSS_IRQ_PD_COMP);
    -cppi41_dma_controller_destroy(c);
  -}

  #ifndef CONFIG_PM_SLEEP
  static void dsps_dma_controller_suspend(struct dsps_glue *glue)
    {
      @ @ -708,7 +709,7 @@

      #ifdef CONFIG_USB_TI_CPPI41_DMA
        .dma_init= dsps_dma_controller_create,
        .dma_exit= dsps_dma_controller_destroy,
        +.dma_exit= cppi41_dma_controller_destroy,
      #endif
ifdef
.enable= dsps_musb_enable,
disable= dsps_musb_disable,
@@ -920,23 +921,24 @@
if (!glue->usbss_base)
return -ENXIO;

-if (usb_get_dr_mode(&pdev->dev) == USB_DR_MODE_PERIPHERAL) {
- ret = dsps_setup_optional_vbus_irq(pdev, glue);
- if (ret)
- goto err_iounmap;
- }
- platform_set_drvdata(pdev, glue);
- pm_runtime_enable(&pdev->dev);
- ret = dsps_create_musb_pdev(glue, pdev);
- if (ret)
- goto err;
+
+if (usb_get_dr_mode(&pdev->dev) == USB_DR_MODE_PERIPHERAL) {
+ ret = dsps_setup_optional_vbus_irq(pdev, glue);
+ if (ret)
+ goto unregister_pdev;
+ }
+
+ return 0;
+
+ unregister_pdev:
+ platform_device_unregister(glue->musb);
 err:
 pm_runtime_enable(&pdev->dev);
-err_iounmap:
 iounmap(glue->usbss_base);
 return ret;
}
--- linux-4.15.0.orig/drivers/usb/musb/musb_gadget.c
+++ linux-4.15.0/drivers/usb/musb/musb_gadget.c
@@ -417,7 +417,6 @@
 req = next_request(musb_ep);
 request = &req->request;

-trace_musb_req_tx(req);
 csr = musb_readw(epio, MUSB_TXCSR);
 musb_dbg(musb, "<== %s, txcsr %04x", musb_ep->end_point.name, csr);
@@ -453,11 +452,10 @@
if (request) {
- u8 is_dma = 0;
- bool short_packet = false;
+
+ trace_musb_req_tx(req);

if (dma && (csr & MUSB_TXCSR_DMAENAB)) {
- is_dma = 1;

csr |= MUSB_TXCSR_P_WZC_BITS;

csr &= ~(MUSB_TXCSR_DMAENAB | MUSB_TXCSR_P_UNDERRUN |
 MUSB_TXCSR_TXPKTRDY | MUSB_TXCSR_AUTOSET);
@@ -475,16 +473,8 @@ */

if ((request->zero && request->length)
&& (request->length % musb_ep->packet_sz == 0)
- && (request->actual == request->length))
- short_packet = true;
-
- if ((musb_dma_inventra(musb) || musb_dma_ux500(musb)) &&
- (is_dma && (!dma->desired_mode ||
- (request->actual &
- (musb_ep->packet_sz - 1))))))
- short_packet = true;
+
+ && (request->actual == request->length)) {

- if (short_packet) {
- /*
- * On DMA completion, FIFO may not be
- * available yet...
- --- linux-4.15.0.orig/drivers/usb/musb/musb_gadget_ep0.c
- +++ linux-4.15.0/drivers/usb/musb/musb_gadget_ep0.c
- @@ -89,15 +89,19 @@
- }

- is_in = epnum & USB_DIR_IN;
- if (is_in) {
- epnum &= 0x0f;
+ epnum &= 0x0f;
+ if (epnum >= MUSB_C_NUM_EPS) {
+ handled = EINVAL;
+ break;
+ }
+ 
+ if (is_in)
 ep = &musb->endpoints[epnum].ep_in;
- } else {
+ else
 ep = &musb->endpoints[epnum].ep_out;
}
-} regs = musb->endpoints[epnum].regs;

- if (epnum >= MUSB_C_NUM_EPS || !ep->desc) {
  +if (!ep->desc) {
    handled = -EINVAL;
    break;
  }
  -- linux-4.15.0.orig/drivers/usb/musb/musb_host.c
+++ linux-4.15.0/drivers/usb/musb/musb_host.c
@@ -393,13 +393,7 @@
  }
  }

- /*
- * The pipe must be broken if current urb->status is set, so don't
- * start next urb.
- * TODO: to minimize the risk of regression, only check urb->status
- * for RX, until we have a test case to understand the behavior of TX.
- */
- if (!status || !is_in) && qh && qh->is_ready) {
  +if (qh != NULL && qh->is_ready) {
    musb_dbg(musb, "... next ep%d %cX urb %p",
             hw_ep->epnum, is_in ? 'R' : 'T', next_urb(qh));
    musb_start_urb(musb, is_in, qh);
    @@ -1004,7 +998,9 @@ /* set tx_reinit and schedule the next qh */
      ep->tx_reinit = 1;
    }
    -musb_start_urb(musb, is_in, next_qh);
    +
    +musb_start_urb(musb, is_in, next_qh);
    }

    @@ -1473,10 +1469,7 @@ /* We need to map sg if the transfer_buffer is
      * NULL.
      */
- if (!urb->transfer_buffer)
-     qh->use_sg = true;
-   -
-   -if (qh->use_sg) {
-     +if (!urb->transfer_buffer) {
-       /* sg_miter_start is already done in musb_ep_program */
-       if (!sg_miter_next(&qh->sg_miter)) {
-         dev_err(musb->controller, "error: sg list empty\n");
-     }

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@@ -1484,9 +1477,8 @@
    status = -EINVAL;
    goto done;
 }
-urb->transfer_buffer = qh->sg_miter.addr;
+urb->transfer_buffer = qh->sg_miter.addr;
    length = min_t(u32, length, qh->sg_miter.length);
    -musb_write_fifo(hw_ep, length, urb->transfer_buffer);
    +musb_write_fifo(hw_ep, length, qh->sg_miter.addr);
    qh->sg_miter.consumed = length;
    sg_miter_stop(&qh->sg_miter);
    } else {
@@ -1495,11 +1487,6 @@
    qh->segsize = length;

    -if (qh->use_sg) {
        -if (offset + length >= urb->transfer_buffer_length)
        -qh->use_sg = false;
        -}
        -
        musb_ep_select(mbase, epnum);
        musb_writew(epio, MUSB_TXCSR,
        MUSB_TXCSR_H_WZC_BITS | MUSB_TXCSR_TXPKTRDY);
@@ -2017,8 +2004,10 @@
        urb->actual_length += xfer_len;
        qh->offset += xfer_len;
        if (done) {
            if (qh->use_sg)
            +if (qh->use_sg) {
            qh->use_sg = false;
            +urb->transfer_buffer = NULL;
            +}

        if (urb->status == -EINPROGRESS)
        urb->status = status;
@@ -2539,8 +2528,11 @@
        {
            struct musb*musb = hcd_to_musb(hcd);
            u8devctl;
            +intret;
            -musb_port_suspend(musb, true);
            +ret = musb_port_suspend(musb, true);
            +if (ret)
            +return ret;

            if (!is_host_active(musb))
            return 0;

extern void musb_root_disconnect(struct musb *musb);
extern void musb_host_resume_root_hub(struct musb *musb);
extern void musb_host_poke_root_hub(struct musb *musb);

/*extern void musb_port_suspend(struct musb *musb, bool do_suspend);*/
+extern int musb_port_suspend(struct musb *musb, bool do_suspend);
extern void musb_port_reset(struct musb *musb, bool do_reset);
extern void musb_host_finish_resume(struct work_struct *work);
#endif

--- linux-4.15.0.orig/drivers/usb/musb/musb_virthub.c
+++ linux-4.15.0/drivers/usb/musb/musb_virthub.c
@@ -48,14 +48,14 @@
  spin_unlock_irqrestore(&musb->lock, flags);
 }

-void musb_port_suspend(struct musb *musb, bool do_suspend)
+int musb_port_suspend(struct musb *musb, bool do_suspend)
{
  struct usb_otg*otg = musb->xceiv->otg;
  u8power;
  void __iomem*mbase = musb->mregs;

  if (!is_host_active(musb))
    -return;
  +return 0;

  /* NOTE: this doesn't necessarily put PHY into low power mode,
    * turning off its clock; that's a function of PHY integration and
  */
  if (do_suspend) {
    int retries = 10000;

    -power &= ~MUSB_POWER_RESUME;
    -power |= MUSB_POWER_SUSPENDM;
    +power &= ~MUSB_POWER_RESUME;
    +power |= MUSB_POWER_SUSPENDM;
- mush_writeb(mbase, MUSB_POWER, power);
+ if (power & MUSB_POWER_RESUME)
+ return -EBUSY;
+ 
+ if (!((power & MUSB_POWER_SUSPENDM)) { 
+ power |= MUSB_POWER_SUSPENDM;
+ mush_writeb(mbase, MUSB_POWER, power);

- /* Needed for OPT A tests */
- power = mush_readb(mbase, MUSB_POWER);
- while (power & MUSB_POWER_SUSPENDM) {
- /* Needed for OPT A tests */
+ power = mush_readb(mbase, MUSB_POWER);
+ if (retries-- < 1)
+ break;
+ while (power & MUSB_POWER_SUSPENDM) {
+ power = mush_readb(mbase, MUSB_POWER);
+ if (retries-- < 1)
+ break;
+ }
}

musb_dbg(musb, "Root port suspended, power %02x", power);
@@ -111,6 +115,7 @@
 schedule_delayed_work(&musb->finish_resume_work,
    msecs_to_jiffies(USB_RESUME_TIMEOUT));
 }
+ return 0;
}

void mush_port_reset(struct mush *musb, bool do_reset)
--- linux-4.15.0.orig/drivers/usb/musb/musbhsdma.c
+++ linux-4.15.0/drivers/usb/musb/musbhsdma.c
@@ -295,12 +295,10 @@
     channel->status = MUSB_DMA_STATUS_FREE;
 */ completed */
- if ((devctl & MUSB_DEVCTL_HM)
- && (musb_channel->transmit)
- && ((channel->desired_mode == 0)
-    || (channel->actual_len &
-    (musb_channel->max_packet_sz - 1)))
- ) {
+ if (musb_channel->transmit &&
+ (!channel->desired_mode ||
+ (channel->actual_len %
+ musb_channel->max_packet_sz))
    u8 epnum = musb_channel->epnum;
int offset = musb->io.ep_offset(epnum, MUSB_TXCSR);
@@ -312,11 +310,14 @@
    */
musb_ep_select(mbase, epnum);
txcsr = musb_readw(mbase, offset);
    -txcsr &= ~(MUSB_TXCSR_DMAENAB |
    +if (channel->desired_mode == 1) {
    +txcsr &= ~(MUSB_TXCSR_DMAENAB |
    -musb_writew(mbase, offset, txcsr);
    -/* Send out the packet */
    -txcsr &= ~MUSB_TXCSR_DMAMODE;
    +musb_writew(mbase, offset, txcsr);
    +/* Send out the packet */
    +txcsr &= ~MUSB_TXCSR_DMAMODE;
    +txcsr |= MUSB_TXCSR_DMAENAB;
    +}
txcsr |= MUSB_TXCSR_TXPKTRDY;
musb_writew(mbase, offset, txcsr);
}
@@ -373,7 +374,7 @@
    controller->controller.channel_abort = dma_channel_abort;
    
    if (request_irq(irq, dma_controller_irq, 0,
    -dev_name(musb->controller), &controller->controller)) {
    +dev_name(musb->controller), controller)) {
      dev_err(dev, "request_irq %d failed!\n", irq);
      musb_dma_controller_destroy(&controller->controller);

      --- linux-4.15.0.orig/drivers/usb/musb/omap2430.c
      +++ linux-4.15.0/drivers/usb/musb/omap2430.c
      @@ -372,8 +372,6 @@
          .init	= omap2430_musb_init,
          .exit	= omap2430_musb_exit,

          .set_vbus= omap2430_musb_set_vbus,
          
          .enable= omap2430_musb_enable,
          .disable= omap2430_musb_disable,

          --- linux-4.15.0.orig/drivers/usb/musb/tusb6010.c
          +++ linux-4.15.0/drivers/usb/musb/tusb6010.c
          @@ -190,6 +190,7 @@
          }
      }
    }
    if (len > 0) {
      /* Write the rest 1 - 3 bytes to FIFO */
      +val = 0;
      
      --- linux-4.15.0.orig/drivers/usb/musb/tusb6010.c
      +++ linux-4.15.0/drivers/usb/musb/tusb6010.c
      @@ -190,6 +190,7 @@
      }
    }
    if (len > 0) {
      /* Write the rest 1 - 3 bytes to FIFO */
      +val = 0;
      
      --- linux-4.15.0.orig/drivers/usb/musb/tusb6010.c
      +++ linux-4.15.0/drivers/usb/musb/tusb6010.c
      @@ -190,6 +190,7 @@
      }
    }
    if (len > 0) {
      /* Write the rest 1 - 3 bytes to FIFO */
      +val = 0;
      
      --- linux-4.15.0.orig/drivers/usb/musb/tusb6010.c
      +++ linux-4.15.0/drivers/usb/musb/tusb6010.c
      @@ -190,6 +190,7 @@
      }
    }
    if (len > 0) {
      /* Write the rest 1 - 3 bytes to FIFO */
      +val = 0;
      
      --- linux-4.15.0.orig/drivers/usb/musb/tusb6010.c
      +++ linux-4.15.0/drivers/usb/musb/tusb6010.c
      @@ -190,6 +190,7 @@
      }
    }
    if (len > 0) {
      /* Write the rest 1 - 3 bytes to FIFO */
      +val = 0;
      
      --- linux-4.15.0.orig/drivers/usb/musb/tusb6010.c
      +++ linux-4.15.0/drivers/usb/musb/tusb6010.c
      @@ -190,6 +190,7 @@
      }
    }
    if (len > 0) {
      /* Write the rest 1 - 3 bytes to FIFO */
      +val = 0;
      
      --- linux-4.15.0.orig/drivers/usb/musb/tusb6010.c
      +++ linux-4.15.0/drivers/usb/musb/tusb6010.c
      @@ -190,6 +190,7 @@
      }
    }
memcpy(&val, buf, len);
msusb_writel(fifo, 0, val);
}

--- linux-4.15.0.orig/drivers/usb/phy/Kconfig
+++ linux-4.15.0/drivers/usb/phy/Kconfig
@@ -20,8 +20,8 @@
in host mode, low speed.
config FSL_USB2_OTG
-bool "Freescale USB OTG Transceiver Driver"
-depends on USB_EHCI_FSL && USB_FSL_USB2 && USB_OTG_FSM && PM
+tristate "Freescale USB OTG Transceiver Driver"
+depends on USB_EHCI_FSL && USB_FSL_USB2 && USB_OTG_FSM=y && PM
depends on USB_GADGET || !USB_GADGET # if USB_GADGET=m, this can't be 'y'
selcet USB_PHY
help
--- linux-4.15.0.orig/drivers/usb/phy/phy-am335x.c
+++ linux-4.15.0/drivers/usb/phy/phy-am335x.c
@@ -61,9 +61,6 @@
if (ret)
    return ret;

-ret = usb_add_phy_dev(&am_phy->usb_phy_gen.phy);
-if (ret)
-    return ret;

am_phy->usb_phy_gen.phy.init = am335x_init;
am_phy->usb_phy_gen.phy.shutdown = am335x_shutdown;

@@ -82,7 +79,7 @@
device_set_wakeup_enable(dev, false);
phy_ctrl_power(am_phy->phy_ctrl, am_phy->id, am_phy->dr_mode, false);

-return 0;
+return usb_add_phy_dev(&am_phy->usb_phy_gen.phy);
}

static int am335x_phy_remove(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/usb/phy/phy-fsl-usb.c
+++ linux-4.15.0/drivers/usb/phy/phy-fsl-usb.c
@@ -861,6 +861,7 @@
if (pdata->init && pdata->init(pdev) != 0)
    return -EINVAL;
+#ifdef CONFIG_PPC32
if (pdata->big_endian_mmio) {
    _fsl_readl = _fsl_readl_be;
    _fsl_writel = _fsl_writel_be;
@@ -868,9 +869,12 @@
_fsl_readl = _fsl_readl_le;
_fsl_writel = _fsl_writel_le;
}
+#endif

/*! request irq */

p_otg->irq = platform_get_irq(pdev, 0);
+if (p_otg->irq < 0)
+return p_otg->irq;
status = request_irq(p_otg->irq, fsl_otg_isr,
IRQF_SHARED, driver_name, p_otg);
if (status) {
@@ -958,7 +962,7 @@
/*
 * state file in sysfs
 */

-static int show_fsl_usb2_otg_state(struct device *dev,
+static ssize_t show_fsl_usb2_otg_state(struct device *dev,
 struct device_attribute *attr, char *buf)
{
 struct otg_fsm *fsm = &fsl_otg_dev->fsm;
--- linux-4.15.0.orig/drivers/usb/phy/phy-mxs-usb.c
+++ linux-4.15.0/drivers/usb/phy/phy-mxs-usb.c
@@ -602,6 +602,9 @@
 enum usb_charger_type chgr_type = UNKNOWN_TYPE;
 
+if (!regmap)
+return UNKNOWN_TYPE;
+
+if (mxs_charger_data_contact_detect(mxs_phy))
 return chgr_type;

--- linux-4.15.0.orig/drivers/usb/phy/phy-tahvo.c
+++ linux-4.15.0/drivers/usb/phy/phy-tahvo.c
@@ -310,7 +310,9 @@
 return r;
 }
-static DEVICE_ATTR(otg_mode, 0644, otg_mode_show, otg_mode_store);
+static DEVICE_ATTR_RW(otg_mode);

 static struct attribute *tahvo_attributes[] = {
 &dev_attr_vbus.attr,
@@ -396,7 +396,9 @@
 dev_set_drvdata(&pdev->dev, tu);
-tu->irq = platform_get_irq(pdev, 0);
+tu->irq = ret = platform_get_irq(pdev, 0);
+if (ret < 0)
+return ret;
ret = request_threaded_irq(tu->irq, NULL, tahvo_usb_vbus_interrupt,
    IRQF_ONESHOT,
    "tahvo-vbus", tu);
--- linux-4.15.0.orig/drivers/usb/phy/phy-twl6030-usb.c
+++ linux-4.15.0/drivers/usb/phy/phy-twl6030-usb.c
@@ -342,6 +342,11 @@
twl->irq2	= platform_get_irq(pdev, 1);
twl->linkstat= MUSB_UNKNOWN;
+if (twl->irq1 < 0)
+return twl->irq1;
+if (twl->irq2 < 0)
+return twl->irq2;
+twl->comparator.set_vbus	= twl6030_set_vbus;
twl->comparator.start_srp	= twl6030_start_srp;
@@ -400,7 +405,7 @@
{
    struct twl6030_usb *twl = platform_get_drvdata(pdev);
-cancel_delayed_work(&twl->get_status_work);
+cancel_delayed_work_sync(&twl->get_status_work);
twl6030_interrupt_mask(TWL6030_USBOTG_INT_MASK,
    REG_INT_MSK_LINE_C);
twl6030_interrupt_mask(TWL6030_USBOTG_INT_MASK,
--- linux-4.15.0.orig/drivers/usb/renesas_usbhs/common.c
+++ linux-4.15.0/drivers/usb/renesas_usbhs/common.c
@@ -457,6 +457,10 @@
*/
static const struct of_device_id usbhs_of_match[] = {
    {
+compatible = "renesas,usbhs-r8a774c0",
+data = (void *)USBHS_TYPE_RCAR_GEN3_WITH_PLL,
+},
+{
.compatible = "renesas,usbhs-r8a7790",
.data = (void *)USBHS_TYPE_RCAR_GEN2,
},
--- linux-4.15.0.orig/drivers/usb/renesas_usbhs/common.h
+++ linux-4.15.0/drivers/usb/renesas_usbhs/common.h
@@ -154,11 +154,12 @@
#define VBSTS	(1 << 7) /* VBUS_0 and VBUSIN_0 Input Status */
#define VALID	(1 << 3) /* USB Request Receive */
#define DVSQ_MASK  (0x3 << 4)  /* Device State */
+#define DVSQ_MASK  (0x7 << 4)  /* Device State */
#define POWER_STATE(0 << 4)
#define DEFAULT_STATE(1 << 4)
#define ADDRESS_STATE(2 << 4)
#define CONFIGURATION_STATE(3 << 4)
+#define SUSPENDED_STATE(4 << 4)

#define CTSQ_MASK  (0x7)  /* Control Transfer Stage */
#define IDLE_SETP_UP_STAGE(0)  /* Idle stage or setup stage */
@@ -204,6 +205,7 @@
 /* DCPCTR */
 #define BSTS(1 << 15)  /* Buffer Status */
 #define SUREQ(1 << 14)  /* Sending SETUP Token */
+#define INBUFM(1 << 14)  /* (PIPEnCTR) Transfer Buffer Monitor */
 #define CSSTS(1 << 12)  /* CSSTS Status */
 #define ACLRM(1 << 9)  /* Buffer Auto-Clear Mode */
 #define SQCLR(1 << 8)  /* Toggle Bit Clear */
--- linux-4.15.0.orig/drivers/usb/renesas_usbhs/fifo.c
+++ linux-4.15.0/drivers/usb/renesas_usbhs/fifo.c
@@ -89,7 +89,7 @@
 list_del_init(&pkt->node);
 }

-struct usbhs_pkt *__usbhsf_pkt_get(struct usbhs_pipe *pipe)
+struct usbhs_pkt *__usbhsf_pkt_get(struct usbhs_pipe *pipe)
{
    return list_first_entry_or_null(&pipe->list, struct usbhs_pkt, node);
}

-static struct usbhs_pkt *__usbhsf_pkt_get(struct usbhs_pipe *pipe)
+static struct usbhs_pkt *__usbhsf_pkt_get(struct usbhs_pipe *pipe)
{
    return list_first_entry_or_null(&pipe->list, struct usbhs_pkt, node);
}
@@ -103,6 +103,15 @@
 dmaengine_terminate_all(chan);
 usbhsf_fifo_clear(pipe, fifo);
 usbhsf_dma_unmap(pkt);
+} else {
+    if (usbhs_pipe_is_dir_in(pipe))
+        usbhsf_rx_irq_ctrl(pipe, 0);
+    else
+        usbhsf_tx_irq_ctrl(pipe, 0);
 }

 struct usbhs_priv *priv = usbhs_pipe_to_priv(pipe);
@@ -126,8 +128,15 @@
 dmaengine_terminate_all(chan);
 usbhsf_fifo_clear(pipe, fifo);
 usbhsf_dma_unmap(pkt);
+} else {
+    if (usbhs_pipe_is_dir_in(pipe))
+        usbhsf_rx_irq_ctrl(pipe, 0);
+    else
+        usbhsf_tx_irq_ctrl(pipe, 0);
static void usbhsf_dma_xfer_preparing(struct usbhs_pkt *pkt) {
    struct usbhs_pkt *pkt = container_of(work, struct usbhs_pkt, work);
    struct usbhs_pipe *pipe = pkt->pipe;
    struct usbhs_fifo *fifo;
    struct usbhs_priv *priv = usbhs_pipe_to_priv(pipe);
    struct dma_chan *chan;
    struct device *dev = usbhs_priv_to_dev(priv);
    enum dma_transfer_direction dir;
    unsigned long flags;

    fifo = usbhs_pipe_to_fifo(pipe);
    if (!fifo)
        goto xfer_work_end;
    chan = usbhsf_dma_chan_get(fifo, pkt);
    dir = usbhs_pipe_is_dir_in(pipe) ? DMA_DEV_TO_MEM : DMA_MEM_TO_DEV;
    pkt->trans, dir,
    DMA_PREP_INTERRUPT | DMA_CTRL_ACK);
    if (!desc)
        goto xfer_work_end;
    desc->callback = usbhsf_dma_complete;
    desc->callback_param = pipe;
    pkt->cookie = dmaengine_submit(desc);
    if (pkt->cookie < 0) {
        dev_err(dev, "%Failed to submit dma descriptor\n");
        goto xfer_work_end;
    }
}
dev_dbg(dev, " %s %d (%d/ %d)
", 
@@ -852,8 +858,17 @@
dma_async_issue_pending(chan);
usbhsf_dma_start(pipe, fifo);
usbhs_pipe_enable(pipe);
+
-xfer_work_end:
+static void xfer_work(struct work_struct *work)
 +{
 +struct usbhs_pkt *pkt = container_of(work, struct usbhs_pkt, work);
 +struct usbhs_pipe *pipe = pkt->pipe;
 +struct usbhs_priv *priv = usbhs_pipe_to_priv(pipe);
 +unsigned long flags;
 +
 +usbhs_lock(priv, flags);
 +usbhsf_dma_xfer_preparing(pkt);
 +usbhs_unlock(priv, flags);
 }
@@ -906,8 +921,13 @@
pkt->trans = len;

usbhsf_tx_irq_ctrl(pipe, 0);
-INIT_WORK(&pkt->work, xfer_work);
-schedule_work(&pkt->work);
+/* FIXME: Workaound for usb dmac that driver can be used in atomic */
+if (usbhs_get_dparam(priv, has_usb_dmac)) {
+usbhsf_dma_xfer_preparing(pkt);
+} else {
+INIT_WORK(&pkt->work, xfer_work);
+schedule_work(&pkt->work);
+}

return 0;
@@ -989,6 +1009,10 @@
if ((uintptr_t)pkt->buf & (USBHS_USB_DMAC_XFER_SIZE - 1))
goto usbhsf_pio_prepare_pop;

+/* return at this time if the pipe is running */
+if (usbhs_pipe_is_running(pipe))
+return 0;
+
+usbhs_pipe_config_change_bfre(pipe, 1);

ret = usbhsf_fifo_select(pipe, fifo, 0);
pkt->trans = pkt->length;

-INIT_WORK(&pkt->work, xfer_work);
schedule_work(&pkt->work);
+usbhsf_dma_xfer_preparing(pkt);

return 0;

@@ -1179,6 +1202,7 @@
usbhsf_fifo_clear(pipe, fifo);
pkt->actual = usbhs_dma_calc_received_size(pkt, chan, rcv_len);
+
+usbhsf_dma_stop(pipe, fifo);
+usbhsf_dma_unmap(pkt);
+usbhsf_fifo_unselect(pipe, pipe->fifo);
--- linux-4.15.0.org/drivers/usb/renesas_usbhs/fifo.h
+++ linux-4.15.0/drivers/usb/renesas_usbhs/fifo.h
@@ -97,5 +97,6 @@
void *buf, int len, int zero, int sequence);
struct usbhs_pkt *usbhs_pkt_pop(struct usbhs_pipe *pipe, struct usbhs_pkt *pkt);
void usbhs_pkt_start(struct usbhs_pipe *pipe);
+struct usbhs_pkt *__usbhsf_pkt_get(struct usbhs_pipe *pipe);
@endif /* RENESAS_USB_FIFO_H */
--- linux-4.15.0.org/drivers/usb/renesas_usbhs/mod_gadget.c
+++ linux-4.15.0/drivers/usb/renesas_usbhs/mod_gadget.c
@@ -456,12 +456,18 @@
{
struct usbhsg_gpriv *gpriv = usbhsg_priv_to_gpriv(priv);
struct device *dev = usbhsg_gpriv_to_dev(gpriv);
+int state = usbhs_status_get_device_state(irq_state);
+gpriv->gadget.speed = usbhs_bus_get_speed(priv);
+
+dev_dbg(dev, "state = %x : speed : %d\n",
+state, gpriv->gadget.speed);
+gpriv->gadget.speed);
+if (gpriv->gadget.speed != USB_SPEED_UNKNOWN &&
+ (state & SUSPENDED_STATE)) {
+if (gpriv->driver && gpriv->driver->suspend)
+gpriv->driver->suspend(&gpriv->gadget);
+usb_gadget_set_state(&gpriv->gadget, USB_STATE_SUSPENDED);
+}
return 0;
}
@@ -720,8 +726,7 @@
struct usbhs_priv *priv = ushsg_gpriv_to_priv(gpriv);
struct device *dev = ushsg_gpriv_to_dev(gpriv);
unsigned long flags;
-
-usbhs_pipe_disable(uep);
+int ret = 0;

dev_dbg(dev, "set halt %d (pipe %d)\n",
halt, usbhs_pipe_number(pipe));
@@ -729,6 +734,18 @@
/********************  spin lock ********************/
usbhs_lock(priv, flags);

+/*
+ * According to usb_ep_set_halt()'s description, this function should
+ * return -EAGAIN if the IN endpoint has any queue or data. Note
+ * that the usbhs_pipe_is_dir_in() returns false if the pipe is an
+ * IN endpoint in the gadget mode.
+ */
+if (!usbhs_pipe_is_dir_in(pipe) && (__usbhsf_pkt_get(pipe) ||
  usbhs_pipe_contains_transmittable_data(pipe))) {
+ret = -EAGAIN;
+goto out;
+
+if (halt)
usbhs_pipe_stall(pipe);
else
@@ -739,10 +756,11 @@
else
usbhsg_status_clr(gpriv, USBHSG_STATUS_WEDGE);

+out:
usbhs_unlock(priv, flags);
/********************  spin unlock ********************/

-return 0;
+return ret;
}

static int usbhsg_ep_set_halt(struct usb_ep *ep, int value)
--- linux-4.15.0.orig/drivers/usb/renesas_usbhs/pipe.c
+++ linux-4.15.0/drivers/usb/renesas_usbhs/pipe.c
@@ -277,6 +277,21 @@

return -EBUSY;

+bool usbhs_pipe_contains_transmittable_data(struct usbhs_pipe *pipe)
+{
+u16 val;
+
+/* Do not support for DCP pipe */
+if (usbhs_pipe_is_dcp(pipe))
+return false;
+
+val = usbhsp_pipectrl_get(pipe);
+if (val & INBUFM)
+return true;
+
+return false;
+}
+
+/*
* PID ctrl
*/
@@ -722,6 +737,8 @@

void usbhs_pipe_free(struct usbhs_pipe *pipe)
{
+usbhsp_pipe_select(pipe);
+usbhsp_pipe_cfg_set(pipe, 0xFFFF, 0);
usbhsp_put_pipe(pipe);
}
--- linux-4.15.0.orig/drivers/usb/renesas_usbhs/pipe.h
+++ linux-4.15.0/drivers/usb/renesas_usbhs/pipe.h
@@ -81,6 +81,7 @@

int usbhs_pipe_get_maxpacket(struct usbhs_pipe *pipe);
void usbhs_pipe_clear(struct usbhs_pipe *pipe);
int usbhs_pipe_is_accessible(struct usbhs_pipe *pipe);
+bool usbhs_pipe_contains_transmittable_data(struct usbhs_pipe *pipe);
void usbhs_pipe_enable(struct usbhs_pipe *pipe);
void usbhs_pipe_disable(struct usbhs_pipe *pipe);
void usbhs_pipe_stall(struct usbhs_pipe *pipe);
--- linux-4.15.0.orig/drivers/usb/serial/Kconfig
+++ linux-4.15.0/drivers/usb/serial/Kconfig
@@ -62,7 +62,9 @@
-Fundamental Software dongle.
-Google USB serial devices
-HP4x calculators
+- Libtransistor USB console
- a number of Motorola phones

---
Motorola Tetra devices
- Novatel Wireless GPS receivers
- Siemens USB/MPI adapter.
- ViVOtech ViVOpay USB device.
--- linux-4.15.0.orig/drivers/usb/serial/ch341.c
+++ linux-4.15.0/drivers/usb/serial/ch341.c
@@ -80,9 +80,12 @@
#define CH341_LCR_CS5          0x00

static const struct usb_device_id id_table[] = {
- { USB_DEVICE(0x4348, 0x5523) },
- { USB_DEVICE(0x1a86, 0x7523) },
+ { USB_DEVICE(0x1a86, 0x5512) },
{ USB_DEVICE(0x1a86, 0x5523) },
+ { USB_DEVICE(0x1a86, 0x7522) },
+ { USB_DEVICE(0x1a86, 0x7523) },
+ { USB_DEVICE(0x4348, 0x5523) },
+ { USB_DEVICE(0x9986, 0x7523) },
},
};
MODULE_DEVICE_TABLE(usb, id_table);
@@ -128,7 +131,7 @@
  r = usb_control_msg(dev, usb_rcvctrlpipe(dev, 0), request,
          USB_TYPE_VENDOR | USB_RECIP_DEVICE | USB_DIR_IN,
          value, index, buf, bufsize, DEFAULT_TIMEOUT);
- if (r < bufsize) {
+ if (r < (int)bufsize) {
  if (r >= 0) {
    dev_err(&dev->dev,
      "short control message received (%d < %u)\n", 
@@ -589,9 +592,13 @@
static int ch341_reset_resume(struct usb_serial *serial)
 { 
 struct usb_serial_port *port = serial->port[0];
- struct ch341_private *priv = usb_get_serial_port_data(port);
+ struct ch341_private *priv;
  int ret;

  +priv = usb_get_serial_port_data(port);
  +if (!priv)
  +return 0;
  +/* reconfigure ch341 serial port after bus-reset */
 ch341_configure(serial->dev, priv);

 --- linux-4.15.0.orig/drivers/usb/serial/console.c
+++ linux-4.15.0/drivers/usb/serial/console.c
@@ -101,7 +101,6 @@
static int ch341_reset_resume(struct usb_serial *serial)
 { 
 struct usb_serial_port *port = serial->port[0];
- struct ch341_private *priv = usb_get_serial_port_data(port);
+ struct ch341_private *priv;
  int ret;

  +priv = usb_get_serial_port_data(port);
  +if (!priv)
  +return 0;
  +/* reconfigure ch341 serial port after bus-reset */
 ch341_configure(serial->dev, priv);

 --- linux-4.15.0.orig/drivers/usb/serial/console.c
+++ linux-4.15.0/drivers/usb/serial/console.c
@@ -101,7 +101,6 @@
static int ch341_reset_resume(struct usb_serial *serial)
 { 
 struct usb_serial_port *port = serial->port[0];
- struct ch341_private *priv = usb_get_serial_port_data(port);
+ struct ch341_private *priv;
  int ret;

  +priv = usb_get_serial_port_data(port);
  +if (!priv)
  +return 0;
  +/* reconfigure ch341 serial port after bus-reset */
 ch341_configure(serial->dev, priv);
cflag |= PARENB;
break;
}
-co->cflag = cflag;

/*
 * no need to check the index here: if the index is wrong, console
@@ -164,6 +163,7 @@
   serial->type->set_termios(tty, port, &dummy);

tty_port_tty_set(&port->port, NULL);
+tty_save_termios(tty);
   tty_kref_put(tty);
 }

tty_port_set_initialized(&port->port, 1);
--- linux-4.15.0.orig/drivers/usb/serial/cp210x.c
+++ linux-4.15.0/drivers/usb/serial/cp210x.c
@@ -61,6 +61,8 @@
   { USB_DEVICE(0x08e6, 0x5501) }, /* Gemalto Prox-PU/CU contactless smartcard reader */
   { USB_DEVICE(0x08FD, 0x000A) }, /* Digianswer A/S , ZigBee/802.15.4 MAC Device */
   { USB_DEVICE(0x0908, 0x01FF) }, /* Siemens RUGGEDCOM USB Serial Console */
+{ USB_DEVICE(0x0988, 0x0578) }, /* Teraoka AD2000 */
+{ USB_DEVICE(0x0988, 0x0579) }, /* Teraoka AD2000 */
   { USB_DEVICE(0x0B00, 0x3070) }, /* Ingenico 3070 */
   { USB_DEVICE(0x0BED, 0x1100) }, /* MEI (TM) Cashflow-SC Bill/Voucher Acceptor */
   { USB_DEVICE(0x0BED, 0x1101) }, /* MEI series 2000 Combo Acceptor */
   { USB_DEVICE(0x0BED, 0x1003) }, /* Dynastream ANT development board */
@@ -79,6 +81,7 @@
   { USB_DEVICE(0x10C4, 0x817C) }, /* CESINEL MEDCAL N Power Quality Monitor */
   { USB_DEVICE(0x10C4, 0x817D) }, /* CESINEL MEDCAL NT Power Quality Monitor */
   { USB_DEVICE(0x10C4, 0x817E) }, /* CESINEL MEDCAL S Power Quality Monitor */
   { USB_DEVICE(0x10C4, 0x818B) }, /* AVIT Research USB to TTL */
   { USB_DEVICE(0x10C4, 0x819F) }, /* MJS USB Toslink Switcher */
   { USB_DEVICE(0x10C4, 0x81A6) }, /* ThinkOptics WavIt */
@@ -95,6 +102,7 @@
   { USB_DEVICE(0x10C4, 0x826B) }, /* Cygnal Integrated Products, Inc., Fasttrax GPS demonstration module */
   { USB_DEVICE(0x10C4, 0x8281) }, /* Nanotec Plug & Drive */
   { USB_DEVICE(0x10C4, 0x8293) }, /* Telegesis ETRX2USB */
+{ USB_DEVICE(0x10C4, 0x82EF) }, /* CESINEL FALCO 6105 AC Power Supply */
+{ USB_DEVICE(0x10C4, 0x82F1) }, /* CESINEL MEDCAL EFD Earth Fault Detector */
+{ USB_DEVICE(0x10C4, 0x82F2) }, /* CESINEL MEDCAL ST Network Analyzer */
{ USB_DEVICE(0x10C4, 0x82F4) }, /* Starizona MicroTouch */
{ USB_DEVICE(0x10C4, 0x82F9) }, /* Procyon AVS */
{ USB_DEVICE(0x10C4, 0x83F1) }, /* Siemens MC35PU GPRS Modem */
{ USB_DEVICE(0x10C4, 0x8382) }, /* Cygnal Integrated Products, Inc. */
{ USB_DEVICE(0x10C4, 0x83A8) }, /* Amber Wireless AMB2560 */
+{ USB_DEVICE(0x10C4, 0x83AA) }, /* Mark-10 Digital Force Gauge */
{ USB_DEVICE(0x10C4, 0x83D8) }, /* DekTec DTA Plus VHF/UHF Booster/Attenuator */
{ USB_DEVICE(0x10C4, 0x8411) }, /* Kyocera GPS Module */
{ USB_DEVICE(0x10C4, 0x8418) }, /* IRZ Automation Teleport SG-10 GSM/GPRS Modem */
@@ -124,7 +134,9 @@
{ USB_DEVICE(0x10C4, 0x8470) }, /* Juniper Networks BX Series System Console */
{ USB_DEVICE(0x10C4, 0x8477) }, /* Balluff RFID */
{ USB_DEVICE(0x10C4, 0x84B6) }, /* Starizona Hyperion */
+{ USB_DEVICE(0x10C4, 0x851E) }, /* CESINEL MEDCAL PT Network Analyzer */
{ USB_DEVICE(0x10C4, 0x85A7) }, /* LifeScan OneTouch Verio IQ */
+{ USB_DEVICE(0x10C4, 0x85B8) }, /* CESINEL ReCon T Energy Logger */
{ USB_DEVICE(0x10C4, 0x85EA) }, /* AC-Services IBUS-IF */
{ USB_DEVICE(0x10C4, 0x85EB) }, /* AC-Services CIS-IBUS */
{ USB_DEVICE(0x10C4, 0x85F8) }, /* Virtenio Preon32 */
@@ -134,17 +146,26 @@
{ USB_DEVICE(0x10C4, 0x8857) }, /* CEL EM357 ZigBee USB Stick */
{ USB_DEVICE(0x10C4, 0x88A4) }, /* MMB Networks ZigBee USB Device */
{ USB_DEVICE(0x10C4, 0x88A5) }, /* Planet Innovation Ingeni ZigBee USB Device */
+{ USB_DEVICE(0x10C4, 0x88D8) }, /* Acuity Brands nLight Air Adapter */
+{ USB_DEVICE(0x10C4, 0x88FB) }, /* CESINEL MEDCAL STII Network Analyzer */
+{ USB_DEVICE(0x10C4, 0x8938) }, /* CESINEL MEDCAL S II Network Analyzer */
{ USB_DEVICE(0x10C4, 0x8946) }, /* Ketra N1 Wireless Interface */
{ USB_DEVICE(0x10C4, 0x8962) }, /* Brim Brothers charging dock */
{ USB_DEVICE(0x10C4, 0x8977) }, /* CEL MeshWorks DevKit Device */
{ USB_DEVICE(0x10C4, 0x8998) }, /* KCF Technologies PRN */
+{ USB_DEVICE(0x10C4, 0x89A4) }, /* CESINEL FTBC Flexible Thyristor Bridge Controller */
+{ USB_DEVICE(0x10C4, 0x89FB) }, /* Qivicon ZigBee USB Radio Stick */
{ USB_DEVICE(0x10C4, 0x8A2A) }, /* Hubz dual ZigBee and Z-Wave dongle */
+{ USB_DEVICE(0x10C4, 0x8A5B) }, /* CEL EM3588 ZigBee USB Stick */
{ USB_DEVICE(0x10C4, 0x8A5E) }, /* CEL EM3588 ZigBee USB Stick Long Range */
{ USB_DEVICE(0x10C4, 0x8B34) }, /* Qivicon ZigBee USB Radio Stick */
{ USB_DEVICE(0x10C4, 0xEA60) }, /* Silicon Labs factory default */
{ USB_DEVICE(0x10C4, 0xEA61) }, /* Silicon Labs factory default */
+{ USB_DEVICE(0x10C4, 0xEA63) }, /* Silicon Labs Windows Update (CP2101-4/CP2102N) */
{ USB_DEVICE(0x10C4, 0xEA70) }, /* Silicon Labs factory default */
{ USB_DEVICE(0x10C4, 0xEA71) }, /* Infinity GPS-MIC-1 Radio Monophone */
+{ USB_DEVICE(0x10C4, 0xEA7A) }, /* Silicon Labs Windows Update (CP2105) */
+{ USB_DEVICE(0x10C4, 0xEA7B) }, /* Silicon Labs Windows Update (CP2108) */
{ USB_DEVICE(0x10C4, 0xF000) }, /* Elan Digital Systems USBscope50 */
{ USB_DEVICE(0x10C4, 0xF002) }, /* Elan Digital Systems USBwave12 */
{ USB_DEVICE(0x10C4, 0xF003) }, /* Elan Digital Systems USBpulse100 */
@@ -155,6 +176,7 @@
{ USB_DEVICE(0x12B8, 0xEC62) }, /* Link G4+ ECU */
{ USB_DEVICE(0x13AD, 0x9999) }, /* Baltech card reader */
{ USB_DEVICE(0x1555, 0x0004) }, /* Owen AC4 USB-RS485 Converter */
+{ USB_DEVICE(0x155A, 0x1006) }, /* ELDAT Easywave RX09 */
{ USB_DEVICE(0x166A, 0x0201) }, /* Clipsal 5500PACA C-Bus Pascal Automation Controller */
{ USB_DEVICE(0x166A, 0x0301) }, /* Clipsal 5800PC C-Bus Wireless PC Interface */
{ USB_DEVICE(0x166A, 0x0303) }, /* Clipsal 5500PCU C-Bus USB interface */
@@ -182,6 +204,9 @@
{ USB_DEVICE(0x1901, 0x0194) }, /* GE Healthcare Remote Alarm Box */
{ USB_DEVICE(0x1901, 0x0195) }, /* GE B850/B650/B450 CP2104 DP UART interface */
+{ USB_DEVICE(0x1901, 0x0196) }, /* GE B850 CP2105 DP UART interface */
+{ USB_DEVICE(0x1901, 0x0197) }, /* GE CS1000 M.2 Key E serial interface */
+{ USB_DEVICE(0x1901, 0x0198) }, /* GE CS1000 Display serial interface */
+{ USB_DEVICE(0x199B, 0xBA30) }, /* LORD WSDA-200-USB */
+{ USB_DEVICE(0x19CF, 0x3000) }, /* Parrot NMEA GPS Flight Recorder */
+{ USB_DEVICE(0x1A0D, 0x0001) }, /* Schweitzer Engineering C662 Cable */
+{ USB_DEVICE(0x1B1C, 0x1C00) }, /* Corsair USB Dongle */
@@ -209,10 +234,12 @@
{ USB_DEVICE(0x1FB9, 0x0602) }, /* Lake Shore Model 648 Magnet Power Supply */
{ USB_DEVICE(0x1FB9, 0x0700) }, /* Lake Shore Model 737 VSM Controller */
{ USB_DEVICE(0x1FB9, 0x0701) }, /* Lake Shore Model 776 Hall Matrix */
+{ USB_DEVICE(0x2184, 0x0030) }, /* GW Instek GDM-834x Digital Multimeter */
+{ USB_DEVICE(0x2626, 0xEA60) }, /* Aruba Networks 7xxx USB Serial Console */
{ USB_DEVICE(0x3195, 0xF190) }, /* Link Instruments MSO-19 */
{ USB_DEVICE(0x3195, 0xF280) }, /* Link Instruments MSO-28 */
{ USB_DEVICE(0x3195, 0xF281) }, /* Link Instruments MSO-28 */
+{ USB_DEVICE(0x3923, 0x7A0B) }, /* National Instruments USB Serial Console */
{ USB_DEVICE(0x413C, 0x9500) }, /* DW700 GPS USB interface */
+{ /* Terminating Entry */
+}
+;
@@ -248,6 +275,8 @@
.break_ctl= cp210x_break_ctl,
.set_termios= cp210x_set_termios,
.tx_empty= cp210x_tx_empty,
+throttle= usb_serial_generic_throttle,
+.unthrottle= usb_serial_generic_unthrottle,
.tiocmget= cp210x_tiocmget,
.tiocmset= cp210x_tiocmset,
.attach= cp210x_attach,
@@ -902,6 +931,7 @@
u32 baud;
u16 bits;
u32 ctl_hs;
+u32 flow_repl;

cp210x_read_u32_reg(port, CP210X_GET_BAUDRATE, &baud);
ctl_hs = le32_to_cpu(flow_ctl.ulControlHandshake);
if (ctl_hs & CP210X_SERIAL_CTS_HANDSHAKE) {
    dev_dbg(dev, "%s - flow control = CRTSCTS\n", __func__);
    /*
     * When the port is closed, the CP210x hardware disables
     * auto-RTS and RTS is deasserted but it leaves auto-CTS when
     * in hardware flow control mode. When re-opening the port, if
     * auto-CTS is enabled on the cp210x, then auto-RTS must be
     * re-enabled in the driver.
     */
    +/
    +flow_repl = le32_to_cpu(flow_ctl.ulFlowReplace);
    +flow_repl &= ~CP210X_SERIAL_RTS_MASK;
    +flow_repl |= CP210X_SERIAL_RTS_SHIFT(CP210X_SERIAL_RTS_FLOW_CTL);
    +flow_ctl.ulFlowReplace = cpu_to_le32(flow_repl);
    +cp210x_write_reg_block(port,
    +CP210X_SET_FLOW,
    +&flow_ctl,
    +sizeof(flow_ctl));
    +
   +cflag |= CRTSCTS;
} else {
    dev_dbg(dev, "%s - flow control = NONE\n", __func__);
    --- linux-4.15.0.orig/drivers/usb/serial/cyberjack.c
    +++ linux-4.15.0/drivers/usb/serial/cyberjack.c
    @@ -354,11 +354,12 @@
    struct cyberjack_private *priv = usb_get_serial_port_data(port);
    struct device *dev = &port->dev;
    int status = urb->status;
    +bool resubmitted = false;
    
    -set_bit(0, &port->write_urbs_free);
    if (status) {
        dev_dbg(dev, "%s - nonzero write bulk status received: %d\n", __func__, status);
        +set_bit(0, &port->write_urbs_free);
        return;
    }
    
    @@ -391,6 +392,8 @@
    goto exit;
 }

+resubmitted = true;
+
}
exit:
spin_unlock(&priv->lock);
+if (!resubmitted)
+set_bit(0, &port->write_urbs_free);
usb_serial_port_softint(port);
}

--- linux-4.15.0.orig/drivers/usb/serial/cypress_m8.c
+++ linux-4.15.0/drivers/usb/serial/cypress_m8.c
@@ -407,6 +410,8 @@
 exit:
 spin_unlock(&priv->lock);
+if (!resubmitted)
+set_bit(0, &port->write_urbs_free);
usb_serial_port_softint(port);
}

--- linux-4.15.0.orig/drivers/usb/serial/cypress_m8.c
+++ linux-4.15.0/drivers/usb/serial/cypress_m8.c
@@ -59,6 +59,7 @@
 static const struct usb_device_id id_table_cyphidcomrs232[] = {
 { USB_DEVICE(VENDOR_ID_CYPRESS, PRODUCT_ID_CYPHIDCOM) },
 +{ USB_DEVICE(VENDOR_ID_SAI, PRODUCT_ID_CYPHIDCOM) },
 { USB_DEVICE(VENDOR_ID_POWERCOM, PRODUCT_ID_UPS) },
 { USB_DEVICE(VENDOR_ID_FRWD, PRODUCT_ID_CYPHIDCOM_FRWD) },
 }/* Terminating entry */
@@ -73,6 +74,7 @@
 { USB_DEVICE(VENDOR_ID_DELORME, PRODUCT_ID_EARTHMATEUSB) },
 { USB_DEVICE(VENDOR_ID_DELORME, PRODUCT_ID_EARTHMATEUSB_LT20) },
 { USB_DEVICE(VENDOR_ID_CYPRESS, PRODUCT_ID_CYPHIDCOM) },
+{ USB_DEVICE(VENDOR_ID_SAI, PRODUCT_ID_CYPHIDCOM) },
 { USB_DEVICE(VENDOR_ID_POWERCOM, PRODUCT_ID_UPS) },
 { USB_DEVICE(VENDOR_ID_FRWD, PRODUCT_ID_CYPHIDCOM_FRWD) },
 { USB_DEVICE(VENDOR_ID_DAZZLE, PRODUCT_ID_CA42) },
@@ -769,7 +771,7 @@
 usb_fill_int_urb(port->interrupt_out_urb, port->serial->dev,
 usb_sndintpipe(port->serial->dev, port->interrupt_out_endpointAddress),
 -port->interrupt_out_buffer, port->interrupt_out_size,
+port->interrupt_out_buffer, actual_size,
 cypress_write_int_callback, port, priv->write_urb_interval);
 result = usb_submit_urb(port->interrupt_out_urb, GFP_ATOMIC);
 if (result) {
 --- linux-4.15.0.orig/drivers/usb/serial/cypress_m8.h
+++ linux-4.15.0/drivers/usb/serial/cypress_m8.h
@@ -73,6 +74,7 @@
 #define VENDOR_ID_CYPRESS		0x04b4
 #define PRODUCT_ID_CYPHIDCOM		0x5500
+/* Simply Automated HID->COM UPB PIM (using Cypress PID 0x5500) */
+#define VENDOR_ID_SAI			0x17dd
+
/* FRWD Dongle - a GPS sports watch */
#define VENDOR_ID_FRWD			0x6737

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#define PRODUCT_ID_CYPHIDCOM_FRWD0x0001
--- linux-4.15.0.orig/drivers/usb/serial/digi_acceleport.c
+++ linux-4.15.0/drivers/usb/serial/digi_acceleport.c
@@ -19,7 +19,6 @@
#include <linux/tty_flip.h>
#include <linux/module.h>
#include <linux/spinlock.h>
-#include <linux/workqueue.h>
#include <linux/uaccess.h>
#include <linux/usb.h>
#include <linux/wait.h>
@@ -198,14 +197,12 @@
int dp_throttle_restart;
wait_queue_head_t dp_flush_wait;
wait_queue_head_t dp_close_wait; /* wait queue for close */
-struct work_struct dp_wakeup_work;
struct usb_serial_port *dp_port;
};

/* Local Function Declarations */

-void digi_wakeup_write_lock(struct work_struct *work);
static int digi_write_oob_command(struct usb_serial_port *port,
unsigned char *buf, int count, int interruptible);
static int digi_write_inb_command(struct usb_serial_port *port,
@@ -356,26 +353,6 @@
return timeout;
}

-/*
- *  Digi Wakeup Write
- *
- *  Wake up port, line discipline, and tty processes sleeping
- *  on writes.
- */
-
-void digi_wakeup_write_lock(struct work_struct *work)
{
-struct digi_port *priv =
-container_of(work, struct digi_port, dp_wakeup_work);
-struct usb_serial_port *port = priv->dp_port;
-unsigned long flags;
-
-spin_lock_irqsave(&priv->dp_port_lock, flags);
-tty_port_tty_wakeup(&port->port);
-spin_unlock_irqrestore(&priv->dp_port_lock, flags);
/* Digi Write OOB Command */

@@ -986,6 +963,7 @@
     struct digi_serial *serial_priv;
    int ret = 0;
    int status = urb->status;
+   bool wakeup;

    /* port and serial sanity check */
    if (port == NULL || (priv = usb_get_serial_port_data(port)) == NULL) {
        @@ -1012,6 +990,7 @@
    }

    /* try to send any buffered data on this port */
+   wakeup = true;
    spin_lock(&priv->dp_port_lock);
    priv->dp_write_urb_in_use = 0;
    if (priv->dp_out_buf_len > 0) {
        @@ -1027,19 +1006,18 @@
        if (ret == 0) {
            priv->dp_write_urb_in_use = 1;
            priv->dp_out_buf_len = 0;
+           wakeup = false;
        }
    }
-
-   /* wake up processes sleeping on writes immediately */
-   tty_port_tty_wakeup(&port->port);
-   /* also queue up a wakeup at scheduler time, in case we */
-   /* lost the race in write_chan(). */
-   schedule_work(&priv->dp_wakeup_work);
-
    spin_unlock(&priv->dp_port_lock);
+    if (ret && ret != -EPERM)
    dev_err_console(port,
       "%s: usb_submit_urb failed, ret=%d, port=%d\n",
       __func__, ret, priv->dp_port_num);
+   +if (wakeup)
+   tty_port_tty_wakeup(&port->port);
    }

static int digi_write_room(struct tty_struct *tty)
    @@ -1239,7 +1217,6 @@
    init_waitqueue_head(&priv->dp_transmit_idle_wait);
init_waitqueue_head(&priv->dp_flush_wait);
init_waitqueue_head(&priv->dp_close_wait);
-INIT_WORK(&priv->dp_wakeup_work, digi_wakeup_write_lock);
priv->dp_port = port;

init_waitqueue_head(&port->write_wait);
@@ -1506,13 +1483,14 @@
rtts = C_CRTSCTS(tty);

if (tty && opcode == DIGI_CMD_READ_INPUT_SIGNALS) {
+bool wakeup = false;
+
spin_lock(&priv->dp_port_lock);
/* convert from digi flags to termiox flags */
if (val & DIGI_READ_INPUT_SIGNALS_CTS) {
priv->dp_modem_signals |= TIOCM_CTS;
-/* port must be open to use tty struct */
if (rtts)
-tty_port_tty_wakeup(&port->port);
+wakeup = true;
} else {
priv->dp_modem_signals &= ~TIOCM_CTS;
/* port must be open to use tty struct */
@@ -1531,6 +1509,9 @@
priv->dp_modem_signals &= ~TIOCM_CD;

spin_unlock(&priv->dp_port_lock);
+
+if (wakeup)
+tty_port_tty_wakeup(&port->port);
} else if (opcode == DIGI_CMD_TRANSMIT_IDLE) {
spin_lock(&priv->dp_port_lock);
priv->dp_transmit_idle = 1;
--- linux-4.15.0.orig/drivers/usb/serial/f81232.c
+++ linux-4.15.0/drivers/usb/serial/f81232.c
@@ -556,9 +556,12 @@
static void f81232_close(struct usb_serial_port *port)
{
+struct f81232_private *port_priv = usb_get_serial_port_data(port);
+
f81232_port_disable(port);
usb_serial_generic_close(port);
usb_kill_urb(port->interrupt_in_urb);
+flush_work(&port_priv->interrupt_work);
}

static void f81232_dtr_rts(struct usb_serial_port *port, int on)

@@ -652,6 +655,40 @@ return 0;
 }

+static int f81232_suspend(struct usb_serial *serial, pm_message_t message)
+{
+struct usb_serial_port *port = serial->port[0];
+struct f81232_private *port_priv = usb_get_serial_port_data(port);
+int i;
+
+for (i = 0; i < ARRAY_SIZE(port->read_urbs); ++i)
+usb_kill_urb(port->read_urbs[i]);
+
+usb_kill_urb(port->interrupt_in_urb);
+
+if (port_priv)
+flush_work(&port_priv->interrupt_work);
+
+return 0;
+}
+
+static int f81232_resume(struct usb_serial *serial)
+{
+struct usb_serial_port *port = serial->port[0];
+int result;
+
+if (tty_port_initialized(&port->port)) {
+result = usb_submit_urb(port->interrupt_in_urb, GFP_NOIO);
+if (result) {
+dev_err(&port->dev, "submit interrupt urb failed: %d\n", 
+result);
+return result;
+}
+
+return usb_serial_generic_resume(serial);
+}
+
+static struct usb_serial_driver f81232_device = {
+  .driver = {
+    .owner = THIS_MODULE,
+    .read_int_callback = f81232_read_int_callback,
+    .port_probe = f81232_port_probe,
+    .port_remove = f81232_port_remove,
+    .suspend = f81232_suspend,
+    .resume = f81232_resume,
+  },
static struct usb_serial_driver * const serial_drivers[] = {
    { USB_DEVICE(FTDI_VID, FTDI_MTXORB_6_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_R2000KU_TRUE_RNG) },
    { USB_DEVICE(FTDI_VID, FTDI_VARDAAN_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_AUTO_M3_OP_COM_V2_PID) },
    { USB_DEVICE(MTXORB_VID, MTXORB_FTDI_RANGE_0100_PID) },
    { USB_DEVICE(MTXORB_VID, MTXORB_FTDI_RANGE_0101_PID) },
    { USB_DEVICE(MTXORB_VID, MTXORB_FTDI_RANGE_0102_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_NT_ORIONLXM_PID),
      .driver_info = (kernel_ulong_t)&ftdi_jtag_quirk },
    { USB_DEVICE(FTDI_VID, FTDI_NT_ORIONLX_PLUS_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_NT_ORION_IO_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_NT_ORIONMX_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_SYNAPSE_SS200_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_CUSTOMWARE_MINIPLEX_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_CUSTOMWARE_MINIPLEX2_PID) },
    { USB_DEVICE(XSENS_VID, XSENS_AWINDA_STATION_PID) },
    { USB_DEVICE(XSENS_VID, XSENS_CONVERTER_PID) },
    { USB_DEVICE(XSENS_VID, XSENS_MTDEVBOARD_PID) },
    { USB_DEVICE(XSENS_VID, XSENS_MTIUSBCONVERTER_PID) },
    { USB_DEVICE(XSENS_VID, XSENS_MTW_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_OMNI1509) },
    { USB_DEVICE(MOBILITY_VID, MOBILITY_USB_SERIAL_PID) },
    { USB_DEVICE(CYPRESS_VID, CYPRESS_WICED_BT_USB_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_SCIENCESCOPE_LS_LOGBOOK_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_SCIENCESCOPE_HS_LOGBOOK_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_CINTERION_MC55I_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_FHE_PID) },
    { USB_DEVICE(FTDI_VID, FTDI_DOTEC_PID) },
    { USB_DEVICE(QIHARDWARE_VID, MILKYMISTONE_JTAGSERIAL_PID),
      .driver_info = (kernel_ulong_t)&ftdi_jtag_quirk },
    { USB_DEVICE(CYPRESS_VID, CYPRESS_WICED_BT_USB_PID) },
};
{ USB_DEVICE(CYPRESS_VID, CYPRESS_WICED_WL_USB_PID) },
{ USB_DEVICE(AIRBUS_DS_VID, AIRBUS_DS_P8GR) },
+/* EZPrototypes devices */
+{ USB_DEVICE(EZPROTOTYPES_VID, HJELMSLUND_USB485_ISO_PID) },
+{ USB_DEVICE_INTERFACE_NUMBER(UNJO_VID, UNJO_ISODEBUG_V1_PID, 1) },
+/* Sienna devices */
+{ USB_DEVICE(FTDI_VID, FTDI_SIENNA_PID) },
+{ USB_DEVICE(ECHELON_VID, ECHELON_U20_PID) },
+/* IDS GmbH devices */
+{ USB_DEVICE(IDS_VID, IDS_SI31A_PID) },
+{ USB_DEVICE(IDS_VID, IDS_CM31A_PID) },
+/* U-Box devices */
+{ USB_DEVICE(UBLOX_VID, UBLOX_C099F9P_ZED_PID) },
+{ USB_DEVICE(UBLOX_VID, UBLOX_C099F9P_ODIN_PID) },
+/* FreeCalypso USB adapters */
+{ USB_DEVICE(FTDI_VID, FTDI_FALCONIA_JTAG_BUF_PID),
  +.driver_info = (kernel_ulong_t)&ftdi_jtag_quirk },
+{ USB_DEVICE(FTDI_VID, FTDI_FALCONIA_JTAG_UNBUF_PID),
  +.driver_info = (kernel_ulong_t)&ftdi_jtag_quirk },
+{ /* Terminating entry */
+};

@@ -1352,8 +1376,9 @@
urb_index_value = get_ftdi_divisor(tty, port);
urb_value = (__u16)urb_index_value;
urb_index = (__u16)(urb_index_value >> 16);
- if ((priv->chip_type == FT2232C) || (priv->chip_type == FT2232H) ||
- (priv->chip_type == FT4232H) || (priv->chip_type == FT232H)) {
- /* Probably the BM type needs the MSB of the encoded fractional
 * divider also moved like for the chips above. Any infos? */
- urb_index = (__u16)((urb_index << 8) | priv->interface);
@@ -1896,7 +1921,8 @@
return ftdi_jtag_probe(serial);

if (udev->product &&
-(!strcmp(udev->product, "BeagleBone/XDS100V2") ||
-(!strcmp(udev->product, "Arrow USB Blaster") ||
-!strcmp(udev->product, "SNAP Connect E10")))
return ftdi_jtag_probe(serial);

@@ -2024,12 +2050,11 @@
#define FTDI_RS_ERR_MASK (FTDI_RS_BI | FTDI_RS_PE | FTDI_RS_FE | FTDI_RS_OE)

static int ftdi_process_packet(struct usb_serial_port *port,
- struct ftdi_private *priv, char *packet, int len)
+ struct ftdi_private *priv, unsigned char *buf, int len)
{
    +unsigned char status;
    int i;
- char status;
    char flag;
- char *ch;

    if (len < 2) {
        dev_dbg(&port->dev, "malformed packet\n");
        @@ -2039,7 +2064,7 @@
/* Compare new line status to the old one, signal if different/
   N.B. packet may be processed more than once, but differences
   are only processed once. */
-    status = packet[0] & FTDI_STATUS_B0_MASK;
+    status = buf[0] & FTDI_STATUS_B0_MASK;
    if (status != priv->prev_status) {
        char diff_status = status ^ priv->prev_status;

        @@ -2065,13 +2090,12 @@
    }

    /* save if the transmitter is empty or not */
    -if (packet[1] & FTDI_RS_TEMT)
+if (buf[1] & FTDI_RS_TEMT)
        priv->transmit_empty = 1;
    else
        priv->transmit_empty = 0;

    - len -= 2;
    -if (!len)
    +if (len == 2)
        return 0; /* status only */

    /*
        @@ -2079,40 +2103,41 @@
        * data payload to avoid over-reporting.
        */
    flag = TTY_NORMAL;
    -if (packet[1] & FTDI_RS_ERR_MASK) {
+if (buf[1] & FTDI_RS_ERR_MASK) {
/* Break takes precedence over parity, which takes precedence
 * over framing errors */
    -if (packet[1] & FTDI_RS_BI) {
+if (buf[1] & FTDI_RS_BI) {
        flag = TTY_BREAK;
        port->icount.brk++;
usb_serial_handle_break(port);
- } else if (packet[1] & FTDI_RS_PE) {
+ } else if (buf[1] & FTDI_RS_PE) {
flag = TTY_PARITY;
port->icount.parity++;
- } else if (packet[1] & FTDI_RS_FE) {
+ } else if (buf[1] & FTDI_RS_FE) {
flag = TTY_FRAME;
port->icount.frame++;
}
/* Overrun is special, not associated with a char */
- if (packet[1] & FTDI_RS_OE) {
+ if (buf[1] & FTDI_RS_OE) {
port->icount.overrun++;
tty_insert_flip_char(&port->port, 0, TTY_OVERRUN);
}

-port->icount.rx += len;
-ch = packet + 2;
+port->icount.rx += len - 2;

if (port->port.console && & port->sysrq) {
- for (i = 0; i < len; i++, ch++) {
+ for (i = 2; i < len; i++) {
- tty_insert_flip_char(port, *ch)
+ if (usb_serial_handle_sysrq_char(port, buf[i]))
+ continue;
+ tty_insert_flip_char(port->port, buf[i], flag);
} 
} else {
- tty_insert_flip_string_fixed_flag(port->port, ch, flag, len);
+ tty_insert_flip_string_fixed_flag(port->port, buf + 2, flag, 
+ len - 2);
}

-return len;
+return len - 2;
}

static void ftdi_process_read_urb(struct urb *urb)
--- linux-4.15.0.orig/drivers/usb/serial/ftdi_sio_ids.h
+++ linux-4.15.0/drivers/usb/serial/ftdi_sio_ids.h
@@ -39,6 +39,16 @@
#define FTDI_LUMEL_PD12_PID 0x6002
+/*
+ * Custom USB adapters made by Falconia Partners LLC
+ * for FreeCalypso project, ID codes allocated to Falconia by FTDI.
+ */
+#define FTDI_FALCONIA_JTAG_BUF_PID 0x7150
+#define FTDI_FALCONIA_JTAG_UNBUF_PID 0x7151
+
+ /* Sienna Serial Interface by Secyourit GmbH */
+#define FTDI_SIENNA_PID 0x8348
+
+ /* Cyber Cortex AV by Fabulous Silicon (http://fabuloussilicon.com) */
#define CYBER_CORTEX_AV_PID 0x8698

@@ -149,6 +159,9 @@
/* Vardaan Enterprises Serial Interface VEUSB422R3 */
#define FTDI_VARDAAN_PID 0xF070
+
+/* Auto-M3 Ltd. - OP-COM USB V2 - OBD interface Adapter */
+#define FTDI_AUTO_M3_OP_COM_V2_PID 0x4f50
+
+ /*
+ * Xsens Technologies BV products (http://www.xsens.com).
+ */
@@ -157,6 +170,7 @@
#define XSENS_AWINDA_DONGLE_PID 0x0102
#define XSENS_MTW_PID 0x0200 /* Xsens MTw */
#define XSENS_MTDEVBOARD_PID 0x0300 /* Motion Tracker Development Board */
+#define XSENS_MTIUSBCONVERTER_PID 0x0301 /* MTi USB converter */
#define XSENS_CONVERTER_PID 0xD00D /* Xsens USB-serial converter */

+ /* Xsens devices using FTDI VID */
@@ -567,7 +581,10 @@
/* NovaTech product ids (FTDI_VID)
 */
@@ -687,6 +704,12 @@
#define BANDB_ZZ_PROG1_USB_PID 0xBA02
/* Synapsee Wireless product ids (FTDI_VID)
@@ -687,6 +704,12 @@
#define BANDB_ZZ_PROG1_USB_PID 0xBA02

+ /* Echelon USB Serial Interface

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+ */
#define ECHELON_VID	0x0920
#define ECHELON_U20_PID	0x7500
+
+/
* Intrepid Control Systems (http://www.intrepidcs.com/) ValueCAN and NeoVI */
#define INTREPID_VID	0x093C
@@ -923,6 +946,9 @@
/* RT Systems programming cables for various ham radios */
+/* This device uses the VID of FTDI */
#define RTSYSTEMS_USB_VX8_PID	0x9e50  /* USB-VX8 USB to 7 pin modular plug for Yaesu VX-8 radio */
+
#define RTSYSTEMS_VID	0x2100	/* Vendor ID */
#define RTSYSTEMS_USB_S03_PID	0x9001	/* RTS-03 USB to Serial Adapter */
#define RTSYSTEMS_USB_59_PID	0x9e50	/* USB-59 USB to 8 pin plug */
@@ -1306,6 +1332,12 @@
#define IONICS_PLUGCOMPUTER_PID	0x0102
/*
+ * EZPrototypes (PID reseller)
+ */
#define EZPROTOTYPES_VID	0x1c40
#define HJELMSLUND_USB485_ISO_PID	0x0477
+
+/
* Dresden Elektronik Sensor Terminal Board */
#define DE_VID	0x1cf1 /* Vendor ID */
@@ -1442,6 +1474,12 @@
#define FTDI_CINTERION_MC55I_PID	0xA951
/*
+ * Product: FirmwareHubEmulator
+ * Manufacturer: Harman Becker Automotive Systems */
#define FTDI_FHE_PID	0xA9A0
+
+/
* Product: Comet Caller ID decoder
* Manufacturer: Crucible Technologies */
@@ -1526,3 +1564,23 @@
#define CHETCO_SEASMART_DISPLAY_PID	0xA5AD /* SeaSmart NMEA2000 Display */
#define CHETCO_SEASMART_LITE_PID	0xA5AE /* SeaSmart Lite USB Adapter */
```c
#define CHETCO_SEASMART_ANALOG_PID 0xA5AF /* SeaSmart Analog Adapter */
#define UNJO_VID 0x22B7
#define UNJO_ISODEBUG_V1_PID 0x150D
#define IDS_VID 0x2CAF
#define IDS_SI31A_PID 0x13A2
#define IDS_CM31A_PID 0x13A3
#define UBLOX_VID 0x1546
#define UBLOX_C099F9P_ZED_PID 0x0502
#define UBLOX_C099F9P_ODIN_PID 0x0503
--- linux-4.15.0.orig/drivers/usb/serial/garmin_gps.c
+++ linux-4.15.0/drivers/usb/serial/garmin_gps.c
@@ -1138,8 +1138,8 @@
send it directly to the tty port */
if (garmin_data_p->flags & FLAGS_QUEUING) {
    pkt_add(garmin_data_p, data, data_length);
} else if (bulk_data ||
--- linux-4.15.0.orig/drivers/usb/serial/generic.c
+++ linux-4.15.0/drivers/usb/serial/generic.c
@@ -376,6 +376,7 @@
struct usb_serial_port *port = urb->context;
unsigned char *data = urb->transfer_buffer;
unsigned long flags;
+bool stopped = false;
int status = urb->status;
int i;
@@ -383,33 +384,51 @@
if (urb == port->read_urbs[i])
    break;
```
- set_bit(i, &port->read_urbs_free);

dev_dbg(&port->dev, "%s - urb %d, len %d\n", __func__, i,
urb->actual_length);
switch (status) {
    case 0:
        +usb_serial_debug_data(&port->dev, __func__, urb->actual_length,
+data);
        +port->serial->type->process_read_urb(urb);
        break;
    case -ENOENT:
        case -ECONNRESET:
        case -ESHUTDOWN:
        dev_dbg(&port->dev, "%s - urb stopped: %d\n",
+__func__, status);
        -return;
        +stopped = true;
        +break;
    case -EPIPE:
        dev_err(&port->dev, "%s - urb stopped: %d\n",
+__func__, status);
        -return;
        +stopped = true;
        +break;
    default:
        dev_dbg(&port->dev, "%s - nonzero urb status: %d\n",
+__func__, status);
        -goto resubmit;
        +break;
}

-usb_serial_debug_data(&port->dev, __func__, urb->actual_length, data);
-usb_serial_debug_data(&port->dev, __func__, urb->actual_length, data);

+/*
 + * Make sure URB processing is done before marking as free to avoid
 + * racing with unthrottle() on another CPU. Matches the barriers
 + * implied by the test_and_clear_bit() in
 + * usb_serial_generic_submit_read_urb().
 + */
+smp_mb__before_atomic();
+set_bit(i, &port->read_urbs_free);
+/*
 + * Make sure URB is marked as free before checking the throttled flag
 + * to avoid racing with unthrottle() on another CPU. Matches the
 + * smp_mb() in unthrottle().
 + */
+smp_mb__after_atomic();
+
+if (stopped)
+return;

-resubmit:
/* Throttle the device if requested by tty */
spin_lock_irqsave(&port->lock, flags);
port->throttled = port->throttle_req;
@@ -484,6 +503,12 @@
port->throttled = port->throttle_req = 0;
spin_unlock_irq(&port->lock);

+/*
+ * Matches the smp_mb__after_atomic() in
+ * usb_serial_generic_read_bulk_callback().
+ */
+smp_mb();
+
if (was_throttled)
usb_serial_generic_submit_read_urbs(port, GFP_KERNEL);
}
/* grab the txcredits for the ports if available */
position = 2;
portNumber = 0;
-while ((position < length) &&
+while ((position < length - 1) &&
(portNumber < edge_serial->serial->num_ports)) {
  txCredits = data[position] | (data[position+1] << 8);
  if (txCredits) {
    port = edge_serial->serial->port[portNumber];
    edge_port = usb_get_serial_port_data(port);
-    if (edge_port->open) {
+    if (edge_port && edge_port->open) {
      +spin_lock_irqsave(&edge_port->ep_lock, flags);
      edge_port->txCredits += txCredits;
      -spin_unlock(&edge_port->ep_lock);
+      spin_unlock_irqrestore(&edge_port->ep_lock, flags);
      dev_dbg(dev, "%s - txcredits for port%d = %d\n", __func__, portNumber,
        edge_port->txCredits);
      if (status) {
        dev_dbg(&urb->dev->dev, "%s - nonzero read bulk status received: %d\n", __func__, urb->status);
        +unsigned long flags;
      usb_serial_debug_data(dev, __func__, raw_data_length, data);

-      spin_lock(&edge_serial->es_lock);
+      spin_lock_irqsave(&edge_serial->es_lock, flags);

    /* decrement our rxBytes available by the number that we just got */
    edge_serial->rxBytesAvail -= raw_data_length;
    @ @ -801,7 +806,7 @@
    edge_serial->read_in_progress = false;
  }
-    spin_unlock(&edge_serial->es_lock);
+    spin_unlock_irqrestore(&edge_serial->es_lock, flags);
}
static void process_rcvd_data(struct edgeport_serial *edge_serial, unsigned char *buffer, __u16 bufferLength)
{
-struct device *dev = &edge_serial->serial->dev->dev;
+struct usb_serial *serial = edge_serial->serial;
+struct device *dev = &serial->dev->dev;
    struct usb_serial_port *port;
    struct edgeport_port *edge_port;
    __u16 lastBufferLength;
    return;

    /* spit this data back into the tty driver if this port is open */
    -if (rxLen) {
    -port = edge_serial->serial->port[ edge_serial->rxPort ];
    +port = serial->port[ edge_serial->rxPort ];
    +if (rxLen && edge_serial->rxPort < serial->num_ports) {
    +port = serial->port[ edge_serial->rxPort ];
        edge_port = usb_get_serial_port_data(port);
    -if (edge_port->open) {
    +if (edge_port && edge_port->open) {
            dev_dbg(dev, \"%s - Sending %d bytes to TTY for port %d\",
                __func__, rxLen, edge_serial->rxPort);
            @ @ -1846,8 +1851,8 @@
                    rxLen);
            edge_port->port->icount.rx += rxLen;
        }
    -buffer += rxLen;
    }
    +buffer += rxLen;
    break;
    }

    case EXPECT_HDR3: /* Expect 3rd byte of status header */
    @ @ -1882,6 +1887,8 @@
        __u8 code = edge_serial->rxStatusCode;
        return;
    }

    /* switch the port pointer to the one being currently talked about */
    +if (edge_serial->rxPort >= edge_serial->serial->num_ports) {
        return;
    }
    port = edge_serial->serial->port[ edge_serial->rxPort ];
    edge_port = usb_get_serial_port_data(port);
    if (edge_port == NULL) {
        @ @ -2282,7 +2289,6 @@
        /* something went wrong */
        dev_err(dev, \"%s - usb_submit_urb(write command) failed, status = %d\",
            __func__, status);
-usb_kill_urb(urb);
usb_free_urb(urb);
atomic_dec(&CmdUrbs);
return status;
@@ -2915,16 +2921,18 @@
response = 0;
if (edge_serial->is_epic) {
+struct usb_host_interface *alt;
+
+alt = serial->interface->cur_altsetting;
+
/\* EPIC thing, set up our interrupt polling now and our read
* urb, so that the device knows it really is connected. */
interrupt_in_found = bulk_in_found = bulk_out_found = false;
- for (i = 0; i < serial->interface->altsetting[0]
- .desc.bNumEndpoints; ++i) {
- struct usb_endpoint_descriptor *endpoint;
- int buffer_size;
- endpoint = &serial->interface->altsetting[0].
- endpoint[i].desc;
+ for (i = 0; i < alt->desc.bNumEndpoints; ++i) {
+ struct usb_endpoint_descriptor *endpoint;
+ int buffer_size;
+ endpoint = &alt->endpoint[i].desc;
+ buffer_size = usb_endpoint_maxp(endpoint);
+ if (!interrupt_in_found &&
+     (usb_endpoint_is_int_in(endpoint))) {
@@ -3013,26 +3021,32 @@
response = -ENODEV;
     }}
-usb_free_urb(edge_serial->interrupt_read_urb);
-kfree(edge_serial->interrupt_in_buffer);
-
-usb_free_urb(edge_serial->read_urb);
-kfree(edge_serial->bulk_in_buffer);
-
kfree(edge_serial);
-
-return response;
+goto error;
}
/\* start interrupt read for this edgeport this interrupt will
* continue as long as the edgeport is connected */
response = usb_submit_urb(edge_serial->interrupt_read_urb,
GFP_KERNEL);
-if (response)
+if (response) {
    dev_err(ddev, "%s - Error %d submitting control urb\n", __func__, response);
    +
    +goto error;
    +}
}

return response;
+
+error:
+usb_free_urb(edge_serial->interrupt_read_urb);
+kfree(edge_serial->interrupt_in_buffer);
+
+usb_free_urb(edge_serial->read_urb);
+kfree(edge_serial->bulk_in_buffer);
+
+kfree(edge_serial);
+
+return response;
}

--- linux-4.15.0.orig/drivers/usb/serial/io_ti.h
+++ linux-4.15.0/drivers/usb/serial/io_ti.h
@@ -173,7 +173,7 @@
 }  __attribute__((packed));

 #define TIUMP_GET_PORT_FROM_CODE(c) (((c) >> 4) - 3)
+#define TIUMP_GET_PORT_FROM_CODE(c) (((c) >> 6) & 0x01)
 #define TIUMP_GET_FUNC_FROM_CODE(c) ((c) & 0x0f)
 #define TIUMP_INTERRUPT_CODE_LSR 0x03
 #define TIUMP_INTERRUPT_CODE_MSR 0x04
--- linux-4.15.0.orig/drivers/usb/serial/ir-usb.c
+++ linux-4.15.0/drivers/usb/serial/ir-usb.c
@@ -45,9 +45,10 @@
 static int xbof = -1;

 static int ir_startup (struct usb_serial *serial);
 static int ir_open(struct tty_struct *tty, struct usb_serial_port *port);
 static int ir_prepare_write_buffer(struct usb_serial_port *port,
void *dest, size_t size);
 static void ir_write(struct tty_struct *tty, struct usb_serial_port *port,
const unsigned char *buf, int count);
 static int ir_write_room(struct tty_struct *tty);
 static void ir_write_bulk_callback(struct urb *urb);
 static void ir_process_read_urb(struct urb *urb);
 static void ir_set_termios(struct tty_struct *tty,
struct usb_serial_port *port, struct ktermios *old_termios);
@@ -77,8 +78,9 @@
 .num_ports		= 1,
 .set_termios		= ir_set_termios,
 .attach			= ir_startup,
-\t.open			= ir_open,
-\t.prepare_write_buffer= ir_prepare_write_buffer,
+\t.write			= ir_write,
+\t.write_room		= ir_write_room,
+\t.write_bulk_callback	= ir_write_bulk_callback,
 .process_read_urb	= ir_process_read_urb,
 }

@@ -195,6 +197,9 @@
 struct usb_irda_cs_descriptor *irda_desc;
 int rates;

+if (serial->num_bulk_in < 1 || serial->num_bulk_out < 1)
+return -ENODEV;
+
 irda_desc = irda_usb_find_class_desc(serial, 0);
 if (!irda_desc) {
 dev_err(&serial->dev->dev,
@@ -251,35 +256,102 @@
 return 0;
 }

 -static int ir_open(struct tty_struct *tty, struct usb_serial_port *port)
 +static int ir_write(struct tty_struct *tty, struct usb_serial_port *port,
  +const unsigned char *buf, int count)
  +
  { int i;
  +struct urb *urb = NULL;
  +unsigned long flags;
  +int ret;

  -for (i = 0; i < ARRAY_SIZE(port->write_urbs); ++i)
  -port->write_urbs[i]->transfer_flags = URB_ZERO_PACKET;
  +if (port->bulk_out_size == 0)
  +return -EINVAL;

  -/* Start reading from the device */
  -return usb_serial_generic_open(tty, port);
  -}
  +if (count == 0)
  +return 0;

  -static int ir_prepare_write_buffer(struct usb_serial_port *port,
-void *dest, size_t size)
{
  unsigned char *buf = dest;
  int count;
  count = min(count, port->bulk_out_size - 1);
  +
  +spin_lock_irqsave(&port->lock, flags);
  +if (__test_and_clear_bit(0, &port->write_urbs_free)) {
    +urb = port->write_urbs[0];
    +port->tx_bytes += count;
    +}
  +spin_unlock_irqrestore(&port->lock, flags);
  +
  +if (!urb)
  +return 0;

  /*
   * The first byte of the packet we send to the device contains an
   * inbound header which indicates an additional number of BOFs and
   * outbound header which indicates an additional number of BOFs and
   * a baud rate change.
   *
   * See section 5.4.2.2 of the USB IrDA spec.
   */
  /*
  *buf = ir_xbof | ir_baud;
  *(u8 *)urb->transfer_buffer = ir_xbof | ir_baud;
  +
  +memcpy(urb->transfer_buffer + 1, buf, count);
  +
  +urb->transfer_buffer_length = count + 1;
  +urb->transfer_flags = URB_ZERO_PACKET;
  +
  +ret = usb_submit_urb(urb, GFP_ATOMIC);
  +if (ret) {
    +dev_err(&port->dev, "failed to submit write urb: %d\n", ret);
    +
    +spin_lock_irqsave(&port->lock, flags);
    +__set_bit(0, &port->write_urbs_free);
    +port->tx_bytes -= count;
    +spin_unlock_irqrestore(&port->lock, flags);
    +
    +return ret;
    +}
  +
  +return count;
  +}
+
+static void ir_write_bulk_callback(struct urb *urb)
struct usb_serial_port *port = urb->context;
int status = urb->status;
unsigned long flags;

spin_lock_irqsave(&port->lock, flags);
__set_bit(0, &port->write_urbs_free);
port->tx_bytes -= urb->transfer_buffer_length - 1;
spin_unlock_irqrestore(&port->lock, flags);

switch (status) {
    case 0:
        break;
    case -ENOENT:
    case -ECONNRESET:
    case -ESHUTDOWN:
        dev_dbg(&port->dev, "write urb stopped: %d\n", status);
        return;
    case -EPIPE:
        dev_err(&port->dev, "write urb stopped: %d\n", status);
        return;
    default:
        dev_err(&port->dev, "nonzero write-urb status: %d\n", status);
        break;
}

usb_serial_port_softint(port);

static int ir_write_room(struct tty_struct *tty)
{
    struct usb_serial_port *port = tty->driver_data;
    int count = 0;

    if (port->bulk_out_size == 0)
        return 0;

    if (test_bit(0, &port->write_urbs_free))
        count = port->bulk_out_size - 1;

    count = kfifo_out_locked(&port->write_fifo, buf + 1, size - 1,
        &port->lock);
    return count;
}

static void ir_process_read_urb(struct urb *urb)
@@ -332,34 +404,34 @@
switch (baud) {
    case 2400:
        ir_baud = USB_IRDA_BR_2400;
        +ir_baud = USB_IRDA_LS_2400;
        break;
    case 9600:
        ir_baud = USB_IRDA_BR_9600;
        +ir_baud = USB_IRDA_LS_9600;
        break;
    case 19200:
        ir_baud = USB_IRDA_BR_19200;
        +ir_baud = USB_IRDA_LS_19200;
        break;
    case 38400:
        ir_baud = USB_IRDA_BR_38400;
        +ir_baud = USB_IRDA_LS_38400;
        break;
    case 57600:
        ir_baud = USB_IRDA_BR_57600;
        +ir_baud = USB_IRDA_LS_57600;
        break;
    case 115200:
        ir_baud = USB_IRDA_BR_115200;
        +ir_baud = USB_IRDA_LS_115200;
        break;
    case 576000:
        ir_baud = USB_IRDA_BR_576000;
        +ir_baud = USB_IRDA_LS_576000;
        break;
    case 1152000:
        ir_baud = USB_IRDA_BR_1152000;
        +ir_baud = USB_IRDA_LS_1152000;
        break;
    case 4000000:
        ir_baud = USB_IRDA_BR_4000000;
        +ir_baud = USB_IRDA_LS_4000000;
        break;
    default:
        ir_baud = USB_IRDA_BR_9600;
        +ir_baud = USB_IRDA_LS_9600;
        baud = 9600;
}

--- linux-4.15.0.orig/drivers/usb/serial/iuu_phoenix.c
+++ linux-4.15.0/drivers/usb/serial/iuu_phoenix.c
@@ -354,10 +354,11 @@
 struct usb_serial_port *port = urb->context;
int result;
char *buf_ptr = port->write_urb->transfer_buffer;
-buf_ptr++ = IUU_SET_LED;
+
if (xmas) {
-get_random_bytes(buf_ptr, 6);
-(buf_ptr+7) = 1;
+buf_ptr[0] = IUU_SET_LED;
+get_random_bytes(buf_ptr + 1, 6);
+buf_ptr[7] = 1;
} else {
 iuu_rgbf_fill_buffer(buf_ptr, 255, 255, 0, 0, 0, 0, 255);
}
@@ -375,13 +376,14 @@
 struct usb_serial_port *port = urb->context;
 int result;
 char *buf_ptr = port->write_urb->transfer_buffer;
+
+if (xmas) {
+ iuu_rxcmd(urb);
+ return;
+} else {
+ buf_ptr++ = IUU_SET_LED;
+ iuu_rgbf_fill_buffer(buf_ptr, 0, 0, 255, 255, 0, 0, 255);
+}
+ iuu_rgbf_fill_buffer(buf_ptr, 0, 0, 255, 255, 0, 0, 255);
+usb_fill_bulk_urb(port->write_urb, port->serial->dev,
+usb_sndbulkpipe(port->serial->dev,
+port->bulk_out_endpointAddress),
@@ -536,23 +538,29 @@
 struct device *dev = &port->dev;
 int i;
 int status;
-u8 rxcmd = IUU_UART_RX;
+u8 *rxcmd;
 struct iuu_private *priv = usb_get_serial_port_data(port);

 if (iuu_led(port, 0xF000, 0, 0, 0xFF) < 0)
 return -EIO;

+rxcmd = kmalloc(1, GFP_KERNEL);
+if (!rxcmd)
+ return -ENOMEM;
+xcmd[0] = IUU_UART_RX;
+
for (i = 0; i < 2; i++) {
    status = bulk_immediate(port, &rxcmd, 1);
    if (status != IUU_OPERATION_OK) {
        dev_dbg(dev, "%s - uart_flush_write error\n", __func__);
        return status;
        goto out_free;
    }
}

status = read_immediate(port, &priv->len, 1);
if (status != IUU_OPERATION_OK) {
    dev_dbg(dev, "%s - uart_flush_read error\n", __func__);
    return status;
    goto out_free;
}

if (priv->len > 0) {
    @ @ -560,12 +568,16 @ @
    status = read_immediate(port, priv->buf, priv->len);
    if (status != IUU_OPERATION_OK) {
        dev_dbg(dev, "%s - uart_flush_read error\n", __func__);
        return status;
        goto out_free;
    }
}
dev_dbg(dev, "%s - uart_flush_read OK!\n", __func__);
iuu_led(port, 0, 0xF000, 0, 0xFF);
+out_free:
+kfree(rxcmd);
+
return status;
}

@@ -699,14 +711,16 @@
struct iuu_private *priv = usb_get_serial_port_data(port);
unsigned long flags;

-if (count > 256)
-return -ENOMEM;
-
spin_lock_irqsave(&priv->lock, flags);
+
count = min(count, 256 - priv->writelen);
+if (count == 0)
+goto out;
/* fill the buffer */
memcpy(priv->writebuf + priv->writelen, buf, count);
priv->writelen += count;
+out:
spin_unlock_irqrestore(&priv->lock, flags);

return count;
--- linux-4.15.0.orig/drivers/usb/serial/keyspan.c
+++ linux-4.15.0/drivers/usb/serial/keyspan.c
@@ -1058,6 +1058,8 @@
    for (i = 0; i < serial->num_ports; ++i) {
        port = serial->port[i];
        p_priv = usb_get_serial_port_data(port);
+    if (!p_priv)
+        continue;

    if (p_priv->resend_cont) {
        dev_dbg(&port->dev, "%s - sending setup\n", __func__);
@@ -1459,6 +1461,8 @@
    for (i = 0; i < serial->num_ports; ++i) {
        port = serial->port[i];
        p_priv = usb_get_serial_port_data(port);
+    if (!p_priv)
+        continue;

    if (p_priv->resend_cont) {
        dev_dbg(&port->dev, "%s - sending setup\n", __func__);
@@ -1741,8 +1745,8 @@
    ep_desc = find_ep(serial, endpoint);
    if (!ep_desc) {
    /* leak the urb, something's wrong and the callers don't care */
-    return urb;
+    usb_free_urb(urb);
+    return NULL;
    }
    if (usb_endpoint_xfer_int(ep_desc)) {
        ep_type_name = "INT";
--- linux-4.15.0.orig/drivers/usb/serial/keyspan_pda.c
+++ linux-4.15.0/drivers/usb/serial/keyspan_pda.c
@@ -40,11 +40,12 @@
        #define DRIVER_AUTHOR "Brian Warner <warner@lothar.com>"
        #define DRIVER_DESC "USB Keyspan PDA Converter driver"

        +#define KEYSPAN_TX_THRESHOLD 16
        +
        struct keyspan_pda_private {
            int tx_room;
            ...
int tx_throttled;
-struct work_struct wakeup_work;
-struct work_struct unthrottle_work;
+struct work_struct unthrottle_work;
struct usb_serial*serial;
struct usb_serial_port*port;
};
@@ -97,15 +98,6 @@
};
#endif

-static void keyspan_pda_wakeup_write(struct work_struct *work)
-{  
-struct keyspan_pda_private *priv =  
-container_of(work, struct keyspan_pda_private, wakeup_work);  
-struct usb_serial_port *port = priv->port;  
-  
-tty_port_tty_wakeup(&port->port);  
-}
-
-static void keyspan_pda_request_unthrottle(struct work_struct *work)
{
struct keyspan_pda_private *priv =  
@@ -120,7 +112,7 @@
7, /* request_unthrottle */  
USB_TYPE_VENDOR | USB_RECIP_INTERFACE  
| USB_DIR_OUT,  
- 16, /* value: threshold */  
+ KEYSPAN_TX_THRESHOLD,  
0, /* index */  
NULL,
0,
@@ -139,6 +131,8 @@  
int retval;
int status = urb->status;
struct keyspan_pda_private *priv;
+unsigned long flags;
+  
priv = usb_get_serial_port_data(port);

switch (status) {
@@ -172,18 +166,21 @@  
break;
    case 1:  
/* status interrupt */  
    -if (len < 3) {  
    +if (len < 2) {  
        dev_warn(&port->dev, "short interrupt message received\n");
    


break;
}
-dev_dbg(&port->dev, "rx int, d1=%d, d2=%d\n", data[1], data[2]);
+dev_dbg(&port->dev, "rx int, d1=%d\n", data[1]);
switch (data[1]) {
    case 1: /* modemline change */
        break;
    case 2: /* tx unthrottle interrupt */
        +spin_lock_irqsave(&port->lock, flags);
        priv->tx_throttled = 0;
        +priv->tx_room = max(priv->tx_room, KEYSPAN_TX_THRESHOLD);
        +spin_unlock_irqrestore(&port->lock, flags);
        /* queue up a wakeup at scheduler time */
        -schedule_work(&priv->wakeup_work);
        +usb_serial_port_softint(port);
        break;
    default:
        break;
    }
    break;
@@ -369,8 +366,10 @@
    3, /* get pins */
        USB_TYPE_VENDOR|USB_RECIP_INTERFACE|USB_DIR_IN,
        0, 0, data, 1, 2000);
    -if (rc >= 0)
        +if (rc == 1)
        *value = *data;
    +else if (rc >= 0)
        +rc = -EIO;
    kfree(data);
    return rc;
@@ -441,6 +440,7 @@
    int request_unthrottle = 0;
    int rc = 0;
    struct keyspan_pda_private *priv;
    +unsigned long flags;
    priv = usb_get_serial_port_data(port);
    /* guess how much room is left in the device's ring buffer, and if we
    @@ -460,13 +460,13 @@
            the TX urb is in-flight (wait until it completes)
            the device is full (wait until it says there is room)
            */
    -spin_lock_bh(&port->lock);
    +spin_lock_irqsave(&port->lock, flags);
    if (!test_bit(0, &port->write_urbs_free) || priv->tx_throttled) {
        -spin_unlock_bh(&port->lock);
        +spin_unlock_irqrestore(&port->lock, flags);
        return 0;
clear_bit(0, &port->write_urbs_free);
-spin_unlock_bh(&port->lock);
+spin_unlock_irqrestore(&port->lock, flags);

/* At this point the URB is in our control, nobody else can submit it
   again (the only sudden transition was the one from EINPROGRESS to
   EINPROGRESS again) */
@@ -512,7 +512,8 @@
goto exit;
}
}
-if (count > priv->tx_room) {
+
+if (count >= priv->tx_room) {
/* we're about to completely fill the Tx buffer, so
   we'll be throttled afterwards. */
   count = priv->tx_room;
@@ -545,7 +546,7 @@
rc = count;
exit:
-if (rc < 0)
+if (rc <= 0)
   set_bit(0, &port->write_urbs_free);
return rc;
}
@@ -554,27 +555,28 @@
static void keyspan_pda_write_bulk_callback(struct urb *urb)
{
 struct usb_serial_port *port = urb->context;
-struct keyspan_pda_private *priv;

  set_bit(0, &port->write_urbs_free);
-priv = usb_get_serial_port_data(port);
+
/* queue up a wakeup at scheduler time */
-schedule_work(&priv->wakeup_work);
+usb_serial_port_softint(port);
}

static int keyspan_pda_write_room(struct tty_struct *tty)
{
 struct usb_serial_port *port = tty->driver_data;
-struct keyspan_pda_private *priv;
-priv = usb_get_serial_port_data(port);
-/* used by n_tty.c for processing of tabs and such. Giving it our
 - conservative guess is probably good enough, but needs testing by
- running a console through the device. */
-return priv->tx_room;
-
+struct keyspan_pda_private *priv = usb_get_serial_port_data(port);
+unsigned long flags;
+int room = 0;

+spin_lock_irqsave(&port->lock, flags);
+if (test_bit(0, &port->write_urb->flags) & & !priv->tx_throttled)
+room = priv->tx_room;
+spin_unlock_irqrestore(&port->lock, flags);
+
+return room;
+
static int keyspan_pda_chars_in_buffer(struct tty_struct *tty)
{
 @@ -654,8 +656,12 @@

 static void keyspan_pda_close(struct usb_serial_port *port)
 {
+struct keyspan_pda_private *priv = usb_get_serial_port_data(port);
+
 usb_kill_urb(port->write_urb);
 usb_kill_urb(port->interrupt_in_urb);
+
+cancel_work_sync(&priv->unthrottle_work);
 }

 @@ -713,7 +719,6 @@
 if (!priv)
 return -ENOMEM;

 -INIT_WORK(&priv->wakeup_work, keyspan_pda_wakeup_write);
 INIT_WORK(&priv->unthrottle_work, keyspan_pda_request_unthrottle);
 priv->serial = port->serial;
 priv->port = port;
--- linux-4.15.0.orig/drivers/usb/serial/kl5kusb105.c
+++ linux-4.15.0/drivers/usb/serial/kl5kusb105.c
 @@ -277,12 +277,12 @@
 priv->cfg.unknown2 = cfg->unknown2;
 spin_unlock_irqrestore(&priv->lock, flags);
+
+kfree(cfg);
+
 /* READ_ON and urb submission */
 rc = usb_serial_generic_open(tty, port);
if (rc) {
    retval = rc;
    goto err_free_cfg;
}
+
if (rc)
+    return rc;

rc = usb_control_msg(port->serial->dev,
    usb_sndctrlpipe(port->serial->dev, 0),
    KLSI_TIMEOUT);
err_generic_close:
    usb_serial_generic_close(port);
-err_free_cfg:
-    kfree(cfg);
    return retval;
}
buf = kmalloc(1, GFP_KERNEL);
-if (!buf)
+if (!buf) {
+ *data = 0;
return -ENOMEM;
+}

status = usb_control_msg(usbdev, pipe, request, requesttype, value,
    index, buf, 1, MOS_WDR_TIMEOUT);
@@ -365,8 +367,6 @@
if (!urbtrack)
return -ENOMEM;

-kref_get(&mos_parport->ref_count);
-urbtrack->mos_parport = mos_parport;
urbtrack->urb = usb_alloc_urb(0, GFP_ATOMIC);
if (!urbtrack->urb) {
    kfree(urbtrack);
    @@ -387,6 +387,8 @@
    usb_sndctrlpipe(usbdev, 0),
    (unsigned char *)urbtrack->setup,
    NULL, 0, async_complete, urbtrack);
+kref_get(&mos_parport->ref_count);
+urbtrack->mos_parport = mos_parport;
kref_init(&urbtrack->ref_count);
INIT_LIST_HEAD(&urbtrack->urblist_entry);

@@ -637,6 +639,8 @@
    spin_unlock(&release_lock);
    return;
+	mos_parport->shadowDCR = s->u.pc.ctr;
+mos_parport->shadowECR = s->u.pc.ecr;
write_parport_reg_nonblock(mos_parport, MOS7720_DCR,
    mos_parport->shadowDCR);
write_parport_reg_nonblock(mos_parport, MOS7720_ECR,
@@ -1247,8 +1251,10 @@
    if (urb->transfer_buffer == NULL) {
    urb->transfer_buffer = kmalloc(URB_TRANSFER_BUFFER_SIZE,
        GFP_ATOMIC);
-if (!urb->transfer_buffer)
+if (!urb->transfer_buffer) {
+    bytes_sent = -ENOMEM;
    goto exit;
+}
}
transfer_size = min(count, URB_TRANSFER_BUFFER_SIZE);
product = le16_to_cpu(serial->dev->descriptor.idProduct);
dev = serial->dev;

/* setting configuration feature to one */
-usb_control_msg(serial->dev, usb_sndctrlpipe(serial->dev, 0),
-(__u8)0x03, 0x00, 0x01, 0x00, NULL, 0x00, 5000);
-
if (product == MOSCHIP_DEVICE_ID_7715) {
struct urb *urb = serial->port[0]->interrupt_in_urb;

--- linux-4.15.0.orig/drivers/usb/serial/mos7840.c
+++ linux-4.15.0/drivers/usb/serial/mos7840.c
@@ -113,16 +113,19 @@
#define BANDB_DEVICE_ID_USOPTL4_2P       0xBC02
#define BANDB_DEVICE_ID_USOPTL4_4        0xAC44
#define BANDB_DEVICE_ID_USOPTL4_4P       0xBC03
-#define BANDB_DEVICE_ID_USOPTL2_4        0xAC24
/* This driver also supports
 * ATEN UC2324 device using Moschip MCS7840
 * ATEN UC2322 device using Moschip MCS7820
+ * MOXA UPort 2210 device using Moschip MCS7820
 */
#define USB_VENDOR_ID_ATENINTL	0x0557
#define ATENINTLDEVICE_ID_UC23240x2011
#define ATENINTLDEVICE_ID_UC23220x7820

+#define USB_VENDOR_ID_MOXA0x110a
+define MOXA_DEVICE_ID_22100x2210
+
/* Interrupt Routine Defines */

#define SERIAL_IIR_RLS      0x06
@@ -190,9 +193,9 @@
{USB_DEVICE(USB_VENDOR_ID_BANDB, BANDB_DEVICE_ID_USOPTL4_2P)},
{USB_DEVICE(USB_VENDOR_ID_BANDB, BANDB_DEVICE_ID_USOPTL4_4)},
{USB_DEVICE(USB_VENDOR_ID_BANDB, BANDB_DEVICE_ID_USOPTL4_4P)},
-{USB_DEVICE(USB_VENDOR_ID_BANDB, BANDB_DEVICE_ID_USOPTL2_4)},
+{USB_DEVICE(USB_VENDOR_ID_MOXA, MOXA_DEVICE_ID_2210)},
{ }/* terminating entry */
}

MODULE_DEVICE_TABLE(usb, id_table);
@@ -468,6 +471,9 @@
}
dev_dbg(dev, "%s urb buffer size is %d\n", __func__, urb->actual_length);
+if (urb->actual_length < 1)
+ goto out;
+
dev_dbg(dev, "%s mos7840_port->MsrLsr is %d port %d\n", __func__,
mos7840_port->MsrLsr, mos7840_port->port_num);
data = urb->transfer_buffer;
@@ -1331,8 +1337,10 @@
if (urb->transfer_buffer == NULL) {
    urb->transfer_buffer = kmalloc(URB_TRANSFER_BUFFER_SIZE,
       GFP_ATOMIC);
    -if (!urb->transfer_buffer)
+rbytes_sent = -ENOMEM;
     goto exit;
+}
}
transfer_size = min(count, URB_TRANSFER_BUFFER_SIZE);

@@ -2049,6 +2057,7 @@

    /* setting configuration feature to one */
    -usb_control_msg(serial->dev, usb_sndctrlpipe(serial->dev, 0),
        0x03, 0x00, 0x01, 0x00, NULL, 0x00,
        -MOS_WDR_TIMEOUT);
static const struct usb_device_id id_table[] = {
    { USB_DEVICE(ZYXEL_VENDOR_ID, ZYXEL_OMNINET_ID) },
    { USB_DEVICE(ZYXEL_VENDOR_ID, ZYXEL_OMNI_56K_PLUS_ID) },
    { USB_DEVICE(ZYXEL_VENDOR_ID, BT_IGNITIONPRO_ID) },
    { } /* Terminating entry */
};

if (retval < 0)
    kfree(buffer);

#define DELL_PRODUCT_5800_V2_MINICARD_VZW0x8196 /* Novatel E362 */
#define DELL_PRODUCT_5804_MINICARD_ATT0x819b /* Novatel E371 */

#define QUECTEL_PRODUCT_UC20
#define QUECTEL_PRODUCT_UC15

/* These Quectel products use Qualcomm's vendor ID */
#define QUECTEL_PRODUCT_UC200x9003
#define QUECTEL_PRODUCT_UC150x9090
/* These u-blox products use Qualcomm's vendor ID */
#define UBLOX_PRODUCT_R410M	0x90b2
#define UBLOX_PRODUCT_R6XX0	0x90fa
/* These Yuga products use Qualcomm's vendor ID */
#define YUGA_PRODUCT_CLM920_NC50	0x9625

/* These Quectel products use Quectel's vendor ID */
#define QUECTEL_PRODUCT_EC2100	0x0121
#define QUECTEL_PRODUCT_EC2500	0x0125
#define QUECTEL_PRODUCT_EG9100	0x0191
#define QUECTEL_PRODUCT_EG9500	0x0195
#define QUECTEL_PRODUCT_BG9600	0x0296
#define QUECTEL_PRODUCT_EP0600	0x0306
#define QUECTEL_PRODUCT_EM1200	0x0512
#define QUECTEL_PRODUCT_RM5000	0x0800
#define QUECTEL_PRODUCT_EC200S_CN0	0x6002
#define QUECTEL_PRODUCT_EC200T	0x6026

#define CMOTECH_VENDOR_ID	0x16d8
#define CMOTECH_PRODUCT_6001	0x6001

/* Fujisoft products */
#define FUJISOFT_PRODUCT_FS040U	0x9b02

/* iBall 3.5G connect wireless modem */
#define IBALL_3_5G_CONNECT	0x9605

/* Olivetti products */
#define OLIVETTI_VENDOR_ID	0x0b3c

/* Cellient products */
#define OLIVETTI_VENDOR_ID	0x0b3c
#define CELLIENT_VENDOR_ID	0x2692
#define CELLIENT_PRODUCT_MEN2000x9005
+#define CELLIENT_PRODUCT_MPL2000x9025

/* Hyundai Petatel Inc. products */
#define PETATEL_VENDOR_ID	0x1ff4
@@ -544,147 +565,24 @@
#define WETELECOM_PRODUCT_6802	0x6802
#define WETELECOM_PRODUCT_WMD3000x6803

-struct option_blacklist_info {
+/* bitmask of interface numbers blacklisted for send_setup */
+const unsigned long sendsetup;
+/* bitmask of interface numbers that are reserved */
+const unsigned long reserved;
+};
+
+static const struct option_blacklist_info four_g_w14_blacklist = {
+ .sendsetup = BIT(0) | BIT(1),
+};
+
+static const struct option_blacklist_info four_g_w100_blacklist = {
+ .sendsetup = BIT(1) | BIT(2),
+ .reserved = BIT(3),
+};
+
+static const struct option_blacklist_info alcatel_x200_blacklist = {
+ .sendsetup = BIT(0) | BIT(1),
+ .reserved = BIT(4),
+};
+
+static const struct option_blacklist_info zte_0037_blacklist = {
+ .sendsetup = BIT(0) | BIT(1),
+};
+
+static const struct option_blacklist_info zte_k3765_z_blacklist = {
+ .sendsetup = BIT(0) | BIT(1) | BIT(2),
+ .reserved = BIT(4),
+};
+
+static const struct option_blacklist_info zte_ad3812_z_blacklist = {
+ .sendsetup = BIT(0) | BIT(1) | BIT(2),
+};
+
+static const struct option_blacklist_info zte_mc2718_z_blacklist = {
+ .sendsetup = BIT(1) | BIT(2) | BIT(3) | BIT(4),
+};
+
- static const struct option_blacklist_info zte_mc2716_z_blacklist = {
  .sendsetup = BIT(1) | BIT(2) | BIT(3),
-};
-
- static const struct option_blacklist_info zte_me3620_mbim_blacklist = {
  .reserved = BIT(2) | BIT(3) | BIT(4),
-};
-
- static const struct option_blacklist_info zte_me3620_xl_blacklist = {
  .reserved = BIT(3) | BIT(4) | BIT(5),
-};
-
- static const struct option_blacklist_info zte_zm8620_x_blacklist = {
  .reserved = BIT(3) | BIT(4) | BIT(5),
-};
-
- static const struct option_blacklist_info huawei_cdc12_blacklist = {
  .reserved = BIT(1) | BIT(2),
-};
-
- static const struct option_blacklist_info net_intf0_blacklist = {
  .reserved = BIT(0),
-};
-
- static const struct option_blacklist_info net_intf1_blacklist = {
  .reserved = BIT(1),
-};
-
- static const struct option_blacklist_info net_intf2_blacklist = {
  .reserved = BIT(2),
-};
-
- static const struct option_blacklist_info net_intf3_blacklist = {
  .reserved = BIT(3),
-};
-
- static const struct option_blacklist_info net_intf4_blacklist = {
  .reserved = BIT(4),
-};
-
- static const struct option_blacklist_info net_intf5_blacklist = {
  .reserved = BIT(5),
-};
-
- static const struct option_blacklist_info net_intf6_blacklist = {
  .reserved = BIT(6),
-};
static const struct option_blacklist_info zte_mf626_blacklist = {
    .sendsetup = BIT(0) | BIT(1),
    .reserved = BIT(4),
};

static const struct option_blacklist_info zte_1255_blacklist = {
    .reserved = BIT(3) | BIT(4),
};

static const struct option_blacklist_info simcom_sim7100e_blacklist = {
    .reserved = BIT(5) | BIT(6),
};

/* Device flags */
static const struct option_blacklist_info simcom_sim7100e_blacklist = {
    .reserved = BIT(5) | BIT(6),
};

#define FLAG_IFNUM_MAX	7

static const struct option_blacklist_info telit_me910_blacklist = {
    .sendsetup = BIT(0),
    .reserved = BIT(1) | BIT(3),
};

/* Interface does not support modem-control requests */
#define NCTRL(ifnum)	((BIT(ifnum) & 0xff) << 8)

static const struct option_blacklist_info telit_me910_dual_modem_blacklist = {
    .sendsetup = BIT(0),
    .reserved = BIT(3),
};

/* Interface is reserved */
#define RSVD(ifnum)	((BIT(ifnum) & 0xff) << 0)

static const struct option_blacklist_info telit_le910_blacklist = {
    .sendsetup = BIT(0),
    .reserved = BIT(1) | BIT(2),
};

/* Interface must have two endpoints */
#define NUMEP2BIT(16)

static const struct option_blacklist_info telit_le910_dual_modem_blacklist = {
    .sendsetup = BIT(0),
    .reserved = BIT(3),
};

static const struct option_blacklist_info telit_le920_blacklist = {
    .sendsetup = BIT(0),
    .reserved = BIT(1) | BIT(5),
};

static const struct option_blacklist_info telit_le920a4_blacklist_1 = {
    .sendsetup = BIT(0),
    .reserved = BIT(1),
};

static const struct option_blacklist_info telit_le922_blacklist_usbcfg0 = {

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.sendsetup = BIT(2),
.reserved = BIT(0) | BIT(1) | BIT(3),
};

static const struct option_blacklist_info telit_le922_blacklist_usbcfg3 = {
.sendsetup = BIT(0),
.reserved = BIT(1) | BIT(2) | BIT(3),
};

static const struct option_blacklist_info cinterion_rmnet2_blacklist = {
.reserved = BIT(4) | BIT(5),
};

#include "zlp.h"

#define ZLP BIT(17)

static const struct option_blacklist_info yuga_clm920_nc5_blacklist = {
.reserved = BIT(1) | BIT(4),
};

static const struct usb_device_id option_ids[] = {
{ USB_DEVICE(OPTION_VENDOR_ID, OPTION_PRODUCT_COLT) },
@@ -718,26 +616,26 @@
{ USB_DEVICE(QUANTA_VENDOR_ID, QUANTA_PRODUCT_GKE) },
{ USB_DEVICE(QUANTA_VENDOR_ID, QUANTA_PRODUCT_GLE) },
{ USB_DEVICE(QUANTA_VENDOR_ID, 0xea42),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+  .driver_info = RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0x1c05, USB_CLASS_COMM, 0x02, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0x1c1f, USB_CLASS_COMM, 0x02, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0x1c23, USB_CLASS_COMM, 0x02, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, HUAWEI_PRODUCT_E173, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf1_blacklist },
+  .driver_info = RSVD(1) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, HUAWEI_PRODUCT_E173S6, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf1_blacklist },
+  .driver_info = RSVD(1) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, HUAWEI_PRODUCT_E1750, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+  .driver_info = RSVD(2) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0x1441, USB_CLASS_COMM, 0x02, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0x1442, USB_CLASS_COMM, 0x02,
0xff }) },
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, HUAWEI_PRODUCT_K4505, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t) &huawei_cdc12_blacklist },
+ .driver_info = RSVD(1) | RSVD(2 ),
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, HUAWEI_PRODUCT_K3765, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t) &huawei_cdc12_blacklist },
+ .driver_info = RSVD(1) | RSVD(2 ),
{ USB_DEVICE_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, HUAWEI_PRODUCT_K4605, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t) &huawei_cdc12_blacklist },
+ .driver_info = RSVD(1) | RSVD(2 ),
{ USB_VENDOR_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0xff, 0xff) },
{ USB_VENDOR_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0xff, 0x01, 0x01) },
{ USB_VENDOR_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0xff, 0x01, 0x02) },
@@ -1088,6 +986,11 @@
{ USB_VENDOR_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0xff, 0x06, 0x07B) },
{ USB_VENDOR_AND_INTERFACE_INFO(HUAWEI_VENDOR_ID, 0xff, 0x06, 0x07C) },
+/* Motorola devices */
+{ USB_DEVICE_AND_INTERFACE_INFO(0x22b8, 0x2a70, 0xff, 0xff, 0xff) },	/* mdm6600 */
+{ USB_DEVICE_AND_INTERFACE_INFO(0x22b8, 0x2e0a, 0xff, 0xff, 0xff) },	/* mdm9600 */
+{ USB_DEVICE_AND_INTERFACE_INFO(0x22b8, 0x4281, 0x0a, 0x00, 0xfc) },	/* mdm ram dl */
+{ USB_DEVICE_AND_INTERFACE_INFO(0x22b8, 0x900e, 0xff, 0xff, 0xff) },	/* mdm qc dl */
{ USB_DEVICE(ANYDATA_VENDOR_ID, ANYDATA_PRODUCT_ADU_E100A) },	/* ADU-E100, ADU-310 */
{ USB_DEVICE(ANYDATA_VENDOR_ID, ANYDATA_PRODUCT_ADU_500A) },
{ USB_DEVICE(ANYDATA_VENDOR_ID, ANYDATA_PRODUCT_ADU_620UW) },
@@ -1182,104 +1089,187 @@
{ USB_DEVICE(DELL_VENDOR_ID, DELL_PRODUCT_5800_MINICARD_VZW, 0xff, 0xff, 0xff) },
{ USB_DEVICE(DELL_VENDOR_ID, DELL_PRODUCT_5800_MINICARD_VZW, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(DELL_VENDOR_ID, DELL_PRODUCT_5800_MINICARD_VZW, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(DELL_VENDOR_ID, DELL_PRODUCT_5804_MINICARD_VZW, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(DELL_VENDOR_ID, DELL_PRODUCT_5804_MINICARD_VZW, 0xff, 0xff, 0xff) },
{ USB_DEVICE(ANYDATA_VENDOR_ID, ANYDATA_PRODUCT_ADU_E100A) },	/* ADU-E100, ADU-310 */
{ USB_DEVICE(ANYDATA_VENDOR_ID, ANYDATA_PRODUCT_ADU_500A) },
{ USB_DEVICE(ANYDATA_VENDOR_ID, ANYDATA_PRODUCT_ADU_620UW) },
@@ -1182,104 +1089,187 @@
{ USB_DEVICE(KYOCERA_VENDOR_ID, KYOCERA_PRODUCT_KPC680) },
{ USB_DEVICE(QUALCOMM_VENDOR_ID, 0x6000) }, /* ZTE AC8700 */
{ USB_DEVICE_AND_INTERFACE_INFO(QUALCOMM_VENDOR_ID, 0x6001, 0xff, 0xff, 0xff), /* 4G LTE
usb-modem U901 */
- .driver_info = (kernel_ulong_t)&net_intf3_blacklist },
+ .driver_info = RSVD(3 )},
{ USB_DEVICE(QUALCOMM_VENDOR_ID, 0x6613) }, /* Onda H600/ZTE MF330 */
{ USB_DEVICE(QUALCOMM_VENDOR_ID, 0x0023) }, /* ONYX 3G device */
- { USB_DEVICE(QUALCOMM_VENDOR_ID, 0x9000) }, /* SIMCom SIM5218 */
+ { USB_DEVICE(QUALCOMM_VENDOR_ID, 0x9000) }, /* SIMCom SIM5218 */
+ .driver_info = NCTRL(0) | NCTRL(1) | NCTRL(2) | NCTRL(3) | RSVD(4) },
/* Quectel products using Qualcomm vendor ID */
{ USB_DEVICE(QUALCOMM_VENDOR_ID, QUECTEL_PRODUCT_UC15) },
{ USB_DEVICE(QUALCOMM_VENDOR_ID, QUECTEL_PRODUCT_UC20) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
/* Yuga products use Qualcomm vendor ID */
{ USB_DEVICE(QUALCOMM_VENDOR_ID, YUGA_PRODUCT_CLM920_NC5) },
- .driver_info = (kernel_ulong_t)&yuga_clm920_nc5_blacklist },
+ /* u-blox products using Qualcomm vendor ID */
+ { USB_DEVICE(QUALCOMM_VENDOR_ID, UBLIX_PRODUCT_R410M) },
+ .driver_info = RSVD(1) | RSVD(4) },
+ /* Quectel products using Quectel vendor ID */
- { USB_DEVICE(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EC21) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
- { USB_DEVICE(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EC25) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ { USB_DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EC21, 0xff, 0xff, 0xff),
+ .driver_info = NUMEP2 },
+ { USB DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EC21, 0xff, 0, 0) },
+ { USB DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EC25, 0xff, 0xff, 0xff),
+ .driver_info = NUMEP2 },
+ { USB DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EC25, 0xff, 0, 0) },
+ { USB DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EG91, 0xff, 0, 0xff),
+ .driver_info = NUMEP2 },
+ { USB DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EG91, 0xff, 0, 0) },
+ { USB DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL PRODUCT_EG95, 0xff, 0, 0xff),
+ .driver_info = NUMEP2 },
+ .driver_info = NUMEP2 },

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+{ USB_DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EG95, 0xff, 0, 0) },
{ USB_DEVICE(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_BG96),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
+{ USB_DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EP06, 0xff, 0xff, 0xff),
  .driver_info = RSVD(1) | RSVD(2) | RSVD(3) | RSVD(4) | NUMEP2 },
+{ USB_DEVICE_AND_INTERFACE_INFO(QUECTEL_VENDOR_ID, QUECTEL_PRODUCT_EM12, 0xff, 0xff, 0xff),
  .driver_info = ZLP },
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{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_CDUC680) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_CDUC685A) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_CHU720S),
  .driver_info = (kernel_ulong_t)&net_intf0_blacklist },
+ .driver_info = RSVD(0) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7002),
  .driver_info = (kernel_ulong_t)&net_intf0_blacklist },
+ .driver_info = RSVD(0) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_CHU629K),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7004),
  .driver_info = (kernel_ulong_t)&net_intf3_blacklist },
+ .driver_info = RSVD(3) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7005) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_CGU629),
  .driver_info = (kernel_ulong_t)&net_intf5_blacklist },
+ .driver_info = RSVD(5) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_CHU629S),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_CHU7201),
  .driver_info = (kernel_ulong_t)&net_intf0_blacklist },
+ .driver_info = RSVD(0) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7212),
  .driver_info = (kernel_ulong_t)&net_intf0_blacklist },
+ .driver_info = RSVD(0) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7213),
  .driver_info = (kernel_ulong_t)&net_intf0_blacklist },
+ .driver_info = RSVD(0) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7251),
  .driver_info = (kernel_ulong_t)&net_intf1_blacklist },
+ .driver_info = RSVD(1) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7252),
  .driver_info = (kernel_ulong_t)&net_intf1_blacklist },
+ .driver_info = RSVD(1) },
{ USB_DEVICE(CMOTECH_VENDOR_ID, CMOTECH_PRODUCT_7253),
  .driver_info = (kernel_ulong_t)&net_intf1_blacklist },
+ .driver_info = RSVD(1) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_UC864E) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_UC864G) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_CC864_DUAL) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_CC864_SINGE) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_DE910_DUAL) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_UE910_V2) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x1031, 0xff),/* Telit LE910C1-EUX */
  .driver_info = NCTRL(0) | RSVD(3) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x1033, 0xff),/* Telit LE910C1-EUX (ECM) */
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x110b, 0xff), /* Telit ME910G1 (ECM) */
  .driver_info = NCTRL(0) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_LE910),
  .driver_info = (kernel_ulong_t)&telit_le910_blacklist },
+{ driver_info = NCTRL(0) | RSV(1) | RSV(2) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x1203, 0xff), /* Telit LE910Cx (RNDIS) */
  .driver_info = NCTRL(2) | RSV(3) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x1204, 0xff), /* Telit LE910Cx (MBIM) */
  .driver_info = NCTRL(0) | RSV(1) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_LE910_USBCFG4),
  .driver_info = (kernel_ulong_t)&telit_le922_blacklist_usbcfg3 },
+{ driver_info = NCTRL(0) | RSV(1) | RSV(5) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_LE920A4_1207) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_LE920A4_1208),
  .driver_info = (kernel_ulong_t)&telit_le920a4_blacklist_1 },
+{ driver_info = NCTRL(0) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_LE920A4_1211),
  .driver_info = (kernel_ulong_t)&telit_le922_blacklist_usbcfg3 },
+{ driver_info = NCTRL(0) | RSV(1) | RSV(2) | RSV(3) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_LE920A4_1212),
  .driver_info = (kernel_ulong_t)&telit_le920a4_blacklist_1 },
+{ driver_info = NCTRL(0) | RSV(1) },
{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, TELIT_PRODUCT_LE920A4_1213, 0xff) },
{ USB_DEVICE(TELIT_VENDOR_ID, TELIT_PRODUCT_LE920A4_1214),
  .driver_info = (kernel_ulong_t)&telit_le922_blacklist_usbcfg3 },
+{ driver_info = NCTRL(0) | RSV(1) | RSV(2) | RSV(3) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x1230, 0xff), /* Telit LE910Cx (rmnet) */
  .driver_info = NCTRL(0) | RSV(1) | RSV(2) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x1231, 0xff), /* Telit LE910Cx (RNDIS) */
  .driver_info = NCTRL(0) },
+{ USB_DEVICE(TELIT_VENDOR_ID, 0x1260),
  .driver_info = NCTRL(0) | RSV(1) | RSV(2) },
+{ USB_DEVICE(TELIT_VENDOR_ID, 0x1261),
  .driver_info = NCTRL(0) | RSV(1) | RSV(2) },
+{ USB_DEVICE(TELIT_VENDOR_ID, 0x1900), /* Telit LN940 (QMI) */
  .driver_info = NCTRL(0) | ZLP },
+{ USB_DEVICE(TELIT_VENDOR_ID, 0x1901), /* Telit LN940 (MBIM) */
  .driver_info = NCTRL(0) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x7010, 0xff), /* Telit LE910-S1 (RNDIS) */
  .driver_info = NCTRL(2) },
+{ USB_DEVICE_INTERFACE_CLASS(TELIT_VENDOR_ID, 0x7011, 0xff), /* Telit LE910-S1 (ECM) */
  .driver_info = NCTRL(2) },
+{ USB_DEVICE(TELIT_VENDOR_ID, 0x9010), /* Telit SBL FN980 flashing device */
  .driver_info = NCTRL(0) | ZLP },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_MF622, 0xff, 0xff, 0xff), /*
ZTE WCDMA products */

{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0002, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf1_blacklist },
+ .driver_info = RSVD(1) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0003, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0004, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0005, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0010, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0011, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0012, 0xff, 0xff, 0xff),
  .driver_info = RSVD(1) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0013, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_MF628, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0016, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0017, 0xff, 0xff, 0xff),
  .driver_info = RSVD(3) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0018, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0019, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0020, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0021, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0022, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0023, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0024, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0025, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_MF626, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&zte_mf626_blacklist },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0028, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0029, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0030, 0xff, 0xff, 0xff) },
+{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_MF626, 0xff, 0xff, 0xff),
  .driver_info = RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0032, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0033, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0034, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0037, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_MF626, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_VENDOR_ID, 0x0038, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0039, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0040, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0042, 0xff, 0xff, 0xff) },
+ .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0043, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0044, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0048, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0049, 0xff, 0xff, 0xff),
+ .driver_info = (kernel_ulong_t)&net_intf5_blacklist },
+ .driver_info = RSVD(5) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0050, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0051, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0052, 0xff, 0xff, 0xff),
+ .driver_info = RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0054, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0055, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0056, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0058, 0xff, 0xff, 0xff) },
+ .driver_info = RSVD(5) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0059, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x005a, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x005b, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x005d, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x005e, 0xff, 0xff, 0xff),
+ .driver_info = RSVD(6) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0060, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0061, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0062, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0063, 0xff, 0xff, 0xff),
+ .driver_info = RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0064, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0065, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0066, 0xff, 0xff, 0xff) },
+ .driver_info = RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0067, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0068, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0069, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x006a, 0xff, 0xff, 0xff),
+ .driver_info = RSVD(5) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x006b, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x006c, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x006d, 0xff, 0xff, 0xff),
+ .driver_info = RSVD(6) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x006e, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x006f, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0070, 0xff, 0xff, 0xff),
+ .driver_info = RSVD(6) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0071, 0xff, 0xff, 0xff) },
+ .driver_info = RSVD(5) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0121, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf5_blacklist },
+  .driver_info = RSVD(5 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0122, 0xff, 0xff, 0xff )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0123, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+  .driver_info = RSVD(4 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0124, 0xff, 0xff, 0xff),
  .driver_info = RSVD(5 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0125, 0xff, 0xff, 0xff),
  .driver_info = RSVD(6 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0126, 0xff, 0xff, 0xff),
  .driver_info = RSVD(5 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0128, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0135, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0136, 0xff, 0xff, 0xff) },
@@ -1406,50 +1396,52 @@
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0155, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0156, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0157, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf5_blacklist },
+  .driver_info = RSVD(5 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0158, 0xff, 0xff, 0xff),
  .driver_info = RSVD(3 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0159, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0161, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0162, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0164, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0165, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0167, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+  .driver_info = RSVD(4 )},
{ USB DEVICE AND INTERFACE INFO(ZTE_VENDOR_ID, 0x0189, 0xff, 0xff, 0xff) },
{ USB DEVICE AND INTERFACE INFO(ZTE_VENDOR_ID, 0x0191, 0xff, 0xff, 0xff), */ ZTE EuFi890 */
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+  .driver_info = RSVD(4 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0196, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0197, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0199, 0xff, 0xff, 0xff), */ ZTE MF820S */
  .driver_info = (kernel_ulong_t)&net_intf1 blacklist },
+  .driver_info = RSVD(1 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0200, 0xff, 0xff, 0xff) },
{ USB DEVICE AND INTERFACE INFO(ZTE_VENDOR_ID, 0x0201, 0xff, 0xff, 0xff) },
{ USB DEVICE AND INTERFACE INFO(ZTE_VENDOR_ID, 0x0254, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0257, 0xff, 0xff, 0xff), /* ZTE MF821 */
  .driver_info = (kernel_ulong_t)&net_intf3_blacklist },
+ .driver_info = RSVD(3 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0265, 0xff, 0xff, 0xff), /* ONDA MT8205 */
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0284, 0xff, 0xff, 0xff), /* ZTE MF880 */
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0317, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0326, 0xff, 0xff, 0xff), /* Telewell TW-LTE 4G */
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0330, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0395, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0412, 0xff, 0xff, 0xff), /* Telewell TW-LTE 4G */
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0414, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0417, 0xff, 0xff, 0xff) },
+ { USB_DEVICE_INTERFACE_CLASS(ZTE_VENDOR_ID, 0x0601, 0xff) }, /* GosunCn ZTE WeLink ME3630 (RNDIS mode) */
+ { USB_DEVICE_INTERFACE_CLASS(ZTE_VENDOR_ID, 0x0602, 0xff) }, /* GosunCn ZTE WeLink ME3630 (MBIM mode) */
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1008, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1010, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1012, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ),
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1018, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1021, 0xff, 0xff, 0xff) },
- .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+ .driver_info = RSVD(2 )
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1170, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1244, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1245, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1246, 0xff, 0xff, 0xff) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 )
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1246, 0xff, 0xff, 0xff) },

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{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1247, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1248, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1249, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1250, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1251, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1252, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1253, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1254, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4 ) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1255, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&zte_1255_blacklist },
+ .driver_info = RSVD(3 ) | RSVD(4 ) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1256, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1257, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1258, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1259, 0xff, 0xff, 0xff) },
@@ -1597,12 +1589,13 @@
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1268, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1269, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1270, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1271, 0xff, 0xff, 0xff) },
@@ -1633,17 +1626,19 @@
{ USB_DEVICE/ZTE_VENDOR_ID, 0x1275),/# ZTE P685M */
+ .driver_info = RSVD(3 ) | RSVD(4 ) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1276, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1277, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1278, 0xff, 0xff, 0xff) },
@@ -1633,17 +1626,19 @@
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1303, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1333, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1401, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+ .driver_info = RSVD(2 ) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1402, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+ .driver_info = RSVD(2 ) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1424, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+ .driver_info = RSVD(2 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1425, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+ .driver_info = RSVD(2 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1426, 0xff, 0xff, 0xff),  /* ZTE MF91 */
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+ .driver_info = RSVD(2 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1428, 0xff, 0xff, 0xff),  /* Telewell TW-LTE 4G v2 */
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist },
+ .driver_info = RSVD(2 )},
+{ USB_DEVICE_INTERFACE_CLASS(ZTE_VENDOR_ID, 0x1476, 0xff) },	/* GosunCn ZTE WeLink ME3630 (ECM/NCM mode) */
+{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1481, 0xff, 0x00, 0x00) }, /* ZTE MF871A */
  { USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1533, 0xff, 0xff, 0xff) },
  { USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1534, 0xff, 0xff, 0xff) },
  { USBDEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1535, 0xff, 0xff, 0xff) },
  @ @ -1661.8 +1656.8 @@
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1596, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1598, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x1600, 0xff, 0xff, 0xff) },
-{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x2002, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&zte_k3765_z_blacklist },
+{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x2002, 0xff, 0xff, 0xff),
  .driver_info = NCTRL(0) | NCTRL(1) | NCTRL(2) | RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x2003, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0014, 0xff, 0xff, 0xff) }, /* ZTE CDMA products */
+ @ @ -1671.22 +1666.21 @@
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0060, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0070, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0073, 0xff, 0xff, 0xff) },
-{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0094, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0130, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf1_blacklist },
+ .driver_info = RSVD(1 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0133, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf3_blacklist },
+ .driver_info = RSVD(3 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0141, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf5_blacklist },
+ .driver_info = RSVD(5 )},
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0147, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0152, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0168, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+  .driver_info = RSVD(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0170, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0176, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf3_blacklist },
+  .driver_info = RSVD(3) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0x0178, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&net_intf3_blacklist },
+  .driver_info = RSVD(3) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0xff42, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0xff43, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0xff44, 0xff, 0xff, 0xff) },
@@ -1838,19 +1832,19 @@
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_AC2726, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_AC8710T, 0xff, 0xff, 0xff) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_MC2718, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&zte_mc2718_z_blacklist },
+  .driver_info = NCTRL(1) | NCTRL(2) | NCTRL(3) | NCTRL(4) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_AD3812, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&zte_ad3812_z_blacklist },
+  .driver_info = NCTRL(0) | NCTRL(1) | NCTRL(2) },
{ USB_DEVICE_AND_INTERFACE_INFO(ZTE_VENDOR_ID, ZTE_PRODUCT_MC2716, 0xff, 0xff, 0xff),
  .driver_info = (kernel_ulong_t)&zte_mc2716_z_blacklist },
+  .driver_info = NCTRL(1) | NCTRL(2) | NCTRL(3) },
{ USB_DEVICE(ZTE_VENDOR_ID, ZTE_PRODUCT_ME3620_L),
  .driver_info = (kernel_ulong_t)&zte_me3620_xl_blacklist },
+  .driver_info = RSVD(3) | RSVD(4) | RSVD(5) },
{ USB_DEVICE(ZTE_VENDOR_ID, ZTE_PRODUCT_ME3620_ME3620_M),
  .driver_info = (kernel_ulong_t)&zte_me3620_mbim_blacklist },
+  .driver_info = RSVD(2) | RSVD(3) | RSVD(4) },
{ USB_DEVICE(ZTE_VENDOR_ID, ZTE_PRODUCT_ME3620_X),
  .driver_info = (kernel_ulong_t)&zte_me3620_xl_blacklist },
+  .driver_info = RSVD(3) | RSVD(4) | RSVD(5) },
{ USB_DEVICE(ZTE_VENDOR_ID, ZTE_PRODUCT_ZM8620_X),
  .driver_info = (kernel_ulong_t)&zte_zm8620_x_blacklist },
+  .driver_info = RSVD(3) | RSVD(4) | RSVD(5) },
{ USB_VENDOR_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0xff, 0x02, 0x01) },
{ USB_VENDOR_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0xff, 0x02, 0x05) },
{ USB_VENDOR_AND_INTERFACE_INFO(ZTE_VENDOR_ID, 0xff, 0x86, 0x10) },
@@ -1870,35 +1864,39 @@
{ USB_DEVICE(ALINK_VENDOR_ID, ALINK_PRODUCT_PH300) },
{ USB_DEVICE_AND_INTERFACE_INFO(ALINK_VENDOR_ID, ALINK_PRODUCT_3GU, 0xff, 0xff, 0xff) },
{ USB_VENDOR_AND_INTERFACE_INFO(ALINK_VENDOR_ID, ALINK_PRODUCT_SIM7100E),
  .driver_info = (kernel_ulong_t)&simcom_sim7100e_blacklist },
+  .driver_info = RSVD(5) | RSVD(6) },
+{ USB_DEVICE_INTERFACE_CLASS(0x1e0e, 0x9003, 0xff) }, /* Simcom SIM7500/SIM7600 MBIM mode */
{ USB_DEVICE_INTERFACE_CLASS(0x1e0e, 0x9011, 0xff), /* Simcom SIM7500/SIM7600 RNDIS mode */
  .driver_info = RSVD(7) },
{ USB_DEVICE_INTERFACE_CLASS(0x1e0e, 0x9205, 0xff) }, /* Simcom SIM7070/SIM7080/SIM7090 AT+ECM mode */
{ USB_DEVICE_INTERFACE_CLASS(0x1e0e, 0x9206, 0xff) }, /* Simcom SIM7070/SIM7080/SIM7090 AT-only mode */
{ USB_DEVICE(ALCATEL_VENDOR_ID, ALCATEL_PRODUCT_X060S_X200),
  .driver_info = (kernel_ulong_t)&alcatel_x200_blacklist
},
{ USB_DEVICE(ALCATEL_VENDOR_ID, ALCATEL_PRODUCT_X220_X500D),
  .driver_info = (kernel_ulong_t)&net_intf6_blacklist
},
{ USB_DEVICE(ALCATEL_VENDOR_ID, 0x0052),
  .driver_info = (kernel_ulong_t)&net_intf6_blacklist
},
{ USB_DEVICE(ALCATEL_VENDOR_ID, 0x00b6),
  .driver_info = (kernel_ulong_t)&net_intf3_blacklist
},
{ USB_DEVICE(ALCATEL_VENDOR_ID, 0x00b7),
  .driver_info = (kernel_ulong_t)&net_intf5_blacklist
},
{ USB_DEVICE(ALCATEL_VENDOR_ID, ALCATEL_PRODUCT_L100V),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist
},
{ USB_DEVICE(ALCATEL_VENDOR_ID, ALCATEL_PRODUCT_L800MA),
  .driver_info = (kernel_ulong_t)&net_intf2_blacklist
},
{ USB_DEVICE(AIRPLUS_VENDOR_ID, AIRPLUS_PRODUCT_MCD650) },
{ USB_DEVICE(TLAYTECH_VENDOR_ID, TLAYTECH_PRODUCT_TEU800) },
{ USB_DEVICE(LONGCHEER_VENDOR_ID, FOUR_G_SYSTEMS_PRODUCT_W14),
  .driver_info = (kernel_ulong_t)&four_g_w14_blacklist
},
{ USB_DEVICE(LONGCHEER_VENDOR_ID, ZOOM_PRODUCT_4597) },
{ USB_DEVICEINTERFACE_CLASS(LONGCHEER_VENDOR_ID, SPEEDUP_PRODUCT_SU9800, 0xff) },
{ USB_DEVICEINTERFACE_CLASS(LONGCHEER_VENDOR_ID, 0x9801, 0xff) },
{ USB_DEVICE(LONGCHEER_VENDOR_ID, IBALL_3_5G_CONNECT) },
{ USB_DEVICE(HAIER_VENDOR_ID, HAIER_PRODUCT_CE100) },
@@@ -1924,37 +1922,44 @@
{ USB_DEVICE(CINTERION_VENDOR_ID, CINTERION_PRODUCT_EU3_E) },
{ USB_DEVICE(CINTERION_VENDOR_ID, CINTERION_PRODUCT_EU3_P) },
{ USB_DEVICE(CINTERION_VENDOR_ID, CINTERION_PRODUCT_PH8),
  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+  .driver_info = RSVD(4) },
{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_AHXX, 0xff) },
{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_AHXX_2RMNET, 0xff) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_AHXX_AUDIO, 0xff) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_PH8_2RMNET, 0xff) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_CLS8, 0xff),
+  .driver_info = RSVD(4) | RSVD(5) },
{- USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_CLS8音频, 0xff),
  .driver_info = RSVD(4) },
+{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_EXS82, 0xff) },
+{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_MV31_MBIM, 0xff),
+  .driver_info = RSVD(3) },
+{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_MV31_RMNET, 0xff),
+  .driver_info = RSVD(0) },
+{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_MV31_RMNET),
+  .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
+{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_MV31_RMNET),
+  .driver_info = RSVD(4) },
+{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_MV31_RMNET),
+  .driver_info = RSVD(4) },
+{ USB_DEVICE_INTERFACE_CLASS(CINTERION_VENDOR_ID, CINTERION_PRODUCT_MV31_RMNET),
+  .driver_info = RSVD(4) },
- .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
+ .driver_info = RSVD(4) },
    { USB_DEVICE(OLIVETTI_VENDOR_ID, OLIVETTI_PRODUCT_OLICARD155),
      - .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
    + .driver_info = RSVD(4) },
    { USB_DEVICE(OLIVETTI_VENDOR_ID, OLIVETTI_PRODUCT_OLICARD200),
      - .driver_info = (kernel_ulong_t)&net_intf6_blacklist },
    + .driver_info = RSVD(6) },
    { USB_DEVICE(OLIVETTI_VENDOR_ID, OLIVETTI_PRODUCT_OLICARD160),
      - .driver_info = (kernel_ulong_t)&net_intf6_blacklist },
    + .driver_info = RSVD(6) },
    { USB_DEVICE(OLIVETTI_VENDOR_ID, OLIVETTI_PRODUCT_OLICARD500),
      - .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
    + .driver_info = RSVD(4) },
    { USB_DEVICE(CELOT_VENDOR_ID, CELOT_PRODUCT_CT680M) }, /* CT-650 CDMA 450 1xEVDO modem */
    { USB_DEVICE_AND_INTERFACE_INFO(SAMSUNG_VENDOR_ID, SAMSUNG_PRODUCT_GT_B3730, USB_CLASS_CDC_DATA, 0x00, 0x00) }, /* Samsung GT-B3730 LTE USB modem. */
    { USB_DEVICE(YUGA_VENDOR_ID, YUGA_PRODUCT_CEM600) },
    @{ -2027,13 +2032,15 @@
    { USB_DEVICE_AND_INTERFACE_INFO(MEDIATEK_VENDOR_ID, MEDIATEK_PRODUCT_DC_4COM2, 0xff, 0x02, 0x01) },
    { USB_DEVICE_AND_INTERFACE_INFO(MEDIATEK_VENDOR_ID, MEDIATEK_PRODUCT_DC_4COM2, 0xff, 0x00, 0x00) },
    { USB_DEVICE(CELLIENT_VENDOR_ID, CELLIENT_PRODUCT_MEN200) },
    + { USB_DEVICE(CELLIENT_VENDOR_ID, CELLIENT_PRODUCT_MPL200),
      + .driver_info = RSVD(1) | RSVD(4) },
    { USB_DEVICE(PETATEL_VENDOR_ID, PETATEL_PRODUCT_NP10T_600A) },
    { USB_DEVICE(PETATEL_VENDOR_ID, PETATEL_PRODUCT_NP10T_600E) },
    { USB_DEVICE_AND_INTERFACE_INFO(TPLINK_VENDOR_ID, TPLINK_PRODUCT_LTE, 0xff, 0x00, 0x00) }, /* TP-Link LTE Module */
    { USB_DEVICE(TPLINK_VENDOR_ID, TPLINK_PRODUCT_MA180),
      - .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
    + .driver_info = RSVD(4) },
    { USB_DEVICE(TPLINK_VENDOR_ID, TPLINK_PRODUCT_MA260) },/* TP-Link MA260 */
    - .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
    + .driver_info = RSVD(4) },
    { USB_DEVICE(CHANGHONG_VENDOR_ID, CHANGHONG_PRODUCT_CH690) },
    + { USB_DEVICEINTERFACE_CLASS(0x2001, 0x7e19, 0xff), /* D-Link DWM-222 */
    { USB_DEVICEINTERFACE_CLASS(0x2001, 0x7e35, 0xff), /* D-Link DWM-222 */
    @ @ @ -2041,19 +2048,55 @@
    { USB_DEVICEINTERFACE_CLASS(0x2001, 0x7d01, 0xff) }, /* D-Link DWM-156 (variant) */
    { USB_DEVICEINTERFACE_CLASS(0x2001, 0x7d02, 0xff) },
    + .driver_info = RSVD(4) },
    { USB_DEVICE(CHANGHONG_VENDOR_ID, CHANGHONG_PRODUCT_CH690) },
    + { USB_DEVICEINTERFACE_CLASS(0x2001, 0x77d0, 0xff) }, /* D-Link DWM-157 */
    { USB_DEVICEINTERFACE_CLASS(0x2001, 0x77d0e, 0xff) }, /* D-Link DWM-157 C1 */
    { USB_DEVICEINTERFACE_CLASS(0x2001, 0x7e19, 0xff), /* D-Link DWM-221 B1 */
    - .driver_info = (kernel_ulong_t)&net_intf4_blacklist },
    + .driver_info = RSVD(4) },
    { USB_DEVICEINTERFACE_CLASS(0x2001, 0x7e35, 0xff), /* D-Link DWM-222 */

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- .driver_info = { kernel_ulong_t }&net_intf4_blacklist },

- { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x3e01, 0xff, 0xff, 0xff) }, /* D-Link DWM-152/C1 */
- { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x3e02, 0xff, 0xff, 0xff) }, /* D-Link DWM-156/C1 */
- { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x7e11, 0xff, 0xff, 0xff) }, /* D-Link DWM-156/A3 */
- { USB_DEVICE_INTERFACE_CLASS(0x0200, 0x4000, 0xff) }, /* OLICARD300 - MT6225 */
+ .driver_info = RSVD(4) },
+ { USB_DEVICE_INTERFACE_CLASS(0x0200, 0x7e3d, 0xff),
  .driver_info = RSVD(4) }, /* D-Link DWM-222 A2 */
+ .driver_info = RSVD(4) },
+ { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x3e01, 0xff, 0xff, 0xff) }, /* D-Link DWM-152/C1 */
+ { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x3e02, 0xff, 0xff, 0xff) }, /* D-Link DWM-156/C1 */
+ { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x7e11, 0xff, 0xff, 0xff) }, /* D-Link DWM-156/A3 */
+ { USB_DEVICE_INTERFACE_CLASS(0x0200, 0x4000, 0xff) }, /* OLICARD300 - MT6225 */
+ { USB_DEVICE_INTERFACE_CLASS(0x0200, 0x7e3d, 0xff),
  .driver_info = RSVD(4) }, /* D-Link DWM-222 A2 */
+ .driver_info = RSVD(4) },
+ { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x3e01, 0xff, 0xff, 0xff) }, /* D-Link DWM-152/C1 */
+ { USB_DEVICE_AND_INTERFACE_INFO(0x07d1, 0x7e11, 0xff, 0xff, 0xff) }, /* D-Link DWM-156/A3 */
+ { USB_DEVICE_INTERFACE_CLASS(0x0200, 0x4000, 0xff) }, /* OLICARD300 - MT6225 */
+ { USB_DEVICE_INTERFACE_CLASS(0x0200, 0x7e3d, 0xff),
  .driver_info = RSVD(4) }, /* D-Link DWM-222 A2 */
+ .driver_info = RSVD(4) },
+ { USB_DEVICE_INTERFACE_CLASS(0x0200, 0x4000, 0xff) }, /* OLICARD300 - MT6225 */
+ { USB_DEVICE(0x03f0, 0x421d, 0xff, 0xff, 0xff) }, /* HP lt2523 (Novatel E371) */
+ { USB_DEVICE(0x03f0, 0x421d, 0xff, 0xff, 0xff) }, /* HP lt2523 (Novatel E371) */
+ { USB_DEVICE(0x03f0, 0xa31d, 0xff, 0x06, 0x10) }, /* HP lt4132 (Huawei ME906s-158) */
+ { USB DEVICE(0x03f0, 0xa31d, 0xff, 0x06, 0x1b) }, /* HP lt4132 (Huawei ME906s-158) */
+ { USB_DEVICE(0x03f0, 0xa31d, 0xff, 0x06, 0x13) }, /* HP lt4132 (Huawei ME906s-158) */
+ { USB_DEVICE(0x03f0, 0xa31d, 0xff, 0x06, 0x14) }, /* HP lt4132 (Huawei ME906s-158) */
+ { USB_DEVICE(0x03f0, 0xa31d, 0xff, 0x06, 0x1b) }, /* HP lt4132 (Huawei ME906s-158) */
+ { USB_DEVICE(0x03f0, 0xa31d, 0xff, 0x06, 0x12) }, /* HP lt4132 (Huawei ME906s-158) */

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module_usb_serial_driver(serial_drivers, option_ids);

+static bool iface_is_reserved(unsigned long device_flags, u8 ifnum)
+{
+if (ifnum > FLAG_IFNUM_MAX)
+return false;
+
+return device_flags & RSVD(ifnum);
+}
+
static int option_probe(struct usb_serial *serial, const struct usb_device_id *id)
{
    struct usb_interface_descriptor *iface_desc =
        &serial->interface->cur_altsetting->desc;
    struct usb_device_descriptor *dev_desc = &serial->dev->descriptor;
    -const struct option_blacklist_info *blacklist;
    +unsigned long device_flags = id->driver_info;
    /* Never bind to the CD-Rom emulation interface*/
    if (iface_desc->bInterfaceClass == 0x08)
        @ @ -2114,9 +2165,7 @@
        * the same class/subclass/protocol as the serial interfaces. Look at
        * the Windows driver .INF files for reserved interface numbers.
        */
        -blacklist = (void *)id->driver_info;
        -if (blacklist && test_bit(iface_desc->bInterfaceNumber,
        -&blacklist->reserved))
        +if (iface_is_reserved(device_flags, iface_desc->bInterfaceNumber))
            return -ENODEV;
        /*
        * Don't bind network interface on Samsung GT-B3730, it is handled by
        @ @ -2127,31 +2176,48 @@

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iface_desc->bInterfaceClass != USB_CLASS_CDC_DATA)
return -ENODEV;

-/* Store the blacklist info so we can use it during attach. */
-usb_set_serial_data(serial, (void *)blacklist);
+/*
+ * Allow matching on bNumEndpoints for devices whose interface numbers
+ * can change (e.g. Quectel EP06).
+ */
+if (device_flags & NUMEP2 && iface_desc->bNumEndpoints != 2)
+return -ENODEV;
+
+/* Store the device flags so we can use them during attach. */
+usb_set_serial_data(serial, (void *)device_flags);

return 0;
}

+static bool iface_no_modem_control(unsigned long device_flags, u8 ifnum)
+{
+if (ifnum > FLAG_IFNUM_MAX)
+return false;
+
+return device_flags & NCTRL(ifnum);
+}
+
+static int option_attach(struct usb_serial *serial)
{
struct usb_interface_descriptor *iface_desc;
const struct option_blacklist_info *blacklist;
struct usb_wwan_intf_private *data;

data = kzalloc(sizeof(struct usb_wwan_intf_private), GFP_KERNEL);
if (!data)
return -ENOMEM;

-/* Retrieve blacklist info stored at probe. */
-blacklist = usb_get_serial_data(serial);
+/* Retrieve device flags stored at probe. */
+device_flags = (unsigned long)usb_get_serial_data(serial);

iface_desc = &serial->interface->cur_altsetting->desc;

-if (!blacklist || !test_bit(iface_desc->bInterfaceNumber,
-&blacklist->sendsetup)) {
+if (!iface_no_modem_control(device_flags, iface_desc->bInterfaceNumber))
data->use_send_setup = 1;
if (device_flags & ZLP)
data->use_zlp = 1;
spin_lock_init(&data->susp_lock);

usb_set_serial_data(serial, data);
--- linux-4.15.0.orig/drivers/usb/serial/pl2303.c
+++ linux-4.15.0/drivers/usb/serial/pl2303.c
@@ -38,6 +38,7 @@
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_RSAQ2) },
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_RSAQ3) },
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_CHILITAG) },
+    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_PHAROS) },
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_ALDIGA) },
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_MMX) },
@@ -45,12 +46,15 @@
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_HCR331) },
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_MOTOROLA) },
    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_ZTEK) },
+    { USB_DEVICE(PL2303_VENDOR_ID, PL2303_PRODUCT_ID_TB) },
    { USB_DEVICE(IODATA_VENDOR_ID, IODATA_PRODUCT_ID) },
    { USB_DEVICE(IODATA_VENDOR_ID, IODATA_PRODUCT_ID_RSAQ5) },
    { USB_DEVICE(PL2303_VENDOR_ID, ATEN_PRODUCT_ID),
          .driver_info = PL2303_QUIRK_ENDIAN_POINT_HACK },
    { USB_DEVICE(PL2303_VENDOR_ID, ATEN_PRODUCT_ID_UC485),
          .driver_info = PL2303_QUIRK_ENDIAN_POINT_HACK },
+    { USB_DEVICE(PL2303_VENDOR_ID, ATEN_PRODUCT_ID2),
+      .driver_info = PL2303_QUIRK_ENDIAN_POINT_HACK },
    { USB_DEVICE(PL2303_VENDOR_ID, ATEN_PRODUCT_ID2),
    { USB_DEVICE(ELCOM_VENDOR_ID, ELCOM_PRODUCT_ID) },
@@ -88,15 +92,24 @@
    { USB_DEVICE(YCCABLE_VENDOR_ID, YCCABLE_PRODUCT_ID) },
    { USB_DEVICE(SUPERIAL_VENDOR_ID, SUPERIAL_PRODUCT_ID) },
    { USB_DEVICE(HP_VENDOR_ID, HP_LD220_PRODUCT_ID) },
+    { USB_DEVICE(HP_VENDOR_ID, HP_LD220TA_PRODUCT_ID) },
+    { USB_DEVICE(HP_VENDOR_ID, HP_LD381PRODUCT_ID) },
+    { USB_DEVICE(HP_VENDOR_ID, HP_LD381GC_PRODUCT_ID) },
    { USB_DEVICE(HP_VENDOR_ID, HP_LD960PRODUCT_ID) },
+    { USB_DEVICE(HP_VENDOR_ID, HP_LD960TA_PRODUCT_ID) },
    { USB_DEVICE(HP_VENDOR_ID, HP_LCD220PRODUCT_ID) },
    { USB_DEVICE(HP_VENDOR_ID, HP_LCD960PRODUCT_ID) },
+    { USB_DEVICE(HP_VENDOR_ID, HP_LCD940PRODUCT_ID) },
+    { USB_DEVICE(HP_VENDOR_ID, HP_TD620PRODUCT_ID) },

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{ USB_DEVICE(CRESSI_VENDOR_ID, CRESSI_EDY_PRODUCT_ID) },
{ USB_DEVICE(ZEAGLE_VENDOR_ID, ZEAGLE_N2ITION3_PRODUCT_ID) },
{ USB_DEVICE(SANWA_VENDOR_ID, SONY_QN3USB_PRODUCT_ID) },
{ USB_DEVICE(SONY_VENDOR_ID, SONY_QN3USB_PRODUCT_ID) },
{ USB_DEVICE(SONY_VENDOR_ID, SONY_QN3USB_PRODUCT_ID) },
{ USB_DEVICE(SANWA_VENDOR_ID, SANWA_PRODUCT_ID) },
{ USB_DEVICE(ADLINK_VENDOR_ID, ADLINK_ND6530_PRODUCT_ID) },
{ USB_DEVICE(ADLINK_VENDOR_ID, ADLINK_ND6530GC_PRODUCT_ID) },
{ USB_DEVICE(SMART_VENDOR_ID, SMART_PRODUCT_ID) },
{ USB_DEVICE(AT_VENDOR_ID, AT_VTKIT3_PRODUCT_ID) },/* Terminating entry */
};

--- linux-4.15.0.orig/drivers/usb/serial/pl2303.h
+++ linux-4.15.0/drivers/usb/serial/pl2303.h
@@ -8,10 +8,12 @@
#define PL2303_VENDOR_ID	0x067b
#define PL2303_PRODUCT_ID	0x2303
+#define PL2303_PRODUCT_ID_TB	0x2304
#define PL2303_PRODUCT_ID_RSAQ2	0x04bb
#define PL2303_PRODUCT_ID_DCU11	0x1234
#define PL2303_PRODUCT_ID_PHAROS0	0xaa0
#define PL2303_PRODUCT_ID_RSAQ30	0xaaa2
+#define PL2303_PRODUCT_ID_CHILITAG0	0xaaa8
#define PL2303_PRODUCT_ID_ALDIGA0	0x0611
#define PL2303_PRODUCT_ID_MMX0	0x0612
#define PL2303_PRODUCT_ID_GPRS0	0x0609
@@ -19,10 +21,12 @@
#define PL2303_PRODUCT_ID_MOTOROLA0	0x0307
#define PL2303_PRODUCT_ID_ZTEK0	0xe1f1
+
+#define ATEN_VENDOR_ID0	0x0557
#define ATEN_VENDOR_ID2	0x0547
#define ATEN_PRODUCT_ID	0x2008
#define ATEN_PRODUCT_ID_UC4850	0x2021
+#define ATEN_PRODUCT_ID_UC232B	0x2022
#define ATEN_VENDOR_ID2	0x2118
#define IODATA_VENDOR_ID0	0x04bb
@@ -117,10 +121,17 @@
/* Hewlett-Packard POS Pole Displays */
#define HP_VENDOR_ID0	0x03f0
+#define HP_LD381GC_PRODUCT_ID0	0x0183
+#define HP_CM920_PRODUCT_ID0	0x026b
+#define HP_TD620_PRODUCT_ID0	0x0956
#define HP_LD960_PRODUCT_ID0	0x0b39
+#define HP_LD381_PRODUCT_ID0	0x0f7f

/* Hewlett-Packard POS Pole Displays */
#define HP_VENDOR_ID0	0x03f0
+#define HP_LD381GC_PRODUCT_ID0	0x0183
+#define HP_CM920_PRODUCT_ID0	0x026b
+#define HP_TD620_PRODUCT_ID0	0x0956
#define HP_LD960_PRODUCT_ID0	0x0b39
+#define HP_LD381_PRODUCT_ID0	0x0f7f
#define HP_LCM220_PRODUCT_ID	0x3139
#define HP_LCM960_PRODUCT_ID	0x3239
#define HP_LD220_PRODUCT_ID	0x3524
+#define HP_LD220TA_PRODUCT_ID	0x4349
+#define HP_LD960TA_PRODUCT_ID	0x4439
+#define HP_LM940_PRODUCT_ID	0x5039

/* Cressi Edy (diving computer) PC interface */
#define CRESSI_VENDOR_ID	0x04b8
@@ -141,8 +152,12 @@
/* ADLINK ND-6530 RS232,RS485 and RS422 adapter */
#define ADLINK_VENDOR_ID	0x0b63
#define ADLINK_ND6530_PRODUCT_ID	0x6530
+#define ADLINK_ND6530GC_PRODUCT_ID	0x653a
/* SMART USB Serial Adapter */
#define SMART_VENDOR_ID	0x0b8c
#define SMART_PRODUCT_ID	0x2303
+/* Allied Telesis VT-Kit3 */
+#define AT_VENDOR_ID	0x0caa
+##define AT_VTKIT3_PRODUCT_ID	0x3001
--- linux-4.15.0.orig/drivers/usb/serial/qcserial.c
+++ linux-4.15.0/drivers/usb/serial/qcserial.c
@@ -155,6 +155,7 @@
        {DEVICE_SWI(0x1199, 0x9061)}, /* Sierra Wireless Modem */
+        {DEVICE_SWI(0x1199, 0x9062)}, /* Sierra Wireless EM7305 QDL */
        {DEVICE_SWI(0x1199, 0x9063)}, /* Sierra Wireless EM7305 */
        {DEVICE_SWI(0x1199, 0x9070)}, /* Sierra Wireless MC74xx */
        {DEVICE_SWI(0x1199, 0x9071)}, /* Sierra Wireless MC74xx */
@@ -164,6 +165,7 @@
        {DEVICE_SWI(0x1199, 0x907b)}, /* Sierra Wireless EM74xx */
        {DEVICE_SWI(0x1199, 0x9090)}, /* Sierra Wireless EM7565 QDL */
        {DEVICE_SWI(0x1199, 0x9091)}, /* Sierra Wireless EM7565 */
+        {DEVICE_SWI(0x1199, 0x90d2)}, /* Sierra Wireless EM9191 QDL */
        {DEVICE_SWI(0x413c, 0x81a2)}, /* Dell Wireless 5806 Gobi(TM) 4G LTE Mobile Broadband Card */
        {DEVICE_SWI(0x413c, 0x81a3)}, /* Dell Wireless 5570 HSPA+ (42Mbps) Mobile Broadband Card */
        {DEVICE_SWI(0x413c, 0x81a4)}, /* Dell Wireless 5570e HSPA+ (42Mbps) Mobile Broadband Card */
@@ -173,6 +175,8 @@
        {DEVICE_SWI(0x413c, 0x81b3)}, /* Dell Wireless 5809e Gobi(TM) 4G LTE Mobile Broadband Card (rev3) */
        {DEVICE_SWI(0x413c, 0x81b5)}, /* Dell Wireless 5811e QDL */
        {DEVICE_SWI(0x413c, 0x81b6)}, /* Dell Wireless 5811e QDL */
+        {DEVICE_SWI(0x413c, 0x81cb)}, /* Dell Wireless 5816e QDL */
+        {DEVICE_SWI(0x413c, 0x81cc)}, /* Dell Wireless 5816e */
        {DEVICE_SWI(0x413c, 0x81cf)}, /* Dell Wireless 5819 */
        {DEVICE_SWI(0x413c, 0x81d0)}, /* Dell Wireless 5819 */

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/* flush the port transmit buffer */
int i = usb_control_msg(serial->dev, USB_RCVCTRLPIPE(serial->dev), 0x40, 0x8000, 0, NULL, 0, QT2_USB_TIMEOUT);

/* flush the port receive buffer */
int i = usb_control_msg(serial->dev, USB_SNDCTRLPIPE(serial->dev), 0x40, 0, NULL, 0, QT2_USB_TIMEOUT);

/* power on unit */
int status = usb_control_msg(serial->dev, USB_RCVCTRLPIPE(serial->dev), 0xc2, 0x40, 0x8000, 0, NULL, 0, QT2_USB_TIMEOUT);
if (status < 0) {
    @ @ -863.7 +863.10 @@
    u8 newMSR = (u8) *ch;
    unsigned long flags;
    /* May be called from qt2_process_read_urb() for an unbound port. */
    port_priv = usb_get_serial_port_data(port);
    +if (port_priv)
    +return;
}

spin_lock_irqsave(&port_priv->lock, flags);
port_priv->shadowMSR = newMSR;
@ @ -894.10 @@
unsigned long flags;
    @ @ -889.17 +889.10 @@
    u8 newLSR = (u8) *ch;

*/
+return;

if (newLSR & UART_LSR_BI)
    newLSR &= (u8) (UART_LSR_OE | UART_LSR_BI);
--- linux-4.15.0.orig/drivers/usb/serial/sierra.c
+++ linux-4.15.0/drivers/usb/serial/sierra.c
@@ -770,9 +770,9 @@
kfree(urb->transfer_buffer);
    usb_free_urb(urb);
    usb_autopm_put_interface_async(serial->interface);
    -spin_lock(&portdata->lock);
    +spin_lock_irq(&portdata->lock);
    portdata->outstanding_urbs--;
    -spin_unlock(&portdata->lock);
    +spin_unlock_irq(&portdata->lock);
} }

sierra_stop_rx_urbs(port);
--- linux-4.15.0.orig/drivers/usb/serial/ti_usb_3410_5052.c
+++ linux-4.15.0/drivers/usb/serial/ti_usb_3410_5052.c
@@ -37,6 +37,7 @@
    #define TI_VENDOR_ID			0x0451
    #define IBM_VENDOR_ID			0x04b3
    +#define STARTECH_VENDOR_ID		0x14b0
    #define TI_3410_PRODUCT_ID		0x3410
    #define IBM_4543_PRODUCT_ID		0x4543
    #define IBM_454B_PRODUCT_ID		0x454b
@@ -776,7 +779,6 @@
    struct ti_port *tport;
    int port_number;
    int status;
-int do_unlock;
unsigned long flags;

tdev = usb_get_serial_data(port->serial);
@@ -800,16 +802,13 @@
"%s - cannot send close port command, %d\n"
 , __func__, status);

-/* if mutex_lock is interrupted, continue anyway */
-   do_unlock = !mutex_lock_interruptible(&tdev->td_open_close_lock);
+   mutex_lock(&tdev->td_open_close_lock);
-   tport->tp_tdev->td_open_port_count;
-   if (tport->tp_tdev->td_open_port_count <= 0) {
-     /* last port is closed, shut down interrupt urb */
-     usb_kill_urb(port->serial->port[0]->interrupt_in_urb);
-     tport->tp_tdev->td_open_port_count = 0;
-   }
-   if (do_unlock)
-     mutex_unlock(&tdev->td_open_close_lock);
+   mutex_unlock(&tdev->td_open_close_lock);
}

static int ti_get_port_from_code(unsigned char code)
{
   -return (code >> 4) - 3;
   +return (code >> 6) & 0x01;
}

static int ti_get_func_from_code(unsigned char code)
--- linux-4.15.0.orig/drivers/usb/serial/usb-serial-simple.c
+++ linux-4.15.0/drivers/usb/serial/usb-serial-simple.c
@@ -63,6 +63,11 @@
0x01) }
DEVICE(google, GOOGLE_IDS);

+/* Libtransistor USB console */
+#define LIBTRANSISTOR_IDS()
+{ USB_DEVICE(0x1209, 0x8b00) }
+DEVICE(libtransistor, LIBTRANSISTOR_IDS);
+
/* ViVOpay USB Serial Driver */
#define VIVOPAY_IDS()
{ USB_DEVICE(0x1d5f, 0x1004) }/* ViVOpay 8800 */
@@ -1119,7 +1118,7 @@
static int ti_get_port_from_code(unsigned char code)
/* Motorola Tetra driver */
#define MOTOROLA_TETRA_IDS()
+{ USB_DEVICE(0x0cad, 0x9011) } /* Motorola Solutions TETRA PEI */
+{ USB_DEVICE(0x0cad, 0x9012) } /* MTP6550 */
+{ USB_DEVICE(0x0cad, 0x9013) } /* MTP3xxx */
+{ USB_DEVICE(0x0cad, 0x9015) } /* MTP85xx */
+{ USB_DEVICE(0x0cad, 0x9016) } /* TPG2200 */
+DEVICE(motorola_tetra, MOTOROLA_TETRA_IDS);
+
/* Novatel Wireless GPS driver */
#define NOVATEL_IDS()
{ USB_DEVICE(0x09d7, 0x0100) } /* NovAtel FlexPack GPS */
@@ -105,8 +119,10 @@
&funsoft_device,
&flashloader_device,
&google_device,
+&libtransistor_device,
&vivopay_device,
&moto_modem_device,
+&motorola_tetra_device,
&novatel_gps_device,
&hp4x_device,
&suunto_device,
@@ -120,8 +136,10 @@
FUNSOFT_IDS(),
FLASHLOADER_IDS(),
GOOGLE_IDS(),
+LIBTRANSISTOR_IDS(),
VIVOPAY_IDS(),
MOTO_IDS(),
+MOTOROLA_TETRA_IDS(),
NOVATEL_IDS(),
HP4X_IDS(),
SUUNTO_IDS(),
--- linux-4.15.0.orig/drivers/usb/serial/usb-serial.c
+++ linux-4.15.0/drivers/usb/serial/usb-serial.c
@@ -311,10 +311,7 @@
 mutex_lock(&serial->disc_mutex);  
 -mutex_lock(&serial->disc_mutex);  
 -if (!serial->disconnected)  
  -usb_autopm_put_interface(serial->interface);  
  -mutex_unlock(&serial->disc_mutex);  
  +usb_autopm_put_interface(serial->interface);  

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usb_serial_put(serial);
module_put(owner);
@@ -1310,6 +1307,9 @@
return -EINVAL;
}

/* Prevent individual ports from being unbound. */
+driver->driver.suppress_bind_attrs = true;
+
usb_serial_operations_init(driver);

/* Add this device to our list of devices */
--- linux-4.15.0.orig/drivers/usb/serial/usb-wwan.h
+++ linux-4.15.0/drivers/usb/serial/usb-wwan.h
@@ -36,6 +36,7 @@
spinlock_t susp_lock;
unsigned int suspended:1;
unsigned int use_send_setup:1;
+unsigned int use_zlp:1;
int in_flight;
unsigned int open_ports;
void *private;
--- linux-4.15.0.orig/drivers/usb/serial/usb_wwan.c
+++ linux-4.15.0/drivers/usb/serial/usb_wwan.c
@@ -299,6 +299,10 @@
if (status) {
dev_dbg(dev, "%s: nonzero status: %d on endpoint %02x\n", __func__, status, endpoint);
+
+/* don't resubmit on fatal errors */
+if (status == -ESHUTDOWN || status == -ENOENT)
+return;
} else {
if (urb->actual_length) {
tty_insert_flip_string(&port->port, data,
@@ -489,6 +493,7 @@
void (*callback) (struct urb *))
{
struct usb_serial *serial = port->serial;
+struct usb_wwan_intf_private *intfdata = usb_get_serial_data(serial);
struct urb *urb;

urb = usb_alloc_urb(0, GFP_KERNEL); /* No ISO */
@@ -499,6 +504,9 @@
usb_sndbulkpipe(serial->dev, endpoint) | dir,
buf, len, callback, ctx);
+if (intfdata->use_zlp && dir == USB_DIR_OUT)
+urb->transfer_flags |= URB ZERO PACKET;
+
+return urb;
}

--- linux-4.15.0.orig/drivers/usb/serial/visor.c
+++ linux-4.15.0/drivers/usb/serial/visor.c
@@ -335,47 +335,48 @@
goto exit;
}

-if (retval == sizeof(*connection_info)) {
-connection_info = (struct visor_connection_info *)
-transfer_buffer;
-
-num_ports = le16_to_cpu(connection_info->num_ports);
-for (i = 0; i < num_ports; ++i) {
-switch (  
-connection_info->connections[i].port_function_id) {
-case VISOR_FUNCTION_GENERIC:  
-string = "Generic";
-break;
-case VISOR_FUNCTION_DEBUGGER:  
-string = "Debugger";
-break;
-case VISOR_FUNCTION_HOTSYNC:  
-string = "HotSync";
-break;
-case VISOR_FUNCTION_CONSOLE:  
-string = "Console";
-break;
-case VISOR_FUNCTION_REMOTE_FILE_SYS:  
-string = "Remote File System";
-break;
-default:  
-string = "unknown";
-break;
-}
-dev_info(dev, "%s: port %d, is for %s use\n",  
-serial->type->description,  
-connection_info->connections[i].port, string);
-
+if (retval != sizeof(*connection_info)) {
+dev_err(dev, "Invalid connection information received from device\n");
+retval = -ENODEV;
+goto exit;
}
+/*
+ * Handle devices that report invalid stuff here.
+ */
+
+connection_info = (struct visor_connection_info *)transfer_buffer;
+
+num_ports = le16_to_cpu(connection_info->num_ports);
+
+/* Handle devices that report invalid stuff here. */
+if (num_ports == 0 || num_ports > 2) {
+  dev_warn(dev, "%s: No valid connect info available\n",
+            serial->type->description);
+  num_ports = 2;
+}
+
+for (i = 0; i < num_ports; ++i) {
+  switch (connection_info->connections[i].port_function_id) {
+    case VISOR_FUNCTION_GENERIC:
+      string = "Generic";
+      break;
+    case VISOR_FUNCTION_DEBUGGER:
+      string = "Debugger";
+      break;
+    case VISOR_FUNCTION_HOTSYNC:
+      string = "HotSync";
+      break;
+    case VISOR_FUNCTION_CONSOLE:
+      string = "Console";
+      break;
+    case VISOR_FUNCTION_REMOTE_FILE_SYS:
+      string = "Remote File System";
+      break;
+    default:
+      string = "unknown";
+      break;
+  }
+  dev_info(dev, "%s: port %d, is for %s use\n",
+            serial->type->description,
+            connection_info->connections[i].port, string);
+}
+
+dev_info(dev, "%s: Number of ports: %d\n", serial->type->description,
+         num_ports);

--- linux-4.15.0.orig/drivers/usb/serial/whiteheat.c
+++ linux-4.15.0/drivers/usb/serial/whiteheat.c
@@ -571,6 +571,10 @@

  command_port = port->serial->port[COMMAND_PORT];
command_info = usb_get_serial_port_data(command_port);
+
+if (command_port->bulk_out_size < datasize + 1)
+return -EIO;
+
+mutex_lock(&command_info->mutex);
command_info->command_finished = false;

@@ -644,6 +648,7 @@
struct device *dev = &port->dev;
struct whiteheat_port_settings port_settings;
unsigned int cflag = tty->termios.c_cflag;
+speed_t baud;

port_settings.port = port->port_number + 1;

@@ -704,11 +709,13 @@
dev_dbg(dev, "%s - XON = %2x, XOFF = %2x\n", __func__, port_settings.xon, port_settings.xoff);

    /* get the baud rate wanted */
    -port_settings.baud = tty_get_baud_rate(tty);
    -dev_dbg(dev, "%s - baud rate = %d\n", __func__, port_settings.baud);
    +baud = tty_get_baud_rate(tty);
    +port_settings.baud = cpu_to_le32(baud);
    +dev_dbg(dev, "%s - baud rate = %u\n", __func__, baud);

    /* fixme: should set validated settings */
    -tty_encode_baud_rate(tty, port_settings.baud, port_settings.baud);
    +tty_encode_baud_rate(tty, baud, baud);
    +
    /* handle any settings that aren't specified in the tty structure */
    port_settings.lloop = 0;

--- linux-4.15.0.orig/drivers/usb/serial/whiteheat.h
+++ linux-4.15.0/drivers/usb/serial/whiteheat.h
@@ -87,7 +87,7 @@
struct whiteheat_port_settings {
	__u8 port; /* port number (1 to N) */
    __u32 baud; /* any value 7 - 460800, firmware calculates
best fit; arrives little endian */
    __u8bits; /* 5, 6, 7, or 8 */
    __u8stop; /* 1 or 2, default 1 (2 = 1.5 if bits = 5) */
--- linux-4.15.0.orig/drivers/usb/storage/realtek_cr.c
+++ linux-4.15.0/drivers/usb/storage/realtek_cr.c
@@ -38,7 +38,11 @@

struct whiteheat_port_settings {
    __u8port;/* port number (1 to N) */
    __u32baud;/* any value 7 - 460800, firmware calculates
any value 7 - 460800, firmware calculates
best fit; arrives little endian */
    __u8bits;/* 5, 6, 7, or 8 */
    __u8stop;/* 1 or 2, default 1 (2 = 1.5 if bits = 5) */

static int auto_delink_en = 1;
module_param(auto_delink_en, int, S_IRUGO | S_IWUSR);
-MODULE_PARM_DESC(auto_delink_en, "enable auto delink");
+MODULE_PARM_DESC(auto_delink_en, "auto delink mode (0=firmware, 1=software [default])");
+
+static int enable_mmc = 1;
+module_param(enable_mmc, int, S_IRUGO | S_IWUSR);
+MODULE_PARM_DESC(enable_mmc, "enable mmc support");

#ifdef CONFIG_REALTEK_AUTOPM
static int ss_en = 1;
@@ -474,6 +478,27 @@
return 0;
}
+static int rts51x_lun_is_mmc_xd(struct us_data *us, u8 lun)
+{ 
+struct rts51x_chip *chip = (struct rts51x_chip *)(us->extra);
+ 
+if (rts51x_check_status(us, lun))
+return -EIO;
+
+usb_stor_dbg(us,"cur_lun = 0x%02X\n", chip->status[lun].cur_lun);
+usb_stor_dbg(us,"card_type = 0x%02X\n", chip->status[lun].card_type);
+usb_stor_dbg(us,"detailed_type1= 0x%02X\n", chip->status[lun].detailed_type.detailed_type1);
+switch (chip->status[lun].card_type) {
+case 0x4: /* XD */
+return 1;
+case 0x2: /* SD/MMC */
+if (chip->status[lun].detailed_type.detailed_type1 & 0x08)
+return 1;
+default:
+return 0;
+
+static int enable_oscillator(struct us_data *us)
{
int retval;
@@ -763,18 +788,16 @@
break;
case RTS51X_STAT_IDLE:
case RTS51X_STAT_SS:
-usb_stor_dbg(us, "RTS51X_STAT_SS, intf->pm_usage_cnt:%d, power.usage:%d\n", 
- atomic_read(&us->pusb_intf->pm_usage_cnt),
+usb_stor_dbg(us, "RTS51X_STAT_SS, power.usage:%d\n", 
atomic_read(&us->pusb_intf->dev.power.usage_count));
-if (atomic_read(&us->pusb_intf->pm_usage_cnt) > 0) {
  +if (atomic_read(&us->pusb_intf->dev.power.usage_count) > 0) {
    usb_stor_dbg(us, "Ready to enter SS state\n");
    rts51x_set_stat(chip, RTS51X_STAT_SS);
    /* ignore mass storage interface's children */
    pm_suspend_ignore_children(&us->pusb_intf->dev, true);
    usb_autopm_put_interface_async(us->pusb_intf);
    -usb_stor_dbg(us, "RTS51X_STAT_SS 01, intf->pm_usage_cnt:%d, power.usage:%d\n",
      atomic_read(&us->pusb_intf->pm_usage_cnt),
    +usb_stor_dbg(us, "RTS51X_STAT_SS 01, power.usage:%d\n",
      atomic_read(&us->pusb_intf->dev.power.usage_count));
  }
  break;
}@ -807,11 +830,10 @@
int ret;

if (working_scsi(srb)) {
  -usb_stor_dbg(us, "working scsi, intf->pm_usage_cnt:%d, power.usage:%d\n",
    atomic_read(&us->pusb_intf->pm_usage_cnt),
  +usb_stor_dbg(us, "working scsi, power.usage:%d\n",
    atomic_read(&us->pusb_intf->dev.power.usage_count));

  -if (atomic_read(&us->pusb_intf->pm_usage_cnt) <= 0) {
    +if (atomic_read(&us->pusb_intf->dev.power.usage_count) <= 0) {
      ret = usb_autopm_get_interface(us->pusb_intf);
      usb_stor_dbg(us, "working scsi, ret=%d\n", ret);
    }
  }
}@ -852,6 +874,17 @@
chip->proto_handler_backup(srb, us);
/* Check whether card is plugged in */
if (srb->cmd[0] == TEST_UNIT_READY) {
  +sb->result = SAM_STAT_CHECK_CONDITION;
  +memcpy(srb->sense_buffer, media_not_present, US_SENSE_SIZE);
  +CLR_LUN_READY(chip, srb->device->lun);
  +card_first_show = 1;
  +return;
  +}
  +if (srb->result == SAM_STAT_GOOD) {
    SET_LUN_READY(chip, srb->device->lun);
    if (card_first_show) {
      @@ -999,12 +1032,15 @@
goto INIT_FAIL;
    }
  }
-if (CHECK_FW_VER(chip, 0x5888) || CHECK_FW_VER(chip, 0x5889) ||
  CHECK_FW_VER(chip, 0x5901))
-SET_AUTO_DELINK(chip);
-if (STATUS_LEN(chip) == 16) {
  -if (SUPPORT_AUTO_DELINK(chip))
  +if (CHECK_PID(chip, 0x0138) || CHECK_PID(chip, 0x0158) ||
      CHECK_PID(chip, 0x0159)) {
    +if (CHECK_FW_VER(chip, 0x5888) || CHECK_FW_VER(chip, 0x5889) ||
        CHECK_FW_VER(chip, 0x5901))
  SET_AUTO_DELINK(chip);
  +if (STATUS_LEN(chip) == 16) {
    +if (SUPPORT_AUTO_DELINK(chip))
  +SET_AUTO_DELINK(chip);
  +}
  }
#endif CONFIG_REALTEK_AUTOPM
if (ss_en)
--- linux-4.15.0.orig/drivers/usb/storage/scsiglue.c
+++ linux-4.15.0/drivers/usb/storage/scsiglue.c
@@ -77,20 +77,8 @@
sdev->inquiry_len = 36;
 
 /*
 - * USB has unusual DMA-alignment requirements: Although the
 - * starting address of each scatter-gather element doesn't matter,
 - * the length of each element except the last must be divisible
 - * by the Bulk maxpacket value. There's currently no way to
 - * express this by block-layer constraints, so we'll cop out
 - * and simply require addresses to be aligned at 512-byte
 - * boundaries. This is okay since most block I/O involves
 - * hardware sectors that are multiples of 512 bytes in length,
 - * and since host controllers up through USB 2.0 have maxpacket
 - * values no larger than 512.
 - *
 - * But it doesn't suffice for Wireless USB, where Bulk maxpacket
 - * values can be as large as 2048. To make that work properly
 - * will require changes to the block layer.
 + * Some host controllers may have alignment requirements.
 + * We'll play it safe by requiring 512-byte alignment always.
 +*/
 blk_queue_update_dma_alignment(sdev->request_queue, (512 - 1));
 
 @@ -238,8 +226,12 @@
 if (!(us->fflags & US_FL_NEEDS_CAP16))
sdev->try_rc_10_first = 1;
 
-/* assume SPC3 or latter devices support sense size > 18 */
if (sdev->scsi_level > SCSI_SPC_2)
+/*
+ * assume SPC3 or latter devices support sense size > 18
+ * unless US_FL_BAD_SENSE quirk is specified.
+ */
+if (sdev->scsi_level > SCSI_SPC_2 &&
+    !(us->fflags & US_FL_BAD_SENSE))
us->fflags |= US_FL_SANE_SENSE;

/*
@@ -378,6 +370,15 @@
done(srb);
return 0;
}
+
+if ((us->fflags & US_FL_NO_ATA_1X) &&
+srb->cmnd[0] == ATA_12 || srb->cmnd[0] == ATA_16) {
+memcpy(srb->sense_buffer, usb_stor_sense_invalidCDB,
+       sizeof(usb_stor_sense_invalidCDB));
+srb->result = SAM_STAT_CHECK_CONDITION;
+done(srb);
+return 0;
+}

/* enqueue the command and wake up the control thread */
srb->scsi_done = done;
--- linux-4.15.0.orig/drivers/usb/storage/transport.c
+++ linux-4.15.0/drivers/usb/storage/transport.c
@@ -654,6 +654,13 @@
need_auto_sense = 1;
}

+/* Some devices (Kindle) require another command after SYNC CACHE */
+if (((us->fflags & US_FL_SENSE_AFTER_SYNC) &&
+srb->cmnd[0] == SYNCHRONIZE_CACHE) {
+usb_stor_dbg(us, "-- sense after SYNC CACHE\n");
+need_auto_sense = 1;
+}
+
/*
 * If we have a failure, we're going to do a REQUEST_SENSE
 * automatically. Note that we differentiate between a command
--- linux-4.15.0.orig/drivers/usb/storage/uas.c
+++ linux-4.15.0/drivers/usb/storage/uas.c
@@ -45,6 +45,7 @@
struct scsi_cmnd *cmnd[MAX_CMNDS];
spinlock_t lock;
struct work_struct work;
enum {
    static void uas_log_cmd_state(struct scsi_cmnd *cmnd, const char *prefix, int status);

    struct work_struct scan_work; /* for async scanning */
}

static struct workqueue_struct *workqueue;

static void uas_do_work(struct work_struct *work)
{
    struct uas_dev_info *devinfo =
        container_of(work, struct uas_dev_info, scan_work);
    struct Scsi_Host *shost = usb_get_intfdata(devinfo->intf);

    dev_dbg(&devinfo->intf->dev, "starting scan
");
    scsi_scan_host(shost);
    dev_dbg(&devinfo->intf->dev, "scan complete\n");
}

static void uas_scan_work(struct work_struct *work)
{
    struct uas_dev_info *devinfo =
        container_of(work, struct uas_dev_info, scan_work);
    struct Scsi_Host *shost = usb_get_intfdata(devinfo->intf);

    +dev_dbg(&devinfo->intf->dev, "starting scan\n");
    +scsi_scan_host(shost);
    +dev_dbg(&devinfo->intf->dev, "scan complete\n");
}

static void uas_add_work(struct uas_cmd_info *cmdinfo)
{
struct scsi_pointer *scp = (void *)cmdinfo;
@@ -122,7 +147,7 @@
    lockdep_assert_held(&devinfo->lock);
    cmdinfo->state |= IS_IN_WORK_LIST;
    schedule_work(&devinfo->work);
+    queue_work(workqueue, &devinfo->work);
    }

static void uas_zap_pending(struct uas_dev_info *devinfo, int result)
@@ -178,6 +203,9 @@
    struct uas_cmd_info *ci = (void *)&cmnd->SCp;
    struct uas_cmd_info *cmdinfo = (void *)&cmnd->SCp;

    +if (status == -ENODEV) /* too late */
    +return;
    +
    scmd_printk(KERN_INFO, cmd,
            "%s %d uas-tag %d inflight:%s%s%s%s%s%s%s%s%s%s %s",
            prefix, status, cmdinfo->uas_tag,
@@ -641,8 +669,7 @@
    if (devinfo->resetting) {
        cmnd->result = DID_ERROR << 16;
        cmnd->scsi_done(cmnd);
-        spin_unlock_irqrestore(&devinfo->lock, flags);
-        return 0;
+        goto zombie;
    }

    /* Find a free uas-tag */
@@ -678,6 +705,16 @@
    cmdinfo->state &= ~(SUBMIT_DATA_IN_URB | SUBMIT_DATA_OUT_URB);

    err = uas_submit_urbs(cmnd, devinfo);
    +/*
    + * in case of fatal errors the SCSI layer is peculiar
    + * a command that has finished is a success for the purpose
    + * of queueing, no matter how fatal the error
    + */
    +if (err == -ENODEV) {
    +    cmnd->result = DID_ERROR << 16;
    +    cmnd->scsi_done(cmnd);
    +    goto zombie;
    +}
    if (err) {
        /* If we did nothing, give up now */
@@ -688,6 +725,7 @@
    if (cmdinfo->state & SUBMIT_STATUS_URB) {
        @@ -122,7 +147,7 @@
    lockdep_assert_held(&devinfo->lock);
    cmdinfo->state |= IS_IN_WORK_LIST;
    schedule_work(&devinfo->work);
+    queue_work(workqueue, &devinfo->work);
    }

static void uas_zap_pending(struct uas_dev_info *devinfo, int result)
@@ -178,6 +203,9 @@
    struct uas_cmd_info *ci = (void *)&cmnd->SCp;
    struct uas_cmd_info *cmdinfo = (void *)&cmnd->SCp;

    +if (status == -ENODEV) /* too late */
    +return;
    +
    scmd_printk(KERN_INFO, cmd,
            "%s %d uas-tag %d inflight:%s%s%s%s%s%s%s%s%s%s %s",
            prefix, status, cmdinfo->uas_tag,
@@ -641,8 +669,7 @@
    if (devinfo->resetting) {
        cmnd->result = DID_ERROR << 16;
        cmnd->scsi_done(cmnd);
-        spin_unlock_irqrestore(&devinfo->lock, flags);
-        return 0;
+        goto zombie;
    }

    /* Find a free uas-tag */
@@ -678,6 +705,16 @@
    cmdinfo->state &= ~(SUBMIT_DATA_IN_URB | SUBMIT_DATA_OUT_URB);

    err = uas_submit_urbs(cmnd, devinfo);
    +/*
    + * in case of fatal errors the SCSI layer is peculiar
    + * a command that has finished is a success for the purpose
    + * of queueing, no matter how fatal the error
    + */
    +if (err == -ENODEV) {
    +    cmnd->result = DID_ERROR << 16;
    +    cmnd->scsi_done(cmnd);
    +    goto zombie;
    +}
    if (err) {
        /* If we did nothing, give up now */
@@ -688,6 +725,7 @@
devinfo->cmd[idx] = cmd;
+zombie:
spin_unlock_irqrestore(&devinfo->lock, flags);
return 0;
}
@@ -800,20 +838,9 @@
sdev->hostdata = devinfo;

/*
 - * USB has unusual DMA-alignment requirements: Although the
 - * starting address of each scatter-gather element doesn't matter,
 - * the length of each element except the last must be divisible
 - * by the Bulk maxpacket value. There's currently no way to
 - * express this by block-layer constraints, so we'll cop out
 - * and simply require addresses to be aligned at 512-byte
 - * boundaries. This is okay since most block I/O involves
 - * hardware sectors that are multiples of 512 bytes in length,
 - * and since host controllers up through USB 2.0 have maxpacket
 - * values no larger than 512.
 - *
 - * But it doesn't suffice for Wireless USB, where Bulk maxpacket
 - * values can be as large as 2048. To make that work properly
 - * will require changes to the block layer.
 + * The protocol has no requirements on alignment in the strict sense.
 + * Controllers may or may not have alignment restrictions.
 + * As this is not exported, we use an extremely conservative guess.
 */
blk_queue_update_dma_alignment(sdev->request_queue, (512 - 1));
@@ -836,6 +863,46 @@
if (devinfo->flags & US_FL_BROKEN_FUA)
sdev->broken_fua = 1;

+/* UAS also needs to support FL_ALWAYS_SYNC */
+if (devinfo->flags & US_FL_ALWAYS_SYNC) {
+sdev->skip_ms_page_3f = 1;
+sdev->skip_ms_page_8 = 1;
+sdev->wce_default_on = 1;
+}
+
+/* Some disks cannot handle READ_CAPACITY_16 */
+if (devinfo->flags & US_FL_NO_READ_CAPACITY_16)
+sdev->no_read_capacity_16 = 1;
+
+/* Some disks cannot handle WRITE_SAME */
+if (devinfo->flags & US_FL_NO_SAME)
+sdev->no_write_same = 1;
+/
+ /*
+ * Some disks return the total number of blocks in response
+ * to READ CAPACITY rather than the highest block number.
+ * If this device makes that mistake, tell the sd driver.
+ */
+if (devinfo->flags & US_FL_FIX_CAPACITY)
+sdev->fix_capacity = 1;
+
+/*
+ * in some cases we have to guess
+ */
+if (devinfo->flags & US_FL_CAPACITY_HEURISTICS)
+sdev->guess_capacity = 1;
+
+/*
+ * Some devices don't like MODE SENSE with page=0x3f,
+ * which is the command used for checking if a device
+ * is write-protected. Now that we tell the sd driver
+ * to do a 192-byte transfer with this command the
+ * majority of devices work fine, but a few still can't
+ * handle it. The sd driver will simply assume those
+ * devices are write-enabled.
+ */
+if (devinfo->flags & US_FL_NO_WP_DETECT)
+sdev->skip_ms_page_3f = 1;
+
+scsi_change_queue_depth(sdev, devinfo->qdepth - 2);
return 0;
}
@@ -963,6 +1030,7 @@
init_usb_anchor(&devinfo->data_urbs);
spin_lock_init(&devinfo->lock);
INIT_WORK(&devinfo->work, uas_do_work);
+INIT_WORK(&devinfo->scan_work, uas_scan_work);

result = uas_configure_endpoints(devinfo);
if (result)
@@ -979,7 +1047,9 @@
goto free_streams;
-scsi_scan_host(shost);
+/* Submit the delayed_work for SCSI-device scanning */
+schedule_work(&devinfo->scan_work);
+
return result;
free_streams:
@@ -1076,20 +1146,19 @@
 return 0;

 err = uas_configure_endpoints(devinfo);
-  if (err) {
+  if (err && err != -ENODEV)
    shost_printk(KERN_ERR, shost,
          "%s: alloc streams error %d after reset",
          __func__, err);
- return 1;
-}
+  /* we must unblock the host in every case lest we deadlock */
+  spin_lock_irqsave(shost->host_lock, flags);
+  scsi_report_bus_reset(shost, 0);
+  spin_unlock_irqrestore(shost->host_lock, flags);
+
+  /* we must unblock the host in every case lest we deadlock */
+  spin_lock_irqsave(shost->host_lock, flags);
+  scsi_report_bus_reset(shost, 0);
+  spin_unlock_irqrestore(shost->host_lock, flags);

 scsi_unblock_requests(shost);

 -return 0;
 +return err ? 1 : 0;
 
}

static int uas_suspend(struct usb_interface *intf, pm_message_t message)
@@ -1148,6 +1217,12 @@
    usb_kill_anchored_urbs(&devinfo->data_urbs);
    uas_zap_pending(devinfo, DID_NO_CONNECT);

+ /* Prevent SCSI scanning (if it hasn't started yet)
+  * or wait for the SCSI-scanning routine to stop.
+  */
+  cancel_work_sync(&devinfo->scan_work);
+  scsi_remove_host(shost);
+  uas_free_streams(devinfo);
+  scsi_host_put(shost);
@@ -1187,7 +1262,31 @@
      .id_table = uas_usb_ids,
    
-module_usb_driver(uas_driver);
+static int __init uas_init(void)
+{
+  int rv;
+  +workqueue = alloc_workqueue("uas", WQ_MEM_RECLAIM, 0);
+if (!workqueue)
+    return -ENOMEM;
+
+rv = usb_register(&uas_driver);
+if (rv) {
+    destroy_workqueue(workqueue);
+    return -ENOMEM;
+}
+
+return 0;
+
+static void __exit uas_exit(void)
+{
+    usb_deregister(&uas_driver);
+    destroy_workqueue(workqueue);
+}
+
+module_init(uas_init);
+module_exit(uas_exit);

MODULE_LICENSE("GPL");
MODULE_AUTHOR(
--- linux-4.15.0.orig/drivers/usb/storage/unusual_devs.h
+++ linux-4.15.0/drivers/usb/storage/unusual_devs.h
@@ -422,9 +422,16 @@
    USB_SC_UFI, USB_PRDEVICE, NULL, US_FL_FIX_INQUIRY | US_FL_SINGLE_LUN),
    /*
     * Reported by Ondrej Zary <linux@rainbow-software.org>
     * + Reported by Ondrej Zary <linux@zary.sk>
     * The device reports one sector more and breaks when that sector is accessed
     * + Firmwares older than 2.6c (the latest one and the only that claims Linux
     * + support) have also broken tag handling
     */
+UNUSUAL_DEV( 0x04ce, 0x0002, 0x0000, 0x026b,
+    "ScanLogic",
+    "SL11R-IDE",
+UNUSUAL_DEV, USB_PRDEVICE, NULL,
+    US_FL_FIX_CAPACITY | US_FL_BULK_IGNORE_TAG),
UNUSUAL_DEV( 0x04ce, 0x0002, 0x026c, 0x026c,
    "ScanLogic",
    "SL11R-IDE",
@@ -1264,6 +1271,12 @@
    USB_SC_RBC, USB_PR_BULK, NULL,
    0 ),
+
+UNUSUAL_DEV(0x090c, 0x1000, 0x1000, 0x1000,
"Samsung",
"Flash Drive FIT",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_MAX_SECTORS_64),
+
/* aeb */
UNUSUAL_DEV( 0x090c, 0x1132, 0x0000, 0xffff, "Feiya",
@@ -1272,6 +1285,18 @@
US_FL_FIX_CAPACITY ),
*/
+ * Reported by Icenowy Zheng <icenowy@aosc.io>
+ * The SMI SM3350 USB-UFS bridge controller will enter a wrong state
+ * that do not process read/write command if a long sense is requested,
+ * so force to use 18-byte sense.
+ */
+UNUSUAL_DEV( 0x090c, 0x3350, 0x0000, 0xffff, "SMI",
+"SM3350 UFS-to-USB-Mass-Storage bridge",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_BAD_SENSE ),
+
+/*
+* Reported by Paul Hartman <paul.hartman+linux@gmail.com>
+* This card reader returns "Illegal Request, Logical Block Address
+* Out of Range" for the first READ(10) after a new card is inserted.
@@ -1325,6 +1350,13 @@
USB_SC_DEVICE, USB_PR_DEVICE, option_ms_init,
0),
+
+/* Reported by Timo Aaltonen <tjaalton@ubuntu.com> */
+UNUSUAL_DEV( 0x0af0, 0x7011, 0x0000, 0x9999,
+"Option",
+"Mass Storage",
+USB_SC_DEVICE, USB_PR_DEVICE, option_ms_init,
+0 ),
+
+/*
+* Reported by F. Aben <f.aben@option.com>
+* This device (wrongly) has a vendor-specific device descriptor.
@@ -2094,7 +2126,7 @@
US_FL_IGNORE_RESIDUE ),

/* Reported by Michael Bsck <m@bues.ch> */
-UNUSUAL_DEV( 0x152d, 0x0567, 0x0114, 0x0116,
+UNUSUAL_DEV( 0x152d, 0x0567, 0x0114, 0x0117,
 "JMicron".
"USB to ATA/ATAPI Bridge",
USB_SC_DEVICE, USB_PR_DEVICE, NULL,
@@ -2124,6 +2156,13 @@
USB_SC_DEVICE, USB_PR_DEVICE, NULL,
US_FL_BROKEN_FUA ),

+/* Reported by Teijo Kinnunen <teijo.kinnunen@code-q.fi> */
+UNUSUAL_DEV( 0x152d, 0x2567, 0x0117, 0x0117,
+"JMicron",
+"USB to ATA/ATAPI Bridge",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_BROKEN_FUA ),
+
+/* Reported by George Cherian <george.cherian@cavium.com> */
UNUSUAL_DEV(0x152d, 0x9561, 0x0000, 0x9999,
"JMicron",
@@ -2193,6 +2232,18 @@
US_FL_NO_READ_DISC_INFO ),

+/* Reported by Matthias Schwarzott <zzam@gentoo.org>
+* The Amazon Kindle treats SYNCHRONIZE CACHE as an indication that
+* the host may be finished with it, and automatically ejects its
+* emulated media unless it receives another command within one second.
+*/
+UNUSUAL_DEV( 0x1949, 0x0004, 0x0000, 0x9999,
+"Amazon",
+"Kindle",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_SENSE_AFTER_SYNC ),
+
+/*
+ * Reported by Oliver Neukum <oneukum@suse.com>
+ * This device morphes spontaneously into another device if the access
+ * pattern of Windows isn't followed. Thus writable media would be dirty
+ @@ -2287,6 +2338,13 @@
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_GO_SLOW ),
+
+/*
+ * Reported by Tim Anderson <tsa@biglakesoftware.com> */
+UNUSUAL_DEV( 0x2ca3, 0x0031, 0x0000, 0x9999,
+"DJI",
+"CineSSD",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_NO_ATA_1X),
+
+/*
+ * Reported by Frederic Marchal <frederic.marchal@wowcompany.com>
Mio Moov 330
@@ -2297,6 +2355,13 @@
US_FL_MAX_SECTORS_64 ),

+/* Reported by Cyril Roelandt <tipecaml@gmail.com> */
+UNUSUAL_DEV( 0x357d, 0x7788, 0x0114, 0x0114,
+"JMicron",
+"USB to ATA/ATAPI Bridge",
+USB_SC_DEVICE,USB_PR_DEVICE, NULL,
+US_FL_BROKEN_FUA | US_FL_IGNORE_UAS ),
+
+/* Reported by Andrey Rahmatullin <wrar@altlinux.org> */
+UNUSUAL_DEV( 0x4102, 0x1020, 0x0100, 0x0100,
+"iRiver",
+@ @ -2320,6 +2385,15 @@
+"Micro Mini 1GB",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL, US_FL_NOT_LOCKABLE ),

+/* "G-DRIVE" external HDD hangs on write without these.
+ * Patch submitted by Alexander Kappner <agk@godking.net>
+ */
+UNUSUAL_DEV(0x4971, 0x8024, 0x0000, 0x9999,
+"SimpleTech",
+"External HDD",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_ALWAYS_SYNC),
+
+/*
+ * Nick Bowler <nbowler@elliptictech.com>
+ * SCSI stack spams (otherwise harmless) error messages.
--- linux-4.15.0.orig/drivers/usb/storage/unusual_realtek.h
+++ linux-4.15.0/drivers/usb/storage/unusual_realtek.h
@@ -17,6 +17,11 @@
+"Realtek",
+"USB Card Reader",
+USB_SC_DEVICE, USB_PR_DEVICE, init_realtek_cr, 0),
+
+/*
+ * Nick Bowler <nbowler@elliptictech.com>
+ * SCSI stack spams (otherwise harmless) error messages.
--- linux-4.15.0.orig/drivers/usb/storage/unusual_realtek.h
+++ linux-4.15.0/drivers/usb/storage/unusual_realtek.h
@@ -26,5 +31,15 @@
+"Realtek",
+"USB Card Reader",
@@ -26,5 +31,15 @@
+"Realtek",
+"USB Card Reader",
UNUSUAL_DEV(0x0bda, 0x0177, 0x0000, 0x9999,
		"Realtek",
		"USB Card Reader",
		USB_SC_DEVICE, USB_PR_DEVICE, init_realtek_cr, 0),
+UNUSUAL_DEV(0x0bda, 0x0184, 0x0000, 0x9999,
		"Realtek",
		"USB Card Reader",
		USB_SC_DEVICE, USB_PRDEVICE, init_realtek_cr, 0),
@endif /* defined(CONFIG_USB_STORAGE_REALTEK) || ... */
--- linux-4.15.0.orig/drivers/usb/storage/unusual_uas.h
+++ linux-4.15.0/drivers/usb/storage/unusual_uas.h
@@ -28,6 +28,30 @@
/* and don't forget to CC: the USB development list <linux-usb@vger.kernel.org> */
+/* Reported-by: Till Drges <doerges@pre-sense.de> */
+UNUSUAL_DEV(0x054c, 0x087d, 0x0000, 0x9999,
+"Sony",
+"PSZ-HA*",
+USB_SC_DEVICE, USB_PRDEVICE, NULL,
+US_FL_NO_REPORT_OPCODES),
+
+/*
+ * Initially Reported-by: Julian Gro <julian.g@posteo.de>
+ * Further reports David C. Partridge <david.partridge@perdrix.co.uk>
+ */
+UNUSUAL_DEV(0x059f, 0x105f, 0x0000, 0x9999,
+"LaCie",
+"2Big Quadra USB3",
+USB_SC_DEVICE, USB_PRDEVICE, NULL,
+US_FL_NO_REPORT_OPCODES | US_FL_NO_SAME),
+
+/* Reported-by: Julian Sikorski <belegdol@gmail.com> */
+UNUSUAL_DEV(0x059f, 0x1061, 0x0000, 0x9999,
+"LaCie",
+"Rugged USB3-FW",
+USB_SCDEVICE, USB_PRDEVICE, NULL,
+US_FL_NO_REPORT_OPCODES | US_FL_NO_SAME),
+
/*
* Apricorn USB3 dongle sometimes returns "USBSUSBSUSBS" in response to SCSI
* commands in UAS mode. Observed with the 1.28 firmware; are there others?
@@ -136,6 +160,20 @@
USB_SCDEVICE, USB_PR_DEVICE, NULL,
US_FL_BROKEN_FUA),

+/* Reported-by: Thinh Nguyen <thinhn@synopsys.com> */
+UNUSUAL_DEV(0x154b, 0xf00b, 0x0000, 0x9999,
+"Pro Elite SSD",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_NO_ATA_1x),
+
+/* Reported-by: Thinh Nguyen <thinhn@synopsys.com> */
+UNUSUAL_DEV(0x154b, 0xf00d, 0x0000, 0x9999,
+"Pro Elite SSD",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_NO_ATA_1x),
+
+/* Reported-by: Hans de Goede <hdegoede@redhat.com> */
+UNUSUAL_DEV(0x2109, 0x0711, 0x0000, 0x9999,
+"VIA",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_NO_ATA_1x),
+
+/* Initially Reported-by: Takeo Nakayama <javhera@gmx.com>
+ * UAS Ignore Reported by Steven Ellis <sellis@redhat.com>
+ */
+UNUSUAL_DEV(0x357d, 0x7788, 0x0000, 0x9999,
+"JMicron",
+"JMS566",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+-US_FL_NO_REPORT_OPCODES),
+US_FL_NO_REPORT_OPCODES | US_FL_IGNORE_UAS),
+
+/* Reported-by: Hans de Goede <hdegoede@redhat.com> */
+UNUSUAL_DEV(0x4971, 0x1012, 0x0000, 0x9999,
+"External HDD",
+USB_SC_DEVICE, USB_PR_DEVICE, NULL,
+US_FL_NO_REPORT_OPCODES | US_FL_IGNORE_UAS),
+
+/* "G-DRIVE" external HDD hangs on write without these.
+ * Patch submitted by Alexander Kappner <agk@godking.net>
+ */
+UNUSUAL_DEV(0x4971, 0x8024, 0x0000, 0x9999,
+"SimpleTech",
+"External HDD",
case 'j':
f |= US_FL_NO_REPORT_LUNS;
break;
+case 'k':
+f |= US_FL_NO_SAME;
+break;
+case 'l':
f |= US_FL_NOT_LOCKABLE;
break;
--- linux-4.15.0.orig/drivers/usb/typec/Kconfig
+++ linux-4.15.0/drivers/usb/typec/Kconfig
@@ -77,6 +77,7 @@
config TYPEC_TPS6598X
tristate "TI TPS6598x USB Power Delivery controller driver"
depends on I2C
+select REGMAP_I2C
help
 Say Y or M here if your system has TI TPS65982 or TPS65983 USB Power
 Delivery controller.
--- linux-4.15.0.orig/drivers/usb/typec/fusb302/fusb302.c
+++ linux-4.15.0/drivers/usb/typec/fusb302/fusb302.c
@@ -662,6 +662,8 @@
return ret;
chip->intr_togdone = false;
} else {
+/* Datasheet says vconn MUST be off when toggling */
+WARN(chip->vconn_on, "Vconn is on during toggle start");
+/* unmask TOGDONE interrupt */
+ret = fusb302_i2c_clear_bits(chip, USB_REG_MASKA,
FUSB_REG_MASKA_TOGDONE);
@@ -1543,6 +1545,21 @@
fusb302_log(chip, "PD message header: %x", msg->header);
fusb302_log(chip, "PD message len: %d", len);
+/
+ * Check if we've read off a GoodCRC message. If so then indicate to
+ * TCPM that the previous transmission has completed. Otherwise we pass
+ * the received message over to TCPM for processing.
+ *
+ * We make this check here instead of basing the reporting decision on
+ * the IRQ event type, as it's possible for the chip to report the
+ * TX_SUCCESS and GCRCSENT events out of order on occasion, so we need
+ * to check the message type to ensure correct reporting to TCPM.
+ */
+if (!len && (pd_header_type_le(msg->header) == PD_CTRL_GOOD_CRC))
+tcpm_pd_transmit_complete(chip->tcpm_port, TCPC_TX_SUCCESS);
+else
+tcpm_pd_receive(chip->tcpm_port, msg);
+
return ret;
}

@@ -1650,13 +1667,12 @@
if (interrupta & FUSB_REG_INTERRUPTA_TX_SUCCESS) {
    fusb302_log(chip, "IRQ: PD tx success");
    /* read out the received good CRC */
    ret = fusb302_pd_read_message(chip, &pd_msg);
    if (ret < 0) {
        fusb302_log(chip, "cannot read in GCRC, ret=%d", ret);
    }
    goto done;
}

-tcpm_pd_transmit_complete(chip->tcpm_port, TCPC_TX_SUCCESS);

if (interrupta & FUSB_REG_INTERRUPTA_HARDRESET) {
    /* cannot read in PD message, ret=%d", ret); 
    goto done;
}
-tcpm_pd_receive(chip->tcpm_port, &pd_msg);
}

done:
mutex_unlock(&chip->lock);
--- linux-4.15.0.orig/drivers/usb/typec/tcpm.c
+++ linux-4.15.0/drivers/usb/typec/tcpm.c
@@ -342,7 +342,8 @@
    else if (port->try_role == TYPEC_SOURCE)
        return SRC_UNATTACHED;
    else if (port->tcpc->config->default_role == TYPEC_SINK)
+    else if (port->tcpc->config &&
+        port->tcpc->config->default_role == TYPEC_SINK)
        return SNK_UNATTACHED;
    /* Fall through to return SRC_UNATTACHED */
} else if (port->port_type == TYPEC_PORT_UFP) {
    u64 ts_nsec = local_clock();
    unsigned long rem_nsec;
+mutex_lock(&port->logbuffer_lock);
if (!port->logbuffer[port->logbuffer_head]) {
    port->logbuffer[port->logbuffer_head] =
kzalloc(LOG_BUFFER_ENTRY_SIZE, GFP_KERNEL);
    if (!port->logbuffer[port->logbuffer_head]) {
        mutex_unlock(&port->logbuffer_lock);
        return;
    }
}

vsnprintf(tmpbuffer, sizeof(tmpbuffer), fmt, args);

-static void tcpm_debugfs_exit(struct tcpm_port *port)
{   +int i;
    +for (i = 0; i < LOG_BUFFER_ENTRIES; i++) {
        +kfree(port->logbuffer[i]);
        +port->logbuffer[i] = NULL;
    }
    +mutex_unlock(&port->logbuffer_lock);
    +debugfs_remove(port->dentry);
    +if (list_empty(&rootdir->d_subdirs)) {
        +debugfs_remove(rootdir);
        +rootdir = NULL;
    }
}

static void tcpm_detach(struct tcpm_port *port)
{   -if (!port->attached)
        -return;
    -if (tcpm_port_is_disconnected(port))

port->hard_reset_count = 0;

+if (!port->attached)
+return;
+
tcpm_reset_port(port);
}

@@ -2439,7 +2454,8 @@
tcpm_port_is_sink(port) &&
time_is_after_jiffies(port->delayed_runtime)) {
tcpm_set_state(port, SNK_DISCOVERY,
- port->delayed_runtime - jiffies);
+ jiffies_to_msecs(port->delayed_runtime -
+ jiffies));
break;
}
tcpm_set_state(port, unattached_state(port), 0);
@@ -2540,7 +2556,8 @@
break;
case SNK_HARD_RESET_SINK_OFF:
tcpm_set_vconn(port, false);
-tcpm_set_charge(port, false);
+if (port->pd_capable)
+tcpm_set_charge(port, false);
tcpm_set_roles(port, false, TYPEC_SINK, TYPEC_DEVICE);
/*
 * VBUS may or may not toggle, depending on the adapter.
@@ -2571,6 +2588,12 @@
 * Similar, dual-mode ports in source mode should transition
 * to PE_SNK_Transition_to_default.
 */
+if (port->pd_capable) {
+tcpm_set_current_limit(port,
+ tcpm_get_current_limit(port),
+  5000);
+tcpm_set_charge(port, true);
+}
tcpm_set_attached_state(port, true);
tcpm_set_state(port, SNK_STARTUP, 0);
break;
@@ -2700,7 +2723,7 @@
*/
tcpm_set_pwr_role(port, TYPEC_SOURCE);
tcpm_pd_send_control(port, PD_CTRL_PS_RDY);
-tcpm_set_state(port, SRC_STARTUP, 0);
+tcpm_set_state(port, SRC_STARTUP, PD_T_SWAP_SRC_START);
brea
case VCONN_SWAP_ACCEPT:
@@ -3332,7 +3355,7 @@
 mutex_lock(&port->lock);
 if (tcpc->try_role)
 ret = tcpc->try_role(tcpc, role);
-@if (!ret && !tcpc->config->try_role_hw)
+@if (!ret && (!tcpc->config || !tcpc->config->try_role_hw))
 port->try_role = role;
 port->try_src_count = 0;
 port->try_snk_count = 0;
--- linux-4.15.0.orig/drivers/usb/typec/tps6598x.c
+++ linux-4.15.0/drivers/usb/typec/tps6598x.c
@@ -39,7 +39,7 @@
 #define TPS_STATUS_VCONN(s)(!(s) & BIT(7)))
 /* TPS_REG_SYSTEM_CONF bits */
-#define TPS_SYSCONF_PORTINFO(c) ((c) & 3)
+#define TPS_SYSCONF_PORTINFO(c) ((c) & 7)

 enum {
 TPS_PORTINFO_SINK,
@@ -73,6 +73,7 @@
 struct device *dev;
 struct regmap *regmap;
 struct mutex lock; /* device lock */
+u8 i2c_protocol:1;

 struct typec_port *port;
 struct typec_partner *partner;
@@ -80,19 +81,39 @@
 struct typec_capability typec_cap;
 }

+static int
+tps6598x_block_read(struct tps6598x *tps, u8 reg, void *val, size_t len)
+{
+u8 data[len + 1];
+int ret;
+
+if (!tps->i2c_protocol)
+return regmap_raw_read(tps->regmap, reg, val, len);
+
+ret = regmap_raw_read(tps->regmap, reg, data, sizeof(data));
+if (ret)
+return ret;
+
+if (data[0] < len)
return -EIO;
+
+memcpy(val, &data[1], len);
+}
+
static inline int tps6598x_read16(struct tps6598x *tps, u8 reg, u16 *val)
{
  -return regmap_raw_read(tps->regmap, reg, val, sizeof(u16));
+return tps6598x_block_read(tps, reg, val, sizeof(u16));
}

static inline int tps6598x_read32(struct tps6598x *tps, u8 reg, u32 *val)
{
  -return regmap_raw_read(tps->regmap, reg, val, sizeof(u32));
+return tps6598x_block_read(tps, reg, val, sizeof(u32));
}

static inline int tps6598x_read64(struct tps6598x *tps, u8 reg, u64 *val)
{
  -return regmap_raw_read(tps->regmap, reg, val, sizeof(u64));
+return tps6598x_block_read(tps, reg, val, sizeof(u64));
}

static inline int tps6598x_write16(struct tps6598x *tps, u8 reg, u16 val)
@@ -121,8 +142,8 @@
struct tps6598x_rx_identity_reg id;
int ret;

-  ret = regmap_raw_read(tps->regmap, TPS_REG_RX_IDENTITY_SOP,
-    &id, sizeof(id));
+  ret = tps6598x_block_read(tps, TPS_REG_RX_IDENTITY_SOP,
+    &id, sizeof(id));
  if (ret)
    return ret;

@@ -223,13 +244,13 @@
} while (val);

if (out_len) {
  -ret = regmap_raw_read(tps->regmap, TPS_REG_DATA1,
-    out_data, out_len);
+ret = tps6598x_block_read(tps, TPS_REG_DATA1,
+    out_data, out_len);
  if (ret)
    return ret;
  val = out_data[0];
} else {
ret = regmap_read(tps->regmap, TPS_REG_DATA1, &val);
+ret = tps6598x_block_read(tps, TPS_REG_DATA1, &val, sizeof(u8));
if (ret)
    return ret;
#endif
if (!vid)
    return -ENODEV;
+
+/* Checking can the adapter handle SMBus protocol. If it can not, the
+ driver needs to take care of block reads separately.
+ */
+/* FIXME: Testing with I2C_FUNC_I2C. regmap-i2c uses I2C protocol
+ unconditionally if the adapter has I2C_FUNC_I2C set.
+ */
+if (i2c_check_functionality(client->adapter, I2C_FUNC_I2C))
    +tps->i2c_protocol = true;
+ret = tps6598x_read32(tps, TPS_REG_STATUS, &status);
if (ret < 0)
    return ret;
--- linux-4.15.0.orig/drivers/usb/typec/typec_wcove.c
+++ linux-4.15.0/drivers/usb/typec/typec_wcove.c
@@ -202,6 +202,10 @@
struct wcove_typec *wcove = tcpc_to_wcove(tcpc);
int ret;

+ret = regmap_write(wcove->regmap, USBC_CONTROL1, 0);
+if (ret)
++return ret;
+ /* Unmask everything */
+ret = regmap_write(wcove->regmap, USBC_IRQMASK1, 0);
if (ret)
    @@ -285,8 +289,30 @@
static int wcove_set_cc(struct tcpc_dev *tcpc, enum typec_cc_status cc)
{
    /* XXX: Relying on the HW FSM to configure things correctly for now */
    -return 0;
    +struct wcove_typec *wcove = tcpc_to_wcove(tcpc);
    +unsigned int ctrl;
    +
    +switch (cc) {
    +case TYPEC_CC_RD:
    +ctrl = USBC_CONTROL1_MODE_SNK;
    +break;
+case TYPEC_CC_RP_DEF:
  +ctrl = USBC_CONTROL1_CURSRC_UA_80 | USBC_CONTROL1_MODE_SRC;
+break;
+case TYPEC_CC_RP_1_5:
  +ctrl = USBC_CONTROL1_CURSRC_UA_180 | USBC_CONTROL1_MODE_SRC;
+break;
+case TYPEC_CC_RP_3_0:
  +ctrl = USBC_CONTROL1_CURSRC_UA_330 | USBC_CONTROL1_MODE_SRC;
+break;
+case TYPEC_CC_OPEN:
  +ctrl = 0;
+break;
+default:
  +return -EINVAL;
+}
+
+return regmap_write(wcove->regmap, USBC_CONTROL1, ctrl);
}

static int wcove_set_polarity(struct tcpc_dev *tcpc, enum typec_cc_polarity pol)
@@ -592,8 +618,13 @@
    wcove->regmap = pmic->regmap;
-
    irq = regmap_irq_get_virq(pmic->irq_chip_data_chgr,
-     platform_get_irq(pdev, 0));
+    irq = platform_get_irq(pdev, 0);
     if (irq < 0) {
        dev_err(&pdev->dev, "Failed to get IRQ: \%d\n", irq);
        +return irq;
+
+    irq = regmap_irq_get_virq(pmic->irq_chip_data_chgr, irq);
        if (irq < 0)
           return irq;

--- linux-4.15.0.orig/drivers/usb/typec/ucsi/Makefile
+++ linux-4.15.0/drivers/usb/typec/ucsi/Makefile
@@ -5,6 +5,6 @@
 typec_UCSI-y	:= ucsi.o
-
typec_UCSI-$(CONFIG_FTRACE)	+= trace.o
+typec_UCSI-$(CONFIG_TRACING)	+= trace.o

 obj-$(CONFIG_UCSI_ACPI)	+= ucsi_acpi.o
--- linux-4.15.0.orig/drivers/usb/typec/ucsi/ucsi.c
+++ linux-4.15.0/drivers/usb/typec/ucsi/ucsi.c
* difficult to estimate the time it takes for the system to process the command
* before it is actually passed to the PPM.
*/
#define UCSI_TIMEOUT_MS	1000
+#define UCSI_TIMEOUT_MS5000

/*
 * UCSI_SWAP_TIMEOUT_MS - Timeout for role swap requests
@@ -343,6 +343,19 @@
{
    int ret;

    if (con->status.change & UCSI_CONSTAT_CONNECT_CHANGE) {
+typec_set_pwr_role(con->port, con->status.pwr_dir);
+    switch (con->status.partner_type) {
+        case UCSI_CONSTAT_PARTNER_TYPE_UFP:
+            typec_set_data_role(con->port, TYPEC_HOST);
+            break;
+        case UCSI_CONSTAT_PARTNER_TYPE_DFP:
+            typec_set_data_role(con->port, TYPECDEVICE);
+            break;
+        default:
+            break;
+    }
+    if (con->status.connected)
+        ucsi_register_partner(con);
+    else
@@ -708,6 +721,7 @@
    err_reset:
+        memset(&ucsi->cap, 0, sizeof(ucsi->cap));
+        ucsi_reset_ppm(ucsi);
    err:
        mutex_unlock(&ucsi->ppm_lock);
    --- linux-4.15.0.orig/drivers/usb/typec/ucsi/ucsi_acpi.c
+++ linux-4.15.0/drivers/usb/typec/ucsi/ucsi_acpi.c
@@ -64,11 +64,15 @@
 static int ucsi_acpi_probe(struct platform_device *pdev)
 {
+    struct acpi_device *adev = ACPI_COMPANION(pdev->dev);
        struct ucsi_acpi *ua;
        struct resource *res;
        acpi_status status;
        int ret;
+if (adev->dep_unmet)
+return -EPROBE_DEFER;
+
+ua = devm_kzalloc(&pdev->dev, sizeof(*ua), GFP_KERNEL);
+if (!ua)
+    return -ENOMEM;
+
+/* This will make sure we can use ioremap_nocache() */
+status = acpi_release_memory(ACPI_HANDLE(&pdev->dev), res, 1);
+if (ACPI_FAILURE(status))
+    return -ENOMEM;
+
+struct mutextio_mutex; /* synchronize I/O with disconnect */
+unsigned long disconnected:1;
+wait_queue_head_t bulk_in_wait; /* to wait for an ongoing read */
+}
+#define to_skel_dev(d) container_of(d, struct usb_skel, kref)
+
+struct usb_skel *dev = to_skel_dev(kref);
+usb_free_urb(dev->bulk_in_urb);
+usb_put_intf(dev->interface);
+usb_put_dev(dev->udev);
+kfree(dev->bulk_in_buffer);
+kfree(dev);
+
+return -ENODEV;

/* allow the device to be autosuspended */
-mutex_lock(&dev->io_mutex);
-if (dev->interface)
-usb_autopm_put_interface(dev->interface);
-mutex_unlock(&dev->io_mutex);
+usb_autopm_put_interface(dev->interface);

/* decrement the count on our device */
kref_put(&dev->kref, skel_delete);
@@ -237,7 +236,7 @@
if (rv < 0)
return rv;

- if (!dev->interface) { /* disconnect() was called */
+ if (dev->disconnected) { /* disconnect() was called */
rv = -ENODEV;
goto exit;
}
@@ -418,7 +417,7 @@
/* this lock makes sure we don't submit URBs to gone devices */
mutex_lock(&dev->io_mutex);
- if (!dev->interface) { /* disconnect() was called */
+ if (dev->disconnected) { /* disconnect() was called */
mutex_unlock(&dev->io_mutex);
retval = -ENODEV;
goto error;
@@ -503,7 +502,7 @@
mutex_lock(&dev->io_mutex);
- dev->interface = NULL;
+ dev->disconnected = 1;
mutex_unlock(&dev->io_mutex);

usb_kill_anchored_urbs(&dev->submitted);
--- linux-4.15.0.orig/drivers/usb/usbip/Kconfig
+++ linux-4.15.0/drivers/usb/usbip/Kconfig
@@ -2,6 +2,7 @@
tristate "USB/IP support"
depends on NET
select USB_COMMON
+select SGL_ALLOC
---help---
This enables pushing USB packets over IP to allow remote
machines direct access to USB devices. It provides the
@@ -27,7 +28,7 @@
config USBIP_VHCI_HC_PORTS
int "Number of ports per USB/IP virtual host controller"
- range 1 31
+ range 1 15
default 8
depends on USBIP_VHCI_HCD
---help---
--- linux-4.15.0.orig/drivers/usb/usbip/stub.h
+++ linux-4.15.0/drivers/usb/usbip/stub.h
@@ -52,7 +52,11 @@
unsigned long seqnum;
struct list_head list;
struct stub_device *sdev;
-struct urb *urb;
+struct urb **urbs;
+struct scatterlist *sgl;
+int num_urbs;
+int completed_urbs;
+int urb_status;
int unlinking;
};
@@ -73,6 +77,7 @@
struct stub_device *sdev;
struct usb_device *udev;
char shutdown_busid;
+spinlock_t busid_lock;
};
/* stub_priv is allocated from stub_priv_cache */
@@ -83,7 +88,9 @@
/* stub_main.c */
struct bus_id_priv *get_busid_priv(const char *busid);
+void put_busid_priv(struct bus_id_priv *bid);
int del_match_busid(char *busid);
+void stub_free_priv_and_urb(struct stub_priv *priv);
void stub_device_cleanup_urbs(struct stub_device *sdev);
/* stub_rx.c */
@@ -46,6 +46,8 @@
int sockfd = 0;
struct socket *socket;
int rv;
+struct task_struct *tcp_rx = NULL;
struct task_struct *tcp_tx = NULL;

if (!sdev) {
    dev_err(dev, "sdev is null
"); @ @ -61.6 +63.7 @@ 
    dev_info(dev, "stub up
");
+
    mutex_lock(&sdev->ud.sysfs_lock);
    spin_lock_irq(&sdev->ud.lock);

    if (sdev->ud.status != SDEV_ST_AVAILABLE) { @ @ -69.22 +72.49 @@ 
        socket = sockfd_lookup(sockfd, &err);
        -if (!socket) 
        +if (!socket) { 
            +dev_err(dev, "failed to lookup sock");
            goto err;
            +}

        -sdev->ud.tcp_socket = socket;
        +if (socket->type != SOCK_STREAM) {
            +dev_err(dev, "Expecting SOCK_STREAM - found %d",
            +socket->type);
            +goto sock_err;
            +}

    -sdev->ud.tcp_rx = kthread_get_run(stub_rx_loop, &sdev->ud,
    -"stub_rx");
    +if (IS_ERR(tcp_rx)) {
            +sockfd_put(socket);
            +goto unlock_mutex;
            +}

    -sdev->ud.tcp_tx = kthread_get_run(stub_tx_loop, &sdev->ud,
    -"stub_tx");
    +if (IS_ERR(tcp_tx)) {
            +kthread_stop(tcp_rx);
            +sockfd_put(socket);
            +goto unlock_mutex;
            +}

    /* unlock and create threads and get tasks */
    spin_unlock_irq(&sdev->ud.lock);
    +tcp_rx = kthread_create(stub_rx_loop, &sdev->ud, "stub_rx");
    +if (IS_ERR(tcp_rx)) {
            +sockfd_put(socket);
            +goto unlock_mutex;
            +}

    +tcp_tx = kthread_create(stub_tx_loop, &sdev->ud, "stub_tx");
    +if (IS_ERR(tcp_tx)) {
            +kthread_stop(tcp_rx);
            +sockfd_put(socket);
            +goto unlock_mutex;
            +}

    -sdev->ud.tcp_rx = kthread_get_run(stub_rx_loop, &sdev->ud,
    -"stub_rx");
    -sdev->ud.tcp_tx = kthread_get_run(stub_tx_loop, &sdev->ud,
    -"stub_tx");
    +/* get task structs now */

    /* get task structs now */
get_task_struct(tcp_rx);
get_task_struct(tcp_tx);

/* lock and update sdev->ud state */
spin_lock_irq(&sdev->ud.lock);
sdev->ud.tcp_socket = socket;
sdev->ud.sockfd = sockfd;
sdev->ud.tcp_rx = tcp_rx;
sdev->ud.tcp_tx = tcp_tx;
sdev->ud.status = SDEV_ST_USED;
spin_unlock_irq(&sdev->ud.lock);

wake_up_process(sdev->ud.tcp_rx);
wake_up_process(sdev->ud.tcp_tx);
mutex_unlock(&sdev->ud.sysfs_lock);
} else {
    dev_info(dev, "stub down\n");

spin_unlock_irq(&sdev->ud.lock);

us bip_event_add(&sdev->ud, SDEV_EVENT_DOWN);
mutex_unlock(&sdev->ud.sysfs_lock);
}
return count;

sock_err:
sockfd_put(socket);
err:
spin_unlock_irq(&sdev->ud.lock);
unlock_mutex:
mutex_unlock(&sdev->ud.sysfs_lock);
return -EINVAL;
}

static DEVICE_ATTR(usbip_sockfd, S_IWUSR, NULL, store_sockfd);

if (ud->tcp_socket) {
    sockfd_put(ud->tcp_socket);
    ud->tcp_socket = NULL;
    ud->sockfd = -1;
}

/* 3. free used data */
sdev->ud.side = USBIP_STUB;
sdev->ud.status = SDEV_ST_AVAILABLE;
spin_lock_init(&sdev->ud.lock);
+mutex_init(&sdev->ud.sysfs_lock);
sdev->ud.tcp_socket = NULL;
+sdev->ud.sockfd = -1;

INIT_LIST_HEAD(&sdev->priv_init);
INIT_LIST_HEAD(&sdev->priv_tx);
@@ -297,9 +335,17 @@
struct stub_device *sdev = NULL;
const char *udev_busid = dev_name(&udev->dev);
struct bus_id_priv *busid_priv;
-int rc;
+int rc = 0;
+char save_status;

-dev_dbg(&udev->dev, "Enter\n");
+dev_dbg(&udev->dev, "Enter probe\n");
+
+// Not sure if this is our device. Allocate here to avoid
+ // calling alloc while holding busid_table lock.
+ */
+sdev = stub_device_alloc(udev);
+if (!sdev)
+return -ENOMEM;
+/* check we should claim or not by busid_table */
+busid_priv = get_busid_priv(udev_busid);
-@ -314,13 +360,18 @@
- * other matched drivers by the driver core.
- * See driver_probe_device() in driver/base/dd.c
+ /*
+-return -ENODEV;
+rc = -ENODEV;
+if (!busid_priv)
+goto sdev_free;
+
+goto call_put_busid_priv;
}

if (udev->descriptor.bDeviceClass == USB_CLASS_HUB) {
    dev_dbg(&udev->dev, "%s is a usb hub device... skip!\n", udev_busid);
    -return -ENODEV;
+rc = -ENODEV;
+goto call_put_busid_priv;
}
if (!strcmp(udev->bus->bus_name, "vhci_hcd")) { 
@@ -328,13 +379,10 @@
 "%s is attached on vhci_hcd... skip!\n",
 udev_busid);

 -return -ENODEV;
 +rc = -ENODEV;
 +goto call_put_busid_priv;
 }

 /* ok, this is my device */
-sdev = stub_device_alloc(udev);
-if (!sdev)
 -return -ENOMEM;

 dev_info(&udev->dev,
 "usbip-host: register new device (bus %u dev %u)\n",
 @@ -344,9 +392,16 @@

 /* set private data to usb_device */
 dev_set_drvdata(&udev->dev, sdev);
 +
 busid_priv->sdev = sdev;
 busid_priv->udev = udev;
 +save_status = busid_priv->status;
 +busid_priv->status = STUB_BUSID_ALLOC;
 +
 +/-* release the busid_lock /*
 +put_busid_priv(busid_priv);
 +
 /*
 * Claim this hub port.
 * It doesn't matter what value we pass as owner
@@ -364,9 +419,9 @@
 dev_err(&udev->dev, "stub_add_files for %s\n", udev_busid);
 goto err_files;
 }
 -busid_priv->status = STUB_BUSID_ALLOC;

 return 0;
 +
 err_files:
 usb_hub_release_port(udev->parent, udev->portnum,
   (struct usb_dev_state *) udev);
@@ -374,20 +429,30 @@
 dev_set_drvdata(&udev->dev, NULL);
 usb_put_dev(udev);
/* we already have busid_priv, just lock busid_lock */
spin_lock(&busid_priv->busid_lock);
busid_priv->sdev = NULL;
spin_unlock(&busid_priv->busid_lock);
/* lock is released - go to free */
goto sdev_free;
+
+call_put_busid_priv:
/+ release the busid_lock */
+put_busid_priv(busid_priv);
+
+sdev_free:
stub_device_free(sdev);
+
return rc;
}

static void shutdown_bus(struct bus_id_priv *busid_priv)
{
- if (busid_priv->sdev && !busid_priv->shutdown_busid) {
- busid_priv->shutdown_busid = 1;
- usbip_event_add(&busid_priv->sdev->ud, SDEV_EVENT_REMOVED);
+ usbip_event_add(&busid_priv->sdev->ud, SDEV_EVENT_REMOVED);

- /* wait for the stop of the event handler */
- usbip_stop_eh(&busid_priv->sdev->ud);
- }
+ /* wait for the stop of the event handler */
+ usbip_stop_eh(&busid_priv->sdev->ud);
}
+put_busid_priv(busid_priv);
return;
}

dev_set_drvdata(&udev->dev, NULL);

+/* release busid_lock before call to remove device files */
+put_busid_priv(busid_priv);
+
+ /* NOTE: rx/tx threads are invoked for each usb_device. */
+ @@ -436,21 +506,29 @@
if (usbip_in_eh(current))
return;

+/* we already have busid_priv, just lock busid_lock */
+spin_lock(&busid_priv->busid_lock);
+if (!busid_priv->shutdown_busid)
+busid_priv->shutdown_busid = 1;
+/* release busid_lock */
+spin_unlock(&busid_priv->busid_lock);
+
+ /* shutdown the current connection */
shutdown_busid(busid_priv);

usb_put_dev(sdev->udev);

+ /* we already have busid_priv, just lock busid_lock */
+spin_lock(&busid_priv->busid_lock);
+/* free sdev */
busid_priv->sdev = NULL;
stub_device_free(sdev);

- if (busid_priv->status == STUB_BUSID_ALLOC) {
+ if (busid_priv->status == STUB_BUSID_ALLOC)
  busid_priv->status = STUB_BUSID_ADDED;
- } else {
  -busid_priv->status = STUB_BUSID_OTHER;
  -del_match_busid((char *)udev_busid);
  -
+ /* release busid_lock */
  spin_unlock(&busid_priv->busid_lock);
  +return;
  }

#endif CONFIG_PM
--- linux-4.15.0.orig/drivers/usb/usbid/stub_main.c
+++ linux-4.15.0/drivers/usb/usbip/stub_main.c
@@ -6,6 +6,7 @@
  
 #include <linux/string.h>
 #include <linux/module.h>
 #include <linux/device.h>
+#include <linux/scatterlist.h>

 #include "usbip_common.h"
 #include "stub.h"
 @@ -14,6 +15,7 @@
  
 #define DRIVER_DESC "USB/IP Host Driver"

 struct kmem_cache *stub_priv_cache;
 +
 /*
  *
  * busid_tables defines matching busids that usbip can grab. A user can change
  * dynamically what device is locally used and what device is exported to a
  @@ -25,6 +27,8 @@
  
 static void init_busid_table(void)
  {
+  int i;
+  +
+  /*
  * This also sets the bus_table[i].status to
  * STUB_BUSID_OTHER, which is 0.
  @ @ -32,6 +36,9 @@
  memset(busid_table, 0, sizeof(busid_table));

  spin_lock_init(&busid_table_lock);
+  +for (i = 0; i < MAX_BUSID; i++)
+  spin_lock_init(&busid_table[i].busid_lock);
  }

  /*
@@ -43,15 +50,20 @@
  int i;
  int idx = -1;

 -for (i = 0; i < MAX_BUSID; i++)
 +for (i = 0; i < MAX_BUSID; i++) { 
 +spin_lock(&busid_table[i].busid_lock);
 if (busid_table[i].name[0])
 if (!strncmp(busid_table[i].name, busid, BUSID_SIZE)) { 
     idx = i;
 +spin_unlock(&busid_table[i].busid_lock);
     break;
```c
+spin_unlock(&busid_table[i].busid_lock);
+
return idx;
}

+/* Returns holding busid_lock. Should call put_busid_priv() to unlock */
+struct bus_id_priv *get_busid_priv(const char *busid)
+
int idx;
@@ -59,13 +71,22 @@
    spin_lock(&busid_table_lock);
    idx = get_busid_idx(busid);
    -if (idx >= 0)
    +if (idx >= 0) {
        bid = &(busid_table[idx]);
        +/* get busid_lock before returning */
        +spin_lock(&bid->busid_lock);
        +}
    spin_unlock(&busid_table_lock);

    return bid;
}

+void put_busid_priv(struct bus_id_priv *bid)
+
+{  
+    if (bid)
+        spin_unlock(&bid->busid_lock);
+}
+
+static int add_match_busid(char *busid)
+{  
int i;
@@ -78,15 +99,19 @@
goto out;
    }

-for (i = 0; i < MAX_BUSID; i++)
+for (i = 0; i < MAX_BUSID; i++) {
    +spin_lock(&busid_table[i].busid_lock);
    if (!busid_table[i].name[0]) {
        strlcpy(busid_table[i].name, busid, BUSID_SIZE);
        if ((busid_table[i].status != STUB_BUSID_ALLOC) &&
            (busid_table[i].status != STUB_BUSID_REMOV))
            busid_table[i].status = STUB_BUSID_ADDED;
            ret = 0;
            +spin_unlock(&busid_table[i].busid_lock);
    }

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```
break;
}
+spin_unlock(&busid_table[i].busid_lock);
+
out:
spin_unlock(&busid_table_lock);
@@ -107,6 +132,8 @@
/* found */
ret = 0;

+spin_lock(&busid_table[idx].busid_lock);
+
if (busid_table[idx].status == STUB_BUSID_OTHER)
memset(busid_table[idx].name, 0, BUSID_SIZE);

@@ -114,6 +141,7 @@
          (busid_table[idx].status != STUB_BUSID_ADDED))
busid_table[idx].status = STUB_BUSID_REMOV;

+spin_unlock(&busid_table[idx].busid_lock);
out:
spin_unlock(&busid_table_lock);

@@ -126,9 +154,12 @@
char *out = buf;

spin_lock(&busid_table_lock);
-for (i = 0; i < MAX_BUSID; i++)
+for (i = 0; i < MAX_BUSID; i++) {
+spin_lock(&busid_table[i].busid_lock);
if (busid_table[i].name[0])
out += sprintf(out, "%s ", busid_table[i].name);
+spin_unlock(&busid_table[i].busid_lock);
+
spin_unlock(&busid_table_lock);
out += sprintf(out, "\n");

@@ -169,6 +200,51 @@
}
static DRIVER_ATTR_RW(match_busid);

+static int do_rebind(char *busid, struct bus_id_priv *busid_priv)
+{
+int ret;
+/* device_attach() callers should hold parent lock for USB */
+if (busid_priv->udev->dev.parent)
device_lock(busid_priv->udev->dev.parent);
ret = device_attach(&busid_priv->udev->dev);
if (busid_priv->udev->dev.parent)
device_unlock(busid_priv->udev->dev.parent);
if (ret < 0) {
dev_err(&busid_priv->udev->dev, "rebind failed\n");
return ret;
}
return 0;

static void stub_device_rebind(void)
{
#if IS_MODULE(CONFIG_USBIP_HOST)

struct bus_id_priv *busid_priv;

int i;

/* update status to STUB_BUSID_OTHER so probe ignores the device */
spin_lock(&busid_table_lock);
for (i = 0; i < MAX_BUSID; i++) {
if (busid_table[i].name[0] &&
    busid_table[i].shutdown_busid) {
    busid_priv = &(busid_table[i]);
    busid_priv->status = STUB_BUSID_OTHER;
}
}
spin_unlock(&busid_table_lock);

/* now run rebind - no need to hold locks, driver files are removed */
for (i = 0; i < MAX_BUSID; i++) {
if (busid_table[i].name[0] &&
    busid_table[i].shutdown_busid) {
    busid_priv = &(busid_table[i]);
    do_rebind(busid_table[i].name, busid_priv);
}
}
#endif

static ssize_t rebind_store(struct device_driver *dev, const char *buf,
size_t count)
{
if (!bid)
return -ENODEV;

-ret = device_attach(&bid->udev->dev);
if (ret < 0) {

dev_err(&bid->udev->dev, "rebind failed
");
/* mark the device for deletion so probe ignores it during rescan */
bid->status = STUB_BUSID_OTHER;
/* release the busid lock */
put_busid_priv(bid);
ret = do_rebind((char *) buf, bid);
if (ret < 0)
return ret;
/* delete device from busid_table */
del_match_busid((char *) buf);
return count;
}

struct stub_priv *priv, *tmp;

list_for_each_entry_safe(priv, tmp, listhead, list) {
	list_del(&priv->list);
	list_del_init(&priv->list);
return priv;
}
return NULL;

void stub_free_priv_and_urb(struct stub_priv *priv)
{
struct urb *urb;
int i;

for (i = 0; i < priv->num_urbs; i++) {
	urb = priv->urbs[i];
	if (!urb)
		return;
	kfree(urb->setup_packet);
	urb->setup_packet = NULL;
	if (urb->transfer_buffer && !priv->sgl) {
		kfree(urb->transfer_buffer);
		urb->transfer_buffer = NULL;
	}
}
if (urb->num_sgs) {
  sgl_free(urb->sg);
  urb->sg = NULL;
  urb->num_sgs = 0;
}
}
+usb_free_urb(urb);
+
+if (!list_empty(&priv->list))
+list_del(&priv->list);
+if (priv->sgl)
+sgl_free(priv->sgl);
+kfree(priv->urbs);
+kmem_cache_free(stub_priv_cache, priv);
+
+
static struct stub_priv *stub_priv_pop(struct stub_device *sdev)
{
  unsigned long flags;
  void stub_device_cleanup_urbs(struct stub_device *sdev)
  {
    struct stub_priv *priv;
    struct urb *urb;
    int i;

    dev_dbg(&sdev->udev->dev, "Stub device cleaning up urbs\n");

    while ((priv = stub_priv_pop(sdev))) {
      urb = priv->urb;
      dev_dbg(&sdev->udev->dev, "free urb seqnum %lu\n",
               urb->seqnum);
      usb_kill_urb(urb);

      kmem_cache_free(stub_priv_cache, priv);
      kfree(urb->transfer_buffer);
      urb->transfer_buffer = NULL;
      kfree(urb->setup_packet);
      urb->setup_packet = NULL;
      for (i = 0; i < priv->num_urb; i++)
        usb_kill_urb(priv->urbs[i]);

      usb_free_urb(urb);
      stub_free_priv_and_urb(priv);
    }
  }
@@ -312,6 +420,9 @@
/*! 
usb_deregister_device_driver(&stub_driver);

+/* initiate scan to attach devices */
+stub_device_rebind();
+
+kmem_cache_destroy(stub_priv_cache);
}

--- linux-4.15.0.orig/drivers/usb/usbip/stub_rx.c
+++ linux-4.15.0/drivers/usb/usbip/stub_rx.c
@@ -7,6 +7,7 @@
#include <linux/kthread.h>
#include <linux/usb.h>
#include <linux/usb/hcd.h>
+include <linux/scatterlist.h>

#include "usbip_common.h"
#include "stub.h"
@@ -201,7 +202,7 @@
static int stub_recv_cmd_unlink(struct stub_device *sdev, 
struct usbip_header *pdu)
{
-int ret;
+int ret, i;
unsigned long flags;
struct stub_priv *priv;

@@ -246,12 +247,14 @@
* so a driver in a client host will know the failure
* of the unlink request?
 */
-ret = usb_unlink_urb(priv->urb);
-if (ret != -EINPROGRESS)
-dev_err(&priv->urb->dev->dev, 
"failed to unlink a urb # %lu, ret %d\n",
-priv->seqnum, ret);
-
+for (i = priv->completed_urbs; i < priv->num_urbs; i++) {
+ret = usb_unlink_urb(priv->urbs[i]);
+if (ret != -EINPROGRESS)
+dev_err(&priv->urbs[i]->dev->dev, 
+"failed to unlink %d/%d urb of seqnum %lu, ret %d\n", 
+i + 1, priv->num_urbs,
+priv->seqnum, ret);
+}
if (usb_endpoint_xfer_isoc(epd)) {
    /* validate packet size and number of packets */
    unsigned int maxp, packets, bytes;
    -
    -maxp = usb_endpoint_maxp(epd);
    -maxp *= usb_endpoint_maxp_mult(epd);
    -bytes = pdu->u.cmd_submit.transfer_buffer_length;
    -packets = DIV_ROUND_UP(bytes, maxp);
    -
    +/* validate number of packets */
    if (pdu->u.cmd_submit.number_of_packets < 0 ||
        pdu->u.cmd_submit.number_of_packets > packets) {
        dev_err(&sdev->udev->dev,
              "CMD_SUBMIT: isoc invalid num packets %d\n",
              pdu->u.cmd_submit.number_of_packets);
        return -442,92 +439,191 @@
    } else {
        urb->transfer_flags &= allowed;
    }

+static int stub_recv_xbuff(struct usbip_device *ud, struct stub_priv *priv)
+{
+    int ret;
+    int i;
+    +for (i = 0; i < priv->num_urbs; i++) {
+        ret = usbip_recv_xbuff(ud, priv->urbs[i]);
+        if (ret < 0)
+            break;
+    } else {
+        return ret;
+    } else {
+            static void stub_recv_cmd_submit(struct stub_device *sdev,
+            struct usbip_header *pdu)
+    {
+        int ret;
+        struct stub_priv *priv;
+        struct usbip_device *ud = &sdev->ud;
+        struct usb_device *udev = sdev->udev;

struct scatterlist *sgl = NULL, *sg;
void *buffer = NULL;
unsigned long long buf_len;
int nents;
int num_urbs = 1;
int pipe = get_pipe(sdev, pdu);
int use_sg = pdu->u.cmd_submit.transfer_flags & URB_DMA_MAP_SG;
int support_sg = 1;
int np = 0;
int ret, i;

if (pipe == -1)
    return;

/*
 * Smatch reported the error case where use_sg is true and buf_len is 0.
 * In this case, It adds SDEV_EVENT_ERROR_MALLOC and stub_priv will be
 * released by stub event handler and connection will be shut down.
 *
priv = stub_priv_alloc(sdev, pdu);
if (!priv)
    return;

/* setup a urb */
-priv->urb = usb_alloc_urb(pdu->u.cmd_submit.number_of_packets,
    -GFP_KERNEL);
-else
    -priv->urb = usb_alloc_urb(0, GFP_KERNEL);
+bbuf_len = (unsigned long long)pdu->u.cmd_submit.transfer_buffer_length;

    -if (!priv->urb) {
        -usbip_event_add(ud, SDEV_EVENT_ERROR_MALLOC);
        -return;
        +if (use_sg && !buf_len) {
            +dev_err(&udev->dev, "sg buffer with zero length\n");
            +goto err_malloc;
        }
        /* allocate urb transfer buffer, if needed */
        -if (pdu->u.cmd_submit.transfer_buffer_length > 0) {
            -priv->urb->transfer_buffer =
                -kzalloc(pdu->u.cmd_submit.transfer_buffer_length,
                    -GFP_KERNEL);
            -if (!priv->urb->transfer_buffer) {
                +if (use_sg) {
                    +sgl = sgl_alloc(buf_len, GFP_KERNEL, &nents);
                }
 */
+if (!sgl)
+goto err_malloc;
+
+/* Check if the server's HCD supports SG */
+if (!udev->bus->sg_tablesize) {
+  /* If the server's HCD doesn't support SG, break
+   * a single SG request into several URBs and map
+   * each SG list entry to corresponding URB
+   * stored in priv->sgl (If the server's HCD
+   * support SG, SG list is stored only in
+   * urb->sg) and it is used as an indicator that
+   * the server split single SG request into
+   * several URBs. Later, priv->sgl is used by
+   * stub_complete() and stub_send_ret_submit() to
+   * reassemble the divied URBs.
+   */
+  support_sg = 0;
+  num_urbs = nents;
+  priv->completed_urbs = 0;
+  pdu->u.cmd_submit.transfer_flags &=
+    URB_DMA_MAP_SG;
+  }
+} else {
+  buffer = kzalloc(buf_len, GFP_KERNEL);
+  if (!buffer)
+    goto err_malloc;
+}
+
+/* allocate urb array */
+priv->num_urbs = num_urbs;
+priv->urbs = kmalloc_array(num_urbs, sizeof(*priv->urbs), GFP_KERNEL);
+if (!priv->urbs)
+  goto err_urbs;
+
+/* setup a urb */
+if (support_sg) {
+  if (usb_pipeisoc(pipe))
+    np = pdu->u.cmd_submit.number_of_packets;
+  priv->urbs[0] = usb_alloc_urb(np, GFP_KERNEL);
+  if (!priv->urbs[0])
+    goto err_urb;
+  if (buf_len) {
+    if (use_sg) {
+priv->urbs[0]->sg = sgl;
+priv->urbs[0]->num_sgs = nents;
+priv->urbs[0]->transfer_buffer = NULL;
+} else {
+priv->urbs[0]->transfer_buffer = buffer;
+
+/* copy urb setup packet */
+priv->urbs[0]->setup_packet = kmemdup(&pdu->u.cmd_submit.setup,
+8, GFP_KERNEL);
+if (!priv->urbs[0]->setup_packet) {
+usbip_event_add(ud, SDEV_EVENT_ERROR_MALLOC);
+return;
+}
+ /* copy urb setup packet */
+priv->urb->setup_packet = kmemdup(&pdu->u.cmd_submit.setup, 8,
+ GFP_KERNEL);
+if (!priv->urb->setup_packet) {
+dev_err(&udev->dev, "allocate setup_packet\n");
+usbip_event_add(ud, SDEV_EVENT_ERROR_MALLOC);
+return;
+
+usbip_pack_pdu(pdu, priv->urbs[0], USBIP_CMD_SUBMIT, 0);
+} else {
+for_each_sg(sgl, sg, nents, i) {
+priv->urbs[i] = usb_alloc_urb(0, GFP_KERNEL);
+/* The URBs which is previously allocated will be freed
+ in stub_device_cleanup_urbs() if error occurs.
+ */
+if (!priv->urbs[i])
+goto err_urb;
+usbip_pack_pdu(pdu, priv->urbs[i], USBIP_CMD_SUBMIT, 0);
+priv->urbs[i]->transfer_buffer = sg_virt(sg);
+priv->urbs[i]->transfer_buffer_length = sg->length;
+
+priv->sgl = sgl;
+}
+
+/* set other members from the base header of pdu */
-priv->urb->context                = (void *) priv;
-priv->urb->dev                    = udev;
-priv->urb->pipe                   = pipe;
-priv->urb->complete               = stub_complete;
+for (i = 0; i < num_urbs; i++) {
+/* set other members from the base header of pdu */
priv->urbs[i]->context = (void *) priv;
priv->urbs[i]->dev = udev;
priv->urbs[i]->pipe = pipe;
priv->urbs[i]->complete = stub_complete;

-usbip_pack_pdu(pdu, priv->urb, USBIP_CMD_SUBMIT, 0);
+/* no need to submit an intercepted request, but harmless */
+tweak_special_requests(priv->urbs[i]);

+masking_bogus_flags(priv->urbs[i]);
+
-if (usbip_recv_xbuff(ud, priv->urb) < 0)
+if (stub_recv_xbuff(ud, priv) < 0)
return;

-if (usbip_recv_iso(ud, priv->urb) < 0)
+if (usbip_recv_iso(ud, priv->urbs[0]) < 0)
return;

-/* no need to submit an intercepted request, but harmless */
-tweak_special_requests(priv->urb);
-
-/* urb is now ready to submit */
-ret = usb_submit_urb(priv->urb, GFP_KERNEL);
-
-if (ret == 0)
-usbip_dbg_stub_rx("submit urb ok, seqnum %u\n",
- pdu->base.seqnum);
-else {
-dev_err(&udev->dev, "submit urb error, %d\n", ret);
-usbip_dump_header(pdu);
-usbip_dump_urb(priv->urb);
+for (i = 0; i < priv->num_urbs; i++) {
+ret = usb_submit_urb(priv->urbs[i], GFP_KERNEL);
+
-/*
-* Pessimistic.
-* This connection will be discarded.
-*/
-usbip_event_add(ud, SDEV_EVENT_ERROR_SUBMIT);
+if (ret == 0)
+usbip_dbg_stub_rx("submit urb ok, seqnum %u\n",
+ pdu->base.seqnum);
+else {
+dev_err(&udev->dev, "submit urb error, %d\n", ret);
+usbip_dump_header(pdu);
+usbip_dump_urb(priv->urbs[i]);
+
+/*
+ * Pessimistic.
+ * This connection will be discarded.
+ */
+usbip_event_add(ud, SDEV_EVENT_ERROR_SUBMIT);
+break;
+}
}

usbip_dbg_stub_rx("Leave\n");
+return;
+
+err_urb:
+kfree(priv->urbs);
+err_urbs:
+kfree(buffer);
+sgl_free(sgl);
+err_malloc:
+usbip_event_add(ud, SDEV_EVENT_ERROR_MALLOC);
}

/* recv a pdu */
--- linux-4.15.0.orig/drivers/usb/usbip/stub_tx.c
+++ linux-4.15.0/drivers/usb/usbip/stub_tx.c
@@ -5,25 +5,11 @@

#include <linux/kthread.h>
#include <linux/socket.h>
/+#include <linux/scatterlist.h>

/#include "usbip_common.h"
/#include "stub.h"

-static void stub_free_priv_and_urb(struct stub_priv *priv)
-{
-struct urb *urb = priv->urb;
-  
-kfree(urb->setup_packet);
-urb->setup_packet = NULL;
-  
-kfree(urb->transfer_buffer);
-urb->transfer_buffer = NULL;
-  
-list_del(&priv->list);
-kmem_cache_free(stub_priv_cache, priv);
-usb_free_urb(urb);

void stub_enqueue_ret_unlink(struct stub_device *sdev, __u32 seqnum,
__u32 status)
@@ -85,6 +71,22 @@
break;
}

+/*
+ * If the server breaks single SG request into the several URBs, the
+ * URBs must be reassembled before sending completed URB to the vhci.
+ * Don't wake up the tx thread until all the URBs are completed.
+ */
+if (priv->sgl) {
+priv->completed_urbs++;
+
+/* Only save the first error status */
+if (urb->status && !priv->urb_status)
+priv->urb_status = urb->status;
+
+if (priv->completed_urbs < priv->num_urbs)
+return;
+}
+
+ /* link a urb to the queue of tx. */
+ spin_lock_irqsave(&sdev->priv_lock, flags);
+if (sdev->ud.tcp_socket == NULL) {
+size_t total_size = 0;
+
+while ((priv = dequeue_from_priv_tx(sdev)) != NULL) {
+-int ret;
+-struct urb *urb = priv->urb;
++struct urb *urb = priv->urbs[0];
+struct usbip_header pdu_header;
+struct usbip_iso_packet_descriptor *iso_buffer = NULL;
+struct kvec *iov = NULL;
++struct scatterlist *sg;
++u32 actual_length = 0;
+int iovnum = 0;
+int ret;
++int i;
+
+txsize = 0;
+memset(&pdu_header, 0, sizeof(pdu_header));
+memset(&msg, 0, sizeof(msg));
if (urb->actual_length > 0 && !urb->transfer_buffer) {
+if (urb->actual_length > 0 && !urb->transfer_buffer &&
  !urb->num_sgs) {
  dev_err(&sdev->udev->dev,
"urb: actual_length %d transfer_buffer null\n",
urb->actual_length);
@@ -176,6 +182,11 @@
    if (usb_pipetype(urb->pipe) == PIPE_ISOCHRONOUS)
    iovnum = 2 + urb->number_of_packets;
+else if (usb_pipein(urb->pipe) && urb->actual_length > 0 &&
+urb->num_sgs)
+  iovnum = 1 + urb->num_sgs;
+else if (usb_pipein(urb->pipe) && priv->sgl)
+  iovnum = 1 + priv->num_urbs;
else
  iovnum = 2;
@@ -192,6 +203,15 @@
          setup_ret_submit_pdu(&pdu_header, urb);
          usbip_dbg_stub_tx("setup txdata seqnum: %d\n",
              pdu_header.base.seqnum);
+          +if (priv->sgl) {
+              for (i = 0; i < priv->num_urbs; i++)
+                actual_length += priv->urbs[i]->actual_length;
+          +}
+  +usbip_header_correct_endian(&pdu_header, 1);

            iov[iovnum].iov_base = &pdu_header;
@@ -200,12 +220,47 @@
            txsize += sizeof(pdu_header);

            /* 2. setup transfer buffer */
            -if (usb_pipein(urb->pipe) &&
+if (usb_pipein(urb->pipe) && priv->sgl) {
+            /* If the server split a single SG request into several
+               URBs because the server's HCD doesn't support SG,
+               reassemble the split URB buffers into a single
+               return command.
+            */
+            for (i = 0; i < priv->num_urbs; i++) {
+                iov[iovnum].iov_base =
+                    priv->urbs[i]->transfer_buffer;


+iov[iovnum].iov_len =
+priv->urbs[i]->actual_length;
+iovnum++;
+
+tsize += actual_length;
+} else if (usb_pipein(urb->pipe) &&
    usb_pipetype(urb->pipe) != PIPE_ISOCHRONOUS &&
    urb->actual_length > 0) {
    -iov[iovnum].iov_base = urb->transfer_buffer;
    -iov[iovnum].iov_len = urb->actual_length;
    -iovnum++; +
    if (urb->num_sgs) {
        unsigned int copy = urb->actual_length;
        +int size;
        +
        +for_each_sg(urb->sg, sg, urb->num_sgs, i) {
            +if (copy == 0)
                +break;
            +if (copy < sg->length)
                +size = copy;
            +else
                +size = sg->length;
            +
            +iov[iovnum].iov_base = sg_virt(sg);
            +iov[iovnum].iov_len = size;
            +
            +iovnum++;
            +copy -= size;
            +}
        +} else {
            +iov[iovnum].iov_base = urb->transfer_buffer;
            +iov[iovnum].iov_len = urb->actual_length;
            +iovnum++;
            +}
        tsize += urb->actual_length;
    } else if (usb_pipein(urb->pipe) &&
        usb_pipetype(urb->pipe) == PIPE_ISOCHRONOUS) {
        --- linux-4.15.0.orig/drivers/usb/usbip/usbip_common.c
        +++ linux-4.15.0/drivers/usb/usbip/usbip_common.c
        @ @ -681.8 +681.12 @@
/* some members of urb must be substituted before. */
int usbip_recv_xbuff(struct usbip_device *ud, struct urb *urb)
{
    -int ret;
    +struct scatterlist *sg;
    +int ret = 0;
    +int recv;
int size;
+int copy;
+int i;

if (ud->side == USBIP_STUB || ud->side == USBIP_VUDC) { /* the direction of urb must be OUT. */
@@ -702,29 +706,51 @@
    if (!(size > 0))
        return 0;

    -if (size > urb->transfer_buffer_length) {
        +if (size > urb->transfer_buffer_length)
/* should not happen, probably malicious packet */
    -if (ud->side == USBIP_STUB) {
        -usbip_event_add(ud, SDEV_EVENT_ERROR_TCP);
        -return 0;
    -} else {
        -usbip_event_add(ud, VDEV_EVENT_ERROR_TCP);
        -return -EPIPE;
    -}
    +goto error;
    +}
    +if (urb->num_sgs) {
        +copy = size;
        +for_each_sg(urb->sg, sg, urb->num_sgs, i) {
            +int recv_size;
            +
            +if (copy < sg->length)
                +recv_size = copy;
            +else
                +recv_size = sg->length;
            +recv = usbip_recv(ud->tcp_socket, sg_virt(sg),
                                +recv_size);
            +ret = usbip_recv(ud->tcp_socket, urb->transfer_buffer, size);
            +if (ret != size) {
                +dev_err(&urb->dev, "recv xbuf, %d\n", ret);
            -} else {
                -usbip_event_add(ud, SDEV_EVENT_ERROR_TCP);
                -}
                -usbip_event_add(ud, VDEV_EVENT_ERROR_TCP);
                -return -EPIPE;
            +}
            +if (recv != recv_size)
                +goto error;
            +}
            +copy -= recv;

    -} else {
        -usbip_event_add(ud, SDEV_EVENT_ERROR_TCP);
        -return 0;
    -}
    -if (usbip_errno)
        -return -errno;
    +goto error;
    +}
    +if (urb->num_sgs) {
        +copy = size;
        +for_each_sg(urb->sg, sg, urb->num_sgs, i) {
            +int recv_size;
            +
            +if (copy < sg->length)
                +recv_size = copy;
            +else
                +recv_size = sg->length;
            +recv = usbip_recv(ud->tcp_socket, sg_virt(sg),
                                +recv_size);
            +ret = usbip_recv(ud->tcp_socket, urb->transfer_buffer, size);
            +if (ret != size) {
                +dev_err(&urb->dev, "recv xbuf, %d\n", ret);
            -} else {
                -usbip_event_add(ud, SDEV_EVENT_ERROR_TCP);
                -}
                -usbip_event_add(ud, VDEV_EVENT_ERROR_TCP);
                -return -EPIPE;
            +}
            +if (recv != recv_size)
                +goto error;
            +}
            +copy -= recv;
+ret += recv;
+
+if (!copy)
+break;
+
+if (ret != size)
+goto error;
+} else {
+ret = usbip_recv(ud->tcp_socket, urb->transfer_buffer, size);
+if (ret != size)
+goto error;
+
}

return ret;
+
+error:
+dev_err(&urb->dev->dev, "recv xbuf, %d\n", ret);
+if (ud->side == USBIP_STUB || ud->side == USBIP_VUDC)
+usbip_event_add(ud, SDEV_EVENT_ERROR_TCP);
+else
+usbip_event_add(ud, VDEV_EVENT_ERROR_TCP);
+
+return -EPIPE;
+
EXPORT_SYMBOL_GPL(usbip_recv_xbuff);

--- linux-4.15.0.orig/drivers/usb/usbip/usbip_common.h
+++ linux-4.15.0/drivers/usb/usbip/usbip_common.h
@@ -121,6 +121,13 @@
#define USBIP_DIR_OUT	0x00
#define USBIP_DIR_IN	0x01
+
/*
 * Arbitrary limit for the maximum number of isochronous packets in an URB,
 * compare for example the uhci_submit_isochronous function in
 * drivers/usb/host/uhci-q.c
 */

#define USBIP_MAX_ISO_PACKETS 1024
+
/**
 * struct usbip_header_basic - data pertinent to every request
 * @command: the usbip request type
 */

#define VUDC_EVENT_ERROR_USB(USBIP_EH_SHUTDOWN | USBIP_EH_UNUSABLE)
#define VUDC_EVENT_ERROR_MALLOC(USBIP_EH_SHUTDOWN | USBIP_EH_UNUSABLE)

-#define VDEV_EVENT_REMOVED(USBIP_EH_SHUTDOWN | USBIP_EH_BYE)
```c
#define VDEV_EVENT_REMOVED (USBIP_EH_SHUTDOWN | USBIP_EH_RESET | USBIP_EH_BYE)
#define VDEV_EVENT_DOWN(USBIP_EH_SHUTDOWN | USBIP_EH_RESET)
#define VDEV_EVENT_ERROR_TCP(USBIP_EH_SHUTDOWN | USBIP_EH_RESET)
#define VDEV_EVENT_ERROR_MALLOC(USBIP_EH_SHUTDOWN | USBIP_EH_UNUSABLE)

/* lock for status */
spinlock_t lock;

/* mutex for synchronizing sysfs store paths */
struct mutex sysfs_lock;

int sockfd;
struct socket *tcp_socket;
```

--- linux-4.15.0.orig/drivers/usb/usbip/usbip_event.c
+++ linux-4.15.0/drivers/usb/usbip/usbip_event.c
@@ -70,6 +70,7 @@
    while ((ud = get_event()) != NULL) {
        usbip_dbg_eh("pending event %lx
", ud->event);
+       mutex_lock(&ud->sysfs_lock);
        /* NOTE: shutdown must come first.
        * Shutdown the device.
@@ -90,10 +91,7 @@
        ud->eh_ops.unusable(ud);
        unset_event(ud, USBIP_EH_UNUSABLE);
    }
-   -/* Stop the error handler. */
+   -if (ud->event & USBIP_EH_BYE)
+      usbip_dbg_eh("removed %p
", ud);
+     mutex_unlock(&ud->sysfs_lock);

    wake_up(&ud->eh_waitq);
} 
--- linux-4.15.0.orig/drivers/usb/usbip/vhci_hcd.c
+++ linux-4.15.0/drivers/usb/usbip/vhci_hcd.c
@@ -318,8 +318,9 @@
    struct vhci_hcd*vhci_hcd;
    struct vhci*vhci;
    int    retval = 0;
-    intrhp;
+    intrhp = -1;
    unsigned long flags;
    bool invalid_rhport = false;

    u32 prev_port_status[VHCI_HC_PORTS];
```

--- Open Source Used In 5GaaS Edge AC-4 29520
usbip_dbg_vhci_rh("typeReq %x wValue %x wIndex %x\n", typeReq, wValue, wIndex);

- if (wIndex > VHCI_HC_PORTS)
  - pr_err("invalid port number \%d\n", wIndex);
  - rhport = wIndex - 1;
/*
+wIndex can be 0 for some request types (typeReq). rhport is
+in valid range when wIndex >= 1 and < VHCI_HC_PORTS.
+*/
+if (wIndex < 1 || wIndex > VHCI_HC_PORTS) {
  +invalid_rhport = true;
+if (wIndex > VHCI_HC_PORTS)
  +pr_err("invalid port number \%d\n", wIndex);
+} else
  +rhport = wIndex - 1;

vhci_hcd = hcd_to_vhci_hcd(hcd);
vhci = vhci_hcd->vhci;
/*/ store old status and compare now and old later */
if (usbip_dbg_flag_vhci_rh) {
  -memcpy(prev_port_status, vhci_hcd->port_status,
  -sizeof(prev_port_status));
  +if (!invalid_rhport)
    +memset(prev_port_status, vhci_hcd->port_status,
    +sizeof(prev_port_status));
}
default:
usbip_dbg_vhci_rh(" ClearPortFeature: default %x\n", wValue);
+if (wValue >= 32)
+goto error;
vhci_hcd->port_status[rhport] &~ (1 << wValue);
break;
}
@@ -413,9 +431,10 @@
break;
case GetPortStatus:
usbip_dbg_vhci_rh(" GetPortStatus port %x\n", wIndex);
-if (wIndex < 1) {
+if (invalid_rhport) {
    pr_err("invalid port number %d\n", wIndex);
    retval = -EPIPE;
    +goto error;
}
/* we do not care about resume. */
@@ -436,8 +455,14 @@
vhci_hcd->port_status[rhport] &~ (1 << USB_PORT_FEAT_RESET);
vhci_hcd->re_timeout = 0;
+/*
+ * A few drivers do usb reset during probe when
+ * the device could be in VDEV_ST_USED state
+ */
+if (vhci_hcd->vdev[rhport].ud.status ==
    - VDEV_ST_NOTASSIGNED) {
+VDEV_ST_NOTASSIGNED ||
+ vhci_hcd->vdev[rhport].ud.status ==
+VDEV_ST_USED) {
  usbip_dbg_vhci_rh(" enable rhport %d (status %u)\n", rhport,
  @@ -511,11 +536,20 @@
goto error;
}
+if (invalid_rhport) {
+ pr_err("invalid port number %d\n", wIndex);
+ goto error;
+}
+ vhci_hcd->port_status[rhport] |= USB_PORT_STAT_SUSPEND;
break;
case USB_PORT_FEAT_POWER:
usbip_dbg_vhci_rh(
" SetPortFeature: USB_PORT_FEAT_POWER"
);
+if (invalid_rhport) {
+pr_err("invalid port number %d\n", wIndex);
+goto error;
+
if (hcd->speed == HCD_USB3)
vhci_hcd->port_status[rhport] |= USB_SS_PORT_STAT_POWER;
else
@@ -524,6 +558,10 @@
case USB_PORT_FEAT_BH_PORT_RESET:
usbip_dbg_vhci_rh(
" SetPortFeature: USB_PORT_FEAT_BH_PORT_RESET"
);
+if (invalid_rhport) {
+pr_err("invalid port number %d\n", wIndex);
+goto error;
+
/* Applicable only for USB3.0 hub */
if (hcd->speed != HCD_USB3) {
pr_err("USB_PORT_FEAT_BH_PORT_RESET req not ",
@@ -534,6 +572,10 @@
case USB_PORT_FEAT_RESET:
usbip_dbg_vhci_rh(
" SetPortFeature: USB_PORT_FEAT_RESET"
);
+if (invalid_rhport) {
+pr_err("invalid port number %d\n", wIndex);
+goto error;
+
/* if it's already enabled, disable */
if (hcd->speed == HCD_USB3) {
vhci_hcd->port_status[rhport] = 0;
@@ -554,6 +596,12 @@
default:
usbip_dbg_vhci_rh(" SetPortFeature: default %d\n",
wValue);
+if (invalid_rhport) {
+pr_err("invalid port number %d\n", wIndex);
+goto error;
+
+if (wValue >= 32)
+goto error;
+if (hcd->speed == HCD_USB3) {
+(vhci_hcd->port_status[rhport] &
+USB_SS_PORT_STAT_POWER) != 0) {
@@ -595,7 +643,7 @@
pr_debug("port %d\n", rhport);
/* Only dump valid port status */
-if (rhport >= 0) {
  if (!invalid_rhport) {
    prev_port_status[rhport],
    vhci_hcd->port_status[rhport],
    hcd->speed == HCD_USB3);
  }
}

@@ -605,8 +653,10 @@
    spin_unlock_irqrestore(&vhci->lock, flags);

- if ((vhci_hcd->port_status[rhport] & PORT_C_MASK) != 0)
+ if (!invalid_rhport &&
+     (vhci_hcd->port_status[rhport] & PORT_C_MASK) != 0) {
  usb_hcd_poll_rh_status(hcd);
+ }
return retval;
}
@@ -662,8 +712,11 @@
}
vdev = &vhci_hcd->vdev[portnum-1];

-/* patch to usb_sg_init() is in 2.5.60 */
-BUG_ON(!urb->transfer_buffer && urb->transfer_length);
+if (!urb->transfer_buffer && !urb->num_sgs &&
+    urb->transfer_buffer_length) {
+    dev_dbg(dev, "Null URB transfer buffer\n");
+    return -EINVAL;
+}
spin_lock_irqsave(&vhci->lock, flags);
@@ -910,8 +963,32 @@
spin_lock(&vdev->priv_lock);

list_for_each_entry_safe(unlink, tmp, &vdev->unlink_tx, list) {
  struct urb *urb;
  +/* give back urb of unsent unlink request */
  pr_info("unlink cleanup tx %lu\n", unlink->unlink_seqnum);
  +urb = pickup_urb_and_free_priv(vdev, unlink->unlink_seqnum);
  +if (!urb) {
    list_del(&unlink->list);
    kfree(unlink);
    continue;
  +}
  urb->status = -ENODEV;
+usb_hcd_unlink_urb_from_ep(hcd, urb);
+
+list_del(&unlink->list);
+
+spin_unlock(&vdev->priv_lock);
+spin_unlock_irqrestore(&vhci->lock, flags);
+
+usb_hcd_giveback_urb(hcd, urb, urb->status);
+
+spin_lock_irqsave(&vhci->lock, flags);
+spin_lock(&vdev->priv_lock);
+
kfree(unlink);
}

@@ -984,6 +1061,7 @@
if (vdev->ud.tcp_socket) {
    sockfd_put(vdev->ud.tcp_socket);
    vdev->ud.tcp_socket = NULL;
+    vdev->ud.sockfd = -1;
}
pr_info("release socket\n");

@@ -1030,6 +1108,7 @@
if (ud->tcp_socket) {
    sockfd_put(ud->tcp_socket);
    ud->tcp_socket = NULL;
+    ud->sockfd = -1;
}
ud->status = VDEV_ST_NULL;

@@ -1052,6 +1131,7 @@
vdev->ud.side   = USBIP_VHCI;
    vdev->ud.status = VDEV_ST_NULL;
    spin_lock_init(&vdev->ud.lock);
+    mutex_init(&vdev->ud.sysfs_lock);

    INIT_LIST_HEAD(&vdev->priv_rx);
    INIT_LIST_HEAD(&vdev->priv_tx);
@@ -1104,6 +1184,15 @@
hcd->speed = HCD_USB3;
    hcd->self.root_hub->speed = USB_SPEED_SUPER;
}
+
+/
+ * Support SG.
+ * sg_tablesize is an arbitrary value to alleviate memory pressure
on the host.
 */
hcda->self.sg_tablesize = 32;
hcda->self.no_sg_constrain = 1;
+
return 0;
}

--- linux-4.15.0.orig/drivers/usb/usbip/vhci_rx.c
+++ linux-4.15.0/drivers/usb/usbip/vhci_rx.c
@@ -77,19 +77,27 @@
usbip_pack_pdu(pdu, urb, USBIP_RET_SUBMIT, 0);

/* recv transfer buffer */
-if (usbip_recv_xbuff(ud, urb) < 0)
-return;
+if (usbip_recv_xbuff(ud, urb) < 0) {
+urb->status = -EPROTO;
+goto error;
+}

/* recv iso_packet_descriptor */
-if (usbip_recv_iso(ud, urb) < 0)
-return;
+if (usbip_recv_iso(ud, urb) < 0) {
+urb->status = -EPROTO;
+goto error;
+}

/* restore the padding in iso packets */
usbip_pad_iso(ud, urb);

+error:
+if (usbip_dbg_flag_vhci_rx)
+usbip_dump_urb(urb);

@if (usbip_dbg_flag_vhci_rx)
+urb->transfer_flags &= ~URB_DMA_MAP_SG;
+
usbip_dbg_vhci_rx("now giveback urb %u\n", pdu->base.seqnum);

spin_lock_irqsave(&vhci->lock, flags);
--- linux-4.15.0.orig/drivers/usb/usbip/vhci_sysfs.c
+++ linux-4.15.0/drivers/usb/usbip/vhci_sysfs.c
@@ -10,6 +10,9 @@
#include <linux/platform_device.h>
#include <linux/slab.h>
/* Hardening for Spectre-v1 */
#include <linux/nospec.h>
+
#include "usbip_common.h"
#include "vhci.h"

@@ -17,10 +20,10 @@

/*
 * output example:
- * hub port sta spd dev       sockfd    local_busid
- * hs  0000 004 000 00000000  3         1-2.3
+ * hub port sta spd dev       sockfd local_busid
+ * hs  0000 004 000 000000000000003 1-2.3
 * ................................................
- * ss  0008 004 000 00000000  4         2-3.4
+ * ss  0008 004 000 000000000000004 2-3.4
 * ................................................
 *
 * Output includes socket fd instead of socket pointer address to avoid
@@ -44,13 +47,13 @@
 if (vdev->ud.status == VDEV_ST_USED) {
 *out += sprintf(*out, "%03u %08x ",
   vdev->speed, vdev->devid);
-*out += sprintf(*out, "%u %s",
+*out += sprintf(*out, "%06u %s",
   vdev->ud.sockfd,
   dev_name(&vdev->udev->dev));
   }
 } else {
 *out += sprintf(*out, "000 00000000 ");
-*out += sprintf(*out, "0000000000000000 0-0");
+*out += sprintf(*out, "000000 0-0");
 }

*out += sprintf(*out, 
@@ -148,7 +151,7 @@
 int pdev_nr;
 out += sprintf(out,
 - " hub port sta spd dev socket local_busid\n");
+ " hub port sta spd dev sockfd local_busid\n");

 pdev_nr = status_name_to_id(attr->attr.name);
 if (pdev_nr < 0)
@@ -182,6 +185,8 @@
 usbp dbg vhci sysfs("enter\n");
mutex_lock(&vdev->ud.sysfs_lock);
+
/* lock */
spin_lock_irqsave(&vhci->lock, flags);
spin_lock(&vdev->ud.lock);
@@ -192,6 +197,7 @@
/* unlock */
spin_unlock_irqrestore(&vhci->lock, flags);
+mutex_unlock(&vdev->ud.sysfs_lock);
return -EINVAL;
}
@@ -202,19 +208,25 @@
usbip_event_add(&vdev->ud, VDEV_EVENT_DOWN);
+mutex_unlock(&vdev->ud.sysfs_lock);
+
return 0;
}

-static int valid_port(__u32 pdev_nr, __u32 rhport)
+static int valid_port(__u32 *pdev_nr, __u32 *rhport)
{
-    if (pdev_nr >= vhci_num_controllers) {
+    if (*pdev_nr >= vhci_num_controllers) {
        pr_err("pdev %u\n", pdev_nr);
+if (*rhport >= VHCI_HC_PORTS) {
+    pr_err("rhport %u\n", *rhport);
 return 0;
    }
-    if (rhport >= VHCI_HC_PORTS) {
-        pr_err("rhport %u\n", rhport);
+    *pdev_nr = array_index_nospec(*pdev_nr, vhci_num_controllers);
+    *rhport = array_index_nospec(*rhport, VHCI_HC_PORTS);
+    return 1;
    }
+    rhport = port_to_rhport(port);
 pdev_nr = port_to_pdev_nr(port);
@@ -232,7 +244,7 @@

-if (!valid_port(pdev_nr, rhport))
+if (!valid_port(&pdev_nr, &rhport))
    return -EINVAL;

    hcd = platform_get_drvdata(vhcis[pdev_nr].pdev);
    \@\@ -258,7 +270,8 \@\@
    }
static DEVICE_ATTR(detach, S_IWUSR, NULL, store_detach);

-static int valid_args(__u32 pdev_nr, __u32 rhport, enum usb_device_speed speed)
+static int valid_args(__u32 *pdev_nr, __u32 *rhport, enum usb_device_speed speed)
{
    if (!valid_port(pdev_nr, rhport)) {
        return 0;
    \@\@ -304,6 +317,8 \@\@
        struct vhci *vhci;
        int err;
        unsigned long flags;
        +struct task_struct *tcp_rx = NULL;
        +struct task_struct *tcp_tx = NULL;

        /*
         * @rhport: port number of vhci_hcd
        \@\@ -322,7 +337,7 \@\@
        sockfd, devid, speed);

        /* check received parameters */
        -if (!valid_args(pdev_nr, rhport, speed))
        +if (!valid_args(&pdev_nr, &rhport, speed))
            return -EINVAL;

    hcd = platform_get_drvdata(vhcis[pdev_nr].pdev);
    \@\@ -339,14 +354,43 \@\@
    else
        vdev = &vhci->vhci_hcd_hs->vdev[rhport];

        +mutex_lock(&vdev->ud.sysfs_lock);
        +
        /* Extract socket from fd. */
        socket = sockfd_lookup(sockfd, &err);
        -if (!socket)
            -return -EINVAL;
        +if (!socket) {
            +dev_err(dev, "failed to lookup sock");
            +err = -EINVAL;
            +goto unlock_mutex;
        }
+} +if (socket->type != SOCK_STREAM) {
+dev_err(dev, "Expecting SOCK_STREAM - found %d",
+socket->type);
+sockfd_put(socket);
+err = -EINVAL;
+goto unlock_mutex;
+}

-/* now need lock until setting vdev status as used */
+/* create threads before locking */
tcp_rx = kthread_create(vhci_rx_loop, &vdev->ud, "vhci_rx");
+if (IS_ERR(tcp_rx)) {
+sockfd_put(socket);
+err = -EINVAL;
+goto unlock_mutex;
+}
tcp_tx = kthread_create(vhci_tx_loop, &vdev->ud, "vhci_tx");
+if (IS_ERR(tcp_tx)) {
+kthread_stop(tcp_rx);
+sockfd_put(socket);
+err = -EINVAL;
+goto unlock_mutex;
+}

-/* begin a lock */
+/* get task structs now */
+get_task_struct(tcp_rx);
+get_task_struct(tcp_tx);
+
+/* now begin lock until setting vdev status set */
+spin_lock_irqsave(&vhci->lock, flags);
+spin_lock(&vdev->ud.lock);

@@ -356,13 +400,16 @@
sockfd_put(socket);
+kthread_stop_put(tcp_rx);
+kthread_stop_put(tcp_tx);

dev_err(dev, "port %d already used\n", rhport);

/*
 * Will be retried from userspace
 * if there's another free port.
 */
-return -EBUSY;
+err = -EBUSY;
dev_info(dev, "pdev(%u) rhport(%u) sockfd(%d)\n",
@@ -374,18 +421,28 @@
vdev->speed = speed;
vdev->ud.sockfd = sockfd;
vdev->ud.tcp_socket = socket;
+vdev->ud.tcp_rx = tcp_rx;
+vdev->ud.tcp_tx = tcp_tx;
vdev->ud.status = VDEV_ST_NOTASSIGNED;

spin_unlock(&vdev->ud.lock);
spin_unlock_irqrestore(&vhci->lock, flags);
/* end the lock */

-vdev->ud.tcp_rx = kthread_get_run(vhci_rx_loop, &vdev->ud, "vhci_rx");
-vdev->ud.tcp_tx = kthread_get_run(vhci_tx_loop, &vdev->ud, "vhci_tx");
+wake_up_process(vdev->ud.tcp_rx);
+wake_up_process(vdev->ud.tcp_tx);

rh_port_connect(vdev, speed);

+dev_info(dev, "Device attached\n");
+
+mutex_unlock(&vdev->ud.sysfs_lock);
+
return count;
+
+unlock_mutex:
+mutex_unlock(&vdev->ud.sysfs_lock);
+return err;
}

static DEVICE_ATTR(attach, S_IWUSR, NULL, store_attach);

--- linux-4.15.0.orig/drivers/usb/usbip/vhci_tx.c
+++ linux-4.15.0/drivers/usb/usbip/vhci_tx.c
@@ -5,6 +5,7 @@
#include <linux/kthread.h>
#include <linux/slab.h>
+#include <linux/scatterlist.h>

#include "usbip_common.h"
#include "vhci.h"
@@ -50,19 +51,23 @@

static int vhci_send_cmd_submit(struct vhci_device *vdev)
struct vhci_priv *priv = NULL;
+struct scatterlist *sg;

struct msghdr msg;
-struct kvec iov[3];
+struct kvec *iov;
size_t txsize;

size_t total_size = 0;
+int iovnum;
+int err = -ENOMEM;
+int i;

while ((priv = dequeue_from_priv_tx(vdev)) != NULL) {
  int ret;
  struct urb *urb = priv->urb;
  struct usbip_header pdu_header;
  -struct usbip_iso_packet_descriptor *iso_buffer = NULL;
  txsize = 0;
  memset(&pdu_header, 0, sizeof(pdu_header));
  @ @ -72.18 +77.45 @ @
  usbip_dbg_vhci_tx("setup txdata urb seqnum %lu\n",
    priv->seqnum);

  +if (urb->num_sgs && usb_pipeout(urb->pipe))
  +iovnum = 2 + urb->num_sgs;
  +else
  +iovnum = 3;
  +
  +iov = kcalloc(iovnum, sizeof(*iov), GFP_KERNEL);
  +if (!iov) {
  +usbip_event_add(&vdev->ud, SDEV_EVENT_ERROR_MALLOC);
  +return -ENOMEM;
  +}
  +
  +if (urb->num_sgs)
  +urb->transfer_flags |= URB_DMA_MAP_SG;
  +
  +/* 1. setup usbip_header */
  setup_cmd_submit_pdu(&pdu_header, urb);
  usbip_header_correct_endian(&pdu_header, 1);
  +iovnum = 0;

  -iov[0].iov_base = &pdu_header;
  -iov[0].iov_len = sizeof(pdu_header);
+iov[iovnum].iov_base = &pdu_header;
+iov[iovnum].iov_len  = sizeof(pdu_header);
txsize += sizeof(pdu_header);
+iovnum++;

/* 2. setup transfer buffer */
if (!usb_pipein(urb->pipe) && urb->transfer_buffer_length > 0) {
  -iov[1].iov_base = urb->transfer_buffer;
  -iov[1].iov_len  = urb->transfer_buffer_length;
  +if (urb->num_sgs &&
    +  !usb_endpoint_xfer_isoc(&urb->ep->desc)) {
    +for_each_sg(urb->sg, sg, urb->num_sgs, i) {
      +iov[iovnum].iov_base = sg_virt(sg);
      +iov[iovnum].iov_len = sg->length;
      +iovnum++;
    +}
    +} else {
      +iov[iovnum].iov_base = urb->transfer_buffer;
      +iov[iovnum].iov_len =
      +urb->transfer_buffer_length;
      +iovnum++;
    +} txsize += urb->transfer_buffer_length;
}

@@ -95,30 +127,43 @@
if (!iso_buffer) {
  usbip_event_add(&vdev->ud,
  SDEV_EVENT_ERROR_MALLOC);
  -return -1;
  +goto err_iso_buffer;
}

-iov[2].iov_base = iso_buffer;
-iov[2].iov_len  = len;
+iov[iovnum].iov_base = iso_buffer;
+iov[iovnum].iov_len = len;
+iovnum++;
+txsize += len;
}

-ret = kernel_sendmsg(vdev->ud.tcp_socket, &msg, iov, 3, txsize);
+ret = kernel_sendmsg(vdev->ud.tcp_socket, &msg, iov, iovnum,
+    txsize);
if (ret != txsize) {
  pr_err("sendmsg failed!, ret=%d for %zd\n", ret,
    txsize);
  kfree(iso_buffer);
usbip_event_add(&vdev->ud, VDEV_EVENT_ERROR_TCP);
-return -1;
+err = -EPIPE;
+goto err_tx;
}

+kfree(iov);
+/* This is only for isochronous case */
kfree(iso_buffer);
+iso_buffer = NULL;
+
usbip_dbg_vhci_tx("send txdata\n");

total_size += txsize;
}

return total_size;
+
+err_tx:
+kfree(iso_buffer);
+err_iso_buffer:
+kfree(iov);
+
+return err;
}

static struct vhci_unlink *dequeue_from_unlink_tx(struct vhci_device *vdev)
--- linux-4.15.0.orig/drivers/usb/usbip/vudc_dev.c
+++ linux-4.15.0/drivers/usb/usbip/vudc_dev.c
@@ -573,6 +573,7 @@
init_waitqueue_head(&udc->tx_waitq);

spin_lock_init(&ud->lock);
+mutex_init(&ud->sysfs_lock);
ud->status = SDEV_ST_AVAILABLE;
ud->side = USBIP_VUDC;

--- linux-4.15.0.orig/drivers/usb/usbip/vudc_main.c
+++ linux-4.15.0/drivers/usb/usbip/vudc_main.c
@@ -73,6 +73,10 @@
cleanup:
list_for_each_entry_safe(udc_dev, udc_dev2, &vudc_devices, dev_entry) {
+    list_del(&udc_dev->dev_entry);
+/
+    /* Just do platform_device_del() here, put_vudc_device()
+    + calls the platform_device_put()
+    */
+    platform_device_del(udc_dev->pdev);


put_vudc_device(udc_dev);
}
@@ -89,7 +93,11 @@
list_for_each_entry_safe(udc_dev, udc_dev2, &vudc_devices, dev_entry) {
    list_del(&udc_dev->dev_entry);
    -platform_device_unregister(udc_dev->pdev);
    +/*
    + * Just do platform_device_del() here, put_vudc_device()
    + * calls the platform_device_put()
    + */
    +platform_device_del(udc_dev->pdev);
    put_vudc_device(udc_dev);
}
platform_driver_unregister(&vudc_driver);
--- linux-4.15.0.orig/drivers/usb/usbip/vudc_sysfs.c
+++ linux-4.15.0/drivers/usb/usbip/vudc_sysfs.c
@@ -12,6 +12,7 @@
 #include <linux/usb/ch9.h>
 #include <linux/sysfs.h>
 #include <linux/kthread.h>
+#include <linux/file.h>
 #include <linux/byteorder/generic.h>

 #include "usbip_common.h"
@@ -90,8 +91,9 @@
static BIN_ATTR_RO(dev_desc, sizeof(struct usb_device_descriptor));

-static ssize_t store_sockfd(struct device *dev, struct device_attribute *attr,
-    const char *in, size_t count)
+static ssize_t store_sockfd(struct device *dev,
+    struct device_attribute *attr,
    + const char *in, size_t count)
{
    struct vudc *udc = (struct vudc *) dev_get_drvdata(dev);
    int rv:
    @@ -100,15 +102,22 @@
    struct socket *socket;
    unsigned long flags;
    int ret;
    +struct task_struct *tcp_rx = NULL;
    +struct task_struct *tcp_tx = NULL;

    rv = kstrtoint(in, 0, &sockfd);
    if (rv != 0)
        return -EINVAL;
+if (!udc) {
+dev_err(dev, "no device");
+return -ENODEV;
+
+mutex_lock(&udc->ud.sysfs_lock);
+spin_lock_irqsave(&udc->lock, flags);
+/* Don't export what we don't have */
-    if (!udc || !udc->driver || !udc->pullup) {
-        dev_err(dev, "no device or gadget not bound");
+    if (!udc->driver || !udc->pullup) {
+        dev_err(dev, "gadget not bound");
+        ret = -ENODEV;
+        goto unlock;
+    }
+    }
+    udc->ud.tcp_socket = socket;
+    if (socket->type != SOCK_STREAM) {
+        dev_err(dev, "Expecting SOCK_STREAM - found %d", 
+            socket->type);
+        ret = -EINVAL;
+        goto sock_err;
+    }
+    /* unlock and create threads and get tasks */
+    spin_unlock_irq(&udc->ud.lock);
+    spin_unlock_irqrestore(&udc->lock, flags);
+
-    udc->ud.tcp_rx = kthread_get_run(&v_rx_loop,
-        &udc->ud, "vudc_rx");
-    udc->ud.tcp_tx = kthread_get_run(&v_tx_loop,
-        &udc->ud, "vudc_tx");
+    tcp_rx = kthread_create(&v_rx_loop, &udc->ud, "vudc_rx");
+    if (IS_ERR(tcp_rx)) {
+        sockfd_put(socket);
+        mutex_unlock(&udc->ud.sysfs_lock);
+        return -EINVAL;
+    }
+    tcp_tx = kthread_create(&v_tx_loop, &udc->ud, "vudc_tx");
+    if (IS_ERR(tcp_tx)) {
+        kthread_stop(tcp_rx);
+        sockfd_put(socket);
+        mutex_unlock(&udc->ud.sysfs_lock);
+        return -EINVAL;
+    }
+
+    /* unlock and create threads and get tasks */
+    sockfd_put(socket);
+    mutex_unlock(&udc->ud.sysfs_lock);
+    return -EINVAL;
+}
/* get task structs now */
+get_task_struct(tcp_rx);
+get_task_struct(tcp_tx);
+
/* lock and update udc->ud state */
spin_lock_irqsave(&udc->lock, flags);
spin_lock_irq(&udc->ud.lock);
+
udc->ud.tcp_socket = socket;
udc->ud.tcp_rx = tcp_rx;
udc->ud.tcp_tx = tcp_tx;
udc->ud.status = SDEV_ST_USED;
+
spin_unlock_irq(&udc->ud.lock);

ktime_get_ts64(&udc->start_time);
v_start_timer(udc);
udc->connected = 1;
+
spin_unlock_irqrestore(&udc->lock, flags);
+
wake_up_process(udc->ud.tcp_rx);
wake_up_process(udc->ud.tcp_tx);
+
mutex_unlock(&udc->ud.sysfs_lock);
+return count;
+
} else {
if (!udc->connected) {
    dev_err(dev, "Device not connected");
    @ @ -170,13 +213,17 @ @
}

spin_unlock_irqrestore(&udc->lock, flags);
+mutex_unlock(&udc->ud.sysfs_lock);

return count;
+
+sock_err:
+sockfd_put(socket);
unlock_ud:
spin_unlock_irq(&udc->ud.lock);
unlock:
spin_unlock_irqrestore(&udc->lock, flags);
+mutex_unlock(&udc->ud.sysfs_lock);

return ret;
}
result = usb_get_descriptor(usb_dev, USB_DT_SECURITY, 0, secd, sizeof(*secd));
-if (result < sizeof(*secd)) {
+if (result < (int)sizeof(*secd)) {
    dev_err(dev, "Can't read security descriptor or "
    "not enough data: %d\n", result);
    goto out;
--- linux-4.15.0.orig/drivers/uwb/hwa-rc.c
+++ linux-4.15.0/drivers/uwb/hwa-rc.c
@@ -873,6 +873,7 @@
error_rc_add: usb_put_intf(iface);
usb_put_dev(hwarc->usb_dev);
+kfree(hwarc);
error_alloc: uwb_rc_put(uwb_rc);
error_rc_alloc:
--- linux-4.15.0.orig/drivers/vfio/Kconfig
+++ linux-4.15.0/drivers/vfio/Kconfig
@@ -29,7 +29,7 @@
If you don't know what to do here, say N.

-menuconfig VFIO_NOIOMMU
+config VFIO_NOIOMMU
bool "VFIO No-IOMMU support"
depends on VFIO
help
--- linux-4.15.0.orig/drivers/vfio/mdev/mdev_core.c
+++ linux-4.15.0/drivers/vfio/mdev/mdev_core.c
@@ -66,34 +66,6 @@
EXPORT_SYMBOL(mdev_uuid);

-static int _find_mdev_device(struct device *dev, void *data)
-{
-    struct mdev_device *mdev;
-    
-    if (!dev_is_mdev(dev))
-        return 0;
-    
-    mdev = to_mdev_device(dev);
-    
-    if (uuid_le_cmp(mdev->uuid, *(uuid_le *)data) == 0)
-return 1;
-
-return 0;
-
-(
-
-static bool mdev_device_exist(struct mdev_parent *parent, uuid_le uuid)
-{  
-struct device *dev;
-
-dev = device_find_child(parent->dev, &uuid, _find_mdev_device);
-if (dev) {
-put_device(dev);
-return true;
-}
-
-return false;
-
- /* Should be called holding parent_list_lock */
-static struct mdev_parent *__find_parent_device(struct device *dev)
{
@@ -178,10 +150,10 @@
static int mdev_device_remove_cb(struct device *dev, void *data)
{
-if (!dev_is_mdev(dev))
-return 0;
+if (dev_is_mdev(dev))
+mdev_device_remove(dev, true);

-return mdev_device_remove(dev, data ? *(bool *)data : true);
+return 0;
 }

 /*
 @@ -210,6 +182,7 @@
 /* Check for duplicate */
 parent = __find_parent_device(dev);
 if (parent) {
+parent = NULL;
 ret = -EEXIST;
 goto add_dev_err;
 }  
@@ -221,7 +194,6 @@
 }

 kref_init(&parent->ref);
-mutex_init(&parent->lock);
parent->dev = dev;
parent->ops = ops;
@@ -269,7 +241,6 @@
void mdev_unregister_device(struct device *dev)
 {
 struct mdev_parent *parent;
-bool force_remove = true;

 mutex_lock(&parent_list_lock);
 parent = __find_parent_device(dev);
@@ -283,8 +254,7 @@
list_del(&parent->next);
class_compat_remove_link(mdev_bus_compat_class, dev, NULL);

-device_for_each_child(dev, (void *)&force_remove,
-   mdev_device_remove_cb);
+device_for_each_child(dev, NULL, mdev_device_remove_cb);

 parent_remove_sysfs_files(parent);
@@ -297,6 +267,10 @@
{
 struct mdev_device *mdev = to_mdev_device(dev);

 +mutex_lock(&mdev_list_lock);
 +list_del(&mdev->next);
 +mutex_unlock(&mdev_list_lock);
 +
dev_dbg(&mdev->dev, "MDEV: destroying\n");
kfree(mdev);
}
@@ -304,7 +278,7 @@
int mdev_device_create(struct kobject *kobj, struct device *dev, uuid_le uuid)
 {
 int ret;
-struct mdev_device *mdev;
+struct mdev_device *mdev, *tmp;
 struct mdev_parent *parent;
 struct mdev_type *type = to_mdev_type(kobj);

@@ -312,21 +286,28 @@
if (!parent)
 return -EINVAL;

 -mutex_lock(&parent->lock);
+-mutex_lock(&mdev_list_lock);
/* Check for duplicate */
- if (mdev_device_exist(parent, uuid)) {
  - ret = -EEXIST;
  - goto create_err;
+ list_for_each_entry(tmp, &mdev_list, next) {
  + if (!uuid_le_cmp(tmp->uuid, uuid)) {
    + mutex_unlock(&mdev_list_lock);
    + ret = -EEXIST;
    + goto mdev_fail;
  + }
}

mdev = kzalloc(sizeof(*mdev), GFP_KERNEL);
if (!mdev) {
  + mutex_unlock(&mdev_list_lock);
  ret = -ENOMEM;
  - goto create_err;
  + goto mdev_fail;
}

memcpy(&mdev->uuid, &uuid, sizeof(uuid_le));
+ list_add(&mdev->next, &mdev_list);
+ mutex_unlock(&mdev_list_lock);
+ mdev->parent = parent;
kref_init(&mdev->ref);

@@ -338,35 +319,28 @@
ret = device_register(&mdev->dev);
if (ret) {
  put_device(&mdev->dev);
  - goto create_err;
  + goto mdev_fail;
}

ret = mdev_device_create_ops(kobj, mdev);
if (ret)
  - goto create_failed;
  + goto create_fail;

ret = mdev_create_sysfs_files(&mdev->dev, type);
if (ret) {
  mdev_device_remove_ops(mdev, true);
  - goto create_failed;
  + goto create_fail;
}

mdev->type_kobj = kobj;
mdev->active = true;
dev_dbg(&mdev->dev, "MDEV: created\n");

.mutex_unlock(&parent->lock);
-
.mutex_lock(&mdev_list_lock);
-list_add(&mdev->next, &mdev_list);
.mutex_unlock(&mdev_list_lock);
-
.return ret;
+return 0;
-
.create_failed:
+create_fail:
device_unregister(&mdev->dev);
-
.create_err:
.mutex_unlock(&parent->lock);
+create_fail:
mdev_put_parent(parent);
.return ret;
}
@@ -377,44 +351,39 @@
struct mdev_parent *parent;
struct mdev_type *type;
.int ret;
-bool found = false;

mdev = to_mdev_device(dev);

.mutex_lock(&mdev_list_lock);
list_for_each_entry(tmp, &mdev_list, next) {
-    if (tmp == mdev) {
-        found = true;
-    }
-}
-
-if (found)
-    list_del(&mdev->next);
+if (tmp != mdev) {
+    mutex_unlock(&mdev_list_lock);
+    return -ENODEV;
+}
+
-mutex_unlock(&mdev_list_lock);
+if (!mdev->active) {
if (found)
+mutex_unlock(&mdev_list_lock);
+return -EAGAIN;
+
-} if (!found)
-return -ENODEV;
+mutex_unlock(&mdev_list_lock);
+
-mdev->active = false;
+mutex_unlock(&mdev_list_lock);

 type = to_mdev_type(mdev->type_kobj);
 parent = mdev->parent;
-mutex_lock(&parent->lock);
+
ret = mdev_device_remove_ops(mdev, force_remove);
if (ret) {
-mutex_unlock(&parent->lock);
-
-mutex_lock(&mdev_list_lock);
-list_add(&mdev->next, &mdev_list);
-mutex_unlock(&mdev_list_lock);
-
+mdev->active = true;
return ret;
}

mdev_remove_sysfs_files(dev, type);
device_unregister(dev);
-mutex_unlock(&parent->lock);
mdev_put_parent(parent);

return 0;
--- linux-4.15.0.orig/drivers/vfio/mdev/mdev_private.h
+++ linux-4.15.0/drivers/vfio/mdev/mdev_private.h
@@ -20,7 +20,6 @@
 struct device *dev;
 const struct mdev_parent_ops *ops;
 struct kref ref;
-struct mutex lock;

 struct list_head next;
 struct kset *mdev_types_kset;
-struct list_head type_list;
@@ -34,6 +33,7 @@
 struct kref ref;
 struct list_head next;
 struct kobject *type_kobj;
+bool active;
};
```c
#define to_mdev_device(dev) container_of(dev, struct mdev_device, dev)
--- linux-4.15.0.orig/drivers/vfio/mdev/mdev_sysfs.c
+++ linux-4.15.0/drivers/vfio/mdev/mdev_sysfs.c
@@ -108,12 +108,13 @@
 return ERR_PTR(-ENOMEM);

 type->kobj.kset = parent->mdev_types_kset;
 +type->parent = parent;

 ret = kobject_init_and_add(&type->kobj, &mdev_type_ktype, NULL,
    "%s-%s", dev_driver_string(parent->dev),
    group->name);
 if (ret) {
    -kfree(type);
    +kobject_put(&type->kobj);
    return ERR_PTR(ret);
 }

 @@ -135,7 +136,6 @@
 }

 type->group = group;
 -type->parent = parent;
 return type;

 attrs_failed:
 @@ -280,7 +280,7 @@

 void mdev_remove_sysfs_files(struct device *dev, struct mdev_type *type)
 { 
    +sysfs_remove_files(&dev->kobj, mdev_device_attrs);
    sysfs_remove_link(&dev->kobj, "mdev_type");
    sysfs_remove_link(type->devices_kobj, dev_name(dev));
    -sysfs_remove_files(&dev->kobj, mdev_device_attrs);
 }
--- linux-4.15.0.orig/drivers/vfio/pci/Kconfig
+++ linux-4.15.0/drivers/vfio/pci/Kconfig
@@ -1,6 +1,7 @@
 config VFIO_PCI
 tristate "VFIO support for PCI devices"
 depends on VFIO && PCI && EVENTFD
+depends on MMU
 select VFIO_VIRQFD
 select IRQ_BYPASS_MANAGER
 help
--- linux-4.15.0.orig/drivers/vfio/pci/vfio_pci.c
+++ linux-4.15.0/drivers/vfio/pci/vfio_pci.c
@@ -28,6 +28,8 @@
```

```c
#include <linux/uaccess.h>
#include <linux/vfio.h>
#include <linux/vgaarb.h>
#include <linux/nospec.h>
#include <linux/sched/mm.h>

#include "vfio_pci_private.h"

@@ -116,8 +118,6 @@
    int bar;
    struct vfio_pci_dummy_resource *dummy_res;

-INIT_LIST_HEAD(&vdev->dummy_resources_list);
-
    for (bar = PCI_STD_RESOURCES; bar <= PCI_STD_RESOURCE_END; bar++) {
        res = vdev->pdev->resource + bar;

@@ -180,6 +180,7 @@
        static void vfio_pci_try_bus_reset(struct vfio_pci_device *vdev);
        static void vfio_pci_disable(struct vfio_pci_device *vdev);
        +static int vfio_pci_try_zap_and_vma_lock_cb(struct pci_dev *pdev, void *data);

        /*
         * INTx masking requires the ability to disable INTx signaling via PCI_COMMAND
        @@ -362,11 +363,20 @@
         * Try to reset the device. The success of this is dependent on
         * being able to lock the device, which is not always possible.
         + Try to get the locks ourselves to prevent a deadlock. The
         + success of this is dependent on being able to lock the device,
         + which is not always possible.
         + We can not use the "try" reset interface here, which will
         + overwrite the previously restored configuration information.
        */
        /*
        -if (vdev->reset_works && !pci_try_reset_function(pdev))
        -vdev->needs_reset = false;
        +if (vdev->reset_works && pci_cfg_access_trylock(pdev)) {
        +    if (device_trylock(&pdev->dev)) {
        +        if (!__pci_reset_function_locked(pdev))
        +            vdev->needs_reset = false;
        +        device_unlock(&pdev->dev);
        +    }
        +    pci_cfg_access_unlock(pdev);
        +}
```
pci_restore_state(pdev);
out:
@@ -387,6 +397,19 @@
if (!(--vdev->refcnt)) {
    vfio_spapr_pci_eeh_release(vdev->pdev);
    vfio_pci_disable(vdev);
+    mutex_lock(&vdev->igate);
+    if (vdev->err_trigger) {
+        eventfd_ctx_put(vdev->err_trigger);
+        vdev->err_trigger = NULL;
+    }
+    mutex_unlock(&vdev->igate);
+
+    mutex_lock(&vdev->igate);
+    if (vdev->req_trigger) {
+        eventfd_ctx_put(vdev->req_trigger);
+        vdev->req_trigger = NULL;
+    }
+    mutex_unlock(&vdev->igate);
}

mutex_unlock(&driver_lock);
@@ -423,10 +446,14 @@
{
    if (irq_type == VFIO_PCI_INTX_IRQ_INDEX) {
        u8 pin;
+        if (!IS_ENABLED(CONFIG_VFIO_PCI_INTX) ||
+            vdev->nointx || vdev->pdev->is_virtfn)
+            return 0;
+        pci_read_config_byte(vdev->pdev, PCI_INTERRUPT_PIN, &pin);
-        if (IS_ENABLED(CONFIG_VFIO_PCI_INTX) && !vdev->nointx && pin)
-            return 1;
+        return pin ? 1 : 0;
    } else if (irq_type == VFIO_PCI_MSI_IRQ_INDEX) {
        u8 pos;
        u16 flags;
@@ -630,6 +657,12 @@
            return 0;
        }
    +struct vfio_devices {
    +    struct vfio_device **devices;
    +    int cur_index;
    +    int max_index;
    +};
static long vfio_pci_ioctl(void *device_data,  
    unsigned int cmd, unsigned long arg)  
{  
    void __iomem *io;
    size_t size;
    +u16 cmd;

    info.offset = VFIO_PCI_INDEX_TO_OFFSET(info.index);
    info.flags = 0;
    @@ -718,15 +752,20 @@  
    break;

    /* Is it really there? */
    */
    + * Is it really there? Enable memory decode for
    + * implicit access in pci_map_rom().
    + */
    +cmd = vfio_pci_memory_lock_and_enable(vdev);
    io = pci_map_rom(pdev, &size);
    -if (!io || !size) {
    +if (io) {
         +info.flags = VFIO_REGION_INFO_FLAG_READ;
         +pci_unmap_rom(pdev, io);
         +} else {
             info.size = 0;
             -break;
         }
         -pci_unmap_rom(pdev, io);
         +vfio_pci_memory_unlock_and_restore(vdev, cmd);

         -info.flags = VFIO_REGION_INFO_FLAG_READ;
         break;
     }
    }
    case VFIO_PCI_VGA_REGION_INDEX:
    @@ -746,6 +785,9 @@
    if (info.index >=
         VFIO_PCI_NUM_REGIONS + vdev->num_regions)
    return -EINVAL;
    +info.index = array_index_nospec(info.index,
    +VFIO_PCI_NUM_REGIONS +
    +vdev->num_regions);

    i = info.index - VFIO_PCI_NUM_REGIONS;

    info.offset = VFIO_PCI_INDEX_TO_OFFSET(info.index);

@@ -859,8 +901,16 @@
    return ret;
    } else if (cmd == VFIO_DEVICE_RESET) {
    -return vdev->reset_works ?
    -pci_try_reset_function(vdev->pdev) : -EINVAL;
    +int ret;
    +
    +if (!vdev->reset_works)
    +return -EINVAL;
    +
    +vfio_pci_zap_and_down_write_memory_lock(vdev);
    +ret = pci_try_reset_function(vdev->pdev);
    +up_write(&vdev->memory_lock);
    +
    +return ret;
    }

    } else if (cmd == VFIO_DEVICE_GET_PCI_HOT_RESET_INFO) {
    struct vfio_pci_hot_reset_info hdr;
    @@ -940,8 +990,9 @@
    int32_t *group_fds;
    struct vfio_pci_group_entry *groups;
    struct vfio_pci_group_info info;
    +struct vfio_devices devs = { .cur_index = 0 };  
    bool slot = false;
    -int i, count = 0, ret = 0;
    +int i, group_idx, mem_idx = 0, count = 0, ret = 0;
    
    minsz = offsetofend(struct vfio_pci_hot_reset, count);

    @@ -993,9 +1044,9 @@
    * user interface and store the group and iommu ID. This
    * ensures the group is held across the reset.
    */
    -for (i = 0; i < hdr.count; i++) {
    +for (group_idx = 0; group_idx < hdr.count; group_idx++) {
    struct vfio_group *group;
    -struct fd f = fdget(group_fds[i]);
    +struct fd f = fdget(group_fds[group_idx]);
    if (!f.file) {
        ret = -EBADF;
        break;
    @@ -1008,8 +1059,9 @@
        break;
    }

    -groups[i].group = group;
    -groups[i].id = vfio_external_user_iommu_id(group);
groups[group_idx].group = group;
+groups[group_idx].id =
+vfio_external_user_iommu_id(group);
}

kfree(group_fds);
@@ -1028,14 +1080,64 @@
 ret = vfio_pci_for_each_slot_or_bus(vdev->pdev,
     vfio_pci_validate_devs,
     &info, slot);
-    if (!ret)
-        /* User has access, do the reset */
-        ret = slot ? pci_try_reset_slot(vdev->pdev->slot) :
-                    pci_try_reset_bus(vdev->pdev->bus);
+    if (ret)
+        goto hot_reset_release;
+
+    devs.max_index = count;
+    devs.devices = kcalloc(count, sizeof(struct vfio_device *),
+                        GFP_KERNEL);
+    if (!devs.devices) {
+        ret = -ENOMEM;
+        goto hot_reset_release;
+    }
+
+    /*
+     * We need to get memory_lock for each device, but devices
+     * can share mmap_sem, therefore we need to zap and hold
+     * the vma_lock for each device, and only then get each
+     * memory_lock.
+     */
+    ret = vfio_pci_for_each_slot_or_bus(vdev->pdev,
+                                         vfio_pci_try_zap_and_vma_lock_cb,
+                                         &devs, slot);
+    if (ret)
+        goto hot_reset_release;
+
+    for (; mem_idx < devs.cur_index; mem_idx++) {
+        struct vfio_pci_device *tmp;
+        tmp = vfio_device_data(devs.devices[mem_idx]);
+        ret = down_write_trylock(&tmp->memory_lock);
+        if (!ret) {
+            ret = -EBUSY;
+            goto hot_reset_release;
+        }
+        mutex_unlock(&tmp->vma_lock);
hot_reset_release:
- for (i--; i >= 0; i--)
  - vfio_group_put_external_user(groups[i].group);
+ for (i = 0; i < devs.cur_index; i++) {
+   struct vfio_device *device;
+   struct vfio_pci_device *tmp;
+   
+   device = devs.devices[i];
+   tmp = vfio_device_data(device);
+   
+   if (i < mem_idx)
+     up_write(&tmp->memory_lock);
+   else
+     mutex_unlock(&tmp->vma_lock);
+   vfio_device_put(device);
+ }
+ kfree(devs.devices);
+
+ for (group_idx--; group_idx >= 0; group_idx--)
+   vfio_group_put_external_user(groups[group_idx].group);

kfree(groups);
return ret;

return vfio_pci_rw(device_data, (char __user *)buf, count, ppos, true);

+/* Return 1 on zap and vma_lock acquired, 0 on contention (only with @try) */
+static int vfio_pci_zap_and_vma_lock(struct vfio_pci_device *vdev, bool try)
+{
+   struct vfio_pci_mmap_vma *mmap_vma, *tmp;
+   
+   /* Lock ordering:
+   * vma_lock is nested under mmap_sem for vm_ops callback paths.
+   * The memory_lock semaphore is used by both code paths calling
+   * into this function to zap vmas and the vm_ops.fault callback
+   * to protect the memory enable state of the device.
+   */
+   
+   /* When zapping vmas we need to maintain the mmap_sem => vma_lock
+      ordering, which requires using vma_lock to walk vma_list to
+      acquire an mm, then dropping vma_lock to get the mmap_sem and
+ * reacquiring vma_lock. This logic is derived from similar
+ * requirements in uverbs_user_mmap_disassociate().
+ *
+ * mmap_sem must always be the top-level lock when it is taken.
+ * Therefore we can only hold the memory_lock write lock when
+ * vma_list is empty, as we’d need to take mmap_sem to clear
+ * entries. vma_list can only be guaranteed empty when holding
+ * vma_lock, thus memory_lock is nested under vma_lock.
+ *
+ * This enables the vm_ops.fault callback to acquire vma_lock,
+ * followed by memory_lock read lock, while already holding
+ * mmap_sem without risk of deadlock.
+ */
+while (1) {
+struct mm_struct *mm = NULL;
+
+if (try) {
+if (!mutex_trylock(&vdev->vma_lock))
+return 0;
+} else {
+mutex_lock(&vdev->vma_lock);
+}
+while (!list_empty(&vdev->vma_list)) {
+mmap_vma = list_first_entry(&vdev->vma_list,
+    struct vfio_pci_mmap_vma,
+    vma_next);
+mm = mmap_vma->vma->vm_mm;
+if (mmget_not_zero(mm))
+break;
+
+kfree(mmap_vma);
+if (!mm)
+    return 1;
+mutex_unlock(&vdev->vma_lock);
+
+if (try) {
+if (!down_read_trylock(&mm->mmap_sem)) {
+mmput(mm);
+return 0;
+} else {
+down_read(&mm->mmap_sem);
+}
+if (mmget_still_valid(mm)) {
+if (try) {
}
if (!mutex_trylock(&vdev->vma_lock)) {
    up_read(&mm->mmap_sem);
    mmput(mm);
    return 0;
} else {
    mutex_lock(&vdev->vma_lock);
    list_for_each_entry_safe(mmap_vma, tmp,
        &vdev->vma_list, vma_next) {
        struct vm_area_struct *vma = mmap_vma->vma;
        if (vma->vm_mm != mm)
            continue;
        list_del(&mmap_vma->vma_next);
        kfree(mmap_vma);
        zap_vma_ptes(vma, vma->vm_start,
        vma->vm_end - vma->vm_start);
    } mutex_unlock(&vdev->vma_lock);
    up_read(&mm->mmap_sem);
    mmput(mm);
}

void vfio_pci_zap_and_down_write_memory_lock(struct vfio_pci_device *vdev)
{
    vfio_pci_zap_and_vma_lock(vdev, false);
    down_write(&vdev->memory_lock);
    mutex_unlock(&vdev->vma_lock);
}

u16 vfio_pci_memory_lock_and_enable(struct vfio_pci_device *vdev)
{
    u16 cmd;
    down_write(&vdev->memory_lock);
    pci_read_config_word(vdev->pdev, PCI_COMMAND, &cmd);
    if (!(cmd & PCI_COMMAND_MEMORY))
       pci_write_config_word(vdev->pdev, PCI_COMMAND,
        cmd | PCI_COMMAND_MEMORY);
    return cmd;
}

+void vfio_pci_memory_unlock_and_restore(struct vfio_pci_device *vdev, u16 cmd)
+{
+pci_write_config_word(vdev->pdev, PCI_COMMAND, cmd);
+up_write(&vdev->memory_lock);
+}
+
+/* Caller holds vma_lock */
+static int __vfio_pci_add_vma(struct vfio_pci_device *vdev,
+struct vm_area_struct *vma)
+{
+struct vfio_pci_mmap_vma *mmap_vma;
+
+mmap_vma = kmalloc(sizeof(*mmap_vma), GFP_KERNEL);
+if (!mmap_vma)
+return -ENOMEM;
+
mmap_vma->vma = vma;
+list_add(&mmap_vma->vma_next, &vdev->vma_list);
+
+return 0;
+}
+
+/*
+ * Zap mmaps on open so that we can fault them in on access and therefore
+ * our vma_list only tracks mappings accessed since last zap.
+ */
+static void vfio_pci_mmap_open(struct vm_area_struct *vma)
+{
+zap_vma_ptes(vma, vma->vm_start, vma->vm_end - vma->vm_start);
+}
+
+static void vfio_pci_mmap_close(struct vm_area_struct *vma)
+{
+mutex_lock(&vdev->vma_lock);
+list_for_each_entry(mmap_vma, &vdev->vma_list, vma_next) {
+if (mmap_vma->vma == vma) {
+kfree(mmap_vma);
+break;
+}
+}
+mutex_unlock(&vdev->vma_lock);
+
+static int vfio_pci_mmap_fault(struct vm_fault *vmf)
struct vm_area_struct *vma = vmf->vma;
struct vfio_pci_device *vdev = vma->vm_private_data;
struct vfio_pci_mmap_vma *mmap_vma;

int ret = VM_FAULT_NOPAGE;
mutex_lock(&vdev->vma_lock);
down_read(&vdev->memory_lock);

if (!__vfio_pci_memory_enabled(vdev)) {
    ret = VM_FAULT_SIGBUS;
goto up_out;
}
/*
 * We populate the whole vma on fault, so we need to test whether
 * the vma has already been mapped, such as for concurrent faults
 * to the same vma. io_remap_pfn_range() will trigger a BUG_ON if
 * we ask it to fill the same range again.
 */
list_for_each_entry(mmap_vma, &vdev->vma_list, vma_next) {
    if (mmap_vma->vma == vma)
        goto up_out;
}  

if (io_remap_pfn_range(vma, vma->vm_start, vma->vm_pgoff,
    vma->vm_end - vma->vm_start,
    vma->vm_page_prot)) {
    ret = VM_FAULT_SIGBUS;
zap_vma_ptes(vma, vma->vm_start, vma->vm_end - vma->vm_start);
goto up_out;
}

if (__vfio_pci_add_vma(vdev, vma)) {
    ret = VM_FAULT_OOM;
zap_vma_ptes(vma, vma->vm_start, vma->vm_end - vma->vm_start);
}  

up_out:
up_read(&vdev->memory_lock);
mutex_unlock(&vdev->vma_lock);
return ret;

static const struct vm_operations_struct vfio_pci_mmap_ops = {
    .open = vfio_pci_mmap_open,
    .close = vfio_pci_mmap_close,
    .fault = vfio_pci_mmap_fault,
static int vfio_pci_mmap(void *device_data, struct vm_area_struct *vma)
{
    struct vfio_pci_device *vdev = device_data;
    vma->vm_page_prot = pgprot_noncached(vma->vm_page_prot);
    vma->vm_pgoff = (pci_resource_start(pdev, index) >> PAGE_SHIFT) + pgoff;
    return remap_pfn_range(vma, vma->vm_start, vma->vm_pgoff,
-            req_len, vma->vm_page_prot);
+/*
+ * See remap_pfn_range(), called from vfio_pci_fault() but we can't
+ * change vm_flags within the fault handler. Set them now.
+ */
+    vma->vm_flags |= VM_IO | VM_PFNMAP | VM_DONTEXPAND | VM_DONTDUMP;
+    vma->vm_ops = &vfio_pci_mmap_ops;
+    return 0;
}

static void vfio_pci_request(void *device_data, unsigned int count)
{
    vdev->irq_type = VFIO_PCI_NUM_IRQS;
    mutex_init(&vdev->igate);
    spin_lock_init(&vdev->irqlock);
    INIT_LIST_HEAD(&vdev->dummy_resources_list);
    INIT_LIST_HEAD(&vdev->vma_list);
    init_rwlock(&vdev->memory_lock);
    ret = vfio_add_group_dev(&pdev->dev, &vfio_pci_ops, vdev);
    if (ret) {
        remove= vfio_pci_remove,
        .err_handler= &vfio_err_handlers,
    ];
-    struct vfio_devices {
-        struct vfio_device ***devices;
-        int cur_index;
-        int max_index;
-    };
+extern void *vfio_pci_driver_ptr;
    static int vfio_pci_get_devs(struct pci_dev *pdev, void *data)
{
return 0;
}

+static int vfio_pci_try_zap_and_vma_lock_cb(struct pci_dev *pdev, void *data)
+{
+struct vfio_devices *devs = data;
+struct vfio_device *device;
+struct vfio_pci_device *vdev;
+
+if (devs->cur_index == devs->max_index)
+return -ENOSPC;
+
+device = vfio_device_get_from_dev(&pdev->dev);
+if (!device)
+return -EINVAL;
+
+if (pci_dev_driver(pdev) != &vfio_pci_driver) {
+vfio_device_put(device);
+-return -EBUSY;
+
+vfio_pci_zap_and_vma_lock(vdev, true)) {
+vfio_device_put(device);
+-return -EBUSY;
+
+devs->devices[devs->cur_index++] = device;
+return 0;
+
+/
+ * Locking multiple devices is prone to deadlock, runaway and
+ * unwind if we hit contention.
+ */
+if (!vfio_pci_zap_and_vma_lock(vdev, true)) {
+vfio_device_put(device);
+-return -EBUSY;
+
+}/
/*
 * Attempt to do a bus/slot reset if there are devices affected by a reset for
 * this device that are needs_reset and all of the affected devices are unused
@@ -1404,6 +1753,8 @@
static void __exit vfio_pci_cleanup(void)
{
+vfio_pci_driver_ptr = (void *)0xdeadfeed;
+
pci_unregister_driver(&vfio_pci_driver);
vfio_pci_uninit_perm_bits();
}
rc = pci_add_dynid(&vfio_pci_driver, vendor, device, 
        subvendor, subdevice, class, class_mask, 0);
if (rc)
    -pr_warn("failed to add dynamic id [%04hx:%04hx[%04hx:%04hx]] class %#08x/%08x (%d)\n",
        +pr_warn("failed to add dynamic id [%04x:%04x[%04x:%04x]] class %#08x/%08x (%d)\n",
        vendor, device, subvendor, subdevice,
        class, class_mask, rc);
else
    -pr_info("add [%04hx:%04hx[%04hx:%04hx]] class %#08x/%08x\n",
        +pr_info("add [%04x:%04x[%04x:%04x]] class %#08x/%08x\n",
        vendor, device, subvendor, subdevice,
        class, class_mask);
}

vfio_pci_fill_ids();

/* Advertise my address. */
+vfio_pci_driver_ptr = &vfio_pci_driver;
+
return 0;

out_driver:
--- linux-4.15.0.orig/drivers/vfio/pci/vfio_pci_config.c
+++ linux-4.15.0/drivers/vfio/pci/vfio_pci_config.c
@@ -398,6 +398,20 @@
  *(__le32 *)(&p->write[off]) = cpu_to_le32(write);
 }

/* Caller should hold memory_lock semaphore */
+bool __vfio_pci_memory_enabled(struct vfio_pci_device *vdev)
+{
+struct pci_dev *pdev = vdev->pdev;
+u16 cmd = le16_to_cpu(*(__le16 *)&vdev->vconfig[PCI_COMMAND]);
+ *
+ /* SR-IOV VF memory enable is handled by the MSE bit in the
+  * PF SR-IOV capability, there's therefore no need to trigger
+  * faults based on the virtual value.
+  */
+  +return pdev->is_virtfn || (cmd & PCI_COMMAND_MEMORY);
+}
+ /*
+ * Restore the *real* BARs after we detect a FLR or backdoor reset.
+ * (backdoor = some device specific technique that we didn't catch)
+ */

new_cmd = le32_to_cpu(val);

+phys_io = !(phys_cmd & PCI_COMMAND_IO);
+virt_io = !(le16_to_cpu(*virt_cmd) & PCI_COMMAND_IO);
+new_io = !(new_cmd & PCI_COMMAND_IO);

phys_mem = !(phys_cmd & PCI_COMMAND_MEMORY);
virt_mem = !(le16_to_cpu(*virt_cmd) & PCI_COMMAND_MEMORY);
new_mem = !(new_cmd & PCI_COMMAND_MEMORY);

-phys_io = !(phys_cmd & PCI_COMMAND_IO);
-virt_io = !(le16_to_cpu(*virt_cmd) & PCI_COMMAND_IO);
-new_io = !(new_cmd & PCI_COMMAND_IO);
+if (!new_mem)
+vfio_pci_zap_and_down_write_memory_lock(vdev);
+else
+down_write(&vdev->memory_lock);

/*
 * If the user is writing mem/io enable (new_mem/io) and we
 * @-581,8 +600,11 @
 */

count = vfio_default_config_write(vdev, pos, count, perm, offset, val);
-if (count < 0)
+if (count < 0) {
+if (offset == PCI_COMMAND)
+up_write(&vdev->memory_lock);
+}
+
/*
 * Save current memory/io enable bits in vconfig to allow for
 @@-593,6 +615,8 @@
 */

*virt_cmd &= cpu_to_le16(~mask);
*virt_cmd |= cpu_to_le16(new_cmd & mask);
+
+up_write(&vdev->memory_lock);
}

/* Emulate INTx disable */
@@-830,8 +854,11 @@
pos - offset + PCI_EXP_DEVCAP,
&cap);

-if (!ret && (cap & PCI_EXP_DEVCAP_FLR))
+if (!ret && (cap & PCI_EXP_DEVCAP_FLR)) {
+vfio_pci_zap_and_down_write_memory_lock(vdev);
pci_try_reset_function(vdev->pdev);
+up_write(&vdev->memory_lock);
+
+
*/
@@ -909,8 +936,11 @@
pos - offset + PCI_AF_CAP,
&cap);

-if (!ret && (cap & PCI_AF_CAP_FLR) && (cap & PCI_AF_CAP_TP)) {
+if (!ret && (cap & PCI_AF_CAP_FLR) && (cap & PCI_AF_CAP_TP)) {
+vfio_pci_zap_and_down_write_memory_lock(vdev);
pci_try_reset_function(vdev->pdev);
+up_write(&vdev->memory_lock);
+
+
return count;
@@ -1180,8 +1210,10 @@
return -ENOMEM;
ret = init_pci_cap_msi_perm(vdev->msi_perm, len, flags);
-if (ret)
+if (ret) {
+kfree(vdev->msi_perm);
return ret;
+
+
return len;
}
@@ -1462,7 +1494,12 @@
if (ret)
return ret;

-if (cap <= PCI_CAP_ID_MAX) {
+/*
+ * ID 0 is a NULL capability, conflicting with our fake
+ * PCI_CAP_ID_BASIC. As it has no content, consider it
+ * hidden for now.
+ */
+if (cap && cap <= PCI_CAP_ID_MAX) {
len = pci_cap_length[cap];
if (len == 0xFF) { /* Variable length */
len = vfio_cap_len(vdev, cap, pos);
@@ -1542,7 +1579,7 @@
if (len == 0xFF) {
    len = vfio_ext_cap_len(vdev, ecap, epos);
    if (len < 0)
        return ret;
    return len;
}

/*@ -1610,6 +1647,15 @*/
}

/*
 * Nag about hardware bugs, hopefully to have vendors fix them, but at least
 * to collect a list of dependencies for the VF INTx pin quirk below.
 */
static const struct pci_device_id known_bogus_vf_intx_pin[] = {
    { PCI_DEVICE(PCI_VENDOR_ID_INTEL, 0x270c) },
    {};
+
/*
 * For each device we allocate a pci_config_map that indicates the
 * capability occupying each dword and thus the struct perm_bits we
 * use for read and write. We also allocate a virtualized config
 @ -1674,6 +1720,33 @*/
if (pdev->is_virtfn) {
    *(__le16 *)&vconfig[PCI_VENDOR_ID] = cpu_to_le16(pdev->vendor);
    *(__le16 *)&vconfig[PCI_DEVICE_ID] = cpu_to_le16(pdev->device);
+
/*
 * Per SR-IOV spec rev 1.1, 3.4.1.18 the interrupt pin register
 * does not apply to VFs and VFs must implement this register
 * as read-only with value zero. Userspace is not readily able
 * to identify whether a device is a VF and thus that the pin
 * definition on the device is bogus should it violate this
 * requirement. We already virtualize the pin register for
 * other purposes, so we simply need to replace the bogus value
 * and consider VFs when we determine INTx IRQ count.
 */
+if (vconfig[PCI_INTERRUPT_PIN] &&
+    !pci_match_id(known_bogus_vf_intx_pin, pdev))
    *pci_warn(pdev,
        "Hardware bug: VF reports bogus INTx pin %d\n",
        vconfig[PCI_INTERRUPT_PIN]);
+
+/* Gratuitous for good VFs */
VF do no implement the memory enable bit of the COMMAND register therefore we’ll not have it set in our initial copy of config space after pci_enable_device(). For consistency with PFs, set the virtual enable bit here.

```c
*(__le16 *)&vconfig[PCI_COMMAND] |= cpu_to_le16(PCI_COMMAND_MEMORY);
```
vdev->num_ctx = nvec;
vdev->irq_type = msix ? VFIO_PCI_MSIX_IRQ_INDEX :
@@ -290,6 +294,7 @@
struct pci_dev *pdev = vdev->pdev;
struct eventfd_ctx *trigger;
int irq, ret;
+u16 cmd;
if (vector < 0 || vector >= vdev->num_ctx)
return -EINVAL;
@@ -297,8 +302,12 @@
irq = pci_irq_vector(pdev, vector);
if (vdev->ctx[vector].trigger) {
-free_irq(irq, vdev->ctx[vector].trigger);
irq_bypass_unregister_producer(&vdev->ctx[vector].producer);
+
+cmd = vfio_pci_memory_lock_and_enable(vdev);
+free_irq(irq, vdev->ctx[vector].trigger);
+vfio_pci_memory_unlock_and_restore(vdev, cmd);
+
kfree(vdev->ctx[vector].name);
eventfd_ctx_put(vdev->ctx[vector].trigger);
vdev->ctx[vector].trigger = NULL;
@@ -326,6 +335,7 @@
* such a reset it would be unsuccessful. To avoid this, restore the
* cached value of the message prior to enabling.
*/
+cmd = vfio_pci_memory_lock_and_enable(vdev);
if (msix) {
struct msi_msg msg;
@@ -335,6 +345,7 @@
ret = request_irq(irq, vfio_msihandler, 0,
vdev->ctx[vector].name, trigger);
+vfio_pci_memory_unlock_and_restore(vdev, cmd);
if (ret) {
kfree(vdev->ctx[vector].name);
eventfd_ctx_put(trigger);
@@ -344,11 +355,13 @@
vdev->ctx[vector].producer.token = trigger;
vdev->ctx[vector].producer.irq = irq;
ret = irq_bypass_register_producer(&vdev->ctx[vector].producer);
-if (unlikely(ret))
+if (unlikely(ret)) {
dev_info(&pdev->dev,

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"irq bypass producer (token %p) registration fails: %d
",
vdev->ctx[vector].producer.token = NULL;
+
} 
vdev->ctx[vector].trigger = trigger;

return 0;
@@ -379,6 +392,7 @@
{
    struct pci_dev *pdev = vdev->pdev;
    int i;
    +u16 cmd;

    for (i = 0; i < vdev->num_ctx; i++) {
        vfio_virqfd_disable(&vdev->ctx[i].unmask);
    }
    vfio_msi_set_block(vdev, 0, vdev->num_ctx, NULL, msix);

    +cmd = vfio_pci_memory_lock_and_enable(vdev);
    pci_free_irq_vectors(pdev);
    +vfio_pci_memory_unlock_and_restore(vdev, cmd);

    /*
     * Both disable paths above use pci_intx_for_msi() to clear DisINTx
     --- linux-4.15.0.orig/drivers/vfio/pci/vfio_pci_private.h
    +++ linux-4.15.0/drivers/vfio/pci/vfio_pci_private.h
    @@ -63,6 +63,11 @@
     struct list_head_next;
    }
    +struct vfio_pci_mmap_vma {
    +struct vm_area_struct *vma;
    +struct list_head *vma_next;
    +};
    +
    struct vfio_pci_device {
    struct pci_dev *pdev;
    void __iomem *barmap[PCI_STD_RESOURCE_END + 1];
    @@ -95,6 +100,9 @@
    struct eventfd_ctx *err_trigger;
    struct eventfd_ctx *req_trigger;
    struct list_head dummy_resources_list;
    +struct mutex vma_lock;
    +struct list_head vma_list;
    +struct rw_semaphore memory_lock;
    };

# define is_intx(vdev) (vdev->irq_type == VFIO_PCI_INTX_IRQ_INDEX)
@@ -130,6 +138,14 @@
 unsigned int type, unsigned int subtype,
 const struct vfio_pci_regops *ops,
 size_t size, u32 flags, void *data);
+extern bool __vfio_pci_memory_enabled(struct vfio_pci_device *vdev);
+extern void vfio_pci_zap_and_down_write_memory_lock(struct vfio_pci_device *vdev);
+extern u16 vfio_pci_memory_lock_and_enable(struct vfio_pci_device *vdev);
+extern void vfio_pci_memory_unlock_and_restore(struct vfio_pci_device *vdev,
+       u16 cmd);
+}
+
#ifdef CONFIG_VFIO_PCI_IGD
extern int vfio_pci_igd_init(struct vfio_pci_device *vdev);
#else
--- linux-4.15.0.orig/drivers/vfio/pci/vfio_pci_rdwr.c
+++ linux-4.15.0/drivers/vfio/pci/vfio_pci_rdwr.c
@@ -122,6 +122,7 @@
 size_t x_start = 0, x_end = 0;
 resource_size_t end;
 void __iomem *io;
+struct resource *res = &vdev->pdev->resource[bar];
 ssize_t done;

 if (pci_resource_start(pdev, bar))
@@ -137,6 +138,14 @@
 count = min(count, (size_t)(end - pos));

+if (res->flags & IORESOURCE_MEM) {
+ down_read(&vdev->memory_lock);
+ if (!__vfio_pci_memory_enabled(vdev)) {
+ up_read(&vdev->memory_lock);
+ return -EIO;
+ }
+ }
+
+ if (bar == PCI_ROM_RESOURCE) {
+ /*
+ The ROM can fill less space than the BAR, so we start the
+ @ @ -144,20 +153,25 @@
+ * filling large ROM BARs much faster.
+ */
+ io = pci_map_rom(pdev, &x_start);
+ if (!io)
+ return -ENOMEM;

+if (!io) {
+  done = -ENOMEM;
+  goto out;
+
} x_end = end;
} else if (!vdev->barmap[bar]) {

  ret = pci_request_selected_regions(pdev, 1 << bar, "vfio");
  -if (ret)
  -return ret;
  +if (ret) {
  +  done = ret;
  +  goto out;
  +}

  io = pci_iomap(pdev, bar, 0);
  if (!io) {
    pci_release_selected_regions(pdev, 1 << bar);
    -return -ENOMEM;
    +done = -ENOMEM;
    +goto out;
  }

  vdev->barmap[bar] = io;
}
@@ -176,6 +190,9 @@
  if (bar == PCI_ROM_RESOURCE)
    pci_unmap_rom(pdev, io);
  +out:
  +if (res->flags & IORESOURCE_MEM)
  +  up_read(&vdev->memory_lock);

  return done;
}
--- linux-4.15.0.orig/drivers/vfio/platform/vfio_platform_common.c
+++ linux-4.15.0/drivers/vfio/platform/vfio_platform_common.c
@@ -288,7 +288,7 @@
  vfio_platform_regions_cleanup(vdev);
  err_reg:
  mutex_unlock(&driver_lock);
  -module_put(THIS_MODULE);
  +module_put(vdev->parent_module);
  return ret;
}
@@ -681,18 +681,23 @@
  group = vfio_iommu_group_get(dev);
if (!group) {
   pr_err("VFIO: No IOMMU group for device %s\n", vdev->name);
   -return -EINVAL;
   +ret = -EINVAL;
   +goto put_reset;
}

ret = vfio_add_group_dev(dev, &vfio_platform_ops, vdev);
-if (ret) {
   -vfio_iommu_group_put(group, dev);
   -return ret;
   -}
+if (ret)
+goto put_iommu;

mutex_init(&vdev->igate);

return 0;
+
+put_iommu:
+vfio_iommu_group_put(group, dev);
+put_reset:
+vfio_platform_put_reset(vdev);
+return ret;
}
EXPORT_SYMBOL_GPL(vfio_platform_probe_common);

--- linux-4.15.0.orig/drivers/vfio/vfio.c
+++ linux-4.15.0/drivers/vfio/vfio.c
@@ -34,6 +34,7 @@
 #include <linux/uaccess.h>
 #include <linux/vfio.h>
 #include <linux/wait.h>
+#include <linux/sched/signal.h>
 #define DRIVER_VERSION "0.3"
 #define DRIVER_AUTHOR "Alex Williamson <alex.williamson@redhat.com>"
 @@ -909,31 +910,22 @@
 EXPORT_SYMBOL_GPL(vfio_device_data);

-/* Given a referenced group, check if it contains the device */
-static bool vfio_dev_present(struct vfio_group *group, struct device *dev)
-{
-    struct vfio_device *device;
-    
-    device = vfio_group_get_device(group, dev);
-    

/*
 * Decrement the device reference count and wait for the device to be
 * removed.  Open file descriptors for the device... */
void *vfio_del_group_dev(struct device *dev)
{
+DEFINE_WAIT_FUNC(wait, woken_wake_function);
struct vfio_device *device = dev_get_drvdata(dev);
struct vfio_group *group = device->group;
void *device_data = device->device_data;
struct vfio_unbound_dev *unbound;
unsigned int i = 0;
-long ret;
bool interrupted = false;
+bool locked = true;
+struct device_driver *drv;
+
+drv = dev->driver;
/
/*
 * The group exists so long as we have a device reference.  Get
@@ -969,23 +961,26 @@
 * interval with counter to allow the driver to take escalating
 * measures to release the device if it has the ability to do so.
 */
+add_wait_queue(&vfio.release_q, &wait);
+
do {
  device = vfio_group_get_device(group, dev);
  if (!device)
    break;

-if (device->ops->request)
  -if (device->ops->request) {
    +device_unlock(dev);
    +locked = false;
    device->ops->request(device_data, i++);
    +}
  }
 vfio_device_put(device);

 if (interrupted) {
  -ret = wait_event_timeout(vfio.release_q,
if (!vfio_dev_present(group, dev), HZ * 10);
+wait_woken(&wait, TASK_UNINTERRUPTIBLE, HZ * 10);
} else {
-!vfio_dev_present(group, dev), HZ * 10);
+wait_woken(&wait, TASK_UNINTERRUPTIBLE, HZ * 10);
-if (ret == -ERESTARTSYS) {
+wait_woken(&wait, TASK_UNINTERRUPTIBLE, HZ * 10);
+if (signal_pending(current)) {
interrupted = true;
dev_warn(dev,
"Device is currently in use, task"
@@ -994,8 +989,24 @@
current->comm, task_pid_nr(current));
}
}
-} while (ret <= 0);
+
+if (!locked) {
+device_lock(dev);
+locked = true;
+/*
+ * A concurrent operation may have released the driver
+ * successfully while we had dropped the lock,
+ * check for that.
+ */
+if (dev->driver != drv) {
+vfio_group_put(group);
+return NULL;
+}
+}
+
+} while (1);
+
+remove_wait_queue(&vfio.release_q, &wait);
+/*
+ * In order to support multiple devices per group, devices can be
+ * plucked from the group while other devices in the group are still
--- linux-4.15.0.orig/drivers/vfio/vfio_iommu_spapr_tce.c
+++ linux-4.15.0/drivers/vfio/vfio_iommu_spapr_tce.c
@@ -409,6 +409,7 @@
{
struct tce_container *container = iommu_data;
struct tce_iommu_group *tcegrp;
+struct tce_iommu_prereg *tcemem, *tmtmp;
long i;

while (tce_groups_attached(container)) {
@@ -431,13 +432,8 @@
tce_iommu_free_table(container, tbl);
}

while (!list_empty(&container->prereg_list)) {
    struct tce_iommu_prereg *tcemem;
    tcemem = list_first_entry(&container->prereg_list, struct tce_iommu_prereg, next);
    WARN_ON_ONCE(tce_iommu_prereg_free(container, tcemem));
}
list_for_each_entry_safe(tcemem, tmtmp, &container->prereg_list, next)
    WARN_ON(tce_iommu_prereg_free(container, tcemem));

static int tce_iommu_prereg_ua_to_hpa(struct tce_container *container,
unsigned long tce, unsigned long size,
unsigned long *phpa, struct mm_iommu_table_group_mem_t **pmem)
{
    long ret = 0;
    struct mm_iommu_table_group_mem_t *mem;

    mem = mm_iommu_lookup(container->mm, tce, size);
    if (!mem)
        return -EINVAL;
    ret = mm_iommu_ua_to_hpa(mem, tce, phpa);
    if (ret)
        return -EINVAL;

    mem = mm_iommu_lookup(container->mm, tce, 1ULL << shift);
    if (!mem)
        return -EINVAL;
    ret = mm_iommu_ua_to_hpa(mem, tce, shift, phpa);
    if (ret)
        return -EINVAL;

    if (!pua)
        return;

    ret = tce_iommu_prereg_ua_to_hpa(container, *pua, IOMMU_PAGE_SIZE(tbl),
&hpa, &mem);
    if (ret)
        pr_debug("%s: tce %lx at #%lx was not cached, ret=%d\n",
"tce_iommu_prereg_prereg_ua_to_hpa", i);
ret = tce_iommu_prereg ua_to_hpa(container,
-tce, IOMMU_PAGE_SIZE(tbl), &hpa, &mem);
+tce, tbl->it_page_shift, &hpa, &mem);
if (ret)
break;

--- linux-4.15.0.orig/drivers/vfio/vfio_iommu_type1.c
+++ linux-4.15.0/drivers/vfio/vfio_iommu_type1.c
@@ -58,12 +58,18 @@
+MODULE_PARM_DESC(dma_entry_limit,
		 "Maximum number of user DMA mappings per container (65535). ");
+
+struct vfio_iommu {
+struct list_head*domain_list;
+struct vfio_domain*external_domain; /* domain for external user */
+struct mutex;
+struct rb_root*dma_list;
+struct blocking_notifier_head notifier;
+unsigned int dma_avail;
+bool v2;
+bool nesting;
+};
@@ -83,6 +89,7 @@
+bool lock_cap; /* capable(CAP_IPC_LOCK) */
+struct task_struct*task;
+struct rb_rootpfn_list; /* Ex-user pinned pfn list */
+};
@@ -246,29 +253,25 @@
+static int vfio_lock_acct(struct vfio_dma *dma, long npage, bool async)
{ return ret; }

-static int vfio_lock_acct(struct task_struct *task, long npage, bool *lock_cap)
+static int vfio_lock_acct(struct vfio_dma *dma, long npage, bool async)
{ struct mm_struct *mm;
-bool is_current;
+int ret;

    if (!npage)
        return 0;
is_current = (task->mm == current->mm);
-
-mm = is_current ? task->mm : get_task_mm(task);
+mm = async ? get_task_mm(dma->task) : dma->task->mm;
if (!mm)
    return -ESRCH; /* process exited */

ret = down_write_killable(&mm->mmap_sem);
if (!ret) {
    if (npage > 0) {
        -if (lock_cap ? !*lock_cap :
        -!has_capability(task, CAP_IPC_LOCK)) {
        +if (!dma->lock_cap) {
            unsigned long limit;
            -limit = task_rlimit(task,
            +limit = task_rlimit(dma->task,
            RLIMIT_MEMLOCK) >> PAGE_SHIFT;

            if (mm->locked_vm + npage > limit)
                up_write(&mm->mmap_sem);
        }

        -if (!is_current)
        +if (async)
            mmput(mm);
    }

    return ret;
}

+static int follow_fault_pfn(struct vm_area_struct *vma, struct mm_struct *mm,
 +    unsigned long vaddr, unsigned long *pfn,
 +    bool write_fault)
 +{
 +    int ret;
 +
 +    +ret = follow_pfn(vma, vaddr, pfn);
 +    +if (ret) {
 +        bool unlocked = false;
 +        +ret = fixup_user_fault(NULL, mm, vaddr,
 +            FAULT_FLAG_REMOTE |
 +            (write_fault ?  FAULT_FLAG_WRITE : 0),
 +            &unlocked);
if (unlocked)
    return -EAGAIN;

if (ret)
    return ret;

ret = follow_pfn(vma, vaddr, pfni);
}

return ret;

static int vaddr_get_pfn(struct mm_struct *mm, unsigned long vaddr,
    int prot, unsigned long *pfni)
{
    struct page *page[1];
    struct vm_area_struct *vma;
    struct vm_area_struct *vmas[1];
    unsigned int flags = 0;
    int ret;

    if (prot & IOMMU_WRITE)
        flags |= FOLL_WRITE;

down_read(&mm->mmap_sem);
if (mm == current->mm) {
    ret = get_user_pages_fast(vaddr, 1, !!(prot & IOMMU_WRITE),
        page);
    ret = get_user_pages_longterm(vaddr, 1, flags, page, vmas);
} else {
    unsigned int flags = 0;
    if (prot & IOMMU_WRITE)
        flags |= FOLL_WRITE;

down_read(&mm->mmap_sem);
ret = get_user_pages_remote(NULL, mm, vaddr, 1, flags, page,
    NULL, NULL);
    up_read(&mm->mmap_sem);
    vma = NULL;
    /*
    * The lifetime of a vaddr_get_pfn() page pin is
    * userspace-controlled. In the fs-dax case this could
    * lead to indefinite stalls in filesystem operations.
    * Disallow attempts to pin fs-dax pages via this
    * interface.
    */
    if (ret > 0 && vma_is_fsdax(vmas[0])) {

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+ret = -EOPNOTSUPP;
+put_page(page[0]);
+
+
+up_read(&mm->mmap_sem);

if (ret == 1) {
    *pfn = page_to_pfn(page[0]);
}
+
+up_read(&mm->mmap_sem);

retry:
    vma = find_vma_intersection(mm, vaddr, vaddr + 1);

    if (vma && vma->vm_flags & VM_PFNMAP) {
        *pfn = ((vaddr - vma->vm_start) >> PAGE_SHIFT) + vma->vm_pgoff;
        -if (is_invalid_reserved_pfn(*pfn))
          -ret = 0;
        +ret = follow_fault_pfn(vma, mm, vaddr, pfn, prot & IOMMU_WRITE);
        +if (ret == -EAGAIN)
            +goto retry;
        +
        +if (!(ret && !is_invalid_reserved_pfn(*pfn))
            +ret = -EFAULT;
    }

    up_read(&mm->mmap_sem);
@@ -381,7 +424,7 @@ /*
 static long vfio_pin_pages_remote(struct vfio_dma *dma, unsigned long vaddr,
    long npage, unsigned long *pfn_base,
    - bool lock_cap, unsigned long limit)
    + unsigned long limit)
 {
    unsigned long pfn = 0;
    long ret, pinned = 0, lock_acct = 0;
@@ -404,7 +447,7 @@
   /* pages are already counted against the user.
   */
    if (!rsvd && !vfio_find_vpfn(dma, iova)) {
      -if (!(lock_cap && current->mm->locked_vm + 1 > limit) {
      +if (!dma->lock_cap && current->mm->locked_vm + 1 > limit) {
         put_pfn(*pfn_base, dma->prot);
         pr_warn("%s: RLIMIT_MEMLOCK (%ld) exceeded\n", __func__,
           limit << PAGE_SHIFT);
@@ -430,7 +473,7 @@}
if (!rsvd && !vfio_find_vpfndma, iova)) {
   -if (!lock_cap &&
   +if (!lock_cap &&
       current->mm->locked_vm + lock_acct + 1 > limit) {
   put_pfn(pfn, dma->prot);
   pr_warn("%s: RLIMIT_MEMLOCK (%ld) exceeded\n",
         -443,7 +486,7 @@
   }

out:
-ret = vfio_lock_acct(current, lock_acct, &lock_cap);
+ret = vfio_lock_acct(dma, lock_acct, false);

unpin_out:
if (ret) {
   @@ -474,7 +517,7 @@
}

if (do_accounting)
- vfio_lock_acct(dma->task, locked - unlocked, NULL);
+ vfio_lock_acct(dma, locked - unlocked, true);

return unlocked;
}
@@ -491,7 +534,7 @@

ret = vaddr_get_pfn(mm, vaddr, dma->prot, pfn_base);
if (!ret && do_accounting && !is_invalid_reserved_pfn(*pfn_base)) {
   -ret = vfio_lock_acct(dma->task, 1, NULL);
   +ret = vfio_lock_acct(dma, 1, true);
   if (ret) {
      put_pfn(*pfn_base, dma->prot);
      if (ret == -ENOMEM)
         @@ -518,7 +561,7 @@
         unlocked = vfio_iova_put_vfio_pfn(dma, vpfn);

if (do_accounting)
- vfio_lock_acct(dma->task, -unlocked, NULL);
+ vfio_lock_acct(dma, -unlocked, true);

return unlocked;
}
@@ -578,7 +621,7 @@
continue;
}

-remote_vaddr = dma->vaddr + iova - dma->iova;
remote_vaddr = dma->vaddr + (iova - dma->iova);
ret = vfio_pin_page_external(dma, remote_vaddr, &phys_pfn[i],
   do_accounting);
if (ret)
   @@ -586,7 +629,8 @@

ret = vfio_add_to_pfn_list(dma, iova, phys_pfn[i]);
if (ret) {
   -vfio_unpin_page_external(dma, iova, do_accounting);
   +if (put_pfn(phys_pfn[i], dma->prot) && do_accounting)
   +vfio_lock_acct(dma, -1, true);
   goto pin_unwind;
}
}
@@ -713,7 +757,7 @@

dma->iommu_mapped = false;
if (do_accounting) {
   -vfio_lock_acct(dma->task, -unlocked, NULL);
   +vfio_lock_acct(dma, -unlocked, true);
   return 0;
}
return unlocked;
@@ -725,6 +769,7 @@
vvio_unlink_dma(iommu, dma);
put_task_struct(dma->task);
kfree(dma);
+iommu->dma_avail++;
}

static unsigned long vfio_pgsize_bitmap(struct vfio_iommu *iommu)
@@ -767,7 +812,7 @@
return -EINVAL;
if (!unmap->size || unmap->size & mask)
return -EINVAL;
-elif (unmap->iova + unmap->size < unmap->iova ||
+elif (unmap->iova + unmap->size - 1 < unmap->iova ||
   unmap->size > SIZE_MAX)
return -EINVAL;

@@ -928,14 +973,12 @@
size_t size = map_size;
long npage;
unsigned long pfn, limit = rlimit(RLIMIT_MEMLOCK) >> PAGE_SHIFT;
-bool lock_cap = capable(CAP_IPC_LOCK);
int ret = 0;

while (size) {
  

/* Pin a contiguous chunk of memory */
npage = vfio_pin_pages_remote(dma, vaddr + dma->size,
-    size >> PAGE_SHIFT, &pfn,
-    lock_cap, limit);
+    size >> PAGE_SHIFT, &pfn, limit);
if (npage <= 0) {
    WARN_ON(!npage);
    ret = (int)npage;
    goto out_unlock;
}

+if (!iommu->dma_avail) {
+    ret = -ENOSPC;
+    goto out_unlock;
+}
+ dma = kzalloc(sizeof(*dma), GFP_KERNEL);
if (!dma) {
    ret = -ENOMEM;
    goto out_unlock;
}
+iommu->dma_avail--;
    dma->iova = iova;
    dma->vaddr = vaddr;
    dma->prot = prot;
-    get_task_struct(current);
+    /*
+     * We need to be able to both add to a task's locked memory and test
+     * against the locked memory limit and we need to be able to do both
+     * outside of this call path as pinning can be asynchronous via the
+     * external interfaces for mdev devices. RLIMIT_MEMLOCK requires a
+     * task_struct and VM locked pages requires an mm_struct, however
+     * holding an indefinite mm reference is not recommended, therefore we
+     * only hold a reference to a task. We could hold a reference to
+     * current, however QEMU uses this call path through vCPU threads,
+     * which can be killed resulting in a NULL mm and failure in the unmap
+     * path when called via a different thread. Avoid this problem by
+     * using the group_leader as threads within the same group require
+     * both CLONE_THREAD and CLONE_VM and will therefore use the same
+     * mm_struct.
+     *
+     * Previously we also used the task for testing CAP_IPC_LOCK at the
+     * time of pinning and accounting, however has_capability() makes use
+     * of real_cred, a copy-on-write field, so we can't guarantee that it

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+ * matches group_leader, or in fact that it might not change by the
+ * time it's evaluated. If a process were to call MAP_DMA with
+ * CAP_IPC_LOCK but later drop it, it doesn't make sense that they
+ * possibly see different results for an iommu_mapped vfio_dma vs
+ * externally mapped. Therefore track CAP_IPC_LOCK in vfio_dma at the
+ * time of calling MAP_DMA.
+ */
+get_task_struct(current->group_leader);
+dma->task = current->group_leader;
+dma->lock_cap = capable(CAP_IPC_LOCK);
+
dma->pfn_list = RB_ROOT;

/* Insert zero-sized and grow as we map chunks of it */
static int vfio_iommu_replay(struct vfio_iommu *iommu,
   struct vfio_domain *domain)
{
-struct vfio_domain *d;
+struct vfio_domain *d = NULL;
struct rb_node *n;
unsigned long limit = rlimit(RLIMIT_MEMLOCK) >> PAGE_SHIFT;
-bool lock_cap = capable(CAP_IPC_LOCK);
+int ret;

/* Arbitrarily pick the first domain in the list for lookups */
-d = list_first_entry(&iommu->domain_list, struct vfio_domain, next);
+if (!list_empty(&iommu->domain_list))
+d = list_first_entry(&iommu->domain_list,
+        struct vfio_domain, next);
+
+n = rb_first(&iommu->dma_list);

for (; n; n = rb_next(n)) {
    phys_addr_t p;
    dma_addr_t i;

+if (WARN_ON(!d)) { /* mapped w/o a domain?! */
+    ret = -EINVAL;
+    goto unwind;
+}
+
    phys = iommu_iova_to_phys(d->domain, iova);

    if (WARN_ON(!phys)) {
        ret = -EINVAL;
        goto unwind;
    }

    i = phys;
    p = phys;
npage = vfio_pin_pages_remote(dma, vaddr,
   n >> PAGE_SHIFT,
   &pfn, lock_cap,
   &pfn, limit);
if (npage <= 0) {
   WARN_ON(!npage);
   ret = (int)npage;
   return ret;
   goto unwind;
}
phys = pfn << PAGE_SHIFT;
ret = iommu_map(domain->domain, iova, phys,
   size, dma->prot | domain->prot);
if (ret)
   return ret;
if (!dma->iommu_mapped)
   vfio_unpin_pages_remote(dma, iova,
   phys >> PAGE_SHIFT,
   size >> PAGE_SHIFT,
   true);
   goto unwind;
   }
iova += size;
}
/* All dmas are now mapped, defer to second tree walk for unwind */
for (n = rb_first(&iommu->dma_list); n; n = rb_next(n)) {
   struct vfio_dma *dma = rb_entry(n, struct vfio_dma, node);
   dma->iommu_mapped = true;
}
return 0;
unwind:
for (; n; n = rb_prev(n)) {
   struct vfio_dma *dma = rb_entry(n, struct vfio_dma, node);
   dma_addr_t iova;
   if (dma->iommu_mapped) {
      iommu_unmap(domain->domain, dma->iova, dma->size);
+continue;
+
+iowa = dma->iowa;
+while (iowa < dma->iowa + dma->size) {
+phys_addr_t phys, p;
+size_t size;
+dma_addr_t i;
+
+phys = iommu_iova_to_phys(domain->domain, iowa);
+if (!phys) {
+iowa += PAGE_SIZE;
+continue;
+}
+
+size = PAGE_SIZE;
+p = phys + size;
+i = iowa + size;
+while (i < dma->iowa + dma->size &&
+      p == iommu_iova_to_phys(domain->domain, i)) {
+size += PAGE_SIZE;
+p += PAGE_SIZE;
+i += PAGE_SIZE;
+}
+
iommu_unmap(domain->domain, iowa, size);
+vfio_unpin_pages_remote(dma, iowa, phys >> PAGE_SHIFT,
+size >> PAGE_SHIFT, true);
+
+vfio_lock_acct(dma, locked - unlocked, true);
+
+return ret;
}

/*
@@ -1371,7 +1507,7 @@
if (!is_invalid_reserved_pfn(vpfn->pfn))
    locked++;
 }
+vfio_lock_acct(dma->task, locked - unlocked, NULL);
+vfio_lock_acct(dma, locked - unlocked, true);
 }

@@ -1476,6 +1612,7 @@
INIT_LIST_HEAD(&iommu->domain_list);
 iommu->dma_list = RB_ROOT;

+iommu->dma_avail = dma_entry_limit;
mutex_init(&iommu->lock);
BLOCKING_INIT_NOTIFIER_HEAD(&iommu->notifier);

--- linux-4.15.0.orig/drivers/vhost/net.c
+++ linux-4.15.0/drivers/vhost/net.c
@@ -35,7 +35,7 @@
#include "vhost.h"

-static int experimental_zcopytx = 1;
+static int experimental_zcopytx = 0;
module_param(experimental_zcopytx, int, 0444);
MODULE_PARM_DESC(experimental_zcopytx, "Enable Zero Copy TX;"
" 1 -Enable; 0 - Disable");
@@ -44,6 +44,12 @@
* Using this limit prevents one virtqueue from starving others. */
#define VHOST_NET_WEIGHT 0x80000

+/* Max number of packets transferred before requeueing the job.
+ * Using this limit prevents one virtqueue from starving others with small
+ * pkts.
+ */
+#define VHOST_NET_PKT_WEIGHT 256
+
/* MAX number of TX used buffers for outstanding zerocopy */
#define VHOST_MAX_PEND 128
#define VHOST_GOODCOPY_LEN 256
@@ -373,13 +379,10 @@
return local_clock() >> 10;
}

-static bool vhost_can_busy_poll(struct vhost_dev *dev,
-unsigned long endtime)
+static bool vhost_can_busy_poll(unsigned long endtime)
{
-    return likely(!need_resched()) &&
-        likely(!time_after(busy_clock(), endtime)) &&
-        likely(!signal_pending(current)) &&
-        !vhost_has_work(dev);
+    return likely(!need_resched() && !time_after(busy_clock(), endtime) &&
+        !signal_pending(current));
}

static void vhost_net_disable_vq(struct vhost_net *n,
@@ -411,7 +414,8 @@
static int vhost_net_tx_get_vq_desc(struct vhost_net *net,

struct iovec iov[], unsigned int iov_size,
- unsigned int *out_num, unsigned int *in_num)
+ unsigned int *out_num, unsigned int *in_num,
+ bool *busyloop_intr)
{
unsigned long uninitialized_var(endtime);
int r = vhost_get_vq_desc(vq, vq->iov, ARRAY_SIZE(vq->iov),
@@ -420,9 +424,15 @@
if (r == vq->num && vq->busyloop_timeout) {
preampt_disable();
endtime = busy_clock() + vq->busyloop_timeout;
- while (vhost_can_busy_poll(vq->dev, endtime) &&
+ while (vhost_can_busy_poll(endtime)) {
+ if (vhost_has_work(vq->dev)) {
+ *busyloop_intr = true;
+ break;
+}
+ if (!vhost_vq_avail_empty(vq->dev, vq))
+ break;
cpu_relax();
+}
preampt_enable();
r = vhost_get_vq_desc(vq, vq->iov, ARRAY_SIZE(vq->iov),
@@ -460,7 +470,9 @@
szize_t hdr_size;
struct socket *sock;
struct vhost_net_ubuf_ref *uninitialized_var(ubufs);
+struct ubuf_info *ubuf;
bool zcopy, zcopy_used;
+int sent_pkts = 0;

mutex_lock(&vq->mutex);
sock = vq->private_data;
@@ -476,21 +488,25 @@
hdr_size = nvq->vhost_hlen;
zcopy = nvq->ubufs;
-
- for (;;) {
-+do {
+ bool busyloop_intr;
+
+ /* Release DMAs done buffers first */
+ if (zcopy)
+ vhost_zerocopy_signal_used(net, vq);
-
+busyloop_intr = false;
head = vhost_net_tx_get_vq_desc(net, vq, vq->iov,
    ARRAY_SIZE(vq->iov),
    &out, &in);
+&out, &in, &busyloop_intr);
/* On error, stop handling until the next kick. */
if (unlikely(head < 0))
    break;
/* Nothing new?  Wait for eventfd to tell us they refilled. */
if (head == vq->num) {
    -if (unlikely(vhost_enable_notify(&net->dev, vq))) {
+if (unlikely(busyloop_intr)) {
    +vhost_poll_queue(&vq->poll);
    +} else if (unlikely(vhost_enable_notify(&net->dev, vq))) {
        vhost_disable_notify(&net->dev, vq);
        continue;
    }
    @@ -520,9 +536,7 @@

    /* use msg_control to pass vhost zerocopy ubuf info to skb */
    if (zcopy_used) {
        -struct ubuf_info *ubuf;
        ubuf = nvq->ubuf_info + nvq->upend_idx;
        -
        vq->heads[nvq->upend_idx].id = cpu_to_vhost32(vq, head);
        vq->heads[nvq->upend_idx].len = VHOST_DMA_IN_PROGRESS;
        ubuf->callback = vhost_zerocopy_callback;
        @@ -538,7 +552,6 @@
        msg.msg_control = NULL;
        ubufs = NULL;
    }
    -
    total_len += len;
    if (total_len < VHOST_NET_WEIGHT &&
        !vhost_vq_avail_empty(&net->dev, vq)) &
    @@ -552,7 +565,8 @@
        err = sock->ops->sendmsg(sock, &msg, len);
        if (unlikely(err < 0)) {
            if (zcopy_used) {
                -vhost_net_ubuf_put(ubufs);
                +if (vq->heads[ubuf->desc].len == VHOST_DMA_IN_PROGRESS)
                    +vhost_net_ubuf_put(ubufs);
                nvq->upend_idx = ((unsigned)nvq->upend_idx - 1)
                    % UIO_MAXIOV;
            }
            @@ -568,11 +582,7 @@
        } else
            vhost_zerocopy_signal_used(net, vq);
vhost_net_tx_packet(net);
-if (unlikely(total_len >= VHOST_NET_WEIGHT)) { 
-vhost_poll_queue(&vq->poll);
-break;
-}
-}
+} while (likely(!vhost_exceeds_weight(vq, ++sent_pkts, total_len)));
out:
mutex_unlock(&vq->mutex);
}
@@ -618,13 +628,14 @@
if (!len && vq->busyloop_timeout) {
    /* Both tx vq and rx socket were polled here */
    -mutex_lock(&vq->mutex);
+    mutex_lock_nested(&vq->mutex, 1);
    vhost_disable_notify(&net->dev, vq);

    preempt_disable();
    endtime = busy_clock() + vq->busyloop_timeout;

-while (vhost_can_busy_poll(&net->dev, endtime) &&
+while (vhost_can_busy_poll(endtime) &&
    !vhost_has_work(&net->dev) &&
    !sk_has_rx_data(sk) &&
    vhost_vq_avail_empty(&net->dev, vq))
    cpu_relax();
@@ -750,8 +761,9 @@
    struct socket *sock;
    struct iov_iter fixup;
    __virtio16 num_buffers;
+    int recv_pkts = 0;

-mutex_lock(&vq->mutex);
+mutex_lock_nested(&vq->mutex, 0);
    sock = vq->private_data;
    if (!sock)
        goto out;
@@ -769,7 +781,11 @@
    vq->log : NULL;
    mergeable = vhost_has_feature(vq, VIRTIO_NET_F_MRG_RXBUF);

-while ((sock_len = vhost_net_rx_peek_head_len(net, sock->sk))) {
+do {
+    sock_len = vhost_net_rx_peek_head_len(net, sock->sk);
+    +if (!sock_len)
+        break;

sock_len += sock_hlen;
vhos_len = sock_len + vhost_hlen;
headcount = get_rx_bufs(vq, vq->heads, vhost_len,
@@ -847,13 +863,11 @@
vhost_add_used_and_signal_n(&net->dev, vq, vq->heads,
    headcount);
if (unlikely(vq_log))
-    vhost_log_write(vq, vq_log, log, vhost_len);
+    vhost_log_write(vq, vq_log, log, vhost_len,
 +vq->iov, in);
total_len += vhost_len;
-if (unlikely(total_len >= VHOST_NET_WEIGHT)) {
-    vhost_poll_queue(&vq->poll);
-    goto out;
-}
+	} while (likely(!vhost_exceeds_weight(vq, ++recv_pkts, total_len)));
+
    vhost_net_enable_vq(net, vq);
out:
mutex_unlock(&vq->mutex);
@@ -931,7 +945,8 @@
n->vqs[i].sock_hlen = 0;
    vhost_net_buf_init(&n->vqs[i].rxq);
}
-vhost_dev_init(dev, vqs, VHOST_NET_VQ_MAX);
+vhost_dev_init(dev, vqs, VHOST_NET_VQ_MAX,
 +VHOST_NET_PKT_WEIGHT, VHOST_NET_WEIGHT);
vhost_poll_init(n->poll + VHOST_NET_VQ_TX, handle_tx_net, POLLOUT, dev);
vhost_poll_init(n->poll + VHOST_NET_VQ_RX, handle_rx_net, POLLIN, dev);
@@ -1015,11 +1030,7 @@

static struct socket *get_raw_socket(int fd)
{
    struct {
-        struct sockaddr_ll sa;
        char buf[MAX_ADDR_LEN];
    } uaddr;
    int uaddr_len = sizeof uaddr, r;
    int r;
    struct socket *sock = sockfd_lookup(fd, &r);

    if (!sock)
@@ -1031,12 +1042,7 @@
        goto err;
    }

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- r = sock->ops->getname(sock, (struct sockaddr *)&uaddr.sa,
-     &uaddr_len, 0);
- if (r)
-     goto err;
-
- if (uaddr.sa.sll_family != AF_PACKET) {
+ if (sock->sk->sk_family != AF_PACKET) {
     r = -EPFNOSUPPORT;
     goto err;
 }
@@ -1182,7 +1188,8 @@
 if (ubufs)
     vhost_net_ubuf_put_wait_and_free(ubufs);
 err_ubufs:
@@ -1208,6 +1215,7 @@
 done:
     vhost_net_stop(n, &tx_sock, &rx_sock);
     vhost_net_flush(n);
     vhost_dev_stop(&n->dev);
     vhost_dev_reset_owner(&n->dev, umem);
     vhost_net_vq_reset(n);
 done:
--- linux-4.15.0.orig/drivers/vhost/scsi.c
+++ linux-4.15.0/drivers/vhost/scsi.c
@@ -58,6 +58,12 @@
#define VHOST_SCSI_PREALLOC_UPAGES 2048
#define VHOST_SCSI_PREALLOC_PROT_SGLS 512

+/* Max number of requests before requeueing the job. 
+ * Using this limit prevents one virtqueue from starving others with 
+ * request. 
+ */
+#define VHOST_SCSI_WEIGHT 256
+
 struct vhost_scsi_inflight {
 /* Wait for the flush operation to finish */
 struct completion comp;
@@ -812,7 +818,7 @@

 u64 tag;
 u32 exp_data_len, data_direction;
 unsigned int out = 0, in = 0;
-int head, ret, prot_bytes;

int head, ret, prot_bytes, c = 0;
size_t req_size, rsp_size = sizeof(struct virtio_scsi_cmd_resp);
size_t out_size, in_size;
uint16 lun;

void vhost_disable_notify(&vs->dev, vq);

for (;;) {
do {
    head = vhost_get_vq_desc(vq, vq->iov,
        ARRAY_SIZE(vq->iov), &out, &in,
        NULL, NULL);
    prot_bytes = vhost32_to_cpu(vq, v_req_pi.pi_bytesin);
}
/*
 * Set prot_iter to data_iter, and advance past any
 * Set prot_iter to data_iter and truncate it to
 * prot_bytes, and advance data_iter past any
 * preceeding prot_bytes that may be present.
 *
 * Also fix up the exp_data_len to reflect only the
*/
    if (prot_bytes) {
        exp_data_len -= prot_bytes;
        prot_iter = data_iter;
        iov_iter_truncate(&prot_iter, prot_bytes);
        iov_iter_advance(&data_iter, prot_bytes);
    }
tag = vhost64_to_cpu(vq, v_req_pi.tag);
}
/*
 INIT_WORK(&cmd->work, vhost_scsi_submission_work);
 queue_work(vhost_scsi_workqueue, &cmd->work);
} */
while (likely(!vhost_exceeds_weight(vq, ++c, 0)));
out:
mutex_unlock(&vq->mutex);

vs[i] = &vs->vqs[i].vq;
vs->vqs[i].vq.handle_kick = vhost_scsi_handle_kick;
}
--- linux-4.15.0.orig/drivers/vhost/test.c
+++ linux-4.15.0/drivers/vhost/test.c
@@ -23,6 +23,12 @@
 * Using this limit prevents one virtqueue from starving others. */
 #define VHOST_TEST_WEIGHT 0x80000

+/* Max number of packets transferred before requeuing the job. 
+ * Using this limit prevents one virtqueue from starving others with 
+ * pkts. 
+ */
+#define VHOST_TEST_PKT_WEIGHT 256
+
+enum {
+ VHOST_TEST_VQ = 0,
+ VHOST_TEST_VQ_MAX = 1,
+}

vhost_add_used_and_signal(&n->dev, vq, head, 0);
total_len += len;
- if (unlikely(total_len >= VHOST_TEST_WEIGHT)) {
- vhost_poll_queue(&vq->poll);
+ if (unlikely(vhost_exceeds_weight(vq, 0, total_len)))
 break;
- }
 }

mutex_unlock(&vq->mutex);
@@ -116,7 +120,8 @@
dev = &n->dev;
vqs[VHOST_TEST_VQ] = &n->vqs[VHOST_TEST_VQ];
n->vqs[VHOST_TEST_VQ].handle_kick = handle_vq_kick;
-vhost_dev_init(dev, vqs, VHOST_TEST_VQ_MAX);
+vhost_dev_init(dev, vqs, VHOST_TEST_VQ_MAX,
+ VHOST_TEST_PKT_WEIGHT, VHOST_TEST_WEIGHT);

f->private_data = n;

@@ -157,6 +162,7 @@
vhost_test_stop(n, &private);
vhost_test_flush(n);
+vhost_dev_stop(&n->dev);
vhost_dev_cleanup(&n->dev, false);
/* We do an extra flush before freeing memory, 
 * since jobs can re-queue themselves. */
@@ -233,6 +239,7 @@
}
vhost_test_stop(n, &priv);
vhost_test_flush(n);
+vhost_dev_stop(&n->dev);
vhost_dev_reset_owner(&n->dev, umem);
done:
mutex_unlock(&n->dev.mutex);
--- linux-4.15.0.orig/drivers/vhost/vhost.c
+++ linux-4.15.0/drivers/vhost/vhost.c
@@ -30,6 +30,7 @@
#include <linux/sched/mm.h>
#include <linux/sched/signal.h>
#include <linux/interval_tree_generic.h>
+  #include <linux/nospec.h>
+
#include "vhost.h"

@@ -213,8 +214,7 @@
if (mask)
vhost_poll_wakeup(&poll->wait, 0, 0, (void *)mask);
if (mask & POLLERR) {
  -if (poll->wqh)
    -remove_wait_queue(poll->wqh, &poll->wait);
  +vhost_poll_stop(poll);
  
  ret = -EINVAL;
}

@@ -324,8 +324,24 @@
vq->call_ctx = NULL;
vq->call = NULL;
vq->log_ctx = NULL;
-vhost_reset_is_le(vq);
vhost_disable_cross_endian(vq);
+vhost_reset_is_le(vq);
vq->busyloop_timeout = 0;
vq->umem = NULL;
vq->iotlb = NULL;
@@ -412,8 +412,24 @@
vhost_vq_free_iovecs(dev->vqs[i]);
}

+bool vhost_exceeds_weight(struct vhost_virtqueue *vq,
+  int pkts, int total_len)
+{
+  struct vhost_dev *dev = vq->dev;
+  
+  if ((dev->byte_weight && total_len >= dev->byte_weight) ||
+    pkts >= dev->weight) {
+    vhost_poll_queue(&vq->poll);
+return true;
+
+return false;
+
EXPORT_SYMBOL_GPL(vhost_exceeds_weight);
+
void vhost_dev_init(struct vhost_dev *dev,
    struct vhost_virtqueue **vqs, int nvqs)
+
    int weight, int byte_weight)
{
    struct vhost_virtqueue *vq;
    int i;

    @ -427,6 +443,8 @
    dev->iotlb = NULL;
    dev->mm = NULL;
    dev->worker = NULL;
    +dev->weight = weight;
    +dev->byte_weight = byte_weight;
    init_llist_head(&dev->work_list);
    init_waitqueue_head(&dev->wait);
    INIT_LIST_HEAD(&dev->read_list);
    @ @ -667,10 +685,16 @@
    (sz + VHOST_PAGE_SIZE * 8 - 1) / VHOST_PAGE_SIZE / 8);
}

+/* Make sure 64 bit math will not overflow. */
+static bool vhost_overflow(u64 uaddr, u64 size)
+
    /* Make sure 64 bit math will not overflow. */
    -return uaddr > ULONG_MAX || size > ULONG_MAX || uaddr > ULONG_MAX - size;
    +if (uaddr > ULONG_MAX || size > ULONG_MAX)
    +return true;
    +
    +if (!size)
    +return false;
    +
    +return uaddr > ULONG_MAX - size + 1;
    }

/* Caller should have vq mutex and device mutex. */
@ @ -757,7 +781,7 @@
struct iov_iter t;
void __user *uaddr = vhost_vq_meta_fetch(vq,
    (u64)(uintptr_t)to, size,
    - VHOST_ADDR_DESC);
    + VHOST_ADDR_USED);
if (uaddr)
return __copy_to_user(uaddr, from, size);
@@ -918,8 +942,12 @@
u64 start, u64 size, u64 end,
u64 userspace_addr, int perm)
{
-struct vhost_umem_node *tmp, *node = kmalloc(sizeof(*node), GFP_ATOMIC);
+struct vhost_umem_node *tmp, *node;

+if (!size)
+return -EFAULT;
+
+node = kmalloc(sizeof(*node), GFP_ATOMIC);
if (!node)
return -ENOMEM;
@@ -961,7 +989,7 @@
list_for_each_entry_safe(node, n, &d->pending_list, node) {
struct vhost_iotlb_msg *vq_msg = &node->msg.iotlb;
if (msg->iova <= vq_msg->iova &&
    msg->iova + msg->size - 1 > vq_msg->iova &&
    msg->iova + msg->size - 1 >= vq_msg->iova &&
    vq_msg->type == VHOST_IOTLB_MISS) {
    list_del(&node->node);
@@ -994,6 +1022,7 @@
{
int ret = 0;

+mutex_lock(&dev->mutex);
    vhost_dev_lock_vqs(dev);
    switch (msg->type) {
    case VHOST_IOTLB_UPDATE:
@@ -1029,6 +1058,8 @@
    }

    vhost_dev_unlock_vqs(dev);
+mutex_unlock(&dev->mutex);
+return ret;

} ssize_t vhost_chr_write_iter(struct vhost_dev *dev,
@@ -1257,14 +1288,14 @@
/* Caller should have vq mutex and device mutex */
int vhost_vq_access_ok(struct vhost_virtqueue *vq)
{
-if (vq->iotlb) {

/* When device IOTLB was used, the access validation
 * will be validated during prefetching.
 */

if (!vq_log_access_ok(vq, vq->log_base))
    return 0;

/* Access validation occurs at prefetch time with IOTLB */
if (vq->iotlb)
    return 1;

return vq_access_ok(vq, vq->num, vq->desc, vq->avail, vq->used) &&
vq_log_access_ok(vq, vq->log_base);

EXPORT_SYMBOL_GPL(vhost_vq_access_ok);

@@ -1368,6 +1399,7 @@
    if (idx >= d->nvqs)
        return -ENOBUFS;

    idx = array_index_nospec(idx, d->nvqs);
    vq = d->vqs[idx];

    mutex_lock(&vq->mutex);

    for (i = 0; i < d->nvqs; ++i) {
        -mutex_lock(&d->vqs[i]->mutex);
        -d->vqs[i]->iotlb = niotlb;
        -mutex_unlock(&d->vqs[i]->mutex);
        +struct vhost_virtqueue *vq = d->vqs[i];
        +
        +mutex_lock(&vq->mutex);
        +vq->iotlb = niotlb;
        +__vhost_vq_meta_reset(vq);
        +mutex_unlock(&vq->mutex);
    }

    vhost_umem_clean(oiotlb);

+static int log_write_hva(struct vhost_virtqueue *vq, u64 hva, u64 len)
+{
    +struct vhost_umem *umem = vq->umem;

    "Open Source Used In 5GaaS Edge AC-4  29591"
struct vhost_umem_node *u;
u64 start, end, l, min;
int r;
bool hit = false;

while (len) {
    min = len;
    /* More than one GPAs can be mapped into a single HVA. So
     * iterate all possible umems here to be safe.
     */
    list_for_each_entry(u, &umem->umem_list, link) {
        if (u->userspace_addr > hva - 1 + len ||
            u->userspace_addr - 1 + u->size < hva)
            continue;
        start = max(u->userspace_addr, hva);
        end = min(u->userspace_addr - 1 + u->size,
            hva - 1 + len);
        l = end - start + 1;
        r = log_write(vq->log_base,
            u->start + start - u->userspace_addr,
            l);
        if (r < 0)
            return r;
        hit = true;
        min = min(l, min);
    }
    if (!hit)
        return -EFAULT;
    len -= min;
    hva += min;
}

static int log_used(struct vhost_virtqueue *vq, u64 used_offset, u64 len)
{
    struct iovec iov[64];
    int i, ret;
    if (!vq->iotlb)
        return log_write(vq->log_base, vq->log_addr + used_offset, len);
    ret = translate_desc(vq, (uintptr_t)vq->used + used_offset,
        len, iov, 64, VHOST_ACCESS_WO);
    if (ret < 0)
return ret;
+
+for (i = 0; i < ret; i++) {
+  ret = log_write_hva(vq,(uintptr_t)iov[i].iov_base,
+    iov[i].iov_len);
+  if (ret)
+    return ret;
+}
+
+return 0;
+
+
int vhost_log_write(struct vhost_virtqueue *vq, struct vhost_log *log,
  unsigned int log_num, u64 len)
{
  int i, r;

  /* Make sure data written is seen before log. */
  smp_wmb();
+
  if (vq->iotlb) {
    for (i = 0; i < count; i++) {
      r = log_write_hva(vq, (uintptr_t)iov[i].iov_base,
        iov[i].iov_len);
      if (r < 0)
        return r;
    }
    return 0;
  }
+
  for (i = 0; i < log_num; ++i) {
    u64 l = min(log[i].len, len);
    r = log_write(vq->log_base, log[i].addr, l);
    smp_wmb();
    /* Log used flag write. */
    used = &vq->used->flags;
    -log_write(vq->log_base, vq->log_addr +
      (used - (void __user *)vq->used),
    - sizeof vq->used->flags);
    +log_used(vq, (used - (void __user *)vq->used),
      sizeof vq->used->flags);
    if (vq->log_ctx)
      eventfd_signal(vq->log_ctx, 1);
  }
  smp_wmb();
/* Log avail event write */
used = vhost_avail_event(vq);
-log_write(vq->log_base, vq->log_addr +
-  (used - (void __user *)vq->used),
-  sizeof *vhost_avail_event(vq));
+log_used(vq, (used - (void __user *)vq->used),
+  sizeof *vhost_avail_event(vq));
if (vq->log_ctx)
eventfd_signal(vq->log_ctx, 1);
}
@@ -1969,7 +2076,7 @@
/* If this is an input descriptor, increment that count. */
if (access == VHOST_ACCESS_WO) {
  *in_num += ret;
  -if (unlikely(log)) {
  +if (unlikely(log && ret)) {
    log[*log_num].addr = vhost64_to_cpu(vq, desc.addr);
    log[*log_num].len = vhost32_to_cpu(vq, desc.len);
    +++*log_num;
@@ -2112,7 +2219,7 @@
/* If this is an input descriptor,
   * increment that count. */
  *in_num += ret;
  -if (unlikely(log)) {
  +if (unlikely(log && ret)) {
    log[*log_num].addr = vhost64_to_cpu(vq, desc.addr);
    log[*log_num].len = vhost32_to_cpu(vq, desc.len);
    +++*log_num;
@@ -2186,10 +2293,11 @@
/* If this is an input descriptor, 
   * increment that count. */
  *in_num += ret;
  -if (unlikely(log)) {
  +if (unlikely(log && ret)) {
    log[*log_num].addr = vhost64_to_cpu(vq, desc.addr);
    log[*log_num].len = vhost32_to_cpu(vq, desc.len);
    +++*log_num;
@@ -2228,10 +2333,11 @@
/* Make sure data is seen before log. */
  smp_wmb();
/* Log used ring entry write. */
-log_write(vq->log_base,
-  vq->log_addr +
-  ((void __user *)used - (void __user *)vq->used),
-  count * sizeof *used);
+log_used(vq, ((void __user *)used - (void __user *)vq->used),
+  count * sizeof *used);
}
old = vq->last_used_idx;
new = (vq->last_used_idx += count);
@@ -2228,10 +2333,11 @@
return -EFAULT;
}
if (unlikely(vq->log_used)) {
  /* Make sure used idx is seen before log. */
  +smp_wmb();
/* Log used index update. */
-log_write(vq->log_base,
- vq->log_addr + offsetof(struct vring_used, idx),
- size vq->used->idx);
+log_used(vq, offsetof(struct vring_used, idx),
 + sizeof vq->used->idx);
if (vq->log_ctx)
eventfd_signal(vq->log_ctx, 1);
}
@@ -2384,6 +2490,9 @@
struct vhost_msg_node *node = kmalloc(sizeof *node, GFP_KERNEL);
if (!node)
+/* Make sure all padding within the structure is initialized. */
+memset(&node->msg, 0, sizeof node->msg);
node->vq = vq;
node->msg.type = type;
return node;
--- linux-4.15.0.orig/drivers/vhost/vhost.h
+++ linux-4.15.0/drivers/vhost/vhost.h
@@ -173,9 +173,13 @@
struct list_head read_list;
struct list_head pending_list;
wait_queue_head_t wait;
+int weight;
+int byte_weight;
};

-void vhost_dev_init(struct vhost_dev *, struct vhost_virtqueue **vqs, int nvqs);
+bool vhost_exceeds_weight(struct vhost_virtqueue *vq, int pkts, int total_len);
+void vhost_dev_init(struct vhost_dev *, struct vhost_virtqueue **vqs,
+ int nvqs, int weight, int byte_weight);
long vhost_dev_set_owner(struct vhost_dev *dev);
bool vhost_dev_has_owner(struct vhost_dev *dev);
long vhost_dev_check_owner(struct vhost_dev *);
@@ -208,7 +212,8 @@
bool vhost_enable_notify(struct vhost_dev *, struct vhost_virtqueue *);

int vhost_log_write(struct vhost_virtqueue *vq, struct vhost_log *log,
- unsigned int log_num, u64 len);
+ unsigned int log_num, u64 len,
+ struct iovec *iov, int count);
int vq_iotlb_prefetch(struct vhost_virtqueue *vq);

struct vhost_msg_node *vhost_new_msg(struct vhost_virtqueue *vq, int type);
--- linux-4.15.0.orig/drivers/vhost/vringh.c
+++ linux-4.15.0/drivers/vhost/vringh.c
@@ -273,13 +273,14 @@
desc_max = vrh->vring.num;
up_next = -1;

/* You must want something! */
+if (WARN_ON(!riov && !wiov))
+return -EINVAL;
+
+if (riov)
+riov->i = riov->used = 0;
+else if (wiov)
+if (wiov)
+wiov->i = wiov->used = 0;
+else
    /* You must want something! */
-BUG();

for (;;) {
    void *addr;
    iov = wiov;
    else {
        iov = riov;
        if (unlikely(wiov && wiov->i)) {
            if (unlikely(wiov && wiov->used)) {
                vringh_bad("Readable desc %p after writable",
                        &descs[i]);
            }
            err = -EINVAL;
        }
    }
    --- linux-4.15.0.orig/drivers/vhost/vsock.c
    +++ linux-4.15.0/drivers/vhost/vsock.c
    @@ -15,11 +15,20 @@
    #include <net/sock.h>
    #include <linux/virtio_vsock.h>
    #include <linux/vhost.h>
    +#include <linux/hashtable.h>

    #include <net/af_vsock.h>
    #include "vhost.h"

    define VHOST_VSOCK_DEFAULT_HOST_CID2
    /* Max number of bytes transferred before requeueing the job.
    + * Using this limit prevents one virtqueue from starving others. */
    +#define VHOST_VSOCK_WEIGHT 0x80000
    /* Max number of packets transferred before requeueing the job.
    + * Using this limit prevents one virtqueue from starving others with
    + * small pkts.
    + */
    +#define VHOST_VSOCK_PKT_WEIGHT 256
enum {
    VHOST_VSOCK_FEATURES = VHOST_FEATURES,
    @ @ -27,14 +36,14 @ @
}

/* Used to track all the vhost_vsock instances on the system. */
static DEFINE_SPINLOCK(vhost_vsock_lock);
static LIST_HEAD(vhost_vsock_list);
+static DEFINE_READ_MOSTLY_HASHTABLE(vhost_vsock_hash, 8);

struct vhost_vsock {
    struct vhost_dev dev;
    struct vhost_virtqueue vqs[2];

    /* Link to global vhost_vsock_list, protected by vhost_vsock_lock */
    struct list_head list;
    /* Link to global vhost_vsock_hash, writes use vhost_vsock_lock */
    struct hlist_node hash;
    struct vhost_work send_pkt_work;
    spinlock_t send_pkt_list_lock;
    @ @ -50,11 +59,14 @ @
}

return VHOST_VSOCK_DEFAULT_HOST_CID;
}

- static struct vhost_vsock *__vhost_vsock_get(u32 guest_cid)
+ /* Callers that dereference the return value must hold vhost_vsock_lock or the
+ RCU read lock. */
+ static struct vhost_vsock *vhost_vsock_get(u32 guest_cid)
{ struct vhost_vsock *vsock;

    - list_for_each_entry(vsock, &vhost_vsock_list, list) {
    + hash_for_each_possible_rcu(vhost_vsock_hash, vsock, hash, guest_cid) {
        u32 other_cid = vsock->guest_cid;

        /* Skip instances that have no CID yet */
        @ @ -69,22 +81,12 @ @
        return NULL;
    }

    - static struct vhost_vsock *vhost_vsock_get(u32 guest_cid)
    - { struct vhost_vsock *vsock;

    - spin_lock_bh(&vhost_vsock_lock);
    - vsock = __vhost_vsock_get(guest_cid);
    - spin_unlock_bh(&vhost_vsock_lock);
static void vhost_transport_do_send_pkt(struct vhost_vsock *vsock,
    struct vhost_virtqueue *vq)
{
    struct vhost_virtqueue *tx_vq = &vsock->vqs[VSOCK_VQ_TX];

    int pkts = 0, total_len = 0;
    bool added = false;
    bool restart_tx = false;

    /* Avoid further vmexits, we're already processing the virtqueue */
    vhost_disable_notify(&vsock->dev, vq);

    -for (;;) {
        do {
            struct virtio_vsock_pkt *pkt;
            struct iov_iter iov_iter;
            unsigned out, in;
            size_t nbytes;
            -size_t len;
            +size_t iov_len, payload_len;
            int head;

            spin_lock_bh(&vsock->send_pkt_list_lock);
            @@ -146,8 +148,24 @@
            break;
        }
    }

    -len = iov_length(&vq->iov[out], in);
    -iov_iter_init(&iov_iter, READ, &vq->iov[out], in, len);
    +iov_len = iov_length(&vq->iov[out], in);
    +if (iov_len < sizeof(pkt->hdr)) {
        virtio_transport_free_pkt(pkt);
        vq_err(vq, "Buffer len [%zu] too small\n", iov_len);
        +break;
        +}
    +iov_iter_init(&iov_iter, READ, &vq->iov[out], in, iov_len);
    +payload_len = pkt->len - pkt->off;
    +/* If the packet is greater than the space available in the
    + * buffer, we split it using multiple buffers.
    + */
    +if (payload_len > iov_len - sizeof(pkt->hdr))


payload_len = iov_len - offsetof(pkt->hdr);
+ /* Set the correct length in the header */
+ pkt->hdr.len = cpu_to_le32(payload_len);

nbytes = copy_to_iter(pkt->hdr, sizeof(pkt->hdr), &iov_iter);
if (nbytes != sizeof(pkt->hdr)) {
    @ @ -156,33 +174,48 @ @
    break;
}
}

-nbytes = copy_to_iter(pkt->buf, pkt->len, &iov_iter);
-if (nbytes != pkt->len) {
+nbytes = copy_to_iter(pkt->buf + pkt->off, payload_len,
+     &iov_iter);
+if (nbytes != payload_len) {
    virtio_transport_free_pkt(pkt);
    vq_err(vq, "Faulted on copying pkt buf\n");
    break;
}
}

-vhost_add_used(vq, head, sizeof(pkt->hdr) + pkt->len);
-added = true;
-
-if (pkt->reply) {
-int val;
+ /* Deliver to monitoring devices all packets that we
+  * will transmit.
+  */
+virtio_transport_deliver_tap_pkt(pkt);

-val = atomic_dec_return(&vsock->queued_replies);
+vhost_add_used(vq, head, sizeof(pkt->hdr) + payload_len);
+added = true;

-/* Do we have resources to resume tx processing? */
-if (val + 1 == tx_vq->num)
-restart_tx = true;
-}
+pkt->off += payload_len;
+total_len += payload_len;

-/* Deliver to monitoring devices all correctly transmitted
- * packets.
+/* If we didn't send all the payload we can requeue the packet
+ * to send it with the next available buffer.
+*/
-virtio_transport_deliver_tap_pkt(pkt);
+ if (pkt->off < pkt->len) {
+ spin_lock_bh(&vsock->send_pkt_list_lock);
+ list_add(&pkt->list, &vsock->send_pkt_list);
+ spin_unlock_bh(&vsock->send_pkt_list_lock);
+ } else {
+ if (pkt->reply) {
+ int val;
+ + val = atomic_dec_return(&vsock->queued_replies);
+ + /* Do we have resources to resume tx
+ * processing?
+ */
+ + if (val + 1 == tx_vq->num)
+ + restart_tx = true;
+ + }
+ virtio_transport_free_pkt(pkt);
+ }
+ virtio_transport_free_pkt(pkt);
+ } while(likely(!vhost_exceeds_weight(vq, ++pkts, total_len)));
if (added)
vhost_signal(&vsock->dev, vq);

@@ -210,9 +243,12 @@
struct vhost_vsock *vsock;
int len = pkt->len;
+rcu_read_lock();
+
/* Find the vhost_vsock according to guest context id */
vsock = vhost_vsock_get(le64_to_cpu(pkt->hdr.dst_cid));
if (!vsock) {
+rcu_read_unlock();
virtio_transport_free_pkt(pkt);
return -ENODEV;
}
@@ -225,6 +261,8 @@
spin_unlock_bh(&vsock->send_pkt_list_lock);

vhost_work_queue(&vsock->dev, &vsock->send_pkt_work);
+
+rcu_read_unlock();
return len;
}

@@ -234,12 +272,15 @@
struct vhost_vsock *vsock;
struct virtio_vsock_pkt *pkt, *n;
int cnt = 0;
+int ret = -ENODEV;
LIST_HEAD(freeme);

+rcu_read_lock();
+
/* Find the vhost_vsock according to guest context id */
vsock = vhost_vsock_get(vsk->remote_addr.svm_cid);
if (!vsock)
-    return -ENODEV;
+    goto out;
+rcu_read_unlock();

spin_lock_bh(&vsock->send_pkt_list_lock);
list_for_each_entry_safe(pkt, n, &vsock->send_pkt_list, list) {
    vhost_poll_queue(&tx_vq->poll);
}

-out:

static struct virtio_vsock_pkt *
@@ -339,6 +383,52 @@
    return val < vq->num;
}

+static struct virtio_transport vhost_transport = {
+    .transport = {
+        .get_local_cid = vhost_transport_get_local_cid,
+        .init = virtio_transport_do_socket_init,
+        .destructor = virtio_transport_destruct,
+        .release = virtio_transport_release,
+        .connect = virtio_transport_connect,
+        .shutdown = virtio_transport_shutdown,
+        .cancel_pkt = vhost_transport_cancel_pkt,
+        .dgram_enqueue = virtio_transport_dgram_enqueue,
+        .dgram_dequeue = virtio_transport_dgram_dequeue,
+        .dgram_bind = virtio_transport_dgram_bind,
+        .dgram_allow = virtio_transport_dgram_allow,
+    }

-return 0;
+ret = 0;
+out:
+rcu_read_unlock();
+return ret;

}
+ .stream_enqueue = virtio_transport_stream_enqueue,
+ .stream_dequeue = virtio_transport_stream_dequeue,
+ .stream_has_data = virtio_transport_stream_has_data,
+ .stream_has_space = virtio_transport_stream_has_space,
+ .stream_rcvhiwat = virtio_transport_stream_rcvhiwat,
+ .stream_is_active = virtio_transport_stream_is_active,
+ .stream_allow = virtio_transport_stream_allow,
+
+ .notify_poll_in = virtio_transport_notify_poll_in,
+ .notify_poll_out = virtio_transport_notify_poll_out,
+ .notify_recv_init = virtio_transport_notify_recv_init,
+ .notify_recv_pre_block = virtio_transport_notify_recv_pre_block,
+ .notify_recv_pre_dequeue = virtio_transport_notify_recv_pre_dequeue,
+ .notify_recv_post_dequeue = virtio_transport_notify_recv_post_dequeue,
+ .notify_send_init = virtio_transport_notify_send_init,
+ .notify_send_pre_block = virtio_transport_notify_send_pre_block,
+ .notify_send_pre_enqueue = virtio_transport_notify_send_pre_enqueue,
+ .notify_send_post_enqueue = virtio_transport_notify_send_post_enqueue,
+
+ .set_buffer_size = virtio_transport_set_buffer_size,
+ .set_min_buffer_size = virtio_transport_set_min_buffer_size,
+ .set_max_buffer_size = virtio_transport_set_max_buffer_size,
+ .get_buffer_size = virtio_transport_get_buffer_size,
+ .get_min_buffer_size = virtio_transport_get_min_buffer_size,
+ .get_max_buffer_size = virtio_transport_get_max_buffer_size,
+
+ .send_pkt = vhost_transport_send_pkt,
+
static void vhost_vsock_handle_tx_kick(struct vhost_work *work)
{
    struct vhost_virtqueue *vq = container_of(work, struct vhost_virtqueue,
    dev);
    struct vhost_vsock *vsock = container_of(vq->dev, struct vhost_vsock,
    dev);
    struct virtio_vsock_pkt *pkt;
    int head;
    int head, pkts = 0, total_len = 0;
    unsigned int out, in;
    bool added = false;

    goto out;
}

vhost_disable_notify(&vsock->dev, vq);
-for (;;) {
+do {

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u32 len;

if (!vhost_vsock_more_replies(vsock)) {
    virtio_transport_deliver_tap_pkt(pkt);

    /* Only accept correctly addressed packets */
    if (le64_to_cpu(pkt->hdr.src_cid) == vsock->guest_cid)
        virtio_transport_recv_pkt(pkt);
    +if (le64_to_cpu(pkt->hdr.src_cid) == vsock->guest_cid &&
        le64_to_cpu(pkt->hdr.dst_cid) ==
        vhost_transport_get_local_cid())
        virtio_transport_recv_pkt(&vhost_transport, pkt);
    else
        virtio_transport_free_pkt(pkt);

    -vhost_add_used(vq, head, sizeof(pkt->hdr) + len);
    +len += sizeof(pkt->hdr);
    +vhost_add_used(vq, head, len);
    +total_len += len;
    added = true;

} while(likely(!vhost_exceeds_weight(vq, ++pkts, total_len)));

no_more_replies:
if (added)
    mutex_unlock(&vq->mutex);
}

/* Some packets may have been queued before the device was started,
 + * let's kick the send worker to send them.
 + */
+ if (added)
+     vhost_work_queue(&vsock->dev, &vsock->send_pkt_work);
+ mutex_unlock(&vsock->dev.mutex);
return 0;

vsock->vqs[VSOCK_VQ_TX].handle_kick = vhost_vsock_handle_tx_kick;
vsock->vqs[VSOCK_VQ_RX].handle_kick = vhost_vsock_handle_rx_kick;

-vhost_dev_init(&vsock->dev, vqs, ARRAY_SIZE(vsock->vqs));
+ vhost_dev_init(&vsock->dev, vqs, ARRAY_SIZE(vsock->vqs),
+     VHOST_VSOCK_PKT_WEIGHT, VHOST_VSOCK_WEIGHT);

file->private_data = vsock;
spin_lock_init(&vsock->send_pkt_list_lock);
INIT_LIST_HEAD(&vsock->send_pkt_list);
vhost_work_init(&vsock->send_pkt_work, vhost_transport_send_pkt_work);
-
- spin_lock_bh(&vhost_vsock_lock);
- list_add_tail(&vsock->list, &vhost_vsock_list);
- spin_unlock_bh(&vhost_vsock_lock);
return 0;

out:
@@ -563,13 +659,21 @@
 * executing.
 */

 -if (!vhost_vsock_get(vsk->remote_addr.svm_cid)) {
- sock_set_flag(sk, SOCK_DONE);
- vsk->peer_shutdown = SHUTDOWN_MASK;
- sk->sk_state = SS_UNCONNECTED;
- sk->sk_err = ECONNRESET;
- sk->sk_error_report(sk);
- }
+ /* If the peer is still valid, no need to reset connection */
+ if (vhost_vsock_get(vsk->remote_addr.svm_cid))
+ return;
+ /* If the close timeout is pending, let it expire. This avoids races
+ * with the timeout callback.
+ */
+ if (vsk->close_work_scheduled)
+ return;
+ sock_set_flag(sk, SOCK_DONE);
+ vsk->peer_shutdown = SHUTDOWN_MASK;
+ sk->sk_state = SS_UNCONNECTED;
+ sk->sk_err = ECONNRESET;
+ sk->sk_error_report(sk);
}

static int vhost_vsock_dev_release(struct inode *inode, struct file *file)
@@ -577,9 +681,13 @@
 struct vhost_vsock *vsock = file->private_data;

 spin_lock_bh(&vhost_vsock_lock);
- list_del(&vsock->list);
+ if (vsock->guest_cid)
+ hash_del_rcu(&vsock->hash);
 spin_unlock_bh(&vhost_vsock_lock);

+ /* Wait for other CPUs to finish using vsock */
/* Iterating over all connections for all CIDs to find orphans is  
* inefficient. Room for improvement here. */
vsock_for_each_connected_socket(vhost_vsock_reset_orphans);

/* Refuse if CID is already in use */
spin_lock_bh(&vhost_vsock_lock);
other = vhost_vsock_get(guest_cid);
if (other && other != vsock) {
    spin_unlock_bh(&vhost_vsock_lock);
    return -EADDRINUSE;
}

vsock->guest_cid = guest_cid;
hash_add_rcu(vhost_vsock_hash, &vsock->hash, vsock->guest_cid);
spin_unlock_bh(&vhost_vsock_lock);

return 0;

- static struct virtio_transport vhost_transport = {
  .transport = {
    .get_local_cid = vhost_transport_get_local_cid,
    .init = virtio_transport_do_socket_init,
    .destructor = virtio_transport_destruct,
    .release = virtio_transport_release,
    .connect = virtio_transport_connect,
    .shutdown = virtio_transport_shutdown,
    .cancel_pkt = vhost_transport_cancel_pkt,
    
    .dgram_enqueue = virtio_transport_dgram_enqueue,
    .dgram_dequeue = virtio_transport_dgram_dequeue,
    .dgram_bind = virtio_transport_dgram_bind,
    .dgram_allow = virtio_transport_dgram_allow,
    
    .stream_enqueue = virtio_transport_stream_enqueue,
    .stream_dequeue = virtio_transport_stream_dequeue,
    .stream_has_data = virtio_transport_stream_has_data,
    .stream_has_space = virtio_transport_stream_has_space,
  }
};
- .stream_rcvhivat = virtio_transport_stream_rcvhivat,
- .stream_is_active = virtio_transport_stream_is_active,
- .stream_allow = virtio_transport_stream_allow,
- .notify_poll_in = virtio_transport_notify_poll_in,
- .notify_poll_out = virtio_transport_notify_poll_out,
- .notify_recv_init = virtio_transport_notify_recv_init,
- .notify_recv_pre_block = virtio_transport_notify_recv_pre_block,
- .notify_recv_pre_dequeue = virtio_transport_notify_recv_pre_dequeue,
- .notify_recv_post_dequeue = virtio_transport_notify_recv_post_dequeue,
- .notify_send_init = virtio_transport_notify_send_init,
- .notify_send_pre_block = virtio_transport_notify_send_pre_block,
- .notify_send_pre_enqueue = virtio_transport_notify_send_pre_enqueue,
- .notify_send_post_enqueue = virtio_transport_notify_send_post_enqueue,
- .set_buffer_size = virtio_transport_set_buffer_size,
- .set_min_buffer_size = virtio_transport_set_min_buffer_size,
- .set_max_buffer_size = virtio_transport_set_max_buffer_size,
- .get_buffer_size = virtio_transport_get_buffer_size,
- .get_min_buffer_size = virtio_transport_get_min_buffer_size,
- .get_max_buffer_size = virtio_transport_get_max_buffer_size,
-
-
- .send_pkt = vhost_transport_send_pkt,
- };
-
-
static int __init vhost_vsock_init(void)
{
  int ret;

  --- linux-4.15.0.orig/drivers/video/backlight/as3711_bl.c
  +++ linux-4.15.0/drivers/video/backlight/as3711_bl.c
  @@ -262,10 +262,10 @@
  static int as3711_backlight_parse_dt(struct device *dev)
  {
    struct as3711_bl_pdata *pdata = dev_get_platdata(dev);
-    struct device_node *bl =
-        of_find_node_by_name(dev->parent->of_node, "backlight"), *fb;
+    struct device_node *bl, *fb;
    int ret;

    +bl = of_get_child_by_name(dev->parent->of_node, "backlight");
    if (!bl) {
      dev_dbg(dev, "backlight node not found\n");
      return -ENODEV;
    } @ @ -279,7 +279,7 @@
    if (pdata->su1_max_uA <= 0)
      ret = -EINVAL;
    if (ret < 0)
+return ret;
+goto err_put_bl;
}

fb = of_parse_phandle(bl, "su2-dev", 0);
@@ -292,7 +292,7 @@
if (pdata->su2_max_uA <= 0)
 ret = -EINVAL;
if (ret < 0)
-+return ret;
+goto err_put_bl;
if (of_find_property(bl, "su2-feedback-voltage", NULL)) {
    pdata->su2_feedback = AS3711_SU2_VOLTAGE;
@@ -314,8 +314,10 @@
    pdata->su2_feedback = AS3711_SU2_CURR_AUTO;
    count++;
    -if (count != 1)
    +ret = -EINVAL;
    +goto err_put_bl;
    +}
    -if (count != 1)
    +return -EINVAL;
    +goto err_put_bl;
}

count = 0;
if (of_find_property(bl, "su2-fbprot-lx-sd4", NULL)) {
@@ -334,8 +336,10 @@
    pdata->su2_fbprot = AS3711_SU2_GPIO4;
    count++;
    -if (count != 1)
    +ret = -EINVAL;
    +goto err_put_bl;
    +}
    -if (count != 1)
    +return -EINVAL;
    +goto err_put_bl;
}

count = 0;
if (of_find_property(bl, "su2-auto-curr1", NULL)) {
@@ -355,11 +359,20 @@
    * At least one su2-auto-curr* must be specified iff
    * AS3711_SU2_CURR_AUTO is used
    */
    -if (!count ^ (pdata->su2_feedback != AS3711_SU2_CURR_AUTO))
    -return -EINVAL;
    +ret = -EINVAL;
    +goto err_put_bl;
    +}
    -if (!count ^ (pdata->su2_feedback != AS3711_SU2_CURR_AUTO))
    +return -EINVAL;
    +ret = -EINVAL;
+goto err_put_bl;
+
}

+of_node_put(bl);
+
return 0;
+
+err_put_bl:
+of_node_put(bl);
+
+return ret;
}

static int as3711_backlight_probe(struct platform_device *pdev)
--- linux-4.15.0.orig/drivers/video/backlight/corgi_lcd.c
+++ linux-4.15.0/drivers/video/backlight/corgi_lcd.c
@@ -177,7 +177,7 @@
    struct spi_message msg;
    struct spi_transfer xfer = {
        .len = 1,
-        .cs_change = 1,
+        .cs_change = 0,
        .tx_buf = lcd->buf,
    };

--- linux-4.15.0.orig/drivers/video/backlight/lm3630a_bl.c
+++ linux-4.15.0/drivers/video/backlight/lm3630a_bl.c
@@ -184,7 +184,7 @@
    if ((pwm_ctrl & LM3630A_PWM_BANK_A) != 0) {
        lm3630a_pwm_ctrl(pchip, bl->props.brightness,
-            bl->props.max_brightness);
+            return 0;
        -return bl->props.brightness;
        +return 0;
    }

    /* disable sleep */
@@ -201,11 +201,11 @@
        LM3630A_LEDA_ENABLE, LM3630A_LEDA_ENABLE);
    if (ret < 0)
        goto out_i2c_err;
-    return bl->props.brightness;
+    return 0;

    out_i2c_err:
-    -dev_err(pchip->dev, "i2c failed to access\n");
-    -return bl->props.brightness;
+    dev_err(pchip->dev, "i2c failed to access (%pe)\n", ERR_PTR(ret));
static int lm3630a_bank_a_get_brightness(struct backlight_device *bl)
{  /* disable sleep */
    regmap_write(pchip->regmap, REG_ENABLE, 0x00);
    if (ret < 0) {
        goto out_i2c_err;
        -return bl->props.brightness;
    +return 0;
    }

    if (&pchip->cdev_torch)
        led_classdev_unregister(&pchip->cdev_torch);
    if (&pchip->cdev_flash)
        led_classdev_unregister(&pchip->cdev_flash);
    if (pchip->bled)
        device_remove_file(&pchip->bled->dev, &dev_attr_bled_mode);
    return 0;

    if (!pwm_ctrl & LM3630A_PWM_BANK_B) goto end;
    lm3630a_pwm_ctrl(pchip, bl->props.brightness,
        bl->props.max_brightness);
    -return bl->props.brightness;
    +return 0;
}

static int lm3630a_bank_b_get_brightness(struct backlight_device *bl)
{  /* disable sleep */
    regmap_write(pchip->regmap, REG_ENABLE, 0x00);
    if (ret < 0) {
        goto out_i2c_err;
        -return bl->props.brightness;
    +return 0;
    }

    if (&pchip->cdev_torch)
        led_classdev_unregister(&pchip->cdev_torch);
    if (&pchip->cdev_flash)
        led_classdev_unregister(&pchip->cdev_flash);
    if (pchip->bled)
        device_remove_file(&pchip->bled->dev, &dev_attr_bled_mode);
    return 0;

    if (pwm_ctrl & LM3630A_PWM_BANK_B) {
        lm3630a_pwm_ctrl(pchip, bl->props.brightness,
            bl->props.max_brightness);
        -return bl->props.brightness;
        +return 0;
    }

    if (!pwm_ctrl & LM3630A_PWM_BANK_B) goto end;
    lm3630a_pwm_ctrl(pchip, bl->props.brightness,
        bl->props.max_brightness);
    -return bl->props.brightness;
    +return 0;
}

out_i2c_err:
    dev_err(pchip->dev, "i2c failed to access REG_CTRL\n");
    -return bl->props.brightness;
    +return ret;
}

--- linux-4.15.0.orig/drivers/video/backlight/lm3639_bl.c
+++ linux-4.15.0/drivers/video/backlight/lm3639_bl.c
@@ -400,10 +400,8 @@
    if (pchip->bled)
        device_remove_file(&pchip->bled->dev, &dev_attr_bled_mode);
    return 0;
-  --- linux-4.15.0.orig/drivers/video/backlight/lp855x_bl.c
+  +++ linux-4.15.0/drivers/video/backlight/lp855x_bl.c
@@ -460,7 +460,7 @@
    ret = regulator_enable(lp->enable);
    if (ret < 0) {  

dev_err(lp->dev, "failed to enable vddio: %d\n", ret);
-return ret;
+goto disable_supply;
}

/*
@@ -475,24 +475,34 @@
ret = lp855x_configure(lp);
if (ret) {
    dev_err(lp->dev, "device config err: %d", ret);
    -return ret;
    +goto disable_vddio;
}

ret = lp855x_backlight_register(lp);
if (ret) {
    dev_err(lp->dev, "failed to register backlight. err: %d\n", ret);
    -return ret;
    +goto disable_vddio;
}

ret = sysfs_create_group(&lp->dev->kobj, &lp855x_attr_group);
if (ret) {
    dev_err(lp->dev, "failed to register sysfs. err: %d\n", ret);
    -return ret;
    +goto disable_vddio;
}

backlight_update_status(lp->bl);
+
+return 0;
+
+disable_vddio:
+if (lp->enable)
+    regulator_disable(lp->enable);
+disable_supply:
+if (lp->supply)
+    regulator_disable(lp->supply);
+
+return ret;
}

static int lp855x_remove(struct i2c_client *cl)
@@ -501,6 +511,8 @@
lp->bl->props.brightness = 0;
backlight_update_status(lp->bl);
+if (lp->enable)
+regulator_disable(lp->enable);
if (lp->supply)
regulator_disable(lp->supply);
sysfs_remove_group(&lp->dev->kobj, &lp855x_attr_group);
--- linux-4.15.0.orig/drivers/video/backlight/max8925_bl.c
+++ linux-4.15.0/drivers/video/backlight/max8925_bl.c
@@ -116,7 +116,7 @@
if (!pdata)
return;

-np = of_find_node_by_name(nproot, "backlight");
+np = of_get_child_by_name(nproot, "backlight");
if (!np) {
  dev_err(&pdev->dev, "failed to find backlight node\n");
  return;
@@ -125,6 +125,8 @@
  if (!of_property_read_u32(np, "maxim,max8925-dual-string", &val))
pdata->dual_string = val;

+of_node_put(np);
+
pdev->dev.platform_data = pdata;
}

--- linux-4.15.0.orig/drivers/video/backlight/pwm_bl.c
+++ linux-4.15.0/drivers/video/backlight/pwm_bl.c
@@ -54,10 +54,11 @@
  if (err < 0)
    dev_err(pb->dev, "failed to enable power supply\n");

+pwm_enable(pb->pwm);
+
  if (pb->enable_gpio)
    gpiod_set_value_cansleep(pb->enable_gpio, 1);

-pwm_enable(pb->pwm);
pb->enabled = true;
}
@@ -66,12 +67,12 @@
  if (!pb->enabled)
    return;

-pwm_config(pb->pwm, 0, pb->period);
-pwm_disable(pb->pwm);
-
gpiod_set_value_cansleep(pb->enable_gpio, 0);

+pwm_config(pb->pwm, 0, pb->period);
+pwm_disable(pb->pwm);
+
regulator_disable(pb->power_supply);
pb->enabled = false;
}

static int pwm_backlight_initial_power_state(const struct pwm_bl_data *pb)
{
    struct device_node *node = pb->dev->of_node;
    bool active = true;
    /*
     * If the enable GPIO is present, observable (either as input
     * or output) and off then the backlight is not currently active.
     * */
    if (pb->enable_gpio && gpiod_get_value_cansleep(pb->enable_gpio) == 0)
        active = false;
    /*
     * Do not change pb->enabled here! pb->enabled essentially
     * tells us if we own one of the regulator's use counts and
     * right now we do not.
     * */

    /* Not booted with device tree or no phandle link to the node */
    if (!node || !node->phandle)
        /* assume that another driver will enable the backlight at the
         * appropriate time. Therefore, if it is disabled, keep it so.
         */
        /*
         * if the enable GPIO is disabled, do not enable the backlight */

if (pb->enable_gpio && gpiod_get_value(pb->enable_gpio) == 0)
return FB_BLANK_POWERDOWN;
-
/* The regulator is disabled, do not enable the backlight */
if (!regulator_is_enabled(pb->power_supply))
return FB_BLANK_POWERDOWN;
-
/* The PWM is disabled, keep it like this */
if (!pwm_is_enabled(pb->pwm))
return FB_BLANK_POWERDOWN;
-
return FB_BLANK_UNBLANK;
+return active ? FB_BLANK_UNBLANK : FB_BLANK_POWERDOWN;
}

static int pwm_backlight_probe(struct platform_device *pdev)
@@ -299,18 +314,6 @@
pb->enable_gpio = gpio_to_desc(data->enable_gpio);
}
-
/*
 * If the GPIO is not known to be already configured as output, that
 * is, if gpiod_get_direction returns either GPIOF_DIR_IN or -EINVAL,
 * change the direction to output and set the GPIO as active.
 * Do not force the GPIO to active when it was already output as it
 * could cause backlight flickering or we would enable the backlight too
 * early. Leave the decision of the initial backlight state for later.
 */
-
-if (pb->enable_gpio &&
- gpiod_get_direction(pb->enable_gpio) != GPIOF_DIR_OUT)
- gpiod_direction_output(pb->enable_gpio, 1);
-
pb->power_supply = devm_regulator_get(&pdev->dev, "power");
if (IS_ERR(pb->power_supply)) {
 ret = PTR_ERR(pb->power_supply);
--- linux-4.15.0.orig/drivers/video/backlight/sky81452-backlight.c
+++ linux-4.15.0/drivers/video/backlight/sky81452-backlight.c
@@ -207,6 +207,7 @@
num_entry);
if (ret < 0) {
 dev_err(dev, "led-sources node is invalid.\n");
+of_node_put(np);
 return ERR_PTR(-EINVAL);
 }
--- linux-4.15.0.orig/drivers/video/backlight/tdo24m.c
+++ linux-4.15.0/drivers/video/backlight/tdo24m.c
@@ -369,7 +369,7 @@
spi_message_init(m);

-x->cs_change = 1;
+x->cs_change = 0;

x->tx_buf = &lcd->buf[0];

--- linux-4.15.0.orig/drivers/video/backlight/tosa_lcd.c
+++ linux-4.15.0/drivers/video/backlight/tosa_lcd.c
@@ -49,7 +49,7 @@
 struct spi_message msg;
 struct spi_transfer xfer = {
     .len= 1,
-    .cs_change= 1,
+    .cs_change= 0,
     .tx_buf= buf,
     
};

--- linux-4.15.0.orig/drivers/video/backlight/tps65217_bl.c
+++ linux-4.15.0/drivers/video/backlight/tps65217_bl.c
@@ -184,11 +184,11 @@
tps65217_bl_parse_dt(struct platform_device *pdev)
 |
 struct tps65217 *tps = dev_get_drvdata(pdev->dev.parent);
-struct device_node *node = of_node_get(tps->dev->of_node);
+struct device_node *node;
 struct tps65217_bl_pdata *pdata, *err;
 u32 val;

-node = of_find_node_by_name(node, "backlight");
+node = of_get_child_by_name(tps->dev->of_node, "backlight");
 if (!node)
     return ERR_PTR(-ENODEV);

--- linux-4.15.0.orig/drivers/video/console/Kconfig
+++ linux-4.15.0/drivers/video/console/Kconfig
@@ -22,52 +22,6 @@
 Say Y.

-config VGACON_SOFT_SCROLLBACK
-    bool "Enable Scrollback Buffer in System RAM"
-    depends on VGA_CONSOLE
-    default n
-    help
-    The scrollback buffer of the standard VGA console is located in
- the VGA RAM. The size of this RAM is fixed and is quite small.
- If you require a larger scrollback buffer, this can be placed in System RAM which is dynamically allocated during initialization.
- Placing the scrollback buffer in System RAM will slightly slow the console.
- If you want this feature, say 'Y' here and enter the amount of RAM to allocate for this buffer. If unsure, say 'N'.

-config VGACON_SOFT_SCROLLBACK_SIZE
  - int "Scrollback Buffer Size (in KB)"
  - depends on VGACON_SOFT_SCROLLBACK
  - range 1 1024
  - default "64"
  - help
  - Enter the amount of System RAM to allocate for scrollback buffers of VGA consoles. Each 64KB will give you approximately 16 80x25 screenfuls of scrollback buffer.

-config VGACON_SOFT_SCROLLBACK_PERSISTENT_ENABLE_BY_DEFAULT
  -bool "Persistent Scrollback History for each console by default"
  -depends on VGACON_SOFT_SCROLLBACK
  -default n
  -help
  - Say Y here if the scrollback history should persist by default when switching between consoles. Otherwise, the scrollback history will be flushed each time the console is switched. This feature can also be enabled using the boot command line parameter 'vgacon.scrollback_persistent=1'.
  - This feature might break your tool of choice to flush the scrollback buffer, e.g. clear(1) will work fine but Debian's clear_console(1) will be broken, which might cause security issues.
  - You can use the escape sequence \e[3J instead if this feature is activated.
  - Note that a buffer of VGACON_SOFT_SCROLLBACK_SIZE is taken for each created tty device.
  - So if you use a RAM-constrained system, say N here.

-config MDA_CONSOLE
  -depends on !M68K && !PARISC && ISA
  -tristate "MDA text console (dual-headed)"
  --- linux-4.15.0.orig/drivers/video-console/dummycon.c
  +++ linux-4.15.0/drivers/video/console/dummycon.c
  @ @ -67,7 +67,6 @ @
     .con_switch =DUMMY,
     .con_blank =DUMMY,
     .con_font_set =DUMMY,
- .con_font_get = DUMMY,
  .con_font_default = DUMMY,
  .con_font_copy = DUMMY,
};
--- linux-4.15.0.orig/drivers/video/console/newport_con.c
+++ linux-4.15.0/drivers/video/console/newport_con.c
@@ -31,17 +31,14 @@
#include <linux/linux_logo.h>
#include <linux/font.h>
-#define FONT_DATA ((unsigned char *)font_vga_8x16.data)
+#define NEWPORT_LEN 0x10000

/* borrowed from fbcon.c */
-#define REFCOUNT(fd)(((int *)(fd))[-1])
-#define FNTSIZE(fd)(((int *)(fd))[-2])
-#define FNTCHARCNT(fd)(((int *)(fd))[-3])
-#define FONT_EXTRA_WORDS 3
+#define FONT_DATA ((unsigned char *)font_vga_8x16.data)

static unsigned char *font_data[MAX_NR_CONSOLES];

static struct newport_regs *npregs;
static unsigned long newport_addr;
static int logo_active;
static int topscan;
@@ -519,6 +516,7 @@
FNTSIZE(new_data) = size;
FNTCHARCNT(new_data) = op->charcount;
REFCOUNT(new_data) = 0;/* usage counter */
+FNTSUM(new_data) = 0;
    p = new_data;
    for (i = 0; i < op->charcount; i++) {
        FNTSUM(new_data) = 0;
@@ -701,7 +699,6 @@
static int newport_probe(struct gio_device *dev,
    const struct gio_device_id *id)
{
-    unsigned long newport_addr;
    int err;

    if (!dev->resource.start)
        return -EBUSY; /* we only support one Newport as console */

    newport_addr = dev->resource.start + 0xF0000;
    -if (!request_mem_region(newport_addr, 0x10000, "Newport"))
+if (!request_mem_region(newport_addr, NEWPORT_LEN, "Newport"))
return -ENODEV;

npregs = (struct newport_regs *)/* ioremap cannot fail */
@@ -719,6 +716,11 @@
console_lock();
err = do_take_over_console(&newport_con, 0, MAX_NR_CONSOLES - 1, 1);
console_unlock();
+
+if (err) {
+iounmap((void *)npregs);
+release_mem_region(newport_addr, NEWPORT_LEN);
+}
return err;
}

@@ -726,6 +728,7 @@
{
give_up_console(&newport_con);
iounmap((void *)npregs);
+release_mem_region(newport_addr, NEWPORT_LEN);
}

static struct gio_device_id newport_ids[] = {
--- linux-4.15.0.orig/drivers/video/console/vgacon.c
+++ linux-4.15.0/drivers/video/console/vgacon.c
@@ -160,209 +160,6 @@
write_vga(12, (c->vc_visible_origin - vga_vram_base) / 2);
}

-#ifdef CONFIG_VGACON_SOFT_SCROLLBACK
-/* software scrollback */
-struct vgacon_scrollback_info {
-void *data;
-int tail;
-int size;
-int rows;
-int cnt;
-int cur;
-int save;
-int restore;
-};
-
-static struct vgaconscrollback_info *vgaconscrollback_cur;
-static struct vgaconscrollback_info vgaconscrollbacks[MAX_NR_CONSOLES];
-static bool scrollback_persistent = 1
-#IS_ENABLED(CONFIG_VGACON_SOFT_SCROLLBACK_PERSISTENT_ENABLE_BY_DEFAULT);
-module_param_named(scrollback_persistent, scrollback_persistent, bool, 0000);
-MODULE_PARM_DESC(scrollback_persistent, "Enable persistent scrollback for all vga consoles");
-
-static void vgacon_scrollback_reset(int vc_num, size_t reset_size)
-{
-struct vgacon_scrollback_info *scrollback = &vgacon_scrollbacks[vc_num];
-
-if (scrollback->data && reset_size > 0)
-memset(scrollback->data, 0, reset_size);
-
-scrollback->cnt = 0;
-scrollback->tail = 0;
-scrollback->cur = 0;
-}
-
-static void vgacon_scrollback_init(int vc_num)
-{
-int pitch = vga_video_num_columns * 2;
-size_t size = CONFIG_VGACON_SOFT_SCROLLBACK_SIZE * 1024;
-int rows = size / pitch;
-void *data;
-
-data = kmalloc_array(CONFIG_VGACON_SOFT_SCROLLBACK_SIZE, 1024, GFP_NOWAIT);
-
-vgacon_scrollbacks[vc_num].data = data;
-vgacon_scrollback_cur = &vgacon_scrollbacks[vc_num];
-
-vgacon_scrollback_cur->rows = rows - 1;
-vgacon_scrollback_cur->size = rows * pitch;
-
-vgacon_scrollback_reset(vc_num, size);
-}
-
-static void vgacon_scrollback_switch(int vc_num)
-{
-if (!scrollback_persistent)
-vc_num = 0;
-
-if (!vgacon_scrollbacks[vc_num].data) {
-vgacon_scrollback_init(vc_num);
-} else {
-if (scrollback_persistent) {
-vgacon_scrollback_cur = &vgacon_scrollbacks[vc_num];
-} else {
-size_t size = CONFIG_VGACON_SOFT_SCROLLBACK_SIZE * 1024;
-
-vgacon_scrollback_reset(vc_num, size);
-}
-\}
-\}
-
-\texttt{static void vgacon_scrollback_startup(void)}
-\{
-\texttt{vgacon_scrollback_cur = &vgacon_scrollbacks[0];}
-\texttt{vgacon_scrollback_init(0);}
-\}
-
-\texttt{static void vgacon_scrollback_update(struct vc \_data \*c, int t, int count)}
-\{
-\texttt{void \*p;}
-
-\texttt{if (!vgacon_scrollback_cur->data || !vgacon_scrollback_cur->size ||}
-\texttt{c->vc\_num != fg\_console)}
-\texttt{return;}
-
-\texttt{p = (void \*) (c->vc\_origin + t \* c->vc\_size\_row);} 
-
-\texttt{while (count--) \{}
-\texttt{scr\_memcpyw(vgacon_scrollback_cur->data +}
-\texttt{vgacon_scrollback_cur->tail,}
-\texttt{p, c->vc\_size\_row);} 
-
-\texttt{vgacon_scrollback_cur->cnt++;
-\texttt{p += c->vc\_size\_row;}
-\texttt{vgacon_scrollback_cur->tail += c->vc\_size\_row;}}
-
-\texttt{if (vgacon_scrollback_cur->tail \geq vgacon_scrollback_cur->size)}
-\texttt{vgacon_scrollback_cur->tail = 0;}
-
-\texttt{if (vgacon_scrollback_cur->cnt > vgacon_scrollback_cur->rows)}
-\texttt{vgacon_scrollback_cur->cnt = vgacon_scrollback_cur->rows;}
-
-\texttt{vgacon_scrollback_cur->cur = vgacon_scrollback_cur->cnt;}
-\}
-\}
-
-\texttt{static void vgacon_restore_screen(struct vc \_data \*c)}
-\{
-\texttt{vgacon_scrollback_cur->save = 0;}
-
-\texttt{if (!vga\_is\_gfx && !vgacon_scrollback_cur->restore) \{}
-\texttt{scr\_memcpyw((u16 \*) c->vc\_origin, (u16 \*) c->vc\_screenbuf,}
-\texttt{c->vc\_screenbuf\_size > vga\_vram\_size ?}
-\texttt{vga\_vram\_size : c->vc\_screenbuf\_size);}
-\texttt{vgacon_scrollback_cur->restore = 1;}
-\texttt{vgacon_scrollback_cur->cur = vgacon_scrollback_cur->cnt;}
static void vgacon_scrolldelta(struct vc_data *c, int lines)
{
  int start, end, count, soff;

  if (!lines) {
    c->vc_visible_origin = c->vc_origin;
    vga_set_mem_top(c);
    return;
  }

  if (!vgacon_scrollback_cur->data)
    return;

  if (!vgacon_scrollback_cur->save) {
    vgacon_cursor(c, CM_ERASE);
    vgacon_save_screen(c);
    vgacon_scrollback_cur->save = 1;
  }

  vgacon_scrollback_cur->restore = 0;
  start = vgacon_scrollback_cur->cur + lines;
  end = start + abs(lines);

  if (start < 0)
    start = 0;

  if (start > vgacon_scrollback_cur->cnt)
    start = vgacon_scrollback_cur->cnt;

  if (end < 0)
    end = 0;

  if (end > vgacon_scrollback_cur->cnt)
    end = vgacon_scrollback_cur->cnt;

  vgacon_scrollback_cur->cur = start;
  count = end - start;
  soff = vgacon_scrollback_cur->tail -
        ((vgacon_scrollback_cur->cnt - end) * c->vc_size_row);
  soff -= count * c->vc_size_row;

  if (soff < 0)
    soff += vgacon_scrollback_cur->size;

  count = vgacon_scrollback_cur->cnt - start;
- if (count > c->vc_rows)
  count = c->vc_rows;
-
- if (count) {
  int copysize;
-
  int diff = c->vc_rows - count;
  void *d = (void *) c->vc_origin;
  void *s = (void *) c->vc_screenbuf;
-
  count *= c->vc_size_row;
/* how much memory to end of buffer left? */
  copysize = min(count, vgacon_scrollback_cur->size - soff);
  scr_memcpyw(d, vgacon_scrollback_cur->data + soff, copysize);
  d += copysize;
  count -= copysize;
-
  if (count) {
    scr_memcpyw(d, vgacon_scrollback_cur->data, count);
    d += count;
  }
-
  if (diff)
    scr_memcpyw(d, s, diff * c->vc_size_row);
} else
  vgacon_cursor(c, CM_MOVE);
-
static void vgacon_flush_scrollback(struct vc_data *c)
{
  size_t size = CONFIG_VGACON_SOFT_SCROLLBACK_SIZE * 1024;
-
  vgacon_scrollback_reset(c->vc_num, size);
-
  #else
  #define vgacon_scrollback_startup(...) do { } while (0)
  #define vgacon_scrollback_init(...) do { } while (0)
  #define vgacon_scrollback_update(...) do { } while (0)
  #define vgacon_scrollback_switch(...) do { } while (0)
-
  static void vgacon_restore_screen(struct vc_data *c)
  {
    if (c->vc_origin != c->vc_visible_origin)
      @ @ -376.11 +173.6 @@
      vga_set_mem_top(c);
  }

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static void vgacon_flush_scrollback(struct vc_data *c) {
 -
 -
 #endif /* CONFIG_VGACON_SOFT_SCROLLBACK */
 -
 static const char *vgacon_startup(void) {
 const char *display_desc = NULL;
 @@ -422,7 +214,10 @@
 vga_video_port_val = VGA_CRT_DM;
 if ((screen_info.orig_video_ega_bx & 0xff) != 0x10) {
 static struct resource ega_console_resource =
 -  { .name = "ega", .start = 0x3B0, .end = 0x3BF };
 +  { .name = "ega",
 +    .flags = IORESOURCE_IO,
 +    .start = 0x3B0,
 +    .end = 0x3BF };
 vga_video_type = VIDEO_TYPE_EGAM;
 vga_vram_size = 0x8000;
 display_desc = "EGA+";
 @@ -430,9 +225,15 @@
 &ega_console_resource);
 } else {
 static struct resource mda1_console_resource =
 -  { .name = "mda", .start = 0x3B0, .end = 0x3BB };
 +  { .name = "mda",
 +    .flags = IORESOURCE_IO,
 +    .start = 0x3B0,
 +    .end = 0x3BB };
 static struct resource mda2_console_resource =
 -  { .name = "mda", .start = 0x3BF, .end = 0x3BF };
 +  { .name = "mda",
 +    .flags = IORESOURCE_IO,
 +    .start = 0x3BF,
 +    .end = 0x3BF };
 vga_video_type = VIDEO_TYPE_MDA;
 vga_vram_size = 0x2000;
 display_desc = "*MDA";
 @@ -454,15 +255,21 @@
 vga_vram_size = 0x8000;
 if (!screen_info.orig_video_isVGA) {
 -static struct resource ega_console_resource
 -  = { .name = "ega", .start = 0x3C0, .end = 0x3DF };
 +static struct resource ega_console_resource =
 +  { .name = "ega",
 +    .flags = IORESOURCE_IO,
 +    .start = 0x3C0,
static struct resource vga_console_resource =
    { .name = "vga+",
      .flags = IORESOURCE_IO,
      .start = 0x3C0,
      .end = 0x3DF};

vga_video_type = VIDEO_TYPE_VGAC;
display_desc = "VGA+";
request_resource(&ioport_resource,
    &vga_console_resource);
c->vc_hi_font_mask = 0x0800;
@@ -705,32 +512,32 @@
switch (c->vc_cursor_type & 0x0f) {
    case CUR_UNDERLINE:
        vgacon_set_cursor_size(c->vc_x,
            - c->vc_font.height -
            - (c->vc_font.height <
                + c->vc_cell_height -
                + (c->vc_cell_height <
                    10 ? 2 : 3),
            - c->vc_font.height -
            - (c->vc_font.height <
                + c->vc_cell_height -
                + (c->vc_cell_height <
                    10 ? 1 : 2));
        break;
    case CUR_TWO_THIRDS:
        vgacon_set_cursor_size(c->vc_x,
            - c->vc_font.height / 3,
            - c->vc_font.height -
            - (c->vc_font.height <
                + c->vc_cell_height / 3,
                + c->vc_cell_height -
                + (c->vc_cell_height <
                    10 ? 1 : 2));
        break;
    case CUR_LOWER_THIRD:
        vgacon_set_cursor_size(c->vc_x,
            - (c->vc_font.height * 2) / 3,
            - c->vc_font.height -
            - (c->vc_font.height <
                + (c->vc_cell_height * 2) / 3,
                + c->vc_cell_height -
                + (c->vc_cell_height <
                    10 ? 1 : 2));
        break;
    case CUR_LOWER_HALF:
        vgacon_set_cursor_size(c->vc_x,
            - c->vc_font.height / 2,
            - c->vc_font.height -
            - (c->vc_font.height <
                + c->vc_cell_height / 2,
                + c->vc_cell_height -
                + (c->vc_cell_height <
                    10 ? 1 : 2));
        break;
    case CUR_NONE:
        @@ -741,7 +548,7 @@
break;
default:
  vgacon_set_cursor_size(c->vc_x, 1,
    c->vc_font.height);
  break;
}
break;
@@ -752,13 +559,13 @@
unsigned int width, unsigned int height)
{
  unsigned long flags;
-  unsigned int scanlines = height * c->vc_font.height;
+  unsigned int scanlines = height * c->vc_cell_height;
  u8 scanlines_lo = 0, r7 = 0, vsync_end = 0, mode, max_scan;
  raw_spin_lock_irqsave(&vga_lock, flags);

  vgacon_xres = width * VGA_FONTWIDTH;
-  vgacon_yres = height * c->vc_font.height;
+  vgacon_yres = height * c->vc_cell_height;
  if (vga_video_type >= VIDEO_TYPE_VGAC) {
    outb_p(VGA_CRTC_MAX_SCAN, vga_video_port_reg);
    max_scan = inb_p(vga_video_port_val);
    @@ -813,9 +620,9 @@
  static int vgacon_switch(struct vc_data *c)
  {
    int x = c->vc_cols * VGA_FONTWIDTH;
-    int y = c->vc_rows * c->vc_font.height;
+    int y = c->vc_rows * c->vc_cell_height;
    int rows = screen_info.orig_video_lines * vga_default_font_height/
      c->vc_font.height;
    /*
      * We need to save screen size here as it's the only way
      * we can spot the screen has been resized and we need to
      @@ -839,7 +646,6 @@
    vgacon_doresize(c, c->vc_cols, c->vc_rows);
  }

-  vgacon_scrollback_switch(c->vc_num);
  return 0; /* Redrawing not needed */
  }

@@ -1247,7 +1053,7 @@
cursor_size_lastto = 0;
c->vc_sw->con_cursor(c, CM_DRAW);
static int vgacon_resize(struct vc_data *c, unsigned int width, unsigned int height, unsigned int user)
{
    if ((width << 1) * height > vga_vram_size)
        return -EINVAL;

    if (user) {
        /* Ho ho! Someone (svgatextmode, eh?) may have reprogrammed
         * the video mode! Set the new defaults then and go away.
         */
        +*/
        +screen_info.orig_video_cols = width;
        +screen_info.orig_video_lines = height;
        +vga_default_font_height = c->vc_cell_height;
        +return 0;
        +}
    if (width % 2 || width > screen_info.orig_video_cols ||
        height > (screen_info.orig_video_lines * vga_default_font_height)/
        -c->vc_font.height)
        -/* let svgatextmode tinker with video timings and
           return success */
        -return (user) ? 0 : -EINVAL;
        +c->vc_cell_height)
        +return -EINVAL;
    }

    if (con_is_visible(c) && !vga_is_gfx) /* who knows */
    vgacon_doresize(c, width, height);

    oldo = c->vc_origin;
    delta = lines * c->vc_size_row;
    if (dir == SM_UP) {
        -vgacon_scrollback_update(c, t, lines);
        if (c->vc_scr_end + delta >= vga_vram_end) {
            scr_memcpwy((u16 *) vga_vram_base,
                        (u16 *) (oldo + delta),
                        @ -1417,7 +1233,6 @@
                        .con_save_screen = vgacon_save_screen,
                        .con_build_attr = vgacon_build_attr,
                        .con_invert_region = vgacon_invert_region,
                        -.con_flush_scrollback = vgacon_flush_scrollback,
                        );
                EXPORT_SYMBOL(vga_con);
--- linux-4.15.0.orig/drivers/video/fbdev/Kconfig
+++ linux-4.15.0/drivers/video/fbdev/Kconfig
@@ -2,6 +2,18 @@
 # fbdev configuration
 #
+config FB_CMDLINE
+bool
+
+config FB_NOTIFY
+bool
+
+config FB_CLPS711X_OLD
+tristate
+select FB_CFB_FILLRECT
+select FB_CFB_COPYAREA
+select FB_CFB_IMAGEBLIT
+
+ menuconfig FB
+ tristate "Support for frame buffer devices"
+ select FB_CMDLINE
@@ -54,12 +66,6 @@
+combination with certain motherboards and monitors are known to
+suffer from this problem.

-config FB_CMDLINE
-bool
-
-config FB_NOTIFY
-bool
-
-config FB_DDC
-config FB_CLPS711X_OLD
-config FB_CLPS711X

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select FB_CFB_IMAGEBLIT
select FB_BACKLIGHT if FB_ATY_BACKLIGHT
select FB_MACMODES if PPC
+select FB_ATY_CT if SPARC64 && PCI

This driver supports graphics boards with the ATI Mach64 chips.
Say Y if you have such a graphics board.

config FB_ATY_CT
bool "Mach64 CT/VT/GT/LT (incl. 3D RAGE) support"
depends on PCI && FB_ATY
-default y if SPARC64 && PCI

Say Y here to support use of ATI's 64-bit Rage boards (or other
boards based on the Mach64 CT, VT, GT, and LT chipsets) as a

config FB_VIA_DIRECT_PROCFS
bool "direct hardware access via procfs (DEPRECATED)(DANGEROUS)"
-depends on FB_VIA
default n

Allow direct hardware access to some output registers via procfs.

config FB_VIA_X_COMPATIBILITY
bool "X server compatibility"
-depends on FB_VIA
default n

This option reduces the functionality (power saving, ...) of the
Configuration re: surface address, size, and format must be provided
through device tree, or plain old platform data.

-sources "drivers/video/fbdev/omap/Kconfig"
-sources "drivers/video/fbdev/omap2/Kconfig"
-sources "drivers/video/fbdev/mmp/Kconfig"

config FB_SH_MOBILE_MERAM
tristate "SuperH Mobile MERAM read ahead support"
depends on (SUPERH || ARCH_SHMOBILE)
-default -2486,3 +2480,7

This driver is also available as a module. The module will be
called sm712fb. If you want to compile it as a module, say M
here and read <file:Documentation/kbuild/modules.txt>.
```c
+source "drivers/video/fbdev/omap/Kconfig"
+source "drivers/video/fbdev/omap2/Kconfig"
+source "drivers/video/fbdev/mmp/Kconfig"
--- linux-4.15.0.orig/drivers/video/fbdev/asiliantfb.c
+++ linux-4.15.0/drivers/video/fbdev/asiliantfb.c
@@ -227,6 +227,9 @@
{
    unsigned long Ftarget, ratio, remainder;

    +if (!var->pixclock)
    +return -EINVAL;
    +
    ratio = 1000000 / var->pixclock;
    remainder = 1000000 % var->pixclock;
    Ftarget = 1000000 * ratio + (1000000 * remainder) / var->pixclock;
--- linux-4.15.0.orig/drivers/video/fbdev/atmel_lcdfb.c
+++ linux-4.15.0/drivers/video/fbdev/atmel_lcdfb.c
@@ -21,6 +21,7 @@
#include <linux/module.h>
#include <linux/of.h>
#include <linux/of_device.h>
+#include <video/of_videomode.h>
#include <linux/of_gpio.h>
#include <video/of_display_timing.h>
#include <linux/regulator/consumer.h>
@@ -1029,11 +1030,11 @@
    struct device *dev = &sinfo->pdev->dev;
    struct device_node *np = dev->of_node;
    struct device_node *display_np;
-    struct device_node *timings_np;
-    struct display_timings *timings;
    enum of_gpio_flags flags;
    struct atmel_lcdfb_power_ctrl_gpio *og;
    bool is_gpio_power = false;
+    struct fb_videomode fb_vm;
+    struct videomode vm;
    int ret = -ENOENT;
    int i, gpio;
@@ -1071,8 +1072,8 @@
 }

 INIT_LIST_HEAD(&pdata->pwr_gpios);
-    ret = -ENOMEM;
-    for (i = 0; i < of_gpio_named_count(display_np, "atmel,power-control-gpio"); i++) {
+    ret = -ENOMEM;
+    gpio = of_get_named_gpio_flags(display_np, "atmel,power-control-gpio",
       i, &flags);
```
if (gpio < 0)
@@ -1112,38 +1113,18 @@
pdata->lcdcon_is_backlight = of_property_read_bool(display_np, "atmel,lcdcon-backlight");
pdata->lcdcon_pol_negative = of_property_read_bool(display_np, "atmel,lcdcon-backlight-inverted");

-timings = of_get_display_timings(display_np);
-if (!timings) {
-dev_err(dev, "failed to get display timings\n");
-ret = EINVAL;
+ret = of_get_videomode(display_np, &vm, OF_USE_NATIVE_MODE);
+if (ret) {
+dev_err(dev, "failed to get videomode from DT\n");
goto put_display_node;
}

-timings_np = of_find_node_by_name(display_np, "display-timings");
-if (!timings_np) {
-dev_err(dev, "failed to find display-timings node\n");
-ret = -ENODEV;
+ret = fb_videomode_from_videomode(&vm, &fb_vm);
+if (ret < 0)
goto put_display_node;
-
-for (i = 0; i < of_get_child_count(timings_np); i++) {
-struct videomode vm;
-struct fb_videomode fb_vm;
-
-ret = videomode_from_timings(timings, &vm, i);
-if (ret < 0)
-goto put_timings_node;
-ret = fb_videomode_from_videomode(&vm, &fb_vm);
-if (ret < 0)
-goto put_timings_node;
-
-fb_add_videomode(&fb_vm, &info->modelist);
-
-
-return 0;
+fb_add_videomode(&fb_vm, &info->modelist);

-fb_add_videomode(&fb_vm, &info->modelist);

-of_node_put(timings_np);
-put_display_node:
of_node_put(display_np);
return ret;
--- linux-4.15.0.orig/drivers/video/fbdev/aty/atyfb.h
+++ linux-4.15.0/drivers/video/fbdev/aty/atyfb.h
extern void aty_set_pll_ct(const struct fb_info *info, const union aty_pll *pll);
extern u8 aty_ld_pll_ct(int offset, const struct atyfb_par *par);

+extern const u8 aty_postdividers[8];
+
/*
 * Hardware cursor support
@@ -359,7 +361,6 @@
extern void aty_reset_engine(const struct atyfb_par *par);
extern void aty_init_engine(struct atyfb_par *par, struct fb_info *info);
-extern u8 aty_ld_pll_ct(int offset, const struct atyfb_par *par);

void atyfb_copyarea(struct fb_info *info, const struct fb_copyarea *area);
void atyfb_fillrect(struct fb_info *info, const struct fb_fillrect *rect);
--- linux-4.15.0.orig/drivers/video/fbdev/aty/atyfb_base.c
+++ linux-4.15.0/drivers/video/fbdev/aty/atyfb_base.c
@@ -3087,17 +3087,18 @@
/* PLL Reference Divider M:
 */
-M = pll_regs[2];
+M = pll_regs[PLL_REF_DIV];

/*
 * PLL Feedback Divider N (Dependent on CLOCK_CNTL):
 */
-N = pll_regs[7 + (clock_cntl & 3)];
+N = pll_regs[VCLK0_FB_DIV + (clock_cntl & 3)];

/*
 * PLL Post Divider P (Dependent on CLOCK_CNTL):
 */
-P = 1 << (pll_regs[6] >> ((clock_cntl & 3) << 1));
+P = aty_postdividers[((pll_regs[VCLK_POST_DIV] >> ((clock_cntl & 3) << 1)) & 3)]
+((pll_regs[PLL_EXT_CNTL] >> (2 + (clock_cntl & 3))) & 4]);

/*
 * PLL Divider Q:
--- linux-4.15.0.orig/drivers/video/fbdev/aty/mach64_accel.c
+++ linux-4.15.0/drivers/video/fbdev/aty/mach64_accel.c
@@ -127,7 +127,7 @@

/* set host attributes */
wait_for_fifo(13, par);
-aty_st_le32(HOST_CNTL, 0, par);
+aty_st_le32(HOST_CNTL, HOST_BYTE_ALIGN, par);

/* set pattern attributes */
aty_st_le32(PAT_REG0, 0, par);
@@ -233,7 +233,8 @@
rotation = rotation24bpp(dx, direction);
}

-wait_for_fifo(4, par);
+wait_for_fifo(5, par);
+aty_st_le32(DP_PIX_WIDTH, par->crtc.dp_pix_width, par);
aty_st_le32(DP_SRC, FRGD_SRC_BLIT, par);
aty_st_le32(SRC_Y_X, (sx << 16) | sy, par);
aty_st_le32(SRC_HEIGHT1_WIDTH1, (width << 16) | area->height, par);
@@ -269,7 +270,8 @@
rotation = rotation24bpp(dx, DST_X_LEFT_TO_RIGHT);
}

-wait_for_fifo(3, par);
+wait_for_fifo(4, par);
+aty_st_le32(DP_PIX_WIDTH, par->crtc.dp_pix_width, par);
aty_st_le32(DP_FRGD_CLR, color, par);
aty_st_le32(DP_SRC, BKGD_SRC_BKGD_CLR | FRGD_SRC_FRGD_CLR | MONO_SRC_ONE, @@ -284,7 +286,7 @@
{
    struct atyfb_par *par = (struct atyfb_par *) info->par;
    u32 src_bytes, dx = image->dx, dy = image->dy, width = image->width;
-    u32 pix_width_save, pix_width, host_cntl, rotation = 0, src, mix;
+    u32 pix_width, rotation = 0, src, mix;

    if (par->asleep)
        return;
@@ -296,8 +298,7 @@
    return;
}

-pix_width = pix_width_save = aty_ld_le32(DP_PIX_WIDTH, par);
-host_cntl = aty_ld_le32(HOST_CNTL, par) | HOST_BYTE_ALIGN;
+pix_width = par->crtc.dp_pix_width;

switch (image->depth) {
    case 1:
        @@ -345,7 +346,7 @@
        * since Rage 3D IIc we have DP_HOST_TRIPLE_EN bit
        * this hwaccelerated triple has an issue with not aligned data
        */
    -if (M64_HAS(HW_TRIPLE) && image->width % 8 == 0)
+if (image->depth == 1 & M64_HAS(HW_TRIPLE) & image->width % 8 == 0)
    pix_width |= DP_HOST_TRIPLE_EN;
}

@@ -370,19 +371,18 @@
mix = FRGD_MIX_D_XOR_S | BKGD_MIX_D;
}

-wait_for_fifo(6, par);
-aty_st_le32(DP_WRITE_MASK, 0xFFFFFFFF, par);
+wait_for_fifo(5, par);
  aty_st_le32(DP_PIX_WIDTH, pix_width, par);
  aty_st_le32(DP_MIX, mix, par);
  aty_st_le32(DP_SRC, src, par);
-if (info->var.bits_per_pixel == 24 && !(pix_width & DP_HOST_TRIPLE_EN)) {
  int inbit, outbit, mult24, byte_id_in_dword, width;
  u8 *pbitmapin = (u8*)image->data, *pbitmapout;
  u32 hostdword;
  @@ -415,7 +415,7 @@
  }
}

/* manual triple each pixel */
-if (info->var.bits_per_pixel == 24 && !(pix_width & DP_HOST_TRIPLE_EN)) {
  int inbit, outbit, mult24, byte_id_in_dword, width;
  u8 *pbitmapin = (u8*)image->data, *pbitmapout;
  u32 hostdword;
  @@ -415,7 +415,7 @@
  }
}

wait_for_fifo(1, par);
-aty_st_le32(HOST_DATA0, hostdword, par);
+pбе_st_le32(HOST_DATA0, le32_to_cpu(hostdword), par);
}
} else {
  u32 *pbitmap, dwords = (src_bytes + 3) / 4;
  @@ -424,8 +424,4 @@
  aty_st_le32(HOST_DATA0, get_unaligned_le32(pbitmap), par);
  }
  }
  
  /* restore pix_width */
-wait_for_fifo(1, par);
-aty_st_le32(DP_PIX_WIDTH, pix_width_save, par);
}
--- linux-4.15.0.orig/drivers/video/fbdev/aty/mach64_ct.c
+++ linux-4.15.0/drivers/video/fbdev/aty/mach64_ct.c
@@ -115,7 +115,7 @@

#define Maximum_DSP_PRECISION 7
-static u8 postdividers[] = {1,2,4,8,3};
+const u8 aty_postdividers[8] = {1,2,4,8,3,5,6,12};

static int aty_dsp_gt(const struct fb_info *info, u32 bpp, struct pll_ct *pll)
{
    @ @ .222,7 +222,7 @ @
    pll->vclk_post_div += (q < 64*8);
    pll->vclk_post_div += (q < 32*8);
}
PLL->vclk_post_div_real = postdividers[PLL->vclk_post_div];
+PLL->vclk_post_div_real = aty_postdividers[PLL->vclk_post_div];
// PLL->vclk_post_div <<= 6;
PLL->vclk_fb_div = q * PLL->vclk_post_div_real / 8;
PLLvclk = (1000000 * 2 * PLL->vclk_fb_div) /
    @ @ .513,7 +513,7 @ @
8 mclk_fb_div, PLL_ext_cntl;
PLL->ct.pll_ref_div = aty_ld_pll_ct(PLL_REF_DIV, par);
PLL_ext_cntl = aty_ld_pll_ct(PLL_EXT_CNTL, par);
-PLL->ct.xclk_post_div_real = postdividers[PLL_ext_cntl & 0x07];
+PLL->ct.xclk_post_div_real = aty_postdividers[PLL_ext_cntl & 0x07];
mclk_fb_div = aty_ld_pll_ct(MCLK_FB_DIV, par);
if (PLL_ext_cntl & PLL_MFB_TIMES_4_2B)
mclk_fb_div <<= 1;
    @ @ .535,7 +535,7 @ @
xpost_div += (q < 64*8);
xpost_div += (q < 32*8);
}
PLL->ct.xclk_post_div_real = postdividers[xpost_div];
+PLL->ct.xclk_post_div_real = aty_postdividers[xpost_div];
PLL->ct.mclk_fb_div = q * PLL->ct.xclk_post_div_real / 8;

#else CONFIG_PPC
    @ @ .584,7 +584,7 @ @
mpost_div += (q < 64*8);
mpost_div += (q < 32*8);
}
-sclk_post_div_real = postdividers[mpost_div];
+scclk_post_div_real = aty_postdividers[mpost_div];
PLL->ct.scclk_fb_div = q * scclk_post_div_real / 8;
PLL->ct.spll_cntl2 = mpost_div << 4;
#endif DEBUG
--- linux-4.15.0.orig/drivers/video/fbdev/auo_k190x.c
+++ linux-4.15.0/drivers/video/fbdev/auo_k190x.c
@@ -708,8 +708,8 @@
    return sprintf(buf, "%d\n", temp);
-static DEVICE_ATTR(update_mode, 0644, update_mode_show, update_mode_store);
-static DEVICE_ATTR(flash, 0644, flash_show, flash_store);
+static DEVICE_ATTR_RW(update_mode);
+static DEVICE_ATTR_RW(flash);
static DEVICE_ATTR(temp, 0644, temp_show, NULL);

static struct attribute *auok190x_attributes[] = {

--- linux-4.15.0.orig/drivers/video/fbdev/chipsfb.c
+++ linux-4.15.0/drivers/video/fbdev/chipsfb.c
@@ -350,7 +350,7 @@
static int chipsfb_pci_init(struct pci_dev *dp, const struct pci_device_id *ent)
{
 struct fb_info *p;
-unsigned long addr, size;
+unsigned long addr;
 unsigned short cmd;
 int rc = -ENODEV;

@@ -362,7 +362,6 @@
     if (dp->resource[0].flags & IORESOURCE_MEM) == 0)
     goto err_disable;
     addr = pci_resource_start(dp, 0);
-    size = pci_resource_len(dp, 0);
     if (addr == 0)
     goto err_disable;

--- linux-4.15.0.orig/drivers/video/fbdev/clps711x-fb.c
+++ linux-4.15.0/drivers/video/fbdev/clps711x-fb.c
@@ -287,14 +287,17 @@
 }
 ret = of_get_fb_videomode(disp, &cfb->mode, OF_USE_NATIVE_MODE);
     if (ret)
+if (ret) {
         +of_node_put(disp);
         goto out_fb_release;
     +}
     of_property_read_u32(disp, "ac-prescale", &cfb->ac_prescale);
     cfb->cmap_invert = of_property_read_bool(disp, "cmap-invert");

     ret = of_property_read_u32(disp, "bits-per-pixel",
         &info->var.bits_per_pixel);
     if (ret)
     goto out_fb_release;
region.color = color;
region.rop = ROP_COPY;

@if (rw && !bottom_only) {
+if ((int) rw > 0 && !bottom_only) {
  region.dx = info->var.xoffset + rs;
  region.dy = 0;
  region.width = rw;
  info->fbops->fb_fillrect(info, &region);
}

-if (bh) {
+if ((int) bh > 0) {
  region.dx = info->var.xoffset;
  region.dy = info->var.yoffset + bs;
  region.width = rs;
  info->fbops->fb_fillrect(info, &region);
}

static void bit_cursor(struct vc_data *vc, struct fb_info *info, int mode,
-     int softback_lines, int fg, int bg)
+     int fg, int bg)
{
struct fb_cursor cursor;
struct fbcon_ops *ops = info->fbcon_par;
@
}
cursor.set = 0;

-if (softback_lines) {
  @-if (y + softback_lines >= vc->vc_rows) {
    mode = CM_ERASE;
    ops->cursor_flash = 0;
    return;
  -} else
  -y += softback_lines;
  -}
  -
c = scr_readw((u16 *) vc->vc_pos);
attribute = get_attribute(info, c);
src = vc->vc_font.data + ((c & charmask) * (w * vc->vc_font.height));
@@ -94,22 +94,24 @@
     int size = len * sizeof(u16);
     int ret = -ENOMEM;

     +flags |= GFP_NOWARN;
     +
     if (cmap->len != len) {
         fb_dealloc_cmap(cmap);
         if (!len)
             return 0;

     -cmap->red = kmalloc(size, flags);
     +cmap->red = kzalloc(size, flags);
     if (!cmap->red)
         goto fail;
     -cmap->green = kmalloc(size, flags);
     +cmap->green = kzalloc(size, flags);
     if (!cmap->green)
         goto fail;
     -cmap->blue = kmalloc(size, flags);
     +cmap->blue = kzalloc(size, flags);
     if (!cmap->blue)
         goto fail;
     if (transp) {
         -cmap->transp = kmalloc(size, flags);
         +cmap->transp = kzalloc(size, flags);
         if (!cmap->transp)
             goto fail;
     } else {
         --- linux-4.15.0.orig/drivers/video/fbdev/core/fbcon.c
        +++ linux-4.15.0/drivers/video/fbdev/core/fbcon.c
      @ @ -102,12 +102,6 @ @
      /* logo_shown is an index to vc_cons when >= 0; otherwise follows FBCON_LOGO
         enums. */
     static int logo_shown = FBCON_LOGO_CANSHOW;
     /* Software scrollback */
     static int fbcon_softback_size = 32768;
     -static unsigned long softback_buf, softback_curr;
     +static unsigned long softback_in;
     -static unsigned long softback_in;
     +static unsigned long softback_top, softback_end;
     -static int softback_lines;
      /* console mappings */
     static int first_fb_vc;
     static int last_fb_vc = MAX_NR_CONSOLES - 1;
    @ @ -142,8 +136,6 @ @

     static const struct consw fb_con;
-#define CM_SOFTBACK(8)
-
#define advance_row(p, delta) (unsigned short *)((unsigned long)(p) + (delta) * vc->vc_size_row)

static int fbcon_set_origin(struct vc_data *);
@@ -349,18 +341,6 @@
 return color;
 }

-static void fbcon_update_softback(struct vc_data *vc)
-{ 
-int l = fbcon_softback_size / vc->vc_size_row;
 -
-if (l > 5)
-softback_end = softback_buf + l * vc->vc_size_row;
-else
-/* Smaller scrollback makes no sense, and 0 would screw
 - the operation totally */
-softback_top = 0;
-}
-
static void fb_flashcursor(struct work_struct *work)
{
 struct fb_info *info = container_of(work, struct fb_info, queue);
@@ -390,7 +370,7 @@
c = scr_readw((u16 *) vc->vc_pos);
 mode = (!ops->cursor_flash || ops->cursor_state.enable) ?
 CM_ERASE : CM_DRAW;
-ops->cursor(vc, info, mode, softback_lines, get_color(vc, info, c, 1),
+ops->cursor(vc, info, mode, get_color(vc, info, c, 1),
 get_color(vc, info, c, 0));
 console_unlock();
 }
@@ -447,13 +427,7 @@

if (!strncmp(options, "scrollback:", 11)) {
-options += 11;
-if (*options) {
- fbcon_softback_size = simple_strtoul(options, &options, 0);
-if (*options == 'k' || *options == 'K') {
- fbcon_softback_size *= 1024;
-}
-}
+pr_warn("Ignoring scrollback size option\n");
 continue;
}
p->con_rotate = fbcon_platform_get_rotate(info);
set_blitting_type(vc, info);

-if (info->fix.type != FB_TYPE_TEXT) {
-if (fbcon_softback_size) {
-if (!softback_buf) {
  softback_buf =
    (unsigned long)
    kmalloc(fbcon_softback_size,
    GFP_KERNEL);
-if (!softback_buf) {
  fbcon_softback_size = 0;
  softback_top = 0;
}
}
}
} else {
-if (softback_buf) {
-kfree((void *) softback_buf);
  softback_buf = 0;
  softback_top = 0;
}
}
-if (softback_buf)
  softback_in = softback_top = softback_curr =
  softback_buf;
  softback_lines = 0;
}

/* Setup default font */
if (!p->fontdata && !vc->vc_font.data) {
if (!fontname[0] || !find_font(fontname))
  fbcon_prepare_logo(vc, info, cols, rows, new_cols, new_rows);
-if (vc == svc && softback_buf)
  fbcon_update_softback(vc);
  set_blitting_type(vc, info);
-if (ops->rotate_font && ops->rotate_font(info, vc)) {
  ops->rotate = FB_ROTATE_UR;
  set_blitting_type(vc, info);
  if (free_font)
    vc->vc_font.data = NULL;
}
-if (vc->vc_hi_font_mask)
+if (vc->vc_hi_font_mask && vc->vc_screenbuf)
set_vc_hi_font(vc, false);

if (!con_is_bound(&fb_con))
    fbcon_exit();

+if (vc->vc_num == logo_shown)
+    logo_shown = FBCON_LOGO_CANSHOW;
+
    return;
}

@@ -1322,7 +1271,6 @@
{
    struct fb_info *info = registered_fb[con2fb_map[vc->vc_num]];
    struct fbcon_ops *ops = info->fbcon_par;
-    int y;
    int c = scr_readw((u16 *) vc->vc_pos);

    ops->cur_blink_jiffies = msecs_to_jiffies(vc->vc_cur_blink_ms);
@@ -1336,16 +1284,11 @@
    fbcon_add_cursor_timer(info);

    ops->cursor_flash = (mode == CM_ERASE) ? 0 : 1;
-    if (mode & CM_SOFTBACK) {
-        mode &= ~CM_SOFTBACK;
-        y = softback_lines;
-    } else {
-        if (softback_lines)
-            fbcon_set_origin(vc);
-        y = 0;
-    }

-    ops->cursor(vc, info, mode, y, get_color(vc, info, c, 1),
+    if (!ops->cursor)
+        return;
+    +
+        ops->cursor(vc, info, mode, get_color(vc, info, c, 1),
            get_color(vc, info, c, 0));
}

@@ -1416,8 +1359,6 @@

    if (con_is_visible(vc)) {
        update_screen(vc);
        -if (softback_buf)
-            fbcon_update_softback(vc);
    }
}
scrollback_current = 0;
}

-static void fbcon_redraw_softback(struct vc_data *vc, struct display *p,
-    long delta)
-{
-    int count = vc->vc_rows;
-    unsigned short *d, *s;
-    unsigned long n;
-    int line = 0;
-
-    d = (u16 *) softback_curr;
-    if (d == (u16 *) softback_in)
-        d = (u16 *) vc->vc_origin;
-    n = softback_curr + delta * vc->vc_size_row;
-    softback_lines -= delta;
-    if (delta < 0) {
-        if (softback_curr < softback_top && n < softback_buf) {
-            n += softback_end - softback_buf;
-            softback_lines -=
-                (softback_top - n) / vc->vc_size_row;
-            n = softback_top;
-        }
-        else if (softback_curr >= softback_top
-            && n < softback_top) {
-            softback_lines -=
-                (softback_top - n) / vc->vc_size_row;
-            n = softback_top;
-        }
-    } else if (softback_curr > softback_in && n >= softback_end) {
-        n += softback_buf - softback_end;
-        if (n > softback_in) {
-            n = softback_in;
-            softback_lines = 0;
-        }
-    } else if (softback_curr <= softback_in && n > softback_in) {
-        n = softback_in;
-        softback_lines = 0;
-    }
-    if (n == softback_curr)
-        return;
-    softback_curr = n;
-    s = (u16 *) softback_curr;
if (s == (u16 *) softback_in) {
    s = (u16 *) vc->vc_origin;
    while (count--) {
        unsigned short *start;
        unsigned short *le;
        unsigned short c;
        int x = 0;
        unsigned short attr = 1;
        start = s;
        le = advance_row(s, 1);
        do {
            c = scr_readw(s);
            if (attr != (c & 0xff00)) {
                attr = c & 0xff00;
                if (s > start) {
                    fbcon_puts(vc, start, s - start,
                        line, x);
                    x += s - start;
                    start = s;
                }
            }
            if (c == scr_readw(d)) {
                if (s > start) {
                    fbcon_puts(vc, start, s - start,
                        line, x);
                    x += s - start + 1;
                    start = s + 1;
                } else {
                    x++;
                    s++;
                }
            }
            s++;
            d++;
        } while (s < le);
        if (s > start)
            fbcon_puts(vc, start, s - start, line, x);
        line++;
    } if (d == (u16 *) softback_end)
        d = (u16 *) softback_buf;
    if (d == (u16 *) softback_in)
        d = (u16 *) vc->vc_origin;
    if (s == (u16 *) softback_end)
        s = (u16 *) softback_buf;
    if (s == (u16 *) softback_in)
        s = (u16 *) vc->vc_origin;
}
static void fbcon_redraw_move(struct vc_data *vc, struct display *p,
    int line, int count, int dy)
{
    @@ -1787,31 +1635,6 @@
}

static inline void fbcon_softback_note(struct vc_data *vc, int t,
    int count)
{
    unsigned short *p;

    if (vc->vc_num != fg_console)
        return;
    p = (unsigned short *) (vc->vc_origin + t * vc->vc_size_row);
    while (count) {
        scr_memcpyw((u16 *) softback_in, p, vc->vc_size_row);
        count--;
        p = advance_row(p, 1);
        softback_in += vc->vc_size_row;
        if (softback_in == softback_end)
            softback_in = softback_buf;
        if (softback_in == softback_top) {
            softback_top += vc->vc_size_row;
            if (softback_top == softback_end)
                softback_top = softback_buf;
        }
        softback_curr = softback_in;
    }
}

static bool fbcon_scroll(struct vc_data *vc, unsigned int t, unsigned int b,
    enum con_scroll dir, unsigned int count)
{
    @@ -1834,8 +1657,6 @@
case SM_UP:
    if (count > vc->vc_rows)/* Maximum realistic size */
        count = vc->vc_rows;
    -if (softback_top)
        -fbcon_softback_note(vc, t, count);
    if (logo_shown >= 0)
        goto redraw_up;
    switch (p->scrollmode) {
    @@ -2128,6 +1949,9 @@

+#define PITCH(w) (((w) + 7) >> 3)
+#define CALC_FONTSZ(h, p, c) ((h) * (p) * (c)) /* size = height * pitch * charcount */
+
static int fbcon_resize(struct vc_data *vc, unsigned int width,
unsigned int height, unsigned int user)
{
    typedef -2137.6 +1961.24 @
struct fb_var_screeninfo var = info->var;
int x_diff, y_diff, virt_w, virt_h, virt_fw, virt_fh;

+if (p->userfont && FNTSIZE(vc->vc_font.data)) {
+int size;
+int pitch = PITCH(vc->vc_font.width);
+
+/*
+ * If user font, ensure that a possible change to user font
+ * height or width will not allow a font data out-of-bounds access.
+ * NOTE: must use original charcount in calculation as font
+ * charcount can change and cannot be used to determine the
+ * font data allocated size.
+ */
+if (pitch <= 0)
+    return -EINVAL;
+size = CALC_FONTSZ(vc->vc_font.height, pitch, FNTCHARCNT(vc->vc_font.data));
+if (size > FNTSIZE(vc->vc_font.data))
+    return -EINVAL;
+}
+
virt_w = FBCON_SWAP(ops->rotate, width, height);
virt_h = FBCON_SWAP(ops->rotate, height, width);
virt_fw = FBCON_SWAP(ops->rotate, vc->vc_font.width,
@@ -2162,7 +2004,7 @@
return -EINVAL;
DPRINTK("resize now %ix%i\n", var.xres, var.yres);
-if (con_is_visible(vc)) {
+if (con_is_visible(vc) && vc->vc_mode == KD_TEXT) {
    var.activate = FB_ACTIVATE_NOW |
    FB_ACTIVATE_FORCE;
    fb_set_var(info, &var);
@@ -2185,14 +2027,6 @@
    info = registered_fb[con2fb_map[vc->vc_num]];
    ops = info->fbcon_par;

    -if (softback_top) {
    -if (softback_lines)
-fbcon_set_origin(vc);
-softback_top = softback_curr = softback_in = softback_buf;
-softback_lines = 0;
-fbcon_update_softback(vc);
-
-
if (logo_shown >= 0) {
struct vc_data *conp2 = vc_cons[logo_shown].d;

@@ -2418,6 +2252,9 @@
if (font->width <= 8) {
  j = vc->vc_font.height;
+if (font->charcount * j > FNTSIZE(fontdata))
+  return -EINVAL;
+  for (i = 0; i < font->charcount; i++) {
    memcpy(data, fontdata, j);
    memset(data + j, 0, 32 - j);
  @ @ -2426,6 +2263,9 @@
  }
} else if (font->width <= 16) {
  j = vc->vc_font.height * 2;
+if (font->charcount * j > FNTSIZE(fontdata))
+  return -EINVAL;
+  for (i = 0; i < font->charcount; i++) {
    memcpy(data, fontdata, j);
    memset(data + j, 0, 32 - j);
  @ @ -2433,6 +2273,9 @@
    fontdata += j;
  }
} else if (font->width <= 24) {
+if (font->charcount * (vc->vc_font.height * sizeof(u32)) > FNTSIZE(fontdata))
+  return -EINVAL;
+    for (i = 0; i < font->charcount; i++) {
      for (j = 0; j < vc->vc_font.height; j++) {
        *data++ = fontdata[0];
  @ @ -2445,6 +2288,9 @@
      }
    } else {
      j = vc->vc_font.height * 4;
+if (font->charcount * j > FNTSIZE(fontdata))
+  return -EINVAL;
+      for (i = 0; i < font->charcount; i++) {
        memcpy(data, fontdata, j);
memset(data + j, 0, 128 - j);
int cnt;
char *old_data = NULL;

-if (con_is_visible(vc) && softback_lines)
-fbcon_set_origin(vc);
-
resize = (w != vc->vc_font.width) || (h != vc->vc_font.height);
if (p->userfont)
old_data = vc->vc_font.data;
-cols /= w;
-rows /= h;
vc_resize(vc, cols, rows);
-if (con_is_visible(vc) && softback_buf)
-fbcon_update_softback(vc);
} else if (con_is_visible(vc)
    && vc->vc_mode == KD_TEXT) {
fbcon_clear_margins(vc, 0);
-int size;
int i, csum;
u8 *new_data, *data = font->data;
-int pitch = (font->width+7) >> 3;
+int pitch = PITCH(font->width);

/*@ 2514,7 +2434,7 @@*/

/* Is there a reason why fbconsole couldn't handle any charcount >256?
* If not this check should be changed to charcount < 256 */
-if (fbcon_invalid_charcount(info, charcount))
return -EINVAL;

-size = h * pitch * charcount;
+size = CALC_FONTSZ(h, pitch, charcount);

new_data = kmalloc(FONT_EXTRA_WORDS * sizeof(int) + size, GFP_USER);
-
static u16 *fbcon_screen_pos(struct vc_data *vc, int offset)
{
-unsigned long p;
-int line;
-
-if (vc->vc_num != fg_console || !softback_lines)
+if (!softback_lines)
-line = offset / vc->vc_size_row;

}@ 2713,16 +2554,7 @@
if (line >= softback_lines)
return (u16 *) (vc->vc_origin + offset -
softback_lines * vc->vc_size_row);
-p = softback_curr + offset;
-if (p >= softback_end)
-p += softback_buf - softback_end;
-return (u16 *) p;
+return (u16 *) (vc->vc_origin + offset);
}

static unsigned long fbcon_getxy(struct vc_data *vc, unsigned long pos,
@@ -2739,22 +2568,7 @@
  
  x = offset % vc->vc_cols;
  y = offset / vc->vc_cols;
-if (vc->vc_num == fg_console)
  -y += softback_lines;
  -ret = pos + (vc->vc_cols - x) * 2;
  -} else if (vc->vc_num == fg_console && softback_lines) {
  -unsigned long offset = pos - softback_curr;
  -
  -if (pos < softback_curr)
  -offset += softback_end - softback_buf;
  -offset /= 2;
  -x = offset % vc->vc_cols;
  -y = offset / vc->vc_cols;
  ret = pos + (vc->vc_cols - x) * 2;
  -if (ret == softback_end)
  -ret = softback_buf;
  -if (ret == softback_in)
  -ret = vc->vc_origin;
  } else {
/* Should not happen */
  x = y = 0;
  @@ -2782,106 +2596,11 @@
a = ((a) & 0x88ff) | (((a) & 0x7000) >> 4) |
        ((a) & 0x0700) << 4);
  scr_writew(a, p++);
  -if (p == (u16 *) softback_end)
  -p = (u16 *) softback_buf;
  -if (p == (u16 *) softback_in)
  -p = (u16 *) vc->vc_origin;
  -}
  -
-}

-struct fb_info *info = registered_fb[con2fb_map[fg_console]];

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-struct fbcon_ops *ops = info->fbcon_par;
-struct display *disp = &fb_display[fg_console];
-int offset, limit, scrollback_old;
-
-if (softback_top) {
-if (vc->vc_num != fg_console)
-return;
-if (vc->vc_mode != KD_TEXT || !lines)
-return;
-if (logoShown >= 0) {
-struct vc_data *comp2 = vc_cons[logoShown].d;
-
-if (comp2->vc_top == logo_lines
- & comp2->vc_bottom == comp2->vc_rows)
-comp2->vc_top = 0;
-if (logoShown == vc->vc_num) {
-unsigned long p, q;
-int i;
-
-p = softback_in;
-q = vc->vc_origin +
- logo_lines * vc->vc_size_row;
-for (i = 0; i < logo_lines; i++) {
-if (p == softback_top)
-break;
-if (p == softback_buf)
-p = softback_end;
-p -= vc->vc_size_row;
-q -= vc->vc_size_row;
-scr_mempyw((u16 *) q, (u16 *) p,
- vc->vc_size_row);
-} 
-softback_in = softback_curr = p;
-update_region(vc, vc->vc_origin,
- logo_lines * vc->vc_cols);
-}
-softback_in = FBCON_LOGO_CANSHOW;
-
-fbcon_cursor(vc, CM_ERASE | CM_SOFTBACK);
-fbcon_redraw_softback(vc, disp, lines);
-fbcon_cursor(vc, CM_DRAW | CM_SOFTBACK);
-return;
-}
-
-if (!scrollback_phys_max)
-return;
-
-scrollback_old = scrollback_current;
-scrollback_current -= lines;
-if (scrollback_current < 0)
-scrollback_current = 0;
-else if (scrollback_current > scrollback_max)
-scrollback_current = scrollback_max;
-if (scrollback_current == scrollback_old)
-return;
-
-if (fbcon_is_inactive(vc, info))
-return;
-
-fbcon_cursor(vc, CM_ERASE);
-
-offset = disp->yscroll - scrollback_current;
-limit = disp->vrows;
-switch (disp->scrollmode) {
-case SCROLL_WRAP_MOVE:
-info->var.vmode |= FB_VMODE_YWRAP;
-break;
-case SCROLL_PAN_MOVE:
-case SCROLL_PAN_REDRAW:
-limit -= vc->vc_rows;
-info->var.vmode &= ~FB_VMODE_YWRAP;
-break;
}
-if (offset < 0)
-offset += limit;
-else if (offset >= limit)
-offset -= limit;
-
-ops->var.xoffset = 0;
-ops->var.yoffset = offset * vc->vc_font.height;
-ops->update_start(info);
-
-if (!scrollback_current)
-fbcon_cursor(vc, CM_DRAW);
}

static int fbcon_set_origin(struct vc_data *vc)
{
-if (softback_lines)
-fbcon_scrolldelta(vc, softback_lines);
return 0;
}

@@ -2945,8 +2664,6 @@
fbcon_set_palette(vc, color_table);
update_screen(vc);
-if (softback_buf)
-fbcon_update_softback(vc);
}
}

@@ -3042,7 +2759,7 @@
for (i = first_fb_vc; i <= last_fb_vc; i++) {
  if (con2fb_map[i] != idx &&
      con2fb_map[i] != -1) {
    +new_idx = con2fb_map[i];
    break;
  }
@@ -3366,7 +3083,6 @@
    .con_font_default= fbcon_set_def_font,
    .con_font_copy = fbcon_copy_font,
    .con_set_palette = fbcon_set_palette,
-   .con_scrolldelta = fbcon_scrolldelta,
    .con_set_origin = fbcon_set_origin,
    .con_invert_region = fbcon_invert_region,
    .con_screen_pos = fbcon_screen_pos,
@@ -3575,9 +3291,6 @@
  if (fbcon_has_exited)
    return;

-kfree((void *)softback_buf);
-softback_buf = 0UL;
-
  for (i = 0; i < FB_MAX; i++) {
    int pending = 0;

--- linux-4.15.0.orig/drivers/video/fbdev/core/fbcon.h
+++ linux-4.15.0/drivers/video/fbdev/core/fbcon.h
@@ -62,7 +62,7 @@
    int color, int bottom_only);
    void (*cursor)(struct vc_data *vc, struct fb_info *info, int mode,
        int softback_lines, int fg, int bg);
+    int fg, int bg);
    int (*update_start)(struct fb_info *info);
    int (*rotate_font)(struct fb_info *info, struct vc_data *vc);
    struct fb_var_screeninfo var;  /* copy of the current fb_var_screeninfo */
@@ -152,13 +152,6 @@
#define attr_bgcol_ec(bgshift, vc, info) attr_col_ec(bgshift, vc, info, 0)
#define attr_fgcol_ec(fgshift, vc, info) attr_col_ec(fgshift, vc, info, 1)
/* Font */
#define REFCOUNT(fd)(((int *)(fd))[-1])
#define FNTSIZE(fd)(((int *)(fd))[-2])
#define FNTCHARCNT(fd)(((int *)(fd))[-3])
#define FNTSUM(fd)(((int *)(fd))[-4])
#define FONT_EXTRA_WORDS 4

/* Scroll Method */
--- linux-4.15.0.orig/drivers/video/fbdev/core/fbcon_ccw.c
+++ linux-4.15.0/drivers/video/fbdev/core/fbcon_ccw.c
@@ -201,7 +201,7 @@
    region.color = color;
    region.rop = ROP_COPY;

-if (rw && !bottom_only) {
+if ((int) rw > 0 && !bottom_only) {
    region.dx = 0;
    region.dy = info->var.yoffset;
    region.height = rw;
@@ -209,7 +209,7 @@
    info->fbops->fb_fillrect(info, &region);
 }

-if (bh) {
+if ((int) bh > 0) {
    region.dx = info->var.xoffset + bs;
    region.dy = 0;
    region.height = info->var.yres_virtual;
@@ -219,7 +219,7 @@
 }

static void ccw_cursor(struct vc_data *vc, struct fb_info *info, int mode,
-       int softback_lines, int fg, int bg)
+       int fg, int bg)
 {
    struct fb_cursor cursor;
    struct fbcon_ops *ops = info->fbcon_par;
@@ -236,15 +236,6 @@

    cursor.set = 0;

-if (softback_lines) {
-    if (y + softback_lines >= vc->vc_rows) {
-        mode = CM_ERASE;
-    ops->cursor_flash = 0;
-    return;

-} else
-\ y += softback_lines;
-\}
-
c = scr_readw((u16 *) vc->vc_pos);
attribute = get_attribute(info, c);
src = ops->fontbuffer + ((c & charmask) * (w * vc->vc_font.width));
--- linux-4.15.0.orig/drivers/video/fbdev/core/fbcon_cw.c
+++ linux-4.15.0/drivers/video/fbdev/core/fbcon_cw.c
@@ -184,7 +184,7 @@
region.color = color;
region.rop = ROP_COPY;

-if (rw && !bottom_only) {
+if ((int) rw > 0 && !bottom_only) {
 region.dx = 0;
 region.dy = info->var.yoffset + rs;
 region.height = rw;
@@ -192,7 +192,7 @@
 info->fbops->fb_fillrect(info, &region);
 }

-if (bh) {
+if ((int) bh > 0) {
 region.dx = info->var.xoffset;
 region.dy = info->var.yoffset;
 region.height = info->var.yres;
@@ -202,7 +202,7 @@
 }

static void cw_cursor(struct vc_data *vc, struct fb_info *info, int mode,
-\ int softback_lines, int fg, int bg)
+\ int fg, int bg)
{ 
 struct fb_cursor cursor;
 struct fbcon_ops *ops = info->fbcon_par;
@@ -219,15 +219,6 @@
cursor.set = 0;

-if (softback_lines) {
-if (y + softback_lines >= vc->vc_rows) {
-mode = CM_ERASE;
-ops->cursor_flash = 0;
-return;
-\} else
-\ y += softback_lines;
-\}
c = scr_readw((u16 *) vc->vc_pos);
attribute = get_attribute(info, c);
src = ops->fontbuffer + ((c & charmask) * (w * vc->vc_font.width));
--- linux-4.15.0.orig/drivers/video/fbdev/core/fbcon_rotate.c
+++ linux-4.15.0/drivers/video/fbdev/core/fbcon_rotate.c
@@ -14,6 +14,7 @@
#include <linux/fb.h>
#include <linux/vt_kern.h>
#include <linux/console.h>
+  #include <linux/font.h>
#include <asm/types.h>
#include "fbcon.h"
#include "fbcon_rotate.h"
--- linux-4.15.0.orig/drivers/video/fbdev/core/fbcon_ud.c
+++ linux-4.15.0/drivers/video/fbdev/core/fbcon_ud.c
@@ -231,7 +231,7 @@
region.color = color;
region.rop = ROP_COPY;

- if (rw && !bottom_only) {
+ if ((int) rw > 0 && !bottom_only) {
  region.dy = 0;
  region.dx = info->var.xoffset;
  region.width = rw;
@@ -239,7 +239,7 @@
    info->fbops->fb_fillrect(info, &region);
  }

- if (bh) {
+ if ((int) bh > 0) {
  region.dy = info->var.yoffset;
  region.dx = info->var.xoffset;
    region.height = bh;
@@ -249,7 +249,7 @@
    info->fbops->fb_fillrect(info, &region);
  }

static void ud_cursor(struct vc_data *vc, struct fb_info *info, int mode,
-        int softback_lines, int fg, int bg)
+        int fg, int bg)
{
  struct fb_cursor cursor;
  struct fbcon_ops *ops = info->fbcon_par;
@@ -267,15 +267,6 @@
cursor.set = 0;

- if (softback_lines) {


if (y + softback_lines >= vc->vc_rows) {
    mode = CM_ERASE;
    ops->cursor_flash = 0;
    return;
} else
    y += softback_lines;
-
    c = scr_readw((u16 *) vc->vc_pos);
    attribute = get_attribute(info, c);
    src = ops->fontbuffer + ((c & charmask) * (w * vc->vc_font.height));
--- linux-4.15.0.orig/drivers/video/fbdev/core/fbmem.c
+++ linux-4.15.0/drivers/video/fbdev/core/fbmem.c
@@ -34,6 +34,7 @@
#include <linux/fb.h>
#include <linux/fbcon.h>
#include <linux/mem_encrypt.h>
+#include <linux/overflow.h>
#include <asm/fb.h>

@@ -427,6 +428,9 @@
{
    unsigned int x;

+if (image->width > info->var.xres || image->height > info->var.yres)
+    return;
+    
    if (rotate == FB_ROTATE_UR) {
        for (x = 0;
            x < num && image->dx + image->width <= info->var.xres;
@@ -435,7 +439,9 @@
            image->dx += image->width + 8;
        }
    } else if (rotate == FB_ROTATE_UD) {
@@ -447,7 +453,9 @@
            image->dy += image->height + 8;
        }
    } else if (rotate == FB_ROTATE_CCW) {
@@ -459,7 +465,9 @@
            image->dy += image->height + 8;
        }
    } else if (rotate == FB_ROTATE_UD) {
@@ -471,7 +477,9 @@
            image->dy += image->height + 8;
        }
    } else if (rotate == FB_ROTATE_CCW) {
@@ -483,7 +489,9 @@
            image->dy += image->height + 8;
        }
    } else if (rotate == FB_ROTATE_CCW) {
@@ -495,7 +501,9 @@
            image->dy += image->height + 8;
        }
    } else if (rotate == FB_ROTATE_CCW) {

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+for (x = 0; x < num && image->dy <= dy; x++) {
  info->fbops->fb_imageblit(info, image);
  image->dy -= image->height + 8;
}
@@ -976,6 +984,7 @@
if ((var->activate & FB_ACTIVATE_FORCE) ||
    memcmp(&info->var, var, sizeof(struct fb_var_screeninfo))) {
  u32 activate = var->activate;
+u32 unused;

  /* When using FOURCC mode, make sure the red, green, blue and
   * transp fields are set to 0.
@@ -996,6 +1005,15 @@
goto done;
}
+/* bitfill_aligned() assumes that it's at least 8x8 */
+if (var->xres < 8 || var->yres < 8)
++return -EINVAL;
++/* Too huge resolution causes multiplication overflow. */
++if (check_mul_overflow(var->xres, var->yres, &unused) ||
++    check_mul_overflow(var->xres_virtual, var->yres_virtual, &unused))
++return -EINVAL;
+
ret = info->fbops->fb_check_var(var, info);

if (ret)
@@ -1127,7 +1145,7 @@
case FBIOGET_FSCREENINFO:
  if (!lock_fb_info(info))
    return -ENODEV;
-  fix = info->fix;
+  memcpy(&fix, &info->fix, sizeof(fix));
  unlock_fb_info(info);

  ret = copy_to_user(argp, &fix, sizeof(fix)) ? -EFAULT : 0;
@@ -1716,12 +1734,12 @@
return 0;
}

-static int do_unregister_framebuffer(struct fb_info *fb_info)
+static int unbind_console(struct fb_info *fb_info)
{
  struct fb_event event;
-  int i, ret = 0;
+  int ret;

int i = fb_info->node;

-i = fb_info->node;
if (i < 0 || i >= FB_MAX || registered_fb[i] != fb_info)
return -EINVAL;

unlock_fb_info(fb_info);
console_unlock();

return ret;
}

static int __unlink_framebuffer(struct fb_info *fb_info);
+
static int do_unregister_framebuffer(struct fb_info *fb_info)
+
+struct fb_event event;
+int ret;
+
+ret = unbind_console(fb_info);
+
if (ret)
return -EINVAL;

pm_vt_switch_unregister(fb_info->dev);

-unlink_framebuffer(fb_info);
+__unlink_framebuffer(fb_info);
if (fb_info->pixmap.addr &
   (fb_info->pixmap.flags & FB_PIXMAP_DEFAULT))
kfree(fb_info->pixmap.addr);
fb_destroy_modelist(&fb_info->modelist);
-registered_fb[i] = NULL;
+registered_fb[fb_info->node] = NULL;
num_registered_fb--;
fb_cleanup_device(fb_info);
event.info = fb_info;
@@ -1759,7 +1789,7 @@
return 0;
}

-int unlink_framebuffer(struct fb_info *fb_info)
+static int __unlink_framebuffer(struct fb_info *fb_info)
{
int i;

@@ -1771,6 +1801,20 @@
device_destroy(fb_class, MKDEV(FB_MAJOR, i));
fb_info->dev = NULL;
}
+
+return 0;
+
+
+int unlink_framebuffer(struct fb_info *fb_info)
+{
+  int ret;
+  
+  ret = __unlink_framebuffer(fb_info);
+  if (ret)
+    return ret;
+  
+  unbind_console(fb_info);
+  
+  return 0;
+}

EXPORT_SYMBOL(unlink_framebuffer);
--- linux-4.15.0.orig/drivers/video/fbdev/core/fbmon.c
+++ linux-4.15.0/drivers/video/fbdev/core/fbmon.c
@@ -997,97 +997,6 @@
DPRINTK("===========================================================\n");
}

-/**
- * fb_edid_add_monspecs() - add monitor video modes from E-EDID data
- * @edid:	128 byte array with an E-EDID block
- * @spacs:	monitor specs to be extended
- */
-void fb_edid_add_monspecs(unsigned char *edid, struct fb_monspecs *specs)
-{
-  unsigned char *block;
-  struct fb_videomode *m;
-  int num = 0, i;
-  u8 svd[64], edt[(128 - 4) / DETAILED_TIMING_DESCRIPTION_SIZE];
-  u8 pos = 4, svd_n = 0;
-  
-  if (!edid)
-    return;
-  
-  if (!edid_checksum(edid))
-    return;
-  
-  if (edid[0] != 0x2 ||
-    return;
- DPRINTK(" Short Video Descriptors\n");
-
- while (pos < edid[2]) {
- u8 len = edid[pos] & 0x1f, type = (edid[pos] >> 5) & 7;
- pr_debug("Data block %u of %u bytes\n", type, len);
- if (type == 2) {
- for (i = pos; i < pos + len; i++) {
- u8 idx = edid[pos + i] & 0x7f;
- svd[svd_n++] = idx;
- pr_debug("N%sative mode #%d\n", edid[pos + i] & 0x80 ? "on-" : "on-n", idx);
- }
- } else if (type == 3 && len >= 3) {
- /* Check Vendor Specific Data Block. For HDMI,
- it is always 00-0C-03 for HDMI Licensing, LLC. */
- if (edid[pos + 1] == 3 && edid[pos + 2] == 0xc &&
- edid[pos + 3] == 0)
- specs->misc |= FB_MISC_HDMI;
- }
- pos += len + 1;
- }
-}
- block = edid + edid[2];
-
- DPRINTK(" Extended Detailed Timings\n");
-
- for (i = 0; i < (128 - edid[2]) / DETAILED_TIMING_DESCRIPTION_SIZE;
- i++, block += DETAILED_TIMING_DESCRIPTION_SIZE)
- if (PIXEL_CLOCK != 0)
- edt[num++] = block - edid;
-}
-
- /* Yikes, EDID data is totally useless */
- if (!!(num + svd_n))
- return;
-
- m = kzalloc((specs->modedb_len + num + svd_n) *
- sizeof(struct fb_videomode), GFP_KERNEL);
-}
-
- if (!m)
- return;
-
- memcpy(m, specs->modedb, specs->modedb_len * sizeof(struct fb_videomode));
-
- for (i = specs->modedb_len; i < specs->modedb_len + num; i++) {
- get_detailed_timing(edid + edt[i - specs->modedb_len], &m[i]);
- if (i == specs->modedb_len)
- m[i].flag |= FB_MODE_IS_FIRST;
-pr_debug("Adding %ux%u@%u", m[i].xres, m[i].yres, m[i].refresh);
-
-
-for (i = specs->modedb_len + num; i < specs->modedb_len + num + svd_n; i++) {
-int idx = svd[i - specs->modedb_len - num];
-if (!((idx || idx >= ARRAY_SIZE(cea_modes)) {
-pr_warn("Reserved SVD code %d\n", idx);
-} else if (!cea_modes[idx].xres) {
-pr_warn("Unimplemented SVD code %d\n", idx);
-} else {
-memcpy(&m[i], cea_modes + idx, sizeof(m[i]));
-pr_debug("Adding SVD #%d: %ux%u@%u\n", idx, m[i].xres, m[i].yres, m[i].refresh);
-}
-}
-kfree(specs->modedb);
-specs->modedb = m;
-specs->modedb_len = specs->modedb_len + num + svd_n;
-}
-}

/*
 * VESA Generalized Timing Formula (GTF)
 */
@@ -1497,9 +1406,6 @@
void fb_edid_to_monspecs(unsigned char *edid, struct fb_monspecs *specs)
{
}
}
-void fb_edid_add_monspecs(unsigned char *edid, struct fb_monspecs *specs)
-{ }
}
void fb_destroy_modedb(struct fb_videomode *modedb)
{
}
@@ -1607,7 +1513,6 @@
EXPORT_SYMBOL(fb_parse_edid);
EXPORT_SYMBOL(fb_edid_to_monspecs);
-EXPORT_SYMBOL(fb_edid_add_monspecs);
EXPORT_SYMBOL(fb_get_mode);
EXPORT_SYMBOL(fb_validate_mode);
EXPORT_SYMBOL(fb_destroy_modedb);
--- linux-4.15.0.orig/drivers/video/fbdev/core/modedb.c
+++ linux-4.15.0/drivers/video/fbdev/core/modedb.c
@@ -289,63 +289,6 @@
#ifdef CONFIG_FB_MODE_HELPERS

ifdef CONFIG_FB_MODE_HELPER
-const struct fb_videomode cea_modes[65] = {
  /* #1: 640x480p@59.94/60Hz */
  [1] = {
    NULL, 60, 640, 480, 39722, 48, 16, 33, 10, 96, 2, 0,
    -FB_VMODE_NONINTERLACED, 0,
  },
  /* #3: 720x480p@59.94/60Hz */
  [3] = {
    NULL, 60, 720, 480, 37037, 60, 16, 30, 9, 62, 6, 0,
    -FB_VMODE_NONINTERLACED, 0,
  },
  /* #5: 1920x1080i@59.94/60Hz */
  [5] = {
    NULL, 60, 1920, 1080, 13763, 148, 88, 15, 2, 44, 5,
    -FB_SYNC_HOR_HIGH_ACT | FB_SYNC_VERT_HIGH_ACT,
    -FB_VMODE_INTERLACED, 0,
  },
  /* #7: 720(1440)x480iH@59.94/60Hz */
  [7] = {
    NULL, 60, 1440, 480, 18554/*37108*/, 114, 38, 15, 4, 124, 3, 0,
    -FB_VMODE_INTERLACED, 0,
  },
  /* #9: 720(1440)x240pH@59.94/60Hz */
  [9] = {
    NULL, 60, 1440, 240, 18554, 114, 38, 16, 4, 124, 3, 0,
    -FB_VMODE_NONINTERLACED, 0,
  },
  /* #18: 720x576pH@50Hz */
  [18] = {
    NULL, 50, 720, 576, 37037, 68, 12, 39, 5, 64, 5, 0,
    -FB_VMODE_NONINTERLACED, 0,
  },
  /* #19: 1280x720p@50Hz */
  [19] = {
    NULL, 50, 1280, 720, 13468, 220, 440, 20, 5, 40, 5,
    -FB_SYNC_HOR_HIGH_ACT | FB_SYNC_VERT_HIGH_ACT,
    -FB_VMODE_NONINTERLACED, 0,
  },
  /* #20: 1920x1080i@50Hz */
  [20] = {
    NULL, 50, 1920, 1080, 13480, 148, 528, 15, 5, 528, 5,
    -FB_SYNC_HOR_HIGH_ACT | FB_SYNC_VERT_HIGH_ACT,
    -FB_VMODE_INTERLACED, 0,
  },
  /* #32: 1920x1080p@23.98/24Hz */
  [32] = {
    NULL, 24, 1920, 1080, 13468, 148, 638, 36, 4, 44, 5,
    -FB_SYNC_HOR_HIGH_ACT | FB_SYNC_VERT_HIGH_ACT,
const struct fb_videomode vesa_modes[] = {

/* 0 640x350-85 VESA */
{ NULL, 85, 640, 350, 31746, 96, 32, 60, 32, 64, 3, 80, 50 },
@@ -644,7 +587,7 @@

* Valid mode specifiers for @mode_option:
*
- * <xres>x<yres>M[R][-<bpp>][@<refresh>][i][m] or
+ * <xres>x<yres>M[R][-<bpp>][@<refresh>][i][p][m] or
 * <name>[-<bpp>][@<refresh>]
*
 * with <xres>, <yres>, <bpp> and <refresh> decimal numbers and
@@ -653,10 +596,10 @@
 *
 * If 'M' is present after yres (and before refresh/bpp if present),
 * the function will compute the timings using VESA(tm) Coordinated
 * Video Timings (CVT). If 'R' is present after 'M', will compute with
- * reduced blanking (for flatpanels). If 'i' is present, compute
- * interlaced mode. If 'm' is present, add margins equal to 1.8%
- * of xres rounded down to 8 pixels, and 1.8% of yres. The char
- * 'i' and 'm' must be after 'M' and 'R'. Example:
+ * reduced blanking (for flatpanels). If 'i' or 'p' are present, compute
+ * interlaced or progressive mode. If 'm' is present, add margins equal
+ * to 1.8% of xres rounded down to 8 pixels, and 1.8% of yres. The chars
+ * 'i', 'p' and 'm' must be after 'M' and 'R'. Example:
 *
* 1024x768MR-8@60m - Reduced blank with margins at 60Hz.
*
@@ -697,7 +640,8 @@
unsigned int namelen = strlen(name);
int res_specified = 0, bpp_specified = 0, refresh_specified = 0;
unsigned int xres = 0, yres = 0, bpp = default_bpp, refresh = 0;
-    int yres_specified = 0, cvt = 0, rb = 0, interlace = 0;
+    int yres_specified = 0, cvt = 0, rb = 0;
+    int interlace_specified = 0, interlace = 0;
int margins = 0;
    u32 best, diff, tdiff;

@@ -748,9 +692,17 @@
        if (!cvt)
margins = 1;
break;
+case 'p':
+if (!cvt) {
+interlace = 0;
+interlace_specified = 1;
+}
+break;
break;
case 'i':
-case 'i':
+if (!cvt) {
+interlace = 1;
+interlace_specified = 1;
+}
break;
default:
goto done;
@@ -819,11 +771,21 @@
if ((name_matches(db[i], name, namelen) ||
(res_specified && res_matches(db[i], xres, yres)) &&
!fb_try_mode(var, info, &db[i], bpp)) {
-if (refresh_specified && db[i].refresh == refresh)
-return 1;
+const int db_interlace = (db[i].vmode &
+FB_VMODE_INTERLACED ? 1 : 0);
+int score = abs(db[i].refresh - refresh);
+
+if (interlace_specified)
+score += abs(db_interlace - interlace);
+
+if (interlace_specified ||
+db_interlace == interlace)
+if (refresh_specified &&
+db[i].refresh == refresh)
+return 1;
-
-if (abs(db[i].refresh - refresh) < diff) {
-diff = abs(db[i].refresh - refresh);
+if (score < diff) {
+diff = score;
best = i;
}
}
@@ -914,6 +876,9 @@
if (var->vmode & FB_VMODE_DOUBLE)
vtotal *= 2;
+
+if (!htotal || !vtotal)
return;

hfreq = pixclock/htotal;
mode->refresh = hfreq/vtotal;
}

--- linux-4.15.0.orig/drivers/video/fbdev/core/tileblit.c
+++ linux-4.15.0/drivers/video/fbdev/core/tileblit.c
@@ -13,6 +13,7 @@
#include <linux/fb.h>
#include <linux/vt_kern.h>
#include <linux/console.h>
+#include <linux/font.h>
#include <asm/types.h>
#include "fbcon.h"

@@ -80,7 +81,7 @@
}
static void tile_cursor(struct vc_data *vc, struct fb_info *info, int mode,
-t		int softback_lines, int fg, int bg)
+int fg, int bg)
{
struct fb_tilecursor cursor;
int use_sw = (vc->vc_cursor_type & 0x10);
--- linux-4.15.0.orig/drivers/video/fbdev/geode/video_gx.c
+++ linux-4.15.0/drivers/video/fbdev/geode/video_gx.c
@@ -127,7 +127,7 @@
int timeout = 1000;
/* Rev. 1 Geode GXs use a 14 MHz reference clock instead of 48 MHz. */
-if (cpu_data(0).x86_mask == 1) {
+if (cpu_data(0).x86_stepping == 1) {
pll_table = gx_pll_table_14MHz;
pll_table_len = ARRAY_SIZE(gx_pll_table_14MHz);
} else {
--- linux-4.15.0.orig/drivers/video/fbdev/goldfishfb.c
+++ linux-4.15.0/drivers/video/fbdev/goldfishfb.c
@@ -234,7 +234,7 @@
fb->fb.var.activate = FB_ACTIVATE_NOW;
fb->fb.var.height = readl(fb->reg_base + FB_GET_PHYS_HEIGHT);
fb->fb.var.width = readl(fb->reg_base + FB_GET_PHYS_WIDTH);
-fb->fb.var.pixclock = 10000;
+fb->fb.var.pixclock = 0;

fb->fb.var.red.offset = 11;
fb->fb.var.red.length = 5;
@@ -301,6 +301,7 @@
dma_free_coherent(&pdev->dev, framesize, (void *)fb->fb.screen_base,
fb->fb.fix.smem_start);
!ounmap(fb->reg_base);
+kfree(fb);
return 0;
}

--- linux-4.15.0.orig/drivers/video/fbdev/hgafb.c
+++ linux-4.15.0/drivers/video/fbdev/hgafb.c
@@ -285,6 +285,8 @@
hga_vram_len = 0x08000;

hga_vram = ioremap(0xb0000, hga_vram_len);
+if (!hga_vram)
+return -ENOMEM;
if (request_region(0x3b0, 12, "hgafb"))
release_io_ports = 1;
@@ -344,13 +346,18 @@
hga_type_name = "Hercules";
break;
} -return 1;
+return 0;
error:
if (release_io_ports)
release_region(0x3b0, 12);
if (release_io_port)
release_region(0x3bf, 1);
-return 0;
+
io_unmap(hga_vram);
+
+pr_err("hgafb: HGA card not detected.\n");
+
+return -EINVAL;
}

/**
 @@ -548,13 +555,11 @@
 static int hgafb_probe(struct platform_device *pdev)
 {
 struct fb_info *info;
+int ret;

 -if (!hga_card_detect()) {
 -printk(KERN_INFO "hgafb: HGA card not detected.\n");
 -if (hga_vram)
 -io_unmap(hga_vram);
+ret = hga_card_detect();
+if (ret)
+return ret;

printk(KERN_INFO "hgafb: %s with %ldK of memory detected.\n",
    hga_type_name, hga_vram_len/1024);
--- linux-4.15.0.orig/drivers/video/fbdev/hyperv_fb.c
+++ linux-4.15.0/drivers/video/fbdev/hyperv_fb.c
@@ -252,7 +252,7 @@
        VM_PKT_DATA_INBAND, 0);
    if (ret)
-    pr_err("Unable to send packet via vmbus\n");
+    pr_err_ratelimited("Unable to send packet via vmbus; error %d\n", ret);

    return ret;
 }
@@ -712,7 +712,10 @@
    goto err2;
 }

-fb_virt = ioremap(par->mem->start, screen_fb_size);
+/*
+ * Map the VRAM cacheable for performance.
+ */
+fb_virt = ioremap_wc(par->mem->start, screen_fb_size);
if (!fb_virt)
    goto err2;

--- linux-4.15.0.orig/drivers/video/fbdev/kyro/fbdev.c
+++ linux-4.15.0/drivers/video/fbdev/kyro/fbdev.c
@@ -372,6 +372,11 @@
       /* probably haven't called CreateOverlay yet */
    return -EINVAL;
 }
+if (ulWidth == 0 || ulWidth == 0xffffffff ||
    ulHeight == 0 || ulHeight == 0xffffffff ||
    (x < 2 && ulWidth + 2 == 0))
+    return -EINVAL;
+/* Stop Ramdac Output */
+DisableRamdacOutput(deviceInfo.pSTGReg);

@@ -394,6 +399,9 @@
    }
  struct kyrofb_info *par = info->par;

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+ if (!var->pixclock)
+ return -EINVAL;
+
+ if (var->bits_per_pixel != 16 && var->bits_per_pixel != 32) {
+ printk(KERN_WARNING "kyrofb: depth not supported: %u\n", var->bits_per_pixel);
+ return -EINVAL;
+ }

static struct mmp_overlay *path_get_overlay(struct mmp_path *path,
@@ -23,6 +23,7 @@
#include <linux/slab.h>
#include <linux/dma-mapping.h>
#include <linux/export.h>
+#include <linux/module.h>
#include <video/mmp_disp.h>

static struct mmp_overlay *path_get_overlay(struct mmp_path *path,
@@ -249,3 +250,7 @@
mutex_unlock(&disp_lock);
}
EXPORT_SYMBOL_GPL(mmp_unregister_path);
+
+MODULE_AUTHOR("Zhou Zhu <zzhu3@marvell.com>");
+MODULE_DESCRIPTION("Marvell MMP display framework");
+MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/video/fbdev/neofb.c
+++ linux-4.15.0/drivers/video/fbdev/neofb.c
@@ -1820,6 +1820,7 @@
#else
printk(KERN_ERR
 "neofb: Only 640x480, 800x600/480 and 1024x768 panels are currently supported\n");
+kfree(info->monsspecs.modedb);
return -1;
#endif
default:
--- linux-4.15.0.orig/drivers/video/fbdev/omap/omapfb_main.c
+++ linux-4.15.0/drivers/video/fbdev/omap/omapfb_main.c
@@ -958,7 +958,7 @@
{
int r;

- if ((unsigned)omapfb_nb->plane_idx > OMAPFB_PLANE_NUM)
+ if ((unsigned)omapfb_nb->plane_idx >= OMAPFB_PLANE_NUM)
 return -EINVAL;

if (!notifier_inited) {
--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/Makefile
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/Makefile
@@ -2,5 +2,5 @@
obj-$(CONFIG_OMAP2_VRFB) += vrfb.o
obj-y += dss/
obj-y += displays/
-obj-$(CONFIG_FB_OMAP2) += omapfb.o
-omapfb-y := omapfb-main.o omapfb-sysfs.o omapfb-ioctl.o
+obj-$(CONFIG_FB_OMAP2) += omap2fb.o
+omap2fb-y := omapfb-main.o omapfb-sysfs.o omapfb-ioctl.o
--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/displays/panel-tpo-td028ttec1.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/displays/panel-tpo-td028ttec1.c
@@ -455,6 +455,8 @@
}
static const struct of_device_id td028ttec1_of_match[] = {
+{ .compatible = "omapdss,tdo28ttec1", },
+/* keep to not break older DTB */
{ .compatible = "omapdss,toppoly,td028ttec1", },
{ },
};
@@ -474,6 +476,7 @@
module_spi_driver(td028ttec1_spi_driver);

+MODULE_ALIAS("spi:tdo28ttec1");
MODULE_ALIASES("spi:toppoly,td028ttec1");
MODULE_AUTHOR("H. Nikolaus Schaller <hns@goldelico.com>");
MODULE_DESCRIPTION("Toppoly TD028TTEC1 panel driver");
--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/dss/dispc.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/dss/dispc.c
@@ -531,8 +531,11 @@
DSSDBG("dispc_runtime_get\n");

r = pm_runtime_get_sync(&dispc.pdev->dev);
-WARN_ON(r < 0);
-return r < 0 ? r : 0;
+if (WARN_ON(r < 0)) {
+pm_runtime_put_sync(&dispc.pdev->dev);
+return r;
+}
+return 0;
}
EXPORT_SYMBOL(dispc_runtime_get);

--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/dss/dsi.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/dss/dsi.c
@@ -1148,8 +1148,11 @@
DSSDBG("dsi_runtime_get\n");
r = pm_runtime_get_sync(&dsi->pdev->dev);
-WARN_ON(r < 0);
-return r < 0 ? r : 0;
+if (WARN_ON(r < 0)) {
+pm_runtime_put_sync(&dsi->pdev->dev);
+return r;
+}
+return 0;
}

static void dsi_runtime_put(struct platform_device *dsidev)
--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/dss/dss.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/dss/dss.c
@@ -778,8 +778,11 @@
DSSDBG("dss_runtime_get\n");

r = pm_runtime_get_sync(&dss.pdev->dev);
-WARN_ON(r < 0);
-return r < 0 ? r : 0;
+if (WARN_ON(r < 0)) {
+pm_runtime_put_sync(&dss.pdev->dev);
+return r;
+}
+return 0;
}

void dss_runtime_put(void)
@@ -843,7 +846,7 @@
};

static const struct dss_features omap3630_dss_feats = {
  .fck_div_max=32,
  +.fck_div_max=31,
  .dss_fck_multiplier=1,
  .parent_clk_name="dpll4_ck",
  .dpi_select_source=&dss_dpi_select_source_omap2_omap3,
--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/dss/hdmi4.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/dss/hdmi4.c
@@ -50,9 +50,10 @@
DSSDBG("hdmi_runtime_get\n");

r = pm_runtime_get_sync(&hdmi(pdev->dev);
-WARN_ON(r < 0);
-if (r < 0)
+if (WARN_ON(r < 0)) {
+pm_runtime_put_sync(&hdmi(pdev->dev);
+return r;
+}
return 0;

--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/dss/hdmi5.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/dss/hdmi5.c
@@ -54,9 +54,10 @@
 DSSDBG("hdmi_runtime_get\n");

 r = pm_runtime_getsync(&hdmi(pdev->dev);
 -WARN_ON(r < 0);
- if (r < 0)
+ if (WARN_ON(r < 0)) {
+ pm_runtime_putsync(&hdmi(pdev->dev);
 return r;
 +}

 return 0;

--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/dss/venc.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/dss/venc.c
@@ -402,8 +402,11 @@
 DSSDBG("venc_runtime_get\n");

 r = pm_runtime_getsync(&venc(pdev->dev);
 -WARN_ON(r < 0);
- if (r < 0)
+ if (WARN_ON(r < 0)) {
+ pm_runtime_putsync(&venc(pdev->dev);
+ return r;
+}
+ return 0;

 static void venc_runtime_put(void)
--- linux-4.15.0.orig/drivers/video/fbdev/omap2/omapfb/omapfb-ioctl.c
+++ linux-4.15.0/drivers/video/fbdev/omap2/omapfb/omapfb-ioctl.c
@@ -496,6 +496,9 @@
 if (!access_ok(VERIFY_WRITE, mr->buffer, mr->buffer_size))
 return -EFAULT;

+ if (mr->w > 4096 || mr->h > 4096)
+ return -EINVAL;
+ if (mr->w * mr->h * 3 > mr->buffer_size)
+ return -EINVAL;

 mr->x, mr->y, mr->w, mr->h);
if (r > 0) {
    -if (copy_to_user(mr->buffer, buf, mr->buffer_size))
    +if (copy_to_user(mr->buffer, buf, r))
    r = -EFAULT;
}

@@ -606,6 +609,8 @@
int r = 0;

+memset(&p, 0, sizeof(p));
+
switch (cmd) {
    case OMAPFB_SYNC_GFX:
        DBG("ioctl SYNC_GFX\n");
--- linux-4.15.0.orig/drivers/video/fbdev/pvr2fb.c
+++ linux-4.15.0/drivers/video/fbdev/pvr2fb.c
@@ -1027,6 +1027,8 @@
    if (!options || !*options)
        return 0;

+    cable_arg[0] = output_arg[0] = 0;
+    while ((this_opt = strsep(&options, ","))) {
if (!*this_opt)
        continue;
--- linux-4.15.0.orig/drivers/video/fbdev/pxa168fb.c
+++ linux-4.15.0/drivers/video/fbdev/pxa168fb.c
@@ -712,7 +712,7 @@
    /*
    * enable controller clock
    */
-    clk_enable(fbi->clk);
+    clk_prepare_enable(fbi->clk);

    pxa168fb_set_par(info);

@@ -767,10 +767,10 @@
    failed_free_cmap:
    fb_dealloc_cmap(&info->cmap);
    failed_free_clk:
-    clk_disable(fbi->clk);
+    clk_disable_unprepare(fbi->clk);
    failed_free_fbmem:
    -dma_free_coherent(fbi->dev, info->fix.smem_len,
    -info->screen_base, fbi->fb_start_dma);
+    dma_free_wc(fbi->dev, info->fix.smem_len,
info->screen_base, fbi->fb_start_dma);
failed_free_info:
kfree(info);

irc = platform_get_irq(pdev, 0);

-dma_free_wc(fbi->dev, PAGE_ALIGN(info->fix.smem_len),
+dma_free_wc(fbi->dev, info->fix.smem_len,
    info->screen_base, info->fix.smem_start);

-clk_disable(fbi->clk);
+clk_disable_unprepare(fbi->clk);

framebuffer_release(info);

--- linux-4.15.0.orig/drivers/video/fbdev/pxafb.c
+++ linux-4.15.0/drivers/video/fbdev/pxafb.c
@@ -2130,8 +2130,8 @@
     return -EINVAL;
    ret = -ENOMEM;
    -info->modes = kmalloc_array(timings->num_timings,
     +info->modes = kcalloc(timings->num_timings, sizeof(info->modes[0]),
     GFP_KERNEL);
    if (!info->modes)
goto out;
    info->num_modes = timings->num_timings;
@@ -2221,10 +2221,8 @@
 if (!info)
     goto out;
    info->num_modes = timings->num_timings;
@@ -2449,8 +2447,8 @@
 free_pages_exact(fbi->video_mem, fbi->video_mem_size);

-dma_free_wc(&dev->dev, fbi->dma_buff_size, fbi->dma_buff,
-    fbi->dma_buff_phys);
+dma_free_coherent(&dev->dev, fbi->dma_buff_size, fbi->dma_buff, 
+ fbi->dma_buff_phys);

iounmap(fbi->mmio_base);

--- linux-4.15.0.orig/drivers/video/fbdev/riva/fbdev.c
+++ linux-4.15.0/drivers/video/fbdev/riva/fbdev.c
@@ -1088,6 +1088,9 @@
 int mode_valid = 0;

 NVTRACE_ENTER();
+if (!var->pixclock)
+return -EINVAL;
+
 switch (var->bits_per_pixel) {
 case 1 ... 8:
 var->red.offset = var->green.offset = var->blue.offset = 0;
--- linux-4.15.0.orig/drivers/video/fbdev/sbuslib.c
+++ linux-4.15.0/drivers/video/fbdev/sbuslib.c
@@ -106,11 +106,11 @@
struct fbtype __user *f = (struct fbtype __user *) arg;

 if (put_user(type, &f->fb_type) ||
-   __put_user(info->var.yres, &f->fb_height) ||
-   __put_user(info->var.xres, &f->fb_width) ||
-   __put_user(fb_depth, &f->fb_depth) ||
-   __put_user(0, &f->fb_cmsize) ||
-   __put_user(fb_size, &f->fb_cmsize))
+   put_user(info->var.yres, &f->fb_height) ||
+   put_user(info->var.xres, &f->fb_width) ||
+   put_user(fb_depth, &f->fb_depth) ||
+   put_user(0, &f->fb_cmsize) ||
+   put_user(fb_size, &f->fb_cmsize))
return -EFAULT;
return 0;
@@ -122,13 +122,13 @@
 unsigned char __user *ured;
 unsigned char __user *ugreen;
 unsigned char __user *ublue;
-    int index, count, i;
+    unsigned int index, count, i;

 if (get_user(index, &c->index) ||
-   __get_user(count, &c->count) ||
-   __get_user(ured, &c->red) ||
-   __get_user(ugreen, &c->green) ||
-   __get_user(ublue, &c->blue))
+ get_user(count, &c->count) ||
+ get_user(ured, &c->red) ||
+ get_user(ugreen, &c->green) ||
+ get_user(ublue, &c->blue))
return -EFAULT;

cmap.len = 1;
@@ -161,17 +161,17 @@
unsigned char __user *ugreen;
unsigned char __user *ublue;
struct fb_cmap *cmap = &info->cmap;
-int index, count, i;
+unsigned int index, count, i;
u8 red, green, blue;

if (get_user(index, &c->index) ||
- __get_user(count, &c->count) ||
- __get_user(ured, &c->red) ||
- __get_user(ugreen, &c->green) ||
- __get_user(ublue, &c->blue))
+ get_user(count, &c->count) ||
+ get_user(ured, &c->red) ||
+ get_user(ugreen, &c->green) ||
+ get_user(ublue, &c->blue))
return -EFAULT;

- if (index + count > cmap->len)
+ if (index > cmap->len || count > cmap->len - index)
return -EINVAL;

for (i = 0; i < count; i++) {
--- linux-4.15.0.orig/drivers/video/fbdev/sis/init.c
+++ linux-4.15.0/drivers/video/fbdev/sis/init.c
@@ -2428,6 +2428,11 @@
i = 0;
+if (SiS_Pr->ChipType == SIS_730)
+queue data = &FQBQData730[0];
+else
+queue data = &FQBQData[0];
+  if (ModeNo > 0x13) {
+    /* Get VCLK */
+    color th = col or th array[(SiS_Pr->SiS_ModeType - ModeEGA)];
if(SiS_Pr->ChipType == SIS_730) {
    queuedata = &FQBQData730[0];
} else {
    queuedata = &FQBQData[0];
}

do {
    templ = SiS_CalcDelay2(SiS_Pr, queuedata[i]) * VCLK * colorth;
}

--- linux-4.15.0.orig/drivers/video/fbdev/sis/init301.c
+++ linux-4.15.0/drivers/video/fbdev/sis/init301.c
@@ -522,9 +522,7 @@
SiS_DDC2Delay(SiS_Pr, 0x4000);
}

-} else if((SiS_Pr->SiS_IF_DEF_LVDS == 1) ||
-          (SiS_Pr->SiS_CustomT == CUT_COMPAQ1280) ||
-          (SiS_Pr->SiS_CustomT == CUT_CLEVO1400) ) { /* 315 series, LVDS; Special */
+} else if (SiS_Pr->SiS_IF_DEF_LVDS == 1) { /* 315 series, LVDS; Special */

    if(SiS_Pr->SiS_IF_DEF_CH70xx == 0) {
        PanelID = SiS_GetReg(SiS_Pr->SiS_P3d4,0x36);
--- linux-4.15.0.orig/drivers/video/fbdev/sm712.h
+++ linux-4.15.0/drivers/video/fbdev/sm712.h
@@ -15,14 +15,10 @@
#define FB_ACCEL_SMI_LYNX 88
-#define SCREEN_X_RES      1024
-#define SCREEN_Y_RES      600
-#define SCREEN_BPP        16
-
-/*Assume SM712 graphics chip has 4MB VRAM */
-#define SM712_VIDEOMEMORYSIZE 0x00400000
-/*Assume SM722 graphics chip has 8MB VRAM */
-#define SM722_VIDEOMEMORYSIZE 0x00800000
+#define SCREEN_X_RES 1024
+#define SCREEN_Y_RES_PC 768
+#define SCREEN_Y_RES_NETBOOK 600
+#define SCREEN_BPP 16

#define dac_reg(0x3c8)
#define dac_val(0x3c9)
--- linux-4.15.0.orig/drivers/video/fbdev/sm712fb.c
+++ linux-4.15.0/drivers/video/fbdev/sm712fb.c
@@ -530,6 +530,65 @@
0x03, 0x03, 0x03, 0x03, 0x03, 0x03, 0x03, 0x03, 0x03, 0x03, 0x03, 0x03, 0x03,
/* 1024 x 768 16Bpp 60Hz */
1024, 768, 16, 60,
/* Init_MISC */
0xEB,
/* Init_SR0_SR4 */
0x03, 0x01, 0x0F, 0x03, 0x0E,
/* Init_SR10_SR24 */
0x03, 0x01, 0x0F, 0x03, 0x0E,
/* Init_SR30_SR75 */
0x38, 0x03, 0x20, 0x09, 0xC0, 0x3A, 0x3A, 0x3A,
/* Init_SR80_SR93 */
0x00, 0x07, 0x00, 0xFF, 0xFF, 0xFF, 0xFF, 0x03,
/* Init_AR00_AR14 */
0x00, 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x07,
/* Init_CR00_CR18 */
0xA3, 0x7F, 0x7F, 0x00, 0x85, 0x16, 0x24, 0xF5,
static int smtc_blank(int blank_mode, struct fb_info *info)
{
    struct smtcfb_info *sfb = info->par;

    /* clear DPMS setting */
    switch (blank_mode) {
    case FB_BLANK_UNBLANK:
        /* Screen On: HSync: On, VSync : On */
        switch (sfb->chip_id) {
        case 0x710:
        case 0x712:
            smtc_seqw(0x6a, 0x16);
            smtc_seqw(0x6b, 0x02);
            break;
        case 0x720:
            smtc_seqw(0x6a, 0x0d);
            smtc_seqw(0x6b, 0x02);
            break;
        }

        smtc_seqw(0x21, (smtc_seqr(0x21) & 0x77));
        smtc_seqw(0x22, (smtc_seqr(0x22) & (~0x30)));
        break;
    }

    +smtc_seqw(0x23, (smtc_seqr(0x23) & (~0xc0)));
    smtc_seqw(0x01, (smtc_seqr(0x01) & (~0x20)));
    -smtc_seqw(0x6a, 0x16);
    -smtc_seqw(0x6b, 0x02);
    smtc_seqw(0x21, (smtc_seqr(0x21) & 0x77));
    smtc_seqw(0x22, (smtc_seqr(0x22) & (~0x30)));
    -smtc_seqw(0x23, (smtc_seqr(0x23) & (~0xc0)));
    -smtc_seqw(0x24, (smtc_seqr(0x24) | 0x01));
    smtc_seqw(0x31, (smtc_seqr(0x31) | 0x03));
}
+smtc_seqw(0x24, (smtc_seqr(0x24) | 0x01));
break;
case FB_BLANK_NORMAL:
/* Screen Off: HSync: On, VSync : On Soft blank */
+smtc_seqw(0x24, (smtc_seqr(0x24) | 0x01));
+smtc_seqw(0x31, ((smtc_seqr(0x31) | (~0x07)) | 0x00));
+smtc_seqw(0x23, (smtc_seqr(0x23) & (~0xc0)));
smtc_seqw(0x01, (smtc_seqr(0x01) & (~0x20)));
+smtc_seqw(0x22, (smtc_seqr(0x22) & (~0x30)));
smtc_seqw(0x6a, 0x16);
smtc_seqw(0x6b, 0x02);
-smtc_seqw(0x22, (smtc_seqr(0x22) & (~0x30)));
-smtc_seqw(0x23, (smtc_seqr(0x23) & (~0xc0)));
-smtc_seqw(0x24, (smtc_seqr(0x24) | 0x01));
-smtc_seqw(0x31, ((smtc_seqr(0x31) & (~0x07)) | 0x00));
break;
case FB_BLANK_VSYNC_SUSPEND:
/* Screen On: HSync: On, VSync : Off */
+smtc_seqw(0x24, (smtc_seqr(0x24) & (~0x01)));
+smtc_seqw(0x31, ((smtc_seqr(0x31) & (~0x07)) | 0x00));
+smtc_seqw(0x23, ((smtc_seqr(0x23) & (~0xc0)) | 0x20));
smtc_seqw(0x01, (smtc_seqr(0x01) | 0x20));
-smtc_seqw(0x20, (smtc_seqr(0x20) & (~0xB0)));
-smtc_seqw(0x6a, 0x0c);
-smtc_seqw(0x6b, 0x02);
smtc_seqw(0x21, (smtc_seqr(0x21) | 0x88));
+smtc_seqw(0x20, (smtc_seqr(0x20) & (~0xB0)));
smtc_seqw(0x22, ((smtc_seqr(0x22) & (~0x30)) | 0x20));
-smtc_seqw(0x23, ((smtc_seqr(0x23) & (~0xc0)) | 0x20));
-smtc_seqw(0x24, (smtc_seqr(0x24) & (~0x01)));
-smtc_seqw(0x31, ((smtc_seqr(0x31) & (~0x07)) | 0x00));
smtc_seqw(0x34, (smtc_seqr(0x34) | 0x80));
+smtc_seqw(0x6a, 0x0c);
+smtc_seqw(0x6b, 0x02);
break;
case FB_BLANK_HSYNC_SUSPEND:
/* Screen On: HSync: Off, VSync : On */
+smtc_seqw(0x24, (smtc_seqr(0x24) & (~0x01)));
+smtc_seqw(0x31, ((smtc_seqr(0x31) & (~0x07)) | 0x00));
+smtc_seqw(0x23, ((smtc_seqr(0x23) & (~0xc0)) | 0xD8));
smtc_seqw(0x01, (smtc_seqr(0x01) | 0x20));
-smtc_seqw(0x20, (smtc_seqr(0x20) & (~0xB0)));
-smtc_seqw(0x6a, 0x0c);
-smtc_seqw(0x6b, 0x02);
smtc_seqw(0x21, (smtc_seqr(0x21) | 0x88));
+smtc_seqw(0x20, (smtc_seqr(0x20) & (~0xB0)));
smtc_seqw(0x22, ((smtc_seqr(0x22) & (~0x30)) | 0x10));
-smtc_seqw(0x23, ((smtc_seqr(0x23) & (~0xc0)) | 0xD8));
- smtc_seqw(0x24, (smtc_seqr(0x24) & (~0x01)));  
- smtc_seqw(0x31, ((smtc_seqr(0x31) & (~0x07)) | 0x00)); 
 smtc_seqw(0x34, (smtc_seqr(0x34) | 0x80));  
+ smtc_seqw(0x6a, 0x0c);  
+ smtc_seqw(0x6b, 0x02);  
break;

case FB_BLANK_POWERDOWN:
	/* Screen On: HSync: Off, VSync : Off */
+ smtc_seqw(0x24, (smtc_seqr(0x24) & (~0x01)));  
+ smtc_seqw(0x31, ((smtc_seqr(0x31) & (~0x07)) | 0x00)); 
+ smtc_seqw(0x23, ((smtc_seqr(0x23) & (~0xc0)) | 0xD8)); 
smtc_seqw(0x01, (smtc_seqr(0x01) | 0x20));  
- smtc_seqw(0x20, (smtc_seqr(0x20) & (~0xB0)));  
- smtc_seqw(0x6a, 0x0c);  
- smtc_seqw(0x6b, 0x02);  
smtc_seqw(0x21, (smtc_seqr(0x21) | 0x88));  
+ smtc_seqw(0x20, (smtc_seqr(0x20) & (~0xB0)));  
+ smtc_seqw(0x22, ((smtc_seqr(0x22) & (~0x30)) | 0x30));  
- smtc_seqw(0x23, ((smtc_seqr(0x23) & (~0xc0)) | 0xD8));  
- smtc_seqw(0x24, (smtc_seqr(0x24) & (~0x01)));  
- smtc_seqw(0x31, ((smtc_seqr(0x31) & (~0x07)) | 0x00));  
+ smtc_seqw(0x6a, 0x0c);  
+ smtc_seqw(0x6b, 0x02);  
break;

default:
	return -EINVAL;

@@ -1145,8 +1217,10 @@
	/* init SEQ register SR30 - SR75 */

for (i = 0; i < SIZE_SR30_SR75; i++) {  
	if ((i + 0x30) != 0x62 && (i + 0x30) != 0x6a &&
		(i + 0x30) != 0x6b)  
+ if ((i + 0x30) != 0x30 && (i + 0x30) != 0x62 &&
+ (i + 0x30) != 0x6a && (i + 0x30) != 0x6b &&
+ (i + 0x30) != 0x70 && (i + 0x30) != 0x71 &&
+ (i + 0x30) != 0x74 && (i + 0x30) != 0x75)
	+ smtc_seqw(i + 0x30,
	+ vgamode[j].init_sr30_sr75[i]);

@@ -1171,8 +1245,12 @@

+ /* init CRTC register CR30 - CR4D */
+ for (i = 0; i < SIZE_CR30_CR4D; i++) {
+ + if ((i + 0x30) >= 0x3B && (i + 0x30) <= 0x3F)
+ + /* side-effect, don't write to CR3B-CR3F */
+continue;
smtc_crtcw(i + 0x30, vgamode[j].init_cr30_cr4d[i]);
+
/*@ init CRTC register CR90 - CRA7 */
for (i = 0; i < SIZE_CR90_CRA7; i++)
@@ -1323,6 +1401,11 @@
{
  sfb->fb->fix.smem_start = pci_resource_start(pdev, 0);

+if (sfb->chip_id == 0x720)
+/* on SM720, the framebuffer starts at the 1 MB offset */
+sfb->fb->fix.smem_start += 0x00200000;
+ /* XXX: is it safe for SM720 on Big-Endian? */
if (sfb->fb->var.bits_per_pixel == 32)
  sfb->fb->fix.smem_start += big_addr;
@@ -1346,6 +1429,8 @@
static void smtc_unmap_smem(struct smtcfb_info *sfb)
{
  if (sfb && sfb->fb->screen_base) {
    +if (sfb->chip_id == 0x720)
    +/* SM720, the framebuffer starts at the 1 MB offset */
    +sfb->fb->screen_base += 0x00200000;
    iounmap(sfb->fb->screen_base);
    sfb->fb->screen_base = NULL;
  }
  @@ -1360,12 +1445,82 @@
  outb_p(0x11, 0x3c5);
}

+static u_long sm7xx_vram_probe(struct smtcfb_info *sfb)
+{
+  u8 vram;
+  +switch (sfb->chip_id) {
+    +case 0x710:
+      +case 0x712:
+        +/* Assume SM712 graphics chip has 4MB VRAM.
+        + FIXME: SM712 can have 2MB VRAM, which is used on earlier
+        + laptops, such as IBM Thinkpad 240X. This driver would
+        + probably crash on those machines. If anyone gets one of
+        + those and is willing to help, run "git blame" and send me
+        + an E-mail.
+        +*/
+        +return 0x00400000;
case 0x720:
+outb_p(0x76, 0x3c4);
+vram = inb_p(0x3c5) >> 6;
+
+if (vram == 0x00)
+return 0x00800000; /* 8 MB */
+else if (vram == 0x01)
+return 0x01000000; /* 16 MB */
+else if (vram == 0x02)
+return 0x00400000; /* illegal, fallback to 4 MB */
+else if (vram == 0x03)
+return 0x00400000; /* 4 MB */
+
+return 0; /* unknown hardware */
+
+static void sm7xx_resolution_probe(struct smtcfb_info *sfb)
+{
+/* get mode parameter from smtc_scr_info */
+if (smtc_scr_info.lfb_width != 0) {
+sfb->fb->var.xres = smtc_scr_info.lfb_width;
+sfb->fb->var.yres = smtc_scr_info.lfb_height;
+sfb->fb->var.bits_per_pixel = smtc_scr_info.lfb_depth;
+goto final;
+}
+
+/* No parameter, default resolution is 1024x768-16.
+ *
+ * FIXME: earlier laptops, such as IBM Thinkpad 240X, has a 800x600
+ * panel, also see the comments about Thinkpad 240X above.
+ */
+sfb->fb->var.xres = SCREEN_X_RES;
+sfb->fb->var.yres = SCREEN_Y_RES_PC;
+sfb->fb->var.bits_per_pixel = SCREEN_BPP;
+
+#ifdef CONFIG_MIPS
+/*
+ * Loongsion MIPS netbooks use 1024x600 LCD panels, which is the original
+ * target platform of this driver, but nearly all old x86 laptops have
+ * 1024x768. Lighting 768 panels using 600's timings would partially
+ * garble the display, so we don't want that. But it's not possible to
+ * distinguish them reliably.
+ *
+ * So we change the default to 768, but keep 600 as-is on MIPS.
+ */
+sfb->fb->var.yres = SCREEN_Y_RES_NETBOOK;
+#endif
static int smtcfb_pci_probe(struct pci_dev *pdev,
    const struct pci_device_id *ent)
{
    struct smtcfb_info *sfb;
    struct fb_info *info;

    if (smtc_scr_info.lfb_width != 0) {
        sfb->fb->var.xres = smtc_scr_info.lfb_width;
        sfb->fb->var.yres = smtc_scr_info.lfb_height;
        sfb->fb->var.bits_per_pixel = smtc_scr_info.lfb_depth;
    } else {
        sfb->fb->var.xres = SCREEN_X_RES;
        sfb->fb->var.yres = SCREEN_Y_RES;
        sfb->fb->var.bits_per_pixel = SCREEN_BPP;
    }

    big_pixel_depth(sfb->fb->var.bits_per_pixel, smtc_scr_info.lfb_depth);

    /* Map address and memory detection */
    mmio_base = pci_resource_start(pdev, 0);
    pci_read_config_byte(pdev, PCI_REVISION_ID, &sfb->chip_rev_id);

    smem_size = smtcfb_vram_probe(sfb);
    dev_info(&pdev->dev, "%lu MiB of VRAM detected.
", smem_size / 1048576);

    switch (sfb->chip_id) {
        case 0x710:
        case 0x712:
            sfb->fb->fix.mmio_start = mmio_base + 0x00400000;
            sfb->fb->fix.mmio_len = 0x00400000;
            smem_size = SM712_VIDEOMEMORYSIZE;
            sfb->lfb = ioremap(mmio_base, mmio_addr);
            if (!sfb->lfb) 
                +

dev_err(&pdev->dev,
@@ -1459,8 +1604,7 @@
     case 0x720:
     sfb->fb->fix.mmio_start = mmio_base;
     sfb->fb->fix.mmio_len = 0x00200000;
-    smem_size = SM722_VIDEOMEMORYSIZE;
-    sfb->dp_regs = ioremap(mmio_base, 0x00a00000);
+    sfb->dp_regs = ioremap(mmio_base, 0x00200000 + smem_size);
     sfb->lfb = sfb->dp_regs + 0x00200000;
     sfb->mmio = (smtc_regbaseaddress =
                 sfb->dp_regs + 0x000c0000);
@@ -1477,6 +1621,9 @@
     goto failed_fb;
 }

+/* probe and decide resolution */
+sm7xx_resolution_probe(sfb);
+ /* can support 32 bpp */
if (sfb->fb->var.bits_per_pixel == 15)
  sfb->fb->var.bits_per_pixel = 16;
@@ -1487,7 +1634,11 @@
 if (err)
     goto failed;
-
-    smtcfb_setmode(sfb);
+    /* The screen would be temporarily garbled when sm712fb takes over
+     * vesafb or VGA text mode. Zero the framebuffer.
+     */
+    memset_io(sfb->lfb, 0, sfb->fb->fix.smem_len);

err = register_framebuffer(info);
if (err < 0)
    --- linux-4.15.0.orig/drivers/video/fbdev/ssd1307fb.c
+++ linux-4.15.0/drivers/video/fbdev/ssd1307fb.c
@@ -433,7 +433,7 @@
    if (ret < 0)
        return ret;
-
-    ret = ssd1307fb_write_cmd(par->client, 0x0);
+    ret = ssd1307fb_write_cmd(par->client, par->page_offset);
    if (ret < 0)
        return ret;

--- linux-4.15.0.orig/drivers/video/fbdev/uvesafb.c
+++ linux-4.15.0/drivers/video/fbdev/uvesafb.c
@@ -1044,7 +1044,8 @@
info->cmap.len || cmap->start < info->cmap.start)
return -EINVAL;

entries = kmalloc(sizeof(*entries) * cmap->len, GFP_KERNEL);
entries = kmalloc_array(cmap->len, sizeof(*entries),
+GFP_KERNEL);
if (!entries)
return -ENOMEM;

--- linux-4.15.0.orig/drivers/video/fbdev/vfb.c
+++ linux-4.15.0/drivers/video/fbdev/vfb.c
@@ -239,8 +239,23 @@
*/
static int vfb_set_par(struct fb_info *info)
{
+switch (info->var.bits_per_pixel) {
+case 1:
+info->fix.visual = FB_VISUAL_MONO01;
+break;
+case 8:
+info->fix.visual = FB_VISUAL_PSEUDOCOLOR;
+break;
+case 16:
+case 24:
+case 32:
+info->fix.visual = FB_VISUAL_TRUECOLOR;
+break;
+}
+
+info->fix.line_length = get_line_length(info->var.xres_virtual,
+info->var.bits_per_pixel);
+
+return 0;
}

@@ -450,6 +465,8 @@
goto err2;
platform_set_drvdata(dev, info);

+vfb_set_par(info);
+
fb_info(info, "Virtual frame buffer device, using %ldK of video memory\n",
videomemorysize >> 10);
return 0;
--- linux-4.15.0.orig/drivers/video/fbdev/vga16fb.c
+++ linux-4.15.0/drivers/video/fbdev/vga16fb.c
@@ -243,7 +243,7 @@
}
static void vga16fb_clock_chip(struct vga16fb_par *par,
             unsigned int pixclock,
            unsigned int *pixclock,
            const struct fb_info *info,
            int mul, int div)
{
    @ @ -259,14 +259,14 @@
    { 0/* bad */, 0x00, 0x00 });
    int err;

    -pixclock = (pixclock * mul) / div;
    +*pixclock = (*pixclock * mul) / div;
    best = vgaclocks;
    -err = pixclock - best->pixclock;
    +err = *pixclock - best->pixclock;
    if (err < 0) err = -err;
    for (ptr = vgaclocks + 1; ptr->pixclock; ptr++) {
        int tmp;

        -tmp = pixclock - ptr->pixclock;
        +tmp = *pixclock - ptr->pixclock;
        if (tmp < 0) tmp = -tmp;
        if (tmp < err) {
            err = tmp;
            @ @ -275,7 +275,7 @@
        }
    }
    par->misc |= best->misc;
    par->clkdiv = best->seq_clock_mode;
    -pixclock = (best->pixclock * div) / mul;
    +*pixclock = (best->pixclock * div) / mul;
}

#define FAIL(X) return -EINVAL
@@ -497,10 +497,10 @@

if (mode & MODE_8BPP)
    /* pixel clock == vga clock / 2 */
    -vga16fb_clock_chip(par, var->pixclock, info, 1, 2);
    +vga16fb_clock_chip(par, &var->pixclock, info, 1, 2);
else
    /* pixel clock == vga clock */
    -vga16fb_clock_chip(par, var->pixclock, info, 1, 1);
    +vga16fb_clock_chip(par, &var->pixclock, info, 1, 1);

var->red.offset = var->green.offset = var->blue.offset =
var->transp.offset = 0;
@@ -1122,7 +1122,7 @@
char oldop = setop(0);
char oldsr = setsr(0);
char oldmask = selectmask();
const char *cdat = image->data;
+const unsigned char *cdat = image->data;
u32 dx = image->dx;
char __iomem *where;
int y;
--- linux-4.15.0.orig/drivers/video/fbdev/via/viafbdev.c
+++ linux-4.15.0/drivers/video/fbdev/via/viafbdev.c
@@ -19,6 +19,7 @@
 * 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.
 */
+
#include <linux/compiler.h>
#include <linux/module.h>
#include <linux/seq_file.h>
#include <linux/slab.h>
@@ -1468,7 +1469,7 @@
@endif /* CONFIG_FB_VIA_DIRECT_PROCFS */

-static int viafb_sup_odev_proc_show(struct seq_file *m, void *v)
+static int __maybe_unused viafb_sup_odev_proc_show(struct seq_file *m, void *v)
 {
  via_odev_to_seq(m, supported_odev_map[
    viaparinfo->shared->chip_info.gfx_chip_name]);
--- linux-4.15.0.orig/drivers/video/fbdev/w100fb.c
+++ linux-4.15.0/drivers/video/fbdev/w100fb.c
@@ -110,7 +110,7 @@
 return count;
 }

-static DEVICE_ATTR_RW(flip);
+static DEVICE_ATTR_RW(flip);

static ssize_t w100fb_reg_read(struct device *dev, struct device_attribute *attr, const char *buf, size_t count)
 {
  return count;
 }

-static DEVICE_ATTRRW(fastpllclk);
+static DEVICE_ATTRRW(fastpllclk);

/*
 * Some touchscreens need hsync information from the video driver to
 @@ -583,6 +583,7 @@
memsize=par->mach->mem->size;
memcpy_toio(remapped_fbuf + (W100_FB_BASE-MEM_WINDOW_BASE), par->saved_extmem, memsize);
vfree(par->saved_extmem);
+par->saved_extmem = NULL;
}
if (par->saved_intmem) {
memsize=MEM_INT_SIZE;
@@ -591,6 +592,7 @@
      memsize=MEM_INT_SIZE;
      @ @ -591,6 +592,7 @@
  else
        memcpy_toio(remapped_fbuf + (W100_FB_BASE-MEM_WINDOW_BASE), par->saved_intmem, memsize);
vfree(par->saved_intmem);
+      par->saved_intmem = NULL;
  }
}

--- linux-4.15.0.orig/drivers/video/hdmi.c
+++ linux-4.15.0/drivers/video/hdmi.c
@@ -321,6 +321,17 @@
 }
EXPORT_SYMBOL(hdmi_vendor_infoframe_init);

+static int hdmi_vendor_infoframe_length(const struct hdmi_vendor_infoframe *frame)
+{*
+  /* for side by side (half) we also need to provide 3D_Ext_Data */
+  if (frame->s3d_struct >= HDMI_3D_STRUCTURE_SIDE_BY_SIDE_HALF)
+    return 6;
+  else if (frame->vic != 0 || frame->s3d_struct != HDMI_3D_STRUCTURE_INVALID)
+    return 5;
+  else
+    return 4;
+  }*
+/**
+ * hdmi_vendor_infoframe_pack() - write a HDMI vendor infoframe to binary buffer
+ * @frame: HDMI infoframe
+ @@ -341,19 +352,11 @@
+ u8 *ptr = buffer;
+ size_t length;
+/* empty info frame */
- if (frame->vic == 0 && frame->s3d_struct == HDMI_3D_STRUCTURE_INVALID)
-  return -EINVAL;
-/* only one of those can be supplied */
- if (frame->vic != 0 && frame->s3d_struct != HDMI_3D_STRUCTURE_INVALID)
-  return -EINVAL;
-/* for side by side (half) we also need to provide 3D_Ext_Data */

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-if (frame->s3d_struct >= HDMI_3D_STRUCTURE_SIDE_BY_SIDE_HALF)
-frame->length = 6;
-else
-frame->length = 5;
+frame->length = hdmi_vendor_infoframe_length(frame);

length = HDMI_INFOFRAME_HEADER_SIZE + frame->length;

@@ -372,14 +375,16 @@
ptr[5] = 0x0c;
ptr[6] = 0x00;

-if (frame->vic) {
-ptr[7] = 0x1 << 5;/* video format */
-ptr[8] = frame->vic;
-} else {
+if (frame->s3d_struct != HDMI_3D_STRUCTURE_INVALID) {
 ptr[7] = 0x2 << 5;/* video format */
 ptr[8] = (frame->s3d_struct & 0xf) << 4;
 if (frame->s3d_struct >= HDMI_3D_STRUCTURE_SIDE_BY_SIDE_HALF)
 ptr[9] = (frame->s3d_ext_data & 0xf) << 4;
+} else if (frame->vic) {
+ptr[7] = 0x1 << 5;/* video format */
+ptr[8] = frame->vic;
+} else {
+ptr[7] = 0x0 << 5;/* video format */
 }

hdmi_infoframe_set_checksum(buffer, length);
@@ -584,10 +589,10 @@
return "xvYCC 709";
case HDMI_EXTENDED_COLORIMETRY_S_YCC_601:
return "sYCC 601";
- case HDMI_EXTENDED_COLORIMETRY_ADOBE_YCC_601:
- return "Adobe YCC 601";
- case HDMI_EXTENDED_COLORIMETRY_ADOBE_RGB:
- return "Adobe RGB";
+ case HDMI_EXTENDED_COLORIMETRY_OPYCC_601:
+ return "opYCC 601";
+ case HDMI_EXTENDED_COLORIMETRY_OPRGB:
+ return "opRGB";
 case HDMI_EXTENDED_COLORIMETRY_BT2020_CONST_LUM:
 return "BT.2020 Constant Luminance";
case HDMI_EXTENDED_COLORIMETRY_BT2020:
@@ -1031,12 +1036,12 @@
if (ptr[0] & 0x10)
 frame->active_aspect = ptr[1] & 0xf;
if (ptr[0] & 0x8) {
- frame->top_bar = (ptr[5] << 8) + ptr[6];
- frame->bottom_bar = (ptr[7] << 8) + ptr[8];
+ frame->top_bar = (ptr[6] << 8) | ptr[5];
+ frame->bottom_bar = (ptr[8] << 8) | ptr[7];
}
if (ptr[0] & 0x4) {
- frame->left_bar = (ptr[9] << 8) + ptr[10];
- frame->right_bar = (ptr[11] << 8) + ptr[12];
+ frame->left_bar = (ptr[10] << 8) | ptr[9];
+ frame->right_bar = (ptr[12] << 8) | ptr[11];
} frame->scan_mode = ptr[0] & 0x3;

@@ -1165,7 +1170,7 @@
if (ptr[0] != HDMI_INFOFRAME_TYPE_VENDOR ||
    ptr[1] != 1 ||
return -EINVAL;

length = ptr[2];
@@ -1193,16 +1198,22 @@
hvf->length = length;

- if (hdmi_video_format == 0x1) {  
- hvf->vic = ptr[4];
- } else if (hdmi_video_format == 0x2) {  
+ if (hdmi_video_format == 0x2) {
+ if (length != 5 && length != 6)
+ return -EINVAL;
+ hvf->s3d_struct = ptr[4] >> 4;
+ if (hvf->s3d_struct >= HDMI_3D_STRUCTURE_SIDE_BY_SIDE_HALF) {
+ if (length == 6)
+ hvf->s3d_ext_data = ptr[5] >> 4;
+ else
+ return -EINVAL;
+ hvf->s3d_ext_data = ptr[5] >> 4;
+ } else if (hdmi_video_format == 0x1) {
+ if (length != 5)
+ return -EINVAL;
+ hvf->vic = ptr[4];
+ } else {
+ if (length != 4)
+ return -EINVAL;
unsigned int i;
long ret = 0;
-int num_pinned; /* return value from get_user_pages() */
+int num_pinned = 0; /* return value from get_user_pages_fast() */
phys_addr_t remote_paddr; /* The next address in the remote buffer */
uint32_t count; /* The number of bytes left to copy */

return -EINVAL;

/*
 * The array of pages returned by get_user_pages() covers only
 * The array of pages returned by get_user_pages_fast() covers only
 * page-aligned memory. Since the user buffer is probably not
 * page-aligned, we need to handle the discrepancy.
 */

/* Allocate the buffers we need */

/*
 * 'pages' is an array of struct page pointers that's initialized by
 * get_user_pages().
 */
pages = kzalloc(num_pages * sizeof(struct page *), GFP_KERNEL);
if (!pages) {
    @ @ -238,7 +241,7 @@
    if (!sg_list_unaligned) {
        pr_debug("fsl-hv: could not allocate S/G list\n");
        ret = -ENOMEM;
        -goto exit;
        +goto free_pages;
    }
sg_list = PTR_ALIGN(sg_list_unaligned, sizeof(struct fh_sg_list));

@@ -247,7 +250,6 @@
num_pages, param.source != -1, pages);

if (num_pinned != num_pages) {
-/* get_user_pages() failed */
pr_debug("fsl-hv: could not lock source buffer\n");
ret = (num_pinned < 0) ? num_pinned : -EFAULT;
goto exit;
@@ -289,13 +291,13 @@
virt_to_phys(sg_list), num_pages);

exit:
-if (pages) {
-    for (i = 0; i < num_pages; i++)
-        if (pages[i])
-            put_page(pages[i]);
+if (pages && (num_pinned > 0)) {
+    for (i = 0; i < num_pinned; i++)
+        put_page(pages[i]);
}

kfree(sg_list_unaligned);
+free_pages:
kfree(pages);

if (!ret)
@@ -331,8 +333,8 @@
struct fsl_hv_ioctl_prop param;
    char __user *upath, *upropname;
    void __user *upropval;
-    char *path = NULL, *propname = NULL;
-    void *propval = NULL;
+    char *path, *propname;
+    void *propval;
    int ret = 0;

    /* Get the parameters from the user. */
@@ -344,32 +346,30 @@
    upropval = (void __user *)((uintptr_t)param.propval);

    path = strdup_user(upath, FH_DTPROP_MAX_PATHLEN);
-    if (IS_ERR(path)) {
-        ret = PTR_ERR(path);
-        goto out;
-    }
+    if (IS_ERR(path))
    int ret = 0;

/* Get the parameters from the user. */
@@ -344,32 +346,30 @@
    upropval = (void __user *)((uintptr_t)param.propval);

    path = strdup_user(upath, FH_DTPROP_MAX_PATHLEN);
-    if (IS_ERR(path)) {
-        ret = PTR_ERR(path);
-        goto out;
-    }
+    if (IS_ERR(path))

//
+return PTR_ERR(path);

propname = strndup_user(upropname, FH_DTPROP_MAX_PATHLEN);
if (IS_ERR(propname)) {
    ret = PTR_ERR(propname);
    goto out;
    +goto err_free_path;
}

if (param.proplen > FH_DTPROP_MAX_PROPLEN) {
    ret = -EINVAL;
    goto out;
    +goto err_free_propname;
}

propval = kmalloc(param.proplen, GFP_KERNEL);
if (!propval) {
    ret = -ENOMEM;
    goto out;
    +goto err_free_propname;
}

if (set) {
    if (copy_from_user(propval, upropval, param.proplen)) {
        ret = -EFAULT;
        goto out;
        +goto err_free_propval;
    }
    param.ret = fh_partition_set_dtprop(param.handle,
    @@ -388,7 +388,7 @@
    if (copy_to_user(upropval, propval, param.proplen)) ||
        put_user(param.proplen, &p->proplen)) {
        ret = -EFAULT;
        goto out;
        +goto err_free_propval;
    }
    }
    }
    @ @ -396,10 +396,12 @@
    if (put_user(param.ret, &p->ret))
    ret = -EFAULT;
    -out:
    -kfree(path);
    +err_free_propval:
    kfree(propval);
    +err_free_propname:
kfree(propname);
+err_free_path:
+kfree(path);

return ret;
}
--- linux-4.15.0.orig/drivers/virtio/virtio.c
+++ linux-4.15.0/drivers/virtio/virtio.c
@@ -222,6 +222,17 @@
driver_features_legacy = driver_features;
}

+/*
+ * Some devices detect legacy solely via F_VERSION_1. Write
+ * F_VERSION_1 to force LE config space accesses before FEATURES_OK for
+ * these when needed.
+ */
+if (drv->validate && !virtio_legacy_is_little_endian() 
+ && device_features & BIT_ULL(VIRTIO_F_VERSION_1)) {
+dev->features = BIT_ULL(VIRTIO_F_VERSION_1);
+dev->config->finalize_features(dev);
+
+
+if (device_features & (1ULL << VIRTIO_F_VERSION_1))
+dev->features = driver_features & device_features;
+else
+--- linux-4.15.0.orig/drivers/virtio/virtio_balloon.c
+++ linux-4.15.0/drivers/virtio/virtio_balloon.c
@@ -132,6 +132,8 @@
{
      BUILD_BUG_ON(VIRTIO_BALLOON_PAGES_PER_PAGE > VIRTIO_BALLOON_ARRAY_PFNS_MAX);
      
+    /*
+     * Set balloon pfns pointing at this page.
+     * Note that the first pfn points at start of the page.
+     @@ -492,6 +494,17 @@
+      get_page(newpage); /* balloon reference */
+      
+      /*
+       * When we migrate a page to a different zone and adjusted the
+       * managed page count when inflating, we have to fixup the count of
+       * both involved zones.
+       */
+      +if (!virtio_has_feature(vb->vdev, VIRTIO_BALLOON_F_DEFLATE_ON_OOM) &&
+      +    page_zone(page) != page_zone(newpage)) {


+adjust_managed_page_count(page, 1);
+adjust_managed_page_count(newpage, -1);
+
+
+ /* balloon's page migration 1st step -- inflate "newpage" */
+ spin_lock_irqsave(&vb_dev_info->pages_lock, flags);
+ balloon_page_insert(vb_dev_info, newpage);
+ tell_host(vb, vb->inflate_vq);
+
+ /* balloon's page migration 2nd step -- deflate "page" */
+ spin_lock_irqsave(&vb_dev_info->pages_lock, flags);
+ balloon_page_delete(page);
+ spin_unlock_irqrestore(&vb_dev_info->pages_lock, flags);
+ vb->num_pfns = VIRTIO_BALLOON_PAGES_PER_PAGE;
+ set_page_pfns(vb, vb->pfns, page);
+ tell_host(vb, vb->deflate_vq);
+
+--- linux-4.15.0.orig/drivers/virtio/virtio_pci_common.c
+++ linux-4.15.0/drivers/virtio/virtio_pci_common.c
@@ -254,9 +254,11 @@
 for (i = 0; i < vp_dev->msix_used_vectors; ++i)
 free_irq(pci_irq_vector(vp_dev->pci_dev, i), vp_dev);

 -for (i = 0; i < vp_dev->msix_vectors; i++)
 -if (vp_dev->msix_affinity_masks[i])
- free_cpumask_var(vp_dev->msix_affinity_masks[i]);
+if (vp_dev->msix_affinity_masks) {
+ for (i = 0; i < vp_dev->msix_vectors; i++)
+ if (vp_dev->msix_affinity_masks[i])
+ free_cpumask_var(vp_dev->msix_affinity_masks[i]);
+ }

 if (vp_dev->msix_enabled) {
 /* Disable the vector used for configuration */
- --- linux-4.15.0.orig/drivers/virtio/virtio_pci_legacy.c
+ --- linux-4.15.0/drivers/virtio/virtio_pci_legacy.c
 +++ linux-4.15.0/drivers/virtio/virtio_pci_legacy.c
 @@ -122,6 +122,7 @@
 struct virtqueue *vq;
 u16 num;
 int err;
+ u64 q_pfn;

 /* Select the queue we're interested in */
 iowrite16(index, vp_dev->ioaddr + VIRTIO_PCI_QUEUE_SEL);
@@ -141,9 +142,17 @@
 if (!vq)
 return ERR_PTR(-ENOMEM);

/* Select the queue we're interested in */
 iowrite16(index, vp_dev->ioaddr + VIRTIO_PCI_QUEUE_SEL);
@@ -141,9 +142,17 @@
 if (!vq)
 return ERR_PTR(-ENOMEM);
q_pfn = virtqueue_get_desc_addr(vq) >> VIRTIO_PCI_QUEUE_ADDR_SHIFT;
if (q_pfn >> 32) {
  dev_err(&vp_dev->pci_dev->dev,
    "platform bug: legacy virtio-mmio must not be used with RAM above 0x%llxGBn",
    0x1ULL << (32 + PAGE_SHIFT - 30);
  err = -E2BIG;
  goto out_del_vq;
}
/* activate the queue */
-iowrite32(virtqueue_get_desc_addr(vq) >> VIRTIO_PCI_QUEUE_ADDR_SHIFT,
  vp_dev->ioaddr + VIRTIO_PCI_QUEUE_PFN);
+iowrite32(q_pfn, vp_dev->ioaddr + VIRTIO_PCI_QUEUE_PFN);

vq->priv = (void __force *)vp_dev->ioaddr + VIRTIO_PCI_QUEUE_NOTIFY;
@@ -160,6 +169,7 @@
out_deactivate:
iowrite32(0, vp_dev->ioaddr + VIRTIO_PCI_QUEUE_PFN);
+out_del_vq:
  vring_del_virtqueue(vq);
  return ERR_PTR(err);
}
--- linux-4.15.0.orig/drivers/virtio/virtio_ring.c
+++ linux-4.15.0/drivers/virtio/virtio_ring.c
@@ -428,13 +428,11 @@
i = virtio16_to_cpu(_vq->vdev, vq->vring.desc[i].next);
{
-  vq->vq.num_free += total_sg;
-  if (indirect)
-    kfree(desc);
-END_USE(vq);
-return -EIO;
+return -ENOMEM;
}
/**
@@ -831,6 +829,9 @@
{
  struct vring_virtqueue *vq = to_vvq(_vq);
  +if (unlikely(vq->broken))
  +return false;
+}
virtio_mb(vq->weak_barriers);
return (u16)last_used_idx != virtio16_to_cpu(_vq->vdev, vq->vring.used->idx);
}
@@ -1089,6 +1090,8 @@
      GFP_KERNEL|__GFP_NOWARN|__GFP_ZERO);
if (queue)
  break;
+if (!may_reduce_num)
+  return NULL;
}

if (!num)
@@ -1195,7 +1198,7 @@
{
  struct vring_virtqueue *vq = to_vvq(_vq);

-  return vq->broken;
+  return READ_ONCE(vq->broken);
}
EXPORT_SYMBOL_GPL(virtqueue_is_broken);

@@ -1209,7 +1212,9 @@
list_for_each_entry(_vq, &dev->vqs, list) {
  struct vring_virtqueue *vq = to_vvq(_vq);
  vq->broken = true;
+  /* Pairs with READ_ONCE() in virtqueue_is_broken(). */
+  WRITE_ONCE(vq->broken, true);
}
}
EXPORT_SYMBOL_GPL(virtio_break_device);
--- linux-4.15.0.orig/drivers/vme/bridges/vme_fake.c
+++ linux-4.15.0/drivers/vme/bridges/vme_fake.c
@@ -418,8 +418,9 @@
}
}

- static u8 fake_vmeread8(struct fake_driver *bridge, unsigned long long addr,
-   u32 aspace, u32 cycle)
+ static noinline_for_stack u8 fake_vmeread8(struct fake_driver *bridge,
+   unsigned long long addr,
+   u32 aspace, u32 cycle)
{
  u8 retval = 0xff;
  int i;
@@ -450,8 +451,9 @@
    return retval;

static u16 fake_vmeread16(struct fake_driver *bridge, unsigned long long addr,
    u32 aspace, u32 cycle)
{ u16 retval = 0xffff;
    int i;
    return retval;
}

static u32 fake_vmeread32(struct fake_driver *bridge, unsigned long long addr,
    u32 aspace, u32 cycle)
{ u32 retval = 0xffffffff;
    int i;
    return retval;
}

static void fake_vmewrite8(struct fake_driver *bridge, u8 *buf,
    unsigned long long addr, u32 aspace, u32 cycle)
{ int i;
    unsigned long long start, end, offset;
}

static void fake_vmewrite16(struct fake_driver *bridge, u16 *buf,
    unsigned long long addr, u32 aspace, u32 cycle)
{ int i;
    unsigned long long start, end, offset;
}
static void fake_vmewrite32(struct fake_driver *bridge, u32 *buf,
    unsigned long long addr, u32 aspace, u32 cycle)
+static noinline_for_stack void fake_vmewrite32(struct fake_driver *bridge,
    u32 *buf, unsigned long long addr,
    u32 aspace, u32 cycle)
{
    int i;

    unsigned long start, end, offset;

    /* alternative 3, 1ms interrupt (greatly speeds search), 64 byte bulk */

    alt = 3;
    err = usb_set_interface(dev->udev, 
        -intf->altsetting[alt].desc.bInterfaceNumber, alt);
        +intf->cur_altsetting->desc.bInterfaceNumber, alt);
    if (err) {
        dev_err(&dev->udev->dev, "Failed to set alternative setting %d "
            "for %d interface: err=%d.\n", alt,
            -intf->altsetting[alt].desc.bInterfaceNumber, err);
        +intf->cur_altsetting->desc.bInterfaceNumber, err);
        goto err_out_clear;
    }

    -iface_desc = &intf->altsetting[alt];
    +iface_desc = intf->cur_altsetting;

    if (iface_desc->desc.bNumEndpoints != NUM_EP-1) {
        pr_info("Num endpoints=%d. It is not DS9490R.\n",
            iface_desc->desc.bNumEndpoints);
    }

    /* alternative 3, 1ms interrupt (greatly speeds search), 64 byte bulk */
    --linux-4.15.0.orig/drivers/w1/masters/ds2490.c
    +++ linux-4.15.0/drivers/w1/masters/ds2490.c
    @@ -1018,15 +1018,15 @@
    */

    static u8 mxc_w1_ds2_reset_bus(void *data)
    {
        struct mxc_w1_device *dev = data;
        -unsigned long timeout;
        +ktime_t timeout;

    }
writeb(MXC_W1_CONTROL_RPP, dev->regs + MXC_W1_CONTROL);

/* Wait for reset sequence 511+512us, use 1500us for sure */
-timeout = jiffies + usecs_to_jiffies(1500);
+timeout = ktime_add_us(ktime_get(), 1500);

udelay(511 + 512);

@@ -62,7 +62,7 @@
/* PST bit is valid after the RPP bit is self-cleared */
if (!(ctrl & MXC_W1_CONTROL_RPP))
return !(ctrl & MXC_W1_CONTROL_PST);
-} while (time_is_after_jiffies(timeout));
+} while (ktime_before(ktime_get(), timeout));

return 1;
}
@@ -75,12 +75,12 @@
static u8 mxc_w1_ds2_touch_bit(void *data, u8 bit)
{
    struct mxc_w1_device *dev = data;
-    unsigned long timeout;
+    ktime_t timeout;
    writeb(MXC_W1_CONTROL_WR(bit), dev->regs + MXC_W1_CONTROL);

    /* Wait for read/write bit (60us, Max 120us), use 200us for sure */
    -timeout = jiffies + usecs_to_jiffies(200);
    +timeout = ktime_add_us(ktime_get(), 200);

    udelay(60);

    @@ -90,7 +90,7 @@
    /* RDST bit is valid after the WR1/RD bit is self-cleared */
    if (!(ctrl & MXC_W1_CONTROL_WR(bit)))
    return !!!(ctrl & MXC_W1_CONTROL_RDST);
-} while (time_is_after_jiffies(timeout));
+} while (ktime_before(ktime_get(), timeout));

    return 0;
}
@@ -112,6 +112,10 @@
if (IS_ERR(mdev->clk))
    return PTR_ERR(mdev->clk);
-
+err = clk_prepare_enable(mdev->clk);
+if (err)
return err;
+
clkrate = clk_get_rate(mdev->clk);
if (clkrate < 10000000)
  dev_warn(&pdev->dev,
    " clkrate = clk_get_rate(mdev->clk);
    if (clkrate < 10000000)
      dev_warn(&pdev->dev,
        " return err;
+
clkrate = clk_get_rate(mdev->clk);
if (clkrate < 10000000)
  dev_warn(&pdev->dev,
    " clkrate = clk_get_rate(mdev->clk);
    if (clkrate < 10000000)
      dev_warn(&pdev->dev,
        " return err;
+
err = clk_prepare_enable(mdev->clk);
-if (err)
  goto out_disable_clk;
+
err = clk_prepare_enable(mdev->clk);
-if (err)
  goto out_disable_clk;
+
if (IS_ERR(mdev->regs)) {
  err = PTR_ERR(mdev->regs);
  goto out_disable_clk;
+}

/* Software reset 1-Wire module */
writeb(MXC_W1_RESET_RST, mdev->regs + MXC_W1_RESET);
@@ -146,8 +148,12 @@
err = w1_add_master_device(&mdev->bus_master);
if (err)
  clk_disable_unprepare(mdev->clk);
+goto out_disable_clk;
+
+out_disable_clk:
+  clk_disable_unprepare(mdev->clk);
return err;
+
--- linux-4.15.0.orig/drivers/w1/masters/omap_hdq.c
+++ linux-4.15.0/drivers/w1/masters/omap_hdq.c
@@ -176,7 +176,7 @@
/* check irqstatus */
if (!(*status & OMAP_HDQ_INT_STATUS_TXCOMPLETE)) {
  dev_dbg(hdq_data->dev, "timeout waiting for"
    " TXCOMPLETE/RXCOMPLETE, %x", *status);
  ret = -ETIMEDOUT;
  goto out;
}
OMAP_HDG_FLAG_CLEAR, &tmp_status);
if (ret) {
    dev_dbg(hdq_data->dev, "timeout waiting GO bit"
        -" return to zero, %x", tmp_status);
    +" return to zero, %x\n", tmp_status);
}

out:
@@ -203,7 +203,7 @@
    spin_lock_irqsave(&hdq_data->hdq_spinlock, irqflags);
    hdq_data->hdq_irqstatus = hdq_reg_in(hdq_data, OMAP_HDG_INT_STATUS);
    spin_unlock_irqrestore(&hdq_data->hdq_spinlock, irqflags);
-    dev_dbg(hdq_data->dev, "hdq_isr: %x", hdq_data->hdq_irqstatus);
+    dev_dbg(hdq_data->dev, "hdq_isr: %x\n", hdq_data->hdq_irqstatus);
    if (hdq_data->hdq_irqstatus &
        OMAP_HDG_INT_STATUS_TXCOMPLETE | OMAP_HDG_INT_STATUS_RXCOMPLETE
            @ @ -311,7 +311,7 @@
            tmp_status = hdq_data->hdq_irqstatus;
            /* check irqstatus */
            if (!(tmp_status & OMAP_HDG_INT_STATUS_TIMEOUT)) {
                -dev_dbg(hdq_data->dev, "timeout waiting for TIMEOUT, %x",
                +dev_dbg(hdq_data->dev, "timeout waiting for TIMEOUT, %x\n",
                    tmp_status);
                ret = -ETIMEDOUT;
                goto out;
            }
            @ @ -338,7 +338,7 @@
            &tmp_status);
            if (ret)
                dev_dbg(hdq_data->dev, "timeout waiting INIT&GO bits"
                    -" return to zero, %x", tmp_status);
                +" return to zero, %x\n", tmp_status);

    out:
    mutex_unlock(&hdq_data->hdq_mutex);
    @ @ -763,6 +763,8 @@
        /* remove module dependency */
        pm_runtime_disable(&pdev->dev);

    +w1_remove_master_device(&omap_w1_master);
    +
    return 0;
    }

--- linux-4.15.0.orig/drivers/w1/slaves/w1_ds2438.c
+++ linux-4.15.0/drivers/w1/slaves/w1_ds2438.c
@@ -64,13 +64,13 @@
 if (w1_reset_select_slave(sl))
continue;
w1_buf[0] = W1_DS2438_RECALL_MEMORY;
-w1_buf[1] = 0x00;
+w1_buf[1] = (u8)pageno;
w1_write_block(sl->master, w1_buf, 2);

if (w1_reset_select_slave(sl))
continue;
w1_buf[0] = W1_DS2438_READ_SCRATCH;
-w1_buf[1] = 0x00;
+w1_buf[1] = (u8)pageno;
w1_write_block(sl->master, w1_buf, 2);

count = w1_read_block(sl->master, buf, DS2438_PAGE_SIZE + 1);
@@ -186,8 +186,8 @@
return -1;
}

- static uint16_t w1_ds2438_get_voltage(struct w1_slave *sl,
+ static int w1_ds2438_get_voltage(struct w1_slave *sl,
       int adc_input, uint16_t *voltage)
+       int adc_input, uint16_t *voltage)
{
 unsigned int retries = W1_DS2438_RETRIES;
 u8 w1_buf[DS2438_PAGE_SIZE + 1 /*for CRC*/];
@@ -235,6 +235,25 @@
 return ret;
 }

+ static int w1_ds2438_get_current(struct w1_slave *sl, int16_t *voltage)
+ {
+ u8 w1_buf[DS2438_PAGE_SIZE + 1 /*for CRC*/];
+ int ret;
+ + mutex_lock(&sl->master->bus_mutex);
+ + if (w1_ds2438_get_page(sl, 0, w1_buf) == 0) {
+ /* The voltage measured across current sense resistor RSENS. */
+ + *voltage = (((int16_t) w1_buf[DS2438_CURRENT_MSB]) << 8) | ((int16_t)
+ w1_buf[DS2438_CURRENT_LSB]);
+ + ret = 0;
+ + } else
+ + ret = -1;
+ + mutex_unlock(&sl->master->bus_mutex);
+ + return ret;
+ +}
static ssize_t iad_write(struct file *filp, struct kobject *kobj,
struct bin_attribute *bin_attr, char *buf,
loff_t off, size_t count)
olated -257.6 +276.27 @ @
return ret;
}

static ssize_t iad_read(struct file *filp, struct kobject *kobj,
struct bin_attribute *bin_attr, char *buf,
loff_t off, size_t count)
+
{
+struct w1_slave *sl = kobj_to_w1_slave(kobj);
+int ret;
+int16_t voltage;
+
+if (off != 0)
+return 0;
+if (!buf)
+return -EINVAL;
+
+if (w1_ds2438_get_current(sl, &voltage) == 0) {
+ret = snprintf(buf, count, "%i\n", voltage);
+} else
+ret = -EIO;
+
+return ret;
+
static ssize_t page0_read(struct file *filp, struct kobject *kobj,
struct bin_attribute *bin_attr, char *buf,
loff_t off, size_t count)
olated -272.9 +312.13 @ @
mutex_lock(&sl->master->bus_mutex);

/* Read no more than page0 size */
+if (count > DS2438_PAGE_SIZE)
+count = DS2438_PAGE_SIZE;
+
if (w1_ds2438_get_page(sl, 0, w1_buf) == 0) {
-memcpy(buf, &w1_buf, DS2438_PAGE_SIZE);
-ret = DS2438_PAGE_SIZE;
+memcpy(buf, &w1_buf, count);
+ret = count;
} else
ret = -EIO;
struct w1_slave *sl = kobj_to_w1_slave(kobj);
int ret;
ssize_t c = PAGE_SIZE;
int16_t temp;

if (off != 0)
    return -EINVAL;

if (w1_ds2438_get_temperature(sl, &temp) == 0) {
    c -= snprintf(buf + PAGE_SIZE - c, c, "%d\n", temp);
    ret = PAGE_SIZE - c;
} else
    ret = -EIO;

struct w1_slave *sl = kobj_to_w1_slave(kobj);
int ret;
ssize_t c = PAGE_SIZE;
uint16_t voltage;

if (off != 0)
    return -EINVAL;

if (w1_ds2438_get_voltage(sl, DS2438_ADC_INPUT_VAD, &voltage) == 0) {
    c -= snprintf(buf + PAGE_SIZE - c, c, "%d\n", voltage);
    ret = PAGE_SIZE - c;
} else
    ret = -EIO;

struct w1_slave *sl = kobj_to_w1_slave(kobj);
int ret;
ssize_t c = PAGE_SIZE;
uint16_t voltage;

if (off != 0)
    return -EINVAL;

if (w1_ds2438_get_voltage(sl, DS2438_ADC_INPUT_VDD, &voltage) == 0) {
-c -= snprintf(buf + PAGE_SIZE - c, c, "%d\n", voltage);
-ret = PAGE_SIZE - c;
+ret = snprintf(buf, count, "%u\n", voltage);
} else
ret = -EIO;

return ret;
}

-static BIN_ATTR(iad, S_IRUGO | S_IWUSR | S_IWGRP, NULL, iad_write, 1);
+static BIN_ATTR(iad, S_IRUGO | S_IWUSR | S_IWGRP, iad_read, iad_write, 0);
static BIN_ATTR_RO(page0, DS2438_PAGE_SIZE);
static BIN_ATTR_RO(temperature, 0/* real length varies */);
static BIN_ATTR_RO(vad, 0/* real length varies */);
--- linux-4.15.0.orig/drivers/w1/w1.c
+++ linux-4.15.0/drivers/w1/w1.c
@@ -750,7 +750,7 @@
/* slave modules need to be loaded in a context with unlocked mutex */
mutex_unlock(&dev->mutex);
-request_module("w1-family-0x%02x", rn->family);
+request_module("w1-family-0x%02X", rn->family);
mutex_lock(&dev->mutex);

spin_lock(&w1_flock);
--- linux-4.15.0.orig/drivers/w1/w1_io.c
+++ linux-4.15.0/drivers/w1/w1_io.c
@@ -431,8 +431,7 @@
if (w1_reset_bus(dev))
return -1;

-/ * This will make only the last matched slave perform a skip ROM. */
-w1_write_8(dev, W1_RESUME_CMD);
+w1_write_8(dev, dev->slave_count > 1 ? W1_RESUME_CMD : W1_SKIP_ROM);
return 0;
}
EXPORT_SYMBOL_GPL(w1_reset_resume_command);

--- linux-4.15.0.orig/drivers/watchdog/Kconfig
+++ linux-4.15.0/drivers/watchdog/Kconfig
@@ -495,7 +495,7 @@
config COH901327_WATCHDOG
+depends on ARCH_U300 || (ARM && COMMON_CLK && COMPILE_TEST)
default y if MACH_U300
select WATCHDOG_CORE
help
config MAX77620_WATCHDOG
tristate "Maxim Max77620 Watchdog Timer"
depends on MFD_MAX77620 || COMPILE_TEST
+select WATCHDOG_CORE
help
This is the driver for the Max77620 watchdog timer.
Say 'Y' here to enable the watchdog timer support for
@@ -619,6 +620,7 @@
config SIRFSOC_WATCHDOG
tristate "SiRFSOC watchdog"
+depends on HAS_IOMEM
depends on ARCH_SIRF || COMPILE_TEST
select WATCHDOG_CORE
default y
@@ -1451,7 +1453,7 @@
config INDYDOG
tristate "Indy/I2 Hardware Watchdog"
-depends on SGI_HAS_INDYDOG || (MIPS && COMPILE_TEST)
+depends on SGI_HAS_INDYDOG
help
Hardware driver for the Indy's/I2's watchdog. This is a
watchdog timer that will reboot the machine after a 60 second
@@ -1941,6 +1943,7 @@
config WATCHDOG_PRETIMEOUT_GOV
bool "Enable watchdog pretimeout governors"
+depends on WATCHDOG_CORE
help
The option allows to select watchdog pretimeout governors.

--- linux-4.15.0.orig/drivers/watchdog/asm9260_wdt.c
+++ linux-4.15.0/drivers/watchdog/asm9260_wdt.c
@@ -292,14 +292,14 @@
if (IS_ERR(priv->iobase))
    return PTR_ERR(priv->iobase);
-ret = asm9260_wdt_get_dt_clks(priv);
-if (ret)
-    return ret;
-
priv->rst = devm_reset_control_get_exclusive(&pdev->dev, "wdt_rst");
if (IS_ERR(priv->rst))
    return PTR_ERR(priv->rst);
+ret = asm9260_wdt_get_dt_clks(priv);
+if (ret)
+    return ret;
+
wdd = &priv->wdd;
wdd->info = &asm9260_wdt_ident;
wdd->ops = &asm9260_wdt_ops;
--- linux-4.15.0.orig/drivers/watchdog/aspeed_wdt.c
+++ linux-4.15.0/drivers/watchdog/aspeed_wdt.c
@@ -38,6 +38,7 @@
static const struct of_device_id aspeed_wdt_of_table[] = {
    { .compatible = "aspeed,ast2400-wdt", .data = &ast2400_config },
    { .compatible = "aspeed,ast2500-wdt", .data = &ast2500_config },
+    { .compatible = "aspeed,ast2600-wdt", .data = &ast2600_config },
    { },
};
MODULE_DEVICE_TABLE(of, aspeed_wdt_of_table);
@@ -46,6 +47,7 @@
#define WDT_RELOAD_VALUE	0x04
#define WDT_RESTART		0x08
#define WDT_CTRL		0x0C
+define WDT_CTRL_BOOT_SECONDARY	BIT(7)
#define WDT_CTRL_RESET_MODE_SOC	(0x00 << 5)
#define WDT_CTRL_RESET_MODE_FULL_CHIP	(0x01 << 5)
#define WDT_CTRL_RESET_MODE_ARM_CPU	(0x10 << 5)
@@ -145,7 +147,7 @@
wdd->timeout = timeout;
-actual = min(timeout, wdd->max_hw_heartbeat_ms * 1000);
+actual = min(timeout, wdd->max_hw_heartbeat_ms / 1000);
writel(actual * WDT_RATE_1MHZ, wdt->base + WDT_RELOAD_VALUE);
writel(WDT_RESTART_MAGIC, wdt->base + WDT_RESTART);
@@ -158,6 +160,7 @@
{
    struct aspeed_wdt *wdt = to_aspeed_wdt(wdd);
    +wdt->ctrl &= ~WDT_CTRL_BOOT_SECONDARY;
    aspeed_wdt_enable(wdt, 128 * WDT_RATE_1MHZ / 1000);

    mdelay(1000);
    @ @ -201,11 +204,6 @@
    if (IS_ERR(wdt->base))
        return PTR_ERR(wdt->base);

    /*
     * The ast2400 wdt can run at PCLK, or 1MHz. The ast2500 only
     * runs at 1MHz. We chose to always run at 1MHz, as there's no

- * good reason to have a faster watchdog counter.
- */
wdt->wdd.info = &aspeed_wdt_info;
wdt->wdd.ops = &aspeed_wdt_ops;
wdt->wdd.max_hw_heartbeat_ms = WDT_MAX_TIMEOUT_MS;
@@ -221,7 +219,16 @@
return -EINVAL;
config = ofdid->data;

-wdt->ctrl = WDT_CTRL_1MHZ_CLK;
+/*
+ * On clock rates:
+ * - ast2400 wdt can run at PCLK, or 1MHz
+ * - ast2500 only runs at 1MHz, hard coding bit 4 to 1
+ * - ast2600 always runs at 1MHz
+ *
+ * Set the ast2400 to run at 1MHz as it simplifies the driver.
+ */
+ if (of_device_is_compatible(np, "aspeed,ast2400-wdt"))
+wdt->ctrl = WDT_CTRL_1MHZ_CLK;

/ *
 * Control reset on a per-device basis to ensure the
@@ -232,16 +239,21 @@
wdt->ctrl |= WDT_CTRL_RESET_MODE_SOC | WDT_CTRL_RESET_SYSTEM;
} else {
  if (!strcmp(reset_type, "cpu"))
-wdt->ctrl |= WDT_CTRL_RESET_MODE_ARM_CPU;
+wdt->ctrl |= WDT_CTRL_RESET_MODE_ARM_CPU | WDT_CTRL_RESET_SYSTEM;
  + WDT_CTRL_RESET_SYSTEM;
  else if (!strcmp(reset_type, "soc"))
-wdt->ctrl |= WDT_CTRL_RESET_MODE_SOC;
+wdt->ctrl |= WDT_CTRL_RESET_MODE_SOC | WDT_CTRL_RESET_SYSTEM;
  + WDT_CTRL_RESET_SYSTEM;
  else if (!strcmp(reset_type, "system"))
-wdt->ctrl |= WDT_CTRL_RESET_SYSTEM;
+wdt->ctrl |= WDT_CTRL_RESET_MODE_FULL_CHIP | WDT_CTRL_RESET_SYSTEM;
  + WDT_CTRL_RESET_SYSTEM;
  else if (strcmp(reset_type, "none"))
    return -EINVAL;
}
if (of_property_read_bool(np, "aspeed,external-signal"))
-wdt->ctrl |= WDT_CTRL_WDT_EXT;
+if (of_property_read_bool(np, "aspeed,alt-boot"))
+wdt->ctrl |= WDT_CTRL_BOOT_SECONDARY;

writel(wdt->ctrl, wdt->base + WDT_CTRL);
set_bit(WDOG_HW_RUNNING, &wdd->status);
} 

-if (of_device_is_compatible(np, "aspeed,ast2500-wdt")) {
+if ((of_device_is_compatible(np, "aspeed,ast2500-wdt")) ||
+(of_device_is_compatible(np, "aspeed,ast2600-wdt"))) {
    u32 reg = readl(wdt->base + WDT_RESET_WIDTH);

    reg &= config->ext_pulse_width_mask;
--- linux-4.15.0.orig/drivers/watchdog/bcm2835_wdt.c
+++ linux-4.15.0/drivers/watchdog/bcm2835_wdt.c
@@ -252,6 +252,7 @@
 MODULE_PARM_DESC(nowayout, "Watchdog cannot be stopped once started (default="
 __MODULE_STRING(WATCHDOG_NOWAYOUT) ")");

+MODULE_ALIAS("platform:bcm2835-wdt");
MODULE_AUTHOR("Lubomir Rintel <lkundrak@v3.sk>");
MODULE_DESCRIPTION("Driver for Broadcom BCM2835 watchdog timer");
MODULE_LICENSE("GPL");
--- linux-4.15.0.orig/drivers/watchdog/da9062_wdt.c
+++ linux-4.15.0/drivers/watchdog/da9062_wdt.c
@@ -94,11 +94,6 @@
             unsigned int regval)
 {
     struct da9062 *chip = wdt->hw;
-    int ret;
-    
-    ret = da9062_reset_watchdog_timer(wdt);
-    if (ret)
-        return ret;
-    return regmap_update_bits(wdt->hw->regmap,
              DA9062AA_CONTROL_D,
              @ @ -126,13 +121,6 @ @
     struct da9062_watchdog *wdt = watchdog_get_drvdata(wdd);
     int ret;

     -ret = da9062_reset_watchdog_timer(wdt);
-    if (ret) {
-        dev_err(wdt->hw->dev, "Failed to ping the watchdog (err = %d)\n",
-         -ret);
-        return ret;
-    }
-    
-    ret = regmap_update_bits(wdt->hw->regmap,
              DA9062AA_CONTROL_D,
              DA9062AA_TWDSCALE_MASK,
--- linux-4.15.0.orig/drivers/watchdog/da9063_wdt.c
+++ linux-4.15.0/drivers/watchdog/da9063_wdt.c
@@ -102,10 +102,23 @@
{
    struct da9063 *da9063 = watchdog_get_drvdata(wdd);
    unsigned int selector;
    -int ret;
+   int ret = 0;

    selector = da9063_wdt_timeout_to_sel(timeout);
    ret = _da9063_wdt_set_timeout(da9063, selector);
    +
    +/*
    + * There are two cases when a set_timeout() will be called:
    + * 1. The watchdog is off and someone wants to set the timeout for the
    + *     further use.
    + * 2. The watchdog is already running and a new timeout value should be
    + *     set.
    + *
    + * The watchdog can't store a timeout value not equal zero without
    + * enabling the watchdog, so the timeout must be buffered by the driver.
    + */
    +if (watchdog_active(wdd))
    +   ret = _da9063_wdt_set_timeout(da9063, selector);
    +
    if (ret)
    dev_err(da9063->dev, "Failed to set watchdog timeout (err = %d)\n",
            ret);

--- linux-4.15.0.orig/drivers/watchdog/davinci_wdt.c
+++ linux-4.15.0/drivers/watchdog/davinci_wdt.c
@@ -198,15 +198,22 @@
        wdt_mem = platform_get_resource(pdev, IORESOURCE_MEM, 0);
        davinci_wdt->base = devm_ioremap_resource(dev, wdt_mem);
        -if (IS_ERR(davinci_wdt->base))
-          return PTR_ERR(davinci_wdt->base);
-        if (IS_ERR(davinci_wdt->base)) {
-            ret = PTR_ERR(davinci_wdt->base);
-            goto err_clk_disable;
-        }

        ret = watchdog_register_device(wdd);
-       if (ret < 0) {
-            clk_disable_unprepare(davinci_wdt->clk);
-            if (ret) {
-                dev_err(dev, "cannot register watchdog device\n");
-                goto err_clk_disable;
-            }
+        }

ret = watchdog_register_device(wdd);
    -if (ret < 0) {
    -   clk_disable_unprepare(davinci_wdt->clk);
    +if (ret) {
    +   dev_err(dev, "cannot register watchdog device\n");
    +   goto err_clk_disable;
+  }
return 0;
+
+err_clk_disable:
+clk_disable_unprepare(davinci_wdt->clk);
+
return ret;
}

--- linux-4.15.0.orig/drivers/watchdog/dw_wdt.c
+++ linux-4.15.0/drivers/watchdog/dw_wdt.c
@@ -34,6 +34,7 @@
#define WDOG_CONTROL_REG_OFFSET	0x00
#define WDOG_CONTROL_REG_WDT_EN_MASK	0x01
+#define WDOG_CONTROL_REG_RESP_MODE_MASK	0x02
#define WDOG_TIMEOUT_RANGE_REG_OFFSET	0x04
#define WDOG_TIMEOUT_RANGE_TOPINIT_SHIFT	4
#define WDOG_CURRENT_COUNT_REG_OFFSET	0x08
@@ -121,16 +122,38 @@
return 0;
}

+static void dw_wdt_arm_system_reset(struct dw_wdt *dw_wdt)
+{
+u32 val = readl(dw_wdt->regs + WDOG_CONTROL_REG_OFFSET);
+
+/* Disable interrupt mode; always perform system reset. */
+val &= ~WDOG_CONTROL_REG_RESP_MODE_MASK;
+/* Enable watchdog. */
+val |= WDOG_CONTROL_REG_WDT_EN_MASK;
+writel(val, dw_wdt->regs + WDOG_CONTROL_REG_OFFSET);
+}
+
+static int dw_wdt_start(struct watchdog_device *wdd)
+{
+struct dw_wdt *dw_wdt = to_dw_wdt(wdd);
+
+dw_wdt_set_timeout(wdd, wdd->timeout);
+dw_wdt_arm_system_reset(dw_wdt);
+
+return 0;
+}
+
+static int dw_wdt_stop(struct watchdog_device *wdd)
+{
+struct dw_wdt *dw_wdt = to_dw_wdt(wdd);
```c
- set_bit(WDOG_HW_RUNNING, &wdd->status);
+ if (!dw_wdt->rst) {
+ set_bit(WDOG_HW_RUNNING, &wdd->status);
+ return 0;
+ }

- writel(WDOG_CONTROL_REG_WDT_EN_MASK,
- dw_wdt->regs + WDOG_CONTROL_REG_OFFSET);
+ reset_control_assert(dw_wdt->rst);
+ reset_control_deassert(dw_wdt->rst);

return 0;
}
@@ -139,16 +162,13 @@
    unsigned long action, void *data)
 {
    struct dw_wdt *dw_wdt = to_dw_wdt(wdd);
- u32 val;
+ struct dw_wdt *dw_wdt = to_dw_wdt(wdd);
    writel(0, dw_wdt->regs + WDOG_TIMEOUT_RANGE_REG_OFFSET);
- val = readl(dw_wdt->regs + WDOG_CONTROL_REG_OFFSET);
- if (val & WDOG_CONTROL_REG_WDT_EN_MASK)
+ if (dw_wdt_is_enabled(dw_wdt))
    writel(WDOG_COUNTER_RESTART_KICK_VALUE,
       dw_wdt->regs + WDOG_COUNTER_RESTART_REG_OFFSET);
    else
- writel(WDOG_CONTROL_REG_WDT_EN_MASK,
- dw_wdt->regs + WDOG_CONTROL_REG_OFFSET);
+ dw_wdt_arm_system_reset(dw_wdt);
    /* wait for reset to assert... */
    mdelay(500);
@@ -173,6 +193,7 @@
 static const struct watchdog_ops dw_wdt_ops = {
  .owner = THIS_MODULE,
  .start = dw_wdt_start,
+ .stop = dw_wdt_stop,
  .ping = dw_wdt_ping,
  .set_timeout = dw_wdt_set_timeout,
  .get_timeleft = dw_wdt_get_timeleft,
--- linux-4.15.0.orig/drivers/watchdog/f71808e_wdt.c
+++ linux-4.15.0/drivers/watchdog/f71808e_wdt.c
@@ -496,7 +496,7 @@
 is_running = (superio_inb(watchdog.sioaddr, SIO_REG_ENABLE) & BIT(0))
 && (superio_inb(watchdog.sioaddr, F71808FG_REG_WDT_CONF)
    && F71808FG_FLAG_WD_EN);
+& F71808FG_FLAG_WD_EN);
+& BIT(F71808FG_FLAG_WD_EN));
```

superio_exit(watchdog.sioaddr);

@@ -566,7 +566,8 @@
 char c;
 if (get_user(c, buf + i))
 return -EFAULT;
-expect_close = (c == 'V');
+expect_close = (c == 'V');
+expect_close = true;
 }

/* Properly order writes across fork()ed processes */
@@ -687,9 +688,9 @@
 * into the module have been registered yet.
 */
 watchdog.sioaddr = sioaddr;
-watchdog.ident.options = WDIOC_SETTIMEOUT
-| WDIOF_MAGICCLOSE
-| WDIOF_KEEPALIVEPING;
+watchdog.ident.options = WDIOF_MAGICCLOSE
+| WDIOF_KEEPALIVEPING
+| WDIOF_CARDRESET;

snprintf(watchdog.ident.identity,
sizeof(watchdog.ident.identity), "%s watchdog",
@@ -703,6 +704,13 @@
wdt_conf = superio_inb(sioaddr, F71808FG_REG_WDT_CONF);
watchdog.caused_reboot = wdt_conf & BIT(F71808FG_FLAG_WDMOUT_STS);

+/*
 + * We don't want WDMOUT_STS to stick around till regular reboot.
 + * Write 1 to the bit to clear it to zero.
 + */
+superio_outb(sioaddr, F71808FG_REG_WDT_CONF,
+ wdt_conf | BIT(F71808FG_FLAG_WDMOUT_STS));
+
superio_exit(sioaddr);

err = watchdog_set_timeout(timeout);
--- linux-4.15.0.orig/drivers/watchdog/gpio_wdt.c
+++ linux-4.15.0/drivers/watchdog/gpio_wdt.c
@@ -80,7 +80,8 @@
if (!priv->always_running) {
-gpio_wdt_disable(priv);
-clear_bit(WDOG_HW_RUNNING, &wdd->status);
+} else {
+}
+set_bit(WDOG_HW_RUNNING, &wdd->status);
}

return 0;
--- linux-4.15.0.orig/drivers/watchdog/hpwdt.c
+++ linux-4.15.0/drivers/watchdog/hpwdt.c
@@ -28,16 +28,7 @@
#include <linux/types.h>
#include <linux/uaccess.h>
#include <linux/watchdog.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#include <linux/dmi.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#include <linux/spinlock.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#include <linux/nmi.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#include <linux/kdebug.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#include <linux/notifier.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#include <asm/set_memory.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#endif /* CONFIG_HPWDT_NMI_DECODING */
#include <asm/nmi.h>
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#include <asm/frame.h>

#define HPWDT_VERSION "1.4.0"
#define SECS_TO_TICKS(secs)((secs) * 1000 / 128)
static unsigned int soft_margin = DEFAULT_MARGIN; /* in seconds */
static unsigned int reload; /* the computed soft_margin */
static bool nowayout = WATCHDOG_NOWAYOUT;
-#ifdef CONFIG_HPWDT_NMI_DECODING
+static unsigned int allow_kdump = 1;
-#ifdef CONFIG_HPWDT_NMI_DECODING
-static char expect_release;
static unsigned long hpwdt_is_open;

static void __iomem *pci_mem_addr; /* the PCI-memory address */
+static unsigned long __iomem *hpwdt_nmistat;
static unsigned long __iomem *hpwdt_timer_reg;
static unsigned long __iomem *hpwdt_timer_con;

MODULE_DEVICE_TABLE(pci, hpwdt_devices);
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#define PCI_BIOS32_SD_VALUE 0x5F32335F /* "_32_" */
-#define CRU_BIOS_SIGNATURE_VALUE 0x55524324
-#define PCI_BIOS32_PARAGRAPH_LEN 16
-#define PCI_ROM_BASE 0x000F0000
-#define ROM_SIZE 0x10000
- struct bios32_service_dir {
  - u32 signature;
  - u32 entry_point;
  - u8 revision;
  - u8 length;
  - u8 checksum;
  - u8 reserved[5];
- }
-
- /* type 212 */
- struct smbios_cru64_info {
  - u8 type;
  - u8 byte_length;
  - u16 handle;
  - u32 signature;
  - u64 physical_address;
  - u32 double_length;
  - u32 double_offset;
- }
- #define SMBIOS_CRU64_INFORMATION 212
-
- /* type 219 */
- struct smbios_proliant_info {
  - u8 type;
  - u8 byte_length;
  - u16 handle;
  - u32 power_features;
  - u32 omega_features;
  - u32 reserved;
  - u32 misc_features;
- }
- #define SMBIOS_ICRU_INFORMATION 219
-
-
- struct cmn_registers {
  - union {
    - struct {
      - u8 ral;
      - u8 rah;
      - u16 rea2;
    - }
    - u32 reax;
  - } u1;
  - union {
    - struct {
      - u8 rbl;
    - } u8 rbl;
  - u8 rhh;
  - u8 rh;
  - u16 reg;
  - u32 regx;
- }
-
-u8 reb2l;
-u8 reb2h;
-\};
-u32 rebx;
-\} u2;
-union {
-\struct {
-u8 rcl;
-u8 rch;
-u16 rec2;
-\};
-u32 recx;
-\} u3;
-union {
-\struct {
-u8 rdl;
-u8 rdh;
-u16 red2;
-\};
-u32 edx;
-\} u4;
-
-u32 resi;
-u32 redi;
-u16 rds;
-u16 res;
-u32 reflags;
-\} __attribute__((packed));
-
-static unsigned int hpwdt_nmi_decoding;
-static unsigned int allow_kdump = 1;
-static unsigned int is_icru;
-static unsigned int is_uefi;
-static DEFINE_SPINLOCK(rom_lock);
-static void *cru_rom_addr;
-static struct cmn_registers cmn_regs;
-
-extern asmlinkage void asminline_call(struct cmn_registers *pi86Regs,
-unsigned long *pRomEntry);
-
-#ifdef CONFIG_X86_32
-/* --32 Bit Bios----------------------------------------------- */
-
-#define HPWDT_ARCH32
-
-asm(".text
\n\t" /*.text
- "\n\t" /*.globl asminline_call \n")
"asminline_call:

"pushl    %ebp
"movl    %esp, %ebp
"pusha
"pushf
"push      %es
"push      %ds
"pop       %es
"movl    8(%ebp),%eax
"movl    4(%eax),%ebx
"movl    8(%eax),%ecx
"movl    12(%eax),%edx
"movl    16(%eax),%esi
"movl    20(%eax),%edi
"movl    (%eax),%eax
"push      %cs
"call    *12(%ebp)
"pushf
"pushl    %eax
"movl    8(%ebp),%eax
"movl    %ebx,4(%eax)
"movl    %ecx,8(%eax)
"movl    %edx,12(%eax)
"movl    %esi,16(%eax)
"movl    %edi,20(%eax)
"movw    %ds,24(%eax)
"movw    %es,26(%eax)
"popl    %ebx
"movl    %ebx,(%eax)
"popl    %ebx
"movl    %ebx,28(%eax)
"pop    %es
"popf
"popa
"leave
"ret"

."previous);

/*
 * cru_detect
 *
 *
 *Routine Description:
 *This function uses the 32-bit BIOS Service Directory record to
 *search for a $CRU record.
 *
 *Return Value:
 *0    : SUCCESS
- *<0    : FAILURE
- */

static int cru_detect(unsigned long map_entry, unsigned long map_offset)
{
    void *bios32_map;
    unsigned long *bios32_entrypoint;
    unsigned long cru_physical_address;
    unsigned long cru_length;
    unsigned long physical_bios_base = 0;
    unsigned long physical_bios_offset = 0;
    int retval = -ENODEV;

    bios32_map = ioremap(map_entry, (2 * PAGE_SIZE));
    if (bios32_map == NULL)
        return -ENODEV;
    bios32_entrypoint = bios32_map + map_offset;

    cmn_regs.u1.reax = CRU_BIOS_SIGNATURE_VALUE;

    //unmap bios
    set_memory_x((unsigned long)bios32_map, 2);
    asminline_call(&cmn_regs, bios32_entrypoint);

    if (cmn_regs.u1.ral != 0) {
        pr_warn("Call succeeded but with an error: 0x%x\n",
                cmn_regs.u1.ral);
    } else {
        physical_bios_base = cmn_regs.u2.rebx;
        physical_bios_offset = cmn_regs.u4.redx;
        cru_length = cmn_regs.u3.recx;
        cru_physical_address = physical_bios_base + physical_bios_offset;

        /* If the values look OK, then map it in. */
        if ((physical_bios_base + physical_bios_offset)) {
            cru_rom_addr =
                ioremap(cru_physical_address, cru_length);
            if (cru_rom_addr) {
                set_memory_x((unsigned long)cru_rom_addr & PAGE_MASK,
                             (cru_length + PAGE_SIZE - 1) >> PAGE_SHIFT);
                retval = 0;
            }
        }
    }
    pr_debug("CRU Base Address:   0x%lx\n", physical_bios_base);
    pr_debug("CRU Offset Address: 0x%lx\n", physical_bios_offset);
-pr_debug("CRU Length: 0x%lx\n", cru_length);
-pr_debug("CRU Mapped Address: %p\n", &cru_rom_addr);
-
-iounmap(bios32_map);
-return retval;
-
-/*
- *bios_checksum
- */
-static int bios_checksum(const char __iomem *ptr, int len)
-
-char sum = 0;
-int i;
-
-/*
- * calculate checksum of size bytes. This should add up
- * to zero if we have a valid header.
- */
-for (i = 0; i < len; i++)
-sum += ptr[i];
-
-return ((sum == 0) && (len > 0));
-
-
-/*
- *bios32_present
- *
- *
- *Routine Description:
- *This function finds the 32-bit BIOS Service Directory
- *
- *Return Value:
- *0 : SUCCESS
- *<0 : FAILURE
- */
-static int bios32_present(const char __iomem *p)
-
-struct bios32_service_dir *bios_32_ptr;
-int length;
-unsigned long map_entry, map_offset;
-
-bios_32_ptr = (struct bios32_service_dir *) p;
-
-/*
- * Search for signature by checking equal to the swizzled value
- * instead of calling another routine to perform a strcmp.
- */
-if (bios_32_ptr->signature == PCI_BIOS32_SD_VALUE) {


-length = bios_32_ptr->length * PCI_BIOS32_PARAGRAPH_LEN;
-if (bios_checksum(p, length)) {
    /*
    * According to the spec, we're looking for the
    * first 4KB-aligned address below the entrypoint
    * listed in the header. The Service Directory code
    * is guaranteed to occupy no more than 2 4KB pages.
    * */
    map_entry = bios_32_ptr->entry_point & ~(PAGE_SIZE - 1);
    map_offset = bios_32_ptr->entry_point - map_entry;
    -return cru_detect(map_entry, map_offset);
    -}
    -}
    -return -ENODEV;
    -}
    -
    -static int detect_cru_service(void)
    -{
    -char __iomem *p, *q;
    -int rc = -1;
    -
    -/*
    - * Search from 0x0f0000 through 0xffff, inclusive.
    - */
    -p = ioremap(PCI_ROM_BASE1, ROM_SIZE);
    -if (p == NULL)
    -return -ENOMEM;
    -for (q = p; q < p + ROM_SIZE; q += 16) {
    -rc = bios32_present(q);
    -if (!rc)
    -break;
    -}
    -iounmap(p);
    -return rc;
    -}
    -/************************************************************************/
    -#endif /* CONFIG_X86_32 */
    -#ifdef CONFIG_X86_64
    -/************************************************************************/
    -#define HPWDT_ARCH 64
    -
    -asm(".text
    -    .align 4
    -    .globl asminline_call
    -    .type asminline_call, @function")
"asminline_call:  

FRAME-BEGIN

"pushq   %rax       
"pushq   %rbx       
"pushq   %rdx       
"pushq   %r12      
"pushq   %r9        
"movq    %rsi, %r12     
"movq    %rdi, %r9        
"movl    4(%r9),%ebx     
"movl    8(%r9),%ecx       
"movl    12(%r9),%edx      
"movl    16(%r9),%esi      
"movl    20(%r9),%edi     
"movl    (%r9),%eax       
"call    *%r12          
"pushfq                           
"popq    %r12           
"movl    %eax, (%r9)      
"movl    %ebx, 4(%r9)      
"movl    %ecx, 8(%r9)      
"movl    %edx, 12(%r9)     
"movl    %esi, 16(%r9)     
"movl    %edi, 20(%r9)     
"movq    %r12, %rax       
"movl    %eax, 28(%r9)     
"popq    %r9            
"popq    %r12           
"popq    %rdx           
"popq    %rbx           
"popq    %rax           

FRAME-END

"ret            

".previous"");

*/

*dmi_find_cru

*/

/*Routine Description:
 *This function checks whether or not a SMBIOS/DMI record is
 *the 64bit CRU info or not
 */

static void dmi_find_cru(const struct dmi_header *dm, void *dummy)
{

struct smbios_cru64_info *smbios_cru64_ptr;

unsigned long cru_physical_address;

if (dm->type == SMBIOS_CRU64_INFORMATION) {


smbios_cru64_ptr = (struct smbios_cru64_info *) dm;
-if (smbios_cru64_ptr->signature == CRU_BIOS_SIGNATURE_VALUE) {
  -cru_physical_address =
  -smbios_cru64_ptr->physical_address +
  -smbios_cru64_ptr->double_offset;
  -cru_rom_addr = ioremap(cru_physical_address,
  -smbios_cru64_ptr->double_length);
  -set_memory_x((unsigned long)cru_rom_addr & PAGE_MASK,
  -smbios_cru64_ptr->double_length >> PAGE_SHIFT);
  -}
  -}
  -}
  -
  -static int detect_cru_service(void)
  -{
  -cru_rom_addr = NULL;
  -
  -dmi_walk(dmi_find_cru, NULL);
  -
  -/* if cru_rom_addr has been set then we found a CRU service */
  -return ((cru_rom_addr != NULL) ? 0 : -ENODEV);*
  -}
  -/* -------------------------------------------------------------- */
  -#endif /* CONFIG_X86_64 */
  -#endif /* CONFIG_HPWDT_NMI_DECODING */

/*
* Watchdog operations
+475,32 +103,22 @@
 }

#endif CONFIG_HPWDT_NMI_DECODING
+static int hpwdt_my_nmi(void)
+{
+ return ioread8(hpwdt_nmistat) & 0x6;
+}
+
/*
* NMI Handler
*/
static int hpwdt_pretimeout(unsigned int ulReason, struct pt_regs *regs)
{
 unsigned long rom_pl;
 static int die_nmi_called;
 -
 -if (!hpwdt_nmi_decoding)
 +if ((ulReason == NMI_UNKNOWN) && !hpwdt_my_nmi())
 return NMI_DONE;
-spin_lock_irqsave(&rom_lock, rom_pl);
-if (!die_nmi_called && !is_icru && !is_uefi)
-asminline_call(&cmn_regs, cru_rom_addr);
-die_nmi_called = 1;
-spin_unlock_irqrestore(&rom_lock, rom_pl);
-
if (allow_kdump)
hpwdt_stop();
-
-if (!is_icru && !is_uefi) {
-if (cmn_regs.u1.ral == 0) {
-nmi_panic(regs, "An NMI occurred, but unable to determine source.");
-return NMI_HANDLED;
-}
-}

nmi_panic(regs, "An NMI occurred. Depending on your system the reason ",
"for the NMI is logged in any one of the following ",
"resources:
"
@@ -666,84 +284,11 @@
*Init & Exit
*/
-
-#ifdef CONFIG_HPWDT_NMI_DECODING
-#ifdef CONFIG_X86_LOCAL_APIC
-static void hpwdt_check_nmi_decoding(struct pci_dev *dev)
-{ 
-/*
- * If nmi_watchdog is turned off then we can turn on
- * our nmi decoding capability.
- */
- hpwdt_nmi_decoding = 1;
-}
-#else
-#endif /* CONFIG_HPWDT_NMI_DECODING */
-
-#ifdef CONFIG_X86_LOCAL_APIC
-static void hpwdt_check_nmi_decoding(struct pci_dev *dev)
-{ 
- dev_warn(&dev->dev, "NMI decoding is disabled.");
- "Your kernel does not support a NMI Watchdog.");
-}
-#endif /* CONFIG_X86_LOCAL_APIC */
-
-/*
-*dmi_find_icru
-*
-*Routine Description:
-*This function checks whether or not we are on an iCRU-based server.
-*This check is independent of architecture and needs to be made for
-*any ProLiant system.
- */
- static void dmi_find_icru(const struct dmi_header *dm, void *dummy)
-{  
- struct smbios_proliant_info *smbios_proliant_ptr;
-
- if (dm->type == SMBIOS_ICRU_INFORMATION) {
- smbios_proliant_ptr = (struct smbios_proliant_info *) dm;
- if (smbios_proliant_ptr->misc_features & 0x01)
- is_icru = 1;
- if (smbios_proliant_ptr->misc_features & 0x408)
- is_uefi = 1;
- }
- }

static int hpwdt_init_nmi_decoding(struct pci_dev *dev)
{
+#ifdef CONFIG_HPWDT_NMI_DECODING
int retval;
-
+ /*
- * On typical CRU-based systems we need to map that service in
- * the BIOS. For 32 bit Operating Systems we need to go through
- * the 32 Bit BIOS Service Directory. For 64 bit Operating
- * Systems we get that service through SMBIOS.
- *
- * On systems that support the new iCRU service all we need to
- * do is call dmi_walk to get the supported flag value and skip
- * the old cru detect code.
- */
- dmi_walk(dmi_find_icru, NULL);
- if (!is_icru && !is_uefi) {
-
- + /*
- + * We need to map the ROM to get the CRU service.
- + For 32 bit Operating Systems we need to go through the 32 Bit
- + BIOS Service Directory
- + For 64 bit Operating Systems we get that service through SMBIOS.
- + */
- + retval = detect_cru_service();
- + if (retval < 0) {
- + dev_warn(&dev->dev,
- + "Unable to detect the %d Bit CRU Service:\n",
- + -HPWDT_ARCH);
- + return retval;
- -
- + */
- + /* We know this is the only CRU call we need to make so lets keep as
-/* few instructions as possible once the NMI comes in.*/
-cmn_regs.u1.rah = 0x0D;
-cmn_regs.u1.ral = 0x02;
-
/*
 * Only one function can register for NMI_UNKNOWN
 */
@@ -771,45 +316,26 @@
 dev_warn(&dev->dev,
         "Unable to register a die notifier (err=%d)\n", 
        retval);
     -if (cru_rom_addr)
     -iounmap(cru_rom_addr);
     return retval;
+#endif /* CONFIG_HPWDT_NMI_DECODING */
+return 0;
 }

static void hpwdt_exit_nmi_decoding(void)
{
  +#ifdef CONFIG_HPWDT_NMI_DECODING
  unregister_nmi_handler(NMI_UNKNOWN, "hpwdt");
  unregister_nmi_handler(NMI_SERR, "hpwdt");
  unregister_nmi_handler(NMI_IO_CHECK, "hpwdt");
  -if (cru_rom_addr)
  -iounmap(cru_rom_addr);
  -}
  +#else /* !CONFIG_HPWDT_NMI_DECODING */
  -static void hpwdt_check_nmi_decoding(struct pci_dev *dev)
  -{ }
  -}
  -
  -static int hpwdt_init_nmi_decoding(struct pci_dev *dev)
  -{ 
  -return 0;
  +#endif
  }

  -static void hpwdt_exit_nmi_decoding(void)
  -{ }
  -}
  +#endif /* CONFIG_HPWDT_NMI_DECODING */
  -
  static int hpwdt_init_one(struct pci_dev *dev,
    const struct pci_device_id *ent)
  {
  
  Open Source Used In 5GaaS Edge AC-4 29724
int retval;

/*
 * Check if we can do NMI decoding or not
 */
-hpwdt_check_nmi_decoding(dev);
-
-/*
 * First let's find out if we are on an iLO2+ server. We will
 * not run on a legacy ASM box.
 * So we only support the G5 ProLiant servers and higher.
 */
retval = -ENOMEM;
goto error_pci_iomap;

@ @ -842,6 +368,7 @@
}
wdog->timeout = new_timeout;
-
regmap_update_bits(wdev->regmap, IMX2_WDT_WCR, IMX2_WDT_WCR_WT,
    WDOG_SEC_TO_COUNT(new_timeout));
+
static int imx2_wdt_set_timeout(struct watchdog_device *wdog,
    unsigned int new_timeout)
{
    unsigned int actual;
    
    actual = min(new_timeout, IMX2_WDT_MAX_TIME);
    __imx2_wdt_set_timeout(wdog, actual);
    wdog->timeout = new_timeout;
    return 0;
}

/* The watchdog IP block is running */
if (imx2_wdt_is_running(wdev)) {
    -imx2_wdt_set_timeout(wdog, IMX2_WDT_MAX_TIME);
    +/*
    + * Don't update wdog->timeout, we'll restore the current value
    + * during resume.
    + */
    +__imx2_wdt_set_timeout(wdog, IMX2_WDT_MAX_TIME);
    imx2_wdt_ping(wdog);
}

--- linux-4.15.0.orig/drivers/watchdog/lpc18xx_wdt.c
+++ linux-4.15.0/drivers/watchdog/lpc18xx_wdt.c
@@ -301,7 +301,7 @@
    struct lpc18xx_wdt_dev *lpc18xx_wdt = platform_get_drvdata(pdev);
    dev_warn(&pdev->dev, "I quit now, hardware will probably reboot\n");
    -del_timer(&lpc18xx_wdt->timer);
    +del_timer_sync(&lpc18xx_wdt->timer);
    watchdog_unregister_device(&lpc18xx_wdt->wdt_dev);
    clk_disable_unprepare(lpc18xx_wdt->wdt_clk);

--- linux-4.15.0.orig/drivers/watchdog/mei_wdt.c
+++ linux-4.15.0/drivers/watchdog/mei_wdt.c
@@ -390,6 +390,7 @@
    watchdog_set_drvdata(&wdt->wdd, wdt);
    watchdog_stop_on_reboot(&wdt->wdd);
+watchdog_stop_on_unregister(&wdt->wdd);

ret = watchdog_register_device(&wdt->wdd);
if (ret) {
    reg = readl(data->reg_base + GXBB_WDT_TCNT_REG);

    -return ((reg >> GXBB_WDT_TCNT_CNT_SHIFT) -
             (reg & GXBB_WDT_TCNT_SETUP_MASK)) / 1000;
    +return ((reg & GXBB_WDT_TCNT_SETUP_MASK) -
              (reg >> GXBB_WDT_TCNT_CNT_SHIFT)) / 1000;
}

static const struct watchdog_ops meson_gxbb_wdt_ops = {
    --- linux-4.15.0.orig/drivers/watchdog/mt7621_wdt.c
    +++ linux-4.15.0/drivers/watchdog/mt7621_wdt.c
    @@ -17,6 +17,7 @@
    #include <linux/watchdog.h>
    #include <linux/moduleparam.h>
    #include <linux/platform_device.h>
    +#include <linux/mod_devicetable.h>
    
    #include <asm/mach-ralink/ralink_regs.h>

    --- linux-4.15.0.orig/drivers/watchdog/qcom-wdt.c
    +++ linux-4.15.0/drivers/watchdog/qcom-wdt.c
    @@ -121,7 +121,7 @@
    */
    wmb();

    -msleep(150);
    +mdelay(150);
    return 0;
}

--- linux-4.15.0.orig/drivers/watchdog/rdc321x_wdt.c
+++ linux-4.15.0/drivers/watchdog/rdc321x_wdt.c
@@ -244,6 +244,8 @@
    rdc321x_wdt_device.sb_pdev = pdata->sb_pdev;
    rdc321x_wdt_device.base_reg = r->start;
    +rdc321x_wdt_device.queue = 0;
    +rdc321x_wdt_device.default_ticks = ticks;
    err = misc_register(&rdc321x_wdt_misc);
if (err < 0) {
@@ -258,14 +260,11 @@
  rdc321x_wdt_device.base_reg, RDC_WDT_RST);

  init_completion(&rdc321x_wdt_device.stop);
-  rdc321x_wdt_device.queue = 0;

  clear_bit(0, &rdc321x_wdt_device.inuse);

  timer_setup(&rdc321x_wdt_device.timer, rdc321x_wdt_trigger, 0);

-  rdc321x_wdt_device.default_ticks = ticks;
-
  dev_info(&pdev->dev, "watchdog init success\n");

  return 0;
--- linux-4.15.0.orig/drivers/watchdog/renesas_wdt.c
+++ linux-4.15.0/drivers/watchdog/renesas_wdt.c
@@ -74,12 +74,17 @@
 static int rwdt_start(struct watchdog_device *wdev)
 {
  struct rwdt_priv *priv = watchdog_get_drvdata(wdev);
+  u8 val;

  pm_runtime_get_sync(wdev->parent);

-  rwdt_write(priv, 0, RWTCSRB);
-  rwdt_write(priv, priv->cks, RWTCSRA);
+  /* Stop the timer before we modify any register */
+  val = readb_relaxed(priv->base + RWTCSRA) & ~RWTCSRA_TME;
+  rwdt_write(priv, val, RWTCSRA);
+
  rwdt_init_timeout(wdev);
+  rwdt_write(priv, priv->cks, RWTCSRA);
+  rwdt_write(priv, 0, RWTCSRB);

  while (readb_relaxed(priv->base + RWTCSRA) & RWTCSRA_WRFLG)
    cpu_relax();
@@ -176,6 +181,7 @@
 platform_set_drvdata(pdev, priv);
  watchdog_set_drvdata(&priv->wdev, priv);
  watchdog_set_nowayout(&priv->wdev, nowayout);
+  watchdog_stop_on_unregister(&priv->wdev);

  /* This overrides the default timeout only if DT configuration was found */
  ret = watchdog_init_timeout(&priv->wdev, 0, &pdev->dev);
--- linux-4.15.0.orig/drivers/watchdog/rn5t618_wdt.c
+++ linux-4.15.0/drivers/watchdog/rn5t618_wdt.c
module_platform_driver(rn5t618_wdt_driver);

+MODULE_ALIAS("platform:rn5t618-wdt");
MODULE_AUTHOR("Beniamino Galvani <b.galvani@gmail.com>");
MODULE_DESCRIPTION("RN5T618 watchdog driver");
MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/drivers/watchdog/rt2880_wdt.c
+++ linux-4.15.0/drivers/watchdog/rt2880_wdt.c
@@ -18,6 +18,7 @@
#include <linux/watchdog.h>
#include <linux/moduleparam.h>
#include <linux/platform_device.h>
+#include <linux/mod_devicetable.h>

#include <asm/mach-ralink/ralink_regs.h>

--- linux-4.15.0.orig/drivers/watchdog/sama5d4_wdt.c
+++ linux-4.15.0/drivers/watchdog/sama5d4_wdt.c
@@ -111,9 +111,7 @@
       value = WDT_SEC2TICKS(timeout);

       wdt->mr &= ~AT91_WDT_WDV;
-wdt->mr &= ~AT91_WDT_WDD;
       wdt->mr |= AT91_WDT_SET_WDV(value);
-wdt->mr |= AT91_WDT_SET_WDD(value);

       /*
 * WDDIS has to be 0 when updating WDD/WDV. The datasheet states: When
@@ -247,15 +245,11 @@
       
       ret = watchdog_init_timeout(wdd, wdt_timeout, &pdev->dev);
-       if (ret) {
-         dev_err(&pdev->dev, "unable to set timeout value\n");
-         return ret;
-       }
+       watchdog_init_timeout(wdd, wdt_timeout, &pdev->dev);

       timeout = WDT_SEC2TICKS(wdt->timeout);

-wdt->mr |= AT91_WDT_SET_WDD(timeout);
+wdt->mr |= AT91_WDT_SET_WDD(WDT_SEC2TICKS(MAX_WDT_TIMEOUT));
       wdt->mr |= AT91_WDT_SET_WDV(timeout);

       ret = sama5d4_wdt_init(wdt);
static void wdt_turnoff(void)
{
    /* Stop the timer */
    -del_timer(&timer);
    +del_timer_sync(&timer);
    inb_p(wdt_stop);
    pr_info("Watchdog timer is now disabled...
    ");
}

#include <linux/io.h>
+#include <linux/io-64-nonatomic-lo-hi.h>
#include <linux/interrupt.h>
#include <linux/module.h>
#include <linux/moduleparam.h>
@@ -159,7 +160,7 @@
    !(readl(gwdt->control_base + SBSA_GWDT_WCS) & SBSA_GWDT_WCS_WS0))
    timeleft += readl(gwdt->control_base + SBSA_GWDT_WOR);

    -timeleft += readq(gwdt->control_base + SBSA_GWDT_WCV) -
    +timeleft += lo_hi_readq(gwdt->control_base + SBSA_GWDT_WCV) -
    arch_counter_get_cntvct();

do_div(timeleft, gwdt->clk);

static int wdt_turnoff(void)
{
    /* Stop the timer */
    -del_timer(&timer);
    +del_timer_sync(&timer);

    /* Stop the watchdog */
    wdt_config(0);

#define SB800_PM_WATCHDOG_CONFIG	0x4C
#define SB800_PCI_WATCHDOG_DECODE_EN	(1 << 0)
#define SB800_PM_WATCHDOG_DISABLE	(1 << 2)

#define SB800_PM_WATCHDOG_CONFIG0x4C

#define SB800_PCI_WATCHDOGDecode_EN(1 << 0)
-#define SB800_PM_WATCHDOG_DISABLE(1 << 2)
+\#define SB800_PM_WATCHDOG_DISABLE (1 << 1)
+\#define SB800_PM_WATCHDOG_SECOND_RES (3 << 0)
+\#define SB800 ACPI_MMIO_DECODE_EN (1 << 0)
+\#define SB800 ACPI_MMIO_SEL (1 << 1)
--- linux-4.15.0.orig/drivers/watchdog/w83627hf_wdt.c
+++ linux-4.15.0/drivers/watchdog/w83627hf_wdt.c
@@ -50,7 +50,7 @@
 enum chips { w83627hf, w83627s, w83697hf, w83697ug, w83637hf, w83627thf,
             w83687hf, w83627ehf, w83627dhg, w83627uhg, w83667hg, w83627dhg_p,
             w83667hg_b, nct6775, nct6776, nct6779, nct6791, nct6792, nct6793,
-    nct6795, nct6102 ];
+    nct6795, nct6796, nct6102 ];

 static int timeout; /* in seconds */
 module_param(timeout, int, 0);
@@ -100,6 +100,7 @@
 #define NCT6792_ID 0xc9
 #define NCT6793_ID 0xd1
 #define NCT6795_ID 0xd3
+\#define NCT6796_ID 0xd4 /* also NCT9697D, NCT9698D */
 #define W83627HF_WDT_TIMEOUT 0xf6
 #define W83697HF_WDT_TIMEOUT 0xf4
@@ -209,6 +210,7 @@
 case nct6792:
 case nct6793:
 case nct6795:
+case nct6796:
 case nct6102:
 /*
 * These chips have a fixed WDTO# output pin (W83627UHG),
@@ -407,6 +409,9 @@
 case NCT6795_ID:
    ret = nct6795;
 break;
+case NCT6796_ID:
+    ret = nct6796;
+    break;
 case NCT6102_ID:
    ret = nct6102;
    cr_wdt_timeout = NCT6102D_WDT_TIMEOUT;
@@ -450,6 +455,7 @@
 "NCT6792",
 "NCT6793",
 "NCT6795",
+"NCT6796",
 "NCT6102",
 ];

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--- linux-4.15.0.orig/drivers/watchdog/w83877f_wdt.c
+++ linux-4.15.0/drivers/watchdog/w83877f_wdt.c
@@ -170,7 +170,7 @@
 static void wdt_turnoff(void)
 {
 /* Stop the timer */
-  del_timer(&timer);
+  del_timer_sync(&timer);

  wdt_change(WDT_DISABLE);

--- linux-4.15.0.orig/drivers/watchdog/watchdog_core.c
+++ linux-4.15.0/drivers/watchdog/watchdog_core.c
@@ -137,6 +137,25 @@
 }
EXPORT_SYMBOL_GPL(watchdog_init_timeout);

+static int watchdog_reboot_notifier(struct notifier_block *nb,
+    unsigned long code, void *data)
+ {
+     struct watchdog_device *wdd;
+     wdd = container_of(nb, struct watchdog_device, reboot_nb);
+     if (code == SYS_DOWN || code == SYS_HALT) {
+         if (watchdog_active(wdd)) {
+             int ret;
+             ret = wdd->ops->stop(wdd);
+             if (ret)
+                 return NOTIFY_BAD;
+         }
+     }
+     return NOTIFY_DONE;
+
+ }
+
+static int watchdog_restart_notifier(struct notifier_block *nb,
+unsigned long action, void *data)
+ {
+    if (test_bit(WDOG_STOP_ON_REBOOT, &wdd->status)) {
+        if (!wdd->ops->stop)
+            pr_warn("watchdog%d: stop_on_reboot not supported\n", wdd->id);
+        else {
+            int ret;
+            ret = wdd->ops->restart(wdd);
+            if (ret)
+                return NOTIFY_BAD;
+        }
+    }
+    return NOTIFY_DONE;
+}
wdd->reboot_nb.notifier_call = watchdog_reboot_notifier;
+
+ret = register_reboot_notifier(&wdd->reboot_nb);
+if (ret) {
+pr_err("watchdog%d: Cannot register reboot notifier (%d)\n",
+wdd->id, ret);
+watchdog_dev_unregister(wdd);
+ida_simple_remove(&watchdog_ida, id);
+return ret;
+}
+
+if (wdd->ops->restart) {
+wdd->restart_nb.notifier_call = watchdog_restart_notifier;
+
+unregister_restart_handler(&wdd->restart_nb);
+
+if (test_bit(WDOG_STOP_ON_REBOOT, &wdd->status))
+unregister_reboot_notifier(&wdd->reboot_nb);
+
+watchdog_dev_unregister(wdd);
+ida_simple_remove(&watchdog_ida, wdd->id);
+}

--- linux-4.15.0.orig/drivers/watchdog/watchdog_dev.c
+++ linux-4.15.0/drivers/watchdog/watchdog_dev.c
@@ -38,11 +38,9 @@
#include <linux/init.h> /* For __init/__exit/... */
#include <linux/jiffies.h> /* For timeout functions */
#include <linux/kernel.h> /* For printk/panic/... */
-#include <linux/kref.h> /* For data references */
+#include <linux/kref.h> /* For data references */
#include <linux/miscdevice.h> /* For handling misc devices */
#include <linux/module.h> /* For module stuff/... */
#include <linux/mutex.h> /* For mutexes */
-#include <linux/reboot.h> /* For reboot notifier */
+#include <linux/reboot.h> /* For reboot notifier */
#include <linux/slab.h> /* For memory functions */
#include <linux/types.h> /* For standard types (like size_t) */
#include <linux/watchdog.h> /* For watchdog specific items */
@@ -54,14 +52,14 @@
/*
 * struct watchdog_core_data - watchdog core internal data
- * @kref:Reference count.
+ * @dev: The watchdog's internal device
 * @cdev: The watchdog's Character device.
 * @wdd: Pointer to watchdog device.
* @lock: Lock for watchdog core.
* @status: Watchdog core internal status bits.
*/

struct watchdog_core_data {
  struct kref kref;
+  struct device dev;
  struct cdev cdev;
  struct watchdog_device *wdd;
  struct mutex lock;
}

if (err == 0) {
  set_bit(WDOG_ACTIVE, &wdd->status);
  wd_data->last_keepalive = started_at;
+  wd_data->last_hw_keepalive = started_at;
  watchdog_update_worker(wdd);
}

struct watchdog_core_data *wd_data;
struct watchdog_device *wdd;
+  bool hw_running;
int err;

/* Get the corresponding watchdog device */

/* If the /dev/watchdog device is open, we don't want the module
 * to be unloaded. */

-if (!watchdog_hw_running(wdd) && !try_module_get(wdd->ops->owner)) {
+  hw_running = watchdog_hw_running(wdd);
+  if (!hw_running && !try_module_get(wdd->ops->owner)) {
    err = -EBUSY;
    goto out_clear;
  }
}

file->private_data = wd_data;

-if (!watchdog_hw_running(wdd))
-  kref_get(&wd_data->kref);
+  if (!hw_running)
+    get_device(&wd_data->dev);

/* dev/watchdog is a virtual (and thus non-seeable) filesystem */
return nonseekable_open(inode, file);

return err;
-static void watchdog_core_data_release(struct kref *kref)  
+static void watchdog_core_data_release(struct device *dev)  
{
    struct watchdog_core_data *wd_data;  

    -wd_data = container_of(kref, struct watchdog_core_data, kref);  
+wd_data = container_of(dev, struct watchdog_core_data, dev);  

    kfree(wd_data);  
}  
@@ -876,7 +877,7 @@  
*/  
if (!running) {  
    module_put(wd_data->cdev.owner);  
    -kref_put(&wd_data->kref, watchdog_core_data_release);  
+put_device(&wd_data->dev);  
}  
return 0;  
}  
@@ -895,17 +896,22 @@  
.fops = &watchdog_fops,  
};  

+static struct class watchdog_class = {  
+    .name = "watchdog",  
+    .owner = THIS_MODULE,  
+    .dev_groups = wdt_groups,  
+};  
+  
+/*  
 * watchdog_cdev_register: register watchdog character device  
 * @wdd: watchdog device  
 * @devno: character device number  
 *  
 * Register a watchdog character device including handling the legacy  
 * /dev/watchdog node. /dev/watchdog is actually a miscdevice and  
 * thus we set it up like that.  
 */  

-static int watchdog_cdev_register(struct watchdog_device *wdd, dev_t devno)  
+static int watchdog_cdev_register(struct watchdog_device *wdd)  
{
    struct watchdog_core_data *wd_data;  
    int err;  
    @@ -913,14 +919,24 @@  
    wd_data = kzalloc(sizeof(struct watchdog_core_data), GFP_KERNEL);  

if (!wd_data)
  return -ENOMEM;
-kref_init(&wd_data->kref);
mutex_init(&wd_data->lock);

wd_data->wdd = wdd;
wdd->wd_data = wd_data;

-if (!watchdog_wq)
  +if (!watchdog_wq) {
  +kfree(wd_data);
  return -ENODEV;
  +}
  +
  +device_initialize(&wd_data->dev);
  +wd_data->dev.devt = MKDEV(MAJOR(watchdog_devt), wdd->id);
  +wd_data->dev.class = &watchdog_class;
  +wd_data->dev.parent = wdd->parent;
  +wd_data->dev.groups = wdd->groups;
  +wd_data->dev.release = watchdog_core_data_release;
  +dev_set_drvdata(&wd_data->dev, &wd_data->dev, wdd);
  +dev_set_name(&wd_data->dev, "watchdog%d", wdd->id);

INIT_DELAYED_WORK(&wd_data->work, watchdog_ping_work);

@@ -935,28 +951,29 @@
pr_err("%s: a legacy watchdog module is probably present.\n",
  wdd->info->identity);
old_wd_data = NULL;
-kfree(wd_data);
-put_device(&wd_data->dev);
  return err;
}
}
/* Fill in the data structures */
cdev_init(&wd_data->cdev, &watchdog_fops);
-wd_data->cdev.owner = wdd->ops->owner;

/* Add the device */
+err = cdev_add(&wd_data->cdev, devno, 1);
+err = cdev_device_add(&wd_data->cdev, &wd_data->dev);
if (err) {
  pr_err("watchdog%d unable to add device %d:%d\n",
    wdd->id, MAJOR(watchdog_dev), wdd->id);
  if (wdd->id == 0) {
    misc_deregister(&watchdog_miscdev);
    old_wd_data = NULL;
  }
- kref_put(&wd_data->kref, watchdog_core_data_release);
+ put_device(&wd_data->dev);
}
return err;

+ wd_data->cdev.owner = wdd->ops->owner;
+
/* Record time of most recent heartbeat as 'just before now'. */
wd_data->last_hw_keepalive = jiffies - 1;

@@ -965,14 +982,13 @@
 * and schedule an immediate ping.
 */
 if (watchdog_hw_running(wdd)) {
- if (handle_boot_enabled) {
- __module_get(wdd->ops->owner);
- kref_get(&wd_data->kref);
+ __module_get(wdd->ops->owner);
+ get_device(&wd_data->dev);
+ if (handle_boot_enabled)
 queue_delayed_work(watchdog_wq, &wd_data->work, 0);
- } else {
+ } else
 pr_info("watchdog%d running and kernel based pre-userspace handler disabled
",
- wdd->id);
- }
+ wdd->id);
}

return 0;
@@ -990,50 +1006,25 @@
{
 struct watchdog_core_data *wd_data = wdd->wd_data;

- cdev_del(&wd_data->cdev);
+ cdev_device_del(&wd_data->cdev, &wd_data->dev);
 if (wdd->id == 0) {
     misc_deregister(&watchdog_miscdev);
     old_wd_data = NULL;
 }

- mutex_lock(&wd_data->lock);
- wd_data->wdd = NULL;
- wdd->wd_data = NULL;
- mutex_unlock(&wd_data->lock);
- if (watchdog_active(wdd) &&
test_bit(WDOG_STOP_ON_UNREGISTER, &wdd->status)) {
    watchdog_stop(wdd);
}

-cancel_delayed_work_sync(&wd_data->work);
-
-kref_put(&wd_data->kref, watchdog_core_data_release);
-}
-
-static struct class watchdog_class = {
  .name = "watchdog",
  .owner = THIS_MODULE,
  .dev_groups = wdt_groups,
  .};
-
-static int watchdog_reboot_notifier(struct notifier_block *nb,
  unsigned long code, void *data)
  {
  struct watchdog_device *wdd;
  +mutex_lock(&wd_data->lock);
  +wd_data->wd = NULL;
  +wdd->wd_data = NULL;
  +mutex_unlock(&wd_data->lock);

  wdd = container_of(nb, struct watchdog_device, reboot_nb);
  -if (code == SYS_DOWN || code == SYS_HALT) {
    -if (watchdog_active(wdd)) {
      -int ret;
      -
      -ret = wdd->ops->stop(wdd);
      -if (ret)
        -return NOTIFY_BAD;
      -}
      -}
    +cancel_delayed_work_sync(&wd_data->work);

    -return NOTIFY_DONE;
    +put_device(&wd_data->dev);
  }

  /*
  @ @ -1047,41 +1038,15 @ @
  
  int watchdog_dev_register(struct watchdog_device *wdd)
  {
    -struct device *dev;
    -dev_t devno;
    int ret;
devno = MKDEV(MAJOR(watchdog_devt), wdd->id);
-
-ret = watchdog_cdev_register(wdd, devno);
+ret = watchdog_cdev_register(wdd);
if (ret)
    return ret;

-dev = device_create_with_groups(&watchdog_class, wdd->parent,
-devno, wdd, wdd->groups,
-"watchdog%d", wdd->id);
-if (IS_ERR(dev)) {
  watchdog_cdev_unregister(wdd);
  return PTR_ERR(dev);
  }

  ret = watchdog_register_pretimeout(wdd);
  if (ret) {
    device_destroy(&watchdog_class, devno);
    watchdog_cdev_unregister(wdd);
    return ret;
  }
-
  if (test_bit(WDOG_STOP_ON_REBOOT, &wdd->status)) {
    wdd->reboot_nb.notifier_call = watchdog_reboot_notifier;
    -
    ret = devm_register_reboot_notifier(dev, &wdd->reboot_nb);
    -if (ret) {
      pr_err("watchdog%d: Cannot register reboot notifier (%d)/n",
      -wdd->id, ret);
      -watchdog_dev_unregister(wdd);
      -}
  }

  return ret;
}  
@@ -1097,7 +1062,6 @@
void watchdog_dev_unregister(struct watchdog_device *wdd)
{
  watchdog_unregister_pretimeout(wdd);
-device_destroy(&watchdog_class, wdd->wd_data->cdev.dev);
  watchdog_cdev_unregister(wdd);
}

--- linux-4.15.0.orig/drivers/watchdog/wdat_wdt.c
+++ linux-4.15.0/drivers/watchdog/wdat_wdt.c
@@ -392,7 +392,7 @@
memset(&r, 0, sizeof(r));
r.start = gas->address;
- r.end = r.start + gas->access_width;
+ r.end = r.start + ACPI_ACCESS_BYTE_WIDTH(gas->access_width) - 1;
if (gas->space_id == ACPI_ADR_SPACE_SYSTEM_MEMORY) {
    r.flags = IORESOURCE_MEM;
} else if (gas->space_id == ACPI_ADR_SPACE_SYSTEM_IO) {
    --- linux-4.15.0.orig/drivers/xen/balloon.c
+++ linux-4.15.0/drivers/xen/balloon.c
@@ -43,6 +43,8 @@
#include <linux/sched.h>
#include <linux/cred.h>
#include <linux/errno.h>
+ #include <linux/freezer.h>
+ #include <linux/kthread.h>
#include <linux/mm.h>
#include <linux/bootmem.h>
#include <linux/pagemap.h>
@@ -119,7 +121,7 @@
#define EXTENT_ORDER (fls(XEN_PFN_PER_PAGE) - 1)

/*
 - * balloon_process() state:
 + * balloon_thread() state:
   *
   * BP_DONE: done or nothing to do,
   * BP_WAIT: wait to be rescheduled,
@@ -134,6 +136,8 @@
BP_ECANCELED
};

+/* Main waiting point for xen-ballooner thread. */
+static DECLARE_WAIT_QUEUE_HEAD(balloon_thread_wq);

static DEFINE_MUTEX(balloon_mutex);

@@ -148,10 +152,6 @@
static LIST_HEAD(ballooned_pages);
static DECLARE_WAIT_QUEUE_HEAD(balloon_wq);

-/* Main work function, always executed in process context. */
-static void balloon_process(struct work_struct *work);
-static DECLARE_DELAYED_WORK(balloon_worker, balloon_process);
-
-/* When ballooning out (allocating memory to return to Xen) we don't really
   want the kernel to try too hard since that can trigger the oom killer. */
#define GFP_BALLOON \
# Host memory not allocated to dom0. We can use this range for hotplug-based ballooning.

- It's a type-less resource. Setting IORESOURCE_MEM will make resource management algorithms (arch_remove_reservations()) look into guest e820, which we don't want.

```c
static struct resource hostmem_resource = {
    .name = "Host RAM",
};

void __attribute__((weak)) __init arch_xen_balloon_init(struct resource *res)
{
    static struct resource *additional_memory_resource(phys_addr_t size)
    {
        struct resource *res, *res_hostmem;
        int ret = -ENOMEM;
        struct resource *res;
        int ret;

        res = kzalloc(sizeof(*res), GFP_KERNEL);
        if (!res)
            res = NULL;

        res->name = "System RAM";
        res->flags = IORESOURCE_SYSTEM_RAM | IORESOURCE_BUSY;

        res_hostmem = kzalloc(sizeof(*res), GFP_KERNEL);
        if (res_hostmem)
        {
            /* Try to grab a range from hostmem */
            res_hostmem->name = "Host memory";
            size = allocate_resource(&hostmem_resource, res_hostmem,
                                    1, 0, -1,
                                    PAGES_PER_SECTION * PAGE_SIZE, NULL, NULL);
        }

        if (!size)
        {
            /* Insert this resource into iomem. Because hostmem_resource tracks portion of guest e820 marked as UNUSABLE noone else should try to use it. */
            res->start = res_hostmem->start;
        }
    }
```

res->end = res_hostmem->end;
ret = insert_resource(&iomem_resource, res);
if (ret < 0) {
    pr_err("Can't insert iomem_resource [%llx - %llx]\n",
    res->start, res->end);
    release_memory_resource(res_hostmem);
    res_hostmem = NULL;
    res->start = res->end = 0;
    }
    
    if (ret) {
        ret = allocate_resource(&iomem_resource, res,
        size, 0, -1,
        -PAGES_PER_SECTION * PAGE_SIZE, NULL, NULL);
        if (ret < 0) {
            pr_err("Cannot allocate new System RAM resource\n");
            kfree(res);
            return NULL;
        }
    }
    
    #ifdef CONFIG_SPARSEMEM
    @@ -331,7 +287,6 @@
    pr_err("New System RAM resource outside addressable RAM (%lu > %lu)\n",
            pfn, limit);
    release_memory_resource(res);
    release_memory_resource(res_hostmem);
    return NULL;
    }
    
    @@ -401,7 +356,10 @@
    * callers drop the mutex before trying again.
    */
    mutex_unlock(&balloon_mutex);
    /* add_memory_resource() requires the device_hotplug lock */
    +lock_device_hotplug();
    rc = add_memory_resource(nid, resource, memhp_auto_online);
    +unlock_device_hotplug();
    mutex_lock(&balloon_mutex);
if (rc) {
    @ @ -431,7 +389,7 @@
static int xen_memory_notifier(struct notifier_block *nb, unsigned long val, void *v)
    {
if (val == MEM_ONLINE)
-    schedule_delayed_work(&balloon_worker, 0);
+    wake_up(&balloon_thread_wq);

    return NOTIFY_OK;
    }
    @ @ -443,7 +401,8 @@
#else
static enum bp_state reserve_additional_memory(void)
    {
-    balloon_stats.target_pages = balloon_stats.current_pages;
+    balloon_stats.target_pages = balloon_stats.current_pages +
+        balloon_stats.target_unpopulated;
    return BP_ECANCELED;
    }
#endif /* CONFIG_XEN_BALLOON_MEMORY_HOTPLUG */
    @ @ -612,18 +571,52 @@
}

/*
- * As this is a work item it is guaranteed to run as a single instance only.
+ * Stop waiting if either state is BP_DONE and ballooning action is
+ * needed, or if the credit has changed while state is not BP_DONE.
+ */
+static bool balloon_thread_cond(enum bp_state state, long credit)
+{
+    if (state == BP_DONE)
+        credit = 0;
+    +return current_credit() != credit || kthread_should_stop();
+}
+ +/*
+ * As this is a kthread it is guaranteed to run as a single instance only.
+ * We may of course race updates of the target counts (which are protected
+ * by the balloon lock), or with changes to the Xen hard limit, but we will
+ * recover from these in time.
+ */
- static void balloon_process(struct work_struct *work)
+ static int balloon_thread(void *unused)
+ {
enum bp_state state = BP_DONE;
    long credit;
+    unsigned long timeout;

    ...
+set_freezable();
+for (;;) {
+case BP_DONE:
+case BP_ECANCELED:
+timeout = 3600 * HZ;
+break;
+case BP_EAGAIN:
+timeout = balloon_stats.schedule_delay * HZ;
+break;
+case BP_WAIT:
+timeout = HZ;
+break;
+
+credit = current_credit();
+
+wait_event_freezable_timeout(balloon_thread_wq, balloon_thread_cond(state, credit), timeout);
+
+if (kthread_should_stop())
+return 0;
}

-do {
mutex_lock(&balloon_mutex);

credit = current_credit();
@@ -635,20 +628,22 @@
state = reserve_additional_memory();
}

-if (credit < 0)
-state = decrease_reservation(-credit, GFP_BALLOON);
+if (credit < 0) {
+long n_pages;
+
+n_pages = min(-credit, si_mem_available());
+state = decrease_reservation(n_pages, GFP_BALLOON);
+if (state == BP_DONE && n_pages != -credit &&
+ n_pages < totalreserve_pages)
+state = BP_EAGAIN;
+
} state = update_schedule(state);

mutex_unlock(&balloon_mutex);
cond_resched();
-
-} while (credit && state == BP_DONE);
-
-/* Schedule more work if there is some still to be done. */
-if (state == BP_EAGAIN)
-schedule_delayed_work(&balloon_worker, balloon_stats.schedule_delay * HZ);
+	} 
+
} 
+
/* Resets the Xen limit, sets new target, and kicks off processing. */
@@ -656,7 +651,7 @@
{
/* No need for lock. Not read-modify-write updates. */
balloon_stats.target_pages = target;
-schedule_delayed_work(&balloon_worker, 0);
+wake_up(&balloon_thread_wq);
} 
EXPORT_SYMBOL_GPL(balloon_set_new_target);
@@ -667,14 +662,19 @@
if (xen_hotplug_unpopulated) {
st = reserve_additional_memory();
if (st != BP_ECANCELED) {
+int rc;
+
mutex_unlock(&balloon_mutex);
-wait_event(balloon_wq,
+rc = wait_event_interruptible(balloon_wq,
+ !list_empty(&ballooned_pages));
mutex_lock(&balloon_mutex);
-return 0;
+return rc ? -ENOMEM : 0;
} 
+
+if (si_mem_available() < nr_pages)
+return -ENOMEM;
+
st = decrease_reservation(nr_pages, GFP_USER);
if (st != BP_DONE)
return -ENOMEM;
@@ -726,6 +726,12 @@
out_undo:
mutex_unlock(&balloon_mutex);
free_xenballooned_pages(pgno, pages);
+/*
+ * NB: free_xenballooned_pages will only subtract pgno pages, but since

+ * target_unpopulated is incremented with nr_pages at the start we need
+ * to remove the remaining ones also, or accounting will be screwed.
+ */
+balloon_stats.target_unpopulated -= nr_pages - pgno;
return ret;
}
EXPORT_SYMBOL(alloc_xenballooned_pages);
@@ -750,7 +756,7 @@
/* The balloon may be too large now. Shrink it if needed. */
if (current_credit())
-schedule_delayed_work(&balloon_worker, 0);
+wake_up(&balloon_thread_wq);

mutex_unlock(&balloon_mutex);
}
@@ -784,6 +790,8 @@
static int __init balloon_init(void)
{
+struct task_struct *task;
+
if (!xen_domain())
return -ENODEV;
@@ -804,14 +812,12 @@
balloon_stats.schedule_delay = 1;
balloon_stats.max_schedule_delay = 32;
balloon_stats.retry_count = 1;
-balloon_stats.max_retry_count = RETRY_UNLIMITED;
+balloon_stats.max_retry_count = 4;
#endif
#endif
+task = kthread_run(balloon_thread, NULL, "xen-balloon");
+if (IS_ERR(task)) {
+pr_err("xen-balloon thread could not be started, ballooning will not work!
");

+return PTR_ERR(task);
+
/* Init the xen-balloon driver. */
xen_balloon_init();

--- linux-4.15.0.orig/drivers/xen/cpu_hotplug.c
+++ linux-4.15.0/drivers/xen/cpu_hotplug.c
@@ -19,15 +19,16 @@
 static void disable_hotplug_cpu(int cpu)
 {
- if (cpu_online(cpu)) {
- lock_device_hotplug();
- if (!cpu_is_hotpluggable(cpu))
+ if (!cpu_is_hotpluggable(cpu))
    return;
- lock_device_hotplug();
- if (cpu_online(cpu))
- device_offline(get_cpu_device(cpu));
- unlock_device_hotplug();
- }
- if (cpu_present(cpu))
- if (!cpu_possible(cpu) && cpu_present(cpu)) {
- xen_arch_unregister_cpu(cpu);
- -
- set_cpu_present(cpu, false);
- +set_cpu_present(cpu, false);
+ }
+ unlock_device_hotplug();
 }

 static int vcpu_online(unsigned int cpu)
@@ -53,7 +54,7 @@
 }
 static void vcpu_hotplug(unsigned int cpu)
 {
- if (!cpu_possible(cpu))
- if (cpu >= nr_cpu_ids || !cpu_possible(cpu))
+ if (!cpu_possible(cpu))
     return;
     switch (vcpu_online(cpu)) {
--- linux-4.15.0.orig/drivers/xen/events/events_2l.c
+++ linux-4.15.0/drivers/xen/events/events_2l.c
@@ -47,6 +47,11 @@
     return EVTCHN_2L_NR_CHANNELS;
 }
+ +static void evtchn_2l_remove(evtchn_port_t evtchn, unsigned int cpu)
static void evtchn_2l_bind_to_cpu(struct irq_info *info, unsigned cpu)
{
  clear_bit(info->evtchn, BM(per_cpu(cpu_evtchn_mask, info->cpu)));
  return sync_test_bit(port, BM(&s->evtchn_pending[0]));
}

-static bool evtchn_2l_test_and_set_mask(unsigned port)
-{
  struct shared_info *s = HYPERVISOR_shared_info;
  return sync_test_and_set_bit(port, BM(s->evtchn_mask[0]));
-}

- static void evtchn_2l_mask(unsigned port)
{
  struct shared_info *s = HYPERVISOR_shared_info;
  BUG_ON(!irqs_disabled());
  /* All writes before unmask must be visible. */
  if (unlikely((cpu != cpu_from_evtchn(port))))
    do_hypercall = 1;
  else {
    /* A bitset of words which contain pending event bits. The second *
    * level is a bitset of pending events themselves. */
    -static void evtchn_2l_handle_events(unsigned cpu)
    +static void evtchn_2l_handle_events(unsigned cpu, struct evtchn_loop_ctrl *ctrl)
    {
      int irq;
      xen_ulong_t pending_words;
      BUG_ON(!irqs_disabled());
      /* Process port. */
      port = (word_idx * BITS_PER_EVTCHN_WORD) + bit_idx;
      irq = get_evtchn_to_irq(port);
      if (irq != -1)
        generic_handle_irq(irq);
      else {
        /* All writes before unmask must be visible. */
        if (unlikely((cpu != cpu_from_evtchn(port))))
          do_hypercall = 1;
        else {
          /* A bitset of words which contain pending event bits. The second *
          * level is a bitset of pending events themselves. */
          -static void evtchn_2l_mask(unsigned port)
          +static void evtchn_2l_mask(unsigned port, struct evtchn_loop_ctrl *ctrl)
          {
            int irq;
            xen_ulong_t pending_words;
            BUG_ON(!irqs_disabled());
            /* Process port. */
            port = (word_idx * BITS_PER_EVTCHN_WORD) + bit_idx;
            irq = get_evtchn_to_irq(port);
            if (irq != -1)
              generic_handle_irq(irq);
            +handle_irq_for_port(port, ctrl);
bit_idx = (bit_idx + 1) % BITS_PER_EVTCHN_WORD;

@@ -355,18 +353,27 @@
 EVTCHN_2L_NR_CHANNELS/BITS_PER_EVTCHN_WORD);
 }

+static int evtchn_2l_percpu_deinit(unsigned int cpu)
+{
+    memset(per_cpu(cpu_evtchn_mask, cpu), 0, sizeof(xen_ulong_t) *
+           EVTCHN_2L_NR_CHANNELS/BITS_PER_EVTCHN_WORD);
+    return 0;
+}
+
+static const struct evtchn_ops evtchn_ops_2l = {
+.max_channels = evtchn_2l_max_channels,
+.nr_channels = evtchn_2l_max_channels,
+.remove = evtchn_2l_remove,
+.bind_to_cpu = evtchn_2l_bind_to_cpu,
+.clear_pending = evtchn_2l_clear_pending,
+.set_pending = evtchn_2l_set_pending,
+.is_pending = evtchn_2l_is_pending,
-.test_and_set_mask = evtchn_2l_test_and_set_mask,
+.mask = evtchn_2l_mask,
+.unmask = evtchn_2l_unmask,
+.handle_events = evtchn_2l_handle_events,
+.resume = evtchn_2l_resume,
+.percpu_deinit = evtchn_2l_percpu_deinit,
};

void __init xen_evtchn_2l_init(void)
--- linux-4.15.0.orig/drivers/xen/events/events_base.c
+++ linux-4.15.0/drivers/xen/events/events_base.c
@@ -32,6 +32,10 @@
#include <linux/slab.h>
#include <linux/irqnr.h>
#include <linux/pci.h>
+include <linux/spinlock.h>
+include <linux/cpuhotplug.h>
+include <linux/atomic.h>
+include <linux/ktime.h>

#ifdef CONFIG_X86
#include <asm/desc.h>
#endif
#include <asm/desc.h>
@@ -61,6 +65,15 @@
#include "events_internal.h"
```c
#define MODULE_PARAM_PREFIX "xen."

static uint __read_mostly event_loop_timeout = 2;
module_param(event_loop_timeout, uint, 0644);

static uint __read_mostly event_eoi_delay = 10;
module_param(event_eoi_delay, uint, 0644);

const struct evtchn_ops *evtchn_ops;

static DEFINE_MUTEX(irq_mapping_update_lock);

/*
 @@ -69,6 +82,25 @@
*/
static DEFINE_MUTEX(irq_mapping_update_lock);

+/*
 + * Lock protecting event handling loop against removing event channels.
 + * Adding of event channels is no issue as the associated IRQ becomes active
 + * only after everything is setup (before request_lthreaded_irq() the handler
 + * can't be entered for an event, as the event channel will be unmasked only
 + * then).
 + */
+static DEFINE_RWLOCK(evtchn_rwlock);
+
+/*
 + * Lock hierarchy:
 + *
 + * irq_mapping_update_lock
 + * evtchn_rwlock
 + * IRQ-desc lock
 + * percpu eoi_list_lock
 + * irq_info->lock
 + */
+
static LIST_HEAD(xen_irq_list_head);

/*/ IRQ <-> VIRQ mapping. */
@@ -90,18 +122,23 @@
*/ Xen will never allocate port zero for any purpose. */
#define VALID_EVTCHN(chn)	((chn) != 0)

+static struct irq_info *legacy_info_ptrs[NR_IRQS_LEGACY];
+
static struct irq_chip xen_dynamicChip;
+static struct irq_chip xen_lateeoi_chip;
static struct irq_chip xen_percpu_chip;
static struct irq_chip xen_pirq_chip;
```
static void enable_dynirq(struct irq_data *data);
static void disable_dynirq(struct irq_data *data);

- static void clear_evtchn_to_irq_row(unsigned row);
+ static DEFINE_PER_CPU(unsigned int, irq_epoch);
+
+ static void clear_evtchn_to_irq_row(int *evtchn_row)
  
  unsigned col;

  for (col = 0; col < EVTCHN_PER_ROW; col++)
-      evtchn_to_irq[row][col] = -1;
+      WRITE_ONCE(evtchn_row[col], -1);
  
static void clear_evtchn_to_irq_all(void)
@@ -111,7 +148,7 @@
for (row = 0; row < EVTCHN_ROW(xen_evtchn_max_channels()); row++) {
  if (evtchn_to_irq[row] == NULL)
    continue;
-    clear_evtchn_to_irq_row(row);
+    clear_evtchn_to_irq_row(evtchn_to_irq[row]);
  }

@@ -119,6 +156,7 @@
{
  unsigned row;
  unsigned col;
+  int *evtchn_row;

  if (evtchn >= xen_evtchn_max_channels())
    return -EINVAL;
@@ -131,14 +169,21 @@
  if (irq == -1)
    return 0;

-  evtchn_to_irq[row] = (int *)get_zeroed_page(GFP_KERNEL);
-  if (evtchn_to_irq[row] == NULL)
+  evtchn_row = (int *)__get_free_pages(GFP_KERNEL, 0);
+  if (evtchn_row == NULL)
+    return -ENOMEM;

-  clear_evtchn_to_irq_row(row);
+  clear_evtchn_to_irq_row(evtchn_to_irq[row]);
 + /*
 + * We've prepared an empty row for the mapping. If a different
+ * thread was faster inserting it, we can drop ours.
+ */
+if (cmpxchg(&evtchn_to_irq[row], NULL, evtchn_row) != NULL)
+free_page((unsigned long) evtchn_row);
+
+evtchn_to_irq[EVTCHN_ROW(evtchn)][EVTCHN_COL(evtchn)] = irq;
+
+WRITE_ONCE(evtchn_to_irq[row][col], irq);
+return 0;
+
@@ -148,13 +193,24 @@
+return -1;
+if (evtchn_to_irq[EVTCHN_ROW(evtchn)] == NULL)
+return -1;
+return evtchn_to_irq[EVTCHN_ROW(evtchn)][EVTCHN_COL(evtchn)];
+return READ_ONCE(evtchn_to_irq[EVTCHN_ROW(evtchn)][EVTCHN_COL(evtchn)]);
+
/* Get info for IRQ */
struct irq_info *info_for_irq(unsigned irq)
{
-return irq_get_handler_data(irq);
+if (irq < nr_legacy_irqs())
+return legacy_info_ptrs[irq];
+else
+return irq_get_chip_data(irq);
+
+static void set_info_for_irq(unsigned int irq, struct irq_info *info)
+{
+if (irq < nr_legacy_irqs())
+legacy_info_ptrs[irq] = info;
+else
+irq_set_chip_data(irq, info);
+
/* Constructors for packed IRQ information. */
@@ -172,6 +228,7 @@

info->irq = irq;
info->evtchn = evtchn;
info->cpu = cpu;
+info->mask_reason = EVT_MASK_REASON_EXPLICIT;
+raw_spin_lock_init(&info->lock);

ret = set_evtchn_to_irq(evtchn, irq);
if (ret < 0)
@@ -238,6 +296,7 @@
static void xen_irq_info_cleanup(struct irq_info *info)
{
    set_evtchn_to_irq(info->evtchn, -1);
    xen_evtchn_port_remove(info->evtchn, info->cpu);
    info->evtchn = 0;
}

unsigned int evtchn_from_irq(unsigned irq)
{
    if (unlikely(WARN(irq >= nr_irqs, "Invalid irq %d!
", irq)))
        return info_for_irq(irq)->evtchn;
    return info->evtchn;
}

unsigned irq_from_evtchn(unsigned int evtchn)
{
    return ret;
}

+static void do_mask(struct irq_info *info, u8 reason)
+{
    +unsigned long flags;
    +
    +raw_spin_lock_irqsave(&info->lock, flags);
    +
    +if (!info->mask_reason)
    +mask_evtchn(info->evtchn);
    +if (!info)
    +return 0;
    -return info_for_irq(irq)->evtchn;
    +return info->evtchn;
}

unsigned irq_from_evtchn(unsigned int evtchn)
{
    return ret;
}

+static void do_unmask(struct irq_info *info, u8 reason)
+{
    +unsigned long flags;
    +
    +raw_spin_lock_irqsave(&info->lock, flags);
    +
    +static void do_unmask(struct irq_info *info, u8 reason)
    +{
    +unsigned long flags;
    +
    +raw_spin_lock_irqsave(&info->lock, flags);
info->mask_reason &= ~reason;
+
+if (!info->mask_reason)
+unmask_evtchn(info->evtchn);
+
+raw_spin_unlock_irqrestore(&info->lock, flags);
+
#else CONFIG_X86

static bool pirq_check_eoi_map(unsigned irq)
{
    @ @ -360,9 +451,160 @@
}

EXPORT_SYMBOL_GPL(notify_remote_via_irq);

+struct lateeoi_work {
+struct delayed_work delayed;
+spinlock_t eoi_list_lock;
+struct list_head eoi_list;
+};
+
+static DEFINE_PER_CPU(struct lateeoi_work, lateeoi);
+
+static void lateeoi_list_del(struct irq_info *info)
+{
+struct lateeoi_work *eoi = &per_cpu(lateeoi, info->eoi_cpu);
+unsigned long flags;
+
+spin_lock_irqsave(&eoi->eoi_list_lock, flags);
+
+list_del_init(&info->eoi_list);
+spin_unlock_irqrestore(&eoi->eoi_list_lock, flags);
+
+static void lateeoi_list_add(struct irq_info *info)
+{
+struct lateeoi_work *eoi = &per_cpu(lateeoi, info->eoi_cpu);
+struct irq_info *elem;
+u64 now = get_jiffies_64();
+unsigned long delay;
+unsigned long flags;
+
+if (now < info->eoi_time)
+delay = info->eoi_time - now;
+else
+delay = 1;
+
+spin_lock_irqsave(&eoi->eoi_list_lock, flags);
+
+if (list_empty(&eoi->eoi_list)) {
+list_add(&info->eoi_list, &eoi->eoi_list);
+mod_delayed_work_on(info->eoi_cpu, system_wq,
+    &eoi->delayed, delay);
+} else {
+list_for_each_entry_reverse(elem, &eoi->eoi_list, eoi_list) {
+if (elem->eoi_time <= info->eoi_time)
+    break;
+}
+list_add(&info->eoi_list, &elem->eoi_list);
+}
+
+spin_unlock_irqrestore(&eoi->eoi_list_lock, flags);
+
+static void xen_irq_lateeoi_locked(struct irq_info *info, bool spurious)
+{
+    evtchn_port_t evtchn;
+    unsigned int cpu;
+    unsigned int delay = 0;
+    
+    evtchn = info->evtchn;
+    if (!VALID_EVTCHN(evtchn) || !list_empty(&info->eoi_list))
+        return;
+    
+    if (spurious) {
+        if ((1 << info->spurious_cnt) < (HZ << 2))
+            info->spurious_cnt++;
+        if (info->spurious_cnt > 1) {
+            delay = 1 << (info->spurious_cnt - 2);
+            if (delay > HZ)
+                delay = HZ;
+        }
+    } else {
+        info->spurious_cnt = 0;
+    }
+    
+    cpu = info->eoi_cpu;
+    if (info->eoi_time &
+        (info->irq_epoch == per_cpu(irq_epoch, cpu) || delay)) {
+        lateeoi_list_add(info);
+        return;
+    }
+    
+    info->eoi_time = 0;
+ /* is_active hasn't been reset yet, do it now. */
+ smp_store_release(&info->is_active, 0);
+ do_unmask(info, EVT_MASK_REASON_EOI_PENDING);
+ 
+ static void xen_irq_lateeoi_worker(struct work_struct *work)
+ {
+ struct lateeoi_work *eoi;
+ struct irq_info *info;
+ u64 now = get_jiffies_64();
+ unsigned long flags;
+ 
+ eoi = container_of(to_delayed_work(work), struct lateeoi_work, delayed);
+ 
+ read_lock_irqsave(&evtchn_rwlock, flags);
+ 
+ while (true) {
+ spin_lock(&eoi->eoi_list_lock);
+ 
+ info = list_first_entry_or_null(&eoi->eoi_list, struct irq_info,
+ eoi_list);
+ 
+ if (info == NULL || now < info->eoi_time) {
+ spin_unlock(&eoi->eoi_list_lock);
+ break;
+ }
+ 
+ list_del_init(&info->eoi_list);
+ 
+ spin_unlock(&eoi->eoi_list_lock);
+ 
+ info->eoi_time = 0;
+ 
+ xen_irq_lateeoi_locked(info, false);
+ }
+ 
+ if (info)
+ mod_delayed_work_on(info->eoi_cpu, system_wq,
+ &eoi->delayed, info->eoi_time - now);
+ 
+ read_unlock_irqrestore(&evtchn_rwlock, flags);
+ }
+ 
+ static void xen_cpu_init_eoi(unsigned int cpu)
+ {
+ struct lateeoi_work *eoi = &per_cpu(lateeoi, cpu);
+ 
+ /*
+INIT_DELAYED_WORK(&eoi->delayed, xen_irq_lateeoi_worker);
+spin_lock_init(&eoi->eoi_list_lock);
+INIT_LIST_HEAD(&eoi->eoi_list);
+
+void xen_irq_lateeoi(unsigned int irq, unsigned int eoi_flags)
+{  
+struct irq_info *info;
+unsigned long flags;
+
+read_lock_irqsave(&evtchn_rwlock, flags);
+
+info = info_for_irq(irq);
+
+if (info)
+xen_irq_lateeoi_locked(info, eoi_flags & XEN_EOI_FLAG_SPURIOUS);
+
+read_unlock_irqrestore(&evtchn_rwlock, flags);
+}
+EXPORT_SYMBOL_GPL(xen_irq_lateeoi);
+
static void xen_irq_init(unsigned irq)
{
 struct irq_info *info;
+
#ifdef CONFIG_SMP
/* By default all event channels notify CPU#0. */
 cpumask_copy(irq_get_affinity_mask(irq), cpumask_of(0));
@@ -375,8 +617,9 @@
 info->type = IRQT_UNBOUND;
 info->refcnt = -1;

-irq_set_handler_data(irq, info);
+set_info_for_irq(irq, info);

+INIT_LIST_HEAD(&info->eoi_list);
 list_add_tail(&info->list, &xen_irq_list_head);
 }
@@ -424,17 +667,25 @@

 static void xen_free_irq(unsigned irq)
 {
-struct irq_info *info = irq_get_handler_data(irq);
+struct irq_info *info = info_for_irq(irq);
+unsigned long flags;

 if (WARN_ON(!info))

return;

+write_lock_irqsave(&evtchn_rwlock, flags);
+
+if (!list_empty(&info->eoi_list))
+lateeoi_list_del(info);
+
+list_del(&info->list);
-
-irq_set_handler_data(irq, NULL);
+
+set_info_for_irq(irq, NULL);
+WARN_ON(info->refcnt > 0);
+
+write_unlock_irqrestore(&evtchn_rwlock, flags);
+
+kfree(info);

/* Legacy IRQ descriptors are managed by the arch. */
@@ -453,6 +704,12 @@
BUG();
}

+static void event_handler_exit(struct irq_info *info)
+{
+smp_store_release(&info->is_active, 0);
+clear_evtchn(info->evtchn);
+}
+
+static void pirq_query_unmask(int irq)
{
struct physdev_irq_status_query irq_status;
@@ -471,7 +728,8 @@
static void eoi_pirq(struct irq_data *data)
{
-struct irq_info *info = info_for_irq(data->irq);
+struct irq_info *info = info_for_irq(data->irq);
+int evtchn = info ? info->evtchn : 0;
struct physdev_eoi eoi = { .irq = pirq_from_irq(data->irq) };
int rc = 0;

@@ -480,16 +738,15 @@

if (unlikely(irqd_is_setaffinity_pending(data)) &&
    likely(!irqd_irq_disabled(data))) {
    -int masked = test_and_set_mask(evtchn);
+do_mask(info, EVT_MASK_REASON_TEMPORARY);
-clear_evtchn(evtchn);
+event_handler_exit(info);

irq_move_masked_irq(data);

-if (!masked)
-  unmask_evtchn(evtchn);
+  do_unmask(info, EVT_MASK_REASON_TEMPORARY);
} else
-  clear_evtchn(evtchn);
+  event_handler_exit(info);

if (pirq_needs_eoi(data->irq)) {
  rc = HYPERVISOR_physdev_op(PHYSDEVOP_eoi, &eoi);
@@ -540,7 +797,8 @@
goto err;

out:
-  unmask_evtchn(evtchn);
+  do_unmask(info, EVT_MASK_REASON_EXPLICIT);
+
eoi_pirq(irq_get_irq_data(irq));

return 0;
@@ -567,7 +825,7 @@
if (!VALID_EVTCHN(evtchn))
return;

-mask_evtchn(evtchn);
+do_mask(info, EVT_MASK_REASON_EXPLICIT);
xen_evtchn_close(evtchn);
xen_irq_info_cleanup(info);
}
@@ -601,7 +859,7 @@
static void __unbind_from_irq(unsigned int irq)
{
  int evtchn = evtchn_from_irq(irq);
-  struct irq_info *info = irq_get_handler_data(irq);
+  struct irq_info *info = info_for_irq(irq);

  if (info->refcnt > 0) {
    info->refcnt--;
@@ -628,8 +886,6 @@
xen_irq_info_cleanup(info);
  }

  -BUG_ON(info_for_irq(irq)->type == IRQT_UNBOUND);
xen_free_irq(irq);
}
@@ -755,8 +1011,8 @@
mutex_unlock(&irq_mapping_update_lock);
return irq;
error_irq:
-  for (; i >= 0; i--)
+  while (nvec--)
    __unbind_from_irq(irq + i);
    __unbind_from_irq(irq + nvec);
mutex_unlock(&irq_mapping_update_lock);
return ret;
}
@@ -828,7 +1084,7 @@
} EXPORT_SYMBOL_GPL(xen_pirq_from_irq);

-int bind_evtchn_to_irq(unsigned int evtchn)
+static int bind_evtchn_to_irq_chip(evtchn_port_t evtchn, struct irq_chip *chip)
{
  int irq;
  int ret;
@@ -845,7 +1101,7 @@
    if (irq < 0)
      goto out;

-    irq_set_chip_and_handler_name(irq, &xen_dynamic_chip,
-    irq_set_chip_and_handler_name(irq, chip,
+    irq_set_chip_and_handler_name(irq, chip,
        handle_edge_irq, "event");

    ret = xen_irq_info_evtchn_setup(irq, evtchn);
@@ -866,8 +1122,19 @@

  return irq;
  }
+  +int bind_evtchn_to_irq(evtchn_port_t evtchn)
+  +{
+    +return bind_evtchn_to_irq_chip(evtchn, &xen_dynamic_chip);
+  +}
+EXPORT_SYMBOL_GPL(bind_evtchn_to_irq);
+
+int bind_evtchn_to_irq_lateeoi(evtchn_port_t evtchn)
+{ +
+  +return bind_evtchn_to_irq_chip(evtchn, &xen_lateeoi_chip);
+  +}
+EXPORT_SYMBOL_GPL(bind_evtchn_to_irq_lateeoi);
+
static int bind_ipi_to_irq(unsigned int ipi, unsigned int cpu)
{
    struct evtchn_bind_ipi bind_ipi;
    @@ -909,8 +1176,9 @@
        return irq;
    }

-int bind_interdomain_evtchn_to_irq(unsigned int remote_domain,
-    unsigned int remote_port)
+static int bind_interdomain_evtchn_to_irq_chip(unsigned int remote_domain,
+    evtchn_port_t remote_port,
+    struct irq_chip *chip)
{
    struct evtchn_bind_interdomain bind_interdomain;
    int err;
    @@ -921,10 +1189,26 @@
        err = HYPERVISOR_event_channel_op(EVTCHNOP_bind_interdomain,
            &bind_interdomain);

        return err ? : bind_evtchn_to_irq(bind_interdomain.local_port);
+    return err ? : bind_evtchn_to_irq_chip(bind_interdomain.local_port,
+        chip);
+}
+
+int bind_interdomain_evtchn_to_irq(unsigned int remote_domain,
+    evtchn_port_t remote_port)
+{
+    +return bind_interdomain_evtchn_to_irq_chip(remote_domain, remote_port,
+        &xen_dynamic_chip);
+} 
EXPORT_SYMBOL_GPL(bind_interdomain_evtchn_to_irq);

+int bind_interdomain_evtchn_to_irq_lateeoi(unsigned int remote_domain,
+    evtchn_port_t remote_port)
+{
+    +return bind_interdomain_evtchn_to_irq_chip(remote_domain, remote_port,
+        &xen_lateeoi_chip);
+}
+EXPORT_SYMBOL_GPL(bind_interdomain_evtchn_to_irq_lateeoi);
+
static int find_virq(unsigned intirq, unsigned int cpu)
{
    struct evtchn_status status;
    @@ -1020,14 +1304,15 @@
        mutex_unlock(&irq_mapping_update_lock);
    }


-int bind_evtchn_to_irqhandler(unsigned int evtchn,
  - irq_handler_t handler,
  - unsigned long irqflags,
  - const char *devname, void *dev_id)
+static int bind_evtchn_to_irqhandler_chip(evtchn_port_t evtchn,
  + irq_handler_t handler,
  + unsigned long irqflags,
  + const char *devname, void *dev_id,
  + struct irq_chip *chip)
{
 int irq, retval;

-irq = bind_evtchn_to_irq(evtchn);
+irq = bind_evtchn_to_irq_chip(evtchn, chip);
if (irq < 0)
 return irq;
 retval = request_irq(irq, handler, irqflags, devname, dev_id);
@@ -1038,18 +1323,38 @@
 return irq;
 }
 +
+int bind_evtchn_to_irqhandler(evtchn_port_t evtchn,
  + irq_handler_t handler,
  + unsigned long irqflags,
  + const char *devname, void *dev_id)
+{
+return bind_evtchn_to_irqhandler_chip(evtchn, handler, irqflags,
  + devname, dev_id,
  + &xen_dynamic_chip);
+}
EXPORT_SYMBOL_GPL(bind_evtchn_to_irqhandler);

-int bind_interdomain_evtchn_to_irqhandler(unsigned int remote_domain,
  - unsigned int remote_port,
  - irq_handler_t handler,
  - unsigned long irqflags,
  - const char *devname,
  - void *dev_id)
+int bind_evtchn_to_irqhandler_lateeoi(evtchn_port_t evtchn,
  + irq_handler_t handler,
  + unsigned long irqflags,
  + const char *devname, void *dev_id)
+{
+return bind_evtchn_to_irqhandler_chip(evtchn, handler, irqflags,
  + devname, dev_id,
  + &xen_lateeoi_chip);
+EXPORT_SYMBOL_GPL(bind_evtchn_to_irqhandler_lateeoi);
+
+static int bind_interdomain_evtchn_to_irqhandler_chip(
+unsigned int remote_domain, evtchn_port_t remote_port,
+irq_handler_t handler, unsigned long irqflags,
+const char *devname, void *dev_id, struct irq_chip *chip)
+{
+    int irq, retval;
+
-irq = bind_interdomain_evtchn_to_irq(remote_domain, remote_port);
+irq = bind_interdomain_evtchn_to_irq_chip(remote_domain, remote_port,
+    chip);
+if (irq < 0)
+    return irq;
+
@@ -1061,8 +1366,33 @@
+return irq;
+
+EXPORT_SYMBOL_GPL(bind_interdomain_evtchn_to_irqhandler);
+
+int bind_interdomain_evtchn_to_irqhandler_lateeoi(unsigned int remote_domain,
+    evtchn_port_t remote_port,
+    irq_handler_t handler,
+    unsigned long irqflags,
+    const char *devname,
+    void *dev_id) {
+    int bind_interdomain_evtchn_to_irqhandler_lateeoi(unsigned int remote_domain,
+        evtchn_port_t remote_port,
+        irq_handler_t handler,
+        unsigned long irqflags,
+        const char *devname,
+        void *dev_id) {
+    return bind_interdomain_evtchn_to_irqhandler_CHIP(remote_domain,
+        remote_port, handler, irqflags, devname,
+        dev_id, &xen_lateeoi_chip);
+}
+
+EXPORT_SYMBOL_GPL(bind_interdomain_evtchn_to_irqhandler_lateeoi);
+
+int bind_virq_to_irqhandler(unsigned int virq, unsigned int cpu,
+    struct irq_chip *chip) {
+    return bind_virq_to_irqhandler_CHIP(virq, cpu, chip);
+}
+
+EXPORT_SYMBOL_GPL(bind_virq_to_irqhandler_CHIP);
void unbind_from_irqhandler(unsigned int irq, void *dev_id)
{
-struct irq_info *info = irq_get_handler_data(irq);
+struct irq_info *info = info_for_irq(irq);

if (WARN_ON(!info))
    return;
@@ -1141,7 +1471,7 @@
    irq == -1)
    return -ENOENT;

-if (irq == -1)
-goto done;
-
-if (irq == -1)
-goto done;

err = -EINVAL;
-if (info->refcnt <= 0)
+if (info->refcnt <= 0 || info->refcnt == SHRT_MAX)
    goto done;

info->refcnt++;
@@ -1214,6 +1544,56 @@
    notify_remote_via_irq(irq);
 }

+struct evtchn_loop_ctrl {
+    kt ime_t timeout;
+    unsigned count;
+    bool defer_eoi;
+};
+
+void handle_irq_for_port(evtchn_port_t port, struct evtchn_loop_ctrl *ctrl)
+{
+int irq;
+struct irq_info *info;
+
+irq = get_evtchn_to_irq(port);
+if (irq == -1)
+return;
+
+/*
+ * Check for timeout every 256 events.
+ * We are setting the timeout value only after the first 256
+ * events in order to not hurt the common case of few loop
+ * iterations. The 256 is basically an arbitrary value.
+ *
+ * In case we are hitting the timeout we need to defer all further
+ * EOs in order to ensure to leave the event handling loop rather
+ * sooner than later.
+ */
+if (!ctrl->defer_eoi && !(++ctrl->count & 0xff)) {
+kt = ktime_get();
+
+if (!ctrl->timeout) {
+kt = ktime_add_ms(kt,
+ jiffies_to_msecs(event_loop_timeout));
+ctrl->timeout = kt;
+} else if (kt > ctrl->timeout) {
+ctrl->defer_eoi = true;
+}
+}
+
+info = info_for_irq(irq);
+if (xchg_acquire(&info->is_active, 1))
+return;
+
+if (ctrl->defer_eoi) {
+info->eoi_cpu = smp_processor_id();
+info->irq_epoch = __this_cpu_read(irq_epoch);
+info->eoi_time = get_jiffies_64() + event_eoi_delay;
+}
+
generic_handle_irq(irq);
+
static DEFINE_PER_CPU(unsigned, xed_nesting_count);
static void __xen_evtchn_do_upcall(void)
@@ -1221,6 +1601,9 @@
struct vcpu_info *vcpu_info = __this_cpu_read(xen_vcpu);
int cpu = get_cpu();

static void __xen_evtchn_do_upcall(void)
unsigned count;
+struct evtchn_loop_ctrl ctrl = { 0 };
+
+read_lock(&evtchn_rwlock);

do {
    vcpu_info->evtchn_upcall_pending = 0;
    if (__this_cpu_inc_return(xed_nesting_count) - 1)
        goto out;

-xen_evtchn_handle_events(cpu);
+xen_evtchn_handle_events(cpu, &ctrl);

BUG_ON(!irqs_disabled());

} while (count != 1 || vcpu_info->evtchn_upcall_pending);

out:
+read_unlock(&evtchn_rwlock);
+
+/*
+ * Increment irq_epoch only now to defer EOI's only for
+ * xen_irq_lateeoi() invocations occurring from inside the loop
+ * above.
+ */
+__this_cpu_inc(irq_epoch);

put_cpu();
}

/* Rebind an evtchn so that it gets delivered to a specific cpu */
-int xen_rebind_evtchn_to_cpu(int evtchn, unsigned tcpu)
+static int xen_rebind_evtchn_to_cpu(struct irq_info *info, unsigned int tcpu)
{
    struct evtchn_bind_vcpu bind_vcpu;
    int masked;
    +evtchn_port_t evtchn = info ? info->evtchn : 0;

    if (!VALID_EVTCHN(evtchn))
        return -1;
    if (!info)
        return -1;
    * Mask the event while changing the VCPU binding to prevent
    * it being delivered on an unexpected VCPU.
    */
masked = test_and_set_mask(evtchn);
do_mask(info, EVT_MASK_REASON_TEMPORARY);

/*
 * If this fails, it usually just indicates that we're dealing with a
 * @ @ -1324,18 +1715,16 @@
 if (HYPERVISOR_event_channel_op(EVTCHNOP_bind_vcpu, &bind_vcpu) >= 0)
 bind_evtchn_to_cpu(evtchn, tcpu);

 -if (!masked)
 -unmask_evtchn(evtchn);
 +do_unmask(info, EVT_MASK_REASON_TEMPORARY);

 return 0;
}
-EXPORT_SYMBOL_GPL(xen_rebind_evtchn_to_cpu);

static int set_affinity_irq(struct irq_data *data, const struct cpumask *dest,
   bool force)
{
 unsigned tcpu = cpumask_first_and(dest, cpu_online_mask);
-int ret = xen_rebind_evtchn_to_cpu(evtchn_from_irq(data->irq), tcpu);
+int ret = xen_rebind_evtchn_to_cpu(info_for_irq(data->irq), tcpu);

 if (!ret)
 irq_data_update_effective_affinity(data, cpumask_of(tcpu));
@@ -1343,41 +1732,52 @@
 return ret;
 }
+/* To be called with desc->lock held. */
+int xen_set_affinity_evtchn(struct irq_desc *desc, unsigned int tcpu)
+{
+ struct irq_data *d = irq_desc_get_irq_data(desc);
+ struct irq_info *info = info_for_irq(data->irq);
+ static void enable_dynirq(struct irq_data *data)
+ {
- int evtchn = evtchn_from_irq(data->irq);
+ struct irq_info *info = info_for_irq(data->irq);
+ struct evtchn_port_t evtchn = info ? info->evtchn : 0;
+
 if (VALID_EVTCHN(evtchn))
 -unmask_evtchn(evtchn);
 +do_unmask(info, EVT_MASK_REASON_EXPLICIT);
static void disable_dynirq(struct irq_data *data)
{
    int evtchn = evtchn_from_irq(data->irq);
    struct irq_info *info = info_for_irq(data->irq);
    evtnchn_port_t evtchn = info ? info->evtnchn : 0;

    if (VALID_EVTCHN(evtchn))
        mask_evtnchn(evtchn);
    do_mask(info, EVT_MASK_REASON_EXPLICIT);
}

static void ack_dynirq(struct irq_data *data)
{
    int evtchn = evtchn_from_irq(data->irq);
    struct irq_info *info = info_for_irq(data->irq);
    evtnchn_port_t evtchn = info ? info->evtnchn : 0;

    if (!VALID_EVTCHN(evtchn))
        return;

    if (unlikely(irqd_is_setaffinity_pending(data)) &&
        likely(!irqd_irq_disabled(data)))
    {
        int masked = test_and_set_mask(evtchn);
        do_mask(info, EVT_MASK_REASON_TEMPORARY);
        clear_evtchn(evtchn);
        event_handler_exit(info);
        irq_move_masked_irq(data);
    }
    else
        clear_evtchn(evtchn);
        event_handler_exit(info);
}

static void mask_ack_dynirq(struct irq_data *data)
{
    ack_dynirq(data);
}

+static void lateeoi_ack_dynirq(struct irq_data *data)
{
    struct irq_info *info = info_for_irq(data->irq);
}
+evtchn_port_t evtchn = info ? info->evtchn : 0;
+
+if (!VALID_EVTCHN(evtchn))
+return;
+
+do_mask(info, EVT_MASK_REASON_EOI_PENDING);
+
+do_mask(info, EVT_MASK_REASON_TEMPORARY);
+
+do_unmask(info, EVT_MASK_REASON_TEMPORARY);
+
+clear_evtchn(evtchn);
+
+irq_move_masked_irq(data);
+
+do_unmask(info, EVT_MASK_REASON_TEMPORARY);
+
+}
 else
+clear_evtchn(evtchn);
+
+static void lateeoi_mask_ack_dynirq(struct irq_data *data)
+{
+struct irq_info *info = info_for_irq(data->irq);
+evtchn_port_t evtchn = info ? info->evtchn : 0;
+
+do_mask(info, EVT_MASK_REASON_EXPLICIT);
+ack_dynirq(data);
+
+}
+
+static int retrigger_dynirq(struct irq_data *data)
+
+
+unsigned int evtchn = evtchn_from_irq(data->irq);
+int masked;
+struct irq_info *info = info_for_irq(data->irq);
+evtchn_port_t evtchn = info ? info->evtchn : 0;
+
+if (!VALID_EVTCHN(evtchn))
+do_mask(info, EVT_MASK_REASON_EXPLICIT);
+
+do_mask(info, EVT_MASK_REASON_TEMPORARY);
+set_evtchn(evtchn);
+
+if (!masked)
+unmask_evtchn(evtchn);
+
+do_unmask(info, EVT_MASK_REASON_TEMPORARY);
void xen_clear_irq_pending(int irq)
{
    int evtchn = evtchn_from_irq(irq);
    struct irq_info *info = info_for_irq(irq);
    evtchn_port_t evtchn = info ? info->evtchn : 0;

    if (VALID_EVTCHN(evtchn))
        clear_evtchn(evtchn);
    event_handler_exit(info);
}
EXPORT_SYMBOL(xen_clear_irq_pending);

void xen_set_irq_pending(int irq)
{
    // code...
}

/* Clear an irq's pending state, in preparation for polling on it */

// code...

+static struct irq_chip xen_lateeoi_chip __read_mostly = {
    .irq_retrigger = retrigger_dynirq,
    .irq_mask_ack = lateeoi_mask_ack_dynirq,
    .irq_set_affinity = set_affinity_irq,
    .irq_retrigger = retrigger_dynirq,
};

+static struct irq_chip xen_pirq_chip __read_mostly = {
    .irq_ack = ack_dynirq,
    .irq_mask_ack = lateeoi_mask_ack_dynirq,
};

-int xen_set_callback_via(uint64_t via)
{-
    struct xen_hvm_param a;
    a.domid = DOMID_SELF;
    a.index = HVM_PARAM_CALLBACK_IRQ;
    a.value = via;
}
-return HYPERVISOR_hvm_op(HVMOP_set_param, &a);
-
-EXPORT_SYMBOL_GPL(xen_set_callback_via);
-
#ifdef CONFIG_XEN_PVHVM
    /* Vector callbacks are better than PCI interrupts to receive event
     * channel notifications because we can receive vector callbacks on any
     * channel.
     */
    xen_have_vector_callback = 0;
    return;
    
    ppr_info("Xen HVM callback vector for event delivery is enabled\n");
  +ppr_info_once("Xen HVM callback vector for event delivery is enabled\n");
  alloc_intr_gate(HYPERVISOR_CALLBACK_VECTOR,
      xen_hvm_callback_vector);
  }  
  @ -1661,12 +2100,31 @@
  void xen_callback_vector(void) {}
#endif  

#undef MODULE_PARAM_PREFIX
-#define MODULE_PARAM_PREFIX "xen."
-
    static bool fifo_events = true;
    module_param(fifo_events, bool, 0);

    +static int xen_evtchn_cpu_prepare(unsigned int cpu)
    +{
    +    int ret = 0;
    +    
    +    xen_cpu_init_eoi(cpu);
    +    
    +    if (evtchn_ops->percpu_init)
    +        ret = evtchn_ops->percpu_init(cpu);
    +    
    +    return ret;
    +    }
    
    +static int xen_evtchn_cpu_dead(unsigned int cpu)
    +{
    +    int ret = 0;
    +    
    +    if (evtchn_ops->percpu_deinit)
    +        ret = evtchn_ops->percpu_deinit(cpu);
    +    
    +    return ret;
    +    }
void __init xen_init_IRQ(void)
{
    int ret = -EINVAL;
    @@ -1677,6 +2135,12 @@
        if (ret < 0)
            xenEvtchn2l_init();

+xen_cpu_init_eoi(smp_processor_id());
+    +cpuhp_setup_state_nocalls(CPUHP_XEN_EVTCHN_PREPARE,
+        +"xen/evtchn:prepare",
+        +xen_evtchn_cpu_prepare, xen_evtchn_cpu_dead);
+
    evtchn_to_irq = kmalloc(EVTCHN_ROW(xen_evtchn_max_channels()),
        sizeof(*evtchn_to_irq), GFP_KERNEL);
    BUG_ON(!evtchn_to_irq);
--- linux-4.15.0.orig/drivers/xen/events/events_fifo.c
+++ linux-4.15.0/drivers/xen/events/events_fifo.c
@@ -209,12 +209,6 @@

    return sync_test_bit(EVTCMN_FIFO_BIT(PENDING, word), BM(word));
}

-static bool evtchn_fifo_test_and_set_mask(unsigned port)
{-
    -event_word_t *word = event_word_from_port(port);
    -return sync_test_and_set_bit(EVTCMN_FIFO_BIT(MASKED, word), BM(word));
-}
-
    static void evtchn_fifo_mask(unsigned port)
    {
    event_word_t *word = event_word_from_port(port);
    @@ -227,19 +221,25 @@

    do {
        +if (w & (1 << EVTCMN_FIFO_PENDING))
        w = *word;
        
    
return false;
+
old = w & ~(1 << EVTCHN_FIFO_BUSY);
new = old & ~(1 << EVTCHN_FIFO_MASKED);
w = sync_cmpxchg(word, old, new);
} while (w != old);
+
return true;
}

static void evtchn_fifo_unmask(unsigned port)
@@ -248,8 +248,7 @@
BUG_ON(!irqs_disabled());

-clear_masked(word);
-if (evtchn_fifo_is_pending(port)) {
+if (!clear_masked_cond(word)) {
 struct evtchn_unmask unmask = {.port = port};
 (void)HYPERVISOR_event_channel_op(EVTCHNOP_unmask, &unmask);
 } @@ -270,19 +269,9 @@
 return w & EVTCHN_FIFO_LINK_MASK;
 }

-static void handle_irq_for_port(unsigned port)
-{:
-int irq;
-
-irq = get_evtchn_to_irq(port);
-if (irq != -1)
-generic_handle_irq(irq);
-}
-
-static void consume_one_event(unsigned cpu,
+static void consume_one_event(unsigned cpu, struct evtchn_loop_ctrl *ctrl,
  struct evtchn_fifo_control_block *control_block,
  unsigned priority, unsigned long *ready,
  bool drop)
+  unsigned priority, unsigned long *ready)
{:
 struct evtchn_fifo_queue *q = &per_cpu(cpu_queue, cpu);
 uint32_t head;
@@ -315,16 +304,17 @@
clear_bit(priority, ready);

 if (evtchn_fifo_is_pending(port) && !evtchn_fifo_is_masked(port)) {
-if (unlikely(drop))

+if (unlikely(!ctrl))
  pr_warn("Dropping pending event for port %u\n", port);
else
  -handle_irq_for_port(port);
  +handle_irq_for_port(port, ctrl);
}

q->head[priority] = head;
}

-static void __evtchn_fifo_handle_events(unsigned cpu, bool drop)
+static void __evtchn_fifo_handle_events(unsigned cpu,
+struct evtchn_loop_ctrl *ctrl)
{
  struct evtchn_fifo_control_block *control_block;
  unsigned long ready;
  @@ -336,14 +326,15 @@

  while (ready) {
    q = find_first_bit(&ready, EVTCHN_FIFO_MAX_QUEUES);
    -consume_one_event(cpu, control_block, q, &ready, drop);
    +consume_one_event(cpu, ctrl, control_block, q, &ready);
    ready |= xchg(&control_block->ready, 0);
  }
}

-static void evtchn_fifo_handle_events(unsigned cpu)
+static void evtchn_fifo_handle_events(unsigned cpu,
+struct evtchn_loop_ctrl *ctrl)
{
  -__evtchn_fifo_handle_events(cpu, false);
  +__evtchn_fifo_handle_events(cpu, ctrl);
}

static void evtchn_fifo_resume(void)
@@ -380,21 +371,6 @@
event_array_pages = 0;
}

-static const struct evtchn_ops evtchn_ops_fifo = {
+static const struct evtchn_ops evtchn_ops_fifo = {
  .max_channels      = evtchn_fifo_max_channels,
  .nr_channels       = evtchn_fifo_nr_channels,
  .setup             = evtchn_fifo_setup,
  .bind_to_cpu       = evtchn_fifo_bind_to_cpu,
  .clear_pending     = evtchn_fifo_clear_pending,
  .set_pending       = evtchn_fifo_set_pending,
  .is_pending        = evtchn_fifo_is_pending,
  .test_and_set_mask = evtchn_fifo_test_and_set_mask,
static int xen_evtchn_cpu_prepare(unsigned int cpu)
{
    if (!per_cpu(cpu_control_block, cpu))
        return evtchn_fifo_alloc_control_block(cpu);
    return 0;
}

static int xen_evtchn_cpu_dead(unsigned int cpu)
{
    __evtchn_fifo_handle_events(cpu, true);
    return 0;
}

static const struct evtchn_ops evtchn_ops_fifo = {
    .max_channels = evtchn_fifo_max_channels,
    .nr_channels = evtchn_fifo_nr_channels,
    .setup = evtchn_fifo_setup,
    .bind_to_cpu = evtchn_fifo_bind_to_cpu,
    .clear_pending = evtchn_fifo_clear_pending,
    .set_pending = evtchn_fifo_set_pending,
    .is_pending = evtchn_fifo_is_pending,
    .mask = evtchn_fifo_mask,
    .unmask = evtchn_fifo_unmask,
    .handle_events = evtchn_fifo_handle_events,
    .resume = evtchn_fifo_resume,
    .percpu_init = evtchn_fifo_percpu_init,
    .percpu_deinit = evtchn_fifo_percpu_deinit,
};

int __init xen_evtchn_fifo_init(void)
{
    int cpu = smp_processor_id();
}

static int evtchn_fifo_alloc_control_block(unsigned cpu)
{
    void *control_block = NULL;
    return ret;
}

static int evtchn_fifo_percpu_init(unsigned int cpu)
{
    if (!per_cpu(cpu_control_block, cpu))
        return evtchn_fifo_alloc_control_block(cpu);
    return 0;
}

static int evtchn_fifo_percpu_deinit(unsigned int cpu)
{
    __evtchn_fifo_handle_events(cpu, NULL);
    return 0;
}

static int xen_evtchn_cpu_prepare(unsigned int cpu)
{
    if (!per_cpu(cpu_control_block, cpu))
        return evtchn_fifo_alloc_control_block(cpu);
    return 0;
}

static int xen_evtchn_cpu_dead(unsigned int cpu)
{
    __evtchn_fifo_handle_events(cpu, true);
    return 0;
}

static const struct evtchn_ops evtchn_ops_fifo = {
    .max_channels = evtchn_fifo_max_channels,
    .nr_channels = evtchn_fifo_nr_channels,
    .setup = evtchn_fifo_setup,
    .bind_to_cpu = evtchn_fifo_bind_to_cpu,
    .clear_pending = evtchn_fifo_clear_pending,
    .set_pending = evtchn_fifo_set_pending,
    .is_pending = evtchn_fifo_is_pending,
    .mask = evtchn_fifo_mask,
    .unmask = evtchn_fifo_unmask,
    .handle_events = evtchn_fifo_handle_events,
    .resume = evtchn_fifo_resume,
    .percpu_init = evtchn_fifo_percpu_init,
    .percpu_deinit = evtchn_fifo_percpu_deinit,
};

int __init xen_evtchn_fifo_init(void)
{
    int cpu = smp_processor_id();
}
evtchn_ops = &evtchn_ops_fifo;

cpuhp_setup_state_nocalls(CPUHP_XEN_EVTCHN_PREPARE,
- "xen/evtchn:prepare",
- xen_evtchn_cpu_prepare, xen_evtchn_cpu_dead);
-
return ret;
}
--- linux-4.15.0.orig/drivers/xen/events/events_internal.h
+++ linux-4.15.0/drivers/xen/events/events_internal.h
@@ -32,11 +32,22 @@
*/
struct irq_info {
struct list_head list;
-int refcnt;
-enum xen_irq_type type;/* type */
+struct list_head eoi_list;
+short refcnt;
+short spurious_cnt;
+short type;/* type */
+u8 mask_reason;/* Why is event channel masked */
+#define EVT_MASK_REASON_EXPLICIT 0x01
+#define EVT_MASK_REASON_TEMPORARY 0x02
+#define EVT_MASK_REASON_EOI_PENDING 0x04
+u8 is_active;/* Is event just being handled */
unsigned irq;
unsigned int evtchn;/* event channel */
unsigned short cpu;/* cpu bound */
+unsigned short eoi_cpu;/* EOI must happen on this cpu */
+unsigned int irq_epoch;/* If eoi_cpu valid: irq_epoch of event */
+u64 eoi_time;/* Time in jiffies when to EOI */
+raw_spinlock_t lock;

union {
unsigned short virq;
@@ -55,28 +66,34 @@
#define PIRQ_SHAREABLE (1 << 1)
#define PIRQ_MSI_GROUP (1 << 2)

+struct evtchn_loop_ctrl;
+
struct evtchn_ops {
unsigned (*max_channels)(void);
unsigned (*nr_channels)(void);

int (*setup)(struct irq_info *info);
+void (*remove)(evtchn_port_t port, unsigned int cpu);
void (*bind_to_cpu)(struct irq_info *info, unsigned cpu);

void (*clear_pending)(unsigned port);
void (*set_pending)(unsigned port);
bool (*is_pending)(unsigned port);
-bool (*test_and_set_mask)(unsigned port);
void (*mask)(unsigned port);
void (*unmask)(unsigned port);

-void (*handle_events)(unsigned cpu);
+void (*handle_events)(unsigned cpu, struct evtchn_loop_ctrl *ctrl);
void (*resume)(void);
+
+int (*percpu_init)(unsigned int cpu);
+int (*percpu_deinit)(unsigned int cpu);
};

extern const struct evtchn_ops *evtchn_ops;

extern int **evtchn_to_irq;
int get_evtchn_to_irq(unsigned int evtchn);
+void handle_irq_for_port(evtchn_port_t port, struct evtchn_loop_ctrl *ctrl);

struct irq_info *info_for_irq(unsigned irq);
unsigned cpu_from_irq(unsigned irq);
@@ -98,6 +115,13 @@
return 0;
}

+static inline void xen_evtchn_port_remove(evtchn_port_t evtchn,
+  unsigned int cpu)
+{
+  if (evtchn_ops->remove)
+    evtchn_ops->remove(evtchn, cpu);
+}
+
static inline void xen_evtchn_port_bind_to_cpu(struct irq_info *info,
    unsigned cpu)
{
  @@ -119,11 +143,6 @@
    return evtchn_ops->is_pending(port);
  }

-static inline bool test_and_set_mask(unsigned port)
-{
-    return evtchn_ops->test_and_set_mask(port);
-}
static inline void mask_evtchn(unsigned port)
{
    return evtchn_ops->mask(port);
}

return evtchn_ops->unmask(port);
}

- static inline void xen_evtchn_handle_events(unsigned cpu)
+ static inline void xen_evtchn_handle_events(unsigned cpu,
+    struct evtchn_loop_ctrl *ctrl)
{
    return evtchn_ops->handle_events(cpu);
+ return evtchn_ops->handle_events(cpu, ctrl);
}

static inline void xen_evtchn_resume(void)
--- linux-4.15.0.orig/drivers/xen/evtchn.c
+++ linux-4.15.0/drivers/xen/evtchn.c
@@ -166,7 +166,6 @@
"Interrupt for port %d, but apparently not enabled; per-user %p\n",
    evtchn->port, u);
-	disable_irq_nosync(irq);
evtchn->enabled = false;
spin_lock(&u->ring_prod_lock);
@@ -292,7 +291,7 @@
evtchn = find_evtchn(u, port);
if (evtchn && !evtchn->enabled) {
    evtchn->enabled = true;
-    enable_irq(irq_from_evtchn(port));
+    xen_irq_lateeoi(irq_from_evtchn(port), 0);
}
}

@@ -392,8 +391,8 @@
if (rc < 0)
    goto err;

    -rc = bind_evtchn_to_irqhandler(port, evtchn_interrupt, 0,
-    -u->name, evtchn);
+rc = bind_evtchn_to_irqhandler_lateeoi(port, evtchn_interrupt, 0,
+    +u->name, evtchn);
if (rc < 0)
    goto err;

@@ -447,7 +446,7 @@
this_cpu_write(bind_last_selected_cpu, selected_cpu);

/* unmask expects irqs to be disabled */
xen_rebind_evtchn_to_cpu(evtchn, selected_cpu);
xen_set_affinity_evtchn(desc, selected_cpu);
raw_spin_unlock_irqrestore(&desc->lock, flags);
}

--- linux-4.15.0.orig/drivers/xen/gntdev.c
+++ linux-4.15.0/drivers/xen/gntdev.c
@@ -295,36 +295,47 @@
* to the kernel linear addresses of the struct pages.
* These ptes are completely different from the user ptes dealt
* with find_grant_ptes.
+ * Note that GNTMAP_device_map isn't needed here: The
+ * dev_bus_addr output field gets consumed only from ->map_ops,
+ * and by not requesting it when mapping we also avoid needing
+ * to mirror dev_bus_addr into ->unmap_ops (and holding an extra
+ * reference to the page in the hypervisor).
+ */
+unsigned int flags = (map->flags & ~GNTMAP_device_map) |
+ GNTMAP_host_map;
+ for (i = 0; i < map->count; i++) {
unsigned long address = (unsigned long)
pfn_to_kaddr(page_to_pfn(map->pages[i]));
BUG_ON(PageHighMem(map->pages[i]));

-gnttab_set_map_op(&map->kmap_ops[i], address,
-map->flags | GNTMAP_host_map,
+gnttab_set_map_op(&map->kmap_ops[i], address, flags,
map->grants[i].ref,
map->grants[i].domid);
gnttab_set_unmap_op(&map->kunmap_ops[i], address,
-map->flags | GNTMAP_host_map, -1);
+flags, -1);
}
}

pr_debug("map %d+%d\n", map->index, map->count);
err = gnttab_map_refs(map->map_ops, use_ptemod ? map->kmap_ops : NULL,
map->pages, map->count);
-if (err)
 return err;

for (i = 0; i < map->count; i++) {
-if (map->map_ops[i].status) {
+if (map->map_ops[i].status == GNTST_okay)
static int gntdev_get_page(struct gntdev_copy_batch *batch, void __user *virt,
    bool writeable, unsigned long *gfn)
{
    unsigned long addr = (unsigned long)virt;
    struct page *page;
    unsigned long xen_pfn;
    int ret;

    ret = get_user_pages_fast(addr, 1, writeable, &page);
    if (ret < 0)
        return ret;

    for (i = 0; i < batch->nr_pages; i++)
    {
+if (batch->writeable && !PageDirty(batch->pages[i]))
+set_page_dirty_lock(batch->pages[i]);
+put_page(batch->pages[i]);
+}
+batch->nr_pages = 0;
+batch->writeable = false;
}

static int gntdev_copy(struct gntdev_copy_batch *batch)
@@ -865,8 +881,9 @@
virt = seg->source.virt + copied;
off = (unsigned long)virt & ~XEN_PAGE_MASK;
len = min(len, (size_t)XEN_PAGE_SIZE - off);
+batch->writeable = false;

-ret = gntdev_get_page(batch, virt, false, &gfn);
+ret = gntdev_get_page(batch, virt, &gfn);
if (ret < 0)
return ret;

@@ -884,8 +901,9 @@
virt = seg->dest.virt + copied;
off = (unsigned long)virt & ~XEN_PAGE_MASK;
len = min(len, (size_t)XEN_PAGE_SIZE - off);
+batch->writeable = true;

-ret = gntdev_get_page(batch, virt, true, &gfn);
+ret = gntdev_get_page(batch, virt, &gfn);
if (ret < 0)
return ret;

--- linux-4.15.0.orig/drivers/xen/grant-table.c
+++ linux-4.15.0/drivers/xen/grant-table.c
@@ -382,7 +382,7 @@
if (entry->page) {
    pr_debug("freeing g.e. %#x (%pfn %#lx)\n",
    entry->ref, page_to_pfn(entry->page));
-__free_page(entry->page);
+put_page(entry->page);
} else
    pr_info("freeing g.e. %#x\n", entry->ref);
kfree(entry);
@@ -438,7 +438,7 @@
if (gnttab_end_foreign_access_ref(ref, readonly)) {
    put_free_entry(ref);
    if (page != 0)
-    free_page(page);
+    put_page(virt_to_page(page));
} else
  gnttab_add_deferred(ref, readonly,
    page ? virt_to_page(page) : NULL);
--- linux-4.15.0.orig/drivers/xen/manage.c
+++ linux-4.15.0/drivers/xen/manage.c
@@ -280,17 +280,26 @@
/*
 * The Xenstore watch fires directly after registering it and
 * after a suspend/resume cycle. So ENOENT is no error but
 - * might happen in those cases.
 + * might happen in those cases. ERANGE is observed when we get
 + * an empty value (''), this happens when we acknowledge the
 + * request by writing '0' below.
 */
-#if (err != -ENOENT)
+if (err != -ENOENT && err != -ERANGE)
 pr_err("Error %d reading sysrq code in control/sysrq
 ,
 err);
 xenbus_transaction_end(xbt, 1);
 return;
}

-#if (sysrq_key != '\0')
-xenbus_printf(xbt, "control","sysrq", "%c", \0);
+if (sysrq_key != \0) {
+  err = xenbus_printf(xbt, "control","sysrq", "%c", \0);
+  if (err) {
+    pr_err("%s: Error %d writing sysrq in control/sysrq\n", __func__, err);
+    xenbus_transaction_end(xbt, 1);
+    return;
+  }
+}
+
+err = xenbus_transaction_end(xbt, 0);
+if (err == -EAGAIN)
@@ -342,7 +351,12 @@
     continue;
     snprintf(node, FEATURE_PATH_SIZE, "feature-%s",
       shutdown_handlers[idx].command);
-  xenbus_printf(XBT_NIL, "control", node, "%u", 1);
+  err = xenbus_printf(XBT_NIL, "control", node, "%u", 1);
+  if (err) {
+    pr_err("%s: Error %d writing %s\n", __func__,
+      err, node);
+    return err;
+  }
+}
static bool __read_mostly pci_seg_supported = true;
#endif CONFIG_PCI_IOV
struct pci_dev *physfn = pci_dev->physfn;
#endif
+static int xen_mcfg_late(void) {
    static bool pci_mcfg_reserved = false;
    /*
     * Reserve MCFG areas in Xen on first invocation due to this being
     * potentially called from inside of acpi_init immediately after
     * MCFG table has been finally parsed.
     */
    if (!pci_mcfg_reserved) {
        xen_mcfg_late();
        pci_mcfg_reserved = true;
    }
    +if (pci_seg_supported) {
        xen_mcfg_late();
        pci_mcfg_reserved = true;
    }
    +#endif
    if (pci_mcfg_reserved) 
    struct {
        struct physdev_pci_device_add add;
        @ @ -213,7 +226,7 @@
        arch_initcall(register_xen_pci_notifier);
    } 
    +#endif
    return 0;
}
- *subsys_initcall_sync(xen_mcfg_late);
#endif
--- linux-4.15.0.orig/drivers/xen/platform-pci.c
+++ linux-4.15.0/drivers/xen/platform-pci.c
@@ -162,7 +162,6 @@
ret = gnttab_init();
if (ret)
goto grant_out;
-xenbus_probe(NULL);
return 0;
grant_out:
gnttab_free_auto_xlat_frames();
--- linux-4.15.0.orig/drivers/xen/preempt.c
+++ linux-4.15.0/drivers/xen/preempt.c
@@ -31,13 +31,15 @@
asmlinkage __visible void xen_maybe_preempt_hcall(void)
{
if (unlikely(__this_cpu_read(xen_in_preemptible_hcall)
-     && need_resched())) {
+     && need_resched() && !preempt_count())) {
/
* Clear flag as we may be rescheduled on a different
* cpu.
*/
__this_cpu_write(xen_in_preemptible_hcall, false);
-__cond_resched();
+local_irq_enable();
+cond_resched();
+local_irq_disable();
__this_cpu_write(xen_in_preemptible_hcall, true);
}
}
--- linux-4.15.0.orig/drivers/xen/pvcalls-back.c
+++ linux-4.15.0/drivers/xen/pvcalls-back.c
@@ -75,6 +75,7 @@
atomic_t eoi;
void (*saved_data_ready)(struct sock *sk);
struct pvcalls_ioworker ioworker;
};
}@ -75,6 +75,7 @@
atomic_t write;
atomic_t io;
atomic_t release;
+atomic_t eoi;
void (*saved_data_ready)(struct sock *sk);
struct pvcalls_ioworker ioworker;
};
}@ -96,7 +97,7 @@
    struct pvcalls_fedata *fedata,
    struct sock_mapping *map);

-static void pvcalls_conn_back_read(void *opaque)
+static bool pvcalls_conn_back_read(void *opaque)
{
    struct sock_mapping *map = (struct sock_mapping *)opaque;
    struct msghdr msg;
    @@ -116,17 +117,17 @@
    virt_mb();

    if (error)
        -return;
    +return false;

    size = pvcallsqueued(prod, cons, array_size);
    if (size >= array_size)
        -return;
    +return false;
    spin_lock_irqsave(&map->sock->sk->sk_receive_queue.lock, flags);
    if (skb_queue_empty(&map->sock->sk->sk_receive_queue)) {
        atomic_set(&map->read, 0);
        spin_unlock_irqrestore(&map->sock->sk->sk_receive_queue.lock, flags);
        -return;
        +return true;
    }
    spin_unlock_irqrestore(&map->sock->sk->sk_receive_queue.lock, flags);
    wanted = array_size - size;
    @@ -150,7 +151,7 @@
    ret = inet_recvmsg(map->sock, &msg, wanted, MSG_DONTWAIT);
    WARN_ON(ret > wanted);
    if (ret == -EAGAIN) /* shouldn’t happen */
        -return;
    +return true;
    if (!ret)
        ret = -ENOTCONN;
    spin_lock_irqsave(&map->sock->sk->sk_receive_queue.lock, flags);
    @@ -160,18 +161,19 @@
    /* write the data, then modify the indexes */
    virt_wmb();
    -if (ret < 0)
    +if (ret < 0) {
        atomic_set(&map->read, 0);
        intf->in_error = ret;
        -else
        +} else
        intf->in_prod = prod + ret;
    /* update the indexes, then notify the other end */
    virt_wmb();
    notify_remote_via_irq(map->irq);
static void pvcalls_conn_back_write(struct sock_mapping *map)
{
    struct pvcalls_data_intf *intf = map->ring;
    struct pvcalls_data *data = &map->data;

    array_size = XEN_FLEX_RING_SIZE(map->ring_order);
    size = pvcalls_queued(prod, cons, array_size);
    if (size == 0)
        return;
    memset(&msg, 0, sizeof(msg));
    msg.msg_flags |= MSG_DONTWAIT;

    atomic_set(&map->write, 0);
    ret = inet_sendmsg(map->sock, &msg, size);
    if (ret == -EAGAIN || (ret >= 0 && ret < size)) {
        atomic_inc(&map->write);
        atomic_inc(&map->io);
        return true;
    }
    if (ret == -EAGAIN)
        return;
    /* write the data, then update the indexes */
    virt_wmb();
    /* update the indexes, then notify the other end */
    virt_wmb();
    if (prod != cons + ret)
        atomic_inc(&map->write);
        atomic_inc(&map->io);
        notify_remote_via_irq(map->irq);
static void pvcalls_back_ioworker(struct work_struct *work)
@@ -235,6 +240,7 @@
    struct pvcalls_ioworker, register_work);
    struct sock_mapping *map = container_of(ioworker, struct sock_mapping,
    ioworker);
+    unsigned int eoi_flags = XEN_EOI_FLAG_SPURIOUS;

    while (atomic_read(&map->io) > 0) {
        if (atomic_read(&map->release) > 0) {
            return;
        }
-	    if (atomic_read(&map->read) > 0)
-	        pvcalls_conn_back_read(map);
-	    if (atomic_read(&map->write) > 0)
-	        pvcalls_conn_back_write(map);
+    if (atomic_read(&map->read) > 0 &&
+        pvcalls_conn_back_read(map))
+        eoi_flags = 0;
+    if (atomic_read(&map->write) > 0 &&
+        pvcalls_conn_back_write(map))
+        eoi_flags = 0;
+    if (atomic_read(&map->eoi) > 0 && !atomic_read(&map->write)) {
+        atomic_set(&map->eoi, 0);
+        xen_irq_lateeoi(map->irq, eoi_flags);
+        eoi_flags = XEN_EOI_FLAG_SPURIOUS;
+    }

    atomic_dec(&map->io);
    }
@@ -282,13 +296,11 @@
 static void pvcalls_sk_state_change(struct sock *sock)
 {
    struct sock_mapping *map = sock->sk_user_data;
-    struct pvcalls_data_intf *intf;
-    if (map == NULL)
-        return;
-    intf = map->ring;
-    intf->in_error = -ENOTCONN;
-    atomic_inc(&map->read);
-    notify_remote_via_irq(map->irq);
+    if (map == NULL)
+        return;
+    struct pvcalls_data_intf *intf;
+    -intf = map->ring;
+    -intf->in_error = -ENOTCONN;
+    +atomic_inc(&map->read);
+    +notify_remote_via_irq(map->irq);
    }
@@ -344,12 +356,9 @@
goto out;
map->bytes = page;

-ret = bind_interdomain_evtchn_to_irqhandler(fedata->dev->otherend_id,
-    evtchn,
-    pvcalls_back_conn_event,
-    0,
-    "pvcalls-backend",
-    map);
+ret = bind_interdomain_evtchn_to_irqhandler_lateeoi(
+    fedata->dev->otherend_id, evtchn,
+    pvcalls_back_conn_event, 0, "pvcalls-backend", map);
if (ret < 0)
    goto out;
map->irq = ret;
@@ -416,7 +425,7 @@
    sock);
    if (!map) {
        ret = -EFAULT;
@@ -785,7 +794,7 @@
    mappass->reqcopy = *req;
    icsk = inet_csk(mappass->sock->sk);
    queue = &icsk->icsk_accept_queue;
    -data = queue->rskq_accept_head != NULL;
    +data = READ_ONCE(queue->rskq_accept_head) != NULL;
    if (data) {
        mappass->reqcopy.cmd = 0;
        ret = 0;
@@ -883,15 +892,18 @@
    }
    struct xenbus_device *dev = dev_id;
    struct pvcalls_fedata *fedata = NULL;
    +unsigned int eoi_flags = XEN_EOI_FLAG_SPURIOUS;

    -if (dev == NULL)
    -return IRQ_HANDLED;
    +if (dev) {
    +    fedata = dev_get_drvdata(&dev->dev);
    +    if (fedata) {
    +        pvcalls_back_work(fedata);
    +        eoi_flags = 0;
    +    }
    +}
-fedata = dev_get_drvdata(&dev->dev);
-if (fedata == NULL)
-return IRQ_HANDLED;
+xen_irq_lateeoi(irq, eoi_flags);

-pvcalls_back_work(fedata);
return IRQ_HANDLED;
}

@@ -901,12 +913,15 @@
struct pvcalls_ioworker *iow;

if (map == NULL || map->sock == NULL || map->sock->sk == NULL ||
-map->sock->sk->sk_user_data != map) {
+map->sock->sk->sk_user_data != map) {
+  xen_irq_lateeoi(irq, 0);
  return IRQ_HANDLED;
+
} 

iow = &map->ioworker;

atomic_inc(&map->write);
+atomic_inc(&map->eoi);
atomic_inc(&map->io);
queue_work(iow->wq, &iow->register_work);

@@ -941,7 +956,7 @@
goto error;
}

-err = bind_interdomain_evtchn_to_irq(dev->otherend_id, evtchn);
+err = bind_interdomain_evtchn_to_irq_lateeoi(dev->otherend_id, evtchn);
if (err < 0)
goto error;
 fedata->irq = err;
@@ -1097,7 +1112,8 @@
case XenbusStateInitialised:
  switch (state) {
  case XenbusStateConnected:
-    backend_connect(dev);
+    if (backend_connect(dev))
+      return;
    xenbus_switch_state(dev, XenbusStateConnected);
    break;
  case XenbusStateClosing:
--- linux-4.15.0.orig/drivers/xen/pvcalls-front.c
+++ linux-4.15.0/drivers/xen/pvcalls-front.c
```c
#define PVCALLS_NR_RSP_PER_RING __CONST_RING_SIZE(xen_pvcalls, XEN_PAGE_SIZE)
#define PVCALLS_FRONT_MAX_SPIN 5000

+static struct proto pvcalls_proto = {
+  .name = "PVCalls",
+  .owner = THIS_MODULE,
+  .obj_size = sizeof(struct sock),
+};
+
+struct pvcalls_bedata {
+  struct xen_pvcalls_front_ring ring;
+  grant_ref_t ref;
+}
+
@@ -353,8 +359,8 @@
out_error:
  if (*evtchn >= 0)
    xenbus_free_evtchn(pvcalls_front_dev, *evtchn);
-  kfree(map->active.data.in);
-  kfree(map->active.ring);
+  free_pages((unsigned long)map->active.data.in, PVCALLS_RING_ORDER);
+  free_page((unsigned long)map->active.ring);
  return ret;
}

@@ -445,8 +451,10 @@
  int sent, tot_sent = 0;
  int count = 0, flags;
@@ -479,7 +487,6 @@
  int pvcalls_front_sendmsg(struct socket *sock, struct msghdr *msg,
                                size_t len)
  {
-    struct pvcalls_bedata *bedata;
    struct sock_mapping *map;
    int sent, tot_sent = 0;
    int count = 0, flags;
@@ -493,7 +500,6 @@
pvcalls_exit();
  return -ENOTCONN;
}
bedata = dev_get_drvdata(&pvcalls_front_dev->dev);

map = (struct sock_mapping *) sock->sk->sk_send_head;
if (!map) {
    error = intf->in_error;
    /* get pointers before reading from the ring */
    virt_rmb();
    -if (error < 0)
    -return error;
}

size = pvcalls_queued(prod, cons, array_size);
masked_prod = pvcalls_mask(prod, array_size);
masked_cons = pvcalls_mask(cons, array_size);

if (size == 0)
    -return 0;
+return error ?: size;

if (len > size)
    len = size;

int pvcalls_front_recvmsg(struct socket *sock, struct msghdr *msg, size_t len,
    int flags)
{
    -struct pvcalls_bedata *bedata;
    int ret;
    struct sock_mapping *map;

    map = (struct sock_mapping *) sock->sk->sk_send_head;
if (!map) {
    -bedata = dev_get_drvdata(&pvcalls_front_dev->dev);
}

received:
bedata->rsp[req_id].req_id = PVCALLS_INVALID_ID;
map->passive.inflight_req_id = PVCALLS_INVALID_ID;

spin_lock(&bedata->socket_lock);
list_del(&map->list);
spin_unlock(&bedata->socket_lock);
-if (READ_ONCE(map->passive.inflight_req_id) !=
  PVCALLS_INVALID_ID) {
+if (READ_ONCE(map->passive.inflight_req_id) != PVCALLS_INVALID_ID &&
+READ_ONCE(map->passive.inflight_req_id) != 0) {
pvcalls_front_free_map(bedata,
    map->passive.accept_map);
}
--- linux-4.15.0.orig/drivers/xen/swiotlb-xen.c
+++ linux-4.15.0/drivers/xen/swiotlb-xen.c
@@ -317,6 +317,9 @@
*/
flags &= ~(__GFP_DMA | __GFP_HIGHMEM);

+/* Convert the size to actually allocated. */
+size = 1UL << (order + XEN_PAGE_SHIFT);
+
+/* On ARM this function returns an ioremap'ped virtual address for
+ * which virt_to_phys doesn't return the corresponding physical
+ * address. In fact on ARM virt_to_phys only works for kernel direct
+ */
+size = 1UL << (order + XEN_PAGE_SHIFT);
+
+xen_destroy_contiguous_region(phys, order);

-if (((dev_addr + size - 1 > dma_mask)) ||
-    range_straddles_page_boundary(phys, size))
+/* Convert the size to actually allocated. */
+size = 1UL << (order + XEN_PAGE_SHIFT);
+
+if (!WARN_ON((dev_addr + size - 1 > dma_mask) ||
+    range_straddles_page_boundary(phys, size)))
xen_destroy_contiguous_region(phys, order);

xen_free_coherent_pages(hwdev, size, vaddr, (dma_addr_t)phys, attrs);
--- linux-4.15.0.orig/drivers/xen/tmem.c
+++ linux-4.15.0/drivers/xen/tmem.c
@@ -284,6 +284,10 @@
        if (pool < 0)
        return -1;
        if (ind64 != ind)
/* There are more ACPI Processor objects than in x2APIC or MADT. */
/* This can happen with incorrect ACPI SSDT declerations. */
-if (acpi_id > nr_acpi_bits) {
  pr_debug("We only have %u, trying to set %u\n",
  - nr_acpi_bits, acpi_id);
+if (acpi_id >= nr_acpi_bits) {
  max_acpi id %u, trying to set %u\n",
  + nr_acpi_bits - 1, acpi_id);
return AE_OK;
}
/* OK. There is a ACPI Processor object */

if (!watch_fired) {
  watch_fired = true;
-err = xenbus_scanf(XBT_NIL, "memory", "static-max", "%llu",
- &static_max);
  -if (err != 1)
-static_max = new_target;
-else
+
+if (((xenbus_scanf(XBT_NIL, "memory", "static-max",
+ "%llu", &static_max) == 1) ||
+ (xenbus_scanf(XBT_NIL, "memory", "memory_static_max",
+ "%llu", &static_max) == 1))
static_max >>= PAGE_SHIFT - 10;
-target_diff = xen_pv_domain() ? 0
+else
+static_max = balloon_stats.current_pages;
+
+target_diff = (xen_pv_domain() || xen_initial_domain()) ? 0
: static_max - balloon_stats.target_pages;
}

--- linux-4.15.0.orig/drivers/xen/xen-pciback/conf_space_capability.c
+++ linux-4.15.0/drivers/xen/xen-pciback/conf_space_capability.c
@@ -116,13 +116,12 @@
{
  int err;
  u16 old_value;
-pci_power_t new_state, old_state;
+p pci_power_t new_state;


err = pci_read_config_word(dev, offset, &old_value);
if (err)
goto out;
-old_state = (pci_power_t)(old_value & PCI_PM_CTRL_STATE_MASK);
new_state = (pci_power_t)(new_value & PCI_PM_CTRL_STATE_MASK);

new_value &= PM_OK_BITS;
--- linux-4.15.0.orig/drivers/xen/xen-pciback/pci_stub.c
+++ linux-4.15.0/drivers/xen/xen-pciback/pci_stub.c
@@ -106,7 +106,8 @@
 /* is called from "unbind" which takes a device_lock mutex.
 */
__pci_reset_function_locked(dev);
-if (pci_load_and_free_saved_state(dev, &dev_data->pci_saved_state))
+if (dev_data &&
 + pci_load_and_free_saved_state(dev, &dev_data->pci_saved_state))
 dev_info(&dev->dev, "Could not reload PCI state\n");
 else
 pci_restore_state(dev);
@@ -732,10 +733,17 @@
 wmb();
 notify_remote_via_irq(pdev->evtchn_irq);

 /* Enable IRQ to signal "request done". */
+xen_pcibk_lateeoi(pdev, 0);
+
 ret = wait_event_timeout(xen_pcibk_aer_wait_queue,
 !(test_bit(_XEN_PCIB_active, (unsigned long *)
 &sh_info->flags)), 300*HZ);

 /* Enable IRQ for pcifront request if not already active. */
+if (!test_bit(_PDEVF_op_active, &pdev->flags))
+xen_pcibk_lateeoi(pdev, 0);
+
 if (!ret) {
 if (test_bit(_XEN_PCIB_active,
 (unsigned long *)&sh_info->flags)) {
+ @ @ .749,13 +757,6 @@
 } clear_bit(_PCIB_op_pending, (unsigned long *)&pdev->flags);

 -if (test_bit(_XEN_PCIF_active,
 -(unsigned long *)&sh_info->flags)) {
 -dev_dbg(&psdev->dev->dev,
 -"schedule pci_conf service in " DRV_NAME "\n");
-xen_pcibk_test_and_schedule_op(psdev->pdev);
res = (pci_ers_result_t)aer_op->err;
return res;
}
--- linux-4.15.0.orig/drivers/xen/xen-pciback/pciback.h
+++ linux-4.15.0/drivers/xen/xen-pciback/pciback.h
@@ -14,6 +14,7 @@
#include <linux/spinlock.h>
#include <linux/workqueue.h>
#include <linux/atomic.h>
+#include <xen/events.h>
#include <xen/interface/io/pciif.h>

#define DRV_NAME "xen-pciback"
@@ -27,6 +28,8 @@
#define PDEVF_op_active (1<<(PDEVF_op_active))
#define _PCIB_op_pending (1)
#define PCIB_op_pending (1<<(PCIB_op_pending))
+#define _EOI_pending (2)
+#define EOI_pending (1<<(EOI_pending))

struct xen_pcibk_device {
    void *pci_dev_data;
@@ -182,12 +185,17 @@
    irqreturn_t xen_pcibk_handle_event(int irq, void *dev_id);
    void xen_pcibk_do_op(struct work_struct *data);

    +static inline void xen_pcibk_lateeoi(struct xen_pcibk_device *pdev,
    +    unsigned int eoi_flag)
    +{
    +    if (test_and_clear_bit(_EOI_pending, &pdev->flags))
    +    xen_irq_lateeoi(pdev->evtchn_irq, eoi_flag);
    +}
    
    int xen_pcibk_xenbus_register(void);
    void xen_pcibk_xenbus_unregister(void);

    extern int verbose_request;
-    void xen_pcibk_test_and_schedule_op(struct xen_pcibk_device *pdev);
+#endif

    /* Handles shared IRQs that can to device domain and control domain. */
    --- linux-4.15.0.orig/drivers/xen/xen-pciback/pciback_ops.c
    +++ linux-4.15.0/drivers/xen/xen-pciback/pciback_ops.c
    @@ -127,8 +127,6 @@
    if (pci_is_enabled(dev))
pci_disable_device(dev);

-pci_write_config_word(dev, PCI_COMMAND, 0);
-
dev->is_busmaster = 0;
} else {
pci_read_config_word(dev, PCI_COMMAND, &cmd);
@@ -299,26 +297,41 @@
return 0;
}
#endif
+
+static inline bool xen_pcibk_test_op_pending(struct xen_pcibk_device *pdev)
+{
+return test_bit(_XEN_PCIF_active,
+ (unsigned long *)&pdev->sh_info->flags) &&
+ test_and_set_bit(_PDEVF_op_active, &pdev->flags);
+
+}
+
+/*
* Now the same evtchn is used for both pcifront conf_read_write request
* as well as PCIe aer front end ack. We use a new work_queue to schedule
* xen_pcibk conf_read_write service for avoiding conflict with aer_core
* do_recovery job which also use the system default work_queue
*/
-void xen_pcibk_test_and_schedule_op(struct xen_pcibk_device *pdev)
+static void xen_pcibk_test_and_schedule_op(struct xen_pcibk_device *pdev)
{
+bool eoi = true;
+
+ /* Check that frontend is requesting an operation and that we are not
* already processing a request */
- if (test_bit(_XEN_PCIF_active, (unsigned long *)&pdev->sh_info->flags)
- & test_and_set_bit(_PDEVF_op_active, &pdev->flags)) {
+ if (xen_pcibk_test_op_pending(pdev)) {
schedule_work(&pdev->op_work);
+eoi = false;
}
/*_XEN_PCIB_active should have been cleared by pcifront. And also make
sure xen_pcibk is waiting for ack by checking _PCIB_op_pending*/
if (!test_bit(_XEN_PCIB_active, (unsigned long *)&pdev->sh_info->flags)
    && test_bit(_PCIB_op_pending, &pdev->flags)) {
    wake_up(&xen_pcibk_aer_wait_queue);
+eoi = false;
}
+
+/* EOI if there was nothing to do. */
+if (eoi)
/* Performing the configuration space reads/writes must not be done in atomic
@@ -326,10 +339,8 @@
* use of semaphores). This function is intended to be called from a work
* queue in process context taking a struct xen_pcibk_device as a parameter */

-xen_pcibk_lateeoi(pdev, XEN_EOI_FLAG_SPURIOUS);
}

/* Check to see if the driver domain tried to start another request in
 * between clearing _XEN_PCIF_active and clearing _PDEVF_op_active.
 */
-xen_pcibk_test_and_schedule_op(pdev);
+void xen_pcibk_do_op(struct work_struct *data)
+static void xen_pcibk_do_one_op(struct xen_pcibk_device *pdev)
+
struct xen_pcibk_device *pdev =
	container_of(data, struct xen_pcibk_device, op_work);
struct pci_dev *dev;
struct xen_pcibk_dev_data *dev_data = NULL;
struct xen_pci_op *op = &pdev->op;
@ @ -402,16 +413,31 @@
smp_mb__before_atomic(); /* /after/ clearing PCIF_active */
clear_bit(_PDEVF_op_active, &pdev->flags);
smp_mb__after_atomic(); /* /before/ final check for work */
+
 reluct_t xen_pcibk_handle_event(int irq, void *dev_id)
{
 struct xen_pcibk_device *pdev = dev_id;
+bool eoi;
 +
+/* IRQs might come in before pdev->evtchn_irq is written. */
+if (unlikely(pdev->evtchn_irq != irq))
+pdev->evtchn_irq = irq;
+
eoi = test_and_set_bit(_EOI_pending, &pdev->flags);

WARN(eoi, "IRQ while EOI pending\n");

xen_pcibk_test_and_schedule_op(pdev);

--- linux-4.15.0.orig/drivers/xen/xen-pciback/vpci.c
+++ linux-4.15.0/drivers/xen/xen-pciback/vpci.c
@@ -69,7 +69,7 @@
 struct pci_dev *dev, int devid,
 publish_pci_dev_cb publish_cb)
 {
- int err = 0, slot, func = -1;
+ int err = 0, slot, func = PCI_FUNC(dev->devfn);
 struct pci_dev_entry *t, *dev_entry;
 struct vpci_dev_data *vpci_dev = pdev->pci_dev_data;

 @@ -94,23 +94,26 @@
 */
 * Keep multi-function devices together on the virtual PCI bus, except
 * virtual functions.
+ * that we want to keep virtual functions at func 0 on their own. They
+ * aren't multi-function devices and hence their presence at func 0
+ * may cause guests to not scan the other functions.
 */
-if (!dev->is_virtfn) {
+if (!dev->is_virtfn || func) {
 for (slot = 0; slot < PCI_SLOT_MAX; slot++) {
 if (list_empty(&vpci_dev->dev_list[slot]))
 continue;

 t = list_entry(list_first(&vpci_dev->dev_list[slot]),
 struct pci_dev_entry, list);
+if (t->dev->is_virtfn && !PCI_FUNC(t->dev->devfn))
 +continue;

 if (match_slot(dev, t->dev)) {
 pr_info("vpci: %s: assign to virtual slot %d func %d\n",
 pci_name(dev), slot,
 -PCI_FUNC(dev->devfn));
+func);
 list_add_tail(&dev_entry->list,
 &vpci_dev->dev_list[slot]);
 -func = PCI_FUNC(dev->devfn);
 goto unlock;
 }
 }
@@ -123,7 +126,6 @@
 pci_name(dev), slot);
list_add_tail(&dev_entry->list, &vpci_dev->dev_list[slot]);
	func = dev->is_virtfn ? 0 : PCI_FUNC(dev->devfn);
goto unlock;
}
}
--- linux-4.15.0.orig/drivers/xen/xen-pciback/xenbus.c
+++ linux-4.15.0/drivers/xen/xen-pciback/xenbus.c
@@ -123,7 +123,7 @@
 pdev->sh_info = vaddr;

-err = bind_interdomain_evtchn_to_irqhandler(
  +err = bind_interdomain_evtchn_to_irqhandler_lateeoi(
     pdev->xdev->otherend_id, remote_evtchn, xen_pcibk_handle_event,
     0, DRV_NAME, pdev);
    if (err < 0) {
@@ -358,7 +358,8 @@
 return err;
 }

-static int xen_pcibk_reconfigure(struct xen_pcibk_device *pdev)
+static int xen_pcibk_reconfigure(struct xen_pcibk_device *pdev, enum xenbus_state state)
{
    int err = 0;
    int num_devs;
@@ -372,9 +373,7 @@
     dev_dbg(pdev->xdev->dev, "Reconfiguring device ...
 mutex_lock(&pdev->dev_lock);
-/* Make sure we only reconfigure once */
-if (xenbus_read_driver_state(pdev->xdev->nodename) !=
-   XenbusStateReconfiguring)
+if (xenbus_read_driver_state(pdev->xdev->nodename) != state)
     goto out;

 err = xenbus_scanf(XBT_NIL, pdev->xdev->nodename, "num_devs", ",\%d",
@@ -499,6 +498,10 @@
 }
 }

+if (state != XenbusStateReconfiguring)
+/* Make sure we only reconfigure once. */
+go to out;
+err = xenbus_switch_state(pdev->xdev, XenbusStateReconfigured);
if (err) {
xenbus_dev_fatal(pdev->xdev, err,
@@ -524,7 +527,7 @@
 break;

case XenbusStateReconfiguring:
-xen_pcibk_reconfigure(pdev);
+xen_pcibk_reconfigure(pdev, XenbusStateReconfiguring);
 break;

case XenbusStateConnected:
@@ -663,6 +666,15 @@
 xen_pcibk_setup_backend(pdev);
 break;

+case XenbusStateInitialised:
+/*
+ * We typically move to Initialised when the first device was
+ * added. Hence subsequent devices getting added may need
+ * reconfiguring.
+ */
+xen_pcibk_reconfigure(pdev, XenbusStateInitialised);
+break;
+
+default:
+break;
}
@@ -688,7 +700,7 @@
/* watch the backend node for backend configuration information */
err = xenbus_watch_path(dev, dev->nodename, &pdev->be_watch,
-xen_pcibk_be_watch);
+NULL, xen_pcibk_be_watch);
if (err)
goto out;

--- linux-4.15.0.orig/drivers/xen/xen-scsiback.c
+++ linux-4.15.0/drivers/xen/xen-scsiback.c
@@ -91,7 +91,6 @@
 unsigned int irq;

 struct vscsiif_back_ring ring;
-struct ring_error;

 spinlock_t ring_lock;
 atomic_t nr_unreplied_reqs;
@@ -423,12 +422,12 @@
 return 0;
err = gnttab_map_refs(map, NULL, pg, cnt);
-BUG_ON(err);
for (i = 0; i < cnt; i++) {
    if (unlikely(map[i].status != GNTST_okay)) {
        pr_err("invalid buffer -- could not remap it\n");
        map[i].handle = SCSIBACK_INVALID_HANDLE;
        -err = -ENOMEM;
        +if (!err)
        +err = -ENOMEM;
    } else {
        get_page(pg[i]);
    }
@@ -721,7 +720,8 @@
    return pending_req;
}

-static int scsiback_do_cmd_fn(struct vscsibk_info *info)
+static int scsiback_do_cmd_fn(struct vscsibk_info *info,
 +    unsigned int *eoi_flags)
 {  
     struct vscsiif_back_ring *ring = &info->ring;
     struct vscsiif_request ring_req;
@@ -738,11 +738,12 @@
     rc = ring->rsp_prod_pvt;
     pr_warn("Dom%d provided bogus ring requests (%#x - %#x = %u). Halting ring processing\n",
           info->domid, rp, rc, rp - rc);
     -info->ring_error = 1;
     -return 0;
     +return -EINVAL;
 }  

while ((rc != rp)) {
 +    *eoi_flags &= ~XEN_EOI_FLAG_SPURIOUS;
 +    if (RING_REQUEST_CONS_OVERFLOW(ring, rc))
     break;
@@ -801,13 +802,16 @@
 static irqreturn_t scsiback_irq_fn(int irq, void *dev_id)
 {  
     struct vscsibk_info *info = dev_id;
     +int rc;
     +unsigned int eoi_flags = XEN_EOI_FLAG_SPURIOUS;

     -if (info->ring_error)
     -return IRQ_HANDLED;
     +
     -while (scsiback_do_cmd_fn(info))
 }
while ((rc = scsiback_do_cmd_fn(info, &eoi_flags)) > 0)
cond_resched();

/* In case of a ring error we keep the event channel masked. */
+if (!rc)
+xen_irq_lateeoi(irq, eoi_flags);
+
return IRQ_HANDLED;
}

/* In case of a ring error we keep the event channel masked. */
warn = bind_interdomain_evtchn_to_irq(info->domid, evtchn);
+warn = bind_interdomain_evtchn_to_irq_lateeoi(info->domid, evtchn);
if (warn < 0)
goto unmap_page;

if (try) {
spin_lock_irqsave(&info->v2p_lock, flags);
+
}
else if (!try) {
-xenbus_printf(XBT_NIL, info->dev->nodename, state,
+err = xenbus_printf(XBT_NIL, info->dev->nodename, state,
"%d", XenbusStateClosed);
+if (err)
+xenbus_dev_error(info->dev, err,
+"%s: writing %s", __func__, state);
+
}
+
+
+sprintf(str, sizeof(str), "vscsi-devs/%s/p-dev", ent);
+val = xenbus_read(XBT_NIL, dev->nodename, str, NULL);
+if (IS_ERR(val)) {
-xenbus_printf(XBT_NIL, dev->nodename, state,
+err = xenbus_printf(XBT_NIL, dev->nodename, state,
"%d", XenbusStateClosed);
+if (err)
xenbus_dev_error(info->dev, err, "+"%s: writing %s", __func__, state); 
return;
}
strlcpy(phy, val, VSCSI_NAMELEN);
@@ -1079,8 +1090,11 @@
er = xenbus_scanf(XBT_NIL, dev->nodename, str, "%u:%u:%u:%u",
   &vir.hst, &vir.chn, &vir.tgt, &vir.lun);
if (XENBUS_EXIST_ERR(err)) {
-xenbus_printf(XBT_NIL, dev->nodename, state, 
+xenbus_printf(XBT_NIL, dev->nodename, state, 
"%d", XenbusStateClosed);
+if (err)
+xenbus_dev_error(info->dev, err, 
+"%s: writing %s", __func__, state);
return;
}
@@ -1241,7 +1255,6 @@
info->domid = dev->otherend_id;
spin_lock_init(&info->ring_lock);
-info->ring_error = 0;
atomic_set(&info->nr_unreplied_reqs, 0);
init_waitqueue_head(&info->waiting_to_free);
info->dev = dev;
--- linux-4.15.0.orig/drivers/xen/xenbus/xenbus.h
+++ linux-4.15.0/drivers/xen/xenbus/xenbus.h
@@ -44,6 +44,8 @@
int (*get_bus_id)(char bus_id[XEN_BUS_ID_SIZE], const char *nodename);
int (*probe)(struct xen_bus_type *bus, const char *type, 
    const char *dir);
+bool (*otherend_will_handle)(struct xenbus_watch *watch, 
    const char *path, const char *token);
void (*otherend_changed)(struct xenbus_watch *watch, const char *path, 
    const char *token);
struct bus_type bus;
@@ -76,12 +78,14 @@
struct list_head list;
wait_queue_head_t wq;
struct xsd_sockmsg msg;
+uint32_t caller_req_id;
enum xsd_sockmsg_type type;
char *body;
const struct kvec *vec;
int num_vecs;
int err;
enum xb_req_state state;
+bool user_req;
void (*cb)(struct xb_req_data *);
void *par;
}
@@ -132,4 +136,6 @@
int xenbus_dev_request_and_reply(struct xsd_sockmsg *msg, void *par);
void xenbus_dev_queue_reply(struct xb_req_data *req);

+extern unsigned int xb_dev_generation_id;
+
#endif
--- linux-4.15.0.orig/drivers/xen/xenbus/xenbus_client.c
+++ linux-4.15.0/drivers/xen/xenbus/xenbus_client.c
@@ -114,18 +114,22 @@
*/
int xenbus_watch_path(struct xenbus_device *dev, const char *path,
    struct xenbus_watch *watch,
+    bool (*will_handle)(struct xenbus_watch *,
+    const char *, const char *),
    void (*callback)(struct xenbus_watch *,
        const char *, const char *))
{
    int err;

    watch->node = path;
+    watch->will_handle = will_handle;
    watch->callback = callback;

    err = register_xenbus_watch(watch);

    if (err) {
        watch->node = NULL;
+        watch->will_handle = NULL;
        watch->callback = NULL;
        xenbus_dev_fatal(dev, err, "adding watch on %s", path);
    }
@@ -152,6 +156,8 @@
*/
int xenbus_watch_pathfmt(struct xenbus_device *dev,
        struct xenbus_watch *watch,
+    bool (*will_handle)(struct xenbus_watch *,
+    const char *, const char *),
    const char *pathfmt, ...)
@@ -168,7 +174,7 @@
xenbus_dev_fatal(dev, -ENOMEM, "allocating path for watch");
return -ENOMEM;
}  
-err = xenbus_watch_path(dev, path, watch, callback);  
+err = xenbus_watch_path(dev, path, watch, will_handle, callback);  

if (err)  
kfree(path);  
@@ -365,8 +371,14 @@  
int i, j;  

for (i = 0; i < nr_pages; i++) {  
-err = gnttab_grant_foreign_access(dev->otherend_id,  
- virt_to_gfn(vaddr), 0);  
+unsigned long gfn;  
+  if (is_vmalloc_addr(vaddr))  
+    gfn = pfn_to_gfn(vmalloc_to_pfn(vaddr));  
+else  
+    gfn = virt_to_gfn(vaddr);  
+  +err = gnttab_grant_foreign_access(dev->otherend_id, gfn, 0);  
if (err < 0) {  
xenbus_dev_fatal(dev, err,  
    "granting access to ring page");  
@@ -450,7 +462,14 @@  
int xenbus_map_ring_valloc(struct xenbus_device *dev, grant_ref_t *gnt_refs,  
    unsigned int nr_grefs, void **vaddr)  
{  
-return ring_ops->map(dev, gnt_refs, nr_grefs, vaddr);  
+int err;  
+  +err = ring_ops->map(dev, gnt_refs, nr_grefs, vaddr);  
+/* Some hypervisors are buggy and can return 1. */  
+if (err > 0)  
+    err = GNTST_general_error;  
+  +return err;  
}  
EXPORT_SYMBOL_GPL(xenbus_map_ring_valloc);  

--- linux-4.15.0.orig/drivers/xen/xenbus/xenbus_comms.c  
+++ linux-4.15.0/drivers/xen/xenbus/xenbus_comms.c  
@@ -57,16 +57,8 @@  
static int xenbus_irq;  
static struct task_struct *xenbus_task;  

-static DECLARE_WORK(probe_work, xenbus_probe);  
-
static irqreturn_t wake_waiting(int irq, void *unused)
{
    if (unlikely(xenstored_ready == 0)) {
        xenstored_ready = 1;
        schedule_work(&probe_work);
    }
    wake_up(&xb_waitq);
    return IRQ_HANDLED;
}

if (req->state == xb_req_state_wait_reply) {
    req->msg.req_id = req->caller_req_id;
    req->msg.type = state.msg.type;
    req->msg.len = state.msg.len;
    req->body = state.body;
    /* write body, then update state */
    /* virt_wmb();
    req->state = xb_req_state_got_reply;
    req->cb(req);
    } else */
    if (req->state == xb_req_state_aborted)
        kfree(state.req);
    else {
        /* write err, then update state */
        /* virt_wmb();
        state.req->state = xb_req_state_got_reply;
        wake_up(&state.req->wq);
    }

#include <linux/string.h>
#include <linux/slab.h>
#include <linux/miscdevice.h>
#include <linux/workqueue.h>
#include <xen/xenbus.h>
#include <xen/xen.h>
#include "xenbus.h"

unsigned int xb_dev_generation_id;
+
/*
* An element of a list of outstanding transactions, for which we're
* still waiting a reply.
@@ -69,6 +72,7 @@
struct xenbus_transaction_holder {
 struct list_head list;
 struct xenbus_transaction handle;
+unsigned int generation_id;
};

/*
@@ -113,6 +117,8 @@
wait_queue_head_t read_waitq;

 struct kref kref;
+ 
+struct work_struct wq;
};

/* Read out any raw xenbus messages queued up. */
@@ -297,14 +303,14 @@
 mutex_unlock(&adap->dev_data->reply_mutex);
 }

-static void xenbus_file_free(struct kref *kref)
+static void xenbus_worker(struct work_struct *wq)
 { 
 struct xenbus_file_priv *u;
 struct xenbus_transaction_holder *trans, *tmp;
 struct watch_adapter *watch, *tmp_watch;
 struct read_buffer *rb, *tmp_rb;

-u = container_of(kref, struct xenbus_file_priv, kref);
+u = container_of(wq, struct xenbus_file_priv, wq);

 /*
 * No need for locking here because there are no other users,
@@ -330,6 +336,18 @@
kfree(u);
 } 

+static void xenbus_file_free(struct kref *kref)
+{
+ struct xenbus_file_priv *u;
+ 
+/*
+ * We might be called in xenbus_thread().
+ * Use workqueue to avoid deadlock.
+ */
+u = container_of(kref, struct xenbus_file_priv, kref);
+schedule_work(&u->wq);
+} +
+
static struct xenbus_transaction_holder *xenbus_get_transaction(  
struct xenbus_file_priv *u, uint32_t tx_id)  
{  
@@ -365,7 +383,7 @@  
if (WARN_ON(rc))  
goto out;  
} -} else if (req->msg.type == XS_TRANSACTION_END) {  
+} else if (req->type == XS_TRANSACTION_END) {  
trans = xenbus_get_transaction(u, req->msg.tx_id);  
if (WARN_ON(!trans))  
goto out;  
@@ -403,7 +421,7 @@  
{  
struct  
struct xsd_sockmsg hdr;  
-const char body[16];  
+char body[16];  
} msg;  
int rc;  
@@ -412,6 +430,7 @@  
msg.hdr.len = strlen(reply) + 1;  
if (msg.hdr.len > sizeof(msg.body))  
return -E2BIG;  
+memcpy(&msg.body, reply, msg.hdr.len);  
mutex_lock(&u->reply_mutex);  
rc = queue_reply(&u->read_buffers, &msg, sizeof(msg.hdr) + msg.hdr.len);  
@@ -429,12 +459,31 @@  
int rc;  
struct xenbus_transaction_holder *trans = NULL;  
+struct {  
+struct xsd_sockmsg hdr;  
+char body[];  
+} *msg = (void *)u->u.buffer;  
}

if (msg_type == XS_TRANSACTION_START) {  
trans = kzalloc(sizeof(*trans), GFP_KERNEL);  
@@ -436,12 +459,31 @@  
rc = -ENOMEM;  
goto out;  
}
trans->generation_id = xb_dev_generation_id;
list_add(&trans->list, &u->transactions);
} else if (u->msg.tx_id != 0 &&
   !xenbus_get_transaction(u, u->msg.tx_id))
+ } else if (msg->hdr.tx_id != 0 &&
+ !xenbus_get_transaction(u, msg->hdr.tx_id))
return xenbus_command_reply(u, XS_ERROR, "ENOENT");
else if (msg_type == XS_TRANSACTION_END &&
+ !(msg->hdr.len == 2 &&
+ (!_strcmp(msg->body, "T") || (!_strcmp(msg->body, "F")))))
+ return xenbus_command_reply(u, XS_ERROR, "EINVAL");
+ else if (msg_type == XS_TRANSACTION_END) {
+ trans = xenbus_get_transaction(u, msg->hdr.tx_id);
+ if (trans && trans->generation_id != xb_dev_generation_id) {
+ list_del(&trans->list);
+ kfree(trans);
+ if (!_strcmp(msg->body, "T"))
+ return xenbus_command_reply(u, XS_ERROR,
+ "EAGAIN");
+ else
+ return xenbus_command_reply(u,
+ XS_TRANSACTION_END,
+ "OK");
+ }
+ }
-
-rc = xenbus_dev_request_and_reply(&u->msg, u);
+rc = xenbus_dev_request_and_reply(&msg->hdr, u);
if (rc && trans) {
lst_del(&trans->list);
kfree(trans);
@@ -613,9 +655,7 @@
if (xen_store_evtchn == 0)
return -ENOENT;
-
-filp->f_mode &= ~FMODE_ATOMIC_POS; /* cdev-style semantics */
+stream_open(inode, filp);

u = kzalloc(sizeof(*u), GFP_KERNEL);
if (u == NULL)
@@ -627,6 +667,7 @@
INIT_LIST_HEAD(&u->watches);
INIT_LIST_HEAD(&u->read_buffers);
init_waitqueue_head(&u->read_waitq);
+INIT_WORK(&u->wq, xenbus_worker);
mutex_init(&u->reply_mutex);
mutex_init(&u->msgbuffer_mutex);
--- linux-4.15.0.orig/drivers/xen/xenbus/xenbus_probe.c
+++ linux-4.15.0/drivers/xen/xenbus/xenbus_probe.c
@@ -136,6 +136,7 @@
    container_of(dev->dev.bus, struct xen_bus_type, bus);

    return xenbus_watch_pathfmt(dev, &dev->otherend_watch,
+    bus->otherend_will_handle,
    bus->otherend_changed,
    "%s/%s", dev->otherend, "state");
}
@@ -466,8 +467,11 @@
    /* Register with generic device framework. */
    err = device_register(&xendev->dev);
    -if (err)
+    if (err) {
      +put_device(&xendev->dev);
      +xendev = NULL;
      goto fail;
      +}

    return 0;

fail:
@@ -670,29 +674,107 @@
}
EXPORT_SYMBOL_GPL(unregister_xenstore_notifier);

-void xenbus_probe(struct work_struct *unused)
+static void xenbus_probe(void)
{
    xenstored_ready = 1;

+/*
+ * In the HVM case, xenbus_init() deferred its call to
+ * xs_init() in case callbacks were not operational yet.
+ * So do it now.
+ */
+if (xen_store_domain_type == XS_HVM)
+xs_init();
+
+/* Notify others that xenstore is up */
+blocking_notifier_call_chain(&xenstore_chain, 0, NULL);
}
-EXPORT_SYMBOL_GPL(xenbus_probe);
-static int __init xenbus_probe_initcall(void)
+/
+ * Returns true when XenStore init must be deferred in order to
+ * allow the PCI platform device to be initialised, before we
+ * can actually have event channel interrupts working.
+ */
+static bool xs_hvm_defer_init_for_callback(void)
{  
-        if (!xen_domain())
-            return -ENODEV;
+        #ifdef CONFIG_XEN_PVHVM
+            return xen_store_domain_type == XS_HVM &&
+                !xen_have_vector_callback;
+        #else
+            return false;
+        #endif
+}

-        if (xen_initial_domain() || xen_hvm_domain())
-            return 0;
+        static int xenbus_probe_thread(void *unused)
+        {
+            DEFINE_WAIT(w);
+            
+            /*
+             * We actually just want to wait for *any* trigger of xb_waitq,
+             * and run xenbus_probe() the moment it occurs.
+             */
+            prepare_to_wait(&xb_waitq, &w, TASK_INTERRUPTIBLE);
+            schedule();
+            finish_wait(&xb_waitq, &w);

-            xenbus_probe(NULL);
+            DPRINTK("probing");
+            xenbus_probe();
+            return 0;
+        }

+        static int __init xenbus_probe_initcall(void)
+        {
+        +/
+        /*
+         * Probe XenBus here in the XS_PV case, and also XS_HVM unless we
+         * need to wait for the platform PCI device to come up.
+         */
+        +if (xen_store_domain_type == XS_PV ||
+            xen_store_domain_type == XS_HVM &&
+            !xs_hvm_defer_init_for_callback())
+            xenbus_probe();


+ /*
+ * For XS_LOCAL, spawn a thread which will wait for xenstored
+ * or a xenstore-stubdom to be started, then probe. It will be
+ * triggered when communication starts happening, by waiting
+ * on xb_waitq.
+ */
+ if (xen_store_domain_type == XS_LOCAL) {
+ struct task_struct *probe_task;
+ 
+ probe_task = kthread_run(xenbus_probe_thread, NULL,
+ "xenbus_probe");
+ if (IS_ERR(probe_task))
+ return PTR_ERR(probe_task);
+ }
+ return 0;
+ }
+ device_initcall(xenbus_probe_initcall);
+
+ int xen_set_callback_via(uint64_t via)
+ {
+ struct xen_hvm_param a;
+ int ret;
+ 
+ a.domid = DOMID_SELF;
+ a.index = HVM_PARAM_CALLBACK_IRQ;
+ a.value = via;
+ 
+ ret = HYPERVISOR_hvm_op(HVMOP_set_param, &a);
+ if (ret)
+ return ret;
+ 
+ /*
+ * If xenbus_probe_initcall() deferred the xenbus_probe()
+ * due to the callback not functioning yet, we can do it now.
+ */
+ if (!xenstored_ready && xs_hvm_defer_init_for_callback())
+ xenbus_probe();
+ 
+ return ret;
+ }
+ EXPORT_SYMBOL_GPL(xen_set_callback_via);
+
+ /* Set up event channel for xenstored which is run as a local process
+ (this is normally used only in dom0)
+ */
+ @@ -806,11 +888,17 @@
+ break;
+
/* Initialize the interface to xenstore. */
err = xs_init();
if (err) {
    pr_warn("Error initializing xenstore comms: %i\n", err);
    goto out_error;
} /*
 * HVM domains may not have a functional callback yet. In that
 * case let xs_init() be called from xenbus_probe(), which will
 * get invoked at an appropriate time.
 */
if (xen_store_domain_type != XS_HVM) {
    err = xs_init();
    if (err) {
        pr_warn("Error initializing xenstore comms: %i\n", err);
        goto out_error;
    }
}

if ((xen_store_domain_type != XS_LOCAL) &&
    --- linux-4.15.0.orig/drivers/xen/xenbus/xenbus_probe_backend.c
+++ linux-4.15.0/drivers/xen/xenbus/xenbus_probe_backend.c
@@ -180,6 +180,12 @@
return err;
}

+static bool frontend_will_handle(struct xenbus_watch *watch,
+const char *path, const char *token)
+{
+    return watch->nr_pending == 0;
+}
+
+static void frontend_changed(struct xenbus_watch *watch,
    const char *path, const char *token)
{
    .levels = 3,/"backend/type/<frontend>/<id>/" */
    .get_bus_id = backend_bus_id,
    .probe = xenbus_probe_backend,
    .otherend_will_handle = frontend_will_handle,
    .otherend_changed = frontend_changed,
    .bus = {
        .name = "xen-backend",
    --- linux-4.15.0.orig/drivers/xen/xenbus/xenbus_xs.c
+++ linux-4.15.0/drivers/xen/xenbus/xenbus_xs.c
@@ -105,6 +105,7 @@
static void xs_suspend_exit(void)
{
+xb_dev_generation_id++;
spin_lock(&xs_state_lock);
xs_suspend_active--;
spin_unlock(&xs_state_lock);
@@ -125,7 +126,7 @@
spin_lock(&xs_state_lock);
}

-if (req->type == XS_TRANSACTION_START)
+if (req->type == XS_TRANSACTION_START && !req->user_req)
   xs_state_users++;
   xs_state_users++;
   rq_id = xs_request_id++;
@@ -140,7 +141,9 @@
spin_lock(&xs_state_lock);
xs_state_users--;
   if ((req->type == XS_TRANSACTION_START && req->msg.type == XS_ERROR) ||
-    req->type == XS_TRANSACTION_END)
+    (req->type == XS_TRANSACTION_END && !req->user_req &&
+     !WARN_ON_ONCE(req->msg.type == XS_ERROR &&
+     !strcmp(req->body, "ENOENT")))
xs_state_users--;
spin_unlock(&xs_state_lock);

@@ -188,8 +191,11 @@
static bool test_reply(struct xb_req_data *req)
{
-   if (req->state == xb_req_state_got_reply || !xenbus_ok())
+   if (req->state == xb_req_state_got_reply || !xenbus_ok()) {
+      /* read req->state before all other fields */
+      virt_rmb();
return true;
+}

   /* Make sure to reread req->state each time. */
   barrier();
@@ -199,7 +205,7 @@
static void *read_reply(struct xb_req_data *req)
{
-while (req->state != xb_req_state_got_reply || !xenbus_ok()) {
+do {
wait_event(req->wq, test_reply(req));

if (!xenbus_ok())
@@ -213,7 +219,7 @@
    if (req->err)
    return ERR_PTR(req->err);

-} while (req->state != xb_req_state_got_reply);
+	} while (req->state != xb_req_state_got_reply);

    return req->body;
 }
@@ -227,6 +233,8 @@
    req->state = xb_req_state_queued;
    init_waitqueue_head(&req->wq);

+/* Save the caller req_id and restore it later in the reply */
    +req->caller_req_id = req->msg.req_id;
    req->msg.req_id = xs_request_enter(req);

    mutex_lock(&xb_write_mutex);
@@ -282,6 +290,7 @@
    req->num_vecs = 1;
    req->cb = xenbus_dev_queue_reply;
    req->par = par;
+    +req->user_req = true;

    xs_send(req, msg);
@@ -309,7 +318,9 @@
    req->vec = iovec;
    req->num_vecs = num_vecs;
    req->cb = xs_wake_up;
+    +req->user_req = false;

+    +msg.req_id = 0;
    msg.tx_id = t.id;
    msg.type = type;
    msg.len = 0;
@@ -694,9 +705,13 @@
    spin_lock(&watches_lock);
    event->handle = find_watch(event->token);
-    -if (event->handle != NULL) {
-        +if (event->handle != NULL &&
-            +(event->handle->will_handle ||
+event->handle->will_handle(event->handle,
+    +event->path, event->token))) {
+spin_lock(&watch_events_lock);
        list_add_tail(&event->list, &watch_events);
+        +event->handle->nr_pending++;
wake_up(&watch_events_waitq);
spin_unlock(&watch_events_lock);
} else
@@ -754,6 +769,8 @@
    sprintf(token, "%lx", (long)watch);
    watch->nr_pending = 0;
+
    down_read(&xs_watch_rwlock);

spin_lock(&watches_lock);
@@ -803,11 +820,14 @@
/* Cancel pending watch events. */
spin_lock(&watch_events_lock);
-list_for_each_entry_safe(event, tmp, &watch_events, list) {
    -if (event->handle != watch)
    -continue;
    -list_del(&event->list);
    -kfree(event);
    +if (watch->nr_pending) {
    +list_for_each_entry_safe(event, tmp, &watch_events, list) {
    +if (event->handle != watch)
    +continue;
    +list_del(&event->list);
    +kfree(event);
    +}
    +watch->nr_pending = 0;
    }
spin_unlock(&watch_events_lock);

@@ -854,7 +874,6 @@
static int xenwatch_thread(void *unused)
{
    struct list_head *ent;
    struct xs_watch_event *event;

    xenwatch_pid = current->pid;
@@ -869,13 +888,15 @@
    mutex_lock(&xenwatch_mutex);

    spin_lock(&watch_events_lock);
    -ent = watch_events.next;
    -if (ent != &watch_events)
    -list_del(ent);
    +event = list_first_entry_or_null(&watch_events,

if (event) {
    if (ent != &watch_events) {
        event = list_entry(ent, struct xs_watch_event, list);
    }
    event->handle->callback(event->handle, event->path, event->token);
    kfree(event);
}

--- linux-4.15.0.orig/drivers/xen/xlate_mmu.c
+++ linux-4.15.0/drivers/xen/xlate_mmu.c
@@ -36,6 +36,7 @@
#include <asm/xen/hypervisor.h>
#include <xen/xen-ops.h>
#include <xen/page.h>
#include <xen/interface/xen.h>
#include <xen/interface/memory.h>
--- linux-4.15.0.orig/drivers/zorro/zorro.c
+++ linux-4.15.0/drivers/zorro/zorro.c
@@ -16,6 +16,7 @@
#include <linux/bitops.h>
#include <linux/string.h>
#include <linux/platform_device.h>
+#include <linux/dma-mapping.h>
#include <linux/slab.h>

#include <asm/byteorder.h>
@ @ -185,6 +186,17 @@
z->dev.parent = &bus->dev;
z->dev.bus = &zorro_bus_type;
z->dev.id = i;
+switch (z->rom.er_Type & ERT_TYPEMASK) {
+    case ERT_ZORROIII:
+        z->dev.coherent_dma_mask = DMA_BIT_MASK(32);
+        break;
+    case ERT_ZORROII:
+        default:
+            z->dev.coherent_dma_mask = DMA_BIT_MASK(24);
+            break;
+    }
+z->dev.dma = &z->dev.coherent_dma_mask;
This is the list of patches/features which have been temporarily reverted or disabled for BB:

+ AUFS
+ LSM stacking patches

+ UBUNTU: SAUCE: (no-up) nbd: Change default partitions per device to 15
+ UBUNTU: SAUCE: (no-up) firmware: Update bnx2x to current firmware version 7.2.51
+ UBUNTU: SAUCE: (no-up) Remove redundant cis firmware
+ UBUNTU: SAUCE: (no-up) Remove redundant ttusb-budget firmware
+ UBUNTU: SAUCE: (no-up) Remove redundant ositech/Xilinx7OD firmware
+ UBUNTU: SAUCE: (no-up) Remove redundant yamaha/ds1 firmware
+ UBUNTU: SAUCE: (no-up) Remove redundant keysuan_pda firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove ess files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove kaweth files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove edgeport files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove ti_usb_3410_5052 duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove adaptec files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove advansys files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove ambassador files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove av7110 files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove cpi2 files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) firmware: Remove obsolete Myricom firmware
+ UBUNTU: SAUCE: (no-up) firmware: Upgrade bnx2 to current versions
+ UBUNTU: SAUCE: (no-up) Remove yam files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove tehuti files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove matrox files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove exgb3 files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove r128 files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove acenic files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove keysuan files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove sun files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Remove radeon files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Update bnx2x firmware to 7.8.2.0
+ UBUNTU: SAUCE: (no-up) Remove dsp56k files used only by m68k
+ UBUNTU: SAUCE: (no-up) Remove vicam files duplicated in linux-firmware
+ UBUNTU: SAUCE: (no-up) Update bnx2x firmware to 7.8.17.0
+ UBUNTU: SAUCE: (no-up) Update bnx2x firmware to 7.10.51.0
+ UBUNTU: SAUCE: (no-up) Update bnx2x firmware to 7.12.30.0
+ UBUNTU: SAUCE: drop obsolete bnx2x firmware
+ UBUNTU: firmware: Update bnx2x to 7.13.1.0
+ UBUNTU: SAUCE: (no-up) HID: Add quirk for Lenovo Yoga 910 with ITE Chips
+UBUNTU: SAUCE: igb: add support for using Broadcom 54616 as PHY
+UBUNTU: SAUCE: LIBIO: Introduce a generic PIO mapping method
+UBUNTU: SAUCE: OF: Add missing I/O range exception for indirect-I/O devices
+UBUNTU: SAUCE: LPC: Support the device-tree LPC host on Hip06/Hip07
+UBUNTU: SAUCE: LPC: Add the ACPI LPC support
+UBUNTU: SAUCE: PCI: Apply the new generic I/O management on PCI IO hosts
+UBUNTU: SAUCE: PCI: Restore codepath for !CONFIG_LIBIO
+UBUNTU: SAUCE: PCI: Support hibmc VGA cards behind a misbehaving HiSilicon bridge
+UBUNTU: SAUCE: Clear Linux: smpboot: reuse timer calibration
+UBUNTU: SAUCE: (no-up) disable -pie when gcc has it enabled by default

--- linux-4.15.0.orig/firmware/Makefile
+++ linux-4.15.0/firmware/Makefile
@@ -19,7 +19,7 @@
PROGBITS=$(if $(CONFIG_ARM),%,@)progbits; \
    echo "/* Generated by firmware/Makefile */" $@;
    echo "    .section .rodata" >>$@;
-   echo "    .p2align $$\{ASM\_ALIGN\}" >>$@;
+   echo "    .p2align 4" >>$@;
    echo "    _fw_$\{FWSTR\}_bin:" >>$@;
    echo "    .incbin "$(2)"" >>$@;
    echo "    _fw_end:" >>$@;
--- linux-4.15.0.orig/fs/9p/acl.c
+++ linux-4.15.0/fs/9p/acl.c
@@ -276,7 +276,7 @@
   switch (handler->flags) {
   case ACL_TYPE_ACCESS:
   if (acl) {
-      struct iattr iattr;
+      struct iattr iattr = { 0 };
      struct posix_acl *old_acl = acl;
      retval = posix_acl_update_mode(inode, &iattr.ia_mode, &acl);
--- linux-4.15.0.orig/fs/9p/v9fs.c
+++ linux-4.15.0/fs/9p/v9fs.c
@@ -61,6 +61,8 @@
   switch (handler->flags) {
   case ACL_TYPE_ACCESS:
   if (acl) {
-   struct iattr iattr;
+   struct iattr iattr = { 0 };
   struct posix_acl *old_acl = acl;
   Opt_cache_loose, Opt_fscache, Opt_mmap,
/* Access options */
   Opt_access, Opt_posixacl,
/* Lock timeout option */
+   Opt_locktimeout,
/* Error token */
   Opt_err
   ];
   @ @ -80.6 +82.7 @@
   { Opt_cachetag, "cachetag=%s" },
   { Opt_access, "access=%s" },
{Opt_posixacl, "posixacl"},
+{Opt_locktimeout, "locktimeout=%u"},
{Opt_err, NULL}
};

@@ -187,6 +190,7 @@
#define CONFIG_9P_FSCACHE
v9ses->cachetag = NULL;
#endif
+v9ses->session_lock_timeout = P9_LOCK_TIMEOUT;

if (!opts)
return 0;
@@ -360,6 +364,23 @@
#endif
break;

+case Opt_locktimeout:
+r = match_int(&args[0], &option);
+if (r < 0) {
+ p9_debug(P9_DEBUG_ERROR,
+ "integer field, but no integer?\n");
+ret = r;
+continue;
+
+}
+if (option < 1) {
+ p9_debug(P9_DEBUG_ERROR,
+ "locktimeout must be a greater than zero integer.\n");
+ret = -EINVAL;
+continue;
++
+v9ses->session_lock_timeout = (long)option * HZ;
+break;
+default:
+continue;
+

#ifdef CONFIG_9P_FSCACHE
-if (v9ses->fscache) {
+if (v9ses->fscache)
 v9fs_cache_session_put_cookie(v9ses);
-kfree(v9ses->cachetag);
-
+}
+kfree(v9ses->cachetag);
#endif
kfree(v9ses->uname);
kfree(v9ses->aname);
--- linux-4.15.0.orig/fs/9p/v9fs.h
+++ linux-4.15.0/fs/9p/v9fs.h
@@ -116,6 +116,7 @@
 struct p9_client *clnt;/* 9p client */
 struct list_head slist; /* list of sessions registered with v9fs */
 struct rw_semaphore rename_sem;
+long session_lock_timeout; /* retry interval for blocking locks */
};

/* cache_validity flags */
--- linux-4.15.0.orig/fs/9p/v9fs_vfs.h
+++ linux-4.15.0/fs/9p/v9fs_vfs.h
@@ -40,6 +40,9 @@
 #define P9_LOCK_TIMEOUT (30*HZ)

 /* flags for v9fs_stat2inode() & v9fs_stat2inode_dotl() */
+#define V9FS_STAT2INOKEEPT_GET_ISIZE 1
 +
 extern struct file_system_type v9fs_fs_type;
 extern const struct address_space_operations v9fs_addr_operations;
 extern const struct file_operations v9fs_file_operations;
@@ -61,8 +64,10 @@
 struct inode *inode, umode_t mode, dev_t);
 void v9fs_evict_inode(struct inode *inode);
 ino_t v9fs_qid2ino(struct p9_qid *qid);
-void v9fs_stat2inode(struct p9_wstat *, struct inode *, struct super_block *);
-void v9fs_stat2inode_dotl(struct p9_stat_dotl *, struct inode *);
+void v9fs_stat2inode(struct p9_wstat *stat, struct inode *inode, 
+ struct super_block *sb, unsigned int flags);
+void v9fs_stat2inode_dotl(struct p9_stat_dotl *stat, struct inode *inode, 
+ unsigned int flags);
 int v9fs_dir_release(struct inode *inode, struct file *filp);
 int v9fs_file_open(struct inode *inode, struct file *file);
 void v9fs_inode2stat(struct inode *inode, struct p9_wstat *stat);
@@ -83,4 +88,18 @@
}

int v9fs_open_to_dotl_flags(int flags);
+
+static inline void v9fs_i_size_write(struct inode *inode, loff_t i_size)
+{
+/*
+ * 32-bit need the lock, concurrent updates could break the
+ * sequences and make i_size_read() loop forever.
+ * 64-bit updates are atomic and can skip the locking.
+ */
+if (sizeof(i_size) > sizeof(long))
+spin_lock(&inode->i_lock);
+i_size_write(inode, i_size);
+if (sizeof(i_size) > sizeof(long))
+spin_unlock(&inode->i_lock);
+
#endif
--- linux-4.15.0.orig/fs/9p/vfs_addr.c
+++ linux-4.15.0/fs/9p/vfs_addr.c
@@ -50,8 +50,9 @@
 * @page: structure to page
 *
 */
-*/ static int v9fs_fid_readpage(struct p9_fid *fid, struct page *page)
+static int v9fs_fid_readpage(void *data, struct page *page)
 { 
+struct p9_fid *fid = data;
 struct inode *inode = page->mapping->host;
 struct bio_vec bvec = {.bv_page = page, .bv_len = PAGE_SIZE};
 struct iov_iter to;
@@ -122,7 +123,8 @@
 if (ret == 0)
 return ret;
-ret = read_cache_pages(mapping, pages, (void *)v9fs_vfs_readpage, filp);
+ret = read_cache_pages(mapping, pages, v9fs_fid_readpage, filp->private_data);
 p9_debug(P9_DEBUG_VFS, " = %d\n", ret);
 return ret;
 }
--- linux-4.15.0.orig/fs/9p/vfs_dir.c
+++ linux-4.15.0/fs/9p/vfs_dir.c
@@ -76,15 +76,6 @@
 return rettype;
 }
-*/ static void p9stat_init(struct p9_wstat *stbuf)
-{ 
- stbuf->name = NULL;
- stbuf->uid = NULL;
- stbuf->gid = NULL;
- stbuf->muid = NULL;
- stbuf->extension = NULL;
- }
-
- /**
- * v9fs_alloc_rdir_buf - Allocate buffer used for read and readdir

* @filp: opened file structure
@@ -114,7 +105,6 @@
    int err = 0;
 struct p9_fid *fid;
    int buflen;
-    int reclen = 0;
 struct p9_rdir *rdir;
 struct kvec kvec;

    @@ -135,12 +148,8 @@
     rdir->tail = n;
 }
 while (rdir->head < rdir->tail) {
-       p9stat_init(&st);
     err = p9stat_read(fid->clnt, rdir->buf + rdir->head,
         rdir->tail - rdir->head, &st);
-       if (err) {
+       if (err <= 0) {
           p9_debug(P9_DEBUG_VFS, "returned %d
", err);
-           p9stat_free(&st);
             return -EIO;
       }
     -reclen = st.size+2;
     
     over = !dir_emit(ctx, st.name, strlen(st.name),
         v9fs_qid2ino(&st.qid), dt_type(&st));
@@ -154,6 +154,7 @@
    uint8_t status = P9_LOCK_ERROR;
    int res = 0;
    unsigned char fl_type;
+    struct v9fs_session_info *v9ses;

    fid = filp->private_data;
    BUG_ON(fid == NULL);
@@ -191,15 +198,8 @@
     if (over)
         return 0;

     -rdir->head += reclen;
     -ctx->pos += reclen;
+     rdir->head += err;
+     ctx->pos += err;
 }
 }

 --- linux-4.15.0.orig/fs/9p/vfs_file.c
+++ linux-4.15.0/fs/9p/vfs_file.c
 @@ -154,6 +154,7 @@
     uint8_t status = P9_LOCK_ERROR;
     int res = 0;
     unsigned char fl_type;
+    struct v9fs_session_info *v9ses;

     fid = filp->private_data;
     BUG_ON(fid == NULL);
@@ -189,6 +190,7 @@
     if (over)
         return 0;
     
@@ -191,15 +198,8 @@
     -rdir->head += reclen;
     -ctx->pos += reclen;
+     rdir->head += err;
+     ctx->pos += err;
 }
if (IS_SETLKW(cmd))
flock.flags = P9_LOCK_FLAGS_BLOCK;

+v9ses = v9fs_inode2v9ses(file_inode(filp));
+
/*
  * if its a blocked request and we get P9_LOCK_BLOCKED as the status
  * for lock request, keep on trying
@@ -202,8 +205,17 @@
   break;
   if (status == P9_LOCK_BLOCKED && !IS_SETLKW(cmd))
   break;
   if (schedule_timeout_interruptible(P9_LOCK_TIMEOUT) != 0)
+if (schedule_timeout_interruptible(v9ses->session_lock_timeout)
+!= 0)
   break;
+/*
 +  * p9_client_lock_dotl overwrites flock.client_id with the
 +  * server message, free and reuse the client name
 + */
+if (flock.client_id != fid->clnt->name) {
+kfree(flock.client_id);
+flock.client_id = fid->clnt->name;
+}
}

/*@ -235,6 +247,8 @@
locks_lock_file_wait(filp, fl);
fl->fl_type = fl_type;
}
+if (flock.client_id != fid->clnt->name)
+kfree(flock.client_id);
out:
return res;
}
/*@ -269,7 +283,7 @@

res = p9_client_getlock_dotl(fid, &glock);
if (res < 0)
  return res;
+goto out;
/* map 9p lock type to os lock type */
switch (glock.type) {
case P9_LOCK_TYPE_RDLCK:
  fl->fl_end = glock.start + glock.length - 1;
  fl->fl_pid = -glock.proc_id;
```c
}
-kfree(glock.client_id);
+out:
+if (glock.client_id != fid->clnt->name)
+kfree(glock.client_id);
return res;
}

@@ -430,7 +446,11 @@
i_size = i_size_read(inode);
if (iocb->ki_pos > i_size) {
    inode_add_bytes(inode, iocb->ki_pos - i_size);
-i_size_write(inode, iocb->ki_pos);
+/*
+ * Need to serialize against i_size_write() in
+ * v9fs_stat2inode()
+ */
+v9fs_i_size_write(inode, iocb->ki_pos);
} return retval;
}

@@ -508,6 +528,7 @@
v9inode = V9FS_I(inode);
mutex_lock(&v9inode->v_mutex);
if (!v9inode->writeback_fid &&
+ (vma->vm_flags & VM_SHARED) &&
    (vma->vm_flags & VM_WRITE)) {
/*
 * clone a fid and add it to writeback_fid
@@ -603,12 +624,14 @@
struct writeback_control wbc = {
    .nr_to_write = LONG_MAX,
    .sync_mode = WB_SYNC_ALL,
-    .range_start = vma->vm_pgoff * PAGE_SIZE,
+    .range_start = (loff_t)vma->vm_pgoff * PAGE_SIZE,
/* absolute end, byte at end included */
-    .range_end = vma->vm_pgoff * PAGE_SIZE +
+    .range_end = (loff_t)vma->vm_pgoff * PAGE_SIZE +
    (vma->vm_end - vma->vm_start - 1),
};

+if (!(vma->vm_flags & VM_SHARED))
+return;

p9_debug(P9_DEBUG_VFS, "%p VMA close, %p, flushing", vma);

--- linux-4.15.0.orig/fs/9p/vfs_inode.c
+++ linux-4.15.0/fs/9p/vfs_inode.c
```
if (retval)
    goto error;

-v9fs_stat2inode(st, inode, sb);
+v9fs_stat2inode(st, inode, sb, 0);
v9fs_cache_inode_get_cookie(inode);
unlock_new_inode(inode);
return inode;

-v9fs_stat2inode(st, d_inode(dentry), dentry->d_sb);
+v9fs_stat2inode(st, d_inode(dentry), dentry->d_sb, 0);
generic_fillattr(d_inode(dentry), stat);

p9stat_free(st);

* @stat: Plan 9 metadata (mistat) structure
* @inode: inode to populate
* @sb: superblock of filesystem
* @flags: control flags (e.g. V9FS_STAT2INODE_KEEP_ISIZE)
*/

void
v9fs_stat2inode(struct p9_wstat *stat, struct inode *inode,
-\tstruct super_block *sb)
+\t\tstruct super_block *sb, unsigned int flags)
{            
    umode_t mode;
    char ext[32];
    @ @ -1204,10 +1205,11 @@
    mode = p9mode2perm(v9ses, stat);
    mode |= inode->i_mode & ~S_IALLUGO;
    inode->i_mode = mode;
    -i_size_write(inode, stat->length);
+if (!(flags & V9FS_STAT2INODE_KEEP_ISIZE))
+\tv9fs_i_size_write(inode, stat->length);
/*@ not real number of blocks, but 512 byte ones ... */
-\t-i_blocks = (i_size_read(inode) + 512 - 1) >> 9;
+\ti_blocks = (stat->length + 512 - 1) >> 9;
-v9inode->cache_validity &= ~V9FS_INO_INVALID_ATTR;
}

@@ -1404,9 +1406,9 @@
int umode;
dev_t rdev;
-loff_t i_size;
struct p9_wstat *st;
struct v9fs_session_info *v9ses;
+unsigned int flags;

v9ses = v9fs_inode2v9ses(inode);
st = p9_client_stat(fid);
if ((inode->i_mode & S_IFMT) != (umode & S_IFMT))
goto out;

-skip_lock(&inode->i_lock);
/*
 * We don't want to refresh inode->i_size,
 * because we may have cached data
 */
-i_size = inode->i_size;
-v9fs_stat2inode(st, inode, inode->i_sb);
-if (v9ses->cache == CACHE_LOOSE || v9ses->cache == CACHE_FSCACHE)
-i_size = i_size;
-skip_unlock(&inode->i_lock);
+flags = (v9ses->cache == CACHE_LOOSE || v9ses->cache == CACHE_FSCACHE) ?
+V9FS_STAT2INODE_KEEP_ISIZE : 0;
+v9fs_stat2inode(st, inode, inode->i_sb, flags);
out:
p9stat_free(st);
kfree(st);
--- linux-4.15.0.orig/fs/9p/vfs_inode_dotl.c
+++ linux-4.15.0/fs/9p/vfs_inode_dotl.c
@@ -143,7 +143,7 @@
 if (retval)
goto error;
-v9fs_stat2inode_dotl(st, d_inode(dentry));
+v9fs_stat2inode_dotl(st, d_inode(dentry), 0);
v9fs_cache_inode_get_cookie(inode);
retval = v9fs_get_acl(inode, fid);
if (retval)
@@ -497,7 +497,7 @@
return PTR_ERR(st);
-v9fs_stat2inode_dotl(st, d_inode(dentry));
+v9fs_stat2inode_dotl(st, d_inode(dentry), 0);
generic_fillattr(d_inode(dentry), stat);
/* Change block size to what the server returned */
stat->blksize = st->st_blksize;
@@ -608,11 +608,13 @@*/
*v9fs_stat2inode_dotl - populate an inode structure with stat info
* @stat: stat structure
* @inode: inode to populate
+ * @flags: ctrl flags (e.g. V9FS_STAT2INODE_KEEP_ISIZE)
* */

void
-v9fs_stat2inode_dotl(struct p9_stat_dotl *stat, struct inode *inode)
+v9fs_stat2inode_dotl(struct p9_stat_dotl *stat, struct inode *inode,
+      unsigned int flags)
{
    umode_t mode;
    struct v9fs_inode *v9inode = V9FS_I(inode);
    @@ -632,7 +634,8 @@
    mode |= inode->i_mode & ~S_IALLUGO;
    inode->i_mode = mode;

    -i_size_write(inode, stat->st_size);
+if (!(flags & V9FS_STAT2INODE_KEEP_ISIZE))
    +v9fs_i_size_write(inode, stat->st_size);
    inode->i_blocks = stat->st_blocks;
} else {
    if (stat->st_result_mask & P9_STATS_ATIME) {
@@ -662,8 +665,9 @@
    } else {
        if (stat->st_result_mask & P9_STATS_RDEV)
            inode->i_rdev = new_decode_dev(stat->st_rdev);
        -if (stat->st_result_mask & P9_STATS_SIZE)
    -i_size_write(inode, stat->st_size);
+if (!(flags & V9FS_STAT2INODE_KEEP_ISIZE) &&
        stat->st_result_mask & P9_STATS_SIZE)
    +v9fs_i_size_write(inode, stat->st_size);
        if (stat->st_result_mask & P9_STATS_BLOCKS)
            inode->i_blocks = stat->st_blocks;
    }
@@ -929,9 +933,9 @@

int v9fs_refresh_inode_dotl(struct p9_fid *fid, struct inode *inode)
{
    -loff_t i_size;
    struct p9_stat_dotl *st;
    struct v9fs_session_info *v9ses;
+unsigned int flags;
v9ses = v9fs_inode2v9ses(inode);
st = p9_client_getattr_dotl(fid, P9_STATS_ALL);
@@ -943,16 +947,13 @@
if ((inode->i_mode & S_IFMT) != (st->st_mode & S_IFMT))
goto out;

-spin_lock(&inode->i_lock);
/*
 * We don't want to refresh inode->i_size,
 * because we may have cached data
 */
-i_size = inode->i_size;
-v9fs_stat2inode_dotl(st, inode);
-if (v9ses->cache == CACHE_LOOSE || v9ses->cache == CACHE_FSCACHE)
-inode->i_size = i_size;
-spin_unlock(&inode->i_lock);
+flags = (v9ses->cache == CACHE_LOOSE || v9ses->cache == CACHE_FSCACHE) ?
+V9FS_STAT2INODE_KEEP_ISIZE : 0;
+v9fs_stat2inode_dotl(st, inode, flags);
out:
kfree(st);
return 0;
--- linux-4.15.0.orig/fs/9p/vfs_super.c
+++ linux-4.15.0/fs/9p/vfs_super.c
@@ -172,7 +172,7 @@
goto release_sb;
} else {
  struct p9_wstat *st = NULL;
  @ @ -183,7 +183,7 @@
}

d_inode(root)->i_ino = v9fs_qid2ino(&st->qid);
-v9fs_stat2inode_dotl(st, d_inode(root));
+v9fs_stat2inode_dotl(st, d_inode(root), 0);
kfree(st);
} else {
  struct p9_wstat *st = NULL;
  @ @ -183,7 +183,7 @@
}

d_inode(root)->i_ino = v9fs_qid2ino(&st->qid);
-v9fs_stat2inode(st, d_inode(root), sb);
+v9fs_stat2inode(st, d_inode(root), sb, 0);
p9stat_free(st);
kfree(st);
--- linux-4.15.0.orig/fs/9p/xattr.c
+++ linux-4.15.0/fs/9p/xattr.c
@@ -105,7 +105,7 @@
{
  struct kvec kvec = {.iov_base = (void *)value,.iov_len = value_len};
  struct iov_iter from;
int retval;
+
t
+=
+int retval, err;
+
iov_iter_kvec(&from, WRITE | ITER_KVEC, &kvec, 1, value_len);
@
+ @@ -126,7 +126,9 @@
  retval);
 else
 p9_client_write(fid, 0, &from, &retval);
-@ -p9_client_clunk(fid);
+@ +err = p9_client_clunk(fid);
+if (!retval && err)
+retval = err;
 return retval;
}

--- linux-4.15.0.orig/fs/Kconfig
+++ linux-4.15.0/fs/Kconfig
@@ -58,6 +58,13 @@
 depends on TRANSPARENT_HUGE_PAGE

 +# Selected by DAX drivers that do not expect filesystem DAX to support
 +# get_user_pages() of DAX mappings. I.e. "limited" indicates no support
 +# for fork() of processes with MAP_SHARED mappings or support for
 +# direct-I/O to a DAX mapping.
+config FS_DAX_LIMITED
+bool
+
endif # BLOCK

# Posix ACL utility routines
@@ -248,6 +255,7 @@
 source "fs/ufs/Kconfig"
 source "fs/exofs/Kconfig"
+source "fs/aufs/Kconfig"
+source "fs/efs/Kconfig"
  endif # MISC_FILESYSTEMS

--- linux-4.15.0.orig/fs/Makefile
+++ linux-4.15.0/fs/Makefile
@@ -129,3 +129,4 @@
  obj-$(CONFIG_CEPH_FS) += ceph/
  obj-$(CONFIG_PSTORE)+= pstore/
  obj-$(CONFIG_EFIVAR_FS)+= efivarfs/
+obj-$(CONFIG_AUFS_FS) += aufs/
  --- linux-4.15.0.orig/fs/adfs/super.c
+++/ linux-4.15.0/fs/adfs/super.c
@@ -368,6 +368,7 @@
struct buffer_head *bh;
struct object_info root_obj;
unsigned char *b_data;
+unsigned int blocksize;
struct adfs_sb_info *asb;
struct inode *root;
int ret = -EINVAL;
@@ -419,8 +420,10 @@
go to error_free_bh;
}

+blocksize = 1 << dr->log2secsize;
blocksize = 1 << dr->log2secsize;
release(bh);
-if (sb_set_blocksize(sb, 1 << dr->log2secsize)) {
+if (sb_set_blocksize(sb, blocksize)) {
    bh = sb_bread(sb, ADFS_DISCRECORD / sb->s_blocksize);
    if (!bh) {
        adfs_error(sb, "couldn't read superblock on ")
--- linux-4.15.0.orig/fs/affs/amigaffs.c
+++ linux-4.15.0/fs/affs/amigaffs.c
@@ -419,24 +419,51 @@
        prot = AFFS_I(inode)->i_protect;
        umode_i mode = inode->i_mode;

+/*
+ * First, clear all RWED bits for owner, group, other.
+ * Then, recalculate them afresh.
+ *
+ * We'll always clear the delete-inhibit bit for the owner, as that is
+ * the classic single-user mode AmigaOS protection bit and we need to
+ * stay compatible with all scenarios.
+ *
+ * Since multi-user AmigaOS is an extension, we'll only set the
+ * delete-allow bit if any of the other bits in the same user class
+ * (group/other) are used.
+ */
+prot &=(~(FIBF_NOEXECUTE | FIBF_NOREAD
+ | FIBF_NOWRITE | FIBF_NODELETE
+ | FIBF_GRP_EXECUTE | FIBF_GRP_READ
+ | FIBF_GRP_WRITE | FIBF_GRP_DELETE
+ | FIBF_OTR_EXECUTE | FIBF_OTR_READ
+ | FIBF_OTR_WRITE | FIBF_OTR_DELETE);
+ */
+ /* Classic single-user AmigaOS flags. These are inverted. */
+ if (!(mode & 0100))
prot |= FIBF_NOEXECUTE;
if (!((mode & 0400)))
prot |= FIBF_NOREAD;
if (!((mode & 0200)))
prot |= FIBF_NOWRITE;
+
+/* Multi-user extended flags. Not inverted. */
if (mode & 0010)
prot |= FIBF_GRP_EXECUTE;
if (mode & 0040)
prot |= FIBF_GRP_READ;
if (mode & 0020)
prot |= FIBF_GRP_WRITE;
+if (mode & 0070)
+prot |= FIBF_GRP_DELETE;
+
if (mode & 0001)
prot |= FIBF_OTR_EXECUTE;
if (mode & 0004)
prot |= FIBF_OTR_READ;
if (mode & 0002)
prot |= FIBF_OTR_WRITE;
+if (mode & 0007)
+prot |= FIBF_OTR_DELETE;

AFFS_I(inode)->i_protect = prot;
}
--- linux-4.15.0.orig/fs/affs/file.c
+++ linux-4.15.0/fs/affs/file.c
@@ -428,6 +428,24 @@
return ret;
}

+static int affs_write_end(struct file *file, struct address_space *mapping,
+ loff_t pos, unsigned int len, unsigned int copied,
+ struct page *page, void *fsdata)
+{
+i struct inode *inode = mapping->host;
+int ret;
+
+ret = generic_write_end(file, mapping, pos, len, copied, page, fsdata);
+
+/* Clear Archived bit on file writes, as AmigaOS would do */
+if (AFFS_I(inode)->i_protect & FIBF_ARCHIVED) {
+AFFS_I(inode)->i_protect &= ~FIBF_ARCHIVED;
+mark_inode_dirty(inode);
+}
+
+return ret;
+
+static sector_t _affs_bmap(struct address_space *mapping, sector_t block)
+{
    return generic_block_bmap(mapping, block, affs_get_block);
@@ -437,7 +455,7 @@
    .readpage = affs_readpage,
    .writepage = affs_writepage,
    .write_begin = affs_write_begin,
-   .write_end = generic_write_end,
+   .write_end = affs_write_end,
    .direct_IO = affs_direct_IO,
    .bmap = _affs_bmap
    }
@@ -794,6 +812,12 @@
    if (tmp > inode->i_size)
        inode->i_size = AFFS_I(inode)->mmu_private = tmp;

+/* Clear Archived bit on file writes, as AmigaOS would do */
+if (AFFS_I(inode)->i_protect & FIBF_ARCHIVED) {
+    AFFS_I(inode)->i_protect &= ~FIBF_ARCHIVED;
+    mark_inode_dirty(inode);
+}
+
+err_first_bh:
unlock_page(page);
put_page(page);
--- linux-4.15.0.orig/fs/affs/namei.c
+++ linux-4.15.0/fs/affs/namei.c
@@ -206,9 +206,10 @@
    bh = affs_find_entry(dir, dentry);
-    affs_unlock_dir(dir);
-    if (IS_ERR(bh))
+    if (IS_ERR(bh)) {
+        affs_unlock_dir(dir);
        return ERR_CAST(bh);
    }
    if (bh) {
        u32 ino = bh->b_blocknr;
@@ -222,10 +223,13 @@
    }
    affs_brelse(bh);
    inode = affs_iget(sb, ino);
-    if (IS_ERR(inode))
if (IS_ERR(inode)) {
    affs_unlock_dir(dir);
    return ERR_CAST(inode);
}
}
d_add(dentry, inode);
+affs_unlock_dir(dir);
return NULL;
}

@@ -457,8 +461,10 @@
return -EIO;

bh_new = affs_bread(sb, d_inode(new_dentry)->i_ino);
-if (!bh_new)
+if (!bh_new) {
    +affs_brelse(bh_old);
    return -EIO;
    +}

/* Remove old header from its parent directory. */
affs_lock_dir(old_dir);
--- linux-4.15.0.orig/fs/affs/super.c
+++ linux-4.15.0/fs/affs/super.c
@@ -559,14 +559,9 @@
int root_block;
unsigned long mount_flags;
int res = 0;
-char*new_opts;
char volume[32];
char*prefix = NULL;

-new_opts = kstrdup(data, GFP_KERNEL);
-if (data && !new_opts)
-return -ENOMEM;
-
pr_debug("%s(flags=0x%x,opts=\"%s\")\n", __func__, *flags, data);

sync_filesystem(sb);
@@ -577,7 +572,6 @@
 &blocksize, &prefix, volume,
 &mount_flags)) {
kfree(prefix);
-kfree(new_opts);
return -EINVAL;
}

--- linux-4.15.0.orig/fs/afs/addr_list.c
+++ linux-4.15.0/fs/afs/addr_list.c
@@ -121,7 +121,7 @@
p = text;
do {
    struct sockaddr_rnxrpc *srx = &alist->addrs[alist->nr_addrs];
    char tdelim = delim;
    const char *q, *stop;

    if (*p == delim) {
        p++;
@@ -130,28 +130,33 @@
        if (*p == '[') {
            tdelim = ']';
            q = memchr(p, ']', end - p);
+        } else {
+            for (q = p; q < end; q++)
+                if (*q == '+' || *q == delim)
+                    break;
+        }
    }

    -if (in4_pton(p, end - p, -(u8 *)&srx->transport.sin6.sin6_addr.s6_addr32[3],
            tdelim, &p)) {
-        srx->transport.sin6.sin6_addr.s6_addr32[0] = 0;
-        srx->transport.sin6.sin6_addr.s6_addr32[1] = 0;
-        srx->transport.sin6.sin6_addr.s6_addr32[2] = htonl(0xffff);
-    } else if (in6_pton(p, end - p, -(u8 *)&srx->transport.sin6.sin6_addr.s6_addr32[0],
-            tdelim, &p)) {
-        srx->transport.sin6.sin6_addr.s6_addr = 0;
-        goto bad_address;
-    } else if (in6_pton(p, q - p, -(u8 *)&srx->transport.sin6.sin6_addr.s6_addr32[0],
-            tdelim, &p)) {
-        srx->transport.sin6.sin6_addr.s6_addr = 0;
-        goto bad_address;
-    } else if (in6_pton(p, q - p, -(u8 *)&srx->transport.sin6.sin6_addr.s6_addr32[0],
-            tdelim, &p)) {
-        srx->transport.sin6.sin6_addr.s6_addr = 0;
-        goto bad_address;
-    }

    -if (tdelim == ']') {
-        -if (p == end || *p != ']')
-            goto bad_address;
+        if (stop != q)
+            goto bad_address;
+        if (q < end && *q == ']')
+            p = q;
+    }

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int afs_end_cursor(struct afs_addr_cursor *ac)
{
    -if (ac->responded && ac->index != ac->start)
    -WRITE_ONCE(ac->alist->index, ac->index);
    +struct afs_addr_list *alist;
    +
    +alist = ac->alist;
    +if (alist) {
    +if (ac->responded && ac->index != ac->start)
    +WRITE_ONCE(alist->index, ac->index);
    +afs_put_addrlist(alist);
    +}
    -afs_put_addrlist(ac->alist);
    +ac->addr = NULL;
    ac->alist = NULL;
    +ac->begun = false;
    return ac->error;
}

--- linux-4.15.0.orig/fs/afs/callback.c
+++ linux-4.15.0/fs/afs/callback.c
@@ -23,36 +23,55 @@
/*
 * Set up an interest-in-callbacks record for a volume on a server and
 * register it with the server.
- * - Called with volume->server_sem held.
+ * - Called with vnode->io_lock held.
 */
int afs_register_server_cb_interest(struct afs_vnode *vnode,
-    struct afs_server_entry *entry)
+    struct afs_server_list *slist,
+    unsigned int index)
{
    -struct afs_cb_interest *cbi = entry->cb_interest, *vcbi, *new, *x;
    +struct afs_server_entry *entry = &slist->servers[index];
    +struct afs_cb_interest *cbi, *vcbi, *new, *old;
    struct afs_server *server = entry->server;

    again:
    +if (vnode->cb_interest &&

---
likely(vnode->cb_interest == entry->cb_interest))
+return 0;
+
+read_lock(&slist->lock);
+cbi = afs_get_cb_interest(entry->cb_interest);
+read_unlock(&slist->lock);
+
vcbi = vnode->cb_interest;
if (vcbi) {
  -if (vcbi == cbi)
  +if (vcbi == cbi) {
    +afs_put_cb_interest(afs_v2net(vnode), cbi);
    return 0;
  +}

  /* Use a new interest in the server list for the same server
   * rather than an old one that's still attached to a vnode. */
  +*/
  if (cbi && vcbi->server == cbi->server) {
    write_seqlock(&vnode->cb_lock);
    -vnode->cb_interest = afs_get_cb_interest(cbi);
    +old = vnode->cb_interest;
    +vnode->cb_interest = cbi;
    write_sequnlock(&vnode->cb_lock);
    -afs_put_cb_interest(afs_v2net(vnode), cbi);
    +afs_put_cb_interest(afs_v2net(vnode), old);
    return 0;
  }

  /* Re-use the one attached to the vnode. */
  if (!cbi && vcbi->server == server) {
    +afs_get_cb_interest(vcbi);
    -x = cmpxchg(&entry->cb_interest, cbi, vcbi);
    -if (x != cbi) {
      +cbi = x;
      -afs_put_cb_interest(afs_v2net(vnode), vcbi);
      +write_lock(&slist->lock);
      +if (entry->cb_interest) {
        +write_unlock(&slist->lock);
        +afs_put_cb_interest(afs_v2net(vnode), cbi);
        goto again;
      }
    }
    +entry->cb_interest = cbi;
    +write_unlock(&slist->lock);
    return 0;
  }

}
list_add_tail(&new->cb_link, &server->cb_interests);
write_unlock(&server->cb_break_lock);

-x = cmpxchg(&entry->cb_interest, cbi, new);
-if (x == cbi) {
  +write_lock(&slist->lock);
  +if (!entry->cb_interest) {
    +new = NULL;
  } else {
    -cbi = x;
    -afs_put_cb_interest(afs_v2net(vnode), new);
    +cbi = afs_get_cb_interest(new);
    +cbi = afs_get_cb_interest(entry->cb_interest);
  }
  +write_unlock(&slist->lock);
  +afs_put_cb_interest(afs_v2net(vnode), new);
}

ASSERT(cbi);
write_seqlock(&vnode->cb_lock);

-vnode->cb_interest = afs_get_cb_interest(cbi);
+old = vnode->cb_interest;
+vnode->cb_interest = cbi;
vnode->cb_s_break = cbi->server->cb_s_break;
clear_bit(AFS_VNODE_CB_PROMISED, &vnode->flags);

write_sequnlock(&vnode->cb_lock);
+afs_put_cb_interest(afs_v2net(vnode), old);
return 0;
}

vfs_cb_break(vnode);
afs_clear_permits(vnode);

-spin_lock(&vnode->lock);
-
-__debug("break callback");
-
-if (list_empty(&vnode->granted_locks) &&
   !list_empty(&vnode->pending_locks))
+if (vnode->lock_state == AFS_VNODE_LOCK_WAITING_FOR_CB)
  afs_lock_may_be_available(vnode);
-spin_unlock(&vnode->lock);
}

write_sequnlock(&vnode->cb_lock);
--- linux-4.15.0.orig/fs/afs/cell.c
+++ linux-4.15.0/fs/afs/cell.c
@@ -75,7 +75,8 @@
cell = rcu_dereference_raw(net->ws_cell);
if (cell) {
    afs_get_cell(cell);
-    continue;
+    ret = 0;
+    break;
}
ret = -EDESTADDRREQ;
continue;
@@ -109,6 +110,9 @@
done_seqretry(&net->cells_lock, seq);

+if (ret != 0 && cell)
+    afs_put_cell(net, cell);
+
return ret == 0 ? cell : ERR_PTR(ret);
}

--- linux-4.15.0.orig/fs/afs/cmservice.c
+++ linux-4.15.0/fs/afs/cmservice.c
@@ -341,7 +341,6 @@
/*
 * we'll need the file server record as that tells us which set of
 * vnodes to operate upon */
-    rxrpc_kernel_get_peer(call->net->socket, call->rxcall, &srx);
-    server = afs_find_server(call->net, &srx);
+    rcu_read_lock();
+    server = afs_find_server_by_uuid(call->net, call->request);
+    rcu_read_unlock();
    if (!server)
        return -ENOTCONN;
    call->cm_server = server;
struct afs_call *call = container_of(work, struct afs_call, work);
struct afs_uuid *r = call->request;

-struct {
-__be32	match;
-} reply;
-
_enter("'");

if (memcmp(r, &call->net->uuid, sizeof(call->net->uuid)) == 0)
-reply.match = htonl(0);
+afs_send_empty_reply(call);
else
-reply.match = htonl(1);
+rxrpc_kernel_abort_call(call->net->socket, call->rxcall,
+1, 1, "K-1");

-afs_send_simple_reply(call, &reply, sizeof(reply));
afs_put_call(call);
_leave("'");
}
--- linux-4.15.0.orig/fs/afs/flock.c
+++ linux-4.15.0/fs/afs/flock.c
@@ -13,9 +13,11 @@
#define AFS_LOCK_GRANTED	0
#define AFS_LOCK_PENDING	1
+#define AFS_LOCK_YOUR_TRY	2

struct workqueue_struct *afs_lock_manager;

+static void afs_next_locker(struct afs_vnode *vnode, int error);
static void afs_fl_copy_lock(struct file_lock *new, struct file_lock *fl);
static void afs_fl_release_private(struct file_lock *fl);

@@ -24,6 +26,12 @@
.fl_release_private= afs_fl_release_private,
};

+static inline void afs_set_lock_state(struct afs_vnode *vnode, enum afs_lock_state state)
+{
+    _debug("STATE %u -> %u", vnode->lock_state, state);
+    vnode->lock_state = state;
+}
+/*
* if the callback is broken on this vnode, then the lock may now be available

_enter("%x:%u", vnode->fid.vid, vnode->fid.vnode);

-queue_delayed_work(afs_lock_manager, &vnode->lock_work, 0);
+spin_lock(&vnode->lock);
+if (vnode->lock_state == AFS_VNODE_LOCK_WAITING_FOR_CB)
+aafs_next_locker(vnode, 0);
+spin_unlock(&vnode->lock);
}

/*
 * the lock will time out in 5 minutes unless we extend it, so schedule
 * extension in a bit less than that time
 */
-static void afs_schedule_lock_extension(struct afs_vnode *vnode)
+static void __maybe_unused afs_schedule_lock_extension(struct afs_vnode *vnode)
{
queue_delayed_work(afs_lock_manager, &vnode->lock_work,
    AFS_LOCKWAIT * HZ / 2);
@@ -49,22 +60,65 @@
* first lock in the queue is itself a readlock)
* - the caller must hold the vnode lock
 */
-static void afs_grant_locks(struct afs_vnode *vnode, struct file_lock *fl)
+static void afs_grant_locks(struct afs_vnode *vnode)
{
    struct file_lock *p, *_p;
+    bool exclusive = (vnode->lock_type == AFS_LOCK_WRITE);

    list_move_tail(&fl->fl_u.afs.link, &vnode->granted_locks);
    -if (fl->fl_type == F_RDLCK) {
    +if (!exclusive && fl->fl_type == F_WRLCK)
+    	continue;
+    
+    list_move_tail(&fl_u.afs.link, &vnode->granted_locks);
+    
+    wake_up(&fl->fl_wait);
+    }
+    list_for_each_entry_safe(p, _p, &vnode->pending_locks, fl_u.afs.link) {
+        if (p->fl_type == F_RDLCK) {
+            p->fl_u.afs.state = AFS_LOCK_GRANTED;
+            list_move_tail(&p->fl_u.afs.link, &vnode->granted_locks);
+            wake_up(&p->fl_wait);
+        }
+    }
+    list_for_each_entry_safe(p, _p, &vnode->pending_locks, fl_u.afs.link) {
+        if (!exclusive && p->fl_type == F_WRLCK)
+            continue;
+        list_move_tail(&p->fl_u.afs.link, &vnode->granted_locks);
+        p->fl_u.afs.state = AFS_LOCK_GRANTED;
+        wake_up(&p->fl_wait);
static void afs_next_locker(struct afs_vnode *vnode, int error)
{
    struct file_lock *p, *_p, *next = NULL;
    struct key *key = vnode->lock_key;
    unsigned int fl_type = F_RDLCK;

    _enter;

    if (vnode->lock_type == AFS_LOCK_WRITE)
        fl_type = F_WRLCK;

    list_for_each_entry_safe(p, _p, &vnode->pending_locks, fl_u.afs.link) {
        if (error &&
            p->fl_type == fl_type &&
            afs_file_key(p->fl_file) == key) {
            list_del_init(&p->fl_u.afs.link);
            p->fl_u.afs.state = error;
            wake_up(&p->fl_wait);
        }
    }

    /* Select the next locker to hand off to. */
    if (next &&
        (next->fl_type == F_WRLCK || p->fl_type == F_RDLCK))
        continue;
    next = p;
}

vnode->lock_key = NULL;
key_put(key);

if (next) {
    afs_set_lock_state(vnode, AFS_VNODE_LOCK_SETTING);
    next->fl_u.afs.state = AFS_LOCK_YOUR_TRY;
    wake_up(&next->fl_wait);
} else {
    afs_set_lock_state(vnode, AFS_VNODE_LOCK_NONE);
}

_leave;
/*
   @ @ -170,8 +224,6 @ @
   { 
   struct afs_vnode *vnode =
   container_of(work, struct afs_vnode, lock_work.work);
   -struct file_lock *fl, *next;
   -afs_lock_type_t t_type;
   struct key *key;
   int ret;
   
   @ @ -184,7 +236,7 @ @
   switch (vnode->lock_state) { 
   case AFS_VNODE_LOCK_NEED_UNLOCK:
   _debug("unlock");
   -vnode->lock_state = AFS_VNODE_LOCK_UNLOCKING;
   +afs_set_lock_state(vnode, AFS_VNODE_LOCK_UNLOCKING);
   spin_unlock(&vnode->lock);
   
   /* attempt to release the server lock; if it fails, we just
   @ @ -196,22 +248,9 @ @
   - vnode->fid.vid, vnode->fid.vnode, ret);
   spin_lock(&vnode->lock);
   -key_put(vnode->lock_key);
   -vnode->lock_key = NULL;
   -vnode->lock_state = AFS_VNODE_LOCK_NONE;
   -
   -if (list_empty(&vnode->pending_locks)) {
   -spin_unlock(&vnode->lock);
   -return;
   -} 
   -
   -/* The new front of the queue now owns the state variables. */
   -next = list_entry(vnode->pending_locks.next,
   - struct file_lock, fl_u.afs.link);
   -vnode->lock_key = afs_file_key(next->fl_file);
   -vnode->lock_type = (next->fl_type == F_RDLCK) ? AFS_LOCK_READ : AFS_LOCK_WRITE;
   -vnode->lock_state = AFS_VNODE_LOCK_WAITING_FOR_CB;
   -goto again;
   +afs_next_locker(vnode, 0);
   +spin_unlock(&vnode->lock);
   +return;

   /* If we've already got a lock, then it must be time to extend that
   * lock as AFS locks time out after 5 minutes.
   @ @ -222,7 +261,7 @ @
   ASSERT(!list_empty(&vnode->granted_locks));
*/
key = key_get(vnode->lock_key);
-vnode->lock_state = AFS_VNODE_LOCK_EXTENDING;
+afs_set_lock_state(vnode, AFS_VNODE_LOCK_EXTENDING);
spin_unlock(&vnode->lock);

ret = afs_extend_lock(vnode, key); /* RPC */
@@ -236,72 +275,26 @@
if (vnode->lock_state != AFS_VNODE_LOCK_EXTENDING)
goto again;
-vnode->lock_state = AFS_VNODE_LOCK_GRANTED;
+afs_set_lock_state(vnode, AFS_VNODE_LOCK_GRANTED);
-		if (ret == 0)
-			afs_schedule_lock_extension(vnode);
-else
+if (ret != 0)
+queue_delayed_work(afs_lock_manager, &vnode->lock_work,
+ HZ * 10);
+spin_unlock(&vnode->lock);
+_leave(" [ext]");
return;

-/* If we don't have a granted lock, then we must've been called
- * back by the server, and so if might be possible to get a
- * lock we're currently waiting for.
- */
+/*
+ * If we're waiting for a callback to indicate lock release, we can't
+ * actually rely on this, so need to recheck at regular intervals. The
+ * problem is that the server might not notify us if the lock just
+ * expires (say because a client died) rather than being explicitly
+ * released.
+ */
case AFS_VNODE_LOCK_WAITING_FOR_CB:
- _debug("get");
- -key = key_get(vnode->lock_key);
- -type = vnode->lock_type;
- -vnode->lock_state = AFS_VNODE_LOCK_SETTING;
+ _debug("retry");
+afs_next_locker(vnode, 0);
spin_unlock(&vnode->lock);
-
- -ret = afs_set_lock(vnode, key, type); /* RPC */
- -key_put(key);
- -spin_lock(&vnode->lock);
switch (ret) {
  case -EWOULDBLOCK:
    _debug("blocked");
    break;
  case 0:
    _debug("acquired");
    vnode->lock_state = AFS_VNODE_LOCK_GRANTED;
    /* Fall through */
  default:
    /* Pass the lock or the error onto the first locker in
     * the list - if they're looking for this type of lock.
     * If they're not, we assume that whoever asked for it
     * took a signal.
     */
    if (list_empty(&vnode->pending_locks)) {
      _debug("withdrawn");
      vnode->lock_state = AFS_VNODE_LOCK_NEED_UNLOCK;
      goto again;
    }
    fl = list_entry(vnode->pending_locks.next,
                    struct file_lock, fl_u.afs.link);
    type = (fl->fl_type == F_RDLCK) ? AFS_LOCK_READ : AFS_LOCK_WRITE;
    if (vnode->lock_type != type) {
      _debug("changed");
      vnode->lock_state = AFS_VNODE_LOCK_NEED_UNLOCK;
      goto again;
    }
    fl->fl_u.afs.state = ret;
    if (ret == 0)
      afs_grant_locks(vnode, fl);
    else
      list_del_init(&fl->fl_u.afs.link);
    wake_up(&fl->fl_wait);
    spin_unlock(&vnode->lock);
    _leave("[granted]"ements);
    return;
  }
default:
  /* Looks like a lock request was withdrawn. */
}
static void afs_defer_unlock(struct afs_vnode *vnode)
{
  _enter(""");
  /*
  */
+ _enter("%u", vnode->lock_state);

- if (vnode->lock_state == AFS_VNODE_LOCK_GRANTED ||
- vnode->lock_state == AFS_VNODE_LOCK_EXTENDING) {
+ if (list_empty(&vnode->granted_locks) &&
+ (vnode->lock_state == AFS_VNODE_LOCK_GRANTED ||
+ vnode->lock_state == AFS_VNODE_LOCK_EXTENDING)) {
  cancel_delayed_work(&vnode->lock_work);

  vnode->lock_state = AFS_VNODE_LOCK_NEED_UNLOCK;
  afs_lock_may_be_available(vnode);
+ afs_set_lock_state(vnode, AFS_VNODE_LOCK_NEED_UNLOCK);
+ queue_delayed_work(afs_lock_manager, &vnode->lock_work, 0);
  }
}

@@ -376,50 +370,6 @@
}

/*
 - * Remove the front runner from the pending queue.
 - * The caller must hold vnode->lock.
 - */
- static void afs_dequeue_lock(struct afs_vnode *vnode, struct file_lock *fl)
- {
- struct file_lock *next;
- 
- _enter("");
- 
- /* -lock_type, -lock_key and -lock_state only belong to this
- * file_lock if we're at the front of the pending queue or if we have
- * the lock granted or if the lock_state is NEED_UNLOCK or UNLOCKING.
- */
- if (vnode->granted_locks.next == &fl->fl_u.afs.link &&
- vnode->granted_locks.prev == &fl->fl_u.afs.link) {
- list_del_init(&fl->fl_u.afs.link);
- afs_defer_unlock(vnode);
- return;
- }
- 
- if (!list_empty(&vnode->granted_locks) ||
- vnode->pending_locks.next != &fl->fl_u.afs.link) {
- list_del_init(&fl->fl_u.afs.link);
- return;
- }
- 
- list_del_init(&fl->fl_u.afs.link);
- key_put(vnode->lock_key);
vnode->lock_key = NULL;
vnode->lock_state = AFS_VNODE_LOCK_NONE;
-
-if (list_empty(&vnode->pending_locks))
-return;
-
-/* The new front of the queue now owns the state variables. */
-next = list_entry(vnode->pending_locks.next, 
- struct file_lock, fl_u.afs.link);
-vnode->lock_key = afs_file_key(next->fl_file);
-vnode->lock_type = (next->fl_type == F_RDLCK) ? AFS_LOCK_READ : AFS_LOCK_WRITE;
-vnode->lock_state = AFS_VNODE_LOCK_WAITING_FOR_CB;
-afs_lock_may_be_available(vnode);
-
-/* request a lock on a file on the server */
-static int afs_do_setlk(struct file *file, struct file_lock *fl)
-{
-/* only whole-file locks are supported */
-if (fl->fl_start != 0 || fl->fl_end != OFFSET_MAX)
-return -EINVAL;
-
-fl->fl_ops = &afs_lock_ops;
-INIT_LIST_HEAD(&fl->fl_u.afs.link);
-fl->fl_u.afs.state = AFS_LOCK_PENDING;
-@ @ -447,44 +393,66 @@
-return ret;
-
-spin_lock(&vnode->lock);
+list_add_tail(&fl->fl_u.afs.link, &vnode->pending_locks);
-
-/* If we've already got a readlock on the server then we instantly
-* grant another readlock, irrespective of whether there are any
-* pending writelocks.
-*/
-if (type == AFS_LOCK_READ &&
- vnode->lock_state == AFS_VNODE_LOCK_GRANTED &&
- vnode->lock_type == AFS_LOCK_READ) {
- _debug("instant readlock");
- ASSERT(!list_empty(&vnode->granted_locks));
- goto share_existing_lock;
-
-/* If we've already got a lock on the server then try to move to having
the VFS grant the requested lock. Note that this means that other
clients may get starved out.
*/
+ _debug("try %u", vnode->lock_state);
+if (vnode->lock_state == AFS_VNODE_LOCK_GRANTED) {
+ if (type == AFS_LOCK_READ) {
+ _debug("instant readlock");
+ list_move_tail(&fl->fl_u.afs.link, &vnode->granted_locks);
+ fl->fl_u.afs.state = AFS_LOCK_GRANTED;
+ goto vnode_is_locked_u;
+ }
}
-
- list_add_tail(&fl->fl_u.afs.link, &vnode->pending_locks);
+ if (vnode->lock_state != AFS_VNODE_LOCK_NONE)
+ goto need_to_wait;
+
+ try_to_lock:
/* We don't have a lock on this vnode and we aren't currently waiting
 * for one either, so ask the server for a lock.
 *
 * Note that we need to be careful if we get interrupted by a signal
 * after dispatching the request as we may still get the lock, even
 * though we don't wait for the reply (it's not too bad a problem - the
 * lock will expire in 10 mins anyway).
 * lock will expire in 5 mins anyway).
 */
 _debug("not locked");
vnode->lock_key = key_get(key);
vnode->lock_type = type;
-vnode->lock_state = AFS_VNODE_LOCK_SETTING;
+afs_set_lock_state(vnode, AFS_VNODE_LOCK_SETTING);
spin_unlock(&vnode->lock);

ret = afs_set_lock(vnode, key, type); /* RPC */

spin_lock(&vnode->lock);
switch (ret) {
+case -EKEYREJECTED:
+case -EKEYEXPIRED:
+case -EKEYREVOKED:
case -EPERM:
case -EACCES:
    +list_del_init(&fl->fl_u.afs.link);
+afs_next_locker(vnode, ret);
+goto error_unlock;
+
default:
-goto abort_attempt;
+fl->fl_u.afs.state = ret;
+list_del_init(&fl->fl_u.afs.link);
+afs_next_locker(vnode, 0);
+goto error_unlock;
+
    case -EWOULDBLOCK:
    /* The server doesn't have a lock-waiting queue, so the client
    @ @ -494,29 +462,23 @@
    _debug("would block");
    ASSERT(list_empty(&vnode->granted_locks));
    ASSERTCMP(vnode->pending_locks.next, ==, &fl->fl_u.afs.link);
    -vnode->lock_state = AFS_VNODE_LOCK_WAITING_FOR_CB;
    -goto need_to_wait;
    +goto lock_is_contended;
    case 0:
    _debug("acquired");
    -break;
    +afs_set_lock_state(vnode, AFS_VNODE_LOCK_GRANTED);
    +afs_grant_locks(vnode);
    +goto vnode_is_locked_u;
    }

    /* we've acquired a server lock, but it needs to be renewed after 5
    * mins */
    -vnode->lock_state = AFS_VNODE_LOCK_GRANTED;
    -afs_schedule_lock_extension(vnode);
    -
    -share_existing_lock:
    /* the lock has been granted as far as we're concerned... */
    -fl->fl_u.afs.state = AFS_LOCK_GRANTED;
    -list_move_tail(&fl->fl_u.afs.link, &vnode->granted_locks);
    -
    -given_lock:
    /* ... but we do still need to get the VFS's blessing */
    +vnode_is_locked_u:
    spin_unlock(&vnode->lock);
    +vnode_is_locked;
    /* the lock has been granted by the server... */
+ASSERT_CMP((fl->u.afs.state == AFS_LOCK_GRANTED);

-ret = posix_lock_file(file, fl, NULL);
+/* ... but the VFS still needs to distribute access on this client. */
+ret = locks_lock_file_wait(file, fl);
if (ret < 0)
goto vfs_rejected_lock;

@@ -528,38 +490,61 @@
 _leave(" = 0");
 return 0;

+lock_is_contended:
+if (!(fl->flags & FL_SLEEP)) {
+list_del_init(&fl->u.afs.link);
+afs_next_locker(vnode, 0);
+ret = -EAGAIN;
+goto error_unlock;
+}
+
+afs_set_lock_state(vnode, AFS_VNODE_LOCK_WAITING_FOR_CB);
+queue_delayed_work(afs_lock_manager, &vnode->lock_work, HZ * 5);
+
+need_to_wait:
/* We're going to have to wait. Either this client doesn't have a lock
 * on the server yet and we need to wait for a callback to occur, or
 - * the client does have a lock on the server, but it belongs to some
 - * other process(es) and is incompatible with the lock we want.
 + * the client does have a lock on the server, but it's shared and we
 + * need an exclusive lock.
 */
-ret = -EAGAIN;
-if (fl->flags & FL_SLEEP) {
-spin_unlock(&vnode->lock);
+-spin_unlock(&vnode->lock);
-
- _debug("sleep");
-ret = wait_event_interruptible(fl->wait,
- fl->u.afs.state != AFS_LOCK_PENDING);
+_debug("sleep");
+ret = wait_event_interruptible(fl->wait,
+ fl->u.afs.state != AFS_LOCK_PENDING);
+_debug("wait = %d", ret);

+if (fl->u.afs.state >= 0 && fl->u.afs.state != AFS_LOCK_GRANTED) {
 spin_lock(&vnode->lock);
+
+switch (fl->u.afs.state) {

+case AFS_LOCK_YOUR_TRY:
+fl->fl_u.afs.state = AFS_LOCK_PENDING;
+goto try_to_lock;
+case AFS_LOCK_PENDING:
+if (ret > 0) {
+  /* We need to retry the lock. We may not be
+   * notified by the server if it just expired
+   * rather than being released.
+   */
+  ASSERTCMP(vnode->lock_state, ==, AFS_VNODE_LOCK_WAITING_FOR_CB);
+  afs_set_lock_state(vnode, AFS_VNODE_LOCK_SETTING);
+  fl->fl_u.afs.state = AFS_LOCK_PENDING;
+  goto try_to_lock;
+}
+goto error_unlock;
+case AFS_LOCK_GRANTED:
+default:
+break;
+}
+
+spin_unlock(&vnode->lock);
}

if (fl->fl_u.afs.state == AFS_LOCK_GRANTED)
  goto given_lock;
-if (fl->fl_u.afs.state < 0)
  ret = fl->fl_u.afs.state;
-
-abort_attempt:
-  /* we aren't going to get the lock, either because we're unwilling to
-   * wait, or because some signal happened */
-  _debug("abort");
-  afs_dequeue_lock(vnode, fl);
-
-error_unlock:
-  spin_unlock(&vnode->lock);
-  _leave(" = %d", ret);
-  return ret;
+goto vnode_is_locked;
+ret = fl->fl_u.afs.state;
+goto error;

vfs_rejected_lock:
/* The VFS rejected the lock we just obtained, so we have to discard
   @ @ -569.9 +554,13 @ @
   _debug("vfs refused %d", ret);
   spin_lock(&vnode->lock);
   list_del_init(&fl->fl_u.afs.link);
if (list_empty(&vnode->granted_locks))
afs_defer_unlock(vnode);
goto error_unlock;
afs_defer_unlock(vnode);

+error_unlock:
+spin_unlock(&vnode->lock);
+error:
+_leave(" = %d", ret);
+return ret;
}

/*
@@ -587,11 +576,7 @@
/* Flush all pending writes before doing anything with locks. */
vfs_fsync(file, 0);

-J/* only whole-file unlocks are supported */
-if (fl->fl_start != 0 || fl->fl_end != OFFSET_MAX)
-return -EINVAL;
-
-ret = posix_lock_file(file, fl, NULL);
+ret = locks_lock_file_wait(file, fl);
+_leave(" = %d [%u]", ret, vnode->lock_state);
return ret;
}
@@ -618,12 +603,15 @@
goto error;

lock_count = READ_ONCE(vnode->status.lock_count);
-if (lock_count > 0)
-fl->fl_type = F_RDLCK;
-else
-fl->fl_type = F_WRLCK;
-fl->fl_start = 0;
-fl->fl_end = OFFSET_MAX;
+if (lock_count != 0) {
+if (lock_count > 0)
+fl->fl_type = F_RDLCK;
+else
+fl->fl_type = F_WRLCK;
+fl->fl_start = 0;
+fl->fl_end = OFFSET_MAX;
+fl->fl_pid = 0;
+}
}

ret = 0;
spin_lock(&vnode->lock);
afs_dequeue_lock(vnode, fl);
+
+list_del_init(&fl->fl_u.afs.link);
+if (list_empty(&vnode->granted_locks))
+afs_defer_unlock(vnode);
+
_debug("state %u for %p", vnode->lock_state, vnode);
spin_unlock(&vnode->lock);
}
--- linux-4.15.0.orig/fs/afs/inode.c
+++ linux-4.15.0/fs/afs/inode.c
@@ -499,6 +499,8 @@
afs_put_permits(vnode->permit_cache);
+key_put(vnode->lock_key);
+vnode->lock_key = NULL;
_leave("");
+refcount_inc(&cbi->usage);
return cbi;
}

--- linux-4.15.0.orig/fs/afs/proc.c
+++ linux-4.15.0/fs/afs/proc.c
@@ -262,13 +262,13 @@
goto inval;
args = strchr(name, ' ');
-if (!args)
-goto inval;
-do {
 -*args++ = 0;
-} while(*args == ' ');
-if (!*args)
-goto inval;
+if (args) {
+ do {
+ *args++ = 0;
+ } while(*args == ' ');
+ if (!*args)
+ goto inval;
+
/* determine command to perform */
_debug("cmd=%s name=%s args=%s", kbuf, name, args);
@@ -283,7 +283,6 @@
}
set_bit(AFS_CELL_FL_NO_GC, &cell->flags);
-printk("kAFS: Added new cell '%s'", name);
} else {
-goto inval;
}
--- linux-4.15.0.orig/fs/afs/rotate.c
+++ linux-4.15.0/fs/afs/rotate.c
@@ -179,7 +179,7 @@
*/
if (fc->flags & AFS_FS_CURSOR_VNOVOL) {
 fc->ac.error = -EREMOTEIO;
-goto failed;
+goto next_server;
}

write_lock(&vnode->volume->servers_lock);
@@ -201,7 +201,7 @@
*/
if (vnode->volume->servers == fc->server_list) {
    fc->ac.error = -EREMOTEIO;
    goto failed;
+    goto next_server;
}

/* Try again */
@@ -334,6 +334,7 @@
next_server:
    _debug("next");
+    afs_end_cursor(&fc->ac);
    afs_put_cb_interest(afs_v2net(vnode), fc->cbi);
    fc->cbi = NULL;
    fc->index++;
@@ -370,8 +371,8 @@
    * break request before we've finished decoding the reply and
    * installing the vnode.
    */
-    fc->ac.error = afs_register_server_cb_interest(
-        vnode, &fc->server_list->servers[fc->index]);
+    fc->ac.error = afs_register_server_cb_interest(vnode, fc->server_list,
+            &fc->index);
    if (fc->ac.error < 0)
        goto failed;

@@ -383,13 +384,22 @@
    afs_get_addrlist(alist);
    read_unlock(&server->fs_lock);
+    memset(&fc->ac, 0, sizeof(fc->ac));

    /* Probe the current fileserver if we haven't done so yet. */
    if (!test_bit(AFS_SERVER_FL_PROBED, &server->flags)) {
        fc->ac.alist = afs_get_addrlist(alist);

-        if (!afs_probe_fileserver(fc))
-            goto failed;
+        if (!afs_probe_fileserver(fc)) {
+            switch (fc->ac.error) {
+            case -ENOMEM:
+            case -ERESTARTSYS:
+            case -EINTR:
+                goto failed;
+            default:
+                goto next_server;
+            }
+        }
+    }
if (!fc->ac.alist)
    afs_put_addrlist(alist);

    fc->ac.addr  = NULL;
    fc->ac.start = READ_ONCE(alist->index);
    fc->ac.index = fc->ac.start;
    fc->ac.error = 0;
    fc->ac.begun = false;
goto iterate_address;

iterate_address:
@@ -410,16 +417,15 @@
/* Iterate over the current server's address list to try and find an
 * address on which it will respond to us.
 */
-    if (afs_iterate_addresses(&fc->ac)) {
-        _leave(" = t");
-        return true;
-    }
+    if (!afs_iterate_addresses(&fc->ac))
+        goto next_server;

-    afs_end_cursor(&fc->ac);
-    goto next_server;
+    _leave(" = t");
+    return true;

failed:
    fc->flags |= AFS_FS_CURSOR_STOP;
+    afs_end_cursor(&fc->ac);
+    _leave(" = f [failed %d]", fc->ac.error);
    return false;
}
@@ -458,12 +464,10 @@
    return false;
}

+    memset(&fc->ac, 0, sizeof(fc->ac));
    fc->ac.alist = alist;
    fc->ac.addr  = NULL;
    fc->ac.start = READ_ONCE(alist->index);
    fc->ac.index = fc->ac.start;
    fc->ac.error = 0;
    fc->ac.begun = false;
goto iterate_address;

case 0:
--- linux-4.15.0.orig/fs/afs/rxrpc.c
+++ linux-4.15.0/fs/afs/rxrpc.c
@@ -41,6 +41,7 @@
{
    struct sockaddr_rxrpc srx;
    struct socket *socket;
    +unsigned int min_level;
    int ret;

    _enter(""");
@@ -60,6 +61,12 @@
    srx.transport.sin6.sin6_family = AF_INET6;
    srx.transport.sin6.sin6_port = htons(AFS_CM_PORT);
    +min_level = RXRPC_SECURITY_ENCRYPT;
    +ret = kernel_setsockopt(socket, SOL_RXRPC, RXRPC_MIN_SECURITY_LEVEL,
    +(void *)&min_level, sizeof(min_level));
    +if (ret < 0)
    +goto error_2;
    +
    ret = kernel_bind(socket, (struct sockaddr *) &srx, sizeof(srx));
    if (ret == -EADDRINUSE) {
    @ @ -151,7 +158,7 @@
        int n = atomic_dec_return(&call->usage);
        int o = atomic_read(&net->nr_outstanding_calls);

        -trace_afs_call(call, afs_call_trace_put, n + 1, o,
        +trace_afs_call(call, afs_call_trace_put, n, o,
           __builtin_return_address(0));

        ASSERTCMP(n, >=, 0);
@@ -561,6 +568,7 @@
        u = __atomic_add_unless(&call->usage, 1, 0);
        if (u != 0) {
            -trace_afs_call(call, afs_call_trace_wake, u,
            +timeout = rtt2;
            continue;
        }
@@ -641,7 +649,7 @@

        ASSERTCMP(n, >=, 0);
@@ -561,6 +568,7 @@
        u = __atomic_add_unless(&call->usage, 1, 0);
        if (u != 0) {
            -trace_afs_call(call, afs_call_trace_wake, u,
            +timeout = rtt2;
            continue;
        }
trace_afs_call(call, afs_call_trace_wake, u + 1,
    atomic_read(&call->net->nr_outstanding_calls),
    __builtin_return_address(0));

if (call->state == AFS_CALL_COMPLETE) {
    call->reply[0] = NULL;

    /* We have two refs to release - one from the alloc and one
     * queued with the work item - and we can't just deallocate the
     * call because the work item may be queued again.
     */

    permits = rcu_dereference_protected(vnode->permit_cache,
        lockdep_is_held(&vnode->lock));
    RCU_INIT_POINTER(vnode->permit_cache, NULL);
    vnode->cb_break++;
    spin_unlock(&vnode->lock);

    if (permits)
        afs_put_permits(permits);
    +afs_put_permits(permits);
}

/*
 @@ -378,18 +376,14 @@
     mask, access, S_ISDIR(inode->i_mode) ? "dir" : "file");

     if (S_ISDIR(inode->i_mode)) {
         if (mask & MAY_EXEC) {
             if (!(access & AFS_ACE_LOOKUP))
                 goto permission_denied;
         } else if (mask & MAY_READ) {
             if (!(access & (AFS_ACE_DELETE | MAY_EXEC | MAY_READ | MAY_CHDIR))) {
                 if (!(access & AFS_ACE_LOOKUP))
                     goto permission_denied;
             } else if (mask & MAY_WRITE) {
                 +if (mask & MAY_WRITE) {
                     if (!(access & (AFS_ACE_DELETE | MAY_EXEC | MAY_READ | MAY_CHDIR))) {
                         if (!(access & AFS_ACE_INSERT)) /* create, mkdir, symlink, rename to */
                             goto permission_denied;
                     } else {
                         -BUG();
                     }
                 }
             }
         }
     }
*/
} else {
    if (!(access & AFS_ACE_LOOKUP))
        --- linux-4.15.0.orig/fs/afs/server.c
+++ linux-4.15.0/fs/afs/server.c
@@ -34,18 +34,11 @@
struct afs_server *afs_find_server(struct afs_net *net,
    const struct sockaddr_rxrpc *srx)
{
    -const struct sockaddr_in6 *a = &srx->transport.sin6, *b;
    const struct afs_addr_list *alist;
    struct afs_server *server = NULL;
    unsigned int i;
    -bool ipv6 = true;
    int seq = 0, diff;

    -if (srx->transport.sin6.sin6_addr.s6_addr32[0] == 0 ||
       -srx->transport.sin6.sin6_addr.s6_addr32[1] == 0 ||
       -srx->transport.sin6.sin6_addr.s6_addr32[2] == htonl(0xffff))
       -ipv6 = false;
    -rcu_read_lock();

do {
@@ -54,7 +47,8 @@
    server = NULL;
    read_seqbegin_or_lock(&net->fs_addr_lock, &seq);

    -if (ipv6) {
       +if (srx->transport.family == AF_INET6) {
       +const struct sockaddr_in6 *a = &srx->transport.sin6, *b;
       hlist_for_each_entry_rcu(server, &net->fs_addresses6, addr6_link) {
           alist = rcu_dereference(server->addresses);
           for (i = alist->nr_ipv4; i < alist->nr_addrs; i++) {
@@ -66,36 +60,25 @@
               sizeof(struct in6_addr);
           if (diff == 0)
               goto found;
           -if (diff < 0) {
               -// TODO: Sort the list
               -//if (i == alist->nr_ipv4)
               -//goto not_found;
               -break;
               -}
               
           if (diff == 0)
               goto found;
           -if (diff < 0) {
               -// TODO: Sort the list
               -//if (i == alist->nr_ipv4)
               -//goto not_found;
               -break;
               -} else {
               +const struct sockaddr_in *a = &srx->transport.sin, *b;
               hlist_for_each_entry_rcu(server, &net->fs_addresses4, addr4_link) {
               

alist = rcu_dereference(server->addresses);
for (i = 0; i < alist->nr_ipv4; i++) {
    b = &alist->addrs[i].transport.sin6;
    -diff = (u16)a->sin6_port - (u16)b->sin6_port;
    +b = &alist->addrs[i].transport.sin;
    +diff = ((u16)a->sin_port -
        (u16)b->sin_port);
if (diff == 0)
    -diff = ((u32)a->sin6_addr.s6_addr32[3] -
        (u32)b->sin6_addr.s6_addr32[3]);
    +diff = ((u32)a->sin_addr.s_addr -
        (u32)b->sin_addr.s_addr);
    if (diff == 0)
        goto found;
    -if (diff < 0) {
        // TODO: Sort the list
        -if (i == 0)
            goto not_found;
    }
    -}
    }
    }
}

-// not_found:
server = NULL;
found:
if (server && !atomic_inc_not_zero(&server->usage))
@@ -426,8 +409,15 @@
    write_sequnlock(&net->fs_lock);

    -if (deleted)
    +if (deleted) {
        +write_seqlock(&net->fs_addr_lock);
        +if (!hlist_unhashed(&server->addr4_link))
            +hlist_del_rcu(&server->addr4_link);
    +if (!hlist_unhashed(&server->addr6_link))
        +hlist_del_rcu(&server->addr6_link);
        +write_sequnlock(&net->fs_addr_lock);
afs_destroy_server(net, server);
    +}
    }
    }

--- linux-4.15.0.orig/fs/afs/server_list.c
+++ linux-4.15.0/fs/afs/server_list.c
@@ -49,6 +49,7 @@
goto error;

refcount_set(&slist->usage, 1);
+rwlock_init(&slist->lock);

/* Make sure a records exists for each server in the list. */
for (i = 0; i < vldb->nr_servers; i++) {
    server = afs_lookup_server(cell, key, &vldb->fs_server[i]);
    if (IS_ERR(server)) {
        ret = PTR_ERR(server);
        -if (ret == -ENOENT)
        +if (ret == -ENOENT ||
            ret == -ENOMEDIUM)
            continue;
        goto error_2;
    }
    /* Insertion-sort by UUID */
    for (j = 0; j < slist->nr_servers; j++)
        if (memcmp(&slist->servers[j].server->uuid,
                  &server->uuid,
                  sizeof(server->uuid)) >= 0)
            break;
    if (j < slist->nr_servers) {
        if (slist->servers[j].server == server) {
            /* fill in the superblock */
sb->s_blocksize = PAGE_SIZE;
sb->s_blocksize_bits = PAGE_SHIFT;
+sb->s_maxbytes = MAX_LFS_FILESIZE;
sb->s_magic = AFS_FS_MAGIC;
sb->s_op = &afs_super_ops;
sb->s_xattr = afs_xattr_handlers;
        }
    }
/* fill in the superblock */
+++ linux-4.15.0/fs/vlclient.c
@@ -23,7 +23,7 @@
          struct afs_vldbentry__xdr *uvldb;
          struct afs_vldb_entry *entry;
          bool new_only = false;
-    u32 tmp;
+    u32 tmp, nr_servers;
    int i, ret;
_enter(");
@@ -36,6 +36,10 @@
 uvldb = call->buffer;
 entry = call->reply[0];

 +nr_servers = ntohl(uvldb->nServers);
+if (nr_servers > AFS_NMAXNSERVERS)
+nr_servers = AFS_NMAXNSERVERS;
 +
 for (i = 0; i < ARRAY_SIZE(uvldb->name) - 1; i++)
 entry->name[i] = (u8)ntohl(uvldb->name[i]);
 entry->name[i] = 0;
@@ -44,14 +48,14 @@
 /* If there is a new replication site that we can use, ignore all the
 * sites that aren't marked as new.
 */
-for (i = 0; i < AFS_NMAXNSERVERS; i++) {
+for (i = 0; i < nr_servers; i++) {
 tmp = ntohl(uvldb->serverFlags[i]);
 if (!tmp & AFS_VLSF_DONTUSE) &&
     (tmp & AFS_VLSF_NEWREPSITE))
    new_only = true;
}

-#for (i = 0; i < AFS_NMAXNSERVERS; i++) {
+for (i = 0; i < nr_servers; i++) {
 struct afs_uuid__xdr *xdr;
 struct afs_uuid *uuid;
 int j;
 --- linux-4.15.0.orig/fs/afs/volume.c
+++ linux-4.15.0/fs/afs/volume.c
@@ -26,9 +26,8 @@
 unsigned long type_mask)
 {
 struct afs_server_list *slist;
-struct afs_server *server;
 struct afs_volume *volume;
 -int ret = -ENOMEM, nr_servers = 0, i, j;
+int ret = -ENOMEM, nr_servers = 0, i;

 for (i = 0; i < vldb->nr_servers; i++)
 if (vldb->fs_mask[i] & type_mask)
@@ -58,50 +57,10 @@
 refcount_set(&slist->usage, 1);
 volume->servers = slist;
-
-/* Make sure a records exists for each server this volume occupies. */

-for (i = 0; i < nr_servers; i++) {
-if (!(vldb->fs_mask[i] & type_mask))
-continue;
-
-server = afs_lookup_server(params->cell, params->key,
- &vldb->fs_server[i]);
-if (IS_ERR(server)) {
-ret = PTR_ERR(server);
-if (ret == -ENOENT)
-continue;
-goto error_2;
-}
-
-/* Insertion-sort by server pointer */
-for (j = 0; j < slist->nr_servers; j++)
-if (slist->servers[j].server >= server)
-break;
-if (j < slist->nr_servers) {
-if (slist->servers[j].server == server) {
-afs_put_server(params->net, server);
-continue;
-}
-
-memmove(slist->servers + j + 1,
-slist->servers + j,
-(slist->nr_servers - j) * sizeof(struct afs_server_entry));
-}
-
-slist->servers[j].server = server;
-slist->nr_servers++;
-}
-
-if (slist->nr_servers == 0) {
-ret = -EDESTADDRREQ;
-goto error_2;
-}
-
-return volume;
-
-error_2:
-afs_put_serverlist(params->net, slist);
-error_1:
+afs_put_cell(params->net, volume->cell);
kfree(volume);
-error_0:
-return ERR_PTR(ret);
@@ -327,7 +286,7 @@
/* See if the volume’s server list got updated. */
new = afs_alloc_server_list(volume->cell, key,
    vldb, (1 << volume->type));
if (IS_ERR(new)) {
    ret = PTR_ERR(new);
    goto error_vldb;
}

i_size = i_size_read(&vnode->vfs_inode);
if (maybe_i_size > i_size) {
    -spin_lock(&vnode->wb_lock);
    +write_seqlock(&vnode->cb_lock);
    i_size = i_size_read(&vnode->vfs_inode);
    if (maybe_i_size > i_size)
        i_size_write(&vnode->vfs_inode, maybe_i_size);
    -spin_unlock(&vnode->wb_lock);
    +write_sequnlock(&vnode->cb_lock);
}

if (!PageUptodate(page)) {
    @@ -247,6 +247,7 @@
        first = page->index + 1;
        lock_page(page);
        generic_error_remove_page(mapping, page);
        +unlock_page(page);
}

__pagevec_release(&pv);
@@ -789,6 +790,7 @@
    vmf->page->index, priv);
    SetPagePrivate(vmf->page);
    set_page_private(vmf->page, priv);
    +file_update_time(file);

    sb_end_pagefault(inode->i_sb);
    return VM_FAULT_LOCKED;
--- linux-4.15.0.orig/fs/afs/xattr.c
+++ linux-4.15.0/fs/afs/xattr.c
@@ -50,7 +50,7 @@
    namelen;
    if (namelen > size)
        return -ERANGE;
    -memcpy(buffer, cell->name, size);
    +memcpy(buffer, cell->name, namelen);
    return namelen;
@@ -104,7 +104,7 @@
 return namelen;
 if (namelen > size)
 return -ERANGE;
-memcpy(buffer, volname, size);
+memcpy(buffer, volname, namelen);
 return namelen;
}

--- linux-4.15.0.orig/fs/aio.c
+++ linux-4.15.0/fs/aio.c
@@ -43,6 +43,7 @@
 #include <asm/kmap_types.h>
 #include <linux/uaccess.h>
 +#include <linux/nospec.h>

 #include "internal.h"

 @@ -68,9 +69,9 @@
 #define AIO_RING_PAGES8

 struct kioctx_table { 
  -struct rcu_headrcu;
  -unsignednr;
  -struct kioctx*table[];
  +struct rcu_headrcu;
  +unsignednr;
  +struct kioctx __rcu*table[];
  
 struct kioctx_cpu {
@@ -115,7 +116,8 @@
 struct page**ring_pages;
 longnr_pages;

-struct work_structfree_work;
+struct rcu_headfree_rcu;
  +struct work_structfree_work;/* see free_iocvx */

 /*
 * signals when all in-flight requests are done
@@ -329,7 +331,7 @@
 for (i = 0; i < table->nr; i++) {
 struct kioctx *ctx;


ctx = table->table[i];
+ctx = rcu_dereference(table->table[i]);
if (ctx && ctx->aio_ring_file == file) {
if (!atomic_read(&ctx->dead)) {
ctx->user_id = ctx->mmap_base = vma->vm_start;
@@ -588,6 +590,12 @@
return cancel(&kiocb->common);
}

+/*
+ * free_ioctx() should be RCU delayed to synchronize against the RCU
+ * protected lookup_ioctx() and also needs process context to call
+ * aio_free_ring(), so the double bouncing through kioctx->free_rcu and
+ * ->free_work.
+ */
static void free_ioctx(struct work_struct *work)
{
struct kioctx *ctx = container_of(work, struct kioctx, free_work);
@@ -601,6 +609,14 @@
kmem_cache_free(kioctx_cachep, ctx);
}

+static void free_ioctx_rcufn(struct rcu_head *head)
+
+struct kioctx *ctx = container_of(head, struct kioctx, free_rcu);
+
+INIT_WORK(&ctx->free_work, free_ioctx);
+schedule_work(&ctx->free_work);
+}
+
+static void free_ioctx_reqs(struct percpu_ref *ref)
+
{struct kioctx *ctx = container_of(ref, struct kioctx, reqs);
@@ -609,8 +625,8 @@
if (ctx->rq_wait && atomic_dec_and_test(&ctx->rq_wait->count))
complete(&ctx->rq_wait->comp);

-INIT_WORK(&ctx->free_work, free_ioctx);
-schedule_work(&ctx->free_work);
+/* Synchronize against RCU protected table->table[] dereferences */
+call_rcu(&ctx->free_rcu, free_ioctx_rcufn);
}

/*
@@ -628,9 +644,8 @@
while (!list_empty(&ctx->active_reqs)) {
req = list_first_entry(&ctx->active_reqs,
struct aio_kiocb, ki_list);
- list_del_init(&req->ki_list);
 kiocb_cancel(req);
+list_del_init(&req->ki_list);
 }

 spin_unlock_irq(&ctx->ctx_lock);
@@ -651,9 +666,9 @@
 while (1) {
 if (table)
 for (i = 0; i < table->nr; i++)
- if (!table->table[i]) {
+ if (!rcu_access_pointer(table->table[i])) {
 ctx->id = i;
 -table->table[i] = ctx;
 +rcu_assign_pointer(table->table[i], ctx);
 spin_unlock(&mm->ioctx_lock);

 /* While kioctx setup is in progress,
 @@ -834,11 +849,11 @@ */
 table = rcu_dereference_raw(mm->ioctx_table);
-WARN_ON(ctx != table->table[ctx->id]);
 -table->table[ctx->id] = NULL;
 +WARN_ON(ctx != rcu_access_pointer(table->table[ctx->id]));
 +RCU_INIT_POINTER(table->table[ctx->id], NULL);
 spin_unlock(&mm->ioctx_lock);

 /* percpu_ref_kill() will do the necessary call_rcu() */
 +/* free_iocctx_reqs() will do the necessary RCU synchronization */
 wake_up_all(&ctx->wait);

 /*
 @@ -880,7 +895,8 @@ */
 skipped = 0;
 for (i = 0; i < table->nr; ++i) {
- struct kioctx *ctx = table->table[i];
+ struct kioctx *ctx =
+ rcu_dereference_protected(table->table[i], true);

 if (!ctx) {
 skipped++;
 @@ -1069,10 +1085,11 @@
 if (!table || id >= table->nr)
 goto out;
-ctx = table->table[id];
+id = array_index_nospec(id, table->nr);
+ctx = rcu_dereference(table->table[id]);
if (ctx && ctx->user_id == ctx_id) {
-  percpu_ref_get(&ctx->users);
-  ret = ctx;
+  if (percpu_ref_tryget_live(&ctx->users))
+    ret = ctx;
}
out:
rcu_read_unlock();
--- linux-4.15.0.orig/fs/attr.c
+++ linux-4.15.0/fs/attr.c
@@ -18,6 +18,30 @@
#include <linux/evm.h>
#include <linux/ima.h>

+static bool chown_ok(const struct inode *inode, kuid_t uid)
+{  
+  if (uid_eq(current_fsuid(), inode->i_uid) &&
+      uid_eq(uid, inode->i_uid))
+    return true;
+  if (capable_wrt_inode_uidgid(inode, CAP_CHOWN))
+    return true;
+  if (ns_capable(inode->i_sb->s_user_ns, CAP_CHOWN))
+    return true;
+  return false;
+}
+
+static bool chgrp_ok(const struct inode *inode, kgid_t gid)
+{  
+  if (uid_eq(current_fsuid(), inode->i_uid) &&
+      (in_group_p(gid) || gid_eq(gid, inode->i_gid)))
+    return true;
+  if (capable_wrt_inode_uidgid(inode, CAP_CHOWN))
+    return true;
+  if (ns_capable(inode->i_sb->s_user_ns, CAP_CHOWN))
+    return true;
+  return false;
+}

/**
 * setattr_prepare - check if attribute changes to a dentry are allowed
 * @dentry: dentry to check
 */
-if ((ia_valid & ATTR_UID) &&
-    !uid_eq(current_fsuid(), inode->i_uid) ||
-    !(uid_eq(attr->ia_uid, inode->i_uid)) &&
-    !capable_wrt_inode_uidgid(inode, CAP_CHOWN))
+if ((ia_valid & ATTR_UID) && !chown_ok(inode, attr->ia_uid))
    return -EPERM;

/* Make sure caller can chgrp. */
-if ((ia_valid & ATTR_GID) &&
-    !uid_eq(current_fsuid(), inode->i_uid) ||
-    !(in_group_p(attr->ia_gid) && !gid_eq(attr->ia_gid, inode->i_gid))) &&
-    !capable_wrt_inode_uidgid(inode, CAP_CHOWN))
+if ((ia_valid & ATTR_GID) && !chgrp_ok(inode, attr->ia_gid))
    return -EPERM;

/* Make sure a caller can chmod. */
--- linux-4.15.0.orig/fs/aufs/Kconfig
+++ linux-4.15.0/fs/aufs/Kconfig
@@ -0,0 +1,199 @@
+# SPDX-License-Identifier: GPL-2.0
+config AUFS_FS
+tristate "Aufs (Advanced multi layered unification filesystem) support"
+help
+Aufs is a stackable unification filesystem such as Unionfs,
+which unifies several directories and provides a merged single
+directory.
+In the early days, aufs was entirely re-designed and
+re-implemented Unionfs Version 1.x series. Introducing many
+original ideas, approaches and improvements, it becomes totally
+different from Unionfs while keeping the basic features.
+
+if AUFS_FS
+choice
+prompt "Maximum number of branches"
+default AUFS_BRANCH_MAX_127
+help
+Specifies the maximum number of branches (or member directories)
in a single aufs. The larger value consumes more system
+resources and has a minor impact to performance.
+config AUFS_BRANCH_MAX_127
+bool "127"
+help
+Specifies the maximum number of branches (or member directories)
in a single aufs. The larger value consumes more system
+resources and has a minor impact to performance.
+config AUFS_BRANCH_MAX_511
+bool "511"
+help
+Specifies the maximum number of branches (or member directories) in a single aufs. The larger value consumes more system resources and has a minor impact to performance.
+config AUFS_BRANCH_MAX_1023
+bool "1023"
+help
+Specifies the maximum number of branches (or member directories) in a single aufs. The larger value consumes more system resources and has a minor impact to performance.
+config AUFS_BRANCH_MAX_32767
+bool "32767"
+help
+Specifies the maximum number of branches (or member directories) in a single aufs. The larger value consumes more system resources and has a minor impact to performance.
+endchoice
+
+config AUFS_SBILIST
+bool
+depends on AUFS_MAGIC_SYSRQ || PROC_FS
+default y
+help
+Automatic configuration for internal use.
+When aufs supports Magic SysRq or /proc, enabled automatically.
+
+config AUFS_HNOTIFY
+bool "Detect direct branch access (bypassing aufs)"
+help
+If you want to modify files on branches directly, eg. bypassing aufs, and want aufs to detect the changes of them fully, then enable this option and use 'udba=notify' mount option.
+Currently there is only one available configuration, "fsnotify".
+It will have a negative impact to the performance.
+See detail in aufs.5.
+
+choice
+prompt "method" if AUFS_HNOTIFY
+default AUFS_HFSNOTIFY
+config AUFS_HFSNOTIFY
+bool "fsnotify"
+select FSNOTIFY
+endchoice
+
+config AUFS_EXPORT
+bool "NFS-exportable aufs"
+depends on EXPORTFS
+help
+If you want to export your mounted aufs via NFS, then enable this
There are several requirements for this configuration. See detail in aufs.5.

+ config AUFS_INO_T_64
  + bool
  + depends on AUFS_EXPORT
  + depends on 64BIT && !(ALPHA || S390)
  + default y
  + help
  + Automatic configuration for internal use.
  + */ typedef unsigned long/int __kernel_ino_t */
  + */ alpha and s390x are int */

+ config AUFS_XATTR
  + bool "support for XATTR/EA (including Security Labels)"
  + help
  + If your branch fs supports XATTR/EA and you want to make them available in aufs too, then enable this option and specify the branch attributes for EA.
  + See detail in aufs.5.

+ config AUFS_FHSM
  + bool "File-based Hierarchical Storage Management"
  + help
  + Hierarchical Storage Management (or HSM) is a well-known feature in the storage world. Aufs provides this feature as file-based.
  + with multiple branches.
  + These multiple branches are prioritized, ie. the topmost one should be the fastest drive and be used heavily.

+ config AUFS_RDU
  + bool "Readdir in userspace"
  + help
  + Aufs has two methods to provide a merged view for a directory, by a user-space library and by kernel-space natively. The latter is always enabled but sometimes large and slow.
  + If you enable this option, install the library in aufs2-util package, and set some environment variables for your readdir(3), then the work will be handled in user-space which generally shows better performance in most cases.
  + See detail in aufs.5.

+ config AUFS_DIRREN
  + bool "Workaround for rename(2)-ing a directory"
  + help
  + By default,aufs returns EXDEV error in renaming a dir who has his child on the lower branch, since it is a bad idea to issue rename(2) internally for every lower branch. But user may not
accept this behaviour. So here is a workaround to allow such
rename(2) and store some extra information on the writable
branch. Obviously this costs high (and I don't like it).
To use this feature, you need to enable this configuration AND
to specify the mount option 'dirren.'
See details in aufs.5 and the design documents.
+
+config AUFS_SHWH
+bool "Show whiteouts"
+help
+If you want to make the whiteouts in aufs visible, then enable
+this option and specify 'shwh' mount option. Although it may
+sounds like philosophy or something, but in technically it
+simply shows the name of whiteout with keeping its behaviour.
+
+config AUFS_BR_RAMFS
+bool "Ramfs (initramfs/rootfs) as an aufs branch"
+help
+If you want to use ramfs as an aufs branch fs, then enable this
+option. Generally tmpfs is recommended.
+Aufs prohibited them to be a branch fs by default, because
+initramfs becomes unusable after switch_root or something
+generally. If you sets initramfs as an aufs branch and boot your
+system by switch_root, you will meet a problem easily since the
+files in initramfs may be inaccessible.
+Unless you are going to use ramfs as an aufs branch fs without
+switch_root or something, leave it N.
+
+config AUFS_BR_FUSE
+bool "Fuse fs as an aufs branch"
+depends on FUSE_FS
+select AUFS_POLL
+help
+If you want to use fuse-based userspace filesystem as an aufs
+branch fs, then enable this option.
+It implements the internal poll(2) operation which is
+implemented by fuse only (currently).
+
+config AUFS_POLL
+bool
+help
+Automatic configuration for internal use.
+
+config AUFS_BR_HFSPLUS
+bool "Hfsplus as an aufs branch"
+depends on HFSPLUS_FS
+default y
+help
+ If you want to use hfsplus fs as an aufs branch fs, then enable
+ this option. This option introduces a small overhead at
+ copying-up a file on hfsplus.
+   + config AUFS_BDEVLOOP
+     bool
+     depends on BLK_DEV_LOOP
+     default y
+     help
+     Automatic configuration for internal use.
+     Convert =[ym] into =y.
+   + config AUFS_DEBUG
+     bool "Debug aufs"
+     help
+     Enable this to compile aufs internal debug code.
+     It will have a negative impact to the performance.
+   + config AUFS_MAGIC_SYSRQ
+     bool
+     depends on AUFS_DEBUG && MAGIC_SYSRQ
+     default y
+     help
+     Automatic configuration for internal use.
+     When aufs supports Magic SysRq, enabled automatically.
+ endif
--- linux-4.15.0.orig/fs/aufs/Makefile
+++ linux-4.15.0/fs/aufs/Makefile
@@ -0,0 +1,46 @@
+ # SPDX-License-Identifier: GPL-2.0
+ + include ${src}/magic.mk
+  ifeq (${CONFIG_AUFS_FS},m)
+    include ${src}/conf.mk
+  endif
+  -include ${src}/priv_def.mk
+  
+  # cf. include/linux/kernel.h
+  +# enable pr_debug
+  +ccflags-y += -DDEBUG
+  +# sparse requires the full pathname
+  +ifdef M
+    +ccflags-y += -include ${M}/../../include/uapi/linux/aufs_type.h
+  +else
+    +ccflags-y += -include ${srctree}/include/uapi/linux/aufs_type.h
+  +endif
+  +
+  +obj-${CONFIG_AUFS_FS} += aufs.o
+aufs-y := module.o sbinfo.o super.o branch.o xino.o sysaufs.o opts.o \ 
+wq.o vfs.o dcsub.o \ 
+cpup.o whout.o wbr_policy.o \ 
+dinfo.o dentry.o \ 
+dynop.o \ 
+finfo.o file.o f_op.o \ 
+dir.o vdir.o \ 
+iinfo.o inode.o i_op.o i_op_add.o i_op_del.o i_op_ren.o \ 
+mvdown.o ioctl.o 
+
+  +# all are boolean
+aufs-$(CONFIG_PROC_FS) += procfs.o plink.o 
aufs-$(CONFIG_SYSFS) += sysfs.o 
aufs-$(CONFIG_DEBUG_FS) += dbgaufs.o 
aufs-$(CONFIG_AUFS_BDEV_LOOP) += loop.o 
aufs-$(CONFIG_AUFS_HNOTIFY) += hnotify.o 
aufs-$(CONFIG_AUFS_HFSNOTIFY) += hfsnotify.o 
aufs-$(CONFIG_AUFS_EXPORT) += export.o 
aufs-$(CONFIG_AUFS_XATTR) += xattr.o 
aufs-$(CONFIG_FS_POSIX_ACL) +=posix_acl.o 
aufs-$(CONFIG_AUFS_DIRREN) += dirren.o 
aufs-$(CONFIG_AUFS_FHSM) += fhsm.o 
aufs-$(CONFIG_AUFS_POLL) += poll.o 
aufs-$(CONFIG_AUFS_RDU) += rdu.o 
aufs-$(CONFIG_AUFS_BR_HFSPLUS) += hfsplus.o 
aufs-$(CONFIG_AUFS_DEBUG) += debug.o 
aufs-$(CONFIG_AUFS_MAGIC_SYSRQ) += sysrq.o 
--- linux-4.15.0.orig/fs/aufs/aufs.h 
+++ linux-4.15.0/fs/aufs/aufs.h 
@@ -0,0 +1,60 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+ */
+ * all header files
+ */
+
+ ifndef __AUFS_H__
+ define __AUFS_H__
+
+ ifndef __KERNEL__
+
+ define AuStub(type, name, body, ...) \
+ static inline type name(__VA_ARGS__) { body; } 
+
+ define AuStubVoid(name, ...) \
+ AuStub(void, name, , __VA_ARGS__) \
+ define AuStubInt0(name, ...) \
+ AuStub(int, name, return 0, __VA_ARGS__) 
+
+ include "debug.h"
+
+ include "branch.h"
+ include "cpup.h"
+ include "dcsub.h"
+ include "dbgaufs.h"
+ include "dentry.h"
+ include "dir.h"
+ include "dirren.h"
+ include "dynop.h"
+ include "file.h"
+ include "fstype.h"
+ include "hbl.h"
+ include "inode.h"
+ include "loop.h"
+ include "module.h"
+ include "opts.h"
+ include "rwsem.h"
+ include "super.h"
+ include "sysaufs.h"
+ include "vsub.h"
+ include "whout.h"
+ include "wkq.h"
+
+ endif /* __KERNEL__ */
+ endif /* __AUFS_H__ */

--- linux-4.15.0.orig/fs/aufs/branch.c
+++ linux-4.15.0/fs/aufs/branch.c
@@ -0,0 +1,1436 @@
+ /*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
This program, aufs is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.

This program is distributed in the hope that it will be useful,
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along with this program.  If not, see <http://www.gnu.org/licenses/>.

/*
 * branch management
 */

#include <linux/compat.h>
#include <linux/statfs.h>
#include "aufs.h"

/*
 * free a single branch
 */
static void au_br_do_free(struct au_branch *br)
{
  int i;
  struct au_wbr *wbr;
  struct au_dykey **key;

  au_hnotify_fin_br(br);
  /* always, regardless the mount option */
  au_dr_hino_free(&br->br_dirren);

  if (br->br_xino.xi_file)
    fput(br->br_xino.xi_file);
  for (i = br->br_xino.xi_nondir.total - 1; i >= 0; i--)
    AuDebugOn(br->br_xino.xi_nondir.array[i]);
  kfree(br->br_xino.xi_nondir.array);

  AuDebugOn(au_br_count(br));
  au_br_count_fin(br);

  wbr = br->br_wbr;
  if (wbr) {
    for (i = 0; i < AuBrWh_Last; i++)
      dput(wbr->wbr_wh[i]);
+AuDebugOn(atomic_read(&wbr->wbr_wh_running));
+AuRwDestroy(&wbr->wbr_wh_rwsem);
+
+if (br->br_fhsm) {
+au_br_fhsm_fin(br->br_fhsm);
+kfree(br->br_fhsm);
+}
+
+key = br->br_dykey;
+for (i = 0; i < AuBrDynOp; i++, key++)
+if (*key)
+au_dy_put(*key);
+else
+break;
+
+/* recursive lock, s_umount of branch's */
+lockdep_off();
+path_put(&br->br_path);
+lockdep_on();
+kfree(wbr);
+kfree(br);
+
+/*
 * frees all branches
 + */
+void au_br_free(struct au_sbinfo *sbinfo)
+{
+aufs_bindex_t bmax;
+struct au_branch **br;
+
+AuRwMustWriteLock(&sbinfo->si_rwsem);
+
+bmax = sbinfo->si_bbot + 1;
+br = sbinfo->si_branch;
+while (bmax--)
+au_br_do_free(*br);
+}
+
+/*
 * find the index of a branch which is specified by @br_id.
 + */
+int au_br_index(struct super_block *sb, aufs_bindex_t br_id)
+{
+aufs_bindex_t bindex, bbot;
+
+bbot = au_sbbot(sb);
+for (bindex = 0; bindex <= bbot; bindex++)
+if (au_sbr_id(sb, bindex) == br_id)
+return bindex;
+}
+
+/* --------------------------------------------------------------- */
+
+/* add a branch */
+y/
+
+static int test_overlap(struct super_block *sb, struct dentry *h_adding,
+struct dentry *h_root)
+{
+if (unlikely(h_adding == h_root
+    || au_test_loopback_overlap(sb, h_adding)))
+    return 1;
+if (h_adding->d_sb != h_root->d_sb)
+    return 0;
+return au_test_subdir(h_adding, h_root)
+|| au_test_subdir(h_root, h_adding);
+}
+
+/* returns a newly allocated branch. @new_nbranch is a number of branches
+ * after adding a branch. */
+y/
+static struct au_branch *au_br_alloc(struct super_block *sb, int new_nbranch,
+    int perm)
+{
+struct au_branch *add_branch;
+struct dentry *root;
+struct inode *inode;
+int err;
+
+err = -ENOMEM;
+add_branch = kzalloc(sizeof(*add_branch), GFP_NOFS);
+if (unlikely(!add_branch))
+    goto out;
+add_branch->br_xino.xi_nondir.total = 8; /* initial size */
+add_branch->br_xino.xi_nondir.array
+ = kmalloc(add_branch->br_xino.xi_nondir.total, sizeof(inode_t),
+ GFP_NOFS);
+if (unlikely(!add_branch->br_xino.xi_nondir.array))
+    goto out_br;
+
+err = au_hnotify_init_br(add_branch, perm);
```c
+if (unlikely(err))
+goto out_xinondir;
+
+if (au_br_writable(perm)) {
+/* may be freed separately at changing the branch permission */
+add_branch->br_wbr = kzalloc(sizeof(*add_branch->br_wbr),
+GFP_NOFS);
+if (unlikely(!add_branch->br_wbr))
+goto out_hnotify;
+}
+
+if (au_br_fhsm(perm)) {
+err = au_fhsm_br_alloc(add_branch);
+if (unlikely(err))
+goto out_wbr;
+}
+
+/*
 * test if the branch permission is legal or not.
 */
+static int test_br(struct inode *inode, int brperm, char *path)
+{  
+int err;
+
+root = sb->s_root;
+err = au_sbr_realloc(au_sbi(sb), new_nbranch, /*may_shrink*/0);
+if (!err)
+err = au_di_realloc(au_di(root), new_nbranch, /*may_shrink*/0);
+if (!err) {  
+inode = d_inode(root);
+err = au_hinode_realloc(au_ii(inode), new_nbranch,
+/*may_shrink*/0);
+}
+if (!err)
+return add_branch; /* success */
+
+out_wbr:
+kfree(add_branch->br_wbr);
+out_hnotify:
+au_hnotify_fin_br(add_branch);
+out_xinondir:
+kfree(add_branch->br_xino.xi_nondir.array);
+out_br:
+kfree(add_branch);
+out:
+return ERR_PTR(err);
+}
+
+*/
+*/
+static int test_br(struct inode *inode, int brperm, char *path)
+{
+int err;
+
```
err = (au_br_writable(brperm) && IS_RDONLY(inode));
if (!err)
goto out;
+
err = -EINVAL;
pr_err("write permission for readonly mount or inode, %s\n", path);
+
out:
+return err;
+
/*
 * returns:
 * 0: success, the caller will add it
 * plus: success, it is already unified, the caller should ignore it
 * minus: error
 */
+
static int test_add(struct super_block *sb, struct au_opt_add *add, int remount)
+
+int err;
+aufs_bindex_t bbot, bindex;
+struct dentry *root, *h_dentry;
+struct inode *inode, *h_inode;
+
+root = sb->s_root;
+bbot = au_sbbot(sb);
+if (unlikely(bbot >= 0
+    && au_find_dbindex(root, add->path.dentry) >= 0)) {
+    err = 1;
+    if (!remount) {
+        err = -EINVAL;
+        pr_err("%s duplicated\n", add->pathname);
+    }
+    goto out;
+}
+
+err = -ENOSPC; /* -E2BIG; */
+if (unlikely(AUFS_BRANCH_MAX <= add->bindex
+    || AUFS_BRANCH_MAX - 1 <= bbot)) {
+    pr_err("number of branches exceeded %s\n", add->pathname);
+    goto out;
+}
+
+err = -EDOM;
+if (unlikely(add->bindex < 0 || bbot + 1 < add->bindex)) {
+    pr_err("bad index %d\n", add->bindex);
+    goto out;
+}
inode = d_inode(add->path.dentry);
err = -ENOENT;
if (unlikely(!inode->i_nlink)) {
    pr_err("no existence %s\n", add->pathname);
goto out;
}
err = -EINVAL;
if (unlikely(inode->i_sb == sb)) {
    pr_err("%s must be outside\n", add->pathname);
goto out;
}
if (unlikely(au_test_fs_unsuppoted(inode->i_sb))) {
    pr_err("unsupported filesystem, %s (%s)\n",
            add->pathname, au_sbtype(inode->i_sb));
goto out;
}
if (unlikely(inode->i_sb->s_stack_depth)) {
    pr_err("already stacked, %s (%s)\n",
            add->pathname, au_sbtype(inode->i_sb));
goto out;
}
err = test_br(d_inode(add->path.dentry), add->perm, add->pathname);
if (unlikely(err))
goto out;
if (bbot < 0)
    return 0; /* success */
err = -EINVAL;
for (bindex = 0; bindex <= bbot; bindex++)
    if (unlikely(test_overlap(sb, add->path.dentry,
                            au_h_dptr(root, bindex)))) {
        pr_err("%s is overlapped\n", add->pathname);
goto out;
    }
err = 0;
if (au_opt_test(au_mntflags(sb), WARN_PERM)) {
    h_dentry = au_h_dptr(root, 0);
    h_inode = d_inode(h_dentry);
    if ((h_inode->i_mode & S_IALLUGO) != (inode->i_mode & S_IALLUGO) ||
        !uid_eq(h_inode->i_uid, inode->i_uid) ||
        !gid_eq(h_inode->i_gid, inode->i_gid))
pr_warn("uid/gid/perm %s %u/%u/0%o, %u/%u/0%o\n",
+add->pathname,
+add->uid_read(inode), add->gid_read(inode),
+inode->i_mode & S_IALLUGO),
+add->uid_read(h_inode), add->gid_read(h_inode),
+(h_inode->i_mode & S_IALLUGO));
+
+out:
+return err;
+
+*/
+ /* initialize or clean the whiteouts for an adding branch
+ */
+static int au_br_init_wh(struct super_block *sb, struct au_branch *br,
+ int new_perm)
+{
+int err, old_perm;
+aufs_bindex_t bindex;
+struct inode *h_inode;
+struct au_wbr *wbr;
+struct au_hinode *hdir;
+struct dentry *h_dentry;
+
+err = vfsub_mnt_want_write(au_br_mnt(br));
+if (unlikely(err))
+goto out;
+
+wbr = br->br_wbr;
+old_perm = br->br_perm;
+br->br_perm = new_perm;
+hdir = NULL;
+h_inode = NULL;
+bindex = au_br_index(sb, br->br_id);
+if (0 <= bindex) {
+hdir = au_hi(d_inode(sb->s_root), bindex);
+au_hn_inode_lock_nested(hdir, AuLsc_I_PARENT); 
+} else {
+h_dentry = au_br_dentry(br);
+h_inode = d_inode(h_dentry);
+inode_lock_nested(h_inode, AuLsc_I_PARENT); 
+}
+if (!wbr)
+err = au_wh_init(br, sb);
+else {
+wbr_wh_write_lock(wbr);
+err = au_wh_init(br, sb);
++++wbr_wh_write_unlock(wbr);
+++++
++if (hdir)
++au_wh_inode_unlock(hdir);
++else
++inode_unlock(h_inode);
++vfs_sub_mnt_drop_write(au_br_mnt(br));
++br->br_perm = old_perm;
++
++if (!err && wbr && !au_br_writable(new_perm)) {
++kfree(wbr);
++br->br_wbr = NULL;
++}
++
++out:
++return err;
++}
++
++
++static int au_wbr_init(struct au_branch *br, struct super_block *sb,
++++int perm)
++{
++int err;
++struct kstatfs kst;
++struct au_wbr *wbr;
++
++wbr = br->br_wbr;
++au_rw_init(&wbr->wbr_wh_rwsem);
++atomic_set(&wbr->wbr_wh_running, 0);
++
++/*
++ * a limit for rmdir/rename a dir
++ * cf. AUFS_MAX_NAMELEN in include/uapi/linux/aufs_type.h
++ */
++err = vfs_statfs(&br->br_path, &kst);
++if (unlikely(err))
++goto out;
++err = -EINVAL;
++if (kst.f_namelen >= NAME_MAX)
++err = au_br_init_wh(sb, br, perm);
++else
++pr_err("%pd(%s), unsupported namelen %ld
",
++  au_br_dentry(br),
++  au_sbtype(au_br_dentry(br)->d_sb), kst.f_namelen);
++
++out:
++return err;
++}
++
/** initialize a new branch */
+static int au_br_init(struct au_branch *br, struct super_block *sb,
+    struct au_opt_add *add)
+
+{ err = 0;
+struct inode *h_inode;
+
+spin_lock_init(&br->br_xino.xi_nondir.spin);
+init_waitqueue_head(&br->br_xino.xi_nondir.wqh);
+br->br_perm = add->perm;
+br->br_path = add->path; /* set first, path_get() later */
+spin_lock_init(&br->br_dykey_lock);
+au_br_count_init(br);
+atomic_set(&br->br_xino_running, 0);
+br->br_id = au_new_br_id(sb);
+AuDebugOn(br->br_id < 0);
+
+/* always, regardless the given option */
+err = au_dr_br_init(sb, br, &add->path);
+if (unlikely(err))
+    goto out_err;
+
+if (au_br_writable(add->perm)) {
+    err = au_wbr_init(br, sb, add->perm);
+    if (unlikely(err))
+        goto out_err;
+}
+
+/* test always */
+if (au_opt_test(au_mntflags(sb), XINO)) {
+    h_inode = d_inode(add->path.dentry);
+    err = au_xino_br(sb, br, h_inode->i_ino,
+        au_sbr(sb, 0)->br_xino.xi_file, /*do_test*/1);
+    if (unlikely(err)) {
+        AuDebugOn(br->br_xino.xi_file);
+        goto out_err;
+    }
+    path_get(&br->br_path);
+    goto out; /* success */
+
} out_err:
    memset(&br->br_path, 0, sizeof(br->br_path));
    out:
    return err;
+}
+static void au_br_do_add_brp(struct au_sbinfo *sbinfo, aufs_index_t bindex,
   struct au_branch *br, aufs_index_t bbot,
   aufs_index_t amount)
{
+struct au_branch **brp;
+
+AuRwMustWriteLock(&sbinfo->si_rwlock);
+
+brp = sbinfo->si_branch + bindex;
+memmove(brp + 1, brp, sizeof(*brp) * amount);
+*brp = br;
+sbinfo->si_bbot++;
+if (unlikely(bbot < 0))
+sbinfo->si_bbot = 0;
+
+
+static void au_br_do_add_hdp(struct au_dinfo *dinfo, aufs_index_t bindex,
   aufs_index_t bbot, aufs_index_t amount)
{
+struct au_hdentry *hdp;
+
+AuRwMustWriteLock(&dinfo->di_rwlock);
+
+hdp = au_hdentry(dinfo, bindex);
+memmove(hdp + 1, hdp, sizeof(*hdp) * amount);
+au_hdentry_init(hdp);
+dinfo->di_bbot++;
+if (unlikely(bbot < 0))
+dinfo->di_btop = 0;
+
+
+static void au_br_do_add_hip(struct au_iinfo *iinfo, aufs_index_t bindex,
   aufs_index_t bbot, aufs_index_t amount)
{
+struct au_hinode *hip;
+
+AuRwMustWriteLock(&iinfo->ii_rwlock);
+
+hip = au_hinode(iinfo, bindex);
+memmove(hip + 1, hip, sizeof(*hip) * amount);
+au_hinode_init(hip);
+iinfo->ii_bbot++;
+if (unlikely(bbot < 0))
+iinfo->ii_btop = 0;
+
+
+static void au_br_do_add(struct super_block *sb, struct au_branch *br,
+aufs_bindex_t bindex)
+{
+    struct dentry *root, *h_dentry;
+    struct inode *root_inode, *h_inode;
+    aufs_bindex_t bbot, amount;
+
+    root = sb->s_root;
+    root_inode = d_inode(root);
+    bbot = au_sbbot(sb);
+    amount = bbot + 1 - bindex;
+    h_dentry = au_br_dentry(br);
+    au_sbilist_lock();
+    au_br_do_add_brp(au_sbi(sb), bindex, br, bbot, amount);
+    au_br_do_add_hdp(au_di(root), bindex, br, bbot, amount);
+    au_br_do_add_hip(au_iinode(root_inode), bindex, br, bbot, amount);
+    au_set_h_dptr(root, bindex, dget(h_dentry));
+    h_inode = d_inode(h_dentry);
+    au_set_h_iptr(root_inode, bindex, au_igrab(h_inode), /*flags*/0);
+    au_sbilist_unlock();
+}
+
+int au_br_add(struct super_block *sb, struct au_opt_add *add, int remount)
+{
+    int err;
+    aufs_bindex_t bbot, add_bindex;
+    struct dentry *root, *h_dentry;
+    struct inode *root_inode;
+    struct au_branch *add_branch;
+
+    root = sb->s_root;
+    root_inode = d_inode(root);
+    IMustLock(root_inode);
+    IiMustWriteLock(root_inode);
+    err = test_add(sb, add, remount);
+    if (unlikely(err < 0))
+        goto out;
+    if (err) {
+        err = 0;
+        goto out; /* success */
+    }
+
+    bbot = au_sbbot(sb);
+    add_branch = au_br_alloc(sb, bbot + 2, add->perm);
+    err = PTR_ERR(add_branch);
+    if (IS_ERR(add_branch))
+        goto out;
+    err = au_br_init(add_branch, sb, add);
+if (unlikely(err)) {
+au_br_do_free(add_branch);
+goto out;
+}
+
+add_bindex = add->bindex;
+if (!remount)
+au_br_do_add(sb, add_branch, add_bindex);
+else {
+sysaufs_brs_del(sb, add_bindex);
+au_br_do_add(sb, add_branch, add_bindex);
+sysaufs_brs_add(sb, add_bindex);
+
+h_dentry = add->path.dentry;
+if (!add_bindex) {
+au_cpup_attr_all(root_inode, /*force*/1);
+sb->s_maxbytes = h_dentry->d_sb->s_maxbytes;
+} else
+au_add_nlink(root_inode, d_inode(h_dentry));
+
+/*
+ * this test/set prevents aufs from handling unnecessary notify events
+ * of xino files, in case of re-adding a writable branch which was
+ * once detached from aufs.
+ */
+if (au_xino_brid(sb) < 0
+ && au_br_writable(add_branch->br_perm)
+ && !au_test_fs_bad_xino(h_dentry->d_sb)
+ && add_branch->br_xino.xi_file
+ && add_branch->br_xino.xi_file->f_path.dentry->d_parent == h_dentry)
+au_xino_brid_set(sb, add_branch->br_id);
+
+out:
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static unsigned long long au_farray_cb(struct super_block *sb, void *a,
+            unsigned long long max __maybe_unused,
+            void *arg)
+{
+unsigned long long n;
+struct file **p, *f;
+struct hlist_bl_head *files;
+struct hlist_bl_node *pos;
+struct au_finfo *finfo;
n = 0;
p = a;
files = &au_sbi(sb)->si_files;
+hlist_bl_lock(files);
+hlist_bl_for_each_entry(finfo, pos, files, fi_hlist) {
f = finfo->fi_file;
+if (file_count(f)
 + && !special_file(file_inode(f)->i_mode)) {
+get_file(f);
+*p++ = f;
+n++;
+AuDebugOn(n > max);
+}
+}
+hlist_bl_unlock(files);
+
+return n;
+}
+
+static struct file **au_farray_alloc(struct super_block *sb,
+ unsigned long long *max)
+{
+*max = au_nfiles(sb);
+return au_array_alloc(max, au_farray_cb, sb, /*arg*/NULL);
+}
+
+static void au_farray_free(struct file **a, unsigned long long max)
+{
+unsigned long long ull;
+
+for (ull = 0; ull < max; ull++)
+if (a[ull])
+fput(a[ull]);
+kvfree(a);
+}
+
+;/* delete a branch  */
+*/
+
+/* to show the line number, do not make it inlined function */
+#define AuVerbose(do_info, fmt, ...) do { 
+if (do_info) 
+pr_info(fmt, ##VA_ARGS);
+} while (0)
+static int au_test_ibusy(struct inode *inode, aufs_bindex_t btop, 
+aufs_bindex_t bbot)
+{
+return (inode && !S_ISDIR(inode->i_mode)) || btop == bbot;
+
+static int au_test_dbusy(struct dentry *dentry, aufs_bindex_t btop, 
+aufs_bindex_t bbot)
+{
+return au_test_ibusy(d_inode(dentry), btop, bbot);
+
+static int test_dentry_busy(struct dentry *root, aufs_bindex_t bindex, 
+    unsigned int sigen, const unsigned int verbose)
+{
+int err, i, j, ndentry;
+aufs_bindex_t btop, bbot;
dauf_dcsub_pages dpages;
dauf_dpage *dpage;
dastruct dentry *d;
+
+err = au_dpages_init(&dpages, GFP_NOFS);
+if (unlikely(err))
goto out;
+err = au_dcsub_pages(&dpages, root, NULL, NULL);
+if (unlikely(err))
goto out_dpages;
+
+for (i = 0; !err && i < dpages.ndpage; i++) {
+dpage = dpages.dpages + i;
+ndentry = dpage->ndentry;
+for (j = 0; !err && j < ndentry; j++) {
+d = dpage->dentries[j];
+AuDebugOn(au_dcount(d) <= 0);
+if (!au_digen_test(d, sigen)) {
+di_read_lock_child(d, AuLock_IR);
+if (unlikely(au_dbrange_test(d))) {
+di_read_unlock(d, AuLock_IR);
+continue;
+}
+} else {
+di_write_lock_child(d);
+if (unlikely(au_dbrange_test(d))) {
+di_write_unlock(d);
continue;
+	}
+	error = au_reval_dpath(d, sigen);
+	if (!error)
+	   di_downgrade_lock(d, AuLock_IR);
+	else {
+	   di_write_unlock(d);
+	   break;
+	}
+
 */ AuDbgDentry(d); */
+btop = au_dbtop(d);
+bbot = au_dbbot(d);
+if (btop <= bindex
+    && bbot <= bindex
+    && au_h_dptr(d, bindex)
+    && au_test_dbusy(d, btop, bbot)) {
+    error = -EBUSY;
+    AuVerbose(verbose, "busy %p\n", d);
+    AuDbgDentry(d);
+}
+di_read_unlock(d, AuLock_IR);
+
+out_dpages:
+au_dpages_free(&dpages);
+out:
+return error;
+
+static int test_inode_busy(struct super_block *sb, aufs_bindex_t bindex,
+               unsigned int sigen, const unsigned int verbose)
+{
+    int error;
+    unsigned long long max, ull;
+    struct inode **array;
+    aufs_bindex_t btop, bbot;
+    array = au_iarray_alloc(sb, &max);
+    error = PTR_ERR(array);
+    if (IS_ERR(array))
+        goto out;
+    error = 0;
+    AuDbg("b%d\n", bindex);
+    for (ull = 0; !error && ull < max; ull++) {
i = array[ull];
if (unlikely(!i))
  break;
if (i->i_ino == AUFS_ROOT_INO)
  continue;

/* AuDbgInode(i); */
if (au_iigen(i, NULL) == sigen)
  ii_read_lock_child(i);
else {
  ii_write_lock_child(i);
  err = au_refresh_hinode_self(i);
  au_iigen_dec(i);
  if (!err)
    ii_downgrade_lock(i);
  else {
    ii_write_unlock(i);
    break;
  }
}

btop = au_ibtop(i);
bbot = au_ibbot(i);
if (btop <= bindex
    && bindex <= bbot
    && au_h_iptr(i, bindex)
    && au_test_ibusy(i, btop, bbot)) {
  err = -EBUSY;
  AuVerbose(verbose, "busy i%lu\n", i->i_ino);
  AuDbgInode(i);
}
ii_read_unlock(i);

out:
return err;

static int test_children_busy(struct dentry *root, aufs_bindex_t bindex,
    const unsigned int verbose)
{
  int err;
  unsigned int sigen;
  sigen = au_sigen(root->d_sb);
  DiMustNoWaiters(root);
  IiMustNoWaiters(d_inode(root));

  +i = array[ull];
  +if (unlikely(!i))
  +break;
  +if (i->i_ino == AUFS_ROOT_INO)
  +continue;
  +
  +/* AuDbgInode(i); */
  +if (au_iigen(i, NULL) == sigen)
  +ii_read_lock_child(i);
  +else {
  +ii_write_lock_child(i);
  +err = au_refresh_hinode_self(i);
  +au_iigen_dec(i);
  +if (!err)
  +ii_downgrade_lock(i);
  +else {
  +ii_write_unlock(i);
  +break;
  +}
  +}
  +btop = au_ibtop(i);
  +bbot = au_ibbot(i);
  +if (btop <= bindex
  +    && bindex <= bbot
  +    && au_h_iptr(i, bindex)
  +    && au_test_ibusy(i, btop, bbot)) {
  +err = -EBUSY;
  +AuVerbose(verbose, "busy i%lu\n", i->i_ino);
  +AuDbgInode(i);
  +}
  +ii_read_unlock(i);
  +}
  +au_iarray_free(array, max);
  +
  +out:
  +return err;
  +}
  +
  +static int test_children_busy(struct dentry *root, aufs_bindex_t bindex,
  +const unsigned int verbose)
  +{
  +int err;
  +unsigned int sigen;
  +
  +sigen = au_sigen(root->d_sb);
  +DiMustNoWaiters(root);
  +IiMustNoWaiters(d_inode(root));
di_write_unlock(root);
+err = test_dentry_busy(root, bindex, sigen, verbose);
+if (!err)
+err = test_inode_busy(root->d_sb, bindex, sigen, verbose);
+di_write_lock_child(root); /* aufs_write_lock() calls ..._child() */
+
+return err;
+
+static int test_dir_busy(struct file *file, aufs_bindex_t br_id,
+struct file **to_free, int *idx)
+{
+int err;
+unsigned char matched, root;
+aufs_bindex_t bindex, bbott;
+struct au_fidir *fidir;
+struct au_hfile *hfile;
+
+err = 0;
+root = IS_ROOT(file->f_path.dentry);
+if (root) {
+get_file(file);
+to_free[*idx] = file;
+(*idx)++;
+goto out;
+}
+
+matched = 0;
+fidir = au_fi(file)->fi_hdir;
+AuDebugOn(!fidir);
+bbot = au_fbbot_dir(file);
+for (bindex = au_fbtop(file); bindex <= bbott; bindex++) {
+hfile = fidir->fd_hfile + bindex;
+if (!hfile->hf_file)
+continue;
+
+if (hfile->hf_br->br_id == br_id) {
+matched = 1;
+break;
+}
+
+if (matched)
+err = -EBUSY;
+
+out:
+return err;
+}
+static int test_file_busy(struct super_block *sb, aufs_bindex_t br_id,
+ struct file **to_free, int opened)
+
+int err, idx;
+unsigned long long ull, max;
+aufs_bindex_t btop;
+struct file *file, **array;
+struct dentry *root;
+struct au_hfile *hfile;
+
+array = au_farray_alloc(sb, &max);
+err = PTR_ERR(array);
+if (IS_ERR(array))
+ goto out;
+
+err = 0;
+idx = 0;
+root = sb->s_root;
+di_write_unlock(root);
+for (ull = 0; ull < max; ull++) {
+ file = array[ull];
+ file_read_lock(file);
+ btop = au_fbtop(file);
+ if (!d_is_dir(file->f_path.dentry)) {
+ hfile = &au_fi(file)->fi_htop;
+ if (hfile->hf_br->br_id == br_id)
+ err = -EBUSY;
+ } else
+ err = test_dir_busy(file, br_id, to_free, &idx);
+ file_read_unlock(file);
+ if (unlikely(err))
+ break;
+}
+
+AuDebug("%pD
", file); */
+file_read_lock(file);
+btop = au_fbtop(file);
+if (!d_is_dir(file->f_path.dentry)) {
+hfile = &au_fi(file)->fi_htop;
+if (hfile->hf_br->br_id == br_id)
+err = -EBUSY;
+} else
+err = test_dir_busy(file, br_id, to_free, &idx);
+file_read_unlock(file);
+if (unlikely(err))
+break;
+}
+di_write_lock_child(root);
+au_farray_free(array, max);
+AuDebugOn(idx > opened);
+
+out:
+return err;
+
+
+static void br_del_file(struct file **to_free, unsigned long long opened,
+ aufs_bindex_t br_id)
+{
unsigned long long ull;
aufs_bindex_t bindex, btop, bbot, bfound;
struct file *file;
struct au_fdir *fidir;
struct au_hfile *hfile;

+for (ull = 0; ull < opened; ull++) {
  +file = to_free[ull];
  +if (unlikely(!file))
    +break;
  +
  /* AuDbg("%pDn", file); */
  +AuDbgOn(!d_is_dir(file->f_path.dentry));
  +bfound = -1;
  +fidir = au_fi(file)->fi_hdir;
  +AuDbgOn(!fidir);
  +fi_write_lock(file);
  +btop = au_fbtop(file);
  +bbot = au_fbbot_dir(file);
  +for (bindex = btop; bindex <= bbot; bindex++) {
    +hfile = fidir->fd_hfile + bindex;
    +if (!hfile->hf_file)
      +continue;
    +
    +if (hfile->hf_br->br_id == br_id) {
      +bfound = bindex;
      +break;
      +}
    +}
    +AuDbgOn(bfound < 0);
    +au_set_h_fptr(file, bfound, NULL);
    +if (bfound == btop) {
      +for (btop++; btop <= bbot; btop++)
        +if (au_hf_dir(file, btop)) {
          +au_set_fbttop(file, btop);
          +break;
          +}
        +}
    +fi_write_unlock(file);
    +}
+}
+
+static void au_br_do_del_brp(struct au_sbinfo *sbinfo,
  +  const aufs_bindex_t bindex,
  +  const aufs_bindex_t bbot)
  +{
    +struct au_branch **brp, **p;
    +
    +
+AuRwMustWriteLock(&sbinfo->si_rwlock);
+
+brp = sbinfo->si_branch + bindex;
+if (bindex < bbot)
+memmove(brp, brp + 1, sizeof(*brp) * (bbot - bindex));
+
+sbinfo->si_branch[0 + bbot] = NULL;
+sbinfo->si_bbot--;
+
+p = au_krealloc(sbinfo->si_branch, sizeof(*p) * bbot, AuGFP_SBILIST,
+/*may_shrink*/1);
+if (p)
+sbinfo->si_branch = p;
+/* harmless error */
+
+static void au_br_do_del_hdp(struct au_dinfo *dinfo, const aufs_bindex_t bindex,
+    const aufs_bindex_t bbot)
+{
+    struct au_hdentry *hdp, *p;
+
+    AuRwMustWriteLock(&dinfo->di_rwlock);
+
+hdp = au_hdentry(dinfo, bindex);
+if (bindex < bbot)
+memmove(hdp, hdp + 1, sizeof(*hdp) * (bbot - bindex));
+/* au_h_dentry_init(au_hdentry(dinfo, bbot)); */
+dinfo->di_bbot--;
+
+p = au_krealloc(dinfo->di_hdentry, sizeof(*p) * bbot, AuGFP_SBILIST,
+/*may_shrink*/1);
+if (p)
+dinfo->di_hdentry = p;
+/* harmless error */
+
+static void au_br_do_del_hip(struct au_iinfo *iinfo, const aufs_bindex_t bindex,
+    const aufs_bindex_t bbot)
+{
+    struct au_hinode *hip, *p;
+
+    AuRwMustWriteLock(&iinfo->ii_rwlock);
+
+hip = au_hinode(iinfo, bindex);
+if (bindex < bbot)
+memmove(hip, hip + 1, sizeof(*hip) * (bbot - bindex));
+/* au_hinode_init(au_hinode(iinfo, bbot)); */
+iinfo->ii_bbot--;
+}
+p = au_krealloc(iinfo->ii_hinode, sizeof(*p) * bbot, AuGFP_SBILIST,
+/* may_shrink */ 1);
+if (p)
+iinfo->ii_hinode = p;
+/* harmless error */
+
+static void au_br_do_del(struct super_block *sb, aufs_bindex_t bindex,
+ struct au_branch *br)
+{
+aufs_bindex_t bbot;
+struct au_sbinfo *sbinfo;
+struct dentry *root, *h_root;
+struct inode *inode, *h_inode;
+struct au_hinode *hinode;
+
+SiMustWriteLock(sb);
+
+root = sb->s_root;
+inode = d_inode(root);
+sbinfo = au_sbi(sb);
+bbot = sbinfo->si_bbot;
+
+h_root = au_h_dptr(root, bindex);
+hinode = au_hi(inode, bindex);
+h_inode = au_igrab(hinode->hi_inode);
+au_hiput(hinode);
+
+au_sblist_lock();
+au_br_do_del_brp(sbinfo, bindex, bbot);
+au_br_do_del_hdp(au_di(root), bindex, bbot);
+au_br_do_del_hip(au_ii(inode), bindex, bbot);
+au_sblist_unlock();
+
+/* ignore an error */
+au_dr_br_fin(sb, br); /* always, regardless the mount option */
+
+dput(h_root);
+iput(h_inode);
+au_br_do_free(br);
+}
+
+static unsigned long long empty_cb(struct super_block *sb, void *array,
+ unsigned long max, void *arg)
+{
+return max;
+}
+int au_br_del(struct super_block *sb, struct au_opt_del *del, int remount)
+{
+int err, rerr, i;
+unsigned long long opened;
+unsigned int mnt_flags;
+aufs_bindex_t bindex, bbot, br_id;
+unsigned char do_wh, verbose;
+struct au_branch *br;
+struct au_wbr *wbr;
+struct dentry *root;
+struct file **to_free;
+
+err = 0;
+opened = 0;
+to_free = NULL;
+root = sb->s_root;
+bindex = au_find_dbindex(root, del->h_path.dentry);
+if (bindex < 0) {
+if (remount) {
+goto out; /* success */
+err = -ENOENT;
+pr_err("%s no such branch\n", del->pathname);
+goto out;
+}
+err = -EBUSY;
+mnt_flags = au_mntflags(sb);
+verbose = !!au_opt_test(mnt_flags, VERBOSE);
+bbot = au_sbbot(sb);
+if (unlikely(!bbot)) {
+AuVerbose(verbose, "no more branches left\n");
+goto out;
+}
+AuDbg("bindex b%d\n", bindex);
+
+err = -EBUSY;
+mnt_flags = au_mntflags(sb);
+verbose = !!au_opt_test(mnt_flags, VERBOSE);
+bbot = au_sbbot(sb);
+if (unlikely(!bbot)) {
+AuVerbose(verbose, "no more branches left\n");
+goto out;
+}
+br = au_sbr(sb, bindex);
+AuDebugOn(path_equal(&br->br_path, &del->h_path));
+
+br_id = br->br_id;
+opened = au_br_count(br);
+if (unlikely(opened)) {
+to_free = au_array_alloc(&opened, empty_cb, sb, NULL);
+err = PTR_ERR(to_free);
+if (IS_ERR(to_free))
+goto out;
+
+err = test_file_busy(sb, br_id, to_free, opened);
+if (unlikely(err)) {
+AuVerbose(verbose, "%llu file(s) opened\n", opened);
+goto out;
+
+wbr = br->br_wbr;
+do_wh = wbr && (wbr->wbr_whbase || wbr->wbr_plink || wbr->wbr_orph);
+if (do_wh) {
+/* instead of WbrWhMustWriteLock(wbr) */
+SiMustWriteLock(sb);
+for (i = 0; i < AuBrWh_Last; i++) {
+dput(wbr->wbr_wh[i]);
+wbr->wbr_wh[i] = NULL;
+
+err = test_children_busy(root, bindex, verbose);
+if (unlikely(err)) {
+if (do_wh)
+goto out_wh;
+goto out;
+
+err = 0;
+if (to_free) {
+/*
+ * now we confirmed the branch is deletable.
+ * let's free the remaining opened dirs on the branch.
+ */
+di_write_unlock(root);
+br_del_file(to_free, opened, br_id);
+di_write_lock_child(root);
+
+if (!remount)
+au_br_do_del(sb, bindex, br);
+else {
+sysaufs_brs_del(sb, bindex);
+au_br_do_del(sb, bindex, br);
+sysaufs_brs_add(sb, bindex);
+
+if (!bindex) {
+au_cpup_attr_all(d_inode(root), /*force*/1);
+sb->s_maxbytes = au_sbr_sb(sb, 0)->s_maxbytes;
+} else
+au_sub_nlink(d_inode(root), d_inode(del->h_path.dentry));
+if (au_opt_test(mnt_flags, PLINK))
+au_plink_half_refresh(sb, br_id);
+if (au_xino_brid(sb) == br_id)
+au_xino_brid_set(sb, -1);
+goto out; /* success */
+
+out_wh:
+/* revert */
+rerr = au_br_init_wh(sb, br, br->br_perm);
+if (rerr)
+pr_warn("failed re-creating base whiteout, %s. (%d)\n",
+del->pathname, rerr);
+out:
+if (to_free)
+au_farray_free(to_free, opened);
+return err;
+
+
/* ---------------------------------------------------------------------- */

static int au_ibusy(struct super_block *sb, struct aufs_ibusy __user *arg)
+
{ +
+int err;
+aufs_bindex_t btop, bbot;
+struct aufs_ibusy ibusy;
+struct inode *inode, *h_inode;
+ +err = -EPERM;
+if (unlikely(!capable(CAP_SYS_ADMIN)))
+goto out;
+
+err = copy_from_user(&ibusy, arg, sizeof(ibusy));
+if (!err)
+err = !access_ok(VERIFY_WRITE, &arg->h_ino, sizeof(arg->h_ino));
+if (unlikely(!err)) { 
+err = -EFAULT;
+AuTraceErr(err);
+goto out;
+} 
+
+err = -EINVAL;
+si_read_lock(sb, AuLock_FLUSH);
+if (unlikely(ibusy.bindex < 0 || ibusy.bindex > au_sbbot(sb)))
+goto out_unlock;
+
+err = 0;
+ibusy.h_ino = 0; /* invalid */
+inode = ilookup(sb, ibusy.ino);
+if (!inode
|| inode->i_ino == AUFS_ROOT_INO
+ || au_is_bad_inode(inode))
+goto out_unlock;
+
+ii_read_lock_child(inode);
+btop = au_ibtop(inode);
+bbot = au_ibbot(inode);
+if (btop <= ibusy.bindex && ibusy.bindex <= bbot) {
+h_inode = au_h_iptr(inode, ibusy.bindex);
+if (h_inode && au_test_ibusy(inode, btop, bbot))
+ibusy.h_ino = h_inode->i_ino;
+}
+ii_read_unlock(inode);
+iput(inode);
+
+out_unlock:
+si_read_unlock(sb);
+if (!err) {
+err = __put_user(ibusy.h_ino, &arg->h_ino);
+if (unlikely(err)) {
+err = -EFAULT;
+AuTraceErr(err);
+}
+}
+out:
+return err;
+}
+
+long au_ibusy_ioctl(struct file *file, unsigned long arg)
+{
+return au_ibusy(file->f_path.dentry->d_sb, (void __user *)arg);
+}
+
+#ifdef CONFIG_COMPAT
+long au_ibusy_compat_ioctl(struct file *file, unsigned long arg)
+{
+return au_ibusy(file->f_path.dentry->d_sb, compat_ptr(arg));
+}
+#endif
+
/* ---------------------------------------------------------------------- */

/* change a branch permission */
+*/
+
+static void au_warn_ima(void)
+{
+#ifdef CONFIG_I MA
+/* since it doesn't support mark_files_ro() */
+AuWarn1("RW -> RO makes IMA to produce wrong message\n");
+#endif
+
+static int do_need_sigen_inc(int a, int b)
+{
+  return au_br_whable(a) && !au_br_whable(b);
+}
+
+static int need_sigen_inc(int old, int new)
+{
+  return do_need_sigen_inc(old, new)
+    || do_need_sigen_inc(new, old);
+}
+
+static int au_br_mod_files_ro(struct super_block *sb, aufs_bindex_t bindex)
+{
+  int err, do_warn;
+  unsigned int mnt_flags;
+  unsigned long long ull, max;
+  aufs_bindex_t br_id;
+  unsigned char verbose, writer;
+  struct file *file, *hf, **array;
+  struct au_hfile *hfile;
+  struct inode *h_inode;
+
+  mnt_flags = au_mntflags(sb);
+  verbose = !!au_opt_test(mnt_flags, VERBOSE);
+
+  array = au_farray_alloc(sb, &max);
+  err = PTR_ERR(array);
+  if (IS_ERR(array))
+    goto out;
+
+  do_warn = 0;
+  br_id = au_sbr_id(sb, bindex);
+  for (ull = 0; ull < max; ull++) {
+    file = array[ull];
+    if (unlikely(!file))
+      break;
+    /* AuDbg("%pD\n", file); */
+    fi_read_lock(file);
+    if (unlikely(au_test_mmapped(file))) {
+      err = -EBUSY;
+      AuVerbose(verbose, "mmapped %pD\n", file);
+AuDbgFile(file);
+FiMustNoWaiters(file);
+fi_read_unlock(file);
+goto out_array;
+}
+
+hfile = &au_fi(file)->fi_htop;
+hf = hfile->hf_file;
+if (!d_is_reg(file->f_path.dentry)
  + || (!(file->f_mode & FMODE_WRITE)
  + || hfile->hf_br->br_id != br_id
  + || !(hf->f_mode & FMODE_WRITE))
+array[ull] = NULL;
+else {
+do_warn = 1;
+get_file(file);
+
+FiMustNoWaiters(file);
+fi_read_unlock(file);
+fput(file);
+}
+
+err = 0;
+if (do_warn)
+au_warn_ima();
+
+for (ull = 0; ull < max; ull++) {
+file = array[ull];
+if (!file)
+continue;
+
+/* todo: already flushed? */
+/
+/*
+ * fs/super.c:mark_files_ro() is gone, but aufs keeps its
+ * approach which resets f_mode and calls mnt_drop_write() and
+ * file_release_write() for each file, because the branch
+ * attribute in aufs world is totally different from the native
+ * fs rw/ro mode.
+ */
+/*
+*/
+/* fi_read_lock(file); */
+hfile = &au_fi(file)->fi_htop;
+hf = hfile->hf_file;
+/* fi_read_unlock(file); */
+spin_lock(&hf->f_lock);
+writer = !!(hf->f_mode & FMODE_WRITER);
+hf->f_mode &= ~(FMODE_WRITE | FMODE_WRITER);
+spin_unlock(&hf->f_lock);
+if (writer) {
+h_inode = file_inode(hf);
+if (hf->f_mode & FMODE_READ)
+i_readcount_inc(h_inode);
+put_write_access(h_inode);
+__mnt_drop_write(hf->f_path.mnt);
+}
+}
+
+out_array:
+au_array_free(array, max);
+out:
+AuTraceErr(err);
+return err;
+}
+
+int au_br_mod(struct super_block *sb, struct au_opt_mod *mod, int remount,
+    int *do_refresh)
+{
+int err, rerr;
+aufs_bindex_t bindex;
+struct dentry *root;
+struct au_branch *br;
+struct au_br_fhsm *bf;
+
+root = sb->s_root;
+bindex = au_find_dbindex(root, mod->h_root);
+if (bindex < 0) {
+if (remount)
+    return 0; /* success */
+err = -ENOENT;
+pr_err("%s no such branch\n", mod->path);
+goto out;
+}
+AuDbg("bindex b%d\n", bindex);
+
+err = test_br(d_inode(mod->h_root), mod->perm, mod->path);
+if (unlikely(err))
+    goto out;
+
+br = au_sbr(sb, bindex);
+AuDebugOn(mod->h_root != au_br_dentry(br));
+if (br->br_perm == mod->perm)
+    return 0; /* success */
+/* pre-allocate for non-fhsm --> fhsm */
+if (!au_br_fhsm(br->br_perm) && au_br_fhsm(mod->perm)) {
err = au_fhsm_br_alloc(br);
if (unlikely(err))
goto out;
bf = br->br_fhsm;
br->br_fhsm = NULL;
}
+
+if (au_br_writable(br->br_perm)) {
+ /* remove whiteout base */
+err = au_br_init_wh(sb, br, mod->perm);
+if (unlikely(err))
goto out_bf;
+
+if (!au_br_writable(mod->perm)) {
+ /* rw -> ro, file might be mmapped */
+DiMustNoWaiters(root);
+liMustNoWaiters(d_inode(root));
+di_write_unlock(root);
+/* aufs_write_lock() calls ..._child() */
+di_write_lock_child(root);
+
+if (unlikely(err)) {
+rerr = -ENOMEM;
+br->br_wbr = kzalloc(sizeof(*br->br_wbr), GFP_NOFS);
+if (br->br_wbr)
+rerr = au_wbr_init(br, sb, br->br_perm);
+if (unlikely(rerr)) {
+AuIOErr("nested error %d (%d)\n",
+rerr, err);
+br->br_perm = mod->perm;
+}
+
+} else if (au_br_writable(mod->perm)) {
+ /* ro -> rw */
+err = -ENOMEM;
+br->br_wbr = kzalloc(sizeof(*br->br_wbr), GFP_NOFS);
+if (br->br_wbr)
+err = au_wbr_init(br, sb, mod->perm);
+if (unlikely(err)) {
+kfree(br->br_wbr);
+br->br_wbr = NULL;
+}
+
} else if (unlikely(err))

goto out_bf;
+
+if (au_br_fhsm(br->br_perm)) {
+if (!au_br_fhsm(mod->perm)) {
+/* fhsm --> non-fhsm */
+au_br_fhsm_fin(br->br_fhsm);
+kfree(br->br_fhsm);
+br->br_fhsm = NULL;
+}
+} else if (au_br_fhsm(mod->perm))
+/* non-fhsm --> fhsm */
+br->br_fhsm = bf;
+
+*do_refresh |= need_sigen_inc(br->br_perm, mod->perm);
+br->br_perm = mod->perm;
+goto out; /* success */
+
+out_bf:
+kfree(bf);
+out:
+AuTraceErr(err);
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+int au_br_stfs(struct au_branch *br, struct aufs_stfs *stfs)
+{
+int err;
+struct kstatfs kstfs;
+
+err = vfs_statfs(&br->br_path, &kstfs);
+if (!err) {
+stfs->f_blocks = kstfs.f_blocks;
+stfs->f_bavail = kstfs.f_bavail;
+stfs->f_files = kstfs.f_files;
+stfs->f_ffree = kstfs.f_ffree;
+}
+
+return err;
+}
+
--- linux-4.15.0.orig/fs/aufs/branch.h
+++ linux-4.15.0/fs/aufs/branch.h
@@ -0,0 +1,333 @@
+/* Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
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+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+ /* branch filesystems and xino for them
+ */
+
+#ifndef __AUFS_BRANCH_H__
+#define __AUFS_BRANCH_H__
+
+#ifdef __KERNEL__
+
+#include <linux/mount.h>
+#include "dirren.h"
+#include "dynop.h"
+#include "rwsem.h"
+#include "super.h"
+
+/* ----------------------------------------------- */
+
+ /* a xino file */
+struct au_xino_file {
+ struct file*xi_file;
+ struct {
+ spinlock_tspin;
+ ino_t*array;
+ int total;
+ /* reserved for future use */
+ /* unsigned long*bitmap; */
+ wait_queue_head_twqh;
+ } xi_nondir;
+
+ /* todo: make xino files an array to support huge inode number */
+
+#ifdef CONFIG_DEBUG_FS
+ struct dentry *xi_dbgafs;
+#endif
+
+};
/* File-based Hierarchical Storage Management */
struct au_br_fhsm {
#ifdef CONFIG_AUFS_FHSM
struct mutex bf_lock;
unsigned long bf_jiffy;
struct aufs_stfs bf_stfs;
int readable;
#endif
};

/* members for writable branch only */
enum {AuBrWh_BASE, AuBrWh_PLINK, AuBrWh_ORPH, AuBrWh_Last};
struct au_wbr {
struct au_rwlock;
struct dentry*wbr_wh[AuBrWh_Last];
atomic_t wbr_wh_running;
#define wbr_whbase wbr_wh[AuBrWh_BASE] /* whiteout base */
#define wbr_plink wbr_wh[AuBrWh_PLINK] /* pseudo-link dir */
#define wbr_orph wbr_wh[AuBrWh_ORPH] /* dir for orphans */

/* mfs mode */
unsigned long long wbr_bytes;
};

/* ext2 has 3 types of operations at least, ext3 has 4 */
#define AuBrDynOp (AuDyLast * 4)

#ifdef CONFIG_AUFS_HFSNOTIFY
/* support for asynchronous destruction */
struct au_br_hfsnotify {
struct fsnotify_group*hfsn_group;
};
#endif

/* sysfs entries */
struct au_brsysfs {
char name[16];
struct attribute attr;
};

enum {
AuBrSysfs_BR,
AuBrSysfs_BRID,
AuBrSysfs_Last
};

/* protected by superblock rwsem */
+struct au_branch {
+struct au_xino_file br_xino;
+
aufs_bindex_t br_id;
+
+int br_perm;
+struct path br_path;
+spinlock_t br_dykey_lock;
+struct au_dykey *br_dykey[AuBrDynOp];
+struct percpu_counter br_count;
+
+struct au_wbr *br_wbr;
+struct au_br_fhsm *br_fhsm;
+
+/* xino truncation * /
+atomic_t br_xino_running;
+
+#ifdef CONFIG_AUFS_HFSNOTIFY
+struct au_br_hfsnotify *br_hfsn;
+#endif
+
+#ifdef CONFIG_SYSFS
+/* entries under sysfs per mount-point * /
+struct au_brsysfsbr_sysfs[AuBrSysfs_Last];
+#endif
+
+struct au_dr_br br_dirren;
+};
+
+/* ----------------------------------------------- */
+
+static inline struct vfsmount *au_br_mnt(struct au_branch *br)
+{
+return br->br_path.mnt;
+}
+
+static inline struct dentry *au_br_dentry(struct au_branch *br)
+{
+return br->br_path.dentry;
+}
+
+static inline struct super_block *au_br_sb(struct au_branch *br)
+{
+return au_br_mnt(br)->mnt_sb;
+}
+
+static inline void au_br_get(struct au_branch *br)
+{

percpu_counter_inc(&br->br_count);
+
+static inline void au_br_put(struct au_branch *br)
+{
+  percpu_counter_dec(&br->br_count);
+}
+
+static inline void au_br_put(struct au_branch *br)
+{
+  percpu_counter_dec(&br->br_count);
+}
+
+static inline s64 au_br_count(struct au_branch *br)
+{
+  return percpu_counter_sum(&br->br_count);
+}
+
+static inline void au_br_count_init(struct au_branch *br)
+{
+  percpu_counter_init(&br->br_count, 0, GFP_NOFS);
+}
+
+static inline void au_br_count_fin(struct au_branch *br)
+{
+  percpu_counter_destroy(&br->br_count);
+}
+
+static inline void au_br_count_init(struct au_branch *br)
+{
+  percpu_counter_init(&br->br_count, 0, GFP_NOFS);
+}
+
+static inline void au_br_count_fin(struct au_branch *br)
+{
+  percpu_counter_destroy(&br->br_count);
+}
+
+static inline int au_br_rdonly(struct au_branch *br)
+{
+  return (sb_rdonly(au_br_sb(br))
+           || !au_br_writable(br->br_perm))
+       ? -EROFS : 0;
+}
+
+static inline int au_br_hnotifyable(int brperm __maybe_unused)
+{
+  #ifdef CONFIG_AUFS_HNOTIFY
+    return !(brperm & AuBrPerm_RR);
+  #else
+    return 0;
+  #endif
+}
+
+static inline int au_br_test_oflag(int oflag, struct au_branch *br)
+{
+  int err, exec_flag;
+  +
+  exec_flag = oflag & __FMODE_EXEC;
+  +if (unlikely(exec_flag && path_noexec(&br->br_path)))
+    err = -EACCES;
+  +
+  return (sb_rdonly(au_br_sb(br))
+           || !au_br_writable(br->br_perm))
+       ? -EROFS : 0;
+}
+
+static inline void au_br_put(struct au_branch *br)
+{
+  percpu_counter_dec(&br->br_count);
+}
+
+static inline void au_br_hnotifyable(int brperm __maybe_unused)
+{
+  #ifdef CONFIG_AUFS_HNOTIFY
+    return !(brperm & AuBrPerm_RR);
+  #else
+    return 0;
+  #endif
+}
+
+static inline int au_br_test_oflag(int oflag, struct au_branch *br)
+{
+  int err, exec_flag;
+  +
+  exec_flag = oflag & __FMODE_EXEC;
+  +if (unlikely(exec_flag && path_noexec(&br->br_path)))
+    err = -EACCES;
+  +
+  return (sb_rdonly(au_br_sb(br))
+           || !au_br_writable(br->br_perm))
+       ? -EROFS : 0;
+}
+return err;
+
+/* ---------------------------------------------------------------------- */
+/* branch.c */
+struct au_sbinfo;
+void au_br_free(struct au_sbinfo *sinfo);
+int au_br_index(struct super_block *sb, aufs_bindex_t br_id);
+struct au_opt_add;
+int au_br_add(struct super_block *sb, struct au_opt_add *add, int remount);
+struct au_opt_del;
+int au_br_del(struct super_block *sb, struct au_opt_del *del, int remount);
+long au_ibusy_ioctl(struct file *file, unsigned long arg);
+#ifdef CONFIG_COMPAT
+long au_ibusy_compat_ioctl(struct file *file, unsigned long arg);
+#endif
+struct au_opt_mod;
+int au_br_mod(struct super_block *sb, struct au_opt_mod *mod, int remount,
+    int *do_refresh);
+struct aufs_stfs;
+int au_br_stfs(struct au_branch *br, struct aufs_stfs *stfs);
+
+/* xino.c */
+static const loff_t au_loff_max = LLONG_MAX;
+
+int au_xib_trunc(struct super_block *sb);
+ssize_t xino_fread(vfs_readf_t func, struct file *file, void *buf, size_t size,
+    loff_t *pos);
+ssize_t xino_fwrite(vfs_writef_t func, struct file *file, void *buf,
+    size_t size, loff_t *pos);
+struct file *au_xino_create2(struct file *base_file, struct file *copy_src);
+struct file *au_xino_create(struct super_block *sb, char *fname, int silent);
+ino_t au_xino_new_ino(struct super_block *sb);
+void au_xino_delete_inode(struct inode *inode, const int unlinked);
+int au_xino_write(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino,
+    ino_t ino);
+int au_xino_read(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino,
+    ino_t *ino);
+int au_xino_br(struct super_block *sb, struct au_branch *br, ino_t hino,
+    struct file *base_file, int do_test);
+int au_xino_trunc(struct super_block *sb, aufs_bindex_t bindex);
+
+int au_opt_xino;
+int au_xino_set(struct super_block *sb, struct au_opt_xino *xino, int remount);
+void au_xino_clr(struct super_block *sb);
+struct file *au_xino_def(struct super_block *sb);
+int au_xino_path(struct seq_file *seq_file, struct file *file);
+ void au_xinondir_leave(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino, int idx);
+ int au_xinondir_enter(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino, int *idx);
+
+ /* ----------------------------- */
+ /* Superblock to branch */
+ static inline
+ aufs_bindex_t au_sbr_id(struct super_block *sb, aufs_bindex_t bindex)
+ {
+ return au_sbr(sb, bindex)->br_id;
+ }
+
+ static inline
+ struct vfsmount *au_sbr_mnt(struct super_block *sb, aufs_bindex_t bindex)
+ {
+ return au_br_mnt(au_sbr(sb, bindex));
+ }
+
+ static inline
+ struct super_block *au_sbr_sb(struct super_block *sb, aufs_bindex_t bindex)
+ {
+ return au_br_sb(au_sbr(sb, bindex));
+ }
+
+ static inline void au_sbr_get(struct super_block *sb, aufs_bindex_t bindex)
+ {
+ au_br_get(au_sbr(sb, bindex));
+ }
+
+ static inline void au_sbr_put(struct super_block *sb, aufs_bindex_t bindex)
+ {
+ au_br_put(au_sbr(sb, bindex));
+ }
+
+ static inline int au_sbr_perm(struct super_block *sb, aufs_bindex_t bindex)
+ {
+ return au_sbr(sb, bindex)->br_perm;
+ }
+
+ static inline int au_sbr_whable(struct super_block *sb, aufs_bindex_t bindex)
+ {
+ return au_br_whable(au_sbr_perm(sb, bindex));
+ }
+
+ /* ----------------------------- */
+ #define wbr_wh_read_lock(wbr) au_rw_read_lock(&(wbr)->wbr_wh_rwsem)
+ #define wbr_wh_write_lock(wbr) au_rw_write_lock(&(wbr)->wbr_wh_rwsem)
+ #define wbr_wh_read_trylock(wbr) au_rw_read_trylock(&(wbr)->wbr_wh_rwsem)
+ #define wbr_wh_write_trylock(wbr) au_rw_write_trylock(&(wbr)->wbr_wh_rwsem)
+ /*
+   #define wbr_wh_read_trylock_nested(wbr) \ 
+   au_rw_read_trylock_nested(&(wbr)->wbr_wh_rwsem)
+   #define wbr_wh_write_trylock_nested(wbr) \ 
+   au_rw_write_trylock_nested(&(wbr)->wbr_wh_rwsem)
+ */
+ +
+ #define wbr_wh_read_unlock(wbr) au_rw_read_unlock(&(wbr)->wbr_wh_rwsem)
+ #define wbr_wh_write_unlock(wbr) au_rw_write_unlock(&(wbr)->wbr_wh_rwsem)
+ #define wbr_wh_downgrade_lock(wbr) au_rw_dgrade_lock(&(wbr)->wbr_wh_rwsem)
+ +
+ #define WbrWhMustNoWaiters(wbr) AuRwMustNoWaiters(&(wbr)->wbr_wh_rwsem)
+ #define WbrWhMustAnyLock(wbr) AuRwMustAnyLock(&(wbr)->wbr_wh_rwsem)
+ #define WbrWhMustWriteLock(wbr) AuRwMustWriteLock(&(wbr)->wbr_wh_rwsem)
+ +
+ */
+ */ --------------------------------------------------------------- */
+ + #ifdef CONFIG_AUFS_FHSM
+ static inline void au_br_fhsm_init(struct au_br_fhsm *brfhsm)
+ { 
+ mutex_init(&brfhsm->bf_lock);
+ brfhsm->bf_jiffy = 0;
+ brfhsm->bf_readable = 0;
+ }
+ 
+ static inline void au_br_fhsm_fin(struct au_br_fhsm *brfhsm)
+ { 
+ mutex_destroy(&brfhsm->bf_lock);
+ }
+ #else
+ AuStubVoid(au_br_fhsm_init, struct au_br_fhsm *brfhsm)
+ AuStubVoid(au_br_fhsm_fin, struct au_br_fhsm *brfhsm)
+ #endif
+ */
+ */ __KERNEL__ */
+ */ __AUFS_BRANCH_H__ */
+ --- linux-4.15.0.orig/fs/aufs/conf.mk
+ +++ linux-4.15.0/fs/aufs/conf.mk
+ @ -0,0 +1,40 @@
+ */ SPDX-License-Identifier: GPL-2.0 */
+ +
+ AuConfStr = CONFIG_AUFS_FS=${CONFIG_AUFS_FS}
+define AuConf
+ifdef $1
+AuConfStr += $1=${$1}
+endif
+endef
+
+AuConfAll = BRANCH_MAX_127 BRANCH_MAX_511 BRANCH_MAX_1023 BRANCH_MAX_32767 \ 
+SBILIST \ 
+HNOTIFY HFSNOTIFY \ 
+EXPORT INO_T_64 \ 
+XATTR \ 
+FHSM \ 
+RDREN \ 
+SHWH \ 
+BR_RAMFS \ 
+BR_FUSE POLL \ 
+BR_HFSPLUS \ 
+BDEV_LOOP \ 
+DEBUG MAGIC_SYSRQ
+$foreach i, ${AuConfAll}, \ 
+$eval $(call AuConf,CONFIG_AUFS_${i}))
+
+AuConfName = ${obj}/conf.str
+${AuConfName}.tmp: FORCE
+@echo ${AuConfStr} | tr ' ' '
' | sed -e 's/^\"/\"/g' -e 's/$\"$/\n\"/g' > $@
+${AuConfName}: ${AuConfName}.tmp
+@diff -q $< $@ > /dev/null 2>&1 || { 
+echo '  GEN    ' $@; 
+tcp -p $< $@; 
+}
+FORCE:
+clean-files += ${AuConfName} ${AuConfName}.tmp
+${obj}/sysfs.o: ${AuConfName}
+
+include ${srctree}/${src}/conf_priv.mk
--- linux-4.15.0.orig/fs/aufs/cpup.c
+++ linux-4.15.0/fs/aufs/cpup.c
@@ -0,0 +1,1444 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ */
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
+ * This program is distributed in the hope that it will be useful,
#include <linux/fs_stack.h>
#include <linux/mm.h>
#include <linux/task_work.h>
#include "aufs.h"

void au_cpup_attr_flags(struct inode *dst, unsigned int iflags)
{
    const unsigned int mask = S_DEAD | S_SWAPFILE | S_PRIVATE
    | S_NOATIME | S_NOCMTIME | S_AUTOMOUNT;
    BUILD_BUG_ON(sizeof(iflags) != sizeof(dst->i_flags));
    dst->i_flags |= iflags & ~mask;
    if (au_test_fs_notime(dst->i_sb))
        dst->i_flags |= S_NOATIME | S_NOCMTIME;
}

void au_cpup_attr_timesizes(struct inode *inode)
{
    struct inode *h_inode;
    struct super_block *sb;
    aufs_bindex_t bindex, bbot;
    sb = inode->i_sb;
    bindex = au_ibtop(inode);
    h_inode = au_h_iptr(inode, bindex);
    fsstack_copy_attr_times(inode, h_inode);
    fsstack_copy_inode_size(inode, h_inode);
}

void au_cpup_attr_nlink(struct inode *inode, int force)
{
    struct inode *h_inode;
    +struct super_block *sb;
    +aufs_bindex_t bindex, bbot;
    +sb = inode->i_sb;
    +bindex = au_ibtop(inode);
    +h_inode = au_h_iptr(inode, bindex);
    +if (!force}
+ \&\& !S_ISDIR(h_inode->i_mode)
+ \&\& au_opt_test(au_mntflags(sb), PLINK)
+ \&\& au_plink_test(inode))
+ return;
+
+ /*
+ * 0 can happen in revalidating.
+ * h_inode->i_mutex may not be held here, but it is harmless since once
+ * i_nlink reaches 0, it will never become positive except O_TMPFILE
+ * case.
+ * todo: O_TMPFILE+linkat(AT_SYMLINK_FOLLOW) bypassing aufs may cause
+ * the incorrect link count.
+ */
+ set_nlink(inode, h_inode->i_nlink);
+
+ /*
+ * fewer nlink makes find(1) noisy, but larger nlink doesn't.
+ * it may includes whplink directory.
+ */
+ if (S_ISDIR(h_inode->i_mode)) {
+ bbot = au_ibbot(inode);
+ for (bindex++; bindex <= bbot; bindex++) {
+ h_inode = au_h_iptr(inode, bindex);
+ if (h_inode)
+ au_add_nlink(inode, h_inode);
+ }
+ }
+
+ void au_cpup_attr_changeable(struct inode *inode)
+ {
+ struct inode *h_inode;
+
+ h_inode = au_h_iptr(inode, au_ibtop(inode));
+ inode->i_mode = h_inode->i_mode;
+ inode->i_uid = h_inode->i_uid;
+ inode->i_gid = h_inode->i_gid;
+ au_cpup_attr_timesizes(inode);
+ au_cpup_attr_flags(inode, h_inode->i_flags);
+ }
+
+ void au_cpup_igen(struct inode *inode, struct inode *h_inode)
+ {
+ struct au_iinfo *iinfo = au_ii(inode);
+ IiMustWriteLock(inode);
+ +iinfo->ii_higen = h_inode->i_generation;
+iinfo->ii_hsb1 = h_inode->i_sb;
+
+void au_cpup_attr_all(struct inode *inode, int force)
+{
+    struct inode *h_inode;
+    
+h_inode = au_h_iptr(inode, au_ibtop(inode));
+au_cpup_attr_changeable(inode);
+if (inode->i_nlink > 0)
+au_cpup_attr_nlink(inode, force);
+inode->i_rdev = h_inode->i_rdev;
+inode->i_blkbits = h_inode->i_blkbits;
+au_cpup igen(inode, h_inode);
+
+/* ------------------------------- */
+
+/* Note: dt_dentry and dt_h_dentry are not dget/dput-ed */
+
+/* keep the timestamps of the parent dir when cpup */
+void au_dtime_store(struct au_dtime *dt, struct dentry *dentry,
+    struct path *h_path)
+{
+    struct inode *h_inode;
+    
+    dt->dt_dentry = dentry;
+    dt->dt_h_path = *h_path;
+    h_inode = d_inode(h_path->dentry);
+    dt->dt_atime = h_inode->i_atime;
+    dt->dt_mtime = h_inode->i_mtime;
+    /* smp_mb(); */ */
+}
+
+void au_dtime_revert(struct au_dtime *dt)
+{
+    struct iattr attr;
+    int err;
+    
+    attr.ia_atime = dt->dt_atime;
+    attr.ia_mtime = dt->dt_mtime;
+    attr.ia_valid = ATTR_FORCE | ATTR_MTIME | ATTR_MTIME_SET
+     | ATTR_ATIME | ATTR_ATIME_SET;
+    /* no delegation since this is a directory */
+    err = vfsub_notify_change(&dt->dt_h_path, &attr, /*delegated*/NULL);
+    if (unlikely(err))
+        pr_warn("restoring timestamps failed(%d). ignored\n", err);
+}
struct au_cpup_reg_attr {
    int	valid;
    struct kstat	st;
    unsigned int	iflags; /* inode->i_flags */
};

static noinline_for_stack
int cpup_iattr(struct dentry *dst, aufs_bindex_t bindex, struct dentry *h_src,
       struct au_cpup_reg_attr *h_src_attr)
{
    int err, sbits, icex;
    unsigned int mnt_flags;
    unsigned char verbose;
    struct iattr ia;
    struct path h_path;
    struct inode *h_isrc, *h_idst;
    struct kstat *h_st;
    struct au_branch *br;

    h_path.dentry = au_h_dptr(dst, bindex);
    h_idst = d_inode(h_path.dentry);
    br = au_sbr(dst->d_sb, bindex);
    h_path.mnt = au_br_mnt(br);
    h_isrc = d_inode(h_src);
    ia.ia_valid = ATTR_FORCE | ATTR_UID | ATTR_GID
    | ATTR_ATIME | ATTR_MTIME
    | ATTR_ATIME_SET | ATTR_MTIME_SET;
    if (h_src_attr && h_src_attr->valid) {
        h_st = &h_src_attr->st;
        ia.ia_uid = h_st->uid;
        ia.ia_gid = h_st->gid;
        ia.ia_atime = h_st->atime;
        ia.ia_mtime = h_st->mtime;
        if (h_idst->i_mode != h_st->mode
            && !S_ISLNK(h_idst->i_mode)) {
            ia.ia_valid |= ATTR_MODE;
            ia.ia_mode = h_st->mode;
        }
        sbits = !!(h_st->mode & (S_ISUID | S_ISGID));
        au_cpup_attr_flags(h_idst, h_src_attr->iflags);
    } else {
        ia.ia_uid = h_isrc->i_uid;
        ia.ia_gid = h_isrc->i_gid;
    }
+ia.ia_atime = h_isrc->i_atime;
+ia.ia_mtime = h_isrc->i_mtime;
+if (h_idst->i_mode != h_isrc->i_mode
+    && !S_ISLNK(h_idst->i_mode)) {
+ia.ia_valid |= ATTR_MODE;
+ia.ia_mode = h_isrc->i_mode;
+}
+sbits = !(h_isrc->i_mode & (S_ISUID | S_ISGID));
+au_cpup_attr_flags(h_idst, h_isrc->i_flags);
+
/* no delegation since it is just created */
+err = vfsub_notify_change(&h_path, &ia, /*delegated*/NULL);
+
/* is this nfs only? */
+if (!err && sbits && au_test_nfs(h_path.dentry->d_sb)) {
+ia.ia_valid = ATTR_FORCE | ATTR_MODE;
+ia.ia_mode = h_isrc->i_mode;
+err = vfsub_notify_change(&h_path, &ia, /*delegated*/NULL);
+}
+
tcex = br->br_perm & AuBrAttr(ICEX);
+if (!err) {
+mnt_flags = au_mntflags(dst->d_sb);
+verbose = !!au_opt_test(mnt_flags, VERBOSE);
+err = au_cpup_xattr(h_path.dentry, h_src, icex, verbose);
+}
+
+return err;
+
/* ---------------------------------------------------------------------- */
+
static int au_do_copy_file(struct file *dst, struct file *src, loff_t len,
    char *buf, unsigned long blksize)
{
+int err;
+size_t sz, rbytes, wbytes;
+unsigned char all_zero;
+char *p, *zp;
+struct inode *h_inode;
+/* reduce stack usage */
+struct iattr *ia;
+
+zp = page_address(ZERO_PAGE(0));
+if (unlikely(!zp))
+err = -ENOMEM; /* possible? */
+
+err = 0;

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all_zero = 0;
while (len) {
    AuDbg("len %lld\n", len);
    sz = blksize;
    if (len < blksize)
        sz = len;
+
    rbytes = 0;
    /* todo: signal_pending? */
    while (!rbytes || err == -EAGAIN || err == -EINTR) {
        rbytes = vfsub_read_k(src, buf, sz, &src->f_pos);
        err = rbytes;
    }
    if (unlikely(err < 0))
        break;
    +
    all_zero = 0;
    if (len >= rbytes && rbytes == blksize)
        all_zero = !memcmp(buf, zp, rbytes);
    if (!all_zero) {
        wbytes = rbytes;
        p = buf;
        while (wbytes) {
            size_t b;
+
            b = vfsub_write_k(dst, p, wbytes, &dst->f_pos);
            err = b;
            /* todo: signal_pending? */
            if (unlikely(err == -EAGAIN || err == -EINTR))
                continue;
            if (unlikely(err < 0))
                break;
            wbytes -= b;
            p += b;
+
        }
    } else {
        loff_t res;
+
        AuLabel(hole);
        res = vfsub_llseek(dst, rbytes, SEEK_CUR);
        err = res;
        if (unlikely(res < 0))
            break;
    }
    len -= rbytes;
    err = 0;
/* the last block may be a hole */
+if (!err && all_zero) {
+AuLabel(last hole);
+
+err = 1;
+}

/* nfs requires this step to make last hole */
+/* is this only nfs? */
+do {
+/* todo: signal_pending? */
+err = vfsub_write_k(dst, "\0", 1, &dst->f_pos);
+} while (err == -EAGAIN || err == -EINTR);
+if (err == 1)
+dst->f_pos--;
+
+if (err == 1) {
+ia = (void *)buf;
+ia->ia_size = dst->f_pos;
+ia->ia_valid = ATTR_SIZE | ATTR_FILE;
+ia->ia_file = dst;
+h_inode = file_inode(dst);
+inode_lock_nested(h_inode, AuLsc_I_CHILD2);
+/* no delegation since it is just created */
+err = vfsub_notify_change(&dst->f_path, ia, /*delegated*/NULL);
+inode_unlock(h_inode);
+
+return err;
+
+}

int au_copy_file(struct file *dst, struct file *src, loff_t len)
+
+int err;
+unsigned long blksize;
+unsigned char do_kfree;
+char *buf;
+
+err = -ENOMEM;
+blksize = dst->f_path.dentry->d_sb->s_blocksize;
+if (!blksize || PAGE_SIZE < blksize)
+blksize = PAGE_SIZE;
+AuDbg("blksize %lu\n", blksize);
+do_kfree = (blksize != PAGE_SIZE && blksize >= sizeof(struct iattr *)):
+if (do_kfree)
+buf = kmalloc(blksize, GFP_NOFS);
+else
+buf = (void *)__get_free_page(GFP_NOFS);
+if (unlikely(!buf))
+goto out;
+
+if (len > (1 << 22))
+AuDbg("copying a large file \%lld\n", (long long)len);
+
+src->f_pos = 0;
+dst->f_pos = 0;
+err = au_do_copy_file(dst, src, len, buf, blksize);
+if (do_kfree)
+kfree(buf);
+else
+free_page((unsigned long)buf);
+
+out:
+return err;
+
+static int au_do_copy(struct file *dst, struct file *src, loff_t len)
+{
+int err;
+struct super_block *h_src_sb;
+struct inode *h_src_inode;
+
+h_src_inode = file_inode(src);
+h_src_sb = h_src_inode->i_sb;
+
+/* XFS acquires inode_lock */
+if (!au_test_xfs(h_src_sb))
+err = au_copy_file(dst, src, len);
+else {
+inode_unlock_shared(h_src_inode);
+err = au_copy_file(dst, src, len);
+vfsub_inode_lock_shared_nested(h_src_inode, AuLsc_I_CHILD);
+}
+
+return err;
+
+static int au_clone_or_copy(struct file *dst, struct file *src, loff_t len)
+{
+int err;
+struct super_block *h_src_sb;
+struct inode *h_src_inode;
+...
+h_src_inode = file_inode(src);
+h_src_sb = h_src_inode->i_sb;
+if (h_src_sb != file_inode(dst)->i_sb
+    || !dst->f_op->clone_file_range) {
+err = au_do_copy(dst, src, len);
+goto out;
+}
+
+if (!au_test_nfs(h_src_sb)) {
+inode_unlock_shared(h_src_inode);
+err = vfsub_clone_file_range(src, dst, len);
+vfsub_inode_lock_shared_nested(h_src_inode, AuLsc_I_CHILD);
+} else
+err = vfsub_clone_file_range(src, dst, len);
+/* older XFS has a condition in cloning */
+if (unlikely(err != -EOPNOTSUPP))
+goto out;
+
+/* the backend fs on NFS may not support cloning */
+err = au_do_copy(dst, src, len);
+
+out:
+AuTraceErr(err);
+return err;
+
+static int au_cp_regular(struct au_cp_generic *cpg)
+{
+int err, i;
+enum { SRC, DST };
+struct {
+aufs_bindex_t bindex;
+unsigned int flags;
+struct dentry *dentry;
+int force_wr;
+struct file *file;
+void *label;
+} *f, file[] = {
+{
+.bindex = cpg->bsrc,
+.flags = O_RDONLY | O_NOATIME | O_LARGEFILE,
+.label = &&out
+},

+{
+.bindex = cpg->bdst,
+.flags = O_WRONLY | O_NOATIME | O_LARGEFILE,
+.force_wr = !!au_fiest_cpup(cpg->flags, RWDST),
+.label = &out_src
+}
+
+struct super_block *sb, *h_src_sb;
+struct inode *h_src_inode;
+struct task_struct *tsk = current;
+
+/* bsrc branch can be ro/rw. */
+sb = cpg->dentry->d_sb;
+f = file;
+for (i = 0; i < 2; i++, f++) {
+  f->dentry = au_h_dptr(cpg->dentry, f->bindex);
+  f->file = au_h_open(cpg->dentry, f->bindex, f->flags,
+      /*file*/ NULL, f->force_wr);
+  /*PTR_ERR(f->file);
+  if (IS_ERR(f->file))
+  goto *f->label;
+  */
+  
+  /* try stopping to update while we copyup */
+  h_src_inode = d_inode(file[SRC].dentry);
+  h_src_sb = h_src_inode->i_sb;
+  if (!au_test_nfs(h_src_sb))
+    IMustLock(h_src_inode);
+    err = au_clone_or_copy(file[DST].file, file[SRC].file, cpg->len);
+    /* i wonder if we had O_NO_DELAY_FPUT flag */
+    if (tsk->flags & PF_KTHREAD)
+      __fput_sync(file[DST].file);
+    else {
+      /* it happend actually */
+      fput(file[DST].file);
+      */
+      * too bad.
+      * we have to call both since we don't know which place the file
+      * was added to.
+      */
+    }
+    task_work_run();
+    flush_delayed_fput();
+  }
+  au_sbr_put(sb, file[DST].bindex);
+  out_src:
+  fput(file[SRC].file);
+au_sbr_put(sb, file[SRC].bindex);
+out:
+return err;
+
+static int au_do_cpup_regular(struct au_cp_generic *cpg,
+    struct au_cpup_reg_attr *h_src_attr)
+{
+int err, rerr;
+loff_t l;
+struct path h_path;
+struct inode *h_src_inode, *h_dst_inode;
+
+err = 0;
+h_src_inode = au_h_iptr(d_inode(cpg->dentry), cpg->bsrc);
+l = i_size_read(h_src_inode);
+if (cpg->len == -1 || l < cpg->len)
+cpg->len = l;
+if (cpg->len) {
+/* try stopping to update while we are referencing */
+vfs_sub_inode_lock_shared_nested(h_src_inode, AuLsc_I_CHILD);
+au_pin_hdir_unlock(cpg->pin);
+
+h_path.dentry = au_h_dptr(cpg->dentry, cpg->bsrc);
+h_path.mnt = au_sbr_mnt(cpg->dentry->d_sb, cpg->bsrc);
+h_src_attr->iflags = h_src_inode->i_flags;
+if (!au_test_nfs(h_src_inode->i_sb))
+err = vfs_sub_getattr(&h_path, &h_src_attr->st);
+else {
+inode_unlock_shared(h_src_inode);
+err = vfs_sub_getattr(&h_path, &h_src_attr->st);
+vfs_sub_inode_lock_shared_nested(h_src_inode,
+    AuLsc_I_CHILD);
+}
+if (unlikely(err)) {
+inode_unlock_shared(h_src_inode);
+goto out;
+}
+h_src_attr->valid = 1;
+if (!au_test_nfs(h_src_inode->i_sb))
+err = au_cp_regular(cpg);
+inode_unlock_shared(h_src_inode);
+} else {
+inode_unlock_shared(h_src_inode);
+err = au_cp_regular(cpg);
+}
+rerr = au_pin_hdir_relock(cpg->pin);
+if (!err && rerr)
err = rerr;
+
+if (!err && (h_src_inode->i_state & I_LINKABLE)) {
+    h_path.dentry = au_h_dptr(cpg->dentry, cpg->bdst);
+    h_dst_inode = d_inode(h_path.dentry);
+    spin_lock(&h_dst_inode->i_lock);
+    h_dst_inode->i_state |= I_LINKABLE;
+    spin_unlock(&h_dst_inode->i_lock);
+}
+out:
+return err;
+
+static int au_do_cpup_symlink(struct path *h_path, struct dentry *h_src,
+      struct inode *h_dir)
+{
+    int err, symlen;
+    mm_segment_t old_fs;
+    union {
+        char *k;
+        char __user *u;
+    } sym;
+    err = -ENOMEM;
+    sym.k = (void *)__get_free_page(GFP_NOFS);
+    if (unlikely(!sym.k))
+        goto out;
+    /* unnecessary to support mmap_sem since symlink is not mmap-able */
+    old_fs = get_fs();
+    set_fs(KERN_DS);
+    symlen = vfs_readlink(h_src, sym.u, PATH_MAX);
+    err = symlen;
+    set_fs(old_fs);
+    if (symlen > 0) {
+        sym.k[symlen] = 0;
+        err = vfs_unlink(h_dir, h_path, sym.k);
+    }
+    free_page((unsigned long)sym.k);
+    out:
+    return err;
+
+/*
 * regardless 'acl' option, reset all ACL.
 */
+ * All ACL will be copied up later from the original entry on the lower branch.
+ */
+static int au_reset_acl(struct inode *h_dir, struct path *h_path, umode_t mode)
+{
+int err;
+struct dentry *h_dentry;
+struct inode *h_inode;
+
+h_dentry = h_path->dentry;
+h_inode = d_inode(h_dentry);
+/* forget_all_cached_acls(h_inode)); */
+err = vfsub_removexattr(h_dentry, XATTR_NAME_POSIX_ACL_ACCESS);
+AuTraceErr(err);
+if (err == -EOPNOTSUPP)
+err = 0;
+if (!err)
+err = vfsub_acl_chmod(h_inode, mode);
+
+AuTraceErr(err);
+return err;
+}
+
+static int au_do_cpup_dir(struct au_cp_generic *cpg, struct dentry *dst_parent,
+struct inode *h_dir, struct path *h_path)
+{
+int err;
+struct inode *dir, *inode;
+
+err = vfsub_removexattr(h_path->dentry, XATTR_NAME_POSIX_ACL_DEFAULT);
+AuTraceErr(err);
+if (err == -EOPNOTSUPP)
+err = 0;
+if (unlikely(err))
+goto out;
+
+/* strange behaviour from the users view,
+ * particularry setattr case
+ */
+dir = d_inode(dst_parent);
+if (au_ibtop(dir) == cpg->bdst)
+au_cpup_attr_nlink(dir, /*force*/1);
+inode = d_inode(cpg->dentry);
+au_cpup_attr_nlink(inode, /*force*/1);
+
+out:
+return err;
+}
+static noinline_for_stack
+int cpup_entry(struct au_cp_generic *cpg, struct dentry *dst_parent,
+    struct au_cpup_reg_attr *h_src_attr)
+
+int err;
+umode_t mode;
+unsigned int mnt_flags;
+unsigned char isdir, isreg, force;
+const unsigned char do_dt = !!au_ftest_cpup(cpg->flags, DTIME);
+struct au_dtime dt;
+struct path h_path;
+struct dentry *h_src, *h_dst, *h_parent;
+struct inode *h_inode, *h_dir;
+struct super_block *sb;
+
/* bsrc branch can be ro/rw. */
+h_src = au_h_dptr(cpg->dentry, cpg->bsrc);
+h_inode = d_inode(h_src);
+AuDebugOn(h_inode != au_h_iptr(d_inode(cpg->dentry), cpg->bsrc));
+
/* try stopping to be referenced while we are creating */
+h_dst = au_h_dptr(cpg->dentry, cpg->bdst);
+if (au_ftest_cpup(cpg->flags, RENAME))
+    AuDebugOn(strncmp(h_dst->d_name.name, AUFS_WH_PFX,
+        AUFS_WH_PFX_LEN));
+h_parent = h_dst->d_parent; /* dir inode is locked */
+h_dir = d_inode(h_parent);
+IMustLock(h_dir);
+AuDebugOn(h_parent != h_dst->d_parent);
+
+sb = cpg->dentry->d_sb;
+h_path.mnt = au_sbr_mnt(sb, cpg->bdst);
+if (do_dt) {
    h_path.dentry = h_parent;
    au_dtime_store(&dt, dst_parent, &h_path);
} }

isreg = 0;
isdir = 0;
mode = h_inode->i_mode;
switch (mode & S_IFMT) {
case S_IFREG:
    isreg = 1;
    err = vfs_create(h_dir, &h_path, S_IRUSR | S_IWUSR,
        /*want_excl*/true);
    /*want_excl*/true);
+if (!err)
err = au_do_cpup_regular(cpg, h_src_attr);
+break;
+case S_IFDIR:
+  isdir = 1;
+err = vfsub_mkdir(h_dir, &h_path, mode);
+if (!err)
+err = au_do_cpup_dir(cpg, dst_parent, h_dir, &h_path);
+break;
+case S_IFLNK:
+err = au_do_cpup_symlink(&h_path, h_src, h_dir);
+break;
+case S_IFCHR:
+case S_IFBLK:
+  AuDebugOn(!capable(CAP_MKNOD));
+  /*FALLTHROUGH*/
+case S_IFIFO:
+case S_IFSOCK:
+err = vfsub_mknod(h_dir, &h_path, mode, h_inode->i_rdev);
+break;
+default:
+  AuIOErr("Unknown inode type 0%o\n", mode);
+err = -EIO;
+} 
+if (!err)
+err = au_reset_acl(h_dir, &h_path, mode);
+
mnt_flags = au_mntflags(sb);
+if (!au_opt_test(mnt_flags, UDBA_NONE)
+  && !isdir
+  && au_opt_test(mnt_flags, XINO)
+  && (h_inode->i_nlink == 1
+    || (h_inode->i_state & I_LINKABLE))
+  /* todo: unnecessary? */
+  && &d_inode(cpg->dentry)->i_nlink == 1 */
+  && cpg->bdst < cpg->bsrc
+  && !au_ftest_cpup(cpg->flags, KEEPLINO))
+au_xino_write(sb, cpg->bdst, h_inode->i_ino, /*ino*/0);
+/* ignore this error */
+
+if (!err) {
+  force = 0;
+if (isreg) {
+  force = !!cpg->len;
+  if (cpg->len == -1)
+    force = !!i_size_read(h_inode);
+} 
+au_fhsm_wrote(sb, cpg->bdst, force);
+}
+ if (do_dt)
+ au_dtime_revert(&dt);
+ return err;
+ }
+
+ static int au_do_ren_after_cpup(struct au_cp_generic *cpg, struct path *h_path)
+ {
+ int err;
+ struct dentry *dentry, *h_dentry, *h_parent, *parent;
+ struct path h_ppath;
+ struct inode *h_dir;
+ aufs_bindx_t bdst;
+ 
dentry = cpg->dentry;
+ bdst = cpg->bdst;
+ h_ppath.mnt = au_sbr_mnt(dentry->d_sb, bdst);
+ h_dentry = au_h_dptr(dentry, bdst);
+ if (!au_ftest_cpup(cpg->flags, OVERWRITE)) {
+ dget(h_dentry);
+ au_set_h_dptr(dentry, bdst, NULL);
+ err = au_lkup_neg(dentry, bdst, /*wh*/0);
+ if (!err)
+ h_path->dentry = dget(h_dentry);
+ au_set_h_dptr(dentry, bdst, h_dentry);
+ } else {
+ err = 0;
+ parent = dget_parent(dentry);
+ h_ppath.dentry = au_h_dptr(parent, bdst);
+ dput(parent);
+ h_path->dentry = vfsub_lkup_one(&dentry->d_name, &h_ppath);
+ if (IS_ERR(h_path->dentry))
+ err = PTR_ERR(h_path->dentry);
+ }
+ if (unlikely(err))
+ goto out;
+
+ h_parent = h_dentry->d_parent; /* dir inode is locked */
+ h_dir = d_inode(h_parent);
+ IMustLock(h_dir);
+ AuDbg("%pd %pdn", h_dentry, h_path->dentry);
+ /* no delegation since it is just created */
+ err = vfsub_rename(h_dir, h_dentry, h_dir, h_path, /*delegated*/NULL,
+ /*flags*/0);
+ dput(h_path->dentry);
+ }
out:
+ return err;
+ */
+ * copyup the @dentry from @bsrc to @bdst.
+ * the caller must set the both of lower dentries.
+ * @len is for truncating when it is -1 copyup the entire file.
+ * in link/rename cases, @dst_parent may be different from the real one.
+ * basic->bsrc can be larger than basic->bdst.
+ * aufs doesn't touch the credential so
+ * security_inode_copy_up{,_xattr}() are unnecrssary.
+ */
+ static int au_cpup_single(struct au_cp_generic *cpg, struct dentry *dst_parent)
+ {
+    int err, rerr;
+    aufs_bindex_t old_ihtop;
+    unsigned char isdir, plink;
+    struct dentry *h_src, *h_dst, *h_parent;
+    struct super_block *sb;
+    struct au_branch *br;
+    /* to reuduce stack size */
+    struct {
+        struct au_dtime dt;
+        struct path h_path;
+        struct au_cpup_reg_attr h_src_attr;
+    } *a;
+    err = -ENOMEM;
+    a = kmalloc(sizeof(*a), GFP_NOFS);
+    if (unlikely(!a))
+        goto out;
+    a->h_src_attr.valid = 0;
+    sb = cpg->dentry->d_sb;
+    br = au_sbr(sb, cpg->bdst);
+    a->h_path.mnt = au_br_mnt(br);
+    h_dst = au_h_dptr(cpg->dentry, cpg->bdst);
+    h_parent = h_dst->d_parent; /* dir inode is locked */
+    h_dir = d_inode(h_parent);
+    IMustLock(h_dir);
+    h_src = au_h_dptr(cpg->dentry, cpg->bsrc);
+    inode = d_inode(cpg->dentry);
+    if (!dst_parent)
+        dst_parent = dget_parent(cpg->dentry);
+    else
+        dget(dst_parent);
+ plink = !!au_opt_test(au_mntflags(sb), PLINK);
+ dst_inode = au_h_iptr(inode, cpg->bdst);
+ if (dst_inode) {
+ if (unlikely(!plink)) {
+ err = -EIO;
+ AuIOErr("hi%lu(i%lu) exists on b%d "
+ "but plink is disabled\n",
+ dst_inode->i_ino, inode->i_ino, cpg->bdst);
+ goto out_parent;
+ }
+ }
+ if (dst_inode->i_nlink) {
+ const int do_dt = au_ftest_cpup(cpg->flags, DTIME);
+ }
+ h_src = au_plink_lkup(inode, cpg->bdst);
+ err = PTR_ERR(h_src);
+ if (IS_ERR(h_src))
+ goto out_parent;
+ if (unlikely(d_is_negative(h_src))) {
+ err = -EIO;
+ AuIOErr("i%lu exists on b%d "
+ "but not pseudo-linked\n",
+ inode->i_ino, cpg->bdst);
+ dput(h_src);
+ goto out_parent;
+ }
+ + if (do_dt) {
+ a->h_path.dentry = h_parent;
+ au_dtime_store(&a->dt, dst_parent, &a->h_path);
+ }
+ a->h_path.dentry = h_dst;
+ delegated = NULL;
+ err = vfsub_link(h_src, h_dir, &a->h_path, &delegated);
+ if (!err &
+ au_ftest_cpup(cpg->flags, RENAME))
+ err = au_do_ren_after_cpup(cpg, &a->h_path);
+ if (do_dt)
+ au_dtime_revert(&a->dt);
+ if (unlikely(err == -EWOULDBLOCK)) {
+ pr_warn("cannot retry for NFSv4 delegation "
+ "for an internal link\n");
+ iput(delegated);
+ }
+ dput(h_src);
+ goto out_parent;
+ } else
+/* todo: cpup_wh_file? */
+/* udba work */
+au_update_ibrange(inode, /*do_put_zero*/1);
+
+isdir = S_ISDIR(inode->i_mode);
+old_ibtop = au_ibtop(inode);
+err = cpup_entry(cpg, dst_parent, &a->h_src_attr);
+if (unlikely(err))
+goto out_rev;
+dst_inode = d_inode(h_dst);
+inode_lock_nested(dstd_inode, AuLsc_I_CHILD2);
+/* todo: necessary? */
+/* au_pin_hdir_unlock(cpg->pin); */
+
+err = cpup_iattr(cpg->dentry, cpg->bdst, h_src, &a->h_src_attr);
+if (unlikely(err)) {
+/* todo: necessary? */
+/* au_pin_hdir_relock(cpg->pin); */ /* ignore an error */
+inode_unlock(dstd_inode);
+goto out_rev;
+}
+
+if (cpg->bdst < old_ibtop) {
+if (S_ISREG(inode->i_mode)) {
+err = au_dy_iaop(inode, cpg->bdst, dst_inode);
+if (unlikely(err)) {
+/* ignore an error */
+/* au_pin_hdir_relock(cpg->pin); */
+inode_unlock(dstd_inode);
+goto out_rev;
+}
+
+au_set_ibtop(inode, cpg->bdst);
+}
+else
+au_set_ibbot(inode, cpg->bdst);
+au_set_hi_ptr(inode, cpg->bdst, dstd_inode, 
+au_hi_flags(inode, isdir));
+
+/* todo: necessary? */
+/* err = au_pin_hdir_relock(cpg->pin); */
+inode_unlock(dstd_inode);
+if (unlikely(err))
+goto out_rev;
+
+src_inode = d_inode(h_src);
+if (!isdir
+    && (src_inode->i_nlink > 1
|| src_inode->i_state & I_LINKABLE) + & plink) +au_plink_append(inode, cpg->bdst, h_dst); + +if (au_ftest_cpup(cpg->flags, RENAME)) { +a->h_path.dentry = h_dst; +err = au_do_ren_after_cpup(cpg, &a->h_path); +} +if (!err) +goto out_parent; /* success */ + +/* revert */ +out_rev: +a->h_path.dentry = h_parent; +au_dtime_store(&a->dt, dst_parent, &a->h_path); +a->h_path.dentry = h_dst; +rerr = 0; +if (d_is_positive(h_dst)) { +if (!isdir) { +/* no delegation since it is just created */ +rerr = vfsub_unlink(h_dir, &a->h_path, + /*delegated*/NULL, /*force*/0); +} else +rerr = vfsub_rmdir(h_dir, &a->h_path); +} +au_dtime_revert(&a->dt); +if (rerr) { +AuIOErr("failed removing broken entry(%d, %d)\n", err, rerr); +err = -EIO; +} +out_parent: +dput(dst_parent); +kfree(a); +out: +return err; +} + +#if 0 /* reserved */ +struct au_cpup_single_args { +int *errp; +struct au_cp_generic *cpg; +struct dentry *dst_parent; +}; + +static void au_call_cpup_single(void *args) +{ +struct au_cpup_single_args *a = args; +
+au_pin_hdir_acquire_nest(a->cpg->pin);
+*a->errp = au_cpup_single(a->cpg, a->dst_parent);
+au_pin_hdir_release(a->cpg->pin);
+
+#endif
+
+/*
+ * prevent SIGXFSZ in copy-up.
+ * testing CAP_MKNOD is for generic fs,
+ * but CAP_FSETID is for xfs only, currently.
+ */
+static int au_cpup_sio_test(struct au_pin *pin, umode_t mode)
+{
+int do_sio;
+struct super_block *sb;
+struct inode *h_dir;
+
+do_sio = 0;
+sb = au_pinned_parent(pin)->d_sb;
+if (!au_wkq_test()
+    && (!au_sbi(sb)->si_plink_maint_pid
+        || au_plink_maint(sb, AuLock_NOPLM))) {
+    switch (mode & S_IFMT) {
+    case S_IFREG:
+        /* no condition about RLIMIT_FSIZE and the file size */
+        do_sio = 1;
+        break;
+    case S_IFCHR:
+    case S_IFBLK:
+        do_sio = !capable(CAP_MKNOD);
+        break;
+    }    
+    if (!do_sio)
+        do_sio = ((mode & (S_ISUID | S_ISGID))
+            && !capable(CAP_FSETID));
+    /* this workaround may be removed in the future */
+    if (!do_sio) {
+        h_dir = au_pinned_h_dir(pin);
+        do_sio = h_dir->i_mode & S_ISVTX;
+    }
+    }
+
+    return do_sio;
+
+}
+}
+int err, wkq_err;
+struct dentry *h_dentry;
+
+h_dentry = au_h_dptr(cpg->dentry, cpg->bsrc);
+if (!au_cpup_sio_test(pin, d_inode(h_dentry)->i_mode))
+err = au_cpup_single(cpg, dst_parent);
+else {
+struct au_cpup_single_args args = {
+.errp		= &err,
+.cpg		= cpg,
+.dst_parent	= dst_parent
+};
+wkq_err = au_wkq_wait(au_call_cpup_single, &args);
+if (unlikely(wkq_err))
+err = wkq_err;
+}
+
+return err;
+
+/*
+ * copyup the @dentry from the first active lower branch to @bdst,
+ * using au_cpup_single().
+ */
+static int au_cpup_simple(struct au_cp_Generic *cpg)
+{
+int err;
+unsigned int flags_orig;
+struct dentry *dentry;
+
+AuDebugOn(cpg->bsrc < 0);
+
+dentry = cpg->dentry;
+DiMustWriteLock(dentry);
+
+err = au_lkup_neg(dentry, cpg->bdst, /*wh*/1);
+if (!err) {
+flags_orig = cpg->flags;
+au_fset_cpup(cpg->flags, RENAME);
+err = au_cpup_single(cpg, NULL);
+cpg->flags = flags_orig;
+if (!err)
+return 0; /* success */
+}
+/* revert */
+au_set_h_dptr(dentry, cpg->bdst, NULL);
+au_set_dbtop(dentry, cpg->bsrc);
+} +
+ return err; +}
+
+ struct au_cpup_simple_args {
+ int *errp;
+ struct au_cp_generic *cpg;
+ );
+
+ static void au_call_cpup_simple(void *args)
+ {
+ struct au_cpup_simple_args *a = args;
+
+ au_pin_hdir_acquire_nest(a->cpg->pin);
+ *a->errp = au_cpup_simple(a->cpg);
+ au_pin_hdir_release(a->cpg->pin);
+ }
+
+ static int au_do_sio_cpup_simple(struct au_cp_generic *cpg)
+ {
+ int err, wkq_err;
+ struct dentry *dentry, *parent;
+ struct file *h_file;
+ struct inode *h_dir;
+
+ dentry = cpg->dentry;
+ h_file = NULL;
+ if (au_ftest_cpup(cpg->flags, HOPEN)) {
+ AuDebugOn(cpg->bsrc < 0);
+ h_file = au_h_open_pre(dentry, cpg->bsrc, /*force_wr*/0);
+ err = PTR_ERR(h_file);
+ if (IS_ERR(h_file))
+ goto out;
+ }
+
+ parent = dget_parent(dentry);
+ h_dir = au_h_iptr(d_inode(parent), cpg->bdst);
+ if (!au_test_h_perm_sio(h_dir, MAY_EXEC | MAY_WRITE)
+ && !au_cpup_sio_test(cpg->pin, d_inode(dentry)->i_mode))
+ err = au_cpup_simple(cpg);
+ else {
+ struct au_cpup_simple_args args = {
+ .errp= &err,
+ .cpg= cpg
+ };
+ wkq_err = au_wkq_wait(au_call_cpup_simple, &args);
+ if (unlikely(wkq_err))
err = wkq_err;
+
+dput(parent);
+if (h_file)
+au_h_open_post(dentry, cpg->bsrc, h_file);
+
+out:
+return err;
+
+int au_sio_cpup_simple(struct au_cp_generic *cpg)
+{
+aufs_bindex_t bsrc, bbott;
+struct dentry *dentry, *h_dentry;
+
+if (cpg->bsrc < 0) {
+dentry = cpg->dentry;
+bbot = au_dbbot(dentry);
+for (bsrc = cpg->bdst + 1; bsrc <= bbott; bsrc++) {
+h_dentry = au_h_dptr(dentry, bsrc);
+if (h_dentry) {
+AuDebugOn(d_is_negative(h_dentry));
+break;
+
+
+AuDebugOn(bsrc > bbott);
+cpg->bsrc = bsrc;
+
+AuDebugOn(cpg->bsrc <= cpg->bdst);
+return au_do_sio_cpup_simple(cpg);
+
+int au_sio_cpdown_simple(struct au_cp_generic *cpg)
+{
+AuDebugOn(cpg->bdst <= cpg->bsrc);
+return au_do_sio_cpup_simple(cpg);
+
+/* ---------------------------------------------------------------------- */
+/*
+ * copyup the deleted file for writing.
+ */
+static int au_do_cpup_wh(struct au_cp_generic *cpg, struct dentry *wh_dentry,
+ struct file *file)
+{
+int err;
unsigned int flags_orig;
aufs_index_t bsrc_orig;
struct au_dinfo *dinfo;

+struct {
+struct au_hdentry *hd;
+struct dentry *h_dentry;
+} hdst, hsrc;

+dinfo = au_di(cpg->dentry);
+AuRwMustWriteLock(&dinfo->di_rwsem);
+
+bsrc_orig = cpg->bsrc;
+cpg->bsrc = dinfo->di_btop;
+hdst.hd = au_hdentry(dinfo, cpg->bdst);
+hdst.hd->hd_dentry = hdst.hd->hd_dentry;
+hdst.hd->hd_dentry = wh_dentry;
+dinfo->di_btop = cpg->bdst;
+
+hsrc.hd->hd_dentry = NULL;
+if (file) {
+hsrc.hd = au_hdentry(dinfo, cpg->bsrc);
+hsrc.hd->hd_dentry = hsrc.hd->hd_dentry;
+hsrc.hd->hd_dentry = au_hf_top(file)->f_path.dentry;
+}
+flags_orig = cpg->flags;
+cpg->flags = !AuCpup_DTIME;
+err = au_cpup_single(cpg, /*h_parent*/NULL);
+cpg->flags = flags_orig;
+if (file) {
+if (!err)
+err = au_reopen_nondir(file);
+hdst.hd->hd_dentry = hsrc.hd->hd_dentry;
+}
+hdst.hd->hd_dentry = hdst.hd->hd_dentry;
+dinfo->di_btop = cpg->bdst;
+cpg->bsrc = bsrc_orig;
+
+return err;
+}
+
+static int au_cpup_wh(struct au_cp_generic *cpg, struct file *file)
+{
+int err;
+aufs_index_t bdst;
+struct au_dtime dt;
+struct dentry *dentry, *parent, *h_parent, *wh_dentry;
+struct au_branch *br;
+struct path h_path;

+   +dentry = cpg->dentry;
+   +bdst = cpg->bdst;
+   +br = au_sbr(dentry->d_sb, bdst);
+   +parent = dget_parent(dentry);
+   +h_parent = au_h_dptr(parent, bdst);
+   +wh_dentry = au_whtmp_lkup(h_parent, br, &dentry->d_name);
+   +err = PTR_ERR(wh_dentry);
+   +if (IS_ERR(wh_dentry))
+   +goto out;
+   +
+   +h_path.dentry = h_parent;
+   +h_path.mnt = au_br_mnt(br);
+   +au_dtime_store(&dt, parent, &h_path);
+   +err = au_do_cpup_wh(cpg, wh_dentry, file);
+   +if (unlikely(err))
+   +goto out_wh;
+   +
+   +dget(wh_dentry);
+   +h_path.dentry = wh_dentry;
+   +if (!d_is_dir(wh_dentry)) {
+     /* no delegation since it is just created */
+     err = vfsub_unlink(d_inode(h_parent), &h_path,
+     +  /*delegated*/NULL, /*force*/0);
+     +} else
+     +err = vfsub_rmdir(d_inode(h_parent), &h_path);
+     +if (unlikely(err)) {
+     +AuIOErr("failed remove copied-up tmp file %pd(%d)\n",
+     +wh_dentry, err);
+     +err = -EIO;
+     +}
+     +au_dtime_revert(&dt);
+   +au_set_hi_wh(d_inode(dentry), bdst, wh_dentry);
+   +
+   +out_wh:
+   +dput(wh_dentry);
+   +out:
+   +dput(parent);
+   +return err;
+   +}
+   +
+   +struct au_cpup_wh_args {
+     +int *errp;
+     +struct au_cp_generic *cpg;
+     +struct file *file;
+   +};
+   +
+   +static void au_call_cpup_wh(void *args)
int au_sio_cpup_wh(struct au_cpup_generic *cpg, struct file *file) {
    int err, wkq_err;
    aufs_bindex_t bdst;
    struct dentry *dentry, *parent, *h_orph, *h_parent;
    struct inode *dir, *h_dir, *h_tmpdir;
    struct au_wbr *wbr;
    struct au_pin wh_pin, *pin_orig;

    dentry = cpg->dentry;
    bdst = cpg->bdst;
    parent = dget_parent(dentry);
    dir = d_inode(parent);
    h_orph = NULL;
    h_parent = NULL;
    h_dir = au_igrab(au_h_iptr(dir, bdst));
    h_tmpdir = h_dir;
    pin_orig = NULL;
    if (!h_dir->i_nlink) {
        wbr = au_sbr(dentry->d_sb, bdst)->br_wbr;
        h_orph = wbr->wbr_orph;
        h_parent = dget(au_h_dptr(parent, bdst));
        au_set_h_dptr(parent, bdst, dget(h_orph));
        h_tmpdir = d_inode(h_orph);
        au_set_h_iptr(dir, bdst, au_igrab(h_tmpdir), /*flags*/0);
        inode_lock_nested(h_tmpdir, AuLsc_I_PARENT3);
        /* todo: au_h_open_pre()? */
        if (!au_test_h_perm_sio(h_tmpdir, MAY_EXEC | MAY_WRITE)
            && !au_cpup_sio_test(cpg->pin, d_inode(dentry)->i_mode))
            err = au_cpup_wh(cpg, file);
        else {
+struct au_cpup_wh_args args = {
 +.errp= &err,
 +.cpg= cpg,
 +.file= file
 +};
+wkq_err = au_wkq_wait(au_call_cpup_wh, &args);
+if (unlikely(wkq_err))
+err = wkq_err;
+
+if (h_orph) {
+inode_unlock(h_tmpdir);
+/* todo: au_h_open_post()? */
+au_set_h_iptr(dir, bdst, au_igrab(h_dir), /*flags=*/0);
+au_set_h_dptr(parent, bdst, h_parent);
+AuDebugOn(!pin_orig);
+cpg->pin = pin_orig;
+
+put(h_dir);
+dput(parent);
+
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+/*
 * generic routine for both of copy-up and copy-down.
 * 
 */
+/* cf. revalidate function in file.c */
+int au_cp_dirs(struct dentry *dentry, aufs_bindex_t bdst,
+ int (*cp)(struct dentry *dentry, aufs_bindex_t bdst,
+ struct au_pin *pin,
+ struct dentry *h_parent, void *arg),
+ void *arg)
+
+int err;
+struct au_pin pin;
+
+err = 0;
+parent = dget_parent(dentry);
+if (IS_ROOT(parent))
+goto out;
+
+au_pin_init(&pin, dentry, bdst, AuLsc_DI_PARENT2, AuLsc_I_PARENT2,
+ au_opt_udba(dentry->d_sb), AuPin_MNT_WRITE);
/* do not use au_dpage */
+real_parent = parent;
+while (1) {
+dput(parent);
+parent = dget_parent(dentry);
+h_parent = au_h_dptr(parent, bdst);
+if (h_parent)
+goto out; /* success */
+
+/* find top dir which is necessary to cpup */
+do {
+d = parent;
+dput(parent);
+parent = dget_parent(d);
+di_read_lock_parent3(parent, !AuLock_IR);
+h_parent = au_h_dptr(parent, bdst);
+di_read_unlock(parent, !AuLock_IR);
+} while (!h_parent);
+
+if (d != real_parent)
+di_write_lock_child3(d);
+
+/* somebody else might create while we were sleeping */
+h_dentry = au_h_dptr(d, bdst);
+if (h_dentry || d_is_negative(h_dentry)) {
+if (h_dentry)
+au_update_dbttop(d);
+
+au_pin_set_dentry(&pin, d);
+err = au_do_pin(&pin);
+if (!err) {
+err = cp(d, bdst, &pin, h_parent, arg);
+au_unpin(&pin);
+}
+}
+
+if (d != real_parent)
+di_write_unlock(d);
+if (unlikely(err))
+break;
+}
+
+out:
+dput(parent);
+return err;
+
+static int au_cpup_dir(struct dentry *dentry, aufs_bindex_t bdst,
+    struct au_pin *pin,
+    struct dentry *h_parent __maybe_unused,
+    void *arg __maybe_unused)
+{
+    struct au_cp_generic cpg = {
+    .dentry = dentry,
+    .bdst = bdst,
+    .bsrc = -1,
+    .len = 0,
+    .pin = pin,
+    .flags = AuCpup_DTIME
+    };
+    return au_sio_cpup_simple(&cpg);
+}
+
+int au_cpup_dirs(struct dentry *dentry, aufs_bindex_t bdst)
+{
+    return au_cp_dirs(dentry, bdst, au_cpup_dir, NULL);
+}
+
+int au_test_and_cpup_dirs(struct dentry *dentry, aufs_bindex_t bdst)
+{
+    int err;
+    struct dentry *parent;
+    struct inode *dir;
+    
+    parent = dget_parent(dentry);
+    dir = d_inode(parent);
+    err = 0;
+    if (au_h_iptr(dir, bdst))
+        goto out;
+    di_read_unlock(parent, AuLock_IR);
+    di_write_lock_parent(parent);
+    /* someone else might change our inode while we were sleeping */
+    if (!au_h_iptr(dir, bdst))
+        err = au_cpup_dirs(dentry, bdst);
+    di_downgrade_lock(parent, AuLock_IR);
+    out:
+    dput(parent);
+    return err;
+}

--- linux-4.15.0.orig/fs/aufs/cpup.h
+++ linux-4.15.0/fs/aufs/cpup.h
@@ -0,0 +1,99 @@
+#* Copyright (C) 2005-2017 Junjiro R. Okajima
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copy-up/down functions

#ifndef __AUFS_CPUP_H__
#define __AUFS_CPUP_H__
#ifdef __KERNEL__
#include <linux/path.h>
struct inode;
struct file;
struct au_pin;
void au_cpup_attr_flags(struct inode *dst, unsigned int iflags);
void au_cpup_attr_timesizes(struct inode *inode);
void au_cpup_attr_nlink(struct inode *inode, int force);
void au_cpup_attr_changeable(struct inode *inode);
void au_cpup_igen(struct inode *inode, struct inode *h_inode);
void au_cpup_attr_all(struct inode *inode, int force);
#endif
#endif

struct au_cpup { 
	struct dentry *dentry;
	unsigned int bdst, bsrc;
	loff_t len;
	struct au_pin *pin;
};

+/_ cpup flags */
+define AuCpup_DTIME /* do dtimes_store/revert */
+define AuCpup_KEEPINO(1 << 1) /* do not clear the lower xino, 
+ for link(2) */
+define AuCpup_RENAME(1 << 2) /* rename after cpup */
+define AuCpup_HOPEN(1 << 3) /* call h_open_pre/post() in 
+ cpup */
+define AuCpup_OVERWRITE(1 << 4) /* allow overwriting the 
+ existing entry */
+define AuCpup_RWDEST(1 << 5) /* force write target even if 
+ the branch is marked as RO */
+
+ifndef CONFIG_AUFS_BR_HFSPLUS
+undef AuCpup_HOPEN
+define AuCpup_HOPEN0
+#endif
+
+define au_fetest_cpup(flags, name)((flags) & AuCpup_##name)
+define au_fset_cpup(flags, name) \
+do { (flags) |= AuCpup_##name; } while (0)
+define au_fclr_cpup(flags, name) \
+do { (flags) &= ~AuCpup_##name; } while (0)
+
+int au_copy_file(struct file *dst, struct file *src, loff_t len);
+int au_sio_cpup_simple(struct au_cp_generic *cpg);
+int au_sio_cpdown_simple(struct au_cpGeneric *cpg);
+int au_sio_cpup_wh(struct au_cp_generic *cpg, struct file *file);
+
+int au_cp_dirs(struct dentry *dentry, aufs_bindex_t bdst, 
+ struct dentry *h_parent, void *arg);
+ void *arg);
+int au_cpup_dirs(struct dentry *dentry, aufs_bindex_t bdst);
+int au_test_and_cpup_dirs(struct dentry *dentry, aufs_bindex_t bdst);
+
+/* ---------------------------------------------------------------------- */
+
+/* keep timestamps when copyup */
+struct au_dtime {
+struct dentry *dt_dentry;
+struct path dt_h_path;
+struct timespec dt_atime, dt_mtime;
+}
+void au_dtime_store(struct au_dtime *dt, struct dentry *dentry, 
+ struct path *h_path);
+void au_dtime_revert(struct au_dtime *dt);
+
+#endif /* __KERNEL__ */

/* debugfs interface */

#include <linux/debugfs.h>
#include "aufs.h"
+
#ifndef CONFIG_SYSFS
#error DEBUG_FS depends upon SYSFS
#endif

static struct dentry *dbgaufs;
static const mode_t dbgaufs_mode = S_IRUSR | S_IRGRP | S_IROTH;

/* 20 is max digits length of ulong 64 */
struct dbgaufs_arg {
  int n;
  char a[20 * 4];
};
+
/* common function for all XINO files */

#define USE_AFS 1

static int dbgaufs_xi_release(struct inode *inode __maybe_unused, struct file *file) {
  kfree(file->private_data);
  return 0;
}
return 0;
+
+static int dbgaufs_xi_open(struct file *xf, struct file *file, int do_fcnt)
+{
+int err;
+struct kstat st;
+struct dbgaufs_arg *p;
+
+err = -ENOMEM;
+p = kmalloc(sizeof(*p), GFP_NOFS);
+if (unlikely(!p))
+goto out;
+
+err = 0;
+p->n = 0;
+file->private_data = p;
+if (!xf)
+goto out;
+
+err = vfsub_getattr(&xf->f_path, &st);
+if (!err) {
+if (do_fcnt)
+p->n = snprintf
+  (p->a, sizeof(p->a), "%ld, %llu%u %lld\n",
+  (long)file_count(xf), st.blocks, st.blksize,
+  (long long)st.size);
+else
+p->n = snprintf(p->a, sizeof(p->a), "%llu%u %lld\n",
+st.blocks, st.blksize,
+(long long)st.size);
+AuDebugOn(p->n >= sizeof(p->a));
+} else {
+p->n = snprintf(p->a, sizeof(p->a), "err %d\n", err);
+err = 0;
+}
+
+out:
+return err;
+
+}
+
+static ssize_t dbgaufs_xi_read(struct file *file, char __user *buf,
+    size_t count, loff_t *ppos)
+{
+struct dbgaufs_arg *p;
+
+p = file->private_data;
+return simple_read_from_buffer(buf, count, ppos, p->a, p->n);
+
+/* ---------------------------------------------------------------------- */
+
+struct dbgaufs_plink_arg {
+int n;
+char a[];
+};
+
+static int dbgaufs_plink_release(struct inode *inode __maybe_unused,
+  struct file *file)
+{
+  free_page((unsigned long)file->private_data);
+  return 0;
+}
+
+static int dbgaufs_plink_open(struct inode *inode, struct file *file)
+{
+  int err, i, limit;
+  unsigned long n, sum;
+  struct dbgaufs_plink_arg *p;
+  struct au_sbinfo *sbinfo;
+  struct super_block *sb;
+  struct hlist_bl_head *hbl;
+
+  err = -ENOMEM;
+  p = (void *)get_zeroed_page(GFP_NOFS);
+  if (unlikely(!p))
+    goto out;
+
+  err = -EFBIG;
+  sbinfo = inode->i_private;
+  sb = sbinfo->si_sb;
+  si_noflush_read_lock(sb);
+  if (au_opt_test(au_mntflags(sb), PLINK)) {
+    limit = PAGE_SIZE - sizeof(p->n);
+    /* the number of buckets */
+    n = snprintf(p->a + p->n, limit, "%d\n", AuPlink_NHASH);
+    p->n += n;
+    limit -= n;
+    sum = 0;
+    for (i = 0, hbl = sbinfo->si_plink; i < AuPlink_NHASH;
+          i++, hbl++) {
+      n = au_hbl_count(hbl);
+      sum += n;
+    }
+  }
+  return 0;
+}


+n = snprintf(p->a + p->n, limit, "%lu ", n);
+p->n += n;
+limit -= n;
+if (unlikely(limit <= 0))
+goto out_free;
+
+/* the sum of plinks */
+n = snprintf(p->a + p->n, limit, "%lu\n", sum);
+p->n += n;
+limit -= n;
+if (unlikely(limit <= 0))
+goto out_free;
+} else {
+#define str "1\n0\n0\n"
+p->n = sizeof(str) - 1;
+strcpy(p->a, str);
+#undef str
+
+si_read_unlock(sb);
+
+err = 0;
+file->private_data = p;
+goto out; /* success */
+
+out_free:
+free_page((unsigned long)p);
+out:
+return err;
+
+static ssize_t dbgaufs_plink_read(struct file *file, char __user *buf,
+  size_t count, loff_t *ppos)
+{
+struct dbgaufs_plink_arg *p;
+
+p = file->private_data;
+return simple_read_from_buffer(buf, count, ppos, p->a, p->n);
+
+static const struct file_operations dbgaufs_plink_fop = {
+  .owner= THIS_MODULE,
+  .open= dbgaufs_plink_open,
+  .release= dbgaufs_plink_release,
+  .read= dbgaufs_plink_read
+};
+/
+--------------------------------------------------------------------------*/
+
+static int dbgaufs_xib_open(struct inode *inode, struct file *file) {
+    int err;
+    struct au_sbinfo *sbinfo;
+    struct super_block *sb;
+    sbinfo = inode->i_private;
+    sb = sbinfo->si_sb;
+    si_noflush_read_lock(sb);
+    err = dbgaufs_xi_open(sbinfo->si_xib, file, /*do_fcnt*/0);
+    si_read_unlock(sb);
+    return err;
+}
+
+static const struct file_operations dbgaufs_xib_fop = {
+    .owner = THIS_MODULE,
+    .open = dbgaufs_xib_open,
+    .release = dbgaufs_xi_release,
+    .read = dbgaufs_xi_read
+};
+
+/#define DbgaufsXi_PREFIX "xi"
+
+static int dbgaufs_xino_open(struct inode *inode, struct file *file) {
+    int err;
+    long l;
+    struct au_sbinfo *sbinfo;
+    struct super_block *sb;
+    struct file *xf;
+    struct qstr *name;
+    err = -ENOENT;
+    xf = NULL;
+    name = &file->f_path.dentry->d_name;
+    if (unlikely(name->len < sizeof(DbgaufsXi_PREFIX) ||
+        memcmp(name->name, DbgaufsXi_PREFIX, sizeof(DbgaufsXi_PREFIX) - 1)))
+        goto out;
+    err = kstrtol(name->name + sizeof(DbgaufsXi_PREFIX) - 1, 10, &l);
+    if (unlikely(err))
+        goto out;
+    goto out;
+}
+sbinfo = inode->i_private;
+sb = sbinfo->si_sb;
+si_noflush_read_lock(sb);
+if (l <= au_sbbot(sb)) {
  +xf = au_sbr(sb, (aufs_bindex_t)l)->br_xino.xi_file;
  +err = dbgaufs_xi_open(xf, file, /*do_fcnt*/1);
  } else
  +err = -ENOENT;
+si_read_unlock(sb);
+
+out:
+return err;
+}
+
+static const struct file_operations dbgaufs_xino_fop = {
  .owner		= THIS_MODULE,
  .open		= dbgaufs_xino_open,
  .release	= dbgaufs_xi_release,
  .read		= dbgaufs_xi_read
  }
+);
+
+void dbgaufs_brs_del(struct super_block *sb, aufs_bindex_t bindex)
+{
  +aufs_bindex_t bbot;
  +struct au_branch *br;
  +struct au_xino_file *xi;
  +
  +if (!au_sbi(sb)->si_dbgaufs)
  +return;
  +
  +bbot = au_sbbot(sb);
  +for (; bindex <= bbot; bindex++) {
    +br = au_sbr(sb, bindex);
    +xi = &br->br_xino;
    +/* debugfs acquires the parent i_mutex */
    +lockdep_off();
    +debugfs_remove(xi->xi_dbgaufs);
    +lockdep_on();
    +xi->xi_dbgaufs = NULL;
    +}
    +}
    +
  +void dbgaufs_brs_add(struct super_block *sb, aufs_bindex_t bindex)
  +{
    +struct au_sbinfo *sbinfo;
    +struct dentry *parent;
    +struct au_branch *br;
    +struct au_xino_file *xi;
    +}
+aufs_bindex_t bbot;
+char name[4096]; /* xi" bindex NULL */
+
+sinfo = au_sbi(sb);
+parent = sinfo->si_dbgaufs;
+if (!parent)
+return;
+
+bbot = au_sbbot(sb);
+for (; bindex <= bbot; bindex++) {
+snprintf(name, sizeof(name), DbgaufsXi_PREFIX "%d", bindex);
+br = au_sbr(sb, bindex);
+if (&br->br_xino);
+AuDebugOn(xi->xi_dbgaufs);
+/* debugfs acquires the parent i_mutex */
+lockdep_off();
+xi->xi_dbgaufs = debugfs_create_file(name, O_RDONLY, parent,
+    sbinfo, &dbgaufs_xino_fop);
+lockdep_on();
+/* ignore an error */
+if (unlikely(!xi->xi_dbgaufs))
+AuWarn1("failed %s under debugfs
", name);
+
+/* ................................................................. */
+
+#ifdef CONFIG_AUFS_EXPORT
+static int dbgaufs_xigen_open(struct inode *inode, struct file *file)
+{
+    int err;
+    struct au_sbinfo *sinfo;
+    struct super_block *sb;
+
+    sinfo = inode->i_private;
+    sb = sinfo->si_sb;
+    si_noflush_read_lock(sb);
+    err = dbgaufs_xi_open(sinfo->si_xigen, file, O_RDONLY);
+    si_read_unlock(sb);
+    return err;
+}
+
+static const struct file_operations dbgaufs_xigen_fop = {
+    .owner= THIS_MODULE,
+    .open= dbgaufs_xigen_open,
+    .release= dbgaufs_xi_release,
+    .read= dbgaufs_xi_read
+};
+static int dbgaufs_xigen_init(struct au_sbinfo *sinfo)
+{
+    int err;
+
+    /* This function is a dynamic '__init' function actually,
+     * so the tiny check for si_rwsem is unnecessary.
+     */
+    /* AuRwMustWriteLock(&sinfo->si_rwsem); */
+    +
+    +err = -EIO;
+    +sinfo->si_dbgaufs_xigen = debugfs_create_file
+    +("xigen", dbgaufs_mode, sinfo->si_dbgaufs, sinfo,
+     +&dbgaufs_xigen_fop);
+    +if (sinfo->si_dbgaufs_xigen)
+        +err = 0;
+    +
+    +return err;
+  +}
+}
+#else
+static int dbgaufs_xigen_init(struct au_sbinfo *sinfo)
+{
+    return 0;
+}
+#endif /* CONFIG_AUFS_EXPORT */
+
+/* ---------------------------------------------------------------------- */
+
+void dbgaufs_si_fin(struct au_sbinfo *sinfo)
+{
+    /* This function is a dynamic '__fin' function actually,
+     * so the tiny check for si_rwsem is unnecessary.
+     */
+    /* AuRwMustWriteLock(&sinfo->si_rwsem); */
+    +
+    +debugfs_remove_recursive(sinfo->si_dbgaufs);
+    +sinfo->si_dbgaufs = NULL;
+    +kobject_put(&sinfo->si_kobj);
+  +}
+}
+
+int dbgaufs_si_init(struct au_sbinfo *sinfo)
+{
+    int err;
+    char name[SysaufsSiNameLen];
+    +
+    +/*
This function is a dynamic '__init' function actually, so the tiny check for si_rwlock is unnecessary.

/*
 * AuRwMustWriteLock(&sbinfo->si_rwlock); */
+
+err = -ENOENT;
+if (!dbgaufs) {
    AuErr1("/debug/aufs is uninitialized
");
    goto out;
    +}
+
+err = -EIO;
+sysaufs_name(sbinfo, name);
+sbinfo->si_dbgaufs = debugfs_create_dir(name, dbgaufs);
+if (unlikely(!sbinfo->si_dbgaufs))
    goto out;
+kobject_get(&sbinfo->si_kobj);
+
+sbinfo->si_dbgaufs_xib = debugfs_create_file
+("xib", dbgaufs_mode, sbinfo->si_dbgaufs, sbinfo,
     &dbgaufs_xib_fop);
+if (unlikely(!sbinfo->si_dbgaufs_xib))
    goto out_dir;
+
+sbinfo->si_dbgaufs_plink = debugfs_create_file
+("plink", dbgaufs_mode, sbinfo->si_dbgaufs, sbinfo,
     &dbgaufs_plink_fop);
+if (unlikely(!sbinfo->si_dbgaufs_plink))
    goto out_dir;
+
+err = dbgaufs_xigen_init(sbinfo);
+if (!err)
    goto out; /* success */
+
+out_dir:
+dbgaufs_si_fin(sbinfo);
+out:
+return err;
+}
+
*/

/* ---------------------------------------------------------------------- */

void dbgaufs_fin(void)
{

debugefs_remove(dbgaufs);
+
+int __init dbgaufs_init(void)
+{
+int err;
+
+err = -EIO;
+dbgaufs = debugfs_create_dir(AUFS_NAME, NULL);
+if (dbgaufs)
+err = 0;
+return err;
+
--- linux-4.15.0.orig/fs/aufs/dbgaufs.h
+++ linux-4.15.0/fs/aufs/dbgaufs.h
@@ -0,0 +1,48 @@
+/*
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+ */
+
+/* debugfs interface
+ */
+#ifndef __DBGAUFS_H__
+#define __DBGAUFS_H__
+
+struct super_block;
+struct au_sbinfo;
+
+if define __KERNEL__
+
+struct super_block;
+struct au_sbinfo;
+
+if define CONFIG_DEBUG_FS
+/* dbgaufs.c */
+void dbgaufs_brs_del(struct super_block *sb, aufs_bindex_t bindex);
+void dbgaufs_brs_add(struct super_block *sb, aufs_bindex_t bindex);
+void dbgaufs_si_fin(struct au_sbinfo *sinfo);
+int dbgaufs_si_init(struct au_sbinfo *sinfo);
+void dbgaufs_fin(void);
#include "aufs.h"

static void au_dpage_free(struct au_dpage *dpage)
{
    int i;
    struct dentry **p;

    p = dpage->dentries;
    for (i = 0; i < dpage->ndentry; i++)
        dput(*p);
    free_page((unsigned long)dpage->dentries);
}

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/* */
/* sub-routines for dentry cache */
/* */
/* include "aufs.h" */

static void au_dpage_free(struct au_dpage *dpage)
{
    int i;
    struct dentry **p;

    p = dpage->dentries;
    for (i = 0; i < dpage->ndentry; i++)
        dput(*p);
    free_page((unsigned long)dpage->dentries);
}
int au_dpages_init(struct au_dcsub_pages *dpages, gfp_t gfp)
{
    int err;
    void *p;
    err = -ENOMEM;
    dpages->dpages = kmalloc(sizeof(*dpages->dpages), gfp);
    if (unlikely(!dpages->dpages))
        goto out;
    p = (void *)__get_free_page(gfp);
    if (unlikely(!p))
        goto out_dpages;
    dpages->dpages[0].ndentry = 0;
    dpages->dpages[0].dentries = p;
    dpages->ndpage = 1;
    return 0; /* success */
    out_dpages:
        kfree(dpages->dpages);
    out:
        return err;
}

void au_dpages_free(struct au_dcsub_pages *dpages)
{
    int i;
    struct au_dpage *p;
    p = dpages->dpages;
    for (i = 0; i < dpages->ndpage; i++)
        au_dpage_free(p++);
    kfree(dpages->dpages);
}

static int au_dpages_append(struct au_dcsub_pages *dpages,
    struct dentry *dentry, gfp_t gfp)
{
    int err, sz;
    struct au_dpage *dpage;
    void *p;
    dpage = dpages->dpages + dpages->ndpage;
    sz = PAGE_SIZE / sizeof(dentry);
    if (unlikely(dpage->ndentry >= sz))
        AuLabel(new dpage);
+err = -ENOMEM;
+sz = dpages->ndpage * sizeof(*dpages->dpages);
+p = au_kzrealloc(dpages->dpages, sz,
+ sz + sizeof(*dpages->dpages), gfp,
+ /*may_shrink*/0);
+if (unlikely(!p))
+goto out;
+
+dpages->dpages = p;
+dpage = dpages->dpages + dpages->ndpage;
+p = (void *)__get_free_page(gfp);
+if (unlikely(!p))
+goto out;
+
+dpage->ndentry = 0;
+dpage->dentries = p;
+dpages->ndpage++;
+
+AuDebugOn(au_dcount(dentry) <= 0);
+dpage->dentries[dpage->ndentry++] = dget_dlock(dentry);
+return 0; /* success */
+
+out:
+return err;
+
+/* todo: BAD approach */
+/* copied from linux/fs/dcache.c */
+enum d_walk_ret {
+D_WALK_CONTINUE,
+D_WALK_QUIT,
+D_WALK_NORETRY,
+D_WALK_SKIP,
+};
+
+extern void d_walk(struct dentry *parent, void *data,
+ enum d_walk_ret (*enter)(void *, struct dentry *),
+ void (*finish)(void *));
+
+struct ac_dpages_arg {
+int err;
+struct au_dcsub_pages *dpages;
+struct super_block *sb;
+au_dpages_test test;
+void *arg;
+};
+
+static enum d_walk_ret au_call_dpaged_append(void *_arg, struct dentry *dentry)
+{
+enum d_walk_ret ret;
+struct ac_dpaged_arg *arg = _arg;
+
+ret = D_WALK_CONTINUE;
+if (dentry->d_sb == arg->sb
+    && !IS_ROOT(dentry)
+    && au_dcount(dentry) > 0
+    && au_di(dentry)
+    && (!arg->test || arg->test(dentry, arg->arg))) {
+arg->err = au_dpaged_append(arg->dpages, dentry, GFP_ATOMIC);
+if (unlikely(arg->err))
+ret = D_WALK_QUIT;
+}
+
+return ret;
+}
+
+int au_dcsb_pages(struct au_dcsb_pages *dpages, struct dentry *root,
+    au_dpaged_test test, void *arg)
+{
+struct ac_dpaged_arg args = {
+.err = 0,
+.dpages = dpages,
+.sb = root->d_sb,
+.test = test,
+.arg = arg
+};
+
+d_walk(root, &args, au_call_dpaged_append, NULL);
+
+return args.err;
+}
+
+int au_dcsb_pages_rev(struct au_dcsb_pages *dpages, struct dentry *dentry,
+    int do_include, au_dpaged_test test, void *arg)
+{
+int err;
+
+err = 0;
+write_seqlock(&rename_lock);
+spin_lock(&dentry->d_lock);
+if (do_include
+    && au_dcount(dentry) > 0
+    && (!test || test(dentry, arg)))
+err = au_dpaged_append(dpages, dentry, GFP_ATOMIC);
+spin_unlock(&dentry->d_lock);
+if (unlikely(err))
+goto out;
+
+/*
+ * RCU for vfsmount is unnecessary since this is a traverse in a single
+ * mount
+ */
+while (!IS_ROOT(dentry)) {
+dentry = dentry->d_parent; /* rename_lock is locked */
+spin_lock(&dentry->d_lock);
+if (au_dcount(dentry) > 0
+    && (!test || test(dentry, arg)))
+err = au_dpages_append(dpages, dentry, GFP_ATOMIC);
+spin_unlock(&dentry->d_lock);
+if (unlikely(err))
+break;
+}
+
+out:
+write_sequnlock(&rename_lock);
+return err;
+
+static inline int au_dcsub_dpages_aufs(struct dentry *dentry, void *arg)
+{
+return au_di(dentry) && dentry->d_sb == arg;
+}
+
+int au_dcsub_pages_rev_aufs(struct au_dcsub_pages *dpages,
+    struct dentry *dentry, int do_include)
+{
+return au_dcsub_pages_rev(dpages, dentry, do_include,
+    struct dentry *dentry, int do_include);
+}
+
+int au_test_subdir(struct dentry *d1, struct dentry *d2)
+{
+struct path path[2] = {
+    {.dentry = d1
+    },
+    {.dentry = d2
+    };
+
+return path_is_under(path + 0, path + 1);
+}
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 */

/* sub-routines for dentry cache */

#ifndef __AUFS_DCSUB_H__
#define __AUFS_DCSUB_H__
#ifdef __KERNEL__

#include <linux/dcache.h>
#include <linux/fs.h>

struct au_dpage {
    int ndentry;
    struct dentry **dentries;
};

struct au_dcsub_pages {
    int ndpage;
    struct au_dpage *dpages;
};

/* dcsub.c */
int au_dpages_init(struct au_dcsub_pages *dpages, gfp_t gfp);
void au_dpages_free(struct au_dcsub_pages *dpages);
typedef int (*au_dpages_test)(struct dentry *dentry, void *arg);
+int au_dcsu_pages(struct au_dcsu_pages *dpages, struct dentry *root,
+     au_dpages_test test, void *arg);
+int au_dcsu_pages_rev(struct au_dcsu_pages *dpages, struct dentry *dentry,
+     int do_include, au_dpages_test test, void *arg);
+int au_dcsu_pages_rev_aufs(struct au_dcsu_pages *dpages,
+     struct dentry *dentry, int do_include);
+int au_test_subdir(struct dentry *d1, struct dentry *d2);
+
+/* ---------------------------------------------------------------------- */
+
+/*
+ * todo: in linux-3.13, several similar (but faster) helpers are added to
+ * include/linux/dcache.h. Try them (in the future).
+ */
+
+static inline int au_d_hashed_positive(struct dentry *d)
+{
+    int err;
+    struct inode *inode = d_inode(d);
+    
+    err = 0;
+    if (unlikely(d_unhashed(d)
+                                || d_is_negative(d)
+                                || !inode->i_nlink))
+        err = -ENOENT;
+    return err;
+}
+
+static inline int au_d_linkable(struct dentry *d)
+{
+    int err;
+    struct inode *inode = d_inode(d);
+    
+    err = au_d_hashed_positive(d);
+    if (err
+        && d_is_positive(d)
+        && (inode->i_state & I_LINKABLE))
+        err = 0;
+    return err;
+}
+
+static inline int au_d_alive(struct dentry *d)
+{
+    int err;
+    struct inode *inode;
+    
+    err = 0;
+    if (!IS_ROOT(d))
+        return 0;
+    err = au_d_hashed_positive(d);
+    if (err
+        && d_is_positive(d)
+        && (inode->i_state & I_LINKABLE))
+        err = 0;
+    return err;
+}
err = au_d_hashed_positive(d);
else {
    inode = d_inode(d);
    if (unlikely(d_unlinked(d))
        || d_is_negative(d)
        || !inode->i_nlink))
        err = -ENOENT;
    }
    return err;
    }

static inline int au_alive_dir(struct dentry *d)
{
    int err;
    err = au_d_alive(d);
    if (unlikely(err || IS_DEADDIR(d_inode(d))))
        err = -ENOENT;
    return err;
}

static inline int au_qstreq(struct qstr *a, struct qstr *b)
{
    return a->len == b->len
    && !memcmp(a->name, b->name, a->len);
}

/*
 * by the commit
 * 360f547 2015-01-25 dcache: let the dentry count go down to zero without
 * taking d_lock
 * the type of d_lockref.count became int, but the inlined function d_count()
 * still returns unsigned int.
 * I don't know why. Maybe it is for every d_count() users?
 * Anyway au_dcount() lives on.
 */
static inline int au_dcount(struct dentry *d)
{
    return (int)d_count(d);
}

#ifdef /* __KERNEL__ */
#endif /* __AUFS_DCSUB_H__ */
--- linux-4.15.0.orig/fs/aufs/debug.c
+++ linux-4.15.0/fs/aufs/debug.c
@@ -0,0 +1,440 @@
+/*
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 */

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/include "aufs.h"

+ static int param_atomic_t_set(const char *val, const struct kernel_param *kp)
+ {
+     int err, n;
+     err = kstrtoint(val, 0, &n);
+     if (!err) {
+         if (n > 0)
+             au_debug_on();
+         else
+             au_debug_off();
+     }
+     return err;
+ }

+ static int param_atomic_t_get(char *buffer, const struct kernel_param *kp)
+ {
+     a = kp->arg;
+     return sprintf(buffer, "%d", atomic_read(a));
+ }

+static struct kernel_param_ops param_ops_atomic_t = {
+    .set = param_atomic_t_set,
+    .get = param_atomic_t_get
/* void (*free)(void *arg) */
+
+atomic_t aufs_debug = ATOMIC_INIT(0);
+MODULE_PARM_DESC(debug, "debug print");
+module_param_named(debug, aufs_debug, atomic_t, S_IRUGO | S_IWUSR | S_IWGRP);
+
+DEFINE_MUTEX(au_dbg_mtx); /* just to serialize the dbg msgs */
+char *au_plevel = KERN_DEBUG;
+#define dpri(fmt, ...) do {
+ if ((au_plevel)
+ && strcmp(au_plevel, KERN_DEBUG))
+ || au_debug_test())
+ printk("%s" fmt, au_plevel, ##__VA_ARGS__);
+ } while (0)
+
+/* ---------------------------------------------------------------------- */
+
+void au_dpri_whlist(struct au_nhash *whlist)
+{
+ unsigned long ul, n;
+ struct hlist_head *head;
+ struct au_vdir_wh *pos;
+ +n = whlist->nh_num;
+ head = whlist->nh_head;
+ for (ul = 0; ul < n; ul++) {
+ hlist_for_each_entry(pos, head, wh_hash)
+ dpri("b%d, %.*s, %d
",
+ pos->wh_bindex,
+ pos->wh_str.len, pos->wh_str.name,
+ pos->wh_str.len);
+ head++;
+ }
+ +}
+
+void au_dpri_vdir(struct au_vdir *vdir)
+{
+ unsigned long ul;
+ union au_vdir_deblk_p p;
+ unsigned char *o;
+ +if (!vdir || IS_ERR(vdir)) {
+ dpri("err %d\n", PTR_ERR(vdir));
+ return;
+ }
+ +dpri("deblk %u, nblk %lu, deblk %p, last{%lu, %p}, ver %lu\n",}
+ vdir->vd_deblk_sz, vdir->vd_nblk, vdir->vd_deblk,
+ vdir->vd_last.ul, vdir->vd_last.p.deblk, vdir->vd_version);
+for (ul = 0; ul < vdir->vd_nblk; ul++) {
  +p.deblk = vdir->vd_deblk[ul];
  +o = p.deblk;
  +dprit("[%lu]: %p\n", ul, o);
  +}
  +}
  +
+static int do_pri_inode(aufs_bindex_t bindex, struct inode *inode, int hn,
+struct dentry *wh)
+{
  +char *n = NULL;
  +int l = 0;
  +
  +#if (!inode || IS_ERR(inode)) {
  +%dprit("i%d: err %ld\n", bindex, PTR_ERR(inode));
  +%return -1;
  +} 
  +
  +#/ the type of i_blocks depends upon CONFIG_LBDAF */
+BUILD_BUG_ON(sizeof(inode->i_blocks) != sizeof(unsigned long)
  + && sizeof(inode->i_blocks) != sizeof(u64));
+if (wh) {
  +n = (void *)wh->d_name.name;
  +l = wh->d_name.len;
  +}
  +
  +dprit("i%d: %p, i%lu, %s, cnt %d, nl %u, 0%o, sz %llu, blk %llu,"
  + " hn %d, ct %ld, np %lu, st 0x%lx, f 0x%x, v %llu, g %x%s%.s\n",
  + buildx, inode,
  + inode->i_ino, inode->i_sb ? au_sbtype(inode->i_sb) : "??",
  + atomic_read(&inode->i_count), inode->i_nlink, inode->i_mode,
  + i_size_read(inode), (unsigned long long)inode->i_blocks,
  + hn, (long long)timespec_to_ns(&inode->i_ctime) & 0xffff,
  + inode->i_mapping ? inode->i_mapping->nrpages : 0,
  + inode->i_state, inode->i_flags, inode->i_version,
  + inode->i_generation,
  + 1 ? ", wh " : "", l, n);
  +return 0;
  +}
  +
  +void au_dpri_inode(struct inode *inode)
  +{
  +struct au_iinfo *iinfo;
  +struct au_hinode *hi;
  +aufs_bindex_t bindex;
  +int err, hn;
  
  

+err = do_pri_inode(-1, inode, -1, NULL);
+if (err || !au_test_aufs(inode->i_sb) || au_is_bad_inode(inode))
+return;
+
+iinfo = au_i(inode);
+dpri("i-1: btop %d, bbot %d, gen %d\n",
    + iinfo->ii_btop, iinfo->ii_bbot, au_iigen(inode, NULL));
+if (!au_test_aufs(inode))
    +return;
+
iinfo = au_ii(inode);
+dpri("i-1: btop %d, bbot %d, gen %d
",
    + iinfo->ii_btop, iinfo->ii_bbot, au_iigen(inode, NULL));
+if (iinfo->ii_btop < 0)
    +return;
+
+for (bindex = iinfo->ii_btop; bindex <= iinfo->ii_bbot; bindex++) {
    +hi = au_hinode(iinfo, bindex);
    +hn = !!au_nh(hi);
    +do_pri_inode(bindex, hi->hi_inode, hn, hi->hi_whdentry);
    +}
    +}
+
+void au_dpri_dalias(struct inode *inode)
+{
+struct dentry *d;
+
+spin_lock(&inode->i_lock);
+hlist_for_each_entry(d, &inode->i_dentry, d_u.d_alias)
    +au_dpri_dentry(d);
+spin_unlock(&inode->i_lock);
+
+static int do_pri_dentry(aufs_bindex_t bindex, struct dentry *dentry)
+{
+struct dentry *wh = NULL;
+int hn;
+struct inode *inode;
+struct au_iinfo *iinfo;
+struct au_hinode *hi;
+
+if (!dentry || IS_ERR(dentry)) {
    +dpri("d%d: err %ld
", bindex, PTR_ERR(dentry));
    +return -1;
    +}
+/* do not call dget_parent() here */
+/* note: access d_xxx without d_lock */
+dpri("d%d: %p, %pd2?, %s, cnt %d, flags 0x%x, %shashed\n",
    + bindex, dentry, dentry,
    + dentry->d_sb ? au_sbtype(dentry->d_sb) : "??",
    + au_dcount(dentry), dentry->d_flags,
    + d_unhashed(dentry) ? "un" : "";
    +hn = -1;
inode = NULL;
if (d_is_positive(dentry))
inode = d_inode(dentry);
if (inode
    && au_test_aufs(dentry->d_sb)
    && bindex >= 0
    && !au_is_bad_inode(inode)) {
    iinfo = au_ii(inode);
    hi = au_hinode(iinfo, bindex);
    hn = au_hn(hi);
    wh = hi->hi_whdentry;
}
do_pri_inode(bindex, inode, hn, wh);
return 0;
}

void au_dpri_dentry(struct dentry *dentry)
{
    struct au_dinfo *dinfo;
    aufs_bindex_t bindex;
    int err;

    err = do_pri_dentry(-1, dentry);
    if (err || !au_test_aufs(dentry->d_sb))
        return;
    dinfo = au_di(dentry);
    if (!dinfo)
        return;

dpri("d-1: btop %d, bbot %d, bwh %d, bdipopq %d, gen %d, tmp %d\n",
    dinfo->di_btop, dinfo->di_bbot,
    dinfo->di_bwh, dinfo->di_bdiropq, au_digen(dentry),
    dinfo->di_tmpfile);
    if (dinfo->di_btop < 0)
        return;
    for (bindex = dinfo->di_btop; bindex <= dinfo->di_bbot; bindex++)
        do_pri_dentry(bindex, au_hdentry(dinfo, bindex)->hd_dentry);
}

static int do_pri_file(aufs_bindex_t bindex, struct file *file)
{
    char a[32];

    if (!file || IS_ERR(file)) {
        dpri("f%d: err %ld\n", bindex, PTR_ERR(file));
        return -1;
    }
a[0] = 0;
+if (bindex < 0
+    && !IS_ERR_OR_NULL(file->f_path.dentry)
+    && au_test_aufs(file->f_path.dentry->d_sb)
+    && au_fi(file))
+snprintf(a, sizeof(a), ", gen %d, mmapped %d",
+    au_figen(file), atomic_read(&au_fi(file)->fi_mmapped));
+dprif("%d: mode 0x%x, flags 0%o, cnt %ld, v %llu, pos %llu\n",
+    bindex, file->f_mode, file->f_flags, (long)file_count(file),
+    file->f_version, file->f_pos, a);
+if (!IS_ERR_OR_NULL(file->f_path.dentry))
+do_pri_dentry(bindex, file->f_path.dentry);
+return 0;
+
+void au_dpri_file(struct file *file)
+{
+struct au_finfo *finfo;
+struct au_fidir *fidir;
+struct au_hfile *hfile;
+aufs_bindex_t bindex;
+int err;
+
+err = do_pri_file(-1, file);
+if (err
+    || IS_ERR_OR_NULL(file->f_path.dentry)
+    || !au_test_aufs(file->f_path.dentry->d_sb))
+return;
+
+finfo = au_fi(file);
+if (!finfo)
+    return;
+
+finfo->fi_btop < 0
+    return;
+
+fidir = finfo->fi_hdir;
+if (!fidir)
+    do_pri_file(finfo->fi_btop, finfo->fi_htop.hf_file);
+else
+for (bindex = finfo->fi_btop;
+    bindex >= 0 &&
+    bindex <= fidir->fd_bbot;
+    bindex++) {  
+hfile = fidir->fd_hfile + bindex;
+do_pri_file(bindex, hfile ? hfile->hf_file : NULL);
+}  
+}
+
+static int do_pri_br(aufs_bindex_t bindex, struct au_branch *br)
+{
+struct vfsmount *mnt;

+struct super_block *sb;
+
+if (!br || IS_ERR(br))
+    goto out;
+mnt = au_br_mnt(br);
+if (!mnt || IS_ERR(mnt))
+    goto out;
+sb = mnt->mnt_sb;
+if (!sb || IS_ERR(sb))
+    goto out;
+
+dpri("s%d: {perm 0x%x, id %d, cnt %lld, wbr %p}, ",
+    "%s, dev 0x%02x%02x, flags 0x%lx, cnt %d, active %d, 
+    "xino %d\n",
+    bindex, br->br_perm, br->br_id, au_br_count(br),
+    br->br_wbr, au_sbtype(sb), MAJOR(sb->s_dev), MINOR(sb->s_dev),
+    sb->s_flags, sb->s_count,
+    atomic_read(&sb->s_active), !!br->br_xino.xi_file);
+return 0;
+
+out:
+    dpri("s%d: err %ld\n", bindex, PTR_ERR(br));
+    return -1;
+
+}
+
+void au_dpri_sb(struct super_block *sb)
+{
+    struct au_sbinfo *sbinfo;
+    aufs_bindex_t bindex;
+    int err;
+    /* to reuduce stack size */
+    struct {
+        struct vfsmount mnt;
+        struct au_branch fake;
+    } *a;
+
+    /* this function can be called from magic sysrq */
+    a = kzalloc(sizeof(*a), GFP_ATOMIC);
+    if (unlikely(!a)) {
+        dpri("no memory\n");
+        return;
+    }

+a->mnt.mnt_sb = sb;
a->fake.br_path.mnt = &a->mnt;
au_br_count_init(&a->fake);
    err = do_pri_br(-1, &a->fake);
au_br_count_fin(&a->fake);
kfree(a);
+
dpri("dev 0x%\x\n", sb->s_dev);
+if (err || !au_test_aufs(sb))
+return;
+
+sbinfo = au_sbi(sb);
+if (!sbinfo)
+return;
+
dpri("nw %d, gen %u, kobj %d\n",
+	bl_atomic_read(&sbinfo->si_nowait.nw_len), sbinfo->si_generation,
+	kref_read(&sbinfo->si_kobj.kref);
+for (bindex = 0; bindex <= sbinfo->si_bbot; bindex++)
+do_pri_br(bindex, sbinfo->si_branch[0 + bindex]);
+
*/
+*/
+__au_dbg_verify_dinode(struct dentry *dentry, const char *func, int line)
+{
+struct inode *h_inode, *inode = d_inode(dentry);
+struct dentry *h_dentry;
+
+aufs_bindex_t bindex, bbot, bi;
+
+if (!inode /* || au_di(dentry)->di_lsc == AuLsc_DI_TMP */)
+return;
+
+bbot = au_dbbot(dentry);
+bi = au_iibot(inode);
+
+if (bi < bbot)
+bbot = bi;
+
+bindex = au_dbtop(dentry);
+bi = au_iibot(inode);
+
+if (bi > bindex)
+bindex = bi;
+
+for (; bindex <= bbot; bindex++) {
+h_dentry = au_h_dptr(dentry, bindex);
+
+if (!h_dentry)
+continue;
+
h_inode = au_h_iptr(inode, bindex);
+
+if (unlikely(h_inode != d_inode(h_dentry))) {
+au_debug_on();
+AuDbg("b%d, %s:%d\n", bindex, func, line);
+AuDbgDentry(dentry);
+AuDbgNode(inode);
+au_debug_off();
+BUG();
+}
+} +} +
+void au_dbg_verify_gen(struct dentry *parent, unsigned int sigen) +
+{ +int err, i, j; +struct au_dcsup_pages dpages; +struct au_dpage *dpage; +struct dentry **dentries; +
+err = au_dpages_init(&dpages, GFP_NOFS); +AuDebugOn(err); +err = au_dcsup_pages_rev_aufs(&dpages, parent, /*do_include*/1); +AuDebugOn(err); +for (i = dpages.ndpage - 1; !err && i >= 0; i--) { +dpage = dpages.dpages + i; +dentries = dpage->dentries; +for (j = dpage->ndentry - 1; !err && j >= 0; j--) +AuDebugOn(au_digen_test(dentries[j], sigen)); +} +au_dpages_free(&dpages); +} +
+
+void au_dbg_verify_kthread(void) +{ +if (au_wkq_test()) {
+au_dbg_blocked(); +/*
+ * It may be recursive, but udba=notify between two aufs mounts,
+ * where a single ro branch is shared, is not a problem.
+ */
+/* WARN_ON(1); */
+}
+} +
+
+/* ---------------------------------------------------------------------- */
+
+int __init au_debug_init(void) +{ +aufs_bindex_t bindex; +struct au_vdir_destr destr;
+
+bindex = -1;
+AuDebugOn(bindex >= 0);
+destr.len = -1;
+AuDebugOn(destr.len < NAME_MAX); +

---

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+ifdef CONFIG_4KSTACKS
+pr_warn("CONFIG_4KSTACKS is defined\n");
+endif
+
+return 0;
+
+
--- linux-4.15.0.orig/fs/aufs/debug.h
+++ linux-4.15.0/fs/aufs/debug.h
@@ -0,0 +1,225 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
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+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * debug print functions
+ */
+
+ifndef __AUFS_DEBUG_H__
+#define __AUFS_DEBUG_H__
+
+#ifdef __KERNEL__
+
+include <linux/atomic.h>
+include <linux/module.h>
+include <linux/kallsyms.h>
+include <linux/sysrq.h>
+
+ifndef CONFIG_AUFS_DEBUG
+#define AuDebugOn(a) BUG_ON(a)
+
+module parameter */
+extern atomic_t aufs_debug;
+static inline void au_debug_on(void)
+{
+atomic_inc(&aufs_debug);
static inline void au_debug_off(void)
{
atomic_dec_if_positive(&aufs_debug);
}

static inline int au_debug_test(void)
{
return atomic_read(&aufs_debug) > 0;
}

#if CONFIG_AUFS_DEBUG
#define AuDebugOn(a)do {} while (0)
AuStubVoid(au_debug_on, void)
AuStubVoid(au_debug_off, void)
AuStubInt0(au_debug_test, void)
#else
#define AuDebugOn(a)	do {} while (0)

#define AuStubVoid(name, void)
#define AuStubInt0(name, int)
#endif

#define param_check_atomic_t(name, p) __param_check(name, p, atomic_t)

#define AuDbg(fmt, ...) do { 
	if (au_debug_test()) 
		pr_debug("DEBUG: " fmt, ##__VA_ARGS__); 
} while (0)
#define AuLabel(l)		AuDbg(#l "\n")
#define AuIOErr(fmt, ...)	pr_err("I/O Error, " fmt, ##__VA_ARGS__)
#define AuWarn1(fmt, ...)
do { 
	static unsigned char _c; 
	if (!_c++) 
		pr_warn(fmt, ##__VA_ARGS__); 
} while (0)
#define AuErr1(fmt, ...)

do { 
	static unsigned char _c; 
	if (!_c++) 
		pr_err(fmt, ##__VA_ARGS__); 
} while (0)
#define AuIOErr1(fmt, ...)

do { 
	static unsigned char _c; 
	if (!_c++) 
		AuIOErr(fmt, ##__VA_ARGS__); 
} while (0)

#define AuUnsupportMsg "This operation is not supported." \

```c
/* Please report this application to aufs-users ML. */
#define AuUnsupport(fmt, ...) do { \
    pr_err(AuUnsupportMsg "\n" fmt, ##__VA_ARGS__); \
    dump_stack(); \
} while (0)
+
#define AuTraceErr(e) do { \
    if (unlikely((e) < 0)) \
    AuDbg("err %d\n", (int)(e)); \
} while (0)
+
#define AuTraceErrPtr(p) do { \
    if (IS_ERR(p)) \
    AuDbg("err %ld\n", PTR_ERR(p)); \
} while (0)
+
/* dirty macros for debug print, use with "%.*s" and caution */
#define AuLNPair(qstr)		(qstr)->len, (qstr)->name
+
/* ---------------------------------------------------------------------- */

struct dentry;
#ifdef CONFIG_AUFS_DEBUG
extern struct mutex au_dbg_mtx;
extern char *au_plevel;
struct au_nhash;
void au_dpri_whlist(struct au_nhash *whlist);
struct au_vdir;
void au_dpri_vdir(struct au_vdir *vdir);
struct inode;
void au_dpri_inode(struct inode *inode);
void au_dpri_dalias(struct inode *inode);
void au_dpri_dentry(struct dentry *dentry);
struct file;
void au_dpri_file(struct file *filp);
struct super_block;
void au_dpri_sb(struct super_block *sb);
+
#define au_dbg_verify_dinode(d) __au_dbg_verify_dinode(d, __func__, __LINE__)

void __au_dbg_verify_dinode(struct dentry *dentry, const char *func, int line);
void au_dbg_verify_gen(struct dentry *parent, unsigned int sigen);
void au_dbg_verify_kthread(void);

int __init au_debug_init(void);
+
#define AuDbgWhlist(w) do { \
    mutex_lock(&au_dbg_mtx); \
    AuDbg(#w "\n"); \
} while (0)
```
```c
+au_dpri_whlist(w); \
+mutex_unlock(&au_dbg_mtx); \
+) while (0) 
+
+#define AuDbgVdir(v) do { \
+mutex_lock(&au_dbg_mtx); \
+AuDbg(#v "v"); \
+au_dpri_vdir(v); \
+mutex_unlock(&au_dbg_mtx); \
+) while (0) 
+
+#define AuDbgInode(i) do { \
+mutex_lock(&au_dbg_mtx); \
+AuDbg(#i "i"); \
+au_dpri_inode(i); \
+mutex_unlock(&au_dbg_mtx); \
+) while (0) 
+
+#define AuDbgDAlias(i) do { \
+mutex_lock(&au_dbg_mtx); \
+AuDbg(#i "i"); \
+au_dpri_dalias(i); \
+mutex_unlock(&au_dbg_mtx); \
+) while (0) 
+
+#define AuDbgDentry(d) do { \
+mutex_lock(&au_dbg_mtx); \
+AuDbg(#d "d"); \
+au_dpri_dentry(d); \
+mutex_unlock(&au_dbg_mtx); \
+) while (0) 
+
+#define AuDbgFile(f) do { \
+mutex_lock(&au_dbg_mtx); \
+AuDbg(#f "f"); \
+au_dpri_file(f); \
+mutex_unlock(&au_dbg_mtx); \
+) while (0) 
+
+#define AuDbgSb(sb) do { \
+mutex_lock(&au_dbg_mtx); \
+AuDbg(#sb "sb"); \
+au_dpri_sb(sb); \
+mutex_unlock(&au_dbg_mtx); \
+) while (0) 
+
+#define AuDbgSym(addr) do { \
+char sym[ksym_symbol_len]; \
```
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lookup and dentry operations

#include <linux/namei.h>
#include "aufs.h"

/* returns positive/negative dentry, NULL or an error.
 * NULL means whiteout-ed or not-found.
 */
static struct dentry*
au_do_lookup(struct dentry *h_parent, struct dentry *dentry,
    aufs_bindex_t bindex, struct au_do_lookup_args *args)
{
    struct dentry *h_dentry;
    struct inode *h_inode;
    struct au_branch *br;
    struct path h_path;
    int wh_found, opq;
    unsigned char wh_able;
    const unsigned char allow_neg = !!au_ftest_lkup(args->flags, ALLOW_NEG);
    const unsigned char ignore_perm = !!au_ftest_lkup(args->flags,
        IGNORE_PERM);

    wh_found = 0;
    br = au_sbr(dentry->d_sb, bindex);
    h_path.dentry = h_parent;
    h_path.mnt = au_br_mnt(br);
    wh_able = !!au_br_whable(br->br_perm);
    if (wh_able)
        wh_found = au_wh_test(&h_path, &args->whname, ignore_perm);
    h_dentry = ERR_PTR(wh_found);
    if (!wh_found)
goto real_lookup;
+if (unlikely(wh_found < 0))
+goto out;
+
+/* We found a whiteout */
+/* au_set_dbbot(dentry, bindex); */
+au_set_dbwh(dentry, bindex);
+if (!allow_neg)
+return NULL; /* success */
+
+real_lookup:
+if (!ignore_perm)
+h_dentry = vfsub_lkup_one(args->name, &h_path);
+else
+h_dentry = au_sio_lkup_one(args->name, &h_path);
+if (IS_ERR(h_dentry)) {
+if (PTR_ERR(h_dentry) == -ENAMETOOLONG
+    && !allow_neg)
+h_dentry = NULL;
+goto out;
+}
+h_inode = d_inode(h_dentry);
+if (d_is_negative(h_dentry)) {
+if (!allow_neg)
+goto out_neg;
+} else if (wh_found
+    || (args->type && args->type != (h_inode->i_mode & S_IFMT)))
+goto out_neg;
+else if (au_ftest_lkup(args->flags, DIRREN)
+    && h_inode)
+    && !au_dr_lkup_h_ino(args, bindex, h_inode->i_ino)) {
+AuDbg("b%d %pd ignored hi%llu", bindex, h_dentry,
+       (unsigned long long)h_inode->i_ino);
+goto out_neg;
+}
+
+if (au_ddbot(dentry) <= bindex)
+au_set_dbbot(dentry, bindex);
+if (au_dbtop(dentry) < 0 || bindex < au_dbtop(dentry))
+au_set_dbtop(dentry, bindex);
+au_set_h_dptr(dentry, bindex, h_dentry);
+
+if (!d_is_dir(h_dentry)
+    || !wh_able
+    || (d_really_is_positive(dentry) && !d_is_dir(h_dentry)))
+goto out; /* success */
+
+h_path.dentry = h_dentry;
+vfsub_inode_lock_shared_nested(h_inode, AuLsc_I_CHILD);
+opq = au_diropq_test(&h_path);
+inode_unlock_shared(h_inode);
+if (opq > 0)
+au_set_dbdiropq(dentry, bindex);
+else if (unlikely(opq < 0)) {
+au_set_h_dptr(dentry, bindex, NULL);
+h_dentry = ERR_PTR(opq);
 +}
+goto out;
+
+out_neg:
+dput(h_dentry);
+h_dentry = NULL;
+out:
+return h_dentry;
 +}
+
+static int au_test_shwh(struct super_block *sb, const struct qstr *name)
+{
+if (unlikely(!au_opt_test(au_mntflags(sb), SHWH)
+ && strncmp(name->name, AUFS_WH_PFX, AUFS_WH_PFX_LEN)))
+return -EPERM;
+}
+
+/*
+ * returns the number of lower positive dentries,
+ * otherwise an error.
+ * can be called at unlinking with @type is zero.
+ */
+int au_lkup_dentry(struct dentry *dentry, aufs_bindex_t btop,
+ unsigned int flags)
+{
+int npositive, err;
+aufs_bindex_t bindex, btail, bdiropq;
+unsigned char isdir, dirperm1, dirren;
+struct au_do_lookup_args args = {
+.flags= flags,
+.name= &dentry->d_name
+};
+struct dentry *parent;
+struct super_block *sb;
+
+sb = dentry->d_sb;
+err = au_test_shwh(sb, args.name);
+if (unlikely(err))

+goto out;
+
+err = au_wh_name_alloc(&args.whname, args.name);
+if (unlikely(err))
+goto out;
+
+isdir = !!d_is_dir(dentry);
+dirperm1 = !!au_opt_test(au_mntflags(sb), DIRPERM1);
+dirren = !!au_opt_test(au_mntflags(sb), DIRREN);
+if (dirren)
+au_fset_lkup(args.flags, DIRREN);
+
+npositive = 0;
+parent = dget_parent(dentry);
+btail = au_dbtaildir(parent);
+for (bindex = btop; bindex <= btail; bindex++) {
+struct dentry *h_parent, *h_dentry;
+struct inode *h_inode, *h_dir;
+
+h_dentry = au_h_dptr(dentry, bindex);
+if (h_dentry) {
++if (d_is_positive(h_dentry))
+npositive++;
+break;
++}
+h_parent = au_h_dptr(parent, bindex);
+if (!(h_parent || d_is_dir(h_parent))
+continue;
+
+if (dirren) {
+/* if the inum matches, then use the prepared name */
+err = au_dr_lkup_name(&args, bindex);
+if (unlikely(err))
+goto out_parent;
++}
+
+h_dir = d_inode(h_parent);
+vfs_sub_inode_lock_shared_nested(h_dir, AuLsc_I_PARENT);
+h_dentry = au_do_lookup(h_parent, dentry, bindex, &args);
+inode_unlock_shared(h_dir);
+err = PTR_ERR(h_dentry);
+if (IS_ERR(h_dentry))
+goto out_parent;
++if (h_dentry)
+au_fclr_lkup(args.flags, ALLOW_NEG);
++if (dirperm1)
+au_fset_lkup(args.flags, IGNORE_PERM);
+if (au_dbwh(dentry) == bindex)
+break;
+if (!h_dentry)
+continue;
+if (d_is_negative(h_dentry))
+continue;
+h_inode = d_inode(h_dentry);
+npositive++;
+if (!args.type)
+args.type = h_inode->i_mode & S_IFMT;
+if (args.type != S_IFDIR)
+break;
+else if (isdir) {
+*/ the type of lower may be different */
+bdiropq = au_dbdiropq(dentry);
+if (bdiropq >= 0 && bdiropq <= bindex)
+break;
+}
+br = au_sbr(sb, bindex);
+if (dirren
+    && au_dr_hino_test_add(&br->br_dirren, h_inode->i_ino,
+    /*add_ent*/NULL)) {
+*/ prepare next name to lookup */
+err = au_dr_lkup(&args,dentry, bindex);
+if (unlikely(err))
+goto out_parent;
+}
+}
+
+if (npositive) {
+AuLabel(positive);
+au_update_dbttop(dentry);
+}
+err = npositive;
+if (unlikely(!au_opt_test(au_mntflags(sb), UDBA_NONE)
+    && au_dbttop(dentry) < 0)) {
+err = -EIO;
+AuIOErr("both of real entry and whiteout found, %pd, err %d\n",
+dentry, err);
+}
+out_parent:
+dput(parent);
+kfree(args.whname.name);
+if (dirren)
+au_dr_lkup_fin(&args);
+out:
+return err;
+
+struct dentry *au_sio_lkup_one(struct qstr *name, struct path *ppath)
+{
+struct dentry *dentry;
+int wkq_err;
+
+if (!au_test_h_perm_sio(d_inode(ppath->dentry), MAY_EXEC))
+dentry = vfsub_lkup_one(name, ppath);
+else {
+struct vfsub_lkup_one_args args = {
+.errp = &dentry,
+.name = name,
+.ppath = ppath
+};
+
+wkq_err = au_wkq_wait(vfsub_call_lkup_one, &args);
+if (unlikely(wkq_err))
+dentry = ERR_PTR(wkq_err);
+}
+
+return dentry;
+
+/*
 * lookup @dentry on @bindex which should be negative.
 */
+int au_lkup_neg(struct dentry *dentry, aufs_bindex_t bindex, int wh)
+{
+int err;
+struct dentry *parent, *h_dentry;
+struct au_branch *br;
+struct path h_ppath;
+
+parent = dget_parent(dentry);
+br = au_sbr(dentry->d_sb, bindex);
+h_ppath.dentry = au_h_dptr(parent, bindex);
+h_ppath.mnt = au_br_mnt(br);
+if (wh)
+h_dentry = au_whtmp_lkup(h_ppath.dentry, br, &dentry->d_name);
+else
+h_dentry = au_sio_lkup_one(&dentry->d_name, &h_ppath);
+err = PTR_ERR(h_dentry);
+if (IS_ERR(h_dentry))
+err = PTR_ERR(h_dentry);
+if (IS_ERR(h_dentry))
+err = -EIO;

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+AuIOErr("%pd should be negative on b%d
", h_dentry, bindex);
+dput(h_dentry);
+goto out;
+
+} +
+err = 0;
+if (bindex < au_dbtop(dentry))
+au_set_dbtop(dentry, bindex);
+if (au_dbbot(dentry) < bindex)
+au_set_dbbot(dentry, bindex);
+au_set_h_dptr(dentry, bindex, h_dentry);
+
+out:
+dput(parent);
+return err;
+
+/* subset of struct inode */
+struct au_iattr {
+unsigned longi_ino;
+/* unsigned inti_nlink; */
+kuid_ti_uid;
+kgid_ti_gid;
+u64i_version;
+/
+loff_ti_size;
+blkcnt_ti_blocks;
+*/
+umode_ti_mode;
+};
+
+static void au_iattr_save(struct au_iattr *ia, struct inode *h_inode)
+{
+ia->i_ino = h_inode->i_ino;
+/* ia->i_nlink = h_inode->i_nlink; */
+ia->i_uid = h_inode->i_uid;
+ia->i_gid = h_inode->i_gid;
+ia->i_version = h_inode->i_version;
+/*
+ia->i_size = h_inode->i_size;
+ia->i_blocks = h_inode->i_blocks;
+*/
+ia->i_mode = (h_inode->i_mode & S_IFMT);
+}
+
+static int au_iattr_test(struct au_iattr *ia, struct inode *h_inode)
+{  
+return ia->i_ino != h_inode->i_ino
+/* || ia->i_nlink != h_inode->i_nlink */
+|| uid_eq(ia->i_uid, h_inode->i_uid)
+|| gid_eq(ia->i_gid, h_inode->i_gid)
+|| ia->i_version != h_inode->i_version
+/*
+|| ia->i_size != h_inode->i_size
+|| ia->i_blocks != h_inode->i_blocks
+*/
+|| ia->i_mode != (h_inode->i_mode & S_IFMT);
+}
+
+static int au_h_verify_dentry(struct dentry *h_dentry, struct dentry *h_parent,
+      struct au_branch *br)
+{
+    int err;
+    struct au_iattr ia;
+    struct inode *h_inode;
+    struct dentry *h_d;
+    struct super_block *h_sb;
+    struct path h_ppath;
+
+    err = 0;
+    memset(&ia, -1, sizeof(ia));
+    h_sb = h_dentry->d_sb;
+    h_inode = NULL;
+    if (d_is_positive(h_dentry)) {
+        h_inode = d_inode(h_dentry);
+        au_iattr_save(&ia, h_inode);
+    } else if (au_test_nfs(h_sb) || au_test_fuse(h_sb))
+        /* nfs d_revalidate may return 0 for negative dentry */
+        /* fuse d_revalidate always return 0 for negative dentry */
+        goto out;
+
+    /* main purpose is namei.c:cached_lookup() and d_revalidate */
+    h_ppath.dentry = h_parent;
+    h_ppath.mnt = au_br_mnt(br);
+    h_d = vfsub_lkup_one(&h_dentry->d_name, &h_ppath);
+    err = PTR_ERR(h_d);
+    if (IS_ERR(h_d))
+        goto out;
+
+    err = 0;
+    if (unlikely(h_d != h_dentry
+        || d_inode(h_d) != h_inode
+        || (h_inode && au_iattr_test(&ia, h_inode))))
+        err = au_busy_or_stale();


+dput(h_d);
+
+out:
+AuTraceErr(err);
+return err;
+
+int au_h_verify(struct dentry *h_dentry, unsigned int udba, struct inode *h_dir,
+struct dentry *h_parent, struct au_branch *br)
+{
+int err;
+
+err = 0;
+if (udba == AuOpt_UDBA_REVAL
+   && !au_test_fs_remote(h_dentry->d_sb)) {
+IMustLock(h_dir);
+err = (d_inode(h_dentry->d_parent) != h_dir);
+} else if (udba != AuOpt_UDBA_NONE)
+err = au_h_verify_dentry(h_dentry, h_parent, br);
+
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+static int au_do_refresh_hdentry(struct dentry *dentry, struct dentry *parent)
+{
+int err;
+aufs_bindex_t new_bindex, bindex, bbot, bwh, bdiropq;
+struct au_hdentry tmp, *p, *q;
+struct au_dinfo *dinfo;
+struct super_block *sb;
+
+DiMustWriteLock(dentry);
+
+sb = dentry->d_sb;
+dinfo = au_di(dentry);
+bbot = dinfo->di_bbot;
+bwh = dinfo->di_bwh;
+bdiropq = dinfo->di_bdiropq;
+bindex = dinfo->di_btop;
+p = au_hdentry(dinfo, bindex);
+
+for (; bindex <= bbot; bindex++, p++) {
+if (!p->hd_dentry)
+continue;
+
+new_bindex = au_br_index(sb, p->hd_id);
+
+if (new_bindex == bindex)
continue;
+
+if (dinfo->di_bwh == bindex)
+bwh = new_bindex;
+if (dinfo->di_bdiropq == bindex)
+bdiropq = new_bindex;
+if (new_bindex < 0) {
+au_hdput(p);
+p->hd_dentry = NULL;
+continue;
+}
+
+/* swap two lower dentries, and loop again */
+q = au_hdentry(dinfo, new_bindex);
+tmp = *q;
+*q = *p;
+*p = tmp;
+if (tmp.hd_dentry) {
+bindex--;
+p--;
+}
+
+dinfo->di_bwh = -1;
+if (bwh >= 0 && bwh <= au_sbbot(sb) && au_sbr_whable(sb, bwh))
+dinfo->di_bwh = bwh;
+
+dinfo->di_bdiropq = -1;
+if (bdiropq >= 0
+ && bdiropq <= au_sbbot(sb)
+ && au_sbr_whable(sb, bdiropq))
+dinfo->di_bdiropq = bdiropq;
+
+err = -EIO;
+dinfo->di_btop = -1;
+dinfo->di_bbot = -1;
+bbot = au_dbbot(parent);
+bindex = 0;
+p = au_hdentry(dinfo, index);
+for (; bindex <= bbot; bindex++, p++)
+if (p->hd_dentry) {
+dinfo->di_btop = bindex;
+break;
+}
+
+if (dinfo->di_btop >= 0) {
+bindex = bbot;
+p = au_hdentry(dinfo, index);
for (; bindex >= 0; bindex--, p--)
    if (p->hd_dentry) {
        dinfo->di_bbot = bindex;
        err = 0;
        break;
    }
}

return err;

static void au_do_hide(struct dentry *dentry)
{
    struct inode *inode;
    
    if (d_really_is_positive(dentry)) {
        inode = d_inode(dentry);
        if (!d_is_dir(dentry)) {
            if (inode->i_nlink && !d_unhashed(dentry))
                drop_nlink(inode);
        } else {
            clear_nlink(inode);
            /* stop next lookup */
            inode->i_flags |= S_DEAD;
        }
    } else {
        clear_nlink(inode);
    /* stop next lookup */
    }
    smp_mb(); /* necessary? */
    }
    d_drop(dentry);
}

static int au_hide_children(struct dentry *parent)
{
    int err, i, j, ndentry;
    struct au_dcsub_pages dpages;
    struct au_dpage *dpage;
    struct dentry *dentry;
    
    err = au_dpages_init(&dpages, GFP_NOFS);
    if (unlikely(err))
        goto out;
    err = au_dcsub_pages(&dpages, parent, NULL, NULL);
    if (unlikely(err))
        goto out_dpages;
    
    /* in reverse order */
    for (i = dpages.ndpage - 1; i >= 0; i--)
    
    +dpage = dpages.dpages + i;
    +ndentry = dpage->ndentry;
for (j = ndentry - 1; j >= 0; j--) {
    dentry = dpage->dentries[j];
    if (dentry != parent) {
        au_do_hide(dentry);
    }
}

out_dpages:
    au_dpages_free(&dpages);
out:
    return err;
}

static void au_hide(struct dentry *dentry) {
    int err;

    AuDbgDentry(dentry);
    if (d_is_dir(dentry)) {
        /* shrink_dcache_parent(dentry); */
        err = au_hide_children(dentry);
        if (unlikely(err)) {
            AuIOErr("%pd, failed hiding children, ignored \%d
", dentry, err);
        }
        au_do_hide(dentry);
    }

    /* By adding a dirty branch, a cached dentry may be affected in various ways.
    *
    * a dirty branch is added
    * - on the top of layers
    * - in the middle of layers
    * - to the bottom of layers
    *
    * on the added branch there exists
    * - a whiteout
    * - a diropq
    * - a same named entry
    * + exist
    *  * negative --> positive
    *  * positive --> positive
    *  - type is unchanged
    *  - type is changed
    *  + doesn't exist
    *  * negative --> negative
    *  * positive --> negative (rejected by au_br_del() for non-dir case)
*/
+ static int au_refresh_by_dinfo(struct dentry *dentry, struct au_dinfo *dinfo,
+     struct au_dinfo *tmp)
+
+int err;
+aufs_bindex_t bindex, bbot;
+struct {
+struct dentry *dentry;
+struct inode *inode;
+mode_t mode;
+} orig_h, tmp_h = {
+.dentry = NULL
+};
+struct au_hdentry *hd;
+struct inode *inode, *h_inode;
+struct dentry *h_dentry;
+
+err = 0;
+AuDebugOn(dinfo->di_btop < 0);
+orig_h.mode = 0;
+orig_h.dentry = au_hdentry(dinfo, dinfo->di_btop)->hd_dentry;
+orig_h.inode = NULL;
+if (d_is_positive(orig_h.dentry)) {
+orig_h.inode = d_inode(orig_h.dentry);
+orig_h.mode = orig_h.inode->i_mode & S_IFMT;
+}
+if (tmp->di_btop >= 0) {
+tmp_h.dentry = au_hdentry(tmp, tmp->di_btop)->hd_dentry;
+if (d_is_positive(tmp_h.dentry)) {
+tmp_h.inode = d_inode(tmp_h.dentry);
+tmp_h.mode = tmp_h.inode->i_mode & S_IFMT;
+}
+
+inode = NULL;
+if (d_really_is_positive(dentry))
+inode = d_inode(dentry);
+if (!orig_h.inode) {
+AuDbg("negative originally\n");
+if (inode) {
+au_hide(dentry);
+goto out;
+}
+AuDebugOn(inode);
+AuDebugOn(dinfo->di_btop != dinfo->di_bbot); 
+AuDebugOn(dinfo->di_bdiropq != -1);
+}
+if (!tmp_h.inode) {
+  AuDbg("negative --> negative\n");
+  /* should have only one negative lower */
+  if (tmp->di_btop >= 0
+      && tmp->di_btop < dinfo->di_btop) {
+    AuDebugOn(tmp->di_btop != tmp->di_bbot);
+    AuDebugOn(dinfo->di_btop != dinfo->di_bbot);
+    au_set_h_dptr(dentry, dinfo->di_btop, NULL);
+    au_di_cp(dinfo, tmp);
+    hd = au_hdentry(tmp, tmp->di_btop);
+    au_set_h_dptr(dentry, tmp->di_btop,
+                  dget(hd->hd_dentry));
+  }
+  au_dbg_verify_dinode(dentry);
+} else {
+  AuDbg("negative --> positive\n");
+  /* similar to the behaviour of creating with bypassing
+   * aufs.
+   * unhash it in order to force an error in the
+   * succeeding create operation.
+   * we should not set S_DEAD here.
+ */
+  d_drop(dentry);
+  /* au_di_swap(tmp, dinfo); */
+  au_dbg_verify_dinode(dentry);
+} 
+} else {
+  AuDbg("positive originally\n");
+  /* inode may be NULL */
+  AuDebugOn(inode && (inode->i_mode & S_IFMT) != orig_h.mode);
+  if (!tmp_h.inode) {
+    AuDbg("positive --> negative\n");
+    /* or bypassing aufs */
+    au_hide(dentry);
+    if (tmp->di_bwh >= 0 && tmp->di_bwh <= dinfo->di_btop)
+      dinfo->di_bwh = tmp->di_bwh;
+    if (inode)
+      err = au_refresh_hinode_self(inode);
+    au_dbg_verify_dinode(dentry);
+  } else if (orig_h.mode == tmp_h.mode) {
+    AuDbg("positive --> positive, same type\n");
+    if (!S_ISDIR(orig_h.mode)
+        && dinfo->di_btop > tmp->di_btop) {
+      /*
+       * similar to the behaviour of removing and
+       * creating.
+ */
+  

+au_hide(dentry);
+if (inode)
+err = au_refresh_hinode_self(inode);
+au_dbg_verify_dinode(dentry);
+} else {
+/* fill empty slots */
+if (dinfo->di_btop > tmp->di_btop)
+dinfo->di_btop = tmp->di_btop;
+if (dinfo->di_bbot < tmp->di_bbot)
+dinfo->di_bbot = tmp->di_bbot;
+dinfo->di_bwh = tmp->di_bwh;
+dinfo->di_bdiropq = tmp->di_bdiropq;
+bbot = dinfo->di_bbot;
+bindex = tmp->di_btop;
+hd = au_hdentry(tmp, bindex);
+for (; bindex <= bbot; bindex++, hd++) {
+if (au_h_dptr(dentry, bindex))
+continue;
+AuDebugOn(d_is_negative(h_dentry));
+h_inode = d_inode(h_dentry);
+AuDebugOn(orig_h.mode
+  != (h_inode->i_mode
+    & S_IFMT));
+au_set_h_dptr(dentry, bindex,
+  dget(h_dentry));
+}
+if (inode)
+err = au_refresh_hinode(inode, dentry);
+au_dbg_verify_dinode(dentry);
+}
+} else {
+AuDbg("positive --> positive, different type
");
+/* similar to the behaviour of removing and creating */
+au_hide(dentry);
+if (inode)
+err = au_refresh_hinode_self(inode);
+au_dbg_verify_dinode(dentry);
+}
+}
+}
+out:
+return err;
+}
+}
+void au_refresh_dop(struct dentry *dentry, int force_reval)
const struct dentry_operations *dop

static const unsigned int mask

BUILD_BUG_ON(sizeof(mask) != sizeof(dentry->d_flags));

if (dentry->d_op == dop)
    return;

AuDbg("%pd\n", dentry);
spin_lock(&dentry->d_lock);
if (dop == &aufs_dop)
    dentry->d_flags |= mask;
else
    dentry->d_flags &= ~mask;
    dentry->d_op = dop;
spin_unlock(&dentry->d_lock);

int au_refresh_dentry(struct dentry *dentry, struct dentry *parent)
{
    int err, ebrange, nbr;
    unsigned int sigen;
    struct au_dinfo *dinfo, *tmp;
    struct super_block *sb;
    struct inode *inode;

    DiMustWriteLock(dentry);
    AuDebugOn(IS_ROOT(dentry));
    AuDebugOn(d_really_is_negative(parent));
    sb = dentry->d_sb;
    sigen = au_sigen(sb);
    err = au_digen_test(parent, sigen);
    if (unlikely(err))
        goto out;
    nbr = au_sbbot(sb) + 1;
    dinfo = au_di(dentry);
    err = au_di_realloc(dinfo, nbr, /*may_shrink*/0);
    if (unlikely(err))
        goto out;
    ebrange = au_dbrange_test(dentry);
    if (!ebrange)
        ebrange = au_do_refresh_hdentry(dentry, parent);
    if (!ebrange)
+if (d_unhashed(dentry) || ebrange /* dinfo->di_tmpfile */) {
+AuDebugOn(au_dbtop(dentry) < 0 && au_dbbot(dentry) >= 0);
+if (d_really_is_positive(dentry)) {
+inode = d_inode(dentry);
+err = au_refresh_hinode_self(inode);
+}
+au_dbg_verify_dinode(dentry);
+if (!err)
+goto out_dgen; /* success */
+goto out;
+}
+
+/* temporary dinfo */
+AuDbgDentry(dentry);
+err = -ENOMEM;
+tmp = au_di_alloc(sb, AuLsc_DI_TMP);
+if (unlikely(!tmp))
+goto out;
+/* returns the number of positive dentries */
+/*
+ * if current working dir is removed, it returns an error.
+ * but the dentry is legal.
+ *
+ */
+err = au_lkup_dentry(dentry, /*btop*/0, AuLkup_ALLOW_NEG);
+AuDbgDentry(dentry);
+au_di_swap(tmp, dinfo);
+/* harmless if err */
+AuDbgDentry(dentry);
+err = au_refresh_by_dinfo(dentry, dinfo, tmp);
+au_dbg_verify_dinode(dentry);
+AuTraceErr(err);
+} 
+au_di_realloc(dinfo, nbr, /*may_shrink*/1); /* harmless if err */
+au_rwlock_unlock(&tmp->di_rwlock);
+au_di_free(tmp);
+if (unlikely(err))
+goto out;
+out_dgen:
+au_update_digen(dentry);
+out:
+if (unlikely(err && !(dentry->d_flags & DCACHE_NFSFS_RENAMED))) {
+AuIOErr("failed refreshing %pd, %d", dentry, err);
+AuDbgDentry(dentry);
+} +AuTraceErr(err);
+return err;
+
+static int au_do_h_d_reval(struct dentry *h_dentry, unsigned int flags,
+ struct dentry *dentry, aufs_bindex_t bindex)
+{
+int err, valid;
+
+err = 0;
+if (!(h_dentry->d_flags & DCACHE_OP_REVALIDATE))
+goto out;
+
+AuDbg("b%d\n", bindex);
+/*
+ * gave up supporting LOOKUP_CREATE/OPEN for lower fs,
+ * due to whiteout and branch permission.
+ */
+flags &= ~(/*LOOKUP_PARENT |*/ LOOKUP_OPEN | LOOKUP_CREATE
+ | LOOKUP_FOLLOW | LOOKUP_EXCL);
+/* it may return tri-state */
+valid = h_dentry->d_op->d_revalidate(h_dentry, flags);
+
+if (unlikely(valid < 0))
+err = valid;
+else if (!valid)
+err = -EINVAL;
+
+out:
+AuTraceErr(err);
+return err;
+
+/* todo: remove this */
+static int h_d_revalidate(struct dentry *dentry, struct inode *inode,
+ unsigned int flags, int do_udba, int dirren)
+{
+int err;
+umode_t mode, h_mode;
+aufs_bindex_t bindex, btail, btop, ibs, ibe;
+unsigned char plus, unhashed, is_root, h_plus, h_nfs, tmpfile;
+struct inode *h_inode, *h_cached_inode;
+struct dentry *h_dentry;
+struct qstr *name, *h_name;
+
+err = 0;
+plus = 0;
+mode = 0;
+ibs = -1;
+ibe = -1;
+unhashed = !!d_unhashed(dentry);
+is_root = !!IS_ROOT(dentry);
+name = &dentry->d_name;
+tmpfile = au_di(dentry)->di_tmpfile;
+
+/*
+ * Theoretically, REVAL test should be unnecessary in case of
+ * {FS,I}NOTIFY.
+ * But {fs,i}notify doesn't fire some necessary events,
+ * IN_ATTRIB for atime/nlink/pageio
+ * Let's do REVAL test too.
+ */
+if (do_udba && inode) {
+   mode = (inode->i_mode & S_IFMT);
+   plus = (inode->i_nlink > 0);
+   ibs = au_ibtop(inode);
+   ibe = au_ibbot(inode);
+}
+
+btop = au_dbtop(dentry);
+btail = btop;
+if (inode && S_ISDIR(inode->i_mode))
+   btail = au_dbtaildir(dentry);
+for (bindex = btop; bindex <= btail; bindex++) {
+   h_dentry = au_h_dptr(dentry, bindex);
+   if (!h_dentry)
+      continue;
+   AuDbg("b%d, %pd
", bindex, h_dentry);
+   h_nfs = !!au_test_nfs(h_dentry->d_sb);
+   spin_lock(&h_dentry->d_lock);
+   h_name = &h_dentry->d_name;
+   if (unlikely(do_udba
+            && !is_root
+            && (!h_nfs
+                && (unhashed != !!d_unhashed(h_dentry)
+                  || (!tmpfile && !dirren
+                      && !au_qstreq(name, h_name))
+                  )))
+      int h_unhashed;
+  
+  h_unhashed = d_unhashed(h_dentry);
+  spin_unlock(&h_dentry->d_lock);
+  AuDbg("unhash 0x%x 0x%x, %pd %pd\n",
+         unhashed, h_unhashed, dentry, h_dentry);
+  goto err;
+}
+  spin_unlock(&h_dentry->d_lock);
+
+  err = au_do_h_d_reval(h_dentry, flags, dentry, bindex);
+  if (unlikely(err))
+    /* do not goto err, to keep the errno */
+    break;
+
+  /* todo: plink too? */
+  if (!do_udba)
+    continue;
+
+  /* UDBA tests */
+  if (unlikely(!inode || d_is_positive(h_dentry)))
+    goto err;
+
+  h_inode = NULL;
+  if (d_is_positive(h_dentry))
+    h_inode = d_inode(h_dentry);
+  h_plus = plus;
+  h_mode = mode;
+  h_cached_inode = h_inode;
+  if (h_inode) {
+    h_mode = (h_inode->i_mode & S_IFMT);
+    h_plus = (h_inode->i_nlink > 0);
+  }
+  if (inode && ibs <= bindex && bindex <= ibe)
+    h_cached_inode = au_h_iptr(inode, bindex);
+
+  if (!h_nfs) {
+    if (unlikely(plus != h_plus && !tmpfile))
+      goto err;
+    else {
+      if (unlikely(!h_dentry->d_flags & DCACHE_NFSFS_RENAMED)
+        && !is_root
+        && !IS_ROOT(h_dentry)
+        && unhashed != d_unhashed(h_dentry)))
+        goto err;
+    }
+    if (unlikely(mode != h_mode
+      || h_cached_inode != h_inode))
+      goto err;
+  }
continue;
+
+err:
+err = -EINVAL;
+break;
+
+AuTraceErr(err);
+return err;
+
+/* todo: consolidate with do_refresh() and au_reval_for_attr() */
+static int simple_reval_dpath(struct dentry *dentry, unsigned int sigen)
+
+int err;
+struct dentry *parent;
+
+if (!au_digen_test(dentry, sigen))
+return 0;
+
+parent = dget_parent(dentry);
+di_read_lock_parent(parent, AuLock_IR);
+AuDebugOn(au_digen_test(parent, sigen));
+au_dbg_verify_gen(parent, sigen);
+err = au_refresh_dentry(dentry, parent);
+di_read_unlock(parent, AuLock_IR);
+dput(parent);
+AuTraceErr(err);
+return err;
+
+int au_reval_dpath(struct dentry *dentry, unsigned int sigen)
+
+int err;
+struct dentry *d, *parent;
+
+if (!au_ftest_si(au_sbi(dentry->d_sb), FAILED_REFRESH_DIR))
+return simple_reval_dpath(dentry, sigen);
+
+/* slow loop, keep it simple and stupid */
+/* cf: au_cpup_dirs() */
+err = 0;
+parent = NULL;
+while (au_digen_test(dentry, sigen)) {
+d = dentry;
+while (1) {
+dput(parent);
+parent = dget_parent(d);
+break;
}
if (!au_digen_test(parent, sigen))
break;

if (d != dentry)
    d = parent;
+
if (d != dentry)
    di_write_lock_child2(d);
+
/* someone might update our dentry while we were sleeping */
if (au_digen_test(d, sigen)) {
    /*
    * todo: consolidate with simple_reval_dpath(),
    * do_refresh() and au_reval_for_attr().
    */
    di_read_lock_parent(parent, AuLock_IR);
    err = au_refresh_dentry(d, parent);
    di_read_unlock(parent, AuLock_IR);
} +
    +
    +
    +if (d != dentry)
    +di_write_unlock(d);
    +dput(parent);
    +if (unlikely(err))
    +break;
+
+return err;
+
+/*
 + * if valid returns 1, otherwise 0.
 + */
+static int aufs_d_revalidate(struct dentry *dentry, unsigned int flags)
+{
    int valid, err;
    unsigned int sigen;
    unsigned char do_udba, dirren;
    struct super_block *sb;
    struct inode *inode;
    +
    +/* todo: support rcu-walk? */
    +if (flags & LOOKUP_RCU)
    +return -ECHILD;
    +
    +valid = 0;
    +if (unlikely(!au_di(dentry)))
    +goto out;
+}
+valid = 1;
+sb = dentry->d.sb;
+/
+  ** todo: very ugly**
+  ** i_mutex of parent dir may be held,**
+  ** but we should not return 'invalid' due to busy.**
+ */
+err = aufs_read_lock(dentry, AuLock_FLUSH | AuLock_DW | AuLock_NOPLM);
+if (unlikely(err)) {
+valid = err;
+AuTraceErr(err);
+goto out;
+
+inode = NULL;
+if (d_really_is_positive(dentry))
+inode = d_inode(dentry);
+if (unlikely(inode && au_is_bad_inode(inode))) {
+err = -EINVAL;
+AuTraceErr(err);
+goto out_dgrade;
+}
+if (unlikely(au_dbrange_test(dentry))) {
+err = -EINVAL;
+AuTraceErr(err);
+goto out_dgrade;
+}
+}
+
+sigen = au_sigen(sb);
+if (au_digen_test(dentry, sigen)) {
+AuDebugOn(IS_ROOT(dentry));
+err = au_reval_dpath(dentry, sigen);
+if (unlikely(err)) {
+AuTraceErr(err);
+goto out_dgrade;
+}
+}
+
+di_downgrade_lock(dentry, AuLock_IR);
+
+err = -EINVAL;
+if (!(flags & (LOOKUP_OPEN | LOOKUP_EMPTY))
+    && inode
+    && !(inode->i_state && I_LINKABLE)
+    && (IS_DEADDIR(inode) || !inode->i_nlink)) {
+AuTraceErr(err);
+goto out_inval;
+}
+
+do_udba = !au_opt_test(au_mntflags(sb), UDBA_NONE);
+if (do_udba && inode) {
+aufs_index_t btop = au_ibtop(inode);
+struct inode *h_inode;
+
+if (btop >= 0) {
+h_inode = au_h_iptr(inode, btop);
+if (h_inode && au_test_higen(inode, h_inode)) {
+AuTraceErr(err);
+goto out_inval;
+}
+}
+}
+
tdirren = !!au_opt_test(au_mntflags(sb), DIRREN);
+err = h_d_revalidate(dentry, inode, flags, do_udba, dirren);
+if (unlikely(!err && do_udba && au_dbtop(dentry) < 0)) {
+err = -EIO;
+AuDbg("both of real entry and whiteout found, %p, err %d\n",
+     dentry, err);
+}
+goto out_inval;
+
+out_dgrade:
+di_downgrade_lock(dentry, AuLock_IR);
+out_inval:
+aufs_read_unlock(dentry, AuLock_IR);
+AuTraceErr(err);
+valid = !err;
+out:
+if (!valid) {
+AuDbg("%pd invalid, %d\n", dentry, valid);
+d_drop(dentry);
+}
+return valid;
+
+static void aufs_d_release(struct dentry *dentry)
+{
+if (au_di(dentry)) {
+au_di_fin(dentry);
+au_hn_di_reinit(dentry);
+}
+}
+
+const struct dentry_operations aufs_dop = {
+.d_revalidate = aufs_d_revalidate,
+.d_weak_revalidate = aufs_d_revalidate,
+.d_release = aufs_d_release
/* aufs_dop without d_revalidate */
const struct dentry_operations aufs_dop_noreval = {
    .d_release = aufs_d_release
};
--- linux-4.15.0.orig/fs/aufs/dentry.h
+++ linux-4.15.0/fs/aufs/dentry.h
@@ -0,0 +1,266 @@
+#* Copyright (C) 2005-2017 Junjiro R. Okajima
+#* This program, aufs is free software; you can redistribute it and/or modify
+#* it under the terms of the GNU General Public License as published by
+#* the Free Software Foundation; either version 2 of the License, or
+#* (at your option) any later version.
+#* This program is distributed in the hope that it will be useful,
+#* but WITHOUT ANY WARRANTY; without even the implied warranty of
+#* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+#* GNU General Public License for more details.
+#* You should have received a copy of the GNU General Public License
+#* along with this program. If not, see <http://www.gnu.org/licenses/>.
+#*/
+#*
+#* lookup and dentry operations
+#*/
+#ifndef __AUFS_DENTRY_H__
+#define __AUFS_DENTRY_H__
+#ifdef __KERNEL__
+#include <linux/dcache.h>
+#include "dirren.h"
+#include "rwsem.h"
+#struct au_hdentry {
+    struct dentry *hd_dentry;
+    aufs_bindex_t hd_id;
+};
+#define __KERNEL__
++#include <linux/dcache.h>
+ +#include "dirren.h"
+ +#include "rwsem.h"
+ +struct au_hdentry {
+    struct dentry*hd_dentry;
+    aufs_bindex_thd_id;
+};
+ +struct au_dinfo {
+    atomic_tdi_generation;
+ + struct au_rwlock_rwlock;
+aufs_bindex_tdi_btop, di_bbot, di_bwh, di_bdiropq;
+unsigned chardi_tmpfile; /* to allow the different name */
+struct au_hdentry*di_hdentry;
+{ } ____cacheline_aligned_in_smp;
+
+/* ----------------------------------------------- */
+
+/* flags for au_lkup_dentry */
+#define AuLkup_ALLOW_NEG1 1
+#define AuLkup_IGNORE_PERM(1 << 1)
+#define AuLkup_DIRREN(1 << 2)
+#define au_ftest_lkup(flags, name)((flags) & AuLkup_##name)
+#define au_fset_lkup(flags, name)
+do { (flags) |= AuLkup_##name; } while (0)
+#define au_fclr_lkup(flags, name)
+do { (flags) &= ~AuLkup_##name; } while (0)
+
+ifndef CONFIG_AUFS_DIRREN
+#undef AuLkup_DIRREN
+define AuLkup_DIRREN 0
+endif
+
+struct au_do_lookup_args {
+unsigned int flags;
+mode_t type;
+struct qstr whname, *name;
+struct au_dr_lookup dirren;
+};
+
+/* ----------------------------------------------- */
+
+extern const struct dentry_operations aufs_dop, aufs_dop_noreval;
+struct au_branch;
+struct dentry *au_sio_lkup_one(struct qstr *name, struct path *ppath);
+int au_h_verify(struct dentry *h_dentry, unsigned int udba, struct inode *h_dir,
+struct au_branch *br);
+
+int au_lkup_dentry(struct dentry *dentry, aufs_bindex_t btop,
+unsigned int flags);
+int au_lkup_neg(struct dentry *dentry, aufs_bindex_t bindex, int wh);
+int au_refresh_dentry(struct dentry *dentry, struct dentry *parent);
+int au_reval_dpath(struct dentry *dentry, unsigned int sigen);
+void au_refresh_dop(struct dentry *dentry, int force_reval);
+
+/* dinfo.c */
+void au_di_init_once(void *_di);
+struct au_dinfo *au_di_alloc(struct super_block *sb, unsigned int lsc);
+void au_di_free(struct au_dinfo *dinfo);
+void au_di_swap(struct au_dinfo *a, struct au_dinfo *b);
+void au_di_cp(struct au_dinfo *dst, struct au_dinfo *src);
+int au_di_init(struct dentry *dentry);
+void au_di_fin(struct dentry *dentry);
+int au_di_realloc(struct au_dinfo *dinfo, int nbr, int may_shrink);
+
+void di_read_lock(struct dentry *d, int flags, unsigned int lsc);
+void di_read_unlock(struct dentry *d, int flags);
+void di_downgrade_lock(struct dentry *d, int flags);
+void di_write_lock(struct dentry *d, unsigned int lsc);
+void di_write_unlock(struct dentry *d);
+void di_write_lock2_child(struct dentry *d1, struct dentry *d2, int isdir);
+void di_write_lock2_parent(struct dentry *d1, struct dentry *d2, int isdir);
+void di_write_unlock2(struct dentry *d1, struct dentry *d2);
+
+struct dentry *au_h_dptr(struct dentry *dentry, aufs_bindex_t bindex);
+struct dentry *au_h_d_alias(struct dentry *dentry, aufs_bindex_t bindex);
+aufs_bindex_t au_dbtail(struct dentry *dentry);
+aufs_bindex_t au_dbtaildir(struct dentry *dentry);
+
+void au_set_h_dptr(struct dentry *dentry, aufs_bindex_t bindex,
+struct dentry *h_dentry);
+int au_digen_test(struct dentry *dentry, unsigned int sigen);
+int au_dbrange_test(struct dentry *dentry);
+void au_update_digen(struct dentry *dentry);
+void au_update_dbrange(struct dentry *dentry, int do_put_zero);
+void au_update_dbtop(struct dentry *dentry);
+void au_update_dbbot(struct dentry *dentry);
+int au_find_dbindex(struct dentry *dentry, struct dentry *h_dentry);
+
+/* ---------------------------------------------------------------------- */
+
+static inline struct au_dinfo *au_di(struct dentry *dentry)
+{
+    return dentry->d_fsdata;
+}
+
+/* ---------------------------------------------------------------------- */
+
+/* lock subclass for dinfo */
+enum {
+    AuLsc_DI_CHILD, /* child first */
+    AuLsc_DI_CHILD2, /* rename(2), link(2), and cpup at hnotify */
+    AuLsc_DI_CHILD3, /* copyup dirs */
+    AuLsc_DI_PARENT,
+    AuLsc_DI_PARENT2,
+    AuLsc_DI_PARENT3,
+AuLsc_DI_TMP/* temp for replacing dinfo */
+};
+
+/*
+ * di_read_lock_child, di_write_lock_child,
+ * di_read_lock_child2, di_write_lock_child2,
+ * di_read_lock_child3, di_write_lock_child3,
+ * di_read_lock_parent, di_write_lock_parent,
+ * di_read_lock_parent2, di_write_lock_parent2,
+ * di_read_lock_parent3, di_write_lock_parent3,
+ */
+#define AuReadLockFunc(name, lsc) 
+static inline void di_read_lock_##name(struct dentry *d, int flags) 
+{ di_read_lock(d, flags, AuLsc_DI_##lsc); }
+
+#define AuWriteLockFunc(name, lsc) 
+static inline void di_write_lock_##name(struct dentry *d) 
+{ di_write_lock(d, AuLsc_DI_##lsc); }
+
+#define AuRWLockFuncs(name, lsc) 
+AuReadLockFunc(name, lsc) 
+AuWriteLockFunc(name, lsc) 
+
+AuRWLockFuncs(child, CHILD);
+AuRWLockFuncs(child2, CHILD2);
+AuRWLockFuncs(child3, CHILD3);
+AuRWLockFuncs(parent, PARENT);
+AuRWLockFuncs(parent2, PARENT2);
+AuRWLockFuncs(parent3, PARENT3);
+
+#undef AuReadLockFunc
+#undef AuWriteLockFunc
+#undef AuRWLockFuncs
+
+#define DiMustNoWaiters(d)AuRwMustNoWaiters(&au_di(d)->di_rwsem)
+#define DiMustAnyLock(d)AuRwMustAnyLock(&au_di(d)->di_rwsem)
+#define DiMustWriteLock(d)AuRwMustWriteLock(&au_di(d)->di_rwsem)
+
+/* todo: memory barrier? */
+static inline unsigned int au_digen(struct dentry *d) 
+{
+return atomic_read(&au_di(d)->di_generation);
+}
+
+static inline void au_h_dentry_init(struct au_hdentry *hdentry) 
+{
hdentry->hd_dentry = NULL;
+
+static inline struct au_hdentry *au_hdentry(struct au_dinfo *di,
    + ausfs_bindex_t bindex)
+{
    +return di->di_hdentry + bindex;
    +}
+
+static inline void au_hdput(struct au_hdentry *hd)
+{
    +if (hd)
    +dput(hd->hd_dentry);
    +}
+
+static inline aufs_bindex_t au_dbtop(struct dentry *dentry)
+{
    +DiMustAnyLock(dentry);
    +return au_di(dentry)->di_btop;
    +}
+
+static inline aufs_bindex_t au_dbbot(struct dentry *dentry)
+{
    +DiMustAnyLock(dentry);
    +return au_di(dentry)->di_bbot;
    +}
+
+static inline aufs_bindex_t au_dbwh(struct dentry *dentry)
+{
    +DiMustAnyLock(dentry);
    +return au_di(dentry)->di_bwh;
    +}
+
+static inline aufs_bindex_t au_dbiropq(struct dentry *dentry)
+{
    +DiMustAnyLock(dentry);
    +return au_di(dentry)->di_bdiropq;
    +}
+
/* todo: hard/soft set? */
+static inline void au_set_dbtop(struct dentry *dentry, aufs_bindex_t bindex)
+{
    +DiMustWriteLock(dentry);
    +au_di(dentry)->di_btop = bindex;
    +}
+
+static inline void au_set_dbbot(struct dentry *dentry, aufs_bindex_t bindex)
+{
    +
DiMustWriteLock(dentry);
+au_di(dentry)->di_bbot = bindex;
+
+static inline void au_set_dbwh(struct dentry *dentry, aufs_bindex_t bindex)
+{
+DiMustWriteLock(dentry);
+/* dbwh can be outside of btop - bbot range */
+au_di(dentry)->di_bwh = bindex;
+
+}
+
+static inline void au_set_dbdiropq(struct dentry *dentry, aufs_bindex_t bindex)
+{
+DiMustWriteLock(dentry);
+au_di(dentry)->di_bdiropq = bindex;
+
+}
+
+/* ---------------------------------------------------------------------- */
+
#ifdef CONFIG_AUFS_HNOTIFY
+static inline void au_digen_dec(struct dentry *d)
+{
+atomic_dec(&au_di(d)->di_generation);
+
+}
+
+static inline void au_hn_di_reinit(struct dentry *dentry)
+{
+dentry->d_fsdata = NULL;
+
+}
+#else
+AuStubVoid(au_hn_di_reinit, struct dentry __maybe_unused)
+#endif /* CONFIG_AUFS_HNOTIFY */
+
+#endif /* __KERNEL__ */
+#endif /* __AUFS_DENTRY_H__ */
--- linux-4.15.0.orig/fs/aufs/dinfo.c
+++ linux-4.15.0/fs/aufs/dinfo.c
@@ -0,0 +1,553 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
/* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
 * GNU General Public License for more details.
 * */

/* dentry private data */

#include "aufs.h"

void au_di_init_once(void *_dinfo)
{
    struct au_dinfo *dinfo = _dinfo;
    au_rwlock(&dinfo->di_rwsem);
}

struct au_dinfo *au_di_alloc(struct super_block *sb, unsigned int lsc)
{
    struct au_dinfo *dinfo;
    int nbr, i;
    dinfo = au_cache_alloc_dinfo();
    if (unlikely(!dinfo))
        goto out;
    nbr = au_sbbot(sb) + 1;
    if (nbr <= 0)
        nbr = 1;
    dinfo->di_hdentry = kmalloc(nbr, sizeof(*dinfo->di_hdentry), GFP_NOFS);
    if (dinfo->di_hdentry) {
        int nbr, i;
        for (i = 0; i < nbr; i++)
            dinfo->di_hdentry[i].hd_id = -1;
        goto out;
    }
    au_cache_free_dinfo(dinfo);
    dinfo = NULL;
}
+out:
+return dinfo;
+
+void au_di_free(struct au_dinfo *dinfo)
+{
+struct au_hdentry *p;
+aufs_bindex_t bbot, bindex;
+
+%" dentry may not be revalidated */
+-bindex = dinfo->di_btop;
+if (bindex >= 0) {
+-bbot = dinfo->di_bbot;
+-p = au_hdentry(dinfo, bindex);
+-while (bindex++ <= bbot)
+-hdput(p++);
+}
+kfree(dinfo->di_hdentry);
+au_cache_free_dinfo(dinfo);
+
+
+void au_di_swap(struct au_dinfo *a, struct au_dinfo *b)
+{
+struct au_hdentry *p;
+aufs_bindex_t bi;
+
+AuRwMustWriteLock(&a->di_rwsem);
+AuRwMustWriteLock(&b->di_rwsem);
+
+#define DiSwap(v, name)				\
+ do {				\
+ v = a->di_##name;		\
+ a->di_##name = b->di_##name;	\
+ b->di_##name = v;	\
+} while (0)
+
+DiSwap(p, hdentry);
+DiSwap(bi, btop);
+DiSwap(bi, bbot);
+DiSwap(bi, bwh);
+DiSwap(bi, bdiropq);
+%" smp_mb(); */
+
+#undef DiSwap
+
+
+void au_di_cp(struct au_dinfo *dst, struct au_dinfo *src)
+{
+}
AuRwMustWriteLock(&dst->di_rwsem);
AuRwMustWriteLock(&src->di_rwsem);

+dst->di_btop = src->di_btop;
+dst->di_bbot = src->di_bbot;
+dst->di_bwh = src->di_bwh;
+dst->di_bdiropq = src->di_bdiropq;
+# smp_mb(); */
+
+
+int au_di_init(struct dentry *dentry)
+{
+int err;
+struct super_block *sb;
+struct au_dinfo *dinfo;
+
+err = 0;
+sb = dentry->d_sb;
+dinfo = au_di_alloc(sb, AuLsc_DI_CHILD);
+if (dinfo) {
+atomic_set(&dinfo->di_generation, au_sigen(sb));
+# smp_mb(); */ /* atomic_set */
+dentry->d_fsdata = dinfo;
+} else
+err = -ENOMEM;
+
+return err;
+}
+
+int au_di_realloc(struct au_dinfo *dinfo, int nbr, int may_shrink)
+{
+int err, sz;
+struct au_hdentry *hdp;
+
+AuRwMustWriteLock(&dinfo->di_rwsem);
+
+err = -ENOMEM;
+sz = sizeof(*hdp) * (dinfo->di_bbot + 1);
+if (!sz)
As shown in the code snippet:

```c
+sz = sizeof(*hdp);
+hdp = au_kzrealloc(dinfo->di_hdentry, sz, sizeof(*hdp) * nbr, GFP_NOFS,
+    may_shrink);
+if (hdp) {
+dinfo->di_hdentry = hdp;
+err = 0;
+}
+
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static void do_i_i_write_lock(struct inode *inode, unsigned int lsc)
+{
+switch (lsc) {
+case AuLsc_DI_CHILD:
++ii_write_lock_child(inode);
+break;
+case AuLsc_DI_CHILD2:
++ii_write_lock_child2(inode);
+break;
+case AuLsc_DI_CHILD3:
++ii_write_lock_child3(inode);
+break;
+case AuLsc_DI_PARENT:
++ii_write_lock_parent(inode);
+break;
+case AuLsc_DI_PARENT2:
++ii_write_lock_parent2(inode);
+break;
+case AuLsc_DI_PARENT3:
++ii_write_lock_parent3(inode);
+break;
+default:
+BUG();
+}
+
+static void do_i_i_read_lock(struct inode *inode, unsigned int lsc)
+{
+switch (lsc) {
+case AuLsc_DI_CHILD:
++ii_read_lock_child(inode);
+break;
+case AuLsc_DI_CHILD2:
++ii_read_lock_child2(inode);
+break;
```

---

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+case AuLsc_DI_CHILD3:
+  ii_read_lock_child3(inode);
+  break;
+case AuLsc_DI_PARENT:
+  ii_read_lock_parent(inode);
+  break;
+case AuLsc_DI_PARENT2:
+  ii_read_lock_parent2(inode);
+  break;
+case AuLsc_DI_PARENT3:
+  ii_read_lock_parent3(inode);
+  break;
+default:
+  BUG();
+}
+
+void di_read_lock(struct dentry *d, int flags, unsigned int lsc)
+{
+  struct inode *inode;
+
+  au_rwlock_nested(&au_di(d)->di_rwlock, lsc);
+  if (d_really_is_positive(d)) {
+    inode = d_inode(d);
+    if (au_ftest_lock(flags, IW))
+      do_ii_write_lock(inode, lsc);
+    else if (au_ftest_lock(flags, IR))
+      do_ii_read_lock(inode, lsc);
+  }
+}
+
+void di_read_unlock(struct dentry *d, int flags)
+{
+  struct inode *inode;
+
+  if (d_really_is_positive(d)) {
+    inode = d_inode(d);
+    if (au_ftest_lock(flags, IW)) {
+      dbg_verify_dinode(d);
+      ii_write_unlock(inode);
+    } else if (au_ftest_lock(flags, IR)) {
+     dbg_verify_dinode(d);
+      ii_read_unlock(inode);
+    }
+  }
+}
+
+au_rwlock_nested(&au_di(d)->di_rwlock, lsc);
+void di_downgrade_lock(struct dentry *d, int flags)
{        
  if (d_really_is_positive(d) && au_ftest_lock(flags, IR))
  {i_downgrade_lock(d_inode(d)); 
  au_rwlock_dgrade_lock(&au_di(d)->di_rwlock);
  }
  +
  +void di_write_lock(struct dentry *d, unsigned int lsc)
{        
  au_rwlock_write_lock_nested(&au_di(d)->di_rwlock, lsc);
  if (d_really_is_positive(d))
  {do_iwrite_lock(d_inode(d), lsc);
  +}
  +
  +void di_write_unlock(struct dentry *d)
{        
  au_dbg_verify_dinode(d);
  if (d_really_is_positive(d))
  {i_write_unlock(d_inode(d));
  au_rwlock_write_unlock(&au_di(d)->di_rwlock);
  +}
  +
  +void di_write_lock2_child(struct dentry *d1, struct dentry *d2, int isdir)
{        
  AuDebugOn(d1 == d2
  || d_inode(d1) == d_inode(d2)
  || d1->d_sb != d2->d_sb);
  +if ((isdir && au_test_subdir(d1, d2))
  + || d1 < d2) {
  di_write_lock_child(d1);
  di_write_lock_child2(d2);
  +} else {
  di_write_lock_child(d2);
  di_write_lock_child2(d1);
  +}
  +
  +void di_write_lock2_parent(struct dentry *d1, struct dentry *d2, int isdir)
{        
  AuDebugOn(d1 == d2
  || d_inode(d1) == d_inode(d2)
  || d1->d_sb != d2->d_sb);
  +if ((isdir && au_test_subdir(d1, d2))
  + || d1 < d2) {
  di_write_lock_parent(d1);
  di_write_lock_parent2(d2);
+} else {
+di_write_lock_parent(d2);
+di_write_lock_parent2(d1);
+}
+
+void di_write_unlock2(struct dentry *d1, struct dentry *d2)
+{
+di_write_unlock(d1);
+if (d_inode(d1) == d_inode(d2))
+au_rw_write_unlock(&au_di(d2)->di_rwlock);
+else
+di_write_unlock(d2);
+}
+
+*---------------------------------------------------------------------- *

+struct dentry *au_h_dptr(struct dentry *dentry, aufs_bindex_t bindex)
+{
+struct dentry *d;
+
+DiMustAnyLock(dentry);
+
+if (au_dbtop(dentry) < 0 || bindex < au_dbtop(dentry))
+return NULL;
+AuDebugOn(bindex < 0);
+d = au_hdentry(au_di(dentry), bindex)->hd_dentry;
+AuDebugOn(d && au_dcount(d) <= 0);
+return d;
+}
+
+/*
+ * extended version of au_h_dptr().
+ * returns a hashed and positive (or linkable) h_dentry in bindex, NULL, or
+ * error.
+ */
+struct dentry *au_h_d_alias(struct dentry *dentry, aufs_bindex_t bindex)
+{
+struct dentry *h_dentry;
+struct inode *inode, *h_inode;
+
+AuDebugOn(d_really_is_negative(dentry));
+
+h_dentry = NULL;
+if (au_dbtop(dentry) <= bindex
+   && bindex <= au_dbbot(dentry))
+h_dentry = au_h_dptr(dentry, bindex);
+AuDebugOn(d Really Is Negative(dentry));
+
+h_dentry = NULL;
+if (au_dbtop(dentry) <= bindex
+   && bindex <= au_dbbot(dentry))
+h_dentry = au_h_dptr(dentry, bindex);
+if (!au_d_linkable(h_dentry) {
\texttt{+dget(h\_dentry);}
\texttt{+goto out; /* success */}
\texttt{+}
\texttt{+inode = d\_inode(dentry);}
\texttt{+AuDebugOn(bindex < au\_ibtop(inode));}
\texttt{+AuDebugOn(au\_ibbot(inode) < bindex);}
\texttt{+h\_inode = au\_h\_iplt(inode, bindex);}
\texttt{+h\_dentry = d\_find\_alias(h\_inode);}
\texttt{+if (h\_dentry) \{}
\texttt{+if (!IS\_ERR(h\_dentry)) \{}
\texttt{+if (!au\_d\_linkable(h\_dentry))}
\texttt{+goto out; /* success */}
\texttt{+dput(h\_dentry);}
\texttt{+\} else}
\texttt{+goto out;}
\texttt{+\} \}
\texttt{+}
\texttt{+if (au\_opt\_test(au\_mntflags(dentry->d\_sb), PLINK)) \{}
\texttt{+h\_dentry = au\_plink\_lkup(inode, bindex);}
\texttt{+AuDebugOn(!h\_dentry);}
\texttt{+if (!IS\_ERR(h\_dentry)) \{}
\texttt{+if (!au\_d\_hashed\_positive(h\_dentry))}
\texttt{+goto out; /* success */}
\texttt{+dput(h\_dentry);}
\texttt{+h\_dentry = NULL;}
\texttt{+\} \}
\texttt{+}
\texttt{+out:}
\texttt{+AuDbgDentry(h\_dentry);}
\texttt{+return h\_dentry;}
\texttt{+\} \}
\texttt{+}
\texttt{+aufs\_bindex\_t au\_dbtail(struct dentry *dentry) \{}
\texttt{+aufs\_bindex\_t bbot, bwh;}
\texttt{+}
\texttt{+bbot = au\_dbbot(dentry);}
\texttt{+if (0 <= bbot) \{}
\texttt{+bwh = au\_dbwh(dentry);}
\texttt{+if (!bwh)}
\texttt{+return bwh;}
\texttt{+if (0 < bwh && bwh < bbot)}
\texttt{+return bwh - 1;}
\texttt{+\} \}
\texttt{+return bbot;}
\texttt{+\}
+aufs_bindex_t au_dbtaildir(struct dentry *dentry)
+{
+aufs_bindex_t bbot, bopq;
+
+bbot = au_dbtail(dentry);
+if (0 <= bbot) {
+bopq = au_dbiropq(dentry);
+if (0 <= bopq && bopq < bbot)
+bbot = bopq;
+}
+return bbot;
+
+/* ---------------------------------------------------------------------- */

+void au_set_h_dptr(struct dentry *dentry, aufs_bindex_t bindex, 
+ struct dentry *h_dentry)
+{
+struct au_dinfo *dinfo;
+struct au_hdentry *hd;
+struct au_branch *br;
+
+DiMustWriteLock(dentry);
+
+dinfo = au_di(dentry);
+hd = au_hdentry(dinfo, bindex);
+au_hdput(hd);
+hd->hd_dentry = h_dentry;
+if (h_dentry) {
+br = au_sbr(dentry->d_sb, bindex);
+hd->hd_id = br->br_id;
+}
+
+
+int au_dbrange_test(struct dentry *dentry)
+{
+int err;
+aufs_bindex_t btop, bbot;
+
+err = 0;
+btop = au_dbtop(dentry);
+bbot = au_dbbot(dentry);
+if (btop >= 0)
+AuDebugOn(bbot < 0 && btop > bbot);
+else {
+err = -EIO;
+AuDebugOn(bbot >= 0);
int au_digen_test(struct dentry *dentry, unsigned int sigen) {
    int err;
    err = 0;
    if (unlikely(au_digen(dentry) != sigen || au_iigen_test(d_inode(dentry), sigen)))
        err = -EIO;
    return err;
}

void au_update_digen(struct dentry *dentry) {
    atomic_set(&au_di(dentry)->di_generation, au_sigen(dentry->d_sb));
    /* smp_mb(); */ /* atomic_set */
}

void au_update_dbrange(struct dentry *dentry, int do_put_zero) {
    struct au_dinfo *dinfo;
    struct dentry *h_d;
    struct au_hdentry *hdp;
    aufs_bindex_t bindex, bbot;
    DiMustWriteLock(dentry);
    dinfo = au_di(dentry);
    if (!dinfo || dinfo->di_btop < 0)
        return;
    if (do_put_zero) {
        bbot = dinfo->di_bbot;
        for (; bindex <= bbot; bindex++, hdp++) {
            h_d = hdp->hd_dentry;
            if (h_d && d_is_negative(h_d))
                au_set_h_dptr(dentry, bindex, NULL);
        }
        dinfo->di_btop = 0;
    }
    else
        dinfo->di_btop = 0;

void au_update_dbtop(struct dentry *dentry) {
    aufs_bindex_t bindex, bbot;
    struct dentry *h_dentry;

    bbot = au_dbbot(dentry);
    for (bindex = au_dbtop(dentry); bindex <= bbot; bindex++) {
        h_dentry = au_h_dptr(dentry, bindex);
        if (!h_dentry)
            continue;
        if (d_is_positive(h_dentry)) {
            au_set_dbtop(dentry, bindex);
            return;
        }
        au_set_h_dptr(dentry, bindex, NULL);
    }
}

void au_update_dbbot(struct dentry *dentry) {
    aufs_bindex_t bindex, btop;
    struct dentry *h_dentry;

    btop = au_dbbot(dentry);
    for (bindex = au_dbbot(dentry); bindex >= btop; bindex--) {
        h_dentry = au_h_dptr(dentry, bindex);
        if (!h_dentry)
            continue;
        if (d_is_positive(h_dentry)) {
            au_set_dbbot(dentry, bindex);
            return;
        }
        au_set_h_dptr(dentry, bindex, NULL);
    }
}
int au_find_dbindex(struct dentry *dentry, struct dentry *h_dentry) {
    aufs_bindex_t index, bbot;

    bbot = au_dbbot(dentry);
    for (index = au_dbtop(dentry); index <= bbot; index++)
        if (au_h_dptr(dentry, index) == h_dentry)
            return index;
    return -1;
}
+nlink = dir->i_nlink;
+nlink += h_dir->i_nlink - 2;
+if (h_dir->i_nlink < 2)
+nlink += 2;
+smp_mb(); /* for i_nlink */
+/** 0 can happen in revaliding */
+set_nlink(dir, nlink);
+}
+
+void au_sub_nlink(struct inode *dir, struct inode *h_dir)
+{
+unsigned int nlink;
+
+AuDebugOn(!S_ISDIR(dir->i_mode) || !S_ISDIR(h_dir->i_mode));
+
+nlink = dir->i_nlink;
+nlink -= h_dir->i_nlink - 2;
+if (h_dir->i_nlink < 2)
+nlink -= 2;
+smp_mb(); /* for i_nlink */
+/** nlink == 0 means the branch-fs is broken */
+set_nlink(dir, nlink);
+}
+
+loff_t au_dir_size(struct file *file, struct dentry *dentry)
+{
+loff_t sz;
+aufs_bindex_t bindex, bbot;
+struct file *h_file;
+struct dentry *h_dentry;
+
+sz = 0;
+if (file) {
+AuDebugOn(!d_is_dir(file->f_path.dentry));
+
+bbot = au_fbbot_dir(file);
+for (bindex = au_fbtop(file);
+     bindex <= bbot && sz < KMALLOC_MAX_SIZE;
+     bindex++) {
+h_file = au_hf_dir(file, bindex);
+if (h_file && file_inode(h_file))
+sz += vfsub_f_size_read(h_file);
+}
+}
+} else {
+AuDebugOn(!dentry);
+AuDebugOn(!d_is_dir(dentry));
+
+bbot = au_dbtaildir(dentry);
for (bindex = au_dbtop(dentry);
    bindex <= bbot && sz < KMALLOC_MAX_SIZE;
    bindex++) {
    h_dentry = au_h_dptr(dentry, bindex);
    if (h_dentry && d_is_positive(h_dentry))
        sz += i_size_read(d_inode(h_dentry));
}
if (sz < KMALLOC_MAX_SIZE)
    sz = roundup_pow_of_two(sz);
if (sz > KMALLOC_MAX_SIZE)
    sz = KMALLOC_MAX_SIZE;
else if (sz < NAME_MAX) {
    BUILD_BUG_ON(AUFS_RDBLK_DEF < NAME_MAX);
    sz = AUFS_RDBLK_DEF;
}
return sz;
}

struct au_dir_ts_arg {
    struct dentry *dentry;
    aufs_bindex_t brid;
};

static void au_do_dir_ts(void *arg) {
    struct au_dir_ts_arg *a = arg;
    struct au_dtime dt;
    struct path h_path;
    struct inode *dir, *h_dir;
    struct super_block *sb;
    struct au_branch *br;
    struct au_hinode *hdir;
    int err;
    aufs_bindex_t btop, bindex;
    sb = a->dentry->d_sb;
    if (d_really_is_negative(a->dentry))
        goto out;
    /* no dir->i_mutex lock */
    aufs_read_lock(a->dentry, AuLock_DW); /* noflush */
    dir = d_inode(a->dentry);
    btop = au_ibtop(dir);
    bindex = au_br_index(sb, a->brid);
    if (bindex < btop)
        goto out_unlock;
    +for (bindex = au_dbtop(dentry);
        bindex <= bbot && sz < KMALLOC_MAX_SIZE;
        bindex++) {
        h_dentry = au_h_dptr(dentry, bindex);
        if (h_dentry && d_is_positive(h_dentry))
            sz += i_size_read(d_inode(h_dentry));
    }
    if (sz < KMALLOC_MAX_SIZE)
        sz = roundup_pow_of_two(sz);
    if (sz > KMALLOC_MAX_SIZE)
        sz = KMALLOC_MAX_SIZE;
    else if (sz < NAME_MAX) {
        BUILD_BUG_ON(AUFS_RDBLK_DEF < NAME_MAX);
        sz = AUFS_RDBLK_DEF;
    }
    +return sz;
}
+br = au_sbr(sb, bindex);
+h_path.dentry = au_h_dptr(a->dentry, bindex);
+if (!h_path.dentry)
+go to out_unlock;
+h_path.mnt = au_br_mnt(br);
+au_dtime_store(&dt, a->dentry, &h_path);
+
+br = au_sbr(sb, btop);
+if (!au_br_writable(br->br_perm))
+go to out_unlock;
+h_path.dentry = au_h_dptr(a->dentry, btop);
+h_path.mnt = au_br_mnt(br);
+err = vfsub_mnt_want_write(h_path.mnt);
+if (err)
+go to out_unlock;
+hdir = au_hi(dir, btop);
+au_hi_inode_lock_nested(hdir, AuLsc_I_PARENT);
+h_dir = au_h_iptr(dir, btop);
+if (h_dir->i_nlink
+&& timespec_compare(&h_dir->i_mtime, &dt.dt_mtime) < 0) {
+dt.dt_h_path = h_path;
+au_dtime_revert(&dt);
+}
+au_hi_inode_unlock(hdir);
+vfsub_mnt_drop_write(h_path.mnt);
+au_cpup_attr_timesizes(dir);
+
+out_unlock:
+aufs_read_unlock(a->dentry, AuLock_DW);
+out:
+dput(a->dentry);
+aufs_nwt_done(&au_sbi(sb)->si_nowait);
+kfree(arg);
+}
+
+void au_dir_ts(struct inode *dir, aufs_bindex_t bindex)
+{
+int perm, wkq_err;
+aufs_bindex_t btop;
+struct au_dir_ts_arg *arg;
+struct dentry *dentry;
+struct super_block *sb;
+
+IMustLock(dir);
+
+dentry = d_find_any_alias(dir);
+AuDebugOn(!dentry);
+sb = dentry->d_sb;
btop = au_i bttop(dir);
+if (btop == bindex) {
+au_cpup_attr_timesizes(dir);
+g oto out;
+}
+
+perm = au_sbr_perm(sb, btop);
+if (!au_br_writable(perm))
+goto out;
+
+arg = kmalloc(sizeof(*arg), GFP_NOFS);
+if (!arg)
+goto out;
+
+arg->dentry = dget(dentry); /* will be dput-ted by au_do_dir ts() */
+arg->brid = au_sbr_id(sb, bindex);
+wkq_err = au_wkq_nowait(au_do_dir_ts, arg, sb, /*flags*/0);
+if (unlikely(wkq_err)) {
+pr_err("wkq %d
", wkq_err);
+dput(dentry);
+kfree(arg);
+}
+
+out:
+dput(dentry);
+}
+
+/* ---------------------------------------------------------------------- */
+
+static int reopen_dir(struct file *file)
+{
+int err;
+unsigned int flags;
+aufs_bindex_t bindex, btail, btop;
+struct dentry *dentry, *h_dentry;
+struct file *h_file;
+
+/* open all lower dirs */
+dentry = file->f_path.dentry;
+btop = au_dbtop(dentry);
+for (bindex = au_fbtop(file); bindex < btop; bindex++)
+au_set_h_fptr(file, bindex, NULL);
+au_set_fbbot_dir(file, btail);
+}
flags = vfsub_file_flags(file);
for (bindex = btop; bindex <= btail; bindex++) {
    h_dentry = au_h_dptr(dentry, bindex);
    if (!h_dentry)
        continue;
    h_file = au_hf_dir(file, bindex);
    if (h_file)
        continue;
    h_file = au_h_open(dentry, bindex, flags, file, /*force_wr*/0);
    err = PTR_ERR(h_file);
    if (IS_ERR(h_file))
        goto out; /* close all? */
    au_set_h_fptr(file, bindex, h_file);
}
au_update_figen(file);
/* todo: necessary? */
/* file->f_ra = h_file->f_ra; */
err = 0;
out:
return err;
}

static int do_open_dir(struct file *file, int flags, struct file *h_file)
{
    int err;
aufs_bindex_t bindex, btail;
    struct dentry *dentry, *h_dentry;
    struct vfsmount *mnt;

    FiMustWriteLock(file);
    AuDebugOn(h_file);

    err = 0;
    mnt = file->f_path.mnt;
    dentry = file->f_path.dentry;
    struct dentry *dentry, *h_dentry;
    struct vfsmount *mnt;
    +
    FiMustWriteLock(file);
    +AuDebugOn(h_file);
    +
    +err = 0;
    +mnt = file->f_path.mnt;
    +dentry = file->f_path.dentry;
    +file->f_version = d_inode(dentry)->i_version;
    +bindex = au_dbtop(dentry);
    +au_set_fbttop(file, bindex);
    +btail = au_dbtaildir(dentry);
    +au_set_fbbot_dir(file, btail);
    +for (; !err && bindex <= btail; bindex++) {
        h_dentry = au_h_dptr(dentry, bindex);
        if (!h_dentry)
            continue;
        h_file = au_hf_dir(file, bindex);
        if (h_file)
            continue;
        h_file = au_h_open(dentry, bindex, flags, file, /*force_wr*/0);
        err = PTR_ERR(h_file);
        if (IS_ERR(h_file))
            goto out; /* close all? */
        au_set_h_fptr(file, bindex, h_file);
    }
    au_update_figen(file);
    /* todo: necessary? */
    /* file->f_ra = h_file->f_ra; */
    err = 0;
    out:
    return err;
}
err = vfsub_test_mntns(mnt, h_dentry->d_sb);
+if (unlikely(err))
+break;
+h_file = au_h_open(dentry, bindex, flags, file, /*force_wr*/0);
+if (IS_ERR(h_file)) {
+err = PTR_ERR(h_file);
+break;
+}
+au_set_h_fptr(file, bindex, h_file);
+}
+au_update_figen(file);
+/* todo: necessary? */
+/* file->f_ra = h_file->f_ra; */
+if (!err)
+return 0; /* success */
+
+/* close all */
+for (bindex = au_fbttop(file); bindex <= btail; bindex++)
+au_set_h_fptr(file, bindex, NULL);
+au_set_fbttop(file, -1);
+au_set_fbbot_dir(file, -1);
+
+return err;
+}
+
+static int aufs_open_dir(struct inode *inode __maybe_unused,
+ struct file *file)
+{
+int err;
+struct super_block *sb;
+struct au_fidir *fidir;
+
+err = -ENOMEM;
+sb = file->f_path.dentry->d_sb;
+si_read_lock(sb, AuLock_FLUSH);
+fidir = au_fidir_alloc(sb);
+if (fidir) {
+struct au_do_open_args args = {
+.open = do_open_dir,
+.fidir = fidir
+};
+err = au_do_open(file, &args);
+if (unlikely(err))
+kfree(fidir);
+}
+si_read_unlock(sb);
+return err;
+}
+static int aufs_release_dir(struct inode *inode __maybe_unused,
 struct file *file)
+{
+struct au_vdir *vdir_cache;
+struct au_finfo *finfo;
+struct au_fidir *fidir;
+struct au_hfile *hf;
+aufs_bindex_t bindex, bbot;
+
+finfo = au_fi(file);
+fidir = finfo->fi_hdir;
+if (fidir) {
+au_hbl_del(&finfo->fi_hlist,
 + &au_sbi(file->f_path.dentry->d_sb)->si_files);
+vfdir_cache = fidir->fd_vdir_cache; /* lock-free */
+if (vdir_cache)
+vdir_free(vdir_cache);
+
+bindex = finfo->fi_btop;
+if (bindex >= 0) { /*
 + * calls fput() instead of filp_close(),
 + * since no dnotify or lock for the lower file.
 + */
+bbot = fidir->fd_bbot;
+for (; bindex <= bbot; bindex++, hf++)
+if (hf->hf_file)
+au_hfput(hf, /*execed*/0);
+
+kfree(fidir);
+finfo->fi_hdir = NULL;
+}
+au_finfo_fin(file);
+return 0;
+}
+
+/*
+static int au_do_flush_dir(struct file *file, fl_owner_t id)
+{ /*
+int err;
+aufs_bindex_t bindex, bbot;
+struct file *h_file;
+
+err = 0;
+bbot = au_fbbot_dir(file);
for (bindex = au_fbtop(file); !err && bindex <= bbot; bindex++) {
    h_file = au_hf_dir(file, bindex);
    if (h_file)
        err = vfsub_flush(h_file, id);
} return err;
}

static int aufs_flush_dir(struct file *file, fl_owner_t id)
{
    return au_do_flush(file, id, au_do_flush_dir);
}

/* ---------------------------------------------------------------------- */

static int au_do_fsync_dir_no_file(struct dentry *dentry, int datasync)
{
    int err;
    aufs_bindex_t bbot, bindex;
    struct inode *inode;
    struct super_block *sb;
    err = 0;
    sb = dentry->d_sb;
    inode = d_inode(dentry);
    IMustLock(inode);
    bbot = au_dbbot(dentry);
    for (bindex = au_dbtop(dentry); !err && bindex <= bbot; bindex++) {
        struct path h_path;

        if (au_test_ro(sb, bindex, inode))
            continue;
        h_path.dentry = au_h_dptr(dentry, bindex);
        if (!h_path.dentry)
            continue;
        h_path.mnt = au_sbr_mnt(sb, bindex);
        err = vfsub_fsync(NULL, &h_path, datasync);
    }
    return err;
}

static int au_do_fsync_dir(struct file *file, int datasync)
{
    int err;
    aufs_bindex_t bbot, bindex;
    struct file *h_file;

    for (bindex = au_fbtop(file); !err && bindex <= bbot; bindex++) {
        h_file = au_hf_dir(file, bindex);
        if (h_file)
            err = vfsub_flush(h_file, id);
    } return err;

struct super_block *sb;
struct inode *inode;
+
err = au_reval_and_lock_fdi(file, reopen_dir, /*wlock*/1, /*fi_lsc*/0);
+if (unlikely(err))
+goto out;
+
inode = file_inode(file);
+sb = inode->i_sb;
+bobot = au_fbbot_dir(file);
+for (bindex = au_fbtop(file); !err && bindex <= bbot; bindex++) {
+h_file = au_hf_dir(file, bindex);
+if (!h_file || au_test_ro(sb, bindex, inode))
+continue;
+
+err = vfsub_fsync(h_file, &h_file->f_path, datasync);
+
}
+
+out:
+return err;
+
+*/
+ * @file may be NULL
+ */
+static int aufs_fsync_dir(struct file *file, loff_t start, loff_t end,
+ int datasync)
+{
+int err;
+struct dentry *dentry;
+struct inode *inode;
+struct super_block *sb;
+
+err = 0;
+dentry = file->f_path.dentry;
+inode = d_inode(dentry);
+inode_lock(inode);
+sb = dentry->d_sb;
+si_noflush_read_lock(sb);
+if (file)
+err = au_do_fsync_dir(file, datasync);
+else {
+di_write_lock_child(dentry);
+err = au_do_fsync_dir_no_file(dentry, datasync);
+
+au_cpup_attr_timesizes(inode);
+di_write_unlock(dentry);
+if (file)
+fi_write_unlock(file);
+
+si_read_unlock(sb);
+inode_unlock(inode);
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static int aufs_iterate_shared(struct file *file, struct dir_context *ctx)
+{
+int err;
+struct dentry *dentry;
+struct inode *inode, *h_inode;
+struct super_block *sb;
+
+AuDbg("%pD, ctx{%pf, %llu}\n", file, ctx->actor, ctx->pos);
+
+dentry = file->f_path.dentry;
+inode = d_inode(dentry);
+IMustLock(inode);
+
sb = dentry->d_sb;
+si_read_lock(sb, AuLock_FLUSH);
+err = au_reval_and_lock_fdi(file, reopen_dir, /*wlock*/1, /*fi_lsc*/0);
+if (unlikely(err))
+goto out;
+err = au_alive_dir(dentry);
+if (!err)
+err = au_vdir_init(file);
+di_downgrade_lock(dentry, AuLock_IR);
+if (unlikely(err))
+goto out_unlock;
+
+h_inode = au_h_iptr(inode, au_ibtop(inode));
+if (!au_test_nfsd()) {
+err = au_vdir_fill_de(file, ctx);
+fsstack_copy_attr_atime(inode, h_inode);
+} else {
+/*
+ * nfsd filldir may call lookup_one_len(), vfs_getattr(),
+ * encode_fh() and others.
+ */
+atomic_inc(&h_inode->i_count);
+di_read_unlock(dentry, AuLock_IR);
+si_read_unlock(sb);
+err = au_vdir_fill_de(file, ctx);
+fsstack_copy_attr_atime(inode, h_inode);
+fi_write_unlock(file);
+iput(h_inode);
+
+AuTraceErr(err);
+return err;
+
+out_unlock:
+di_read_unlock(dentry, AuLock_IR);
+fi_write_unlock(file);
+out:
+si_read_unlock(sb);
+return err;
+
+out_unlock:
+fi_write_unlock(file);
+iput(h_inode);
+
+AuTraceErr(err);
+return err;
+
/* ---------------------------------------------------------------------- */

#define AuTestEmpty_WHONLY 1
#define AuTestEmpty_CALLED (1 << 1)
#define AuTestEmpty_SHWH (1 << 2)
#define au_ftest_testempty(flags, name) ((flags) & AuTestEmpty_##name)
#define au_fset_testempty(flags, name) \
	 do { (flags) |= AuTestEmpty_##name; } while (0)
#define au_fclr_testempty(flags, name) \
	 do { (flags) &= ~AuTestEmpty_##name; } while (0)
+
#ifndef CONFIG_AUFS_SHWH
#undef AuTestEmpty_SHWH
#define AuTestEmpty_SHWH 0
#endif

+struct test_empty_arg {
+struct dir_context ctx;
+struct au_nhash *whlist;
+unsigned int flags;
+int err;
+aufs_bindex_t bindex;
+};
+
+static int test_empty_cb(struct dir_context *ctx, const char *__name, 
+ int namelen, loff_t offset __maybe_unused, u64 ino, 
+ unsigned int d_type) 
+{
+struct test_empty_arg *arg = container_of(ctx, struct test_empty_arg, 
+ ctx);
+char *name = (void *)__name;
+
+arg->err = 0;
+au_fset_testempty(arg->flags, CALLED);
+/* smp_mb(); */
+if (name[0] == ' '
+    && (namelen == 1 || (name[1] == '.' && namelen == 2)))
+    goto out; /* success */
+
+if (name == AUFS_WH_PFX_LEN
+    || memcmp(name, AUFS_WH_PFX, AUFS_WH_PFX_LEN)) {
+    if (au_fset_testempty(arg->flags, WHONLY)
+        && !au_nhash_test_known_wh(arg->whlist, name, namelen))
+        arg->err = -ENOTEMPTY;
+        goto out;
+    }
+
+name += AUFS_WH_PFX_LEN;
+namelen -= AUFS_WH_PFX_LEN;
+if (!au_nhash_test_known_wh(arg->whlist, name, namelen))
+    arg->err = au_nhash_append_wh
+        arg->whlist, name, namelen, ino, d_type, arg->bindex,
+        au_ftest_testempty(arg->flags, SHWH));
+
+out:
+/* smp_mb(); */
+AuTraceErr(arg->err);
+return arg->err;
+}
+
+static int do_test_empty(struct dentry *dentry, struct test_empty_arg *arg)
+{
+    int err;
+    struct file *h_file;
+    
+    h_file = au_h_open(dentry, arg->bindex,
+        O_RDONLY | O_NONBLOCK | O_DIRECTORY | O_LARGEFILE,
+        /*file*/NULL, /*force_wr*/0);
+    err = PTR_ERR(h_file);
+    if (IS_ERR(h_file))
+        goto out;
+    err = 0;
+    if (!au_opt_test(au_mntflags(dentry->d_sb), UDBA_NONE)
+            && !file_inode(h_file)->i_nlink)
+        goto out_put;
+    do {
+        arg->err = 0;
+        au_fclr_testempty(arg->flags, CALLED);
+        /* smp_mb(); */
+        }
err = vfsub_iterate_dir(h_file, &arg->ctx);
+ if (err >= 0)
+ err = arg->err;
+ } while (!err && au_ftest_testempty(arg->flags, CALLED));
+
+ out_put:
+ fput(h_file);
+ au_sbr_put(dentry->d_sb, arg->bindex);
+ out:
+ return err;
+
+ struct do_test_empty_args {
+ int *errp;
+ struct dentry *dentry;
+ struct test_empty_arg *arg;
+ }
+
+ static void call_do_test_empty(void *args)
+ {
+ struct do_test_empty_args *a = args;
+ *a->errp = do_test_empty(a->dentry, a->arg);
+ }
+
+ static int sio_test_empty(struct dentry *dentry, struct test_empty_arg *arg)
+ {
+ int err, wkq_err;
+ struct dentry *h_dentry;
+ struct inode *h_inode;
+
+ h_dentry = au_h_dptr(dentry, arg->bindex);
+ h_inode = d_inode(h_dentry);
+ /* todo: i_mode changes anytime? */
+ vfsub_inode_lock_shared_nested(h_inode, AuLsc_I_CHILD);
+ err = au_test_h_perm_sio(h_inode, MAY_EXEC | MAY_READ);
+ inode_unlock_shared(h_inode);
+ if (!err)
+ err = do_test_empty(dentry, arg);
+ else {
+ struct do_test_empty_args args = {
+ .errp= &err,
+ .dentry= dentry,
+ .arg= arg
+ };
+ unsigned int flags = arg->flags;
+ wkq_err = au_wkq_wait(call_do_test_empty, &args);
+ if (unlikely(wkq_err))
err = wkq_err;
arg->flags = flags;
+
+return err;
+
+int au_test_empty_lower(struct dentry *dentry)
+
+int err;
+unsigned int rdhash;
aufs_bindex_t bindex, btop, btail;
+struct au_nhash whlist;
+struct test_empty_arg arg = {
+.ctx = {
+.actor = test_empty_cb
+}
+};
+int (*test_empty)(struct dentry *dentry, struct test_empty_arg *arg);
+
+SiMustAnyLock(dentry->d_sb);
+
+rdhash = au_sbi(dentry->d_sb)->si_rdhash;
+if (!rdhash)
+rdhash = au_rdhash_est(au_dir_size(/*file*/NULL, dentry));
+err = au_nhash_alloc(&whlist, rdhash, GFP_NOFS);
+if (unlikely(err))
+goto out;
+
+arg.flags = 0;
+arg.whlist = &whlist;
+btop = au_dbsp(dentry);
+if (au_opt_test(au_mntflags(dentry->d_sb), SHWH))
+au_fset_testempty(arg.flags, SHWH);
+test_empty = do_test_empty;
+if (au_opt_test(au_mntflags(dentry->d_sb), DIRPERM1))
+test_empty = sio_test_empty;
+arg.bindex = btop;
+err = test_empty(dentry, &arg);
+if (unlikely(err))
+goto out_whlist;
+
+au_fset_testempty(arg.flags, WHONLY);
+btail = au_dbtaildir(dentry);
+for (bindex = btop + 1; !err && bindex <= btail; bindex++) {
+struct dentry *h_dentry;
+
+h_dentry = au_h_dptr(dentry, bindex);
}
if (h_dentry && d_is_positive(h_dentry)) {
    arg.bindex = bindex;
    err = test_empty(dentry, &arg);
    +}

+out_whlist:
+au_nhash_wh_free(&whlist);
+out:
+return err;
+}

out_whlist:
+out:
+return err;
+}

int au_test_empty(struct dentry *dentry, struct au_nhash *whlist)
+{
+int err;
+struct test_empty_arg arg = {
+.ctx = {
+.actor = test_empty_cb
+}
+};
+aufs_bindex_t bindex, btail;
+
+err = 0;
+arg.whlist = whlist;
+arg.flags = AuTestEmpty_WHONLY;
+if (au_opt_test(au_mntflags(dentry->d_sb), SHWH))
+aufs_fset_testempty(arg.flags, SHWH);
+btail = au_dbtaildir(dentry);
+for (bindex = au_dbtop(dentry); !err && bindex <= btail; bindex++) {
+struct dentry *h_dentry;
+
+h_dentry = au_h_dptr(dentry, bindex);
+if (h_dentry && d_is_positive(h_dentry)) {
+arg.bindex = bindex;
+err = sio_test_empty(dentry, &arg);
+}
+
+return err;
+}
+
+/* ----------------------------------------------- */
+
+const struct file_operations aufs_dir_fop = {
+.owner= THIS_MODULE,
+.llseek= default_llseek,
+.read= generic_read_dir,
+.iterate_shared= aufs_iterate_shared,
+.
+++ linux-4.15.0/fs/aufs/dir.h
@@ -0,0 +1,131 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
 * directory operations
 */
+
+#ifndef __AUFS_DIR_H__
+#define __AUFS_DIR_H__
+
+#ifdef __KERNEL__

+struct au_nhash {
+    unsigned int nh_num;
+    struct hlist_head* nh_head;
+};
+ struct au_vdir_destr {
+ unsigned char len;
+ unsigned char charname[0];
+ } __packed;
+
+ struct au_vdir_destr {
+ struct hlist_node hash;
+ struct au_vdir_destr *str;
+ } __cacheline_aligned_in_smp;
+
+ struct au_vdir_de {
+ ino_tde_ino;
+ unsigned char de_type;
+ /* caution: packed */
+ struct au_vdir_destr de_str;
+ } __packed;
+
+ struct au_vdir_wh {
+ struct hlist_node wh_hash;
+ #ifdef CONFIG_AUFS_SHWH
+ ino_twh_ino;
+ aufs_bindex_t twh_bindex;
+ unsigned char wh_type;
+ #else
+ aufs_bindex_t twh_bindex;
+ #endif
+ /* caution: packed */
+ struct au_vdir_destr wh_str;
+ } __packed;
+
+ union au_vdir_deblk_p {
+ unsigned char *deblk;
+ struct au_vdir_de *de;
+ };
+
+ struct au_vdir {
+ unsigned char **vd_deblk;
+ unsigned long vd_nblk;
+ struct {
+ unsigned long vnl;
+ union au_vdir_deblk_pp;
+ } vd_last;
+ }
+
+ unsigned longvd_version;
+ unsigned intvd_deblk_sz;
+ unsigned longvd_jiffies;
+ } __cacheline_aligned_in_smp;
extern const struct file_operations aufs_dir_fop;
void au_add_nlink(struct inode *dir, struct inode *h_dir);
void au_sub_nlink(struct inode *dir, struct inode *h_dir);
loff_t au_dir_size(struct file *file, struct dentry *dentry);
void au_dir_size(struct inode *dir, aufs_bindex_t bsrc);
int au_test_empty_lower(struct dentry *dentry);
int au_test_empty(struct dentry *dentry, struct au_nhash *whlist);

unsigned int au_rdhash_est(loff_t sz);
int au_nhash_alloc(struct au_nhash *nhash, unsigned int num_hash, gfp_t gfp);
void au_nhash_wh_free(struct au_nhash *whlist);
int au_nhash_test_longer_wh(struct au_nhash *whlist, aufs_bindex_t btgt,
    int limit);
int au_nhash_test_known_wh(struct au_nhash *whlist, char *name, int nlen);
int au_nhash_append_wh(struct au_nhash *whlist, char *name, int nlen, ino_t ino,
    unsigned int d_type, aufs_bindex_t bindex,
    unsigned char shwh);
void au_vdir_free(struct au_vdir *vdir);
int au_vdir_init(struct file *file);
int au_vdir_fill_de(struct file *file, struct dir_context *ctx);

#include <include/linux/iocliconfig.h>

#define Configuration_AUFS_RDU
#define Configuration_AUFS_COMPAT

#define AuStub(long, au_rdu_ioctl, return -EINVAL, struct file *file,
    unsigned int cmd, unsigned long arg)

#define endif
#define else

#define CONFIG_AUFS_RDU
#define CONFIG_AUFS_COMPAT

--- linux-4.15.0.orig/fs/aufs/dirren.c
+++ linux-4.15.0/fs/aufs/dirren.c
@@ -0,0 +1,1314 @@
+/*
+ * Copyright (C) 2017 Junjiro R. Okajima
+ *
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+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * special handling in renaming a directory
+ * in order to support looking-up the before-renamed name on the lower readonly
+ * branches
+ */
+
+#include <linux/byteorder/generic.h>
+#include "aufs.h"
+
+static void au_dr_hino_del(struct au_dr_br *dr, struct au_dr_hino *ent)
+{  
+    int idx;
+    
+    idx = au_dr_ihash(ent->dr_h_ino);
+    au_hbl_del(&ent->dr_hnode, dr->dr_h_ino + idx);
+}
+
+static int au_dr_hino_test_empty(struct au_dr_br *dr)
+{  
+    int ret, i;
+    struct hlist_bl_head *hbl;
+    
+    ret = 1;
+    for (i = 0; ret && i < AuDirren_NHASH; i++) {
+        hbl = dr->dr_h_ino + i;
+        hlist_bl_lock(hbl);
+        ret &= hlist_bl_empty(hbl);
+        hlist_bl_unlock(hbl);
+    }
+}
+ return ret;
+ }
+
+static struct au_dr_hino *au_dr_hino_find(struct au_dr_br *dr, ino_t ino)
+{
+struct au_dr_hino *found, *ent;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *pos;
+int idx;
+
+found = NULL;
+idx = au_dr_ihash(ino);
+hbl = dr->dr_h_ino + idx;
+hlist_bl_lock(hbl);
+hlist_bl_for_each_entry(ent, pos, hbl, dr_hnode)
+if (ent->dr_h_ino == ino) {
+found = ent;
+break;
+}
+hlist_bl_unlock(hbl);
+
+return found;
+}
+
+int au_dr_hino_test_add(struct au_dr_br *dr, ino_t ino,
+struct au_dr_hino *add_ent)
+{
+int found, idx;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *pos;
+struct au_dr_hino *ent;
+
+found = 0;
+idx = au_dr_ihash(ino);
+hbl = dr->dr_h_ino + idx;
+#if 0
+{
+struct hlist_bl_node *tmp;
+
+hlist_bl_for_each_entry_safe(ent, pos, tmp, hbl, dr_hnode)
+AuDbg("hi%llu\n", (unsigned long long)ent->dr_h_ino);
+}
+#endif
+hlist_bl_lock(hbl);
+hlist_bl_for_each_entry(ent, pos, hbl, dr_hnode)
+if (ent->dr_h_ino == ino) {
+found = 1;
+break;
+
+if (!found & add_ent)
+hlist_bl_add_head(&add_ent->dr_hnode, hbl);
+hlist_bl_unlock(hbl);
+
+if (!found && add_ent)
+AuDbg("i%llu added\n", (unsigned long long)add_ent->dr_h_ino);
+
+return found;
+
+}
+
+void au_dr_hino_free(struct au_dr_br *dr)
+{
+int i;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *pos, *tmp;
+struct au_dr_hino *ent;
+
+/* SiMustWriteLock(sb); */
+
+for (i = 0; i < AuDirren_NHASH; i++) {
+hbl = dr->dr_h_ino + i;
+/* no spinlock since sbinfo must be write-locked */
+hlist_bl_for_each_entry_safe(ent, pos, tmp, hbl, dr_hnode)
+kfree(ent);
+INIT_HLIST_BL_HEAD(hbl);
+
+} /* SiMustWriteLock(sb); */
+
+/
+for (i = 0; i < AuDirren_NHASH; i++) {
+hbl = dr->dr_h_ino + i;
+/* no spinlock since sbinfo must be write-locked */
+hlist_bl_for_each_entry_safe(ent, pos, tmp, hbl, dr_hnode)
+kfree(ent);
+INIT_HLIST_BL_HEAD(hbl);  
+
+ểreturns the number of inodes or an error */
+static int au_dr_hino_store(struct super_block *sb, struct au_branch *br,
+    struct file *hinofile)
+{
+int err, i;
+ssize_t ssz;
+loff_t pos, oldsize;
+_be64 u64;
+struct inode *hinoinode;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *n1, *n2;
+struct au_dr_hino *ent;
+
+SiMustWriteLock(sb);
+AuDebugOn(!au_br_writable(br->br_perm));
+
+hinoinode = file_inode(hinofile);
+oldsize = i_size_read(hinoinode);
err = 0;
pos = 0;
hbl = br->br_dirren.dr_h_ino;
for (i = 0; !err && i < AuDirren_NHASH; i++, hbl++) {
    /* no bit-lock since sbinfo must be write-locked */
    hlist_bl_for_each_entry_safe(ent, n1, n2, hbl, dr_hnode) {
        AuDbg("hi%llu, %pD2\n",
            (unsigned long long)ent->dr_h_ino, hinofile);
        u64 = cpu_to_be64(ent->dr_h_ino);
        ssz = vfsub_write_k(hinofile, &u64, sizeof(u64), &pos);
        if (ssz == sizeof(u64))
            continue;
        /* write error */
        pr_err("ssz %zd, %pD2\n", ssz, hinofile);
        err = -ENOSPC;
        if (ssz < 0)
            err = ssz;
        break;
    }
}
/* regardless the error */
if (pos < oldsize) {
    err = vfsub_trunc(& hinofile->f_path, pos, /*attr*/0, hinofile);
    AuTraceErr(err);
}
}
AuTraceErr(err);
return err;
)
static int au_dr_hino_load(struct au_dr_br *dr, struct file *hinofile)
{
    int err, hidx;
    ssize_t ssz;
    size_t sz, n;
    loff_t pos;
    uint64_t u64;
    struct au_dr_hino *ent;
    struct inode *hinoinode;
    struct hlist_bl_head *hbl;
+
    err = 0;
    pos = 0;
    hbl = dr->dr_h_ino;
    hinoinode = file_inode(hinofile);
    sz = i_size_read(hinoinode);
+AuDebugOn(sz % sizeof(u64));
+n = sz / sizeof(u64);
+while (n--) {
+ssz = vfsub_read_k(hinofile, &u64, sizeof(u64), &pos);
+if (unlikely(ssz != sizeof(u64))) {
+pr_err("ssz %zd, %pD2\n", ssz, hinofile);
+err = -EINVAL;
+if (ssz < 0)
+err = ssz;
+goto out_free;
+}
+ent = kmalloc(sizeof(*ent), GFP_NOFS);
+if (!ent) {
+err = -ENOMEM;
+AuTraceErr(err);
+goto out_free;
+}
+ent->dr_h_ino = be64_to_cpu((__force __be64)u64);
+AuDbg("hi%llu, %pD2\n",
+      (unsigned long long)ent->dr_h_ino, hinofile);
+hidx = au_dr_ihash(ent->dr_h_ino);
+au_hbl_add(&ent->dr_hnode, hbl + hidx);
+}
+goto out; /* success */
+
+out_free:
+au_dr_hino_free(dr);
+out:
+AuTraceErr(err);
+return err;
+}

/*
 * @bindex/@br is a switch to distinguish whether suspending hnotify or not.
 * @path is a switch to distinguish load and store.
 */
+static int au_dr_hino(struct super_block *sb, aufs_bindex_t bindex,
+           struct au_branch *br, const struct path *path)
+{
+int err, flags;
+unsigned char load, suspend;
+struct file *hinofile;
+struct au_hinode *hdir;
+struct inode *dir, *delegated;
+struct path hinopath;
+struct qstr hinoname = QSTR_INIT(AUFS_WH_DR_BRHINO,
+    sizeof(AUFS_WH_DR_BRHINO) - 1);
+AuDebugOn(bindex < 0 && !br);
+AuDebugOn(bindex >= 0 && br);
+
+err = -EINVAL;
+suspend = !br;
+if (suspend)
+br = au_sbr(sb, bindex);
+load = !!path;
+if (!load) {
+path = &br->br_path;
+AuDebugOn(!au_br_writable(br->br_perm));
+if (unlikely(!au_br_writable(br->br_perm)))
+goto out;
+}
+
+hdir = NULL;
+if (suspend) {
+dir = d_inode(sb->s_root);
+hdir = au_hinode(au_ii(dir), bindex);
+dir = hdir->hi_inode;
+au_hn_inode_lock_nested(hdir, AuLsc_I_CHILD);
+} else {
+dir = d_inode(path->dentry);
+inode_lock_nested(dir, AuLsc_I_CHILD);
+}
+hinopath.mnt = path->mnt;
+hinopath.dentry = vfs_sublkup_one(&hinoname, (struct path *)path);
+err = PTR_ERR(hinopath.dentry);
+if (IS_ERR(hinopath.dentry))
+goto out_unlock;
+
+err = 0;
+flags = O_RDONLY;
+if (load) {
+if (d_is_negative(hinopath.dentry))
+goto out_dput; /* success */
+} else {
+if (au_dr_hino_test_empty(&br->br_dirren)) {
+if (d_is_positive(hinopath.dentry)) {
+delegated = NULL;
+err = vfs_unlink(dir, &hinopath, &delegated,
+ /*force*/0);
+AuTraceErr(err);
+if (unlikely(err))
+pr_err("ignored err %d, %pd2n",
+ err, hinopath.dentry);
+if (unlikely(err == -EWOULDBLOCK))
+iiput(delegated);
+err = 0;
+
+goto out_dput;
+} else if (!d_is_positive(hinopath.dentry)) {
+err = vsub_create(dir, &hinopath, 0600,
+ /*want_excel*/false);
+AuTraceErr(err);
+if (unlikely(err))
+goto out_dput;
+
+flags = O_WRONLY;
+
+hinofile = vsub_dentry_open(&hinopath, flags);
+if (suspend)
+au_hn_inode_unlock(hdir);
+else
+inode_unlock(dir);
+dput(hinopath.dentry);
+AuTraceErrPtr(hinofile);
+if (IS_ERR(hinofile)) {
+err = PTR_ERR(hinofile);
+goto out;
+}
+
+if (load)
+err = au_dr_hino_load(&br->br_dirren, hinofile);
+else
+err = au_dr_hino_store(sb, br, hinofile);
+fput(hinofile);
+goto out;
+
+out_dput:
+dput(hinopath.dentry);
+
+out_unlock:
+if (suspend)
+au_hn_inode_unlock(hdir);
+else
+inode_unlock(dir);
+AuTraceErr(err);
+return err;
+
+/* ---------------------------------------------------------------------- */
+static int au_dr_brid_init(struct au_dr_brid *brid, const struct path *path)
+{
int err;
struct kstatfs kstfs;
dev_t dev;
dentry *dentry;
struct super_block *sb;

err = vfs_statfs((void *)path, &kstfs);
AuTraceErr(err);
if (unlikely(err))
goto out;

/* todo: support for UUID */
if (kstfs.f_fsid.val[0] || kstfs.f_fsid.val[1]) {
brid->type = AuBrid_FSID;
brid->fsid = kstfs.f_fsid;
} else {
dentry = path->dentry;
sb = dentry->d_sb;
dev = sb->s_dev;
if (dev) {
brid->type = AuBrid_DEV;
brid->dev = dev;
}
}

out:
return err;

int au_dr_br_init(struct super_block *sb, struct au_branch *br,
const struct path *path)
{
int err, i;
struct au_dr_br *dr;
struct hlist_bl_head *hbl;

dr = &br->br_dirren;
hbl = dr->dr_h_ino;
for (i = 0; i < AuDirren_NHASH; i++, hbl++)
INIT_HLIST_BL_HEAD(hbl);

err = au_dr_brid_init(&dr->dr_brid, path);
if (unlikely(err))
goto out;

au_opt_test(au_mntflags(sb), DIRREN))
err = au_dr_hino(sb, /*bindex*/-1, br, path);
AuTraceErr(err);
+return err;
+
int au_dr_br_fin(struct super_block *sb, struct au_branch *br)
+
{

int err;
+
+err = 0;
+if (au_br_writable(br->br_perm))
+err = au_dr_hino(sb, /*bindex*/-1, br, /*path*/NULL);
+if (!err)
+au_dr_hino_free(&br->br_dirren);
+
+return err;
+
+
/* ---------------------------------------------------------------------- */

/* static int au_brid_str(struct au_dr_brid *brid, struct inode *h_inode,
 + char *buf, size_t sz) */
+
{
+int err;
+unsigned int major, minor;
+char *p;
+
+p = buf;
+err = snprintf(p, sz, "%d", brid->type);
+AuDebugOn(err > sz);
+p += err;
+sz -= err;
+switch (brid->type) {
+case AuBrid_Unset:
+return -EINVAL;
+case AuBrid_UUID:
+err = snprintf(p, sz, "%pU", brid->uuid.b);
+bbreak;
+case AuBrid_FSID:
+err = snprintf(p, sz, "%08x-%08x",
 + brid->fsid.val[0], brid->fsid.val[1]);
+bbreak;
+case AuBrid_DEV:
+major = MAJOR(brid->dev);
+minor = MINOR(brid->dev);
+if (major <= 0xff && minor <= 0xff)
+err = snprintf(p, sz, "%02x%02x", major, minor);
+break;
}
else
+err = snprintf(p, sz, "%03x:%05x", major, minor);
+break;
+
+AuDebugOn(err > sz);
+p += err;
+sz -= err;
+err = snprintf(p, sz, "_%llu", (unsigned long long)h_inode->i_ino);
+AuDebugOn(err > sz);
+p += err;
+sz -= err;
+
+return p - buf;
+
+static int au_drinfo_name(struct au_branch *br, char *name, int len)
+
+{
+int rlen;
+struct dentry *br_dentry;
+struct inode *br_inode;
+
+br_dentry = au_br_dentry(br);
+br_inode = d_inode(br_dentry);
+rlen = au_brid_str(&br->br_dirren.dr_brid, br_inode, name, len);
+AuDebugOn(rlen >= AUFS_DIRREN_ENV_VAL_SZ);
+AuDebugOn(rlen > len);
+
+return rlen;
+
+}
+
+/* ---------------------------------------------------------------------- */
+
+/* from the given @h_dentry, construct drinfo at @*fdata.
+ * when the size of @*fdata is not enough, reallocate and return new @fdata and
+ * @allocated.
+ */
+static int au_drinfo_construct(struct au_drinfo_fdata **fdata, 
+struct dentry *h_dentry,
+unsigned char *allocated)
+
+{
+int err, v;
+struct au_drinfo_fdata *f, *p;
+struct au_drinfo *drinfo;
+struct inode *h_inode;
+struct qstr *qname;
+
+err = 0;
f = *fdata;
+h_inode = d_inode(h_dentry);
+qname = &h_dentry->d_name;
+drinfo = &f->drinfo;
+drinfo->ino = (__force uint64_t)cpu_to_be64(h_inode->i_ino);
+drinfo->oldnamelen = qname->len;
+if (*allocated < sizeof(*f) + qname->len) {
+v = roundup_pow_of_two(*allocated + qname->len);
+p = au_krealloc(f, v, GFP_NOFS, /*may_shrink*/0);
+if (unlikely(!p)) {
+err = -ENOMEM;
+AuTraceErr(err);
+goto out;
+
+f = p;
+*fdata = f;
+*allocated = v;
+drinfo = &f->drinfo;
+}
+memcpy(drinfo->oldname, qname->name, qname->len);
+AuDbg("i%llu, %.*s
",
+      be64_to_cpu((__force __be64)drinfo->ino), drinfo->oldnamelen,
+      drinfo->oldname);
%
+out:
+AuTraceErr(err);
+return err;
+}
+/* callres have to free the return value */
+static struct au_drinfo *au_drinfo_read_k(struct file *file, ino_t h_ino)
+{
+ret = ERR_PTR(-EIO);
+pos = 0;
+ssz = vfsub_read_k(file, &fdata, sizeof(fdata), &pos);
+if (unlikely(ssz != sizeof(fdata))) {
+AuIOErr("ssz %zd, %u, %pD2
",
+      ssz, (unsigned int)sizeof(fdata), file);
+goto out;
+
+ret = ERR_PTR(-EIO);
+pos = 0;
+ssz = vfsub_read_k(file, &fdata, sizeof(fdata), &pos);
+if (unlikely(ssz != sizeof(fdata))) {
+AuIOErr("ssz %zd, %u, %pD2
",
+      ssz, (unsigned int)sizeof(fdata), file);
+goto out;
+
+fdata.magic = ntohl((__force __be32)fdata.magic);
switch (fdata.magic) {
    case AUFS_DRINFO_MAGIC_V1:
        break;
    default:
        AuIOErr("magic-num 0x%x, 0x%x, %pD2u",
                 fdata.magic, AUFS_DRINFO_MAGIC_V1, file);
        goto out;
    }
    
    drinfo = &fdata.drinfo;
    len = drinfo->oldnamelen;
    if (!len) {
        AuIOErr("broken drinfo %pD2u", file);
        goto out;
    }
    
    ret = NULL;
    drinfo->ino = be64_to_cpu((__force __be64)drinfo->ino);
    if (unlikely(h_ino && drinfo->ino != h_ino)) {
        AuDbg("ignored i%llu, i%llu, %pD2u",
              (unsigned long long)drinfo->ino,
              (unsigned long long)h_ino, file);
        goto out; /* success */
    }
    
    ret = kmalloc(sizeof(*ret) + len, GFP_NOFS);
    if (unlikely(!ret)) {
        ret = ERR_PTR(-ENOMEM);
        AuTraceErrPtr(ret);
        goto out;
    }
    
    *ret = *drinfo;
    ssz = vfsub_read_k(file, (void *)ret->oldname, len, &pos);
    if (unlikely(ssz != len)) {
        kfree(ret);
        ret = ERR_PTR(-EIO);
        AuIOErr("ssz %zd, %u, %pD2u", ssz, len, file);
        goto out;
    }
    
    AuDbg("oldname %.*s",
           ssz, ret->oldname, ret->oldnamelen, ret->oldname);
    
out:
    return ret;
}

/* ---------------------------------------------------------------------- */
+ /* in order to be revertible */
+ struct au_drinfo_rev_elm {
+ int created;
+ struct dentry *info_dentry;
+ struct au_drinfo *info_last;
+ }
+ 
+ struct au_drinfo_rev {
+ unsigned char already;
+ aufs_bindex_t nelm;
+ struct au_drinfo_rev_elm elm[0];
+ }
+ 
+ /* todo: isn't it too large? */
+ struct au_drinfo_store {
+ struct path h_ppath;
+ struct dentry *h_dentry;
+ struct au_drinfo_fdata *fdata;
+ char *infoname; /* inside of whname, just after PFX */
+ char whname[sizeof(AUFS_WH_DR_INFO_PFX) + AUFS_DIRREN_ENV_VAL_SZ];
+ aufs_bindex_t bgtt, btail;
+ unsigned char no_sio,
+ allocated /* current size of *fdata */
+ infonamelen /* room size for p */
+ whnamelen /* length of the generated name */
+ renameback /* renamed back */
+ }
+ 
+ /* on rename(2) error, the caller should revert it using @elm */
+ static int au_drinfo_do_store(struct au_drinfo_store *w,
+ struct au_drinfo_rev_elm *elm)
+ {
+ int err, len;
+ ssize_t ssz;
+ loff_t pos;
+ struct path infopath = {
+ .mnt = w->h_ppath.mnt
+ };
+ struct inode *h_dir, *h_inode, *delegated;
+ struct file *infofile;
+ struct qstr *qname;
+ 
+ AuDebugOn(elm
+ && memcmp(elm, page_address(ZERO_PAGE(0)), sizeof(*elm)));
+ 
+ infopath.dentry = vfsub_lookup_one_len(w->whname, &w->h_ppath,
+ w->whnamelen);
+AuTraceErrPtr(inopath.dentry);
+if (IS_ERR(inopath.dentry)) {
+err = PTR_ERR(inopath.dentry);
+goto out;
+
+err = 0;
+h_dir = d_inode(w->h_ppath.dentry);
+if (elm & d_is_negative(inopath.dentry)) {
+err = vfs_sub_create(h_dir, &infopath, 0600, /*want_excl*/true);
+AuTraceErr(err);
+if (unlikely(err))
+goto out_dput;
+elm->created = 1;
+elm->info_dentry = dget(inopath.dentry);
+}
+
+infofile = vfs_sub_dentry_open(&infopath, O_RDWR);
+AuTraceErrPtr(infofile);
+if (IS_ERR(infofile)) {
+err = PTR_ERR(infofile);
+goto out_dput;
+
+h_inode = d_inode(inopath.dentry);
+if (elm & i_size_read(h_inode)) {
+h_inode = d_inode(w->h_dentry);
+elm->info_last = au_drinfo_read_k(infofile, h_inode->i_ino);
+AuTraceErrPtr(elm->info_last);
+if (IS_ERR(elm->info_last)) {
+err = PTR_ERR(elm->info_last);
+elm->info_last = NULL;
+AuDebugOn(elm->info_dentry);
+goto out_fput;
+
+if (elm & w->renameback) {
+delegated = NULL;
+err = vfs_sub_unlink(h_dir, &infopath, &delegated, /*force*/0);
+AuTraceErr(err);
+if (unlikely(err == -EWOULDBLOCK))
+iut(dexte);
+goto out_fput;
+
+pos = 0;
+qname = &w->h_dentry->d_name;
+len = sizeof(*w->fdata) + qname->len;
+if (!elm)
+len = sizeof(*w->fdata) + w->fdata->drinfo.oldnamelen;
+ssz = vfsub_write_k(infofile, w->fdata, len, &pos);
+if (ssz == len) {
+AuDbg("hi%llu, %.*s\n", w->fdata->drinfo.ino,
+      w->fdata->drinfo.oldnamelen, w->fdata->drinfo.oldname);
+goto out_fput; /* success */
+} else {
+err = -EIO;
+if (ssz < 0)
+err = ssz;
+/" the caller should revert it using @elm */
+}
+
+out_fput:
+fput(infofile);
+out_dput:
+dput(infopath.dentry);
+out:
+AuTraceErr(err);
+return err;
+}
+
+struct au_call_drinfo_do_store_args {
+int *errp;
+struct au_drinfo_store *w;
+struct au_drinfo_rev_elm *elm;
+};
+
+static void au_call_drinfo_do_store(void *args)
+{
+struct au_call_drinfo_do_store_args *a = args;
+
+*a->errp = au_drinfo_do_store(a->w, a->elm);
+}
+
+static int au_drinfo_store_sio(struct au_drinfo_store *w,
+struct au_drinfo_rev_elm *elm)
+{
+int err, wkq_err;
+
+if (w->no_sio)
+err = au_drinfo_do_store(w, elm);
+else {
+struct au_call_drinfo_do_store_args a = {
+.errp= &err,
+.w= w,
+elm= elm;
+wq_err = au_wq_wait(au_call_drinfo_do_store, &a);
+if (unlikely(wq_err))
+err = wq_err;
+
+AuTraceErr(err);
+
+return err;
+
+
+static int au_drinfo_store_work_init(struct au_drinfo_store *w,
+    aufs_bindex_t btgt)
+{
+    int err;
+
+    memset(w, 0, sizeof(*w));
+    w->allocated = roundup_pow_of_two(sizeof(*w->fdata) + 40);
+    strcpy(w->whname, AUFS_WH_DR_INFO_PFX);
+    w->infoname = w->whname + sizeof(AUFS_WH_DR_INFO_PFX) - 1;
+    w->infolen = sizeof(w->whname) - sizeof(AUFS_WH_DR_INFO_PFX);
+    w->btgt = btgt;
+    w->no_sio = !!uid_eq(current_fsuid(), GLOBAL_ROOT_UID);
+
+    err = -ENOMEM;
+    w->fdata = kcalloc(1, w->allocated, GFP_NOFS);
+    if (unlikely(!w->fdata)) {
+        AuTraceErr(err);
+        goto out;
+    }
+    w->fdata->magic = (__force uint32_t)htonl(AUFS_DRINFO_MAGIC_V1);
+    err = 0;
+
+    out:
+    return err;
+
+
+static void au_drinfo_store_work_fin(struct au_drinfo_store *w)
+{
+    kfree(w->fdata);
+}
+
+static void au_drinfo_store_rev(struct au_drinfo_rev *rev,
+    struct au_drinfo_store *w)
+{
+    struct au_drinfo_rev_elm *elm;
+    struct inode *h_dir, *delegated;
+    int err, nelm;

---

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struct path infopath = {
    .mnt = w->h_ppath.mnt
};
+
+h_dir = d_inode(w->h_ppath.dentry);
IMustLock(h_dir);
+
+err = 0;
+elm = rev->elm;
+for (nelm = rev->nelm; nelm > 0; nelm--, elm++) {
+AuDebugOn(elm->created && elm->info_last);
+if (elm->created) {
+AuDbg("here\n");
+delegated = NULL;
+infopath.dentry = elm->info_dentry;
+err = vfsub_unlink(h_dir, &infopath, &delegated,
+    !w->no_sio);
+AuTraceErr(err);
+if (unlikely(err == -EWOULDBLOCK))
+iput(delegated);
+dput(elm->info_dentry);
+} else if (elm->info_last) {
+AuDbg("here\n");
+w->fdata->drinfo = *elm->info_last;
+memcpy(w->fdata->drinfo.oldname,
+    elm->info_last->oldname,
+    elm->info_last->oldnamelen);
+err = au_drinfo_store_sio(w, /*elm*/NULL);
+kfree(elm->info_last);
+} if (unlikely(err))
+AuIOErr("%d, %s\n", err, w->whname);
+/* go on even if err */
+}
+/* caller has to call au_dr_rename_fin() later */
+static int au_drinfo_store(struct dentry *dentry, aufs_bindex_t btgt,
+    struct qstr *dst_name, void *_rev)
+{
+int err, sz, nelm;
aufs_bindex_t bindex, btail;
+struct au_drinfo_store work;
+struct au_drinfo_rev *rev, **p;
+struct au_drinfo_rev_elm *elm;
+struct super_block *sb;
+struct au_branch *br;
+struct au_hinode *hdir;
+err = au_drinfo_store_work_init(&work, bg);  
+AuTraceErr(err);  
+if (unlikely(err))  
+goto out;  
+  
+err = -ENOMEM;  
+btail = au_dbtaildir(dentry);  
+nelm = btail - bg;  
+sz = sizeof(*rev) + sizeof(*elm) * nelm;  
+rev = kcalloc(1, sz, GFP_NOFS);  
+if (unlikely(!rev)) {  
+AuTraceErr(err);  
+goto out_args;  
+}  
+rev->nelm = nelm;  
+elm = rev->elm;  
+p = _rev;  
+*p = rev;  
+  
+err = 0;  
+sb = dentry->d_sb;  
+work.h_ppath.dentry = au_h_dptr(dentry, bg);  
+work.h_ppath.mnt = au_sbr_mnt(sb, bg);  
+hdir = au_hi(d_inode(dentry), bg);  
+au_hi_inode_lock_nested(hdir, AuLsc_I_CHILD);  
+for (bindex = bg + 1; bindex <= btail; bindex++, elm++) {  
+work.h_dentry = au_h_dptr(dentry, bindex);  
+if (!work.h_dentry)  
+  continue;  
+  
+err = au_drinfo_construct(&work.fdata, work.h_dentry,  
+ &work.allocated);  
+AuTraceErr(err);  
+if (unlikely(err))  
+break;  
+  
+work.renameback = au_qstreq(&work.h_dentry->d_name, dst_name);  
+br = au_sbr(sb, bindex);  
+work.whnamelen = sizeof(AUFS_WH_DR_INFO_PFX) - 1;  
+work.whnamelen += au_drinfo_name(br, work.infoname,  
+ work.infonamelen);  
+AuDbg("whname %.*s, i%llu, %.*s\n",  
+ work.whnamelen, work.whname,  
+ be64_to_cpu((__force __be64)work.fdata->drinfo.ino),  
+ work.fdata->drinfo.oldnamelen,  
+ work.fdata->drinfo.oldname);  
+  

err = au_drinfo_store_sio(&work, elm);
+AuTraceErr(err);
+if (unlikely(err))
+break;
+
+if (unlikely(err)) {
+/* revert all drinfo */
+au_drinfo_store_rev(rev, &work);
+kfree(rev);
+*p = NULL;
+
+au_hn_inode_unlock(hdir);
+
++out_args:
+au_drinfo_store_work_fin(&work);
+out:
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+int au_dr_rename(struct dentry *src, aufs_bindex_t bindex,
+struct qstr *dst_name, void *_rev)
+{
+int err, already;
+ino_t ino;
+struct super_block *sb;
+struct au_branch *br;
+struct au_dr_br *dr;
+struct dentry *h_dentry;
+struct inode *h_inode;
+struct au_drinfo_rev *rev, **p;
+
+AuDbg("bindex %d\n", bindex);
+
+err = -ENOMEM;
+ent = kmalloc(sizeof(*ent), GFP_NOFS);
+if (unlikely(!ent))
+goto out;
+
+sb = src->d_sb;
+br = au_sbr(sb, bindex);
+dr = &br->br_dirren;
+h_dentry = au_h_dptr(src, bindex);
+h_inode = d_inode(h_dentry);
inod = h_inode->i_ino;
+ent->dr_h_ino = ino;
Val = au_dr_hino_test_add(dr, ino, ent);

AuDbg("b%d, hi%llu, already %d\n",
      bindex, (unsigned long long)ino, already);

err = au_drinfo_store(src, bindex, dst_name, rev);

if (!err) {
    p = rev;
    rev = *p;
    rev->already = already;
    goto out; /* success */
}

/* revert */
if (!already)
    au_dr_hino_del(dr, ent);
kfree(ent);

out:
AuTraceErr(err);
return err;
}

void au_dr_rename_fin(struct dentry *src, aufs_bindex_t btgt, void *_rev)
{
    struct au_drinfo_rev *rev;
    struct au_drinfo_rev_elm *elm;
    int nelm;

    rev = _rev;
    elm = rev->elm;
    for (nelm = rev->nelm; nelm > 0; nelm--, elm++) {
        dput(elm->info_dentry);
        kfree(elm->info_last);
    }
    kfree(rev);
}

void au_dr_rename_rev(struct dentry *src, aufs_bindex_t btgt, void *_rev)
{
    int err;
    struct au_drinfo_store work;
    struct au_drinfo_rev *rev = _rev;
    struct super_block *sb;
    struct au_branch *br;
    struct inode *h_inode;
    struct au_dr_br *dr;
    struct au_dr_hino *ent;

    +int err;
    +struct au_drinfo_store work;
    +struct au_drinfo_rev *rev = _rev;
    +struct super_block *sb;
    +struct au_branch *br;
    +struct inode *h_inode;
    +struct au_dr_br *dr;
    +struct au_dr_hino *ent;
errer = au_drinfo_store_work_init(&work, btgt);
+if (unlikely(err))
+goto out;
+
+sb = src->d_sb;
+br = au_sbr(sb, btgt);
+work.h_ppath.dentry = au_h_dptr(src, btgt);
+work.h_ppath.mnt = au_br_mnt(br);
+au_drinfo_store_rev(rev, &work);
+au_drinfo_store_work_fin(&work);
+if (rev->already)
+goto out;
+
+dr = &br->br_dirren;
+h_inode = d_inode(work.h_ppath.dentry);
+ent = au_dr_hino_find(dr, h_inode->i_ino);
+BUG_ON(!ent);
+au_dr_hino_del(dr, ent);
+kfree(ent);
+
+out:
+kfree(rev);
+if (unlikely(err))
+pr_err("failed to remove dirren info\n");
+
+/* ---------------------------------------------------------------------- */

+static struct au_drinfo *au_drinfo_do_load(struct path *h_ppath,
+    char *whname, int whnamelen,
+    struct dentry **info_dentry)
+{
+    struct au_drinfo *drinfo;
+    struct file *f;
+    struct inode *h_dir;
+    struct path infopath;
+    int unlocked;
+    AuDbg("%pd/%.*s
", h_ppath->dentry, whnamelen, whname);
+    *info_dentry = NULL;
+    drinfo = NULL;
+    unlocked = 0;
+    h_dir = d_inode(h_ppath->dentry);
+    vfsub_inode_lock_shared_nested(h_dir, AuLsc_I_PARENT);
+    infopath.dentry = vfsub_lookup_one_len(whname, h_ppath, whnamelen);
+    if (IS_ERR(infopath.dentry))
+    

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drinfo = (void *)infopath.dentry;
go to out;
+
+if (d_is_negative(infopath.dentry))
+go to out_dput; /* success */
+
+infopath.mnt = h_ppath->mnt;
f = vfs_sub_dentry_open(&infopath, O_RDONLY);
inode_unlock_shared(h_dir);
+unlocked = 1;
+if (IS_ERR(f)) {
+drinfo = (void *)f;
+go to out_dput;
+
+drinfo = au_drinfo_read_k(f, /*h_ino*/0);
+if (IS_ERR_OR_NULL(drinfo))
+go to out_fput;
+
+AuDbg("oldname \%.*s\n", drinfo->oldnamelen, drinfo->oldname);
+*info_dentry = dget(infopath.dentry); /* keep it alive */
+
+out_fput:
+fput(f);
+out_dput:
+dput(infopath.dentry);
+out:
+if (!unlocked)
+inode_unlock_shared(h_dir);
+AuTraceErrPtr(drinfo);
+return drinfo;
+
+struct au_drinfo_do_load_args {
+struct au_drinfo **drinfop;
+struct path *h_ppath;
+char *whname;
+int whnamelen;
+struct dentry **info_dentry;
+};
+
+static void au_call_drinfo_do_load(void *args)
+{
+struct au_drinfo_do_load_args *a = args;
+
+*a->drinfop = au_drinfo_do_load(a->h_ppath, a->whname, a->whnamelen, 
a->info_dentry);
```c
+struct au_drinfo_load {
+struct path h_ppath;
+struct qstr *qname;
+unsigned char no_sio;
+
aufs_bindex_t ninfo;
+struct au_drinfo **drinfo;
+};
+
+static int au_drinfo_load(struct au_drinfo_load *w, aufs_bindex_t bindex,
+ struct au_branch *br)
+{
+int err, wkq_err, whnamelen, e;
+char whname[sizeof(AUFS_WH_DR_INFO_PFX) + AUFS_DIRREN_ENV_VAL_SZ]
+= AUFS_WH_DR_INFO_PFX;
+struct au_drinfo *drinfo;
+struct qstr oldname;
+struct inode *h_dir, *delegated;
+struct dentry *info_dentry;
+struct path infopath;
+
+whnamelen = sizeof(AUFS_WH_DR_INFO_PFX) - 1;
+whnamelen += au_drinfo_name(br, whname + whnamelen,
+ sizeof(whname) - whnamelen);
+if (w->no_sio)
+drinfo = au_drinfo_do_load(&w->h_ppath, whname, whnamelen,
+ &info_dentry);
+else {
+struct au_drinfo_do_load_args args = {
+.drinfop= &drinfo,
+.h_ppath= &w->h_ppath,
+.whname= whname,
+.whnamelen= whnamelen,
+.info_dentry= &info_dentry
+};
+wkq_err = au_wkq_wait(au_call_drinfo_do_load, &args);
+if (unlikely(wkq_err))
+drinfo = ERR_PTR(wkq_err);
+}
+err = PTR_ERR(drinfo);
+if (IS_ERR_OR_NULL(drinfo))
+goto out;
+
+err = 0;
+oldname.len = drinfo->oldnamelen;
+oldname.name = drinfo->oldname;
```
+if (au_qstreq(w->qname, &oldname)) {
+/* the name is renamed back */
+kfree(drinfo);
+drinfo = NULL;
+
+infopath.dentry = info_dentry;
+infopath.mnt = w->h_ppath.mnt;
+h_dir = d_inode(w->h_ppath.dentry);
+delegated = NULL;
+inode_lock_nested(h_dir, AuLsc_I_PARENT);
+e = vfsunsub_unlink(h_dir, &infopath, &delegated, !w->no_sio);
+inode_unlock(h_dir);
+if (unlikely(e))
+AuIOErr("ignored %d, %pd2\n", e, &infopath.dentry);
+if (unlikely(e == -EWOULDBLOCK))
+iput(delegated);
+
+kfree(w->drinfo[bindex]);
+w->drinfo[bindex] = drinfo;
+dput(info_dentry);
+
+out:
+AuTraceErr(err);
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+static void au_dr_lkup_free(struct au_drinfo **drinfo, int n)
+{
+struct au_drinfo **p = drinfo;
+
+while (n-- > 0)
+kfree(*drinfo++);
+kfree(p);
+}
+
+int au_dr_lkup(struct au_do_lookup_args *lkup, struct dentry *dentry,
+aufs_bindex_t btgt)
+{
+int err, ninfo;
+struct au_drinfo_load w;
+aufs_bindex_t bindex, bbot;
+struct au_branch *br;
+struct inode *h_dir;
+struct au_dr_hino *ent;
+struct super_block *sb;
+}
+AuDbg("%.*s, name %.*s, whname %.*s, b%d\n",
+    AuLNPair(&dentry->d_name), AuLNPair(&lkup->dirren.dr_name),
+    AuLNPair(&lkup->whname), btgt);
+
+sb = dentry->d_sb;
+bbot = au_sbbot(sb);
+w.ninfo = bbot + 1;
+if (!lkup->dirren.drinfo) {
+    lkup->dirren.drinfo = kcalloc(w.ninfo,
+        sizeof(*lkup->dirren.drinfo),
+        GFP_NOFS);
+    if (unlikely(!lkup->dirren.drinfo)) {
+        err = -ENOMEM;
+        goto out;
+    }
+    lkup->dirren.ninfo = w.ninfo;
+}
+w.drinfo = lkup->dirren.drinfo;
+w.no_sio = !uid_eq(current_fsuid(), GLOBAL_ROOT_UID);
+w.h_ppath.dentry = au_h_dptr(dentry, btgt);
+AuDebugOn(!w.h_ppath.dentry);
+w.h_ppath.mnt = au_sbr_mnt(sb, btgt);
+w.qname = &dentry->d_name;
+
+ninfo = 0;
+for (bindex = btgt + 1; bindex <= bbot; bindex++) {
+    br = au_sbr(sb, bindex);
+    err = au_drinfo_load(&w, bindex, br);
+    if (unlikely(err))
+        goto out_free;
+    if (w.drinfo[bindex])
+        ninfo++;
+}
+if (!ninfo) {
+    br = au_sbr(sb, btgt);
+    h_dir = d_inode(w.h_ppath.dentry);
+    ent = au_dr_hino_find(&br->br_dirren, h_dir->i_ino);
+    AuDebugOn(!ent);
+    AuDrHinoDel(&br->br_dirren, ent);
+    kfree(ent);
+}
+goto out; /* success */
+
+out_free:
+AuDrLkupFree(lkup->dirren.drinfo, lkup->dirren.ninfo);
+lkup->dirren.ninfo = 0;
+lkup->dirren.drinfo = NULL;
+out:
AuTraceErr(err);
+return err;
+
+} au_dr_lkup_fin(struct au_do_lookup_args *lkup)
+
+ au_dr_lkup_free(lkup->dirren.drinfo, lkup->dirren.ninfo);
+
+} au_dr_lkup_name(struct au_do_lookup_args *lkup, aufs_bindex_t btgt)
+
+int err;
+struct au_drinfo *drinfo;
+
+err = 0;
+if (!lkup->dirren.drinfo)
+goto out;
+AuDebugOn(lkup->dirren.ninfo < btgt + 1);
+drinfo = lkup->dirren.drinfo[btgt + 1];
+if (!drinfo)
+goto out;
+
+kfree(lkup->whname.name);
+lkup->whname.name = NULL;
+lkup->dirren.dr_name.len = drinfo->oldnamelen;
+lkup->dirren.dr_name.name = drinfo->oldname;
+lkup->name = &lkup->dirren.dr_name;
+err = au_wh_name_alloc(&lkup->whname, lkup->name);
+if (!err)
+AuDbg("name %.*s, whname %.*s, b%d
",
+      AuLNPair(lkup->name), AuLNPair(&lkup->whname),
+      btgt);
+
+out:
+AuTraceErr(err);
+return err;
+
+} au_dr_lkup_h_ino(struct au_do_lookup_args *lkup, aufs_bindex_t bindex,
+       ino_t h_ino)
+
+{ int match;
+struct au_drinfo *drinfo;
+
+match = 1;
+if (!lkup->dirren.drinfo)
+goto out;
+AuDebugOn(lkup->dirren.ninfo < bindex + 1);
drinfo = lookup->dirren.drinfo[bindex + 1];
if (!drinfo)
    goto out;
match = (drinfo->ino == h_ino);
AuDbg("match %d\n", match);
out:
    return match;
}
/* ---------------------------------------------------------------------- */
int au_dr_opt_set(struct super_block *sb)
{
    int err;
    aufs_bindex_t bindex, bbot;
    struct au_branch *br;
    err = 0;
    bbot = au_sbbot(sb);
    for (bindex = 0; !err && bindex <= bbot; bindex++) {
        br = au_sbr(sb, bindex);
        err = au_dr_hino(sb, bindex, /*br*/NULL, &br->br_path);
    }
    return err;
}

int au_dr_opt_flush(struct super_block *sb)
{
    int err;
    aufs_bindex_t bindex, bbot;
    struct au_branch *br;
    err = 0;
    bbot = au_sbbot(sb);
    for (bindex = 0; !err && bindex <= bbot; bindex++) {
        br = au_sbr(sb, bindex);
        if (au_br_writable(br->br_perm))
            err = au_dr_hino(sb, bindex, /*br*/NULL, /*path*/NULL);
    }
    return err;
}

int au_dr_opt_clr(struct super_block *sb, int no_flush)
{
+int err;
+aufs_index_t bindex, bbot;
+struct au_branch *br;
+
+err = 0;
+if (!no_flush) {
+err = au_dr_opt_flush(sb);
+if (unlikely(err))
+goto out;
+}
+
+bbot = au_sbbot(sb);
+for (bindex = 0; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+au_dr_hino_free(&br->br_dirren);
+}
+
+out:
+return err;
+}

--- linux-4.15.0.orig/fs/aufs/dirren.h
+++ linux-4.15.0/fs/aufs/dirren.h
@@ -0,0 +1,139 @@
+/*
+ * Copyright (C) 2017 Junjiro R. Okajima
+ */
+
+/* renamed dir info */
+
+#ifndef __AUFS_DIRREN_H__
+#define __AUFS_DIRREN_H__
+
+/* This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+*/
+
+#ifdef __KERNEL__
+"}
```c
#include <linux/dcache.h>
#include <linux/statfs.h>
#include <linux/uuid.h>
#include "hbl.h"

#define AuDirren_NHASH 100

#ifdef CONFIG_AUFS_DIRREN
enum au_brid_type {
  AuBrid_Unset,
  AuBrid_UUID,
  AuBrid_FSID,
  AuBrid_DEV
};

+struct au_dr_brid {
  enum au_brid_type type;
  union {
    uuid_t uuid; /* unimplemented yet */
    fsid_t fsid;
    dev_t dev;
  }
};
+
+/* 20 is the max digits length of ulong 64 */
+/* brid-type "_" uuid "_" inum */
+#define AUFS_DIRREN_FNAME_SZ (1 + 1 + UUID_STRING_LEN + 20)
+#define AUFS_DIRREN_ENV_VAL_SZ (AUFS_DIRREN_FNAME_SZ + 1 + 20)
+
+struct au_dr_hino {
  struct hlist_bl_node dr_hnode;
  ino_t dr_h_ino;
};
+
+struct au_dr_br {
  struct hlist_bl_head dr_h_ino[AuDirren_NHASH];
  struct au_dr_brid dr_brid;
};
+
+struct au_dr_lookup {
  /* dr_name is pointed by struct au_do_lookup_args.name */
  struct qstr dr_name; /* subset of dr_info */
  aufs_bindex_t ninfo;
  struct au_drinfo **drinfo;
};
+else
+struct au_dr_hino;
```
/* empty */
+struct au_dr_br { }
+struct au_dr_lookup { }
+#endif
+
/* ---------------------------------------------------------------------- */

+struct au_branch;
+struct au_do_lookup_args;
+struct au_hinode;
+#ifdef CONFIG_AUFS_DIRREN
+int au_dr_hino_test_add(struct au_dr_br *dr, ino_t h_ino,
+struct au_dr_hino *add_ent);
+void au_dr_hino_free(struct au_dr_br *dr);
+int au_dr_br_init(struct super_block *sb, struct au_branch *br,
+ const struct path *path);
+int au_dr_br_fin(struct super_block *sb, struct au_branch *br);
+int au_dr_rename(struct dentry *src, aufs_bindex_t bindex,
+ struct qstr *dst_name, void *rev);
+void au_dr_rename_fin(struct dentry *src, aufs_bindex_t btgt, void *rev);
+int au_dr_lkup(struct au_do_lookup_args *lkup, struct dentry *dentry,
+ aufs_bindex_t bindex);
+int au_dr_lkup_name(struct au_do_lookup_args *lkup, aufs_bindex_t btgt);
+int au_dr_lkup_h_ino(struct au_do_lookup_args *lkup, aufs_bindex_t bindex,
+ ino_t h_ino);
+void au_dr_lkup_fin(struct au_do_lookup_args *lkup);
+int au_dr_opt_set(struct super_block *sb);
+int au_dr_opt_flush(struct super_block *sb);
+int au_dr_opt_clr(struct super_block *sb, int no_flush);
+#else
    AuStubInt0(au_dr_hino_test_add, struct au_dr_br *dr, ino_t h_ino,
        struct au_dr_hino *add_ent);
    AuStubVoid(au_dr_hino_free, struct au_dr_br *dr);
    AuStubInt0(au_dr_br_init, struct super_block *sb, struct au_branch *br,
        const struct path *path);
    AuStubInt0(au_dr_br_fin, struct super_block *sb, struct au_branch *br);
    AuStubInt0(au_dr_rename, struct dentry *src, aufs_bindex_t bindex,
        struct qstr *dst_name, void *rev);
    AuStubVoid(au_dr_rename_fin, struct dentry *src, aufs_bindex_t btgt, void *rev);
    AuStubInt0(au_dr_lkup, struct au_do_lookup_args *lkup, struct dentry *dentry,
        aufs_bindex_t bindex);
    AuStubInt0(au_dr_lkup_name, struct au_do_lookup_args *lkup, aufs_bindex_t btgt);
    AuStubInt0(au_dr_lkup_h_ino, struct au_do_lookup_args *lkup, aufs_bindex_t bindex,
        ino_t h_ino);
    AuStubVoid(au_dr_lkup_fin, struct au_do_lookup_args *lkup);
    AuStubInt0(au_dr_opt_set, struct super_block *sb);
    AuStubVoid(au_dr_opt_flush, struct super_block *sb);
    AuStubVoid(au_dr_opt_clr, struct super_block *sb, int no_flush);
#endif
+AuStubInt0(au_dr_opt_set, struct super_block *sb);
+AuStubInt0(au_dr_opt_flush, struct super_block *sb);
+AuStubInt0(au_dr_opt_clr, struct super_block *sb, int no_flush);
+#endif
+
+/* ---------------------------------------------------------------------- */
+
+#ifdef CONFIG_AUFS_DIRREN
+static inline int au_dr_ihash(ino_t h_ino)
+{
+  return h_ino % AuDirren_NHASH;
+}
+#else
+AuStubInt0(au_dr_ihash, ino_t h_ino);
+#endif
+
+#endif /* __KERNEL__ */
+#endif /* __AUFS_DIRREN_H__ */

--- linux-4.15.0.orig/fs/aufs/dynop.c
+++ linux-4.15.0/fs/aufs/dynop.c
@@ -0,0 +1,369 @@
+/*
+ * Copyright (C) 2010-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * dynamically customizable operations for regular files
+ */
+
+#include "aufs.h"
+
+#define DyPrSym(key)AuDbgSym(key->dk_op.dy_hop)
+
+/* How large will these lists be?
```c
+ * Usually just a few elements, 20-30 at most for each, I guess.
+ */
+static struct hlist_bl_head dynop[AuDyLast];
+
+static struct au_dykey *dy_gfind_get(struct hlist_bl_head *hbl,
+    const void *h_op)
+{
+struct au_dykey *key, *tmp;
+struct hlist_bl_node *pos;
+
+key = NULL;
+hlist_bl_lock(hbl);
+hlist_bl_for_each_entry(tmp, pos, hbl, dk_hnode)
+    if (tmp->dk_op.dy_hop == h_op) {
+        key = tmp;
+kref_get(&key->dk_kref);
+        break;
+    }
+hlist_bl_unlock(hbl);
+
+return key;
+}
+
+static struct au_dykey *dy_bradd(struct au_branch *br, struct au_dykey *key)
+{
+struct au_dykey **k, *found;
+const void *h_op = key->dk_op.dy_hop;
+int i;
+
+found = NULL;
+k = br->br_dykey;
+for (i = 0; i < AuBrDynOp; i++)
+    if (k[i]) {
+        if (k[i]->dk_op.dy_hop == h_op) {
+            found = k[i];
+            break;
+        }
+    } else
+    break;
+
+if (!found) {
+spin_lock(&br->br_dykey_lock);
+for (; i < AuBrDynOp; i++)
+    if (k[i]) {
+        if (k[i]->dk_op.dy_hop == h_op) {
+            found = k[i];
+            break;
+        }
+    } else {
```
+k[i] = key;
+break;
+
+spin_unlock(&br->br_dykey_lock);
+BUG_ON(i == AuBrDynOp); /* expand the array */
+
+
+return found;
+
+/* kref_get() if @key is already added */
+static struct au_dykey *dy_gadd(struct hlist_bl_head *hbl, struct au_dykey *key)
+
+
+struct au_dykey *tmp, *found;
+struct hlist_bl_node *pos;
+const void *h_op = key->dk_op.dy_hop;
+
+found = NULL;
+hlist_bl_lock(hbl);
+hlist_bl_for_each_entry(tmp, pos, hbl, dk_hnode)
+if (tmp->dk_op.dy_hop == h_op) {
+kref_get(&tmp->dk_kref);
+found = tmp;
+break;
+
+if (!found)
+hlist_bl_add_head(&key->dk_hnode, hbl);
+hlist_bl_unlock(hbl);
+
+if (!found)
+DyPrSym(key);
+return found;
+
+
+static void dy_free_rcu(struct rcu_head *rcu)
+
+
+struct au_dykey *key;
+
+key = container_of(rcu, struct au_dykey, dk_rcu);
+DyPrSym(key);
+kfree(key);
+
+
+static void dy_free(struct kref *kref)
+
+
+struct au_dykey *key;
+struct hlist_bl_head *hbl;
+
+#define DyDbgSize(cnt, op) AuDebugOn(cnt != sizeof(op)/sizeof(void *))
+#ifdef CONFIG_AUFS_DEBUG
+#define DyDbgDeclare(cnt) unsigned int cnt = 0
+#define DyDbgInc(cnt) do { cnt++; } while (0)
+#else
+#define DyDbgDeclare(cnt) do {} while (0)
+#define DyDbgInc(cnt) do {} while (0)
+#endif

#define DySet(func, dst, src, h_op, h_sb) do {
    DyDbgInc(cnt);
    if (h_op->func) {
        if (src.func)
            dst.func = src.func;
        else
            AuDbg("%s %s
", au_sbtype(h_sb), #func);
    }
} while (0)
#define DySetForce(func, dst, src) do {
    AuDebugOn(!src.func);
    DyDbgInc(cnt);
    dst.func = src.func;
} while (0)
#define DySetAop(func)  
    DySet(func, dyaop->da_op, aufs_aop, h_aop, h_sb)
#define DySetAopForce(func)  
    DySetForce(func, dyaop->da_op, aufs_aop)

static void dy_aop(struct au_dykey *key, const void *h_op, 
    struct super_block *h_sb __maybe_unused)
{  

const struct address_space_operations *h_aop = h_op;
+DyDbgDeclare(cnt);
+
+AuDbg("%s\n", au_subtype(h_sb));
+
+DySetAop(writepage);
+DySetAopForce(readpage); /* force */
+DySetAop(writepages);
+DySetAop(set_page_dirty);
+DySetAop(readpages);
+DySetAop(write_begin);
+DySetAop(write_end);
+DySetAop(bmap);
+DySetAop(invalidatepage);
+DySetAop(releasepage);
+DySetAop(freepage);
+/* this one will be changed according to an aufs mount option */
+DySetAop(direct_IO);
+DySetAop(migratepage);
+DySetAop(isolate_page);
+DySetAop(putback_page);
+DySetAop(launder_page);
+DySetAop(is_partially_uptodate);
+DySetAop(is_dirty_writeback);
+DySetAop(error_remove_page);
+DySetAop(swap_activate);
+DySetAop(swap_deactivate);
+
+DyDbgSize(cnt, *h_aop);
+
+/* ----------------------------------------------- */
+
+static void dy_bug(struct kref *kref)
+{
+  +BUG();
+}
+
+static struct au_dykey *dy_get(struct au_dynop *op, struct au_branch *br)
+{
+  +struct au_dykey *key, *old;
+  +struct hlist_bl_head *hbl;
+  +struct op {
+    +unsigned int sz;
+    +void (*set)(struct au_dykey *key, const void *h_op,
+      + struct super_block *h_sb __maybe_unused);
+  +};
+  +static const struct op a[] = {
+    +

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+[AuDy_AOP] = {
   .sz= sizeof(struct au_dyaop),
   .set= dy_aop
};
+
+const struct op *p;
+
+hbl = dynop + op->dy_type;
+key = dy_gfind_get(hbl, op->dy_hop);
+if (key)
+goto out_add; /* success */
+
+p = a + op->dy_type;
+key = kzalloc(p->sz, GFP_NOFS);
+if (unlikely(!key)) {
+key = ERR_PTR(-ENOMEM);
+goto out;
+
+key->dk_op.dy_hop = op->dy_hop;
+kref_init(&key->dk_kref);
+p->set(key, op->dy_hop, au_br_sb(br));
+old = dy_gadd(hbl, key);
+if (old) {
+kfree(key);
+key = old;
+
+out_add:
+old = dy_bradd(br, key);
+if (old)
+/* its ref-count should never be zero here */
+kref_put(&key->dk_kref, dy_bug);
+out:
+return key;
+
+/* ---------------------------------------------------------------------- */
+
+/* Aufs prohibits O_DIRECT by defaut even if the branch supports it. */
+/* This behaviour is necessary to return an error from open(O_DIRECT) instead */
+/* of the succeeding I/O. The dio mount option enables O_DIRECT and makes */
+/* open(O_DIRECT) always succeed, but the succeeding I/O may return an error. */
+/* See the aufs manual in detail. */
+/* */
+static void dy_adx(struct au_dyaop *dyap, int do_dx)
+{
+if (!do_dx)
static struct au_dyaop *dy_aget(struct au_branch *br, const struct address_space_operations *h_aop, int do_dx)
{
    struct au_dyaop *dyaop;
    struct au_dynop op;

    op.dy_type = AuDy_AOP;
    op.dy_haop = h_aop;
    dyaop = dy_get(&op, br);
    if (IS_ERR(dyaop))
        goto out;
    dy_adx(dyaop, do_dx);

out:
    return dyaop;
}

int au_dy_iop(struct inode *inode, aufs_bindex_t bindex, struct inode *h_inode)
{
    int err, do_dx;
    struct super_block *sb;
    struct au_branch *br;
    struct au_dyaop *dyaop;

    AuDebugOn(!S_ISREG(h_inode->i_mode));
    IiMustWriteLock(inode);

    sb = inode->i_sb;
    br = au_sbr(sb, bindex);
    do_dx = !!au_opt_test(au_mntflags(sb), DIO);
    dyaop = dy_aget(br, h_inode->i_mapping->a_ops, do_dx);
    err = PTR_ERR(dyaop);
    if (IS_ERR(dyaop))
        goto out;

    err = 0;
    inode->i_mapping->a_ops = &dyaop->da_op;

out:
    return err;
Is it safe to replace a_ops during the inode/file is in operation? 
Yes, I hope so.

```c
int au_dy_irefresh(struct inode *inode) {
    int err;
    aufs_bindex_t btop;
    struct inode *h_inode;

    err = 0;
    if (S_ISREG(inode->i_mode)) {
        btop = au_ibtop(inode);
        h_inode = au_h_iptr(inode, btop);
        err = au_dy_iaop(inode, btop, h_inode);
    }
    return err;
}

void au_dy_arefresh(int do_dx) {
    struct hlist_bl_head *hbl;
    struct hlist_bl_node *pos;
    struct au_dykey *key;

    hbl = dynop + AuDy_AOP;
    hlist_bl_lock(hbl);
    hlist_bl_for_each_entry(key, pos, hbl, dk_hnode)
        dy_adx((void *)key, do_dx);
    hlist_bl_unlock(hbl);
}

/* ---------------------------------------------------------------------- */

void __init au_dy_init(void) {
    int i;

    /* make sure that 'struct au_dykey *' can be any type */
    BUILD_BUG_ON(offsetof(struct au_dyaop, da_key));
    for (i = 0; i < AuDyLast; i++)
        INIT_HLIST_BL_HEAD(dynop + i);
}

void au_dy_fin(void)
```
int i;

for (i = 0; i < AuDyLast; i++)

WARN_ON(!hlist_bl_empty(dynop + i));

/*
 * Copyright (C) 2010-2017 Junjiro R. Okajima
 * *
 * This program, aufs is free software; you can redistribute it and/or modify
 * it under the terms of the GNU General Public License as published by
 * the Free Software Foundation; either version 2 of the License, or
 * (at your option) any later version.
 * *
 * This program is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
 * GNU General Public License for more details.
 * *
 * You should have received a copy of the GNU General Public License
 * along with this program. If not, see <http://www.gnu.org/licenses/>.
 * *
 */

/*
 * dynamically customizable operations (for regular files only)
 */

#ifndef __AUFS_DYNOP_H__
#define __AUFS_DYNOP_H__

#define __KERNEL__

#include <linux/fs.h>
#include <linux/kref.h>

enum {AuDy_AOP, AuDyLast};

struct au_dynop {
    int dy_type;
    union {
        const void *dy_hop;
        const struct address_space_operations *dy_haop;
    }
    union {
        const void *dy_hop;
    }
};


+struct au_dykey {  
+union {  
+struct hlist_bl_node dk_hnode;  
+struct rcu_head dk_rcu;  
+};  
+struct au_dynopdk_op;  
+  
+/*  
+ * during I am in the branch local array, kref is gotten. when the  
+ * branch is removed, kref is put.  
+ */  
+struct krefdk_kref;  
+};  
+  
+/* stop unioning since their sizes are very different from each other */  
+struct au_dyaop {  
+struct au_dykey da_key;  
+struct address_space_operations da_op; /* not const */  
+};  
+  
+/* --------------------------------------------------------------- */  
+  
+/* dynop.c */  
+struct au_branch;  
+void au_dy_put(struct au_dykey *key);  
+int au_dy_iap(struct inode *inode, aufs_bindex_t bindex,  
+struct inode *h_inode);  
+int au_dy_irefresh(struct inode *inode);  
+void au_dy_arefresh(int do_dio);  
+  
+void __init au_dy_init(void);  
+void au_dy_fin(void);  
+  
+#endif /* __KERNEL__ */  
+#endif /* __AUFS_DYNOP_H__ */

--- linux-4.15.0.orig/fs/aufs/export.c
+++ linux-4.15.0/fs/aufs/export.c
@@ -0,0 +1,836 @@
+/*  
+ * Copyright (C) 2005-2017 Junjiro R. Okajima  
+ */  
+/* This program, aufs is free software; you can redistribute it and/or modify  
+ * it under the terms of the GNU General Public License as published by  
+ * the Free Software Foundation; either version 2 of the License, or  
+ * (at your option) any later version.  
+ */  
+/* This program is distributed in the hope that it will be useful,  
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANDABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
GNU General Public License for more details.
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/#include <linux/exportfs.h>
+/#include <linux/fs_struct.h>
+/#include <linux/namei.h>
+/#include <linux/nsproxy.h>
+/#include <linux/random.h>
+/#include <linux/writeback.h>
+/#include "aufs.h"
+
+union conv {
+    __u32 a[2];
+}__else
+    __u32 a[1];
+}endif
+ino_t ino;
+};
+
+static ino_t decode_ino(__u32 *a)
+{
+    union conv u;
+
+    __BUILD_BUG_ON(sizeof(u.ino) != sizeof(u.a));
+    u.a[0] = a[0];
+}ifdef CONFIG_AUFS_INO_T_64
+    u.a[1] = a[1];
+}endif
+return u.ino;
+}
+
+static void encode_ino(__u32 *a, ino_t ino)
+{
+    union conv u;
+
+    u.ino = ino;
+    a[0] = u.a[0];
+}ifdef CONFIG_AUFS_INO_T_64
+    a[1] = u.a[1];
+}endif

Open Source Used In 5GaaS Edge AC-4 30078
+#endif
+
+/* NFS file handle */
+enum {
+Fh_br_id,
+Fh_sigen,
+#ifdef CONFIG_AUFS_INO_T_64
+/* support 64bit inode number */
+Fh_ino1,
+Fh_ino2,
+Fh_dir_ino1,
+Fh_dir_ino2,
+#else
+Fh_ino1,
+Fh_dir_ino1,
+#endif
+Fh_igen,
+Fh_h_type,
+Fh_tail,
+
+Fh_ino = Fh_ino1,
+Fh_dir_ino = Fh_dir_ino1
+};
+
+static int au_test_anon(struct dentry *dentry)
+
+/* note: read d_flags without d_lock */
+return !!(dentry->d_flags & DCACHE_DISCONNECTED);
+}
+
+int au_test_nfsd(void)
+{
+int ret;
+struct task_struct *tsk = current;
+char comm[sizeof(tsk->comm)];
+
+ret = 0;
+if (tsk->flags & PF_KTHREAD) {
+get_task_comm(comm, tsk);
+ret = !strcmp(comm, "nfsd");
+}
+
+return ret;
+}
+
+/* ---------------------------------------------------------------------- */
+/* inode generation external table */

Open Source Used in 5GaaS Edge AC-4 30079
+void au_xigen_inc(struct inode *inode)  
+{
+loff_t pos;
+ssize_t sz;
+__u32 igen;
+struct super_block *sb;
+struct au_sbinfo *sbinfo;
+
+sb = inode->i_sb;
+AuDebugOn(!au_opt_test(au_mntflags(sb), XINO));
+
+sbinfo = au_sbi(sb);
+pos = inode->i_ino;
+pos *= sizeof(igen);
+igen = inode->i_generation + 1;
+sz = xino_fwrite(sbinfo->si_xwrite, sbinfo->si_xigen, &igen,
+ sizeof(igen), &pos);
+if (sz == sizeof(igen))
+return; /* success */
+
+if (unlikely(sz >= 0))
+AuIOErr("xigen error (%zd)\n", sz);
+
+int au_xigen_new(struct inode *inode)  
+{
+int err;
+loff_t pos;
+ssize_t sz;
+struct super_block *sb;
+struct au_sbinfo *sbinfo;
+struct file *file;
+
+err = 0;
+/* todo: dirty, at mount time */
+if (inode->i_ino == AUFS_ROOT_INO)
+goto out;
+sb = inode->i_sb;
+SiMustAnyLock(sb);
+if (unlikely(!au_opt_test(au_mntflags(sb), XINO)))
+goto out;
+
+err = -EFBIG;
+if (unlikely((au_loff_max / sizeof(inode->i_generation) - 1 < pos)) {  
+AuIOErr1("too large i%lld\n", pos);
+goto out;
pos *= sizeof(inode->i_generation);
+
err = 0;
+sbsinfo = au_sbi(sb);
+file = sbinfo->si_xigen;
+BUG_ON(!file);
+
if (vfsub_f_size_read(file)
  < pos + sizeof(inode->i_generation)) {
  inode->i_generation = atomic_inc_return(&sbinfo->si_xigen_next);
  +sz = xino_fwrite(sbinfo->si_xwrite, file, &inode->i_generation,
  + sizeof(inode->i_generation), &pos);
  +}
else
  +sz = xino_fread(sbinfo->si_xread, file, &inode->i_generation,
  + sizeof(inode->i_generation), &pos);
  +if (sz == sizeof(inode->i_generation))
  +goto out; /* success */
+
  +err = sz;
  +if (unlikely(sz >= 0)) {
    +err = -EIO;
    +AuIOErr("xigen error (%zd)\n", sz);
  +}
  +
  +out:
  +return err;
+

int au_xigen_set(struct super_block *sb, struct file *base)
+{
  +int err;
  +struct au_sbiinfo *sbsinfo;
  +struct file *file;
  +
  +SiMustWriteLock(sb);
  +
  +sbsinfo = au_sbi(sb);
  +file = au_xino_create2(base, sbinfo->si_xigen);
  +err = PTR_ERR(file);
  +if (IS_ERR(file))
  +goto out;
  +err = 0;
  +if (sbsinfo->si_xigen)
  +fput(sbinfo->si_xigen);
  +sbsinfo->si_xigen = file;
  +
  +out:
+return err;
+}
+
+void au_xigen_clr(struct super_block *sb)
+{
+struct au_sbinfo *sbinf;
+
+SiMustWriteLock(sb);
+
+sbinf = au_sbi(sb);
+if (sbinf->si_xigen) {
+fput(sbinf->si_xigen);
+sbinf->si_xigen = NULL;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static struct dentry *decode_by_ino(struct super_block *sb, ino_t ino,
+    ino_t dir_ino)
+{
+struct dentry *dentry, *d;
+struct inode *inode;
+unsigned int sigen;
+
dentry = NULL;
+inode = ilookup(sb, ino);
+if (!inode)
+    goto out;
+
dentry = ERR_PTR(-ESTALE);
+sigen = au_sigen(sb);
+if (unlikely(au_is_bad_inode(inode)
+      || IS_DEADDIR(inode)
+      || sigen != au_iigen(inode, NULL)))
+    goto out_iput;
+
dentry = NULL;
+if (!dir_ino || S_ISDIR(inode->i_mode))
+    dentry = d_find_alias(inode);
+else {
+    spin_lock(&inode->i_lock);
+    hlist_for_each_entry(d, &inode->i_dentry, d_u.d_alias) {
+        spin_lock(&d->d_lock);
+        if (!au_test_anon(d)
+            && d_inode(d->d_parent)->i_ino == dir_ino) {
+            dentry = dget_dlock(d);
+            spin_unlock(&d->d_lock);
+        }
+    }
+    spin_unlock(&inode->i_lock);
+}
break;
+
+spin_unlock(&d->d_lock);
+
+spin_unlock(&inode->i_lock);
+
+if (unlikely(dentry && au_digen_test(dentry, sigen))) {
+  /* need to refresh */
+  dput(dentry);
+  dentry = NULL;
+
+out_iput:
+  iput(inode);
+  out:
+  AuTraceErrPtr(dentry);
+  return dentry;
+
+  /* todo: dirty? */
+  /* if exportfs_decode_fh() passed vfsmount*, we could be happy */
+  +
+  +struct au_compare_mnt_args {
+    /* input */
+    struct super_block *sb;
+    /* output */
+    struct vfsmount *mnt;
+  };
+  +
+  +static int au_compare_mnt(struct vfsmount *mnt, void *arg)
+  +{
+    +struct au_compare_mnt_args *a = arg;
+    +
+    +if (mnt->mnt_sb != a->sb)
+      +return 0;
+    +a->mnt = mntget(mnt);
+    +return 1;
+  +
+  +
+  +static struct vfsmount *au_mnt_get(struct super_block *sb)
+  +{
+    +int err;
+    +struct path root;
+    +struct au_compare_mnt_args args = {
+      .sb = sb
+    };
+    +
+    +return 1;
+};
+
+get_fs_root(current->fs, &root);
+rcpu_read_lock();
+err = iterate_mounts(au_compare_mnt, &args, root.mnt);
+rcpu_read_unlock();
+path_put(&root);
+AudDebugOn(!err);
+AudDebugOn(!args.mnt);
+return args.mnt;
+
+struct au_nfsd_si_lock {
+unsigned int signen;
+aufs_bindex_t bindex, br_id;
+unsigned char force_lock;
+};
+
+static int si_nfsd_read_lock(struct super_block *sb,
+   struct au_nfsd_si_lock *nsi_lock)
+{
+  int err;
+  aufs_bindex_t bindex;
+
+  si_read_lock(sb, AuLock_FLUSH);
+
+  /* branch id may be wrapped around */
+  err = 0;
+  bindex = au_br_index(sb, nsi_lock->br_id);
+  if (bindex >= 0 && nsi_lock->sigen + AUFS_BRANCH_MAX > au_sigen(sb))
+    goto out; /* success */
+
+  err = -ESTALE;
+  bindex = -1;
+  if (!nsi_lock->force_lock)
+    si_read_unlock(sb);
+
+  out:
+  nsi_lock->bindex = bindex;
+  return err;
+
+struct find_name_by_ino {
+struct dir_context ctx;
+int called, found;
+ino_t ino;
+char *name;
+int namelen;
+};
static int find_name_by_ino(struct dir_context *ctx, const char *name, int namelen, loff_t offset, u64 ino, unsigned int d_type) {
    struct find_name_by_ino *a = container_of(ctx, struct find_name_by_ino, ctx);
    a->called++;
    if (a->ino != ino)
        return 0;
    memcpy(a->name, name, namelen);
    a->namelen = namelen;
    a->found = 1;
    return 1;
}

static struct dentry *au_lkup_by_ino(struct path *path, ino_t ino, struct au_nfsd_si_lock *nsi_lock) {
    struct dentry *dentry, *parent;  
    struct file *file;  
    struct inode *dir;  
    struct find_name_by_ino arg = {
        .ctx = {
            .actor = find_name_by_ino
        },
        .name = (void *)__get_free_page(GFP_NOFS),
        .ino = ino,  
        .found = 0,
        .called = 0;
    }
    int err;
    parent = path->dentry;
    if (nsi_lock)
        si_read_unlock(parent->d_sb);
    file = vfsub_dentry_open(path, au_dir_roflags);
    dentry = (void *)file;
    if (IS_ERR(file))
        goto out;
    dentry = ERR_PTR(-ENOMEM);
    arg.name = (void *)__get_free_page(GFP_NOFS);
    if (unlikely(!arg.name))
        goto out_file;
    arg.ino = ino;
    arg.found = 0;
    do {
        arg.called = 0;
        err = find_name_by_ino(ctx, arg.name, arg.namelen, arg.offset, arg.ino, arg.d_type);
        if (err)
            break;
        if (!arg.called)
            continue;
        arg.found = 1;
        dentry = ERR_PTR(-ENOMEM);
        arg.name = (void *)__get_free_page(GFP_NOFS);
        if (unlikely(!arg.name))
            goto out_file;
        arg.ino = ino;
        arg.found = 0;
        arg.called = 0;
    } while (arg.called);
    
    goto out;
}
/* smp_mb(); */
+err = vfsub_iterate_dir(file, &arg.ctx);
+} while (!(err && !arg.found && !arg.called);
+dentry = ERR_PTR(err);
+if (unlikely(err))
+goto out_name;
+/* instead of ENOENT */
+dentry = ERR_PTR(-ESTALE);
+if (!arg.found)
+goto out_name;
+
+/* do not call vfsub_lookup_one() */
+dir = d_inode(parent);
+dentry = vfsub_lookup_one_len_unlocked(arg.name, path, arg.namelen);
+AuTraceErrPtr(dentry);
+if (IS_ERR(dentry))
+goto out_name;
+AuDebugOn(au_test_anon(dentry));
+if (unlikely(d_really_is_negative(dentry))) {
+dput(dentry);
+dentry = ERR_PTR(-ENOENT);
+}
+
+out_name:
+free_page(unsigned long)arg.name);
+out_file:
+fput(file);
+out:
+if (unlikely(nsi_lock
+ & si_nfsd_read_lock(parent->d_sb, nsi_lock) < 0))
+if (IS_ERR(dentry)) {
+dput(dentry);
+dentry = ERR_PTR(-ESTALE);
+}
+AuTraceErrPtr(dentry);
+return dentry;
+}
+
+static struct dentry *decode_by_dir_ino(struct super_block *sb, ino_t ino,
+ino_t dir_ino,
+struct au_nfsd_si_lock *nsi_lock)
+{
+struct dentry *dentry;
+dentry = decode_by_ino(sb, dir_ino, 0);
+dentry = path.dentry;
+if (!path.dentry || IS_ERR(path.dentry))
+goto out;
+AuDebugOn(au_test_anon(path.dentry));
+} else
+path.dentry = dget(sb->s_root);
+
+path.mnt = au_mnt_get(sb);
+dentry = au_lkup_by_ino(&path, ino, nsi_lock);
+path_put(&path);
+
+out:
+AuTraceErrPtr(dentry);
+return dentry;
+
+/* ---------------------------------------------------------------------- */
+
+static int h_acceptable(void *expv, struct dentry *dentry)
+{
+return 1;
+}
+
+static char *au_build_path(struct dentry *h_parent, struct path *h_rootpath,
+    char *buf, int len, struct super_block *sb)
+{
+char *p;
+int n;
+struct path path;
+
+p = d_path(h_rootpath, buf, len);
+if (IS_ERR(p))
+goto out;
+n = strlen(p);
+
+path.mnt = h_rootpath->mnt;
+path.dentry = h_parent;
+p = d_path(&path, buf, len);
+if (IS_ERR(p))
+goto out;
+if (n != 1)
+p += n;
+
+path.mnt = au_mnt_get(sb);
+path.dentry = sb->s_root;
+p = d_path(&path, buf, len - strlen(p));
mntput(path.mnt);
+if (IS_ERR(p))
+goto out;
+if (n != 1)
+p[strlen(p)] = '/';
+
+out:
+AuTraceErrPtr(p);
+return p;
+
+static
+struct dentry *decode_by_path(struct super_block *sb, ino_t ino, __u32 *fh,
+    int fh_len, struct au_nfsd_si_lock *nsi_lock)
+
+{
+    struct dentry *dentry, *h_parent, *root;
+    struct super_block *h_sb;
+    char *pathname, *p;
+    struct vfsmount *h_mnt;
+    struct au_branch *br;
+    int err;
+    struct path path;
+
+    br = au_sbr(sb, nsi_lock->bindex);
+    h_mnt = au_br_mnt(br);
+    h_sb = h_mnt->mnt_sb;
+    /* todo: call lower fh_to_dentry()? fh_to_parent()? */
+    lockdep_off();
+    h_parent = exportfs_decode_fh(h_mnt, (void *)(fh + Fh_tail),
+        fh_len - Fh_tail, fh[Fh_h_type],
+        h_acceptable, /*context*/NULL);
+    lockdep_on();
+    dentry = h_parent;
+    if (unlikely(!h_parent || IS_ERR(h_parent))) {
+        AuWarn1("%s decode_fh failed, %ld
",
+            au_sbtype(h_sb), PTR_ERR(h_parent));
+        goto out;
+    }
+    dentry = NULL;
+    if (unlikely(au_test_anon(h_parent))) {
+        AuWarn1("%s decode_fh returned a disconnected dentry\n",
+            au_sbtype(h_sb));
+        goto out_h_parent;
+    }
+    dentry = ERR_PTR(-ENOMEM);
+    pathname = (void *)__get_free_page(GFP_NOFS);
+    if (unlikely(!pathname))
+        goto out_h_parent;
+    root = sb->s_root;
+path.mnt = h_mnt;
+dri_read_lock_parent(root, !AuLock_IR);
+path.dentry = au_h_dptr(root, nsi_lock->bindex);
+dri_read_unlock(root, !AuLock_IR);
+p = au_build_path(h_parent, &path, pathname, PAGE_SIZE, sb);
+dentry = (void *)p;
+if (IS_ERR(p))
+goto out_pathname;
+
+si_read_unlock(sb);
+err = vfs_kern_path(p, LOOKUP_FOLLOW | LOOKUP_DIRECTORY, &path);
+dentry = ERR_PTR(err);
+if (unlikely(err))
+goto out_relock;
+
+dentry = ERR_PTR(-ENOENT);
+AuDebugOn(au_test_anon(path.dentry));
+if (unlikely(d_really_is_negative(path.dentry)))
+goto out_path;
+
+if (ino != d_inode(path.dentry)->i_ino)
+dentry = au_lkup_by_ino(&path, ino, /*nsi_lock*/NULL);
+else
+dentry = dget(path.dentry);
+
+out_path:
+path_put(&path);
+out_relock:
+if (unlikely(si_nfsd_read_lock(sb, nsi_lock) < 0))
+if (!IS_ERR(dentry)) {
+dput(dentry);
+dentry = ERR_PTR(-ESTALE);
+}
+out_pathname:
+free_page((unsigned long)pathname);
+out_h_parent:
+dput(h_parent);
+out:
+AuTraceErrPtr(dentry);
+return dentry;
+
+/* ---------------------------------------------------------------------- */
+
+static struct dentry *
aufs_fh_to_dentry(struct super_block *sb, struct fid *fid, int fh_len,
+    int fh_type)
+struct dentry *dentry;
+__u32 *fh = fid->raw;
+struct au_branch *br;
+ino_t ino, dir_ino;
+struct au_nfsd_si_lock nsi_lock = {
+force_lock= 0
+};
+
dentry = ERR_PTR(-ESTALE);
+/* it should never happen, but the file handle is unreliable */
+if (unlikely(fh_len < Fh_tail))
+goto out;
+nsi_lock.sigen = fh[Fh_sigen];
+nsi_lock.br_id = fh[Fh_br_id];
+
+/* branch id may be wrapped around */
+br = NULL;
+if (unlikely(si_nfsd_read_lock(sb, &nsi_lock)))
+goto out;
+nsi_lock.force_lock = 1;
+
+/* is this inode still cached? */
+ino = decode_ino(fh + Fh_ino);
+/* it should never happen */
+if (unlikely(ino == AUFS_ROOT_INO))
+goto out_unlock;
+
+dir_ino = decode_ino(fh + Fh_dir_ino);
+dentry = decode_by_ino(sb, ino, dir_ino);
+if (IS_ERR(dentry))
+goto out_unlock;
+if (dentry)
+goto accept;
+
+/* is the parent dir cached? */
+br = au_sbr(sb, nsi_lock.bindex);
+au_br_get(br);
+dentry = decode_by_dir_ino(sb, ino, dir_ino, &nsi_lock);
+if (IS_ERR(dentry))
+goto out_unlock;
+if (dentry)
+goto accept;
+
+/* lookup path */
+dentry = decode_by_path(sb, ino, fh, fh_len, &nsi_lock);
+if (IS_ERR(dentry))
+goto out_unlock;
+if (unlikely(!dentry))
+}
/* todo?: make it ESTALE */
goto out_unlock;
+
+accept:
+if (!au_digen_test(dentry, au_sigen(sb))
  + & & d_inode(dentry)->i_generation == fh[Fh_igen])
goto out_unlock; /* success */
+
+dput(dentry);
+dentry = ERR_PTR(-ESTALE);
+out_unlock:
+if (br)
  +au_br_put(br);
+si_read_unlock(sb);
+out:
+AuTraceErrPtr(dentry);
+return dentry;
+}
+
+#if 0 /* reserved for future use */
+#/ * support subtreecheck option */
+static struct dentry *aufs_fh_to_parent(struct super_block *sb, struct fid *fid,
  +int fh_len, int fh_type)
  +{
  +struct dentry *parent;
  +__u32 *fh = fid->raw;
  +ino_t dir_ino;
  +
  +dir_ino = decode_ino(fh + Fh_dir_ino);
  +parent = decode_by_ino(sb, dir_ino, 0);
  +if (IS_ERR(parent))
  +goto out;
  +if (!parent)
    +parent = decode_by_path(sb, au_br_index(sb, fh[Fh_br_id]),
      +dir_ino, fh, fh_len);
  +
  +out:
  +AuTraceErrPtr(parent);
  +return parent;
  +}
 +#endif
+
+/* ---------------------------------------------------------------------- */
+
+static int aufs_encode_fh(struct inode *inode, __u32 *fh, int *max_len,
  +struct inode *dir)
  +{
  +int err;
+aufs_bindex_t bindex;
+struct super_block *sb, *h_sb;
+struct dentry *dentry, *parent, *h_parent;
+struct inode *h_dir;
+struct au_branch *br;
+
+err = -ENOSPC;
+if (unlikely(*max_len <= Fh_tail)) {
+ AuWarn1("NFSv2 client (max_len %d)?\n", *max_len);
+ goto out;
+
+err = FILEID_ROOT;
+if (inode->i_ino == AUFS_ROOT_INO) {
+ AuDebugOn(inode->i_ino != AUFS_ROOT_INO);
+ goto out;
+
+h_parent = NULL;
+sb = inode->i_sb;
+err = si_read_lock(sb, AuLock_FLUSH);
+if (unlikely(err))
+ goto out;
+
+ifdef CONFIG_AUFS_DEBUG
+if (unlikely(!au_opt_test(au_mntflags(sb), XINO)))
+ AuWarn1("NFS-exporting requires xino\n");
+ #endif
+err = -EIO;
+parent = NULL;
+ii_read_lock_child(inode);
+bindex = au_ibtop(inode);
+if (!dir) {
+dentry = d_find_any_alias(inode);
+if (unlikely(!dentry))
+ goto out_unlock;
+ AuDebugOn(au_test_anon(dentry));
+parent = dget_parent(dentry);
+dput(dentry);
+if (unlikely(!parent))
+ goto out_unlock;
+ if (d_really_is_positive(parent))
+ dir = d_inode(parent);
+
+ii_read_lock_parent(dir);
+b_dir = au_h_iptr(dir, bindex);
+ii_read_unlock(dir);
+if (unlikely(!h_dir))
+goto out_parent;
+h_parent = d_find_any_alias(h_dir);
+if (unlikely(!h_parent))
+goto out_hparent;
+
+err = -EPERM;
+br = au_sbr(sb, bindex);
+h_sb = au_br_sb(br);
+if (unlikely(!h_sb->s_export_op)) {
+AuErr1("%s branch is not exportable\n", au_sbtpe(h_sb));
+goto out_hparent;
+
+fh[Fh_br_id] = br->br_id;
+fh[Fh_sigen] = au_sigen(sb);
+encode_ino(fh + Fh_ino, inode->i_ino);
+encode_ino(fh + Fh_dir_ino, dir->i_ino);
+fh[Fh_igen] = inode->i_generation;
+
+*max_len -= Fh_tail;
+fh[Fh_h_type] = exportfs_encode_fh(h_parent, (void *)(fh + Fh_tail),
+  max_len,
+  /*connectable or subtreecheck*/0);
+err = fh[Fh_h_type];
+*max_len += Fh_tail;
+/* todo: macros? */
+if (err != FILEID_INVALID)
+err = 99;
+else
+AuWarn1("%s encode_fh failed\n", au_sbtpe(h_sb));
+
+out_hparent:
+dput(h_parent);
+out_parent:
+dput(parent);
+out_unlock:
+ii_read_unlock(inode);
+si_read_unlock(sb);
+out:
+if (unlikely(err < 0))
+err = FILEID_INVALID;
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static int aufs_commit_metadata(struct inode *inode)
int err;
tua_bindex_t bindex;
struct super_block *sb;
struct inode *h_inode;
int (*f)(struct inode *inode);

sb = inode->i_sb;
si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW);
ii_write_lock_child(inode);
bindex = au_ibtop(inode);
AuDebugOn(bindex < 0);
h_inode = au_h_iptr(inode, bindex);
+f = h_inode->i_sb->s_export_op->commit_metadata;
if (f)
err = f(h_inode);
else {
struct writeback_control wbc = {
+ .sync_mode= WB_SYNC_ALL,
+ .nr_to_write= 0 /* metadata only */
+};
+err = sync_inode(h_inode, &wbc);
+}
+au_cpup_attr_timesizes(inode);
ii_write_unlock(inode);
+return err;
+}
+/* ------------------------------- */
+
+static struct export_operations aufs_export_op = {
+ .fh_to_dentry= aufs_fh_to_dentry,
+/* .fh_to_parent= aufs_fh_to_parent, */
+ .encode_fh= aufs_encode_fh,
+ .commit_metadata= aufs_commit_metadata
+};
+
+void au_export_init(struct super_block *sb)
+{
+struct au_sbinfo *sbinfo;
+__u32 u;
+
+BUILD_BUG_ON_MSG(IS_BUILTIN(CONFIG_AUFS_FS)
+& IS_MODULE(CONFIG_EXPORTFS),
/* 
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 */

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 */

/* file and vm operations */

#include <linux/aio.h>
#include <linux/fs_stack.h>
#include <linux/mman.h>
#include <linux/security.h>
#include "aufs.h"

int au_do_open_nondir(struct file *file, int flags, struct file *h_file)
{
    int err;
    aufs_bindex_t bindex;
    struct dentry *dentry, *h_dentry;
    struct au_finfo *finfo;
    struct inode *h_inode;

    /* unsupported configuration */
    "CONFIG_EXPORTFS=m and CONFIG_AUFS_FS=y");
    +
    +sb->s_export_op = &aufs_export_op;
    +sbinfo = au_shi(sb);
    +sbinfo->si_xigen = NULL;
    +get_random_bytes(&u, sizeof(u));
    +BUILD_BUG_ON(sizeof(u) != sizeof(int));
    +atomic_set(&sbinfo->si_xigen_next, u);
    +}

--- linux-4.15.0.orig/fs/aufs/f_op.c
+++ linux-4.15.0/fs/aufs/f_op.c
@@ -0,0 +1,817 @@
+/*
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+ *
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+ *
+ /* file and vm operations */
+ */
+
+/#include <linux/aio.h>
+/#include <linux/fs_stack.h>
+/#include <linux/mman.h>
+/#include <linux/security.h>
+/#include "aufs.h"
+
+int au_do_open_nondir(struct file *file, int flags, struct file *h_file)
+{
+    int err;
+    aufs_bindex_t bindex;
+    struct dentry *dentry, *h_dentry;
+    struct au_finfo *finfo;
+    struct inode *h_inode;
+    +"AUFS_NAME ": unsupported configuration ");
+    +"CONFIG_EXPORTFS=m and CONFIG_AUFS_FS=y");
+    +sb->s_export_op = &aufs_export_op;
+    +sbinfo = au_shi(sb);
+    +sbinfo->si_xigen = NULL;
+    +get_random_bytes(&u, sizeof(u));
+    +BUILD_BUG_ON(sizeof(u) != sizeof(int));
+    +atomic_set(&sbinfo->si_xigen_next, u);
+    +}
+FiMustWriteLock(file);
+
+err = 0;
+dentry = file->f_path.dentry;
+AuDebugOn(IS_ERR_OR_NULL(dentry));
+finfo = au_fi(file);
+memset(&finfo->fi_htop, 0, sizeof(finfo->fi_htop));
+atomic_set(&finfo->fi_mmapped, 0);
+bindex = au_dbttop(dentry);
+if (!h_file) {
+h_dentry = au_h_dptr(dentry, bindex);
+err = vfsub_test_mntns(file->f_path.mnt, h_dentry->d_sb);
+if (unlikely(err))
+    goto out;
+h_file = au_h_open(dentry, bindex, flags, file, /*force_wr*/0);
+} else {
+h_dentry = h_file->f_path.dentry;
+err = vfsub_test_mntns(file->f_path.mnt, h_dentry->d_sb);
+if (unlikely(err))
+    goto out;
+    get_file(h_file);
+}
+if (IS_ERR(h_file))
+    err = PTR_ERR(h_file);
+else {
+    if (flags & __O_TMPFILE)
+        &flags & O_EXCL) {
+h_inode = file_inode(h_file);
+spin_lock(&h_inode->i_lock);
+h_inode->i_state |= I_LINKABLE;
+spin_unlock(&h_inode->i_lock);
+} else
+au_set_fbtop(file, bindex);
+au_set_h_fptr(file, bindex, h_file);
+au_update_figen(file);
+/* todo: necessary? */
+/* file->f_ra = h_file->f_ra; */
+}
+
+return err;
+
+}
+}
+aufs_open_nondir(struct inode *inode __maybe_unused,
+    struct file *file)
+{
+int err;
+struct super_block *sb;
struct au_do_open_args args = {
.open= au_do_open_nondir
+};
+
AuDbg("%pD, f_flags 0x%x, f_mode 0x%x\n",
+ file, vfsub_file_flags(file), file->f_mode);
+
+sb = file->f_path.dentry->d_sb;
+si_read_lock(sb, AuLock_FLUSH);
+err = au_do_open(file, &args);
+si_read_unlock(sb);
+return err;
+
+
int aufs_release_nondir(struct inode *inode __maybe_unused, struct file *file)
+
+struct au_finfo *finfo;
+aufs_bindex_t bindex;
+
+finfo = au_fi(file);
+au_hbl_del(&finfo->fi_hlist,
+ &au_sbi(file->f_path.dentry->d_sb)->si_files);
+bindex = finfo->fi_btop;
+if (bindex >= 0)
+au_set_h_fptr(file, bindex, NULL);
+
+au_finfo_fin(file);
+return 0;
+
+
/* ---------------------------------------------------------------------- */

static int au_do_flush_nondir(struct file *file, fl_owner_t id)
+
+int err;
+struct file *h_file;
+
+err = 0;
+h_file = au_hf_top(file);
+if (h_file)
+err = vfsubFlush(h_file, id);
+return err;
+

static int aufs_flush_nondir(struct file *file, fl_owner_t id)
+
+return au_do_flush(file, id, au_do_flush_nondir);
+}
/* read and write functions acquire [fdi]_rwsem once, but release before
 * mmap_sem. This is because to stop a race condition between mmap(2).
 * Releasing these aufs-rwsem should be safe, no branch-management (by keeping
 * si_rwsem), no harmful copy-up should happen. Actually copy-up may happen in
 * read functions after [fdi]_rwsem are released, but it should be harmless.
 */

/* Callers should call au_read_post() or fput() in the end */

struct file *au_read_pre(struct file *file, int keep_fi, unsigned int lsc)
{
    struct file *h_file;
    int err;

    err = au_reval_and_lock_fdi(file, au_reopen_nondir, /*wlock*/0, lsc);
    if (!err)
    {
        di_read_unlock(file->f_path.dentry, AuLock_IR);
        h_file = au_hf_top(file);
        get_file(h_file);
        if (!keep_fi)
            fi_read_unlock(file);
    } else
    { h_file = ERR_PTR(err);
    }
    return h_file;
}

static void au_read_post(struct inode *inode, struct file *h_file)
{
    /* update without lock, I don't think it a problem */
    fsstack_copy_attr_atime(inode, file_inode(h_file));
    fput(h_file);
}

struct au_write_pre {
    /* input */
    unsigned int lsc;

    /* output */
    blkcnt_t blks;
    aufs_bindex_t btop;
};

/* return with iinfo is write-locked
 * callers should call au_write_post() or iinfo_write_unlock() + fput() in the
static struct file *au_write_pre(struct file *file, int do_ready, struct au_write_pre *wpre)
{
    struct file *h_file;
    struct dentry *dentry;
    int err;
    unsigned int lsc;
    struct au_pin pin;

    lsc = 0;
    if (wpre)
        lsc = wpre->lsc;
    err = au_reval_and_lock_fdi(file, au_reopen_nondir, /*wlock*/1, lsc);
    h_file = ERR_PTR(err);
    if (unlikely(err))
        goto out;

    dentry = file->f_path.dentry;
    if (do_ready) {
        err = au_ready_to_write(file, -1, &pin);
        if (unlikely(err)) {
            h_file = ERR_PTR(err);
            di_write_unlock(dentry);
            goto out_fi;
        }
    }

    di_downgrade_lock(dentry, /*flags*/0);
    if (wpre)
        wpre->btop = au_fbtop(file);
    h_file = auhf_top(file);
    get_file(h_file);
    if (wpre)
        wpre->blks = file_inode(h_file)->i_blocks;
    if (do_ready)
        unpin(&pin);
    di_read_unlock(dentry, /*flags*/0);

out_fi:
    fi_write_unlock(file);
out:
    return h_file;
}

static void au_write_post(struct inode *inode, struct file *h_file, struct au_write_pre *wpre, ssize_t written)
{ + struct inode *h_inode; + + Au_cpup_attr_timesizes(inode); + AuDebugOn(au_ibtop(inode) != wpre->btop); + h_inode = file_inode(h_file); + inode->i_mode = h_inode->i_mode; + ii_write_unlock(inode); /* AuDBG("blks %llu, %llu\n", (u64)blks, (u64)h_inode->i_blocks); */ + if (written > 0) + au_fhsm_wrote(inode->i_sb, wpre->btop, + /*force*/h_inode->i_blocks > wpre->blks); + fput(h_file); + } + + static ssize_t aufs_read(struct file *file, char __user *buf, size_t count, + loff_t *ppos) + { + ssize_t err; + struct inode *inode; + struct file *h_file; + struct super_block *sb; + + inode = file_inode(file); + sb = inode->i_sb; + si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW); + + h_file = au_read_pre(file, /*keep_fi*/0, /*lsc*/0); + err = PTR_ERR(h_file); + if (IS_ERR(h_file)) + goto out; + + /* filedata may be obsoleted by concurrent copyup, but no problem */ + err = vfsub_read_u(h_file, buf, count, ppos); + /* todo: necessary? */ + /* file->f_ra = h_file->f_ra; */ + + au_read_post(inode, h_file); + + out: + si_read_unlock(sb); + return err; + } + + /* + * todo: very ugly + * it locks both of i_mutex and si_rwlock for read in safe. + * if the plink maintenance mode continues forever (that is the problem), + * may loop forever. + */
static void au_mtx_and_read_lock(struct inode *inode) {
    int err;
    struct super_block *sb = inode->i_sb;
    while (1) {
        inode_lock(inode);
        err = si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
        if (!err)
            break;
        inode_unlock(inode);
        si_read_lock(sb, AuLock_NOPLMW);
        si_read_unlock(sb);
    }
}

static ssize_t aufs_write(struct file *file, const char __user *ubuf,
    size_t count, loff_t *ppos) {
    ssize_t err;
    struct au_write_pre wpre;
    struct inode *inode;
    struct file *h_file;
    char __user *buf = (char __user *)ubuf;
    inode = file_inode(file);
    au_mtx_and_read_lock(inode);
    wpre.lsc = 0;
    h_file = au_write_pre(file, /*do_ready*/1, &wpre);
    err = PTR_ERR(h_file);
    if (IS_ERR(h_file))
        goto out;
    err = vfsub_write_u(h_file, buf, count, ppos);
    au_write_post(inode, h_file, &wpre, err);
    out:
    si_read_unlock(inode->i_sb);
    inode_unlock(inode);
    return err;
}

static ssize_t au_do_iter(struct file *h_file, int rw, struct kiocb *kio,
    struct iov_iter *iov_iter) {
    ssize_t err;
...
struct file *file;
size_t (*iter)(struct kiocb *, struct iov_iter *);

err = security_file_permission(h_file, rw);
if (unlikely(err))
goto out;

err = -ENOSYS;
iter = NULL;
if (rw == MAY_READ)
iter = h_file->f_op->read_iter;
else if (rw == MAY_WRITE)
iter = h_file->f_op->write_iter;

file = kio->ki_filp;
file = h_file;
if (iter) {
lockdep_off();
err = iter(kio, iov_iter);
lockdep_on();
}
WARN_ONCE("currently there is no such fs");
file = kio->ki_filp;
++file;
if (iter) {
lockdep_off();
err = iter(kio, iov_iter);
lockdep_on();
}

static ssize_t aufs_read_iter(struct kiocb *kio, struct iov_iter *iov_iter)
{
ssize_t err;
struct file *file, *h_file;
struct inode *inode;
struct super_block *sb;

file = kio->ki_filp;
inode = file_inode(file);
if (iter) {
lockdep_off();
err = iter(kio, iov_iter);
lockdep_on();
}

si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW);

if (IS_ERR(h_file))
goto out;

au_warn_loopback(h_file->f_path.dentry->d_sb);
if (file->f_mapping != h_file->f_mapping) {
    file->f_mapping = h_file->f_mapping;
    smp_mb(); /* unnecessary? */
}

fi_read_unlock(file);
+
+err = au_do_iter(h_file, MAY_READ, kio, iov_iter);
+/* todo: necessary? */
+/* file->f_ra = h_file->f_ra; */
+au_read_post(inode, h_file);
+
+out:
+si_read_unlock(sb);
+return err;
+
+static ssize_t aufs_write_iter(struct kiocb *kio, struct iov_iter *iov_iter)
+{
    ssize_t err;
    struct au_write_pre wpre;
    struct inode *inode;
    struct file *file, *h_file;
    
    file = kio->ki_filp;
    inode = file_inode(file);
    
    wpre.lsc = 0;
    h_file = au_write_pre(file, /*do_ready*/1, &wpre);
    err = PTR_ERR(h_file);
    if (IS_ERR(h_file))
        goto out;
    
    err = au_do_iter(h_file, MAY_WRITE, kio, iov_iter);
    au_write_post(inode, h_file, &wpre, err);
    
    out:
+si_read_unlock(inode->i_sb);
+inode_unlock(inode);
+return err;
+
+static ssize_t aufs_splice_read(struct file *file, loff_t *ppos,
+struct pipe_inode_info *pipe, size_t len,
+unsigned int flags)
+{
    ssize_t err;

struct file *h_file;
struct inode *inode;
struct super_block *sb;

inode = file_inode(file);

sb = inode->i_sb;

si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW);

h_file = au_read_pre(file, /*keep_fi*/0, /*lsc*/0);

err = PTR_ERR(h_file);

if (IS_ERR(h_file))
    goto out;

err = vfsub_splice_to(h_file, ppos, pipe, len, flags);

/* todo: necessary? */
/* file->f_ra = h_file->f_ra; */
au_read_post(inode, h_file);

out:

si_read_unlock(sb);

return err;

static ssize_t
aufs_splice_write(struct pipe_inode_info *pipe, struct file *file, loff_t *ppos,
   size_t len, unsigned int flags)
{
    ssize_t err;
    struct au_write_pre wpre;
    struct inode *inode;
    struct file *h_file;

    inode = file_inode(file);

    mtx_and_read_lock(inode);

    wpre.lsc = 0;
    h_file = au_write_pre(file, /*do_ready*/1, &wpre);
    err = PTR_ERR(h_file);
    if (IS_ERR(h_file))
        goto out;

    err = vfsub_splice_from(pipe, h_file, ppos, len, flags);
    au_write_post(inode, h_file, &wpre, err);

out:

    si_read_unlock(inode->i_sb);
    inode_unlock(inode);

    return err;

    +struct file *h_file;
    +struct inode *inode;
    +struct super_block *sb;
    +
    +inode = file_inode(file);
    +sb = inode->i_sb;
    +si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW);
    +
    +h_file = au_read_pre(file, /*keep_fi*/0, /*lsc*/0);
    +err = PTR_ERR(h_file);
    +if (IS_ERR(h_file))
    +goto out;
    +
    +err = vfsub_splice_to(h_file, ppos, pipe, len, flags);
    +/* todo: necessasry? */
    +/* file->f_ra = h_file->f_ra; */
    +au_read_post(inode, h_file);
    +
    +out:
    +si_read_unlock(sb);
    +return err;
    +
    +static ssize_t
    +aufs_splice_write(struct pipe_inode_info *pipe, struct file *file, loff_t *ppos,
    + size_t len, unsigned int flags)
    +{
    +    ssize_t err;
    +    struct au_write_pre wpre;
    +    struct inode *inode;
    +    struct file *h_file;
    +
    +    inode = file_inode(file);
    +    au_mtx_and_read_lock(inode);
    +
    +    wpre.lsc = 0;
    +    h_file = au_write_pre(file, /*do_ready*/1, &wpre);
    +    err = PTR_ERR(h_file);
    +    if (IS_ERR(h_file))
    +        goto out;
    +
    +    err = vfsub_splice_from(pipe, h_file, ppos, len, flags);
    +    au_write_post(inode, h_file, &wpre, err);
    +
    +out:
    +si_read_unlock(inode->i_sb);
    +inode_unlock(inode);
    +return err;
+static long aufs_fallocate(struct file *file, int mode, loff_t offset, 
+  loff_t len)
+{
+  long err;
+  struct au_write_pre wpre;
+  struct inode *inode;
+  struct file *h_file;
+ _inode = file_inode(file);
+  au_mtx_and_read_lock(inode);
+  wpre.lsc = 0;
+  h_file = au_write_pre(file, /*do_ready*/1, &wpre);
+  err = PTR_ERR(h_file);
+  if (IS_ERR(h_file))
+    goto out;
+  lockdep_off();
+  err = vfs_fallocate(h_file, mode, offset, len);
+  lockdep_on();
+  au_write_post(inode, h_file, &wpre, /*written*/1);
+ out:
+  si_read_unlock(inode->i_sb);
+  inode_unlock(inode);
+  return err;
+
+static ssize_t aufs_copy_file_range(struct file *src, loff_t src_pos, 
+    struct file *dst, loff_t dst_pos, 
+    size_t len, unsigned int flags)
+{
+  ssize_t err;
+  struct au_write_pre wpre;
+  enum { SRC, DST };
+  struct {
+    struct inode *inode;
+    struct file *h_file;
+    struct super_block *h_sb;
+  } a[2];
+  define a_src[SRC]
+  define a_dst[DST]
+  err = -EINVAL;
+  a_src.inode = file_inode(src);
+  if (unlikely(!S_ISREG(a_src.inode->i_mode)))
+goto out;
+a_dst.inode = file_inode(dst);
+if (unlikely(!S_ISREG(a_dst.inode->i_mode)))
+goto out;
+
aux_mtx_and_read_lock(a_dst.inode);
+/*
+ * in order to match the order in di_write_lock2_{child,parent}(),
+ * use f_path.dentry for this comparision.
+ */
+if (src->f_path.dentry < dst->f_path.dentry) {
+a_src.h_file = au_read_pre(src, /*keep_fi*/1, AuxLsc_FL_1);
+err = PTR_ERR(a_src.h_file);
+if (IS_ERR(a_src.h_file))
+goto out_si;
+
+wpre.lsc = AuxLsc_FL_2;
+a_dst.h_file = au_write_pre(dst, /*do_ready*/1, &wpre);
+err = PTR_ERR(a_dst.h_file);
+if (IS_ERR(a_dst.h_file))
+au_read_post(a_src.inode, a_src.h_file);
+goto out_si;
+}
+} else {
+wpre.lsc = AuxLsc_FL_1;
+a_dst.h_file = au_write_pre(dst, /*do_ready*/1, &wpre);
+err = PTR_ERR(a_dst.h_file);
+if (IS_ERR(a_dst.h_file))
+au_read_post(a_src.inode, a_dst.h_file);
+goto out_si;
+
+a_src.h_file = au_read_pre(src, /*keep_fi*/1, AuxLsc_FL_2);
+err = PTR_ERR(a_src.h_file);
+if (IS_ERR(a_src.h_file))
+au_write_post(a_dst.inode, a_dst.h_file, &wpre,
+  /*written*/0);
+goto out_si;
+}
+
+err = -EXDEV;
+a_src.h_sb = file_inode(a_src.h_file)->i_sb;
+a_dst.h_sb = file_inode(a_dst.h_file)->i_sb;
+if (unlikely(a_src.h_sb != a_dst.h_sb)) {
+AuDbgFile(src);
+AuDbgFile(dst);
+goto out_file;
+}
+}
err = vfsub_copy_file_range(a_src.h_file, src_pos, a_dst.h_file,
  dst_pos, len, flags);
+
+out_file:
+au_write_post(a_dst.inode, a_dst.h_file, &wpre, err);
+fi_read_unlock(src);
+au_read_post(a_src.inode, a_src.h_file);
+out_si:
+si_read_unlock(a_dst.inode->i_sb);
+inode_unlock(a_dst.inode);
+out:
+return err;
+#undef a_src
+#undef a_dst
+
+/* The locking order around current->mmap_sem.
+ * - in most and regular cases
+ *   file I/O syscall -- aufs_read() or something
+ *   -- si_rwsem for read -- mmap_sem
+ *   (Note that [fdi]i_rwsem are released before mmap_sem).
+ * - in mmap case
+ *   mmap(2) -- mmap_sem -- aufs_mmap() -- si_rwsem for read -- [fdi]i_rwsem
+ *   This AB-BA order is definitely bad, but is not a problem since "si_rwsem for
+ *   read" allows multiple processes to acquire it and [fdi]i_rwsem are not held in
+ *   file I/O. Aufs needs to stop lockdep in aufs_mmap() though.
+ * It means that when aufs acquires si_rwsem for write, the process should never
+ * acquire mmap_sem.
+ *
+ * Actually aufs_iterate() holds [fdi]i_rwsem before mmap_sem, but this is not a
+ * problem since any directory is not able to be mmap-ed.
+ */
+/* stop calling security_file_mmap() */
+/* cf. linux/include/linux/mman.h: calc_vm_prot_bits() */
+#define AuConv_VM_PROT(f, b)_calc_vm_trans(f, VM_##b, PROT_##b)
+
+static unsigned long au_arch_prot_conv(unsigned long flags)
+{ /* currently ppc64 only */
+#ifdef CONFIG_PPC64
+/* cf. linux/arch/powerpc/include/asm/mman.h */
+AuDebugOn(arch_calc_vm_prot_bits(-1) != VM_SAO);
+return AuConv_VM_PROT(flags, SAO);
+\#else
+AuDebugOn(arch_calc_vm_prot_bits(-1));
+return 0;
+\#endif
+
+static unsigned long au_prot_conv(unsigned long flags)
+{
+\+return AuConv_VM_PROT(flags, READ)
+\+AuConv_VM_PROT(flags, WRITE)
+\+AuConv_VM_PROT(flags, EXEC)
+\+au_arch_prot_conv(flags);
+}
+
+static unsigned long au_flag_conv(unsigned long flags)
+{
+\return AuConv_VM_MAP(flags, GROWSDOWN)
+\AuConv_VM_MAP(flags, DENYWRITE)
+\AuConv_VM_MAP(flags, LOCKED);
+}
+\#endif
+
+static int aufs_mmap(struct file *file, struct vm_area_struct *vma)
+{
+\int err;
+\const unsigned char wlock
+\= (file->f_mode & FMODE_WRITE) && (vma->vm_flags & VM_SHARED);
+\struct super_block *sb;
+\struct file *h_file;
+\struct inode *inode;
+
+AuDbgVmRegion(file, vma);
+
+inode = file_inode(file);
+sb = inode->i_sb;
+lockdep_off();
+si_read_lock(sb, AuLock_NOPLMW);
+
+h_file = au_write_pre(file, wlock, /*wpre*/NULL);
+lockdep_on();
+err = PTR_ERR(h_file);
+if (IS_ERR(h_file))
+goto out;
+
+err = 0;
+au_set_mmapped(file);
+au_vm_file_reset(vma, h_file);
+/
+ * we cannot call security_mmap_file() here since it may acquire
+ * mmap_sem or i_mutex.
+ *
+ * err = security_mmap_file(h_file, au_prot_conv(vma->vm_flags),
+ * au_flag_conv(vma->vm_flags));
+ */
+if (!err)
+err = call_mmap(h_file, vma);
+if (!err) {
+tau_vm_profile_set(vma, file);
+fsstack_copy_attr_atime(inode, file_inode(h_file));
+goto out_fput; /* success */
+}
+au_unset_mmapped(file);
+au_vm_file_reset(vma, file);
+
+out_fput:
+lockdep_off();
+i_write_unlock(inode);
+lockdep_on();
+fput(h_file);
+out:
+lockdep_off();
+si_read_unlock(sb);
+lockdep_on();
+AuTraceErr(err);
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+static int aufs_fsync_nondir(struct file *file, loff_t start, loff_t end,
+    int datasync)
+{
+    int err;
+    struct au_write_pre wpre;
+    struct inode *inode;
+    struct file *h_file;
+
+    err = 0; /* -EBADF; */ /* posix? */
+    if (unlikely(!(file->f_mode & FMODE_WRITE))
+        goto out;
+    
+    /* ------------------------------- */
+    
+    static int aufs_fsync_nondir(struct file *file, loff_t start, loff_t end,
+        int datasync)
+    {
+        int err;
+        struct au_write_pre wpre;
+        struct inode *inode;
+        struct file *h_file;
+
+        err = 0; /* -EBADF; */ /* posix? */
+        if (unlikely(!(file->f_mode & FMODE_WRITE))
+            goto out;
+        
+        inode = file_inode(file);
+        au_mtx_and_read_lock(inode);
+ wpre.lsc = 0;
+ h_file = au_write_pre(file, /*do_ready*/1, &wpre);
+ err = PTR_ERR(h_file);
+ if (IS_ERR(h_file))
+ goto out_unlock;
+ err = vfsync(h_file, &h_file->f_path, datasync);
+ au_write_post(inode, h_file, &wpre, /*written*/0);
+ out_unlock:
+ si_read_unlock(inode->i_sb);
+ inode_unlock(inode);
+ out:
+ return err;
+
+ static int aufs_fasync(int fd, struct file *file, int flag)
+ {
+ int err;
+ struct file *h_file;
+ struct super_block *sb;
+ sb = file->f_path.dentry->d_sb;
+ si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW);
+ h_file = au_read_pre(file, /*keep_fi*/0, /*lsc*/0);
+ err = PTR_ERR(h_file);
+ if (IS_ERR(h_file))
+ goto out;
+ if (h_file->f_op->fasync)
+ err = h_file->f_op->fasync(fd, h_file, flag);
+ fput(h_file); /* instead of au_read_post() */
+ out:
+ si_read_unlock(sb);
+ return err;
+ }
+
+ static int aufs_setfio(struct file *file, unsigned long arg)
+ {
+ int err;
+ struct file *h_file;
+ struct super_block *sb;
+ sb = file->f_path.dentry->d_sb;
+ si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW);
+h_file = au_read_pre(file, /*keep_fi*/0, /*lsc*/0);
+err = PTR_ERR(h_file);
+if (IS_ERR(h_file))
+goto out;
+
+/* stop calling h_file->fasync */
+arg |= vsub_file_flags(file) & FASYNC;
+err = setfl(/*unused fd*/-1, h_file, arg);
+fput(h_file); /* instead of au_read_post */
+
+out:
+si_read_unlock(sb);
+return err;
+
+/* no one supports this operation, currently */
+#if 0
+static ssize_t aufs_sendpage(struct file *file, struct page *page, int offset,
+size_t len, loff_t *pos, int more)
+{
+}
+}
+#endif
+
+const struct file_operations aufs_file_fop = {
+.owner = THIS_MODULE,
+.llseek = default_llseek,
+.read = aufs_read,
+.write = aufs_write,
+.read_iter = aufs_read_iter,
+.write_iter = aufs_write_iter,
+
+#ifdef CONFIG_AUFS_POLL
+.poll = aufs_poll,
+#endif
+.unlocked_ioctl = aufs_ioctl_nondir,
+#ifdef CONFIG_COMPAT
+.compat_ioctl = aufs_compat_ioctl_nondir,
+#endif
+.mmap = aufs_mmap,
+.open = aufs_open_nondir,
+.flush = aufs_flush_nondir,
+.release= aufs_release_nondir,
+.fsync= aufs_fsync_nondir,
+.fasync= aufs_fasync,
+/* .sendpage= aufs_sendpage, */
+.setfl= aufs_setfl,
+.splice_write= aufs_splice_write,
+.splice_read= aufs_splice_read,
+if 0
+.aio_splice_write = aufs_aio_splice_write,
+.aio_splice_read  = aufs_aio_splice_read,
+endif
+.fallocate= aufs_fallocate,
+.copy_file_range = aufs_copy_file_range
+};

--- linux-4.15.0.orig/fs/aufs/fhsm.c
+++ linux-4.15.0/fs/aufs/fhsm.c
@@ -0,0 +1,426 @@
+/*
+ * Copyright (C) 2011-2017 Junjiro R. Okajima
+ */
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program; if not, write to the Free Software
+ * Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA
+ */
+ *
+/*
+ * File-based Hierarchy Storage Management
+ */
+
+static aufs_bindex_t au_fhsm_bottom(struct super_block *sb)
+{
+struct au_sbinfo *sbinfo;
+struct au_fhsm *fhsm;
+
+SiMustAnyLock(sb);
+
+sbinfo = au_shi(sb);
+fhsm = &sbinfo->si_fhsm;
+AuDebugOff(!fhsm);
+return fhsm->fhsm_bottom;
+
+void au_fhsm_set_bottom(struct super_block *sb, aufs_bindex_t bindex)
+{
+struct au_sbinfo *sbinfo;
+struct au_fhsm *fhsm;
+
+SiMustWriteLock(sb);
+
+sbinfo = au_shi(sb);
+fhsm = &sbinfo->si_fhsm;
+AuDebugOff(!fhsm);
+fhsm->fhsm_bottom = bindex;
+
+/* .............................................................. */
+
+static int au_fhsm_test_jiffy(struct au_sbinfo *sbinfo, struct au_branch *br)
+{
+struct au_br_fhsm *bf;
+
+bf = br->br_fhsm;
+MtxMustLock(&bf->bf_lock);
+
+return !bf->bf_readable
+|| time_after(jiffies,
+    bf->bf_jiffy + sbinfo->si_fhsm.fhsm_expire);
+
+/* .............................................................. */
+
+static void au_fhsm_notify(struct super_block *sb, int val)
+{
+struct au_sbinfo *sbinfo;
+struct au_fhsm *fhsm;
+
+SiMustAnyLock(sb);
+
+sbinfo = au_shi(sb);
+fhsm = &sbinfo->si_fhsm;
+if (au_fhsm_pid(fhsm)
+   && atomic_read(&fhsm->fhsm_readable) != -1) {
+atomic_set(&fhsm->fhsm_readable, val);
+if (val)
+wake_up(&fhsm->fhsm_wqh);
+
+}
+
+static int au_fhsm_stfs(struct super_block *sb, aufs_bindex_t bindex,
+struct aufs_stfs *rstfs, int do_lock, int do_notify)
+{
+int err;
+struct au_branch *br;
+struct au_br_fhsm *bf;
+
+br = au_sbr(sb, bindex);
+AuDebugOn(au_br_rdonly(br));
+bf = br->br_fhsm;
+AuDebugOn(!bf);
+
+if (do_lock)
+mutex_lock(&bf->bf_lock);
+else
+MtxMustLock(&bf->bf_lock);
+
+/* sb->s_root for NFS is unreliable */
+err = au_br_stfs(br, &bf->bf_stfs);
+if (unlikely(err)) {
+AuErr1("FHSM failed (%d), b%d, ignored.", bindex, err);
+goto out;
+
+}
+
+bf->bf_jiffy = jiffies;
+bf->bf_readable = 1;
+if (do_notify)
+au_fhsm_notify(sb, /*val*/1);
+if (rstfs)
+*rstfs = bf->bf_stfs;
+
+out:
+if (do_lock)
+mutex_unlock(&bf->bf_lock);
+au_fhsm_notify(sb, /*val*/1);
+
+return err;
+
+
+}
+
+void au_fhsm_wrote(struct super_block *sb, aufs_bindex_t bindex, int force)
+{ int err;
+struct au_sbiinfo *sinfo;
+struct au_fhsm *fhsm;
+struct au_branch *br;
+struct au_br_fhsm *bf;
+
+AuDbg("b%d, force %d\n", bindex, force);
+SiMustAnyLock(sb);
+
+sinfo = au_sbi(sb);
+fhsm = &sinfo->si_fhsm;
+if (!au_ftest_si(sinfo, FHSM)
+    || fhsm->fhsm_bottom == bindex)
+    return;
+
+br = au_sbr(sb, bindex);
+bf = br->br_fhsm;
+AuDebugOn(!bf);
+mutex_lock(&bf->bf_lock);
+if (force
+    || au_fhsm_pid(fhsm)
+    || au_fhsm_test_jiffy(sinfo, br))
+    err = au_fhsm_stfs(sb, bindex, /*rstfs*/NULL, /*do_lock*/0,
+        /*do_notify*/1);
+    mutex_unlock(&bf->bf_lock);
+} } 

+void au_fhsm_wrote_all(struct super_block *sb, int force)
+{ 
aufs_bindex_t bindex, bbot;
+struct au_branch *br;
+
+/* exclude the bottom */
+bbot = au_fhsm_bottom(sb);
+for (bindex = 0; bindex < bbot; bindex++) {
+    br = au_sbr(sb, bindex);
+    if (au_br_fhsm(br->br_perm))
+        au_fhsm_wrote(sb, bindex, force);
+}
+
+/* ----------------------------------------------- */
+
+static unsigned int au_fhsm_poll(struct file *file,
+    struct poll_table_struct *wait)
+{ 
+    unsigned int mask;
+struct au_sbinfo *sbinfo;
+struct au_fhsm *fhsm;
+
+mask = 0;
+sbinfo = file->private_data;
+fhsm = &sbinfo->si_fhsm;
+poll_wait(file, &fhsm->fhsm_wqh, wait);
+if (atomic_read(&fhsm->fhsm_readable))
+mask = POLLIN /* | POLLRDNORM */;
+
+AuTraceErr((int)mask);
+return mask;
+}
+
+static int au_fhsm_do_read_one(struct aufs_stbr __user *stbr,
+struct aufs_stfs *stfs, __s16 brid)
+{
+int err;
+
+err = copy_to_user(&stbr->stfs, stfs, sizeof(*stfs));
+if (!err)
+err = __put_user(brid, &stbr->brid);
+if (unlikely(err))
+err = -EFAULT;
+
+return err;
+}
+
+static ssize_t au_fhsm_do_read(struct super_block *sb,
+struct aufs_stbr __user *stbr, size_t count)
+{
+ssize_t err;
+int nstbr;
+aufs_bindex_t bindex, bbot;
+struct au_branch *br;
+struct au_br_fhsm *bf;
+
+/* except the bottom branch */
+err = 0;
+nstbr = 0;
+bbot = au_fhsm_bottom(sb);
+for (bindex = 0; !err && bindex < bbot; bindex++)
+{ br = au_sbr(sb, bindex);
+if (!au_br_fhsm(br->br_perm))
+continue;
+
+bf = br->br_fhsm;
+mutex_lock(&bf->bf_lock);
if (bf->bf_readable) {
    err = -EFAULT;
    if (count >= sizeof(*stbr))
        err = au_fhsm_do_read_one(stbr++, &bf->bf_stfs,
            + br->br_id);
    if (!err) {
        bf->bf_readable = 0;
        count -= sizeof(*stbr);
        nstbr++;
    }
    mutex_unlock(&bf->bf_lock);
} +
if (!err)
    err = sizeof(*stbr) * nstbr;
+
return err;
+
static ssize_t au_fhsm_read(struct file *file, char __user *buf, size_t count,
    loff_t *pos)
{
    ssize_t err;
    int readable;
    aufs_bindex_t nfhsm, bindex, bbot;
    struct au_sbinfo *sbinfo;
    struct au_fhsm *fhsm;
    struct au_branch *br;
    struct super_block *sb;
    
    err = 0;
    sbinfo = file->private_data;
    fhsm = &sbinfo->si_fhsm;

    need_data:
    spin_lock_irq(&fhsm->fhsm_wqh.lock);
    if (!atomic_read(&fhsm->fhsm_readable)) {
        if (vfsub_file_flags(file) & O_NONBLOCK)
            err = -EAGAIN;
        else
            err = wait_event_interruptible_locked_irq
                (fhsm->fhsm_wqh,
                atomic_read(&fhsm->fhsm_readable));
    }
    spin_unlock_irq(&fhsm->fhsm_wqh.lock);
    if (unlikely(err))
        goto out;
    /* sb may already be dead */
+au_rwlock_lock(&sbinfo->si_rwlock);
+readable = atomic_read(&fhsm->fhsm_readable);
+if (readable > 0) {
+  sb = sbinfo->si_sb;
+  AuDebugOn(sb);
+  /* exclude the bottom branch */
+  nfhsm = 0;
+  bbott = au_fhsm_bottom(sb);
+  for (bindex = 0; bindex < bbott; bindex++) {
+    br = au_sbr(sb, bindex);
+    if (au_br_fhsm(br->br_perm))
+      nfhsm++;
+  }
+  err = -EMSGSIZE;
+  if (nfhsm * sizeof(struct aufs_stbr) <= count) {
+    atomic_set(&fhsm->fhsm_readable, 0);
+    err = au_fhsm_do_read(sbinfo->si_sb, (void __user *)buf,
+      count);
+  }
+  +}
+  +}
+au_rwlock_unlock(&sbinfo->si_rwlock);
+if (!readable)
+  goto need_data;
+
+out:
+  return err;
+}
+}
+static int au_fhsm_release(struct inode *inode, struct file *file)
+{
+  struct au_sbinfo *sbinfo;
+  struct au_fhsm *fhsm;
+  /* sb may already be dead */
+  sbinfo = file->private_data;
+  fhsm = &sbinfo->si_fhsm;
+  spin_lock(&fhsm->fhsm_spin);
+  fhsm->fhsm_pid = 0;
+  spin_unlock(&fhsm->fhsm_spin);
+  kobject_put(&sbinfo->si_kobj);
+  return 0;
+}
+}
+static const struct file_operations au_fhsm_fops = {
+  .owner		= THIS_MODULE,
+  .llseek		= noop_llseek,
+  .read		= au_fhsm_read,
+ .poll= au_fhsm_poll,
+ .release= au_fhsm_release
+ ;
+
+ int au_fhsm_fd(struct super_block *sb, int oflags)
+ {
+ int err, fd;
+ struct au_sbiinfo *sinfo;
+ struct au_fhsm *fhsm;
+ 
+ err = -EPERM;
+ if (unlikely(!capable(CAP_SYS_ADMIN)))
+ goto out;
+ 
+ err = -EINVAL;
+ if (unlikely(oflags & ~(O_CLOEXEC | O_NONBLOCK)))
+ goto out;
+ 
+ err = 0;
+ sinfo = au_sbi(sb);
+ fhsm = &sinfo->si_fhsm;
+ spin_lock(&fhsm->fhsm_spin);
+ if (!fhsm->fhsm_pid)
+ fhsm->fhsm_pid = current->pid;
+ else
+ err = -EBUSY;
+ spin_unlock(&fhsm->fhsm_spin);
+ if (unlikely(err))
+ goto out;
+ 
+ oflags |= O_RDONLY;
+ /* oflags |= FMODE_NONOTIFY; */
+ fd = anon_inode_getfd("[aufs_fhsm]", &au_fhsm_fops, sinfo, oflags);
+ err = fd;
+ if (unlikely(fd < 0))
+ goto out_pid;
+
+ /* succeed reglardless 'fhsm' status */
+ kobject_get(&sinfo->si_kobj);
+ si_noflush_read_lock(sb);
+ if (au_ftest_si(sinfo, FHSM))
+ au_fhsm_wrote_all(sb, /*force*/0);
+ si_read_unlock(sb);
+ goto out; /* success */
+
+ out_pid:
+ spin_lock(&fhsm->fhsm_spin);
+ fhsm->fhsm_pid = 0;
+spin_unlock(&fhsm->fhsm_spin);
+out:
+AuTraceErr(err);
+return err;
+
+/* ----------------------------------------------- */
+
+int au_fhsm_br_alloc(struct au_branch *br)
+{
+int err;
+
+err = 0;
+br->br_fhsm = kmalloc(sizeof(*br->br_fhsm), GFP_NOFS);
+if (br->br_fhsm)
+au_br_fhsm_init(br->br_fhsm);
+else
+err = -ENOMEM;
+
+return err;
+
+/* ----------------------------------------------- */
+
+void au_fhsm_fin(struct super_block *sb)
+{
+au_fhsm_notify(sb, /*val*/-1);
+
+void au_fhsm_init(struct au_sbinfo *sbinfo)
+{
+struct au_fhsm *fhsm;
+
+fhsm = &sbinfo->si_fhsm;
+spin_lock_init(&fhsm->fhsm_spin);
+init_waitqueue_head(&fhsm->fhsm_wqh);
+atomic_set(&fhsm->fhsm_readable, 0);
+fhsm->fhsm_expire
+  = msecs_to_jiffies(AUFS_FHSM_CACHE_DEF_SEC * MSEC_PER_SEC);
+fhsm->fhsm_bottom = -1;
+
+void au_fhsm_set(struct au_sbinfo *sbinfo, unsigned int sec)
+{
+sbinfo->si_fhsm.fhsm_expire
+  = msecs_to_jiffies(sec * MSEC_PER_SEC);
+
+}
+void au_fhsm_show(struct seq_file *seq, struct au_sbinfo *sbinfo)
+{
+unsigned int u;
+
+if (!au_ftest_si(sbinfo, FHSM))
+return;
+
+u = jiffies_to_msecs(sbinfo->si_fhsm.fhsm_expire) / MSEC_PER_SEC;
+if (u != AUFS_FHSM_CACHE_DEF_SEC)
+seq_printf(seq, ",fhsm_sec=%u", u);
+}

--- linux-4.15.0.orig/fs/aufs/file.c
+++ linux-4.15.0/fs/aufs/file.c
@@ -0,0 +1,856 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+*/
+
+/* handling file/dir, and address_space operation
+*/
+
+#ifdef CONFIG_AUFS_DEBUG
+#+include <linux/migrate.h>
+#+endif
+#+include <linux/pagemap.h>
+#+include "aufs.h"
+
+/* drop flags for writing */
+unsigned int au_file_roflags(unsigned int flags)
+{
+flags &= ~(O_WRONLY | O_RDWR | O_APPEND | O_CREAT | O_TRUNC);
+flags |= O_RDONLY | O_NOATIME;
+return flags;
+}
/+ common functions to regular file and dir */
+struct file *au_h_open(struct dentry *dentry, aufs_bindex_t bindex, int flags,
+    struct file *file, int force_wr)
+{
+    struct file *h_file;
+    struct dentry *h_dentry;
+    struct inode *h_inode;
+    struct super_block *sb;
+    struct au_branch *br;
+    struct path h_path;
+    int err;
+
+    /* a race condition can happen between open and unlink/rmdir */
+    h_file = ERR_PTR(-ENOENT);
+    h_dentry = au_h_dptr(dentry, bindex);
+    if (au_test_nfsd() && (!h_dentry || d_is_negative(h_dentry)))
+        goto out;
+    h_inode = d_inode(h_dentry);
+    spin_lock(&h_dentry->d_lock);
+    err = (!d_unhashed(dentry) && d_unlinked(h_dentry))
+        || !d_inode(dentry)->i_nlink;
+    spin_unlock(&h_dentry->d_lock);
+    if (unlikely(err))
+        goto out;
+
+    sb = dentry->d_sb;
+    br = au_sbr(sb, bindex);
+    err = au_br_test_oflag(flags, br);
+    h_file = ERR_PTR(err);
+    if (unlikely(err))
+        goto out;
+
+    /* drop flags for writing */
+    if (au_test_ro(sb, bindex, d_inode(dentry))) {
+        if (force_wr && !(flags & O_WRONLY))
+            force_wr = 0;
+        flags = au_file_roflags(flags);  
+        if (force_wr) {
+            h_file = ERR_PTR(-EROFS);
+            flags = au_file_roflags(flags);
+            if (unlikely(vfsub_native_ro(h_inode)
+                || IS_APPEND(h_inode)))
+                goto out;
+            flags &= ~O_ACCMODE;
+            flags |= O_WRONLY;
+        }
+    }
flags &= ~O_CREAT;
au_br_get(br);

flags &= ~O_CREAT;
au_br_get(br);

h_path.dentry = h_dentry;
h_path.mnt = au_br_mnt(br);
h_file = vfsub_dentry_open(&h_path, flags);
if (IS_ERR(h_file))
goto out_br;
+
if (flags & __FMODE_EXEC) {
err = deny_write_access(h_file);
if (unlikely(err)) {
    fput(h_file);
h_file = ERR_PTR(err);
goto out_br;
}
+
fsnotify_open(h_file);
goto out; /* success */
+
out_br:
au_br_put(br);
out:
return h_file;
+
static int au_cmoo(struct dentry *dentry)
{
int err, cmoo, matched;
unsigned int udba;
struct path h_path;
struct au_pin pin;
struct au_cp_generic cpg = {
    .dentry= dentry,
    .bdst= -1,
    .bsrc= -1,
    .len= -1,
    .pin= &pin,
    .flags= AuCpup_DTIME | AuCpup_HOPEN
};
struct inode *delegated;
struct super_block *sb;
struct au_sbinfo *sbinfo;
struct au_fhsm *fhsm;
pid_t pid;
struct au_branch *br;
struct dentry *parent;
struct au_hinode *hdir;
+DiMustWriteLock(dentry);
+DiMustWriteLock(d_inode(dentry));
+
+err = 0;
+if (!IS_ROOT(dentry))
+goto out;
+cpg.bsrc = au_dbtop(dentry);
+if (!cpg.bsrc)
+goto out;
+
+sb = dentry->d_sb;
+sbinfo = au_sbi(sb);
+fhsms = &sbinfo->si_fhsms;
+pid = au_fhsms_pid(fhsms);
+rcu_read_lock();
+matched = (pid
+ & & (current->pid == pid
+ || rcu_dereference(current->real_parent)->pid == pid));
+rcu_read_unlock();
+if (matched)
+goto out;
+
+br = au_sbr(sb, cpg.bsrc);
+cmmo = au_br_cmoo(br->br_perm);
+if (!cmmo)
+goto out;
+if (!d_is_reg(dentry))
+cmmo &= AuBrAttr_COO_ALL;
+if (!cmmo)
+goto out;
+
+parent = dget_parent(dentry);
+di_write_lock_parent(parent);
+err = au_wbr_do_copyup_bu(dentry, cpg.bsrc - 1);
+cpg.bdst = err;
+if (unlikely(err < 0)) {
+err = 0;/* there is no upper writable branch */
+goto out_dgrade;
+}
+AuDbg("bsrc %d, bdst %d\n", cpg.bsrc, cpg.bdst);
+
+/* do not respect the coo attrib for the target branch */
+err = au_cpup_dirs(dentry, cpg.bdst);
+if (unlikely(err))
+goto out_dgrade;
+
+di downgrade_lock(parent, AuLock_IR);
+udba = au_opt_udba(sb);
+err = au_pin(&pin, dentry, cpg.bdst, udba,
+    AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (unlikely(err))
+goto out_parent;
+
+err = au_sio_cpup_simple(&cpg);
+au_unpin(&pin);
+if (unlikely(err))
+goto out_parent;
+
+if (!(cmoo & AuBrWAttr_MOO))
+goto out_parent; /* success */
+
+err = au_pin(&pin, dentry, cpg.bsrc, udba,
+    AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (unlikely(err))
+goto out_parent;
+
+h_path.mnt = au_br_mnt(br);
+h_path.dentry = au_h_dptr(dentry, cpg.bsrc);
+hidir = au_hi(d_inode(parent), cpg.bsrc);
+delegated = NULL;
+err = vfsub_unlink(hdir->hi_inode, &h_path, &delegated, /*force*/1);
+au_unpin(&pin);
+/* todo: keep h_dentry or not? */
+if (unlikely(err == -EWOULDBLOCK)) {
+    pr_warn("cannot retry for NFSv4 delegation"
+        " for an internal unlink\n");
+    iput(delegated);
+    } else {
+    pr_err("unlink %pd after coo failed (%d), ignored\n",
+        dentry, err);
+    err = 0;
+    }
+goto out_parent; /* success */
+
+out_dgrade:
+di_downgrade_lock(parent, AuLock_IR);
+out_parent:
+di_read_unlock(parent, AuLock_IR);
+dput(parent);
+out:
+AuTraceErr(err);
+return err;
+
+int au_do_open(struct file *file, struct au_do_open_args *args)
# File Management in Open Source Used In 5GaaS Edge

```c
int err, aopen = args->aopen;
struct dentry *dentry;
struct au_finfo *finfo;

if (!aopen)
    err = au_finfo_init(file, args->fidir);
else {
    lockdep_off();
    err = au_finfo_init(file, args->fidir);
    lockdep_on();
}
if (unlikely(err))
    goto out;

dentry = file->f_path.dentry;
AuDebugOn(IS_ERR_OR_NULL(dentry));
di_write_lock_child(dentry);
err = au_cmoo(dentry);
di_downgrade_lock(dentry, AuLock_IR);
if (!err) {
    if (!aopen)
        err = args->open(file, vfsub_file_flags(file), NULL);
    else {
        lockdep_off();
        err = args->open(file, vfsub_file_flags(file), NULL);
        lockdep_on();
    }
}
+di_read_unlock(dentry, AuLock_IR);

finfo = au_fi(file);
if (!err) {
    finfo->fi_file = file;
    au_hbl_add(&finfo->fi_hlist,
            &au_sbi(file->f_path.dentry->d_sb)->si_files);
    if (!aopen)
        fi_write_unlock(file);
    else {
        lockdep_off();
        fi_write_unlock(file);
        lockdep_on();
    }
    if (unlikely(err)) {
        finfo->fi_hdir = NULL;
        au_finfo_fin(file);
    }
    +fi_write_unlock(file);
} else {
    lockdep_off();
    fi_write_unlock(file);
    lockdep_on();
    if (unlikely(err)) {
        finfo->fi_hdir = NULL;
        au_finfo_fin(file);
    }
}```
+ out:
+ AuTraceErr(err);
+ return err;
+ }
+
+ int au_reopen_nondir(struct file *file)
+ {
+ int err;
+ aufs_bindex_t btop;
+ struct dentry *dentry;
+ struct file *h_file, *h_file_tmp;
+ 
+ dentry = file->f_path.dentry;
+ btop = au_dbtop(dentry);
+ h_file_tmp = NULL;
+ if (au_fbtop(file) == btop) {
+ h_file = au_hf_top(file);
+ if (file->f_mode == h_file->f_mode)
+ return 0; /* success */
+ h_file_tmp = h_file;
+ get_file(h_file_tmp);
+ au_set_h_fptr(file, btop, NULL);
+ }
+ AuDebugOn(au_fi(file)->fi_hdir);
+ /*
+ * it can happen
+ * file exists on both of rw and ro
+ * open --> dbtop and fbtop are both 0
+ * prepend a branch as rw, "rw" become ro
+ * remove rw/file
+ * delete the top branch, "rw" becomes rw again
+ * dbtop is 1, fbtop is still 0
+ * write --> fbtop is 0 but dbtop is 1
+ */
+ /* AuDebugOn(au_fbtop(file) < btop); */
+ 
+ h_file = au_h_open(dentry, btop, vfsub_file_flags(file) & ~O_TRUNC,
+ file, /*force_wr*/0);
+ err = PTR_ERR(h_file);
+ if (IS_ERR(h_file)) {
+ if (h_file_tmp) {
+ au_sbr_get(dentry->d_sb, btop);
+ au_set_h_fptr(file, btop, h_file_tmp);
+ h_file_tmp = NULL;
+ }
+ goto out; /* todo: close all? */
+ }
err = 0;
au_set_ftop(file, btop);
au_set_h_fptr(file, btop, h_file);
uau_update_figen(file);
/* todo: necessary? */
/* file->f_ra = h_file->f_ra; */
+
+out:
+if (h_file_tmp)
+fput(h_file_tmp);
+return err;
+
+
/* ---------------------------------------------------------------------- */
+
static int au_reopen_wh(struct file *file, aufs_bindex_t btgt,
 struct dentry *hi_wh)
+{  
+int err;
+aufs_bindex_t btop;
+struct au_dinfo *dinfo;
+struct dentry *h_dentry;
+struct au_hdentry *hdp;
+
+dinfo = au_di(file->f_path.dentry);
+AuRwMustWriteLock(&dinfo->di_rwsem);
+
+btop = dinfo->di_btop;
+dinfo->di_btop = btgt;
+hdp = au_hdentry(dinfo, btgt);
+h_dentry = hdp->hd_dentry;
+hdp->hd_dentry = hi_wh;
+err = au_reopen_nondir(file);
+hdp->hd_dentry = h_dentry;
+dinfo->di_btop = btop;
+
+return err;
+}
+
+static int au_ready_to_write_wh(struct file *file, loff_t len,
 aufs_bindex_t bcpup, struct au_pin *pin)
+{  
+int err;
+struct inode *inode, *h_inode;
+struct dentry *h_dentry, *hi_wh;
+struct au_cp_generic cpg = {
+.dentry = file->f_path.dentry,
+.bdst= bcpup,
+.bsrc= -1,
+.len= len,
+.pin= pin
+
+au_update_dbtop(cpg.dentry);
+inode = d_inode(cpg.dentry);
+h_inode = NULL;
+if (au_dbtop(cpg.dentry) <= bcpup
+    && au_dbbot(cpg.dentry) >= bcpup ) {
+h_dentry = au_h_dptr(cpg.dentry, bcpup);
+if (h_dentry && d_is_positive(h_dentry))
+h_inode = d_inode(h_dentry);
+
+hi_wh = au_hi_wh(inode, bcpup);
+if (!hi_wh & !h_inode)
+err = au_sio_cpup_wh(&cpg, file);
+else
+/* already copied-up after unlink */
+err = au_reopen_wh(file, bcpup, hi_wh);
+
+if (!err
+    && (inode->i_nlink > 1
+    || (inode->i_state & I_LINKABLE))
+    && au_opt_test(au_mntflags(cpg.dentry->d_sb), PLINK))
+au_plink_append(inode, bcpup, au_h_dptr(cpg.dentry, bcpup));
+
+return err;
+
+/*
+ * prepare the @file for writing.
+ */
+int au_ready_to_write(struct file *file, loff_t len, struct au_pin *pin)
+{
+    int err;
+aufs_bindex_t dbtop;
+struct dentry *parent;
+struct inode *inode;
+struct super_block *sb;
+struct file *h_file;
+struct cp_generic cpg = {
 .dentry= file->f_path.dentry,
 .bdst= -1,
 .bsrc= -1,
 .len= len,
 .pin= pin,
.flags= AuCpup_DTIME
+
+sb = cpg.dentry->d_sb;
+inode = d_inode(cpg.dentry);
+cpg.bsrc = au_fbttop(file);
+err = au_test_ro(sb, cpg.bsrc, inode);
+if (!err && (au_hf_top(file)->f_mode & FMODE_WRITE)) {
+    /*flags*/0);
+    goto out;
+}
+
+/* need to cpup or reopen */
+parent = dget_parent(cpg.dentry);
+di_write_lock_parent(parent);
+err = AuWbrCopyup(au_sbi(sb), cpg.dentry);
+cpg.bdst = err;
+if (unlikely(err < 0))
+    goto out_dgrade;
+err = 0;
+
+if (!d_unhashed(cpg.dentry) && !au_h_dptr(parent, cpg.bdst)) {
+    err = au_cpup_dirs(cpg.dentry, cpg.bdst);
+    if (unlikely(err))
+        goto out_dgrade;
+}
+
+err = au_pin(pin, cpg.dentry, cpg.bdst, AuOpt_UDBA_NONE,
+    AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (unlikely(err))
+    goto out_dgrade;
+
+dbtop = au_dbtop(cpg.dentry);
+if (dbtop <= cpg.bdst)
+
+    if (dbtop <= cpg.bdst /* just reopen */
+        || !d_unhashed(cpg.dentry)/* copyup and reopen */
+    ) {
+        h_file = au_h_open_pre(cpg.dentry, cpg.bsrc, /*force_wr*/0);
+        if (IS_ERR(h_file))
+            err = PTR_ERR(h_file);
+        else {
+            di_downgrade_lock(parent, AuLock_IR);
+            if (dbtop > cpg.bdst)
+                err = au_sio_cpup_simple(&cpg);
+            if (!err)
err = au_reopen_nondir(file);
+au_h_open_post(cpg.dentry, cpg.bsrc, h_file);
+
+} else { /* copyup as wh and reopen */
+/*
+ * since writable hfsplus branch is not supported,
+ * h_open_pre/post() are unnecessary.
+ */
+err = au_ready_to_write_wh(file, len, cpg.bdst, pin);
+di_downgrade_lock(parent, AuLock_IR);
+}
+
+if (!err) {
+pin_set_parent_lflag(pin, /*lflag*/0);
+goto out_dput; /* success */
+}
+unpin(pin);
+goto out_unlock;
+
+out_dgrade:
+di_downgrade_lock(parent, AuLock_IR);
+
+out_unlock:
+di_read_unlock(parent, AuLock_IR);
+
+out_dput:
+dput(parent);
+
+out:
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+int au_do_flush(struct file *file, fl_owner_t id,
+int (*flush)(struct file *file, fl_owner_t id))
+{
+int err;
+struct super_block *sb;
+struct inode *inode;
+
+inode = file_inode(file);
+sb = inode->i_sb;
+si_noflush_read_lock(sb);
+fi_read_lock(file);
+ii_read_lock_child(inode);
+
+err = flush(file, id);
+au_cpup_attr_timesizes(inode);
+
+ii_read_unlock(inode);
+fi_read_unlock(file);
+si_read_unlock(sb);
+return err;
+
+/* ----------------------------- */
+
+static int au_file_refresh_by_inode(struct file *file, int *need_reopen)
+{
+int err;
+struct au_pin pin;
+struct au_finfo *finfo;
+struct dentry *parent, *hi_wh;
+struct inode *inode;
+struct super_block *sb;
+struct au_cp_generic cpg = {
+.dentry= file->f_path.dentry,
+.bdst= -1,
+.bsrc= -1,
+.len= -1,
+.pin= &pin,
+.flags= AuCpup_DTIME
+};
+
+FiMustWriteLock(file);
+
+err = 0;
+finfo = au_fi(file);
+sb = cpg.dentry->d_sb;
+inode = d_inode(cpg.dentry);
+cpg.bdst = au_ibtop(inode);
+if (cpg.bdst == finfo->fi_btop || IS_ROOT(cpg.dentry))
+goto out;
+
+parent = dget_parent(cpg.dentry);
+if (au_test_ro(sb, cpg.bdst, inode)) {
+di_read_lock_parent(parent, !AuLock_IR);
+err = AuWbrCopyup(au_sbi(sb), cpg.dentry);
+cpg.bdst = err;
+di_read_unlock(parent, !AuLock_IR);
+if (unlikely(err < 0))
+goto out_parent;
+err = 0;
+}
+
++parent = dget_parent(cpg.dentry);
+if (au_test_ro(sb, cpg.bdst, inode)) {
+di_read_lock_parent(parent, !AuLock_IR);
+err = AuWbrCopyup(au_sbi(sb), cpg.dentry);
+cpg.bdst = err;
+di_read_unlock(parent, !AuLock_IR);
+if (unlikely(err < 0))
+goto out_parent;
+err = 0;
+}
+
++hi_wh = au_hi_wh(inode, cpg.bdst);
+if (!S_ISDIR(inode->i_mode)
& & au_opt_test(au_mntflags(sb), PLINK)
& & au_plink_test(inode)
& & !d_unhashed(cpg.dentry)
+ & cpg.bdst < au_dbtop(cpg.dentry)) {
+err = au_test_and_cpup_dirs(cpg.dentry, cpg.bdst);
+if (unlikely(err))
+goto out_unlock;
+
+/* always superio. */
+err = au_pin(&pin, cpg.dentry, cpg.bdst, AuOpt_UDBA_NONE,
+ AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (!err) {
+err = au_sio_cpup_simple(&cpg);
+au_unpin(&pin);
+}
+} else if (hi_wh) {
+/* already copied-up after unlink */
+err = au_reopen_wh(file, cpg.bdst, hi_wh);
+*need_reopen = 0;
+}
+
+out_unlock:
+di_read_unlock(parent, AuLock_IR);
+out_parent:
dput(parent);
+out:
+return err;
+}
+
+static void au_do_refresh_dir(struct file *file)
+
+aufs_bindex_t bindex, bbot, new_bindex, brid;
+struct au_hfile *p, tmp, *q;
+struct au_finfo *finfo;
+struct super_block *sb;
+struct au_fidir *fidir;
+
+FiMustWriteLock(file);
+
+sb = file->f_path.dentry->d_sb;
+finfo = au_fi(file);
+fidir = finfo->fi_hdir;
+AuDebugOn(!fidir);
+p = fidir->fd_hfile + finfo->fi_btop;
+brid = p->hf_br->br_id;
+bbot = fidir->fd_bbot;
+for (bindex = finfo->fi_btop; bindex <= bbot; bindex++, p++) {
+if (!p->hf_file)
+continue;
+
+new_bindex = au_br_index(sb, p->hf_br->br_id);
+if (new_bindex == bindex)
+continue;
+if (new_bindex < 0) {
+au_set_h_fptr(file, bindex, NULL);
+continue;
+
+/* swap two lower inode, and loop again */
+q = fidir->fd_hfile + new_bindex;
+tmp = *q;
+*q = *p;
+*p = tmp;
+if (tmp.hf_file) {
+bindex--;
+}
+
+p = fidir->fd_hfile;
+if (!au_test_mmapped(file) && !d_unlinked(file->f_path.dentry)) {
+bbot = au_sbbot(sb);
+for (finfo->fi_btop = 0; finfo->fi_btop <= bbot;
+     finfo->fi_btop++, p++)
+    if (p->hf_file) {
+      au_hfput(p, /*execed*/0);
+    }
+} else {
+bbot = au_br_index(sb, brid);
+for (finfo->fi_btop = 0; finfo->fi_btop < bbot;
+     finfo->fi_btop++, p++)
+    if (p->hf_file) {
+      au_hfput(p, /*execed*/0);
+    }
+bbot = au_sbbot(sb);
+
+p = fidir->fd_hfile + bbot;
+for (fidir->fd_bbot = bbot; fidir->fd_bbot >= finfo->fi_btop;
+     fidir->fd_bbot--, p--)}{
+if (p->hf_file) {
+if (file_inode(p->hf_file))
+break;
+au_hfput(p, /*execed*/0);
+}
+} else {
+bbot = au_br_index(sb, brid);
+for (finfo->fi_btop = 0; finfo->fi_btop < bbot;
+     finfo->fi_btop++, p++)
+    if (p->hf_file) {
+      au_hfput(p, /*execed*/0);
+    }
+bbot = au_sbbot(sb);
+
+p = fidir->fd_hfile + bbot;
+for (fidir->fd_bbot = bbot; fidir->fd_bbot >= finfo->fi_btop;
+     fidir->fd_bbot--, p--){
+if (p->hf_file) {
+if (file_inode(p->hf_file))
+break;
+au_hfput(p, /*execed*/0);
+}
+AuDebugOn(fidir->fd_bbot < finfo->fi_btop);
+
+ /*
+ * after branch manipulating, refresh the file.
+ */
+static int refresh_file(struct file *file, int (*reopen)(struct file *file))
+{
+int err, need_reopen, nbr;
+aufs_bindex_t bbot, bindex;
+struct dentry *dentry;
+struct super_block *sb;
+struct au_finfo *finfo;
+struct au_hfile *hfile;
+
+dentry = file->f_path.dentry;
+sb = dentry->d_sb;
+nbr = au_sbbot(sb) + 1;
+finfo = au_fi(file);
+if (!finfo->fi_hdir) {
+hfile = &finfo->fi_htop;
+AuDebugOn(!hfile->hf_file);
+bindex = au_br_index(sb, hfile->hf_br->br_id);
+AuDebugOn(bindex < 0);
+if (bindex != finfo->fi_btop)
+	au_set_fbtop(file, bindex);
+} else {
+err = au_fidir_realloc(finfo, nbr, /*may_shrink*/0);
+if (unlikely(err))
+goto out;
+Au_do_refresh_dir(file);
+}
+err = 0;
+need_reopen = 1;
+if (!au_test_mmapped(file))
+err = au_file_refresh_by_inode(file, &need_reopen);
+if (finfo->fi_hdir)
+/* harmless if err */
+au_fidir realloc(finfo, nbr, /*may_shrink*/1);
+if (!err & need_reopen & !d_unlinked(dentry))
+err = reopen(file);
+if (!err) {
+au_update_figen(file);
+goto out; /* success */
+}
+
+/* error, close all lower files */
+if (finfo->fi_hdir) {
+bbot = au_fbbot_dir(file);
+for (bindex = au_fbtop(file); bindex <= bbot; bindex++)
+au_set_h_fptr(file, bindex, NULL);
+
+out:
+return err;
+
+} 
+ /* common function to regular file and dir */
+int au_reval_and_lock_fdi(struct file *file, int (*reopen)(struct file *,
+int wlock, unsigned int fi_lsc)
+{
+int err;
+unsigned int sigen, figen;
+aufs_bindex_t btop;
+unsigned char pseudo_link;
+struct dentry *dentry;
+struct inode *inode;
+
+err = 0;
+dentry = file->f_path.dentry;
+inode = d_inode(dentry);
+sigen = au_sigen(dentry->d_sb);
+fi_write_lock_nested(file, fi_lsc);
+figen = au_figen(file);
+if (!fi_lsc)
+di_write_lock_child(dentry);
+else
+di_write_lock_child2(dentry);
+btop = au_dbtop(dentry);
+pseudo_link = (btop != au_ibtop(inode));
+if (sigen == figen && !pseudo_link && au_fbtop(file) == btop) {
++if (!wlock) {
+di_downgrade_lock(dentry, AuLock_IR);
+fi_downgrade_lock(file);
+}
+goto out; /* success */
+
+AuDbg("sigen %d, figen %d\n", sigen, figen);
+if (au_digen_test(dentry, sigen)) {
+err = au_reval_dpath(dentry, sigen);
+AuDebugOn(!err && au_digen_test(dentry, sigen));
+}
+
+if (!err)
err = refresh_file(file, reopen);
+if (!err) {
+if (!wlock) {
+di_downgrade_lock(dentry, AuLock_IR);
+fi_downgrade_lock(file);
+
+} else {
+di_write_unlock(dentry);
+fi_write_unlock(file);
+
+}
+
+out:
+return err;
+
+ /* cf. aufs_nopage() */
+/* for madvise(2) */
+static int aufs_readpage(struct file *file __maybe_unused, struct page *page)
+{
+unlock_page(page);
+return 0;
+}
+
+/* it will never be called, but necessary to support O_DIRECT */
+static ssize_t aufs_direct_IO(struct kiocb *iocb, struct iov_iter *iter)
+{ BUG(); return 0; }
+
+/* they will never be called. */
+#ifdef CONFIG_AUFS_DEBUG
+static int aufs_write_begin(struct file *file, struct address_space *mapping,
+ loff_t pos, unsigned len, unsigned flags,
+ struct page **pagep, void **fsdata)
+{ AuUnsupport(); return 0; }
+static int aufs_write_end(struct file *file, struct address_space *mapping,
+ loff_t pos, unsigned len, unsigned copied,
+ struct page *page, void *fsdata)
+{ AuUnsupport(); return 0; }
+static int aufs_writepage(struct page *page, struct writeback_control *wbc)
+{ AuUnsupport(); return 0; }
+
+static int aufs_set_page_dirty(struct page *page)
+{ AuUnsupport(); return 0; }
+static void aufs_invalidatepage(struct page *page, unsigned int offset,
+unsigned int length)
+{ AuUnsupport(); }
+static int aufs_releasepage(struct page *page, gfp_t gfp)
+{ AuUnsupport(); return 0; }
+#endif /* called by memory compaction regardless file */
+static int aufs_migratepage(struct address_space *mapping, struct page *newpage,
+    struct page *page, enum migrate_mode mode)
+{ AuUnsupport(); return 0; }
+#endif
+static bool aufs_isolate_page(struct page *page, isolate_mode_t mode)
+{ AuUnsupport(); return true; }
+static void aufs_putback_page(struct page *page)
+{ AuUnsupport(); }
+static int aufs_launser_page(struct page *page)
+{ AuUnsupport(); return 0; }
+static int aufs_is_partially_uptodate(struct page *page,
+    unsigned long from,
+    unsigned long count)
+{ AuUnsupport(); return 0; }
+static void aufs_is_dirty_writeback(struct page *page, bool *dirty,
+    bool *writeback)
+{ AuUnsupport(); }
+static int aufs_error_remove_page(struct address_space *mapping,
+    struct page *page)
+{ AuUnsupport(); return 0; }
+static int aufs_swap_activate(struct swap_info_struct *sis, struct file *file,
+    sector_t *span)
+{ AuUnsupport(); return 0; }
+static void aufs_swap_deactivate(struct file *file)
+{ AuUnsupport(); }
+#endif /* CONFIG_AUFS_DEBUG */
+
+const struct address_space_operations aufs_aop = {
+    .readpage = aufs_readpage,
+    .direct_IO = aufs_direct_IO,
+    #ifdef CONFIG_AUFS_DEBUG
+    .writepage = aufs_writepage,
+    #endif
+    .set_page_dirty = aufs_set_page_dirty,
+    .write_begin = aufs_write_begin,
+    .write_end = aufs_write_end,
+    .invalidatepage = aufs_invalidatepage,
+    .releasepage = aufs_releasepage,
+    .is_fallback_migrate_page_ok = aufs_migratepage,
+    .isolate_page = aufs_isolate_page,
+    .putback_page = aufs_putback_page,
+    .launder_page = aufs_launser_page,
+    .is_partially_uptodate = aufs_is_partially_uptodate,
+is_dirty_writeback= aufs_is_dirty_writeback,
+error_remove_page= aufs_error_remove_page,
+swap_activate= aufs_swap_activate,
+swap_deactivate= aufs_swap_deactivate
+#endif /* CONFIG_AUFS_DEBUG */
+
--- linux-4.15.0.orig/fs/aufs/file.h
+++ linux-4.15.0/fs/aufs/file.h
@@ -0,0 +1,340 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+#ifndef __AUFS_FILE_H__
+#define __AUFS_FILE_H__
+
+#ifdef __KERNEL__
+
+#include <linux/file.h>
+#include <linux/fs.h>
+#include <linux/mm_types.h>
+#include <linux/poll.h>
+#include "rwsem.h"
+
+struct au_branch;
+struct au_hfile {
+struct file*hf_file;
+struct au_branch*hf_br;
+};
+
+struct au_vdir;
+struct au_fidir {
+aufs_bindex_t tfd_bbot;
+aufs_bindex_t tfd_nent;
+struct au_vdir*fd_vdir_cache;
+struct au_hfilefd_hfile[];
+};
+
+static inline int au_fidir_sz(int nent)
+{
+AuDebugOn(nent < 0);
+return sizeof(struct au_fidir) + sizeof(struct au_hfile) * nent;
+}
+
+struct au_finfo {
+atomic_t fi_generation;
+
+struct au_rwsem fi_rwsem;
+aufs_bindex_t fi_btop;
+
+/* do not union them */
+struct {
+/* for non-dir */
+struct au_hfile fi_htop;
+atomic_t fi_mmapped;
+};
+struct au_fidir*fi_hdir;/* for dir only */
+
+struct hlist_bl_node fi_hlist;
+struct file*fi_file;/* very ugly */
+} cachesline_aligned_in_smp;
+
+/* ---------------------------------------------------------------------- */
+
+/* file.c */
+extern const struct address_space_operations aufs_aop;
+unsigned int au_file_roflags(unsigned int flags);
+struct file *au_h_open(struct dentry *dentry, aufs_bindex_t bindex, int flags,
+struct file *file, int force_wr);
+struct au_do_open_args {
+int aopen;
+int(*open)(struct file *file, int flags,
+struct file *h_file);
+struct au_fidir*fidir;
+struct file*h_file;
+};
+int au_do_open(struct file *file, struct au_do_open_args *args);
+int au_reopen_nondir(struct file *file);
+struct au_pin;
+int au_ready_to_write(struct file *file, loff_t len, struct au_pin *pin);
+int au_reval_and_lock_fdi(struct file *file, int (*reopen)(struct file *file),
  + int wlock, unsigned int fi_lsc);
+int au_do_flush(struct file *file, fl_owner_t id,
  +int (*flush)(struct file *file, fl_owner_t id));

+ /* poll.c */
+ #ifdef CONFIG_AUFS_POLL
+ unsigned int aufs_poll(struct file *file, poll_table *wait);
+ #endif
+
+ #ifdef CONFIG_AUFS_BR_HFSPLUS
+ /* hfsplus.c */
+ struct file *au_h_open_pre(struct dentry *dentry, aufs_bindex_t bindx,
  + int force_wr);
+ void au_h_open_post(struct dentry *dentry, aufs_bindex_t bindx,
  + struct file *h_file);
+ #else
+ AuStub(struct file *, au_h_open_pre, return NULL, struct dentry *dentry,
  + aufs_bindex_t bindx, int force_wr)
+ AuStubVoid(au_h_open_post, struct dentry *dentry, aufs_bindex_t bindx,
  + struct file *h_file);
+ #endif
+
+ /* f_op.c */
+ extern const struct file_operations aufs_file_fop;
+ int au_do_open_nondir(struct file *file, int flags, struct file *h_file);
+ int aufs_release_nondir(struct inode *inode __maybe_unused, struct file *file);
+ struct file *au_read_pre(struct file *file, int keep_fi, unsigned int lsc);
+
+ /* finfo.c */
+ void au_hfput(struct au_hfile *hf, int execed);
+ void au_set_h_fptr(struct file *file, aufs_bindex_t bindx,
  + struct file *h_file);
+
+ void au_update_figen(struct file *file);
+ struct au_fidir *au_fidir_alloc(struct super_block *sb);
+ int au_fidir_realloc(struct au_finfo *finfo, int nbr, int may_shrink);
+
+ void au_fi_init_once(void *_fi);
+ void au_finfo_fin(struct file *file);
+ int au_finfo_init(struct file *file, struct au_fidir *fidir);
+
+ /* ioctl.c */
+ long aufs_ioctl_nondir(struct file *file, unsigned int cmd, unsigned long arg);
+ #ifdef CONFIG_COMPAT
+ long aufs_compat_ioctl_dir(struct file *file, unsigned int cmd,
  + unsigned long arg);
+ #endif
+ long aufs_compat_ioctl_nondir(struct file *file, unsigned int cmd,
unsigned long arg);
#endif

/* ---------------------------------------------------------------------- */

static inline struct au_finfo *au_fi(struct file *file)
{
    return file->private_data;
}

/* ---------------------------------------------------------------------- */

#define fi_read_lock(f) \t_rw_read_lock(&au_fi(f)->fi_rwsem)
#define fi_write_lock(f) \t_rw_write_lock(&au_fi(f)->fi_rwsem)
#define fi_read_trylock(f)\t_rw_read_trylock(&au_fi(f)->fi_rwsem)
#define fi_write_trylock(f)\t_rw_write_trylock(&au_fi(f)->fi_rwsem)

/* lock subclass for finfo */
enum {
    AuLsc_FI_1,
    AuLsc_FI_2
};

/* static inline void fi_read_lock_nested(struct file *f, unsigned int lsc) */
static inline void fi_read_lock_nested(struct file *f, unsigned int lsc)
{
    _rw_read_lock_nested(&au_fi(f)->fi_rwsem, lsc);
}

static inline void fi_write_lock_nested(struct file *f, unsigned int lsc)
{
    _rw_write_lock_nested(&au_fi(f)->fi_rwsem, lsc);
}

/* 
 *   fi_read_lock_1, fi_write_lock_1,
 *   fi_read_lock_2, fi_write_lock_2 
 */
#define AuReadLockFunc(name) \n    };

#define AuReadLockFunc(name) \n
/* Open Source Used In 5GaaS Edge AC-4  30142 */
+static inline void fi_read_lock_##name(struct file *f) \
+{ fi_read_lock_nested(f, AuLsc_FL_##name); } \
+ 
+#define AuWriteLockFunc(name) \
+static inline void fi_write_lock_##name(struct file *f) \
+{ fi_write_lock_nested(f, AuLsc_FL_##name); } \
+ 
+#define AuRWLockFuncs(name) \
+AuReadLockFunc(name) \
+AuWriteLockFunc(name) \
+ 
+AuRWLockFuncs(1); \
+AuRWLockFuncs(2); \
+ 
+#undef AuReadLockFunc \
+#undef AuWriteLockFunc \
+#undef AuRWLockFuncs \
+ 
+#define FiMustNoWaiters(f) AuRwMustNoWaiters(&au_fi(f)->fi_rwsem) \
+#define FiMustAnyLock(f) AuRwMustAnyLock(&au_fi(f)->fi_rwsem) \
+#define FiMustWriteLock(f) AuRwMustWriteLock(&au_fi(f)->fi_rwsem) \
+ 
+/* todo: hard/soft set? */ 
+static inline aufs_bindex_t au_fbtop(struct file *file) \
+{ 
+FiMustAnyLock(file); 
+return au_fi(file)->fi_btop; 
+} \
+ 
+static inline aufs_bindex_t au_fbbot_dir(struct file *file) \
+{ 
+FiMustAnyLock(file); 
+AuDebugOn(!au_fi(file)->fi_hdir); 
+return au_fi(file)->fi_hdir->fd_bbot; 
+} \
+ 
+static inline struct au_vdir *au_fvdir_cache(struct file *file) \
+{ 
+FiMustAnyLock(file); 
+AuDebugOn(!au_fi(file)->fi_hdir); 
+return au_fi(file)->fi_hdir->fd_vdir_cache; 
+} \
+ 
+static inline void au_set_fbtop(struct file *file, aufs_bindex_t bindex) \
+{ 
+FiMustWriteLock(file);
+ au_fi(file)->fi_btop = bindex;
+
+static inline void au_set_fbbot_dir(struct file *file, aufs_bindx_t bindx)
{  
+FiMustWriteLock(file);
+AuDebugOn(!au_fi(file)->fi_hdir);
+au_fi(file)->fi_hdir->fd_bbot = bindx;
+
+
+static inline void au_set_fvdir_cache(struct file *file, struct au_vdir *vdir_cache)
{  
+FiMustWriteLock(file);
+AuDebugOn(!au_fi(file)->fi_hdir);
+au_fi(file)->fi_hdir->fd_vdir_cache = vdir_cache;
+
+
+static inline struct file *au_hf_top(struct file *file)
{  
+FiMustAnyLock(file);
+AuDebugOn(au_fi(file)->fi_hdir);
+return au_fi(file)->fi_htop.hf_file;
+
+
+static inline struct file *au_hf_dir(struct file *file, aufs_bindx_t bindx)
{  
+FiMustAnyLock(file);
+AuDebugOn(!au_fi(file)->fi_hdir);
+return au_fi(file)->fi_hdir->fd_hfile[0 + bindx].hf_file;
+
+/* todo: memory barrier? */
+static inline unsigned int au_figen(struct file *f)
{  
+return atomic_read(&au_fi(f)->fi_generation);
+
+
+static inline void au_set_mmapped(struct file *f)
{  
+if (atomic_inc_return(&au_fi(f)->fi_mmapped))
+return;
+pr_warn("fi_mmapped wrapped around\n");
+while (!atomic_inc_return(&au_fi(f)->fi_mmapped))
+;
+
+static inline void au_unset_mmapped(struct file *f)


atomic_dec(&au_fi(f)->fi_mmapped);
+
static inline int au_test_mmapped(struct file *f)
{
    return atomic_read(&au_fi(f)->fi_mmapped);
}
+
static inline void au_do_vm_file_reset(struct vm_area_struct *vma, struct file *file)
{
    struct file *f;
    f = vma->vm_file;
    get_file(file);
    vma->vm_file = file;
    fput(f);
}
+
#define AuDbgVmRegion(file, vma) do {} while (0)

static inline void au_vm_file_reset(struct vm_area_struct *vma, struct file *file)
{
    au_do_vm_file_reset(vma, file);
}

#define AuDbgVmRegion(file, vma) (vma)->vm_region && (vma)->vm_region->vm_file != (file)

static inline void au_vm_file_reset(struct vm_area_struct *vma, struct file *file)
{
    struct file *f;
    f = vma->vm_region->vm_file;
    get_file(file);
    vma->vm_region->vm_file = file;
    fput(f);
}

#ifndef CONFIG_MMU
#endif /* CONFIG_MMU */

/* handle vma->vm_file */
+static inline void au_vm_prfile_set(struct vm_area_struct *vma,
+    struct file *file)
+{
+    get_file(file);
+    vma->vm_prfile = file;
+#ifndef CONFIG_MMU
+    get_file(file);
+    vma->vm_region->vm_prfile = file;
+#endif
+}
+
+/* __KERNEL__ */
+#endif /* __KERNEL__ */

--- linux-4.15.0.orig/fs/aufs/finfo.c
+++ linux-4.15.0/fs/aufs/finfo.c
@@ -0,0 +1,148 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * file private data
+ */
+
+#include "aufs.h"
+
+void au_hfput(struct au_hfile *hf, int execed)
+{
+    if (execed)
+        allow_write_access(hf->hf_file);
+    fput(hf->hf_file);
+    hf->hf_file = NULL;
+    au_br_put(hf->hf_br);
+    hf->hf_br = NULL;
+}
+void au_set_h_fptr(struct file *file, aufs_bindex_t bindex, struct file *val)
+{
+struct au_finfo *finfo = au_fi(file);
+struct au_hfile *hf;
+struct au_fidir *fidir;
+
+if (!fidir) {
+AuDebugOn(finfo->fi_btop != bindex);
+hf = &finfo->fi_hfop;
+} else
+hf = fidir->fd_hfptr + bindex;
+
+if (hf && hf->hf_file)
+au_hfput(hf, vfsub_file_execed(file));
+if (val) {
+FiMustWriteLock(file);
+AuDebugOn(IS_ERR_OR_NULL(file->f_path.dentry));
+hf->hf_file = val;
+hf->hf_br = au_sbr(file->f_path.dentry->d_sb, bindex);
+}
+}
+
+void au_update_figen(struct file *file)
+{
+atomic_set(&au_fi(file)->fi_generation, au_digen(file->f_path.dentry));
+/* smp_mb(); */ /* atomic_set */
+}
+
+/* ---------------------------------------------------------------------- */
+
+struct au_fidir *au_fidir_alloc(struct super_block *sb)
+{
+int nbr;
+
+nbr = au_sbbot(sb) + 1;
+if (nbr < 2)
+nbr = 2; /* initial allocate for 2 branches */
+fidir = kzalloc(au_fidir_sz(nbr), GFP_NOFS);
+if (fidir) {
+ fidir->fd_bbptr = -1;
+ fidir->fd_nent = nbr;
+}
+}
+
+return fidir;
+}
+int au_fidirrealloc(struct au_finfo *finfo, int nbr, int may_shrink)
+{
+int err;
+struct au_fidir *fidir, *p;
+
+AuRwMustWriteLock(&finfo->fi_rwsem);
+fidir = finfo->fi_hdir;
+AuDebugOn(fidir);
+
+err = -ENOMEM;
+p = au_kzrealloc(fidir, au_fidir_sz(fidir->fd_nent), au_fidir_sz(nbr),
+ GFP_NOFS, may_shrink);
+if (p) {
+p->fd_nent = nbr;
+finfo->fi_hdir = p;
+err = 0;
+}
+
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+void au_finfo_fin(struct file *file)
+{
+struct au_finfo *finfo;
+
+Au_i_nfiles_dec(file->f_path.dentry->d_sb);
+
+finfo = au_fi(file);
+AuDebugOn(finfo->fi_hdir);
+AuRwDestroy(&finfo->fi_rwlock);
+au_cache_free_finfo(finfo);
+}
+
+void au_fi_init_once(void *finfo)
+{
+struct au_finfo *finfo = _finfo;
+
+Au_i_rw_init(&finfo->fi_rwlock);
+AuDebugOn(finfo->fi_hdir);
+AuRwDestroy(&finfo->fi_rwlock);
+au_cache_free_finfo(finfo);
+}
+
+int au_finfo_init(struct file *file, struct au_fidir *fidir)
+{
+int err;
+struct au_finfo *finfo;
+struct dentry *dentry;
err = -ENOMEM;
dentry = file->f_path.dentry;
info = au_cache_alloc_finfo();
if (unlikely(!info))
    goto out;

err = 0;
au_nfiles_inc(dentry->d_sb);
au_rwlock_lock(&info->fi_rwlock);
info->fi_btop = -1;
info->fi_hdir = fidir;
atomic_set(&info->fi_generation, au_digen(dentry));
/* smp_mb(); */ /* atomic_set */

file->private_data = info;

out:
return err;

--- linux-4.15.0.orig/fs/aufs/fstype.h
+++ linux-4.15.0/fs/aufs/fstype.h
@@ -0,0 +1,400 @@
+/*
 * Copyright (C) 2005-2017 Junjiro R. Okajima
 *
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 * it under the terms of the GNU General Public License as published by
 * the Free Software Foundation; either version 2 of the License, or
 * (at your option) any later version.
 *
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 * but WITHOUT ANY WARRANTY; without even the implied warranty of
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 * GNU General Public License for more details.
 *
 * You should have received a copy of the GNU General Public License
 * along with this program. If not, see <http://www.gnu.org/licenses/>.
 *
+
+*/
+
+* judging filesystem type
+*/
+
+#ifndef __AUFS_FSTYPE_H__
+#define __AUFS_FSTYPE_H__
+
+#ifdef __KERNEL__
```c
#include <linux/fs.h>
#include <linux/magic.h>
#include <linux/nfs_fs.h>
#include <linux/romfs_fs.h>

+static inline int au_test_aufs(struct super_block *sb)
{  
    return sb->s_magic == AUFS_SUPER_MAGIC;
}
+
+static inline const char *au_sbtype(struct super_block *sb)
{  
    return sb->s_type->name;
}
+
+static inline int au_test_iso9660(struct super_block *sb __maybe_unused)
{  
#if IS_ENABLED(CONFIG_ISO9660_FS)
    return sb->s_magic == ISOFS_SUPER_MAGIC;
#else
    return 0;
#endif
}
+
+static inline int au_test_romfs(struct super_block *sb __maybe_unused)
{  
#if IS_ENABLED(CONFIG_ROMFS_FS)
    return sb->s_magic == ROMFS_MAGIC;
#else
    return 0;
#endif
}
+
+static inline int au_test_cramfs(struct super_block *sb __maybe_unused)
{  
#if IS_ENABLED(CONFIG_CRAMFS)
    return sb->s_magic == CRAMFS_MAGIC;
#else
    return 0;
#endif
}
+
+static inline int au_test_nfs(struct super_block *sb __maybe_unused)
{  
#if IS_ENABLED(CONFIG_NFS_FS)
    return sb->s_magic == NFS_SUPER_MAGIC;
#else
    return 0;
#endif
}

```

static inline int au_test_fuse(struct super_block *sb __maybe_unused)
{
#if IS_ENABLED(CONFIG_FUSE_FS)
    return sb->s_magic == FUSE_SUPER_MAGIC;
#else
    return 0;
#endif
}

static inline int au_test_xfs(struct super_block *sb __maybe_unused)
{
#if IS_ENABLED(CONFIG_XFS_FS)
    return sb->s_magic == XFS_SB_MAGIC;
#else
    return 0;
#endif
}

static inline int au_test_tmpfs(struct super_block *sb __maybe_unused)
{
#if defined(CONFIG_TMPFS)
    return sb->s_magic == TMPFS_MAGIC;
#else
    return 0;
#endif
}

static inline int au_test_ecryptfs(struct super_block *sb __maybe_unused)
{
#if IS_ENABLED(CONFIG_ECRYPT_FS)
    return !strcmp(au_sbtype(sb), "ecryptfs");
#else
    return 0;
#endif
}

static inline int au_test_ramfs(struct super_block *sb)
{
    return sb->s_magic == RAMFS_MAGIC;
}

static inline int au_test_ubifs(struct super_block *sb __maybe_unused)
{
#if IS_ENABLED(CONFIG_UBIFS_FS)
    return sb->s_magic == UBIFS_SUPER_MAGIC;
#else
    return 0;
#endif
}
+#else
+return 0;
+#endif
+
+static inline int au_test_procfs(struct super_block *sb __maybe_unused)
+{
+  +#ifdef CONFIG_PROC_FS
+  +return sb->s_magic == PROC_SUPER_MAGIC;
+  +#else
+  +return 0;
+  +#endif
+}
+
+static inline int au_test_sysfs(struct super_block *sb __maybe_unused)
+{
+  +#ifdef CONFIG_SYSFS
+  +return sb->s_magic == SYSFS_MAGIC;
+  +#else
+  +return 0;
+  +#endif
+}
+
+static inline int au_test_configfs(struct super_block *sb __maybe_unused)
+{
+  +#if IS_ENABLED(CONFIG_CONFIGFS_FS)
+  +return sb->s_magic == CONFIGFS_MAGIC;
+  +#else
+  +return 0;
+  +#endif
+}
+
+static inline int au_test_minix(struct super_block *sb __maybe_unused)
+{
+  +#if IS_ENABLED(CONFIG_MINIX_FS)
+  +return sb->s_magic == MINIX3_SUPER_MAGIC
+    || sb->s_magic == MINIX2_SUPER_MAGIC
+    || sb->s_magic == MINIX2_SUPER_MAGIC2
+    || sb->s_magic == MINIX_SUPER_MAGIC
+    || sb->s_magic == MINIX_SUPER_MAGIC2;
+  +#else
+  +return 0;
+  +#endif
+}
+
+static inline int au_test_fat(struct super_block *sb __maybe_unused)
+{
+  +#if IS_ENABLED(CONFIG_FAT_FS)
+return sb->s_magic == MSDOS_SUPER_MAGIC;
+} #else
+return 0;
+} #endif
+
+static inline int au_test_msdos(struct super_block *sb)
+{
+return au_test_fat(sb);
+}
+
+static inline int au_test_vfat(struct super_block *sb)
+{
+return au_test_fat(sb);
+}
+
+static inline int au_test_securityfs(struct super_block *sb __maybe_unused)
+{
+    #ifdef CONFIG_SECURITYFS
+    return sb->s_magic == SECURITYFS_MAGIC;
+    #else
+    return 0;
+    #endif
+}
+
+static inline int au_test_squashfs(struct super_block *sb __maybe_unused)
+{
+    #if IS_ENABLED(CONFIG_SQUASHFS)
+    return sb->s_magic == SQUASHFS_MAGIC;
+    #else
+    return 0;
+    #endif
+}
+
+static inline int au_test_btrfs(struct super_block *sb __maybe_unused)
+{
+    #if IS_ENABLED(CONFIG_BTRFS_FS)
+    return sb->s_magic == BTRFS_SUPER_MAGIC;
+    #else
+    return 0;
+    #endif
+}
+
+static inline int au_test_xenfs(struct super_block *sb __maybe_unused)
+{
+    #if IS_ENABLED(CONFIG_XENFS)
+    return sb->s_magic == XENFS_SUPER_MAGIC;
+    #else
+    return 0;
+    #endif
+}

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+return 0;
+}  
+  
+static inline int au_test_debugfs(struct super_block *sb __maybe_unused)
+{  
+  #ifdef CONFIG_DEBUG_FS  
+  return sb->s_magic == DEBUGFS_MAGIC;
+  +#else  
+  return 0;
+  +#endif  
+  }  
+  
+static inline int au_test_nilfs(struct super_block *sb __maybe_unused)
+{  
+  #if IS_ENABLED(CONFIG_NILFS)  
+  return sb->s_magic == NILFS_SUPER_MAGIC;
+  +#else  
+  return 0;
+  +#endif  
+  }  
+  
+static inline int au_test_hfsplus(struct super_block *sb __maybe_unused)
+{  
+  #if IS_ENABLED(CONFIG_HFSPLUS_FS)  
+  return sb->s_magic == HFSPLUS_SUPER_MAGIC;
+  +#else  
+  return 0;
+  +#endif  
+  }  
+  
+/* ---------------------------------------------------------------------- */
+/*  
+ * they can't be an aufs branch.  
+ */
+/*  
+static inline int au_test_fs_unsuppoted(struct super_block *sb)
+{  
+  return  
+  */
+  
+  ifndef CONFIG_AUFS_BR_RAMFS  
+  au_test_ramfs(sb) ||
+  #endif  
+  au_test_procfs(sb)
+  || au_test_sysfs(sb)
+  || au_test_configfs(sb)
+  || au_test_debugfs(sb)
+  || au_test_securityfs(sb)
+  || au_test_xenfs(sb)
+  || au_test_ecryptfs(sb)
static inline int au_test_fs_remote(struct super_block *sb)
{
    return !au_test_tmpfs(sb)  
#ifdef CONFIG_AUFS_BR_RAMFS
    && !au_test_ramfs(sb)  
#endif
    && !(sb->s_type->fs_flags & FS_REQUIRES_DEV);
}

/* Note: these functions (below) are created after reading ->getattr() in all filesystems under linux/fs. it means we have to do so in every update... */

static inline int au_test_fs_refresh_iattr(struct super_block *sb)
{
    return au_test_nfs(sb)  
    || au_test_fuse(sb)  
    /* || au_test_btrfs(sb)  */ /* untested */
    ;
}

/* filesystems which don't maintain i_size or i_blocks. */
static inline int au_test_fs_bad_iattr_size(struct super_block *sb)
{
    return au_test_xfs(sb)  
    || au_test_btrfs(sb)  
    || au_test_ubifs(sb)  
    || au_test_hfsplus(sb) /* maintained, but incorrect */
    /* || au_test_minix(sb) */ /* untested */
    ;
}
+ * filesystems which don't store the correct value in some of their inode
+ * attributes.
+ */
+static inline int au_test_fs_bad_iattr(struct super_block *sb)
+{
+return au_test_fs_bad_iattr_size(sb)
+|| au_test_fat(sb)
+|| au_test_msdos(sb)
+|| au_test_vfat(sb);
+}
+
+/* they don't check i_nlink in link(2) */
+static inline int au_test_fs_no_limit_nlink(struct super_block *sb)
+{
+return au_test_tmpfs(sb)
+#ifdef CONFIG_AUFS_BR_RAMFS
+|| au_test_ramfs(sb)
+#endif
+|| au_test_ubifs(sb)
+|| au_test_hfsplus(sb);
+}
+
+/*
+ * filesystems which sets S_NOATIME and S_NOCMTIME.
+ */
+static inline int au_test_fs_notime(struct super_block *sb)
+{
+return au_test_nfs(sb)
+|| au_test_fuse(sb)
+|| au_test_ubifs(sb)
+;
+}
+
+/* temporary support for i#1 in cramfs */
+static inline int au_test_fs_unique_ino(struct inode *inode)
+{
+if (au_test_cramfs(inode->i_sb))
+return inode->i_ino != 1;
+return 1;
+}
+
+/*------------------------------------------*/
+
+/* the filesystem where the xino files placed must support i/o after unlink and
+ * maintain i_size and i_blocks.
+ */
+static inline int au_test_fs_bad_xino(struct super_block *sb)

+ return au_test_fs_remote(sb)
+ || au_test_fs_bad_iattr_size(sb)
+ /* don't want unnecessary work for xino */
+ || au_test_aufs(sb)
+ || au_test_ecryptfs(sb)
+ || au_test_nilfs(sb);
+ }
+
+ static inline int au_test_fs_trunc_xino(struct super_block *sb)
+ {
+ return au_test_tmpfs(sb)
+ || au_test_ramfs(sb);
+ }
+
+ /*
+ * test if the @sb is real-readonly.
+ *
+ */
+ static inline int au_test_fs_rr(struct super_block *sb)
+ {
+ return au_test_squashfs(sb)
+ || au_test_iso9660(sb)
+ || au_test_cramfs(sb)
+ || au_test_romfs(sb);
+ }
+
+ /*
+ * test if the @inode is nfs with 'noacl' option
+ * NFS always sets SB_POSIXACL regardless its mount option 'noacl.'
+ */
+ static inline int au_test_nfs_noacl(struct inode *inode)
+ {
+ return au_test_nfs(inode->i_sb)
+ /* && IS_POSIXACL(inode) */
+ && !nfs_server_capable(inode, NFS_CAP_ACLS);
+ }
+
+#endif /* __KERNEL__ */
+#endif /* __AUFS_FSTYPE_H__ */

--- linux-4.15.0.orig/fs/aufs/hbl.h
+++ linux-4.15.0/fs/aufs/hbl.h
@@ -0,0 +1,64 @@
+ /*
+ * Copyright (C) 2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
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+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+ /* helpers for hlist_bl.h
+ */
+
+#ifndef __AUFS_HBL_H__
+#define __AUFS_HBL_H__
+
+#ifdef __KERNEL__
+
+#include <linux/list_bl.h>
+
+static inline void au_hbl_add(struct hlist_bl_node *node,
+      struct hlist_bl_head *hbl)
+{
+hlist_bl_lock(hbl);
+hlist_bl_add_head(node, hbl);
+hlist_bl_unlock(hbl);
+}
+
+static inline void au_hbl_del(struct hlist_bl_node *node,
+      struct hlist_bl_head *hbl)
+{
+hlist_bl_lock(hbl);
+hlist_bl_del(node);
+hlist_bl_unlock(hbl);
+}
+
+#define au_hbl_for_each(pos, head)					
+for (pos = hlist_bl_first(head);				
+     pos;							
+     pos = pos->next)
+
+static inline unsigned long au_hbl_count(struct hlist_bl_head *hbl)
+{
+unsigned long cnt;
+struct hlist_bl_node *pos;
+   

cnt = 0;
+hlist_bl_lock(hbl);
+au_hbl_for_each(pos, hbl)
+cnt++;
+hlist_bl_unlock(hbl);
+return cnt;
+
+#endif /* __KERNEL__ */
+#endif /* __AUFS_HBL_H__ */
--- linux-4.15.0.orig/fs/aufs/hfsnotify.c
+++ linux-4.15.0/fs/aufs/hfsnotify.c
@@ -0,0 +1,289 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
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+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * fsnotify for the lower directories
+ */
+
+#include "aufs.h"
+
+/* FS_IN_IGNORED is unnecessary */
+static const __u32 AuHfsnMask = (FS_MOVED_TO | FS_MOVED_FROM | FS_DELETE
+ | FS_CREATE | FS_EVENT_ON_CHILD);
+static DECLARE_WAIT_QUEUE_HEAD(au_hfsn_wq);
+static __cacheline_aligned_in_smp atomic64_t au_hfsn_ifree = ATOMIC64_INIT(0);
+
+static void au_hfsn_free_mark(struct fsnotify_mark *mark)
+{
+struct au_hnotify *hn = container_of(mark, struct au_hnotify,
+     hn_mark);
+/* AuDbg("here\n"); */
+au_cache_free_hnotify(hn);
+smp_mb__before_atomic(); /* for atomic64_dec */
+if (atomic64_dec_and_test(&au_hfsn_ifree))
+wake_up(&au_hfsn_wq);
+
+static int au_hfsn_alloc(struct au_hinode *hinode)
+{
+int err;
+struct au_hnotify *hn;
+struct super_block *sb;
+struct au_branch *br;
+struct fsnotify_mark *mark;
+aufs_bindex_t bindex;
+
+hn = hinode->hi_notify;
+sb = hn->hn_aufs_inode->i_sb;
+bindex = au_br_index(sb, hinode->hi_id);
+br = au_sbr(sb, bindex);
+AuDebugOn(!br->br_hfsn);
+
+mark = &hn->hn_mark;
+fsnotify_init_mark(mark, br->br_hfsn->hfsn_group);
+mark->mask = AuHfsnMask;
+/
+ * by udba rename or rmdir, aufs assign a new inode to the known
+ * h_inode, so specify 1 to allow dups.
+ */
+lockdep_off();
+err = fsnotify_add_mark(mark, hinode->hi_inode, /*mnt*/NULL,
+/*allow_dups*/1);
+lockdep_on();
+
+return err;
+
+static int au_hfsn_free(struct au_hinode *hinode, struct au_hnotify *hn)
+{
+struct fsnotify_mark *mark;
+unsigned long long ull;
+struct fsnotify_group *group;
+
+ull = atomic64_inc_return(&au_hfsn_ifree);
+BUG_ON(!ull);
+
+mark = &hn->hn_mark;
+spin_lock(&mark->lock);
+group = mark->group;
+fsnotify_get_group(group);
+spin_unlock(&mark->lock);
+lockdep_off();
+fsnotify_destroy_mark(mark, group);
+fsnotify_put_mark(mark);
+fsnotify_put_group(group);
+lockdep_on();
+
+/* free hn by myself */
+return 0;
+
+
+/* ---------------------------------------------- */
+
+static void au_hfsn_ctl(struct au_hinode *hinode, int do_set)
+{
+struct fsnotify_mark *mark;
+
+mark = &hinode->hi_notify->hn_mark;
+spin_lock(&mark->lock);
+if (do_set) {
+AuDebugOn(mark->mask & AuHfsnMask);
+mark->mask |= AuHfsnMask;
+} else {
+AuDebugOn(!(mark->mask & AuHfsnMask));
+mark->mask &= ~AuHfsnMask;
+}
+spin_unlock(&mark->lock);
+/* fsnotify_recalc_inode_mask(hinode->hi_inode); */
+}
+
+/* ---------------------------------------------- */
+
+/* #define AuDbgHnotify */
+#ifdef AuDbgHnotify
+static char *au_hfsn_name(u32 mask)
+{
+#ifdef CONFIG_AUFS_DEBUG
+#define test_ret(flag)					do {						if (mask & flag)						return #flag;					} while (0)
+test_ret(FS_ACCESS);
+test_ret(FS_MODIFY);
+test_ret(FS_ATTRIB);
+test_ret(FS_CLOSE_WRITE);
+test_ret(FS_CLOSE_NOWRITE);
+test_ret(FS_OPEN);
test_ret(FS_MOVED_FROM);
test_ret(FS_MOVED_TO);
test_ret(FS_CREATE);
test_ret(FS_DELETE);
test_ret(FS_DELETE_SELF);
test_ret(FS_MOVE_SELF);
test_ret(FS_UNMOUNT);
test_ret(FS_Q_OVERFLOW);
test_ret(FS_IN_IGNORED);
test_ret(FS_ISDIR);
test_ret(FS_IN_ONESHOT);
test_ret(FS_EVENT_ON_CHILD);
return "";
#else
return "??";
#endif
}#undef test_ret
}
}#endif
/* ---------------------------------------------------------------------- */

static void au_hfsn_free_group(struct fsnotify_group *group)
{
struct au_br_hfsnotify *hfsn = group->private;

/* AuDbg("here\n"); */
kfree(hfsn);
}

static int au_hfsn_handle_event(struct fsnotify_group *group,
				struct inode *inode,
				struct fsnotify_mark *inode_mark,
				struct fsnotify_mark *vfsmount_mark,
				u32 mask, const void *data, int data_type,
				const unsigned char *file_name, u32 cookie,
				struct fsnotify_iter_info *iter_info)
{
int err;
struct au_hnotify *hnotify,
struct fsnotify_mark *inode_mark,
struct fsnotify_mark *vfsmount_mark,
u32 mask, const void *data, int data_type,
const unsigned char *file_name, u32 cookie,
struct fsnotify_iter_info *iter_info)
{
int err;
struct au_hnotify *hnotify;
struct fsnotify_mark *inode_mark,
struct fsnotify_mark *vfsmount_mark,
u32 mask, const void *data, int data_type,
const unsigned char *file_name, u32 cookie,
struct fsnotify_iter_info *iter_info)
{
int err;
struct au_hnotify *hnotify;
struct fsnotify_mark *inode_mark,
struct fsnotify_mark *vfsmount_mark,
AuDebugOn(data_type != FSNOTIFY_EVENT_INODE);

AuDebugOn(mask & FS_UNMOUNT);
+if (mask & (FS_IN_IGNRED | FS_UNMOUNT))
+goto out;
+
+h_dir = inode;
+h_inode = NULL;
+#ifdef AuDbgHnotify
+au_debug_on();
+if (1 || h_child_qstr.len != sizeof(AUFS_XINO_FNAME) - 1
+    || strncmp(h_child_qstr.name, AUFS_XINO_FNAME, h_child_qstr.len)) {
+AuDbg("i%lu, mask 0x%x %s, hname %.*s, hi%lu\n",
+        h_dir->i_ino, mask, au_hfsn_name(mask),
+        AuLNPair(&h_child_qstr), h_inode ? h_inode->i_ino : 0);
+/* WARN_ON(1); */
+}
+au_debug_off();
+#endif
+
+AuDebugOn(!inode_mark);
+hnotify = container_of(inode_mark, struct au_hnotify, hn_mark);
+err = au_hnotify(h_dir, hnotify, mask, &h_child_qstr, h_inode);
+
+out:
+return err;
+
+static struct fsnotify_ops au_hfsn_ops = {
+    .handle_event	= au_hfsn_handle_event,
+    .free_group_priv	= au_hfsn_free_group,
+    .free_mark	= au_hfsn_free_mark
+};
+
+/* --------------------------------------------------------------- */
+
+static void au_hfsn_fin_br(struct au_branch *br)
+{
+    struct au_br_hfsnotify *hfsn;
+
+hfsn = br->br_hfsn;
+if (hfsn) {
+lockdep_off();
+fsnotify_put_group(hfsn->hfsn_group);
+lockdep_on();
+}
+}
+
+static int au_hfsn_init_br(struct au_branch *br, int perm)
+{
+int err;
struct fsnotify_group *group;
struct au_br_hfsnotify *hfsn;

err = 0;
br->br_hfsn = NULL;
if (!au_br_hnotifyable(perm))
  goto out;
+
err = -ENOMEM;
hfsn = kmalloc(sizeof(*hfsn), GFP_NOFS);
if (unlikely(!hfsn))
  goto out;
+
err = 0;
+group = fsnotify_alloc_group(&au_hfsn_ops);
+if (IS_ERR(group)) {
  +err = PTR_ERR(group);
  +pr_err("fsnotify_alloc_group() failed, %d\n", err);
  +goto out_hfsn;
  +}
+
+group->private = hfsn;
+hfsn->hfsn_group = group;
+br->br_hfn = hfn;
+goto out; /* success */
+
+out_hfsn:
+kfree(hfn);
+out:
+-return err;
+}
+
+static int au_hfsn_reset_br(unsigned int udba, struct au_branch *br, int perm)
+{
  +int err;
  +
  +err = 0;
  +if (!br->br_hfn)
    +err = au_hfsn_init_br(br, perm);
  +
  +return err;
  +}
+
+static void au_hfsn_fin(void)
+{
  +Au DBG("au_hfsn_ifree %ld\n", (long long)atomic64_read(&au_hfsn_ifree));
wait_event(au_hfsn_wq, !atomic64_read(&au_hfsn_ifree));
+
+const struct au_hnotify_op au_hnotify_op = {
+ .ctl= au_hfsn_ctl,
+ .alloc= au_hfsn_alloc,
+ .free= au_hfsn_free,
+ .fin= au_hfsn_fin,
+ .reset_br= au_hfsn_reset_br,
+ .fin_br= au_hfsn_fin_br,
+ .init_br= au_hfsn_init_br
+);
--- linux-4.15.0.orig/fs/aufs/hfsplus.c
+++ linux-4.15.0/fs/aufs/hfsplus.c
@@ -0,0 +1,56 @@
+/*
+ * Copyright (C) 2010-2017 Junjiro R. Okajima
+ *
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+#include "aufs.h"

+struct file *au_h_open_pre(struct dentry *dentry, aufs_bindex_t bindex, 
+ int force_wr)
struct file *h_file;
struct dentry *h_dentry;

h_dentry = au_h_dptr(dentry, bindex);
AuDebugOn(!h_dentry);
AuDebugOn(d_is_negative(h_dentry));

h_file = NULL;
if (au_test_hfsplus(h_dentry->d_sb)
    && d_is_reg(h_dentry))
    h_file = au_h_open(dentry, bindex,
    O_RDONLY | O_NOATIME | O_LARGEFILE,
    /*file*/NULL, force_wr);
return h_file;
}

void au_h_open_post(struct dentry *dentry, aufs_bindex_t bindex,
struct file *h_file)
{
if (h_file) {
    fput(h_file);
    au_sbr_put(dentry->d_sb, bindex);
}

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 */
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 * it under the terms of the GNU General Public License as published by
 * the Free Software Foundation; either version 2 of the License, or
 * (at your option) any later version.
 */
/* This program is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
 * GNU General Public License for more details.
 */
/* You should have received a copy of the GNU General Public License
 * along with this program.  If not, see <http://www.gnu.org/licenses/>.
 */
/* abstraction to notify the direct changes on lower directories
 */
```c
#include "aufs.h"

int au_hn_alloc(struct au_hinode *hinode, struct inode *inode)
{
    int err;
    struct au_hnotify *hn;

    err = -ENOMEM;
    hn = au_cache_alloc_hnotify();
    if (hn) {
        hn->hn_aufs_inode = inode;
        hinode->hi_notify = hn;
        err = au_hnotify_op.alloc(hinode);
        AuTraceErr(err);
        if (unlikely(err)) {
            hinode->hi_notify = NULL;
            au_cache_free_hnotify(hn);
        }
    }
    AuTraceErr(err);
    return err;
}

void au_hn_free(struct au_hinode *hinode)
{
    struct au_hnotify *hn;

    hn = hinode->hi_notify;
    if (hn) {
        hinode->hi_notify = NULL;
        if (au_hnotify_op.free(hinode, hn))
            au_cache_free_hnotify(hn);
    }
}

/* ---------------------------------------------------------------------- */

void au_hn_ctl(struct au_hinode *hinode, int do_set)
{
    struct au_hnotify *hn;
    
    hn = hinode->hi_notify;
    if (hn) {
        hinode->hi_notify = NULL;
        if (au_hnotify_op.free(hinode, hn))
            au_cache_free_hnotify(hn);
    }
    
    /* The upper dir was removed by udba, but the same named
     * dir left. In this case, aufs assignes a new inode
     * number and set the monitor again.
     * For the lower dir, the old monitor is still left.
     */
    if (err == -EEXIST)
        err = 0;
    
    AuTraceErr(err);
    return err;
}

/* */

void au_hn_free(struct au_hinode *hinode)
{
    struct au_hnotify *hn;

    hn = hinode->hi_notify;
    if (hn) {
        hinode->hi_notify = NULL;
        if (au_hnotify_op.free(hinode, hn))
            au_cache_free_hnotify(hn);
    }
    
    /* ------------------------------- */
    void au_hn_ctl(struct au_hinode *hinode, int do_set)
```
void au_hn_reset(struct inode *inode, unsigned int flags)
{
    aufs_bindex_t bindex, bbot;
    struct inode *hi;
    struct dentry *iwhdentry;

    bbot = au_ibbot(inode);
    for (bindex = au_ibtop(inode); bindex <= bbot; bindex++) {
        hi = au_h_iptr(inode, bindex);
        if (!hi)
            continue;
        /* inode_lock_nested(hi, AuLsc_I_CHILD); */
        iwhdentry = au_hi_wh(inode, bindex);
        if (iwhdentry)
            dget(iwhdentry);
        igrab(hi);
        set_h_iptr(inode, bindex, NULL, 0);
        set_h_iptr(inode, bindex, igrab(hi),
            flags & ~AuHi_XINO);
        iput(hi);
        dput(iwhdentry);
        /* inode_unlock(hi); */
    }
}

/* ---------------------------------------------------------------------- */

static int hn_xino(struct inode *inode, struct inode *h_inode)
{
    int err;
    aufs_bindex_t bindex, bbot, bfound, btop;
    struct inode *h_i;

    err = 0;
    if (unlikely(inode->i_ino == AUFS_ROOT_INO)) {
        pr_warn("branch root dir was changed\n");
        goto out;
    }
    bfound = -1;
    bbot = au_ibbot(inode);
    btop = au_ibtop(inode);

    /*(inode_lock_nested(hi, AuLsc_I_CHILD)); */
    iwhdentry = au_hi_wh(inode, bindex);
    if (iwhdentry)
        dget(iwhdentry);
    igrab(hi);
    set_h_iptr(inode, bindex, NULL, 0);
    set_h_iptr(inode, bindex, igrab(hi),
        flags & ~AuHi_XINO);
    iput(hi);
    dput(iwhdentry);
    /* inode_unlock(hi); */
}

/* ---------------------------------------------------------------------- */
+if 0 /* reserved for future use */
+if (bindex == bbot) {
+  /* keep this ino in rename case */
+  goto out;
+}
+#endif
+for (bindex = btop; bindex <= bbot; bindex++)
+if (au_h_iptr(inode, bindex) == h_inode) {
+  bfound = bindex;
+  break;
+}
+if (bfound < 0)
  goto out;
+for (bindex = btop; bindex <= bbot; bindex++) {
+  h_i = au_h_iptr(inode, bindex);
+  if (!h_i)
+    continue;
+  err = au_xino_write(inode->i_sb, bindex, h_i->i_ino, /*ino*/0);
+  /* ignore this error */
+  /* bad action? */
+}
+ /* children inode number will be broken */
+out:
+AuTraceErr(err);
+return err;
+
+static int hn_gen_tree(struct dentry *dentry)
+{
+  int err, i, j, ndentry;
+  struct au_dcsub_pages dpages;
+  struct au_dpage *dpage;
+  struct dentry **dentries;
+  err = au_dpages_init(&dpages, GFP_NOFS);
+  if (unlikely(err))
+    goto out;
+  err = au_dcsub_pages(&dpages, dentry, NULL, NULL);
+  if (unlikely(err))
+    goto out_dpages;
+  for (i = 0; i < dpages.ndpage; i++) {
+    dpage = dpages.dpages + i;
+    dentries = dpage->dentries;
+    for (j = 0; j < dpage->ndentry; j++) {
+      dentry = dentries + j;
+      if (dentry->d_ino == h_inode)
+        continue;
+      err = au_xino_write(dentry->d_inode->i_sb, i, h_inode->i_ino, /*ino*/0);
+      /* ignore this error */
+      /* bad action? */
+    }
+  }
+  /* children inode number will be broken */
+  out_dpages:
+  AuTraceErr(err);
+  return err;
+}
+ndentry = dpage->ndentry;
+for (j = 0; j < ndentry; j++) {
+struct dentry *d;
+
+ d = dentries[j];
+if (IS_ROOT(d))
+ continue;
+
+au_digen_dec(d);
+if (d_really_is_positive(d))
+ /* todo: reset children xino?
+ cached children only? */
+au_iigen_dec(d_inode(d));
+} }
+
+out_dpages:
+au_dpages_free(&dpages);
+
+if 0
+ /* discard children */
+dentry_unhash(dentry);
+dput(dentry);
+endif
+out:
+return err;
+}
+
+static int hn_gen_by_inode(char *name, unsigned int nlen, struct inode *inode,
+ const unsigned int isdir)
+{
+int err;
+struct dentry *d;
+struct qstr *dname;
+
+err = 1;
+if (unlikely(inode->i_ino == AUFS_ROOT_INO))
+{
+pr_warn("branch root dir was changed\n");
+err = 0;
+goto out;
+}
+
+if (!isdir)
+AuDebugOn(!name);
+au_iigen_dec(inode);
spin_lock(&inode->i_lock);
hlist_for_each_entry(d, &inode->i_dentry, d_u.d_alias) {
    spin_lock(&d->d_lock);
    dname = &d->d_name;
    if (dname->len != nlen &
        & memcmp(dname->name, name, nlen)) {
        spin_unlock(&d->d_lock);
        continue;
    }
    err = 0;
    au_digen_dec(d);
    spin_unlock(&d->d_lock);
    break;
}
spin_unlock(&inode->i_lock);
} else {
    au_fset_si(au_sbi(inode->i_sb), FAILED_REFRESH_DIR);
    d = d_find_any_alias(inode);
    if (!d) {
        au_iigen_dec(inode);
        goto out;
    }
    spin_lock(&d->d_lock);
    dname = &d->d_name;
    if (dname->len == nlen && !memcmp(dname->name, name, nlen)) {
        spin_unlock(&d->d_lock);
        err = hn_gen_tree(d);
        spin_lock(&d->d_lock);
    }
    spin_unlock(&d->d_lock);
    dput(d);
}
out:
AuTraceErr(err);
return err;

static int hn_gen_by_name(struct dentry *dentry, const unsigned int isdir) {
    int err;
    if (IS_ROOT(dentry)) {
        pr_warn("branch root dir was changed\n");
        return 0;
    }
    static int hn_gen_by_name(struct dentry *dentry, const unsigned int isdir) {
    int err;
    if (IS_ROOT(dentry)) {
        pr_warn("branch root dir was changed\n");
    return 0;
    }
err = 0;
if (!isdir) {
    au_digen_dec(dentry);
    if (d_really_is_positive(dentry))
        au_iigen_dec(d_inode(dentry));
} else {
    au_fset_si(au_sbi(dentry->d_sb), FAILED_REFRESH_DIR);
    if (d_really_is_positive(dentry))
        err = hn_gen_tree(dentry);}

AuTraceErr(err);
return err;
}

/* ---------------------------------------------------------------------- */

/* hnotify job flags */
#define AuHnJob_XINO0		1
#define AuHnJob_GEN		(1 << 1)
#define AuHnJob_DIRENT(1 << 2)
#define AuHnJob_ISDIR(1 << 3)
#define AuHnJob_TRYXINO0(1 << 4)
#define AuHnJob_MNTPNT(1 << 5)
#define au_ftest_hnjob(flags, name)((flags) & AuHnJob_##name)
#define au_fset_hnjob(flags, name) \
    do { (flags) |= AuHnJob_##name; } while (0)
#define au_fclr_hnjob(flags, name) \
    do { (flags) &= ~AuHnJob_##name; } while (0)

enum {
    AuHn_CHILD,
    AuHn_PARENT,
    AuHnLast
};

+struct au_hnotify_args {
+    struct inode *h_dir, *dir, *h_child_inode;
+    u32 mask;
+    unsigned int flags[AuHnLast];
+    unsigned int h_child_nlen;
+    char h_child_name[];
+};
+
+struct hn_job_args {
+    unsigned int flags;
+    struct inode *inode, *h_inode, *dir, *h_dir;
+    struct dentry *dentry;
+char *h_name;
+int h_nlen;
+};
+
+static int hn_job(struct hn_job_args *a)
+{
+    const unsigned int isdir = au_ftest_hnjob(a->flags, ISDIR);
+    int e;
+
+    /* reset xino */
+    if (au_ftest_hnjob(a->flags, XINO0) && a->inode)
+        hn_xino(a->inode, a->h_inode); /* ignore this error */
+    +
+    if (au_ftest_hnjob(a->flags, TRYXINO0)
+        + &a->inode
+        + &a->h_inode) {
+        vfsub_inode_lock_shared_nested(a->h_inode, AuLsc_I_CHILD);
+        if (!a->h_inode->i_nlink
+            + (a->h_inode->i_state & I_LINKABLE))
+            hn_xino(a->inode, a->h_inode); /* ignore this error */
+            inode_unlock_shared(a->h_inode);
+    }
+
+    /* make the generation obsolete */
+    if (au_ftest_hnjob(a->flags, GEN)) {
+        e = -1;
+        if (a->inode)
+            e = hn_gen_by_inode(a->h_name, a->h_nlen, a->inode,
+                + isdir);
+        if (e && a->dentry)
+            hn_gen_by_name(a->dentry, isdir);
+            /* ignore this error */
+    }
+
+    /* make dir entries obsolete */
+    if (au_ftest_hnjob(a->flags, DIRENT) && a->inode) {
+        struct au_vdir *vdir;
+        vdir = au_ivdir(a->inode);
+        if (vdir)
+            vdir->vd_jiffy = 0;
+            /* IMustLock(a->inode); */
+            /* a->inode->i_version++; */
+    }
+
+    /* can do nothing but warn */
+    if (au_ftest_hnjob(a->flags, MNTPNT)
+        + &a->dentry
+        + &a->h_inode
+        + &a->inode
+        + &a->h_inode) {
&& d_mountpoint(a->dentry))
+pr_warn("mount-point %pd is removed or renamed\n", a->dentry);
+return 0;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static struct dentry *lookup_wlock_by_name(char *name, unsigned int nlen,
+ struct inode *dir)
+{
+struct dentry *dentry, *d, *parent;
+struct qstr *dname;
+
+parent = d_find_any_alias(dir);
+if (!parent)
+return NULL;
+
dentry = NULL;
+spin_lock(&parent->d_lock);
+list_for_each_entry(d, &parent->d_subdirs, d_child) {
+AuDbg("%pd
", d);
+spin_lock_nested(&d->d_lock, DENTRY_D_LOCK_NESTED);
+dname = &d->d_name;
+if (dname->len != nlen || memcmp(dname->name, name, nlen))
+goto cont_unlock;
+if (au_di(d))
+tdigen_dec(d);
+else
+goto cont_unlock;
+if (au_dcount(d) > 0) {
+dentry = dget_dlock(d);
+spin_unlock(&d->d_lock);
+break;
+}
+
+cont_unlock:
+spin_unlock(&d->d_lock);
+}
+spin_unlock(&parent->d_lock);
+dput(parent);
+
+if (dentry)
+di_write_lock_child(dentry);
+
+return dentry;
+}
+static struct inode *lookup_wlock_by_ino(struct super_block *sb,
+aufs_bindex_t bindex, ino_t h_ino)
+{
+struct inode *inode;
+ino_t ino;
+int err;
+
+inode = NULL;
+err = au_xino_read(sb, bindex, h_ino, &ino);
+if (!err && ino)
+inode = ilookup(sb, ino);
+if (!inode)
+goto out;
+
+if (unlikely(inode->i_ino == AUFS_ROOT_INO)) {
+pr_warn("wrong root branch\n");
+iput(inode);
+inode = NULL;
+goto out;
+}
+
+ii_write_lock_child(inode);
+
+out:
+return inode;
+}
+
+static void au_hn_bh(void *_args)
+{
+struct au_hnotify_args *a = _args;
+struct super_block *sb;
+aufs_bindex_t bbot, bfound;
+unsigned char xino, try_iput;
+int err;
+struct inode *inode;
+ino_t h_ino;
+struct hn_job_args args;
+struct dentry *dentry;
+struct au_sbinfo *sbinfo;
+
+AuDbgOn(!_args);
+AuDbgOn(!a->h_dir);
+AuDbgOn(!a->dir);
+AuDbgOn(!a->mask);
+AuDbg("mask 0x%lx, i%lu, hi%lu, hci%lu\n",
+ a->mask, a->dir->i_ino, a->h_dir->i_ino,
+ a->h_child_inode ? a->h_child_inode->i_ino : 0);
+
inode = NULL;
dentry = NULL;
/*
 * do not lock a->dir->i_mutex here
 * because of d_revalidate() may cause a deadlock.
 * */
sb = a->dir->i_sb;
AuDebugOn(!sb);
sbinfo = au_sbi(sb);
AuDebugOn(!sbinfo);
+si_write_lock(sb, AuLock_NOPLMW);
+
+if (au_opt_test(sbinfo->si_mntflags, DIRREN))
+switch (a->mask & FS_EVENTS_POSS_ON_CHILD) {
+case FS_MOVED_FROM:
+case FS_MOVED_TO:
+ AuWarn1("DIRREN with UDBA may not work correctly 
+"for the direct rename(2)/u");
+}
+
+ii_read_lock_parent(a->dir);
+bfound = -1;
+bbot = au_ibbot(a->dir);
+for (bindx = au_ibtop(a->dir); bindx <= bbot; bindx++)
+if (au_h_iptr(a->dir, bindx) == a->h_dir) {
+bfound = bindx;
+break;
+}
+ii_read_unlock(a->dir);
+if (unlikely(bfound < 0))
goto out;
+
xino = !!au_opt_test(au_mntflags(sb), XINO);
+h_ino = 0;
+if (a->h_child_inode)
+h_ino = a->h_child_inode->i_ino;
+
+if (a->h_child_nlen
+ && (au_ftest_hnjob(a->flags[AuHn_CHILD], GEN)
+ || au_ftest_hnjob(a->flags[AuHn_CHILD], MNTPNT)))
dentry = lookup_wlock_by_name(a->h_child_name, a->h_child_nlen,
+ a->dir);
+try_iput = 0;
+if (dentry && d_really_is_positive(dentry))
+inode = d_inode(dentry);
+if (xino && !inode && h_ino
+ && (au_ftest_hnjob(a->flags[AuHn_CHILD], XINO0)
+ || au_ftest_hnjob(a->flags[AuHn_CHILD], TRYXINO0)

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int au_hnotify(struct inode *h_dir, struct au_hnotify *hnotify, u32 mask,
+|| au_ftest_hnjob(a->flags[AuHn_CHILD], GEN))) {
+inode = lookup_wlock_by_ino(sb, bfound, h_ino);
+try_iput = 1;
+}
+
+args.flags = a->flags[AuHn_CHILD];
+args.dentry = dentry;
+args.inode = inode;
+args.h_inode = a->h_child_inode;
+args.dir = a->dir;
+args.h_dir = a->h_dir;
+args.h_name = a->h_child_name;
+err = hn_job(&args);
+if (dentry) {
+if (au_di(dentry))
+di_write_unlock(dentry);
+dput(dentry);
+}
+if (inode && try_iput) {
+ii_write_unlock(inode);
+iput(inode);
+}
+
+ii_write_lock_parent(a->dir);
+args.flags = a->flags[AuHn_PARENT];
+args.dentry = NULL;
+args.inode = a->dir;
+args.h_inode = a->h_dir;
+args.dir = NULL;
+args.h_dir = NULL;
+args.h_name = NULL;
+args.h_nlen = 0;
+err = hn_job(&args);
+ii_write_unlock(a->dir);
+out:
+iput(a->h_child_inode);
+iput(a->h_dir);
+iput(a->dir);
+si_write_unlock(sb);
+au_nwt_done(&sbinfo->si_nowait);
+kfree(a);
+}
+
+/* ---------------------------------------------------------------------- */

int au_hnotify(struct inode *h_dir, struct au_hnotify *hnotify, u32 mask,
+ struct qstr *h_child_qstr, struct inode *h_child_inode)
+
+int err, len;
+unsigned int flags[AuHnLast], f;
+unsigned char isdir, isroot, wh;
+struct inode *dir;
+struct au_hnotify_args *args;
+char *p, *h_child_name;
+
+err = 0;
+AuDebugOn(!hnotify || !hnotify->hn_aufs_inode);
+dir = igrab(hnotify->hn_aufs_inode);
+if (!dir)
+    goto out;
+
+isroot = (dir->i_ino == AUFS_ROOT_INO);
+wh = 0;
+h_child_name = (void *)h_child_qstr->name;
+len = h_child_qstr->len;
+if (h_child_name) {
+    if (len > AUFS_WH_PFX_LEN
+        && !memcmp(h_child_name, AUFS_WH_PFX, AUFS_WH_PFX_LEN)) {
+        h_child_name += AUFS_WH_PFX_LEN;
+        len -= AUFS_WH_PFX_LEN;
+        wh = 1;
+    }
+
+    isdir = 0;
+    if (h_child_inode)
+        isdir = !!S_ISDIR(h_child_inode->i_mode);
+    flags[AuHn_PARENT] = AuHnJob_ISDIR;
+    flags[AuHn_CHILD] = 0;
+    if (isdir)
+        flags[AuHn_CHILD] = AuHnJob_ISDIR;
+    au_fset_hnjob(flags[AuHn_PARENT], DIRENT);
+    au_fset_hnjob(flags[AuHn_CHILD], GEN);
+    switch (mask & FS_EVENTS_POSS_ON_CHILD) {
+        case FS_MOVED_FROM:
+            AuDebugOn(!h_child_name);
+            break;
+        *
+        case FS_CREATE:
+            AuDebugOn(!h_child_name);
+            break;
+        *
/*
 * aufs never be able to get this child inode.
 * revalidation should be in d_revalidate()
 * by checking i_nlink, i_generation or d_unhashed().
 */
AuDebugOn(!h_child_name);
auf_set_hnjob(flags[AuHn_CHILD], TRYXINO0);
auf_set_hnjob(flags[AuHn_CHILD], MNTPNT);
break;
+
default:
+AuDebugOn(1);
+
+if (wh)
+h_child_inode = NULL;
+
+err = -ENOMEM;
 */ input() and kfree() will be called in au_hnotify() */
+args = kmalloc(sizeof(*args) + len + 1, GFP_NOFS);
+if (unlikely(!args)) {
+AuErr1("no memory\n");
iput(dir);
goto out;
+}
+args->flags[AuHn_PARENT] = flags[AuHn_PARENT];
+args->flags[AuHn_CHILD] = flags[AuHn_CHILD];
+args->mask = mask;
+args->dir = dir;
+args->h_dir = igrab(h_dir);
+if (h_child_inode)
+h_child_inode = igrab(h_child_inode); /* can be NULL */
+args->h_child_inode = h_child_inode;
+args->h_child_nlen = len;
+if (len) {
+p = (void *)args;
+p += sizeof(*args);
+memcpy(p, h_child_name, len);
p[len] = 0;
+}
+
+ /* NFS fires the event for silly-renamed one from kworker */
+f = 0;
+if (!dir->i_nlink
+    || (au_test_nfs(h_dir->i_sb) && (mask & FS_DELETE)))
+f = AuWkq_NEST;
+err = au_wkq_nowait(au_hn_bh, args, dir->i_sb, f);
+if (unlikely(err)) {
pr_err("wkq %d\n", err);
iput(args->h_child_inode);
iput(args->h_dir);
iput(args->dir);
kfree(args);
}
+
+out:
+return err;
+
+/* ---------------------------------------------------------------------- */

int au_hnotify_reset_br(unsigned int udba, struct au_branch *br, int perm)
+
+int err;
+
+AuDebugOn(!(udba & AuOptMask_UDBA));
+
+err = 0;
+if (au_hnotify_op.reset_br)
+err = au_hnotify_op.reset_br(udba, br, perm);
+
+return err;
+
+int au_hnotify_init_br(struct au_branch *br, int perm)
+
+int err;
+
+err = 0;
+if (au_hnotify_op.init_br)
+err = au_hnotify_op.init_br(br, perm);
+
+return err;
+
+void au_hnotify_fin_br(struct au_branch *br)
+
+if (au_hnotify_op.fin_br)
+au_hnotify_op.fin_br(br);
+
+static void au_hn_destroy_cache(void)
+
+kmem_cache_destroy(au_cache[AuCache_HNOTIFY]);
+au_cache[AuCache_HNOTIFY] = NULL;
int __init au_hnotify_init(void)
{
    int err;
    
    err = -ENOMEM;
    au_cache[AuCache_HNOTIFY] = AuCache(au_hnotify);
    if (au_cache[AuCache_HNOTIFY]) {
        err = 0;
        if (au_hnotify_op.init)
            err = au_hnotify_op.init();
        if (unlikely(err))
            au_hn_destroy_cache();
    }
    AuTraceErr(err);
    return err;
}

void au_hnotify_fin(void)
{
    if (au_hnotify_op.fin)
        au_hnotify_op.fin();
    /* cf. au_cache_fin() */
    if (au_cache[AuCache_HNOTIFY])
        au_hn_destroy_cache();
}

--- linux-4.15.0.orig/fs/aufs/i_op.c
+++ linux-4.15.0/fs/aufs/i_op.c
@@ -0,0 +1,1459 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+ * inode operations (except add/del/rename)
+ */
+
+#include <linux/device_cgroup.h>
+#include <linux/fs_stack.h>
+#include <linux/namei.h>
+#include <linux/security.h>
+#include "aufs.h"
+
+static int h_permission(struct inode *h_inode, int mask,
+struct path *h_path, int brperm)
+
+int err;
+const unsigned char write_mask = (!(mask & (MAY_WRITE | MAY_APPEND)));
+
+err = -EPERM;
+if (write_mask && IS_IMMUTABLE(h_inode))
+    goto out;
+
+err = -EACCES;
+if (((mask & MAY_EXEC)
+     && S_ISREG(h_inode->i_mode)
+     && (path_noexec(h_path)
+         || !(h_inode->i_mode & S_IXUGO))))
+    goto out;
+
+/*
+ * - skip the lower fs test in the case of write to ro branch.
+ * - nfs dir permission write check is optimized, but a policy for
+ *   link/rename requires a real check.
+ * - nfs always sets SB_POSIXACL regardless its mount option 'noacl.'
+ * - in this case, generic_permission() returns -EOPNOTSUPP.
+ */
+if (((write_mask && !au_br_writable(brperm))
+     && S_ISREG(h_inode->i_mode)
+     && !path_noexec(h_path)
+     && !(h_inode->i_mode & S_IXUGO)))
+    goto out;
+
+/*
+ * AuLabel(generic_permission); */
+AuDbg("get_acl %p
", h_inode->i_op->get_acl); */
+err = generic_permission(h_inode, mask);
+if (err == -EOPNOTSUPP && au_test_nfs_noacl(h_inode))
+    err = h_inode->i_op->permission(h_inode, mask);
+AuTraceErr(err);
+} else {
+/* AuLabel(h_inode->permission); */
+err = h_inode->i_op->permission(h_inode, mask);
+AuTraceErr(err);
+}
+ if (!err)
+ err = devgroup_inode_permission(h_inode, mask);
+ if (!err)
+ err = security_inode_permission(h_inode, mask);
+ 
+ #if 0
+ #if (!err) {
+ /* todo: do we need to call ima_path_check()? */
+ struct path h_path = {
+ .dentry =
+ .mnt = h_mnt
+ };
+ err = ima_path_check(&h_path,
+ mask & (MAY_READ | MAY_WRITE | MAY_EXEC),
+ IMA_COUNT_LEAVE);
+ }
+ #endif
+ 
+ out:
+ return err;
+ }
+
+ static int aufs_permission(struct inode *inode, int mask)
+ {
+ int err;
+ aufs_bindex_t bindex, bbot;
+ const unsigned char isdir = !!S_ISDIR(inode->i_mode),
+ write_mask = !!(mask & (MAY_WRITE | MAY_APPEND));
+ struct inode *h_inode;
+ struct super_block *sb;
+ struct au_branch *br;
+ 
+ /* todo: support rcu-walk? */
+ #if (mask & MAY_NOT_BLOCK)
+ return -ECHILD;
+ 
+ sb = inode->i_sb;
+ si_read_lock(sb, AuLock_FLUSH);
+ ii_read_lock_child(inode);
+ 
+ /* todo: do we need to call au_iigen_test()? */
+ if (unlikely(err))
+ goto out;
+ 
+ if (isdir
+ || write_mask
+ ||
+ i

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+    || au_opt_test(au_mntflags(sb), DIRPERM1))
+    { err = au_busy_or_stale();
+    h_inode = au_h_ipt(inode, au_ibtop(inode));
+    if (unlikely(!h_inode
+              || (h_inode->i_mode & S_IFMT)
+              != (inode->i_mode & S_IFMT)))
+        goto out;
+    
+    err = 0;
+    bindex = au_ibtop(inode);
+    br = au_sbr(sb, bindex);
+    err = h_permission(h_inode, mask, &br->br_path, br->br_perm);
+    if (write_mask
+        & & !err
+        & & !special_file(h_inode->i_mode))
+        /* test whether the upper writable branch exists */
+        err = -EROFS;
+    for (; bindex >= 0; bindex--)
+        if (!au_br_rdonly(au_sbr(sb, bindex)))
+            err = 0;
+            break;
+        }
+    }
+    goto out;
+
+    /* non-write to dir */
+    err = 0;
+    bbott = au_ibbot(inode);
+    for (bindex = au_ibtop(inode); !err && bindex <= bbott; bindex++)
+    {
+        h_inode = au_h_ipt(inode, bindex);
+        if (h_inode)
+        {
+            err = au_busy_or_stale();
+            if (unlikely(!S_ISDIR(h_inode->i_mode)))
+                break;
+            br = au_sbr(sb, bindex);
+            err = h_permission(h_inode, mask, &br->br_path,
+                               &br->br_perm);
+            if (write_mask
+                & & !err
+                & & !special_file(h_inode->i_mode))
+                /* test whether the upper writable branch exists */
+                err = -EROFS;
+            for (; bindex >= 0; bindex--)
+                if (!au_br_rdonly(au_sbr(sb, bindex)))
+                    err = 0;
+                    break;
+                }
+            }
+        }
+    out:
+    ii_read_unlock(inode);
+    si_read_unlock(sb);
+    return err;
static struct dentry *aufs_lookup(struct inode *dir, struct dentry *dentry,
  unsigned int flags)
{
  struct dentry *ret, *parent;
  struct inode *inode;
  struct super_block *sb;
  int err, npositive;

  IMustLock(dir);

  /* todo: support rcu-walk? */
  ret = ERR_PTR(-ECHILD);
  if (flags & LOOKUP_RCU)
    goto out;
  ret = ERR_PTR(-ENAMETOOLONG);
  if (unlikely(dentry->d_name.len > AUFS_MAX_NAMELEN))
    goto out;
  sb = dir->i_sb;
  err = si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
  ret = ERR_PTR(err);
  if (unlikely(err))
    goto out;
  err = au_di_init(dentry);
  ret = ERR_PTR(err);
  if (unlikely(err))
    goto out_si;
  inode = NULL;
  npositive = 0; /* suppress a warning */
  parent = dentry->d_parent; /* dir inode is locked */
  di_read_lock_parent(parent, AuLock_IR);
  err = au_alive_dir(parent);
  if (!err)
    err = au_digen_test(parent, au_sigen(sb));
  if (!err) {
    /* regardless LOOKUP_CREATE, always ALLOW_NEG */
    npositive = au_lkup_dentry(dentry, au_dbtop(parent),
      AuLkup_ALLOW_NEG);
    +
    +inode = NULL;
    +npositive = 0; /* suppress a warning */
    +parent = dentry->d_parent; /* dir inode is locked */
    +di_read_lock_parent(parent, AuLock_IR);
    +err = au_alive_dir(parent);
    +if (!err) {
      /* regardless LOOKUP_CREATE, always ALLOW_NEG */
      +npositive = au_lkup_dentry(dentry, au_dbtop(parent),
        +AuLkup_ALLOW_NEG);
      +err = npositive;
      +}
    +di_read_unlock(parent, AuLock_IR);
    +ret = ERR_PTR(err);
    +if (unlikely(err < 0))
goto out_unlock;
+
+if (npositive) {
+inode = au_new_inode(dentry, /*must_new*/0);
+if (IS_ERR(inode)) {
+ret = (void *)inode;
+inode = NULL;
+goto out_unlock;
+}
+}
+
+if (inode)
+atomic_inc(&inode->i_count);
+ret = d_splice_alias(inode, dentry);
+#if 0
+if (unlikely(d_need_lookup(dentry))) {
+spin_lock(&dentry->d_lock);
+dentry->d_flags &= ~DCACHE_NEED_LOOKUP;
+spin_unlock(&dentry->d_lock);
+} else
+#endif
+if (inode) {
+if (!IS_ERR(ret)) {
+iput(inode);
+if (ret && ret != dentry)
+ii_write_unlock(inode);
+} else {
+ii_write_unlock(inode);
+iput(inode);
+inode = NULL;
+}
+}
+
+out_unlock:
+di_write_unlock(dentry);
+out_si:
+si_read_unlock(sb);
+out:
+return ret;
+}
+
+/* ---------------------------------------------------------------------- */
+
+struct aopen_node {
+struct hlist_bl_node hblist;
+struct file *file, *h_file;
+};
+static int au_do_aopen(struct inode *inode, struct file *file)
+{  
+  struct hlist_bl_head *aopen;
+  struct hlist_bl_node *pos;
+  struct aopen_node *node;
+  struct au_do_open_args args = {
+    .aopen= 1,
+    .open= au_do_open_nondir
+ };
+  
+  aopen = &au_sbi(inode->i_sb)->si_aopen;
+  hlist_bl_lock(aopen);
+  hlist_bl_for_each_entry(node, pos, aopen, hblist)
+    if (node->file == file) {
+      args.h_file = node->h_file;
+      break;
+    }
+  hlist_bl_unlock(aopen);
+  /* AuDebugOn(!args.h_file); */
+  
+  return au_do_open(file, &args);
+}
+
+static int aufs_atomic_open(struct inode *dir, struct dentry *dentry, struct file *file, unsigned int open_flag, umode_t create_mode, int *opened)
+{
+  int err, unlocked, h_opened = *opened;
+  unsigned int lkup_flags;
+  struct dentry *parent, *d;
+  struct hlist_bl_head *aopen;
+  struct vfsub_aopen_args args = {
+    .open_flag= open_flag,
+    .create_mode= create_mode,
+    .opened= &h_opened
+  };
+  struct aopen_node aopen_node = {
+    .file= file
+  };
+  
+  IMustLock(dir);
+  AuDbg("open_flag 0%o\n", open_flag);
+  AuDbgDentry(dentry);
+  
+  err = 0;
+  if (!au_di(dentry)) {
+    lkup_flags = LOOKUP_OPEN;
+    if (open_flag & O_CREAT)
lkup_flags |= LOOKUP_CREATE;
+d = aufs_lookup(dir, dentry, lkup_flags);
+if (IS_ERR(d)) {
+err = PTR_ERR(d);
+AuTraceErr(err);
+goto out;
+} else if (d) {
+/*
+ * obsoleted dentry found.
+ * another error will be returned later.
+ */
+d_drop(d);
+AuDbgDentry(d);
+dput(d);
+}
+AuDbgDentry(dentry);
+}
+if (d_is_positive(dentry)
+    || d_unhashed(dentry)
+    || d_unlinked(dentry)
+    || !(open_flag & O_CREAT))
+goto out_no_open;
+unlocked = 0;
+err = aufs_read_lock(dentry, AuLock_DW | AuLock_FLUSH | AuLock_GEN);
+if (unlikely(err))
+goto out_unlock;
+parent = dentry->d_parent;/* dir is locked */
+di_write_lock_parent(parent);
+err = au_lkup_dentry(dentry, /*btop*/0, AuLkup_ALLOW_NEG);
+if (unlikely(err))
+goto out_unlock;
+AuDbgDentry(dentry);
+if (d_is_positive(dentry))
+goto out_unlock;
+args.file = get_empty_filp();
+err = PTR_ERR(args.file);
+if (IS_ERR(args.file))
+goto out_unlock;
+args.file->f_flags = file->f_flags;
+err = au_aopen_or_create(dir, dentry, &args);
+AuTraceErr(err);
+AuDbgFile(args.file);
+if (unlikely(err < 0)) {
+if (h_opened & FILE_OPENED)
+fput(args.file);
+else
+put_filp(args.file);
+goto out_unlock;
+}
+di_write_unlock(parent);
+di_write_unlock(dentry);
+unlocked = 1;
+
+/* some filesystems don't set FILE_CREATED while succeeded? */
+*opened |= FILE_CREATED;
+if (h_opened & FILE_OPENED)
+aopen_node.h_file = args.file;
+else {
+put_filp(args.file);
+args.file = NULL;
+}
+aopen = &au_sbi(dir->i_sb)->si_aopen;
+au_hbl_add(&aopen_node.hblist, aopen);
+err = finish_open(file, dentry, au_do_aopen, opened);
+au_hbl_del(&aopen_node.hblist, aopen);
+AuTraceErr(err);
+AuDbgFile(file);
+if (aopen_node.h_file)
+fput(aopen_node.h_file);
+
+out_unlock:
+if (unlocked)
+si_read_unlock(dentry->d_sb);
+else {
+di_write_unlock(parent);
+aufs_read_unlock(dentry, AuLock_DW);
+}
+AuDbgDentry(dentry);
+if (unlikely(err < 0))
+goto out;
+out_no_open:
+if (err >= 0 && !(*opened & FILE_CREATED)) {
+AuLabel(out_no_open);
+dget(dentry);
+err = finish_no_open(file, dentry);
+}
+out:
+AuDbg("%pd%s%s\n", dentry,
+ (*opened & FILE_CREATED) ? " created" : "",
+ (*opened & FILE_OPENED) ? " opened" : "");
+AuTraceErr(err);
+return err;
+
+/* */
+/* */
+*---------------------------------------------------------------------*/
+
+static int au_wr_dir_cpup(struct dentry *dentry, struct dentry *parent,
+    const unsigned char add_entry, aufs_bindex_t bcpup,
+    aufs_bindex_t btop)
+{
+  int err;
+
+  struct dentry *h_parent;
+  struct inode *h_dir;
+
+  if (add_entry)
+    IMustLock(d_inode(parent));
+  else
+    di_write_lock_parent(parent);
+  
+  err = 0;
+  if (!au_h_dptr(parent, bcpup)) {
+    if (btop > bcpup)
+      err = au_cpup_dirs(dentry, bcpup);
+    else if (btop < bcpup)
+      err = au_cpdown_dirs(dentry, bcpup);
+    else
+      BUG();
+  }
+  if (!err && add_entry && !au_ftest_wrdir(add_entry, TMPFILE)) {
+    h_parent = au_h_dptr(parent, bcpup);
+    h_dir = d_inode(h_parent);
+    vfsub_inode_lock_shared_nested(h_dir, AuLsc_I_PARENT);
+    err = au_lkup_neg(dentry, bcpup, /*wh*/0);
+    /* todo: no unlock here */
+    inode_unlock_shared(h_dir);
+    
+    AuDbg("bcpup %d\n", bcpup);
+    if (!err) {
+      if (d_really_is_negative(dentry))
+        au_set_h_dptr(dentry, btop, NULL);
+      au_update_dbrange(dentry, /*do_put_zero*/0);
+    }
+  }
+  
+  if (!add_entry)
+    di_write_unlock(parent);
+  if (!err)
err = bcpup; /* success */
+
+AuTraceErr(err);
+return err;
+}
+
+/*
+ * decide the branch and the parent dir where we will create a new entry.
+ * returns new bindex or an error.
+ */
+int au_wr_dir(struct dentry *dentry, struct dentry *src_dentry,
+ struct au_wr_dir_args *args)
+{
+int err;
+unsigned int flags;
+aufs_bindex_t bcpup, btop, src_btop;
+const unsigned char add_entry
+  = au_ftest_wrdir(args->flags, ADD_ENTRY)
+  | au_ftest_wrdir(args->flags, TMPFILE);
+struct super_block *sb;
+struct dentry *parent;
+struct au_sbinfo *sbinfo;
+
+sb = dentry->d_sb;
+sbinfo = au_sbi(sb);
+parent = dget_parent(dentry);
+btop = au_dbtop(dentry);
+bcpup = btop;
+if (args->force_btgt < 0) {
+  if (src_dentry) {
+    src_btop = au_dbtop(src_dentry);
+    if (src_btop < btop)
+      bcpup = src_btop;
+  } else if (add_entry) {
+    flags = 0;
+    if (au_ftest_wrdir(args->flags, ISDIR))
+      au_fset_wbr(flags, DIR);
+    err = AuWbrCreate(sbinfo, dentry, flags);
+    bcpup = err;
+  }
+  else if (add_entry) {
+    if (au_ftest_wrdir(args->flags, ISDIR))
+      au_fset_wbr(flags, DIR);
+    err = AuWbrCreate(sbinfo, dentry, flags);
+    bcpup = err;
+  }
+  
+  if (bcpup < 0 || au_test_ro(sb, bcpup, d_inode(dentry))) {
+    if (add_entry)
+      err = AuWbrCopyup(sbinfo, dentry);
+    else {
+      if (!IS_ROOT(dentry)) {
+        di_read_lock_parent(parent, !AuLock_IR);
+      }
+    }
+  }
+}
+else if (add_entry) {
+  if (arg->flags & ADD_ENTRY)
+    err = AuWbrCreate(sbinfo, dentry, flags);
+  else if (!IS_ROOT(dentry)) {
+    di_read_lock_parent(parent, !AuLock_IR);
+  }
+  return err;
+}
+
+err = AuTraceErr(err);
+return err;
+}
err = AuWbrCopyup(sbinfo, dentry);
+di_read_unlock(parent, !AuLock_IR);
+} else
+err = AuWbrCopyup(sbinfo, dentry);
+
+bcx = err;
+if (unlikely(err < 0))
+goto out;
+
+AuDbg("btop %d, bcx %d\n", btop, bcx);
+err = bcx;
+if (bcx == btop)
+goto out; /* success */
+
+/* copyup the new parent into the branch we process */
+err = au_wr_dir_cpup(dentry, parent, add_entry, bcx, btop);
+if (err >= 0) {
+AuDbg("add_entry
+ &\& !au_ftest_wrdir(args->flags, TMPFILE)
+ &\& !au_h_dptr(dentry, bcx))
+}
+
+out:
+dput(parent);
+return err;
+
+/* ----------------------------------------- */
+
+void au_pin_hdir_unlock(struct au_pin *p)
+{
+if (p->hdir)
+au_hn_inode_unlock(p->hdir);
+}
+
+int au_pin_hdir_lock(struct au_pin *p)
+{
+int err;
+}
```c
+ err = 0;
+ if (!p->hdir)
+ goto out;
+ /* even if an error happens later, keep this lock */
+ au_hn_inode_lock_nested(p->hdir, p->lsc_hi);
+ + err = -EBUSY;
+ if (unlikely(p->hdir->hi_inode != d_inode(p->h_parent)))
+ goto out;
+ + err = 0;
+ if (p->h_dentry)
+ err = au_h_verify(p->h_dentry, p->udba, p->hdir->hi_inode,
+ p->h_parent, p->br);
+ + out:
+ return err;
+ }
+
+ int au_pin_hdir_relock(struct au_pin *p)
+ {
+ int err, i;
+ struct inode *h_i;
+ struct dentry *h_d[] = {
+ p->h_dentry,
+ p->h_parent
+ };
+ + err = au_pin_hdir_lock(p);
+ if (unlikely(err))
+ goto out;
+ for (i = 0; !err && i < sizeof(h_d)/sizeof(*h_d); i++) {
+ if (!h_d[i])
+ continue;
+ if (d_is_positive(h_d[i])) {
+ h_i = d_inode(h_d[i]);
+ err = !h_i->i_nlink;
+ };
+ + out:
+ return err;
+ }
+
+ static void au_pin_hdir_set_owner(struct au_pin *p, struct task_struct *task)
```
+{  
+  #if !defined(CONFIG_RWSEM_GENERIC_SPINLOCK) && defined(CONFIG_RWSEM_SPIN_ON_OWNER)  
+  p->hdir->hi_inode->i_rwsem.owner = task;  
+  +#endif  
+  +}  
+  +void au_pin_hdir_acquire_nest(struct au_pin *p)  
+  +{  
+  +  +if (p->hdir) {  
+  +rwsem_acquire_nest(&p->hdir->hi_inode->i_rwsem.dep_map,  
+ + p->lsc_hi, 0, NULL, _RET_IP_);  
+ +au_pin_hdir_set_owner(p, current);  
+ +}  
+ +}  
+ +  
+void au_pin_hdir_release(struct au_pin *p)  
+{  
+  +if (p->hdir) {  
+  +au_pin_hdir_set_owner(p, p->task);  
+  +rwsem_release(&p->hdir->hi_inode->i_rwsem.dep_map, 1, _RET_IP_);  
+ +}  
+ +}  
+ +  
+struct dentry *au_pinned_h_parent(struct au_pin *pin)  
+{  
+  +if (pin && pin->parent)  
+  +return au_h_dptr(pin->parent, pin->bindx);  
+  +return NULL;  
+ +}  
+ +  
+void au_unpin(struct au_pin *p)  
+{  
+  +if (p->hdir)  
+  +au_pin_hdir_unlock(p);  
+  +if (p->h_mnt && au_ftest_pin(p->flags, MNT_WRITE))  
+  +vfsub_mnt_drop_write(p->h_mnt);  
+  +if (!p->hdir)  
+  +return;  
+  +  
+  +di_read_unlock(p->parent, AuLock_IR);  
+  +iuput(p->hdir->hi_inode);  
+  +duput(p->parent);  
+  +p->parent = NULL;  
+  +p->hdir = NULL;  
+  +p->h_mnt = NULL;  
+  +/* do not clear p->task */  
+ +}
int au_do_pin(struct au_pin *p) {
    int err;
    struct super_block *sb;
    struct inode *h_dir;

    err = 0;
    sb = p->dentry->d_sb;
    p->br = au_sbr(sb, p->bindex);
    if (IS_ROOT(p->dentry)) {
        if (au_ftest_pin(p->flags, MNT_WRITE)) {
            p->h_mnt = au_br_mnt(p->br);
            err = vfsub_mnt_want_write(p->h_mnt);
            if (unlikely(err)) {
                au_fclr_pin(p->flags, MNT_WRITE);
                goto out_err;
            }
            goto out;
        }
    }
    p->h_dentry = NULL;
    if (p->bindex <= au_dbbot(p->dentry))
        p->h_dentry = au_h_dptr(p->dentry, p->bindex);
    p->parent = dget_parent(p->dentry);
    if (!au_ftest_pin(p->flags, DI_LOCKED))
        di_read_lock(p->parent, AuLock_IR, p->lsc_di);
    h_dir = NULL;
    p->h_parent = au_h_dptr(p->parent, p->bindex);
    if (p->hdir)
        h_dir = p->hdir->hi_inode;
    /*
     * udba case, or
     * if DI_LOCKED is not set, then p->parent may be different
     * and h_parent can be NULL.
     */
    if (unlikely(!p->hdir || !h_dir || !p->h_parent)) {
        err = -EBUSY;
        if (!au_ftest_pin(p->flags, DI_LOCKED))
            di_read_unlock(p->parent, AuLock_IR);
        dput(p->parent);
        p->parent = NULL;
        goto out_err;
    }
    p->h_dentry = NULL;
    p->h_parent = au_h_dptr(p->parent, p->bindex);
    p->hdir = au_hi(d_inode(p->parent), p->bindex);
    if (p->hdir)
        h_dir = p->hdir->hi_inode;
    /*
     * udba case, or
     * if DI_LOCKED is not set, then p->parent may be different
     * and h_parent can be NULL.
     */
    if (unlikely(!p->hdir || !h_dir || !p->h_parent)) {
        err = -EBUSY;
        if (!au_ftest_pin(p->flags, DI_LOCKED))
            di_read_unlock(p->parent, AuLock_IR);
        dput(p->parent);
        p->parent = NULL;
        goto out_err;
    }
}
if (au_ftest_pin(p->flags, MNT_WRITE)) {
    p->h_mnt = au_br_mnt(p->br);
    err = vfsub_mnt_want_write(p->h_mnt);
    if (unlikely(err)) {
        au_fclr_pin(p->flags, MNT_WRITE);
        if (!au_ftest_pin(p->flags, DI_LOCKED))
            di_read_unlock(p->parent, AuLock_IR);
        dput(p->parent);
        p->parent = NULL;
        goto out_err;
    }
}

au_igrab(h_dir);
err = au_pin_hdir_lock(p);
if (!err)
    goto out; /* success */

au_unpin(p);

out_err:
pr_err("err %d\n", err);
err = au_busy_or_stale();
out:
return err;
}

void au_pin_init(struct au_pin *p, struct dentry *dentry,
		 aufs_bindex_t bindex, int lsc_di, int lsc_hi,
		 unsigned int udba, unsigned char flags)
{
    p->dentry = dentry;
    p->udba = udba;
    p->lsc_di = lsc_di;
    p->lsc_hi = lsc_hi;
    p->flags = flags;
    p->bindex = bindex;
    p->parent = NULL;
    p->hdir = NULL;
    p->h_mnt = NULL;
    p->h_dentry = NULL;
    p->h_parent = NULL;
    p->br = NULL;
    p->task = current;
int au_pin(struct au_pin *pin, struct dentry *dentry, aufs_bindex_t bindex,
   unsigned int udba, unsigned char flags)
{
    au_pin_init(pin, dentry, bindex, AuLsc_DI_PARENT, AuLsc_I_PARENT2,
             udba, flags);
    return au_do_pin(pin);
}

/* ---------------------------------------------------------------------- */

/* ->setattr() and ->getattr() are called in various cases.
 * chmod, stat: dentry is revalidated.
 * fchmod, fstat: file and dentry are not revalidated, additionally they may be
 * unhashed.
 * for ->setattr(), ia->ia_file is passed from ftruncate only.
 * */
/* todo: consolidate with do_refresh() and simple_reval_dpath() */
int au_reval_for_attr(struct dentry *dentry, unsigned int sigen)
{
    int err;
    struct dentry *parent;

    err = 0;
    if (au_digen_test(dentry, sigen)) {
        parent = dget_parent(dentry);
        di_read_lock_parent(parent, AuLock_IR);
        err = au_refresh_dentry(dentry, parent);
        di_read_unlock(parent, AuLock_IR);
        dput(parent);
    }
    AuTraceErr(err);
    return err;
}

int au_pin_and_icpup(struct dentry *dentry, struct iattr *ia,
            struct au_icpup_args *a)
{
    int err;
    loff_t sz;
    aufs_bindex_t btop, ibtop;
    struct dentry *hi_wh, *parent;
    struct inode *inode;
    struct au_wr_dir_args wr_dir_args = {
        .force_btgt = -1,
.flags = 0
+
+if (d_is_dir(dentry))
+au_fset_wdir(wr_dir_args.flags, ISDIR);
+/* plink or hi_wh() case */
+btop = au_dbtop(dentry);
+inode = d_inode(dentry);
+ibtop = au_ibtop(inode);
+if (btop != ibtop & & !au_test_ro(inode->i_sb, ibtop, inode))
+wr_dir_args.force_btgt = ibtop;
+err = au_wr_dir(dentry, /*src_dentry*/NULL, &wr_dir_args);
+if (unlikely(err < 0))
+goto out;
+a->btgt = err;
+if (err != btop)
+au_fset_icpup(a->flags, DID_CPUP);
+
+err = 0;
+a->pin_flags = AuPin_MNT_WRITE;
+parent = NULL;
+if (!IS_ROOT(dentry)) {
+au_fset_pin(a->pin_flags, DI_LOCKED);
+parent = dget_parent(dentry);
+di_write_lock_parent(parent);
+}
+
+err = au_pin(&a->pin, dentry, a->btgt, a->udba, a->pin_flags);
+if (unlikely(err))
+goto out_parent;
+
+sz = -1;
+a->h_path.dentry = au_h_dptr(dentry, btop);
+a->h_inode = d_inode(a->h_path.dentry);
+if (ia && (ia->ia_valid & ATTR_SIZE)) {
+vfsub_inode_lock_shared_nested(a->h_inode, AuLsc_I_CHILD);
+if (ia->ia_size < i_size_read(a->h_inode))
+sz = ia->ia_size;
+inode_unlock_shared(a->h_inode);
+}
+
+hi_wh = NULL;
+if (au_fset_icpup(a->flags, DID_CPUP) & & d_unlinked(dentry)) {
+hi_wh = au_hi_wh(inode, a->btgt);
+if (!hi_wh) {
+struct au_cp_generic cpg = {
+.dentry= dentry,
+.bdst= a->btgt,
+}
+bsrc = -1,
+len = sz,
+pin = &a->pin
+);
+err = au_sio_cpup_wh(&cpg, /*file*/NULL);
+if (unlikely(err))
+goto out_unlock;
+hi_wh = au_hi_wh(inode, a->btgt);
+/* todo: revalidate hi_wh? */
+
+if (parent) {
+au_pin_set_parent_lflag(&a->pin, /*lflag*/0);
+di_downgrade_lock(parent, AuLock_IR);
+dput(parent);
+parent = NULL;
+}
+}
+if (!au_ftest_icpup(a->flags, DID_CPUP))
+goto out; /* success */
+
+if (!d_unhashed(dentry)) {
+struct au_cp_generic cpg = {
+.dentry = dentry,
+.bdst = a->btgt,
+.bsrc = btop,
+.len = sz,
+.pin = &a->pin,
+.flags = AuCpup_DTIME | AuCpup_HOPEN
+};
+err = au_sio_cpup_simple(&cpg);
+if (!err)
+a->h_path.dentry = au_h_dptr(dentry, a->btgt);
+} else if (!hi_wh)
+a->h_path.dentry = au_h_dptr(dentry, a->btgt);
+else
+a->h_path.dentry = hi_wh; /* do not dget here */
+
+out_unlock:
+a->h_inode = d_inode(a->h_path.dentry);
+if (!err)
+goto out; /* success */
+au_unpin(&a->pin);
+out_parent:
+if (parent) {
+di_write_unlock(parent);
+dput(parent);
+}
+out:
+if (!err)
+inode_lock_nested(a->h_inode, AuLsc_I_CHILD);
+return err;
+
+static int aufs_setattr(struct dentry *dentry, struct iattr *ia)
++{
++++int err;
+struct inode *inode, *delegated;
+struct super_block *sb;
+struct file *file;
+struct au_icpup_args *a;
+
++inode = d_inode(dentry);
++IMustLock(inode);
++
++++err = setattr_prepare(dentry, ia);
++++if (unlikely(err))
++++goto out;
++
++++err = -ENOMEM;
++++a = kzalloc(sizeof(*a), GFP_NOFS);
++++if (unlikely(!a))
++++goto out;
++
++++if (ia->ia_valid & (ATTR_KILL_SUID | ATTR_KILL_SGID))
++++ia->ia_valid &= ~ATTR_MODE;
+
++++file = NULL;
++++sb = dentry->d_sb;
++err = si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
++++if (unlikely(err))
++++goto out_kfree;
++
++++if (ia->ia_valid & ATTR_FILE)
++++/* currently ftruncate(2) only */
++++AuDebugOn(!d_is_reg(dentry));
++++file = ia->ia_file;
++++err = au_reval_and_lock_fdi(file, au_reopen_nondir, /*wlock*/1,
++++/*fi_lsc*/0);
++++if (unlikely(err))
++++goto out_si;
++
++++if (ia->ia_valid & ATTR_FILE) {
++++/* currently ftruncate(2) only */
++++AuDebugOn(!d_is_reg(dentry));
++++file = ia->ia_file;
++++err = au_reval_and_lock_fdi(file, au_reopen_nondir, /*wlock*/1,
++++/*fi_lsc*/0);
++++if (unlikely(err))
++++goto out_si;
++++ia->ia_file = au_hf_top(file);
++++a->udba = AuOpt_UDBA_NONE;
++++} else {
++++/* fchmod() doesn't pass ia_file */
++++a->udba = au_opt_udba(sb);
+di_write_lock_child(dentry);
+/* no d_unlinked(), to set UDBA_NONE for root */
+if (d_unhashed(dentry))
+a->udba = AuOpt_UDBA_NONE;
+if (a->udba != AuOpt_UDBA_NONE) {
+AuDebugOn(IS_ROOT(dentry));
+err = au_reval_for_attr(dentry, au_sigen(sb));
+if (unlikely(err))
+goto out_dentry;
+
+err = au_pin_and_icpup(dentry, ia, a);
+if (unlikely(err < 0))
+goto out_dentry;
+if (au_ftest_icpup(a->flags, DID_CPUP)) {
+a->ia_file = NULL;
+a->ia_valid &= ~ATTR_FILE;
+}
+
a->h_path.mnt = au_sbr_mnt(sb, a->btgt);
+if ((ia->ia_valid & (ATTR_MODE | ATTR_CTIME))
+ == (ATTR_MODE | ATTR_CTIME)) {
+err = security_path_chmod(&a->h_path, ia->ia_mode);
+if (unlikely(err))
+goto out_unlock;
+} else if ((ia->ia_valid & (ATTR_UID | ATTR_GID))
+&& (ia->ia_valid & ATTR_CTIME)) {
+err = security_path_chown(&a->h_path, ia->ia_uid, ia->ia_gid);
+if (unlikely(err))
+goto out_unlock;
+}
+
+if (ia->ia_valid & ATTR_SIZE) {
+struct file *f;
+
+if (ia->ia_size < i_size_read(inode))
+/* unmap only */
+truncate_setsize(inode, ia->ia_size);
+
+f = NULL;
+if (ia->ia_valid & ATTR_FILE)
+f = ia->ia_file;
+inode_unlock(a->h_inode);
+err = vfsub_trunc(&a->h_path, ia->ia_size, ia->ia_valid, f);
+inode_lock_nested(a->h_inode, AuLsc_I_CHILD);
+} else {
+delegated = NULL;
while (1) {
err = vfsub_notify_change(&a->h_path, ia, &delegated);
if (delegated) {
err = break_deleg_wait(&delegated);
if (!err)
	continue;
	break;
}
}
/*
 * regardless aufs 'acl' option setting.
 * why don't all acl-aware fs call this func from their ->setattr()?
 */
if (!err && (ia->ia_valid & ATTR_MODE))
err = vfsub_acl_chmod(a->h_inode, ia->ia_mode);
if (!err)
au_cpup_attr_changeable(inode);

out_unlock:
inode_unlock(a->h_inode);
au_unpin(&a->pin);
if (unlikely(err))
au_update_dbttop(dentry);
out_dentry:
di_write_unlock(dentry);
if (file) {
fi_write_unlock(file);
ia->ia_file = file;
ia->ia_valid |= ATTR_FILE;
}
out_si:
si_read_unlock(sb);
out_kfree:
kfree(a);
out:
AuTraceErr(err);
return err;
}
+a->udba = au_opt_udba(sb);
+/* no d_unlinked(), to set UDBA_NONE for root */
+if (d_unhashed(dentry))
+a->udba = AuOpt_UDBA_NONE;
+if (a->udba != AuOpt_UDBA_NONE) {
+AuDebugOn(IS_ROOT(dentry));
+err = au_reval_for_attr(dentry, au_sigen(sb));
+if (unlikely(err))
+goto out;
+}
+err = au_pin_and_icpup(dentry, /*ia*/NULL, a);
+if (unlikely(err < 0))
+goto out;
+
+ path->dentry = a->h_path.dentry;
+h_path->mnt = au_sbr_mnt(sb, a->btgt);
+
+out:
+return err;
+}
+
+ssize_t au_sxattr(struct dentry *dentry, struct inode *inode,
+ struct au_sxattr *arg)
+{
+int err;
+struct path h_path;
+struct super_block *sb;
+struct icpup_args *a;
+struct inode *h_inode;
+
+IMustLock(inode);
+
+err = -ENOMEM;
+a = kzalloc(sizeof(*a), GFP_NOFS);
+if (unlikely(!a))
+goto out;
+
+sb = dentry->d_sb;
+err = si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
+if (unlikely(err))
+goto out_kfree;
+
+h_path.dentry = NULL; /* silence gcc */
+di_write_lock_child(dentry);
+err = au_h_path_to_set_attr(dentry, a, &h_path);
+if (unlikely(err))
+goto out_di;
+}
+inode_unlock(a->h_inode);
+switch (arg->type) {
+case AU_XATTR_SET:
+AuDebugOn(d_is_negative(h_path.dentry));
+err = vfsub_setxattr(h_path.dentry,
+    arg->u.set.name, arg->u.set.value,
+    arg->u.set.size, arg->u.set.flags);
+break;
+case AU_ACL_SET:
+err = -EOPNOTSUPP;
+h_inode = d_inode(h_path.dentry);
+if (h_inode->i_op->set_acl)
+ /* this will call posix_acl_update_mode */
+err = h_inode->i_op->set_acl(h_inode,
+    arg->u.acl_set.acl,
+    arg->u.acl_set.type);
+break;
+}
+if (!err)
+au_cpup_attr_timesizes(inode);
+
+au_unpin(&a->pin);
+if (unlikely(err))
+au_update_dbtop(dentry);
+
+out_di:
+di_write_unlock(dentry);
+si_read_unlock(sb);
+out_kfree:
+kfree(a);
+out:
+AuTraceErr(err);
+return err;
+
+au_refresh_iattr(struct inode *inode, struct kstat *st,
+unsigned int nlink)
+{
+unsigned int n;
+
+inode->i_mode = st->mode;
+/* don’t i_iugid_write() here */
+inode->i_uid = st->uid;
+inode->i_gid = st->gid;
+inode->i_atime = st->atime;
+inode->i_mtime = st->mtime;
+inode->i_ctime = st->ctime;
+au_cpup_attr_nlink(inode, /*force*/0);
+if (S_ISDIR(inode->i_mode)) {
+n = inode->i_nlink;
+n -= nlink;
+n += st->nlink;
+smp_mb(); /* for i_nlink */
+/* 0 can happen */
+set_nlink(inode, n);
+}
+
+spin_lock(&inode->i_lock);
+inode->i_blocks = st->blocks;
+i_size_write(inode, st->size);
+spin_unlock(&inode->i_lock);
+}
+
+/*
 * common routine for aufs_getattr() and au_getxattr().
 * returns zero or negative (an error).
 * @dentry will be read-locked in success.
 */
+int au_h_path_getattr(struct dentry *dentry, int force, struct path *h_path,
+      int locked)
+{
+int err;
+unsigned int mnt_flags, sigen;
+unsigned char udba_none;
+aufs_bindex_t bindex;
+struct super_block *sb, *h_sb;
+struct inode *inode;
+
+h_path->mnt = NULL;
+h_path->dentry = NULL;
+
+err = 0;
+sb = dentry->d_sb;
+mnt_flags = au_mntflags(sb);
+udba_none = !!au_opt_test(mnt_flags, UDBA_NONE);
+
+if (unlikely(locked))
+goto body; /* skip locking dinfo */
+
+/* support fstat(2) */
+if (!d_unlinked(dentry) && !udba_none) {
+sigen = au_sigen(sb);
+err = au_digen_test(dentry, sigen);
+if (!err) {
+di_read_lock_child(dentry, AuLock_IR);
+err = au_dbrange_test(dentry);
+if (unlikely(err)) {
+di_read_unlock(dentry, AuLock_IR);
+goto out;
+
} else {
+AuDebugOn(IS_ROOT(dentry));
+di_write_lock_child(dentry);
+err = au_dbrange_test(dentry);
+if (!err)
+err = au_reval_for_attr(dentry, sigen);
+if (!err)
+di_dowgrade_lock(dentry, AuLock_IR);
+else {
+di_write_unlock(dentry);
+goto out;
+
+
} else
+di_read_lock_child(dentry, AuLock_IR);
+
+body:
inode = d_inode(dentry);
bindex = au_ibtop(inode);
+h_path->mnt = au_sbr_mnt(sb, bindex);
+h_sb = h_path->mnt->mnt_sb;
+if (!force
+    && !au_test_fs_bad_iattr(h_sb)
+    && udba_none)
+    goto out; /* success */
+
+if (au_dbtop(dentry) == bindex)
+h_path->dentry = au_h_dptr(dentry, bindex);
+else if (au_opt_test(mnt_flags, PLINK) && au_plink_test(inode)) {
+h_path->dentry = au_plink_lkup(inode, bindex);
+if (IS_ERR(h_path->dentry))
+/* pretending success */
+h_path->dentry = NULL;
+else
+dput(h_path->dentry);
+
+out:
+return err;
+
+}
+u32 request, unsigned int query)
+
+int err;
+unsigned char positive;
+struct path h_path;
+struct dentry *dentry;
+struct inode *inode;
+struct super_block *sb;
+
+dentry = path->dentry;
+inode = d_inode(dentry);
+sb = dentry->d_sb;
+err = si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
+if (unlikely(err))
+goto out;
+err = au_h_path_getattr(dentry, /*force*/0, &h_path, /*locked*/0);
+if (unlikely(err))
+goto out_si;
+if (unlikely(!h_path.dentry))
+/* illegally overlapped or something */
+goto out_fill; /* pretending success */
+
+positive = d_is_positive(h_path.dentry);
+if (positive)
+/* no vfsub version */
+err = vfs_getattr(&h_path, st, request, query);
+if (!err) {
+if (positive)
+au_refresh_iattr(inode, st,
+ d_inode(h_path.dentry)->i_nlink);
+goto out_fill; /* success */
+}
+AuTraceErr(err);
+goto out_di;
+
+out_fill:
+generic_fillattr(inode, st);
+out_di:
+di_read_unlock(dentry, AuLock_IR);
+out_si:
+si_read_unlock(sb);
+out:
+AuTraceErr(err);
+return err;
+}
+
+/* ----------------------------------------------- */
+static const char *aufs_get_link(struct dentry *dentry, struct inode *inode,
+ struct delayed_call *done)
+{
+    const char *ret;
+    struct dentry *h_dentry;
+    struct inode *h_inode;
+    int err;
+    aufs_bindex_t bindex;
+
+    ret = NULL; /* suppress a warning */
+    err = -ECHILD;
+    if (!dentry)
+        goto out;
+
+    err = aufs_read_lock(dentry, AuLock_IR | AuLock_GEN);
+    if (unlikely(err))
+        goto out;
+
+    err = au_d_hashed_positive(dentry);
+    if (unlikely(err))
+        goto out_unlock;
+
+    err = -EINVAL;
+    inode = d_inode(dentry);
+    bindex = au_ibtop(inode);
+    h_inode = au_h_iptr(inode, bindex);
+    if (unlikely(!h_inode->i_op->get_link))
+        goto out_unlock;
+
+    err = -EBUSY;
+    h_dentry = NULL;
+    if (au_dbtop(dentry) <= bindex) {
+        h_dentry = au_h_dptr(dentry, bindex);
+        if (h_dentry)
+            dget(h_dentry);
+    }
+
+    if (!h_dentry) {
+        h_dentry = d_find_any_alias(h_inode);
+        if (IS_ERR(h_dentry)) {
+            err = PTR_ERR(h_dentry);
+            goto out_unlock;
+        }
+    }
+
+    if (unlikely(!h_dentry))
+        goto out_unlock;
+
+    err = 0;
+AuDbg("%p
", h_inode->i_op->get_link);
AuDbgDentry(h_dentry);
+ret = vfs_get_link(h_dentry, done);
+dput(h_dentry);
+if (IS_ERR(ret))
+err = PTR_ERR(ret);
+
+out_unlock:
+aufs_read_unlock(dentry, AuLock_IR);
+out:
+if (unlikely(err))
+ret = ERR_PTR(err);
+AuTraceErrPtr(ret);
+return ret;
+
+/* ---------------------------------------------------------------------- */
+
+static int au_is_special(struct inode *inode)
+{
+return (inode->i_mode & (S_IFBLK | S_IFCHR | S_IFIFO | S_IFSOCK));
+}
+
+static int aufs_update_time(struct inode *inode, struct timespec *ts, int flags)
+{
+int err;
+aufs_bindex_t bindex;
+struct super_block *sb;
+struct inode *h_inode;
+struct vfsmount *h_mnt;
+
+sb = inode->i_sb;
+WARN_ONCE((flags & S_ATIME) && !IS_NOATIME(inode),
+"unexpected s_flags 0x%lx", sb->s_flags);
+
+/* mmap_sem might be acquired already, cf. aufs_mmap() */
+lockdep_off();
+si_read_lock(sb, AuLock_FLUSH);
+ii_write_lock_child(inode);
+
+err = 0;
+bindex = au_ibtop(inode);
+h_inode = au_h_iptr(inode, bindex);
+if (!au_test_ro(sb, bindex, inode)) {
+h_mnt = au_sbr_mnt(sb, bindex);
+err = vfsub_mnt_want_write(h_mnt);
+if (!err) {
+err = vfsub_update_time(h_inode, ts, flags);
+vfsub_mnt_drop_write(h_mnt);
+}
else if (au_is_special(h_inode)) {
    /*
     * Never copy-up here.
     * These special files may already be opened and used for
     * communicating. If we copied it up, then the communication
     * would be corrupted.
     */
    AuWarn1("timestamps for i%lu are ignored ",
            inode->i_ino, h_inode->i_ino);
    if (flags & ~S_ATIME) {
        err = -EIO;
        AuIOErr1("unexpected flags 0x%x", flags);
        AuDebugOn(1);
    }
    if (!err)
        i_cpup_attr_sizes(inode);
    ii_write_unlock(inode);
    si_read_unlock(sb);
    lockdep_on();
    if (!err && (flags & S_VERSION))
        inode_inc_iversion(inode);
    return err;
}

/* ---------------------------------------------------------------------- */
/* no getattr version will be set by module.c:aufs_init() */
struct inode_operations aufs_iop_nogetattr[AuIop_Last],
    aufs_iop[] = {
        [AuIop_SYMLINK] = {
            .permission= aufs_permission,
            #ifdef CONFIG_FS_POSIX_ACL
            .get_acl= aufs_get_acl,
            #endif
            .set_acl= aufs_set_acl, /* unsupport for symlink? */
            #ifdef CONFIG_AUFS_XATTR
            .listxattr= aufs_listxattr,
            #endif
            .setattr= aufs_setattr,
            .getattr= aufs_getattr,
        },
+ get_link= aufs_get_link,
+
+/* .update_time= aufs_update_time */
+
+[AuIop_DIR] = {
+ .create= aufs_create,
+ .lookup= aufs_lookup,
+ .link= aufs_link,
+ .unlink= aufs_unlink,
+ .symlink= aufs_symlink,
+ .mkdir= aufs_mkdir,
+ .rmdir= aufs_rmdir,
+ .mkod= aufs_mknod,
+ .rename= aufs_rename,
+ + .permission= aufs_permission,
+ NDEBUG CONFIG_FS_POSIX_ACL
+ .get_acl= aufs_get_acl,
+ .set_acl= aufs_set_acl,
+ NDEBUG
+
+ .setattr= aufs_setattr,
+ .getattr= aufs_getattr,
+ + NDEBUG CONFIG_AUFS_XATTR
+ .listattr= aufs_listattr,
+ NDEBUG
+
+ .update_time= aufs_update_time,
+ .atomic_open= aufs_atomic_open,
+ .tmpfile= aufs_tmpfile
+
+[AuIop_OTHER] = {
+ .permission= aufs_permission,
+ NDEBUG CONFIG_FS_POSIX_ACL
+ .get_acl= aufs_get_acl,
+ .set_acl= aufs_set_acl,
+ NDEBUG
+
+ .setattr= aufs_setattr,
+ .getattr= aufs_getattr,
+ + NDEBUG CONFIG_AUFS_XATTR
+ .listattr= aufs_listattr,
+ NDEBUG
+
+ .update_time= aufs_update_time
+ }

Open Source Used In 5GaaS Edge AC-4  30211
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * inode operations (add entry)
+ */
+
+##include "aufs.h"
+
+/* final procedure of adding a new entry, except link(2).
+ * remove whiteout, instantiate, copyup the parent dir's times and size
+ * and update version.
+ * if it failed, re-create the removed whiteout.
+ */
+static int epilog(struct inode *dir, aufs_bindex_t bindex,
+     struct dentry *wh_dentry, struct dentry *dentry)
+{
+    int err, rerr;
+    aufs_bindex_t bwh;
+    struct path h_path;
+    struct super_block *sb;
+    struct inode *inode, *h_dir;
+    struct dentry *wh;
+
+    bwh = -1;
+    sb = dir->i_sb;
+    if (wh_dentry) {
+        h_dir = d_inode(wh_dentry->d_parent); /* dir inode is locked */
+        h_dir = d_inode(wh_dentry->d_parent); /* dir inode is locked */
+        #MustLock(h_dir);
+    }
+AuDebugOn(au_h_iptr(dir, bindex) != h_dir);
+bwh = au_dbwh(dentry);
+h_path.dentry = wh_dentry;
+h_path.mnt = au_sbr_mnt(sb, bindex);
+err = au_wh_unlink_dentry(au_h_iptr(dir, bindex), &h_path,
+  dentry);
+if (unlikely(err))
+goto out;
+
+inode = au_new_inode(dentry, /*must_new*/1);
+if (!IS_ERR(inode)) {
+d_instantiate(dentry, inode);
+dir = d_inode(dentry->d_parent); /* dir inode is locked */
+IMustLock(dir);
+au_dir_ts(dir, bindex);
+dir->i_version++;
+au_fhsm_wrote(sb, bindex, /*force*/0);
+return 0; /* success */
+}
+
+err = PTR_ERR(inode);
+if (!wh_dentry)
+goto out;

+/* revert */
+/* dir inode is locked */
+wh = au_wh_create(dentry, bwh, wh_dentry->d_parent);
+rerr = PTR_ERR(wh);
+if (IS_ERR(wh)) {
+AUIOErr("%pd reverting whiteout failed(%d, %d)\n",
+dentry, err, rerr);
+err = -EIO;
+} else
+dput(wh);
+
+out:
+return err;
+
+static int au_d_may_add(struct dentry *dentry)
+{
+int err;
+
+err = 0;
+if (unlikely(d_unhashed(dentry)))
+err = -ENOENT;
+if (unlikely(d_really_is_positive(dentry)))
+err = -ENOTDIR;
+return err;
}


err = -EEXIST;
return err;
*
*/
* simple tests for the adding inode operations.
* following the checks in vfs, plus the parent-child relationship.
*/
int au_may_add(struct dentry *dentry, aufs_bindex_t bindex,
    struct dentry *h_parent, int isdir)
{
    int err;
    umode_t h_mode;
    struct dentry *h_dentry;
    struct inode *h_inode;

    err = -ENAMETOOLONG;
    if (unlikely(dentry->d_name.len > AUFS_MAX_NAMELEN))
        goto out;
    h_dentry = au_h_dptr(dentry, bindex);
    if (d_really_is_negative(dentry)) {
        err = -EEXIST;
        if (unlikely(d_is_positive(h_dentry)))
            goto out;
    } else {
        /* rename(2) case */
        err = -EIO;
        if (unlikely(d_is_negative(h_dentry)))
            goto out;
        h_inode = d_inode(h_dentry);
        if (unlikely(!h_inode->i_nlink))
            goto out;
    } else {
        h_mode = h_inode->i_mode;
        if (!isdir) {
            err = -EISDIR;
            if (unlikely(S_ISDIR(h_mode)))
                goto out;
        } else if (unlikely(!S_ISDIR(h_mode))) {
            err = -ENOTDIR;
            goto out;
        } else if (unlikely(!h_inode->i_nlink))
            goto out;

        h_inode = d_inode(h_dentry);
        if (unlikely(!h_inode->i_nlink))
            goto out;
        h_mode = h_inode->i_mode;
        if (!isdir) {
            err = -EISDIR;
            if (unlikely(S_ISDIR(h_mode)))
                goto out;
        } else if (unlikely(!S_ISDIR(h_mode))) {
            err = -ENOTDIR;
            goto out;
        }
    }
    if (unlikely(h_parent != h_dentry->d_parent))
        goto out;

err = -EIO;
+
+out:
+AuTraceErr(err);
+return err;
+
+/*
+ * initial procedure of adding a new entry.
+ * prepare writable branch and the parent dir, lock it,
+ * and lookup whiteout for the new entry.
+ */
+static struct dentry*
+lock_hdr_lkup_wh(struct dentry *dentry, struct au_dtime *dt,
+ struct dentry *src_dentry, struct au_pin *pin,
+ struct au_wr_dir_args *wr_dir_args)
+{
+struct dentry *wh_dentry, *h_parent;
+struct super_block *sb;
+struct au_branch *br;
+int err;
+unsigned int ubda;
+aufs_bindex_t bcpup;
+
+AuDbg("%pD", dentry);
+
+err = au_wr_dir(dentry, src_dentry, wr_dir_args);
+bcpup = err;
+wh_dentry = ERR_PTR(err);
+if (unlikely(err < 0))
+    goto out;
+
+sb = dentry->d_sb;
+udba = au_opt_udba(sb);
+err = au_pin(pin, dentry, bcpup, ubda,
+    AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+wh_dentry = ERR_PTR(err);
+if (unlikely(err))
+    goto out;
+
+h_parent = au_pinned_h_parent(pin);
+if (udba != AuOpt_UDBA_NONE
+    && au_dbtop(dentry) == bcpup)
+    err = au_may_add(dentry, bcpup, h_parent,
+        au_ftest_wrdir(wr_dir_args->flags, ISDIR));
+else if (unlikely(dentry->d_name.len > AUFS_MAX_NAMELEN))
+    err = -ENAMETOOLONG;
+wh_dentry = ERR_PTR(err);
+if (unlikely(err))
+goto out_unpin;
+
+br = au_sbr(sb, bcpup);
+if (dt) {
+struct path tmp = {
+.dentry= h_parent,
+.mnt= au_br_mnt(br)
+};
+au_dtime_store(dt, au_pinned_parent(pin), &tmp);
+}
+
+wh_dentry = NULL;
+if (bcpup != au_dbwh(dentry))
+goto out; /* success */
+
+/*
+ * ENAMETOOLONG here means that if we allowed create such name, then it
+ * would not be able to removed in the future. So we don't allow such
+ * name here and we don't handle ENAMETOOLONG differently here.
+ */
+wh_dentry = au_wh_lkup(h_parent, &dentry->d_name, br);
+
+out_unpin:
+if (IS_ERR(wh_dentry))
+unpin(pin);
+out:
+return wh_dentry;
+}
+
+/* ---------------------------------------------------------------------- */
+
+enum { Mknod, Symlink, Creat }
+
+struct simple_arg {
+int type;
+union {
+struct {
+umode_t mode;
+bool want_excl;
+bool try_aopen;
+struct vfsub_aopen_args *aopen;
+} c;
+} c;
+const char *symname;
+} s;
+struct {
+umode_t mode;
+dev_t dev;
static int add_simple(struct inode *dir, struct dentry *dentry, 
    struct simple_arg *arg)
{
    int err, rerr;
    aufs_bindex_t btop;
    unsigned char created;
    const unsigned char try_aopen
        = (arg->type == Creat && arg->u.c.try_aopen);
    struct dentry *wh_dentry, *parent;
    struct inode *h_dir;
    struct super_block *sb;
    struct au_branch *br;
    /* to reduce stack size */
    struct {
        struct au_dtime dt;
        struct au_pin pin;
        struct path h_path;
        struct au_wr_dir_args wr_dir_args;
    } *a;
    AuDbg("%pd\n", dentry);
    IMustLock(dir);
    
    err = -ENOMEM;
    a = kmalloc(sizeof(*a), GFP_NOFS);
    if (unlikely(!a))
        goto out;
    a->wr_dir_args.force_btgt = -1;
    a->wr_dir_args.flags = AuWrDir_ADD_ENTRY;
    
    parent = dentry->d_parent; /* dir inode is locked */
    if (!try_aopen) {
        err = aufs_read_lock(dentry, AuLock_DW | AuLock_GEN);
        if (unlikely(err))
            goto out_unlock;
    }
    err = au_d_may_add(dentry);
    if (unlikely(err))
        goto out_unlock;
    if (!try_aopen)
        di_write_lock_parent(parent);
    wh_dentry = lock_hdir_lkup_wh(dentry, &a->dt, /*src_dentry*/NULL,
        &a->pin, &a->wr_dir_args);
    err = PTR_ERR(wh_dentry);
    
    } m;
    } u;
    
    // Rest of the function implementation...
+if (IS_ERR(wh_dentry))
+ goto out_parent;
+
+ btop = au_dbttop(dentry);
+ sb = dentry->d_sb;
+ br = au_sbr(sb, btop);
+ a->h_path.dentry = au_h_dpdr(dentry, btop);
+ a->h_path.mnt = au_br_mnt(br);
+ h_dir = au_pinned_h_dir(&a->pin);
+ switch (arg->type) {
+ case Creat:
+ err = 0;
+ if (!try_aopen || !h_dir->i_op->atomic_open)
+ err = vfsub_create(h_dir, &a->h_path, arg->u.c.mode,
+ arg->u.c.want_excl);
+ else
+ err = vfsub_atomic_open(h_dir, &a->h_path,
+ arg->u.c.aopen, br);
+ break;
+ case Symlink:
+ err = vfsub_symlink(h_dir, &a->h_path, arg->u.s.symname);
+ break;
+ case Mknod:
+ err = vfsub_mknod(h_dir, &a->h_path, arg->u.m.mode,
+ arg->u.m.dev);
+ break;
+ default:
+ BUG();
+ }
+ created = !err;
+ if (!err)
+ err = epilog(dir, btop, wh_dentry, dentry);
+
+ /* revert */
+ if (unlikely(created && err && d_is_positive(a->h_path.dentry))) {
+ /* no delegation since it is just created */
+ rerr = vfsub_unlink(h_dir, &a->h_path, /*delegated*/NULL,
+ /*force*/0);
+ if (rerr) {
+ AuIOErr("pd revert failure(%d, %d)\n",
+ dentry, err, rerr);
+ err = -EIO;
+ }
+ au_dtime_revert(&a->dt);
+ }
+ /*arg->u.c.aopen->opened |= FILE CREATED;"}
+au_unpin(&a->pin);
+dput(wh_dentry);
+
+out_parent:
+if (!try_aopen)
+di_write_unlock(parent);
+out_unlock:
+if (unlikely(err)) {
+au_update_dbtop(dentry);
+d_drop(dentry);
+
+if (!try_aopen)
+aufs_read_unlock(dentry, AuLock_DW);
+out_free:
+kfree(a);
+out:
+return err;
+
+int aufs_mknod(struct inode *dir, struct dentry *dentry, umode_t mode,
+    dev_t dev)
+{
+struct simple_arg arg = {
+.type = Mknod,
+.u.m = {
+.mode= mode,
+.dev= dev
+}
+};
+return add_simple(dir, dentry, &arg);
+
+int aufs_symlink(struct inode *dir, struct dentry *dentry, const char *symname)
+{
+struct simple_arg arg = {
+.type = Symlink,
+.u.s.symname = symname
+};
+return add_simple(dir, dentry, &arg);
+
+int aufs_create(struct inode *dir, struct dentry *dentry, umode_t mode,
+    bool want_excl)
+{
+struct simple_arg arg = {
+.type = Creat,
+.u.c = {
+.mode= mode,
+.want_excl= want_excl
+
++;
+return add_simple(dir, dentry, &arg);
+
+
+int au_aopen_or_create(struct inode *dir, struct dentry *dentry,
+    struct vfsub_aopen_args *aopen_args)
+{
+    struct simple_arg arg = {
+        .type = Creat,
+        .u.c = {
+            .mode= aopen_args->create_mode,
+            .want_excl= aopen_args->open_flag & O_EXCL,
+            .try_aopen= true,
+            .aopen= aopen_args
+        };
+    }
+    return add_simple(dir, dentry, &arg);
+
+
+intaufs_tmpfile(struct inode *dir, struct dentry *dentry, umode_t mode)
+{
+    int err;
+    aufs_bindex_t bindex;
+    struct super_block *sb;
+    struct dentry *parent, *h_parent, *h_dentry;
+    struct inode *h_dir, *inode;
+    struct vfsmount *h_mnt;
+    struct au_wr_dir_args wr_dir_args = {
+        .force_btgt= -1,
+        .flags= AuWrDir_TMPFILE
+    };
+    /* copy-up may happen */
+    inode_lock(dir);
+    +sb = dir->i_sb;
+    +err = si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
+    +if (unlikely(err))
+        goto out;
+    +err = -EBUSY;
parent = d_find_any_alias(dir);
+AuDebugOn(!parent);
+di_write_lock_parent(parent);
+if (unlikely(d_inode(parent) != dir))
+goto out_parent;
+
+err = au_digen_test(parent, au_sigen(sb));
+if (unlikely(err))
+goto out_parent;
+
+bindex = au_dbtop(parent);
+au_set_dbttop(dentry, bindex);
+au_set_dbbot(dentry, bindex);
+err = au_wr_dir(dentry, /*src_dentry*/NULL, &wr_dir_args);
+bindex = err;
+if (unlikely(err < 0))
+goto out_parent;
+
+err = -EOPNOTSUPP;
+h_dir = au_h_iptr(dir, bindex);
+if (unlikely(!h_dir->i_op->tmpfile))
+goto out_parent;
+
+h_mnt = au_sbr_mnt(sb, bindex);
+err = vfs_mnt_want_write(h_mnt);
+if (unlikely(err))
+goto out_parent;
+
+h_parent = au_h_dptr(parent, bindex);
+h_dentry = vfs_tmpfile(h_parent, mode, /*open_flag*/0);
+if (IS_ERR(h_dentry)) {
+err = PTR_ERR(h_dentry);
+goto out_mnt;
+}
+
+au_set_dbtop(dentry, bindex);
+au_set_dbbot(dentry, bindex);
+au_set_h_dptr(dentry, bindex, dget(h_dentry));
+inode = au_new_inode(dentry, /*must_new*/1);
+if (IS_ERR(inode)) {
+err = PTR_ERR(inode);
+goto out_mnt;
+}
+else { 
+if (!inode->i_nlink)
+set_nlink(inode, 1);
+d_tmpfile(dentry, inode);
+au_di(dentry)->di_tmpfile = 1;
+
+/* update without i_mutex */
+if (au_ibtop(dir) == au_dbtop(dentry))
+au_cpup_attr_timesizes(dir);
+
+dput(h_dentry);
+
+out_mnt:
+vfsub_mnt_drop_write(h_mnt);
+out_parent:
+di_write_unlock(parent);
+dput(parent);
+di_write_unlock(dentry);
+if (unlikely(err)) {
+au_di_fin(dentry);
+dentry->d_fsdata = NULL;
+}
+out_si:
+si_read_unlock(sb);
+out:
+inode_unlock(dir);
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+struct au_link_args {
+aufs_bindex_t bdst, bsrc;
+struct au_pin pin;
+struct path h_path;
+struct dentry *src_parent, *parent;
+};
+
+static int au_cpup_before_link(struct dentry *src_dentry,
+struct au_link_args *a)
+{
+int err;
+struct dentry *h_src_dentry;
+struct au_cp_generic cpg = {
+.dentry= src_dentry,
+.bdst= a->bdst,
+.bsrc= a->bsrc,
+.len= -1,
+.pin= &a->pin,
+.flags= AuCpup_DTIME | AuCpup_HOPEN /* | AuCpup_KEEPLINO */
+};
+}
+di_read_lock_parent(a->src_parent, AuLock_IR);
+err = au_test_and_cpup_dirs(src_dentry, a->bdst);
+if (unlikely(err))
+goto out;
+
+h_src_dentry = au_h_dptr(src_dentry, a->bsrc);
+err = au_pin(&a->pin, src_dentry, a->bdst,
+    au_opt_udba(src_dentry->d_sb),
+    AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (unlikely(err))
+goto out;
+
+err = au_sio_cpup_simple(&cpg);
+au_unpin(&a->pin);
+
+out:
+di_read_unlock(a->src_parent, AuLock_IR);
+return err;
+
+static int au_cpup_or_link(struct dentry *src_dentry, struct dentry *dentry,
+    struct au_link_args *a)
+{
+    int err;
+    unsigned char plink;
+    aufs_bindex_t bbot;
+    struct dentry *h_src_dentry;
+    struct inode *h_inode, *inode, *delegated;
+    struct super_block *sb;
+    struct file *h_file;
+
+    plink = 0;
+    h_inode = NULL;
+    sb = src_dentry->d_sb;
+    inode = d_inode(src_dentry);
+    if (au_ibtop(inode) <= a->bdst)
+        h_inode = au_h_iptr(inode, a->bdst);
+    if (!h_inode || !h_inode->i_nlink) {
+        /* copyup src_dentry as the name of dentry. */
+        bbot = au_dbbot(dentry);
+    if (bbot < a->bsrc)
+        au_set_dbbot(dentry, a->bsrc);
+        au_set_h_dbptr(dentry, a->bsrc,
+            dget(au_h_dbptr(src_dentry, a->bsrc)));
+        dget(a->h_path.dentry);
+        au_set_h_dbptr(dentry, a->bdst, NULL);
+        AuDbg("temporary d_inode...
");
+        spin_lock(&dentry->d_lock);
+dentry->d_inode = d_inode(src_dentry); /* tmp */
+spin_unlock(&dentry->d_lock);
+h_file = au_h_open_pre(dentry, a->bsrc, /*force_wr*/0);
+if (IS_ERR(h_file))
+err = PTR_ERR(h_file);
+else {
+struct au_cp_generic cpg = {
+.dentry= dentry,
+.bdst= a->bdst,
+.bsrc= -1,
+.len= -1,
+.pin= &a->pin,
+.flags= AuCpup_KEEPINO
+};
+au_h_open_post(dentry, a->bsrc, h_file);
+if (!err) {
+put(a->h_path.dentry);
+a->h_path.dentry = au_h_dptr(dentry, a->bdst);
+} else
+au_set_h_dptr(dentry, a->bdst,
+ a->h_path.dentry);
+}
+spin_lock(&dentry->d_lock);
+dentry->d_inode = NULL; /* restore */
+spin_unlock(&dentry->d_lock);
+AuDbg("temporary d_inode...done\n");
+au_set_h_dptr(dentry, NULL);
+au_set_dbbot(dentry, bbot);
+} else { /* the inode of src_dentry already exists on a.bdstat branch */
+h_src_dentry = d_find_alias(h_inode);
+if (!h_src_dentry && au_plink_test(inode)) {
+plink = 1;
+h_src_dentry = au_plink_lkup(inode, a->bdst);
+err = PTR_ERR(h_src_dentry);
+if (IS_ERR(h_src_dentry))
+goto out;
+
+if (unlikely(d_is_negative(h_src_dentry))) {
+put(h_src_dentry);
+h_src_dentry = NULL;
+}
+}
+
+if (h_src_dentry) {
+delegated = NULL;
+err = vfsub_link(h_src_dentry, au_pinned_h_dir(&a->pin),

+ &a->h_path, &delegated);  
+ if (unlikely(err == -EWOULDBLOCK)) {
+ pr_warn("cannot retry for NFSv4 delegation
" for an internal link\n");
+ iput(delegated);
+ }
+ dput(h_src_dentry);
+ } else {
+ AuIOErr("no dentry found for hi%lu on b%d
",
+ h_inode->i_ino, a->bdst);
+ err = -EIO;
+ }
+ }
+ +
+ +if (!err && !plink)
+ au_plink_append(inode, a->bdst, a->h_path.dentry);
+ +
+ out:
+ AuTraceErr(err);
+ return err;
+ }
+ +
+ int aufs_link(struct dentry *src_dentry, struct inode *dir,
+ struct dentry *dentry)
+ {
+ int err, rerr;
+ struct au_dtime dt;
+ struct au_link_args *a;
+ struct dentry *wh_dentry, *h_src_dentry;
+ struct inode *inode, *delegated;
+ struct super_block *sb;
+ struct au_wr_dir_args wr_dir_args = {
+ /* .force_btgt=-1, */
+ .flags= AuWrDir_ADD_ENTRY
+ +};
+ +IMustLock(dir);
+ inode = d_inode(src_dentry);
+ IMustLock(inode);
+ +err = -ENOMEM;
+ a = kzalloc(sizeof(*a), GFP_NOFS);
+ if (unlikely(!a))
+ goto out;
+ +a->parent = dentry->d_parent; /* dir inode is locked */
+ err = aufs_read_and_write_lock2(dentry, src_dentry,
+ AuLock_NOPLM | AuLock_GEN);

---

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+if (unlikely(err))
+goto out_kfree;
+err = au_d_linkable(src_dentry);
+if (unlikely(err))
+goto out_unlock;
+err = au_d_may_add(dentry);
+if (unlikely(err))
+goto out_unlock;
+
+a->src_parent = dget_parent(src_dentry);
+wr_dir_args.force_btgt = au_ibtop(inode);
+
+di_write_lock_parent(a->parent);
+wr_dir_args.force_btgt = au_wbr(dentry, wr_dir_args.force_btgt);
+wh_dentry = lock_hdir lkup_wh(dentry, &dt, src_dentry, &a->pin,
+ + &wr_dir_args);
+err = PTR_ERR(wh_dentry);
+if (IS_ERR(wh_dentry))
+goto out_parent;
+
+err = 0;
+sb = dentry->d_sb;
+a->bdst = au_dbtop(dentry);
+a->h_path.dentry = au_h_dptr(dentry, a->bdst);
+a->h_path.mnt = au_sbr_mnt(sb, a->bdst);
+a->bsrc = au_ibtop(inode);
+h_src_dentry = au_h_d_alias(src_dentry, a->bsrc);
+if (!h_src_dentry && au_di(src_dentry)->di_tmpfile)
+h_src_dentry = dget(au_hi_wh(inode, a->bsrc));
+if (!h_src_dentry) {
+a->bsrc = au_dbtop(src_dentry);
+h_src_dentry = au_h_d_alias(src_dentry, a->bsrc);
+AudDebugOn(!h_src_dentry);
} else if (IS_ERR(h_src_dentry)) {
+err = PTR_ERR(h_src_dentry);
+goto out_parent;
+
+/*
+ * aufs doesn't touch the credential so
+ * security_dentry_create_files_as() is unnecrsssary.
+ */
+if (au_opt_test(au_mntflags(sb), PLINK)) {
+if (a->bdst < a->bsrc
+ /* && h_src_dentry->d_sb != a->h_path.dentry->d_sb */)
+err = au_cpup_or_link(src_dentry, dentry, a);
+} else {
+delegated = NULL;
err = vfsub_link(h_src_dentry, au_pinned_h_dir(&a->pin),
+ &a->h_path, &delegated);
+if (unlikely(err == -EWOULDBLOCK)) {
+pr_warn("cannot retry for NFSv4 delegation"
+"for an internal link\n");
+iput(delegated);
+}
+
dput(h_src_dentry);
+} else {
+/*
+ * copyup src_dentry to the branch we process,
+ * and then link(2) to it.
+ */
+dput(h_src_dentry);
+if (a->bdst < a->bsrc
+ /* && h_src_dentry->d_sb != a->h_path.dentry->d_sb */) {
+au_unpin(&a->pin);
+di_write_unlock(a->parent);
+err = au_cpup_before_link(src_dentry, a);
+di_write_lock_parent(a->parent);
+if (!err)
+err = au_pin(&a->pin, dentry, a->bdst,
+ au_opt_udba(sb),
+ AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (unlikely(err))
goto out_wh;
+}
+if (!err) {
+h_src_dentry = au_h_dptr(src_dentry, a->bdst);
+err = -ENOENT;
+if (h_src_dentry && d_is_positive(h_src_dentry)) {
+delegated = NULL;
+err = vfsub_link(h_src_dentry,
+ au_pinned_h_dir(&a->pin),
+ &a->h_path, &delegated);
+if (unlikely(err == -EWOULDBLOCK)) {
+pr_warn("cannot retry"
+"for NFSv4 delegation"
+"for an internal link\n");
+iput(delegated);
+}
+}
+}
+}
+}
+if (unlikely(err))
goto out_unpin;
+}
+if (wh_dentry) {
+a->h_path.dentry = wh_dentry;
+err = au_wh_unlink_dentry(au_pinned_h_dir(&a->pin), &a->h_path,
+    dentry);
+if (unlikely(err))
+goto out_revert;
+}
+
++au_dir_ts(dir, a->bdst);
+dir->i_version++;
+inc_nlink(inode);
+inode->i_ctime = dir->i_ctime;
+d_instantiate(dentry, au_igrab(inode));
+if (d_unhashed(a->h_path.dentry))
+/* some filesystem calls d_drop() */
+d_drop(dentry);
+/* some filesystems consume an inode even hardlink */
+au_fhsm_wrote(sb, a->bdst, /*force=*/0);
+goto out_unpin; /* success */
+
+out_revert:
+/* no delegation since it is just created */
+rerr = vfsub_unlink(au_pinned_h_dir(&a->pin), &a->h_path,
+    /*delegated=*/NULL, /*force=*/0);
+if (unlikely(rerr)) {
+AuIOErr("%pd reverting failed(%d, %d)\n", dentry, err, rerr);
+err = -EIO;
+}
+au_dtime_revert(&dt);
+out_unpin:
+au_unpin(&a->pin);
+out_wh:
+dput(wh_dentry);
+out_parent:
+di_write_unlock(a->parent);
+dput(a->src_parent);
+out_unlock:
+if (unlikely(err)) {
+au_update_dbtop(dentry);
+d_drop(dentry);
+}
+aufs_read_and_write_unlock2(dentry, src_dentry);
+kfree:
+kfree(a);
+out:
+AuTraceErr(err);
+return err;
+}
int aufs_mkdir(struct inode *dir, struct dentry *dentry, umode_t mode) {
+    int err, rerr;
+    aufs_index_t bindex;
+    unsigned char diropq;
+    struct path h_path;
+    struct dentry *wh_dentry, *parent, *opq_dentry;
+    struct inode *h_inode;
+    struct super_block *sb;
+    struct {
+        struct au_pin pin;
+        struct au_dtime dt;
+    } *a; /* reduce the stack usage */
+    struct au_wr_dir_args wr_dir_args = {
+        .force_btgt = -1,
+        .flags = AuWrDir_ADD_ENTRY | AuWrDir_ISDIR
+    };
+    +IMustLock(dir);
+    +
+    err = -ENOMEM;
+    a = kmalloc(sizeof(*a), GFP_NOFS);
+    if (unlikely(!a))
+        goto out;
+    err = aufs_read_lock(dentry, AuLock_DW | AuLock_GEN);
+    if (unlikely(err))
+        goto out_free;
+    err = au_d_may_add(dentry);
+    if (unlikely(err))
+        goto out_unlock;
+    parent = dentry->d_parent; /* dir inode is locked */
+    di_write_lock_parent(parent);
+    wh_dentry = lock_hdir_lkup_wh(dentry, &a->dt, /*src_dentry*/NULL,
+        &a->pin, &wr_dir_args);
+    err = PTR_ERR(wh_dentry);
+    if (IS_ERR(wh_dentry))
+        goto out_parent;
+    sb = dentry->d_sb;
+    bindex = au_dbtop(dentry);
+    h_path.dentry = au_h_dptr(dentry, bindex);
+    h_path.mnt = au_sbr_mnt(sb, bindex);
+    err = vfsub_mkdir(au_pinned_h_dir(&a->pin), &h_path, mode);
+    if (unlikely(err))
+        goto out_unpin;

}
/* make the dir opaque */
diropq = 0;
+\h_inode = d_inode(h_path.dentry);
+if (wh_dentry
  + || au_opt_test(au_mntflags(sb), ALWAYS_DIROPQ)) {
+inode_lock_nested(h_inode, AuLsc_I_CHILD);
+opq_dentry = au_diropq_create(dentry, bindex);
+inode_unlock(h_inode);
+err = PTR_ERR(opq_dentry);
+if (IS_ERR(opq_dentry))
+goto out_dir;
+dput(opq_dentry);
+diropq = 1;
+
+err = epilog(dir, bindex, wh_dentry, dentry);
+if (!err) {
+  inc_nlink(dir);
+  goto out_unpin; /* success */
+
+  /* revert */
+  if (diropq) {
+    AuLabel(revert opq);
+    inode_lock_nested(h_inode, AuLsc_I_CHILD);
+    rerr = au_diropq_remove(dentry, bindex);
+    inode_unlock(h_inode);
+    if (rerr) {
+      AuIOErr("%pd reverting diropq failed(%d, %d)\n",
+        dentry, err, rerr);
+      err = -EIO;
+    }
+  }
+  }
+  }
+  out_dir:
+AuLabel(revert dir);
+rerr = vfsub_rmdir(au_pinned_h_dir(&a->pin), &h_path);
+if (rerr) {
+  AuIOErr("%pd reverting dir failed(%d, %d)\n",
+    dentry, err, rerr);
+  err = -EIO;
+  }
+  }
+  out_dir:
+AuLabel(revert dir);
+rerr = vfsub_rmdir(au_pinned_h_dir(&a->pin), &h_path);
+if (rerr) {
+  AuIOErr("%pd reverting dir failed(%d, %d)\n",
+    dentry, err, rerr);
+  err = -EIO;
+  }
+  au_dtime_revert(&a->dt);
+  out_unpin:
+  au_unpin(&a->pin);
+dput(wh_dentry);
+out_parent:
+di_write_unlock(parent);
+out_unlock:
+if (unlikely(err)) {
+au_update_dbtop(dentry);
+d_drop(dentry);
+
+aufs_read_unlock(dentry, AuLock_DW);
+out_free:
+kfree(a);
+out:
+return err;
+
--- linux-4.15.0.orig/fs/aufs/i_op_del.c
+++ linux-4.15.0/fs/aufs/i_op_del.c
@@ -0,0 +1,518 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
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+ * (at your option) any later version.
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * inode operations (del entry)
+ */
+
+#include "aufs.h"
+
+/*
+ * decide if a new whiteout for @dentry is necessary or not.
+ * when it is necessary, prepare the parent dir for the upper branch whose
+ * branch index is @bcpup for creation. the actual creation of the whiteout will
+ * be done by caller.
+ * return value:
+ * 0: wh is unnecessary
+ * plus: wh is necessary
+ * minus: error
+ */
+int au_wr_dir_need_wh(struct dentry *dentry, int isdir, aufs_bindex_t *bcpup)
 +{
  +int need_wh, err;
  +aufs_bindex_t btop;
  +struct super_block *sb;
  +
  +sb = dentry->d_sb;
  +btop = au_dbtop(dentry);
  +if (*bcpup < 0) {
    +*bcpup = btop;
    +if (au_test_ro(sb, btop, d_inode(dentry))) {
      +err = AuWbrCopyup(au_sbi(sb), dentry);
      +*bcpup = err;
      +if (unlikely(err < 0))
        +goto out;
    +}
  +} else
    +AuDebugOn(btop < *bcpup
    + || au_test_ro(sb, *bcpup, d_inode(dentry)));
  +AuDbg("bcpup %d, btop %d
", *bcpup, btop);
  +if (*bcpup != btop) {
    +err = au_cpup_dirs(dentry, *bcpup);
    +if (unlikely(err))
      +goto out;
    +need_wh = 1;
  +} else {
    +struct au_dinfo *dinfo, *tmp;
    +
    +need_wh = -ENOMEM;
    +dinfo = au_di(dentry);
    +tmp = au_di_alloc(sb, AuLsc_DL_TMP);
    +if (tmp) {
      +au_di_cp(tmp, dinfo);
      +au_di_swap(tmp, dinfo);
      +/* returns the number of positive dentries */
      +need_wh = au_lkup_dentry(dentry, btop + 1,
      + /* AuLkup_IGNORE_PERM */ 0);
      +/* AuLkup_IGNORE_PERM */ 0);
      +au_di_swap(tmp, dinfo);
      +au_rw_write_unlock(&tmp->di_rwsem);
      +au_di_free(tmp);
    +}
  +}
  +AuDbg("need_wh %d\n", need_wh);
  +err = need_wh;
  +
  +out:
  +return err;
+ * simple tests for the del-entry operations.
+ * following the checks in vfs, plus the parent-child relationship.
+ */
+int au_may_del(struct dentry *dentry, aufs_index_t bindex,
+ struct dentry *h_parent, int isdir)
+
+int err;
+umode_t h_mode;
+struct dentry *h_dentry, *h_latest;
+struct inode *h_inode;
+struct path h_ppath;
+struct super_block *sb;
+struct au_branch *br;
+
+h_dentry = au_h_dptr(dentry, bindex);
+if (d_really_is_positive(dentry)) {
+  err = -ENOENT;
+  if (unlikely(d_is_negative(h_dentry)))
+    goto out;
+  h_inode = d_inode(h_dentry);
+  if (unlikely(!h_inode->i_nlink))
+    goto out;
+
+  h_mode = h_inode->i_mode;
+  if (!isdir) {
+    err = -EISDIR;
+    if (unlikely(S_ISDIR(h_mode)))
+      goto out;
+    } else if (unlikely(!S_ISDIR(h_mode))) {
+      err = -ENOTDIR;
+      goto out;
+    } else {
+      /* rename(2) case */
+      err = -EIO;
+      if (unlikely(d_is_positive(h_dentry)))
+        goto out;
+    }
+  }
+
+err = -ENOENT;
+/* expected parent dir is locked */
+if (unlikely(h_parent != h_dentry->d_parent))
+err = -ENOENT;
+/* expected parent dir is locked */
+if (unlikely(h_parent != h_dentry->d_parent))
+err = -ENOENT;
+/* expected parent dir is locked */
/*
 * rmdir a dir may break the consistency on some filesystem.
 * let's try heavy test.
 */
err = -EACCES;
(sb = dentry->d_sb;
+br = au_sbr(sb, bindex);
+if (unlikely(!au_opt_test(au_mntflags(sb), DIRPERM1) +
+& au_test_h_perm(d_inode(h_parent),
+ MAY_EXEC | MAY_WRITE))
+goto out;
+
+h_ppath.dentry = h_parent;
+h_ppath.mnt = au_br_mnt(br);
+h_latest = au_sio_lkup_one(&dentry->d_name, &h_ppath);
+err = -EIO;
+if (IS_ERR(h_latest))
+goto out;
+if (h_latest == h_dentry)
+err = 0;
+dput(h_latest);
+
+out:
+return err;
+
/**
 * decide the branch where we operate for @dentry. the branch index will be set
 * @rbcpup. after diciding it,’pin’ it and store the timestamps of the parent
 * dir for reverting.
 * when a new whiteout is necessary, create it.
 */
+static struct dentry*
+lock_hdir_create_wh(struct dentry *dentry, int isdir, aufs_bindex_t *rbcpup,
+ struct au_dtime *dt, struct au_pin *pin)
+{ +
+struct dentry *wh_dentry;
+struct super_block *sb;
+struct path h_path;
+int err, need_wh;
+unsigned int udba;
+aufs_bindex_t bcpup;
+
+need_wh = au_wr_dir_need_wh(dentry, isdir, rbcpup);
+wh_dentry = ERR_PTR(need_wh);
+if (unlikely(need_wh < 0))
+goto out; +


+sb = dentry->d_sb;
+udba = au_opt_udba(sb);
+bcpup = *rbcpup;
+err = au_pin(pin, dentry, bcpup, udba,
+    AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+wh_dentry = ERR_PTR(err);
+if (unlikely(err))
+goto out;
+
+h_path.dentry = au_pinned_h_parent(pin);
+if (udba != AuOpt_UDBA_NONE
+    && au_dbtop(dentry) == bcpup) {
+err = au_may_del(dentry, bcpup, h_path.dentry, isdir);
+wh_dentry = ERR_PTR(err);
+if (unlikely(err))
+goto out_unpin;
+
+h_path.mnt = au_sbr_mnt(sb, bcpup);
+au_dtime_store(dt, au_pinned_parent(pin), &h_path);
+wh_dentry = NULL;
+if (!need_wh)
+goto out; /* success, no need to create whiteout */
+
+wh_dentry = au_wh_create(dentry, bcpup, h_path.dentry);
+if (IS_ERR(wh_dentry))
+goto out_unpin;
+
/* returns with the parent is locked and wh_dentry is dget-ed */
+goto out; /* success */
+
+out_unpin:
+au_unpin(pin);
+out:
+return wh_dentry;
+
+/*
+ * when removing a dir, rename it to a unique temporary whiteout-ed name first
+ * in order to be revertible and save time for removing many child whiteouts
+ * under the dir.
+ * returns 1 when there are too many child whiteout and caller should remove
+ * them asynchroneously. returns 0 when the number of children is enough small to
+ * remove now or the branch fs is a remote fs.
+ * otherwise return an error.
+ */
+static int renwh_and_rmdir(struct dentry *dentry, aufs_bindex_t bindex,
+    struct au_nhash *whlist, struct inode *dir)
int rmdir_later, err, dirwh;
struct dentry *h_dentry;
struct super_block *sb;
struct inode *inode;

sb = dentry->d_sb;
SiMustAnyLock(sb);

h_dentry = au_h_dptr(dentry, bindex);
err = au_whtmp_ren(h_dentry, au_sbr(sb, bindex));
if (unlikely(err))
goto out;

/* stop monitoring */
inode = d_inode(dentry);
au_hn_free(au_hi(inode, bindex));

if (!au_test_fs_remote(h_dentry->d_sb)) {
    dirwh = au_sbi(sb)->si_dirwh;
    rmdir_later = (dirwh <= 1);
    if (!rmdir_later)
        rmdir_later = au_nhash_test_longer_wh(whlist, bindex,
            dirwh);
    if (rmdir_later)
        return rmdir_later;
}

err = au_whtmp_rmdir(dir, bindex, h_dentry, whlist);
if (unlikely(err)) {
    AuIOErr("rmdir %pd, b%d failed, %d. ignored\n",
        h_dentry, bindex, err);
    err = 0;
}

out:
AuTraceErr(err);
return err;

/**
 * final procedure for deleting a entry.
 * maintain dentry and iattr.
 */
static void epilog(struct inode *dir, struct dentry *dentry,
    aufs_bindex_t bindex)
{
    struct inode *inode;

inode = d_inode(dentry);
d_drop(dentry);
inode->i_ctime = dir->i_ctime;
+
+au_dir_ts(dir, bindex);
dir->i_version++;
+
*/
/* when an error happened, remove the created whiteout and revert everything.
 */
static int do_revert(int err, struct inode *dir, aufs_bindex_t bindex,
  aufs_bindex_t bwh, struct dentry *wh_dentry,
  struct dentry *dentry, struct au_dtime *dt)
{
  int rerr;
  struct path h_path = {
    .dentry = wh_dentry,
    .mnt= au_sbr_mnt(dir->i_sb, bindex)
  };
  +
  +rerr = au_wh_unlink_dentry(au_h_iptr(dir, bindex), &h_path, dentry);
  +if (!rerr) {
    +au_set_dbwh(dentry, bwh);
    +au_dtime_revert(dt);
    +return 0;
    +}
  +
  +AuIOErr("%pd reverting whiteout failed(%d, %d)\n", dentry, err, rerr);
  +return -EIO;
  +}
  +
  /* ---------------------------------------------------------------------- */

int aufs_unlink(struct inode *dir, struct dentry *dentry)
{
  int err;
aufs_bindex_t bwh, bindex, btop;
  struct inode *inode, *h_dir, *delegated;
  struct dentry *parent, *wh_dentry;
  /* to reduce stack size */
  struct {
    struct au_dtime dt;
    struct au_pin pin;
    struct path h_path;
  } *a;
  +IMustLock(dir);
+err = -ENOMEM;
+a = kmalloc(sizeof(*a), GFP_NOFS);
+if (unlikely(!a))
+goto out;
+
+err = aufs_read_lock(dentry, AuLock_DW | AuLock_GEN);
+if (unlikely(err))
+goto out_free;
+err = au_d_hashed_positive(dentry);
+if (unlikely(err))
+goto out_unlock;
+inode = d_inode(dentry);
+IMustLock(inode);
+err = -EISDIR;
+if (unlikely(d_is_dir(dentry)))
+goto out_unlock; /* possible? */
+
+btop = au_dbtop(dentry);
+bwh = au_dbwh(dentry);
+bindex = -1;
+parent = dentry->d_parent; /* dir inode is locked */
+di_write_lock_parent(parent);
+wh_dentry = lock_hdr_create_wh(dentry, /*isdir*/0, &bindex, &a->dt,
+&a->pin);
+err = PTR_ERR(wh_dentry);
+if (IS_ERR(wh_dentry))
+goto out_parent;
+
+a->h_path.mnt = au_sbr_mnt(dentry->d_sb, btop);
+a->h_path.dentry = au_h_dptr(dentry, btop);
+dget(a->h_path.dentry);
+if (bindex == btop) {
+h_dir = au_pinned_h_dir(&a->pin);
+delegated = NULL;
+err = vfs_unlink(h_dir, &a->h_path, &delegated, /*force*/0);
+if (unlikely(err == -EWOULDBLOCK)) {
+pr_warn("cannot retry for NFSv4 delegation
" +" for an internal unlink\n");
+iput(delegated);
+}
+} else {
+/* dir inode is locked */
+h_dir = d_inode(wh_dentry->d_parent);
+IMustLock(h_dir);
+err = 0;
+}
+
```c
if (!err) {
    vfsub_drop_nlink(inode);
    epilog(dir, dentry, bindex);
+
    /* update target timestamps */
    if (bindex == btop) {
        vfsub_update_h_iattr(&a->h_path, /*did*/NULL);
        /*ignore*/
        inode->i_ctime = d_inode(a->h_path.dentry)->i_ctime;
        +} else
    /* todo: this timestamp may be reverted later */
    inode->i_ctime = h_dir->i_ctime;
    goto out_unpin; /* success */
    +}
    +
    /* revert */
    if (wh_dentry) {
        int rerr;
        +
        rerr = do_revert(err, dir, bindex, bwh, wh_dentry, dentry,
        + &a->dt);
        +if (rerr)
        +err = rerr;
        +}
        +
        +out_unpin:
        +au_unpin(&a->pin);
        +dput(wh_dentry);
        +dput(a->h_path.dentry);
        +out_parent:
        +di_write_unlock(parent);
        +out_unlock:
        +aufs_read_unlock(dentry, AuLock_DW);
        +out_free:
        +kfree(a);
        +out:
        +return err;
        +}
        +
        +int aufs_rmdir(struct inode *dir, struct dentry *dentry)
        +{
        +int err, rmdir_later;
        +aufs_bindex_t bwh, bindex, btop;
        +struct inode *inode;
        +struct dentry *parent, *wh_dentry, *h_dentry;
        +struct au_whtmp_rmdir *args;
        +/* to reduce stack size */
        +struct {
```
struct au_dtime dt;
+struct au_pin pin;
+
+IMustLock(dir);
+
+err = -ENOMEM;
+a = kmalloc(sizeof(*a), GFP_NOFS);
+if (unlikely(!a))
+goto out;
+
+err = aufs_read_lock(dentry, AuLock_DW | AuLock_FLUSH | AuLock_GEN);
+if (unlikely(err))
+goto out_free;
+
+err = au_alive_dir(dentry);
+if (unlikely(err))
+goto out_unlock;
+
+inode = d_inode(dentry);
+IMustLock(inode);
+err = -ENOTDIR;
+if (unlikely(!d_is_dir(dentry)))
+goto out_unlock; /* possible? */
+
+err = -ENOMEM;
+args = au_whtmp_rmdir_alloc(dir->i_sb, GFP_NOFS);
+if (unlikely(!args))
+goto out_unlock;
+
+parent = dentry->d_parent; /* dir inode is locked */
+di_write_lock_parent(parent);
+
+err = au_test_empty(dentry, &args->whlist);
+if (unlikely(err))
+goto out_parent;
+
+btop = au_dbtop(dentry);
+bwh = au_dbwh(dentry);
+bindex = -1;
+wh_dentry = lock_hdir_create_wh(dentry, /*isdir*/1, &bindex, &a->dt, &a->pin);
+err = PTR_ERR(wh_dentry);
+if (IS_ERR(wh_dentry))
+goto out_parent;
+
+h_dentry = au_h_dptr(dentry, btop);
+dget(h_dentry);
+rmdir_later = 0;
+if (bindex == btop) {
+err = renwh_and_rmdir(dentry, btop, &args->whlist, dir);
```c
if (err > 0) {
    rmdir_later = err;
    err = 0;
} else {
    /* stop monitoring */
    au_hi_free(au_hi(inode, btop));
    /* dir inode is locked */
    IMustLock(d_inode(wh_dentry->d_parent));
    err = 0;
}

if (!err) {
    vfsub_dead_dir(inode);
    au_set_dbdiropq(dentry, -1);
    epilog(dir, dentry, bindex);
    if (rmdir_later) {
        whtmp_kick_rmdir(dir, btop, h_dentry, args);
        args = NULL;
    }
    goto out_unpin; /* success */
}

/* revert */
AuLabel(revert);
if (wh_dentry) {
    int rerr;
    rerr = do_revert(err, dir, bindex, bwh, wh_dentry, dentry,
                     &a->dt);
    if (rerr)
        err = rerr;
    if (rerr)
        err = rerr;
    }
    goto out_unpin;
    au_unpin(&a->pin);
    dput(wh_dentry);
    dput(h_dentry);
    out_parent:
    di_write_unlock(parent);
    if (args)
        whtmp_rmdir_free(args);
    out_unlock:
    aufs_read_unlock(dentry, AuLock_DW);
    out_free:
```
+kfree(a);
+out:
+AuTraceErr(err);
+return err;
+
--- linux-4.15.0.orig/fs/aufs/i_op_ren.c
+++ linux-4.15.0/fs/aufs/i_op_ren.c
@@ -0,0 +1,1252 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/
+
+/* inode operation (rename entry)
+ * todo: this is crazy monster
+ */
+
+#include "aufs.h"
+
+enum { AuSRC, AuDST, AuSrcDst };
+enum { AuPARENT, AuCHILD, AuParentChild };
+
+#define AuRen_ISDIR_SRC 1
+#define AuRen_ISDIR_DST (1 << 1)
+#define AuRen_ISSAMEDIR (1 << 2)
+#define AuRen_WHSRC (1 << 3)
+#define AuRen_WHSTST (1 << 4)
+#define AuRen_MNT_WRITE (1 << 5)
+#define AuRen_DT_DSTDIR (1 << 6)
+#define AuRen_DIRPOPQ_SRC (1 << 7)
+#define AuRen_DIRPOPQ_DST (1 << 8)
+#define AuRen_DIRDEN (1 << 9)
+#define AuRen_DROPPED_SRC (1 << 10)
+#define AuRen_DROPPED_DST (1 << 11)
+#define au_ftest_ren(flags, name)((flags) & AuRen_##name)
```c
#define au_fset_ren(flags, name)  
   do { (flags) |= AuRen_##name; } while (0)
#define au_fclr_ren(flags, name)  
   do { (flags) &= ~AuRen_##name; } while (0)

#ifndef CONFIG_AUFS_DIRREN
#undef AuRen_DIRREN
#define AuRen_DIRREN 0
#endif

struct au_ren_args {
   struct {
      struct dentry *dentry, *h_dentry, *parent, *h_parent,
      *wh_dentry;
      struct inode *dir, *inode;
      struct au_hinode *hdir, *hinode;
      struct au_dtime dt[AuParentChild];
      aufs_bindex_t btop, bdiropq;
   } sd[AuSrcDst];

   #define src_dentry    sd[AuSRC].dentry
   #define src_dir       sd[AuSRC].dir
   #define src_inode     sd[AuSRC].inode
   #define src_h_dentry  sd[AuSRC].h_dentry
   #define src_parent    sd[AuSRC].parent
   #define src_h_parent  sd[AuSRC].h_parent
   #define src_wh_dentry sd[AuSRC].wh_dentry
   #define src_hdir      sd[AuSRC].hdir
   #define src_hinode    sd[AuSRC].hinode
   #define src_h_dir     sd[AuSRC].hdir->hi_inode
   #define src_dt        sd[AuSRC].dt
   #define src_btop      sd[AuSRC].btop
   #define src_bdiropq   sd[AuSRC].bdiropq

   #define dst_dentry    sd[AuDST].dentry
   #define dst_dir       sd[AuDST].dir
   #define dst_inode     sd[AuDST].inode
   #define dst_h_dentry  sd[AuDST].h_dentry
   #define dst_parent    sd[AuDST].parent
   #define dst_h_parent  sd[AuDST].h_parent
   #define dst_wh_dentry sd[AuDST].wh_dentry
   #define dst_hdir      sd[AuDST].hdir
   #define dst_hinode    sd[AuDST].hinode
   #define dst_h_dir     sd[AuDST].hdir->hi_inode
   #define dst_dt        sd[AuDST].dt
   #define dst_btop      sd[AuDST].btop
   #define dst_bdiropq   sd[AuDST].bdiropq
```

---

Open Source Used In 5GasS Edge AC-4 30243
+struct dentry *h_trap;
+struct au_branch *br;
+struct path h_path;
+struct au_nhash whlist;
+aufs_bindex_t btgt, src_bwh;
+
+struct {
+unsigned short auren_flags;
+unsigned char flags; /* syscall parameter */
+unsigned char exchange;
+} __packed;
+
+struct au_whtmp_rmdir *thargs;
+struct dentry *h_dst;
+struct au_hinode *h_root;
+};
+
+/* ---------------------------------------------------------------------- */
+
+/* functions for reverting. */
+/* when an error happened in a single rename systemcall, we should revert */
+/* everything as if nothing happened. */
+/* we don't need to revert the copied-up/down the parent dir since they are */
+/* harmless. */
+/* */
+
+#define RevertFailure(fmt, ...) do { \
+AuIOErr("revert failure: " fmt " (%d, %d)\n", \
+#__VA_ARGS__, err, rerr); \
+err = -EIO; \
+} while (0)
+
+static void au_ren_do_rev_diropq(int err, struct au_ren_args *a, int idx)
+{
+int rerr;
+struct dentry *d;
+#define src_or_dst(member) a->sd[idx].member
+
+d = src_or_dst(dentry); /* {src,dst}_dentry */
+au_hn_inode_lock_nested(src_or_dst(hinode), AuLsc_I_CHILD);
+rerr = au_diropq_remove(d, a->btgt);
+au_hn_inode_unlock(src_or_dst(hinode));
+au_set_dbdiropq(d, src_or_dst(bdiropq));
+if (rerr)
+RevertFailure("remove diropq %pd", d);
+
+#undef src_or_dst_
static void au_ren_rev_diropq(int err, struct au_ren_args *a)
{
    if (au_ftest_ren(a->auren_flags, DIROPQ_SRC))
        au_ren_do_rev_diropq(err, a, AuSRC);
    if (au_ftest_ren(a->auren_flags, DIROPQ_DST))
        au_ren_do_rev_diropq(err, a, AuDST);
}

static void au_ren_rev_rename(int err, struct au_ren_args *a)
{
    int rerr;
    struct inode *delegated;
    struct path h_ppath = {
        .dentry = a->src_h_parent,
        .mnt = a->h_path.mnt
    };
    a->h_path.dentry = vfsub_lkup_one(&a->src_dentry->d_name, &h_ppath);
    rerr = PTR_ERR(a->h_path.dentry);
    if (IS_ERR(a->h_path.dentry)) {
        RevertFailure("lkup one %pd", a->src_dentry);
        return;
    }
    delegated = NULL;
    rerr = vfsub_rename(a->dst_h_dir,
            au_h_dptr(a->src_dentry, a->btgt),
            a->src_h_dir, &a->h_path, &delegated, a->flags);
    if (unlikely(rerr == -EWOULDBLOCK)) {
        pr_warn("cannot retry for NFSv4 delegation"
                " for an internal rename\n");
        iput(delegated);
        d_drop(a->h_path.dentry);
    } else
    { /* au_set_h_dptr(a->src_dentry, a->btgt, NULL); */
        if (rerr)
            RevertFailure("rename %pd", a->src_dentry);
    }
}

static void au_ren_rev_whtmp(int err, struct au_ren_args *a)
{
    int rerr;
    struct inode *delegated;
    struct path h_ppath = {
        .dentry = a->dst_h_parent,
.mnt= a->h_path.mnt
+);
+
a->h_path.dentry = vfsub lkup_one(&a->dst_dentry->d_name, &h_ppth);
rerr = PTR_ERR(a->h_path.dentry);
+if (IS_ERR(a->h_path.dentry)) {
+RevertFailure("lkup one %pd", a->dst_dentry);
+return;
+}
+if (d_is_positive(a->h_path.dentry)) {
+d_drop(a->h_path.dentry);
+dput(a->h_path.dentry);
+return;
+}
+delegated = NULL;
rerr = vfsub_rename(a->dst_h_dir, a->h_dst, a->dst_h_dir, &h_ppt, a->h_path, a-
+&delegated, a->flags);
+if (unlikely(rerr == -EWOULDBLOCK)) {
+pr_warn("cannot retry for NFSv4 delegation"
+" for an internal rename\n");
+iiput(delegated);
+}
+d_drop(a->h_path.dentry);
+dput(a->h_path.dentry);
+if (!rerr)
+u_set_h_dptr(a->dst_dentry, a->btgt, dget(a->h_dst));
+else
+RevertFailure("rename %pd", a->h_dst);
+}
+static void au_ren_rev_whsrc(int err, struct au_ren_args *a)
+{
+int rerr;
+
a->h_path.dentry = a->src_wh_dentry;
+rerr = au_wh_unlink_dentry(a->src_h_dir, &h_ppt, a->h_path, a->src_dentry);
+au_set_dbwh(a->src_dentry, a->src_bwh);
+if (rerr)
+RevertFailure("unlink %pd", a->src_wh_dentry);
+}
+#undef RevertFailure
+
+/* when we have to copyup the renaming entry, do it with the rename-target name
+ * in order to minimize the cost (the later actual rename is unnecessary).
+ * otherwise rename it on the target branch.
+ */
+static int au_ren_or_cpup(struct au_ren_args *a)
+{
+int err;
+struct dentry *d;
+struct inode *delegated;
+
+d = a->src_dentry;
+if (au_dbtop(d) == a->btgt) {
+a->h_path.dentry = a->dst_h_dentry;
+AuDebugOn(au_dbtop(d) != a->btgt);
+delegated = NULL;
+err = vfsub_rename(a->src_h_dir, au_h_dptr(d, a->btgt),
+ a->dst_h_dir, &a->h_path, &delegated,
+ a->flags);
+if (unlikely(err == -EWOULDBLOCK)) {
+ pr_warn("cannot retry for NFSv4 delegation"
+ " for an internal rename\n");
+iput(delegated);
+}
+} else
+BUG();
+
+if (!err && a->h_dst)
+/* it will be set to dinfo later */
+dget(a->h_dst);
+
+return err;
+}
+
+/* cf. aufs_rmdir() */
+static int au_ren_del_whtmp(struct au_ren_args *a)
+{
+int err;
+struct inode *dir;
+
dir = a->dst_dir;
+SiMustAnyLock(dir->i_sb);
+if (!au_nhash_test_longer_wh(&a->whlist, a->btgt,
+ & au_shb(dir->i_sb)->si_dirwh)
+ || au_test_fs_remote(a->h_dst->d_sb)) {
+err = au_whtmp_rmdir(dir, a->btgt, a->h_dst, &a->whlist);
+if (unlikely(err))
+pr_warn("failed removing whtmp dir %pd (%d), ",
+"ignored.\n", a->h_dst, err);
+} else {
+au_nhash_wh_free(&a->thargs->whlist);
+a->thargs->whlist = a->whlist;
+a->whlist.nh_num = 0;
+au_whtmp_kick_rmdir(dir, a->btgt, a->h_dst, a->thargs);
+dput(a->h_dst);
+a->thargs = NULL;
+}
+
+return 0;
+
+/* make it 'opaque' dir. */
+static int au_ren_do_diropq(struct au_ren_args *a, int idx)
+{
+    int err;
+    struct dentry *d, *diropq;
+    #define src_or_dst(member) a->sd[idx].member
+
+    err = 0;
+    d = src_or_dst(dentry); /* {src,dst}_dentry */
+    src_or_dst(bdiropq) = au_dbdiropq(d);
+    src_or_dst(hinode) = au_hi(src_or_dst(inode), a->btgt);
+    hn_inode_lock_nested(src_or_dst(hinode), AuLsc_I_CHILD);
+    diropq = au_diropq_create(d, a->btgt);
+    hn_inode_unlock(src_or_dst(hinode));
+    if (IS_ERR(diropq))
+        err = PTR_ERR(diropq);
+    else
+        dput(diropq);
+    
+    #undef src_or_dst_
+    +return err;
+}
+
+static int au_ren_diropq(struct au_ren_args *a)
+{
+    int err;
+    unsigned char always;
+    struct dentry *d;
+
+    err = 0;
+    d = a->dst_dentry; /* already renamed on the branch */
+    always = !!au_opt_test(au_mntflags(d->d_sb), ALWAYS_DIROPQ);
+    if (au_ftest_ren(a->auren_flags, ISDIR_SRC)
+        && !au_ftest_ren(a->auren_flags, DIRREN)
+        && a->btgt != au_dbdiropq(a->src_dentry)
+        && (a->dst_wh_dentry
+            || a->btgt <= au_dbdiropq(d)
+            /* hide the lower to keep xino */
/* the lowers may not be a dir, but we hide them anyway */
a->btgt < au_dbbot(d)
|| always)) {
    AuDbg("here\n");
+err = au_ren_do_diropq(a, AuSRC);
+if (unlikely(err))
+goto out;
+au_fset_ren(a->auren_flags, DIROPQ_SRC);
+
+if (!a->exchange)
+goto out; /* success */
+
+d = a->src_dentry; /* already renamed on the branch */
+if (au_ftest_ren(a->auren_flags, ISDIR_DST)
+    && a->btgt != au_dbdiropq(a->dst_dentry)
+    && (a->btgt < au_dbdiropq(d)
+        || a->btgt < au_dbbot(d)
+        || always)) {
    AuDbgDentry(a->src_dentry);
    AuDbgDentry(a->dst_dentry);
    err = au_ren_do_diropq(a, AuDST);
+if (unlikely(err))
+goto out_rev_src;
+au_fset_ren(a->auren_flags, DIROPQ_DST);
+
+goto out; /* success */
+
+out_rev_src:
    AuDbg("err %d, reverting src\n", err);
    ren_rev_diropq(err, a);
+out:
    return err;
+
+static int do_rename(struct au_ren_args *a)
+{
    int err;
    struct dentry *d, *h_d;
    
+if (!a->exchange) {
    /* prepare workqueue args for asynchronous rmdir */
    +h_d = a->dst_h_dentry;
    +if (au_ftest_ren(a->auren_flags, ISDIR_DST)
    +    && !au_ftest_ren(a->auren_flags, DIRREN) /*
    +    && d_is_positive(h_d) */
    +    err = -ENOMEM;
+    a->thargs = au_whtmp_rmdir_alloc(a->src_dentry->d_sb,
    +    GFP_NOFS);
+if (unlikely(!a->thargs))
+goto out;
+a->h_dst = dget(h_d);
+
+/* create whiteout for src_dentry */
+if (au_ftest_ren(a->auren_flags, WHSRC)) {
+a->src_bwh = au_dbwh(a->src_dentry);
+AuDebugOn(a->src_bwh >= 0);
+a->src_wh_dentry = au_wh_create(a->src_dentry, a->btgt,
+a->src_h_parent);
+err = PTR_ERR(a->src_wh_dentry);
+if (IS_ERR(a->src_wh_dentry))
+goto out_thargs;
+}
+
+/* lookup whiteout for dentry */
+if (au_ftest_ren(a->auren_flags, WHDST)) {
+h_d = au_wh_lkup(a->dst_h_parent,
+ &a->dst_dentry->d_name, a->br);
+err = PTR_ERR(h_d);
+if (IS_ERR(h_d))
+goto out_whsrc;
+if (d_is_negative(h_d))
+dput(h_d);
+else
+a->dst_wh_dentry = h_d;
+}
+
+/* rename dentry to tmpwh */
+if (a->thargs) {
+err = au_whtmp_ren(a->dst_h_dentry, a->br);
+if (unlikely(err))
+goto out_whdst;
+
+d = a->dst_dentry;
+au_set_h_dptr(d, a->btgt, NULL);
+err = au_lkup_neg(d, a->btgt, /*wh*/0);
+if (unlikely(err))
+goto out_whtmp;
+a->dst_h_dentry = au_h_dptr(d, a->btgt);
+}
+}
+
+BUG_ON(d_is_positive(a->dst_h_dentry) && a->src_btop != a->btgt);
+
+if 0
+BUG_ON(!au_ftest_ren(a->auren_flags, DIRREN)
+   && d_is_positive(a->dst_h_dentry)
&& a->src_btop != a->btgt);
#endif

/* rename by vfs_rename or cpup */
+err = au_ren_or_cpup(a);
+if (unlikely(err))
+goto out_whtmp;

/* make dir opaque */
+err = au_ren_diropq(a);
+if (unlikely(err))
+goto out_rename;

/* update target timestamps */
+if (!a->exchange) {
+AuDebugOn(au_dbtop(a->dst_dentry) != a->btgt);
+a->h_path.dentry = au_h_dptr(a->dst_dentry, a->btgt);
+vfsub_update_h_iattr(&a->h_path, /*did*/NULL); /*ignore*/
+a->dst_inode->i_ctime = d_inode(a->h_path.dentry)->i_ctime;
+}
+AuDebugOn(au_dbtop(a->src_dentry) != a->btgt);
+a->h_path.dentry = au_h_dptr(a->src_dentry, a->btgt);
+vfsub_update_h_iattr(&a->h_path, /*did*/NULL); /*ignore*/
+a->src_inode->i_ctime = d_inode(a->h_path.dentry)->i_ctime;
+
+if (!a->exchange) {
+/* remove whiteout for dentry */
+if (a->dst_wh_dentry) {
+a->h_path.dentry = a->dst_wh_dentry;
+err = au_wh_unlink_dentry(a->dst_h_dir, &a->h_path,
+ a->dst_dentry);
+if (unlikely(err))
+goto out_diropq;
+}

+/* remove whtmp */
+if (a->thargs)
+au_ren_del_whtmp(a); /* ignore this error */
+
+au_fhsm_wrote(a->src_dentry->d_sb, a->btgt, /*force*/0);
+
+err = 0;
+goto out_success;
+
+out_diropq:
+au_ren_rev_diropq(err, a);
+out_rename:
+au_ren_rev_rename(err, a);
+dput(a->h_dst);
+out_whtmp:
+if (a->thargs)
+au_ren_rev_whtmp(err, a);
+out_whdst:
+dput(a->dst_wh_dentry);
+a->dst_wh_dentry = NULL;
+out_whsrc:
+if (a->src_wh_dentry)
+au_ren_rev_whsrc(err, a);
+out_success:
+dput(a->src_wh_dentry);
+dput(a->dst_wh_dentry);
+out_thargs:
+if (a->thargs) {
+dput(a->h_dst);
+au_whtmp_rmdir_free(a->thargs);
+a->thargs = NULL;
+
+} +out:
+return err;
+
+/* ---------------------------------------------------------------------- */
+/*
+ * test if @dentry dir can be rename destination or not.
+ * success means, it is a logically empty dir.
+ */
+static int may_rename_dstdir(struct dentry *dentry, struct au_nhash *whlist)
+{
+return au_test_empty(dentry, whlist);
+}
+
+/*
+ * test if @a->src_dentry dir can be rename source or not.
+ * if it can, return 0.
+ * success means,
+ * - it is a logically empty dir.
+ * - or, it exists on writable branch and has no children including whiteouts
+ *   on the lower branch unless DIRREN is on.
+ */
+static int may_rename_srcdir(struct au_ren_args *a)
+{
+int err;
+unsigned int rdhash;
+aufs_bindex_t btop, btgt;
+struct dentry *dentry;
+struct super_block *sb;
+struct au_sinfo *sbinfo;
+
+dentry = a->src_dentry;
+sb = dentry->d_sb;
+sbinfo = au_sbi(sb);
+
+sbinfo = a->auren_flags, DIRREN);
+tu$fset_ren(a->auren_flags, DIRREN);
+
+btgt = a->btgt;
+btop = au_dbtop(dentry);
+if (btop != btgt) {
+struct au_nhash whlist;
+
+SiMustAnyLock(sb);
+rdhash = sbinfo->si_rdhash;
+if (!rdhash)
+rdhash = au_rdhash_est(au_dir_size(/*file*/NULL,
+ dentry));
+err = au_nhash Alloc(&whlist, rdhash, GFP_NOFS);
+if (unlikely(err))
+goto out;
+err = au_test_empty(dentry, &whlist);
+au_nhash_wh_free(&whlist);
+goto out;
+)
+
+if (btop == au_dbtaidir(dentry))
+return 0; /* success */
+
+err = au_test_empty_lower(dentry);
+
+out:
+if (err == -ENOTEMPTY) {
+if (au_fset_ren(a->auren_flags, DIRREN)) {
+err = 0;
+} else {
+AuWarn1("renaming dir who has child(ren) on multiple 
"+"branches, is not supported");
+err = -EXDEV;
+}
+
+return err;
+}
+
+/* side effect: sets whlist and b_dentry */
+static int au_ren_may_dir(struct au_ren_args *a)
+{
+int err;
+unsigned int rdhash;
+struct dentry *d;
+
+d = a->dst_dentry;
+SiMustAnyLock(d->d_sb);
+
+err = 0;
+if (au_ftest_ren(a->auren_flags, ISDIR_DST) && a->dst_inode) {
++rdhash = au_sbi(d->d_sb)->si_rdhash;
++if (!rdhash)
++    rdhash = au_rdhash_est(au_dir_size(/*file*/NULL, d));
++err = au_nhash_alloc(&a->whlist, rdhash, GFP_NOFS);
++if (unlikely(err))
++    goto out;
++
++if (!a->exchange) {
++    au_set_dbtop(d, a->dst_btop);
++    err = may_rename_dstdir(d, &a->whlist);
++    au_set_dbtop(d, a->btgt);
++    } else
++    err = may_rename_srcdir(a);
++
+a->dst_h_dentry = au_h_dptr(d, au_dbtop(d));
++if (unlikely(err))
++    goto out;
+
+d = a->src_dentry;
+a->src_h_dentry = au_h_dptr(d, au_dbtop(d));
+if (au_ftest_ren(a->auren_flags, ISDIR_SRC)) {
++err = may_rename_srcdir(a);
++if (unlikely(err)) {
++    au_nhash_wh_free(&a->whlist);
++    a->whlist.nh_num = 0;
++    } else
++}
+out:
+return err;
+}
+
+/* ----------------------------------------------- */
+
+/*
+ * simple tests for rename.
+ * following the checks in vfs, plus the parent-child relationship.
+ */
+static int au_may_ren(struct au_ren_args *a)
+{  
+int err, isdir;
+struct inode *h_inode;
+
+if (a->src_btop == a->btgt) {
+err = au_may_del(a->src_dentry, a->btgt, a->src_h_parent,
+    au_ftest_ren(a->auren_flags, ISDIR_SRC));
+if (unlikely(err))
+    goto out;
+err = -EINVAL;
+if (unlikely(a->src_h_dentry == a->h_trap))
+    goto out;
+}
+
+err = 0;
+if (a->dst_btop != a->btgt)
+    goto out;
+
+err = -ENOTEMPTY;
+if (unlikely(a->dst_h_dentry == a->h_trap))
+    goto out;
+
+err = -EIO;
+isdir = !!au_ftest_ren(a->auren_flags, ISDIR_DST);
+if (d_really_is_negative(a->dst_dentry)) {
+    if (d_is_negative(a->dst_h_dentry))
+        err = au_may_add(a->dst_dentry, a->btgt,
+            a->dst_h_parent, isdir);
+} else {
+    if (unlikely(d_is_negative(a->dst_h_dentry))
+        goto out;
+h_inode = d_inode(a->dst_h_dentry);
+if (h_inode->i_nlink)
+    err = au_may_del(a->dst_dentry, a->btgt,
+        a->dst_h_parent, isdir);
+}
+
+out:
+if (unlikely(err == -ENOENT || err == -EEXIST))
+    err = -EIO;
+AuTraceErr(err);
+return err;
+}
+
+/* locking order */
+ *(VFS)
+ * - src_dir and dir by lock_rename()
+ * - inode if exits
+ * (aufs)
+ * - lock all
+ * + src_dentry and dentry by aufs_read_and_write_lock2() which calls,
+ *   + si_read_lock
+ *   + di_write_lock2_child()
+ *   + di_write_lock_child()
+ *   + ii_write_lock_child()
+ *   + di_write_lock_child2()
+ *   + ii_write_lock_child2()
+ *   + src_parent and parent
+ *   + di_write_lock_parent()
+ *   + ii_write_lock_parent()
+ *   + di_write_lock_parent2()
+ *   + ii_write_lock_parent2()
+ *   + lower src_dir and dir by vfsub_lock_rename()
+ *   + verify the every relationships between child and parent. if any
+ *     of them failed, unlock all and return -EBUSY.
+ */
+static void au_ren_unlock(struct au_ren_args *a)
{+  vfsub_unlock_rename(a->src_h_parent, a->src_hdir,
+    a->dst_h_parent, a->dst_hdir);
+  if (au_ftest_ren(a->auren_flags, DIRREN)
+      && a->h_root)
+    au_hn_inode_unlock(a->h_root);
+  if (au_ftest_ren(a->auren_flags, MNT_WRITE))
+    vfsub_mnt_drop_write(au_br_mnt(a->br));
+}
+static int au_ren_lock(struct au_ren_args *a)
{+  int err;
+  unsigned int udba;
+
+  err = 0;
+  a->src_h_parent = au_h_dptr(a->src_parent, a->btgt);
+  a->src_hdir = au_hi(a->src_dir, a->btgt);
+  a->dst_h_parent = au_h_dptr(a->dst_parent, a->btgt);
+  a->dst_hdir = au_hi(a->dst_dir, a->btgt);
+
+  err = vfsub_mnt_want_write(au_br_mnt(a->br));
+  if (unlikely(err))
+    goto out;
+  fset_ren(a->auren_flags, MNT_WRITE);
+  if (au_ftest_ren(a->auren_flags, DIRREN)) {
+    vfsub_unlock_rename(a->src_h_parent, a->src_hdir,
+      a->dst_h_parent, a->dst_hdir);
+  }
struct dentry *root;
struct inode *dir;

/* sbinfo is already locked, so this ii_read_lock is unnecessary, but our debugging feature checks it. */
+root = a->src_inode->i_sb->s_root;
+if (root != a->src_parent && root != a->dst_parent) {
+dir = d_inode(root);
+ii_read_lock_parent3(dir);
+a->h_root = au_hi(dir, a->btgt);
+ii_read_unlock(dir);
+au_hi_inode_lock_nested(a->h_root, AuLsc_I_PARENT3);
+
+a->h_trap = vfsub_lock_rename(a->src_h_parent, a->src_hdir,  
  a->dst_h_parent, a->dst_hdir);
+udba = au_opt_udba(a->src_dentry->d_sb);
+if (unlikely(a->src_hdir->hi_inode != d_inode(a->src_h_parent)  
  || a->dst_hdir->hi_inode != d_inode(a->dst_h_parent)))
+err = au_busy_or_stale();
+if (!err) au_dbtop(a->src_dentry) == a->btgt)
+err = au_h_verify(a->src_h_dentry, udba,  
  d_inode(a->src_h_parent), a->src_h_parent,  
  a->br);
+if (!err) au_dbtop(a->dst_dentry) == a->btgt)
+err = au_h_verify(a->dst_h_dentry, udba,  
  d_inode(a->dst_h_parent), a->dst_h_parent,  
  a->br);
+if (!err)
+goto out; /* success */
+
+err = au_busy_or_stale();
+au_ren_unlock(a);
+
+out:
+return err;
+
+/* ----------------------------------------------- */
+
+static void au_ren_refresh_dir(struct au_ren_args *a) {
+struct inode *dir;
+
+dir = a->dst_dir;
+dir->i_version++;
```c
+if (au_ftest_ren(a->auren_flags, ISDIR_SRC)) {
+/* is this updating defined in POSIX? */
+au_cpup_attr_timesizes(a->src_inode);
+au_cpup_attr_nlink(dir, /*force*/1);
+}
+au_dir_ts(dir, a->btgt);
+
+if (a->exchange) {
+dir = a->src_dir;
+dir->i_version++;
+if (au_ftest_ren(a->auren_flags, ISDIR_DST)) {
+/* is this updating defined in POSIX? */
+au_cpup_attr_timesizes(a->dst_inode);
+au_cpup_attr_nlink(dir, /*force*/1);
+}
+au_dir_ts(dir, a->btgt);
+}
+
+if (au_ftest_ren(a->auren_flags, ISSAMEDIR))
+return;
+
+dir = a->src_dir;
+dir->i_version++;
+if (au_ftest_ren(a->auren_flags, ISDIR_SRC))
+au_cpup_attr_nlink(dir, /*force*/1);
+au_dir_ts(dir, a->btgt);
+}
+
+static void au_ren_refresh(struct au_ren_args *a) {
+}{
+aufs_bindex_t bbot, bindex;
+struct dentry *d, *h_d;
+struct inode *i, *h_i;
+struct super_block *sb;
+
+d = a->dst_dentry;
+d_drop(d);
+if (a->h_dst)
+/* already dget-ed by au_ren_or_cpup() */
+au_set_h_dptr(d, a->btgt, a->h_dst);
+
+i = a->dst_inode;
+if (i) {
+if (!a->exchange) {
+if (!au_ftest_ren(a->auren_flags, ISDIR_DST))
+vfs_nlink(i);
+else {
+vfs_deal(i);
+}
+}
+else {
+}
+}
```
+au_cpup_attr_timesizes(i);
+}
+au_update_dbrange(d, /*do_put_zero*/1);
+} else
+au_cpup_attr_nlink(i, /*force*/1);
+} else {
+bbot = a->btgt;
+for (bindex = au_dbttop(d); bindex < bbot; index++)
+au_set_h_dptr(d, bindex, NULL);
+bbot = au_dbbot(d);
+for (bindex = a->btgt + 1; bindex <= bbot; bindex++)
+au_set_h_dptr(d, bindex, NULL);
+au_update_dbrange(d, /*do_put_zero*/0);
+}
+
+if (a->exchange
+    || au_ftest_ren(a->auren_flags, DIRREN)) {
+d_drop(a->src_dentry);
+if (au_ftest_ren(a->auren_flags, DIRREN))
+au_set_dbwh(a->src_dentry, -1);
+return;
+}
+
+d = a->src_dentry;
+au_set_dbwh(d, -1);
+bbot = au_dbbot(d);
+for (bindex = a->btgt + 1; bindex <= bbot; bindex++) {
+h_d = au_h_dptr(d, bindex);
+if (h_d)
+au_set_h_dptr(d, bindex, NULL);
+}
+au_set_dbbot(d, a->btgt);
+
+sb = d->d_sb;
+i = a->src_inode;
+if (au_opt_test(au_mntflags(sb), PLINK) && au_plink_test(i))
+return; /* success */
+
+bbot = au_ibbot(i);
+for (bindex = a->btgt + 1; bindex <= bbot; index++) {
+h_i = au_h_iptr(i, bindex);
+if (h_i) {
+au_xino_write(sb, bindex, h_i->i_ino, /*ino*/0);
+/* ignore this error */
+au_set_h_iptr(i, bindex, NULL, 0);
+}
+}
+au_set_ibbot(i, a->btgt);
int au_wbr(struct dentry *dentry, aufs_bindex_t btgt)
{
    aufs_bindex_t bdiropq, bwh;
    struct dentry *parent;
    struct au_branch *br;
    
    parent = dentry->d_parent;
    IMustLock(d_inode(parent)); /* dir is locked */
    
    bdiropq = au_dbdiropq(parent);
    bwh = au_dbwh(dentry);
    br = au_sbr(dentry->d_sb, btgt);
    if (au_br_rdonly(br)
        || (0 <= bdiropq && bdiropq < btgt)
        || (0 <= bwh && bwh < btgt))
        btgt = -1;
    
    AuDbg("btgt %d\n", btgt);
    return btgt;
}

static int au_ren_wbr(struct au_ren_args *a)
{
    int err;
    struct au_wr_dir_args wr_dir_args = {
        .force_btgt	= -1,
    };
    
    a->src_btop = au_dbtop(a->src_dentry);
    a->dst_btop = au_dbtop(a->dst_dentry);
    if (au_ftest_ren(a->auren_flags, ISDIR_SRC)
        || au_ftest_ren(a->auren_flags, ISDIR_DST))
        tfset_wrdir(wr_dir_args.flags, ISDIR);
    wr_dir_args.force_btgt = a->src_btop;
    if (a->dst_inode && a->dst_btop < a->src_btop)
        wr_dir_args.force_btgt = a->dst_btop;
    wr_dir_args.force_btgt = au_wbr(a->dst_dentry, wr_dir_args.force_btgt);
    err = au_wr_dir(a->dst_dentry, a->src_dentry, &wr_dir_args);
    a->btgt = err;
    if (a->exchange)
        au_update_dbtop(a->dst_dentry);
+ return err;
+
+static void au_ren_dt(struct au_ren_args *a)
+{
+a->h_path.dentry = a->src_h_parent;
+au_dtime_store(a->src_dt + AuPARENT, a->src_parent, &a->h_path);
+if (!au_ftest_ren(a->auren_flags, ISSAMEDIR)) {
+a->h_path.dentry = a->dst_h_parent;
+au_dtime_store(a->dst_dt + AuPARENT, a->dst_parent, &a->h_path);
+}
+
+au_fclr_ren(a->auren_flags, DT_DSTDIR);
+if (!au_ftest_ren(a->auren_flags, ISDIR_SRC) && !a->exchange)
+return;
+
a->h_path.dentry = a->src_h_dentry;
+au_dtime_store(a->src_dt + AuCHILD, a->src_dentry, &a->h_path);
+if (d_is_positive(a->dst_h_dentry)) {
+au_fset_ren(a->auren_flags, DT_DSTDIR);
+a->h_path.dentry = a->dst_h_dentry;
+au_dtime_store(a->dst_dt + AuCHILD, a->dst_dentry, &a->h_path);
+}
+
+static void au_ren_rev_dt(int err, struct au_ren_args *a)
+{
+struct dentry *h_d;
+struct inode *h_inode;
+
+au_dtime_revert(a->src_dt + AuPARENT);
+if (!au_ftest_ren(a->auren_flags, ISSAMEDIR)) {
+au_dtime_revert(a->src_dt + AuCHILD);
+h_inode = d_inode(h_d);
+inode_lock_nested(h_inode, AuLsc_I_CHILD);
+au_dtime_revert(a->src_dt + AuCHILD);
+inode_unlock(h_inode);
+
+if (au_ftest_ren(a->auren_flags, ISDIR_SRC) && err != -EIO) {
+h_d = a->src_dt[AUCHILD].dt_h_path.dentry;
+h_inode = d_inode(h_d);
+inode_lock_nested(h_inode, AuLsc_I_CHILD);
+au_dtime_revert(a->src_dt + AuCHILD);
+inode_unlock(h_inode);
+
+if (au_ftest_ren(a->auren_flags, DT_DSTDIR)) {
+h_d = a->dst_dt[AUCHILD].dt_h_path.dentry;
+h_inode = d_inode(h_d);
+inode_lock_nested(h_inode, AuLsc_I_CHILD);
+au_dtime_revert(a->dst_dt + AuCHILD);
+}
inode_unlock(h_inode);
+
+int aufs_rename(struct inode * src_dir, struct dentry * src_dentry, 
+struct inode * dst_dir, struct dentry * dst_dentry, 
+unsigned int _flags)
+{
+int err, lock_flags;
+void *rev;
+/* reduce stack space */
+struct au_ren_args *a;
+struct au_pin pin;
+
+AuDbg("%pd, %pd, 0x%x\n", _src_dentry, _dst_dentry, _flags);
+IMustLock(_src_dir);
+IMustLock(_dst_dir);
+
+err = -EINVAL;
+if (unlikely(_flags & RENAME_WHITEOUT))
+goto out;
+
+err = -ENOMEM;
+BUILD_BUG_ON(sizeof(*a) > PAGE_SIZE);
+a = kzalloc(sizeof(*a), GFP_NOFS);
+if (unlikely(!a))
+goto out;
+
a->flags = _flags;
+a->exchange = _flags & RENAME_EXCHANGE;
+a->src_dir = _src_dir;
+a->src_dentry = _src_dentry;
+a->src_inode = NULL;
+if (d_really_is_positive(a->src_dentry))
+a->src_inode = d_inode(a->src_dentry);
+a->src_parent = a->src_dentry->d_parent; /* dir inode is locked */
+a->dst_dir = _dst_dir;
+a->dst_dentry = _dst_dentry;
+a->dst_inode = NULL;
+if (d_really_is_positive(a->dst_dentry))
+a->dst_inode = d_inode(a->dst_dentry);
+a->dst_parent = a->dst_dentry->d_parent; /* dir inode is locked */
+a->dir_inode = d_ino(a->src_dentry);
+a->dir_parent = a->src_dentry->d_parent; /* dir inode is locked */
+if (a->dir_inode) {
+/*
+ * if EXCHANGE && src is non-dir && dst is dir,
+ */
+}
+ * dst is not locked.
+ */
+/** IMustLock(a->dst_inode); */
+au_igrab(a->dst_inode);
+}
+
+err = -ENOTDIR;
+lock_flags = AuLock_FLUSH | AuLock_NOPLM | AuLock_GEN;
+if (d_is_dir(a->src_dentry)) {
+au_fsset_ren(a->auren_flags, ISDIR_SRC);
+if (unlikely(!a->exchange
+    && d_really_is_positive(a->dst_dentry)
+    && !d_is_dir(a->dst_dentry)))
goto out_free;
+lock_flags |= AuLock_DIRS;
+}
+if (a->dst_inode && d_is_dir(a->dst_dentry)) {
+au_fsset_ren(a->auren_flags, ISDIR_DST);
+if (unlikely(!a->exchange
+    && d_really_is_positive(a->src_dentry)
+    && !d_is_dir(a->src_dentry)))
goto out_free;
+lock_flags |= AuLock_DIRS;
+}
+err = aufs_read_and_write_lock2(a->dst_dentry, a->src_dentry,
+lock_flags);
+if (unlikely(err))
goto out_free;
+
+err = au_d_hashed_positive(a->src_dentry);
+if (unlikely(err))
goto out_unlock;
+err = -ENOENT;
+if (a->dst_inode) {
+    /*
+     * If it is a dir, VFS unhash it before this
+     * function. It means we cannot rely upon d_unhashed().
+     */
+if (unlikely(!a->dst_inode->i_nlink))
goto out_unlock;
+if (!au_ftest_ren(a->auren_flags, ISDIR_DST)) {
+err = au_d_hashed_positive(a->dst_dentry);
+if (unlikely(err && !a->exchange))
goto out_unlock;
+} else if (unlikely(IS_DEADDIR(a->dst_inode)))
goto out_unlock;
+} else if (unlikely(d_unhashed(a->dst_dentry)))
goto out_unlock;
+ /*
+ * is it possible?
+ * yes, it happened (in linux-3.3-rcN) but I don't know why.
+ * there may exist a problem somewhere else.
+ */
+ err = -EINVAL;
+ if (unlikely(d_inode(a->dst_parent) == d_inode(a->src_dentry)))
+ goto out_unlock;
+
+ au_fset_ren(a->auren_flags, ISSAMEDIR); /* temporary */
+ di_write_lock_parent(a->dst_parent);
+
+ /* which branch we process */
+ err = au_ren_wbr(a);
+ if (unlikely(err < 0))
+ goto out_parent;
+ a->br = au_sbr(a->dst_dentry->d_sb, a->btgt);
+ a->h_path.mnt = au_br_mnt(a->br);
+
+ /* are they available to be renamed */
+ err = au_ren_may_dir(a);
+ if (unlikely(err))
+ goto out_children;
+
+ /* prepare the writable parent dir on the same branch */
+ if (a->dst_btop == a->btgt) {
+ au_fset_ren(a->auren_flags, WHDST);
+ } else {
+ err = au_cpup_dirs(a->dst_dentry, a->btgt);
+ if (unlikely(err))
+ goto out_children;
+ }
+
+ err = 0;
+ if (!a->exchange) {
+ if (a->src_dir != a->dst_dir) {
+ /*
+ * this temporary unlock is safe,
+ * because both dir->i_mutex are locked.
+ */
+ di_write_unlock(a->dst_parent);
+ di_write_lock_parent(a->src_parent);
+ err = au_wr_dir_need_wh(a->src_dentry,
+ &a->auren_flags,
+ ISDIR_SRC),
+ &a->btgt);
+ di_write_unlock(a->src_parent);
/* isdir */
+au_fclr_ren(a->auren_flags, ISSAMEDIR);
+} else
+err = au_wr_dir_need_wh(a->src_dentry,
+au_flest_ren(a->auren_flags,
+ISDIR_SRC),
+&a->btgt);
+
+if (unlikely(err < 0))
goto out_children;
+if (err)
+au_fset_ren(a->auren_flags, WHSRC);
+
+/* cpup src */
+if (a->src_btop != a->btgt) {
+err = au_pin(&pin, a->src_dentry, a->btgt,
+au_opt_udba(a->src_dentry->d_sb),
+AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (!err) {
+struct au_cp_generic cpg = {
+.dentry= a->src_dentry,
+.bdst= a->btgt,
+.bsrc= a->src_btop,
+.len= -1,
+.pin= &pin,
+.flags= AuCpup_DTIME | AuCpup_HOPEN
+};
+AuDebugOn(au_dbtop(a->src_dentry) != a->src_btop);
+err = au_sio_cpup_simple(&cpg);
+au_unpin(&pin);
+}
+if (unlikely(err))
goto out_children;
+a->src_btop = a->btgt;
+a->src_h_dentry = au_h_dptr(a->src_dentry, a->btgt);
+if (!a->exchange)
+au_fset_ren(a->auren_flags, WHSRC);
+}
+
+/* cpup dst */
+if (a->exchange && a->dst_inode
+&& a->dst_btop != a->btgt) {
+err = au_pin(&pin, a->dst_dentry, a->btgt,
+au_opt_udba(a->dst_dentry->d_sb),
+AuPin_DI_LOCKED | AuPin_MNT_WRITE);
+if (!err) {
+struct au_cp_generic cpg = {
+.dentry= a->dst_dentry,
+.bdst= a->btgt,
+.bsrc= a->dst_btop,
+.len= -1,
+.pin= &pin,
+.flags= AuCpup_DTIME | AuCpup_HOPEN
+);
+err = au_sio_cpup_simple(&cpg);
+au_unpin(&pin);
+
+if (unlikely(err))
+goto out_children;
+a->dst_btop = a->btgt;
+a->dst_h_dentry = au_h_dptr(a->dst_dentry, a->btgt);
+
+/* lock them all */
+err = au_ren_lock(a);
+if (unlikely(err))
+/* leave the copied-up one */
+goto out_children;
+
+if (!a->exchange) {
+if (!au_opt_test(au_mntflags(a->dst_dir->i_sb), UDBA_NONE))
+err = au_may_ren(a);
+else if (unlikely(a->dst_dentry->d_name.len > AUFS_MAX_NAMELEN))
+err = -ENAMETOOLONG;
+if (unlikely(err))
+goto out_hdir;
+
+/* store timestamps to be revertible */
+au_ren_dt(a);
+
+/* store dirren info */
+if (au_ftest_ren(a->auren_flags, DIRREN)) {
+err = au_dr_rename(a->src_dentry, a->btgt,
+ &a->dst_dentry->d_name, &rev);
+AuTraceErr(err);
+if (unlikely(err))
+goto out_dt;
+
+/* here we go */
+err = do_rename(a);
+if (unlikely(err))
+goto out_dirren;
+}
if (au_ftest_ren(a->auren_flags, DIRREN))
    au_dr_rename_fin(a->src_dentry, a->btgt, rev);
+
/* update dir attributes */
    au_ren_refresh_dir(a);
+
/* dput/iput all lower dentries */
    au_ren_refresh(a);
+
go to out_hdir; /* success */
+
out_dirren:
if (au_ftest_ren(a->auren_flags, DIRREN))
    au_dr_rename_rev(a->src_dentry, a->btgt, rev);
out_dt:
    au_ren_rev_dt(err, a);
out_hdir:
    au_ren_unlock(a);
out_children:
    au_nhash_wh_free(&a->whlist);
+ if (err & & a->dst_inode & & a->dst_btop != a->btgt) {
+ AuDbg("btop %d, btgt %d\n", a->dst_btop, a->btgt);
+ au_set_h_dptr(a->dst_dentry, a->btgt, NULL);
+ au_set_dbtop(a->dst_dentry, a->dst_btop);
+ }
out_parent:
if (!err) {
    if (d_unhashed(a->src_dentry))
        au_fset_ren(a->auren_flags, DROPPED_SRC);
    if (d_unhashed(a->dst_dentry))
        au_fset_ren(a->auren_flags, DROPPED_DST);
    if (!a->exchange)
        d_move(a->src_dentry, a->dst_dentry);
    else {
        d_exchange(a->src_dentry, a->dst_dentry);
        if (au_ftest_ren(a->auren_flags, DROPPED_DST))
            d_drop(a->dst_dentry);
        +}
    if (au_ftest_ren(a->auren_flags, DROPPED_SRC))
        d_drop(a->src_dentry);
    +} else {
        au_update_dbtop(a->dst_dentry);
        if (!a->dst_inode)
            d_drop(a->dst_dentry);
        +}
    if (au_ftest_ren(a->auren_flags, ISSAMEDIR))
        di_write_unlock(a->dst_parent);
    +}
+di_write_unlock2(a->src_parent, a->dst_parent);
+out_unlock:
+aufs_read_and_write_unlock2(a->dst_dentry, a->src_dentry);
+out_free:
+iput(a->dst_inode);
+if (a->thargs)
+au_whtmp_rmdir_free(a->thargs);
+kfree(a);
+out:
+AuTraceErr(err);
+return err;
+}
--- linux-4.15.0.orig/fs/aufs/iinfo.c
+++ linux-4.15.0/fs/aufs/iinfo.c
@@ -0,0 +1,285 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
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+ *
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * inode private data
+ */
+
+#include "aufs.h"
+
+struct inode *au_h_iptr(struct inode *inode, aufs_bindex_t bindex)
+{
+    struct au_hinode *hinode;
+    IiMustAnyLock(inode);
+    hinode = au_hinode(au_ii(inode), bindex);
+    h_inode = hinode->hi_inode;
+    AuDebugOn(h_inode && atomic_read(&h_inode->i_count) <= 0);
+return h_inode;
+
+/* todo: hard/soft set? */
+void au_hiput(struct au_hinode *hinode)
+{
+au_hn_free(hinode);
+dput(hinode->hi_whdentry);
+iput(hinode->hi_inode);
+}
+
unsigned int au_hi_flags(struct inode *inode, int isdir)
+
unsigned int flags;
+const unsigned int mnt_flags = au_mntflags(inode->i_sb);
+flags = 0;
+if (au_opt_test(mnt_flags, XINO))
+au_fset_hi(flags, XINO);
+if (isdir && au_opt_test(mnt_flags, UDBA_HNOTIFY))
+au_fset_hi(flags, HNOTIFY);
+return flags;
+
void au_set_h_iptr(struct inode *inode, aufs_bindex_t bindex,
+      struct inode *h_inode, unsigned int flags)
+{
+struct au_hinode *hinode;
+struct inode *hi;
+struct au_iinfo *iinfo = au_ii(inode);
+
+IiMustWriteLock(inode);
+
+hinode = au_hinode(iinfo, bindex);
+hi = hinode->hi_inode;
+AuDebugOn(h_inode && atomic_read(&h_inode->i_count) <= 0);
+
+if (hi)
+au_hiput(hinode);
+hinode->hi_inode = h_inode;
+if (h_inode) {
+int err;
+struct super_block *sb = inode->i_sb;
+struct au_branch *br;
+
+AuDebugOn(inode->i_mode
+      && (h_inode->i_mode & S_IFMT)
+      && (inode->i_mode & S_IFMT)
+      && (h_inode->i_mode & S_IFMT)
+      && (inode->i_mode & S_IFMT));
if (bindex == iinfo->ii_btop)
  au_cpup_igen(inode, h_inode);
br = au_sbr(sh, bindex);
hiinode->hi_id = br->br_id;
if (au_ftest_hi(flags, XINO)) {
  err = au_xino_write(sh, bindex, h_inode->i_ino, 
    inode->i_ino); 
  if (unlikely(err))
    AuIOErr1("failed au_xino_write() %d\n", err);
}

if (au_ftest_hi(flags, HNOTIFY)
  && au_br_hnotifyable(br->br_perm)) {
  err = au_hn_alloc(hinode, inode);
  if (unlikely(err))
    AuIOErr1("au_hn_alloc() %d\n", err);
}

void au_set_hi_wh(struct inode *inode, aufs_bindex_t bindex, 
  struct dentry *h_wh)
{
  struct au_hinode *hinode;
  IiMustWriteLock(inode);
  hinode = au_hinode(au_ii(inode), bindex);
  AuDebugOn(hinode->hi_whdentry);
  hinode->hi_whdentry = h_wh;
  +HiMustWriteLock(inode);
  +hinode = au_hinode(au_ii(inode), bindex);
  +AuDebugOn(hinode->hi_whdentry);
  +hinode->hi_whdentry = h_wh;
}

void au_update_iigen(struct inode *inode, int half)
{
  struct au_iinfo *iinfo;
  struct au_iigen *iigen;
  unsigned int sigen;
  
sigen = au_sigen(inode->i_sb);
  iinfo = au_ii(inode);
  +iigen = &iinfo->ii_generation;
  +spin_lock(&iigen->ig_spin);
  +iigen->ig_generation = sigen;
  if (half)
    au_ig_fset(iigen->ig_flags, HALF_REFRESHED);
  else
    au_ig_fclr(iigen->ig_flags, HALF_REFRESHED);
  +spin_unlock(&iigen->ig_spin);
void au_update_ibrange(struct inode *inode, int do_put_zero) {
    struct au_iinfo *iinfo;
    aufs_bindex_t bindex, bbot;
    
    AuDebugOn(au_is_bad_inode(inode));
    iMustWriteLock(inode);
    
    iinfo = au_ii(inode);
    if (do_put_zero && iinfo->ii_btop >= 0) {
        for (bindex = iinfo->ii_btop; bindex <= iinfo->ii_bbot;
             bindex++) {
            struct inode *h_i;
            
            h_i = au_hinode(iinfo, bindex)->hi_inode;
            if (h_i && !h_i->i_nlink && !(h_i->i_state & I_LINKABLE))
                au_set_h_iptr(inode, bindex, NULL, 0);
        }
        
        iinfo->ii_btop = -1;
        iinfo->ii_bbot = -1;
        bbot = au_sbbot(inode->i_sb);
        for (bindex = 0; bindex <= bbot; bindex++)
            if (au_hinode(iinfo, bindex)->hi_inode) {
                iinfo->ii_btop = bindex;
                break;
            }
        
        if (iinfo->ii_btop >= 0)
            for (bindex = bbot; bindex >= iinfo->ii_btop; bindex--)
                if (au_hinode(iinfo, bindex)->hi_inode) {
                    iinfo->ii_bbot = bindex;
                    break;
                }
    }
    AuDebugOn(iinfo->ii_btop > iinfo->ii_bbot);
}

/* ---------------------------------------------------------------------- */

void au_icntnr_init_once(void *_c) {
    struct au_icntnr *c = _c;
    struct au_iinfo *iinfo = &c->iinfo;
    
    iinfo->ii_btop = -1;
    iinfo->ii_bbot = -1;
    bbot = au_sbbot(inode->i_sb);
    for (bindex = 0; bindex <= bbot; bindex++)
        if (au_hinode(iinfo, bindex)->hi_inode) {
            iinfo->ii_btop = bindex;
            break;
        }
    
    if (iinfo->ii_btop >= 0)
        for (bindex = bbot; bindex >= iinfo->ii_btop; bindex--)
            if (au_hinode(iinfo, bindex)->hi_inode) {
                iinfo->ii_bbot = bindex;
                break;
            }
    
    AuDebugOn(iinfo->ii_btop > iinfo->ii_bbot);
}

/* it may be called at remount time, too */

/* ---------------------------------------------------------------------- */

void au_icntnr_init_once(void *c) {
    struct au_icntnr *c = _c;
    struct au_iinfo *iinfo = &c->iinfo;
+spin_lock_init(&iinfo->ii_generation.ig_spin);
+au_rwlock_init(&iinfo->ii_rwlock);
+inode_init_once(&c->vfs_inode);
+
+void au_hinode_init(struct au_hinode *hinode)
+{
+hinode->hi_inode = NULL;
+hinode->hi_id = -1;
+au_hn_init(hinode);
+hinode->hi_whdentry = NULL;
+
+int au_iinfo_init(struct inode *inode)
+{
+struct au_iinfo *iinfo;
+struct super_block *sb;
+struct au_hinode *hi;
+int nbr, i;
+
+sb = inode->i_sb;
+iinfo = &(container_of(inode, struct au_icntnr, vfs_inode)->iinfo);
+nbr = au_sbbot(sb) + 1;
+if (unlikely(nbr <= 0))
+nbr = 1;
+hi = kmalloc_array(nbr, sizeof(*iinfo->ii_hinode), GFP_NOFS);
+if (hi) {
+au_ninodes_inc(sb);
+
+iinfo->ii_hinode = hi;
+for (i = 0; i < nbr; i++, hi++)
+au_hinode_init(hi);
+
+iinfo->ii_generation.ig_generation = au_sigen(sb);
+iinfo->ii_btop = -1;
+iinfo->ii_bbot = -1;
+iinfo->ii_vdir = NULL;
+return 0;
+}
+return -ENOMEM;
+
+int au_hinode_realloc(struct au_iinfo *iinfo, int nbr, int may_shrink)
+{
+int err, i;
+struct au_hinode *hip;
+

AuRwMustWriteLock(&iinfo->ii_rwlock);
+ err = -ENOMEM;
+ hip = au_krealloc(iinfo->ii_hinode, sizeof(*hip) * nbr, GFP_NOFS,
+ may_shrink);
+ if (hip) {
+ iinfo->ii_hinode = hip;
+ i = iinfo->ii_bbot + 1;
+ hip += i;
+ for (; i < nbr; i++, hip++)
+ au_hinode_init(hip);
+ err = 0;
+ }
+ +return err;
+ }
+ +void au_iinfo_fin(struct inode *inode)
+ {
+ struct au_iinfo *iinfo;
+ struct au_hinode *hi;
+ struct super_block *sb;
+ aufs_bindex_t bindex, bbot;
+ const unsigned char unlinked = !inode->i_nlink;
+ +AuDebugOn(au_is_bad_inode(inode));
+ +sb = inode->i_sb;
+ au_ninodes_dec(sb);
+ if (si_pid_test(sb))
+ au_xino_delete_inode(inode, unlinked);
+ else {
+ /*
+ * it is safe to hide the dependency between sbinfo and
+ * sb->s_umount.
+ */
+ lockdep_off();
+ si_noflush_read_lock(sb);
+ au_xino_delete_inode(inode, unlinked);
+ si_read_unlock(sb);
+ lockdep_on();
+ }
+ +iinfo = au_ii(inode);
+ if (iinfo->ii_vdir)
+ au_vdir_free(iinfo->ii_vdir);
+ +bindex = iinfo->ii_btop;
+if (bindx >= 0) {
+hi = au_hinode(iinfo, bindx);
+bbot = iinfo->ii_bbot;
+while (bindx++ <= bbott) {
+if (hi->hi_inode) {
+au_hiput(hi);
+hi++;
+}
+}
+kfree(iinfo->ii_hinode);
+AuRwDestroy(&iinfo->ii_rwsem);
+
--- linux-4.15.0.orig/fs/aufs/inode.c
+++ linux-4.15.0/fs/aufs/inode.c
@@ -0,0 +1,527 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+ *
+/*
+ * inode functions
+ */
+
+#include "aufs.h"
+
+struct inode *au_igrab(struct inode *inode)
+{
+if (inode) {
+AuDebugOn(!atomic_read(&inode->i_count));
+ihold(inode);
+}
+return inode;
+}
+
+static void au_refresh_hinode_attr(struct inode *inode, int do_version)
+{  
+au_cpu_attr_all(inode, /*force*/0);  
+au_update_iigen(inode, /*half*/1);  
+if (do_version)  
+inode->i_version++;  
+}  
+
+static int au_ii_refresh(struct inode *inode, int *update)  
+{  
+int err, e, nbr;  
+umode_t type;  
+aufs_bindex_t bindex, new_bindex;  
+struct super_block *sb;  
+struct au_iinfo *iinfo;  
+struct au_hinode *p, *q, tmp;  
+  
+AuDebugOn(au_is_bad_inode(inode));  
+IiMustWriteLock(inode);  
+  
+*update = 0;  
+sb = inode->i_sb;  
+nbr = au_sbbot(sb) + 1;  
+type = inode->i_mode & S_IFMT;  
iinfo = au_ii(inode);  
+err = au_hinode_realloc(iinfo, nbr, /*may_shrink*/0);  
+if (unlikely(err))  
+goto out;  
+  
+AuDebugOn(iinfo->ii_btop < 0);  
p = au_hinode(iinfo, iinfo->ii_btop);  
+for (bindex = iinfo->ii_btop; bindex <= iinfo->ii_bbot;  
+     bindex++, p++)  
+     {  
+if (!p->hi_inode)  
+continue;  
+  
+AuDebugOn(type != (p->hi_inode->i_mode & S_IFMT));  
+new_bindex = au_br_index(sb, p->hi_id);  
+if (new_bindex == bindex)  
+continue;  
+  
+if (new_bindex < 0)  
+ *update = 1;  
+au_hiput(p);  
p->hi_inode = NULL;  
+continue;  
+}  
+  
+if (new_bindex < iinfo->ii_btop)  
(out)}
+iinfo->ii_btop = new_bindex;
+if (iinfo->ii_bbott < new_bindex)
+iinfo->ii_bbott = new_bindex;
+/* swap two lower inode, and loop again */
+q = au_hinode(iinfo, new_bindex);
+tmp = *q;
+*q = *p;
+*p = tmp;
+if (tmp.hi_inode) {
+bindex--;
+p--;
+}
+
+au_update_i subrange(inode, /*do_put_zero*/0);
+au_hinode_realloc(iinfo, nбр, /*may_shrink*/1); /* harmless if err */
+e = au_dy_irefresh(inode);
+if (unlikely(e && !err))
+err = e;
+
+out:
+AuTraceErr(err);
+return err;
+
+void au_refresh_iop(struct inode *inode, int force_getattr)
+{
+int type;
+struct au_sbinfo *sbi = au_sbi(inode->i_sb);
+const struct inode_operations *iop
+= force_getattr ? aufs_iop : sbi->si_iop_array;
+
+if (inode->i_op == iop)
+return;
+
+switch (inode->i_mode & S_IFMT) {
+case S_IFDIR:
+type = AuIop_DIR;
+break;
+case S_IFLNK:
+type = AuIop_SYMLINK;
+break;
+default:
+type = AuIop_OTHER;
+break;
+}
+
+inode->i_op = iop + type;
+/* unnecessary smp_wmb() */
int au_refresh_hinode_self(struct inode *inode) {
    int err, update;
    err = au_ii_refresh(inode, &update);
    if (!err)
        au_refresh_hinode_attr(inode, update && S_ISDIR(inode->i_mode));
    AuTraceErr(err);
    return err;
}

int au_refresh_hinode(struct inode *inode, struct dentry *dentry) {
    int err, e, update;
    unsigned int flags;
    umode_t mode;
    aufs_bindex_t bindex, bbot;
    unsigned char isdir;
    struct au_hinode *p;
    struct au_iinfo *iinfo;
    err = au_ii_refresh(inode, &update);
    if (unlikely(err))
        goto out;
    update = 0;
    iinfo = au_ii(inode);
    p = au_hinode(iinfo, iinfo->ii_btop);
    mode = (inode->i_mode & S_IFMT);
    isdir = S_ISDIR(mode);
    flags = au_hi_flags(inode, isdir);
    bbot = au_dbbot(dentry);
    for (bindex = au_dbtop(dentry); bindex <= bbot; bindex++) {
        struct inode *h_i, *h_inode;
        struct dentry *h_d;

        h_d = au_h_dptr(dentry, bindex);
        if (!h_d || d_is_negative(h_d))
            continue;

        h_inode = d_inode(h_d);
        AuDebugOn(mode != (h_inode->i_mode & S_IFMT));
        if (iinfo->ii_btop <= bindex && bindex <= iinfo->ii_bbot) {
            h_i = au_h_iptr(inode, bindex);
            if (h_i) {

if (h_i == h_inode)
+continue;
+err = -EIO;
+break;
+}
+
+if (bindex < iinfo->ii_btop)
+iinfo->ii_btop = bindex;
+if (iinfo->ii_bbot < bindex)
+iinfo->ii_bbot = bindex;
+au_set_h_iptr(inode, bindex, au_igrab(h_inode), flags);
+update = 1;
+}
+au_update_ibrange(inode, /*do_put_zero*/0);
+e = au_dy_irefresh(inode);
+if (unlikely(e && !err))
+err = e;
+if (!err)
+au_refresh_hinode_attr(inode, update && isdir);
+
+out:
+AuTraceErr(err);
+return err;
+
+static int set_inode(struct inode *inode, struct dentry *dentry)
+{ }
+{ int err;
+unsigned int flags;
+umode_t mode;
+aufs_bindex_t bindex, btop, btail;
+unsigned char isdir;
+struct dentry *h_dentry;
+struct inode *h_inode;
+struct au_iinfo *iinfo;
+struct inode_operations *iop;
+
+IiMustWriteLock(inode);
+
+err = 0;
+isdir = 0;
+iop = au_sbi(inode->i_sb)->si_iop_array;
+btop = au_dbtop(dentry);
+h_dentry = au_h_dptr(dentry, btop);
+h_inode = d_inode(h_dentry);
+mode = h_inode->i_mode;
+switch (mode & S_IFMT) {
+case S_IFREG:
+btail = au_dbtail(dentry);
+inode->i_op = iop + AuIop_OTHER;
+inode->i_fop = &aufs_file_fop;
+err = au_dy_iaop(inode, btop, h_inode);
+if (unlikely(err))
+    goto out;
+break;
+case S_IFDIR:
+    isdir = 1;
+    btail = au_dbtaildir(dentry);
+    inode->i_op = iop + AuIop_DIR;
+    inode->i_fop = &aufs_dir_fop;
+    break;
+case S_IFLNK:
+    btail = au_dbtail(dentry);
+    inode->i_op = iop + AuIop_SYMLINK;
+    break;
+case S_IFBLK:
+    case S_IFCHR:
+    case S_IFIFO:
+    case S_IFSOCK:
+    btail = au_dbtail(dentry);
+    inode->i_op = iop + AuIop_OTHER;
+    init_special_inode(inode, mode, h_inode->i_rdev);
+    break;
+default:
+    AuIOErr("Unknown file type 0%o\n", mode);
+    err = -EIO;
+    goto out;
+}
+
+/* do not set hnotify for whiteouted dirs (SHWH mode) */
+flags = au_hi_flags(inode, isdir);
+if (au_opt_test(au_mntflags(dentry->d_sb), SHWH)
+    && au_ftest_hi(flags, HNOTIFY)
+    && dentry->d_name.len > AUFS_WH_PFX_LEN
+    && !memcmp(dentry->d_name.name, AUFS_WH_PFX, AUFS_WH_PFX_LEN))
+    au_fclr_hi(flags, HNOTIFY);
+iinfo = au_ii(inode);
+iinfo->ii_btop = btop;
+iinfo->ii_bbot = btail;
+for (bindex = btop; bindex <= btail; bindex++) {
+    h_dentry = au_h_dptr(dentry, bindex);
+    if (h_dentry)
+        au_set_h_iptr(inode, bindex, au_igrab(d_inode(h_dentry)), flags);
+}
+au_cpup_attr_all(inode, /*force*/1);
/*
 * to force calling aufs_get_acl() every time,
 * do not call cache_no_acl() for aufs inode.
 */
+
+out:
+return err;
+}
+
+/*
 * successful returns with iinfo write_locked
 * minus: errno
 * zero: success, matched
 * plus: no error, but unmatched
 */
+static int reval_inode(struct inode *inode, struct dentry *dentry)
+{
+int err;
+unsigned int igflags;
+aufs_bindex_t bindex, bbot;
+struct inode *h_inode, *h_dinode;
+struct dentry *h_dentry;
+
+/*
 * before this function, if aufs got any iinfo lock, it must be only
 * one, the parent dir.
 * it can happen by UDBA and the obsoleted inode number.
 */
+err = -EIO;
+if (unlikely(inode->i_ino == parent_ino(dentry)))
+goto out;
+
+err = 1;
+ii_write_lock_new_child(inode);
+h_dentry = au_h_dptr(dentry, au_dbtop(dentry));
+h_dinode = d_inode(h_dentry);
+bbot = au_ibbot(inode);
+for (bindex = au_ibtop(inode); bindex <= bbot; bindex++) {
+    h_inode = au_h_iptr(inode, bindex);
+    if (!h_inode || h_inode != h_dinode)
+        continue;
+
+    err = 0;
+    gen = au_iigen(inode, &igflags);
+    if (gen == au_digen(dentry)
+        && !au_ig_ftest(igflags, HALF_REFRESHED))
+        break;
+  ]}
/* fully refresh inode using dentry */
+err = au_refresh_hinode(inode, dentry);
+if (!err)
+au_update_iigen(inode, /*half*/0);
+break;
+
+if (unlikely(err))
+ii_write_unlock(inode);
+out:  
+return err;
+
+int au_ino(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino,
+   unsigned int d_type, ino_t *ino)
+{
+int err, idx;
+const int isnondir = d_type != DT_DIR;
+
+/* prevent hardlinked inode number from race condition */
+if (isnondir) {
+err = au_xinondir_enter(sb, bindex, h_ino, &idx);
+if (unlikely(err))
+goto out;
+}
+
+err = au_xino_read(sb, bindex, h_ino, ino);
+if (unlikely(err))
+goto out_xinondir;
+
+if (!*ino) {
+err = -EIO;
+*ino = au_xino_new_ino(sb);
+if (unlikely(!*ino))
+goto out_xinondir;
+err = au_xino_write(sb, bindex, h_ino, *ino);
+if (unlikely(err))
+goto out_xinondir;
+}
+
+if (isnondir && idx >= 0)
+au_xinondir_leave(sb, bindex, h_ino, idx);
+out_xinondir:
+if (isnondir && idx >= 0)
+au_xinondir_leave(sb, bindex, h_ino, idx);
+out:
+return err;
+
+/* successful returns with iinfo write_locked */
*/ todo: return with unlocked? */
+struct inode *au_new_inode(struct dentry *dentry, int must_new)
+
+struct inode *inode, *h_inode;
+struct dentry *h_dentry;
+struct super_block *sb;
+ino_t h_ino, ino;
+int err, idx, hlinked;
+aufs_bindex_t btop;
+
+sb = dentry->d_sb;
+btop = au_dbtop(dentry);
+h_dentry = au_h_dptr(dentry, btop);
+h_inode = d_inode(h_dentry);
+h_ino = h_inode->i_ino;
+hlinked = !d_is_dir(h_dentry) && h_inode->i_nlink > 1;
+
+new_ino:
+/*
+ * stop 'race'-ing between hardlinks under different
+ * parents.
+ */
+if (hlinked) {
+err = au_xinondir_enter(sb, btop, h_ino, &idx);
+inode = ERR_PTR(err);
+if (unlikely(err))
+goto out;
+}
+
+err = au_xino_read(sb, btop, h_ino, &ino);
+inode = ERR_PTR(err);
+if (unlikely(err))
+goto out_xinondir;
+
+if (!ino) {
+ino = au_xino_new_ino(sb);
+if (unlikely(!ino)) {
+inode = ERR_PTR(-EIO);
+goto out_xinondir;
+}
+}
+
+AuDbg("i%lu
", (unsigned long)ino);
+inode = au_iget_locked(sb, ino);
+err = PTR_ERR(inode);
+if (IS_ERR(inode))
+goto out_xinondir;
+}
+AuDbg("%lx, new %d
", inode->i_state, !(inode->i_state & I_NEW));
+if (inode->i_state & I_NEW) {
+ii_write_lock_new_child(inode);
+err = set_inode(inode, dentry);
+if (!err) {
+unlock_new_inode(inode);
+goto out_xinondir; /* success */
+}
+
+/*
+ * iget_failed() calls iput(), but we need to call
+ * ii_write_unlock() after iget_failed(). so dirty hack for
+ * i_count.
+ */
+atomic_inc(&inode->i_count);
+iget_failed(inode);
+ii_write_unlock(inode);
+au_xino_write(sb, btop, h_ino, /*ino*/0);
+/* ignore this error */
+goto out_iput;
+} else if (!must_new && !IS_DEADDIR(inode) && inode->i_nlink) {
+/*
+ * horrible race condition between lookup, readdir and copyup
+ * (or something).
+ */
+if (hlinked && idx >= 0)
+au_xinondir_leave(sb, btop, h_ino, idx);
+err = reval_inode(inode, dentry);
+if (unlikely(err < 0)) {
+hlinked = 0;
+goto out_iput;
+}
+if (!err)
+goto out; /* success */
+else if (hlinked && idx >= 0) {
+err = au_xinondir_enter(sb, btop, h_ino, &idx);
+if (unlikely(err)) {
+iput(inode);
+inode = ERR_PTR(err);
+goto out;
+}
+}
+}
+if (unlikely(au_test_fs_unique_ino(h_inode)))
+AuWarn1("Warning: Un-notified UDBA or repeatedly renamed dir,
+" b%d, %s, %pd, hi%lu, i%lu.
", btop, au_sbtype(h_dentry->d_sb), dentry,
+(unsigned long)h_ino, (unsigned long)ino);
+ino = 0;
+err = au_xino_write(sb, btop, h_ino, /*ino*/0);
+if (!err) {
+iput(inode);
+if (hlinked && idx >= 0)
+au_xinondir_leave(sb, btop, h_ino, idx);
+goto new_ino;
+}
+
+out_iput:
+iput(inode);
+inode = ERR_PTR(err);
+out_xinondir:
+if (hlinked && idx >= 0)
+au_xinondir_leave(sb, btop, h_ino, idx);
+out:
+return inode;
+}
+
+/#  ........................................................................... */
+
+int au_test_ro(struct super_block *sb, aufs_bindex_t bindex,
+    struct inode *inode)
+{
+    int err;
+    struct inode *hi;
+    
+    err = au_br_rdonly(au_sbr(sb, bindex));
+    
+    /* pseudo-link after flushed may happen out of bounds */
+    if (!err
+        && inode
+        && au_ibtop(inode) <= bindex
+        && bindex <= au_ibbot(inode)) {
+        
+        /* permission check is unnecessary since vfsub routine
+        * will be called later
+        */
+        hi = au_h_iptr(inode, bindex);
+        if (hi)
+            err = IS_IMMUTABLE(hi) ? -EROFS : 0;
+    }
+    
+    return err;
+}
+
+int au_test_h_perm(struct inode *h_inode, int mask)
+{  
+if (uid_eq(current_fsuid(), GLOBAL_ROOT_UID))  
+return 0;  
+return inode_permission(h_inode, mask);  
+}  
+  
+int au_test_h_perm_sio(struct inode *h_inode, int mask)  
+{  
+if (au_test_nfs(h_inode->i_sb)  
+  && (mask & MAY_WRITE)  
+  && S_ISDIR(h_inode->i_mode))  
+mask |= MAY_READ; /* force permission check */  
+return au_test_h_perm(h_inode, mask);  
+}  
--- linux-4.15.0.orig/fs/aufs/inode.h  
+++ linux-4.15.0/fs/aufs/inode.h  
@@ -0,0 +1,695 @@  
+/*  
+ * Copyright (C) 2005-2017 Junjiro R. Okajima  
+ *  
+ * This program, aufs is free software; you can redistribute it and/or modify  
+ * it under the terms of the GNU General Public License as published by  
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+ * (at your option) any later version.  
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.  
+ */  
+  
+/*  
+ * inode operations  
+ */  
+  
+ifndef __AUFS_INODE_H__  
+#define __AUFS_INODE_H__  
+  
+ifndef __KERNEL__  
+  
+include <linux/fsnotify.h>  
+#include "rwsem.h"  
+  
+struct vfsmount;  
+}
+struct au_hnotify {
+  #ifdef CONFIG_AUFS_HNOTIFY
+  #ifdef CONFIG_AUFS_HFSNOTIFY
+    /* never use fsnotify_add_vfsmount_mark() */
+    struct fsnotify_mark hn_mark;
+  #endif
+  struct inode* hn_aufs_inode;/* no get/put */
+  #endif
+} __cacheline_aligned_in_smp;
+
+struct au_hinode {
+  struct inode* hi_inode;
+  aufs_bindex_t hi_id;
+  #ifdef CONFIG_AUFS_HNOTIFY
+  struct au_hnotify* hi_notify;
+  #endif
+
+  /* reference to the copied-up whiteout with get/put */
+  struct dentry* hi_whdentry;
+};
+
+/* ig_flags */
+#define AuIG_HALF_REFRESHED 1
+#define au_ig_ftest(flags, name) ((flags) & AuIG_##name)
+#define au_ig_fset(flags, name) \
+    do { (flags) |= AuIG_##name; } while (0)
+#define au_ig_fclr(flags, name) \
+    do { (flags) &= ~AuIG_##name; } while (0)
+
+struct au_iigen {
+  spinlock_t ig_spin;
+  __u32 ig_generation, ig_flags;
+};
+
+struct au_vdir;
+
+struct au_iinfo {
+  struct au_iigen ii_generation;
+  struct super_block* ii_hsb1;/* no get/put */
+  struct au_rwsem ii_rwsem;
+  aufs_bindex_tii_btop, ii_bbot;
+  __u32 ii_higen;
+  struct au_hinode* ii_hinode;
+  struct au_vdir* ii_vdir;
+};
+
+struct au_icntnr {
+  struct au_iinfo iinfo;
+struct inode vfs_inode;
+struct hlist_bl_node plink;
+} __cacheline_aligned_in_smp;
+
+/* au_pin flags */
+#define AuPin_DI_LOCKED	1
+#define AuPin_MNT_WRITE(1 << 1)
+#define au_ftest_pin(flags, name)(((flags) & AuPin_##name)
+#define au_fset_pin(flags, name) \
+do { (flags) |= AuPin_##name; } while (0)
+#define au_fclr_pin(flags, name) \
+do { (flags) &= ~AuPin_##name; } while (0)
+
+struct au_pin {
+/* input */
+struct dentry *dentry;
+unsigned int udba;
+unsigned char lsc_di, lsc_hi, flags;
aufs_bindex_t bindex;
+
+/* output */
+struct dentry *parent;
+struct au_hinode *hdir;
+struct vfsmount *h_mnt;
+
+/* temporary unlock/relock for copyup */
+struct dentry *h_dentry, *h_parent;
+struct au_branch *br;
+struct task_struct *task;
+}
+
+void au_pin_hdir_unlock(struct au_pin *p);
+int au_pin_hdir_lock(struct au_pin *p);
+int au_pin_hdir_relock(struct au_pin *p);
+void au_pin_hdir_acquire_nest(struct au_pin *p);
+void au_pin_hdir_release(struct au_pin *p);
+
+/* ---------------------------------------------------------------------- */
+
+static inline struct au_iinfo *au_ii(struct inode *inode)
+{
+BUG_ON(is_bad_inode(inode));
+return &(container_of(inode, struct au_icntnr, vfs_inode)->iinfo);
+}
+
+/* ---------------------------------------------------------------------- */
+
/* inode.c */
+struct inode *au_igrab(struct inode *inode);
+void au_refresh_iop(struct inode *inode, int force_getattr);
+int au_refresh_hinode_self(struct inode *inode);
+int au_refresh_hinode(struct inode *inode, struct dentry *dentry);
+int au_ino(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino,
  + unsigned int d_type, ino_t *ino);
+struct inode *au_new_inode(struct dentry *dentry, int must_new);
+int au_test_ro(struct super_block *sb, aufs_bindex_t bindex,
  + struct inode *inode);
+int au_test_h_perm(struct inode *h_inode, int mask);
+int au_test_h_perm_sio(struct inode *h_inode, int mask);
+
+static inline int au_wh_ino(struct super_block *sb, aufs_bindex_t bindex,
  + ino_t h_ino, unsigned int d_type, ino_t *ino)
+{
+  ifdef CONFIG_AUFS_SHWH
+    return au_ino(sb, bindex, h_ino, d_type, ino);
+  else
+    return 0;
+  endif
+
+  "i_op.c */
+enum {
+  AuIop_SYMLINK,
+  AuIop_DIR,
+  AuIop_OTHER,
+  AuIop_Last
+};
+extern struct inode_operations aufs_iop[AuIop_Last],
+aufs_iop_nogetattr[AuIop_Last];
+
+  "au_wr_dir flags */
+#define AuWrDir_ADD_ENTRY1
+#define AuWrDir_ISDIR(1 << 1)
+#define AuWrDir_TMPFILE(1 << 2)
+#define au_ftest_wrdir(flags, name)((flags) & AuWrDir_##name)
+#define au_fset_wrdir(flags, name)\
+  do { (flags) |= AuWrDir_##name; } while (0)
+#define au_fclr_wrdir(flags, name)\
+  do { (flags) &= ~AuWrDir_##name; } while (0)
+
+  struct au_wr_dir_args {
+  aufs_bindex_t force_btgt;
+  unsigned char flags;
+};
+int au_wr_dir(struct dentry *dentry, struct dentry *src_dentry,
  + struct au_wr_dir_args *args);
struct dentry *au_pinned_h_parent(struct au_pin *pin);

void au_pin_init(struct au_pin *pin, struct dentry *dentry,
    aufs_bindex_t bindex, int lsc_di, int lsc_hi,
    unsigned int udba, unsigned char flags);

int au_pin(struct au_pin *pin, struct dentry *dentry, aufs_bindex_t bindex,
    unsigned int udba, unsigned char flags) __must_check;

int au_do_pin(struct au_pin *pin) __must_check;

void au_unpin(struct au_pin *pin);

int au_reval_for_attr(struct dentry *dentry, unsigned int sigen);

#define AuIcpup_DID_CPUP1
#define au_ftest_icpup(flags, name) ((flags) & AuIcpup_##name)
#define au_fset_icpup(flags, name) \
    do { (flags) |= AuIcpup_##name; } while (0)
#define au_fclr_icpup(flags, name) \
    do { (flags) &= ~AuIcpup_##name; } while (0)

struct au_icpup_args {
    unsigned char flags;
    unsigned char pin_flags;
    aufs_bindex_t btgt;
    unsigned int udba;
    struct au_pin pin;
    struct path h_path;
    struct inode *h_inode;
};

int au_pin_and_icpup(struct dentry *dentry, struct iattr *ia,
    struct au_icpup_args *a);

int au_h_path_getattr(struct dentry *dentry, int force, struct path *h_path,
    int locked);

/* i_op_add.c */
int au_may_add(struct dentry *dentry, aufs_bindex_t bindex,
    struct dentry *h_parent, int isdir);

int aufs_mknod(struct inode *dir, struct dentry *dentry, umode_t mode,
    dev_t dev);

int aufs_symlink(struct inode *dir, struct dentry *dentry, const char *symname);

int aufs_create(struct inode *dir, struct dentry *dentry, umode_t mode,
    bool want_excl);

struct vfsub_aopen_args;

int au_aopen_or_create(struct inode *dir, struct dentry *dentry,
    struct vfsub_aopen_args *args);

int aufs_tmpfile(struct inode *dir, struct dentry *dentry, umode_t mode);

int aufs_link(struct dentry *src_dentry, struct inode *dir,
    struct dentry *dentry);
+int aufs_mkdir(struct inode *dir, struct dentry *dentry, umode_t mode);
+
+/* i_op_del.c */
+int aufs_mkdir(struct inode *dir, struct dentry *dentry, umode_t mode);
+/* i_op_del.c */
+int au_wr_dir_need_wh(struct dentry *dentry, int isdir, aufs_bindex_t *bcpup);
+int au_may_del(struct dentry *dentry, aufs_bindex_t bindex,
+ struct dentry *h_parent, int isdir);
+int aufs_unlink(struct inode *dir, struct dentry *dentry);
+int aufs_rmdir(struct inode *dir, struct dentry *dentry);
+
+/* i_op_ren.c */
+int au_wbr(struct dentry *dentry, aufs_bindex_t btgt);
+int aufs_rename(struct inode *src_dir, struct dentry *src_dentry,
+struct dentry *dentry, int isdir, struct dentry *dentry,
+unsigned int flags);
+
+/* iinfo.c */
+struct inode *au_h_iptr(struct inode *inode, aufs_bindex_t bindex);
+void au_hiput(struct au_hinode *hinode);
+void au_set_hi_wh(struct inode *inode, aufs_bindex_t bindex,
+ struct dentry *h_wh);
+unsigned int au_hi_flags(struct inode *inode, int isdir);
+
+/* hinode flags */
+#define AuHi_XINO	1
+#define AuHi_HNOTIFY	(1 << 1)
+#define au_ftest_hi(flags, name)((flags) & AuHi_##name)
+#define au_fset_hi(flags, name) \
+do { (flags) |= AuHi_##name; } while (0)
+#define au_fclr_hi(flags, name) \
+do { (flags) &= ~AuHi_##name; } while (0)
+
+#ifndef CONFIG_AUFS_HNOTIFY
+#undef AuHi_HNOTIFY
+#define AuHi_HNOTIFY0
+#endif
+
+void au_set_h_iptr(struct inode *inode, aufs_bindex_t bindex,
+ struct inode *h_inode, unsigned int flags);
+
+void au_update_iigen(struct inode *inode, int half);
+void au_update_ibrange(struct inode *inode, int do_put_zero);
+
+void au_icntnr_init_once(void *_c);
+void au_hinode_init(struct au_hinode *hinode);
+int au_iinfo_init(struct inode *inode);
+void au_iinfo_fin(struct inode *inode);
+int au_hinode_realloc(struct au_iinfo *iinfo, int nbr, int may_shrink);
+
+ifdef CONFIG_PROC_FS
+/* plink.c */
+int au_plink_maint(struct super_block *sb, int flags);
+struct au_sbinfo;
+void au_plink_maint_leave(struct au_sbinfo *sbinfo);
+int au_plink_maint_enter(struct super_block *sb);
+ifdef CONFIG_AUFS_DEBUG
+void au_plink_list(struct super_block *sb);
+else
+AuStubVoid(au_plink_list, struct super_block *sb)
+endif
+int au_plink_test(struct inode *inode);
+struct dentry *au_plink_lkup(struct inode *inode, aufs_bindex_t bindex);
+void au_plink_append(struct inode *inode, aufs_bindex_t bindex,
  + struct dentry *h_dentry);
+void au_plink_put(struct super_block *sb, int verbose);
+void au_plink_clean(struct super_block *sb, int verbose);
+void au_plink_half_refresh(struct super_block *sb, aufs_bindex_t br_id);
+else
+AuStubInt0(au_plink_maint, struct super_block *sb, int flags);
+AuStubVoid(au_plink_maint_leave, struct au_sbinfo *sbinfo);
+AuStubInt0(au_plink_maint_enter, struct super_block *sb);
+AuStubVoid(au_plink_list, struct super_block *sb);
+AuStubInt0(au_plink_test, struct inode *inode);
+AuStub(struct dentry *, au_plink_lkup, return NULL,
  + struct inode *inode, aufs_bindex_t bindex);
+AuStubVoid(au_plink_append, struct inode *inode, aufs_bindex_t bindex,
  + struct dentry *h_dentry);
+AuStubVoid(au_plink_put, struct super_block *sb, int verbose);
+AuStubVoid(au_plink_clean, struct super_block *sb, int verbose);
+AuStubVoid(au_plink_half_refresh, struct super_block *sb, aufs_bindex_t br_id);
+endif /* CONFIG_PROC_FS */
+
+ifdef CONFIG_AUFS_XATTR
+/* xattr.c */
+int au_cpup_xattr(struct dentry *h_dst, struct dentry *h_src, int ignore_flags,
  + unsigned int verbose);
+ssize_t aufs_listxattr(struct dentry *dentry, char *list, size_t size);
+void au_xattr_init(struct super_block *sb);
+else
+AuStubInt0(au_cpup_xattr, struct dentry *h_dst, struct dentry *h_src, int ignore_flags,
  + unsigned int verbose);
+endif /* CONFIG_AUFS_XATTR */
+
+ifdef CONFIG_FS_POSIX_ACL
+struct posix_acl *aufs_get_acl(struct inode *inode, int type);
+int aufs_set_acl(struct inode *inode, struct posix_acl *acl, int type);
+endif /* CONFIG_FS_POSIX_ACL */

+enum {
   AU_XATTR_SET,
   AU_ACL_SET
+};
+
+struct au_sxattr {
   int type;
   union {
      struct {
         const char* name;
         const void* value;
         size_t size;
         int flags;
      } set;
      struct {
         struct posix_acl *acl;
         int type;
      } acl_set;
   } u;
   
+ssize_t au_sxattr(struct dentry *dentry, struct inode *inode,
   struct au_sxattr *arg);
+
+/* lock subclass for iinfo */
+enum {
   AuLsc_II_CHILD/* child first */
   AuLsc_II_CHILD2,/ rename(2), link(2), and cpup at hnotify */
   AuLsc_II_CHILD3,/ copyup dirs */
   AuLsc_II_PARENT,/ see AuLsc_I_PARENT in vfsub.h */
   AuLsc_II_PARENT2,
   AuLsc_II_PARENT3,/ copyup dirs */
   AuLsc_II_NEW_CHILD
+};
+
+* ii_read_lock_child, ii_write_lock_child,
   ii_read_lock_child2, ii_write_lock_child2,
   ii_read_lock_child3, ii_write_lock_child3,
   ii_read_lock_parent, ii_write_lock_parent,
   ii_read_lock_parent2, ii_write_lock_parent2,
   ii_read_lock_parent3, ii_write_lock_parent3,
   ii_read_lock_new_child, ii_write_lock_new_child,
+ */
+ #define AuReadLockFunc(name, lsc)  
+ static inline void ii_read_lock_##name(struct inode *i)  
+ {  
+     au_rw_read_lock_nested(&au_ii(i)->ii_rwlock, AuLsc_II_##lsc);  
+ }  
+ +
+ #define AuWriteLockFunc(name, lsc)  
+ static inline void ii_write_lock_##name(struct inode *i)  
+ {  
+     au_rw_write_lock_nested(&au_ii(i)->ii_rwlock, AuLsc_II_##lsc);  
+ }  
+ +
+ #define AuRWLockFuncs(name, lsc)  
+     AuReadLockFunc(name, lsc)  
+     AuWriteLockFunc(name, lsc)  
+     +
+     AuRWLockFuncs(child, CHILD);  
+     AuRWLockFuncs(child2, CHILD2);  
+     AuRWLockFuncs(child3, CHILD3);  
+     AuRWLockFuncs(parent, PARENT);  
+     AuRWLockFuncs(parent2, PARENT2);  
+     AuRWLockFuncs(parent3, PARENT3);  
+     AuRWLockFuncs(new_child, NEW_CHILD);  
+ +
+ #undef AuReadLockFunc  
+ #undef AuWriteLockFunc  
+ #undef AuRWLockFuncs  
+ +
+ #define ii_read_unlock(i)  
+     au_rw_read_unlock(&au_ii(i)->ii_rwlock)  
+ #define ii_write_unlock(i)  
+     au_rw_write_unlock(&au_ii(i)->ii_rwlock)  
+ #define ii_downgrade_lock(i)  
+     au_rw_dgrade_lock(&au_ii(i)->ii_rwlock)  
+ +
+ #define IiMustNoWaiters(i)  
+     AuRwMustNoWaiters(&au_ii(i)->ii_rwlock)  
+ #define IiMustAnyLock(i)  
+     AuRwMustAnyLock(&au_ii(i)->ii_rwlock)  
+ #define IiMustWriteLock(i)  
+     AuRwMustWriteLock(&au_ii(i)->ii_rwlock)  
+ +
+ /* ---------------------------------------------------------------------- */  
+ +
+ static inline void au_icntnr_init(struct au_icntnr *c)  
+ {  
+     if (CONFIG_AUFS_DEBUG)  
+         c->vfs_inode.i_mode = 0;  
+     endif  
+ }  
+ +
+ static inline unsigned int au_iigen(struct inode *inode, unsigned int *igflags)  
+ {
unsigned int gen;
+struct au_iinfo *iinfo;
+struct au_iigen *iigen;
+
iinfo = au_ii(inode);
iigen = &iinfo->ii_generation;
+spin_lock(&iigen->ig_spin);
+if (igflags)
+*igflags = iigen->ig_flags;
+gen = iigen->ig_generation;
+spin_unlock(&iigen->ig_spin);
+
+return gen;
+
+/* tiny test for inode number */
+/* tmpfs generation is too rough */
+static inline int au_test_higen(struct inode *inode, struct inode *h_inode)
+{
+struct au_iinfo *iinfo;
+
iinfo = au_ii(inode);
+AuRwMustAnyLock(&iinfo->ii_rwsem);
+return !(iinfo->ii_hsb1 == h_inode->i_sb
+ && iinfo->ii_higen == h_inode->i_generation);
+
+static inline void au_iigen_dec(struct inode *inode)
+{
+struct au_iinfo *iinfo;
+struct au_iigen *iigen;
+
iinfo = au_ii(inode);
iigen = &iinfo->ii_generation;
+spin_lock(&iigen->ig_spin);
iigen->ig_generation--;
+spin_unlock(&iigen->ig_spin);
+
+static inline int au_iigen_test(struct inode *inode, unsigned int sigen)
+{
+int err;
+
+err = 0;
+if (unlikely(inode && au_iigen(inode, NULL) != sigen))
+err = -EIO;
+
+return err;
static inline struct au_hinode *au_hinode(struct au_iinfo *iinfo, aufs_bindex_t bindex)
{
    return iinfo->ii_hinode + bindex;
}

static inline int au_is_bad_inode(struct inode *inode)
{
    return !!(is_bad_inode(inode) || !au_hinode(au_ii(inode), 0));
}

static inline aufs_bindex_t au_ii_br_id(struct inode *inode, aufs_bindex_t bindex)
{
    IiMustAnyLock(inode);
    return au_hinode(au_ii(inode), bindex)->hi_id;
}

static inline aufs_bindex_t au_ibtop(struct inode *inode)
{
    IiMustAnyLock(inode);
    return au_ii(inode)->ii_btop;
}

static inline aufs_bindex_t au_ibbot(struct inode *inode)
{
    IiMustAnyLock(inode);
    return au_ii(inode)->ii_bbot;
}

static inline struct au_vdir *au_ivdir(struct inode *inode)
{
    IiMustAnyLock(inode);
    return au_ii(inode)->ii_vdir;
}

static inline void au_set_ibtop(struct inode *inode, aufs_bindex_t bindex)
{
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+IiMustWriteLock(inode);
+au_ii(inode)->ii_btop = bindex;
+
+static inline void au_set_ibbot(struct inode *inode, aufs_bindex_t bindex)
+{
+IiMustWriteLock(inode);
+au_ii(inode)->ii_bbott = bindex;
+}
+
+static inline void au_set_ivdir(struct inode *inode, struct au_vdir *vdir)
+{
+IiMustWriteLock(inode);
+au_ii(inode)->ii_vdir = vdir;
+}
+
+static inline struct au_hinode *au_hi(struct inode *inode, aufs_bindex_t bindex)
+{
+IiMustAnyLock(inode);
+return au_hinode(au_ii(inode), bindex);
+}
+
+/* ----------------------------- */
+
+static inline struct dentry *au_pinned_parent(struct au_pin *pin)
+{
+if (pin)
+return pin->parent;
+return NULL;
+}
+
+static inline struct inode *au_pinned_h_dir(struct au_pin *pin)
+{
+if (pin && pin->hdir)
+return pin->hdir->hi_inode;
+return NULL;
+}
+
+static inline struct au_hinode *au_pinned_hdir(struct au_pin *pin)
+{
+if (pin)
+au_pinned_hdir = au_pinned_hdir;
+return NULL;
+}
+
+static inline void au_pin_set_dentry(struct au_pin *pin, struct dentry *dentry)
+{
+if (pin)
+pin->dentry = dentry;
+
+static inline void au_pin_set_parent_lflag(struct au_pin *pin,
+   unsigned char lflag)
+{
+  if (pin) {
+    if (lflag)
+      au_fset_pin(pin->flags, DI_LOCKED);
+    else
+      au_fclr_pin(pin->flags, DI_LOCKED);
+  }
+}
+
+#if 0 /* reserved */
+static inline void au_pin_set_parent(struct au_pin *pin, struct dentry *parent)
+{
+  if (pin) {
+    dput(pin->parent);
+    pin->parent = dget(parent);
+  }
+}
+#endif
+
+/* ---------------------------------------------------------------------- */
+struct au_branch;
+#ifdef CONFIG_AUFS_HNOTIFY
+struct au_hnotify_op {
+  void (*ctl)(struct au_hinode *hinode, int do_set);
+  int (*alloc)(struct au_hinode *hinode);
+  /*
+   * if it returns true, the the caller should free hinode->hi_notify,
+   * otherwise ->free() frees it.
+   */
+  int (*free)(struct au_hinode *hinode,
+    struct au_hnotify *hn) __must_check;
+  void (*fin)(void);
+  int (*init)(void);
+  int (*reset_br)(unsigned int udba, struct au_branch *br, int perm);
+  void (*fin_br)(struct au_branch *br);
+  int (*init_br)(struct au_branch *br, int perm);
+};
+#endif

/* hnotify.c */
+int au_hn_alloc(struct au_hinode *hinode, struct inode *inode);
+void au_hn_free(struct au_hinode *hinode);
+void au_hn_ctl(struct au_hinode *hinode, int do_set);
+void au_hn_reset(struct inode *inode, unsigned int flags);
+int au_hnotify(struct inode *h_dir, struct au_hnotify *hnotify, u32 mask,
  + struct qstr *h_child_qstr, struct inode *h_child_inode);
+int au_hnotify_reset_br(unsigned int udba, struct au_branch *br, int perm);
+int au_hnotify_init_br(struct au_branch *br, int perm);
+void au_hnotify_fin_br(struct au_branch *br);
+int __init au_hnotify_init(void);
+void au_hnotify_fin(void);
+
+/* hfsnotify.c */
+extern const struct au_hnotify_op au_hnotify_op;
+
+static inline
+void au_hn_init(struct au_hinode *hinode)
+{
+hinode->hi_notify = NULL;
+}
+
+static inline struct au_hnotify *au_hn(struct au_hinode *hinode)
+{
+return hinode->hi_notify;
+}
+
+#else
+AuStub(int, au_hn_alloc, return -EOPNOTSUPP,
+    struct au_hinode *hinode __maybe_unused,
+    struct inode *inode __maybe_unused)
+AuStub(struct au_hnotify *, au_hn, return NULL, struct au_hinode *hinode)
+AuStubVoid(au_hn_free, struct au_hinode *hinode __maybe_unused)
+AuStubVoid(au_hn_ctl, struct au_hinode *hinode __maybe_unused,
+    int do_set __maybe_unused)
+AuStubVoid(au_hn_reset, struct inode *inode __maybe_unused,
+    unsigned int flags __maybe_unused)
+AuStubInt0(au_hnotify_reset_br, unsigned int udba __maybe_unused,
+    struct au_branch *br __maybe_unused,
+    int perm __maybe_unused)
+AuStubInt0(au_hnotify_init_br, struct au_branch *br __maybe_unused,
+    int perm __maybe_unused)
+AuStubVoid(au_hnotify_fin_br, struct au_branch *br __maybe_unused)
+AuStubInt0(__init au_hnotify_init, void)
+AuStubVoid(au_hnotify_fin, void)
+AuStubVoid(au_hn_init, struct au_hinode *hinode __maybe_unused)
+#endif /* CONFIG_AUFS_HNOTIFY */
+
+static inline void au_hn_suspend(struct au_hinode *hdir)
+\{ 
+au_hn_ctl(hdir, /*do_set*/0); 
+\} 
+
+static inline void au_hn_resume(struct auinode *hdir) 
+\{ 
+au_hn_ctl(hdir, /*do_set*/1); 
+\} 
+
+static inline void au_hn_inode_lock(struct auinode *hdir) 
+\{ 
+\} 
+
+static inline void au_hn_inode_lock_nested(struct auinode *hdir, 
+ unsigned int sc __maybe_unused) 
+\{ 
+\} 
+
+static inline void au_hn_inode_unlock(struct auinode *hdir) 
+\{ 
+au_hn_resume(hdir); 
+\} 
+
+#if 0 /* unused */ 
+#include "vfsub.h" 
+static inline void au_hn_inode_lock_shared_nested(struct auinode *hdir, 
+ unsigned int sc) 
+\{ 
+\} 
+#endif 
+
+static inline void au_hn_inode_unlock(struct auinode *hdir) 
+\{ 
+au_hn_resume(hdir); 
+\} 
+
+#endif /* __KERNEL__ */ 
+
+/* Copyright (C) 2005-2017 Junjiro R. Okajima */ 
+* 
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * ioctl
+ * plink-management and readdir in userspace.
+ * assist the pathconf(3) wrapper library.
+ * move-down
+ * File-based Hierarchical Storage Management.
+ */
+
+#include <linux/compat.h>
+#include <linux/file.h>
+#include "aufs.h"
+
+static int au_wbr_fd(struct path *path, struct aufs_wbr_fd __user *arg)
+{
+  int err, fd;
+  aufs_bindex_t wbi, bindex, bbot;
+  struct file *h_file;
+  struct super_block *sb;
+  struct dentry *root;
+  struct au_branch *br;
+  struct aufs_wbr_fd wbrfd = {
+    .oflags = au_dir_roflags,
+    .brid = -1
+  };
+  const int valid = O_RDONLY | O_NONBLOCK | O_LARGEFILE | O_DIRECTORY
+                  | O_NOATIME | O_CLOEXEC;
+  
+  AuDebugOn(wbrfd.oflags & ~valid);
+  
+  if (arg) {
+    err = copy_from_user(&wbrfd, arg, sizeof(wbrfd));
+    if (unlikely(err)) {
+      err = -EFAULT;
+      goto out;
+    }
+  }
+  
+  

err = -EINVAL;
+AuDbg("wbrfd(0%o, %d)\n", wbrfd.oflags, wbrfd.brid);
wbrfd.oflags |= au_dir_oflags;
+AuDbg("0%o\n", wbrfd.oflags);
+if (unlikely(wbrfd.oflags & ~valid))
go to out;
+
+fd = get_unused_fd_flags(0);
+err = fd;
+if (unlikely(fd < 0))
go to out;
+
+h_file = ERR_PTR(-EINVAL);
wbi = 0;
br = NULL;
sb = path->dentry->d_sb;
+root = sb->s_root;
+aufs_read_lock(root, AuLock_IR);
+bbot = au_sbbot(sb);
+if (wbrfd.brid >= 0) {
+wbi = au_br_index(sb, wbrfd.brid);
+if (unlikely(wbi < 0 || wbi > bbot))
go to unlock;
+}
+
+h_file = ERR_PTR(-ENOENT);
br = au_br(sb, wbi);
+if (!au_br_writable(br->br_perm)) {
+if (arg)
go to unlock;
+
+bindex = wbi + 1;
wbi = -1;
+for (; bindex <= bbot; bindex++) {
+br = au_br(sb, bindex);
+if (au_br_writable(br->br_perm)) {
+wbi = bindex;
+br = au_br(sb, wbi);
+break;
+}
+}
+
+AuDbg("wbi %d\n", wbi);
+if (wbi >= 0)
h_file = au_h_open(root, wbi, wbrfd.oflags, NULL,
+ /*force_wr*/0);
+}
+out_unlock:
+aufs_read_unlock(root, AuLock_IR);
+err = PTR_ERR(h_file);
+if (IS_ERR(h_file))
+goto out_fd;
+
+au_br_put(br); /* cf. au_h_open() */
+fd_install(fd, h_file);
+err = fd;
+goto out; /* success */
+
+out_fd:
+put_unused_fd(fd);
+out:
+AuTraceErr(err);
+return err;
+
+/* ---------------------------------------------------------------------- */
+long aufs_ioctl_dir(struct file *file, unsigned int cmd, unsigned long arg)
+{
+long err;
+struct dentry *dentry;
+switch (cmd) {
+case AUFS_CTL_RDU:
+case AUFS_CTL_RDU_INO:
+err = au_rdu_ioctl(file, cmd, arg);
+break;
+
+case AUFS_CTL_WBR_FD:
+err = au_wbr_fd(&file->f_path, (void __user *)arg);
+break;
+
+case AUFS_CTL_IBUSY:
+err = au_ibusy_ioctl(file, arg);
+break;
+
+case AUFS_CTL_BRINFO:
+err = au_brinfo_ioctl(file, arg);
+break;
+
+case AUFS_CTL_FHSM_FD:
+dentry = file->f_path.dentry;
+if (IS_ROOT(dentry))
+err = au_fhsm_fd(dentry->d_sb, arg);
+else
/* do not call the lower */
AuDbg("0x%x\n", cmd);
+err = -ENOTTY;
+
+default:
+
+AuTraceErr(err);
+return err;
+
+long aufs_ioctl_nondir(struct file *file, unsigned int cmd, unsigned long arg)
+{
+long err;
+
+switch (cmd) {
+case AUFS_CTL_MVDOWN:
+err = au_mvdown(file->f_path.dentry, (void __user *)arg);
+break;
+
+case AUFS_CTL_WBR_FD:
+err = au_wbr_fd(&file->f_path, (void __user *)arg);
+break;
+
+default:
+/* do not call the lower */
+AuDbg("0x%x\n", cmd);
+err = -ENOTTY;
+
+AuTraceErr(err);
+return err;
+
+#ifdef CONFIG_COMPAT
+long aufs_compat_ioctl_nondir(struct file *file, unsigned int cmd, unsigned long arg)
+{
+long err;
+
+switch (cmd) {
+case AUFS_CTL_RDU:
+case AUFS_CTL_RDU_INO:
+err = au_rdu_compat_ioctl(file, cmd, arg);
+break;
+}
+case AUFS_CTL_IBUSY:
+err = au_ibusy_compat_ioctl(file, arg);
+break;
+
+case AUFS_CTL_BRINFO:
+err = au_brinfo_compat_ioctl(file, arg);
+break;
+
+default:
+err = aufs_ioctl_dir(file, cmd, arg);
+}
+
+AuTraceErr(err);
+return err;
+
+long aufs_compat_ioctl_nondir(struct file *file, unsigned int cmd,
+       unsigned long arg)
+{
+return aufs_ioctl_nondir(file, cmd, (unsigned long)compat_ptr(arg));
+}
+
+endif
--- linux-4.15.0.orig/fs/aufs/loop.c
+++ linux-4.15.0/fs/aufs/loop.c
@@ -0,0 +1,163 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
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+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+ *
+ */
+ *
+ #include "aufs.h"

+
/* added into drivers/block/loop.c */
+static struct file *(*backing_file_func)(struct super_block *sb);
+
+/*
  * test if two lower dentries have overlapping branches.
  */
+int au_test_loopback_overlap(struct super_block *sb, struct dentry *h_adding)
+{
+  struct super_block *h_sb;
+  struct file *backing_file;
+
+  if (unlikely(!backing_file_func)) {
+    /* don't load "loop" module here */
+    backing_file_func = symbol_get(loop_backing_file);
+    if (unlikely(!backing_file_func))
+      /* "loop" module is not loaded */
+      return 0;
+  }
+
+  h_sb = h_adding->d_sb;
+  backing_file = backing_file_func(h_sb);
+  if (!backing_file)
+    return 0;
+
+  h_adding = backing_file->f_path.dentry;
+/*
  * h_adding can be local NFS.
  * in this case aufs cannot detect the loop.
  */
+  if (unlikely(h_adding->d_sb == sb))
+    return 1;
+  return !!au_test_subdir(h_adding, sb->s_root);
+}
+
+/* true if a kernel thread named 'loop[0-9].*' accesses a file */
+int au_test_loopback_kthread(void)
+{
+  int ret;
+  struct task_struct *tsk = current;
+  char c, comm[sizeof(tsk->comm)];
+
+  ret = 0;
+  if (tsk->flags & PF_KTHREAD) {
+    get_task_comm(comm, tsk);
+    c = comm[4];
+    ret = ('0' <= c && c <= '9'
+      && !strncmp(comm, "loop", 4));
+  }
+  return ret;
+}
+return ret;
+
+/* --------------------------------------------- */
+
+//define au_warn_loopback_step16
+static int au_warn_loopback_nelem = au_warn_loopback_step;
+static unsigned long *au_warn_loopback_array;
+
+void au_warn_loopback(struct super_block *h_sb)
+{
+int i, new_nelem;
+unsigned long *a, magic;
+static DEFINE_SPINLOCK(spin);
+
+magic = h_sb->s_magic;
+spin_lock(&spin);
+a = au_warn_loopback_array;
+for (i = 0; i < au_warn_loopback_nelem && *a; i++)
+if (a[i] == magic) {
+spin_unlock(&spin);
+return;
+}
+
+/* h_sb is new to us, print it */
+if (i < au_warn_loopback_nelem) {
+a[i] = magic;
+goto pr;
+}
+
+/* expand the array */
+new_nelem = au_warn_loopback_nelem + au_warn_loopback_step;
+a = au_kzrealloc(au_warn_loopback_array,
+ au_warn_loopback_nelem * sizeof(unsigned long),
+ new_nelem * sizeof(unsigned long), GFP_ATOMIC,
+ /*may_shrink*/0);
+if (a) {
+au_warn_loopback_nelem = new_nelem;
+au_warn_loopback_array = a;
+a[i] = magic;
+goto pr;
+}
+
+spin_unlock(&spin);
+AuWarn1("realloc failed, ignored\n");
+return;
+
+pr:
+spin_unlock(&spin);
+pr_warn("you may want to try another patch for loopback file ")
+"on %s(0x%x) branch\n", au_sbtype(h_sb), magic);
+}
+
+int au_loopback_init(void)
+{
+int err;
+struct super_block *sb __maybe_unused;
+
+BUILD_BUG_ON(sizeof(sb->s_magic) != sizeof(unsigned long));
+
+err = 0;
+au_warn_loopback_array = kcalloc(au_warn_loopback_step,
+sizeof(unsigned long), GFP_NOFS);
+if (unlikely(!au_warn_loopback_array))
+err = -ENOMEM;
+
+return err;
+}
+
+void au_loopback_fin(void)
+{
+if (backing_file_func)
+symbol_put(loop_backing_file);
+kfree(au_warn_loopback_array);
+}
+
+/* ---------------------------------------------------------------------- */
+
+/* support the loopback block device inside aufs */
+
+struct file *aufs_real_loop(struct file *file)
+{
+struct file *f;
+
+BUILD_ON(!au_test_aufs(file->f_path.dentry->d_sb));
+fi_read_lock(file);
+f = au_hf_top(file);
+fi_read_unlock(file);
+AuDebugOn(!f);
+return f;
+}
+
--- linux-4.15.0.orig/fs/aufs/loop.h
+++ linux-4.15.0/fs/aufs/loop.h
@@ -0,0 +1,58 @@
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+ */
+
+/* support for loopback mount as a branch
+ */
+
+#ifndef __AUFS_LOOP_H__
+#define __AUFS_LOOP_H__
+
+#ifdef __KERNEL__

+struct dentry;
+struct super_block;

+#ifdef CONFIG_AUFS_BDEV_LOOP
+ /* drivers/block/loop.c */
+ struct file *loop_backing_file(struct super_block *sb);
+
+ /* loop.c */
+ int au_test_loopback_overlap(struct super_block *sb, struct dentry *h_adding);
+ int au_test_loopback_kthread(void);
+ void au_warn_loopback(struct super_block *h_sb);
+
+ int au_loopback_init(void);
+ void au_loopback_fin(void);
+
+ struct file *aufs_real_loop(struct file *file);
+ #else
+ AuStub(struct file *, loop_backing_file, return NULL)
+ +
+AuStubInt0(au_test_loopback_overlap, struct super_block *sb,
+ + struct dentry *h_adding)
+AuStubInt0(au_test_loopback_kthread, void)
+AuStubVoid(au_warn_loopback, struct super_block *h_sb)


+AuStubInt0(au_loopback_init, void)
+AuStubVoid(au_loopback_fin, void)
+
+AuStub(struct file *, aufs_real_loop, return NULL, struct file *file)
+#endif /* BLK_DEV_LOOP */
+
+#endif /* __KERNEL__ */
+#endif /* __AUF5LOOP_H__ */
--- linux-4.15.0.orig/fs/aufs/magic.mk
+++ linux-4.15.0/fs/aufs/magic.mk
@@ -0,0 +1,31 @@
+# SPDX-License-Identifier: GPL-2.0
+
+# defined in ${srctree}/fs/fuse/inode.c
+# tristate
+ifdef CONFIG_FUSE_FS
+ccflags-y += -DFUSE_SUPER_MAGIC=0x65735546
+endif
+
+# defined in ${srctree}/fs/xfs/xfs_sb.h
+# tristate
+ifdef CONFIG_XFS_FS
+ccflags-y += -DXFS_SB_MAGIC=0x58465342
+endif
+
+# defined in ${srctree}/fs/configfs/mount.c
+# tristate
+ifdef CONFIG_CONFIGFS_FS
+ccflags-y += -DCONFIGFS_MAGIC=0x62656570
+endif
+
+# defined in ${srctree}/fs/ubifs/ubifs.h
+# tristate
+ifdef CONFIG_UBIFS_FS
+ccflags-y += -DUBIFS_SUPER_MAGIC=0x24051905
+endif
+
+# defined in ${srctree}/fs/hfsplus/hfsplus_raw.h
+# tristate
+ifdef CONFIG_HFSPLUS_FS
+ccflags-y += -DHFSPLUS_SUPER_MAGIC=0x482b
+endif
--- linux-4.15.0.orig/fs/aufs/module.c
+++ linux-4.15.0/fs/aufs/module.c
@@ -0,0 +1,266 @@
+/
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******************************************************************************

* module global variables and operations *
******************************************************************************

#include <linux/module.h>
#include <linux/seq_file.h>
#include "aufs.h"

/* shrinkable realloc */
void *au_krealloc(void *p, unsigned int new_sz, gfp_t gfp, int may_shrink)
{
    size_t sz;
    int diff;
    if (p) {
#if 0 /* unused */
        if (!new_sz) {
            kfree(p);
            p = NULL;
            goto out;
        } /* unused */
#else
        AuDebugOn(!new_sz);
#endif
        sz = ksize(p);
        diff = au_kmidx_sub(sz, new_sz);
    }
    if (sz && !diff)
        goto out;
    if (sz < new_sz)
/* expand or SLOB */
+p = krealloc(p, new_sz, gfpg);
+else if (new_sz < sz && may_shrink) {
  /* shrink */
  void *q;
  +
  +q = kmalloc(new_sz, gfpg);
  +if (q) {
    +if (p) {
      memcpy(q, p, new_sz);
      +kfree(p);
    +}
    +p = q;
    +} else
    +p = NULL;
  +}
 +
+out:
+return p;
+
+void *au_kzrealloc(void *p, unsigned int nused, unsigned int new_sz, gfp_t gfpg,
+ int may_shrink)
+{
+p = au_krealloc(p, new_sz, gfpg, may_shrink);
+if (p && new_sz > nused)
+memset(p + nused, 0, new_sz - nused);
+return p;
+
+/* ---------------------------------------------------------------------- */
+/*
 * aufs caches
 */
+struct kmem_cache *au_cache[AuCache_Last];
 +
+static void au_cache_fin(void)
+{
+int i;
+
+/*
 + * Make sure all delayed rcu free inodes are flushed before we
 + * destroy cache.
 + */
+rcu_barrier();
+
+/* excluding AuCache_HNOTIFY */
+BUILD_BUG_ON(AuCache_HNOTIFY + 1 != AuCache_Last);
for (i = 0; i < AuCache_HNOTIFY; i++) {
    kmem_cache_destroy(au_cache[i]);
    au_cache[i] = NULL;
}

static int __init au_cache_init(void)
{
    au_cache[AuCache_DINFO] = AuCacheCtor(au_dinfo, au_di_init_once);
    if (au_cache[AuCache_DINFO])
        /* SLAB_DESTROY_BY_RCU */
    au_cache[AuCache_ICNTNR] = AuCacheCtor(au_icntnr,
        au_icntnr_init_once);
    if (au_cache[AuCache_ICNTNR])
        au_cache[AuCache_FINFO] = AuCacheCtor(au_finfo,
            au_fi_init_once);
    if (au_cache[AuCache_FINFO])
        au_cache[AuCache_VDIR] = AuCache(au_vdir);
    if (au_cache[AuCache_VDIR])
        au_cache[AuCache_DEHSTR] = AuCache(au_vdir_dehstr);
    if (au_cache[AuCache_DEHSTR])
        return 0;
    au_cache_fin();
    return -ENOMEM;
}

/* ---------------------------------------------------------------------- */

int au_dir_roflags;

#ifdef CONFIG_AUFS_SBILIST

/* iterate_supers_type() doesn't protect us from
 * remounting (branch management)
 */
struct hlist_bl_head au_sbilist;

#endif

/* functions for module interface.
 */
MODULE_LICENSE("GPL");
/* MODULE_LICENSE("GPL v2"); */
MODULE_AUTHOR("Junjiro R. Okajima <aufs-users@lists.sourceforge.net>");
MODULE_DESCRIPTION(AUFS_NAME
    " -- Advanced multi layered unification filesystem");
MODULE_VERSION(AUFS_VERSION);
+MODULE_ALIAS_FS(AUFS_NAME);
+
+/* this module parameter has no meaning when SYSFS is disabled */
+int sysaufs_brs = 1;
+MODULE_PARM_DESC(brs, "use <sysfs>/fs/aufs/si_/brN");
+module_param_named(brs, sysaufs_brs, int, S_IRUGO);
+
+/* this module parameter has no meaning when USER_NS is disabled */
+bool au_usersns;
+MODULE_PARM_DESC(allow_usersns, "allow unprivileged to mount under users");
+module_param_named(allow_usersns, au_usersns, bool, S_IRUGO);
+
+/* ---------------------------------------------------------------------- */
+
+static char au_esc_chars[0x20 + 3]; /* 0x01-0x20, backslash, del, and NULL */
+
+int au_seq_path(struct seq_file *seq, struct path *path)
+{
+int err;
+
+err = seq_path(seq, path, au_esc_chars);
+if (err >= 0)
+err = 0;
+else
+err = -ENOMEM;
+
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static int __init aufs_init(void)
+{
+int err, i;
+char *p;
+
+p = au_esc_chars;
+for (i = 1; i <= ' '; i++)
+*p++ = i;
+*p++ = '\';
+*p++ = '\x7f';
+*p = 0;
+
+au_dir_roflags = au_file_roflags(O_DIRECTORY | O_LARGEFILE);
+
+memcpy(aufs_iop_nogetattr, aufs_iop, sizeof(aufs_iop));
+for (i = 0; i < AuIop_Last; i++)
aufs_iop_nogetattr[i].getattr = NULL;
+ memset(au_cache, 0, sizeof(au_cache)); /* including hnotify */
+ au_sbilist_init();
+ sysaufs_brs_init();
+ au_debug_init();
+ au_dy_init();
+ err = sysaufs_init();
+ if (unlikely(err))
+ goto out;
+ err = au_procsfs_init();
+ if (unlikely(err))
+ goto out_sysaufs;
+ err = au_wkq_init();
+ if (unlikely(err))
+ goto out_procs;
+ err = au_loopback_init();
+ if (unlikely(err))
+ goto out_loopback;
+ err = au_hnotify_init();
+ if (unlikely(err))
+ goto out_hin;
+ err = au_cache_init();
+ if (unlikely(err))
+ goto out_sysrq;
+ aktfs_fs_type.fs_flags |= au_userns ? FS_USERNS_MOUNT : 0;
+ err = register_filesystem(&aufs_fs_type);
+ if (unlikely(err))
+ goto out_cache;
+ /* since we define pr_fmt, call printk directly */
+ printk(KERN_INFO AUFS_NAME " " AUFS_VERSION "n");
+ goto out; /* success */
+ out_cache:
+ au_cache_fin();
+ out_sysrq;
+ au_sysrq_fin();
+ out_hin;
+ au_hnotify_fin();
+ out_loopback:
+ au_loopback_fin();
+ out_wkq:
+ au_wkq_fin();
+out_procfs:
+au_procfs_fin();
+out Sysafs:
+Sysafs_fin();
+au_dy_fin();
+out:
+return err;
+
+static void __exit aufs_exit(void)
+{
+unregister_filesystem(&aufs_fs_type);
+au_cache_fin();
+au_sysrq_fin();
+au_hnotify_fin();
+au_loopback_fin();
+au_wkq_fin();
+au_procfs_fin();
+sysaufs_fin();
+au_dy_fin();
+
+module_init(aufs_init);
+module_exit(aufs_exit);

--- linux-4.15.0.orig/fs/aufs/module.h
+++ linux-4.15.0/fs/aufs/module.h
@@ -0,0 +1,101 @@
+/
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/
+ * module initialization and module-global
+ */
+
#ifndef __AUFS_MODULE_H__
define __AUFS_MODULE_H__
+
+ifndef __KERNEL__
+
+#include <linux/slab.h>
+
+struct path;
+struct seq_file;
+
+/* module parameters */
+extern int sysaufs_brs;
+extern bool au_userns;
+
+/* ------------------------------- */
+
+extern int au_dir_roflags;
+
+void *au_krealloc(void *p, unsigned int new_sz, gfp_t gfp, int may_shrink);
+void *au_kzrealloc(void *p, unsigned int nused, unsigned int new_sz, gfp_t gfp,
+ int may_shrink);
+
+static inline int au_kmidx_sub(size_t sz, size_t new_sz)
+{
+ifndef CONFIG_SLOB
+ return kmalloc_index(sz) - kmalloc_index(new_sz);
+else
+ return -1; /* SLOB is untested */
+endif
+}
+
+int au_seq_path(struct seq_file *seq, struct path *path);
+
+ifndef CONFIG_PROC_FS
+/* procfs.c */
+int __init au_procfs_init(void);
+void au_procfs_fin(void);
+else
+ AuStubInt0(au_procfs_init, void);
+ AuStubVoid(au_procfs_fin, void);
+endif
+
+/* ------------------------------- */
+
+/* kmem cache */
+enum { 
+AuCache_DINFO,
+AuCache_ICNTNR,
AuCache_FINFO, AuCache_VDIR, AuCache_DEHSTR, AuCache_HNOTIFY, /* must be last */ AuCache_Last +}; + extern struct kmem_cache *au_cache[AuCache_Last]; + +#define AuCacheFlags(SLAB_RECLAIM_ACCOUNT | SLAB_MEM_SPREAD) +#define AuCache(type) KMEM_CACHE(type, AuCacheFlags) +#define AuCacheCtor(type, ctor)\ + kmem_cache_create(#type, sizeof(struct type), \ + __alignof__(struct type), AuCacheFlags, ctor) + +#define AuCacheFuncs(name, index) \ + static inline struct au_##name *au_cache_alloc_##name(void) \ + { return kmem_cache_alloc(au_cache[AuCache_##index], GFP_NOFS); } \ + static inline void au_cache_free_##name(struct au_##name *p) \ + { kmem_cache_free(au_cache[AuCache_##index], p); } + +AuCacheFuncs(dinfo, DINFO); AuCacheFuncs(icntnr, ICNTNR); AuCacheFuncs(finfo, FINFO); AuCacheFuncs(vdir, VDIR); AuCacheFuncs(vdir_dehstr, DEHSTR); +#ifdef CONFIG_AUFS_HNOTIFY +AuCacheFuncs(hnotify, HNOTIFY); +#endif + +endif /* __KERNEL__ */ + +endif /* __AUFS_MODULE_H__ */ --- linux-4.15.0.orig/fs/aufs/mvdown.c +++ linux-4.15.0/fs/aufs/mvdown.c @@ -0,0 +1,704 @@ */ + * Copyright (C) 2011-2017 Junjiro R. Okajima + * + * This program, aufs is free software; you can redistribute it and/or modify + * it under the terms of the GNU General Public License as published by + * the Free Software Foundation; either version 2 of the License, or + * (at your option) any later version. + * + * This program is distributed in the hope that it will be useful, + * but WITHOUT ANY WARRANTY; without even the implied warranty of + * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the + * GNU General Public License for more details. + */
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+ /*
+ * move-down, opposite of copy-up
+ */
+
+ /*include "aufs.h"
+
+ +struct au_mvd_args {
+ +struct {
+ +struct super_block *h_sb;
+ +struct dentry *h_parent;
+ +struct au_hinode *hdir;
+ +struct inode *h_dir, *h_inode;
+ +struct au_pin pin;
+ +} info[AUFS_MVDOWN_NARRAY];
+ +
+ +struct aufs_mvdown mvdown;
+ +struct dentry *dentry, *parent;
+ +struct inode *inode, *dir;
+ +struct super_block *sb;
+ +aufs_bindex_t bopq, bwh, bfound;
+ +unsigned char rename_lock;
+ +};
+
+ +#define mvd_errno		mvdown.au_errno
+ +#define mvd_bsrc		mvdown.stbr[AUFS_MVDOWN_UPPER].bindex
+ +#define mvd_src_brid		mvdown.stbr[AUFS_MVDOWN_UPPER].brid
+ +#define mvd_bdst		mvdown.stbr[AUFS_MVDOWN_LOWER].bindex
+ +#define mvd_dst_brid		mvdown.stbr[AUFS_MVDOWN_LOWER].brid
+ +
+ +#define mvd_h_src_sb		info[AUFS_MVDOWN_UPPER].h_sb
+ +#define mvd_h_src_parent	info[AUFS_MVDOWN_UPPER].h_parent
+ +#define mvd_hdr_srcinfo[AUFS_MVDOWN_UPPER].hdr
+ +#define mvd_h_src_dirinfo[AUFS_MVDOWN_UPPER].h_dir
+ +#define mvd_h_src_inodeinfo[AUFS_MVDOWN_UPPER].h_inode
+ +#define mvd_pin_srcinfo[AUFS_MVDOWN_UPPER].pin
+ +
+ +#define mvd_h_dst_sbinfo[AUFS_MVDOWN_LOWER].h_sb
+ +#define mvd_h_dst_parentinfo[AUFS_MVDOWN_LOWER].h_parent
+ +#define mvd_hdr_dstinfo[AUFS_MVDOWN_LOWER].hdr
+ +#define mvd_h_dst_dirinfo[AUFS_MVDOWN_LOWER].h_dir
+ +#define mvd_h_dst_inodeinfo[AUFS_MVDOWN_LOWER].h_inode
+ +#define mvd_pin_dstinfo[AUFS_MVDOWN_LOWER].pin
+ +
+ +#define AU_MVD_PR(flag, ...) do {
+ \

if (flag)
pr_err(__VA_ARGS__);
} while (0)
+
+static int find_lower_writable(struct au_mvd_args *a)
+
+struct super_block *sb;
+aufs_bindex_t bindex, bbot;
+struct au_branch *br;
+
+sb = a->sb;
+bindex = a->mvd_bsrc;
+bbot = au_sbbot(sb);
+if (a->mvdown.flags & AUFS_MVDOWN_FHSM_LOWER)
+for (bindex++; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+if (au_br_fhsm(br->br_perm)
+    && !sb_rdonly(au_br_sb(br)))
+return bindex;
+}
+else if (!(a->mvdown.flags & AUFS_MVDOWN_ROLOWER))
+for (bindex++; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+if (!au_br_rdonly(br))
+return bindex;
+}
+else
+for (bindex++; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+if (!sb_rdonly(au_br_sb(br))) {
+if (au_br_rdonly(br))
+a->mvdown.flags
+= AUFS_MVDOWN_ROLOWER_R;
+return bindex;
+}
+}
+
+return -1;
+
+/* make the parent dir on bdst */
+static int au_do_mkdir(const unsigned char dmsg, struct au_mvd_args *a)
+
+int err;
+
+err = 0;
+a->mvd_hdir_src = au_hi(a->dir, a->mvd_bsrc);
+a->mvd_hdir_dst = au_hi(a->dir, a->mvd_bdst);
```c
+a->mvd_h_src_parent = au_h_dptr(a->parent, a->mvd_bsrc);
+a->mvd_h_dst_parent = NULL;
+if (au_dbbot(a->parent) >= a->mvd_bdst)
+a->mvd_h_dst_parent = au_h_dptr(a->parent, a->mvd_bdst);
+if (!a->mvd_h_dst_parent) {
  +err = au_cpdown_dirs(a->dentry, a->mvd_bdst);
  +if (unlikely(err)) {
    +AU_MVD_PR(dmsg, "cpdown_dirs failed\n");
    +goto out;
    +}
+a->mvd_h_dst_parent = au_h_dptr(a->parent, a->mvd_bdst);
  +}
+}
+out:
+AuTraceErr(err);
+return err;
+}
+
+/* lock them all */
+static int au_do_lock(const unsigned char dmsg, struct au_mvd_args *a)
+{
+  +int err;
+  +struct dentry *h_trap;
+  +
+  +a->mvd_h_src_sb = au_sbr_sb(a->sb, a->mvd_bsrc);
+  +a->mvd_h_dst_sb = au_sbr_sb(a->sb, a->mvd_bdst);
+  +err = au_pin(&a->mvd_pin_dst, a->dentry, a->mvd_bdst,
+    +  + au_opt_udba(a->sb),
+    +  + AuPin_MNT_WRITE | AuPin_DI_LOCKED);
+ AuTraceErr(err);
+  +if (unlikely(err)) {
+    +AU_MVD_PR(dmsg, "pin_dst failed\n");
+    +goto out_dst;
+    +}
+  +}
+  +
+  +if (a->mvd_h_src_sb != a->mvd_h_dst_sb) {
+    +rename_lock = 0;
+    +au_pin_init(&a->mvd_pin_src, a->dentry, a->mvd_bsrc,
+      +  + AuLsc_DI_PARENT, AuLsc_I_PARENT3,
+      +  + au_opt_udba(a->sb),
+      +  + AuPin_MNT_WRITE | AuPin_DI_LOCKED);
+    +AuTraceErr(err);
+    +if (unlikely(err)) {
+      +AU_MVD_PR(dmsg, "pin_src failed\n");
+      +goto out;
+      +}
+    +}
+    +
+    +if (a->mvd_h_src_sb != a->mvd_h_dst_sb) {
+      +rename_lock = 0;
+      +au_pin_init(&a->mvd_pin_src, a->dentry, a->mvd_bsrc,
+        +  + AuLsc_DI_PARENT, AuLsc_I_PARENT3,
+        +  + au_opt_udba(a->sb),
+        +  + AuPin_MNT_WRITE | AuPin_DI_LOCKED);
+      +AuTraceErr(err);
+      +a->mvd_h_src_dir = d_inode(a->mvd_h_src_parent);
+      +if (unlikely(err)) {
+        +AU_MVD_PR(dmsg, "pin_src failed\n");
+        +goto out_dst;
+        +}
```
goto out; /* success */
+
+a->rename_lock = 1;
+au_pin_hdir_unlock(&a->mvd_pin_dst);
+err = au_pin(&a->mvd_pin_src, a->dentry, a->mvd_bsrc,
  + au_opt_udba(a->sb),
  + AuPin_MNT_WRITE | AuPin_DI_LOCKED);
+AuTraceErr(err);
+a->mvd_h_src_dir = d_inode(a->mvd_h_src_parent);
+if (unlikely(err)) {
  +AU_MVD_PR(dmsg, "pin_src failed\n");
  +au_pin_hdir_lock(&a->mvd_pin_src);
  +goto out_dst;
  +}
  +au_pin_hdir_unlock(&a->mvd_pin_src);
  +h_trap = vfsub_lock_rename(a->mvd_h_src_parent, a->mvd_hdir_src,
  +  a->mvd_h_dst_parent, a->mvd_hdir_dst);
  +if (h_trap) {
  +err = (h_trap != a->mvd_h_src_parent);
  +if (err)
  +err = (h_trap != a->mvd_h_dst_parent);
  +}
  +BUG_ON(err); /* it should never happen */
  +if (unlikely(a->mvd_h_src_dir != au_pinned_h_dir(&a->mvd_pin_src))) {
  +err = -EBUSY;
  +AuTraceErr(err);
  +vfsub_unlock_rename(a->mvd_h_src_parent, a->mvd_hdir_src,
  +  a->mvd_h_dst_parent, a->mvd_hdir_dst);
  +au_pin_hdir_lock(&a->mvd_pin_src);
  +au_unpin(&a->mvd_pin_src);
  +au_pin_hdir_lock(&a->mvd_pin_dst);
  +goto out_dst;
  +}
  +goto out; /* success */
+
+out_dst:
+au_unpin(&a->mvd_pin_dst);
+AuTraceErr(err);
+return err;
+
+static void au_do_unlock(const unsigned char dmsg, struct au_mvd_args *a)
+{  
+if (!a->rename_lock)
+au_unpin(&a->mvd_pin_src);
+else {  

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vfsub_unlock_rename(a->mvd_h_src_parent, a->mvd_hdir_src, 
  a->mvd_h_dst_parent, a->mvd_hdir_dst);
+au_pin_hdir_lock(&a->mvd_pin_src);
+au_unpin(&a->mvd_pin_src);
+au_pin_hdir_lock(&a->mvd_pin_dst);
+}
+au_unpin(&a->mvd_pin_dst);
+}
+
+/* copy-down the file */
+static int au_do_cpdown(const unsigned char dmsg, struct au_mvd_args *a)
+{
+int err;
+struct au_cp_generic cpg = {
  .dentry = a->dentry,
  .bdst = a->mvd_bdst,
  .bsrc = a->mvd_bsrc,
  .len = -1,
  .pin = &a->mvd_pin_dst,
  .flags = AuCpup_DTIME | AuCpup_HOPEN
+};
+
+AuDbg("b%d, b%d\n", cpg.bsrc, cpg.bdst);
+if (a->mvdown.flags & AUFS_MVDOWN_OWLOWER)
+au_fset_cpup(cpg.flags, OVERWRITE);
+if (a->mvdown.flags & AUFS_MVDOWN_ROLOWER)
+au_fset_cpup(cpg.flags, RWDST);
+err = au_sio_cpdown_simple(&cpg);
+if (unlikely(err))
+AU_MVD_PR(dmsg, "cpdown failed\n");
+
+AuTraceErr(err);
+return err;
+}
+
+/*
+ * unlink the whiteout on bdst if exist which may be created by UDBA while we
+ * were sleeping
+ */
+static int au_do_unlink_wh(const unsigned char dmsg, struct au_mvd_args *a)
+{
+int err;
+struct path h_path;
+struct au_branch *br;
+struct inode *delegated;
+
+br = au_sbr(a->sb, a->mvd_bdst);
+h_path.dentry = au_wh_lkup(a->mvd_h_dst_parent, &a->dentry->d_name, br);
err = PTR_ERR(h_path.dentry);
if (IS_ERR(h_path.dentry)) {
  AU_MVD_PR(dmsg, "wh_lkup failed\n");
  goto out;
}
err = 0;
if (d_is_positive(h_path.dentry)) {
  h_path.mnt = au_br_mnt(br);
  delegated = NULL;
  err = vfsub_unlink(d_inode(a->mvd_h_dst_parent), &h_path,
    &delegated, /*force*/0);
  if (unlikely(err == -EWOULDBLOCK)) {
    pr_warn("cannot retry for NFSv4 delegation"
      " for an internal unlink\n");
    iput(delegated);
  }
  if (unlikely(err))
    AU_MVD_PR(dmsg, "wh_unlink failed\n");
}
dput(h_path.dentry);
out:
AuTraceErr(err);
return err;

/* unlink the topmost h_dentry */
static int au_do_unlink(const unsigned char dmsg, struct au_mvd_args *a)
{
  int err;
  struct path h_path;
  struct inode *delegated;
  h_path.mnt = au_sbr_mnt(a->sb, a->mvd_bsrc);
  h_path.dentry = au_h_dptr(a->dentry, a->mvd_bsrc);
  delegated = NULL;
  err = vfsub_unlink(a->mvd_h_src_dir, &h_path, &delegated, /*force*/0);
  if (unlikely(err == -EWOULDBLOCK)) {
    pr_warn("cannot retry for NFSv4 delegation"
      " for an internal unlink\n");
    iput(delegated);
  }
  if (unlikely(err))
    AU_MVD_PR(dmsg, "unlink failed\n");
  
  

+AuTraceErr(err);
+return err;
+}
+
+/# Since mvdown succeeded, we ignore an error of this function */
+static void au_do_stfs(const unsigned char dmsg, struct au_mvd_args *a)
+{
+int err;
+struct au_branch *br;
+
+a->mvdown.flags |= AUFS_MVDOWN_STFS_FAILED;
+br = au_sbr(a->sb, a->mvd_bsrc);
+err = au_br_stfs(br, &a->mvdown.stbr[AUFS_MVDOWN_UPPER].stfs);
+if (!err) {
+br = au_sbr(a->sb, a->mvd_bdst);
+a->mvdown.stbr[AUFS_MVDOWN_LOWER].bri = br->br_id;
+err = au_br_stfs(br, &a->mvdown.stbr[AUFS_MVDOWN_LOWER].stfs);
+}
+if (!err)
+a->mvdown.flags &= ~AUFS_MVDOWN_STFS_FAILED;
+else
+AU_MVD_PR(dmsg, "statfs failed (%d), ignored\n", err);
+}
+
+/#
+ * copy-down the file and unlink the bsrc file.
+ * - unlink the bdst whout if exist
+ * - copy-down the file (with whtmp name and rename)
+ * - unlink the bsrc file
+ */
+static int au_do_mvdown(const unsigned char dmsg, struct au_mvd_args *a)
+{
+int err;
+
+err = au_do_mkdir(dmsg, a);
+if (!err)
+err = au_do_lock(dmsg, a);
+if (unlikely(err))
+goto out;
+
+/#
+ * do not revert the activities we made on bdst since they should be
+ * harmless in aufs.
+ */
+
+err = au_do_cpdwn(dmsg, a);
+if (!err)
+err = au_do_unlink_wh(dmsg, a);
if (!err && !(a->mvdown.flags & AUFS_MVDOWN_KUPPER))
+err = au_do_unlink(dmsg, a);
+if (unlikely(err))
+goto out_unlock;
+
+ AuDbg("%pd2, 0x%x, %d --> %d\n",
+ a->dentry, a->mvdown.flags, a->mvd_bsrc, a->mvd_bdst);
+if (find_lower_writable(a) < 0)
+a->mvdown.flags |= AUFS_MVDOWN_BOTTOM;
+
+if (a->mvdown.flags & AUFS_MVDOWN_STFS)
+au_do_stfs(dmsg, a);
+
+ /* maintain internal array */
+if (!a->mvdown.flags & AUFS_MVDOWN_KUPPER)) {
+au_set_h_dptr(a->dentry, a->mvd_bscc, NULL);
+au_set_dbtop(a->dentry, a->mvd_bdst);
+au_set_h_iptr(a->inode, a->mvd_bscc, NULL, /*flags*/0);
+au_set_ibtop(a->inode, a->mvd_bdst);
+} else {
+ /* hide the lower */
+au_set_h_dptr(a->dentry, a->mvd_bdst, NULL);
+au_set_dbbot(a->dentry, a->mvd_bsrc);
+au_set_h_iptr(a->inode, a->mvd_bsrc, NULL, /*flags*/0);
+au_set_ibbot(a->inode, a->mvd_bsrc);
+}
+
+ /* hide the lower */
+au_set_h_dptr(a->dentry, a->mvd_bdst, NULL);
+au_set_dbbot(a->dentry, a->mvd_bsrc);
+au_set_h_iptr(a->inode, a->mvd_bsrc, NULL, /*flags*/0);
+au_set_ibbot(a->inode, a->mvd_bsrc);
+
+ out_unlock:
+au_do_unlock(dmsg, a);
+out:
+AuTraceErr(err);
+return err;
+}
+
+ /* make sure the file is idle */
+static int au_mvd_args_busy(const unsigned char dmsg, struct au_mvd_args *a)
+{
+int err, plinked;
+
+err = 0;
+plinked = !au_opt_test(au_mntflags(a->sb), PLINK);
+if (au_dbbot(a->dentry) < a->mvd_bdst)
+au_set_dbbot(a->dentry, a->mvd_bdst);
+if (au_ibbot(a->inode) < a->mvd_bdst)
+au_set_ibbot(a->inode, a->mvd_bdst);
+}
& & au_dcount(a->dentry) == 1
+ & & atomic_read(&a->inode->i_count) == 1
+ /& & & a->mvd_h_src_inode->i_nlink == 1 */
+ & & (!plinked || au_plink_test(a->inode))
+ & & & if a->inode->i_nlink == 1)
+ goto out;
+ 
+ err = -EBUSY;
+ AU_MVD_PR(dmsg,
+ "b%d, d{b%d, c%d?}, i{c%d?, l%u}, hi{l%u}, p{d, %d}\n",
+ a->mvd_bsrc, au_dbtop(a->dentry), au_dcount(a->dentry),
+ atomic_read(&a->inode->i_count), a->inode->i_nlink,
+ a->mvd_h_src_inode->i_nlink,
+ plinked, plinked ? au_plink_test(a->inode) : 0);
+ 
+ out:
+ AuTraceErr(err);
+ return err;
+
+ /* make sure the parent dir is fine */
+ static int au_mvd_args_parent(const unsigned char dmsg,
+      struct au_mvd_args *a)
+{
+    int err;
+    aufs_bindex_t bindex;
+    
+    err = 0;
+    if (unlikely(au_alive_dir(a->parent))) {
+        err = -ENOENT;
+        AU_MVD_PR(dmsg, "parent dir is dead\n");
+        goto out;
+    } 
+    
+    out:
+    AuTraceErr(err);
+    return err;
+}
static int au_mvd_args_intermediate(const unsigned char dmsg,
    struct au_mvd_args *a)
{
    int err;
    struct au_dinfo *dinfo, *tmp;

    /* lookup the next lower positive entry */
    err = -ENOMEM;
    tmp = au_di_alloc(a->sb, AuLsc_DI_TMP);
    if (unlikely(!tmp))
        goto out;

    a->bfound = -1;
    a->bwh = -1;
    dinfo = au_di(a->dentry);
    au_di_cp(tmp, dinfo);
    au_di_swap(tmp, dinfo);

    /* returns the number of positive dentries */
    err = au_lkup_dentry(a->dentry, a->mvd_bsrc + 1,
        AuLkup_IGNORE_PERM *0);
    if (!err)
        a->bwh = au_dbwh(a->dentry);
    else if (err > 0)
        a->bfound = au_dbtop(a->dentry);
    au_di_swap(tmp, dinfo);
    rw_write_unlock(&tmp->di_rwsem);
    au_di_free(tmp);
    if (unlikely(err < 0))
        AU_MVD_PR(dmsg, "failed look-up lower\n");

    /* here, we have these cases.
    * bfound == -1
    * no positive dentry under bsrc. there are more sub-cases.
    * bwh < 0
    * there no whiteout, we can safely move-down.
    * bwh <= bsrc
    * impossible
    * bsrc < bwh && bwh < bdst
    * there is a whiteout on RO branch. cannot proceed.
    * bwh == bdst
    * there is a whiteout on the RW target branch. it should
    * be removed.
    * bdst < bwh
there is a whiteout somewhere unrelated branch.
-1 < bfound && bfound <= bsrc
impossible.
bfound < bdst
* found, but it is on RO branch between bsrc and bdst. cannot
* proceed.
bfound == bdst
* found, replace it if AUFS_MVDOWN_FORCE is set. otherwise return
* error.
bdst < bfound
* found, after we create the file on bdst, it will be hidden.
*/

AuDebugOn(a->bfound == -1
  && a->bwh != -1
  && a->bwh <= a->mvd_bsrc);
AuDebugOn(-1 < a->bfound
  && a->bfound <= a->mvd_bsrc);
+
+err = -EINVAL;
+if (a->bfound == -1
  && a->mvd_bsrc < a->bwh
  && a->bwh != -1
  && a->bwh < a->mvd_bdst) {
+a->mvd_errno = EAU_MVDOWN_WHITEOUT;
+AU_MVD_PR(dmsg, "bsrc %d, bdst %d, bfound %d, bwh %d\n",
  a->mvd_bsrc, a->mvd_bdst, a->bfound, a->bwh);
+goto out;
+} else if (a->bfound != -1 && a->bfound < a->mvd_bd)
{a->mvd_errno = EAU_MVDOWN_UPPER;
+AU_MVD_PR(dmsg, "bdst %d, bfound %d\n",
  a->mvd_bdst, a->bfound);
+goto out;
+}
+err = 0; /* success */
+
+err = 0;
+int err;
+if (!a->mvdown.flags & AUFS_MVDOWN_OWLOWER)
&& a->bfound == a->mvbdst)
+err = -EEXIST;
+AuTraceErr(err);
+return err;
+
+static int au_mvd_args(const unsigned char dmsg, struct au_mvd_args *a)
+{
+int err;
+struct au_branch *br;
+
+err = -EISDIR;
+if (unlikely(S_ISDIR(a->inode->i_mode)))
+ goto out;
+
+err = -EINVAL;
+if (!(a->mvdown.flags & AUFS_MVDOWN_BRID_UPPER))
+ a->mvd_bsrc = au_ibtop(a->inode);
+else {
+ a->mvd_bsrc = au_br_index(a->sb, a->mvdsrcbrid);
+ if (unlikely(a->mvdbsrc < 0)
+ || (a->mvdbsrc < au_dbbot(a->dentry)
+ || au_dbbot(a->dentry) < a->mvdbsrc
+ || !au_h_dptr(a->dentry, a->mvdbsrc))
+ || (a->mvdbsrc < au_ibtop(a->inode)
+ || au_ibtop(a->inode) < a->mvdbsrc
+ || !au_h_iptr(a->inode, a->mvdbsrc))) {
+ a->mv_errno = EAU_MVDOWN_NOUPPER;
+ AU_MVD_PR(dmsg, "no upper\n");
+ goto out;
+ }
+
+ if (unlikely(a->mvdbsrc == au_sbbot(a->sb))) {
+ a->mv_errno = EAU_MVDOWN_BOTTOM;
+ AU_MVD_PR(dmsg, "on the bottom\n");
+ goto out;
+ }
+ a->mv_h_src_inode = au_h_iptr(a->inode, a->mvdbsrc);
+ br = au_sbr(a->sb, a->mvdbsrc);
+ err = au_br_rdonly(br);
+ if (!!(a->mvdown.flags & AUFS_MVDOWN_ROUPPER)) {
+ if (unlikely(err))
+ goto out;
+ } else if (!!(vfsub_native_ro(a->mvhsrcinode)
+ || IS_APPEND(a->mvhsrcinode))) {
+ if (err)
+ a->mvdown.flags |= AUFS_MVDOWN_ROUPPER_R;
+ /* go on */
+}
+} else
+goto out;
+
+err = -EINVAL;
+if (!(a->mvdown.flags & AUFS_MVDOWN_BRID_LOWER)) {
+a->mvd_bdst = find_lower_writable(a);
+if (unlikely(a->mvd_bdst < 0)) {
+a->mvd_errno = EAU_MVDOWN_BOTTOM;
+AU_MVD_PR(dmsg, "no writable lower branch\n");
+goto out;
+}
+} else {
+a->mvd_bdst = au_br_index(a->sb, a->mvd_dst_brid);
+if (unlikely(a->mvd_bdst < 0
+     || au_sbbot(a->sb) < a->mvd_bdst)) {
+a->mvd_errno = EAU_MVDOWN_NOLOWERBR;
+AU_MVD_PR(dmsg, "no lower brid\n");
+goto out;
+}
+}
+
+err = au_mvd_args_busy(dmsg, a);
+if (!err)
+err = au_mvd_args_parent(dmsg, a);
+if (!err)
+err = au_mvd_args_intermediate(dmsg, a);
+if (!err)
+err = au_mvd_args_exist(dmsg, a);
+if (!err)
+AuDbg("b%d, b%d\n", a->mvd_bsrc, a->mvd_bdst);
+
+AuTraceErr(err);
+return err;
+
+int au_mvdown(struct dentry *dentry, struct aufs_mvdown __user *uarg)
+{
+int err, e;
+unsigned char dmsg;
+struct au_mvd_args *args;
+struct inode *inode;
+
inode = d_inode(dentry);
+err = -EPERM;
+if (unlikely(!capable(CAP_SYS_ADMIN)))
+goto out;
+
err = -ENOMEM;
args = kmalloc(sizeof(*args), GFP_NOFS);
if (unlikely(!args))
goto out;
+
err = copy_from_user(&args->mvdown, uarg, sizeof(args->mvdown));
if (!err)
err = !access_ok VERIFY_WRITE, uarg, sizeof(*uarg));
if (unlikely(err)) {
AuTraceErr(err);
goto out_free;
+
AuDbg("flags 0x%x\n", args->mvdown.flags);
args->mvdown.flags &= ~(AUFS_MVDOWN_ROLOWER_R | AUFS_MVDOWN_ROUPPER_R);
args->mvdown.au_errno = 0;
args->dentry = dentry;
args->inode = inode;
args->sb = dentry->d_sb;
+
err = -ENOENT;
dmsg = !!((args->mvdown.flags & AUFS_MVDOWN_DMSG);
args->parent = dget_parent(dentry);
args->dir = d_inode(args->parent);
inode_lock_nested(args->dir, I_MUTEX_PARENT);
dput(args->parent);
if (unlikely(args->parent != dentry->d_parent)) {
AU_MVD_PR(dmsg, "parent dir is moved\n");
goto out_dir;
+
inode_lock_nested(inode, I_MUTEX_CHILD);
err = aufs_read_lock(dentry, AuLock_DW | AuLock_FLUSH | AuLock_NOPLMW);
if (unlikely(err))
goto out_inode;
+
dio_write_lock_parent(args->parent);
err = au_mvd_args(dmsg, args);
if (unlikely(err))
goto out_parent;
+
err = au_do_mvdown(dmsg, args);
if (unlikely(err))
goto out_parent;
+
aucpup_attr_timesizes(args->dir);
aucpup_attr_timesizes(inode);
if (!!(args->mvdown.flags & AUFS_MVDOWN_KUPPER))
```c
+ au_cpup_igen(inode, au_h_iptr(inode, args->mvd_bdst));
+ /* au_digen_dec(dentry); */
+
+ out_parent:
+ di_write_unlock(args->parent);
+ aufs_read_unlock(dentry, AuLock_DW);
+ out_inode:
+ inode_unlock(inode);
+ out_dir:
+ inode_unlock(args->dir);
+ out_free:
+ e = copy_to_user(uarg, &args->mvdown, sizeof(args->mvdown));
+ if (unlikely(e))
+ err = -EFAULT;
+ kfree(args);
+ out:
+ AuTraceErr(err);
+ return err;
+}
--- linux-4.15.0.orig/fs/aufs/opts.c
+++ linux-4.15.0/fs/aufs/opts.c
@@ -0,0 +1,1891 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+ *
+/*
+ * mount options/flags
+ */
+
+#include <linux/namei.h>
+#include <linux/types.h> /* a distribution requires */
+#include <linux/parser.h>
+#include "aufs.h"
+)```
# Include opt allowing

+enum {
    Opt_br,
    Opt_add, Opt_del, Opt_mod, Opt_append, Opt_prepend,
    Opt_idel, Opt_imod,
    Opt_dirwh, Opt_rdcache, Opt_rdblk, Opt_rdhash,
    Opt_rdblk_def, Opt_rdhash_def,
    Opt_xino, Opt_noxino,
    Opt_trunc_xino, Opt_trunc_xino_v, Opt_notrunc_xino,
    Opt_trunc_xino_path, Opt_itrunc_xino,
    Opt_trunc_xib, Opt_notrunc_xib,
    Opt_shwh, Opt_noshwh,
    Opt_plink, Opt_noplink, Opt_list_plink,
    Opt_udba,
    Opt_dio, Opt_nodio,
    Opt_diropq_a, Opt_diropq_w,
    Opt_warn_perm, Opt_nowarn_perm,
    Opt_wbr_copyup, Opt_wbr_create,
    Opt_fhsm_sec,
    Opt_verbose, Opt_noverbose,
    Opt_sum, Opt_nosum, Opt_wsum,
    Opt_dirperm1, Opt_nodirperm1,
    Opt_dirren, Opt_nodirren,
    Opt_acl, Opt_noacl,
    Opt_tail, Opt_ignore, Opt_ignore_silent, Opt_err
};

+static match_table_t options = {
    {Opt_br, "br=%s"},
    {Opt_br, "br:%s"},
    {Opt_add, "add=%d:%s"},
    {Opt_add, "add:%d:%s"},
    {Opt_add, "ins=%d:%s"},
    {Opt_add, "ins:%d:%s"},
    {Opt_append, "append=%s"},
    {Opt_append, "append:%s"},
    {Opt_prepend, "prepend=%s"},
    {Opt_prepend, "prepend:%s"},
    {Opt_del, "del=%s"},
    {Opt_del, "del:%s"},
    /* {Opt_idel, "idel=%d"}, */
    {Opt_mod, "mod=%s"},
    {Opt_mod, "mod:%s"},
    /* {Opt_imod, "imod=%d:%s"}, */
   .NewReaderStatus,
    +/\ {Opt_plink, "plink"},
    */

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+{Opt_dirwh, "dirwh=%d"},
+
+{Opt_xino, "xino=%s"},
+{Opt_noxino, "noxino"},
+{Opt_trunc_xino, "trunc_xino"},
+{Opt_trunc_xino_v, "trunc_xino_v=%d:%d"},
+{Opt_notrunc_xino, "notrunc_xino"},
+{Opt_trunc_xino_path, "trunc_xino=%s"},
+{Opt_itrunc_xino, "itrunc_xino=%d"},
+/* {Opt_zxino, "zxino=%s"}, */
+{Opt_trunc_xib, "trunc_xib"},
+{Opt_notrunc_xib, "notrunc_xib"},
+
+#ifdef CONFIG_PROC_FS
+{Opt_plink, "plink"},
+#else
+{Opt_ignore_silent, "plink"},
+#endif
+
+{Opt_noplink, "noplink"},
+
+#ifdef CONFIG_AUFS_DEBUG
+{Opt_list_plink, "list_plink"},
+#endif
+
+{Opt_udba, "udba=%s"},
+
+{Opt_dio, "dio"},
+{Opt_nodio, "nodio"},
+
+#ifdef CONFIG_AUFS_DIRREN
+{Opt_dirren, "dirren"},
+{Opt_nodirren, "nodirren"},
+#else
+{Opt_ignore, "dirren"},
+{Opt_ignore_silent, "nodirren"},
+#endif
+
+#ifdef CONFIG_AUFS_FHSM
+{Opt_fhsm_sec, "fhsm_sec=%d"},
+#else
+{Opt_ignore, "fhsm_sec=%d"},
+#endif
+
+{Opt_diropq_a, "diropq=always"},
+{Opt_diropq_a, "diropq=a"},
+{Opt_diropq_w, "diropq=whiteouted"},
+{Opt_diropq_w, "diropq=w"},
+ {Opt_warn_perm, "warn_perm"},
+ {Opt_nowarn_perm, "nowarn_perm"},
+
+ /* keep them temporary */
+ {Opt_ignore_silent, "nogltx"},
+ {Opt_ignore, "clean_plink"},
+
+ #ifdef CONFIG_AUFS_SHWH
+ {Opt_shwh, "shwh"},
+ #endif
+ {Opt_noshwh, "noshwh"},
+
+ {Opt_dirperm1, "dirperm1"},
+ {Opt_nodirperm1, "nodirperm1"},
+
+ {Opt_verbose, "verbose"},
+ {Opt_verbose, "v"},
+ {Opt_noverbose, "noverbose"},
+ {Opt_noverbose, "quiet"},
+ {Opt_noverbose, "q"},
+ {Opt_noverbose, "silent"},
+
+ {Opt_sum, "sum"},
+ {Opt_nosum, "nosum"},
+ {Opt_wsum, "wsum"},
+
+ {Opt_rdcache, "rdcache=%d"},
+ {Opt_rdblk, "rdblk=%d"},
+ {Opt_rdblk_def, "rdblk=def"},
+ {Opt_rdhash, "rdhash=%d"},
+ {Opt_rdhash_def, "rdhash=def"},
+
+ {Opt_wbr_create, "create=%s"},
+ {Opt_wbr_create, "create_policy=%s"},
+ {Opt_wbr_copyup, "cpup=%s"},
+ {Opt_wbr_copyup, "copyup=%s"},
+ {Opt_wbr_copyup, "copyup_policy=%s"},
+
+ /* generic VFS flag */
+ #ifdef CONFIG_FS_POSIX_ACL
+ {Opt_acl, "acl"},
+ {Opt_noacl, "noacl"},
+ #else
+ {Opt_ignore, "acl"},
+ {Opt_ignore_silent, "noacl"},
+ #endif
+ +
+/* internal use for the scripts */
+{Opt_ignore_silent, "si=%s"},
+
+{Opt_br, "dirs=%s"},
+{Opt_ignore, "debug=%d"},
+{Opt_ignore, "delete=whiteout"},
+{Opt_ignore, "delete=all"},
+{Opt_ignore, "imap=%s"},
+
+/* temporary workaround, due to old mount(8)? */
+{Opt_ignore_silent, "relatime"},
+
+{Opt_err, NULL}
+);
+
+/* ---------------------------------------------------------------------- */
+
+static const char *au_parser_pattern(int val, match_table_t tbl)
+{
+struct match_token *p;
+
+p = tbl;
+while (p->pattern) {
+if (p->token == val)
{return p->pattern;
+p++;
+}
+BUG();
+return "??";
+}
+
+static const char *au_optstr(int *val, match_table_t tbl)
+{
+struct match_token *p;
+
+int v;
+
+v = *val;
+if (!v)
{goto out;
+p = tbl;
+while (p->pattern) {
+if (p->token
+    && (v & p->token) == p->token) {
+val &=!p->token;
+return p->pattern;
+}
+p++;
+}
static match_table_t brperm = {
    {AuBrPerm_RO, AUFS_BRPERM_RO},
    {AuBrPerm_RR, AUFS_BRPERM_RR},
    {AuBrPerm_RW, AUFS_BRPERM_RW},
    {0, NULL}
};

static match_table_t brattr = {
    /* general */
    {AuBrAttr_COO_REG, AUFS_BRATTR_COO_REG},
    {AuBrAttr_COO_ALL, AUFS_BRATTR_COO_ALL},
    /* 'unpin' attrib is meaningless since linux-3.18-rc1 */
    {AuBrAttr_UNPIN, AUFS_BRATTR_UNPIN},
    #ifdef CONFIG_AUFS_FHSM
    {AuBrAttr_FHSM, AUFS_BRATTR_FHSM},
    #endif
    #ifdef CONFIG_AUFS_XATTR
    {AuBrAttr_ICEX, AUFS_BRATTR_ICEX},
    {AuBrAttr_ICEX_SEC, AUFS_BRATTR_ICEX_SEC},
    {AuBrAttr_ICEX_SYS, AUFS_BRATTR_ICEX_SYS},
    {AuBrAttr_ICEX_TR, AUFS_BRATTR_ICEX_TR},
    {AuBrAttr_ICEX_USR, AUFS_BRATTR_ICEX_USR},
    {AuBrAttr_ICEX_OTH, AUFS_BRATTR_ICEX_OTH},
    #endif
    /* ro/rr branch */
    {AuBrAttr_WH, AUFS_BRRATTR_WH},
    /* rw branch */
    {AuBrWAttr_MOO, AUFS_BRWATTR_MOO},
    {AuBrWAttr_NoLinkWH, AUFS_BRWATTR_NLWH},
    {0, NULL}
};

static int br_attr_val(char *str, match_table_t table, substring_t args[])
{
    int attr, v;
    char *p;
    
    attr = 0;
    
    ...
do {
    p = strchr(str, '+');
    if (p)
        *p = 0;
    v = match_token(str, table, args);
    if (v) {
        if (v & AuBrAttr_CMOO_Mask)
            attr &= ~AuBrAttr_CMOO_Mask;
        attr |= v;
    } else {
        if (p)
            *p = '+';
        pr_warn("ignored branch attribute %s\n", str);
        break;
    }
    if (p)
        str = p + 1;
} while (p);
return attr;
}

static int au_do_optstr_br_attr(au_br_perm_str_t *str, int perm)
{
    int sz;
    const char *p;
    char *q;
    q = str->a;
    *q = 0;
    p = au_optstr(&perm, brattr);
    if (p) {
        sz = strlen(p);
        memcpy(q, p, sz + 1);
        q += sz;
    } else
        goto out;
    do {
        p = au_optstr(&perm, brattr);
        if (p) {
            *q++ = '+';
            sz = strlen(p);
            memcpy(q, p, sz + 1);
            q += sz;
        }
    } while (p);
    out:
+out:
+return q - str->a;
+
+static int noinline_for_stack br_perm_val(char *perm)
+{
+int val, bad, sz;
+char *p;
+substring_t args[MAX_OPT_ARGS];
+au_br_perm_str_t attr;
+
+p = strchr(perm, '+');
+if (p)
+*p = 0;
+val = match_token(perm, brperm, args);
+if (!val) {
+if (p)
+*p = '+';
+pr_warn("ignored branch permission \%s\n", perm);
+val = AuBrPerm_RO;
+goto out;
+}
+if (!p)
+goto out;
+
+val |= br_attr_val(p + 1, brattr, args);
+
+bad = 0;
+switch (val & AuBrPerm_Mask) {
+case AuBrPerm_RO:
+case AuBrPerm_RR:
+bad = val & AuBrWAttr_Mask;
+val &= ~AuBrWAttr_Mask;
+break;
+case AuBrPerm_RW:
+bad = val & AuBrRAttr_Mask;
+val &= ~AuBrRAttr_Mask;
+break;
+}
+
+/*
+ * 'unpin' attrib becomes meaningless since linux-3.18-rc1, but aufs
+ * does not treat it as an error, just warning.
+ * this is a tiny guard for the user operation.
+ */
+if (val & AuBrAttr_UNPIN) {
+bad |= AuBrAttr_UNPIN;
+val &= ~AuBrAttr_UNPIN;
+}
if (unlikely(bad)) {
  sz = au_do_optstr_br_attr(&attr, bad);
  AuDebugOn(sz);
  pr_warn("ignored branch attribute %s\n", attr.a);
}
+
+out:
+return val;
+
+void au_optstr_br_perm(au_br_perm_str_t *str, int perm)
+{
+  au_br_perm_str_t attr;
+  const char *p;
+  char *q;
+  int sz;
+  
+  q = str->a;
+  p = au_optstr(&perm, brperm);
+  AuDebugOn(!p || !*p);
+  sz = strlen(p);
+  memcpy(q, p, sz + 1);
+  q += sz;
+  
+  sz = au_do_optstr_br_attr(&attr, perm);
+  if (sz) {
+    *q++ = '+';
+    memcpy(q, attr.a, sz + 1);
+  }
+  
+  AuDebugOn(strlen(str->a) >= sizeof(str->a));
+}
+
+/* -------------------------- */
+
+static match_table_t udbalevel = {
+  {AuOpt_UDBA_REVAL, "reval"},
+  {AuOpt_UDBA_NONE, "none"},
+  #ifdef CONFIG_AUFS_HNOTIFY
+  {AuOpt_UDBA_HNOTIFY, "notify"}, /* abstraction */
+  #ifdef CONFIG_AUFS_HFSNOTIFY
+  {AuOpt_UDBA_HFSNOTIFY, "fsnotify"},
+  #endif
+  #endif
+  {-1, NULL}
+};
static int noinline_for_stack udba_val(char *str) {
    substring_t args[MAX_OPT_ARGS];
    return match_token(str, udbalevel, args);
}

const char *au_optstr_udba(int udba) {
    return au_parser_pattern(udba, udbalevel);
}

static match_table_t au_wbr_create_policy = {
    {AuWbrCreate_TDP, "tdp"},
    {AuWbrCreate_TDP, "top-down-parent"},
    {AuWbrCreate_RR, "rr"},
    {AuWbrCreate_RR, "round-robin"},
    {AuWbrCreate_MFS, "mfs"},
    {AuWbrCreate_MFS, "most-free-space"},
    {AuWbrCreate_MFSV, "mfs:%d"},
    {AuWbrCreate_MFSV, "most-free-space:%d"},
    /* top-down regardless the parent, and then mfs */
    {AuWbrCreate_TDMFS, "tdmfs:%d"},
    {AuWbrCreate_TDMFSV, "tdmfs:%d:%d"},
    {AuWbrCreate_MFSRR, "mfsrr:%d"},
    {AuWbrCreate_MFSRRV, "mfsrr:%d:%d"},
    {AuWbrCreate_PMFS, "pmfs"},
    {AuWbrCreate_PMFSV, "pmfs:%d"},
    {AuWbrCreate_PMFSRR, "pmfsrr:%d"},
    {AuWbrCreate_PMFSRRV, "pmfsrr:%d:%d"},
    {AuWbrCreate_TDMFSRR, "tdmfsrr:%d"},
    {AuWbrCreate_TDMFSRRV, "tdmfsrr:%d:%d"},
    {AuWbrCreate_PMFSRRR, "pmfsrr:%d"},
    {AuWbrCreate_PMFSRRV, "pmfsrr:%d:%d"},
    {AuWbrCreate_PMFSRRRV, "pmfsrr:%d:%d"},
    {-1, NULL}
};

static int au_wbr_mfs_wmark(substring_t *arg, char *str,
    struct au_opt_wbr_create *create) {
    int err;
    unsigned long long ull;
    err = 0;
    if (!match_u64(arg, &ull))
        create->mfsrr_watermark = ull;
template<>
+break;
+}  
+/*FALLTHROUGH*/
+case AuWbrCreate_MFS:
+case AuWbrCreate_PMFS:
+create->mfs_second = AUFS_MFS_DEF_SEC;
+break;
+case AuWbrCreate_MFSV:
+case AuWbrCreate_PMFSV:
+e = au_wbr_mfs_sec(&args[0], str, create);
+if (unlikely(e))
+err = e;
+break;
+}  
+
+return err;
+}
+
+const char *au_optstr_wbr_create(int wbr_create)
+{
+return au_parser_pattern(wbr_create, au_wbr_create_policy);
+}
+
+static match_table_t au_wbr_copyup_policy = {
+{AuWbrCopyup_TDP, "tdp"},
+{AuWbrCopyup_TDP, "top-down-parent"},
+{AuWbrCopyup_BUP, "bup"},
+{AuWbrCopyup_BUP, "bottom-up-parent"},
+{AuWbrCopyup_BU, "bu"},
+{AuWbrCopyup_BU, "bottom-up"},
+{-1, NULL}
+};
+
+static int noinline_for_stack au_wbr_copyup_val(char *str)
+{
+substring_t args[MAX_OPT_ARGS];
+
+return match_token(str, au_wbr_copyup_policy, args);
+}
+
+const char *au_optstr_wbr_copyup(int wbr_copyup)
+{
+return au_parser_pattern(wbr_copyup, au_wbr_copyup_policy);
+}
+
+static const int lkup_dirflags = LOOKUP_FOLLOW | LOOKUP_DIRECTORY;
+static void dump_opts(struct au_opts *opts)
+{
+#ifdef CONFIG_AUFS_DEBUG
+/* reduce stack space */
+union {
  +struct au_opt_add *add;
  +struct au_opt_del *del;
  +struct au_opt_mod *mod;
  +struct au_opt_xino *xino;
  +struct au_opt_xino_itrunc *xino_itrunc;
  +struct au_opt_wbr_create *create;
+} u;
  +struct au_opt *opt;
+  
opt = opts->opt;
  +while (opt->type != Opt_tail) {
  +switch (opt->type) {
  +case Opt_add:
        +u.add = &opt->add;
        +AuDbg("add \{\%d, %s, 0x%lx, %p\}\n",
  +      opt->bindex, opt->pathname, opt->perm,
  +      opt->path.dentry);
  +break;
  +case Opt_del:
  +case Opt_idel:
        +u.del = &opt->del;
        +AuDbg("del \%s, %p\n",
  +      opt->pathname, opt->h_path.dentry);
  +break;
  +case Opt_mod:
  +case Opt_imod:
        +u.mod = &opt->mod;
        +AuDbg("mod \%s, 0x%lx, %p\n",
  +      opt->path, opt->perm, opt->h_root);
  +break;
  +case Opt_append:
        +u.add = &opt->add;
        +AuDbg("append \{\%d, %s, 0x%lx, %p\}\n",
  +      opt->bindex, opt->pathname, opt->perm,
  +      opt->path.dentry);
  +break;
  +case Opt_prepend:
        +u.add = &opt->add;
        +AuDbg("prepend \{\%d, %s, 0x%lx, %p\}\n",
  +      opt->bindex, opt->pathname, opt->perm,
  +      opt->path.dentry);
  +break;
case Opt_dirwh:
    AuDbg("dirwh %d\n", opt->dirwh);
    break;
    
case Opt_rdcache:
    AuDbg("rdcache %d\n", opt->rdcache);
    break;
    
case Opt_rdblk:
    AuDbg("rdblk %u\n", opt->rdblk);
    break;
    
case Opt_rdblk_def:
    AuDbg("rdblk_def\n");
    break;
    
case Opt_rdhash:
    AuDbg("rdhash %u\n", opt->rdhash);
    break;
    
case Opt_rdhash_def:
    AuDbg("rdhash_def\n");
    break;
    
case Opt_xino:
    u.xino = &opt->xino;
    AuDbg("xino {\%s \%pD} \n", u.xino->path, u.xino->file);
    break;
    
case Opt_trunc_xino:
    AuLabel(trunc_xino);
    break;
    
case Opt_notrunc_xino:
    AuLabel(notrunc_xino);
    break;
    
case Opt_trunc_xino_path:
    
case Opt_itrunc_xino:
    u.xino_itrunc = &opt->xino_itrunc;
    AuDbg("trunc_xino %d\n", u.xino_itrunc->bindex);
    break;
    
case Opt_noxino:
    AuLabel(noxino);
    break;
    
case Opt_trunc_xib:
    AuLabel(trunc_xib);
    break;
    
case Opt_notrunc_xib:
    AuLabel(notrunc_xib);
    break;
    
case Opt_shwh:
    AuLabel(shwh);
    break;
    
case Opt_noshwh:
    AuLabel(noshwh);
    break;
case Opt_dirperm1:
    AuLabel(dirperm1);
    break;
    case Opt_nodirperm1:
    AuLabel(nodirperm1);
    break;
    case Opt_plink:
    AuLabel(plink);
    break;
    case Opt_noplink:
    AuLabel(noplink);
    break;
    case Opt_list_plink:
    AuLabel(list_plink);
    break;
    case Opt_udba:
    AuDbg("udba %d, %s\n",
    + opt->udba, au_optstr_udba(opt->udba));
    break;
    case Opt dio:
    AuLabel(dio);
    break;
    case Opt_nodio:
    AuLabel(nodio);
    break;
    case Opt_diropq_a:
    AuLabel(diropq_a);
    break;
    case Opt_diropq_w:
    AuLabel(diropq_w);
    break;
    case Opt_warn_perm:
    AuLabel(warn_perm);
    break;
    case Opt_nowarn_perm:
    AuLabel(nowarn_perm);
    break;
    case Opt verbose:
    AuLabel(verbos);
    break;
    case Opt_nowebose:
    AuLabel(nowerbos);
    break;
    case Opt_sum:
    AuLabel(sum);
    break;
    case Opt nosum:
    AuLabel(nosum);
+break;
+case Opt_wsum:
+AuLabel(wsum);
+break;
+case Opt_wbr_create:
+u.create = &opt->wbr_create;
+AuDbg("create %d, %s\n", u.create->wbr_create,
+ au_optstr_wbr_create(u.create->wbr_create));
+switch (u.create->wbr_create) {
+case AuWbrCreate_MFSV:
+case AuWbrCreate_PMFSV:
+AuDbg("%d sec\n", u.create->mfs_second);
+break;
+case AuWbrCreate_MFSRR:
+case AuWbrCreate_TDMFS:
+AuDbg("%lu watermark\n",
+ u.create->mfsrr_watermark);
+break;
+case AuWbrCreate_MFSRRV:
+case AuWbrCreate_TDMFSV:
+case AuWbrCreate_PMFSRRV:
+AuDbg("%lu watermark, %d sec\n",
+ u.create->mfsrr_watermark,
+ u.create->mfs_second);
+break;
+
+case Opt_wbr_copyup:
+AuDbg("copyup %d, %s\n", opt->wbr_copyup,
+ au_optstr_wbr_copyup(opt->wbr_copyup));
+break;
+case Opt_fhsm_sec:
+AuDbg("fhsm_sec %u\n", opt->fhsm_second);
+break;
+case Opt_dirren:
+AuLabel(dirren);
+break;
+case Opt_nodirren:
+AuLabel(nodirren);
+break;
+case Opt_acl:
+AuLabel(acl);
+break;
+case Opt_noacl:
+AuLabel(noacl);
+break;
+default:
+BUG();
void au_opts_free(struct au_opts *opts)
{
    struct au_opt *opt;
    opt = opts->opt;
    while (opt->type != Opt_tail) {
        switch (opt->type) {
            case Opt_add:
            case Opt_append:
            case Opt_prepend:
                path_put(&opt->add.path);
                break;
            case Opt_del:
            case Opt_idel:
                path_put(&opt->del.h_path);
                break;
            case Opt_mod:
            case Opt_imod:
                dput(opt->mod.h_root);
                break;
            case Opt_xino:
                fput(opt->xino.file);
                break;
            }
        opt++;
    }
}

static int opt_add(struct au_opt *opt, char *opt_str, unsigned long sb_flags,
    aufs_bindex_t bindex)
{
    int err;
    struct au_opt_add *add = &opt->add;
    char *p;
    add->bindex = bindex;
    add->perm = AuBrPerm_RO;
    add->pathname = opt_str;
    p = strchr(opt_str, '=');
    if (p) {
        *p++ = 0;
        if (*p)
add->perm = br_perm_val(p);
+
+err = vfsub_kern_path(add->pathname, lkup_dirflags, &add->path);
+if (!err) {
+    if (!p) {
+        add->perm = AuBrPerm_RO;
+        if (au_test_fs_rr(add->path.dentry->d_sb))
+            add->perm = AuBrPerm_RR;
+        else if (!bindex && !(sb_flags & SB_RDONLY))
+            add->perm = AuBrPerm_RW;
+    }
+    opt->type = Opt_add;
+    goto out;
+}
+err = -EINVAL;
+
+out:
+return err;
}

static int au_opts_parse_del(struct au_opt_del *del, substring_t args[])
{
    int err;

    del->pathname = args[0].from;
    AuDbg("del path %s
", del->pathname);
+
+err = vfsub_kern_path(del->pathname, lkup_dirflags, &del->h_path);
+if (unlikely(err))
+    pr_err("lookup failed %s (%d)\n", del->pathname, err);
+err = -EINVAL;
+
+return err;
+
+static int au_opts_parse_idel(struct super_block *sb, aufs_bindex_t bindex,
+                              struct au_opt_del *del, substring_t args[])
+{
+    int err;
+    struct dentry *root;
+
+    err = -EINVAL;
+    root = sb->s_root;
+    aufs_read_lock(root, AuLock_FLUSH);
+    if (bindex < 0 || au_sbbot(sb) < bindex) {
+        pr_err("out of bounds, %d\n", bindex);
goto out;
+
+err = 0;
+del->h_path.dentry = dget(au_h_dptr(root, bindex));
+del->h_path.mnt = mntget(au_sbr_mnt(sb, bindex));
+
+out:
+aufs_read_unlock(root, !AuLock_IR);
+return err;
+
+static int noinline_for_stack
+au_opts_parse_mod(struct au_opt_mod *mod, substring_t args[])
+{
+    int err;
+    struct path path;
+    char *p;
+
+    err = -EINVAL;
+    mod->path = args[0].from;
+    p = strchr(mod->path, '=');
+    if (unlikely(!p)) {
+        pr_err("no permssion \%s\n", args[0].from);
+        goto out;
+    }
+    *p++ = 0;
+    err = vfsub_kern_path(mod->path, lkup_dirflags, &path);
+    if (unlikely(err)) {
+        pr_err("lookup failed \%s (\%d)\n", mod->path, err);
+        goto out;
+    }
+    mod->perm = br_perm_val(p);
+    AuDbg("mod path \%s, perm 0x\%x, \%s\n", mod->path, mod->perm, p);
+    mod->h_root = dget(path.dentry);
+    path_put(&path);
+
+out:
+    return err;
+
+    #if 0 /* reserved for future use */
+    static int au_opts_parse_imod(struct super_block *sb, aufs_bindex_t bindex,
+        struct au_opt_mod *mod, substring_t args[])
+    {
+        int err;
+        struct path path;
+        char *p;
+
+        err = -EINVAL;
+        sb->path = args[0].from;
+        p = strchr(sb->path, '=');
+        if (unlikely(!p)) {
+            pr_err("no permssion \%s\n", args[0].from);
+            goto out;
+        }
+        *p++ = 0;
+        err = vfsub_kern_path(sb->path, lkup_dirflags, &path);
+        if (unlikely(err)) {
+            pr_err("lookup failed \%s (\%d)\n", sb->path, err);
+            goto out;
+        }
+        sb->perm = br_perm_val(p);
+        AuDbg("mod path \%s, perm 0x\%x, \%s\n", sb->path, sb->perm, p);
+        sb->h_root = dget(path.dentry);
+        path_put(&path);
+
+out:
+        return err;
+    }
+}
+}
+int err;
+struct dentry *root;
+
+err = -EINVAL;
+root = sb->s_root;
+aufs_read_lock(root, AuLock_FLUSH);
+if (bindex < 0 || au_sbbot(sb) < bindex) {
+pr_err("out of bounds, %d\n", bindex);
+goto out;
+}
+
+err = 0;
+mod->perm = br_perm_val(args[1].from);
+AuDbg("mod path %s, perm 0x%x, %s\n", 
+      mod->path, mod->perm, args[1].from);
+mod->h_root = dget(au_h_dptr(root, bindex));
+
+out:
+aufs_read_unlock(root, !AuLock_IR);
+return err;
+}
+#endif
+
+static int au_opts_parse_xino(struct super_block *sb, struct au_opt_xino *xino, 
+                              substring_t args[])
+{
+  int err;
+  struct file *file;
+
+  file = au_xino_create(sb, args[0].from, /*silent*/0);
+  err = PTR_ERR(file);
+  if (IS_ERR(file))
+    goto out;
+  err = -EINVAL;
+  if (unlikely(file->f_path.dentry->d_sb == sb)) {
+    fput(file);
+    pr_err("%s must be outside\n", args[0].from);
+    goto out;
+  }
+  err = 0;
+  xino->file = file;
+  xino->path = args[0].from;
+  out:
+  return err;
+}
+static int noinline_for_stack
+au_opts_parse_xino_itrunc_path(struct super_block *sb,
+    struct au_opt_xino_itrunc *xino_itrunc,
+    substring_t args[])
+{
+    int err;
+aufs_bindex_t bbot, bindex;
+struct path path;
+struct dentry *root;
+
+    err = vfskern_path(args[0].from, lkup_dirflags, &path);
+    if (unlikely(err)) {
+        pr_err("lookup failed %s (%d)
", args[0].from, err);
+        goto out;
+    }
+
+    xino_itrunc->bindex = -1;
+    root = sb->s_root;
+aufs_read_lock(root, AuLock_FLUSH);
+    bbot = au_sbbot(sb);
+    for (bindex = 0; bindex <= bbot; bindex++) {
+        if (au_h_dptr(root, bindex) == path.dentry) {
+            xino_itrunc->bindex = bindex;
+            break;
+        }
+    }
+aufs_read_unlock(root, !AuLock_IR);
+    path_put(&path);
+
+    if (unlikely(xino_itrunc->bindex < 0)) {
+        pr_err("no such branch %s
", args[0].from);
+        err = -EINVAL;
+    }
+    out:
+    return err;
+
+/* called without aufs lock */
+int au_opts_parse(struct super_block *sb, char *str, struct au_opts *opts)
+{
+    int err, n, token;
+aufs_bindex_t bindex;
+unsigned char skipped;
+struct dentry *root;
+struct au_opt *opt, *opt_tail;
+char *opt_str;


/* reduce the stack space */
+union {
    +struct au_opt_xino_itrunc *xino_itrunc;
    +struct au_opt_wbr_create *create;
    +} u;
+union {
    +struct {
        +substring_t args[MAX_OPT_ARGS];
    +} *a;
+err = -ENOMEM;
+a = kmalloc(sizeof(*a), GFP_NOFS);
+if (unlikely(!a))
+goto out;
+
+root = sb->s_root;
+err = 0;
+bindex = 0;
+opt = opts->opt;
+opt_tail = opt + opts->max_opt - 1;
+opt->type = Opt_tail;
+while (err && (opt_str = strsep(&str, "\,")) && *opt_str) {
    +err = -EINVAL;
    +skipped = 0;
    +token = match_token(opt_str, options, a->args);
    +switch (token) {
        +case Opt_br:
            +err = 0;
            +while (err && (opt_str = strsep(&a->args[0].from, "\,"))
                  && *opt_str) {
                +err = opt_add(opt, opt_str, opts->sb_flags,
                              +bindex++);
                +if (unlikely(!err && ++opt > opt_tail))
                    +err = -E2BIG;
                +break;
            +
            +opt->type = Opt_tail;
            +skipped = 1;
            +}
            +break;
+        +case Opt_add:
+            +if (unlikely(match_int(&a->args[0], &n))) {
+                +pr_err("bad integer in %s
", opt_str);
+                +break;
+            +}
+            +bindex++;
+            +if (unlikely(!err && ++opt > opt_tail))
+                +err = -E2BIG;
+            +break;
+        +} +break;
+    +case Opt_br:
+        +err = 0;
+        +while (err && (opt_str = strsep(&a->args[0].from, ",\:"))
+                       && *opt_str) {
+            +err = opt_add(opt, opt_str, opts->sb_flags,
+                         +bindex++);
+            +if (unlikely(!err && ++opt > opt_tail))
+                +err = -E2BIG;
+            +break;
+        +} +break;
+    +}
+    +case Opt_add:
+        +if (unlikely(match_int(&a->args[0], &n))) {
+            +pr_err("bad integer in %s
", opt_str);
+            +break;
+        +}
+        +bindex++;
+        +if (unlikely(!err && ++opt > opt_tail))
+            +err = -E2BIG;
+        +break;
+    +} +break;
+    +}
+    +case Opt_br:
+        +err = 0;
+        +while (err && (opt_str = strsep(&a->args[0].from, ",\:"))
+                       && *opt_str) {
+            +err = opt_add(opt, opt_str, opts->sb_flags,
+                         +bindex++);
+            +if (unlikely(!err && ++opt > opt_tail))
+                +err = -E2BIG;
+            +break;
+        +} +break;
+    +}
+    +}
+    +}
+    +}
+    +break;
+} +break;
+case Opt_add:
+if (unlikely(match_int(&a->args[0], &n))) {
+pr_err("bad integer in %s
", opt_str);
+break;
+}
+if (!err)
+opt->type = token;
+break;
+case Opt_append:
+err = opt_add(opt, a->args[0].from, opts->sb_flags,
+    /*dummy bindex*/1);
+if (!err)
+    opt->type = token;
+break;
+case Opt_prepend:
+err = opt_add(opt, a->args[0].from, opts->sb_flags,
+    /*bindex*/0);
+if (!err)
+    opt->type = token;
+break;
+case Opt_del:
+err = au_opts_parse_del(&opt->del, a->args);
+if (!err)
+    opt->type = token;
+break;
+if 0 /* reserved for future use */
+case Opt_idel:
+    del->pathname = "(indexed)";
+    if (unlikely(match_int(&args[0], &n))) {
+        pr_err("bad integer in %s
", opt_str);
+        break;
+    }
+    err = au_opts_parse_idel(sb, n, &opt->del, a->args);
+    if (!err)
+    opt->type = token;
+break;
+endif
+case Opt_mod:
+err = au_opts_parse_mod(&opt->mod, a->args);
+if (!err)
+    opt->type = token;
+break;
+ifdef IMOD /* reserved for future use */
+case Opt_imod:
+    u.mod->path = "(indexed)";
+    if (unlikely(match_int(&a->args[0], &n))) {
+        pr_err("bad integer in %s
", opt_str);
+        break;
+    }
+    err = au_opts_parse_imod(sb, n, &opt->mod, a->args);
+    if (!err)
+    opt->type = token;
+break;
+endif
case Opt_xino:
    err = au_opts_parse_xino(sb, &opt->xino, a->args);
    if (!err)
        opt->type = token;
    break;
+
case Opt_trunc_xino_path:
    err = au_opts_parse_xino_itrunc_path
        (sb, &opt->xino_itrunc, a->args);
    if (!err)
        opt->type = token;
    break;
+
    case Opt_itrunc_xino:
        u.xino_itrunc = &opt->xino_itrunc;
        if (unlikely(match_int(&a->args[0], &n))) {
            pr_err("bad integer in %s\n", opt_str);
            break;
        }
        u.xino_itrunc->bindex = n;
        aufs_read_lock(root, AuLock_FLUSH);
        if (n < 0 || au_sbbot(sb) < n) {
            pr_err("out of bounds, %d\n", n);
            aufs_read_unlock(root, !AuLock_IR);
            break;
        }
        aufs_read_unlock(root, !AuLock_IR);
        err = 0;
        opt->type = token;
        break;
+
    case Opt_dirwh:
        if (unlikely(match_int(&a->args[0], &opt->dirwh)))
            break;
        err = 0;
        opt->type = token;
        break;
+
    case Opt_rdcache:
        if (unlikely(match_int(&a->args[0], &n))) {
            pr_err("bad integer in %s\n", opt_str);
            break;
        }
        if (unlikely(n > AUFS_RDCACHE_MAX)) {
            pr_err("rdcache must be smaller than %d\n",
                   AUFS_RDCACHE_MAX);
            break;
        }
+opt->rdcache = n;
+err = 0;
+opt->type = token;
+break;
+case Opt_rdblk:
+if (unlikely(match_int(&a->args[0], &n) +
    || n < 0 +
    || n > KALLOC_MAX_SIZE)) {
+pr_err("bad integer in %s\n", opt_str);
+break;
+
+    if (unlikely(n && n < NAME_MAX)) {
+pr_err("rdblk must be larger than %d\n", +
+    NAME_MAX);
+break;
+}
+opt->rdblk = n;
+err = 0;
+opt->type = token;
+break;
+case Opt_rdhash:
+if (unlikely(match_int(&a->args[0], &n) +
    || n < 0 +
    || n * sizeof(struct hlist_head) +
    > KALLOC_MAX_SIZE)) {
+pr_err("bad integer in %s\n", opt_str);
+break;
+
+opt->rdhash = n;
+err = 0;
+opt->type = token;
+break;
+case Opt_trunc_xino:
+case Opt_notrunc_xino:
+case Opt_noxino:
+case Opt_trunc_xib:
+case Opt_notrunc_xib:
+case Opt_shwh:
+case Opt_noshwh:
+case Opt_dirperm1:
+case Opt_nodirperm1:
+case Opt_plink:
+case Opt_noplink:
+case Opt_list_plink:
+case Opt_dio:
+case Opt_nodio:
+case Opt_diropq_a:

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case Opt_diropq_w:
    case Opt_warn_perm:
    case Opt_nowarn_perm:
    case Opt_verbose:
    case Opt_noverbose:
    case Opt_sum:
    case Opt_nosum:
    case Opt_wsum:
    case Opt_rdblk_def:
    case Opt_rdhash_def:
    case Opt_dirren:
    case Opt_nodirren:
    case Opt_acl:
    case Opt_noacl:
    err = 0;
    opt->type = token;
    break;
    
    case Opt_udba:
    opt->udba = udba_val(a->args[0].from);
    if (opt->udba >= 0) {
        err = 0;
        opt->type = token;
    } else
        pr_err("wrong value, %s\n", opt_str);
    break;
    
    case Opt_wbr_create:
    u.create = &opt->wbr_create;
    u.create->wbr_create = au_wbr_create_val(a->args[0].from, u.create);
    if (u.create->wbr_create >= 0) {
        err = 0;
        opt->type = token;
    } else
        pr_err("wrong value, %s\n", opt_str);
    break;
    
    case Opt_wbr_copyup:
    opt->wbr_copyup = au_wbr_copyup_val(a->args[0].from);
    if (opt->wbr_copyup >= 0) {
        err = 0;
        opt->type = token;
    } else
        pr_err("wrong value, %s\n", opt_str);
    break;
    
    case Opt_fhsm_sec:
    if (unlikely(match_int(&a->args[0], &n))
\[ n < 0 \}) \{ \\
+pr_err("bad integer in %s
", opt_str); \\
+break; \\
+\}

+if (sysaufs_brs) \{ \\
+opt->fhsm_second = n; \\
+opt->type = token; \\
+\} else \\
+pr_warn("ignored %s
", opt_str); \\
+err = 0; \\
+break; \\
+
+case Opt_ignore: \\
+pr_warn("ignored %s
", opt_str); \\
+/*FALLTHROUGH*/ \\
+case Opt_ignore_silent: \\
+skipped = 1; \\
+err = 0; \\
+break; \\
+case Opt_err: \\
+pr_err("unknown option %s
", opt_str); \\
+break; \\
+\}

+if (!err && !skipped) \{ \\
+if (unlikely(++opt > opt_tail)) \{ \\
+err = -E2BIG; \\
+opt--; \\
+opt->type = Opt_tail; \\
+break; \\
+\} \\
+opt->type = Opt_tail; \\
+\} \\
+\}

+kfree(a); \\
+dump_opts(opts); \\
+if (unlikely(err)) \\
au_opts_free(opts); \\
+ \\
+out: \\
+return err; \\
+\}

+static int au_opt_wbr_create(struct super_block *sb, \\
+ struct au_opt_wbr_create *create) \\
+{ \\
+int err; 

+struct au_sbinfo *sinfo;  
+SiMustWriteLock(sb);  
+*err = 1; /* handled */  
+sinfo = au_sb(sb);  
+if (sinfo->si_wbr_create_ops->fin) {  
+err = sinfo->si_wbr_create_ops->fin(sb);  
+if (!err)  
+err = 1;  
+}  
+  
+sinfo->si_wbr_create = create->wbr_create;  
+sinfo->si_wbr_create_ops = au_wbr_create_ops + create->wbr_create;  
+switch (create->wbr_create) {  
+case AuWbrCreate_MFSRRV:  
+case AuWbrCreate_MFSRR:  
+case AuWbrCreate_TDMFS:  
+case AuWbrCreate_TDMFSV:  
+case AuWbrCreate_PMFSRR:  
+case AuWbrCreate_PMFSRRV:  
+sinfo->si_wbr_mfs.mfsrr_watermark = create->mfsrr_watermark;  
+/*FALLTHROUGH*/  
+case AuWbrCreate_MFS:  
+case AuWbrCreate_MFSV:  
+case AuWbrCreate_PMFS:  
+case AuWbrCreate_PMFSV:  
+sinfo->si_wbr_mfs.mfs_expire += msecs_to_jiffies(create->mfs_second * MSEC_PER_SEC);  
+break;  
+}  
+  
+if (sinfo->si_wbr_create_ops->init)  
+sinfo->si_wbr_create_ops->init(sb); /* ignore */  
+  
+return err;  
+}  
+  
+/*  
+ * returns,  
+ * plus: processed without an error  
+ * zero: unprocessed  
+ */  
+static int au_opt_simple(struct super_block *sb, struct au_opt *opt,  
+ struct au_opts *opts)  
+{  
+int err;  
+struct au_sbinfo *sinfo;
SiMustWriteLock(sb);
+err = 1; /* handled */
+sbinfo = au_sbi(sb);
+switch (opt->type) {
+case Opt_udba:
+sbinfo->si_mntflags &= ~AuOptMask_UDBA;
+sbinfo->si_mntflags |= opt->udba;
+opts->given_udba |= opt->udba;
++break;
+
+case Opt_plink:
+au_opt_set(sbinfo->si_mntflags, PLINK);
++break;
+
+case Opt_noplink:
+if (au_opt_test(sbinfo->si_mntflags, PLINK))
++au_plink_put(sb, /*verbose*/1);
++au_opt_clr(sbinfo->si_mntflags, PLINK);
++break;
+
+case Opt_list_plink:
++au_plink_list(sb);
++break;
+
+case Opt_dio:
++au_opt_set(sbinfo->si_mntflags, DIO);
++au_fset_opts(opts->flags, REFRESH_DYAOP);
++break;
+
+case Opt_nodio:
++au_opt_clr(sbinfo->si_mntflags, DIO);
++au_fset_opts(opts->flags, REFRESH_DYAOP);
++break;
+
+case Opt_fhsm_sec:
++au_fhsm_set(sbinfo, opt->fhsm_second);
++break;
+
+case Opt_diropq_a:
++au_opt_set(sbinfo->si_mntflags, ALWAYS_DIROPQ);
++break;
+
+case Opt_diropq_w:
++au_opt_clr(sbinfo->si_mntflags, ALWAYS_DIROPQ);
++break;
+
+case Opt_warn_perm:
++au_opt_set(sbinfo->si_mntflags, WARN_PERM);
++break;
+case Opt_nowarn_perm:
+au_opt_clr(sbinfo->si_mntflags, WARN_PERM);
+break;
+
+case Opt_verbose:
+au_opt_set(sbinfo->si_mntflags, VERBOSE);
+break;
+case Opt_noverbose:
+au_opt_clr(sbinfo->si_mntflags, VERBOSE);
+break;
+
+case Opt_sum:
+au_opt_set(sbinfo->si_mntflags, SUM);
+break;
+case Opt_wsum:
+au_opt_clr(sbinfo->si_mntflags, SUM);
+au_opt_set(sbinfo->si_mntflags, SUM_W);
+case Opt_nosum:
+au_opt_clr(sbinfo->si_mntflags, SUM);
+au_opt_clr(sbinfo->si_mntflags, SUM_W);
+break;
+
+case Opt_wbr_create:
+err = au_opt_wbr_create(sb, &opt->wbr_create);
+break;
+case Opt_wbr_copyup:
+sbinfo->si_wbr_copyup = opt->wbr_copyup;
+sbinfo->si_wbr_copyup_ops = au_wbr_copyup_ops + opt->wbr_copyup;
+break;
+
+case Opt_dirwh:
+sbinfo->si_dirwh = opt->dirwh;
+break;
+
+case Opt_rdcache:
+sbinfo->si_rdcache
+= msecs_to_jiffies(opt->rdcache * MSEC_PER_SEC);
+break;
+case Opt_rdblk:
+sbinfo->si_rdblk = opt->rdblk;
+break;
+case Opt_rdblk_def:
+sbinfo->si_rdblk = AUFS_RDBLK_DEF;
+break;
+case Opt_rdhash:
+sbinfo->si_rdhash = opt->rdhash;
+break;
+case Opt_rdhash_def:
+sbinf->si_rdhash = AUFS_RDHASH_DEF;
+break;
+
+case Opt_shwh:
+au_opt_set(sbinf->si_mntflags, SHWH);
+break;
+case Opt_noshwh:
+au_opt_clr(sbinf->si_mntflags, SHWH);
+break;
+
+case Opt_dirperm1:
+au_opt_set(sbinf->si_mntflags, DIRPERM1);
+break;
+case Opt_nodirperm1:
+au_opt_clr(sbinf->si_mntflags, DIRPERM1);
+break;
+
+case Opt_trunc_xino:
+au_opt_set(sbinf->si_mntflags, TRUNC_XINO);
+break;
+case Opt_notrunc_xino:
+au_opt_clr(sbinf->si_mntflags, TRUNC_XINO);
+break;
+
+case Opt_trunc_xino_path:
+case Opt_itrunc_xino:
+err = au_xino_trunc(sb, opt->xino_itrunc.bindex);
+if (!err)
+err = 1;
+break;
+
+case Opt_trunc_xib:
+au_fset_opts(opts->flags, TRUNC_XIB);
+break;
+case Opt_notrunc_xib:
+au_fclr_opts(opts->flags, TRUNC_XIB);
+break;
+
+case Opt_dirren:
+err = 1;
+if (!au_opt_test(sbinf->si_mntflags, DIRREN)) {
+err = au_dr_opt_set(sb);
+if (!err)
+err = 1;
+
+if (err == 1)
+au_opt_set(sbinf->si_mntflags, DIRREN);
+break;
+case Opt_nodirren:
+err = 1;
+if (au_opt_test(sbinfo->si_mntflags, DIRREN)) {
+err = au_dr_opt_clr(sb, au_ftest_opts(opts->flags,
+     DR_FLUSHED));
+if (!err)
+err = 1;
+}
+if (err == 1)
+au_opt_clr(sbinfo->si_mntflags, DIRREN);
+break;
+
+case Opt_acl:
+sb->s_flags |= SB_POSIXACL;
+break;
+case Opt_noacl:
+sb->s_flags &= ~SB_POSIXACL;
+break;
+
+default:
+err = 0;
+break;
+}
+
+return err;
+}

+static int au_opt_br(struct super_block *sb, struct au_opt *opt,
+     struct au_opts *opts)
+{
+int err, do_refresh;
+
+err = 0;
+switch (opt->type) { 
+case Opt_append:
+opt->add.bindex = au_sbbot(sb) + 1;
+if (opt->add.bindex < 0)
+opt->add.bindex = 0;
+goto add;
+case Opt_prepend:
+opt->add.bindex = 0;
+add: /* indented label */
+case Opt_add:
+err = au_br_add(sb, &opt->add,
+au_ftest_opts(opts->flags, REMOUNT));
+if (!err) {
+err = 1;
+au_fset_opts(opts->flags, REFRESH);
+
+break;
+
+case Opt_del:
+case Opt_idel:
+err = au_br_del(sb, &opt->del,
+au_ftest_opts(opts->flags, REMOUNT));
+if (!err) {
+err = 1;
+au_fset_opts(opts->flags, TRUNC_XIB);
+au_fset_opts(opts->flags, REFRESH);
+
+break;
+
+case Opt_mod:
+case Opt_imod:
+err = au_br_mod(sb, &opt->mod,
+au_ftest_opts(opts->flags, REMOUNT),
+&do_refresh);
+if (!err) {
+err = 1;
+if (do_refresh)
+au_fset_opts(opts->flags, REFRESH);
+
+break;
+
+return err;
+
+}
+
+static int au_opt_xino(struct super_block *sb, struct au_opt *opt,
+struct au_opt_xino **opt_xino,
+struct au_opts *opts)
+{
+int err;
+aufs_bindex_t bbot, bindex;
+struct dentry *root, *parent, *h_root;
+
+err = 0;
+switch (opt->type) {
+case Opt_xino:
+err = au_xino_set(sb, &opt->xino,
+!!au_ftest_opts(opts->flags, REMOUNT));
if (unlikely(err))
    break;
+
*opt_xino = &opt->xino;
+au_xino_brid_set(sb, -1);
+
/* safe d_parent access */
+parent = opt->xino.file->f_path.dentry->d_parent;
+root = sb->s_root;
+bbot = au_sbbot(sb);
+for (bindex = 0; bindex <= bbot; bindex++) {
    +h_root = au_h_dptr(root, bindex);
    +if (h_root == parent) {
        +au_xino_brid_set(sb, au_sbr_id(sb, bindex));
        +break;
        +}
    +}
+break;
+
+case Opt_noxino:
    +au_xino_clr(sb);
    +au_xino_brid_set(sb, -1);
    +*opt_xino = (void *)-1;
    +break;
    +}
+
+return err;
+
if (unlikely(!au_br_writable(au_sbr_perm(sb, 0))))
    pr_warn("first branch should be rw\n");
if (unlikely(au_opt_test(sbinfo->si_mntflags, SHWH)))
    pr_warn_once("shwh should be used with ro\n");
}
+
if (au_opt_test((sbinfo->si_mntflags | pending), UDBA_HNOTIFY)
    && !au_opt_test(sbinfo->si_mntflags, XINO))
    pr_warn_once("udba=*notify requires xino\n");
+
if (au_opt_test(sbinfo->si_mntflags, DIRPERM1))
    pr_warn_once("dirperm1 breaks the protection"
        " by the permission bits on the lower branch\n");
+
err = 0;
fhsm = 0;
root = sb->s_root;
dir = d_inode(root);
+do_plink = !!au_opt_test(sbinfo->si_mntflags, PLINK);
+can_no_dreval = !!au_opt_test((sbinfo->si_mntflags | pending),
    UDBA_NONE);
+bbot = au_sbbot(sb);
+for (bindex = 0; !err && & bindex <= bbot; bindex++) {
    +skip = 0;
    +h_dir = au_h_iptr(dir, bindex);
    +br = au_sbr(sb, bindex);
    +
    +if ((br->br_perm & AuBrAttr_ICEX)
        && !h_dir->i_op->listxattr)
        br->br_perm &= ~AuBrAttr_ICEX;
    +#if 0
    +if ((br->br_perm & AuBrAttr_ICEX_SEC)
        && (au_br_sb(br)->s_flags & SB_NOSEC))
        br->br_perm &= ~AuBrAttr_ICEX_SEC;
    +#endif
    +
    +do_free = 0;
    +wbr = br->br_wbr;
    +if (wbr)
        +wbr_wh_read_lock(wbr);
    +
    +if (!au_br_writable(br->br_perm)) [
        +do_free = !!wbr;
        +skip = !wbr
        +]
    +} else if (!au_br_wh_linkable(br->br_perm)) {
/* skip = (!br->br_whbase && !br->br_orph); */
+skip = (!wbr || !wbr->wbr_whbase);
+if (skip && wbr) {
+if (do_plink)
+skip = !!wbr->wbr_plink;
+else
+skip = !wbr->wbr_plink;
+}
+} else {
+/* skip = (br->br_whbase && br->br_ohph); */
+skip = (wbr && wbr->wbr_whbase);
+if (skip) {
+if (do_plink)
+skip = !!wbr->wbr_plink;
+else
+skip = !wbr->wbr_plink;
+}
+}
+if (wbr)
+wbr_wh_read_unlock(wbr);
+
+if (can_no_dreval) {
+dentry = br->br_path.dentry;
+spin_lock(&dentry->d_lock);
+if (dentry->d_flags &
+ (DCACHE_OP_REVALIDATE | DCACHE_OP_WEAK_REVALIDATE))
+can_no_dreval = 0;
+spin_unlock(&dentry->d_lock);
+}
+
+if (au_br_fhsm(br->br_perm)) {
+fhsm++;
+AuDebugOn(!br->br_fhsm);
+}
+
+if (skip)
+continue;
+
+hdir = au_hi(dir, bindex);
+au_hn_inode_lock_nested(hdir, AuSc_I_PARENT);
+if (wbr)
+wbr_wh_write_lock(wbr);
+err = au_wh_init(br, sb);
+if (wbr)
+wbr_wh_write_unlock(wbr);
+au_hn_inode_unlock(hdir);
+
+if (!err &&& do_free) {
+kfree(wbr);
+br->br_wbr = NULL;
+}
+
+if (can_no_dreval)
+au_fset_si(sbinf, NO_DREVAL);
+else
+au_fclr_si(sbinf, NO_DREVAL);
+
+if (fhsm >= 2) {
+au_fset_si(sbinf, FHSM);
+for (bindx = bbot; bindx >= 0; bindx--) {
+br = au_sbr(sb, bindx);
+if (au_br_fhsm(br->br_perm)) {
+au_fhsm_set_bottom(sb, bindx);
+break;
+}
+}
+}
+}
+}
+} else {
+au_fclr_si(sbinf, FHSM);
+au_fhsm_set_bottom(sb, -1);
+
+return err;
+}
+
+int au_opts_mount(struct super_block *sb, struct au_opts *opts)
+{
+int err;
+unsigned int tmp;
+aufs_bindex_t bindex, bbot;
+struct au_opt *opt;
+struct au_opt_xino *opt_xino, xino;
+struct au_sbinfo *sbinf;
+struct au_branch *br;
+struct inode *dir;
+
+SiMustWriteLock(sb);
+
+err = 0;
+opt_xino = NULL;
+opt = opts->opt;
+while (err >= 0 && opt->type != Opt_tail)
+err = au_opt_simple(sb, opt++, opts);
+if (err > 0)
+err = 0;
+else if (unlikely(err < 0))
+goto out;
+
+/* disable xino and udba temporary */
+sbinfo = au_sbi(sb);
+tmp = sbinfo->si_mntflags;
+au_opt_clr(sbinfo->si_mntflags, XINO);
+au_opt_set_udba(sbinfo->si_mntflags, UDBA_REVAL);
+
+opt = opts->opt;
+while (err >= 0 && opt->type != Opt_tail)
+err = au_opt_br(sb, opt++, opts);
+if (err > 0)
+err = 0;
+else if (unlikely(err < 0))
+goto out;
+
+bbot = au_sbbot(sb);
+if (unlikely(bbot < 0)) {
+err = -EINVAL;
+pr_err("no branches\n");
+goto out;
+}
+
+if (au_opt_test(tmp, XINO))
+au_opt_set(sbinfo->si_mntflags, XINO);
+opt = opts->opt;
+while (err && opt->type != Opt_tail)
+err = au_opt_xino(sb, opt++, &opt_xino, opts);
+if (unlikely(err))
+goto out;
+
+err = au_opts_verify(sb, sb->s_flags, tmp);
+if (unlikely(err))
+goto out;
+
+/* restore xino */
+if (au_opt_test(tmp, XINO) && !opt_xino) {
+xino.file = au_xino_def(sb);
+err = PTR_ERR(xino.file);
+if (IS_ERR(xino.file))
+goto out;
+
+err = au_xino_set(sb, &xino, /*remount*/0);
+fput(xino.file);
+if (unlikely(err))
+goto out;
+}
/* restore udba */
+tmp &= AuOptMask_UDBA;
+sbinfo->si_mntflags &= ~AuOptMask_UDBA;
+sbinfo->si_mntflags |= tmp;
+bbot = au_sbbot(sb);
+for (bindex = 0; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+err = au_hnotify_reset_br(tmp, br, br->br_perm);
+if (unlikely(err))
+AuIOErr("hnotify failed on br %d, %d, ignored\n",
+bindex, err);
+/* go on even if err */
+}
+if (au_opt_test(tmp, UDBA_HNOTIFY)) {
+dir = d_inode(sb->s_root);
+au_hi_Reset(dir, au_hi_flags(dir, /*isdir*/1) & ~AuHi_XINO);
+
+out:
+return err;
+}

int au_opts_remount(struct super_block *sb, struct au_opts *opts)
+
+int err, rerr;
+unsigned char no_dreval;
+struct inode *dir;
+struct au_opt_xino *opt_xino;
+struct au_opt *opt;
+struct au_sbinfo *sbinfo;
+
+SiMustWriteLock(sb);
+
+err = au_dr_opt_flush(sb);
+if (unlikely(err))
+goto out;
+tau_fset_opts(opts->flags, DR_FLUSHED);
+
+dir = d_inode(sb->s_root);
+sbinfo = au_sbi(sb);
+opt_xino = NULL;
+opt = opts->opt;
+while (err >= 0 && opt->type != Opt_tail) {
+err = au_opt_simple(sb, opt, opts);
+if (!err)
+err = au_opt_br(sb, opt, opts);
+if (!err)
+err = au_opt_xino(sb, opt, &opt_xino, opts);
```c
+opt++;
+
+if (err > 0)
+err = 0;
+AuTraceErr(err);
+/* go on even err */
+
+no_dreval = !!au_ftest_si(sbinfo, NO_DREVAL);
+rerr = au_opts_verify(sb, opts->sb_flags, /*pending*/0);
+if (unlikely(rerr && !err))
+err = rerr;
+
+if (no_dreval != !!au_ftest_si(sbinfo, NO_DREVAL))
+au_fset_opts(opts->flags, REFRESH_IDOP);
+
+if (au_ftest_opts(opts->flags, TRUNC_XIB)) {
+rerr = au_xib_trunc(sb);
+if (unlikely(rerr && !err))
+err = rerr;
+
+/* will be handled by the caller */
+
+if (!au_ftest_opts(opts->flags, REFRESH)
+    && (opts->given_udba
+         || au_opt_test(sbinfo->si_mntflags, XINO)
+         || au_ftest_opts(opts->flags, REFRESH_IDOP)
+         ))
+au_fset_opts(opts->flags, REFRESH);
+
+AuDbg("status 0x%x\n", opts->flags);
+
+out:
+return err;
+
+/* --------------------------------------------------------------- */
+
+unsigned int au_opt_udba(struct super_block *sb)
+{
+return au_mntflags(sb) & AuOptMask_UDBA;
+}

--- linux-4.15.0.orig/fs/aufs/opts.h
+++ linux-4.15.0/fs/aufs/opts.h
@@ -0,0 +1,224 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
```
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+#ifndef __AUFS_OPTS_H__
+#define __AUFS_OPTS_H__
+
+#ifdef __KERNEL__
+
+#include <linux/path.h>
+
+struct file;
+
+/* ---------------------------------------------------------------------- */
+
+/* mount flags */
+#define AuOpt_XINO		1		/* external inode number bitmap
+ and translation table */
+#define AuOpt_TRUNC_XINO	(1 << 1)	/* truncate xino files */
+#define AuOpt_UDBA_NONE		(1 << 2)	/* users direct branch access */
+#define AuOpt_UDBA_REVAL(1 << 3)
+#define AuOpt_UDBA_HNOTIFY(1 << 4)
+#define AuOpt_SHWH(1 << 5)/* show whiteout */
+#define AuOpt_PLINK(1 << 6)/* pseudo-link */
+#define AuOpt_DIRPERM1(1 << 7)/* ignore the lower dir's perm
+ bits */
+#define AuOpt_ALWAYS_DIRROPQ(1 << 9)/* policy to creating diropq */
+#define AuOpt_SUM(1 << 10)/* summation for statfs(2) */
+#define AuOpt_SUM_W(1 << 11)/* unimplemented */
+#define AuOpt_WARN_PERM(1 << 12)/* warn when add-branch */
+#define AuOpt_VERBOSE(1 << 13)/* busy inode when del-branch */
+#define AuOpt_DIO(1 << 14)/* direct io */
+#define AuOpt_DIRREN(1 << 15)/* directory rename */
+
+#ifndef CONFIG_AUFS_HNOTIFY

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+\#define AuOpt_Def(AuOpt_XINO \n    + | AuOpt_UDBA_REVAL \n    + | AuOpt_PLINK \n    + /* | AuOpt_DIRPERM1 */ \n    + | AuOpt_WARN_PERM) \n+\#define AuOptMask_UDBA(AuOpt_UDBA_NONE \n    + | AuOpt_UDBA_REVAL \n    + | AuOpt_UDBA_HNOTIFY) \n+
+\#define au_opt_test(flags, name)(flags & AuOpt_##name) \n+\#define au_opt_set(flags, name) do { \n+    BUILD_BUG_ON(AuOpt_##name & AuOptMask_UDBA); \n+    ((flags) |= AuOpt_##name); \n+} while (0) \n+\#define au_opt_set_udba(flags, name) do { \n+    (flags) &= ~AuOptMask_UDBA; \n+    ((flags) |= AuOpt_##name); \n+} while (0) \n+\#define au_opt_clr(flags, name) do { \n+    ((flags) &= ~AuOpt_##name); \n+} while (0) \n+
+static inline unsigned int au_opts_plink(unsigned int mntflags) \n+{ \n+\#ifdef CONFIG_PROC_FS \n+    return mntflags; \n+\#else \n+    return mntflags & ~AuOpt_PLINK; \n+\#endif \n+} \n
/* ---------------------------------------------------------------------- */

/* policies to select one among multiple writable branches */
enum { \n    AuWbrCreate_TDP, /* top down parent */
+AuWbrCreate_RR /* round robin */
+AuWbrCreate_MFS /* most free space */
+AuWbrCreate_MFSV /* mfs with seconds */
+AuWbrCreate_MFSRR /* mfs then rr */
+AuWbrCreate_MFSRRV /* mfs then rr with seconds */
+AuWbrCreate_TDMFS /* top down regardless parent and mfs */
+AuWbrCreate_TDMFSV /* top down regardless parent and mfs */
+AuWbrCreate_PMFS /* parent and mfs */
+AuWbrCreate_PMFSV /* parent and mfs with seconds */
+AuWbrCreate_PMFSRR /* parent, mfs and round-robin */
+AuWbrCreate_PMFSRRV /* plus seconds */
+ +AuWbrCreate_Def = AuWbrCreate_TDP
+
+enum {
+AuWbrCopyup_TDP /* top down parent */
+AuWbrCopyup_BUP /* bottom up parent */
+AuWbrCopyup_BU /* bottom up */
+
+AuWbrCopyup_Def = AuWbrCopyup_TDP
+};
+
+/* ---------------------------------------------------------------------- */

+struct au_opt_add {
+aufs_bindex_t bindex;
+char*pathname;
+int perm;
+struct path pathpath;
+};
+
+struct au_opt_del {
+char*pathname;
+struct path h_path;
+};
+
+struct au_opt_mod {
+char*path;
+int perm;
+struct dentry*h_root;
+};
+
+struct au_opt_xino {
+char*path;
+struct file*file;
+};
+

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+struct au_opt_xino_itrunc {
  +aufs_bindex_t bindex;
+};
+
+struct au_opt_wbr_create {
  +int wbr_create;
  +int mfs_second;
  +unsigned long long mfsrr_watermark;
+};
+
+struct au_opt {
  +int type;
  +union {
    +struct au_opt_xino xino;
    +struct au_opt_xino_itrunc xino_itrunc;
    +struct au_opt_add add;
    +struct au_opt_del del;
    +struct au_opt_mod mod;
    +int dirwh;
    +intrdcache;
    +unsigned intrdblk;
    +unsigned intrdhash;
    +intudba;
    +struct au_opt_wbr_create wbr_create;
    +int wbr_copyup;
    +unsigned intfhsm_second;
  +};
+};
+
+/* opts flags */
+[
+define AuOpts_REMOUNT1
+define AuOpts_REFRESH(1 << 1)
+define AuOpts_TRUNC_XIB(1 << 2)
+define AuOpts_REFRESH_DYAOP(1 << 3)
+define AuOpts_REFRESH_IDOP (1 << 4)
+define AuOpts_DR_FLUSHED(1 << 5)
+define au_ftest_opts(flags, name)((flags) & AuOpts_##name)
+define au_fset_opts(flags, name)\n+do { (flags) |= AuOpts_##name; } while (0)
+define au_fclr_opts(flags, name)\n+do { (flags) &= ~AuOpts_##name; } while (0)
+}
+ifndef CONFIG_AUFS_DIRREN
+undef AuOpts_DR_FLUSHED
+endif
+
+struct au_opts {
+ struct au_opt *opt;
+ int max_opt;
+
+ unsigned int given_udba;
+ unsigned int flags;
+ unsigned long sb_flags;
+
+ /* ---------------------------------------------------------------------- */
+ /* opts.c */
+ #define au_optstr_br_perm(au_br_perm_str_t *str, int perm);
+ #define au_optstr_udba(int udba);
+ #define au_optstr_wbr_copyup(int wbr_copyup);
+ #define au_optstr_wbr_create(int wbr_create);
+
+ #define au_opts_free(struct au_opts *opts);
+ struct super_block;
+ int au_opts_parse(struct super_block *sb, char *str, struct au_opts *opts);
+ int au_opts_verify(struct super_block *sb, unsigned long sb_flags,
+                     int pending);
+ int au_opts_mount(struct super_block *sb, struct au_opts *opts);
+ int au_opts_remount(struct super_block *sb, struct au_opts *opts);
+
+ unsigned int au_opt_udba(struct super_block *sb);
+
+ #endif /* __KERNEL__ */
+ #endif /* __AUFS_OPTS_H__ */

--- linux-4.15.0.orig/fs/aufs/plink.c
+++ linux-4.15.0/fs/aufs/plink.c
@@ -0,0 +1,515 @@
+ /*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
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+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
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+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
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+ * GNU General Public License for more details.
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+/*
+ * pseudo-link
+ */
+
+#include "aufs.h"
+
+/*
+ * the pseudo-link maintenance mode.
+ * during a user process maintains the pseudo-links,
+ * prohibit adding a new plink and branch manipulation.
+ *
+ * Flags
+ * NOPLM:
+ * For entry functions which will handle plink, and i_mutex is already held
+ * in VFS.
+ * They cannot wait and should return an error at once.
+ * Callers has to check the error.
+ * NOPLMW:
+ * For entry functions which will handle plink, but i_mutex is not held
+ * in VFS.
+ * They can wait the plink maintenance mode to finish.
+ *
+ * They behave like F_SETLK and F_SETLKW.
+ * If the caller never handle plink, then both flags are unnecessary.
+ */
+
+int au_plink_maint(struct super_block *sb, int flags)
+{
+    int err;
+    pid_t pid, ppid;
+    struct task_struct *parent, *prev;
+    struct au_sbinfo *sbi;
+    
+    SiMustAnyLock(sb);
+    
+    err = 0;
+    if (!au_opt_test(au_mntflags(sb), PLINK))
+        goto out;
+        
+    sbi = au_sbi(sb);
+    pid = sbi->si_plink_maint_pid;
+    if (pid || pid == current->pid)
+        goto out;
+        
+    /* todo: it highly depends upon /sbin/mount.aufs */
+    prev = NULL;
+    parent = current;
+    ppid = 0;
+    out:
+rcu_read_lock();
+while (1) {
+parent = rcu_dereference(parent->real_parent);
+if (parent == prev)
+break;
+ppid = task_pid_vnr(parent);
+if (pid == ppid) {
+rcu_read_unlock();
+goto out;
+}
+prev = parent;
+}
+rcu_read_unlock();
+
+if (au_ftest_lock(flags, NOPLMW)) {
+/* if there is no i_mutex lock in VFS, we don't need to wait */
+/* AuDebugOn(!lockdep_depth(current)); */
+while (sbi->si_plink_maint_pid) {
+si_read_unlock(sb);
+/* gave up wake_up_bits */
+wait_event(sbi->si_plink_wq, !sbi->si_plink_maint_pid);
+
+if (au_ftest_lock(flags, FLUSH))
+au_nwt_flush(&sbi->si_nowait);
+si_noflush_read_lock(sb);
+}
+} else if (au_ftest_lock(flags, NOPLM)) {
+AuDbg("ppid %d, pid %d
", ppid, pid);
+err = -EAGAIN;
+}
+
+out:
+return err;
+
+void au_plink_maint_leave(struct au_sbinfo *sbiinfo)
+{
+spin_lock(&sbiinfo->si_plink_maint_lock);
+sbiinfo->si_plink_maint_pid = 0;
+spin_unlock(&sbiinfo->si_plink_maint_lock);
+wake_up_all(&sbiinfo->si_plink_wq);
+}
+
+int au_plink_maint_enter(struct super_block *sb)
+{
+int err;
+struct au_sbinfo *sbiinfo;
+}
err = 0;
sbinfo = au_sbi(sb);
+/* make sure i am the only one in this fs */
+si_write_lock(sb, AuLock_FLUSH);
+if (au_opt_test(au_mntflags(sb), PLINK)) {
    spin_lock(&sbinfo->si_plink_maint_lock);
    if (!sbinfo->si_plink_maint_pid)
        sbinfo->si_plink_maint_pid = current->pid;
    else
        err = -EBUSY;
    spin_unlock(&sbinfo->si_plink_maint_lock);
} +
+si_write_unlock(sb);
+
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+#ifdef CONFIG_AUFS_DEBUG
+void au_plink_list(struct super_block *sb)
+{
+    int i;
+    struct au_sbinfo *sbinfo;
+    struct hlist_bl_head *hbl;
+    struct hlist_bl_node *pos;
+    struct au_icntnr *icntnr;
+
+    SiMustAnyLock(sb);
+
+    sbinfo = au_sbi(sb);
+    AuDebugOn(!au_opt_test(au_mntflags(sb), PLINK));
+    AuDebugOn(au_plink_maint(sb, AuLock_NOPLM));
+    +
+    for (i = 0; i < AuPlink_NHASH; i++) {
+        hbl = sbinfo->si_plink + i;
+        hlist_bl_lock(hbl);
+        hlist_bl_for_each_entry(icntnr, pos, hbl, plink)
+            AuDbg("%lu\n", icntnr->vfs_inode.i_ino);
+        hlist_bl_unlock(hbl);
+    }
+    +
+#endif
+
+/* is the inode pseudo-linked? */
+int au_plink_test(struct inode *inode)
+{
+    int found, i;
```c
+struct au_sbinfo *sinfo;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *pos;
+struct au_icntnr *icntnr;
+
+sinfo = au_sbi(inode->i_sb);
+AuRwMustAnyLock(&sinfo->si_rwsem);
+AuDebugOn(!au_opt_test(au_mntflags(inode->i sb), PLINK));
+AuDebugOn(au_plink_maint(inode->i sb, AuLock_NOPLM));
+
+found = 0;
+i = au_plink_hash(inode->i_ino);
+hbl = sinfo->si_plink + i;
+hlist_bl_lock(hbl);
+hlist_bl_for_each_entry(icntnr, pos, hbl, plink)
+if (&icntnr->vfs_inode == inode) {
++found = 1;
++break;
+}
+hlist_bl_unlock(hbl);
+return found;
+
+/* ----------------------------------------------- */
+
+/*
+ * generate a name for plink.
+ * the file will be stored under AUFS_WH_PLINKDIR.
+ */
+/* 20 is max digits length of ulong 64 */
+#define PLINK_NAME_LEN ((20 + 1) * 2)
+
+static int plink_name(char *name, int len, struct inode *inode,
+                      aufs_bindex_t bindex)
+{
++rlen;
+struct inode *h_inode;
+
+h_inode = au_h_iptr(inode, bindex);
++rlen = snprintf(name, len, "%lu.%lu", inode->i_ino, h_inode->i_ino);
+return rlen;
+}
+
+struct au_do_plink lkup_args {
++struct dentry **errp;
++struct qstr *tgtname;
++struct path *h _ppath;
+};
```
static struct dentry *au_do_plink_lkup(struct qstr *tgtname, struct path *h_ppath)
{
    struct dentry *h_dentry;
    struct inode *h_inode;

    h_inode = d_inode(h_ppath->dentry);
    vfsub_inode_lock_shared_nested(h_inode, AuLsc_I_CHILD2);
    h_dentry = vfsub_lkup_one(tgtname, h_ppath);
    inode_unlock_shared(h_inode);

    return h_dentry;
}

static void au_call_do_plink_lkup(void *args)
{
    struct au_do_plink_lkup_args *a = args;
    *a->errp = au_do_plink_lkup(a->tgtname, a->h_ppath);
}

/* lookup the plink-ed @inode under the branch at @bindex */
struct dentry *au_plink_lkup(struct inode *inode, aufs_bindex_t bindex)
{
    struct dentry *h_dentry;
    struct au_branch *br;
    struct path h_ppath;
    int wkq_err;
    char a[PLINK_NAME_LEN];
    struct qstr tgtname = QSTR_INIT(a, 0);

    AuDebugOn(au_plink_maint(inode->i_sb, AuLock_NOPLM));

    br = au_sbr(inode->i_sb, bindex);
    h_ppath.dentry = br->br_wbr->wbr_plink;
    h_ppath.mnt = au_br_mnt(br);
    tgtname.len = plink_name(a, sizeof(a), inode, bindex);

    if (!uid_eq(current_fsuid(), GLOBAL_ROOT_UID)) {
        struct au_do_plink_lkup_args args = {
            .errp= &h_dentry,
            .tgtname= &tgtname,
            .h_ppath= &h_ppath
        };

        wkq_err = au_wkq_wait(au_call_do_plink_lkup, &args);
        if (unlikely(wkq_err))
            h_dentry = ERR_PTR(wkq_err);
    } else {
        h_dentry = au_do_plink_lkup(inode->i_sb, bindex);
    }
    return h_dentry;
}
```c
} else
+h_dentry = au_do_plink_lkup(&tgtname, &h_ppath);
+
+return h_dentry;
+
+/* create a pseudo-link */
+static int do_whplink(struct qstr *tgt, struct path *h_ppath,
+    struct dentry *h_dentry)
+{
+    int err;
+    struct path h_path;
+    struct inode *h_dir, *delegated;
+
+h_dir = d_inode(h_ppath->dentry);
+inode_lock_nested(h_dir, AuLsc_I_CHILD2);
+h_path.mnt = h_ppath->mnt;
+again:
+h_path.dentry = vfsub_lkup_one(tgt, h_ppath);
+err = PTR_ERR(h_path.dentry);
+if (IS_ERR(h_path.dentry))
+    goto out;
+
+err = 0;
+/* wh.plink dir is not monitored */
+/* todo: is it really safe? */
+if (d_is_positive(h_path.dentry)
+     && d_inode(h_path.dentry) != d_inode(h_dentry)) {
+    delegated = NULL;
+    err = vfsub_unlink(h_dir, &h_path, &delegated, /*force*/0);
+    if (unlikely(err == -EWOULDBLOCK)) {
+        pr_warn("cannot retry for NFSv4 delegation"
+            " for an internal unlink\n");
+        iput(delegated);
+    }
+    dput(h_path.dentry);
+    h_path.dentry = NULL;
+    if (!err)
+        goto again;
+}
+if (!err)
+    goto again;
+
+if (!err && d_is_negative(h_path.dentry)) {
+    delegated = NULL;
+    err = vfsub_link(h_dentry, h_dir, &h_path, &delegated);
+    if (unlikely(err == -EWOULDBLOCK)) {
+        pr_warn("cannot retry for NFSv4 delegation"
+            " for an internal link\n");
+        iput(delegated);
+    }
```
{ } 
dput(h_path.dentry);
+
+out:
+inode_unlock(h_dir);
+return err;
+
+struct do_whplink_args {
+int *errp;
+struct qstr *tgt;
+struct path *h_ppath;
+struct dentry *h_dentry;
+};
+
+static void call_do_whplink(void *args)
+{
+struct do_whplink_args *a = args;
+*a->errp = do_whplink(a->tgt, a->h_ppath, a->h_dentry);
+}
+
+static int whplink(struct dentry *h_dentry, struct inode *inode,
+aufs_bindex_t bindex)
+{
+int err, wkq_err;
+struct au_branch *br;
+struct au_wbr *wbr;
+struct path h_ppath;
+char a[PLINK_NAME_LEN];
+struct qstr tgtname = QSTR_INIT(a, 0);
+
+br = au_sbr(inode->i_sb, bindex);
+wbr = br->br_wbr;
+h_ppath.dentry = wbr->wbr_plink;
+h_ppath.mnt = au_br_mnt(br);
+tgtname.len = plink_name(a, sizeof(a), inode, bindex);
+
+/* always superio. */
+if (!uid_eq(current_fsuid(), GLOBAL_ROOT_UID)) {
+struct do_whplink_args args = {
+.errp= &err,
+.tgt= &tgtname,
+.h_ppath= &h_ppath,
+.h_dentry= h_dentry
+};
+wkq_err = au_wkq_wait(call_do_whplink, &args);
+if (unlikely(wkq_err))
+err = wkq_err;
+
+ /* ... */
+} else {
+ /* ... */
+}
Open Source Used In 5GaaS Edge AC-4  30384

```c
+} else
+err = do_whplink(&gtname, &h_ppath, h_dentry);
+
+return err;
+
+/*
+ * create a new pseudo-link for @h_dentry on @bindx.
+ * the linked inode is held in aufs @inode.
+ */
+void au_plink_append(struct inode *inode, aufs_bindex_t bindx,
+ struct dentry *h_dentry)
+{
+struct super_block *sb;
+struct au_sbinfo *sbinfo;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *pos;
+struct au_icntnr *icntnr;
+int found, err, cnt, i;
+
+sb = inode->i_sb;
+sbinfo = au_sbi(sb);
+AuDebugOn(!au_opt_test(au_mntflags(sb), PLINK));
+AuDebugOn(au_plink_maint(sb, AuLock_NOPLM));
+
+found = au_plink_test(inode);
+if (found)
+return;
+
i = au_plink_hash(inode->i_ino);
+hbl = sbinfo->si_plink + i;
+au_igrab(inode);
+
+hlist_bl_lock(hbl);
+hlist_bl_for_each_entry(icntnr, pos, hbl, plink) {
  if (&icntnr->vfs_inode == inode) {
    found = 1;
    break;
  }
}
+if (!found) {
+icntnr = container_of(inode, struct au_icntnr, vfs_inode);
+hlist_bl_add_head(&icntnr->plink, hbl);
+
+hlist_bl_unlock(hbl);
+if (!found) {
+cnt = au_hbl_count(hbl);
+#define msg "unexpectedly unblanced or too many pseudo-links"
```
+if (cnt > AUFS_PLINK_WARN)
+AuWarn1(msg ", %d
", cnt);
+#undef msg
+err = whplink(h_dentry, inode, bindex);
+if (unlikely(err)) {
+pr_warn("err %d, damaged pseudo link\n", err);
+au_hbl_del(&icntnr->plink, hbl);
+iput(&icntnr->vfs_inode);
+}
+} else
+iput(&icntnr->vfs_inode);
+
+/* free all plinks */
+void au_plink_put(struct super_block *sb, int verbose)
+{
+int i, warned;
+struct au_sbinfo *sbinf;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *pos, *tmp;
+struct au_icntnr *icntnr;
+
+SiMustWriteLock(sb);
+
+sbinf = au_sbi(sb);
+AuDebugOn(!au_opt_test(au_mntflags(sb), PLINK));
+AuDebugOn(au_plink_maint(sb, AuLock_NOPLM));
+
+/* no spin_lock since sbinfo is write-locked */
+warned = 0;
+for (i = 0; i < AuPlink_NHASH; i++) {
+hbl = sbinfo->si_plink + i;
+if (!warned && verbose && !hlist_bl_empty(hbl)) {
+pr_warn("pseudo-link is not flushed");
+warned = 1;
+}
+hlist_bl_for_each_entry_safe(icntnr, pos, tmp, hbl, plink)
+iput(&icntnr->vfs_inode);
+INIT_HLIST_BL_HEAD(hbl);
+}
+}
+
+void au_plink_clean(struct super_block *sb, int verbose)
+{
+struct dentry *root;
+
+root = sb->s_root;
aufs_write_lock(root);
+if (au_opt_test(au_mntflags(sb), PLINK))
+au_plink_put(sb, verbose);
+aufs_write_unlock(root);
+
+static int au_plink_do_half_refresh(struct inode *inode, aufs_bindex_t br_id)
+{
+int do_put;
+aufs_bindex_t btop, bbot, bindex;
+
+do_put = 0;
+btop = au_ibtop(inode);
+bbot = au_ibbot(inode);
+if (btop >= 0) {
+for (bindex = btop; bindex <= bbot; bindex++) {
+if (!au_h_iptr(inode, bindex)
+    || au_ii_br_id(inode, bindex) != br_id)
+    continue;
+au_set_h_iptr(inode, bindex, NULL, 0);
+do_put = 1;
+break;
+}
+if (do_put)
+for (bindex = btop; bindex <= bbot; bindex++)
+if (au_h_iptr(inode, bindex)) {
+do_put = 0;
+break;
+}
+} else
+do_put = 1;
+
+return do_put;
+
+/* free the plinks on a branch specified by @br_id */
+void au_plink_half_refresh(struct super_block *sb, aufs_bindex_t br_id)
+{
+struct au_sbinfo *sbinfo;
+struct hlist_bl_head *hbl;
+struct hlist_bl_node *pos, *tmp;
+struct au_icntnr *icntnr;
+struct inode *inode;
+int i, do_put;
+
+SiMustWriteLock(sb);
+
+sbinfo = au_sbi(sb);
+AuDebugOn(!au_opt_test(au_mntflags(sb), PLINK));
+AuDebugOn(au_plink_maint(sb, AuLock_NOPLM));
+
+/* no bit_lock since sbinfo is write-locked */
+for (i = 0; i < AuPlink_NHASH; i++) {
  hbl = sbinfo->si_plink + i;
  hlist_bl_for_each_entry_safe(icntnr, pos, tmp, hbl, plink) {
    inode = au_igrab(&icntnr->vfs_inode);
    ii_write_lock_child(inode);
    do_put = au_plink_do_half_refresh(inode, br_id);
    if (do_put) {
      hlist_bl_del(&icntnr->plink);
      iput(inode);
    }
    ii_write_unlock(inode);
    iput(inode);
  }
}

--- linux-4.15.0.orig/fs/aufs/poll.c
+++ linux-4.15.0/fs/aufs/poll.c
@@ -0,0 +1,52 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
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+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * poll operation
+ * There is only one filesystem which implements ->poll operation, currently.
+ */
+
+#include "aufs.h"
+
+unsigned int aufs_poll(struct file *file, poll_table *wait)
+{
+  unsigned int mask;
int err;
struct file *h_file;
struct super_block *sb;

/* We should pretend an error happened. */
mask = POLLERR /* | POLLIN | POLLOUT */;
sb = file->f_path.dentry->d_sb;
si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLMW);

h_file = au_read_pre(file, /*keep_fi*/0, /*lsc*/0);
err = PTR_ERR(h_file);
if (IS_ERR(h_file))
go_to out;

/* it is not an error if h_file has no operation */
mask = DEFAULT_POLLMASK;
if (h_file->f_op->poll)
    mask = h_file->f_op->poll(h_file, wait);
    fput(h_file); /* instead of au_read_post() */
out:
    si_read_unlock(sb);
    AuTraceErr((int)mask);
    return mask;
}
--- linux-4.15.0.orig/fs/aufs/posix_acl.c
+++ linux-4.15.0/fs/aufs/posix_acl.c
@@ -0,0 +1,102 @@
+/*
+ * Copyright (C) 2014-2017 Junjiro R. Okajima
+ */
+/* This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
+/* This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ */
+/* You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+*/
+*/
+* posix acl operations
+ */
#include <linux/fs.h>
#include "aufs.h"

struct posix_acl *aufs_get_acl(struct inode *inode, int type)
{
    struct posix_acl *acl;
    int err;
    aufs_bindex_t bindex;
    struct inode *h_inode;
    struct super_block *sb;

    acl = NULL;
    sb = inode->i_sb;
    si_read_lock(sb, AuLock_FLUSH);
    ii_read_lock_child(inode);
    if (!(sb->s_flags & SB_POSIXACL))
        goto out;

    bindex = au_ibtop(inode);
    h_inode = au_h_iptr(inode, bindex);
    if (unlikely(!h_inode
                || ((h_inode->i_mode & S_IFMT)
                    != (inode->i_mode & S_IFMT)))) {
        err = au_busy_or_stale();
        acl = ERR_PTR(err);
        goto out;
    }

    /* always topmost only */
    acl = get_acl(h_inode, type);
    if (!IS_ERR_OR_NULL(acl))
        set_cached_acl(inode, type, acl);

out:
    ii_read_unlock(inode);
    si_read_unlock(sb);
    AuTraceErrPtr(acl);
    return acl;
}

int aufs_set_acl(struct inode *inode, struct posix_acl *acl, int type)
{
    int err;
    ssize_t ssz;
    struct dentry *dentry;
    struct au_sxattr arg = {
        /* Always topmost only */
        acl = get_acl(h_inode, type);
        if (!IS_ERR_OR_NULL(acl))
            set_cached_acl(inode, type, acl);
        out:
        ii_read_unlock(inode);
        si_read_unlock(sb);
        AuTraceErrPtr(acl);
        return acl;
    }

    /* Always topmost only */
    acl = get_acl(h_inode, type);
    if (!IS_ERR_OR_NULL(acl))
        set_cached_acl(inode, type, acl);
    out:
    ii_read_unlock(inode);
    si_read_unlock(sb);
    AuTraceErrPtr(acl);
    return acl;
}
+.type = AU_ACL_SET,
+.u.acl_set = {
+.acl= acl,
+.type= type
+},
+
+IMustLock(inode);
+
+if (inode->i_ino == AUFS_ROOT_INO)
+dentry = dget(inode->i_sb->s_root);
+else {
+dentry = d_find_alias(inode);
+if (!dentry)
+dentry = d_find_any_alias(inode);
+if (!dentry) {
+pr_warn("cannot handle this inode, ",
+"please report to aufs-users ML\n");
+err = -ENOENT;
+goto out;
+}
+}
+
+ssz = au_sxattr(dentry, inode, &arg);
+dput(dentry);
+err = ssz;
+if (ssz >= 0) {
+err = 0;
+set_cached_acl(inode, type, acl);
+}
+
+out:
+return err;
+
--- linux-4.15.0.orig/fs/aufs/procfs.c
+++ linux-4.15.0/fs/aufs/procfs.c
@@ -0,0 +1,170 @@
+/*
+ * Copyright (C) 2010-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
/* GNU General Public License for more details.
 */

/*
 * procfs interfaces
 */

#include <linux/proc_fs.h>
#include "aufs.h"

static int au_procfs_plm_release(struct inode *inode, struct file *file)
{
    struct au_sbinfo *sbinfo;

    sbinfo = file->private_data;
    if (sbinfo) {
        au_plink_maint_leave(sbinfo);
        kobject_put(&sbinfo->si_kobj);
    }

    return 0;
}

static void au_procfs_plm_write_clean(struct file *file)
{
    struct au_sbinfo *sbinfo;

    sbinfo = file->private_data;
    if (sbinfo)
        au_plink_clean(sbinfo->si_sb, /*verbose*/0);
}

static int au_procfs_plm_write_si(struct file *file, unsigned long id)
{
    int err;
    struct super_block *sb;
    struct au_sbinfo *sbinfo;
    struct hlist_bl_node *pos;

    err = -EBUSY;
    if (unlikely(file->private_data))
        goto out;

    sb = NULL;

out:
    */+ don't use au_sbilist_lock() here */
+hlist_bl_lock(&au_sbilist);
+hlist_bl_for_each_entry(sbinfo, pos, &au_sbilist, si_list)
+if (id == sysaufs_si_id(sbinfo)) {
+kobject_get(&sbinfo->si_kobj);
+sb = sbinfo->si_sb;
+break;
+
+hlist_bl_unlock(&au_sbilist);
+
+err = -EINVAL;
+if (unlikely(!sb))
+goto out;
+
+err = au_plink_maint_enter(sb);
+if (!err)
+/* keep kobject_get() */
+file->private_data = sbinfo;
+else
+kobject_put(&sbinfo->si_kobj);
+out:
+return err;
+
+/*
 * Accept a valid "si=xxxx" only.
 * Once it is accepted successfully, accept "clean" too.
 */
+static ssize_t au_procfs_plm_write(struct file *file, const char __user *ubuf,
+ size_t count, loff_t *ppos)
+
+ssize_t err;
+unsigned long id;
+/* last newline is allowed */
+char buf[3 + sizeof(unsigned long) * 2 + 1];
+
+err = -EACCES;
+if (unlikely(!capable(CAP_SYS_ADMIN)))
+goto out;
+
+err = -EINVAL;
+if (unlikely(count > sizeof(buf)))
+goto out;
+
+err = copy_from_user(buf, ubuf, count);
+if (unlikely(err)) {
+err = -EFAULT;
+goto out;
+}
buf[count] = 0;
+
+err = -EINVAL;
+if (!strcmp("clean", buf)) {
+au_procs_plm_write_clean(file);
+goto out_success;
+} else if (unlikely(strncmp("si=", buf, 3)))
+goto out;
+
+err = kstrtoul(buf + 3, 16, &id);
+if (unlikely(err))
+goto out;
+
+err = au_procs_plm_write_si(file, id);
+if (unlikely(err))
+goto out;
+
+out_success:
+err = count; /* success */
+out:
+return err;
+
+static const struct file_operations au_procs_plm_fop = {
+write= au_procs_plm_write,
+release= au_procs_plm_release,
+owner= THIS_MODULE
+};
+
+/* ---------------------------------------------------------------------- */
+
+static struct proc_dir_entry *au_procs_dir;
+
+void au_procs_fin(void)
+{
+remove_proc_entry(AUFS_PLINK_MAINT_NAME, au_procs_dir);
+remove_proc_entry(AUFS_PLINK_MAINT_DIR, NULL);
+}
+
+int __init au_procs_init(void)
+{
+int err;
+struct proc_dir_entry *entry;
+
+err = -ENOMEM;
+au_procs_dir = proc_mkdir(AUFS_PLINK_MAINT_DIR, NULL);
+if (unlikely(!au_procs_dir))
+goto out;
entry = proc_create(AUFS_PLINK_MAINT_NAME, S_IFREG | S_IWUSR,
    au_procfs_dir, &au_procfs_plm_fop);
if (unlikely(!entry))
goto out_dir;
+
+err = 0;
+goto out; /* success */
+
+out_dir:
+remove_proc_entry(AUFS_PLINK_MAINT_DIR, NULL);
+out:
+return err;
+
--- linux-4.15.0.orig/fs/aufs/rdu.c
+++ linux-4.15.0/fs/aufs/rdu.c
@@ -0,0 +1,381 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
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+ * This program is distributed in the hope that it will be useful,
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+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+ *
+ * readdir in userspace.
+ */
+ */
+ include <linux/compat.h>
+ include <linux/fs_stack.h>
+ include <linux/security.h>
+ include "aufs.h"
+ */
+ bits for struct aufs_rdu.flags */
+ defineAuRdu_CALLED1
+ defineAuRdu_CONT(1 << 1)
+ defineAuRdu_FULL(1 << 2)
```c
#define au_ftest_rdu(flags, name)((flags) & AuRdu_##name)
#define au_fset_rdu(flags, name) \do{ (flags) |= AuRdu_##name; } while (0)
#define au_fclr_rdu(flags, name) \do{ (flags) &= ~AuRdu_##name; } while (0)

+struct au_rdu_arg {
+struct dir_context ctx;
+struct aufs_rdu *rdu;
+union au_rdu_ent_ul ent;
+unsigned long end;
+
+struct super_block *sb;
+int err;
+};
+
+static int au_rdu_fill(struct dir_context *ctx, const char *name, int nlen,
+                       loff_t offset, u64 h_ino, unsigned int d_type)
+{
+  int err, len;
+  struct au_rdu_arg *arg = container_of(ctx, struct au_rdu_arg, ctx);
+  struct aufs_rdu *rdu = arg->rdu;
+  struct au_rdu_ent ent;
+
+  err = 0;
+  arg->err = 0;
+  au_fset_rdu(rdu->cookie.flags, CALLED);
+  len = au_rdu_len(nlen);
+  if (arg->ent.ul + len < arg->end) {
+    ent.ino = h_ino;
+    ent.bindex = rdu->cookie.bindex;
+    ent.type = d_type;
+    ent.nlen = nlen;
+    if (unlikely(nlen > AUFS_MAX_NAMELEN))
+      ent.type = DT_UNKNOWN;
+    /* unnecessary to support mmap_sem since this is a dir */
+    err = -EFAULT;
+    if (copy_to_user(arg->ent.e, &ent, sizeof(ent)))
+      goto out;
+    if (copy_to_user(arg->ent.e->name, name, nlen))
+      goto out;
+    /* the terminating NULL */
+    if (__put_user(0, arg->ent.e->name + nlen))
+      goto out;
+    err = 0;
+    AuDbg("%p, %.*s\n", arg->ent.p, nlen, name); /*
+    arg->ent.ul += len;
```

+rdu->rent++;  
+} else {  
+err = -EFAULT;  
+au_fset_rdu(rdu->cookie.flags, FULL);  
+rdu->full = 1;  
+rdu->tail = arg->ent;  
+}  
+  
+out:  
+/* AuTraceErr(err); */  
+return err;  
+}  
+  
+static int au_rdu_do(struct file *h_file, struct au_rdu_arg *arg)  
+{  
+int err;  
+loff_t offset;  
+struct au_rdu_cookie *cookie = &arg->rdu->cookie;  
+  
+/* we don't have to care (FMODE_32BITHASH | FMODE_64BITHASH) for ext4 */  
+offset = vfsub_llseek(h_file, cookie->h_pos, SEEK_SET);  
+err = offset;  
+if (unlikely(offset != cookie->h_pos))  
+goto out;  
+  
++err = 0;  
+do {  
+arg->err = 0;  
+au_fclr_rdu(cookie->flags, CALLED);  
+/* smp_mb(); */  
+err = vfsub_iterate_dir(h_file, &arg->ctx);  
+if (err >= 0)  
+err = arg->err;  
+} while (!err  
+ && au_ftest_rdu(cookie->flags, CALLED)  
+ && !au_ftest_rdu(cookie->flags, FULL));  
+cookie->h_pos = h_file->f_pos;  
+  
+out:  
+AuTraceErr(err);  
+return err;  
+}  
+  
+static int au_rdu(struct file *file, struct aufs_rdu *rdu)  
+{  
+int err;  
+aufs_bindex_t bbot;  
+struct au_rdu_arg arg = {  

+ctx = {
+    .actor = au_rdu_fill
+};
+}
+struct dentry *dentry;
+struct inode *inode;
+struct file *h_file;
+struct au_rdu_cookie *cookie = &rdu->cookie;
+
+err = !access_ok(VERIFY_WRITE, rdu->ent.e, rdu->sz);
+if (unlikely(err)) {
+    err = -EFAULT;
+    AuTraceErr(err);
+    goto out;
+}
+rdu->rent = 0;
+rdu->tail = rdu->ent;
+rdu->full = 0;
+arg.rdu = rdu;
+arg.ent = rdu->ent;
+arg.end = arg.ent.ul;
+arg.end += rdu->sz;
+
+err = -ENOTDIR;
+if (unlikely(!file->f_op->iterate && !file->f_op->iterate_shared))
+    goto out;
+
+err = security_file_permission(file, MAY_READ);
+AuTraceErr(err);
+if (unlikely(err))
+    goto out;
+
+dentry = file->f_path.dentry;
+inode = d_inode(dentry);
+inode_lock_shared(inode);
+
+arg.sb = inode->i_sb;
+err = si_read_lock(arg.sb, AuLock_FLUSH | AuLock_NOPLM);
+if (unlikely(err))
+    goto out_mtx;
+err = au_alive_dir(dentry);
+if (unlikely(err))
+    goto out_si;
+/* todo: reval? */
+fi_read_lock(file);
+
+err = -EAGAIN;
+if (unlikely(au_ftest_rdu(cookie->flags, CONT)
&
+     && cookie->generation != au_figen(file))
+goto out_unlock;
+}
+err = 0;
+if (!rdu->blk) {
+rdu->blk = au_sbi(arg.sb)->si_rdblk;
+if (!rdu->blk)
+rdu->blk = au_dir_size(file, /*dentry*/NULL);
+
+bbot = au_fbttop(file);
+if (cookie->bindex < bbot)
+cookie->bindex = bbot;
+bbot = au_fbbot_dir(file);
+/* AuDbg("b%d, b%d\n", cookie->bindex, bbot); */
+for (; !err && cookie->bindex <= bbot;
+     cookie->bindex++, cookie->h_pos = 0) {
+h_file = au_hf_dir(file, cookie->bindex);
+if (!h_file)
+continue;
+
+tau_fclr_rdu(cookie->flags, FULL);
+err = au_rdu_do(h_file, &arg);
+AuTraceErr(err);
+if (unlikely(au_ftest_rdu(cookie->flags, FULL) || err))
+break;
+}
+AuDbg("rent %llu\n", rdu->rent);
+
+if (!err && !au_ftest_rdu(cookie->flags, CONT)) {
+rdu->shwh = !!au_opt_test(au_sbi(arg.sb)->si_mntflags, SHWH);
+au_fset_rdu(cookie->flags, CONT);
+cookie->generation = au_figen(file);
+}
+
+ii_read_lock_child(inode);
+fsstack_copy_attr_atime(inode, au_h_iptr(inode, au_ibtop(inode)));
+ii_read_unlock(inode);
+
+out_unlock:
+fi_read_unlock(file);
+out_si:
+si_read_unlock(arg.sb);
+out_mtx:
+inode_unlock_shared(inode);
+out:
+AuTraceErr(err);
+return err;
+}
+static int au_rdu_ino(struct file *file, struct aufs_rdu *rdu)
+{
+int err;
+ino_t ino;
+unsigned long long nent;
+union au_rdu_ent_ul *u;
+struct au_rdu_ent ent;
+struct super_block *sb;
+
+err = 0;
+nent = rdu->nent;
+u = &rdu->ent;
+sb = file->f_path.dentry->d_sb;
+si_read_lock(sb, AuLock_FLUSH);
+while (nent-- > 0) {
+/* unnecessary to support mmap_sem since this is a dir */
+err = copy_from_user(&ent, u->e, sizeof(ent));
+if (!err)
+err = !access_ok(VERIFY_WRITE, &u->e->ino, sizeof(ino));
+if (unlikely(err)) {
+AuTraceErr(err);
+break;
+}
+
+/* AuDbg("b%d, i%llu\n", ent.bindex, ent.ino); */
+if (!ent.wh)
+err = au_ino(sb, ent.bindex, ent.ino, ent.type, &ino);
+else
+err = au_wh_ino(sb, ent.bindex, ent.ino, ent.type, 
+&ino);
+if (unlikely(err)) {
+AuTraceErr(err);
+break;
+}
+
+err = __put_user(ino, &u->e->ino);
+if (unlikely(err)) {
+err = -EFAULT;
+AuTraceErr(err);
+break;
+}
+u->ul += au_rdu_len(ent.nlen);
+
+si_read_unlock(sb);
+
+return err;
 static int au_rdu_verify(struct aufs_rdu *rdu)
{
    /* ---------------------------------------------------------------------- */
    AuDbg("rdu{%llu, %p, %u | %u | %llu, %u, %u | %llu, b%d, 0x%x, g%u}\n",
          rdu->sz, rdu->ent.e, rdu->verify[AufsCtlRduV_SZ],
          rdu->blk,
          rdu->rent, rdu->shwh, rdu->full,
          rdu->cookie.h_pos, rdu->cookie.bindx, rdu->cookie.flags,
          rdu->cookie.generation);
    AuDbg("%u:%u\n",
           rdu->verify[AufsCtlRduV_SZ], sizeof(*rdu));
    return -EINVAL;
}

long au_rdu_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
{
    long err, e;
    struct aufs_rdu rdu;
    void __user *p = (void __user *)arg;
    err = copy_from_user(&rdu, p, sizeof(rdu));
    if (unlikely(err)) {
        err = -EFAULT;
        AuTraceErr(err);
        goto out;
    }
    err = au_rdu_verify(&rdu);
    if (unlikely(err))
        goto out;
    switch (cmd) {
    case AUFS_CTL_RDU:
        err = au_rdu(file, &rdu);
        if (unlikely(err))
            break;
        e = copy_to_user(p, &rdu, sizeof(rdu));
        if (unlikely(e)) {
            err = -EFAULT;
            AuTraceErr(err);
            goto out;
        }
        /* ---------------------------------------------------------------------- */
        AuDbg("%llu\n",
              rdu->verify[AufsCtlRduV_SZ], (unsigned int)sizeof(*rdu));
        /* ---------------------------------------------------------------------- */
        return -EINVAL;
    }
+} +break;
+case AUFS_CTL_RDU_INO:
+err = au_rdu_ino(file, &rdu);
+break;
+
+default:
+/* err = -ENOTTY; */
+err = -EINVAL;
+}
+
+out:
+AuTraceErr(err);
+return err;
+
+#ifdef CONFIG_COMPAT
+long au_rdu_compat_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
+{
+long err, e;
+struct aufs_rdu rdu;
+void __user *p = compat_ptr(arg);
+
+/* todo: get_user()? */
+err = copy_from_user(&rdu, p, sizeof(rdu));
+if (unlikely(err)) {
+  err = -EFAULT;
+  AuTraceErr(err);
+  goto out;
+}
+rdu.ent.e = compat_ptr(rdu.ent.ul);
+err = au_rdu_verify(&rdu);
+if (unlikely(err))
+  goto out;
+
+switch (cmd) {
+case AUFS_CTL_RDU:
+err = au_rdu(file, &rdu);
+if (unlikely(err))
+  break;
+
+rdu.ent.ul = ptr_to_compat(rdu.ent.e);
+rdu.tail.ul = ptr_to_compat(rdu.tail.e);
+e = copy_to_user(p, &rdu, sizeof(rdu));
+if (unlikely(e)) {
+  err = -EFAULT;
+  AuTraceErr(err);
+}


break;
+case AUFS_CTL_RDU_INO:
+err = au_rdu_ino(file, &rdu);
+break;
+
+default:
+/* err = -ENOTTY; */
+err = -EINVAL;
+
+out:
+AuTraceErr(err);
+return err;
+}
+#endif
--- linux-4.15.0.orig/fs/aufs/rwsem.h
+++ linux-4.15.0/fs/aufs/rwsem.h
@@ -0,0 +1,72 @@
+%/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ *
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+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * simple read-write semaphore wrappers
+ */
+
+#ifndef __AUFS_RWSEM_H__
+#define __AUFS_RWSEM_H__
+
+#ifdef __KERNEL__
+
+#include "debug.h"
+
+/* in the future, the name 'au_rwsem' will be totally gone */
+#define au_rwsemrw_semaphore
/* to debug easier, do not make them inlined functions */
#define AuRwMustNoWaiters(rw)AuDebugOn(rwsem_is_contended(rw))
/* rwsem_is_locked() is unusable */
#define AuRwMustReadLock(rw)AuDebugOn(!lockdep_recursing(current) \ 
  && debug_locks \ 
  && !lockdep_is_held_type(rw, 1))
#define AuRwMustWriteLock(rw)AuDebugOn(!lockdep_recursing(current) \ 
  && debug_locks \ 
  && !lockdep_is_held_type(rw, 0))
#define AuRwMustAnyLock(rw)AuDebugOn(!lockdep_recursing(current) \ 
  && debug_locks \ 
  && !lockdep_is_held(rw))
#define AuRwDestroy(rw)AuDebugOn(!lockdep_recursing(current) \ 
  && debug_locks \ 
  && lockdep_is_held(rw))

#define au_rw_init(rw) init_rwsem(rw)
#define au_rw_init_wlock(rw) do { 
  au_rw_init(rw);
  down_write(rw);
} while (0)
#define au_rw_init_wlock_nested(rw, lsc) do { 
  au_rw_init(rw);
  down_write_nested(rw, lsc);
} while (0)
#define au_rw_read_lock(rw) down_read(rw)
#define au_rw_read_lock_nested(rw, lsc) down_read_nested(rw, lsc)
#define au_rw_read_unlock(rw) up_read(rw)
#define au_rw_dgrade_lock(rw) downgrade_write(rw)
#define au_rw_write_lock(rw) down_write(rw)
#define au_rw_write_lock_nested(rw, lsc) down_write_nested(rw, lsc)
#define au_rw_write_unlock(rw) up_write(rw)
/* why is not _nested version defined? */
#define au_rw_read_trylock(rw) down_read_trylock(rw)
#define au_rw_write_trylock(rw) down_write_trylock(rw)

@endef /* __KERNEL__ */
@endef /* __AUSF_RWSEM_H__ */
--- linux-4.15.0.orig/fs/aufs/sbinfo.c
+++ linux-4.15.0/fs/aufs/sbinfo.c
@@ -0,0 +1,304 @@
+/* * Copyright (C) 2005-2017 Junjiro R. Okajima */
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#include "aufs.h"

/* superblock private data */

#include <aufs.h>

/* they are necessary regardless sysfs is disabled. */

void au_si_free(struct kobject *kobj)
{
    int i;
    struct au_sbinfo *sbinfo;
    char *locked __maybe_unused; /* debug only */
    
    sbinfo = container_of(kobj, struct au_sbinfo, si_kobj);
    
    for (i = 0; i < AuPlink_NHASH; i++)
        AuDebugOn(!hlist_bl_empty(sbinfo->si_plink + i));
    AuDebugOn(atomic_read(&sbinfo->si_nowait.nw_len));
    
    AuDebugOn(percpu_counter_sum(&sbinfo->si_ninodes));
    percpu_counter_destroy(&sbinfo->si_ninodes);
    AuDebugOn(percpu_counter_sum(&sbinfo->si_nfiles));
    percpu_counter_destroy(&sbinfo->si_nfiles);
    
    //rw_write_lock(&sbinfo->si_rwlock);
    au_rwlock_unlock(&sbinfo->si_rwlock);
    kfree(sbinfo->si_branch);
    mutex_destroy(&sbinfo->si_xib_mtx);
    AuRwDestroy(&sbinfo->si_rwlock);
    
    kfree(sbinfo);
int au_si_alloc(struct super_block *sb)
{
    int err, i;
    struct au_sbinfo *sbinfo;

    err = -ENOMEM;
    sbinfo = kzalloc(sizeof(*sbinfo), GFP_NOFS);
    if (unlikely(!sbinfo))
        goto out;

    /* will be reallocated separately */
    sbinfo->si_branch = kzalloc(sizeof(*sbinfo->si_branch), GFP_NOFS);
    if (unlikely(!sbinfo->si_branch))
        goto out_sbinfo;

    err = sysaufs_si_init(sbinfo);
    if (unlikely(err))
        goto out_br;

    nwt_init(&sbinfo->si_nowait);
    rw_init_wlock(&sbinfo->si_rwlock);

    percpu_counter_init(&sbinfo->si_ninodes, 0, GFP_NOFS);
    percpu_counter_init(&sbinfo->si_nfiles, 0, GFP_NOFS);

    sbinfo->si_bbot = -1;
    sbinfo->si_last_br_id = AUFS_BRANCH_MAX / 2;

    sbinfo->si_wbr_copyup = AuWbrCopyup_Def;
    sbinfo->si_wbr_create = AuWbrCreate_Def;
    sbinfo->si_wbr_copyup_ops = au_wbr_copyup_ops + sbinfo->si_wbr_copyup;
    sbinfo->si_wbr_create_ops = au_wbr_create_ops + sbinfo->si_wbr_create;

    fhsm_init(sbinfo);

    sbinfo->si_mntflags = au_opts_plink(AuOpt_Def);

    sbinfo->si_xino_jiffy = jiffies;
    sbinfo->si_xino_expire
    += msecs_to_jiffies(AUFS_XINO_DEF_SEC * MSEC_PER_SEC);
    mutex_init(&sbinfo->si_xib_mtx);
    sbinfo->si_xib_brid = -1;
    /* leave si_xib_last_pindex and si_xib_next_bit */
    INIT_HLIST_BL_HEAD(&sbinfo->si_aopen);

sbinfo->si_rdcache = msecs_to_jiffies(AUFS_RDCACHE_DEF * MSEC_PER_SEC);
+sbinfo->si_rdblk = AUFS_RDBLK_DEF;
+sbinfo->si_rdhsh = AUFS_RDHASH_DEF;
+sbinfo->si_dirwh = AUFS_DIRWH_DEF;
+
+for (i = 0; i < AuPlink_NHASH; i++)
+INIT_HLIST_BL_HEAD(sbinfo->si_plink + i);
+init_waitqueue_head(&sbinfo->si_plink_wq);
+spin_lock_init(&sbinfo->si_plink_maint_lock);
+
+INIT_HLIST_BL_HEAD(&sbinfo->si_files);
+
+/* with getattr by default */
+sbinfo->si_iop_array = aufs_iop;
+
+/* leave other members for sysaufs and si_mnt. */
+sbinfo->si_sb = sb;
+sb->s_fs_info = sbinfo;
+si_pid_set(sb);
+return 0; /* success */
+
+out_br:
+kfree(sbinfo->si_branch);
+out_sbinfo:
+kfree(sbinfo);
+out:
+return err;
+
+int au_sbr_realloc(struct au_sbinfo *sbinfo, int nbr, int may_shrink)
+{
+int err, sz;
+struct au_branch **brp;
+
+AuRwMustWriteLock(&sbinfo->si_rwlock);
+
+err = -ENOMEM;
+sz = sizeof(*brp) * (sbinfo->si_bbot + 1);
+if (unlikely(!sz))
+sz = sizeof(*brp);
+brp = au_kzrealloc(sbinfo->si_branch, sz, sizeof(*brp) * nbr, GFP_NOFS,
+ may_shrink);
+if (brp) {
+sbinfo->si_branch = brp;
+err = 0;
+}
+
+return err;
unsigned int au_sigen_inc(struct super_block *sb) {
    unsigned int gen;
    struct inode *inode;
    SiMustWriteLock(sb);
    gen = ++au_sbi(sb)->si_generation;
    Au_update_digen(sb->s_root);
    inode = d_inode(sb->s_root);
    Au_update_iigen(inode, /*half*/0);
    inode->i_version++;
    return gen;
}

aufs_bindex_t au_new_br_id(struct super_block *sb) {
    aufs_bindex_t br_id;
    int i;
    struct au_sbinfo *sbinfo;
    SiMustWriteLock(sb);
    sbinfo = au_sbi(sb);
    for (i = 0; i <= AUFS_BRANCH_MAX; i++) {
        br_id = ++sbinfo->si_last_br_id;
        AuDebugOn(br_id < 0);
        if (br_id && au_br_index(sb, br_id) < 0)
            return br_id;
    }
    return -1;
}

/* it is ok that new 'nwt' tasks are appended while we are sleeping */
int si_read_lock(struct super_block *sb, int flags) {
    int err;
    err = 0;
    if (au_ftest_lock(flags, FLUSH))
        Au_nwt_flush(&au_sbi(sb)->si_nowait);
    return err;
}
+si_noflush_read_lock(sb);
+err = au_plink_maint(sb, flags);
+if (unlikely(err))
+si_read_unlock(sb);
+
++return err;
+
+int si_write_lock(struct super_block *sb, int flags)
+{
+int err;
+
+if (au_ftest_lock(flags, FLUSH))
+au_nwt_flush(&au_sbi(sb)->si_nowait);
+
+si_noflush_write_lock(sb);
+err = au_plink_maint(sb, flags);
+if (unlikely(err))
+si_write_unlock(sb);
+
++return err;
+
+ /* dentry and super_block lock. call at entry point */
+int aufs_read_lock(struct dentry *dentry, int flags)
+{
+int err;
+struct super_block *sb;
+
+sb = dentry->d_sb;
+err = si_read_lock(sb, flags);
+if (unlikely(err))
goto out;
+
+if (au_ftest_lock(flags, DW))
+di_write_lock_child(dentry);
+else
+di_read_lock_child(dentry, flags);
+
+if (au_ftest_lock(flags, GEN)) {
+err = au_digen_test(dentry, au_sigen(sb));
+if (!err)
+AuDebugOn(!err && au_dbrange_test(dentry));
+else if (!err)
+err = au_dbrange_test(dentry);
+if (unlikely(err))
+aufs_read_unlock(dentry, flags);
+}
+}
+
+out:
+return err;
+}
+
+void aufs_read_unlock(struct dentry *dentry, int flags)
+{
+if (au_ftest_lock(flags, DW))
+di_write_unlock(dentry);
+else
+di_read_unlock(dentry, flags);
+si_read_unlock(dentry->d_sb);
+}
+
+void aufs_read_lock(struct dentry *dentry)
+{
+si_write_lock(dentry->d_sb, AuLock_FLUSH | AuLock_NOPLMW);
+di_write_lock_child(dentry);
+}
+
+void aufs_write_lock(struct dentry *dentry)
+{
+si_write_lock(dentry->d_sb, AuLock_FLUSH | AuLock_NOPLMW);
+di_write_lock_child(dentry);
+}
+
+void aufs_write_unlock(struct dentry *dentry)
+{
+di_write_unlock(dentry);
+si_write_unlock(dentry->d_sb);
+}
+
+int aufs_read_and_write_lock2(struct dentry *d1, struct dentry *d2, int flags)
+{
+int err;
+unsigned int sigen;
+struct super_block *sb;
+
+sb = d1->d_sb;
+err = si_read_lock(sb, flags);
+if (unlikely(err))
+goto out;
+
+di_write_lock2_child(d1, d2, au_ftest_lock(flags, DIRS));
+
+if (au_ftest_lock(flags, GEN)) {
+sigen = au_sigen(sb);
+err = au_digen_test(d1, sigen);
+AuDebugOn(!err && au_dbrange_test(d1));
+if (!err) {
+err = au_digen_test(d2, sigen);
+AuDebugOn(!err && au_dbrange_test(d2));
+}
if (unlikely(err))
aufs_read_and_write_unlock2(d1, d2);
}
+
+out:
+return err;
+
+void aufs_read_and_write_unlock2(struct dentry *d1, struct dentry *d2)
+{
+di_write_unlock2(d1, d2);
+si_read_unlock(d1->d_sb);
+}
--- linux-4.15.0.orig/fs/aufs/super.c
+++ linux-4.15.0/fs/aufs/super.c
@@ -0,0 +1,1049 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
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+ * it under the terms of the GNU General Public License as published by
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+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * mount and super_block operations
+ */
+
+#include <linux/mm.h>
+#include <linux/seq_file.h>
+#include <linux/statfs.h>
+#include <linux/vmalloc.h>
+#include "aufs.h"
+
+/*
+ * super_operations
+ */
+static struct inode *aufs_alloc_inode(struct super_block *sb __maybe_unused)
+{
+struct au_icntnr *c;
+
c = au_cache_alloc_icntnr();
+if (c) {
+au_icntnr_init(c);
+c->vfs_inode.i_version = 1; /* sigen(sb); */
+c->iinfo.ii_hinode = NULL;
+return &c->vfs_inode;
+}
+return NULL;
+
+static voidaufs_destroy_inode_cb(struct rcu_head *head)
+{
+struct inode *inode = container_of(head, struct inode, i_rcu);
+
+au_cache_free_icntnr(container_of(inode, struct au_icntnr, vfs_inode));
+}
+
+static voidaufs_destroy_inode(struct inode *inode)
+{
+if (!au_is_bad_inode(inode))
+au_iinfo_fin(inode);
+call_rcu(&inode->i_rcu, aufs_destroy_inode_cb);
+}
+
+struct inode *au_iget_locked(struct super_block *sb, ino_t ino)
+{
+struct inode *inode;
+int err;
+
+inode = iget_locked(sb, ino);
+if (unlikely(!inode)) {
+inode = ERR_PTR(-ENOMEM);
+goto out;
+}
+if (!(inode->i_state & I_NEW))
+goto out;
+
+err = au_xigen_new(inode);
+if (!err)
+err = au_iinfo_init(inode);
+if (!err)
+inode->i_version++;
+else {
+iget_failed(inode);
+inode = ERR_PTR(err);
+}
+out:
+/* never return NULL */
+AuDebugOn(inode);
+AuTraceErrPtr(inode);
+return inode;
+
+/* lock free root dinfo */
+static int au_show_brs(struct seq_file *seq, struct super_block *sb)
+{
+int err;
+aufs_bindex_t bindex, bbot;
+struct path path;
+struct au_hdentry *hdp;
+struct au_branch *br;
+au_br_perm_str_t perm;
+
+err = 0;
+bbot = au_sbbot(sb);
+bindex = 0;
+hdp = au_hdentry(au_di(sb->s_root), bindex);
+for (; !err && bindex <= bbot; bindex++, hdp++) {
+br = au_sbr(sb, bindex);
+path.mnt = au_br_mnt(br);
+path.dentry = hdp->hd_dentry;
+err = au_seq_path(seq, &path);
+}
+}
+au_gen_fmt(char *fmt, int len __maybe_unused, const char *pat,
+const char *append)
+{
+char *p;
+
+p = fmt;
+while (*pat != '\0')
+*p++ = *pat++:
+*p++ = *pat++;
+strcpy(p, append);
+AuDebugOn(strlen(fmt) >= len);
+
+static void au_show_wbr_create(struct seq_file *m, int v,
+     struct au_sbinfo *sbinfo)
+{
+const char *pat;
+char fmt[32];
+struct au_wbr_mfs *mfs;
+
+AuRwMustAnyLock(&sbinfo->si_rwsem);
+
+seq_puts(m, ",create=\"\"");
+pat = au_optstr_wbr_create(v);
+mfs = &sbinfo->si_wbr_mfs;
+switch (v) {
+case AuWbrCreate_TDP:
+case AuWbrCreate_RR:
+case AuWbrCreate_MFS:
+case AuWbrCreate_PMFS:
+seq_puts(m, pat);
+break;
+case AuWbrCreate_MFSRR:
+case AuWbrCreate_TDMFS:
+case AuWbrCreate_PMFSR:
+au_gen_fmt(fmt, sizeof(fmt), pat, "%llu");
+seq_printf(m, fmt, mfs->mfsrr_watermark);
+break;
+case AuWbrCreate_MFSV:
+case AuWbrCreate_PMFSV:
+au_gen_fmt(fmt, sizeof(fmt), pat, "%lu");
+seq_printf(m, fmt,
+     jiffies_to_msecs(mfs->mfs_expire)
+     / MSEC_PER_SEC);
+break;
+case AuWbrCreate_MFSRRV:
+case AuWbrCreate_TDMFSV:
+case AuWbrCreate_PMFSRRV:
+au_gen_fmt(fmt, sizeof(fmt), pat, "%llu:%lu");
+seq_printf(m, fmt, mfs->mfsrr_watermark,
+     jiffies_to_msecs(mfs->mfs_expire) / MSEC_PER_SEC);
+break;
+default:
+BUG();
+}
+}
+static int au_show_xino(struct seq_file *seq, struct super_block *sb)
+{
+  #ifdef CONFIG_SYSFS
+  return 0;
+  #else
+  int err;
+  const int len = sizeof(AUFS_XINO_FNAME) - 1;
+  aufs_bindex_t bindex, brid;
+  struct qstr *name;
+  struct file *f;
+  struct dentry *d, *h_root;
+
+  AuRwMustAnyLock(&sbinfo->si_rwsem);
+
+  err = 0;
+  f = au_sbi(sb)->si_xib;
+  if (!f)
+    goto out;
+
+  /* stop printing the default xino path on the first writable branch */
+  h_root = NULL;
+  brid = au_xino_brid(sb);
+  if (brid >= 0) {
+    bindex = au_br_index(sb, brid);
+    h_root = au_hdentry(au_di(sb->s_root), bindex)->hd_dentry;
+  }
+  d = f->f_path.dentry;
+  name = &d->d_name;
+
+  /* safe ->d_parent because the file is unlinked */
+  if (d->d_parent == h_root
+      && name->len == len
+      && !memcmp(name->name, AUFS_XINO_FNAME, len))
+    goto out;
+
+  seq_puts(seq, ",xino=");
+  err = au_xino_path(seq, f);
+
+  out:
+  return err;
+  #endif
+}
+
+/* seq_file will re-call me in case of too long string */
+static int aufs_show_options(struct seq_file *m, struct dentry *dentry)
+{
+  int err;
+  unsigned int mnt_flags, v;

+struct super_block *sb;
+struct au_sbiho *sbinfo;
+
+#define AuBool(name, str) do { \
+  v = au_opt_test(mnt_flags, name); \
+  if (v != au_opt_test(AuOpt_Def, name)) \
+    seq_printf(m, ",%s" #str, v ? "" : "no"); \
+  } while (0)
+
+#define AuStr(name, str) do { \
+  v = mnt_flags & AuOptMask_##name; \
+  if (v != (AuOpt_Def & AuOptMask_##name)) \
+    seq_printf(m, "," #str "=%s", au_optstr_##str(v)); \
+  } while (0)
+
+#define AuUInt(name, str, val) do { \
+  if (val != AUFS_##name##_DEF) \
+    seq_printf(m, "," #str "=%u", val); \
+  } while (0)
+
  sb = dentry->d_sb;
  if (sb->s_flags & SB_POSIXACL)
    seq_puts(m, ",acl");
+
  /* lock free root dinfo */
  si_noflush_read_lock(sb);
  sbinfo = au_sbi(sb);
  seq_printf(m, ",si=%lx", sysaufs_si_id(sbinfo));
+
  mnt_flags = au_mntflags(sb);
  if (au_opt_test(mnt_flags, XINO)) {
    err = au_show_xino(m, sb);
    if (unlikely(err))
      goto out;
  } else
    seq_puts(m, ",noxino");
+
  AuBool(TRUNC_XINO, trunc_xino);
  AuStr(UDBA, udba);
  AuBool(SHWH, shwh);
  AuBool(PLINK, plink);
  AuBool(DIO, dio);
  AuBool(DIRPERM1, dirperm1);
+
  v = sbinfo->si_wbr_create;
  if (v != AuWbrCreate_Def)
    au_show_wbr_create(m, v, sbinfo);
v = sbinfo->si_wbr_copyup;
if (v != AuWbrCopyup_Def)
+seq_printf(m, ",cpup=%s", au_optstr_wbr_copyup(v));
+
v = au_opt_test(mnt_flags, ALWAYS_DIROPQ);
if (v != au_opt_test(AuOpt_Def, ALWAYS_DIROPQ))
+seq_printf(m, ",diropq=%c", v ? 'a' : 'w');
+
AuUInt(DIRWH, dirwh, sbinfo->si_dirwh);
+
v = jiffies_to_msecs(sbinfo->si_rdcache) / MSEC_PER_SEC;
+AuUInt(RDCACHE, rdcache, v);
+
+AuUInt(RDBLK, rdblk, sbinfo->si_rdblk);
+AuUInt(RDHASH, rdhash, sbinfo->si_rdhash);
+
+au_fhsm_show(m, sbinfo);
+
+AuBool(DIRREN, dirren);
+AuBool(SUM, sum);
+/* AuBool(SUM_W, wsum); */
+AuBool(WARN_PERM, warn_perm);
+AuBool(VERBOSE, verbose);
+
+out:
+/* be sure to print "br:" last */
+if (!sysaufs_brs) {
+seq_puts(m, ",br:");
+au_show_brs(m, sb);
+}
+si_read_unlock(sb);
+return 0;
+
+#undef AuBool
+#undef AuStr
+#undef AuUInt
+
+/* sum mode which returns the summation for statfs(2) */
+
+static u64 au_add_till_max(u64 a, u64 b)
+{
+u64 old;
+
+old = a;
+a += b;
if (old <= a)
return a;
return ULLONG_MAX;
}

static u64 au_mul_till_max(u64 a, long mul)
{
    u64 old;
    old = a;
    a *= mul;
    if (old <= a)
        return a;
    return ULLONG_MAX;
}

static int au_statfs_sum(struct super_block *sb, struct kstatfs *buf)
{
    int err;
    long bsize, factor;
    u64 blocks, bfree, bavail, files, ffree;
    aufs_bindex_t bbot, bindex, i;
    unsigned char shared;
    struct path h_path;
    struct super_block *h_sb;

    err = 0;
    bsize = LONG_MAX;
    files = 0;
    ffree = 0;
    blocks = 0;
    bfree = 0;
    bavail = 0;
    bbot = au_sbbot(sb);
    for (bindex = 0; bindex <= bbot; bindex++) {
        h_path.mnt = au_sbr_mnt(sb, bindex);
        h_sb = h_path.mnt->mnt_sb;
        shared = 0;
        for (i = 0; !shared && i < bindex; i++)
            shared = (au_sbr_sb(sb, i) == h_sb);
        if (shared)
            continue;
        /* sb->s_root for NFS is unreliable */
        h_path.dentry = h_path.mnt->mnt->mnt_root;
        err = vfs_statfs(&h_path, buf);
        if (unlikely(err))
            goto out;
+ if (bsize > buf->f_bsize) {
+ /*
+ * we will reduce bsize, so we have to expand blocks
+ * etc. to match them again
+ */
+ factor = (bsize / buf->f_bsize);
+ blocks = au_mul_till_max(blocks, factor);
+ bfree = au_mul_till_max(bfree, factor);
+ bavail = au_mul_till_max(bavail, factor);
+ bsize = buf->f_bsize;
+ }
+ + factor = (buf->f_bsize / bsize);
+ blocks = au_add_till_max(blocks, 
+ au_mul_till_max(buf->f_blocks, factor));
+ bfree = au_add_till_max(bfree, 
+ au_mul_till_max(buf->f_bfree, factor));
+ bavail = au_add_till_max(bavail, 
+ au_mul_till_max(buf->f_bavail, factor));
+ files = au_add_till_max(files, buf->f_files);
+ ffree = au_add_till_max(ffree, buf->f_ffree);
+ }
+ + buf->f_bsize = bsize;
+ buf->f_blocks = blocks;
+ buf->f_bfree = bfree;
+ buf->f_bavail = bavail;
+ buf->f_files = files;
+ buf->f_ffree = ffree;
+ buf->f_frsize = 0;
+ + out:
+ return err;
+ }
+
+ static int aufs_statfs(struct dentry *dentry, struct kstatfs *buf)
+ {
+ int err;
+ struct path h_path;
+ struct super_block *sb;
+ + /* lock free root dinfo */
+ sb = dentry->d_sb;
+ si_noflush_read_lock(sb);
+ if (!au_opt_test(au_mntflags(sb), SUM)) {
+ /* sb->s_root for NFS is unreliable */
+ h_path.mnt = au_sbr_mnt(sb, 0);
h_path.dentry = h_path.mnt->mnt_root;
+err = vfs_statfs(&h_path, buf);
+} else
+err = au_statfs_sum(sb, buf);
+si_read_unlock(sb);
+
+if (!err) {
+buf->f_type = AUFS_SUPER_MAGIC;
+buf->f_namelen = AUFS_MAX_NAMELEN;
+memset(&buf->f_fsid, 0, sizeof(buf->f_fsid));
+}
+/* buf->f_bsize = buf->f_blocks = buf->f_bfree = buf->f_bavail = -1; */
+
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static int aufs_sync_fs(struct super_block *sb, int wait)
+{
+int err, e;
+aufs_bindex_t bbot, bindex;
+struct au_branch *br;
+struct super_block *h_sb;
+
+err = 0;
+si_noflush_read_lock(sb);
+bbot = au_sbbot(sb);
+for (bindex = 0; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+if (!au_br_writable(br->br_perm))
+continue;
+
+h_sb = au_sbr_sb(sb, bindex);
+e = vfsub_sync_filesystem(h_sb, wait);
+if (unlikely(e && !err))
+err = e;
+/* go on even if an error happens */
+}
+si_read_unlock(sb);
+
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+/* final actions when unmounting a file system */
+static void aufs_put_super(struct super_block *sb)

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```c
+{
+struct au_sbinfo *sbinfo;
+
+sbinfo = au_sbi(sb);
+if (!sbinfo)
+return;
+
+dbgaufs_si_fin(sbinfo);
+kobject_put(&sbinfo->si_kobj);
+}
+
+/* ---------------------------------------------------------------------- */
+
+void *au_array_alloc(unsigned long long *hint, au_arraycb_t cb,
+ struct super_block *sb, void *arg)
+{
+void *array;
+unsigned long long n, sz;
+
+array = NULL;
+n = 0;
+if (!*hint)
+goto out;
+
+if (*hint > ULLONG_MAX / sizeof(array)) {
+array = ERR_PTR(-EMFILE);
+pr_err("hint %llu\n", *hint);
+goto out;
+}
+
+sz = sizeof(array) * *hint;
+array = kzalloc(sz, GFP_NOFS);
+if (unlikely(!array))
+array = vzalloc(sz);
+if (unlikely(!array)) {
+array = ERR_PTR(-ENOMEM);
+goto out;
+}
+
+array = cb(sb, array, *hint, arg);
+AuDebugOn(n > *hint);
+
+out:
+*hint = n;
+return array;
+}
+
+static unsigned long long au_iarray_cb(struct super_block *sb, void *a,
```
unsigned long long max __maybe_unused,
void *arg)
+
unsigned long long n;
+struct inode **p, *inode;
+struct list_head *head;
+
+n = 0;
+p = a;
+head = arg;
+spin_lock(&sb->s_inode_list_lock);
+list_for_each_entry(inode, head, i_sb_list) {
+if (!au_is_bad_inode(inode)
+    && au_ii(inode)->ii_btop >= 0) {
+spin_lock(&inode->i_lock);
+if (atomic_read(&inode->i_count)) {
+AuDebugOn(n > max);
+*p++ = inode;
+n++;
+AuDebugOn(n > max);
+}
+spin_unlock(&inode->i_lock);
+}
+spin_unlock(&sb->s_inode_list_lock);
+
+return n;
+
+struct inode **au_iarray_alloc(struct super_block *sb, unsigned long long *max)
+{
+max = au_ninodes(sb);
+return au_array_alloc(max, au_iarray_cb, sb, &sb->s_inodes);
+}
+
+void au_iarray_free(struct inode **a, unsigned long long max)
+{
+unsigned long long ull;
+
+for (ull = 0; ull < max; ull++)
+iput(a[ull]);
+kvfree(a);
+}
+
+/* refresh dentry and inode at remount time. */
static int au_do_refresh(struct dentry *dentry, unsigned int dir_flags, struct dentry *parent)
{
  int err;
  
  di_write_lock_child(dentry);
  di_read_lock_parent(parent, AuLock_IR);
  err = au_refresh_dentry(dentry, parent);
  if (!err && dir_flags)
    au_ln_reset(d_inode(dentry), dir_flags);
  di_read_unlock(parent, AuLock_IR);
  di_write_unlock(dentry);

  return err;
}

static int au_do_refresh_d(struct dentry *dentry, unsigned int sigen, struct au_sbinfo *sbinfo,
   const unsigned int dir_flags, unsigned int do_idop)
{
  int err;
  struct dentry *parent;

  err = 0;
  parent = dget_parent(dentry);
  if (!au_digen_test(parent, sigen) && au_digen_test(dentry, sigen)) {
    if (d_really_is_positive(dentry)) {
      if (!d_is_dir(dentry))
        err = au_do_refresh(dentry, /*dir_flags*/0, parent);
      else {
        err = au_do_refresh(dentry, dir_flags, parent);
        if (unlikely(err))
          au_fset_si(sbinfo, FAILED_REFRESH_DIR);
      }
    } else
      err = au_do_refresh(dentry, /*dir_flags*/0, parent);
    AuDbgDentry(dentry);
  }
  dput(parent);

  if (!err) {
    if (do_idop)
      au_refresh_dop(dentry, /*force_reval*/0);
  } else
    au_refresh_dop(dentry, /*force_reval*/1);
+AuTraceErr(err);
+return err;
+
+static int au_refresh_d(struct super_block *sb, unsigned int do_idop)
+{
+int err, i, j, ndentry, e;
+unsigned int sigen;
+struct au_dcsb_pages dpages;
+struct au_dpage *dpage;
+struct dentry **dentries, *d;
+struct au_sbi *sbiinfo;
+struct dentry *root = sb->s_root;
+const unsigned int dir_flags = au_hi_flags(d_inode(root), /*isdir*/1);
+
+if (do_idop)
+au_refresh_dop(root, /*force_reval*/0);
+
+err = au_dpages_init(&dpages, GFP_NOFS);
+if (unlikely(err))
+goto out;
+err = au_dcsb_pages(&dpages, root, NULL, NULL);
+if (unlikely(err))
+goto out_dpages;
+
+sigen = au_sigen(sb);
+sbiinfo = au_sbi(sb);
+for (i = 0; i < dpages.ndpage; i++) {
+dpage = dpages.dpages + i;
+dentries = dpage->dentries;
+ndentry = dpage->ndentry;
+for (j = 0; j < ndentry; j++) {
+d = dentries[j];
+e = au_do_refresh_d(d, sigen, sbiinfo, dir_flags,
+    do_idop);
+if (unlikely(e && !err))
+err = e;
+/* go on even err */
+}
+}
+
+out_dpages:
+au_dpages_free(&dpages);
+out:
+return err;
+}
+static int au_refresh_i(struct super_block *sb, unsigned int do_idop)
+{
+int err, e;
+unsigned int sigen;
+unsigned long long max, ull;
+struct inode *inode, **array;
+
+array = au_iarray_alloc(sb, &max);
+err = PTR_ERR(array);
+if (IS_ERR(array))
+goto out;
+
+err = 0;
+sigen = au_sigen(sb);
+for (ull = 0; ull < max; ull++) {
+inode = array[ull];
+if (unlikely(!inode))
+break;
+
+e = 0;
+ii_write_lock_child(inode);
+if (au_igen(inode, NULL) != sigen) {
+e = au_refresh_hinode_self(inode);
+if (unlikely(e)) {
+au_refresh_iop(inode, /*force_getattr*/1);
+pr_err("error %d, i%lu\n", e, inode->i_ino);
+if (!err)
+err = e;
+/* go on even if err */
+}
+}
+
+if (!e && do_idop)
+au_refresh_iop(inode, /*force_getattr*/0);
+ii_write_unlock(inode);
+
+au_iarray_free(array, max);
+
+out:
+return err;
+}
+
+static void au_remount_refresh(struct super_block *sb, unsigned int do_idop)
+{
+int err, e;
+unsigned int udba;
+aufs_bindex_t bindex, bbot;
+struct dentry *root;
+ struct inode *inode;
+ struct au_branch *br;
+ struct au_sbinfo *sbi;
  +
+ au_sigen_inc(sb);
+ sbi = au_sbi(sb);
+ au_fclr_si(sbi, FAILED_REFRESH_DIR);
  +
+ root = sb->s_root;
+ DiMustNoWaiters(root);
+ inode = d_inode(root);
+ LiMustNoWaiters(inode);
  +
+ udba = au_opt_udba(sb);
+ bbot = au_sbot(sb);
  +for (bindex = 0; bindex <= bbot; bindex++) {
+ br = au_sbr(sb, bindex);
+ err = au_hnotify_reset_br(udba, br, br->br_perm);
+ if (unlikely(err))
+ AuIOErr("hnotify failed on br %d, %d, ignored\n",
+ bindex, err);
+ /* go on even if err */
+ }
+ au_hn_reset(inode, au_hi_flags(inode, /*isdir*/1));
  +
  +if (do_idop) {
  + if (au_ftest_si(sbi, NO_DREVAL)) {
  + AuDebugOn(sb->s_d_op == &aufs_dop_noreval);
  + sb->s_d_op = &aufs_dop_noreval;
  + AuDebugOn(sbi->si_iop_array == aufs_iop_nogetattr);
  + sbi->si_iop_array = aufs_iop_nogetattr;
  + } else {
  + AuDebugOn(sb->s_d_op == &aufs_dop);
  + sb->s_d_op = &aufs_dop;
  + AuDebugOn(sbi->si_iop_array == aufs_iop);
  + sbi->si_iop_array = aufs_iop;
  + }
+ pr_info("reset to %pf and %pf\n",
+ sb->s_d_op, sbi->si_iop_array);
  + }
  +
  + di_write_unlock(root);
  + err = au_refresh_d(sb, do_idop);
  + e = au_refresh_i(sb, do_idop);
  + if (unlikely(e && !err))
  + err = e;
  + /* aufs_write_lock() calls ..._child() */
  + di_write_lock_child(root);
+au_cpup_attr_all(inode, /*force*/1);
+
+if (unlikely(err))
+AuIOErr("refresh failed, ignored, %d\n", err);
+
+/* stop extra interpretation of errno in mount(8), and strange error messages */
+static int cvt_err(int err)
+{
+AutraceErr(err);
+
+switch (err) {
+case -ENOENT:
+case -ENOTDIR:
+case -EEXIST:
+case -EIO:
+err = -EINVAL;
+
+}
+return err;
+
+
+static int aufs_remount_fs(struct super_block *sb, int *flags, char *data)
+{
+int err, do_dx;
+unsigned int mntflags;
+struct au_opts opts = {
+.opt = NULL
+};
+struct dentry *root;
+struct inode *inode;
+struct au_sbinfo *sbinfo;
+
+err = 0;
+root = sb->s_root;
+if (!data || !*data) {
+err = si_write_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
+if (err)
+
+err = -ENOMEM;
+opts.opt = (void *)__get_free_page(GFP_NOFS);
+if (unlikely(!opts.opt))
+goto out;
+opts.max_opt = PAGE_SIZE / sizeof(*opts.opt);
+opts.flags = AuOpts_REMOUNT;
+opts.sb_flags = *flags;
+
+/* parse it before aufs lock */
+err = au_opts_parse(sb, data, &opts);
+if (unlikely(err))
+goto out_opts;
+
+sbinfo = au_sbi(sb);
+inode = d_inode(root);
+inode_lock(inode);
+err = si_write_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
+if (unlikely(err))
+goto out_mtx;
+di_write_lock_child(root);
+
+/* au_opts_remount() may return an error */
+err = au_opts_remount(sb, &opts);
+au_opts_free(&opts);
+
+if (au_ftest_opts(opts.flags, REFRESH))
+rebuild_cache(sb, au_ftest_opts(opts.flags, REFRESH_IDOP));
+
+if (au_ftest_opts(opts.flags, REFRESH_DYAOP)) {
+mntflags = au_mntflags(sb);
+do_dx = !!au_opt_test(mntflags, DIO);
+au_dy_arefresh(do_dx);
+}
+
+fhsm_wrote_all(sb, /*force*/1); /* ?? */
+aufs_write_unlock(root);
+
+out_mtx:
+inode_unlock(inode);
+out_opts:
+free_page((unsigned long)opts.opt);
+out:
+err = cvt_err(err);
+AuTraceErr(err);
+return err;
+
+static const struct super_operations aufs_sop = {
+.alloc_inode= aufs_alloc_inode,
+.destroy_inode= aufs_destroy_inode,
+/* always deleting, no clearing */}
.drop_inode= generic_delete_inode,
+show_options= aufs_show_options,
+statfs= aufs_statfs,
+put_super= aufs_put_super,
+sync_fs= aufs_sync_fs,
+remount_fs= aufs_remount_fs,
+#ifdef CONFIG_AUFS_BDEV_LOOP
+real_loop= aufs_real_loop
+#endif
+}
+
+/* ---------------------------------------------------------------------- */
+
+static int alloc_root(struct super_block *sb)
+{
+int err;
+struct inode *inode;
+struct dentry *root;
+
+err = -ENOMEM;
+inode = au_iget_locked(sb, AUFS_ROOT_INO);
+err = PTR_ERR(inode);
+if (IS_ERR(inode))
+goto out;
+inode->i_op = aufs_iop + AuIop_DIR; /* with getattr by default */
+inode->i_fop = &aufs_dir_fop;
+inode->i_mode = S_IFDIR;
+set_nlink(inode, 2);
+unlock_new_inode(inode);
+
+root = d_make_root(inode);
+if (unlikely(!root))
+goto out;
+err = PTR_ERR(root);
+if (IS_ERR(root))
+goto out;
+
+err = au_di_init(root);
+if (!err) {
+sb->s_root = root;
+return 0; /* success */
+}
+dput(root);
+
+out:
+return err;
+}
+static int aufs_fill_super(struct super_block *sb, void *raw_data,
  int silent __maybe_unused)
+
+{  
+  int err;
+  struct au_opts opts = {
+    .opt = NULL
+  };
+  struct au_sbinfo *sinfo;
+  struct dentry *root;
+  struct inode *inode;
+  char *arg = raw_data;
+  
+  if (unlikely(!arg || !*arg)) {
+    err = -EINVAL;
+    pr_err("no arg
");
+    goto out;
+  }
+  
+  err = -ENOMEM;
+  opts.opt = (void *)__get_free_page(GFP_NOFS);
+  if (unlikely(!opts.opt))
+    goto out;
+  opts.max_opt = PAGE_SIZE / sizeof(*opts.opt);
+  opts.sb_flags = sb->s_flags;
+  
+  err = au_si_alloc(sb);
+  if (unlikely(err))
+    goto out_opts;
+  sbinfo = au_sbi(sb);
+  
+  /* all timestamps always follow the ones on the branch */
+  sb->s_flags |= SB_NOATIME | SB_NODIRATIME;
+  sb->s_op = &aufs_sop;
+  sb->s_d_op = &aufs_dop;
+  sb->s_magic = AUFS_SUPER_MAGIC;
+  sb->s_maxbytes = 0;
+  sb->s_stack_depth = 1;
+  au_export_init(sb);
+  au_xattr_init(sb);
+  
+  err = alloc_root(sb);
+  if (unlikely(err)) {
+    si_write_unlock(sb);
+    goto out_info;
+  }  
+  root = sb->s_root;
+  inode = d_inode(root);
/* actually we can parse options regardless aufs lock here. */
+ * but at remount time, parsing must be done before aufs lock.
+ * so we follow the same rule.
+ */
+ii_write_lock_parent(inode);
aufs_write_unlock(root);
+err = au_opts_parse(sb, arg, &opts);
+if (unlikely(err))
+goto out_root;
+
+/* lock vfs_inode first, then aufs. */
inode_lock(inode);
aufs_write_lock(root);
+err = au_opts_mount(sb, &opts);
au_opts_free(&opts);
+if (!err &
+& au_ftest_si(sbinfo, NO_DREVAL)) {
+sb->s_d_op = &aufs_dop_noreval;
+pr_info("%pf
", sb->s_d_op);
+au_refresh_dop(root, */force_reval*/0);
+sbinfo->si_iop_array = aufs_iop_nogetattr;
+au_refresh_iop(inode, */force_getattr*/0);
+}
aufs_write_unlock(root);
inode_unlock(inode);
+if (!err)
+goto out_opts; /* success */
+
+out_root:
dput(root);
+sb->s_root = NULL;
+out_info:
+dbgaufs_si_fin(sbinfo);
+kobject_put(&sbinfo->si_kobj);
+sb->ss_fs_info = NULL;
+out_opts:
+free_page((unsigned long)opts.opt);
+out:
+AuTraceErr(err);
+err = cvt_err(err);
+AuTraceErr(err);
+return err;
+}
+/* ---------------------------------------------------------------------- */
+
+/* static struct dentry *aufs_mount(struct file_system_type *type, int flags,
const char *dev_name __maybe_unused,
void *raw_data)
{
    struct dentry *root;
    struct super_block *sb;

    /* all timestamps always follow the ones on the branch */
    /* mnt->mnt_flags |= MNT_NOATIME | MNT_NODIRATIME; */
    root = mount_nodev(fs_type, flags, raw_data, aufs_fill_super);
    if (IS_ERR(root))
        goto out;

    sb = root->d_sb;
    si_write_lock(sb, !AuLock_FLUSH);
    sysaufs_brs_add(sb, 0);
    si_write_unlock(sb);
    t_sbilist_add(sb);

    out:
    return root;
}

static void aufs_kill_sb(struct super_block *sb)
{
    struct au_sbinfo *sbinfo;
    sbinfo = au_sbi(sb);
    if (sbinfo) {
        t_sbilist_del(sb);
        aufs_write_lock(sb->s_root);
        t_fhsm_fin(sb);
        if (sbinfo->si_wbr_create_ops->fin)
            sbinfo->si_wbr_create_ops->fin(sb);
        if (au_opt_test(sbinfo->si_mntflags, UDBA_HNOTIFY)) {
            t_opt_set_udba(sbinfo->si_mntflags, UDBA_NONE);
            t_remount_refresh(sb, /*do_idop*/0);
        }
        if (au_opt_test(sbinfo->si_mntflags, PLINK))
            t_plink_put(sb, /*verbose*/1);
        t_xino_clr(sb);
        t_dr_opt_flush(sb);
        sbinfo->si_sb = NULL;
        t_opt_set_udba(sbinfo->si_mntflags, UDBA_HNOTIFY);
    }
    t_nwt_flush(&sbinfo->si_nowait);
}

kill_anon_super(sb);
}
+struct file_system_type aufs_fs_type = { 
+ .name= AUFS_FSTYPE,  
+ /* a race between rename and others */
+ .fs_flags= FS_RENAME_DOES_D_MOVE,  
+ .mount= aufs_mount,  
+ .kill_sb= aufs_kill_sb,  
+ /* no need to __module_get() and module_put(). */
+ .owner= THIS_MODULE,  
+ };  
--- linux-4.15.0.orig/fs/aufs/super.h  
+++ linux-4.15.0/fs/aufs/super.h  
@@ -0,0 +1,626 @@
+/*  
+ * Copyright (C) 2005-2017 Junjiro R. Okajima  
+ *  
+ * This program, aufs is free software; you can redistribute it and/or modify  
+ * it under the terms of the GNU General Public License as published by  
+ * the Free Software Foundation; either version 2 of the License, or  
+ * (at your option) any later version.  
+ *  
+ * This program is distributed in the hope that it will be useful,  
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of  
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the  
+ * GNU General Public License for more details.  
+ *  
+ * You should have received a copy of the GNU General Public License  
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.  
+ */  
+ +
+ +/*  
+ * super_block operations  
+ */
+ +
+ ifndef __AUFS_SUPER_H__
+ define __AUFS_SUPER_H__
+ +
+ ifndef __KERNEL__
+ include <linux/fs.h>
+ include <linux/kobject.h>
+ include "hbl.h"
+ include "rwsem.h"
+ include "wkq.h"
+ +/* policies to select one among multiple writable branches */
+ struct au_wbr_copyup_operations {
+ int (*copyup)(struct dentry *dentry);
+ };

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+ define AuWbr_DIR /* target is a dir */
+ define AuWbr_PARENT(1 << 1) /* always require a parent */
+
+ define au_ftest_wbr(flags, name)((flags) & AuWbr_##name)
+ define au_fset_wbr(flags, name){ (flags) |= AuWbr_##name; }
+ define au_fclr_wbr(flags, name){ (flags) &= ~AuWbr_##name; }
+
+ struct au_wbr_create_operations {
+ int (*create)(struct dentry *dentry, unsigned int flags);
+ int (*init)(struct super_block *sb);
+ int (*fin)(struct super_block *sb);
+ };
+
+ struct au_wbr_mfs {
+ struct mutex mfs_lock; /* protect this structure */
+ unsigned long mfs_jiffy;
+ unsigned long mfs_expire;
+ aufs_bindex_tmfs_bindex;
+ 
+ unsigned long long mfsrr_bytes;
+ unsigned long long mfsrr_watermark;
+ };
+
+ define AuPlink_NHASH 100
+ static inline int au_plink_hash(ino_t ino)
+ `{ ino % AuPlink_NHASH; }
+
+ /* File-based Hierarchical Storage Management */
+ struct au_fhsm {
+ ifdef CONFIG_AUFS_FHSM
+ /* allow only one process who can receive the notification */
+ spinlock_t fhsm_spin;
+ pid_t fhsm_pid;
+ wait_queue_head_t fhsm_wqh;
+ atomic_t fhsm_readable;
+ 
+ /* these are protected by si_rwlock */
+ unsigned long fhsm_expire;
+ aufs_bindex_fhsm_bottom;
+ endif
+ };
+ 
+ struct au_branch;
+ struct au_sbinfo {
+ /* nowait tasks in the system-wide workqueue */
+struct au_nowait_taskssi_nowait;
+-
+/*
+ * tried sb->s_umount, but failed due to the dependency between i_mutex.
+ * rwsem for au_sbinfo is necessary.
+ */
+struct au_rwsemsi_rwlock;
+
+/* dirty approach to protect sb->sb_inodes and ->s_files (gone) from
+ * remount.
+ */
+struct percpu_countertsi_ninodes, si_nfiles;
+
+/* branch management */
+unsigned intsi_generation;
+
+/* see AuSi_flags */
+unsigned charau_si_status;
+
+aufs_bindex_tsi_bbot;
+
+/* dirty trick to keep br_id plus */
+unsigned intsi_last_br_id:
+sizeof(aufs_bindex_t) * BITS_PER_BYTE - 1;
+struct au_branch**si_branch;
+
+/* policy to select a writable branch */
+unsigned charsi_wbr_copyup;
+unsigned charsi_wbr_create;
+struct au_wbr_copyup_operations *si_wbr_copyup_ops;
+struct au_wbr_create_operations *si_wbr_create_ops;
+
+/* round robin */
+atomic_tsi_wbr_rr_next;
+
+/* most free space */
+struct au_wbr_mfssi_wbr_mfs;
+
+/* File-based Hierarchical Storage Management */
+struct au_fhsmfssi_fhsm;
+
+/* mount flags */
+/* include/asm-ia64/siginfo.h defines a macro named si_flags */
+unsigned intsi_mntflags;
+
+/* external inode number (bitmap and translation table) */
+vfs_readf_tsi_xread;
+vfs_writef_t si_xwrite;
+struct file*si_xib;
+struct mutex si_xib_mtx; /* protect xib members */
+unsigned long*si_xib_buf;
+unsigned long si_xib_last_pindex;
+unsigned long si_xib_next_bit;
+aufs_bindex_t si_xino_brid;
+unsigned long si_xino_jiffy;
+unsigned long si_xino_expire;
+/* reserved for future use */
+/* unsigned long long si_xib_limit; *//* Max xib file size */
+
+if defined CONFIG_AUFS_EXPORT
+/* i_generation */
+struct file*si_xigen;
+atomic_t si_xigen_next;
+#endif
+
+/* dirty trick to supraer atomic_open */
+struct hlist_bl_head si_aopen;
+
+/* vdir parameters */
+unsigned long si_rdcache;/* max cache time in jiffies */
+unsigned int si_rdblk;/* deblk size */
+unsigned int si_rdhash;/* hash size */
+
+/*
+ * If the number of whiteouts are larger than si_dirwh, leave all of
+ * them after au_whtmp_ren to reduce the cost of rmdir(2).
+ * future fsck.aufs or kernel thread will remove them later.
+ * Otherwise, remove all whiteouts and the dir in rmdir(2).
+ */
+unsigned int si_dirwh;
+
+/* pseudo_link list */
+struct hlist_bl_head si_plink[AuPlink_NHASH];
+wait_queue_head_t si_plink_wq;
+spinlock_t si_plink_maint_lock;
+pid_t si_plink_maint_pid;
+
+/* file list */
+struct hlist_bl_head si_files;
+
+/* with/without getattr, brother of sb->s_d_op */
+struct inode_operations *si_iop_array;
+
+/* sysfs and lifetime management.
* this is not a small structure and it may be a waste of memory in case
* of sysfs is disabled, particularly when many aufs-es are mounted.
* but using sysfs is majority.
*/
+ struct kobject si_kobj;
+ @{$ifdef CONFIG_DEBUG_FS$
+ struct dentry *si_dbgaufs;
+ struct dentry *si_dbgaufs_plink;
+ struct dentry *si_dbgaufs_xib;
+ @{$ifdef CONFIG_AUFS_EXPORT$
+ struct dentry *si_dbgaufs_xigen;
+ @{$endif$
+ @{$endif$
+ + @{$ifdef CONFIG_AUFS_SBLIST$
+ struct hlist_bl_node si_list;
+ @{$endif$
+ + /* dirty, necessary for unmounting, sysfs and sysrq */
+ struct super_block*si_sb;
+ }
+ + /* sbinfo status flags */
+ + /* set true when refresh_dirs() failed at remount time.
+ * then try refreshing dirs at access time again.
+ * if it is false, refreshing dirs at access time is unnecessary
+ */
+ #$define AuSiFAILED_REFRESH_DIR1
+ #$define AuSi_FHSM(1 << 1)/* fhsm is active now */
+ #$define AuSi_NO_DREVAL(1 << 2)/* disable all d_revalidate */
+ + #$ifndef CONFIG_AUFS_FHSM
+ #undef AuSi_FHSM
+ #$define AuSi_FHSM0
+ #$endif
+ + static inline unsigned char au_do_ftest_si(struct au_sbinfo *sbi,
+ + unsigned int flag)
+ + { AuRwMustAnyLock(&sbi->si_rwsem);
+ + return sbi->au_si_status & flag;
+ + }
+ #$define au_ftest_si(sbinfo, name) au_do_ftest_si(sbinfo, AuSi_##name)
+ #$define au_fset_si(sbinfo, name) do { AuRwMustWriteLock(&sbinfo->si_rwsem);
+ + (sbinfo)->au_si_status |= AuSi_##name;
+ + while (0)
```c
#define au_fclr_si(sbinfo, name) do { 
    AuRwMustWriteLock(&(sbinfo)->si_rwsem); 
    (sbinfo)->au_si_status &= ~AuSi_##name; 
} while (0)
+
+/* policy to select one among writable branches */
+#define AuWbrCopyup(sbinfo, ...) 
+((sbinfo)->si_wbr_copyup_ops->copyup(__VA_ARGS__))
+#define AuWbrCreate(sbinfo, ...) 
+((sbinfo)->si_wbr_create_ops->create(__VA_ARGS__))
+
+/* flags for si_read_lock()/aufs_read_lock()/di_read_lock() */
+#define AuLock_DW /* write-lock dentry */
+#define AuLock_IR (1 << 1) /* read-lock inode */
+#define AuLock_IW (1 << 2) /* write-lock inode */
+#define AuLock_FLUSH (1 << 3) /* wait for 'nowait' tasks */
+#define AuLock_DIRS (1 << 4) /* target is a pair of dirs */
+/* except RENAME_EXCHANGE */
+#define AuLock_NOPLM (1 << 5) /* return err in plm mode */
+#define AuLock_NOPLMW (1 << 6) /* wait for plm mode ends */
+#define AuLock_GEN (1 << 7) /* test digen/iigen */
+#define au_ftest_lock(flags, name)((flags) & AuLock_##name)
+#define au_fset_lock(flags, name) 
+    do { (flags) |= AuLock_##name; } while (0)
+#define au_fclr_lock(flags, name) 
+    do { (flags) &= ~AuLock_##name; } while (0)
+
+/* super.c */
extern struct file_system_type aufs_fs_type;
+struct inode *au_iget_locked(struct super_block *sb, ino_t ino);
+typedef unsigned long long (*au_arraycb_t)(struct super_block *sb, void *array,
+    unsigned long long max, void *arg);
+void *au_array_alloc(unsigned long long *hint, au_arraycb_t cb,
+    struct super_block *sb, void *arg);
+struct inode **au_iarray_alloc(struct super_block *sb, unsigned long long *max);
+void au_iarray_free(struct inode **a, unsigned long long max);
+
+/* sbinfo.c */
+void au_si_free(struct kobject *kobj);
+int au_si_alloc(struct super_block *sb);
+int au_sbr_realloc(struct au_sbinfo *sbinfo, int nbr, int may_shrink);
+
+unsigned int au_sigen_inc(struct super_block *sb);
+aufs_bindex_t au_new_br_id(struct super_block *sb);
```
int si_read_lock(struct super_block *sb, int flags);
int si_write_lock(struct super_block *sb, int flags);
int aufs_read_lock(struct dentry *dentry, int flags);
void aufs_read_unlock(struct dentry *dentry, int flags);
void aufs_write_lock(struct dentry *dentry);
void aufs_write_unlock(struct dentry *dentry);
int aufs_read_and_write_lock2(struct dentry *d1, struct dentry *d2, int flags);
void aufs_read_and_write_unlock2(struct dentry *d1, struct dentry *d2);

/* wbr_policy.c */
extern struct au_wbr_copyup_operations au_wbr_copyup_ops[];
extern struct au_wbr_create_operations au_wbr_create_ops[];
int au_cpdown_dirs(struct dentry *dentry, aufs_bindex_t bdst);
int au_wbr_nonopq(struct dentry *dentry, aufs_bindex_t bindex);
int au_wbr_do_copyup_bu(struct dentry *dentry, aufs_bindex_t btop);

/* mvdown.c */
int au_mvdown(struct dentry *dentry, struct aufs_mvdown __user *arg);

#ifdef CONFIG_AUFS_FHSM

/* fhsm.c */

static inline pid_t au_fhsm_pid(struct au_fhsm *fhsm)
{
    pid_t pid;
    
    spin_lock(&fhsm->fhsm_spin);
    pid = fhsm->fhsm_pid;
    spin_unlock(&fhsm->fhsm_spin);
    
    return pid;
}

void au_fhsm_wrote(struct super_block *sb, aufs_bindex_t bindex, int force);
void au_fhsm_wrote_all(struct super_block *sb, int force);
int au_fhsm_fd(struct super_block *sb, int oflags);
int au_fhsm_br_alloc(struct au_branch *br);
void au_fhsm_set_bottom(struct super_block *sb, aufs_bindex_t bindex);
void au_fhsm_fin(struct super_block *sb);
void au_fhsm_init(struct au_sbinfo *sbinfo);
void au_fhsm_set(struct au_sbinfo *sbinfo, unsigned int sec);
void au_fhsm_show(struct seq_file *seq, struct au_sbinfo *sbinfo);
#else
    AuStubVoid(au_fhsm_wrote, struct super_block *sb, aufs_bindex_t bindex,
              int force)
    AuStubVoid(au_fhsm_wrote_all, struct super_block *sb, int force)
    AuStub(int, au_fhsm_fd, return -EOPNOTSUPP, struct super_block *sb, int oflags)
#endif
+AuStub(pid_t, au_fhsm_pid, return 0, struct au_fhsm *fhsm)
+AuStubInt0(au_fhsm_br_alloc, struct au_branch *br)
+AuStubVoid(au_fhsm_set_bottom, struct super_block *sb, aufs_bindex_t bindex)
+AuStubVoid(au_fhsm_fin, struct super_block *sb)
+AuStubVoid(au_fhsm_init, struct au_sbinfo *sbinfo)
+AuStubVoid(au_fhsm_set, struct au_sbinfo *sbinfo, unsigned int sec)
+AuStubVoid(au_fhsm_show, struct seq_file *seq, struct au_sbinfo *sbinfo)
+#endif
+
+/* --------------------------------------------------------------- */
+
+static inline struct au_sbinfo *au_sbi(struct super_block *sb)
+{
+return sb->s_fs_info;
+}
+
+/* --------------------------------------------------------------- */
+
+#endif CONFIG_AUFS_EXPORT
+
+int au_test_nfsd(void);
+void au_export_init(struct super_block *sb);
+void au_xigen_inc(struct inode *inode);
+int au_xigen_new(struct inode *inode);
+int au_xigen_set(struct super_block *sb, struct file *base);
+void au_xigen_clr(struct super_block *sb);
+
+static inline int au_busy_or_stale(void)
+{
+if (!au_test_nfsd())
+return -EBUSY;
+return -ESTALE;
+}
+
+#else
+AuStubInt0(au_test_nfsd, void)
+AuStubVoid(au_export_init, struct super_block *sb)
+AuStubVoid(au_xigen_inc, struct inode *inode)
+AuStubInt0(au_xigen_new, struct inode *inode)
+AuStubInt0(au_xigen_set, struct super_block *sb, struct file *base)
+AuStubVoid(au_xigen_clr, struct super_block *sb)
+AuStub(int, au_busy_or_stale, return -EBUSY, void)
+#endif /* CONFIG_AUFS_EXPORT */
+
+/* --------------------------------------------------------------- */
+
+#ifndef CONFIG_AUFS_SBILIST
+/* module.c */
+extern struct hlist_bl_head au_sbilist;
+
---
+static inline void au_sbilist_init(void)
+{
+INIT_HLIST_BL_HEAD(&au_sbilist);
+}
+
+static inline void au_sbilist_add(struct super_block *sb)
+{
+au_hbl_add(&au_sbi(sb)->si_list, &au_sbilist);
+}
+
+static inline void au_sbilist_del(struct super_block *sb)
+{
+au_hbl_del(&au_sbi(sb)->si_list, &au_sbilist);
+}
+
+#ifdef CONFIG_AUFS_MAGIC_SYSRQ
+static inline void au_sbilist_lock(void)
+{
+hlist_bl_lock(&au_sbilist);
+}
+
+static inline void au_sbilist_unlock(void)
+{
+hlist_bl_unlock(&au_sbilist);
+}
+#define AuGFP_SBILIST GFP_ATOMIC
+#else
+AuStubVoid(au_sbilist_lock, void)
+AuStubVoid(au_sbilist_unlock, void)
+#define AuGFP_SBILIST GFP_NOFS
+#endif /* CONFIG_AUFS_MAGIC_SYSRQ */
+#endif
+AuStubVoid(au_sbilist_init, void)
+AuStubVoid(au_sbilist_add, struct super_block *sb)
+AuStubVoid(au_sbilist_del, struct super_block *sb)
+AuStubVoid(au_sbilist_lock, void)
+AuStubVoid(au_sbilist_unlock, void)
+#define AuGFP_SBILIST GFP_NOFS
+#endif
+
+/* This function is a dynamic `__init` function actually, */
+/* so the tiny check for si_rwlock is unnecessary. */
+/*

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AuRwMustWriteLock(&sbinfo->si_rwlock); */
#elif defined CONFIG_DEBUG_FS
+sbinfo->si_dbgafs = NULL;
+sbinfo->si_dbgafs_plink = NULL;
+sbinfo->si_dbgafs_xib = NULL;
#elif defined CONFIG_AUFS_EXPORT
+sbinfo->si_dbgafs_xigen = NULL;
#endif
#endif
} /* AuRwMustWriteLock */

+*/ current->atomic_flags */
+*/ this value should never corrupt the ones defined in linux/sched.h */
#define PFA_AUFS 7

+TASK_PFA_TEST(AUFS, test_aufs) /* task_test_aufs */
+TASK_PFA_SET(AUFS, aufs) /* task_set_aufs */
+TASK_PFA_CLEAR(AUFS, aufs) /* task_clear_aufs */
+
+static inline int si_pid_test(struct super_block *sb)
+{
+return !!task_test_aufs(current);
+}
+
+static inline void si_pid_clr(struct super_block *sb)
+{
+AuDebugOn(!task_test_aufs(current));
+task_clear_aufs(current);
+}
+
+static inline void si_pid_set(struct super_block *sb)
+{
+AuDebugOn(task_test_aufs(current));
+task_set_aufs(current);
+}
+
+*/ lock superblock. mainly for entry point functions */
+define __si_read_lock(sb) au_rwlock_read_lock(&au_sbi(sb)->si_rwlock)
+define __si_write_lock(sb) au_rwlock_write_lock(&au_sbi(sb)->si_rwlock)
+define __si_read_trylock(sb) au_rwlock_read_trylock(&au_sbi(sb)->si_rwlock)
+define __si_write_trylock(sb) au_rwlock_write_trylock(&au_sbi(sb)->si_rwlock)
+*/
+define __si_read_trylock_nested(sb) \
+au_rwlock_read_trylock_nested(&au_sbi(sb)->si_rwlock)
+\#define __si_write_trylock_nested(sb) \n+au_rw_write_trylock_nested(&au_sbi(sb)->si_rwlock) \n+*/ \n+\#define __si_read_unlock(sb)au_rw_read_unlock(&au_sbi(sb)->si_rwlock) \n+\#define __si_write_unlock(sb)au_rw_write_unlock(&au_sbi(sb)->si_rwlock) \n+\#define __si_downgrade_lock(sb)au_rw downgrade_lock(&au_sbi(sb)->si_rwlock) + \n+\#define SiMustNoWaiters(sb)AuRwMustNoWaiters(&au_sbi(sb)->si_rwlock) \n+\#define SiMustAnyLock(sb)AuRwMustAnyLock(&au_sbi(sb)->si_rwlock) \n+\#define SiMustWriteLock(sb)AuRwMustWriteLock(&au_sbi(sb)->si_rwlock) + \n+static inline void si_noflush_read_lock(struct super_block *sb) \n+{ \n+__si_read_lock(sb); \n+si_pid_set(sb); \n+} + \n+static inline int si_noflush_read_trylock(struct super_block *sb) \n+{ \n+int locked; + \n+locked = __si_read_trylock(sb); +if (locked) \n+si_pid_set(sb); \n+return locked; \n+} + \n+static inline void si_noflush_write_lock(struct super_block *sb) \n+{ \n+__si_write_lock(sb); \n+si_pid_set(sb); \n+} + \n+static inline int si_noflush_write_trylock(struct super_block *sb) \n+{ \n+int locked; + \n+locked = __si_write_trylock(sb); +if (locked) \n+si_pid_set(sb); \n+return locked; \n+} + \n+\#if 0 /* reserved */ 
+static inline int si_read_trylock(struct super_block *sb, int flags) \n+{ \n+if (au_ftest_lock(flags, FLUSH))
+au_nwt_flush(&au_sbi(sb)->si_nowait);
+return si_noflush_read_trylock(sb);
+
+#endif
+
+static inline void si_read_unlock(struct super_block *sb)
+{
+  si_pid_clr(sb);
+  _si_read_unlock(sb);
+}
+
+if 0 /* reserved */
+static inline int si_write_trylock(struct super_block *sb, int flags)
+{
+  if (au_ftest_lock(flags, FLUSH))
+    au_nwt_flush(&au_sbi(sb)->si_nowait);
+  return si_noflush_write_trylock(sb);
+}
+#endif
+
+static inline void si_write_unlock(struct super_block *sb)
+{
+  si_pid_clr(sb);
+  __si_write_unlock(sb);
+}
+
+if 0 /* reserved */
+static inline void si_downgrade_lock(struct super_block *sb)
+{
+  __si_downgrade_lock(sb);
+}
+#endif
+
+/* ---------------------------------------------------------------------- */
+
+static inline aufs_bindex_t au_sbbot(struct super_block *sb)
+{
+  SiMustAnyLock(sb);
+  return au_sbi(sb)->si_bbot;
+}
+
+static inline unsigned int au_mntflags(struct super_block *sb)
+{
+  SiMustAnyLock(sb);
+  return au_sbi(sb)->si_mntflags;
+}
+
+static inline unsigned int au_sigen(struct super_block *sb)
+{  
+SiMustAnyLock(sb);  
+return au_sbi(sb)->si_generation;  
+}  
+
+static inline unsigned long long au_ninodes(struct super_block *sb)  
+{  
+s64 n = percpu_counter_sum(&au_sbi(sb)->si_ninodes);  
+  
+BUG_ON(n < 0);  
+return n;  
+}  
+
+static inline void au_ninodes_inc(struct super_block *sb)  
+{  
+percpu_counter_inc(&au_sbi(sb)->si_ninodes);  
+}  
+
+static inline void au_ninodes_dec(struct super_block *sb)  
+{  
+percpu_counter_dec(&au_sbi(sb)->si_ninodes);  
+}  
+
+static inline unsigned long long au_nfiles(struct super_block *sb)  
+{  
+s64 n = percpu_counter_sum(&au_sbi(sb)->si_nfiles);  
+  
+BUG_ON(n < 0);  
+return n;  
+}  
+
+static inline void au_nfiles_inc(struct super_block *sb)  
+{  
+percpu_counter_inc(&au_sbi(sb)->si_nfiles);  
+}  
+
+static inline void au_nfiles_dec(struct super_block *sb)  
+{  
+percpu_counter_dec(&au_sbi(sb)->si_nfiles);  
+}  
+
+static inline struct au_branch *au_sbr(struct super_block *sb,  
+    aufs_bindex_t bindex)  
+{  
+SiMustAnyLock(sb);  
+return au_sbi(sb)->si_branch[0 + bindex];  
+}  
+
+static inline void au_xino_brid_set(struct super_block *sb, aufs_bindex_t brid)
+{
+SiMustWriteLock(sb);
+au_sbi(sb)->si_xino_brid = brid;
+}
+
+static inline aufs_bindex_t au_xino_brid(struct super_block *sb)
+{
+SiMustAnyLock(sb);
+return au_sbi(sb)->si_xino_brid;
+}
+
+#endif /* __KERNEL__ */
+#endif /* __AUFS_SUPER_H__ */
--- linux-4.15.0.orig/fs/aufs/sysaufs.c
+++ linux-4.15.0/fs/aufs/sysaufs.c
@@ -0,0 +1,104 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
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+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * sysfs interface and lifetime management
+ * they are necessary regardless sysfs is disabled.
+ */
+
+#include <linux/random.h>
+#include "aufs.h"
+
+unsigned long sysaufs_si_mask;
+struct kset *sysaufs_kset;
+
+#define AuSiAttr(_name) { \
+.attr = { .name = __stringify(_name), .mode = 0444 },\n+.show = sysaufs_si_##_name,\
+}
static struct sysaufs_si_attr sysaufs_si_attr_xi_path = AuSiAttr(xi_path);
+static attribute *sysaufs_si_attrs[] = {
+&sysaufs_si_attr_xi_path.attr,
+NULL,
+};
+
+static const struct sysfs_ops au_sbi_ops = {
+.show = sysaufs_si_show
+};
+
+static struct kobj_type au_sbi_ktype = {
+.release = au_si_free,
+.sysfs_ops = &au_sbi_ops,
+.default_attrs = sysaufs_si_attrs
+};
+
+/* ---------------------------------------------------------------------- */
+
+int sysaufs_si_init(struct au_sbinfo *sbinfo)
+{
+int err;
+
+sbinfo->si_kobj.kset = sysaufs_kset;
+/* cf. sysaufs_name() */
+err = kobject_init_and_add
+(&sbinfo->si_kobj, &au_sbi_ktype, /*&sysaufs_kset->kobj*/NULL,
+SysaufsSiNamePrefix "%lx", sysaufs_si_id(sbinfo));
+
+dbgafs_si_null(sbinfo);
+if (!err) {
+err = dbgafs_si_init(sbinfo);
+if (unlikely(err))
+kobject_put(&sbinfo->si_kobj);
+}
+return err;
+}
+
+void sysaufs_fin(void)
+{
+dbgafs_fin();
+sysfs_remove_group(&sysaufs_kset->kobj, sysaufs_attr_group);
+kset_unregister(sysaufs_kset);
+}
+
+int __init sysaufs_init(void)
+{
int err;
+
do {
+    get_random_bytes(&sysaufs_si_mask, sizeof(sysaufs_si_mask));
+} while (!sysaufs_si_mask);
+
+err = -EINVAL;
+sysaufs_kset = kset_create_and_add(AUFS_NAME, NULL, fs_kobj);
+if (unlikely(!sysaufs_kset))
+    goto out;
+err = PTR_ERR(sysaufs_kset);
+if (IS_ERR(sysaufs_kset))
+    goto out;
+err = sysfs_create_group(&sysaufs_kset->kobj, sysaufs_attr_group);
+if (unlikely(err)) {
+    kset_unregister(sysaufs_kset);
+    goto out;
+}
+
+err = dbgaufs_init();
+if (unlikely(err))
+    sysaufs_fin();
+out:
+    return err;
+
--- linux-4.15.0.orig/fs/aufs/sysaufs.h
+++ linux-4.15.0/fs/aufs/sysaufs.h
@@ -0,0 +1,101 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+*/
+* sysfs interface and mount lifetime management
+*/
#ifndef __SYSAUFS_H__
#define __SYSAUFS_H__

#ifdef __KERNEL__

#include <linux/sysfs.h>
#include "module.h"

+struct super_block;
+struct au_sbsinfo;
+
+struct sysaufs_si_attr {
+struct attribute attr;
+int (*show)(struct seq_file *seq, struct super_block *sb);
+};
+
+/#------------------------------------------------------------------------------- */
+
+/# sysaufs.c */
+extern unsigned long sysaufs_si_mask;
+extern struct kset *sysaufs_kset;
+extern struct attribute *sysaufs_si_atts[];
+int sysaufs_si_init(struct au_sbsinfo *sbsinfo);
+int __init sysaufs_init(void);
+void sysaufs_fin(void);
+
+/#------------------------------------------------------------------------------- */
+
+/# some people doesn’t like to show a pointer in kernel */
+static inline unsigned long sysaufs_si_id(struct au_sbsinfo *sbsinfo)
+{
+return sysaufs_si_mask ^ (unsigned long)sbsinfo;
+}
+
+#define SysaufsSiNamePrefix"si_"
+#define SysaufsSiNameLen(sizeof(SysaufsSiNamePrefix) + 16)
+static inline void sysaufs_name(struct au_sbsinfo *sbsinfo, char *name)
+{
+snprintf(name, SysaufsSiNameLen, SysaufsSiNamePrefix "%lx",
+ sysaufs_si_id(sbsinfo));
+}
+
+struct au_branch;
+#ifdef CONFIG_SYSFS
+/* sysfs.c */
+extern struct attribute_group *sysaufs_attr_group;
+
+}
+int sysaufs_si_xi_path(struct seq_file *seq, struct super_block *sb);
+ssize_t sysaufs_si_show(struct kobject *kobj, struct attribute *attr,  
+char *buf);
+long au_brinfo_ioctl(struct file *file, unsigned long arg);
+#ifdef CONFIG_COMPAT
+long au_brinfo_compat_ioctl(struct file *file, unsigned long arg);
+#endif
+
+void sysaufs_br_init(struct au_branch *br);
+void sysaufs_brs_add(struct super_block *sb, aufs_bindex_t bindex);
+void sysaufs_brs_del(struct super_block *sb, aufs_bindex_t bindex);
+
+#define sysaufs_brs_init() do {} while (0)
+
+#else
+#define sysaufs_attr_groupNULL
+
+AuStubInt0(sysaufs_si_xi_path, struct seq_file *seq, struct super_block *sb)  
+AuStub(ssize_t, sysaufs_si_show, return 0, struct kobject *kobj,  
+struct attribute *attr, char *buf)
+AuStubVoid(sysaufs_br_init, struct au_branch *br)
+AuStubVoid(sysaufs_brs_add, struct super_block *sb, aufs_bindex_t bindex)
+AuStubVoid(sysaufs_brs_del, struct super_block *sb, aufs_bindex_t bindex)
+
+static inline void sysaufs_brs_init(void)
+{
+sysaufs_brs = 0;
+}
+
+#endif /* CONFIG_SYSFS */
+
+#endif /* __KERNEL__ */
+}
+ * You should have received a copy of the GNU General Public License  
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.  
+ */
+
+ /* sysfs interface */
+
+ #include <linux/compat.h>
+ #include <linux/seq_file.h>
+ #include "aufs.h"
+
+ #ifdef CONFIG_AUFS_FS_MODULE
+ /* this entry violates the "one line per file" policy of sysfs */
+ static ssize_t config_show(struct kobject *kobj, struct kobj_attribute *attr,  
+ char *buf)
+ {
+ ssize_t err;
+ static char *conf =  
+ "this file is generated at compiling */
+ #include "conf.str"
+ ;
+ 
+ err = snprintf(buf, PAGE_SIZE, conf);
+ if (unlikely(err >= PAGE_SIZE))
+ err = -EFBIG;
+ return err;
+ }
+
+ static struct kobj_attribute au_config_attr = __ATTR_RO(config);
+ 
+ static struct attribute *au_attr[] = {
+ #ifdef CONFIG_AUFS_FS_MODULE
+ &au_config_attr.attr,
+ #endif
+ NULL,/* need to NULL terminate the list of attributes */
+ };
+
+ static struct attribute_group sysaufs_attr_group_body = {
+ .attrs = au_attr  
+ };
+
+ struct attribute_group *sysaufs_attr_group = &sysaufs_attr_group_body;
+
+ /* **************************************************************/
+

+int sysaufs_si_xi_path(struct seq_file *seq, struct super_block *sb)
+{
+int err;
+
+SiMustAnyLock(sb);
+
+err = 0;
+if (au_opt_test(au_mntflags(sb), XINO)) {
+err = au_xino_path(seq, au_sbi(sb)->si_xib);
+seq_putchar(seq, '\n');
+}
+return err;
+
+/
+ * the lifetime of branch is independent from the entry under sysfs.
+ * sysfs handles the lifetime of the entry, and never call \->show() after it is
+ * unlinked.
+ */
+
+static int sysaufs_si_br(struct seq_file *seq, struct super_block *sb,
+aufs_bindex_t bindex, int idx)
+{
+int err;
+struct path path;
+struct dentry *root;
+struct au_branch *br;
+au_br_perm_str_t perm;
+
+AuDbg("b%d\n", bindex);
+
+err = 0;
+root = sb->s_root;
+di_read_lock_parent(root, !AuLock_IR);
+br = au_sbr(sb, bindex);
+
+switch (idx) {
+case AuBrSysfs_BR:
+path.mnt = au_br_mnt(br);
+path.dentry = au_h_dptr(root, !AuLock_IR);
+err = au_seq_path(seq, &path);
+if (!err) {
+au_optstr_br_perm(&perm, br->br_perm);
+seq_printf(seq, "=%s\n", perm.a);
+}
+break;
+case AuBrSysfs_BRID:
+seq_printf(seq, "%d\n", br->br_id);
+break;
+}  
+di_read_unlock(root, !AuLock_IR);  
+if (unlikely(err || seq_has_overflowed(seq)))  
+err = -E2BIG;  
+  
+return err;  
+}  
+  
+/* ---------------------------------------------------------------------- */  
+  
+static struct seq_file *au_seq(char *p, ssize_t len)  
+{  
+struct seq_file *seq;  
+  
+seq = kzalloc(sizeof(*seq), GFP_NOFS);  
+if (seq) {  
+/* mutex_init(&seq.lock); */  
+seq->buf = p;  
+seq->size = len;  
+return seq; /* success */  
+}  
+  
+seq = ERR_PTR(-ENOMEM);  
+return seq;  
+}  
+  
+#define SysaufsBr_PREFIX	"br"  
+#define SysaufsBrid_PREFIX	"brid"  
+  
+/* todo: file size may exceed PAGE_SIZE */  
+ssize_t sysaufs_si_show(struct kobject *kobj, struct attribute *attr,  
+char *buf)  
+{  
+ssize_t err;  
+int idx;  
+long l;  
+aufs_bindex_t bbot;  
+struct au_sbinfo *sinfo;  
+struct super_block *sb;  
+struct seq_file *seq;  
+char *name;  
+struct attribute **cattr;  
+  
+sinfo = container_of(kobj, struct au_sbinfo, si_kobj);  
+sb = sinfo->si_sb;  
+  
+/*  
* prevent a race condition between sysfs and aufs.  
*/
for instance, sysfs_file_read() calls sysfs_get_active_two() which
prohibits maintaining the sysfs entries.

hew we acquire read lock after sysfs_get_active_two().
on the other hand, the remount process may maintain the sysfs/ufs
entries after acquiring write lock.

it can cause a deadlock.
simply we gave up processing read here.
 */

err = -EBUSY;
+err = PTR_ERR(seq);
+err = kstrtol(name, 10, &l);
+if (!err) {
  if (!strncmp(name, SysaufsBrid_PREFIX,
    sizeof(SysaufsBrid_PREFIX) - 1)) {
    idx = AuBrSysfs_BRID;
    name += sizeof(SysaufsBrid_PREFIX) - 1;
  } else if (!strncmp(name, SysaufsBr_PREFIX,
    sizeof(SysaufsBr_PREFIX) - 1)) {
    idx = AuBrSysfs_BR;
    name += sizeof(SysaufsBr_PREFIX) - 1;
  } else
    BUG();
  +err = sysaufs_si_br(seq, sb, (aufs_bindex_t)l, id);
```c
+out_seq:
+if (!err) {
+err = seq->count;
+// sysfs limit */
+if (unlikely(err == PAGE_SIZE))
+err = -EFBIG;
+
+kfree(seq);
+out_unlock:
+si_read_unlock(sb);
+out:
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+static int au_brinfo(struct super_block *sb, union aufs_brinfo __user *arg)
+{
+int err;
+int16_t brid;
+aufs_bindex_t bindex, bbot;
+size_t sz;
+char *buf;
+struct seq_file *seq;
+struct au_branch *br;
+
+si_read_lock(sb, AuLock_FLUSH);
+bbot = au_sbbot(sb);
+err = bbot + 1;
+if (!arg)
++goto out;
+
+err = -ENOMEM;
+buf = (void *)__get_free_page(GFP_NOFS);
+if (unlikely(!buf))
++goto out;
+
+seq = au_seq(buf, PAGE_SIZE);
+err = PTR_ERR(seq);
+if (IS_ERR(seq))
++goto out_buf;
+
+sz = sizeof(*arg) - offsetof(union aufs_brinfo, path);
+for (bindex = 0; bindex <= bbot; bindex++, arg++) {
+err = !access_ok(VERIFY_WRITE, arg, sizeof(*arg));
+if (unlikely(err))
++break;
+
```
+br = au_sbr(sb, bindex);
+brid = br->br_id;
+BUILD_BUG_ON(sizeof(brid) != sizeof(arg->id));
+err = __put_user(brid, &arg->id);
+if (unlikely(err))
+break;
+
+BUILD_BUG_ON(sizeof(br->br_perm) != sizeof(arg->perm));
+err = __put_user(br->br_perm, &arg->perm);
+if (unlikely(err))
+break;
+
+err = au_seq_path(seq, &br->br_path);
+if (unlikely(err))
+break;
+seq_puts(seq, \0);
+if (!seq_has_overflowed(seq)) {
+err = copy_to_user(arg->path, seq->buf, seq->count);
+seq->count = 0;
+if (unlikely(err))
+break;
+} else {
+err = -E2BIG;
+goto out_seq;
+}
+}
+
+if (unlikely(err))
+err = -EFAULT;
+
+long au_brinfo_ioctl(struct file *file, unsigned long arg)
+{
+return au_brinfo(file->f_path.dentry->d_sb, (void __user *)arg);
+}
+
+#ifdef CONFIG_COMPAT
+long au_brinfo_compat_ioctl(struct file *file, unsigned long arg)
+{
+return au_brinfo(file->f_path.dentry->d_sb, compat_ptr(arg));
+}
+
#include
+
/* ---------------------------------------------------------------------- */

void sysaufs_br_init(struct au_branch *br)
{

int i;

struct au_brsysfs *br_sysfs;

struct attribute *attr;

br_sysfs = br->br_sysfs;

for (i = 0; i < ARRAY_SIZE(br->br_sysfs); i++) {

attr = &br_sysfs->attr;

sysfs_attr_init(attr);

attr->name = br_sysfs->name;

attr->mode = S_IRUGO;

br_sysfs++;

}

}

void sysaufs_brs_del(struct super_block *sb, aufs_bindex_t bindex)
{

struct au_branch *br;

struct kobject *kobj;

struct au_brsysfs *br_sysfs;

int i;

aufs_bindex_t bbot;

dbaufs_brs_del(sb, bindex);

if (!sysaufs_brs)

return;

kobj = &au_sbi(sb)->si_kobj;

bbot = au_sbbot(sb);

for (; bindex <= bbot; bindex++) {

br = au_sbr(sb, bindex);

br_sysfs = br->br_sysfs;

for (i = 0; i < ARRAY_SIZE(br->br_sysfs); i++) {

sysfs_remove_file(kobj, &br_sysfs->attr);

br_sysfs++;

}

}

}

void sysaufs_brs_add(struct super_block *sb, aufs_bindex_t bindex)
{

int err, i;
+aufs_bindex_t bbot;
+struct kobject *kobj;
+struct au_branch *br;
+struct au_brsysfs *br_sysfs;
+
+dbgaufs_brs_add(sb, bindex);
+
+if (!sysaufs_brs)
+return;
+
+kobj = &au_sbi(sb)->si_kobj;
+bbot = au_sbbot(sb);
+for (; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+br_sysfs = br->br_sysfs;
+snprintf(br_sysfs[AuBrSysfs_BR].name, sizeof(br_sysfs->name),
+ SysaufsBr_PREFIX "%d", bindex);
+snprintf(br_sysfs[AuBrSysfs_BRID].name, sizeof(br_sysfs->name),
+ SysaufsBrid_PREFIX "%d", bindex);
+for (i = 0; i < ARRAY_SIZE(br->br_sysfs); i++) {
+err = sysfs_create_file(kobj, &br_sysfs->attr);
+if (unlikely(err))
+pr_warn("failed %s under sysfs(%d)/ln",
+ br_sysfs->name, err);
+br_sysfs++;
+}
+
--- linux-4.15.0.orig/fs/aufs/sysrq.c
+++ linux-4.15.0/fs/aufs/sysrq.c
@@ -0,0 +1,159 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+}
/ * magic sysrq hanlder
 */

#include <linux/sysrq.h>
#include <linux/writeback.h>
#include "aufs.h"

static void sysrq_sb(struct super_block *sb)
{
  char *plevel;
  struct au_sbinfo *sbinfo;
  struct file *file;
  struct hlist_bl_head *files;
  struct hlist_bl_node *pos;
  struct au_finfo *finfo;
  plevel = au_plevel;
  au_plevel = KERN_WARNING;

  sbinfo = au_sbi(sb);
  printk(KERN_WARNING "si=%lx\n", sysaufs_si_id(sbinfo));
  pr("superblock\n");
  au_dpri_sb(sb);
  ifdef 0
  pr("root dentry\n");
  au_dpri_dentry(sb->s_root);
  pr("root inode\n");
  au_dpri_inode(d_inode(sb->s_root));
  endif
  ifdef 0
  do {
    int err, i, j, ndentry;
    struct au_dcsub_pages dpages;
    struct au_dpage *dpage;
    err = au_dpages_init(&dpages, GFP_ATOMIC);
    if (unlikely(err))
      break;
    err = au_dcsub_pages(&dpages, sb->s_root, NULL, NULL);
    if (!err)
+for (i = 0; i < dpages.ndpage; i++) {
+dpage = dpages.dpages + i;
+ndentry = dpage->ndentry;
+for (j = 0; j < ndentry; j++)
+au_dpri_dentry(dpage->dentries[j]);
+
+au_dpri_free(&dpages);
+} while (0);
+#endif
+
+#if 1
+	{
+		struct inode *i;
+
+	+pr("isolated inode\n");
+	+spin_lock(&sb->s_inode_list_lock);
+	+list_for_each_entry(i, &sb->s_inodes, i_sb_list) {
+	+spin_lock(&i->i_lock);
+	+if (1 || hlist_empty(&i->i_dentry))
+	+au_dpri_inode(i);
+	+spin_unlock(&i->i_lock);
+
+	+spin_unlock(&sb->s_inode_list_lock);
+
+	}
+
+#endif
+
+pr("files\n");
+files = &au_sbi(sb)->si_files;
+hlist_bl_lock(files);
+hlist_bl_for_each_entry(finfo, pos, files, fi_hlist) {
+umode_t mode;
+
+file = finfo->fi_file;
+mode = file_inode(file)->i_mode;
+if (!special_file(mode))
+au_dpri_file(file);
+
+hlist_bl_unlock(files);
+pr("done\n");
+
+#undef pr
+au_plevel = plevel;
+
+/* module parameter */
+static char *aufs_sysrq_key = "a";
+module_param_named(sysrq, aufs_sysrq_key, charp, S_IRUGO);
+MODULE_PARM_DESC(sysrq, "MagicSysRq key for " AUFS_NAME);
+
+static void au_sysrq(int key __maybe_unused)
+{
+struct au_sbinfo *sbinfo;
+struct hlist_bl_node *pos;
+
+lockdep_off();
+au_sbilist_lock();
+hlist_bl_for_each_entry(sbinfo, pos, &au_sbilist, si_list)
+sysrq_sb(sbinfo->si_sb);
+au_sbilist_unlock();
+lockdep_on();
+
+static struct sysrq_key_op au_sysrq_op = {
+.handler= au_sysrq,
+.help_msg= "Aufs",
+.action_msg= "Aufs",
+.enable_mask= SYSRQ_ENABLE_DUMP
+};
+
+/* ---------------------------------------------------------------------- */
+
+int __init au_sysrq_init(void)
+{
+int err;
+char key;
+
+err = -1;
+key = *aufs_sysrq_key;
+if ('a' <= key && key <= 'z')
+err = register_sysrq_key(key, &au_sysrq_op);
+if (unlikely(err))
+pr_err("err %d, sysrq=%c\n", err, key);
+return err;
+
+void au_sysrq_fin(void)
+{
+int err;
+
+err = unregister_sysrq_key(*aufs_sysrq_key, &au_sysrq_op);
+if (unlikely(err))
+pr_err("err %d (ignored)\n", err);
+
--- linux-4.15.0.orig/fs/aufs/vdir.c
+++ linux-4.15.0/fs/aufs/vdir.c
/*
 * Copyright (C) 2005-2017 Junjiro R. Okajima
 * This program, aufs is free software; you can redistribute it and/or modify
 * it under the terms of the GNU General Public License as published by
 * the Free Software Foundation; either version 2 of the License, or
 * (at your option) any later version.
 *
 * This program is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
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 * GNU General Public License for more details.
 *
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 * along with this program. If not, see <http://www.gnu.org/licenses/>.
 */

#include "aufs.h"

static unsigned int calc_size(int nlen)
{
    return ALIGN(sizeof(struct au_vdir_de) + nlen, sizeof(ino_t));
}

static int set_deblk_end(union au_vdir_deblk_p *p, union au_vdir_deblk_p *deblk_end)
{
    if (calc_size(0) <= deblk_end->deblk - p->deblk) {
        p->de->de_str.len = 0;
        /* smp_mb(); */
        return 0;
    }
    return -1; /* error */
}

/* returns true or false */
static int is_deblk_end(union au_vdir_deblk_p *p, union au_vdir_deblk_p *deblk_end)
{
    if (calc_size(0) <= deblk_end->deblk - p->deblk) {
        p->de->de_str.len = 0;
        /* smp_mb(); */
        return 0;
    }
    return -1; /* error */
}

/* virtual or vertical directory */

#ifinclude "aufs.h"

+static unsigned int calc_size(int nlen)
+
+
+ */
+
+static int set_deblk_end(union au_vdir_deblk_p *p,
+union au_vdir_deblk_p *deblk_end)
+
+ {      
+ if (calc_size(0) <= deblk_end->deblk - p->deblk) {
+ p->de->de_str.len = 0;
+ /* smp_mb(); */
+ return 0;
+ }      
+ return -1; /* error */
+
+ */
+
+static int is_deblk_end(union au_vdir_deblk_p *p,
+union au_vdir_deblk_p *deblk_end)
+
+ { 
+ if (calc_size(0) <= deblk_end->deblk - p->deblk) 
+ return !p->de->de_str.len;
+ return 1;
+ }

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static unsigned char *last_deblk(struct au_vdir *vdir) {
    return vdir->vd_deblk[vdir->vd_nblk - 1];
}

/* estimate the appropriate size for name hash table */
unsigned int au_rdhash_est(loff_t sz) {
    unsigned int n;
    n = UINT_MAX;
    sz >>= 10;
    if (sz < n)
        n = sz;
    if (sz < AUFS_RDHASH_DEF)
        n = AUFS_RDHASH_DEF;
    /* pr_info("n %u\n", n); */
    return n;
}

int au_nhash_alloc(struct au_nhash *nhash, unsigned int num_hash, gfp_t gfp) {
    struct hlist_head *head;
    unsigned int u;
    size_t sz;

    sz = sizeof(*nhash->nh_head) * num_hash;
    head = kmalloc(sz, gfp);
    if (head) {
        nhash->nh_num = num_hash;
        nhash->nh_head = head;
        for (u = 0; u < num_hash; u++)
            INIT_HLIST_HEAD(head);
        return 0; /* success */
    }
    return -ENOMEM;
}

static void nhash_count(struct hlist_head *head) {
    /* the allocated memory has to be freed by
     * au_nhash_wh_free() or au_nhash_de_free().
     */
}

static void *last_deblk(struct au_vdir *vdir) {
    return vdir->vd_deblk[vdir->vd_nblk - 1];
}
+if 0
+unsigned long n;
+struct hlist_node *pos;
+
+n = 0;
+hlist_for_each(pos, head)
+n++;
+pr_info("%lu\n", n);
+#endif
+
+static void au_nhash_wh_do_free(struct hlist_head *head)
+{
+struct au_vdir_wh *pos;
+struct hlist_node *node;
+
+hlist_for_each_entry_safe(pos, node, head, wh_hash)
+kfree(pos);
+}
+
+static void au_nhash_de_do_free(struct hlist_head *head)
+{
+struct au_vdir_dehstr *pos;
+struct hlist_node *node;
+
+hlist_for_each_entry_safe(pos, node, head, hash)
+au_cache_free_vdir_dehstr(pos);
+}
+
+static void au_nhash_do_free(struct au_nhash *nhash,
+    void (*free)(struct hlist_head *head))
+{
+unsigned int n;
+struct hlist_head *head;
+
+n = nhash->nh_num;
+if (!n)
+return;
+
+head = nhash->nh_head;
+while (n-- > 0) {
+nhash_count(head);
+free(head++);
+}
+kfree(nhash->nh_head);
+}
+
+void au_nhash_wh_free(struct au_nhash *whlist)
+{  
+au_nhash_do_free(whlist, au_nhash_wh_do_free);
+}
+
+static void au_nhash_de_free(struct au_nhash *delist)
+{
+au_nhash_do_free(delist, au_nhash_de_do_free);
+}
+
+/*  
+ *    au_nhash_de_free
+ */
+
+int au_nhash_test_longer_wh(struct au_nhash *whlist, aufs_bindex_t btgt,
+    int limit)
+{
+int num;
+unsigned int u, n;
+struct hlist_head *head;
+struct au_vdir_wh *pos;
+  
+num = 0;
+n = whlist->nh_num;
+head = whlist->nh_head;
+for (u = 0; u < n; u++, head++)
+hlist_for_each_entry(pos, head, wh_hash)
+    if (pos->wh_bindex == btgt && ++num > limit)
+        return 1;
+return 0;
+}
+
+static struct hlist_head *au_name_hash(struct au_nhash *nhash,
+    unsigned char *name,
+    unsigned int len)
+{
+unsigned int v;
+/*   
+ *      const unsigned int magic_bit = 12; */
+  
+AuDebugOn(!nhash->nh_num || !nhash->nh_head);
+  
+v = 0;
+if (len > 8)
+len = 8;
+while (len--)
+v += *name++;
+/* v = hash_long(v, magic_bit); */
+v %= nhash->nh_num;
+return nhash->nh_head + v;
+}
+static int au_nhhash_test_name(struct au_vdir_destr *str, const char *name, int nlen)
+{
+    return str->len == nlen && !memcmp(str->name, name, nlen);
+}
+
+ /* returns found or not */
+int au_nhhash_test_known_wh(struct au_nhhash *whlist, char *name, int nlen)
+{
+    struct hlist_head *head;
+    struct au_vdir_wh *pos;
+    struct au_vdir_destr *str;
+
+    head = au_name_hash(whlist, name, nlen);
+    hlist_for_each_entry(pos, head, wh_hash) {
+        str = &pos->wh_str;
+        AuDbg("%.%s\n", str->len, str->name);
+        if (au_nhhash_test_name(str, name, nlen))
+            return 1;
+    }
+    return 0;
+}
+
+ /* returns found(true) or not */
+static int test_known(struct au_nhhash *delist, char *name, int nlen)
+{
+    struct hlist_head *head;
+    struct au_vdir_dehstr *pos;
+    struct au_vdir_destr *str;
+
+    head = au_name_hash(delist, name, nlen);
+    hlist_for_each_entry(pos, head, hash) {
+        str = pos->str;
+        AuDbg("%.%s\n", str->len, str->name);
+        if (au_nhhash_test_name(str, name, nlen))
+            return 1;
+    }
+    return 0;
+}
+
+static void au_shwh_init_wh(struct au_vdir_wh *wh, ino_t ino, unsigned char d_type)
+{
+    #ifdef CONFIG_AUFS_SHWH
+        wh->wh_ino = ino;
+        wh->wh_type = d_type;
+    #endif
+}
+
int au_nhash_append_wh(struct au_nhash *whlist, char *name, int nlen, ino_t ino,
    unsigned int d_type, aufs_bindex_t bindex,
    unsigned char shwh)
{
    int err;
    struct au_vdir_destr *str;
    struct au_vdir_wh *wh;
    AuDbg("%.*s\n", nlen, name);
    AuDebugOn(!whlist->nh_num || !whlist->nh_head);
    err = -ENOMEM;
    wh = kmalloc(sizeof(*wh) + nlen, GFP_NOFS);
    if (unlikely(!wh))
        goto out;
    err = 0;
    wh->wh_bindex = bindex;
    if (shwh)
        au_shwh_init_wh(wh, ino, d_type);
    str = &wh->wh_str;
    str->len = nlen;
    memcpy(str->name, name, nlen);
    hlist_add_head(&wh->wh_hash, au_name_hash(whlist, name, nlen));
    /* smp_mb(); */
out:
    return err;
}

static int append_deblk(struct au_vdir *vdir)
{
    int err;
    unsigned long ul;
    const unsigned int deblk_sz = vdir->vd_deblk_sz;
    union au_vdir_deblk_p p, deblk_end;
    unsigned char **o;
    err = -ENOMEM;
    o = au_krealloc(vdir->vd_deblk, sizeof(*o) * (vdir->vd_nblk + 1),
        GFP_NOFS, /*may_shrink*/0);
    if (unlikely(!o))
        goto out;
    vdir->vd_deblk = o;
    /
    +static int append_deblk(struct au_vdir *vdir)
+{
    +int err;
    +unsigned long ul;
    +const unsigned int deblk_sz = vdir->vd_deblk_sz;
    +union au_vdir_deblk_p p, deblk_end;
    +unsigned char **o;
    +err = -ENOMEM;
    +o = au_krealloc(vdir->vd_deblk, sizeof(*o) * (vdir->vd_nblk + 1),
        +GFP_NOFS, /*may_shrink*/0);
    +if (unlikely(!o))
        +goto out;
    +vdir->vd_deblk = o;
/
+p.deblk = kmalloc(deblk_sz, GFP_NOFS);
+if (p.deblk) {
  +ul = vdir->vd_nblk++;
  +vdir->vd_deblk[ul] = p.deblk;
  +vdir->vd_last.ul = ul;
  +vdir->vd_last.p.deblk = p.deblk;
  +deblk_end.deblk = p.deblk + debblk_sz;
  +err = set_deblk_end(&p, &deblk_end);
  +}
  +
  +out:
  +return err;
  +}
  +
  +static int append_de(struct au_vdir *vdir, char *name, int nlen, ino_t ino,
  +  + unsigned int d_type, struct au_nhash *delist)
  +{
  +  +int err;
  +  +unsigned int sz;
  +  +const unsigned int debblk_sz = vdir->vd_deblk_sz;
  +  +union au_vdir_deblk_p p, *room, debblk_end;
  +  +struct au_vdir_dehstr *dehstr;
  +
  +  +p.deblk = last_deblk(vdir);
  +  +deblk_end.deblk = p.deblk + debblk_sz;
  +  +room = &vdir->vd_last.p;
  +  +AuDebugOn(room->deblk < p.deblk || debblk_end.deblk <= room->deblk
  +  +  || !is_deblk_end(room, &deblk_end));
  +
  +  +sz = calc_size(nlen);
  +  +if (unlikely(sz > debblk_end.deblk - room->deblk)) {
  +  +err = append_deblk(vdir);
  +  +if (unlikely(err))
  +  +goto out;
  +  +
  +  +p.deblk = last_deblk(vdir);
  +  +deblk_end.deblk = p.deblk + debblk_sz;
  +  +/* smp_mb(); */
  +  +AuDebugOn(room->deblk != p.deblk);
  +  +}
  +
  +  +err = -ENOMEM;
  +  +dehstr = au_cache_alloc_vdir_dehstr();
  +  +if (unlikely(!dehstr))
  +  +goto out;
  +
  +  +dehstr->str = &room->de->de_str;
  +  +hlist_add_head(&dehstr->hash, au_name_hash(delist, name, nlen));
+room->de->de_ino = ino;
+room->de->de_type = d_type;
+room->de->de_str.len = nlen;
+memcpy(room->de->de_str.name, name, nlen);
+
+err = 0;
+room->deblk += sz;
+if (unlikely(set_deblk_end(room, &deblk_end)))
+err = append_deblk(vdir);
+/* smp_mb(); */
+
+out:
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+void au_vdir_free(struct au_vdir *vdir)
+{
+unsigned char **deblk;
+
+deblk = vdir->vd_deblk;
+while (vdir->vd_nblk--)
+kfree(*deblk);
+kfree(vdir->vd_deblk);
+au_cache_free_vdir(vdir);
+
+static struct au_vdir *alloc_vdir(struct file *file)
+{
+struct au_vdir *vdir;
+struct super_block *sb;
+int err;
+
+sb = file->f_path.dentry->d_sb;
+SiMustAnyLock(sb);
+
+err = -ENOMEM;
+vdir = au_cache_alloc_vdir();
+if (unlikely(!vdir))
+goto out;
+
+vdir->vd_deblk = kzalloc(sizeof(*vdir->vd_deblk), GFP_NOFS);
+if (unlikely(!vdir->vd_deblk))
+goto out_free;
+
+vdir->vd_deblk_sz = au_sbi(sb)->si_rdblk;
+if (!vdir->vd_deblk_sz) 

/* estimate the appropriate size for deblk */
+vdir->vd_deblk_sz = au_dir_size(file, /*dentry*/NULL);
/* pr_info("vd_deblk_sz %u\n", vdir->vd_deblk_sz); */
+
+vdir->vd_nblk = 0;
+vdir->vd_version = 0;
+vdir->vd_jiffy = 0;
+err = append_deblk(vdir);
+if (!err)
+return vdir; /* success */
+
+kfree(vdir->vd_deblk);
+
+out_free:
+au_cache_free_vdir(vdir);
+
+err = append_deblk(vdir);
+if (!err)
+return vdir; /* success */
+
+kfree(vdir->vd_deblk);
+
+static int reinit_vdir(struct au_vdir *vdir)
+
+{  
+    union au_vdir_deblk_p p, deblk_end;
+    while (vdir->vd_nblk > 1) {
+        kfree(vdir->vd_deblk[vdir->vd_nblk - 1]);
+        vdir->vd_deblk[vdir->vd_nblk - 1] = NULL; /*
+        vdir->vd_nblk--;  
+    }
+    p.deblk = vdir->vd_deblk[0];
+    deblk_end.deblk = p.deblk + vdir->vd_deblk_sz;
+    err = set_deblk_end(&p, &deblk_end);
+    /* keep vd_dblk_sz */
+    vdir->vd_last.ul = 0;
+    vdir->vd_last.p.deblk = vdir->vd_deblk[0];
+    vdir->vd_version = 0;
+    vdir->vd_jiffy = 0;
+    /* smp_mb(); */
+    return err;
+}
+
+#define AuFillVdir_CALLED1
+#define AuFillVdir_WHABLE(1 << 1)
+#define AuFillVdir_SHWH(1 << 2)
+#define au_ftest_fillvdir(flags, name)((flags) & AuFillVdir_##name)
```c
#define au_fset_fillvdir(flags, name)  
   { (flags) |= AuFillVdir_##name; } while (0)
#define au_fclr_fillvdir(flags, name)  
   { (flags) &= ~AuFillVdir_##name; } while (0)

#ifndef CONFIG_AUFS_SHWH
#undef AuFillVdir_SHWH
#define AuFillVdir_SHWH		0
#endif

struct fillvdir_arg {
   struct dir_context	ctx;
   struct file		*file;
   struct au_vdir		*vdir;
   struct au_nhash		delist;
   struct au_nhash		whlist;
   aufs_bindex_t		bindex;
   unsigned int		flags;
   int			err;
};

static int fillvdir(struct dir_context *ctx, const char *__name, int nlen,
   loff_t offset __maybe_unused, u64 h_ino,
   unsigned int d_type)
{
   struct fillvdir_arg *arg = container_of(ctx, struct fillvdir_arg, ctx);
   char *name = (void *)__name;
   struct super_block *sb;
   ino_t ino;
   const unsigned char shwh = !!au_ftest_fillvdir(arg->flags, SHWH);

   arg->err = 0;
   sb = arg->file->f_path.dentry->d_sb;
   au_fset_fillvdir(arg->flags, CALLED);
   /* smp_mb(); */
   if (nlen <= AUFS_WH_PFX_LEN
      || memcmp(name, AUFS_WH_PFX, AUFS_WH_PFX_LEN)) {
      if (test_known(&arg->delist, name, nlen)
         || au_nhash_test_known_wh(&arg->whlist, name, nlen))
         goto out; /* already exists or whiteouted */
   }
   arg->err = au_ino(sb, arg->bindex, h_ino, d_type, &ino);
   if (!arg->err) {
      if (unlikely(nlen > AUFS_MAX_NAMELEN))
         d_type = DT_UNKNOWN;
      arg->err = append_de(arg->vdir, name, nlen, ino,
         d_type, &arg->delist);
   }
```

+} else if (au_ftest_fillvdir(arg->flags, WHABLE)) {
+name += AUFS_WH_PFX_LEN;
+nlen -= AUFS_WH_PFX_LEN;
+if (au_nhash_test_known_wh(&arg->whlist, name, nlen))
+goto out; /* already whiteouted */
+
+if (shwh)
+arg->err = au_wh_ino(sb, arg->bindex, h_ino, d_type,
+ &ino);
+if (!arg->err) {
+if (nlen <= AUFS_MAX_NAMELEN + AUFS_WH_PFX_LEN)
+d_type = DT_UNKNOWN;
+arg->err = au_nhash_append_wh
+(&arg->whlist, name, nlen, ino, d_type,
+ arg->bindex, shwh);
+}
+}
+
+out:
+if (!arg->err)
+arg->vdir->vd_jiffy = jiffies;
+/* smp_mb(); */
+AuTraceErr(arg->err);
+return arg->err;
+
+static int au_handle_shwh(struct super_block *sb, struct au_vdir *vdir,
+struct au_nhash *whlist, struct au_nhash *delist)
+{
+#ifdef CONFIG_AUFS_SHWH
+int err;
+unsigned int nh, u;
+struct hlist_head *head;
+struct au_vdir_wh *pos;
+struct hlist_node *n;
+char *p, *o;
+struct au_vdir_destr *destr;
+
+AuDebugOn(!au_opt_test(au_mntflags(sb), SHWH));
+
+err = -ENOMEM;
+o = p = (void *)__get_free_page(GFP_NOFS);
+if (unlikely(!p))
+goto out;
+
+err = 0;
+nh = whlist->nh_num;
+memcpy(p, AUFS_WH_PFX, AUFS_WH_PFX_LEN);
+p += AUFS_WH_PFX_LEN;
+for (u = 0; u < nh; u++) {
+head = whlist->nh_head + u;
+hlist_for_each_entry_safe(pos, n, head, wh_hash) {
+destr = &pos->wh_str;
+memcpy(p, destr->name, destr->len);
+err = append_de(vdir, o, destr->len + AUFS_WH_PFX_LEN,
+pos->wh_ino, pos->wh_type, delist);
+if (unlikely(err))
+break;
+}
+}
+
+free_page((unsigned long)o);
+
+out:
+AuTraceErr(err);
+return err;
+#else
+return 0;
+#endif
+
+static int au_do_read_vdir(struct fillvdir_arg *arg)
+{
+int err;
+unsigned int rdhash;
+loff_t offset;
+aufs_bindex_t bbot, bindex, btop;
+unsigned char shwh;
+struct file *hf, *file;
+struct super_block *sb;
+
+file = arg->file;
+sb = file->f_path.dentry->d_sb;
+SiMustAnyLock(sb);
+
+rdhash = au_sbi(sb)->si_rdhash;
+if (!rdhash)
+rdhash = au_rdhash_est(au_dir_size(file, /*dentry*/NULL));
+err = au_nhash_alloc(&arg->delist, rdhash, GFP_NOFS);
+if (unlikely(err))
+goto out;
+
+err = au_nhash_alloc(&arg->whlist, rdhash, GFP_NOFS);
+if (unlikely(err))
+goto out_delist;
+
+err = 0;
+arg->flags = 0;
+shwh = 0;
+if (au_opt_test(au_mntflags(sb), SHWH)) {
    +shwh = 1;
    +au_fset_fillvdir(arg->flags, SHWH);
    +}
+btop = au_fbtop(file);
+bbot = au_fbbot_dir(file);
+for (bindex = btop; !err && bindex <= bbot; bindex++) {
    +hf = au_hf_dir(file, bindex);
    +if (!hf)
        +continue;
    +offset = vfsub_llseek(hf, 0, SEEK_SET);
    +err = offset;
    +if (unlikely(offset))
        +break;
    +arg->bindex = bindex;
    +au_fclr_fillvdir(arg->flags, WHABLE);
    +if (shwh
        + || (bindex != bbot
            +&& au_br_whable(au_sbr_perm(sb, bindex))))
        +au_fset_fillvdir(arg->flags, WHABLE);
        +do {
            +arg->err = 0;
            +au_fclr_fillvdir(arg->flags, CALLED);
            +# smp_mb(); */
            +err = vfsub_iterate_dir(hf, &arg->ctx);
            +if (err >= 0)
                +err = arg->err;
            +} while (!err && au_ftest_fillvdir(arg->flags, CALLED));
            +
            +#
            +* dir_relax() may be good for concurrency, but aufs should not
            +* use it since it will cause a lockdep problem.
            +#/
            +}
            +
            +if (!err && shwh)
                +err = au_handle_shwh(sb, arg->vdir, &arg->whlist, &arg->delist);
                +au_nhash_wh_free(&arg->whlist);
                +au_nhash_de_free(&arg->delist);
                +out_delist:
                +out:
                +return err;
static int read_vdir(struct file *file, int may_read)
{
    int err;
    unsigned long expire;
    unsigned char do_read;
    struct fillvdir_arg arg = {
        .ctx = {
            .actor = fillvdir
        }
    };
    struct inode *inode;
    struct au_vdir *vdir, *allocated;
    if (!do_read)
        return 0; /* success */
    arg.file = file;
    arg.vdir = vdir;
    err = au_do_read_vdir(&arg);
    if (unlikely(err))
        goto out;
    if (IS_ERR(vdir))
        goto out;
    expire = au_sbi(inode->i_sb)->si_rdcache;
    vdir = au_ivdir(inode);
    if (!vdir)
        do_read = 1;
    file = alloc_vdir(file);
    if (!do_read)
        return 0; /* success */
    if (may_read
        && (inode->i_version != vdir->vd_version
            || time_after(jiffies, vdir->vd_jiffy + expire))
    )
        goto out;
    if (IS_ERR(vdir))
        goto out;
    allocated = vdir;
    if (!do_read)
        return 0; /* success */
    arg.file = file;
    arg.vdir = vdir;
    err = au_do_read_vdir(&arg);
+if (!err) {
+/* file->f_pos = 0; */ /* todo: ctx->pos? */
+vdir->vd_version = inode->i_version;
+vdir->vd_last.ul = 0;
+vdir->vd_last.p.deblk = vdir->vd_deblk[0];
+if (allocated)
+au_set_ivdir(inode, allocated);
+} else if (allocated)
+au_vdir_free(allocated);
+
+out:
+return err;
+}
+
+static int copy_vdir(struct au_vdir *tgt, struct au_vdir *src)
+{ 
+int err, rerr;
+unsigned long ul, n;
+const unsigned int deblk_sz = src->vd_deblk_sz;
+
+AuDebugOn(tgt->vd_nblk != 1);
+
+err = -ENOMEM;
+if (tgt->vd_nblk < src->vd_nblk) {
+unsigned char **p;
+
+p = au_krealloc(tgt->vd_deblk, sizeof(*p) * src->vd_nblk,
+GFP_NOFS, /*may_shrink*/0);
+if (unlikely(!p))
+goto out;
+tgt->vd_deblk = p;
+}
+
+if (tgt->vd_deblk_sz != deblk_sz) {
+unsigned char *p;
+
+p = au_krealloc(tgt->vd_deblk[0], sizeof(*p) * src->vd_nblk,
+GFP_NOFS, /*may_shrink*/0);
+if (unlikely(!p))
+goto out;
+tgt->vd_deblk[0] = p;
+}
+
+memcpy(tgt->vd_deblk[0], src->vd_deblk[0], deblk_sz);
+tgt->vd_version = src->vd_version;
+tgt->vd_jiffy = src->vd_jiffy;
+
+n = src->vd_nblk;
+}
for (ul = 1; ul < n; ul++) {
    tgt->vd_deblk[ul] = kmemdup(src->vd_deblk[ul], deblk_sz, GFP_NOFS);
    if (unlikely(!tgt->vd_deblk[ul]))
        goto out;
    tgt->vd_nblk++;
}

tgt->vd_nblk = n;
tgt->vd_last.ul = tgt->vd_last.ul;
tgt->vd_last.p.deblk = tgt->vd_deblk[tgt->vd_last.ul];
tgt->vd_last.p.deblk += src->vd_last.p.deblk - src->vd_deblk[src->vd_last.ul];

/* smp_mb(); */
return 0; /* success */
out:
    rerr = reinit_vdir(tgt);
    BUG_ON(rerr);
    return err;
}

int au_vdir_init(struct file *file) {
    int err;
    struct inode *inode;
    struct au_vdir *vdir_cache, *allocated;

    /* test file->f_pos here instead of ctx->pos */
    err = read_vdir(file, !file->f_pos);
    if (unlikely(err))
        goto out;

    allocated = NULL;
    vdir_cache = au_fvdircache(file);
    if (!vdir_cache) {
        vdir_cache = alloc_vdir(file);
        err = PTR_ERR(vdir_cache);
    } else if (!file->f_pos && vdir_cache->vd_version != file->f_version) {
        /* test file->f_pos here instead of ctx->pos */
        err = reinit_vdir(vdir_cache);
    } else
        return 0; /* success */
    out:
inode = file_inode(file);
+err = copy_vdir(vdir_cache, au_ivdir(inode));
+if (!err) {
+file->f_version = inode->i_version;
+if (allocated)
+au_set_fvdir_cache(file, allocated);
+} else if (allocated)
+au_vdir_free(allocated);
+
+out:
+return err;
+
+static loff_t calc_offset(struct au_vdir *vdir)
+{
+loff_t offset;
+union au_vdir_deblk_p p;
+
p.deblk = vdir->vd_deblk[vdir->vd_last.ul];
+offset = vdir->vd_last.p.deblk - p.deblk;
+offset += vdir->vd_deblk_sz * vdir->vd_last.ul;
+return offset;
+}
+
/+* returns true or false */
+static int seek_vdir(struct file *file, struct dir_context *ctx)
+{
+int valid;
+unsigned int deblk_sz;
+unsigned long ul, n;
+loff_t offset;
+union au_vdir_deblk_p p, deblk_end;
+struct au_vdir *vdir_cache;
+
+valid = 1;
+vdir_cache = au_fvdir_cache(file);
+offset = calc_offset(vdir_cache);
+AuDbg("offset %lld\n", offset);
+if (ctx->pos == offset)
go to out;
+
+vdir_cache->vd_last.ul = 0;
+vdir_cache->vd_last.p.deblk = vdir_cache->vd_deblk[0];
+if (!ctx->pos)
go to out;
+
+valid = 0;
+deblk_sz = vdir_cache->vd_deblk_sz;
ul = div64_u64(ctx->pos, deblk_sz);
+AuDbg("ul %lu\n", ul);
+if (ul >= vdir_cache->vd_nblk)
+goto out;
+
+n = vdir_cache->vd_nblk;
+for (; ul < n; ul++) {
+  p.deblk = vdir_cache->vd_deblk[ul];
+  deblk_end.deblk = p.deblk + deblk_sz;
+  offset = ul;
+  offset *= deblk_sz;
+  while (!is_deblk_end(&p, &deblk_end) && offset < ctx->pos) {
+    unsigned int l;
+    l = calc_size(p.de->de_str.len);
+    offset += l;
+    p.deblk += l;
+  }
+  if (!is_deblk_end(&vdir_cache->vd_last.p, &deblk_end)) {
+    valid = 1;
+    vdir_cache->vd_last.ul = ul;
+    vdir_cache->vd_last.p = p;
+    break;
+  }
+}
+out:
+/* smp_mb(); */
+AuTraceErr(!valid);
+return valid;
+
+int au_vdir_fill_de(struct file *file, struct dir_context *ctx) {
+{
+  unsigned int l, deblk_sz;
+  union au_vdir_deblk_p deblk_end;
+  struct au_vdir *vdir_cache;
+  struct au_vdir_de *de;
+  vdir_cache = au_fvdir_cache(file);
+  if (!seek_vdir(file, ctx))
+    return 0;
+  deblk_sz = vdir_cache->vd_deblk_sz;
+  while (1) {
+    deblk_end.deblk = vdir_cache->vd_deblk[vdir_cache->vd_last.ul];
+    deblk_end.deblk += deblk_sz;
+    while (!is_deblk_end(&vdir_cache->vd_last.p, &deblk_end)) {
+      l = calc_size(p.de->de_str.len);
+      offset += l;
+      p.deblk += l;
+    }
+    if (!is_deblk_end(&vdir_cache->vd_last.p, &deblk_end)) {
+      valid = 1;
+      vdir_cache->vd_last.ul = ul;
+      vdir_cache->vd_last.p = p;
+      break;
+    }
+  }
+de = vdir_cache->vd_last.p.de;
+AuDbg("%.*s, off%lld, i%lu, dt%d
",
+ de->de_str.len, de->de_str.name, ctx->pos,
+ (unsigned long)de->de_ino, de->de_type);
+if (unlikely(!dir_emit(ctx, de->de_str.name,
+ de->de_str.len, de->de_ino,
+ de->de_type))) {
+/* todo: ignore the error caused by udba? */
+/* return err; */
+return 0;
+}
+
+l = calc_size(de->de_str.len);
+vdir_cache->vd_last.p.deblk += l;
+ctx->pos += l;
+}
+if (vdir_cache->vd_last.ul < vdir_cache->vd_nblk - 1) {
+vdir_cache->vd_last.ul++;
+vdir_cache->vd_last.p.deblk
+= vdir_cache->vd_deblk[vdir_cache->vd_last.ul];
+ctx->pos = deblk_sz * vdir_cache->vd_last.ul;
+continue;
+}
+break;
+}
+
+/* smp_mb(); */
+return 0;
+}
--- linux-4.15.0.orig/fs/aufs/vfsub.c
+++ linux-4.15.0/fs/aufs/vfsub.c
@@ -0,0 +1,892 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ */
+/* This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
+/* This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ */
+/* You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+ /*
+ * sub-routines for VFS
+ */
+
+ #include <linux/mnt_namespace.h>
+ #include <linux/namei.h>
+ #include <linux/nsproxy.h>
+ #include <linux/security.h>
+ #include <linux/splice.h>
+ #include "aufs.h"
+
+ #ifdef CONFIG_AUFS_BR_FUSE
+ int vfsub_test_mntns(struct vfsmount *mnt, struct super_block *h_sb)
+ {
+ if (!au_test_fuse(h_sb) || !au_userns)
+ return 0;
+ +return is_current_mnt_ns(mnt) ? 0 : -EACCES;
+ +}
+ #endif
+ +
+ int vfsub_sync_filesystem(struct super_block *h_sb, int wait)
+ {
+ int err;
+ +lockdep_off();
+ down_read(&h_sb->s_umount);
+ err = __sync_filesystem(h_sb, wait);
+ up_read(&h_sb->s_umount);
+ lockdep_on();
+ +
+ +return err;
+ +}
+ +
+ /* ---------------------------------------------------------- */
+ +
+ int vfsub_update_h_iattr(struct path *h_path, int *did)
+ {
+ int err;
+ +struct kstat st;
+ +struct super_block *h_sb;
+ +
+ /*
+ * Always needs h_path->mnt for LSM or FUSE branch.
+ */
+ +AuDebugOn(!h_path->mnt);
+ +
/* for remote fs, leave work for its getattr or d_revalidate */
/* for bad i_attr fs, handle them in aufs_getattr() */
/* still some fs may acquire i_mutex. we need to skip them */
+err = 0;
+if (!did)
+did = &err;
+h_sb = h_path->dentry->d_sb;
+*did = (!au_test_fs_remote(h_sb) && au_test_fs_refresh_iattr(h_sb));
+if (*did)
+err = vfs_getattr(h_path, &st);
+
+return err;
+
+#include <linux/fs.h>
+
+/* ---------------------------------------------------------------------- */
+
+struct file *vfs_getattr(file *path, struct dentry *dentry, struct vfsub_attr *args, struct au_branch *au_branch)
+{
+
+    struct file *file;
+
+    file = filp_open(path,
+        OFLAGS /* | __FMODE_NONOTIFY */,      
+        mode);
+    if (IS_ERR(file))
+        goto out;
+   vfs_getattr(&file->f_path, /*did*/NULL); /*ignore*/
+    out:
+    return file;
+
+}  

/* Ideally this function should call VFS:do_last() in order to keep all its 
+ * checkings. But it is very hard for aufs to regenerate several VFS internal 
+ * structure such as nameidata. This is a second (or third) best approach. 
+ * cf. linux/fs/namei.c:do_last(), lookup_open() and atomic_open().  
+ */
+int vfs_setattr(struct inode *dir, struct dentry *dentry, 
+       struct vfsub_aopen_args *args, struct au_branch *au_branch)
+{
+int err;
+struct file *file = args->file;
+/* copied from linux/fs/namei.c:atomic_open */
+struct dentry *const DENTRY_NOT_SET = (void *)-1UL;
+
+IMustLock(dir);
+AuDebugOn(!dir->i_op->atomic_open);
+
+err = au_br_test_oflag(args->open_flag, br);
+if (unlikely(err))
+goto out;
+
+args->file->f_path.dentry = DENTRY_NOT_SET;
+args->file->f_path.mnt = au_br_mnt(br);
+err = dir->i_op->atomic_open(dir, dentry, file, args->open_flag,
++++ args->create_mode, args->opened);
+if (err >= 0) {
++++ /* some filesystems don't set FILE_CREATED while succeeded */
++++ if (*args->opened & FILE_CREATED)
++++ fsnotify_create(dir, dentry);
++++ } else
++++ goto out;
+
+au_br_get(br);
+fsnotify_open(file);
+
+out:
+return err;
+
+int vfsub_kern_path(const char *name, unsigned int flags, struct path *path)
+{
+int err;
+
+err = kern_path(name, flags, path);
+if (!err && d_is_positive(path->dentry))
++
++}
+    /* todo: call VFS:may_open() here */
+    +err = open_check_o_direct(file);
+    /* todo: ima_file_check() too? */
+    +if (!err && (args->open_flag & __FMODE_EXEC))
+    +err = deny_write_access(file);
+    +if (unlikely(err))
+    /* note that the file is created and still opened */
+    +goto out;
+    +}
++au_br_get(br);
+fsnotify_open(file);
+
+out:
+return err;
+
+int vfsub_kern_path(const char *name, unsigned int flags, struct path *path)
+{
+int err;
+
+err = kern_path(name, flags, path);
+if (!err && d_is_positive(path->dentry))
++
+vfsub_update_h_iattr(path, /*did*/NULL); /*ignore*/
+return err;
+
+struct dentry *vfsub_lookup_one_len_unlocked(const char *name,
      struct path *ppath, int len)
+
+}

struct path *vfsub_lookup_one_len_unlocked(const char *name,
      struct path *ppath, int len)
{
+
+struct path;
+
+path.dentry = lookup_one_len_unlocked(name, ppath->dentry, len);
+if (IS_ERR(path.dentry))
+    goto out;
+if (d_is_positive(path.dentry)) {
      path.mnt = ppath->mnt;
      vfsub_update_h_iattr(&(path, /*did*/NULL); /*ignore*/
+}
+
+out:
+AuTraceErrPtr(path.dentry);
+return path.dentry;
+
+}

struct dentry *vfsub_lookup_one_len(const char *name, struct path *ppath,
      int len)
{
+
+struct path;
+
+/* VFS checks it too, but by WARN_ON_ONCE() */
+IMustLock(d_inode(ppath->dentry));
+
+path.dentry = lookup_one_len(name, ppath->dentry, len);
+if (IS_ERR(path.dentry))
+    goto out;
+if (d_is_positive(path.dentry)) {
      path.mnt = ppath->mnt;
      vfsub_update_h_iattr(&(path, /*did*/NULL); /*ignore*/
+}
+
+out:
+AuTraceErrPtr(path.dentry);
+return path.dentry;
+
+}

void vfsub_call_lkup_one(void *args)
+
+struct vfsub_lkup_one_args *a = args;
+*a->errp = vfsub_lkup_one(a->name, a->ppath);
+}
struct dentry *vfsub_lock_rename(struct dentry *d1, struct au_hinode *hd1,  
struct dentry *d2, struct au_hinode *hd2)  
{
+struct dentry *d;
+
+lockdep_off();
+d = lock_rename(d1, d2);
+lockdep_on();
+au_hn_suspend(hd1);
+if (hd1 != hd2)
+au_hn_suspend(hd2);
+
+return d;
+}

void vfsub_unlock_rename(struct dentry *d1, struct au_hinode *hd1,  
struct dentry *d2, struct au_hinode *hd2)  
{
+au_hn_resume(hd1);
+if (hd1 != hd2)
+au_hn_resume(hd2);
+lockdep_off();
+unlock_rename(d1, d2);
+lockdep_on();
+}

int vfsub_create(struct inode *dir, struct path *path, int mode, bool want_excl)  
{
+int err;
+struct dentry *d;
+
+IMustLock(dir);
+
+d = path->dentry;
+path->dentry = d->d_parent;
+err = security_path_mknod(path, d, mode, 0);
+path->dentry = d;
+if (unlikely(err))
+goto out;
+
+lockdep_off();
+err = vfs_create(dir, path->dentry, mode, want_excl);
+lockdep_on();
+if (!err) {
+struct path tmp = *path;
+int did;
+
+vfs peel_h_iattr(&tmp, &did);
+if (did) {
+tmp.dentry = path->dentry->d_parent;
+vfs peel_h_iattr(&tmp, /*did*/NULL);
+}
+/*ignore*/
+}
+
+int vfs sub symlink(struct inode *dir, struct path *path, const char *symname)
+{
+int err;
+struct dentry *d;
+
+IMustLock(dir);
+
+d = path->dentry;
+path->dentry = d->d_parent;
+err = security path symlink(path, d, symname);
+path->dentry = d;
+if (unlikely(err))
+goto out;
+
+lockdep_off();
+err = vfs symlink(dir, path->dentry, symname);
+lockdep_on();
+if (!err) {
+struct path tmp = *path;
+int did;
+
+vfs peel_h_iattr(&tmp, &did);
+if (did) {
+tmp.dentry = path->dentry->d_parent;
+vfs peel_h_iattr(&tmp, /*did*/NULL);
+}
+/*ignore*/
+}
+
+out:
+-return err;
+}
```c
int vfsub_mknod(struct inode *dir, struct path *path, int mode, dev_t dev) {
    int err;
    struct dentry *d;
    IMustLock(dir);
    
    d = path->dentry;
    path->dentry = d->d_parent;
    err = security_path_mknod(path, d, mode, new_encode_dev(dev));
    path->dentry = d;
    if (unlikely(err))
        goto out;
    lockdep_off();
    err = vfs_mknod(dir, path->dentry, mode, dev);
    lockdep_on();
    if (!err) {
        struct path tmp = *path;
        int did;
        
        vfsub_update_h_iattr(&tmp, &did);
        if (did) {
            tmp.dentry = path->dentry->d_parent;
            vfsub_update_h_iattr(&tmp, /*did*/NULL);
        }
        /*ignore*/
    }
out:
    return err;
}

static int au_test_nlink(struct inode *inode) {
    const unsigned int link_max = UINT_MAX >> 1; /* rough margin */
    
    if (!au_test_fs_no_limit_nlink(inode->i_sb)
        || inode->i_nlink < link_max)
        return 0;
    return -EMLINK;
}

int vfsub_link(struct dentry *src_dentry, struct inode *dir, struct path *path,
       struct inode **delegated_inode) {
    int err;
    
    struct path tmp = *path;
    int did;
    
    vfsub_update_h_iattr(&tmp, &did);
    if (did) {
        tmp.dentry = path->dentry->d_parent;
        vfsub_update_h_iattr(&tmp, /*did*/NULL);
    }
    /*ignore*/
    /*
    */
}
```
struct dentry *d = path->dentry;
+path->dentry = d->d_parent;
+err = security_path_link(src_dentry, path, d);
+path->dentry = d;
+if (unlikely(err))
+goto out;
+
+lockdep_off();
+err = vfs_link(src_dentry, dir, path->dentry, delegated_inode);
+lockdep_on();
+if (!err) {
+struct path tmp = *path;
+int did;
+
+/* fuse has different memory inode for the same inumber */
+vfs_sub_update_h_iattr(&tmp, &did);
+if (did) {
+tmp.dentry = path->dentry->d_parent;
+vfs_sub_update_h_iattr(&tmp, /*did*/NULL);
+tmp.dentry = src_dentry;
+vfs_sub_update_h_iattr(&tmp, /*did*/NULL);
+}
+/*ignore*/
+}
+
+out:
+return err;
+}
+
+int vfs_sub_rename(struct inode *src_dir, struct dentry *src_dentry, 
+struct inode *dir, struct path *path, 
+struct ino **delegated_inode, unsigned int flags)
+{
+int err;
+struct path tmp = {
+.mnt= path->mnt
+};
+struct dentry *d =
+IMustLock(dir);
+IMustLock(src_dir);
+
+d = path->dentry;
+path->dentry = d->d_parent;
+tmp.dentry = src_dentry->d_parent;
+err = security_path_rename(&tmp, src_dentry, path, d, /*flags*/0);
+path->dentry = d;
+if (unlikely(err))
+goto out;
+
+lockdep_off();
+err = vfs_rename(src_dir, src_dentry, dir, path->dentry,
+ delegated_inode, flags);
+lockdep_on();
+if (!err) {
+int did;
+
+tmp.dentry = d->d_parent;
+vfs_sub_update_h_iattr(&tmp, &did);
+if (did) {
+tmp.dentry = src_dentry;
+vfs_sub_update_h_iattr(&tmp, /*did*/NULL);
+tmp.dentry = src_dentry->d_parent;
+vfs_sub_update_h_iattr(&tmp, /*did*/NULL);
+}
+#/ignore*/
+
+out:
+return err;
+
+int vfs_sub_mkdir(struct inode *dir, struct path *path, int mode)
+{
+int err;
+struct dentry *d;
+
+IMustLock(dir);
+
+d = path->dentry;
+path->dentry = d->d_parent;
+err = security_path_mkdir(path, d, mode);
+path->dentry = d;
+if (unlikely(err))
+goto out;
+
+lockdep_off();
+err = vfs_mkdir(dir, path->dentry, mode);
+lockdep_on();
+if (!err) {
+struct path tmp = *path;
+int did;
+
+vfsub_update_h_iattr(&tmp, &did);
+if (did) {
+tmp.dentry = path->dentry->d_parent;
+vfsub_update_h_iattr(&tmp, /*did*/NULL);
+}
+/*ignore*/
+}
+
+out:
+return err;
+
+int vfsub_rmdir(struct inode *dir, struct path *path)
{+
int err;
+struct dentry *d;
+
+IMustLock(dir);
+
+d = path->dentry;
+path->dentry = d->d_parent;
+err = security_path_rmdir(path, d);
+path->dentry = d;
+if (unlikely(err))
+goto out;
+
+lockdep_off();
+err = vfs_rmdir(dir, path->dentry);
+lockdep_on();
+if (!err) {
+struct path tmp = {
+.dentry= path->dentry->d_parent,
+.mnt= path->mnt
+};
+
+vfsub_update_h_iattr(&tmp, /*did*/NULL); /*ignore*/
+}
+
+out:
+return err;
+}
/* ------------------------------- */
+/* todo: support mmap_sem? */
+ssize_t vfsub_read_u(struct file *file, char __user *ubuf, size_t count,
+ loff_t *ppos)
+{
+ssize_t err;
+
+lockdep_off();
+err = vfs_read(file, ubuf, count, ppos);
+lockdep_on();
+if (err >= 0)
+vfsub_update_h_iattr(&file->f_path, /*did*/NULL); /*ignore*/
+return err;
+}
+
+/* todo: kernel_read()? */
+ssize_t vfsub_read_k(struct file *file, void *kbuf, size_t count,
+ loff_t *ppos)
+{
+ssize_t err;
+mm_segment_t oldfs;
+union {
+void *k;
+char __user *u;
+} buf;
+
+buf.k = kbuf;
+oldfs = get_fs();
+set_fs(KERNL_DS);
+err = vfs_read_u(file, buf.u, count, ppos);
+set_fs(oldfs);
+return err;
+}
+
+ssize_t vfsub_write_u(struct file *file, const char __user *ubuf, size_t count,
+ loff_t *ppos)
+{
+ssize_t err;
+
+lockdep_off();
+err = vfs_write(file, ubuf, count, ppos);
+lockdep_on();
+if (err >= 0)
+vfsub_update_h_iattr(&file->f_path, /*did*/NULL); /*ignore*/
+return err;
+}
```c
ssize_t vfsub_write_k(struct file *file, void *kbuf, size_t count, loff_t *ppos)
+
+{  
+ssize_t err;
+mm_segment_t oldfs;
+union {
+void *k;
+const char __user *u;
+} buf;
+ buf.k = kbuf;
+oldfs = get_fs();
+set_fs(KERNEL_DS);
+err = vfsub_write_u(file, buf.u, count, ppos);
+set_fs(oldfs);
+return err;
+}
+
+int vfsub_flush(struct file *file, fl_owner_t id)
+
+{  
+int err;
+
+err = 0;
+if (file->f_op->flush) {
+if (!au_test_nfs(file->f_path.dentry->d_sb))
+err = file->f_op->flush(file, id);
+else {
+lockdep_off();
+err = file->f_op->flush(file, id);
+lockdep_on();
+}
+lockdep_off();
+vfsub_update_h_iattr(&file->f_path, /*did*/NULL); /*ignore*/
+}
+return err;
+}
+
+int vfsub_iterate_dir(struct file *file, struct dir_context *ctx)
+
+{  
+int err;
+
+AuDbg("%pD, ctx{%pf, %llu}\n", file, ctx->actor, ctx->pos);
+lockdep_off();
+err = iterate_dir(file, ctx);
+lockdep_on();
+if (err >= 0)
+vfsub_update_h_iattr(&file->f_path, /*did*/NULL); /*ignore*/
```
return err;
}

long vfsub_splice_to(struct file *in, loff_t *ppos,
    struct pipe_inode_info *pipe, size_t len,
    unsigned int flags)
{
    long err;
    lockdep_off();
    err = do_splice_to(in, ppos, pipe, len, flags);
    lockdep_on();
    file_accessed(in);
    if (err >= 0)
        vfsub_update_h_iattr(&in->f_path, /*did*/NULL); /*ignore*/
    return err;
}

long vfsub_splice_from(struct pipe_inode_info *pipe, struct file *out,
    loff_t *ppos, size_t len, unsigned int flags)
{
    long err;
    lockdep_off();
    err = do_splice_from(pipe, out, ppos, len, flags);
    lockdep_on();
    if (err >= 0)
        vfsub_update_h_iattr(&out->f_path, /*did*/NULL); /*ignore*/
    return err;
}

int vfsub_fsync(struct file *file, struct path *path, int datasync)
{
    int err;
    /* file can be NULL */
    lockdep_off();
    err = vfs_fsync(file, datasync);
    lockdep_on();
    if (!err) {
        if (!path) {
            AuDebugOn(!file);
            path = &file->f_path;
        }
        vfsub_update_h_iattr(path, /*did*/NULL); /*ignore*/
    }
    return err;
int vfsub_trunc(struct path *h_path, loff_t length, unsigned int attr, struct file *h_file)
{
  int err;
  struct inode *h_inode;
  struct super_block *h_sb;

  if (!h_file) {
    err = vfsub_truncate(h_path, length);
    goto out;
  }

  h_inode = d_inode(h_path->dentry);
  h_sb = h_inode->i_sb;
  lockdep_off();
  sb_start_write(h_sb);
  lockdep_on();
  err = locks_verify_truncate(h_inode, h_file, length);
  if (!err)
    err = security_path_truncate(h_path);
  if (!err) {
    lockdep_off();
    err = do_truncate(h_path->dentry, length, attr, h_file);
    lockdep_on();
  }
  lockdep_off();
  sb_end_write(h_sb);
  lockdep_on();

out:
  return err;
}

/* ---------------------------------------------------------------------- */

struct au_vfsub_mkdir_args {
  int *errp;
  struct inode *dir;
  struct path *path;
  int mode;
};

static void au_call_vfsub_mkdir(void *args)
{
  struct au_vfsub_mkdir_args *a = args;
int vfsub_sio_mkdir(struct inode *dir, struct path *path, int mode) {
    int err, do_sio, wkq_err;
    do_sio = au_test_h_perm_sio(dir, MAY_EXEC | MAY_WRITE);
    if (!do_sio) {
        lockdep_off();
        err = vfsub_mkdir(dir, path, mode);
        lockdep_on();
    } else {
        struct au_vfsub_mkdir_args args = {
            .errp = &err,
            .dir = dir,
            .path = path,
            .mode = mode
        };
        wkq_err = au_wkq_wait(au_call_vfsub_mkdir, &args);
        if (unlikely(wkq_err))
            err = wkq_err;
    }
    return err;
}

int vfsub_sio_rmdir(struct inode *dir, struct path *path) {
    int err, do_sio, wkq_err;
    do_sio = au_test_h_perm_sio(dir, MAY_EXEC | MAY_WRITE);
    if (!do_sio) {
        lockdep_off();
        err = vfsub_rmdir(dir, path);
        lockdep_on();
    } else {
        struct au_vfsub_rmdir_args a = args;
        *a->errp = vfsub_rmdir(a->dir, a->path);
    }
    return err;
}

int vfsub_sio_rmdir(struct inode *dir, struct path *path) {
    int err, do_sio, wkq_err;
    do_sio = au_test_h_perm_sio(dir, MAY_EXEC | MAY_WRITE);
    if (!do_sio) {
        lockdep_off();
        err = vfsub_rmdir(dir, path);
        lockdep_on();
    }
}
+} else { 
+struct au_vfsub_rmdir_args args = { 
+  .errp= &err, 
+  .dir= dir, 
+  .path= path 
+}; 
+wq_err = au_wq_wait(au_call_vfsub_rmdir, &args); 
+if (unlikely(wq_err)) 
+err = wq_err; 
+} 
+ 
+return err; 
+
+/* ---------------------------------------------------------------------- */
+
+struct notify_change_args {
+  int *errp;
+  struct path *path;
+  struct iattr *ia;
+  struct inode **delegated_inode;
+}; 
+
+static void call_notify_change(void *args) 
+{ 
+  struct notify_change_args *a = args; 
+  struct inode *h_inode; 
+  
+  h_inode = d_inode(a->path->dentry); 
+  IMustLock(h_inode); 
+  
+  *a->errp = -EPERM; 
+  if (!IS_IMMUTABLE(h_inode) && !IS_APPEND(h_inode)) { 
+lockdep_off(); 
+  *a->errp = notify_change(a->path->dentry, a->ia, 
+    a->delegated_inode); 
+lockdep_on(); 
+  if (!*a->errp) 
+vfsub_update_h_iattr(a->path, /*did*/NULL); /*ignore*/ 
+  } 
+AuTraceErr(*a->errp); 
+} 
+ 
+int vfsub_notify_change(struct path *path, struct iattr *ia, 
+  struct inode **delegated_inode) 
+{ 
+  int err; 
+  struct notify_change_args args = { 
+  
+}
+errp= &err,
+path= path,
+ia= ia,
+.delegated_inode= delegated_inode
+};
+
call_notify_change(&args);
+
+return err;
+}
+
+int vfsub_sio_notify_change(struct path *path, struct iattr *ia,
+  struct inode **delegated_inode)
+{
+  int err, wkq_err;
+  struct notify_change_args args = {
+    .errp= &err,
+    .path= path,
+    .ia= ia,
+    .delegated_inode= delegated_inode
+  };
+  
+  wkq_err = au_wkq_wait(call_notify_change, &args);
+  if (unlikely(wkq_err))
+    err = wkq_err;
+  
+  return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+struct unlink_args {
+  int *errp;
+  struct inode *dir;
+  struct path *path;
+  struct inode **delegated_inode;
+};
+
+static void call_unlink(void *args)
+{
+  struct unlink_args *a = args;
+  struct dentry *d = a->path->dentry;
+  struct inode *h_inode;
+  const int stop_sillyrename = (au_test_nfs(d->d_sb)
+    && au_dcount(d) == 1);
+  
+  IMustLock(a->dir);
+  
+  /* */
+  /* */
a->path->dentry = d->d_parent;
*a->errp = security_path_unlink(a->path, d);
a->path->dentry = d;
if (unlikely(*a->errp))
{return;
+
if (!stop_sillyrename)
+dget(d);
+h_inode = NULL;
if (d_is_positive(d)) {
+h_inode = d_inode(d);
ihold(h_inode);
+
+lockdep_off();
*a->errp = vfs_unlink(a->dir, d, a->delegated_inode);
+lockdep_on();
+if (!*a->errp) {
+struct path tmp = {
+.dentry = d->d_parent,
+.mnt= a->path->mnt
+};
+vfs_sub_update_h_iattr(&tmp, /*did*/NULL); /*ignore*/
+}
+
if (!stop_sillyrename)
+dput(d);
if (h_inode)
iput(h_inode);
+
AuTraceErr(*a->errp);
+
+/*
+ * @dir: must be locked.
+ * @dentry: target dentry.
+ */
+int vfs_sub_unlink(struct inode *dir, struct path *path,
+ struct inode **delegated_inode, int force)
+{
+int err;
+struct unlink_args args = {
+.errp= &err,
+.dir= dir,
+.path= path,
+.delegated_inode= delegated_inode
+};
+
ifdef (!force)
call_unlink(&args);
else {
int wkq_err;

wkq_err = au_wkq_wait(call_unlink, &args);
if (unlikely(wkq_err))
err = wkq_err;
}

return err;
#endif

--- linux-4.15.0.orig/fs/aufs/vfsub.h
+++ linux-4.15.0/fs/aufs/vfsub.h
@@ -0,0 +1,360 @@
#ifdef __KERNEL__

#include <linux/fs.h>
#include <linux/mount.h>
#include <linux/posix_acl.h>
#include <linux/xattr.h>
#include "debug.h"

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/* sub-routines for VFS */

/* copied from linux/fs/internal.h */
/* todo: BAD approach!! */
+extern void __mnt_drop_write(struct vfsmount *);
+extern int open_check_o_direct(struct file *f);
+
+/* lock subclass for lower inode */
+/* default MAX_LOCKDEP_SUBCLASSES(8) is not enough */
+/* reduce? gave up. */
+
+enum {
+AuLsc_I_Begin = I_MUTEX_PARENT2, /* 5 */
+AuLsc_I_PARENT, /* lower inode, parent first */
+AuLsc_I_PARENT2,/* copyup dirs */
+AuLsc_I_PARENT3,/* copyup wh */
+AuLsc_I_CHILD,
+AuLsc_I_CHILD2,
+AuLsc_I_End
+};
+
+/* to debug easier, do not make them inlined functions */
+#define MtxMustLock(mtx) AuDebugOn(!mutex_is_locked(mtx))
+#define IMustLock(i) AuDebugOn(!inode_is_locked(i))
+
+/* why VFS doesn't define it? */
+static inline
+void vfsub_inode_lock_shared_nested(struct inode *inode, unsigned int sc)
+{
+tdown_read_nested(&inode->i_rwlock, sc);
+}
+
+/* ---------------------------------------------- */
+
+static inline void vfsub_drop_nlink(struct inode *inode)
+{
+AuDebugOn(!inode->i_nlink);
+drop_nlink(inode);
+}
+
+static inline void vfsub_dead_dir(struct inode *inode)
+{
+AuDebugOn(!S_ISDIR(inode->i_mode));
+inode->i_flags |= S_DEAD;
+clear_nlink(inode);
+}
+
+static inline int vfsub_native_ro(struct inode *inode)
+{
+return sb_rdonly(inode->i_sb)
#ifdef CONFIG_AUFS_BR_FUSE
+int vfsub_test_mntns(struct vfsmount *mnt, struct super_block *h_sb);
+#else
+AuStubInt0(vfsub_test_mntns, struct vfsmount *mnt, struct super_block *h_sb);
+#endif
+
+int vfsub_sync_filesystem(struct super_block *h_sb, int wait);
+
+/* ---------------------------------------------------------------------- */
+
+int vfsub_update_h_iattr(struct path *h_path, int *did);
+struct file *vfsub_dentry_open(struct path *path, int flags);
+struct file *vfsub_filp_open(const char *path, int oflags, int mode);
+struct vfsub_aopen_args {
+    struct file *file;
+    unsigned int open_flag;
+    umode_t create_mode;
+    int opened;
+};
+struct au_branch;
+int vfsub_atomic_open(struct inode *dir, struct dentry *dentry,
+    struct vfsub_aopen_args *args, struct au_branch *br);
+int vfsub_kern_path(const char *name, unsigned int flags, struct path *path);
+
+struct dentry *vfsub_lookup_one_len_unlocked(const char *name,
+    struct path *ppath, int len);
+struct dentry *vfsub_lookup_one_len(const char *name, struct path *ppath,
+    int len);
+
+struct vfsub_lkup_one_args {
+    struct dentry **errp;
+    struct qstr *name;
+    struct path *ppath;
+};
+
+static inline struct dentry *vfsub_lkup_one(struct qstr *name,
+    struct path *ppath)
+{
+    return vfsub_lookup_one_len(name->name, ppath, name->len);
+}
+
+void vfsub_call_lkup_one(void *args);
+
static inline int vfsub_mnt_want_write(struct vfsmount *mnt)
{
  int err;
  lockdep_off();
  err = mnt_want_write(mnt);
  lockdep_on();
  return err;
}

static inline void vfsub_mnt_drop_write(struct vfsmount *mnt)
{
  lockdep_off();
  mnt_drop_write(mnt);
  lockdep_on();
}

/* if 0 /* reserved */
static inline void vfsub_mnt_drop_write_file(struct file *file)
{
  lockdep_off();
  mnt_drop_write_file(file);
  lockdep_on();
}
#endif

struct au_hinode;
struct dentry *vfsub_lock_rename(struct dentry *d1, struct au_hinode *hdir1,
  struct dentry *d2, struct au_hinode *hdir2);
void vfsub_unlockRename(struct dentry *d1, struct au_hinode *hdir1,
  struct dentry *d2, struct au_hinode *hdir2);

int vfsub_create(struct inode *dir, struct path *path, int mode,
  bool want_excl);
int vfsub_symlink(struct inode *dir, struct path *path,
  const char *symname);
int vfsub_mknod(struct inode *dir, struct path *path, int mode, dev_t dev);
int vfsub_link(struct dentry *src_dentry, struct inode *dir,
  struct path *path, struct inode **delegated_inode);
int vfsub_rename(struct inode *src_inode, struct dentry *src_dentry,
  struct inode *dir, struct path *path,
  struct ino_t *delegated_inode, unsigned int flags);
int vfsub_mkdir(struct inode *dir, struct path *path);
int vfsub_rmdir(struct inode *dir, struct path *path);
ssize_t vfsub_read_u(struct file *file, char __user *ubuf, size_t count,
    loff_t *ppos);
ssize_t vfsub_read_k(struct file *file, void *kbuf, size_t count,
    loff_t *ppos);
ssize_t vfsub_write_u(struct file *file, const char __user *ubuf, size_t count,
    loff_t *ppos);
ssize_t vfsub_write_k(struct file *file, void *kbuf, size_t count,
    loff_t *ppos);
int vfsub_flush(struct file *file, fl_owner_t id);
int vfsub_iterate_dir(struct file *file, struct dir_context *ctx);

static inline loff_t vfsub_f_size_read(struct file *file)
{
    return i_size_read(file_inode(file));
}

static inline unsigned int vfsub_file_flags(struct file *file)
{
    unsigned int flags;
    spin_lock(&file->f_lock);
    flags = file->f_flags;
    spin_unlock(&file->f_lock);
    return flags;
}

static inline int vfsub_file_execed(struct file *file)
{
    /* todo: direct access f_flags */
    return (!!(vfsub_file_flags(file) & __FMODE_EXEC));
}

#if 0 /* reserved */
static inline void vfsub_file_accessed(struct file *h_file)
{
    file_accessed(h_file);
    vfsub_update_h_iattr(&h_file->f_path, /*did*/NULL); /*ignore*/
}
#endif

#if 0 /* reserved */
static inline void vfsub_touch_atime(struct vfsmount *h_mnt,
    struct dentry *h_dentry)
{
struct path h_path = {
    .dentry = h_dentry,
    .mnt = h_mnt
};
touch_atime(&h_path);
vfsub_update_h_iattr(&h_path, /*did*/NULL); /*ignore*/
}
#endif

static inline int vfsub_update_time(struct inode *h_inode, struct timespec *ts,
    int flags)
{
    return update_time(h_inode, ts, flags);
}

#ifdef CONFIG_FS_POSIX_ACL
static inline int vfsub_acl_chmod(struct inode *h_inode, umode_t h_mode)
{
    int err;

    err = posix_acl_chmod(h_inode, h_mode);
    if (err == -EOPNOTSUPP)
        err = 0;
    return err;
}
#else
AuStubInt0(vfsub_acl_chmod, struct inode *h_inode, umode_t h_mode);
#endif

long vfsub_splice_to(struct file *in, loff_t *ppos,
    struct pipe_inode_info *pipe, size_t len,
    unsigned int flags);

long vfsub_splice_from(struct pipe_inode_info *pipe, struct file *out,
    loff_t *ppos, size_t len, unsigned int flags);

static inline long vfsub_truncate(struct path *path, loff_t length)
{
    long err;

    lockdep_off();
    err = vfs_truncate(path, length);
    lockdep_on();
    return err;
}

int vfsub_trunc(struct path *h_path, loff_t length, unsigned int attr,
    struct file *h_file);
+int vfssub_fsync(struct file *file, struct path *path, int datasync);
+
+/*
+ * re-use branch fs's ioctl(FICLONE) while aufs itself doesn't support such
+ * ioctl.
+ */
+static inline int vfssub_clone_file_range(struct file *src, struct file *dst,
+    u64 len)
+{
+    int err;
+    +lockdep_off();
+    +err = vfs_clone_file_range(src, 0, dst, 0, len);
+    +lockdep_on();
+    +return err;
+}
+
+/* copy_file_range(2) is a syscall */
+static inline ssize_t vfssub_copy_file_range(struct file *src, loff_t src_pos,
+    struct file *dst, loff_t dst_pos,
+    size_t len, unsigned int flags)
+{
+    ssize_t ssz;
+    +lockdep_off();
+    +ssz = vfs_copy_file_range(src, src_pos, dst, dst_pos, len, flags);
+    +lockdep_on();
+    +return ssz;
+}
+
+/* ------------------------------ */
+static inline loff_t vfssub_llseek(struct file *file, loff_t offset, int origin)
+{
+    loff_t err;
+    +lockdep_off();
+    +err = vfs_llseek(file, offset, origin);
+    +lockdep_on();
+    +return err;
+}
+
+/* ------------------------------ */
+int vfssub_sio_mkdir(struct inode *dir, struct path *path, int mode);
+int vfssub_sio_rmdir(struct inode *dir, struct path *path);
+int vfsub_sio_notify_change(struct path *path, struct iattr *ia,
+    struct inode **delegated_inode);
+int vfsub_notify_change(struct path *path, struct iattr *ia,
+  struct inode **delegated_inode);
+int vfsub_unlink(struct inode *dir, struct path *path,
+    struct inode **delegated_inode, int force);
+
+static inline int vfsub_getattr(const struct path *path, struct kstat *st)
+{
+    return vfs_getattr(path, st, STATX_BASIC_STATS, AT_STATX_SYNC_AS_STAT);
+}
+
+static inline int vfsub_setxattr(struct dentry *dentry, const char *name,
+    const void *value, size_t size, int flags)
+{
+    int err;
+    lockdep_off();
+    err = vfs_setxattr(dentry, name, value, size, flags);
+    lockdep_on();
+    return err;
+}
+
+static inline int vfsub_removexattr(struct dentry *dentry, const char *name)
+{
+    int err;
+    lockdep_off();
+    err = vfs_removexattr(dentry, name);
+    lockdep_on();
+    return err;
+}
+
+#endif /* __KERNEL__ */
+#endif /* __AUFS_VFSUB_H__ */
--- linux-4.15.0.orig/fs/aufs/wbr_policy.c
+++ linux-4.15.0/fs/aufs/wbr_policy.c
@@ -0,0 +1,830 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ *(at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
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+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+ /* policies for selecting one among multiple writable branches */
+ */
+
+#include <linux/statfs.h>
+#include "aufs.h"
+
+/* subset of cpup_attr() */
+static noinline_for_stack
+int au_cpdown_attr(struct path *h_path, struct dentry *h_src)
+{
+int err, sbits;
+struct iattr ia;
+struct inode *h_isrc;
+
+h_isrc = d_inode(h_src);
+ia.ia_valid = ATTR_FORCE | ATTR_MODE | ATTR_UID | ATTR_GID;
+ia.ia_mode = h_isrc->i_mode;
+ia.ia_uid = h_isrc->i_uid;
+ia.ia_gid = h_isrc->i_gid;
+sbits = !!(ia.ia_mode & (S_ISUID | S_ISGID));
+au_cpup_attr_flags(d_inode(h_path->dentry), h_isrc->i_flags);
+/* no delegation since it is just created */
+err = vfsub_sio_notify_change(h_path, &ia, /*delegated*/NULL);
+
+/* is this nfs only? */
+if (!err && sbits && au_test_nfs(h_path->dentry->d_sb)) {
+ia.ia_valid = ATTR_FORCE | ATTR_MODE;
+ia.ia_mode = h_isrc->i_mode;
+err = vfsub_sio_notify_change(h_path, &ia, /*delegated*/NULL);
+}
+
+return err;
+}
+
+#define AuCpdown_PARENT_OPQ1
+#define AuCpdown_WHED(1 << 1)
+define AuCpdown_MADE_DIR(1 << 2)
+define AuCpdown_DIROPQ(1 << 3)
+define au_fset_cpdown(flags, name)((flags) & AuCpdown_##name)
+define au_fclr_cpdown(flags, name)
+do { (flags) |= AuCpdown_##name; } while (0)
+define au_ftest_cpdown(flags, name)
+do { (flags) &= ~AuCpdown_##name; } while (0)
+
+static int au_cpdown_dir_opq(struct dentry *dentry, aufs_bindex_t bdst,
+   unsigned int *flags)
+{
+int err;
+struct dentry *opq_dentry;
+
+opq_dentry = au_diropq_create(dentry, bdst);
+err = PTR_ERR(opq_dentry);
+if (IS_ERR(opq_dentry))
+goto out;
+dput(opq_dentry);
+au_fset_cpdown(*flags, DIROPQ);
+
+out:
+return err;
+
+static int au_cpdown_dir_wh(struct dentry *dentry, struct dentry *h_parent,
+   struct inode *dir, aufs_bindex_t bdst)
+{
+int err;
+struct path h_path;
+struct au_branch *br;
+
+br = au_sbr(dentry->d_sb, bdst);
+h_path.dentry = au_wh_lkup(h_parent, &dentry->d_name, br);
+err = PTR_ERR(h_path.dentry);
+if (IS_ERR(h_path.dentry))
+goto out;
+dput(h_path.dentry);
+au_fset_cpdown(*flags, DIROPQ);
+
+out:
+return err;

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static int au_cpdown_dir(struct dentry *dentry, aufs_bindex_t bdst,
+ struct au_pin *pin,
+ struct dentry *h_parent, void *arg)
{
+int err, rerr;
+aufs_bindex_t bopq, btop;
+struct path h_path;
+struct dentry *dir;
+struct inode *h_inode, *inode, *dir;
+unsigned int *flags = arg;
+
+btop = au_dbtop(dentry);
+/* dentry is di-locked */
+parent = dget_parent(dentry);
+dir = d_inode(parent);
+h_dir = d_inode(h_parent);
+AuDebugOn(h_dir != au_h_iptr(dir, bdst));
+IMustLock(h_dir);
+
+err = au_lkup_neg(dentry, bdst, /*wh*/0);
+if (unlikely(err < 0))
+goto out;
+h_path.dentry = au_h_dptr(dentry, bdst);
+h_path.mnt = au_sbr_mnt(dentry->d_sb, bdst);
+err = vfsuio_mkdir(au_h_iptr(dir, bdst), &h_path,
+      S_IRWXU | S_IRUGO | S_IXUGO);
+if (unlikely(err))
+goto out_put;
+\_fset.cpdown(*flags, MADE_DIR);
+
+bopq = au_dbdiropq(dentry);
+\_fclr.cpdown(*flags, WHED);
+\_fclr.cpdown(*flags, DIROPQ);
+if (au_dbwh(dentry) == bdst)
+\_fset.cpdown(*flags, WHED);
+if (!\_ftest.cpdown(*flags, PARENT_OPQ) && bopq <= bdst)
+\_fset.cpdown(*flags, PARENT_OPQ);
+h_inode = d_inode(h_path.dentry);
+inode_lock_nested(h_inode, AuLsc_I_CHILD);
+if (\_ftest.cpdown(*flags, WHED)) {
+err = au_cpdown_dir_opq(dentry, bdst, flags);
+if (unlikely(err)) {
+inode_unlock(h_inode);
+goto out_dir;
+}
+}
+err = au_cpdown_attr(h_path, au_h_dptr(dentry, btop));
+inode_unlock(h_inode);
+if (unlikely(err))
+goto out_opq;
+
+if (au_ftest_cpdown(*flags, WHED)) {
+err = au_cpdown_dir_wh(dentry, h_parent, dir, bdst);
+if (unlikely(err))
+goto out_opq;
+}
+
+inode = d_inode(dentry);
+if (au_iibbot(inode) < bdst)
+au_set_iibbot(inode, bdst);
+au_set_h_iptr(inode, bdst, au_igrab(h_inode),
+    au_hi_flags(inode, /*isdir*/1));
+au_fhsm_wrote(dentry->d_sb, bdst, /*force*/0);
+goto out; /* success */
+
+/* revert */
+out_opq:
+if (au_ftest_cpdown(*flags, DIROPQ)) {
+inode_lock_nested(h_inode, AuLsc_I_CHILD);
+rerr = au_diropq_remove(dentry, bdst);
+inode_unlock(h_inode);
+if (unlikely(rerr)) {
+AuIOErr("failed removing diropq for %pd b%d (%d)n",
+dentry, bdst, rerr);
+err = -EIO;
+goto out;
+}
+}
+}
+}
+out_dir:
+if (au_ftest_cpdown(*flags, MADE_DIR)) {
+rerr = vfsb_sio_rmdir(au_h_iptr(dir, bdst), &h_path);
+if (unlikely(rerr)) {
+AuIOErr("failed removing %pd b%d (%d)n",
+dentry, bdst, rerr);
+err = -EIO;
+}
+}
+}
+
+out_put:
+au_set_h_dptr(dentry, bdst, NULL);
+if (au_ddbot(dentry) == bdst)
+au_update_ddbot(dentry);
+out:
+dput(parent);
+return err;
+
+int au_cpdown_dirs(struct dentry *dentry, aufs_bindex_t bdst)
+{
+int err;
+unsigned int flags;
+
+flags = 0;
+err = au_cp_dirs(dentry, bdst, au_cpdown_dir, &flags);
+
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+/* policies for create */
+
+int au_wbr_nonopq(struct dentry *dentry, aufs_bindex_t bindex)
+{
+int err, i, j, ndentry;
+aufs_bindex_t bopq;
+struct au_dcsub_pages dpages;
+struct au_dpage *dpage;
+struct dentry **dentries, *parent, *d;
+
+err = au_dpages_init(&dpages, GFP_NOFS);
+if (unlikely(err))
+goto out;
+parent = dget_parent(dentry);
+err = au_dcsub_pages_rev_aufs(&dpages, parent, /*do_include*/0);
+if (unlikely(err))
+goto out_free;
+
+err = bindex;
+for (i = 0; i < dpages.ndpage; i++) {
+dpage = dpages.dpages + i;
+dentries = dpage->dentries;
+ndentry = dpage->ndentry;
+for (j = 0; j < ndentry; j++) {
+d = dentries[j];
+di_read_lock_parent2(d, !AuLock_IR);
+bopq = au_dbdiropq(d);
+di_read_unlock(d, !AuLock_IR);
+if (bopq >= 0 && bopq < err)
+err = bopq;
+}
+}
+}
+out_free;
dput(parent);
+au_dpages_free(&dpages);
+out:
+return err;
+
+static int au_wbr_bu(struct super_block *sb, aufs_bindex_t bindex)
+{
+for (; bindex >= 0; bindex--)
+if (!au_br_rdonly(au_sbr(sb, bindex)))
+return bindex;
+return -EROFS;
+
+# top down parent */
+static int au_wbr_create_tdp(struct dentry *dentry,
+    unsigned int flags __maybe_unused)
+{
+int err;
+aufs_bindex_t btop, bindex;
+struct super_block *sb;
+struct dentry *parent, *h_parent;
+
+sb = dentry->d_sb;
+btop = au_dbtop(dentry);
+err = btop;
+if (!au_br_rdonly(au_sbr(sb, btop)))
+goto out;
+
+err = -EROFS;
+parent = dget_parent(dentry);
+for (bindex = au_dbtop(parent); bindex < btop; bindex++)
+h_parent = au_h_dptr(parent, bindex);
+if (!h_parent || d_is_negative(h_parent))
+continue;
+
+if (!au_br_rdonly(au_sbr(sb, bindex)))
+err = bindex;
+break;
+}
+
+dput(parent);
+
/* bottom up here */
+if (unlikely(err < 0))
+err = au_wbr_bu(sb, btop - 1);
if (err >= 0) 
  err = au_wbr_nonopq(dentry, err); 
+
+out:
+AuDbg("b%d\n", err); 
+return err; 
+
+/* an exception for the policy other than tdp */
+static int au_wbr_create_exp(struct dentry *dentry) 
+{ 
+int err; 
+aufs_bindex_t bwh, bdiorpq; 
+struct dentry *parent; 
+
+err = -1; 
+bwh = au_dbwh(dentry); 
+parent = dget_parent(dentry); 
+bdiorpq = au_dbdiropq(parent); 
+if (bwh >= 0) { 
+  if (bdiorpq >= 0) 
+    err = min(bdiorpq, bwh); 
+  else 
+    err = bwh; 
+  AuDbg("%d\n", err); 
+} else if (bdiorpq >= 0) { 
+  err = bdiorpq; 
+  AuDbg("%d\n", err); 
+} 
+dput(parent); 
+
+if (err >= 0) 
+err = au_wbr_nonopq(dentry, err); 
+
+if (err >= 0 && au_br_rdonly(au_sbr(dentry->d_sb, err))) 
+err = -1; 
+
+AuDbg("%d\n", err); 
+return err; 
+
+/* round robin */
+static int au_wbr_create_init_rr(struct super_block *sb)
{
    int err;
    
    err = au_wbr_bu(sb, au_sbbot(sb));
    atomic_set(&au_sbi(sb)->si_wbr_rr_next, -err); /* less important */
    /* smp_mb(); */ */
    +AuDbg("b%d\n", err);
    +return err;
    +}
    +
    +static int au_wbr_create_rr(struct dentry *dentry, unsigned int flags)
    +{
        int err, nbr;
        unsigned int u;
        aufs_bindex_t bindex, bbot;
        struct super_block *sb;
        atomic_t *next;
        
        err = au_wbr_create_exp(dentry);
        if (err >= 0)
            goto out;
        +
        sb = dentry->d_sb;
        next = &au_sbi(sb)->si_wbr_rr_next;
        bbot = au_sbbot(sb);
        +nbr = bbot + 1;
        +for (bindex = 0; bindex <= bbot; bindex++) {
            if (!au_ftest_wbr(flags, DIR)) {
                err = atomic_dec_return(next) + 1;
                /* modulo for 0 is meaningless */
                if (unlikely(!err))
                    err = atomic_dec_return(next) + 1;
            } else
                err = atomic_read(next);
            AuDbg("%d\n", err);
            u = err;
            +err = u % nbr;
            AuDbg("%d\n", err);
            if (!au_br_rdonly(au_sbr(sb, err)))
                +break;
            +err = -EROFS;
            +}
            +
            +if (err >= 0)
                +err = au_wbr_nonopq(dentry, err);
            +
            +out:
        }
    }
}

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# Open Source Used In 5GaaS Edge AC-4

```c
+AuDbg("%d\n", err);
+return err;
+
+/* most free space */
+static void au_mfs(struct dentry *dentry, struct dentry *parent)
+{
+struct super_block *sb;
+struct au_branch *br;
+struct au_wbr_mfs *mfs;
+struct dentry *h_parent;
+aufs_bindex_t bindex, bbot;
+int err;
+unsigned long long b, bavail;
+struct path h_path;
+/* reduce the stack usage */
+struct kstatfs *st;
+
+st = kmalloc(sizeof(*st), GFP_NOFS);
+if (unlikely(!st)) {
+AuWarn1("failed updating mfs(%d), ignored\n", -ENOMEM);
+return;
+}
+
+bavail = 0;
+sb = dentry->d_sb;
+mfs = &au_sbi(sb)->si_wbr_mfs;
+MtxMustLock(&mfs->mfs_lock);
+mfs->mfs_bindex = -EROFS;
+mfs->mfsrr_bytes = 0;
+if (!parent) {
+bindex = 0;
+bbot = au_sbbot(sb);
+} else {
+bindex = au_dbtop(parent);
+bbot = au_dbtaildir(parent);
+}
+
+for (; bindex <= bbot; bindex++) {
+if (parent) {
+h_parent = au_h_dptr(parent, bindex);
+if (!h_parent || d_is_negative(h_parent))
+continue;
+}
+br = au_sbr(sb, bindex);
+if (au_br_rdonly(br))
```
continue;
+
+/\ sb->s_root for NFS is unreliable */
+h_path.mnt = au_br_mnt(br);
+h_path.dentry = h_path.mnt->mnt_root;
+err = vfs_statfs(&h_path, st);
+if (unlikely(err)) {
+AuWarn1("failed statfs, b%d, %d\n", bindex, err);
+continue;
+}
+
+/\ when the available size is equal, select the lower one */
+BUILD_BUG_ON(sizeof(b) < sizeof(st->f_bavail)
+     || sizeof(b) < sizeof(st->f_bsize));
+b = st->f_bavail * st->f_bsize;
+br->br_wbr->wbr_bytes = b;
+if (b >= bavail) {
+bavail = b;
+mfs->mfs_bindex = bindex;
+mfs->mfs_jiffy = jiffies;
+}
+
+mfs->mfsrr_bytes = bavail;
+AuDbg("b%d\n", mfs->mfs_bindex);
+kfree(st);
+}
+
+static int au_wbr_create_mfs(struct dentry *dentry, unsigned int flags)
+{
+int err;
+struct dentry *parent;
+struct super_block *sb;
+struct au_wbr_mfs *mfs;
+
+err = au_wbr_create_exp(dentry);
+if (err >= 0)
+goto out;
+
+sb = dentry->d_sb;
+parent = NULL;
+if (au_ftest_wbr(flags, PARENT))
+parent = dget_parent(dentry);
+mfs = &au_sbi(sb)->si_wbr_mfs;
+mutex_lock(&mfs->mfs_lock);
+if (time_after(jiffies, mfs->mfs_jiffy + mfs->mfs_expire)
+     || mfs->mfs_index < 0
+     || au_br_rdonly(au_sbr(sb, mfs->mfs_bindex)))
+kfree(st);
+}
+out:
+au_mfs(dentry, parent);
+mutex_unlock(&mfs->mfs_lock);
+err = mfs->mfs_bindex;
+dput(parent);
+
+if (err >= 0)
+err = au_wbr_nonopq(dentry, err);
+
+out:
+AuDbg("b%d\n", err);
+return err;
+
+static int au_wbr_create_init_mfs(struct super_block *sb)
+
+{
+struct au_wbr_mfs *mfs;
+
+mfs = &au_sbi(sb)->si_wbr_mfs;
+mutex_init(&mfs->mfs_lock);
+mfs->mfs_jiffy = 0;
+mfs->mfs_bindex = -EROFS;
+
+return 0;
+
+}
+
+static int au_wbr_create_fin_mfs(struct super_block *sb __maybe_unused)
+
+{
+mutex_destroy(&au_sbi(sb)->si_wbr_mfs.mfs_lock);
+return 0;
+
+}
+
+/* ---------------------------------------------------------------------- */
+
+/* top down regardless parent, and then mfs */
+static int au_wbr_create_tdmfs(struct dentry *dentry,
+unsigned int flags __maybe_unused)
+
+{
+int err;
+aufs_bindex_t bwh, btail, bindex, bfound, bmfs;
+unsigned long long watermark;
+struct super_block *sb;
+struct au_wbr_mfs *mfs;
+struct au_branch *br;
+struct dentry *parent;
+
+sb = dentry->d_sb;
+mfs = &au_sbi(sb)->si_wbr_mfs;
+mutex_lock(&mfs->mfs_lock);
+if (time_after(jiffies, mfs->mfs_jiffy + mfs->mfs_expire)  
+    || mfs->mfs_bindex < 0)  
+au_mfs(dentry, /*parent*/NULL);  
+watermark = mfs->mfsrr_watermark;  
+bmfs = mfs->mfs_bindex;  
+mutex_unlock(&mfs->mfs_lock);  
+  +  */ another style of au_wbr_create_exp() */  
+  bwh = au_dbwh(dentry);  
+  parent = dget_parent(dentry);  
+  btail = au_dbtailld(parent);  
+  if (bwh >= 0 && bwh < btail)  
+  btail = bwh;  
+  +  +  err = au_wbr_nonopq(dentry, btail);  
+  +  if (unlikely(err < 0))  
+  +  goto out;  
+  +  btail = err;  
+  +  bfound = -1;  
+  +  for (bindex = 0; bindex <= btail; bindex++) {  
+  +  br = au_sbr(sb, bindex);  
+  +  if (au_br_rدون(бр))  
+  +  continue;  
+  +  if (бр->бр_rбнр->wbr_bytes > watermark) {  
+  +  bfound = bindex;  
+  +  break;  
+  +  }  
+  +  }  
+  +  +  err = bfound;  
+  +  if (err < 0)  
+  +  err = bmfs;  
+  +  out:  
+  +  dput(parent);  
+  +  AuDbg("b%d\n", err);  
+  +  return err;  
+  +  }  
+  +  /* ---------------------------------------------------------------------- */  
+  +  /* most free space and then round robin */  
+  +  static int au_wbr_create_mfsrr(struct dentry *dentry, unsigned int flags)  
+  +  {  
+  +  int err;  
+  +  struct au_wbr_mfs *mfs;  
+  +  err = au_wbr_create_mfs(dentry, flags);  
+  +  if (err >= 0) {  
+  +  }
mfs = &au_sbi(dentry->d_sb)->si_wbr_mfs;
mutex_lock(&mfs->mfs_lock);
if (mfs->mfsrr_bytes < mfs->mfsrr_watermark)
    err = au_wbr_create_rr(dentry, flags);
mutex_unlock(&mfs->mfs_lock);
}

AuDbg("b%d
", err);
return err;

static int au_wbr_create_init_mfsrr(struct super_block *sb)
{
    int err;
    au_wbr_create_init_mfs(sb); /* ignore */
    err = au_wbr_create_init_rr(sb);
    return err;
}

/* ---------------------------------------------------------------------- */

/* top down parent and most free space */
static int au_wbr_create_pmfs(struct dentry *dentry, unsigned int flags)
{
    int err, e2;
    unsigned long long b;
    aufs_bindex_t bindex, btop, bbot;
    struct super_block *sb;
    struct dentry *parent, *h_parent;
    struct au_branch *br;

    err = au_wbr_create_tdp(dentry, flags);
    if (unlikely(err < 0))
        goto out;
    parent = dget_parent(dentry);
    btop = au_dbtop(parent);
    bbot = au_dbtaildir(parent);
    if (btop == bbot)
        goto out_parent; /* success */
    e2 = au_wbr_create_mfs(dentry, flags);
    if (e2 < 0)
        goto out_parent; /* success */
    /* when the available size is equal, select upper one */
    sb = dentry->d_sb;
+br = au_sbr(sb, err);
+b = br->br_wbr->wbr_bytes;
+AuDbg("b%d, %llu\n", err, b);
+
+for (bindex = btop; bindex <= bbot; bindex++) {
+h_parent = au_h_dptr(parent, bindex);
+if (!h_parent || d_is_negative(h_parent))
+continue;
+
+br = au_sbr(sb, bindex);
+if (!au_br_rdonly(br) && br->br_wbr->wbr_bytes > b) {
+b = br->br_wbr->wbr_bytes;
+err = bindex;
+AuDbg("b%d, %llu\n", err, b);
+}
+}
+
+if (err >= 0)
+err = au_wbr_nonopq(dentry, err);
+
+out_parent:
+dput(parent);
+out:
+AuDbg("b%d\n", err);
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+/* - top down parent
+ * - most free space with parent
+ * - most free space round-robin regardless parent
+ */
+static int au_wbr_create_pmfsrr(struct dentry *dentry, unsigned int flags)
+{
+int err;
+unsigned long long watermark;
+struct super_block *sb;
+struct au_branch *br;
+struct au_wbr_mfs *mfs;
+
+err = au_wbr_create_pmfs(dentry, flags | AuWbr_PARENT);
+if (unlikely(err < 0))
+goto out;
+
+sb = dentry->d_sb;
+br = au_sbr(sb, err);
+mfs = &au_sbi(sb)->si_wbr_mfs;
+mutex_lock(&mfs->mfs_lock);
+watermark = mfs->mfsrr_watermark;
+mutex_unlock(&mfs->mfs_lock);
+if (br->br_wbr->wbr_bytes < watermark)
+/* regardless the parent dir */
+err = au_wbr_create_mfsrr(dentry, flags);
+
+out:
+AuDbg("b%d\n", err);
+return err;
+
+/* policies for copyup */
+
+/* top down parent */
+static int au_wbr_copyup_tdp(struct dentry *dentry)
+{
+    return au_wbr_create_tdp(dentry, /*flags, anything is ok*/0);
+}
+
+/* bottom up parent */
+static int au_wbr_copyup_bup(struct dentry *dentry)
+{
+    int err;
+    aufs_bindex_t bindex, btop;
+    struct dentry *parent, *h_parent;
+    struct super_block *sb;
+
+    err = -EROFS;
+    sb = dentry->d_sb;
+    parent = dget_parent(dentry);
+    btop = au_dbtop(parent);
+    for (bindex = au_dbtop(dentry); bindex >= btop; bindex--) {
+        h_parent = au_h_dptr(parent, bindex);
+        if (!h_parent || d_is_negative(h_parent))
+            continue;
+        if (!au_br_rdonly(au_sbr(sb, bindex))) {
+            err = bindex;
+            break;
+        }
+    }
+    dput(parent);
+    /* bottom up here */
+if (unlikely(err < 0))
+err = au_wbr_bu(sb, btop - 1);
+
+*AuDbg("b%d\n", err);
+return err;
+
+/* bottom up */
+int au_wbr_do_copyup_bu(struct dentry *dentry, aufs_bindex_t btop)
+{
+int err;
+
+err = au_wbr_bu(dentry->d.sb, btop);
+*AuDbg("b%d\n", err);
+if (err > btop)
+err = au_wbr_nonopq(dentry, err);
+
+*AuDbg("b%d\n", err);
+return err;
+
+static int au_wbr_copyup_bu(struct dentry *dentry)
+{
+int err;
+aufs_bindex_t btop;
+
+btop = au_dbtop(dentry);
+err = au_wbr_do_copyup_bu(dentry, btop);
+return err;
+
+/* ---------------------------------------------------------------------- */
+struct au_wbr_copyup_operations au_wbr_copyup_ops[] = { 
+[AuWbrCopyup_TDP] = {
+.copyup= au_wbr_copyup_tdp
+},
+[AuWbrCopyup_BUP] = {
+.copyup= au_wbr_copyup_bup
+},
+[AuWbrCopyup_BU] = {
+.copyup= au_wbr_copyup_bu
+};
+
+struct au_wbr_create_operations au_wbr_create_ops[] = {
+[AuWbrCreate_TDP] = {
+.create= au_wbr_create_tdp
+};
+[AuWbrCreate_RR] = 
  + .create= au_wbr_create_rr,
  + .init= au_wbr_create_init_rr
 +],
+[AuWbrCreate_MFS] = 
  + .create= au_wbr_create_mfs,
  + .init= au_wbr_create_init_mfs,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_MFSV] = 
  + .create= au_wbr_create_mfs,
  + .init= au_wbr_create_init_mfs,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_MFSRR] = 
  + .create= au_wbr_create_mfsrr,
  + .init= au_wbr_create_init_mfsrr,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_MFSRRV] = 
  + .create= au_wbr_create_mfsrr,
  + .init= au_wbr_create_init_mfsrr,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_TDMFS] = 
  + .create= au_wbr_create_tdmfs,
  + .init= au_wbr_create_init_mfs,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_TDMFSV] = 
  + .create= au_wbr_create_tdmfs,
  + .init= au_wbr_create_init_mfs,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_PMFS] = 
  + .create= au_wbr_create_pmfs,
  + .init= au_wbr_create_init_mfs,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_PMFSV] = 
  + .create= au_wbr_create_pmfs,
  + .init= au_wbr_create_init_mfs,
  + .fin= au_wbr_create_fin_mfs
 +],
+[AuWbrCreate_PMFSRR] = 
  + .create= au_wbr_create_pmfsrr,
  + .init= au_wbr_create_init_mfsrr,
+ fin= au_wbr_create_fin_mfs
+
+[AuWbrCreate_PMFSRRV] = {
+ create= au_wbr_create_pmfsrr,
+ init= au_wbr_create_init_mfsrr,
+ fin= au_wbr_create_fin_mfs
+
+};
--- linux-4.15.0.orig/fs/aufs/whout.c
+++ linux-4.15.0/fs/aufs/whout.c
@@ -0,0 +1,1063 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ */
+/*
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
+/*
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ */
+/*
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * whiteout for logical deletion and opaque directory
+ */
+
+#include "aufs.h"
+
+#define WH_MASK S_IRUGO
+
+/*
+ * If a directory contains this file, then it is opaque. We start with the
+ * .wh. flag so that it is blocked by lookup.
+ */
+static struct qstr diropq_name = QSTR_INIT(AUFS_WH_DIROPQ,
+ sizeof(AUFS_WH_DIROPQ) - 1);
+
+/*
+ * generate whiteout name, which is NOT terminated by NULL.
+ */
+@name: original d_name.name
+@len: original d_name.len
+@wh: whiteout qstr
+ * returns zero when succeeds, otherwise error.
+ * succeeded value as wh->name should be freed by kfree().
+ */
+int au_wh_name_alloc(struct qstr *wh, const struct qstr *name)
+{
+char *p;
+
+if (unlikely(name->len > PATH_MAX - AUFS_WH_PFX_LEN))
+return -ENAMETOOLONG;
+
+wh->len = name->len + AUFS_WH_PFX_LEN;
+p = kmalloc(wh->len, GFP_NOFS);
+wh->name = p;
+if (p) {
+memcpy(p, AUFS_WH_PFX, AUFS_WH_PFX_LEN);
+memcpy(p + AUFS_WH_PFX_LEN, name->name, name->len);
+/* smp_mb(); */
+return 0;
+}
+return -ENOMEM;
+}
+
+/* ---------------------------------------------------------------------- */
+
+/* test if the @wh_name exists under @h_ppath. 
+ * @try_sio specifies the necessary of super-io. 
+ */
+int au_wh_test(struct path *h_ppath, struct qstr *wh_name, int try_sio)
+{
+int err;
+struct dentry *wh_dentry;
+
+if (!try_sio)
+wh_dentry = vfsub_lkup_one(wh_name, h_ppath);
+else
+wh_dentry = au_sio_lkup_one(wh_name, h_ppath);
+err = PTR_ERR(wh_dentry);
+if (IS_ERR(wh_dentry)) {
+if (err == -ENAMETOOLONG)
+err = 0;
+goto out;
+}
+err = 0;
+if (d_is_negative(wh_dentry))
+goto out_wh; /* success */
+*/
```c
+err = 1;
+if (d_is_reg(wh_dentry))
+goto out_wh; /* success */
+
+err = -EIO;
+AuIOErr("%pd Invalid whiteout entry type 0%o\n",
+wh_dentry, d_inode(wh_dentry)->i_mode);  
+
+out_wh:
+dput(wh_dentry);
+out:
+return err;
+
+}
+
+/*
+ * test if the @h_path->dentry sets opaque or not.
+ */
+int au_diropq_test(struct path *h_path)
+{
+int err;
+struct inode *h_dir;
+
+h_dir = d_inode(h_path->dentry);
+err = au_wh_test(h_path, &diropq_name,
+ au_test_h_perm_sio(h_dir, MAY_EXEC));
+return err;
+
+/*
+ * returns a negative dentry whose name is unique and temporary.
+ */
+struct dentry *au_whtmp_lkup(struct dentry *h_parent, struct au_branch *br,
+    struct qstr *prefix)
+{
+struct dentry *dentry;
+int i;
+char defname[NAME_MAX - AUFS_MAX_NAMELEN + DNAME_INLINE_LEN + 1],
+ *name, *p;
+/* strict atomic_t is unnecessary here */
+static unsigned short cnt;
+struct qstr qs;
+struct path h_ppath;
+
+BUILD_BUG_ON(sizeof(cnt) * 2 > AUFS_WH_TMP_LEN);
+
+name = defname;
+qs.len = sizeof(defname) - DNAME_INLINE_LEN + prefix->len - 1;
+if (unlikely(prefix->len > DNAME_INLINE_LEN)) {
```
+dentry = ERR_PTR(-ENOMEM);
+if (unlikely(!name))
+go to out;
+
+/* doubly whiteout-ed */
+memcpy(name, AUFS_WH_PFX AUFS_WH_PFX, AUFS_WH_PFX_LEN * 2);
+p = name + AUFS_WH_PFX_LEN * 2;
+memcpy(p, prefix->name, prefix->len);
+p += prefix->len;
+*p++ = '.';
+AuDebugOn(name + qs.len + 1 - p <= AUFS_WH_TMP_LEN);
+
+h_ppath.dentry = h_parent;
+h_ppath.mnt = au_br_mnt(br);
+qs.name = name;
+for (i = 0; i < 3; i++) {
+sprintf(p, "%.x", AUFS_WH_TMP_LEN, cnt++);
+dentry = au_sio_lkup_one(&qs, &h_ppath);
+if (IS_ERR(dentry) || d_is_negative(dentry))
+go to out_name;
+dput(dentry);
+}
+/* pr_warn("could not get random name\n") */
+dentry = ERR_PTR(-EEXIST);
+AuDbg("%.s\n", AuLNPair(&qs));
+BUG();
+
+out_name:
+if (name != defname)
+kfree(name);
+out:
+AuTraceErrPtr(dentry);
+return dentry;
+
+/
+ * rename the @h_dentry on @br to the whiteouted temporary name.
+ */
+int au_whtmp_ren(struct dentry *h_dentry, struct au_branch *br)
+
+err;
+struct path h_path = {
+.mnt = au_br_mnt(br)
+\};
+\struct inode *h_dir, *delegated;
+\struct dentry *h_parent;
+\n+\h_parent = h_dentry->d_parent; /* dir inode is locked */
+\h_dir = d_inode(h_parent);
+\IMustLock(h_dir);
+\n+\h_path.dentry = au_whtmp_lkup(h_parent, br, &h_dentry->d_name);
+\err = PTR_ERR(h_path.dentry);
+\if (IS_ERR(h_path.dentry))
+\goto out;
+\/+/* under the same dir, no need to lock_rename() */
+\delegated = NULL;
+\err = vfsub_rename(h_dir, h_dentry, h_dir, &h_path, &delegated,
+\    /*flags*/0);
+\AuTraceErr(err);
+\if (unlikely(err == -EWOULDBLOCK)) {
+\pr_warn("cannot retry for NFSv4 delegation"
+\" for an internal rename\n");
+\iput(delegated);
+\} \dput(h_path.dentry);
+\n+\out:
+\AuTraceErr(err);
+\return err;
+\}
+\n+/* functions for removing a whiteout
+ */
+\n+\static int do_unlink_wh(struct inode *h_dir, struct path *h_path)
+{
+\int err, force;
+\struct inode *delegated;
+\n+/*
+ * forces superio when the dir has a sticky bit.
+ * this may be a violation of unix fs semantics.
+ */
+\force = (h_dir->i_mode & S_ISVTX)
+&& !uid_eq(current_fsuid(), d_inode(h_path->dentry)->i_uid);
+\delegated = NULL;
+\err = vfsub_unlink(h_dir, h_path, &delegated, force);
if (unlikely(err == -EWOULDBLOCK)) {
    pr_warn("cannot retry for NFSv4 delegation" "for an internal unlink\n");
    iput(delegated);
    }
    return err;
    }
    +
    +
    +int au_wh_unlink_dentry(struct inode *h_dir, struct path *h_path,
    +struct dentry *dentry)
    +{
    +int err;
    +
    +err = do_unlink_wh(h_dir, h_path);
    +if (!err & dentry)
    +au_set_dbwh(dentry, -1);
    +
    +#return err;
    +}
    +
    +static int unlink_wh_name(struct path *h_ppath, struct qstr *wh)
    +{
    +int err;
    +struct path h_path;
    +
    +err = 0;
    +h_path.dentry = vfslookup_one(wh, h_ppath);
    +if (IS_ERR(h_path.dentry))
    +err = PTR_ERR(h_path.dentry);
    +else {
    +if (d_is_reg(h_path.dentry)) {
    +h_path.mnt = h_ppath->mnt;
    +err = do_unlink_wh(d_inode(h_ppath->dentry), &h_path);
    +}
    +dput(h_path.dentry);
    +}
    +
    +#return err;
    +}
    +
    +/* ---------------------------------------------------------------------- */
    +/*
    * initialize/clean whiteout for a branch
    */
    +*/
    +static void au_wh_clean(struct inode *h_dir, struct path *whpath,
    +const int isdir)
    +{
+int err;
+struct inode *delegated;
+
+if (d_is_negative(whpath->dentry))
+return;
+
+if (isdir)
+err = vfs_sub_rmdir(h_dir, whpath);
+else {
+delegated = NULL;
+err = vfs_sub_unlink(h_dir, whpath, &delegated, /*force*/0);
+if (unlikely(err == -EWOULDBLOCK)) {
+pr_warn("cannot retry for NFSv4 delegation"
+" for an internal unlink\n");
+iput(delegated);
+}
+}
+
+static int test_linkable(struct dentry *h_root)
+{
+struct inode *h_dir = d_inode(h_root);
+
+if (h_dir->i_op->link)
+return 0;
+
+pr_err("%pd (%s) doesn't support link(2), use noplink and rw+nolwh\n", 
+whpath->dentry, err);
+}
+
+static int au_whdir(struct inode *h_dir, struct path *path)
+{
+int err;
+
+err = -EEXIST;
+
+if (d_is_negative(path->dentry)) {
+int mode = S_IRWXU;
+
+if (au_test_nfs(path->dentry->d_sb))
+mode |= S_IXUGO;
+err = vfs_sub_mkdir(h_dir, path, mode);
+} else if (d_is_dir(path->dentry))
+err = 0;

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else
+pr_err("unknown %pd exists\n", path->dentry);
+
+return err;
+}
+
+struct au_wh_base {
+const struct qstr *name;
+struct dentry *dentry;
+};
+
+static void au_wh_init_ro(struct inode *h_dir, struct au_wh_base base[],
+struct path *h_path)
+{
+h_path->dentry = base[AuBrWh_BASE].dentry;
+au_wh_clean(h_dir, h_path, /*isdir*/0);
+h_path->dentry = base[AuBrWh_PLINK].dentry;
+au_wh_clean(h_dir, h_path, /*isdir*/1);
+h_path->dentry = base[AuBrWh_ORPH].dentry;
+au_wh_clean(h_dir, h_path, /*isdir*/1);
+}
+
+/*
+ * returns tri-state,
+ * minus: error, caller should print the message
+ * zero: success
+ * plus: error, caller should NOT print the message
+ */
+static int au_wh_init_rw_nolink(struct dentry *h_root, struct au_wbr *wbr,
+int do_plink, struct au_wh_base base[],
+struct path *h_path)
+{
+int err;
+
+struct inode *h_dir;
+
+h_dir = d_inode(h_root);
+h_path->dentry = base[AuBrWh_BASE].dentry;
+au_wh_clean(h_dir, h_path, /*isdir*/0);
+h_path->dentry = base[AuBrWh_PLINK].dentry;
+if (do_plink) {
+err = test_linkable(h_root);
+if (unlikely(err)) {
+err = 1;
+goto out;
+}
+
+err = au_whdir(h_dir, h_path);
+if (unlikely(err))
+{
goto out;
wbr->wbr_plink = dget(base[AuBrWh_PLINK].dentry);
+} else
+au_wh_clean(h_dir, h_path, /*isdir*/1);
+h_path->dentry = base[AuBrWh_ORPH].dentry;
+err = au_whdir(h_dir, h_path);
+if (unlikely(err))
+goto out;
wbr->wbr_orph = dget(base[AuBrWh_ORPH].dentry);
+
+out:
+return err;
+
+/
+ * for the moment, aufs supports the branch filesystem which does not support
+ * link(2), testing on FAT which does not support i_op->setattr() fully either,
+ * copyup failed. finally, such filesystem will not be used as the writable
+ * branch.
+ *
+ * returns tri-state, see above.
+ */
+static int au_wh_init_rw(struct dentry *h_root, struct au_wbr *wbr,
+ int do_plink, struct au_wh_base base[],
+ struct path *h_path)
+{
+int err;
+struct inode *h_dir;
+
+WbrWhMustWriteLock(wbr);
+
+err = test_linkable(h_root);
+if (unlikely(err)) {
+err = 1;
+goto out;
+}
+
+/*
+ * todo: should this create be done in /sbin/mount.aufs helper?
+ */
+err = -EEXIST;
+h_dir = d_inode(h_root);
+if (d_is_negative(base[AuBrWh_BASE].dentry)) {
+h_path->dentry = base[AuBrWh_BASE].dentry;
+err = vfs_create(h_dir, h_path, WH_MASK, /*want_excl*/true);
+} else if (d_is_reg(base[AuBrWh_BASE].dentry))
+err = 0;
+else

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pr_err("unknown \%pd2 exists\n", base[AuBrWh_BASE].dentry);
+if (unlikely(err))
+goto out;
+
+h_path->dentry = base[AuBrWh_PLINK].dentry;
+if (do_plink) {
+err = au_whdir(h_dir, h_path);
+if (unlikely(err))
+goto out;
+wbr->wbr_plink = dget(base[AuBrWh_PLINK].dentry);
+} else
+au_wh_clean(h_dir, h_path, /*isdir*/1);
+wbr->wbr_whbase = dget(base[AuBrWh_BASE].dentry);
+
+h_path->dentry = base[AuBrWh_ORPH].dentry;
+err = au_whdir(h_dir, h_path);
+if (unlikely(err))
+goto out;
+wbr->wbr_orph = dget(base[AuBrWh_ORPH].dentry);
+
+out:
+return err;
+}
+
+/*
 * initialize the whiteout base file/dir for @br.
 */
+int au_wh_init(struct au_branch *br, struct super_block *sb)
+{
+int err, i;
+const unsigned char do_plink
++= !!au_opt_test(au_mntflags(sb), PLINK);
+struct inode *h_dir;
+struct path path = br->br_path;
+struct dentry *h_root = path.dentry;
+struct au_wbr *wbr = br->br_wbr;
+static const struct qstr base_name[] = {
+[AuBrWh_BASE] = QSTR_INIT(AUFS_BASE_NAME,
+ sizeof(AUFS_BASE_NAME) - 1),
+[AuBrWh_PLINK] = QSTR_INIT(AUFS_PLINKDIR_NAME,
+ sizeof(AUFS_PLINKDIR_NAME) - 1),
+[AuBrWh_ORPH] = QSTR_INIT(AUFS_ORPHDIR_NAME,
+ sizeof(AUFS_ORPHDIR_NAME) - 1)
+};
+struct au_wh_base base[] = {
+[AuBrWh_BASE] = {
+ .name= base_name + AuBrWh_BASE,
+.dentry= NULL

+[AuBrWh_PLINK] = {
   .name  = base_name + AuBrWh_PLINK,
   .dentry = NULL
+},
+[AuBrWh_ORPH] = {
   .name  = base_name + AuBrWh_ORPH,
   .dentry = NULL
+};
+
if (wbr)
+WbrWhMustWriteLock(wbr);
+
for (i = 0; i < AuBrWh_Last; i++) {
   /* doubly whiteouted */
   struct dentry *d;
   +
   +d = au_wh_lkup(h_root, (void *)base[i].name, br);
   +err = PTR_ERR(d);
   +if (IS_ERR(d))
   +goto out;
   +
   base[i].dentry = d;
   +AuDebugOn(wbr
   +   && wbr->wbr_wh[i]
   +   && wbr->wbr_wh[i] != base[i].dentry);
   +}
   +
   +if (wbr)
   +for (i = 0; i < AuBrWh_Last; i++) {
   +dput(wbr->wbr_wh[i]);
   +wbr->wbr_wh[i] = NULL;
   +}
   +
   +err = 0;
   +if (!au_br writable(br->br_perm)) {
   +h_dir = d_inode(h_root);
   +au_wh_init_ro(h_dir, base, &path);
   +} else if (!au_br_wh_linkable(br->br_perm)) {
   +err = au_wh_init_rw_nolink(h_root, wbr, do_plink, base, &path);
   +if (err > 0)
   +goto out;
   +else if (err)
   +goto out_err;
   +} else {
   +err = au_wh_init_rw(h_root, wbr, do_plink, base, &path);
   +if (err > 0)
goto out;
+else if (err)
+goto out_err;
+}
+goto out; /* success */
+
+out_err:
+pr_err("an error(%d) on the writable branch %pd(%s)n",
+ err, h_root, au_sbtpe(h_root->d_sb));
+out:
+for (i = 0; i < AuBrWh_Last; i++)
+dput(base[i].dentry);
+return err;
+
+/* whiteouts are all hard-linked usually.
+ * when its link count reaches a ceiling, we create a new whiteout base
+ * asynchronously.
+ */
+
+struct reinit_br_wh {
+struct super_block *sb;
+struct au_branch *br;
+};
+
+static void reinit_br_wh(void *arg)
+{
+int err;
+aufs_bindex_t bindex;
+struct path h_path;
+struct reinit_br_wh *a = arg;
+struct au_wbr *wbr;
+struct inode *dir, *delegated;
+struct dentry *h_root;
+struct au_hinode *hdir;
+
+err = 0;
+wbr = a->br->br_wbr;
+/* big aufs lock */
+si_noflush_write_lock(a->sb);
+if (!au_br_writable(a->br->br_perm))
+goto out;
+bindex = au_br_index(a->sb, a->br->br_id);
+if (unlikely(bindex < 0))
+goto out;
+di_read_lock_parent(a->sb->s_root, AuLock_IR);
+dir = d_inode(a->sb->s_root);
+hdhir = au_hi(dir, bindex);
+h_root = au_h_dptr(a->sb->s_root, bindex);
+AuDebugOn(h_root != au_br_dentry(a->br));
+
+au_ln_inode_lock_nested(hdir, AuSc_L_PARENT);
+wbr_wh_write_lock(wbr);
+err = au_h_verify(wbr->wbr_whbase, au_opt_udba(a->sb), hdir->hi_inode,
+ h_root, a->br);
+if (!err) {
+h_path.dentry = wbr->wbr_whbase;
+h_path.mnt = au_br_mnt(a->br);
+delegated = NULL;
+err = vfsub_unlink(hdir->hi_inode, &h_path, &delegated,
+ */force*/0);
+if (unlikely(err == -EWOULDBLOCK)) {
  +pr_warn("cannot retry for NFSv4 delegation"
+" for an internal unlink\n");
  +iput(delegated);
+}
+} else {
  +pr_warn("%pd is moved, ignored\n", wbr->wbr_whbase);
  +err = 0;
+}
+dput(wbr->wbr_whbase);
+wbr->wbr_whbase = NULL;
+if (!err)
+err = au_wh_init(a->br, a->sb);
+wbr_wh_write_unlock(wbr);
+au_ln_inode_unlock(hdir);
+di_read_unlock(a->sb->s_root, AuLock_IR);
+if (!err)
+au_fhsm_wrote(a->sb, bindex, /*force*/0);
+
+out:
+if (wbr)
+atomic_dec(&wbr->wbr_wh_running);
+au_br_put(a->br);
+si_write_unlock(a->sb);
+au_nwt_done(&au_sbi(a->sb)->si_nowait);
+kfree(arg);
+if (unlikely(err))
+AuIOErr("err %d\n", err);
+
+static void kick_reinit_br_wh(struct super_block *sb, struct au_branch *br)
+{
+int do_dec, wkq_err;
+struct reinit_br_wh *arg;
+
+do_dec = 1;
+if (atomic_inc_return(&br->br_wbr->wbr_wh_running) != 1)
+goto out;
+
+/* ignore ENOMEM */
+arg = kmalloc(sizeof(*arg), GFP_NOFS);
+if (arg) {
+    /*
+     * dec(wh_running), kfree(arg) and dec(br_count)
+     * in reinit function
+     */
+    arg->sb = sb;
+    arg->br = br;
+    au_br_get(br);
+    wkq_err = au_wkq_nowait(reinit_br_wh, arg, sb, /*flags*/0);
+    if (unlikely(wkq_err)) {
+        atomic_dec(&br->br_wbr->wbr_wh_running);
+        au_br_put(br);
+        kfree(arg);
+    }
+    do_dec = 0;
+}
+
+out:
+if (do_dec)
+    atomic_dec(&br->br_wbr->wbr_wh_running);
+}
+
+/* ---------------------------------------------------------------------- */

+/* create the whiteout @wh. */
+static int link_or_create_wh(struct super_block *sb, aufs_bindex_t bindex,
+    struct dentry *wh)
+{
+    int err;
+    struct path h_path = {
+        .dentry = wh
+    };
+    struct au_branch *br;
+    struct au_wbr *wbr;
+    struct dentry *h_parent;
+    struct inode *h_dir, *delegated;
+
+h_parent = wh->d_parent; /* dir inode is locked */
+h_dir = d_inode(h_parent);
+IMustLock(h_dir);
+
+br = au_sbr(sb, bindex);
+h_path.mnt = au_br_mnt(br);
+wbr = br->br_wbr;
+wbr_wh_read_lock(wbr);
+if (wbr->wbr_whbase) {
+delegated = NULL;
+err = vfsub_link(wbr->wbr_whbase, h_dir, &h_path, &delegated);
+if (unlikely(err == -EWOULDBLOCK)) {
+pr_warn("cannot retry for NFSv4 delegation"
+" for an internal link\n");
+iPut(delegated);
+}
+if (!err || err != -EMLINK)
+goto out;
+
+/* link count full. re-initialize br_whbase. */
+kick_reinit_br_wh(sb, br);
+}
+
+/* return this error in this context */
+err = vfsub_create(h_dir, &h_path, WH_MASK, /*want_excl*/true);
+if (!err)
+au_fhsm_wrote(sb, bindex, /*force*/0);
+
+out:
+wbr_wh_read_unlock(wbr);
+return err;
+
+/* ---------------------------------------------------------------------- */
+
+/* create or remove the diropq. */
+*/
+static struct dentry *do_diropq(struct dentry *dentry, aufs_bindex_t bindex,
(unsigned int flags)
+{
+struct dentry *opq_dentry;
+struct super_block *sb;
+struct au_branch *br;
+struct path h_path;
+int err;
+
+sb = dentry->d_sb;
+br = au_sbr(sb, bindex);
+h_path.dentry = au_h_dptr(dentry, bindex);
+h_path.mnt = au_br_mnt(br);
+opq_dentry = vfs_lookup_one(&diropq_name, &h_path);
+if (IS_ERR(opq_dentry))
+goto out;
+
+if (au_ftest_diropq(flags, CREATE)) {
+err = link_or_create_wh(sb, bindex, opq_dentry);
+if (!err) {
+au_set_dbdiropq(dentry, bindex);
+goto out; /* success */
+}
+} else {
+h_path.dentry = opq_dentry;
+err = do_unlink_wh(au_h_iptr(d_inode(dentry), bindex), &h_path);
+if (!err)
+au_set_dbdiropq(dentry, -1);
+}
+dput(opq_dentry);
+opq_dentry = ERR_PTR(err);
+
+out:
+return opq_dentry;
+}
+
+struct do_diropq_args {
+struct dentry **errp;
+struct dentry *dentry;
+aufs_bindex_t bindex;
+unsigned int flags;
+};
+
+static void call_do_diropq(void *args)
+{
+struct do_diropq_args *a = args;
+*a->errp = do_diropq(a->dentry, a->bindex, a->flags);
+}
+
+struct dentry *au_diropq_sio(struct dentry *dentry, aufs_bindex_t bindex,
+unsigned int flags)
+{
+struct dentry *diropq, *h_dentry;
+
+h_dentry = au_h_dptr(dentry, bindex);
+if (!au_test_h_perm_sio(d_inode(h_dentry), MAY_EXEC | MAY_WRITE))
+diropq = do_diropq(dentry, bindex, flags);
+else {
+int wkq_err;
+struct do_diropq_args args = {
+.errp= &diropq,
+.dentry= dentry,
+.bindex= bindex,
+.flags= flags
+};
+
+wkq_err = au_wkq_wait(call_do_diropq, &args);
+if (unlikely(wkq_err))
+diropq = ERR_PTR(wkq_err);
+
+return diropq;
+
+/* ---------------------------------------------------------------------- */
+/
+/*
 * lookup whiteout dentry.
 * @h_parent: lower parent dentry which must exist and be locked
 * @base_name: name of dentry which will be whiteouted
 * returns dentry for whiteout.
 */
+/
+struct dentry *au_wh_lkup(struct dentry *h_parent, struct qstr *base_name,
+    struct au_branch *br)
+{
+int err;
+struct qstr wh_name;
+struct dentry *wh_dentry;
+struct path h_path;
+
+err = au_wh_name_alloc(&wh_name, base_name);
+wh_dentry = ERR_PTR(err);
+if (!err) {
+h_path.dentry = h_parent;
+h_path.mnt = au_br_mnt(br);
+wh_dentry = vfsub_lkup_one(&wh_name, &h_path);
+kfree(wh_name.name);
+}
+return wh_dentry;
+
+/*
 * link/create a whiteout for @dentry on @bindex.
 */
+/
+struct dentry *au_wh_create(struct dentry *dentry, aufs_bindex_t bindex,
+    struct dentry *h_parent)
+{  
+struct dentry *wh_dentry;  
+struct super_block *sb;  
+int err;  
+  
+sb = dentry->d_sb;  
+wh_dentry = au_wh_lkup(h_parent, &dentry->d_name, au_sbr(sb, bindex));  
+if (!IS_ERR(wh_dentry) && d_is_negative(wh_dentry)) {  
+err = link_or_create_wh(sb, bindex, wh_dentry);  
+if (!err) {  
+au_set_dbwh(dentry, bindex);  
+au_fhsm_wrote(sb, bindex, /*force*/0);  
+} else {  
+dput(wh_dentry);  
+wh_dentry = ERR_PTR(err);  
+}  
+}  
+  
+return wh_dentry;  
+}  
+  
+/* ---------------------------------------------------------------------- */  
+  
+/* Delete all whiteouts in this directory on branch bindex. */  
+static int del_wh_children(struct path *h_path, struct au_nhash *whlist,  
+t aufs_bindex_t bindex)  
+{  
+int err;  
+unsigned long ul, n;  
+struct qstr wh_name;  
+char *p;  
+struct hlist_head *head;  
+struct au_vdir_wh *pos;  
+struct au_vdir_destr *str;  
+  
+err = -ENOMEM;  
+p = (void *)__get_free_page(GFP_NOFS);  
+wh_name.name = p;  
+if (unlikely(!wh_name.name))  
goto out;  
+  
+err = 0;  
+memcpy(p, AUFS_WH_PFX, AUFS_WH_PFX_LEN);  
+p += AUFS_WH_PFX_LEN;  
n = whlist->nh_num;  
+head = whlist->nh_head;  
+for (ul = 0; !err && ul < n; ul++, head++) {  
+hlist_for_each_entry(pos, head, wh_hash) {  

if (pos->wh_bindex != bindex)  
	continue;
+
+str = &pos->wh_str;
+if (str->len + AUFS_WH_PFX_LEN <= PATH_MAX) {
+memcpy(p, str->name, str->len);
+wh_name.len = AUFS_WH_PFX_LEN + str->len;
+err = unlink_wh_name(h_path, &wh_name);
+if (!err)
+continue;
+break;
+
+AuIOErr("whiteout name too long %.*s\n",
+str->len, str->name);
+err = -EIO;
+break;
+
+free_page((unsigned long)wh_name.name);
+
+out:
+return err;
+
+}
+
+struct del_wh_children_args {
+int *errp;
+struct path *h_path;
+struct au_nhash *whlist;
+aufs_bindex_t bindex;
+};
+
+static void call_del_wh_children(void *args)
+{
+struct del_wh_children_args *a = args;
+*a->errp = del_wh_children(a->h_path, a->whlist, a->bindex);
+}
+
+/* ................................................................. */
+
+struct au_whtmp_rmdir *au_whtmp_rmdir_alloc(struct super_block *sb, gfp_t gfp)
+{
+struct au_whtmp_rmdir *whtmp;
+int err;
+unsigned int rdhash;
+
+SiMustAnyLock(sb);
+
+whtmp = kzalloc(sizeof(*whtmp), gfp);
+if (unlikely(!whtmp)) {
+  whtmp = ERR_PTR(-ENOMEM);
+  goto out;
+} 
+
+/* no estimation for dir size */
+rdhash = au_sbi(sb)->si_rdhash;
+if (!rdhash)
+rdhash = AUFS_RDHASH_DEF;
+err = au_nhash_alloc(&whtmp->whlist, rdhash, gfpm);
+if (unlikely(err)) {
+  kfree(whtmp);
+  whtmp = ERR_PTR(err);
+}

+out:
+  return whtmp;
+
+}

+void au_whtmp_rmdir_free(struct au_whtmp_rmdir *whtmp)
+{
+  if (whtmp->br)
+    au_br_put(whtmp->br);
+  dput(whtmp->wh_dentry);
+  iput(whtmp->dir);
+  au_nhash_wh_free(&whtmp->whlist);
+  kfree(whtmp);
+} 
+
+/*
+ * rmdir the whiteouted temporary named dir @h_dentry.
+ * @whlist: whiteouted children.
+ */
+int au_whtmp_rmdir(struct inode *dir, aufs_bindex_t bindex,
+                    struct dentry *wh_dentry, struct au_nhash *whlist)
+{
+  int err;
+  unsigned int h_nlink;
+  struct path wh_path;
+  struct inode *wh_inode, *h_dir;
+  struct au_branch *br;
+
+  h_dir = d_inode(wh_dentry->d_parent); /* dir inode is locked */
+  IMustLock(h_dir);
+
+  br = au_sbr(dir->i_sb, bindex);
+  wh_path.dentry = wh_dentry;
+  wh_path.mnt = au_br_mnt(br);
+wh_inode = d_inode(wh_dentry);
+inode_lock_nested(wh_inode, AuLsc_1_CHILD);
+
+/*
+ * someone else might change some whiteouts while we were sleeping.
+ * it means this whilst may have an obsoleted entry.
+ */
+if (!au_test_h_perm_sio(wh_inode, MAY_EXEC | MAY_WRITE))
+err = del_wh_children(&wh_path, whlist, bindex);
+else {
+int wkq_err;
+struct del_wh_children_args args = {
+.errp = &err,
+.h_path = &wh_path,
+.whlist = whlist,
+.bindex = bindex
+};
+
+wkq_err = au_wkq_wait(call_del_wh_children, &args);
+if (unlikely(wkq_err))
+err = wkq_err;
+}
+inode_unlock(wh_inode);
+
+if (!err) {
+h_nlink = h_dir->i_nlink;
+err = vfsub_rmdir(h_dir, &wh_path);
+/* some fs doesn't change the parent nlink in some cases */
+h_nlink -= h_dir->i_nlink;
+}
+
+if (!err) {
+if (au_ibtop(dir) == bindex) {
+/* todo: dir->i_mutex is necessary */
+au_cpup_attr_timesizes(dir);
+if (h_nlink)
+vfsub_drop_nlink(dir);
+}
+return 0; /* success */
+}
+
+pr_warn("failed removing %pd(%d), ignored\n", wh_dentry, err);
+return err;
+
+static void call_rmdir_whtmp(void *args)
+{ }
+int err:
+aufs_bindex_t bindex;
+struct au_whtmp_rmdir *a = args;
+struct super_block *sb;
+struct dentry *h_parent;
+struct inode *h_dir;
+struct au_hinode *hdir;
+
+/* rmdir by nfsd may cause deadlock with this i_mutex */
+/* inode_lock(a->dir); */ */
+err = -EROFS;
+sb = a->dir->i_sb;
+si_read_lock(sb, !AuLock_FLUSH);
+if (!au_br_writable(a->br->br_perm))
+goto out;
+bindex = au_br_index(sb, a->br->br_id);
+if (unlikely(bindex < 0))
+goto out;
+
+err = -EIO;
+ii_write_lock_parent(a->dir);
+h_parent = dget_parent(a->wh_dentry);
+h_dir = d_inode(h_parent);
+hdird = au_hi(a->dir, bindex);
+err = vfs_sub_mnt_want_write(au_br_mnt(a->br));
+if (unlikely(err))
+goto out_mnt;
+hdir_inode_lock_nested(hdir, AuLsc_I_PARENT);
+err = au_h_verify(a->wh_dentry, au_opt_udba(sb), h_dir, h_parent,
+    a->br);
+if (!err)
+    err = au_whtmp_rmdir(a->dir, bindex, a->wh_dentry, &a->whlist);
+    au_h_inode_unlock(hdir);
+    vfs_sub_mnt_drop_write(au_br_mnt(a->br));
+
+    out_mnt:
+    dput(h_parent);
+    ii_write_unlock(a->dir);
+    out:
+    /* inode_unlock(a->dir); */ */
+    au_whtmp_rmdir_free(a);
+    si_read_unlock(sb);
+    au_nwt_done(&au_sbi(sb)->si_nowait);
+    if (unlikely(!err))
+        AuIOErr("err %d\n", err);
+}
+
+void au_whtmp_kick_rmdir(struct inode *dir, aufs_bindex_t bindex,
+    struct dentry *wh_dentry, struct au_whtmp_rmdir *args)
int wkq_err;
struct super_block *sb;
IMustLock(dir);

/* all post-process will be done in do_rmdir_whtmp(). */
+sb = dir->i_sb;
+args->dir = au_igrab(dir);
+args->br = au_sbr(sb, bindex);
+au_br_get(args->br);
+args->wh_dentry = dget(wh_dentry);
+wkq_err = au_wkq_nowait(call_rmdir_whtmp, args, sb, /*flags*/0);
+if (unlikely(wkq_err)) {
+pr_warn("rmdir error %pd (%d), ignored\n", wh_dentry, wkq_err);
+au_whtmp_rmdir_free(args);
+}
}

--- linux-4.15.0.orig/fs/aufs/whout.h
+++ linux-4.15.0/fs/aufs/whout.h
@@ -0,0 +1,85 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * whiteout for logical deletion and opaque directory
+ */
+
+#ifndef __AUFS_WHOUT_H__
+#define __AUFS_WHOUT_H__
+
+#ifndef __KERNEL__
+
+#include "dir.h"
+/* whout.c */
+int au_wh_name_alloc(struct qstr *wh, const struct qstr *name);
+int au_wh_test(struct path *h_ppath, struct qstr *wh_name, int try_sio);
+int au_diropq_test(struct path *h_path);
+struct au_branch;
+struct dentry *au_whtmp_lkup(struct dentry *h_parent, struct au_branch *br,
+    struct qstr *prefix);
+int au_whtmp_ren(struct dentry *h_dentry, struct au_branch *br);
+int au_wh_unlink_dentry(struct inode *h_dir, struct path *h_path,
+    struct dentry *dentry);
+int au_wh_init(struct au_branch *br, struct super_block *sb);
+
+/* diropq flags */
+#define AuDiropq_CREATE	1
+#define au_ftest_diropq(flags, name)	((flags) & AuDiropq_##name)
+#define au_fset_diropq(flags, name) \
+    do { (flags) |= AuDiropq_##name; } while (0)
+#define au_fclr_diropq(flags, name) \
+    do { (flags) &= ~AuDiropq_##name; } while (0)
+
+struct dentry *au_diropq_sio(struct dentry *dentry, aufs_bindex_t bindex,
+    unsigned int flags);
+struct dentry *au_wh_lkup(struct dentry *h_parent, struct qstr *base_name,
+    struct au_branch *br);
+struct dentry *au_wh_create(struct dentry *dentry, aufs_bindex_t bindex,
+    struct dentry *h_parent);
+
+/* real rmdir for the whiteout-ed dir */
+struct au_whtmp_rmdir {
+    struct inode *dir;
+    struct au_branch *br;
+    struct dentry *wh_dentry;
+    struct au_nhash whlist;
+};
+
+struct au_whtmp_rmdir *au_whtmp_rmdir_alloc(struct super_block *sb, gfp_t gfp);
+void au_whtmp_rmdir_free(struct au_whtmp_rmdir *whtmp);
+int au_whtmp_rmdir(struct inode *dir, aufs_bindex_t bindex,
+    struct dentry *wh_dentry, struct au_nhash *whlist);
+void au_whtmp_kick_rmdir(struct inode *dir, aufs_bindex_t bindex,
+    struct dentry *wh_dentry, struct au_whtmp_rmdir *args);
+
+/* ---------------------------------------------------------------------- */
+
+static inline struct dentry *au_diropq_create(struct dentry *dentry,
+    aufs_bindex_t bindex)
return au_diropq_sio(dentry, bindex, AuDiropq_CREATE);  
+
+static inline int au_diropq_remove(struct dentry *dentry, aufs_bindex_t bindex)  
+{
+return PTR_ERR(au_diropq_sio(dentry, bindex, !AuDiropq_CREATE));  
+
+
+#endif /* __KERNEL__ */
+,#endif /* __AUFS_WHOUT_H__ */
--- linux-4.15.0.orig/fs/aufs/wkq.c
+++ linux-4.15.0/fs/aufs/wkq.c
@@ -0,0 +1,390 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+#include <linux/module.h>
+#include "aufs.h"
+
+/* internal workqueue named AUFS_WKQ_NAME */
+
+static struct workqueue_struct *au_wkq;
+
+struct au_wkinfo {
+struct work_struct wk;
+struct kobject *kobj;
+
+unsigned int flags; /* see wkq.h */
+}
+au_wkq_func_t func;
+void *args;
+
+ifdef CONFIG_LOCKDEP
+int dont_check;
+struct held_lock **hlock;
+endif
+
+struct completion *comp;
+}
+
+/# ----------------------------------------------- */
+/
+/* Aufs passes some operations to the workqueue such as the internal copyup.
+ * This scheme looks rather unnatural for LOCKDEP debugging feature, since the
+ * job run by workqueue depends upon the locks acquired in the other task.
+ * Delegating a small operation to the workqueue, aufs passes its lockdep
+ * information too. And the job in the workqueue restores the info in order to
+ * pretend as if it acquired those locks. This is just to make LOCKDEP work
+ * correctly and expectedly.
+ */
+/
+
+ifdef CONFIG_LOCKDEP
+AuStubInt0(au_wkq_lockdep_alloc, struct au_wkinfo *wkinfo);
+AuStubVoid(au_wkq_lockdep_free, struct au_wkinfo *wkinfo);
+AuStubVoid(au_wkq_lockdep_pre, struct au_wkinfo *wkinfo);
+AuStubVoid(au_wkq_lockdep_post, struct au_wkinfo *wkinfo);
+AuStubVoid(au_wkq_lockdep_init, struct au_wkinfo *wkinfo);
+else
+static void au_wkq_lockdep_init(struct au_wkinfo *wkinfo)
+{
+wkinfo->hlock = NULL;
+wkinfo->dont_check = 0;
+}
+
+/#
+/* 1: matched
+ 0: unmatched
+ */
+static int au_wkq_lockdep_test(struct lock_class_key *key, const char *name)
+{
+static DEFINE_SPINLOCK(spin);
+static struct {
+char *name;
+struct lock_class_key *key;
+} a[] = {
+{'name = "&sbinfo->si_rwsem" },
+{'name = "&info->fi_rwsem" },
+}
+
+
+
+
+/*/ lockless read from 'set.' see below */
+if (set == ARRAY_SIZE(a)) {
+for (i = 0; i < ARRAY_SIZE(a); i++)
+if (a[i].key == key)
+goto match;
+goto unmatch;
+}
+
+spin_lock(&spin);
+if (set) {
+for (i = 0; i < ARRAY_SIZE(a); i++)
+if (a[i].key == key) {
+spin_unlock(&spin);
+goto match;
+}
+for (i = 0; i < ARRAY_SIZE(a); i++) {
+if (unlikely(a[i].key == key)) { /* rare but possible */
+spin_unlock(&spin);
+goto match;
+} else
+continue;
+}
+if (strstr(a[i].name, name)) {
+/*
+ * the order of these three lines is important for the
+ * lockless read above.
+ */
+a[i].key = key;
+spin_unlock(&spin);
+set++;
+/* AuDbg("%d, %s\n", set, name); */
+goto match;
+}
+
+spin_unlock(&spin);
+goto unmatch;
+
+match:,
+return 1;
+unmatch:,
+return 0;
```c
static int au_wkq_lockdep_alloc(struct au_wkinfo *wkinfo)
{
    int err, n;
    struct task_struct *curr;
    struct held_lock **hl, *held_locks, *p;
    err = 0;
    curr = current;
    wkinfo->dont_check = lockdep_recursing(curr);
    if (wkinfo->dont_check)
        goto out;
    n = curr->lockdep_depth;
    if (!n)
        goto out;
    err = -ENOMEM;
    wkinfo->hlock = kmalloc_array(n + 1, sizeof(*wkinfo->hlock), GFP_NOFS);
    if (unlikely(!wkinfo->hlock))
        goto out;
    err = 0;
#endif
    held_locks = curr->held_locks;
    hl = wkinfo->hlock;
    while (n--) {
        p = held_locks++;
        if (au_wkq_lockdep_test(p->instance->key, p->instance->name))
            *hl++ = p;
    }
    *hl = NULL;
    out:
    return err;
}

static void au_wkq_lockdep_free(struct au_wkinfo *wkinfo)
{
    kfree(wkinfo->hlock);
}

static void au_wkq_lockdep_pre(struct au_wkinfo *wkinfo)
{
    struct held_lock *p, **hl = wkinfo->hlock;
```
int subclass;
+
if (wkinfo->dont_check)
lockdep_off();
+if (!hl)
+return;
+while ((p = *hl++)) { /* assignment */
+subclass = lockdep_hlock_class(p)->subclass;
+*AuDbg("%s, %d
", p->instance->name, subclass); */
+if (p->read)
+rwsem_acquire_read(p->instance, subclass, 0,
+ /*p->acquire_ip*/_RET_IP_);
+else
+rwsem_acquire(p->instance, subclass, 0,
+ /*p->acquire_ip*/_RET_IP_);
+
+static void au_wkq_lockdep_post(struct au_wkinfo *wkinfo)
+{ /*
+struct held_lock *p, **hl = wkinfo->hlock;
+
+if (wkinfo->dont_check)
+lockdep_on();
+if (!hl)
+return;
+while ((p = *hl++)) /* assignment */
+rwsem_release(p->instance, 0, /*p->acquire_ip*/_RET_IP_);
+}
+#endif
+
+static void wkq_func(struct work_struct *wk)
+{ /*
+struct au_wkinfo *wkinfo = container_of(wk, struct au_wkinfo, wk);
+
+AuDebugOn(!uid_eq(current_fsuid(), GLOBAL_ROOT_UID));
+AuDebugOn(rlimit(RLIMIT_FSIZE) != RLIM_INFINITY);
+
+au_wkq_lockdep_pre(wkinfo);
+wkinfo->func(wkinfo->args);
+au_wkq_lockdep_post(wkinfo);
+if (au_ftest_wkq(wkinfo->flags, WAIT))
+complete(wkinfo->comp);
+else {
+kobject_put(wkinfo->kobj);
+module_put.THIS_MODULE); /* todo: ?? */
+kfree(wkinfo);
+}
Since struct completion is large, try allocating it dynamically.

```c
#include <linux/fs.h>

static int au_wkq_comp_alloc(struct au_wkinfo *wkinfo, struct completion **comp)
{
    *comp = kmalloc(sizeof(**comp), GFP_NOFS);
    if (*comp) {
        init_completion(*comp);
        wkinfo->comp = *comp;
        return 0;
    }
    return -ENOMEM;
}

static void au_wkq_comp_free(struct completion *comp)
{
    kfree(comp);
}

static void au_wkq_run(struct au_wkinfo *wkinfo)
{
    if (au_ftest_wkq(wkinfo->flags, NEST)) {
        if (au_wkq_test()) {
            AuWarn1("wkq from wkq, unless silly-rename on NFS,
```
 AuDebugOn(au_ftest_wkq(wkinfo->flags, WAIT));
+
                if (au_ftest_wkq(wkinfo->flags, WAIT)) {
                    INIT_WORK_ONSTACK(&wkinfo->wk, wkq_func);
                    queue_work(au_wkq, &wkinfo->wk);
                    } else {
                        INIT_WORK(&wkinfo->wk, wkq_func);
                        schedule_work(&wkinfo->wk);
                }
                }
                
                /*
                * Be careful. It is easy to make deadlock happen.
                * processA: lock, wkq and wait
                * processB: wkq and wait, lock in wkq
                * --> deadlock
                */

+int au_wkq_do_wait(unsigned int flags, au_wkq_func_t func, void *args)
+{
    int err;
    AuWkqCompDeclare(comp);
    struct au_wkinfo wkinfo = {
        .flags= flags,
        .func= func,
        .args= args
    };
    
    +err = au_wkq_comp_alloc(&wkinfo, &comp);
    +if (unlikely(err))
        goto out;
    +err = au_wkq_lockdep_alloc(&wkinfo);
    +if (unlikely(err))
        goto out_comp;
    +if (!err) {
        +au_wkq_run(&wkinfo);
        +/* no timeout, no interrupt */
        +wait_for_completion(wkinfo.comp);
        +}
    +au_wkq_lockdep_free(&wkinfo);
    +
    +out_comp:
    +au_wkq_comp_free(comp);
    +out:
    +destroy_work_on_stack(&wkinfo.wk);
+return err;
+
+/*
+ * Note: dget/dpUT() in func for aufs dentries are not supported. It will be a
+ * problem in a concurrent umounting.
+ */
+int au_wkq_nowait(au_wkq_func_t func, void *args, struct super_block *sb,
+ unsigned int flags)
+{
+    int err;
+struct au_wkinfo *wkinfo;
+
+    atomic_inc(&au_sbi(sb)->si_nowait.nw_len);
+
+    /* wkq_func() must free this wkinfo.
+    * it highly depends upon the implementation of workqueue.
+    */
+    err = 0;
+    wkinfo = kmalloc(sizeof(*wkinfo), GFP_NOFS);
+    if (wkinfo) {
+        wkinfo->kobj = &au_sbi(sb)->si_kobj;
+        wkinfo->flags = flags & ~AuWkq_WAIT;
+        wkinfo->func = func;
+        wkinfo->args = args;
+        wkinfo->comp = NULL;
+        au_wkq_lockdep_init(wkinfo);
+        kobject_get(wkinfo->kobj);
+        __module_get(THIS_MODULE); /* todo: ?? */
+        au_wkq_run(wkinfo);
+    } else {
+        err = -ENOMEM;
+        au_nwt_done(&au_sbi(sb)->si_nowait);
+    }
+
+return err;
+
+/*
+ * ---------------------------------------------- */
+
+void au_nwt_init(struct au_nowait_tasks *nwt)
+{
+    atomic_set(&nwt->nw_len, 0);
+    /* smp_mb(); */ /* atomic_set */
+    init_waitqueue_head(&nwt->nw_wq);
+}
+ void au_wkq_fin(void)
+ {
+ destroy_workqueue(au_wkq);
+ }
+
+ int __init au_wkq_init(void)
+ {
+ int err;
+ 
+ err = 0;
+ 
+ au_wkq = alloc_workqueue(AUFS_WKQ_NAME, 0, WQ_DFL_ACTIVE);
+ if (IS_ERR(au_wkq))
+ err = PTR_ERR(au_wkq);
+ else if (!au_wkq)
+ err = -ENOMEM;
+ 
+ return err;
+ }
--- linux-4.15.0.orig/fs/aufs/wkq.h
+++ linux-4.15.0/fs/aufs/wkq.h
@@ -0,0 +1,93 @@
+/*
+ * Copyright (C) 2005-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+ *
+ /* workqueue for asynchronous/super-io operations
+ * todo: try new credentials management scheme
+ */
+
+ #ifdef __AUFS_WKQ_H__
+ #define __AUFS_WKQ_H__
+ +#ifdef ___KERNEL___
+ }
+ #include <linux/wait.h>
+ +struct super_block;
+ +
+/* ---------------------------------------------------------------------- */
+ /* in the next operation, wait for the 'nowait' tasks in system-wide workqueue */
+ /* */
+ +struct au_nowait_tasks {
+ atomic_t
nw_len;
+ wait_queue_head_t
nw_wq;
+ };
+ +/* ---------------------------------------------------------------------- */
+ typedef void (*au_wkq_func_t)(void *args);
+ +/* wkq flags */
+ #define AuWkq_WAIT	1
+ #define AuWkq_NEST	(1 << 1)
+ #define au_ftest_wkq(flags, name)((flags) & AuWkq_##name)
+ #define au_fset_wkq(flags, name) dow { (flags) |= AuWkq_##name; } while (0)
+ #define au_fclr_wkq(flags, name) dow { (flags) &= ~AuWkq_##name; } while (0)
+ +ifndef CONFIG_AUFS_HNOTIFY
+ #undef AuWkq_NEST
+ #define AuWkq_NEST	0
+ +endif
+ +/* wkq.c */
+ +int au_wkq_do_wait(unsigned int flags, au_wkq_func_t func, void *args);
+ int au_wkq_nowait(au_wkq_func_t func, void *args, struct super_block *sb,
+ unsigned int flags);
+ void au_nwt_init(struct au_nowait_tasks *nwt);
+ int __init au_wkq_init(void);
+ void au_wkq_fin(void);
+ +/* ---------------------------------------------------------------------- */
+ +static inline int au_wkq_test(void)
+ { return current->flags & PF_WQ_WORKER;
+ }
+ +
+static inline int au_wkq_wait(au_wkq_func_t func, void *args)
+{
+return au_wkq_do_wait(AuWkq_WAIT, func, args);
+}
+
+static inline void au_nwt_done(struct au_nowait_tasks *nwt)
+{
+if (atomic_dec_and_test(&nwt->nw_len))
+wake_up_all(&nwt->nw_wq);
+}
+
+static inline int au_nwt_flush(struct au_nowait_tasks *nwt)
+{
+wait_event(nwt->nw_wq, !atomic_read(&nwt->nw_len));
+return 0;
+}
+
+#endif /* __KERNEL__ */
+#endif /* __AUFS_WKQ_H__ */

--- linux-4.15.0.orig/fs/aufs/xattr.c
+++ linux-4.15.0/fs/aufs/xattr.c
@@ -0,0 +1,355 @@
+/*
+ * Copyright (C) 2014-2017 Junjiro R. Okajima
+ *
+ * This program, aufs is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program.  If not, see <http://www.gnu.org/licenses/>.
+ */
+
+/*
+ * handling xattr functions
+ */
+
+#include <linux/fs.h>
+#include <linux/posix_acl_xattr.h>
+#include <linux/xattr.h>
+#include "aufs.h"
+
+static int au_xattr_ignore(int err, char *name, unsigned int ignore_flags)  
+{
+    if (!ignore_flags)
+        goto out;
+switch (err) {
+    case -ENOMEM:
+    case -EDQUOT:
+        goto out;
+    }
+    if ((ignore_flags & AuBrAttr_ICEX) == AuBrAttr_ICEX) {
+        err = 0;
+        goto out;
+    }
+    +#define cmp(brattr, prefix) do {
+        if (!strncmp(name, XATTR_##prefix##_PREFIX,
+            XATTR_##prefix##_PREFIX_LEN)) {
+            if (ignore_flags & AuBrAttr_ICEX_##brattr)
+                err = 0;
+        }
+    } while (0)
+    cmp(SEC, SECURITY);
+    cmp(SYS, SYSTEM);
+    cmp(TR, TRUSTED);
+    cmp(USR, USER);
+    #+#undef cmp
+    if (ignore_flags & AuBrAttr_ICEX_OTH)
+        err = 0;
+    +
+    out:
+    return err;
+}

+static const int au_xattr_out_of_list = AuBrAttr_ICEX_OTH << 1;
+
+static int au_do_cpup_xattr(struct dentry *h_dst, struct dentry *h_src, 
+    char *name, char **buf, unsigned int ignore_flags, 
+    unsigned int verbose)  
+{
+    int err;
+    ssize_t ssz;
+    struct inode *h_idst;
+    +ssz = vfs_getxattr_alloc(h_src, name, buf, 0, GFP_NOFS);
err = ssz;
if (unlikely(err <= 0)) {
    if (err == -ENODATA
        || (err == -EOPNOTSUPP
            && ((ignore_flags & au_xattr_out_of_list)
                || (au_test_nfs_noacl(d_inode(h_src))
                    && (!strcmp(name, XATTR_NAME_POSIX_ACL_ACCESS)
                        || !strcmp(name, XATTR_NAME_POSIX_ACL_DEFAULT)))))
        err = 0;
    if (err && (verbose || au_debug_test()))
        pr_err("%s, err %d\n", name, err);
    goto out;
}
/* unlock it temporary */
h_idst = d_inode(h_dst);
inode_unlock(h_idst);
err = vfsub_setxattr(h_dst, name, *buf, ssz, /*flags*/0);
inode_lock_nested(h_idst, AuLsc_I_CHILD2);
if (unlikely(err)) {
    if (verbose || au_debug_test())
        pr_err("%s, err %d\n", name, err);
    err = au_xattr_ignore(err, name, ignore_flags);
}
out:
return err;

int au_cpup_xattr(struct dentry *h_dst, struct dentry *h_src, int ignore_flags,
        unsigned int verbose)
{
    int err, unlocked, acl_access, acl_default;
    ssize_t ssz;
    struct inode *h_isrc, *h_idst;
    char *value, *p, *o, *e;
    /* try stopping to update the source inode while we are referencing */
    /* there should not be the parent-child relationship between them */
    h_isrc = d_inode(h_src);
    h_idst = d_inode(h_dst);
    inode_unlock(h_idst);
    vfsub_inode_lock_shared_nested(h_isrc, AuLsc_I_CHILD);
   (inode_lock_nested(h_idst, AuLsc_I_CHILD2);
    unlocked = 0;
    +


/* some filesystems don't list POSIX ACL, for example tmpfs */

```c
ssz = vfs_listxattr(h_src, NULL, 0);
+err = ssz;
+if (unlikely(err < 0)) {
  +AuTraceErr(err);
  +if (err == -ENODATA || err == -EOPNOTSUPP) {
    +err = 0; /* ignore */
    +goto out;
  }

  +err = 0;
  +p = NULL;
  +o = NULL;
  +if (ssz) {
    +err = -ENOMEM;
    +p = kmalloc(ssz, GFP_NOFS);
    +o = p;
    +if (unlikely(!p))
      +goto out;
    +err = vfs_listxattr(h_src, p, ssz);
    +}
  }
  +inode_unlock_shared(h_isrc);
  +unlocked = 1;
  +AuDbg("err %d, ssz %zd\n", err, ssz);
  +if (unlikely(err < 0))
    +goto out_free;

  +err = 0;
  +e = p + ssz;
  +value = NULL;
  +acl_access = 0;
  +acl_default = 0;
  +while (!err && p < e) {
    +acl_access |= !strncmp(p, XATTR_NAME_POSIX_ACL_ACCESS, sizeof(XATTR_NAME_POSIX_ACL_ACCESS) - 1);
    +acl_default |= !strncmp(p, XATTR_NAME_POSIX_ACL_DEFAULT, sizeof(XATTR_NAME_POSIX_ACL_DEFAULT) - 1);
    +err = au_do_cpup_xattr(h_dst, h_src, p, &value, ignore_flags, verbose);
    +p += strlen(p) + 1;
  }
  +AuTraceErr(err);
  +ignore_flags |= au_xattr_out_of_list;
  +if (!err && !acl_access) {
    +err = au_do_cpup_xattr(h_dst, h_src, XATTR_NAME_POSIX_ACL_ACCESS, &value,
    +    verbose);
    +p += strlen(p) + 1;
  }
  +AuTraceErr(err);
  +ignore_flags |= au_xattr_out_of_list;
  +if (!err && !acl_access) {
    +err = au_do_cpup_xattr(h_dst, h_src, XATTR_NAME_POSIX_ACL_ACCESS, &value,
    +    verbose);
  }

```

Open Source Used In 5GaaS Edge AC-4 30560
+     ignore_flags, verbose);
+AuTraceErr(err);
+}
+if (!err && !acl_default) {
+err = au_do_cpup_xattr(h_dst, h_src,
+     XATTR_NAME_POSIX_ACL_DEFAULT, &value,
+     ignore_flags, verbose);
+AuTraceErr(err);
+}
+
+kfree(value);
+
+out_free:
+kfree(o);
+out:
+if (!unlocked)
+inode_unlock_shared(h_isrc);
+AuTraceErr(err);
+return err;
+}
+
+/* ---------------------------------------------------------------------- */
+
+static int au_smack_reentering(struct super_block *sb)
+{
+  /* if IS_ENABLED(CONFIG_SECURITY_SMACK)
+     */
+  + * as a part of lookup, smack_dInstantiate() is called, and it calls
+     + * i_op->getxattr(). ouch.
+     + */
+  return si_pid_test(sb);
+  +#else
+  return 0;
+  +#endif
+  +}
+  +enum {
+     AU_XATTR_LIST,
+     AU_XATTR_GET
+  };
+  +
+  +struct au_lgxattr {
+     int type;
+     union {
+     +struct {
+         +char*list;
+         +size_tsize;
+     } list;
struct {
    const char* name;
    void* value;
    size_t size;
} get;
} u;

static ssize_t au_lgxattr(struct dentry *dentry, struct au_lgxattr *arg) {
    ssize_t err;
    int reenter;
    struct path h_path;
    struct super_block *sb;

    sb = dentry->d_sb;
    reenter = au_smack_reentering(sb);
    if (!reenter) {
        err = si_read_lock(sb, AuLock_FLUSH | AuLock_NOPLM);
        if (unlikely(err))
            goto out;
    }

    err = au_h_path_getattr(dentry, /*force*/1, &h_path, reenter);
    if (unlikely(err))
        goto out_si;
    if (unlikely(!h_path.dentry))
        /* illegally overlapped or something */
    goto out_di; /* pretending success */

        /* always topmost entry only */
    switch (arg->type) {
        case AU_XATTR_LIST:
            err = vfs_listxattr(h_path.dentry,
                /*force*/1, &h_path, reenter);
            if (unlikely(err))
                goto out_si;
            break;
        case AU_XATTR_GET:
            AuDebugOn(d_is_negative(h_path.dentry));
            err = vfs_getxattr(h_path.dentry,
                arg->u.list.list, arg->u.list.size);
            break;
        case AU_XATTR_GET:
            +AuDebugOn(d_is_negative(h_path.dentry));
            err = vfs_getxattr(h_path.dentry,
                arg->u.get.name, arg->u.get.value,
                arg->u.get.size);
            break;
        +} 
        +out_di:
        if (!reenter)
            +di_read_unlock(dentry, AuLock_IR);
        +out_si:
        if (!reenter)
+si_read_unlock(sb);
+out:
+AuTraceErr(err);
+return err;
+
+ssize_t aufs_listxattr(struct dentry *dentry, char *list, size_t size)
+{
+struct au_lgxattr arg = {
+.type = AU_XATTR_LIST,
+.u.list = {
+.list= list,
+.size= size
+},
+};
+
+return au_lgxattr(dentry, &arg);
+}
+
+static ssize_t au_getxattr(struct dentry *dentry,
+ struct inode *inode __maybe_unused,
+ const char *name, void *value, size_t size)
+{  
+struct au_lgxattr arg = {
+.type = AU_XATTR_GET,
+.u.get = {
+.name= name,
+.value= value,
+.size= size
+},
+};
+
+return au_lgxattr(dentry, &arg);
+}
+
+static int au_setxattr(struct dentry *dentry, struct inode *inode,
+ const char *name, const void *value, size_t size,
+ int flags)
+{  
+struct au_sxattr arg = {
+.type = AU_XATTR_SET,
+.u.set = {
+.name= name,
+.value= value,
+.size= size,
+.flags= flags
+},
+};
+
+}
return au_sxattr(dentry, inode, &arg);
}

static int au_xattr_get(const struct xattr_handler *handler, struct dentry *dentry, struct inode *inode, const char *name, void *buffer, size_t size)
{
    return au_getxattr(dentry, inode, name, buffer, size);
}

static int au_xattr_set(const struct xattr_handler *handler, struct dentry *dentry, struct inode *inode, const char *name, const void *value, size_t size, int flags)
{
    return au_setxattr(dentry, inode, name, value, size, flags);
}

static const struct xattr_handler au_xattr_handler = {
    .name = "",
    .prefix = "",
    .get = au_xattr_get,
    .set = au_xattr_set
};

static const struct xattr_handler *au_xattr_handlers[] = {
#ifdef CONFIG_FS_POSIX_ACL
    &posix_acl_access_xattr_handler,
    &posix_acl_default_xattr_handler,
#endif
    &au_xattr_handler, /* must be last */
    NULL
};

void au_xattr_init(struct super_block *sb)
{
    sb->s_xattr = au_xattr_handlers;
}

--- linux-4.15.0.orig/fs/aufs/xino.c
+++ linux-4.15.0/fs/aufs/xino.c
@@ -0,0 +1,1470 @@

/* Copyright (C) 2005-2017 Junjiro R. Okajima
 */
+ * This program, aufs is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.

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*/

* external inode number translation table and bitmap
*/

#include <linux/seq_file.h>
#include <linux/statfs.h>
#include "aufs.h"

static ssize_t xino_fread_wkq(vfs_readf_t func, struct file *file, void *buf,
size_t size, loff_t *pos);

/* todo: unnecessary to support mmap_sem since kernel-space? */
ssize_t xino_fread(vfs_readf_t func, struct file *file, void *kbuf, size_t size,
loff_t *pos)
{
  ssize_t err;
  mm_segment_t oldfs;
  union {
    void *k;
    char __user *u;
  } buf;
  int i;
  const int prevent_endless = 10;
  +i = 0;
  +buf.k = kbuf;
  +oldfs = get_fs();
  +set_fs(KERNEL_DS);
  +do {
    +err = func(file, buf.u, size, pos);
    +if (err == -EINTR
    +  && !au_wkq_test()
    +  && fatal_signal_pending(current)) {
      +set_fs(oldfs);
      +err = xino_fread_wkq(func, file, kbuf, size, pos);

+BUG_ON(err == -EINTR);
+oldfs = get_fs();
+set_fs(KERNلس_DS);
+
+} while (i++ < prevent_endless
+ && (err == -EAGAIN || err == -EINTR));
+set_fs(oldfs);
+
+#if 0 /* reserved for future use */
+if (err > 0)
+fsnotify_access(file->f_path.dentry);
+#endif
+
+return err;
+
+
+struct xino_fread_args {
+ssize_t *errp;
+vfs_readf_t func;
+struct file *file;
+void *buf;
+size_t size;
+loff_t *pos;
+};
+
+static void call_xino_fread(void *args)
+{
+struct xino_fread_args *a = args;
+*a->errp = xino_fread(a->func, a->file, a->buf, a->size, a->pos);
+}
+
+static ssize_t xino_fread_wkq(vfs_readf_t func, struct file *file, void *buf,
+size_t size, loff_t *pos)
+{
+ssize_t err;
+int wkq_err;
+struct xino_fread_args args = {
+.errp= &err,
+.func= func,
+.file= file,
+.buf= buf,
+.size= size,
+.pos= pos
+};
+
+wkq_err = au_wkq_wait(call_xino_fread, &args);
+if (unlikely(wkq_err))
+err = wkq_err;
return err;
}

+static ssize_t xino_fwrite_wkq(vfs_writef_t func, struct file *file, void *buf,
   size_t size, loff_t *pos);
+
+static ssize_t do_xino_fwrite(vfs_writef_t func, struct file *file, void *kbuf,
   size_t size, loff_t *pos)
+
+ssize_t err;
+mm_segment_t oldfs;
+union {
+  void *k;
+  const char __user *u;
+} buf;
+int i;
+const int prevent_endless = 10;
+
+i = 0;
+buf.k = kbuf;
+oldfs = get_fs();
+set Fs(KERNEL_DS);
+do {
+  err = func(file, buf.u, size, pos);
+  if (err == -EINTR
+      && !au_wkq_test()
+      && fatal_signal_pending(current)) {
+    oldfs = get_fs();
+    set_fs(oldfs);
+    err = xino_fwrite_wkq(func, file, kbuf, size, pos);
+    BUG_ON(err == -EINTR);
+    oldfs = get_fs();
+    set_fs(KERNEL_DS);
+  }
+  } while (i++ < prevent_endless
+          && (err == -EAGAIN || err == -EINTR));
+  set_fs(oldfs);
+
+} /* reserved for future use */
+if (err > 0)
+  fsnotify_modify(file->f_path.dentry);
+endif
+
+return err;
+}
+struct do_xino_fwrite_args {
+  ssize_t *errp;
+  vfs_writef_t func;
+  struct file *file;
+  void *buf;
+  size_t size;
+  loff_t *pos;
+};
+
+static void call_do_xino_fwrite(void *args)
+{
+  struct do_xino_fwrite_args *a = args;
+  a->errp = do_xino_fwrite(a->func, a->file, a->buf, a->size, a->pos);
+}
+
+static ssize_t xino_fwrite_wkq(vfs_writef_t func, struct file *file, void *buf,
+    size_t size, loff_t *pos)
+{
+  ssize_t err;
+  int wkq_err;
+  struct do_xino_fwrite_args args = {
+    .errp = &err,
+    .func = func,
+    .file = file,
+    .buf = buf,
+    .size = size,
+    .pos = pos
+  };
+
+  /*
+  * it breaks RLIMIT_FSIZE and normal user's limit,
+  * users should care about quota and real 'filesystem full.'
+  */
+  wkq_err = au_wkq_wait(call_do_xino_fwrite, &args);
+  if (unlikely(wkq_err))
+    err = wkq_err;
+  return err;
+}
+
+ssize_t xino_fwrite(vfs_writef_t func, struct file *file, void *buf,
+    size_t size, loff_t *pos)
+{
+  ssize_t err;
+  if (rlimit(RLIMIT_FSIZE) == RLIM_INFINITY) {
+    lockdep_off();
+    err = do_xino_fwrite(func, file, buf, size, pos);
lockdep_on();
} else {
lockdep_off();
+err = xino_fwrite_wkq(func, file, buf, size, pos);
+lockdep_on();
+
+return err;
+
+/* ------------------------------- */
+
+/*
 * create a new xinofile at the same place/path as @base_file.
 */
+au_xino_create2(struct file *base_file, struct file *copy_src)
+{
+struct file *file;
+struct dentry *base;
+struct inode *dir, *delegated;
+struct qstr *name;
+struct path ppath, path;
+int err;
+
br = base_file->f_path.dentry;
+ppath.dentry = base->d_parent; /* dir inode is locked */
+ppath.mnt = base_file->f_path.mnt;
+dir = d_inode(ppath.dentry);
+IMustLock(dir);
+
+file = ERR_PTR(-EINVAL);
+name = &base->d_name;
+path.dentry = vfs_sub_lookup_one_len(name->name, &ppath, name->len);
+if (IS_ERR(path.dentry)) {
+file = (void *)path.dentry;
+pr_err("%pd lookup err %ld\n",
+base, PTR_ERR(path.dentry));
+goto out_dput;
+}
+
+/* no need to mnt_want_write() since we call dentry_open() later */
+err = vfs_create(dir, path.dentry, S_IRUGO | S_IWUGO, NULL);
+if (unlikely(err)) {
+file = ERR_PTR(err);
+pr_err("%pd create err %d\n", base, err);
+goto out_dput;
+}
+path.mnt = base_file->f_path.mnt;
+file = vfsub_dentry_open(&path, 
+ O_RDWR | O_CREAT | O_EXCL | O_LARGEFILE
+ /* | __FMODE_NONOTIFY */); 
+if (IS_ERR(file)) {
+pr_err("%pd open err %ld", base, PTR_ERR(file));
+goto out_dput;
+}
+
delegated = NULL;
+err = vfsub_unlink(dir, &file->f_path, &delegated, /*force*/0);
+if (unlikely(err == -EWOULDBLOCK)) {
+pr_warn("cannot retry for NFSv4 delegation"
+" for an internal unlink\n");
iput(delegated);
+}
+if (unlikely(err)) {
+pr_err("%pd unlink err %d\n", base, err);
+goto out_fput;
+}
+
+if (copy_src) {
+/* no one can touch copy_src xino */
+err = au_copy_file(file, copy_src, vfsub_f_size_read(copy_src));
+if (unlikely(err)) {
+pr_err("%pd copy err %d\n", base, err);
+goto out_fput;
+}
+}
+goto out_dput; /* success */
+
+out_fput: /* success */
+fpput(file);
+file = ERR_PTR(err);
+out_dput:
+dput(path.dentry);
+out:
+return file;
+}
+
+struct au_xino_lock_dir {
+struct au_hinode *hdir;
+struct dentry *parent;
+struct inode *dir;
+};
+
+static void au_xino_lock_dir(struct super_block *sb, struct file *xino,
+ struct au_xino_lock_dir *ldir)
+{  
+aufs_bindex_t brid, bindex;
+
+ldir->hdir = NULL;
+bindex = -1;
+brid = au_xino_brid(sb);
+if (brid >= 0)  
+bindex = au_br_index(sb, brid);
+if (bindex >= 0) {  
+ldir->hdir = au_hi(d_inode(sb->s_root), bindex);
+au_hn_inode_lock_nested(ldir->hdir, AuLsc_I_PARENT);
+} else {  
+ldir->parent = dget_parent(xino->f_path.dentry);
+ldir->dir = d_inode(ldir->parent);
+inode_lock_nested(ldir->dir, AuLsc_I_PARENT);
+}  
+}
+
+static void au_xino_unlock_dir(struct au_xino_lock_dir *ldir)  
+{  
+if (ldir->hdir) 
+au_hn_inode_unlock(ldir->hdir);
+else {  
+inode_unlock(ldir->dir);
+dput(ldir->parent);
+}  
+}
+
+/* ---------------------------------------------------------------------- */  
+
+/* trucate xino files asynchronously */  
+  
+int au_xino_trunc(struct super_block *sb, aufs_bindex_t bindex)  
+{  
+int err;
+unsigned long jiffy;
+blkcnt_t blocks;
+aufs_bindex_t bi, bbott;
+struct kstatfs *st;
+struct au_branch *br;
+struct file *new_xino, *file;
+struct super_block *h_sb;
+struct au_xino_lock_dir ldir;
+
+err = -ENOMEM;
+st = kmalloc(sizeof(*st), GFP_NOFS);
+if (unlikely(!st))
+goto out;
+err = -EINVAL;
+bbot = au_sbbot(sb);
+if (unlikely(bindex < 0 || bbot < bindex))
+goto out_st;
+br = au_shr(sb, bindex);
+file = br->br_xino.xi_file;
+if (!file)
+goto out_st;
+
+err = vfs_statfs(&file->f_path, st);
+if (unlikely(err))
+AuErr1("statfs err %d, ignored\n", err);
+jiffy = jiffies;
+blocks = file_inode(file)->i_blocks;
+pr_info("begin truncating xino(b%d), ib%llu, %llu/%llu free blks\n",
+bindex, (u64)blocks, st->f_bfree, st->f_blocks);
+
+au_xino_lock_dir(sb, file, &ldir);
+/* mnt_want_write() is unnecessary here */
+new_xino = au_xino_create2(file, file);
+au_xino_unlock_dir(&ldir);
+err = PTR_ERR(new_xino);
+if (IS_ERR(new_xino)) {
+pr_err("err %d, ignored\n", err);
+goto out_st;
+}
+err = 0;
+fput(file);
+br->br_xino.xi_file = new_xino;
+
+h_sb = au_br_sb(br);
+for (bi = 0; bi <= bbot; bi++) {
+if (unlikely(bi == bindex))
+continue;
+br = au_shr(sb, bi);
+if (au_br_sb(br) != h_sb)
+continue;
+
+fput(br->br_xino.xi_file);
+br->br_xino.xi_file = new_xino;
+get_file(new_xino);
+
+err = vfs_statfs(&new_xino->f_path, st);
+if (!err) {
+pr_info("end truncating xino(b%d), ib%llu, %llu/%llu free blks\n",
+bindex, (u64)file_inode(new_xino)->i_blocks,
struct xino_do_trunc_args {
    struct super_block *sb;
    struct au_branch *br;
};

static void xino_do_trunc(void *_args) {
    struct xino_do_trunc_args *args = _args;
    struct super_block *sb;
    struct au_branch *br;
    struct inode *dir;
    int err;
    aufs_bindex_t bindex;

    err = 0;
    sb = args->sb;
    dir = d_inode(sb->s_root);
    br = args->br;
    
    si_noflush_write_lock(sb);
    ii_read_lock_parent(dir);
    bindex = au_br_index(sb, br->br_id);
    err = au_xino_trunc(sb, bindex);
    ii_read_unlock(dir);
    if (unlikely(err))
        pr_warn("err b%d, (%d)\n", bindex, err);
    atomic_dec(&br->br_xino_running);
    br_put(br);
    si_write_unlock(sb);
    au_nwt_done(&au_sbi(sb)->si_nowait);
    kfree(args);
}

static int xino_trunc_test(struct super_block *sb, struct au_branch *br) {
    int err;
    
    st->f_bfree, st->f_blocks);
    if (file_inode(new_xino)->i_blocks < blocks)
        AuErr1("statfs err %d, ignored\n", err);
    } else
    AuErr1("statfs err %d, ignored\n", err);
    +
    +out_st:
    +kfree(st);
    +out:
    +return err;
    +
    +struct xino_do_trunc_args {
    +struct super_block *sb;
    +struct au_branch *br;
    +};
    +
    +static void xino_do_trunc(void *_args)
    +{
    +struct xino_do_trunc_args *args = _args;
    +struct super_block *sb;
    +struct au_branch *br;
    +struct inode *dir;
    +int err;
    +aufs_bindex_t bindex;
    +
    +err = 0;
    +sb = args->sb;
    +dir = d_inode(sb->s_root);
    +br = args->br;
    +
    +si_noflush_write_lock(sb);
    +ii_read_lock_parent(dir);
    +bindex = au_br_index(sb, br->br_id);
    +err = au_xino_trunc(sb, bindex);
    +ii_read_unlock(dir);
    +if (unlikely(err))
        pr_warn("err b%d, (%d)\n", bindex, err);
    +atomic_dec(&br->br_xino_running);
    +au_br_put(br);
    +si_write_unlock(sb);
    +au_nwt_done(&au_sbi(sb)->si_nowait);
    +kfree(args);
    +}
+struct kstatfs st;
+struct au_sinfo *sinfo;
+
+/* todo: si_xino_expire and the ratio should be customizable */
+sinfo = au_sbi(sb);
+if (time_before(jiffies, 
+sinfo->si_xino_jiffy + sinfo->si_xino_expire)) 
+return 0;
+
+/* truncation border */
+err = vfs_statfs(&br->br_xino.xi_file->f_path, &st);
+if (unlikely(err)) {
+AuErr1("statfs err %d, ignored\n", err);
+return 0;
+
+if (div64_u64(st.f_bfree * 100, st.f_blocks) >= AUFS_XINO_DEF_TRUNC)
+return 0;
+
+return 1;
+
+static void xino_try_trunc(struct super_block *sb, struct au_branch *br)
+{
+struct xino_do_trunc_args *args;
+int wkq_err;
+
+if (!xino_trunc_test(sb, br))
+return;
+
+if (atomic_inc_return(&br->br_xino_running) > 1)
+goto out;
+
+/* lock and kfree() will be called in trunc_xino() */
+args = kmalloc(sizeof(*args), GFP_NOFS);
+if (unlikely(!args)) {
+AuErr1("no memory\n");
+goto out;
+
+au_br_get(br);
+args->sb = sb;
+args->br = br;
+wkq_err = au_wkq_nowait(xino_do_trunc, args, sb, */flags*/0);
+if (!wkq_err)
+return; /* success */
+
+pr_err("wkq %d\n", wkq_err);
+au_br_put(br);
+kfree(args);
+
+out:
+atomic_dec(&br->br_xino_running);
+}
+
+/* ----------------------------------------------- */
+
+static int au_xino_do_write(vfs_writef_t write, struct file *file,
+    ino_t h_ino, ino_t ino)
+{
+    loff_t pos;
+    ssize_t sz;
+
+    pos = h_ino;
+    if (unlikely(au_loff_max / sizeof(ino) - 1 < pos)) {
+        AuIOErr1("too large hi%lu", (unsigned long)h_ino);
+        return -EFBIG;
+    }
+    pos *= sizeof(ino);
+    sz = xino_fwrite(write, file, &ino, sizeof(ino), &pos);
+    if (sz == sizeof(ino))
+        return 0; /* success */
+    AuIOErr("write failed (%zd)\n", sz);
+    return -EIO;
+}
+
+/*
+ * write @ino to the xinofile for the specified branch{@sb, @bindex}
+ * at the position of @h_ino.
+ * even if @ino is zero, it is written to the xinofile and means no entry.
+ * if the size of the xino file on a specific filesystem exceeds the watermark,
+ * try truncating it.
+ */
+int au_xino_write(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino,
+    ino_t ino)
+{
+    int err;
+    unsigned int mnt_flags;
+    struct au_branch *br;
+
+    BUILD_BUG_ON(sizeof(long long) != sizeof(au_loff_max)
+        || ((loff_t)-1) > 0);
+    SiMustAnyLock(sb);
+
+    mnt_flags = au_mntflags(sb);
+    if (!au_opt_test(mnt_flags, XINO))
return 0;
+
+br = au_sbr(sb, bindex);
+err = au_xino_do_write(au_sbi(sb)->si_xwrite, br->br_xino.xi_file,
+    h_ino, ino);
+if (!err) {
+    if (au_opt_test(mnt_flags, TRUNC_XINO)
+        && au_test_fs_trunc_xino(au_br_sb(br)))
+        xino_trunc(sb, br);
+    return 0; /* success */
+}
+
+AuIOErr("write failed (%d)\n", err);
+return -EIO;
+
+/* ---------------------------------------------------------------------- */
+
+/* aufs inode number bitmap */
+
+static const int page_bits = (int)PAGE_SIZE * BITS_PER_BYTE;
+static ino_t xib_calc_ino(unsigned long pindex, int bit)
+{
+    ino_t ino;
+
+    AuDebugOn(bit < 0 || page_bits <= bit);
+    ino = AUFS_FIRST_INO + pindex * page_bits + bit;
+    return ino;
+}
+
+static void xib_calc_bit(ino_t ino, unsigned long *pindex, int *bit)
+{
+    AuDebugOn(ino < AUFS_FIRST_INO);
+    ino -= AUFS_FIRST_INO;
+    *pindex = ino / page_bits;
+    *bit = ino % page_bits;
+}
+
+static int xib_pindex(struct super_block *sb, unsigned long pindex)
+{
+    int err;
+    llof_t pos;
+    ssize_t sz;
+    struct au_sbinfo *sbinfo;
+    struct file *xib;
+    unsigned long *p;
+
+    sbinfo = au_sbi(sb);
+
+    /* ... */
MtxMustLock(&sbinfo->si_xib_mtx);
AuDebugOn(pindex > ULONG_MAX / PAGE_SIZE 
  || !au_opt_test(sbinfo->si_mntflags, XINO));

if (pindex == sbinfo->si_xib_last_pindex)
  return 0;

xib = sbinfo->si_xib;
p = sbinfo->si_xib_buf;
pos = sbinfo->si_xib_last_pindex;
pos *= PAGE_SIZE;
sz = xino_fwrite(sbinfo->si_xwrite, xib, p, PAGE_SIZE, &pos);
if (unlikely(sz != PAGE_SIZE))
  goto out;

pos = pindex;
pos *= PAGE_SIZE;
if (vfsub_f_size_read(xib) >= pos + PAGE_SIZE)
  sz = xino_fread(sbinfo->si_xread, xib, p, PAGE_SIZE, &pos);
else {
  memset(p, 0, PAGE_SIZE);
  sz = xino_fwrite(sbinfo->si_xwrite, xib, p, PAGE_SIZE, &pos);
  }
if (sz == PAGE_SIZE) {
  sbinfo->si_xib_last_pindex = pindex;
  return 0; /* success */
  }

out:
  AuIOErr1("write failed (%zd)
  ", sz);
  err = sz;
  if (sz >= 0)
    err = -EIO;
  return err;
  
/* static void au_xib_clear_bit(struct inode *inode) */
{ int err, bit;
  unsigned long pindex;
  struct super_block *sb;
  struct au_sbinfo *sbinfo;
  
  AuDebugOn(inode->i_nlink);
  
sb = inode->i_sb;
+xib_calc_bit(inode->i_ino, &pindex, &bit);
+AuDebugOn(page_bits <= bit);
+sbinfo = au_sh(sb);
+mutex_lock(&sbinfo->si_xib_mtx);
+err = xib_pindex(sb, pindex);
+if (!err) {
+clear_bit(bit, sbinfo->si_xib_buf);
+sbinfo->si_xib_next_bit = bit;
+}
+mutex_unlock(&sbinfo->si_xib_mtx);
+}
+
+/* for s_op->delete_inode() */
+void au_xino_delete_inode(struct inode *inode, const int unlinked)
+
+{ int err;
+unsigned int mnt_flags;
+aufs_bindex_t bindex, bbot, bi;
+unsigned char try_trunc;
+struct au_iinfo *iinfo;
+struct super_block *sb;
+struct au_hinode *hi;
+struct inode *h_inode;
+struct au_branch *br;
+vfs_writef_t xwrite;
+
+AuDebugOn(au_is_bad_inode(inode));
+
+sb = inode->i_sb;
+mnt_flags = au_mntflags(sb);
+if (!au_opt_test(mnt_flags, XINO)
+    || inode->i_ino == AUFS_ROOT_INO)
+    return;
+
+if (unlinked) {
+au_xigen_inc(inode);
+au_xib_clear_bit(inode);
+}
+
iinfo = au_ii(inode);
+bindex = iinfo->ii_btop;
+if (bindex < 0)
+return;
+
+if (unlinked) {
+au_xigen_inc(inode);
+au_xib_clear_bit(inode);
+}
+
iinfo = au_ii(inode);
+bindex = iinfo->ii_btop;
+if (bindex < 0)
+return;
+
xwrite = au_sbi(sb)->si_xwrite;
+try_trunc = !!au_opt_test(mnt_flags, TRUNC_XINO);
+hi = au_hinode(iinfo, bindex);
+bbot = iinfo->ii_bbot;
for (; bindex <= bbot; bindex++, hi++) {
+ h_inode = hi->hi_inode;
+ if (!h_inode
+   || (unlinked && h_inode->i_nlink))
+ continue;
+
+ /* inode may not be revalidated */
+ bi = au_br_index(sb, hi->hi_id);
+ if (bi < 0)
+ continue;
+
+ br = au_sbr(sb, bi);
+ err = au_xino_do_write(xwrite, br->br_xino.xi_file,
+   h_inode->i_ino, /*ino*/0);
+ if (!err && try_trunc
+   && au_test_fs_trunc_xino(au_br_sb(br)))
+ xino_try_trunc(sb, br);
+
+ /* get an unused inode number from bitmap */
+ ino_t au_xino_new_ino(struct super_block *sb)
+ {
+ ino_t ino;
+ unsigned long *p, pindex, ul, pend;
+ struct au_sbinfo *sbinfo;
+ struct file *file;
+ int free_bit, err;
+
+ if (!au_opt_test(au_mntflags(sb), XINO))
+ return iunique(sb, AUFS_FIRST_INO);
+
+ sbinfo = au_sb(sb);
+ mutex_lock(&sbinfo->si_xib_mtx);
+ p = sbinfo->si_xib_buf;
+ free_bit = sbinfo->si_xib_next_bit;
+ if (find_first_zero_bit(p, page_bits));
+ if (likely(likely(err))
+ goto out; /* success */
+ free_bit = find_first_zero_bit(p, page_bits);
+ if (likely(err))
+ goto out; /* success */
+
+ pindex = sbinfo->si_xib_last_pindex;
+ for (ul = pindex - 1; ul < ULONG_MAX; ul--) {
+ err = xib_pindex(sb, ul);
+ if (unlikely(err))
+ goto out_err;
+ free_bit = find_first_zero_bit(p, page_bits);
+if (free_bit < page_bits)
+goto out; /* success */
+
+file = sbinfo->si_xib;
+pend = vfsub_f_size_read(file) / PAGE_SIZE;
+for (ul = pindex + 1; ul <= pend; ul++) {
+err = xib_pindex(sb, ul);
+if (unlikely(err))
+goto out_err;
+free_bit = find_first_zero_bit(p, page_bits);
+if (free_bit < page_bits)
+goto out; /* success */
+
+out:
+set_bit(free_bit, p);
+sbinfo->si_xib_next_bit = free_bit + 1;
+pindex = sbinfo->si_xib_last_pindex;
+mutex_unlock(&sbinfo->si_xib_mtx);
+ino = xib_calc_ino(pindex, free_bit);
+AuDbg("i%lu\n", (unsigned long)ino);
+return ino;
+
+out_err:
+mutex_unlock(&sbinfo->si_xib_mtx);
+AuDbg("i0\n");
+return 0;
+
+/*
+ * read @ino from xinofile for the specified branch[@sb, @bindex]
+ * at the position of @h_ino.
+ * if @ino does not exist and @do_new is true, get new one.
+ */
+int au_xino_read(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino,
+    ino_t *ino)
+{
+    int err;
+    ssize_t sz;
+    loff_t pos;
+    struct file *file;
+    struct au_sbinfo *sbinfo;
+
+    *ino = 0;
+    if (!au_opt_test(au_mntflags(sb), XINO))
+        return 0; /* no xino */
err = 0;
sbinfo = au_sbi(sb);
pos = h_ino;
;if (unlikely(au_loff_max / sizeof(*ino) - 1 < pos)) {
    AuIOErr1("too large hi%lu
", (unsigned long)h_ino);
    return -EFBIG;
}
pos *= sizeof(*ino);
+file = au_sbr(sb, bindex)->br_xino.xi_file;
+if (vfsub_f_size_read(file) < pos + sizeof(*ino))
    return 0; /* no ino */
+sz = xino_fread(sbinfo->si_xread, file, ino, sizeof(*ino), &pos);
+if (sz == sizeof(*ino))
    return 0; /* success */
+
+err = sz;
+if (unlikely(sz >= 0)) {
    err = -EIO;
    AuIOErr("xino read error (%zd)
", sz);
+
+return err;
+
+/* ------------------------------- */
+
+/* create and set a new xino file */
+
+struct file *au_xino_create(struct super_block *sb, char *fname, int silent)
+
+{ 
+    struct file *file;
+    struct dentry *h_parent, *d;
+    struct inode *h_dir, *inode;
+    int err;
+
+    /* at mount-time, and the xino file is the default path,
+     * hnotify is disabled so we have no notify events to ignore.
+     * when a user specified the xino, we cannot get au_hdir to be ignored.
+     */
+    file = vfsub_filp_open(fname, O_RDWR | O_CREAT | O_EXCL | O_LARGEFILE
+        /* | __FMODE_NONOTIFY */,
+        S_IRUGO | S_IWUGO);
+    if (IS_ERR(file)) {
        if (!silent)
            pr_err("open %s(%ld)n", fname, PTR_ERR(file));
+pr_err("open %s(%ld)n", fname, PTR_ERR(file));

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return file;
+
+/* keep file count */
+err = 0;
+inode = file_inode(file);
+h_parent = dget_parent(file->f_path.dentry);
+h_dir = d_inode(h_parent);
+inode_lock_nested(h_dir, AuLsc_I_PARENT);
+/* mnt_want_write() is unnecessary here */
+/* no delegation since it is just created */
+if (inode->i_nlink)
+err = vfsub_unlink(h_dir, &file->f_path, /*delegated*/NULL, /*force*/0);
+inode_unlock(h_dir);
+dput(h_parent);
+if (unlikely(err)) {
+if (!silent)
+pr_err("unlink %s(%d)\n", fname, err);
+goto out;
+}
+
+err = -EINVAL;
+d = file->f_path.dentry;
+if (unlikely(sb == d->d_sb)) {
+if (!silent)
+pr_err("%s must be outside\n", fname);
+goto out;
+}
+if (unlikely(au_test_fs_bad_xino(d->d_sb))) {
+if (!silent)
+pr_err("xino doesn't support %s(%s)\n", fname, au_sbtype(d->d_sb));
+goto out;
+}
+return file; /* success */
+
+out:
+fput(file);
+file = ERR_PTR(err);
+return file;
+
+/* find another branch who is on the same filesystem of the specified
+ * branch[@btgt]. search until @bbot.
+ */
+static int is_sb_shared(struct super_block *sb, aufs_bindex_t btgt,
+aufs_bindex_t bbot)
+
+aufs_bindex_t bindex;
+struct super_block *tgt_sb = au_sbr_sb(sb, btgt);
+
+for (bindex = 0; bindex < btgt; bindex++)
+if (unlikely(tgt_sb == au_sbr_sb(sb, bindex)))
+return bindex;
+
+for (bindex++; bindex <= bbot; bindex++)
+if (unlikely(tgt_sb == au_sbr_sb(sb, bindex)))
+return bindex;
+return -1;
+
+/* ---------------------------------------------------------------------- */
+
+/*
+ * initialize the xinofile for the specified branch @br
+ * at the place/path where @base_file indicates.
+ * test whether another branch is on the same filesystem or not,
+ * if @do_test is true.
+ */
+int au_xino_br(struct super_block *sb, struct au_branch *br, ino_t h_ino,
+struct file *base_file, int do_test)
+
+// initialize the xinofile for the specified branch @br
+// at the place/path where @base_file indicates.
+// test whether another branch is on the same filesystem or not,
+// if @do_test is true.
+int err;
+ino_t ino;
+aufs_bindex_t bbot, bindex;
+struct au_branch *shared_br, *b;
+struct file *file;
+struct super_block *tgt_sb;
+
+shared_br = NULL;
+bbot = au_sbbot(sb);
+
+if (do_test) {
+tgt_sb = au_br_sb(br);
+
+for (bindex = 0; bindex <= bbot; bindex++) {
+b = au_sbr(sb, bindex);
+
+if (tgt_sb == au_br_sb(b)) {
+shared_br = b;
+
+break;
+}
+}
+}
+
+if (!shared_br || !shared_br->br_xino.xi_file) {
+struct au_xino_lock_dir ldir;
+
+au_xino_lock_dir(sb, base_file, &ldir);
+/* mnt_want_write() is unnecessary here */
+file = au_xino_create2(base_file, NULL);
+au_xino_unlock_dir(&ldir);
+err = PTR_ERR(file);
+if (IS_ERR(file))
+goto out;
+br->br_xino.xi_file = file;
+} else {
+br->br_xino.xi_file = shared_br->br_xino.xi_file;
+get_file(br->br_xino.xi_file);
+}
+
in = AUFS_ROOT_INO;
+err = au_xino_do_write(au_sbi(sb)->si_xwrite, br->br_xino.xi_file,
+ h_ino, ino);
+if (unlikely(err)) {
+fput(br->br_xino.xi_file);
+br->br_xino.xi_file = NULL;
+}
+
+out:
+return err;
+
+/* trucate a xino bitmap file */
+
+/* todo: slow */
+static int do_xib_restore(struct super_block *sb, struct file *file, void *page)
+{
+int err, bit;
+ssize_t sz;
+unsigned long pindex;
+lloff_t pos, pend;
+struct au_sbinfo *sbinfo;
+vfs_readf_t func;
+ino_t *ino;
+unsigned long *p;
+
+err = 0;
+sbinfo = au_sbi(sb);
+MtxMustLock(&sbinfo->si_xib_mtx);
+p = sbinfo->si_xib_buf;
+func = sbinfo->si_xread;
+pend = vfs_f_size_read(file);
+pos = 0;
+while (pos < pend) {
+  sz = xino_fread(func, file, page, PAGE_SIZE, &pos);
+  err = sz;
+  if (unlikely(sz <= 0))
+    goto out;
+  err = 0;
+  for (ino = page; sz > 0; ino++, sz -= sizeof(ino)) {
+    if (unlikely(*ino < AUFS_FIRST_INO))
+      continue;
+    xib_calc_bit(*ino, &pindex, &bit);
+    AuDebugOn(page_bits <= bit);
+    err = xib_pindex(sb, pindex);
+    if (!err)
+      set_bit(bit, p);
+    else
+      goto out;
+  }
+out:
+  return err;
+
+static int xib_restore(struct super_block *sb) {
+  int err;
+  aufs_bindex_t bindex, bbot;
+  void *page;
+  err = -ENOMEM;
+  page = (void *)__get_free_page(GFP_NOFS);
+  if (unlikely(!page))
+    goto out;
+  err = 0;
+  bbot = au_sbbot(sb);
+  for (bindex = 0; !err && bindex <= bbot; bindex++)
+    if (!bindex || is_sb_shared(sb, bindex, bindex - 1) < 0)
+      err = do_xib_restore
+        (sb, au_sbr(sb, bindex)->br_xino.xi_file, page);
+    else
+      AuDbg("b%d
", bindex);
+    free_page((unsigned long)page);
+  out:
+  return err;
int au_xib_trunc(struct super_block *sb)
{
    int err;
    ssize_t sz;
    loff_t pos;
    struct au_xino_lock_dir ldir;
    struct au_sbinfo *sbinfo;
    unsigned long *p;
    struct file *file;

    SiMustWriteLock(sb);

    err = 0;
    sbinfo = au_sbi(sb);
    if (!au_opt_test(sbinfo->si_mntflags, XINO))
        goto out;

    file = sbinfo->si_xib;
    if (vfsub_f_size_read(file) <= PAGE_SIZE)
        goto out;

    au_xino_lock_dir(sb, file, &ldir);
    /* mnt_want_write() is unnecessary here */
    file = au_xino_create2(sbinfo->si_xib, NULL);
    au_xino_unlock_dir(&ldir);
    err = PTR_ERR(file);
    if (IS_ERR(file))
        goto out;
    fput(sbinfo->si_xib);
    sbinfo->si_xib = file;

    p = sbinfo->si_xib_buf;
    memset(p, 0, PAGE_SIZE);
    pos = 0;
    sz = xino_fwrite(sbinfo->si_xwrite, sbinfo->si_xib, p, PAGE_SIZE, &pos);
    if (unlikely(sz != PAGE_SIZE)) {
        err = sz;
        AuIOErr("err %d\n", err);
        if (sz >= 0)
            err = -EIO;
        goto out;
    }

    mutex_lock(&sbinfo->si_xib_mtx);
    /* mnt_want_write() is unnecessary here */
    err = xib_restore(sb);

}
+mutex_unlock(&sbinfo->si_xib_mtx);
+
+out:
+return err;
+
+/* ----------------------------------------------- */
+
+/*
+ * xino mount option handlers
+ */
+
+/* xino bitmap */
+static void xino_clear_xib(struct super_block *sb)
+{
+struct au_sbinfo *sbinfo;
+
+SiMustWriteLock(sb);
+
+sbinfo = au_sbi(sb);
+sbinfo->si_xread = NULL;
+sbinfo->si_xwrite = NULL;
+if (sbinfo->si_xib)
+fput(sbinfo->si_xib);
+sbinfo->si_xib = NULL;
+if (sbinfo->si_xib_buf)
+free_page((unsigned long)sbinfo->si_xib_buf);
+sbinfo->si_xib_buf = NULL;
+
+static int au_xino_set_xib(struct super_block *sb, struct file *base)
+{
+int err;
+loff_t pos;
+struct au_sbinfo *sbinfo;
+struct file *file;
+
+SiMustWriteLock(sb);
+
+sbinfo = au_sbi(sb);
+file = au_xino_create2(base, sbinfo->si_xib);
+err = PTR_ERR(file);
+if (IS_ERR(file))
+goto out;
+if (sbinfo->si_xib)
+fput(sbinfo->si_xib);
+sbinfo->si_xib = file;
+sbinfo->si_xread = vfs_readf(file);
+sbinfo->si_xwrite = vfs_writef(file);
+
+err = -ENOMEM;
+if (!sbinfo->si_xib_buf)
+sbinfo->si_xib_buf = (void *)get_zeroed_page(GFP_NOFS);
+if (unlikely(!sbinfo->si_xib_buf))
+goto out_unset;
+
+sbinfo->si_xib_last_pindex = 0;
+sbinfo->si_xib_next_bit = 0;
+if (vfsub_f_size_read(file) < PAGE_SIZE) {
+pos = 0;
+err = xino_fwrite(sbinfo->si_xwrite, file, sbinfo->si_xib_buf,
+ PAGE_SIZE, &pos);
+if (unlikely(err != PAGE_SIZE))
+goto out_free;
+}
+err = 0;
+goto out; /* success */
+
+out_free:
+if (sbinfo->si_xib_buf)
+free_page((unsigned long)sbinfo->si_xib_buf);
+sbinfo->si_xib_buf = NULL;
+if (err >= 0)
+err = -EIO;
+out_unset:
+fput(sbinfo->si_xib);
+sbinfo->si_xib = NULL;
+sbinfo->si_xread = NULL;
+sbinfo->si_xwrite = NULL;
+out:
+return err;
+}
+
+/* xino for each branch */
+static void xino_clear_br(struct super_block *sb)
+{
+aufs_bindex_t bindex, bbot;
+struct au_branch *br;
+
+bbot = au_sbbot(sb);
+for (bindex = 0; bindex <= bbot; bindex++) {
+br = au_sbr(sb, bindex);
+if (!br || !br->br_xino.xi_file)
+continue;
+
+fput(br->br_xino.xi_file);
br_xino.xi_file = NULL;
+
+}
+
+static int au_xino_set_br(struct super_block *sb, struct file *base)
+{
+int err;
+ino_t ino;
aufs_bindex_t bindex, bbot, bshared;
+struct {
+struct file *old, *new;
+} *fpair, *p;
+struct au_branch *br;
+struct inode *inode;
+vfs_writef_t writef;
+
+SiMustWriteLock(sb);
+
+err = -ENOMEM;
+bbot = au_sbbot(sb);
+fpair = kcalloc(bbot + 1, sizeof(*fpair), GFP_NOFS);
+if (unlikely(!fpair))
+goto out;
+
inode = d_inode(sb->s_root);
in = AUFS_ROOT_INO;
+writef = au_sbi(sb)->si_xwrite;
+for (bindex = 0, p = fpair; bindex <= bbot; bindex++, p++)
+{
+bshared = is_sb_shared(sb, bindex, bindex - 1);
+if (bshared >= 0) {
+/* shared xino */
+*p = fpair[bshared];
+get_file(p->new);
+}
+if (!p->new) {
+/* new xino */
+br = au_sbr(sb, bindex);
+p->old = br->br_xino.xi_file;
+p->new = au_xino_create2(base, br->br_xino.xi_file);
+err = PTR_ERR(p->new);
+if (IS_PTR_ERR(p->new)) {
+p->new = NULL;
+goto out_pair;
+}
+}
+
+err = au_xino_do_write(writef, p->new,
+    au_h_iptr(inode, bindex)->i_ino, ino);
+if (unlikely(err))
+goto out_pair;
+
+for (bindex = 0, p = fpair; bindex <= bbot; bindex++, p++) {
+br = au_sbr(sb, bindex);
+if (br->br_xino.xi_file)
+fput(br->br_xino.xi_file);
+get_file(p->new);
+br->br_xino.xi_file = p->new;
+
+out_pair:
+for (bindex = 0, p = fpair; bindex <= bbot; bindex++, p++)
+if (p->new)
+fput(p->new);
+else
+break;
+kfree(fpair);
+out:
+return err;
+
+void au_xino_clr(struct super_block *sb)
+{
+struct au_sbinfo *sbinfo;
+
+au_xigen_clr(sb);
+xino_clear_xib(sb);
+xino_clear_br(sb);
+sbinfo = au_sbi(sb);
+/* lvalue, do not call au_mntflags() */
+au_opt_clr(sbinfo->si_mntflags, XINO);
+
+
+int au_xino_set(struct super_block *sb, struct au_opt_xino *xino, int remount)
+{
+int err, skip;
+struct dentry *parent, *cur_parent;
+struct qstr *dname, *cur_name;
+struct file *cur_xino;
+struct inode *dir;
+struct au_sbinfo *sbinfo;
+
+SiMustWriteLock(sb);
+
+err = 0;
sbinfo = au_sbi(sb);
parent = dget_parent(xino->file->f_path.dentry);
if (remount) {
    skip = 0;
dname = &xino->file->f_path.dentry->d_name;
cur_xino = sbinfo->si_xib;
    if (cur_xino) {
cur_parent = dget_parent(cur_xino->f_path.dentry);
cur_name = &cur_xino->f_path.dentry->d_name;
skip = (cur_parent == parent && au_qstreq(dname, cur_name));
dput(cur_parent);
    }
    if (skip)
goto out;
}
au_opt_set(sbinfo->si_mntflags, XINO);
dir = d_inode(parent);
inode_lock_nested(dir, AuLsc_I_PARENT);
/* mnt_want_write() is unnecessary here */
t_err = au_xino_set_xib(sb, xino->file);
    if (!err)
t_err = au_xigen_set(sb, xino->file);
    if (!err)
t_err = au_xino_set_br(sb, xino->file);
inode_unlock(dir);
    if (!err)
goto out; /* success */
/* reset all */
AuIOErr("failed creating xino(%d).\n", err);
au_xigen_clr(sb);
xino_clear_xib(sb);
out:
dput(parent);
return err;
}
/* ---------------------------------------------------------------------- */
/* create a xinofile at the default place/path. */
*/
+struct file *au_xino_def(struct super_block *sb)
{
+struct file *file;
+char *page, *p;
+struct au_branch *br;
+struct super_block *h_sb;
+struct path path;
+aufs_bindex_t bbot, bindex, bwr;
+
+br = NULL;
+bbot = au_sbbot(sb);
+bwr = -1;
+for (bindex = 0; bindex <= bbot; bindex++) {
  br = au_sbr(sb, bindex);
  if (au_br_writable(br->br_perm)
+    && !au_test_fs_bad_xino(au_br_sb(br))) {
    bwr = bindex;
    break;
  }
}
```c
int au_xino_path(struct seq_file *seq, struct file *file)
{
    int err;

    err = au_seq_path(seq, &file->f_path);
    if (unlikely(err))
        goto out;

#define Deleted "\040(deleted)"
    seq->count -= sizeof(Deleted) - 1;
    AuDebugOn(memcmp(seq->buf + seq->count, Deleted,
        sizeof(Deleted) - 1));
#undef Deleted

out:
    return err;
}

static int au_xinondir_find(struct au_xino_file *xino, ino_t h_ino)
{
    int found, total, i;

    AuDebugOn(!au_opt_test(au_mntflags(sb), XINO));
    xino = &au_sbr(sb, bindex)->br_xino;
    AuDebugOn(idx < 0 || xino->xi_nondir.total <= idx);

    spin_lock(&xino->xi_nondir.spin);
    AuDebugOn(xino->xi_nondir.array[idx] != h_ino);
    xino->xi_nondir.array[idx] = 0;
    spin_unlock(&xino->xi_nondir.spin);
    wake_up_all(&xino->xi_nondir.wqh);
}
```

+found = -1;
+total = xino->xi_nondir.total;
+for (i = 0; i < total; i++) {
+if (xino->xi_nondir.array[i] != h_ino)
+continue;
+found = i;
+break;
+}
+
+return found;
+
+static int au_xinondir_expand(struct au_xino_file *xino)
+{
+int err, sz;
+ino_t *p;
+
+BUILD_BUG_ON(KMALLOC_MAX_SIZE > INT_MAX);
+
+err = -ENOMEM;
+sz = xino->xi_nondir.total * sizeof(ino_t);
+if (unlikely(sz > KMALLOC_MAX_SIZE / 2))
+goto out;
+p = au_kzrealloc(xino->xi_nondir.array, sz, sz << 1, GFP_ATOMIC,
+     /*may_shrink*/0);
+if (p) {
+xino->xi_nondir.array = p;
+xino->xi_nondir.total <<= 1;
+AuDbg("xi_nondir.total %d\n", xino->xi_nondir.total);
+err = 0;
+}
+
+out:
+return err;
+
+int au_xinondir_enter(struct super_block *sb, aufs_bindex_t bindex, ino_t h_ino,
+             int *idx)
+{
+int err, found, empty;
+struct au_xino_file *xino;
+
+err = 0;
+*idx = -1;
+if (!au_opt_test(au_mntflags(sb), XINO))
+goto out; /* no xino */
+
+xino = &au_sbr(sb, bindex)->br_xino;
again:
+spin_lock(&xino->xi_nondir.spin);
+found = au_xinondir_find(xino, h_ino);
+if (found == -1) {
+empty = au_xinondir_find(xino, /*h_ino*/0);
+if (empty == -1) {
+empty = xino->xi_nondir.total;
+err = au_xinondir_expand(xino);
+if (unlikely(err))
+goto out_unlock;
+} else {
+spin_unlock(&xino->xi_nondir.spin);
+wait_event(xino->xi_nondir.wqh,
+ xino->xi_nondir.array[found] != h_ino);
+goto again;
+}
+xino->xi_nondir.array[empty] = h_ino;
+*idx = empty;
+} else {
+spin_unlock(&xino->xi_nondir.spin);
+out_unlock:
+spin_unlock(&xino->xi_nondir.spin);
+out:
+return err;
+}
--- linux-4.15.0.orig/fs/autofs4/autofs_i.h
+++ linux-4.15.0/fs/autofs4/autofs_i.h
@@ -26,6 +26,7 @@
#include <linux/list.h>
#include <linux/completion.h>
#include <asm/current.h>
+include <linux/magic.h>
/* This is the range of ioctl() numbers we claim as ours */
#define AUTOFS_IOC_FIRST AUTOFS_IOC_READY
@@ -124,7 +125,8 @@
static inline struct autofs_sb_info *autofs4_sbi(struct super_block *sb)
{
- return (struct autofs_sb_info *)(sb->s_fs_info);
+ return sb->s_magic != AUTOFS_SUPER_MAGIC ?
+NULL : (struct autofs_sb_info *)(sb->s_fs_info);
}
static inline struct autofs_info *autofs4_dentry_ino(struct dentry *dentry)
--- linux-4.15.0.orig/fs/autofs4/dev-ioctl.c
+++ linux-4.15.0/fs/autofs4/dev-ioctl.c
cmd);
goto out;
}
} else {
    unsigned int inr = _IOC_NR(cmd);
+
    if (inr == AUTOFS_DEV_IOCTL_OPENMOUNT_CMD ||
        inr == AUTOFS_DEV_IOCTL_REQUESTER_CMD ||
        inr == AUTOFS_DEV_IOCTL_ISMOUNTPOINT_CMD) {
        err = -EINVAL;
        goto out;
    }
}

err = 0;

/* param->path has already been checked */
/* param->path has been checked in validate_dev_ioctl() */
if (!param->openmount.devid)
    return -EINVAL;

dev_t devid;

/* param->path has been checked in validate_dev_ioctl() */
dev_t devid;

unsigned int devid, magic;

unsigned int devid, size;

unsigned int devid, magic;

unsigned int devid, magic;
int err = -ENOENT;
if (param->size <= AUTOFS_DEV_IOCTL_SIZE) {
    err = -EINVAL;
    goto out;
}
/* param->path has been checked in validate_dev_ioctl() */
devid = sbi->sb->s_dev;

unsigned int devid, magic;
int err = -ENOENT;
if (param->size <= AUTOFS_DEV_IOCTL_SIZE) {
    err = -EINVAL;
    goto out;
}
/* param->path has been checked in validate_dev_ioctl() */
name = param->path;
type = param->ismountpoint.in.type;
--- linux-4.15.0.orig/fs/autofs4/expire.c
+++ linux-4.15.0/fs/autofs4/expire.c
@@ -472,9 +472,10 @@
 */
flags &= ~AUTOFS_EXP_LEAVES;
found = should_expire(expired, mnt, timeout, how);
-if (!found || found != expired)
-        /* Something has changed, continue */
+if (found != expired) { // something has changed, continue
+dput(found);
  goto next;
 +}

if (expired != dentry)
dput(dentry);
@@ -567,7 +568,6 @@
        pkt.len = dentry->d_name.len;
        memcpy(pkt.name, dentry->d_name.name, pkt.len);
        pkt.name[pkt.len] = '0';
-      dput(dentry);
        if (copy_to_user(pkt_p, &pkt, sizeof(struct autofs_packet_expire)))
          ret = -EFAULT;
-      @ @ -580,6 +580,8 @@
      complete_all(&ino->expire_complete);
      spin_unlock(&sbi->fs_lock);

      +dput(dentry);
+      
      return ret;
  }

--- linux-4.15.0.orig/fs/autofs4/inode.c
+++ linux-4.15.0/fs/autofs4/inode.c
@@ -14,7 +14,6 @@
#include <linux/pagemap.h>
#include <linux/parser.h>
#include <linux/bitops.h>
-#include <linux/magic.h>
#include "autofs_i.h"
#include <linux/module.h>

@@ -260,8 +259,10 @@
root_inode = autofs4_get_inode(s, S_IFDIR | 0755);
root = d_make_root(root_inode);
if (!root) {
    ret = -ENOMEM;
    goto fail_ino;
}
pipe = NULL;

root->d_fsdata = ino;

inode = autofs4_get_inode(dir->i_sb, S_IFDIR | mode);
if (!inode)
    return -ENOMEM;
d_add(dentry, inode);

s->s_magic = BFS_MAGIC;

if (le32_to_cpu(bfs_sb->s_start) > le32_to_cpu(bfs_sb->s_end) ||
    le32_to_cpu(bfs_sb->s_start) < BFS_BSIZE) {
    printf("Superblock is corrupted\n");
    goto out1;
}
imap_len = (info->si_lasti / 8) + 1;
for (i = 0; i < BFS_ROOT_INO; i++)
    set_bit(i, info->si_imap);
current->mm->start_stack = bprm->p;

if ((current->flags & PF_RANDOMIZE) && (randomize_va_space > 1)) {
    /*
     * For architectures with ELF randomization, when executing
     * a loader directly (i.e. no interpreter listed in ELF
     * headers), move the brk area out of the mmap region
     * (since it grows up, and may collide early with the stack
     * growing down), and into the unused ELF_ET_DYN_BASE region.
     */
    if (IS_ENABLED(CONFIG_ARCH_HAS_ELF_RANDOMIZE) &&
        loc->elf_ex.e_type == ET_DYN && !interpreter)
        current->mm->brk = current->mm->start_brk =
        ELF_ET_DYN_BASE;
    
    current->mm->brk = current->mm->start_brk =
    arch_randomize_brk(current->mm);
    #ifdef compat_brk_randomized
    goto out_free_ph;
    
    -len = ELF_PAGESTART(eppnt->p_filesz + eppnt->p_vaddr +
    - ELF_MIN_ALIGN - 1);
    -bss = eppnt->p_memsz + eppnt->p_vaddr;
    +len = ELF_PAGEALIGN(eppnt->p_filesz + eppnt->p_vaddr);
    +bss = ELF_PAGEALIGN(eppnt->p_memsz + eppnt->p_vaddr);
    if (bss > len) {
        error = vm_brk(len, bss - len);
        if (error)
            goto out_free_ph;
            
    -const struct user_regset *regset = &view->regsets[i];
    -do_thread_regset_writeback(t->task, regset);
    -size_t size = regset_size(t->task, regset);
    -void *data = kmalloc(size, GFP_KERNEL);
    +void *data = kzalloc(size, GFP_KERNEL);
    if (unlikely(!data))
        return 0;
    ret = regset->get(t->task, regset, (regset->active(t->task, regset))) { 
        int ret;
        size_t size = regset_size(t->task, regset);
        void *data = kmalloc(size, GFP_KERNEL);
        if (unlikely(!data))
            return 0;
        ret = regset->get(t->task, regset, (regset->active(t->task, regset) > 0)) { 
        int ret;
        size_t size = regset_size(t->task, regset);
        void *data = kmalloc(size, GFP_KERNEL);
        if (unlikely(!data))
            return 0;
        ret = regset->get(t->task, regset, --- linux-4.15.0.orig/fs/binfmt_flat.c
        ++ +linux-4.15.0/fs/binfmt_flat.c
        @ @ -856,9 +856,14 @@

        static int load_flat_shared_library(int id, struct lib_info *libs)
{ }
+/*
 + * This is a fake bprm struct; only the members "buf", "file" and
 + * "filename" are actually used.
 + */
struct linux_binprm bprm;
int res;
char buf[16];
+loff_t pos = 0;

memset(&bprm, 0, sizeof(bprm));

@@ -872,25 +877,11 @@
if (IS_ERR(bprm.file))
 return res;

-bprm.cred = prepare_exec_creds();
-res = -ENOMEM;
-if (!bprm.cred)
-goto out;
-
-/* We don't really care about recalculating credentials at this point
- * as we're past the point of no return and are dealing with shared
- * libraries.
- */
-bprm.called_set_creds = 1;
-
-res = prepare_binprm(&bprm);
+res = kernel_read(bprm.file, bprm.buf, BINPRM_BUF_SIZE, &pos);

-if (!res)
+if (res >= 0)
 res = load_flat_file(&bprm, libs, id, NULL);

-abortcreds(bprm.cred);
-
-out:
allow_write_access(bprm.file);
fput(bprm.file);

--- linux-4.15.0.orig/fs/binfmt_misc.c
+++ linux-4.15.0/fs/binfmt_misc.c
@@ -387,8 +387,13 @@
s = strchr(p, del);
if (!s)
goto einval;
-*s++ = '\0';
-e->offset = simple_strtoul(p, &p, 10);
if (p != s) {
    int r = kstrtoint(p, 10, &e->offset);
    if (r != 0 || e->offset < 0)
        goto einval;
}

if (*p++)
    goto einval;
pr_debug("register: offset: %#x\n", e->offset);

if (e->mask &&
    string_unescape_inplace(e->mask, UNESCAPE_HEX) != e->size)
    goto einval;

if (e->size > BINPRM_BUF_SIZE ||
    BINPRM_BUF_SIZE - e->size < e->offset)
    goto einval;
pr_debug("register: magic/mask length: %i\n", e->size);

if (USE_DEBUG) {
    struct super_block *sb = file_inode(file)->i_sb;
    struct dentry *root = sb->s_root, *dentry;
    int err = 0;
    struct file *f = NULL;
    e = create_entry(buffer, count);
    if (IS_ERR(e))
        return PTR_ERR(e);

    if (e->flags & MISC_FMT_OPEN_FILE) {
        f = open_exec(e->interpreter);
        if (IS_ERR(f)) {
            pr_notice("register: failed to install interpreter file %s\n", e->name);
            delete_no_lock(d_inode(root));
            dentry = lookup_one_len(e->name, root, strlen(e->name));
            err = PTR_ERR(dentry);
            goto out2;
        }
        e->interp_file = f;
    }
    inode_lock(d_inode(root));
    dentry = lookup_one_len(e->name, root, strlen(e->name));
    err = PTR_ERR(dentry);
    goto out2;
}
-if (e->flags & MISC_FMT_OPEN_FILE) {
  -struct file *f;
  -
  -f = open_exec(e->interpreter);
  -if (IS_ERR(f)) {
    -err = PTR_ERR(f);
    -pr_notice("register: failed to install interpreter file %s\n", e->interpreter);
    -simple_release_fs(&bm_mnt, &entry_count);
    -iput(inode);
    -inode = NULL;
    -goto out2;
  -}
  -e->interp_file = f;
  -
  -
  e->dentry = dget(dentry);
  inode->i_private = e;
  inode->i_fop = &bm_entry_operations;
@@ -748,6 +751,8 @@
  inode_unlock(d_inode(root));

  if (err) {
    +if (f)
    +filp_close(f, NULL);
    kfree(e);
    return err;
  }
--- linux-4.15.0.orig/fs/binfmt_script.c
+++ linux-4.15.0/fs/binfmt_script.c
@@ -14,13 +14,30 @@
 #include <linux/err.h>
 #include <linux/fs.h>

+static inline bool spacetab(char c) { return c == ' ' || c == '\t'; }
+static inline char *next_non_spacetab(char *first, const char *last)
+{
+  +for (; first <= last; first++)
+  +if (!spacetab(*first))
+  +return first;
+  +return NULL;
+}
+static inline char *next_terminator(char *first, const char *last)
+{
+  +for (; first <= last; first++)
+  +if (spacetab(*first) || !*first)
+  +return first;
+  +return NULL;


static int load_script(struct linux_binprm *bprm)
{
    const char *i_arg, *i_name;
    char *cp;
    struct file *file;
    int retval;

    /* Not ours to exec if we don't start with "#!". */
    if ((bprm->buf[0] != '#') || (bprm->buf[1] != '!'))
        return -ENOEXEC;

    /* Release since we are not mapping a binary into memory. */
    allow_write_access(bprm->file);
    fput(bprm->file);
    bprm->file = NULL;

    /* This section does the #! interpretation. */
    /* Sorta complicated, but hopefully it will work. -TYT */
    /* */
    /* This section handles parsing the #! line into separate */
    /* interpreter path and argument strings. We must be careful */
    /* because bprm->buf is not yet guaranteed to be NUL-terminated */
    /* (though the buffer will have trailing NUL padding when the */
    /* file size was smaller than the buffer size). */
    /* */
    /* We do not want to exec a truncated interpreter path, so either */
    /* we find a newline (which indicates nothing is truncated), or */
    /* we find a space/tab/NUL after the interpreter path (which */
    /* itself may be preceded by spaces/tabs). Truncating the */
    /* arguments is fine: the interpreter can re-read the script to */
    /* parse them on its own. */
    /* */
    buf_end = bprm->buf + sizeof(bprm->buf) - 1;
    cp = strchr(bprm->buf, '\n');
    if (!cp) {
+cp = next_non_spacetab(bprm->buf + 2, buf_end);
+if (!cp)
+return -ENOEXEC; /* Entire buf is spaces/tabs */
+/*
+ * If there is no later space/tab/NUL we must assume the
+ * interpreter path is truncated.
+ */
+if (!next_terminator(cp, buf_end))
+return -ENOEXEC;
+cp = buf_end;
+
+/* NUL-terminate the buffer and any trailing spaces/tabs. */
*cp = '\0';
while (cp > bprm->buf) {
  cp--;
--- linux-4.15.0.orig/fs/block_dev.c
+++ linux-4.15.0/fs/block_dev.c
@@ -104,6 +104,20 @@
 }}
EXPORT_SYMBOL(invalidate_bdev);

+static void set_init_blocksize(struct block_device *bdev)
+{
+  unsigned bsize = bdev_logical_block_size(bdev);
+  loff_t size = i_size_read(bdev->bd_inode);
+  
+  while (bsize < PAGE_SIZE) {
+    if (size & bsize)
+      break;
+    bsize <<= 1;
+  }
+  bdev->bd_block_size = bsize;
+  bdev->bd_inode->i_blkbits = blksize_bits(bsize);
+}
+
+int set_blocksize(struct block_device *bdev, int size)
+{ /* Size must be a power of two, and between 512 and PAGE_SIZE */
+  @ @ -219,7 +233,7 @@
+  ret = bio_iov_iter_get_pages(&bio, iter);
+  if (unlikely(ret))
+    -return ret;
+    goto out;
+  ret = bio.bi_iter.bi_size;
+
if (iov_iter_rw(iter) == READ) {
  @ @ -248,12 +262,13 @@
put_page(bvec->bv_page);
}

- if (vecs != inline_vecs)
- kfree(vecs);
-
- if (unlikely(bio.bi_status))
 ret = blk_status_to_errno(bio.bi_status);

+ out:
+ if (vecs != inline_vecs)
+ kfree(vecs);
+
 bio_uninit(&bio);

return ret;
@@ -279,10 +294,10 @@
 struct blkdev_dio *dio = bio->bi_private;
 bool should_dirty = dio->should_dirty;

- if (dio->multi_bio && !atomic_dec_and_test(&dio->ref)) {
- if (bio->bi_status && !dio->bio.bi_status)
- dio->bio.bi_status = bio->bi_status;
- } else {
+ if (bio->bi_status && !dio->bio.bi_status)
+ dio->bio.bi_status = bio->bi_status;
 +
+ if (!dio->multi_bio || atomic_dec_and_test(&dio->ref)) {
 if (!dio->is_sync) {
 struct kiocb *iocb = dio->iocb;
 ssize_t ret;
 @@ -1291,11 +1306,7 @@
 "resized disk %s
",
 bdev->bd_disk ? bdev->bd_disk->disk_name : "");
 }
-
- if (!bdev->bd_disk)
- return;
- if (disk_part_scan_enabled(bdev->bd_disk))
- bdev->bd_invalidated = 1;
+ bdev->bd_invalidated = 1;
 }

 /**
 @@ -1380,23 +1391,27 @@
 void bd_set_size(struct block_device *bdev, loff_t size)
 {
unsigned bsize = bdev_logical_block_size(bdev);

inode_lock(bdev->bd_inode);
i_size_write(bdev->bd_inode, size);
inode_unlock(bdev->bd_inode);
while (bsize < PAGE_SIZE) {
    if (size & bsize)
        break;
    bsize <<= 1;
}
bdev->bd_block_size = bsize;
bdev->bd_inode->i_blkbits = blksize_bits(bsize);
}EXPORT_SYMBOL(bd_set_size);

static void __blkdev_put(struct block_device *bdev, fmode_t mode, int for_part);
+static void bdev_disk_changed(struct block_device *bdev, bool invalidate)
{+ if (disk_part_scan_enabled(bdev->bd_disk)) {
+     if (invalidate)
+         invalidate_partitions(bdev->bd_disk, bdev);
+     else
+         rescan_partitions(bdev->bd_disk, bdev);
+ } else {
+     check_disk_size_change(bdev->bd_disk, bdev);
+     bdev->bd_invalidated = 0;
+ }
+}
+
/*
 * bd_mutex locking:
 * @@ -1421,10 +1436,8 @@
 */
if (!for_part) {
    ret = devgroup_inode_permission(bdev->bd_inode, perm);
    -if (ret != 0) {
        bdp(bdev);
        +if (ret != 0)
            return ret;
    -}
}

restart:
@@ -1469,8 +1482,10 @@
}
}
if (!ret)
+ if (!ret) {
bd_set_size(bdev,(loff_t)get_capacity(disk)<<9);
+ set_init_blocksize(bdev);
+
/ *
* If the device is invalidated, rescan partition
@@ -1478,12 +1493,9 @@
* The latter is necessary to prevent ghost
* partitions on a removed medium.
*/
-if (bdev->bd_invalidated) {
- if (!ret)
- rescan_partitions(disk, bdev);
- else if (ret == -ENOMEDIUM)
- invalidate_partitions(disk, bdev);
-}
+ if (bdev->bd_invalidated &&
+ (!ret || ret == -ENOMEDIUM))
+ bdev_disk_changed(bdev, ret == -ENOMEDIUM);

if (ret)
goto out_clear;
@@ -1495,8 +1507,10 @@
goto out_clear;
BUG_ON(for_part);
ret = __blkdev_get(whole, mode, 1);
-if (ret)
+ if (ret) {
+ bdput(whole);
+ goto out_clear;
+}

bdev->bd_contains = whole;
bdev->bd_part = disk_get_part(disk, partno);
if (!(disk->flags & GENHD_FL_UP) ||
@@ -1505,6 +1519,7 @@
goto out_clear;
}
bd_set_size(bdev, (loff_t)bdev->bd_part->nr_sects << 9);
+ set_init_blocksize(bdev);
}

if (bdev->bd_bdi == &noop_backing_dev_info)
@@ -1515,12 +1530,9 @@
if (bdev->bd_disk->fops->open)
ret = bdev->bd_disk->fops->open(bdev, mode);


/* the same as first opener case, read comment there */
-if (bdev->bd_invalidated) {
-    if (!ret)
-        rescan_partitions(bdev->bd_disk, bdev);
-    else if (ret == -ENOMEDIUM)
-        invalidate_partitions(bdev->bd_disk, bdev);
-}
+			if (bdev->bd_invalidated &&
+         (!ret || ret == -ENOMEDIUM))
+bdev_disk_changed(bdev, ret == -ENOMEDIUM);
    if (ret)
        goto out_unlock_bdev;
}
@@ -1549,7 +1561,6 @@
        put_disk(disk);
        module_put(owner);
        out:
-    bdput(bdev);
+
        return ret;
    }
@@ -1635,6 +1646,9 @@
    bdput(whole);
    }
+
+    if (res)
+        bdput(bdev);
+    return res;
+
EXPORT_SYMBOL(blkdev_get);
@@ -1660,9 +1674,14 @@
    struct block_device *bdev;
    +int perm = 0;
    int err;

-    bdev = lookup_bdev(path);
+    if (mode & FMODE_READ)
+        perm |= MAY_READ;
+    if (mode & FMODE_WRITE)
+        perm |= MAY_WRITE;
    bdev = lookup_bdev(path, perm);
    if (IS_ERR(bdev))
        return bdev;
@@ -1743,6 +1762,20 @@
if (bdev == NULL)
    return -ENOMEM;

+#
+ /* A negative i_writecount for bdev->bd_inode means that the bdev
+ * or one of its paritions is mounted in a user namespace. Deny
+ * writing for non-root in this case, otherwise an unprivileged
+ * user can attack the kernel by modifying the backing store of a
+ * mounted filesystem.
+ */
+if ((filp->f_mode & FMODE_WRITE) &&
    !file_ns_capable(filp, &init_user_ns, CAP_SYS_ADMIN) &&
    !atomic_inc_unless_negative(&bdev->bd_inode->i_writecount)) {
    bdput(bdev);
    return -EBUSY;
}
+
filp->f_mapping = bdev->bd_inode->i_mapping;
filp->f_wb_err = filemap_sample_wb_err(filp->f_mapping);

@@ -1754,6 +1787,16 @@
struct gendisk *disk = bdev->bd_disk;
struct block_device *victim = NULL;

+#
+ /* Sync early if it looks like we're the last one. If someone else
+ * opens the block device between now and the decrement of bd_openers
+ * then we did a sync that we didn't need to, but that's not the end
+ * of the world and we want to avoid long (could be several minute)
+ * syncs while holding the mutex.
+ */
+if (bdev->bd_openers == 1)
+    sync_blockdev(bdev);
+
mutex_lock_nested(&bdev->bd_mutex, for_part);
if (for_part)
    bdev->bd_part_count--;
@@ -1839,6 +1882,9 @@
static int blkdev_close(struct inode * inode, struct file * filp)
{
    struct block_device *bdev = I_BDEV(bdev_file_inode(filp));
    +if (filp->f_mode & FMODE_WRITE &&
    + file_ns_capable(filp, &init_user_ns, CAP_SYS_ADMIN))
    +atomic_dec(&bdev->bd_inode->i_writecount);
    blkdev_put(bdev, filp->f_mode);
    return 0;
}
struct inode *bd_inode = bdev_file_inode(file);
loff_t size = i_size_read(bd_inode);
struct blk_plug plug;
+size_t shorted = 0;
ssize_t ret;

if (bdev_read_only(I_BDEV(bd_inode)))
@@ -1887,12 +1934,17 @@
if ((iocb->ki_flags & (IOCB_NOWAIT | IOCB_DIRECT)) == IOCB_NOWAIT)
return -EOPNOTSUPP;

-iov_iter_truncate(from, size - iocb->ki_pos);
+size -= iocb->ki_pos;
+if (iov_iter_count(from) > size) {
  +shorted = iov_iter_count(from) - size;
  +iov_iter_truncate(from, size);
  +}

blk_start_plug(&plug);
ret = _generic_file_write_iter(iocb, from);
if (ret > 0)
ret = generic_write_sync(iocb, ret);
+iov_iter_reexpand(from, iov_iter_count(from) + shorted);
blk_finish_plug(&plug);
return ret;
}
@@ -1904,13 +1956,21 @@
struct inode *bd_inode = bdev_file_inode(file);
loff_t size = i_size_read(bd_inode);
loff_t pos = iocb->ki_pos;
+size_t shorted = 0;
+ssize_t ret;

if (pos >= size)
return 0;

size -= pos;
-iov_iter_truncate(to, size);
-return generic_file_read_iter(iocb, to);
+if (iov_iter_count(to) > size) {
  +shorted = iov_iter_count(to) - size;
  +iov_iter_truncate(to, size);
  +}
  +
  +ret = generic_file_read_iter(iocb, to);
  +iov_iter_reexpand(to, iov_iter_count(to) + shorted);
  +return ret;
}
EXPORT_SYMBOL_GPL(blkdev_read_iter);

/**
 * lookup_bdev - lookup a struct block_device by name
 * @pathname: special file representing the block device
 * @mask: rights to check for (%MAY_READ, %MAY_WRITE, %MAY_EXEC)
 * Get a reference to the blockdevice at @pathname in the current
 * namespace if possible and return it. Return ERR_PTR(error)
 * otherwise. If @mask is non-zero, check for access rights to the
 * inode at @pathname.
 */
-struct block_device *lookup_bdev(const char *pathname)
+struct block_device *lookup_bdev(const char *pathname, int mask)
{
    struct block_device *bdev;
    struct inode *inode;
    --- linux-4.15.0.orig/fs/btrfs/Kconfig
+++ linux-4.15.0/fs/btrfs/Kconfig
@@ -11,6 +11,8 @@
       select RAID6_PQ
       select XOR_BLOCKS
       select SRCU
+depends on !PPC_256K_PAGES # powerpc
+depends on !PAGE_SIZE_256KB # hexagon

 help
     Btrfs is a general purpose copy-on-write filesystem with extents,
--- linux-4.15.0.orig/fs/btrfs/acl.c
+++ linux-4.15.0/fs/btrfs/acl.c
@@ -22,6 +22,7 @@
    ifdef CAP_SYS_ADMIN
        error = __inode_permission(inode, mask);
    endif
+    goto fail;
+}
    error = -ENOTBLK;
    if (!S_ISBLK(inode->i_mode))
        goto fail;
--- linux-4.15.0.orig/fs/btrfs/Kconfig
+++ linux-4.15.0/fs/btrfs/Kconfig
@@ -11,6 +11,8 @@
       select RAID6_PQ
       select XOR_BLOCKS
       select SRCU
+depends on !PPC_256K_PAGES # powerpc
+depends on !PAGE_SIZE_256KB # hexagon

 help
     Btrfs is a general purpose copy-on-write filesystem with extents,
+include <linux/sched/mm.h>
#include <linux/slab.h>

#include "ctree.h"
@@ -89,8 +90,16 @@
}

if (acl) {
+unsigned int nofs_flag;
+
size = posix_acl_xattr_size(acl->a_count);
+/
+ * We're holding a transaction handle, so use a NOFS memory
+ * allocation context to avoid deadlock if reclaim happens.
+ */
+nofs_flag = memalloc_nofs_save();
value = kmalloc(size, GFP_KERNEL);
+memalloc_nofs_restore(nofs_flag);
if (!value) {
ret = -ENOMEM;
goto out;
--- linux-4.15.0.orig/fs/btrfs/async-thread.c
+++ linux-4.15.0/fs/btrfs/async-thread.c
@@ -265,16 +265,17 @@
}

-static void run_ordered_work(struct __btrfs_workqueue *wq)
+static void run_ordered_work(struct __btrfs_workqueue *wq,
+   struct btrfs_work *self)
{
struct list_head *list = &wq->ordered_list;
struct btrfs_work *work;
spinlock_t *lock = &wq->list_lock;
unsigned long flags;
+void *wtag;
+bool free_self = false;

while (1) {
-void *wtag;
-  spin_lock_irqsave(lock, flags);
if (list_empty(list))
break;
@@ -300,16 +301,47 @@
list_del(&work->ordered_list);
spin_unlock_irqrestore(lock, flags);
- We don't want to call the ordered free functions with the
- lock held though. Save the work as tag for the trace event,
- because the callback could free the structure.
- */
-wtag = work;
-work->ordered_free(work);
TRACE_BTRFS_ALL_WORK_DONE(wq->fs_info, wtag);
+if (work == self) {
+/*
+ * This is the work item that the worker is currently
+ * executing.
+ *
+ * The kernel workqueue code guarantees non-reentrancy
+ * of work items. I.e., if a work item with the same
+ * address and work function is queued twice, the second
+ * execution is blocked until the first one finishes. A
+ * work item may be freed and recycled with the same
+ * work function; the workqueue code assumes that the
+ * original work item cannot depend on the recycled work
+ * item in that case (see find_worker_executing_work()).
+ *
+ * Note that the work of one Btrfs filesystem may depend
+ * on the work of another Btrfs filesystem via, e.g., a
+ * loop device. Therefore, we must not allow the current
+ * work item to be recycled until we are really done,
+ * otherwise we break the above assumption and can
+ * deadlock.
+ */
+free_self = true;
+} else {
+/*
+ * We don't want to call the ordered free functions with
+ * the lock held though. Save the work as tag for the
+ * trace event, because the callback could free the
+ * structure.
+ */
+wtag = work;
+work->ordered_free(work);
+TRACE_BTRFS_ALL_WORK_DONE(wq->fs_info, wtag);
+
}
static void normal_work_helper(struct btrfs_work *work)
@@ -337,7 +369,7 @@
 work->func(work);
 if (need_order) {
     set_bit(WORK_DONE_BIT, &work->flags);
@@ -415,3 +447,11 @@
     set_bit(WORK_HIGH_PRIO_BIT, &work->flags);
     +}
+void btrfs_flush_workqueue(struct btrfs_workqueue *wq)
+{ +
+    if (wq->high)
+        flush_workqueue(wq->high->normal_wq);
+    +
+    flush_workqueue(wq->normal->normal_wq);
+} --- linux-4.15.0.orig/fs/btrfs/async-thread.h
+++ linux-4.15.0/fs/btrfs/async-thread.h
@@ -85,4 +85,6 @@
 struct btrfs_fs_info *btrfs_work_owner(const struct btrfs_work *work);
 struct btrfs_fs_info *btrfs_workqueue_owner(const struct __btrfs_workqueue *wq);
 bool btrfs_workqueue_normal_congested(const struct btrfs_workqueue *wq);
+void btrfs_flush_workqueue(struct btrfs_workqueue *wq);
+}
@endif
--- linux-4.15.0.orig/fs/btrfs/backref.c
+++ linux-4.15.0/fs/btrfs/backref.c
@@ -722,7 +722,7 @@
 * read tree blocks and add keys where required.
 */
 static int add_missing_keys(struct btrfs_fs_info *fs_info,
@@ -737,7 +737,8 @@
     BUG_ON(ref->key_for_search.type);
     BUG_ON(!ref->wanted_disk_byte);
eb = read_tree_block(fs_info, ref->wanted_disk_byte, 0);
+ eb = read_tree_block(fs_info, ref->wanted_disk_byte, 0,
+     ref->level - 1, NULL);
if (IS_ERR(eb)) {
    free_pref(ref);
    return PTR_ERR(eb);
    @ @ -746,12 +747,14 @@
    free_extent_buffer(eb);
    return -EIO;
}
-btrfs_tree_read_lock(eb);
+if (lock)
+    btrfs_tree_read_lock(eb);
if (btrfs_header_level(eb) == 0)
    btrfs_item_key_to_cpu(eb, &ref->key_for_search, 0);
else
    btrfs_node_key_to_cpu(eb, &ref->key_for_search, 0);
-btrfs_tree_read_unlock(eb);
+if (lock)
+    btrfs_tree_read_unlock(eb);
free_extent_buffer(eb);
pref_insert(fs_info, &prefrees->indirect, ref, NULL);
cond_resched();
@@ -801,7 +804,7 @@
count = node->ref_mod * -1;
break;
default:
    -BUG_ON(1);
+BUG();
} *
*total_refs += count;
switch (node->type) {
@@ -1239,7 +1242,7 @@
btrfs_release_path(path);

ret = add_missing_keys(fs_info, &prefrees);
+ret = add_missing_keys(fs_info, &prefrees, path->skip_locking == 0);
if (ret)
goto out;
@@ -1263,7 +1266,16 @@
while (node) {
    ref = rb_entry(node, struct prelim_ref, rbnode);
    node = rb_next(&ref->rbnode);
    -WARN_ON(ref->count < 0);
+/*
* ref->count < 0 can happen here if there are delayed
* refs with a node->action of BTRFS_DROP_DELAYED_REF.
* prelim_ref_insert() relies on this when merging
* identical refs to keep the overall count correct.
* prelim_ref_insert() will merge only those refs
* which compare identically. Any refs having
* e.g. different offsets would not be merged,
* and would retain their original ref->count < 0.
*/
if (roots && ref->count && ref->root_id && ref->parent == 0) {
if (sc && sc->root_objectid &&
    ref->root_id != sc->root_objectid) {
@@ -1281,7 +1293,8 @@
    ref->level == 0) {
    struct extent_buffer *eb;

    -eb = read_tree_block(fs_info, ref->parent, 0);
+eb = read_tree_block(fs_info, ref->parent, 0,
    + ref->level, NULL);
if (IS_ERR(eb)) {
    ret = PTR_ERR(eb);
    goto out;
@@ -1290,11 +1303,14 @@
    ret = -EIO;
    goto out;
}
    -btrfs_tree_read_lock(eb);
+    btrfs_tree_read_lock(eb);
    -btrfs_set_lock_blocking_rw(eb, BTRFS_READ_LOCK);
+    btrfs_set_lock_blocking_rw(eb, BTRFS_READ_LOCK);
    +}
    ret = find_extent_in_eb(eb, bytenr,
    *extent_item_pos, &eie, ignore_offset);
    -btrfs_tree_read_unlock_blocking(eb);
+    btrfs_tree_read_unlock_blocking(eb);
    free_extent_buffer(eb);
    if (ret < 0)
    goto out;
@@ -1418,6 +1434,7 @@
    if (ret < 0 && ret != -ENOENT) {
    ulist_free(tmp);
    ulist_free(*roots);
+    *roots = NULL;
    return ret;
    }
    node = ulist_next(tmp, &uiter);
@@ -1456,8 +1473,8 @@
 * callers (such as fiemap) which want to know whether the extent is
 * shared but do not need a ref count.
 *
- * This attempts to allocate a transaction in order to account for
- * delayed refs, but continues on even when the alloc fails.
+ * This attempts to attach to the running transaction in order to account for
+ * delayed refs, but continues on even when no running transaction exists.
 *
 * Return: 0 if extent is not shared, 1 if it is shared, < 0 on error.
 */
@@ -1480,13 +1497,16 @@
tmp = ulist_alloc(GFP_NOFS);
roots = ulist_alloc(GFP_NOFS);
if (!tmp || !roots) {
- 	ulist_free(tmp);
- 	ulist_free(roots);
- 	return -ENOMEM;
+ 	ret = -ENOMEM;
+ 	goto out;
}
-trans = btrfs_join_transaction(root);
+trans = btrfs_attach_transaction(root);
if (IS_ERR(trans)) {
+ 	if (PTR_ERR(trans) != -ENOENT && PTR_ERR(trans) != -EROFS) {
+ 		ret = PTR_ERR(trans);
+ 	goto out;
+ 
}
trans = NULL;
down_read(&fs_info->commit_root_sem);
} else {
@@ -1509,6 +1529,7 @@
if (!node) break;
bytenr = node->val;
+ 	shared.share_count = 0;
cond_resched();
}
@@ -1518,6 +1539,7 @@
} else {
 up_read(&fs_info->commit_root_sem);
}
+out:
ulist_free(tmp);
ulist_free(roots);
return ret;
else if (flags & BTRFS_EXTENT_FLAG_DATA)
 *flags_ret = BTRFS_EXTENT_FLAG_DATA;
 else
 -BUG_ON(1);
 +BUG();
 return 0;
 }

extent_item_objectid);

if (!search_commit_root) {
-trans = btrfs_join_transaction(fs_info->extent_root);
-if (IS_ERR(trans))
 -return PTR_ERR(trans);
+trans = btrfs_attach_transaction(fs_info->extent_root);
 +if (IS_ERR(trans)) {
 +if (PTR_ERR(trans) != -ENOENT &&
 + PTR_ERR(trans) != -EROFS)
 +return PTR_ERR(trans);
 +trans = NULL;
 +}
 +}
+
+if (trans)
btrfs_get_tree_mod_seq(fs_info, &tree_mod_seq_elem);
-} else {
+else
 down_read(&fs_info->commit_root_sem);
-}

out:

free_leaf_list(refs);

out:
-if (!search_commit_root) {
 +if (trans) {
 btrfs_put_tree_mod_seq(fs_info, &tree_mod_seq_elem);
 btrfs_end_transaction(trans);
 } else {
 --- linux-4.15.0.orig/fs/btrfs/btrfs_inode.h
 +++ linux-4.15.0/fs/btrfs/btrfs_inode.h
 @@ -160,6 +160,12 @@
 u64 last_unlink_trans;

/*
 * Track the transaction id of the last transaction used to create a
 * hard link for the inode. This is used by the log tree (fsync).
 */

u64 last_link_trans;

/*
 * Number of bytes outstanding that are going to need csums. This is
 * used in ENOSPC accounting.
 */

--- linux-4.15.0.orig/fs/btrfs/check-integrity.c
+++ linux-4.15.0/fs/btrfs/check-integrity.c
@@ -642,7 +642,6 @@
 static int btrfsic_process_superblock(struct btrfsic_state *state,
                                           struct btrfs_FS_DEVICES *fs_devices)
 {
-    struct btrfs_FS_INFO *fs_info = state->fs_info;
    struct btrfs_super_block *selected_super;
    struct list_head *dev_head = &fs_devices->devices;
    struct btrfs_device *device;
@@ -713,7 +712,7 @@
         break;
 }

-num_copies = btrfs_num_copies(fs_info, next_bytenr,
+num_copies = btrfs_num_copies(state->fs_info, next_bytenr,
                              state->metablock_size);
 if (state->print_mask & BTRFSIC_PRINT_MASK_NUM_COPIES)
     pr_info("num_copies(log_bytenr=%llu) = %d\n",
@@ -1215,24 +1214,24 @@
 void *dstv, u32 offset, size_t len)
 {
     size_t cur;
-    size_t offset_in_page;
+    size_t pgoff;
     char *kaddr;
     char *dst = (char *)dstv;
-    size_t start_offset = block_ctx->start & ((u64)PAGE_SIZE - 1);
+    size_t start_offset = offset_in_page(block_ctx->start);
     unsigned long i = (start_offset + offset) >> PAGE_SHIFT;

     WARN_ON(offset + len > block_ctx->len);
-    offset_in_page = (start_offset + offset) & (PAGE_SIZE - 1);
+    pgoff = offset_in_page(start_offset + offset);

     while (len > 0) {
         -cur = min(len, ((size_t)PAGE_SIZE - offset_in_page));
+cur = min(len, ((size_t)PAGE_SIZE - pgoff));
BUG_ON(i >= DIV_ROUND_UP(block_ctx->len, PAGE_SIZE));

kaddr = block_ctx->data[i];
-memcpy(dst, kaddr + offset_in_page, cur);
+memcpy(dst, kaddr + pgoff, cur);

dst += cur;
len -= cur;
-offset_in_page = 0;
+pgoff = 0;
i++;
}
}
@@ -1552,7 +1551,12 @@
}

device = multi->stripes[0].dev;
-block_ctx_out->dev = btrfsic_dev_state_lookup(device->bdev->bd_dev);
+if (test_bit(BTRFS_DEV_STATE_MISSING, &device->dev_state) ||
+    !device->bdev || !device->name)
+block_ctx_out->dev = NULL;
+else
+block_ctx_out->dev = btrfsic_dev_state_lookup(  
+device->bdev->bd_dev);
:block_ctx_out->dev_bytenr = multi->stripes[0].physical;
:block_ctx_out->start = bytenr;
:block_ctx_out->len = len;
--- linux-4.15.0.orig/fs/btrfs/compression.c
+++ linux-4.15.0/fs/btrfs/compression.c
@@ -45,6 +45,37 @@
#include "extent_io.h"
#include "extent_map.h"

+static const char* const btrfs_compress_types[] = { "", "zlib", "lz4", "zstd" };
+
+const char* btrfs_compress_type2str(enum btrfs_compression_type type)
+{
+    switch (type) {
+        case BTRFS_COMPRESS_ZLIB:
+        case BTRFS_COMPRESS_LZO:
+        case BTRFS_COMPRESS_ZSTD:
+        case BTRFS_COMPRESS_NONE:
+            return btrfs_compress_types[type];
+    }
+
+    return NULL;
+}
+
+bool btrfs_compress_is_valid_type(const char *str, size_t len)
+
+int i;
+
+for (i = 1; i < ARRAY_SIZE(btrfs_compress_types); i++) {
+size_t comp_len = strlen(btrfs_compress_types[i]);
+
+if (len < comp_len)
+continue;
+
+if (!strncmp(btrfs_compress_types[i], str, comp_len))
+return true;
+}
+return false;
+
static int btrfs_decompress_bio(struct compressed_bio *cb);

static inline int compressed_bio_size(struct btrfs_fs_info *fs_info,
@@ -257,8 +288,7 @@
        cb->start + cb->len - 1,
        NULL,
        - bio->bi_status ?
-        - BLK_STS_OK : BLK_STS_NOTSUPP);
        + !cb->errors);
        cb->compressed_pages[0]->mapping = NULL;

    end_compressed_writeback(inode, cb);
@@ -495,7 +525,7 @@

    if (page->index == end_index) {
        char *userpage;
        -size_t zero_offset = isize & (PAGE_SIZE - 1);
        +size_t zero_offset = offset_in_page(isize);

        if (zero_offset) {
            int zeros;
--- linux-4.15.0.orig/fs/btrfs/compression.h
+++ linux-4.15.0/fs/btrfs/compression.h
@@ -137,6 +137,9 @@
 extern const struct btrfs_compress_op btrfs_lzo_compress;
 extern const struct btrfs_compress_op btrfs_zstd_compress;

+const char* btrfs_compress_type2str(enum btrfs_compression_type type);
+bool btrfs_compress_is_valid_type(const char *str, size_t len);
+
int btrfs_compress_heuristic(struct inode *inode, u64 start, u64 end);
endif
--- linux-4.15.0.orig/fs/btrfs/ctree.c
+++ linux-4.15.0/fs/btrfs/ctree.c
@@ -282,9 +282,12 @@
 ret = btrfs_inc_ref(trans, root, cow, 1);
 else
 ret = btrfs_inc_ref(trans, root, cow, 0);
- if (ret)
+ if (ret) {
+ btrfs_tree_unlock(cow);
+ free_extent_buffer(cow);
+ btrfs_abort_transaction(trans, ret);
 return ret;
+ }

 btrfs_mark_buffer_dirty(cow);
 *cow_ret = cow;
@@ -334,26 +337,6 @@
 struct tree_mod_root old_root;
 };
-
-static inline void tree_mod_log_read_lock(struct btrfs_fs_info *fs_info)
-{
- read_lock(&fs_info->tree_mod_log_lock);
- }
- 
- static inline void tree_mod_log_read_unlock(struct btrfs_fs_info *fs_info)
-{
- read_unlock(&fs_info->tree_mod_log_lock);
- }
- 
- static inline void tree_mod_log_write_lock(struct btrfs_fs_info *fs_info)
-{
- write_lock(&fs_info->tree_mod_log_lock);
- }
- 
- static inline void tree_mod_log_write_unlock(struct btrfs_fs_info *fs_info)
-{
- write_unlock(&fs_info->tree_mod_log_lock);
- }
- 
- /*
- * Pull a new tree mod seq number for our operation.
- */
-@@ -373,14 +356,12 @@
 u64 btrfs_get_tree_mod_seq(struct btrfs_fs_info *fs_info,
 struct seq_list *elem)
tree_mod_log_write_lock(fs_info);
spin_lock(&fs_info->tree_mod_seq_lock);
write_lock(&fs_info->tree_mod_log_lock);
if (!elem->seq) {
    elem->seq = btrfs_inc_tree_mod_seq(fs_info);
    list_add_tail(&elem->list, &fs_info->tree_mod_seq_list);
}
spin_unlock(&fs_info->tree_mod_seq_lock);
tree_mod_log_write_unlock(fs_info);
write_unlock(&fs_info->tree_mod_log_lock);
return elem->seq;
}

if (!seq_putting)
return;

spin_lock(&fs_info->tree_mod_seq_lock);
write_lock(&fs_info->tree_mod_log_lock);
list_del(&elem->list);
 elem->seq = 0;

/*
 * blocker with lower sequence number exists, we
 * cannot remove anything from the log
 */
spin_unlock(&fs_info->tree_mod_seq_lock);
write_unlock(&fs_info->tree_mod_log_lock);
return;
}
min_seq = cur_elem->seq;
}
}
spin_unlock(&fs_info->tree_mod_seq_lock);

/*
 * anything that's lower than the lowest existing (read: blocked)
 * sequence number can be removed from the tree.
 */
tree_mod_log_write_lock(fs_info);
tm_root = &fs_info->tree_mod_log;
for (node = rb_first(tm_root); node; node = next) {
    next = rb_next(node);
tm = rb_entry(node, struct tree_mod_elem, node);
    if (tm->seq > min_seq)
        continue;
    if (tm->seq >= min_seq)
        continue;
    
for (node = rb_first(tm_root); node; node = next) {
    next = rb_next(node);
tm = rb_entry(node, struct tree_mod_elem, node);
    if (tm->seq > min_seq)
        continue;
    if (tm->seq >= min_seq)
        continue;
rb_erase(node, tm_root);
kfree(tm);
}
-tree_mod_log_write_unlock(fs_info);
+write_unlock(&fs_info->tree_mod_log_lock);
}

/*
@@ -443,7 +422,7 @@
 * for root replace operations, or the logical address of the affected
 * block for all other operations.
 * *
- * Note: must be called with write lock (tree_mod_log_write_lock).
+ * Note: must be called with write lock for fs_info::tree_mod_log_lock.
 */
static noinline int
__tree_mod_log_insert(struct btrfs_fs_info *fs_info, struct tree_mod_elem *tm)
@@ -481,7 +460,7 @@
* Determines if logging can be omitted. Returns 1 if it can. Otherwise, it
* returns zero with the tree_mod_log_lock acquired. The caller must hold
* this until all tree mod log insertions are recorded in the rb tree and then
- * call tree_mod_log_write_unlock() to release.
+ * write unlock fs_info::tree_mod_log_lock.
 */
static inline int tree_mod_dont_log(struct btrfs_fs_info *fs_info,
struct extent_buffer *eb) {
@@ -491,9 +470,9 @@
if (eb && btrfs_header_level(eb) == 0)
    return 1;
-tree_mod_log_write_lock(fs_info);
+write_lock(&fs_info->tree_mod_log_lock);
if (list_empty(&(fs_info)->tree_mod_seq_list)) {
  -tree_mod_log_write_unlock(fs_info);
+write_unlock(&fs_info->tree_mod_log_lock);
  return 1;
}

@@ -557,7 +536,7 @@
}

ret = __tree_mod_log_insert(fs_info, tm);
-tree_mod_log_write_unlock(fs_info);
+write_unlock(&fs_info->tree_mod_log_lock);
if (ret)
kfree(tm);

@@ -621,7 +600,7 @@
ret = __tree_mod_log_insert(fs_info, tm);
if (ret)
    goto free_tms;
-tree_mod_log_write_unlock(fs_info);
+write_unlock(&fs_info->tree_mod_log_lock);
kfree(tm_list);

return 0;
@@ -632,7 +611,7 @@
kfree(tm_list[i]);
}
if (locked)
-tree_mod_log_write_unlock(fs_info);
+write_unlock(&fs_info->tree_mod_log_lock);
kfree(tm_list);
kfree(tm);

@@ -713,7 +692,7 @@
if (!ret)
    ret = __tree_mod_log_insert(fs_info, tm);

-tree_mod_log_write_unlock(fs_info);
+write_unlock(&fs_info->tree_mod_log_lock);
if (ret)
    goto free_tms;
kfree(tm_list);
@@ -740,7 +719,7 @@
struct tree_mod_elem *cur = NULL;
struct tree_mod_elem *found = NULL;

-tree_mod_log_read_lock(fs_info);
+read_lock(&fs_info->tree_mod_log_lock);
tm_root = &fs_info->tree_mod_log;
node = tm_root->rb_node;
while (node) {
    @@ -768,7 +747,7 @@
break;
}
}
-tree_mod_log_read_unlock(fs_info);
+read_unlock(&fs_info->tree_mod_log_lock);

return found;
}
```c
- tree_mod_log_write_unlock(fs_info);
+ write_unlock(&fs_info->tree_mod_log_lock);
kfree(tm_list);

return 0;
@@ -861,7 +840,7 @@
kfree(tm_list[i]);
} if (locked)
- tree_mod_log_write_unlock(fs_info);
+ write_unlock(&fs_info->tree_mod_log_lock);
kfree(tm_list);
return ret;
@@ -921,7 +900,7 @@ goto free_tms;
ret = __tree_mod_log_free_eb(fs_info, tm_list, nritems);
- tree_mod_log_write_unlock(fs_info);
+ write_unlock(&fs_info->tree_mod_log_lock);
if (ret)
  goto free_tms;
kfree(tm_list);
@@ -1084,6 +1063,48 @@ return 0;
}
+
+static struct extent_buffer *alloc_tree_block_no_bg_flush(
+  struct btrfs_trans_handle *trans,
+  struct btrfs_root *root,
+  u64 parent_start,
+  const struct btrfs_disk_key *disk_key,
+  int level,
+  u64 hint,
+  u64 empty_size)
+{
+  struct btrfs_fs_info *fs_info = root->fs_info;
+  struct extent_buffer *ret;
+  
+  /* If we are COWing a node/leaf from the extent, chunk, device or free
+   * space trees, make sure that we do not finish block group creation of
+   * pending block groups. We do this to avoid a deadlock.
+   * COWing can result in allocation of a new chunk, and flushing pending
+   * block groups (btrfs_create_pending_block_groups()) can be triggered
+   * when finishing allocation of a new chunk. Creation of a pending block
+   * group modifies the extent, chunk, device and free space trees,
+   * therefore we could deadlock with ourselves since we are holding a
```

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+ * lock on an extent buffer that btrfs_create_pending_block_groups() may
+ * try to COW later.
+ * For similar reasons, we also need to delay flushing pending block
+ * groups when splitting a leaf or node, from one of those trees, since
+ * we are holding a write lock on it and its parent or when inserting a
+ * new root node for one of those trees.
+ */
+if (root == fs_info->extent_root ||
+ root == fs_info->chunk_root ||
+ root == fs_info->dev_root ||
+ root == fs_info->free_space_root)
+trans->can_flush_pending_bgs = false;
+
+ret = btrfs_alloc_tree_block(trans, root, parent_start,
+root->root_key.objectid, &disk_key, level,
+hint, empty_size);
+trans->can_flush_pending_bgs = true;
+
+return ret;
+
+/*
* does the dirty work in cow of a single block.  The parent block (if
* supplied) is updated to point to the new cow copy.  The new buffer is marked
@@ -1131,9 +1152,8 @@
if ((root->root_key.objectid == BTRFS_TREE_RELOC_OBJECTID) && parent)
parent_start = parent->start;

-cow = btrfs_alloc_tree_block(trans, root, parent_start,
-root->root_key.objectid, &disk_key, level,
-search_start, empty_size);
+cow = alloc_tree_block_no_bg_flush(trans, root, parent_start, &disk_key,
+ level, search_start, empty_size);
if (IS_ERR(cow))
return PTR_ERR(cow);
@@ -1154,6 +1174,8 @@
ret = update_ref_for_cow(trans, root, buf, cow, &last_ref);
if (ret) {
+btrfs_tree_unlock(cow);
+free_extent_buffer(cow);
btrfs_abort_transaction(trans, ret);
return ret;
}
@@ -1154,6 +1174,8 @@
if (test_bit(BTRFS_ROOT_REF_COWS, &root->state)) {
ret = btrfs_reloc_cow_block(trans, root, buf, cow);
if (ret) {
    +btrfs_tree_unlock(cow);
    +free_extent_buffer(cow);
    btrfs_abort_transaction(trans, ret);
    return ret;
}
@@ -1192,6 +1216,8 @@
    if (last_ref) {
        ret = tree_mod_log_free_eb(fs_info, buf);
        if (ret) {
            +btrfs_tree_unlock(cow);
            +free_extent_buffer(cow);
            btrfs_abort_transaction(trans, ret);
            return ret;
        }
    }
    @@ -1279,7 +1305,7 @@
    unsigned long p_size = sizeof(struct btrfs_key_ptr);

    n = btrfs_header_nritems(eb);
    -tree_mod_log_read_lock(fs_info);
    +read_lock(&fs_info->tree_mod_log_lock);
    while (tm && &tm->seq >= time_seq) {
    /*
      * all the operations are recorded with the operator used for
      @@ -1334,7 +1360,7 @@
    if (tm->logical != first_tm->logical)
        break;
    }
    -tree_mod_log_read_unlock(fs_info);
    +read_unlock(&fs_info->tree_mod_log_lock);
    btrfs_set_header_nritems(eb, n);
    }
    @@ -1391,7 +1417,8 @@
    btrfs_tree_read_unlock_blocking(eb);
    free_extent_buffer(eb);

    -extent_buffer_get(eb_rewin);
    +btrfs_set_buffer_lockdep_class(btrfs_header_owner(eb_rewin),
        + eb_rewin, btrfs_header_level(eb_rewin));
    btrfs_tree_read_lock(eb_rewin);
    __tree_mod_log_rewind(fs_info, eb_rewin, time_seq, tm);
    WARN_ON(btrfs_header_nritems(eb_rewin) >
    @@ -1414,10 +1441,12 @@
        struct tree_mod_elem *tm;
        struct extent_buffer *eb = NULL;
        struct extent_buffer *eb_root;
        +u64 eb_root_owner = 0;
struct extent_buffer *old;
struct tree_mod_root *old_root = NULL;
uint64_t old_generation = 0;
uint64_t logical;
+int level;

eb_root = btrfs_read_lock_root_node(root);
tm = __tree_mod_log_oldest_root(fs_info, eb_root, time_seq);
@@ -1428,15 +1457,17 @@
 old_root = &tm->old_root;
 old_generation = tm->generation;
 logical = old_root->logical;
+level = old_root->level;
 ] else {
 logical = eb_root->start;
+level = btrfs_header_level(eb_root);
 }

 tm = tree_mod_log_search(fs_info, logical, time_seq);
 if (old_root && &tm && tm->op != MOD_LOG_KEY_REMOVE_WHILE_FREEING) {
 btrfs_tree_read_unlock(eb_root);
 free_extent_buffer(eb_root);
- old = read_tree_block(fs_info, logical, 0);
+ old = read_tree_block(fs_info, logical, 0, level, NULL);
 if (WARN_ON(IS_ERR(old) || !extent_buffer_uptodate(old))) {
 if (!IS_ERR(old))
 free_extent_buffer(old);
@@ -1444,10 +1475,33 @@
 "failed to read tree block %llu from get_old_root",
 logical);
 } else {
+*struct tree_mod_elem *tm2;
 +
+*btrfs_tree_read_lock(old);
 eb = btrfs_clone_extent_buffer(old);
+/*
+ * After the lookup for the most recent tree mod operation
+ * above and before we locked and cloned the extent buffer
+ * 'old', a new tree mod log operation may have been added.
+ * So lookup for a more recent one to make sure the number
+ * of mod log operations we replay is consistent with the
+ * number of items we have in the cloned extent buffer,
+ * otherwise we can hit a BUG_ON when rewinding the extent
+ * buffer.
+ */
+tm2 = tree_mod_log_search(fs_info, logical, time_seq);
+btrfs_tree_read_unlock(old);
 free_extent_buffer(old);
+ASSERT(tm2);
+ASSERT(tm2 == tm || tm2->seq > tm->seq);
+if (!tm2 || tm2->seq < tm->seq) {
+free_extent_buffer(eb);
+return NULL;
+
+tm = tm2;
+}
+else if (old_root) {
+eb_root_owner = btrfs_header_owner(eb_root);
+btrfs_tree_read_unlock(eb_root);
+free_extent_buffer(eb_root);
+eb = alloc_dummyExtentBuffer(fs_info, logical);
+}
+else if (!eb) return NULL;
-extentBuffer_get(eb);
-btrfs_tree_read_lock(eb);
if (old_root) {
+btrfs_set_header_bytenr(eb, eb->start);
+btrfs_set_header_backref_rev(eb, BTRFS_MIXED_BACKREF_REV);
-btrfs_set_header_owner(eb, btrfs_header_owner(eb_root));
+btrfs_set_header_owner(eb, eb_root_owner);
+btrfs_set_header_level(eb, old_root->level);
+btrfs_set_header_generation(eb, old_generation);
}
+btrfs_set_buffer_lockdep_class(btrfs_header_owner(eb), eb, btrfs_header_level(eb));
+btrfs_tree_read_lock(eb);
if (tm)
__tree_mod_log_rewind(fs_info, eb, time_seq, tm);
else
@@ -1656,6 +1711,7 @@
btrfs_set_lock_blocking(parent);

for (i = start_slot; i <= end_slot; i++) {
+struct btrfs_key first_key;
+int close = 1;
+btrfs_node_key(parent, &disk_key, i);
@@ -1665,6 +1721,7 @@
+progress_passed = 1;
+blocknr = btrfs_node_blockptr(parent, i);
+gen = btrfs_node_ptr_generation(parent, i);
+btrfs_node_key_to_cpu(parent, &first_key, i);
+if (last_block == 0)
+last_block = blocknr;
uptodate = 0;
if (!cur || !uptodate) {
    if (!cur) {
        cur = read_tree_block(fs_info, blocknr, gen);
    }
    if (IS_ERR(cur)) {
        return PTR_ERR(cur);
    } else if (!extent_buffer_uptodate(cur)) {
        return -EIO;
    }
} else if (!uptodate) {
    err = btrfs_read_buffer(cur, gen);
    if (err) {
        free_extent_buffer(cur);
        return err;
    }
    int level = btrfs_header_level(parent);
    struct extent_buffer *eb;
    struct btrfs_key first_key;
    if (slot < 0 || slot >= btrfs_header_nritems(parent))
        return ERR_PTR(-ENOENT);
    BUG_ON(level == 0);
    eb = read_tree_block(fs_info, btrfs_node_blockptr(parent, slot),
            btrfs_node_ptr_generation(parent, slot),
            level - 1, &first_key);
    if (!IS_ERR(eb) && !extent_buffer_uptodate(eb)) {
        free_extent_buffer(eb);
        eb = ERR_PTR(-EIO);
    }
    int level = btrfs_header_level(parent);
    struct extent_buffer *b = *eb_ret;
    struct extent_buffer *tmp;
    struct btrfs_key first_key;
    ret = 0;
    int parent_level;
blocknr = btrfs_node_blockptr(b, slot);
gen = btrfs_node_ptr_generation(b, slot);
+parent_level = btrfs_header_level(b);
+btrfs_node_key_to_cpu(b, &first_key, slot);

tmp = find_extent_buffer(fs_info, blocknr);
if (tmp) {
@@ -2473,7 +2540,7 @@
btrfs_set_path_blocking(p);
/* now we're allowed to do a blocking uptodate check */
-ret = btrfs_read_buffer(tmp, gen);
+ret = btrfs_read_buffer(tmp, gen, parent_level - 1, &first_key);
if (!ret) {
*eb_ret = tmp;
return 0;
@@ -2497,10 +2564,9 @@
if (p->reada != READA_NONE)
reada_for_search(fs_info, p, level, slot, key->objectid);
-btrfs_release_path(p);
-
ret = -EAGAIN;
-tmp = read_tree_block(fs_info, blocknr, 0);
+tmp = read_tree_block(fs_info, blocknr, gen, parent_level - 1,
+ &first_key);
if (!IS_ERR(tmp)) {
/*
 * If the read above didn't mark this buffer up to date,
@@ -2514,6 +2580,8 @@
} else {
ret = PTR_ERR(tmp);
}
+
+btrfs_release_path(p);
return ret;
}

@@ -2774,6 +2842,8 @@
* contention with the cow code
*/
if (cow) {
+bool last_level = (level == (BTRFS_MAX_LEVEL - 1));
+
/*
* if we don't really need to cow this block
* then we don't want to set the path blocking,
btrfs_set_path_blocking(p);
-err = btrfs_cow_block(trans, root, b,
- p->nodes[level + 1],
- p->slots[level + 1], &b);
+if (last_level)
+err = btrfs_cow_block(trans, root, b, NULL, 0,
+ &b);
+else
+err = btrfs_cow_block(trans, root, b,
+ p->nodes[level + 1],
+ p->slots[level + 1], &b);
if (err) {
ret = err;
goto done;
@@ -2980,6 +3054,10 @@
again:
b = get_old_root(root, time_seq);
+if (!b) {
+ret = -EIO;
+goto done;
+
level = btrfs_header_level(b);
p->locks[level] = BTRFS_READ_LOCK;

@@ -3196,6 +3274,58 @@
/*
 * Check key order of two sibling extent buffers.
 * *
 * Return true if something is wrong.
 * Return false if everything is fine.
 * *
 * Tree-checker only works inside one tree block, thus the following
 * corruption can not be detected by tree-checker:
 * *
 * Leaf @left| Leaf @right
 * ---------------------------------------------
 * | 1 | 2 | 3 | 4 | 5 | f6 | | 7 | 8 |
 * *
 * Key f6 in leaf @left itself is valid, but not valid when the next
 * key in leaf @right is 7.
 * This can only be checked at tree block merge time.
 * And since tree checker has ensured all key order in each tree block
static bool check_sibling_keys(struct extent_buffer *left, 
        struct extent_buffer *right)
{
    struct btrfs_key left_last;
    struct btrfs_key right_first;
    int level = btrfs_header_level(left);
    int nr_left = btrfs_header_nritems(left);
    int nr_right = btrfs_header_nritems(right);
    
    /* No key to check in one of the tree blocks */
    if (!nr_left || !nr_right)
        return false;
    
    if (level) {
        btrfs_node_key_to_cpu(left, &left_last, nr_left - 1);
        btrfs_node_key_to_cpu(right, &right_first, 0);
    } else {
        btrfs_item_key_to_cpu(left, &left_last, nr_left - 1);
        btrfs_item_key_to_cpu(right, &right_first, 0);
    }
    
    if (btrfs_comp_cpu_keys(&left_last, &right_first) >= 0) {
        btrfs_crit(left->fs_info, 
           "bad key order, sibling blocks, left last (%llu %u %llu) right first (%llu %u %llu)", 
           left_last.objectid, left_last.type, 
           left_last.offset, right_first.objectid, 
           right_first.type, right_first.offset);
        return true;
    }
    return false;
}

/* try to push data from one node into the next node left in the 
* tree.
* 
* @@ -3239,6 +3369,12 @@
} else
    push_items = min(src_nritems - 8, push_items);

/* dst is the left eb, src is the middle eb */
+if (check_sibling_keys(dst, src)) {
    ret = -EUCLEAN;
    btrfs_abort_transaction(trans, ret);
    +return ret;
ret = tree_mod_log_eb_copy(fs_info, dst, src, dst_nritems, 0, push_items);
if (ret) {
    if (max_push < push_items)
        push_items = max_push;

    /* dst is the right eb, src is the middle eb */
    if (check_sibling_keys(src, dst)) {
        ret = -EUCLEAN;
        btrfs_abort_transaction(trans, ret);
        return ret;
    }

    tree_mod_log_eb_move(fs_info, dst, push_items, 0, dst_nritems);
    memmove_extent_buffer(dst, btrfs_node_key_ptr_offset(push_items),
        btrfs_node_key_ptr_offset(0),
    }
        c = btrfs_alloc_tree_block(trans, root, 0, root->root_key.objectid,
            &lower_key, level, root->node->start, 0);
        btrfs_node_key(lower, &lower_key, 0);
    -c = btrfs_alloc_tree_block(trans, root, 0, root->root_key.objectid,
        &lower_key, level, root->node->start, 0);
        btrfs_node_key(c, &disk_key, mid);

    -split = btrfs_alloc_tree_block(trans, root, 0, root->root_key.objectid,
        &disk_key, level, c->start, 0);
        btrfs_node_key(split, &disk_key, level, c->start, 0);
    if (IS_ERR(split))
        return PTR_ERR(split);

else
    btrfs_node_key(lower, &lower_key, 0);

    if (check_sibling_keys(left, right)) {
        ret = -EUCLEAN;
        btrfs_tree_unlock(right);
        free_extent_buffer(right);
        return ret;

}
if (path->slots[0] == left_nritems && !empty) {
    /* Key greater than all keys in the leaf, right neighbor has
    * enough room for it and we're not emptying our leaf to delete
    */
    goto out;
}

if (check_sibling_keys(left, right)) {
    ret = -EUCLEAN;
    goto out;
}

return __push_leaf_left(fs_info, path, min_data_size,
                        empty, left, free_space, right_nritems,
                        max_slot);

else
    btrfs_item_key(l, &disk_key, mid);

-right = btrfs_alloc_tree_block(trans, root, 0, root->root_key.objectid,
                            &disk_key, 0, l->start, 0);
+right = alloc_tree_block_no_bg_flush(trans, root, 0, &disk_key, 0,
                             l->start, 0);
if (IS_ERR(right))
    return PTR_ERR(right);

/*
 *
 */
@@ -4776,7 +4928,7 @@
 btrfs_crit(fs_info, "slot %d too large, nritems %d",
             slot, nritems);
-BUG_ON(1);
+BUG();
}
/*
 *
 */
left_path->nodes[left_level] = left_root->commit_root;
left_path->nodes[left_level] = btrfs_clone_extent_buffer(left_root->commit_root);
if (!left_path->nodes[left_level]) {
  up_read(&fs_info->commit_root_sem);
  ret = -ENOMEM;
  goto out;
}
extent_buffer_get(left_path->nodes[left_level]);

right_level = btrfs_header_level(right_root->commit_root);
right_root_level = right_level;
right_path->nodes[right_level] = right_root->commit_root;
right_path->nodes[right_level] = btrfs_clone_extent_buffer(right_root->commit_root);
if (!right_path->nodes[right_level]) {
  up_read(&fs_info->commit_root_sem);
  ret = -ENOMEM;
  goto out;
}
extent_buffer_get(right_path->nodes[right_level]);
up_read(&fs_info->commit_root_sem);

while (1) {
  cond_resched();
  if (advance_left && !left_end_reached) {
    ret = tree_advance(fs_info, left_path, &left_level, left_root_level,
    --- linux-4.15.0.orig/fs/btrfs/ctree.h
    +++ linux-4.15.0/fs/btrfs/ctree.h
    @ @ -51,6 +51,7 @@
    extern struct kmem_cache *btrfs_bit_radix_cachep;
    extern struct kmem_cache *btrfs_path_cachep;
    extern struct kmem_cache *btrfs_free_space_cachep;
    extern struct kmem_cache *btrfs_free_space_bitmap_cachep;
    struct btrfs_ordered_sum;
    #ifdef CONFIG_BTRFS_FS_RUN_SANITY_TESTS
    @ @ -869,12 +869,12 @@
    struct list_head delayed_iputs;
    struct mutex cleaner_delayed_iput_mutex;

    /* this protects tree_mod_seq_list */
    -spinlock_t tree_mod_seq_lock;
    atomic64_t tree_mod_seq;
- struct list_head tree_mod_seq_list;

-/* this protects tree_mod_log */
+/* this protects tree_mod_log and tree_mod_seq_list */
 rwlock_t tree_mod_log_lock;
 struct rb_root tree_mod_log;
 +struct list_head tree_mod_seq_list;

 atomic_t async_delalloc_pages;
 atomic_t open_ioctl_trans;
 @@ -1260,6 +1259,7 @@
    int send_in_progress;
 struct btrfs_subvolume_writers *subv_writers;
    atomic_t will_be_snapshotted;
+atomic_t snapshot_force_cow;

 /* For qgroup metadata space reserve */
 atomic64_t qgroup_meta_rsv;
 @@ -1438,6 +1438,21 @@

#define BTRFS_INODE_ROOT_ITEM_INIT (1 << 31)

+#define BTRFS_INODE_FLAG_MASK
+(BTRFS_INODE_NODATASUM |
  + BTRFS_INODE_NODATACOW |
  + BTRFS_INODE_READONLY |
  + BTRFS_INODE_NOCOMPRESS |
  + BTRFS_INODE_PREALLOC |
  + BTRFS_INODE_SYNC |
  + BTRFS_INODE_IMMUTABLE |
  + BTRFS_INODE_APPEND |
  + BTRFS_INODE_NODUMP |
  + BTRFS_INODE_NOATIME |
  + BTRFS_INODE_DIRSYNC |
  + BTRFS_INODE_COMPRESS |
  + BTRFS_INODE_ROOT_ITEM_INIT)
+
 struct btrfs_map_token {
    const struct extent_buffer *eb;
    char *kaddr;
@@ -2410,32 +2425,6 @@
 return btrfs_item_size(eb, e) - BTRFS_FILE_EXTENT_INLINE_DATA_START;
}

-/* this returns the number of file bytes represented by the inline item.
- * If an item is compressed, this is the uncompressed size
- */
- static inline u32 btrfs_file_extent_inline_len(const struct extent_buffer *eb,
-int slot,
-const struct btrfs_file_extent_item *fi)
{
-struct btrfs_map_token token;
-
-btrfs_init_map_token(&token);
-/*
- * return the space used on disk if this item isn't
- * compressed or encoded
- */
-if (btrfs_token_file_extent_compression(eb, fi, &token) == 0 &&
- btrfs_token_file_extent_encryption(eb, fi, &token) == 0 &&
- btrfs_token_file_extent_other_encoding(eb, fi, &token) == 0) {
-return btrfs_file_extent_inline_item_len(eb,
- btrfs_item_nr(slot));
-}
-
-/* otherwise use the ram bytes field */
-return btrfs_token_file_extent_ram_bytes(eb, fi, &token);
-}
-
-/* btrfs_dev_stats_item */
-static inline u64 btrfs_dev_stats_value(const struct extent_buffer *eb,
 const struct btrfs_dev_stats_item *ptr,
@@ -2578,6 +2567,7 @@
 int btrfs_get_extent_inline_ref_type(const struct extent_buffer *eb,
 struct btrfs_extent_inline_ref *iref,
 enum btrfs_inline_ref_type is_data);
+u64 hash_extent_data_ref(u64 root_objectid, u64 owner, u64 offset);
 u64 btrfs_csum_bytes_to_leaves(struct btrfs_fs_info *fs_info, u64 csum_bytes);
@@ -2975,7 +2965,7 @@
 kfree(fs_info->super_for_commit);
 security_free_mnt_opts(&fs_info->security_opts);
-kfree(fs_info);
+kvfree(fs_info);
 }

/* tree mod log functions from ctree.c */
@@ -3109,8 +3099,9 @@
 /* file-item.c */
 struct btrfs_dio_private;
 int btrfs_del_csums(struct btrfs_trans_handle *trans,
- struct btrfs_fs_info *fs_info, u64 bytenr, u64 len);
+ struct btrfs_root *root, u64 bytenr, u64 len);
blk_status_t btrfs_lookup_bio_sums(struct inode *inode, struct bio *bio, u32 *dst);
+blk_status_t btrfs_lookup_bio_sums_dio(struct inode *inode, struct bio *bio,
   u64 logical_offset);
int btrfs_insert_file_extent(struct btrfs_trans_handle *trans,
   u64 *orig_start, u64 *orig_block_len,
   u64 *ram_bytes);

+void __btrfs_del_delalloc_inode(struct btrfs_root *root,
   +struct btrfs_inode *inode);
struct inode *btrfs_lookup_dentry(struct inode *dir, struct dentry *dentry);
int btrfs_insert_file_extent(struct btrfs_trans_handle *trans,
   u64 start, u64 num_bytes, u64 min_size,
   loff_t actual_len, u64 *alloc_hint);
+void __btrfs_del_delalloc_inode(struct btrfs_root *root,
   +struct btrfs_inode *inode);
int btrfs_set_inode_index(struct btrfs_inode *dir, u64 *index);
int btrfs_unlink_inode(struct btrfs_trans_handle *trans,
   u64 start, u64 end, int *page_started, unsigned long *nr_written,
   struct writeback_control *wbc);
extern const struct dentry_operations btrfs_dentry_operations;

#include "btrfsinode.h"
#include "disk-io.h"
#include "transaction.h"

int btrfs_parse_options(struct btrfs_fs_info *info, char *options,
   unsigned long new_flags);
int btrfs_sync_fs(struct super_block *sb, int wait);
+char *btrfs_get_subvol_name_from_objectid(struct btrfs_fs_info *fs_info,
   +u64 subvol_objectid);

    struct btrfs_fs_info *fs_info = root->fs_info;
    struct extent_buffer *leaf;
    unsigned int nofs_flag;
    extern const struct dentry_operations btrfs_dentry_operations;
    #ifdef CONFIG_BTRFS_FS_RUN_SANITY_TESTS
    void btrfs_test_inode_set_ops(struct inode *inode);
    #endif

static inline __printf(2, 3)
void btrfs_no printk(const struct btrfs_fs_info *fs_info, const char *fmt, ...)
--- linux-4.15.0.org/fs/btrfs/delayed-inode.c
+++ linux-4.15.0/fs/btrfs/delayed-inode.c
@@ -18,6 +18,7 @@
 *}

#include <linux/slab.h>
#include <linux/sched/mm.h>
#include "delayed-inode.h"
#include "disk-io.h"
#include "transaction.h"
@@ -789,11 +790,14 @@
{
    struct btrfs_fs_info *fs_info = root->fs_info;
    struct extent_buffer *leaf;
    +unsigned int nofs_flag;

char *ptr;
int ret;

+nofs_flag = memalloc_nofs_save();
ret = btrfs_insert_empty_item(trans, root, path, &delayed_item->key, 
    delayed_item->data_len);
+memalloc_nofs_restore(nofs_flag);
if (ret < 0 && ret != -EEXIST)
return ret;

@@ -922,6 +926,7 @@
    }
    struct btrfs_delayed_node *node)
{ 
    struct btrfs_delayed_item *curr, *prev;
+unsigned int nofs_flag;
    int ret = 0;

    do_again:
@@ -930,7 +935,9 @@
    if (!curr)
goto delete_fail;

    +nofs_flag = memalloc_nofs_save();
    ret = btrfs_search_slot(trans, root, &curr->key, path, -1, 1);
+memalloc_nofs_restore(nofs_flag);
    if (ret < 0)
goto delete_fail;
else if (ret > 0) {
@@ -997,6 +1004,7 @@
    struct btrfs_key key;
    struct btrfs_inode_item *inode_item;
    struct extent_buffer *leaf;
+unsigned int nofs_flag;
    int mod;
    int ret;

@@ -1009,13 +1017,13 @@
    else
    mod = 1;

    +nofs_flag = memalloc_nofs_save();
    ret = btrfs_lookup_inode(trans, root, path, &key, mod);
    -if (ret > 0) {
    -btrfs_release_path(path);
    -return -ENOENT;
    -} else if (ret < 0) {
    -return ret;
    -}
leaf = path->nodes[0];
inode_item = btrfs_item_ptr(leaf, path->slots[0],
@@ -1053,6 +1061,14 @@
btrfs_delayed_inode_release_metadata(fs_info, node);
btrfs_release_delayed_inode(node);

+/*
+ * If we fail to update the delayed inode we need to abort the
+ * transaction, because we could leave the inode with the improper
+ * counts behind.
+ */
+if (ret && ret != -ENOENT)
+btrfs_abort_transaction(trans, ret);
+return ret;

search:
@@ -1060,7 +1076,10 @@
key.type = BTRFS_INODE_EXTREF_KEY;
key.offset = -1;
+
+nofs_flag = memalloc_nofs_save();
ret = btrfs_search_slot(trans, root, &key, path, -1, 1);
+memalloc_nofs_restore(nofs_flag);
if (ret < 0)
goto err_out;
ASSERT(ret);
@@ -1931,12 +1950,19 @@
inode_id = delayed_nodes[n - 1]->inode_id + 1;
-
-for (i = 0; i < n; i++)
-        refcount_inc(&delayed_nodes[i]->refs);
+for (i = 0; i < n; i++) {
+    /*
+     * Don't increase refs in case the node is dead and
+     * about to be removed from the tree in the loop below
+     */
+    if (!refcount_inc_not_zero(&delayed_nodes[i]->refs))
+        delayed_nodes[i] = NULL;
+\}
spin_unlock(&root->inode_lock);

for (i = 0; i < n; i++) {
+if (!delayed_nodes[i])
+continue;
__btrfs_kill_delayed_node(delayed_nodes[i]);
btrfs_release_delayed_node(delayed_nodes[i]);
}
--- linux-4.15.0.orig/fs/btrfs/delayed-ref.c
+++ linux-4.15.0/fs/btrfs/delayed-ref.c
@@ -247,8 +247,6 @@
    ref->in_tree = 0;
btrfs_put_delayed_ref(ref);
atomic_dec(&delayed_refs->num_entries);
-if (trans->delayed_ref_updates)
-trans->delayed_ref_updates--;
}

static bool merge_ref(struct btrfs_trans_handle *trans,
@@ -316,7 +314,7 @@
    if (head->is_data)
    return;

-spin_lock(&fs_info->tree_mod_seq_lock);
+read_lock(&fs_info->tree_mod_log_lock);
    if (!list_empty(&fs_info->tree_mod_seq_list)) {
      struct seq_list *elem;

      struct seq_list, list);
    seq = elem->seq;
    }
-spin_unlock(&fs_info->tree_mod_seq_lock);
+read_unlock(&fs_info->tree_mod_log_lock);

again:
for (node = rb_first(&head->ref_tree); node; node = rb_next(node)) {
  @ @ .343,7 +341,7 @@
  struct seq_list *elem;
  int ret = 0;

-spin_lock(&fs_info->tree_mod_seq_lock);
+read_lock(&fs_info->tree_mod_log_lock);
  if (!list_empty(&fs_info->tree_mod_seq_list)) {
    elem = list_first_entry(&fs_info->tree_mod_seq_list,
      struct seq_list, list);
    @ @ .357,7 +355,7 @@


@@ -462,7 +460,6 @@
if (ref->action == BTRFS_ADD_DELAYED_REF)
    list_add_tail(&ref->add_list, &href->ref_add_list);
    atomic_inc(&root->num_entries);
-trans->delayed_ref_updates++;
spin_unlock(&href->lock);
return ret;
}
@@ -553,8 +550,10 @@
struct btrfs_delayed_ref_head *head_ref,
    struct btrfs_qgroup_extent_record *qrecord,
    u64 bytenr, u64 num_bytes, u64 ref_root, u64 reserved,
-trans->delayed_ref_updates++;
spin_unlock(&href->lock);
return ret;
}
@@ -598,6 +597,7 @@
head_ref->ref_mod = count_mod;
head_ref->must_insert_reserved = must_insert_reserved;
head_ref->is_data = is_data;
+head_ref->is_system = is_system;
head_ref->ref_tree = RB_ROOT;
INIT_LIST_HEAD(&head_ref->ref_add_list);
RB_CLEAR_NODE(&head_ref->href_node);
@@ -785,6 +785,7 @@
struct btrfs_delayed_ref_root *delayed_refs;
struct btrfs_qgroup_extent_record *record = NULL;
int qrecord_inserted;
+int is_system = (ref_root == BTRFS_CHUNK_TREE_OBJECTID);

BUG_ON(extent_op && extent_op->is_data);

ref = kmem_cache_alloc(btrfs_delayed_tree_ref_cachep, GFP_NOFS);
@@ -813,8 +814,8 @@
/*
head_ref = add_delayed_ref_head(fs_info, trans, head_ref, record,
bytenr, num_bytes, 0, 0, action, 0,
&qrecord_inserted, old_ref_mod,
-new_ref_mod);
+is_system, &qrecord_inserted,
+old_ref_mod, new_ref_mod);

add_delayed_tree_ref(fs_info, trans, head_ref, &ref->node, bytenr,
    num_bytes, parent, ref_root, level, action);
@@ -880,7 +881,7 @@
    old_ref_mod, new_ref_mod);

add_delayed_ref_head(fs_info, trans, head_ref, NULL, bytenr,
    num_bytes, 0, 0, BTRFS_UPDATE_DELAYED_HEAD,
    extent_op->is_data, NULL, NULL, NULL);
spin_unlock(&delayed_refs->lock);

+/*
 * extent_ops just modify the flags of an extent and they don't result
 * in ref count changes, hence it's safe to pass false/0 for is_system
 * argument
 *
add_delayed_ref_head(fs_info, trans, head_ref, NULL, bytenr,
    num_bytes, 0, 0, BTRFS_UPDATE_DELAYED_HEAD,
    extent_op->is_data, NULL, NULL, NULL);

spin_unlock(&delayed_refs->lock);
return 0;
--- linux-4.15.0.orig/fs/btrfs/delayed-ref.h
+++ linux-4.15.0/fs/btrfs/delayed-ref.h
@@ -139,6 +139,7 @@
 ** 
unsigned int must_insert_reserved:1;
unsigned int is_data:1;
+unsigned int is_system:1;
unsigned int processing:1;
};

--- linux-4.15.0.orig/fs/btrfs/dev-replace.c
+++ linux-4.15.0/fs/btrfs/dev-replace.c
@@ -132,11 +132,11 @@
break;
    case BTRFS_IOCTL_DEV_REPLACE_STATE_STARTED:
    case BTRFS_IOCTL_DEV_REPLACE_STATE_SUSPENDED:
dev_replace->srcdev = btrfs_find_device(fs_info, src_devid, NULL, NULL);
dev_replace->tgtdev = btrfs_find_device(fs_info, +dev_replace->srcdev = btrfs_find_device(fs_info->fs_devices, +dev_replace->tgtdev = btrfs_find_device(fs_info->fs_devices, BTRFS_DEV_REPLACE_DEVID,
-NULL, NULL);
+NULL, NULL, true);
/*
 * allow 'btrfs dev replace_cancel' if src/tgt device is missing
@@ -351,6 +351,7 @@
break;
case BTRFS_IOCTL_DEV_REPLACE_STATE_STARTED:
case BTRFS_IOCTL_DEV_REPLACE_STATE_SUSPENDED:
+ASSERT(0);
ret = BTRFS_IOCTL_DEV_REPLACE_RESULT_ALREADY_STARTED;
goto leave;
}
@@ -395,6 +396,10 @@
if (IS_ERR(trans)) {
ret = PTR_ERR(trans);
btrfs_dev_replace_lock(dev_replace, 1); +dev_replace->replace_state = +BTRFS_IOCTL_DEV_REPLACE_STATE_NEVER_STARTED; +dev_replace->srcdev = NULL; +dev_replace->tgtdev = NULL; goto leave;
}
@@ -416,8 +421,6 @@
return ret;
leave:
-dev_replace->srcdev = NULL;
-dev_replace->tgtdev = NULL;
btrfs_dev_replace_unlock(dev_replace, 1);
btrfs_destroy_dev_replace_tgtdev(fs_info, tgt_device);
return ret;
@@ -509,18 +512,27 @@
}
btrfs_wait_ordered_roots(fs_info, U64_MAX, 0, (u64)-1);

-trans = btrfs_start_transaction(root, 0);
-if (IS_ERR(trans)) {
-mutex_unlock(&dev_replace->lock_finishing_cancelUnmount);
-return PTR_ERR(trans);
+while (1) {
+trans = btrfs_start_transaction(root, 0);
+if (IS_ERR(trans)) {
+mutex_unlock(&dev_replace->lock_finishing_cancelUnmount);
+return PTR_ERR(trans);
+
} +ret = btrfs_commit_transaction(trans);
+WARN_ON(ret);
+mutex_lock(&uuid_mutex);
+/* keep away write_all_supers() during the finishing procedure */
+mutex_lock(&fs_info->fs_devices->device_list_mutex);
+mutex_lock(&fs_info->chunk_mutex);
+if (src_device->has_pending_chunks) {
+mutex_unlock(&root->fs_info->chunk_mutex);
+mutex_unlock(&root->fs_info->fs_devices->device_list_mutex);
+mutex_unlock(&uuid_mutex);
+} else {
+break;
+}
+
} -ret = btrfs_commit_transaction(trans);
-WARN_ON(ret);

-mutex_lock(&uuid_mutex);
-/* keep away write_all_supers() during the finishing procedure */
-mutex_lock(&fs_info->fs_devices->device_list_mutex);
-mutex_lock(&fs_info->chunk_mutex);
+btrfs_dev_replace_lock(dev_replace, 1);
+dev_replace->replace_state =
+scrub_ret ? BTRFS_IOCTL_DEV_REPLACE_STATE_CANCELED
@@ -589,6 +601,12 @@
btrfs_rm_dev_replace_unblocked(fs_info);

/*
 + * Increment dev_stats_ccnt so that btrfs_run_dev_stats() will
 + * update on-disk dev stats value during commit transaction
 + */
+atomic_inc(&tgt_device->dev_stats_ccnt);
+
+/*
 + * this is again a consistent state where no dev_replace procedure
 + * is running, the target device is part of the filesystem, the
 + * source device is not part of the filesystem anymore and its 1st
 @@ -795,6 +813,8 @@
btrfs_info(fs_info,
 "cannot continue dev_replace, tgtdev is missing");
 btrfs_info(fs_info,
 "you may cancel the operation after 'mount -o degraded'");
+dev_replace->replace_state =
btrfs_dev_replace_unlock(dev_replace, 1);

return 0;
}

--- linux-4.15.0.orig/fs/btrfs/disk-io.c
+++ linux-4.15.0/fs/btrfs/disk-io.c
@@ -61,7 +61,8 @@
        BTRFS_SUPER_FLAG_ERROR |
        BTRFS_SUPER_FLAG_SEEDING |
-       BTRFS_SUPER_FLAG_METADUMP)
+       BTRFS_SUPER_FLAG_METADUMP |
+       BTRFS_SUPER_FLAG_METADUMP_V2)

static const struct extent_io_ops btree_extent_io_ops;
static void end_workqueue_fn(struct btrfs_work *work);
@@ -436,13 +437,77 @@
return ret;
}

+static int verify_level_key(struct btrfs_fs_info *fs_info, 
+                           struct extent_buffer *eb, int level, 
+                           struct btrfs_key *first_key)
+{
+    int found_level;
+    struct btrfs_key found_key;
+    int ret;
+    
+    found_level = btrfs_header_level(eb);
+    if (found_level != level) {
+        #ifdef CONFIG_BTRFS_DEBUG
+        WARN_ON(1);
+        btrfs_err(fs_info,
+            "tree level mismatch detected, bytenr=%llu level expected=%u has=%u",
+            eb->start, level, found_level);
+        #endif
+        return -EIO;
+    }
+    
+    if (!first_key)
+        return 0;
+    
+    /* For live tree block (new tree blocks in current transaction),
+     * we need proper lock context to avoid race, which is impossible here.
+     * So we only checks tree blocks which is read from disk, whose
+     * generation <= fs_info->last_trans_committed.
+     */
+    

if (btrfs_header_generation(eb) > fs_info->last_trans_committed)
+return 0;
+
+/* We have @first_key, so this @eb must have at least one item */
+if (btrfs_header_nritems(eb) == 0) {
+btrfs_err(fs_info,
+"invalid tree nritems, bytenr=%llu nritems=0 expect >0",
+ eb->start);
+WARN_ON(IS_ENABLED(CONFIG_BTRFS_DEBUG));
+return -EUCLEAN;
+}
+
+if (found_level)
+btrfs_node_key_to_cpu(eb, &found_key, 0);
+else
+btrfs_item_key_to_cpu(eb, &found_key, 0);
+ret = btrfs_comp_cpu_keys(first_key, &found_key);
+
+#ifdef CONFIG_BTRFS_DEBUG
+if (ret) {
+WARN_ON(1);
+btrfs_err(fs_info,
+"tree first key mismatch detected, bytenr=%llu key expected=(%llu, %u, %llu) has=(%llu, %u, %llu)",
+ eb->start, first_key->objectid, first_key->type,
+ first_key->offset, found_key.objectid,
+ found_key.type, found_key.offset);
+}
+#endif
+return ret;
+
/*
* helper to read a given tree block, doing retries as required when
* the checksums don't match and we have alternate mirrors to try.
* *
* @parent_transid:expected transid, skip check if 0
* @level:expected level, mandatory check
* @first_key:expected key of first slot, skip check if NULL
*/
static int btree_read_extent_buffer_pages(struct btrfs_fs_info *fs_info,
struct extent_buffer *eb,
  u64 parent_transid)
  u64 parent_transid, int level,
+ struct btrfs_key *first_key)
{    + struct btrfs_key *first_key)
    struct extent_io_tree *io_tree;
    int failed = 0;
    @ @ -451.27 +516.22 @@
int mirror_num = 0;
int failed_mirror = 0;

-clear_bit(EXTENT_BUFFER_CORRUPT, &eb->bflags);
io_tree = &BTRFS_I(fs_info->btree_inode)->io_tree;
while (1) {
+clear_bit(EXTENT_BUFFER_CORRUPT, &eb->bflags);
ret = read_extent_buffer_pages(io_tree, eb, WAIT_COMPLETE,
    btree_get_extent, mirror_num);
if (!ret) {

	-/*
	- * This buffer's crc is fine, but its contents are corrupted, so
	- * there is no reason to read the other copies, they won't be
	- * any less wrong.
	- */
	-if (test_bit(EXTENT_BUFFER_CORRUPT, &eb->bflags))
	-breaking;

	 num_copies = btrfs_num_copies(fs_info,
          eb->start, eb->len);
if (num_copies == 1)
@@ -610,12 +670,12 @@
* that we don't try and read the other copies of this block, just
* return -EIO.
* /
- if (found_level == 0 && btrfs_check_leaf_full(root, eb)) {
+ if (found_level == 0 && btrfs_check_leaf_full(fs_info, eb)) {
    set_bit(EXTENT_BUFFER_CORRUPT, &eb->bflags);
    ret = -EIO;
}

- if (found_level > 0 && btrfs_check_node(root, eb))
+ if (found_level > 0 && btrfs_check_node(fs_info, eb))
    ret = -EIO;

if (!ret)
@@ -937,8 +997,9 @@
    ret = percpu_counter_compare(&fs_info->dirty_metadata_bytes,
    - BTRFS_DIRTY_METADATA_THRESH);
    + ret = __percpu_counter_compare(&fs_info->dirty_metadata_bytes,
    + BTRFS_DIRTY_METADATA_THRESH,
    + fs_info->dirty_metadata_batch);
    if (ret < 0)
        return 0;
}
@@ -1007,13 +1068,18 @@
{
    struct extent_buffer *buf = NULL;
    struct inode *btree_inode = fs_info->btree_inode;
    +int ret;

    buf = btrfs_find_create_tree_block(fs_info, bytenr);
    if (IS_ERR(buf))
        return;
    -read_extent_buffer_pages(&BTRFS_I(btree_inode)->io_tree,
    -buf, WAIT_NONE, btree_get_extent, 0);
    -free_extent_buffer(buf);
    +
    +ret = read_extent_buffer_pages(&BTRFS_I(btree_inode)->io_tree, buf,
    +WAIT_NONE, btree_get_extent, 0);
    +if (ret < 0)
    +free_extent_buffer_stale(buf);
    +else
    +free_extent_buffer(buf);
}

int reada_tree_block_flagged(struct btrfs_fs_info *fs_info, u64 bytenr,
@@ -1033,12 +1099,12 @@
    ret = read_extent_buffer_pages(io_tree, buf, WAIT_PAGE_LOCK,
    -btree_get_extent, mirror_num);
    if (ret) {
    -free_extent_buffer(buf);
    +free_extent_buffer_stale(buf);
        return ret;
    }

if (test_bit(EXTENT_BUFFER_CORRUPT, &buf->bflags)) {
    -free_extent_buffer(buf);
    +free_extent_buffer_stale(buf);
    return -EIO;


else if (extent_buffer_uptodate(buf)) {
  *eb = buf;
  @@ -1070,8 +1136,17 @@
    buf->start, buf->start + buf->len - 1);
 }

+/*
 + * Read tree block at logical address @bytenr and do variant basic but critical
 + * verification.
 + *
 + * @parent_transid:expected transid of this tree block, skip check if 0
 + * @level:expected level, mandatory check
 + * @first_key:expected key in slot 0, skip check if NULL
 + */
+struct extent_buffer *read_tree_block(struct btrfs_fs_info *fs_info, u64 bytenr,
+    u64 parent_transid)
+    u64 parent_transid, int level,
+    struct btrfs_key *first_key)
{  
  struct extent_buffer *buf = NULL;
  int ret;
  @@ -1080,9 +1155,10 @@
    if (IS_ERR(buf))
      return buf;

    -ret = btree_read_extent_buffer_pages(fs_info, buf, parent_transid);
    +ret = btree_read_extent_buffer_pages(fs_info, buf, parent_transid,
    +  level, first_key);
    if (ret) {
      -free_extent_buffer(buf);
      +free_extent_buffer_stale(buf);
      return ERR_PTR(ret);
    }
    return buf;
  @@ -1116,7 +1192,7 @@
    if (!writers)
      return ERR_PTR(-ENOMEM);

    -ret = percpu_counter_init(&writers->counter, 0, GFP_KERNEL);
    +ret = percpu_counter_init(&writers->counter, 0, GFP_NOFS);
    if (ret < 0) {
      kfree(writers);
      return ERR_PTR(ret);
    @@ -1184,6 +1260,7 @@
    atomic_set(&root->orphan_inodes, 0);
    refcount_set(&root->refs, 1);
    atomic_set(&root->will_be_snapshotted, 0);
    +atomic_set(&root->snapshot_force_cow, 0);
atomic64_set(&root->qgroup_meta_rsv, 0);
root->log_transid = 0;
root->log_transid_committed = -1;
@@ -1408,6 +1485,7 @@
 struct btrfs_path *path;
 u64 generation;
 int ret;
+int level;

 path = btrfs_alloc_path();
 if (!path)
@@ -1430,9 +1508,10 @@
{ 
    generation = btrfs_root_generation(&root->root_item);
+    level = btrfs_root_level(&root->root_item);
    root->node = read_tree_block(fs_info,
-        btrfs_root_bytenr(&root->root_item),
+        btrfs_root_bytenr(&root->root_item),
-        generation);
+        generation, level, NULL);
    if (IS_ERR(root->node)) {
        ret = PTR_ERR(root->node);
        goto find_fail;
@@ -1494,9 +1573,16 @@
    spin_lock_init(&root->ino_cache_lock);
    init_waitqueue_head(&root->ino_cache_wait);

    ret = get_anon_bdev(&root->anon_dev);
    if (ret)
@@ -1664,8 +1750,8 @@
        bio->bi_status = end_io_wq->status;
        bio->bi_private = end_io_wq->private;
        bio->bi_end_io = end_io_wq->end_io;
-        kmem_cache_free(btrfs_end_io_wq_cache, end_io_wq);
bio_endio(bio);
+kmem_cache_free(btrfs_end_io_wq_cache, end_io_wq);
}
static int cleaner_kthread(void *arg)
@@ -1673,9 +1759,8 @@
struct btrfs_root *root = arg;
struct btrfs_fs_info *fs_info = root->fs_info;
int again;
-struct btrfs_trans_handle *trans;
-do {
+while (1) {
again = 0;
/* Make the cleaner go to sleep early. */
@@ -1724,42 +1809,16 @@
*/
btrfs_delete_unused_bgs(fs_info);
sleep:
+if (kthread_should_park())
+kthread_parkme();
+if (kthread_should_stop())
+return 0;
if (!again) {
set_current_state(TASK_INTERRUPTIBLE);
-if (!kthread_should_stop())
-schedule();
+schedule();
__set_current_state(TASK_RUNNING);
}
-} while (!kthread_should_stop());
-/*
- * Transaction kthread is stopped before us and wakes us up.
- * However we might have started a new transaction and COWed some
- * tree blocks when deleting unused block groups for example. So
- * make sure we commit the transaction we started to have a clean
- * shutdown when evicting the btree inode - if it has dirty pages
- * when we do the final iput() on it, eviction will trigger a
- * writeback for it which will fail with null pointer dereferences
- * since work queues and other resources were already released and
- * destroyed by the time the iput/eviction/writeback is made.
- */
-trans = btrfs_attach_transaction(root);
-if (IS_ERR(trans)) {
-if (PTR_ERR(trans) != -ENOENT)
-btrfs_err(fs_info,

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- "cleaner transaction attach returned %ld",
- PTR_ERR(trans));
-} else {
- int ret;
-
- ret = btrfs_commit_transaction(trans);
- if (ret)
- btrfs_err(fs_info,
- "cleaner open transaction commit returned %d",
- ret);
-}
-
- return 0;
}

static int transaction_kthread(void *arg)
@@ -2063,7 +2122,7 @@

}@ 

/* helper to cleanup tree roots */
-static void free_root_pointers(struct btrfs_fs_info *info, int chunk_root)
+static void free_root_pointers(struct btrfs_fs_info *info, bool free_chunk_root)
{
 free_root_extent_buffers(info->tree_root);

@@ -2072,7 +2131,7 @@
 free_root_extent_buffers(info->csum_root);
 free_root_extent_buffers(info->quota_root);
 free_root_extent_buffers(info->uuid_root);
- if (chunk_root)
+ if (free_chunk_root)
 free_root_extent_buffers(info->chunk_root);
 free_root_extent_buffers(info->free_space_root);
}
@@ -2283,6 +2342,7 @@
 struct btrfs_root *log_tree_root;
 struct btrfs_super_block *disk_super = fs_info->super_copy;
 u64 bytenr = btrfs_super_log_root_level(disk_super);
+int level = btrfs_super_log_root_level(disk_super);

 if (fs_devices->rw_devices == 0) {
 btrfs_warn(fs_info, "log replay required on RO media");
@@ -2296,7 +2356,8 @@
 __setup_root(log_tree_root, fs_info, BTRFS_TREE_LOG_OBJECTID);

 log_tree_root->node = read_tree_block(fs_info, bytenr,
- fs_info->generation + 1);
+ fs_info->generation + 1,
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fs_info->generation = generation;
fs_info->last_trans_committed = generation;

+/*
 + * If we have a uuid root and we're not being told to rescan we need to
 + * check the generation here so we can set the
 + * BTRFS_FS_UPDATE_UUID_TREE_GEN bit. Otherwise we could commit the
 + * transaction during a balance or the log replay without updating the
 + * uuid generation, and then if we crash we would rescan the uuid tree,
 + * even though it was perfectly fine.
 + */
+if (fs_info->uuid_root && !btrfs_test_opt(fs_info, RESCAN_UUID_TREE) &&
+    fs_info->generation == btrfs_super_uuid_tree_generation(disk_super))
+  set_bit(BTRFS_FS_UPDATE_UUID_TREE_GEN, &fs_info->flags);
+
ret = btrfs_recover_balance(fs_info);
if (ret) {
  btrfs_err(fs_info, "failed to recover balance: %d", ret);
  @ @ -2926,6 +3001,7 @@
/* do not make disk changes in broken FS or nologreplay is given */
if (btrfs_super_log_root(disk_super) != 0 &&
    !btrfs_test_opt(fs_info, NOLOGREPLAY)) {
  btrfs_info(fs_info, "start tree-log replay");
  ret = btrfs_replay_log(fs_info, fs_devices);
  if (ret) {
    err = ret;
    @ @ -2960,6 +3036,7 @@
    fs_info->fs_root = btrfs_read_fs_root_no_name(fs_info, &location);
    if (IS_ERR(fs_info->fs_root)) {
      err = PTR_ERR(fs_info->fs_root);
+    fs_info->fs_root = NULL;
      goto fail_qgroup;
    }
    @ @ -3043,8 +3120,6 @@
    close_ctree(fs_info);
    return ret;
  } else {
    -set_bit(BTRFS_FS_UPDATE_UUID_TREE_GEN, &fs_info->flags);
  }
  set_bit(BTRFS_FS_OPEN, &fs_info->flags);
  @ @ -3081,7 +3156,7 @@
  btrfs_put_block_group_cache(fs_info);

  fail_tree_roots:
- free_root_pointers(fs_info, 1);
+ free_root_pointers(fs_info, true);
invalidate_inode_pages2(fs_info->btree_inode->i_mapping);

fail_sb_buffer:
@@ -3109,7 +3184,7 @@
if (!btrfs_test_opt(fs_info, USEBACKUPROOT))
goto fail_tree_roots;

- free_root_pointers(fs_info, 0);
+ free_root_pointers(fs_info, false);

/* don't use the log in recovery mode, it won't be valid */
btrfs_set_super_log_root(disk_super, 0);
@@ -3698,6 +3773,13 @@
int ret;

set_bit(BTRFS_FS_CLOSING_START, &fs_info->flags);
+/*
+ * We don't want the cleaner to start new transactions, add more delayed
+ * iputs, etc. while we're closing. We can't use kthread_stop() yet
+ * because that frees the task_struct, and the transaction kthread might
+ * still try to wake up the cleaner.
+ */
+kthread_park(fs_info->cleaner_kthread);

/* wait for the qgroup rescan worker to stop */
btrfs_qgroup_wait_for_completion(fs_info, false);
@@ -3725,18 +3807,31 @@

if (!sb_rdonly(fs_info->sb)) {
/*
 - * If the cleaner thread is stopped and there are
 - * block groups queued for removal, the deletion will be
 - * skipped when we quit the cleaner thread.
+ * The cleaner kthread is stopped, so do one final pass over
+ * unused block groups.
 */
btrfs_delete_unused_bgs(fs_info);

+/*
 + * There might be existing delayed inode workers still running
 + * and holding an empty delayed inode item. We must wait for
 + * them to complete first because they can create a transaction.
 + * This happens when someone calls btrfs_balance_delayed_items()
 + * and then a transaction commit runs the same delayed nodes
 + * before any delayed worker has done something with the nodes.
 + * We must wait for any worker here and not at transaction
+ * commit time since that could cause a deadlock.
+ * This is a very rare case.
+ */
+\n+\n+btrfs_flush_workqueue(fs_info->delayed_workers);
+\n+ret = btrfs_commit_super(fs_info);
+if (ret)
+btrfs_err(fs_info, "commit super ret \%d", ret);
+}
-
-\n-if (test_bit(BTRFS_FS_STATE_ERROR, &fs_info->fs_state))
+if (test_bit(BTRFS_FS_STATE_ERROR, &fs_info->fs_state) ||
+ test_bit(BTRFS_FS_STATE_TRANS_ABORTED, &fs_info->fs_state))
+btrfs_error_commit_super(fs_info);
+\n+kthread_stop(fs_info->transaction_kthread);
@@ -3745,6 +3840,7 @@
-set_bit(BTRFS_FS_CLOSING_DONE, &fs_info->flags);
+btrfs_free_qgroup_config(fs_info);
+\n+ASSERT(list_empty(&fs_info->delalloc_roots));
+\n+if (percpu_counter_sum(&fs_info->delalloc_bytes)) {
+  btrfs_info(fs_info, "at unmount delalloc count \%lld",
+@@ -3765,10 +3861,17 @@
invalidate_inode_pages2(fs_info->btree_inode->i_mapping);
+btrfs_stop_all_workers(fs_info);
+-btrfs_free_block_groups(fs_info);
-\n-clear_bit(BTRFS_FS_OPEN, &fs_info->flags);
-\n-free_root_pointers(fs_info, 1);
+free_root_pointers(fs_info, true);
+\n+/*
+ * We must free the block groups after dropping the fs_roots as we could
+ * have had an IO error and have left over tree log blocks that aren't
+ * cleaned up until the fs roots are freed. This makes the block group
+ * accounting appear to be wrong because there's pending reserved bytes,
+ * so make sure we do the block group cleanup afterwards.
+ */
+btrfs_free_block_groups(fs_info);
+\n-iput(fs_info->btree_inode);
@@ -3852,7 +3955,7 @@
+\n+* So here we should only check item pointers, not item data.
+*/

if (btrfs_header_level(buf) == 0 &&
    !btrfs_check_leaf_relaxed(root, buf)) {
  btrfs_check_leaf_relaxed(fs_info, buf)) {
    btrfs_print_leaf(buf);
    ASSERT(0);
}

@@ -3874,8 +3977,9 @@
if (flush_delayed)
  btrfs_balanceDelayed_items(fs_info);

-ret = percpu_counterCompare(&fs_info->dirty_metadataBytes,
-      BTRFS_DIRTY_METADATA_THRESH);
+ret = __percpu_counterCompare(&fs_info->dirty_metadataBytes,
+    BTRFS_DIRTY_METADATA_THRESH,
+    fs_info->dirty_metadataBatch);
if (ret > 0) {
  balanceDirty_pages_ratelimited(fs_info->btree_inode->i_mapping);
}
@@ -3891,12 +3995,14 @@
__btrfs_btree_balance_dirty(fs_info, 0);
}

-int btrfs_read_buffer(struct extent_buffer *buf, u64 parent_transid)
+int btrfs_read_buffer(struct extent_buffer *buf, u64 parent_transid, int level,
+    struct btrfs_key *first_key)
{
  struct btrfs_root *root = BTRFS_I(buf->pages[0]->mapping->host)->root;
  struct btrfs_fs_info *fs_info = root->fs_info;

-    return btree_read_extent_buffer_pages(fs_info, buf, parent_transid);
-  return btree_read_extent_buffer_pages(fs_info, buf, parent_transid,
-      level, first_key);
+
  return btree_read_extent_buffer_pages(fs_info, buf, parent_transid,
      level, first_key);
}

static int btrfs_check_super_valid(struct btrfs_fs_info *fs_info)
@@ -3910,9 +4016,11 @@
    btrfs_err(fs_info, "no valid FS found");
    ret = -EINVAL;
}
-    if (btrfs_super_flags(sb) & ~BTRFS_SUPER_FLAG_SUPP)
+    if (btrfs_super_flags(sb) & ~BTRFS_SUPER_FLAG_SUPP) {
+      btrfs_err(fs_info, "unrecognized or unsupported super flag: %llu",
+        btrfs_super_flags(sb) & ~BTRFS_SUPER_FLAG_SUPP);
+      ret = -EINVAL;
+    }
  if (btrfs_super_root_level(sb) >= BTRFS_MAX_LEVEL) {
    btrfs_err(fs_info, "tree_root level too big: %d >= %d",

static void btrfs_error_commit_super(struct btrfs_fs_info *fs_info)
{
    /* cleanup FS via transaction */
    btrfs_cleanup_transaction(fs_info);
    mutex_lock(&fs_info->cleaner_mutex);
btrfs_run_delayed_iputs(fs_info);
    mutex_unlock(&fs_info->cleaner_mutex);

down_write(&fs_info->cleanup_work_sem);
up_write(&fs_info->cleanup_work_sem);
-
-/* cleanup FS via transaction */
-btrfs_cleanup_transaction(fs_info);
}

static void btrfs_destroy_ordered_extents(struct btrfs_root *root)
{
    spin_lock(&fs_info->ordered_root_lock);
}
spin_unlock(&fs_info->ordered_root_lock);
+
+/*
+ * We need this here because if we've been flipped read-only we won't
+ * get sync() from the umount, so we need to make sure any ordered
+ * extents that haven't had their dirty pages IO start writeout yet
+ * actually get run and error out properly.
+ */
+btrfs_wait_ordered_roots(fs_info, U64_MAX, 0, (u64)-1);
}

static int btrfs_destroy_delayed_refs(struct btrfs_transaction *trans,
{
    list_splice_init(&root->delalloc_inodes, &splice);

    while (!list_empty(&splice)) {
        struct inode *inode = NULL;
btrfs_inode = list_first_entry(&splice, struct btrfs_inode,
            delalloc_inodes);
-
-        list_del_init(&btrfs_inode->delalloc_inodes);
-        clear_bit(BTRFS_INODE_IN_DELALLOC_LIST,
-            &btrfs_inode->runtime_flags);
+        __btrfs_del_delalloc_inode(root, btrfs_inode);
spin_unlock(&root->delalloc_lock);
btrfs_invalidate_inodes(btrfs_inode->root);
-
+/*
+ * Make sure we get a live inode and that it'll not disappear
+ * meanwhile.
+ */
+inode = igrab(&btrfs_inode->vfs_inode);
+if (inode) {
+invalidate_inode_pages2(inode->i_mapping);
+iput(inode);
+}
+spin_lock(&root->delalloc_lock);
+
+spin_unlock(&root->delalloc_lock);
}

while (!list_empty(&splice)) {
  root = list_first_entry(&splice, struct btrfs_root, delalloc_root);
  -list_del_init(&root->delalloc_root);
  root = btrfs_grab_fs_root(root);
  BUG_ON(!root);
  spin_unlock(&fs_info->delalloc_root_lock);
  @@ -4267,13 +4386,26 @@
    unpin = pinned_extents;
    again:
    while (1) {
  +struct extent_state *cached_state = NULL;
  +
  +/*
  + * The btrfs_finish_extent_commit() may get the same range as
  + * ours between find_first_extent_bit and clear_extent_dirty.
  + * Hence, hold the unused_bg_unpin_mutex to avoid double unpin
  + * the same extent range.
  + */
  +mutex_lock(&fs_info->unused_bg_unpin_mutex);
    ret = find_first_extent_bit(unpin, 0, &start, &end,
-    EXTENT_DIRTY, NULL);
-  -if (ret)
-    EXTENT_DIRTY, &cached_state);
-  +if (ret) {
-    mutex_unlock(&fs_info->unused_bg_unpin_mutex);
-    break;
-  +}
clear_extent_dirty(unpin, start, end);
+clear_extent_dirty(unpin, start, end, &cached_state);
+free_extent_state(cached_state);
btrfs_error_unpin_extent_range(fs_info, start, end);
+mutex_unlock(&fs_info->unused_bg_unpin_mutex);
cond_resched();
}

@@ -4300,6 +4432,7 @@
cache->io_ctl(inode) = NULL;
 iput(inode);
 }
+ASSERT(cache->io_ctl.pages == NULL);
btrfs_put_block_group(cache);
}

@@ -4370,7 +4503,6 @@
wake_up(&fs_info->transaction_wait);

btrfs_destroy_delayed_inodes(fs_info);
-btrfs_assert_delayed_root_empty(fs_info);

btrfs_destroy_marked_extents(fs_info, &cur_trans->dirty_pages,
   EXTENT_DIRTY);
--- linux-4.15.0.orig/fs/btrfs/disk-io.h
+++ linux-4.15.0/fs/btrfs/disk-io.h
@@ -52,8 +52,9 @@
 struct btrfs_device;
 struct btrfs_fs_devices;
-struct extent_buffer *read_tree_block(struct btrfs_fs_info *fs_info,
-                        u64 bytenr, u64 parent_transid);
+struct extent_buffer *read_tree_block(struct btrfs_fs_info *fs_info, u64 bytenr,
+                        u64 parent_transid, int level,
+                        struct btrfs_key *first_key);
void readahead_tree_block(struct btrfs_fs_info *fs_info, u64 bytenr);
int reada_tree_block_flagged(struct btrfs_fs_info *fs_info, u64 bytenr,
        int mirror_num, struct extent_buffer **eb);
@@ -123,7 +124,8 @@
void btrfs_mark_buffer_dirty(struct extent_buffer *buf);
int btrfs_buffer_uptodate(struct extent_buffer *buf, u64 parent_transid,
                           int atomic);
-int btrfs_read_buffer(struct extent_buffer *buf, u64 parent_transid);
+int btrfs_read_buffer(struct extent_buffer *buf, u64 parent_transid, int level,
+                        struct btrfs_key *first_key);
u32 btrfs_csum_data(const char *data, u32 seed, size_t len);
void btrfs_csum_final(u32 crc, u8 *result);
blk_status_t btrfs_bio_wq_end_io(struct btrfs_fs_info *info, struct bio *bio,
--- linux-4.15.0.orig/fs/btrfs/export.c
+++ linux-4.15.0/fs/btrfs/export.c
@@ -56,9 +56,9 @@
        return type;
    }

-static struct dentry *btrfs_get_dentry(struct super_block *sb, u64 objectid,
-       u64 root_objectid, u32 generation,
-       int check_generation)
+struct dentry *btrfs_get_dentry(struct super_block *sb, u64 objectid,
+       u64 root_objectid, u32 generation,
+       int check_generation)
{
    struct btrfs_fs_info *fs_info = btrfs_sb(sb);
    struct btrfs_root *root;
@@ -151,7 +151,7 @@
        return btrfs_get_dentry(sb, objectid, root_objectid, generation, 1);
    }

-static struct dentry *btrfs_get_parent(struct dentry *child)
+struct dentry *btrfs_get_parent(struct dentry *child)
{
    struct inode *dir = d_inode(child);
    struct btrfs_fs_info *fs_info = btrfs_sb(dir->i_sb);
--- linux-4.15.0.orig/fs/btrfs/export.h
+++ linux-4.15.0/fs/btrfs/export.h
@@ -17,4 +17,9 @@
     u64 parent_root_objectid;
 } __attribute__ ((__packed));

+struct dentry *btrfs_get_dentry(struct super_block *sb, u64 objectid,
+       u64 root_objectid, u32 generation,
+       int check_generation);
+struct dentry *btrfs_get_parent(struct dentry *child);
+
#endif
--- linux-4.15.0.orig/fs/btrfs/extent-tree.c
+++ linux-4.15.0/fs/btrfs/extent-tree.c
@@ -1160,12 +1160,11 @@
        if (type == BTRFS_SHARED_BLOCK_REF_KEY) {
            ASSERT(eb->fs_info);
            /*
-             * Every shared one has parent tree
-             * block, which must be aligned to
-             * nodestore.
-             * Every shared one has parent tree block,
+             * which must be aligned to sector size.
+             */
          }
if (offset &&
    IS_ALIGNED(offset, eb->fs_info->nodesize))
+    IS_ALIGNED(offset, eb->fs_info->sectorsize))
return type;
}
} else if (is_data == BTRFS_REF_TYPE_DATA) {
@@ -1174,12 +1173,11 @@
    IS_ALIGNED(offset, eb->fs_info->nodesize))
    IS_ALIGNED(offset, eb->fs_info->sectorsize))
return type;
}
else {
@@ -1189,14 +1187,15 @@
btrfs_print_leaf((struct extent_buffer *)eb);
-btrfs_err(eb->fs_info, "eb %llu invalid extent inline ref type %d",
    - eb->start, type);
+btrfs_err(eb->fs_info,
    + "eb %llu iref 0x%lx invalid extent inline ref type %d",
    + eb->start, (unsigned long)iref, type);
WARN_ON(1);

return BTRFS_REF_TYPE_INVALID;
}

-static u64 hash_extent_data_ref(u64 root_objectid, u64 owner, u64 offset)
+u64 hash_extent_data_ref(u64 root_objectid, u64 owner, u64 offset)
{
    u32 high_crc = ~(u32)0;
    u32 low_crc = ~(u32)0;
@@ -1995,7 +1994,22 @@
        bytenr, num_bytes, parent,
        root_objectid, owner, offset, 1);
    if (ret == 0) {
-        -BUG_ON(owner < BTRFS_FIRST_FREE_OBJECTID);
+        */
+        + * We're adding refs to a tree block we already own, this

+ * should not happen at all.
+ */
+if (owner < BTRFS_FIRST_FREE_OBJECTID) {
+    btrfs_crit(trans->fs_info,
+        "adding refs to an existing tree ref, bytenr %llu num_bytes %llu root_objectid %llu",
+        bytenr, num_bytes, root_objectid);
+if (IS_ENABLED(CONFIG_BTRFS_DEBUG)) {
+    WARN_ON(1);
+    btrfs_crit(trans->fs_info,
+        "path->slots[0]=%d path->nodes[0]:", path->slots[0]);
+btrfs_print_leaf(path->nodes[0]);
+}
+return -EUCLEAN;
+}
update_inline_extent_backref(fs_info, path, iref,
    refs_to_add, extent_op, NULL);
} else if (ret == -ENOENT) {
    @ @ -2511.6 +2525.9 @ @
    insert_reserved);
else
    BUG();
+if (ret && insert_reserved)
+btrfs_pin_extent(trans->fs_info, node->bytenr,
    node->num_bytes, 1);
return ret;
}

if (head->total_ref_mod < 0) {

    struct btrfs_block_group_cache *cache;
+    struct btrfs_space_info *space_info;
+    u64 flags;

-    cache = btrfs_lookup_block_group(fs_info, head->bytenr);
-    ASSERT(cache);
-    percpu_counter_add(&cache->space_info->total_bytes_pinned,
+    if (head->is_data)
+        flags = BTRFS_BLOCK_GROUP_DATA;
+    else if (head->is_system)
+        flags = BTRFS_BLOCK_GROUP_SYSTEM;
+    else
+        flags = BTRFS_BLOCK_GROUP_METADATA;
+    space_info = __find_space_info(fs_info, flags);
+    ASSERT(space_info);
+    percpu_counter_add(&space_info->total_bytes_pinned,
-    head->num_bytes);


btrfs_put_block_group(cache);

if (head->is_data) {
    spin_lock(&delayed_refs->lock);
    btrfs_pin_extent(fs_info, head->bytenr,
        head->num_bytes, 1);
    if (head->is_data) {
        ret = btrfs_del_csums(trans, fs_info, head->bytenr,
            head->num_bytes);
        ret = btrfs_del_csums(trans, fs_info->csum_root,
            head->bytenr, head->num_bytes);
    }
}

head->qgroup_reserved);
btrfs_delayed_ref_unlock(head);
btrfs_put_delayed_ref_head(head);
return 0;
return ret;
}

/*
struct btrfs_delayed_ref_head *head;
int ret;
int run_all = count == (unsigned long)-1;
bool can_flush_pending_bgs = trans->can_flush_pending_bgs;
*/
if (trans->aborted)
    can_flush_pending_bgs = false;
ret = __btrfs_run_delayed_refs(trans, fs_info, count);
if (ret < 0) {
btrfs_abort_transaction(trans, ret);
goto again;
}
out:
can_flush_pending_bgs = can_flush_pending_bgs;
return 0;
}
struct rb_node *node;
int ret = 0;

+spin_lock(&root->fs_info->trans_lock);
cur_trans = root->fs_info->running_transaction;
+if (cur_trans)
+refcount_inc(&cur_trans->use_count);
+spin_unlock(&root->fs_info->trans_lock);
if (!cur_trans)
return 0;

head = btrfs_find_delayed_ref_head(delayed_refs, bytenr);
if (!head) {
spin_unlock(&delayed_refs->lock);
+btrfs_put_transaction(cur_trans);
return 0;
}
mutex_lock(&head->mutex);
mutex_unlock(&head->mutex);
btrfs_put_delayed_ref_head(head);
+btrfs_put_transaction(cur_trans);
return -EAGAIN;
} spin_unlock(&delayed_refs->lock);

mutex_lock(&head->mutex);
mutex_unlock(&head->mutex);
btrfs_put_transaction(cur_trans);
return ret;
}

info->space_info_kobj, "%s",
alloc_name(space_info->flags));
if (ret) {
-percpu_counter_destroy(&space_info->total_bytes_pinned);
-kfree(space_info);
+kobject_put(&space_info->kobj);
return ret;
}
data_sinfo->flags, bytes, 1);
spin_unlock(&data_sinfo->lock);

return ret;
+return 0;
}

int btrfs_check_data_free_space(struct inode *inode,
@@ -4637,6 +4663,7 @@
    if (wait_for_alloc) {
        mutex_unlock(&fs_info->chunk_mutex);
        wait_for_alloc = 0;
+        cond_resched();
        goto again;
    }

@@ -4673,10 +4700,12 @@
    spin_lock(&space_info->lock);
    if (ret < 0 && ret != -ENOSPC)
        goto out;
    -if (ret)
+    if (ret) {
        space_info->full = 1;
        -else
+        } else {
            ret = 1;
+            space_info->max_extent_size = 0;
        +}

    space_info->force_alloc = CHUNKALLOC_NO_FORCE;
    out:
@@ -6611,6 +6638,7 @@
    space_info->bytes_readonly += num_bytes;
    cache->reserved -= num_bytes;
    space_info->bytes_reserved -= num_bytes;

```
space_info->max_extent_size = 0;

if (delalloc)
cache->delalloc_bytes -= num_bytes;
@@ -6794,9 +6822,11 @@
unpin = &fs_info->freed_extents[0];

while (!trans->aborted) {
+struct extent_state *cached_state = NULL;
+mutex_lock(&fs_info->unused_bg_unpin_mutex);
ret = find_first_extent_bit(unpin, 0, &start, &end,
- EXTENT_DIRTY, NULL);
+ EXTENT_DIRTY, &cached_state);
if (ret) {
mutex_unlock(&fs_info->unused_bg_unpin_mutex);
break;
@@ -6806,9 +6836,10 @@
ret = btrfs_discard_extent(fs_info, start,
   end + 1 - start, NULL);

-clear_extent_dirty(unpin, start, end);
+clear_extent_dirty(unpin, start, end, &cached_state);
unpin_extent_range(fs_info, start, end, true);
mutex_unlock(&fs_info->unused_bg_unpin_mutex);
+free_extent_state(cached_state);
cond_resched();
}
@@ -6843,6 +6874,65 @@
return 0;
}

+/*
+ * Drop one or more refs of @node.
+ *
+ * 1. Locate the extent refs.
+ * It's either inline in EXTENT/METADATA_ITEM or in keyed SHARED_* item.
+ * Locate it, then reduce the refs number or remove the ref line completely.
+ *
+ * 2. Update the refs count in EXTENT/METADATA_ITEM
+ *
+ * Inline backref case:
+ *
+ * in extent tree we have:
+ *
* item 0 key (13631488 EXTENT_ITEM 1048576) itemoff 16201 itemsize 82
*refs 2 gen 6 flags DATA
This function gets called with:

node->bytenr = 13631488
node->num_bytes = 1048576
root_objectid = FS_TREE
owner_objectid = 257
owner_offset = 0
refs_to_drop = 1

Then we should get some like:

item 0 key (13631488 EXTENT_ITEM 1048576) itemoff 16201 itemsize 82
refs 1 gen 6 flags DATA
extent data backref root FS_TREE objectid 258 offset 0 count 1

Keyed backref case:

in extent tree we have:

item 0 key (13631488 EXTENT_ITEM 1048576) itemoff 3971 itemsize 24
refs 754 gen 6 flags DATA
[...]
item 2 key (13631488 EXTENT_DATA_REF <HASH>) itemoff 3915 itemsize 28
extent data backref root FS_TREE objectid 866 offset 0 count 1

This function get called with:

node->bytenr = 13631488
node->num_bytes = 1048576
root_objectid = FS_TREE
owner_objectid = 866
owner_offset = 0
refs_to_drop = 1

Then we should get some like:

item 0 key (13631488 EXTENT_ITEM 1048576) itemoff 3971 itemsize 24
refs 753 gen 6 flags DATA

And that (13631488 EXTENT_DATA_REF <HASH>) gets removed.

static int __btrfs_free_extent(struct btrfs_trans_handle *trans,
               struct btrfs_fs_info *info,
               struct btrfs_delayed_ref_node *node, u64 parent,
               @@ -6876,7 +6966,15 @@
path->leave_spinning = 1;

is_data = owner_objectid >= BTRFS_FIRST_FREE_OBJECTID;
-BUG_ON(!is_data && refs_to_drop != 1);
+
+if (!is_data && refs_to_drop != 1) {
+btrfs_crit(info,
+"invalid refs_to_drop, dropping more than 1 refs for tree block %llu refs_to_drop %u",
+ node->bytenr, refs_to_drop);
+ret = -EINVAL;
+btrfs_abort_transaction(trans, ret);
+goto out;
+}

if (is_data)
skinny_metadata = false;
@@ -6886,6 +6984,13 @@
root_objectid, owner_objectid,
owner_offset);
if (ret == 0) {
+/*
 + Either the inline backref or the SHARED_DATA_REF/
 + SHARED_BLOCK_REF is found
 + *
 + Here is a quick path to locate EXTENT/METADATA_ITEM.
 + It's possible the EXTENT/METADATA_ITEM is near current slot.
 + */
 extent_slot = path->slots[0];
 while (extent_slot >= 0) {
 btrfs_item_key_to_cpu(path->nodes[0], &key,
@@ -6902,6 +7007,8 @@
 found_extent = 1;
 break;
 }
+/* Quick path didn't find the EXTENT/METADATA_ITEM */
if (path->slots[0] - extent_slot > 5)
break;
extent_slot--;
@@ -6912,7 +7019,13 @@
found_extent = 0;
#endif
if (!found_extent) {
-BUG_ON(iref);
+if (iref) {
+btrfs_crit(info,
+"invalid iref, no EXTENT/METADATA_ITEM found but has inline extent ref");
+btrfs_abort_transaction(trans, -EUCLEAN);
goto err_dump;
+
/* Must be SHARED_* item, remove the backref first */
ret = remove_extent_backref(trans, info, path, NULL,
    refs_to_drop,
    is_data, &last_ref);
@@ -6923,6 +7036,7 @@
btrfs_release_path(path);
path->leave_spinning = 1;

/* Slow path to locate EXTENT/METADATA_ITEM */
key.objectid = bytenr;
key.type = BTRFS_EXTENT_ITEM_KEY;
key.offset = num_bytes;
@@ -7027,19 +7141,26 @@
    if (owner_objectid < BTRFS_FIRST_FREE_OBJECTID &&
        key.type == BTRFS_EXTENT_ITEM_KEY) {
        struct btrfs_tree_block_info *bi;
-        BUG_ON(item_size < sizeof(*ei) + sizeof(*bi));
+        if (item_size < sizeof(*ei) + sizeof(*bi)) {
+            btrfs_crit(info,
+                "invalid extent item size for key (%llu, %u, %llu) owner %llu, has %u expect >= %zu",
+                key.objectid, key.type, key.offset,
+                owner_objectid, item_size,
+                sizeof(*ei) + sizeof(*bi));
+            btrfs_abort_transaction(trans, -EUCLEAN);
+            goto err_dump;
+        }
    bi = (struct btrfs_tree_block_info *)(ei + 1);
    WARN_ON(owner_objectid != btrfs_tree_block_level(leaf, bi));
}

refs = btrfs_extent_refs(leaf, ei);
if (refs < refs_to_drop) {
    btrfs_err(info,
        - "trying to drop %d refs but we only have %Lu for bytenr %Lu",
        +btrfs_crit(info,
            +"trying to drop %d refs but we only have %llu for bytenr %llu",
                refs_to_drop, refs, bytenr);}
.ret = -EINVAL;
-btrfs_abort_transaction(trans, ret);
-goto out;
+btrfs_abort_transaction(trans, -EUCLEAN);
+goto err_dump;
}
refs -= refs_to_drop;
@@ -7051,7 +7172,12 @@
* be updated by remove_extent_backref
*/
if (iref) {
-BUG_ON(!found_extent);
+if (!found_extent) {
+bftrs_crit(info,
+"invalid iref, got inlined extent ref but no EXTENT/METADATA_ITEM found");
+bftrs_abort_transaction(trans, -EUCLEAN);
+goto err_dump;
+}
} else {
bftrs_set_extent_refs(leaf, ei, refs);
bftrs_mark_buffer_dirty(leaf);
@@ -7066,13 +7192,39 @@
}
}
} else {
+/* In this branch refs == 1 */
if (found_extent) {
-BUG_ON(is_data && refs_to_drop !=
-extent_data_ref_count(path, iref));
+if (is_data && refs_to_drop !=
+extent_data_ref_count(path, iref)) {
+bftrs_crit(info,
+"invalid refs_to_drop, current refs %u refs_to_drop %u",
+extent_data_ref_count(path, iref),
+refs_to_drop);
+bftrs_abort_transaction(trans, -EUCLEAN);
+goto err_dump;
+}
if (iref) {
-BUG_ON(path->slots[0] != extent_slot);
+if (path->slots[0] != extent_slot) {
+bftrs_crit(info,
+"invalid iref, extent item key (%llu %u %llu) doesn’t have wanted iref",
+key.objectid, key.type,
+key.offset);
+bftrs_abort_transaction(trans, -EUCLEAN);
+goto err_dump;
+}
} else {
-BUG_ON(path->slots[0] != extent_slot + 1);
+/*
+ * No inline ref, we must be at SHARED_* item,
+ * And it’s single ref, it must be:
+ * [ extent_slot | extent_slot + 1]
+ * [ EXTENT/METADATA_ITEM || SHARED_* ITEM ]
+ */
+if (path->slots[0] != extent_slot + 1) {
+   btrfs_crit(info,
+   "invalid SHARED_* item, previous item is not EXTENT/METADATA_ITEM");
+   btrfs_abort_transaction(trans, -EUCLEAN);
+   goto err_dump;
+}
path->slots[0] = extent_slot;
num_to_del = 2;
}
@@ -7088,7 +7240,8 @@
btrfs_release_path(path);

if (is_data) {
   -ret = btrfs_del_csums(trans, info, bytenr, num_bytes);
+ret = btrfs_del_csums(trans, info->csum_root, bytenr,
+   num_bytes);
   if (ret) {
      btrfs_abort_transaction(trans, ret);
      goto out;
@@ -7112,6 +7265,19 @@
out:
   btrfs_free_path(path);
   return ret;
+err_dump:
+/*
+ * Leaf dump can take up a lot of log buffer, so we only do full leaf
+ * dump for debug build.
+ */
+if (IS_ENABLED(CONFIG_BTRFS_DEBUG)) {
+   btrfs_crit(info, "path->slots[0]=%d extent_slot=%d",
+      path->slots[0], extent_slot);
+   btrfs_print_leaf(path->nodes[0]);
+}
+}
+btrfs_free_path(path);
+return -EUCLEAN;
}
/*
@@ -7480,6 +7646,7 @@
struct btrfs_block_group_cache *block_group = NULL;
  u64 search_start = 0;
  u64 max_extent_size = 0;
+  u64 max_free_space = 0;
  u64 empty_cluster = 0;
  struct btrfs_space_info *space_info;
  int loop = 0;
@@ -7613,6 +7780,14 @@
if ((flags & extra) && !(block_group->flags & extra))
    goto loop;
+
+/*
+ * This block group has different flags than we want.
+ * It's possible that we have MIXED_GROUP flag but no
+ * block group is mixed. Just skip such block group.
+ */
+btrfs_release_block_group(block_group, delalloc);
+continue;
}

have_block_group:
@@ -7774,8 +7949,8 @@
    spin_lock(&ctl->tree_lock);
    if (ctl->free_space <
        num_bytes + empty_cluster + empty_size) {
-        if (ctl->free_space > max_extent_size)
-            max_extent_size = ctl->free_space;
+        max_free_space = max(max_free_space,
          ctl->free_space);
    spin_unlock(&ctl->tree_lock);
    goto loop;
    }
@@ -7944,6 +8119,8 @@
    }
out:
    if (ret == -ENOSPC) {
        if (!max_extent_size)
            max_extent_size = max_free_space;
        spin_lock(&space_info->lock);
        space_info->max_extent_size = max_extent_size;
        spin_unlock(&space_info->lock);
        }
        @ @ -8168,19 +8345,14 @@
        size += sizeof(*block_info);

        path = btrfs_alloc_path();
        -if (!path) {
            -btrfs_free_and_pin_reserved_extent(fs_info, ins->objectid,
                -fs_info->nodesize);
        +if (!path)
            return -ENOMEM;
        }
        path->leave_spinning = 1;
        ret = btrfs_insert_empty_item(trans, fs_info->extent_root, path,
            ins, size);
if (ret) {
    btrfs_free_path(path);
    -btrfs_free_and_pin_reserved_extent(fs_info, ins->objectid, 
    - fs_info->nodesize);
    return ret;
}

@@ -8310,6 +8482,19 @@
if (IS_ERR(buf))
return buf;

+/*
+ * Extra safety check in case the extent tree is corrupted and extent
+ * allocator chooses to use a tree block which is already used and
+ * locked.
+ */
+if (buf->lock_owner == current->pid) {
+    btrfs_err_rl(fs_info,
+    +"tree block %llu owner %llu already locked by pid=%d, extent tree corruption detected",
+    +buf->start, btrfs_header_owner(buf), current->pid);
+    free_extent_buffer(buf);
+    return ERR_PTR(-EUCLEAN);
+}
+
btrfs_set_header_generation(buf, trans->transid);
btrfs_set_buffer_lockdep_class(root->root_key.objectid, buf, level);
btrfs_tree_lock(buf);
@@ -8694,6 +8879,7 @@
}{
    bytenr = btrfs_node_blockptr(path->nodes[level], path->slots[level]);
    +btrfs_node_key_to_cpu(path->nodes[level], &first_key,
    + path->slots[level]);
    blocksize = fs_info->nodesize;

    next = find_extent_buffer(fs_info, bytenr);
    @@ -8778,7 +8966,8 @@
    if (!next) {
        if (reada && level == 1)
            reada_walk_down(trans, root, wc, path);
next = read_tree_block(fs_info, bytenr, generation);
+next = read_tree_block(fs_info, bytenr, generation, level - 1,
+    &first_key);
if (IS_ERR(next)) {
    return PTR_ERR(next);
} else if (!extent_buffer_uptodate(next)) {
    return -943,15 +9132,14 @@
if (eb == root->node) {
    if (wc->flags[level] & BTRFS_BLOCK_FLAG_FULL_BACKREF)
+        parent = eb->start;
-else
    -BUG_ON(root->root_key.objectid != btrfs_header_owner(eb));
+        else if (root->root_key.objectid != btrfs_header_owner(eb))
+            goto owner_mismatch;
    } else {
    if (wc->flags[level + 1] & BTRFS_BLOCK_FLAG_FULL_BACKREF)
        parent = path->nodes[level + 1]->start;
-else
    -BUG_ON(root->root_key.objectid !=
    -    btrfs_header_owner(path->nodes[level + 1]));
-else if (root->root_key.objectid !=
-    btrfs_header_owner(path->nodes[level + 1]))
-        goto owner_mismatch;
    }
    btrfs_free_tree_block(trans, root, eb, parent, wc->refs[level] == 1);
    return -895,6 +9147,11 @@
w->refs[level] = 0;
w->flags[level] = 0;
return 0;
+    +owner_mismatch:
    +btrfs_err_rl(fs_info, "unexpected tree owner, have %llu expect %llu",
+        btrfs_header_owner(eb), root->root_key.objectid);
    +return -EUCLEAN;
}
static noinline int walk_down_tree(struct btrfs_trans_handle *trans,
    ret = walk_up_proc(trans, root, path, wc);
    if (ret > 0)
        return 0;
    if (ret < 0)
        return ret;
    if (path->locks[level]) {
        btrfs_tree_unlock_rw(path->nodes[level],

goto out_free;
} 
+err = btrfs_run_delayed_items(trans, fs_info);
+if (err)
+goto out_end_trans;
+
if (block_rsv)
trans->block_rsv = block_rsv;

if (!for_reloc && !root_dropped)
btrfs_add_dead_root(root);
-if (err && err != -EAGAIN)
-btrfs_handle_fs_error(fs_info, err, NULL);
return err;
}

int ret = 0;
struct btrfs_key found_key;
struct extent_buffer *leaf;
+struct btrfs_block_group_item bg;
+u64 flags;
int slot;

ret = btrfs_search_slot(NULL, root, key, path, 0, 0);
"logical %llu len %llu found bg but no related chunk",
  found_key.objectid, found_key.offset);
ret = -ENOENT;
+} else if (em->start != found_key.objectid ||
+  em->len != found_key.objectid)
  btrfs_err(fs_info,
+"block group %llu len %llu mismatch with chunk %llu len %llu",
  found_key.objectid, found_key.objectid,
  em->start, em->len);
+ret = -EUCLEAN;
} else {
-ret = 0;
+read_extent_buffer(leaf, &bg,
  btrfs_item_ptr_offset(leaf, slot),
  sizeof(bg));
+flags = btrfs_block_group_flags(&bg) &
+BTRFS_BLOCK_GROUP_TYPE_MASK;
+
if (flags != (em->map_lookup->type &
    BTRFS_BLOCK_GROUP_TYPE_MASK)) {
    btrfs_err(fs_info,
    "block group %llu len %llu type flags 0x%llx mismatch with chunk type flags 0x%llx",
    found_key.objectid,
    found_key.offset, flags,
    (BTRFS_BLOCK_GROUP_TYPE_MASK &
    em->map_lookup->type));
    ret = -EUCLEAN;
} else {
    ret = 0;
}
free_extent_map(em);
goto out;

block_group = btrfs_lookup_first_block_group(info, last);
while (block_group) {
    wait_block_group_cache_done(block_group);
    spin_lock(&block_group->lock);
    if (block_group->iref)
        break;
    @ @ -9984,6 +10208,62 @@
    return cache;
}

+ /*
+ * Iterate all chunks and verify that each of them has the corresponding block
+ * group
+ */
+ static int check_chunk_block_group_mappings(struct btrfs_fs_info *fs_info)
+ {
+     struct btrfs_mapping_tree *map_tree = &fs_info->mapping_tree;
+     struct extent_map *em;
+     struct btrfs_block_group_cache *bg;
+     u64 start = 0;
+     int ret = 0;
+     +while (1) {
+         read_lock(&map_tree->map_tree.lock);
+         /*
+         * lookup_extent_mapping will return the first extent map
+         * intersecting the range, so setting @len to 1 is enough to
+         * get the first chunk.
+         */
+         em = lookup_extent_mapping(&map_tree->map_tree, start, 1);
+read_unlock(&map_tree->map_tree.lock);
+if (!em)
+break;
+
+bg = btrfs_lookup_block_group(fs_info, em->start);
+if (!bg) {
+btrfs_err(fs_info,
+"chunk start=%llu len=%llu doesn't have corresponding block group",
+ em->start, em->len);
+ret = -EUCLEAN;
+free_extent_map(em);
+break;
+}
+if (bg->key.objectid != em->start ||
+ bg->key.offset != em->len ||
+ (bg->flags & BTRFS_BLOCK_GROUP_TYPE_MASK) !=
+ (em->map_lookup->type & BTRFS_BLOCK_GROUP_TYPE_MASK)) {
+btrfs_err(fs_info,
+"chunk start=%llu len=%llu flags=0x%llx doesn't match block group start=%llu len=%llu flags=0x%llx",
+em->start, em->len,
+em->map_lookup->type & BTRFS_BLOCK_GROUP_TYPE_MASK,
+bg->key.objectid, bg->key.offset,
+bg->flags & BTRFS_BLOCK_GROUP_TYPE_MASK);
+ret = -EUCLEAN;
+free_extent_map(em);
+btrfs_put_block_group(bg);
+break;
+}
+start = em->start + em->len;
+free_extent_map(em);
+btrfs_put_block_group(bg);
+
+return ret;
+
+int btrfs_read_block_groups(struct btrfs_fs_info *info)
+
+struct btrfs_path *path;
+@@ -10058,6 +10338,7 @@
+btrfs_err(info,
+"bg %llu is a mixed block group but filesystem hasn't enabled mixed block groups",
+cache->key.objectid);
+btrfs_put_block_group(cache);
+ret = -EINVAL;
+goto error;
+
+@@ -10156,7 +10437,7 @@
init_global_block_rsv(info);
-ret = 0;
+ret = check_chunk_block_group_mappings(info);
error:
btrfs_free_path(path);
return ret;
@@ -10165,15 +10446,19 @@
void btrfs_create_pending_block_groups(struct btrfs_trans_handle *trans,
        struct btrfs_fs_info *fs_info)
{
-struct btrfs_block_group_cache *block_group, *tmp;
+struct btrfs_block_group_cache *block_group;
struct btrfs_root *extent_root = fs_info->extent_root;
struct btrfs_block_group_item item;
struct btrfs_key key;
int ret = 0;
-booth can_flush_pending_bgs = trans->can_flush_pending_bgs;

-trans->can_flush_pending_bgs = false;
-list_for_each_entry_safe(block_group, tmp, &trans->new_bgs, bg_list) {
+if (!trans->can_flush_pending_bgs)
+return;
+
+while (!list_empty(&trans->new_bgs)) {
+block_group = list_first_entry(&trans->new_bgs,
+    struct btrfs_block_group_cache,
+    bg_list);
if (ret)
    goto next;

@@ -10195,7 +10480,7 @@
next:
list_del_init(&block_group->bg_list);
}
-trans->can_flush_pending_bgs = can_flush_pending_bgs;
+btrfs_trans_release_chunk_metadata(trans);
}

int btrfs_make_block_group(struct btrfs_trans_handle *trans,
@@ -10430,6 +10715,9 @@
    &fs_info->block_group_cache_tree);
RB_CLEAR_NODE(&block_group->cache_node);

+/* Once for the block groups rbtree */
+btrfs_put_block_group(block_group);
+
if (fs_info->first_logical_byte == block_group->key.objectid)
fs_info->first_logical_byte = (u64)-1;
spin_unlock(&fs_info->block_group_cache_lock);
@@ -10559,6 +10847,22 @@
}
spin_unlock(&block_group->lock);

+mutex_unlock(&fs_info->chunk_mutex);
+
+ret = remove_block_group_free_space(trans, fs_info, block_group);
+if (ret)
+goto out;
+
+ret = btrfs_search_slot(trans, root, &key, path, -1, 1);
+if (ret > 0)
+ret = -EIO;
+if (ret < 0)
+goto out;
+
+ret = btrfs_del_item(trans, root, path);
+if (ret)
+goto out;
+
if (remove_em) {
    struct extent_map_tree *em_tree;

    @ @ -10575.23 +10879.9 @@
    free_extent_map(em);
}

-mutex_unlock(&fs_info->chunk_mutex);
-
-ret = remove_block_group_free_space(trans, fs_info, block_group);
-if (ret)
-goto out;
-
-btrfs_put_block_group(block_group);
-btrfs_put_block_group(block_group);
-
-ret = btrfs_search_slot(trans, root, &key, path, -1, 1);
-if (ret > 0)
-ret = -EIO;
-if (ret < 0)
-goto out;
-
-ret = btrfs_del_item(trans, root, path);
out:
+/* Once for the lookup reference */
+btrfs_put_block_group(block_group);
btrfs_free_path(path);
return ret;
}
@@ -10674,7 +10964,7 @@
/* Don’t want to race with allocators so take the groups_sem */
down_write(&space_info->groups_sem);
spin_lock(&block_group->lock);
-if (block_group->reserved ||
 +if (block_group->reserved || block_group->pinned ||
   btrfs_block_group_used(&block_group->item) ||
   block_group->ro ||
   list_is_singular(&block_group->list)) {
@@ -10857,14 +11147,16 @@
  * We don’t want a transaction for this since the discard may take a
  * substantial amount of time. We don’t require that a transaction be
  * running, but we do need to take a running transaction into account
  - * to ensure that we’re not discarding chunks that were released in
  - * the current transaction.
  + * to ensure that we’re not discarding chunks that were released or
  + * allocated in the current transaction.
  *
  * Holding the chunks lock will prevent other threads from allocating
  * or releasing chunks, but it won’t prevent a running transaction
  * from committing and releasing the memory that the pending chunks
  * list head uses. For that, we need to take a reference to the
  - * transaction.
  + * transaction and hold the commit root sem. We only need to hold
  + * it while performing the free space search since we have already
  + * held back allocations.
  */
static int btrfs_trim_free_extents(struct btrfs_device *device,
   u64 minlen, u64 *trimmed)
@@ -10874,6 +11166,10 @@
*trimmed = 0;

+/* Discard not supported = nothing to do. */
+if (!blk_queue_discard(bdev_get_queue(device->bdev)))
+return 0;
++/* Not writeable = nothing to do. */
  if (!device->writeable)
  return 0;
@@ -10891,9 +11187,13 @@
  ret = mutex_lock_interruptible(&fs_info->chunk_mutex);
  if (ret)
    -return ret;
break;
down_read(&fs_info->commit_root_sem);
if (ret) {
    mutex_unlock(&fs_info->chunk_mutex);
    break;
}
spin_lock(&fs_info->trans_lock);
trans = fs_info->running_transaction;
spin_unlock(&fs_info->trans_lock);
if (!trans)
    up_read(&fs_info->commit_root_sem);
ret = find_free_dev_extent_start(trans, device, minlen, start,
    &start, &len);
if (ret)
    up_read(&fs_info->commit_root_sem);
btrfs_put_transaction(trans);
}

if (ret) {
    up_read(&fs_info->commit_root_sem);
    mutex_unlock(&fs_info->chunk_mutex);
    if (ret == -ENOSPC)
        ret = 0;
}
ret = btrfs_issue_discard(device->bdev, start, len, &bytes);
up_read(&fs_info->commit_root_sem);
mutex_unlock(&fs_info->chunk_mutex);
if (ret)
    return ret;

/*
 * Trim the whole filesystem by:
 * 1) trimming the free space in each block group
 * 2) trimming the unallocated space on each device
 * */
This will also continue trimming even if a block group or device encounters an error. The return value will be the last error, or 0 if nothing bad happens.

```c
int btrfs_trim_fs(struct btrfs_fs_info *fs_info, struct fstrim_range *range)
{
    struct btrfs_block_group_cache *cache = NULL;
    u64 start;
    u64 end;
    u64 trimmed = 0;
    -u64 total_bytes = btrfs_super_total_bytes(fs_info->super_copy);
+u64 bg_failed = 0;
+u64 dev_failed = 0;
+int bg_ret = 0;
+int dev_ret = 0;
    int ret = 0;
    /
    -/*
    - * try to trim all FS space, our block group may start from non-zero.
    - */
    -if (range->len == total_bytes)
    -cache = btrfs_lookup_first_block_group(fs_info, range->start);
    -else
    -cache = btrfs_lookup_block_group(fs_info, range->start);
    -
    -while (cache) {
    +cache = btrfs_lookup_first_block_group(fs_info, range->start);
    +for (; cache; cache = next_block_group(fs_info, cache)) {
        if (cache->key.objectid >= (range->start + range->len)) {
            btrfs_put_block_group(cache);
            break;
            @@ -10969,13 +11277,15 @@
            if (!block_group_cache_done(cache)) {
                ret = cache_block_group(cache, 0);
                if (ret) {
                    -btrfs_put_block_group(cache);
                    -break;
                    +bg_failed++;
                    +bg_ret = ret;
                    +continue;
                }
            ret = wait_block_group_cache_done(cache);
            if (ret) {
                -btrfs_put_block_group(cache);
                -break;
                +bg_failed++;
                +bg_ret = ret;
```
trimmed += group_trimmed;
if (ret) {
  btrfs_put_block_group(cache);
  break;
  bg_failed++;
  bg_ret = ret;
  continue;
}
-
  cache = next_block_group(fs_info, cache);
}

+if (bg_failed)
  btrfs_warn(fs_info,
  "failed to trim %llu block group(s), last error %d",
  bg_failed, bg_ret);
m_mutex_lock(&fs_info->fs_devices->device_list_mutex);
-devices = &fs_info->fs_devices->alloc_list;
-list_for_each_entry(device, devices, dev_alloc_list) {
  +devices = &fs_info->fs_devices->devices;
  +list_for_each_entry(device, devices, dev_list) {
    ret = btrfs_trim_free_extents(device, range->minlen,
        &group_trimmed);
    -if (ret)
        +if (ret) {
            +dev_failed++;
            +dev_ret = ret;
            break;
        +}
  }
  trimmed += group_trimmed;
}
m_mutex_unlock(&fs_info->fs_devices->device_list_mutex);

+if (dev_failed)
  btrfs_warn(fs_info,
  "failed to trim %llu device(s), last error %d",
  dev_failed, dev_ret);
range->len = trimmed;
-return ret;
+if (bg_ret)
+return bg_ret;
+return dev_ret;
}

/*
--- linux-4.15.0.orig/fs/btrfs/extent_io.c
+++ linux-4.15.0/fs/btrfs/extent_io.c
@@ -12,6 +12,7 @@
#include <linux/pagevec.h>
#include <linux/prefetch.h>
#include <linux/cleancache.h>
+#include <linux/overflow.h>
#include "extent_io.h"
#include "extent_map.h"
#include "ctree.h"
@@ -139,7 +140,6 @@
BUG_ON(ret < 0);
}

-static noinline void flush_write_bio(void *data);
static inline struct btrfs_fs_info *
tree_fs_info(struct extent_io_tree *tree)
{
@@ -148,6 +148,65 @@
return NULL;
}

+static int __must_check submit_one_bio(struct bio *bio, int mirror_num,
+    unsigned long bio_flags)
+{
+  blk_status_t ret = 0;
+  struct bio_vec *bvec = bio->bi_io_vec + bio->bi_vcnt - 1;
+  struct page *page = bvec->bv_page;
+  struct extent_io_tree *tree = bio->bi_private;
+  u64 start;
+  +
+  start = page_offset(page) + bvec->bv_offset;
+  +
+  bio->bi_private = NULL;
+  bio_get(bio);
+  +
+  if (tree->ops)
+ret = tree->ops->submit_bio_hook(tree->private_data, bio,
+    mirror_num, bio_flags, start);
+  else
+btrfsic_submit_bio(bio);
+  +
+  bio_put(bio);
return blk_status_to_errno(ret);
+
+
+/* Cleanup unsentmitted bios */
+static void end_write_bio(struct extent_page_data *epd, int ret)
+{
+    if (epd->bio) {
+        epd->bio->bi_status = errno_to_blk_status(ret);
+        bio_endio(epd->bio);
+        epd->bio = NULL;
+    }
+
+
+/* Submit bio from extent page data via submit_one_bio */
+/* Return 0 if everything is OK. */
+/* Return <0 for error. */
+static int __must_check flush_write_bio(struct extent_page_data *epd)
+{
+    int ret = 0;
+
+    if (epd->bio) {
+        ret = submit_one_bio(epd->bio, 0, 0);
+    }
+
+    epd->bio = NULL;
+
+    return ret;
+
+
+ int __init extent_io_init(void)
+ {
+     extent_state_cache = kmem_cache_create("btrfs_extent_state",
+     @@ -1720,7 +1779,8 @@
+     if (!PageDirty(pages[i]) ||
+         pages[i]->mapping != mapping) {
+             unlock_page(pages[i]);
+             -put_page(pages[i]);
+             +for (; i < ret; i++)
+             +put_page(pages[i]);
err = -EAGAIN;
goto out;
}
@@ -2612,7 +2672,7 @@
unsigned off;

    /* Zero out the end if this page straddles i_size */
    -off = i_size & (PAGE_SIZE-1);
    +off = offset_in_page(i_size);
    if (page->index == end_index && off)
        zero_user_segment(page, off, PAGE_SIZE);
        SetPageUptodate(page);
@@ -2720,30 +2780,6 @@
    return bio;
}

    -static int __must_check submit_one_bio(struct bio *bio, int mirror_num,
    -    unsigned long bio_flags)
    -{
    -    blk_status_t ret = 0;
    -    struct bio_vec *bvec = bio->bi_io_vec + bio->bi_vcnt - 1;
    -    struct page *page = bvec->bv_page;
    -    struct extent_io_tree *tree = bio->bi_private;
    -    u64 start;
    -    -    start = page_offset(page) + bvec->bv_offset;
    -    -    bio->bi_private = NULL;
    -    -    bio_get(bio);
    -    -    if (tree->ops)
    -    -        ret = tree->ops->submit_bio_hook(tree->private_data, bio,
    -    -            mirror_num, bio_flags, start);
    -    -    else
    -    -        btrfsic_submit_bio(bio);
    -    -    bio_put(bio);
    -    -    return blk_status_to_errno(ret);
    -}
    -
    -static int merge_bio(struct extent_io_tree *tree, struct page *page,
    -    unsigned long offset, size_t size, struct bio *bio,
    -    unsigned long bio_flags)
@@ -2916,7 +2952,7 @@
    if (page->index == last_byte >> PAGE_SHIFT) {
        char *userpage;
        -size_t zero_offset = last_byte & (PAGE_SIZE - 1);
+size_t zero_offset = offset_in_page(last_byte);

if (zero_offset) {
    iosize = PAGE_SIZE - zero_offset;
    /* -3014,11+3050,11 */
    */
    if (test_bit(EXTENT_FLAG_COMPRESSED, &em->flags) &&
        prev_em_start && *prev_em_start != (u64)-1 &&
        *prev_em_start != em->orig_start)
        - *prev_em_start != em->start)
        force_bio_submit = true;

    if (prev_em_start)
        -*prev_em_start = em->orig_start;
        +*prev_em_start = em->start;

    free_extent_map(em);
    em = NULL;
    @@ -3215,7 +3251,7 @@
    /*
     * helper for __extent_writepage, doing all of the delayed allocation setup.
     *
     - * This returns 1 if our fill_delalloc function did all the work required
     + * This returns 1 if btrfs_run_delalloc_range function did all the work required
     * to write the page (copy into inline extent). In this case the IO has
     * been started and the page is already unlocked.
     *
     @@ -3236,7 +3272,7 @@
    int ret;
    int page_started = 0;

    -if (epd->extent_locked || !tree->ops || !tree->ops->fill_delalloc)
    +if (epd->extent_locked)
    return 0;

    while (delalloc_end < page_end) {
        @@ -3249,18 +3285,16 @@
        delalloc_start = delalloc_end + 1;
        continue;
    }
    -ret = tree->ops->fill_delalloc(inode, page,
    -    delalloc_start,
    -    delalloc_end,
    -    &page_started,
    -    nr_written, wbc);
    +ret = btrfs_run_delalloc_range(inode, page, delalloc_start,
    +delalloc_end, &page_started, nr_written, wbc);
    /* File system has been set read-only */
if (ret) {
    SetPageError(page);
    /* fill_delalloc should be return < 0 for error
    - * but just in case, we use > 0 here meaning the
    - * IO is started, so we don't want to return > 0
    - * unless things are going well.
    */
    /*
    * btrfs_run_delalloc_range should return < 0 for error
    * but just in case, we use > 0 here meaning the IO is
    * started, so we don't want to return > 0 unless
    * things are going well.
    */
    ret = ret < 0 ? ret : -EIO;
    goto done;
}
ClearPageError(page);

-pg_offset = i_size & (PAGE_SIZE - 1);
+pg_offset = offset_in_page(i_size);
if (page->index > end_index ||
    (page->index == end_index && !pg_offset)) {
    page->mapping->a_ops->invalidatepage(page, 0, PAGE_SIZE);
    @ @ .3536,18 +3570,34 @ @
        TASK_UNINTERRUPTIBLE);
}
+static void end_extent_buffer_writeback(struct extent_buffer *eb)
 +{
+    clear_bit(EXTENT_BUFFER_WRITEBACK, &eb->bflags);
+    smp_mb__after_atomic();
+    wake_up_bit(&eb->bflags, EXTENT_BUFFER_WRITEBACK);
+}
+    +/
+    /*
+    * Lock eb pages and flush the bio if we can't the locks
+    * +
+    * Return  0 if nothing went wrong
+    * Return >0 is same as 0, except bio is not submitted
+    * Return <0 if something went wrong, no page is locked
+    */
static noinline_for_stack int
lock_extent_buffer_for_io(struct extent_buffer *eb,
    struct btrfs_fs_info *fs_info,
    struct extent_page_data *epd)
{
    -unsigned long i, num_pages;
+int i, num_pages, failed_page_nr;

    if (ret) {
        SetPageError(page);
        /* fill_delalloc should be return < 0 for error
        - * but just in case, we use > 0 here meaning the
        - * IO is started, so we don't want to return > 0
        - * unless things are going well.
        */
        /*
        * btrfs_run_delalloc_range should return < 0 for error
        * but just in case, we use > 0 here meaning the IO is
        * started, so we don't want to return > 0 unless
        * things are going well.
        */
        ret = ret < 0 ? ret : -EIO;
        goto done;
    }
    ClearPageError(page);

    -pg_offset = i_size & (PAGE_SIZE - 1);
    +pg_offset = offset_in_page(i_size);
    if (page->index > end_index ||
        (page->index == end_index && !pg_offset)) {
        page->mapping->a_ops->invalidatepage(page, 0, PAGE_SIZE);
        @ @ .3536,18 +3570,34 @ @
            TASK_UNINTERRUPTIBLE);
    }
+static void end_extent_buffer_writeback(struct extent_buffer *eb)
 +{
+    clear_bit(EXTENT_BUFFER_WRITEBACK, &eb->bflags);
+    smp_mb__after_atomic();
+    wake_up_bit(&eb->bflags, EXTENT_BUFFER_WRITEBACK);
+}
+    +/
+    /*
+    * Lock eb pages and flush the bio if we can't the locks
+    * +
+    * Return  0 if nothing went wrong
+    * Return >0 is same as 0, except bio is not submitted
+    * Return <0 if something went wrong, no page is locked
+    */
static noinline_for_stack int
lock_extent_buffer_for_io(struct extent_buffer *eb,
    struct btrfs_fs_info *fs_info,
    struct extent_page_data *epd)
{
    -unsigned long i, num_pages;
+int i, num_pages, failed_page_nr;
int flush = 0;
int ret = 0;

if (!btrfs_try_tree_write_lock(eb)) {
    ret = flush_write_bio(epd);
    if (ret < 0)
        return ret;
    flush = 1;
    -flush_write_bio(epd);
    btrfs_tree_lock(eb);
}

if (!epd->sync_io)
    return 0;
if (!flush) {
    -flush_write_bio(epd);
    ret = flush_write_bio(epd);
    if (ret < 0)
        return ret;
    flush = 1;
}
while (1) {
    @ @ -3566,7 +3616,9 @@
    if (!trylock_page(p)) {
        if (!flush) {
            -flush_write_bio(epd);
            int err;
            +
            +err = flush_write_bio(epd);
            if (err < 0) {
                ret = err;
                failed_page_nr = i;
                goto err_unlock;
            }
            flush = 1;
        }
        lock_page(p);
        @ @ -3605,13 +3664,25 @@
    }
    return ret;
-}
-
-static void end_extent_buffer_writeback(struct extent_buffer *eb)
-{
-    clear_bit(EXTENT_BUFFER_WRITEBACK, &eb->bflags);
- smp_mb__after_atomic();
- wake_up_bit(&eb->bflags, EXTENT_BUFFER_WRITEBACK);
+ err_unlock:
+ /* Unlock already locked pages */
+ for (i = 0; i < failed_page_nr; i++)
+ unlock_page(eb->pages[i]);
+ /*
+ * Clear EXTENT_BUFFER_WRITEBACK and wake up anyone waiting on it.
+ * Also set back EXTENT_BUFFER_DIRTY so future attempts to this eb can
+ * be made and undo everything done before.
+ */
+ btrfs_tree_lock(eb);
+ spin_lock(&eb->refs_lock);
+ set_bit(EXTENT_BUFFER_DIRTY, &eb->bflags);
+ end_extent_buffer_writeback(eb);
+ spin_unlock(&eb->refs_lock);
+ percpu_counter_add_batch(&fs_info->dirty_metadata_bytes, eb->len,
+ os_info->dirty_metadata_batch);
+ btrfs_clear_header_flag(eb, BTRFS_HEADER_FLAG_WRITTEN);
+ btrfs_tree_unlock(eb);
+ return ret;
}

static void set_btree_ioerr(struct page *page)
@@ -3788,6 +3859,7 @@
    .sync_io = wbc->sync_mode == WB_SYNC_ALL,
    ];

int ret = 0;
+int flush_ret;
int done = 0;
int nr_to_write_done = 0;
struct pagevec pvec;
@@ -3858,6 +3930,10 @@
if (!ret) {
    free_extent_buffer(eb);
    continue;
+} else if (ret < 0) {
+    done = 1;
+    free_extent_buffer(eb);
+    break;
    }

    ret = write_one_eb(eb, fs_info, wbc, &epd);
@@ -3887,7 +3963,44 @@
    index = 0;
    goto retry;
  }
-    flush_write_bio(&epd);
+ASSERT(ret <= 0);
+if (ret < 0) {
+end_write_bio(&epd, ret);
+return ret;
+}
+
+/*
+ * If something went wrong, don't allow any metadata write bio to be
+ * submitted.
+ *
+ * This would prevent use-after-free if we had dirty pages not
+ * cleaned up, which can still happen by fuzzed images.
+ *
+ * - Bad extent tree
+ *   Allowing existing tree block to be allocated for other trees.
+ *
+ * - Log tree operations
+ *   Exiting tree blocks get allocated to log tree, bumps its
+ *   generation, then get cleaned in tree re-balance.
+ *   Such tree block will not be written back, since it's clean,
+ *   thus no WRITTEN flag set.
+ *   And after log writes back, this tree block is not traced by
+ *   any dirty extent_io_tree.
+ *
+ * - Offending tree block gets re-dirtied from its original owner
+ *   Since it has bumped generation, no WRITTEN flag, it can be
+ *   reused without COWing. This tree block will not be traced
+ *   by btrfs_transaction::dirty_pages.
+ *
+ *   Now such dirty tree block will not be cleaned by any dirty
+ *   extent io tree. Thus we don't want to submit such wild eb
+ *   if the fs already has error.
+ */
+if (!test_bit(BTRFS_FS_STATE_ERROR, &fs_info->fs_state)) {
+ret = flush_write_bio(&epd);
+} else {
+ret = -EUCLEAN;
+end_write_bio(&epd, ret);
+}
{return ret;
}

@@ -3908,8 +4021,7 @@

*/
static int extent_write_cache_pages(struct address_space *mapping,
    struct writeback_control *wbc,
    - writepage_t writepage, void *data,
    - void (*flush_fn)(void *)
    + writepage_t writepage, void *data)
struct inode *inode = mapping->host;
int ret = 0;

for (i = 0; i < nr_pages; i++) {
  struct page *page = pvec.pages[i];

  done_index = page->index;
  done_index = page->index + 1;

  /*
   * At this point we hold neither mapping->tree_lock nor
   * lock on the page itself: the page may be truncated or
   * mapping
   */
  if (!trylock_page(page)) {
    flush_write_bio(data);
    lock_page(page);
  }

  if (wbc->sync_mode != WB_SYNC_NONE) {
    if (PageWriteback(page))
      flush_write_bio(data);
    wait_on_page_writeback(page);
  }

  ret = 0;
}

if (ret < 0) {
  /*
   * done_index is set past this page,
   * so media errors will not choke
   * background writeout for the entire
   * file. This has consequences for
   * range_cyclic semantics (ie. it may
   * not be suitable for data integrity
   * writeout).
   */
  done_index = page->index + 1;
  done = 1;
  break;
}

/**
scanned = 1;
index = 0;
+
+/
+ * If we're looping we could run into a page that is locked by a
+ * writer and that writer could be waiting on writeback for a
+ * page in our current bio, and thus deadlock, so flush the
+ * write bio here.
+ */
+flush_write_bio(data);
goto retry;
}

@@ -4053,17 +4163,12 @@
}
}

-static noinline void flush_write_bio(void *data)
-{  
-struct extent_page_data *epd = data;
-flush_epd_write_bio(epd);
-}
-
-int extent_write_full_page(struct extent_io_tree *tree, struct page *page,
-get_extent_t *get_extent,
-struct writeback_control *wbc)
{
 int ret;
+int flush_ret;
 struct extent_page_data epd = {
 .bio = NULL,
 .tree = tree,
@@ -4074,7 +4179,8 @@
 ret = __extent_writepage(page, wbc, &epd);

-flush_epd_write_bio(&epd);
+flush_ret = flush_write_bio(&epd);
+BUG_ON(flush_ret < 0);
 return ret;
 }

@@ -4083,6 +4189,7 @@
 int mode)
 {
 int ret = 0;
+int flush_ret;
struct address_space *mapping = inode->i_mapping;
struct page *page;
unsigned long nr_pages = (end - start + PAGE_SIZE) >>
@@ -4117,7 +4224,8 @@
start += PAGE_SIZE;
}

-flush_epd_write_bio(&epd);
+flush_ret = flush_write_bio(&epd);
+BUG_ON(flush_ret < 0);
return ret;
}

@@ -4127,6 +4235,7 @@
struct writeback_control *wbc)
{
    int ret = 0;
    +int flush_ret;
    struct extent_page_data epd = {
        .bio = NULL,
        .tree = tree,
@@ -4135,9 +4244,9 @@
            .sync_io = wbc->sync_mode == WB_SYNC_ALL,
        };

    -ret = extent_write_cache_pages(mapping, wbc, __extent_writepage, &epd,
    -    flush_write_bio);
    -flush_epd_write_bio(&epd);
    +ret = extent_write_cache_pages(mapping, wbc, __extent_writepage, &epd);
    +flush_ret = flush_write_bio(&epd);
    +BUG_ON(flush_ret < 0);
    return ret;
}

@@ -4261,6 +4370,7 @@
struct extent_map *em;
    u64 start = page_offset(page);
    u64 end = start + PAGE_SIZE - 1;
    +struct btrfs_inode *btrfs_inode = BTRFS_I(page->mapping->host);

    if (gfpflags_allow_blocking(mask) &&
        page->mapping->host->i_size > SZ_16M) {
@@ -4283,6 +4393,8 @@
            extent_map_end(em) - 1,
            EXTENT_LOCKED | EXTENT_WRITEBACK,
            0, NULL)) {
    +set_bit(BTRFS_INODE_NEEDS_FULL_SYNC,
            +&btrfs_inode->runtime_flags);
remove_extent_mapping(map, em);
/* once for the rb tree */
free_extent_map(em);
@@ -4292,6 +4404,8 @@
    free_extent_map(em);

/* once for us */
free_extent_map(em);
+
+cond_resched(); /* Allow large-extent preemption. */
}

return try_release_extent_state(map, tree, page, mask);
@@ -4832,25 +4946,28 @@
    static void check_buffer_tree_ref(struct extent_buffer *eb)
    {
        int refs;
-/* the ref bit is tricky. We have to make sure it is set
- * if we have the buffer dirty. Otherwise the
- * code to free a buffer can end up dropping a dirty
- * page
+/*
+ * The TREE_REF bit is first set when the extent_buffer is added
+ * to the radix tree. It is also reset, if unset, when a new reference
+ * is created by find_extent_buffer.
+ *
+ * Once the ref bit is set, it won't go away while the
+ * buffer is dirty or in writeback, and it also won't
+ * go away while we have the reference count on the
+ * eb bumped.
+ * It is only cleared in two cases: freeing the last non-tree
+ * reference to the extent_buffer when its STALE bit is set or
+ * calling releasepage when the tree reference is the only reference.
+ *
+ * We can't just set the ref bit without bumping the
+ * ref on the eb because free_extent_buffer might
+ * see the ref bit and try to clear it. If this happens
+ * free_extent_buffer might end up dropping our original
+ * ref by mistake and freeing the page before we are able
+ * to add one more ref.
+ * In both cases, care is taken to ensure that the extent_buffer's
+ * pages are not under io. However, releasepage can be concurrently
+ * called with creating new references, which is prone to race
+ * conditions between the calls to check_buffer_tree_ref in those
+ * codepaths and clearing TREE_REF in try_release_extent_buffer.
+ *
+ * So bump the ref count first, then set the bit. If someone
+ * beat us to it, drop the ref we added.
+ * The actual lifetime of the extent_buffer in the radix tree is
* adequately protected by the refcount, but the TREE_REF bit and
* its corresponding reference are not. To protect against this
* class of races, we call check_buffer_tree_ref from the codepaths
* which trigger io after they set eb->io_pages. Note that once io is
* initiated, TREE_REF can no longer be cleared, so that is the
* moment at which any such race is best fixed.
*/
refs = atomic_read(&eb->refs);
if (refs >= 2 && test_bit(EXTENT_BUFFER_TREE_REF, &eb->bflags))
return eb;
eb = alloc_dummy_extent_buffer(fs_info, start);
if (!eb)
-return NULL;
+return ERR_PTR(-ENOMEM);
eb->fs_info = fs_info;
again:
ret = radix_tree_preload(GFP_NOFS);
-if (ret)
+if (ret) {
+exists = ERR_PTR(ret);
goto free_eb;
+
spin_lock(&fs_info->buffer_lock);
ret = radix_tree_insert(&fs_info->buffer_radix,
start >> PAGE_SHIFT, eb);
@@ -5312,6 +5431,11 @@
clear_bit(EXTENT_BUFFER_READ_ERR, &eb->bflags);
eb->read_mirror = 0;
atomic_set(&eb->io_pages, num_reads);
+/
+ It is possible for releasepage to clear the TREE_REF bit before we
+ set io_pages. See check_buffer_tree_ref for a more detailed comment.
+ */
+check_buffer_tree_ref(eb);
for (i = 0; i < num_pages; i++) {
page = eb->pages[i];
@@ -5371,6 +5495,36 @@
return ret;
}
+static bool report_eb_range(const struct extent_buffer *eb, unsigned long start,
+ unsigned long len)
+{
+btrfs_warn(eb->fs_info,
+"access to eb bytenr %llu len %lu out of range start %lu len %lu",
+eb->start, eb->len, start, len);
WARN_ON(IS_ENABLED(CONFIG_BTRFS_DEBUG));
+
 RETURN_TRUE;
+
}
+
/*
 * Check if the [start, start + len) range is valid before reading/writing
 * the eb.
 * NOTE: @start and @len are offset inside the eb, not logical address.
 * *
 * Caller should not touch the dst/src memory if this function returns error.
 * */
+static inline int check_eb_range(const struct extent_buffer *eb,
+ unsigned long start, unsigned long len)
+{
+ unsigned long offset;
+
+/* start, start + len should not go beyond eb->len nor overflow */
+if (unlikely(check_add_overflow(start, len, &offset) || offset > eb->len))
+return report_eb_range(eb, start, len);
+
+return false;
+
void read_extent_buffer(const struct extent_buffer *eb, void *dstv,
 unsigned long start, unsigned long len)
{
 @@ -5379,17 +5533,12 @@
 struct page *page;
 char *kaddr;
 char *dst = (char *)dstv;
- size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
- unsigned long i = (start_offset + start) >> PAGE_SHIFT;
+unsigned long i = start >> PAGE_SHIFT;

- if (start + len > eb->len) {
- WARN(1, KERN_ERR "btrfs bad mapping eb start %lu len %lu, wanted %lu %lu\n",
- - eb->start, eb->len, start, len);
- memset(dst, 0, len);
- if (check_eb_range(eb, start, len))
- return;
- }

- offset = (start_offset + start) & (PAGE_SIZE - 1);
+ offset = offset_in_page(start);

 while (len > 0) {
 page = eb->pages[i];
int read_extent_buffer_to_user(const struct extent_buffer *eb,
    void __user *dstv,
    unsigned long start, unsigned long len)
{
    size_t cur;
    struct page *page;
    char *kaddr;
    char __user *dst = (char __user *)dstv;
    size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
    unsigned long i = (start_offset + start) >> PAGE_SHIFT;
    int ret = 0;

    WARN_ON(start > eb->len);
    WARN_ON(start + len > eb->start + eb->len);

    while (len > 0) {
        page = eb->pages[i];
        cur = min(len, (PAGE_SIZE - start_offset));
        kaddr = page_address(page);
        if (copy_to_user(dst, kaddr + start_offset, cur)) {
            ret = -EFAULT;
            break;
        }
    }

    size_t offset = start & (PAGE_SIZE - 1);
    struct page *p;
    size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
    size_t start_offset = offset_in_page(eb->start);
    unsigned long i = (start_offset + start) >> PAGE_SHIFT;
    unsigned long end_i = (start_offset + start + min_len - 1) >> PAGE_SHIFT;
    size_t offset = start & (PAGE_SIZE - 1);
    char *kaddr;
    struct page *p;
    size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
    size_t start_offset = offset_in_page(eb->start);
    unsigned long i = (start_offset + start) >> PAGE_SHIFT;
    unsigned long end_i = (start_offset + start + min_len - 1) >> PAGE_SHIFT;

    @@ -5455,7 +5603,7 @@
    size_t offset = start & (PAGE_SIZE - 1);
    char *kaddr;
    struct page *p;
    size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
    size_t start_offset = offset_in_page(eb->start);
    unsigned long i = (start_offset + start) >> PAGE_SHIFT;
    unsigned long end_i = (start_offset + start + min_len - 1) >> PAGE_SHIFT;
    @-5492,14 +5640,13 @@
    struct page *page:
char *kaddr;
char *ptr = (char *)ptrv;
-size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
-unsigned long i = (start_offset + start) >> PAGE_SHIFT;
+offset = start >> PAGE_SHIFT;
int ret = 0;

-WARN_ON(start > eb->len);
-WARN_ON(start + len > eb->start + eb->len);
+if (check_eb_range(eb, start, len))
+return -EINVAL;

-offset = (start_offset + start) & (PAGE_SIZE - 1);
+offset = offset_in_page(start);

while (len > 0) {
    page = eb->pages[i];
    @ @ -5548,13 +5695,12 @ @
    struct page *page;
    char *kaddr;
    char *src = (char *)srcv;
-size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
-unsigned long i = (start_offset + start) >> PAGE_SHIFT;
+unsigned long i = start >> PAGE_SHIFT;

-WARN_ON(start > eb->len);
-WARN_ON(start + len > eb->start + eb->len);
+if (check_eb_range(eb, start, len))
+return;

-offset = (start_offset + start) & (PAGE_SIZE - 1);
+offset = offset_in_page(start);

while (len > 0) {
    page = eb->pages[i];
    @ @ -5578,13 +5724,12 @ @
    size_t offset;
    struct page *page;
    char *kaddr;
-size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
-unsigned long i = (start_offset + start) >> PAGE_SHIFT;
+unsigned long i = start >> PAGE_SHIFT;

-WARN_ON(start > eb->len);
-WARN_ON(start + len > eb->start + eb->len);
+if (check_eb_range(eb, start, len))
+return;
offset = (start_offset + start) & (PAGE_SIZE - 1);
+offset = offset_in_page(start);

while (len > 0) {
    page = eb->pages[i];
    offset = offset_in_page(dst_offset);
    struct page *page;
    char *kaddr;
    -size_t start_offset = dst->start & ((u64)PAGE_SIZE - 1);
    -unsigned long i = (start_offset + dst_offset) >> PAGE_SHIFT;
    +unsigned long i = dst_offset >> PAGE_SHIFT;
    +if (check_eb_range(dst, dst_offset, len) ||
       check_eb_range(src, src_offset, len))
       +return;

    WARN_ON(src->len != dst_len);

    offset = (start_offset + dst_offset) &
    -(PAGE_SIZE - 1);
    +offset = offset_in_page(dst_offset);

    while (len > 0) {
        page = dst->pages[i];
        unsigned long *page_index,
        size_t *page_offset)
        {
            size_t start_offset = eb->start & ((u64)PAGE_SIZE - 1);
            size_t byte_offset = BIT_BYTE(nr);
            size_t offset;

            * the bitmap item in the extent buffer + the offset of the byte in the
            * bitmap item.
            */
            -offset = start_offset + start + byte_offset;
            +offset = start + byte_offset;

            *page_index = offset >> PAGE_SHIFT;
            -*page_offset = offset & (PAGE_SIZE - 1);
            +*page_offset = offset_in_page(offset);
        }

    /**
    @ @ -5855,35 +6001,22 @@
    void memcpy_extent_buffer(struct extent_buffer *dst, unsigned long dst_offset,
unsigned long src_offset, unsigned long len)
{
    struct btrfs_fs_info *fs_info = dst->fs_info;
    size_t cur;
    size_t dst_off_in_page;
    size_t src_off_in_page;
    size_t start_offset = dst->start & ((u64)PAGE_SIZE - 1);
    unsigned long dst_i;
    unsigned long src_i;

    if (src_offset + len > dst->len) {
        btrfs_err(fs_info,
            "memmove bogus src_offset %lu move len %lu dst len %lu",
            src_offset, len, dst->len);
        BUG_ON(1);
    }
    if (dst_offset + len > dst->len) {
        btrfs_err(fs_info,
            "memmove bogus dst_offset %lu move len %lu dst len %lu",
            dst_offset, len, dst->len);
        BUG_ON(1);
    }
    if (check_eb_range(dst, dst_offset, len) ||
        check_eb_range(dst, src_offset, len))
        return;

    while (len > 0) {
        dst_off_in_page = (start_offset + dst_offset) &
            (PAGE_SIZE - 1);
        src_off_in_page = (start_offset + src_offset) &
            (PAGE_SIZE - 1);
        dst_i = (start_offset + dst_offset) >> PAGE_SHIFT;
        src_i = (start_offset + src_offset) >> PAGE_SHIFT;

        cur = min(len, (unsigned long)(PAGE_SIZE -
            src_off_in_page));
        while (cur > 0) {
            dst_off_in_page = offset_in_page(dst_offset);
            src_off_in_page = offset_in_page(src_offset);
            dst_i = (start_offset + dst_offset) >> PAGE_SHIFT;
            src_i = (start_offset + src_offset) >> PAGE_SHIFT;

            cur = min(len, (unsigned long)(PAGE_SIZE -
                src_off_in_page));
            @ @ -5902.40 +6035.27 @ @
        }
    }

void memmove_extent_buffer(struct extent_buffer *dst, unsigned long dst_offset,
    unsigned long src_offset, unsigned long len)
{
    struct btrfs_fs_info *fs_info = dst->fs_info;
    size_t cur;
    size_t dst_off_in_page;
size_t src_off_in_page;
unsigned long dst_end = dst_offset + len - 1;
unsigned long src_end = src_offset + len - 1;
-size_t start_offset = dst->start & ((u64)PAGE_SIZE - 1);
unsigned long dst_i;
unsigned long src_i;

-if (src_offset + len > dst->len) {
- btrfs_err(fs_info,
-  "memmove bogus src_offset %lu move len %lu len %lu",
-  src_offset, len, dst->len);
- BUG_ON(1);
-}
-if (dst_offset + len > dst->len) {
- btrfs_err(fs_info,
-  "memmove bogus dst_offset %lu move len %lu len %lu",
-  dst_offset, len, dst->len);
- BUG_ON(1);
-}
+if (check_eb_range(dst, dst_offset, len) ||
+    check_eb_range(dst, src_offset, len))
+  return;
if (dst_offset < src_offset) {
  memcpy_extent_buffer(dst, dst_offset, src_offset, len);
  return;
}
while (len > 0) {
- dst_i = (start_offset + dst_end) >> PAGE_SHIFT;
- src_i = (start_offset + src_end) >> PAGE_SHIFT;
+ dst_i = dst_end >> PAGE_SHIFT;
+ src_i = src_end >> PAGE_SHIFT;
- dst_off_in_page = (start_offset + dst_end) &
- (PAGE_SIZE - 1);
- src_off_in_page = (start_offset + src_end) &
- (PAGE_SIZE - 1);
+ dst_off_in_page = offset_in_page(dst_end);
+ src_off_in_page = offset_in_page(src_end);

  cur = min_t(unsigned long, len, src_off_in_page + 1);
  cur = min(cur, dst_off_in_page + 1);
  --- linux-4.15.0.orig/fs/btrfs/extent_io.h
  +++ linux-4.15.0/fs/btrfs/extent_io.h
  @ @ -114,11 +114,6 @@
 /*
 * Optional hooks, called if the pointer is not NULL
 */
-int (*fill_delalloc)(void *private_data, struct page *locked_page,
static inline int clear_extent_dirty(struct extent_io_tree *tree, u64 start, u64 end, struct extent_state **cached)
{
    return clear_extent_bit(tree, start, end,
    EXTENT_DIRTY | EXTENT_DELALLOC |
    -EXTENT_DO_ACCOUNTING, 0, 0, NULL, GFP_NOFS);  
    +EXTENT_DO_ACCOUNTING, 0, 0, cached, GFP_NOFS);  
}

int convert_extent_bit(struct extent_io_tree *tree, u64 start, u64 end, 
@@ -456,9 +451,9 @@
    void read_extent_buffer(const struct extent_buffer *eb, void *dst,
    unsigned long start, 
    unsigned long len);
-int read_extent_buffer_to_user(const struct extent_buffer *eb, 
    void __user *dst, unsigned long start, 
    unsigned long len);
+int read_extent_buffer_to_user_nofault(const struct extent_buffer *eb, 
+    void __user *dst, unsigned long start, 
+    unsigned long len);
    void write_extent_buffer_fsid(struct extent_buffer *eb, const void *src);
    void write_extent_buffer_chunk_tree_uuid(struct extent_buffer *eb, const void *src);
    --- linux-4.15.0.orig/fs/btrfs/extent_map.c
+++ linux-4.15.0/fs/btrfs/extent_map.c
@@ -228,6 +228,17 @@
    struct extent_map *merge = NULL;
    struct rb_node *rb;

+/*
+ * We can't modify an extent map that is in the tree and that is being
+ * used by another task, as it can cause that other task to see it in
+ * inconsistent state during the merging. We always have 1 reference for
+ * the tree and 1 for this task (which is unpinning the extent map or
+ * clearing the logging flag), so anything > 2 means it's being used by
+ * other tasks too.
+ */

if (refcount_read(&em->refs) > 2)  
+ return;
+
if (em->start != 0) {
    rb = rb_prev(&em->rb_node);
    if (rb)
++ linux-4.15.0.orig/fs/btrfs/file-item.c
+++ linux-4.15.0/fs/btrfs/file-item.c
@@ -288,7 +288,8 @@
csum += count * csum_size;
nblocks -= count;
next:
-while (count--) {
+while (count > 0) {
+count--;
    disk_bytenr += fs_info->sectorsize;
    offset += fs_info->sectorsize;
    page_bytes_left -= fs_info->sectorsize;
@@ -590,18 +591,21 @@
    * range of bytes.
*/
int btrfs_del_csums(struct btrfs_trans_handle *trans,
          - struct btrfs_fs_info *fs_info, u64 bytenr, u64 len)
+ struct btrfs_root *root, u64 bytenr, u64 len)
{
-struct btrfs_root *root = fs_info->csum_root;
+struct btrfs_fs_info *fs_info = trans->fs_info;
struct btrfs_path *path;
struct btrfs_key key;
        u64 end_byte = bytenr + len;
        u64 csum_end;
        struct extent_buffer *leaf;
-int ret;
+int ret = 0;
        u16 csum_size = btrfs_super_csum_size(fs_info->super_copy);
        int blocksize_bits = fs_info->sb->s_blocksize_bits;

+ASSERT(root == fs_info->csum_root ||
+        root->root_key.objectid == BTRFS_TREE_LOG_OBJECTID);
+
        path = btrfs_alloc_path();
        if (!path)
            return -ENOMEM;
@@ -614,6 +618,7 @@
        path->leave_spinning = 1;
        ret = btrfs_search_slot(trans, root, &key, path, -1, 1);
        if (ret > 0) {
+      ret = 0;

if (path->slots[0] == 0)
break;
path->slots[0]--;
@@ -670,7 +675,7 @@
ret = btrfs_del_items(trans, root, path,
    path->slots[0], del_nr);
if (ret)
    -goto out;
+break;
if (key.offset == bytenr)
    +break;
} else if (key.offset < bytenr && csum_end > end_byte) {
    @@ -714,8 +719,9 @@
    ret = btrfs_split_item(trans, root, path, &key, offset);
    if (ret && ret != -EAGAIN) {
        btrfs_abort_transaction(trans, ret);
        -goto out;
        +break;
    }
    +ret = 0;
    
    key.offset = end_byte - 1;
} else {
    @@ -725,8 +731,6 @@
    btrfs_release_path(path);
    }
    -ret = 0;
    -out:
    btrfs_free_path(path);
    return ret;
}
@@ -794,10 +798,7 @@
nritems = btrfs_header_nritems(path->nodes[0]);
if (!nritems || (path->slots[0] >= nritems - 1)) {
    ret = btrfs_next_leaf(root, path);
    -if (ret == 1)
    +if (ret < 0) {
        goto out;
    } else if (ret > 0) {
        found_next = 1;
    -if (ret != 0)
        goto insert;
    +}
    slot = path->slots[0];
    }
    btrfs_item_key_to_cpu(path->nodes[0], &found_key, slot);
    @@ -955,7 +961,7 @@
btrfs_file_extent_num_bytes(leaf, fi);
} else if (type == BTRFS_FILE_EXTENT_INLINE) {
    size_t size;
    size = btrfs_file_extent_inline_len(leaf, slot, fi);
    extent_end = ALIGN(extent_start + size,
                       fs_info->sectorsize);
}
--- linux-4.15.0.orig/fs/btrfs/file.c
+++ linux-4.15.0/fs/btrfs/file.c
@@ -414,7 +414,7 @@
 size_t copied = 0;
 size_t total_copied = 0;
 int pg = 0;
-int offset = pos & (PAGE_SIZE - 1);
+int offset = offset_in_page(pos);

 while (write_bytes > 0) {
    size_t count = min_t(size_t,
@@ -546,6 +546,15 @@
        end_of_last_block = start_pos + num_bytes - 1;

     /*
     * The pages may have already been dirty, clear out old accounting so
     * we can set things up properly
     */
    clear_extent_bit(&BTRFS_I(inode)->io_tree, start_pos, end_of_last_block,
     EXTENT_DIRTY | EXTENT_DELALLOC |
     EXTENT_DO_ACCOUNTING | EXTENT_DEFRAG, 0, 0, cached,
     GFP_NOFS);
    +if (!btrfs_is_free_space_inode(BTRFS_I(inode))) {
        if (start_pos <= isize &&
            !(BTRFS_I(inode)->flags & BTRFS_INODE_PREALLOC)) {
            btrfs_file_extent_num_bytes(leaf, fi);
        } else if (extent_type == BTRFS_FILE_EXTENT_INLINE) {
            extent_end = key.offset +
                        btrfs_file_extent_inline_len(leaf,
                        -    path->slots[0], fi);
            +btrfs_file_extent_ram_bytes(leaf, fi);
        } else {
            /* can't happen */
            BUG();
@@ -1033,7 +1041,7 @@
        continue;
    }
-BUG_ON(1);
+BUG();
}

if (!ret && del_nr > 0) {
@@ -1162,7 +1170,7 @@
    int del_nr = 0;
    int del_slot = 0;
    int recow;
    -int ret;
+    int ret = 0;
    u64 ino = btrfs_ino(inode);

    path = btrfs_alloc_path();
    @@ -1382,7 +1390,7 @@
 }
 out:
 btrfs_free_path(path);
@@ -1516,18 +1524,27 @@
 }
 if (ordered)
 btrfs_put_ordered_extent(ordered);
-    clear_extent_bit(&inode->io_tree, start_pos, last_pos,
-        - EXTENT_DIRTY | EXTENT_DELALLOC |
-        - EXTENT_DO_ACCOUNTING | EXTENT_DEFrag,
-        - 0, 0, cached_state, GFP_NOFS);
+    *lockstart = start_pos;
+    *lockend = last_pos;
    ret = 1;
 }

+/*
+ * It's possible the pages are dirty right now, but we don't want
+ * to clean them yet because copy_from_user may catch a page fault
+ * and we might have to fall back to one page at a time. If that
+ * happens, we'll unlock these pages and we'd have a window where
+ * reclaim could sneak in and drop the once-dirty page on the floor
+ * without writing it.
+ */
+* We have the pages locked and the extent range locked, so there's
+* no way someone can start IO on any dirty pages in this range.
for (i = 0; i < num_pages; i++) {
    if (clear_page_dirty_for_io(pages[i]))
        account_page_redirty(pages[i]);
    set_page_extent_mapped(pages[i]);
    WARN_ON(!PageLocked(pages[i]));
}

struct btrfs_fs_info *fs_info = btrfs_sb(inode->i_sb);
struct btrfs_root *root = BTRFS_I(inode)->root;
struct page **pages = NULL;
-struct extent_state *cached_state = NULL;
struct extent_changeset *data_reserved = NULL;

u64 release_bytes = 0;
lockstart;
@@ -1589,7 +1606,6 @@
while (iov_iter_count(i) > 0) {
    -size_t offset = pos & (PAGE_SIZE - 1);
    +size_t offset = offset_in_page(pos);
    +struct extent_state *cached_state = NULL;
    size_t sector_offset;
    size_t write_bytes = min(iov_iter_count(i),
        nrptrs * (size_t)PAGE_SIZE -
    @ @ -1634,6 +1651,7 @@
        break;
    }

+only_release_metadata = false;
    sector_offset = pos & (fs_info->sectorsize - 1);
    reserve_bytes = round_up(write_bytes + sector_offset,
        fs_info->sectorsize);
    @ @ -1756,10 +1774,21 @@
    if (copied > 0)
        ret = btrfs.dirty_pages(inode, pages, dirty_pages,
            pos, copied, NULL);
+*/
+*/
+* If we have not locked the extent range, because the range's
+* start offset is >= i_size, we might still have a non-NULL
+* cached extent state, acquired while marking the extent range
+* as delalloc through btrfs.dirty_pages(). Therefore free any
+* possible cached extent state to avoid a memory leak.
+*/
if (extents_locked)
unlock_extent_cached(&BTRFS_I(inode)->io_tree,
    lockstart, lockend, &cached_state,
    GFP_NOFS);
+else
+free_extent_state(cached_state);
+
 btrfs_delalloc_release_extents(BTRFS_I(inode), reserve_bytes);
if (ret) {
 btrfs_drop_pages(pages, num_pages);
@@ -1779,7 +1808,6 @@
 set_extent_bit(&BTRFS_I(inode)->io_tree, lockstart,
     lockend, EXTENT_NORESERVE, NULL,
     NULL, GFP_NOFS);
-only_release_metadata = false;
 } 
 btrfs_drop_pages(pages, num_pages);
@@ -1883,7 +1911,7 @@
 bool sync = (file->f_flags & O_DSYNC) || IS_SYNC(file->f_mapping->host);
 ssize_t err;
 loff_t pos;
-size_t count = iov_iter_count(from);
+size_t count;
 loff_t oldsize;
 int clean_page = 0;

 @@ -1891,9 +1919,10 @@
 (iocb->ki_flags & IOCB_NOWAIT))
 return -EOPNOTSUPP;

 -if (!inode_trylock(inode)) {
 -if (iocb->ki_flags & IOCB_NOWAIT)
 +if (iocb->ki_flags & IOCB_NOWAIT) {
 +if (!inode_trylock(inode))
 return -EAGAIN;
 +} else {
 inode_lock(inode);
 }

 @@ -1904,6 +1933,7 @@
 }

 pos = iocb->ki_pos;
+count = iov_iter_count(from);
 if (iocb->ki_flags & IOCB_NOWAIT) {
 /*
 * We will allocate space in case nodatacow is not set,
static int start_ordered_ops(struct inode *inode, loff_t start, loff_t end)
{
    int ret;
    struct blk_plug plug;

    /*
     * This is only called in fsync, which would do synchronous writes, so
     * a plug can merge adjacent IOs as much as possible. Esp. in case of
     * multiple disks using raid profile, a large IO can be split to
     * several segments of stripe length (currently 64K).
     */
    blk_start_plug(&plug);
    atomic_inc(&BTRFS_I(inode)->sync_writers);
    ret = btrfs_fdatawrite_range(inode, start, end);
    atomic_dec(&BTRFS_I(inode)->sync_writers);
    blk_finish_plug(&plug);

    return ret;
}

u64 len;

/*
 * If the inode needs a full sync, make sure we use a full range to
 * avoid log tree corruption, due to hole detection racing with ordered
 * extent completion for adjacent ranges, and assertion failures during
 * hole detection.
 */
if (test_bit(BTRFS_INODE_NEEDS_FULL_SYNC, &BTRFS_I(inode)->runtime_flags)) {
    start = 0;
    end = LLONG_MAX;
}

/*
 * The range length can be represented by u64, we have to do the typecasts
 * to avoid signed overflow if it's [0, LLONG_MAX] eg. from fsync()
 */
btrfs_init_log_ctx(&ctx, inode);

/*
 * Before we acquired the inode's lock, someone may have dirtied more
 * pages in the target range. We need to make sure that writeback for
 * any such pages does not start while we are logging the inode, because
 * if it does, any of the following might happen when we are not doing a
 * full inode sync:
We log an extent after its writeback finishes but before its checksums are added to the csum tree, leading to -EIO errors when attempting to read the extent after a log replay.

Therefore after the log replay we will have a file extent item pointing to an unwritten extent (and no data checksums as well).

So trigger writeback for any eventual new dirty pages and then we wait for all ordered extents to complete below.

```
ret = start_ordered_ops(inode, start, end);
if (ret) {
    up_write(&BTRFS_I(inode)->dio_sem);
    inode_unlock(inode);
    goto out;
}
```

We write the dirty pages in the range and wait until they complete out of the ->i_mutex. If so, we can flush the dirty pages by multi-task, and make the performance up. See @@ -2070,57 +2146,25 @@

goto out;

inode_lock(inode);
+
+/*
+ * We take the dio_sem here because the tree log stuff can race with lockless dio writes and get an extent map logged for an extent we never waited on. We need it this high up for lockdep reasons.
+ */
+down_write(&BTRFS_I(inode)->dio_sem);
+
atomic_inc(&root->log_batch);
full_sync = test_bit(BTRFS_INODE_NEEDS_FULL_SYNC, &BTRFS_I(inode)->runtime_flags);
+
/ *
- * We might have have had more pages made dirty after calling start_ordered_ops and before acquiring the inode's i_mutex.
+ * We have to do this here to avoid the priority inversion of waiting on IO of a lower priority task while holding a transaction open.
+ */
-if (full_sync) {
-*/
- * For a full sync, we need to make sure any ordered operations
start and finish before we start logging the inode, so that
all extents are persisted and the respective file extent
items are in the fs/subvol btree.
*/
ret = btrfs_wait_ordered_range(inode, start, len);
} else {
    /*
    * Start any new ordered operations before starting to log the
    * inode. We will wait for them to finish in btrfs_sync_log().
    *
    * Right before acquiring the inode's mutex, we might have new
    * writes dirtying pages, which won't immediately start the
    * respective ordered operations - that is done through the
    * fill_delalloc callbacks invoked from the writepage and
    * writepages address space operations. So make sure we start
    * all ordered operations before starting to log our inode. Not
    * doing this means that while logging the inode, writeback
    * could start and invoke writepage/writepages, which would call
    * the fill_delalloc callbacks (cow_file_range,
    * submit_compressed_extents). These callbacks add first an
    * extent map to the modified list of extents and then create
    * the respective ordered operation, which means in
    * btrfs_log_inode() we might capture all existing
    * ordered operations (with btrfs_get_logged_extents()) before
    * the fill_delalloc callback adds its ordered operation, and by
    * the time we visit the modified list of extent maps (with
    * btrfs_log_changed_extents()), we see and process the extent
    * map they created. We then use the extent map to construct a
    * file extent item for logging without waiting for the
    * respective ordered operation to finish - this file extent
    * item points to a disk location that might not have yet been
    * written to, containing random data - so after a crash a log
    * replay will make our inode have file extent items that point
    * to disk locations containing invalid data, as we returned
    * success to userspace without waiting for the respective
    * ordered operation to finish, because it wasn't captured by
    * btrfs_get_logged_extents().
    */
    ret = start_ordered_ops(inode, start, end);
}
+ret = btrfs_wait_ordered_range(inode, start, len);
if (ret) {
    up_write(&BTRFS_I(inode)->dio_sem);
    inode_unlock(inode);
    goto out;
}@@ -2176,6 +2220,7 @@
    * checked called fsync.
ret = filemap_check_wb_err(inode->i_mapping, file->f_wb_err);
+up_write(&BTRFS_I(inode)->dio_sem);
inode_unlock(inode);
goto out;
}
@@ -2200,6 +2245,7 @@
trans = btrfs_start_transaction(root, 0);
if (IS_ERR(trans)) {
ret = PTR_ERR(trans);
+up_write(&BTRFS_I(inode)->dio_sem);
inode_unlock(inode);
goto out;
}
@@ -2221,6 +2267,7 @@
* file again, but that will end up using the synchronization
* inside btrfs_sync_log to keep things safe.
*/
+up_write(&BTRFS_I(inode)->dio_sem);
inode_unlock(inode);

/*
@@ -2250,13 +2297,6 @@
goto out;
}

-if (!full_sync) {
-ret = btrfs_wait_ordered_range(inode, start, len);
-if (ret) {
-btrfs_end_transaction(trans);
-goto out;
-
-ret = btrfs_commit_transaction(trans);
} else {
ret = btrfs_end_transaction(trans);
@@ -2752,6 +2792,11 @@
* for detecting, at fsync time, if the inode isn't yet in the
* log tree or it's there but not up to date.
*/
+struct timespec now = current_time(inode);
+
inode_inc_iversion(inode);
inode->i_mtime = now;
inode->i_ctime = now;
trans = btrfs_start_transaction(root, 1);
if (IS_ERR(trans)) {
err = PTR_ERR(trans);

ret = btrfs_qgroup_reserve_data(inode, &data_reserved,
cur_offset, last_byte - cur_offset);
if (ret < 0) {
+cur_offset = last_byte;
free_extent_map(em);
break;
}
ret = btrfs_qgroup_reserve_data(inode, &data_reserved,
cur_offset, last_byte - cur_offset);
if (ret < 0) {
+cur_offset = last_byte;
free_extent_map(em);
break;
}
/* Let go of our reservation. */
if (ret != 0)
btrfs_free_reserved_data_space(inode, data_reserved,
ALLOC_START, alloc_end - cur_offset);
+cur_offset, alloc_end - cur_offset);
extent_changeset_free(data_reserved);
return ret;
}
--- linux-4.15.0.orig/fs/btrfs/free-space-cache.c
+++ linux-4.15.0/fs/btrfs/free-space-cache.c
@@ -22,6 +22,7 @@
#include <linux/slab.h>
#include <linux/math64.h>
#include <linux/ratelimit.h>
+#include <linux/sched/mm.h>
#include "ctree.h"
#include "free-space-cache.h"
#include "transaction.h"
@@ -59,6 +60,7 @@
struct btrfs_free_space_header *header;
struct extent_buffer *leaf;
struct inode *inode = NULL;
+unsigned nofs_flag;
int ret;

key.objectid = BTRFS_FREE_SPACE_OBJECTID;
@@ -80,7 +82,13 @@
btrfs_disk_key_to_cpu(&location, &disk_key);
btrfs_release_path(path);

+/*
+ * We are often under a trans handle at this point, so we need to make
+ * sure NOFS is set to keep us from deadlocking.
+ */
+nofs_flag = memalloc_nofs_save();
inode = btrfs_iget(fs_info->sb, &location, root, NULL);
+memalloc_nofs_restore(nofs_flag);
if (IS_ERR(inode))
  return inode;
if (is_bad_inode(inode)) {
    @@ -390,6 +398,12 @@
    if (uptodate && !PageUptodate(page)) {
        btrfs_readpage(NULL, page);
        lock_page(page);
        +if (page->mapping != inode->i_mapping) {
        +btrfs_err(BTRFS_I(inode)->root->fs_info,
        +"free space cache page truncated");
        +io_ctl_drop_pages(io_ctl);
        +return -EIO;
        +}
    if (!PageUptodate(page)) {
        btrfs_err(BTRFS_I(inode)->root->fs_info,
        "error reading free space cache");
        @@ -745,8 +759,10 @@
        while (num_entries) {
            e = kmem_cache_zalloc(btrfs_free_space_cachep,
            GFP_NOFS);
            -if (!e)
            +if (!e) {
            +ret = -ENOMEM;
                goto free_cache;
            +}
            ret = io_ctl_read_entry(&io_ctl, e, &type);
            if (ret) {
                @@ -755,6 +771,7 @@
                }
            if (!e->bytes) {
                +ret = -1;
                kmem_cache_free(btrfs_free_space_cachep, e);
                goto free_cache;
                }
            @@ -772,8 +789,10 @@
        } else {
            num_bitmaps--;
            -e->bitmap = kzalloc(PAGE_SIZE, GFP_NOFS);
            +e->bitmap = kmem_cache_zalloc( 
            +btrfs_free_space_bitmap_cachep, GFP_NOFS);
            if (!e->bitmap) {
                +ret = -ENOMEM;
                kmem_cache_free( 
                btrfs_free_space_cachep, e);
                goto free_cache;
                @@ -1155,7 +1174,6 @@
                ret = update_cache_item(trans, root, inode, path, offset,

out:
- io_ctl_free(io_ctl);
if (ret) {
    invalidate_inode_pages2(inode->i_mapping);
    BTRFS_I(inode)->generation = 0;
    @@ -1320,6 +1338,7 @@
* them out later
*/
    io_ctl_drop_pages(io_ctl);
    +io_ctl_free(io_ctl);
}

unlock_extent_cached(&BTRFS_I(inode)->io_tree, 0,
    i_size_read(inode) - 1, &cached_state, GFP_NOFS);
@@ -1702,6 +1721,8 @@
    bitmap_clear(info->bitmap, start, count);

    info->bytes -= bytes;
    +if (info->max_extent_size > ctl->unit)
    +info->max_extent_size = 0;
}

static void bitmap_clear_bits(struct btrfs_free_space_ctl *ctl,
    @@ -1785,6 +1806,13 @@
    return -1;
}

+static inline u64 get_max_extent_size(struct btrfs_free_space *entry)
+{
+    +if (entry->bitmap)
+        return entry->max_extent_size;
+    +return entry->bytes;
+}
+
/* Cache the size of the max extent in bytes */
static struct btrfs_free_space *
find_free_space(struct btrfs_free_space_ctl *ctl, u64 *offset, u64 *bytes,
    @@ -1806,8 +1834,8 @@
    for (node = &entry->offset_index; node; node = rb_next(node)) {
        entry = rb_entry(node, struct btrfs_free_space, offset_index);
        if (entry->bytes < *bytes) {
            -if (entry->bytes > *max_extent_size)
            -*max_extent_size = entry->bytes;
            +*max_extent_size = max(get_max_extent_size(entry),
            +    *max_extent_size);
            continue;
        }
        break;  // Found a better extent
    }
}
if (entry->bytes < *bytes + align_off) {
    -if (entry->bytes > *max_extent_size)
        -*max_extent_size = entry->bytes;
    +*max_extent_size = max(get_max_extent_size(entry),
        +*max_extent_size);
    continue;
}

*offset = tmp;
*bytes = size;
return entry;

} else if (size > *max_extent_size) {
    -*max_extent_size = size;
    +} else {
        +*max_extent_size =
        +max(get_max_extent_size(entry),
        +*max_extent_size);
    continue;
}

struct btrfs_free_space *bitmap_info)
{
    unlink_free_space(ctl, bitmap_info);
    -kfree(bitmap_info->bitmap);
    +kmem_cache_free(btrfs_free_space_bitmap_cachep, bitmap_info->bitmap);
    kmem_cache_free(btrfs_free_space_cachep, bitmap_info);
    ctl->total_bitmaps--;
    ctl->op->recalc_thresholds(ctl);
    @ @ -1868,7+1898,7 @@
    }

/* allocate the bitmap */
-info->bitmap = kzalloc(PAGE_SIZE, GFP_NOFS);
+info->bitmap = kmem_cache_zalloc(btrfs_free_space_bitmap_cachep,
    + GFP_NOFS);
spin_lock(&ctl->tree_lock);
if (!info->bitmap) {
    ret = -ENOMEM;
    @ @ -2122,7+2152,8 @@
    out:
    if (info) {
        if (info->bitmap)
            kfree(info->bitmap);
+kmem_cache_free(btrfs_free_space_bitmap_cachep, info->bitmap);
kmem_cache_free(btrfs_free_space_cachep, info);
}

@@ -2144,7 +2176,7 @@
static bool try_merge_free_space(struct btrfs_free_space_ctl *ctl,
    struct btrfs_free_space *info, bool update_stat)
{
    -struct btrfs_free_space *left_info;
    +struct btrfs_free_space *left_info = NULL;
    struct btrfs_free_space *right_info;
    bool merged = false;
    u64 offset = info->offset;
@@ -2159,7 +2191,7 @@
    if (right_info && rb_prev(&right_info->offset_index))
        left_info = rb_entry(rb_prev(&right_info->offset_index),
            struct btrfs_free_space, offset_index);
    -else
    +else if (!right_info)
        left_info = tree_search_offset(ctl, offset - 1, 0, 0);

    if (right_info && !right_info->bitmap) {
@@ -2463,6 +2495,7 @@
        struct rb_node *n;
        int count = 0;

+spin_lock(&ctl->tree_lock);
        for (n = rb_first(&ctl->free_space_offset); n; n = rb_next(n)) {
            info = rb_entry(n, struct btrfs_free_space, offset_index);
            if (info->bytes >= bytes && !block_group->ro)
                count ++;
            (info->bitmap) ? "yes" : "no");
        }
+spin_unlock(&ctl->tree_lock);
        btrfs_info(fs_info, "block group has cluster?: %s",
            list_empty(&block_group->cluster_list) ? "no" : "yes");
        btrfs_info(fs_info,
            @@ -2699,8 +2733,8 @@
            err = search_bitmap(ctl, entry, &search_start, &search_bytes, true);
            if (err) {
                -if (search_bytes > *max_extent_size)
                -*max_extent_size = search_bytes;
                +*max_extent_size = max(get_max_extent_size(entry),
                +  *max_extent_size);
                return 0;
            }
```c
entry = rb_entry(node, struct btrfs_free_space, offset_index);
while (1) {
    if (entry->bytes < bytes && entry->bytes > *max_extent_size)
        *max_extent_size = entry->bytes;
    if (entry->bytes < bytes)
        *max_extent_size = max(get_max_extent_size(entry),
        *max_extent_size);

    if (entry->bytes < bytes ||
        (!entry->bitmap && entry->offset < min_start)) {
        if (entry->bytes == 0) {
            ctl->free_extents--;
            if (entry->bitmap) {
                kfree(entry->bitmap);
                kmem_cache_free(btrfs_free_space_bitmap_cachep,
                entry->bitmap);
                ctl->total_bitmaps--;
                ctl->op->recalc_thresholds(ctl);
            }
        }
    }

    if (!map) {
        map = kzalloc(PAGE_SIZE, GFP_NOFS);
        kmem_cache_free(btrfs_free_space_bitmap_cachep,
        map);
        if (!map) {
            kmem_cache_free(btrfs_free_space_cachep, info);
            return -ENOMEM;
        }
    }

    if (!map) {
        map = kmem_cache_zalloc(btrfs_free_space_bitmap_cachep, GFP_NOFS);
        kmem_cache_free(btrfs_free_space_cachep, info);
    }
}
```

static void fail_caching_thread(struct btrfs_root *root)
{
+{struct btrfs_fs_info *fs_info = root->fs_info;
 +
+btrfs_warn(fs_info, "failed to start inode caching task");
+btrfs_clear_pending_and_info(fs_info, INODE_MAP_CACHE,
 + "disabling inode map caching");
+spin_lock(&root->ino_cache_lock);
+root->ino_cache_state = BTRFS_CACHE_ERROR;
+spin_unlock(&root->ino_cache_lock);
+wake_up(&root->ino_cache_wait);
+}
+
static int caching_kthread(void *data)
{
 struct btrfs_root *root = data;
 @ @ -42,8 +55,10 @@
 return 0;

 path = btrfs_alloc_path();
 -if (!path)
 +if (!path) {
 +fail_caching_thread(root);
 return -ENOMEM;
 +}

 /* Since the commit root is read-only, we can safely skip locking. */
 path->skip_locking = 1;
 @ @ -159,6 +174,7 @@
 spin_lock(&root->ino_cache_lock);
 root->ino_cache_state = BTRFS_CACHE_FINISHED;
 spin_unlock(&root->ino_cache_lock);
 +wake_up(&root->ino_cache_wait);
 return;
 }

 @ @ -177,11 +193,8 @@

 tsk = kthread_run(caching_kthread, root, "btrfs-ino-cache-%llu",
 root->root_key.objectid);
 -if (IS_ERR(tsk)) {
 -btrfs_warn(fs_info, "failed to start inode caching task");
 -btrfs_clear_pending_and_info(fs_info, INODE_MAP_CACHE,
 - "disabling inode map caching");
 -}
 +if (IS_ERR(tsk))
 +fail_caching_thread(root);
int btrfs_find_free_ino(struct btrfs_root *root, u64 *objectid)
@@ -199,11 +212,14 @@
  wait_event(root->ino_cache_wait,
    root->ino_cache_state == BTRFS_CACHE_FINISHED ||
    root->ino_cache_state == BTRFS_CACHE_ERROR ||
+    root->free_ino_ctl->free_space > 0);

  if (root->ino_cache_state == BTRFS_CACHE_FINISHED &&
+    root->free_ino_ctl->free_space == 0)
    return -ENOSPC;
  +else if (root->ino_cache_state == BTRFS_CACHE_ERROR)
  +return btrfs_find_free_objectid(root, objectid);
  else
    goto again;
 }
@@ -501,6 +517,7 @@
  if (ret) {
+    btrfs_delalloc_release_metadata(BTRFS_I(inode), prealloc);
    goto out_put;
  }

--- linux-4.15.0.orig/fs/btrfs/inode.c
+++ linux-4.15.0/fs/btrfs/inode.c
@@ -43,6 +43,7 @@
 #include <asm/unaligned.h>
 #include "ctree.h"
 #include "disk-io.h"
+#include <asm/unaligned.h>
 #include "transaction.h"
@@ -88,6 +89,7 @@
 struct kmem_cache *btrfs_trans_handle_cachep;
 struct kmem_cache *btrfs_path_cachep;
 struct kmem_cache *btrfs_free_space_cachep;
+struct kmem_cache *btrfs_free_space_bitmap_cachep;

 #define S_SHIFT 12
 static const unsigned char btrfs_type_by_mode[S_IFMT >> S_SHIFT] = {
@@ -126,17 +128,17 @@
 * extent_clear_unlock_delalloc() to clear both the bits EXTENT_DO_ACCOUNTING
 * and EXTENT_DELALLOC simultaneously, because that causes the reserved metadata
 * to be released, which we want to happen only when finishing the ordered
- * extent (btrfs_finish_ordered_io()). Also note that the caller of the
static inline void btrfs_cleanup_ordered_extents(struct inode *inode,
- const u64 offset,
- const u64 bytes)
+ struct page *locked_page,
+ u64 offset, u64 bytes)
{
  unsigned long index = offset >> PAGE_SHIFT;
  unsigned long end_index = (offset + bytes - 1) >> PAGE_SHIFT;
+u64 page_start = page_offset(locked_page);
+u64 page_end = page_start + PAGE_SIZE - 1;
+
  struct page *page;
  while (index <= end_index) {
@@ -147,8 +149,18 @@
    ClearPagePrivate2(page);
    put_page(page);
  }
-  return __endio_write_update_ordered(inode, offset + PAGE_SIZE,
-    bytes - PAGE_SIZE, false);
  +
  +/*
  + * In case this page belongs to the delalloc range being instantiated
  + * then skip it, since the first page of a range is going to be
  + * properly cleaned up by the caller of run_delalloc_range
  + */
  +if (page_start >= offset && page_end <= (offset + bytes - 1)) {
    +offset += PAGE_SIZE;
    +bytes -= PAGE_SIZE;
    +} 
  +
  +return __endio_write_update_ordered(inode, offset, bytes, false);
  }

static int btrfs_dirty_inode(struct inode *inode);
@@ -246,7 +258,7 @@
    start >> PAGE_SHIFT);
    btrfs_set_file_extent_compression(leaf, ei, 0);
    kaddr = kmap_atomic(page);
-  offset = start & ( PAGE_SIZE - 1);
+  offset = offset_in_page(start);
    write_extent_buffer(leaf, kaddr + offset, ptr, size);
    kunmap_atomic(kaddr);
static inline bool inode_can_compress(struct inode *inode) {
    if (BTRFS_I(inode)->flags & BTRFS_INODE_NODATACOW ||
        BTRFS_I(inode)->flags & BTRFS_INODE_NODATASUM)
        return false;
    return true;
}

static inline int inode_need_compress(struct inode *inode, u64 start, u64 end) {
    struct btrfs_fs_info *fs_info = btrfs_sb(inode->i_sb);
    if (!inode_can_compress(inode)) {
        WARN(IS_ENABLED(CONFIG_BTRFS_DEBUG),
             KERN_ERR "BTRFS: unexpected compression for ino %llu\n",
             btrfs_ino(BTRFS_I(inode)));
        return 0;
    }
    /* force compress */
    if (btrfs_test_opt(fs_info, FORCE_COMPRESS))
        return 1;
}

unsigned long offset = offset_in_page(total_compressed);
if (!ret) {
    unsigned long offset = total_compressed &
    PAGE_SIZE - 1);
    unsigned long offset = offset_in_page(total_compressed);
struct page *page = pages[nr_pages - 1];
char *kaddr;

@@ -607,7 +640,21 @@
    PAGE_SET_WRITEBACK |
    page_error_op |
    PAGE_END_WRITEBACK);
-goto free_pages_out;
+
+/*
+ * Ensure we only free the compressed pages if we have
+ * them allocated, as we can still reach here with
+ * inode_need_compress() == false.
+ */
+if (pages) {
+for (i = 0; i < nr_pages; i++) {
+WARN_ON(pages[i]->mapping);
+put_page(pages[i]);
+}
+kfree(pages);
+}
+}
+return;
}

@@ -685,13 +732,6 @@
*num_added += 1;

return;
-
-free_pages_out:
-for (i = 0; i < nr_pages; i++) {
-WARN_ON(pages[i]->mapping);
-put_page(pages[i]);
-}
-kfree(pages);
}

static void free_async_extent_pages(struct async_extent *async_extent)
@@ -956,8 +996,8 @@
u64 alloc_hint = 0;
u64 num_bytes;
unsigned long ram_size;
-u64 disk_num_bytes;
u64 cur_alloc_size = 0;
+u64 min_alloc_size;
u64 blocksize = fs_info->sectorsize;
struct btrfs_key ins;
struct extent_map *em;
@@ -974,7 +1014,6 @@
    num_bytes = ALIGN(end - start + 1, blocksize);
    num_bytes = max(blocksize, num_bytes);
    -disk_num_bytes = num_bytes;

    inode_should_defrag(BTRFS_I(inode), start, end, num_bytes, SZ_64K);
@@ -1005,17 +1044,32 @@
    } }

    -BUG_ON(disk_num_bytes >
    -    btrfs_super_total_bytes(fs_info->super_copy));
    +BUG_ON(num_bytes > btrfs_super_total_bytes(fs_info->super_copy));

    alloc_hint = get_extent_allocation_hint(inode, start, num_bytes);
    btrfs_drop_extent_cache(BTRFS_I(inode), start,
    start + num_bytes - 1, 0);

    -while (disk_num_bytes > 0) {
    -    cur Alloc_size = disk_num_bytes;
    +/*
    +  * Relocation relies on the relocated extents to have exactly the same
    +  * size as the original extents. Normally writeback for relocation data
    +  * extents follows a NOCOW path because relocation preallocates the
    +  * extents. However, due to an operation such as scrub turning a block
    +  * group to RO mode, it may fallback to COW mode, so we must make sure
    +  * an extent allocated during COW has exactly the requested size and can
    +  * not be split into smaller extents, otherwise relocation breaks and
    +  * fails during the stage where it updates the bytenr of file extent
    +  * items.
    +  */
    +if (root->root_key.objectid == BTRFS_DATA_RELOC_TREE_OBJECTID)
    +    min_alloc_size = num_bytes;
    +else
    +    min_alloc_size = fs_info->sectorsize;
    +
    +while (num_bytes > 0) {
    +    cur Alloc_size = num_bytes;
    ret = btrfs_reserve_extent(root, cur Alloc_size, cur Alloc_size,
    - fs_info->sectorsize, 0, alloc_hint,
    + min Alloc_size, 0, alloc_hint,
    &ins, 1, 1);
    if (ret < 0)
    goto out_unlock;

    /*
ram_size, /* ram_bytes */
BTRFS_COMPRESS_NONE, /* compress_type */
BTRFS_ORDERED_REGULAR /* type */);
-if (IS_ERR(em))
+if (IS_ERR(em)) {
+ret = PTR_ERR(em);
+goto out_reserve;
+
} free_extent_map(em);

ret = btrfs_add_ordered_extent(inode, start, ins.objectid,
@@ -1077,11 +1133,10 @@
   delalloc_end, locked_page,
   EXTENT_LOCKED | EXTENT_DELALLOC,
   page_ops);
-If (disk_num_bytes < cur_alloc_size)
-   disk_num_bytes = 0;
+If (num_bytes < cur_alloc_size)
+   num_bytes = 0;
else
   -disk_num_bytes -= cur_alloc_size;
   -num_bytes -= cur_alloc_size;
   +num_bytes -= cur_alloc_size;
   alloc_hint = ins.objectid + ins.offset;
   start += cur_alloc_size;
   extent_reserved = false;
@@ -1119,8 +1174,8 @@ *
/*
 if (extent_reserved) {
   extent_clear_unlock_delalloc(inode, start,
-     start + cur_alloc_size,
-     start + cur_alloc_size,
+     start + cur_alloc_size - 1,
+     start + cur_alloc_size - 1,
       locked_page,
       clear_bits,
       page_ops);
@@ -1257,6 +1312,8 @@
   list_del(&sums->list);
   kfree(sums);
 } 
+if (ret < 0)
+return ret;
 return 1;
}

@@ -1288,7 +1345,7 @@
u64 disk_num_bytes;

u64 ram_bytes;

int extent_type;

-int ret, err;
+int ret;

int type;

int nocow;

int check_prev = 1;

leaf = path->nodes[0];

if (path->slots[0] >= btrfs_header_nritems(leaf)) {
ret = btrfs_next_leaf(root, path);
-if (ret < 0)
+if (ret < 0) {
+if (cow_start != (u64)-1)
+cur_offset = cow_start;

goto error;
+
}

if (ret > 0)
break;

leaf = path->nodes[0];

goto out_check;

if (btrfs_extent_readonly(fs_info, disk_bytenr))

goto out_check;

-if (btrfs_cross_ref_exist(root, ino,
-    found_key.offset -
-    extent_offset, disk_bytenr))
+ret = btrfs_cross_ref_exist(root, ino,
+    found_key.offset -
+    extent_offset, disk_bytenr);

+if (ret) {
+ /*
+  * ret could be -EIO if the above fails to read
+  * metadata.
+  */
+}

+if (ret < 0) {
+if (cow_start != (u64)-1)
+cur_offset = cow_start;
+goto error;
+
+WARN_ON_ONCE(nolock);

goto out_check;
+

disk_bytenr += extent_offset;

disk_bytenr += cur_offset - found_key.offset;

num_bytes = min(end + 1, extent_end) - cur_offset;
if there are pending snapshots for this root,
we fall into common COW way.
*/
-if (!nolock) {
-int = btrfs_start_write_no_snapshotting(root);
-if (!int)
-goto out_check;
-
+if (!nolock && atomic_read(&root->snapshot_force_cow))
+goto out_check;

/*
force cow if csum exists in the range.
this ensure that csum for a given extent are
either valid or do not exist.
*/
-if (csum_exist_in_range(fs_info, disk_bytenr,
-num_bytes)) {
-if (!nolock)
-btrfs_end_write_no_snapshotting(root);
+ret = csum_exist_in_range(fs_info, disk_bytenr,
 +num_bytes);
+if (ret) {
+/*
 + * ret could be -EIO if the above fails to read
 + * metadata.
 + */
+if (ret < 0) {
+if (cow_start != (u64)-1)
+cur_offset = cow_start;
+goto error;
+}
+WARN_ONCE(nolock);
-goto out_check;
}
-if (!btrfs_inc_nocow_writers(fs_info, disk_bytenr)) {
-if (!nolock)
-btrfs_end_write_no_snapshotting(root);
+if (!btrfs_inc_nocow_writers(fs_info, disk_bytenr))
-goto out_check;
-
-nocow = 1;
} else if (extent_type == BTRFS_FILE_EXTENT_INLINE) {
extent_end = found_key.offset +
-btrfs_file_extent_inline_len(leaf,
- path->slots[0], fi);
+btrfs_file_extent_ram_bytes(leaf, fi);
extent_end = ALIGN(extent_end,
fs_info->sectorsize);
} else {
    -BUG_ON(1);
    +BUG();
}
out_check:
    if (extent_end <= start) {
        path->slots[0]++;
        -if (!nolock && nocow)
            -btrfs_end_write_no_snapshotting(root);
        if (nocow)
            btrfs_dec_nocow_writers(fs_info, disk_bytenr);
        goto next_slot;
    @@ -1454,8 +1527,6 @@
        end, page_started, nr_written, 1,
        NULL);
        if (ret) {
            -if (!nolock && nocow)
                -btrfs_end_write_no_snapshotting(root);
            if (nocow)
                btrfs_dec_nocow_writers(fs_info, disk_bytenr);
    @@ -1475,8 +1546,6 @@
          ram_bytes, BTRFS_COMPRESS_NONE,
          BTRFS_ORDERED_PREALLOC);
        if (IS_ERR(em)) {
            -if (!nolock && nocow)
                -btrfs_end_write_no_snapshotting(root);
            if (nocow)
                btrfs_dec_nocow_writers(fs_info, disk_bytenr);
    @@ -1515,8 +1584,6 @@
          EXTENT_CLEAR_DATA_RESV,
          PAGE_UNLOCK | PAGE_SET_PRIVATE2);
    -if (!nolock && nocow)
        -btrfs_end_write_no_snapshotting(root);
        cur_offset = extent_end;
/*
@@ -1531,12 +1598,11 @@
       btrfs_release_path(path);
    -if (cur_offset <= end && cow_start == (u64)-1) {
        +if (cur_offset <= end && cow_start == (u64)-1)
            cow_start = cur_offset;
        -cur_offset = end;
if (cow_start != (u64)-1) {
    cur_offset = end;
    ret = cow_file_range(inode, locked_page, cow_start, end, end,
                          page_started, nr_written, 1, NULL);
    if (ret)
        @@ -1577,12 +1643,12 @@
}

/*
   * extent_io.c call back to do delayed allocation processing
   * Function to process delayed allocation (create CoW) for ranges which are
   * being touched for the first time.
   */
-static int run_delalloc_range(void *private_data, struct page *locked_page,
-                              u64 start, u64 end, int *page_started,
-                              unsigned long *nr_written,
-                              struct writeback_control *wbc)
+int btrfs_run_delalloc_range(void *private_data, struct page *locked_page,
+                             u64 start, u64 end, int *page_started, unsigned long *nr_written,
+                             struct writeback_control *wbc)
{
    struct inode *inode = private_data;
    int ret;
    @@ -1595,7 +1661,8 @@
    } else if (BTRFS_I(inode)->flags & BTRFS_INODE_PREALLOC && !force_cow) {
        ret = run_delalloc_nocow(inode, locked_page, start, end,
                                page_started, 0, nr_written);
-    } else if (!inode_need_compress(inode, start, end)) {
+    } else if (!inode_can_compress(inode) ||
        !inode_need_compress(inode, start, end)) {
        ret = cow_file_range(inode, locked_page, start, end, end,
                             page_started, nr_written, 1, NULL);
    } else {
        @@ -1606,7 +1673,8 @@
            write_flags);
    }
    if (ret)
        -btrfs_cleanup_ordered_extents(inode, start, end - start + 1);
+        btrfs_cleanup_ordered_extents(inode, locked_page, start,
+                                       end - start + 1);
    return ret;
}

@@ -1726,12 +1794,12 @@
spin_unlock(&root->delalloc_lock);
}

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-static void btrfs_del_delalloc_inode(struct btrfs_root *root,
  struct btrfs_inode *inode)
+
+void __btrfs_del_delalloc_inode(struct btrfs_root *root,
+  struct btrfs_inode *inode)
{
  struct btrfs_fs_info *fs_info = btrfs_sb(inode->vfs_inode.i_sb);

  -spin_lock(&root->delalloc_lock);
  if (!list_empty(&inode->delalloc_inodes)) {
    list_del_init(&inode->delalloc_inodes);
    clear_bit(BTRFS_INODE_IN_DELALLOC_LIST,
    @ @ -1744,6 +1812,13 @@
    spin_unlock(&fs_info->delalloc_root_lock);
  }
+
+  static void btrfs_del_delalloc_inode(struct btrfs_root *root,
+    struct btrfs_inode *inode)
+  {
+    spin_lock(&root->delalloc_lock);
+    __btrfs_del_delalloc_inode(root, inode);
+    spin_unlock(&root->delalloc_lock);
  }
+
@@ -2098,11 +2173,22 @@
    goto out;
  }

  -btrfs_set_extent_delalloc(inode, page_start, page_end, 0, &cached_state,
  -  0);
  +ret = btrfs_set_extent_delalloc(inode, page_start, page_end, 0,
  +    &cached_state, 0);
  +if (ret) {
  +    mapping_set_error(page->mapping, ret);
  +    end_extent_writepage(page, ret, page_start, page_end);
  +    ClearPageChecked(page);
  +    goto out_reserved;
  +}
  +
  ClearPageChecked(page);
  set_page_dirty(page);
  +out_reserved:
  btrfs_delalloc_release_extents(BTRFS_I(inode), PAGE_SIZE);
  +if (ret)
  +btrfs_delalloc_release_space(inode, data_reserved, page_start,
PAGE_SIZE);
out:
unlock_extent_cached(&BTRFS_I(inode)->io_tree, page_start, page_end,
   &cached_state, GFP_NOFS);
bool truncated = false;
bool range_locked = false;
bool clear_new_delalloc_bytes = false;
bool clear_reserved_extent = true;

if (!test_bit(BTRFS_ORDERED_NOCOW, &ordered_extent->flags) &&
   !test_bit(BTRFS_ORDERED_PREALLOC, &ordered_extent->flags) &&
   logical_len == logical_len,
   compress_type, 0, 0,
BTRFS_FILE_EXTENT_REG);
- if (!ret)
+ if (!ret) {
+    clear_reserved_extent = false;
+    btrfs_release_delalloc_bytes(fs_info,
+      ordered_extent->start,
+      ordered_extent->disk_len);
+ }
}
unpin_extent_cache(&BTRFS_I(inode)->extent_tree,
   ordered_extent->file_offset, ordered_extent->len,
   logical_len, logical_len,
   BTRFS_FILE_EXTENT_REG);
*/
if ((ret || !logical_len) &&
   clear_reserved_extent &&
   !test_bit(BTRFS_ORDERED_NOCOW, &ordered_extent->flags) &&
   !test_bit(BTRFS_ORDERED_PREALLOC, &ordered_extent->flags))
   btrfs_free_reserved_extent(fs_info,
   logical_len, logical_len,
   BTRFS_FILE_EXTENT_REG);
if (ret) {
+    /* dec doesn't need spin_lock as ->orphan_block_rsv
+     * would be released only if ->orphan_inodes is
+      * zero.
+     */
+     if (ret) [
atomic_dec(&root->orphan_inodes);
clear_bit(BTRFS_INODE_ORPHAN_META_RESERVED,
   &inode->runtime_flags);
@@ -3373,12 +3472,17 @@
   if (insert >= 1) {
   ret = btrfs_insert_orphan_item(trans, root, btrfs_ino(inode));
   if (ret) {
-atomic_dec(&root->orphan_inodes);
   if (reserve) {
   clear_bit(BTRFS_INODE_ORPHAN_META_RESERVED,
- &inode->runtime_flags);
+atomic_dec(&root->orphan_inodes);
   btrfs_orphan_release_metadata(inode);
   }
+/*
+ * btrfs_orphan_commit_root may race with us and set
+ * ->orphan_block_rsv to zero, in order to avoid that,
+ * decrease ->orphan_inodes after everything is done.
+ */
+atomic_dec(&root->orphan_inodes);
   if (ret != -EEXIST) {
   clear_bit(BTRFS_INODE_HAS_ORPHAN_ITEM,
      &inode->runtime_flags);
-@@ -3410,28 +3514,26 @@
-    struct btrfs_root *root = inode->root;
-    int delete_item = 0;
-    -int release_rsv = 0;
-    int ret = 0;
+    if (delete_item && trans)
+    ret = btrfs_del_orphan_item(trans, root, btrfs_ino(inode));
+    if (test_and_clear_bit(BTRFS_INODE_ORPHAN_META_RESERVED,
+       &inode->runtime_flags))
+    -release_rsv = 1;
-    -spin_unlock(&root->orphan_lock);
-    if (test_and_clear_bit(BTRFS_INODE_HAS_ORPHAN_ITEM,
+    -spin_lock(&root->orphan_lock);
+    if (test_and_clear_bit(BTRFS_INODE_HAS_ORPHAN_ITEM,
+       &inode->runtime_flags))
+    delete_item = 1;
+    if (delete_item && trans)
+    ret = btrfs_del_orphan_item(trans, root, btrfs_ino(inode));
+    if (test_and_clear_bit(BTRFS_INODE_ORPHAN_META_RESERVED,
+       &inode->runtime_flags))
+    -release_rsv = 1;
-    -spin_unlock(&root->orphan_lock);
-    +btrfs_orphan_release_metadata(inode);
+    +if (delete_item) {
+    +/*
+    + * btrfs_orphan_commit_root may race with us and set ->orphan_block_rsv
+    + * to zero, in order to avoid that, decrease ->orphan_inodes after

+ * everything is done.
+ */
+if (delete_item)
    atomic_dec(&root->orphan_inodes);
-if (trans)
    ret = btrfs_del_orphan_item(trans, root,
    btrfs_ino(inode));
-
-if (release_rsv)
    btrfs_orphan_release_metadata(inode);

return ret;
}
@@ -3827,6 +3929,21 @@
/* inode is not a directory, logging its parent unnecessarily.
 */
BTRFS_I(inode)->last_unlink_trans = BTRFS_I(inode)->last_trans;
+/
+ * Similar reasoning for last_link_trans, needs to be set otherwise
+ * for a case like the following:
+ *
+ * mkdir A
+ * touch foo
+ * ln foo A/bar
+ * echo 2 > /proc/sys/vm/drop_caches
+ * fsync foo
+ * <power failure>
+ *
+ * Would result in link bar and directory A not existing after the power
+ * failure.
+ */
+BTRFS_I(inode)->last_link_trans = BTRFS_I(inode)->last_trans;

path->slots[0]++;
if (inode->i_nlink != 1 ||
@@ -4511,8 +4628,8 @@
BTRFS_I(inode), leaf, fi,
    found_key.offset);
} else if (extent_type == BTRFS_FILE_EXTENT_INLINE) {
    -item_end += btrfs_file_extent_inline_len(leaf,
    - path->slots[0], fi);
    +item_end += btrfs_file_extent_ram_bytes(leaf,
       +fi);

    trace_btrfs_truncate_show_fi_inline(
        BTRFS_I(inode), leaf, fi, path->slots[0],
@@ -4627,7 +4744,10 @@
extent_num_bytes, 0,
btfs_header_owner(leaf),
ino, extent_offset);
-BUG_ON(ret);
+if (ret) {
+btrfs_abort_transaction(trans, ret);
+break;
+}
if (btrfs_should_throttle_delayed.refs(trans, fs_info))
btrfs_async_run_delayed.refs(fs_info,
trans->delayed.ref_updates * 2,
@@ -5211,11 +5331,13 @@
struct extent_state *cached_state = NULL;
u64 start;
u64 end;
+unsigned state_flags;

node = rb_first(&io_tree->state);
state = rb_entry(node, struct extent_state, rb_node);
start = state->start;
end = state->end;
+state_flags = state->state;
spin_unlock(&io_tree->lock);

lock_extent_bits(io_tree, start, end, &cached_state);
@@ -5228,7 +5350,7 @@
 * 
 * Note, end is the bytenr of last byte, so we need + 1 here.
 */
-if (state->state & EXTENT_DELALLOC)
+if (state_flags & EXTENT_DELALLOC)
btrfs_qgroup_free_data(inode, NULL, start, end - start + 1);

clear_extent_bit(io_tree, start, end,
@@ -5256,7 +5378,7 @@
trace_btrfs_inode_evict(inode);

if (!root) {
-kmem_cache_free(btrfs_inode_cachep, BTRFS_I(inode));
+clear_inode(inode);
return;
}

@@ -5387,13 +5509,18 @@
trans->block_rsv = rsv;

ret = btrfs_truncate_inode.items(trans, root, inode, 0, 0);
-if (ret != -ENOSPC && ret != -EAGAIN)
+if (ret) {
+trans->block_rsv = &fs_info->trans_block_rsv;
+btrfs_end_transaction(trans);
+btrfs_btree_balance_dirty(fs_info);
+if (ret == -ENOSPC && ret != -EAGAIN) {
+btrfs_orphan_del(NULL, BTRFS_I(inode));
+btrfs_free_block_rsv(fs_info, rsv);
+goto no_delete;
+}
+} else {
+trans->block_rsv = &fs_info->trans_block_rsv;
+btrfs_end_transaction(trans);
+trans = NULL;
+btrfs_btree_balance_dirty(fs_info);
+}
+
+btrfs_free_block_rsv(fs_info, rsv);
@@ -5402,12 +5529,8 @@
 *
 * Errors here aren't a big deal, it just means we leave orphan items
 * in the tree. They will be cleaned up on the next mount.
 */
-if (ret == 0) {
-trans->block_rsv = root->orphan_block_rsv;
-btrfs_orphan_del(trans, BTRFS_I(inode));
-} else {
-btrfs_orphan_del(NULL, BTRFS_I(inode));
-}
+trans->block_rsv = root->orphan_block_rsv;
+btrfs_orphan_del(trans, BTRFS_I(inode));

-trans->block_rsv = &fs_info->trans_block_rsv;
+trans->block_rsv = &fs_info->trans_block_rsv;
if (!root == fs_info->tree_root ||
@@ -5422,11 +5545,14 @@
 /*
 - * this returns the key found in the dir entry in the location pointer.
 - * If no dir entries were found, location->objectid is 0.
 */
 static int btrfs_inode_by_name(struct inode *dir, struct dentry *entry,
struct btrfs_key *location, u8 *type) {
    const char *name = dentry->d_name.name;
    int namelen = dentry->d_name.len;
    di = btrfs_lookup_dir_item(NULL, root, path, btrfs_ino(BTRFS_I(dir)),
    name, namelen, 0);
    if (IS_ERR(di))
        if (!di) {
            ret = -ENOENT;
            goto out;
        }
        if (IS_ERR(di)) {
            ret = PTR_ERR(di);
            -if (IS_ERR_OR_NULL(di))
                goto out_err;
        }
    if (IS_ERR_OR_NULL(di))
        goto out_err;
    *type = btrfs_dir_type(path->nodes[0], di);
out:
    return ret;
-out_err:
    location->objectid = 0;
    goto out;
}

static void inode_tree_del(struct inode *inode) {
    struct btrfs_fs_info *fs_info = btrfs_sb(inode->i_sb);
    if (location->type != BTRFS_INODE_ITEM_KEY &&
        location->type != BTRFS_ROOT_ITEM_KEY) {
        ret = -EUCLEAN;
        btrfs_warn(root->fs_info, "%s gets something invalid in DIR_ITEM (name %s, directory ino %llu, location(%llu %u %llu))", __func__, name, btrfs_ino(BTRFS_I(dir)),
        location->objectid, location->type, location->offset);
        goto out_err;
    }
    if (!ret)
        *type = btrfs_dir_type(path->nodes[0], di);
    out:
    btrfs_free_path(path);
    return ret;
-out_err:
    -location->objectid = 0;
    goto out;
}

/*
@@ -5569,7 +5697,6 @@
static void inode_tree_del(struct inode *inode) {
    struct btrfs_fs_info *fs_info = btrfs.sb(inode->i_sb);
struct btrfs_root *root = BTRFS_I(inode)->root;
int empty = 0;

@@ -5582,7 +5709,6 @@
 spin_unlock(&root->inode_lock);

if (empty && btrfs_root_refs(&root->root_item) == 0) {
-synchronize_srcu(&fs_info->subvol_srcu);
spin_lock(&root->inode_lock);
empty = RB_EMPTY_ROOT(&root->inode_tree);
spin_unlock(&root->inode_lock);
@@ -5747,6 +5873,11 @@
 return inode;
 }

+static inline u8 btrfs_inode_type(struct inode *inode)
+{
+return btrfs_type_by_mode[(inode->i_mode & S_IFMT) >> S_SHIFT];
+}
+
+struct inode *btrfs_lookup_dentry(struct inode *dir, struct dentry *dentry)
{
 struct btrfs_fs_info *fs_info = btrfs_sb(dir->i_sb);
@@ -5754,21 +5885,31 @@
 struct btrfs_root *sub_root = root;
 struct btrfs_key location;
+u8 di_type = 0;
 int index;
 int ret = 0;

if (dentry->d_name.len > BTRFS_NAME_LEN)
return ERR_PTR(-ENAMETOOLONG);

-ret = btrfs_inode_by_name(dir, dentry, &location);
+ret = btrfs_inode_by_name(dir, dentry, &location, &di_type);
if (ret < 0)
return ERR_PTR(ret);

-if (location.objectid == 0)
-return ERR_PTR(-ENOENT);
-
if (location.type == BTRFS_INODE_ITEM_KEY) {
inode = btrfs_iget(dir->i_sb, &location, root, NULL);
+if (IS_ERR(inode))
+return inode;
+*/ Do extra check against inode mode with di_type */
if (btrfs_inode_type(inode) != di_type) {
    btrfs_crit(fs_info, "inode mode mismatch with dir: inode mode=0\%o btrfs type=\%u dir type=\%u",
               inode->i_mode, btrfs_inode_type(inode),
               di_type);
    iput(inode);
    return ERR_PTR(-EUCLEAN);
}
return inode;

@@ -5881,11 +6022,13 @@
    struct dir_entry *entry = addr;
    char *name = (char *)(entry + 1);

    -ctx->pos = entry->offset;
    -if (!dir_emit(ctx, name, entry->name_len, entry->ino,
                    - entry->type))
     +ctx->pos = get_unaligned(&entry->offset);
    +if (!dir_emit(ctx, name, get_unaligned(&entry->name_len),
                  + get_unaligned(&entry->ino),
                  + get_unaligned(&entry->type)))
      return 1;
    -addr += sizeof(struct dir_entry) + entry->name_len;
    +addr += sizeof(struct dir_entry) +
                  + get_unaligned(&entry->name_len);
    ctx->pos++;
    }
return 0;
@@ -.5979,14 +6122,15 @@
}

entry = addr;
-entry->name_len = name_len;
+put_unaligned(name_len, &entry->name_len);
    name_ptr = (char *)(entry + 1);
    read_extent_buffer(leaf, name_ptr, (unsigned long)(di + 1),
                       name_len);
    -entry->type = btrfs_filetype_table[btrfs_dir_type(leaf, di)];
    +put_unaligned(btrfs_filetype_table[btrfs_dir_type(leaf, di)],
                   +&entry->type);
    btrfs_dir_item_key_to_cpu(leaf, di, &location);
    -entry->ino = location.objectid;
    -entry->offset = found_key.offset;
    +put_unaligned(location.objectid, &entry->ino);
    +put_unaligned(found_key.offset, &entry->offset);
    entries++;
    addr += sizeof(struct dir_entry) + name_len;
total_len += sizeof(struct dir_entry) + name_len;
return ret;
}

int btrfs_write_inode(struct inode *inode, struct writeback_control *wbc)
{
    struct btrfs_root *root = BTRFS_I(inode)->root;
    struct btrfs_trans_handle *trans;
    int ret = 0;
    bool nolock = false;
    if (test_bit(BTRFS_INODE_DUMMY, &BTRFS_I(inode)->runtime_flags))
        return 0;
    if (btrfs_fs_closing(root->fs_info) &&
        btrfs_is_free_space_inode(BTRFS_I(inode)))
        nolock = true;
    if (wbc->sync_mode == WB_SYNC_ALL) {
        if (nolock)
            trans = btrfs_join_transaction_nolock(root);
        else
            trans = btrfs_join_transaction(root);
        if (IS_ERR(trans))
            return PTR_ERR(trans);
        ret = btrfs_commit_transaction(trans);
    }
    return ret;
}

/*
 * This is somewhat expensive, updating the tree every time the
 * inode changes. But, it is most likely to find the inode in cache.
 *@@ -6409,11 +6527,6 @@
 * return ERR_PTR(ret);
 */

static inline u8 btrfs_inode_type(struct inode *inode)
{
    return btrfs_type_by_mode[(inode->i_mode & S_IFMT) >> S_SHIFT];
}

/*
 * utility function to add 'inode' into 'parent_inode' with
 * a give name and a given sequence number.
 *@@ -6465,8 +6578,18 @@
 btrfs_i_size_write(parent_inode, parent_inode->vfs_inode.i_size +

name_len * 2);
inode_inc_i-version(&parent_inode->vfs_inode);
-parent_inode->vfs_inode.i_mtime = parent_inode->vfs_inode.i_ctime =
-current_time(&parent_inode->vfs_inode);
+/
+ * If we are replaying a log tree, we do not want to update the mtime
+ * and cttime of the parent directory with the current time, since the
+ * log replay procedure is responsible for setting them to their correct
+ * values (the ones it had when the fsync was done).
+ */
+if (!test_bit(BTRFS_FS_LOG_RECOVERING, &root->fs_info->flags)) {
+struct timespec now = current_time(&parent_inode->vfs_inode);
+
+parent_inode->vfs_inode.i_mtime = now;
+parent_inode->vfs_inode.i_ctime = now;
+
} else if (add_backref) {
	u64 local_index;
	err = btrfs_del_inode_ref(trans, root, name, name_len,
		ino, parent_ino, &local_index);
+if (err)
+btrfs_abort_transaction(trans, err);
} else if (add_backref) {
	err = btrfs_del_root_ref(trans, fs_info, key.objectid,
	root->root_key.objectid, parent_ino,
	&local_index, name, name_len);
+
+if (err)
+btrfs_abort_transaction(trans, err);
} else if (add_backref) {
	err = btrfs_del_root_ref(trans, fs_info, key.objectid,
	root->root_key.objectid, parent_ino,
	&local_index, name, name_len);
+if (err)
+btrfs_abort_transaction(trans, err);
}
+/* Return the original error code */
return ret;
}
@@ -6554,8 +6682,7 @@
 goto out_unlock_inode;
 } else {
 btrfs_update_inode(trans, root, inode);
-
unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
}
out_unlock:
@@ -6632,8 +6759,7 @@
goto out_unlock_inode;

BTRFS_I(inode)->io_tree.ops = &btrfs_extent_io_ops;
-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);

out_unlock:
    btrfs_end_transaction(trans);
@@ -6712,6 +6838,7 @@
    if (err)
        goto fail;
    }
+BTRFS_I(inode)->last_link_trans = trans->transid;
    d_instantiate(dentry, inode);
    btrfs_log_new_name(trans, BTRFS_I(inode), NULL, parent);
}    @@ -6780,12 +6907,7 @@
    if (err)
        goto out_fail_inode;

-d_instantiate(dentry, inode);
-/*
- * mkdir is special. We're unlocking after we call d_instantiate
- * to avoid a race with nfsd calling d_instantiate.
- */
-unlock_new_inode(inode);
+d_instantiate_new(dentry, inode);
    drop_on_err = 0;

out_fail:
@@ -7016,6 +7138,14 @@
    extent_start = found_key.offset;
    if (found_type == BTRFS_FILE_EXTENT_REG ||
        found_type == BTRFS_FILE_EXTENT_PREALLOC) {
+/* Only regular file could have regular/prealloc extent */
+    if (!S_ISREG(inode->vfs_inode.i_mode)) {
+        err = -EUCLEAN;
+        btrfs_crit(fs_info,
+            "regular/prealloc extent found for non-regular inode %llu",
+            btrfs_ino(inode));
+        goto out;
+    }
    extent_end = extent_start +
        btrfs_file_extent_num_bytes(leaf, item);
extent_start);
} else if (found_type == BTRFS_FILE_EXTENT_INLINE) {
    size_t size;
    -size = btrfs_file_extent_inline_len(leaf, path->slots[0], item);
    +size = btrfs_file_extent_ram_bytes(leaf, item);
    extent_end = ALIGN(extent_start + size,
                       fs_info->sectorsize);
}

if (new_inline)
goto out;

-size = btrfs_file_extent_inline_len(leaf, path->slots[0], item);
+size = btrfs_file_extent_ram_bytes(leaf, item);
extent_offset = page_offset(page) + pg_offset - extent_start;
copy_size = min_t(u64, PAGE_SIZE - pg_offset,
                   size - extent_offset);

/*
 * existing will always be non-NULL, since there must be
 * extent causing the -EEXIST.
 */
@if (existing->start == em->start &&
   extent_map_end(existing) >= extent_map_end(em) &&
   em->block_start == existing->block_start) {
/*
 * The existing extent map already encompasses the
 * entire extent map we tried to add.
 */
+if (start >= existing->start &&
    start < extent_map_end(existing)) {
    free_extent_map(em);
    em = existing;
    err = 0;
-} else if (start >= extent_map_end(existing)) ||
-    start <= existing->start) {
+} else {
/*
 * The existing extent map is the one nearest to
 * the [start, start + len) range which overlaps
 @ @ -7186,10 -7310,6 @ @
    free_extent_map(em);
    em = NULL;
 } 
-} else {
- free_extent_map(em);
- em = existing;
- err = 0;
}
}
write_unlock(&em_tree->lock);
@@ -8538,7 +8658,6 @@
/* bio split */
ASSERT(map_length <= INT_MAX);
-atomic_inc(&dip->pending_bios);
do {
clone_len = min_t(int, submit_len, map_length);

@@ -8589,7 +8708,8 @@
if (!status)
 return 0;

-bio_put(bio);
+if (bio != orig_bio)
+bio_put(bio);
out_err:
dip->errors = 1;
/*
@@ -8629,7 +8749,7 @@
bio->bi_private = dip;
dip->orig_bio = bio;
dip->dio_bio = dio_bio;
-atomic_set(&dip->pending_bios, 0);
+atomic_set(&dip->pending_bios, 1);
io_bio = btrfs_io_bio(bio);
io_bio->logical = file_offset;

@@ -8777,9 +8897,6 @@
dio_dataoverwrite = 1;
inode_unlock(inode);
relock = true;
-} else if (iocb->ki_flags & IOCB_NOWAIT) {
-ret = -EAGAIN;
-goto out;
}
ret = btrfs_delalloc_reserve_space(inode, &data_reserved,
offset, count);
@@ -9017,20 +9134,17 @@
/*
 * Qgroup reserved space handler
 * Page here will be either
 * 1) Already written to disk
In this case, its reserved space is released from data rsv map and will be freed by delayed_ref handler finally. So even we call qgroup_free_data(), it won't decrease reserved space.

2) Not written to disk
This means the reserved space should be freed here. However, if a truncate invalidates the page (by clearing PageDirty) and the page is accounted for while allocating extent in btrfs_check_data_free_space() we let delayed_ref to free the entire extent.

1) Already written to disk or ordered extent already submitted
Then its QGROUP_RESERVED bit in io_tree is already cleaned.
Qgroup will be handled by its qgroup_record then.
btrfs_qgroup_free_data() call will do nothing here.

2) Not written to disk yet
Then btrfs_qgroup_free_data() call will clear the QGROUP_RESERVED bit of its io_tree, and free the qgroup reserved data space. Since the IO will never happen for this page.

@if (PageDirty(page))
btrfs_qgroup_free_data(inode, NULL, page_start, PAGE_SIZE);
@end

clear_extent_bit(tree, page_start, page_end, EXTENT_LOCKED | EXTENT_DIRTY |

/* page is wholly or partially inside EOF */
if (page_start + PAGE_SIZE > size)
-zero_start = size & ~PAGE_MASK;
+zero_start = offset_in_page(size);
else
-zero_start = PAGE_SIZE;
@end

BTRFS_EXTENT_DATA_KEY);
trans->block_rsv = &fs_info->trans_block_rsv;
if (ret != -ENOSPC && ret != -EAGAIN) {
-err = ret;
+if (ret < 0)
+err = ret;
break;
}

ei->index_cnt = (u64)-1;
ei->dir_index = 0;
ei->last_unlink_trans = 0;
+ei->last_link_trans = 0;
ei->last_log_commit = 0;
ei->delayed_iput_count = 0;

@@ -9571,6 +9687,7 @@
 kmem_cache_destroy(btrfs_trans_handle_cachep);
 kmem_cache_destroy(btrfs_path_cachep);
 kmem_cache_destroy(btrfs_free_space_cache);
+kmem_cache_destroy(btrfs_free_space_bitmap_cache);
 }

int btrfs_init_cachep(void)
@@ -9600,6 +9717,12 @@
 if (!btrfs_free_space_cachep)
 goto fail;

+ btrfs_free_space_bitmap_cachep = kmem_cache_create("btrfs_free_space_bitmap",
+ PAGE_SIZE, PAGE_SIZE,
+ SLAB_MEM_SPREAD, NULL);
+ if (!btrfs_free_space_bitmap_cachep)
+ goto fail;
+ return 0;
 fail:
 btrfs_destroy_cachep();
@@ -9661,17 +9784,23 @@
 u64 new_idx = 0;
 u64 root_objectid;
 int ret;
+ int ret2;
 bool root_log_pinned = false;
 bool dest_log_pinned = false;

 /* we only allow rename subvolume link between subvolumes */
-if (old_ino != BTRFS_FIRST_FREE_OBJECTID && root != dest)
+ /* For non-subvolumes allow exchange only within one subvolume, in the
+ * same inode namespace. Two subvolumes (represented as directory) can
+ * be exchanged as they're a logical link and have a fixed inode number.
+ */
+if (root != dest &&
+ (old_ino != BTRFS_FIRST_FREE_OBJECTID ||
+ new_ino != BTRFS_FIRST_FREE_OBJECTID))
 return -EXDEV;

 /* close the race window with snapshot create/destroy ioctl */
-if (old_ino == BTRFS_FIRST_FREE_OBJECTID)
-down_read(&fs_info->subvol_sem);
-if (new_ino == BTRFS_FIRST_FREE_OBJECTID)
+if (old_ino == BTRFS_FIRST_FREE_OBJECTID ||
    new_ino == BTRFS_FIRST_FREE_OBJECTID)
down_read(&fs_info->subvol_sem);

/*
@@ -9688,6 +9817,9 @@
goto out_notrans;
 */
+if (dest != root)
+btrfs_record_root_in_trans(trans, dest);
+
/*
* We need to find a free sequence number both in the source and
* in the destination directory for the exchange.
@@ -9857,11 +9989,11 @@
dest_log_pinned = false;
 */
-ret = btrfs_end_transaction(trans);
+ret2 = btrfs_end_transaction(trans);
+ret = ret ? ret : ret2;
out_notrans:
-if (new_ino == BTRFS_FIRST_FREE_OBJECTID)
-up_read(&fs_info->subvol_sem);
-if (old_ino == BTRFS_FIRST_FREE_OBJECTID)
+if (new_ino == BTRFS_FIRST_FREE_OBJECTID ||
    old_ino == BTRFS_FIRST_FREE_OBJECTID)
up_read(&fs_info->subvol_sem);

return ret;
@@ -10439,8 +10571,7 @@
goto out_unlock_inode;
 }

out_unlock:
btrfs_end_transaction(trans);
@@ -10468,6 +10599,7 @@
 struct btrfs_root *root = BTRFS_I(inode)->root;
 struct btrfs_key ins;
 u64 cur_offset = start;
+u64 clear_offset = start;
u64 i_size;
u64 cur_bytes;
u64 last_alloc = (u64)-1;
@@ -10502,6 +10634,15 @@
btrfs_end_transaction(trans);
 break;
 }
 +
 */
 + * We've reserved this space, and thus converted it from
 + * ->bytes_may_use to ->bytes_reserved. Any error that happens
 + * from here on out we will only need to clear our reservation
 + * for the remaining unreserved area, so advance our
 + * clear_offset by our extent size.
 + */
+curent_offset += ins.offset;
btrfs_dec_block_group_reservations(fs_info, ins.objectid);

last_alloc = ins.offset;
@@ -10582,9 +10723,9 @@
 if (own_trans)
btrfs_end_transaction(trans);
}
 -if (cur_offset < end)
- btrfs_free_reserved_data_space(inode, NULL, cur_offset,
- end - cur_offset + 1);
+if (clear_offset < end)
+ btrfs_free_reserved_data_space(inode, NULL, clear_offset,
+ end - clear_offset + 1);
 return ret;
}

@@ -10788,7 +10929,6 @@
 .set_range_writeback = btrfs_set_range_writeback,
 */ optional callbacks */
 - .fill_delalloc = run_delalloc_range,
 .writepage_end_io_hook = btrfs_writepage_end_io_hook,
 .writepage_start_hook = btrfs_writepage_start_hook,
 .set_bit_hook = btrfs_set_bit_hook,
--- linux-4.15.0.orig/fs/btrfs/ioctl.c
+++ linux-4.15.0/fs/btrfs/ioctl.c
@@ -365,12 +365,21 @@
 struct fstrim_range range;
 u64 minlen = ULLONG_MAX;
 u64 num_devices = 0;
 -u64 total_bytes = btrfs_super_total_bytes(fs_info->super_copy);
 int ret;
if (!capable(CAP_SYS_ADMIN))
    return -EPERM;

+/*
+ * If the fs is mounted with nologreplay, which requires it to be
+ * mounted in RO mode as well, we can not allow discard on free space
+ * inside block groups, because log trees refer to extents that are not
+ * pinned in a block group's free space cache (pinning the extents is
+ * precisely the first phase of replaying a log tree).
+ */
+if (btrfs_test_opt(fs_info, NOLOGREPLAY))
    return -EROFS;
+
rcu_read_lock();
list_for_each_entry_rcu(device, &fs_info->fs_devices->devices,
  dev_list) {
  @@ -389,11 +398,15 @@
    return -EOPNOTSUPP;
    if (copy_from_user(&range, arg, sizeof(range)))
        return -EFAULT;
-    if (range.start > total_bytes ||
-          range.len < fs_info->sb->s_blocksize)
-        range.len = min(range.len, total_bytes - range.start);
+    /*
+     * NOTE: Don't truncate the range using super->total_bytes. Bytenr of
+     * block group is in the logical address space, which can be any
+     * sectorsize aligned bytenr in the range [0, U64_MAX].
+     */
+    if (range.len < fs_info->sb->s_blocksize)
        return -EINVAL;
-    range.minlen = max(range.minlen, minlen);
    ret = btrfs_trim_fs(fs_info, &range);
    if (ret < 0)
        @@ -527,8 +540,6 @@
            btrfs_set_root_otransid(root_item, trans->transid);

            btrfs_tree_unlock(leaf);
            -free_extent_buffer(leaf);
            -leaf = NULL;

            btrfs_set_root_dirid(root_item, new_dirid);

            key.type = BTRFS_ROOT_ITEM_KEY;
            ret = btrfs_insert_root(trans, fs_info->tree_root, &key,
root_item);
- if (ret)
+ if (ret) {
+ /*
+ */
+ * Since we don't abort the transaction in this case, free the
+ * tree block so that we don't leak space and leave the
+ * filesystem in an inconsistent state (an extent item in the
+ * extent tree without backreferences). Also no need to have
+ * the tree block locked since it is not in any tree at this
+ * point, so no other task can find it and use it.
+ */
+ btrfs_free_tree_block(trans, root, leaf, 0, 1);
+ free_extent_buffer(leaf);
+ goto fail;
+ }
+ 
+ free_extent_buffer(leaf);
+ leaf = NULL;

key.offset = (u64)-1;
new_root = btrfs_read_fs_root_no_name(fs_info, &key);
@@ -580,12 +605,18 @@
btrfs_i_size_write(BTRFS_I(dir), dir->i_size + namelen * 2);
ret = btrfs_update_inode(trans, root, dir);
-BUG_ON(ret);
+if (ret) {
+btrfs_abort_transaction(trans, ret);
+goto fail;
+}
+
ret = btrfs_add_root_ref(trans, fs_info,
objectid, root->root_key.objectid,
btrfs_ino(BTRFS_I(dir)), index, name, namelen);
-BUG_ON(ret);
+if (ret) {
+btrfs_abort_transaction(trans, ret);
+goto fail;
+}
+
ret = btrfs_uuid_tree_add(trans, fs_info, root_item->uuid,
BTRFS_UUID_KEY_SUBVOL, objectid);
@@ -632,6 +663,7 @@
struct btrfs_pending_snapshot *pending_snapshot;
struct btrfs_trans_handle *trans;
int ret;
+bool snapshot_force_cow = false;
if (!test_bit(BTRFS_ROOT_REF_COWS, &root->state))
return -EINVAL;
@@ -648,6 +680,11 @@ goto free_pending;

+/*
+ * Force new buffered writes to reserve space even when NOCOW is
+ * possible. This is to avoid later writeback (running dealloc) to
+ * fallback to COW mode and unexpectedly fail with ENOSPC.
+ */
atomic_inc(&root->will_be_snapshotted);
smp_mb__after_atomic();
/* wait for no snapshot writes */
@@ -658,6 +695,14 @@ if (ret)
goto dec_and_free;

+/*
+ * All previous writes have started writeback in NOCOW mode, so now
+ * we force future writes to fallback to COW mode during snapshot
+ * creation.
+ */
+atomic_inc(&root->snapshot_force_cow);
+snapshot_force_cow = true;
+
+ btrfs_wait_ordered_extents(root, U64_MAX, 0, (u64)-1);

btrfs_init_block_rsv(&pending_snapshot->block_rsv,
@@ -723,6 +768,8 @@ fail:
btrfs_subvolume_release_metadata(fs_info, &pending_snapshot->block_rsv);
dec_and_free:
+if (snapshot_force_cow)
+atomic_dec(&root->snapshot_force_cow);
if (atomic_dec_and_test(&root->will_be_snapshotted))
    wake_up_atomic_t(&root->will_be_snapshotted);
free_pending:
@@ -1090,6 +1137,7 @@ u64 page_start;
u64 page_end;
u64 page_cnt;
+u64 start = (u64)start_index << PAGE_SHIFT;
int ret;
int i;
int i_done;
@@ -1106,8 +1154,7 @@ page_cnt = min_t(u64, (u64)num_pages, (u64)file_end - start_index + 1);
ret = btrfs_delalloc_reserve_space(inode, &data_reserved,
-start_index << PAGE_SHIFT,
-page_cnt << PAGE_SHIFT);
+start, page_cnt << PAGE_SHIFT);
if (ret)
return ret;
i_done = 0;
@@ -1194,11 +1241,10 @@
if (i_done != page_cnt) {
spin_lock(&BTRFS_I(inode)->lock);
-BTRFS_I(inode)->outstanding_extents++;
+btfs_mod_outstanding_extents(BTRFS_I(inode), 1);
spin_unlock(&BTRFS_I(inode)->lock);
btfs_delalloc_release_space(inode, data_reserved,
-start_index << PAGE_SHIFT,
-(page_cnt - i_done) << PAGE_SHIFT);
+start, (page_cnt - i_done) << PAGE_SHIFT);
}
@@ -1226,8 +1272,7 @@
put_page(pages[i]);
} btfs_delalloc_release_space(inode, data_reserved,
-start_index << PAGE_SHIFT,
-page_cnt << PAGE_SHIFT);
+start, page_cnt << PAGE_SHIFT);
btfs_delallocReleaseExtents(BTRFS_I(inode), page_cnt << PAGE_SHIFT);
extent_changeset_free(data_reserved);
return ret;
@@ -1495,7 +1540,7 @@
btrfs_info(fs_info, "resizing devid %llu", devid);
}
-device = btrfs_find_device(fs_info, devid, NULL, NULL);
+device = btrfs_find_device(fs_info->fs_devices, devid, NULL, NULL, true);
if (!device) {
btfs_info(fs_info, "resizer unable to find device %llu", devid);
@@ -1987,9 +2032,14 @@
sh.len = item_len;
sh.transid = found_transid;

-/* copy search result header */
-if (copy_to_user(ubuf + *sk_offset, &sh, sizeof(sh))) {
-ret = -EFAULT;

/*
 * Copy search result header. If we fault then loop again so we
 * can fault in the pages and -EFAULT there if there's a
 * problem. Otherwise we'll fault and then copy the buffer in
 * properly this next time through
 */
+if (probe_user_write(ubuf + *sk_offset, &sh, sizeof(sh))) {
+    ret = 0;
+    goto out;
+}
@@ -1997,10 +2047,14 @@
if (item_len) {
    char __user *up = ubuf + *sk_offset;
-/* copy the item */
-    if (read_extent_buffer_to_user(leaf, up,
-        item_off, item_len)) {
-        ret = -EFAULT;
-    } /* Copy the item, same behavior as above, but reset the
-              * sk_offset so we copy the full thing again.
- */
+    if (read_extent_buffer_to_user_nofault(leaf, up,
+        item_off, item_len)) {
+        ret = 0;
+        *sk_offset -= sizeof(sh);
+        goto out;
+}
@@ -2088,6 +2142,11 @@
key.offset = sk->min_offset;

while (1) {
+    ret = fault_in_pages_writeable(ubuf + sk_offset,
+        *buf_size - sk_offset);
+    if (ret)
+        break;
+    ret = btrfs_search_forward(root, &key, path, sk->min_transid);
    if (ret != 0) {
        if (ret > 0)
@@ -2667,8 +2726,10 @@
/* Check for compatibility reject unknown flags */
-    if (vol_args->flags & ~BTRFS_VOL_ARG_V2_FLAGS_SUPPORTED)
-        return -EOPNOTSUPP;
-return -EOPNOTSUPP;
+if (vol_args->flags & ~BTRFS_VOL_ARG_V2_FLAGS_SUPPORTED) {
+  ret = -EOPNOTSUPP;
+  goto out;
+}

if (test_and_set_bit(BTRFS_FS_EXCL_OP, &fs_info->flags)) {
  ret = BTRFS_ERROR_DEV_EXCL_RUN_IN_PROGRESS;
  @@ -2791,7 +2852,8 @@
    s_uuid = di_args->uuid;

  mutex_lock(&fs_devices->device_list_mutex);
-  dev = btrfs_find_device(fs_info, di_args->devid, s_uuid, NULL);
+  dev = btrfs_find_device(fs_info->fs_devices, di_args->devid, s_uuid, NULL, true);
  if (!dev) {
    ret = -ENODEV;
  @@ -3141,6 +3203,27 @@
    len = round_down(i_size_read(src), sz) - loff;
    if (len == 0)
      return 0;
    olen = len;
+  } else {
+    /* If the source and destination inodes are different, the
+     * source's range end offset matches the source's i_size, that
+     * i_size is not a multiple of the sector size, and the
+     * destination range does not go past the destination's i_size,
+     * we must round down the length to the nearest sector size
+     * multiple. If we don't do this adjustment we end replacing
+     * with zeroes the bytes in the range that starts at the
+     * deduplication range's end offset and ends at the next sector
+     * size multiple.
+     */
+    if (loff + olen == i_size_read(src) &&
+        dst_loff + len < i_size_read(dst)) {
+      const u64 sz = BTRFS_I(src)->root->fs_info->sectorsize;
+      len = round_down(i_size_read(src), sz) - loff;
+      if (len == 0)
+        return 0;
+      olen = len;
+    }
+  }
+
/* don't make the dst file partly checksummed */
@@ -3776,6 +3859,8 @@
  ret = -EINTR;
  goto out;
+cond_resched();
}
ret = 0;

@@ -3846,11 +3931,6 @@
src->i_sb != inode->i_sb)
return -EXDEV;

-/* don't make the dst file partly checksummed */
-if ((BTRFS_I(src)->flags & BTRFS_INODE_NODATASUM) !=
-    (BTRFS_I(inode)->flags & BTRFS_INODE_NODATASUM))
-return -EINVAL;
-
-if (S_ISDIR(src->i_mode) || S_ISDIR(inode->i_mode))
return -EISDIR;

@@ -3860,15 +3940,30 @@
inode_lock(src);
}

+/* don't make the dst file partly checksummed */
+if ((BTRFS_I(src)->flags & BTRFS_INODE_NODATASUM) !=
+    (BTRFS_I(inode)->flags & BTRFS_INODE_NODATASUM)) {
+    ret = -EINVAL;
+    goto out_unlock;
+}
+
+/* determine range to clone */
-ret = -EINVAL;
-if (off + len > src->i_size || off + len < off)
goto out_unlock;
-if (len == 0)
olen = len = src->i_size - off;
-/* if we extend to eof, continue to block boundary */
-if (off + len == src->i_size)
+
+/* If we extend to eof, continue to block boundary if and only if the
+ destination end offset matches the destination file's size, otherwise
+ we would be corrupting data by placing the eof block into the middle
+ of a file.
+ */
+if (off + len == src->i_size) {
+    if (!IS_ALIGNED(len, bs) && destoff + len < inode->i_size)
+        goto out_unlock;
+    len = ALIGN(src->i_size, bs) - off;
+}
if (len == 0) {
    ret = 0;
    --- linux-4.15.0.orig/fs/btrfs/ordered-data.c
    +++ linux-4.15.0/fs/btrfs/ordered-data.c
    @@ -855,10 +855,15 @@
    } btrfs_start_ordered_extent(inode, ordered, 1);
    end = ordered->file_offset;
    /*
    * If the ordered extent had an error save the error but don't
    * exit without waiting first for all other ordered extents in
    * the range to complete.
    * /
    if (test_bit(BTRFS_ORDERED_IOERR, &ordered->flags))
        ret = -EIO;
    btrfs_put_ordered_extent(ordered);
    -if (ret || end == 0 || end == start)
    +if (end == 0 || end == start)
        break;
    end--;
} --- linux-4.15.0.orig/fs/btrfs/print-tree.c
+++ linux-4.15.0/fs/btrfs/print-tree.c
@@ -116,9 +116,10 @@
    /*
    * offset is supposed to be a tree block which
    * must be aligned to nodelsize.
    * /
    -if (!IS_ALIGNED(offset, eb->fs_info->nodesize))
    -pr_info("\t\t \t\t(parent %llu is NOT ALIGNED to nodelsize %llu)\n",
    -offset, (unsigned long long)eb->fs_info->nodesize);
    +if (!IS_ALIGNED(offset, eb->fs_info->sectorsize))
    +pr_info(
    +"\t\t \t\t(parent %llu not aligned to sectorsize %u)\n",
    +offset, eb->fs_info->sectorsize);
    break;
    case BTRFS_EXTENT_DATA_REF_KEY:
    dref = (struct btrfs_extent_data_ref *)&iref->offset;
    @@ -133,8 +134,9 @@
    /*
    if (!IS_ALIGNED(offset, eb->fs_info->nodesize))
    -pr_info("\t\t \t\t(parent %llu is NOT ALIGNED to nodelsize %llu)\n",
    -offset, (unsigned long long)eb->fs_info->nodesize);
    +pr_info(
    +"\t\t \t\t(parent %llu not aligned to sectorsize %u)\n",
    +offset, eb->fs_info->sectorsize);
    break;
default:
pr_cont("(extent %llu has INVALID ref type %d)\n", @@ -259,8 +261,8 @@
   struct btrfs_file_extent_item);
if (btrfs_file_extent_type(l, fi) ==
   BTRFS_FILE_EXTENT_INLINE) {
   pr_info("\tinline extent data size %u\n", @@ -259,8 +261,8 @@
      btrfs_file_extent_inline_len(l, i, fi));
   pr_info("\tinline extent data size %llu\n", +btrfs_file_extent_ram_bytes(l, fi));
   break;
}
pr_info("\textent data disk bytenr %llu nr %llu\n", @@ -365,9 +367,13 @@
      btrfs_node_blockptr(c, i));
}
for (i = 0; i < nr; i++) {
   struct extent_buffer *next = read_tree_block(fs_info,
   btrfs_node_blockptr(c, i),
   btrfs_node_ptr_generation(c, i));
   struct btrfs_key first_key;
   struct extent_buffer *next;
   +btrfs_node_key_to_cpu(c, &first_key, i);
   +next = read_tree_block(fs_info, btrfs_node_blockptr(c, i),
   +btrfs_node_ptr_generation(c, i),
   +level - 1, &first_key);
   if (IS_ERR(next)) {
      continue;
   } else if (!extent_buffer_uptodate(next)) {
--- linux-4.15.0.orig/fs/btrfs/props.c
+++ linux-4.15.0/fs/btrfs/props.c
@@ -386,11 +386,7 @@
static int prop_compression_validate(const char *value, size_t len)
{
   -if (!strncmp("lzo", value, len))
      -return 0;
   -else if (!strncmp("zlib", value, len))
      -return 0;
   -else if (!strncmp("zstd", value, len))
      +if (btrfs_compress_is_valid_type(value, len))
         return 0;
      return -EINVAL;
      @@ -400,6 +396,7 @@
      const char *value,
      size_t len)

struct btrfs_fs_info *fs_info = btrfs_sb(inode->i_sb);
int type;

if (len == 0) {
    return 0;
}

if (!strncmp("lzo", value, 3)) {
    type = BTRFS_COMPRESS_LZO;
} else if (!strncmp("zlib", value, 4)) {
    btrfs_set_fs_incompat(fs_info, COMPRESS_LZO);
} else if (!strncmp("zstd", value, 4)) {
    type = BTRFS_COMPRESS_ZSTD;
} else {
    return -EINVAL;
}

BTRFS_I(inode)->flags &= ~BTRFS_INODE_NOCOMPRESS;
BTRFS_I(inode)->flags |= BTRFS_INODE_COMPRESS;

out:
btrfs_free_path(path);
fs_info->qgroup_flags |= flags;
if (!fs_info->qgroup_flags & BTRFS_QGROUP_STATUS_FLAG_ON)
clear_bit(BTRFS_FS_QUOTA_ENABLED, &fs_info->flags);
else if (fs_info->qgroup_flags & BTRFS_QGROUP_STATUS_FLAG_RESCAN &&
    ret >= 0)
    ret = qgroup_rescan_init(fs_info, rescan_progress, 0);
-btrfs_free_path(path);

if (ret < 0) {
    ulist_free(fs_info->qgroup_ulist);
    return ret;
}
static int update_qgroup_status_item(struct btrfs_trans_handle *trans,  
     struct btrfs_fs_info *fs_info,  
     struct btrfs_root *root)  
{  
    struct btrfs_fs_info *fs_info = trans->fs_info;  
    struct btrfs_root *quota_root = fs_info->quota_root;  
    struct btrfs_path *path;  
    struct btrfs_key key;  
    struct extent_buffer *l;  
    @ @ -741,7 +741,7 @ @  
    if (!path)  
        return -ENOMEM;  
    ret = btrfs_search_slot(trans, quota_root, &key, path, 0, 1);  
    if (ret > 0)  
        ret = -ENOENT;  
    @@ -1609,7 +1609,7 @@  
    return 0;  
    }  
   @@ -1640,6 +1640,7 @@  
    level = root_level;  
    while (level >= 0) {  
    if (path->nodes[level] == NULL) {  
        +struct btrfs_key first_key;  
        int parent_slot;  
        u64 child_gen;  
        u64 child_bytenr;  
        @ @ -1652,8 +1653,10 @ @  
        parent_slot = path->slots[level + 1];  
        child_bytenr = btrfs_node_blockptr(eb, parent_slot);  
        child_gen = btrfs_node_ptr_generation(eb, parent_slot);  
        +btrfs_node_key_to_cpu(eb, &first_key, parent_slot);  
    -eb = read_tree_block(fs_info, child_bytenr, child_gen);  
    +eb = read_tree_block(fs_info, child_bytenr, child_gen,  
        +     level, &first_key);  
    if (IS_ERR(eb)) {  
        ret = PTR_ERR(eb);  
        goto out;  
    }  
    }  
}
u64 nr_old_roots = 0;

int ret = 0;

/**
 * If quotas get disabled meanwhile, the resources need to be freed and
 * we can't just exit here.
 */
if (!test_bit(BTRFS_FS_QUOTA_ENABLED, &fs_info->flags))
-  return 0;
+  goto out_free;

if (new_roots) {
if (!maybe_fs_roots(new_roots))
-  return 0;
+  goto out_free;

  // fs_info->qgroup_flags &= ~BTRFS_QGROUP_STATUS_FLAG_ON;
spin_unlock(&fs_info->qgroup_lock);

  ret = update_qgroup_status_item(trans, fs_info, quota_root);
+  ret = update_qgroup_status_item(trans);
  if (ret)
    fs_info->qgroup_flags |= BTRFS_QGROUP_STATUS_FLAG_INCONSISTENT;

  ret = qgroup_rescan_init(fs_info, 0, 1);
if (!ret) {
    qgroup_rescan_zero_tracking(fs_info);
+    fs_info->qgroup_rescan_running = true;
    btrfs_queue_work(fs_info->qgroup_rescan_workers,
      &fs_info->qgroup_rescan_work);
  }
}

int ret = 0;
int i;

u64 *i_qgroups;
struct btrfs_root *quota_root = fs_info->quota_root;
+  committing = false;
+  struct btrfs_root *quota_root;
struct btrfs_qgroup *srcgroup;
struct btrfs_qgroup *dstgroup;
+  bool need_rescan = false;
  u32 level_size = 0;
  u64 nums;

  - mutex_lock(&fs_info->qgroup_ioctl_lock);
+/**
 * There are only two callers of this function.
 */

One in create_subvol() in the ioctl context, which needs to hold
the qgroup_ioctl_lock.

The other one in create_pending_snapshot() where no other qgroup
code can modify the fs as they all need to either start a new trans
or hold a trans handler, thus we don't need to hold
qgroup_ioctl_lock.

This would avoid long and complex lock chain and make lockdep happy.

+spin_lock(&fs_info->trans_lock);

if (trans->transaction->state == TRANS_STATE_COMMIT_DOING)
committing = true;

spin_unlock(&fs_info->trans_lock);
+if (!committing)

if (!test_bit(BTRFS_FS_QUOTA_ENABLED, &fs_info->flags))
goto out;

+quota_root = fs_info->quota_root;

if (!quota_root) {
ret = -EINVAL;
goto out;
 goto unlock;
}
++i_qgroups;

/*
 * If we're doing a snapshot, and adding the snapshot to a new
 * qgroup, the numbers are guaranteed to be incorrect.
 */
+if (srcid)

need_rescan = true;
}
for (i = 0; i < inherit->num_ref_copies; ++i, i_qgroups += 2) {
 dst->rfer = src->rfer - level_size;
dst->rfer_cmpr = src->rfer_cmpr - level_size;
+
/* Manually tweaking numbers certainly needs a rescan */
+need_rescan = true;
}
for (i = 0; i < inherit->num_excl_copies; ++i, i_qgroups += 2) {
struct btrfs_qgroup *src;


dst->excl = src->excl + level_size;
dst->excl_cmpr = src->excl_cmpr + level_size;
+need_rescan = true;
}

unlock:
spin_unlock(&fs_info->qgroup_lock);
out:
-mutex_unlock(&fs_info->qgroup_ioctl_lock);
+if (!committing)
+mutex_unlock(&fs_info->qgroup_ioctl_lock);
+if (need_rescan)
+fs_info->qgroup_flags |= BTRFS_QGROUP_STATUS_FLAG_INCONSISTENT;
return ret;
}

@@ -2500,6 +2543,21 @@
}

/*
+ * Check if the leaf is the last leaf. Which means all node pointers
+ * are at their last position.
+ */
+static bool is_last_leaf(struct btrfs_path *path)
+{
+int i;
+
+for (i = 1; i < BTRFS_MAX_LEVEL && path->nodes[i]; i++) {
+if (path->slots[i] != btrfs_header_nritems(path->nodes[i]) - 1)
+return false;
+}
+return true;
+}
+
+/*
 * returns < 0 on error, 0 when more leafs are to be scanned.
 * returns 1 when done.
 */
@@ -2512,6 +2570,7 @@
struct ulist *roots = NULL;
struct seq_list tree_mod_seq_elem = SEQ_LIST_INIT(tree_mod_seq_elem);
u64 num_bytes;
+bool done;
int slot;
int ret;

@@ -2540,6 +2599,7 @@
mutex_unlock(&fs_info->qgroup_rescan_lock);
return ret;
}
+done = is_last_leaf(path);

btrfs_item_key_to_cpu(path->nodes[0], &found,
  btrfs_header_nritems(path->nodes[0]) - 1);
@@ -2586,9 +2646,19 @@
} btrfs_put_tree_mod_seq(fs_info, &tree_mod_seq_elem);

+if (done && !ret) {
+ret = 1;
+fs_info->qgroup_rescan_progress.objectid = (u64)-1;
+}
return ret;
}

+static bool rescan_should_stop(struct btrfs_fs_info *fs_info)
+{
+return btrfs_fs_closing(fs_info) ||
+test_bit(BTRFS_FS_STATE_REMOUNTING, &fs_info->fs_state);
+}
+
static void btrfs_qgroup_rescan_worker(struct btrfs_work *work)
{
 struct btrfs_fs_info *fs_info = container_of(work, struct btrfs_fs_info,
 @@ -2597,13 +2667,14 @@
 struct btrfs_trans_handle *trans = NULL;
 int err = -ENOMEM;
 int ret = 0;
 +bool stopped = false;

 path = btrfs_alloc_path();
 if (!path)
 goto out;

 err = 0;
-while (err && !btrfs_fs_closing(fs_info)) {
+while (err && !stopped = rescan_should_stop(fs_info)) {
 trans = btrfs_start_transaction(fs_info->fs_root, 0);
 if (IS_ERR(trans)) {
 err = PTR_ERR(trans);
 @@ -2624,9 +2695,6 @@
 btrfs_free_path(path);
 mutex_lock(&fs_info->qgroup_rescan_lock);
 -if (!btrfs_fs_closing(fs_info))

-fs_info->qgroup_flags &= ~BTRFS_QGROUP_STATUS_FLAG_RESCAN;
-
if (err > 0 &&
    fs_info->qgroup_flags & BTRFS_QGROUP_STATUS_FLAG_INCONSISTENT) {
    fs_info->qgroup_flags &= ~BTRFS_QGROUP_STATUS_FLAG_INCONSISTENT;
    trans = btrfs_start_transaction(fs_info->quota_root, 1);
if (IS_ERR(trans)) {
    err = PTR_ERR(trans);
    trans = NULL;
    btrfs_err(fs_info,
        "fail to start transaction for status update: %d",
        err);
    goto done;
}
    ret = update_qgroup_status_item(trans, fs_info, fs_info->quota_root);
    if (ret < 0) {
        err = ret;
        btrfs_err(fs_info, "fail to update qgroup status: %d", err);
        + mutex_lock(&fs_info->qgroup_rescan_lock);
        + if (!stopped)
            +fs_info->qgroup_flags &= ~BTRFS_QGROUP_STATUS_FLAG_RESCAN;
            +if (trans) {
                +ret = update_qgroup_status_item(trans);
                +if (ret < 0) {
                    +err = ret;
                    +btrfs_err(fs_info, "fail to update qgroup status: %d", + err);
                    +}
                }
        +fs_info->qgroup_rescan_running = false;
        +complete_all(&fs_info->qgroup_rescan_completion);
        +mutex_unlock(&fs_info->qgroup_rescan_lock);
        +
        +if (!trans)
            +return;
        +
        btrfs_end_transaction(trans);
        -if (btrfs_fs_closing(fs_info)) {
            +if (stopped) {
                btrfs_info(fs_info, "qgroup scan paused");
            } else if (err >= 0) {
                btrfs_info(fs_info, "qgroup scan completed%s",
                    + @ @ -2662,12 +2744,6 @@
                } else {
                    btrfs_err(fs_info, "qgroup scan failed with %d", err);
            }
mutex_lock(&fs_info->qgroup_rescan_lock);
-fs_info->qgroup_rescan_running = false;
-mutex_unlock(&fs_info->qgroup_rescan_lock);
-complete_all(&fs_info->qgroup_rescan_completion);
}

/*@ -2708,7 +2784,6 @@*/
sizeof(fs_info->qgroup_rescan_progress));
fs_info->qgroup_rescan_progress.objectid = progress_objectid;
init_completion(&fs_info->qgroup_rescan_completion);
-fs_info->qgroup_rescan_running = true;
spin_unlock(&fs_info->qgroup_lock);
mutex_unlock(&fs_info->qgroup_rescan_lock);
/*@ -2742,6 +2817,7 @@*/
qgroup->rfer_cmpr = 0;
qgroup->excl = 0;
qgroup->excl_cmpr = 0;
+qgroup_dirty(fs_info, qgroup);
}
spin_unlock(&fs_info->qgroup_lock);
}
/*@ -2780,8 +2856,11 @@*/
qgroup_rescan_zero_tracking(fs_info);

+mutex_lock(&fs_info->qgroup_rescan_lock);
+fs_info->qgroup_rescan_running = true;
btrfs_queue_work(fs_info->qgroup_rescan_workers,
    &fs_info->qgroup_rescan_work);
+mutex_unlock(&fs_info->qgroup_rescan_lock);

return 0;
}
/*@ -2817,9 +2896,13 @@*/
void
btrfs_qgroup_rescan_resume(struct btrfs_fs_info *fs_info)
{
-if (fs_info->qgroup_flags & BTRFS_QGROUP_STATUS_FLAG_RESCAN)
+if (fs_info->qgroup_flags & BTRFS_QGROUP_STATUS_FLAG_RESCAN) {
    +mutex_lock(&fs_info->qgroup_rescan_lock);
    +fs_info->qgroup_rescan_running = true;
    btrfs_queue_work(fs_info->qgroup_rescan_workers,
        &fs_info->qgroup_rescan_work);
mutex_unlock(&fs_info->qgroup_rescan_lock);
+
}

/*
 * EXTENT_QGROUP_RESERVED, we won't double free.
 * So not need to rush.
 */
- ret = clear_record_extent_bits(&BTRFS_I(inode)->io_failure_tree,
+ ret = clear_record_extent_bits(&BTRFS_I(inode)->io_tree,
 free_start, free_start + free_len - 1, 
EXTENT_QGROUP_RESERVED, &changeset);
if (ret < 0)
@@ -2951,6 +3034,10 @@
int trace_op = QGROUP_RELEASE;
int ret;

+if (!test_bit(BTRFS_FS_QUOTA_ENABLED, 
+ &BTRFS_I(inode)->root->fs_info->flags))
+return 0;
+
/* In release case, we shouldn't have @reserved */
WARN_ON(!free && &reserved);
if (free && reserved) 
--- linux-4.15.0.orig/fs/btrfs/qgroup.h
+++ linux-4.15.0/fs/btrfs/qgroup.h
@@ -232,6 +232,8 @@
static inline void btrfs_qgroup_free_delayed_ref(struct btrfs_fs_info *fs_info, 
 u64 ref_root, u64 num_bytes)
 {
+if (!test_bit(BTRFS_FS_QUOTA_ENABLED, &fs_info->flags))
+return;
 trace_btrfs_qgroup_free_delayed_ref(fs_info, ref_root, num_bytes);
btrfs_qgroup_free_refroot(fs_info, ref_root, num_bytes);
}
--- linux-4.15.0.orig/fs/btrfs/raid56.c
+++ linux-4.15.0/fs/btrfs/raid56.c
@@ -858,10 +858,17 @@
kfree(rbio);
}

-static void free_raid_bio(struct btrfs_raid_bio *rbio)
+static void rbio_endio_bio_list(struct bio *cur, blk_status_t err)
+{
+ unlock_stripe(rbio);
 - __free_raid_bio(rbio);
+struct bio *next;


+while (cur) {
+next = cur->bi_next;
+cur->bi_next = NULL;
+cur->bi_status = err;
+bio_endio(cur);
+cur = next;
+}
}

/*@ -871.20 +878.26 @*/
static void rbio_orig_end_io(struct btrfs_raid_bio *rbio, blk_status_t err)
{
struct bio *cur = bio_list_get(&rbio->bio_list);
-struct bio *next;
+struct bio *extra;

if (rbio->generic_bio_cnt)
btrfs_bio_counter_sub(rbio->fs_info, rbio->generic_bio_cnt);

-free_raid_bio(rbio);
+/*
+ * At this moment, rbio->bio_list is empty, however since rbio does not
+ * always have RBIO_RMW_LOCKED_BIT set and rbio is still linked on the
+ * hash list, rbio may be merged with others so that rbio->bio_list
+ * becomes non-empty.
+ * Once unlock_stripe() is done, rbio->bio_list will not be updated any
+ * more and we can call bio_endio() on all queued bios.
+ */
+unlock_stripe(rbio);
+extra = bio_list_get(&rbio->bio_list);
+__free_raid_bio(rbio);

-while (cur) {
-next = cur->bi_next;
-cur->bi_next = NULL;
-cur->bi_status = err;
-bio_endio(cur);
-cur = next;
-}
+rbio_endio_bio_list(cur, err);
+if (extra)
+rbio_endio_bio_list(extra, err);
}

/*@ -1177.22 +1190.19 @*/
int nr_data = rbio->nr_data;
int stripe;
int pagenr;
-int p_stripe = -1;
-int q_stripe = -1;
+bool has_qstripe;
struct bio_list bio_list;
struct bio *bio;
int ret;

bio_list_init(&bio_list);

-if (rbio->real_stripes - rbio->nr_data == 1) {
- p_stripe = rbio->real_stripes - 1;
} else if (rbio->real_stripes - rbio->nr_data == 2) {
- p_stripe = rbio->real_stripes - 2;
- q_stripe = rbio->real_stripes - 1;
} else {
+if (rbio->real_stripes - rbio->nr_data == 1)
+ has_qstripe = false;
+else if (rbio->real_stripes - rbio->nr_data == 2)
+ has_qstripe = true;
+else
BUG();
-}

/* at this point we either have a full stripe, * or we've read the full stripe from the drive.@@ -1236,7 +1246,7 @@
SetPageUptodate(p);
pointers[stripe++] = kmap(p);

-if (q_stripe != -1) {
+if (has_qstripe) {

/*
 * raid6, add the qstripe and call the
 @@ -1351,6 +1361,7 @@
 stripe_start = stripe->physical;
 if (physical >= stripe_start &&
 physical < stripe_start + rbio->stripe_len &&
 + stripe->dev->bdev &&
 bio->bi_disk == stripe->dev->bdev->bd_disk &&
 bio->bi_partno == stripe->dev->bdev->bd_partno) {
 return i;
@@ -1435,14 +1446,13 @@
 */
 static void set_bio_pages_uptodate(struct bio *bio)
{
-struct bio_vec bvec;
-struct bvec_iter iter;
+struct bio_vec *bvec;
+int i;

-if (bio_flagged(bio, BIO_CLONED))
-bio->bi_iter = btrfs_io_bio(bio)->iter;
+ASSERT(!bio_flagged(bio, BIO_CLONED));

-bio_for_each_segment(bvec, bio, iter)
-SetPageUptodate(bvec.bv_page);
+bio_for_each_segment_all(bvec, bio, i)
+SetPageUptodate(bvec->bv_page);
}

/*@ -2170,11 +2180,21 @@*/
}

/*@*/
/*
 * reconstruct from the q stripe if they are
 * asking for mirror 3
 +* Loop retry:
 +* for 'mirror == 2', reconstruct from all other stripes.
 +* for 'mirror_num > 2', select a stripe to fail on every retry.
 */
-if (mirror_num == 3)
-rbio->failb = rbio->real_stripes - 2;
+if (mirror_num > 2) {
+/*
 +* 'mirror == 3' is to fail the p stripe and
 +* reconstruct from the q stripe. 'mirror > 3' is to
 +* fail a data stripe and reconstruct from p+q stripe.
 +*/
+rbio->failb = rbio->real_stripes - (mirror_num - 1);
+ASSERT(rbio->failb > 0);
+if (rbio->failb <= rbio->faila)
+rbio->failb--;
+

ret = lock_stripe_add(rbio);

@@ -2319,8 +2339,7 @@
 int nr_data = rbio->nr_data;
 int stripe;
 int pagenr;
-int p_stripe = -1;

-int q_stripe = -1;
+bool has_qstripe;
struct page *p_page = NULL;
struct page *q_page = NULL;
struct bio_list bio_list;
@@ -2330,14 +2349,12 @@
bio_list_init(&bio_list);

-    -if (rbio->real_stripes - rbio->nr_data == 1) {
-        p_stripe = rbio->real_stripes - 1;
-    } else if (rbio->real_stripes - rbio->nr_data == 2) {
-        p_stripe = rbio->real_stripes - 2;
-        q_stripe = rbio->real_stripes - 1;
-    } else {
+    if (rbio->real_stripes - rbio->nr_data == 1)
+        has_qstripe = false;
+    else if (rbio->real_stripes - rbio->nr_data == 2)
+        has_qstripe = true;
+    else
+        BUG();
+    }

    if (bbio->num_tgtdevs && bbio->tgtdev_map[rbio->scrubp]) {
        is_replace = 1;
@@ -2359,17 +2376,22 @@
goto cleanup;
    SetPageUptodate(p_page);

-    -if (q_stripe != -1) {
+    if (has_qstripe) {
+/* RAID6, allocate and map temp space for the Q stripe */
        q_page = alloc_page(GFP_NOFS | __GFP_HIGHMEM);
        if (!q_page) {
            __free_page(p_page);
            goto cleanup;
        }
        pointers[rbio->real_stripes - 1] = kmap(q_page);
    }

    atomic_set(&rbio->error, 0);

+/* Map the parity stripe just once */
+    pointers[nr_data] = kmap(p_page);
+    for_each_set_bit(pagenr, rbio->dbitmap, rbio->stripe_npages) {
        struct page *p;

    atomic_set(&rbio->error, 0);
void *parity;

 pointers[stripe] = kmap(p);
}

/* then add the parity stripe */
- pointers[stripe++] = kmap(p_page);
-
- if (q_stripe != -1) {
-
- /* raid6, add the qstripe and call the
- * library function to fill in our p/q
- */
- pointers[stripe++] = kmap(q_page);
-
+ if (has_qstripe) {
+ /* RAID6, call the library function to fill in our P/Q */
raid6_call_gen_syndrome(rbio->real_stripes, PAGE_SIZE, pointers);
} else {

- if (q_page)
- 		kunmap(q_page);
- __free_page(q_page);
+ if (q_page) {
+ 		kunmap(q_page);
+ __free_page(q_page);
+ }

writeback:
/

/*
--- linux-4.15.0.orig/fs/btrfs/reada.c
+++ linux-4.15.0/fs/btrfs/reada.c
@@ -456,6 +456,8 @@
}

have_zone = 1;
}
+ if (!have_zone)
+ radix_tree_delete(&fs_info->reada_tree, index);
spin_unlock(&fs_info->reada_lock);
btrfs_dev_replace_unlock(&fs_info->dev_replace, 0);

static void reada_start_machine_worker(struct btrfs_work *work)
{
    struct reada_machine_work *rmw;
    struct btrfs_fs_info *fs_info;
    int old_ioprio;
    rmw = container_of(work, struct reada_machine_work, work);
    -fs_info = rmw->fs_info;
    -kfree(rmw);

    old_ioprio = IOPRIO_PRIO_VALUE(task_nice_ioclass(current),
        task_nice_ioprio(current));
    set_task_ioprio(current, BTRFS_IOPRIO_READA);
    -__reada_start_machine(fs_info);
    +__reada_start_machine(rmw->fs_info);
    set_task_ioprio(current, old_ioprio);

    -atomic_dec(&fs_info->reada_works_cnt);
    +atomic_dec(&rmw->fs_info->reada_works_cnt);
    +kfree(rmw);
}

static void __reada_start_machine(struct btrfs_fs_info *fs_info)
@@ -759,6 +759,7 @@
    u64 total = 0;
    int i;

    +again:
    do {
        enqueued = 0;
        mutex_lock(&fs_devices->device_list_mutex);
        @ @ -770,6 +771,10 @@
        mutex_unlock(&fs_devices->device_list_mutex);
        total += enqueued;
    } while (enqueued && total < 10000);
    +if (fs_devices->seed) {
        +fs_devices = fs_devices->seed;
        +goto again;
    +}
--- linux-4.15.0.orig/fs/btrfs/ref-verify.c
+++ linux-4.15.0/fs/btrfs/ref-verify.c
@@ -310,6 +310,8 @@
exist_re = insert_root_entry(&exist->roots, re);
if (exist_re)
kfree(re);
+    } else {
+        kfree(re);
    }
    kfree(be);
return exist;
@@ -524,7 +526,7 @@
struct btrfs_extent_data_ref *dref;
struct btrfs_shared_data_ref *sref;
    u32 count;
-int i = 0, tree_block_level = 0, ret;
+int i = 0, tree_block_level = 0, ret = 0;
    struct btrfs_key key;
    int nritems = btrfs_header_nritems(leaf);

    while (level >= 0) {
    if (level) {
+        struct btrfs_key first_key;
+        block_bytenr = btrfs_node_blockptr(path->nodes[level],
            path->slots[level]);
        gen = btrfs_node_ptr_generation(path->nodes[level],
            path->slots[level]);
        -eb = read_tree_block(fs_info, block_bytenr, gen);
+        btrfs_node_key_to_cpu(path->nodes[level], &first_key,
+            path->slots[level]);
        +eb = read_tree_block(fs_info, block_bytenr, gen,
            level - 1, &first_key);
    if (IS_ERR(eb))
        return PTR_ERR(eb);
    if (!extent_buffer_uptodate(eb)) {
    @ @ -756,6 +763,7 @@ */
        be = add_block_entry(root->fs_info, bytenr, num_bytes, ref_root);
    if (IS_ERR(be)) {
+        kfree(ref);
        kfree(ra);
        ret = PTR_ERR(be);
        goto out;
        @ @ -769,6 +777,8 @@
"re-allocated a block that still has references to it!");
dump_block_entry(fs_info, be);
dump_ref_action(fs_info, ra);
+kfree(ref);
+kfree(ra);
goto out_unlock;
}

@@ -831,6 +841,7 @@
"dropping a ref for a existing root that doesn't have a ref on the block");
dump_block_entry(fs_info, be);
dump_ref_action(fs_info, ra);
+kfree(ref);
kfree(ra);
goto out_unlock;
}
@@ -846,6 +857,7 @@
"attempting to add another ref for an existing ref on a tree block");
dump_block_entry(fs_info, be);
dump_ref_action(fs_info, ra);
+kfree(ref);
kfree(ra);
goto out_unlock;
}
@@ -856,6 +868,7 @@
"dropping a ref for a root that doesn't have a ref on the block");
dump_block_entry(fs_info, be);
dump_ref_action(fs_info, ra);
+kfree(ref);
kfree(ra);
goto out_unlock;
}
--- linux-4.15.0.orig/fs/btrfs/relocation.c
+++ linux-4.15.0/fs/btrfs/relocation.c
@@ -538,8 -538,8 @@
if (!reloc_root)
    return 0;

-if (btrfs_root_last_snapshot(&reloc_root->root_item) ==
 - root->fs_info->running_transaction->transid - 1)
+if (btrfs_header_generation(reloc_root->commit_root) ==
 + root->fs_info->running_transaction->transid)
    return 0;
 /*
 * if there is reloc tree and it was created in previous
 @@ -1194,7 +1194,7 @@
    free_backref_node(cache, lower);
 }
- free_backref_node(cache, node);
+ remove_backref_node(cache, node);
 return ERR_PTR(err);
}

ASSERT(!node || !node->detached);
@@ -1306,7 +1306,7 @@
 if (!node)
 return -ENOMEM;

-node->bytenr = root->node->start;
+node->bytenr = root->commit_root->start;
 node->data = root;

 spin_lock(&rc->reloc_root_tree.lock);
@@ -1334,18 +1334,18 @@
 struct mapping_node *node = NULL;
 struct reloc_control *rc = fs_info->reloc_ctl;

- spin_lock(&rc->reloc_root_tree.lock);
- rb_node = tree_search(&rc->reloc_root_tree.rb_root,
-   - root->node->start);
- if (rb_node) {
- node = rb_entry(rb_node, struct mapping_node, rb_node);
- rb_erase(&node->rb_node, &rc->reloc_root_tree.rb_root);
+ if (rc && root->node) {
+ spin_lock(&rc->reloc_root_tree.lock);
+ rb_node = tree_search(&rc->reloc_root_tree.rb_root,
+   + root->commit_root->start);
+ if (rb_node) {
+ node = rb_entry(rb_node, struct mapping_node, rb_node);
+ rb_erase(&node->rb_node, &rc->reloc_root_tree.rb_root);
+ RB_CLEAR_NODE(&node->rb_node);
+ }
+ spin_unlock(&rc->reloc_root_tree.lock);
+ ASSERT(!node || (struct btrfs_root *)node->data == root);
 } - spin_unlock(&rc->reloc_root_tree.lock);
- if (!node)
- return;
- BUG_ON((struct btrfs_root *)node->data != root);

 spin_lock(&fs_info->trans_lock);
 list_del_init(&root->root_list);
@@ -1357,7 +1357,7 @@
 * helper to update the 'address of tree root -> reloc tree'
 * mapping
 */
static int __update_reloc_root(struct btrfs_root *root, u64 new_bytenr)
{ #8-1366,7 #8+1366,7
  struct btrfs_fs_info *fs_info = root->fs_info;
  struct rb_node *rb_node;
  spin_lock(&rc->reloc_root_tree.lock);
  rb_node = tree_search(&rc->reloc_root_tree.rb_root,
    -  root->node->start); #8+1378,7 #8+1523,6
  +  root->commit_root->start);
  if (rb_node) {
    node = rb_entry(rb_node, struct mapping_node, rb_node);
    rb_erase(&node->rb_node, &rc->reloc_root_tree.rb_root);
  #8-1378,7 #8+1378,7
  BUG_ON((struct btrfs_root *)node->data != root);
  }
  spin_lock(&rc->reloc_root_tree.lock);
  node->bytenr = new_bytenr;
  rb_node = tree_insert(&rc->reloc_root_tree.rb_root,
    node->bytenr, &node->rb_node);
  spin_unlock(&rc->reloc_root_tree.lock);
  if (reloc_root->commit_root != reloc_root->node) {
    __update_reloc_root(reloc_root);
    btrfs_set_root_node(root_item, reloc_root->node);
    free_extent_buffer(reloc_root->commit_root);
  #8-1807,8 #8+1808,8
  int ret;
  int slot;
  }
  BUG_ON(src->root_key.objectid != BTRFS_TREE_RELOC_OBJECTID);
  BUG_ON(dest->root_key.objectid == BTRFS_TREE_RELOC_OBJECTID);
  ASSERT(src->root_key.objectid == BTRFS_TREE_RELOC_OBJECTID);
  ASSERT(dest->root_key.objectid != BTRFS_TREE_RELOC_OBJECTID);
  last_snapshot = btrfs_root_last_snapshot(&src->root_item);
  again:
  @ @ -1839,8 +1840,10
  parent = eb;
  while (1) {
    struct btrfs_key first_key;
    +
level = btrfs_header_level(parent);
-BUG_ON(level < lowest_level);
+ASSERT(level >= lowest_level);

ret = btrfs_bin_search(parent, &key, level, &slot);
if (ret && slot > 0)
@@ -1852,6 +1855,7 @@
old_bytenr = btrfs_node_blockptr(parent, slot);
blocksize = fs_info->nodesize;
old_ptr_gen = btrfs_node_ptr_generation(parent, slot);
+btrfs_node_key_to_cpu(parent, &first_key, slot);

if (level <= max_level) {
 eb = path->nodes[level];
@@ -1876,7 +1880,8 @@
break;
}

-eb = read_tree_block(fs_info, old_bytenr, old_ptr_gen);
+eb = read_tree_block(fs_info, old_bytenr, old_ptr_gen,
+       level - 1, &first_key);
if (IS_ERR(eb)) {
 ret = PTR_ERR(eb);
break;
@@ -2036,6 +2041,8 @@
last_snapshot = btrfs_root_last_snapshot(&root->root_item);

for (i = #level; i > 0; i--) {
+struct btrfs_key first_key;
+ eb = path->nodes[i];
nritems = btrfs_header_nritems(eb);
while (path->slots[i] < nritems) {
@@ -2056,7 +2063,9 @@
bytenr = btrfs_node_blockptr(eb, path->slots[i]);
-eb = read_tree_block(fs_info, bytenr, ptr_gen);
+btrfs_node_key_to_cpu(eb, &first_key, path->slots[i]);
+eb = read_tree_block(fs_info, bytenr, ptr_gen, i - 1,
+       &first_key);
if (IS_ERR(eb)) {
 return PTR_ERR(eb);
} else if (!extent_buffer_uptodate(eb)) {
@@ -2435,12 +2444,10 @@
reloc_root = list_entry(reloc_roots.next,
struct btrfs_root, root_list);
+root = read_fs_root(fs_info, reloc_root->root_key.offset);
if (btrfs_root_refs(&reloc_root->root_item) > 0) {
    root = read_fs_root(fs_info,
    reloc_root->root_key.offset);
    BUG_ON(IS_ERR(root));
    BUG_ON(root->reloc_root != reloc_root);
    ret = merge_reloc_root(rc, root);
    if (ret) {
        if (list_empty(&reloc_root->root_list))
            goto out;
    } else {
        +if (!IS_ERR(root)) {
            +if (root->reloc_root == reloc_root)
                +root->reloc_root = NULL;
        +}
        +
        list_del_init(&reloc_root->root_list);
    }
}

-BUG_ON(!RB_EMPTY_ROOT(&rc->reloc_root_tree.rb_root));
+/
+ * We used to have
+ *
+ * BUG_ON(!RB_EMPTY_ROOT(&rc->reloc_root_tree.rb_root));
+ *
+ * here, but it's wrong. If we fail to start the transaction in
+ * prepare_to_merge() we will have only 0 ref reloc roots, none of which
+ * have actually been removed from the reloc_root_tree rb tree. This is
+ * fine because we're bailing here, and we hold a reference on the root
+ * for the list that holds it, so these roots will be cleaned up when we
+ * do the reloc_dirty_list afterwards. Meanwhile the root->reloc_root
+ * will be cleaned up on unmount.
+ *
+ * The remaining nodes will be cleaned up by free_reloc_control.
+ */
}

static void free_block_list(struct rb_root *blocks)
@@ -2714,6 +2740,8 @@
    path->lowest_level = node->level + 1;
    rc->backref_cache.path[node->level] = node;

list_for_each_entry(edge, &node->upper, list[LOWER]) {
+struct btrfs_key first_key;
+
cond_resched();

upper = edge->node[UPPER];
@@ -2779,7 +2807,9 @@

blocksize = root->fs_info->nodesize;
generation = btrfs_node_ptr_generation(upper->eb, slot);
-eb = read_tree_block(fs_info, bytenr, generation);
+btrfs_node_key_to_cpu(upper->eb, &first_key, slot);
+eb = read_tree_block(fs_info, bytenr, generation,
+    upper->level - 1, &first_key);
if (IS_ERR(eb)) {
    err = PTR_ERR(eb);
    goto next;
@@ -2944,7 +2974,8 @@
struct extent_buffer *eb;

BUG_ON(block->key_ready);
-eb = read_tree_block(fs_info, block->bytenr, block->key.offset);
+btrfs_node_key_to_cpu(block->eb, &first_key, &block->key.offset, block->level, NULL);
if (IS_ERR(eb)) {
    return PTR_ERR(eb);
} else if (!extent_buffer_uptodate(eb)) {
@@ -3227,6 +3258,8 @@
if (!page) {
    btrfs_delalloc_release_metadata(BTRFS_I(inode), PAGE_SIZE);
+btrfs_delalloc_release_extents(BTRFS_I(inode), +PAGE_SIZE);
    ret = -ENOMEM;
    goto out;
} 
@@ -4051,6 +4084,7 @@

restart:
if (update_backref_cache(trans, &rc->backref_cache)) {
    btrfs_end_transaction(trans);
+trans = NULL;
    continue;
}

@@ -4405,27 +4439,36 @@
mutex_lock(&fs_info->cleaner_mutex);
ret = relocate_block_group(rc);
mutex_unlock(&fs_info->cleaner_mutex);
if (ret < 0) {
    err = ret;
    goto out;
}

if (rc->extents_found == 0)
    break;

btrfs_info(fs_info, "found %llu extents", rc->extents_found);

/*
 * We may have gotten ENOSPC after we already dirtied some
 * extents. If writeout happens while we're relocating a
 * different block group we could end up hitting the
 * BUG_ON(rc->stage == UPDATE_DATA_PTRS) in
 * btrfs_reloc_cow_block. Make sure we write everything out
 * properly so we don't trip over this problem, and then break
 * out of the loop if we hit an error.
 */
if (rc->stage == MOVE_DATA_EXTENTS && rc->found_file_extent) {
    ret = btrfs_wait_ordered_range(rc->data_inode, 0,
        (u64)-1);
    -if (ret) {
+    if (ret)
        err = ret;
        goto out;
    -}
    invalidate_mapping_pages(rc->data_inode->i_mapping,
        0, -1);
    rc->stage = UPDATE_DATA_PTRS;
}
+
+if (err < 0)
    goto out;
+
+if (rc->extents_found == 0)
    +break;
+
+btrfs_info(fs_info, "found %llu extents", rc->extents_found);
+
}

WARN_ON(rc->block_group->pinned > 0);

fs_root = read_fs_root(fs_info, reloc_root->root_key.offset);
if (IS_ERR(fs_root)) {
    err = PTR_ERR(fs_root);
+list_add_tail(&reloc_root->root_list, &reloc_roots);
goto out_free;
}

@@ -4690,11 +4734,6 @@
BUG_ON(rc->stage == UPDATE_DATA_PTRS &&
        root->root_key.objectid == BTRFS_DATA_RELOC_TREE_OBJECTID);

-if (root->root_key.objectid == BTRFS_TREE_RELOC_OBJECTID) {
-if (buf == root->node)
-__update_reloc_root(root, cow->start);
-
-level = btrfs_header_level(buf);
-if (btrfs_header_generation(buf) <=
    btrfs_root_last_snapshot(&root->root_item))
--- linux-4.15.0.orig/fs/btrfs/root-tree.c
+++ linux-4.15.0/fs/btrfs/root-tree.c
@@ -145,16 +145,17 @@
return -ENOMEM;
ret = btrfs_search_slot(trans, root, key, path, 0, 1);
-if (ret < 0) {
-btrfs_abort_transaction(trans, ret);
+if (ret < 0)
    goto out;
-
-if (ret != 0) {
-btrfs_print_leaf(path->nodes[0]);
-btrfs_crit(fs_info, "unable to update root key %llu %u %llu",
-    key->objectid, key->type, key->offset);
-BUG_ON(1);
+if (ret > 0) {
+btrfs_crit(fs_info,
+"unable to find root key (%llu %u %llu) in tree %llu",
+key->objectid, key->type, key->offset,
+root->root_key.objectid);
+ret = -EUCLEAN;
+btrfs_abort_transaction(trans, ret);
+goto out;
}

l = path->nodes[0];
@@ -384,8 +385,6 @@
ref = btrfs_item_ptr(leaf, path->slots[0],
    struct btrfs_root_ref);
WARN_ON(btrfs_root_ref_dirid(leaf, ref) != dirid);
WARN_ON(btrfs_root_ref_name_len(leaf, ref) != name_len);
ptr = (unsigned long)(ref + 1);
ret = btrfs_is_name_len_valid(leaf, path->slots[0], ptr,
    name_len);
@@ -394,7 +393,12 @@
goto out;
}

WARN_ON(memcmp_extent_buffer(leaf, name, ptr, name_len));
+if ((btrfs_root_ref_dirid(leaf, ref) != dirid) ||
    (btrfs_root_ref_name_len(leaf, ref) != name_len) ||
    memcmp_extent_buffer(leaf, name, ptr, name_len)) {
+    err = -ENOENT;
+    goto out;
+}
*sequence = btrfs_root_ref_sequence(leaf, ref);

ret = btrfs_del_item(trans, tree_root, path);
--- linux-4.15.0.orig/fs/btrfs/scrub.c
+++ linux-4.15.0/fs/btrfs/scrub.c
@@ -301,6 +301,11 @@
static void scrub_blocked_if_needed(struct btrfs_fs_info *fs_info);
static void scrub_put_ctx(struct scrub_ctx *sctx);
+static inline int scrub_is_page_on_raid56(struct scrub_page *page)
+{
+    return page->recover &&
+        (page->recover->bbio->map_type & BTRFS_BLOCK_GROUP_RAID56_MASK);
+}

static void scrub_pending_bio_inc(struct scrub_ctx *sctx)
{
    struct rb_node *parent = NULL;
    struct full_stripe_lock *entry;
    struct full_stripe_lock *ret;
+    unsigned int nofs_flag;

    WARN_ON(!mutex_is_locked(&locks_root->lock));
@@ -382,8 +388,17 @@

WARN_ON(!mutex_is_locked(&locks_root->lock));

 */ Insert new lock */
+*/
+ * Insert new lock.
+ * We must use GFP_NOFS because the scrub task might be waiting for a
+ * worker task executing this function and in turn a transaction commit
+ * might be waiting the scrub task to pause (which needs to wait for all
+ * the worker tasks to complete before pausing).
+ */
+nofs_flag = memalloc_nofs_save();
ret = kmalloc(sizeof(*ret), GFP_KERNEL);
+memalloc_nofs_restore(nofs_flag);
if (!ret)
return ERR_PTR(-ENOMEM);
ret->logical = fstripe_logical;
@@ -665,12 +680,11 @@
scrub_free_ctx(sctx);
}

-static noinline_for_stack
-struct scrub_ctx *scrub_setup_ctx(struct btrfs_device *dev, int is_dev_replace)
+static noinline_for_stack struct scrub_ctx *scrub_setup_ctx(
+struct btrfs_fs_info *fs_info, int is_dev_replace)
{
 struct scrub_ctx *sctx;
 int i;
-struct btrfs_fs_info *fs_info = dev->fs_info;
+struct btrfs_fs_info *fs_info = fs_info;
 INIT_LIST_HEAD(&sctx->csum_list);
 for (i = 0; i < SCRUB_BIOS_PER_SCTX; ++i) {
 struct scrub_bio *sbio;

 @@ -679,7 +693,8 @@
sctx->is_dev_replace = is_dev_replace;
sctx->pages_per_rd_bio = SCRUB_PAGES_PER_RD_BIO;
sctx->curr = -1;
- sctx->fs_info = dev->fs_info;
+ sctx->fs_info = fs_info;
+INIT_LIST_HEAD(&sctx->csum_list);
 for (i = 0; i < SCRUB_BIOS_PER_SCTX; ++i) {
 struct scrub_bio *sbio;

 @@ -704,7 +719,6 @@
 atomic_set(&sctx->workers_pending, 0);
 atomic_set(&sctx->cancel_req, 0);
sctx->csum_size = btrfs_super_csum_size(fs_info->super_copy);
-INIT_LIST_HEAD(&sctx->csum_list);

 spin_lock_init(&sctx->list_lock);
 spin_lock_init(&sctx->stat_lock);
@@ -1161,11 +1175,6 @@
return ret;
}
if (sctx->is_dev_replace && !is_metadata && !have_csum) {
    sblocks_for_recheck = NULL;
    goto nodatasum_case;
}

/*
 * read all mirrors one after the other. This includes to
 * re-read the extent or metadata block that failed (that was
 @@ -1278,13 +1287,19 @@
goto out;
 }

-if (!is_metadata && !have_csum) {
+/*
+ * NOTE: Even for nodatasum case, it's still possible that it's a
+ * compressed data extent, thus scrub_fixup_nodatasum(), which write
+ * inode page cache onto disk, could cause serious data corruption.
+ *
+ * So here we could only read from disk, and hope our recovery could
+ * reach disk before the newer write.
+ */
+if (0 && !is_metadata && !have_csum) {
    struct scrub_fixup_nodatasum *fixup_nodatasum;
    WARN_ON(sctx->is_dev_replace);
    nodatasum_case:
    -
    /*
     * !is_metadata and !have_csum, this means that the data
     * might not be COWed, that it might be modified
 @@ -1323,15 +1338,34 @@
     * could happen otherwise that a correct page would be
     * overwritten by a bad one).
     */
     -for (mirror_index = 0;
     -    mirror_index < BTRFS_MAX_MIRRORS &&
     -    sblocks_for_recheck[mirror_index].page_count > 0;
     -    mirror_index++) {
     +for (mirror_index = 0; ;mirror_index++) {
        struct scrub_block *sblock_other;

        if (mirror_index == failed_mirror_index)
            continue;
        sblock_other = sblocks_for_recheck + mirror_index;
        +*/
raid56's mirror can be more than BTRFS_MAX_MIRRORS */
+if (!scrub_is_page_on_raid56(sblock_bad->pagev[0])) {
+if (mirror_index >= BTRFS_MAX_MIRRORS)
+break;
+if (!sblocks_for_recheck[mirror_index].page_count)
+break;
+
+sblock_other = sblocks_for_recheck + mirror_index;
+} else {
+struct scrub_recover *r = sblock_bad->pagev[0]->recover;
+int max_allowed = r->bbio->num_stripes -
+r->bbio->num_tgtdevs;
+
+if (mirror_index >= max_allowed)
+break;
+if (!sblocks_for_recheck[1].page_count)
+break;
+
+ASSERT(failed_mirror_index == 0);
+sblock_other = sblocks_for_recheck + 1;
+sblock_other->pagev[0]->mirror_num = 1 + mirror_index;
+
}

/* build and submit the bios, check checksums */
scrub_recheck_block(fs_info, sblock_other, 0);
@@ -1679,18 +1713,13 @@
complete(&ret->event);
}

-static inline int scrub_is_page_on_raid56(struct scrub_page *page)
-{
-+int mirror_num;
-init_completion(&done.event);
-done.status = 0;
-@@ -1698,9 +1727,10 @@
-bio->bi_private = &done;
-bio->bi_end_io = scrub_bio_wait_endio;

mirror_num = page->sblock->pagev[0]->mirror_num;
ret = raid56_parity_recover(fs_info, bio, page->recover->bbio,
    page->recover->map_length,
    page->mirror_num, 0);
+ mirror_num, 0);
if (ret)
return ret;

mutex_lock(&sctx->wr_lock);
again:
if (!sctx->wr_curr_bio) {
+ unsigned int nofs_flag;
+
+ /*
+ * We must use GFP_NOFS because the scrub task might be waiting
+ * for a worker task executing this function and in turn a
+ * transaction commit might be waiting the scrub task to pause
+ * (which needs to wait for all the worker tasks to complete
+ * before pausing).
+ * /
+ +nofs_flag = memalloc_nofs_save();
+ sctx->wr_curr_bio = kzalloc(sizeof(*sctx->wr_curr_bio),
+ GFP_KERNEL);
+ memalloc_nofs_restore(nofs_flag);
if (!sctx->wr_curr_bio) {
mutex_unlock(&sctx->wr_lock);
return -ENOMEM;
}

-scrub_block_put(sblock);
-
if (sctx->is_dev_replace && sctx->flush_all_writes) {
mutex_lock(&sctx->wr_lock);
scrib_wr_submit(sctx);
mutex_unlock(&sctx->wr_lock);
}
+scrub_block_put(sblock);
scrub_pending_bio_dec(sctx);
}

-have_csum = scrub_find_csum(sctx, logical, csum);
if (have_csum == 0)
++sctx->stat.no_csum;
if (sctx->is_dev_replace & !have_csum) {
    ret = copy_nocow_pages(sctx, logical, 1,
                           mirror_num,
                           physical_for_dev_replace);
}
static noinline_for_stack int scrub_stripe(struct scrub_ctx *sctx,
                                          struct map_lookup *map,
                                          struct btrfs_device *scrub_dev,
                                          int num, u64 base, u64 length,
                                          int is_dev_replace)
+
static noinline_for_stack int scrub_stripe(struct scrub_ctx *sctx,
                                          struct map_lookup *map,
                                          struct btrfs_device *scrub_dev,
                                          int num, u64 base, u64 length)
{
    struct btrfs_path *path, *ppath;
    struct btrfs_fs_info *fs_info = sctx->fs_info;
    extent_physical = extent_logical - logical + physical;
    extent_dev = scrub_dev;
    extent_mirror_num = mirror_num;
    -if (is_dev_replace)
    +if (sctx->is_dev_replace)
    scrub_remap_extent(fs_info, extent_logical,
                       extent_len, &extent_physical,
                       &extent_dev,
                       u64 chunk_offset, u64 length,
                       u64 dev_offset,
                       -struct btrfs_block_group_cache *cache,
                       -int is_dev_replace)
    +struct btrfs_block_group_cache *cache)
{
    struct btrfs_fs_info *fs_info = sctx->fs_info;
    struct btrfs_mapping_tree *map_tree = &fs_info->mapping_tree;
    if (map->stripes[i].dev->bdev == scrub_dev->bdev &
        map->stripes[i].physical == dev_offset)
        ret = scrub_stripe(sctx, map, scrub_dev, i,
                           chunk_offset, length,
                           is_dev_replace);
    +chunk_offset, length);
    if (ret)
        goto out;
}
static noinline_for_stack
int scrubEnumerateChunks(struct scrub_ctx *sctx,
- struct btrfs_device *scrub_dev, u64 start, u64 end,
- int is_dev_replace)
+ struct btrfs_device *scrub_dev, u64 start, u64 end)
{
    struct btrfs_dev_extent *dev_extent = NULL;
    struct btrfs_path *path;
@@ -3819,7 +3855,7 @@
    */
    scrub_pause_on(fs_info);
    ret = btrfs_inc_block_group_ro(fs_info, cache);
-    if (!ret && is_dev_replace) {
+    if (!ret && sctx->is_dev_replace) {
        /*
         * If we are doing a device replace wait for any tasks
         * that started dellaloc right before we set the block
@@ -3884,7 +3920,7 @@
            dev_replace->item_needs_writeback = 1;
            btrfs_dev_replace_unlock(&fs_info->dev_replace, 1);
            ret = scrub_chunk(sctx, scrub_dev, chunk_offset, length,
-                found_key.offset, cache, is_dev_replace);
+                found_key.offset, cache);
        */
        /*
         * flush, submit all pending read and write bios, afterwards
@@ -3951,7 +3987,7 @@
            btrfs_put_block_group(cache);
            if (ret)
                break;
-    } elsif (is_dev_replace &&
+    } if (sctx->is_dev_replace &&
                   atomic64_read(&dev_replace->num_write_errors) > 0) { 
            ret = -EIO;
            break;
@@ -4068,6 +4104,7 @@
            int ret;
            struct btrfs_device *dev;
            struct rcu_string *name;
+            unsigned int nofs_flag;

            if (btrfs_fs_closing(fs_info))
                return -EINVAL;
@@ -4111,7 +4148,7 @@
                mutex_lock(&fs_info->fs_devices->device_list_mutex);
-            dev = btrfs_find_device(fs_info, devid, NULL, NULL);
+            dev = btrfs_find_device(fs_info->fs_devices, devid, NULL, NULL, true);
            if (!dev || (dev->missing && !is_dev_replace)) {

            mutex_lock(&fs_info->fs_devices->device_list_mutex);
-            dev = btrfs_find_device(fs_info, devid, NULL, NULL);
+            dev = btrfs_find_device(fs_info->fs_devices, devid, NULL, NULL, true);
            if (!dev || (dev->missing && !is_dev_replace)) {
mutex_unlock(&fs_info->fs_devices->device_list_mutex);
return -ENODEV;
@@ -4152,7 +4189,7 @@
return ret;
}

-sctx = scrub_setup_ctx(dev, is_dev_replace);
+sctx = scrub_setup_ctx(fs_info, is_dev_replace);
if (IS_ERR(sctx)) {
    mutex_unlock(&fs_info->scrub_lock);
    mutex_unlock(&fs_info->fs_devices->device_list_mutex);
    @ @ -4171,6 +4208,16 @@
    atomic_inc(&fs_info->scrubs_running);
    mutex_unlock(&fs_info->scrub_lock);
}

+/*
+ * In order to avoid deadlock with reclaim when there is a transaction
+ * trying to pause scrub, make sure we use GFP_NOFS for all the
+ * allocations done at btrfs_scrub_pages() and scrub_pages_for_parity()
+ * invoked by our callees. The pausing request is done when the
+ * transaction commit starts, and it blocks the transaction until scrub
+ * is paused (done at specific points at scrubStripe() or right above
+ * before incrementing fs_info->scrubs_running).
+ */
+nofs_flag = memalloc_nofs_save();
if (!is_dev_replace) {
    /* by holding device list mutex, we can
     @ @ -4182,8 +4229,8 @@
}

if (!ret)
-ret = scrubEnumerateChunks(sctx, dev, start, end,
- is_dev_replace);
+ret = scrubEnumerateChunks(sctx, dev, start, end);
+memalloc_nofs_restore(nofs_flag);

wait_event(sctx->list_wait, atomic_read(&sctx->bios_in_flight) == 0);
atomic_dec(&fs_info->scrubs_running);
@ @ -4276,7 +4323,7 @@
struct scrub_ctx *sctx = NULL;

mutex_lock(&fs_info->fs_devices->device_list_mutex);
-dev = btrfs_find_device(fs_info, devid, NULL, NULL);
+dev = btrfs_find_device(fs_info->fs_devices, devid, NULL, NULL, true);
if (dev)
    sctx = dev->scrub_device;
if (sctx)
--- linux-4.15.0.orig/fs/btrfs/send.c
+++ linux-4.15.0/fs/btrfs/send.c
@@ -36,6 +36,15 @@
 #include "btrfs_inode.h"
 #include "transaction.h"
 #include "compression.h"
+  #include "xattr.h"
+
+/*
+ * Maximum number of references an extent can have in order for us to attempt to
+ * issue clone operations instead of write operations. This currently exists to
+ * avoid hitting limitations of the backreference walking code (taking a lot of
+ * time and using too much memory for extents with large number of references).
+ */
+  #define SEND_MAX_EXTENT_REFS64
+
/

/*
 * A fs_path is a helper to dynamically build path names with unknown size.
 @@ -112,6 +121,7 @@
 u64 cur_inode_mode;
 u64 cur_inode_rdev;
 u64 cur_inode_last_extent;
+  bool ignore_cur_inode;
 u64 send_progress;

@@ -1318,6 +1328,7 @@
 struct clone_root *cur_clone_root;
 struct btrfs_key found_key;
 struct btrfs_path *tmp_path;
+  struct btrfs_extent_item *ei;
 int compressed;
 u32 i;

@@ -1367,7 +1378,6 @@
 ret = extent_from_logical(fs_info, disk_byte, tmp_path,
     &found_key, &flags);
 up_read(&fs_info->commit_root_sem);
-btrfs_release_path(tmp_path);

 if (ret < 0)
     goto out;
@@ -1376,6 +1386,21 @@
 goto out;
 }

+ei = btrfs_item_ptr(tmp_path->nodes[0], tmp_path->slots[0],
 +    struct btrfs_extent_item);
/*
 * Backreference walking (iterate_extent_inodes() below) is currently
 * too expensive when an extent has a large number of references, both
 * in time spent and used memory. So for now just fallback to write
 * operations instead of clone operations when an extent has more than
 * a certain amount of references.
 */

if (btrfs_extent_refs(tmp_path->nodes[0], ei) > SEND_MAX_EXTENT_REFS) {
    ret = -ENOENT;
    goto out;
}

btrfs_release_path(tmp_path);

/*
 * Setup the clone roots.
 */

BUG_ON(compression);

off = btrfs_file_extent_inline_start(ei);
len = btrfs_file_extent_inline_len(path->nodes[0], path->slots[0], ei);
len = btrfs_file_extent_ram_bytes(path->nodes[0], ei);

ret = fs_path_add_from_extent_buffer(dest, path->nodes[0], off, len);

static void tail_append_pending_moves(struct pending_dir_move *moves,
                                        struct list_head *stack)
{
    if (list_empty(&moves->list)) {
        list_add_tail(&moves->list, stack);
        list_splice_tail(&list, stack);
    }
}

static void tail_append_pending_moves(struct send_ctx *sctx,
                                       struct pending_dir_move *moves,
                                       struct list_head *stack)
{
    if (list_empty(&moves->list)) {
        list_add_tail(&moves->list, stack);
        list_splice_tail(&list, stack);
    }
    if (!RB_EMPTY_NODE(&moves->node)) {
        rb_erase(&moves->node, &sctx->pending_dir_moves);
        RB_CLEAR_NODE(&moves->node);
    }
}

static int apply_children_dir_moves(struct send_ctx *sctx)
{
    return 0;
}
INIT_LIST_HEAD(&stack);
-tail_append_pending_moves(pm, &stack);
+tail_append_pending_moves(sctx, pm, &stack);

while (!list_empty(&stack)) {
  pm = list_first_entry(&stack, struct pending_dir_move, list);
  goto out;
  pm = get_pending_dir_moves(sctx, parent_ino);
  if (pm)
    -tail_append_pending_moves(pm, &stack);
    +tail_append_pending_moves(sctx, pm, &stack);
}
return 0;

/*@ -3786.6 +3816.72 @*/
}

/*
 * When processing the new references for an inode we may orphanize an existing
directory inode because its old name conflicts with one of the new references
of the current inode. Later, when processing another new reference of our
inode, we might need to orphanize another inode, but the path we have in the
reference reflects the pre-orphanization name of the directory we previously
orphanized. For example:
 *
 * + * parent snapshot looks like:
 * + *
 * + *. (ino 256)
 * + |----- f1 (ino 257)
 * + |----- f2 (ino 258)
 * + |----- d1/ (ino 259)
 * + |----- d2/ (ino 260)
 * + *
 * + * send snapshot looks like:
 * + *
 * + *. (ino 256)
 * + |----- d1 (ino 258)
 * + |----- f2/ (ino 259)
 * + |----- f2_link/ (ino 260)
 * + |----- f1 (ino 257)
 * + |
 * + |----- d2 (ino 258)
 * + *
 */

+ * When processing inode 257 we compute the name for inode 259 as "d1", and we
  + * cache it in the name cache. Later when we start processing inode 258, when
  + * collecting all its new references we set a full path of "d1/d2" for its new
+ * reference with name "d2". When we start processing the new references we
+ * start by processing the new reference with name "d1", and this results in
+ * orphanizing inode 259, since its old reference causes a conflict. Then we
+ * move on the next new reference, with name "d2", and we find out we must
+ * orphanize inode 260, as its old reference conflicts with ours - but for the
+ * orphanization we use a source path corresponding to the path we stored in the
+ * new reference, which is "d1/d2" and not "o259-6-0/d2" - this makes the
+ * receiver fail since the path component "d1/" no longer exists, it was renamed
+ * to "o259-6-0/" when processing the previous new reference. So in this case we
+ * must recompute the path in the new reference and use it for the new
+ * orphanization operation.
+ */
+static int refresh_ref_path(struct send_ctx *sctx, struct recorded_ref *ref)
+{
+char *name;
+int ret;
+
+name = kmemdup(ref->name, ref->name_len, GFP_KERNEL);
+if (!name)
+    return -ENOMEM;
+
+fs_path_reset(ref->full_path);
+ret = get_cur_path(sctx, ref->dir, ref->dir_gen, ref->full_path);
+if (ret < 0)
+    goto out;
+
+ret = fs_path_add(ref->full_path, name, ref->name_len);
+if (ret < 0)
+    goto out;
+
+/* Update the reference's base name pointer. */
+set_ref_path(ref, ref->full_path);
+out:
+kfree(name);
+return ret;
+}
+
+/*
+ * This does all the move/link/unlink/rmdir magic.
+ */
+static int process_recorded_refs(struct send_ctx *sctx, int *pending_move)
+@@ -3915,6 +4011,12 @@
+struct name_cache_entry *nce;
+struct waiting_dir_move *wdm;
+
+if (orphanized_dir) {
+    ret = refresh_ref_path(sctx, cur);
+    if (ret < 0)
goto out;
}

ret = orphanize_inode(sctx, ow_inode, ow_gen, cur->full_path);
if (ret < 0)
    goto out;

if (ret < 0)
    goto out;
}

/* If we previously orphanized a directory that
  collided with a new reference that we already
  processed, recompute the current path because
  that directory may be part of the path. */
#endif
	ret = refresh_ref_path(sctx, cur);
}
    if (ret < 0)
        goto out;
    ret = send_unlink(sctx, cur->full_path);
if (ret < 0)
    goto out;

/* Capabilities are emitted by finish_inode_if_needed */
	if (!strncmp(name, XATTR_NAME_CAPS, name_len))
	    return 0;

    p = fs_path_alloc();
    struct fs_path *p;
    struct posix_acl_xattr_header dummy_acl;

    /* Capabilities are emitted by finish_inode_if_needed */
    if (!strncmp(name, XATTR_NAME_CAPS, name_len))
        return 0;
    ++
    p = fs_path_alloc();
    struct btrfs_key key;
    pgoff_t index = offset >> PAGE_SHIFT;
    agg_ofs t last_index;
    unsigned pg_offset = offset & ~PAGE_MASK;
    pgoff_t offset = offset_in_page(offset);
    ssize_t ret = 0;

    key.objectid = sctx->cur_ino;
    u64 len;
    int ret = 0;
/*
 * A hole that starts at EOF or beyond it. Since we do not yet support
 * fallocate (for extent preallocation and hole punching), sending a
 * write of zeroes starting at EOF or beyond would later require issuing
 * a truncate operation which would undo the write and achieve nothing.
 */

if (offset >= sctx->cur_inode_size)
    return 0;

/*
 * Don't go beyond the inode's i_size due to prealloc extents that start
 * after the i_size.
 */
end = min_t(u64, end, sctx->cur_inode_size);

if (sctx->flags & BTRFS_SEND_FLAGS_BTRFS_SEND_FLAG_NO_FILE_DATA)
    return send_update_extent(sctx, offset, end - offset);

p = fs_path_alloc();
if (!p)
    return -ENOMEM;

/*
 * Search for a capability xattr related to sctx->cur_inode. If the capability is
 * found, call send_set_xattr function to emit it.
 * Return 0 if there isn't a capability, or when the capability was emitted
 * successfully, or < 0 if an error occurred.
 */
static int send_capabilities(struct send_ctx *sctx)
{
    struct fs_path *fspath = NULL;
    struct btrfs_path *path;
    struct btrfs_dir_item *di;
    struct extent_buffer *leaf;
    unsigned long data_ptr;
    char *buf = NULL;
    int buf_len;
    int ret = 0;

    path = alloc_path_for_send();
    if (!path)
        return -ENOMEM;

    di = btrfs_lookup_xattr(NULL, sctx->send_root, path, sctx->cur_ino,
        NULL);
    if (!di)
        return 0;

    // More code here...
}
if (!di) {
    /* There is no xattr for this inode */
    goto out;
} else if (IS_ERR(di)) {
    ret = PTR_ERR(di);
    goto out;
}

leaf = path->nodes[0];
buf_len = btrfs_dir_data_len(leaf, di);

fspath = fs_path_alloc();
buf = kmalloc(buf_len, GFP_KERNEL);
if (!fspath || !buf) {
    ret = -ENOMEM;
    goto out;
}

ret = get_cur_path(sctx, sctx->cur_ino, sctx->cur_inode_gen, fspath);
if (ret < 0)
    goto out;

data_ptr = (unsigned long)(di + 1) + btrfs_dir_name_len(leaf, di);
read_extent_buffer(leaf, buf, data_ptr, buf_len);

ret = send_set_xattr(sctx, fspath, XATTR_NAME_CAPS,
    strlen(XATTR_NAME_CAPS), buf, buf_len);
out:
    kfree(buf);
    fs_path_free(fspath);
    btrfs_free_path(path);
    return ret;
}

static int clone_range(struct send_ctx *sctx, struct clone_root *clone_root, const u64 disk_byte, 
    ei = btrfs_item_ptr(leaf, slot, struct btrfs_file_extent_item);
type = btrfs_file_extent_type(leaf, ei);
if (type == BTRFS_FILE_EXTENT_INLINE) {
    ext_len = btrfs_file_extent_inline_len(leaf, slot, ei);
} else {
    ext_len = btrfs_file_extent_num_bytes(leaf, ei);
}

struct btrfs_file_extent_item;

if (type == BTRFS_FILE_EXTENT_INLINE) {
  len = btrfs_file_extent_inline_len(path->nodes[0],
                                    path->slots[0], ei);
  +len = btrfs_file_extent_ram_bytes(path->nodes[0], ei);
/*
 * it is possible the inline item won't cover the whole page,
 * but there may be items after this page. Make
 @@ -5371,7 +5563,7 @@
 */
}

if (right_type == BTRFS_FILE_EXTENT_INLINE) {
  -right_len = btrfs_file_extent_inline_len(eb, slot, ei);
  +right_len = btrfs_file_extent_ram_bytes(eb, ei);
  right_len = PAGE_ALIGN(right_len);
} else {
  right_len = btrfs_file_extent_num_bytes(eb, ei);
@@ -5492,8 +5684,7 @@
   struct btrfs_file_extent_item);
   type = btrfs_file_extent_type(path->nodes[0], fi);
   if (type == BTRFS_FILE_EXTENT_INLINE) {
     -u64 size = btrfs_file_extent_inline_len(path->nodes[0],
      -path->slots[0], fi);
     +u64 size = btrfs_file_extent_ram_bytes(path->nodes[0], fi);
     extent_end = ALIGN(key->offset + size,
      sctx->send_root->fs_info->sectorsize);
   } else {
@@ -5556,7 +5747,7 @@
           fi = btrfs_item_ptr(leaf, slot, struct btrfs_file_extent_item);
           if (btrfs_file_extent_type(leaf, fi) == 
               BTRFS_FILE_EXTENT_INLINE) {
             -u64 size = btrfs_file_extent_inline_len(leaf, slot, fi);
             +u64 size = btrfs_file_extent_ram_bytes(leaf, fi);
             extent_end = ALIGN(key->offset + size,
              root->fs_info->sectorsize);
@@ -5602,8 +5793,7 @@
               struct btrfs_file_extent_item);
               type = btrfs_file_extent_type(path->nodes[0], fi);
               if (type == BTRFS_FILE_EXTENT_INLINE) {
                 -u64 size = btrfs_file_extent_inline_len(path->nodes[0],
                  -path->slots[0], fi);
                 +u64 size = btrfs_file_extent_ram_bytes(path->nodes[0], fi);
                 extent_end = ALIGN(key->offset + size,
                  sctx->send_root->fs_info->sectorsize);
               } else {
@@ -5794,6 +5984,9 @@
int pending_move = 0;
int refs_processed = 0;

+if (sctx->ignore_cur_inode)
+return 0;
+
ret = process_recorded_refs_if_needed(sctx, at_end, &pending_move,
    &refs_processed);
if (ret < 0)
    goto out;

+ret = send_capabilities(sctx);
+if (ret < 0)
+goto out;
+
/*
 * If other directory inodes depended on our current directory
 * inode's move/rename, now do their move/rename operations.
 */
@@ -5876,6 +6069,10 @@

return ret;
}

+struct parent_paths_ctx {
+    struct list_head *refs;
+    struct send_ctx *sctx;
+};
+
+static int record_parent_ref(int num, u64 dir, int index, struct fs_path *name,
+    void *ctx)
+{
+    struct parent_paths_ctx *ppctx = ctx;
+    
+    +return record_ref(ppctx->sctx->parent_root, dir, name, ppctx->sctx,
+        ppctx->refs);
+}
+*/
+
+static int btrfs_unlink_all_paths(struct send_ctx *sctx)
+{
+    LIST_HEAD(deleted_refs);
+    struct btrfs_path *path;
+    struct btrfs_key key;
+    struct parent_paths_ctx ctx;
int ret;

path = alloc_path_for_send();
if (!path)
    return -ENOMEM;

key.objectid = sctx->cur_ino;
key.type = BTRFS_INODE_REF_KEY;
key.offset = 0;
ret = btrfs_search_slot(NULL, sctx->parent_root, &key, path, 0, 0);
if (ret < 0)
    goto out;

ctx.refs = &deleted_refs;
ctx.sctx = sctx;

while (true) {
    struct extent_buffer *eb = path->nodes[0];
    int slot = path->slots[0];

    if (slot >= btrfs_header_nritems(eb)) {
        ret = btrfs_next_leaf(sctx->parent_root, path);
        if (ret < 0)
            goto out;
        else if (ret > 0)
            break;
        continue;
    }

    btrfs_item_key_to_cpu(eb, &key, slot);
    if (key.objectid != sctx->cur_ino)
        break;
    if (key.type != BTRFS_INODE_REF_KEY &&
        key.type != BTRFS_INODE_EXTREF_KEY)
        break;

    ret = iterate_inode_ref(sctx->parent_root, path, &key, 1,
        record_parent_ref, &ctx);
    if (ret < 0)
        goto out;

    path->slots[0]++;
}
+ret = send_unlink(sctx, ref->full_path);
+if (ret < 0)
+goto out;
+fs_path_free(ref->full_path);
+list_del(&ref->list);
+kfree(ref);
+
+ret = 0;
+out:
+btrfs_free_path(path);
+if (ret)
+__free_recorded_refs(&deleted_refs);
+return ret;
+
static int changed_inode(struct send_ctx *sctx,
enum btrfs_compare_tree_result result)
{
@@ -5914,6 +6198,7 @@
sctx->cur_ino = key->objectid;
 sctx->cur_inode_new_gen = 0;
 sctx->cur_inode_last_extent = (u64)-1;
 +sctx->ignore_cur_inode = false;
/*
 * Set send_progress to current inode. This will tell all get_cur_xxx
@@ -5954,6 +6239,33 @@
sctx->cur_inode_new_gen = 1;
 }

+/*
+ * Normally we do not find inodes with a link count of zero (orphans)
+ * because the most common case is to create a snapshot and use it
+ * for a send operation. However other less common use cases involve
+ * using a subvolume and send it after turning it to RO mode just
+ * after deleting all hard links of a file while holding an open
+ * file descriptor against it or turning a RO snapshot into RW mode,
+ * keep an open file descriptor against a file, delete it and then
+ * turn the snapshot back to RO mode before using it for a send
+ * operation. So if we find such cases, ignore the inode and all its
+ * items completely if it's a new inode, or if it's a changed inode
+ * make sure all its previous paths (from the parent snapshot) are all
+ * unlinked and all other the inode items are ignored.
+ */
+if (result == BTRFS_COMPARE_TREE_NEW ||
+ result == BTRFS_COMPARE_TREE_CHANGED) {
+u32 nlinks;
+nlinks = btrfs_inode_nlink(sctx->left_path->nodes[0], left_ii);
+if (nlinks == 0) {
  +sctx->ignore_cur_inode = true;
  +if (result == BTRFS_COMPARE_TREE_CHANGED)
    +ret = btrfs_unlink_all_paths(sctx);
    +goto out;
  +}
  +}
}

if (result == BTRFS_COMPARE_TREE_NEW) {
  sctx->cur_inode_gen = left_gen;
  sctx->cur_inode_new = 1;
 @@ -6119,68 +6431,21 @@
  }

int ret = 0;

-if (sctx->cur_ino != sctx->cmp_key->objectid) {
  -
  -if (result == BTRFS_COMPARE_TREE_CHANGED) {
    -struct extent_buffer *leaf_l;
    -struct extent_buffer *leaf_r;
    -struct btrfs_file_extent_item *ei_l;
    -struct btrfs_file_extent_item *ei_r;
    -
    -leaf_l = sctx->left_path->nodes[0];
    -leaf_r = sctx->right_path->nodes[0];
    -ei_l = btrfs_item_ptr(leaf_l, sctx->left_path->slots[0], struct btrfs_file_extent_item);
    -ei_r = btrfs_item_ptr(leaf_r, sctx->right_path->slots[0], struct btrfs_file_extent_item);
    -
    */

    /* We may have found an extent item that has changed
    * only its disk_bytenr field and the corresponding
    * inode item was not updated. This case happens due to
    * very specific timings during relocation when a leaf
    * that contains file extent items is COWed while
    * relocation is ongoing and its in the stage where it
    * updates data pointers. So when this happens we can
    * safely ignore it since we know it's the same extent,
    * but just at different logical and physical locations
    * (when an extent is fully replaced with a new one, we
    * know the generation number must have changed too,
    * since snapshot creation implies committing the current
    * transaction, and the inode item must have been updated
    * as well).
/* This replacement of the disk_bytenr happens at
   relocation.c:replace_file_extents() through
   relocation.c:btrfs_reloc_cow_block().

   */
#endif

if (btrfs_file_extent_generation(leaf_l, ei_l) ==
  btrfs_file_extent_generation(leaf_r, ei_r) &&
  btrfs_file_extent_ram_bytes(leaf_l, ei_l) ==
  btrfs_file_extent_ram_bytes(leaf_r, ei_r) &&
  btrfs_file_extent_compression(leaf_l, ei_l) ==
  btrfs_file_extent_compression(leaf_r, ei_r) &&
  btrfs_file_extent_encryption(leaf_l, ei_l) ==
  btrfs_file_extent_encryption(leaf_r, ei_r) &&
  btrfs_file_extent_other_encoding(leaf_l, ei_l) ==
  btrfs_file_extent_other_encoding(leaf_r, ei_l) &&
  btrfs_file_extent_type(leaf_l, ei_l) ==
  btrfs_file_extent_type(leaf_r, ei_r) &&
  btrfs_file_extent_disk_bytenr(leaf_l, ei_l) !=
  btrfs_file_extent_disk_bytenr(leaf_r, ei_r) &&
  btrfs_file_extent_disk_num_bytes(leaf_l, ei_l) ==
  btrfs_file_extent_disk_num_bytes(leaf_r, ei_r) &&
  btrfs_file_extent_offset(leaf_l, ei_l) ==
  btrfs_file_extent_offset(leaf_r, ei_r) &&
  btrfs_file_extent_num_bytes(leaf_l, ei_l) ==
  btrfs_file_extent_num_bytes(leaf_r, ei_r))
{return 0;
}

-inconsistent_snapshot_error(sctx, result, "extent");
return -EIO;
}

/*
 * We have found an extent item that changed without the inode item
 * having changed. This can happen either after relocation (where the
 * disk_bytenr of an extent item is replaced at
 * relocation.c:replace_file_extents()) or after deduplication into a
 * file in both the parent and send snapshots (where an extent item can
 * get modified or replaced with a new one). Note that deduplication
 * updates the inode item, but it only changes the iversion (sequence
 * field in the inode item) of the inode, so if a file is deduplicated
 * the same amount of times in both the parent and send snapshots, its
 * iversion becomes the same in both snapshots, whence the inode item is
 * the same on both snapshots.
 */
#if (sctx->cur_ino != sctx->cmp_key->objectid)
return 0;

if (!sctx->cur_inode_new_gen && !sctx->cur_inode_deleted) {
if (result != BTRFS_COMPARE_TREE_DELETED)
key->objectid == BTRFS_FREE_SPACE_OBJECTID)
goto out;

-if (key->type == BTRFS_INODE_ITEM_KEY)
+if (key->type == BTRFS_INODE_ITEM_KEY) {
  ret = changed_inode(sctx, result);
-else if (key->type == BTRFS_INODE_REF_KEY ||
-  key->type == BTRFS_INODE_EXTREF_KEY)
-  ret = changed_ref(sctx, result);
-else if (key->type == BTRFS_XATTR_ITEM_KEY)
-  ret = changed_xattr(sctx, result);
-else if (key->type == BTRFS_EXTENT_DATA_KEY)
-  ret = changed_extent(sctx, result);
+} else if (!sctx->ignore_cur_inode) {
+  if (key->type == BTRFS_INODE_REF_KEY ||
+      key->type == BTRFS_INODE_EXTREF_KEY)
+    ret = changed_ref(sctx, result);
+  else if (key->type == BTRFS_XATTR_ITEM_KEY)
+    ret = changed_xattr(sctx, result);
+  else if (key->type == BTRFS_EXTENT_DATA_KEY)
+    ret = changed_extent(sctx, result);
+  }

out:
return ret;

spin_unlock(&send_root->root_item_lock);

/*
 - * This is done when we lookup the root, it should already be complete
 - * by the time we get here.
 - */
-WARN_ON(send_root->orphan_cleanup_state != ORPHAN_CLEANUP_DONE);
-
-/*
 * Userspace tools do the checks and warn the user if it's
 * not RO.
 */
@@ -6568,7 +6829,7 @@
 alloc_size = sizeof(struct clone_root) * (arg->clone_sources_count + 1);

-sctx->clone_roots = kzalloc(alloc_size, GFP_KERNEL);
+sctx->clone_roots = kvzalloc(alloc_size, GFP_KERNEL);
if (!sctx->clone_roots) {
  ret = -ENOMEM;
goto out;

@@ -6292,15 +6557,17 @@

*/

*/
```c
--- linux-4.15.0.orig/fs/btrfs/super.c
+++ linux-4.15.0/fs/btrfs/super.c
@@ -412,6 +412,7 @@
     char *compress_type;
     bool compress_force = false;
     enum btrfs_compression_type saved_compress_type;
+    int saved_compress_level;
     bool saved_compress_force;
     int no_compress = 0;

-@@ -503,6 +504,7 @@
     info->compress_type = BTRFS_COMPRESS_NONE;
     saved_compress_force =
     btrfs_test_opt(info, FORCE_COMPRESS);
+    +saved_compress_level = info->compress_level;
     if (token == Opt_compress ||
         token == Opt_compress_force ||
         strncmp(args[0].from, "zlib", 4) == 0) {
@@ -526,6 +528,7 @@
     } else if (strncmp(args[0].from, "lzo", 3) == 0) {
         compress_type = "lzo";
         info->compress_type = BTRFS_COMPRESS_LZO;
+        +info->compress_level = 0;
         btrfs_set_opt(info->mount_opt, COMPRESS);
         btrfs_clear_opt(info->mount_opt, NODATACOW);
         btrfs_clear_opt(info->mount_opt, NODATASUM);
@@ -541,6 +544,8 @@
     no_compress = 0;
 } else if (strncmp(args[0].from, "no", 2) == 0) {
     compress_type = "no";
+    +info->compress_level = 0;
+    +info->compress_type = 0;
     btrfs_clear_opt(info->mount_opt, COMPRESS);
     btrfs_clear_opt(info->mount_opt, FORCE_COMPRESS);
-@@ -561,11 +566,11 @@
     */
     btrfs_clear_opt(info->mount_opt, FORCE_COMPRESS);
     }
-    -if ((btrfs_test_opt(info, COMPRESS) &&
-        (info->compress_type != saved_compress_type ||
-         compress_force != saved_compress_force)) ||
-        (!btrfs_test_opt(info, COMPRESS) &&
-         no_compress == 1)) {
+    +} else if ((info->compress_type != saved_compress_type) ||
+        (compress_force != saved_compress_force) ||
```

---
+ (info->compress_level != saved_compress_level)) {
  btrfs_info(info, "%s %s compression, level %d",
             (compress_force) ? "force" : "use",
             compress_type, info->compress_level);
@@ -962,8 +967,8 @@
  return error;
 }

 static char *get_subvol_name_from_objectid(struct btrfs_fs_info *fs_info,
-       u64 subvol_objectid)
+       char *btrfs_get_subvol_name_from_objectid(struct btrfs_fs_info *fs_info,
+          u64 subvol_objectid)
 {
   struct btrfs_root *root = fs_info->tree_root;
   struct btrfs_root *fs_root;
@@ -1244,6 +1249,7 @@
 {
   struct btrfs_fs_info *info = btrfs_sb(dentry->d_sb);
   char *compress_type;
+  const char *subvol_name;
   if (btrfs_test_opt(info, DEGRADED))
     seq_puts(seq, ",degraded");
@@ -1334,8 +1340,13 @@
     seq_puts(seq, ",ref_verify");
     seq_printf(seq, ",subvolid=%llu",
                  BTRFS_I(d_inode(dentry))->root->root_key.objectid);
-    seq_puts(seq, ",subvol=\
-              seq_dentry(seq, dentry, " 	
\"
+    subvol_name = btrfs_get_subvol_name_from_objectid(info,
+        BTRFS_I(d_inode(dentry))->root->root_key.objectid);
+    if (!IS_ERR(subvol_name)) {
+      seq_puts(seq, ",subvol=\"
+               seq_escape(seq, subvol_name, " 	
\"
+    } 
+  kfree(subvol_name);
+  return 0;
+}
}

 goto out;
}

 -subvol_name = get_subvol_name_from_objectid(btrfs_sb(mnt->mnt_sb),
-   subvol_objectid);
+subvol_name = btrfs_get_subvol_name_from_objectid(
+   btrfs_sb(mnt->mnt_sb), subvol_objectid);
  if (IS_ERR(subvol_name)) {


root = ERR_CAST(subvol_name);
subvol_name = NULL;
@@ -1608,7 +1619,7 @@
  * it for searching for existing supers, so this lets us do that and
  * then open_ctree will properly initialize everything later.
  */
-fs_info = kzalloc(sizeof(struct btrfs_fs_info), GFP_KERNEL);
+fs_info = kvzalloc(sizeof(struct btrfs_fs_info), GFP_KERNEL);
if (!fs_info) {
  error = -ENOMEM;
  goto error_sec_opts;
@@ -1624,7 +1635,9 @@
  error = btrfs_open_devices(fs_devices, mode, fs_type);
+  mutex_lock(&uuid_mutex);
  if (error)
    goto error_fs_info;
  mutex_unlock(&uuid_mutex);
  ret = btrfs_commit_super(fs_info);
+  btrfs_qgroup_wait_for_completion(fs_info, false);
+  if (ret)
+    goto restore;
  } 

  btrfs_scrub_cancel(fs_info);
  btrfs_pause_balance(fs_info);
+/*
+ * Pause the qgroup rescan worker if it is running. We don't want
+ * it to be still running after we are in RO mode, as after that,
+ * by the time we unmount, it might have left a transaction open,
+ * so we would leak the transaction and/or crash.
+ */
+btrfs_qgroup_wait_for_completion(fs_info, false);
+ ret = btrfs_commit_super(fs_info);
+ if (ret)
+   goto restore;
  } 

  if (btrfs_super_log_root(fs_info->super_copy) != 0) {
    btrfs_warn(fs_info,
    /*mount required to replay tree-log, cannot remount read-write*/);
    ret = -EINVAL;
    goto restore;
  } 
@@ -1805,6 +1818,14 @@
  btrfs_scrub_cancel(fs_info);
  btrfs_pause_balance(fs_info);

-*/

/* Used to sort the devices by max_avail(descending sort) */
-static int btrfs_cmp_device_free_bytes(const void *dev_info1,
+static inline int btrfs_cmp_device_free_bytes(const void *dev_info1,
    const void *dev_info2)
        {
        if (((struct btrfs_device_info *)dev_info1)->max_avail >
            
            /* The helper to calc the free space on the devices that can be used to store
            * file data.
            */
        -static int btrfs_calc_avail_data_space(struct btrfs_fs_info *fs_info,
+static inline int btrfs_calc_avail_data_space(struct btrfs_fs_info *fs_info,
            u64 *free_bytes)
        +static inline int btrfs_calc_avail_data_space(struct btrfs_fs_info *fs_info,
            u64 *free_bytes)
        |
        
        */
        struct btrfs_device_info *devices_info;
        struct btrfs_fs_devices *fs_devices = fs_info->fs_devices;
        /*
        */
        thresh = SZ_4M;
        
        -if (!mixed && total_free_meta - thresh < block_rsv->size)
+/*
+    * We only want to claim there's no available space if we can no longer
+    * allocate chunks for our metadata profile and our global reserve will
+    * not fit in the free metadata space. If we aren't ->full then we
+    * still can allocate chunks and thus are fine using the currently
+    * calculated f_bavail.
+    */
+    
+    +if (!mixed && block_rsv->space_info->full &&
+        total_free_meta - thresh < block_rsv->size)
                    buf->f_bavail = 0;
                    
                    buf->f_type = BTRFS_SUPER_MAGIC;
                    /*
                    */
                    vol = memdup_user((void __user *)arg, sizeof(*vol));
                    if (IS_ERR(vol))
                        return PTR_ERR(vol);
                    +vol->name[BTRFS_PATH_NAME_MAX] = '\0';
                    switch (cmd) {
                        case BTRFS_IOC_SCAN_DEV:
                            
                            static int btrfs_show_devname(struct seq_file *m, struct dentry *root)
                                    {
                                    struct btrfs_fs_info *fs_info = btrfs_sb(root->d_sb);
                                    struct btrfs_device *dev, *first_dev = NULL;
                                    
                                    
                                    vol = memdup_user((void __user *)arg, sizeof(*vol));
                                    if (IS_ERR(vol))
                                        return PTR_ERR(vol);
                                    +vol->name[BTRFS_PATH_NAME_MAX] = '\0';
                                    
                                    switch (cmd) {
                                    case BTRFS_IOC_SCAN_DEV:
                                        
                                        static int btrfs_show_devname(struct seq_file *m, struct dentry *root)
                                            {
                                            struct btrfs_fs_info *fs_info = btrfs_sb(root->d_sb);
                                            -struct btrfs_fs_devices *cur_devices;
                                            struct btrfs_device *dev, *first_dev = NULL;
mutex_lock(&fs_info->fs_devices->device_list_mutex);
-cur_devices = fs_info->fs_devices;
-while (cur_devices) {
-    head = &cur_devices->devices;
-    list_for_each_entry(dev, head, dev_list) {
-        if (dev->missing)
-            continue;
-        if (!dev->name)
-            continue;
-        if (!first_dev || dev->devid < first_dev->devid)
-            first_dev = dev;
-    }
-    cur_devices = cur_devices->seed;
+list_for_each_entry_rcu(dev, &fs_info->fs_devices->devices, dev_list) {
+    if (dev->missing)
+        continue;
+    if (!dev->name)
+        continue;
+    if (!first_dev || dev->devid < first_dev->devid)
+        first_dev = dev;
+}

if (first_dev) {
    .sync_fs= btrfs_sync_fs,
    .show_options= btrfs_show_options,
    .show_devname= btrfs_show_devname,
    .write_inode= btrfs_write_inode,
    .alloc_inode= btrfs_alloc_inode,
    .destroy_inode= btrfs_destroy_inode,
    .statfs= btrfs_statfs,
    static void btrfs_print_mod_info(void)
    
static const char options[] = ""
#ifdef CONFIG_BTRFS_DEBUG
    ", debug=on"
#endif
#endif
}
static int __init init_btrfs_fs(void)
--- linux-4.15.0.orig/fs/btrfs/sysfs.c
+++ linux-4.15.0/fs/btrfs/sysfs.c
@@ -25,6 +25,7 @@
#include <linux/bug.h>
#include <linux/genhd.h>
#include <linux/debugfs.h>
+#include <linux/sched/mm.h>
#include "ctree.h"
#include "disk-io.h"
@@ -750,7 +751,9 @@
{
int error = 0;
struct btrfs_device *dev;
+unsigned int nofs_flag;

+nofs_flag = memalloc_nofs_save();
list_for_each_entry(dev, &fs_devices->devices, dev_list) {
struct hd_struct *disk;
struct kobject *disk_kobj;
@@ -769,6 +772,7 @@
if (error)
break;
} +memalloc_nofs_restore(nofs_flag);

return error;
}
@@ -795,7 +799,12 @@
fs_devs->fsid_kobj.kset = btrfs_kset;
error = kobject_init_and_add(&fs_devs->fsid_kobj, &btrfs_ktype, parent, "%pU", fs_devs->fsid);
-return error;
+if (error) {
+kobject_put(&fs_devs->fsid_kobj);
+return error;
+}
+
+return 0;
}

int btrfs_sysfs_add_mounted(struct btrfs_fs_info *fs_info)
struct inode *btrfs_new_test_inode(void) {
    struct inode *inode;
    inode = new_inode(test_mnt->mnt_sb);
    if (inode)
        inode_init_owner(inode, NULL, S_IFREG);
    return inode;
}

static int btrfs_init_test_fs(void) {
    spin_lock_init(&fs_info->qgroup_op_lock);
    spin_lock_init(&fs_info->super_lock);
    spin_lock_init(&fs_info->fs_roots_radix_lock);
    spin_lock_init(&fs_info->tree_mod_seq_lock);
    mutex_init(&fs_info->qgroup_ioctl_lock);
    mutex_init(&fs_info->qgroup_rescan_lock);
    rwlock_init(&fs_info->tree_mod_log_lock);
    root->fs_info->tree_root = root;
    if (!root->node) {
        test_msg("Couldn't allocate dummy buffer\n");
        ret = -ENOMEM;
    } else if (IS_ERR(root->node)) {
        test_msg("couldn't allocate dummy buffer\n");
        ret = PTR_ERR(root->node);
        goto out;
    }
    btrfs_set_header_level(root->node, 0);
    root->node = alloc_test_extent_buffer(root->fs_info, nodesize);
    if (!root->node) {
        test_msg("Couldn't allocate dummy buffer\n");
        ret = -ENOMEM;
    } else if (IS_ERR(root->node)) {
        test_msg("couldn't allocate dummy buffer\n");
        ret = PTR_ERR(root->node);
        goto out;
    }
    btrfs_set_header_level(root->node, 0);

    return ret;
}
BTRFS_I(inode)->location.objectid = BTRFSFIRST_FREEOBJECTID;
BTRFS_I(inode)->location.offset = 0;
--- linux-4.15.0.orig/fs/btrfs/tests/qgroup-tests.c
+++ linux-4.15.0/fs/btrfs/tests/qgroup-tests.c
@@ -63,7 +63,7 @@
 btrfs_set_extent_generation(leaf, item, 1);
 btrfs_set_extent_flags(leaf, item, BTRFS_EXTENT_FLAG_TREE_BLOCK);
 block_info = (struct btrfs_tree_block_info *)(item + 1);
-brtrfs_set_tree_block_level(leaf, block_info, 1);
+brtrfs_set_tree_block_level(leaf, block_info, 0);
 iref = (struct btrfs_extent_inline_ref *)(block_info + 1);
 if (parent > 0) {
     btrfs_set_extent_inline_ref_type(leaf, iref,
@@ -497,9 +497,9 @@
     root->node = alloc_test_extent_buffer(root->fs_info, nodesize);
     -if (!root->node) {
         +if (IS_ERR(root->node)) {
         test_msg("Couldn't allocate dummy buffer\n");
         -ret = -ENOMEM;
         +ret = PTR_ERR(root->node);
         goto out;
 } 
-brtrfs_set_header_level(root->node, 0);
+brtrfs_set_header_level(root->node, 0);
--- linux-4.15.0.orig/fs/btrfs/transaction.c
+++ linux-4.15.0/fs/btrfs/transaction.c
@@ -319,7 +319,7 @@
 if ((test_bit(BTRFS_ROOT_REF_COWS, &root->state) &&
     root->last_trans < trans->transid) || force) {
     WARN_ON(root == fs_info->extent_root);
-warn_on(root->commit_root != root->node);
+WARN_ON(!force && root->commit_root != root->node);
 */
 * see below for IN_TRANS_SETUP usage rules
@@ -591,10 +591,19 @@
 got_it:
-brtrfs_record_root_in_trans(h, root); 
- if (!current->journal_info && type != TRANS_USERSPACE) 
+  /* btrfs_record_root_in_trans() needs to alloc new extents, and may
+   * call btrfs_join_transaction() while we're also starting a
+*/
-
+ * transaction.
+ *
+ * Thus it need to be called after current->journal_info initialized,
+ * or we can deadlock.
+ */
+btrfs_record_root_in_trans(h, root);
+
return h;

join_fail:
@@ -1258,7 +1267,6 @@
    struct btrfs_root *gang[8];
    int i;
    int ret;
-    -int err = 0;

    spin_lock(&fs_info->fs_roots_radix_lock);
    while (1) {
-    -    @@ -1270,6 +1278,8 @@
break;
    for (i = 0; i < ret; i++) {
        struct btrfs_root *root = gang[i];
+        +int ret2;
+        +
radix_tree_tag_clear(&fs_info->fs_roots_radix,
        (unsigned long)root->root_key.objectid,
        BTRFS_ROOT_TRANS_TAG);
@@ -1292,17 +1302,17 @@
            root->node);
    }

    -err = btrfs_update_root(trans, fs_info->tree_root,
-    ret2 = btrfs_update_root(trans, fs_info->tree_root,
+    ret2 = btrfs_update_root(trans, fs_info->tree_root,
        &root->root_key,
        &root->root_item);
+        +if (ret2)
+        +return ret2;
+        +
spin_lock(&fs_info->fs_roots_radix_lock);
        -if (err)
        -break;
        btrfs_qgroup_free_meta_all(root);
    }
    }
spin_unlock(&fs_info->fs_roots_radix_lock);
    -return err;
    +return 0;
}
while (1) {
trans = btrfs_start_transaction(root, 0);
- if (IS_ERR(trans))
- return PTR_ERR(trans);
+ if (IS_ERR(trans)) {
+ ret = PTR_ERR(trans);
+ break;
+ }

ret = btrfs_defrag_leaves(trans, root);

/*
 * Ensure dirty @src will be committed. Or, after comming
 * commit_fs_roots() and switch_commit_roots(), any dirty but not
 * recorded root will never be updated again, causing an outdated root
 * item.
 * */
+ record_root_in_trans(trans, src, 1);
+
+ /*
 * We are going to commit transaction, see btrfs_commit_transaction()
 * comment for reason locking tree_log_mutex
 */
@@ -1950,6 +1970,14 @@
struct btrfs_transaction *prev_trans = NULL;
int ret;

+ /* Some places just start a transaction to commit it. We need to make
+ sure that if this commit fails that the abort code actually marks the
+ transaction as failed, so set trans->dirty to make the abort code do
+ the right thing.
+ */
+ trans->dirty = true;
+
+ /* Stop the commit early if ->aborted is set */
if (unlikely(READ_ONCE(cur_trans->aborted))) {
ret = cur_trans->aborted;
@@ -1957,6 +1985,9 @@
return ret;
}
+btrfs_trans_release_metadata(trans, fs_info);
+trans->block_rsv = NULL;
+
/* make a pass through all the delayed refs we have so far */
/* any runnings procs may add more while we are here */
@@ -1966,9 +1997,6 @@
 return ret;
 }

-btrfs_trans_release_metadata(trans, fs_info);
-trans->block_rsv = NULL;
-
cur_trans = trans->transaction;

/*
@@ -2054,6 +2082,16 @@
 }
 } else {
 spin_unlock(&fs_info->trans_lock);
+/*
+ * The previous transaction was aborted and was already removed
+ * from the list of transactions at fs_info->trans_list. So we
+ * abort to prevent writing a new superblock that reflects a
+ * corrupt state (pointing to trees with unwritten nodes/leafs).
+ */
+if (test_bit(BTRFS_FS_STATE_TRANS_ABORTED, &fs_info->fs_state)) {
+ ret = -EROFS;
+ goto cleanup_transaction;
+}
 }

extwriter_counter_dec(cur_trans, trans->type);
@@ -2309,15 +2347,6 @@
 kmem_cache_free(btrfs_trans_handle_cachep, trans);

 /*
- * If fs has been frozen, we can not handle delayed iputs, otherwise
- * it'll result in deadlock about SB_FREEZE_FS.
- */
-if (current != fs_info->transaction_kthread &&
- current != fs_info->cleaner_kthread &&
- !test_bit(BTRFS_FS_FROZEN, &fs_info->flags))
-btrfs_run_delayed_iputs(fs_info);
-
return ret;
/*
 * Error message should follow the following format:
 * @format to @fmt.
 * Allows callers to customize the output.
 */
-__printf(4, 5)
+__printf(3, 4)
+__cold
+static void generic_err(const struct extent_buffer *eb, int slot,
+const char *fmt, ...)
{
+const struct btrfs_fs_info *fs_info = eb->fs_info;
+va_format vaf;
+va_list args;

@@ -64,10 +67,10 @@
+vaf.fmt = fmt;
+vaf.va = &args;

-btrfs_crit(root->fs_info,
+btrfs_crit(fs_info,
 "corrupt %s: root=%llu block=%llu slot=%d, %pV",
 btrfs_header_level(eb) == 0 ? "leaf" : "node",
-root->objectid, btrfs_header_bytenr(eb), slot, &vaf);
+root->objectid, btrfs_header_bytenr(eb), slot, &vaf);
+va_end(args);
}
}

@@ -75,11 +78,12 @@
+vaf.va = &args;
+btrfs_crit(root->fs_info,
+btrfs_crit(fs_info,
 "corrupt %s: root=%llu block=%llu slot=%d, %pV",
 btrfs_header_level(eb) == 0 ? "leaf" : "node",
-root->objectid, btrfs_header_bytenr(eb), slot, &vaf);
+root->objectid, btrfs_header_bytenr(eb), slot, &vaf);
+va_end(args);
}

@@ -82,11 +85,12 @@
+btrfs_crit(root->fs_info,
+btrfs_crit(fs_info,
 "corrupt %s: root=%llu block=%llu slot=%d, %pV",
 btrfs_header_level(eb) == 0 ? "leaf" : "node",
-root->objectid, btrfs_header_bytenr(eb), slot, &vaf);
+root->objectid, btrfs_header_bytenr(eb), slot, &vaf);
+va_end(args);
}

* Customized reporter for extent data item, since its key objectid and
* offset has its own meaning.
 */
-__printf(4, 5)
+__printf(3, 4)
+__cold
+static void file_extent_err(const struct btrfs_root *root,
+const struct extent_buffer *eb, int slot,
+__printf(3, 4)
+_cold
+static void file_extent_err(const struct extent_buffer *eb, int slot, const char *fmt, ...)
{
+const struct btrfs_fs_info *fs_info = eb->fs_info;
struct btrfs_key key;
struct va_format vaf;
va_list args;
@@ -90,10 +94,11 @@
vaf.fmt = fmt;
vaf.va = &args;

-btrfs_crit(root->fs_info, btrfs_crit(fs_info, "corrupt %s: root=%llu block=%llu slot=%d ino=%llu file_offset=%llu, %pV",
-btrfs_header_level(eb) == 0 ? "leaf" : "node", root->objectid, btrfs_header_bytenr(eb), slot, key.objectid, key.offset, &vaf);
+btrfs_header_level(eb) == 0 ? "leaf" : "node", btrfs_header_owner(eb), btrfs_header_bytenr(eb), slot, key.objectid, key.offset, &vaf);
va_end(args);
}

@@ -101,35 +106,67 @@
* Return 0 if the btrfs_file_extent_##name is aligned to @alignment
* Else return 1
*/
-#define CHECK_FE_ALIGNED(root, leaf, slot, fi, name, alignment)		      
+#define CHECK_FE_ALIGNED(fs_info, leaf, slot, fi, name, alignment)	      
({									      
if (!IS_ALIGNED(btrfs_file_extent_##name((leaf), (fi)), (alignment))) |
-file_extent_err((root), (leaf), (slot), |
+file_extent_err((leaf), (slot), |
"invalid %s for file extent, have %llu, should be aligned to %u",
(#name), btrfs_file_extent_##name((leaf), (fi)), |
(alignment)); |
(!IS_ALIGNED(btrfs_file_extent_##name((leaf), (fi)), (alignment)));
 })

-static int check_extent_data_item(struct btrfs_root *root, - struct extent_buffer *leaf, - struct btrfs_key *key, int slot)
+static u64 file_extent_end(struct extent_buffer *leaf, + struct btrfs_key *key, + struct btrfs_file_extent_item *extent)
+{
+u64 end;


```c
+u64 len;
+
+if (btrfs_fileExtentType(leaf, extent) == BTRFS_FILE_EXTENT_INLINE) {
+len = btrfs_fileExtentRamBytes(leaf, extent);
+end = ALIGN(key->offset + len, leaf->fs_info->sectorsize);
+} else {
+len = btrfs_fileExtentNumBytes(leaf, extent);
+end = key->offset + len;
+
+return end;
+
+
+static int check_extent_data_item(struct extentBuffer *leaf,
+    struct btrfs_key *key, int slot,
+    struct btrfs_key *prev_key)
{+
    struct btrfsFsInfo *fs_info = leaf->fs_info;
    struct btrfs_fileExtentItem *fi;
    u32 sectorsize = fs_info->sectorsize;
    u32 item_size = btrfsItemSizeNr(leaf, slot);
    
    if (!IS_ALIGNED(key->offset, sectorsize)) {
        fileExtentErr(root, leaf, slot,
        "unaligned file_offset for file extent, have %llu should be aligned to %u",
        key->offset, sectorsize);
        return -EUCLEAN;
    }
    
    fi = btrfsItemPtr(leaf, slot, struct btrfs_file_extent_item);
    
    if (btrfs_fileExtentType(leaf, fi) > BTRFS_FILE_EXTENT_TYPES) {
        fileExtentErr(root, leaf, slot,
        "invalid previous key objectid, have %llu expect %llu",
        prev_key->objectid, key->objectid);
        return -EUCLEAN;
    }
    
    fi = btrfsItemPtr(leaf, slot, struct btrfs_file_extent_item);
    
    if (btrfs_fileExtentType(leaf, fi) > BTRFS_FILE_EXTENT_TYPES) {
        fileExtentErr(root, leaf, slot,
```
+file_extent_err(leaf, slot,
"invalid type for file extent, have %u expect range [0, %u]",
btrfs_file_extent_type(leaf, fi),
BTRFS_FILE_extent_TYPES);
@@ -141,14 +178,14 @@
* and must be caught in open_ctree().
*/
if (btrfs_file_extent_compression(leaf, fi) > BTRFS_COMPRESS_TYPES) {
-    file_extent_err(root, leaf, slot,
  +    file_extent_err(leaf, slot,
"invalid compression for file extent, have %u expect range [0, %u]",
btrfs_file_extent_compression(leaf, fi),
BTRFS_COMPRESS_TYPES);
return -EUCLEAN;
} if (btrfs_file_extent_encryption(leaf, fi)) {
-    file_extent_err(root, leaf, slot,
  +    file_extent_err(leaf, slot,
"invalid encryption for file extent, have %u expect 0",
btrfs_file_extent_encryption(leaf, fi));
return -EUCLEAN;
@@ -156,7 +193,7 @@
if (btrfs_file_extent_type(leaf, fi) == BTRFS_FILE_extent_INLINE) {
  /* Inline extent must have 0 as key offset */
  if (key->offset) {
-      file_extent_err(root, leaf, slot,
  +      file_extent_err(leaf, slot,
"invalid file_offset for inline file extent, have %llu expect 0",
key->offset);
return -EUCLEAN;
@@ -170,7 +218,1118 @@
/* Uncompressed inline extent size must match item size */
if (item_size != BTRFS_FILE_EXTENT_INLINE_DATA_START +
    btrfs_file_extent_ram_bytes(leaf, fi)) {
  -file_extent_err(root, leaf, slot,
  +file_extent_err(leaf, slot,
"invalid ram_bytes for uncompressed inline extent, have %u expect %llu",
item_size, BTRFS_FILE_EXTENT_INLINE_DATA_START +
btrfs_file_extent_ram_bytes(leaf, fi));
@@ -181,77 +218,1118 @@
/* Regular or preallocated extent has fixed item size */
if (item_size != sizeof(*fi)) {
  -file_extent_err(root, leaf, slot,
  +file_extent_err(leaf, slot,
"invalid item size for reg/prealloc file extent, have %u expect %zu",
item_size, sizeof(*fi));
return -EUCLEAN;
if (CHECK_FE_ALIGNED(root, leaf, slot, fi, ram_bytes, sectorsize) ||
    CHECK_FE_ALIGNED(root, leaf, slot, fi, disk_bytenr, sectorsize) ||
    CHECK_FE_ALIGNED(root, leaf, slot, fi, disk_num_bytes, sectorsize) ||
    CHECK_FE_ALIGNED(root, leaf, slot, fi, offset, sectorsize) ||
    CHECK_FE_ALIGNED(root, leaf, slot, fi, num_bytes, sectorsize))
return -EUCLEAN;
+
+if (CHECK_FE_ALIGNED(fs_info, leaf, slot, fi, ram_bytes, sectorsize) ||
    CHECK_FE_ALIGNED(fs_info, leaf, slot, fi, disk_bytenr, sectorsize) ||
    CHECK_FE_ALIGNED(fs_info, leaf, slot, fi, disk_num_bytes, sectorsize) ||
    CHECK_FE_ALIGNED(fs_info, leaf, slot, fi, offset, sectorsize) ||
    CHECK_FE_ALIGNED(fs_info, leaf, slot, fi, num_bytes, sectorsize))
return -EUCLEAN;
+
+/*
+ * Check that no two consecutive file extent items, in the same leaf,
+ * present ranges that overlap each other.
+ */
+if (slot > 0 &&
    prev_key->objectid == key->objectid &&
    prev_key->type == BTRFS_EXTENT_DATA_KEY) {
        struct btrfs_file_extent_item *prev_fi;
+u64 prev_end;
+
+prev_fi = btrfs_item_ptr(leaf, slot - 1,
+        struct btrfs_file_extent_item);
+prev_end = file_extent_end(leaf, prev_key, prev_fi);
+if (prev_end > key->offset) {
            file_extent_err(leaf, slot - 1,
+                "file extent end range (%llu) goes beyond start offset (%llu) of the next file extent",
+                prev_end, key->offset);
+return -EUCLEAN;
+
+}
+}
+
+return 0;
}

-static int check_csum_item(struct btrfs_root *root, struct extent_buffer *leaf,
        struct btrfs_key *key, int slot)
+static int check_csum_item(struct extent_buffer *leaf, struct btrfs_key *key,
        int slot, struct btrfs_key *prev_key)
{
    u32 sectorsize = root->fs_info->sectorsize;
    u32 csumsize = btrfs_super_csum_size(root->fs_info->super_copy);
    struct btrfs_fs_info *fs_info = leaf->fs_info;
    u32 sectorsize = fs_info->sectorsize;
    u32 csumsize = btrfs_super_csum_size(fs_info->super_copy);
if (key->objectid != BTRFS_EXTENT_CSUM_OBJECTID) {
    -generic_err(root, leaf, slot,
    +generic_err(leaf, slot,
        "invalid key objectid for csum item, have %llu expect %llu",
    key->objectid, BTRFS_EXTENT_CSUM_OBJECTID);
    return -EUCLEAN;
}
if (!IS_ALIGNED(key->offset, sectorsize)) {
    -generic_err(root, leaf, slot,
    +generic_err(leaf, slot,
        "unaligned key offset for csum item, have %llu should be aligned to %u",
    key->offset, sectorsize);
    return -EUCLEAN;
}
if (!IS_ALIGNED(btrfs_item_size_nr(leaf, slot), csumsize)) {
    -generic_err(root, leaf, slot,
    +generic_err(leaf, slot,
        "unaligned item size for csum item, have %u should be aligned to %u",
    btrfs_item_size_nr(leaf, slot), csumsize);
    return -EUCLEAN;
}
+if (slot > 0 && prev_key->type == BTRFS_EXTENT_CSUM_KEY) {
    +u64 prev_csum_end;
    +u32 prev_item_size;
    +
    +prev_item_size = btrfs_item_size_nr(leaf, slot - 1);
    +prev_csum_end = (prev_item_size / csumsize) * sectorsize;
    +prev_csum_end += prev_key->offset;
    +if (prev_csum_end > key->offset) {
        +generic_err(leaf, slot - 1,
        +"csum end range (%llu) goes beyond the start range (%llu) of the next csum item",
        +    prev_csum_end, key->offset);
        +return -EUCLEAN;
    +}
    +}
    +return 0;
    +}
    +*/
    + * Customized reported for dir_item, only important new info is key->objectid,
    + * which represents inode number
    + */
    +__printf(3, 4)
    +__cold
    +static void dir_item_err(const struct extent_buffer *eb, int slot,
    + const char *fmt, ...)
    +{
    +const struct btrfs_fs_info *fs_info = eb->fs_info;
+struct btrfs_key key;
+struct va_format vaf;
+va_list args;
+
+btrfs_item_key_to_cpu(eb, &key, slot);
+va_start(args, fmt);
+
+vaf.fmt = fmt;
+vaf.va = &args;
+
+btrfs_crit(fs_info,
+"corrupt %s: root=%llu block=%llu slot=%d ino=%llu, %pV",
+btrfs_header_level(eb) == 0 ? "leaf" : "node",
+btrfs_header_owner(eb), btrfs_header_bytenr(eb), slot,
+key.objectid, &vaf);
+va_end(args);
+}
+
+static int check_dir_item(struct extent_buffer *leaf,
+ struct btrfs_key *key, struct btrfs_key *prev_key,
+ int slot)
+{
+struct btrfs_fs_info *fs_info = leaf->fs_info;
+struct btrfs_dir_item *di;
+u32 item_size = btrfs_item_size_nr(leaf, slot);
+u32 cur = 0;
+
+/* Same check as in check_extent_data_item() */
+if (slot > 0 && is_fstree(btrfs_header_owner(leaf)) &&
+ prev_key->objectid != key->objectid) {
+dir_item_err(leaf, slot,
+"invalid previous key objectid, have %llu expect %llu",
+ prev_key->objectid, key->objectid);
+return -EUCLEAN;
+}
+di = btrfs_item_ptr(leaf, slot, struct btrfs_dir_item);
+while (cur < item_size) {
+u32 name_len;
+u32 data_len;
+u32 max_name_len;
+u32 total_size;
+u32 name_hash;
+u8 dir_type;
+
+/* header itself should not cross item boundary */
+if (cur + sizeof(*di) > item_size) {
+dir_item_err(leaf, slot,
+"dir item header crosses item boundary, have %zu boundary %u",
+cur, item_size - cur);
+break;
+}
+ /*!
+ * btrfs_item_key_to_cpu():
+ */
+struct ino_slot_info *isi = &isi_table[isi_slot chỉnh];
+for (int slot = isi->slot; slot < isi->max_slot; slot++) {
+u64 ino = isi_table[slot].ino;
+ino = btrfs_inode_major(ino, &si);
+cur + sizeof(*di), item_size);
+return -EUCLEAN;
+
+/* dir type check */
+dir_type = btrfs_dir_type(leaf, di);
+if (dir_type >= BTRFS_FT_MAX) {
+  dir_item_err(leaf, slot,
+  "invalid dir item type, have %u expect [0, %u],
+  dir_type, BTRFS_FT_MAX);
+  return -EUCLEAN;
+}
+
+if (key->type == BTRFS_XATTR_ITEM_KEY &&
+    dir_type != BTRFS_FT_XATTR) {
+  dir_item_err(leaf, slot,
+  "invalid dir item type for XATTR key, have %u expect %u",
+  dir_type, BTRFS_FT_XATTR);
+  return -EUCLEAN;
+}
+if (dir_type == BTRFS_FT_XATTR &&
+    key->type != BTRFS_XATTR_ITEM_KEY) {
+  dir_item_err(leaf, slot,
+  "xattr dir type found for non-XATTR key");
+  return -EUCLEAN;
+}
+if (dir_type == BTRFS_FT_XATTR)
+  max_name_len = XATTR_NAME_MAX;
+else
+  max_name_len = BTRFS_NAME_LEN;
+
+/* Name/data length check */
+name_len = btrfs_dir_name_len(leaf, di);
+data_len = btrfs_dir_data_len(leaf, di);
+if (name_len > max_name_len) {
+  dir_item_err(leaf, slot,
+  "dir item name len too long, have %u max %u",
+  name_len, max_name_len);
+  return -EUCLEAN;
+}
+if (name_len + data_len > BTRFS_MAX_XATTR_SIZE(fs_info)) {
+  dir_item_err(leaf, slot,
+  "dir item name and data len too long, have %u max %u",
+  name_len + data_len,
+  BTRFS_MAX_XATTR_SIZE(fs_info));
+  return -EUCLEAN;
+}
if (data_len && dir_type != BTRFS_FT_XATTR) {
    dir_item_err(leaf, slot,
    "dir item with invalid data len, have %u expect 0",
    data_len);
    return -EUCLEAN;
}

+total_size = sizeof(*di) + name_len + data_len;
+
+/* header and name/data should not cross item boundary */
+if (cur + total_size > item_size) {
    dir_item_err(leaf, slot,
    "dir item data crosses item boundary, have %u boundary %u",
    cur + total_size, item_size);
    return -EUCLEAN;
}

+/*
+ * Special check for XATTR/DIR_ITEM, as key->offset is name
+ * hash, should match its name
+ */
+if (key->type == BTRFS_DIR_ITEM_KEY ||
    key->type == BTRFS_XATTR_ITEM_KEY) {
    char namebuf[max(BTRFS_NAME_LEN, XATTR_NAME_MAX)];
    +read_extent_buffer(leaf, namebuf,
    (unsigned long)(di + 1), name_len);
    +name_hash = btrfs_name_hash(namebuf, name_len);
    +if (key->offset != name_hash) {
        dir_item_err(leaf, slot,
        "name hash mismatch with key, have 0x%016x expect 0x%016llx",
        name_hash, key->offset);
        return -EUCLEAN;
    }
}
+cur += total_size;
+di = (struct btrfs_dir_item *)((void *)di + total_size);
+
+return 0;
+
+__printf(3, 4)
+__cold
+static void block_group_err(const struct extent_buffer *eb, int slot,
    const char *fmt, ...)
+{
    +const struct btrfs_fs_info *fs_info = eb->fs_info;
    +struct btrfs_key key;
struct va_format vaf;
+va_list args;
+
+btrfs_item_key_to_cpu(eb, &key, slot);
+va_start(args, fmt);
+
+vaf.fmt = fmt;
+vaf.va = &args;
+
+btrfs_crit(fs_info,
+"corrupt %s: root=%llu block=%llu slot=%d bg_start=%llu bg_len=%llu, %pV",
+btrfs_header_level(eb) == 0 ? "leaf" : "node",
+btrfs_header_owner(eb), btrfs_header_bytenr(eb), slot,
+key.objectid, key.offset, &vaf);
+va_end(args);
+
+static int check_block_group_item(struct extent_buffer *leaf,
+  struct btrfs_key *key, int slot)
+{
+struct btrfs_block_group_item bgi;
+u32 item_size = btrfs_item_size_nr(leaf, slot);
+u64 flags;
+u64 type;
+
+/*
+ * Here we don't really care about alignment since extent allocator can
+ * handle it. We care more about the size.
+ */
+if (key->offset == 0) {
+block_group_err(leaf, slot,
+"invalid block group size 0");
+return -EUCLEAN;
+}
+
+if (item_size != sizeof(bgi)) {
+block_group_err(leaf, slot,
+"invalid item size, have %u expect %zu",
+item_size, sizeof(bgi));
+return -EUCLEAN;
+}
+
+read_extent_buffer(leaf, &bgi, btrfs_item_ptr_offset(leaf, slot),
+sizeof(bgi));
+if (btrfs_block_group_chunk_objectid(&bgi) !=
+BTRFS_FIRST_CHUNK_TREE_OBJECTID) {
+block_group_err(leaf, slot,
+"invalid block group chunk objectid, have %llu expect %llu",
}
btrfs_block_group_chunk_objectid(&bgi),
+ BTRFS_FIRST CHUNK_TREE_OBJECTID);
+return -EUCLEAN;
+
+if (btrfs_block_group_used(&bgi) > key->offset) {
+block_group_err(leaf, slot,
+      "invalid block group used, have %llu expect [0, %llu",
+      btrfs_block_group_used(&bgi), key->offset);
+return -EUCLEAN;
+}
+
+flags = btrfs_block_group_flags(&bgi);
+if (hweight64(flags & BTRFS_BLOCK_GROUP_PROFILE_MASK) > 1) {
+block_group_err(leaf, slot,
+      "invalid profile flags, have 0x%llx (%lu bits set) expect no more than 1 bit set",
+      flags & BTRFS_BLOCK_GROUP_PROFILE_MASK,
+      hweight64(flags & BTRFS_BLOCK_GROUP_PROFILE_MASK));
+return -EUCLEAN;
+}
+
+type = flags & BTRFS_BLOCK_GROUP_TYPE_MASK;
+if (type != BTRFS_BLOCK_GROUP_DATA &&
+    type != BTRFS_BLOCK_GROUP_METADATA &&
+    type != BTRFS_BLOCK_GROUP_SYSTEM &&
+    type != (BTRFS_BLOCK_GROUP_METADATA |
+    BTRFS_BLOCK_GROUP_DATA)) {
+block_group_err(leaf, slot,
+      "invalid type, have 0x%llx (%lu bits set) expect either 0x%llx, 0x%llx, 0x%llx or 0x%llx",
+      type, hweight64(type),
+      BTRFS_BLOCK_GROUP_DATA, BTRFS_BLOCK_GROUP_METADATA,
+      BTRFS_BLOCK_GROUP_SYSTEM,
+      BTRFS_BLOCK_GROUP_METADATA | BTRFS_BLOCK_GROUP_DATA);
+return -EUCLEAN;
+}
+return 0;
+}
+
__printf(4, 5)
__cold
static void chunk_err(const struct extent_buffer *leaf,
    const struct btrfs_chunk *chunk, u64 logical,
    const char *fmt, ...)
{
    const struct btrfs_fs_info *fs_info = leaf->fs_info;
    bool is_sb;
    struct va_format vaf;
    va_list args;
int i;
int slot = -1;

/* Only superblock eb is able to have such small offset */
is_sb = (leaf->start == BTRFS_SUPER_INFO_OFFSET);

if (!is_sb) {
    /* Get the slot number by iterating through all slots, this
     * would provide better readability.
     */
    for (i = 0; i < btrfs_header_nritems(leaf); i++) {
        if (btrfs_item_ptr_offset(leaf, i) ==
            (unsigned long)chunk) {
            slot = i;
            break;
        }
    }
    va_start(args, fmt);
    vaf.fmt = fmt;
    vaf.va = &args;

    if (is_sb)
        btrfs_crit(fs_info,
            "corrupt superblock syschunk array: chunk_start=%llu, %pV",
            logical, &vaf);
    else
        btrfs_crit(fs_info,
            "corrupt leaf: root=%llu block=%llu slot=%d chunk_start=%llu, %pV",
            BTRFS_CHUNK_TREE_OBJECTID, leaf->start, slot,
            logical, &vaf);
    va_end(args);
}

/* The common chunk check which could also work on super block sys chunk array.
 * Return -EUCLEAN if anything is corrupted.
 * Return 0 if everything is OK.
 */
int btrfs_check_chunk_valid(struct btrfs_fs_info *fs_info,
    struct extent_buffer *leaf, u64 logical)
{
    u64 length;
    u64 stripe_len;
    u16 num_stripes;
+u16 sub_stripes;
+u64 type;
+u64 features;
+bool mixed = false;
+
+length = btrfs_chunk_length(leaf, chunk);
+stripe_len = btrfs_chunk_stripe_len(leaf, chunk);
+num_stripes = btrfs_chunk_num_stripes(leaf, chunk);
+sub_stripes = btrfs_chunk_sub_stripes(leaf, chunk);
+type = btrfs_chunk_type(leaf, chunk);
+
+if (!num_stripes) {
+chunk_err(leaf, chunk, logical,
+    "invalid chunk num_stripes, have %u", num_stripes);
+return -EUCLEAN;
+}
+if (!IS_ALIGNED(logical, fs_info->sectorsize)) {
+chunk_err(leaf, chunk, logical,
+    "invalid chunk logical, have %llu should aligned to %u",
+    logical, fs_info->sectorsize);
+return -EUCLEAN;
+}
+if (btrfs_chunk_sector_size(leaf, chunk) != fs_info->sectorsize) {
+chunk_err(leaf, chunk, logical,
+    "invalid chunk sectorsize, have %u expect %u",
+    btrfs_chunk_sector_size(leaf, chunk),
+    fs_info->sectorsize);
+return -EUCLEAN;
+}
+if (!length || !IS_ALIGNED(length, fs_info->sectorsize)) {
+chunk_err(leaf, chunk, logical,
+    "invalid chunk length, have %llu", length);
+return -EUCLEAN;
+}
+if (!is_power_of_2(stripe_len) || stripe_len != BTRFS_STRIPE_LEN) {
+chunk_err(leaf, chunk, logical,
+    "invalid chunk stripe length: %llu",
+    stripe_len);
+return -EUCLEAN;
+}
+if (! ~(BTRFS_BLOCK_GROUP_TYPE_MASK | BTRFS_BLOCK_GROUP_PROFILE_MASK) &
+    type) {
+chunk_err(leaf, chunk, logical,
+    "unrecognized chunk type: 0x%llx",
+    ~(BTRFS_BLOCK_GROUP_TYPE_MASK | BTRFS_BLOCK_GROUP_PROFILE_MASK) &
+    btrfs_chunk_type(leaf, chunk));
+return -EUCLEAN;
if (!is_power_of_2(type & BTRFS_BLOCK_GROUP_PROFILE_MASK) &&
(type & BTRFS_BLOCK_GROUP_PROFILE_MASK) != 0) {
+chunk_err(leaf, chunk, logical,
+"invalid chunk profile flag: 0x%llx, expect 0 or 1 bit set",
+type & BTRFS_BLOCK_GROUP_PROFILE_MASK);
+return -EUCLEAN;
+
+if ((type & BTRFS_BLOCK_GROUP_TYPE_MASK) == 0) {
+chunk_err(leaf, chunk, logical,
+"missing chunk type flag, have 0x%llx one bit must be set in 0x%llx",
+type, BTRFS_BLOCK_GROUP_TYPE_MASK);
+return -EUCLEAN;
+
+if ((type & BTRFS_BLOCK_GROUP_SYSTEM) &&
+ (type & (BTRFS_BLOCK_GROUP_METADATA | BTRFS_BLOCK_GROUP_DATA))) {
+chunk_err(leaf, chunk, logical,
+"system chunk with data or metadata type: 0x%llx",
+type);
+return -EUCLEAN;
+
+features = btrfs_super_incompat_flags(fs_info->super_copy);
+if (features & BTRFS_FEATURE_INCOMPAT_MIXED_GROUPS)
+mixed = true;
+
+if (!mixed) {
+if ((type & BTRFS_BLOCK_GROUP_METADATA) &&
+ (type & BTRFS_BLOCK_GROUP_DATA)) {
+chunk_err(leaf, chunk, logical,
+"mixed chunk type in non-mixed mode: 0x%llx", type);
+return -EUCLEAN;
+
+if ((type & BTRFS_BLOCK_GROUP_RAID10 && sub_stripes != 2) ||
+ (type & BTRFS_BLOCK_GROUP_RAID1 && num_stripes != 2) ||
+ (type & BTRFS_BLOCK_GROUP_RAID5 && num_stripes < 2) ||
+ (type & BTRFS_BLOCK_GROUP_RAID6 && num_stripes < 3) ||
+ (type & BTRFS_BLOCK_GROUP_DUP && num_stripes != 2) ||
+ ((type & BTRFS_BLOCK_GROUP_PROFILE_MASK) == 0 && num_stripes != 1)) {
+chunk_err(leaf, chunk, logical,
+"invalid num_stripes:sub_stripes %u:%u for profile %llu",
+num_stripes, sub_stripes,
+type & BTRFS_BLOCK_GROUP_PROFILE_MASK);
+return -EUCLEAN;
static void dev_item_err(const struct extent_buffer *eb, int slot, const char *fmt, ...)
{
    struct btrfs_key key;
    struct va_format vaf;
    va_list args;

    btrfs_item_key_to_cpu(eb, &key, slot);
    va_start(args, fmt);

    vaf.fmt = fmt;
    vaf.va = &args;

    btrfs_crit(eb->fs_info, "corrupt %s: root=%llu block=%llu slot=%d devid=%llu %pV", 
        btrfs_header_level(eb) == 0 ? "leaf" : "node", 
        btrfs_header_owner(eb), btrfs_header_bytenr(eb), slot, 
        key.objectid, &vaf);
    va_end(args);
}

static int check_dev_item(struct extent_buffer *leaf, struct btrfs_key *key, int slot)
{
    struct btrfs_dev_item *ditem;

    if (key->objectid != BTRFS_DEV_ITEMS_OBJECTID) {
        dev_item_err(leaf, slot, "invalid objectid: has=%llu expect=%llu", 
            key->objectid, BTRFS_DEV_ITEMS_OBJECTID);
        return -EUCLEAN;
    }

    ditem = btrfs_item_ptr(leaf, slot, struct btrfs_dev_item);
    if (btrfs_device_id(leaf, ditem) != key->offset) {
        dev_item_err(leaf, slot, "devid mismatch: key has=%llu item has=%llu", 
            key->offset, btrfs_device_id(leaf, ditem));
        return -EUCLEAN;
    }

    /*
For device total_bytes, we don’t have reliable way to check it, as
it can be 0 for device removal. Device size check can only be done
by dev extents check.

```c
/*
 * Remaining members like io_align/type/gen/dev_group aren’t really
 * utilized. Skip them to make later usage of them easier.
 */
```

```c
/* Inode item error output has the same format as dir_item_err() */
#define inode_item_err(fs_info, eb, slot, fmt, ...)
    dir_item_err(eb, slot, fmt, __VA_ARGS__)

static int check_inode_item(struct extent_buffer *leaf,
    struct btrfs_key *key, int slot)
{
    struct btrfs_fs_info *fs_info = leaf->fs_info;
    struct btrfs_inode_item *iitem;
    u64 super_gen = btrfs_super_generation(fs_info->super_copy);
    u32 valid_mask = (S_IFMT | S_ISUID | S_ISGID | S_ISVTX | 0777);
    u32 mode;

    if ((key->objectid < BTRFS_FIRST_FREE_OBJECTID ||
         key->objectid > BTRFS_LAST_FREE_OBJECTID) &&
        key->objectid != BTRFS_ROOT_TREE_DIR_OBJECTID &&
        key->objectid != BTRFS_FREE_INO_OBJECTID) {
        generic_err(leaf, slot,
                    "invalid key objectid: has %llu expect %llu or
                    [%llu, %llu] or %llu",
                    key->objectid, BTRFS_ROOT_TREE_DIR_OBJECTID,
                    BTRFS_FIRST_FREE_OBJECTID,
                    BTRFS_LAST_FREE_OBJECTID,
                    BTRFS_FREE_INO_OBJECTID);
        return -EUCLEAN;
    }
    if (key->offset != 0) {
        inode_item_err(fs_info, leaf, slot,
                      "invalid key offset: has %llu expect 0",
                      key->offset);
```
+return -EUCLEAN;
+
+iitem = btrfs_item_ptr(leaf, slot, struct btrfs_inode_item);
+
+/* Here we use super block generation + 1 to handle log tree */
+if (btrfs_inode_generation(leaf, iitem) > super_gen + 1) {
+    inode_item_err(fs_info, leaf, slot,
+    "invalid inode generation: has %llu expect (0, %llu]",
+    btrfs_inode_generation(leaf, iitem),
+    super_gen + 1);
+    return -EUCLEAN;
+
+    /* Note for ROOT_TREE_DIR_ITEM, mkfs could set its transid 0 */
+    if (btrfs_inode_transid(leaf, iitem) > super_gen + 1) {
+        inode_item_err(fs_info, leaf, slot,
+        "invalid inode transid: has %llu expect [0, %llu]",
+        btrfs_inode_transid(leaf, iitem), super_gen + 1);
+        return -EUCLEAN;
+    }
+    /* For size and nbytes it's better not to be too strict, as for dir
+    * item its size/nbytes can easily get wrong, but doesn't affect
+    * anything in the fs. So here we skip the check.
+    */
+    mode = btrfs_inode_mode(leaf, iitem);
+    if (mode & ~valid_mask) {
+        inode_item_err(fs_info, leaf, slot,
+        "unknown mode bit detected: 0x%x",
+        mode & ~valid_mask);
+        return -EUCLEAN;
+    }
+
+    /* S_IFMT is not bit mapped so we can't completely rely on is_power_of_2,
+    * but is_power_of_2() can save us from checking FIFO/CHR/DIR/REG.
+    * Only needs to check BLK, LNK and SOCKS
+    */
+    if (!is_power_of_2(mode & S_IFMT)) {
+        if (!S_ISLNK(mode) && !S_ISBLK(mode) && !S_ISSOCK(mode)) {
+            inode_item_err(fs_info, leaf, slot,
+            "invalid mode: has 0%x expect valid S_IF* bit(s)",
+            mode & S_IFMT);
+            return -EUCLEAN;
+        }
+        if (S_ISDIR(mode) && btrfs_inode_nlink(leaf, iitem) > 1) {
+            inode_item_err(fs_info, leaf, slot,
"invalid nlink: has %u expect no more than 1 for dir",
+btrfs_inode_nlink(leaf, iitem));
+return -EUCLEAN;
+
+if (btrfs_inode_flags(leaf, iitem) & ~BTRFS_INODE_FLAG_MASK) {
+inode_item_err(fs_info, leaf, slot,
+    "unknown flags detected: 0x%llx",
+    btrfs_inode_flags(leaf, iitem) &
+    ~BTRFS_INODE_FLAG_MASK);
+return -EUCLEAN;
+} +return 0;
+
+static int check_root_item(struct extent_buffer *leaf, struct btrfs_key *key,
+    int slot)
+{
+    struct btrfs_fs_info *fs_info = leaf->fs_info;
+    struct btrfs_root_item ri;
+    const u64 valid_root_flags = BTRFS_ROOT_SUBVOL_RDONLY |
+        BTRFS_ROOT_SUBVOL_DEAD;
+    /* No such tree id */
+    if (key->objectid == 0) {
+        generic_err(leaf, slot, "invalid root id 0");
+        return -EUCLEAN;
+    }
+    /* Some older kernel may create ROOT_ITEM with non-zero offset, so here
    * we only check offset for reloc tree whose key->offset must be a
    * valid tree.
    * */
+    if (key->objectid == BTRFS_TREE_RELOC_OBJECTID && key->offset == 0) {
+        generic_err(leaf, slot, "invalid root id 0 for reloc tree");
+        return -EUCLEAN;
+    }
+    if (btrfs_item_size_nr(leaf, slot) != sizeof(ri)) {
+        generic_err(leaf, slot,
+            "invalid root item size, have %u expect %zu",
+            btrfs_item_size_nr(leaf, slot), sizeof(ri));
+    }
+    read_extent_buffer(leaf, &ri, btrfs_item_ptr_offset(leaf, slot),
+        sizeof(ri));
+    /* Generation related */
```c
+if (btrfs_root_generation(&ri) >
+   btrfs_super_generation(fs_info->super_copy) + 1) {
+    generic_err(leaf, slot,
+    "invalid root generation, have %llu expect (0, %llu",
+    btrfs_root_generation(&ri),
+    btrfs_super_generation(fs_info->super_copy) + 1);
+    return -EUCLEAN;
+}
+if (btrfs_root_generation_v2(&ri) >
+   btrfs_super_generation(fs_info->super_copy) + 1) {
+    generic_err(leaf, slot,
+    "invalid root v2 generation, have %llu expect (0, %llu",
+    btrfs_root_generation_v2(&ri),
+    btrfs_super_generation(fs_info->super_copy) + 1);
+    return -EUCLEAN;
+}
+if (btrfs_root_last_snapshot(&ri) >
+    btrfs_super_generation(fs_info->super_copy) + 1) {
+    generic_err(leaf, slot,
+    "invalid root last_snapshot, have %llu expect (0, %llu",
+    btrfs_root_last_snapshot(&ri),
+    btrfs_super_generation(fs_info->super_copy) + 1);
+    return -EUCLEAN;
+}
+/* Alignment and level check */
+if (!IS_ALIGNED(btrfs_root_bytenr(&ri), fs_info->sectorsize)) {
+    generic_err(leaf, slot,
+    "invalid root bytenr, have %llu expect to be aligned to %u",
+    btrfs_root_bytenr(&ri), fs_info->sectorsize);
+    return -EUCLEAN;
+}
+if (btrfs_root_level(&ri) >= BTRFS_MAX_LEVEL) {
+    generic_err(leaf, slot,
+    "invalid root level, have %u expect [0, %u]",
+    btrfs_root_level(&ri), BTRFS_MAX_LEVEL - 1);
+    return -EUCLEAN;
+}
+if (ri.drop_level >= BTRFS_MAX_LEVEL) {
+    generic_err(leaf, slot,
+    "invalid root level, have %u expect [0, %u]",
+    ri.drop_level, BTRFS_MAX_LEVEL - 1);
+    return -EUCLEAN;
+}
+/* Flags check */
+if (btrfs_root_flags(&ri) & ~valid_root_flags) {
+    generic_err(leaf, slot,
```
"invalid root flags, have 0x%llx expect mask 0x%llx",
    btrfs_root_flags(&ri), valid_root_flags);
+return -EUCLEAN;
+
+    __printf(3,4)
+__cold
+static void extent_err(const struct extent_buffer *eb, int slot,
+    const char *fmt, ...)
+
+struct btrfs_key key;
+struct va_format vaf;
+va_list args;
+u64 bytenr;
+u64 len;
+
+btrfs_item_key_to_cpu(eb, &key, slot);
+bytenr = key.objectid;
+if (key.type == BTRFS_METADATA_ITEM_KEY ||
+    key.type == BTRFS_TREE_BLOCK_REF_KEY ||
+    key.type == BTRFS_SHARED_BLOCK_REF_KEY)
+len = eb->fs_info->nodesize;
+else
+len = key.offset;
+va_start(args, fmt);
+
+vaf.fmt = fmt;
+vaf.va = &args;
+
+btrfs_crit(eb->fs_info,
+"corrupt %s: block=%llu slot=%d extent bytenr=%llu len=%llu %pV",
+btrfs_header_level(eb) == 0 ? "leaf" : "node",
+eb->start, slot, bytenr, len, &vaf);
+va_end(args);
+
+static int check_extent_item(struct extent_buffer *leaf,
+    struct btrfs_key *key, int slot)
+
+{ struct btrfs_key *key = leaf->fs_info = leaf->fs_info;
+    struct btrfs_extent_item *ei;
+    bool is_tree_block = false;
+    unsigned long ptr;/* Current pointer inside inline refs */
+    unsigned long end;/* Extent item end */
+    const u32 item_size = btrfs_item_size_nr(leaf, slot);
+    u64 flags;
+u64 generation;
+u64 total_refs;/* Total refs in btrfs_extent_item */
+u64 inline_refs = 0;/* found total inline refs */
+
+if (key->type == BTRFS_METADATA_ITEM_KEY &&
    !btrfs_fs_incompat(fs_info, SKINNY_METADATA)) { 
+generic_err(leaf, slot,
+"invalid key type, METADATA_ITEM type invalid when SKINNY_METADATA feature disabled");
+return -EUCLEAN;
+}
+/* key->objectid is the bytenr for both key types */
+if (!IS_ALIGNED(key->objectid, fs_info->sectorsize)) { 
+generic_err(leaf, slot,
+"invalid key objectid, have %llu expect to be aligned to %u",
+ key->objectid, fs_info->sectorsize);
+return -EUCLEAN;
+}
+
+/* key->offset is tree level for METADATA_ITEM_KEY */
+if (key->type == BTRFS_METADATA_ITEM_KEY &&
    key->offset >= BTRFS_MAX_LEVEL) { 
+extent_err(leaf, slot,
+"invalid tree level, have %llu expect [0, %u",
+ key->offset, BTRFS_MAX_LEVEL - 1);
+return -EUCLEAN;
+}
+
+/*
 * EXTENT/METADATA_ITEM consists of:
 * 1) One btrfs_extent_item
 * Records the total refs, type and generation of the extent.
 *
 * 2) One btrfs_tree_block_info (for EXTENT_ITEM and tree backref only)
 * Records the first key and level of the tree block.
 *
 * 2) Zero or more btrfs_extent_inline_ref(s)
 * Each inline ref has one btrfs_extent_inline_ref shows:
 * 2.1) The ref type, one of the 4
 * TREE_BLOCK_REF Tree block only
 * SHARED_BLOCK_REF Tree block only
 * EXTENT_DATA_REF Data only
 * SHARED_DATA_REF Data only
 *
 * 2.2) Ref type specific data
 * Either using btrfs_extent_inline_ref::offset, or specific
 * data structure.
 */
+if (item_size < sizeof(*ei)) {
+extent_err(leaf, slot,
"invalid item size, have %u expect [%zu, %u]",
+ item_size, sizeof(*ei),
+ BTRFS_LEAF_DATA_SIZE(fs_info));
+return -EUCLEAN;
+
+end = item_size + btrfs_item_ptr_offset(leaf, slot);
+
+/* Checks against extent_item */
+ei = btrfs_item_ptr(leaf, slot, struct btrfs_extent_item);
+flags = btrfs_extent_flags(leaf, ei);
+total_refs = btrfs_extent_refs(leaf, ei);
+generation = btrfs_extent_generation(leaf, ei);
+if (generation > btrfs_super_generation(fs_info->super_copy) + 1) {
+extent_err(leaf, slot,
+ "invalid generation, have %llu expect (0, %llu",
+ generation,
+ btrfs_super_generation(fs_info->super_copy) + 1);
+return -EUCLEAN;
+}
+if (!(is_power_of_2(flags & (BTRFS_EXTENT_FLAG_DATA |
+ BTRFS_EXTENT_FLAG_TREE_BLOCK)) { 
+extent_err(leaf, slot,
+"invalid extent flag, have 0x%llx expect 1 bit set in 0x%llx",
+flags, BTRFS_EXTENT_FLAG_DATA |
+BTRFS_EXTENT_FLAG_TREE_BLOCK);
+return -EUCLEAN;
+}
+is_tree_block = !!(flags & BTRFS_EXTENT_FLAG_TREE_BLOCK);
+if (is_tree_block) {
+if (key->type == BTRFS_EXTENT_ITEM_KEY &&
+ key->offset != fs_info->nodesize) {
+extent_err(leaf, slot,
+ "invalid extent length, have %llu expect %u",
+ key->offset, fs_info->nodesize);
+return -EUCLEAN;
+}
+} else {
+if (key->type != BTRFS_EXTENT_ITEM_KEY) {
+extent_err(leaf, slot,
+"invalid key type, have %u expect %u for data backref",
+ key->type, BTRFS_EXTENT_ITEM_KEY);
+return -EUCLEAN;
+}
+if (!IS_ALIGNED(key->offset, fs_info->sectorsize)) {
+extent_err(leaf, slot,
+"invalid extent length, have %llu expect aligned to %u",
+ key->offset, fs_info->sectorsize);
+return -EUCLEAN;
+}
+ptr = (unsigned long)(struct btrfs_extent_item *)(ei + 1);
+
+/* Check the special case of btrfs_tree_block_info */
+if (is_tree_block && key->type != BTRFS_METADATA_ITEM_KEY) {
+struct btrfs_tree_block_info *info;
+
+info = (struct btrfs_tree_block_info *)ptr;
+if (btrfs_tree_block_level(leaf, info) >= BTRFS_MAX_LEVEL) {
+extent_err(leaf, slot,
+    "invalid tree block info level, have %u expect [0, %u]",
+    btrfs_tree_block_level(leaf, info),
+    BTRFS_MAX_LEVEL - 1);
+return -EUCLEAN;
+}
+
+ptr = (unsigned long)(struct btrfs_tree_block_info *)(info + 1);
+
+/* Check inline refs */
+while (ptr < end) {
+struct btrfs_extent_inline_ref *iref;
+struct btrfs_extent_data_ref *dref;
+struct btrfs_shared_data_ref *sref;
+u64 dref_offset;
+u64 inline_offset;
+u8 inline_type;
+
+if (ptr + sizeof(*iref) > end) {
+extent_err(leaf, slot,
+    "inline ref item overflows extent item, ptr %lu iref size %zu end %lu",
+    ptr, sizeof(*iref), end);
+return -EUCLEAN;
+}
+
+switch (inline_type) {
+    /* inline_offset is subvolid of the owner, no need to check */
+    case BTRFS_TREE_BLOCK_REF_KEY:
+        inline_refs++;
+    }
+}
+iref = (struct btrfs_extent_inline_ref *)ptr;
+inline_type = btrfs_extent_inline_ref_type(leaf, iref);
+inline_offset = btrfs_extent_inline_ref_offset(leaf, iref);
+if (ptr + btrfs_extent_inline_ref_size(inline_type) > end) {
+extent_err(leaf, slot,
+    "inline ref item overflows extent item, ptr %lu iref size %u end %lu",
+    ptr, inline_type, end);
+return -EUCLEAN;
+}
+}
+switch (inline_type) {
+    /* inline_offset is subvolid of the owner, no need to check */
+    case BTRFS_TREE_BLOCK_REF_KEY:
+        inline_refs++;
+    }

+break;
+/* Contains parent bytenr */
+case BTRFS_SHARED_BLOCK_REF_KEY:
+if (!IS_ALIGNED(inline_offset, fs_info->sectorsize)) {
+extent_err(leaf, slot,
+"invalid tree parent bytenr, have %llu expect aligned to %u",
+inline_offset, fs_info->sectorsize);
+return -EUCLEAN;
+}
+inline_refs++;
+break;
+/*
+ * Contains owner subvolid, owner key objectid, adjusted offset.
+ * The only obvious corruption can happen in that offset.
+ */
+case BTRFS_EXTENT_DATA_REF_KEY:
+dref = (struct btrfs_extent_data_ref *)(&iref->offset);
+dref_offset = btrfs_extent_data_ref_offset(leaf, dref);
+if (!IS_ALIGNED(dref_offset, fs_info->sectorsize)) {
+extent_err(leaf, slot,
+"invalid data ref offset, have %llu expect aligned to %u",
+dref_offset, fs_info->sectorsize);
+return -EUCLEAN;
+}
+inline_refs += btrfs_extent_data_ref_count(leaf, dref);
+break;
+/* Contains parent bytenr and ref count */
+case BTRFS_SHARED_DATA_REF_KEY:
+sref = (struct btrfs_shared_data_ref *)(iref + 1);
+if (!IS_ALIGNED(inline_offset, fs_info->sectorsize)) {
+extent_err(leaf, slot,
+"invalid data parent bytenr, have %llu expect aligned to %u",
+inline_offset, fs_info->sectorsize);
+return -EUCLEAN;
+}
+inline_refs += btrfs_shared_data_ref_count(leaf, sref);
+break;
+default:
+extent_err(leaf, slot, "unknown inline ref type: %u",
+inline_type);
+return -EUCLEAN;
+
+ptr += btrfs_extent_inline_ref_size(inline_type);
+
+/* No padding is allowed */
+if (ptr != end) {
+extent_err(leaf, slot,
+"invalid extent item size, padding bytes found");
static int check_simple_keyed_refs(struct extent_buffer *leaf, struct btrfs_key *key, int slot) {
    u32 expect_item_size = 0;
    if (key->type == BTRFS_SHARED_DATA_REF_KEY)
        expect_item_size = sizeof(struct btrfs_shared_data_ref);
    if (btrfs_item_size_nr(leaf, slot) != expect_item_size) {
        generic_err(leaf, slot,
            "invalid item size, have %u expect %u for key type %u",
            btrfs_item_size_nr(leaf, slot),
            expect_item_size, key->type);
        return -EUCLEAN;
    }
    if (!IS_ALIGNED(key->objectid, leaf->fs_info->sectorsize)) {
        generic_err(leaf, slot,
            "invalid key objectid for shared block ref, have %llu expect aligned to %u",
            key->objectid, leaf->fs_info->sectorsize);
        return -EUCLEAN;
    }
    if (key->type != BTRFS_TREE_BLOCK_REF_KEY && !IS_ALIGNED(key->offset, leaf->fs_info->sectorsize)) {
        extent_err(leaf, slot,
            "invalid tree parent bytenr, have %llu expect aligned to %u",
            key->offset, leaf->fs_info->sectorsize);
        return -EUCLEAN;
    }
    return 0;
}

static int check_extent_data_ref(struct extent_buffer *leaf, struct btrfs_key *key, int slot) {
    struct btrfs_extent_data_ref *dref;
unsigned long ptr = btrfs_item_ptr_offset(leaf, slot);
const unsigned long end = ptr + btrfs_item_size_nr(leaf, slot);

if (btrfs_item_size_nr(leaf, slot) % sizeof(*dref) != 0) {
    generic_err(leaf, slot,
    "invalid item size, have %u expect aligned to %zu for key type %u",
    btrfs_item_size_nr(leaf, slot),
    sizeof(*dref), key->type);
}

if (!IS_ALIGNED(key->objectid, leaf->fs_info->sectorsize)) {
    generic_err(leaf, slot,
    "invalid key objectid for shared block ref, have %llu expect aligned to %u",
    key->objectid, leaf->fs_info->sectorsize);
    return -EUCLEAN;
}

for (; ptr < end; ptr += sizeof(*dref)) {
    u64 root_objectid;
    u64 owner;
    u64 offset;
    u64 hash;

    dref = (struct btrfs_extent_data_ref *)ptr;
    root_objectid = btrfs_extent_data_ref_root(leaf, dref);
    owner = btrfs_extent_data_ref_objectid(leaf, dref);
    offset = btrfs_extent_data_ref_offset(leaf, dref);
    hash = hash_extent_data_ref(root_objectid, owner, offset);
    if (hash != key->offset) {
        extent_err(leaf, slot,
        "invalid extent data ref hash, item has 0x%016llx key has 0x%016llx",
        hash, key->offset);
        return -EUCLEAN;
    }
    if (!IS_ALIGNED(offset, leaf->fs_info->sectorsize)) {
        extent_err(leaf, slot,
        "invalid extent data backref offset, have %llu expect aligned to %u",
        offset, leaf->fs_info->sectorsize);
    }
}

return 0;

*/
/*
 * Common point to switch the item-specific validation.
 */
-static int check_leaf_item(struct btrfs_root *root,
    struct extent_buffer *leaf,
    struct btrfs_key *key, int slot)
+static int check_leaf_item(struct extent_buffer *leaf,
struct btrfs_key *key, int slot,
struct btrfs_key *prev_key)
{
    int ret = 0;
+  struct btrfs_chunk *chunk;

    switch (key->type) {
    case BTRFS_EXTENT_DATA_KEY:
+      ret = check_extent_data_item(leaf, key, slot, prev_key);
        break;
        case BTRFS_EXTENT_CSUM_KEY:
+        ret = check_csum_item(leaf, key, slot, prev_key);
+        break;
+        case BTRFS_DIR_ITEM_KEY:
+        case BTRFS_DIR_INDEX_KEY:
+        case BTRFS_XATTR_ITEM_KEY:
+        ret = check_dir_item(leaf, key, prev_key, slot);
+        break;
+        case BTRFS_BLOCK_GROUP_ITEM_KEY:
+        ret = check_block_group_item(leaf, key, slot);
+        break;
+        case BTRFS_CHUNK_ITEM_KEY:
+        chunk = btrfs_item_ptr(leaf, slot, struct btrfs_chunk);
+        ret = btrfs_check_chunk_valid(leaf->fs_info, leaf, chunk,
+                                      key->offset);
+        break;
+        case BTRFS_DEV_ITEM_KEY:
+        ret = check_dev_item(leaf, key, slot);
+        break;
+        case BTRFS_INODE_ITEM_KEY:
+        ret = check_inode_item(leaf, key, slot);
+        break;
+        case BTRFS_ROOT_ITEM_KEY:
+        ret = check_root_item(leaf, key, slot);
+        break;
+        case BTRFS_EXTENT_ITEM_KEY:
+        case BTRFS_METADATA_ITEM_KEY:
+        ret = check_extent_item(leaf, key, slot);
+        break;
+        case BTRFS_TREE_BLOCK_REF_KEY:
+        case BTRFS_SHARED_DATA_REF_KEY:
+        case BTRFS_SHARED_BLOCK_REF_KEY:
+        ret = check_simple_keyed_refs(leaf, key, slot);
+        break;
+        case BTRFS_EXTENT_DATA_REF_KEY:
+        ret = check_extent_data_ref(leaf, key, slot);
break;
}
return ret;
}

+static int check_leaf(struct extent_buffer *leaf, bool check_item_data)
{
+    struct btrfs_fs_info *fs_info = leaf->fs_info;
+    /* No valid key type is 0, so all key should be larger than this key */
    struct btrfs_key prev_key = {0, 0, 0};
    struct btrfs_key key;
    u32 nritems = btrfs_header_nritems(leaf);
    int slot;

+    if (btrfs_header_level(leaf) != 0) {
+        generic_err(leaf, 0,
+        +    "invalid level for leaf, have %d expect 0",
+        +    btrfs_header_level(leaf));
+        +    return -EUCLEAN;
+    +}
+
+    /*
+     * Extent buffers from a relocation tree have a owner field that
+     * corresponds to the subvolume tree they are based on. So just from an
+     * @ @ -261,9 +1339,29 @@
+     * skip this check for relocation trees.
+     */
    if (nritems == 0 && !btrfs_header_flag(leaf, BTRFS_HEADER_FLAG_RELOC)) {
+        u64 owner = btrfs_header_owner(leaf);
+        struct btrfs_root *check_root;
+        -key.objectid = btrfs_header_owner(leaf);
+        +/* These trees must never be empty */
+        +    if (owner == BTRFS_ROOT_TREE_OBJECTID ||
+        +        owner == BTRFS_CHUNK_TREE_OBJECTID ||
+        +        owner == BTRFS_EXTENT_TREE_OBJECTID ||
+        +        owner == BTRFS_DEV_TREE_OBJECTID ||
+        +        owner == BTRFS_FS_TREE_OBJECTID ||
+        +        owner == BTRFS_DATA_RELOC_TREE_OBJECTID) {
+            generic_err(leaf, 0,
+            +            "invalid root, root %llu must never be empty",
+            +            owner);
+            +            return -EUCLEAN;
+        +}
+if (owner == 0) {
+generic_err(leaf, 0,
+"invalid owner, root 0 is not defined");
+return -EUCLEAN;
+}
+
+key.objectid = owner;
+key.type = BTRFS_ROOT_ITEM_KEY;
+key.offset = (u64)-1;

@@ -278,7 +1376,7 @@
eb = btrfs_root_node(check_root);
/* if leaf is the root, then it's fine */
if (leaf != eb) {
			generic_err(check_root, leaf, 0,
				generic_err(leaf, 0,
	"invalid nritems, have %u should not be 0 for non-root leaf",
+nritems);
+free_extent_buffer(eb);
@@ -311,7 +1409,7 @@
/* Make sure the keys are in the right order */
if (btrfs_comp_cpu_keys(&prev_key, &key) >= 0) {
	generic_err(root, leaf, slot,
+generic_err(leaf, slot,
"bad key order, prev (%llu %u %llu) current (%llu %u %llu)",
+prev_key.objectid, prev_key.type,
+prev_key.offset, key.objectid, key.type,
@@ -330,7 +1428,7 @@
+item_end_expected = btrfs_item_offset_nr(leaf,
+ slot - 1);
+if (btrfs_item_end_nr(leaf, slot) != item_end_expected) {
+generic_err(root, leaf, slot,
+generic_err(leaf, slot,
"unexpected item end, have %u expect %u",
+btrfs_item_end_nr(leaf, slot),
+item_end_expected);
@@ -344,7 +1442,7 @@
 */
+if (btrfs_item_end_nr(leaf, slot) >
+ BTRFS_LEAF_DATA_SIZE(fs_info)) {
+generic_err(root, leaf, slot,
+generic_err(leaf, slot,
"slot end outside of leaf, have %u expect range [0, %u]",
+btrfs_item_end_nr(leaf, slot),
+ BTRFS_LEAF_DATA_SIZE(fs_info));
@@ -354,7 +1452,7 @@
// Also check if the item pointer overlaps with btrfs item */
if (btrfs_item_nr_offset(slot) + sizeof(struct btrfs_item) >
btrfs_item_ptr_offset(leaf, slot)) {
-generic_err(root, leaf, slot,
+generic_err(leaf, slot,
"slot overlaps with its data, item end %lu data start %lu",
btrfs_item_nr_offset(slot) +
sizeof(struct btrfs_item),
@@ -367,7 +1465,7 @@
* Check if the item size and content meet other
* criteria
*/
-ret = check_leaf_item(root, leaf, &key, slot);
+ret = check_leaf_item(leaf, &key, slot, &prev_key);
if (ret < 0)
return ret;
}
@@ -380,31 +1478,39 @@
return 0;
}
-int btrfs_check_leaf_full(struct btrfs_root *root, struct extent_buffer *leaf)
+int btrfs_check_leaf_full(struct btrfs_fs_info *fs_info,
+ struct extent_buffer *leaf)
{
-return check_leaf(root, leaf, true);
+return check_leaf(leaf, true);
}
-int btrfs_check_leaf_relaxed(struct btrfs_root *root,
+int btrfs_check_leaf_relaxed(struct btrfs_fs_info *fs_info,
struct extent_buffer *leaf)
{
-return check_leaf(root, leaf, false);
+return check_leaf(leaf, false);
}
-int btrfs_check_node(struct btrfs_root *root, struct extent_buffer *node)
+int btrfs_check_node(struct btrfs_fs_info *fs_info, struct extent_buffer *node)
{
unsigned long nr = btrfs_header_nritems(node);
struct btrfs_key key, next_key;
int slot;
+int level = btrfs_header_level(node);
u64 bytenr;
int ret = 0;
-if (nr == 0 || nr > BTRFS_NODEPTRS_PER_BLOCK(root->fs_info)) {
-btrfs_crit(root->fs_info,

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```c
+if (level <= 0 || level >= BTRFS_MAX_LEVEL) {
+    generic_err(node, 0,
+    "invalid level for node, have %d expect [1, %d]",
+    level, BTRFS_MAX_LEVEL - 1);
+    return -EUCLEAN;
+}
+if (nr == 0 || nr > BTRFS_NODEPTRS_PER_BLOCK(fs_info)) {
+    btrfs_cr(it(fs_info,
    "corrupt node: root=%llu block=%llu, nritems too %s, have %lu expect range [1,%lu]",
    - root->objectid, node->start,
+    btrfs_header_owner(node), node->start,
    nr == 0 ? "small" : "large", nr,
    - BTRFS_NODEPTRS_PER_BLOCK(root->fs_info);
+    BTRFS_NODEPTRS_PER_BLOCK(fs_info));
+    return -EUCLEAN;
}

if (!bytenr) {
    -generic_err(root, node, slot,
+generic_err(node, slot,
    "invalid NULL node pointer");
    ret = -EUCLEAN;
    goto out;
}
-if (!IS_ALIGNED(bytenr, root->fs_info->sectorsize)) {
    -generic_err(root, node, slot,
+if (!IS_ALIGNED(bytenr, fs_info->sectorsize)) {
+    generic_err(node, slot,
    "unaligned pointer, have %llu should be aligned to %u",
    -bytenr, root->fs_info->sectorsize);
+    bytenr, fs_info->sectorsize);
    ret = -EUCLEAN;
    goto out;
}

if (btrfs_comp_cpu_keys(&key, &next_key) >= 0) {
    -generic_err(root, node, slot,
+generic_err(node, slot,
    "bad key order, current (%llu %u %llu) next (%llu %u %llu)",
    key.objectid, key.type, key.offset,
    next_key.objectid, next_key.type,
    --- linux-4.15.0.orig/fs/btrfs/tree-checker.h
+++ linux-4.15.0/fs/btrfs/tree-checker.h
@@ -25,14 +25,19 @@
* Will check not only the item pointers, but also every possible member
- int btrfs_check_leaf_full(struct btrfs_root *root, struct extent_buffer *leaf);
+ int btrfs_check_leaf_full(struct btrfs_fs_info *fs_info, struct extent_buffer *leaf);

/*
 * Less strict leaf checker.
 * Will only check item pointers, not reading item data.
 */
- int btrfs_check_leaf_relaxed(struct btrfs_root *root,
+ int btrfs_check_leaf_relaxed(struct btrfs_fs_info *fs_info,
 struct extent_buffer *leaf);
+ int btrfs_check_node(struct btrfs_root *root, struct extent_buffer *node);
+ int btrfs_check_node(struct btrfs_fs_info *fs_info, struct extent_buffer *node);
+ int btrfs_check_chunk_valid(struct btrfs_fs_info *fs_info, struct extent_buffer *leaf,
 struct btrfs_chunk *chunk, u64 logical);

#include "inode-map.h"

/* magic values for the inode_only field in btrfs_log_inode:
 *
 @@ -272,6 +273,13 @@
 /* what stage of the replay code we're currently in */
 int stage;

 /* Ignore any items from the inode currently being processed. Needs
 + to be set every time we find a BTRFS_INODE_ITEM_KEY and we are in
 + the LOG_WALK_REPLAY_INODES stage.
 + */
+ bool ignore_cur_inode;
+ */
+ /* the root we are currently replaying */
 struct btrfs_root *replay_dest;

 /* inside it */
int (*process_func)(struct btrfs_root *log, struct extent_buffer *eb,
    struct walk_control *wc, u64 gen);

static int process_one_buffer(struct btrfs_root *log,
    struct extent_buffer *eb,
    struct walk_control *wc, u64 gen, int level)
{
    struct btrfs_fs_info *fs_info = log->fs_info;
    int ret = 0;

    if (btrfs_fs_incompat(fs_info, MIXED_GROUPS)) {
        ret = btrfs_read_buffer(eb, gen, level, NULL);
        if (ret)
            return ret;
    }

    if (btrfs_file_extent_disk_bytenr(eb, item) == 0)
        nbytes = 0;
    else if (found_type == BTRFS_FILE_EXTENT_INLINE) {
        size = btrfs_file_extent_inline_len(eb, slot, item);
        nbytes = btrfs_file_extent_ram_bytes(eb, item);
        extent_end = ALIGN(start + size,
            fs_info->sectorsize);

    }

    if (!ret)
        ret = btrfs_del_csums(trans, fs_info,
            sums->bytenr,
            sums->len);

    if (!ret)
        return ret;

    /*
    * helper function to see if a given name and sequence number found
- * in an inode back reference are already in a directory and correctly
- * point to this inode
+ * See if a given name and sequence number found in an inode back reference are
+ * already in a directory and correctly point to this inode.
+ *
+ * Returns: < 0 on error, 0 if the directory entry does not exists and 1 if it
+ * exists.
+ */
static noinline int inode_in_dir(struct btrfs_root *root,
    struct btrfs_path *path,
    @@ -904,29 +915,35 @@
{
    struct btrfs_dir_item *di;
    struct btrfs_key location;
    -int match = 0;
    +int ret = 0;
    
    di = btrfs_lookup_dir_index_item(NULL, root, path, dirid,
    index, name, name_len, 0);
    -if (di && !IS_ERR(di)) {
    +if (IS_ERR(di)) {
    +if (PTR_ERR(di) != -ENOENT)
    +ret = PTR_ERR(di);
    +goto out;
    +} else if (di) {
    -btrfs_dir_item_key_to_cpu(path->nodes[0], di, &location);
    if (location.objectid != objectid)
    goto out;
    -} else
    +} else {
    goto out;
    -btrfs_release_path(path);
    +}

    +btrfs_release_path(path);
    di = btrfs_lookup_dir_item(NULL, root, path, dirid, name, name_len, 0);
    -if (di && !IS_ERR(di)) {
    -btrfs_dir_item_key_to_cpu(path->nodes[0], di, &location);
    -if (location.objectid != objectid)
    -goto out;
    -} else
    +if (IS_ERR(di)) {
    +ret = PTR_ERR(di);
    goto out;
    -match = 1;
    +} else if (di) {
    +btrfs_dir_item_key_to_cpu(path->nodes[0], di, &location);
    +if (location.objectid == objectid)
+ret = 1;
+
} out:
btrfs_release_path(path);
-return match;
+return ret;
}

/*
@@ -1153,7 +1170,10 @@
/* look for a conflicting sequence number */
di = btrfs_lookup_dir_index_item(trans, root, path, btrfs_ino(dir),
   ref_index, name, namelen, 0);
-if (di && !IS_ERR(di)) {
+if (IS_ERR(di)) {
+if (PTR_ERR(di) != -ENOENT)
+return PTR_ERR(di);
+} else if (di) {
ret = drop_one_dir_item(trans, root, path, dir, di);
if (ret)
return ret;
@@ -1163,7 +1183,9 @@
/* look for a conflicting name */
di = btrfs_lookup_dir_item(trans, root, path, btrfs_ino(dir),
   name, namelen, 0);
-if (di && !IS_ERR(di)) {
+if (IS_ERR(di)) {
+return PTR_ERR(di);
+} else if (di) {
ret = drop_one_dir_item(trans, root, path, dir, di);
if (ret)
return ret;
@@ -1306,10 +1328,12 @@
if (ret)
goto out;

-* if we already have a perfect match, we're done */
-if (!inode_in_dir(root, path, btrfs_ino(BTRFS_I(dir)),
   -btrfs_ino(BTRFS_I(inode)), ref_index,
   -name, namelen)) {
+ret = inode_in_dir(root, path, btrfs_ino(BTRFS_I(dir)),
+ btrfs_ino(BTRFS_I(inode)), ref_index,
+ name, namelen));
+if (ret < 0) {
+goto out;
+} else if (ret == 0) {
/*
 * look for a conflicting back reference in the
/* metadata. if we find one we have to unlink that name */
@@ -1342,6 +1366,7 @@
    btrfs_update_inode(trans, root, inode);
 }
+/* Else, ret == 1, we already have a perfect match, we're done. */

    ref_ptr = (unsigned long)(ref_ptr + ref_struct_size) + namelen;
    kfree(name);
@@ -1550,6 +1575,7 @@
        break;

    if (ret == 1) {
        +ret = 0;
        if (path->slots[0] == 0)
            break;
        path->slots[0]--;
@@ -1562,17 +1588,19 @@
            ret = btrfs_del_item(trans, root, path);
            if (ret)
                -goto out;
                +break;

            btrfs_release_path(path);
            inode = read_one_inode(root, key.offset);
            -if (!inode)
                +return -EIO;
            +ret = -EIO;
            +break;
            +}

        ret = fixup_inode_link_count(trans, root, inode);
        iput(inode);
        if (ret)
            -goto out;
            +break;

        /*
         * fixup on a directory may create new entries,
@@ -1581,8 +1609,6 @@
         */
         key.offset = (u64)-1;
     }
@@ -1627,3 +1655,3 @@
     }
     -ret = 0;
     -out:
 btrfs_release_path(path);
return ret;
}
@@ -1621,8 +1647,6 @@
ret = btrfs_update_inode(trans, root, inode);
} else if (ret == -EEXIST) {
ret = 0;
-} else {
-BUG(); /* Logic Error */
}
iput(inode);
@@ -1718,8 +1742,8 @@
struct btrfs_key log_key;
struct inode *dir;
uint8_t log_type;
- int exists;
- int ret = 0;
+ bool exists;
+ int ret;
bool update_size = (key->type == BTRFS_DIR_INDEX_KEY);
bool name_added = false;
@@ -1739,12 +1763,12 @@
    name_len);

btrfs_dir_item_key_to_cpu(eb, di, &log_key);
- exists = btrfs_lookup_inode(trans, root, path, &log_key, 0);
- if (exists == 0)
- exists = 1;
- else
- exists = 0;
+ ret = btrfs_lookup_inode(trans, root, path, &log_key, 0);
btrfs_release_path(path);
+ if (ret < 0)
+ goto out;
+ exists = (ret == 0);
+ ret = 0;

if (key->type == BTRFS_DIR_ITEM_KEY) {
dst_di = btrfs_lookup_dir_item(trans, root, path, key->objectid,
@@ -1759,7 +1783,14 @@
ret = -EINVAL;
goto out;
}
- if (IS_ERR_OR_NULL(dst_di)) {
+ if (dst_di == ERR_PTR(-ENOENT)) {
+     +dst_di = NULL;

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+ if (IS_ERR(dst_di)) {
+ ret = PTR_ERR(dst_di);
+ goto out;
+ } else if (!dst_di) {
    /* we need a sequence number to insert, so we only
    * do inserts for the BTRFS_DIR_INDEX_KEY types
    */
    nritems = btrfs_header_nritems(path->nodes[0]);
    if (path->slots[0] >= nritems) {
        ret = btrfs_next_leaf(root, path);
        if (ret)
            break;
        else if (ret < 0)
            goto out;
    }
    btrfs_item_key_to_cpu(path->nodes[0], &found_key,
        path->slots[0]);
}

static int replay_one_buffer(struct btrfs_root *log, struct extent_buffer *eb,
    struct walk_control *wc, u64 gen,
    int level)
{
    int nritems;
    struct btrfs_path *path;
    struct btrfs_root *root = wc->replay_dest;
    struct btrfs_key key;
    -int level;
    int i;
    int ret;

    -ret = btrfs_read_buffer(eb, gen);
    +ret = btrfs_read_buffer(eb, gen, level, NULL);
    if (ret)
        return ret;

    inode_item = btrfs_item_ptr(eb, i,
        struct btrfs_inode_item);
    /*
    * If we have a tmpfile (O_TMPFILE) that got fsync'ed
    * and never got linked before the fsync, skip it, as
    * replaying it is pointless since it would be deleted
later. We skip logging tmpfiles, but it's always possible we are replaying a log created with a kernel that used to log tmpfiles.
*/
if (btrfs_inode_nlink(eb, inode_item) == 0) {
    wc->ignore_cur_inode = true;
    continue;
} else {
    wc->ignore_cur_inode = false;
}
ret = replay_xattr_deletes(wc->trans, root, log,
    path, key.objectid);
if (ret)
    @ @ -2376,13 +2422,33 @ @
if (ret)
    break;
/* for regular files, make sure corresponding orphan item exist. extents past the new EOF will be truncated later by orphan cleanup.
*/
if (S_ISREG(mode)) {
    ret = insert_orphan_item(wc->trans, root,
        key.objectid);
    struct inode *inode;
    u64 from;
    inode = read_one_inode(root, key.objectid);
    if (!inode)
        ret = -EIO;
    from = ALIGN(i_size_read(inode),
        root->fs_info->sectorsize);
    ret = btrfs_drop_extents(wc->trans, root, inode,
        from, (u64)-1, 1);
    if (!ret)
        /* Update the inode's nbytes. */
        ret = btrfs_update_inode(wc->trans,
            root, inode);
    +
}
+iput(inode);
if (ret)
  break;
@@ -2393,6 +2459,9 @@
  break;
}
+if (wc->ignore_cur_inode)
+  continue;
+
    if (key.type == BTRFS_DIR_INDEX_KEY &&
        wc->stage == LOG_WALK_REPLAY_DIR_INDEX) {
      ret = replay_one_dir_item(wc->trans, root, path,
@@ -2452,6 +2521,8 @@
        WARN_ON(*level >= BTRFS_MAX_LEVEL);

      while (*level > 0) {
+        struct btrfs_key first_key;
+      WARN_ON(*level < 0);
        WARN_ON(*level >= BTRFS_MAX_LEVEL);
        cur = path->nodes[*level];
@@ -2464,6 +2535,7 @@
        return PTR_ERR(next);
      if (*level == 1) {
        -ret = wc->process_func(root, next, wc, ptr_gen);
+        ret = wc->process_func(root, next, wc, ptr_gen,
+             *level - 1);
        if (ret) {
          free_extent_buffer(next);
          return ret;
@@ -2482,7 +2555,8 @@
        path->slots[*level]++;
      if (wc->free) {
        -ret = btrfs_read_buffer(next, ptr_gen);
+        ret = btrfs_read_buffer(next, ptr_gen,
+             *level - 1, &first_key);
if (ret) {
    free_extent_buffer(next);
    return ret;
}
@@ -2494,6 +2568,9 @@
clean_tree_block(fs_info, next);
btrfs_wait_tree_block_writeback(next);
btrfs_tree_unlock(next);
+} else {
+    if (test_and_clear_bit(EXTENT_BUFFER_DIRTY, &next->bflags))
+        clear_extent_buffer_dirty(next);
}

WARN_ON(root_owner !=
@@ -2509,7 +2586,7 @@
free_extent_buffer(next);
continue;
}
-wall = btrfs_read_buffer(next, ptr_gen);
+ret = btrfs_read_buffer(next, ptr_gen, *level - 1, &first_key);
if (ret) {
    free_extent_buffer(next);
    return ret;
@@ -2559,7 +2636,8 @@
root_owner = btrfs_header_owner(parent);
ret = wc->process_func(root, path->nodes[*level], wc,
          btrfs_header_generation(path->nodes[*level]));
+        btrfs_header_generation(path->nodes[*level]),
+        *level);
if (ret)
    return ret;
@@ -2574,6 +2652,9 @@
clean_tree_block(fs_info, next);
btrfs_wait_tree_block_writeback(next);
btrfs_tree_unlock(next);
+} else {
+    if (test_and_clear_bit(EXTENT_BUFFER_DIRTY, &next->bflags))
+        clear_extent_buffer_dirty(next);
}

WARN_ON(root_owner != BTRFS_TREE_LOG_OBJECTID);
@@ -2638,7 +2719,8 @@/* was the root node processed? if not, catch it here */
if (path->nodes[orig_level]) {
    ret = wc->process_func(log, path->nodes[orig_level], wc,
          btrfs_header_generation(path->nodes[orig_level]));
+        btrfs_header_generation(path->nodes[orig_level]),
+        *level),
          *level),
          *level, &first_key);
if (ret) {
    free_extent_buffer(next);
    return ret;
@@ -2597,7 +2674,8 @@
clean_tree_block(fs_info, next);
btrfs_wait_tree_block_writeback(next);
btrfs_tree_unlock(next);
+} else {
+    if (test_and_clear_bit(EXTENT_BUFFER_DIRTY, &next->bflags))
+        clear_extent_buffer_dirty(next);
}

WARN_ON(root_owner != BTRFS_TREE_LOG_OBJECTID);
@@ -2674,6 +2751,7 @@/* was the root node processed? if not, catch it here */
if (path->nodes[orig_level]) {
    ret = wc->process_func(log, path->nodes[orig_level], wc,
          btrfs_header_generation(path->nodes[orig_level]));
+        btrfs_header_generation(path->nodes[orig_level]),
+        *level),
          *level),
          *level, &first_key);}
WARN_ON(log->root_key.objectid !=
    in the tree of log roots
*/
static int update_log_root(struct btrfs_trans_handle *trans,
    struct btrfs_root *log,
    struct btrfs_root_item *root_item)
{
    struct btrfs_fs_info *fs_info = log->fs_info;
    int ret;
    if (log->log_transid == 1) {
        /* insert root item on the first sync */
        ret = btrfs_insert_root(trans, fs_info->log_root_tree,
            &log->root_key, &log->root_item);
    } else {
        ret = btrfs_update_root(trans, fs_info->log_root_tree,
            &log->root_key, &log->root_item);
    }
    return ret;
}

struct btrfs_fs_info *fs_info = root->fs_info;
struct btrfs_root *log = root->log_root;
struct btrfs_root *log_root_tree = fs_info->log_root_tree;
int log_transid = 0;
struct btrfs_log_ctx root_log_ctx;
struct blk_plug plug;
@g 2782,6 +2868,7 @
struct btrfs_fs_info *fs_info = root->fs_info;
struct btrfs_root *log = root->log_root;
struct btrfs_root *log_root_tree = fs_info->log_root_tree;
+struct btrfs_root_item new_root_item;
int log_transid = 0;
struct btrfs_log_ctx root_log_ctx;
struct blk_plug plug;
@g 2847,7 +2934,21 @
goto out;
}
+/*
+ * We _must_ update under the root->log_mutex in order to make sure we
+ * have a consistent view of the log root we are trying to commit at
+ * this moment.
+ *
+ * We _must_ copy this into a local copy, because we are not holding the
+ * log_root_tree->log_mutex yet. This is important because when we
+ * commit the log_root_tree we must have a consistent view of the
+ * log_root_tree when we update the super block to point at the
+ * log_root_tree bytenr. If we update the log_root_tree here we'll race
+ * with the commit and possibly point at the new block which we may not
+ * have written out.
+ */
+ btrfs_set_root_node(&log->root_item, log->node);
+ memcpy(&new_root_item, &log->root_item, sizeof(new_root_item));
+
+ root->log_transid++;
+ log->log_transid = root->log_transid;
+ @ @ -2871.9 +2972.15 @ @
+
+ mutex_unlock(&log_root_tree->log_mutex);
+
+ -ret = update_log_root(trans, log);
+ -
+ mutex_lock(&log_root_tree->log_mutex);
+ +
+ /*
+ * Now we are safe to update the log_root_tree because we're under the
+ * log_mutex, and we're a current writer so we're holding the commit
+ * open until we drop the log_mutex.
+ */
+ +ret = update_log_root(trans, log, &new_root_item);
+ +
+ if (atomic_dec_and_test(&log_root_tree->log_writers)) {
+ /*
+ * Implicit memory barrier after atomic_dec_and_test
+ @ @ -3003.8 +3110.11 @ @
+ mutex_unlock(&log_root_tree->log_mutex);
+ */
+ smp_mb();
+ if (waitqueue_active(&log_root_tree->log_commit_wait[index2]))
+ /*
+ * The barrier before waitqueue_active is implied by mutex_unlock
+ * The barrier before waitqueue_active is needed so all the updates
+ * above are seen by the woken threads. It might not be necessary, but
+ * proving that seems to be hard.
+ */
wake_up(&log_root_tree->log_commit_wait[index2]);
out:
@@ -3015,8 +3125,11 @@
mutex_unlock(&root->log_mutex);

/*
 - * The barrier before waitqueue_active is implied by mutex_unlock
 + * The barrier before waitqueue_active is needed so all the updates
 + * above are seen by the woken threads. It might not be necessary, but
 + * proving that seems to be hard.
 */
+smp_mb();
if (waitqueue_active(&root->log_commit_wait[index1]))
    wake_up(&root->log_commit_wait[index1]);
return ret;
@@ -3034,19 +3147,23 @@
};

ret = walk_log_tree(trans, log, &wc);
-/* I don't think this can happen but just in case */
-if (ret)
-    btrfs_abort_transaction(trans, ret);
+if (ret) {
+    if (trans)
+        btrfs_abort_transaction(trans, ret);
+else
+    btrfs_handle_fs_error(log->fs_info, ret, NULL);
+}

while (1) {
    ret = find_first_extent_bit(&log->dirty_log_pages,
-0, &start, &end, EXTENT_DIRTY | EXTENT_NEW,
+0, &start, &end,
+EXTENT_DIRTY | EXTENT_NEW | EXTENT_NEED_WAIT,
    NULL);
    if (ret)
        break;

clear_extent_bits(&log->dirty_log_pages, start, end,
- EXTENT_DIRTY | EXTENT_NEW);
+ EXTENT_DIRTY | EXTENT_NEW | EXTENT_NEED_WAIT);
}
+ * Check if an inode was logged in the current transaction. We can't always rely
+ * on an inode's logged_trans value, because it's an in-memory only field and
+ * therefore not persisted. This means that its value is lost if the inode gets
+ * evicted and loaded again from disk (in which case it has a value of 0, and
+ * certainly it is smaller then any possible transaction ID), when that happens
+ * the full_sync flag is set in the inode's runtime flags, so on that case we
+ * assume eviction happened and ignore the logged_trans value, assuming the
+ * worst case, that the inode was logged before in the current transaction.
+ */
+static bool inode_logged(struct btrfs_trans_handle *trans,
+    struct btrfs_inode *inode)
+{
+    if (inode->logged_trans == trans->transid)
+        return true;
+    if (inode->last_trans == trans->transid &&
+        test_bit(BTRFS_INODE_NEEDS_FULL_SYNC, &inode->runtime_flags) &&
+        !test_bit(BTRFS_FS_LOG_RECOVERING, &trans->fs_info->flags))
+        return true;
+    return false;
+}

    * If both a file and directory are logged, and unlinks or renames are
    * mixed in, we have a few interesting corners:
    *
    @@ -3118,7 +3259,7 @@
    int bytes_del = 0;
    u64 dir_ino = btrfs_ino(dir);

    -if (dir->logged_trans < trans->transid)
    +if (!inode_logged(trans, dir))
    return 0;

    ret = join_running_log_trans(root);
    @@ -3201,11 +3342,13 @@
    btrfs_free_path(path);
    out_unlock:
    mutex_unlock(&dir->log_mutex);
    -if (ret == -ENOSPC) {
    +if (err == -ENOSPC) {
    btrfs_set_log_full_commit(root->fs_info, trans);
    -ret = 0;
    -} else if (ret < 0)
    -btrfs_abort_transaction(trans, ret);
    +err = 0;
    +} else if (err < 0 && err != -ENOENT) {
btrfs_abort_transaction(trans, err);
+
}

btrfs_end_log_trans(root);

u64 index;

int ret;

-if (inode->logged_trans < trans->transid)
+if (!inode_logged(trans, inode))
return 0;

ret = join_running_log_trans(root);

btrfs_release_path(path);

-* find the first key from this transaction again */
+/* Find the first key from this transaction again. See the note for
+ * log_new_dir_dentries, if we're logging a directory recursively we
+ * won't be holding its i_mutex, which means we can modify the directory
+ * while we're logging it. If we remove an entry between our first
+ * search and this search we'll not find the key again and can just
+ * bail.
+ */
+search:
ret = btrfs_search_slot(NULL, root, &min_key, path, 0, 0);
-if (WARN_ON(ret != 0))
+if (ret != 0)
goto done;

/*
@@ -3378,6 +3529,13 @@
if (min_key.objectid != ino || min_key.type != key_type)
goto done;
+ +if (need_resched()) {
+btrfs_release_path(path);
+cond_resched();
+goto search;
+} 
+
ret = overwrite_item(trans, log, dst_path, src, i,
    &min_key);
if (ret) {
    @@ -3423,8 +3581,11 @@
    /* from this directory and from this transaction */
    ret = btrfs_next_leaf(root, path);
    -if (ret == 1) {
    -last_offset = (u64)-1;
    +if (ret) {
    +last_offset = (u64)-1;
    +else
    +err = ret;
    goto done;
    }
    btrfs_item_key_to_cpu(path->nodes[0], &tmp, path->slots[0]);
    @@ -3635,10 +3796,32 @@
    return 0;
 }

+static int log_csums(struct btrfs_trans_handle *trans,
  +struct btrfs_root *log_root,
  +struct btrfs_ordered_sum *sums)
  +{
    +int ret;
    +    /*
    +    * Due to extent cloning, we might have logged a csum item that covers a
    +    * subrange of a cloned extent, and later we can end up logging a csum
    +    * item for a larger subrange of the same extent or the entire range.
    +    * This would leave csum items in the log tree that cover the same range
    +    * and break the searches for checksums in the log tree, resulting in
    +    * some checksums missing in the fs/subvolume tree. So just delete (or
    +    * trim and adjust) any existing csum items in the log for this range.
    +    */
    +ret = btrfs_del_csums(trans, log_root, sums->bytenr, sums->len);
    +if (ret)
    +return ret;
    +}
    +return btrfs_csum_file_blocks(trans, log_root, sums);
  +}

+static noinline int copy_items(struct btrfs_trans_handle *trans,
  +struct btrfs_inode *inode,
  +struct btrfs_path *dst_path,
  +struct btrfs_path *src_path, u64 *last_extent,
  +int start_slot, int nr, int inode_only,
  +u64 logged_isize)
struct btrfs_file_extent_item *extent;
struct btrfs_inode_item *inode_item;
struct extent_buffer *src = src_path->nodes[0];
-struct btrfs_key first_key, last_key, key;
int ret;
struct btrfs_key *ins_keys;
u32 *ins_sizes;
@@ -3657,9 +3849,6 @@
int i;
struct list_head ordered_sums;
int skip_csum = inode->flags & BTRFS_INODE_NODATASUM;
-bool has_extents = false;
-bool need_find_last_extent = true;
-bool done = false;

INIT_LIST_HEAD(&ordered_sums);

@@ -3668,8 +3850,6 @@
if (!ins_data)
    return -ENOMEM;
-    first_key.objectid = (u64)-1;
-
    ins_sizes = (u32 *)ins_data;
    ins_keys = (struct btrfs_key *)(ins_data + nr * sizeof(u32));
@@ -3690,9 +3867,6 @@
    src_offset = btrfs_item_ptr_offset(src, start_slot + i);
-    if (i == nr - 1)
-        last_key = ins_keys[i];
-    if (ins_keys[i].type == BTRFS_INODE_ITEM_KEY) {
        inode_item = btrfs_item_ptr(dst_path->nodes[0],
            dst_path->slots[0],
@@ -3706,20 +3880,6 @@
        src_offset, ins_sizes[i]);
    }

    /*
    - * We set need_find_last_extent here in case we know we were
    - * processing other items and then walk into the first extent in
    - * the inode. If we don't hit an extent then nothing changes,
    - * we'll do the last search the next time around.
    - */
-if (ins_keys[i].type == BTRFS_EXTENT_DATA_KEY) {
  has_extents = true;
-} else {
  need_find_last_extent = false;
  -}

/* take a reference on file data extents so that truncates
 * or deletes of this inode don't have to relog the inode
 * again
 @@ -3757,11 +3917,8 @@
  fs_info->csum_root,
  ds + cs, ds + cs + cl - 1,
  &ordered_sums, 0);
  -if (ret) {
  -btrfs_release_path(dst_path);
  -kfree(ins_data);
  -return ret;
  -}
  +if (ret)
  +break;
  }
  }
  }
 @@ -3774,148 +3931,16 @@
  * we have to do this after the loop above to avoid changing the
  * log tree while trying to change the log tree.
  */
  -ret = 0;
  while (!list_empty(&ordered_sums)) {
    struct btrfs_ordered_sum *sums = list_entry(ordered_sums.next,
    struct btrfs_ordered_sum,
    list);
    if (!ret)
    -ret = btrfs_csum_file_blocks(trans, log, sums);
    +ret = log_csums(trans, log, sums);
    list_del(&sums->list);
    kfree(sums);
  }

  -if (!has_extents)
  -return ret;
  -
  -if (need_find_last_extent && *last_extent == first_key.offset) {
  -/*
  - * We don't have any leafs between our current one and the one
  - * we processed before that can have file extent items for our
- * inode (and have a generation number smaller than our current
- * transaction id).
- */
- need_find_last_extent = false;
-
- /*
- * Because we use btrfs_search_forward we could skip leaves that were
- * not modified and then assume *last_extent is valid when it really
- * isn't. So back up to the previous leaf and read the end of the last
- * extent before we go and fill in holes.
- */
- if (need_find_last_extent) {
- u64 len;
-
- ret = btrfs_prev_leaf(inode->root, src_path);
- if (ret < 0)
- return ret;
- if (ret)
- goto fill_holes;
- if (src_path->slots[0])
- src_path->slots[0]--;
- src = src_path->nodes[0];
- btrfs_item_key_to_cpu(src, &key, src_path->slots[0]);
- if (key.objectid != btrfs_ino(inode) ||
- key.type != BTRFS_EXTENT_DATA_KEY)
- goto fill_holes;
- extent = btrfs_item_ptr(src, src_path->slots[0],
- struct btrfs_file_extent_item);
- if (btrfs_file_extent_type(src, extent) ==
- BTRFS_FILE_EXTENT_INLINE) {
- len = btrfs_file_extent_inline_len(src,
- src_path->slots[0],
- extent);
- *last_extent = ALIGN(key.offset + len,
- fs_info->sectorsize);
- } else {
- len = btrfs_file_extent_num_bytes(src, extent);
- *last_extent = key.offset + len;
- }
- }
- fill_holes:
- /* So we did prev_leaf, now we need to move to the next leaf, but a few
- * things could have happened
- */
- * 1) A merge could have happened, so we could currently be on a leaf
- * that holds what we were copying in the first place.
- * 2) A split could have happened, and now not all of the items we want
- * are on the same leaf.
- *
- * So we need to adjust how we search for holes, we need to drop the
- * path and re-search for the first extent key we found, and then walk
- * forward until we hit the last one we copied.
- */
-if (need_find_last_extent) {
-/* btrfs_prev_leaf could return 1 without releasing the path */
- btrfs_release_path(src_path);
- ret = btrfs_search_slot(NULL, inode->root, &first_key,
- src_path, 0, 0);
- if (ret < 0)
- return ret;
- ASSERT(ret == 0);
- src = src_path->nodes[0];
- i = src_path->slots[0];
- } else {
- i = start_slot;
- }
- */
- /*
- * Ok so here we need to go through and fill in any holes we may have
- * to make sure that holes are punched for those areas in case they had
- * extents previously.
- */
- while (!done) {
- u64 offset, len;
- u64 extent_end;
- 
- if (i >= btrfs_header_nritems(src_path->nodes[0])) {
- ret = btrfs_next_leaf(inode->root, src_path);
- if (ret < 0)
- return ret;
- ASSERT(ret == 0);
- src = src_path->nodes[0];
- i = 0;
- }
- 
- btrfs_item_key_to_cpu(src, &key, i);
- if (!btrfs_comp_cpu_keys(&key, &last_key))
- done = true;
- if (key.objectid != btrfs_ino(inode))}
- key.type != BTRFS_EXTENT_DATA_KEY) {
- i++;
- continue;
- }
- extent = btrfs_item_ptr(src, i, struct btrfs_file_extent_item);
- if (btrfs_file_extent_type(src, extent) ==
    - BTRFS_FILE_EXTENT_INLINE) {
    -len = btrfs_file_extent_inline_len(src, i, extent);
    -extent_end = ALIGN(key.offset + len,
    - fs_info->sectorsize);
    -} else {
    -len = btrfs_file_extent_num_bytes(src, extent);
    -extent_end = key.offset + len;
    -}
    -i++;
    -
    -if (*last_extent == key.offset) {
    -*last_extent = extent_end;
    -continue;
    -}
    -offset = *last_extent;
    -len = key.offset - *last_extent;
    -ret = btrfs_insert_file_extent(trans, log, btrfs_ino(inode),
    -offset, 0, 0, len, 0, 0, 0, 0, 0);
    -if (ret)
    -break;
    -*last_extent = extent_end;
    -}
    +/-*
    - * Need to let the callers know we dropped the path so they should
    - * re-search.
    - */
    -if (!ret && need_find_last_extent)
    -ret = 1;
    -return ret;
    -}

@@ -4069,7 +4094,7 @@
    struct btrfs_ordered_sum,
    list);
    if (!ret)
-    -ret = btrfs_csum_file_blocks(trans, log, sums);
+    -ret = log_csums(trans, log, sums);
     +ret = log_csums(trans, log, sums);
    list_del(&sums->list);
    kfree(sums);
    }
@@ -4171,6 +4196,146 @@
    return ret;
    }

+/*
+ * Log all prealloc extents beyond the inode's i_size to make sure we do not
+ * lose them after doing a fast fsync and replaying the log. We scan the
+ * subvolume's root instead of iterating the inode's extent map tree because

+ * otherwise we can log incorrect extent items based on extent map conversion.
+ * That can happen due to the fact that extent maps are merged when they
+ * are not in the extent map tree's list of modified extents.
+ */
+static int btrfs_log_prealloc_extents(struct btrfs_trans_handle *trans,
 + struct btrfs_inode *inode,
 + struct btrfs_path *path)
 +{
 +struct btrfs_root *root = inode->root;
 +struct btrfs_key key;
 +const u64 i_size = i_size_read(inode->vfs_inode);
 +const u64 ino = btrfs_ino(inode);
 +struct btrfs_path *dst_path = NULL;
 +bool dropped_extents = false;
 +u64 truncate_offset = i_size;
 +struct extent_buffer *leaf;
 +int slot;
 +int ins_nr = 0;
 +int start_slot;
 +int ret;
 +
 +if (!(inode->flags & BTRFS_INODE_PREALLOC))
 +	return 0;
 +
 +key.objectid = ino;
 +key.type = BTRFS_EXTENT_DATA_KEY;
 +key.offset = i_size;
 +ret = btrfs_search_slot(NULL, root, &key, path, 0, 0);
 +if (ret < 0)
 +	goto out;
 +
 +/*
 + * We must check if there is a prealloc extent that starts before the
 + * i_size and crosses the i_size boundary. This is to ensure later we
 + * truncate down to the end of that extent and not to the i_size, as
 + * otherwise we end up losing part of the prealloc extent after a log
 + * replay and with an implicit hole if there is another prealloc extent
 + * that starts at an offset beyond i_size.
 + */
 +ret = btrfs_previous_item(root, path, ino, BTRFS_EXTENT_DATA_KEY);
 +if (ret < 0)
 +	goto out;
 +
 +if (ret == 0) {
 +struct btrfs_file_extent_item *ei;
 +
 +leaf = path->nodes[0];
 +slot = path->slots[0];
+ei = btrfs_item_ptr(leaf, slot, struct btrfs_file_extent_item);
+
+if (btrfs_file_extent_type(leaf, ei) ==
+    BTRFS_FILE_EXTENT_PREALLOC) {
+u64 extent_end;
+
+btrfs_item_key_to_cpu(leaf, &key, slot);
+extent_end = key.offset +
+btrfs_file_extent_num_bytes(leaf, ei);
+
+if (extent_end > i_size)
+truncate_offset = extent_end;
+}
+} else {
+ret = 0;
+
+while (true) {
+leaf = path->nodes[0];
+slot = path->slots[0];
+
+if (slot >= btrfs_header_nritems(leaf)) {
+if (ins_nr > 0) {
+ret = copy_items(trans, inode, dst_path, path,
+                     start_slot, ins_nr, 1, 0);
+if (ret < 0)
+    goto out;
+    ins_nr = 0;
+}
+ret = btrfs_next_leaf(root, path);
+if (ret < 0)
+    goto out;
+if (ret > 0) {
+    ret = 0;
+    break;
+} continue;
+}
+
+btrfs_item_key_to_cpu(leaf, &key, slot);
+if (key.objectid > ino)
+    break;
+if (WARN_ON_ONCE(key.objectid < ino) ||
+    key.type < BTRFS_EXTENT_DATA_KEY ||
+    key.offset < i_size) {
+    path->slots[0]++;
+    continue;
+}
+if (!dropped_extents) {
+/*
+ * Avoid logging extent items logged in past fsync calls
+ * and leading to duplicate keys in the log tree.
+ */
+do {
+ret = btrfs_truncate_inode_items(trans,
+ root->log_root,
+ &inode->vfs_inode,
+ truncate_offset,
+ BTRFS_EXTENT_DATA_KEY);
+} while (ret == -EAGAIN);
+if (ret)
+goto out;
+dropped_extents = true;
+}
+if (ins_nr == 0)
+start_slot = slot;
+ins_nr++;
+path->slots[0]++;
+if (!dst_path) {
+dst_path = btrfs_alloc_path();
+if (!dst_path) {
+ret = -ENOMEM;
+goto out;
+}
+}
+}
+if (ins_nr > 0) {
+ret = copy_items(trans, inode, dst_path, path,
+ start_slot, ins_nr, 1, 0);
+if (ret > 0)
+ret = 0;
+}
+out:
+btrfs_release_path(path);
+btrfs_free_path(dst_path);
+return ret;
+
static int btrfs_log_changed_extents(struct btrfs_trans_handle *trans,
    struct btrfs_root *root,
    struct btrfs_inode *inode,
@@ -4190,7 +4355,6 @@
INIT_LIST_HEAD(&extents);

-down_write(&inode->dio_sem);
write_lock(&tree->lock);
test_gen = root->fs_info->last_trans_committed;
logged_start = start;
@@ -4213,6 +4377,11 @@
if (em->generation <= test_gen)
    continue;

+/# We log prealloc extents beyond eof later. */
+if (test_bit(EXTENT_FLAG_PREALLOC, &em->flags) &&
+    em->start >= i_size_read(&inode->vfs_inode))
+    continue;
+
+if (em->start < logged_start)
    logged_start = em->start;
if ((em->start + em->len - 1) > logged_end)
@@ -4266,9 +4435,11 @@
WARN_ON(!list_empty(&extents));
write_unlock(&tree->lock);
-up_write(&inode->dio_sem);

btrfs_release_path(path);
+if (!ret)
+    ret = btrfs_log_prealloc_extents(trans, inode, path);
+
return ret;
}

@@ -4293,6 +4464,19 @@
item = btrfs_item_ptr(path->nodes[0], path->slots[0],
                      struct btrfs_inode_item);
*size_ret = btrfs_inode_size(path->nodes[0], item);
+/#
+ * If the in-memory inode's i_size is smaller then the inode
+ * size stored in the btree, return the inode's i_size, so
+ * that we get a correct inode size after replaying the log
+ * when before a power failure we had a shrinking truncate
+ * followed by addition of a new name (rename / new hard link).
+ * Otherwise return the inode size from the btree, to avoid
+ * data loss when replaying a log due to previously doing a
+ * write that expands the inode's size and logging a new name
+ * immediately after.
+ */
+if (*size_ret > inode->vfs_inode.i_size)
+    *size_ret = inode->vfs_inode.i_size;
}

btrfs_release_path(path);
if (slot >= nritems) {
    if (ins_nr > 0) {
        u64 last_extent = 0;
        ret = copy_items(trans, inode, dst_path, path,
            &last_extent, start_slot,
            ins_nr, 1, 0);
        /* can't be 1, extent items aren't processed */
        ASSERT(ret <= 0);
        start_slot, ins_nr, 1, 0);
        if (ret < 0)
            return ret;
        ins_nr = 0;
    }
}
if (ins_nr > 0) {
    u64 last_extent = 0;
    ret = copy_items(trans, inode, dst_path, path,
        &last_extent, start_slot,
        ins_nr, 1, 0);
    /* can't be 1, extent items aren't processed */
    ASSERT(ret <= 0);
    start_slot, ins_nr, 1, 0);
    if (ret < 0)
        return ret;
}

/*
 * If the no holes feature is enabled we need to make sure any hole between the
 * last extent and the i_size of our inode is explicitly marked in the log. This
 * is to make sure that doing something like:
 *  1) create file with 128Kb of data
 *  2) truncate file to 64Kb
 *  3) truncate file to 256Kb
 *  4) fsync file
 *  5) <crash/power failure>
 *  6) mount fs and trigger log replay
 * Will give us a file with a size of 256Kb, the first 64Kb of data match what
 * the file had in its first 64Kb of data at step 1 and the last 192Kb of the
 * file correspond to a hole. The presence of explicit holes in a log tree is
 * */
what guarantees that log replay will remove/adjust file extent items in the
fs/subvol tree.

Here we do not need to care about holes between extents, that is already done
by copy_items(). We also only need to do this in the full sync path, where we
lookup for extents from the fs/subvol tree only. In the fast path case, we
lookup the list of modified extent maps and if any represents a hole, we
insert a corresponding extent representing a hole in the log tree.

When using the NO_HOLES feature if we punched a hole that causes the
deletion of entire leaves or all the extent items of the first leaf (the one
that contains the inode item and references) we may end up not processing
any extents, because there are no leaves with a generation matching the
current transaction that have extent items for our inode. So we need to find
if any holes exist and then log them. We also need to log holes after any
truncate operation that changes the inode's size.

- static int btrfs_log_trailing_hole(struct btrfs_trans_handle *trans,
  struct btrfs_root *root,
  struct btrfs_inode *inode,
  struct btrfs_path *path)
+ static int btrfs_log_holes(struct btrfs_trans_handle *trans,
   struct btrfs_root *root,
   struct btrfs_inode *inode,
   struct btrfs_path *path)
{
  struct btrfs_fs_info *fs_info = root->fs_info;
  int ret;
  struct btrfs_key key;
  u64 hole_start;
  u64 hole_size;
  struct extent_buffer *leaf;
  struct btrfs_root *log = root->log_root;
  const u64 ino = btrfs_ino(inode);
  const u64 i_size = i_size_read(&inode->vfs_inode);
  u64 prev_extent_end = 0;
  int ret;

  if (!btrfs_fs_incompat(fs_info, NO_HOLES) || i_size == 0)
    return 0;

  key.objectid = ino;
  key.type = BTRFS_EXTENT_DATA_KEY;
  key.offset = (u64)-1;
  ret = btrfs_search_slot(NULL, root, &key, path, 0, 0);
  ASSERT(ret != 0);
if (ret < 0)
    return ret;

-ASSERT(path->slots[0] > 0);
-path->slots[0]--;
-leaf = path->nodes[0];
-btrfs_item_key_to_cpu(leaf, &key, path->slots[0]);
-
-if (key.objectid != ino || key.type != BTRFS_EXTENT_DATA_KEY) {
-/* inode does not have any extents */
-hole_start = 0;
-hole_size = i_size;
-} else {
+while (true) {
    struct btrfs_file_extent_item *extent;
    struct extent_buffer *leaf = path->nodes[0];
    u64 len;

    /*
    * If there's an extent beyond i_size, an explicit hole was
    * already inserted by copy_items().
    */
    -if (key.offset >= i_size)
        return 0;
    +if (path->slots[0] >= btrfs_header_nritems(path->nodes[0])) {
        +ret = btrfs_next_leaf(root, path);
        +if (ret < 0)
            +return ret;
        +if (ret > 0) {
            +ret = 0;
            +break;
        } else {
            +leaf = path->nodes[0];
            +
            +btrfs_item_key_to_cpu(leaf, &key, path->slots[0]);
            +if (key.objectid != ino || key.type != BTRFS_EXTENT_DATA_KEY)
                +break;
            +
            +/* We have a hole, log it. */
            +if (prev_extent_end < key.offset) {
                +const u64 hole_len = key.offset - prev_extent_end;
                +
                +/* Release the path to avoid deadlocks with other code
                * paths that search the root while holding locks on
                * leafs from the log root.
                */
                +*/
btrfs_release_path(path);
+ret = btrfs_insert_file_extent(trans, root->log_root,
+    ino, prev_extent_end, 0,
+    0, hole_len, 0, hole_len,
+    0, 0, 0);
+if (ret < 0)
+return ret;
+
+/*
+ * Search for the same key again in the root. Since it's
+ * an extent item and we are holding the inode lock, the
+ * key must still exist. If it doesn't just emit warning
+ * and return an error to fall back to a transaction
+ * commit.
+ */
+ret = btrfs_search_slot(NULL, root, &key, path, 0, 0);
+if (ret < 0)
+return ret;
+if (WARN_ON(ret > 0))
+return -ENOENT;
+leaf = path->nodes[0];
+
} extent = btrfs_item_ptr(leaf, path->slots[0],
struct btrfs_file_extent_item);
-
if (btrfs_file_extent_type(leaf, extent) ==
    BTRFS_FILE_EXTENT_INLINE) {
-    len = btrfs_file_extent_inline_len(leaf,
-        path->slots[0],
-        extent);
-    ASSERT(len == i_size ||
-        (len == fs_info->sectorsize &&
-        btrfs_file_extent_compression(leaf, extent) !=
-        BTRFS_COMPRESS_NONE));
-    return 0;
+    len = btrfs_file_extent_ram_bytes(leaf, extent);
+    prev_extent_end = ALIGN(key.offset + len,
+        fs_info->sectorsize);
+} else {
+    len = btrfs_file_extent_num_bytes(leaf, extent);
+    prev_extent_end = key.offset + len;
+}

-len = btrfs_file_extent_num_bytes(leaf, extent);
-/* Last extent goes beyond i_size, no need to log a hole. */
-if (key.offset + len > i_size)
-return 0;
hole_start = key.offset + len;
-hole_size = i_size - hole_start;
+path->slots[0]++;
+cond_resched();
}
btrfs_release_path(path);

/* Last extent ends at i_size. */
-if (hole_size == 0)
-return 0;
+if (prev_extent_end < i_size) {
+u64 hole_len;

-hole_size = ALIGN(hole_size, fs_info->sectorsize);
-ret = btrfs_insert_file_extent(trans, log, ino, hole_start, 0, 0,
- hole_size, 0, hole_size, 0, 0);
-return ret;
+btrfs_release_path(path);
+hole_len = ALIGN(i_size - prev_extent_end, fs_info->sectorsize);
+ret = btrfs_insert_file_extent(trans, root->log_root,
+ ino, prev_extent_end, 0, 0,
+ hole_len, 0, hole_len,
+ 0, 0, 0);
+if (ret < 0)
+return ret;
+}
+
+return 0;
}

/*@ -4648,7 +4833,6 @@*/
struct btrfs_key max_key;
struct btrfs_root *log = root->log_root;
LIST_HEAD(logged_list);
-u64 last_extent = 0;
int err = 0;
int ret;
int nritems;
@ @ -4659,6 +4843,7 @@
struct extent_map_tree *em_tree = &inode->extent_tree;
u64 logged_isize = 0;
bool need_log_inode_item = true;
+bool xattrs_logged = false;

path = btrfs_alloc_path();
if (!path)
@ @ -4821,7 +5006,7 @@
ins_start_slot = path->slots[0];
    }
ret = copy_items(trans, inode, dst_path, path,
    - &last_extent, ins_start_slot,
    + ins_start_slot,
    ins_nr, inode_only,
    logged_isize);
if (ret < 0) {
    @@ -4862,7 +5047,7 @@
    BTRFS_I(other_inode),
    LOG_OTHER_INODE, 0, LLONG_MAX,
    ctx);
    -iput(other_inode);
    +btrfs_add_delayed_iput(other_inode);
    if (err)
        goto out_unlock;
    else
    @@ -4875,17 +5060,13 @@
    if (ins_nr == 0)
        goto next_slot;
    ret = copy_items(trans, inode, dst_path, path,
    - &last_extent, ins_start_slot,
    + ins_start_slot,
    ins_nr, inode_only, logged_isize);
    if (ret < 0) {
        err = ret;
        goto out_unlock;
    }
    ins_nr = 0;
    -if (ret) {
    -btrfs_release_path(path);
    -continue;
    -}
        goto next_slot;
    }
    @@ -4898,18 +5079,13 @@
goto next_slot;
    }

    -ret = copy_items(trans, inode, dst_path, path, &last_extent,
        +ret = copy_items(trans, inode, dst_path, path,
        ins_start_slot, ins_nr, inode_only,
        logged_isize);
    if (ret < 0) {
        err = ret;
        goto out_unlock;
    }
if (ret) {
    ins_nr = 0;
    btrfs_release_path(path);
    continue;
}
ins_nr = 1;
ins_start_slot = path->slots[0];
next_slot:
    @ @ -4923,13 +5099,12 @@
    
if (ins_nr) {
    ret = copy_items(trans, inode, dst_path, path,
    - &last_extent, ins_start_slot,
    + ins_start_slot,
    ins_nr, inode_only, logged_isize);
    if (ret < 0) {
        err = ret;
        goto out_unlock;
    }
    -ret = 0;
    ins_nr = 0;
}
btrfs_release_path(path);
    @ @ -4944,14 +5119,13 @@
    }

if (ins_nr) {
    -ret = copy_items(trans, inode, dst_path, path, &last_extent,
    +ret = copy_items(trans, inode, dst_path, path,
    ins_start_slot, ins_nr, inode_only,
    logged_isize);
    if (ret < 0) {
        err = ret;
        goto out_unlock;
    }
    -ret = 0;
    ins_nr = 0;
}

    @ @ -4960,10 +5134,11 @@
err = btrfs_log_all_xattrs(trans, root, inode, path, dst_path);
if (err)
    goto out_unlock;
+xattrs_logged = true;
if (max_key.type >= BTRFS_EXTENT_DATA_KEY && !fast_search) {
    btrfs_release_path(path);
    btrfs_release_path(dst_path);
    -err = btrfs_log_trailing_hole(trans, root, inode, path);
err = btrfs_log_holes(trans, root, inode, path);
if (err)
go to out_unlock;
}
#endif
btrfs_release_path(dst_path);
if (need_log_inode_item) {
err = log_inode_item(trans, log, dst_path, inode);
+if (!err & !xattrs_logged) {
+err = btrfs_log_all_xattrs(trans, root, inode, path, 
+ dst_path);
+btrfs_release_path(path);
+}
if (err)
go to out_unlock;
}
#endif
/*
 * Don't update last_log_commit if we logged that an inode exists after
 * it was loaded to memory (full_sync bit set).
 * This is to prevent data loss when we do a write to the inode, then
 * the inode gets evicted after all delalloc was flushed, then we log
 * it exists (due to a rename for example) and then fsync it. This last
 * fsync would do nothing (not logging the extents previously written).
 * */
spin_lock(&inode->lock);
inode->logged_trans = trans->transid;
-node->last_log_commit = inode->last_sub_trans;
+if (inode_only != LOG_INODE_EXISTS ||
+ !test_bit(BTRFS_INODE_NEEDS_FULL_SYNC, &inode->runtime_flags))
+inode->last_log_commit = inode->last_sub_trans;
spin_unlock(&inode->lock);
out_unlock:
if (unlikely(err))
#endif
int ret = 0;
struct dentry *old_parent = NULL;
-struct btrfs_inode *orig_inode = inode;

/*
 * for regular files, if its inode is already on disk, we don't
#endif
}
while (1) {
	/*
- * If we are logging a directory then we start with our inode,
- * not our parent’s inode, so we need to skip setting the
- * logged_trans so that further down in the log code we don’t
- * think this inode has already been logged.
- */
-if (inode != orig_inode)
-
-inode->logged_trans = trans->transid;
-smp_mb();
-
-if (btrfs_must_commit_transaction(trans, inode)) {
-ret = 1;
-break;
@@ -5273,7 +5452,7 @@
}

if (btrfs_inode_in_log(BTRFS_I(di_inode), trans->transid)) {
-iput(di_inode);
+btrfs_add_delayed_iput(di_inode);
-break;
}
@@ -5285,7 +5464,7 @@
-if (!ret &&
- btrfs_must_commit_transaction(trans, BTRFS_I(di_inode)))
-ret = 1;
-iput(di_inode);
+btrfs_add_delayed_iput(di_inode);
-if (ret)
-goto next_dir_inode;
-if (ctx->log_new_dentries) {
@@ -5394,9 +5573,33 @@
-dir_inode = btrfs_iget(fs_info->sb, &inode_key,
- root, NULL);
-/* If parent inode was deleted, skip it. */
-if (IS_ERR(dir_inode))
-continue;
+/*
+ * If the parent inode was deleted, return an error to
+ * fallback to a transaction commit. This is to prevent
+ * getting an inode that was moved from one parent A to
+ * a parent B, got its former parent A deleted and then
+ * it got fsync’ed, from existing at both parents after
+ * a log replay (and the old parent still existing).
+ * Example:
+ *
```c
if (IS_ERR(dir_inode)) {
    ret = PTR_ERR(dir_inode);
    goto out;
}
if (ctx)
    ctx->log_new_dentries = false;
if (!ret && ctx && ctx->log_new_dentries)
    ret = log_new_dir_dentries(trans, root,
        BTRFS_I(dir_inode), ctx);
-iput(dir_inode);
+btrfs_add_delayed_iput(dir_inode);
if (ret)
    goto out;
}
-if (btrfs_inode_in_log(inode, trans->transid)) {
    /*
     * Skip already logged inodes or inodes corresponding to tmpfiles
     * (since logging them is pointless, a link count of 0 means they
     * will never be accessible).
     * /
    +if (btrfs_inode_in_log(inode, trans->transid) ||
        inode->vfs_inode.i_nlink == 0) {
        ret = BTRFS_NO_LOG_SYNC;
        goto end_no_trans;
    }
```
+/*
+ * If a new hard link was added to the inode in the current transaction
+ * and its link count is now greater than 1, we need to fallback to a
+ * transaction commit, otherwise we can end up not logging all its new
+ * parents for all the hard links. Here just from the dentry used to
+ * fsync, we can not visit the ancestor inodes for all the other hard
+ * links to figure out if any is new, so we fallback to a transaction
+ * commit (instead of adding a lot of complexity of scanning a btree,
+ * since this scenario is not a common use case).
+ */
+if (inode->vfs_inode.i_nlink > 1 &&
+    inode->last_link_trans > last_committed) {
+  ret = -EMLINK;
+  goto end_trans;
+}
+
+while (1) {
+  if (!parent || d_really_is_negative(parent) || sb != parent->d_sb)
+    break;
+  wc.replay_dest = btrfs_read_fs_root_no_name(fs_info, &tmp_key);
+  if (IS_ERR(wc.replay_dest)) {
+    ret = PTR_ERR(wc.replay_dest);
+    if (!ret)
+      goto next;
+  }
+
+  /* We didn't find the subvol, likely because it was
+   * deleted. This is ok, simply skip this log and go to
+   * the next one.
+   * We need to exclude the root because we can't have
+   * other log replays overwriting this log as we'll read
+   * it back in a few more times. This will keep our
+   * block from being modified, and we'll just bail for
+   * each subsequent pass.
+   */
+  if (ret == -ENOENT)
+    ret = btrfs_pin_extent_for_log_replay(fs_info,
+      log->node->start,
+      log->node->len);
+    free_extent_buffer(log->node);
+    free_extent_buffer(log->commit_root);
+    kfree(log);
+    if (!ret)
+      goto next;
+  btrfs_handle_fs_error(fs_info, ret,
+    "Couldn't read target root for tree log recovery.");
goto error;
@@ -5705,7 +5949,23 @@
 path);
 }

-key.offset = found_key.offset - 1;
+if (!ret && wc.stage == LOG_WALK_REPLAY_ALL) {
+struct btrfs_root *root = wc.replay_dest;
+
+btrfs_release_path(path);
+
+/*
+ * We have just replayed everything, and the highest
+ * objectid of fs roots probably has changed in case
+ * some inode_item's got replayed.
+ *
+ * root->objectid_mutex is not acquired as log replay
+ * could only happen during mount.
+ */
+ret = btrfs_find_highest_objectid(root,
+ &root->highest_objectid);
+
+wc.replay_dest->log_root = NULL;
+free_extent_buffer(log->node);
+free_extent_buffer(log->commit_root);
@@ -5713,9 +5973,10 @@
 if (ret)
goto error;
-
+next:
+if (found_key.offset == 0)
brkak;
+key.offset = found_key.offset - 1;
+}
btrfs_release_path(path);

@@ -5748,6 +6009,7 @@
 error:
 if (wc.trans)
btrfs_end_transaction(wc.trans);
+clear_bit(BTRFS_FS_LOG_RECOVERING, &fs_info->flags);
btrfs_free_path(path);
 return ret;
 }
@@ -5785,7 +6047,6 @@
 * if this directory was already logged any new
* names for this file/dir will get recorded
*/
smp_mb();
if (dir->logged_trans == trans->transid)
return;

@@ -5853,7 +6114,7 @@
* this will force the logging code to walk the dentry chain
* up for the file
*/
if (S_ISREG(inode->vfs_inode.i_mode))
+if (!S_ISDIR(inode->vfs_inode.i_mode))
inode->last_unlink_trans = trans->transid;

/*
--- linux-4.15.0.orig/fs/btrfs/uuid-tree.c
+++ linux-4.15.0/fs/btrfs/uuid-tree.c
@@ -336,6 +336,8 @@
} if (ret < 0 && ret != -ENOENT)
goto out;
+key.offset++;
+goto again_search_slot;
} item_size -= sizeof(subid_le);
offset += sizeof(subid_le);
--- linux-4.15.0.orig/fs/btrfs/volumes.c
+++ linux-4.15.0/fs/btrfs/volumes.c
@@ -16,6 +16,7 @@
 * Boston, MA 02110-1307, USA.
 */
#include <linux/sched.h>
+#include <linux/sched/mm.h>
#include <linux/bio.h>
#include <linux/slab.h>
#include <linux/buffer_head.h>
@@ -41,6 +42,7 @@
#include "math.h"
#include "dev-replace.h"
#include "sysfs.h"
+#include "tree-checker.h"

const struct btrfs RAID_attr btrfs RAID_array[BTRFS_NR_RAID_TYPES] = {
[BTRFS_RAID_RAID10] = {
@@ -95,7 +97,7 @@
.dev_min = 2,
.tolerated_failures = 1,
.dev_increment= 1,
BTRFS_RAID_R6 = {
    .sub_stripes = 1,
    .devs_min = 3,
    .tolerated_failures = 2,
    .devs_increment = 1,
    .ncopies = 3,
    .ncopies = 1,
},

return dev;

-/*
 * Find a device specified by @devid or @uuid in the list of @fs_devices, or
 * return NULL.
 * *
 * If devid and uuid are both specified, the match must be exact, otherwise
 * only devid is used.
 * */
-static struct btrfs_device *find_device(struct btrfs_fs_devices *fs_devices,
    u64 devid, const u8 *uuid)
{
    struct list_head *head = &fs_devices->devices;
    struct btrfs_device *dev;
    
    list_for_each_entry(dev, head, dev_list) {
        if (dev->devid == devid &&
            (!uuid || !memcmp(dev->uuid, uuid, BTRFS_UUID_SIZE))) {
        return dev;
    }
}

return NULL;

-}

static noinline struct btrfs_fs_devices *find_fsid(u8 *fsid)
{
    struct btrfs_fs_devices *fs_devices;

    btrfs_sysfs_remove_fsid(fs_devs);
    list_del(&fs_devs->list);
    free_fs_devices(fs_devs);
+break;
} else {
    fs_devs->num_devices--;
    list_del(&dev->dev_list);
    @ @ -614,8 +595,8 @ @

device = NULL;
} else {
    -device = find_device(fs_devices, devid,
    -disk_super->dev_item.uuid);
    +device = btrfs_find_device(fs_devices, devid,
    +disk_super->dev_item.uuid, NULL, false);
}

if (!device) {
    @ @ -682,6 +663,43 @ @
    return -EEXIST;
}

+/*
+ * We are going to replace the device path for a given devid,
+ * make sure it's the same device if the device is mounted
+ */
+if (device->bdev) {
    +struct block_device *path_bdev;
    +
    +path_bdev = lookup_bdev(path, 0);
    +if (IS_ERR(path_bdev)) {
    +    mutex_unlock(&fs_devices->device_list_mutex);
    +    return ERR_CAST(path_bdev);
    +}
    +
    +if (device->bdev != path_bdev) {
    +    bdput(path_bdev);
    +    mutex_unlock(&fs_devices->device_list_mutex);
    +/*
    + * device->fs_info may not be reliable here, so
    + * pass in a NULL instead. This avoids a
    + * possible use-after-free when the fs_info and
    + * fs_info->sb are already torn down.
    + */
    +btrfs_warn_in_rcu(NULL,
    +"duplicate device %s devid %llu generation %llu scanned by %s (%d)",
    +path, devid, found_transid,
    +current->comm,
    +task_pid_nr(current));
    +return ERR_PTR(-EEXIST);
    +}
    +bdput(path_bdev);
```c
+printk(KERN_WARNING "btrfs_info_in_rcu: device %d from %d changed to %s
+scanned by %s (%d)",
+  devid, rcu_str_deref(device->name),
+  path, current->comm,
+  task_pid_nr(current));
+
+name = rcu_string_strdup(path, GFP_NOFS);
+if (!name)
+    return -ENOMEM;
+@@ -1045,14 +1063,14 @@
+{
+    int ret;
+
-    mutex_lock(&uuid_mutex);
+    lockdep_assert_held(&uuid_mutex);
+    if (fs_devices->opened) {
+        fs_devices->opened++;
+        ret = 0;
+    } else {
+        ret = __btrfs_open_devices(fs_devices, flags, holder);
+    }
-    mutex_unlock(&uuid_mutex);
+    return ret;
+}
+
@@ -1092,7 +1110,7 @@
+    p = kmap(*page);
+    /* align our pointer to the offset of the super block */
+    *disk_super = p + (bytenr & ~PAGE_MASK);
+    *disk_super = p + offset_in_page(bytenr);
+
        if (btrfs_super_bytenr(*disk_super) != bytenr ||
            btrfs_super_magic(*disk_super) != BTRFS_MAGIC) {
@@ -2105,7 +2123,8 @@
            disk_super = (struct btrfs_super_block *)bh->b_data;
            devid = btrfs_stack_device_id(&disk_super->dev_item);
            dev_uuid = disk_super->dev_item.uuid;
-        *device = btrfs_find_device(fs_info, devid, dev_uuid, disk_super->fsid);
-        *device = btrfs_find_device(fs_info->fs_devices, devid, dev_uuid, disk_super->fsid, true);
+brelse(bh);
+    if (!*device)
+        ret = -ENOENT;
@@ -2154,7 +2173,8 @@
```
if (devid) {
    ret = 0;
    *device = btrfs_find_device(fs_info, devid, NULL, NULL);
    +device = btrfs_find_device(fs_info->fs_devices, devid, NULL,
        +NULL, true);
    if (!device)
        ret = -ENOENT;
    } else {
@@ -2286,7 +2306,8 @@
        BTRFS_UUID_SIZE);
    read_extent_buffer(leaf, fs_uuid, btrfs_device_fsid(dev_item),
        BTRFS_FSID_SIZE);
    -device = btrfs_find_device(fs_info, devid, dev_uuid, fs_uuid);
    +device = btrfs_find_device(fs_info->fs_devices, devid, dev_uuid,
        + fs_uuid, true);
    BUG_ON(!device); /* Logic error */
    if (device->fs_devices->seeding) {
@@ -2427,9 +2448,6 @@
        tmp = btrfs_super_num_devices(fs_info->super_copy);
        btrfs_set_super_num_devices(fs_info->super_copy, tmp + 1);

-/* add sysfs device entry */
-    btrfs_sysfs_add_device_link(fs_info->fs_devices, device);
-
-/* we've got more storage, clear any full flags on the space
* info
@@ -2437,6 +2455,10 @@
        btrfs_clear_space_info_full(fs_info);

        mutex_unlock(&fs_info->chunk_mutex);
        +
        /* Add sysfs device entry */
        +btrfs_sysfs_add_device_link(fs_info->fs_devices, device);
        +
        mutex_unlock(&fs_info->fs_devices->device_list_mutex);

    if (seeding_dev) {
@@ -2536,7 +2558,7 @@
        int ret = 0;

        *device_out = NULL;
    -if (fs_info->fs_devices->seeding) {
        +if (srcdev->fs_devices->seeding) {
            btrfs_err(fs_info, "the filesystem is a seed filesystem!");
            return -EINVAL;
        }
    }
int ret;
uf64 num_devices;
unsigned seq;
bool reducing_integrity;

if (btrfs_fs_closing(fs_info) ||
    atomic_read(&fs_info->balance_pause_req) ||
    !(bctl->sys.target & allowed)) ||
    ((bctl->meta.flags & BTRFS_BALANCE_ARGS_CONVERT) &&
    (fs_info->avail_metadata_alloc_bits & allowed) &&
    !(bctl->meta.target & allowed)) { +
    if (bctl->flags & BTRFS_BALANCE_FORCE) {
        btrfs_info(fs_info,
            "force reducing metadata integrity");
    } else {
        btrfs_err(fs_info,
            "balance will reduce metadata integrity, use force if you want this");
        ret = -EINVAL;
    }
}

/* if we're not converting, the target field is uninitialized */
+meta_target = (bctl->meta.flags & BTRFS_BALANCE_ARGS_CONVERT) ?
    bctl->meta.target : fs_info->avail_metadata_alloc_bits;
+data_target = (bctl->data.flags & BTRFS_BALANCE_ARGS_CONVERT) ?
    bctl->data.target : fs_info->avail_data_alloc_bits;
} while (read_seqretry(&fs_info->profiles_lock, seq));
goto out;
+
+if (btrfs_get_num_tolerated_disk_barrier_failures(meta_target) <
btrfs_get_num_tolerated_disk_barrier_failures(data_target)) {
    btrfs_warn(fs_info,
    @ @ -3967,6 +3996,15 @@
    return 0;
}
+
+/*
+ * A ro->rw remount sequence should continue with the paused balance
+ * regardless of who pauses it, system or the user as of now, so set
+ * the resume flag.
+ */
+spin_lock(&fs_info->balance_lock);
+fs_info->balance_ctl->flags |= BTRFS_BALANCE_RESUME;
+spin_unlock(&fs_info->balance_lock);
+
tsk = kthread_run(balance_kthread, fs_info, "btrfs-balance");
return PTR_ERR_OR_ZERO(tsk);
}
@@ -4168,6 +4206,7 @@
goto skip;
}
update_tree:
+btrfs_release_path(path);
if (!btrfs_is_empty_uuid(root_item.uuid)) {
    ret = btrfs_uuid_tree_add(trans, fs_info,
    root_item.uuid,
    @@ -4193,6 +4232,7 @@
}
skip:
+btrfs_release_path(path);
if (trans) {
    ret = btrfs_end_transaction(trans);
    trans = NULL;
    @ @ -4200,7 +4240,6 @@
    break;
}
-
btrfs_release_path(path);
if (key.offset < (u64)-1) {
    key.offset++;
} else if (key.type < BTRFS_ROOT_ITEM_KEY) {
    @ @ -4511,7 +4550,12 @@
/* Now btrfs_update_device() will change the on-disk size. */
ret = btrfs_update_device(trans, device);
btrfs_end_transaction(trans);
+if (ret < 0) {
+btrfs_abort_transaction(trans, ret);
+btrfs_end_transaction(trans);
+} else {
+ret = btrfs_commit_transaction(trans);
+} 
done:
btrfs_free_path(path);
if (ret) {
@@ -4581,15 +4625,6 @@ 
btrfs_set_fs_incompat(info, RAID56);
}

#define BTRFS_MAX_DEVS(r) ((BTRFS_MAX_ITEM_SIZE(r->fs_info)
-- sizeof(struct btrfs_chunk))
-/ sizeof(struct btrfs_stripe) + 1)
-
#define BTRFS_MAX_DEVS_SYS_CHUNK ((BTRFS_SYSTEM CHUNK ARRAY_SIZE
-- 2 * sizeof(struct btrfs_disk_key)
-- 2 * sizeof(struct btrfs_chunk))
-/ sizeof(struct btrfs_stripe) + 1)
-
static int __btrfs_alloc_chunk(struct btrfs_trans_handle *trans,
u64 start, u64 type)
{
@@ -4636,9 +4671,9 @@
if (type & BTRFS_BLOCK_GROUP_DATA) {
 max_stripe_size = SZ_1G;
-max_chunk_size = 10 * max_stripe_size;
+max_chunk_size = BTRFS_MAX_DATA_CHUNK_SIZE;
 if (!devs_max)
-devs_max = BTRFS_MAX_DEVS(info->chunk_root);
+devs_max = BTRFS_MAX_DEVS(info);
 } else if (type & BTRFS_BLOCK_GROUP_METADATA) {
 /* for larger filesystems, use larger metadata chunks */
 if (fs_devices->total_rw_bytes > 50ULL * SZ_1G)
@@ -4647,7 +4682,7 @@
 max_stripe_size = SZ_256M;
 max_chunk_size = max_stripe_size;
 if (!devs_max)
-devs_max = BTRFS_MAX_DEVS(info->chunk_root);
+devs_max = BTRFS_MAX_DEVS(info);
 } else if (type & BTRFS_BLOCK_GROUP_SYSTEM) {

Open Source Used In 5GaaS Edge AC-4  30894
max Stripe Size = SZ_32M;
max chunk size = 2 * max stripe size;
@@ -4656,7 +4691,7 @@
} else {
btrfs_err(info, "invalid chunk type 0x%llx requested",
    type);
-BUG_ON(1);
+BUG();
}

/* we don't want a chunk larger than 10% of writeable space */
@@ -4737,10 +4772,13 @@
ndevs = min(ndevs, devs_max);

/*
- * the primary goal is to maximize the number of stripes, so use as many
- * devices as possible, even if the stripes are not maximum sized.
+ * The primary goal is to maximize the number of stripes, so use as
+ * many devices as possible, even if the stripes are not maximum sized.
+ *
+ * The DUP profile stores more than one stripe per device, the
+ * max_avail is the total size so we have to adjust.
+ */
-stripe_size = devices_info[ndevs-1].max_avail;
+stripe_size = div_u64(devices_info[ndevs - 1].max_avail, dev_stripes);
num_stripes = ndevs * dev_stripes;

/*
@@ -4775,8 +4813,6 @@
stripe_size = devices_info[ndevs-1].max_avail;
} }
-stripe_size = div_u64(stripe_size, dev_stripes);
-
/* align to BTRFS_STRIP_LEN */
stripe_size = round_down(stripe_size, BTRFS_STRIP_LEN);
@@ -4839,6 +4875,7 @@
for (i = 0; i < map->num_stripes; i++) {
    num_bytes = map->stripes[i].dev->bytes_used + stripe_size;
btrfs_device_set_bytes_used(map->stripes[i].dev, num_bytes);
+map->stripes[i].dev->has_pending_chunks = true;
}
atomic64_sub(stripe_size * map->num_stripes, &info->free_chunk_space);
@@ -5006,8 +5043,7 @@
if (map->type & (BTRFS_BLOCK_GROUP_RAID1 |
BTRFS_BLOCK_GROUP_RAID10 |  
- BTRFS_BLOCK_GROUP_RAID5 |  
- BTRFS_BLOCK_GROUP_DUP)) {  
+ BTRFS_BLOCK_GROUP_RAID5)) {  
max_errors = 1;  
} else if (map->type & BTRFS_BLOCK_GROUP_RAID6) {  
max_errors = 2;  
@@ -5103,7 +5139,14 @@  
else if (map->type & BTRFS_BLOCK_GROUP_RAID5)  
ret = 2;  
else if (map->type & BTRFS_BLOCK_GROUP_RAID6)  
- ret = 3;  
+ /*  
+ * There could be two corrupted data stripes, we need  
+ * to loop retry in order to rebuild the correct data.  
+ *  
+ * Fail a stripe at a time on every retry except the  
+ * stripe under reconstruction.  
+ */  
+ ret = map->num_stripes;  
else  
ret = 1;  
free_extent_map(em);  
@@ -5300,7 +5343,7 @@  
}

offset = logical - em->start;  
-length = min_t(u64, em->len - offset, length);  
+length = min_t(u64, em->start + em->len - logical, length); 

stripe_len = map->stripe_len;  
/*  
@@ -6224,21 +6267,36 @@  
return BLK_STS_OK;  
}  

-struct btrfs_device *btrfs_find_device(struct btrfs_fs_info *fs_info, u64 devid,  
- u8 *uuid, u8 *fsid)  
+ /*  
+ * Find a device specified by @devid or @uuid in the list of @fs_devices, or  
+ * return NULL.  
+ *  
+ * If devid and uuid are both specified, the match must be exact, otherwise  
+ * only devid is used.  
+ *  
+ * If @seed is true, traverse through the seed devices.  
+ */  
+struct btrfs_device *btrfs_find_device(struct btrfs_fs_devices *fs_devices,
```c
+ u64 devid, u8 *uuid, u8 *fsid,
+ bool seed)
{
struct btrfs_device *device;
struct btrfs_fs_devices *cur_devices;

-cur_devices = fs_info->fs_devices;
-while (cur_devices) {
+while (fs_devices) {
  if (!fsid ||
-    !memcmp(cur_devices->fsid, fsid, BTRFS_FSID_SIZE)) {
-      device = find_device(cur_devices, devid, uuid);
-      if (device)
-        return device;
+    !memcmp(fs_devices->fsid, fsid, BTRFS_FSID_SIZE)) {
+      list_for_each_entry(device, &fs_devices->devices,
+        dev_list) {
+        if (device->devid == devid &&
+            (!uuid || memcmp(device->uuid, uuid,
+                BTRFS_UUID_SIZE) == 0))
+            return device;
+      }
-    cur_devices = cur_devices->seed;
+    if (seed)
+        fs_devices = fs_devices->seed;
+    else
+        return NULL;
  }
return NULL;
}
 @@ -6247,8 +6305,17 @@
  u64 devid, u8 *dev_uuid)
{
struct btrfs_device *device;
+unsigned int nofs_flag;

+/*
+ * We call this under the chunk_mutex, so we want to use NOFS for this
+ * allocation, however we don't want to change btrfs_alloc_device() to
+ * always do NOFS because we use it in a lot of other GFP_KERNEL safe
+ * places.
+ */
+nofs_flag = memalloc_nofs_save();
device = btrfs_alloc_device(NULL, &devid, dev_uuid);
+memalloc_nofs_restore(nofs_flag);
if (IS_ERR(device))
return device;
```
/* Return -EIO if any error, otherwise return 0. */
static int btrfs_check_chunk_valid(struct btrfs_fs_info *fs_info,
  struct extent_buffer *leaf,
  struct btrfs_chunk *chunk, u64 logical)
{
  u64 length;
  u64 stripe_len;
  u16 num_stripes;
  u16 sub_stripes;
  u64 type;

  -length = btrfs_chunk_length(leaf, chunk);
  -stripe_len = btrfs_chunk_stripe_len(leaf, chunk);
  -num_stripes = btrfs_chunk_num_stripes(leaf, chunk);
  -sub_stripes = btrfs_chunk_sub_stripes(leaf, chunk);
  -type = btrfs_chunk_type(leaf, chunk);

  -if (!num_stripes) {
    -btrfs_err(fs_info, "invalid chunk num_stripes: %u",
      - num_stripes);
    -return -EIO;
    -}
  -if (!IS_ALIGNED(logical, fs_info->sectorsize)) {
    -btrfs_err(fs_info, "invalid chunk logical %llu", logical);
    -return -EIO;
    -}
  -if (btrfs_chunk_sector_size(leaf, chunk) != fs_info->sectorsize) {
    -btrfs_err(fs_info, "invalid chunk sectorsize %u",
      - btrfs_chunk_sector_size(leaf, chunk));
    -return -EIO;
    -}
  -if (!length || !IS_ALIGNED(length, fs_info->sectorsize)) {
    -btrfs_err(fs_info, "invalid chunk length %llu", length);
    -return -EIO;
    -}
  -if (!is_power_of_2(stripe_len) || stripe_len != BTRFS_STRIPE_LEN) {
    -btrfs_err(fs_info, "invalid chunk stripe length: %llu",
      - stripe_len);
    -return -EIO;
    -}
  -if (~(BTRFS_BLOCK_GROUP_TYPE_MASK | BTRFS_BLOCK_GROUP_PROFILE_MASK) &
    -type) {
    -btrfs_err(fs_info, "unrecognized chunk type: %llu",
      -type);
    -return -EIO;
  -}
- ~(BTRFS_BLOCK_GROUP_TYPE_MASK | BTRFS_BLOCK_GROUP_PROFILE_MASK) &
- btrfs_chunk_type(leaf, chunk));
- return -EIO;
-
- if ((type & BTRFS_BLOCK_GROUP_RAID10 && & sub_stripes != 2) ||
- (type & BTRFS_BLOCK_GROUP_RAID1 && & num_stripes < 1) ||
- (type & BTRFS_BLOCK_GROUP_RAID5 && & num_stripes < 2) ||
- (type & BTRFS_BLOCK_GROUP_RAID6 && & num_stripes < 3) ||
- (type & BTRFS_BLOCK_GROUP_DUP && & num_stripes > 2) ||
- ((type & BTRFS_BLOCK_GROUP_PROFILE_MASK) == 0 &&
- num_stripes != 1)) {
- btrfs_err(fs_info,
- "invalid num_stripes:sub_stripes %u:%u for profile %llu",
- num_stripes, sub_stripes,
- type & BTRFS_BLOCK_GROUP_PROFILE_MASK);
- return -EIO;
- }
-
- return 0;
-
-}
-
- static void btrfs_report_missing_device(struct btrfs_fs_info *fs_info,
  u64 devid, u8 *uuid, bool error)
{
  length = btrfs_chunk_length(leaf, chunk);
  num_stripes = btrfs_chunk_num_stripes(leaf, chunk);

  ret = btrfs_check_chunk_valid(fs_info, leaf, chunk, logical);
  if (ret)
    return ret;
+
+ /*
+ * Only need to verify chunk item if we're reading from sys chunk array,
+ * as chunk item in tree block is already verified by tree-checker.
+ */
+ if (leaf->start == BTRFS_SUPER_INFO_OFFSET) {
+ ret = btrfs_check_chunk_valid(fs_info, leaf, chunk, logical);
+ if (ret)
+ return ret;
+ }

read_lock(&map_tree->map_tree.lock);
em = lookup_extent_mapping(&map_tree->map_tree, logical, 1);
read_extent_buffer(leaf, uuid, (unsigned long)
  btrfs_stripe_dev_uuid_nr(chunk, i),
  BTRFS_UUID_SIZE);
-map->stripes[i].dev = btrfs_find_device(fs_info, devid, uuid, NULL);
+map->stripes[i].dev = btrfs_find_device(fs_info->fs_devices, devid, uuid, NULL, true);
if (!map->stripes[i].dev && !btrfs_test_opt(fs_info, DEGRADED)) {
  free_extent_map(em);
  write_lock(&map_tree->map_tree.lock);
  ret = add_extent_mapping(&map_tree->map_tree, em, 0);
  write_unlock(&map_tree->map_tree.lock);
-  BUG_ON(ret); /* Tree corruption */
+  if (ret < 0) {
+    btrfs_err(fs_info,
+      "failed to add chunk map, start=%llu len=%llu: %d",
+      em->start, em->len, ret);
+  }
  free_extent_map(em);

-  return 0;
+  return ret;
}

static void fill_device_from_item(struct extent_buffer *leaf,
  return PTR_ERR(fs_devices);
}

-device = btrfs_find_device(fs_info, devid, dev_uuid, fs_uuid);
+device = btrfs_find_device(fs_info->fs_devices, devid, dev_uuid,
  +  fs_uuid, true);
if (!device) {
  if (!btrfs_test_opt(fs_info, DEGRADED)) {
    btrfs_report_missing_device(fs_info, devid,
      mutex_lock(&fs_info->chunk_mutex);

/*
 * It is possible for mount and umount to race in such a way that
 * we execute this code path, but open_fs_devices failed to clear
 * total_rw_bytes. We certainly want it cleared before reading the
 * device items, so clear it here.
 */
+fs_info->fs_devices->total_rw_bytes = 0;
+
*/
* Read all device items, and then all the chunk items. All
* device items are found before any chunk item (their object id
mutex_lock(&fs_devices->device_list_mutex);
list_for_each_entry(device, &fs_devices->devices, dev_list) {
    -if (!device->dev_stats_valid || !btrfs_dev_stats_dirty(device))
      +stats_cnt = atomic_read(&device->dev_stats_ccnt);
    +if (!device->dev_stats_valid || stats_cnt == 0)
      continue;
    
    -stats_cnt = atomic_read(&device->dev_stats_ccnt);
    +
    +/
    + * There is a LOAD-LOAD control dependency between the value of
    + * dev_stats_ccnt and updating the on-disk values which requires
    + * reading the in-memory counters. Such control dependencies
    + * require explicit read memory barriers.
    + *
    + * This memory barriers pairs with smp_mb__before_atomic in
    + * btrfs_dev_stat_inc/btrfs_dev_stat_set and with the full
    + * barrier implied by atomic_xchg in
    + * btrfs_dev_stats_read_and_reset
    + */
    +smp_rmb();
    +
    ret = update_dev_stat_item(trans, fs_info, device);
    if (!ret)
      atomic_sub(stats_cnt, &device->dev_stats_ccnt);
    
mutex_lock(&fs_devices->device_list_mutex);
-dev = btrfs_find_device(fs_info, stats->devid, NULL, NULL);
+dev = btrfs_find_device(fs_info->fs_devices, stats->devid, NULL, NULL,
+true);
mutex_unlock(&fs_devices->device_list_mutex);

if (!dev) {
  @ @ -7169,6 +7205,8 @@
else
  btrfs_dev_stat_reset(dev, i);
}
+btrfs_info(fs_info, "device stats zeroed by %s (%d)",
  + current->comm, task_pid_nr(current));
} else {
  for (i = 0; i < BTRFS_DEV_STAT_VALUES_MAX; i++)
    if (stats->nr_items > i)
      @ @ -7252,6 +7290,7 @@
for (i = 0; i < map->num_stripes; i++) {
    dev = map->stripes[i].dev;
    dev->commit_bytes_used = dev->bytes_used;
    dev->has_pending_chunks = false;
}
}
mutex_unlock(&fs_info->chunk_mutex);
--- linux-4.15.0.orig/fs/btrfs/volumes.h
+++ linux-4.15.0/fs/btrfs/volumes.h
@@ -24,6 +24,8 @@
#include <linux/btrfs.h>
#include "async-thread.h"
+#define BTRFS_MAX_DATA_CHUNK_SIZE (10ULL * SZ_1G)
+
extern struct mutex uuid_mutex;
#define BTRFS_STRIPE_LEN SZ_64K
@@ -59,6 +61,11 @@
spinlock_t io_lock ____cacheline_aligned;
int running_pending;
/* When true means this device has pending chunk alloc in
 * current transaction. Protected by chunk_mutex.
 */
+bool has_pending_chunks;
+
/* regular prio bios */
struct btrfs_pending_bios pending_bios;
/* sync bios */
@@ -263,6 +270,15 @@
#define BTRFS_BIO_INLINE_CSUM_SIZE 64
+#define BTRFS_MAX_DEVS(info) ((BTRFS_MAX_ITEM_SIZE(info)
+                         - sizeof(struct btrfs_chunk))
+                         / sizeof(struct btrfs_stripe) + 1)
+
+#define BTRFS_MAX_DEVS_SYS_CHUNK ((BTRFS_SYSTEM_CHUNK_ARRAY_SIZE
+                         - 2 * sizeof(struct btrfs_disk_key)
+                         - 2 * sizeof(struct btrfs_chunk))
+                         / sizeof(struct btrfs_stripe) + 1)
+
/*
 * we need the mirror number and stripe index to be passed around
 * the call chain while we are processing end_io (especially errors).
 @@ -310,7 +326,6 @@
 u64 map_type; /* get from map_lookup->type */
bio_end_io_t *end_io;
struct bio *orig_bio;
unsigned long flags;
void *private;
atomic_t error;
int max_errors;
@@ -440,8 +455,8 @@
 int btrfs_num_copies(struct btrfs_fs_info *fs_info, u64 logical, u64 len);
 int btrfs_grow_device(struct btrfs_trans_handle *trans,
    struct btrfs_device *device, u64 new_size);
-struct btrfs_device *btrfs_find_device(struct btrfs_fs_info *fs_info, u64 devid,
-    u8 *uuid, u8 *fsid);
+struct btrfs_device *btrfs_find_device(struct btrfs_fs_devices *fs_devices,
    u64 devid, u8 *uuid, u8 *fsid, bool seed);
 int btrfs_shrink_device(struct btrfs_device *device, u64 new_size);
 int btrfs_init_new_device(struct btrfs_fs_info *fs_info, const char *path);
 int btrfs_init_dev_replace_tgtdev(struct btrfs_fs_info *fs_info,
@@ -498,6 +513,12 @@
 atomic_inc(dev->dev_stat_values + index);
 */
 + * This memory barrier orders stores updating statistics before stores
 + * updating dev_stats_ccnt.
 + *
 + * It pairs with smp_rmb() in btrfs_run_dev_stats().
 + */
 smp_mb__before_atomic();
 atomic_inc(&dev->dev_stats_ccnt);
 }
```c
#include <linux/posix_acl_xattr.h>
#include <linux/sched/mm.h>
#include "ctree.h"
#include "btrfs_inode.h"
#include "transaction.h"

const struct xattr *xattr;
struct btrfs_trans_handle *trans = fs_info;
unsigned int nofs_flag;
char *name;
int err = 0;

/*
 * We're holding a transaction handle, so use a NOFS memory allocation
 * context to avoid deadlock if reclaim happens.
 * */
nofs_flag = memalloc_nofs_save();
for (xattr = xattr_array; xattr->name != NULL; xattr++) {
    name = kmalloc(XATTR_SECURITY_PREFIX_LEN +
        strlen(xattr->name) + 1, GFP_KERNEL);
    if (err < 0)
        break;
}
memalloc_nofs_restore(nofs_flag);
return err;
```

---

```c
struct buffer_head *head;
struct page *page;
int all_mapped = 1;
static DEFINE_RATELIMIT_STATE(last_warned, HZ, 1);

index = block >> (PAGE_SHIFT - bd_inode->i_blkbits);
page = find_get_page_flags(bd_mapping, index, FGP_ACCESSED);

* file io on the block device and getblk. It gets dealt with
* elsewhere, don't buffer_error if we had some unmapped buffers
*/
-if (all_mapped) {
    printk("__find_get_block_slow() failed. 
    " "block=\%llu, b_blocknr=\%llu\n",
    (unsigned long long)block,
    (unsigned long long)bh->b_blocknr);
```
-printk("b_state=0x%08lx, b_size=%zu", 
-bh->b_state, bh->b_size); 
-printk("device %pg blocksize: %d\n", bdev, 
-1 << bd_inode->i_blkbits); 
+ratelimit_set_flags(&last_warned, RATELIMIT_MSG_ON_RELEASE); 
+if (all_mapped && __ratelimit(&last_warned)) { 
+printk("__find_get_block_slow() failed. block=%llu, " 
+ "b_blocknr=%llu, b_state=0x%08lx, b_size=%zu, " 
+ "device %pg blocksize: %d\n", 
+ (unsigned long long)block, 
+ (unsigned long long)bh->b_blocknr, 
+ bh->b_state, bh->b_size, bdev, 
+ 1 << bd_inode->i_blkbits); 
} 
out_unlock: 
spin_unlock(&bd_mapping->private_lock); 
@@ -1357,6 +1358,17 @@ 
} 
EXPORT_SYMBOL(__breadahead); 
+void __breadahead_gfp(struct block_device *bdev, sector_t block, unsigned size, 
+ gfp_t gfp) 
+{
+struct buffer_head *bh = __getblk_gfp(bdev, block, size, gfp); 
+if (likely(bh)) { 
+ll_rw_block(REQ_OP_READ, REQ_RAHEAD, 1, &bh); 
+brelse(bh); 
+}
+} 
+EXPORT_SYMBOL(__breadahead_gfp); 
+/** 
+ * __bread_gfp() - reads a specified block and returns the bh 
+ * @bdev: the block_device to read from 
+ @@ -2748,16 +2760,6 @@ 
/* Is the page fully outside i_size? (truncate in progress) */
offset = i_size & (PAGE_SIZE-1); 
if (page->index >= end_index+1 || !offset) { 
 /*
- * The page may have dirty, unmapped buffers. For example, 
- * they may have been added in ext3_writepage(). Make them 
- * freeable here, so the page does not leak. 
- */
-#if 0 
-/* Not really sure about this - do we need this? */
-if (page->mapping->a_ops->invalidatepage) 
-page->mapping->a_ops->invalidatepage(page, offset); 
-#endif 
}
unlock_page(page);
return 0; /* don't care */
}
@@ -2952,12 +2954,6 @@
/* Is the page fully outside i_size? (truncate in progress) */
offset = i_size & (PAGE_SIZE-1);  
if (page->index >= end_index+1 || !offset) {
-/*
- * The page may have dirty, unmapped buffers. For example,
- * they may have been added in ext3_writepage(). Make them
- * freeable here, so the page does not leak.
- */
-do_invalidatepage(page, 0, PAGE_SIZE);
unlock_page(page);
return 0; /* don't care */
}
@@ -3044,6 +3040,13 @@
/* Uhhuh. We've got a bio that straddles the device size! */
truncated_bytes = bio->bi_iter.bi_size - (maxsector << 9);

+/*
+ * The bio contains more than one segment which spans EOD, just return
+ * and let IO layer turn it into an EIO
+ */
+if (truncated_bytes > bvec->bv_len)
+return;
+
+ /* Truncate the bio.. */
bio->bi_iter.bi_size -= truncated_bytes;
bvec->bv_len -= truncated_bytes;
@@ -3192,6 +3195,15 @@
WARN_ON(atomic_read(&bh->b_count) < 1);
lock_buffer(bh);
if (test_clear_buffer_dirty(bh)) {
+/*
+ * The bh should be mapped, but it might not be if the
+ * device was hot-removed. Not much we can do but fail the I/O.
+ */
+if (!buffer_mapped(bh)) {
+unlock_buffer(bh);
+return -EIO;
+}
+get_bh(bh);
bh->b_end_io = end_buffer_write_sync;
ret = submit_bh(REQ_OP_WRITE, op_flags, bh);
--- linux-4.15.0.orig/fs/cachefiles/bind.c
+++ linux-4.15.0/fs/cachefiles/bind.c
"%s",
    fsdef->dentry->d_sb->s_id);

-fscache_object_init(&fsdef->fscache, NULL, &cache->cache);
+fscache_object_init(&fsdef->fscache, &fscache_fsdef_index, &cache->cache);

ret = fscache_add_cache(&cache->cache, &fsdef->fscache, cache->tag);
if (ret < 0)
--- linux-4.15.0.orig/fs/cachefiles/namei.c
+++ linux-4.15.0/fs/cachefiles/namei.c
@@ -191,11 +191,12 @@
/* an old object from a previous incarnation is hogging the slot - we
 * need to wait for it to be destroyed */
 wait_for_old_object:
+clear_bit(CACHEFILES_OBJECT_ACTIVE, &object->flags);
 +
 if (fscache_object_is_live(&xobject->fscache)) {
 pr_err("\n");
 pr_err("Error: Unexpected object collision\n");
cachefiles_printf(object, xobject);
-BUG();
 }
atomic_inc(&xobject->usage);
write_unlock(&cache->active_lock);
@@ -252,7 +253,6 @@
requeue:
-clear_bit(CACHEFILES_OBJECT_ACTIVE, &object->flags);
 cache->cache.ops->put_object(&xobject->fscache);
_leave(" = -ETIMEDOUT");
return -ETIMEDOUT;
@@ -341,7 +341,7 @@
 trap = lock_rename(cache->graveyard, dir);

 /* do some checks before getting the grave dentry */
-if (rep->d_parent != dir) {
+if (rep->d_parent != dir || IS_DEADDIR(d_inode(rep))) {
 /* the entry was probably culled when we dropped the parent dir
 * lock */
 unlock_rename(cache->graveyard, dir);
--- linux-4.15.0.orig/fs/cachefiles/rdwr.c
+++ linux-4.15.0/fs/cachefiles/rdwr.c
@@ -27,6 +27,7 @@
 struct cachefiles_one_read *monitor =
 container_of(wait, struct cachefiles_one_read, monitor);
struct cachefiles_object *object;
+struct fscache_retrieval *op = monitor->op;
struct wait_bit_key *key = _key;
struct page *page = wait->private;

list_del(&wait->entry);

/* move onto the action list and queue for FS-Cache thread pool */
-ASSERT(monitor->op);
+ASSERT(op);

-object = container_of(monitor->op->op.object,
-    struct cachefiles_object, fscache);
+/* We need to temporarily bump the usage count as we don't own a ref
+ * here otherwise cachefiles_read_copier() may free the op between the
+ * monitor being enqueued on the op->to_do list and the op getting
+ * enqueued on the work queue.
+ */
+fscache_get_retrieval(op);

+object = container_of(op->op.object, struct cachefiles_object, fscache);
spin_lock(&object->work_lock);
-list_add_tail(&monitor->op_link, &monitor->op->to_do);
+list_add_tail(&monitor->op_link, &op->to_do);
+fscache_enqueue_retrieval(op);
spin_unlock(&object->work_lock);

-fscache_enqueue_retrieval(monitor->op);
+fscache_put_retrieval(op);
return 0;
}

unlock_discard:
unlock_page(backpage);
+discard:
spin_lock_irq(&object->work_lock);

/* but the page may have been read before the monitor was installed, so
unlock_discard:
unlock_page(backpage);
+discard:
spin_lock_irq(&object->work_lock);
list_del(&monitor->op_link);
spin_unlock_irq(&object->work_lock);
@@ -528,7 +536,10 @@
    netpage->index, cachefiles_gfp);
if (ret < 0) {
if (ret == -EEXIST) {
+    put_page(backpage);
+    backpage = NULL;
    put_page(netpage);
+    netpage = NULL;
    fscache_retrieval_complete(op, 1);
    continue;
}
@@ -601,7 +612,10 @@
    netpage->index, cachefiles_gfp);
if (ret < 0) {
if (ret == -EEXIST) {
+    put_page(backpage);
+    backpage = NULL;
    put_page(netpage);
+    netpage = NULL;
    fscache_retrieval_complete(op, 1);
    continue;
}
@@ -954,11 +968,8 @@
void cachefiles_uncache_page(struct fscache_object *object, struct page *page)
{
struct cachefiles_object *object;
-    struct cachefiles_cache *cache;

    object = container_of(_object, struct cachefiles_object, fscache);
-    cache = container_of(object->fscache.cache,
-        struct cachefiles_cache, cache);

    _enter("%p,%lu", object, page->index);

--- linux-4.15.0.orig/fs/cachefiles/xattr.c
+++ linux-4.15.0/fs/cachefiles/xattr.c
@@ -134,7 +134,8 @@
    struct dentry *dentry = object->dentry;
    int ret;

-    ASSERT(dentry);
+    if (!dentry)
+        return -ESTALE;

    _enter("%p,%hd", object, auxdata->len);
--- linux-4.15.0.orig/fs/ceph/Makefile
+++ linux-4.15.0/fs/ceph/Makefile
@@ -6,7 +6,7 @@
obj-$(CONFIG_CEPH_FS) += ceph.o
ceph-y := super.o inode.o dir.o file.o locks.o ioctl.o \ 
-export.o caps.o snap.o xattr.o \ 
+export.o caps.o snap.o xattr.o quota.o \ 
mds_client.o mdsmap.o strings.o ceph_frag.o \ 
defaults.o

--- linux-4.15.0.orig/fs/ceph/addr.c
+++ linux-4.15.0/fs/ceph/addr.c
@@ -74,10 +74,6 @@
struct inode *inode;
struct ceph_inode_info *ci;
struct ceph_snap_context *snapc;
-int ret;
-
-if (unlikely(!mapping))
-return !TestSetPageDirty(page);

if (PageDirty(page)) {
    dout("%p set_page_dirty %p idx %lu -- already dirty\n", 
@@ -123,11 +119,7 @@
page->private = (unsigned long)snapc;
SetPagePrivate(page);

    -ret = __set_page_dirty_nobuffers(page);
-WARN_ON(!PageLocked(page));
-WARN_ON(!page->mapping);
-
    -return ret;
+return __set_page_dirty_nobuffers(page);
}

/*
@@ -299,7 +291,8 @@
* start an async read(ahead) operation. return nr_pages we submitted
* a read for on success, or negative error code.
*/
-static int start_read(struct inode *inode, struct list_head *page_list, int max)
+static int start_read(struct inode *inode, struct ceph_rw_context *rw_ctx,
+        struct list_head *page_list, int max)
{
    struct ceph_osd_client *osdc =
    &ceph_inode_to_client(inode)->client->osdc;
@@ -316,7 +309,7 @@
int got = 0;
int ret = 0;

-if (!current->journal_info) {
+if (!rw_ctx) {
 /* caller of readpages does not hold buffer and read caps
  * (fadvise, madvise and readahead cases) */
 int want = CEPH_CAP_FILE_CACHE;
 } @@ -437,6 +430,8 @@
 }
 struct inode *inode = file_inode(file);
 struct ceph_fs_client *fsc = ceph_inode_to_client(inode);
+struct ceph_file_info *ci = file->private_data;
+struct ceph_rw_context *rw_ctx;
 int rc = 0;
 int max = 0;

 @@ -449,11 +444,12 @@
 if (rc == 0)
 goto out;

 +rw_ctx = ceph_find_rw_context(ci);
 max = fsc->mount_options->rsize >> PAGE_SHIFT;
 -dout("readpages %p file %p nr_pages %d max %d\n",
 -  inode, file, nr_pages, max);
 ++dout("readpages %p file %p ctx %p nr_pages %d max %d\n",
 +  inode, file, rw_ctx, nr_pages, max);
 while (!list_empty(page_list)) {
 -rc = start_read(inode, page_list, max);
 +rc = start_read(inode, rw_ctx, page_list, max);
 if (rc < 0)
 goto out;
 }
@@ -1427,7 +1423,7 @@
 struct ceph_inode_info *ci = ceph_inode(inode);
 struct ceph_file_info *fi = vma->vm_file->private_data;
 struct page *pinned_page = NULL;
-loff_t off = vmf->pgoff << PAGE_SHIFT;
+loff_t off = (loff_t)vmf->pgoff << PAGE_SHIFT;
 int want, got, ret;
 sigset_t oldset;

 @@ -1450,9 +1446,10 @@
 if ((got & (CEPH_CAP_FILE_CACHE | CEPH_CAP_FILE_LAZYIO)) ||
   ci->i_inline_version == CEPH_INLINE_NONE) {
 -current->journal_info = vma->vm_file;
 +CEPH_DEFINE_RW_CONTEXT(rw_ctx, got);
+ceph_add_rw_context(fi, &rw_ctx);
ret = filemap_fault(vmf);
-current->journal_info = NULL;
+ceph_del_rw_context(fi, &rw_ctx);
} else
ret = -EAGAIN;

--- linux-4.15.0.orig/fs/ceph/caps.c
+++ linux-4.15.0/fs/ceph/caps.c
@@ -498,7 +498,7 @@
*/
if ((issued & CEPH_CAP_FILE_SHARED) != (had & CEPH_CAP_FILE_SHARED)) {
if (issued & CEPH_CAP_FILE_SHARED)
-ci->i_shared_gen++;
+atomic_inc(&ci->i_shared_gen);
if (S_ISDIR(ci->vfs_inode.i_mode)) {
  dout(" marking %p NOT complete\n", &ci->vfs_inode);
  __ceph_dir_clear_complete(ci); 
@@ -585,9 +585,11 @@
    realmino);
if (realm) {
  spin_lock(&realm->inodes_with_caps_lock);
-ci->i_snap_realm = realm;
+list_add(&ci->i_snap_realm_item, 
          &realm->inodes_with_caps);
+ci->i_snap_realm = realm;
+if (realm->ino == ci->i_vino.ino)
  realm->inode = inode;
spin_unlock(&realm->inodes_with_caps_lock);
} else {
  pr_err("ceph_add_cap: couldn't find snap realm %llx\n", 
@@ -929,12 +931,24 @@
{
  struct ceph_mds_session *session = cap->session;
  struct ceph_inode_info *ci = cap->ci;
-struct ceph_mds_client *mdsc =
-  ceph_sb_to_client(ci->vfs_inode.i_sb)->mdsc;
+struct ceph_mds_client *mdsc =
  int removed = 0;

  /* 'ci' being NULL means the remove have already occurred */
+if (!ci) {
+dout("%s: cap inode is NULL\n", __func__);
+return;
+}
+  dout("__ceph_remove_cap %p from %p\n", cap, &ci->vfs_inode);
+mdsc = ceph_inode_to_client(&ci->vfs_inode)->mdsc;
+
+/* remove from inode's cap rbtree, and clear auth cap */
+rb_erase(&cap->ci_node, &ci->i_caps);
+if (ci->i_auth_cap == cap)
+ci->i_auth_cap = NULL;
+
+/* remove from session list */
+spin_lock(&session->s_cap_lock);
+if (session->s_cap_iterator == cap) {
+    /* remove from inode list */
+    rb_erase(&cap->ci_node, &ci->i_caps);
+    if (ci->i_auth_cap == cap)
+        ci->i_auth_cap = NULL;
+
+    if (removed)
+        list_add_tail(&cap->session_caps,
+        &session->s_cap_releases);
+    session->s_num_cap_releases++;
+    __ceph_queue_cap_release(session, cap);
+    removed = 0;
+}
+} else {
+    spin_unlock(&session->s_cap_lock);
+}
+
void ceph_queue_caps_release(struct inode *inode)
{
    struct ceph_inode_info *ci = ceph_inode(inode);
    struct rb_node *p;
    {
        struct ceph_inode_info *ci = cap->ci;
        struct inode *inode = &ci->vfs_inode;
        +struct ceph_buffer *old_blob = NULL;
        struct cap_msg_args arg;

* Queue cap releases when an inode is dropped from our cache. Since
* inode is about to be destroyed, there is no need for i_ceph_lock.
*/
-void ceph_queue_caps_release(struct inode *inode)
+void __ceph_remove_caps(struct inode *inode)
{
    struct ceph_inode_info *ci = ceph_inode(inode);
    struct rb_node *p;
    {
        struct ceph_inode_info *ci = cap->ci;
        struct inode *inode = &ci->vfs_inode;
        +struct ceph_buffer *old_blob = NULL;
        struct cap_msg_args arg;

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int held, revoking;
int wake = 0;
@@ -1223,7 +1231,7 @@
    ci->i_requested_max_size = arg.max_size;

    if (flushing & CEPH_CAP_XATTR_EXCL) {
-      __ceph_build_xattrs_blob(ci);
+      old_blob = __ceph_build_xattrs_blob(ci);
      arg.xattr_version = ci->i_xattrs.version;
      arg.xattr_buf = ci->i_xattrs.blob;
    } else {
@@ -1258,6 +1266,8 @@
    spin_unlock(&ci->i_ceph_lock);

    +ceph_buffer_put(old_blob);
    +
    ret = send_cap_msg(&arg);
    if (ret < 0) {
        dout("error sending cap msg, must requeue %p\n", inode);
@@ -1643,11 +1653,14 @@
        /* try to invalidate mapping pages without blocking. */
        static int try_nonblocking_invalidate(struct inode *inode)
        +__releases(ci->i_ceph_lock)
        +__acquires(ci->i_ceph_lock)
        {
            struct ceph_inode_info *ci = ceph_inode(inode);
            u32 invalidating_gen = ci->i_rdcache_gen;
            spin_unlock(&ci->i_ceph_lock);
            +ceph_fscache_invalidate(inode);
            invalidate_mapping_pages(&inode->i_data, 0, -1);
            spin_lock(&ci->i_ceph_lock);
@@ -1856,8 +1869,12 @@
            }
/* want more caps from mds? */
            -if (want & ~(cap->mds_wanted | cap->issued))
            -goto ack;
            +if (want & ~cap->mds_wanted) {
            +    if (want & ~(cap->mds_wanted | cap->issued))
            +      goto ack;
            +    if (!__cap_is_valid(cap))
            +      goto ack;
            +}
/* things we might delay */
if ((cap->issued & ~retain) == 0 &&
@@ -1895,12 +1912,24 @@
if (mutex_trylock(&session->s_mutex) == 0) {
    dout("inverting session/ino locks on %p\n",
        session);
    +session = ceph_get_mds_session(session);
    spin_unlock(&ci->i_ceph_lock);
    if (took_snap_rwlock) {
        up_read(&mdsc->snap_rwlock);
        took_snap_rwlock = 0;
    }
-    mutex_lock(&session->s_mutex);
+    if (session) {
+        mutex_lock(&session->s_mutex);
+        ceph_put_mds_session(session);
+    } else {
+        /*
+         * Because we take the reference while
+         * holding the i_ceph_lock, it should
+         * never be NULL. Throw a warning if it
+         * ever is.
+         */
+        WARN_ON_ONCE(true);
+    }
    goto retry;
}
@@ -2873,8 +2902,10 @@
if (complete_capsnap)
    wake_up_all(&ci->i_cap_wq);
-while (put-- > 0)
-    iput(inode);
+    while (put-- > 0) {
+        /* avoid calling iput_final() in osd dispatch threads */
+        ceph_async_iput(inode);
+    }
}

/*
@@ -2909,24 +2940,32 @@
dput(prev);
}

+struct cap_extra_info {
+    struct ceph_string *pool_ns;
+    /* inline data */
u64 inline_version;
+void *inline_data;
+u32 inline_len;
+/* currently issued */
+int issued;
+}:
+
/*
 * Handle a cap GRANT message from the MDS. (Note that a GRANT may
 * actually be a revocation if it specifies a smaller cap set.)
 *
 * caller holds s_mutex and i_ceph_lock, we drop both.
 */
-static void handle_cap_grant(struct ceph_mds_client *mdsc,
-    struct inode *inode, struct ceph_mds_caps *grant,
-    struct ceph_string **pns, u64 inline_version,
-    void *inline_data, u32 inline_len,
-    struct ceph_buffer *xattr_buf,
+static void handle_cap_grant(struct inode *inode,
                        struct ceph_mds_session *session,
-    struct ceph_cap *cap, int issued)
+    struct ceph_cap *cap,
+    struct ceph_mds_caps *grant,
+    struct ceph_buffer *xattr_buf,
+    struct cap_extra_info *extra_info)
__releases(ci->i_ceph_lock)
-__releases(mdsc->snap_rwsem)
+__releases(session->s_mdsc->snap_rwsem)
{
struct ceph_inode_info *ci = ceph_inode(inode);
-    int mds = session->s_mds;
    int seq = le32_to_cpu(grant->seq);
    int newcaps = le32_to_cpu(grant->caps);
    int used, wanted, dirty;
@@ -2942,7 +2981,7 @@
    bool fill_inline = false;

dout("handle_cap_grant inode %p cap %p mds%d seq %d %s\n",
    -    inode, cap, mds, seq, ceph_cap_string(newcaps));
+    inode, cap, session->s_mds, seq, ceph_cap_string(newcaps));
dout(" size %llu max_size %llu, i_size %llu\n", size, max_size,
    inode->i_size);
@@ -2988,7 +3027,7 @@
    __check_cap_issue(ci, cap, newcaps);

    if ((newcaps & CEPH_CAP_AUTH_SHARED) &&
-        (issued & CEPH_CAP_AUTH_EXCL) == 0) {
+ (extra_info->issued & CEPH_CAP_AUTH_EXCL) == 0) {
inode->i_mode = le32_to_cpu(grant->mode);
inode->i_uid = make_kuid(&init_user_ns, le32_to_cpu(grant->uid));
inode->i_gid = make_kgid(&init_user_ns, le32_to_cpu(grant->gid));
} @@ -2998,14 +3037,15 @@
}

if ((newcaps & CEPH_CAP_AUTH_SHARED) &&
    (issued & CEPH_CAP_LINK_EXCL) == 0) {
+ (extra_info->issued & CEPH_CAP_LINK_EXCL) == 0) {
set_nlink(inode, le32_to_cpu(grant->nlink));
if (inode->i_nlink == 0 &&
    (newcaps & (CEPH_CAP_LINK_SHARED | CEPH_CAP_LINK_EXCL)))
deleted_inode = true;
}

-if ((issued & CEPH_CAP_XATTR_EXCL) == 0 && grant->xattr_len) {
+if ((extra_info->issued & CEPH_CAP_XATTR_EXCL) == 0 &&
+    grant->xattr_len) {
int len = le32_to_cpu(grant->xattr_len);
le64 version = le64_to_cpu(grant->xattr_version);
}

-ceph_decode_timespec(&mtime, &grant->mtime);
-ceph_decode_timespec(&atime, &grant->atime);
-ceph_decode_timespec(&ctime, &grant->ctime);
-ceph_fill_file_time(inode, issued,
+ceph_fill_file_time(inode, extra_info->issued,
    le32_to_cpu(grant->time_warp_seq),
    &ctime, &mtime, &atime);
} @@ -3038,15 +3078,16 @@
ceph_file_layout_from_legacy(&ci->i_layout, &grant->layout);
old_ns = rcu_dereference_protected(ci->i_layout.pool_ns,
lockdep_is_held(&ci->i_ceph_lock));
rCU_assign_pointer(ci->i_layout.pool_ns, *pns);
rCU_assign_pointer(ci->i_layout.pool_ns, extra_info->pool_ns);

-if (ci->i_layout.pool_id != old_pool || *pns != old_ns)
+if (ci->i_layout.pool_id != old_pool ||
+    extra_info->pool_ns != old_ns)
    ci->i_ceph_flags &= ~CEPH_I_POOL_PERM;

-*pns = old_ns;
+extra_info->pool_ns = old_ns;

/*/ size/truncate_seq */
-queue_trunc = ceph_fill_file_size(inode, issued,
+ queue_trunc = ceph_fill_file_size(inode, extra_info->issued,
le32_to_cpu(grant->truncate_seq),
le64_to_cpu(grant->truncate_size),
size);
@@ -3125,24 +3166,26 @@
} BUG_ON(cap->issued & ~cap->implemented);

-if (inline_version > 0 && inline_version >= ci->i_inline_version) {
-    ci->i_inline_version = inline_version;
+    if (extra_info->inline_version > 0 &&
+        extra_info->inline_version >= ci->i_inline_version) {
+        ci->i_inline_version = extra_info->inline_version;
 if (ci->i_inline_version != CEPH_INLINE_NONE &&
 (newcaps & (CEPH_CAP_FILE_CACHE|CEPH_CAP_FILE_LAZYIO)))
    fill_inline = true;
 }

 if (le32_to_cpu(grant->op) == CEPH_CAP_OP_IMPORT) {
-    if (newcaps & ~issued)
+    if (newcaps & ~extra_info->issued)
      wake = true;
-    kick_flushing_inode_caps(mdsc, session, inode);
-    up_read(&mdsc->snap_rwsem);
+    kick_flushing_inode_caps(session->s_mdsc, session, inode);
+    up_read(&session->s_mdsc->snap_rwsem);
  } else {
    spin_unlock(&ci->i_ceph_lock);
  }

 if (fill_inline)
-    ceph_fill_inline_data(inode, NULL, inline_data, inline_len);
+    ceph_fill_inline_data(inode, NULL, extra_info->inline_data,
+                          extra_info->inline_len);

 if (queue_trunc)
  ceph_queue_vmtruncate(inode);    
@@ -3437,7 +3480,6 @@
tcap->cap_id = t_cap_id;
tcap->seq = t_seq - 1;
tcap->issue_seq = t_seq - 1;
-    tcap->mseq = t_mseq;
tcap->issued |= issued;
tcap->implemented |= issued;
if (cap == ci->i_auth_cap)
@@ -3492,6 +3534,7 @@
 WARN_ON(1);
tsession = NULL;
target = -1;
+mutex_lock(&session->s_mutex);
}
goto retry;

@@ -3599,31 +3642,24 @@
        struct ceph_msg *msg)
    {
    struct ceph_mds_client *mdsc = session->s_mdsc;
-    struct super_block *sb = mdsc->fsc->sb;
    struct inode *inode;
    struct ceph_inode_info *ci;
    struct ceph_cap *cap;
    struct ceph_mds_caps *h;
    struct ceph_mds_cap_peer *peer = NULL;
    struct ceph_snap_realm *realm = NULL;
-    struct ceph_string *pool_ns = NULL;
-    int mds = session->s_mds;
    int op, issued;
+    int op;
    u32 seq, mseq;
    struct ceph_vino vino;
    -u64 tid;
    -u64 inline_version = 0;
    -void *inline_data = NULL;
    -u32 inline_len = 0;
    void *snaptrace;
    size_t snaptrace_len;
    void *p, *end;
    +struct cap_extra_info extra_info = {};

    -dout("handle_caps from mds%d\n", mds);
+    dout("handle_caps from mds%d\n", session->s_mds);

    /* decode */
    end = msg->front.iov_base + msg->front.iov_len;
    -tid = le64_to_cpu(msg->hdr.tid);
    if (msg->front.iov_len < sizeof(*h))
        goto bad;
    h = msg->front.iov_base;
    @@ -3658,12 +3694,12 @@
}

if (le16_to_cpu(msg->hdr.version) >= 4) {
    -ceph_decode_64_safe(&p, end, inline_version, bad);
    -ceph_decode_32_safe(&p, end, inline_len, bad);
    -if (p + inline_len > end)
        +ceph_decode_64_safe(&p, end, extra_info.inline_version, bad);

    /* decode */
    end = msg->front.iov_base + msg->front.iov_len;
    -tid = le64_to_cpu(msg->hdr.tid);
    if (msg->front.iov_len < sizeof(*h))
        goto bad;
    h = msg->front.iov_base;
    @@ -3658,12 +3694,12 @@
}
+ceph_decode_32_safe(&p, end, extra_info.inline_len, bad);
+if (p + extra_info.inline_len > end)
  goto bad;
inline_data = p;
-p += inline_len;
+extra_info.inline_data = p;
+p += extra_info.inline_len;
}

    if (le16_to_cpu(msg->hdr.version) >= 5) {
@@ -3688,13 +3724,14 @@
    ceph_decode_32_safe(&p, end, pool_ns_len, bad);
    if (pool_ns_len > 0) {
        ceph_decode_need(&p, end, pool_ns_len, bad);
-      pool_ns = ceph_find_or_create_string(p, pool_ns_len);
+      extra_info.pool_ns =
+      ceph_find_or_create_string(p, pool_ns_len);
        p += pool_ns_len;
    }
    }
    /* lookup ino */
-  inode = ceph_find_inode(sb, vino);
+  inode = ceph_find_inode(mdsc->fsc->sb, vino);
  ci = ceph_inode(inode);
  dout(" op %s ino %llx.%llx inode %p\n", ceph_cap_op_name(op), vino.ino,
      vino.snap, inode);
@@ -3716,18 +3753,17 @@
cap->seq = seq;
cap->issue_seq = seq;
spin_lock(&session->s_cap_lock);
-  list_add_tail(&cap->session_caps,
-    &session->s_cap_releases);
-  session->s_num_cap_releases++;
+  __ceph_queue_cap_release(session, cap);
  spin_unlock(&session->s_cap_lock);
  }
  goto flush_cap_releases;
+  goto done;
  }
/* these will work even if we don't have a cap yet */
switch (op) {
case CEPH_CAP_OP_FLUSHSNAP_ACK:
  -handle_cap_flushsnap_ack(inode, tid, h, session);
  +handle_cap_flushsnap_ack(inode, le64_to_cpu(msg->hdr.tid),
    + h, session);
  goto done;
case CEPH_CAP_OP_EXPORT:
@@ -3746,10 +3782,9 @@
down_read(&mdsc->snap_rwsem);
}
handle_cap_import(mdsc, inode, h, peer, session,
- &cap, &issued);
-handle_cap_grant(mdsc, inode, h, &pool_ns,
- inline_version, inline_data, inline_len,
- msg->middle, session, cap, issued);
+ &cap, &extra_info.issued);
+handle_cap_grant(inode, session, cap,
+ h, msg->middle, &extra_info);
if (realm)
ceph_put_snapRealm(mdsc, realm);
goto done_unlocked;
@@ -3757,10 +3792,11 @@
/* the rest require a cap */
spin_lock(&ci->i_ceph_lock);
-cap = __get_cap_for_mds(ceph_inode(inode), mds);
+cap = __get_cap_for_mds(ceph_inode(inode), session->s_mds);
+cap = __get_cap_for_mds(ceph_inode(inode), session->s_mds);
if (!cap) {
    dout(" no cap on %p ino %llx.%llx from mds%d":
- inode, ceph_ino(inode), ceph_snap(inode), mds);
- inode, ceph_ino(inode), ceph_snap(inode),
+ inode, ceph_ino(inode), ceph_snap(inode),
+ session->s_mds);
spin_unlock(&ci->i_ceph_lock);
goto flush_cap_releases;
} }
@@ -3769,15 +3805,15 @@
switch (op) {
case CEPH_CAP_OP_REVOKE:
case CEPH_CAP_OP_GRANT:
-__ceph_caps_issued(ci, &issued);
+__ceph_caps_issued(ci, &extra_info.issued);
+issued |= __ceph_caps_dirty(ci);
-handle_cap_grant(mdsc, inode, h, &pool_ns,
- inline_version, inline_data, inline_len,
- msg->middle, session, cap, issued);
+__ceph_caps_issued(ci, &extra_info.issued);
+extra_info.issued |= __ceph_caps_dirty(ci);
+handle_cap_grant(inode, session, cap,
+ h, msg->middle, &extra_info);
goto done_unlocked;
}
case CEPH_CAP_OP_FLUSH_ACK:
-handle_cap_flush_ack(inode, tid, h, session, cap);
+handle_cap_flush_ack(inode, le64_to_cpu(msg->hdr.tid),
case CEPH_CAP_OP_TRUNC:
    ceph_cap_op_name(op));
}

-goto done;
+done:
+mutex_unlock(&session->s_mutex);
+done_unlocked:
+ceph_put_string(extra_info.pool_ns);
+/* avoid calling iput_final() in mds dispatch threads */
+ceph_async_iput(inode);
+return;

flush_cap_releases:
/*
   * along for the mds (who clearly thinks we still have this
   * cap).
   */
-ceph_send_cap_releases(mdsc, session);
-
-done:
-mutex_unlock(&session->s_mutex);
-done_unlocked:
-iput(inode);
-ceph_put_string(pool_ns);
-return;
+ceph_flush_cap_releases(mdsc, session);
+goto done;

bad:
pr_err("ceph_handle_caps: corrupt message\n");
if (inode) {
    dout("check_delayed_caps on \%p\n", inode);
    ceph_check_caps(ci, flags, NULL);
    -iput(inode);
    +/* avoid calling iput_final() in tick thread */
    +ceph_async_iput(inode);
} 
}
spin_unlock(&mdsc->cap_delay_lock);
--- linux-4.15.0.orig/fs/ceph/dir.c
+++ linux-4.15.0/fs/ceph/dir.c
+++ linux-4.15.0/fs/ceph/dir.c
static int __dcache_readdir(struct file *file, struct dir_context *ctx,
    u32 shared_gen)
{
    struct ceph_file_info *fi = file->private_data;
    struct dentry *parent = file->f_path.dentry;
    u64 idx = 0;
    int err = 0;

    dout("__dcache_readdir %p v%u at %llx\n", dir, shared_gen, ctx->pos);
    dout("__dcache_readdir %p v%u at %llx\n", dir, (unsigned)shared_gen, ctx->pos);

    /* search start position */
    if (ctx->pos > 2) {
        goto out;
    }

    di = ceph_dentry(dentry);
    spin_lock(&dentry->d_lock);
    if (di->lease_shared_gen == shared_gen &&
        d_really_is_positive(dentry) &&
        fpos_cmp(ctx->pos, di->offset) <= 0) {
        di = ceph_dentry(dentry);
        if (d_unhashed(dentry) ||
            d_really_is_negative(dentry) ||
            di->lease_shared_gen != shared_gen) {
            spin_unlock(&dentry->d_lock);
            dput(dentry);
            err = -EAGAIN;
            goto out;
        } 
        if (fpos_cmp(ctx->pos, di->offset) <= 0) {
            emit_dentry = true;
        }
    }
    spin_unlock(&dentry->d_lock);
}

---

@@ -173,7 +173,7 @@
    * the MDS if/when the directory is modified).
 */

---

@@ -184,7 +184,7 @@
    u64 idx = 0;
    int err = 0;

    -dout("__dcache_readdir %p v%u at %llx\n", dir, shared_gen, ctx->pos);
    +dout("__dcache_readdir %p v%u at %llx\n", dir, (unsigned)shared_gen, ctx->pos);

    /* search start position */
    if (ctx->pos > 2) {
        goto out;
    }

    -di = ceph_dentry(dentry);
    +di = ceph_dentry(dentry);
    spin_lock(&dentry->d_lock);
    -if (di->lease_shared_gen == shared_gen &&
    +if (d_unhashed(dentry) ||
        -d_really_is_positive(dentry) &&
        -fpos_cmp(ctx->pos, di->offset) <= 0) {
    +if (d_really_is_negative(dentry) ||
        +di->lease_shared_gen != shared_gen) {
        spin_unlock(&dentry->d_lock);
        dput(dentry);
        err = -EAGAIN;
        goto out;
    +}
    +if (fpos_cmp(ctx->pos, di->offset) <= 0) {
        emit_dentry = true;
    }
    spin_unlock(&dentry->d_lock);
    @ @ -333,7 +339,7 @@
        -ceph_snap(inode) != CEPH_SNAPDIR &&
        +ceph_snap(inode) != CEPH_SNAPDIR &&
        _ceph_dir_is_complete_ordered(ci) &&
        _ceph_caps_issued_mask(ci, CEPH_CAP_FILE_SHARED, 1)) {
        -u32 shared_gen = ci->i_shared_gen;
        +int shared_gen = atomic_read(&ci->i_shared_gen);
        spin_unlock(&ci->i_ceph_lock);
        err = __dcache_readdir(file, ctx, shared_gen);
    }

---
if (err != -EAGAIN)
spin_unlock(&ci->i_ceph_lock);
dout(" dir %p complete, -ENOENT\n", dir);
d_add(dentry, NULL);
-di->lease_shared_gen = ci->i_shared_gen;
+di->lease_shared_gen = atomic_read(&ci->i_shared_gen);
return NULL;
}
spin_unlock(&ci->i_ceph_lock);
@@ -818,6 +824,9 @@
if (ceph_snap(dir) != CEPH_NOSNAP)
return -EROFS;

+if (ceph_quota_is_max_files_exceeded(dir))
+return -EDQUOT;
+
err = ceph_pre_init_acls(dir, &mode, &acls);
if (err < 0)
return err;
@@ -871,6 +880,9 @@
if (ceph_snap(dir) != CEPH_NOSNAP)
return -EROFS;

+if (ceph_quota_is_max_files_exceeded(dir))
+return -EDQUOT;
+
dout(" symlink in dir %p dentry %p to '%s'\n", dir, dentry, dest);
req = ceph_mdsc_create_request(mdsc, CEPH_MDS_OP_SYMLINK, USE_AUTH_MDS);
if (IS_ERR(req)) {
@@ -920,6 +932,12 @@
goto out;
}

+if (op == CEPH_MDS_OP_MKDIR &&
+ ceph_quota_is_max_files_exceeded(dir)) {
+err = -EDQUOT;
+goto out;
+}
+
mode |= S_IFDIR;
err = ceph_pre_init_acls(dir, &mode, &acls);
if (err < 0)
@@ -1079,6 +1097,11 @@
else
return -EROFS;
}
+/* don't allow cross-quota renames */
+if ((old_dir != new_dir) &&
   (!ceph_quota_is_same_realm(old_dir, new_dir)))
+return -EXDEV;
+
dout("rename dir %p dentry %p to dir %p dentry %p\n",
    old_dir, old_dentry, new_dir, new_dentry);
req = ceph_mdsc_create_request(mdsc, op, USE_AUTH_MDS);
@@ -1199,12 +1222,12 @@
int valid = 0;

spin_lock(&ci->i_ceph_lock);
-if (ci->i_shared_gen == di->lease_shared_gen)
+if (atomic_read(&ci->i_shared_gen) == di->lease_shared_gen)
valid = __ceph_caps_issued_mask(ci, CEPH_CAP_FILE_SHARED, 1);
spin_unlock(&ci->i_ceph_lock);
dout("dir_lease_is_valid dir %p v%u dentry %p v%u = %d\n",
    dir, (unsigned)ci->i_shared_gen, dentry,
    (unsigned)di->lease_shared_gen, valid);
+dir_ci = ceph_inode(d_inode(dentry->d_parent));
+if (dir_ci->i_vino.snap == CEPH_SNAPDIR)
return valid;
}
@@ -1332,24 +1355,37 @@

static void ceph_d_prune(struct dentry *dentry)
{
    dout("ceph_d_prune %p\n", dentry);
    struct ceph_inode_info *dir_ci;
    struct ceph_dentry_info *di;
+
    dout("ceph_d_prune %pd %p\n", dentry, dentry);

    /* do we have a valid parent? */
    if (IS_ROOT(dentry))
        return;
-
    /* if we are not hashed, we don't affect dir's completeness */
    -if (d_unhashed(dentry))
+
    /* we hold d_lock, so d_parent is stable */
    +dir_ci = ceph_inode(d_inode(dentry->d_parent));
    +if (dir_ci->i_vino.snap == CEPH_SNAPDIR)
        return;
-
    -if (ceph_snap(d_inode(dentry->d_parent)) == CEPH_SNAPDIR)
+
    /* who calls d_delete() should also disable dcache readdir */
    +if (d_really_is_negative(dentry))
        return;

    /* do we have a valid parent? */
    if (IS_ROOT(dentry))
        return;
    -if (d_unhashed(dentry))
    +if (d_lock_is_stable(dentry))
    +dir_ci = ceph_inode(d_inode(dentry->d_parent));
    +if (dir_ci->i_vino.snap == CEPH_SNAPDIR)
        return;

    -if (ceph_snap(d_inode(dentry->d_parent)) == CEPH_SNAPDIR)
    +if (d_really_is_negative(dentry))
        return;
- we hold d_lock, so d_parent is stable, and d_fsdata is never cleared until d_release
- */
- ceph_dir_clear_complete(d_inode(dentry->d_parent));
+ /* d_fsdata does not get cleared until d_release */
+ if (!d_unhashed(dentry)) {
+ __ceph_dir_clear_complete(dir_ci);
+ return;
+ }
+ /* Disable dcache readdir just in case that someone called d_drop()
+ * or d_invalidate(), but MDS didn't revoke CEPH_CAP_FILE_SHARED
+ * properly (dcache readdir is still enabled) */
+ di = ceph_dentry(dentry);
+ if (di->offset > 0 &&
+ di->lease_shared_gen == atomic_read(&dir_ci->i_shared_gen))
+ __ceph_dir_clear_ordered(dir_ci);
}

/*
@@ -1454,6 +1490,7 @@
unsigned ceph_dentry_hash(struct inode *dir, struct dentry *dn)
 {
 struct ceph_inode_info *dci = ceph_inode(dir);
+unsigned hash;

 switch (dci->i_dir_layout.dl_dir_hash) {
 case 0: /* for backward compat */
 @@ -1461,8 +1498,11 @@
 return dn->d_name.hash;

 default:
- return ceph_str_hash(dci->i_dir_layout.dl_dir_hash,
+ spin_lock(&dn->d_lock);
+ hash = ceph_str_hash(dci->i_dir_layout.dl_dir_hash,
+ dn->d_name.name, dn->d_name.len);
+ spin_unlock(&dn->d_lock);
+ return hash;
 }

 --- linux-4.15.0.orig/fs/ceph/export.c
+++ linux-4.15.0/fs/ceph/export.c
@@ -151,6 +151,11 @@
 req->r_num_caps = 1;

err = ceph_mdsc_do_request(mdsc, NULL, req);
+if (err) {
 +ceph_mdsc_put_request(req);
 +return ERR_PTR(err);
 +}
 +
inode = req->r_target_inode;
if (inode)
  ihold(inode);
--- linux-4.15.0.orig/fs/ceph/file.c
+++ linux-4.15.0/fs/ceph/file.c
@@ -181,6 +181,10 @@
 return -ENOMEM;
 }
 cf->fmode = fmode;
+
 +spin_lock_init(&cf->rw_contexts_lock);
 +INIT_LIST_HEAD(&cf->rw_contexts);
 +
 cf->next_offset = 2;
 cf->readdir_cache_idx = -1;
 file->private_data = cf;
@@ -371,7 +375,7 @@
 struct ceph_mds_request *req;
 struct dentry *dn;
 struct ceph_acls_info acls = {};
- int mask;
+ int mask;
 int err;

dout("atomic_open %p dentry %p '%pd' %s flags %d mode 0%o\n",
@@ -382,6 +386,8 @@
 return -ENAMETOOLONG;

 if (flags & O_CREAT) {
 +if (ceph_quota_is_max_files_exceeded(dir))
 +return -EDQUOT;
 err = ceph_pre_init_acls(dir, &mode, &acls);
 if (err < 0)
 return err;
@@ -464,6 +470,7 @@
 ceph_mdsc_put_request(cf->last_readdir);
 kfree(cf->last_name);
 kfree(cf->dir_info);
+WARN_ON(!list_empty(&cf->rw_contexts));
 kmem_cache_free(ceph_file_cachep, cf);

 /* wake up anyone waiting for caps on this inode */
```c
struct ceph_aio_request {
    struct kiocb *iocb;
    size_t total_len;
    int write;
    bool write;
    bool should_dirty;
    int error;
    struct list_head osd_reqs;
    unsigned num_reqs;
}

int ceph_aio_request::request_write(struct kiocb *iocb, size_t total_len, int write, bool should_dirty) {
    if (write)
        ceph_put_page_vector(osd_data->pages, num_pages, !write);
    ceph_osdc_put_request(req);
    return CEPHD_ERRNO(rc);
}

if (write && ceph_snap(file_inode(file)) != CEPH_NOSNAP)
    return -EROFS;

if (write && ceph_snap(file_inode(file)) != CEPH_NOSNAP)
    return -EROFS;
```
@@ -886,11 +900,6 @@
 break;
 }

-if (write)
-size = min_t(u64, size, fsc->mount_options->wsize);
-else
-size = min_t(u64, size, fsc->mount_options->rsize);
-
-len = size;
-pages = dio_get_pages_alloc(iter, len, &start, &num_pages);
if (IS_ERR(pages)) {
@@ -909,6 +918,7 @@
 if (aio_req) {
   aio_req->iocb = iocb;
   aio_req->write = write;
+   aio_req->should_dirty = should_dirty;
   INIT_LIST_HEAD(&aio_req->osd_reqs);
 if (write) {
   aio_req->mtime = mtime;
@@ -966,7 +976,7 @@
   len = ret;
 }

-ceph_put_page_vector(pages, num_pages, !write);
+ceph_put_page_vector(pages, num_pages, should_dirty);

-ceph_osdc_put_request(req);
 if (ret < 0)
@@ -1199,12 +1209,13 @@
   retry_op = READ_INLINE;
 }
 } else {
+CEPH_DEFINE_RW_CONTEXT(rw_ctx, got);
   dout("aio_read %p %llx.%llx %llu~%u got cap refs on %s\n",
     inode, ceph_vinop(inode), iocb->ki_pos, (unsigned)len,
     ceph_cap_string(got));
-current->journal_info = filp;
+ceph_add_rw_context(fi, &rw_ctx);
 ret = generic_file_read_iter(iocb, to);
-current->journal_info = NULL;
+ceph_del_rw_context(fi, &rw_ctx);
 }
 dout("aio_read %p %llx.%llx dropping cap refs on %s = %d\n",
     inode, ceph_vinop(inode), ceph_cap_string(got), (int)ret);
@@ -1329,6 +1340,11 @@

 pos = iocb->ki_pos;
count = iov_iter_count(from);
+if (ceph_quota_is_max_bytes_exceeded(inode, pos + count)) {
+err = -EDQUOT;
+goto out;
+}
+
err = file_remove_privs(file);
if (err)
go_to out;
@@ -1410,6 +1426,7 @@
if (written >= 0) {
int dirty;
+
spin_lock(&ci->i_ceph_lock);
ci->i_inline_version = CEPH_INLINE_NONE;
dirty = __ceph_mark_dirty_caps(ci, CEPH_CAP_FILE_WR,
@@ -1417,6 +1434,8 @@
spin_unlock(&ci->i_ceph_lock);
if (dirty)
__mark_inode_dirty(inode, dirty);
+if (ceph_quota_is_max_bytes_approaching(inode, iocb->ki_pos))
+ceph_check_caps(ci, CHECK_CAPS_NODELAY, NULL);
}

dout("aio_write %p %llx.%llx %llu~%u dropping cap refs on %s\n",
@@ -1633,8 +1652,6 @@
struct ceph_file_info *fi = file->private_data;
struct inode *inode = file_inode(file);
struct ceph_inode_info *ci = ceph_inode(inode);
-struct ceph_osd_client *osdc =
-&ceph_inode_to_client(inode)->client->osdc;
struct ceph_cap_flush *prealloc_cf;
int want, got = 0;
int dirty;
@@ -1642,7 +1659,7 @@
loff_t endoff = 0;
loff_t size;

-loff @ -1659,7 +1676,6 @@
if (!S_ISREG(inode->i_mode))
go_to unlock;
}
-if (ceph_osdmap_flag(osdc, CEPH_OSDMAP_FULL) &&
-   !(mode & FALLOC_FL_PUNCH_HOLE)) {
-ret = -ENOSPC;
-goto unlock;
-
-
if (ci->i_inline_version != CEPH_INLINE_NONE) {
ret = ceph_uninline_data(file, NULL);
if (ret < 0)
@@ -1672,12 +1683,12 @@ 
}

size = i_size_read(inode);
-if (!((mode & FALLOC_FL_KEEP_SIZE)) {
-endoff = offset + length;
-ret = inode_newsize_ok(inode, endoff);
-if (ret)
-goto unlock;
-
+/* Are we punching a hole beyond EOF? */
+if (offset >= size)
+goto unlock;
+if ((offset + length) > size)
+length = size - offset;

if (fi->fmode & CEPH_FILE_MODE_LAZY)
want = CEPH_CAP_FILE_BUFFER | CEPH_CAP_FILE.LAZYIO;
@@ -1688,16 +1699,8 @@
if (ret < 0)
goto unlock;

-if (mode & FALLOC_FL_PUNCH_HOLE) {
-if (offset < size)
-ceph_zero_pagecache_range(inode, offset, length);
-ret = ceph_zero_objects(inode, offset, length);
-} else if (endoff > size) {
-truncate_pagecache_range(inode, size, -1);
-if (ceph_inode_set_size(inode, endoff))
-ceph_check_caps(ceph_inode(inode),
-CHECK_CAPS_AUTHONLY, NULL);
-}
+ceph_zero_pagecache_range(inode, offset, length);
+ret = ceph_zero_objects(inode, offset, length);

if (!ret) {
spin_lock(&ci->i_ceph_lock);
@@ -1725,6 +1728,7 @@
.mmap = ceph_mmap,
.fsync = ceph_fsync,
.lock = ceph_lock,
+setlease = simple_nosetlease,
.flock = ceph_flock,
.splice_read = generic_file_splice_read,
.splice_write = iter_file_splice_write,
--- linux-4.15.0.orig/fs/ceph/inode.c
+++ linux-4.15.0/fs/ceph/inode.c
@@ -33,9 +33,7 @@
static const struct inode_operations ceph_symlink_iops;

-static void ceph_invalidate_work(struct work_struct *work);
-static void ceph_writeback_work(struct work_struct *work);
-static void ceph_vmtruncate_work(struct work_struct *work);
+static void ceph_inode_work(struct work_struct *work);

/*
 * find or create an inode, given the ceph ino number
@@ -441,6 +439,9 @@
atomic64_set(&ci->i_complete_seq[1], 0);
 ci->i_symlink = NULL;
+ci->i_max_bytes = 0;
+ci->i_max_files = 0;
+memset(&ci->i_dir_layout, 0, sizeof(ci->i_dir_layout));
RCU_INIT_POINTER(ci->i_layout.pool_ns, NULL);

@@ -494,7 +495,7 @@
 ci->i_wrbuffer_ref = 0;
 ci->i_wrbuffer_ref_head = 0;
 atomic_set(&ci->i_filelock_ref, 0);
-ci->i_shared_gen = 0;
+atomic_set(&ci->i_shared_gen, 0);
 ci->i_rdcache_gen = 0;
 ci->i_rdcache_revoking = 0;

@@ -506,10 +507,8 @@
 INIT_LIST_HEAD(&ci->i_snap_realm_item);
 INIT_LIST_HEAD(&ci->i_snap_flush_item);

-INIT_WORK(&ci->i_wb_work, ceph_writeback_work);
-INIT_WORK(&ci->i_pg_inv_work, ceph_invalidate_work);
-INIT_WORK(&ci->i_vmtruncate_work, ceph_vmtruncate_work);
+INIT_WORK(&ci->i_work, ceph_inode_work);
+ci->i_work_mask = 0;

ceph_fscache_inode_init(ci);

@@ -521,20 +520,27 @@
struct inode *inode = container_of(head, struct inode, i_rcu);
struct ceph_inode_info *ci = ceph_inode(inode);

+kfree(ci->i_symlink);
kmem_cache_free(ceph_inode_cachep, ci);
}

-void ceph_destroy_inode(struct inode *inode)
+void ceph_evict_inode(struct inode *inode)
{
 struct ceph_inode_info *ci = ceph_inode(inode);
 struct ceph_inode_frag *frag;
 struct rb_node *n;

-dout("destroy_inode %p ino %llx.%llx\n", inode, ceph_vinop(inode));
+dout("evict_inode %p ino %llx.%llx\n", inode, ceph_vinop(inode));
+
+truncate_inode_pages_final(&inode->i_data);
+clear_inode(inode);

ceph_fscache_unregister_inode_cookie(ci);

-ceph_queue_caps_release(inode);
+ceph_remove_caps(inode);
+
+if (__ceph_has_any_quota(ci))
+ceph_adjust_quota_realms_count(inode, false);

/*
 * we may still have a snap_realm reference if there are stray
@@ -548,11 +554,13 @@
dout(" dropping residual ref to snap realm %p\n", realm);
 spin_lock(&realm->inodes_with_caps_lock);
 list_del_init(&ci->i_snap_realm_item);
+ci->i_snap_realm = NULL;
+if (realm->ino == ci->i_vino.ino)
+realm->inode = NULL;
 spin_unlock(&realm->inodes_with_caps_lock);
 ceph_put_snap_realm(mdsc, realm);
 }

-kfree(ci->i_symlink);
while ((n = rb_first(&ci->i_fragtree)) != NULL) {

frag = rb_entry(n, struct ceph_inode_frag, node);
br_ease(n, &ci->i_fragtree);
@@ -567,7 +575,10 @@
ceph_buffer_put(ci->i_xattrs.prealloc_blob);

ceph_put_string(rcu_dereference_raw(ci->i_layout.pool_ns));
+
+void ceph_destroy_inode(struct inode *inode)
+{
+call_rcu(&inode->i_rcu, ceph_i_callback);
+
@@ -660,13 +671,15 @@
CEPH_CAP_FILE_BUFFER|
CEPH_CAP_AUTH_EXCL|
CEPH_CAP_XATTR_EXCL)) {  
-if (timespec_compare(ctime, &inode->i_ctime) > 0) {  
+if (ci->i_version == 0 ||
+    timespec_compare(ctime, &inode->i_ctime) > 0) {  
    dout("ctime %ld.%09ld -> %ld.%09ld inc w/ cap\n",  
    inode->i_ctime.tv_sec, inode->i_ctime.tv_nsec,  
    ctime->tv_sec, ctime->tv_nsec);

inode->i_ctime = *ctime;
}
-if (ceph_seq_cmp(time_warp_seq, ci->i_time_warp_seq) > 0) {  
+if (ci->i_version == 0 ||
+    ceph_seq_cmp(time_warp_seq, ci->i_time_warp_seq) > 0) {  
    /* the MDS did a utimes() */  
    dout("mtime %ld.%09ld -> %ld.%09ld ",  
        "tw %d -> %d\n",  
@@ -731,6 +744,7 @@
int issued = 0, implemented, new_issued;
struct timespec mtime, atime, ctime;
struct ceph_buffer *xattr_blob = NULL;
+struct ceph_buffer *old_blob = NULL;
struct ceph_string *pool_ns = NULL;
struct ceph_cap *new_cap = NULL;
int err = 0;
@@ -744,8 +758,11 @@
ci->i_version);
/* prealloc new cap struct */
-if (info->cap.caps && ceph_snap(inode) == CEPH_NOSNAP)  
+if (info->cap.caps && ceph_snap(inode) == CEPH_NOSNAP) {
    new_cap = ceph_get_cap(mdsc, caps_reservation);
+if (!new_cap)  
+return -ENOMEM;
/* prealloc xattr data, if it looks like we'll need it. only */
new_issued = ~issued & le32_to_cpu(info->cap.caps);

/* update inode */
-ci->i_version = le64_to_cpu(info->version);
inode->i_rdev = le32_to_cpu(info->rdev);
_inode->i_blkbits = fls(le32_to_cpu(inode->layout.fl_stripe_unit)) - 1;
+/* directories have fl_stripe_unit set to zero */
+if (le32_to_cpu(inode->layout.fl_stripe_unit))
+inode->i_blkbits =
+fls(le32_to_cpu(inode->layout.fl_stripe_unit)) - 1;
+else
+inode->i_blkbits = CEPH_BLOCK_SHIFT;
+
+__ceph_update_quota(ci, iinfo->max_bytes, iinfo->max_files);

if ((new_version || (new_issued & CEPH_CAP_AUTH_SHARED)) &&
    (issued & CEPH_CAP_AUTH_EXCL) == 0) {
    @ @ -847,7 +870,7 @@
    if ((ci->i_xattrs.version == 0 || !(issued & CEPH_CAP_XATTR_EXCL)) &&
        le64_to_cpu(info->xattr_version) > ci->i_xattrs.version) {
        if (ci->i_xattrs.blob)
            -ceph_buffer_put(ci->i_xattrs.blob);
            +old_blob = ci->i_xattrs.blob;
            ci->i_xattrs.blob = xattr_blob;
            if (xattr_blob)
                memcpy(ci->i_xattrs.blob->vec.iov_base,
                @@ -857,6 +880,9 @@
                    xattr_blob = NULL;
                }
+
+/* finally update i_version */
+ci->i_version = le64_to_cpu(info->version);
+
inode->i_mapping->a_ops = &ceph_aops;

switch (inode->i_mode & S_IFMT) {
    @ @ -993,8 +1019,8 @@
    out:
    if (new_cap)
        ceph_put_cap(mdsc, new_cap);
        -if (xattr_blob)
            -ceph_buffer_put(xattr_blob);
            +ceph_buffer_put(old_blob);


+ceph_buffer_put(xattr_blob);
ceph_put_string(pool_ns);
return err;
}
@@ -1041,7 +1067,7 @@
if (ceph_snap(dir) != CEPH_NOSNAP)
goto out_unlock;
-di->lease_shared_gen = ceph_inode(dir)->i_shared_gen;
+di->lease_shared_gen = atomic_read(&ceph_inode(dir)->i_shared_gen);

if (duration == 0)
goto out_unlock;
@@ -1080,6 +1106,27 @@
BUG_ON(d_inode(dn));

+if (S_ISDIR(in->i_mode)) {
+ /* If inode is directory, d_splice_alias() below will remove
+ * 'realdn' from its origin parent. We need to ensure that
+ * origin parent's readdir cache will not reference 'realdn'
+ */
+ realdn = d_find_any_alias(in);
+ if (realdn) {
+ struct ceph_dentry_info *di = ceph_dentry(realdn);
+ spin_lock(&realdn->d_lock);
+ +realdn->d_op->d_prune(realdn);
+ +di->time = jiffies;
+ di->lease_shared_gen = 0;
+ di->offset = 0;
+ +spin_unlock(&realdn->d_lock);
+ dput(realdn);
+ }
+ }
+ /* dn must be unhashed */
+ if (!d_unhashed(dn))
+ d_drop(dn);
@@ -1295,8 +1342,8 @@
if (!rinfo->head->is_target) {
    dout("fill_trace null dentry\n");
if (d_really_is_positive(dn)) {
    -ceph_dir_clear_ordered(dir);
    dout("d_delete %p\n", dn);
    +ceph_dir_clear_ordered(dir);
d_delete(dn);
} else if (have_lease) {
if (d_unhashed(dn))
@@ -1323,7 +1370,6 @@
dout(" %p links to %p %llx.%llx, not %llx.%llx\n",
    dn, d_inode(dn), ceph_vinop(d_inode(dn)),
    ceph_vinop(in));
-ceph_dir_clear_ordered(dir);
  d_invalidate(dn);
  have_lease = false;
}
@@ -1338,6 +1384,7 @@
dout(" final dn %p\n", dn);
} else if ((req->r_op == CEPH_MDS_OP_LOOKUPSNAP ||
    req->r_op == CEPH_MDS_OP_MKSnap) &&
+          test_bit(CEPH_MDS_R_PARENT_LOCKED, &req->r_req_flags) &&
    !test_bit(CEPH_MDS_R_ABORTED, &req->r_req_flags)) {
  struct dentry *dn = req->r_dentry;
  struct inode *dir = req->r_parent;
@@ -1412,7 +1459,8 @@
pr_err("fill_inode badness on %p got %d\n", in, rc);
err = rc;
}
-put(in);
+/* avoid calling iput_final() in mds dispatch threads */
+ceph_async_iput(in);
}

return err;
@@ -1573,9 +1621,19 @@
} else if (d_really_is_positive(dn) &&
    (ceph_ino(d_inode(dn)) != tvino.ino ||
    ceph_snap(d_inode(dn)) != tvino.snap)) {
+struct ceph_dentry_info *di = ceph_dentry(dn);
  dout(" dn %p points to wrong inode %p\n",
    dn, d_inode(dn));
-__ceph_dir_clear_ordered(ci);
+
+spin_lock(&dn->d_lock);
+if (di->offset > 0 &&
+    di->lease_shared_gen ==
+    atomic_read(&ci->i_shared_gen)) {
+  __ceph_dir_clear_ordered(ci);
+  di->offset = 0;
+  }
+spin_unlock(&dn->d_lock);
+  
  d_delete(dn);
dput(dn);
goto retry_lookup;
@@ -1600,10 +1658,11 @@
 &req->r_caps_reservation);
if (ret < 0) {
    pr_err("fill_inode badness on \%p\n", in);
    -if (d_really_is_positive(dn))
    -__ceph_dir_clear_ordered(ci);
    -else
    -iput(in);
    +if (d_really_is_negative(dn)) {
    +/* avoid calling iput_final() in mds
    + * dispatch threads */
    +ceph_async_iput(in);
    +}
    d_drop(dn);
    err = ret;
    goto next_item;
@@ -1615,7 +1674,7 @@
 if (ceph_security_xattr_deadlock(in)) {
     dout(" skip splicing dn \%p to inode \%p"
          " (security xattr deadlock)\n\n", dn, in);
     -iput(in);
     +ceph_async_iput(in);
     skipped++;
     goto next_item;
 }  
@@ -1624,7 +1783,6 @@
 if (IS_ERR(realdn)) {
     err = PTR_ERR(realdn);
     d_drop(dn);
     -dn = NULL;
     goto next_item;
 }
    dn = realdn;
@@ -1673,56 +1731,86 @@
 }
*/
+ /* Put reference to inode, but avoid calling iput_final() in current thread.
+ * iput_final() may wait for realhaead pages. The wait can cause deadlock in
+ * some contexts.
+ */
+void ceph_async_iput(struct inode *inode)
+{
+    +if (!inode)
+    return;
+    for (;;) {
+        


+if (atomic_add_unless(&inode->i_count, -1, 1))
+break;
+if (queue_work(ceph_inode_to_client(inode)->inode_wq,
+    &ceph_inode(inode)->i_work))
+break;
+/* queue work failed, i_count must be at least 2 */
+}
+
+/*
* Write back inode data in a worker thread.  (This can’t be done
* in the message handler context.)
*/
void ceph_queue_writeback(struct inode *inode)
{
+struct ceph_inode_info *ci = ceph_inode(inode);
+set_bit(CEPH_I_WORK_WRITEBACK, &ci->i_work_mask);
+
ihold(inode);
-if (queue_work(ceph_inode_to_client(inode)->wb_wq,
-    &ceph_inode(inode)->i_wb_work)) {
+if (queue_work(ceph_inode_to_client(inode)->inode_wq,
+    &ci->i_work)) {
  dout("ceph_queue_writeback %p\n", inode);
} else {
-    dout("ceph_queue_writeback %p failed\n", inode);
+    dout("ceph_queue_writeback %p already queued, mask=%lx\n",
+          inode, ci->i_work_mask);
  iput(inode);
  }
}
}

-static void ceph_writeback_work(struct work_struct *work)
-{*
-    struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
-        i_wb_work);
-    struct inode *inode = &ci->vfs_inode;
-    -
-    dout("writeback %p\n", inode);
-    filemap_fdatawrite(&inode->i_data);
-    iput(inode);
-}*
-/*
* queue an async invalidation
*/
void ceph_queue_invalidated(struct inode *inode)
+struct ceph_inode_info *ci = ceph_inode(inode);
+set_bit(CEPH_I_WORK_INVALIDATE_PAGES, &ci->i_work_mask);
+
+ihold(inode);
-if (queue_work(ceph_inode_to_client(inode)->pg_inv_wq,
-   &ceph_inode(inode)->i_pg_inv_work)) {
+if (queue_work(ceph_inode_to_client(inode)->inode_wq,
+   &ceph_inode(inode)->i_work)) {
  dout("ceph_queue_invalidate %p\n", inode);
} else {
-  dout("ceph_queue_invalidate %p failed\n", inode);
+  dout("ceph_queue_invalidate %p already queued, mask=%lx\n",
+        inode, ci->i_work_mask);
  iput(inode);
  }
}

/*
 - * Invalidate inode pages in a worker thread. (This can't be done
 - * in the message handler context.)
+ * Queue an async vmtruncate. If we fail to queue work, we will handle
+ * the truncation the next time we call __ceph_do_pending_vmtruncate.
 */
-static void ceph_invalidate_work(struct work_struct *work)
+void ceph_queue_vmtruncate(struct inode *inode)
{
  struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
    i_pg_inv_work);
  struct inode *inode = &ci->vfs_inode;
+struct ceph_inode_info *ci = ceph_inode(inode);
+set_bit(CEPH_I_WORK_VMTRUNCATE, &ci->i_work_mask);
+
+ihold(inode);
+if (queue_work(ceph_inode_to_client(inode)->inode_wq,
   &ci->i_work)) {
  dout("ceph_queue_vmtruncate %p\n", inode);
} else {
+  dout("ceph_queue_vmtruncate %p already queued, mask=%lx\n",
   inode, ci->i_work_mask);
  iput(inode);
  }
+
+static void ceph_do_invalidate_pages(struct inode *inode)
+{
+  struct ceph_inode_info *ci = ceph_inode(inode);
  struct ceph_fs_client *fsc = ceph_inode_to_client(inode);
  u32 orig_gen;
  
  /*
   * Invalidate inode pages in a worker thread. (This can't be done
   * in the message handler context.)
   */
  +static void ceph_invalidate_work(struct work_struct *work)
  +void ceph_queue_vmtruncate(struct inode *inode)
  {
    struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
      i_pg_inv_work);
    struct inode *inode = &ci->vfs_inode;
+    struct ceph_inode_info *ci = ceph_inode(inode);
+    set_bit(CEPH_I_WORK_VMTRUNCATE, &ci->i_work_mask);
+    
+ihold(inode);
+    if (queue_work(ceph_inode_to_client(inode)->inode_wq,
+      &ci->i_work)) {
+      dout("ceph_queue_vmtruncate %p\n", inode);
+    } else {
+      dout("ceph_queue_vmtruncate %p already queued, mask=%lx\n",
+            inode, ci->i_work_mask);
+      iput(inode);
+    }
+  
+  +static void ceph_do_invalidate_pages(struct inode *inode)
+  +{
+    +struct ceph_inode_info *ci = ceph_inode(inode);
+    struct ceph_fs_client *fsc = ceph_inode_to_client(inode);
+    u32 orig_gen;
  
  */
  
  /*
   * Invalidate inode pages in a worker thread. (This can't be done
   * in the message handler context.)
   */
  +static void ceph_invalidate_work(struct work_struct *work)
  +void ceph_queue_vmtruncate(struct inode *inode)
  {
    struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
      i_pg_inv_work);
    struct inode *inode = &ci->vfs_inode;
+    struct ceph_inode_info *ci = ceph_inode(inode);
+    set_bit(CEPH_I_WORK_VMTRUNCATE, &ci->i_work_mask);
+    
+ihold(inode);
+    if (queue_work(ceph_inode_to_client(inode)->inode_wq,
+      &ci->i_work)) {
+      dout("ceph_queue_vmtruncate %p\n", inode);
+    } else {
+      dout("ceph_queue_vmtruncate %p already queued, mask=%lx\n",
+            inode, ci->i_work_mask);
+      iput(inode);
+    }
+  
+  +static void ceph_do_invalidate_pages(struct inode *inode)
+  +{
+    +struct ceph_inode_info *ci = ceph_inode(inode);
+    struct ceph_fs_client *fsc = ceph_inode_to_client(inode);
+    u32 orig_gen;
  
  */
  
  /*
   * Invalidate inode pages in a worker thread. (This can't be done
   * in the message handler context.)
   */
  +static void ceph_invalidate_work(struct work_struct *work)
  +void ceph_queue_vmtruncate(struct inode *inode)
  {
    struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
      i_pg_inv_work);
    struct inode *inode = &ci->vfs_inode;
+    struct ceph_inode_info *ci = ceph_inode(inode);
+    set_bit(CEPH_I_WORK_VMTRUNCATE, &ci->i_work_mask);
+    
+ihold(inode);
+    if (queue_work(ceph_inode_to_client(inode)->inode_wq,
+      &ci->i_work)) {
+      dout("ceph_queue_vmtruncate %p\n", inode);
+    } else {
+      dout("ceph_queue_vmtruncate %p already queued, mask=%lx\n",
+            inode, ci->i_work_mask);
+      iput(inode);
+    }
+  
+  +static void ceph_do_invalidate_pages(struct inode *inode)
+  +{
+    +struct ceph_inode_info *ci = ceph_inode(inode);
+    struct ceph_fs_client *fsc = ceph_inode_to_client(inode);
+    u32 orig_gen;
  
  */
  
  /*
   * Invalidate inode pages in a worker thread. (This can't be done
   * in the message handler context.)
   */
  +static void ceph_invalidate_work(struct work_struct *work)
  +void ceph_queue_vmtruncate(struct inode *inode)
  {
    struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
      i_pg_inv_work);
    struct inode *inode = &ci->vfs_inode;
+    struct ceph_inode_info *ci = ceph_inode(inode);
+    set_bit(CEPH_I_WORK_VMTRUNCATE, &ci->i_work_mask);
+    
+ihold(inode);
+    if (queue_work(ceph_inode_to_client(inode)->inode_wq,
+      &ci->i_work)) {
+      dout("ceph_queue_vmtruncate %p\n", inode);
+    } else {
+      dout("ceph_queue_vmtruncate %p already queued, mask=%lx\n",
+            inode, ci->i_work_mask);
+      iput(inode);
+    }
+  
+  +static void ceph_do_invalidate_pages(struct inode *inode)
+  +{
+    +struct ceph_inode_info *ci = ceph_inode(inode);
+    struct ceph_fs_client *fsc = ceph_inode_to_client(inode);
+    u32 orig_gen;
int check = 0;
@@ -1751,6 +1839,7 @@
    orig_gen = ci->i_rdcache_gen;
    spin_unlock(&ci->i_ceph_lock);

    +ceph_fscache_invalidate(inode);
    if (invalidate_inode_pages2(inode->i_mapping) < 0) {
        pr_err("invalidate_pages %p fails\n", inode);
    }
@@ -1774,44 +1863,6 @@
    out:
    if (check)
        ceph_check_caps(ci, 0, NULL);
    -iput(inode);
    -}
    -
    -
    -/*
    -* called by trunc_wq;
    -*
    -* We also truncate in a separate thread as well.
    -*/
    static void ceph_vmtruncate_work(struct work_struct *work)
    -{
        struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
        - i_vmtruncate_work);
        struct inode *inode = &ci->vfs_inode;
        -
        -dout("vmtruncate_work %p\n", inode);
        -__ceph_do_pending_vmtruncate(inode);
        -iput(inode);
        -}
        -
        -
        -/*
        -* Queue an async vmtruncate. If we fail to queue work, we will handle
        -* the truncation the next time we call __ceph_do_pending_vmtruncate.
        -*/
        -void ceph_queue_vmtruncate(struct inode *inode)
        -{
            struct ceph_inode_info *ci = ceph_inode(inode);
            -
            -ihold(inode);
            -
            -if (queue_work(ceph_sb_to_client(inode->i_sb)->trunc_wq,
                - &ci->i_vmtruncate_work)) {
                -dout("ceph_queue_vmtruncate %p\n", inode);
                -} else {
                -dout("ceph_queue_vmtruncate %p failed, pending=%d\n",}
inode, &ci->tr truncate_pending);
iput(inode);
-}
}

/*
 @@ -1886,6 +1937,25 @@
 wake up all(&ci->i_cap_wq);
 }

+static void ceph_inode_work(struct work_struct *work)
+{ 
+struct ceph_inode_info *ci = container_of(work, struct ceph_inode_info,
+ i_work);
+struct inode *inode = &ci->vfs_inode;
+ 
+if (test_and_clear_bit(CEPH_I_WORK_WRITEBACK, &ci->i_work_mask)) {
+dout("writeback %p
", inode);
+filemap_fdatawrite(&inode->i_data);
+}
+if (test_and_clear_bit(CEPH_I_WORK_INVALIDATE_PAGES, &ci->i_work_mask))
+ceph_do_invalidate_pages(inode);
+
+if (test_and_clear_bit(CEPH_I_WORK_VMTRUNCATE, &ci->i_work_mask))
+__ceph_do_pending_vmtruncate(inode);
+
+iput(inode);
+}
+
/*
* symlinks
*/
@@ -2124,6 +2194,10 @@
if (err != 0)
return err;

+if ((attr->ia_valid & ATTR_SIZE) &&
+ ceph_quota_is_max_bytes_exceeded(inode, attr->ia_size))
+return -EDQUOT;
+
err = __ceph_setattr(inode, attr);

if (err >= 0 && (attr->ia_valid & ATTR_MODE))
--- linux-4.15.0.orig/fs/ceph/locks.c
+++ linux-4.15.0/fs/ceph/locks.c
@@ -111,8 +111,7 @@
 req->r_wait_for_completion = ceph_lock_wait_for_completion;
err = ceph_mdsc_do_request(mdsc, inode, req);
-
-    -if (operation == CEPH_MDS_OP_GETFILELOCK) {
-        +if (!err && operation == CEPH_MDS_OP_GETFILELOCK) {
        fl->fl_pid = -le64_to_cpu(req->r_reply_info.filelock_reply->pid);
        if (CEPH_LOCK_SHARED == req->r_reply_info.filelock_reply->type)
            fl->fl_type = F_RDLCK;
--- linux-4.15.0.orig/fs/ceph/mds_client.c
+++ linux-4.15.0/fs/ceph/mds_client.c
@@ -53,6 +53,7 @@
 static void __wake_requests(struct ceph_mds_client *mdsc,
     struct list_head *head);
+static void ceph_cap_release_work(struct work_struct *work);
 static const struct ceph_connection_operations mds_con_ops;

@@ -100,6 +101,26 @@
 } else
 info->inline_version = CEPH_INLINE_NONE;
+
+if (features & CEPH_FEATURE_MDS_QUOTA) {
+    u8 struct_v, struct_compat;
+    u32 struct_len;
+    +/
+    + * both struct_v and struct_compat are expected to be >= 1
+    +/
+    +ceph_decode_8_safe(p, end, struct_v, bad);
+    +ceph_decode_8_safe(p, end, struct_compat, bad);
+    +if (!struct_v || !struct_compat)
+        goto bad;
+    +ceph_decode_32_safe(p, end, struct_len, bad);
+    +ceph_decode_need(p, end, struct_len, bad);
+    +ceph_decode_64_safe(p, end, info->max_bytes, bad);
+    +ceph_decode_64_safe(p, end, info->max_files, bad);
+    } else {
+        info->max_bytes = 0;
+        info->max_files = 0;
+    }
+    info->pool_ns_len = 0;
    info->pool_ns_data = NULL;
    if (features & CEPH_FEATURE_FS_FILE_LAYOUT_V2) {
        @@ -474,6 +495,8 @@
 s->s_cap_reconnect = 0;
 s->s_cap_iterator = NULL;
 INIT_LIST_HEAD(&s->s_cap_releases);
+INIT_WORK(&s->s_cap_release_work, ceph_cap_release_work);
+
INIT_LIST_HEAD(&s->s_cap_flushing);

dout("register_session mds%d\n", mds);
@@ -516,6 +539,7 @@
dout("__unregister_session mds%d %p\n", s->s_mds, s);
BUG_ON(mdsc->sessions[s->s_mds] != s);
mdsc->sessions[s->s_mds] = NULL;
+s->s_state = 0;
ceph_con_close(&s->s_con);
ceph_put_mds_session(s);
atomic_dec(&mdsc->num_sessions);
@@ -546,11 +570,12 @@
ceph_msg_put(req->r_reply);
if (req->r_inode) {
ceph_put_cap.refs(ceph_inode(req->r_inode), CEPH_CAP_PIN);
-iput(req->r_inode);
+/* avoid calling iput_final() in mds dispatch threads */
+ceph_async_iput(req->r_inode);
}
if (req->r_parent)
ceph_put_cap.refs(ceph_inode(req->r_parent), CEPH_CAP_PIN);
-iput(req->r_target_inode);
+ceph_async_iput(req->r_target_inode);
if (req->r_dentry)
dput(req->r_dentry);
if (req->r_old_dentry)
@@ -564,7 +589,7 @@
+/*
ceph_put_cap.refs(ceph_inode(req->r_old_dentry_dir),
 CEPH_CAP_PIN);
-iput(req->r_old_dentry_dir);
+ceph_async_iput(req->r_old_dentry_dir);
}
kfree(req->r_path1);
kfree(req->r_path2);
@@ -664,7 +689,8 @@
}
if (req->r_unsafe_dir) {
-iput(req->r_unsafe_dir);
+/* avoid calling iput_final() in mds dispatch threads */
+ceph_async_iput(req->r_unsafe_dir);
req->r_unsafe_dir = NULL;
}
@@ -829,7 +855,7 @@
cap = rb_entry(rb_first(&ci->i_caps), struct ceph_cap, ci_node);
if (!cap) {
    spin_unlock(&ci->i_ceph_lock);
    -iput(inode);
+ceph_async_iput(inode);
    goto random;
}
mds = cap->session->s_mds;
@@ -838,7 +864,9 @@
    cap == ci->i_auth_cap ? "auth " : ",", cap);
    spin_unlock(&ci->i_ceph_lock);
out:
-    -iput(inode);
+/* avoid calling iput_final() while holding mdsc->mutex or
+ * in mds dispatch threads */
+ceph_async_iput(inode);
    return mds;
random:
@@ -1118,7 +1146,9 @@
    spin_unlock(&session->s_cap_lock);

    if (last_inode) {
-        -iput(last_inode);
+        /* avoid calling iput_final() while holding
+         * s_mutex or in mds dispatch threads */
+        ceph_async_iput(last_inode);
        last_inode = NULL;
    }
    if (old_cap) {
@@ -1138,13 +1168,10 @@
        cap->session = NULL;
        list_del_init(&cap->session_caps);
        session->s_nr_caps--;
-        -if (cap->queue_release) {
-            -list_add_tail(&cap->session_caps,
-                            &session->s_cap_releases);
-        -} else {
+        if (cap->queue_release)
+            __ceph_queue_cap_release(session, cap);
+        else
        old_cap = cap; /* put_cap it w/o locks held */
-    }
    }
    if (ret < 0)
        goto out;
@@ -1154,7 +1181,7 @@
session->s_cap_iterator = NULL;
spin_unlock(&session->s_cap_lock);

-iput(last_inode);
+ceph_async_iput(last_inode);
if (old_cap)
ceph_put_cap(session->s_mdsc, old_cap);

@@ -1227,6 +1254,15 @@
list_add(&ci->i_prealloc_cap_flush->i_list, &to_remove);
   ci->i_prealloc_cap_flush = NULL;
 }
 +
 +    if (drop &&
 +    ci->i_wrbuffer_ref_head == 0 &&
 +    ci->i_wr_ref == 0 &&
 +    ci->i_dirty_caps == 0 &&
 +    ci->i_flushing_caps == 0) {
 +        ceph_put_snap_context(ci->i_head_snapc);
 +    ci->i_head_snapc = NULL;
 +    }
 +}
spin_unlock(&ci->i_ceph_lock);
while (!list_empty(&to_remove)) {
@@ -1281,7 +1317,8 @@
spin_unlock(&session->s_cap_lock);

inode = ceph_find_inode(sb, vino);
-  -iput(inode);
+ /* avoid calling iput_final() while holding s_mutex */
+    +ceph_async_iput(inode);

spin_lock(&session->s_cap_lock);
}
@@ -1562,7 +1599,7 @@

session->s_trim_caps = 0;
}

-ceph_send_cap_releases(mdsc, session);
+ceph_flush_cap_releases(mdsc, session);
return 0;
}

@@ -1605,8 +1642,8 @@
/*
 * called under s_mutex
 */
-void ceph_send_cap_releases(struct ceph_mds_client *mdsc,
+static void ceph_send_cap_releases(struct ceph_mds_client *mdsc,
+    struct ceph_mds_session *session)
{
    struct ceph_msg *msg = NULL;
    struct ceph_mds_cap_release *head;
    @ @ -1698,6 +1735,48 @@
    spin_unlock(&session->s_cap_lock);
}

+static void ceph_cap_release_work(struct work_struct *work)
+{
+    struct ceph_mds_session *session =
+        container_of(work, struct ceph_mds_session, s_cap_release_work);
+    +mutex_lock(&session->s_mutex);
+    +if (session->s_state == CEPH_MDS_SESSION_OPEN ||
+        session->s_state == CEPH_MDS_SESSION_HUNG)
+        ceph_send_cap_releases(session->s_mdsc, session);
+    +mutex_unlock(&session->s_mutex);
+    +ceph_put_mds_session(session);
+    +}
+    +
+    +void ceph_flush_cap_releases(struct ceph_mds_client *mdsc,
+        struct ceph_mds_session *session)
+    +{
+        +if (mdsc->stopping)
+            +return;
+        +get_session(session);
+        +if (queue_work(mdsc->fsc->cap_wq,
+            &session->s_cap_release_work)) {
+            dout("cap release work queued\n");
+        } else {
+            ceph_put_mds_session(session);
+            dout("failed to queue cap release work\n");
+        }
+    +}
+    +*
+    +*/
+    +* caller holds session->s_cap_lock
+    +*/
+    +void __ceph_queue_cap_release(struct ceph_mds_session *session,
+        struct ceph_cap *cap)
+    +{
+        +list_add_tail(&cap->session_caps, &session->s_cap_releases);
+        +session->s_num_cap_releases++;
+        +*/
+        +*/

+if (!(session->s_num_cap_releases % CEPH_CAPS_PER_RELEASE))
+ceph_flush_cap_releases(session->s_mdsc, session);
+
/*
 * requests
 */
@@ -1880,10 +1959,39 @@
 return path;
 }

+/* Duplicate the dentry->d_name.name safely */
+static int clone_dentry_name(struct dentry *dentry, const char **ppath,
+        int *ppathlen)
+{
+    u32 len;
+    char *name;
+
+retry:
+    len = READ_ONCE(dentry->d_name.len);
+    name = kmalloc(len + 1, GFP_NOFS);
+    if (!name)
+        return -ENOMEM;
+
+    spin_lock(&dentry->d_lock);
+    if (dentry->d_name.len != len) {
+        spin_unlock(&dentry->d_lock);
+        kfree(name);
+        goto retry;
+    }
+    memcpy(name, dentry->d_name.name, len);
+    spin_unlock(&dentry->d_lock);
+
+    name[len] = '\0';
+    *ppath = name;
+    *ppathlen = len;
+    return 0;
+}
+
static int build_dentry_path(struct dentry *dentry, struct inode *dir,
        const char **ppath, int *ppathlen, u64 *pino,
-        int *pfreepath, bool *pfreepath, bool parent_locked)
+
{ +int ret;
    char *path;

rcu_read_lock();
@@ -1892,8 +2000,15 @@
if (dir && ceph_snap(dir) == CEPH_NOSNAP) {
*pino = ceph_ino(dir);
rcu_read_unlock();
-*ppath = dentry->d_name.name;
-*ppathlen = dentry->d_name.len;
+if (parent_locked) {
+ *ppath = dentry->d_name.name;
+ *ppathlen = dentry->d_name.len;
+} else {
+ ret = clone_dentry_name(dentry, ppath, ppathlen);
+ if (ret)
+ return ret;
+ *pfreepath = true;
+}
return 0;
}
rcu_read_unlock();
@@ -1901,13 +2016,13 @@
if (IS_ERR(path))
return PTR_ERR(path);
*ppath = path;
-*pfreepath = 1;
+ *pfreepath = true;
return 0;
}
static int build_inode_path(struct inode *inode,
    const char **ppath, int *ppathlen, u64 *pino,
-    int *pfreepath)
+    bool *pfreepath)
{
    struct dentry *dentry;
    char *path;
@@ -1923,7 +2038,7 @@
    if (IS_ERR(path))
    return PTR_ERR(path);
    *ppath = path;
    -*pfreepath = 1;
+ *pfreepath = true;
    return 0;
}
@@ -1934,7 +2049,7 @@
static int set_request_path_attr(struct inode *rinode, struct dentry *rdentry,
    struct inode *rdiri, const char *rpath,
    u64 rino, const char **ppath, int *pathlen,
-    u64 *ino, int *freepath)
+ u64 *ino, bool *freepath, bool parent_locked)
{|}
int r = 0;

@@ -1944,7 +2059,7 @@
 ceph_snap(rinode));
} else if (rdentry) {
 r = build_dentry_path(rdentry, rdiri, ppath, pathlen, ino,
-+freepath, parent_locked);
+dout(“ dentry %p %llx/%.*s
”, rdentry, *ino, *pathlen,
+*ppath);
} else if (rpath || rino) {
@@ -1970,7 +2085,7 @@
 const char *path2 = NULL;
 u64 ino1 = 0, ino2 = 0;
 int pathlen1 = 0, pathlen2 = 0;
-+int freepath1 = 0, freepath2 = 0;
+bool freepath1 = false, freepath2 = false;
 int len;
 u16 releases;
 void *p, *end;
@@ -1978,16 +2093,19 @@
 ret = set_request_path_attr(req->r_inode, req->r_dentry,
-+req->r_parent, req->r_path1, req->r_ino1.ino,
+test_bit(CEPH_MDS_R_PARENT_LOCKED,
 +&req->r_req_flags));
 if (ret < 0) {
 msg = ERR_PTR(ret);
 goto out;
 |
+/* If r_old_dentry is set, then assume that its parent is locked */
+ret = set_request_path_attr(NULL, req->r_old_dentry,
+req->r_old_dentry_dir,
+req->r_path2, req->r_ino2.ino,
-+&path2, &pathlen2, &ino2, &freepath2);
+&req->r_req_flags));
 if (ret < 0) {
 msg = ERR_PTR(ret);
 goto out_free1;
@@ -2230,8 +2348,7 @@
 if (!((mdsc->fsc->mount_options->flags &
 CEPH_MOUNT_OPT_MOUNTWAIT) &&
 !ceph_mdsmap_is_cluster_available(mdsc->mdsmap))
{
err = -ENOENT;
pr_info("probably no mds server is up\n");
+err = -EHOSTUNREACH;
goto finish;
}
}
@@ -3411,8 +3528,9 @@
ceph_con_send(&session->s_con, msg);

out:
iput(inode);
mutex_unlock(&session->s_mutex);
+/* avoid calling iput_final() in mds dispatch threads */
+ceph_async_iput(inode);
return;

bad:
@@ -3501,6 +3619,9 @@
dout("mdsc delayed_work\n");
ceph_check_delayed_caps(mdsc);

+if (mdsc->stopping)
+return;
+
mutex_lock(&mdsc->mutex);
renew_interval = mdsc->mdsmap->m_session_timeout >> 2;
renew_caps = time_after_eq(jiffies, HZ*renew_interval +
@@ -3525,7 +3646,9 @@
pr_info("mds%d hung\n", s->s_mds);
}
}
-@ @ -3411.8 +3528.9 @@

static void ceph_mdsc_stop(struct ceph_mds_client *mdsc)


{  
dout("stop\n");  
  - cancel_delayed_work_sync(&mdsc->delayed_work); /* cancel timer */  
+/
+  * Make sure the delayed work stopped before releasing
+  * the resources.
+  *
+  * Because the cancel_delayed_work_sync() will only
+  * guarantee that the work finishes executing. But the
+  * delayed work will re-arm itself again after that.
+  */
+  +flush_delayed_work(&mdsc->delayed_work);
+
+  if (mdsc->mdsmap)
+  ceph_mdsmap_destroy(mdsc->mdsmap);
+  kfree(mdsc->sessions);
+  @ @ -4064,6 +4197,9 @@
+  case CEPH_MSG_CLIENT_LEASE:
+      handle_lease(mdsc, s, msg);
+      break;
+  +case CEPH_MSG_CLIENT_QUOTA:
+      ceph_handle_quota(mdsc, s, msg);
+      +break;
+
+  default:
+      pr_err("received unknown message type \%d \%s\n", type,
+      @ @ -4109,6 +4245,16 @@
+      return auth;
+  }
+
+static int add_authorizer_challenge(struct ceph_connection *con,
+  + void *challenge_buf, int challenge_buf_len)
+{
+  +struct ceph_mds_session *s = con->private;
+  +struct ceph_mds_client *mdsc = s->s_mdsc;
+  +struct ceph_auth_client *ac = mdsc->fsc->client->monc.auth;
+  +
+  +return ceph_auth_add_authorizer_challenge(ac, s->s_auth.authorizer,
+  +  challenge_buf, challenge_buf_len);
+  +}
+
+static int verify_authorizer_reply(struct ceph_connection *con)
+{
+  @@ -4172,6 +4318,7 @@
+     .put = con_put,
+     .dispatch = dispatch,
+     .get_authorizer = get_authorizer,
+     .add_authorizer_challenge = add_authorizer_challenge,
.verify_authorizer_reply = verify_authorizer_reply,
.invalidate_authorizer = invalidate_authorizer,
.peer_reset = peer_reset,
--- linux-4.15.0.orig/fs/ceph/mds_client.h
+++ linux-4.15.0/fs/ceph/mds_client.h
@@ -49,6 +49,8 @@
 char *inline_data;
u32 pool_ns_len;
 char *pool_ns_data;
+u64 max_bytes;
+u64 max_files;
};

struct ceph_mds_reply_dir_entry {
@@ -151,12 +153,13 @@
 /* protected by s_cap_lock */
 spinlock_t s_cap_lock;
 struct list_head s_caps; /* all caps issued by this session */
+struct ceph_cap *s_cap_iterator;
 int s_nr_caps, s_trimmer_caps;
 int s_num_cap_releases;
 int s_cap_reconnect;
 int s_readonly;
 struct list_head s_cap_releases; /* waiting cap_release messages */
-struct ceph_cap *s_cap_iterator;
+struct work_struct s_cap_release_work;

 /* protected by mutex */
 struct list_head s_cap_flushing; /* inodes w/ flushing caps */
@@ -312,6 +315,8 @@
 int max_sessions; /* len of s_mds_sessions */
 int stopping; /* true if shutting down */
+atomic64_t quotarealms_count; /* # realms with quota */
 +
 /*
 * snap_rwsem will cover cap linkage into snaprealms, and
 * realm snap contexts. (later, we can do per-realm snap
@@ -420,9 +425,10 @@
kref_put(&req->r_kref, ceph_mdsc_release_request);
 }
-extern void ceph_send_cap_releases(struct ceph_mds_client *mdsc,
 - struct ceph_mds_session *session);
-extern void __ceph_queue_cap_release(struct ceph_mds_session *session,
+struct ceph_cap *cap);
+extern void ceph_flush_cap_releases(struct ceph_mds_client *mdsc,
+ struct ceph_mds_session *session);
extern void ceph_mdsc_pre_umount(struct ceph_mds_client *mdsc);

extern char *ceph_mdsc_build_path(struct dentry *dentry, int *plen, u64 *base,
--- linux-4.15.0.orig/fs/ceph/quota.c
+++ linux-4.15.0/fs/ceph/quota.c
@@ -0,0 +1,309 @@
+// SPDX-License-Identifier: GPL-2.0
+/*
+ * quota.c - CephFS quota
+ *
+ * Copyright (C) 2017-2018 SUSE
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+ * along with this program; if not, see <http://www.gnu.org/licenses/>.
+ */
+
+#include "super.h"
+#include "mds_client.h"
+
+void ceph_adjust_quota_realms_count(struct inode *inode, bool inc)
+{
+    struct ceph_mds_client *mdsc = ceph_inode_to_client(inode)->mdsc;
+    if (inc)
+        atomic64_inc(&mdsc->quotarealms_count);
+    else
+        atomic64_dec(&mdsc->quotarealms_count);
+
+static inline bool ceph_has_realms_with_quotas(struct inode *inode)
+{
+    struct ceph_mds_client *mdsc = ceph_inode_to_client(inode)->mdsc;
+    return atomic64_read(&mdsc->quotarealms_count) > 0;
+}
+
+void ceph_handle_quota(struct ceph_mds_client *mdsc,
+    struct ceph_mds_session *session,
+    struct ceph_msg *msg)
{+
struct super_block *sb = mdsc->fsc->sb;
struct ceph_mds_quota *h = msg->front.iov_base;
struct ceph_vino vino;
struct inode *inode;
struct ceph_inode_info *ci;
+
if (msg->front.iov_len != sizeof(*h)) {
    pr_err("%s corrupt message mds%d len %d\n", __func__,
    session->s_mds, (int)msg->front.iov_len);
    ceph_msg_dump(msg);
    return;
}
+
/* increment msg sequence number */
mutex_lock(&session->s_mutex);
session->s_seq++;
mutex_unlock(&session->s_mutex);
+
/* lookup inode */
vino.ino = le64_to_cpu(h->ino);
vino.snap = CEPH_NOSNAP;
inode = ceph_find_inode(sb, vino);
if (!inode) {
    pr_warn("Failed to find inode %llu\n", vino.ino);
    return;
}

ci = ceph_inode(inode);
+
spin_lock(&ci->i_ceph_lock);
+ci->i_rbytes = le64_to_cpu(h->rbytes);
+ci->i_rfiles = le64_to_cpu(h->rfiles);
+ci->i_rsubdirs = le64_to_cpu(h->rsubdirs);
+__ceph_update_quota(ci, le64_to_cpu(h->max_bytes),
    le64_to_cpu(h->max_files));
+spin_unlock(&ci->i_ceph_lock);
+
/* avoid calling iput_final() in dispatch thread */
ceph_async_iput(inode);
+}
+
/* This function walks through the snaprealm for an inode and returns the
 * ceph_snap_realm for the first snaprealm that has quotas set (either max_files
 * or max_bytes). If the root is reached, return the root ceph_snap_realm
 * instead.
 +
 * Note that the caller is responsible for calling ceph_put_snap_realm() on the

static struct ceph_snap_realm *get_quota_realm(struct ceph_mds_client *mdsc, struct inode *inode)
{
    struct ceph_inode_info *ci = NULL;
    struct ceph_snap_realm *realm, *next;
    struct inode *in;
    bool has_quota;

    if (ceph_snap(inode) != CEPH_NOSNAP)
        return NULL;

    realm = ceph_inode(inode)->i_snap_realm;
    if (realm)
        ceph_get_snap_realm(mdsc, realm);
    else
        pr_err_ratelimited("get_quota_realm: ino (%llx.%llx) "
            "null i_snap_realm\n", ceph_vinop(inode));

    while (realm) {
        spin_lock(&realm->inodes_with_caps_lock);
        in = realm->inode ? igrab(realm->inode) : NULL;
        spin_unlock(&realm->inodes_with_caps_lock);
        if (!in)
            break;

        ci = ceph_inode(in);
        has_quota = __ceph_has_any_quota(ci);
        /* avoid calling iput_final() while holding mdsc->snap_rwsem */
        ceph_async_iput(in);

        next = realm->parent;
        if (has_quota || !next)
            return realm;

        ceph_get_snap_realm(mdsc, next);
        ceph_put_snap_realm(mdsc, realm);
        realm = next;
    }

    ceph_put_snap_realm(mdsc, realm);
    return NULL;
}

bool ceph_quota_is_same_realm(struct inode *old, struct inode *new)
{
    struct ceph_mds_client *mdsc = ceph_inode_to_client(old)->mdsc;
struct ceph_snap_realm *old_realm, *new_realm;
bool is_same;

down_read(&mdsc->snap_rwlock);
old_realm = get_quota_realm(mdsc, old);
new_realm = get_quota_realm(mdsc, new);
is_same = (old_realm == new_realm);
up_read(&mdsc->snap_rwlock);

if (old_realm)
ceph_put_snap_realm(mdsc, old_realm);
if (new_realm)
ceph_put_snap_realm(mdsc, new_realm);

return is_same;

enum quota_check_op {
QUOTA_CHECK_MAX_FILES_OP, /* check quota max_files limit */
QUOTA_CHECK_MAX_BYTES_OP, /* check quota max_files limit */
QUOTA_CHECK_MAX_BYTES_APPROACHING_OP /* check if quota max_files limit is approaching */
};

/* check_quota_exceeded() will walk up the snaprealm hierarchy and, for each
realm, it will execute quota check operation defined by the 'op' parameter.
The snaprealm walk is interrupted if the quota check detects that the quota
is exceeded or if the root inode is reached.
 */
static bool check_quota_exceeded(struct inode *inode, enum quota_check_op op,
loff_t delta) {
struct ceph_mds_client *mdsc = ceph_inode_to_client(inode)->mdsc;
struct ceph_inode_info *ci;
struct ceph_snap_realm *realm, *next;
struct inode *in;
u64 max, rvalue;
bool exceeded = false;

if (ceph_snap(inode) != CEPH_NOSNAP)
return false;

down_read(&mdsc->snap_rwlock);
realm = ceph_inode(inode)->i_snap_realm;
if (realm)
ceph_get_snap_realm(mdsc, realm);
if (op == QUOTA_CHECK_MAX_FILES_OP)
ceph_snap(inode) = CEPH_NOSNAP

return false;

down_read(&mdsc->snap_rwlock);
realm = ceph_inode(inode)->i_snap_realm;
if (realm)
ceph_get_snap_realm(mdsc, realm);
else
pr_err_ratelimited("check_quota_exceeded: ino (%llx.%llx) ")
+ "null i_snaprealm\n", ceph_vinop(inode));
+while (realm) {
+  spin_lock(&realm->inodes_with_caps_lock);
+  in = realm->inode ? igrab(realm->inode) : NULL;
+  spin_unlock(&realm->inodes_with_caps_lock);
+  if (!in)
+    break;
+
+  ci = ceph_inode(in);
+  spin_lock(&ci->i_ceph_lock);
+  if (op == QUOTA_CHECK_MAX_FILES_OP) {
+    max = ci->i_max_files;
+    rvalue = ci->i_rfiles + ci->i_rsubdirs;
+  } else {
+    max = ci->i_max_bytes;
+    rvalue = ci->i_rbytes;
+  }
+  spin_unlock(&ci->i_ceph_lock);
+  switch (op) {
+    case QUOTA_CHECK_MAX_FILES_OP:
+      exceeded = (max && (rvalue >= max));
+      break;
+    case QUOTA_CHECK_MAX_BYTES_OP:
+      exceeded = (max && (rvalue + delta > max));
+      break;
+    case QUOTA_CHECK_MAX_BYTES_APPROACHING_OP:
+      if (max) {
+        if (rvalue >= max)
+          exceeded = true;
+        else {
+          // when we're writing more that 1/16th
+          // of the available space
+          exceeded =
+            (((max - rvalue) >> 4) < delta);
+        }
+      }
+      break;
+    default:
+      /* Shouldn't happen */
+      pr_warn("Invalid quota check op (%d)\n", op);
+      exceeded = true; /* Just break the loop */
+      break;
+    */
+  }
+  /* avoid calling iput_final() while holding mdsc->snap_rwsem */
+  ceph_async_iput(in);
+}
next = realm->parent;
if (exceeded || !next)
    break;
ceph_get_snapRealm(mdsc, next);
ceph_put_snapRealm(mdsc, realm);
realm = next;
}
if (realm)
    ceph_put_snapRealm(mdsc, realm);
up_read(&mdsc->snap_rwsem);
+
return exceeded;
+
+/*
+ * ceph_quota_is_max_files_exceeded - check if we can create a new file
+ * @inode: directory where a new file is being created
+ * This functions returns true is max_files quota allows a new file to be
+ * created. It is necessary to walk through the snaprealm hierarchy (until the
+ * FS root) to check all realms with quotas set.
+ */
+bool ceph_quota_is_max_files_exceeded(struct inode *inode)
+
+if (!ceph_has_realms_with_quotas(inode))
    return false;
+WARN_ON(!S_ISDIR(inode->i_mode));
+
+return check_quota_exceeded(inode, QUOTA_CHECK_MAX_FILES_OP, 0);
+
+/*
+ * ceph_quota_is_max_bytes_exceeded - check if we can write to a file
+ * @inode: inode being written
+ * @newsize: new size if write succeeds
+ * This functions returns true is max_bytes quota allows a file size to reach
+ * @newsize; it returns false otherwise.
+ */
+bool ceph_quota_is_max_bytes_exceeded(struct inode *inode, loff_t newsize)
+
+loff_t size = i_size_read(inode);
+
+if (!ceph_has_realms_with_quotas(inode))
    return false;
+
+/* return immediately if we're decreasing file size */
+if (newsize <= size)
+return false;
+
+return check_quota_exceeded(inode, QUOTA_CHECK_MAX_BYTES_OP, (newsize - size));
+
+/*
+ * ceph_quota_is_max_bytes_approaching - check if we're reaching max_bytes
+ * @inode: inode being written
+ * @newsize: new size if write succeeds
+ *
+ * This function returns true if the new file size @newsize will be consuming
+ * more than 1/16th of the available quota space; it returns false otherwise.
+ */
+bool ceph_quota_is_max_bytes_approaching(struct inode *inode, loff_t newsize)
+{
+loff_t size = ceph_inode(inode)->i_reported_size;
+
+if (!ceph_has_realms_with_quotas(inode))
+return false;
+
+/* return immediately if we're decreasing file size */
+if (newsize <= size)
+return false;
+
+return check_quota_exceeded(inode, QUOTA_CHECK_MAX_BYTES_APPROACHING_OP,
+    (newsize - size));
+
--- linux-4.15.0.orig/fs/ceph/snap.c
+++ linux-4.15.0/fs/ceph/snap.c
@@ -460,6 +460,7 @@
 struct inode *inode = &ci->vfs_inode;
 struct ceph_cap_snap *capsnap;
 struct ceph_snap_context *old_snapc, *new_snapc;
+struct ceph_buffer *old_blob = NULL;
 int used, dirty;

 capsnap = kzalloc(sizeof(*capsnap), GFP_NOFS);
 @@ -536,7 +537,7 @@
 capsnap->gid = inode->i_gid;
 capsnap->xattr_blob = ceph_buffer_get(ci->i_xattrs.blob);
 capsnap->xattr_version = ci->i_xattrs.version;
+old_blob = __ceph_build_xattrs_blob(ci);

 if (dirty & CEPH_CAP_XATTR_EXCL) {
-__ceph_build_xattrs_blob(ci);
+old_blob = __ceph_build_xattrs_blob(ci);
 capsnap->xattr_blob =
 ceph_buffer_get(ci->i_xattrs.blob);
 capsnap->xattr_version = ci->i_xattrs.version;
@@ -568,12 +569,18 @@
old_snapc = NULL;

update_snapc:
- if (ci->i_head_snapc) {
+   if (ci->i_wrbuffer_ref_head == 0 &&
+       ci->i_wr_ref == 0 &&
+       ci->i_dirty_caps == 0 &&
+       ci->i_flushing_caps == 0) { 
+       ci->i_head_snapc = NULL;
+   } else {
   ci->i_head_snapc = ceph_get_snap_context(new_snapc);
   dout(" new snapc is %p\n", new_snapc);
} 
spin_unlock(&ci->i_ceph_lock);

+ceph_buffer_put(old_blob);
kfree(capsnap);
ceph_put_snap_context(old_snapc);
}
@@ -616,7 +623,8 @@
capsnap->size);
spin_lock(&mdsc->snap_flush_lock);
- list_add_tail(&ci->i_snap_flush_item, &mdsc->snap_flush_list);
+ if (list_empty(&ci->i_snap_flush_item))
+ list_add_tail(&ci->i_snap_flush_item, &mdsc->snap_flush_list);
spin_unlock(&mdsc->snap_flush_lock);
return 1; /* caller may want to ceph_flush_snaps */
}
@@ -638,13 +646,15 @@
if (!inode)
   continue;
spin_unlock(&realm->inodes_with_caps_lock);
-iput(lastinode);
+/* avoid calling iput_final() while holding
+ * mdsc->snap_rwsem or in mds dispatch threads */
+ceph_async_iput(lastinode);
lastinode = inode;
ceph_queue_cap_snap(ci);
spin_lock(&realm->inodes_with_caps_lock);
}
spin_unlock(&realm->inodes_with_caps_lock);
iput(lastinode);
+ceph_async_iput(lastinode);
dout("queue_realm_cap_snaps %p %llx done\n", realm, realm->ino);
} 
@@ -796,7 +806,9 @@
ihold(inode);
spin_unlock(&mdsc->snap_flush_lock);
ceph_flush_snaps(ci, &session);
-iput(inode);
+/* avoid calling iput_final() while holding */
+ /* session->s_mutex or in mds dispatch threads */
+ceph_async_iput(inode);
spin_lock(&mdsc->snap_flush_lock);
}
spin_unlock(&mdsc->snap_flush_lock);
@@ -928,18 +940,22 @@
&realm->inodes_with_caps);
oldrealm = ci->i_snap_realm;
if (realm->ino == ci->i_vino.ino)
	realm->inode = inode;
spin_unlock(&realm->inodes_with_caps_lock);
spin_unlock(&ci->i_ceph_lock);

ceph_get_snap_realm(mdsc, realm);
ceph_put_snap_realm(mdsc, oldrealm);
-iput(inode);
+/* avoid calling iput_final() while holding */
+ /* mdsc->snap_rwsem or mds in dispatch threads */
+ceph_async_iput(inode);
continue;

skip_inode:
spin_unlock(&ci->i_ceph_lock);
-iput(inode);
+ceph_async_iput(inode);
}

/* we may have taken some of the old realm's children. */
--- linux-4.15.0.orig/fs/ceph/super.c
+++ linux-4.15.0/fs/ceph/super.c
@@ -45,7 +45,7 @@
static int ceph_statfs(struct dentry *dentry, struct kstatfs *buf)
 {
 struct ceph_fs_client *fsc = ceph_inode_to_client(d_inode(dentry));
-struct ceph_monmap *monmap = fsc->client->monc.monmap;
+struct ceph_mon_client *monc = &fsc->client->monc.monmap;
+struct ceph_mon_client *mone = &fsc->client->mone;
 struct ceph_statfs st;
u64 fsid;
 int err;
@@ -58,7 +58,7 @@
}
dout("statfs\n");
-err = ceph_monc_do_statfs(&fsc->client->monc, data_pool, &st);
+err = ceph_monc_do_statfs(monc, data_pool, &st);
if (err < 0)
    return err;
@@ -85,15 +85,17 @@
    buf->f_namelen = NAME_MAX;

    /* Must convert the fsid, for consistent values across arches */
    -fsid = le64_to_cpu(*(__le64 *)&monmap->fsid) ^
    -    le64_to_cpu(*((__le64 *)&monmap->fsid + 1));
+    mutex_lock(&monc->mutex);
+    fsid = le64_to_cpu(*(__le64 *)&monc->monmap->fsid) ^
+    +    le64_to_cpu(*((__le64 *)&monc->monmap->fsid + 1));
+    mutex_unlock(&monc->mutex);
    +
    buf->f_fsid.val[0] = fsid & 0xffffffff;
    buf->f_fsid.val[1] = fsid >> 32;

    return 0;
}
-
static int ceph_sync_fs(struct super_block *sb, int wait)
{
    struct ceph_fs_client *fsc = ceph_sb_to_client(sb);
    @ @ -190,6 +192,26 @@
    { -1, NULL }
};

+/*
+ * Remove adjacent slashes and then the trailing slash, unless it is
+ * the only remaining character.
+ * E.g. "/dir1///dir2///" --> "/dir1/dir22", "/" --> "/".
+ */
+static void canonicalize_path(char *path)
+{
+    int i, j = 0;
+    +
+    +for (i = 0; path[i] != '\0'; i++) {
+        +if (path[i] != '\/' || j < 1 || path[j - 1] != '\/')
+            +path[j++] = path[i];
+        +}
+    +
+    +if (j > 1 && &path[j - 1] == '\/')

static int parse_fsopt_token(char *c, void *private)
{
    struct ceph_mount_options *fsopt = private;
    return -ENOMEM;
    break;
    case Opt_mds_namespace:
        kfree(fsopt->mds_namespace);
        fsopt->mds_namespace = kstrndup(argstr[0].from,
                                       GFP_KERNEL);
        return -ENOMEM;
        break;
    case Opt_fscache_uniq:
        #ifdef CONFIG_CEPH_FSCACHE
            kfree(fsopt->fscache_uniq);
            fsopt->fscache_uniq = kstrndup(argstr[0].from,
                                           GFP_KERNEL);
            return -ENOMEM;
            break;
        #else
            pr_err("fscache support is disabled\n");
            return -EINVAL;
        #endif
        case Opt_wsize:
            if (intval < PAGE_SIZE || intval > CEPH_MAX_WRITE_SIZE)
                return -EINVAL;
            break;
            case Opt_rasize:
                if (intval < 0)
                    return -EINVAL;
                fsopt->rasize = ALIGN(intval, PAGE_SIZE);
                break;
                case Opt_caps_wanted_delay_min:
                    if (intval < 1)
                        fsopt->flags &= ~CEPH_MOUNT_OPT_INO32;
                    break;
case Opt_fscache:
+#ifndef CONFIG_CEPH_FSCACHE
fsopt->flags |= CEPH_MOUNT_OPT_FSCACHE;
b现实中
+}else
+pr_err("fscache support is disabled\n");
+return -EINVAL;
+#endif

case Opt_nofscache:
fsopt->flags &= ~CEPH_MOUNT_OPT_FSCACHE;
b现实中
@@ -380,12 +413,15 @@
ret = strcmp_null(fsopt1->snapdir_name, fsopt2->snapdir_name);
if (ret)
return ret;
+
 ret = strcmp_null(fsopt1->mds_namespace, fsopt2->mds_namespace);
if (ret)
return ret;
+
 ret = strcmp_null(fsopt1->server_path, fsopt2->server_path);
if (ret)
return ret;
+
 ret = strcmp_null(fsopt1->fscache_uniq, fsopt2->fscache_uniq);
if (ret)
return ret;
@@ -441,13 +477,17 @@
*/
dev_name_end = strchr(dev_name, '/');
if (dev_name_end) {
- if (strlen(dev_name_end) > 1) {
- fsopt->server_path = kstrdup(dev_name_end, GFP_KERNEL);
- if (!fsopt->server_path) {
- err = -ENOMEM;
- goto out;
- }
+/*
+ * The server_path will include the whole chars from userland
+ * including the leading '/'.
+ */
+ fsopt->server_path = kstrdup(dev_name_end, GFP_KERNEL);
+ if (!fsopt->server_path) {
+ err = -ENOMEM;
+ goto out;
+ }
+canonicalize_path(fsopt->server_path);
} else {
    dev_name_end = dev_name + strlen(dev_name);
}
@@ -575,6 +615,8 @@
/
 * create a new fs client
 + *
 + * Success or not, this function consumes @fsopt and @opt.
 */
static struct ceph_fs_client *create_fs_client(struct ceph_mount_options *fsopt,
    struct ceph_options *opt)
@@ -582,17 +624,21 @@
    struct ceph_fs_client *fsc;
    int page_count;
    size_t size;
    -int err = -ENOMEM;
    +int err;

    fsc = kzalloc(sizeof(*fsc), GFP_KERNEL);
    -if (!fsc)
    +if (!fsc) {
        -err = -ENOMEM;
        +err = -ENOMEM;
        +goto fail;
        +}

    fsc->client = ceph_create_client(opt, fsc);
    if (IS_ERR(fsc->client)) {
        err = PTR_ERR(fsc->client);
        goto fail;
    }
    +opt = NULL; /* fsc->client now owns this */
    +
    fsc->client->extra_mon_dispatch = extra_mon_dispatch;

    if (!fsopt->mds_namespace) {
        @@ -615,15 +661,12 @@
            * The number of concurrent works can be high but they don't need
            * to be processed in parallel, limit concurrency.
            */
            -fsc->wb_wq = alloc_workqueue("ceph-writeback", 0, 1);
            -if (!fsc->wb_wq)
            +fsc->inode_wq = alloc_workqueue("ceph-inode", WQ_UNBOUND, 0);
            +if (!fsc->inode_wq)
                goto fail_client;
            -fsc->pg_inv_wq = alloc_workqueue("ceph-pg-invalid", 0, 1);
            -if (!fsc->pg_inv_wq)
goto fail_wb_wq;
-fsc->trunc_wq = alloc_workqueue("ceph-trunc", 0, 1);
-if (!fsc->trunc_wq)
-goto fail_pg_inv_wq;
+fsc->cap_wq = alloc_workqueue("ceph-cap", 0, 1);
+if (!fsc->cap_wq)
+goto fail_inode_wq;

/* set up mempools */
err = -ENOMEM;
@@ -631,33 +674,39 @@
size = sizeof (struct page *) * (page_count ? page_count : 1);
fsc->wb_pagevec_pool = mempool_create_kmalloc_pool(10, size);
if (!fsc->wb_pagevec_pool)
-goto fail_trunc_wq;
+	goto fail_cap_wq;
/* caps */
fsc->min_caps = fsopt->max_readdir;
return fsc;

-fail_trunc_wq:
-fail_pg_inv_wq:
-fail_wb_wq:
-fail_cap_wq:
-fail_inode_wq:
-fail_client:
ceph_destroy_client(fsc->client);
fail:
kfree(fsc);
+if (opt)
+ceph_destroy_options(opt);
+destroy_mount_options(fsopt);
return ERR_PTR(err);
}

+static void flush_fs_workqueues(struct ceph_fs_client *fsc)
+{
+flush_workqueue(fsc->inode_wq);
+flush_workqueue(fsc->cap_wq);
+}
static void destroy_fs_client(struct ceph_fs_client *fsc)
{
    dout("destroy_fs_client %p
", fsc);

    -destroy_workqueue(fsc->wb_wq);
    -destroy_workqueue(fsc->pg_inv_wq);
    -destroy_workqueue(fsc->trunc_wq);
    +destroy_workqueue(fsc->inode_wq);
    +destroy_workqueue(fsc->cap_wq);

    mempool_destroy(fsc->wb_pagevec_pool);

    @@ -711,14 +760,17 @@
goto bad_dentry;

    ceph_file_cachep = KMEM_CACHE(ceph_file_info, SLAB_MEM_SPREAD);
    -
    if (!ceph_file_cachep)
    goto bad_file;

    -if ((error = ceph_fscache_register()))
        goto bad_file;
    +error = ceph_fscache_register();
    +if (error)
        goto bad_fscache;

    return 0;
    +
    +bad_fscache:
    +kmem_cache_destroy(ceph_file_cachep);
    bad_file:
    kmem_cache_destroy(ceph_dentry_cachep);
    bad_dentry:
    @@ -747,7 +799,6 @@
    ceph_fscache_unregister();
    }

    /*
     * ceph_umount_begin - initiate forced umount. Tear down down the
     * mount, skipping steps that may hang while waiting for server(s).
     @@ -764,13 +815,21 @@
     return;
    }

    +static int ceph_remount(struct super_block *sb, int *flags, char *data)
    +{
    +sync_filesystem(sb);
return 0;
+
static const struct super_operations ceph_super_ops = {
   .alloc_inode = ceph_alloc_inode,
   .destroy_inode = ceph_destroy_inode,
   .write_inode = ceph_write_inode,
   .drop_inode = ceph_drop_inode,
   .evict_inode = ceph_evict_inode,
   .sync_fs = ceph_sync_fs,
   .put_super = ceph_put_super,
   .remount_fs = ceph_remount,
   .show_options = ceph_show_options,
   .statfs = ceph_statfs,
   .umount_begin = ceph_umount_begin,
}@ -825,9 +884,6 @@
return root;
}
-
-
-/*
 * mount: join the ceph cluster, and open root directory.
 */
@@ -836,13 +892,14 @@
int err;
unsigned long started = jiffies; /* note the start time */
struct dentry *root;
-@ -836,13 +892,14 @@
if (!fsc->sb->s_root) {
   const char *path;
+   const char *path = fsc->mount_options->server_path ?
+      fsc->mount_options->server_path + 1 : "";
+   err = __ceph_open_session(fsc->client, started);
if (err < 0)
goto out;
@@ -854,24 +911,18 @@
goto out;
}
-
-if (!fsc->mount_options->server_path) {
-    path = "";

-dout("mount opening path \t\n");
-} else {
-path = fsc->mount_options->server_path + 1;
-dout("mount opening path \%s\n", path);
-
+dout("mount opening path "\%s"\n", path);
+
+err = ceph_fs_debugfs_init(fsc);
+if (err < 0)
+goto out;
+
+root = open_root_dentry(fsc, path, started);
+if (IS_ERR(root)) {
+    err = PTR_ERR(root);
+    goto out;
+}
+    fsc->sb->s_root = dget(root);
+    first = 1;
+
-err = ceph_fs_debugfs_init(fsc);
-    if (err < 0)
-        goto fail;
+}
} else {
root = dget(fsc->sb->s_root);
}
@@ -881,11 +932,6 @@
mutex_unlock(&fsc->client->mount_mutex);
return root;

-fail:
-if (first) {
-dput(fsc->sb->s_root);
-fsc->sb->s_root = NULL;
-}

out:
mutex_unlock(&fsc->client->mount_mutex);
return ERR_PTR(err);
@@ -1000,8 +1046,6 @@
fsc = create_fs_client(fsopt, opt);
if (IS_ERR(fsc)) {
    res = ERR_CAST(fsc);
    -destroy_mount_options(fsopt);
-    ceph_destroy_options(opt);
    goto out_final;
}
@@ -1041,6 +1085,11 @@
return res;
out_splat:
+if (!ceph_mdsmap_is_cluster_available(fsc->mdsc->mdsmap)) {
  +pr_info("No mds server is up or the cluster is laggy\n");
  +err = -EHOSTUNREACH;
  +}
  +
  +ceph_mdsc_close_sessions(fsc->mdsc);
  deactivate_locked_super(sb);
  goto out_final;
@@ -1061,6 +1110,8 @@
  dout("kill_sb %p\n", s);

  ceph_mdsc_pre_umount(fsc->mdsc);
  +flush_fs_workqueues(fsc);
  +
  +generic_shutdown_super(s);

  fsc->client->extra_mon_dispatch = NULL;
--- linux-4.15.0.orig/fs/ceph/super.h
+++ linux-4.15.0/fs/ceph/super.h
@@ -85,7 +85,7 @@
 char *snapdir_name;   /* default ".snap" */
 char *mds_namespace;  /* default NULL */
 -char *server_path;    /* default "/" */
+char *server_path;    /* default NULL (means "/") */
 char *fscache_uniq;   /* default NULL */
 }

@@ -102,11 +102,11 @@
 /* writeback */
 mempool_t *wb_pagevec_pool;
 -struct workqueue_struct *wb_wq;
-struct workqueue_struct *pg_inv_wq;
-struct workqueue_struct *trunc_wq;
 atomic_long_t writeback_count;

 +struct workqueue_struct *inode_wq;
 +struct workqueue_struct *cap_wq;
 +
 +#ifdef CONFIG_DEBUG_FS
 struct dentry *debugfs_dentry_lru, *debugfs_caps;
 struct dentry *debugfs_congestion_kb;
-@@ -256,7 +256,8 @@
 */
 struct ceph_dentry_info {
struct ceph_mds_session *lease_session;
-u32 lease_gen, lease_shared_gen;
+int lease_shared_gen;
+u32 lease_gen;
u32 lease_seq;
unsigned long lease_renew_after, lease_renew_from;
struct list_head lru;
@@ -309,6 +310,9 @@
u64 i_rbytes, i_rfiles, i_rsubdirs;
u64 i_files, i_subdirs;
+/* quotas */
+u64 i_max_bytes, i_max_files;
+
+struct rb_root i_fragtree;
+int i_fragtree_nsplits;
+struct mutex i_fragtree_mutex;
@@ -353,7 +357,7 @@
+u32 i_shared_gen;       /* increment each time we get FILE_SHARED */
+atomic_t i_shared_gen;       /* increment each time we get FILE_SHARED */
+i_rdcache_gen;      /* incremented each time we get FILE_CACHE. */
+i_rdcache_revoking; /* RDCACHE gen to async invalidate, if any */
@@ -366,10 +370,8 @@
+struct work_struct i_wb_work;  /* writeback work */
+struct work_struct i_pg_inv_work;  /* page invalidation work */
-struct work_struct i_vmtruncate_work;
+struct work_struct i_work;
+unsigned long  i_work_mask;

#ifdef CONFIG_CEPH_FSCACHE
struct fscache_cookie *fscache;
@@ -492,6 +494,13 @@

/*
+ * Masks of ceph inode work.
+ */
+#define CEPH_I_WORK_WRITEBACK	0 /* writeback */
+#define CEPH_I_WORK_INVALIDATE_PAGES	1 /* invalidate pages */
+#define CEPH_I_WORK_VMTRUNCATE	2 /* vmtruncate */
* We set the ERROR_WRITE bit when we start seeing write errors on an inode
* and then clear it when they start succeeding. Note that we do a lockless
* check first, and only take the lock if it looks like it needs to be changed.

```c
+/*
+ * We set the ERROR_WRITE bit when we start seeing write errors on an inode
+ * and then clear it when they start succeeding. Note that we do a lockless
+ * check first, and only take the lock if it looks like it needs to be changed.
+/**
+ * We set the ERROR_WRITE bit when we start seeing write errors on an inode
+ * and then clear it when they start succeeding. Note that we do a lockless
+ * check first, and only take the lock if it looks like it needs to be changed.
+ */
+static long long release_count,
+    long long ordered_count)
+
+  -smp_mb__before_atomic();
+  /*
+   * Makes sure operations that setup readdir cache (update page
+   * cache and i_size) are strongly ordered w.r.t. the following
+   * atomic64_set() operations.
+   */
+  SMP_MB();
+  atomic64_set(&ci->i_complete_seq[0], release_count);
+  atomic64_set(&ci->i_complete_seq[1], ordered_count);
```
+spin_lock(&cf->rw_contexts_lock);
+list_add(&ctx->list, &cf->rw_contexts);
+spin_unlock(&cf->rw_contexts_lock);
+
+static inline void ceph_del_rw_context(struct ceph_file_info *cf,
+struct ceph_rw_context *ctx)
+{
+spin_lock(&cf->rw_contexts_lock);
+list_del(&ctx->list);
+spin_unlock(&cf->rw_contexts_lock);
+
+static inline struct ceph_rw_context*
+ceph_find_rw_context(struct ceph_file_info *cf)
+{
+struct ceph_rw_context *ctx, *found = NULL;
+spin_lock(&cf->rw_contexts_lock);
+list_for_each_entry(ctx, &cf->rw_contexts, list) {
+if (ctx->thread == current) {
+found = ctx;
+break;
+}
+</code>
+spin_unlock(&cf->rw_contexts_lock);
+return found;
+
+struct ceph_readdir_cache_control {
+struct page  *page;
+struct dentry **dentries;
+}
+struct ceph_snap_realm {
+u64 ino;
+struct inode *inode;
+atomic_t nref;
+struct rb_node node;
+
+}
+extern const struct inode_operations ceph_file_iops;
+
+extern struct inode *ceph_alloca_inode(struct super_block *sb);
+extern void ceph_evict_inode(struct inode *inode);
+extern void ceph_destroy_inode(struct inode *inode);
+extern int ceph_drop_inode(struct inode *inode);
+}
+had_quota = __ceph_has_any_quota(ci);
+ci->i_max_bytes = max_bytes;
+ci->i_max_files = max_files;
+has_quota = __ceph_has_any_quota(ci);
+
+if (had_quota != has_quota)
+ceph_adjust_quota_realms_count(&ci->vfs_inode, has_quota);
+
+extern void ceph_handle_quota(struct ceph_mds_client *mdsc,
+      struct ceph_mds_session *session,
+      struct ceph_msg *msg);
+extern bool ceph_quota_is_max_files_exceeded(struct inode *inode);
+extern bool ceph_quota_is_same_realm(struct inode *old, struct inode *new);
+extern bool ceph_quota_is_max_bytes_exceeded(struct inode *inode,
+      loff_t newlen);
+extern bool ceph_quota_is_max_bytes_approaching(struct inode *inode,
+      loff_t newlen);
+
+#endif /* _FS_CEPH_SUPER_H */
+/* quotas */
+
+static bool ceph_vxattrcb_quota_exists(struct ceph_inode_info *ci)
+{
+    return (ci->i_max_files || ci->i_max_bytes);
+}
+
+static size_t ceph_vxattrcb_quota(struct ceph_inode_info *ci, char *val,
+    size_t size)
+{
+    return snprintf(val, size, "max_bytes=%llu max_files=%llu",
+                    ci->i_max_bytes, ci->i_max_files);
+}
+
+static size_t ceph_vxattrcb_quota_max_bytes(struct ceph_inode_info *ci,
+    char *val, size_t size)
+{
+    return snprintf(val, size, "%llu", ci->i_max_bytes);
+}
+
+static size_t ceph_vxattrcb_quota_max_files(struct ceph_inode_info *ci,
+    char *val, size_t size)
+{
+    return snprintf(val, size, "%llu", ci->i_max_files);
+}
+
#define CEPH_XATTR_NAME(_type, _name)
    XATTR_CEPH_PREFIX #_type "." #_name
#define CEPH_XATTR_NAME2(_type, _name, _name2)
    @} -247,6 +269,15 @@
    .hidden = true,
    .exists_cb = ceph_vxattrcb_layout_exists,
    }
+
+XATTR_NAME_CEPH(dir, rsubdirs),
+XATTR_NAME_CEPH(dir, rbytes),

static struct ceph_vxattr ceph_dir_vxattrs[] = {
    @} -270,6 +301,16 @@
    XATTR_NAME_CEPH(dir, rsubdirs),
    XATTR_NAME_CEPH(dir, rbytes),

```
XATTR_NAME_CEPH(dir, rtime),
+{
  .name = "ceph.quota",
  .name_size = offsetof("ceph.quota"),
  .getxattr_cb = ceph_vxattrcb_quota,
  .readonly = false,
  .hidden = true,
  .exists_cb = ceph_vxattrcb_quota_exists,
  +},
+XATTR_QUOTA_FIELD(quota, max_bytes),
+XATTR_QUOTA_FIELD(quota, max_files),
  {.name = NULL, 0 } /* Required table terminator */
};
static size_t ceph_dir_vxattrs_name_size; /* total size of all names */
@@ -684,12 +725,15 @@
  */
  * If there are dirty xattrs, reencode xattrs into the prealloc_blob
  * and swap into place.
  + * and swap into place. It returns the old i_xattrs.blob (or NULL) so
  + * that it can be freed by the caller as the i_ceph_lock is likely to be
  + * held.
  */
-void __ceph_build_xattrs_blob(struct ceph_inode_info *ci)
+struct ceph_buffer *__ceph_build_xattrs_blob(struct ceph_inode_info *ci)
{
  struct rb_node *p;
  struct ceph_inode_xattr *xattr = NULL;
  void *dest;

dout("__build_xattrs_blob %p\n", &ci->vfs_inode);
@@ -720,12 +764,14 @@
doest - ci->i_xattrs.prealloc_blob->vec.iov_base;

  if (ci->i_xattrs.blob)
    -ceph_buffer_put(ci->i_xattrs.blob);
    +old_blob = ci->i_xattrs.blob;
    ci->i_xattrs.blob = ci->i_xattrs.prealloc_blob;
    ci->i_xattrs.prealloc_blob = NULL;
    ci->i_xattrs.dirty = false;
    ci->i_xattrs.version++;}
  +
  +return old_blob;
  }

  static inline int __get_request_mask(struct inode *in) {
@@ -761,8 +807,11 @@
  if (err)
     return err;
  err = -ENODATA;
-  if (!((vxattr->exists_cb && !vxattr->exists_cb(ci)))
+  if (!((vxattr->exists_cb && !vxattr->exists_cb(ci))){
     err = vxattr->getxattr_cb(ci, value, size);
     if (size && size < err)
        err = -ERANGE;
   }
  return err;
}

@@ -955,6 +1004,7 @@
 struct ceph_inode_info *ci = ceph_inode(inode);
 struct ceph_mds_client *mdsc = ceph_sb_to_client(inode->i_sb)->mdsc;
 struct ceph_cap_flush *prealloc_cf = NULL;
+  struct ceph_buffer *old_blob = NULL;
  int issued;
  int err;
  int dirty = 0;
@@ -1023,13 +1073,15 @@
 struct ceph_buffer *blob;

 spin_unlock(&ci->i_ceph_lock);
-  dout(" preaallocating new blob size=%d\n", required_blob_size);
+  ceph_buffer_put(old_blob); /* Shouldn't be required */
+  dout(" pre-allocating new blob size=%d\n", required_blob_size);
  blob = ceph_buffer_new(required_blob_size, GFP_NOFS);
  if (!blob)
     goto do_sync_unlocked;
  spin_lock(&ci->i_ceph_lock);
+  /* prealloc_blob can't be released while holding i_ceph_lock */
  if (ci->i_xattrs.prealloc_blob)
     -ceph_buffer_put(ci->i_xattrs.prealloc_blob);
     +old_blob = ci->i_xattrs.prealloc_blob;
     +ci->i_xattrs.prealloc_blob = blob;
  goto retry;
 }
@@ -1045,6 +1097,7 @@
 }

 spin_unlock(&ci->i_ceph_lock);
+  ceph_buffer_put(old_blob);
  if (lock_snap_rwsem)
     up_read(&mdsc->snap_rwsem);
  if (dirty)
--- linux-4.15.0.orig/fs/char_dev.c
+++ linux-4.15.0/fs/char_dev.c
@@ -159,6 +159,12 @@
    ret = -EBUSY;
    goto out;
  }
+  if (new_min < old_min && new_max > old_max) {
+    ret = -EBUSY;
+    goto out;
+  }
  
  cd->next = *cp;
@@ -355,7 +361,7 @@
    if (owner && !try_module_get(owner))
      return NULL;
-   kobj = kobject_get(&p->kobj);
+   kobj = kobject_get_unless_zero(&p->kobj);
    if (!kobj)
      module_put(owner);
    return kobj;
--- linux-4.15.0.orig/fs/cifs/Kconfig
+++ linux-4.15.0/fs/cifs/Kconfig
@@ -66,9 +66,24 @@
 Unless you are a developer or are doing network performance analysis
 or tuning, say N.

+config CIFS_ALLOW_INSECURE_LEGACY
+  bool "Support legacy servers which use less secure dialects"
+  depends on CIFS
+  default y
+  help
+  Modern dialects, SMB2.1 and later (including SMB3 and 3.1.1), have
+  additional security features, including protection against
+  man-in-the-middle attacks and stronger crypto hashes, so the use
+  of legacy dialects (SMB1/CIFS and SMB2.0) is discouraged.
+  Disabling this option prevents users from using vers=1.0 or vers=2.0
+  on mounts with cifs.ko
+  If unsure, say Y.
+config CIFS_WEAK_PW_HASH
  bool "Support legacy servers which use weaker LANMAN security"
  depends on CIFS
  depends on CIFS && CIFS_ALLOW_INSECURE_LEGACY
help
Modern CIFS servers including Samba and most Windows versions
(since 1997) support stronger NTLM (and even NTLMv2 and Kerberos)
@@ -121,7 +136,7 @@
help
Enabling this option will cause the cifs client to attempt to
negotiate a newer dialect with servers, such as Samba 3.0.5
@@ -190,6 +205,7 @@
help
This enables experimental support for the newest, SMB3.1.1, dialect.
--- linux-4.15.0.orig/fs/cifs/asn1.c
+++ linux-4.15.0/fs/cifs/asn1.c
@@ -541,8 +541,8 @@
return 0;
} else if ((cls != ASN1_CTX) || (con != ASN1_CON)
  || (tag != ASN1_EOC)) {
  -cifs_dbg(FYI, "cls = %d con = %d tag = %d end = %p (%d) exit 0\n",
    - cls, con, tag, end, *end);
+   cifs_dbg(FYI, "cls = %d con = %d tag = %d end = %p exit 0\n",
      + cls, con, tag, end);
    return 0;
  }
@@ -552,8 +552,8 @@
return 0;
} else if ((cls != ASN1_UNI) || (con != ASN1_CON)
  || (tag != ASN1_SEQ)) {
  -cifs_dbg(FYI, "cls = %d con = %d tag = %d end = %p (%d) exit 1\n",
    - cls, con, tag, end, *end);
+   cifs_dbg(FYI, "cls = %d con = %d tag = %d end = %p exit 1\n",
      + cls, con, tag, end);
    return 0;
  }
@@ -563,8 +563,8 @@
return 0;
} else if ((cls != ASN1_CTX) || (con != ASN1_CON)
  || (tag != ASN1_EOC)) {
-cifs_dbg(FYI, "cls = %d con = %d tag = %d end = %p (%d) exit 0\n",
    cls, con, tag, end, *end);
+\tcifs_dbg(FYI, "cls = %d con = %d tag = %d end = %p exit 0\n",
+    cls, con, tag, end);
return 0;
}

@@ -575,8 +575,8 @@
return 0;
} else if ((cls != ASN1ungi) || (con != ASN1_CON)
    || (tag != ASN1_SEQ)) {
-\tcifs_dbg(FYI, "cls = %d con = %d tag = %d end = %p (%d) exit 1\n",
-    cls, con, tag, end, *end);
+\tcifs_dbg(FYI, "cls = %d con = %d tag = %d sequence_end = %p exit 1\n",
+    cls, con, tag, sequence_end);
return 0;
}

--- linux-4.15.0.orig/fs/cifs/cifs_debug.c
+++ linux-4.15.0/fs/cifs/cifs_debug.c
@@ -107,6 +107,32 @@
}

#ifdef CONFIG_PROC_FS
+static void cifs_debug_tcon(struct seq_file *m, struct cifs_tcon *tcon)
+{
+    __u32 dev_type = le32_to_cpu(tcon->fsDevInfo.DeviceType);
+
+    seq_printf(m, "%s Mounts: %d ", tcon->treeName, tcon->tc_count);
+    if (tcon->nativeFileSystem)
+        seq_printf(m, "Type: %s ", tcon->nativeFileSystem);
+    seq_printf(m, "DevInfo: 0x%x Attributes: 0x%x\nPathComponentMax: %d Status: %d",
+        le32_to_cpu(tcon->fsDevInfo.DeviceCharacteristics),
+        le32_to_cpu(tcon->fsAttrInfo.Attributes),
+        le32_to_cpu(tcon->fsAttrInfo.MaxPathNameComponentLength),
+        tcon->tidStatus);
+    if (dev_type == FILE_DEVICE_DISK)
+        seq_puts(m, " type: DISK ");
+    else if (dev_type == FILE_DEVICE_CD_ROM)
+        seq_puts(m, " type: CDROM ");
+    else
+        seq_printf(m, " type: %d ", dev_type);
+    if (tcon->ses->server->ops->dump_share_caps)
+        tcon->ses->server->ops->dump_share_caps(m, tcon);
+    +
+    +if (tcon->need_reconnect)
+        seq_puts(m, "\nDISCONNECTED ");
+    seq_putc(m, '\n');
static int cifs_debug_data_proc_show(struct seq_file *m, void *v)
{
    struct list_head *tmp1, *tmp2, *tmp3;
    struct cifs_ses *ses;
    struct cifs_tcon *tcon;
    int i, j;
    __u32 dev_type;

    seq_puts(m,
"Display Internal CIFS Data Structures for Debugging\n"
    seq_printf(m, "CIFS Version %s\n", CIFS_VERSION);
    #ifdef CONFIG_CIFS_DFS_UPCALL
    -seq_printf(m, " dfs");
    +seq_printf(m, " DFS");
    #endif
    #ifdef CONFIG_CIFS_FSCACHE
    -seq_printf(m, " fscache");
    +seq_printf(m, ",FSCACHE");
    +#endif
    +#ifdef CONFIG_CIFS_SMB_DIRECT
    +seq_printf(m, ",SMB_DIRECT");
    +#endif
    +#ifdef CONFIG_CIFS_STATS2
    +seq_printf(m, ",STATS2");
    +#elif defined(CONFIG_CIFS_STATS)
    +seq_printf(m, ",STATS");
    +#endif
    +#ifdef CONFIG_CIFS_DEBUG2
    +seq_printf(m, ",DEBUG2");
    +#elif defined(CONFIG_CIFS_DEBUG)
    +seq_printf(m, ",DEBUG");
    +#endif
    +#ifdef CONFIG_CIFS_ALLOW_INSECURE_LEGACY
    +seq_printf(m, ",ALLOW_INSECURE_LEGACY");
    +#endif
    +#ifdef CONFIG_CIFS_WEAK_PW_HASH
    -seq_printf(m, " lanman");
    +seq_printf(m, ",WEAK_PW_HASH");
    +#endif
    +#ifdef CONFIG_CIFS_POSIX
    -seq_printf(m, " posix");
    +seq_printf(m, ",CIFS_POSIX");
    +#endif
}
#ifdef CONFIG_CIFS_UPCALL
-seq_printf(m, " spnego");
+seq_printf(m, ",UPCALL(SPNEGO)");
#endif

#ifdef CONFIG_CIFS_XATTR
-seq_printf(m, " xattr");
+seq_printf(m, ",XATTR");
#endif

#ifdef CONFIG_CIFS_ACL
-seq_printf(m, " acl");
+seq_printf(m, ",ACL");
#endif

seq_putc(m, '\n');
seq_printf(m, "Active VFS Requests: %d
", GlobalTotalActiveXid);
@@ -189,35 +230,19 @@

seq_puts(m, "\n\tShares:");
j = 0;
+
+seq_printf(m, "\n\t%d) IPC: ", j);
+if (ses->tcon_ipc)
+cifs_debug_tcon(m, ses->tcon_ipc);
+else
+seq_puts(m, "none
");
+
list_for_each(tmp3, &ses->tcon_list) {
  tcon = list_entry(tmp3, struct cifs_tcon,
                   tcon_list);
  ++j;
  -dev_type = le32_to_cpu(tcon->fsDevInfo.DeviceType);
  -seq_printf(m, "\n\t%d) %s Mounts: %d ", j,
           -tcon->treeName, tcon->tc_count);
  -if (tcon->nativeFileSystem) {
    -seq_printf(m, "Type: %s",
               -tcon->nativeFileSystem);
    -seq_printf(m, "DevInfo: 0x%x Attributes: 0x%x"
               -"\n\tPathComponentMax: %d Status: %d",
               -le32_to_cpu(tcon->fsDevInfo.DeviceCharacteristics),
               -le32_to_cpu(tcon->fsAttrInfo.Attributes),
               -le32_to_cpu(tcon->fsAttrInfo.MaxPathNameComponentLength),
               -tcon->tidStatus);
    -if (dev_type == FILE_DEVICE_DISK)
      -seq_puts(m, " type: DISK ");
    -else if (dev_type == FILE_DEVICE_CD_ROM)
      -seq_puts(m, " type: CDROM ");
    -else
      -seq_printf(m, " type: %d", dev_type);
  }
if (server->ops->dump_share_caps)
-server->ops->dump_share_caps(m, tcon);
-
-if (tcon->need_reconnect)
-seq_puts(m, "\tDISCONNECTED ");
-seq_puts(m, 'n');
+seq_printf(m, "\n\t%d) ", j);
+cifs_debug_tcon(m, tcon);
}

seq_puts(m, "\n\tMIDs:");
@ @ -273,6 +298,13 @@
atomic_set(&totBufAllocCount, 0);
atomic_set(&totSmBufAllocCount, 0);
#endif /* CONFIG_CIFS_STATS2 */
+atomic_set(&tcpSesReconnectCount, 0);
+atomic_set(&tconInfoReconnectCount, 0);
+
+spin_lock(&GlobalMid_Lock);
+GlobalMaxActiveXid = 0;
+GlobalCurrentXid = 0;
+spin_unlock(&GlobalMid_Lock);
spin_lock(&cifs_tcp_ses_lock);
list_for_each(tmp1, &cifs_tcp_ses_list) {
server = list_entry(tmp1, struct TCP_Server_Info,
@ @ -285,6 +317,10 @@
struct cifs_tcon,
tcon_list);
atomic_set(&tcon->num_smbs_sent, 0);
+spin_lock(&tcon->stat_lock);
+tcon->bytes_read = 0;
+spin_unlock(&tcon->stat_lock);
if (server->ops->clear_stats)
server->ops->clear_stats(tcon);
}
--- linux-4.15.0.orig/fs/cifs/cifs_dfs_ref.c
+++ linux-4.15.0/fs/cifs/cifs_dfs_ref.c
@@ -271,9 +271,9 @@
{
  cifs_dbg(FYI, "DFS: ref path: %s\n", ref->path_name);
  cifs_dbg(FYI, "DFS: node path: %s\n", ref->node_name);
-  cifs_dbg(FYI, "DFS: fl: %hd, srv_type: %hd\n" ,
+  cifs_dbg(FYI, "DFS: fl: %d, srv_type: %d\n",
    ref->flags, ref->server_type);
-  cifs_dbg(FYI, "DFS: ref_flags: %hd, path_consumed: %hd\n",
+  cifs_dbg(FYI, "DFS: ref_flags: %d, path_consumed: %d\n",
    ref->ref_flag, ref->path_consumed);
struct delayed_work prune_tlinks;
struct rcu_head rcu;
char *prepath;

/*
 * Indicate whether serverino option was turned off later
 * (cifs_autodisable_serverino) in order to match new mounts.
 */
bool mnt_cifs_serverino_autodisabled;

};
#endif /* _CIFS_FS_SB_H */

--- linux-4.15.0.orig/fs/cifs/cifs_spnego.c
+++ linux-4.15.0/fs/cifs/cifs_spnego.c
@@ -147,8 +147,10 @@
     sprintf(dp, ";sec=krb5");
 else if (server->sec_mskerberos)
     sprintf(dp, ";sec=mskrb5");
-else
-    goto out;
+else {
+cifs_dbg(VFS, "unknown or missing server auth type, use krb5\n");
+sprintf(dp, ";sec=krb5");
 +}

 dp = description + strlen(description);
 sprintf(dp, ";uid=0x%x",
--- linux-4.15.0.orig/fs/cifs/cifs_unicode.c
+++ linux-4.15.0/fs/cifs/cifs_unicode.c
@@ -105,9 +105,6 @@
      case SFM_SLASH:
      *target = '\';
      break;
-      case SFM_LESSTHAN:
-      *target = '<';
-      break;
  case SFM_LESS_THAN:
      *target = '<';
      break;
-      case SFM_SPACE:
-      *target = ' ';
-      break;
      case SFM_SPACE:  
      *target = ' ';
      break;
      if (!dst)
          return NULL;
cifs_from_utf16(dst, (__le16 *) src, len, maxlen, codepage,
-            NO_MAP_UNI_RSVD);
+            NO_MAP_UNI_RSVD);
} else {
- len = strnlen(src, maxlen);
- len++;
- dst = kmalloc(len, GFP_KERNEL);
- if (!dst)
- return NULL;
- strlcpy(dst, src, len);
+ dst = kstrndup(src, maxlen, GFP_KERNEL);
} 

return dst;
@@ -504,7 +496,13 @@
else if (map_chars == SFM_MAP_UNI_RSVD) {
 bool end_of_string;

- if (i == srclen - 1)
+/**
+ * Remap spaces and periods found at the end of every
+ * component of the path. The special cases of '.' and
+ * '..' do not need to be dealt with explicitly because
+ * they are addressed in namei.c:link_path_walk().
+ **/
+ if ((i == srclen - 1) || (source[i+1] == '\'))
end_of_string = true;
else
end_of_string = false;
--- linux-4.15.0.orig/fs/cifs/cifsacl.c
+++ linux-4.15.0/fs/cifs/cifsacl.c
@@ -603,7 +603,7 @@
((flags & FILE_EXEC_RIGHTS) == FILE_EXEC_RIGHTS))
*pmode |= (S_IXUGO & (*pbits_to_set));
- cifs_dbg(NOISY, "access flags 0x%x mode now 0x%x\n", flags, *pmode);
+ cifs_dbg(NOISY, "access flags 0x%x mode now %04o\n", flags, *pmode);
return;
}
@@ -632,7 +632,7 @@
if (mode & S_IXUGO)
*pace_flags |= SET_FILE_EXEC_RIGHTS;
- cifs_dbg(NOISY, "mode: 0x%x, access flags now 0x%x\n",
+ cifs_dbg(NOISY, "mode: %04o, access flags now 0x%x\n",
    mode, *pace_flags);
return;
} 
--- linux-4.15.0.orig/fs/cifs/cifsacl.h
+++ linux-4.15.0/fs/cifs/cifsacl.h
struct cifs_sid sid; /* ie UUID of user or group who gets these perms */
} __attribute__((packed));

/*
 * Minimum security identifier can be one for system defined Users
 * and Groups such as NULL SID and World or Built-in accounts such
 * as Administrator and Guest and consists of
 * Revision + Num (Sub)Auths + Authority + Domain (one Subauthority)
 */
#define MIN_SID_LEN (1 + 1 + 6 + 4) /* in bytes */
+
/+*
+ * Minimum security descriptor can be one without any SACL and DACL and can
+ * consist of revision, type, and two sids of minimum size for owner and group
 +*/
+*#
define MIN_SEC_DESC_LEN (sizeof(struct cifs_ntsd) + (2 * MIN_SID_LEN))
+
#endif /* _CIFSACL_H */
--- linux-4.15.0.orig/fs/cifs/cifsencrypt.c
+++ linux-4.15.0/fs/cifs/cifsencrypt.c
@@ -98,4 +98,18 @@
struct cifs_sid sid; /* ie UUID of user or group who gets these perms */
} __attribute__((packed));

/*
 * Minimum security identifier can be one for system defined Users
 * and Groups such as NULL SID and World or Built-in accounts such
 * as Administrator and Guest and consists of
 * Revision + Num (Sub)Auths + Authority + Domain (one Subauthority)
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define MIN_SEC_DESC_LEN (sizeof(struct cifs_ntsd) + (2 * MIN_SID_LEN))
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#endif /* _CIFSACL_H */
--- linux-4.15.0.orig/fs/cifs/cifsencrypt.c
+++ linux-4.15.0/fs/cifs/cifsencrypt.c
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/*
 * Minimum security identifier can be one for system defined Users
 * and Groups such as NULL SID and World or Built-in accounts such
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#define MIN_SID_LEN (1 + 1 + 6 + 4) /* in bytes */
+
/+*
+ * Minimum security descriptor can be one without any SACL and DACL and can
 + * consist of revision, type, and two sids of minimum size for owner and group
 + */
+*#
define MIN_SEC_DESC_LEN (sizeof(struct cifs_ntsd) + (2 * MIN_SID_LEN))
+
#endif /* _CIFSACL_H */
int __cifs_calc_signature(struct smb_rqst *rqst, struct TCP_Server_Info *server, char *signature, struct shash_desc *shash)
{
    if (!rqst->rq_iov || !signature || !server)
        return -EINVAL;

    if (!server->secmech.sdescmd5) {
        int rc = cifs_crypto_shash_md5_allocate(server);
        if (rc)
            return -1;
    }

    int rc = cifs_alloc_hash("md5", &server->secmech.md5,
                          &server->secmech.sdescmd5);
    if (rc)
        return -1;

    rc = crypto_shash_init(&server->secmech.sdescmd5->shash);
    if (rc) {
        @ @ -325,9 +291,8 @@
        int i;
        int rc;
        -char password_with_pad[CIFS_ENCPWD_SIZE];
        +char password_with_pad[CIFS_ENCPWD_SIZE] = {0};

        memset(password_with_pad, 0, CIFS_ENCPWD_SIZE);
        if (password)
            strncpy(password_with_pad, password, CIFS_ENCPWD_SIZE);

        @ @ -664,37 +629,6 @@
        return rc;
    }

    -static int crypto_hmacmd5_alloc(struct TCP_Server_Info *server)
    -{
      -int rc;
      -unsigned int size;
- /* check if already allocated */
- if (server->secmech.sdeschmacmd5)
- return 0;
-
- server->secmech.hmacmd5 = crypto_alloc_sha3("hmac(md5)", 0, 0);
- if (IS_ERR(server->secmech.hmacmd5)) {  
- cifs_dbg(VFS, "could not allocate crypto hmacmd5\n");
- rc = PTR_ERR(server->secmech.hmacmd5);
- server->secmech.hmacmd5 = NULL;
- return rc;
- }
-
- size = sizeof(struct shash_desc) +
- crypto_shash_descsize(server->secmech.hmacmd5);
- server->secmech.sdeschmacmd5 = kmalloc(size, GFP_KERNEL);
- if (!server->secmech.sdeschmacmd5) {
- crypto_free_sha3(server->secmech.hmacmd5);
- server->secmech.hmacmd5 = NULL;
- return -ENOMEM;
- }
- server->secmech.sdeschmacmd5->shash.tfm = server->secmech.hmacmd5;
- server->secmech.sdeschmacmd5->shash.flags = 0x0;
-
- return 0;
-
-
int setup_nltmv2_rsp(struct cifs_ses *ses, const struct nls_table *nls_cp)
{
  @@ -758,9 +692,10 @@
mutex_lock(&ses->server->srv_mutex);
-
-rc = crypto_hmacmd5_alloc(ses->server);
+rc = cifs_alloc_hash("hmac(md5)",
 +     &ses->server->secmech.hmacmd5,
 +     &ses->server->secmech.sdeschmacmd5);
 if (rc) {
- cifs_dbg(VFS, "could not crypto alloc hmacmd5 rc %d\n", rc);
+ goto unlock;
}  

 @@ -894,6 +829,11 @@
 server->secmech.md5 = NULL;
 }
+
+if (server->secmech.sha512) {


crypto_free_shash(server->secmech.sha512);
s++server->secmech.sha512 = NULL;
+
if (server->secmech.hmacmd5) {
    crypto_free_shash(server->secmech.hmacmd5);
s++server->secmech.hmacmd5 = NULL;
}@@ -917,4 +857,6 @@
s++server->secmech.sdeschmacmd5 = NULL;
kfree(server->secmech.sdescmd5);
s++server->secmech.sdescmd5 = NULL;
+s++kfree(server->secmech.sdescsha512);
s++server->secmech.sdescsha512 = NULL;
}
--- linux-4.15.0.orig/fs/cifs/cifsfs.c
+++ linux-4.15.0/fs/cifs/cifsfs.c
@@ -197,14 +197,16 @@
xid = get_xid();

-/*
- * PATH_MAX may be too long - it would presumably be total path,
- * but note that some servers (including Samba 3) have a shorter
- * maximum path.
- *
- * Instead could get the real value via SMB_QUERY_FS_ATTRIBUTE_INFO.
- */
-buf->f_namelen = PATH_MAX;
+if (le32_to_cpu(tcon->fsAttrInfo.MaxPathNameComponentLength) > 0)
  +buf->f_namelen =
  +     le32_to_cpu(tcon->fsAttrInfo.MaxPathNameComponentLength);
+else
  +buf->f_namelen = PATH_MAX;
+
  +buf->f_fsid.val[0] = tcon->vol_serial_number;
+/* are using part of create time for more randomness, see man statfs */
  +buf->f_fsid.val[1] = (int)le64_to_cpu(tcon->vol_create_time);
+
  buf->f_files = 0;/* undefined */
  buf->f_ffree = 0;/* unlimited */

@@ -212,7 +214,7 @@
rc = server->ops->queryfs(xid, tcon, buf);

free_xid(xid);
-return 0;
+return rc;
}
static long cifs_fallocate(struct file *file, int mode, loff_t off, loff_t len)
@@ -275,6 +277,7 @@
cifs_inode->uniqueid = 0;
cifs_inode->createtime = 0;
cifs_inode->epoch = 0;
+spin_lock_init(&cifs_inode->open_file_lock);
generate_random_uuid(cifs_inode->lease_key);
/*
@@ -408,6 +411,8 @@
cifs_show_security(s, tcon->ses);
cifs_show_cache_flavor(s, cifs_sb);

+if (tcon->no_lease)
+seq_puts(s, ",nolease");
if (cifs_sb->mnt_cifs_flags & CIFS_MOUNT_MULTIUSER)
+seq_puts(s, ",multiuser");
else if (tcon->ses->user_name)
@@ -931,8 +936,8 @@
struct inode *src_inode = file_inode(src_file);
struct inode *target_inode = file_inode(dst_file);
struct cifsFileInfo *smb_file_src = src_file->private_data;
-struct cifsFileInfo *smb_file_target = dst_file->private_data;
-struct cifs_tcon *target_tcon = tlink_tcon(smb_file_target->tlink);
+struct cifsFileInfo *smb_file_target;
+struct cifs_tcon *target_tcon;
unsigned int xid;
int rc;
@@ -946,6 +951,9 @@
goto out;
}
+smb_file_target = dst_file->private_data;
+target_tcon = tlink_tcon(smb_file_target->tlink);
+
/*
* Note: cifs case is easier than btrfs since server responsible for
* checks for proper open modes and file type and if it wants
@@ -1045,6 +1053,18 @@
return rc;
}
+/*
+ * Directory operations under CIFS/SMB2/SMB3 are synchronous, so fsync()
+ * is a dummy operation.
+ */
+static int cifs_dir_fsync(struct file *file, loff_t start, loff_t end, int datasync)
+
+cifs_dbg(FYI, "Sync directory - name: %pD datasync: 0x%x\n",
+ file, datasync);
+
+return 0;
+}
+
+static ssize_t cifs_copy_file_range(struct file *src_file, loff_t off,
+struct file *dst_file, loff_t destoff,
+size_t len, unsigned int flags)
@@ -1173,6 +1193,7 @@
+.copy_file_range = cifs_copy_file_range,
+.clone_file_range = cifs_clone_file_range,
+.llseek = generic_file_llseek,
+.fsync = cifs_dir_fsync,
+};

static void
@@ -1476,6 +1497,7 @@
MODULE_SOFTDEP("pre: aes");
MODULE_SOFTDEP("pre: cmac");
MODULE_SOFTDEP("pre: sha256");
+MODULE_SOFTDEP("pre: sha512");
MODULE_SOFTDEP("pre: aead2");
MODULE_SOFTDEP("pre: ccm");
module_init(init_cifs)
--- linux-4.15.0.orig/fs/cifs/cifsglob.h
+++ linux-4.15.0/fs/cifs/cifsglob.h
@@ -64,8 +64,8 @@
#define RFC1001_NAME_LEN 15
#define RFC1001_NAME_LEN_WITH_NULL (RFC1001_NAME_LEN + 1)

-/* currently length of NIP6_FMT */
-#define SERVER_NAME_LENGTH 40
+/* maximum length of ip addr as a string (including ipv6 and sctp) */
+#define SERVER_NAME_LENGTH 80

#define SERVER_NAME_LEN_WITH_NULL (SERVER_NAME_LENGTH + 1)

/* echo interval in seconds */
@@ -130,10 +130,12 @@
 struct crypto_shash *md5; /* md5 hash function */
 struct crypto_shash *hmacsha256; /* hmac-sha256 hash function */
 struct crypto_shash *cmacaes; /* block-cipher based MAC function */
+struct crypto_shash *sha512; /* sha512 hash function */
 struct sdesc *sdeschmacmd5; /* ctxt to generate ntlmv2 hash, CR1 */
 struct sdesc *sdescmd5; /* ctxt to generate cifs/smb signature */
 struct sdesc *sdeschmacsha256; /* ctxt to generate smb2 signature */
struct sdesc *sdescmmacae; /*ctxt to generate smb3 signature*/
+struct sdesc *sdescsha512; /*ctxt to generate smb3.11 signing key*/
struct crypto_aead *ccmaesencrypt; /*smb3 encryption aead*/
struct crypto_aead *ccmaesdecrypt; /*smb3 decryption aead*/
}
@@ -244,8 +246,9 @@
int (*check_message)(char *, unsigned int, struct TCP_Server_Info *);
bool (*is_oplock_break)(char *, struct TCP_Server_Info *);
int (*handle_cancelled_mid)(char *, struct TCP_Server_Info *);
   -void (*downgrade_oplock)(struct TCP_Server_Info *,
   - struct cifsInodeInfo *, bool);
+ void (*downgrade_oplock)(struct TCP_Server_Info *server,
+ struct cifsInodeInfo *cinode, __u32 oplock,
+ unsigned int epoch, bool *purge_cache);
/* process transaction2 response */
bool (*check_trans2)(struct mid_q_entry *, struct TCP_Server_Info *,
   char *, int);
@@ -523,6 +526,7 @@
bool noblocksnd:1;
bool noautotune:1;
bool nostrictsync:1; /* do not force expensive SMBflush on every sync*/
+bool no leases:1; /* disable requesting leases*/
bool fsc:1;/* enable fscache*/
bool mfsymlinks:1; /* use Minshall+French Symlinks*/
bool multiuser:1;
@@ -822,12 +826,12 @@
    struct cifs_ses {
    struct list_head smb_ses_list;
    struct list_head tcon_list;
    +struct cifs_tcon *tcon_ipc;
    struct mutex session_mutex;
    struct TCP_Server_Info *server;/* pointer to server info*/
    int ses_count;/* reference counter*/
    enum statusEnum status;
    unsigned overrideSecFlg; /* if non-zero override global sec flags*/
    -__u32 ipc_tid;/* special tid for connection to IPC share*/
    char *serverOS;/* name of operating system underlying server*/
    char *serverNOS;/* name of network operating system of server*/
    char *serverDomain;/* security realm of server*/
    @ @ -835,8 +839,7 @@
    kuid_t linux_uid;/* overriding owner of files on the mount*/
    kuid_t cred_uid;/* owner of credentials*/
    unsigned int capabilities;
    -char *serverName[SERVER_NAME_LEN_WITH_NULL * 2];/* BB make bigger for
    -TCP names - will ipv6 and scpt addresses fit? */
    +char *serverName[SERVER_NAME_LEN_WITH_NULL];
    char *user_name;/* must not be null except during init of sess
    and after mount option parsing we fill it*/
char *domainName;
@@ -931,7 +934,9 @@
 FILE_SYSTEM_DEVICE_INFO fsDevInfo;
 FILE_SYSTEM_ATTRIBUTE_INFO fsAttrInfo; /* ok if fs name truncated */
 FILE_SYSTEM_UNIX_INFO fsUnixInfo;
-bool ipc:1; /* set if connection to IPC$ eg for RPC/Pipes */
+bool ipc:1; /* set if connection to IPC$ share (always also pipe) */
+bool pipe:1; /* set if connection to pipe share */
+bool print:1; /* set if connection to printer share */
bool retry:1;
bool nocase:1;
bool seal:1; /* transport encryption for this mounted share */
@@ -944,7 +949,7 @@
 bool need_reopen_files:1; /* need to reopen tcon file handles */
 bool use_resilient:1; /* use resilient instead of durable handles */
 bool usePersistent:1; /* use persistent instead of durable handles */
-bool print:1; /* set if connection to printer share */
+bool no_lease:1; /* Do not request leases on files or directories */
 __le32 capabilities;
 __u32 share_flags;
 __u32 maximal_access;
@@ -1090,6 +1095,8 @@
 unsigned int f_flags;
 bool invalidHandle:1; /* file closed via session abend */
 bool oplock_break_cancelled:1;
+unsigned int oplock_epoch; /* epoch from the lease break */
+__u32 oplock_level; /* oplock/lease level from the lease break */
 int count;
 spinlock_t file_info_lock; /* protects four flag/count fields above */
 struct mutex fh_mutex; /* prevents reopen race after dead ses*/
@@ -1207,15 +1215,21 @@
 struct cifsFileInfo *cifsFileInfo_get(struct cifsFileInfo *cifs_file);
 +void _cifsFileInfo_put(struct cifsFileInfo *cifs_file, bool wait_oplock_hdlr);
 void cifsFileInfo_put(struct cifsFileInfo *cifs_file);
#define CIFS_CACHE_READ_FLG	1
}
/* BB add in lists for dirty pages i.e. write caching info for oplock */
struct list_head openFileList;
+spinlock_open_file_lock;/* protects openFileList */
__u32 cifAttrs; /* e.g. DOS archive bit, sparse, compressed, system */
unsigned int oplock; /* oplock/lease level we have */
unsigned int epoch; /* used to track lease state changes */
#define CIFS_INODE_PENDING_OPLOCK_BREAK (0) /* oplock break in progress */
define CIFS_INODE_PENDING_WRITERS (1) /* Writes in progress */
-define CIFS_INODE_PENDING_OPLOCK_TO_L2 (2) /* Downgrade oplock to L2 */
+#define CIFS_INODE_FLAG_UNUSED (2) /* Unused flag */
define CIFS_INODE_DELETE_PENDING (3) /* delete pending on server */
define CIFS_INO_INVALID_MAPPING (4) /* pagecache is invalid */
define CIFS_INO_LOCK (5) /* lock bit for synchronization */
@@ -1338,6 +1352,7 @@
/* one of these for every pending CIFS request to the server */
struct mid_q_entry {
    struct list_head qhead; /* mids waiting on reply from this server */
    +struct kref refcount;
    struct TCP_Server_Info *server; /* server corresponding to this mid */
    __u64 mid; /* multiplex id */
    __u32 pid; /* process id */
@@ -1449,6 +1464,7 @@
define CIFS_FATTR_NEED_REVAL (0x4)
define CIFS_FATTR_INO_COLLISION (0x8)
define CIFS_FATTR_UNKNOWN_NLINK (0x10)
+define CIFS_FATTR_FAKE_ROOT_INO (0x20)
struct cifs_fattr {
    u32 cf_flags;
    @@ -1490,6 +1506,25 @@
kfree(param);
}
+static inline bool is_interrupt_error(int error) {
+    +switch (error) {
+    +case -EINTR:
+    +case -ERESTARTSYS:
+    +case -ERESTARTNOHAND:
+    +case -ERESTARTNOINTR:
+    +return true;
+    +}
+    +return false;
+    +}
+static inline bool is_retryable_error(int error) {
+if (is_interrupt_error(error) || error == -EAGAIN)
+return true;
+return false;
+
+#define MID_FREE 0
+#define MID_REQUEST_ALLOCATED 1
+#define MID_REQUEST_SUBMITTED 2
@@ -1594,10 +1629,14 @@
*tcp_ses_lock protects:
+ *list operations on tcp and SMB session lists
+ *tcon->open_file_lock protects the list of open files hanging off the tcon
+ *inode->open_file_lock protects the openFileList hanging off the inode
+ *cfile->file_info_lock protects counters and fields in cifs file struct
+ *f_owner.lock protects certain per file struct operations
+ *mapping->page_lock protects certain per page operations
+
+ * Note that the cifs_tcon.open_file_lock should be taken before
+ * not after the cifsInodeInfo.open_file_lock
+
+ * Semaphores
+ * ---------
+ * sesSem operations on smb session
@@ -1689,6 +1728,7 @@
#endif /* CONFIG_CIFS_ACL */

void cifs_oplock_break(struct work_struct *work);
+void cifs_queue_oplock_break(struct cifsFileInfo *cfile);

extern const struct slow_work_ops cifs_oplock_break_ops;
extern struct workqueue_struct *cifsiod_wq;
--- linux-4.15.0.orig/fs/cifs/cifsproto.h
+++ linux-4.15.0/fs/cifs/cifsproto.h
@@ -76,6 +76,7 @@
struct TCP_Server_Info *server);
extern void DeleteMidQEntry(struct mid_q_entry *midEntry);
extern void cifs_delete_mid(struct mid_q_entry *mid);
+extern void cifs_mid_q_entry_release(struct mid_q_entry *midEntry);
extern void cifs_wake_up_task(struct mid_q_entry *mid);
extern int cifs_handle_standard(struct TCP_Server_Info *server,
   struct mid_q_entry *mid);
@@ -148,6 +149,7 @@
   struct file_lock *flock, const unsigned int xid);
extern int cifs_push_mandatory_locks(struct cifsFileInfo *cfile);

+extern void cifs_down_write(struct rw_semaphore *sem);
extern struct cifsFileInfo *cifs_new_fileinfo(struct cifs_fid *fid,
   struct file *file,
   struct tcon_link *tlink,
struct cifs_aio_ctx *cifs_aio_ctx_alloc(void);
void cifs_aio_ctx_release(struct kref *refcount);
int setup_aio_ctx_iter(struct cifs_aio_ctx *ctx, struct iov_iter *iter, int rw);
+int cifs_alloc_hash(const char *name, struct crypto_shash **shash,
+struct sdesc **sdesc);
+void cifs_free_hash(struct crypto_shash **shash, struct sdesc **sdesc);
+
#endif			/* _CIFSPROTO_H */
--- linux-4.15.0.orig/fs/cifs/cifssmb.c
+++ linux-4.15.0/fs/cifssmb.c
@@ -150,8 +150,14 @@

 while (server->tcpStatus == CifsNeedReconnect) {
-\t	wait_event_interruptible_timeout(server->response_q,
-\t		(server->tcpStatus != CifsNeedReconnect), 10 * HZ);
+\t	rc = wait_event_interruptible_timeout(server->response_q,
+\t					(server->tcpStatus != CifsNeedReconnect),
+\t					10 * HZ);
+\t	if (rc < 0) {
+\t\tcifs_dbg(FYI, "%s: aborting reconnect due to a received"
+\t\t" signal by the process", __func__);  
+\t\treturn -ERESTARTSYS;
+\t}

 /* are we still trying to reconnect? */
 if (server->tcpStatus != CifsNeedReconnect)
@@ -583,10 +589,15 @@

 count = 0;
+/*
+ * We know that all the name entries in the protocols array
+ * are short (< 16 bytes anyway) and are NUL terminated.
+ */
 for (i = 0; i < CIFS_NUM_PROT; i++) {
-\t\tstrncpy(pSMB->DialectsArray+count, protocols[i].name, 16);
-\t\tcount += strlen(protocols[i].name) + 1;
-\t/* null at end of source and target buffers anyway */
-\t\tsize_t len = strlen(protocols[i].name) + 1;
-\t\tmemcpy(pSMB->DialectsArray+count, protocols[i].name, len);
+\t\tinc_rfc1001_len(pSMB, count);
+\t\tpSMB->ByteCount = cpu_to_le16(count);
```
static int
-cifs_readv_discard(struct TCP_Server_Info *server, struct mid_q_entry *mid)
+__cifs_readv_discard(struct TCP_Server_Info *server, struct mid_q_entry *mid,
+     bool malformed)
{
    int length;
-struct cifs_readdata *rdata = mid->callback_data;

    length = cifs_discard_remaining_data(server);
- dequeue_mid(mid, rdata->result);
+ dequeue_mid(mid, malformed);
    mid->resp_buf = server->smallbuf;
    server->smallbuf = NULL;
    return length;
}

+static int
+cifs_readv_discard(struct TCP_Server_Info *server, struct mid_q_entry *mid)
+
+{ +
    +struct cifs_readdata *rdata = mid->callback_data;
    +
    +return __cifs_readv_discard(server, mid, rdata->result);
    +}
+
int
cifs_readv_receive(struct TCP_Server_Info *server, struct mid_q_entry *mid)
{
     return -1;
}

+/* set up first two iov for signature check and to get credits */
+rdata->iov[0].iov_base = buf;
+rdata->iov[0].iov_len = 4;
+rdata->iov[1].iov_base = buf + 4;
+rdata->iov[1].iov_len = server->total_read - 4;
+cifs_dbg(FYI, "0: iov_base=%p iov_len=%zu\n",
+     rdata->iov[0].iov_base, rdata->iov[0].iov_len);
+cifs_dbg(FYI, "1: iov_base=%p iov_len=%zu\n",
+     rdata->iov[1].iov_base, rdata->iov[1].iov_len);
+
/* Was the SMB read successful? */
rdata->result = server->ops->map_error(buf, false);
if (rdata->result != 0) {
    cifs_dbg(FYI, "%s: server returned error %d\n",
__func__, rdata->result);
-return cifs_readv_discard(server, mid);
+/* normal error on read response */
+return __cifs_readv_discard(server, mid, false);
}

/* Is there enough to get to the rest of the READ_RSP header? */
@@ -1533,14 +1563,6 @@
 server->total_read += length;
 }

-/* set up first iov for signature check */
-rdata->iov[0].iov_base = buf;
-rdata->iov[0].iov_len = 4;
-rdata->iov[1].iov_base = buf + 4;
-rdata->iov[1].iov_len = server->total_read - 4;
-cifs_dbg(FYI, "0: iov_base=%p iov_len=%u\n",
 - rdata->iov[0].iov_base, server->total_read);
-
-/* how much data is in the response? */
data_len = server->ops->read_data_length(buf);
if (data_offset + data_len > buflen) {
@@ -1985,26 +2007,28 @@
 wdata2->cfile = find_writable_file(CIFS_I(inode), false);
 if (!wdata2->cfile) {
 -cifs_dbg(VFS, "No writable handles for inode\n");
 +cifs_dbg(VFS, "No writable handle to retry writepages\n");
 rc = -EBADF;
 -break;
 +} else {
+wdata2->pid = wdata2->cfile->pid;
+rc = server->ops->async_writev(wdata2,
+ cifs_writedata_release);
 }
-wdata2->pid = wdata2->cfile->pid;
-rc = server->ops->async_writev(wdata2, cifs_writedata_release);

 for (j = 0; j < nr_pages; j++) {
 unlock_page(wdata2->pages[j]);
-if (rc != 0 && & rc != -EAGAIN) {
+if (rc != 0 && !is_retryable_error(rc)) {
 SetPageError(wdata2->pages[j]);
 end_page_writeback(wdata2->pages[j]);
 put_page(wdata2->pages[j]);
 }
 }
+kref_put(&wdata2->refcount, cifs_writedata_release);
if (rc) {
-kref_put(&wdata2->refcount, cifs_writedata_release);
-if (rc == -EAGAIN)
+if (is_retryable_error(rc))
    continue;
+i += nr_pages;
    break;
}

@@ -2012,7 +2036,15 @@
i += nr_pages;
} while (i < wdata->nr_pages);

-mapping_set_error(inode->i_mapping, rc);
+/* cleanup remaining pages from the original wdata */
+for (; i < wdata->nr_pages; i++) {
+    SetPageError(wdata->pages[i]);
+    end_page_writeback(wdata->pages[i]);
+    put_page(wdata->pages[i]);
+} 
+ 
+if (rc != 0 && !is_retryable_error(rc))
+    mapping_set_error(inode->i_mapping, rc);
    kref_put(&wdata->refcount, cifs_writedata_release);
}

@@ -4822,10 +4854,11 @@
*target_nodes = NULL;

cifs_dbg(FYI, "In GetDFSRefer the path %s\n", search_name);
-if (ses == NULL) 
+if (ses == NULL || ses->tcon_ipc == NULL)
    return -ENODEV;
getDFSRetry:
-rc = smb_init(SMB_COM_TRANSACTION2, 15, NULL, (void **) &pSMB,
+rc = smb_init(SMB_COM_TRANSACTION2, 15, ses->tcon_ipc, (void **) &pSMB,
    (void **) &pSMBr);
if (rc) 
    return rc;
@@ -4833,7 +4866,7 @@
/* server pointer checked in called function, 
but should never be null here anyway */
    pSMB->hdr.Mid = get_next_mid(ses->server);
-    pSMB->hdr.Tid = ses->ipc_tid;
+    pSMB->hdr.Tid = ses->tcon_ipc->tid;
    pSMB->hdr.Uid = ses->Suid;

if (ses->capabilities & CAP_STATUS32)
pSMB->hdr.Flags2 |= SMBFLG2_ERR_STATUS;
@@ -6331,9 +6364,7 @@
pSMB->InformationLevel =
cpu_to_le16(SMB_SET_FILE_EA);

-param_data =
-(struct realist *) (((char *) &pSMB->hdr.Protocol) +
- offset);
+parm_data = (void *)pSMB + offsetof(struct smb_hdr, Protocol) + offset;
pSMB->ParameterOffset = cpu_to_le16(param_offset);
pSMB->DataOffset = cpu_to_le16(offset);
pSMB->SetupCount = 1;
--- linux-4.15.0.orig/fs/cifs/connect.c
+++ linux-4.15.0/fs/cifs/connect.c
@@ -51,6 +51,7 @@
#include "cifs_unicode.h"
#include "cifs_debug.h"
#include "cifs_fs_sb.h"
#include "dns_resolve.h"
+#include "ntlmssp.h"
#include "nterr.h"
#include "rfc1002pdu.h"
@@ -71,7 +72,7 @@
Opt_user_xattr, Opt_nouser_xattr,
Opt_forceuid, Opt_noforceuid,
Opt_forcegid, Opt_noforcegid,
-Opt_nbblocksend, Opt_noautotune,
+Opt_noblocksend, Opt_noautotune, Opt_nolease,
Opt_hard, Opt_soft, Opt_perm, Opt_noperm,
Opt_mapposix, Opt_nomapposix,
Opt_mapchars, Opt_nomapchars, Opt_sf,
@@ -314,6 +316,55 @@
{ Opt_noforcegid, "noforcegid" },
{ Opt_noblocksend, "noblocksend" },
{ Opt_noautotune, "noautotune" },
+{ Opt_nolease, "nolease" },
{ Opt_hard, "hard" },
{ Opt_soft, "soft" },
{ Opt_perm, "perm" },
@@ -314,6 +316,55 @@
const char *devname):

/*
+ * Resolve hostname and set ip addr in tcp ses. Useful for hostnames that may
+ * get their ip addresses changed at some point.
+ *
+ * This should be called with server->srv_mutex held.
/*
 * ifdef CONFIG_CIFS_DFS_UPCALL
 *static int reconn_set_ipaddr(struct TCP_Server_Info *server)
 +{
 +int rc;
 +int len;
 +char *unc, *ipaddr = NULL;
 +
 +if (!server->hostname)
 +return -EINVAL;
 +
 +len = strlen(server->hostname) + 3;
 +
 +unc = kmalloc(len, GFP_KERNEL);
 +if (!unc) {
 +cifs_dbg(FYI, "%s: failed to create UNC path\n", __func__);
 +return -ENOMEM;
 +}
 +snprintf(unc, len, "\\%s", server->hostname);
 +
 +rc = dns_resolve_server_name_to_ip(unc, &ipaddr);
 +kfree(unc);
 +
 +if (rc < 0) {
 +cifs_dbg(FYI, "%s: failed to resolve server part of %s to IP: %d\n", 
 +__func__, server->hostname, rc);
 +return rc;
 +}
 +
 +spin_lock(&cifs_tcp_ses_lock);
 +rc = cifs_convert_address((struct sockaddr *)&server->dstaddr, ipaddr, 
 +strlen(ipaddr));
 +spin_unlock(&cifs_tcp_ses_lock);
 +kfree(ipaddr);
 +
 +return !rc ? -1 : 0;
 +}
 +
 +#else
 +static inline int reconn_set_ipaddr(struct TCP_Server_Info *server)
 +{
 +return 0;
 +}
 +
 +#endif
 +
 +/
 +* cifs tcp session reconnection
 +*
 +* mark tcp session as reconnecting so temporarily locked
list_for_each(tmp, &server->smb_ses_list) {
    ses = list_entry(tmp, struct cifs_ses, smb_ses_list);
    ses->need_reconnect = true;
    sess->ipc_tid = 0;
    list_for_each(tmp2, &ses->tcon_list) {
        tcon = list_entry(tmp2, struct cifs_tcon, tcon_list);
        tcon->need_reconnect = true;
    }
    if (ses->tcon_ipc)
        ses->tcon_ipc->need_reconnect = true;
} spin_unlock(&cifs_tcp_ses_lock);

rc = generic_ip_connect(server);
if (rc) {
cifs_dbg(FYI, "reconnect error %d\n", rc);
+rc = reconn_set_ipaddr(server);
+if (rc) {
+    cifs_dbg(FYI, "%s: failed to resolve hostname: %d\n", __func__, rc);
+}  mutex_unlock(&server->srv_mutex);
} else {
server_unresponsive(struct TCP_Server_Info *server)
{
/*
- * We need to wait 2 echo intervals to make sure we handle such
+ * We need to wait 3 echo intervals to make sure we handle such
* situations right:
* 1s  client sends a normal SMB request
- * 2s  client gets a response
+ * 3s  client gets a response
* 30s echo workqueue job pops, and decides we got a response recently
*    and don't need to send another
* ...
*/
if ((server->tcpStatus == CifsGood ||
     server->tcpStatus == CifsNeedNegotiate) &&
- time_after(jiffies, server->lstrp + 2 * server->echo_interval)) {
+ time_after(jiffies, server->lstrp + 3 * server->echo_interval)) {
    cifs_dbg(VFS, "Server %s has not responded in %lu seconds. Reconnecting...\n",
- server->hostname, (2 * server->echo_interval) / HZ);
+ server->hostname, (3 * server->echo_interval) / HZ);
cifs_reconnect(server);
wake_up(&server->response_q);
return true;
@@ -524,6 +581,21 @@
return false;
}

+static inline bool
+zero_credits(struct TCP_Server_Info *server)
+{
+int val;
+
+spin_lock(&server->req_lock);
+val = server->credits + server->echo_credits + server->oplock_credits;
+if (server->in_flight == 0 && val == 0) {
+spin_unlock(&server->req_lock);
+return true;
+}
+spin_unlock(&server->req_lock);
+return false;
+}
+
static int
cifs_readv_from_socket(struct TCP_Server_Info *server, struct msghdr *smb_msg)
{
@@ -536,6 +608,12 @@
for (total_read = 0; msg_data_left(smb_msg); total_read += length) {
 try_to_freeze();

+/* reconnect if no credits and no requests in flight */
+if (zero_credits(server)) {
+cifs_reconnect(server);
+return -ECONNABORTED;
+}
+
if (server_unresponsive(server))
return -ECONNABORTED;

@@ -680,6 +758,8 @@
list_del_init(&server->tcp_ses_list);
spin_unlock(&cifs_tcp_ses_lock);

+cancelDelayed_work_sync(&server->echo);
+
spin_lock(&GlobalMid_Lock);
server->tcpStatus = CifsExiting;
spin_unlock(&GlobalMid_Lock);
@@ -847,6 +927,7 @@
mempool_resize(cifs_req_poolp, length + cifs_min_rcv);

set_freezable();
+allow_kernel_signal(SIGKILL);
while (server->tcpStatus != CifsExiting) {
  if (try_to_freeze())
    continue;
  continue;
  server->total_read += length;

  +mid_entry = NULL;
  if (server->ops->is_transform_hdr &&
      server->ops->receive_transform &&
      server->ops->is_transform_hdr(buf)) {
    length = mid_entry->receive(server, mid_entry);
  }

  -if (length < 0)
  +if (length < 0) {
    +if (mid_entry)
      +cifs_mid_q_entry_release(mid_entry);
    continue;
  }

  if (server->large_buf)
    buf = server->bigbuf;

  if (!mid_entry->multiRsp || mid_entry->multiEnd)
    mid_entry->callback(mid_entry);
  +
  +cifs_mid_q_entry_release(mid_entry);
} else if (server->ops->is_oplock_break &&
          server->ops->is_oplock_break(buf, server)) {
    cifs_dbg(FYI, "Received oplock break\n");
    @ @ -1124,6 +1211,7 @@
    substring_t args[MAX_OPT_ARGS];

    switch (match_token(value, cifs_smb_version_tokens, args)) {
      +
      +#ifdef CONFIG_CIFS_ALLOW_INSECURE_LEGACY
      case Smb_1:
        vol->ops = &smb1_operations;
        vol->vals = &smb1_values;
        @ @ -1132,6 +1220,14 @@
        vol->ops = &smb20_operations;
        vol->vals = &smb20_values;
break;
+#elif
+case Smb_1:
+cifs_dbg(VFS, "vers=1.0 (cifs) mount not permitted when legacy dialects disabled
");
+return 1;
+case Smb_20:
+cifs_dbg(VFS, "vers=2.0 mount not permitted when legacy dialects disabled
");
+return 1;
+#elif /* CIFS_ALLOW_INSECURE_LEGACY */
+case Smb_21:
+vol->ops = &smb21_operations;
+vol->vals = &smb21_values;
+@ @ @ -1176,6 +1272,11 @@
+const char *delims = "/\";
+size_t len;
+
+if (unlikely(!devname || !*devname)) {
+ cifs_dbg(VFS, "Device name not specified.
");
+ return -EINVAL;
+}
+ /* make sure we have a valid UNC double delimiter prefix */
+ len = strspn(devname, delims);
+ if (len != 2)
+ @@ @ -1366,6 +1467,9 @@
+ case Opt_noautotune:
+ vol->noautotune = 1;
+ break;
+case Opt_nolease:
+vol->no_lease = 1;
+break;
+case Opt_hard:
+vol->retry = 1;
+break;
+@@ @ -1707,7 +1811,7 @@
+tmp_end++;
+if (!((tmp_end < end && tmp_end[1] == delim))) {
+ /* No it is not. Set the password to NULL */
+ -kfree(vol->password);
+ +kzfree(vol->password);
+ vol->password = NULL;
+ break;
+}
+ @@ @ -1745,7 +1849,7 @@
+ options = end;
+}
+
- kfree(vol->password);
+kzfree(vol->password);
/* Now build new password string */
temp_len = strlen(value);
vol->password = kzalloc(temp_len+1, GFP_KERNEL);
@@ -2226,7 +2330,7 @@
task = xchg(&server->tsk, NULL);
if (task)
-force_sig(SIGKILL, task);
+send_sig(SIGKILL, task, 1);
}
static struct TCP_Server_Info *
@@ -2381,6 +2485,93 @@
return 1;
}
+/**
+ * cifs_setup_ipc - helper to setup the IPC tcon for the session
+*
+ * A new IPC connection is made and stored in the session
+ * tcon_ipc. The IPC tcon has the same lifetime as the session.
+ */
+static int
+cifs_setup_ipc(struct cifs_ses *ses, struct smb_vol *volume_info)
+{
+int rc = 0, xid;
+struct cifs_tcon *tcon;
+struct nls_table *nls_codepage;
+char unc[SERVER_NAME_LENGTH + sizeof("//x/IPC$")] = {0};
+bool seal = false;
+
+/*
+ * If the mount request that resulted in the creation of the
+ * session requires encryption, force IPC to be encrypted too.
+ */
+if (volume_info->seal) {
+if (ses->server->capabilities & SMB2_GLOBAL_CAP_ENCRYPTION)
+seal = true;
+else {
+cifs_dbg(VFS,
+ "IPC: server doesn't support encryption\n");
+return -EOPNOTSUPP;
+}
+}
+
+tcon = tconInfoAlloc();
+if (tcon == NULL)

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+return -ENOMEM;
+
+snprintf(unc, sizeof(unc), "\\%s\IPC\$", ses->server->hostname);
+
+/* cannot fail */
+nls_codepage = load_nls_default();
+
+xid = get_xid();
+tcon->ses = ses;
+tcon->ipc = true;
+tcon->seal = seal;
+rc = ses->server->ops->tree_connect(xid, ses, unc, tcon, nls_codepage);
+free_xid(xid);
+
+if (rc) {
+cifs_dbg(VFS, "failed to connect to IPC (rc=%d)\n", rc);
+tconInfoFree(tcon);
+goto out;
+
+cifs_dbg(FYI, "IPC tcon rc = %d ipc tid = %d\n", rc, tcon->tid);
+
+ses->tcon_ipc = tcon;
+out:
+unload_nls(nls_codepage);
+return rc;
+
+/**
+ * cifs_free_ipc - helper to release the session IPC tcon
+ * Needs to be called everytime a session is destroyed
+ */
+static int
+cifs_free_ipc(struct cifs_ses *ses)
+{
+int rc = 0, xid;
+struct cifs_tcon *tcon = ses->tcon_ipc;
+
+if (tcon == NULL)
+return 0;
+
+if (ses->server->ops->tree_disconnect)
+{ xid = get_xid();
+rc = ses->server->ops->tree_disconnect(xid, tcon);
+free_xid(xid);
+}
+if (rc)
+cifs_dbg(FYI, "failed to disconnect IPC tcon (rc=%d)\n", rc);
+
tconInfoFree(tcon);
+ses-&gt;tcon_ipc = NULL;
+return rc;
+
static struct cifs_ses *
cifs_find_smb_ses(struct TCP_Server_Info *server, struct smb_vol *vol)
{
@@ -2421,6 +2612,8 @@
ses-&gt;status = CifsExiting;
spin_unlock(&cifs_tcp_ses_lock);
+
cifs_free_ipc(ses);
+
if (ses-&gt;status == CifsExiting &amp;&amp; server-&gt;ops-&gt;logoff) {
  xid = get_xid();
  rc = server-&gt;ops-&gt;logoff(xid, ses);
@@ -2448,6 +2641,7 @@
cifs_set_cifscrreds(struct smb_vol *vol, struct cifs_ses *ses)
{
  int rc = 0;
+int is_domain = 0;
  const char *delim, *payload;
  char *desc;
  ssize_t len;
@@ -2495,6 +2689,7 @@
      PTR_ERR(key);
    goto out_err;
  }
+is_domain = 1;
  }

  down_read(&key-&gt;sem);
@@ -2552,6 +2747,26 @@
  goto out_key_put;
  }

*/
+ * If we have a domain key then we must set the domainName in the
+ * for the request.
+ */
+if (is_domain &amp;&amp; ses-&gt;domainName) {
  vol-&gt;domainname = kstrndup(ses-&gt;domainName,
+ strlen(ses-&gt;domainName),
+ GFP_KERNEL);
if (!vol->domainname) {
    cifs_dbg(FYI, "Unable to allocate %zd bytes for "
    "domain\n", len);
    rc = -ENOMEM;
    kfree(vol->username);
    vol->username = NULL;
    kzfree(vol->password);
    vol->password = NULL;
    goto out_key_put;
}

out_key_put:
up_read(&key->sem);
key_put(key);

get_ses_fail:
return 0;
if (tcon->snapshot_time != volume_info->snapshot_time)
return 0;
@if (tcon->no_lease != volume_info->no_lease)
return 1;
}

cifs_put_tcon(struct cifs_tcon *tcon)
{
    unsigned int xid;
    struct cifs_ses *ses = tcon->ses;
    struct cifs_ses *ses;
    /*
    * IPC tcon share the lifetime of their session and are
    * destroyed in the session put function
    */
    if (tcon == NULL || tcon->ipc)
    return;
}

spin_unlock(&cifs_tcp_ses_lock);
free_xid(xid);
+cifs_setup_ipc(ses, volume_info);
+
return ses;
+ses = tcon->ses;
cifs_dbg(FYI, "%s: tc_count=%d
", __func__, tcon->tc_count);
spin_lock(&cifs_tcp_ses_lock);
if (--tcon->tc_count > 0) {
    tcon->retry = volume_info->retry;
tcon->nocase = volume_info->nocase;
tcon->local_lease = volume_info->local_lease;
+tcon->no_lease = volume_info->no_lease;
INIT_LIST_HEAD(&tcon->pending_opens);
}

spin_lock(&cifs_tcp_ses_lock);
if ((sb->s_flags & CIFS_MS_MASK) != (mnt_data->flags & CIFS_MS_MASK))
    return 0;

-old->mnt_cifs_flags & CIFS_MOUNT_MASK) !=
    (new->mnt_cifs_flags & CIFS_MOUNT_MASK))
+if (old->mnt_cifs_serverino_autodisabled)
    newflags &= ~CIFS_MOUNT_SERVER_INUM;
+
+if (oldflags != newflags)
    return 0;

/*
@@ -2930,8 +3163,10 @@
{ 
    struct cifs_sb_info *old = CIFS_SB(sb);
    struct cifs_sb_info *new = mnt_data->cifs_sb;
-old_set = old->mnt_cifs_flags & CIFS_MOUNT_USE_PREFIX_PATH;
-new_set = new->mnt_cifs_flags & CIFS_MOUNT_USE_PREFIX_PATH;
+old_set = (old->mnt_cifs_flags & CIFS_MOUNT_USE_PREFIX_PATH) &&
+new_set =  (new->mnt_cifs_flags & CIFS_MOUNT_USE_PREFIX_PATH) &&
+old->prepath;
+new->prepath =  (new->mnt_cifs_flags & CIFS_MOUNT_USE_PREFIX_PATH) &&
+new->prepath;

    if (old_set && new_set && !strcmp(new->prepath, old->prepath))
        return 1;
@@ -2956,9 +3191,10 @@
    spin_lock(&cifs_tcp_ses_lock);
    cifs_sb = CIFS_SB(sb);
    tlink = cifs_get_tlink(cifs_sb_master_tlink(cifs sb));
-if (IS_ERR(tlink)) {
+if (tlink == NULL) {
+/* can not match superblock if tlink were ever null */
spin_unlock(&cifs_tcp_ses_lock);
-return rc;
+return 0;
}
tcon = tlink_tcon(tlink);
ses = tcon->ses;
@@ -2986,39 +3222,17 @@
const struct nls_table *nls_codepage, unsigned int *num_referrals,
struct dfs_info3_param **referrals, int remap)
{
-char *temp_unc;
int rc = 0;
-if (!ses->server->ops->tree_connect || !ses->server->ops->get_dfs_refer)
+if (!ses->server->ops->get_dfs_refer)
return -ENOSYS;
*num_referrals = 0;
*referrals = NULL;
-if (ses->ipc_tid == 0) {
-temp_unc = kmalloc(2 /* for slashes */ +
-strnlen(ses->serverName, SERVER_NAME_LEN_WITH_NULL * 2)
-+ 1 + 4 /* slash IPC$ */ + 2, GFP_KERNEL);
-if (temp_unc == NULL)
-return -ENOMEM;
-temp_unc[0] = '\\';
-temp_unc[1] = '\\';
-strcpy(temp_unc + 2, ses->serverName);
-strcpy(temp_unc + 2 + strlen(ses->serverName), "\\IPC$");
-rc = ses->server->ops->tree_connect(xid, ses, temp_unc, NULL,
- nls_codepage);
-cifs_dbg(FYI, "Tcon rc = %d ipc_tid = %d\n", rc, ses->ipc_tid);
-kfree(temp_unc);
-}
-if (rc == 0)
-rc = ses->server->ops->get_dfs_refer(xid, ses, old_path,
- referrals, num_referrals,
- nls_codepage, remap);
-/*
- * BB - map targetUNCs to dfs_info3 structures, here or in
- * ses->server->ops->get_dfs_refer.
- */
+rc = ses->server->ops->get_dfs_refer(xid, ses, old_path,

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+ referrals, num_referrals,
+ nls_codepage, remap);
return rc;
}

@@ -3402,7 +3616,7 @@
cifs_sb->mnt_gid = pvolume_info->linux_gid;
cifs_sb->mnt_file_mode = pvolume_info->file_mode;
cifs_sb->mnt_dir_mode = pvolume_info->dir_mode;
-cifs_dbg(FYI, "file mode: 0x%x  dir mode: 0x%x\n",
+cifs_dbg(FYI, "file mode: %04ho  dir mode: %04ho\n",
    cifs_sb->mnt_file_mode, cifs_sb->mnt_dir_mode);

cifs_sb->actimeo = pvolume_info->actimeo;
@@ -3783,7 +3997,7 @@
tcon->unix_ext = 0; /* server does not support them */

/* do not care if a following call succeed - informational */
-if (!tcon->ipc && server->ops->qfs_tcon)
+if (!tcon->pipe && server->ops->qfs_tcon)
    server->ops->qfs_tcon(xid, tcon);

cifs_sb->wsize = server->ops->negotiate_wsize(tcon, volume_info);
@@ -3913,8 +4127,7 @@
} /*
- * Issue a TREE_CONNECT request. Note that for IPC$ shares, that the tcon
- * pointer may be NULL.
+ * Issue a TREE_CONNECT request.
 */
int CIFSTCon(const unsigned int xid, struct cifs_ses *ses,
@@ -3950,7 +4163,7 @@
pSMB->Flags = cpu_to_le16(TCON_EXTENDED_SECINFO);
bcc_ptr = &pSMB->Password[0];
-if (!tcon || (ses->server->sec_mode & SECMODE_USER)) {
+if (tcon->pipe || (ses->server->sec_mode & SECMODE_USER)) {
    pSMB->PasswordLength = cpu_to_le16(1); /* minimum */
    *bcc_ptr = 0; /* password is null byte */
    bcc_ptr++; /* skip password */
@@ -4022,7 +4235,7 @@
0);

/* above now done in SendReceive */
-if ((rc == 0) && (tcon != NULL)) {
+if (rc == 0) {

bool is_unicode;

tcon->tidStatus = CifsGood;
@@ -4042,7 +4255,8 @@
 if ((bcc_ptr[0] == 'I') && (bcc_ptr[1] == 'P') &&
     (bcc_ptr[2] == 'C')) {
   cifs_dbg(FYI, "IPC connection\n");
-   tcon->ipc = 1;
+   tcon->ipc = true;
+   tcon->pipe = true;
   }
 } else if (length == 2) {
 if ((bcc_ptr[0] == 'A') && (bcc_ptr[1] == ':')) {
@@ -4069,9 +4283,6 @@
   else
   tcon->Flags = 0;
   cifs_dbg(FYI, "Tcon flags: 0x%x\n", tcon->Flags);
- } else if ((rc == 0) && tcon == NULL) {
-   /* all we need to save for IPC$ connection */
-   -ses->ipc_tid = smb_buffer_response->Tid;
 } 

cifs_buf_release(smb_buffer);
@@ -4203,9 +4414,13 @@
 vol_info->retry = master_tcon->retry;
 vol_info->nocase = master_tcon->nocase;
 vol_info->local_lease = master_tcon->local_lease;
+vol_info->no_lease = master_tcon->no_lease;
+vol_info->resilient = master_tcon->use_resilient;
+vol_info->persistent = master_tcon->use_persistent;
 vol_info->no_linux_ext = !master_tcon->unix_ext;
 vol_info->sectype = master_tcon->ses->sectype;
+vol_info->seal = master_tcon->seal;

rc = cifs_set_vol_auth(vol_info, master_tcon->ses);
if (rc) {
@@ -4235,7 +4450,7 @@
 reset_cifs_unix_caps(0, tcon, NULL, vol_info);
 out:
  kfree(vol_info->username);
- kfree(vol_info->password);
+ kzfree(vol_info->password);
  kfree(vol_info);

  return tcon;
--- linux-4.15.0.orig/fs/cifs/dir.c
+++ linux-4.15.0/fs/cifs/dir.c
@@ -174,7 +174,7 @@
cifs_dbg(FYI, "using cifs_sb prepath <\%s>\n", cifs_sb->prepath);
memcpy(full_path+dfsplen+1, cifs_sb->prepath, pplen-1);
  -full_path[dfsplen] = '\';
+full_path[dfsplen] = dirsep;
for (i = 0; i < pplen-1; i++)
  if (full_path[dfsplen+1+i] == '/')
    full_path[dfsplen+1+i] = CIFS_DIR_SEP(cifs_sb);
@@ -562,7 +562,6 @@
if (server->ops->close)
  server->ops->close(xid, tcon, &fid);
  cifs_del_pending_open(&open);
  -fput(file);
  rc = -ENOMEM;
}
@@ -684,6 +683,9 @@
goto mknod_out;
}

+if (!S_ISCHR(mode) && !S_ISBLK(mode))
+  goto mknod_out;
+if (!(cifs_sb->mnt_cifs_flags & CIFS_MOUNT_UNX_EMUL))
  goto mknod_out;
@@ -692,10 +694,7 @@
buf = kmalloc(sizeof(FILE_ALL_INFO), GFP_KERNEL);
if (buf == NULL) {
  -kfree(full_path);
  rc = -ENOMEM;
  -free_xid(xid);
  -return rc;
  +goto mknod_out;
}
if (backup_cred(cifs_sb))
    goto mknod_out;
@ @ -742,7 +742,7 @@
pdev->minor = cpu_to_le64(MINOR(device_number));
rc = tcon->ses->server->ops->sync_write(xid, &fid, &io_parms,
  &bytes_written, iov, 1);
-} /* else if (S_ISFIFO) */
+}
tcon->ses->server->ops->close(xid, tcon, &fid);
d_drop(direntry);
static int
cifs_d_revalidate(struct dentry *direntry, unsigned int flags)
{
+struct inode *inode;
+int rc;
+
if (flags & LOOKUP_RCU)
return -ECHILD;

if (d_really_is_positive(direntry)) {
-if (cifs_revalidate_dentry(direntry))
-return 0;
+
inode = d_inode(direntry);
+if (((flags & LOOKUP_REVAL) && !CIFS_CACHE_READ(CIFS_I(inode)))
+CIFS_I(inode)->time = 0; /* force reval */
+
+rc = cifs_revalidate_dentry(direntry);
+if (rc) {
+cifs_dbg(FYI, "cifs_revalidate_dentry failed with rc=%d", rc);
+switch (rc) {
+case -ENOENT:
+case -ESTALE:
+/*
+ * Those errors mean the dentry is invalid
+ * (file was deleted or recreated)
+ */
+return 0;
+default:
+/
+/*
+ * Otherwise some unexpected error happened
+ * report it as-is to VFS layer
+ */
+return rc;
+}
+}
} else {
/*
 * If the inode wasn't known to be a dfs entry when
@ @ -854,7 +878,7 @@
 * attributes will have been updated by
 * cifs_revalidate_dentry().
 */
-if (IS_AUTOMOUNT(d_inode(direntry))) &&
+if (IS_AUTOMOUNT(inode)) &&
+!((direntry->d_flags & DCACHE_NEED_AUTOMOUNT)) {
spin_lock(&direntry->d_lock);
direntry->d_flags |= DCACHE_NEED_AUTOMOUNT;
goto posix_open_ret;
}
} else {
  cifs_revalidate_mapping(*pinode);
  cifs_fattr_to_inode(*pinode, &fattr);
}

rc = cifs_get_inode_info(&inode, full_path, buf, inode->i_sb, xid, fid);

if (rc) {
  server->ops->close(xid, tcon, fid);
  if (rc == -ESTALE)
    rc = -EOPENSTALE;
}

out:
kfree(buf);
return rc;

void
cifs_down_write(struct rw_semaphore *sem)
{
  while (!down_write_trylock(sem))
    msleep(10);
}

struct cifsFileInfo *
cifs_new_fileinfo(struct cifs_fid *fid, struct file *file, struct tcon_link *tlink, __u32 oplock)
{
  INIT_LIST_HEAD(&fdlocks->locks);
  fdlocks->cfile = cfile;
  cfile->llist = fdlocks;
  -down_write(&cinode->lock_sem);
  -list_add(&fdlocks->llist, &cinode->llist);
  -up_write(&cinode->lock_sem);

  cfile->count = 1;
  cfile->pid = current->tgid;
}
oplock = 0;
}

+cifs_down_write(&cinode->lock_sem);
+list_add(&fdlocks->llist, &cinode->llist);
+up_write(&cinode->lock_sem);
+
spin_lock(&tcon->open_file_lock);
if (fid->pending_open->oplock != CIFS_OPLOCK_NO_CHANGE && oplock)
oplock = fid->pending_open->oplock;
@@ -336,10 +351,12 @@
list_add(&cfile->tlist, &tcon->openFileList);

/* if readable file instance put first in list*/
+spin_lock(&cinode->open_file_lock);
if (file->f_mode & FMODE_READ)
list_add(&cfile->flist, &cinode->openFileList);
else
list_add_tail(&cfile->flist, &cinode->openFileList);
+spin_unlock(&cinode->open_file_lock);
spin_unlock(&tcon->open_file_lock);

if (fid->purge_cache)
@@ -358,13 +375,31 @@
return cifs_file;
}

-/*
-* Release a reference on the file private data. This may involve closing
-* the filehandle out on the server. Must be called without holding
-* tcon->open_file_lock and cifs_file->file_info_lock.
+/**
+* cifsFileInfo_put - release a reference of file priv data
+*
+* Always potentially wait for oplock handler. See _cifsFileInfo_put().
+*/
void cifsFileInfo_put(struct cifsFileInfo *cifs_file)
{
+ _cifsFileInfo_put(cifs_file, true);
+} 
+/***
+* _cifsFileInfo_put - release a reference of file priv data
+*
+* This may involve closing the filehandle @cifs_file out on the
+* server. Must be called without holding tcon->open_file_lock and
+* cifs_file->file_info_lock.
+*
+ * If @wait_for_oplock_handler is true and we are releasing the last
+ * reference, wait for any running oplock break handler of the file
+ * and cancel any pending one. If calling this function from the
+ * oplock break handler, you need to pass false.
+ *
+ */
+void _cifsFileInfo_put(struct cifsFileInfo *cifs_file, bool wait_oplock_handler)
+{
    struct inode *inode = d_inode(cifs_file->dentry);
    struct cifs_tcon *tcon = tlink_tcon(cifs_file->tlink);
    struct TCP_Server_Info *server = tcon->ses->server;
    bool oplock_break_cancelled;
    spin_lock(&tcon->open_file_lock);
    spin_lock(&cifsi->open_file_lock);
    if (--cifs_file->count > 0) {
        spin_unlock(&cifs_file->file_info_lock);
        spin_unlock(&cifsi->open_file_lock);
        spin_unlock(&tcon->open_file_lock);
        return;
    }
    cifs_set_oplock_level(cifsi, 0);
}
+spin_unlock(&cifsi->open_file_lock);
spin_unlock(&tcon->open_file_lock);

-oplock_break_cancelled = cancel_work_sync(&cifs_file->oplock_break);
+oplock_break_cancelled = wait_oplock_handler ?
+cancel_work_sync(&cifs_file->oplock_break) : false;

if (!(tcon->need_reconnect && !cifs_file->invalidHandle)) {
    struct TCP_Server_Info *server = tcon->ses->server;
    * Delete any outstanding lock records. We'll lose them when the file
    * is closed anyway.
    */
-down_write(&cifsi->lock_sem);
-+cifs_down_write(&cifsi->lock_sem);
-list_for_each_entry_safe(li, tmp, &cifs_file->llist->locks, llist) {
    list_del(&li->llist);
    cifs_del_lock_waiters(li);
    } if (backup_cred(cifs_sb))
create_options |= CREATE_OPEN_BACKUP_INTENT;

/* O_SYNC also has bit for O_DSYNC so following check picks up either */
+if (cfile->f_flags & O_SYNC)
  +create_options |= CREATE_WRITE_THROUGH;
  +
+if (cfile->f_flags & O_DIRECT)
  +create_options |= CREATE_NO_BUFFER;
+
if (server->ops->get_lease_key)
  server->ops->get_lease_key(inode, &cfile->fid);

@@ -730,7 +775,8 @@
if (can_flush) {
  rc = filemap_write_and_wait(inode->i_mapping);
  -mapping_set_error(inode->i_mapping, rc);
  +if (!is_interrupt_error(rc))
  +mapping_set_error(inode->i_mapping, rc);

  if (tcon->unix_ext)
    rc = cifs_get_inode_info_unix(&inode, full_path,
@@ -986,7 +1032,7 @@
cifs_lock_add(struct cifsFileInfo *cfile, struct cifsLockInfo *lock) {
  
  struct cifsInodeInfo *cinode = CIFS_I(d_inode(cfile->dentry));
  -down_write(&cinode->lock_sem);
  +cifs_down_write(&cinode->lock_sem);
  list_add_tail(&lock->llist, &cfile->llist->locks);
  up_write(&cinode->lock_sem);
}
@@ -1008,7 +1054,7 @@
try_again:
  exist = false;
  -down_write(&cinode->lock_sem);
  +cifs_down_write(&cinode->lock_sem);

  exist = cifs_find_lock_conflict(cfile, lock->offset, lock->length,
@@ -1030,7 +1076,7 @@
      @ @ -1030,7 +1076,7 @ @
      (lock->blist.next == &lock->blist));
    if (!rc)
      goto try_again;
  -down_write(&cinode->lock_sem);
  +cifs_down_write(&cinode->lock_sem);
  list_del_init(&lock->blist);
return rc;

try_again:
-down_write(&cinode->lock_sem);
+cifs_down_write(&cinode->lock_sem);
if (!cinode->can_cache_brcks) {
  up_write(&cinode->lock_sem);
return rc;

/*
 * Accessing maxBuf is racy with cifs_reconnect - need to store value
- * and check it for zero before using.
+ * and check it before using.
 */
max_buf = tcon->ses->server->maxBuf;
-if (!max_buf) {
+if (max_buf < (sizeof(struct smb_hdr) + sizeof(LOCKING_ANDX_RANGE))) {
  free_xid(xid);
return -EINVAL;
  }

+BUILD_BUG_ON(sizeof(struct smb_hdr) + sizeof(LOCKING_ANDX_RANGE) >
+    PAGE_SIZE);
+max_buf = min_t(unsigned int, max_buf - sizeof(struct smb_hdr),
+    PAGE_SIZE);
max_num = (max_buf - sizeof(struct smb_hdr)) /
    sizeof(LOCKING_ANDX_RANGE);
buf = kcalloc(max_num, sizeof(LOCKING_ANDX_RANGE), GFP_KERNEL);

int rc = 0;

/* we are going to update can_cache_brcks here - need a write access */
-down_write(&cinode->lock_sem);
+cifs_down_write(&cinode->lock_sem);
if (!cinode->can_cache_brcks) {
  up_write(&cinode->lock_sem);
return rc;

/*
 * Accessing maxBuf is racy with cifs_reconnect - need to store value
- * and check it for zero before using.
+ * and check it before using.
 */
max_buf = tcon->ses->server->maxBuf;

-if (!max_buf)
+if (max_buf < (sizeof(struct smb_hdr) + sizeof(LOCKING_ANDX_RANGE)))
    return -EINVAL;

+BUILD_BUG_ON(sizeof(struct smb_hdr) + sizeof(LOCKING_ANDX_RANGE) >
+    PAGE_SIZE);
+max_buf = min_t(unsigned int, max_buf - sizeof(struct smb_hdr),
+    PAGE_SIZE);
max_num = (max_buf - sizeof(struct smb_hdr)) /
sizeof(LOCKING_ANDX_RANGE);
buf = kcalloc(max_num, sizeof(LOCKING_ANDX_RANGE), GFP_KERNEL);
if (!buf)
    return -ENOMEM;

tdown_write(&cinode->lock_sem);
+cifs_down_write(&cinode->lock_sem);
for (i = 0; i < 2; i++) {
    cur = buf;
    num = 0;
@@ -1623,8 +1677,20 @@
    rc = server->ops->mand_unlock_range(cfile, flock, xid);
    out:
-    if (flock->fl_flags & FL_POSIX && !rc)
+    if (flock->fl_flags & FL_POSIX) {
+        /*
+         * If this is a request to remove all locks because we
+         * are closing the file, it doesn't matter if the
+         * unlocking failed as both cifs.ko and the SMB server
+         * remove the lock on file close
+         */
+        if (rc) {
+            cifs_dbg(VFS, "%s failed rc=%d\n", __func__, rc);
+            if (!(flock->fl_flags & FL_CLOSE))
+                return rc;
+        }
+    }
+rc = locks_lock_file_wait(file, flock);
+}
    return rc;
}
@@ -1791,13 +1857,12 @@
{
    struct cifsFileInfo *open_file = NULL;
    struct cifs_sb_info *cifs_sb = CIFS_SB(cifs_inode->vfs_inode.i_sb);
-    struct cifs_tcon *tcon = cifs_sb_master_tcon(cifs_sb);
    /* only filter by fsuid on multiuser mounts */
if (!(cifs_sb->mnt_cifs_flags & CIFS_MOUNT_MULTIUSER))
    fsuid_only = false;

-spin_lock(&tcon->open_file_lock);
+spin_lock(&cifs_inode->open_file_lock);

    /* we could simply get the first_list_entry since write-only entries
       are always at the end of the list but since the first entry might
       have a close pending, we go through the whole list */
@@ -1809,7 +1874,7 @@
    @ @ -1809,7 +1874,7 @@
    /* found a good file */
    /* lock it so it will not be closed on us */
-    cifsFileInfo_get(open_file);
-    spin_unlock(&tcon->open_file_lock);
+    spin_unlock(&cifs_inode->open_file_lock);
    cifsFileInfo_get(open_file);
    return open_file;

} /* else might as well continue, and look for
    another, or simply have the caller reopen it
@@ -1817,7 +1882,7 @@
    @ @ -1817,7 +1882,7 @@
} else /* write only file */
    break; /* write only files are last so must be done */
}
-spin_unlock(&tcon->open_file_lock);
+spin_unlock(&cifs_inode->open_file_lock);
return NULL;
}

@@ -1826,7 +1906,6 @@
{ 
    struct cifsFileInfo *open_file, *inv_file = NULL;
    struct cifs_sb_info *cifs_sb;
-    struct cifs_tcon *tcon;
    bool any_available = false;
    int rc;
    unsigned int refind = 0;
@@ -1842,16 +1906,15 @@
}

cifs_sb = CIFS_SB(cifs_inode->vfs_inode.i_sb);
-tcon = cifs_sb_master_tcon(cifs_sb);

/* only filter by fsuid on multiuser mounts */
if (!(cifs_sb->mnt_cifs_flags & CIFS_MOUNT_MULTIUSER))
    fsuid_only = false;

-spin_lock(&tcon->open_file_lock);
+spin_lock(&cifs_inode->open_file_lock);
    refind_writable:
    if (refind > MAX_REOPEN_ATT) {
-spin_unlock(&tcon->open_file_lock);
+spin_unlock(&cifs_inode->open_file_lock);
return NULL;
}
list_for_each_entry(open_file, &cifs_inode->openFileList, flist) {
@@ -1863,7 +1926,7 @@
if (!open_file->invalidHandle) {
    /* found a good writable file */
    cifsFileInfo_get(open_file);
-    spin_unlock(&tcon->open_file_lock);
+    spin_unlock(&cifs_inode->open_file_lock);
    return open_file;
} else {
    if (!inv_file)
@@ -1882,21 +1945,21 @@
cifsFileInfo_get(inv_file);
}

-spin_unlock(&tcon->open_file_lock);
+spin_unlock(&cifs_inode->open_file_lock);

if (inv_file) {
    rc = cifs_reopen_file(inv_file, false);
    if (rc)
return inv_file;
else {
-    spin_lock(&tcon->open_file_lock);
+    spin_lock(&cifs_inode->open_file_lock);
    list_move_tail(&inv_file->flist,
&cifs_inode->openFileList);
-    spin_unlock(&tcon->open_file_lock);
+    spin_unlock(&cifs_inode->open_file_lock);
    cifsFileInfo_put(inv_file);
    ++refind;
    inv_file = NULL;
-    spin_lock(&tcon->open_file_lock);
+    spin_lock(&cifs_inode->open_file_lock);
goto refind_writable;
}
}
@@ -2099,6 +2162,7 @@
pgoff_t end, index;
struct cifs_writedata *wdata;
int rc = 0;
+int saved_rc = 0;

/*
 * If wsize is smaller than the page cache size, default to writing
rc = server->ops->wait_mtu_credits(server, cifs_sb->wsize, &wsize, &credits);
@if (rc)
+if (rc != 0) {
+    done = true;
+break;
+}
tofind = min((wsize / PAGE_SIZE) - 1, end - index) + 1;

@@ -2134,6 +2200,7 @@
    &found_pages);
    if (!wdata) {
        rc = -ENOMEM;
+        done = true;
        add_credits_and_wake_if(server, credits, 0);
        break;
    }
@@ -2162,7 +2229,7 @@
    if (rc != 0) {
        add_credits_and_wake_if(server, wdata->credits, 0);
        for (i = 0; i < nr_pages; ++i) {
-            if (rc == -EAGAIN)
+            if (is_retryable_error(rc))
                redirty_page_for_writepage(wbc, wdata->pages[i]);
        else
@@ -2170,7 +2237,7 @@
            end_page_writeback(wdata->pages[i]);
            put_page(wdata->pages[i]);
        }
-        if (rc != -EAGAIN)
+        if (!is_retryable_error(rc))
            mapping_set_error(mapping, rc);
    } else
    @ @ -2180,6 +2247,15 @@
            continue;
        }
+
+/* Return immediately if we received a signal during writing */
+if (is_interrupt_error(rc)) {
+    done = true;
+break;
+}
+
+if (rc != 0 && saved_rc == 0)
+saved_rc = rc;
+wbc->nr_to_write -= nr_pages;
if (wbc->nr_to_write <= 0)
done = true;
@@ -2197,6 +2273,9 @@
goto retry;
}

+if (saved_rc != 0)
+rc = saved_rc;
+
if (wbc->range_cyclic || (range_whole & wbc->nr_to_write > 0))
mapping->writeback_index = index;

@@ -2228,8 +2307,8 @@
set_page_writeback(page);
retry_write:
rc = cifs_partialpagewrite(page, 0, PAGE_SIZE);
- if (rc == -EAGAIN) {
- if (wbc->sync_mode == WB_SYNC_ALL)
+ if (is_retryable_error(rc)) {
+ if (wbc->sync_mode == WB_SYNC_ALL && rc == -EAGAIN)
goto retry_write;
redirty_page_for_writepage(wbc, page);
} else if (rc != 0) {
@@ -2864,14 +2943,16 @@
* these pages but not on the region from pos to ppos+len-1.
 */
written = cifs_user_writev(iocb, from);
- if (written > 0 & CIFS_CACHE_READ(cinode)) {
+ if (CIFS_CACHE_READ(cinode)) {
  /*
   * Windows 7 server can delay breaking level2 oplock if a write
   * request comes - break it on the client to prevent reading
   * an old data.
   * We have read level caching and we have just sent a write
   * request to the server thus making data in the cache stale.
   * Zap the cache and set oplock/lease level to NONE to avoid
   * reading stale data from the cache. All subsequent read
   * operations will read new data from the server.
   */
cifs_zap_mapping(inode);
- cifs_dbg(FYI, "Set no oplock for inode=%p after a write operation\n",
+ cifs_dbg(FYI, "Set Oplock/Lease to NONE for inode=%p after write\n",
    inode);
    cinode->oplock = 0;
if (rc) {
    for (i = 0; i < nr_pages; i++) {
        unsigned int nr_page_failed = i;
        for (i = 0; i < nr_page_failed; i++) {
            put_page(rdata->pages[i]);
            rdata->pages[i] = NULL;
        }
    }
}

if (rc == -ENODATA)
rc = 0;

-ctx->rc = (rc == 0) ? ctx->total_len : rc;
+ctx->rc = (rc == 0) ? (ssize_t)ctx->total_len : rc;

mutex_unlock(&ctx->aio_mutex);

* than it negotiated since it will refuse the read
* then.
*/
-if ((tcon->ses) & & !(tcon->ses->capabilities &
+if (!(tcon->ses->capabilities &
    tcon->ses->server->vals->cap_large_files)) {
    current_read_size = min_t(uint,
    current_read_size, CIFSMaxBufSize);
}
@@ -3471,20 +3554,18 @@

int cifs_file_strict_mmap(struct file *file, struct vm_area_struct *vma)
{
    -int rc, xid;
    +int xid, rc = 0;
    struct inode *inode = file_inode(file);

    xid = get_xid();

    -if (!CIFS_CACHE_READ(CIFS_I(inode))) {
    +if (!CIFS_CACHE_READ(CIFS_I(inode)))
        rc = cifs_zap_mapping(inode);
    -if (rc)
    -return rc;
    -}
    -rc = generic_file_mmap(file, vma);
-if (rc == 0)
+if (!rc)
+rc = generic_file_mmap(file, vma);
+if (!rc)
vma->vm_ops = &cifs_file_vm_ops;
+free_xid(xid);
return rc;
}
@@ -3494,16 +3575,16 @@
int rc, xid;

xid = get_xid();
+
rc = cifs_revalidate_file(file);
-if (rc) {
+if (rc) {
+cifs_dbg(FYI, "Validation prior to mmap failed, error=%d\n", rc);
-free_xid(xid);
-return rc;
-
-rc = generic_file_mmap(file, vma);
-if (rc == 0)
+rc = generic_file_mmap(file, vma);
+if (!rc)
vma->vm_ops = &cifs_file_vm_ops;
+
free_xid(xid);
return rc;
}
@@ -3674,7 +3755,8 @@
break;

__SetPageLocked(page);
-if (add_to_page_cache_locked(page, mapping, page->index, gfp)) {
+rc = add_to_page_cache_locked(page, mapping, page->index, gfp);
+if (rc) {
+__ClearPageLocked(page);
break;
}
@@ -3690,6 +3772,7 @@
struct list_head *page_list, unsigned num_pages)
{
    int rc;
+int err = 0;
    struct list_head tmplist;
struct cifsFileInfo *open_file = file->private_data;
struct cifs_sb_info *cifs_sb = CIFS_FILE_SB(file);
@@ -3730,7 +3813,7 @@
 * the order of declining indexes. When we put the pages in
 * the rdata->pages, then we want them in increasing order.
 /*
-while (!list_empty(page_list)) {
+while (!list_empty(page_list) && !err) {
            unsigned int i, nr_pages, bytes, rsize;
            loff_t offset;
            struct page *page, *tpage;
@@ -3753,9 +3836,10 @@
 return 0;
 }

-rc = readpages_get_pages(mapping, page_list, rsize, &tmplist,
+nr_pages = 0;
+err = readpages_get_pages(mapping, page_list, rsize, &tmplist,
 &nr_pages, &offset, &bytes);
-if (rc) {
+if (!nr_pages) {
           add_credits_and_wake_if(server, credits, 0);
           break;
@@ -3888,17 +3972,15 @@
 is_inode_writable(struct cifsInodeInfo *cifs_inode)
 }
 struct cifsFileInfo *open_file;
-struct cifs_tcon *tcon =
-cifs_sb_master_tcon(CIFS_SB(cifs_inode->vfs_inode.i_sb));

-spin_lock(&tcon->open_file_lock);
+spin_lock(&cifs_inode->open_file_lock);
 list_for_each_entry(open_file, &cifs_inode->openFileList, flist) {
 if (OPEN_FMODE(open_file->f_flags) & FMODE_WRITE) {
-        spin_unlock(&tcon->open_file_lock);
+        spin_unlock(&cifs_inode->open_file_lock);
 return 1;
 }
 }
@@ -4056,12 +4138,13 @@
 struct cifs_tcon *tcon = tlink_tcon(cfile->tlink);
 struct TCP_Server_Info *server = tcon->ses->server;

int rc = 0;
+bool purge_cache = false;

wait_on_bit(&cinode->flags, CIFS_INODE_PENDING_WRITERS, TASK_UNINTERRUPTIBLE);

-server->ops->downgrade_oplock(server, cinode,
-test_bit(CIFS_INODE_DOWNGRADE_OPLOCK_TO_L2, &cinode->flags));
+server->ops->downgrade_oplock(server, cinode, cfile->oplock_level,
+ cfile->oplock_epoch, &purge_cache);

if (!CIFS_CACHE_WRITE(cinode) && CIFS_CACHE_READ(cinode) &&
cifs_has_mand_locks(cinode)) {
@@ -4076,18 +4159,21 @@
    else
    break_lease(inode, O_WRONLY);
    rc = filemap_fdatawrite(inode->i_mapping);
-    if (!CIFS_CACHE_READ(cinode)) {
+    if (!CIFS_CACHE_READ(cinode) || purge_cache) {
       rc = filemap_fdatawait(inode->i_mapping);
       mapping_set_error(inode->i_mapping, rc);
       cifs_zap_mapping(inode);
    }
    cifs_dbg(FYI, "Oplock flush inode %p rc %d\n", inode, rc);
+    if (CIFS_CACHE_WRITE(cinode))
+        goto oplock_break_ack;
    }

    rc = cifs_push_locks(cfile);
    if (rc)
    cifs_dbg(VFS, "Push locks rc = %d\n", rc);

+oplock_break_ack:
/*
 * releasing stale oplock after recent reconnect of smb session using
 * a now incorrect file handle is not a data integrity issue but do
@@ -4099,6 +4185,7 @@
    cifs_dbg(FYI, "Oplock release rc = %d\n", rc);
 } +_cifsFileInfo_put(cfile, false /* do not wait for ourself */);
 cifs_done_oplock_break(cinode);
}

--- linux-4.15.0.orig/fs/cifs/inode.c
+++ linux-4.15.0/fs/cifs/inode.c
@@ -410,6 +4159,21 @@
/* if uniqueid is different, return error */
if (unlikely(cifs_sb->mnt_cifs_flags & CIFS_MOUNT_SERVER_INUM &&
    CIFS_I(*pinode)->uniqueid != fattr.cf_uniqueid)) {
    +CIFS_I(*pinode)->time = 0; /* force reval */
    rc = -ESTALE;
    goto cgiiu_exit;
}
/* if filetype is different, return error */
if (unlikely((((*pinode)->i_mode & S_IFMT) !=
    (fattr.cf_mode & S_IFMT))) {
    +CIFS_I(*pinode)->time = 0; /* force reval */
    rc = -ESTALE;
    goto cgiiu_exit;
}
@@ -417,6 +418,7 @@
/* if filetype is different, return error */
if (unlikely(((*pinode)->i_mode & S_IFMT) !=
    (fattr.cf_mode & S_IFMT))) {
    +CIFS_I(*pinode)->time = 0; /* force reval */
    rc = -ESTALE;
    goto cgiiu_exit;
}
@@ -467,6 +469,8 @@
oparms.cifs_sb = cifs_sb;
oparms.desired_access = GENERIC_READ;
oparms.create_options = CREATE_NOT_DIR;
+if (backup_cred(cifs_sb))
+oparms.create_options |= CREATE_OPEN_BACKUP_INTENT;
oparms.disposition = FILE_OPEN;
oparms.path = path;
oparms.fid = &fid;
@@ -707,6 +711,18 @@
return rc;
} /* Simple function to return a 64 bit hash of string. Rarely called */
+static __u64 simple_hashstr(const char *str)
+{
+    __u64 hash_mult = 1125899906842597ULL; /* a big enough prime */
+    __u64 hash = 0;
+    while (*str)
+        hash = (hash + (__u64) *str++) * hash_mult;
+    return hash;
+
int cifs_get_inode_info(struct inode **inode, const char *full_path,
    FILE_ALL_INFO *data, struct super_block *sb, int xid,
@@ -762,38 +778,53 @@
} else if (rc == -EREMOTE) {
cifs_create_dfs_fattr(&fattr, sb);
rc = 0;
-} else if (rc == -EACCES && backup_cred(cifs_sb)) {
-srchinf = kzalloc(sizeof(struct cifs_search_info),

if (srchinf == NULL) {
    rc = -ENOMEM;
    goto cgii_exit;
} else if ((rc == -EACCES) && backup_cred(cifs_sb) &&
            (strcmp(server->vals->version_string, SMB1_VERSION_STRING)
            == 0)) {
    /*
    * For SMB2 and later the backup intent flag is already
    * sent if needed on open and there is no path based
    * FindFirst operation to use to retry with
    */
    srchinf->endOfSearch = false;
    srchinf = kzalloc(sizeof(struct cifs_search_info),
                      GFP_KERNEL);
    if (srchinf == NULL) {
        rc = -ENOMEM;
        goto cgii_exit;
    } else if ((rc == -EACCES) && backup_cred(cifs_sb) &&
               (strcmp(server->vals->version_string, SMB1_VERSION_STRING)
               == 0)) {
        srchinf->endOfSearch = false;
        if (tcon->unix_ext)
            srchinf->info_level = SMB_FIND_FILE_UNIX;
        else if ((tcon->ses->capabilities &
                  tcon->ses->server->vals->cap_nt_find) == 0)
            srchinf->info_level = SMB_FIND_FILE_INFO_STANDARD;
        else if (cifs_sb->mnt_cifs_flags & CIFS_MOUNT_SERVER_INUM)
            srchinf->info_level = SMB_FIND_FILE_ID_FULL_DIR_INFO;
        else /* no srvino useful for fallback to some netapp */
            srchinf->info_level = SMB_FIND_FILE_DIRECTORY_INFO;
        srchflgs = CIFS_SEARCH_CLOSE_ALWAYS |
                    CIFS_SEARCH_CLOSE_AT_END |
                    CIFS_SEARCH_BACKUP_SEARCH;
        -rc = CIFSFindFirst(xid, tcon, full_path,
                             cifs_sb, NULL, srchflgs, srchinf, false);
        -if (!rc) {
            data =
            -((FILE_ALL_INFO *)srchinf->srch_entries_start;
            -cifs_dir_info_to_fattr(&fattr,&fattr,
            -((FILE_DIRECTORY_INFO *)data, cifs_sb);
            -fattr.cf_uniqueid = le64_to_cpu(
            -((SEARCH_ID_FULL_DIR_INFO *)data)->UniqueId);
            -validinum = true;
srchflgs = CIFS_SEARCH_CLOSE_ALWAYS | CIFS_SEARCH_CLOSE_AT_END | CIFS_SEARCH_BACKUP_SEARCH;

rc = CIFSFindFirst(xid, tcon, full_path, cifs_sb, NULL, srchflgs, srchinf, false);
if (!rc) {
  data = (FILE_ALL_INFO *)srchinf->srch_entries_start;
+
cifs_dir_info_to_fattr(&fattr, (FILE_DIRECTORY_INFO *)data, cifs_sb);
+fattr.cf_uniqueid = le64_to_cpu((SEARCH_ID_FULL_DIR_INFO *)data)->UniqueId);
+validinum = true;
-	cifs_buf_release(srchinf->ntwrk_buf_start);
-}
-kfree(srchinf);
-if (rc)
-goto cgii_exit;
+cifs_buf_release(srchinf->ntwrk_buf_start);
+
+kfree(srchinf);
+if (rc)
+goto cgii_exit;
} else
@@ -816,6 +847,14 @@
tmprc);
fattr.cf_uniqueid = iunique(sb, ROOT_I);
cifs_autodisable_serverino(cifs_sb);
+} else if (((fattr.cf_uniqueid == 0) &&
+strlen(full_path) == 0) {
+"some servers ret bad root ino ie 0 */
+cifs_dbg(FYI, "Invalid (0) inodenum\n");
+fattr.cf_flags |=
+CIFS_FATTR_FAKE_ROOT_INO;
+fattr.cf_uniqueid =
+simple_hashstr(tcon->treeName);
}
}
}else
@@ -832,6 +871,16 @&
&fattr.cf_uniqueid, data);
if (tmprc)
fattr.cf_uniqueid = CIFS_I(*inode)->uniqueid;
+else if ((fattr.cf_uniqueid == 0) &&
+strlen(full_path) == 0) {
  +/*
  + * Reuse existing root inode num since
  + * inum zero for root causes ls of . and .. to
  + * not be returned
  + */
  +cifs_dbg(FYI, "Srv ret 0 inode num for root\n");
  +fatattr.cf_uniqueid = CIFS_I(*inode)->uniqueid;
  +}
} else
fatattr.cf_uniqueid = CIFS_I(*inode)->uniqueid;
}
@@ -878,6 +927,7 @@
/* if uniqueid is different, return error */
if (unlikely(cifs_sb->mnt_cifs_flags & CIFS_MOUNT_SERVER_INUM &&
    CIFS_I(*inode)->uniqueid != fatattr.cf_uniqueid)) {
  +CIFS_I(*inode)->time = 0; /* force reval */
  rc = -ESTALE;
  goto cgii_exit;
}
@@ -885,6 +935,7 @@
  /* if filetype is different, return error */
  if (unlikely(((inmode & S_IFMT) !=
    (fatattr.cf_mode & S_IFMT))) {
    +CIFS_I(*inode)->time = 0; /* force reval */
    rc = -ESTALE;
    goto cgii_exit;
}
@@ -893,6 +944,9 @@
}

cgii_exit:
+if ((*inode) && ((*inode)->i_ino == 0))
  +cifs_dbg(FYI, "inode number of zero returned\n");
  +kfree(buf);
  cifs_put_tlink(tlink);
return rc;
@@ -1049,7 +1103,7 @@
tcon->resource_id = CIFS_I(inode)->uniqueid;
#ifdef
-if (rc && tcon->ipc) {
  +if (rc && tcon->pipe) {
    cifs_dbg(FYI, "ipc connection - fake read inode\n");
    spin_lock(&inode->i_lock);
    inode->i_mode |= S_IFDIR;
    @ @ -1049,7 +1103,7 @@
    tcon->resource_id = CIFS_I(inode)->uniqueid;
  #endif

  -if (rc && tcon->ipc) {
    +if (rc && tcon->pipe) {
      cifs_dbg(FYI, "ipc connection - fake read inode\n");
      spin_lock(&inode->i_lock);
      inode->i_mode |= S_IFDIR;
      @ @ -1089,6 +1143,8 @@
if (!server->ops->set_file_info)
    return -ENOSYS;

+info_buf.Pad = 0;
+
if (attrs->ia_valid & ATTR_ATIME) {
    set_time = true;
    info_buf.LastAccessTime =
        -1525.7 + 1581.7 @@
struct TCP_Server_Info *server;
char *full_path;

-cifs_dbg(FYI, "In cifs_mkdir, mode = 0x%hx inode = 0x%p\n",
+  "In cifs_mkdir, mode = %04ho inode = 0x%p\n",
mode, inode);

cifs_sb = CIFS_SB(inode->i_sb);
    @ @ -1678.6 + 1734.10 @@
if (rc == 0 || rc != -EBUSY)
    goto do_rename_exit;

+/* Don't fall back to using SMB on SMB 2+ mount */
+if (server->vals->protocol_id != 0)
    +goto do_rename_exit;
+
/* open-file renames don't work across directories */
if (to_dentry->d_parent != from_dentry->d_parent)
    goto do_rename_exit;
    @ @ -1938.6 + 1998.7 @@
struct inode *inode = d_inode(dentry);
struct super_block *sb = dentry->d_sb;
char *full_path = NULL;
    +int count = 0;

if (inode == NULL)
    return -ENOENT;

full_path, inode, inode->i_count.counter,
dentry, cifs_get_time(dentry), jiffies);

+again:
if (cifs_sb_master_tcon(CIFS_SB(sb))->unix_ext)
    rc = cifs_get_inode_info_unix(&inode, full_path, sb, xid);
else
    rc = cifs_get_inode_info(&inode, full_path, NULL, sb,
        xid, NULL);
    -
+if (rc == -EAGAIN && count++ < 10)
+goto again;
out:
kfree(full_path);
free_xid(xid);
+
return rc;
}

@@ -2146,6 +2210,15 @@
if (rc == 0) {
cifs_inode->server_eof = attrs->ia_size;
cifs_setsize(inode, attrs->ia_size);
+
+/*
+ * The man page of truncate says if the size changed,
+ * then the st_ctime and st_mtime fields for the file
+ * are updated.
+ */
+attrs->ia_ctime = attrs->ia_mtime = current_time(inode);
+attrs->ia_valid |= ATTR_CTIME | ATTR_MTIME;
+ cifs_truncate_page(inode->i_mapping, inode->i_size);
}

@@ -2196,6 +2269,11 @@
* the flush returns error?
 */
rc = filemap_write_and_wait(inode->i_mapping);
+if (is_interrupt_error(rc)) {
+rc = -ERESTARTSYS;
+goto out;
+}
+ mapping_set_error(inode->i_mapping, rc);
rc = 0;

@@ -2339,6 +2417,11 @@
* the flush returns error?
 */
rc = filemap_write_and_wait(inode->i_mapping);
+if (is_interrupt_error(rc)) {
+rc = -ERESTARTSYS;
+goto cifs_setattr_exit;
+}
+ mapping_set_error(inode->i_mapping, rc);
rc = 0;
struct cifs_sb_info *cifs_sb = CIFS_SB(direntry->d_sb);
struct cifs_tcon *pTcon = cifs_sb_master_tcon(cifs_sb);

if (pTcon->unix_ext)
	return cifs_setattr_unix(direntry, attrs);

return cifs_setattr_nounix(direntry, attrs);
	do {
		if (pTcon->unix_ext)
			rc = cifs_setattr_unix(direntry, attrs);
		else
			rc = cifs_setattr_nounix(direntry, attrs);
		retries++;
	} while (is_retryable_error(rc) && retries < 2);

/* BB: add cifs_setattr_legacy for really old servers */
+return rc;

#if 0
--- linux-4.15.0.orig/fs/cifs/link.c
+++ linux-4.15.0/fs/cifs/link.c
@@ -50,25 +50,12 @@
symlink_hash(unsigned int link_len, const char *link_str, u8 *md5_hash) {

int rc;
-unsigned int size;
-struct crypto_shash *md5;
-struct sdesc *sdescmd5;
-
-md5 = crypto_alloc_shash("md5", 0, 0);
-if (IS_ERR(md5)) {
-rc = PTR_ERR(md5);
-cifs_dbg(VFS, "%s: Crypto md5 allocation error %d\n",
-__func__, rc);
-return rc;
-}
-size = sizeof(struct shash_desc) + crypto_shash_descsize(md5);
-sdescmd5 = kmalloc(size, GFP_KERNEL);
-if (!sdescmd5) {
-rc = -ENOMEM;
+struct crypto_shash *md5 = NULL;
+struct sdesc *sdescmd5 = NULL;
+
+rc = cifs_alloc_hash("md5", &md5, &sdescmd5);
if (rc)
goto symlink_hash_err;
-
  sdescmd5->shash.tfm = md5;
  sdescmd5->shash.flags = 0x0;
-
rc = crypto_shash_init(&sdescmd5->shash);
if (rc) {
  cifs_dbg(VFS, "%s: Could not generate md5 hash\n", __func__);

  symlink_hash_err:
  -crypt0_free_shash(md5);
  -kfree(sdescmd5);
  -
  +cifs_free_hash(&md5, &sdescmd5);
  return rc;
}

@@ -411,7 +396,7 @@
  struct cifs_io_parms io_parms;
  int buf_type = CIFS_NO_BUFFER;
  __le16 *utf16_path;
  +__u8 oplock = SMB2_OPLOCK_LEVEL_NONE;
  +__u8 oplock = SMB2_OPLOCK_LEVEL_EXCLUSIVE;
  struct smb2_file_all_info *pfile_info = NULL;

  oparms.tcon = tcon;
@@ -473,7 +458,7 @@
  struct cifs_io_parms io_parms;
  int create_options = CREATE_NOT_DIR;
  __le16 *utf16_path;
  +__u8 oplock = SMB2_OPLOCK_LEVEL_EXCLUSIVE;
  +__u8 oplock = SMB2_OPLOCK_LEVEL_NONE;
  struct kvec iov[2];

  if (backup_cred(cifs_sb))
  --- linux-4.15.0.orig/fs/cifs/misc.c
+++ linux-4.15.0/fs/cifs/misc.c
@@ -98,14 +98,11 @@
  kfree(buf_to_free->serverOS);
  kfree(buf_to_free->servername);
  kfree(buf_to_free->serverNOS);
-  if (buf_to_free->password) {
-    memset(buf_to_free->password, 0, strlen(buf_to_free->password));
-    kfree(buf_to_free->password);
-  }
+  kfree(buf_to_free->password);

kfree(buf_to_free->user_name);
kfree(buf_to_free->domainName);
-kfree(buf_to_free->auth_key.response);
-kfree(buf_to_free);
+kzfree(buf_to_free->auth_key.response);
+kzfree(buf_to_free);
}

struct cifs_tcon *
@@ -136,10 +133,7 @@
}
atomic_dec(&tconInfoAllocCount);
kfree(buf_to_free->nativeFileSystem);
-if (buf_to_free->password) {
-memset(buf_to_free->password, 0, strlen(buf_to_free->password));
-kfree(buf_to_free->password);
-}
+kzfree(buf_to_free->password);
kfree(buf_to_free);
}

@@ -404,9 +398,17 @@
(struct smb_com_transaction_change_notify_rsp *)buf;
struct file_notify_information *pnotify;
__u32 data_offset = 0;
+size_t len = srv->total_read - sizeof(pSMBr->hdr.smb_buf_length);
+if (get_bcc(buf) > sizeof(struct file_notify_information)) {
+data_offset = le32_to_cpu(pSMBr->DataOffset);
+
+if (data_offset >
+   len - sizeof(struct file_notify_information)) {
+cifs_dbg(FYI, "invalid data_offset %u\n",
+   data_offset);
+return true;
+}
+pnotify = (struct file_notify_information *)
+(char *)&pSMBr->hdr.Protocol + data_offset);
cifs_dbg(FYI, "dnotify on %s Action: 0x%x",
@@ -471,22 +473,10 @@
set_bit(CIFS_INODE_PENDING_OPLOCK_BREAK,
   &pCifsInode->flags);

-/*
- * Set flag if the server downgrades the oplock
- * to L2 else clear.
- */
-if (pSMB->OplockLevel)
-set_bit(
-  CIFS_INODE_DOWNGRADE_OPLOCK_TO_L2,
-  &pCifs_inode->flags);
-else
-clear_bit(
-  CIFS_INODE_DOWNGRADE_OPLOCK_TO_L2,
-  &pCifs_inode->flags);
-
-queue_work(cifsoplockd_wq,
-  &netfile->oplock_break);
+netfile->oplock_epoch = 0;
+netfile->oplock_level = pSMB->OplockLevel;
netfile->oplock_break_cancelled = false;
+cifs_queue_oplock_break(netfile);

spin_unlock(&tcon->open_file_lock);
spin_unlock(&cifs_tcp_ses_lock);
@@ -518,6 +508,7 @@
{
  if (cifs_sb->mnt_cifs_flags & CIFS_MOUNT_SERVER_INUM) {
    cifs_sb->mnt_cifs_flags &= ~CIFS_MOUNT_SERVER_INUM;
+    cifs_sb->mnt_cifs_serverino_autodisabled = true;
    cifs_dbg(VFS, "Autodisabling the use of server inode numbers on %s. This server doesn't seem to support them
properly. Hardlinks will not be recognized on this mount. Consider mounting with the \"noserverino\" option to
silence this message.\n",
    cifs_sb_master_tcon(cifs_sb)->treeName);
  }
@@ -582,6 +573,28 @@
spin_unlock(&cinode->writers_lock);
}

+/**
+ * cifs_queue_oplock_break - queue the oplock break handler for cfile
+ *
+ * This function is called from the demultiplex thread when it
+ * receives an oplock break for @cfile.
+ *
+ * Assumes the tcon->open_file_lock is held.
+ * Assumes cfile->file_info_lock is NOT held.
+ */
+void cifs_queue_oplock_break(struct cifsFileInfo *cfile)
+{
+/*
+ * Bump the handle refcount now while we hold the
+ * open_file_lock to enforce the validity of it for the oplock
+ * break handler. The matching put is done at the end of the
+ * handler.
+ */
cifsFileInfo_get(cfile);
+
+queue_work(cifsoplockd_wq, &cfile->oplock_break);
+}
+
void cifs_done_oplock_break(struct cifsNodeInfo *cinode)
{
  clear_bit(CIFS_INODE_PENDING_OPLOCK_BREAK, &cinode->flags);
  iov_iter_bvec(&ctx->iter, ITER_BVEC | rw, ctx->bv, npages, ctx->len);
  return 0;
}
+
/**
 * cifs_alloc_hash - allocate hash and hash context together
 * 
 * The caller has to make sure @sdesc is initialized to either NULL or
 * a valid context. Both can be freed via cifs_free_hash().
 */
+int
cifs_alloc_hash(const char *name,
+struct crypto_shash **shash, struct sdesc **sdesc)
+{
+int rc = 0;
+size_t size;
+
+if (*sdesc != NULL)
+return 0;
+
+*shash = crypto_alloc_shash(name, 0, 0);
+if (IS_ERR(*shash)) {
+cifs_dbg(VFS, "could not allocate crypto %s\n", name);
+rc = PTR_ERR(*shash);
+*shash = NULL;
+*sdesc = NULL;
+return rc;
+}
+
+size = sizeof(struct shash_desc) + crypto_shash-descsize(*shash);
+*sdesc = kmalloc(size, GFP_KERNEL);
+if (*sdesc == NULL) {
+cifs_dbg(VFS, "no memory left to allocate crypto %s\n", name);
+crypto_free_shash(*shash);
+*shash = NULL;
+*sdesc = NULL;
+return -ENOMEM;
+}
+
+(*sdesc)->shash.tfm = *shash;
(*sdesc)->shash.flags = 0x0;
+return 0;
+
+/**
+ * cifs_free_hash - free hash and hash context together
+ *
+ * Freeing a NULL hash or context is safe.
+ */
+ void
+cifs_free_hash(struct crypto_shash **shash, struct sdesc **sdesc)
+{
+kfree(*sdesc);
+ *sdesc = NULL;
+ if (*shash)
+ crypto_free_shash(*shash);
+ *shash = NULL;
+}
--- linux-4.15.0.orig/fs/cifs/netmisc.c
+++ linux-4.15.0/fs/cifs/netmisc.c
@@ -130,10 +130,6 @@
 {0, 0}
-] static const struct smb_to_posix_error mapping_table_ERRHRD[ ] = {
-] {0, 0}
-] ;
-
-/*
-* Convert a string containing text IPv4 or IPv6 address to binary form.
-*
--- linux-4.15.0.orig/fs/cifs/readdir.c
+++ linux-4.15.0/fs/cifs/readdir.c
@@ -376,8 +376,15 @@
 new_entry = old_entry + sizeof(FIND_FILE_STANDARD_INFO) +
 pFindData->FileNameLength;
-} else
-new_entry = old_entry + le32_to_cpu(pDirInfo->NextEntryOffset);
+} else {
+ u32 next_offset = le32_to_cpu(pDirInfo->NextEntryOffset);
+ if (old_entry + next_offset < old_entry) {
+ cifs_dbg(VFS, "invalid offset %u\n", next_offset);
+ return NULL;
+ }
+ new_entry = old_entry + next_offset;
+}
cifs_dbg(FYI, "new entry %p old entry %p\n", new_entry, old_entry);
/* validate that new_entry is not past end of SMB */
if (new_entry >= end_of_smb) {
	@ -648,7 +655,14 @@
/* scan and find it */

int i;
char *cur_ent;
- char *end_of_smb = cfile->srch_inf.ntwrk_buf_start +
+ char *end_of_smb = cfile->srch_inf.ntwrk_buf_start +
+ server->ops->calc_smb_size(
+ cfile->srch_inf.ntwrk_buf_start);

--- linux-4.15.0.orig/fs/cifs/sess.c
+++ linux-4.15.0/fs/cifs/sess.c
@@ -398,6 +398,12 @@
} goto setup_ntlmv2_ret;
}
*pbuffer = kmalloc(size_of_ntlmssp_blob(ses), GFP_KERNEL);
+if (!*pbuffer) {
+rc = -ENOMEM;
+cifs_dbg(VFS, "Error %d during NTLMSSP allocation\n", rc);
+*buflen = 0;
+goto setup_ntlmv2_ret;
+}
sec_blob = (AUTHENTICATE_MESSAGE *)*pbuffer;

memcpy(sec_blob->Signature, NTLMSSP_SIGNATURE, 8);
@@ -596,7 +602,7 @@
return 0;
}

out_free_smb_buf:
-kfree(smb_buf);
+cifs_small_buf_release(smb_buf);
sess_data->iov[0].iov_base = NULL;
sess_data->iov[0].iov_len = 0;
sess_data->buf0_type = CIFS_NO_BUFFER;
--- linux-4.15.0.orig/fs/cifs/smb1ops.c
+++ linux-4.15.0/fs/cifs/smb1ops.c
@@ -105,6 +105,7 @@
if (compare_mid(mid->mid, buf) &&
} if (compare_mid(mid->mid, buf) &&

mid->mid_state == MID_REQUEST_SUBMITTED &&

---
le16_to_cpu(mid->command) == buf->Command) {
    kref_get(&mid->refcount);
    spin_unlock(&GlobalMid_Lock);
    return mid;
}
@@ -180,6 +181,9 @@
/* we do not want to loop forever */
    last_mid = cur_mid;
    cur_mid++;
+/* avoid 0xFFFF MID */
+if (cur_mid == 0xffff)
+    cur_mid++;

/*
 * This nested loop looks more expensive than it is.
 @@ -305,7 +309,7 @@
     remaining = tgt_total_cnt - total_in_tgt;

     if (remaining < 0) {
-        cifs_dbg(FYI, "Server sent too much data. tgt_total_cnt=%hu total_in_tgt=%hu\n",
+        cifs_dbg(FYI, "Server sent too much data. tgt_total_cnt=%hu total_in_tgt=%u\n",
             tgt_total_cnt, total_in_tgt);
         return -EPROTO;
     }
@@ -375,12 +379,10 @@
 static void
    cifs_downgrade_oplock(struct TCP_Server_Info *server,
    -struct cifsInodeInfo *cinode, bool set_level2)
    + struct cifsInodeInfo *cinode, __u32 oplock,
    +     unsigned int epoch, bool *purge_cache)
    {
    -if (set_level2)
    -    cifs_set_oplock_level(cinode, OPLOCK_READ);
    -else
    -    cifs_set_oplock_level(cinode, 0);
    +    cifs_set_oplock_level(cinode, oplock);
    }

 static bool
 --- linux-4.15.0.orig/fs/cifs/smb2file.c
 +++ linux-4.15.0/fs/cifs/smb2file.c
 @@ -69,12 +69,12 @@
 goto out;

 - if (oparms->tcon->use_resilient) {
 +if (oparms->tcon->use_resilient) {

nr_ioctl_req.Timeout = 0; /* use server default (120 seconds) */
nr_ioctl_req.Reserved = 0;
rc = SMB2_ioctl(xid, oparms->tcon, fid->persistent_fid,
fid->volatile_fid, FSCTL_LMR_REQUEST_RESILIENCY,
-true /* is_fsctl */, false /* use_ipc */,
+true /* is_fsctl */,
(char *)&nr_ioctl_req, sizeof(nr_ioctl_req),
NULL, NULL /* no return info */);
if (rc == -EOPNOTSUPP) {
    @ @ -124,12 +124,14 @@

    /*
     * Accessing maxBuf is racy with cifs_reconnect - need to store value
     - * and check it for zero before using.
     + * and check it before using.
     */
    max_buf = tcon->ses->server->maxBuf;
    -if (!max_buf)
    +if (max_buf < sizeof(struct smb2_lock_element))
    return -EINVAL;
    +BUILD_BUG_ON(sizeof(struct smb2_lock_element) > PAGE_SIZE);
    +max_buf = min_t(unsigned int, max_buf, PAGE_SIZE);
    max_num = max_buf / sizeof(struct smb2_lock_element);
    buf = kmalloc(max_num, sizeof(struct smb2_lock_element), GFP_KERNEL);
    if (!buf)
        @ @ -137,7 +139,7 @@

    cur = buf;
    -down_write(&cinode->lock_sem);
    +cifs_down_write(&cinode->lock_sem);
    list_for_each_entry_safe(li, tmp, &cfile->llist->locks, llist) {
        if (flock->fl_start > li->offset ||
            (flock->fl_start + length) <
            @@ -266,6 +268,8 @@
                return -EINVAL;
    }
    +BUILD_BUG_ON(sizeof(struct smb2_lock_element) > PAGE_SIZE);
    +max_buf = min_t(unsigned int, max_buf, PAGE_SIZE);
    max_num = max_buf / sizeof(struct smb2_lock_element);
    buf = kmalloc(max_num, sizeof(struct smb2_lock_element), GFP_KERNEL);
    if (!buf) {
        --- linux-4.15.0.orig/fs/cifs/smb2inode.c
        +++ linux-4.15.0/fs/cifs/smb2inode.c
        @@ -267,7 +267,7 @@
        int rc;

if ((buf->CreationTime == 0) && (buf->LastAccessTime == 0) &&
- (buf->LastWriteTime == 0) && (buf->ChangeTime) &&
+ (buf->LastWriteTime == 0) && (buf->ChangeTime == 0) &&
    (buf->Attributes == 0))
return 0; /* would be a no op, no sense sending this */
if (((clc_len + 7) & ~7) == len)
+return 0;
+
+/
* MacOS server pads after SMB2.1 write response with 3 bytes
* of junk. Other servers match RFC1001 len to actual
* SMB2/SMB3 frame length (header + smb2 response specific data)
@@ -472,7 +479,6 @@
__u8 lease_state;
struct list_head *tmp;
struct cifsFileInfo *cfile;
-struct TCP_Server_Info *server = tcon->ses->server;
struct cifs_pending_open *open;
struct cifsInodeInfo *cinode;
int ack_req = le32_to_cpu(rsp->Flags &
@@ -490,16 +496,19 @@
cifs_dbg(FYI, "found in the open list\n");
cifs_dbg(FYI, "lease key match, lease break 0x%\n",
- le32_to_cpu(rsp->NewLeaseState));
-
-server->ops->set_oplock_level(cinode, lease_state, 0, NULL);
+ lease_state);

if (ack_req)
cfile->oplock_break_cancelled = false;
else
  cfile->oplock_break_cancelled = true;

-queue_work(cifsoplockd_wq, &cfile->oplock_break);
+set_bit(CIFS_INODE_PENDING_OPLOCK_BREAK, &cinode->flags);
+
cfile->oplock_epoch = le16_to_cpu(rsp->Epoch);
cfile->oplock_level = lease_state;
+
cifs_queue_oplock_break(cfile);
kfree(lw);
return true;
}
@@ -520,7 +529,7 @@
cifs_dbg(FYI, "found in the pending open list\n");
cifs_dbg(FYI, "lease key match, lease break 0x%\n",
- le32_to_cpu(rsp->NewLeaseState));
+ lease_state);

open->oplock = lease_state;
}
spin_lock(&cifs_tcp_ses_lock);
list_for_each(tmp, &server->smb_ses_list) {
    ses = list_entry(tmp, struct cifs_ses, smb_ses_list);
    +
    list_for_each(tmp1, &ses->tcon_list) {
        tcon = list_entry(tmp1, struct cifs_tcon, tcon_list);
        ...
        cifs_stats_inc(&tcon->stats.cifs_stats.num_oplock_brks);
        spin_lock(&tcon->open_file_lock);
        list_for_each(tmp2, &tcon->openFileList) {
            cfile = list_entry(tmp2, struct cifsFileInfo,
            @@ -619,6 +628,8 @@
            continue;
            cifs_dbg(FYI, "file id match, oplock break\n");
            +cifs_stats_inc(
                +  &tcon->stats.cifs_stats.num_oplock_brks);
            cinode = CIFS_I(d_inode(cfile->dentry));
            spin_lock(&cfile->file_info_lock);
            if (!CIFS_CACHE_WRITE(cinode) &&
                @@ -630,35 +641,23 @@
                set_bit(CIFS_INODE_PENDING_OPLOCK_BREAK,
                    &cinode->flags);
                    
                    /*
                    - * Set flag if the server downgrades the oplock
                    - * to L2 else clear.
                    - */
                    -if (rsp->OplockLevel)
                    -set_bit(
                        -  CIFS_INODE_DOWNGRADE_OPLOCK_TO_L2,
                        -  &cinode->flags);
                    -else
                    -clear_bit(
                        -  CIFS_INODE_DOWNGRADE_OPLOCK_TO_L2,
                        -  &cinode->flags);
                    
                    +cfile->oplock_epoch = 0;
                    +cfile->oplock_level = rsp->OplockLevel;
                    +
                    spin_unlock(&cfile->file_info_lock);
                    -queue_work(cifsoptlockd_wq,
                        - &cfile->oplock_break);
                    +
                    +cifs_queue_oplock_break(cfile);
                    
                    spin_unlock(&tcon->open_file_lock);
                    spin_unlock(&cifs_tcp_ses_lock);
                    
                    spin_unlock(&cifs_tcp_ses_lock);
return true;
}
spin_unlock(&tcon->open_file_lock);
spin_unlock(&cifs_tcp_ses_lock);
cifs_dbg(FYI, "No matching file for oplock break\n");
-return true;
}
}
spin_unlock(&cifs_tcp_ses_lock);
cifs_dbg(FYI, "Can not process oplock break for non-existent connection\n");
-return false;
+cifs_dbg(FYI, "No file id matched, oplock break ignored\n");
+return true;
}

void
--- linux-4.15.0.orig/fs/cifs/smb2ops.c
+++ linux-4.15.0/fs/cifs/smb2ops.c
@@ -33,6 +33,7 @@
#include "smb2glob.h"
#include "cifs_ioctl.h"

+/* Change credits for different ops and return the total number of credits */
 static int
 change_conf(struct TCP_Server_Info *server)
{
 @@ -40,17 +41,15 @@
switch (server->credits) {
 case 0:
-     return -1;
+     return 0;
 case 1:
 server->oplock_credits = server->echo_credits = 0;
 switch (server->credits) {
 case 0:
-       return -1;
+       return 0;
 case 1:
 server->echoes = false;
 server->oplocks = false;
-     cifs_dbg(VFS, "disabling echoes and oplocks\n");
 break;
 case 2:
 server->echoes = true;
 server->oplocks = false;
 server->echo_credits = 1;
-     cifs_dbg(FYI, "disabling oplocks\n");
 break;
 default:
 server->echoes = true;
 @@ -63,14 +62,15 @@
 server->echo_credits = 1;
 }
server->credits -= server->echo_credits + server->oplock_credits;
return 0;
return server->credits + server->echo_credits + server->oplock_credits;
}

static void
smb2_add_credits(struct TCP_Server_Info *server, const unsigned int add, const int optype)
{
    int *val, rc = 0;
+    int *val, rc = -1;
+    spin_lock(&server->req_lock);
    val = server->ops->get_credits_field(server, optype);
*    @ @ -94,8 +94,26 @ @
    *val += add;
    spin_unlock(&server->req_lock);
    wake_up(&server->request_q);
    -if (rc)
    -cifs_reconnect(server);
    +
    +if (server->tcpStatus == CifsNeedReconnect)
    +return;
    +
    +switch (rc) {
    +case -1:
    +/* change_conf hasn't been executed */
    +break;
    +case 0:
    +cifs_dbg(VFS, "Possible client or server bug - zero credits\n");
    +break;
    +case 1:
    +cifs_dbg(VFS, "disabling echoes and oplocks\n");
    +break;
    +case 2:
    +cifs_dbg(FYI, "disabling oplocks\n");
    +break;
    +default:
    +cifs_dbg(FYI, "add \%u credits total=\%d\n", add, rc);
    +}
}

static void
scredits = server->credits;
/* can deadlock with reopen */
-if (scredits == 1) {
+if (scredits <= 8) {
    *num = SMB2_MAX_BUFFER_SIZE;
    *credits = 0;
    break;
}

/* leave one credit for a possible reopen */
-scredits--;

/* leave some credits for reopen and other ops */
+scredits -= 8;

*num = min_t(unsigned int, size,
    scredits * SMB2_MAX_BUFFER_SIZE);

@ @ -202,6 +220,7 @@
if ((mid->mid == wire_mid) &&
    (mid->mid_state == MID_REQUEST_SUBMITTED) &&
    (mid->command == shdr->Command)) {
    +kref_get(&mid->refcount);
    spin_unlock(&GlobalMid_Lock);
    return mid;
}
@@ -283,7 +302,6 @@
rc = SMB2_ioctl(xid, tcon, NO_FILE_ID, NO_FILE_ID,
FSCTL_QUERY_NETWORK_INTERFACE_INFO, true /* is_fsctl */,
-false /* use_ipc */,
-NUL/* no data input */, 0 /* no data input */,
(char **)out_buf, &ret_data_len);
if (rc != 0)
@@ -332,6 +350,8 @@
SMB2_QFS_attr(xid, tcon, fid.persistent_fid, fid.volatile_fid,
FS_DEVICE_INFORMATION);
SMB2_QFS_attr(xid, tcon, fid.persistent_fid, fid.volatile_fid,
+FS_VOLUME_INFORMATION);
+SMB2_QFS_attr(xid, tcon, fid.persistent_fid, fid.volatile_fid,
FS_SECTOR_SIZE_INFORMATION); /* SMB3 specific */
SMB2_close(xid, tcon, fid.persistent_fid, fid.volatile_fid);
return;
@@ -382,7 +402,10 @@
oparms.tcon = tcon;
oparms.desired_access = FILE_READ_ATTRIBUTES;
oparms.disposition = FILE_OPEN;
-oparms.create_options = 0;
+if (backup_cred(cifs_sb))
+oparms.create_options = CREATE_OPEN_BACKUP_INTENT;
+else
+oparms.create_options = 0;
oparms.fid = &fid;
oparms.reconnect = false;

@@ -435,6 +458,7 @@
int rc = 0;
unsigned int ea_name_len = ea_name ? strlen(ea_name) : 0;
char *name, *value;
+size_t buf_size = dst_size;
size_t name_len, value_len, user_name_len;

while (src_size > 0) {
@@ -470,9 +494,10 @@
/* 'user.' plus a terminating null */
user_name_len = 5 + 1 + name_len;

-rc += user_name_len;
-
-if (dst_size >= user_name_len) {
+if (buf_size == 0) {
+/* skip copy - calc size only */
+rc += user_name_len;
+} else if (dst_size >= user_name_len) {
dst_size -= user_name_len;
memcpy(dst, "user.", 5);
dst += 5;
@@ -480,8 +505,7 @@
dst += name_len;
*dst = 0;
++dst;
-} else if (dst_size == 0) {
-/* skip copy - calc size only */
+rc += user_name_len;
 } else {
/* stop before overrun buffer */
rc = -ERANGE;
@@ -531,7 +555,10 @@
oparms.tcon = tcon;
oparms.desired_access = FILE_READ_EA;
oparms.disposition = FILE_OPEN;
-oparms.create_options = 0;
+if (backup_cred(cifs_sb))
+oparms.create_options = CREATE_OPEN_BACKUP_INTENT;
+else
+oparms.create_options = 0;
oparms.fid = &fid;
oparms.reconnect = false;

@@ -570,9 +597,15 @@
SMB2_close(xid, tcon, fid.persistent_fid, fid.volatile_fid);

+/*
+ * If ea_name is NULL (listxattr) and there are no EAs, return 0 as it's
+ * not an error. Otherwise, the specified ea_name was not found.
+ */
if (!rc)
    rc = move_smb2_ea_to_cifs(ea_data, buf_size, smb2_data,
                   SMB2_MAX_EA_BUF, ea_name);
else if (!ea_name && rc == -ENODATA)
    rc = 0;

kfree(smb2_data);
return rc;
@@ -604,7 +637,10 @@
oparms.tcon = tcon;
oparms.desired_access = FILE_WRITE_EA;
oparms.disposition = FILE_OPEN;
-oparms.create_options = 0;
+if (backup_cred(cifs_sb))
+    oparms.create_options = CREATE_OPEN_BACKUP_INTENT;
+else
+    oparms.create_options = 0;
oparms.fid = &fid;
oparms.reconnect = false;

@@ -615,7 +651,7 @@
return rc;
}

-len = sizeof(ea) + ea_name_len + ea_value_len + 1;
+len = sizeof(*ea) + ea_name_len + ea_value_len + 1;
ea = kzalloc(len, GFP_KERNEL);
if (ea == NULL) {
    SMB2_close(xid, tcon, fid.persistent_fid, fid.volatile_fid);
@@ -629,6 +665,8 @@
rc = SMB2_set_ea(xid, tcon, fid.persistent_fid, fid.volatile_fid, ea,
+            len);
kfree(ea);
+SMB2_close(xid, tcon, fid.persistent_fid, fid.volatile_fid);

return rc;
@@ -782,7 +820,6 @@
rc = SMB2_ioctl(xid, tcon, persistent_fid, volatile_fid,
FSCTL_SRV_REQUEST_RESUME_KEY, true /* is_fsctl */,
-false /* use_ipc */,
NULL, 0 /* no input */,
(char **) &res_key, &ret_data_len);

@@ -846,10 +883,11 @@
cpu_to_le32(min_t(u32, len, tcon->max_bytes_chunk));

/* Request server copy to target from src identified by key */
+kfree(retbuf);
+retbuf = NULL;
rc = SMB2_ioctl(xid, tcon, trgtfile->fid.persistent_fid,
trgtfile->fid.volatile_fid, FSCTL_SRV_COPYCHUNK_WRITE,
-true /* is_fsctl */, false /* use_ipc */,
-(char *)pcchunk,
+true /* is_fsctl */, (char *)pcchunk,
sizeof(struct copychunk_ioctl), (char **) &retbuf,
&ret_data_len);
if (rc == 0) {
@@ -1006,7 +1044,7 @@
crc = SMB2_ioctl(xid, tcon, cfile->fid.persistent_fid,
cfile->fid.volatile_fid, FSCTL_SET_SPARSE,
-true /* is_fsctl */, false /* use_ipc */,
+true /* is_fsctl */,
&setsparse, 1, NULL, NULL);
if (rc) {
tcon->broken_sparse_sup = true;
@@ -1077,7 +1115,7 @@
rc = SMB2_ioctl(xid, tcon, trgtfile->fid.persistent_fid,
trgtfile->fid.volatile_fid,
FSCTL_DUPLICATE_EXTENTS_TO_FILE,
-true /* is_fsctl */, false /* use_ipc */,
+true /* is_fsctl */,
(char *) &dup_ext_buf,
sizeof(struct duplicate_extents_to_file),
NULL,
@@ -1112,7 +1150,7 @@
return SMB2_ioctl(xid, tcon, cfile->fid.persistent_fid,
cfile->fid.volatile_fid,
FSCTL_SET_INTEGRITY_INFORMATION,
-true /* is_fsctl */, false /* use_ipc */,
+true /* is_fsctl */,
(char *) &integr_info,
sizeof(struct fsctl_set_integrity_information_req),
NULL,
@@ -1120,6 +1158,13 @@
static int
smb3_enum_snapshots(const unsigned int xid, struct cifs_tcon *tcon,
struct cifsFileInfo *cfile, void __user *ioc_buf)
@@ -1132,7 +1177,7 @@
rc = SMB2_ioctl(xid, tcon, cfile->fid.persistent_fid,
cfile->fid.volatile_fid,
FSCTL_SRV_ENUMERATE_SNAPSHOTS,
-true /* is_fsctl */, false /* use_ipc */,
+true /* is_fsctl */,
NULL, 0 /* no input data */,
(char **)&retbuf,
&ret_data_len);
@@ -1149,14 +1194,27 @@
kfree(retbuf);
return rc;
}
-if (snapshot_in.snapshot_array_size < sizeof(struct smb_snapshot_array)) { 
-rc = -ERANGE;
-kfree(retbuf);
-return rc;
-}

-if (ret_data_len > snapshot_in.snapshot_array_size)
-ret_data_len = snapshot_in.snapshot_array_size;
+/*
+ * Check for min size, ie not large enough to fit even one GMT
+ * token (snapshot). On the first ioctl some users may pass in
+ * smaller size (or zero) to simply get the size of the array
+ * so the user space caller can allocate sufficient memory
+ * and retry the ioctl again with larger array size sufficient
+ * to hold all of the snapshot GMT tokens on the second try.
+ */
+if (snapshot_in.snapshot_array_size < GMT_TOKEN_SIZE)
+ret_data_len = sizeof(struct smb_snapshot_array);
+
+/*
+ * We return struct SRV_SNAPSHOT_ARRAY, followed by
+ * the snapshot array (of 50 byte GMT tokens) each
+ * representing an available previous version of the data

if (ret_data_len > (snapshot_in.snapshot_array_size +
sizeof(struct smb_snapshot_array)))
ret_data_len = snapshot_in.snapshot_array_size +
sizeof(struct smb_snapshot_array);

if (copy_to_user(ioc_buf, retbuf, ret_data_len))
rc = -EFAULT;
@@ -1184,7 +1242,10 @@
oparms.tcon = tcon;
oparms.desired_access = FILE_READ_ATTRIBUTES | FILE_READ_DATA;
oparms.disposition = FILE_OPEN;
-oparms.create_options = 0;
+if (backup_cred(cifs_sb))
+oparms.create_options = CREATE_OPEN_BACKUP_INTENT;
+else
+oparms.create_options = 0;
oparms.fid = fid;
oparms.reconnect = false;

@@ -1196,7 +1257,7 @@
}

srch_inf->entries_in_buffer = 0;
-srch_inf->index_of_last_entry = 0;
+srch_inf->index_of_last_entry = 2;

rc = SMB2_query_directory(xid, tcon, fid->persistent_fid,
    fid->volatile_fid, 0, srch_inf);
@@ -1250,10 +1311,11 @@
{
    struct smb2_sync_hdr *shdr = get_sync_hdr(buf);

    -if (shdr->Status != STATUS_NETWORK_SESSION_EXPIRED)
+if (shdr->Status != STATUS_NETWORK_SESSION_EXPIRED &&
+    shdr->Status != STATUS_USER_SESSION_DELETED)
        return false;

    -cifs_dbg(FYI, "Session expired\n");
+    cifs_dbg(FYI, "Session expired or deleted\n");
        return true;
    }

@@ -1351,16 +1413,20 @@
cifs_dbg(FYI, "smb2_get_dfs_refer path <%s>\n", search_name);

    /*
    - * Use any tcon from the current session. Here, the first one.
    */
/* Try to use the IPC tcon, otherwise just use any */
-spin_lock(&cifs_tcp_ses_lock);
-tcon = list_first_entry_or_null(&ses->tcon_list, struct cifs_tcon,
-tcon_list);
-if (tcon)
-tcon->tc_count++;
-spin_unlock(&cifs_tcp_ses_lock);
+tcon = ses->tcon_ipc;
+if (tcon == NULL) {
+spin_lock(&cifs_tcp_ses_lock);
+tcon = list_first_entry_or_null(&ses->tcon_list,
+struct cifs_tcon,
+tcon_list);
+if (tcon)
+tcon->tc_count++;
+spin_unlock(&cifs_tcp_ses_lock);
+
-if (!tcon) {
+if (tcon == NULL) {
 cifs_dbg(VFS, "session %p has no tcon available for a dfs referral request\n", ses);
 rc = -ENOTCONN;
@@ -1389,20 +1455,11 @@
 memcpy(dfs_req->RequestFileName, utf16_path, utf16_path_len);
 do {
-/* try first with IPC */
 rc = SMB2_ioctl(xid, tcon, NO_FILE_ID, NO_FILE_ID,
 FSCTL_DFS_GET_REFERRALS,
-true /* is_fsctl */, true /* use_ipc */,
+true /* is_fsctl */,
 (char *)dfs_req, dfs_req_size,
 (char **)&dfs_rsp, &dfs_rsp_size);
 -if (rc == -ENOTCONN) {
-/* try with normal tcon */
 -rc = SMB2_ioctl(xid, tcon, NO_FILE_ID, NO_FILE_ID,
 -FSCTL_DFS_GET_REFERRALS,
 -true /* is_fsctl */, false /*use_ipc*/,
 -(char *)dfs_req, dfs_req_size,
 -(char **)&dfs_rsp, &dfs_rsp_size);
 -}
 } while (rc == -EAGAIN);

 if (rc) {
 @@ -1421,7 +1478,8 @@
 }
out:
-if (tcon) {
+if (tcon && !tcon->ipc) {
+/* ipc tcons are not refcounted */
spin_lock(&cifs_tcp_ses_lock);
tcon->tc_count--;
spin_unlock(&cifs_tcp_ses_lock);
@@ -1460,11 +1518,16 @@
oparms.tcon = tcon;
oparms.desired_access = FILE_READ_ATTRIBUTES;
oparms.disposition = FILE_OPEN;
-oparms.create_options = 0;
+if (backup_cred(cifs_sb))
+oparms.create_options = CREATE_OPEN_BACKUP_INTENT;
+else
+oparms.create_options = 0;
oparms.fid = &fid;
oparms.reconnect = false;

rc = SMB2_open(xid, &oparms, utf16_path, &oplock, NULL, &err_buf);
+if (!rc)
+SMB2_close(xid, tcon, fid.persistent_fid, fid.volatile_fid);

if (!rc || !err_buf) {
kfree(utf16_path);
@@ -1566,8 +1629,11 @@
oparms.create_options = 0;
utf16_path = cifs_convert_path_to_utf16(path, cifs_sb);
-if (!utf16_path)
-return ERR_PTR(-ENOMEM);
+if (!utf16_path) {
+rc = -ENOMEM;
+free_xid(xid);
+return ERR_PTR(rc);
+
}
oparms.tcon = tcon;
oparms.desired_access = READ_CONTROL;
@@ -1625,8 +1691,11 @@
access_flags = WRITE_DAC;
utf16_path = cifs_convert_path_to_utf16(path, cifs_sb);
-if (!utf16_path)
-return ERR_PTR(-ENOMEM);
+if (!utf16_path) {
+rc = -ENOMEM;
+}
+free_xid(xid);
+return rc;
+
oparms.tcon = tcon;
oparms.desired_access = access_flags;
@@ -1684,17 +1753,29 @@
inode = d_inode(cfile->dentry);
cifsi = CIFS_i(inode);

+/*
+ * We zero the range through ioctl, so we need remove the page caches
+ * first, otherwise the data may be inconsistent with the server.
+ */
+truncate_pagecache_range(inode, offset, offset + len - 1);
+
/* if file not oplocked can't be sure whether asking to extend size */
if (!CIFS_CACHE_READ(cifsi))
  -if (keep_size == false)
    -return -EOPNOTSUPP;
  +if (keep_size == false) {
    +rc = -EOPNOTSUPP;
    +free_xid(xid);
    +return rc;
  +}

/*
 * Must check if file sparse since fallocate -z (zero range) assumes
 * non-sparse allocation
 */
-if (!(cifsi->cifsAttrs & FILE_ATTRIBUTE_SPARSE_FILE))
  -return -EOPNOTSUPP;
  +if (!(cifsi->cifsAttrs & FILE_ATTRIBUTE_SPARSE_FILE)) {
    +rc = -EOPNOTSUPP;
    +free_xid(xid);
    +return rc;
  +}

/*
 * need to make sure we are not asked to extend the file since the SMB3
 * which for a non sparse file would zero the newly extended range
 */
-if (keep_size == false)
  -if (i_size_read(inode) < offset + len)
    -return -EOPNOTSUPP;
  +if (i_size_read(inode) < offset + len) {
    +rc = -EOPNOTSUPP;
    +free_xid(xid);
    +return rc;
  +}
free_xid(xid);
+return rc;
+
}
cifs dbg(FYI, "offset %lld len %lld", offset, len);

@@ -1713,8 +1797,7 @@

rc = SMB2_ioctl(xid, tcon, cfile->fid.persistent_fid,  
cfile->fid.volatile_fid, FSCTL_SET_ZERO_DATA,  
-true /* is_fctl */, false /* use_ipc */,
-true /* is_fctl */, (char *)&fsctl_buf,
+true /* is_fctl */, (char *)&fsctl_buf,
ssizeof(struct file_zero_data_information), NULL, NULL);
free_xid(xid);
return rc;
@@ -1738,8 +1821,17 @@
/* Need to make file sparse, if not already, before freeing range. */
/* Consider adding equivalent for compressed since it could also work */
-if (!smb2_set_sparse(xid, tcon, cfile, inode, set_sparse))
-rc = -EOPNOTSUPP;
+if (!smb2_set_sparse(xid, tcon, cfile, inode, set_sparse)) {
+rc = -EOPNOTSUPP;
+free_xid(xid);
+return rc;
+
+/*
+ * We implement the punch hole through ioctl, so we need remove the page
+ * caches first, otherwise the data may be inconsistent with the server.
+ */
+truncate_pagecache_range(inode, offset, offset + len - 1);
+
cifs dbg(FYI, "offset %lld len %lld", offset, len);

@@ -1748,8 +1840,7 @@

rc = SMB2_ioctl(xid, tcon, cfile->fid.persistent_fid,  
cfile->fid.volatile_fid, FSCTL_SET_ZERO_DATA,  
-true /* is_fctl */, false /* use_ipc */,
-(char *)&fsctl_buf,
+true /* is_fctl */, (char *)&fsctl_buf,
ssizeof(struct file_zero_data_information), NULL, NULL);
free_xid(xid);
return rc;
@@ -1771,8 +1862,10 @@
/* if file not oplocked can't be sure whether asking to extend size */
if (!CIFS_CACHE_READ(cifsi))
    -if (keep_size == false)
        -return -EOPNOTSUPP;
    +if (keep_size == false) {
        +free_xid(xid);
        +return rc;
    +}

/*
 * Files are non-sparse by default so falloc may be a no-op
@@ -1781,14 +1874,16 @@
*/
if ((cifsi->cifsAttrs & FILE_ATTRIBUTE_SPARSE_FILE) == 0) {
    if (keep_size == true)
        -return 0;
    +rc = 0;
    /* check if extending file */
    else if (i_size_read(inode) >= off + len)
        /* not extending file and already not sparse */
        -return 0;
    +rc = 0;
    /* BB: in future add else clause to extend file */
    else
        -return -EOPNOTSUPP;
    +rc = -EOPNOTSUPP;
    +free_xid(xid);
    +return rc;
}

if ((keep_size == true) || (i_size_read(inode) >= off + len)) {
    @@ -1800,8 +1931,11 @@
        * ie potentially making a few extra pages at the beginning
        * or end of the file non-sparse via set_sparse is harmless.
        */
        -if ((off > 8192) || (off + len + 8192 < i_size_read(inode)))
            -return -EOPNOTSUPP;
        +if ((off > 8192) || (off + len + 8192 < i_size_read(inode))) {
            +rc = -EOPNOTSUPP;
            +free_xid(xid);
            +return rc;
        +}
    
    rc = smb2_set_sparse(xid, tcon, cfile, inode, false);
}
@@ -1833,13 +1931,38 @@

static void
smb2_downgrade_oplock(struct TCP_Server_Info *server,
-struct cifsInodeInfo *cinode, bool set_level2)
+  struct cifsInodeInfo *cinode, __u32 oplock,
+  unsigned int epoch, bool *purge_cache)
{
  -if (set_level2)
    -server->ops->set_oplock_level(cinode, SMB2_OPLOCK_LEVEL_II,
      -0, NULL);
  -else
    -server->ops->set_oplock_level(cinode, 0, 0, NULL);
+server->ops->set_oplock_level(cinode, oplock, 0, NULL);
+}
+
+static void
+smb21_set_oplock_level(struct cifsInodeInfo *cinode, __u32 oplock,
+  unsigned int epoch, bool *purge_cache);
+
+static void
+smb3_downgrade_oplock(struct TCP_Server_Info *server,
+  struct cifsInodeInfo *cinode, __u32 oplock,
+  unsigned int epoch, bool *purge_cache)
+
+unsigned int old_state = cinode->oplock;
+unsigned int old_epoch = cinode->epoch;
+unsigned int new_state;
+
+if (epoch > old_epoch) {
  +smb21_set_oplock_level(cinode, oplock, 0, NULL);
  +cinode->epoch = epoch;
+
  +new_state = cinode->oplock;
  +*purge_cache = false;
  +
  +if ((old_state & CIFS_CACHE_READ_FLG) != 0 &&
+    (new_state & CIFS_CACHE_READ_FLG) == 0)
  +*purge_cache = true;
  +else if (old_state == new_state && (epoch - old_epoch > 1))
  +*purge_cache = true;
}
oplock &= 0xFF;
if (oplock == SMB2_OPLOCK_LEVEL_NOCHANGE) return;

-cinode->oplock = 0;
+ /* Check if the server granted an oplock rather than a lease */
+if (oplock & SMB2_OPLOCK_LEVEL_EXCLUSIVE)
+return smb2_set_oplock_level(cinode, oplock, epoch,
+    purge_cache);
+
+if (oplock & SMB2_LEASE_READ_CACHING_HE) {
+    cinode->oplock |= CIFS_CACHE_READ_FLG;
+    new_oplock |= CIFS_CACHE_READ_FLG;
+    strcat(message, "R");
+
+    if (oplock & SMB2_LEASE_HANDLE_CACHING_HE) {
+        cinode->oplock |= CIFS_CACHE_HANDLE_FLG;
+        new_oplock |= CIFS_CACHE_HANDLE_FLG;
+        strcat(message, "H");
+    }
+
+    if (oplock & SMB2_LEASE_WRITE_CACHING_HE) {
+        cinode->oplock |= CIFS_CACHE_WRITE_FLG;
+        new_oplock |= CIFS_CACHE_WRITE_FLG;
+        strcat(message, "W");
+    }
+
+    if (!cinode->oplock)
+        strcat(message, "None");
+    if (!new_oplock)
+        strncpy(message, "None", sizeof(message));
+
+    cinode->oplock = new_oplock;
+
cifs_dbg(FYI, "%s Lease granted on inode %p\n", message,
    &cinode->vfs_inode);
}

@@ -2061,6 +2191,23 @@
+
+inc_rfc1001_len(tr_hdr, orig_len);

+/* We can not use the normal sg_set_buf() as we will sometimes pass a
+ * stack object as buf.
+ */
+static inline void smb2_sg_set_buf(struct scatterlist *sg, const void *buf,
+    unsigned int buflen)
+{
+    void *addr;
+    /*
+     * VMAP_STACK (at least) puts stack into the vmalloc address space
+     */
+    }
if (is_vmalloc_addr(buf))
    addr = vmalloc_to_page(buf);
else
    addr = virt_to_page(buf);
sg_set_page(sg, addr, buflen, offset_in_page(buf));
}
+
static struct scatterlist *
init_sg(struct smb_rqst *rqst, u8 *sign)
{
    @@ -2075,16 +2222,16 @@
    return NULL;
    sg_init_table(sg, sg_len);
    smb2_sg_set_buf(&sg[0], rqst->rq_iov[0].iov_base + 24,
        assoc_data_len);
    for (i = 1; i < rqst->rq_nvec; i++)
        smb2_sg_set_buf(&sg[i], rqst->rq_iov[i].iov_base,
            rqst->rq_iov[i].iov_len);
    for (j = 0; i < sg_len - 1; i++, j++) {
        unsigned int len = (j < rqst->rq_npages - 1) ?
            rqst->rq_pagesz : rqst->rq_tailsz;
        sg_set_page(&sg[i], rqst->rq_pages[j], len, 0);
    }
    smb2_sg_set_buf(&sg[sg_len - 1], sign, SMB2_SIGNATURE_SIZE);
    return sg;
}
@@ -2106,7 +2253,7 @@
    return 1;
    +return -EAGAIN;
}
/*
 * Encrypt or decrypt @rqst message. @rqst has the following format:
@@ -2136,7 +2283,7 @@
    cifs_dbg(VFS, "\%s: Could not get %scryption key\n", __func__,
        enc ? "en" : "de");
    -return 0;
    +return rc;
}
rc = smb3_crypto_aead_allocate(server);
server->ops->is_status_pending(buf, server, 0))
return -1;

-rdata->result = server->ops->map_error(buf, false);
+/* set up first two iov to get credits */
+rdata->iov[0].iov_base = buf;
+rdata->iov[0].iov_len = 4;
+rdata->iov[1].iov_base = buf + 4;
+rdata->iov[1].iov_len =
+min_t(unsigned int, buf_len, server->vals->read_rsp_size) - 4;
+cifs_dbg(FYI, "%0: iov_base=%p iov_len=%zu\n",
    rdata->iov[0].iov_base, rdata->iov[0].iov_len);
+cifs_dbg(FYI, "%1: iov_base=%p iov_len=%zu\n",
    rdata->iov[1].iov_base, rdata->iov[1].iov_len);
+
+rdata->result = server->ops->map_error(buf, true);
if (rdata->result != 0) {
    cifs_dbg(FYI, "%s: server returned error %d\n",
        __func__, rdata->result);
    dequeue_mid(mid, rdata->result);
+/* normal error on read response */
+dequeue_mid(mid, false);
    return 0;
}

-kfree(bvec);

-/* set up first iov for signature check */
-rdata->iov[0].iov_base = buf;
-rdata->iov[0].iov_len = 4;
-rdata->iov[1].iov_base = buf + 4;
-rdata->iov[1].iov_len = server->vals->read_rsp_size - 4;
-cifs_dbg(FYI, "%0: iov_base=%p iov_len=%zu\n",
    rdata->iov[0].iov_base, server->vals->read_rsp_size);
-
-length = rdata->copy_into_pages(server, rdata, &iter);

kfree(bvec);

-dump_share_caps = smb2_dump_share_caps,
.is_oplock_break = smb2_is_valid_oplock_break,
.handle_cancelled_mid = smb2_handle_cancelled_mid,
-dowgrade_oplock = smb2_downgrade_oplock,
+downgrade_oplock = smb3_downgrade_oplock,
-need_neg = smb2_need_neg,
.negotiate = smb2_negotiate,
negotiate_wsize = smb2_negotiate_wsize,
@@ -2992,7 +3143,7 @@.dump_share_caps = smb2_dump_share_caps,
.is_oplock_break = smb2_is_valid_oplock_break,
.handle_cancelled_mid = smb2_handleCancelled_mid,
-.downgrade_oplock = smb2 downgrade_oplock,
+.downgrade_oplock = smb3 downgrade_oplock,
.need_neg = smb2 need_neg,
.negotiate = smb2_negotiate,
.negotiate_wsize = smb2_negotiate_wsize,
@@ -3113,7 +3264,7 @@
struct smb_version_values smb3any_values = {
  .version_string = SMB3ANY_VERSION_STRING,
  .protocol_id = SMB302 PROT_ID, /* doesn't matter, send protocol array */
-.req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
+SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES |
  SMB2_GLOBAL_CAP_ENCRYPTION,
+.req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
+SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES |
  SMB2_GLOBAL_CAP_ENCRYPTION | SMB2_GLOBAL_CAP_DIRECTORY_LEASING,
.large_lock_type = 0,
.exclusive_lock_type = SMB2_LOCKFLAG_EXCLUSIVE_LOCK,
.shared_lock_type = SMB2_LOCKFLAG_SHARED_LOCK,
@@ -3133,7 +3284,7 @@
struct smb_version_values smbdefault_values = {
  .version_string = SMBDEFAULT_VERSION_STRING,
  .protocol_id = SMB302 PROT_ID, /* doesn't matter, send protocol array */
-.req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
+SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES |
  SMB2_GLOBAL_CAP_ENCRYPTION,
+.req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
+SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES |
  SMB2_GLOBAL_CAP_ENCRYPTION | SMB2_GLOBAL_CAP_DIRECTORY_LEASING,
.large_lock_type = 0,
.exclusive_lock_type = SMB2_LOCKFLAG_EXCLUSIVE_LOCK,
.shared_lock_type = SMB2_LOCKFLAG_SHARED_LOCK,
@@ -3153,7 +3304,7 @@
struct smb_version_values smb30_values = {
  .version_string = SMB30_VERSION_STRING,
  .protocol_id = SMB30 PROT_ID,
-.req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
+SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES |
  SMB2_GLOBAL_CAP_ENCRYPTION,
+.req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
+SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES |
  SMB2_GLOBAL_CAP_ENCRYPTION | SMB2_GLOBAL_CAP_DIRECTORY_LEASING,
.large_lock_type = 0,
exclusive_lock_type = SMB2_LOCKFLAG_EXCLUSIVE_LOCK,
.shared_lock_type = SMB2_LOCKFLAG_SHARED_LOCK,
@@ -3173,7 +3324,7 @@
    struct smb_version_values smb302_values = {
        .version_string = SMB302_VERSION_STRING,
        .protocol_id = SMB302 PROT_ID,
    -req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
    SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES | SMB2_GLOBAL_CAP_ENCRYPTION,
    +req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
    SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES | SMB2_GLOBAL_CAP_ENCRYPTION | SMB2_GLOBAL_CAP_DIRECTORY_LEASING,
    .large_lock_type = 0,
    .exclusive_lock_type = SMB2_LOCKFLAG_EXCLUSIVE_LOCK,
    .shared_lock_type = SMB2_LOCKFLAG_SHARED_LOCK,
@@ -3194,7 +3345,7 @@
    struct smb_version_values smb311_values = {
        .version_string = SMB311_VERSION_STRING,
        .protocol_id = SMB311 PROT_ID,
    -req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
    SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES | SMB2_GLOBAL_CAP_ENCRYPTION,
    +req_capabilities = SMB2_GLOBAL_CAP_DFS | SMB2_GLOBAL_CAP_LEASING |
    SMB2_GLOBAL_CAP_LARGE_MTU | SMB2_GLOBAL_CAP_PERSISTENT_HANDLES | SMB2_GLOBAL_CAP_ENCRYPTION | SMB2_GLOBAL_CAP_DIRECTORY_LEASING,
    .large_lock_type = 0,
    .exclusive_lock_type = SMB2 LOCKFLAG_EXCLUSIVE_LOCK,
    .shared_lock_type = SMB2 LOCKFLAG_SHARED_LOCK,
--- linux-4.15.0.orig/fs/cifs/smb2pdu.c
+++ linux-4.15.0/fs/cifs/smb2pdu.c
@@ -153,7 +153,7 @@
 static int
    smb2_reconnect(__le16 smb2_command, struct cifs_tcon *tcon)
    {
-    int rc = 0;
+    int rc;
        struct nls_table *nls_codepage;
        struct cifs_ses *ses;
        struct TCP_Server_Info *server;
@@ -164,10 +164,10 @@
 * for those three - in the calling routine.
 */
 if (tcon == NULL)
    -return rc;
+    return 0;

    -if (smb2_command == SMB2 TREE_CONNECT)
    -return rc;
+if (smb2_command == SMB2_TREE_CONNECT || smb2_command == SMB2_IOCTL)
+return 0;

if (tcon->tidStatus == CifsExiting) {
/*
@@ -210,8 +210,14 @@
return -EAGAIN;
}

-wait_event_interruptible_timeout(server->response_q,
-(server->tcpStatus != CifsNeedReconnect), 10 * HZ);
+rc = wait_event_interruptible_timeout(server->response_q,
  + (server->tcpStatus != CifsNeedReconnect),
  + 10 * HZ);
+if (rc < 0) {
  +cifs_dbg(FYI, "%s: aborting reconnect due to a received"
  +" signal by the process\n", __func__);
  +return -ERESTARTSYS;
  +}

/* are we still trying to reconnect? */
if (server->tcpStatus != CifsNeedReconnect)
@@ -229,7 +235,7 @@
}

if (!tcon->ses->need_reconnect && !tcon->need_reconnect)
  -return rc;
  +return 0;

nls_codepage = load_nls_default();

@@ -251,9 +257,14 @@
}

rc = cifs_negotiate_protocol(0, tcon->ses);
-if (!rc && tcon->ses->need_reconnect)
+if (!rc && tcon->ses->need_reconnect) {
  rc = cifs_setup_session(0, tcon->ses, nls_codepage);
  -
  +if ((rc == -EACCES) && !tcon->retry) {
  +rc = -EHOSTDOWN;
  +mutex_unlock(&tcon->ses->session_mutex);
  +goto failed;
  +}
  +}
  if (rc || !tcon->need_reconnect) {
    mutex_unlock(&tcon->ses->session_mutex);
  goto out;
}
case SMB2_SET_INFO:
    rc = -EAGAIN;
    if (failed):
        unload_nls(nls_codepage);
        return rc;
    pdu->hdr.smb2_buf_length = cpu_to_be32(total_len);
    if (tcon != NULL) {
        if (CONFIG_CIFS_STATS2)
            #ifdef CONFIG_CIFS_STATS
            uint16_t com_code = le16_to_cpu(smb2_command);
            cifs_stats_inc(&tcon->stats.smb2_stats.smb2_com_sent[com_code]);
            #endif
        @ @ -569,6 +581,7 @ @
    } else if (rsp->DialectRevision == cpu_to_le16(SMB21_PROT_ID)) {
        /* ops set to 3.0 by default for default so update */
        ses->server->ops = &smb21_operations;
        +ses->server->vals = &smb21_values;
    } else if (le16_to_cpu(rsp->DialectRevision) !=
        ses->server->vals->protocol_id) {
        @ @ -646,8 +659,8 @ @
    }

    int smb3_validate_negotiate(const unsigned int xid, struct cifs_tcon *tcon) {
        -int rc = 0;
        struct validate_negotiate_info_req vneg_inbuf;
        +int rc;
        +struct validate_negotiate_info_req *pneg_inbuf;
        struct validate_negotiate_info_rsp *pneg_rsp = NULL;
        u32 rsplen;
        u32 inbuflen; /* max of 4 dialects */
        @ @ -672,69 +685,80 @ @
        if (tcon->ses->session_flags & SMB2_SESSION_FLAG_IS_NULL)
            cifs_dbg(VFS, "Unexpected null user (anonymous) auth flag sent by server\n");

        -vneg_inbuf.Capabilities =
        +pneg_inbuf = kmalloc(sizeof(*pneg_inbuf), GFP_NOFS);
        +if (!pneg_inbuf)
            return -ENOMEM;
        +pneg_inbuf->Capabilities =
        cpu_to_le32(tcon->ses->server->vals->req_capabilities);
        -memcpy(vneg_inbuf.Guid, tcon->ses->server->client_guid,
memcpy(pneg_inbuf->Guid, tcon->ses->server->client_guid, SMB2_CLIENT_GUID_SIZE);

if (tcon->ses->sign)
  -vneg_inbuf.SecurityMode =
  +pneg_inbuf->SecurityMode =
  cpu_to_le16(SMB2_NEGOTIATE_SIGNING_REQUIRED);
else if (global_secflags & CIFSSEC_MAY_SIGN)
  -vneg_inbuf.SecurityMode =
  +pneg_inbuf->SecurityMode =
  cpu_to_le16(SMB2_NEGOTIATE_SIGNING_ENABLED);
else
  -vneg_inbuf.SecurityMode = 0;
  +pneg_inbuf->SecurityMode = 0;

if (strcmp(tcon->ses->server->vals->version_string, SMB3ANY_VERSION_STRING) == 0) {
  -vneg_inbuf.Dialects[0] = cpu_to_le16(SMB30_PROT_ID);
  -vneg_inbuf.Dialects[1] = cpu_to_le16(SMB302_PROT_ID);
  -vneg_inbuf.DialectCount = cpu_to_le16(2);
  +pneg_inbuf->Dialects[0] = cpu_to_le16(SMB30_PROT_ID);
  +pneg_inbuf->Dialects[1] = cpu_to_le16(SMB302_PROT_ID);
  +pneg_inbuf->DialectCount = cpu_to_le16(2);
  /* structure is big enough for 3 dialects, sending only 2 */
  -inbuflen = sizeof(struct validate_negotiate_info_req) - 2;
  +inbuflen = sizeof(*pneg_inbuf) -
  +sizeof(pneg_inbuf->Dialects[0]);
} else if (strcmp(tcon->ses->server->vals->version_string, SMBDEFAULT_VERSION_STRING) == 0) {
  -vneg_inbuf.Dialects[0] = cpu_to_le16(SMB21_PROT_ID);
  -vneg_inbuf.Dialects[1] = cpu_to_le16(SMB30_PROT_ID);
  -vneg_inbuf.Dialects[2] = cpu_to_le16(SMB302_PROT_ID);
  -vneg_inbuf.DialectCount = cpu_to_le16(3);
  +pneg_inbuf->Dialects[0] = cpu_to_le16(SMB21_PROT_ID);
  +pneg_inbuf->Dialects[1] = cpu_to_le16(SMB30_PROT_ID);
  +pneg_inbuf->Dialects[2] = cpu_to_le16(SMB302_PROT_ID);
  +pneg_inbuf->DialectCount = cpu_to_le16(3);
  /* structure is big enough for 3 dialects */
  -inbuflen = sizeof(struct validate_negotiate_info_req);
  +inbuflen = sizeof(*pneg_inbuf);
} else {
  /* otherwise specific dialect was requested */
  -vneg_inbuf.Dialects[0] =
  +pneg_inbuf->Dialects[0] =
  cpu_to_le16(tcon->ses->server->vals->protocol_id);
  -vneg_inbuf.DialectCount = cpu_to_le16(1);
  +pneg_inbuf->DialectCount = cpu_to_le16(1);
/* structure is big enough for 3 dialects, sending only 1 */
-inbuflen = sizeof(struct validate_negotiate_info_req) - 4;
+inbuflen = sizeof(*pneg_inbuf) -
+sizeof(pneg_inbuf->Dialects[0]) * 2;
}
rc = SMB2_ioctl(xid, tcon, NO_FILE_ID, NO_FILE_ID,
FSCTL_VALIDATE_NEGOTIATE_INFO, true /* is_fsctl */,
-false /* use_ipc */,
-(char *)&vneg_inbuf, sizeof(struct validate_negotiate_info_req),
-(char **)&pneg_rsp, &rsplen);
-
-if (rc != 0) {
+(char *)pneg_inbuf, inbuflen, (char **)&pneg_rsp, &rsplen);
+if (rc == -EOPNOTSUPP) {
+/*
+ * Old Windows versions or Netapp SMB server can return
+ * not supported error. Client should accept it.
+ */
+cifs_dbg(VFS, "Server does not support validate negotiate\n");
+rc = 0;
+goto out_free_inbuf;
+} else if (rc != 0) {
+goto out_free_inbuf;
+} else if (rc != 0) {
+cifs_dbg(VFS, "validate protocol negotiate failed: %d\n", rc);
-return -EIO;
+rc = -EIO;
+goto out_free_inbuf;
}

-if (rsplen != sizeof(struct validate_negotiate_info_rsp)) {
+rc = -EIO;
+if (rsplen != sizeof(*pneg_rsp)) {
+cifs_dbg(VFS, "invalid protocol negotiate response size: %d\n",
+rsplen);
/* relax check since Mac returns max bufsize allowed on ioctl */
-((rsplen > CIFSMaxBufSize)
- || (rsplen < sizeof(struct validate_negotiate_info_rsp)))
-goto err_rsp_free;
+if (rsplen > CIFSMaxBufSize || rsplen < sizeof(*pneg_rsp))
+goto out_free_rsp;
}
/* check validate negotiate info response matches what we got earlier */
-if (pneg_rsp->Dialect !=
-cpu_to_le16(tcon->ses->server->vals->protocol_id))
+if (pneg_rsp->Dialect != cpu_to_le16(tcon->ses->server->dialect))
goto vneg_out;
if (pneg_rsp->SecurityMode != cpu_to_le16(tcon->ses->server->sec_mode))
@@ -747,15 +771,17 @@
goto vneg_out;
/* validate negotiate successful */
+rc = 0;
cifs_dbg(FYI, "validate negotiate info successful\n");
-kfree(pneg_rsp);
-return 0;
+goto out_free_rsp;

vneg_out:
cifs_dbg(VFS, "protocol revalidation - security settings mismatch\n");
-err_rsp_free:
+out_free_rsp:
kfree(pneg_rsp);
-return -EIO;
+out_free_inbuf:
+kfree(pneg_inbuf);
+return rc;
}

enum securityEnum
@@ -818,8 +844,9 @@
req->PreviousSessionId = sess_data->previous_session;

req->Flags = 0; /* MBZ */
-/* to enable echos and oplocks */
-req->hdr.sync_hdr.CreditRequest = cpu_to_le16(3);
- +
+/* enough to enable echos and oplocks and one max size write */
+req->hdr.sync_hdr.CreditRequest = cpu_to_le16(130);

/* only one of SMB2 signing flags may be set in SMB2 request */
if (server->sign)
@@ -829,7 +856,12 @@
else
 req->SecurityMode = 0;

+#ifdef CONFIG_CIFS_DFS_UPCALL
+req->Capabilities = cpu_to_le32(SMB2_GLOBAL_CAP_DFS);
+#else
 req->Capabilities = 0;
+#endif /* DFS_UPCALL */
+ req->Channel = 0; /* MBZ */
sess_data->iov[0].iov_base = (char *)req;
@@ -925,6 +957,8 @@
  spnego_key = cifs_get_spnego_key(ses);
  if (IS_ERR(spnego_key)) {
    rc = PTR_ERR(spnego_key);
+   if (rc == -ENOKEY)
+     cifs_dbg(VFS, "Verify user has a krb5 ticket and keyutils is installed\n");
    spnego_key = NULL;
    goto out;
  }
@@ -1183,6 +1217,7 @@
  sess_data->ses = ses;
  sess_data->buf0_type = CIFS_NO_BUFFER;
  sess_data->nls_cp = (struct nls_table *) nls_cp;
+ sess_data->previous_session = ses->Suid;

  while (sess_data->func)
    sess_data->func(sess_data);
@@ -1283,8 +1318,7 @@
           /* SMB2 TREE_CONNECT request must be called with TreeId == 0 */
-          if (tcon)
-            tcon->tid = 0;
+          tcon->tid = 0;

          rc = small_smb2_init(SMB2_TREE_CONNECT, tcon, (void **) &req);
          if (rc) {
@@ -1292,15 +1326,7 @@
             return rc;
          }

-          if (tcon == NULL) {
-            if ((ses->session_flags & SMB2_SESSION_FLAG_ENCRYPT_DATA))
-              flags |= CIFS_TRANSFORM_REQ;
-          -/* since no tcon, smb2_init can not do this, so do here */
-          -req->hdr.sync_hdr.SessionId = ses->Suid;
-          -if (ses->server->sign)
-            req->hdr.sync_hdr.Flags |= SMB2_FLAGS_SIGNED;
-          } else if (encryption_required(tcon))
-            flags |= CIFS_TRANSFORM_REQ;
-          iov[0].iov_base = (char *)req;
@@ -1328,21 +1354,16 @@
             goto tcon_error_exit;
          }

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if (tcon == NULL) {
    ses->ipc_tid = rsp->hdr.sync_hdr.TreeId;
    goto tcon_exit;
}

switch (rsp->ShareType) {
case SMB2_SHARE_TYPE_DISK:
    cifs_dbg(FYI, "connection to disk share\n");
    break;
case SMB2_SHARE_TYPE_PIPE:
    tcon->ipc = true;
    +tcon->pipe = true;
    cifs_dbg(FYI, "connection to pipe share\n");
    break;
case SMB2_SHARE_TYPE_PRINT:
    tcon->ipc = true;
    +tcon->print = true;
    cifs_dbg(FYI, "connection to printer\n");
    break;
default:
    @@ -1774,8 +1795,10 @@
    rc = alloc_path_with_tree_prefix(&copy_path, &copy_size,
                                     &name_len,
                                     tcon->treeName, path);
    -if (rc)
       +if (rc) {
           +cifs_small_buf_release(req);
           return rc;
       +}
    req->NameLength = cpu_to_le16(name_len * 2);
    uni_path_len = copy_size;
    path = copy_path;
    @@ -1786,8 +1809,10 @@
    if (uni_path_len % 8 != 0) {
        copy_size = roundup(uni_path_len, 8);
        copy_path = kzalloc(copy_size, GFP_KERNEL);
        -if (!copy_path)
           +if (!copy_path) {
               +cifs_small_buf_release(req);
               return -ENOMEM;
           +}
        memcpy((char *)copy_path, (const char *)path,
               uni_path_len);
        uni_path_len = copy_size;
        @@ -1800,12 +1825,15 @@
        /* -1 since last byte is buf[0] which was counted in smb2_buf_len */
        inc_rfc1001_len(req, uni_path_len - 1);
if (!server->oplocks)
+if (!server->oplocks) || (tcon->no_lease))
*oplock = SMB2_OPLOCK_LEVEL_NONE;

if (!(server->capabilities & SMB2_GLOBAL_CAP_LEASING) ||
*oplock == SMB2_OPLOCK_LEVEL_NONE)
req->RequestedOplockLevel = *oplock;
+else if (!(server->capabilities & SMB2_GLOBAL_CAP_DIRECTORY_LEASING) &&
+ (oparms->create_options & CREATE_NOT_FILE))
+req->RequestedOplockLevel = *oplock; /* no srv lease support */
else {
rc = add_lease_context(server, iov, &n_iov, oplock);
if (rc) {
@@ -1877,7 +1905,7 @@
*/
int
SMB2_ioctl(const unsigned int xid, struct cifs_tcon *tcon, u64 persistent_fid,
- u64 volatile_fid, u32 opcode, bool is_fsctl, bool use_ipc,
+ u64 volatile_fid, u32 opcode, bool is_fsctl,
   char *in_data, u32 indatalen,
   char **out_data, u32 *plen /* returned data len */) {
@@ -1913,16 +1941,6 @@
if (rc)
return rc;

-if (use_ipc) {
- if (ses->ipc_tid == 0) {
- cifs_small_buf_release(req);
- return -ENOTCONN;
- }
-}
- -cifs_dbg(FYI, "replacing tid 0x%x with IPC tid 0x%x\n",
- req->hdr.sync_hdr.TreeId, ses->ipc_tid);
- req->hdr.sync_hdr.TreeId = ses->ipc_tid;
-}
if (encryption_required(tcon))
flags |= CIFS_TRANSFORM_REQ;

@@ -2007,14 +2025,14 @@
/* We check for obvious errors in the output buffer length and offset */
if (*plen == 0)
goto ioctl_exit; /* server returned no data */
-else if (*plen > 0xFF00) {
+else if (*plen > rsp_iov.iov_len || *plen > 0xFF00) {
   cifs_dbg(VFS, "srv returned invalid ioctl length: \%d\n", *plen);
   *plen = 0;

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rc = -EIO;
goto ioctl_exit;
}

@if (get_rfc1002_length(rsp) < le32_to_cpu(rsp->OutputOffset) + *plen) {
+if (rsp iov.iov_len - *plen < le32_to_cpu(rsp->OutputOffset)) {
cifs_dbg(VFS, "Malformed ioctl resp: len %d offset %d\n", *plen, le32_to_cpu(rsp->OutputOffset));
*plen = 0;
@@ -2052,7 +2070,6 @@

rc = SMB2_ioctl(xid, tcon, persistent_fid, volatile_fid,
FSCTL_SET_COMPRESSION, true /* is_fsctl */,
-false /* use_ipc */,
(char *)&fsctl_input /* data input */,
2 /* in data len */, &ret_data /* out data */, NULL);
@@ -2275,8 +2292,7 @@

return query_info(xid, tcon, persistent_fid, volatile_fid,
 0, SMB2_O_INFO_SECURITY, additional_info,
- SMB2_MAX_BUFFER_SIZE,
- sizeofs(struct smb2_file_all_info), data, plen);
+ SMB2_MAX_BUFFER_SIZE, MIN_SEC_DESC_LEN, data, plen);
}

int
@@ -2338,6 +2354,10 @@
tcon_exist = true;
}
}
+if (ses->tcon_ipc && ses->tcon_ipc->need_reconnect) {
+list_add_tail(&ses->tcon_ipc->rlist, &tmp_list);
+tcon_exist = true;
+}
+
*/
* Get the reference to server struct to be sure that the last call of
@@ -2492,10 +2512,10 @@
* Related requests use info from previous read request
* in chain.
*/
-shdr->SessionId = 0xFFFFFFFF;
+shdr->SessionId = 0xFFFFFFFFFFFFFFFF;
shdr->TreeId = 0xFFFFFFFF;
-req->PersistentFileId = 0xFFFFFFFF;
-req->VolatileFileId = 0xFFFFFFFF;
+req->PersistentFileId = 0xFFFFFFFFFFFFFFFF;
+req->VolatileFileId = 0xFFFFFFFFFFFFFFFF;
}
}
if (remaining_bytes > io_parms->length)
@@ -2558,7 +2578,7 @@
    rdata->result = -EIO;
}

-if (rdata->result)
+if (rdata->result && rdata->result != -ENODATA)
cifs_stats_fail_inc(tcon, SMB2_READ_HE);

queue_work(cifsiod_wq, &rdata->work);
@@ -2620,12 +2640,14 @@
    if (rdata->credits) {
        shdr->CreditCharge = cpu_to_le16(DIV_ROUND_UP(rdata->bytes,
            SMB2_MAX_BUFFER_SIZE));
    -shdr->CreditRequest = shdr->CreditCharge;
+shdr->CreditRequest =
+    +cpu_to_le16(le16_to_cpu(shdr->CreditCharge) + 1);
    spin_lock(&server->req_lock);
    server->credits += rdata->credits -
        le16_to_cpu(shdr->CreditCharge);
    spin_unlock(&server->req_lock);
    wake_up(&server->request_q);
    +rdata->credits = le16_to_cpu(shdr->CreditCharge);
    flags |= CIFS_HAS_CREDITS;
    }

@@ -2830,12 +2852,14 @@
    if (wdata->credits) {
        shdr->CreditCharge = cpu_to_le16(DIV_ROUND_UP(wdata->bytes,
            SMB2_MAX_BUFFER_SIZE));
    -shdr->CreditRequest = shdr->CreditCharge;
+shdr->CreditRequest =
+    +cpu_to_le16(le16_to_cpu(shdr->CreditCharge) + 1);
    spin_lock(&server->req_lock);
    server->credits += wdata->credits -
        le16_to_cpu(shdr->CreditCharge);
    spin_unlock(&server->req_lock);
    wake_up(&server->request_q);
    +wdata->credits = le16_to_cpu(shdr->CreditCharge);
    flags |= CIFS_HAS_CREDITS;
    }

@@ -2927,33 +2951,38 @@
    int len;
    unsigned int entrycount = 0;


unsigned int next_offset = 0;
-FILE_DIRECTORY_INFO *entryptr;
+char *entryptr;
+FILE_DIRECTORY_INFO *dir_info;

if (bufstart == NULL)
return 0;

-entryptr = (FILE_DIRECTORY_INFO *)bufstart;
+entryptr = bufstart;

while (1) {
-entryptr = (FILE_DIRECTORY_INFO *)
-(char *)entryptr + next_offset);
-
-if ((char *)entryptr + size > end_of_buf) {
+if (entryptr + next_offset < entryptr ||
+ entryptr + next_offset > end_of_buf ||
+ entryptr + next_offset + size > end_of_buf) {
    cifs_dbg(VFS, "malformed search entry would overflow\n");
    break;
}
-len = le32_to_cpu(entryptr->FileNameLength);
-if ((char *)entryptr + len + size > end_of_buf) {
+entryptr = entryptr + next_offset;
+dir_info = (FILE_DIRECTORY_INFO *)entryptr;
+  +len = le32_to_cpu(dir_info->FileNameLength);
+if (entryptr + len < entryptr ||
+ entryptr + len > end_of_buf ||
+ entryptr + len + size > end_of_buf) {
    cifs_dbg(VFS, "directory entry name would overflow frame end of buf %p\n",
    end_of_buf);
    break;
}
-*lastentry = (char *)entryptr;
+*lastentry = entryptr;
entrycount++;

-next_offset = le32_to_cpu(entryptr->NextEntryOffset);
+next_offset = le32_to_cpu(dir_info->NextEntryOffset);
if (!next_offset)
break;
}
@@ -3050,8 +3079,8 @@
rsp->hdr.sync_hdr.Status == STATUS_NO_MORE_FILES) {

srch_inf->endofsearch = true;
rc = 0;
-
-cifs_stats_fail_inc(tcon, SMB2_QUERY_DIRECTORY_HE);
+} else
+cifs_stats_fail_inc(tcon, SMB2_QUERY_DIRECTORY_HE);
goto qdir_exit;
}

@@ -3446,6 +3475,9 @@
 } else if (level == FS_SECTOR_SIZE_INFORMATION) {
 max_len = sizeof(struct smb3_fs_ss_info);
 min_len = sizeof(struct smb3_fs_ss_info);
+} else if (level == FS_VOLUME_INFORMATION) {
 +max_len = sizeof(struct smb3_fs_vol_info) + MAX_VOL_LABEL_LEN;
 +min_len = sizeof(struct smb3_fs_vol_info);
 } else {
   cifs_dbg(FYI, "Invalid qfsinfo level %d\n", level);
   return -EINVAL;
-@@ -3486,6 +3518,11 @@
 tcon->ss_flags = le32_to_cpu(ss_info->Flags);
 tcon->perf_sector_size =
 le32_to_cpu(ss_info->PhysicalBytesPerSectorForPerf);
+} else if (level == FS_VOLUME_INFORMATION) {
+  struct smb3_fs_vol_info *vol_info = (struct smb3_fs_vol_info *)
+    (offset + (char *)rsp);
+  tcon->vol_serial_number = vol_info->VolumeSerialNumber;
+  tcon->vol_create_time = vol_info->VolumeCreationTime;
 } qfsattr_exit:
--- linux-4.15.0.orig/fs/cifs/smb2pdu.h
+++ linux-4.15.0/fs/cifs/smb2pdu.h
@@ -84,8 +84,8 @@
 #define NUMBER_OF_SMB2_COMMANDS 0x0013
-/* 4 len + 52 transform hdr + 64 hdr + 56 create rsp */
-#define MAX_SMB2_HDR_SIZE 0x00b0
+/* 52 transform hdr + 64 hdr + 88 create rsp */
+#define MAX_SMB2_HDR_SIZE 204

#define SMB2_PROTO_NUMBER cpu_to_le32(0x424d53fe)
#define SMB2_TRANSFORM_PROTO_NUM cpu_to_le32(0x424d53fd)
@@ -206,7 +206,7 @@
 __le32 NegotiateContextOffset; /* SMB3.1.1 only. MBZ earlier */
 __le16 NegotiateContextCount; /* SMB3.1.1 only. MBZ earlier */
 __le16 Reserved2;
/* Dialects */
@@ -640,6 +640,7 @@
    struct create_context ccontext;
    __u8   Name[8];
    struct durable_reconnect_context_v2 dcontext;
+    __u8   Pad[4];
 } __packed;

#define COPY_CHUNK_RES_KEY_SIZE 24
@@ -1046,7 +1047,7 @@
    struct smb2_lease_break {
        struct smb2_hdr hdr;
        __le16 StructureSize; /* Must be 44 */
-        __le16 Reserved;
+        __le16 Epoch;
        __le32 Flags;
        __u8   LeaseKey[16];
        __le32 CurrentLeaseState;
@@ -1108,6 +1109,17 @@
        __le32 ByteOffsetForPartitionAlignment;
 } __packed;

+/* volume info struct - see MS-FSCC 2.5.9 */
+#define MAX_VOL_LABEL_LEN 32
+struct smb3_fs_vol_info {
+    __le64    VolumeCreationTime;
+    __u32     VolumeSerialNumber;
+    __le32    VolumeLabelLength; /* includes trailing null */
+    __u8      SupportsObjects; /* True if eg like NTFS, supports objects */
+    __u8      Reserved;
+    __u8      VolumeLabel[0]; /* variable len */
+} __packed;
+
/* partial list of QUERY INFO levels */
#define FILE_DIRECTORY_INFORMATION 1
#define FILE_FULL_DIRECTORY_INFORMATION 2
--- linux-4.15.0.orig/fs/cifs/smb2proto.h
+++ linux-4.15.0/fs/cifs/smb2proto.h
@@ -125,8 +125,7 @@
    struct smb2_err_rsp **err_buf);
 extern int SMB2_ioctl(const unsigned int xid, struct cifs_tcon *tcon, u64 persistent_fid, u64 volatile_fid, u32 opcode,
    bool is_fsctl, bool use_ipc,
-    char *in_data, u32 indatalen,
bool is_fsmctl, char *in_data, u32 indatalen,
    char **out_data, u32 *plen /* returned data len */);
extern int SMB2_close(const unsigned int xid, struct cifs_tcon *tcon,
    u64 persistent_file_id, u64 volatile_file_id);

extern enum securityEnum smb2_select_sectype(struct TCP_Server_Info *,
    enum securityEnum);
#ifdef CONFIG_CIFS_SMB311
+extern int smb311_crypto_shash_allocate(struct TCP_Server_Info *server);
@endif
#endif /* _SMB2PROTO_H */

--- linux-4.15.0.orig/fs/cifs/smb2transport.c
+++ linux-4.15.0/fs/cifs/smb2transport.c
@@ -43,77 +43,62 @@
static int
smb2_crypto_shash_allocate(struct TCP_Server_Info *server)
{
-    int rc;
-    unsigned int size;
+    return cifs_alloc_hash("hmac(sha256)",
    +        &server->secmech.hmacsha256,
    +        &server->secmech.sdeschmacsha256);
+
-    if (server->secmech.sdeschmacsha256 != NULL)
-        return 0; /* already allocated */
+static int
+smb3_crypto_shash_allocate(struct TCP_Server_Info *server)
+{
+    struct cifs_secmech *p = &server->secmech;
+    int rc;
+
-    server->secmech.hmacsha256 = crypto_alloc_shash("hmac(sha256)", 0, 0);
-    if (IS_ERR(server->secmech.hmacsha256)) {
-        cifs_dbg(VFS, "could not allocate crypto hmacsha256
-            rc = PTR_ERR(server->secmech.hmacsha256);
-        server->secmech.hmacsha256 = NULL;
-        return rc;
-    }
+    rc = cifs_alloc_hash("hmac(sha256)",
+        &p->hmacsha256,
+        &p->sdeschmacsha256);
+    if (rc)
+        goto err;
+    size = sizeof(struct shash_desc) +
-    crypto_shash_descsize(server->secmech.hmacsha256);
server->secmech.sdeschmacsha256 = kmalloc(size, GFP_KERNEL);
if (!server->secmech.sdeschmacsha256) {
    crypto_free_shash(server->secmech.hmacsha256);
    server->secmech.hmacsha256 = NULL;
    return -ENOMEM;
}
server->secmech.sdeschmacsha256->shash.tfm = server->secmech.hmacsha256;
server->secmech.sdeschmacsha256->shash.flags = 0x0;
rc = cifs_alloc_hash("cmac(aes)", &p->cmacaes, &p->sdesccmacaes);
if (rc)
    goto err;
return 0;

err:
cifs_free_hash(&p->hmacsha256, &p->sdeschmacsha256);
return rc;
}

static int
smb3_crypto_shash_allocate(struct TCP_Server_Info *server)
#define CONFIG_CIFS_SMB311
int
smb311_crypto_shash_allocate(struct TCP_Server_Info *server)
{
    unsigned int size;
    int rc;
    if (server->secmech.sdesccmacaes != NULL)
        return 0;  /* already allocated */
    struct cifs_secmech *p = &server->secmech;
    int rc = 0;
    rc = smb2_crypto_shash_allocate(server);
    rc = cifs_alloc_hash("hmac(sha256)",
        &p->hmacsha256, &p->sdeschmacsha256);
if (rc)
    return rc;

    -server->secmech.cmacaes = crypto_alloc_shash("cmac(aes)", 0, 0);
    -if (IS_ERR(server->secmech.cmacaes)) {
        -cifs_dbg(VFS, "could not allocate crypto cmac-aes");
        -kfree(server->secmech.sdeschmacsha256);
        -server->secmech.sdeschmacsha256 = NULL;
        -crypto_free_shash(server->secmech.hmacsha256);
        -server->secmech.hmacsha256 = NULL;
        -rc = PTR_ERR(server->secmech.cmacaes);
        -server->secmech.cmacaes = NULL;
    }
-return rc;
-
+rc = cifs_alloc_hash("cmac(aes)", &p->cmacaes, &p->sdesccmacaes);
+if (rc)
+goto err;

-size = sizeof(struct shash_desc) +
-crypto_shash_descsize(server->secmech.cmacaes);
-server->secmech.sdesccmacaes = kmalloc(size, GFP_KERNEL);
-if (!server->secmech.sdesccmacaes) {
-cifs_dbg(VFS, "%s: Can't alloc cmacaes\n", __func__);
-kfree(server->secmech.sdeschmacsha256);
-server->secmech.sdeshmacsha256 = NULL;
-crypto_free_shash(server->secmech.hmacsha256);
-crypto_free_shash(server->secmech.cmacaes);
-server->secmech.hmacsha256 = NULL;
-server->secmech.cmacaes = NULL;
-return -ENOMEM;
-
-server->secmech.sdesccmacaes->shash.tfm = server->secmech.cmacaes;
-server->secmech.sdesccmacaes->shash.flags = 0x0;
+rc = cifs_alloc_hash("sha512", &p->sha512, &p->sdescsha512);
+if (rc)
+goto err;
+goto err;

return 0;
+
+err:
+cifs_free_hash(&p->cmacaes, &p->sdesccmacaes);
+cifs_free_hash(&p->hmacsha256, &p->sdeschmacsha256);
+return rc;
}
+
#endif

static struct cifs_ses *
smb2_find_smb_ses_unlocked(struct TCP_Server_Info *server, __u64 ses_id)
@@ -457,7 +442,7 @@
cifs_dbg(VFS, "%s: Could not init cmac aes\n", __func__);
 return rc;
 }
-
+rc = __cifs_calc_signature(rqst, server, sigptr,
 &server->secmech.sdesccmacaes->shash);
@@ -563,6 +548,7 @@
 temp = mempool_alloc(cifs_mid_poolp, GFP_NOFS);
memset(temp, 0, sizeof(struct mid_q_entry));
+kref_init(&temp->refcount);
temp->mid = le64_to_cpu(shdr->MessageId);
temp->pid = current->pid;
temp->command = shdr->Command; /* Always LE */
--- linux-4.15.0.orig/fs/cifs/smbencrypt.c
+++ linux-4.15.0/fs/cifs/smbencrypt.c
@@ -121,25 +121,12 @@
    mdfour(unsigned char *md4_hash, unsigned char *link_str, int link_len)
{
    int rc;
    -unsigned int size;
    -struct crypto_shash *md4;
    -struct sdesc *sdescmd4;
    +struct crypto_shash *md4 = NULL;
    +struct sdesc *sdescmd4 = NULL;

    -md4 = crypto_alloc_shash("md4", 0, 0);
    -if (IS_ERR(md4)) {
    -rc = PTR_ERR(md4);
    -cifs_dbg(VFS, "%s: Crypto md4 allocation error %d\n", 
    -__func__, rc);
    -return rc;
    -}
    -size = sizeof(struct shash_desc) + crypto_shash_descsize(md4);
    -sdescmd4 = kmalloc(size, GFP_KERNEL);
    -if (!sdescmd4) {
    -rc = -ENOMEM;
    +rc = cifs_alloc_hash("md4", &md4, &sdescmd4);
    +if (rc)
    +goto mdfour_err;
    -}
    -sdescmd4->shash.tfm = md4;
    -sdescmd4->shash.flags = 0x0;

    rc = crypto_shash_init(&sdescmd4->shash);
    if (rc) {
@@ -156,9 +143,7 @@
        cifs_dbg(VFS, "%s: Could not generate md4 hash\n", __func__); 

    mdfour_err:
    -crypto_free_shash(md4);
    -kfree(sdescmd4);
    -
    +cifs_free_hash(&md4, &sdescmd4);
    return rc;
    }
temp = mempool_alloc(cifs_mid_poolp, GFP_NOFS);
memset(temp, 0, sizeof(struct mid_q_entry));
+kref_init(&temp->refcount);
temp->mid = get_mid(smb_buffer);
temp->pid = current->pid;
temp->command = cpu_to_le16(smb_buffer->Command);
@@ -77,6 +78,21 @@
return temp;
}
+
+static void _cifs_mid_q_entry_release(struct kref *refcount)
+{
+struct mid_q_entry *mid = container_of(refcount, struct mid_q_entry,
+ refcount);
+ mempool_free(mid, cifs_mid_poolp);
+}
+ void cifs_mid_q_entry_release(struct mid_q_entry *midEntry)
+{
+spin_lock(&GlobalMid_Lock);
+kref_put(&midEntry->refcount, _cifs_mid_q_entry_release);
+spin_unlock(&GlobalMid_Lock);
+}
+ void
DeleteMidQEntry(struct mid_q_entry *midEntry)
{
@@ -105,7 +121,7 @@
}
#endif
-mempool_free(midEntry, cifs_mid_poolp);
+cifs_mid_q_entry_release(midEntry);
}

void
@@ -302,7 +318,7 @@
if (rc < 0 & & rc != -EINTR)
cifs_dbg(VFS, "Error %d sending data on socket to server\n", rc);
#else
+else if (rc > 0)
rc = 0;
int rc;

new_iov = kmalloc(sizeof(struct kvec) * (n_vec + 1), GFP_KERNEL);
-if (!new_iov)
+if (!new_iov) {
+/* otherwise cifs_send_recv below sets resp_buf_type */
+*resp_buf_type = CIFS_NO_BUFFER;
return -ENOMEM;
+
/* 1st iov is a RFC1001 length followed by the rest of the packet */
memcpy(new_iov + 1, iov, (sizeof(struct kvec) * n_vec));
--- linux-4.15.0.orig/fs/cifs/xattr.c
+++ linux-4.15.0/fs/cifs/xattr.c
@@ -31,7 +31,7 @@
#include "cifs_fs_sb.h"
#include "cifs_unicode.h"

#define MAX_EA_VALUE_SIZE CIFSMaxBufSize
#define CIFS_XATTR_CIFS_ACL "system.cifs_acl"
#define CIFS_XATTR_ATTRIB "cifs.dosattrib" /* full name: user.cifs.dosattrib */
#define CIFS_XATTR_CREATETIME "cifs.creationtime" /* user.cifs.creationtime */
--- linux-4.15.0.orig/fs/coda/file.c
+++ linux-4.15.0/fs/coda/file.c
@@ -27,6 +27,13 @@
#include "coda_linux.h"
#include "coda_int.h"

+struct coda_vm_ops {
+atomic_t refcnt;
+struct file *coda_file;
+const struct vm_operations_struct *host_vm_ops;
+struct vm_operations_struct vm_ops;
+};
+
static ssize_t
coda_file_read_iter(struct kiocb *iocb, struct iov_iter *to)
{...

+static void
+coda_vm_open(struct vm_area_struct *vma)
+{  
+struct coda_vm_ops *cvm_ops =  
+container_of(vma->vm_ops, struct coda_vm_ops, vm_ops);  
+  
+atomic_inc(&cvm_ops->refcnt);  
+  
+if (cvm_ops->host_vm_ops && cvm_ops->host_vm_ops->open)  
cvm_ops->host_vm_ops->open(vma);  
+}  
+  
+static void  
coda_vm_close(struct vm_area_struct *vma)  
+{  
+struct coda_vm_ops *cvm_ops =  
+container_of(vma->vm_ops, struct coda_vm_ops, vm_ops);  
+  
+if (cvm_ops->host_vm_ops && cvm_ops->host_vm_ops->close)  
cvm_ops->host_vm_ops->close(vma);  
+  
+if (atomic_dec_and_test(&cvm_ops->refcnt)) {  
+vma->vm_ops = cvm_ops->host_vm_ops;  
fput(cvm_ops->coda_file);  
kfree(cvm_ops);  
+}  
+}  
+  
+static int  
coda_file_mmap(struct file *coda_file, struct vm_area_struct *vma)  
{  
@@ -68,6 +103,8 @@  
struct coda_inode_info *cii;  
struct file *host_file;  
struct inode *coda_inode, *host_inode;  
+struct coda_vm_ops *cvm_ops;  
+int ret;  
  
cfi = CODA_FTOC(coda_file);  
BUG_ON(!cfi || cfi->cfi_magic != CODA_MAGIC);  
@@ -76,6 +113,13 @@  
if (!host_file->f_op->mmap)  
return -ENODEV;  
+if (WARN_ON(coda_file != vma->vm_file))  
+return -EIO;  
+  
cvm_ops = kmalloc(sizeof(struct coda_vm_ops), GFP_KERNEL);  
+if (!cvm_ops)  
+return -ENOMEM;  
}
+coda_inode = file_inode(coda_file);
host_inode = file_inode(host_file);

@@ -89,6 +133,7 @@
* the container file on us! */
else if (coda_inode->i_mapping != host_inode->i_mapping) {
    spin_unlock(&cii->c_lock);
-kfree(cvm_ops);
    return -EBUSY;
}

@@ -97,7 +142,29 @@
cfi->cfi_mapcount++;
    spin_unlock(&cii->c_lock);

    return call_mmap(host_file, vma);
    vma->vm_file = get_file(host_file);
    ret = call_mmap(vma->vm_file, vma);
    +
    +if (ret) {
        +/- if call_mmap fails, our caller will put coda_file so we
        + * should drop the reference to the host_file that we got.
        + */
        +fput(host_file);
        +kfree(cvm_ops);
        +} else {
        +/# here we add redirects for the open/close vm_operations */
        +cvm_ops->host_vm_ops = vma->vm_ops;
        +if (vma->vm_ops)
        +cvm_ops->vm_ops = *vma->vm_ops;
        +
        +cvm_ops->vm_ops.open = codaVm_open;
        +cvm_ops->vm_ops.close = codaVm_close;
        +cvm_ops->coda_file = coda_file;
        +atomic_set(&cvm_ops->refcnt, 1);
        +
        +vma->vm_ops = &cvm_ops->vm_ops;
        +} }
    +return ret;
}

int coda_open(struct inode *coda_inode, struct file *coda_file)
@@ -207,4 +274,3 @@
    .fsync= coda_fsync,
    .splice_read= generic_file_splice_read,
};
--- linux-4.15.0.orig/fs/coda/psdev.c
+++ linux-4.15.0/fs/coda/psdev.c
@@ -187,8 +187,11 @@
      if (req->uc_opcode == CODA_OPEN_BY_FD) {
       struct coda_open_by_fd_out *outp =
       (struct coda_open_by_fd_out *)req->uc_data;
-      if (!outp->oh.result)
+      if (!outp->oh.result) {
          outp->fh = fget(outp->fd);
+         if (!outp->fh)
+            return -EBADF;
+      }}
+      wake_up(&req->uc_sleep);

 --- linux-4.15.0.orig/fs/compat_ioctl.c
+++ linux-4.15.0/fs/compat_ioctl.c
@@ -143,6 +143,7 @@
       unsigned int frame_rate;
       } u;
    ];
+    #define VIDEO_GET_EVENT32 _IOR('o', 28, struct compat_video_event)

     static int do_video_get_event(struct file *file,
                                 unsigned int cmd, struct compat_video_event __user *up)
@@ -154,7 +155,7 @@
      if (kevent == NULL)
       return -EFAULT;
-     err = do_ioctl(file, cmd, (unsigned long)kevent);
+     err = do_ioctl(file, VIDEO_GET_EVENT, (unsigned long)kevent);
      if (!err) {
       err |= convert_in_user(&kevent->type, &up->type);
       err |= convert_in_user(&kevent->timestamp, &up->timestamp);
@@ -173,6 +174,7 @@
          compat_uptr_t iFrame;
          int32_t size;
      ];
+    #define VIDEO_STILLPICTURE32 _IOW('o', 30, struct compat_video_still_picture)

     static int do_video_stillpicture(struct file *file,
                                       unsigned int cmd, struct compat_video_still_picture __user *up)
@@ -223,7 +225,7 @@
      if (err)
       return -EFAULT;
-     err = do_ioctl(file, cmd, (unsigned long) up_native);
+     err = do_ioctl(file, VIDEO_STILLPICTURE, (unsigned long) up_native);
return err;
}
@@ -924,9 +926,6 @@
COMPATIBLE_IOCTL(PPPIOCATTCHAN)
COMPATIBLE_IOCTL(PPPIOCGCHAN)
COMPATIBLE_IOCTL(PPPIOCGL2TPSTATS)
-/* PPPOX */
-COMPATIBLE_IOCTL(PPPOEIOCSFWD)
-COMPATIBLE_IOCTL(PPPOEIOCDFWD)
/* Big A */
/* sparc only */
/* Big Q for sound/OSS */
@@ -1357,9 +1356,9 @@
return rtc_ioctl(file, cmd, argp);

/* dvb */
-case VIDEO_GET_EVENT:
+case VIDEO_GET_EVENT32:
   return do_video_get_event(file, cmd, argp);
-case VIDEO_STILLPICTURE:
+case VIDEO_STILLPICTURE32:
   return do_video_stillpicture(file, cmd, argp);
-case VIDEO_SET_SPU_PALETTE:
+case VIDEO_SET_SPU_PALETTE:
   return do_video_set_spu_palette(file, cmd, argp);
@endif

case FICLONE:
+goto do_ioctl;
case FICLONERANGE:
case FIDEDUPERANGE:
case FS_IOC_FIEMAP:
   -goto do_ioctl;
+goto found_handler;

case FIBMAP:
case FIGETBSZ:
   --- linux-4.15.0.orig/fs/configfs/configfs_internal.h
   +++ linux-4.15.0/fs/configfs/configfs_internal.h
@@ -34,6 +34,15 @@
#include <linux/list.h>
#include <linux/spinlock.h>

+struct configfs_fragment {
+atomic_t frag_count;
+struct rw_semaphore frag_sem;
+bool frag_dead;


+};
+
+void put_fragment(struct configfs_fragment *);
+struct configfs_fragment *get_fragment(struct configfs_fragment *);
+
+struct configfs_dirent {
    atomic_ts_count;
    int s_dependent_count;
    @ @ -48.6 +57.7 @@
    #ifdef CONFIG_LOCKDEP
    int s_depth;
    #endif
+	struct configfs_fragment *s_frag;
};

#define CONFIGFS_ROOT 0x0001
@@ -75,8 +85,8 @@
extern int configfs_create_file(struct config_item *, const struct configfs_attribute *);
extern int configfs_create_bin_file(struct config_item *,
    const struct configfs_bin_attribute *);
-extern int configfs_make_dirent(struct configfs_dirent *,
-    struct dentry *, void *, umode_t, int);
+extern int configfs_make_dirent(struct configfs_dirent *, struct dentry *,
+    void *, umode_t, int, struct configfs_fragment *);
extern int configfs_dirent_is_ready(struct configfs_dirent *);
extern void configfs_hash_and_remove(struct dentry * dir, const char * name);
@@ -151,6 +161,7 @@
{ 
    if (!(sd->s_type & CONFIGFS_ROOT)) {
        kfree(sd->s_iattr);
+		put_fragment(sd->s_frag);
        kmem_cache_free(configfs_dir_cachep, sd);
    }
}
--- linux-4.15.0.orig/fs/configfs/dir.c
+++ linux-4.15.0/fs/configfs/dir.c
@@ -58,15 +58,13 @@
    if (sd) {
        /* Coordinate with configfs_readdir */
        spin_lock(&configfs_dirent_lock);
-/* Coordinate with configfs_attach_attr where will increase
-    * sd->s_count and update sd->s_dentry to new allocated one.
-    * Only set sd->dentry to null when this dentry is the only
-    * sd owner.
-    * If not do so, configfs_d_iput may run just after
-    * configfs_attach_attr and set sd->s_dentry to null
-    * even it's still in use.

/*
 * Set sd->s_dentry to null only when this dentry is the one
 * that is going to be killed. Otherwise configfs_d_iput may
 * run just after configfs_attach_attr and set sd->s_dentry to
 * NULL even it's still in use.
 */

if (atomic_read(&sd->s_count) <= 2)
    if (sd->s_dentry == dentry)
        sd->s_dentry = NULL;

spin_unlock(&configfs_dirent_lock);

#endif /* CONFIG_LOCKDEP */

+static struct configfs_fragment *new_fragment(void)
+{
+    struct configfs_fragment *p;
+    
+    p = kmalloc(sizeof(struct configfs_fragment), GFP_KERNEL);
+    if (p) {
+        atomic_set(&p->frag_count, 1);
+        init_rwsem(&p->frag_sem);
+        p->frag_dead = false;
+    }
+    return p;
+}
+
+void put_fragment(struct configfs_fragment *frag)
+{
+    if (frag && atomic_dec_and_test(&frag->frag_count))
+        kfree(frag);
+}
+
+struct configfs_fragment *get_fragment(struct configfs_fragment *frag)
+{
+    if (likely(frag))
+        atomic_inc(&frag->frag_count);
+    return frag;
+}
+
/*
 * Allocates a new configfs_dirent and links it to the parent configfs_dirent
 */
static struct configfs_dirent *configfs_new_dirent(struct configfs_dirent *parent_sd,
    void *element, int type,
    struct configfs_fragment *frag)
{struct configfs dirent * sd;

@@ -190,6 +215,7 @@
kmem_cache_free(configfs_dir_cachep, sd);
return ERR_PTR(-ENOENT);
}
+sd->s_frag = get_fragment(frag);
list_add(&sd->s_sibling, &parent_sd->s_children);
spin_unlock(&configfs_dirent_lock);

@@ -224,11 +250,11 @@

int configfs_make_dirent(struct configfs dirent * parent_sd,
 struct dentry * dentry, void * element,
- umode_t mode, int type)
+ umode_t mode, int type, struct configfs_fragment *frag)
{
 struct configfs dirent * sd;

-sd = configfs_new_dirent(parent_sd, element, type);
+sd = configfs_new_dirent(parent_sd, element, type, frag);
if (IS_ERR(sd))
return PTR_ERR(sd);

@@ -275,7 +301,8 @@
/* until it is validated by configfs_dir_set_ready() */
*

-static int configfs_create_dir(struct config_item *item, struct dentry *dentry)
+static int configfs_create_dir(struct config_item *item, struct dentry *dentry,
+struct configfs_fragment *frag)
{
 int error;
 umode_t mode = S_IFDIR | S_IRWXU | S_IRUGO | S_IXUGO;
@@ -288,7 +315,8 @@
 return error;

 error = configfs_make_dirent(p->d_fsdata, dentry, item, mode,
- CONFIGFS_DIR | CONFIGFS_USET_CREATING);
+ CONFIGFS_DIR | CONFIGFS_USET_CREATING,
+ frag);
if (unlikely(error))
return error;

@@ -353,9 +381,10 @@

{int err = 0;

umode_t mode = S_IFLNK | S_IRWXUGO;
+struct configfs_dirent *p = parent->d_fsdata;

-err = configfs_make_dirent(parent->d_fsdata, dentry, sl, mode,
- CONFIGFS_ITEM_LINK);
+err = configfs_make_dirent(p, dentry, sl, mode,
+ CONFIGFS_ITEM_LINK, p->s_frag);
if (!err) {
  err = configfs_create(dentry, mode, init_symlink);
if (err) {
@@ -614,7 +643,8 @@

static int configfs_attach_group(struct config_item *parent_item,
  struct config_item *item,
- struct dentry *dentry);
+ struct dentry *dentry,
+ struct configs_fragment *frag);
static void configfsDetach_group(struct config_item *item);

static void detach_groups(struct config_group *group)
@@ -662,7 +692,8 @@ * try using vfs_mkdir. Just a thought.
 */
static int create_default_group(struct config_group *parent_group,
- struct config_group *group)
+ struct config_group *group,
+ struct configfs_fragment *frag)
{
    int ret;
    struct configfs_dirent *sd;
@@ -678,7 +709,7 @@
    if (!ret) {
        sd = child->d_fsdata;
        sd->s_type |= CONFIGFS_USET_DEFAULT;
@@ -692,13 +723,14 @@
    return ret;
    }

    -static int populate_groups(struct config_group *group)
    +static int populate_groups(struct config_group *group,
    + struct configfs_fragment *frag)
    {
        struct config_group *new_group;


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int ret = 0;

list_for_each_entry(new_group, &group->default_groups, group_entry) {
    -ret = create_default_group(group, new_group);
    +ret = create_default_group(group, new_group, frag);
    if (ret) {
        detach_groups(group);
        break;
    }
}

static int configfs_attach_item(struct config_item *parent_item,
        struct config_item *item,
        -struct dentry *dentry)
        +struct dentry *dentry,
        +struct configfs_fragment *frag)
{
    int ret;

    -ret = configfs_create_dir(item, dentry);
    +ret = configfs_create_dir(item, dentry, frag);
    if (!ret) {
        ret = populate_attrs(item);
        if (ret) {
            @ @ -846,12 +879,13 @@

            static int configfs_attach_group(struct config_item *parent_item,
                    struct config_item *item,
                    -struct dentry *dentry)
                    +struct dentry *dentry,
                    +struct configfs_fragment *frag)
{
    int ret;
    struct configfs_dirent *sd;

    -ret = configfs_attach_item(parent_item, item, dentry);
    +ret = configfs_attach_item(parent_item, item, dentry, frag);
    if (!ret) {
        sd = dentry->d_fsdata;
        sd->s_type |= CONFIGFS_USET_DIR;
        @ @ -867,7 +901,7 @@

        inode_lock_nested(d_inode(dentry), I_MUTEX_CHILD);
        configfs_adjust_dir_dirent_depth_before_populate(sd);
        -ret = populate_groups(to_config_group(item));
        +ret = populate_groups(to_config_group(item), frag);
        if (ret) {
            configfs_detach_item(item);
            d_inode(dentry)->i_flags |= S_DEAD;

            Open Source Used In 5GaaS Edge AC-4 31096
struct configfs_dirent *sd;
const struct config_item_type *type;
struct module *subsys_owner = NULL, *new_item_owner = NULL;
+struct configfs_fragment *frag;
char *name;

sd = dentry->d_parent->d_fsdata;
 goto out;
}

+frag = new_fragment();
+if (!frag) {
+ret = -ENOMEM;
+goto out;
+
+ /* Get a working ref for the duration of this function */
parent_item = configfs_get_config_item(dentry->d_parent);
type = parent_item->ci_type;
@@ -1382,9 +1423,9 @@
spin_unlock(&configfs_dirent_lock);

if (group)
 -ret = configfs_attach_group(parent_item, item, dentry);
+ret = configfs_attach_group(parent_item, item, dentry, frag);
else
 -ret = configfs_attach_item(parent_item, item, dentry);
+ret = configfs_attach_item(parent_item, item, dentry, frag);

spin_lock(&configfs_dirent_lock);
sd->s_type &= ~CONFIGFS_USET_IN_MKDIR;
@@ -1421,6 +1462,7 @@
 * reference.
 */
 config_item_put(parent_item);
+put_fragment(frag);

out:
return ret;
@@ -1432,6 +1474,7 @@
 struct config_item *item;
 struct configfs_subsystem *subsys;
 struct configfs_dirent *sd;
+struct configfs_fragment *frag;
 struct module *subsys_owner = NULL, *dead_item_owner = NULL;
 int ret;
frag = sd->s_frag;
if (down_write_killable(&frag->frag_sem)) {
    spin_lock(&configfs_dirent_lock);
    configfs_detach_rollback(dentry);
    spin_unlock(&configfs_dirent_lock);
    config_item_put(parent_item);
    return -EINTR;
}
frag->frag_dead = true;
up_write(&frag->frag_sem);
/* Get a working ref for the duration of this function */
item = configfs_get_config_item(dentry);

err = -ENOENT;
if (configfs_dirent_is_ready(parent_sd)) {
    file->private_data = configfs_new_dirent(parent_sd, NULL, 0);
    if (IS_ERR(file->private_data))
        err = PTR_ERR(file->private_data);
else
    @ @ -1745,8 +1799,13 @@
    
    struct configfs_subsystem *subsys = parent_group->cg_subsys;
    struct dentry *parent;
    +struct configfs_fragment *frag;
    int ret;

    frag = new_fragment();
    +return -ENOMEM;
    +mutex_lock(&subsys->su_mutex);
    link_group(parent_group, group);
    mutex_unlock(&subsys->su_mutex);
    @ @ -1754,13 +1813,22 @@
    parent = parent_group->cg_item.ci_dentry;
    
inode_lock_nested(d_inode(parent), I_MUTEX_PARENT);
    -ret = create_default_group(parent_group, group);
    -if (!ret) {
spin_lock(&configfs_dirent_lock);
configfs_dir_set_ready(group->cg_item.ci_dentry->d_fsdata);
spin_unlock(&configfs_dirent_lock);
}
+ret = create_default_group(parent_group, group, frag);
+if (ret)
+goto err_out;
+
+spin_lock(&configfs_dirent_lock);
+configfs_dir_set_ready(group->cg_item.ci_dentry->d_fsdata);
+spin_unlock(&configfs_dirent_lock);
inode_unlock(d_inode(parent));
+put_fragment(frag);
+return 0;
+err_out:
+inode_unlock(d_inode(parent));
+mutex_lock(&subsys->su_mutex);
unlink_group(group);
+mutex_unlock(&subsys->su_mutex);
+put_fragment(frag);
return ret;
}
EXPORT_SYMBOL(configfs_register_group);
@@ -1776,6 +1844,12 @@
\struct configfs_subsystem *subsys = group->cg_subsys;
\struct dentry *dentry = group->cg_item.ci_dentry;
\struct dentry *parent = group->cg_item.ci_parent->ci_dentry;
+\struct configfs_dirent *sd = dentry->d_fsdata;
+\struct configfs_fragment *frag = sd->s_frag;
+
+down_write(&frag->frag_sem);
+frag->frag_dead = true;
+up_write(&frag->frag_sem);

inode_lock_nested(d_inode(parent), I_MUTEX_PARENT);
spin_lock(&configfs_dirent_lock);
@@ -1847,10 +1921,17 @@
\struct dentry *dentry;
\struct dentry *root;
\struct configfs_dirent *sd;
+\struct configfs_fragment *frag;
+
+frag = new_fragment();
+if (!frag)
+return -ENOMEM;
root = configfs_pin_fs();
-if (IS_ERR(root))

if (IS_ERR(root)) {
  put_fragment(frag);
  return PTR_ERR(root);
}

if (!group->cg_item.ci_name)
  group->cg_item.ci_name = group->cg_item.ci_namebuf;
@@ -1866,7 +1947,7 @@
  d_add(dentry, NULL);

err = configfs_attach_group(sd->s_element, &group->cg_item,
  - dentry);
+ dentry, frag);
if (err) {
  BUG_ON(d_inode(dentry));
  d_drop(dentry);
@@ -1884,6 +1965,7 @@
  unlink_group(group);
  configfs_release_fs();
 }  
  +put_fragment(frag);

return err;
}
@@ -1893,12 +1975,18 @@
    struct config_group *group = &subsys->su_group;
    struct dentry *dentry = group->cg_item.ci_dentry;
    struct dentry *root = dentry->d_sb->s_root;
+    struct configfs_dirent *sd = dentry->d_fsdata;
+    struct configfs_fragment *frag = sd->s_frag;

    if (dentry->d_parent != root) {
        pr_err("Tried to unregister non-subsystem!\n");
        return;
    }

    +down_write(&frag->frag_sem);
    +frag->frag_dead = true;
    +up_write(&frag->frag_sem);
    +inode_lock_nested(d_inode(root),
        I_MUTEX_PARENT);
    inode_lock_nested(d_inode(dentry), I_MUTEX_CHILD);
--- linux-4.15.0.orig/fs/configfs/file.c
+++ linux-4.15.0/fs/configfs/file.c
@@ -53,40 +53,44 @@
    bool write_in_progress;
    char *bin_buffer;
int bin_buffer_size;
+int cb_max_size;
+struct config_item *item;
+struct module *owner;
+union {
    +struct configfs_attribute *attr;
    +struct configfs_bin_attribute *bin_attr;
    +};
);
+
+static inline struct configfs_fragment *to_frag(struct file *file)
+{
+    +struct configfs dirent *sd = file->f_path.dentry->d_fsdata;

    /**
- * fill_read_buffer - allocate and fill buffer from item.
- * @dentry: dentry pointer.
- * @buffer: data buffer for file.
- *
- * Allocate @buffer->page, if it hasn't been already, then call the
- * config_item's show() method to fill the buffer with this attribute's
- * data.
- * This is called only once, on the file's first read.
- */
- static int fill_read_buffer(struct dentry * dentry, struct configfs_buffer * buffer)
+    return sd->s_frag;
+}
+
+static int fill_read_buffer(struct file *file, struct configfs_buffer *buffer)
{
    struct configfs_attribute * attr = to_attr(dentry);
    struct config_item * item = to_item(dentry->d_parent);
    int ret = 0;
    ssize_t count;
    struct configfs_fragment *frag = to_frag(file);
    ssize_t count = -ENOENT;

    if (!buffer->page)
        buffer->page = (char *) get_zeroed_page(GFP_KERNEL);
    if (!buffer->page)
        return -ENOMEM;

    count = attr->show(item, buffer->page);
    -BUG_ON(count > (ssize_t)SIMPLE_ATTR_SIZE);
    -if (count >= 0) {
        -buffer->needs_read_fill = 0;
        -buffer->count = count;

- } else
- ret = count;
- return ret;
+ down_read(&frag->frag_sem);
+ if (!frag->frag_dead)
+ count = buffer->attr->show(buffer->item, buffer->page);
+ up_read(&frag->frag_sem);
+
+ if (count < 0)
+ return count;
+ if (WARN_ON_ONCE(count > (ssize_t)SIMPLE_ATTR_SIZE))
+ return -EIO;
+ buffer->needs_read_fill = 0;
+ buffer->count = count;
+ return 0;
+
/**
 @@ -111,12 +115,13 @@
 static ssize_t
 configfs_read_file(struct file *file, char __user *buf, size_t count, loff_t *ppos)
 {
- struct configfs_buffer * buffer = file->private_data;
+ struct configfs_buffer *buffer = file->private_data;
 ssize_t retval = 0;
 mutex_lock(&buffer->mutex);
 if (buffer->needs_read_fill) {
- retval = fill_read_buffer(file->f_path.dentry,buffer))
+ retval = fill_read_buffer(file, buffer);
+ if (retval)
+ goto out;
 }
 pr_debug("%s: count = %zd, ppos = %lld, buf = %s\n",
 /* @ @ -152,10 +157,8 @@
 configfs_read_bin_file(struct file *file, char __user *buf,
 size_t count, loff_t *ppos)
 {
+ struct configfs_fragment *frag = to_frag(file);
 struct configfs_buffer *buffer = file->private_data;
- struct dentry *dentry = file->f_path.dentry;
- struct config_item *item = to_item(dentry->d_parent);
- struct configfs_bin_attribute *bin_attr = to_bin_attr(dentry);
 ssize_t retval = 0;
 ssize_t len = min_t(size_t, count, PAGE_SIZE);
 */ @ @ -170,14 +173,19 @@
if (buffer->needs_read_fill) {
/* perform first read with buf == NULL to get extent */
    len = bin_attr->read(item, NULL, 0);
+down_read(&frag->frag_sem);
+if (!frag->frag_dead)
+len = buffer->bin_attr->read(buffer->item, NULL, 0);
+else
+len = -ENOENT;
+up_read(&frag->frag_sem);
if (len <= 0) {
    retval = len;
goto out;
}

/* do not exceed the maximum value */
-if (bin_attr->cb_max_size && len > bin_attr->cb_max_size) {
+if (buffer->cb_max_size && len > buffer->cb_max_size) {
    retval = -EFBIG;
    goto out;
}
@@ -190,7 +198,13 @@
    buffer->bin_buffer_size = len;

/* perform second read to fill buffer */
-if (bin_attr->cb_max_size && len > bin_attr->cb_max_size) {
+if (buffer->cb_max_size && len > buffer->cb_max_size) {
    retval = -EFBIG;
    goto out;
}
@@ -240,25 +254,17 @@
    return error ? -EFAULT : count;
}
-
-/**
- * flush_write_buffer - push buffer to config_item.
- * @dentry: dentry to the attribute
- * @buffer: data buffer for file.
- * @count: number of bytes
- *
- * Get the correct pointers for the config_item and the attribute we're
- * dealing with, then call the store() method for the attribute,
- *passing the buffer that we acquired in fill_write_buffer().
  - */

static int
flush_write_buffer(struct dentry * dentry, struct configfs_buffer * buffer, size_t count)
{
  struct configfs_attribute * attr = to_attr(dentry);
  struct config_item * item = to_item(dentry->d_parent);
  int res = -ENOENT;
  down_read(&frag->frag_sem);
  if (!frag->frag_dead)
    res = buffer->attr->store(buffer->item, buffer->page, count);
  up_read(&frag->frag_sem);
  return res;
}

static ssize_t
configfs_write_file(struct file *file, const char __user *buf, size_t count, loff_t *ppos)
{
  struct configfs_buffer * buffer = file->private_data;
  ssize_t len;
  mutex_lock(&buffer->mutex);
  len = fill_write_buffer(buffer, buf, count);
  if (len > 0)
    len = flush_write_buffer(file->f_path.dentry, buffer, len);
  if (len > 0)
    *ppos += len;
  mutex_unlock(&buffer->mutex);
}

static ssize_t
configfs_write_file(struct file *file, const char __user *buf, size_t count, loff_t *ppos)
{
  struct configfs_buffer *buffer = file->private_data;
  struct dentry *dentry = file->f_path.dentry;
  struct configfs_bin_attribute *bin_attr = to_bin_attr(dentry);
  void *tbuf = NULL;
  ssize_t len;

  mutex_lock(&buffer->mutex);
  len = fill_write_buffer(buffer, buf, count);
  if (len > 0)
    len = flush_write_buffer(file->f_path.dentry, buffer, len);
  if (len > 0)
    *ppos += len;
  mutex_unlock(&buffer->mutex);

  struct configfs_buffer *buffer = file->private_data;
  struct dentry *dentry = file->f_path.dentry;
  struct configfs_bin_attribute *bin_attr = to_bin_attr(dentry);
  void *tbuf = NULL;
  ssize_t len;

  @ @ -330,8 +334,8 @@
  /* buffer grows? */
if (*ppos + count > buffer->bin_buffer_size) {

    -if (bin_attr->cb_max_size &&
    -*ppos + count > bin_attr->cb_max_size) {
        +if (buffer->cb_max_size &&
        +*ppos + count > buffer->cb_max_size) {
            len = -E2BIG;
            goto out;
        }
    }
}
@@ -363,31 +367,51 @@
return len;
}

-static int check_perm(struct inode * inode, struct file * file, int type)
+static int __configfs_open_file(struct inode *inode, struct file *file, int type)
{
    struct config_item *item = configfs_get_config_item(file->f_path.dentry->d_parent);
    struct configfs_attribute * attr = to_attr(file->f_path.dentry);
    struct configfs_bin_attribute *bin_attr = NULL;
    struct configfs_buffer * buffer;
    struct configfs_item_operations * ops = NULL;
    int error = 0;
    +struct dentry *dentry = file->f_path.dentry;
    +struct configfs_fragment *frag = to_frag(file);
    +struct configfs_attribute *attr;
    +struct configfs_buffer *buffer;
    +int error;

    -if (!item || !attr)
    -goto Einval;
    +error = -ENOMEM;
    +buffer = kzalloc(sizeof(struct configfs_buffer), GFP_KERNEL);
    +if (!buffer)
    +goto out;

    -if (type & CONFIGFS_ITEM_BIN_ATTR)
    -bin_attr = to_bin_attr(file->f_path.dentry);
    +error = -ENOENT;
    +down_read(&frag->frag_sem);
    +if (unlikely(frag->frag_dead))
    +goto out_free_buffer;

    /* Grab the module reference for this attribute if we have one */
    -if (!try_module_get(attr->ca_owner)) {
        -error = -ENODEV;
        -goto Done;
        +error = -EINVAL;
        +buffer->item = to_item(dentry->d_parent);
    }

if (!buffer->item)
  goto out_free_buffer;
+
attr = to_attr(dentry);
+if (!attr)
  goto out_free_buffer;
+
+if (type & CONFIGFS_ITEM_BIN_ATTR) {
  buffer->bin_attr = to_bin_attr(dentry);
  buffer->cb_max_size = buffer->bin_attr->cb_max_size;
+} else {
  buffer->attr = attr;
}
-
-ops = item->ci_type->ct_item_ops;
-else
-goto Eaccess;
+buffer->owner = attr->ca_owner;
+/* Grab the module reference for this attribute if we have one */
+error = -ENODEV;
+if (!try_module_get(buffer->owner))
  goto out_free_buffer;
+
+error = -EACCES;
+if (!buffer->item->ci_type)
  goto out_put_module;
+
+buffer->ops = buffer->item->ci_type->ct_item_ops;

/* File needs write support.
 * The inode's perms must say it's ok,
 @@ -395,13 +419,11 @@
 if (file->f_mode & FMODE_WRITE) {
 if (!(inode->i_mode & S_IWUGO))
-  goto Eaccess;
-  if ((type & CONFIGFS_ITEM_ATTR) && !attr->store)
-    goto Eaccess;
-    if ((type & CONFIGFS_ITEM_BIN_ATTR) && !bin_attr->write)
-      goto Eaccess;
-      if ((type & CONFIGFS_ITEM_BIN_ATTR) && !buffer->bin_attr->write)
-        goto out_put_module;

 /* File needs write support.
 * The inode's perms must say it's ok,
/* File needs read support.
   @ @ -410,103 +432,79 @ @
* /
if (file->f_mode & FMODE_READ) {
if (!(inode->i_mode & S_IRUGO))
    -goto Eaccess;
+
    +goto out_put_module;
if (((type & CONFIGFS_ITEM_ATTR) && !attr->show)
    -goto Eaccess;
-    if ((type & CONFIGFS_ITEM_BIN_ATTR) && !bin_attr->read)
-        -goto Eaccess;
-        +goto out_put_module;
+        +if ((type & CONFIGFS_ITEM_BIN_ATTR) && !buffer->bin_attr->read)
+            +goto out_put_module;
}

-/* No error? Great, allocate a buffer for the file, and store it
 - * it in file->private_data for easy access.
 - */
-    -buffer = kzalloc(sizeof(struct configfs_buffer),GFP_KERNEL);
-    -if (!buffer) {
-        -error = -ENOMEM;
-        -goto Enomem;
-        -mutex_init(&buffer->mutex);
-        -buffer->needs_read_fill = 1;
-        -buffer->read_in_progress = false;
-        -buffer->write_in_progress = false;
-        -buffer->ops = ops;
-        -file->private_data = buffer;
-        -goto Done;
-        +up_read(&frag->frag_sem);
-        +return 0;

- Einval:
-    -error = -EINVAL;
-    -goto Done;
- Eaccess:
-    -error = -EACCES;
-    -Enomem:
-        -module_put(attr->ca_owner);
-        - Done:
-        -if (error && item)
-            -config_item_put(item);
+ out_put_module:
+module_put(buffer->owner);
+out_free_buffer:
+up_read(&frag->frag_sem);
+kfree(buffer);
+out:
return error;
}

static int configfs_release(struct inode *inode, struct file *filp)
{
    struct config_item * item = to_item(filp->f_path.dentry->d_parent);
    struct configfs_attribute * attr = to_attr(filp->f_path.dentry);
    struct module * owner = attr->ca_owner;
    struct configfs_buffer * buffer = filp->private_data;
    
    -if (item)
        config_item_put(item);
    -/* After this point, attr should not be accessed. */
    -module_put(owner);

    -if (buffer) {
        -if (buffer->page)
            free_page((unsigned long)buffer->page);
        -mutex_destroy(&buffer->mutex);
        -kfree(buffer);
    -}

    +struct configfs_buffer *buffer = filp->private_data;
    +
    +module_put(buffer->owner);
    +if (buffer->page)
        free_page((unsigned long)buffer->page);
    +mutex_destroy(&buffer->mutex);
    +kfree(buffer);
return 0;
}

static int configfs_open_file(struct inode *inode, struct file *filp)
{
    -return check_perm(inode, filp, CONFIGFS_ITEM_ATTR);
    +return __configfs_open_file(inode, filp, CONFIGFS_ITEM_ATTR);
}

static int configfs_open_bin_file(struct inode *inode, struct file *filp)
{
    -return check_perm(inode, filp, CONFIGFS_ITEM_BIN_ATTR);
    +return __configfs_open_file(inode, filp, CONFIGFS_ITEM_BIN_ATTR);
}
static int configfs_release_bin_file(struct inode *inode, struct file *filp)
{
    struct configfs_buffer *buffer = filp->private_data;
    struct dentry *dentry = filp->f_path.dentry;
    struct config_item *item = to_item(dentry->d_parent);
    struct configfs_bin_attribute *bin_attr = to_bin_attr(dentry);
    ssize_t len = 0;
    int ret;

    buffer->read_in_progress = false;
    
    if (buffer->write_in_progress) {
        struct configfs_fragment *frag = to_frag(file);
        buffer->write_in_progress = false;

        len = bin_attr->write(item, buffer->bin_buffer,
            buffer->bin_buffer_size);
        /* vfree on NULL is safe */
        vfree(buffer->bin_buffer);
        buffer->bin_buffer = NULL;
        buffer->bin_buffer_size = 0;
        buffer->needs_read_fill = 1;
        down_read(&frag->frag_sem);
        if (!frag->frag_dead) {
            /* result of ->release() is ignored */
            +buffer->bin_attr->write(buffer->item,
                buffer->bin_buffer,
                buffer->bin_buffer_size);
        }
        up_read(&frag->frag_sem);
    }
    ret = configfs_release(inode, filp);
    if (len < 0)
        return len;
    return ret;
    +vfree(buffer->bin_buffer);
    buffer->bin_buffer = NULL;
    buffer->bin_buffer_size = 0;
    buffer->needs_read_fill = 1;
    +configfs_release(inode, file);
    +return 0;
}
inode_lock_nested(d_inode(dir), I_MUTEX_NORMAL);
error = configfs_make_dirent(parent_sd, NULL, (void *) attr, mode,
    - CONFIGFS_ITEM_ATTR);
+ CONFIGFS_ITEM_ATTR, parent_sd->s_frag);
inode_unlock(d_inode(dir));

return error;
inode_lock_nested(dir->d_inode, I_MUTEX_NORMAL);
error = configfs_make_dirent(parent_sd, NULL, (void *) bin_attr, mode,
    - CONFIGFS_ITEM_BIN_ATTR);
+ CONFIGFS_ITEM_BIN_ATTR, parent_sd->s_frag);
inode_unlock(dir->d_inode);

return error;
--- linux-4.15.0.orig/fs/configfs/symlink.c
+++ linux-4.15.0/fs/configfs/symlink.c
@@ -64,7 +64,7 @@
    /* back up enough to print this bus id with '/' */
    length -= cur;
    -strncpy(buffer + length, config_item_name(p), cur);
+memcpy(buffer + length, config_item_name(p), cur);
    *(buffer + --length) = '/';
    }
    }
@@ -157,11 +157,42 @@
    !type->ct_item_ops->allow_link)
goto out_put;

+/*
+ * This is really sick. What they wanted was a hybrid of
+ * link(2) and symlink(2) - they wanted the target resolved
+ * at syscall time (as link(2) would've done), be a directory
+ * (which link(2) would've refused to do) *AND* be a deep
+ * fucking magic, making the target busy from rmdir POV.
+ * symlink(2) is nothing of that sort, and the locking it
+ * gets matches the normal symlink(2) semantics. Without
+ * attempts to resolve the target (which might very well
+ * not even exist yet) done prior to locking the parent
+ * directory. This perversion, OTOH, needs to resolve
+ * the target, which would lead to obvious deadlocks if
+ * attempted with any directories locked.
+ */
Unfortunately, that garbage is userland ABI and we should've
said "no" back in 2005. Too late now, so we get to
play very ugly games with locking.

Try *ANYTHING* of that sort in new code, and you will
really regret it. Just ask yourself - what could a BOFH
do to me and do I want to find it out first-hand?

AV, a thoroughly annoyed bastard.

```
inode_unlock(dir);
ret = get_target(symname, &path, &target_item, dentry->d_sb);
inode_lock(dir);
if (ret)
goto out_put;
```

```
ret = type->ct_item_ops->allow_link(parent_item, target_item);
if (dentry->d_inode || d_unhashed(dentry))
ret = -EEXIST;
else
ret = inode_permission(dir, MAY_WRITE | MAY_EXEC);
if (!ret)
ret = type->ct_item_ops->allow_link(parent_item, target_item);
if (!ret) {
mutex_lock(&configfs_symlink_mutex);
ret = create_link(parent_item, target_item, dentry);
--- linux-4.15.0.orig/fs/coredump.c
+++ linux-4.15.0/fs/coredump.c
@@ -753,6 +753,14 @@
if (displaced)
put_files_struct(displaced);
if (!dump_interrupted()) {
+/*
+ * umh disabled with CONFIG_STATIC_USERMODEHELPER_PATH="" would
+ * have this set to NULL.
+ */
+if (!cprm.file) {
+pr_info("Core dump to |%s disabled\n", cn.corename);
+goto close_fail;
+
file_start_write(cprm.file);
core_dumped = binfmt->core_dump(&cprm);
file_end_write(cprm.file);
--- linux-4.15.0.orig/fs/cramfs/inode.c
+++ linux-4.15.0/fs/cramfs/inode.c
@@ @ -202,7 +202,8 @@
continue;
blk_offset = (blocknr - buffer_blocknr[i]) << PAGE_SHIFT;
```
blk_offset += offset;
-if (blk_offset + len > BUFFER_SIZE)
+ if (blk_offset > BUFFER_SIZE)
+ blk_offset + len > BUFFER_SIZE)
continue;
return read_buffers[i] + blk_offset;
}
--- linux-4.15.0.orig/fs/crypto/crypto.c
+++ linux-4.15.0/fs/crypto/crypto.c
@@ -142,7 +142,10 @@
 struct crypto_skcipher *tfm = ci->ci_ctfm;
 int res = 0;

-BUG_ON(len == 0);
+if (WARN_ON_ONCE(len <= 0))
+return -EINVAL;
+if (WARN_ON_ONCE(len % FS_CRYPTO_BLOCK_SIZE != 0))
+return -EINVAL;

 BUILD_BUG_ON(sizeof(iv) != FS_IV_SIZE);
BUILD_BUG_ON(AES_BLOCK_SIZE != FS_IV_SIZE);
@@ -237,8 +240,6 @@
struct page *ciphertext_page = page;
int err;

-BUG_ON(len % FS_CRYPTO_BLOCK_SIZE != 0);
-
if (inode->i_sb->s_cop->flags & FS_CFLG_OWN_PAGES) {
 /* with inplace-encryption we just encrypt the page */
erр = fscrypt_do_page_crypto(inode, FS_ENCRYPT, lblk_num, page,
@@ -250,7 +251,8 @@
return ciphertext_page;
}

-BUG_ON(!PageLocked(page));
+if (WARN_ON_ONCE(!PageLocked(page)))
+return ERR_PTR(-EINVAL);

ctx = fscrypt_get_ctx(inode, gfp_flags);
if (IS_ERR(ctx))
@@ -298,8 +300,9 @@
int fscrypt_decrypt_page(const struct inode *inode, struct page *page,
unsigned int len, unsigned int offs, u64 lblk_num)
{
-if (!(inode->i_sb->s_cop->flags & FS_CFLG_OWN_PAGES))
-BUG_ON(!PageLocked(page));
+if (WARN_ON_ONCE(!PageLocked(page) &&
+ !(inode->i_sb->s_cop->flags & FS_CFLG_OWN_PAGES)))


+return -EINVAL;

return fscrypt_do_page_crypto(inode, FS_DECRYPT, blk_num, page, page,
    len, offs, GFP_NOFS);
@@ -426,8 +429,17 @@
    */
static int __init fscrypt_init(void)
{
+ /*
+ * Use an unbound workqueue to allow bios to be decrypted in parallel
+ * even when they happen to complete on the same CPU. This sacrifices
+ * locality, but it's worthwhile since decryption is CPU-intensive.
+ *
+ * Also use a high-priority workqueue to prioritize decryption work,
+ * which blocks reads from completing, over regular application tasks.
+ */
    fscrypt_read_workqueue = alloc_workqueue("fscrypt_read_queue",
        WQ_UNBOUND | WQ_HIGHPRI, num_online_cpus());
    if (!fscrypt_read_workqueue)
        goto fail;

--- linux-4.15.0.orig/fs/crypto/fname.c
+++ linux-4.15.0/fs/crypto/fname.c
@@ -280,13 +280,8 @@
    oname->name);
    return 0;
-    if (hash) {
-        digested_name.hash = hash;
-        digested_name.minor_hash = minor_hash;
-    } else {
-        digested_name.hash = 0;
-        digested_name.minor_hash = 0;
-    }
+    digested_name.hash = hash;
+    digested_name.minor_hash = minor_hash;
    memcpy(digested_name.digest,
        FSCRYPT_FNAME_DIGEST(iname->name, iname->len),
        FSCRYPT_FNAME_DIGEST_SIZE);
--- linux-4.15.0.orig/fs/crypto/hooks.c
+++ linux-4.15.0/fs/crypto/hooks.c
@@ -57,7 +57,7 @@
    return err;
    if (!fscrypt_has_permitted_context(dir, inode))
        goto fail;

    if (!fscrypt_has_permitted_context(dir, inode))
        -return -EPERM;
return -EXDEV;

return 0;
}
@@ -81,13 +81,13 @@
if (IS_ENCRYPTED(new_dir) &&
    !fscrypt_has_permitted_context(new_dir,
    d_inode(old_dentry)))
- return -EPERM;
+ return -EXDEV;
if ((flags & RENAME_EXCHANGE) &&
   IS_ENCRYPTED(old_dir) &&
   !fscrypt_has_permitted_context(old_dir,
   d_inode(new_dentry)))
- return -EPERM;
+ return -EXDEV;
return 0;
}
@@ -104,9 +104,8 @@
spin_lock(&dentry->d_lock);
 dentry->d_flags |= DCACHE_ENCRYPTED_WITH_KEY;
 spin_unlock(&dentry->d_lock);
+ d_set_d_op(dentry, &fscrypt_d_ops);
}
-
-d_set_d_op(dentry, &fscrypt_d_ops);
return 0;
}
EXPORT_SYMBOL_GPL(__fscrypt_prepare_lookup);
--- linux-4.15.0.orig/fs/crypto/policy.c
+++ linux-4.15.0/fs/crypto/policy.c
@@ -81,6 +81,8 @@
if (ret == -ENODATA) {
 if (!S_ISDIR(inode->i_mode))
 ret = -ENOTDIR;
+ else if (IS_DEADDIR(inode))
+ ret = -ENOENT;
 else if (!inode->i_sb->s_cop->empty_dir(inode))
 ret = -ENOTEMPTY;
 else
@@ -151,8 +153,7 @@
 * malicious offline violations of this constraint, while the link and rename
 * checks are needed to prevent online violations of this constraint.
 *
-* Return: 1 if permitted, 0 if forbidden. If forbidden, the caller must fail
- * the filesystem operation with EPERM.
int fscrypt_has_permitted_context(struct inode *parent, struct inode *child)
{
    pmd = pmd_mkclean(pmd);
    set_pmd_at(vma->vm_mm, address, pmdp, pmd);
    unlock_pmd:
    spin_unlock(ptl);
    #endif
    spin_unlock(ptl);
} else {
    if (pfn != pte_pfn(*ptep))
        goto unlock_pte;
    @ -1061,6 +1061,9 @@
    lockdep_assert_held(&inode->i_rwsem);
}

if (iocb->ki_flags & IOCB_NOWAIT)
    flags |= IOMAP_NOWAIT;
+
    while (iov_iter_count(iter)) {
        ret = iomap_apply(inode, pos, iov_iter_count(iter), flags, ops,
                          iter, dax_iomap_actor);
        @ -1435,8 +1438,7 @@
    }

trace_dax_pmd_insert_mapping(inode, vmf, PMD_SIZE, pfn, entry);
-result = vmf_insert_pfn_pmd(vma, vmf->address, vmf->pmd, pfn,
-     write);
+result = vmf_insert_pfn_pmd(vmf, pfn, FAULT_FLAG_WRITE);
    break;
case IOMAP_UNWRITTEN:
    case IOMAP_HOLE:
        @ -1550,8 +1552,7 @@
    break;
#ifdef CONFIG_FS_DAX_PMD
case PE_SIZE_PMD:
    -vmf_ret = vmf_insert_pfn_pmd(vmf->vma, vmf->address, vmf->pmd, pfn,
-     true);
    +vmf_ret = vmf_insert_pfn_pmd(vmf, pfn, FAULT_FLAG_WRITE);
    break;
#endif
default:
    --- linux-4.15.0.orig/fs/dcache.c
    +++ linux-4.15.0/fs/dcache.c
kmem_cache_free(dentry_cache, dentry);

+static void __d_free_external_name(struct rcu_head *head)
+{
+  struct external_name *name = container_of(head, struct external_name,
+    u.head);
+  +mod_node_page_state(page_pgdat(virt_to_page(name)),
+    NR_INDIRECTLY_RECLAIMABLE_BYTES,
+    -ksize(name));
+  +kfree(name);
+}
+
+static void __d_free_external(struct rcu_head *head)
+{
+  struct dentry *dentry = container_of(head, struct dentry, d_u.d_rcu);
+  kfree(external_name(dentry));
+  kmem_cache_free(dentry_cache, dentry);
+  __d_free_external_name(&external_name(dentry)->u.head);
+  kmem_cache_free(dentry_cache, dentry);
+
+static inline int dname_external(const struct dentry *dentry)
+{
+  spin_unlock(&dentry->d_lock);
+  name->name = p->name;
+  } else {
+    memcpy(name->inline_name, dentry->d_iname, DNAME_INLINE_LEN);
+    memcpy(name->inline_name, dentry->d_name.len + 1);
+    spin_unlock(&dentry->d_lock);
+    name->name = name->inline_name;
+  }
+}
+static inline int dname_external(const struct dentry *dentry)
+{
+  spin_unlock(&dentry->d_lock);
+  name->name = p->name;
+  } else {
+    memcpy(name->inline_name, dentry->d_iname, DNAME_INLINE_LEN);
+    memcpy(name->inline_name, dentry->d_iname,
+        dentry->d_name.len + 1);
+    spin_unlock(&dentry->d_lock);
+    name->name = name->inline_name;
+  }
+}
+}
+-kfree_rcu(p, u.head);
+call_rcu(&p->u.head, __d_free_external_name);
+}
+
+EXPORT_SYMBOL(release_dentry_name_snapshot);
+

@@ -270,11 +270,25 @@

@@ -291,7 +305,7 @@

@@ -304,7 +319,7 @@

@@ -357,14 +372,11 @@
__releases(dentry->d_inode->i_lock)
{
struct inode *inode = dentry->d_inode;
-bool hashed = !d_unhashed(dentry);

-if (hashed)
  -raw_write_seqcount_begin(&dentry->d_seq);
+raw_write_seqcount_begin(&dentry->d_seq);
  __d_clear_type_and_inode(dentry);
  hlist_del_init(&dentry->d_u.d_alias);
  -if (hashed)
    -raw_write_seqcount_end(&dentry->d_seq);
+raw_write_seqcount_end(&dentry->d_seq);
  spin_unlock(&dentry->d_lock);
  spin_unlock(&inode->i_lock);
  if (!inode->i_nlink)
     @@ -468,9 +480,11 @@
       * d_drop() is used mainly for stuff that wants to invalidate a dentry for some
       * reason (NFS timeouts or autofs deletes).
       *
-   - __d_drop requires dentry->d_lock.
+   + __d_drop requires dentry->d_lock
+   + __d_drop doesn't mark dentry as "unhashed"
+   + (dentry->d_hash.pprev will be LIST_POISON2, not NULL).
   */
-void __d_drop(struct dentry *dentry)
+static void ___d_drop(struct dentry *dentry)
{
  if (!d_unhashed(dentry)) {
    struct hlist_bl_head *b;
    @@ -486,12 +500,17 @@
       hlist_bl_lock(b);
       __hlist_bl_del(&dentry->d_hash);
-      dentry->d_hash.pprev = NULL;
+      hlist_bl_unlock(b);
/* After this call, in-progress rcu-walk path lookup will fail. */
  write_seqcount Invalidate(&dentry->d_seq);
  }
  }
+void __d_drop(struct dentry *dentry)
+{+
+__d_drop(dentry);
+}
EXPORT_SYMBOL(__d_drop);
void d_drop(struct dentry *dentry)
//@ -644,11 +663,16 @@
spin_unlock(&parent->d_lock);
goto again;
}
-rcu_read_unlock();
-if (parent != dentry)
+if (parent != dentry) {
spin_lock_nested(&dentry->d_lock, DENTRY_D_LOCK_NESTED);
-else
+else
+if (unlikely(dentry->d_lockref.count < 0)) {
+spin_unlock(&parent->d_lock);
+parent = NULL;
+}
+} else {
parent = NULL;
+
+rcu_read_unlock();
return parent;
}

//@ -844,17 +868,19 @@
{
int gotref;
struct dentry *ret;
+unsigned seq;

/*
 * Do optimistic parent lookup without any
 * locking.
 */
rcu_read_lock();
+seq = raw_seqcount_begin(&dentry->d_seq);
ret = READ_ONCE(dentry->d_parent);
gotref = lockref_get_not_zero(&ret->d_lockref);
rcu_read_unlock();
if (likely(gotref)) {
-if (likely(ret == READ_ONCE(dentry->d_parent)))
+if (!read_seqcount_retry(&dentry->d_seq, seq))
return ret;
dput(ret);
}
//@ -1159,15 +1185,11 @@
*/
void shrink_dcache_sb(struct super_block *sb)
{
-long freed;
-
do {
    LIST_HEAD(dispose);

    freed = list_lru_walk(&sb->s_dentry_lru,
    +list_lru_walk(&sb->s_dentry_lru,
    dentry_lru_isolate_shrink, &dispose, 1024);
    -
    -this_cpu_sub(nr_dentry_unused, freed);
    shrink_dentry_list(&dispose);
    cond_resched();
} while (list_lru_count(&sb->s_dentry_lru) > 0);
\@\@ -1197,7 +1219,7 @@
* *
* The @enter() and @finish() callbacks are called with d_lock held.
*/
-static void d_walk(struct dentry *parent, void *data,
+void d_walk(struct dentry *parent, void *data,
    enum d_walk_ret (*enter)(void *, struct dentry *),
    void (*finish)(void *))
{
    @@ -1305,6 +1327,7 @@
    seq = 1;
    goto again;
    }
+EXPORT_SYMBOL_GPL(d_walk);

    struct check_mount {
        struct vfsmount *mnt;
        @@ -1595,6 +1618,7 @@
    struct dentry *__d_alloc(struct super_block *sb, const struct qstr *name)
    {
        +struct external_name *ext = NULL;
        struct dentry *dentry;
        char *dname;
        int err;
        @@ -1615,14 +1639,13 @@
        dname = dentry->d_iname;
    } else if (name->len > DNAME_INLINE_LEN-1) {
            size_t size = offsetof(struct external_name, name[1]);
            -struct external_name *p = kmalloc(size + name->len,
                - GFP_KERNEL_ACCOUNT);
            +struct external_name *p = kmalloc(size + name->len,
                GFP_KERNEL_ACCOUNT);
            -if (!p) {
                +ext = kmalloc(size + name->len, GFP_KERNEL_ACCOUNT);
                +if (!ext) {
                    kmem_cache_free(dentry_cache, dentry);
                    return NULL;
                }
            }
-atomic_set(&p->u.count, 1);
-dname = p->name;
+atomic_set(&ext->u.count, 1);
+dname = ext->name;
if (IS_ENABLED(CONFIG_DCACHE_WORD_ACCESS))
  kasan_unpoison_shadow(dname,
  round_up(name->len + 1, sizeof(unsigned long)));
@@ -1665,6 +1688,12 @@
 }
 }

+if (unlikely(ext)) {
+  pg_data_t *pgdat = page_pgdat(virt_to_page(ext));
+  mod_node_page_state(pgdat, NR_INDIRECTLY_RECLAIMABLE_BYTES,
+    ksize(ext));
+}
+
+this_cpu_inc(nr_dentry);

return dentry;
@@ -1855,6 +1884,28 @@
}
EXPORT_SYMBOL(d_instantiate);

+/*
+ * This should be equivalent to d_instantiate() + unlock_new_inode(),
+ * with lockdep-related part of unlock_new_inode() done before
+ * anything else. Use that instead of open-coding d_instantiate()/
+ * unlock_new_inode() combinations.
+ */
+void d_instantiate_new(struct dentry *entry, struct inode *inode)
+{
+  BUG_ON(!hlist_unhashed(&entry->d_u.d_alias));
+  BUG_ON(!inode);
+  lockdep_annotate_inode_mutex_key(inode);
+  security_d_instantiate(entry, inode);
+  spin_lock(&inode->i_lock);
+  __d_instantiate(entry, inode);
+  WARN_ON(!(inode->i_state & I_NEW));
+  inode->i_state &= ~I_NEW;
+  smp_mb();
+  wake_up_bit(&inode->i_state, __I_NEW);
+  spin_unlock(&inode->i_lock);
+}
+EXPORT_SYMBOL(d_instantiate_new);
+
/**
 * d_instantiate_no_diralias - instantiate a non-aliased dentry
 */
if (root_inode) {
    res = __d_alloc(root_inode->i_sb, NULL);
    -if (res)
+if (res) {
+    res->d_flags |= DCACHE_RCUACCESS;
    d_instantiate(res, root_inode);
    -else
+    } else {
        iput(root_inode);
    +}
} return res;
}

static void __d_rehash(struct dentry *entry)
{
    struct hlist_bl_head *b = d_hash(entry->d_name.hash);
    -BUG_ON(!d_unhashed(entry));
+    hlist_bl_lock(b);
    hlist_bl_add_head_rcu(&entry->d_hash, b);
    hlist_bl_unlock(b);
}

retry:
rcu_read_lock();
-seq = smp_load_acquire(&parent->d_inode->i_dir_seq) & ~1;
+seq = smp_load_acquire(&parent->d_inode->i_dir_seq);
r_seq = read_seqbegin(&rename_lock);
dentry = __d_lookup_rcu(parent, name, &d_seq);
if (unlikely(dentry)) {
    @@ -2469,8 +2522,14 @@
    rcu_read_unlock();
goto retry;
    -
    +if (unlikely(seq & 1)) {
    +rcu_read_unlock();
    +goto retry;
    +}
    +}
    +hlist_bl_lock(b);
    -if (unlikely(parent->d_inode->i_dir_seq != seq)) {
    +if (unlikely(READ_ONCE(parent->d_inode->i_dir_seq) != seq)) {
        hlist_bl_unlock(b);
rcu_read_unlock();

goto retry;

dentry->d_name.hash_len = target->d_name.hash_len;

if (old_name && likely(atomic_dec_and_test(&old_name->u.count)))
    kfree_rcu(old_name, u.head);
+call_rcu(&old_name->u.head, __d_free_external_name);

static void dentry_lock_for_move(struct dentry *dentry, struct dentry *target)

/* unhash both */
-__d_drop does write_seqcount_barrier, but they're OK to nest. */
-__d_drop(dentry);
-__d_drop(target);
+___d_drop does write_seqcount_barrier, but they're OK to nest. */
+___d_drop(dentry);
+___d_drop(target);

/* Switch the names.. */

if (exchange)
    __d_rehash(dentry);
else
    target->d_hash.pprev = NULL;

/* ... and switch them in the tree */

if (IS_ROOT(dentry)) {

    write_sequnlock(&rename_lock);
}

EXPORT_SYMBOL_GPL(d_exchange);

/**
* d_ancestor - search for an ancestor
--- linux-4.15.0.orig/fs/debugfs/file.c
+++ linux-4.15.0/fs/debugfs/file.c
@@ -142,6 +142,10 @@
real_fops = NULL;
 int r;

 +if (kernel_is_locked_down("debugfs"))
return -EPERM;
+
+
r = debugfs_file_get(dentry);
if (r)
return r == -EIO ? -ENOENT : r;
@@ -267,6 +271,9 @@
struct file_operations *proxy_fops = NULL;
int r;

@if (kernel_is_locked_down("debugfs"))
+return -EPERM;
+
+r = debugfs_file_get(dentry);
if (r)
return r == -EIO ? -ENOENT : r;
--- linux-4.15.0.orig/fs/debugfs/inode.c
+++ linux-4.15.0/fs/debugfs/inode.c
@@ -163,19 +163,24 @@
return 0;
}

-static void debugfs_evict_inode(struct inode *inode)
+static void debugfs_i_callback(struct rcu_head *head)
{
-truncate_inode_pages_final(&inode->i_data);
-clear_inode(inode);
+struct inode *inode = container_of(head, struct inode, i_rcu);
if (S_ISLNK(inode->i_mode))
kfree(inode->i_link);
+free_inode_nonrcu(inode);
+}
+
+static void debugfs_destroy_inode(struct inode *inode)
+{
+call_rcu(&inode->i_rcu, debugfs_i_callback);
+
static const struct super_operations debugfs_super_operations = {
.statfs= simple_statfs,
.remount_fs= debugfs_remount,
.show_options= debugfs_show_options,
.evict_inode= debugfs_evict_inode,
+.destroy_inode= debugfs_destroy_inode,
};

static void debugfs_release_dentry(struct dentry *dentry)
@@ -790,6 +795,13 @@
struct dentry *dentry = NULL, *trap;
struct name_snapshot old_name;

+if (IS_ERR(old_dir))
 +return old_dir;
+if (IS_ERR(new_dir))
 +return new_dir;
+if (IS_ERR_OR_NULL(old_dentry))
 +return old_dentry;
+
+trap = lock_rename(new_dir, old_dir);

/* Source or destination directories don't exist? */
if (d_really_is_negative(old_dir) || d_really_is_negative(new_dir))
 --- linux-4.15.0.orig/fs/devpts/inode.c
+++ linux-4.15.0/fs/devpts/inode.c
@@ -138,10 +138,6 @@
struct super_block *sb;
int err;

-/* Has the devpts filesystem already been found? */
-if (path->mnt->mnt_sb->s_magic == DEVPTS_SUPER_MAGIC)
- return 0;
-
-/* Is a devpts filesystem at "pts" in the same directory? */
-err = path_pts(path);
-if (err)
- @@ -156,25 +152,53 @@
return 0;
}
struct vfsmount *devpts_mntget(struct file *filp, struct pts_fs_info *fsi)
{
    struct path path;
    int err;
    +int err = 0;

    path = filp->f_path;
    path_get(&path);

    -err = devpts_ptmx_path(&path);
    +/* Walk upward while the start point is a bind mount of
    + * a single file.
    + */
    +while (path.mnt->mnt_root == path.dentry)
    +if (follow_up(&path) == 0)
    +break;
    +
    +/* devpts_ptmx_path() finds a devpts fs or returns an error. */
    +if ((path.mnt->mnt_sb->s_magic != DEVPTS_SUPER_MAGIC) ||
    + (DEVPTS_SB(path.mnt->mnt_sb) != fsi))
    +err = devpts_ptmx_path(&path);
    dput(path.dentry);
    -if (err) {
        -mntput(path.mnt);
        -path.mnt = ERR_PTR(err);
    -}
    -if (DEVPTS_SB(path.mnt->mnt_sb) != fsi) {
        -mntput(path.mnt);
        -path.mnt = ERR_PTR(-ENODEV);
    -}
    +return path.mnt;
    +
    +err = -ENODEV;
    }
    -return path.mnt;
    +
    +mntput(path.mnt);
    +return ERR_PTR(err);
    }

struct pts_fs_info *devpts_acquire(struct file *filp)
@@ -182,15 +206,19 @@
    struct pts_fs_info *result;
    struct path path;
    struct super_block *sb;
    -int err;
path = filp->f_path;
path_get(&path);

-err = devpts_ptmx_path(&path);
-if (err) {
-result = ERR_PTR(err);
-goto out;
+# Has the devpts filesystem already been found? */
+if (path.mnt->mnt_sb->s_magic != DEVPTS_SUPER_MAGIC) {
+int err;
+  err = devpts_ptmx_path(&path);
+if (err) {
+result = ERR_PTR(err);
+goto out;
+} }

/*
@@ -429,6 +457,7 @@
s->s_blocksize_bits = 10;
s->s_magic = DEVPTS_SUPER_MAGIC;
s->s_op = &devpts_sops;
+s->s_d_op = &simple_dentry_operations;
s->s_time_gran = 1;

error = -ENOMEM;
--- linux-4.15.0.orig/fs/direct-io.c
+++ linux-4.15.0/fs/direct-io.c
@@ -219,6 +219,27 @@
return dio->pages[sdio->head];
}

+/*
+ * Warn about a page cache invalidation failure during a direct io write.
+ */
+void dio_warn_stale_pagecache(struct file *filp)
+{ 
+static DEFINE_RATELIMIT_STATE(_rs, 86400 * HZ, DEFAULT_RATELIMIT_BURST);
+char pathname[128];
+struct inode *inode = file_inode(filp);
+char *path;
+  errseq_set(&inode->i_mapping->wb_err, -EIO);
+if (__ratelimit(&_rs)) {
+  path = file_path(filp, pathname, sizeof(pathname));
+if (IS_ERR(path))
+  path = "(unknown)";
pr_crit("Page cache invalidation failure on direct I/O. Possible data corruption due to collision with buffered I/O!");

pr_crit("File: %s PID: %d Comm: %.20s\n", path, current->pid, current->comm);
+

/**
 * dio_complete() - called when all DIO BIO I/O has been completed
 * @offset: the byte offset in the file of the completed operation
 err = invalidate_inode_pages2_range(dio->inode->i_mapping, offset >> PAGE_SHIFT, (offset + ret - 1) >> PAGE_SHIFT);
 WARN_ON_ONCE(err);
 +if (err)
 +dio_warn_stale_pagecache(dio->iocb->ki_filp);
 }

if (!(dio->flags & DIO_SKIP_DIO_COUNT))
+loff_t i_size;
+/*
 dio->iocb->ki_pos += transferred;

-if (dio->op == REQ_OP_WRITE)
-ret = generic_write_sync(dio->iocb, transferred);
+if (ret > 0 && dio->op == REQ_OP_WRITE)
 +ret = generic_write_sync(dio->iocb, ret);
 dio->iocb->ki_complete(dio->iocb, ret, 0);
 }

unsigned long fs_count;/* Number of filesystem-sized blocks */
int create;
unsigned int i_blkbits = sdio->blkbits + sdio->blkfactor;
+loff_t i_size;

/*
 * If there was a memory error and we've overwritten all the
 create = dio->op == REQ_OP_WRITE;
 if (dio->flags & DIO_SKIP_HOLES) {
 -if (fs_startblk <= ((i_size_read(dio->inode) - 1) >> -i_blkbits))
 +i_size = i_size_read(dio->inode);
 +if (i_size && fs_startblk <= (i_size - 1) >> i_blkbits)
 create = 0;
int boundary = sdio->boundary;/* dio_send_cur_page may clear it */

if (dio->op == REQ_OP_WRITE) {

/*
@@ -872,10 +896,10 @@

sdio->cur_page_fs_offset = sdio->block_in_file << sdio->blkbits;
out:
*/
- * If sdio->boundary then we want to schedule the IO now to
+ * If boundary then we want to schedule the IO now to
 * avoid metadata seeks.
 */
-if (sdio->boundary) {
+if (boundary) {
ret = dio_send_cur_page(dio, sdio, map_bh);
if (sdio->bio)
  dio_bio_submit(dio, sdio);
@@ -1252,8 +1276,7 @@
/*
if (dio->is_async && iov_iter_rw(iter) == WRITE) {
  retval = 0;
-if (((iocb->ki_filp->f_flags & O_DSYNC) ||
- IS_SYNC(iocb->ki_filp->f_mapping->host))
+if (iocb->ki_flags & IOCB_DSYNC)
  retval = dio_set_defer_completion(dio);
else if (!dio->inode->i_sb->s_dio_done_wq) {
/*
- * If sdio->boundary then we want to schedule the IO now to
+ * If boundary then we want to schedule the IO now to
 * avoid metadata seeks.
 */
-dlm_callback_resume(struct dlm_ls *ls)
+void dlm_callback_resume(struct dlm_ls *ls)
{
  struct dlm_lkb *lkb, *safe;
  if (!ls->ls_callback_wq) return;
mutex_lock(&ls->ls_cb_mutex);
list_for_each_entry_safe(lkb, safe, &ls->ls_cb_delay, lkb_cb_list) {
    list_del_init(&lkb->lkb_cb_list);
    queue_work(ls->ls_callback_wq, &lkb->lkb_cb_work);
    count++;
    if (count == MAX_CB_QUEUE) 
        break;
}
mutex_unlock(&ls->ls_cb_mutex);

if (count)
    log_rinfo(ls,"dlm_callback_resume %d", count);
if (count == MAX_CB_QUEUE) {
    count = 0;
    cond_resched();
    goto more;
}

--- linux-4.15.0.orig/fs/dlm/config.c
+++ linux-4.15.0/fs/dlm/config.c
@@ -80,6 +80,9 @@
    unsigned int cl_new_rsb_count;
    unsigned int cl_recover_callbacks;
    char cl_cluster_name[DLM_LOCKSPACE_LEN];
+    struct dlm_spaces *sps;
+    struct dlm_comms *cms;
};

static struct dlm_cluster *config_item_to_cluster(struct config_item *i)
@@ -218,6 +221,7 @@
    struct list_head members;
    struct mutex members_lock;
    int members_count;
+    struct dlm_nodes *nds;
};

struct dlm_comms {
    @ @ -355,6 +359,9 @ @
    if (!cl || !sps || !cms)
        goto fail;
    +cl->sps = sps;
    +cl->cms = cms;
    +
    config_group_init_type_name(&cl->group, name, &cluster_type);
config_group_init_type_name(&sps->ss_group, "spaces", &spaces_type);
config_group_init_type_name(&cms->cs_group, "comms", &comms_type);
static void release_cluster(struct config_item *i)
{
    struct dlm_cluster *cl = config_item_to_cluster(i);
    +
    +kfree(cl->sps);
    +kfree(cl->cms);
    kfree(cl);
}

static void release_space(struct config_item *i)
{
    struct dlm_space *sp = config_item_to_space(i);
    +kfree(sp->nds);
    kfree(sp);
}

if (bucket >= ls->ls_rsbtbl_size) {
    kfree(ri);
    +++"pos;
    return NULL;
}
if (rv < 0) {
    log_error(ls, "create_lkb idr error %d", rv);
    dlm_free_lkb(lkb);
    return rv;
}

(unsigned long long)lkb->lkb_recover_seq,
    ms->m_header.h_nodeid, ms->m_lkid);
error = -ENOENT;
    dlm_put_lkb(lkb);
    goto fail;
}

lkb->lkb_id, lkb->lkb_remid,
    ms->m_header.h_nodeid, ms->m_lkid);
error = -ENOENT;
    dlm_put_lkb(lkb);
    goto fail;
}

goto out;
}

/* After ua is attached to lkb it will be freed by dlm_free_lkb().
 - When DLM_IFL_USER is set, the dlm knows that this is a userspace
 - lock and that lkb_astparam is the dlm_user_args structure. */
-
error = set_lock_args(mode, &ua->lksb, flags, namelen, timeout_cs,
    fake_astfn, ua, fake_bastfn, &args);
-lkb->lkb_flags |= DLM_IFL_USER;
-
    if (error) {
        kfree(ua->lksb.sb_lvbptr);
        ua->lksb.sb_lvbptr = NULL;
        kfree(ua);
        __put_lkb(ls, lkb);
        goto out;
    }

    */ After ua is attached to lkb it will be freed by dlm_free_lkb().


+ When DLM_IFL_USER is set, the dlm knows that this is a userspace lock and that lkb_astparam is the dlm_user_args structure. */
+lkb->lkb_flags |= DLM_IFL_USER;
error = request_lock(ls, lkb, name, namelen, &args);

switch (error) {
    --- linux-4.15.0.orig/fs/dlm/lockspace.c
    +++ linux-4.15.0/fs/dlm/lockspace.c
    @@ -633,6 +633,9 @@
        wait_event(ls->ls_recover_lock_wait,
            test_bit(LSFL_RECOVER_LOCK, &ls->ls_flags));

        /* let kobject handle freeing of ls if there's an error */
        +do_unreg = 1;
        +ls->ls_kobj.kset = dlm_kset;
        error = kobject_init_and_add(&ls->ls_kobj, &dlm_ktype, NULL,
            "%s", ls->ls_name);
        @@ -640,9 +643,6 @@
            goto out_recoverd;
            kobject_uevent(&ls->ls_kobj, KOBJ_ADD);

        -/* let kobject handle freeing of ls if there's an error */
        -do_unreg = 1;
        -
        /* This uevent triggers dlm_controld in userspace to add us to the group of nodes that are members of this lockspace (managed by the cluster infrastructure.) Once it's done that, it tells us who the
        @@ -680,11 +680,11 @@
            kfree(ls->ls_recover_buf);
            out_lkbldr:
            idr_destroy(&ls->ls_lkbldr);
            + out_rsbtbl:
            for (i = 0; i < DLM_REMOVE_NAMES_MAX; i++) {
                if (ls->ls_remove_names[i])
                    kfree(ls->ls_remove_names[i]);
            }
            - out_rsbtbl:
            vfree(ls->ls_rsbtbl);
            out_lsfree:
            if (do_unreg)
                @@ -807,6 +807,7 @@
                    dlm_delete_debug_file(ls);

                    +idr_destroy(&ls->ls_recover_idr);
                    kfree(ls->ls_recover_buf);

---
/*
--- linux-4.15.0.orig/fs/dlm/lowcomms.c
+++ linux-4.15.0/fs/dlm/lowcomms.c
@@ -610,7 +610,7 @@
} if (con->othercon && and_other) {
 /* Will only re-enter once. */
 -close_connection(con->othercon, false, true, true);
 +close_connection(con->othercon, false, tx, rx);
 } if (con->rx_page) {
 __free_page(con->rx_page);
 @@ -1619,8 +1619,10 @@
 static void work_stop(void)
 {
 -destroy_workqueue(recv_workqueue);
 -destroy_workqueue(send_workqueue);
 +if (recv_workqueue)
 +destroy_workqueue(recv_workqueue);
 +if (send_workqueue)
 +destroy_workqueue(send_workqueue);
 }

 static int work_start(void)
 @@ -1680,13 +1682,17 @@
 struct hlist_node *n;
 struct connection *con;

 -flush_workqueue(recv_workqueue);
 -flush_workqueue(send_workqueue);
 +if (recv_workqueue)
 +flush_workqueue(recv_workqueue);
 +if (send_workqueue)
 +flush_workqueue(send_workqueue);
 do {
   ok = 1;
   foreach_conn(stop_conn);
 -flush_workqueue(recv_workqueue);
 -flush_workqueue(send_workqueue);
 +if (recv_workqueue)
 +flush_workqueue(recv_workqueue);
 +if (send_workqueue)
 +flush_workqueue(send_workqueue);
 for (i = 0; i < CONN_HASH_SIZE && &ok; i++) {
   hlist_for_each_entry_safe(con, n,
   &connection_hash[i], list) {
 --- linux-4.15.0.orig/fs/dlm/member.c
+++ linux-4.15.0/fs/dlm/member.c
@@ -671,7 +671,7 @@
 int dlm_ls_start(struct dlm_ls *ls)
 {
     struct dlm_recover *rv, *rv_old;
-    struct dlm_config_node *nodes;
+    struct dlm_config_node *nodes = NULL;
     int error, count;

     rv = kzalloc(sizeof(*rv), GFP_NOFS);
@@ -680,7 +680,7 @@
     error = dlm_config_nodes(ls->ls_name, &nodes, &count);
 if (error < 0)
-    goto fail;
+    goto fail_rv;
     spin_lock(&ls->ls_recover_lock);
@@ -712,8 +712,9 @@
     return 0;

     fail:
-    kfree(rv);
     kfree(nodes);
+    fail_rv:
+    kfree(rv);
     return error;
 }

--- linux-4.15.0.orig/fs/dlm/memory.c
+++ linux-4.15.0/fs/dlm/memory.c
@@ -38,10 +38,8 @@
 void dlm_memory_exit(void)
 {
     if (lkb_cache)
-    kmem_cache_destroy(lkb_cache);
-    if (rsb_cache)
-        kmem_cache_destroy(rsb_cache);
+    kmem_cache_destroy(lkb_cache);
+    kmem_cache_destroy(rsb_cache);
 }

 char *dlm_allocate_lvb(struct dlm_ls *ls)
@@ -86,8 +84,7 @@
 struct dlm_user_args *ua;
     ua = lkb->lkb_ua;
if (ua) {
  if (ua->lksb.sb_lvbptr)
    kfree(ua->lksb.sb_lvbptr);
  kfree(ua);
}

--- linux-4.15.0.orig/fs/dlm/user.c
+++ linux-4.15.0/fs/dlm/user.c
@@ -25,6 +25,7 @@
    #include "lvb_table.h"
    #include "user.h"
    #include "ast.h"
    +#include "config.h"

 static const char name_prefix[] = "dlm";
 static const struct file_operations device_fops;
 @@ -404,7 +405,7 @@
 if (!capable(CAP_SYS_ADMIN))
  return -EPERM;

-error = dlm_new_lockspace(params->name, NULL, params->flags, 
+error = dlm_new_lockspace(params->name, dlm_config.ci_cluster_name, params->flags, 
    DLM_USER_LVB_LEN, NULL, NULL, NULL, 
    &lockspace);
 if (error)
@@ -702,7 +703,7 @@
result.version[0] = DLM_DEVICE_VERSION_MAJOR;
 result.version[1] = DLM_DEVICE_VERSION_MINOR;
 result.version[2] = DLM_DEVICE_VERSION_PATCH;
-memcpy(&result.lksb, &ua->lksb, sizeof(struct dlm_lksb));
+memcpy(&result.lksb, &ua->lksb, offsetof(struct dlm_lksb, sb_lvbptr));
 result.user_lksb = ua->user_lksb;

 /* FIXME: dlm1 provides for the user's bastparam/addr to not be updated
--- linux-4.15.0.orig/fs/drop_caches.c
+++ linux-4.15.0/fs/drop_caches.c
@@ -21,8 +21,13 @@
 spin_lock(&sb->s_inode_list_lock);
 list_for_each_entry(inode, &sb->s_inodes, i_sb_list) {
    spin_lock(&inode->i_lock);
+    /*
+     * We must skip inodes in unusual state. We may also skip
+     * inodes without pages but we deliberately won't in case
+     * we need to reschedule to avoid softlockups.
+     */
+    if ((inode->i_state & (I_FREEING|I_WILL_FREE|I_NEW)) ||
-           (inode->i_mapping->nrpages == 0)) {
+           (inode->i_mapping->nrpages == 0)) {
+ (inode->i_mapping->nrpages == 0 && !need_resched()) {
    spin_unlock(&inode->i_lock);
    continue;
}
@@ -34,6 +39,7 @@
iput(toput_inode);
toput_inode = inode;

+cond_resched();
spin_lock(&sb->s_inode_list_lock);
}
spin_unlock(&sb->s_inode_list_lock);
--- linux-4.15.0.orig/fs/ecryptfs/crypto.c
+++ linux-4.15.0/fs/ecryptfs/crypto.c
@@ -1018,8 +1018,10 @@
    if (rc < 0)
        return rc;
    else if (rc < ECRYPTFS_SIZE_AND_MARKER_BYTES)
+        return -EINVAL;
        rc = ecryptfs_validate_marker(marker);
        if (!rc)
            ecryptfs_i_size_init(file_size, inode);
@@ -1381,8 +1383,10 @@
            if (!rc)
                ecryptfs_i_size_init(file_size, inode);
@@ -1997,6 +2001,16 @@
 return rc;
+
static bool is_dot_dotdot(const char *name, size_t name_size)
+{
+    if (name_size == 1 && name[0] == '.')
+        return true;

if (name_size == 2 && name[0] == '.' && name[1] == '.')
+return true;
+
+return false;
+
+
/*
 * ecryptfs_decode_and_decrypt_filename - converts the encoded cipher text name to decoded plaintext
 * @plaintext_name: The plaintext name
@@ -2021,13 +2035,21 @@
 size_t packet_size;
 int rc = 0;

-if ((mount_crypt_stat->flags & ECRYPTFS_GLOBAL_ENCRYPT_FILENAMES)
-    &
-    !(mount_crypt_stat->flags & ECRYPTFS_ENCRYPTED_VIEW_ENABLED)
-    &
-    (name_size > ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX_SIZE)
-    &
-    (strncmp(name, ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX,
-            ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX_SIZE) == 0)) {
-    const char *orig_name = name;
-    size_t orig_name_size = name_size;
+if ((mount_crypt_stat->flags & ECRYPTFS_GLOBAL_ENCRYPT_FILENAMES) &&
+    !(mount_crypt_stat->flags & ECRYPTFS_ENCRYPTED_VIEW_ENABLED)) {
+    if (is_dot_dotdot(name, name_size)) {
+        rc = ecryptfs_copy_filename(plaintext_name,
+            plaintext_name_size,
+            name, name_size);
+        goto out;
+    }
+
+    if (name_size <= ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX_SIZE ||
+        strncmp(name, ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX,
+                ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX_SIZE)) {
+        rc = -EINVAL;
+        goto out;
+    }

name += ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX_SIZE;
name_size -= ECRYPTFS_FNEK_ENCRYPTED_FILENAME_PREFIX_SIZE;

if (rc) {
    printk(KERN_INFO "Could not parse tag 70 packet 
" - "from filename; copying through filename 
" "as-is\n", __func__);
    -rc = ecryptfs_copy_filename(plaintext_name,
        plaintext_name_size,
        orig_name, orig_name_size);
encryptfs_printk(KERN_DEBUG, "+"%s: Could not parse tag 70 packet from filename\n", +__func__); 
goto out_free;
}
} else {
--- linux-4.15.0.orig/fs/ecryptfs/file.c
+++ linux-4.15.0/fs/ecryptfs/file.c
@@ -82,17 +82,28 @@
buf->sb, lower_name,
lower_namelen);
if (rc) {
-printf(KERN_ERR "%s: Error attempting to decode and decrypt " 
- "filename [\%s]\; rc = [\%d]\n", __func__, lower_name, 
- rc);
-goto out;
+if (rc != -EINVAL) {
+encryptfs_printk(KERN_DEBUG, 
+"%s: Error attempting to decode and decrypt filename [\%s]\; rc = [\%d]\n", 
+__func__, lower_name, rc);
+return rc;
+
+/* Mask -EINVAL errors as these are most likely due a plaintext 
+* filename present in the lower filesystem despite filename 
+* encryption being enabled. One unavoidable example would be 
+* the "lost+found" dentry in the root directory of an Ext4 
+* filesystem.
+*/
+return 0;
}
+
+buf->caller->pos = buf->ctx.pos;
+rc = !dir_emit(buf->caller, name, name_size, ino, d_type);
kfree(name);
if (!rc)
buf->entries_written++;
-out:
+
return rc;
}

--- linux-4.15.0.orig/fs/ecryptfs/inode.c
+++ linux-4.15.0/fs/ecryptfs/inode.c
@@ -283,8 +283,7 @@
iget_failed(ecryptfs_inode);
goto out;
}

unlock_new_inode(ecryptfs_inode);
-d Instantiate(ecryptfs_dentry, ecryptfs_inode);
+d Instantiate_new(ecryptfs_dentry, ecryptfs_inode);
out:
return rc;
}
@@ -326,9 +325,9 @@ static struct dentry *ecryptfs_lookup_interpose(struct dentry *dentry,
     struct dentry *lower_dentry)
 {
-struct inode *inode, *lower_inode = d_inode(lower_dentry);
+struct path *path = ecryptfs_dentry_to_lower_path(dentry->d_parent);
+struct inode *inode, *lower_inode;
 struct ecryptfs_dentry_info *dentry_info;
-struct vfsmount *lower_mnt;
 int rc = 0;

dentry_info = kmem_cache_alloc(ecryptfs_dentry_info_cache, GFP_KERNEL);
@@ -337,16 +336,23 @@ return ERR_PTR(-ENOMEM);
 }
-
-lower_mnt = mntget(ecryptfs_dentry_to_lower_mnt(dentry->d_parent));
 fsstack_copy_attr_atime(d_inode(dentry->d_parent),
-    d_inode(lower_dentry->d_parent));
+d_inode(path->dentry));
 BUG_ON(!d_count(lower_dentry));

ecryptfs_set_dentry_private(dentry, dentry_info);
-dentry_info->lower_path.mnt = lower_mnt;
+dentry_info->lower_path.mnt = mntget(path->mnt);
 dentry_info->lower_path.dentry = lower_dentry;

-if (d_really_is_negative(lower_dentry)) {
+/*
+ * negative dentry can go positive under us here - its parent is not
+ * locked. That's OK and that could happen just as we return from
+ * ecryptfs_lookup() anyway. Just need to be careful and fetch
+ * ->d_inode only once - it's not stable here.
+ */
+lower_inode = READ_ONCE(lower_dentry->d_inode);
 +
+if (!lower_inode) {
 /* We want to add because we couldn't find in lower */
 d_add(dentry, NULL);
 return NULL;
--- linux-4.15.0.orig/fs/ecryptfs/keystore.c
+++ linux-4.15.0/fs/ecryptfs/keystore.c
printk(KERN_WARNING "Tag 1 packet contains key larger than ECRYPTFS_MAX_ENCRYPTED_KEY_BYTES\n");  
rc = -EINVAL;  
-goto out;  
+goto out_free;  
}  
memcpy(&(*new_auth_tok)->session_key.encrypted_key, &data[(*packet_size)], (body_size - (ECRYPTFS_SIG_SIZE + 2)));  

+if (!dev_name) {  
+rc = -EINVAL;  
+err = "Device name cannot be null";  
+goto out;  
+}  
+  
+rc = ecryptfs_parse_options(sbi, raw_data, &check_ruid);  
+if (rc) {  
+err = "Error parsing options";  
+goto out;  
+}  
+  
+ecryptfs_message_buf_len,  
+GFP_KERNEL);  
+if (!ecryptfs_msg_ctx_arr) {  
+kfree(ecryptfs_daemon_hash);  
+rc = -ENOMEM;  
+goto out;  
+}  
+  
+--- linux-4.15.0.orig/fs/ecryptfs/main.c  
+++ linux-4.15.0/fs/ecryptfs/main.c  
+@ @ -506,6 +506,12 @@  
goto out;  
}  
+  
+ecryptfs_message_buf_len,  
+GFP_KERNEL);  
+if (!ecryptfs_msg_ctx_arr) {  
+kfree(ecryptfs_daemon_hash);  
+rc = -ENOMEM;  
+goto out;  
+}  
+  
+--- linux-4.15.0.orig/fs/ecryptfs/messaging.c  
+++ linux-4.15.0/fs/ecryptfs/messaging.c  
+@ @ -392,6 +392,7 @@  
+* ecryptfs_message_buf_len),  
+  
+--- linux-4.15.0.orig/fs/efivarfs/inode.c  
+++ linux-4.15.0/fs/efivarfs/inode.c  
+@ @ -104,6 +105,7 @@  
+      
+var->var.VariableName[i] = '\0';  
+      
+inode->i_private = var;
+kmemleak_ignore(var);

err = efivar_entry_add(var, &efivarfs_list);
if (err)
--- linux-4.15.0.orig/fs/efivarfs/super.c
+++ linux-4.15.0/fs/efivarfs/super.c
@@ -145,6 +145,9 @@
    name[len + EFI_VARIABLE_GUID_LEN+1] = '\0';

    /* replace invalid slashes like kobject_set_name_vargs does for /sys/firmware/efi/vars. */
+    strreplace(name, '/', '!');
+
inode = efivarfs_get_inode(sb, d_inode(root), S_IFREG | 0644, 0,
    is_removable);
if (!inode)
--- linux-4.15.0.orig/fs/eventfd.c
+++ linux-4.15.0/fs/eventfd.c
@@ -22,6 +22,8 @@

 #include <linux/proc_fs.h>
 #include <linux/seq_file.h>

+DEFINE_PER_CPU(int, eventfd_wake_count);
+
 struct eventfd_ctx {
     struct kref kref;
     wait_queue_head_t wqh;
@@ -55,12 +57,25 @@
 {
     unsigned long flags;
+
     /* Deadlock or stack overflow issues can happen if we recurse here
     + through waitqueue wakeup handlers. If the caller users potentially
     + nested waitqueues with custom wakeup handlers, then it should
     + check eventfd_signal_count() before calling this function. If
     + it returns true, the eventfd_signal() call should be deferred to a
     + safe context.
     + */
+    if (WARN_ON_ONCE(this_cpu_read(eventfd_wake_count)))
+        return 0;
+
     spin_lock_irqsave(&ctx->wqh.lock, flags);
     +this_cpu_inc(eventfd_wake_count);
     if (ULLONG_MAX - ctx->count < n)
         n = ULLONG_MAX - ctx->count;
     ctx->count += n;
     if (waitqueue_active(&ctx->wqh))
Wake up locked poll(ctx->wqh, POLLIN);
+this_cpu_dec(eventfd_wake_count);
spin_unlock_irqrestore(&ctx->wqh.lock, flags);

return n;
--- linux-4.15.0.orig/fs/eventpoll.c
+++ linux-4.15.0/fs/eventpoll.c
@@ -223,8 +223,7 @@
 struct file *file;
 /* used to optimize loop detection check */
 -int visited;
-struct list_head visited_list_link;
+u64 gen;

 ifdef CONFIG_NET_RX_BUSY_POLL
 /* used to track busy poll napi_id */
@@ -273,6 +272,8 @@
 */
 static DEFINE_MUTEX(epmutex);
+static u64 loop_check_gen = 0;
+
 /* Used to check for epoll file descriptor inclusion loops */
 static struct nested_calls poll_loop_ncalls;

 @@ -1147,7 +1145,7 @@
 * semantics). All the events that happen during that period of time are
 * chained in ep->ovflist and requeued later on.
 */
-/* Visited nodes during ep_loop_check(), so we can unset them when we finish */
-/* static LIST_HEAD(visited_list); */
-/*
 * List of files with newly added links, where we may need to limit the number
 * of emanating paths. Protected by the epmutex.
 @@ -1147,7 +1145,7 @@
 * semantics). All the events that happen during that period of time are
 * chained in ep->ovflist and requeued later on.
 */
-if (unlikely(ep->ovflist != EP_UNACTIVE_PTR)) {
+if (ep->ovflist != EP_UNACTIVE_PTR) {
 if (epi->next == EP_UNACTIVE_PTR) {
 epi->next = ep->ovflist;
 ep->ovflist = epi;
@@ -1371,7 +1369,7 @@

 static int ep_create_wakeup_source(struct epitem *epi)
const char *name;
+struct name_snapshot n;
struct wakeup_source *ws;

if (!epi->ep->ws) {
@@ -1380,8 +1378,9 @@
    return -ENOMEM;
}
-name = epi->ffd.file->f_path.dentry->d_name.name;
-ws = wakeup_source_register(name);
+take_dentry_name_snapshot(&n, epi->ffd.file->f_path.dentry);
+ws = wakeup_source_register(n.name);
+release_dentry_name_snapshot(&n);

if (!ws)
    return -ENOMEM;
@@ -1441,6 +1440,22 @@
    RCU_INIT_POINTER(epi->ws, NULL);
}

+/* Add the current item to the list of active epoll hook for this file */
+spin_lock(&tfile->f_lock);
+list_add_tail_rcu(&epi->fllink, &tfile->f_ep_links);
+spin_unlock(&tfile->f_lock);
+
+/* Add the current item to the RB tree. All RB tree operations are
+ * protected by "mtx", and ep_insert() is called with "mtx" held.
+ */
+ep_rbtree_insert(ep, epi);
+
+/* now check if we've created too many backpaths */
+error = -EINVAL;
+if (full_check && reverse_path_check())
    goto error_remove_epi;
+
    /* Initialize the poll table using the queue callback */
    epq.epi = epi;
    init_poll_funcptr(&epq.pt, ep_ptable_queue_proc);
    if (epi->nwait < 0)
        goto error_unregister;

-/* Add the current item to the list of active epoll hook for this file */
-spin_lock(&tfile->f_lock);
-list_add_tail_rcu(&epi->fllink, &tfile->f_ep_links);
- spin_unlock(&tfile->f_lock);
-
-/*
- * Add the current item to the RB tree. All RB tree operations are
- * protected by "mtx", and ep_insert() is called with "mtx" held.
- */
-ep_rbtree_insert(ep, epi);
-
-/* now check if we've created too many backpaths */
-error = -EINVAL;
-if (full_check && reverse_path_check())
goto error_remove_epi;
-
/* We have to drop the new item inside our item list to keep track of it */
spin_lock_irqsave(&ep->lock, flags);

@@ -1507,6 +1506,8 @@
return 0;
+
+error_unregister:
+ep_unregister_pollwait(ep, epi);
error_remove_epi:
spin_lock(&tfile->f_lock);
list_del_rcu(&epi->fllink);
@@ -1514,9 +1515,6 @@
rb_erase_cached(&epi->rbn, &ep->rbr);

-error_unregister:
-ep_unregister_pollwait(ep, epi);
-
/*
 * We need to do this because an event could have been arrived on some
 * allocated wait queue. Note that we don't care about the ep->ovflist
@@ -1858,13 +1856,12 @@
struct epitem *epi;

mutex_lock_nested(&ep->mtx, call_nests + 1);
-ep->visited = 1;
-list_add(&ep->visited_list_link, &visited_list);
+ep->gen = loop_check_gen;
for (rbp = rb_first_cached(&ep->rbr); rbp; rbp = rb_next(rbp)) {
  epi = rb_entry(rbp, struct epitem, rbn);
  if (unlikely(is_file_epoll(epi->ffd.file))) {
    ep_tovisit = epi->ffd.file->private_data;
    if (ep_tovisit->visited)
      if (ep_tovisit->gen == loop_check_gen)
continue;
error = ep_call_nested(&poll_loop_ncalls, EP_MAX_NESTS,
ep_loop_check_proc, epi->ffd.file,
@@ -1880,9 +1877,11 @@
* not already there, and calling reverse_path_check()
* during ep_insert().
 */
-if (list_empty(&epi->ffd.file->f_tfile_llink))
-list_add(&epi->ffd.file->f_tfile_llink,
- &tfile_check_list);
+if (list_empty(&epi->ffd.file->f_tfile_llink)) {
+if (get_file_rcu(epi->ffd.file))
+list_add(&epi->ffd.file->f_tfile_llink,
+ &tfile_check_list);
+}
}
mutex_unlock(&ep->mtx);
@@ -1903,18 +1902,8 @@
*/
static int ep_loop_check(struct eventpoll *ep, struct file *file)
{
-int ret;
-struct eventpoll *ep_cur, *ep_next;
-
-ret = ep_call_nested(&poll_loop_ncalls, EP_MAX_NESTS,
+return ep_call_nested(&poll_loop_ncalls, EP_MAX_NESTS,
   ep_loop_check_proc, file, ep, current);
-/* clear visited list */
-list_for_each_entry_safe(ep_cur, ep_next, &visited_list,
-visited_list_link) {
-ep_cur->visited = 0;
-list_del(&ep_cur->visited_list_link);
-}
-return ret;
}

static void clear_tfile_check_list(void)
@@ -1926,6 +1915,7 @@
file = list_first_entry(&tfile_check_list, struct file,
 f_tfile_llink);
list_del_init(&file->f_tfile_llink);
+file_destroy(&file);
}
INIT_LIST_HEAD(&tfile_check_list);
}
@@ -2070,19 +2060,20 @@
mutex_lock_nested(&ep->mtx, 0);
if (op == EPOLL_CTL_ADD) {
    if (list_empty(&f.file->f_ep_links) ||
        ep->gen == loop_check_gen ||
        is_file_epoll(tf.file)) {
        full_check = 1;
        mutex_unlock(&ep->mtx);
        mutex_lock(&epmutex);
        if (is_file_epoll(tf.file)) {
            error = -ELOOP;
            -if (ep_loop_check(ep, tf.file) != 0) {
                clear_tfile_check_list();
                +if (ep_loop_check(ep, tf.file) != 0)
                    goto error_tgt_fput;
            -}
            -} else
            +} else {
                +get_file(tf.file);
                list_add(&tf.file->f_tfile_llink,
                         &tfile_check_list);
                +}
        mutex_lock_nested(&ep->mtx, 0);
        if (is_file_epoll(tf.file)) {
            tep = tf.file->private_data;
            @@ -2106,8 +2097,6 @@
            error = ep_insert(ep, &epds, tf.file, fd, full_check);
        } else
            error = -EEXIST;
        -if (full_check)
        -clear_tfile_check_list();
        break;
    case EPOLL_CTL_DEL:
        if (epi)
            @@ -2130,8 +2119,11 @@
            mutex_unlock(&ep->mtx);
            error_tgt_fput:
            -if (full_check)
            +if (full_check) {
                +clear_tfile_check_list();
                +loop_check_gen++;
                mutex_unlock(&epmutex);
            +}

        fdput(tf);
        error_fput:
        --- linux-4.15.0.orig/fs/exec.c
        +++ linux-4.15.0/fs/exec.c
        @@ -63,6 +63,8 @@

#include <linux/compat.h>
#include <linux/vmalloc.h>

+#include <trace/events/fs.h>
+
#include <linux/uaccess.h>
#include <asm/mmu_context.h>
#include <asm/tlb.h>

@@ -109,6 +111,14 @@
 return (path->mnt->mnt_flags & MNT_NOEXEC) ||
         (path->mnt->mnt_sb->s_iflags & SB_I_NOEXEC);
 }
+EXPORT_SYMBOL_GPL(path_noexec);
+
+bool path_nosuid(const struct path *path)
+{
+    return !mnt_may_suid(path->mnt) ||
+          (path->mnt->mnt_sb->s_iflags & SB_I_NOSUID);
+}
+EXPORT_SYMBOL(path_nosuid);

#ifdef CONFIG_USELIB
/*
@@ -290,7 +300,7 @@
 struct vm_area_struct *vma = NULL;
 struct mm_struct *mm = bprm->mm;

-bprm->vma = vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);
+bprm->vma = vma = vm_area_alloc(mm);
 if (!vma)
     return -ENOMEM;
@@ -298,7 +308,6 @@
 err = -EINVAL;
 goto err_free;
 }
-vma->vm_mm = mm;

/*
 * Place the stack at the largest stack address the architecture
@@ -311,7 +320,6 @@
 vma->vm_start = vma->vm_end - PAGE_SIZE;
 vma->vm_flags = VM_SOFTDIRTY | VM_STACK_FLAGS | VM_STACK_INCOMPLETE_SETUP;
 vma->vm_page_prot = vm_get_page_prot(vma->vm_flags);
-INIT_LIST_HEAD(&vma->anon_vma_chain);

 err = insert_vm_struct(mm, vma);
 if (err)
@@ -326,7 +334,7 @@
    up_write(&mm->mmap_sem);
    err_free:
    bprm->vma = NULL;
-   kmem_cache_free(vm_area_cachep, vma);
+   vm_area_free(vma);
    return err;
 }

@@ -864,6 +872,8 @@
 if (name->name[0] != '0')
    fsnotify_open(file);

+    trace_open_exec(name->name);
 +
    out:
    return file;

@@ -925,7 +935,7 @@
 bytes = kernel_read(file, *buf + pos, i_size - pos, &pos);
 if (bytes < 0) {
    ret = bytes;
-   goto out;
+   goto out_free;
 }

 if (bytes == 0)
@@ -980,7 +990,7 @@
 struct fd f = fdget(fd);
 int ret = -EBADF;

-   if (!f.file)
+   if (!f.file || !(f.file->f_mode & FMODE_READ))
    goto out;
 ret = kernel_read_file(f.file, buf, size, max_size, id);
@@ -1007,7 +1017,7 @@
 /* Notify parent that we're no longer interested in the old VM */
 tsk = current;
 old_mm = current->mm;
-   mm_release(tsk, old_mm);
+   exec_mm_release(tsk, old_mm);

 if (old_mm) {
    sync_mm_rss(old_mm);
@@ -1024,10 +1034,23 @@
 }
 }


task_lock(tsk);
+
+local_irq_disable();
active_mm = tsk->active_mm;
-tsk->mm = mm;
tsk->active_mm = mm;
+tsk->mm = mm;
+/
+ * This prevents preemption while active_mm is being loaded and
+ * it and mm are being updated, which could cause problems for
+ * lazy tbl mm refcounting when these are updated by context
+ * switches. Not all architectures can handle irqs off over
+ * activate_mm yet.
+ */
+if (!IS_ENABLED(CONFIG_ARCH_WANT_IRQS_OFF_ACTIVATE_MM))
+local_irq_enable();
activate_mm(active_mm, mm);
+if (IS_ENABLED(CONFIG_ARCH_WANT_IRQS_OFF_ACTIVATE_MM))
+local_irq_enable();
tsk->mm->vmacache_seqnum = 0;
vmacache_flush(tsk);
task_unlock(tsk);
@@ -1264,6 +1287,8 @@
 */
set_mm_exe_file(bprm->mm, bprm->file);

+would_dump(bprm, bprm->file);
+
/*
 * Release all of the old mmap stuff
 */
@@ -1373,7 +1398,7 @@
/*
 /* An exec changes our domain. We are no longer part of the thread
- group */
-current->self_exec_id++;
+WRITE_ONCE(current->self_exec_id, current->self_exec_id + 1);
flush_signal_handlers(current, 0);
}
EXPORT_SYMBOL(setup_new_exec);
@@ -1507,7 +1532,7 @@
bprm->cred->euid = current_euid();
bprm->cred->egid = current_egid();

-if (!mnt_may_suid(bprm->file->f_path.mnt))
+if (path_nosuid(&bprm->file->f_path))
return;
if (task_no_new_privs(current))
@@ -1797,8 +1822,6 @@
if (retval < 0)
goto out;
-	would_dump(bprm, bprm->file);
-
retval = exec_binprm(bprm);
if (retval < 0)
goto out;
@@ -1808,7 +1831,7 @@
current->in_execve = 0;
membARRIER_execve(current);
acct_update_integrals(current);
-task_numa_free(current);
+task_numa_free(current, false);
free_bprm(bprm);
kfree(pathbuf);
putname(filename);
--- linux-4.15.0.orig/fs/exofs/super.c
+++ linux-4.15.0/fs/exofs/super.c
@@ -100,6 +100,7 @@
token = match_token(p, tokens, args);
switch (token) {
case Opt_name:
+kfree(opts->dev_name);
opts->dev_name = match_strdup(&args[0]);
if (unlikely(!opts->dev_name)) {
EXOFS_ERR("Error allocating dev_name");
@@ -701,21 +702,18 @@
/*
 * Read the superblock from the OSD and fill in the fields
 */
 static int exofs_fill_super(struct super_block *sb, void *data, int silent)
+static int exofs_fill_super(struct super_block *sb, 
+struct exofs_mounutopt *opts,
+struct exofs_sb_info *sbi,
+int silent)
+
+struct inode *root;
-struct exofs_mounutopt *opts = data;
-struct exofs_sb_info *sbi;/*extended info
+struct osd_dev *od;/* Master device
+struct exofs_fscb fsch; /*on-disk superblock info
struct ore_comp comp;
unsigned table_count;
int ret;
-sbi = kzalloc(sizeof(*sbi), GFP_KERNEL);
-if (!sbi)
-return -ENOMEM;
-
/* use mount options to fill superblock */
if (opts->is_osdname) {
 struct osd_dev_info odi = {.systemid_len = 0};
 @ @ -859,16 +857,42 @@
 int flags, const char *dev_name,
 void *data)
 {
  +struct super_block *s;
 struct exofs_mountopt opts;
  +struct exofs_sb_info *sbi;
  int ret;

  ret = parse_options(data, &opts);
  -if (ret)
  +if (ret) {
   +kfree(opts.dev_name);
   return ERR_PTR(ret);
  +}
  +
  +sbi = kzalloc(sizeof(*sbi), GFP_KERNEL);
  +if (!sbi) {
   +kfree(opts.dev_name);
   +return ERR_PTR(-ENOMEM);
  +}
  +
  +s = sget(type, NULL, set_anon_super, flags, NULL);
  +
  +if (IS_ERR(s)) {
   +kfree(opts.dev_name);
   +kfree(sbi);
   +return ERR_CAST(s);
  +}
  +
  +s = gget(type, NULL, set_anon_super, flags, NULL);
  +
  +if (IS_ERR(s)) {
   +kfree(opts.dev_name);
   +kfree(sbi);
   +return ERR_CAST(s);
  +}

  if (!opts.dev_name)
    opts.dev_name = dev_name;
  -return mount_nodev(type, flags, &opts, exofs_fill_super);
  +
  +
  +ret = exofs_fill_super(s, &opts, sbi, flags & SB_SILENT ? 1 : 0);
  +if (ret) {
   +deactivate_locked_super(s);
   +return ERR_PTR(ret);
  +}
  +s->s_flags |= SB_ACTIVE;
/*
--- linux-4.15.0.orig/fs/exportfs/expfs.c
+++ linux-4.15.0/fs/exportfs/expfs.c
@@ -77,7 +77,7 @@
 struct dentry *parent = dget_parent(dentry);

dput(dentry);
-if (IS_ROOT(dentry)) {
+if (dentry == parent) {
 dput(parent);
 return false;
 }
@@ -147,6 +147,7 @@
 tmp = lookup_one_len_unlocked(nbuf, parent, strlen(nbuf));
 if (IS_ERR(tmp)) {
 dprintk("%s: lookup failed: %d\n", __func__, PTR_ERR(tmp));
+err = PTR_ERR(tmp);
 goto out_err;
 }
 if (tmp != dentry) {
@@ -508,26 +509,33 @@
 * inode is actually connected to the parent.
 */
 err = exportfs_get_name(mnt, target_dir, nbuf, result);
-if (!err) {
-inode_lock(target_dir->d_inode);
-nresult = lookup_one_len(nbuf, target_dir,
-strlen(nbuf));
-inode_unlock(target_dir->d_inode);
-if (!IS_ERR(nresult)) {
-if (nresult->d_inode) {
-dput(result);
-nresult = nresult;
 } else
-dput(nresult);
 } else
+if (err) {
+dput(target_dir);
+goto err_result;
 }

+inode_lock(target_dir->d_inode);
+nresult = lookup_one_len(nbuf, target_dir, strlen(nbuf));
+if (!IS_ERR(nresult)) {
+if (unlikely(nresult->d_inode != result->d_inode)) {


+dput(nresult);
+nresult = ERR_PTR(-ESTALE);
+}
+}
+inode_unlock(target_dir->d_inode);
/*
* At this point we are done with the parent, but it's pinned
* by the child dentry anyway.
*/
dput(target_dir);
+if (IS_ERR(nresult)) {
+err = PTR_ERR(nresult);
+goto err_result;
+}
+dput(result);
+result = nresult;
+
/*
* And finally make sure the dentry is actually acceptable
* to NFSD.
--- linux-4.15.0.orig/fs/ext2/balloc.c
+++ linux-4.15.0/fs/ext2/balloc.c
@@ -48,10 +48,9 @@
struct ext2_sb_info *sbi = EXT2_SB(sb);
if (block_group >= sbi->s_groups_count) {
-ext2_error (sb, "ext2_get_group_desc",
- "block_group >= groups_count - "
- "block_group = %d, groups_count = %lu",
- block_group, sbi->s_groups_count);
+WARN(1, "block_group >= groups_count - "
+ "block_group = %d, groups_count = %lu",
+ block_group, sbi->s_groups_count);
return NULL;
}
@@ -59,10 +58,9 @@
group_desc = block_group >> EXT2_DESC_PER_BLOCK_BITS(sb);
offset = block_group & (EXT2_DESC_PER_BLOCK(sb) - 1);
if (!sbi->s_group_desc[group_desc]) {
-ext2_error (sb, "ext2_get_group_desc",
- "Group descriptor not loaded - "
- "block_group = %d, group_desc = %lu, desc = %lu",
- block_group, group_desc, offset);
+WARN(1, "Group descriptor not loaded - "
+ "block_group = %d, group_desc = %lu, desc = %lu",
+
block_group, group_desc, offset);

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return NULL;
}

--- linux-4.15.0.orig/fs/ext2/file.c
+++ linux-4.15.0/fs/ext2/file.c
@@ -93,8 +93,10 @@
    struct inode *inode = file_inode(vmf->vma->vm_file);
    struct ext2_inode_info *ei = EXT2_I(inode);
    int ret;
    +bool write = (vmf->flags & FAULT_FLAG_WRITE) &&
    +(vmf->vma->vm_flags & VM_SHARED);

-if (vmf->flags & FAULT_FLAG_WRITE) {
    if (write) {
        sb_start_pagefault(inode->i_sb);
        file_update_time(vmf->vma->vm_file);
    }
    @ @ -103,7 +105,7 @@
    ret = dax_iomap_fault(vmf, PE_SIZE_PTE, NULL, &ext2_iomap_ops);
}

up_read(&ei->dax_sem);
-if (vmf->flags & FAULT_FLAG_WRITE)
+if (write) {
    sb_end_pagefault(inode->i_sb);
    return ret;
}

--- linux-4.15.0.orig/fs/ext2/ialloc.c
+++ linux-4.15.0/fs/ext2/ialloc.c
@@ -80,6 +80,7 @@
    if (dir)
        le16_add_cpu(&desc->bg_used_dirs_count, -1);
    spin_unlock(sb_bgl_lock(EXT2_SB(sb), group));
+    percpu_counter_inc(&EXT2_SB(sb)->s_freeinodes_counter);
    if (dir)
        percpu_counter_dec(&EXT2_SB(sb)->s_dirs_counter);
    mark_buffer_dirty(bh);
@@ -531,7 +532,7 @@
goto fail;
}

-percpu_counter_add(&sbi->s_freeinodes_counter, -1);
+percpu_counter_dec(&sbi->s_freeinodes_counter);
    if (S_ISDIR(mode))
        percpu_counter_inc(&sbi->s_dirs_counter);

--- linux-4.15.0.orig/fs/ext2/inode.c
+++ linux-4.15.0/fs/ext2/inode.c
@@ -699,10 +699,13 @@

if (!partial) {
    count++;
    mutex_unlock(&ei->truncate_mutex);
    -if (err)
    -goto cleanup;
    goto got_it;
}
 +
 +if (err) {
 +mutex_unlock(&ei->truncate_mutex);
 +goto cleanup;
 +}
}

static void ext2_truncate_blocks(struct inode *inode, loff_t offset)
{
    /*
    * XXX: it seems like a bug here that we don't allow
    * IS_APPEND inode to have blocks-past-i_size trimmed off.
    * review and fix this.
    * 
    * Also would be nice to be able to handle IO errors and such,
    * but that's probably too much to ask.
    */
    if (!(S_ISREG(inode->i_mode) || S_ISDIR(inode->i_mode) ||
         S_ISLNK(inode->i_mode)))
        return;
    if (ext2_inode_is_fast_symlink(inode))
        return;
    -if (IS_APPEND(inode) || IS_IMMUTABLE(inode))
    -return;
    dax_sem_down_write(EXT2_I(inode));
    __ext2_truncate_blocks(inode, offset);
}

inode->i_blocks = le32_to_cpu(raw_inode->i_blocks);
ei->i_blocks = le32_to_cpu(raw_inode->i_blocks);
+ext2_set_inode_flags(inode);
ei->i_faddr = le32_to_cpu(raw_inode->i_faddr);
ei->i_frag_no = raw_inode->i_frag;
ei->i_frag_size = raw_inode->i_fsize;
@@ -1519,7 +1513,6 @@
        new_decode_dev(le32_to_cpu(raw_inode->i_block[1]));
    }
brelse (bh);
-ext2_set_inode_flags(inode);
unlock_new_inode(inode);
return inode;

--- linux-4.15.0.orig/fs/ext2/namei.c
+++ linux-4.15.0/fs/ext2/namei.c
@@ -41,8 +41,7 @@
{
    int err = ext2_add_link(dentry, inode);
    if (!err) {
      -unlock_new_inode(inode);
-      d_instantiate(dentry, inode);
+      d_instantiate_new(dentry, inode);
        return 0;
    }
    inode_dec_link_count(inode);
@@ -269,8 +268,7 @@
    if (err)
      goto out_fail;

-    unlock_new_inode(inode);
-    d_instantiate(dentry, inode);
+    d_instantiate_new(dentry, inode);
    out:
    return err;

--- linux-4.15.0.orig/fs/ext2/super.c
+++ linux-4.15.0/fs/ext2/super.c
@@ -754,7 +754,8 @@
{
    loff_t res = EXT2_NDIR_BLOCKS;
    int meta_blocks;
@@ -768,24 +769,34 @@
/* this is calculated to be the largest file size for a
 * dense, file such that the total number of
 @@ -768,24 +769,34 @@
 /* total blocks in file system block size */
 upper_limit >>= (bits - 9);
 /* */ indirect blocks */
-meta_blocks = 1;
-/* double indirect blocks */
-meta_blocks += 1 + (1LL << (bits-2));
/* tripple indirect blocks */
meta_blocks += 1 + (1LL << (bits-2)) + (1LL << (2*(bits-2)));

-upper_limit -= meta_blocks;
-upper_limit <<= bits;

+/* Compute how many blocks we can address by block tree */
res += 1LL << (bits-2);
res += 1LL << (2*(bits-2));
res += 1LL << (3*(bits-2));
+/* Does block tree limit file size? */
+if (res < upper_limit)
+goto check_lfs;
+
+res = upper_limit;
+/* How many metadata blocks are needed for addressing upper_limit? */
+upper_limit = EXT2_NDIR_BLOCKS;
+/* indirect blocks */
+meta_blocks = 1;
+upper_limit -= ppb;
+/* double indirect blocks */
+if (upper_limit < ppb * ppb) {
+meta_blocks += 1 + DIV_ROUND_UP(upper_limit, ppb);
+res -= meta_blocks;
+goto check_lfs;
+}
+meta_blocks += 1 + ppb;
+upper_limit -= ppb * ppb;
+/* tripple indirect blocks for the rest */
+meta_blocks += 1 + DIV_ROUND_UP(upper_limit, ppb) +
+DIV_ROUND_UP(upper_limit, ppb*ppb);
+res -= meta_blocks;
+check_lfs:
res <<= bits;
-if (res > upper_limit)
-res = upper_limit;
-
if (res > MAX_LFS_FILESIZE)
res = MAX_LFS_FILESIZE;

@@ -888,6 +899,7 @@
if (sb->s_magic != EXT2_SUPER_MAGIC)
goto cantfind_ext2;

+opts.s_mount_opt = 0;
+/* Set defaults before we parse the mount options */
def_mount_opts = le32_to_cpu(es->s_default_mount_opts);
if (def_mount_opts & EXT2_DEFM_DEBUG)
blocksize = BLOCK_SIZE << le32_to_cpu(sbi->s_es->s_log_block_size);

if (sbi->s_mount_opt & EXT2_MOUNT_DAX) {
    -err = bdev_dax_supported(sb, blocksize);
    -if (err)
    -goto failed_mount;
    +if (!bdev_dax_supported(sb->s_bdev, blocksize)) {
    +ext2_msg(sb, KERN_ERR,
    +"DAX unsupported by block device. Turning off DAX.");
    +sbi->s_mount_opt &= ~EXT2_MOUNT_DAX;
    +}
}

/* If the blocksize doesn't match, re-read the thing.. */

if (EXT2_BLOCKS_PER_GROUP(sb) == 0)
    goto cantfind_ext2;
- sbi->s_groups_count = ((le32_to_cpu(es->s_blocks_count) -
- le32_to_cpu(es->s_first_data_block) - 1)
- / EXT2_BLOCKS_PER_GROUP(sb)) + 1;
+ sbi->s_groups_count = ((le32_to_cpu(es->s_blocks_count) -
+ le32_to_cpu(es->s_first_data_block) - 1)
+ / EXT2_BLOCKS_PER_GROUP(sb)) + 1;

db_count = (sbi->s_groups_count + EXT2_DESC_PER_BLOCK(sb) - 1) /
    EXT2_DESC_PER_BLOCK(sb);

#include <linux/buffer_head.h>
#include <linux/init.h>
+#include <linux/printk.h>
#include <linux/slab.h>
#include <linux/mbcache.h>
#include <linux/quotaops.h>

#define ea_idebug(inode, f...)	no_printk(f)
#define ea_bdebug(bh, f...)	no_printk(f)

#include <linux/buffer_head.h>
#include <linux/init.h>
+#include <linux/printk.h>
#include <linux/slab.h>
#include <linux/mbcache.h>
#include <linux/quotaops.h>

printk("\n");
} while (0)
#else
-# define ea_idebug(f...)
-# define ea_bdebug(f...)
+# define ea_idebug(inode, f...)no_printk(f)
+# define ea_bdebug(bh, f...)no_printk(f)
#endif
static int ext2_xattr_set2(struct inode *, struct buffer_head *,
@@ -612,9 +613,9 @@}
cleanup:
    -brelse(bh);
    if (!bh && & header == HDR(bh)))
kfree(header);
    +brelse(bh);
    up_write(&EXT2_I(inode)->xattr_sem);

    return error;
@@ -838,8 +839,7 @
    error = mb_cache_entry_create(cache, GFP_NOFS, hash, bh->b_blocknr, 1);
    if (error) {
        if (error == -EBUSY) {
            -ea_bdebug(bh, "already in cache (%d cache entries),
            -atomic_read(&ext2_xattr_cache->c_entry_count));
            +ea_bdebug(bh, "already in cache");
            error = 0;
        }
    } else
--- linux-4.15.0.orig/fs/ext4/acl.c
+++ linux-4.15.0/fs/ext4/acl.c
@@ -15,7 +15,7 @
 /* Convert from filesystem to in-memory representation. */
 static struct posix_acl *
 -ext4_acl_from_disk(const void *value, size_t size)
+++ ext4_acl_from_disk(struct super_block *sb, const void *value, size_t size)
{ const char *end = (char *)value + size; 
 int n, count;
@@ -59,16 +59,20 @@
    goto fail;
    acl->a_entries[n].e_uid =
    -make_kuid(&init_user_ns,
        +make_kuid(sb->s_user_ns,
    le32_to_cpu(entry->e_id));
    +if (!uid_valid(acl->a_entries[n].e_uid))
    +goto fail;
    break;
    case ACL_GROUP:
    value = (char *)value + sizeof(ext4_acl_entry);
    if ((char *)value > end)
    goto fail;
    acl->a_entries[n].e_gid =
make_kgid(&init_user_ns, le32_to_cpu(entry->e_id));
+if (!gid_valid(acl->a_entries[n].e_gid))
+goto fail;
break;

default:
@@ -88,11 +92,14 @@
 * Convert from in-memory to filesystem representation.
 */
 static void *
-ext4_acl_to_disk(const struct posix_acl *acl, size_t *size)
+ext4_acl_to_disk(struct super_block *sb, const struct posix_acl *acl,
 + size_t *size)
 {
 ext4_acl_header *ext_acl;
 char *e;
 size_t n;
 +uid_t uid;
 +gid_t gid;
 *
*size = ext4_acl_size(acl->a_count);
 ext_acl = kmalloc(sizeof(ext4_acl_header) + acl->a_count *
@@ -108,13 +115,17 @@
 entry->e_perm = cpu_to_le16(acl_e->e_perm);
 switch (acl_e->e_tag) {
 case ACL_USER:
-+entry->e_id = cpu_to_le32(
-+from_kuid(&init_user_ns, acl_e->e_uid));
+uid = from_kuid(sb->s_user_ns, acl_e->e_uid);
 +if (uid == (uid_t)-1)
 +goto fail;
 +entry->e_id = cpu_to_le32(uid);
 e += sizeof(ext4_acl_entry);
 break;
 case ACL_GROUP:
-+entry->e_id = cpu_to_le32(
-+from_kgid(&init_user_ns, acl_e->e_gid));
+gid = from_kgid(sb->s_user_ns, acl_e->e_gid);
 +if (gid == (gid_t)-1)
 +goto fail;
 +entry->e_id = cpu_to_le32(gid);
 e += sizeof(ext4_acl_entry);
 break;
@@ -167,7 +178,7 @@
 retval = ext4_xattr_get(inode, name_index, ",", value, retval);
if (retval > 0)
- acl = ext4_acl_from_disk(value, retval);
+ acl = ext4_acl_from_disk(inode->i_sb, value, retval);
else if (retval == -ENODATA || retval == -ENOSYS)
  acl = NULL;
else
  return -EINVAL;
}
if (acl) {
- value = ext4_acl_to_disk(acl, &size);
+ value = ext4_acl_to_disk(inode->i_sb, acl, &size);
if (IS_ERR(value))
  return (int)PTR_ERR(value);
}
--- linux-4.15.0.orig/fs/ext4/balloc.c
+++ linux-4.15.0/fs/ext4/balloc.c
@@ -184,7 +184,6 @@
  struct ext4_fsblk_t start, tmp;
- if (ext4_has_feature_flex_bg(sb))
-     flex_bg = 1;
-/* Set bits for block and inode bitmaps, and inode table */
  tmp = ext4_block_bitmap(sb, gdp);
- if (!flex_bg || ext4_block_in_group(sb, tmp, block_group))
+ if (ext4_block_in_group(sb, tmp, block_group))
    ext4_set_bit(EXT4_B2C(sbi, tmp - start), bh->b_data);
  tmp = ext4_inode_bitmap(sb, gdp);
- if (!flex_bg || ext4_block_in_group(sb, tmp, block_group))
+ if (ext4_block_in_group(sb, tmp, block_group))
    ext4_set_bit(EXT4_B2C(sbi, tmp - start), bh->b_data);
  tmp = ext4_inode_table(sb, gdp);
  for (; tmp < ext4_inode_table(sb, gdp) +
    sb->s_iib_per_group; tmp++) {
- if (!flex_bg || ext4_block_in_group(sb, tmp, block_group))
  }
if (ext4_block_in_group(sb, tmp, block_group))
ext4_set_bit(EXT4_B2C(sbi, tmp - start), bh->b_data);
}

ext4_mark_bitmap_end(num_clusters_in_group(sb, block_group),
    sb->s_blocksize * 8, bh->b_data);
-ext4_block_bitmap_csum_set(sb, block_group, gdp, bh);
-ext4_group_desc_csum_set(sb, block_group, gdp);
return 0;
}

ext4_group_t ngroups = ext4_get_groups_count(sb);
struct ext4_group_desc *desc;
struct ext4_sb_info *sbi = EXT4_SB(sb);
+struct buffer_head *bh_p;

if (block_group >= ngroups) {
ext4_error(sb, "block_group >= groups_count - block_group = %u,"
    block_group, groups_count - block_group = %u,"
    @@ -296,7 +291,14 @@

    group_desc = block_group >> EXT4_DESC_PER_BLOCK_BITS(sb);
    offset = block_group & (EXT4_DESC_PER_BLOCK(sb) - 1);
    -if (!sbi->s_group_desc[group_desc]) {
      bh_p = sbi_array_rcu_deref(sbi, s_group_desc, group_desc);
      + /*
      + * sbi_array_rcu_deref returns with rcu unlocked, this is ok since
      + * the pointer being dereferenced won't be dereferenced again. By
      + * looking at the usage in add_new_gdb() the value isn't modified,
      + * just the pointer, and so it remains valid.
      + */
      +if (!bh_p) {
        ext4_error(sb, "Group descriptor not loaded - "
            "block_group = %u, group_desc = %u, desc = %u",
            block_group, group_desc, desc);
        @@ -304,10 +306,10 @@
      }
    }
    desc = (struct ext4_group_desc *)(
        +(-__u8 *)sbi->s_group_desc[group_desc]->b_data +
        +(-__u8 *)bh_p->b_data +
        offset * EXT4_DESC_SIZE(sb));
    if (bh)
        -*bh = sbi->s_group_desc[group_desc];
        +bh = bh_p;
    return desc;
struct ext4_sb_info *sbi = EXT4_SB(sb);
ext4_grpblk_t offset;
ext4_grpblk_t next_zero_bit;
+ext4_grpblk_t max_bit = EXT4_CLUSTERS_PER_GROUP(sb);
ext4_ftblk_t blk;
ext4_fsblk_t group_first_block;

/* check whether block bitmap block number is set */
blk = ext4_block_bitmap(sb, desc);
offset = blk - group_first_block;
- if (!ext4_test_bit(EXT4_B2C(sbi, offset), bh->b_data))
+ if (offset < 0 || EXT4_B2C(sbi, offset) >= max_bit ||
+ !ext4_test_bit(EXT4_B2C(sbi, offset), bh->b_data))
/* bad block bitmap */
return blk;

/* check whether the inode bitmap block number is set */
blk = ext4_inode_bitmap(sb, desc);
offset = blk - group_first_block;
- if (!ext4_test_bit(EXT4_B2C(sbi, offset), bh->b_data))
+ if (offset < 0 || EXT4_B2C(sbi, offset) >= max_bit ||
+ !ext4_test_bit(EXT4_B2C(sbi, offset), bh->b_data))
/* bad block bitmap */
return blk;

/* check whether the inode table block number is set */
blk = ext4_inode_table(sb, desc);
offset = blk - group_first_block;
+ if (offset < 0 || EXT4_B2C(sbi, offset) >= max_bit ||
+ EXT4_B2C(sbi, offset + sbi->s_itb_per_group) >= max_bit)
+return blk;
next_zero_bit = ext4_find_next_zero_bit(bh->b_data,
EXT4_B2C(sbi, offset + EXT4_SB(sb)->s_itb_per_group),
EXT4_B2C(sbi, offset));

ext4_lock_group(sb, block_group);
+ if (buffer_verified(bh))
+ goto verified;
if (unlikely(!ext4_block_bitmap_csum_verify(sb, block_group,
desc, bh))) {
    ext4_unlock_group(sb, block_group);
}
return -EFSCORRUPTED;
}
set_buffer_verified(bh);
+verified:
ext4_unlock_group(sb, block_group);
return 0;
}
@@ -419,6 +430,7 @@
ext4_read_block_bitmap_nowait(struct super_block *sb, ext4_group_t block_group)
 {
 struct ext4_group_desc *desc;
+struct ext4_sb_info *sbi = EXT4_SB(sb);
 struct buffer_head *bh;
 ext4_fsblk_t bitmap_blk;
 int err;
@@ -427,11 +439,17 @@
 if (!desc)
 return ERR_PTR(-EFSCORRUPTED);
 bitmap_blk = ext4_block_bitmap(sb, desc);
+if ((bitmap_blk <= le32_to_cpu(sbi->s_es->s_first_data_block)) ||
 + (bitmap_blk >= ext4_blocks_count(sbi->s_es))) {
 +ext4_error(sb, "Invalid block bitmap block %llu in "
 + "block_group %u", bitmap_blk, block_group);
 +return ERR_PTR(-EFSCORRUPTED);
 +}
 bh = sb_getblk(sb, bitmap_blk);
 if (unlikely(!bh)) {
 -ext4_error(sb, "Cannot get buffer for block bitmap - "
 - "block_group = %u, block_bitmap = %llu",
 - block_group, bitmap_blk);
 +ext4_warning(sb, "Cannot get buffer for block bitmap - "
 + "block_group = %u, block_bitmap = %llu",
 + block_group, bitmap_blk);
 return ERR_PTR(-ENOMEM);
 }
@@ -444,10 +462,20 @@
goto verify;
 }
 ext4_lock_group(sb, block_group);
-if (desc->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT)) {
+if (ext4_has_group_desc_csum(sb) &&
 + (desc->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT))) {
 +if (block_group == 0) {
 +ext4_unlock_group(sb, block_group);
 +unlock_buffer(bh);
 +ext4_error(sb, "Block bitmap for bg 0 marked "
 + "uninitialized");

err = ext4_init_block_bitmap(sb, bh, block_group, desc);
set_bitmap_uptodate(bh);
set_buffer_uptodate(bh);
+ set_buffer_verified(bh);
ext4_unlock_group(sb, block_group);
unlock_buffer(bh);
if (err) {
	@@ -566,8 +594,8 @@

/* Hm, nope. Are (enough) root reserved clusters available? */
if (uid_eq(sbi->s_resuid, current_fsuid()) ||
-    (!gid_eq(sbi->s_resgid, GLOBAL_ROOT_GID) && in_group_p(sbi->s_resgid)) ||
-    capable(CAP_SYS_RESOURCE) ||
+    (!gid_eq(sbi->s_resgid, make_kgid(sbi->s_sb->s_user_ns, 0)) && in_group_p(sbi->s_resgid)) ||
+    ns_capable(sbi->s_sb->s_user_ns, CAP_SYS_RESOURCE) ||
    (flags & EXT4_MB_USE_ROOT_BLOCKS)) {

    if (free_clusters >= (nclusters + dirty_clusters +
--- linux-4.15.0.orig/fs/ext4/block_validity.c
+++ linux-4.15.0/fs/ext4/block_validity.c
@@ -24,6 +24,7 @@
    struct rb_node
    ext4_fsblk_t
    unsigned int count;
+    u32 ino;
    };

    static struct kmem_cache *ext4_system_zone_cachep;
    @@ -44,7 +45,8 @@
    static inline int can_merge(struct ext4_system_zone *entry1,
        struct ext4_system_zone *entry2)
    {
-      if ((entry1->start_blk + entry1->count) == entry2->start_blk)
+      if ((entry1->start_blk + entry1->count) == entry2->start_blk &&
+      entry1->ino == entry2->ino)
        return 1;
    return 0;
    }
    @@ -56,9 +58,9 @@
    */
    static int add_system_zone(struct ext4_sb_info *sbi,
        ext4_fsblk_t start_blk,
-      unsigned int count)
+      unsigned int count, u32 ino)
    {
-struct ext4_system_zone *new_entry = NULL, *entry;
+struct ext4_system_zone *new_entry, *entry;
struct rb_node **n = &sbi->system_blks.rb_node, *node;
struct rb_node *parent = NULL, *new_node = NULL;

@@ -69,30 +71,21 @@
 n = &(*n)->rb_left;
 else if (start_blk >= (entry->start_blk + entry->count))
 n = &(*n)->rb_right;
-else {
-    if (start_blk + count > (entry->start_blk +
-    entry->count))
-        entry->count = (start_blk + count -
-    entry->start_blk);
-    new_node = *n;
-    new_entry = rb_entry(new_node, struct ext4_system_zone,
-    node);
-    break;
-}
+ else/* Unexpected overlap of system zones. */
+    return -EFSCORRUPTED;
 }

-if (!new_entry) {
-    new_entry = kmem_cache_alloc(ext4_system_zone_cachep,
-    GFP_KERNEL);
-    if (!new_entry)
-        return -ENOMEM;
-    new_entry->start_blk = start_blk;
-    new_entry->count = count;
-    new_entry->ino = ino;
-    new_node = &new_entry->node;
-    rb_link_node(new_node, parent, n);
-    rb_insert_color(new_node, &sbi->system_blks);
}

/* Can we merge to the left? */
node = rb_prev(new_node);
static int ext4_protect_reserved_inode(struct super_block *sb, u32 ino) {
    struct inode *inode;
    struct ext4_sb_info *sbi = EXT4_SB(sb);
    struct ext4_map_blocks map;
    u32 i = 0, num;
    int err = 0, n;

    if ((ino < EXT4_ROOT_INO) ||
        (ino > le32_to_cpu(sbi->s_es->s_inodes_count)))
        return -EINVAL;
    inode = ext4_iget(sb, ino, EXT4_IGET_SPECIAL);
    if (IS_ERR(inode))
        return PTR_ERR(inode);
    num = (inode->i_size + sb->s_blocksize - 1) >> sb->s_blocksize_bits;
    while (i < num) {
        cond_resched();
        map.m_lblk = i;
        map.m_len = num - i;
        n = ext4_map_blocks(NULL, inode, &map, 0);
        if (n < 0) {
            err = n;
            break;
        } else { 
            err = add_system_zone(sbi, map.m_pblk, n, ino);
            if (err < 0) {
                if (err == -EFSCORRUPTED) {
                    ext4_error(sb,
                        "blocks %llu-%llu from inode %u 
                        "overlap system zone", map.m_pblk,
                        map.m_pblk + map.m_len - 1, ino);
                }
                break;
            }
            i += n;
        }
    }
    iput(inode);
    return err;
}
int ext4_setup_system_zone(struct super_block *sb)
{
    ext4_group_t ngroups = ext4_get_groups_count(sb);
    if (ext4_bg_has_super(sb, i) &&
        (i < 5) || ((i % flex_size) == 0))
        add_system_zone(sbi, ext4_group_first_block_no(sb, i),
                        ext4_num_gdb(sb, i) + 1);
    ext4_num_gdb(sb, i) + 1, 0);
    gd = ext4_get_group_desc(sb, i, NULL);
    ret = add_system_zone(sbi, ext4_block_bitmap(sb, gd, 1);
    ret = add_system_zone(sbi, ext4_block_bitmap(sb, gd, 1, 0);
    if (ret)
        return ret;
    ret = add_system_zone(sbi, ext4_inode_bitmap(sb, gd, 1);
    ret = add_system_zone(sbi, ext4_inode_bitmap(sb, gd, 1, 0);
    if (ret)
        return ret;
    ret = add_system_zone(sbi, ext4_inode_table(sb, gd),
                          sb->s_itb_per_group);
    ret = add_system_zone(sbi, s_itb_per_group, 0);
    if (ret)
        return ret;
}
if (ext4_has_feature_journal(sb) && sb->s_es->s_journal_inum) {
    ret = ext4_protect_reserved_inode(sb,
           le32_to_cpu(sb->s_es->s_journal_inum));
    if (ret)
        return ret;
}
/* start_blk+count) is valid; 0 if some part of the block region
* overlaps with filesystem metadata blocks.
*/
-int ext4_data_block_valid(struct ext4_sb_info *sbi, ext4_fsblk_t start_blk,
    unsigned int count)
+int ext4_inode_block_valid(struct inode *inode, ext4_fsblk_t start_blk,
    unsigned int count)
{
    struct ext4_system_zone *entry;
    struct ext4_sb_info *sbi = EXT4_SB(inode->i_sb);
    struct rb_node *n = sbi->system_blks.rb_node;

    if ((start_blk <= le32_to_cpu(sbi->s_es->s_first_data_block)) ||
        (start_blk >= (entry->start_blk + entry->count)))
        n = n->rb_right;
    else {

+if (entry->ino == inode->i_ino)
  +return 1;
  sbi->s_es->s_last_error_block = cpu_to_le64(start_blk);
  return 0;
}
@@ -227,11 +273,15 @@
 __le32 *bref = p;
 unsigned int blk;

+if (ext4_has_feature_journal(inode->i_sb) &&
  +(inode->i_ino ==
  +le32_to_cpu(EXT4_SB(inode->i_sb)->s_es->s_journal_inum)))
+return 0;
+
+while (bref < p+max) {
  blk = le32_to_cpu(*bref++);
  if (blk &&
    -unlikely(!ext4_data_block_valid(EXT4_SB(inode->i_sb),
    -blk, 1)))
    +unlikely(!ext4_inode_block_valid(inode, blk, 1))) {
    es->s_last_error_block = cpu_to_le64(blk);
    ext4_error_inode(inode, function, line, blk,
    "invalid block");
    --- linux-4.15.0.orig/fs/ext4/dir.c
    +++ linux-4.15.0/fs/ext4/dir.c
    @@ -75,7 +75,12 @@
      else if (unlikely(rlen < EXT4_DIR_REC_LEN(de->name_len)))
        error_msg = "rec_len is too small for name_len";
      else if (unlikely(((char *) de - buf) + rlen > size))
        -error_msg = "directory entry across range";
        +error_msg = "directory entry overrun";
      +else if (unlikely(((char *) de - buf) + rlen >
      + size - EXT4_DIR_REC_LEN(1) &&
      + ((char *) de - buf) + rlen != size)) {
        +error_msg = "directory entry too close to block end";
      +}
    else if (unlikely(le32_to_cpu(de->inode) >
    le32_to_cpu(EXT4_SB(dir->i_sb)->s_es->s_inodes_count))
      error_msg = "inode out of bounds";
    @ @ -84,18 +89,16 @@

 if (filp)
 ext4_error_file(filp, function, line, bh->b_blocknr,
  -"bad entry in directory: %s - offset=%u(%u), "
  -"inode=%u, rec_len=%d, name_len=%d",
  -error_msg, (unsigned) (offset % size),
  -offset, le32_to_cpu(de->inode),
  -rlen, de->name_len);
"bad entry in directory: %s - offset=%u, "
"inode=%u, rec_len=%d, name_len=%d, size=%d",
+error_msg, offset, le32_to_cpu(de->inode),
+rlen, de->name_len, size);
else
ext4_error_inode(dir, function, line, bh->b_blocknr,
-"bad entry in directory: %s - offset=%u(%u), 
-"inode=%u, rec_len=%d, name_len=%d",
-error_msg, (unsigned) (offset % size),
-offset, le32_to_cpu(de->inode),
-rlen, de->name_len);
+"bad entry in directory: %s - offset=%u, 
+"inode=%u, rec_len=%d, name_len=%d, size=%d",
+error_msg, offset, le32_to_cpu(de->inode),
+rlen, de->name_len, size);
return 1;
}
@@ -109,7 +112,6 @@
struct inode *inode = file_inode(file);
struct super_block *sb = inode->i_sb;
struct buffer_head *bh = NULL;
-int dir_has_error = 0;
-struct fscrypt_str fstr = FSTR_INIT(NULL, 0);

if (ext4_encrypted_inode(inode)) {
@@ -123,12 +125,14 @@
if (err != ERR_BAD_DX_DIR) {
return err;
}
-/*
- * We don't set the inode dirty flag since it's not
- * critical that it get flushed back to the disk.
- */
-ext4_clear_inode_flag(file_inode(file),
- EXT4_INODE_INDEX);
+/* Can we just clear INDEX flag to ignore htree information? */
+if (!ext4_has_metadata_csum(sb)) {
+/*
+ * We don't set the inode dirty flag since it's not
+ * critical that it gets flushed back to the disk.
+ */
+ext4_clear_inode_flag(inode, EXT4_INODE_INDEX);
+}
}

if (ext4_has_inline_data(inode)) {
@@ -145,8 +149,6 @@

return err;
}

-offset = ctx->pos & (sb->s_blocksize - 1);
-
while (ctx->pos < inode->i_size) {
struct ext4_map_blocks map;

@@ -155,9 +157,18 @@
go to errout;
} cond_resched();
+offset = ctx->pos & (sb->s_blocksize - 1);
map.m_lblk = ctx->pos >> EXT4_BLOCK_SIZE_BITS(sb);
map.m_len = 1;
err = ext4_map_blocks(NULL, inode, &map, 0);
+if (err == 0) {
+/* m_len should never be zero but let's avoid
+ * an infinite loop if it somehow is */
+if (map.m_len == 0)
+map.m_len = 1;
+ctx->pos += map.m_len * sb->s_blocksize;
+continue;
+}
if (err > 0) {
pgoff_t index = map.m_pblk >>
(PAGE_SHIFT - inode->i_blkbits);
@@ -176,13 +187,6 @@
}

if (!bh) {
-if (!dir_has_error) {
-EXT4_ERROR_FILE(file, 0,
-"directory contains a "
-"hole at offset %llu",
- (unsigned long long) ctx->pos);
-dir_has_error = 1;
-}
/* corrupt size? Maybe no more blocks to read */
if (ctx->pos > inode->i_blocks << 9)
br eak;
@@ -364,13 +368,15 @@
{
struct inode *inode = file->f_mapping->host;
int dx_dir = is_dx_dir(inode);
-loff_t htree_max = ext4_get_htree_eof(file);
+loff_t ret, htree_max = ext4_get_htree_eof(file);
if (likely(dx_dir))
    return generic_file_llseek_size(file, offset, whence,
    htree_max, htree_max);
else
    return ext4_llseek(file, offset, whence);
    ret = ext4_llseek(file, offset, whence);
    file->f_version = inode->i_version - 1;
    return ret;
}

/*
@@ -528,7 +534,7 @@
    struct dir_private_info *info = file->private_data;
    struct inode *inode = file_inode(file);
    struct fname *fname;
-    int ret;
+    int ret = 0;
    if (!info) {
        info = ext4_htree_create_dir_info(file, ctx->pos);
-      @ @ -528,7 +534,7 @@
-            info->curr_minor_hash,
-            &info->next_hash);
+      @ @ -576,7 +582,7 @@
+            info->curr_minor_hash,
+            &info->next_hash);
    if (ret < 0)
        return ret;
    goto finished;
    if (ret == 0) {
        ctx->pos = ext4_get_htree_eof(file);
        break;
-      @ @ -607,7 +613,7 @@
+      @ @ -607,7 +613,7 @@
    }
    finished:
    info->last_pos = ctx->pos;
    return 0;
    +return ret < 0 ? ret : 0;
}

static int ext4_dir_open(struct inode * inode, struct file * filp)
--- linux-4.15.0.orig/fs/ext4/ext4.h
+++ linux-4.15.0/fs/ext4/ext4.h
@@ -424,6 +424,9 @@
/* Flags that are appropriate for non-directories/regular files. */
#define EXT4_OTHER_FLMASK (EXT4_NODUMP_FL | EXT4_NOATIME_FL)
+/* The only flags that should be swapped */
+#define EXT4_FL_SHOULD_SWAP (EXT4_HUGE_FILE_FL | EXT4_EXTENTS_FL)
+*/

/* Mask out flags that are inappropriate for the given type of inode. */
static inline __u32 ext4_mask_flags(umode_t mode, __u32 flags)
{
    @@ -675,6 +678,9 @@
/* Max physical block we can address w/o extents */
#define EXT4_MAX_BLOCK_FILE_PHYS0xFFFFFFFF

/+* Max logical block we can support */
+#define EXT4_MAX_LOGICAL_BLOCK0xFFFFFFFF
+
/+* Structure of an inode on the disk */
@@ -1337,7 +1343,7 @@
loff_t s_bitmap_maxbytes;/* max bytes for bitmap files */
struct buffer_head * s_sbh;/* Buffer containing the super block */
struct ext4_super_block *s_es;/* Pointer to the super block in the buffer */
-struct buffer_head **s_group_desc;
+struct buffer_head * __rcu *s_group_desc;
unsigned int s_mount_opt;
unsigned int s_mount_opt2;
unsigned int s_mount_flags;
@@ -1377,7 +1383,8 @@
u32 s_min_batch_time;
struct block_device *journal_bdev;
#endif
#define CONFIG_QUOTA
-#char *s_qf_names[EXT4_MAXQUOTAS];/* Names of quota files with journalled quota */
+#char __rcu *s_qf_names[EXT4_MAXQUOTAS];
int s_jquota_fmt;/* Format of quota to use */
#endif
unsigned int s.want_extra_isize; /* New inodes should reserve # bytes */
@@ -1394,7 +1401,7 @@
#ifdef
/* for buddy allocator */
-struct ext4_group_info **s_group_info;
+struct ext4_group_info ** __rcu *s_group_info;
struct inode *s_buddy_cache;
spinlock_t s_md_lock;
unsigned short *s_mb_offsets;
@@ -1444,7 +1451,7 @@
unsigned int s.extent_max_zeroout_kb;

unsigned int s_log_groups_per_flex;
-struct flex_groups *s_flex_groups;
+struct flex_groups * __rcu *s_flex_groups;
ext4_group_t s_flex_groups_allocated;
 /* workqueue for reserved extent conversions (buffered io) */
@@ -1484,8 +1491,11 @@
 struct ratelimit_state s_warning_ratelimit_state;
 struct ratelimit_state s_msg_ratelimit_state;

-/* Barrier between changing inodes' journal flags and writepages ops. */
-struct percpu_rwlock s_journal_flag_rwlock;
+/*
+ * Barrier between writepages ops and changing any inode's JOURNAL_DATA
+ * or EXTENTS flag.
+ */
+struct percpu_rwlock s_writepages_rwlock;

 struct dax_device *s_daxdev;
};

@@ -1501,16 +1511,28 @@
 static inline int ext4_valid_inum(struct super_block *sb, unsigned long ino)
 {
 return ino == EXT4_ROOT_INO ||
 -ino == EXT4_USR_QUOTA_INO ||
 -ino == EXT4_GRP_QUOTA_INO ||
 -ino == EXT4_BOOT_LOADER_INO ||
 -ino == EXT4_JOURNAL_INO ||
 -ino == EXT4_RESIZE_INO ||
 (ino >= EXT4_FIRST_INO(sb) &&
 ino <= le32_to_cpu(EXT4_SB(sb)->s_es->s_inodes_count));
 }

/*
 + * Returns: sbi->field[index]
 + * Used to access an array element from the following sbi fields which require
 + * rcu protection to avoid dereferencing an invalid pointer due to reassignment
 + * - s_group_desc
 + * - s_group_info
 + * - s_flex_group
 + */
 #define sbi_array_rcu_deref(sbi, field, index) \  
 (+{} \ 
 +typeof(*((sbi)->field)) _v; \ 
 +rcu_read_lock(); \ 
 +_v = ((typeof(_v))*rcu_dereference((sbi)->field))[index]; \ 
 +rcu_read_unlock(); \ 
 +_v; \ 
 +})
 +
+/*
 * Inode dynamic state flags
enum {
    @@@ -1649,6 +1671,8 @@
#define EXT4_FEATURE_INCOMPAT_INLINE_DATA 0x8000 /* data in inode */
#define EXT4_FEATURE_INCOMPAT_ENCRYPT 0x10000

+extern void ext4_update_dynamic_rev(struct super_block *sb);
+
#define EXT4_FEATURE_COMPAT_FUNCS(name, flagname) \
static inline bool ext4_has_feature_##name(struct super_block *sb) \
{
    @@@ -1657,6 +1681,7 @@
}
static inline void ext4_set_feature_##name(struct super_block *sb) \
{
    @@@ -1691,6 +1717,7 @@
}
static inline void ext4_set_feature_##name(struct super_block *sb) \
{
    +ext4_update_dynamic_rev(sb);
    EXT4_SB(sb)->s_es->s_feature_compat |= \
    cpu_to_le32(EXT4_FEATURE_COMPAT_##flagname);
    @@@ -1674,6 +1699,7 @@
}
static inline void ext4_set_feature_##name(struct super_block *sb) \
{
    +ext4_update_dynamic_rev(sb);
    EXT4_SB(sb)->s_es->s_feature_ro_compat |= \
    cpu_to_le32(EXT4_FEATURE_RO_COMPAT_##flagname);
    @@@ -1691,6 +1717,7 @@
}
static inline void ext4_set_feature_##name(struct super_block *sb) \
{
    +ext4_update_dynamic_rev(sb);
    EXT4_SB(sb)->s_es->s_feature_incompat |= \
    cpu_to_le32(EXT4_FEATURE_INCOMPAT_##flagname);
    @@@ -2343,8 +2370,12 @@
}
static const unsigned char ext4_filetype_table[] = {

static inline void ext4_update_dx_flag(struct inode *inode)
{
    -if (!ext4_has_feature_dir_index(inode->i_sb))
    +if (!ext4_has_feature_dir_index(inode->i_sb) &&
        + ext4_test_inode_flag(inode, EXT4_INODE_INDEX))
    +/* ext4_iget() should have caught this... */
        +WARN_ON_ONCE(ext4_has_feature_metadata_csum(inode->i_sb));
    ext4_clear_inode_flag(inode, EXT4_INODE_INDEX);
    +}
}
static const unsigned char ext4_filetype_table[] = {


extern struct inode *ext4_iget(struct super_block *, unsigned long);
extern struct inode *ext4_iget_normal(struct super_block *, unsigned long);
typedef enum {
    EXT4_IGET_NORMAL =0,
    EXT4_IGET_SPECIAL =0x0001, /* OK to iget a system inode */
    EXT4_IGET_HANDLE = 0x0002 /* Inode # is from a handle */
} ext4_iget_flags;

extern struct inode *__ext4_iget(struct super_block *sb, unsigned long ino,
        ext4_iget_flags flags, const char *function,
        unsigned int line);
#define ext4_iget(sb, ino, flags) __ext4_iget((sb), (ino), (flags), __func__, __LINE__)

extern int  ext4_write_inode(struct inode *, struct writeback_control *);
extern int  ext4_setattr(struct dentry *, struct iattr *);
extern int  ext4_getattr(const struct path *, struct kstat *, u32, unsigned int);
extern bool ext4_empty_dir(struct inode *inode);

/* resize.c */
+extern void ext4_kvfree_array_rcu(void *to_free);
extern int ext4_group_add(struct super_block *sb,
        struct ext4_new_group_data *input);
extern int ext4_group_extend(struct super_block *sb,
        ext4_fsblk_t n_blocks_count);

/* super.c */
+extern struct buffer_head *ext4_sb_bread(struct super_block *sb,
        sector_t block, int op_flags);
extern int ext4_seq_options_show(struct seq_file *seq, void *offset);
extern int ext4_calculate_overhead(struct super_block *sb);
extern void ext4_superblock_csum_set(struct super_block *sb);
#endif

extern void ext4_update_dynamic_rev(struct super_block *sb);
extern int ext4_update_compat_feature(handle_t *handle, struct super_block *sb,
        __u32 compat);
extern int ext4_update_rocompat_feature(handle_t *handle,
struct ext4_group_info *ext4_get_group_info(struct super_block *sb, 
    ext4_group_t group)
{
    struct ext4_group_info ***grp_info;
    long indexv, indexh;
    BUG_ON(group >= EXT4_SB(sb)->s_groups_count);
    -grp_info = EXT4_SB(sb)->s_group_info;
    indexv = group >> (EXT4_DESC_PER_BLOCK_BITS(sb));
    indexh = group & ((EXT4_DESC_PER_BLOCK(sb)) - 1);
    -return grp_info[indexv][indexh];
    +grp_info = sbi_array_rcu_deref(EXT4_SB(sb), s_group_info, indexv);
    +return grp_info[indexh];
}

/*
   @ @ -2816.7 +2860.7 @@
   !inode_is_locked(inode));
   down_write(&EXT4_I(inode)->i_data_sem);
   if (newsize > EXT4_I(inode)->i_disksize)
     -EXT4_I(inode)->i_disksize = newsize;
     +WRITE_ONCE(EXT4_I(inode)->i_disksize, newsize);
   up_write(&EXT4_I(inode)->i_data_sem);
   }

   @ @ -3009.9 +3053.6 @@
   struct iomap;
   extern int ext4_inline_data_iomap(struct inode *inode, struct iomap *iomap);

   -extern int ext4_try_to_evict_inline_data(handle_t *handle,
   - struct inode *inode,
   - int needed);
   extern int ext4_inline_data_truncate(struct inode *inode, int *has_inline);

   extern int ext4_convert_inline_data(struct inode *inode);
   @ @ -3074.9 +3155.9 @@
   extern int ext4_setup_system_zone(struct super_block *sb);
   extern int __init ext4_init_system_zone(void);
   extern void ext4_exit_system_zone(void);
   -extern int ext4_data_block_valid(struct ext4_sb_info *sbi,
     - ext4_fsblk_t start_blk,
     - unsigned int count);
     +extern int ext4_inode_block_valid(struct inode *inode,
       + ext4_fsblk_t start_blk,
       + unsigned int count);
   extern int ext4_check_blockref(const char *, unsigned int,
       struct inode *, __le32 *, unsigned int);
--- linux-4.15.0.orig/fs/ext4/ext4_extents.h
+++ linux-4.15.0/fs/ext4/ext4_extents.h
@@ -103,6 +103,7 @@

#define EXT4_EXT_MAGIC	cpu_to_le16(0xf30a)
+#define EXT4_MAX_EXTENT_DEPTH 5

#define EXT4_EXTENT_TAIL_OFFSET(hdr) \
    (sizeof(struct ext4_extent_header) + \
     @ @ -168,10 +169,13 @@
     (EXT_FIRST_EXTENT((__hdr__)) + le16_to_cpu((__hdr__)->eh_entries) - 1)
#define EXT_LAST_INDEX(__hdr__) \
    (EXT_FIRST_INDEX((__hdr__)) + le16_to_cpu((__hdr__)->eh_entries) - 1)
+#define EXT_MAX_EXTENT(__hdr__) \
    (le16_to_cpu((__hdr__)->eh_max)) ? \
    ((EXT_FIRST_EXTENT((__hdr__)) + le16_to_cpu((__hdr__)->eh_max) - 1)) : 0)
#define EXT_MAX_INDEX(__hdr__) \
    ((le16_to_cpu((__hdr__)->eh_max)) ? \
    ((EXT_FIRST_INDEX((__hdr__)) + le16_to_cpu((__hdr__)->eh_max) - 1)) : 0)

static inline struct ext4_extent_header *ext_inode_hdr(struct inode *inode)
{
    --- linux-4.15.0.orig/fs/ext4/ext4_jbd2.c
+++ linux-4.15.0/fs/ext4/ext4_jbd2.c
@@ -166,13 +166,6 @@

    might_sleep();
    if (ext4_handle_valid(handle)) {
        struct super_block *sb;
-        -sb = handle->h_transaction->t_journal->j_private;
-        -if (unlikely(ext4_forced_shutdown(EXT4_SB(sb)))) {
-            jbd2_journal_abort_handle(handle);
-            return -EIO;
-        }
+        +(where, line, __func__, bh, 

    err = jbd2_journal_get_write_access(handle, bh);
    if (err)
        ext4_journal_abort_handle(where, line, __func__, bh,
--- linux-4.15.0.orig/fs/ext4/ext4_jbd2.h
+++ linux-4.15.0/fs/ext4/ext4_jbd2.h
@@ -364,20 +364,20 @@
}
static inline int ext4_jbd2_inode_add_write(handle_t *handle,
    struct inode *inode, loff_t start_byte, loff_t length)
{
    if (ext4_handle_valid(handle))
        return jbd2_journal_inode_add_write(handle,
            EXT4_I(inode)->jinode);
    return jbd2_journal_inode_ranged_write(handle,
        EXT4_I(inode)->jinode, start_byte, length);
    return 0;
}

static inline int ext4_jbd2_inode_add_wait(handle_t *handle,
    struct inode *inode, loff_t start_byte, loff_t length)
{
    if (ext4_handle_valid(handle))
        return jbd2_journal_inode_add_wait(handle,
            EXT4_I(inode)->jinode);
    return jbd2_journal_inode_ranged_wait(handle,
        EXT4_I(inode)->jinode, start_byte, length);
    return 0;
}

static inline ext4_inode_info *ext4_inode_info *ei = EXT4_I(inode);

@if (ext4_handle_valid(handle))
    ei->i_sync_tid = handle->h_transaction->t_tid;
    if (datasync)
        ei->i_datasync_tid = handle->h_transaction->t_tid;
@end

static int ext4_valid_extent_idx(struct inode *inode,
struct ext4_inode_info *ei = EXT4_I(inode);

static int ext4_valid_extent_idx(struct inode *inode,
    ext4_fsblk_t block = ext4_idx_pblock(ext_idx);
int len = ext4_ext_get_actual_len(ex);
-
-if (prev && (prev != lblk))
-ext4_es_cache_extent(inode, prev,
 -   lblk - prev, ~0,
 -   EXTENT_STATUS_HOLE);
-
-if (ext4_ext_is_unwritten(ex))
-status = EXTENT_STATUS_UNWRITTEN;
-ext4_es_cache_extent(inode, lblk, len,
 -   ext4_ext_pblock(ex), status);
-prev = lblk + len;
-
+ext4_cache_extents(inode, eh);
 }
return bh;

errout:
@@ -865,6 +870,7 @@
eh->eh_entries = 0;
eh->eh_magic = EXT4_EXT_MAGIC;
eh->eh_max = cpu_to_le16(ext4_ext_space_root(inode, 0));
+eh->eh_generation = 0;
ext4_mark_inode_dirty(handle, inode);
return 0;
}
@@ -881,6 +887,12 @@
eh = ext_inode_hdr(inode);
depth = ext_depth(inode);
+if (depth < 0 || depth > EXT4_MAX_EXTENT_DEPTH) {
+  EXT4_ERROR_INODE(inode, "inode has invalid extent depth: %d",
+    depth);
+  ret = -EFSCORRUPTED;
+  goto err;
+}

if (path) {
ext4_ext_drop_refs(path);
@@ -901,6 +913,8 @@
path[0].p_bh = NULL;

i = depth;
+if (!(flags & EXT4_EX_NOCACHE) && depth == 0)
+ext4_cache_extents(inode, eh);
 /* walk through the tree */
 while (i) {
  ext_debug("depth %d: num %d, max %d\n", 
@@ -1041,6 +1055,7 @@
__le32 border;
ext4_fsblk_t *ablocks = NULL; /* array of allocated blocks */
int err = 0;
+size_t ext_size = 0;

/* make decision: where to split */
/* FIXME: now decision is simplest: at current extent */
@@ -1112,6 +1127,7 @@
neh->eh_max = cpu_to_le16(ext4_ext_space_block(inode, 0));
neh->eh_magic = EXT4_EXT_MAGIC;
neh->eh_depth = 0;
+neh->eh_generation = 0;

/* move remainder of path[depth] to the new leaf */
if (unlikely(path[depth].p_hdr->eh_entries !=
@@ -1132,6 +1148,10 @@
le16_add_cpu(&neh->eh_entries, m);
}

+/* zero out unused area in the extent block */
+ext_size = sizeof(struct ext4_extent_header) +
+sizeof(struct ext4_extent) * le16_to_cpu(neh->eh_entries);
+memset_bh->b_data + ext_size, 0, inode->i_sb->s_blocksize - ext_size);
ext4_extent_block_csum_set(inode, neh);
set_buffer_uptodate(bh);
unlock_buffer(bh);
@@ -1185,6 +1205,7 @@
neh->eh_magic = EXT4_EXT_MAGIC;
neh->eh_max = cpu_to_le16(ext4_ext_space_block_idx(inode, 0));
neh->eh_depth = cpu_to_le16(depth - i);
+neh->eh_generation = 0;
fidx = EXT_FIRST_INDEX(neh);
fidx->ei_block = border;
ext4_idx_store_pblock(fidx, oldblock);
@@ -1211,6 +1232,11 @@
le16_add_cpu(&neh->eh_entries, m);
}
+/* zero out unused area in the extent block */
+ext_size = sizeof(struct ext4_extent_header) +
+ (sizeof(struct ext4_extent) * le16_to_cpu(neh->eh_entries));
+memset_bh->b_data + ext_size, 0,
inode->i_sb->s_blocksize - ext_size);
ext4_extent_block_csum_set(inode, neh);
set_buffer_uptodate(bh);
unlock_buffer(bh);
@@ -1276,6 +1302,7 @@
ext4_fsblk_t newblock, goal = 0;
struct ext4_super_block *es = EXT4_SB(inode->i_sb)->s_es;
int err = 0;
+size_t ext_size = 0;

/* Try to prepend new index to old */
if (ext_depth(inode))
    @ @ -1301.9 +1328.11 @@
goto out;
}

+ext_size = sizeof(EXT4_I(inode)->i_data);
/* move top-level index/leaf into new block */
-memmove(bh->b_data, EXT4_I(inode)->i_data,
-sizeof(EXT4_I(inode)->i_data));
+memmove(bh->b_data, EXT4_I(inode)->i_data, ext_size);
/+* zero out unused area in the extent block */
+memset(bh->b_data + ext_size, 0, inode->i_sb->s_blocksize - ext_size);

/* set size of new block */
neh = ext_block_hdr(bh);
@@ -2887,7 +2916,7 @@
* in use to avoid freeing it when removing blocks.
 */
if (sbi->s_cluster_ratio > 1) {
-pblk = ext4_ext_pblock(ex) + end - ee_block + 2;
+pblk = ext4_ext_pblock(ex) + end - ee_block + 1;
partial_cluster =
-(long long) EXT4_B2C(sbi, pblk);
}
@@ -3249,7 +3278,10 @@
ext4_ext_mark_unwritten(ex2);

err = ext4_ext_insert_extent(handle, inode, ppath, &newex, flags);
-if (err == -ENOSPC && (EXT4_EXT_MAY_ZEROOUT & split_flag)) {
 +if (err != -ENOSPC && err != -EDQUOT)
 +goto out;
 +
 +if (EXT4_EXT_MAY_ZEROOUT & split_flag) {
 if (split_flag & (EXT4_EXT_DATA_VALID1|EXT4_EXT_DATA_VALID2)) {
 if (split_flag & EXT4_EXT_DATA_VALID1) {
err = ext4_ext_zeroout(inode, ex2);
@@ -3275,30 +3307,30 @@
 ext4_ext_pblock(&orig_ex));
 }

 -if (err)
 -goto fix_extent_len;
 -/* update the extent length and mark as initialized */

ex->ee_len = cpu_to_le16(ee_len);
ext4_ext_try_to_merge(handle, inode, path, ex);
err = ext4_ext(dirty(handle, inode, path + path->p_depth);
if (err)
goto fix_extent_len;

/* update extent status tree */
err = ext4_zeroout_es(inode, &zero_ex);
-goto out;
} else if (err)
goto fix_extent_len;

out:
exit4_ext_show_leaf(inode, path);
return err;

if (!err) {
/* update the extent length and mark as initialized */
ex->ee_len = cpu_to_le16(ee_len);
ext4_ext_try_to_merge(handle, inode, path, ex);
err = ext4_ext(dirty(handle, inode, path + path->p_depth);
if (!err)
/* update extent status tree */
err = ext4_zeroout_es(inode, &zero_ex);
/* If we failed at this point, we don't know in which
 * state the extent tree exactly is so don't try to fix
 * length of the original extent as it may do even more
 * damage.
 */
goto out;
}
}

fix_extent_len:
ex->ee_len = orig_ex.ee_len;
ext4_ext(dirty(handle, inode, path + path->p_depth);
return err;

out:
ext4_ext_show_leaf(inode, path);
return err;
}

/*
@@ -3427,8 +3459,8 @@
(unsigned long long)map->m_lblk, map_len);
sbi = EXT4_SB(inode->i_sb);
eof_block = (inode->i_size + inode->i_sb->s_blocksize - 1) >>
inode->i_sb->s_blocksize_bits;
+eof_block = (EXT4_L(inode)->i_disksize + inode->i_sb->s_blocksize - 1)
+>> inode->i_sb->s_blocksize_bits;
if (eof_block < map->m_lblk + map->m_len)
eof_block = map->m_lblk + map->m_len;

@@ -3683,8 +3715,8 @@
    __func__, inode->i_ino,
    (unsigned long long)map->m_lblk, map->m_len);

-eof_block = (inode->i_size + inode->i_sb->s_blocksize - 1) >>
-inode->i_sb->s_blocksize_bits;
+eof_block = (EXT4_L(inode)->i_disksize + inode->i_sb->s_blocksize - 1)
+>> inode->i_sb->s_blocksize_bits;
if (eof_block < map->m_lblk + map->m_len)
eof_block = map->m_lblk + map->m_len;
/*
@@ -3737,8 +3769,8 @@
 */
if (ee_block != map->m_lblk || ee_len > map->m_len) {
    #ifdef EXT4_DEBUG
    -ext4_warning("Inode (%ld) finished: extent logical block %llu,"
    +#ifdef CONFIG_EXT4_DEBUG
    +ext4_warning(inode->i_sb, "Inode (%ld) finished: extent logical block %llu,"
    "    len %u; IO logical block %llu, len %u",
    inode->i_ino, (unsigned long long)ee_block, ee_len,
    (unsigned long long)map->m_lblk, map->m_len);
    @@ -5346,8 +5378,9 @@
     stop = le32_to_cpu(extent->ee_block);

    /*
    - * In case of left shift, Don’t start shifting extents until we make
    - * sure the hole is big enough to accommodate the shift.
    +* For left shifts, make sure the hole on the left is big enough to
    +* accommodate the shift. For right shifts, make sure the last extent
    +* won’t be shifted beyond EXT_MAX_BLOCKS.
    */
    if (SHIFT == SHIFT_LEFT) {
        path = ext4_find_extent(inode, start - 1, &path,
        @@ -5367,9 +5400,14 @@
         if ((start == ex_start && shift > ex_start) ||
             (shift > start - ex_end)) {
             -ext4_ext_drop_refs(path);
             -kfree(path);
             -return -EINVAL;
             +ret = -EINVAL;
             +}
goto out;
+
} else {
+ if (shift > EXT_MAX_BLOCKS -
+ (stop + ext4_ext_get_actual_len(extent)) ) {
+ ret = -EINVAL;
+ goto out;
}
}

--- linux-4.15.0.orig/fs/ext4/extents_status.c
+++ linux-4.15.0/fs/ext4/extents_status.c
@@ -1081,11 +1081,9 @@
 ret = percpu_counter_read_positive(&sbi->s_es_stats.es_stats_shk_cnt);
 trace_ext4_es_shrink_scan_enter(sbi->s_sb, nr_to_scan, ret);

- if (!nr_to_scan)
- return ret;
-
 nr_shrunk = __es_shrink(sbi, nr_to_scan, NULL);

+ ret = percpu_counter_read_positive(&sbi->s_es_stats.es_stats_shk_cnt);
 trace_ext4_es_shrink_scan_exit(sbi->s_sb, nr_shrunk, ret);
 return nr_shrunk;
}

--- linux-4.15.0.orig/fs/ext4/file.c
+++ linux-4.15.0/fs/ext4/file.c
@@ -40,9 +40,10 @@
 struct inode *inode = file_inode(iocb->ki_filp);
 ssize_t ret;

- if (!inode_trylock_shared(inode)) {
- if (iocb->ki_flags & IOCB_NOWAIT)
+ if (iocb->ki_flags & IOCB_NOWAIT) {
+ if (!inode_trylock_shared(inode))
   return -EAGAIN;
+ } else {
   inode_lock_shared(inode);
   }
/*
@@ -125,7 +126,7 @@
 struct super_block *sb = inode->i_sb;
 int blockmask = sb->s_blocksize - 1;

- if (pos >= i_size_read(inode))
+ if (pos >= ALIGN(i_size_read(inode), sb->s_blocksize))
 return 0;
if ((pos | iov_iter_alignment(from)) & blockmask)
@@ -165,6 +166,10 @@
 ret = generic_write_checks(iocb, from);
 if (ret <= 0)
 return ret;
+  
+  if (unlikely(IS_IMMUTABLE(inode)))
+  return -EPERM;
+  
+/*
 * If we have encountered a bitmap-format file, the size limit
 * is smaller than s_maxbytes, which is for extent-mapped files.
 @@ -186,9 +191,10 @@
 struct inode *inode = file_inode(iocb->ki_filp);
 ssize_t ret;

-  if (!inode_trylock(inode)) {
-    if (iocb->ki_flags & IOCB_NOWAIT)
+  if (iocb->ki_flags & IOCB_NOWAIT) {
+    if (!inode_trylock(inode))
      return -EAGAIN;
+  } else {
      inode_lock(inode);
    ret = ext4_write_checks(iocb, from);
@@ -264,6 +270,13 @@
 } else {
     ret = __generic_file_write_iter(iocb, from);
+/*
+ * Unaligned direct AIO must be the only IO in flight. Otherwise
+ * overlapping aligned IO after unaligned might result in data
+ * corruption.
+ */
+  if (ret == -EIOCBQUEUED && unaligned_aio)
+ext4_unwritten_wait(inode);
 inode_unlock(inode);

 if (ret > 0)
 --- linux-4.15.0.orig/fs/ext4/fsmap.c
+++ linux-4.15.0/fs/ext4/fsmap.c
@@ -121,6 +121,9 @@
/* Are we just counting mappings? */
 if (info->gfi_head->fmh_count == 0) {
  
+  if (info->gfi_head->fmh_count == 0) {
+    return EXT4_QUERY_RANGE_ABORT;
if (rec_fsblk > info->gfi_next_fsblk)
info->gfi_head->fmh_entries++;

--- linux-4.15.0.orig/fs/ext4/fsync.c
+++ linux-4.15.0/fs/ext4/fsync.c
@@ -44,30 +44,28 @@
*/
static int ext4_sync_parent(struct inode *inode)
{
-struct dentry *dentry = NULL;
-struct inode *next;
+struct dentry *dentry, *next;
int ret = 0;

if (!ext4_test_inode_state(inode, EXT4_STATE_NEWENTRY))
    return 0;
-inode = igrab(inode);
+    dentry = d_find_any_alias(inode);
+if (!dentry)
+    return 0;
    while (ext4_test_inode_state(inode, EXT4_STATE_NEWENTRY)) {
        ext4_clear_inode_state(inode, EXT4_STATE_NEWENTRY);
        -dentry = d_find_any_alias(inode);
-    if (!dentry)
-        break;
-    next = igrab(d_inode(dentry->d_parent));
+    next = dget_parent(dentry);
        dput(dentry);
-    if (!next)
-        break;
-    iput(inode);
-    inode = next;
+    dentry = next;
+    inode = dentry->d_inode;
+/*
 * The directory inode may have gone through rmdir by now. But
 * the inode itself and its blocks are still allocated (we hold
 * a reference to the inode so it didn't go through
 * ext4_evict_inode()) and so we are safe to flush metadata
 * blocks and the inode.
 + * a reference to the inode via its dentry), so it didn't go
 + * through ext4_evict_inode()) and so we are safe to flush
 + * metadata blocks and the inode.
 */
    ret = sync_mapping_buffers(inode->i_mapping);
    if (ret)
@@ -76,7 +74,7 @@
        if (ret)
            break;
    }
-    }put(inode);
+    }dput(dentry);
    return ret;
    }

@@ -159,6 +157,9 @@
    ret = err;
    }
    out:
-    +err = file_check_and_advance_wb_err(file);
+    if (ret == 0)
+        ret = err;
    trace_ext4_sync_file_exit(inode, ret);
    return ret;
    }
--- linux-4.15.0.orig/fs/ext4/ialloc.c
+++ linux-4.15.0/fs/ext4/ialloc.c
@@ -66,44 +66,6 @@
        memset(bitmap + (i >> 3), 0xff, (end_bit - i) >> 3);
    }

-/* Initializes an uninitialized inode bitmap */
-static int ext4_init_inode_bitmap(struct super_block *sb,
-     struct buffer_head *bh,
-     ext4_group_t block_group,
-     struct ext4_group_desc *gdp)
-{
-    struct ext4_group_info *grp;
-    struct ext4_sb_info *sbi = EXT4_SB(sb);
-    J_ASSERT_BH(bh, buffer_locked(bh));
-    
-    /* If checksum is bad mark all blocks and inodes use to prevent
-     * allocation, essentially implementing a per-group read-only flag. */
-    if (!ext4_group_desc_csum_verify(sb, block_group, gdp)) {
-        grp = ext4_get_group_info(sb, block_group);
-        if (!EXT4_MB_GRP_BBITMAP_CORRUPT(grp)) {
-            percpu_counter_sub(&sbi->s_freeclusters_counter,
-                grp->bb_free);
-            set_bit(EXT4_GROUP_INFO_BB_BITMAP_CORRUPT_BIT, &grp->bb_state);
-        }
-        if (!EXT4_MB_GRP_IBITMAP_CORRUPT(grp)) {
-            int count;
-            count = ext4_free_inodes_count(sb, gdp);
-            percpu_counter_sub(&sbi->s_freeinodes_counter,
-                count);
-        }
-    }
- set_bit(EXT4_GROUP_INFO_IBITMAP_CORRUPT_BIT, &grp->bb_state);
- return -EFSBADCRC;
-
-memset(bh->b_data, 0, (EXT4_INODES_PER_GROUP(sb) + 7) / 8);
-ext4_mark_bitmap_end(EXT4_INODES_PER_GROUP(sb), sb->s_blocksize * 8,
-bh->b_data);
-ext4_inode_bitmap_csum_set(sb, block_group, gd, bh,
- EXT4_INODES_PER_GROUP(sb) / 8);
-ext4_group_desc_csum_set(sb, block_group, gd);
-
-return 0;
-
void ext4_end_bitmap_read(struct buffer_head *bh, int uptodate)
{
    if (uptodate) {
        ext4_lock_group(sb, block_group);
        if (buffer_verified(bh))
            goto verified;
        blk = ext4_inode_bitmap(sb, desc);
        if (!ext4_inode_bitmap_csum_verify(sb, block_group, desc, bh,
             EXT4_INODES_PER_GROUP(sb) / 8)) {
            return -EFSBADCRC;
        }
    }
    set_buffer_verified(bh);
    verified:
    ext4_unlock_group(sb, block_group);
    return 0;
}
@@ -160,6 +125,7 @@
ext4_read_inode_bitmap(struct super_block *sb, ext4_group_t block_group)
{
    struct ext4_group_desc *desc;
    struct ext4_sb_info *sbi = EXT4_SB(sb);
    struct buffer_head *bh = NULL;
    ext4_fsblk_t bitmap_blk;
    int err;
    @ @ -169,11 +135,17 @@
    return ERR_PTR(-EFSCORRUPTED);

    bitmap_blk = ext4_inode_bitmap(sb, desc);
    if (bitmap_blk <= le32_to_cpu(sbi->s_es->s_first_data_block)) ||

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+(bitmap_blk >= ext4_blocks_count(sbi->s_es))) {
+ext4_error(sb, "Invalid inode bitmap blk %llu in 
+ "block_group %u", bitmap_blk, block_group);
+return ERR_PTR(-EFSCORRUPTED);
+}
+bh = sb_getblk(sb, bitmap_blk);
+if (unlikely(!bh)) {
- ext4_error(sb, "Cannot read inode bitmap - 
- "block_group = %u, inode_bitmap = %llu",
- block_group, bitmap_blk);
+ext4_warning(sb, "Cannot read inode bitmap - 
+ "block_group = %u, inode_bitmap = %llu",
+ block_group, bitmap_blk);
+return ERR_PTR(-EIO);
}
+if (bitmap_uptodate(bh))
@@ -186,18 +158,24 @@
+}
+ext4_lock_group(sb, block_group);
-if (desc->bg_flags & cpu_to_le16(EXT4_BG_INODE_UNINIT)) {
-err = ext4_init_inode_bitmap(sb, bh, block_group, desc);
+if (ext4_has_group_desc_csum(sb) &&
+ (desc->bg_flags & cpu_to_le16(EXT4_BG_INODE_UNINIT))) {
+if (block_group == 0) {
+ext4_unlock_group(sb, block_group);
+unlock_buffer(bh);
+ext4_error(sb, "Inode bitmap for bg 0 marked 
+ "uninitialized");
+err = -EFSCORRUPTED;
+goto out;
+}
+mempset(bh->b_data, 0, (EXT4_INODES_PER_GROUP(sb) + 7) / 8);
+ext4_mark_bitmap_end(EXT4_INODES_PER_GROUP(sb),
+ sb->s_blocksize * 8, bh->b_data);
+set_bitmap_uptodate(bh);
+set_buffer_uptodate(bh);
+set_buffer_verified(bh);
+ext4_unlock_group(sb, block_group);
+unlock_buffer(bh);
- if (err) {
- ext4_error(sb, "Failed to init inode bitmap for group 
- "%u: %d", block_group, err);
- goto out;
- }
+ return bh;
+}
+ext4_unlock_group(sb, block_group);
percpu_counter_inc(&sbi->s_freeinodes_counter);
if (sbi->s_log_groups_per_flex) {
    ext4_group_t f = ext4_flex_group(sbi, block_group);
    struct flex_groups *fg;

    atomic_inc(&sbi->s_flex_groups[f].free_inodes);
    fg = sbi_array_rcu_deref(sbi, s_flex_groups,
                            ext4_flex_group(sbi, block_group));
    atomic_inc(&fg->free_inodes);
    if (is_directory)
        atomic_dec(&sbi->s_flex_groups[f].used_dirs);
    atomic_dec(&fg->used_dirs);
}
BUFFER_TRACE(bh2, "call ext4_handle_dirty_metadata");
fatal = ext4_handle_dirty_metadata(handle, NULL, bh2);
int flex_size, struct orlov_stats *stats)
{
    struct ext4_group_desc *desc;
    struct flex_groups *flex_group = EXT4_SB(sb)->s_flex_groups;

    if (flex_size > 1) {
        stats->free_inodes = atomic_read(&flex_group[g].free_inodes);
        stats->free_clusters = atomic64_read(&flex_group[g].free_clusters);
        stats->used_dirs = atomic_read(&flex_group[g].used_dirs);
        struct flex_groups *fg = sbi_array_rcu_deref(EXT4_SB(sb),
                                                  s_flex_groups, g);
        stats->free_inodes = atomic_read(&fg->free_inodes);
        stats->free_clusters = atomic64_read(&fg->free_clusters);
        stats->used_dirs = atomic_read(&fg->used_dirs);
        return;
    }

    @ @ -426,7 +407,7 @ @
    *
    * We always try to spread first-level directories.
    *
    - * If there are blockgroups with both free inodes and free blocks counts
    + * If there are blockgroups with both free inodes and free clusters counts
    * not worse than average we return one with smallest directory count.
    * Otherwise we simply return a random group.
    *
    @ @ -435,7 +416,7 @ @
    * It's OK to put directory into a group unless
    * it has too many directories already (max_dirs) or
    * it has too few free inodes left (min_inodes) or
- * it has too few free blocks left (min_blocks) or
+ * it has too few free clusters left (min_clusters) or
* Parent's group is preferred, if it doesn't satisfy these
* conditions we search cyclically through the rest. If none
* of the groups look good we just look for a group with more
@@ -451,7 +432,7 @@
ext4_group_t real_ngroups = ext4_get_groups_count(sb);
int inodes_per_group = EXT4_INODES_PER_GROUP(sb);
unsigned int freei, avefreei, grp_free;
-ext4_fsblk_t freeb, avefreec;
+ext4_fsblk_t freec, avefreec;
unsigned int ndirs;
int max_dirs, min_inodes;
ext4_grpblk_t min_clusters;
@@ -470,9 +451,8 @@
freei = percpu_counter_read_positive(&sbi->freeinodes_counter);
avefreei = freei / ngroups;
-freeb = EXT4_C2B(sbi,
-percpu_counter_read_positive(&sbi->freeclusters_counter));
-avefreec = freeb;
+freec = percpu_counter_read_positive(&sbi->freeclusters_counter);
+avefreec = freec;
do_div(avefreec, ngroups);
ndirs = percpu_counter_read_positive(&sbi->dirs_counter);

@@ -692,7 +672,7 @@
* block has been written back to disk. (Yes, these values are
* somewhat arbitrary...)
*/
#define RECENTCY_MIN	5
+#define RECENTCY_MIN60
#define RECENTCY_DIRTY300

static int recently_deleted(struct super_block *sb, ext4_group_t group, int ino)
@@ -801,6 +781,10 @@
if (unlikely(ext4_forced_shutdown(sbi)))
return ERR_PTR(-EIO);

+/* Supplied owner must be valid */
+if (owner && (owner[0] == (uid_t)-1 || owner[1] == (uid_t)-1))
+return ERR_PTR(-EOVERFLOW);
+
if ((ext4_encrypted_inode(dir) || DUMMY_ENCRYPTION_ENABLED(sbi)) &&
    (S_ISREG(mode) || S_ISDIR(mode) || S_ISLNK(mode)) &&
!i_flags & EXT4_EA_INODE_FL)) {
@@ -881,7 +865,7 @@
ext4_test_inode_flag(dir, EXT4_INODE_PROJINHERIT))

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ei->i_projid = EXT4_I(dir)->i_projid;
else
- ei->i_projid = make_kprojid(&init_user_ns, EXT4_DEF_PROJID);
+ ei->i_projid = make_kprojid(sb->s_user_ns, EXT4_DEF_PROJID);

err = dquot_initialize(inode);
if (err)
@@ -1034,7 +1018,8 @@
/* recheck and clear flag under lock if we still need to */
ext4_lock_group(sb, group);
- if (gdp->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT)) {
+ if (ext4_has_group_desc_csum(sb) &&
+ (gdp->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT))) {
  gdp->bg_flags &= cpu_to_le16(~EXT4_BG_BLOCK_UNINIT);
  ext4_free_group_clusters_set(sb, gdp,
  ext4_free_clusters_after_init(sb, group, gdp));
@@ -1083,7 +1068,8 @@
  if (sbi->s_log_groups_per_flex) {
    ext4_group_t f = ext4_flex_group(sbi, group);

    -atomic_inc(&sbi->s_flex_groups[f].used_dirs);
    +atomic_inc(&sbi_array_rcu_deref(sbi, s_flex_groups,
    +f)->used_dirs);
    }
  }
  if (ext4_has_group_desc_csum(sb)) {
@@ -1106,7 +1092,8 @@
    if (sbi->s_log_groups_per_flex) {
      flex_group = ext4_flex_group(sbi, group);
      -atomic_dec(&sbi->s_flex_groups[flex_group].free_inodes);
      +atomic_dec(&sbi_array_rcu_deref(sbi, s_flex_groups,
      +flex_group)->free_inodes);
      }

    inode->i_ino = ino + group * EXT4_INODES_PER_GROUP(sb);
@@ -1253,7 +1240,7 @@
    if (!ext4_test_bit(bit, bitmap_bh->b_data))
      goto bad_orphan;

    -inode = ext4_iget(sb, ino);
    +inode = ext4_iget(sb, ino, EXT4_IGET_NORMAL);
    if (IS_ERR(inode)) {
      err = PTR_ERR(inode);
      ext4_error(sb, "couldn't read orphan inode %lu (err %d)",
@@ -1381,6 +1368,7 @@
      handle_t *handle;


ext4_fsblk_t blk;
int num, ret = 0, used_blks = 0;
unsigned long used_inos = 0;

/* This should not happen, but just to be sure check this */
if (sb_rdonly(sb)) {
	/* used inodes so we need to skip blocks with used inodes in
* inode table. */
	/*
- if (!(gdp->bg_flags & cpu_to_le16(EXT4_BG_INODE_UNINIT)))
- used_blks = DIV_ROUND_UP((EXT4_INODES_PER_GROUP(sb) -
- ext4_itable_unused_count(sb, gdp),
- sb->s_inodes_per_block);
-
- if ((used_blks < 0) || (used_blks > sb->s_itb_per_group)) {
- ext4_error(sb, "Something is wrong with group %u: ",
- "used itable blocks: %d; ",
- "itable unused count: %u",
- group, used_blks,
- ext4_itable_unused_count(sb, gdp));
- ret = 1;
- goto err_out;
-}
+ if (!(gdp->bg_flags & cpu_to_le16(EXT4_BG_INODE_UNINIT))) {
+ used_inos = EXT4_INODES_PER_GROUP(sb) -
+ ext4_itable_unused_count(sb, gdp);
+ used_blks = DIV_ROUND_UP(used_inos, sb->s_inodes_per_block);
+ */
+ /* Bogus inode unused count? */
+ if (used_blks < 0 || used_blks > sb->s_itb_per_group) {
+ ext4_error(sb, "Something is wrong with group %u: ",
+ "used itable blocks: %d; ",
+ "itable unused count: %u",
+ group, used_blks,
+ ext4_itable_unused_count(sb, gdp));
+ ret = 1;
+ goto err_out;
+ }
+ }+
+ used_inos += group * EXT4_INODES_PER_GROUP(sb);
+ /*
+ * Are there some uninitialized inodes in the inode table
+ * before the first normal inode?
+ */
+ if ((used_blks != sb->s_itb_per_group) &&
+ (used_inos < EXT4_FIRST_INO(sb))) {
+ ext4_error(sb, "Something is wrong with group %u: ",
+ "itable unused count: %u;")

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+ "itables initialized count: %ld",
+ group, ext4_itable_unused_count(sb, gdp),
+ used_inos);
+ret = 1;
+goto err_out;
+}
+
blk = ext4_inode_table(sb, gdp) + used_blks;
--- linux-4.15.0.orig/fs/ext4/indirect.c
+++ linux-4.15.0/fs/ext4/indirect.c
@@ -561,10 +561,16 @@
unsigned epb = inode->i_sb->s_blocksize / sizeof(u32);
int i;

-/* Count number blocks in a subtree under 'partial' */
- count = 1;
- for (i = 0; partial + i != chain + depth - 1; i++)
- count *= epb;
+/*
+ * Count number blocks in a subtree under 'partial'. At each
+ * level we count number of complete empty subtrees beyond
+ * current offset and then descend into the subtree only
+ * partially beyond current offset.
+ */
+ count = 0;
+ for (i = partial - chain + 1; i < depth; i++)
+ count = count * epb + (epb - offsets[i] - 1);
+ count++;
+ /* Fill in size of a hole we found */
+ map->m_pblk = 0;
+ map->m_len = min_t(unsigned int, map->m_len, count);
+ @ @ -836.8 +842.7 @@
+}
else if (ext4_should_journal_data(inode))
flags |= EXT4_FREE_BLOCKS_FORGET;

-if (!ext4_data_block_valid(EXT4_SB(inode->i_sb), block_to_free,
- count)) {
- +if (!ext4_inode_block_valid(inode, block_to_free, count)) {
- EXT4_ERROR_INODE(inode, "attempt to clear invalid 
- "blocks %llu len %lu",
- (unsigned long long) block_to_free, count);
- @ @ -999.8 +1004.7 @@
- if (!nr)
- continue; /* A hole */
+if (!ext4_data_block_valid(EXT4_SB(inode->i_sb),
+ nr, 1)) {

---
```
@if (!ext4_inode_block_valid(inode, nr, 1)) {
  EXT4_ERROR_INODE(inode,
  "invalid indirect mapped 
  "block %lu (level %d)",
  @ @ -1213,6 +1217,7 @@
  ext4_lblk_t offsets[4], offsets2[4];
  Indirect chain[4], chain2[4];
  Indirect *partial, *partial2;
  +Indirect *p = NULL, *p2 = NULL;
  ext4_lblk_t max_block;
  __le32 nr = 0, nr2 = 0;
  int n = 0, n2 = 0;
  @@ -1254,7 +1259,7 @@ }

  -partial = ext4_find_shared(inode, n, offsets, chain, &nr);
  +partial = p = ext4_find_shared(inode, n, offsets, chain, &nr);
  if (nr) {
    if (partial == chain) {
      /* Shared branch grows from the inode */
      @@ -1279,13 +1284,11 @@
      partial->p + 1,
      (__le32 *)partial->bh->b_data+addr_per_block,
      (chain+n-1) - partial);
      -BUFFER_TRACE(partial->bh, "call brelse");
      -brelse(partial->bh);
      partial--;
    }
  }

  end_range:
  -partial2 = ext4_find_shared(inode, n2, offsets2, chain2, &nr2);
  +partial2 = p2 = ext4_find_shared(inode, n2, offsets2, chain2, &nr2);
  if (nr2) {
    if (partial2 == chain2) {
      /*
      @@ -1315,16 +1318,14 @@
      (__le32 *)partial2->bh->b_data,
      partial2->p,
      (chain2+n2-1) - partial2);
      -BUFFER_TRACE(partial2->bh, "call brelse");
      -brelse(partial2->bh);
      partial2--;
    }
    goto do_indirects;
  } 

  /* Punch happened within the same level (n == n2) */
```
-partial = ext4_find_shared(inode, n, offsets, chain, &nr);
-partial2 = ext4_find_shared(inode, n2, offsets2, chain2, &nr2);
+partial = p = ext4_find_shared(inode, n, offsets, chain, &nr);
+partial2 = p2 = ext4_find_shared(inode, n2, offsets2, chain2, &nr2);

/* Free top, but only if partial2 isn't its subtree. */
if (nr) {
@@ -1381,11 +1382,7 @@
    partial->p + 1,
    partial2->p,
    (chain+n-1) - partial);
-BUFFER_TRACE(partial->bh, "call brelse");
-brelse(partial->bh);
-BUFFER_TRACE(partial2->bh, "call brelse");
-brelse(partial2->bh);
-return 0;
+goto cleanup;
}
/*
@@ -1400,8 +1397,6 @@
    partial->p + 1,
    (___le32 *)partial->bh->b_data+addr_per_block,
    (chain+n-1) - partial);
-BUFFER_TRACE(partial->bh, "call brelse");
-brelse(partial->bh);
    partial--;}
if (partial2 > chain2 && depth2 <= depth) {
@@ -1409,11 +1404,21 @@
    (___le32 *)partial2->bh->b_data,
    partial2->p,
    (chain2+n2-1) - partial2);
-BUFFER_TRACE(partial2->bh, "call brelse");
-brelse(partial2->bh);
    partial2--;}
}
+
+cleanup:
+while (p && p > chain) {
+  BUFFER_TRACE(p->bh, "call brelse");
  brelse(p->bh);
  +p--;
+}
+while (p2 && p2 > chain2) {
+  BUFFER_TRACE(p2->bh, "call brelse");
  brelse(p2->bh);
do_indirects:
@@ -1421,7 +1426,7 @@
   switch (offsets[0]) {
   default:
     if (++n >= n2)
-    return 0;
+    break;
     nr = i_data[EXT4_IND_BLOCK];
   if (nr) {
     ext4_free_branches(handle, inode, NULL, &nr, &nr+1, 1);
-    return 0;
+    break;
   }
   case EXT4_IND_BLOCK:
     if (++n >= n2)
-    return 0;
+    break;
     nr = i_data[EXT4_DIND_BLOCK];
   if (nr) {
     ext4_free_branches(handle, inode, NULL, &nr, &nr+1, 2);
-    return 0;
+    break;
   }
   case EXT4_DIND_BLOCK:
     if (++n >= n2)
-    return 0;
+    break;
     nr = i_data[EXT4_TIND_BLOCK];
   if (nr) {
     ext4_free_branches(handle, inode, NULL, &nr, &nr+1, 3);
-    return 0;
+    goto cleanup;
   }
   -return 0;
+goto cleanup;
   
--- linux-4.15.0.orig/fs/ext4/inline.c
+++ linux-4.15.0/fs/ext4/inline.c
@@ -151,6 +151,12 @@
   goto out;
   if (!is.s.not_found) {
     if (is.s.here->e_value_inum) {
-        EXT4_ERROR_INODE(inode, "inline data xattr refers 
+EXT4_ERROR_INODE(inode, "inline data xattr refers 
+ "to an external xattr inode");
error = -EFSCORRUPTED;
+goto out;
+
EXT4_I(inode)->i_inline_off = (u16)((void *)is.s.here -
(void *)ext4_raw_inode(&isiloc));
EXT4_I(inode)->i_inline_size = EXT4_MIN_INLINE_DATA_SIZE +
@@ -438,6 +444,7 @@
memset((void *)ext4_raw_inode(&isiloc)->i_block,
0, EXT4_MIN_INLINE_DATA_SIZE);
+memset(ei->i_data, 0, EXT4_MIN_INLINE_DATA_SIZE);

if (ext4_has_feature_extents(inode->i_sb)) {
if (S_ISDIR(inode->i_mode) ||
@@ -682,6 +689,10 @@
goto convert;
}

+ret = ext4_journal_get_write_access(handle, iloc.bh);
+if (ret)
+goto out;
+
flags |= AOP_FLAG_NOFS;

page = grab_cache_page_write_begin(mapping, 0, flags);
@@ -701,8 +712,11 @@
if (!PageUptodate(page)) {
ret = ext4_read_inline_page(inode, page);
-if (ret < 0)
+if (ret < 0) {
+unlock_page(page);
+put_page(page);
+goto out_up_read;
+}
+
}  
ret = 1;
@@ -710,7 +724,7 @@
out_up_read:
up_read(&EXT4_I(inode)->xattr_sem);
out:
-if (handle)
+if (handle && (ret != 1))
ext4_journal_stop(handle);
brelse(iloc.bh);
return ret;
@@ -743,6 +757,12 @@
ext4_write_lock_xattr(inode, &no Expand);
BUG_ON(!ext4_has_inline_data(inode));

+/*
+ * ei->i_inline_off may have changed since ext4_write_begin()
+ * called ext4_try_to_write_inline_data()
+ */
+(void) ext4_find_inline_data_nolock(inode);
+
+kaddr = kmap_atomic(page);
ext4_write_inline_data(inode, &iloc, kaddr, pos, len);
kunmap_atomic(kaddr);
@@ -752,6 +772,7 @@

ext4_write_unlock_xattr(inode, &no Expand);
breelse(iloc.bh);
+mark_inode_dirty(inode);
out:
return copied;
}
@@ -858,7 +879,7 @@
handle_t *handle;
struct page *page;
struct ext4_iloc iloc;
-int retries;
+int retries = 0;

ret = ext4_get_inode_loc(inode, &iloc);
if (ret)
@@ -887,18 +908,17 @@
flags |= AOP_FLAG_NOFS;

if (ret == -ENOSPC) {
+ext4_journal_stop(handle);
ret = ext4_da_convert_inline_data_to_extent(mapping,
inode,
flags,
fsdata);
-ext4_journal_stop(handle);
if (ret == -ENOSPC &&
 ext4_should_retry_alloc(inode->i_sb, &retries))
goto retry_journal;
goto out;
}
-
page = grab_cache_page_write_begin(mapping, 0, flags);
if (!page) {
ret = -ENOMEM;
@@ -916,6 +936,9 @@
if (ret < 0)
goto out_release_page;
}
+ret = ext4_journal_get_write_access(handle, iloc.bh);
+if (ret)
+goto out_release_page;

up_read(&EXT4_I(inode)->xattr_sem);
*pagep = page;
@@ -936,7 +959,6 @@
    struct page *page)
{
-    int i_size_changed = 0;
    int ret;

    ret = ext4_write_inline_data_end(inode, pos, len, copied, page);
-    if (pos+copied > inode->i_size) {
-        i_size_write(inode, pos+copied);
-        i_size_changed = 1;
-    }
unlock_page(page);
put_page(page);

    @ @ -967,8 +987,7 @@
    * ordering of page lock and transaction start for journaling
    * filesystems.
-    if (i_size_changed)
-        mark_inode_dirty(inode);
+    mark_inode_dirty(inode);

    return copied;
}
@@ -1413,7 +1432,7 @@
err = ext4_htree_store_dirent(dir_file, hinfo->hash,
    hinfo->minor_hash, de, &tmp_str);
if (err) {
-    count = err;
+    ret = err;
    goto out;
count++;

int err, inline_size;
struct ext4_iloc iloc;
+size_t inline_len;
void *inline_pos;
unsigned int offset;
struct ext4_dir_entry_2 *de;

inline_len = ext4_get_inline_size(dir);
offset = EXT4_INLINE_DOTDOT_SIZE;
while (offset < dir->i_size) {
+while (offset < inline_len) {
    de = ext4_get_inline_entry(dir, &iloc, offset,
        &inline_pos, &inline_size);
    if (ext4_check_dir_entry(dir, NULL, de,
        physical += (char *)ext4_raw_inode(&iloc) - iloc.bh->b_data;
    physical += offsetof(struct ext4_inode, i_block);
    if (physical)
        error = fiemap_fill_next_extent(fieinfo, start, physical,
            &inline_len, flags);
    brelse(iloc.bh);
}
out:
up_read(&EXT4_I(inode)->xattr_sem);
if (physical)
    error = fiemap_fill_next_extent(fieinfo, start, physical,
        +inline_len, flags);
return (error < 0 ? error : 0);
}

- * Called during xattr set, and if we can sparse space 'needed',
  * just create the extent tree evict the data to the outer block.
  * We use jbd2 instead of page cache to move data to the 1st block
  * so that the whole transaction can be committed as a whole and
  * the data isn't lost because of the delayed page cache write.
  */
-int ext4_try_to_evict_inline_data(handle_t *handle,
    - struct inode *inode,
    - int needed)
int ext4_xattr_get(struct ext4_xattr_entry *entry, struct ext4_inode *raw_inode, struct ext4_iloc iloc, struct ext4_inode **raw_inode);
-{
-int error;
-struct ext4_xattr_entry *entry;
-struct ext4_inode *raw_inode;
-struct ext4_iloc iloc;
-
-error = ext4_get_inode_loc(inode, &iloc);
-if (error)
-return error;
-
-raw_inode = ext4_raw_inode(&iloc);
-entry = (struct ext4_xattr_entry *)((void *)raw_inode +
- EXT4_I(inode)->i_inline_off);
-if (EXT4_XATTR_LEN(entry->e_name_len) +
- EXT4_XATTR_SIZE(le32_to_cpu(entry->e_value_size)) < needed) {
-error = -ENOSPC;
-goto out;
-}
-
-error = ext4_convert_inline_data_nolock(handle, inode, &iloc);
-out:
-brelse(iloc.bh);
-return error;
-}
-
-int ext4_inline_data_truncate(struct inode *inode, int *has_inline)
{
handle_t *handle;
@@ -1949,6 +1934,7 @@
ext4_write_lock_xattr(inode, &no_expand);
if (!ext4_has_inline_data(inode)) {
+ext4_write_unlock_xattr(inode, &no_expand);
*has_inline = 0;
ext4_journal_stop(handle);
return 0;
--- linux-4.15.0.orig/fs/ext4/inode.c
+++ linux-4.15.0/fs/ext4/inode.c
@@ -195,8 +195,14 @@
{
handle_t *handle;
int err;
-int extra_credits = 3;
+/*
+ * Credits for final inode cleanup and freeing:
+ * sb + inode (ext4_orphan_del()), block bitmap, group descriptor
+ * (xattr block freeing), bitmap, group descriptor (inode freeing)
+ */


int extra_credits = 6;
struct ext4_xattr_inode_array *ea_inode_array = NULL;
bool freeze_protected = false;

trace_ext4_evict_inode(inode);

/*
 * Protect us against freezing - iput() caller didn't have to have any
 * protection against it
 * /
-sb_start_intwrite(inode->i_sb);
+ * protection against it. When we are in a running transaction though,
+ * we are already protected against freezing and we cannot grab further
+ * protection due to lock ordering constraints.
+ */
+if (!ext4_journal_current_handle()) {
+sb_start_intwrite(inode->i_sb);
+freeze_protected = true;
+}

if (!IS_NOQUOTA(inode))
extra_credits += EXT4_MAXQUOTAS_DEL_BLOCKS(inode->i_sb);

+/*
+ * Block bitmap, group descriptor, and inode are accounted in both
+ * ext4_blocks_for_truncate() and extra_credits. So subtract 3.
+ */
+handle = ext4_journal_start(inode, EXT4_HT_TRUNCATE,
- ext4_blocks_for_truncate(inode)+extra_credits);
+ ext4_blocks_for_truncate(inode) + extra_credits - 3);
+if (IS_ERR(handle)) {
+ext4_std_error(inode->i_sb, PTR_ERR(handle));
+}

/*
 * cleaned up.
 */
ext4_orphan_del(NULL, inode);
-sb_end_intwrite(inode->i_sb);
+if (freeze_protected)
+sb_end_intwrite(inode->i_sb);
goto no_delete;
}

/*
 * cleaned up.
 */
stop_handle:
ext4_journal_stop(handle);
ext4_orphan_del(NULL, inode);
-sb_end_intwrite(inode->i_sb);
+if (freeze_protected)
+sb_end_intwrite(inode->i_sb);
ext4_xattr_inode_array_free(ea_inode_array);
goto no_delete;
}
@@ -331,7 +348,8 @@
else
ext4_free_inode(handle, inode);
ext4_journal_stop(handle);
-sb_end_intwrite(inode->i_sb);
+if (freeze_protected)
+sb_end_intwrite(inode->i_sb);
ext4_xattr_inode_array_free(ea_inode_array);
return;
no_delete:
@@ -398,12 +416,15 @@
unsigned int line,
struct ext4_map_blocks *map)
{
-if (!ext4_data_block_valid(EXT4_SB(inode->i_sb), map->m_pblk,
- map->m_len)) {
+if (ext4_has_feature_journal(inode->i_sb) &&
+ (inode->i_ino ==
+ le32_to_cpu(EXT4_SB(inode->i_sb)->s_es->s_journal_inum)))
+return 0;
+if (!ext4_inode_block_valid(inode, map->m_pblk, map->m_len)) {
ext4_error_inode(inode, func, line, map->m_pblk,
- "lblock %lu mapped to illegal pblock "
+ "lblock %lu mapped to illegal pblock %llu "
"(length %d)", (unsigned long) map->m_lblk,
- map->m_len);
+ map->m_pblk, map->m_len);
return -EFSCORRUPTED;
}
return 0;
@@ -728,10 +749,16 @@
!(flags & EXT4_GET_BLOCKS_ZERO) &&
!ext4_is_quota_file(inode) &&
ext4_should_order_data(inode)) {
+loff_t start_byte =
+(loff_t)map->m_lblk << inode->i_blkbits;
+loff_t length = (loff_t)map->m_len << inode->i_blkbits;
+
if (flags & EXT4_GET_BLOCKS_IO_SUBMIT)
-ret = ext4_jbd2_inode_add_wait(handle, inode);
+ret = ext4_jbd2_inode_add_wait(handle, inode,

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+start_byte, length); 
else 
- ret = ext4_jbd2_inode_add_write(handle, inode); 
+ ret = ext4_jbd2_inode_add_write(handle, inode, 
+ start_byte, length); 
if (ret) 
 return ret;  
} 
@@ -1388,9 +1415,10 @@ 
loff_t old_size = inode->i_size; 
int ret = 0, ret2; 
int i_size_changed = 0; 
+int inline_data = ext4_has_inline_data(inode); 

trace_ext4_write_end(inode, pos, len, copied); 
-if (ext4_has_inline_data(inode)) { 
+if (inline_data) { 
 ret = ext4_write_inline_data_end(inode, pos, len, 
 copied, page); 
 if (ret < 0) { 
 @@ -1418,7 +1446,7 @@ 
 * ordering of page lock and transaction start for journaling 
 * filesystems. 
 */ 
-if (i_size_changed) 
+if (i_size_changed || inline_data) 
 ext4_mark_inode_dirty(handle, inode); 

 if (pos + len > inode->i_size && ext4_can_truncate(inode)) 
@@ -1492,6 +1520,7 @@ 
int partial = 0; 
unsigned from, to; 
int size_changed = 0; 
+int inline_data = ext4_has_inline_data(inode); 

trace_ext4_journalled_write_end(inode, pos, len, copied); 
from = pos & (PAGE_SIZE - 1); 
@@ -1499,7 +1528,7 @@ 
 BUG_ON(!ext4_handle_valid(handle)); 

- if (ext4_has_inline_data(inode)) { 
+ if (inline_data) { 
 ret = ext4_write_inline_data_end(inode, pos, len, 
 copied, page); 
 if (ret < 0) { 
 @@ -1530,7 +1559,7 @@ 
 if (old_size < pos)
pagecache_isize_extended(inode, old_size, pos);

-if (size_changed) {
+if (size_changed || inline_data) {
ret2 = ext4_mark_inode_dirty(handle, inode);
if (!ret)
ret = ret2;
@@ -2027,11 +2056,7 @@
 }

if (inline_data) {
-BUFFER_TRACE(inode_bh, "get write access");
-ret = ext4_journal_get_write_access(handle, inode_bh);
-
-err = ext4_handle_dirty_metadata(handle, inode, inode_bh);
-
+ret = ext4_mark_inode_dirty(handle, inode);
 } else {
ret = ext4_walk_page_buffers(handle, page_bufs, 0, len, NULL,
- do_journal_get_write_access);
@@ -2041,18 +2066,21 @@
 }
if (ret == 0)
ret = err;
+err = ext4_jbd2_inode_add_write(handle, inode, page_offset(page), len);
+if (ret == 0)
+ret = err;
 EXT4_I(inode)->i_datasync_tid = handle->h_transaction->t_tid;
err = ext4_journal_stop(handle);
if (!ret)
ret = err;

-if (!ext4_has_inline_data(inode))
-ext4_walk_page_buffers(NULL, page_bufs, 0, len,
- NULL, bput_one);
ext4_set_inode_state(inode, EXT4_STATE_JDATA);
out:
unlock_page(page);
out_no_pagelock:
+if (!inline_data && page_bufs)
+ext4_walk_page_buffers(NULL, page_bufs, 0, len,
+ NULL, bput_one);
brelse(inode_bh);
return ret;
} 
@@ -2110,7 +2138,7 @@
bool keep_towrite = false;

if (unlikely(ext4_forced_shutdown(EXT4_SB(inode->i_sb)))) {
    -ext4_invalidatepage(page, 0, PAGE_SIZE);
    +inode->i_mapping->a_ops->invalidatepage(page, 0, PAGE_SIZE);
    unlock_page(page);
    return -EIO;
}
@@ -2551,7 +2579,7 @@
 * truncate are avoided by checking i_size under i_data_sem.
 */
disksize = ((loff_t)mpd->first_page) << PAGE_SHIFT;
- if (disksize > EXT4_I(inode)->i_disksize) {
+ if (disksize > READ_ONCE(EXT4_I(inode)->i_disksize)) {
    int err2;
    loff_t i_size;

    @@ -2721,7 +2749,7 @@
 if (unlikely(ext4_forced_shutdown(EXT4_SB(inode->i_sb))))
 return -EIO;

 -percpu_down_read(&sbi->s_journal_flag_rwlock);
+percpu_down_read(&sbi->s_writepages_rwlock);
 trace_ext4_writepages(inode, wbc);

 if (dax_mapping(mapping)) {
@@ -2950,7 +2979,7 @@
 out_writepages:
 trace_ext4_writepages_result(inode, wbc, ret,
         nr_to_write - wbc->nr_to_write);
- percpu_up_read(&sbi->s_journal_flag_rwlock);
+ percpu_up_read(&sbi->s_writepages_rwlock);
 return ret;
 }

 @@ -3411,12 +3440,16 @@
 { struct ext4_sb_info *sbi = EXT4_SB(inode->i_sb);
 unsigned int blkbits = inode->i_blkbits;
-unsigned long first_block = offset >> blkbits;
+unsigned long first_block = offset >> blkbits;
unsigned long last_block = (offset + length - 1) >> blkbits;
unsigned long first_block, last_block;
struct ext4_map_blocks map;
bool delalloc = false;
int ret;

if ((offset >> blkbits) > EXT4_MAX_LOGICAL_BLOCK)
    return -EINVAL;
first_block = offset >> blkbits;
last_block = min_t(loff_t, (offset + length - 1) >> blkbits,
    EXT4_MAX_LOGICAL_BLOCK);

if (flags & IOMAP_REPORT) {
    if (ext4_has_inline_data(inode)) {
        return ret;
    }

    /*
     * Writes that span EOF might trigger an I/O size update on completion,
     * so consider them to be dirty for the purposes of O_DSYNC, even if
     * there is no other metadata changes being made or are pending here.
     */
    iomap->flags = 0;
    -if (ext4_inode_datasync_dirty(inode))
    +if (ext4_inode_datasync_dirty(inode) ||
        offset + length > i_size_read(inode))
    +    iomap->flags |= IOMAP_F_DIRTY;
    iomap->bdev = inode->i_sb->s_bdev;
    iomap->dax_dev = sbi->s_daxdev;
    -iomap->offset = first_block << blkbits;
    +iomap->offset = (u64)first_block << blkbits;
    iomap->length = (u64)map.m_len << blkbits;

    if (ret == 0) {
        @ @ -3657,7 +3696,6 @ @
        {
            struct file *file = iocb->ki_filp;
            struct inode *inode = file->f_mapping->host;
        -struct ext4_inode_info *ei = EXT4_I(inode);
            ssize_t ret;
            loff_t offset = iocb->ki_pos;
            size_t count = iov_iter_count(iter);
            @ @ -3681,7 +3719,7 @ @
            goto out;
        }
        orphan = 1;
        -ei->i_disksize = inode->i_size;
ext4_update_i_disksize(inode, inode->i_size);
}
}

/* Credits for sb + inode write */
handle = ext4_journal_start(inode, EXT4_HT_INODE, 2);
if (!handle) {
    /* This is really bad luck. We've written the data
    * but cannot extend i_size. Bail out and pretend
    * the write failed... */
    ret = PTR_ERR(handle);
    /* We wrote the data but cannot extend
    * i_size. Bail out. In async io case, we do
    * not return error here because we have
    * already submitted the corresponding
    * bio. Returning error here makes the caller
    * think that this IO is done and failed
    * resulting in race with bio's completion
    * handler.
    */
    if (!ret)
        ret = PTR_ERR(handle);
    if (inode->i_nlink)
        ext4_orphan_del(NULL, inode);
}

if (ret > 0) {
    lloff_t end = offset + ret;
    if (end > inode->i_size) {
        -ei->i_disksize = end;
        ext4_update_i_disksize(inode, end);
        i_size_write(inode, end);
    /*
     * We're going to return a positive `ret'
    */
    }
    loff_t offset = iocb->ki_pos;
    ssize_t size = i_size_read(inode);
    if (offset >= size)
        return 0;
    if (inode = mapping->host;
    size_t count = iov_iter_count(iter);
    ssize_t ret;
    loff_t offset = iocb->ki_pos;
    loff_t size = i_size_read(inode);
    +
    +if (offset >= size)
    +return 0;

    /*
     * Shared inode_lock is enough for us - it protects against concurrent
     */


* writes & truncates and since we take care of writing back page cache, * we are protected against page writeback as well.
*/
-inode_lock_shared(inode);
+if (iocb->ki_flags & IOCB_NOWAIT) {
+if (!inode_trylock_shared(inode))
+return -EAGAIN;
+} else {
+inode_lock_shared(inode);
+
+ret = filemap_write_and_wait_range(mapping, iocb->ki_pos, iocb->ki_pos + count - 1);
+if (ret)
@@ -4036,7 +4093,8 @@
+err = ext4_jbd2_inode_add_write(handle, inode, from, length);
}
unlock:
@@ -4202,6 +4260,15 @@

trace_ext4_punch_hole(inode, offset, length, 0);
+ext4_clear_inode_state(inode, EXT4_STATE_MAY_INLINE_DATA);
+if (ext4_has_inline_data(inode)) {
+down_write(&EXT4_I(inode)->i_mmap_sem);
+ret = ext4_convert_inline_data(inode);
+up_write(&EXT4_I(inode)->i_mmap_sem);
+if (ret)
+return ret;
+}
+
/*
 * Write out all dirty pages to avoid race conditions
 * Then release them.
@@ -4282,28 +4349,28 @@
 EXT4_BLOCK_SIZE_BITS(sb);
 stop_block = (offset + length) >> EXT4_BLOCK_SIZE_BITS(sb);

-/* If there are no blocks to remove, return now */
-if (first_block >= stop_block)
-goto out_stop;
+/* If there are blocks to remove, do it */
+if (stop_block > first_block) {

-down_write(&EXT4_I(inode)->i_data_sem);
-ext4_discard_preallocations(inode);
+down_write(&EXT4_I(inode)->i_data_sem);
+ext4_discard_preallocations(inode);

-ret = ext4_es_remove_extent(inode, first_block,
-     stop_block - first_block);
-if (ret) {
-up_write(&EXT4_I(inode)->i_data_sem);
-goto out_stop;
-}
+ret = ext4_es_remove_extent(inode, first_block,
+     stop_block - first_block);
+if (ret) {
+up_write(&EXT4_I(inode)->i_data_sem);
+goto out_stop;
+}

-if (ext4_test_inode_flag(inode, EXT4_INODE_EXTENTS))
-    ret = ext4_ext_remove_space(inode, first_block,
-     stop_block - 1);
-else
-    ret = ext4_ind_remove_space(handle, inode, first_block,
-     stop_block);
+if (ext4_test_inode_flag(inode, EXT4_INODE_EXTENTS))
+    ret = ext4_ext_remove_space(inode, first_block,
+     stop_block - 1);
+else
+    ret = ext4_ind_remove_space(handle, inode, first_block,
+     stop_block);

-up_write(&EXT4_I(inode)->i_data_sem);
+up_write(&EXT4_I(inode)->i_data_sem);
+up_write(&EXT4_I(inode)->i_data_sem);
+}
}

if (IS_SYNC(inode))
ext4_handle_sync(handle);

@@ -4491,7 +4558,8 @@
int inodes_per_block, inode_offset;

iloc->bh = NULL;
-if (!ext4_valid_inum(sb, inode->i_ino))
+if (inode->i_ino < EXT4_ROOT_INO
+    || inode->i_ino > le32_to_cpu(EXT4_SB(sb)->s_es->s_inodes_count))
    return -EFSCORRUPTED;
iloc->block_group = (inode->i_ino - 1) / EXT4_INODES_PER_GROUP(sb);
@@ -4593,7 +4661,7 @@
 if (end > table)
 end = table;
 while (b <= end)
-        sb_breadahead(sb, b++);
+        sb_breadahead_unmovable(sb, b++);
 }
/*
@@ -4686,19 +4754,21 @@
 }
 }

-static inline void ext4_iget_extra_inode(struct inode *inode,
+static inline int ext4_iget_extra_inode(struct inode *inode,
struct ext4_inode *raw_inode,
struct ext4_inode_info *ei)
{
    __le32 *magic = (void *)raw_inode +
EXT4_GOOD_OLD_INODE_SIZE + ei->i_extra_isize;
+    if (EXT4_GOOD_OLD_INODE_SIZE + ei->i_extra_isize + sizeof(__le32) <=
    EXT4_INODE_SIZE(inode->i_sb) &&
        *magic == cpu_to_le32(EXT4_XATTR_MAGIC)) {
    ext4_set_inode_state(inode, EXT4_STATE_XATTR);
    -ext4_find_inline_data_nolock(inode);
+    return ext4_find_inline_data_nolock(inode);
    } else
    EXT4_I(inode)->i_inline_off = 0;
    +return 0;
 }

int ext4_get_projid(struct inode *inode, kprojid_t *projid)
@@ -4709,7 +4779,9 @@
 return 0;
 }

-struct inode *ext4_iget(struct super_block *sb, unsigned long ino)
+struct inode *__ext4_iget(struct super_block *sb, unsigned long ino,
+    ext4_iget_flags flags, const char *function,
+    unsigned int line)
{
    struct ext4_iiloc iloc;
    struct ext4_inode *raw_inode;
@@ -4723,6 +4795,18 @@
 gid_t i_gid;
 projid_t i_projid;
+if (!(flags & EXT4_IGET_SPECIAL) &&
+    (ino < EXT4_ROOT_INO(sb) &&
     ino != EXT4_ROOT_INO)) ||
+    (ino > le32_to_cpu(EXT4_SB(sb)->s_es->s_inodes_count)) { 
  +if (flags & EXT4_IGET_HANDLE) 
  +return ERR_PTR(-ESTALE);
  +__ext4_error(sb, function, line,
  +  "inode #%lu: comm %s: iget: illegal inode #",
  +  ino, current->comm);
  +return ERR_PTR(-EFSCORRUPTED);
  +}
  +
  +inode = iget_locked(sb, ino);
  +if (!inode)
  +return ERR_PTR(-ENOMEM);
  +
  +if ((ino == EXT4_ROOT_INO) &&
   (raw_inode->i_links_count == 0)) {
    +ext4_error_inode(inode, function, line, 0,
     "iget: root inode unallocated");
    +ret = -EFSCORRUPTED;
    +goto bad_inode;
    +}
    +
    +if ((flags & EXT4_IGET_HANDLE) &&
     (raw_inode->i_links_count == 0) &&
     (raw_inode->i_mode == 0)) {
      +ret = -ESTALE;
      +goto bad_inode;
      +}
      +
      +if (EXT4_INODE_SIZE(inode->i_sb) > EXT4_GOOD_OLD_INODE_SIZE) {
        +ext4_error_inode(inode, function, line, 0,
         "bad extra isize %u (inode size %u)",
         +ext4_error_inode(inode, function, line, 0,
          "(inode size %u)",
          +i->i_extra_isize, 
          EXT4_INODE_SIZE(inode->i_sb))); 
        +ret = -EFSCORRUPTED; 
    }
if (!ext4_inode_csum_verify(inode, raw_inode, ei)) {
    -EXT4_ERROR_INODE(inode, "checksum invalid");
    +ext4_error_inode(inode, function, line, 0,
                    +"iget: checksum invalid");
    ret = -EFSBADCRC;
    goto bad_inode;
}
@@ -4786,7 +4885,7 @@
}
i_uid_write(inode, i_uid);
i_gid_write(inode, i_gid);
    -ei->i_projid = make_kprojid(&init_user_ns, i_projid);
    +ei->i_projid = make_kprojid(sb->s_user_ns, i_projid);
    set_nlink(inode, le16_to_cpu(raw_inode->i_links_count));
    ext4_clear_state_flags(ei);/* Only relevant on 32-bit archs */
@@ -4814,6 +4913,7 @@
    * not initialized on a new filesystem. */
}
ei->i_flags = le32_to_cpu(raw_inode->i_flags);
+ext4_set_inode_flags(inode);
inode->i_blocks = ext4_inode_blocks(raw_inode, ei);
ei->i_file_acl = le32_to_cpu(raw_inode->i_file_acl_lo);
if (ext4_has_feature_64bit(sb))
    @@ -4821,7 +4921,20 @@
        ((__u64)le16_to_cpu(raw_inode->i_file_acl_high)) << 32;
    inode->i_size = ext4_isize(sb, raw_inode);
    if ((size = i_size_read(inode)) < 0) {
        -EXT4_ERROR_INODE(inode, "bad i_size value: %lld", size);
        +ext4_error_inode(inode, function, line, 0,
                         +"iget: bad i_size value: %lld", size);
        +ret = -EFSCORRUPTED;
        +goto bad_inode;
        +}
        +/*
        + * If dir_index is not enabled but there's dir with INDEX flag set,
        + * we'd normally treat htree data as empty space. But with metadata
        + * checksumming that corrupts checksums so forbid that.
        + */
        +if (!ext4_has_feature_dir_index(sb) && ext4_has_metadata_csum(sb) &&
           +ext4_test_inode_flag(inode, EXT4_INODE_INDEX)) {
           +ext4_error_inode(inode, function, line, 0,
                            +"iget: Dir with htree data on filesystem without dir_index feature.");
           ret = -EFSCORRUPTED;
           goto bad_inode;
        }
@@ -4872,7 +4985,9 @@
ei->i_extra_isize = sizeof(struct ext4_inode) -
    EXT4_GOOD_OLD_INODE_SIZE;
} else {
    -ext4_iget_extra_inode(inode, raw_inode, ei);
+ret = ext4_iget_extra_inode(inode, raw_inode, ei);
    +if (ret)
    +goto bad_inode;

@@ -4892,8 +5007,9 @@
    ret = 0;
    if (ei->i_file_acl &&
        !ext4_data_block_valid(EXT4_SB(sb), ei->i_file_acl, 1)) {
    -EXT4_ERROR_INODE(inode, "bad extended attribute block %llu",
        +ext4_inode_block_valid(inode, ei->i_file_acl, 1)) {
            +ext4_error_inode(inode, function, line, 0,
                "iget: bad extended attribute block %llu",
                ei->i_file_acl);
            ret = -EFSCORRUPTED;
            goto bad_inode;
@@ -4922,6 +5038,14 @@
    inode->i_op = &ext4_dir_inode_operations;
    inode->i_fop = &ext4_dir_operations;
    } else if (S_ISLNK(inode->i_mode)) {
        +/* VFS does not allow setting these so must be corruption */
        +if (IS_APPEND(inode) || IS_IMMUTABLE(inode)) {
            +ext4_error_inode(inode, function, line, 0,
                +"iget: immutable or append flags "
                +"not allowed on symlinks");
            +ret = -EFSCORRUPTED;
            +goto bad_inode;
        +} if (ext4_encrypted_inode(inode)) {
            inode->i_op = &ext4_encrypted_symlink_inode_operations;
            ext4_set_aops(inode);
            @@ -4948,11 +5072,11 @@
                make_bad_inode(inode);
            } else {
                ret = -EFSCORRUPTED;
                -EXT4_ERROR_INODE(inode, "bogus i_mode (%o)", inode->i_mode);
                +ext4_error_inode(inode, function, line, 0,
                +"iget: bogus i_mode (%o)", inode->i_mode);
                goto bad_inode;
            }
            brelse(iloc.bh);
            -ext4_set_inode_flags(inode);
            ret = 0;
            if (ei->i_file_acl &&
                !ext4_data_block_valid(EXT4_SB(sb), ei->i_file_acl, 1)) {
                -EXT4_ERROR_INODE(inode, "bad extended attribute block %llu",
                    +ext4_inode_block_valid(inode, ei->i_file_acl, 1)) {
                        +ext4_error_inode(inode, function, line, 0,
                            "iget: bad extended attribute block %llu",
                            ei->i_file_acl);
                        ret = -EFSCORRUPTED;
                        goto bad_inode;
@@ -4922,6 +5038,14 @@
                            inode->i_op = &ext4_dir_inode_operations;
                            inode->i_fop = &ext4_dir_operations;
                            } else if (S_ISLNK(inode->i_mode)) {
                                +/* VFS does not allow setting these so must be corruption */
                                +if (IS_APPEND(inode) || IS_IMMUTABLE(inode)) {
                                    +ext4_error_inode(inode, function, line, 0,
                                        +"iget: immutable or append flags "
                                        +"not allowed on symlinks");
                                    +ret = -EFSCORRUPTED;
                                    +goto bad_inode;
                                +} if (ext4_encrypted_inode(inode)) {
                                    inode->i_op = &ext4_encrypted_symlink_inode_operations;
                                    ext4_set_aops(inode);
                                    @@ -4948,11 +5072,11 @@
                                        make_bad_inode(inode);
                                    } else {
                                        ret = -EFSCORRUPTED;
                                        -EXT4_ERROR_INODE(inode, "bogus i_mode (%o)", inode->i_mode);
                                        +ext4_error_inode(inode, function, line, 0,
                                            +"iget: bogus i_mode (%o)", inode->i_mode);
                                        goto bad_inode;
                                    }
                                    brelse(iloc.bh);
                                    -ext4_set_inode_flags(inode);
                                    ret = 0;
                                    if (ei->i_file_acl &&
                                        !ext4_data_block_valid(EXT4_SB(sb), ei->i_file_acl, 1)) {
                                            -EXT4_ERROR_INODE(inode, "bad extended attribute block %llu",
                                                +ext4_inode_block_valid(inode, ei->i_file_acl, 1)) {
                                                    +ext4_error_inode(inode, function, line, 0,
                                                        "iget: bad extended attribute block %llu",
                                                        ei->i_file_acl);
                                                    ret = -EFSCORRUPTED;
                                                    goto bad_inode;
                                                }
unlock_new_inode(inode);
return inode;
@@ -4963,19 +5087,12 @@
return ERR_PTR(ret);
}

-struct inode *ext4_iget_normal(struct super_block *sb, unsigned long ino)
-{  
-if (ino < EXT4_FIRST_INO(sb) && ino != EXT4_ROOT_INO)
-return ERR_PTR(-EFSCORRUPTED);
-return ext4_iget(sb, ino);
-}

- static int ext4_inode_blocks_set(handle_t *handle,
- struct ext4_inode *raw_inode,
- struct ext4_inode_info *ei)
- {
- struct inode *inode = &(ei->vfs_inode);
- u64 i_blocks = inode->i_blocks;
+u64 i_blocks = READ_ONCE(inode->i_blocks);
+struct super_block *sb = inode->i_sb;

-if (i_blocks <= ~0U) {  
@@ -5021,16 +5138,16 @@
return 0;
spin_lock(&inode->i_lock);
if (((inode->i_state & (I_FREEING | I_WILL_FREE | I_NEW |
- I_DIRTY_SYNC | I_DIRTY_DATASYNC)) == 0))
+ I_DIRTY_INODE) == 0) &&
(inode->i_state & I_DIRTY_TIME) == 0) &&
-struct ext4_inode_info *ei = EXT4_I(inode);
+struct ext4_inode_info *ei = EXT4_I(inode);

-inode->i_state &= ~(I_DIRTY_TIME | I_DIRTY_TIME_EXPIRED);
+inode->i_state &= ~I_DIRTY_TIME;
spin_unlock(&inode->i_lock);
spin_lock(&ei->i_raw_lock);
@@ -5088,7 +5205,7 @@
struct ext4_inode_info *ei = EXT4_I(inode);
struct buffer_head *bh = iloc->bh;
struct super_block *sb = inode->i_sb;
-int err = 0, rc, block;
+int err = 0, block;
int need_datasync = 0, set_large_file = 0;
uid_t i_uid;
gid_t i_gid;
@@ -5101,10 +5218,16 @@
if (ext4_test_inode_state(inode, EXT4_STATE_NEW))
memset(raw_inode, 0, EXT4_SB(inode->i_sb)->s_inode_size);
+err = ext4_inode_blocks_set(handle, raw_inode, ei);
+if (err) {
+spin_unlock(&ei->i_raw_lock);
+goto out_brelse;
+}
+raw_inode->i_mode = cpu_to_le16(inode->i_mode);
+i_uid = i_uid_read(inode);
+i_gid = i_gid_read(inode);
-i_projid = from_kprojid(&init_user_ns, ei->i_projid);
+i_projid = from_kprojid(sb->s_user_ns, ei->i_projid);
if (!(test_opt(inode->i_sb, NO_UID32))) {
raw_inode->i_uid_low = cpu_to_le16(low_16_bits(i_uid));
raw_inode->i_gid_low = cpu_to_le16(low_16_bits(i_gid));
@@ -5134,18 +5257,13 @@
EXT4_INODE SET_XTIME(i_atime, inode, raw_inode);
EXT4_EINODE_SET_XTIME(i_ctime, ei, raw_inode);

-err = ext4_inode_blocks_set(handle, raw_inode, ei);
-if (err) {
-spin Unlock(&ei->i_raw_lock);
-goto out_brelse;
-}
+raw_inode->i_dtime = cpu_to_le32(ei->i_dtime);
+raw_inode->i_flags = cpu_to_le32(ei->i_flags & 0xFFFFFFFF);
+if (likely(!test_opt2(inode->i sb, HURD COMPAT))) {
+raw_inode->i_file_acl_high =
cpu_to_le16(ei->i_file_acl >> 32);
+raw_inode->i_file_acl_lo = cpu_to_le32(ei->i_file_acl);
+if (esi->i_disksize != ext4_isize(inode->i sb, raw_inode)) {
+if (READ_ONCE(ei->i_disksize) != ext4_isize(inode->i sb, raw_inode)) {
+ext4_isize_set(raw_inode, ei->i_disksize);
+need_datasync = 1;
+
@@ -5183,12 +5301,14 @@

-BUG_ON(!ext4_has_feature_project(inode->i_sb) &&

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- i_projid != EXT4_DEF_PROJID);
-
- if (EXT4_INODE_SIZE(inode->i_sb) > EXT4_GOOD_OLD_INODE_SIZE &&
- EXT4_FITS_IN_INODE(raw_inode, ei, i_projid))
- raw_inode->i_projid = cpu_to_le32(i_projid);
+ if (i_projid != (projid_t)-1) {
+ BUG_ON(ext4_has_feature_project(inode->i_sb) &&
+ i_projid != EXT4_DEF_PROJID);
+}
+ if (EXT4_INODE_SIZE(inode->i_sb) > EXT4_GOOD_OLD_INODE_SIZE &&
+ EXT4_FITS_IN_INODE(raw_inode, ei, i_projid))
+ raw_inode->i_projid = cpu_to_le32(i_projid);
+
ext4_inode_csum_set(inode, raw_inode, ei);
spin_unlock(&ei->i_raw_lock);
@@ -5197,16 +5317,15 @@
 bh->b_data);

 BUFFER_TRACE(bh, "call ext4_handle_dirty_metadata");
-rc = ext4_handle_dirty_metadata(handle, NULL, bh);
- if (!err)
- err = rc;
+err = ext4_handle_dirty_metadata(handle, NULL, bh);
+ if (err)
+ goto out_brelse;
ext4_clear_inode_state(inode, EXT4_STATE_NEW);
if (set_large_file) {
 BUFFER_TRACE(EXT4_SB(sb)->s_sbh, "get write access");
 err = ext4_journal_get_write_access(handle, EXT4_SB(sb)->s_sbh);
 if (err)
 goto out_brelse;
-ext4_update_dynamic_rev(sb);
 ext4_set_feature_large_file(sb);
 ext4_handle_sync(handle);
 err = ext4_handle_dirty_super(handle, sb);
 @@ -5256,9 +5375,13 @@
 {
 int err;

- if (WARN_ON_ONCE(current->flags & PF_MEMALLOC))
+ if (WARN_ON_ONCE(current->flags & PF_MEMALLOC)) ||
+ sb_rdonly(inode->i_sb))
 return 0;

+ if (unlikely(ext4_forced_shutdown(EXT4_SB(inode->i_sb))))
+ return -EIO;
+}
if (EXT4_SB(inode->i_sb)->s_journal) {
if (ext4_journal_current_handle()) {
    jbd_debug(1, "called recursively, non-PF_MEMALLOC\n");
    @ @ -5274,7 +5397,8 @@
if (wbc->sync_mode != WB_SYNC_ALL || wbc->for_sync)
    return 0;
-
    -err = ext4_force_commit(inode->i_sb);
+    err = jbd2_complete_transaction(EXT4_SB(inode->i_sb)->s_journal,
+        EXT4_I(inode)->i_sync_tid);
} else {
    struct ext4_iloc iloc;
    @ @ -5312,11 +5436,15 @@

    offset = inode->i_size & (PAGE_SIZE - 1);
/
    /*
     * All buffers in the last page remain valid? Then there's nothing to
     * do. We do the check mainly to optimize the common PAGE_SIZE ==
     * blocksize case
     * + If the page is fully truncated, we don't need to wait for any commit
     * + (and we even should not as __ext4_journalled_invalidatepage() may
     * + strip all buffers from the page but keep the page dirty which can then
     * + confuse e.g. concurrent ext4_writepage() seeing dirty page without
     * + buffers). Also we don't need to wait for any commit if all buffers in
     * + the page remain valid. This is most beneficial for the common case of
     * + blocksize == PAGESIZE.
     */
    -if (offset > PAGE_SIZE - i_blocksize(inode))
+if (!offset || offset > (PAGE_SIZE - i_blocksize(inode)))
    return;
    while (1) {
        page = find_lock_page(inode->i_mapping,
        @ @ -5373,6 +5501,14 @@
        if (unlikely(ext4_forced_shutdown(EXT4_SB(inode->i_sb))))
            return -EIO;

+    +if (unlikely(IS_IMMUTABLE(inode)))
+        return -EPERM;
+    +if (unlikely(IS_APPEND(inode)) &&
+        (ia_valid & (ATTR_MODE | ATTR_UID |
+            ATTR_GID | ATTR_TIMES_SET))))
+        return -EPERM;
+    +
        error = setattr_prepare(dentry, attr);
    if (error)
        return error;

}
up_write(&EXT4_I(inode)->i_data_sem);
ext4_journal_stop(handle);
if (error) {
  -if (orphan)
  +if (orphan && inode->i_nlink)
  ext4_orphan_del(NULL, inode);
goto err_out;
} }
}
-if (!shrink)
+if (!shrink) {
pagecache_isize_extended(inode, oldsize, inode->i_size);
-
-/*
- * Blocks are going to be removed from the inode. Wait
- * for dio in flight. Temporarily disable
- * dioread_nolock to prevent livelock.
- */
-if (orphan) {
-if (!ext4_should_journal_data(inode)) {
- ext4_inode_block_unlocked_dio(inode);
- inode_dio_wait(inode);
- ext4_inode_resume_unlocked_dio(inode);
- } else
- ext4_wait_for_tail_page_commit(inode);
+} else {
+/*
+ * Blocks are going to be removed from the inode. Wait
+ * for dio in flight.
+ */
+inode_dio_wait(inode);
}
+if (orphan && ext4_should_journal_data(inode))
+ext4_wait_for_tail_page_commit(inode);
down_write(&EXT4_I(inode)->i_mmap_sem);
/*
 * Truncate pagecache after we've waited for commit
@ @ -5705,9 +5836,10 @@
{
int err = 0;

-if (unlikely(ext4_forced_shutdown(EXT4_SB(inode->i_sb))))
+if (unlikely(ext4_forced_shutdown(EXT4_SB(inode->i_sb)))) {
+ put_bh(iloc->bh);
return -EIO;
- }
+}
if (IS_I_VERSION(inode))
inode_inc_iveversion(inode);

@@ -5754,8 +5886,23 @@
{
 struct ext4_inode *raw_inode;
 struct ext4_xattr_ibody_header *header;
+unsigned int inode_size = EXT4_INODE_SIZE(inode->i_sb);
+struct ext4_inode_info *ei = EXT4_I(inode);
 int error;

+/* this was checked at iget time, but double check for good measure */
+if ((EXT4_GOOD_OLD_INODE_SIZE + ei->i_extra_isize > inode_size) ||
+    (ei->i_extra_isize & 3)) {
+    EXT4_ERROR_INODE(inode, "bad extra_isize %u (inode size %u)",
+        ei->i_extra_isize,
+        EXT4_INODE_SIZE(inode->i_sb));
+    return -EFSCORRUPTED;
+}
+if ((new_extra_isize < ei->i_extra_isize) ||
+    (new_extra_isize < 4) ||
+    (new_extra_isize > inode_size - EXT4_GOOD_OLD_INODE_SIZE))
+    return -EINVAL; /* Should never happen */
+
+raw_inode = ext4_raw_inode(iloc);

header = IHDR(inode, raw_inode);
@@ -5845,11 +5992,11 @@
 ext4_write_lock_xattr(inode, &no_expand);

 -BUFFER_TRACE(iloc.bh, "get_write_access");
 +BUFFER_TRACE(iloc->bh, "get_write_access");
 error = ext4_journal_get_write_access(handle, iloc->bh);
 if (error) {
     brelse(iloc->bh);
-    goto out_stop;
+    goto out_unlock;
 }

 error = __ext4_expand_extra_isize(inode, new_extra_isize, iloc,
@@ -5859,8 +6006,8 @@
 if (!error)
     error = rc;

+out_unlock:
 ext4_write_unlock_xattr(inode, &no_expand);
-out_stop:
ext4_journal_stop(handle);
return error;
}
@@ -6007,7 +6154,7 @@
}
}

-percpu_down_write(&sbi->s_journal_flag_rwlock);
+percpu_down_write(&sbi->s_writepages_rwlock);
jbd2_journal_lock_updates(journal);

/*
@@ -6024,7 +6171,7 @@
err = jbd2_journal_flush(journal);
if (err < 0) {
  jbd2_journal_unlock_updates(journal);
-percpu_up_write(&sbi->s_journal_flag_rwlock);
+percpu_up_write(&sbi->s_writepages_rwlock);
  ext4_inode_resume_unlocked_dio(inode);
  return err;
}
@@ -6033,7 +6180,7 @@
ext4_set_aops(inode);

jbd2_journal_unlock_updates(journal);
-percpu_up_write(&sbi->s_journal_flag_rwlock);
+percpu_up_write(&sbi->s_writepages_rwlock);

if (val)
  up_write(&EXT4_I(inode)->i_mmap_sem);
@@ -6072,6 +6219,9 @@
get_block_t *get_block;
int retries = 0;

+if (unlikely(IS_IMMUTABLE(inode)))
+return VM_FAULT_SIGBUS;
+
sb_start_pagefault(inode->i_sb);
file_update_time(vma->vm_file);

@@ -6081,9 +6231,17 @@
if (ret)
goto out_ret;

+/*
+ * On data journalling we skip straight to the transaction handle:
+ * there's no delalloc; page truncated will be checked later; the
+ * early return w/ all buffers mapped (calculates size/len) can't
+*/
+ * be used; and there's no dioread_nolock, so only ext4_get_block.
+ */
+if (ext4_should_journal_data(inode))
+goto retry_alloc;
+
+ /* Delalloc case is easy... */
if (test_opt(inode->i_sb, DELALLOC) &&
    !ext4_should_journal_data(inode) &&
    !ext4_nonda_switch(inode->i_sb)) {
    do {
        ret = block_page_mkwrite(vma, vmf,
            @ -6109,6 +6267,9 @
    */
    * Return if we have all the buffers mapped. This avoids the need to do
    * journal_start/journal_stop which can block and take a long time
    * + *
    * This cannot be done for data journalling, as we have to add the
    * + * inode to the transaction's list to writeprotect pages on commit.
    */
if (page_has_buffers(page)) {
    if (!ext4_walk_page_buffers(NULL, page_buffers(page),
        @ -6133,16 +6294,44 @
    ret = VM_FAULT_SIGBUS;
    goto out;
    }
    -ret = block_page_mkwrite(vma, vmf, get_block);
    -if (!ret & ext4_should_journal_data(inode)) {
    -if (ext4_walk_page_buffers(handle, page_buffers(page), 0,
        - PAGE_SIZE, NULL, do_journal_get_write_access)) {
        -unlock_page(page);
    +/*
    + * Data journalling can't use block_page_mkwrite() because it
    + * will set_buffer_dirty() before do_journal_get_write_access()
    + * thus might hit warning messages for dirty metadata buffers.
    + */
    +if (!ext4_should_journal_data(inode)) {
        +ret = block_page_mkwrite(vma, vmf, get_block);
        +} else {
            +lock_page(page);
            +size = i_size_read(inode);
        +/* Page got truncated from under us? */
        +if (page->mapping != mapping || page_offset(page) > size) {
            +ret = VM_FAULT_NOPAGE;
            +goto out_error;
            +}
            +if (page->index == size >> PAGE_SHIFT)
            +len = size & ~PAGE_MASK;
+else
+len = PAGE_SIZE;
+
+ret = __block_write_begin(page, 0, len, ext4_get_block);
+if (!ret) {
    ret = VM_FAULT_SIGBUS;
    ext4_journal_stop(handle);
    goto out;
+    if (ext4_walk_page_buffers(handle, page_buffers(page),
+0, len, NULL, do_journal_get_write_access))
+    goto out_error;
+    if (ext4_walk_page_buffers(handle, page_buffers(page),
+0, len, NULL, write_end_fn))
+    goto out_error;
+    if (ext4_jbd2_inode_add_write(handle, inode,
+        page_offset(page), len))
+    goto out_error;
+    ext4_set_inode_state(inode, EXT4_STATE_JDATA);
+    ret = 0; // ensure return is VM_FAULT_LOCKED.
+} else {
+    unlock_page(page);
+
    ext4_set_inode_state(inode, EXT4_STATE_JDATA);
    ext4_journal_stop(handle);
    if (ret == -ENOSPC && ext4_should_retry_alloc(inode->i_sb, &retries))
        @ @ -6153.6 +6342.10 @ @
        up_read(&EXT4_I(inode)->i_mmap_sem);
        sb_end_pagefault(inode->i_sb);
        return ret;
+    out_error:
+    unlock_page(page);
+    ext4_journal_stop(handle);
+    goto out;
+
int ext4_filemap_fault(struct vm_fault *vmf)
--- linux-4.15.0.orig/fs/ext4/ioctl.c
+++ linux-4.15.0/fs/ext4/ioctl.c
@@ -62,19 +62,20 @@
    isize;
    struct ext4_inode_info *ei1;
    struct ext4_inode_info *ei2;
+    unsigned long tmp;
    ei1 = EXT4_I(inode1);
    ei2 = EXT4_I(inode2);
-swap(inode1->i_flags, inode2->i_flags);
swap(inode1->i_version, inode2->i_version);

- swap(inode1->i_blocks, inode2->i_blocks);
- swap(inode1->i_bytes, inode2->i_bytes);

swap(inode1->i_atime, inode2->i_atime);
swap(inode1->i_mtime, inode2->i_mtime);

memswap(ei1->i_data, ei2->i_data, sizeof(ei1->i_data));
swap(ei1->i_flags, ei2->i_flags);
tmpl = ei1->i_flags & EXT4_FL_SHOULD_SWAP;
edi1->i_flags = (ei2->i_flags & EXT4_FL_SHOULD_SWAP) |
+(ei1->i_flags & ~EXT4_FL_SHOULD_SWAP);
edi2->i_flags = tmp | (ei2->i_flags & ~EXT4_FL_SHOULD_SWAP);
swap(ei1->i_disksize, ei2->i_disksize);

ext4_es_remove_extent(inode1, 0, EXT_MAX_BLOCKS);
ext4_es_remove_extent(inode2, 0, EXT_MAX_BLOCKS);

static void reset_inode_seed(struct inode *inode)
+
+struct ext4_inode_info *ei = EXT4_I(inode);
+struct ext4_sb_info *sbi = EXT4_SB(inode->i_sb);
+__le32 inum = cpu_to_le32(inode->i_ino);
+__le32 gen = cpu_to_le32(inode->i_generation);
+__u32 csum;
+
+if (!ext4_has_metadata_csum(inode->i_sb))
+return;
++csum = ext4_chksum(sbi, sbi->s_csum_seed, (__u8 *)&inum, sizeof(inum));
+ei->i_csum_seed = ext4_chksum(sbi, csum, (__u8 *)&gen, sizeof(gen));
+
/*
 * Swap the information from the given @inode and the inode
 * EXT4_BOOT_LOADER_INO. It will basically swap i_data and all other
 * int err;
struct inode *inode_bl;
struct ext4_inode_info *ei_bl;
+qsize_t size, size_bl, diff;
+blkcnt_t blocks;
+unsigned short bytes;
+
-if (inode->i_nlink != 1 || !S_ISREG(inode->i_mode))
-return -EINVAL;
if (!inode_owner_or_capable(inode) || !capable(CAP_SYS_ADMIN))
return -EPERM;

inode_bl = ext4_iget(sb, EXT4_BOOT_LOADER_INO);
inode_bl = ext4_iget(sb, EXT4_BOOT_LOADER_INO, EXT4_IGET_SPECIAL);
if (IS_ERR(inode_bl))
return PTR_ERR(inode_bl);
ei_bl = EXT4_I(inode_bl);

filemap_flush(inode->i_mapping);
filemap_flush(inode_bl->i_mapping);

/* Protect orig inodes against a truncate and make sure,
* that only 1 swap_inode_boot_loader is running. */
lock_two_nondirectories(inode, inode_bl);

-truncate_inode_pages(&inode->i_data, 0);
-truncate_inode_pages(&inode_bl->i_data, 0);
+if (inode->i_nlink != 1 || !S_ISREG(inode->i_mode))
  + IS_SWAPFILE(inode) || IS_ENCRYPTED(inode)
  + (EXT4_I(inode)->i_flags & EXT4_JOURNAL_DATA_FL)
  + ext4_has_inline_data(inode)) {
    +err = -EINVAL;
    +goto journal_err_out;
  +}
  +
  +if (IS_RDONLY(inode) || IS_APPEND(inode) || IS_IMMUTABLE(inode)
    + !inode_owner_or_capable(inode) || !capable(CAP_SYS_ADMIN)) {
      +err = -EPERM;
      +goto journal_err_out;
    +}
    +
    +down_write(&EXT4_I(inode)->i_mmap_sem);
    +err = filemap_write_and_wait(inode->i_mapping);
    +if (err)
      +goto err_out;
    +
    +err = filemap_write_and_wait(inode_bl->i_mapping);
    +if (err)
      +goto err_out;

  /* Wait for all existing dio workers */
ext4_inode_block_unlocked_dio(inode);
   @@ -128,10 +158,13 @@
inode_dio_wait(inode);
inode_dio_wait(inode_bl);
+truncate_inode_pages(&inode->i_data, 0);
+truncate_inode_pages(&inode_bl->i_data, 0);
+
handle = ext4_journal_start(inode_bl, EXT4_HT_MOVE_EXTENTS, 2);
if (IS_ERR(handle)) {
  err = -EINVAL;
  goto journal_err_out;
++goto err_out;
}

/* Protect extent tree against block allocations via delalloc */
@@ -154,36 +187,71 @@
memset(ei_bl->i_data, 0, sizeof(ei_bl->i_data));
}

+err = dquot_initialize(inode);
+if (err)
+  goto err_out1;
+
+size = (qsize_t)(inode->i_blocks) * (1 << 9) + inode->i_bytes;
+size_bl = (qsize_t)(inode_bl->i_blocks) * (1 << 9) + inode_bl->i_bytes;
+diff = size - size_bl;
swap_inode_data(inode, inode_bl);

inode->i_ctime = inode_bl->i_ctime = current_time(inode);

inode->i_generation = prandom_u32();
inode_bl->i_generation = prandom_u32();
+reset_inode_seed(inode);
+reset_inode_seed(inode_bl);

ext4_discard_preallocations(inode);

err = ext4_mark_inode_dirty(handle, inode);
if (err < 0) {
  /* No need to update quota information. */
  ext4_warning(inode->i_sb,
"couldn't mark inode #\%lu dirty (err %d)",
inode->i_ino, err);
/* Revert all changes: */
swap_inode_data(inode, inode_bl);
-} else {
-err = ext4_mark_inode_dirty(handle, inode_bl);
-if (err < 0) {
-  ext4_warning(inode_bl->i_sb,
-"couldn't mark inode #\%lu dirty (err %d)",
inode_bl->i_ino, err);
-/* Revert all changes: */
- swap_inode_data(inode, inode_bl);
- ext4_mark_inode_dirty(handle, inode);
-
+ ext4_mark_inode_dirty(handle, inode);
+ goto err_out1;
+ }
+
+ blocks = inode_bl->i_blocks;
+ bytes = inode_bl->i_bytes;
+ inode_bl->i_blocks = inode->i_blocks;
+ inode_bl->i_bytes = inode->i_bytes;
+ err = ext4_mark_inode_dirty(handle, inode_bl);
+ if (err < 0) {
+ /* No need to update quota information. */
+ ext4_warning(inode_bl->i_sb,
+ "couldn't mark inode #%lu dirty (err %d)",
+ inode_bl->i_ino, err);
+ goto revert;
+ }
+
+ /* Bootloader inode should not be counted into quota information. */
+ if (diff > 0)
+ quot_free_space(inode, diff);
+ else
+ err = quot_alloc_space(inode, -1 * diff);
+ 
+ if (err < 0) {
+ revert:
+ /* Revert all changes: */
+ inode_bl->i_blocks = blocks;
+ inode_bl->i_bytes = bytes;
+ swap_inode_data(inode, inode_bl);
+ ext4_mark_inode_dirty(handle, inode);
+ ext4_mark_inode_dirty(handle, inode_bl);
+ }
+
+ err_out1:
+ ext4_journal_stop(handle);
+ ext4_double_up_write_data_sem(inode, inode_bl);
+
+ err_out:
+ up_write(&EXT4_I(inode)->i_mmap_sem);
+ journal_err_out:
+ ext4_inode_resume_unlocked_dio(inode);
+ ext4_inode_resume_unlocked_dio(inode_bl);
+ @ @ -204,6 +272,29 @ @
} 
#endif
+/*
+ * If immutable is set and we are not clearing it, we're not allowed to change
+ * anything else in the inode. Don't error out if we're only trying to set
+ * immutable on an immutable file.
+ */
+static int ext4_ioctl_check_immutable(struct inode *inode, __u32 new_projid,
+    unsigned int flags)
+{
+struct ext4_inode_info *ei = EXT4_I(inode);
+unsigned int oldflags = ei->i_flags;
+
+if (!(oldflags & EXT4_IMMUTABLE_FL) || !(flags & EXT4_IMMUTABLE_FL))
+    return 0;
+
+if ((oldflags & ~EXT4_IMMUTABLE_FL) != (flags & ~EXT4_IMMUTABLE_FL))
+    return -EPERM;
+
+if (ext4_has_feature_project(inode->i_sb) &&
+    __kprojid_val(ei->i_projid) != new_projid)
+    return -EPERM;
+
+return 0;
+
+static int ext4_ioctl_setflags(struct inode *inode,
+    unsigned int flags)
+{
+    int jflag = EXT4_JOURNAL_DATA_FL;
+
+    if ((jflag ^ oldflags) & (EXT4_JOURNAL_DATA_FL)) {
+        if (!capable(CAP_SYS_RESOURCE))
+            goto flags_out;
+    }
+
+    if ((flags ^ oldflags) & EXT4_EXTENTS_FL)
+        goto flags_out;
+
+    if (S_ISREG(inode->i_mode) && !IS_IMMUTABLE(inode) &&
+        (flags & EXT4_IMMUTABLE_FL)) {
+        /* Wait for all pending directio and then flush all the dirty pages
+         * for this file. The flush marks all the pages readonly, so any
+         * subsequent attempt to write to the file (particularly mmap pages)
+         * will come through the filesystem and fail.
+         */
+        if (S_ISREG(inode->i_mode) && !IS_IMMUTABLE(inode) &&
+            (flags & EXT4_IMMUTABLE_FL)) {
+            /* the relevant capability.
+             */
+            if (!ns_capable(inode->i_sb->s_user_ns, CAP_SYS_RESOURCE))
+                goto flags_out;
+        }
+    }
+}
+"
inode_dio_wait(inode);
+err = filemap_write_and_wait(inode->i_mapping);
+if (err)
+goto flags_out;
+
+handle = ext4_journal_start(inode, EXT4_HT_INODE, 1);
if (IS_ERR(handle)) {
  err = PTR_ERR(handle);
@@ -337,24 +442,21 @@
  if (EXT4_INODE_SIZE(sb) <= EXT4_GOOD_OLD_INODE_SIZE)
    return -EOPNOTSUPP;

-kprojid = make_kprojid(&init_user_ns, (projid_t)projid);
+kprojid = make_kprojid(sb->s_user_ns, (projid_t)projid);

+if (!projid_valid(kprojid))
+return -EOVERFLOW;
if (projid_eq(kprojid, EXT4_I(inode)->i_projid))
  return 0;

-err = mnt_want_write_file(filp);
-if (err)
-  return err;
-
-err = -EPERM;
-inode_lock(inode);
/* Is it quota file? Do not allow user to mess with it */
if (ext4_is_quota_file(inode))
  goto out_unlock;
+return err;

err = ext4_get_inode_loc(inode, &iloc);
if (err)
  goto out_unlock;
+return err;

raw_inode = ext4_raw_inode(&iloc);
if (!EXT4_FITS_IN_INODE(raw_inode, ei, i_projid)) {
  EXT4_SB(sb)->s_want_extra_isize,
  &iloc);
  if (err)
    goto out_unlock;
  +return err;
} else {
  brelse(iloc.bh);
}
- quot_initialize(inode);
+ err = quot_initialize(inode);
+ if (err)
+ return err;

handle = ext4_journal_start(inode, EXT4_HT_QUOTA,
EXT4_QUOTA_INIT_BLOCKS(sb) +
EXT4_QUOTA_DEL_BLOCKS(sb) + 3);
- if (IS_ERR(handle)) {
- err = PTR_ERR(handle);
- goto out_unlock;
- }
+ if (IS_ERR(handle))
+ return PTR_ERR(handle);

err = ext4_reserve_inode_write(handle, inode, &iloc);
if (err)
@@ -403,9 +505,6 @@
 err = rc;
 out_stop:
 ext4_journal_stop(handle);
-out_unlock:
- inode_unlock(inode);
- mnt_drop_write_file(filp);
 return err;
 }
#else
@@ -491,15 +590,13 @@
 set_bit(EXT4_FLAGS_SHUTDOWN, &sbi->s_ext4_flags);
 if (sbi->s_journal && !is_journal_aborted(sbi->s_journal)) {
 (void) ext4_force_commit(sb);
-jbd2_journal_abort(sbi->s_journal, 0);
+ jbd2_journal_abort(sbi->s_journal, -ESHUTDOWN);
 } break;
case EXT4_GOING_FLAGS_NOLOGFLUSH:
 set_bit(EXT4_FLAGS_SHUTDOWN, &sbi->s_ext4_flags);
- if (sbi->s_journal && !is_journal_aborted(sbi->s_journal)) {
- msleep(100);
-jbd2_journal_abort(sbi->s_journal, 0);
- }
+ if (sbi->s_journal && !is_journal_aborted(sbi->s_journal))
+ jbd2_journal_abort(sbi->s_journal, -ESHUTDOWN);
 break;
default:
 return -EINVAL;
@@ -630,6 +727,30 @@
return err;
}

+static int ext4_ioctl_check_project(struct inode *inode, struct fsxattr *fa)
+{
+/*
+ * Project Quota ID state is only allowed to change from within the init
+ * namespace. Enforce that restriction only if we are trying to change
+ * the quota ID state. Everything else is allowed in user namespaces.
+ */
+if (current_user_ns() == &init_user_ns)
+return 0;
+
+if (__kprojid_val(EXT4_I(inode)->i_projid) != fa->fsx Projid)
+return -EINVAL;
+
+if (ext4_test_inode_flag(inode, EXT4_INODE_PROJINHERIT)) {
+if (!(fa->fsx_xflags & FS_XFLAG_PROJINHERIT))
+return -EINVAL;
+} else {
+if (fa->fsx_xflags & FS_XFLAG_PROJINHERIT)
+return -EINVAL;
+}
+
+ return 0;
+
+long ext4_ioctl(struct file *filp, unsigned int cmd, unsigned long arg)
+
+ inode *inode = file_inode(filp);
+ err = ext4_ioctl_setflags(inode, flags);
+ from_kprojid(&init_user_ns, ei->i_projid),
+ +flags);
+ if (!err)
+ return 0;
+ +return 0;
+ }
+
+ int ext4_ioctl(struct file *filp, unsigned int cmd, unsigned long arg){
if (!err && (o_group < EXT4_SB(sb)->s_groups_count) &&
    ext4_has_group_desc_csum(sb) &&
    test_opt(sb, INIT_INODE_TABLE))
err = ext4_register_li_request(sb, o_group);
@@ -914,12 +1039,19 @@
struct fstrim_range range;
int ret = 0;

-if (!capable(CAP_SYS_ADMIN))
+if (!ns_capable(sb->s_user_ns, CAP_SYS_ADMIN))
    return -EPERM;

if (!blk_queue_discard(q))
    return -EOPNOTSUPP;

+/*
+ * We haven’t replayed the journal, so we cannot use our
+ * block-bitmap-guided storage zapping commands.
+ */
+if (test_opt(sb, NOLOAD) && ext4_has_feature_journal(sb))
+return -EROFS;
+
if (copy_from_user(&range, (struct fstrim_range __user *)arg,
    sizeof(range)))
    return -EFAULT;
@@ -964,7 +1096,10 @@
err = ext4_journal_get_write_access(handle, sbi->s_sbh);
if (err)
go to pwsalt_err_journal;
+lock_buffer(sbi->s_sbh);
generate_random_uuid(sbi->s_es->s_encrypt_pw_salt);
+ext4_superblock_csum_set(sb);
+unlock_buffer(sbi->s_sbh);
err = ext4_handle_dirty_metadata(handle, NULL,
    sbi->s_sbh);
pwsalt_err_journal:
@@ -995,7 +1130,7 @@
fa.fsx_xflags = ext4_iflags_to_xflags(ei->i_flags & EXT4_FL_USER_VISIBLE);

if (ext4_has_feature_project(inode->i_sb)) {
    fa.fsx_projid = (__u32)from_kprojid(&init_user_ns,
+-fa.fsx_projid = (__u32)from_kprojid_munged(sb->s_user_ns,
    EXT4_I(inode)->i_projid);
}
@@ -1029,19 +1164,22 @@
return err;


inode_lock(inode);
+err = ext4_ioctl_check_project(inode, &fa);
+if (err)
+goto out;
flags = (ei->i_flags & ~EXT4_FL_XFLAG_VISIBLE) |
(flags & EXT4_FL_XFLAG_VISIBLE);
+err = ext4_ioctl_checkImmutable(inode, fa.fsx_projid, flags);
+if (err)
+goto out;
err = ext4_ioctl_setflags(inode, flags);
-inode_unlock(inode);
-mnt_drop_write_file(filp);
if (err)
-return err;
-
+goto out;
err = ext4_ioctl_setproject(filp, fa.fsx_projid);
-if (err)
-return err;
-
-return 0;
+out:
+inode_unlock(inode);
+mnt_drop_write_file(filp);
+return err;
}
case EXT4_IOC_SHUTDOWN:
return ext4_shutdown(sb, arg);

--- linux-4.15.0.orig/fs/ext4/mballoc.c
+++ linux-4.15.0/fs/ext4/mballoc.c
@@ -26,6 +26,7 @@
 #include <linux/log2.h>
 #include <linux/module.h>
 #include <linux/slab.h>
+#include <linux/nospec.h>
 #include <linux/backing-dev.h>
 #include <trace/events/ext4.h>

 @@ -1554,13 +1555,14 @@
 ex->fe_len += 1 << order;
 }

-if (ex->fe_start + ex->fe_len > (1 << (e4b->bd_blkbits + 3))) {
+if (ex->fe_start + ex->fe_len > EXT4_CLUSTERS_PER_GROUP(e4b->bd_sb)) {
 /* Should never happen! (but apparently sometimes does???) */
 WARN_ON(1);
-ext4_error(e4b->bd_sb, "corruption or bug in mb_find_extent 
- "block=%d, order=%d needed=%d ex=%u/%d/@%u", 

block, order, needed, ex->fe_group, ex->fe_start,
ex->fe_len, ex->fe_logical);
+ext4_grp_locked_error(e4b->bd_sb, e4b->bd_group, 0, 0,
+"corruption or bug in mb_find_extent ");
+"block=%d, order=%d needed=%d ex=%u/%d/%d@%u",
+ex->order, needed, ex->fe_group, ex->fe_start,
ex->fe_len, ex->fe_logical);
ex->fe_len = 0;
ex->fe_start = 0;
ex->fe_group = 0;

int free;
free = e4b->bd_info->bb_free;
-BUG_ON(free <= 0);
+if (WARN_ON(free <= 0))
+return;

i = e4b->bd_info->bb_first_free;

mb_find_extent(e4b, i, ac->ac_g_ex.fe_len, &ex);
-BUG_ON(ex.fe_len <= 0);
+if (WARN_ON(ex.fe_len <= 0))
+break;
if (free < ex.fe_len) {
    ext4_grp_locked_error(sb, e4b->bd_group, 0, 0,
    "%d free clusters as per ");
    @ @ -2152.7 +2156.8 @ @
    * This should tell if fe_len is exactly power of 2 */
    if ((ac->ac_g_ex.fe_len & (~(1 << (i - 1)))) == 0)
    -ac->ac_2order = i - 1;
    +ac->ac_2order = array_index_nospec(i - 1,
    + sb->s_blocksize_bits + 2);
}

/* if stream allocation is enabled, use global goal */
@ @ -2387.7 +2392.7 @ @
{
struct ext4_sb_info *shi = EXT4_SB(sb);
unsigned size;
-struct ext4_group_info ***new_groupinfo;
+struct ext4_group_info ***old_groupinfo, ***new_groupinfo;

size = (ngroups + EXT4_DESC_PER_BLOCK(sb) - 1) >>
EXT4_DESC_PER_BLOCK_BITS(sb);
@@ -2400,13 +2405,16 @@
ext4_msg(sb, KERN_ERR, "can't allocate buddy meta group");
return -ENOMEM;
}
-if (sbi->s_group_info) {
-memcpy(new_groupinfo, sbi->s_group_info,
+rcu_read_lock();
+old_groupinfo = rcu_dereference(sbi->s_group_info);
+if (old_groupinfo)
+memcpy(new_groupinfo, old_groupinfo,
       sbi->s_group_info_size * sizeof(*sbi->s_group_info));
-kvfree(sbi->s_group_info);
-}
-sbi->s_group_info = new_groupinfo;
+rcu_read_unlock();
+rcu_assign_pointer(sbi->s_group_info, new_groupinfo);
sbi->s_group_info_size = size / sizeof(*sbi->s_group_info);
+if (old_groupinfo)
+ext4_kvfree_array_rcu(old_groupinfo);
ext4_debug("allocated s_groupinfo array for %d meta_bg's\n",
       sbi->s_group_info_size);
return 0;
@@ -2418,6 +2426,7 @@
{
  int i;
  int metalen = 0;
+int idx = group >> EXT4_DESC_PER_BLOCK_BITS(sb);
  struct ext4_sb_info *sbi = EXT4_SB(sb);
  struct ext4_group_info **meta_group_info;
  struct kmem_cache *cachep = get_groupinfo_cache(sb->s_blocksize_bits);
@@ -2436,12 +2445,12 @@
     "for a buddy group");
 goto exit_meta_group_info;
 }
-  sbi->s_group_info[group >> EXT4_DESC_PER_BLOCK_BITS(sb)] =
+  meta_group_info;
+rcu_read_lock();
+rcu_dereference(sbi->s_group_info)[idx] = meta_group_info;
+rcu_read_unlock();
 }

-meta_group_info =
-  sbi->s_group_info[group >> EXT4_DESC_PER_BLOCK_BITS(sb)];
+meta_group_info = sbi_array_rcu_deref(sbi, s_group_info, idx);
  i = group & (EXT4_DESC_PER_BLOCK(sb) - 1);

meta_group_info[i] = kmem_cache_zalloc(cachep, GFP_NOFS);
initialize bb_free to be able to skip empty groups without initialization
*/
-if (desc->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT)) {
+if (ext4_has_group_desc_csum(sb) &&
+ (desc->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT))) {
meta_group_info[i]->bb_free =
ext4_free_clusters_after_init(sb, group, desc);
} else {
@@ -2488,8 +2498,13 @@
exit_group_info:
/* If a meta_group_info table has been allocated, release it now */
if (group % EXT4_DESC_PER_BLOCK(sb) == 0) {
- kfree(sbi->s_group_info[group >> EXT4_DESC_PER_BLOCK_BITS(sb)]);
- sbi->s_group_info[group >> EXT4_DESC_PER_BLOCK_BITS(sb)] = NULL;
+ struct ext4_group_info ***group_info;
+ 
+rcu_read_lock();
+ group_info = rcu_dereference(sbi->s_group_info);
+ kfree(group_info[idx]);
+ group_info[idx] = NULL;
+ rcu_read_unlock();
} exit_meta_group_info:
return -ENOMEM;
@@ -2502,6 +2517,7 @@
struct ext4_sb_info *sbi = EXT4_SB(sb);
int err;
struct ext4_group_desc *desc;
+ struct ext4_group_info ***group_info;
struct kmem_cache *cachep;
err = ext4_mb_alloc_groupinfo(sb, ngroups);
@@ -2536,11 +2552,16 @@
while (i-- > 0)
kmem_cache_free(cachep, ext4_get_group_info(sb, i));
i = sbi->s_group_info_size;
+ rcu_read_lock();
+ group_info = rcu_dereference(sbi->s_group_info);
while (i-- > 0)
-kfree(sbi->s_group_info[i]);
+ kfree(group_info[i]);
+ rcu_read_unlock();
iput(sbi->s_buddy_cache);
err_freesgi:
-kvfree(sbi->s_group_info);
+ rcu_read_lock();
+kvfree(rcu_dereference(sbi->s_group_info));
+rcu_read_unlock();
return -ENOMEM;
}

@@ -2730,7 +2751,7 @@
ext4_group_t ngroups = ext4_get_groups_count(sb);
ext4_group_t i;
int num_meta_group_infos;
-struct ext4_group_info *grinfo;
struct ext4_group_info *grinfo, ***group_info;
struct ext4_sb_info *sbi = EXT4_SB(sb);
struct kmem_cache *cachep = get_groupinfo_cache(sb->s_blocksize_bits);

@@ -2748,9 +2769,12 @@
num_meta_group_infos = (ngroups +
EXT4_DESC_PER_BLOCK(sb) - 1) >>
EXT4_DESC_PER_BLOCK_BITS(sb);
+rcu_read_lock();
+group_info = rcu_dereference(sbi->s_group_info);
for (i = 0; i < num_meta_group_infos; i++)
- kfree(sbi->s_group_info[i]);
- kvfree(sbi->s_group_info);
- kfree(group_info[i]);
- kvfree(group_info);
+ kfree(group_info[i]);
+ kvfree(group_info);
+rcu_read_unlock();
}
kfree(sbi->s_mb_offsets);
kfree(sbi->s_mb_maxs);
@@ -2994,7 +3018,7 @@
block = ext4_grp_offs_to_block(sb, &ac->ac_b_ex);

len = EXT4_C2B(sbi, ac->ac_b_ex.fe_len);
-if (!ext4_data_block_valid(sbi, block, len)) { 
+if (!ext4_inode_block_valid(ac->ac_inode, block, len)) { 
ext4_error(sb, "Allocating blocks %llu-%llu which overlap "
"fs metadata", block, block+len);
/* File system mounted not to panic on error
@@ -3023,7 +3047,8 @@
#endif
ext4_set_bits(bitmap_bh->b_data, ac->ac_b_ex.fe_start,
ac->ac_b_ex.fe_len);
-if (gdp->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT)) { 
+if (ext4_has_group_desc_csum(sb) &&
 + (gdp->bg_flags & cpu_to_le16(EXT4_BG_BLOCK_UNINIT))) { 
gdp->bg_flags &= cpu_to_le16(~EXT4_BG_BLOCK_UNINIT);
ext4_free_group_clusters_set(sb, gdp,
   ext4_free_clusters_after_init(sb,

ext4_group_t flex_group = ext4_flex_group(sbi, ac->ac_b_ex.fe_group);
atomic64_sub(ac->ac_b_ex.fe_len,
- &sbi->s_flex_groups[flex_group].free_clusters);
+ &sbi_array_rcu_deref(sbi, s_flex_groups,
+ flex_group)->free_clusters);
}

err = ext4_handle_dirty_metadata(handle, NULL, bitmap_bh);
// -3048,7+3073,8 @@

ext4_group_first_block_no(sb, group) +
EXT4_C2B(sbi, cluster),
"Block already on to-be-freed list";
+kmem_cache_free(ext4_free_data_cachep, new_entry);
return 0;
}

sbi = EXT4_SB(sb);
if (!(flags & EXT4_FREE_BLOCKS_VALIDATED) &&
- !ext4_data_block_valid(sbi, block, count)) {
+ !ext4_inode_block_valid(inode, block, count)) {
ext4_error(sb, "Freeing blocks not in datazone - 
"block = %llu, count = %lu", block, count);
goto error_return;
}@ -4943,7+4970,8 @@
if (sbi->s_log_groups_per_flex) {
ext4_group_t flex_group = ext4_flex_group(sbi, block_group);
atomic64_add(count_clusters,
- &sbi->s_flex_groups[flex_group].free_clusters);
+ &sbi_array_rcu_deref(sbi, s_flex_groups,
+ flex_group)->free_clusters);
}

if (!(flags & EXT4_FREE_BLOCKS_NO_QUOT_UPDATE))
//@ -5092,7+5120,8 @@
if (sbi->s_log_groups_per_flex) {
ext4_group_t flex_group = ext4_flex_group(sbi, block_group);
atomic64_add(clusters_freed,
- &sbi->s_flex_groups[flex_group].free_clusters);
+ &sbi_array_rcu_deref(sbi, s_flex_groups,
+ flex_group)->free_clusters);
}

ext4_mb_unload_buddy(&e4b);
--- linux-4.15.0.orig/fs/ext4/migrate.c
+++ linux-4.15.0/fs/ext4/migrate.c
@@ -123,9 +123,9 @@
     int i, retval = 0;
     unsigned long max_entries = inode->i_sb->s_blocksize >> 2;

     -bh = sb_bread(inode->i_sb, pblock);
-    if (!bh)
-        return -EIO;
+    bh = ext4_sb_bread(inode->i_sb, pblock, 0);
+    if (IS_ERR(bh))
+        return PTR_ERR(bh);
     i_data = (__le32 *)bh->b_data;
     for (i = 0; i < max_entries; i++) {
         @@ -152,9 +152,9 @@
             int i, retval = 0;
             unsigned long max_entries = inode->i_sb->s_blocksize >> 2;

             -bh = sb_bread(inode->i_sb, pbblock);
-            if (!bh)
-                return -EIO;
+            bh = ext4_sb_bread(inode->i_sb, pbblock, 0);
+                if (IS_ERR(bh))
+                    return PTR_ERR(bh);
             i_data = (__le32 *)bh->b_data;
             for (i = 0; i < max_entries; i++) {
                 @@ -182,9 +182,9 @@
                     int i, retval = 0;
                     unsigned long max_entries = inode->i_sb->s_blocksize >> 2;

                     -bh = sb_bread(inode->i_sb, pbblock);
-                    if (!bh)
-                        return -EIO;
+                    bh = ext4_sb_bread(inode->i_sb, pbblock, 0);
+                        if (IS_ERR(bh))
+                            return PTR_ERR(bh);
                     i_data = (__le32 *)bh->b_data;
                     for (i = 0; i < max_entries; i++) {
                         @@ -216,9 +216,9 @@
                             struct buffer_head *bh;
                             unsigned long max_entries = inode->i_sb->s_blocksize >> 2;

                             -bh = sb_bread(inode->i_sb, le32_to_cpu(i_data));
-                            if (!bh)
-                                return -EIO;
+                            bh = ext4_sb_bread(inode->i_sb, le32_to_cpu(i_data), 0);
+                                if (IS_ERR(bh))
+                                    return PTR_ERR(bh);
+if (IS_ERR(bh))
+return PTR_ERR(bh);

tmp_idata = (__le32 *)bh->b_data;
for (i = 0; i < max_entries; i++) {
    @ @ -261,9 +261,9 @@
    struct buffer_head *bh;
    unsigned long max_entries = inode->i_sb->s_blocksize >> 2;

    -bh = sb_bread(inode->i_sb, le32_to_cpu(i_data));
    -if (!bh)
    -return -EIO;
    +bh = ext4_sb_bread(inode->i_sb, le32_to_cpu(i_data), 0);
    +if (IS_ERR(bh))
    +return PTR_ERR(bh);
    tmp_idata = (__le32 *)bh->b_data;
    for (i = 0; i < max_entries; i++) {
        @ @ -389,9 +389,9 @@
        struct ext4_extent_header *eh;

        block = ext4_idx_pblock(ix);
        -bh = sb_bread(inode->i_sb, block);
        -if (!bh)
        -return -EIO;
        +bh = ext4_sb_bread(inode->i_sb, block, 0);
        +if (IS_ERR(bh))
        +return PTR_ERR(bh);

        eh = (struct ext4_extent_header *)bh->b_data;
        if (eh->eh_depth != 0) {
            @ @ -434,6 +434,7 @@

        int ext4_ext_migrate(struct inode *inode)
        {
            +struct ext4_sb_info *sbi = EXT4_SB(inode->i_sb);
            handle_t *handle;
            int retval = 0, i;
            __le32 *i_data;
            @ @ -458,6 +459,8 @@
            */
            return retval;

            +percpu_down_write(&sbi->s_writepages_rwlock);
            +
            /*
             * Worst case we can touch the allocation bitmaps, a bgd
             * block, and a block to link in the orphan list. We do need
if (IS_ERR(handle)) {
    retval = PTR_ERR(handle);
    -return retval;
    +goto out_unlock;
}
goal = (((inode->i_ino - 1) / EXT4_INODES_PER_GROUP(inode->i_sb)) *
    EXT4_INODES_PER_GROUP(inode->i_sb)) + 1;
if (IS_ERR(tmp_inode)) {
    retval = PTR_ERR(tmp_inode);
    ext4_journal_stop(handle);
    -return retval;
    +goto out_unlock;
}
i_size_write(tmp_inode, i_size_read(inode));
/*
@@ -521,7 +524,7 @@
ext4_orphan_del(NULL, tmp_inode);
    retval = PTR_ERR(handle);
    -goto out;
    +goto out_tmp_inode;
}
ei = EXT4_I(inode);
/* Reset the extent details */
ext4_ext_tree_init(handle, tmp_inode);
ext4_journal_stop(handle);
-out:
+out_tmp_inode:
    unlock_new_inode(tmp_inode);
    iput(tmp_inode);
    -
    +out_unlock:
    +percpu_up_write(&sbi->s_writepages_rwsem);
    return retval;
}

int ext4_ind_migrate(struct inode *inode)
{
    struct ext4_extent_header*eh;
    -struct ext4_super_block*es = EXT4_SB(inode->i_sb)->s_es;
    +struct ext4_sb_info*sbi = EXT4_SB(inode->i_sb);
    +struct ext4_super_block*es = sbi->s_es;
struct ext4_inode_info*ei = EXT4_I(inode);
struct ext4_extent*ex;
unsigned inti, len;
@@ -639,9 +644,13 @@
if (test_opt(inode->i_sb, DELALLOC))
ext4_alloc_da_blocks(inode);
+percpu_down_write(&sbi->s_writepages_rwsem);
+
handle = ext4_journal_start(inode, EXT4_HT_MIGRATE, 1);
-if (IS_ERR(handle))
-return PTR_ERR(handle);
+if (IS_ERR(handle)) {
+ret = PTR_ERR(handle);
+goto out_unlock;
+}
down_write(&EXT4_I(inode)->i_data_sem);
ret = ext4_ext_check_inode(inode);
@@ -676,5 +685,7 @@
errout:
ext4_journal_stop(handle);
up_write(&EXT4_I(inode)->i_data_sem);
+out_unlock:
+percpu_up_write(&sbi->s_writepages_rwsem);
return ret;
}
--- linux-4.15.0.orig/fs/ext4/mmp.c
+++ linux-4.15.0/fs/ext4/mmp.c
@@ -49,7 +49,6 @@
*/
sb_start_write(sb);
ext4_mmp_csum_set(sb, mmp);
-mark_buffer_dirty(bh);
lock_buffer(bh);
bh->b_end_io = end_buffer_write_sync;
get_bh(bh);
@@ -121,10 +120,10 @@
{
__ext4_warning(sb, function, line, "%s", msg);
__ext4_warning(sb, function, line,
"MMP failure info: last update time: %llu, last update "
"node: %s, last update device: %s",
(long long unsigned int) le64_to_cpu(mmp->mmp_time),
mmp->mmp_nodename, mmp->mmp_bdevname);
+
"MMP failure info: last update time: %llu, last update node: %.*s, last update device: %.*s",
+
(unsigned long long)le64_to_cpu(mmp->mmp_time),
+
(int)sizeof(mmp->mmp_nodename), mmp->mmp_nodename,

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(int)sizeof(mmp->mmp_bdevname), mmp->mmp_bdevname);
}

/*
@@ -155,6 +154,7 @@
mmp_check_interval = max(EXT4_MMP_CHECK_MULT * mmp_update_interval,
 EXT4_MMP_MIN_CHECK_INTERVAL);
mmp->mmp_check_interval = cpu_to_le16(mmp_check_interval);
+BUILD_BUG_ON(sizeof(mmp->mmp_bdevname) < BDEVNAME_SIZE);
bdevname(bh->b_bdev, mmp->mmp_bdevname);

memcpy(mmp->mmp_nodename, init_utsname()->nodename,
@@ -186,11 +186,8 @@
goto exit_thread;
}

-if (sb_rdonly(sb)) {
-ext4_warning(sb, "kmmpd being stopped since filesystem 
-"has been remounted as readonly.");
-goto exit_thread;
-}
+if (sb_rdonly(sb))
+break;

diff = jiffies - last_update_time;
if (diff < mmp_update_interval * HZ)
@@ -379,7 +376,8 @@
/* Start a kernel thread to update the MMP block periodically.
 */
-EXT4_SB(sb)->s_mmp_tsk = kthread_run(kmmpd, mmpd_data, "kmmpd-%s",
+EXT4_SB(sb)->s_mmp_tsk = kthread_run(kmmpd, mmpd_data, "kmmpd-%.*s",
+bdevname(bh->b_bdev, mmp->mmp_bdevname));
if (IS_ERR(EXT4_SB(sb)->s_mmp_tsk)) {
--- linux-4.15.0.orig/fs/ext4/move_extent.c
+++ linux-4.15.0/fs/ext4/move_extent.c
@@ -400,7 +400,8 @@
/*
 * Even in case of data=writeback it is reasonable to pin
 * inode to transaction, to prevent unexpected data loss */
-*err = ext4_jbd2_inode_add_write(handle, orig_inode);
+*err = ext4_jbd2_inode_add_write(handle, orig_inode,
+(loff_t)orig_page_offset << PAGE_SHIFT, replaced_size);

unlock_pages:
unlock_page(pagep[0]);
orig_inode->i_ino, donor_inode->i_ino);
    return -EINVAL;
  }
  
  if (orig_eof < orig_start + *len - 1)
  +if (orig_eof <= orig_start)
  +*len = 0;
  +else if (orig_eof < orig_start + *len - 1)
  +*len = orig_eof - orig_start;
  -if (donor_eof < donor_start + *len - 1)
  +if (donor_eof <= donor_start)
  +*len = 0;
  +else if (donor_eof < donor_start + *len - 1)
  +*len = donor_eof - donor_start;
  if (!*len) {
    ext4_debug("ext4 move extent: len should not be 0 ");
    ext4_error_inode(inode, func, line, block,
      "Directory hole found for htree %s block",
      (type == INDEX) ? "index" : "leaf");
  }

  typedef enum {
    EITHER, INDEX, DIRENT
  +EITHER, INDEX, DIRENT, DIRENT_HTREE
  } dirblock_type_t;

  #define ext4_read_dirblock(inode, block, type) \
    return bh;
  
  -if (!bh) {
  +if (!bh && (type == INDEX || type == DIRENT_HTREE)) {
    ext4_error_inode(inode, func, line, block,
      "Directory hole found");
    +"Directory hole found for htree %s block",
    + (type == INDEX) ? "index" : "leaf");
  }
return ERR_PTR(-EFSCORRUPTED);
}
+if (!bh)
+return NULL;
dirent = (struct ext4_dir_entry *) bh->b_data;
/* Determine whether or not we have an index block */
if (is_dx(inode)) {
@@ -125,6 +138,7 @@
if (!is_dx_block && type == INDEX) {
ext4_error_inode(inode, func, line, block,
"directory leaf block found instead of index block");
+brelse(bh);
return ERR_PTR(-EFSCORRUPTED);
}
if (!ext4_has_metadata_csum(inode->i_sb) ||
@@ -869,12 +883,15 @@
{
struct dx_root_info *info;
int i;
+unsigned int indirect_levels;
if (frames[0].bh == NULL)
return;
info = &((struct dx_root *)frames[0].bh->b_data)->info;
-for (i = 0; i <= info->indirect_levels; i++) {
+/* save local copy, "info" may be freed after brelse() */
+indirect_levels = info->indirect_levels;
+for (i = 0; i <= indirect_levels; i++) {
if (frames[i].bh == NULL)
break;
brelse(frames[i].bh);
@@ -974,7 +991,7 @@
dxtrace(printk(KERN_INFO "In htree dirblock_to_tree: block %lu\n",
(unsigned long)block));
-bh = ext4_read_dirblock(dir, block, DIRENT);
+bh = ext4_read_dirblock(dir, block, DIRENT_HTREE);
if (IS_ERR(bh))
return PTR_ERR(bh);
@@ -1291,8 +1308,8 @@
ext4_match(fname, de)) {
/* found a match - just to be sure, do
* a full check */
-if (ext4_check_dir_entry(dir, NULL, de, bh, bh->b_data,
- bh->b_size, offset))
+if (ext4_check_dir_entry(dir, NULL, de, bh, search_buf,

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+ buf_size, offset))
return -1;
*res_dir = de;
return 1;
@@ -1397,6 +1414,7 @@
goto cleanup_and_exit;
dxtrace(printk(KERN_DEBUG "ext4_find_entry: dx failed, "
    "falling back\n"));
+ret = NULL;
}

nblocks = dir->i_size >> EXT4_BLOCK_SIZE_BITS(sb);
if (!nblocks) {
@@ -1412,6 +1430,7 @@
/*
 * We deal with the read-ahead logic here.
 */
+cond_resched();
if (ra_ptr >= ra_max) {
/* Refill the readahead buffer */
ra_ptr = 0;
@@ -1503,7 +1522,7 @@
return (struct buffer_head *) frame;
do {
    block = dx_get_block(frame->at);
    -bh = ext4_read_dirblock(dir, block, DIRENT);
+bh = ext4_read_dirblock(dir, block, DIRENT_HTREE);
    if (IS_ERR(bh))
        goto errout;

@@ -1568,7 +1587,7 @@
    dentry);
return ERR_PTR(-EFSCORRUPTED);
}
    -inode = ext4_iget_normal(dir->i_sb, ino);
+inode = ext4_iget(dir->i_sb, ino, EXT4_IGET_NORMAL);
    if (inode == ERR_PTR(-ESTALE)) {
EXT4_ERROR_INODE(dir,
    "deleted inode referenced: %u",
@@ -1610,7 +1629,7 @@
return ERR_PTR(-EFSCORRUPTED);
}
    -return d_obtain_alias(ext4_iget_normal(child->d_sb, ino));
+return d_obtain_alias(ext4_iget(child->d_sb, ino, EXT4_IGET_NORMAL));
}

/*
@@ -1712,7 +1731,7 @@

blocksize, hinfo, map);
map -= count;
dx_sort_map(map, count);

/* Split the existing block in the middle, size-wise */
/* Ensure that neither split block is over half full */
size = 0;
move = 0;
for (i = count-1; i >= 0; i--) {
@@ -1722,8 +1741,18 @@
size += map[i].size;
move++;
}
/* map index at which we will split */
-split = count - move;
+/*
+ * map index at which we will split
+ *
+ * If the sum of active entries didn't exceed half the block size, just
+ * split it in half by count; each resulting block will have at least
+ * half the space free.
+ */
+if (i > 0)
+split = count - move;
+else
+split = count/2;
+
hash2 = map[split].hash;
continued = hash2 == map[split - 1].hash;
dxtrace(printk(KERN_INFO "Split block %lu at %x, %i/%i
@@ -2066,6 +2095,13 @@
retval = ext4_dx_add_entry(handle, &fname, dir, inode);
if (!retval || (retval != ERR_BAD_DX_DIR))
goto out;
/* Can we just ignore htree data? */
+if (ext4_has_metadata_csum(sb)) {
+EXT4_ERROR_INODE(dir,
+"Directory has corrupted htree index.");
+retval = -EFSCORRUPTED;
+goto out;
+
} ext4_clear_inode_flag(dir, EXT4_INODE_INDEX);
dx_fallback++;
}
exh_mark_inode_dirty(handle, dir);
@@ -2073,6 +2109,13 @@
blocks = dir->i_size >> sb->s_blocksize_bits;
for (block = 0; block < blocks; block++) {
bh = ext4_read_dirblock(dir, block, DIRENT);
+if (bh == NULL) {
+bh = ext4_bread(handle, dir, block,
+EXT4_GET_BLOCKS_CREATE);
+goto add_to_new_block;
+
if (IS_ERR(bh)) {
    retval = PTR_ERR(bh);
    bh = NULL;
    @@ -2093,6 +2134,7 @@
    brelse(bh);
    }
    bh = ext4_append(handle, dir, &block);
    +add_to_new_block:
    if (IS_ERR(bh)) {
        retval = PTR_ERR(bh);
        bh = NULL;
        @@ -2137,7 +2179,7 @@
        return PTR_ERR(frame);
        entries = frame->entries;
        at = frame->at;
        -bh = ext4_read_dirblock(dir, dx_get_block(frame->at), DIRENT);
        +bh = ext4_read_dirblock(dir, dx_get_block(frame->at), DIRENT_HTREE);
        if (IS_ERR(bh)) {
            err = PTR_ERR(bh);
            bh = NULL;
            @@ -2241,11 +2283,10 @@
                (frame - 1)->bh);
                if (err)
                    goto journal_error;
                -if (restart) {
                    -err = ext4_handle_dirty_dx_node(handle, dir,
                        - frame->bh);
                    +err = ext4_handle_dirty_dx_node(handle, dir,
                        + frame->bh);
                    +if (restart || err)
                        goto journal_error;
                    -}
                } else {
                    struct dx_root *dxroot;
                    memcpy((char *) entries2, (char *) entries,
                        @@ -2259,7 +2300,7 @@
                        dxroot->info.indirect_levels += 1;
                        dxtrace printk(KERN_DEBUG
                            "Creating %d level index...\n",
                            - info->indirect_levels));
                            + dxroot->info.indirect_levels));
                            err = ext4_handle_dirty_dx_node(handle, dir, frame->bh);
                            if (err)
                                goto journal_error;

goto journal_error;
}

de = do_split(handle, dir, &bh, frame, &fname->hinfo);
-if (IS_ERR(de)) {
-err = PTR_ERR(de);
+if (!restart) {
+de = do_split(handle, dir, &bh, frame, &fname->hinfo);
+if (IS_ERR(de)) {
+err = PTR_ERR(de);
+goto cleanup;
+
+err = add_dirent_to_buf(handle, fname, dir, inode, de, bh);
+goto cleanup;
+
+err = add_dirent_to_buf(handle, fname, dir, inode, de, bh);
+goto cleanup;
+
journal_error:
ext4_std_error(dir->i_sb, err); /* this is a no-op if err == 0 */
@@ -2311,7 +2354,7 @@
de = (struct ext4_dir_entry_2 *)entry_buf;
while (i < buf_size - csum_size) {
  if (ext4_check_dir_entry(dir, NULL, de, bh,
t					bh->b_data, bh->b_size, i))
+return -EFSCORRUPTED;
  if (de == de_del)  {
+if (pde)
@@ -2410,8 +2453,7 @@
int err = ext4_add_entry(handle, dentry, inode);
if (!err) {
ext4_mark_inode_dirty(handle, inode);
-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
return 0;
}
drop_nlink(inode);
@@ -2650,8 +2692,7 @@
err = ext4_mark_inode_dirty(handle, dir);
if (err)
goto out_clear_inode;
-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
if (IS_DIRSYNC(dir))
ext4_handle_sync(handle);

@@ -2670,7 +2711,7 @@
{
  unsigned int offset;
  struct buffer_head *bh;
-  struct ext4_dir_entry_2 *de, *de1;
+  struct ext4_dir_entry_2 *de;
  struct super_block *sb;

  if (ext4_has_inline_data(inode)) {
    @ @ -2687.36 +2728.48 @@
    EXT4_ERROR_INODE(inode, "invalid size");
    return true;
  }
- bh = ext4_read_dirblock(inode, 0, EITHER);
+  /* The first directory block must not be a hole,
+     * so treat it as DIRENT_HTREE
+      */
+  bh = ext4_read_dirblock(inode, 0, DIRENT_HTREE);
  if (IS_ERR(bh))
    return true;
  de = (struct ext4_dir_entry_2 *) bh->b_data;
-  de1 = ext4_next_entry(de, sb->s_blocksize);
-  if (le32_to_cpu(de->inode) != inode->i_ino ||
-      le32_to_cpu(de1->inode) == 0 ||
-      strcmp('.', de->name) || strcmp '..', de1->name)) {
-    ext4_warning_inode(inode, "directory missing ". and/or ".");
+  if (ext4_check_dir_entry(inode, NULL, de, bh, bh->b_data, bh->b_size,
+    offset) ||
+      le32_to_cpu(de->inode) != inode->i_ino || strcmp("..", de->name)) {
+    ext4_warning_inode(inode, "directory missing ".");
+    brelse(bh);
+    return true;
+  }
+  offset = ext4_rec_len_from_disk(de->rec_len, sb->s_blocksize);
+  de = ext4_next_entry(de, sb->s_blocksize);
+  if (ext4_check_dir_entry(inode, NULL, de, bh, bh->b_data, bh->b_size,
+    offset) ||
+    le32_to_cpu(de->inode) == 0 || strcmp("..", de->name)) {
+    ext4_warning_inode(inode, "directory missing ".");
+    brelse(bh);
+    return true;
  }
  offset = ext4_rec_len_from_disk(de->rec_len, sb->s_blocksize) +
    ext4_rec_len_from_disk(de1->rec_len, sb->s_blocksize);
  de = ext4_next_entry(de1, sb->s_blocksize);

offset += ext4_rec_len_from_disk(de->rec_len, sb->s_blocksize);
while (offset < inode->i_size) {
    if (((void *) de >= (void *) (bh->b_data+sb->s_blocksize)) {
        if (!(offset & (sb->s_blocksize - 1))) {
            unsigned int lblock;
            brelse(bh);
            lblock = offset >> EXT4_BLOCK_SIZE_BITS(sb);
            bh = ext4_read_dirblock(inode, lblock, EITHER);
        }
        if (IS_ERR(bh))
            return true;
        de = (struct ext4_dir_entry_2 *)(bh->b_data +
            (offset & (sb->s_blocksize - 1)));
        if (ext4_check_dir_entry(inode, NULL, de, bh,
            bh->b_data, bh->b_size, offset)) {
            offset = (offset | (sb->s_blocksize - 1)) + 1;
            continue;
        }
        return false;
    } else
        brelse(ioc.bh);
    jbd_debug(4, "superblock will point to %lu
", inode->i_ino);
    jbd_debug(4, "orphan inode %lu will point to %d\n",
        inode->i_ino, NEXT_ORPHAN(inode));
    if (IS_DIRSYNC(dir))
        ext4_handle_sync(handle);
if (inode->i_nlink == 0) {
    ext4_warning_inode(inode, "Deleting file '%.*s' with no links",
    dentry->d_name.len, dentry->d_name.name);
    set_nlink(inode, 1);
}
retval = ext4_delete_entry(handle, dir, de, bh);
if (retval)
goto end_unlink;
dir->i_ctime = dir->i_mtime = current_time(dir);
ext4_update_dx_flag(dir);
ext4_mark_inode_dirty(handle, dir);
drop_nlink(inode);
@if (inode->i_nlink == 0)
+ext4_warning_inode(inode, "Deleting file '%.*s' with no links",
    dentry->d_name.len, dentry->d_name.name);
+drop_nlink(inode);
else
+drop_nlink(inode);
if (!inode->i_nlink)
ext4_orphan_add(handle, inode);
inode->i_ctime = current_time(inode);
return err;

if ((ext4_test_inode_flag(dir, EXT4_INODE_PROJINHERIT)) &&
    (!projid_eq(EXT4_I(dir)->i_projid,
        EXT4_I(old_dentry->d_inode)->i_projid)))
return -EXDEV;

err = dquot_initialize(dir);
struct buffer_head *bh;
if (!ext4_has_inline_data(inode)) {
    bh = ext4_read_dirblock(inode, 0, EITHER);
    /* The first directory block must not be a hole, so
     * treat it as DIRENT_HTREE
     */
    +bh = ext4_read_dirblock(inode, 0, DIRENT_HTREE);
    if (IS_ERR(bh)) {
        *retval = PTR_ERR(bh);
        return NULL;
    }
}
-brelse(ent->bh);
-ent->bh = NULL;

return 0;
}

+static void ext4_resetent(handle_t *handle, struct ext4_renament *ent,
+ unsigned ino, unsigned file_type)
+{
+struct ext4_renament old = *ent;
+int retval = 0;
+
+/*
+ * old->de could have moved from under us during make indexed dir,
+ * so the old->de may no longer valid and need to find it again
+ * before reset old inode info.
+ */
+old.bh = ext4_find_entry(old.dir, &old.dentry->d_name, &old.de, NULL);
+if (IS_ERR(old.bh))
+retval = PTR_ERR(old.bh);
+if (!old.bh)
+retval = -ENOENT;
+if (retval) {
+ext4_std_error(old.dir->i_sb, retval);
+return;
+}
+
+ext4_setent(handle, &old, ino, file_type);
+brelse(old.bh);
+
+static int ext4_find_delete_entry(handle_t *handle, struct inode *dir,
+const struct qstr *d_name)
+
{*@ -3506,9 +3585,15 @*
int credits;
unsigned old_file_type;

+if (new.inode && new.inode->i_nlink == 0) {
+EXT4_ERROR_INODE(new.inode,
+"target of rename is already freed");
+return -EFSCORRUPTED;
+}
+
+if ((ext4_test_inode_flag(new_dir, EXT4_INODE_PROJINHERIT)) &&
+!projid_eq(EXT4_I(new_dir)->i_projid,
+EXT4_I(old_dentry->d_inode)->i_projid))
+!projid_valid_eq(EXT4_I(new_dir)->i_projid,
+EXT4_I(old_dentry->d_inode)->i_projid))
+}
return -EXDEV;

retval = dquot_initialize(old.dir);
@@ -3537,14 +3622,14 @@
 /*
 retval = -ENOENT;
 if (!old.bh || le32_to_cpu(old.de->inode) != old.inode->i_ino)
-    goto end_rename;
+    goto release_bh;

new.bh = ext4_find_entry(new.dir, &new.dentry->d_name,
    &new.de, &new.inlined);
if (IS_ERR(new.bh)) {
    retval = PTR_ERR(new.bh);
    new.bh = NULL;
    -goto end_rename;
+    goto release_bh;
    }
if (new.bh) {
    if (!new.inode) {
        @@ -3561,18 +3646,17 @@
            handle = ext4_journal_start(old.dir, EXT4_HT_DIR, credits);
            if (IS_ERR(handle)) {
                retval = PTR_ERR(handle);
                -handle = NULL;
+                goto release_bh;
            }
        } else {
            whiteout = ext4_whiteout_for_rename(&old, credits, &handle);
            if (IS_ERR(whiteout)) {
                retval = PTR_ERR(whiteout);
                -whiteout = NULL;
+                goto release_bh;
            }
        }
    }
    +old_file_type = old.de->file_type;
    if (IS_DIRSYNC(old.dir) || IS_DIRSYNC(new.dir))
        ext4_handle_sync(handle);
@@ -3600,7 +3684,6 @@
    force_reread = (new.dir->i_ino == old.dir->i_ino &&
        ext4_test_inode_flag(new.dir, EXT4_INODE_INLINE_DATA));

    +old_file_type = old.de->file_type;
    if (whiteout) {
/*
 * Do this before adding a new entry, so the old entry is sure

@@ -3672,17 +3755,23 @@
 retval = 0;

 end_rename:
- trelse(old.dir_bh);
- brelse(old.bh);
- brelse(new.bh);
 if (whiteout) {
- if (retval)
+ if (retval) {
+ ext4_resetent(handle, &old,
+ old.inode->i_ino, old_file_type);
 drop_link(whiteout);
+ ext4_orphan_add(handle, whiteout);
+ }
 unlock_new_inode(whiteout);
+ ext4_journal_stop(handle);
 iput(whiteout);
- }
- if (handle)
+ } else {
 ext4_journal_stop(handle);
+ }
+ release_bh:
+ trelse(old.dir_bh);
+ brelse(old.bh);
+ brelse(new.bh);
 return retval;
 }

@@ -3705,11 +3794,11 @@
 struct timespec ctime;

 if ((ext4_test_inode_flag(new_dir, EXT4_INODE_PROJINHERIT) &&
- !projid_eq(EXT4_I(new_dir)->i_projid,
- EXT4_I(old_dentry->d_inode)->i_projid)) ||
+ !projid_valid_eq(EXT4_I(new_dir)->i_projid,
+ EXT4_I(old_dentry->d_inode)->i_projid)) ||
 (ext4_test_inode_flag(old_dir, EXT4_INODE_PROJINHERIT) &&
- !projid_eq(EXT4_I(old_dir)->i_projid,
- EXT4_I(new_dentry->d_inode)->i_projid)))
+ !projid_valid_eq(EXT4_I(old_dir)->i_projid,
+ EXT4_I(new_dentry->d_inode)->i_projid)))
 return -EXDEV;

 retval = dquot_initialize(old.dir);
nr_to_submit) {
    gfp_t gfp_flags = GFP_NOFS;

    /*
     * Since bounce page allocation uses a mempool, we can only use
     * a waiting mask (i.e. request guaranteed allocation) on the
     * first page of the bio. Otherwise it can deadlock.
     */
    +if (io->io_bio)
    +gfp_flags = GFP_NOWAIT | __GFP_NOWARN;
    retry_encrypt:
    data_page = fscrypt_encrypt_page(inode, page, PAGE_SIZE, 0,
    page->index, gfp_flags);
    if (IS_ERR(data_page)) {
        ret = PTR_ERR(data_page);
        -if (ret == -ENOMEM && wbc->sync_mode == WB_SYNC_ALL) {
            -if (io->io_bio) {
                +if (ret == -ENOMEM &&
                    (io->io_bio || wbc->sync_mode == WB_SYNC_ALL)) {
                    +gfp_flags = GFP_NOFS;
                    +if (io->io_bio)
                        ext4_io_submit(io);
                    -congestion_wait(BLK_RW_ASYNC, HZ/50);
                }
            }
        }
        +if (ret == -ENOMEM &&
            (io->io_bio || wbc->sync_mode == WB_SYNC_ALL)) {
            +gfp_flags = GFP_NOFS;
            +if (io->io_bio)
                ext4_io_submit(io);
            -congestion_wait(BLK_RW_ASYNC, HZ/50);
        }
        goto retry_encrypt;
    }
    data_page = NULL;
    -}
    -gfp_flags |= __GFP_NOFAIL;
    +else
    +gfp_flags |= __GFP_NOFAIL;
    +congestion_wait(BLK_RW_ASYNC, HZ/50);
    goto retry_encrypt;
}
#include "ext4_jbd2.h"

+struct ext4_rcu_ptr {
    +struct rcu_head rcu;
    +void *ptr;
    +};
    +static void ext4_rcu_ptr_callback(struct rcu_head *head)
    +{
    +struct ext4_rcu_ptr *ptr;
+ptr = container_of(head, struct ext4_rcu_ptr, rcu);
+kvfree(ptr->ptr);
+kfree(ptr);
+
+void ext4_kvfree_array_rcu(void *to_free)
+
+struct ext4_rcu_ptr *ptr = kzalloc(sizeof(*ptr), GFP_KERNEL);
+
+if (ptr) {
+    ptr->ptr = to_free;
+    call_rcu(&ptr->rcu, ext4_rcu_ptr_callback);
+    return;
+}
+synchronize_rcu();
+kvfree(to_free);
+
+int ext4_resize_begin(struct super_block *sb)
+
+struct ext4_sb_info *sbi = EXT4_SB(sb);
+int ret = 0;
+
-if (!capable(CAP_SYS_RESOURCE))
+if (!ns_capable(sb->s_user_ns, CAP_SYS_RESOURCE))
    return -EPERM;
+
/**
    @ @ -29,7 +57,7 @@
        * because the user tools have no way of handling this. Probably a
        * bad time to do it anyways.
    */
-if (EXT4_SB(sb)->s_sbh->b_blocknr !=
+if (EXT4_B2C(sbi, sbi->s_sbh->b_blocknr) !=
     le32_to_cpu(EXT4_SB(sb)->s_es->s_first_data_block)) {
        ext4_warning(sb, "won't resize using backup superblock at %llu",
            (unsigned long long)EXT4_SB(sb)->s_sbh->b_blocknr);
    @ @ -126,10 +154,12 @@
        else if (free_blocks_count < 0)
            ext4_warning(sb, "Bad blocks count %u",
                input->blocks_count);
        -else if (!bh = sb_bread(sb, end - 1))
        +else if (IS_ERR(bh = ext4_sb_bread(sb, end - 1, 0))) {
            +err = PTR_ERR(bh);
            +bh = NULL;
            ext4_warning(sb, "Cannot read last block (%llu)",
                end - 1);
            else if (!bh = sb_bread(sb, end - 1))
            +err = PTR_ERR(bh);
            +bh = NULL;
            ext4_warning(sb, "Cannot read last block (%llu)",
                end - 1);
else if (outside(input->block_bitmap, start, end))
    ext4_warning(sb, "Block bitmap not in group (block %llu)",
                (unsigned long long)input->block_bitmap);
else if (outside(input->inode_bitmap, start, end))

BUFFER_TRACE(bh, "get_write_access");
err = ext4_journal_get_write_access(handle, bh);
-if (err)
  -return err;
+if (err) {
+  brelse(bh);
  + return err;
+}
ext4_debug("mark block bitmap %#04llx (+%llu/%u)n",
            first_cluster, first_cluster - start, count2);
ext4_set_bits(bh->b_data, first_cluster - start, count2);

err = ext4_handle_dirty_metadata(handle, NULL, bh);
+brelse(bh);
if (unlikely(err))
  return err;
-brelse(bh);
}

return 0;
@@ -553,8 +585,8 @@
  brelse(gdb);
  goto out;
 }
-memcpy(gdb->b_data, sib->s_group_desc[j]->b_data,
     gdb->b_size);
+memcpy(gdb->b_data, sbi_array_rcu_deref(sbi,
+s_group_desc, j)->b_data, gdb->b_size);
set_buffer_uptodate(gdb);

err = ext4_handle_dirty_metadata(handle, NULL, gdb);
@@ -602,7 +634,6 @@
  bh = bclean(handle, sb, block);
  if (IS_ERR(bh)) {
    err = PTR_ERR(bh);
-   bh = NULL;
  goto out;
  }
overhead = ext4_group_overhead_blocks(sb, group);
@@ -615,9 +646,9 @@
ext4_mark_bitmap_end(EXT4_B2C(sbi, group_data[i].blocks_count),
sb->s_blocksize * 8, bh->b_data);
err = ext4_handle_dirty_metadata(handle, NULL, bh);
+brelse(bh);
if (err)
goto out;
-brelse(bh);

handle_ib:
if (bg_flags[i] & EXT4_BG_INODE_UNINIT)
@@ -632,18 +663,16 @@
bh = bclean(handle, sb, block);
if (IS_ERR(bh)) {
    err = PTR_ERR(bh);
    -bh = NULL;
    goto out;
}
ext4_mark_bitmap_end(EXT4_INODES_PER_GROUP(sb),
    sb->s_blocksize * 8, bh->b_data);
err = ext4_handle_dirty_metadata(handle, NULL, bh);
+brelse(bh);
if (err)
goto out;
-brelse(bh);
}
-bh = NULL;
/* Mark group tables in block bitmap */
for (j = 0; j < GROUP_TABLE_COUNT; j++) {
@@ -682,7 +711,6 @@
}
out:
-brelse(bh);
err2 = ext4_journal_stop(handle);
if (err2 & & !err)
err = err2;
@@ -780,11 +808,11 @@
        unsigned long gdb_num = group / EXT4_DESC_PER_BLOCK(sb);
        ext4_fsblk_t gdblock = EXT4_SB(sb)->s_sbh->b_blocknr + 1 + gdb_num;
        -struct buffer_head **o_group_desc, **n_group_desc;
        -struct buffer_head *dind;
        -struct buffer_head *gdb_bh;
        +struct buffer_head **o_group_desc, **n_group_desc = NULL;
        +struct buffer_head *dind = NULL;
        +struct buffer_head *gdb_bh = NULL;
        int gdbbackups;
-struct ext4_iloc iloc;
+struct ext4_iloc iloc = { .bh = NULL };
__le32 *data;
int err;

@@ -793,21 +821,22 @@
          "EXT4-fs: ext4_add_new_gdb: adding group block %lu\n",
          gdb_num);
-gdb_bh = sb_bread(sb, gdblock);
-if (!gdb_bh)
-    return -EIO;
+gdb_bh = ext4_sb_bread(sb, gdblock, 0);
+if (IS_ERR(gdb_bh))
+    return PTR_ERR(gdb_bh);

gdbbackups = verify_reserved_gdb(sb, group, gdb_bh);
if (gdbbackups < 0) {
    err = gdbbackups;
    -goto exit_bh;
    +goto errout;
}

data = EXT4_I(inode)->i_data + EXT4_DIND_BLOCK;
-dind = sb_bread(sb, le32_to_cpu(*data));
-if (!dind) {
-    err = -EIO;
-    -goto exit_bh;
-    +goto errout;
}

    +dind = ext4_sb_bread(sb, le32_to_cpu(*data), 0);
+if (IS_ERR(dind)) {
+    err = PTR_ERR(dind);
+    +dind = NULL;
+    +goto errout;
    }

data = (__le32 *)dind->b_data;
@@ -815,28 +844,30 @@
            ext4_warning(sb, "new group %u GDT block %llu not reserved",
                          group, gdblock);
            err = -EINVAL;
            -goto exit_dind;
            +goto errout;
    }

    data = (__le32 *)dind->b_data;
@@ -815,28 +844,30 @@
            ext4_warning(sb, "new group %u GDT block %llu not reserved",
                          group, gdblock);
            err = -EINVAL;
            -goto exit_dind;
            +goto errout;
    }

    BUFFER_TRACE(EXT4_SB(sb)->s_sbh, "get_write_access");
    err = ext4_journal_get_write_access(handle, EXT4_SB(sb)->s_sbh);
    if (unlikely(err))
        +goto exit_dind;
+goto errout;

BUFFER_TRACE(gdb_bh, "get_write_access");
err = ext4_journal_get_write_access(handle, gdb_bh);
if (unlikely(err))
  -goto exit_dind;
+goto errout;

BUFFER_TRACE(dind, "get_write_access");
err = ext4_journal_get_write_access(handle, dind);
- if (unlikely(err))
+ if (unlikely(err)) {
  ext4_std_error(sb, err);
+ goto errout;
+ }

/* ext4_reserve_inode_write() gets a reference on the iloc */
err = ext4_reserve_inode_write(handle, inode, &iloc);
if (unlikely(err))
  -goto exit_dind;
+goto errout;

n_group_desc = ext4_kvmalloc((gdb_num + 1) *
   sizeof(struct buffer_head *),
@@ -845,7 +876,7 @@
   err = -ENOMEM;
   ext4_warning(sb, "not enough memory for %lu groups",
      gdb_num + 1);
- goto exit_inode;
+ goto errout;
}

/*
@@ -861,7 +892,7 @@
   err = ext4_handle_dirty_metadata(handle, NULL, dind);
   if (unlikely(err)) {
     ext4_std_error(sb, err);
- goto exit_inode;
+ goto errout;
   }

   inode->i_blocks -= (gdbackup + 1) * sb->s_blocksize >>
      (9 - EXT4_SB(sb)->s_cluster_bits);
@@ -870,31 +901,30 @@
   err = ext4_handle_dirty_metadata(handle, NULL, gdb_bh);
   if (unlikely(err)) {
     ext4_std_error(sb, err);
- goto exit_inode;
+ iloc.bh = NULL;

goto errout;
}
brelse(dind);

-o_group_desc = EXT4_SB(sb)->s_group_desc;
+rcu_read_lock();
+o_group_desc = rcu_dereference(EXT4_SB(sb)->s_group_desc);
memcpy(n_group_desc, o_group_desc,
       EXT4_SB(sb)->s_gdb_count * sizeof(struct buffer_head *));
+rcu_read_unlock();
n_group_desc[gdb_num] = gdb_bh;
-EXT4_SB(sb)->s_group_desc = n_group_desc;
+rcu_assign_pointer(EXT4_SB(sb)->s_group_desc, n_group_desc);
EXT4_SB(sb)->s_gdb_count++;
-kvfree(o_group_desc);
+ext4_kvfree_array_rcu(o_group_desc);

le16_add_cpu(&es->s_reserved_gdt_blocks, -1);
err = ext4_handle_dirty_super(handle, sb);
if (err)
ext4_std_error(sb, err);
-
return err;
-
-exit_inode:
+errout:
    kvfree(n_group_desc);
brelse(iloc.bh);
-exit_dind:
brelse(dind);
-exit_bh:
brelse(gdb_bh);

ext4_debug("leaving with error %d\n", err);
@@ -914,30 +944,38 @@

gdblock = ext4_meta_bg_first_block_no(sb, group) +
    ext4_bg_has_super(sb, group);
-gdb_bh = sb_bread(sb, gdblock);
-if (!gdb_bh)
    -return -EIO;
+gdb_bh = ext4_sb_bread(sb, gdblock, 0);
+if (IS_ERR(gdb_bh))
    +return PTR_ERR(gdb_bh);
+n_group_desc = ext4_kvmalloc((gdb_num + 1) *
    sizeof(struct buffer_head *),
    GFP_NOFS);
if (!n_group_desc) {

+brelse(gdb_bh);
err = -ENOMEM;

ext4_warning(sb, "not enough memory for %lu groups",
          gdb_num + 1);
return err;
}

-o_group_desc = EXT4_SB(sb)->s_group_desc;
+rcu_read_lock();
+o_group_desc = rcu_dereference(EXT4_SB(sb)->s_group_desc);
memcpy(n_group_desc, o_group_desc,
       EXT4_SB(sb)->s_gdb_count * sizeof(struct buffer_head *));
+rcu_read_unlock();
n_group_desc[gdb_num] = gdb_bh;
-EXT4_SB(sb)->s_group_desc = n_group_desc;
-EXT4_SB(sb)->s_gdb_count++;
-kvfree(o_group_desc);
+
BUFFER_TRACE(gdb_bh, "get_write_access");
err = ext4_journal_get_write_access(handle, gdb_bh);
- if (unlikely(err))
  +if (err) {
    +kvfree(n_group_desc);
    +brelse(gdb_bh);
    +return err;
  +}
  +
  +rcu_assign_pointer(EXT4_SB(sb)->s_group_desc, n_group_desc);
  +EXT4_SB(sb)->s_gdb_count++;
  +ext4_kvfree_array_rcu(o_group_desc);
  return err;
}

@@ -974,9 +1012,10 @@
return -ENOMEM;

data = EXT4_I(inode)->i_data + EXT4_DIND_BLOCK;
-dind = sb_bread(sb, le32_to_cpu(*data));
- if (!dind) {
-err = -EIO;
+dind = ext4_sb_bread(sb, le32_to_cpu(*data), 0);
+if (IS_ERR(dind)) {
+err = PTR_ERR(dind);
+dind = NULL;
+ goto exit_free;
 }

@@ -995,9 +1034,10 @@
err = -EINVAL;
go to exit_bh;
}
-primary[res] = sb_bread(sb, blk);
-if (!primary[res]) {
-err = -EIO;
+primary[res] = ext4_sb_bread(sb, blk, 0);
+if (IS_ERR(primary[res])) {
+err = PTR_ERR(primary[res]);
+primary[res] = NULL;
go to exit_bh;
}
gdbackups = verify_reserved_gdb(sb, group, primary[res]);
@@ -1121,8 +1161,10 @@
    backup_block, backup_block -
    ext4_group_first_block_no(sb, group));
 BUFFER_TRACE(bh, "get_write_access");
-if ((err = ext4_journal_get_write_access(handle, bh)))
+-if ((err = ext4_journal_get_write_access(handle, bh))) {
+-brelse(bh);
b reak;
+}
 lock_buffer(bh);
 memcpy(bh->b_data, data, size);
 if (rest)
@@ -1199,7 +1241,8 @@
 /* use non-sparse filesystems anymore. This is already checked above.
 */
 if (gdb_off) {
- gdb_bh = sbi->s_group_desc[gdb_num];
+ gdb_bh = sbi_array_rcu_deref(sbi, s_group_desc, gdb_num);
+ BUFFER_TRACE(gdb_bh, "get_write_access");
 err = ext4_journal_get_write_access(handle, gdb_bh);
@@ -1281,7 +1324,7 @@
 /*
 * get_write_access() has been called on gdb_bh by ext4_add_new_desc().
 */
- gdb_bh = sbi->s_group_desc[gdb_num];
+ gdb_bh = sbi_array_rcu_deref(sbi, s_group_desc, gdb_num);
 /* Update group descriptor block for new group */
 gdp = (struct ext4_group_desc *)(gdb_bh->b_data +
 gdb_off * EXT4_DESC_SIZE(sb));
@@ -1409,11 +1452,14 @@
 percpu_counter_read(&sbi->s_freeclusters_counter));
 if (ext4_has_feature_flex_bg(sb) && sbi->s_log_groups_per_flex) {
 ext4_group_t flex_group;
+struct flex_groups *fg;
+
flex_group = ext4-flex_group(sbi, group_data[0].group);
+fg = sbi_array_rcu_deref(sbi, s_flex_groups, flex_group);
atomic64_add(EXT4_NUM_B2C(sbi, free_blocks),
- &sbi->s_flex_groups[flex_group].free_clusters);
+ &fg->free_clusters);
atomic_add(EXT4_INODES_PER_GROUP(sb) * flex_gd->count,
- &sbi->s_flex_groups[flex_group].free_inodes);
+ &fg->free_inodes);
}

/*
@@ -1508,7 +1554,8 @@
for (; gdb_num <= gdb_num_end; gdb_num++) {
    struct buffer_head *gdb_bh;

-gdb_bh = sbi->s_group_desc[gdb_num];
+gdb_bh = sbi_array_rcu_deref(sbi, s_group_desc,
   gdb_num);
if (old_gdb == gdb_bh->b_blocknr)
    continue;
update_backups(sb, gdb_bh->b_blocknr, gdb_bh->b_data,
@@ -1628,13 +1675,13 @@
}
if (reserved_gdb || gdb_off == 0) {
-    if (ext4_has_feature_resize_inode(sb) ||
+    if (!ext4_has_feature_resize_inode(sb) ||
        !le16_to_cpu(es->s_reserved_gdt_blocks)) {
        ext4_warning(sb,
            "No reserved GDT blocks, can't resize");
        return -EPERM;
    }
    inode = ext4_iget(sb, EXT4_RESIZE_INO);
+inode = ext4_iget(sb, EXT4_RESIZE_INO, EXT4_IGET_SPECIAL);
if (IS_ERR(inode)) {
    ext4_warning(sb, "Error opening resize inode");
    return PTR_ERR(inode);
@@ -1933,7 +1980,7 @@
    return 0;
}

n_group = ext4_get_group_number(sb, n_blocks_count - 1);
-    if (n_group > (0xFFFFFFFFUL / EXT4_INODES_PER_GROUP(sb))) {
+    if (n_group >= (0xFFFFFFFFUL / EXT4_INODES_PER_GROUP(sb))) {
        ext4_warning(sb, "resize would cause inodes_count overflow");
        return -EINVAL;
    }
le16_to_cpu(es->s_reserved_gdt_blocks);

n_group = n_desc_blocks * EXT4_DESC_PER_BLOCK(sb);

n_blocks_count = (ext4_fsblk_t)n_group *
EXT4_BLOCKS_PER_GROUP(sb);

+EXT4_BLOCKS_PER_GROUP(sb) +
+le32_to_cpu(es->s_first_data_block);

n_group--; /* set to last group number */
}

if (!resize_inode)
	resize_inode = ext4_iget(sb, EXT4_RESIZE_INO);
+resize_inode = ext4_iget(sb, EXT4_RESIZE_INO,
+ EXT4_IGET_SPECIAL);

if (IS_ERR(resize_inode)) {
	ext4_warning(sb, "Error opening resize inode");
return PTR_ERR(resize_inode);
@@ -1984,6 +2033,26 @@
}
}

+/*
+ * Make sure the last group has enough space so that it's
+ * guaranteed to have enough space for all metadata blocks
+ * that it might need to hold. (We might not need to store
+ * the inode table blocks in the last block group, but there
+ * will be cases where this might be needed.)
+ */
+if ((ext4_group_first_block_no(sb, n_group) +
+ ext4_group_overhead_blocks(sb, n_group) + 2 +
+ sbi->s_itb_per_group + sbi->s_cluster_ratio) >= n_blocks_count) {
+n_blocks_count = ext4_group_first_block_no(sb, n_group);
+n_group--;
+n_blocks_count_retry = 0;
+if (resize_inode) {
+iput(resize_inode);
+resize_inode = NULL;
+}
+goto retry;
+
/* extend the last group */
if (n_group == o_group)
	add = n_blocks_count - o_blocks_count;
@@ -2000,7 +2069,7 @@

err = ext4_alloc_flex_bg_array(sb, n_group + 1);
if (err)
-return err;
+goto out;
err = ext4_mb_alloc_groupinfo(sb, n_group + 1);
if (err)
@@ -2036,6 +2105,10 @@
n_blocks_count_retry = 0;
free_flex_gd(flex_gd);
flex_gd = NULL;
+if (resize_inode) {
+iput(resize_inode);
+resize_inode = NULL;
+}
goto retry;
}
@@ -2044,6 +2117,10 @@
free_flex_gd(flex_gd);
if (resize_inode != NULL)
iput(resize_inode);
-ext4_msg(sb, KERN_INFO, "resized filesystem to %llu", n_blocks_count);
+if (err)
+ext4_warning(sb, "error (%d) occurred during "
+ "file system resize", err);
+ext4_msg(sb, KERN_INFO, "resized filesystem to %llu",
+ ext4_blocks_count(es));
return err;
}
--- linux-4.15.0.orig/fs/ext4/super.c
+++ linux-4.15.0/fs/ext4/super.c
@@ -40,6 +40,7 @@
#include <linux/dax.h>
#include <linux/cleancache.h>
#include <linux/uaccess.h>
+#include <linux/user_namespace.h>
#include <linux/kthread.h>
#include <linux/freezer.h>
@@ -63,10 +64,10 @@
unsigned long journal_devnum);
static int ext4_show_options(struct seq_file *seq, struct dentry *root);
static int ext4_commit_super(struct super_block *sb, int sync);
-static void ext4_mark_recovery_complete(struct super_block *sb,
+static int ext4_mark_recovery_complete(struct super_block *sb,
struct ext4_super_block *es);
-static void ext4_clear_journal_err(struct super_block *sb,
- struct ext4_super_block *es);
+static int ext4_clear_journal_err(struct super_block *sb,

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+ struct ext4_super_block *es;
static int ext4_sync_fs(struct super_block *sb, int wait);
static int ext4_remount(struct super_block *sb, int *flags, char *data);
static int ext4_statfs(struct dentry *dentry, struct kstatfs *buf);

/*
 * transaction start -> page lock(s) -> i_data_sem (rw)
 */

+static bool userns_mounts = false;
+module_param(userns_mounts, bool, 0644);
+MODULE_PARM_DESC(userns_mounts, "Allow mounts from unprivileged user namespaces");
+
+#if !defined(CONFIG_EXT2_FS) && !defined(CONFIG_EXT2_FS_MODULE) &&
defined(CONFIG_EXT4_USE_FOR_EXT2)
static struct file_system_type ext2_fs_type = {
   .owner = THIS_MODULE,
   .name = "ext2",
   .mount = ext4_mount,
   .kill_sb = kill_block_super,
   -.fs_flags = FS_REQUIRES_DEV,
   +.fs_flags = FS_REQUIRES_DEV | FS_USERNS_MOUNT,
   };;
MODULE_ALIAS_FS("ext2");
MODULE_ALIAS("ext2");
@@ -134,12 +139,35 @@
   .name = "ext3",
   .mount = ext4_mount,
   .kill_sb = kill_block_super,
   -.fs_flags = FS_REQUIRES_DEV,
   +.fs_flags = FS_REQUIRES_DEV | FS_USERNS_MOUNT,
   ;
MODULE_ALIAS_FS("ext3");
MODULE_ALIAS("ext3");
#define IS_EXT3_SB(sb) ((sb)->s_bdev->bd_holder == &ext3_fs_type)
+
+ /* This works like sb_bread() except it uses ERR_PTR for error
+ * returns. Currently with sb_bread it's impossible to distinguish
+ * between ENOMEM and EIO situations (since both result in a NULL
+ * return.
+ */
+ struct buffer_head *
+ext4_sb_bread(struct super_block *sb, sector_t block, int op_flags)
+{
+    struct buffer_head *bh = sb_getblk(sb, block);
+    
+    if (bh == NULL)
+        return ERR_PTR(-ENOMEM);
+*/

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+if (buffer_uptodate(bh))
+return bh;
+ll_rw_block(REQ_OP_READ, REQ_META | op_flags, 1, &bh);
+wait_on_buffer(bh);
+if (buffer_uptodate(bh))
+return bh;
+put_bh(bh);
+return ERR_PTR(-EIO);
+
+static int ext4_verify_csum_type(struct super_block *sb,
   struct ext4_super_block *es)
{
  unsigned int line)
  {
    __save_error_info(sb, func, line);
  ext4_commit_super(sb, 1);
+if (!bdev_read_only(sb->s_bdev))
+ext4_commit_super(sb, 1);
  }

  /*
  @@ -346,7 +374,8 @@
   unsigned int line)
   {
     __save_error_info(sb, func, line);
  ext4_commit_super(sb, 1);
+if (!bdev_read_only(sb->s_bdev))
+ext4_commit_super(sb, 1);
  }

  /*
  @@ -388,6 +417,95 @@
   spin_unlock(&sbi->s_md_lock);
  }

  +/*
  + * This writepage callback for write_cache_pages()
  + * takes care of a few cases after page cleaning.
  + *
  + * write_cache_pages() already checks for dirty pages
  + * and calls clear_page_dirty_for_io(), which we want,
  + * to write protect the pages.
  + *
  + * However, we may have to redirty a page (see below.)
  + */
  +static int ext4_journalled_writepage_callback(struct page *page,
  +  struct writeback_control *wbc,
  +  void *data)
  +{
    transaction_t *transaction = (transaction_t *) data;
    struct buffer_head *bh, *head;
    struct journal_head *jh;
    +bh = head = page_buffers(page);
    +do {
      +*/
We have to redirty a page in these cases:
1) If buffer is dirty, it means the page was dirty because it contains a buffer that needs checkpointing. So the dirty bit needs to be preserved so that checkpointing writes the buffer properly.
2) If buffer is not part of the committing transaction (we may have just accidentally come across this buffer because inode range tracking is not exact) or if the currently running transaction already contains this buffer as well, dirty bit needs to be preserved so that the buffer gets writeprotected properly on running transaction's commit.

```c
+jh = bh2jh(bh);
+if (buffer_dirty(bh) ||
    (jh && (jh->b_transaction != transaction ||
    jh->b_next_transaction))) {
    redirty_page_for_writepage(wbc, page);
    goto out;
}
```

```
static int ext4_journalled_submit_inode_data_buffers(struct jbd2_inode *jinode)
{
    struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    struct writeback_control wbc = {
        .sync_mode = WB_SYNC_ALL,
        .nr_to_write = LONG_MAX,
        .range_start = jinode->i_dirty_start,
        .range_end = jinode->i_dirty_end,
    };
    return write_cache_pages(mapping, &wbc,
        ext4_journalled_writepage_callback,
        jinode->i_transaction);
}
```

```
static int ext4_journal_submit_inode_data_buffers(struct jbd2_inode *jinode)
{
    int ret;
    if (ext4_should_journal_data(jinode->i_vfs_inode))
        ret = ext4_journalled_submit_inode_data_buffers(jinode);
    else
        ret = jbd2_journal_submit_inode_data_buffers(jinode);
```
```c
static int ext4_journal_finish_inode_data_buffers(struct jbd2_inode *jinode)
{
    int ret = 0;

    if (!ext4_should_journal_data(jinode->i_vfs_inode))
        ret = jbd2_journal_finish_inode_data_buffers(jinode);
    return ret;
}

static bool system_going_down(void)
{
    return system_state == SYSTEM_HALT || system_state == SYSTEM_POWER_OFF
    || system_state == SYSTEM_RESTART;
}

/* Deal with the reporting of failure conditions on a filesystem such as
 * inconsistencies detected or read IO failures.
 *
@@ -405,17 +523,20 @@
static void ext4_handle_error(struct super_block *sb)
{
    if (sb_rdonly(sb))
        return;
+    journal_t *journal = EXT4_SB(sb)->s_journal;
    if (!test_opt(sb, ERRORS_CONT)) {
+        journal_t *journal = EXT4_SB(sb)->s_journal;
        if (sb_rdonly(sb) || test_opt(sb, ERRORS_CONT))
            return;
    }
    if (test_opt(sb, ERRORS_RO)) {
+        EXT4_SB(sb)->s_mount_flags |= EXT4_MF_FS_ABORTED;
        if (journal)
            jbd2_journal_abort(journal, -EIO);
    }
    if (test_opt(sb, ERRORS_CONT)) {
+        EXT4_SB(sb)->s_mount_flags |= EXT4_MF_FS_ABORTED;
        if (journal)
            jbd2_journal_abort(journal, -EIO);
+        /*
+        * We force ERRORS_RO behavior when system is rebooting. Otherwise we
+        * could panic during 'reboot -f' as the underlying device got already
+        * disabled.
+        */
```
```c
/*
 * Make sure updated value of ->s_mount_flags will be visible
 */

smp_wmb();
sb->s_flags |= SB_RDONLY;
-
} -if (test_opt(sb, ERRORS_PANIC)) {
+} else if (test_opt(sb, ERRORS_PANIC)) {
if (EXT4_SB(sb)->s_journal &&
  !(EXT4_SB(sb)->s_journal->j_flags & JBD2_REC_ERR))
return;
@@ -640,7 +760,7 @@
jbd2_journal_abort(EXT4_SB(sb)->s_journal, -EIO);
save_error_info(sb, function, line);
}
-} if (test_opt(sb, ERRORS_PANIC)) {
+} if (test_opt(sb, ERRORS_PANIC) && !system_going_down()) {
if (EXT4_SB(sb)->s_journal &&
  !(EXT4_SB(sb)->s_journal->j_flags & JBD2_REC_ERR))
return;
@@ -742,6 +862,7 @@
}

ext4_unlock_group(sb, grp);
+ext4_commit_super(sb, 1);
ext4_handle_error(sb);
/*
 * We only get here in the ERRORS_RO case; relocking the group
 @@ -854,6 +975,18 @@
 for (type = 0; type < EXT4_MAXQUOTAS; type++)
 ext4_quota_off(sb, type);
 }
+*/
+/* This is a helper function which is used in the mount/remount
 + + codepaths (which holds s_umount) to fetch the quota file name.
 + */
+static inline char *get_qf_name(struct super_block *sb,
 + struct ext4_sb_info *sbi,
 + int type)
 +{
 +return rcu_dereference_protected(sbi->s_qf_names[type],
 + lockdep_is_held(&sb->s_umount));
 +}
```
static inline void ext4_quota_off_umount(struct super_block *sb)
{
    if (!sb_rdonly(sb))
        ext4_commit_super(sb, 1);

    +rcu_read_lock();
    +group_desc = rcu_dereference(sb->s_group_desc);
    for (i = 0; i < sb->s_gdb_count; i++)
        -brelse(sb->s_group_desc[i]);
    -kvfree(sb->s_group_desc);
    -kvfree(sb->s_flex_groups);
    +brelse(group_desc[i]);
    +kvfree(group_desc);
    +flex_groups = rcu_dereference(sb->s_flex_groups);
    +if (flex_groups) {
        +for (i = 0; i < sb->s_flex_groups_allocated; i++)
            +kvfree(flex_groups[i]);
        +kvfree(flex_groups);
    } +}
    +rcu_read_unlock();
    percpu_counter_destroy(&sb->s_freeclusters_counter);
    percpu_counter_destroy(&sb->s_freeinodes_counter);
    percpu_counter_destroy(&sb->s_dirs_counter);
    percpu_counter_destroy(&sb->s_dirtyclusters_counter);
    -percpu_free_rwlock(&sb->s_journal_flag_rwlock);
    +percpu_free_rwlock(&sb->s_writepages_rwlock);
    #ifdef CONFIG_QUOTA
    for (i = 0; i < EXT4_MAXQUOTAS; i++)
        -kfree(sb->s_qf_names[i]);
    +kfree(get_qf_name(sb, sbi, i));
    #endif

    /* Debugging code just in case the in-memory inode orphan list
    if (sb->s_orphan_list)
        kmem_cache_free(sb->s_orphan_list_cache);
    */
-if (ino < EXT4_FIRST_INO(sb) && ino != EXT4_ROOT_INO)
-return ERR_PTR(-ESTALE);
-if (ino > le32_to_cpu(EXT4_SB(sb)->s_es->s_inodes_count))
-return ERR_PTR(-ESTALE);
-
-/* iget isn't really right if the inode is currently unallocated!!
- *
- * ext4_read_inode will return a bad_inode if the inode had been
- * deleted, so we should be safe.
- *
-+/*
- * Currently we don't know the generation for parent directory, so
- * a generation of 0 means "accept any"
- */
-inode = ext4_iget_normal(sb, ino);
+inode = ext4_iget(sb, ino, EXT4_IGET_HANDLE);
if (IS_ERR(inode))
    return ERR_CAST(inode);
if (generation && inode->i_generation != generation) {
    ext4_nfs_get_inode);
}

+static int ext4_nfs_commit_metadata(struct inode *inode)
+{
+    struct writeback_control wbc = {
+        .sync_mode = WB_SYNC_ALL
+    };
+    +trace_ext4_nfs_commit_metadata(inode);
+    return ext4_write_inode(inode, &wbc);
+
+    
+    */
+    * Try to release metadata pages (indirect blocks, directories) which are
+    * mapped via the block device. Since these pages could have journal heads
+    @ @ -1327,6 +1471,7 @@
+.fh_to_dentry = ext4_fh_to_dentry,
+.fh_to_parent = ext4_fh_to_parent,
+.get_parent = ext4_get_parent,
+.commit_metadata = ext4_nfs_commit_metadata,
+};

enum {
    @ @ -1474,11 +1619,10 @@
static int set_qf_name(struct super_block *sb, int qtype, substring_t *args)
{
    struct ext4_sb_info *sbi = EXT4_SB(sb);
-char *qname;
+char *qname, *old_qname = get_qf_name(sb, sbi, qtype);
int ret = -1;

-if (sb_any_quota_loaded(sb) &&
-!sbi->s_qf_names[qtype]) {
+if (sb_any_quota_loaded(sb) && !old_qname) {
 ext4_msg(sb, KERN_ERR,
 "Cannot change journaled 
"quota options when quota turned on");
@@ -1495,8 +1639,8 @@
      "Not enough memory for storing quotafile name");
      return -1;
    }
    if (sbi->s_qf_names[qtype]) {
      if (strcmp(sbi->s_qf_names[qtype], qname) == 0)
+        if (old_qname) {
+            if (strcmp(old_qname, qname) == 0)
ret = 1;
else
      ext4_msg(sb, KERN_ERR,
@@ -1509,7 +1653,7 @@
      "quotafile must be on filesystem root");
      goto errout;
    }
    -sbi->s_qf_names[qtype] = qname;
+rcu_assign_pointer(sbi->s_qf_names[qtype], qname);
set_opt(sb, QUOTA);
return 1;
errout:
@@ -1521,15 +1665,16 @@
{

struct ext4_sb_info *sbi = EXT4_SB(sb);
+char *old_qname = get_qf_name(sb, sbi, qtype);

-if (sb_any_quota_loaded(sb) &&
-sbi->s_qf_names[qtype]) {
+if (sb_any_quota_loaded(sb) && old_qname) {
 ext4_msg(sb, KERN_ERR, "Cannot change journaled quota options"
" when quota turned on");
      return -1;
    }
-kfree(sbi->s_qf_names[qtype]);
-sbi->s_qf_names[qtype] = NULL;
+rcu_assign_pointer(sbi->s_qf_names[qtype], NULL);
+synchronize_rcu();
+kfree(old_qname);
return 1;
}
#endif
@@ -1632,8 +1777,8 @@
{-Opt_noquota, (EXT4_MOUNT_QUOTA | EXT4_MOUNT_USRQUOTA |  
                   EXT4_MOUNT_GRPQUOTA | EXT4_MOUNT_PRJQUOTA),
         MOPT_CLEAR | MOPT_Q},
-{-Opt_usrjquota, 0, MOPT_Q},
-{-Opt_grpjquota, 0, MOPT_Q},
+{Opt_usrjquota, 0, MOPT_Q | MOPT_STRING},
+{Opt_grpjquota, 0, MOPT_Q | MOPT_STRING},
   {Opt_offusrjquota, 0, MOPT_Q},
   {Opt_offgrpjquota, 0, MOPT_Q},
   {Opt_jqfmt_vfsold, QFMT_VFS_OLD, MOPT_QFMT},
@@ -1710,6 +1855,13 @@
   return -1;
}

+if (token == Opt_err_panic && !capable(CAP_SYS_ADMIN)) {
+   ext4_msg(sb, KERN_ERR,
+            "Mount option "\%s\" not allowed for unprivileged mounts",
+                  opt);
+   return -1;
+}
+
if (args->from && !(m->flags & MOPT_STRING) && match_int(args, &arg))
   return -1;
if (args->from && (m->flags & MOPT_GTE0) && (arg < 0))
@@ -1737,6 +1919,13 @@
   arg = JBD2_DEFAULT_MAX_COMMIT_AGE;
   sbi->s_commit_interval = HZ * arg;
 } else if (token == Opt_debug_want_extra_isize) {
+   if ((arg & 1) ||
+       (arg < 4) ||
+       (arg > (sbi->s_inode_size - EXT4_GOOD_OLD_INODE_SIZE))) {
+      ext4_msg(sb, KERN_ERR,
+               "Invalid want_extra_isize %d", arg);
+      return -1;
+   }
   sbi->s_want_extra_isize = arg;
 } else if (token == Opt_max_batch_time) {
   sbi->s_max_batch_time = arg;
@@ -1760,14 +1919,14 @@
 } else if (token == Opt_stripe) {
   sbi->s_stripe = arg;
 } else if (token == Opt_resuid) {
-   uid = make_kuid(current_user_ns(), arg);
+   uid = make_kuid(sb->s_user_ns, arg);

if (!uid_valid(uid)) {
    ext4_msg(sb, KERN_ERR, "Invalid uid value %d", arg);
    return -1;
}
sbi->s_resuid = uid;
} else if (token == Opt_resgid) {
    -gid = make_kgid(current_user_ns(), arg);
    +gid = make_kgid(sb->s_user_ns, arg);
    if (!gid_valid(gid)) {
        ext4_msg(sb, KERN_ERR, "Invalid gid value %d", arg);
        return -1;
    }

    /*
     * Refuse access for unprivileged mounts if the user does
     * not have rw access to the journal device via the supplied
     * path.
     */
    +if (!capable(CAP_SYS_ADMIN) &&
        inode_permission(d_inode(path.dentry), MAY_READ|MAY_WRITE)) {
    +ext4_msg(sb, KERN_ERR,
    "error: Insufficient access to journal path %s",
    +journal_path);
    +return -1;
    +}
    +
    journal_inode = d_inode(path.dentry);
    if (!S_ISBLK(journal_inode->i_mode)) {
        ext4_msg(sb, KERN_ERR, "error: journal path %s"
    @ @ -1866,6 +2038,16 @ @
    #endif
    } else if (token == Opt_dax) {
    #ifdef CONFIG_FS_DAX
    +if (is_remount && test_opt(sb, DAX)) {
    +ext4_msg(sb, KERN_ERR, "can't mount with 
    +"both data=journal and dax");
    +return -1;
    +}
    +if (is_remount && !(sbi->s_mount_opt & EXT4_MOUNT_DAX)) {
    +ext4_msg(sb, KERN_ERR, "can't change 
    +"dax mount option while remounting");
    +return -1;
    +}
    ext4_msg(sb, KERN_WARNING,
    "DAX enabled. Warning: EXPERIMENTAL, use at your own risk");
    sbi->s_mount_opt |= m->mount_opt;
int is_remount)
{
    struct ext4_sb_info *sbi = EXT4_SB(sb);
    char *p;
    char *p, __maybe_unused *usr_qf_name, __maybe_unused *grp_qf_name;
    substring_t args[MAX_OPT_ARGS];
    int token;

    "Cannot enable project quota enforcement.");
    return 0;
}

-if (sbi->s_qf_names[USRQUOTA] || sbi->s_qf_names[GRPQUOTA]) {
    if (test_opt(sb, USRQUOTA) && sbi->s_qf_names[USRQUOTA])
        usr_qf_name = get_qf_name(sb, sbi, USRQUOTA);
    if (test_opt(sb, GRPQUOTA) && sbi->s_qf_names[GRPQUOTA])
        grp_qf_name = get_qf_name(sb, sbi, GRPQUOTA);
    if (usr_qf_name || grp_qf_name) {
        if (test_opt(sb, USRQUOTA) && usr_qf_name)
            clear_opt(sb, USRQUOTA);
        if (test_opt(sb, GRPQUOTA) && grp_qf_name)
            clear_opt(sb, GRPQUOTA);
    }
}

-if (test_opt(sb, GRPQUOTA) && sbi->s_qf_names[GRPQUOTA])
    clear_opt(sb, GRPQUOTA);

if (test_opt(sb, GRPQUOTA) || test_opt(sb, USRQUOTA)) {
    #if defined(CONFIG_QUOTA)
    struct ext4_sb_info *sbi = EXT4_SB(sb);
    char *usr_qf_name, *grp_qf_name;

    if (sbi->s_jquota_fmt) {
        char *fmtname = "";
        seq_printf(seq, ",jqfmt=%s", fmtname);
    }

    -if (sbi->s_qf_names[USRQUOTA])
        -seq_show_option(seq, "usrjquota", sbi->s_qf_names[USRQUOTA]);
    -if (sbi->s_qf_names[GRPQUOTA])
        -seq_show_option(seq, "grpjquota", sbi->s_qf_names[GRPQUOTA]);
    +rcu_read_lock();
    +usr_qf_name = rcu_dereference(sbi->s_qf_names[USRQUOTA]);
    +grp_qf_name = rcu_dereference(sbi->s_qf_names[GRPQUOTA]);
    +if (usr_qf_name)
        +seq_show_option(seq, "usrjquota", usr_qf_name);
+if (grp_qf_name)
+seq_show_option(seq, "grpquota", grp_qf_name);
+rcu_read_unlock();
@endif

@@ -2041,14 +2229,14 @@
SEQ_OPTS_PRINT("%s", token2str(m->token));
}

-if (nodefs || !uid_eq(sbi->s_resuid, make_kuid(&init_user_ns, EXT4_DEF_RESUID)) ||
+if (nodefs || !uid_eq(sbi->s_resuid, make_kuid(sb->s_user_ns, EXT4_DEF_RESUID)) ||
    le16_to_cpu(es->s_def_resuid) != EXT4_DEF_RESUID)
SEQ_OPTS_PRINT("resuid=\%u",
-from_kuid_munged(&init_user_ns, sbi->s_resuid));
-if (nodefs || !gid_eq(sbi->s_resgid, make_kgid(&init_user_ns, EXT4_DEF_RESGID)) ||
+from_kuid_munged(sb->s_user_ns, sbi->s_resuid));
+if (nodefs || !gid_eq(sbi->s_resgid, make_kgid(sb->s_user_ns, EXT4_DEF_RESGID)) ||
    le16_to_cpu(es->s_def_resgid) != EXT4_DEF_RESGID)
SEQ_OPTS_PRINT("resgid=\%u",
-from_kgid_munged(&init_user_ns, sbi->s_resgid));
+from_kgid_munged(sb->s_user_ns, sbi->s_resgid));
  def_errors = nodefs ? -1 : le16_to_cpu(es->s_errors);
if (test_opt(sb, ERRORS_RO) && def_errors != EXT4_ERRORS_RO)
SEQ_OPTS_PUTS("errors=remount-ro");
@@ -2086,6 +2274,8 @@
SEQ_OPTS_PRINT("max_dir_size_kb=\%u", sbi->s_max_dir_size_kb);
if (test_opt(sb, DATA_ERR_ABORT))
SEQ_OPTS_PUTS("data_err=abort");
+if (DUMMY_ENCRYPTION_ENABLED(sbi))
+SEQ_OPTS_PUTS("test_dummy_encryption");

ext4_show_quota_options(seq, sb);
return 0;
@@ -2145,7 +2335,6 @@
es->s_max_mnt_count = cpu_to_le16(EXT4_DFL_MAX_MNT_COUNT);
le16_add_cpu(&es->s_mnt_count, 1);
es->s_mtime = cpu_to_le32(get_seconds());
ex4_update_dynamic_rev(sb);
if (sbi->s_journal)
ex4_set_feature_journal_needs_recovery(sb);

@@ -2167,8 +2356,8 @@
int ext4_alloc_flex_bg_array(struct super_block *sb, ext4_group_t ngroup)
{
struct ext4_sb_info *sbi = EXT4_SB(sb);
-struct flex_groups *new_groups;
-int size;
struct flex_groups **old_groups, **new_groups;
int size, i, j;

if (!sbi->s_log_groups_per_flex)
    return 0;
@@ -2177,22 +2366,37 @@
    if (size <= sbi->s_flex_groups_allocated)
        return 0;
    -size = roundup_pow_of_two(size * sizeof(struct flex_groups));
    -new_groups = kvzalloc(size, GFP_KERNEL);
    +new_groups = kvzalloc(roundup_pow_of_two(size *
    +    sizeof(*sbi->s_flex_groups)), GFP_KERNEL);
    if (!new_groups) {
        -ext4_msg(sb, KERN_ERR, "not enough memory for %d flex groups",
        -size / (int) sizeof(struct flex_groups));
        +ext4_msg(sb, KERN_ERR,
        +"not enough memory for %d flex group pointers", size);
        return -ENOMEM;
    }
    -if (sbi->s_flex_groups) {
    -memcpy(new_groups, sbi->s_flex_groups,
    -    (sbi->s_flex_groups_allocated *
    -    sizeof(struct flex_groups)));
    -kvfree(sbi->s_flex_groups);
    +for (i = sbi->s_flex_groups_allocated; i < size; i++) {
    +new_groups[i] = kvzalloc(roundup_pow_of_two(
    +    sizeof(struct flex_groups)),
    +    GFP_KERNEL);
    +if (!new_groups[i]) {
    +    for (j = sbi->s_flex_groups_allocated; j < i; j++)
    +        kvfree(new_groups[j]);
    +    kvfree(new_groups);
    +    ext4_msg(sb, KERN_ERR,
    +        "not enough memory for %d flex groups", size);
    +    return -ENOMEM;
    +}
    }
    -sbi->s_flex_groups = new_groups;
    -sbi->s_flex_groups_allocated = size / sizeof(struct flex_groups);
    +rcu_read_lock();
    +old_groups = rcu_dereference(sbi->s_flex_groups);
    +if (old_groups)
    +    memcpy(new_groups, old_groups,
    +        (sbi->s_flex_groups_allocated *
    +        sizeof(struct flex_groups *)));
    +rcu_read_unlock();

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rcu_assign_pointer(sbi->s_flex_groups, new_groups);
+sb->s_flex_groups_allocated = size;
+if (old_groups)
+ext4_kvfree_array_rcu(old_groups);
return 0;
}
}
@@ -2200,6 +2404,7 @@
{
struct ext4_sb_info *sbi = EXT4_SB(sb);
struct ext4_group_desc *gdp = NULL;
+struct flex_groups *fg;
ex4_group_t flex_group;
int i, err;
}
@@ -2217,12 +2422,11 @@
gdp = ext4_get_group_desc(sb, i, NULL);

flex_group = ext4_flex_group(sbi, i);
-atomic_add(ext4_free_inodes_count(sb, gdp),
- &sb->s_flex_groups[flex_group].free_inodes);
+fg = sbi_array_rcu_deref(sbi, s_flex_groups, flex_group);
+atomic_add(ext4_free_inodes_count(sb, gdp), &fg->free_inodes);
atomic64_add(ext4_free_group_clusters(sb, gdp),
- &sb->s_flex_groups[flex_group].free_clusters);
-atomic_add(ext4_used_dirs_count(sb, gdp),
- &sb->s_flex_groups[flex_group].used_dirs);
+ &fg->free_clusters);
+atomic_add(ext4_used_dirs_count(sb, gdp), &fg->used_dirs);
}

return 1;
@@ -2302,6 +2506,7 @@
struct ext4_sb_info *sbi = EXT4_SB(sb);
ext4_fsblk_t first_block = le32_to_cpu(sbi->s_es->s_first_data_block);
ext4_fsblk_t last_block;
+ext4_fsblk_t last_bg_block = sb_block + ext4_bg_num_gdb(sb, 0);
ex4_fsblk_t last_block;
+ext4_fsblk_t last_bg_block = sb_block + ext4_bg_num_gdb(sb, 0);
ex4_fsblk_t block_bitmap;
ex4_fsblk_t inode_bitmap;
ex4_fsblk_t inode_table;
@@ -2331,6 +2536,16 @@
ex4_msg(sb, KERN_ERR, "ext4_check_descriptors: 
" "Block bitmap for group %u overlaps ");
"superblock", i);
+if (!sb_rdonly(sb))
+return 0;
+}
+if (block_bitmap >= sb_block + 1 &&

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+ block_bitmap <= last_bg_block) {
+ ext4_msg(sb, KERN_ERR, "ext4_check_descriptors: 
+ "Block bitmap for group %u overlaps " 
+ "block group descriptors", i);
+ if (!sb_rdonly(sb))
+ return 0;
+ }
if (block_bitmap < first_block || block_bitmap > last_block) {
 ext4_msg(sb, KERN_ERR, "ext4_check_descriptors: " 
 "Inode bitmap for group %u overlaps " 
 "superblock", i);
+ if (!sb_rdonly(sb))
+ return 0;
+ }
+ if (inode_bitmap >= sb_block + 1 &&
+ inode_bitmap <= last_bg_block) {
+ ext4_msg(sb, KERN_ERR, "ext4_check_descriptors: " 
+ "Inode bitmap for group %u overlaps " 
+ "block group descriptors", i);
+ if (!sb_rdonly(sb))
+ return 0;
+ }
if (inode_bitmap < first_block ||
inode_bitmap + sbi->s_itb_per_group - 1 > last_block) {
 ext4_msg(sb, KERN_ERR, "ext4_check_descriptors: " 
 "Inode table for group %u overlaps " 
 "superblock", i);
+ if (!sb_rdonly(sb))
+ return 0;
+ }
+ if (inode_table >= sb_block + 1 &&
+ inode_table <= last_bg_block) {
+ ext4_msg(sb, KERN_ERR, "ext4_check_descriptors: " 
+ "Inode table for group %u overlaps " 
+ "block group descriptors", i);
+ if (!sb_rdonly(sb))
+ return 0;
+ }
if (inode_table < first_block ||
inode_table + sb->s_blocks_per_group - 1 > last_block) {
 sb->s_flags &= ~SB_RDONLY;
}
#endif CONFIG_QUOTA
-/* Needed for iput() to work correctly and not trash data */
sb->s_flags |= SB_ACTIVE;
-
/*
 * Turn on quotas which were not enabled for read-only mounts if
 * filesystem has quota feature, so that they are updated correctly.
@@ -2506,8 +2738,15 @@
inode_lock(inode);
 truncate_inode_pages(inode->i_mapping, inode->i_size);
 ret = ext4_truncate(inode);
-if (ret)
+-if (ret) {
+-/*
+- * We need to clean up the in-core orphan list
+- * manually if ext4_truncate() failed to get a
+- * transaction handle.
+- */
+ext4_orphan_del(NULL, inode);
 ext4_std_error(inode->i_sb, ret);
+}
 inode_unlock(inode);
 nr_truncates++;
 } else {
@@ -2772,17 +3011,11 @@
 return 0;
 }

-#ifndef CONFIG_QUOTA
-if (ext4_has_feature_quota(sb) && !readonly) {
+if (!IS_ENABLED(CONFIG_QUOTA) || !IS_ENABLED(CONFIG_QFMT_V2)
+if (!readonly && (ext4_has_feature_quota(sb) ||
+ ext4_has_feature_project(sb))) {
 ext4_msg(sb, KERN_ERR,
- "Filesystem with quota feature cannot be mounted RDWR 
- "without CONFIG_QUOTA");
- return 0;
- }
-#endif /* CONFIG_QUOTA */
-if (ext4_has_feature_project(sb) && !readonly) {
- ext4_msg(sb, KERN_ERR,
- "Filesystem with project quota feature cannot be mounted RDWR 
- "without CONFIG_QUOTA");
+ "The kernel was not built with CONFIG_QUOTA and CONFIG_QFMT_V2");
+ return 0;
+ }
 
 ext4_group_t group, ngroups = EXT4_SB(sb)->s_groups_count;
 struct ext4_group_desc *gdp = NULL;
+if (!ext4_has_group_desc_csum(sb))
+return ngroups;
+
for (group = 0; group < ngroups; group++) {
  gdp = ext4_get_group_desc(sb, group, NULL);
  if (!gdp)
    goto -3348,7 +3584,8 @@
    */
  if (sbi->s_journal && !sbi->journal_bdev)
    overhead += EXT4_NUM_B2C(sbi, sbi->s_journal->j_maxlen);
  -else if (ext4_has_feature_journal(sb) && !sbi->s_journal) {
  +else if (ext4_has_feature_journal(sb) && !sbi->s_journal && j_inum) {
    +/* j_inum for internal journal is non-zero */
    j_inode = ext4_get_journal_inode(sb, j_inum);
    if (j_inode) {
      j_blocks = j_inode->i_size >> sb->s_blocksize_bits;
      @@ -3398,9 +3635,10 @@
        }
      struct dax_device *dax_dev = fs_dax_get_by_bdev(sb->s_bdev);
      char *orig_data = kstrdup(data, GFP_KERNEL);
      -struct buffer_head *bh;
      +struct buffer_head *bh, **group_desc;
      struct ext4_super_block *es = NULL;
      struct ext4_sb_info *sbi = kzalloc(sizeof(*sbi), GFP_KERNEL);
      +struct flex_groups **flex_groups;
      ext4_fsblk_t block;
      ext4_fsblk_t sb_block = get_sb_block(&data);
      ext4_fsblk_t logical_sb_block;
      @@ -3422,6 +3660,11 @@
      if ((data && !orig_data) || !sbi)
        goto out_free_base;

      +if (!userns_mounts && !capable(CAP_SYS_ADMIN)) {
        ret = -EPERM;
        +goto out_free_base;
        +}
      +
      sbi->s_daxdev = dax_dev;
      sbi->s_blockgroup_lock =
      kzalloc(sizeof(struct blockgroup_lock), GFP_KERNEL);
      @@ -3488,15 +3731,12 @@
    }

    /* Load the checksum driver */
    -if (ext4_has_feature_metadata_csum(sb))
      - ext4_has_feature_ea_inode(sb)) {
    -sbi->s_chksum_driver = crypto_alloc_shash("crc32c", 0, 0);
if (le16_to_cpu(sb->s_es->s_errors) == EXT4_ERRORS_PANIC) {
    if (!capable(CAP_SYS_ADMIN))
        goto failed_mount;
    set_opt(sb, ERRORS_PANIC);
} else if (le16_to_cpu(sb->s_es->s_errors) == EXT4_ERRORS_CONTINUE) {
    } else if (le16_to_cpu(sb->s_es->s_errors) == EXT4_ERRORS_CONTINUE) {
        set_opt(sb, ERRORS_CONT);
    } else {
        set_opt(sb, ERRORS_RO);
    }

/* block_validity enabled by default; disable with noblock_validity */
set_opt(sb, BLOCK_VALIDITY);
if (def_mount_opts & EXT4_DEFM_DISCARD)
    set_opt(sb, DISCARD);

-sbi->s_resuid = make_kuid(&init_user_ns, le16_to_cpu(es->s_def_resuid));
-sbi->s_resgid = make_kgid(&init_user_ns, le16_to_cpu(es->s_def_resgid));
+sbi->s_resuid = make_kuid(sb->s_user_ns, le16_to_cpu(es->s_def_resuid));
+if (!uid_valid(sbi->s_resuid))
    +sbi->s_resuid = make_kuid(sb->s_user_ns, EXT4_DEF_RESUID);
+sbi->s_resgid = make_kgid(sb->s_user_ns, le16_to_cpu(es->s_def_resgid));
+if (!gid_valid(sbi->s_resgid))
    +sbi->s_resgid = make_kgid(sb->s_user_ns, EXT4_DEF_RESGID);
-sbi->s_commit_interval = JBD2_DEFAULT_MAX_COMMIT_AGE * HZ;
-sbi->s_min_batch_time = EXT4_DEF_MIN_BATCH_TIME;
-sbi->s_max_batch_time = EXT4_DEF_MAX_BATCH_TIME;
@@ -3574,6 +3821,75 @@
*/

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sbi->s_li_wait_mult = EXT4_DEF_LI_WAIT_MULT;

+blocksize = BLOCK_SIZE << le32_to_cpu(es->s_log_block_size);
+if (blocksize < EXT4_MIN_BLOCK_SIZE ||
+ blocksize > EXT4_MAX_BLOCK_SIZE) {
+ext4_msg(sb, KERN_ERR,
+"Unsupported filesystem blocksize %d (%d log_block_size)",
+blocksize, le32_to_cpu(es->s_log_block_size));
+goto failed_mount;
+}
+
+if (le32_to_cpu(es->s_rev_level) == EXT4_GOOD_OLD_REV) {
+sbi->s_inode_size = EXT4_GOOD_OLD_INODE_SIZE;
+sbi->s_first_ino = EXT4_GOOD_OLD_FIRST_INO;
+} else {
+sbi->s_inode_size = le16_to_cpu(es->s_inode_size);
+sbi->s_first_ino = le32_to_cpu(es->s_first_ino);
+if (sbi->s_first_ino < EXT4_GOOD_OLD_FIRST_INO) {
+ext4_msg(sb, KERN_ERR, "invalid first ino: %u",
+sbi->s_first_ino);
+goto failed_mount;
+}
+if (((sbi->s_inode_size < EXT4_GOOD_OLD_INODE_SIZE) ||
+ (!is_power_of_2(sbi->s_inode_size)) ||
+ (sbi->s_inode_size > blocksize)) {
+ext4_msg(sb, KERN_ERR,
+"unsupported inode size: %d",
+sbi->s_inode_size);
+ext4_msg(sb, KERN_ERR, "blocksize: %d", blocksize);
+goto failed_mount;
+}
+/*
+ * i_atime_extra is the last extra field available for
+ * [acm]times in struct ext4_inode. Checking for that
+ * field should suffice to ensure we have extra space
+ * for all three.
+ */
+if (sbi->s_inode_size >= offsetof(struct ext4_inode, i_atime_extra) +
+sizeof((struct ext4_inode *)0)->i_atime_extra)) {
+sb->s_time_gran = 1;
+} else {
+sb->s_time_gran = NSEC_PER_SEC;
+}
+}
+
+if (sbi->s_inode_size > EXT4_GOOD_OLD_INODE_SIZE) {
+sbi->s_want_extra_isize = sizeof(struct ext4_inode) -
+EXT4_GOOD_OLD_INODE_SIZE;
+if (ext4_has_feature_extra_isize(sb)) {
unsigned v, max = (sbi->s_inode_size -
+ EXT4_GOOD_OLD_INODE_SIZE);
+
+v = le16_to_cpu(es->s_want_extra_isize);
+if (v > max) {
+ext4_msg(sb, KERN_ERR,
+ "bad s_want_extra_isize: %d", v);
+goto failed_mount;
+}
+if (sbi->s_want_extra_isize < v)
+sbi->s_want_extra_isize = v;
+
+v = le16_to_cpu(es->s_min_extra_isize);
+if (v > max) {
+ext4_msg(sb, KERN_ERR,
+ "bad s_min_extra_isize: %d", v);
+goto failed_mount;
+}
+if (sbi->s_want_extra_isize < v)
+sbi->s_want_extra_isize = v;
+
if (sbi->s_es->s_mount_opts[0]) {
char *s_mount_opts = kstrndup(sbi->s_es->s_mount_opts,
@@ -3658,6 +3974,12 @@
ext4_msg(sb, KERN_INFO, "mounting ext2 file system 
"using the ext4 subsystem");
else {
+/*
+ * If we're probing be silent, if this looks like
+ * it's actually an ext[34] filesystem.
+ */
+if (silent && ext4_feature_set_ok(sb, sb_rdonly(sb)))
+goto failed_mount;
+ext4_msg(sb, KERN_ERR, "couldn't mount as ext2 due "
"to feature incompatibilities");
goto failed_mount;
@@ -3669,6 +3991,12 @@
ext4_msg(sb, KERN_INFO, "mounting ext3 file system 
"using the ext4 subsystem");
else {
+/*
+ * If we're probing be silent, if this looks like
+ * it's actually an ext4 filesystem.
+ */
+if (silent && ext4_feature_set_ok(sb, sb_rdonly(sb)))

goto failed_mount;
ext4_msg(sb, KERN_ERR, "couldn't mount as ext3 due "
"to feature incompatibilities");
goto failed_mount;
@@ -3683,14 +4011,6 @@
if (!ext4_feature_set_ok(sb, (sb_rdonly(sb))))
goto failed_mount;

-blocksize = BLOCK_SIZE << le32_to_cpu(es->s_log_block_size);
-if (blocksize < EXT4_MIN_BLOCK_SIZE ||
-    blocksize > EXT4_MAX_BLOCK_SIZE) {
-    ext4_msg(sb, KERN_ERR,
-        "Unsupported filesystem blocksize %d (%d log_block_size)",
-        blocksize, le32_to_cpu(es->s_log_block_size));
-goto failed_mount;
-
} if (le32_to_cpu(es->s_log_block_size) >
      (EXT4_MAX_BLOCK_LOG_SIZE - EXT4_MIN_BLOCK_LOG_SIZE)) {
    ext4_msg(sb, KERN_ERR,
        "Invalid log cluster size: %u",
        le32_to_cpu(es->s_log_cluster_size));
-goto failed_mount;
+
} if (le32_to_cpu(es->s_log_cluster_size) >
      (EXT4_MAX_CLUSTER_LOG_SIZE - EXT4_MIN_BLOCK_LOG_SIZE)) {
+    ext4_msg(sb, KERN_ERR,
+        "Invalid log cluster size: %u",
+        le32_to_cpu(es->s_log_cluster_size));
+    goto failed_mount;
+
} +if (le32_to_cpu(s->s_reserved_gdt_blocks) > (blocksize / 4)) {
    ext4_msg(sb, KERN_ERR,
        "Cannot use DAX on a filesystem that may contain inline data");
-goto failed_mount;
+s->s_mount_opt &= ~EXT4_MOUNT_DAX;
+
} +if (!bdev_dax_supported(sb->s_bdev, blocksize)) {
+    ext4_msg(sb, KERN_ERR,
+        "DAX unsupported by block device. Turning off DAX.");
+s->s_mount_opt &= ~EXT4_MOUNT_DAX;
+
} -err = bdev_dax_supported(sb, blocksize);
-if (err)
-goto failed_mount;

if (ext4_has_feature_encrypt(sb) &
    & es->s_encryption_level) {
    has_huge_files);
    sb->s_maxbytes = ext4_max_size(sb->s_blocksize_bits, has_huge_files);

    if (le32_to_cpu(es->s_rev_level) == EXT4_GOOD_OLD_REV) {
        sbi->s_inode_size = EXT4_GOOD_OLD_INODE_SIZE;
        sbi->s_first_ino = EXT4_GOOD_OLD_FIRST_INO;
        if ((sbi->s_inode_size < EXT4_MIN_DESC_SIZE_64BIT) ||
            (sbi->s_inodes_per_group < sbi->s_inodes_per_block) ||
            (sbi->s_inodes_per_group > blocksize * 8)) {
            ext4_msg(sb, KERN_ERR,
                    "invalid inodes per group: %lu",
                    sbi->s_inodes_per_group);
            goto failed_mount;
        }
    }

    sb->s_time_gran = 1 << (EXT4_EPOCH_BITS - 2);
    sb->s_desc_size = le16_to_cpu(es->s_desc_size);
    sb->s_itb_per_group = sbi->s_inodes_per_group /
                         sbi->s_blocks_per_group;
    goto failed_mount;
}

ext4_msg(sb, KERN_ERR,
        "block size (%d)", clustersize, blocksize);
    goto failed_mount;
}

if (le32_to_cpu(es->s_log_cluster_size) >
    (EXT4_MAX_CLUSTER_LOG_SIZE - EXT4_MIN_BLOCK_LOG_SIZE)) {
    ext4_msg(sb, KERN_ERR,
             "Invalid log cluster size: %u",
             le32_to_cpu(es->s_log_cluster_size));
    goto failed_mount;
}
sbi->s_cluster_bits = le32_to_cpu(es->s_log_cluster_size) -
le32_to_cpu(es->s_log_block_size);
sbi->s_clusters_per_group =
@@ -3863,10 +4167,10 @@
}
} else {
if (clustersize != blocksize) {
-ext4_warning(sb, "fragment/cluster size (%d) != ")
- "block size (%d)", clustersize,
- blocksize);
-clustersize = blocksize;
+ext4_msg(sb, KERN_ERR,
 + "fragment/cluster size (%d) != ")
 + "block size (%d)", clustersize, blocksize);
goto failed_mount;
}
if (sbi->s_blocks_per_group > blocksize * 8) {
ext4_msg(sb, KERN_ERR,
@@ -3920,14 +4224,21 @@
ext4_blocks_count(es));
goto failed_mount;
}
+if ((es->s_first_data_block == 0) && (es->s_log_block_size == 0) &&
 + (sbi->s_cluster_ratio == 1)) {
+ext4_msg(sb, KERN_WARNING, "bad geometry: first data ")
+ "block is 0 with a 1k block and cluster size");
goto failed_mount;
+}
+blocks_count = (ext4_blocks_count(es) -
 le32_to_cpu(es->s_first_data_block) +
 EXT4_BLOCKS_PER_GROUP(sb) - 1);
div(blocks_count, EXT4_BLOCKS_PER_GROUP(sb));
if (blocks_count > ((uint64_t)1ll<<32) - EXT4_DESC_PER_BLOCK(sb)) {
-ext4_msg(sb, KERN_WARNING, "groups count too large: %u ")
+ext4_msg(sb, KERN_WARNING, "groups count too large: %llu ")
 "(block count %llu, first data block %u, ")
 - "blocks per group %llu", sbi->s_groups_count,
 + "blocks per group %llu", blocks_count,
ext4_blocks_count(es),
 le32_to_cpu(es->s_first_data_block),
 EXT4_BLOCKS_PER_GROUP(sb));
@@ -3936,6 +4247,14 @@
 sbi->s_groups_count = blocks_count;
sbi->s_blockfile_groups = min_t(ext4_group_t, sbi->s_groups_count,
 (EXT4_MAX_BLOCK_FILE_PHYS / EXT4_BLOCKS_PER_GROUP(sb)));
+if (((u64)sbi->s_groups_count * sbi->s_inodes_per_group) !=
 + le32_to_cpu(es->s_inodes_count)) {
ext4_msg(sb, KERN_ERR, "inodes count not valid: %u vs %llu", 
+ le32_to_cpu(es->s_inodes_count), 
+ ((u64)sbi->s_groups_count * sbi->s_inodes_per_group)); 
+ret = -EINVAL; 
goto failed_mount; 
+
+db_count = (sbi->s_groups_count + EXT4_DESC_PER_BLOCK(sb) - 1) / 
+EXT4_DESC_PER_BLOCK(sb); 
if (ext4_has_feature_meta_bg(sb)) { 
@@ -3947,9 +4266,10 @@
goto failed_mount; 
} 
}
-sbi->s_group_desc = kvmalloc(db_count * 
+rcu_assign_pointer(sbi->s_group_desc, 
+ kvmalloc_array(db_count, 
sizeof(struct buffer_head *), 
- GFP_KERNEL); 
+ GFP_KERNEL));
if (sbi->s_group_desc == NULL) { 
ext4_msg(sb, KERN_ERR, "not enough memory"); 
ret = -ENOMEM; 
@@ -3961,27 +4281,31 @@
/* Pre-read the descriptors into the buffer cache */
for (i = 0; i < db_count; i++) { 
block = descriptor_loc(sb, logical_sb_block, i); 
-sb_breadahead(sb, block); 
+sb_breadahead_unmovable(sb, block); 
+sb_breadahead_unmovable(sb, block); 
} 
for (i = 0; i < db_count; i++) { 
+struct buffer_head *bh; 
+ block = descriptor_loc(sb, logical_sb_block, i); 
-sbi->s_group_desc[i] = sb_bread_unmovable(sb, block); 
-if (!sbi->s_group_desc[i]) { 
+bh = sb_bread_unmovable(sb, block); 
+if (!bh) { 
ext4_msg(sb, KERN_ERR, 
"can't read group descriptor %d", i); 
+db_count = i; 
goto failed_mount2; 
} 
+rcu_read_lock(); 
+rcu_dereference(sbi->s_group_desc[i]) = bh; 
+rcu_read_unlock(); 
} 
+sbi->s_gdb_count = db_count;
if (!ext4_check_descriptors(sb, logical_sb_block, &first_not_zeroed)) {
    ext4_msg(sb, KERN_ERR, "group descriptors corrupted!");
    ret = -EFSCORRUPTED;
    goto failed_mount2;
}

-sbi->s_gdb_count = db_count;
-
timer_setup(&sbi->s_err_report, print_daily_error_info, 0);

/* Register extent status tree shrinker */
@@ -4059,7 +4383,7 @@
"data=, fs mounted w/o journal");
goto failed_mount_wq;
}
-sbi->s_def_mount_opt &= EXT4_MOUNT_JOURNAL_CHECKSUM;
+sbi->s_def_mount_opt &= ~EXT4_MOUNT_JOURNAL_CHECKSUM;
clear_opt(sb, JOURNAL_CHECKSUM);
clear_opt(sb, DATA_FLAGS);
sbi->s_journal = NULL;
@@ -4117,6 +4441,10 @@
set_task_ioprio(sbi->s_journal->j_task, journal_ioprio);

sbi->s_journal->j_commit_callback = ext4_journal_commit_callback;
+sbi->s_journal->j_submit_inode_data_buffers =
+ext4_journal_submit_inode_data_buffers;
+sbi->s_journal->j_finish_inode_data_buffers =
+ext4_journal_finish_inode_data_buffers;

no_journal:
if (!test_opt(sb, NO_MBCACHE)) {
    @@ -4179,7 +4507,7 @@
    * so we can safely mount the rest of the filesystem now.
    */

-root = ext4_iget(sb, EXT4_ROOT_INO);
+root = ext4_iget(sb, EXT4_ROOT_INO, EXT4_IGET_SPECIAL);
    if (IS_ERR(root)) {
        ext4_msg(sb, KERN_ERR, "get root inode failed");
        ret = PTR_ERR(root);
        @@ -4201,31 +4529,6 @@
        if (ext4_setup_super(sb, es, sb_rdonly(sb)))
            sb->s_flags |= SB_RDONLY;

-/* determine the minimum size of new large inodes, if present */
-  if (sbi->s_inode_size > EXT4_GOOD_OLD_INODE_SIZE &&
-      sbi->s_want_extra_isize == 0) {
-    sbi->s_want_extra_isize = sizeof(struct ext4_inode) -
EXT4_GOOD_OLD_INODE_SIZE;
-if (ext4_has_feature_extra_isize(sb)) {
  if (sbi->s_want_extra_isize <
    le16_to_cpu(es->s_want_extra_isize))
    sbi->s_want_extra_isize =
    le16_to_cpu(es->s_want_extra_isize);
  if (sbi->s_want_extra_isize <
    le16_to_cpu(es->s_min_extra_isize))
    sbi->s_want_extra_isize =
    le16_to_cpu(es->s_min_extra_isize);
}
/* Check if enough inode space is available */
-if (EXT4_GOOD_OLD_INODE_SIZE + sbi->s_want_extra_isize >
  sbi->s_inode_size) {
  sbi->s_want_extra_isize = sizeof(struct ext4_inode) -
  EXT4_GOOD_OLD_INODE_SIZE;
  ext4_msg(sb, KERN_INFO, "required extra inode space not" -
          "available");
}
ext4_set_resv_clusters(sb);
err = ext4_setup_system_zone(sb);
@@ -4246,11 +4549,13 @@
  block = ext4_count_free_clusters(sb);
  ext4_free_blocks_count_set(sbi->s_es,
    EXT4_C2B(sbi, block));
+ext4_superblock_csum_set(sb);
  err = percpu_counter_init(&sbi->s_freeclusters_counter, block,
    GFP_KERNEL);
  if (!err) {
    unsigned long freei = ext4_count_free_inodes(sb);
    sbi->s_es->s_free_inodes_count = cpu_to_le32(freei);
    +ext4_superblock_csum_set(sb);
    err = percpu_counter_init(&sbi->s_freeinodes_counter, freei,
      GFP_KERNEL);
  }
@@ -4261,7 +4566,7 @@
  err = percpu_counter_init(&sbi->s_dirtyclusters_counter, 0,
    GFP_KERNEL);
  if (!err) {
    -err = percpu_init_rwsem(&sbi->s_journal_flag_rwlock);
    +err = percpu_init_rwlock(&sbi->s_writepages_rwlock);

    if (err) {
      ext4_msg(sb, KERN_ERR, "insufficient memory");
      @@ -4298,7 +4603,9 @@
EXT4_SB(sb)->s_mount_state &= ~EXT4_ORPHAN_FS;
if (needs_recovery) {
    ext4_msg(sb, KERN_INFO, "recovery complete");
    ext4_mark_recovery_complete(sb, es);
    if (err)
        goto failed_mount8;
}
if (EXT4_SB(sb)->s_journal) {
    if (test_opt(sb, DATA_FLAGS) == EXT4_MOUNT_JOURNAL_DATA)
        ext4_msg(sb, KERN_ERR, "VFS: Can't find ext4 filesystem");
    goto failed_mount;
}
failed_mount8:
    ext4_unregister_sysfs(sb);
-#ifdef CONFIG_QUOTA
failed_mount8:
    ext4_unregister_sysfs(sb);
-#endif
    kobject_put(&sbi->s_kobj);
failed_mount7:
    ext4_unregister_li_request(sb);
failed_mount6:
    ext4_mb_release(sb);
    if (sbi->s_flex_groups)
        kvfree(sbi->s_flex_groups);
    rcu_read_lock();
    flex_groups = rcu_dereference(sbi->s_flex_groups);
    if (flex_groups) {
        for (i = 0; i < sbi->s_flex_groups_allocated; i++)
            kvfree(flex_groups[i]);
        kvfree(flex_groups);
    }
    rcu_read_unlock();
    percpu_counter_destroy(&sbi->s_freeclusters_counter);
    percpu_counter_destroy(&sbi->s_freeinodes_counter);
    percpu_counter_destroy(&sbi->s_dirs_counter);
    percpu_counter_destroy(&sbi->s_dirtyclusters_counter);
    percpu_free_rwlock(&sbi->s_writepages_rwlock);
failed_mount5:
    ext4_ext_release(sb);
    ext4_release_system_zone(sb);
    if (sbi->s_mmp_tsk)
        kthread_stop(sbi->s_mmp_tsk);
failed_mount2:
    rcu_read_lock();
    group_desc = rcu_dereference(sbi->s_group_desc);
    for (i = 0; i < db_count; i++)
- brelse(sbi->s_group_desc[i]);
- kvfree(sbi->s_group_desc);
+ brelse(group_desc[i]);
+ kvfree(group_desc);
+ rcu_read_unlock();

failed_mount:
if (sbi->s_chksum_driver)
crypto_free_shash(sbi->s_chksum_driver);
@@ -4398,6 +4714,7 @@
ext4_blkdev_remove(sbi);
brelse(bh);
out_fail:
+/* sb->s_user_ns will be put when sb is destroyed */
sb->s_fs_info = NULL;
kfree(sbi->s_blockgroup_lock);
out_free_base:
@@ -4442,7 +4759,7 @@
  * happen if we iget() an unused inode, as the subsequent iput()
  * will try to delete it.
 */
-journal_inode = ext4_iget(sb, journal_inum);
+journal_inode = ext4_iget(sb, journal_inum, EXT4_IGET_SPECIAL);
if (IS_ERR(journal_inode)) {
  ext4_msg(sb, KERN_ERR, "no journal found");
  return NULL;
+} if (WARN_ON_ONCE(!ext4_has_feature_journal(sb)))
  return NULL;
  struct inode *journal_inode;
journal_t *journal;

-BUG_ON(!ext4_has_feature_journal(sb));
+if (WARN_ON_ONCE(!ext4_has_feature_journal(sb)))
+return NULL;

journal_inode = ext4_get_journal_inode(sb, journal_inum);
if (!journal_inode)
@@ -4500,7 +4818,8 @@
struct ext4_super_block *es;
struct block_device *bdev;

-BUG_ON(!ext4_has_feature_journal(sb));
+if (WARN_ON_ONCE(!ext4_has_feature_journal(sb)))
+return NULL;

bdev = ext4_blkdev_get(j_dev, sb);
if (bdev == NULL)
@@ -4591,8 +4910,10 @@
dev_t journal_dev;
  int err = 0;
int really_read_only;
+int journal_dev_ro;

-BUG_ON(!ext4_has_feature_journal(sb));
+if (WARN_ON_ONCE(!ext4_has_feature_journal(sb)))
+return -EFSCORRUPTED;

if (journal_devnum &&
        journal_devnum != le32_to_cpu(es->s_journal_dev)) {
    goto err_out;
} else
    journal_dev = new_decode_dev(le32_to_cpu(es->s_journal_dev));

-really_read_only = bdev_read_only(sb->s_bdev);
+if (journal_inum && journal_dev) {
+ext4_msg(sb, KERN_ERR,
+    "filesystem has both journal inode and journal device!");
+return -EINVAL;
+}
+
+if (journal_inum) {
+journal = ext4_get_journal(sb, journal_inum);
+if (!journal)
+    return -EINVAL;
+} else {
+journal = ext4_get_dev_journal(sb, journal_dev);
+if (!journal)
+    return -EINVAL;
+}
+
+journal_dev_ro = bdev_read_only(journal->j_dev);
+really_read_only = bdev_read_only(sb->s_bdev) | journal_dev_ro;
+
+if (journal_dev_ro && !sb_rdonly(sb)) {
+ext4_msg(sb, KERN_ERR,
+    "journal device read-only, try mounting with '-o ro'");
+err = -EROFS;
+goto err_out;
+}

/*
 * Are we loading a blank journal or performing recovery after a
 */
+ext4_msg(sb, KERN_ERR, "write access 
" "unavailable, cannot proceed 
"(try mounting with noload)");
+err = -EROFS;
goto err_out;
}
ext4_msg(sb, KERN_INFO, "write access will 
  be enabled during recovery");
}

- if (journal_inum && journal_dev) {
  ext4_msg(sb, KERN_ERR, "filesystem has both journal 
-  "and inode journals!");
  return -EINVAL;
- }
  
- if (journal_inum) {
  - if (!journal = ext4_get_journal(sb, journal_inum))
  - return -EINVAL;
  - } else {
  - if (!journal = ext4_get_dev_journal(sb, journal_dev))
  - return -EINVAL;
  - }
  
  if (!journal->j_flags & JBD2_BARRIER)
  ext4_msg(sb, KERN_INFO, "barriers disabled");

@@ -4657,12 +4989,16 @@
  if (err) {
    ext4_msg(sb, KERN_ERR, "error loading journal");
    -jbd2_journal_destroy(journal);
-  return err;
+  goto err_out;
  }

  EXT4_SB(sb)->s_journal = journal;
  -ext4_clear_journal_err(sb, es);
+err = ext4_clear_journal_err(sb, es);
+if (err) {
+  +EXT4_SB(sb)->s_journal = NULL;
+  +jbd2_journal_destroy(journal);
+  +return err;
+  +}

  if (!really_read_only && journal_devnum &&
      journal_devnum != le32_to_cpu(es->s_journal_dev)) {
@@ -4673,6 +5009,10 @@
    return 0;
    

static int ext4_commit_super(struct super_block *sb, int sync)
{ struct buffer_head *sbh = EXT4_SB(sb)->s_sbh;
  int error = 0;

  -if (!sbh || block_device_ejected(sb))
    -return error;
  +if (!sbh)
    +return -EINVAL;
  +if (block_device_ejected(sb))
    +return -ENODEV;
  +
  /*
   * If the file system is mounted read-only, don't update the
   * superblock write time. This avoids updating the superblock
   * remounting) the filesystem readonly, then we will end up with a
   * consistent fs on disk. Record that fact.
   */
  -static void ext4_mark_recovery_complete(struct super_block *sb,
   -      struct ext4_super_block *es)
  +static int ext4_mark_recovery_complete(struct super_block *sb,
   +      struct ext4_super_block *es)
  { int err;
    journal_t *journal = EXT4_SB(sb)->s_journal;
    if (!ext4_has_feature_journal(sb)) {
      -BUG_ON(journal != NULL);
      -return;
      +if (journal != NULL) {
        +ext4_error(sb, "Journal got removed while the fs was 
        + "mounted!");
    }

    if (!journal) {
      BUG_ON(NULL == journal);
      return;
    }

    ext4_superblock_csum_set(sb);
    if (sync)
      lock_buffer(sbh);
    -if (buffer_write_io_error(sbh)) {
      +if (buffer_write_io_error(sbh) || !buffer_uptodate(sbh)) {
        /*
         * Oh, dear. A previous attempt to write the
         * superblock failed. This could happen because the
         * remounting) the filesystem readonly, then we will end up with a
         * consistent fs on disk. Record that fact.
         */
        -static void ext4_mark_recovery_complete(struct super_block *sb,
        -      struct ext4_super_block *es)
        +static int ext4_mark_recovery_complete(struct super_block *sb,
        +      struct ext4_super_block *es)
        {
          int err;
          journal_t *journal = EXT4_SB(sb)->s_journal;

          if (!ext4_has_feature_journal(sb)) {
            BUG_ON(journal != NULL);
            return;
          }

          if (journal != NULL) {
            ext4_error(sb, "Journal got removed while the fs was 
            "mounted!");
          }
        }
      }
    }
  }

  return error;
}

static int err_out:
  +jbd2_journal_destroy(journal);
  +return err;
}
+return -EFSCORRUPTED;
+}
+return 0;
}
jbd2_journal_lock_updates(journal);
-if (jbd2_journal_flush(journal) < 0)
+err = jbd2_journal_flush(journal);
+if (err < 0)
goto out;

if (ext4_has_feature_journal_needs_recovery(sb) && sb_rdonly(sb)) {
    ext4_clear_feature_journal_needs_recovery(sb);
    ext4_commit_super(sb, 1);
}
-
out:
    jbd2_journal_unlock_updates(journal);
+return err;
}

/*
@@ -4780,14 +5129,17 @@
  * has recorded an error from a previous lifetime, move that error to the
  * main filesystem now.
  */
- static void ext4_clear_journal_err(struct super_block *sb,
+ static int ext4_clear_journal_err(struct super_block *sb,
    struct ext4_super_block *es)
{        
    journal_t *journal;
    int j_errno;
    const char *errstr;
-RUN ON(!ext4_has_feature_journal(sb));
+if (!ext4_has_feature_journal(sb)) {
+    ext4_error(sb, "Journal got removed while the fs was mounted!");
+    +return -EFSCORRUPTED;
+}

    journal = EXT4_SB(sb)->s_journal;

    @@ -4812,6 +5164,7 @@
        jbd2_journal_clear_err(journal);
        jbd2_journal_update_sb_errno(journal);
    }
+    return 0;
    

/*
@@ -4954,7 +5307,7 @@
{
  struct ext4_super_block *es;
  struct ext4_sb_info *sbi = EXT4_SB(sb);
  unsigned long old_sb_flags;
+  unsigned long old_sb_flags, vfs_flags;
  struct ext4_mount_options old_opts;
  int enable_quota = 0;
  ext4_group_t g;
@@ -4962,6 +5315,7 @@
  int err = 0;
 #ifdef CONFIG_QUOTA
  int i, j;
+  char *to_free[EXT4_MAXQUOTAS];
 #endif
  char *orig_data = kstrdup(data, GFP_KERNEL);

@@ -4978,8 +5332,9 @@
  old_opts.s_jquota_fmt = sbi->s_jquota_fmt;
  for (i = 0; i < EXT4_MAXQUOTAS; i++)
    if (sbi->s_qf_names[i]) {
-      old_opts.s_qf_names[i] = kstrdup(sbi->s_qf_names[i],
-      GFP_KERNEL);
+      char *qf_name = get_qf_name(sb, sbi, i);
+      old_opts.s_qf_names[i] = kstrdup(qf_name, GFP_KERNEL);
    if (!old_opts.s_qf_names[i]) {
      for (j = 0; j < i; j++)
        kfree(old_opts.s_qf_names[j]);
@@ -4992,6 +5347,14 @@
    if (sbi->s_journal && sbi->s_journal->j_task->io_context)
      journal_ioprio = sbi->s_journal->j_task->io_context->ioprio;

+/*
+ * Some options can be enabled by ext4 and/or by VFS mount flag
+ * either way we need to make sure it matches in both *flags and
+ * s_flags. Copy those selected flags from *flags to s_flags
+ */
+vfs_flags = SB_LAZYTIME | SB_I_VERSION;
+sbi->s_flags = (sbi->s_flags & ~vfs_flags) | (*flags & vfs_flags);
+if (!parse_options(data, sb, NULL, &journal_ioprio, 1)) {
  err = -EINVAL;
  goto restore_opts;
@@ -5017,12 +5380,6 @@
  err = -EINVAL;
  goto restore_opts;
*/
if (test_opt(sb, DAX)) {
    ext4_msg(sb, KERN_ERR, "can't mount with "
    "both data=journal and dax");
    err = -EINVAL;
    goto restore_opts;
}
} else if (test_opt(sb, DATA_FLAGS) == EXT4_MOUNT_ORDERED_DATA) {
    if (test_opt(sb, JOURNAL_ASYNC_COMMIT)) {
        ext4_msg(sb, KERN_ERR, "can't mount with "
        @ @ -5038,12 +5395,6 @ @
        goto restore_opts;
    }
    -if ((sbi->s_mount_opt ^ old_opts.s_mount_opt) & EXT4_MOUNT_DAX) {
        ext4_msg(sb, KERN_WARNING, "warning: refusing change of "
        "dax flag with busy inodes while remounting");
        sbi->s_mount_opt &= EXT4_MOUNT_DAX;
    }
    -
    if (sbi->s_mount_flags & EXT4_MF_FS_ABORTED)
        ext4_abort(sb, "Abort forced by user");
        @ @ -5057,9 +5408,6 @ @
        set_task_ioprio(sbi->s_journal->j_task, journal_ioprio);
    }
    -if (*flags & SB_LAZYTIME)
        sb->s_flags |= SB_LAZYTIME;
    -
    if ((bool)(*flags & SB_RDONLY) != sb_rdonly(sb)) {
        if (sbi->s_mount_flags & EXT4_MF_FS_ABORTED) {
            err = -EROFS;
            @ @ -5089,8 +5437,15 @ @
            (sbi->s_mount_state & EXT4_VALID_FS))
            es->s_state = cpu_to_le16(sbi->s_mount_state);
            -if (sbi->s_journal)
                +if (sbi->s_journal) {
                    +/*
                    + * We let remount-ro finish even if marking fs
                    + * as clean failed...
                    + */
                    ext4_mark_recovery_complete(sb, es);
                    +}
                +if (sbi->s_mmp_tsk)
                    +kthread_stop(sbi->s_mmp_tsk);
                } else {
/* Make sure we can mount this feature set readwrite */
if (ext4_has_feature_readonly(sb)) ||
  @@ -5136,8 +5491,11 @@
  * been changed by e2fsck since we originally mounted
  * the partition.)
 */
-  if (sbi->s_journal)
-    if (sbi->s_journal)
+    if (sbi->s_journal) {
+      err = ext4_clear_journal_err(sb, es);
+      if (err)
+        goto restore_opts;
+    }
  sbi->s_mount_state = le16_to_cpu(es->s_state);
if (!ext4_setup_super(sb, es, 0))
  sb->s_flags &= ~SB_RDONLY;
@@ -5163,7 +5521,10 @@
  ext4_register_li_request(sb, first_not_zeroed);
  }
  }
  -ext4_setup_system_zone(sb);
  +err = ext4_setup_system_zone(sb);
  +if (err)
  +  goto restore_opts;
  +
  if (sbi->s_journal == NULL && !(old_sb_flags & SB_RDONLY))
  ext4_commit_super(sb, 1);

  @@ -5182,7 +5543,13 @@
  }
  #endif

-  *flags = (*flags & ~SB_LAZYTIME) | (sb->s_flags & SB_LAZYTIME);
+  *flags = (*flags & ~SB_LAZYTIME) | (sb->s_flags & SB_LAZYTIME);
+  /*
+   * Some options can be enabled by ext4 and/or by VFS mount flag
+   * either way we need to make sure it matches in both *flags and
+   * s_flags. Copy those selected flags from s_flags to *flags
+   */
+  *flags = (*flags & ~vfs_flags) | (sb->s_flags & vfs_flags);
  +
  ext4_msg(sb, KERN_INFO, "re-mounted. Opts: \%s", orig_data);
  kfree(orig_data);
  return 0;
  @@ -5199,9 +5566,12 @@
 #ifdef CONFIG_QUOTA
  sbi->s_jquota_fmt = old_opts.s_jquota_fmt;
  for (i = 0; i < EXT4_MAXQUOTAS; i++) {
  -kfree(sbi->s_qf_names[i]);
sbi->s_qf_names[i] = old_opts.s_qf_names[i];
+to_free[i] = get_qf_name(sb, sbi, i);
+rcu_assign_pointer(sbi->s_qf_names[i], old_opts.s_qf_names[i]);
}
+synchronize_rcu();
+for (i = 0; i < EXT4_MAXQUOTAS; i++)
+kfree(to_free[i]);
#endif
kfree(orig_data);
return err;
@@ -5391,7 +5761,7 @@
 /* Quotafile not on the same filesystem? */
 if (path->dentry->d_sb != sb)
 return -EXDEV;
+
 /* Quota already enabled for this file? */
 +if (IS_NOQUOTA(d_inode(path->dentry)))
 +return -EBUSY;
+
 /* Journaling quota? */
 if (EXT4_SB(sb)->s_qf_names[type]) {
 /* Quotafile not in fs root? */
@@ -5501,7 +5876,7 @@
 if (!qf_inums[type])
 return -EPERM;
-qf_inode = ext4_iget(sb, qf_inums[type]);
+qf_inode = ext4_iget(sb, qf_inums[type], EXT4_IGET_SPECIAL);
 if (IS_ERR(qf_inode)) {
 ext4_error(sb, "Bad quota inode # %lu", qf_inums[type]);
 return PTR_ERR(qf_inode);
@@ -5511,9 +5886,9 @@
 qf_inode->i_flags |= S_NOQUOTA;
 lockdep_set_quota_inode(qf_inode, I_DATA_SEM_QUOTA);
 err = dquot_enable(qf_inode, type, format_id, flags);
-put(qf_inode);
+put(qf_inode);
return err;
}
@@ -5775,7 +6150,7 @@
      .name		= "ext4",
      .mount		= ext4_mount,
      .kill_sb	= kill_block_super,
-     .fs_flags	= FS_REQUIRES_DEV,
+     .fs_flags	= FS_REQUIRES_DEV | FS_USERNS_MOUNT,
  }
MODULE_ALIAS_FS("ext4");
@@ -5860,5 +6235,6 @@
MODULE_AUTHOR("Remy Card, Stephen Tweedie, Andrew Morton, Andreas Dilger, Theodore Ts'o and others");
MODULE_DESCRIPTION("Fourth Extended Filesystem");
MODULE_LICENSE("GPL");
+MODULE_SOFTDEP("pre: crc32c");
module_init(ext4_init_fs)
module_exit(ext4_exit_fs)
--- linux-4.15.0.orig/fs/ext4/sysfs.c
+++ linux-4.15.0/fs/ext4/sysfs.c
@@ -278,8 +278,12 @@
case attr_pointer_ui:
  if (!ptr)
    return 0;
-   return snprintf(buf, PAGE_SIZE, "%u\n",
-                   (*((unsigned int *) ptr));
+   if (a->attr_ptr == ptr_ext4_super_block_offset)
+      return snprintf(buf, PAGE_SIZE, "%u\n",
+                       le32_to_cpup(ptr));
+   else
+      return snprintf(buf, PAGE_SIZE, "%u\n",
+                       *((unsigned int *) ptr));
   case attr_pointer Atomic:
  if (!ptr)
    return 0;
@@ -312,7 +316,10 @@
ret = kstrtol(skip_spaces(buf), 0, &t);
if (ret)
  return ret;
-  *((unsigned int *) ptr) = t;
+  if (a->attr_ptr == ptr_ext4_super_block_offset)
+     *((__le32 *) ptr) = cpu_to_le32(t);
+  else
+     *((unsigned int *) ptr) = t;
  return len;
  case attr_inode_readahead:
return inode_readahead_blks_store(a, sbi, buf, len);
--- linux-4.15.0.orig/fs/ext4/xattr.c
+++ linux-4.15.0/fs/ext4/xattr.c
@@ -189,15 +189,20 @@
 struct ext4_xattr_entry *next = EXT4_XATTR_NEXT(e);
 if ((void *)next >= end)
 return -EFSCORRUPTED;
+if (strlen(e->e_name, e->e_name_len) != e->e_name_len)
+return -EFSCORRUPTED;
 e = next;
 }

/* Check the values */
while (!IS_LAST_ENTRY(entry)) {
-if (entry->e_value_size != 0 &&
 - entry->e_value_inum == 0) {
+u32 size = le32_to_cpu(entry->e_value_size);
 +
 +if (size > EXT4_XATTR_SIZE_MAX)
 +return -EFSCORRUPTED;
 +
 +if (size != 0 && entry->e_value_inum == 0) {
 u16 offs = le16_to_cpu(entry->e_value_offs);
-void *value;
 }

/*
 @@ -221,25 +226,36 @@
 }

static inline int
-ext4_xattr_check_block(struct inode *inode, struct buffer_head *bh)
+__ext4_xattr_check_block(struct inode *inode, struct buffer_head *bh,
 + const char *function, unsigned int line)
 {
- int error;
 + int error = -EFSCORRUPTED;

+if (BHDR(bh)->h_magic != cpu_to_le32(EXT4_XATTR_MAGIC) ||
 + BHDR(bh)->h_blocks != cpu_to_le32(1))
 goto errout;
 if (buffer_verified(bh))
 return 0;

- if (BHDR(bh)->h_magic != cpu_to_le32(EXT4_XATTR_MAGIC) ||
 - BHDR(bh)->h_blocks != cpu_to_le32(1))
 -return -EFSCORRUPTED;
 +error = -EFSBADCRC;
if (!ext4_xattr_block_csum_verify(inode, bh))
- return -EFSBADCRC;
+ goto errout;
error = ext4_xattr_check_entries(BFIRST(bh), bh->b_data + bh->b_size,
  bh->b_data);
-if (!error)
  +errout:
+ if (error)
+  
+  __ext4_error_inode(inode, function, line, 0,
+  "corrupted xattr block %llu",
+  (unsigned long long) bh->b_blocknr);
+else
+  set_buffer_verified(bh);
+ return error;
+
+ //define ext4_xattr_check_block(inode, bh) 
+ \__ext4_xattr_check_block((inode), (bh), \func, \LINE)
+
+ static int
+ \xattr_check_inode(struct inode *inode, struct ext4_xattr_ibody_header *header,
+ \end, const char *function, unsigned int line)
@@ -261,18 +277,22 @@
+ \xattr_check_inode((inode), (header), (end), \func, \LINE)
+
+ static int
-\xattr_find_entry(struct ext4_xattr_entry **pentry, int name_index,
- \ const char *name, int sorted)
+\xattr_find_entry(struct inode *inode, struct ext4_xattr_entry **pentry,
+ \ void *end, int name_index, const char *name, int sorted)
{ 
-\struct ext4_xattr_entry *entry;
+\struct ext4_xattr_entry *entry, *next;
size_t name_len;
int cmp = 1;

if (name == NULL)
  return -EINVAL;
name_len = strlen(name);
-entry = *pentry;
-\for (; !IS_LAST_ENTRY(entry); entry = EXT4_XATTR_NEXT(entry)) {
+for (entry = *pentry; !IS_LAST_ENTRY(entry); entry = next) {
+  next = EXT4_XATTR_NEXT(entry);
+  if ((void *) next >= end) {
+    \EXT4_ERROR_INODE(inode, "corrupted xattr entries");
+    return -EFSCORRUPTED;
+  }
+}
cmp = name_index - entry->e_name_index;
if (!cmp)
cmp = name_len - entry->e_name_len;
@@ -363,7 +383,7 @@
struct inode *inode;
int err;

-inode = ext4_iget(parent->i_sb, ea_ino);
+inode = ext4_iget(parent->i_sb, ea_ino, EXT4_IGET_NORMAL);
if (IS_ERR(inode)) {
    err = PTR_ERR(inode);
    ext4_error(parent->i_sb,
    @@ -494,36 +514,36 @@
struct buffer_head *bh = NULL;
struct ext4_xattr_entry *entry;
size_t size;
+void *end;
    int err;
    struct mb_cache *ea_block_cache = EA_BLOCK_CACHE(inode);

    ea_idbuge(inode, "name=%d.%s, buffer=%p, buffer_size=%ld",
    name_index, name, buffer, (long)buffer_size);

    -error = -ENODATA;
    if (!EXT4_I(inode)->i_file_acl)
    -goto cleanup;
    +return -ENODATA;
    ea_idbuge(inode, "reading block %llu",
    (unsigned long long)EXT4_I(inode)->i_file_acl);
    -bh = sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl);
    -if (!bh)
    -goto cleanup;
    +bh = ext4_sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl, REQ_PRIO);
    +if (IS_ERR(bh))
    +return PTR_ERR(bh);
    ea_bdebug(bh, "b_count=%d, refcount=%d",
    atomic_read(&bh->b_count), le32_to_cpu(BHDR(bh)->h_refcount));
    -if (ext4_xattr_check_block(inode, bh)) {
    -EXT4_ERROR_INODE(inode, "bad block %llu",
    -EXT4_I(inode)->i_file_acl);
    -error = -EFSCORRUPTED;
    +error = ext4_xattr_check_block(inode, bh);
    +if (error)
goto cleanup;
    -}
    ext4_xattr_block_cache_insert(ea_block_cache, bh);
    entry = BFIRST(bh);
    -error = ext4_xattr_find_entry(&entry, name_index, name, 1);
end = bh->b_data + bh->b_size;
+error = xattr_find_entry(inode, &entry, end, name_index, name, 1);
if (error)
    goto cleanup;
size = le32_to_cpu(entry->e_value_size);
+error = -ERANGE;
+if (unlikely(size > EXT4_XATTR_SIZE_MAX))
+goto cleanup;
if (buffer) {
    -error = -ERANGE;
    if (size > buffer_size)
        goto cleanup;
    if (entry->e_value_inum) {
+        u16 offset = le16_to_cpu(entry->e_value_offs);
+        void *p = bh->b_data + offset;
+        +if (unlikely(p + size > end))
+            goto cleanup;
+        memcpy(buffer, p, size);
    }
}
error = size;
@@ -567,12 +591,14 @@
if (error)
    goto cleanup;
entry = IFIRST(header);
-error = ext4_xattr_find_entry(&entry, name_index, name, 0);
+error = xattr_find_entry(inode, &entry, end, name_index, name, 0);
if (error)
    goto cleanup;
size = le32_to_cpu(entry->e_value_size);
+error = -ERANGE;
+if (unlikely(size > EXT4_XATTR_SIZE_MAX))
+goto cleanup;
if (buffer) {
    -error = -ERANGE;
    if (size > buffer_size)
        goto cleanup;
    if (entry->e_value_inum) {
@@ -581,8 +607,12 @@
        if (error)
            goto cleanup;
} else {
    memcpy(buffer, (void *)IFIRST(header) +
        le16_to_cpu(entry->e_value_offs), size);
    u16 offset = le16_to_cpu(entry->e_value_offs);
    void *p = (void *)IFIRST(header) + offset;
    if (unlikely(p + size > end))
        goto cleanup;
    memcpy(buffer, p, size);
}

error = size;
@@ -664,29 +694,23 @@
eea_idebug(inode, "buffer=%p, buffer_size=%ld",
    buffer, (long)buffer_size);

-error = 0;
if (!EXT4_I(inode)->i_file_acl)
    -goto cleanup;
+return 0;
    ea_idebug(inode, "reading block %llu",
        (unsigned long long)EXT4_I(inode)->i_file_acl);
-bh = sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl);
-error = -EIO;
-if (!bh)
    -goto cleanup;
    +bh = ext4_sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl, REQ_PRIO);
    +if (IS_ERR(bh))
        +return PTR_ERR(bh);
    ea_bdebug(bh, "b_count=%d, refcount=%d",
        atomic_read(&(bh->b_count)), le32_to_cpu(BHDR(bh)->h_refcount));
-if (ext4_xattr_check_block(inode, bh)) {
    -EXT4_ERROR_INODE(inode, "bad block %llu",
        - EXT4_I(inode)->i_file_acl);
    -error = -EFSCORRUPTED;
    +error = ext4_xattr_check_block(inode, bh);
    +if (error)
        goto cleanup;
    -
    ext4_xattr_block_cache_insert(EA_BLOCK_CACHE(inode), bh);
    -error = ext4_xattr_list_entries(dentry, BFIRST(bh), buffer, buffer_size);
    
    +error = ext4_xattr_list_entries(dentry, BFIRST(bh), buffer,
    +buffer_size);
    cleanup:
    brelse(bh);
    -
    return error;
if (EXT4_I(inode)->i_file_acl) {
    bh = sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl);
    if (!bh) {
        ret = -EIO;
    } else {
        bh = ext4_sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl, REQ_PRIO);
        if (IS_ERR(bh)) {
            ret = PTR_ERR(bh);
            bh = NULL;
            goto out;
        }
    }
}

if (ext4_xattr_check_block(inode, bh)) {
    ret = -EFSCORRUPTED;
    ext4_xattr_check_block(inode, bh);
    if (ret)
        goto out;
}

for (entry = BFIRST(bh); !IS_LAST_ENTRY(entry);
    entry = EXT4_XATTR_NEXT(entry))
    bh = ext4_getblk(handle, ea_inode, block, 0);
if (IS_ERR(bh))
    return PTR_ERR(bh);
if (!bh) {
    WARN_ON_ONCE(1);
    EXT4_ERROR_INODE(ea_inode, "ext4_getblk() return bh = NULL");
    return -EFSCORRUPTED;
}
ret = ext4_journal_get_write_access(handle, bh);
if (ret)
    goto out;
if (!ce)
    return NULL;
WARN_ON_ONCE(ext4_handle_valid(journal_current_handle())
             && !(current->flags & PF_MEMALLOC_NOFS));
ea_data = ext4_kvmalloc(value_len, GFP_NOFS);
if (!ea_data) {
    mbb_cache_entry_put(ea_inode_cache, ce);
}
while (ce) {
    -ea_inode = ext4_iget(inode->i_sb, ce->e_value);
+ea_inode = ext4_iget(inode->i_sb, ce->e_value, 
                     EXT4_IGET_NORMAL);
    if (!IS_ERR(ea_inode) &&
        !is_bad_inode(ea_inode) &&
        (EXT4_I(ea_inode)->i_flags & EXT4_EA_INODE_FL) &&
        @ @ -1534,7 +1568,7 @ @
        handle_t *handle, struct inode *inode,
        bool is_block)
    {
        -struct ext4_xattr_entry *last;
+struct ext4_xattr_entry *last, *next;
        struct ext4_xattr_entry *here = s->here;
        size_t min_offs = s->end - s->base, name_len = strlen(i->name);
        int in_inode = i->in_inode;
        @ @ -1569,7 +1603,13 @ @

        /* Compute min_offs and last. */
        last = s->first;
        -for (; !IS_LAST_ENTRY(last); last = EXT4_XATTR_NEXT(last)) {
+for (; !IS_LAST_ENTRY(last); last = next) {
            next = EXT4_XATTR_NEXT(last);
            +if ((void *)next >= s->end) {
+                EXT4_ERROR_INODE(inode, "corrupted xattr entries");
+                ret = -EFSCORRUPTED;
+                goto out;
+            }
        } if (!last->e_value_inum && last->e_value_size) {
            size_t offs = le16_to_cpu(last->e_value_offs);
            if (offs < min_offs)
                @ @ -1662,7 +1702,7 @ @
        } /* No failures allowed past this point. */

-    -if ( (!s->not_found && & here->e_value_offs) }
+    -if ( (!s->not_found && & here->e_value_size && !here->e_value_inum) )
+        /* Remove the old value. */
+        void *first_val = s->base + min_offs;
+        size_t offs = le16_to_cpu(here->e_value_offs);
+        @ @ -1785,34 +1825,30 @ @

        if (EXT4_I(inode)->i_file_acl) {
            /* The inode already has an extended attribute block. */
            -bs->bh = sb_bread(sb, EXT4_I(inode)->i_file_acl);
            @ @ -1456,7 +1489,8 @ @
        }
    }
}

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error = -EIO;
if (!bs->bh)
goto cleanup;
+bs->bh = ext4_sb_bread(sb, EXT4_I(inode)->i_file_acl, REQ_PRIO);
+if (IS_ERR(bs->bh)) {
    error = PTR_ERR(bs->bh);
    if (error)
        goto cleanup;
    bs->bh = NULL;
    return error;
}
ed0debug(bs->bh, "b_count=%d, refcount=%d",
atomic_read(&bs->bh->b_count)),
le32_to_cpu(BHDR(bs->bh)->h_refcount);
-if (ext4_xattr_check_block(inode, bs->bh)) {
    -EXT4_ERROR_INODE(inode, "bad block %llu",
    - EXT4_I(inode)->i_file_acl);
    -error = -EFSCORRUPTED;
    -goto cleanup;
    -}
+error = ext4_xattr_check_block(inode, bs->bh);
+if (error)
    +return error;
/* Find the named attribute. */
bs->s.base = BHDR(bs->bh);
bs->s.first = BFIRST(bs->bh);
bs->s.end = bs->bh->b_data + bs->bh->b_size;
bs->s.here = bs->s.first;
-error = ext4_xattr_find_entry(&bs->s.here, i->name_index,
    - i->name, 1);
+error = xattr_find_entry(inode, &bs->s.here, bs->s.end,
    + i->name_index, i->name, 1);
if (error && error != -ENODATA)
    -goto cleanup;
+return error;
bs->s.not_found = error;
}
-error = 0;
-
-cleanup:
-return error;
+return 0;
}

static int
@@ -2163,8 +2199,8 @@
if (error)
    return error;
/* Find the named attribute. */
-error = ext4_xattr_find_entry(&is->s.here, i->name_index,
i->name, 0);
+ error = xattr_find_entry(inode, &is->s.here, is->s.end,
+ i->name_index, i->name, 0);
if (error && error != -ENODATA)
return error;
is->s.not_found = error;
}@ @ -2183.23 +2219.8 @@
if (EXT4_I(inode)->i_extra_isize == 0)
return -ENOSPC;
error = ext4_xattr_set_entry(i, s, handle, inode, false /* is_block */);
- if (error) {
- if (error == -ENOSPC &&
- ext4_has-inline_data(inode)) {
- error = ext4_try_to_evict-inline_data(handle, inode,
- EXT4_XATTR_LEN(strlen(i->name) +
- EXT4_XATTR_SIZE(i->value_len)));
- if (error)
- return error;
- error = ext4_xattr_ibody_find(inode, i, is);
- if (error)
- return error;
- error = ext4_xattr_set_entry(i, s, handle, inode,
- false /* is_block */);
- }
- if (error)
- return error;
- }
+ if (error)
+ return error;
+ header = IHDR(inode, ext4_raw_inode(&is->iloc));
if (!IS_LAST_ENTRY(s->first)) {
++header->h_magic = cpu_to_le32(EXT4_XATTR_MAGIC);
}@ @ -2256.12 +2277.14 @@

if (!EXT4_I(inode)->i_file_acl)
return NULL;
-bh = sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl);
- if (!bh)
- return ERR_PTR(-EIO);
+ bh = ext4_sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl, REQ_PRIO);
+ if (IS_ERR(bh))
+ return bh;
error = ext4_xattr_check_block(inode, bh);
- if (error)
- if (error) {
- brelse(bh);
- return ERR_PTR(error);
- }

return bh;
}

@@ -2325,6 +2348,7 @@
error = -ENOSPC;
goto cleanup;
}
+WARN_ON_ONCE((current->flags & PF_MEMALLOC_NOFS));
}

error = ext4_reserve_inode_write(handle, inode, &is.iiloc);
@@ -2381,6 +2405,7 @@
error = ext4_xattr_block_set(handle, inode, &i, &bs);
} else if (error == -ENOSPC) {
if (EXT4_I(inode)->i_file_acl && !bs.s.base) {
+brelse(bs.bh);
+bs.bh = NULL;
error = ext4_xattr_block_find(inode, &i, &bs);
if (error)
goto cleanup;
@@ -2396,7 +2422,7 @@
  * external inode if possible.
  */
if (ext4_has_feature_ea_inode(inode->i_sb) &&
-  !.i.in_inode) {
+  !.i.in_inode) {
  i.value_len && !i.in_inode) {
  i.in_inode = 1;
goto retry_inode;
}
@@ -2601,6 +2627,8 @@
kfree(buffer);
if (is)
brelse(is->iloc.bh);
+if (bs)
+brelse(bs->bh);
kfree(is);
kfree(bs);

@@ -2628,6 +2656,11 @@
last = IFIRST(header);
/* Find the entry best suited to be pushed into EA block */
for (; !IS_LAST_ENTRY(last); last = EXT4_XATTR_NEXT(last)) {
+/* never move system.data out of the inode */
+if ((last->e_name_len == 4) &&
+    (last->e_name_index == EXT4_XATTR_INDEX_SYSTEM) &&
+    !memcmp(last->e_name, "data", 4))
+continue;
total_size = EXT4_XATTR_LEN(last->e_name_len);
if (!last->e_value_inum)
    total_size += EXT4_XATTR_SIZE(
@@ -2675,7 +2708,6 @@
    struct ext4_inode *raw_inode, handle_t *handle)
{
    struct ext4_xattr_ibody_header *header;
-    struct buffer_head *bh;
    struct ext4_sb_info *sbi = EXT4_SB(inode->i_sb);
    static unsigned int mnt_count;
    size_t min_offs;
@@ -2701,7 +2733,7 @@
    base = IFIRST(header);
    end = (void *)raw_inode + EXT4_SB(inode->i_sb)->s_inode_size;
    min_offs = end - base;
    -total_ino = sizeof(struct ext4_xattr_ibody_header);
    +total_ino = sizeof(struct ext4_xattr_ibody_header) + sizeof(u32);

    error = xattr_check_inode(inode, header, end);
    if (error)
@@ -2716,14 +2748,15 @@
        * EA block can hold new_extra_isize bytes.
        */
    if (EXT4_I(inode)->i_file_acl) {
-        bh = sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl);
-        error = -EIO;
-        if (!bh)
-            goto cleanup;
-        if (ext4_xattr_check_block(inode, bh)) {
-            EXT4_ERROR_INODE(inode, "bad block %llu",
-            EXT4_I(inode)->i_file_acl);
-            error = -EFSCORRUPTED;
-            struct buffer_head *bh;
-            +bh = ext4_sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl, REQ_PRIO);
-            if (IS_ERR(bh)) {
-                error = PTR_ERR(bh);
-                goto cleanup;
-            }
-            error = ext4_xattr_check_block(inode, bh);
-            if (error) {
-                brelse(bh);
-                goto cleanup;
-            }
    }
    if (EXT4_I(inode)->i_file_acl) {
-        bh = sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl);


-if (!bh) {
  -EXT4_ERROR_INODE(inode, "block %llu read error",
    - EXT4_I(inode)->i_file_acl);
  -error = -EIO;
  +bh = ext4_sb_bread(inode->i_sb, EXT4_I(inode)->i_file_acl, REQ_PRIO);
  +if (IS_ERR(bh)) {
    +error = PTR_ERR(bh);
    +if (error == -EIO)
      +EXT4_ERROR_INODE(inode, "block %llu read error",
      + EXT4_I(inode)->i_file_acl);
    +bh = NULL;
    goto cleanup;
  }
  error = ext4_xattr_check_block(inode, bh);
  -if (error) {
    -EXT4_ERROR_INODE(inode, "bad block %llu (error %d)",
      - EXT4_I(inode)->i_file_acl, error);
    -if (error)
      goto cleanup;
  }
  if (ext4_has_feature_ea_inode(inode->i_sb)) {
    for (entry = BFIRST(bh); !IS_LAST_ENTRY(entry);
      @ @ .3035.8 +3067.11 @@
      while (ce) {
        struct buffer_head *bh;

        -bh = sb_bread(inode->i_sb, ce->e_value);
        -if (!bh) {
          +bh = ext4_sb_bread(inode->i_sb, ce->e_value, REQ_PRIO);
          +if (IS_ERR(bh)) {
            +if (PTR_ERR(bh) == -ENOMEM)
              +return NULL;
            +bh = NULL;
          }
          EXT4_ERROR_INODE(inode, "block %lu read error",
            (unsigned long)ce->e_value);
        } else if (ext4_xattr_cmp(header, BHDR(bh)) == 0) {
          --- linux-4.15.0.orig/fs/ext4/xattr.h
          +++ linux-4.15.0/fs/ext4/xattr.h
          @ @ .71,6 +71,17 @@
          #define IFIRST(hdr) ((struct ext4_xattr_entry *)(hdr)+1))
    /*
     * XATTR_SIZE_MAX is currently 64k, but for the purposes of checking
     * for file system consistency errors, we use a somewhat bigger value.
     * This allows XATTR_SIZE_MAX to grow in the future, but by using this
     * instead of INT_MAX for certain consistency checks, we don't need to
     * worry about arithmetic overflows. (Actually XATTR_SIZE_MAX is
+ * defined in include/uapi/linux/limits.h, so changing it is going
+ * not going to be trivial....)
+ */
+#define EXT4_XATTR_SIZE_MAX (1 << 24)
+
+/*
+ * The minimum size of EA value when you start storing it in an external inode
+ * size of block - size of header - size of 1 entry - 4 null bytes
+ */
--- linux-4.15.0.orig/fs/f2fs/acl.c
+++ linux-4.15.0/fs/f2fs/acl.c
@@ -352,12 +352,14 @@
 return PTR_ERR(p);

 clone = f2fs_acl_clone(p, GFP_NOFS);
-if (!clone)
- goto no_mem;
+if (!clone) {
+ ret = -ENOMEM;
+ goto release_acl;
+ }
 
 ret = f2fs_acl_create_masq(clone, mode);
 if (ret < 0)
- goto no_mem_clone;
+ goto release_clone;
 
 if (ret == 0)
 posix_acl_release(clone);
@@ -371,11 +373,11 @@
 return 0;

 -no_mem_clone:
+release_clone:
 posix_acl_release(clone);
 -no_mem:
+release_acl:
 posix_acl_release(p);
 -return -ENOMEM;
+return ret;
 }

 int f2fs_init_acl(struct inode *inode, struct inode *dir, struct page *ipage,
--- linux-4.15.0.orig/fs/f2fs/checkpoint.c
+++ linux-4.15.0/fs/f2fs/checkpoint.c
 @@ -68,6 +68,7 @@
 .old_blkaddr = index,
.new_blkaddr = index,
.encrypted_page = NULL,
+is_meta = is_meta,
};

if (unlikely(!is_meta))
@@ -84,8 +85,10 @@
 fio.page = page;

 if (f2fs_submit_page_bio(&fio)) {
- f2fs_put_page(page, 1);
- goto repeat;
+ memset(page_address(page), 0, PAGE_SIZE);
+ f2fs_stop_checkpoint(sbi, false);
+ f2fs_bug_on(sbi, 1);
+ return page;
 }

 lock_page(page);
@@ -99,8 +102,10 @@
 * readonly and make sure do not write checkpoint with non-uptodate
 * meta page.
 */
- if (unlikely(!PageUptodate(page)))
+ if (unlikely(!PageUptodate(page))) {
+ memset(page_address(page), 0, PAGE_SIZE);
+ f2fs_stop_checkpoint(sbi, false);
+ }
 out:
 return page;
 }
@@ -116,7 +121,8 @@
 return __get_meta_page(sbi, index, false);
 }

-bool is_valid_blkaddr(struct f2fs_sb_info *sbi, block_t blkaddr, int type)
+bool f2fs_is_valid_blkaddr(struct f2fs_sb_info *sbi,
+ block_t blkaddr, int type)
 {
 switch (type) {
 case META_NAT:
@@ -136,8 +142,20 @@
 return false;
 break;
 case META_POR:
+ case DATA_GENERIC:
+ if (unlikely(blkaddr >= MAX_BLKADDR(sbi)) ||
+ blkaddr < MAIN_BLKADDR(sbi)))
+blkaddr < MAIN_BLKADDR(sbi)) {  
+if (type == DATA_GENERIC) {  
+f2fs_msg(sbi->sb, KERN_WARNING,  
+"access invalid blkaddr:%u", blkaddr);  
+WARN_ON(1);  
+}  
+return false;  
+}
+break;
+case META_GENERIC:
+if (unlikely(blkaddr < SEG0_BLKADDR(sbi) ||  
+blkaddr >= MAIN_BLKADDR(sbi)))
+return false;
+break;
+default:
@@ -162,6 +180,7 @@
        .op_flags = sync ? (REQ_META | REQ_PRIO) : REQ_RAHEAD,
        .encrypted_page = NULL,
        .in_list = false,
-       .is_meta = (type != META_POR),
+       .is_meta = (type != META_POR),
    ];
    struct blk_plug plug;
@@ -171,7 +190,7 @@
    blk_start_plug(&plug);
    for (; nrpages-- > 0; blkno++) {
-    if (!is_valid_blkaddr(sbi, blkno, type))
+    if (!f2fs_is_valid_blkaddr(sbi, blkno, type))
        goto out;

    switch (type) {
@@ -184,6 +203,8 @@
        blkno * NAT_ENTRY_PER_BLOCK);
    break;
    case META_SIT:
+    if (unlikely(blkno >= TOTAL_SEGS(sbi)))
+        goto out;
        /* get sit block addr */
        fio.new_blkaddr = current_sit_addr(sbi,
        blkno * SIT_ENTRY_PER_BLOCK);
@@ -733,6 +754,7 @@
        crc_offset = le32_to_cpu((*cp_block)->checksum_offset);
        if (crc_offset > (blk_size - sizeof(__le32))) {
            +f2fs_put_page(*cp_page, 1);
-        f2fs_msg(sbi->sb, KERN_WARNING,
+        f2fs_msg(sbi->sb, KERN_WARNING,
"invalid crc_offset: %zu", crc_offset);
return -EINVAL;
@@ -740,6 +762,7 @@
crc = cur_cp_crc(*cp_block);
if (!f2fs_crc_valid(sbi, crc, *cp_block, crc_offset)) {
  +f2fs_put_page(*cp_page, 1);
f2fs_msg(sbi->sb, KERN_WARNING, "invalid crc value");
return -EINVAL;
}
@@ -759,14 +782,22 @@
err = get_checkpoint_version(sbi, cp_addr, &cp_block,
&cp_page_1, version);
if (err)
  +goto invalid_cp1;
+return NULL;
+
+if (le32_to_cpu(cp_block->cp_pack_total_block_count) >
+sbi->blocks_per_seg) {
+  +f2fs_msg(sbi->sb, KERN_WARNING,
+  +"invalid cp_pack_total_block_count:%u",
+  +le32_to_cpu(cp_block->cp_pack_total_block_count));
+  +goto invalid_cp;
+}

pre_version = *version;

cp_addr += le32_to_cpu(cp_block->cp_pack_total_block_count) - 1;
err = get_checkpoint_version(sbi, cp_addr, &cp_block,
&cp_page_2, version);
if (err)
  -goto invalid_cp2;
+goto invalid_cp;
cur_version = *version;

if (cur_version == pre_version) {
@@ -774,9 +805,8 @@
f2fs_put_page(cp_page_2, 1);
return cp_page_1;
}
-invalid_cp2:
f2fs_put_page(cp_page_2, 1);
-invalid_cp1:
+invalid_cp:
f2fs_put_page(cp_page_1, 1);
return NULL;
}
@@ -792,6 +822,7 @@
unsigned int cp_blks = 1 + __cp_payload(sbi);
block_t cp_blk_no;
int i;
+int err;

sbi->ckpt = kzalloc(cp_blks * blk_size, GFP_KERNEL);
if (sbi->ckpt)
@@ -818,21 +849,24 @@
} else if (cp2) {
    cur_page = cp2;
} else {
+err = -EFSCORRUPTED;
goto fail_no_cp;
}

cp_block = (struct f2fs_checkpoint *)page_address(cur_page);
memcpy(sbi->ckpt, cp_block, blk_size);

/* Sanity checking of checkpoint */
-if (sanity_check_ckpt(sbi))
-goto free_fail_no_cp;
-
if (cur_page == cp1)
sbi->cur_cp_pack = 1;
else
sbi->cur_cp_pack = 2;

/* Sanity checking of checkpoint */
+if (sanity_check_ckpt(sbi)) {
+err = -EFSCORRUPTED;
+goto free_fail_no_cp;
+}
+
if (cp_blks <= 1)
goto done;

@@ -859,7 +893,7 @@
f2fs_put_page(cp2, 1);
fail_no_cp:
kfree(sbi->ckpt);
-kreturn -EINVAL;
++return err;
}

static void __add_dirty_inode(struct inode *inode, enum inode_type type)
@@ -937,8 +971,12 @@
get_pages(sbi, is_dir ?
F2FS_DIRTY_DENTS : F2FS_DIRTY_DATA));
retry:
-if (unlikely(f2fs_cp_error(sbi)))

if (unlikely(f2fs_cp_error(sbi))) {
    trace_f2fs_sync_dirty_inodes_exit(sbi->sb, is_dir,
    +get_pages(sbi, is_dir ?
    +F2FS_DIRTY_DENTS : F2FS_DIRTY_DATA));
    return -EIO;
}

spin_lock(&sbi->inode_lock[type]);

static void commit_checkpoint(struct f2fs_sb_info *sbi,
    void *src, block_t blk_addr)
{
    struct writeback_control wbc = {
        .for_reclaim = 0,
    +};
    +
    +# pagevec_lookup_tag and lock_page again will take
    + # some extra time. Therefore, update_meta_pages and
    + # sync_meta_pages are combined in this function.
    +#
    +struct page *page = grab_meta_page(sbi, blk_addr);
    +int err;
    +
    +memcpy(page_address(page), src, PAGE_SIZE);
    +set_page_dirty(page);
    +
    +f2fs_wait_on_page_writeback(page, META, true);
    +f2fs_bug_on(sbi, PageWriteback(page));
    +if (unlikely(!clear_page_dirty_for_io(page)))
    +f2fs_bug_on(sbi, 1);
    +
    +# writeout cp pack 2 page */
    +err = __f2fs_write_meta_page(page, &wbc, FS_CP_META_IO);
    +f2fs_bug_on(sbi, err);
+ f2fs_put_page(page, 0);
+
+ /* submit checkpoint (with barrier if NOBARRIER is not set) */
+ f2fs_submit_merged_write(sbi, META_FLUSH);
+
+ static int do_checkpoint(struct f2fs_sb_info *sbi, struct cp_control *cpc)
+ {
+ struct f2fs_checkpoint *ckpt = F2FS_CKPT(sbi);
+ @@ -1260,16 +1333,6 @@
+ 
+ /* need to wait for end_io results */
+ -wait_on_all_pages_writeback(sbi);
+ -if (unlikely(f2fs_cp_error(sbi)))
+ -return -EIO;
+ 
+ /* flush all device cache */
+ -err = f2fs_flush_device_cache(sbi);
+ -if (err)
+ -return err;
+ 
+ /* write out checkpoint buffer at block 0 */
+ update_meta_page(sbi, ckpt, start_blk++);
+ @@ -1297,26 +1360,26 @@
+ start_blk += NR_CURSEG_NODE_TYPE;
+ }
+ 
+ /* writeout checkpoint block */
+ -update_meta_page(sbi, ckpt, start_blk);
+ /* update user_block_counts */
+ +sbi->last_valid_block_count = sbi->total_valid_block_count;
+ +percpu_counter_set(&sbi->alloc_valid_block_count, 0);
+ +
+ /* Here, we have one bio having CP pack except cp pack 2 page */
+ +sync_meta_pages(sbi, META, LONG_MAX, FS_CP_META_IO);
+ 
+ /* wait for previous submitted node/meta pages writeback */
+ /* wait for previous submitted meta pages writeback */
+ wait_on_all_pages_writeback(sbi);
+ 
+ if (unlikely(f2fs_cp_error(sbi)))
+ return -EIO;
+ 
+ -filemap_fdatawait_range(NODE_MAPPING(sbi), 0, LLONG_MAX);
- filemap_fdatawait_range(META_MAPPING(sbi), 0, LLONG_MAX);
-
- /* update user_block_counts */
- sbi->last_valid_block_count = sbi->total_valid_block_count;
- percpu_counter_set(&sbi->alloc_valid_block_count, 0);
-
- /* Here, we only have one bio having CP pack */
- sync_meta_pages(sbi, META_FLUSH, LONG_MAX, FS_CP_META_IO);
+ /* flush all device cache */
+ err = f2fs_flush_device_cache(sbi);
+ if (err)
+ return err;
-
- /* wait for previous submitted meta pages writeback */
- /* barrier and flush checkpoint cp pack 2 page if it can */
+ commit_checkpoint(sbi, ckpt, start_blk);
+ wait_on_all_pages_writeback(sbi);

release_ino_entry(sbi, false);
--- linux-4.15.0.orig/fs/f2fs/data.c
+++ linux-4.15.0/fs/f2fs/data.c
@@ -79,7 +79,8 @@
 SetPageUptodate(page);
 } else {
 ClearPageUptodate(page);
-SetPageError(page);
+ /* will re-read again later */
+CleartPageError(page);
 }
 unlock_page(page);
 }
@@ -133,12 +134,14 @@
 struct block_device *bdev = sbi->sb->s_bdev;
 int i;

- for (i = 0; i < sbi->s ndevs; i++) {
- if (FDEV(i).start_blk <= blk_addr &&
- FDEV(i).end_blk >= blk_addr) {
- blk_addr -= FDEV(i).start_blk;
- bdev = FDEV(i).bdev;
- break;
+ if (f2fs_is_multi_device(sbi)) {
+ for (i = 0; i < sbi->s ndevs; i++) {
+ if (FDEV(i).start_blk <= blk_addr &&
+ FDEV(i).end_blk >= blk_addr) {
+ blk_addr -= FDEV(i).start_blk;
+ bdev = FDEV(i).bdev;
+ break;
+}
if (bio) {
    @@ -152,6 +155,9 @@
    }
    int i;

    +if (!f2fs_is_multi_device(sbi))
    +return 0;
    +
    for (i = 0; i < sbi->s_ndevs; i++)
    if (FDEV(i).start_blk <= blkaddr && FDEV(i).end_blk >= blkaddr)
        return i;
    @@ -369,6 +375,10 @@
    struct page *page = fio->encrypted_page ?
                      fio->encrypted_page : fio->page;

    +if (!f2fs_is_valid_blkaddr(fio->sbi, fio->new_blkaddr,
     +__is_meta_io(fio) ? META_GENERIC : DATA_GENERIC))
    +return -EFSCORRUPTED;
    +
    trace_f2fs_submit_page_bio(page, fio);
    f2fs_trace_ios(fio, 0);

    @@ -381,6 +391,10 @@
    }
    bio_set_op_attrs(bio, fio->op, fio->op_flags);

    -__submit_bio(fio->sbi, bio, fio->type);
    -
    if (!is_read_io(fio->op))
    inc_page_count(fio->sbi, WB_DATA_TYPE(fio->page));
    +
    +__submit_bio(fio->sbi, bio, fio->type);
    return 0;
    }

    @@ -412,9 +422,9 @@
    spin_unlock(&io->io_lock);
}

-if (fio->old_blkaddr != NEW_ADDR)
-verify_block_addr(sbi, fio->old_blkaddr);
-verify_block_addr(sbi, fio->new_blkaddr);
+if (__is_valid_data_blkaddr(fio->old_blkaddr))
+verify_block_addr(fio, fio->old_blkaddr);
+verify_block_addr(fio, fio->new_blkaddr);
bio_page = fio->encrypted_page ? fio->encrypted_page : fio->page;

@@ -464,6 +474,9 @@
 struct fscrypt_ctx *ctx = NULL;
 struct bio *bio;

+if (!f2fs_is_valid_blkaddr(sbi, blkaddr, DATA_GENERIC))
+return ERR_PTR(-EFAULT);
+
if (f2fs_encrypted_file(inode)) {
    ctx = fscrypt_get_ctx(inode, GFP_NOFS);
    if (IS_ERR(ctx))
@@ -500,6 +513,7 @@
     bio_put(bio);
     return -EFAULT;
 }
+ClearPageError(page);
 __submit_bio(F2FS_I_SB(inode), bio, DATA);
 return 0;
 }
@@ -788,7 +802,6 @@
 struct f2fs_sb_info *sbi = F2FS_I_SB(dn->inode);
 struct f2fs_summary sum;
 struct node_info ni;
-    fofs;
 blkcnt_t count = 1;
 int err;

@@ -811,12 +824,10 @@
 &sum, CURSEG_WARM_DATA, NULL, false);
 set_data_blkaddr(dn);

 */ update i_size */
-fofs = start_bidx_of_node(ofs_of_node(dn->node_page), dn->inode) +
-dn->ofs_in_node;
-if (i_size_read(dn->inode) < ((loff_t)(fofs + 1) << PAGE_SHIFT))
-f2fs_i_size_write(dn->inode,
-((loff_t)(fofs + 1) << PAGE_SHIFT));
+/*
 + * i_size will be updated by direct_IO. Otherwise, we'll get stale
 + * data from unwritten block via dio_read.
 + */
 return 0;
 }
@@ -948,7 +959,13 @@
 next_block:
blkaddr = datablock_addr(dn.inode, dn.node_page, dn.ofs_in_node);

- if (blkaddr == NEW_ADDR || blkaddr == NULL_ADDR) {
+ if (!f2fs_is_valid_blkaddr(bki, blkaddr, DATA_GENERIC)) {
+ err = -EFSCORRUPTED;
+ goto sync_out;
+ }
+
+ if (!is_valid_data_blkaddr(sbi, blkaddr)) {
if (create) {
if (unlikely(f2fs_cp_error(sbi))) {
err = -EIO;
@@ -960,6 +977,8 @@
last_ofs_in_node = dn.ofs_in_node;
}
} else {
+ WARN_ON(flag != F2FS_GET_BLOCK_PRE_DIO &&
+ flag != F2FS_GET_BLOCK_DIO);
err = __allocate_data_block(&dn);
if (!err)
set_inode_flag(inode, FI_APPEND_WRITE);
@@ -1083,7 +1102,7 @@
struct buffer_head *bh_result, int create)
{
return __get_data_block(inode, iblock, bh_result, create,
-F2FS_GET_BLOCK_DEFAULT, NULL);
+F2FS_GET_BLOCK_DIO, NULL);
}

static int get_data_block_bmap(struct inode *inode, sector_t iblock,
@@ -1266,6 +1285,10 @@
SetPageUptodate(page);
goto confused;
}
+
+ if (!f2fs_is_valid_blkaddr(F2FS_I_SB(inode), block_nr,
+ DATA_GENERIC))
+ goto set_error_page;
} else {
zero_user_segment(page, 0, PAGE_SIZE);
if (!PageUptodate(page))
@@ -1295,6 +1318,7 @@
if (bio_add_page(bio, page, blocksize, 0) < blocksize)
goto submit_and_realloc;

+CLEARPAGE_ERROR(page);
last_block_in_bio = block_nr;
goto next_page;
set_error_page:
@@ -1390,15 +1414,6 @@
return need_inplace_update_policy(inode, fio);
}

-static inline bool valid_ipu_blkaddr(struct f2fs_io_info *fio)
-{
-if (fio->old_blkaddr == NEW_ADDR)
-return false;
-if (fio->old_blkaddr == NULL_ADDR)
-return false;
-return true;
-}

-int do_write_data_page(struct f2fs_io_info *fio)
{
 struct page *page = fio->page;
@@ -1413,11 +1428,13 @@
 if (f2fs_lookup_extent_cache(inode, page->index, &ei)) {
 fio->old_blkaddr = ei.blk + page->index - ei.fofs;
-
-if (valid_ipu_blkaddr(fio)) {
- ipu_force = true;
- fio->need_lock = LOCK_DONE;
- goto got_it;
- }
+if (!f2fs_is_valid_blkaddr(fio->sbi, fio->old_blkaddr,
+ DATA_GENERIC)) {
+ ipu_force = true;
+ fio->need_lock = LOCK_DONE;
+ goto got_it;
 }
/* Deadlock due to between page->lock and f2fs_lock_op */
@@ -1433,14 +1450,22 @@
/* This page is already truncated */
 if (fio->old_blkaddr == NULL_ADDR) {
 ClearPageUptodate(page);
+clear_cold_data(page);
 goto out_writepage;
 }
-got_it:
+if (__is_valid_data_blkaddr(fio->old_blkaddr) &&
+!f2fs_is_valid_blkaddr(fio->sbi, fio->old_blkaddr,
+ DATA_GENERIC)) {

err = -EFSCORRUPTED;
goto out_writepage;
+
/*
* If current allocation needs SSR,
* it had better in-place writes for updated data.
*/
- if (ipu_force || (valid_ipu_blkaddr(fio) && need_inplace_update(fio))) {
+ if (ipu_force || (is_valid_data_blkaddr(fio->sbi, fio->old_blkaddr) &&
+ need_inplace_update(fio))) {
err = encrypt_one_page(fio);
if (err)

goto out_writepage;
@@ -1492,7 +1517,7 @@
loff_t i_size = i_size_read(inode);
const pgoff_t end_index = ((unsigned long long) i_size)
>> PAGE_SHIFT;
-loff_t psize = (page->index + 1) << PAGE_SHIFT;
+loff_t psize = (loff_t)(page->index + 1) << PAGE_SHIFT;
unsigned offset = 0;
bool need_balance_fs = false;
int err = 0;
@@ -1539,6 +1564,12 @@
/* we should bypass data pages to proceed the kworkder jobs */
if (unlikely(f2fs_cp_error(sbi))) {
  mapping_set_error(page->mapping, -EIO);
+/*
+ * don't drop any dirty dentry pages for keeping lastest
+ * directory structure.
+ */
+if (S_ISDIR(inode->i_mode))
+goto redirty_out;
+goto out;
+
/*@ -1582,8 +1613,10 @@
out:
inode_dec_dirty_pages(inode);
-if (err)
+if (err) {
  ClearPageUptodate(page);
  clear_cold_data(page);
+}
-
if (wbc->for_reclaim) {
f2fs_submit_merged_write_cond(sbi, inode, 0, page->index, DATA);
@@ -1608,7 +1641,13 @@
redirty_out:
redirty_page_for_writepage(wbc, page);
- if (!err)
+ /*
+ * pageout() in MM translates EAGAIN, so calls handle_write_error()
+ * -> mapping_set_error() -> set_bit(AS_EIO, ...).
+ * file_write_and_wait_range() will see EIO error, which is critical
+ * to return value of fsync() followed by atomic_write failure to user.
+ */
+ if (!err || wbc->for_reclaim)
return AOP_WRITEPAGE_ACTIVATE;
unlock_page(page);
return err;
@@ -1859,6 +1898,7 @@
bool locked = false;
struct extent_info ei = {0,0,0};
int err = 0;
+ int flag;

/*
 * we already allocated all the blocks, so we don’t need to get
 @@ -1868,9 +1908,15 @@
 !is_inode_flag_set(inode, FI_NO_PREALLOC))
 return 0;
+ /* f2fs_lock_op avoids race between write CP and convert_inline_page */
+ if (f2fs_has_inline_data(inode) && pos + len > MAX_INLINE_DATA(inode))
+ flag = F2FS_GET_BLOCK_DEFAULT;
+ else
+ flag = F2FS_GET_BLOCK_PRE_AIO;
+ if (f2fs_has_inline_data(inode) ||
 (pos & PAGE_MASK) >= i_size_read(inode)) {
- __do_map_lock(sbi, F2FS_GET_BLOCK_PRE_AIO, true);
+ __do_map_lock(sbi, flag, true);
 locked = true;
 }
restart:
 @@ -1908,6 +1954,7 @@
f2fs_put_dnode(&dn);
 __do_map_lock(sbi, F2FS_GET_BLOCK_PRE_AIO, true);
+ WARN_ON(flag != F2FS_GET_BLOCK_PRE_AIO);
 locked = true;
goto restart;
}
@@ -1921,7 +1968,7 @@
f2fs_put_dnode(&dn);
unlock_out:
if (locked)
-  __do_map_lock(sbi, F2FS_GET_BLOCK_PRE_AIO, false);
+  __do_map_lock(sbi, flag, false);
return err;
}

@@ -2065,6 +2112,9 @@
{
unsigned blocksize_mask = inode->i_sb->s_blocksize - 1;

+if (iov_iter_rw(iter) == READ && offset >= i_size_read(inode))
+return 1;
+
if (offset & blocksize_mask)
return -EINVAL;

@@ -2132,6 +2182,8 @@
}
}

+clear_cold_data(page);
+
/* This is atomic written page, keep Private */
if (IS_ATOMIC_WRITTEN_PAGE(page))
return drop_inmem_page(inode);
@@ -2150,6 +2202,7 @@
if (IS_ATOMIC_WRITTEN_PAGE(page))
return 0;

+clear_cold_data(page);
set_page_private(page, 0);
ClearPagePrivate(page);
return 1;
--- linux-4.15.0.orig/fs/f2fs/dir.c
+++ linux-4.15.0/fs/f2fs/dir.c
@@ -210,16 +210,15 @@
unsigned int max_depth;
unsigned int level;
+*res_page = NULL;
+
if (f2fs_has_inline_dentry(dir)) {
-*res_page = NULL;
    de = find_in_inline_dir(dir, fname, res_page);
    goto out;
}
-if (npages == 0) {
-*res_page = NULL;
+if (npages == 0)
go to out;
-}

max_depth = F2FS_I(dir)->i_current_depth;
if (unlikely(max_depth > MAX_DIR_HASH_DEPTH)) {
@@ -231,7 +230,6 @@
}
for (level = 0; level < max_depth; level++) {
-*res_page = NULL;
 de = find_in_level(dir, level, fname, res_page);
if (de || IS_ERR(*res_page))
br eak;
@@ -747,6 +745,7 @@
clear_page_dirty_for_io(page);
 ClearPagePrivate(page);
 ClearPageUptodate(page);
+clear_cold_data(page);
 inode_dec_dirty_pages(dir);
 remove_dirty_inode(dir);
 }
@@ -818,6 +817,17 @@
de_name.name = d->filename[bit_pos];
de_name.len = le16_to_cpu(de->name_len);

+/* check memory boundary before moving forward */
+bit_pos += GET_DENTRY_SLOTS(le16_to_cpu(de->name_len));
+if (unlikely(bit_pos > d->max ||
+le16_to_cpu(de->name_len) > F2FS_NAME_LEN)) {
+f2fs_msg(F2FS_I_SB(d->inode)->sb, KERN_WARNING,
+"%s: corrupted namelen=%ld, run fsck to fix.",
+__func__, le16_to_cpu(de->name_len));
+set_sbi_flag(F2FS_I_SB(d->inode)->sb->s_fs_info, SBI_NEED_FSCK);
+return -EINVAL;
+}
+if (f2fs_encrypted_inode(d->inode)) {
+int save_len = fstr->len;
+int err;
@@ -836,7 +846,6 @@
 le32_to_cpu(de->ino), d_type))
 return 1;
-bit_pos += GET_DENTRY_SLOTS(le16_to_cpu(de->name_len));
ctx->pos = start_pos + bit_pos;
}
return 0;
--- linux-4.15.0.orig/fs/f2fs/extent_cache.c
+++ linux-4.15.0/fs/f2fs/extent_cache.c
@@ -308,14 +308,13 @@
 return count - atomic_read(&et->node_cnt);
 }

 static void __drop_largest_extent(struct inode *inode,
+static void __drop_largest_extent(struct extent_tree *et,
     pgoff_t fofs, unsigned int len)
 {
-    struct extent_info *largest = &F2FS_I(inode)->extent_tree->largest;
+    struct extent_info *largest = &et->extent_tree->largest;
     -    if (fofs < largest->fofs + largest->len && fofs + len > largest->fofs) {
+    if (fofs < et->largest.fofs + et->largest.len &&
+        fofs + len > et->largest.fofs) {
         et->largest.len = 0;
         et->largest_updated = true;
     }
     }

     return ret;
 }

 static struct extent_node *__try_merge_extent_node(struct inode *inode,
+static struct extent_node *__try_merge_extent_node(struct f2fs_sb_info *sbi,
     struct extent_tree *et, struct extent_info *ei,
     struct extent_node *prev_ex,
     struct extent_node *next_ex)
 {
-    struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
     struct extent_node *en = NULL;

     if (prev_ex && __is_back_mergeable(ei, &prev_ex->ei)) {
@@ -443,7 +441,7 @@
         return NULL;
     }

     spin_lock(&sbi->extent_lock);
     if (!list_empty(&en->list) {
static struct extent_node *__insert_extent_tree(struct f2fs_sb_info *sbi, struct extent_tree *et, struct extent_info *ei, struct rb_node **insert_p, struct rb_node *insert_parent)
{
    struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
    struct rb_node **p = &et->root.rb_node;
    struct rb_node *parent = NULL;
    struct extent_node *en = NULL;
    __try_update_largest_extent(et, en);
    /* update in global extent list */
    spin_lock(&sbi->extent_lock);
    struct rb_node **insert_p = NULL, *insert_parent = NULL;
    unsigned int end = fofs + len;
    unsigned int pos = (unsigned int)fofs;
    bool updated = false;
    if (!et)
        return;
    /* 1. lookup first extent node in range [fofs, fofs + len - 1] */
    en = (struct extent_node *)__lookup_rb_tree_ret(&et->root, &ei, end - dei.fofs + dei.blk, org_end - end);
    -en1 = __insert_extent_tree(sbi, et, &ei, NULL, NULL);
    next_en = en1;
if (parts)
    __try_update_largest_extent(inode, et, en);
else
    __release_extent_node(sbi, et, en);

if (blkaddr) {
    set_extent_info(&ei, fofs, blkaddr, len);
    if (!__try_merge_extent_node(inode, et, &ei, prev_en, next_en))
        __insert_extent_tree(inode, et, &ei, insert_p, insert_parent);
    /* give up extent_cache, if split and small updates happen */
    if (dei.len >= 1 && prev.len < F2FS_MIN_EXTENT_LEN &&
        et->largest.len < F2FS_MIN_EXTENT_LEN) {
        __drop_largest_extent(inode, 0, UINT_MAX);
        et->largest.len = 0;
        et->largest_updated = true;
        set_inode_flag(inode, FI_NO_EXTENT);
    }
}

if (is_inode_flag_set(inode, FI_NO_EXTENT))
    __free_extent_tree(sbi, et);

unsigned int f2fs_shrink_extent_tree(struct f2fs_sb_info *sbi, int nr_shrink) {
    ...

    +f2fs_mark_inode_dirty_sync(inode, true);
}
struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
struct extent_tree *et = F2FS_I(inode)->extent_tree;
+bool updated = false;
+
+if (!f2fs_may_extent_tree(inode))
+return;

set_inode_flag(inode, FI_NO_EXTENT);

write_lock(&et->lock);
__free_extent_tree(sbi, et);
-__drop_largest_extent(inode, 0, UINT_MAX);
+if (et->largest.len) {
  et->largest.len = 0;
  updated = true;
  +}
write_unlock(&et->lock);
+if (updated)
+f2fs_mark_inode_dirty_sync(inode, true);
}

void f2fs_destroy_extent_tree(struct inode *inode)
--- linux-4.15.0.orig/fs/f2fs/f2fs.h
+++ linux-4.15.0/fs/f2fs/f2fs.h
@@ -164,7 +164,7 @@
};
/*
- * For CP/NAT/SIT/SSA readahead
+ * indicate meta/data type
 */
enum {
  META_CP,
  @@ -172,6 +172,8 @@
  META_SIT,
  META_SSA,
  META_POR,
+DATA_GENERIC,
+META_GENERIC,
};
/* for the list of ino */
@@ -523,6 +525,7 @@
  atomic_t node_cnt; /* # of extent node in rb-tree*/
};
/* for the list of ino */
@@ -523,6 +525,7 @@
  atomic_t node_cnt; /* # of extent node in rb-tree*/
};

/* For CP/NAT/SIT/SSA readahead */
/* indicate meta/data type */
/*
*/
enum {
  META_CP,
  @@ -172,6 +172,8 @@
  META_SIT,
  META_SSA,
  META_POR,
+DATA_GENERIC,
+META_GENERIC,
};
/* for the list of ino */
@@ -523,6 +525,7 @@
  atomic_t node_cnt; /* # of extent node in rb-tree*/
};
/*
 * F2FS_GET_BLOCK_DEFAULT,
 * F2FS_GET_BLOCK_FIEMAP,
 * F2FS_GET_BLOCK_BMAP,
 * F2FS_GET_BLOCK_DIO,
 * F2FS_GET_BLOCK_PRE_DIO,
 * F2FS_GET_BLOCK_PRE_AIO,
 */

extern void f2fs_mark_inode_dirty_sync(struct inode *inode, bool sync);

static inline void __try_update_largest_extent(struct extent_tree *et,
		struct extent_node *en)
{
    if (en->ei.len > et->largest.len) {
        et->largest = en->ei;
        f2fs_mark_inode_dirty_sync(inode, true);
    }
}

/*
 * Test if the mounted volume is a multi-device volume.
 * - For a single regular disk volume, sbi->s_ndevs is 0.
 * - For a single zoned disk volume, sbi->s_ndevs is 1.
 * - For a multi-device volume, sbi->s_ndevs is always 2 or more.
 */

static inline bool f2fs_is_multi_device(struct f2fs_sb_info *sbi)
{
    return sbi->s_ndevs > 1;
}
+ /* For write statistics. Suppose sector size is 512 bytes, 
+ * and the return value is in kbytes. s is of struct f2fs_sb_info. 
+ */
@@ -1529,18 +1545,6 @@
}

/* * Check whether the given nid is within node id range. *
 * */
-static inline int check_nid_range(struct f2fs_sb_info *sbi, nid_t nid)
{-
-if (unlikely(nid < F2FS_ROOT_INO(sbi)))
-return -EINVAL;
-if (unlikely(nid >= NM_I(sbi)->max_nid))
-return -EINVAL;
-return 0;
-}
-
-/*
 * Check whether the inode has blocks or not
 */
static inline int F2FS_HAS_BLOCKS(struct inode *inode)
@@ -1591,22 +1595,25 @@
sbi->total_valid_block_count = avail_user_block_count;
if (!*count) {
spin_unlock(&sbi->stat_lock);
-percpu_counter_sub(&sbi->alloc_valid_block_count, diff);
go to enospc;
} 
spin_unlock(&sbi->stat_lock);

-if (release)
+if (unlikely(release)) {
+percpu_counter_sub(&sbi->alloc_valid_block_count, release);
dquot_release_reservation_block(inode, release);
+}
f2fs_i_blocks_write(inode, *count, true, true);
return 0;

enospc:
+percpu_counter_sub(&sbi->alloc_valid_block_count, release);
dquot_release_reservation_block(inode, release);
return -ENOSPC;
}

+void f2fs_msg(struct super_block *sb, const char *level, const char *fmt, ...);
static inline void dec_valid_block_count(struct f2fs_sb_info *sbi,
struct inode *inode,
block_t count)
@@ -1615,13 +1622,21 @@
spin_lock(&sbi->stat_lock);
 f2fs_bug_on(sbi, sbi->total_valid_block_count < (block_t) count);
 -f2fs_bug_on(sbi, inode->i_blocks < sectors);
 sbi->total_valid_block_count -= (block_t)count;
 if (sbi->reserved_blocks &&
 sbi->current_reserved_blocks < sbi->reserved_blocks)
 sbi->current_reserved_blocks = min(sbi->reserved_blocks,
 sbi->current_reserved_blocks + count);
 spin_unlock(&sbi->stat_lock);
 +if (unlikely(inode->i_blocks < sectors)) {
 +f2fs_msg(sbi->sb, KERN_WARNING,
 +"Inconsistent i_blocks, ino:%lu, iblocks:%llu, sectors:%llu",
 +inode->i_ino,
 +(unsigned long long)inode->i_blocks,
 +(unsigned long long)sectors);
 +set_sbi_flag(sbi, SBI_NEED_FSCK);
 +return;
 +}
 f2fs_i_blocks_write(inode, count, false, true);
 }
@@ -1855,8 +1870,13 @@
 pgoff_t index, bool for_write)
 {
 #ifdef CONFIG_F2FS_FAULT_INJECTION
 -struct page *page = find_lock_page(mapping, index);
 -struct page *page;
 +if (!for_write)
 +page = find_get_page_flags(mapping, index,
 +FGP_LOCK | FGP_ACCESSED);
 +else
 +page = find_lock_page(mapping, index);
 if (page)
 return page;
@@ -2273,7 +2293,9 @@
 static inline int inline_xattr_size(struct inode *inode)
 {
 -return get_inline_xattr_addrs(inode) * sizeof(__le32);
 +if (f2fs_has_inline_xattr(inode))
 +return get_inline_xattr_addrs(inode) * sizeof(__le32);
return 0;
}

static inline int f2fs_has_inline_data(struct inode *inode)
@@ -2399,10 +2421,19 @@
static inline bool f2fs_may_extent_tree(struct inode *inode)
{
-  if (!test_opt(F2FS_I_SB(inode), EXTENT_CACHE) ||
-  struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
+  if (!test_opt(sbi, EXTENT_CACHE) ||
+      is_inode_flag_set(inode, FI_NO_EXTENT))
    return false;

/*
 * for recovered files during mount do not create extents
 * if shrinker is not registered.
 */
+if (list_empty(&sbi->s_list))
+return false;
+
return S_ISREG(inode->i_mode);
}
@@ -2468,6 +2499,38 @@
spin_unlock(&sbi->iostat_lock);
}

+#define __is_meta_io(fio) (PAGE_TYPE_OF_BIO(fio->type) == META &&
+  (!is_read_io(fio->op) || fio->is_meta))
+
bool f2fs_is_valid_blkaddr(struct f2fs_sb_info *sbi,
+block_t blkaddr, int type);
+
static inline void verify_blkaddr(struct f2fs_sb_info *sbi,
+block_t blkaddr, int type)
+{
+if (!f2fs_is_valid_blkaddr(sbi, blkaddr, type)) {
+f2fs_msg(sbi->sb, KERN_ERR,
+  "invalid blkaddr: %u, type: %d, run fsck to fix.",
+  blkaddr, type);
+f2fs_bug_on(sbi, 1);
+}
+}
+
+static inline bool __is_valid_data_blkaddr(block_t blkaddr)
+{
+if (blkaddr == NEW_ADDR || blkaddr == NULL_ADDR)
return false;
return true;
}
+
+static inline bool is_valid_data_blkaddr(struct f2fs_sb_info *sbi,
+block_t blkaddr)
+{
+if (!__is_valid_data_blkaddr(blkaddr))
+return false;
+verify_blkaddr(sbi, blkaddr, DATA_GENERIC);
+return true;
+

/*
* file.c
*/
@@ -2577,6 +2640,7 @@
struct dnode_of_data;
struct node_info;
+int check_nid_range(struct f2fs_sb_info *sbi, nid_t nid);
bool available_free_memory(struct f2fs_sb_info *sbi, int type);
int need_dentry_mark(struct f2fs_sb_info *sbi, nid_t nid);
bool is_checkpointed_node(struct f2fs_sb_info *sbi, nid_t nid);
@@ -2680,7 +2744,8 @@
struct page *grab_meta_page(struct f2fs_sb_info *sbi, pgoff_t index);
struct page *get_meta_page(struct f2fs_sb_info *sbi, pgoff_t index);
struct page *get_tmp_page(struct f2fs_sb_info *sbi, pgoff_t index);
-bool is_valid_blkaddr(struct f2fs_sb_info *sbi, block_t blkaddr, int type);
+bool f2fs_is_valid_blkaddr(struct f2fs_sb_info *
+block_t blkaddr, int type);
int ra_meta_pages(struct f2fs_sb_info *sbi, block_t start, int nrpages,
int type, bool sync);
void ra_meta_pages_cond(struct f2fs_sb_info *sbi, pgoff_t index);
@@ -3065,7 +3130,7 @@
{
#endif CONFIG_F2FS_FS_ENCRYPTION
file_set_encrypt(inode);
-inode->i_flags |= S_ENCRYPTED;
+f2fs_set_inode_flags(inode);
#endif

@@ -3157,3 +3222,7 @@
}

#ifdef CONFIG_F2FS_FS_ENCRYPTION
file_set_encrypt(inode);
-edge->i_flags |= S_ENCRYPTED;
+block_t blkaddr, int type);

@endif


```c
#define EFSBADCRCEBADMSG	/* Bad CRC detected */
#define EFSCORRUPTEDEUCLEAN	/* Filesystem is corrupted */

--- linux-4.15.0.orig/fs/f2fs/file.c
+++ linux-4.15.0/fs/f2fs/file.c
@@ -213,6 +213,9 @@
 trace_f2fs_sync_file_enter(inode);

 +if (S_ISDIR(inode->i_mode))
+goto go_write;
+
 /* if fdatasync is triggered, let's do in-place-update */
 if (datasync || get_dirty_pages(inode) <= SM_I(sbi)->min_fsync_blocks)
 set_inode_flag(inode, FI_NEED_IPU);
@@ -342,13 +345,13 @@
 return pgofs;
 }

-static bool __found_offset(block_t blkaddr, pgoff_t dirty, pgoff_t pgofs,
- 							int whence)
+static bool __found_offset(struct f2fs_sb_info *sbi, block_t blkaddr,
+ 				pgoff_t dirty, pgoff_t pgofs, int whence)
{
 switch (whence) {
 case SEEK_DATA:
if ((blkaddr == NEW_ADDR && dirty == pgofs) ||
-(blkaddr != NEW_ADDR && blkaddr != NULL_ADDR))
+is_valid_data_blkaddr(sbi, blkaddr))
return true;
break;
    case SEEK_HOLE:
@@ -411,7 +414,15 @@
 blkaddr = datablock_addr(dn.inode,
 dn.node_page, dn.ofs_in_node);

-if (__found_offset(blkaddr, dirty, pgofs, whence)) {
+if (__is_valid_data_blkaddr(blkaddr) &&
+!f2fs_is_valid_blkaddr(F2FS_I_SB(inode),
+blkaddr, DATA_GENERIC)) {
+f2fs_put_dnode(&dn);
+goto fail;
+}
+
+if (__found_offset(F2FS_I_SB(inode), blkaddr, dirty,
+pgofs, whence)) {
 f2fs_put_dnode(&dn);
 goto found;
```

dn->data_blkaddr = NULL_ADDR;
set_data_blkaddr(dn);
+
+if (__is_valid_data_blkaddr(blkaddr) &&
+!f2fs_is_valid_blkaddr(sbi, blkaddr, DATA_GENERIC))
+continue;
+
invalidate_blocks(sbi, blkaddr);
if (dn->ofs_in_node == 0 && IS_INODE(dn->node_page))
clear_inode_flag(dn->inode, FI_FIRST_BLOCK_WRITTEN);

return -EIO;
}
#endif
+
tterr = dquot_initialize(inode);
+if (err)
+return err;
+
/* we should check inline_data size */
if (!f2fs_may_inline_data(inode)) {
err = f2fs_convert_inline_inode(inode);
}

if (ia_valid & ATTR_MODE) {
umode_t mode = attr->ia_mode;

-if (!in_group_p(inode->i_gid) && !capable(CAP_FSETID))
+if (!in_group_p(inode->i_gid) &&
+!capable_wrt_inode_uidgid(inode, CAP_FSETID))
mode &= ~S_ISGID;
set_acl_inode(inode, mode);
}

struct inode *inode = d_inode(dentry);
int err;
-bool size_changed = false;

if (unlikely(f2fs_cp_error(F2FS_I_SB(inode))))
return -EIO;

-down_write(&F2FS_I(inode)->i_sem);
F2FS_I(inode)->last_disk_size = i_size_read(inode);
up_write(&F2FS_I(inode)->i_sem);
-
size_changed = true;
}  
__setattr_copy(inode, attr);
@@ -821,7 +840,7 @@
}  
/* file size may changed here */
-f2fs_mark_inode_dirty_sync(inode, size_changed);
-f2fs_mark_inode_dirty_sync(inode, true);

/* inode change will produce dirty node pages flushed by checkpoint */
f2fs_balance_fs(F2FS_I_SB(inode), true);
@@ -931,7 +950,6 @@
}

if (pg_start < pg_end) {
-struct address_space *mapping = inode->i_mapping;
-loff_t blk_start, blk_end;
-struct f2fs_sb_info *sbi = F2FS_I_SB(inode);

@@ -940,8 +958,7 @@
   blk_start = (loff_t)pg_start << PAGE_SHIFT;
   blk_end = (loff_t)pg_end << PAGE_SHIFT;
   down_write(&F2FS_I(inode)->i_mmap_sem);
   -truncate_inode_pages_range(mapping, blk_start,
   -blk_end - 1);
   +truncate_pagecache_range(inode, blk_start, blk_end - 1);

   f2fs_lock_op(sbi);
   ret = truncate_hole(inode, pg_start, pg_end);
@@ -1070,7 +1087,7 @@
   dn.ofs_in_node++;
   i++;
   -new_size = (dst + i) << PAGE_SHIFT;
   +new_size = (loff_t)(dst + i) << PAGE_SHIFT;
   if (dst_inode->i_size < new_size)
   f2fs_i_size_write(dst_inode, new_size);
 } while (--ilen && (do_replace[i] || blkaddr[i] == NULL_ADDR));
@@ -1186,14 +1203,14 @@
   pg_start = offset >> PAGE_SHIFT;
   pg_end = (offset + len) >> PAGE_SHIFT;

   /* avoid gc operation during block exchange */
   +down_write(&F2FS_I(inode)->dio_rwlock[WRITE]);
   +down_write(&F2FS_I(inode)->i_mmap_sem);
/* write out all dirty pages from offset */
ret = filemap_write_and_wait_range(inode->i_mapping, offset, LLONG_MAX);
if (ret)
    -goto out;
-
/* avoid gc operation during block exchange */
-down_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
+goto out_unlock;

truncate_pagecache(inode, offset);
@@ -1212,9 +1229,8 @@
if (!ret)
f2fs_i_size_write(inode, new_size);
out_unlock:
-up_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
-out:
up_write(&F2FS_I(inode)->i_mmap_sem);
+up_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
return ret;
}
@@ -1352,8 +1368,12 @@
out:
-if (!(mode & FALLOC_FL_KEEP_SIZE) && i_size_read(inode) < new_size)
-f2fs_i_size_write(inode, new_size);
+if (new_size > i_size_read(inode)) {
+    if (mode & FALLOC_FL_KEEP_SIZE)
+        file_set_keep_isize(inode);
+    else
+        f2fs_i_size_write(inode, new_size);
+} 
out_sem:
up_write(&F2FS_I(inode)->i_mmap_sem);
@@ -1385,6 +1405,9 @@
f2fs_balance_fs(sbi, true);
+/* avoid gc operation during block exchange */
+down_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
+down_write(&F2FS_I(inode)->i_mmap_sem);
ret = truncate_blocks(inode, i_size_read(inode), true);
if (ret)
@@ -1395,9 +1418,6 @@
if (ret)
goto out;

/* avoid gc operation during block exchange */
-down_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
-
truncate_pagecache(inode, offset);

pg_start = offset >> PAGE_SHIFT;
@@ -1425,10 +1445,9 @@
if (!ret)
f2fs_i_size_write(inode, new_size);
-
-up_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
out:
up_write(&F2FS_I(inode)->i_mmap_sem);
+up_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
return ret;
}

@@ -1614,7 +1633,7 @@
inode->i_ctime = current_time(inode);
f2fs_set_inode_flags(inode);
-f2fs_mark_inode_dirty_sync(inode, false);
+f2fs_mark_inode_dirty_sync(inode, true);
return 0;
}

@@ -1667,6 +1686,8 @@
inode_lock(inode);
+
down_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
+
if (f2fs_is_atomic_file(inode))
goto out;

@@ -1696,6 +1717,7 @@
stat_inc_atomic_write(inode);
stat_update_max_atomic_write(inode);
out:
+up_write(&F2FS_I(inode)->dio_rwsem[WRITE]);
inode_unlock(inode);
mnt_drop_write_file(filp);
return ret;
@@ -1837,7 +1859,7 @@
struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
struct super_block *sb = sbi->sb;
__u32 in;
-int ret;
+int ret = 0;

if (!capable(CAP_SYS_ADMIN))
return -EPERM;
@@ -1845,9 +1867,11 @@
if (get_user(in, (__u32 __user *)arg))
return -EFAULT;

-ret = mnt_want_write_file(filp);
-if (ret)
-return ret;
+if (in != F2FS_GOING_DOWN_FULLSYNC) {
+ret = mnt_want_write_file(filp);
+if (ret)
+return ret;
+
}

switch (in) {
case F2FS_GOING_DOWN_FULLSYNC:
@@ -1875,7 +1899,8 @@
}
f2fs_update_time(sbi, REQ_TIME);
out:
-mnt_drop_write_file(filp);
+if (in != F2FS_GOING_DOWN_FULLSYNC)
+mnt_drop_write_file(filp);
+return ret;
+
}

@@ -2049,7 +2074,7 @@
}

sizeof(range)))
return -EFAULT;
+if (!f2fs_is_multi_device(sbi) || sbi->s_ndevs - 1 <= range.dev_num ||
sbi->segs_per_sec != 1) {
    f2fs_msg(sbi->sb, KERN_WARNING, "Can't flush %u in %d for segs_per_sec %u != 1\n",
    @ @ -2539,7 +2564,9 @@
} }
f2fs_put_page(ipage, 1);

-dquot_initialize(inode);
+err = dquot_initialize(inode);
+if (err)
+goto out_unlock;

transfer_to[PRJQUOTA] = dqget(sb, make_kqid_projid(kprojid));
if (!IS_ERR(transfer_to[PRJQUOTA])) {
    @@ -2749,11 +2776,16 @@
inode_lock(inode);
    ret = generic_write_checks(iocb, from);
    if (ret > 0) {
        bool preallocated = false;
        +size_t target_size = 0;
        int err;

        if (iov_iter_fault_in_readable(from, iov_iter_count(from)))
            set_inode_flag(inode, FI_NO_PREALLOC);

        +preallocated = true;
        +target_size = iocb->ki_pos + iov_iter_count(from);
        +
        err = f2fs_preallocate_blocks(iocb, from);
        if (err) {
            clear_inode_flag(inode, FI_NO_PREALLOC);
            @@ -2765,6 +2797,10 @@
            blk_finish_plug(&plug);
            clear_inode_flag(inode, FI_NO_PREALLOC);

        +/* if we couldn't write data, we should deallocate blocks. */
        +if (preallocated && i_size_read(inode) < target_size)
            +f2fs_truncate(inode);
        +
        if (ret > 0)
            f2fs_update_iostat(F2FS_I_SB(inode), APP_WRITE_IO, ret);
    }
--- linux-4.15.0.orig/fs/f2fs/gc.c
+++ linux-4.15.0/fs/f2fs/gc.c
@@ -191,8 +191,9 @@
    if (gc_type != FG_GC && p->max_search > sbi->max_victim_search)
    p->max_search = sbi->max_victim_search;
-/* let's select beginning hot/small space first */
-if (type == CURSEG_HOT_DATA || IS_NODESEG(type))
+/* let's select beginning hot/small space first in no_heap mode*/
+if (test_opt(sbi, NOHEAP) &&
+(type == CURSEG_HOT_DATA || IS_NODESEG(type)))
  p->offset = 0;
else
  p->offset = SIT_I(sbi)->last_victim[p->gc_mode];
@@ -319,8 +320,7 @@
  p.min_cost = get_max_cost(sbi, &p);
  if (*result != NULL_SEGNO) {
    if (IS_DATASEG(get_seg_entry(sbi, *result)->type) &&
@@ -686,7 +686,12 @@
    fio.op = REQ_OP_WRITE;
    fio.op_flags = REQ_SYNC;
    fio.new_blkaddr = newaddr;
    -f2fs_submit_page_write(&fio);
    +err = f2fs_submit_page_write(&fio);
    +if (err) {
      +if (PageWriteback(fio.encrypted_page))
    +end_page_writeback(fio.encrypted_page);
    +goto put_page_out;
    +}
    f2fs_update_iostat(fio.sbi, FS_GC_DATA_IO, F2FS_BLKSIZE);
@@ -754,9 +759,14 @@
    set_cold_data(page);
    err = do_write_data_page(&fio);
    -if (err == -ENOMEM && is_dirty) {
    -congestion_wait(BLK_RW_ASYNC, HZ/50);
    -goto retry;
    +if (err) {
      +clear_cold_data(page);
      +if (err == -ENOMEM) {
        +congestion_wait(BLK_RW_ASYNC, HZ/50);
        +goto retry;
        +}
      +if (is_dirty)
        +set_page_dirty(page);
      +}
out:
@@ -940,13 +950,19 @@
    GET_SUM_BLOCK(sbi, segno));
f2fs_put_page(sum_page, 0);

    -if (get_valid_blocks(sbi, segno, false) == 0 ||
    -!PageUptodate(sum_page) ||
    -unlikely(f2fs_cp_error(sbi)))
    +if (get_valid_blocks(sbi, segno, false) == 0)
    +goto freed;
    +if (!PageUptodate(sum_page) || unlikely(f2fs_cp_error(sbi)))
    goto next;

    sum = page_address(sum_page);
    -f2fs_bug_on(sbi, type != GET_SUM_TYPE((&sum->footer)));
    +if (type != GET_SUM_TYPE((&sum->footer))) {
    +f2fs_bug_on(sbi, type != GET_SUM_TYPE((&sum->footer)));
    +f2fs_msg(sbi->sb, KERN_ERR, "Inconsistent segment (%u)"
    +"type [%d, %d] in SSA and SIT",
    +segno, type, GET_SUM_TYPE((&sum->footer)));
    +set_sbi_flag(sbi, SBI_NEED_FSCK);
    +goto next;
    +}

    /*
    * this is to avoid deadlock:
    @@ -963,6 +979,7 @@
    stat_inc_seg_count(sbi, type, gc_type);

    freed:
    if (gc_type == FG_GC &&
    get_valid_blocks(sbi, segno, false) == 0)
    seg_freed++;
    @@ -1073,7 +1090,7 @@

    put_gc_inode(&gc_list);

    -if (sync)
    +if (sync && !ret)
    ret = sec_freed ? 0 : -EAGAIN;
    return ret;
    }
    @@ -1093,7 +1110,7 @@

    BLKS_PER_SEC(sbi), (main_count - resv_count));

    /* give warm/cold data area from slower device */
    -if (sbi->s_ndevs && sbi->segs_per_sec == 1)
    +if (sbi->s_ndevs && sbi->segs_per_sec == 1)
if (unlikely(dn->data_blkaddr != NEW_ADDR)) {
    f2fs_put_dnode(dn);
    set_sbi_flag(fio.sbi, SBI_NEED_FSCK);
    f2fs_msg(fio.sbi->sb, KERN_WARNING,
             "corrupted inline inode ino=%lx, i_addr[0]:0x%x, "
             +"run fsck to fix."
             +__func__. dn->inode->i_ino, dn->data_blkaddr);
    return -EFSCORRUPTED;
}
f2fs_bug_on(F2FS_P_SB(page), PageWriteback(page));

read_inline_data(page, dn->inode_page);
if (!f2fs_has_inline_data(inode))
    return 0;

err = dquot_initialize(inode);
if (err)
    return err;
page = f2fs_grab_cache_page(inode->i_mapping, 0, false);
if (!page)
    return -ENOMEM;

f2fs_put_page(page, 1);

f2fs_balance_fs(sbi, dn.node_changed);
if (!err)
    f2fs_balance_fs(sbi, dn.node_changed);

return err;
}
+if (unlikely(dn.data_blkaddr != NEW_ADDR)) {
+    f2fs_put_dnode(&dn);
+    set_sbi_flag(F2FS_P_SB(page), SBI_NEED_FSCK);
+    f2fs_msg(F2FS_P_SB(page)->sb, KERN_WARNING,
+             "%s: corrupted inline inode ino=%lx, i_addr[0]:0x%x, "
+             "run fsck to fix.",
+             __func__, dir->i_ino, dn.data_blkaddr);
+    err = -EFSCORRUPTED;
+    goto out;
+}
+
+f2fs_wait_on_page_writeback(page, DATA, true);
zero_user_segment(page, MAX_INLINE_DATA(dir), PAGE_SIZE);

@@ -482,6 +508,7 @@
return 0;
recover:
lock_page(ipage);
+f2fs_wait_on_page_writeback(ipage, NODE, true);
memcpy(inline_dentry, backup_dentry, MAX_INLINE_DATA(dir));
f2fs_i_depth_write(dir, 0);
f2fs_i_size_write(dir, MAX_INLINE_DATA(dir));
@@ -635,6 +662,12 @@
if (IS_ERR(ipage))
return PTR_ERR(ipage);

+/*
+ * f2fs_readdir was protected by inode.i_rwlock, it is safe to access
+ * ipage without page's lock held.
+ */
+unlock_page(ipage);
+
inline_dentry = inline_data_addr(inode, ipage);

make_dentry_ptr_inline(inode, &d, inline_dentry);
@@ -643,7 +676,7 @@
if (!err)
    ctx->pos = d.max;
-f2fs_put_page(ipage, 1);
+f2fs_put_page(ipage, 0);
return err < 0 ? err : 0;
}

--- linux-4.15.0.orig/fs/f2fs/inode.c
+++ linux-4.15.0/fs/f2fs/inode.c
@@ -65,13 +65,16 @@
}
static bool __written_first_block(struct f2fs_inode *ri)
+
static int __written_first_block(struct f2fs_sb_info *sbi,
					struct f2fs_inode *ri)
{
    block_t addr = le32_to_cpu(ri->i_addr[offset_in_addr(ri)]);

    -if (addr != NEW_ADDR && addr != NULL_ADDR)
        -return true;
        -return false;
    +if (!__is_valid_data_blkaddr(addr))
        +return 1;
    +if (!f2fs_is_valid_blkaddr(sbi, addr, DATA_GENERIC))
        +return -EFSCORRUPTED;
    +return 0;
}

static void __set_inode_rdev(struct inode *inode, struct f2fs_inode *ri)

+static bool sanity_check_inode(struct inode *inode, struct page *node_page)
{
    struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
    struct f2fs_inode_info *fi = F2FS_I(inode);
    unsigned long long iblocks;

    iblocks = le64_to_cpu(F2FS_INODE(node_page)->i_blocks);
    if (!iblocks) {
        set_sbi_flag(sbi, SBI_NEED_FSCK);
        f2fs_msg(sbi->sb, KERN_WARNING,
                  "%s: corrupted inode i_blocks i_ino=%lx iblocks=%llu, ".
                  "%run fsck to fix.",
                  __func__, inode->i_ino,
                  __func__, inode->i_ino, iblocks);
        return false;
    }
    +if (ino_of_node(node_page) != nid_of_node(node_page)) {
        set_sbi_flag(sbi, SBI_NEED_FSCK);
        f2fs_msg(sbi->sb, KERN_WARNING,
                 "%s: corrupted inode footer i_ino=%lx, ino,nid: ".
                 "%run fsck to fix.",
                 __func__, inode->i_ino,
                 __func__, node_page, nid_of_node(node_page));
        return false;
    }

+static bool __written_first_block(struct f2fs_inode *ri)
+static int __written_first_block(struct f2fs_sb_info *sbi,
+struct f2fs_inode *ri)
{
    block_t addr = le32_to_cpu(ri->i_addr[offset_in_addr(ri)]);

    -if (addr != NEW_ADDR && addr != NULL_ADDR)
        -return true;
        -return false;
    +if (!__is_valid_data_blkaddr(addr))
        +return 1;
    +if (!f2fs_is_valid_blkaddr(sbi, addr, DATA_GENERIC))
        +return -EFSCORRUPTED;
    +return 0;
}
if (f2fs_sb_has_flexible_inline_xattr(sbi->sb) && !f2fs_has_extra_attr(inode)) {
    set_sbi_flag(sbi, SBI_NEED_FSCK);
    f2fs_msg(sbi->sb, KERN_WARNING,
        "%s: corrupted inode ino=%lx, run fsck to fix.",
        __func__, inode->i_ino);
    return false;
}
+
if (f2fs_has_extra_attr(inode) && !f2fs_sb_has_extra_attr(sbi->sb)) {
    set_sbi_flag(sbi, SBI_NEED_FSCK);
    f2fs_msg(sbi->sb, KERN_WARNING,
        "%s: inode (ino=%lx) is with extra_attr, "
        "but extra_attr feature is off",
        __func__, inode->i_ino);
    return false;
}
+
if (fi->i_extra_isize > F2FS_TOTAL_EXTRA_ATTR_SIZE ||
    fi->i_extra_isize % sizeof(__le32)) {
    set_sbi_flag(sbi, SBI_NEED_FSCK);
    f2fs_msg(sbi->sb, KERN_WARNING,
        "%s: inode (ino=%lx) has corrupted i_extra_isize: %d, "
        "max: %zu",
        __func__, inode->i_ino, fi->i_extra_isize,
        F2FS_TOTAL_EXTRA_ATTR_SIZE);
    return false;
}
+
if (F2FS_I(inode)->extent_tree) {
    struct extent_info *ei = &F2FS_I(inode)->extent_tree->largest;
    +
    if (ei->len &&
        !(f2fs_is_valid_blkaddr(sbi, ei->blk, DATA_GENERIC)) ||
        !(f2fs_is_valid_blkaddr(sbi, ei->blk + ei->len - 1,
            DATA_GENERIC))) {
        set_sbi_flag(sbi, SBI_NEED_FSCK);
        f2fs_msg(sbi->sb, KERN_WARNING,
            "%s: inode (ino=%lx) extent info [%u, %u, %u] "
            "is incorrect, run fsck to fix",
            __func__, inode->i_ino,
            ei->blk, ei->fofs, ei->len);
        return false;
    }
    +}
} +
+return true;
static int do_read_inode(struct inode *inode) {
    struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
    @ @ -189,14 +267,11 @@
    struct page *node_page;
    struct f2fs_inode *ri;
    projid_t i_projid;
    +int err;

    /* Check if ino is within scope */
    -if (check_nid_range(sbi, inode->i_ino)) {
    +if (check_nid_range(sbi, inode->i_ino))
        return -EINVAL;
    -}

    node_page = get_node_page(sbi, inode->i_ino);
    if (IS_ERR(node_page))
        @ @ -235,8 +310,12 @@
    fi->i_extra_isize = f2fs_has_extra_attr(inode) ?
        le16_to_cpu(ri->i_extra_isize) : 0;

    +if (!sanity_check_inode(inode, node_page)) {
        +f2fs_put_page(node_page, 1);
        +return -EFSCORRUPTED;
    +}

    if (f2fs_sb_has_flexible_inline_xattr(sbi->sb)) {
        -f2fs_bug_on(sbi, !f2fs_has_extra_attr(inode));
        fi->i_inline_xattr_size = le16_to_cpu(ri->i_inline_xattr_size);
    } else if (f2fs_has_inline_xattr(inode))
        f2fs_has_inline_dentry(inode) {
            @@ -256,10 +335,21 @@
            if (f2fs_has_inline_data(inode) && !f2fs_exist_data(inode))
                __recover_inline_status(inode, node_page);

            /* try to recover cold bit for non-dir inode */
            +if (!S_ISDIR(inode->i_mode) && !is_cold_node(node_page)) {
                +set_cold_node(inode, node_page);
                +set_page_dirty(node_page);
            +}

            /* get rdev by using inline_info */
            __get_inode_rdev(inode, ri);
-if (__written_first_block(ri))
+err = __written_first_block(sbi, ri);
+if (err < 0) {
+f2fs_put_page(node_page, 1);
+return err;
+}
+if (!err)
set_inode_flag(inode, FI_FIRST_BLOCK_WRITTEN);

if (!need_inode_block_update(sbi, inode->i_ino))
@@ -307,10 +397,10 @@
make_now:
if (ino == F2FS_NODE_INO(sbi)) {
    inode->i_mapping->a_ops = &f2fs_node_aops;
-    mapping_set_gfp_mask(inode->i_mapping, GFP_F2FS_ZERO);
+    mapping_set_gfp_mask(inode->i_mapping, GFP_NOFS);
    } else if (ino == F2FS_META_INO(sbi)) {
    inode->i_mapping->a_ops = &f2fs_meta_aops;
-    mapping_set_gfp_mask(inode->i_mapping, GFP_F2FS_ZERO);
+    mapping_set_gfp_mask(inode->i_mapping, GFP_NOFS);
    } else if (S_ISREG(inode->i_mode)) {
    inode->i_op = &f2fs_file_inode_operations;
    inode->i_fop = &f2fs_file_operations;
@@ -341,6 +431,7 @@
    return inode;
bad_inode:
+f2fs_inode_synced(inode);
    iget_failed(inode);
    trace_f2fs_iget_exit(inode, ret);
    return ERR_PTR(ret);
@@ -565,8 +656,11 @@
alloc_nid_failed(sbi, inode->i_ino);
clear_inode_flag(inode, FI_FREE_NID);
} else {
-    f2fs_bug_on(sbi, err &&
-    !exist_written_data(sbi, inode->i_ino, ORPHAN_INO));
+/*
+ * If xattr nid is corrupted, we can reach out error condition,
+ * err & !exist_written_data(sbi, inode->i_ino, ORPHAN_INO)).
+ * In that case, check_nid_range() is enough to give a clue.
+ */
+}
out_clear:
fscrypt_put_encryption_info(inode, NULL);
--- linux-4.15.0.orig/fs/f2fs/namei.c
+++ linux-4.15.0/fs/f2fs/namei.c

if (F2FS_I(inode)->i_flags & FS_PROJINHERIT_FL)
set_inode_flag(inode, FI_PROJ_INHERIT);

+f2fs_set_inode_flags(inode);
+
trace_f2fs_new_inode(inode, 0);
return inode;

alloc_nid_done(sbi, ino);

-d_instantiate(dentry, inode);
-unlock_new_inode(inode);
+d_instantiate_new(dentry, inode);

if (IS_DIRSYNC(dir))
f2fs_sync_fs(sbi->sb, 1);
err_out:
-d_instantiate(dentry, inode);
-unlock_new_inode(inode);
+d_instantiate_new(dentry, inode);

/*/ 
* Let's flush symlink data in order to avoid broken symlink as much as 
@@ -634,8 +634,7 @@
alloc_nid_done(sbi, inode->i_ino);

-d_instantiate(dentry, inode);
-unlock_new_inode(inode);
+d_instantiate_new(dentry, inode);

if (IS_DIRSYNC(dir))
f2fs_sync_fs(sbi->sb, 1);
alloc_nid_done(sbi, inode->i_ino);

-d_instantiate(dentry, inode);
-unlock_new_inode(inode);
+d_instantiate_new(dentry, inode);

if (IS_DIRSYNC(dir))
f2fs_sync_fs(sbi->sb, 1);
@@ -741,6 +739,11 @@
if (whiteout) {
    f2fs_i_links_write(inode, false);
+    spin_lock(&inode->i_lock);
+    inode->i_state |= I_LINKABLE;
+    spin_unlock(&inode->i_lock);
+    *whiteout = inode;
} else {
    d_tmpfile(dentry, inode);
@@ -817,6 +820,12 @@
F2FS_I(old_dentry->d_inode)->i_projid)))
return -EXDEV;

+if (flags & RENAME_WHITEOUT) {
+    err = f2fs_create_whiteout(old_dir, &whiteout);
+    if (err)
+        return err;
+} 
+ err = dquot_initialize(old_dir);
if (err)
goto out;
@@ -847,17 +856,11 @@
}

-if (flags & RENAME_WHITEOUT) {
-    err = f2fs_create_whiteout(old_dir, &whiteout);
-    if (err)
-        goto out_dir;
-} 
- if (new_inode) {
  err = -ENOTEMPTY;
  if (old_dir_entry && !f2fs_empty_dir(new_inode))
    goto out_whiteout;
  +goto out_dir;
  -}
  if (new_inode) {

  err = -ENOENT;
  new_entry = f2fs_find_entry(new_dir, &new_dentry->d_name,
@@ -865,7 +868,7 @@
    if (!new_entry) {
    if (IS_ERR(new_page))
err = PTR_ERR(new_page);
-goto out_whiteout;
+%goto out_dir;
}

f2fs_balance_fs(sbi, true);
@@ -897,7 +900,7 @@
err = f2fs_add_link(new_dentry, old_inode);
if (err) {
  f2fs_unlock_op(sbi);
  -goto out_whiteout;
  +goto out_dir;
  
  if (old_dir_entry)
  @@ -921,7 +924,7 @@
    if (IS_ERR(old_page))
      err = PTR_ERR(old_page);
    f2fs_unlock_op(sbi);
    -goto out_whiteout;
    +goto out_dir;
  }
  }
  }
@@ -930,7 +933,8 @@
  if (!old_dir_entry || whiteout)
    file_lost_pino(old_inode);
  else
    -F2FS_I(old_inode)->i_pino = new_dir->i_ino;
    +/* adjust dir's i_pino to pass fsck check */
    +f2fs_i_pino_write(old_inode, new_dir->i_ino);
    up_write(&F2FS_I(old_inode)->i_sem);

    old_inode->i_ctime = current_time(old_inode);
@@ -939,12 +943,15 @@
    f2fs_delete_entry(old_entry, old_page, old_dir, NULL);

    if (whiteout) {
      -whiteout->i_state |= I_LINKABLE;
      set_inode_flag(whiteout, FI_INC_LINK);
      err = f2fs_add_link(old_dentry, whiteout);
      if (err)
        goto put_out_dir;
        +
        +spin_lock(&whiteout->i_lock);
        whiteout->i_state &= ~I_LINKABLE;
        +spin_unlock(&whiteout->i_lock);
        +


iput(whiteout);
}

@@ -971,9 +978,6 @@
    f2fs_dentry_kunmap(new_dir, new_page);
    f2fs_put_page(new_page, 0);
 }
-out_whiteout:
-if (whiteout)
-iput(whiteout);
out_dir:
if (old_dir_entry) {
    f2fs_dentry_kunmap(old_inode, old_dir_page);
@@ -983,6 +987,8 @@
    f2fs_dentry_kunmap(old_dir, old_page);
    f2fs_put_page(old_page, 0);
    out:
    +if (whiteout)
    +iput(whiteout);
    return err;
}

@@ -1098,7 +1104,11 @@
    f2fs_set_link(old_dir, old_entry, old_page, new_inode);

down_write(&F2FS_I(old_inode)->i_sem);
-file_lost_pino(old_inode);
+if (!old_dir_entry)
+file_lost_pino(old_inode);
+else
+/* adjust dir's i_pino to pass fsck check */
+f2fs_i_pino_write(old_inode, new_dir->i_ino);
    up_write(&F2FS_I(old_inode)->i_sem);

old_dir->i_ctime = current_time(old_dir);
@@ -1113,7 +1123,11 @@
    f2fs_set_link(new_dir, new_entry, new_page, old_inode);

down_write(&F2FS_I(new_inode)->i_sem);
-file_lost_pino(new_inode);
+if (!new_dir_entry)
+file_lost_pino(new_inode);
+else
+/* adjust dir's i_pino to pass fsck check */
+f2fs_i_pino_write(new_inode, old_dir->i_ino);
    up_write(&F2FS_I(new_inode)->i_sem);

new_dir->i_ctime = current_time(new_dir);
static struct kmem_cache *free_nid_slab;
static struct kmem_cache *nat_entry_set_slab;

int check_nid_range(struct f2fs_sb_info *sbi, nid_t nid)
{
    if (unlikely(nid < F2FS_ROOT_INO(sbi) || nid >= NM_I(sbi)->max_nid)) {
        set_sbi_flag(sbi, SBI_NEED_FSCK);
        f2fs_msg(sbi->sb, KERN_WARNING,
                 "%s: out-of-range nid=%x, run fsck to fix.",
                 __func__, nid);
        __func__, nid);
        return -EFSCORRUPTED;
    }
    return 0;
}

bool available_free_memory(struct f2fs_sb_info *sbi, int type)
{
    struct f2fs_nm_info *nm_i = NM_I(sbi);
    new_blkaddr == NULL_ADDR);
    if (new_blkaddr == NEW_ADDR || new_blkaddr == NULL_ADDR)
        if (!is_valid_data_blkaddr(sbi, new_blkaddr))
            set_nat_flag(e, IS_CHECKPOINTED, false);
            __set_nat_cache_dirty(nm_i, e);
            new_blkaddr == NEW_ADDR);

    /* increment version no as node is removed */
    new_blkaddr == NULL_ADDR);
    new_blkaddr == NEW_ADDR);
    if (is_valid_data_blkaddr(sbi, new_blkaddr))
        set_nat_flag(e, IS_CHECKPOINTED, false);
        __set_nat_cache_dirty(nm_i, e);

    @ @ -700,6 +714,7 @@
    }
    struct f2fs_sb_info *sbi = F2FS_I_SB(dn->inode);
    struct node_info ni;
    +pgoff_t index;
get_node_info(sbi, dn->nid, &ni);
f2fs_bug_on(sbi, ni.blk_addr == NULL_ADDR);
@@ -718,10 +733,11 @@
clear_node_page_dirty(dn->node_page);
set_sbi_flag(sbi, SBI_IS_DIRTY);

+index = dn->node_page->index;
f2fs_put_page(dn->node_page, 1);

invalidate_mapping_pages(NODE_MAPPING(sbi),
-dn->node_page->index, dn->node_page->index);
+index, index);

dn->node_page = NULL;
trace_f2fs_truncate_node(dn->inode, dn->nid, ni.blk_addr);
@@ -1030,8 +1046,13 @@
truncate_data_blocks_range(&dn, 1);

/* 0 is possible, after f2fs_new_inode() has failed */
-f2fs_bug_on(F2FS_I_SB(inode),
-inode->i_blocks != 0 && inode->i_blocks != 8);
+if (unlikely(inode->i_blocks != 0 && inode->i_blocks != 8)) {
+  f2fs_msg(F2FS_I_SB(inode)->sb, KERN_WARNING,
+    "Inconsistent i_blocks, ino:%lu, iblocks:%llu",
+    inode->i_ino,
+    (unsigned long long)inode->i_blocks);
+  set_sbi_flag(F2FS_I_SB(inode), SBI_NEED_FSCK);
+}

/* will put inode & node pages */
truncate_node(&dn);
@@ -1140,7 +1161,8 @@

if (!nid)
return;
-f2fs_bug_on(sbi, check_nid_range(sbi, nid));
+if (check_nid_range(sbi, nid))
+return;

rcu_read_lock();
apage = radix_tree_lookup(&NODE_MAPPING(sbi)->page_tree, nid);
@@ -1164,7 +1186,8 @@

if (!nid)
return ERR_PTR(-ENOENT);
-f2fs_bug_on(sbi, check_nid_range(sbi, nid));
+if (check_nid_range(sbi, nid))
return ERR_PTR(-EINVAL);

repeat:
page = f2fs_grab_cache_page(NODE_MAPPING(sbi), nid, false);
if (!page)
@@ -1195,7 +1218,7 @@
    }

if (!f2fs_inode_chksum_verify(sbi, page)) {
    -err = -EBADMSG;
    +err = -EFSBADCRC;
    goto out_err;
    }
page_hit:
@@ -1367,6 +1390,12 @@
return 0;
    }

+if (__is_valid_data_blkaddr(ni.blk_addr) &&
+!f2fs_is_valid_blkaddr(sbi, ni.blk_addr, DATA_GENERIC)) {
+    up_read(&sbi->node_write);
+    goto redirty_out;
+}
+
  if (atomic && !test_opt(sbi, NOBARRIER))
    fio.op_flags |= REQ_PREFLUSH | REQ_FUA;
@@ -1601,7 +1630,9 @@
!is_cold_node(page)))
continue;
lock_node:
    -if (!trylock_page(page))
    +if (wbc->sync_mode == WB_SYNC_ALL)
    +lock_page(page);
    +else if (!trylock_page(page))
continue;
    
if (unlikely(page->mapping != NODE_MAPPING(sbi))) {
@@ -2015,6 +2046,9 @@
    if (unlikely(nid >= nm_i->max_nid))
        nid = 0;
    
+if (unlikely(nid % NAT_ENTRY_PER_BLOCK))
+    nid = NAT_BLOCK_OFFSET(nid) * NAT_ENTRY_PER_BLOCK;
+ /* Enough entries */
    if (nm_i->nid_cnt[FREE_NID] >= NAT_ENTRY_PER_BLOCK)
        return;
@@ -2286,6 +2320,7 @@
if (!PageUptodate(ipage))
SetPageUptodate(ipage);
fill_node_footer(ipage, ino, ino, 0, true);
+set_cold_node(NULL, ipage);

src = F2FS_INODE(page);
dst = F2FS_INODE(ipage);
--- linux-4.15.0.orig/fs/f2fs/node.h
+++ linux-4.15.0/fs/f2fs/node.h
@@ -423,7 +423,7 @@
struct f2fs_node *rn = F2FS_NODE(page);
unsigned int flag = le32_to_cpu(rn->footer.flag);
-if (S_ISDIR(inode->i_mode))
+if (inode && S_ISDIR(inode->i_mode))
flag &= ~(0x1 << COLD_BIT_SHIFT);
else
flag |= (0x1 << COLD_BIT_SHIFT);
--- linux-4.15.0.orig/fs/f2fs/recovery.c
+++ linux-4.15.0/fs/f2fs/recovery.c
@@ -99,8 +99,12 @@
return ERR_PTR(err);
}
-static void del_fsync_inode(struct fsync_inode_entry *entry)
+static void del_fsync_inode(struct fsync_inode_entry *entry, int drop)
{
+if (drop) {
+/* inode should not be recovered, drop it */
+f2fs_inode_synced(entry->inode);
+}
iput(entry->inode);
list_del(&entry->list);
kmem_cache_free(fsync_entry_slab, entry);
@@ -201,6 +205,21 @@
char *name;
inode->i_mode = le16_to_cpu(raw->i_mode);
+i_uid_write(inode, le32_to_cpu(raw->i_uid));
+i_gid_write(inode, le32_to_cpu(raw->i_gid));
+
+if (raw->i_inline & F2FS_EXTRA_ATTR) {
+if (f2fs_sb_has_project_quota(F2FS_I_SB(inode)->sb) &&
+F2FS_FITS_IN_INODE(raw, le16_to_cpu(raw->i_extra_isize),
+i_projid)) {
+projid_t i_projid;
+
+i_projid = (projid_t)le32_to_cpu(raw->i_projid);
F2FS_I(inode)->i_projid = make_kprojid(&init_user_ns, i_projid);
+
+
f2fs_i_size_write(inode, le64_to_cpu(raw->i_size));
inode->i_atime.tv_sec = le64_to_cpu(raw->i_atime);
inode->i_ctime.tv_sec = le64_to_cpu(raw->i_ctime);
@@ -210,6 +229,9 @@
inode->i_mtime.tv_nsec = le32_to_cpu(raw->i_mtime_nsec);

F2FS_I(inode)->i_advise = raw->i_advise;
+F2FS_I(inode)->i_flags = le32_to_cpu(raw->i_flags);
+
+f2fs_mark_inode_dirty_sync(inode, true);

if (file_enc_name(inode))
  name = "<encrypted>";
@@ -235,7 +257,7 @@
while (1) {
  struct fsync_inode_entry *entry;

  -if (!is_valid_blkaddr(sbi, blkaddr, META_POR))
    +if (!f2fs_is_valid_blkaddr(sbi, blkaddr, META_POR))
    return 0;

  page = get_tmp_page(sbi, blkaddr);
  @@ -288,12 +310,12 @@
  return err;
}

-static void destroy_fsync_dnodes(struct list_head *head)
+static void destroy_fsync_dnodes(struct list_head *head, int drop)
{
  struct fsync_inode_entry *entry, *tmp;

  list_for_each_entry_safe(entry, tmp, head, list)
  -del_fsync_inode(entry);
    +del_fsync_inode(entry, drop);
}

static int check_index_in_prev_nodes(struct f2fs_sb_info *sbi,
@@ -444,7 +466,15 @@
  get_node_info(sbi, dn.nid, &ni);
  f2fs_bug_on(sbi, ni.ino != ino_of_node(page));
  +f2fs_bug_on(sbi, ofs_of_node(dn.node_page) != ofs_of_node(page));
  +
  }

---
if (ofs_of_node(dn.node_page) != ofs_of_node(page)) {
    f2fs_msg(sbi->sb, KERN_WARNING,
        "Inconsistent ofs_of_node, ino:%lu, ofs:%u, %u",
        inode->i_ino, ofs_of_node(dn.node_page),
        ofs_of_node(page));
    err = -EFSCORRUPTED;
    goto err;
}

for (; start < end; start++, dn.ofs_in_node++) {
    block_t src, dest;
    if (!is_valid_blkaddr(sbi, dest, META_POR)) {
        if (f2fs_is_valid_blkaddr(sbi, dest, META_POR)) {
            if (src == NULL_ADDR) {
                err = reserve_new_block(&dn);
            }
        }
    }
    /* dest is valid block, try to recover from src to dest */
}

recover_data(sbi, &inode_list, &dir_list, blkaddr);
if (entry->blkaddr == blkaddr)
    del_fsync_inode(entry);
next:
    if (entry->blkaddr == blkaddr)
        -del_fsync_inode(entry);
    +list_move_tail(&entry->list, &tmp_inode_list);
    if (entry->blkaddr == blkaddr)
        break;

ra_meta_pages_cond(sbi, blkaddr);
if (entry->blkaddr == blkaddr)
    -del_fsync_inode(entry);
    +list_move_tail(&entry->list, &tmp_inode_list);
next:
    /* check next segment */
    blkaddr = next_blkaddr_of_node(page);
}
int recover_fsync_data(struct f2fs_sb_info *sbi, bool check_only)
{
    struct list_head inode_list;
    struct list_head inode_list, tmp_inode_list;
    struct list_head dir_list;
    int err;
    int ret = 0;
    /* prevent checkpoint */
    /* step #2: recover data */
    -err = recover_data(sbi, &inode_list, &dir_list);
    +err = recover_data(sbi, &inode_list, &tmp_inode_list, &dir_list);
    if (!err)
        f2fs_bug_on(sbi, !list_empty(&inode_list));
    +else {
        /* restore s_flags to let iput() trash data */
        +sbi->sb->s_flags = s_flags;
        +} skip:
        -destroy_fsync_dnodes(&inode_list);
        +destroy_fsync_dnodes(&inode_list, err);
        +destroy_fsync_dnodes(&tmp_inode_list, err);
    /* truncate meta pages to be used by the recovery */
    truncate_inode_pages_range(META_MAPPING(sbi),
        /* let's drop all the directory inodes for clean checkpoint */
        -destroy_fsync_dnodes(&dir_list);
static int __revoke_inmem_pages(struct inode *inode,  
  struct list_head *head, bool drop, bool recover,  
  bool trylock)
{
  struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
  struct inmem_pages *cur, *tmp;

  if (drop)
    trace_f2fs_commit_inmem_page(page, INMEM_DROP);
  else
    lock_page(page);

  if (trylock) {
    /* to avoid deadlock in between page lock and
     * inmem_lock.
     */
    if (!trylock_page(page))
      continue;
  } else {
    lock_page(page);
  }

  f2fs_wait_on_page_writeback(page, DATA, true);

  if (recover) {
    struct dnode_of_data dn;
    ClearPageUptodate(page);
    ClearPagePrivate(page);
    f2fs_put_page(page, 1);
@@ -296,13 +310,19 @@
    struct f2fs_sb_info *sbi = F2FS_I_SB(inode);
    struct f2fs_inode_info *fi = F2FS_I(inode);

    -mutex_lock(&fi->inmem_lock);
    -__revoke_inmem_pages(inode, &fi->inmem_pages, true, false);
    -spin_lock(&sbi->inode_lock[ATOMIC_FILE]);
    -if (!list_empty(&fi->inmem_ilist))
    -list_del_init(&fi->inmem_ilist);
    -spin_unlock(&sbi->inode_lock[ATOMIC_FILE]);
    -mutex_unlock(&fi->inmem_lock);
    while (!list_empty(&fi->inmem_pages)) {
        mutex_lock(&fi->inmem_lock);
        __revoke_inmem_pages(inode, &fi->inmem_pages,
        true, false, true);
        +
        +if (list_empty(&fi->inmem_pages)) {
            spin_lock(&sbi->inode_lock[ATOMIC_FILE]);
            +if (!list_empty(&fi->inmem_ilist))
            +list_del_init(&fi->inmem_ilist);
            spin_unlock(&sbi->inode_lock[ATOMIC_FILE]);
        +}
        +mutex_unlock(&fi->inmem_lock);
        +}

    clear_inode_flag(inode, FI_ATOMIC_FILE);
    clear_inode_flag(inode, FI_HOT_DATA);
    @@ -396,7 +416,7 @@
    f2fs_submit_merged_write_cond(sbi, inode, 0, last_idx, DATA);

    if (!err)
    -__revoke_inmem_pages(inode, &revoke_list, false, false);
    +__revoke_inmem_pages(inode, &revoke_list, false, false, false);

    return err;
    }
    @@ -426,12 +446,14 @@
 * recovery or rewrite & commit last transaction. For other
 * error number, revoking was done by filesystem itself.
 */
    -ret = __revoke_inmem_pages(inode, &revoke_list, false, true);
    +ret = __revoke_inmem_pages(inode, &revoke_list,
    +false, true, false);
    if (ret)
    err = ret;

 /* drop all uncommitted pages */
    -__revoke_inmem_pages(inode, &fi->inmem_pages, true, false);
void f2fs_balance_fs_bg(struct f2fs_sb_info *sbi)
{
+if (unlikely(is_sbi_flag_set(sbi, SBI_POR_DOING)))
+return;
+
/* try to shrink extent cache when there is no enough memory */
if (!available_free_memory(sbi, EXTENT_CACHE))
f2fs_shrink_extent_tree(sbi, EXTENT_CACHE_SHRINK_NUMBER);
int ret = 0;
int i;

-if (!sbi->s_ndevs)
+if (!f2fs_is_multi_device(sbi))
return __submit_flush_wait(sbi, sbi->sb->s_bdev);

for (i = 0; i < sbi->s_ndevs; i++) {
return 0;
}

if (!test_opt(sbi, FLUSH_MERGE)) {
+atomic_inc(&fcc->issing_flush);
ret = submit_flush_wait(sbi, ino);
+atomic_dec(&fcc->issing_flush);
atomic_inc(&fcc->issued_flush);
return ret;
}

trace_f2fs_queue_discard(bdev, blkstart, blklen);

-if (sbi->s_ndevs) {
+if (f2fs_is_multi_device(sbi)) {
int devi = f2fs_target_device_index(sbi, blkstart);

blkstart -= FDEV(devi).start_blk;
}

block_t lblkstart = blkstart;
int devi = 0;

-if (sbi->s_ndevs) {


if (f2fs_is_multi_device(sbi)) {
    devi = f2fs_target_device_index(sbi, blkstart);
    blkstart -= FDEV(devi).start_blk;
}
unsigned int start = 0, end = -1;
unsigned int secno, start_segno;
bool force = (cpc->reason & CP_DISCARD);
bool need_align = test_opt(sbi, LFS) && sbi->segs_per_sec > 1;
mutex_lock(&dirty_i->seglist_lock);

while (1) {
    int i;
    +
    +if (need_align && & end != -1)
    +end--;
    start = find_next_bit(prefree_map, MAIN_SEGS(sbi), end + 1);
    if (start >= MAIN_SEGS(sbi))
        break;
    end = find_next_zero_bit(prefree_map, MAIN_SEGS(sbi),
        start + 1);
    for (i = start; i < end; i++)
        clear_bit(i, prefree_map);
    +if (need_align) {
        +start = rounddown(start, sbi->segs_per_sec);
        +end = roundup(end, sbi->segs_per_sec);
        +}
    -dirty_i->nr_dirty[PRE] -= end - start;
    +for (i = start; i < end; i++) {
        +if (test_and_clear_bit(i, prefree_map))
            +dirty_i->nr_dirty[PRE]--;
    +}
    if (!test_opt(sbi, DISCARD))
        continue;
    @ @ -1921,7 +1957,7 @@
    struct seg_entry *se;
    bool is_cp = false;
    -if (blkaddr == NEW_ADDR || blkaddr == NULL_ADDR)
    +#if (!is_valid_data_blkaddr(sbi, blkaddr))
    return true;
    
    down_read(&sit_i->sentry_lock);
    @ @ -2012,6 +2048,7 @@
struct f2fs_summary_block *dst;

dst = (struct f2fs_summary_block *)page_address(page);
+memset(dst, 0, PAGE_SIZE);

mutex_lock(&curseg->curseg_mutex);

@@ -2155,7 +2192,8 @@
 if (sbi->segs_per_sec != 1)
 return CURSEG_I(sbi, type)->segno;

-if (type == CURSEG_HOT_DATA || IS_NODESEG(type))
+if (test_opt(sbi, NOHEAP) &&
+   (type == CURSEG_HOT_DATA || IS_NODESEG(type)) )
 return 0;

if (SIT_I(sbi)->last_victim[ALLOC_NEXT])
 @@ -2369,6 +2407,7 @@
 struct discard_policy dpolicy;
 unsigned long long trimmed = 0;
 int err = 0;
+bool need_align = test_opt(sbi, LFS) && sbi->segs_per_sec > 1;

if (start >= MAX_BLKADDR(sbi) || range->len < sbi->blocksize)
 return -EINVAL;
@@ -2379,6 +2418,7 @@
 if (is_sbi_flag_set(sbi, SBI_NEED_FSCK)) {
 f2fs_msg(sbi->sb, KERN_WARNING,
 "Found FS corruption, run fsck to fix.");
+err = -EFSCORRUPTED;
 goto out;
 }

@@ -2386,6 +2426,10 @@
 start_segno = (start <= MAIN_BLKADDR(sbi)) ? GET_SEGNO(sbi, start);
 end_segno = (end >= MAX_BLKADDR(sbi)) ? MAIN_SEGS(sbi) - 1 :
 GET_SEGNO(sbi, end);
+if (need_align) {
+  start_segno = rounddown(start_segno, sbi->segs_per_sec);
+  end_segno = roundup(end_segno + 1, sbi->segs_per_sec) - 1;
+}

cpc.reason = CP_DISCARD;
cpc.trim_minlen = max_t(__u64, 1, F2FS_BYTES_TO_BLK(range->minlen));
@@ -2813,7 +2857,7 @@
 {
 struct page *cpage;
if (blkaddr == NEW_ADDR || blkaddr == NULL_ADDR)
+if (!is_valid_data_blkaddr(sbi, blkaddr))
return;

cpage = find_lock_page(META_MAPPING(sbi), blkaddr);
@@ -3005,6 +3049,7 @@

page = grab_meta_page(sbi, blkaddr++);
kaddr = (unsigned char *)page_address(page);
+memset(kaddr, 0, PAGE_SIZE);
/* Step 1: write nat cache */
seg_i = CURSEG_I(sbi, CURSEG_HOT_DATA);
@@ -3029,6 +3074,7 @@
if (!page) {
page = grab_meta_page(sbi, blkaddr++);
kaddr = (unsigned char *)page_address(page);
+memset(kaddr, 0, PAGE_SIZE);
written_size = 0;
}
summary = (struct f2fs_summary *)(kaddr + written_size);
@@ -3482,7 +3528,7 @@
return restore_curseg_summaries(sbi);
}

static void build_sit_entries(struct f2fs_sb_info *sbi)
+static int build_sit_entries(struct f2fs_sb_info *sbi)
{
struct sit_info *sit_i = SIT_I(sbi);
struct curseg_info *curseg = CURSEG_I(sbi, CURSEG_COLD_DATA);
@@ -3492,6 +3538,8 @@
int sit_blk_cnt = SIT_BLK_CNT(sbi);
unsigned int i, start, end;
unsigned int readed, start_blk = 0;
+int err = 0;
+block_t total_node_blocks = 0;

do {
readed = ra_meta_pages(sbi, start_blk, BIO_MAX_PAGES,
@@ -3510,8 +3558,12 @@
sit = sit_blk->entries[SIT_ENTRY_OFFSET(sit_i, start)];
f2fs_put_page(page, 1);

-check_block_count(sbi, start, &sit);
+err = check_block_count(sbi, start, &sit);
+if (err)
+return err;
seg_info_from_raw_sit(se, &sit);
if (IS_NODESEG(se->type))
+total_node_blocks += se->valid_blocks;

/* build discard map only one time */
if (f2fs_discard_en(sbi)) {
    start = le32_to_cpu(segno_in_journal(journal, i));
    if (start >= MAIN_SEGS(sbi)) {
        f2fs_msg(sbi->sb, KERN_ERR,
            "Wrong journal entry on segno %u",
            start);
        set_sbi_flag(sbi, SBI_NEED_FSCK);
        err = -EFSCORRUPTED;
        break;
    }
    se = &sit_i->sentries[start];
    sit = sit_in_journal(journal, i);

    old_valid_blocks = se->valid_blocks;
    if (IS_NODESEG(se->type))
        total_node_blocks -= old_valid_blocks;

    -check_block_count(sbi, start, &sit);
    +err = check_block_count(sbi, start, &sit);
    +if (err)
        break;
    seg_info_from_raw_sit(se, &sit);
    +if (IS_NODESEG(se->type))
        total_node_blocks += se->valid_blocks;

    if (f2fs_discard_en(sbi)) {
        if (is_set_ckpt_flags(sbi, CP_TRIMMED_FLAG)) {
            memcpy(se->discard_map, se->cur_valid_map,
                SIT_VBLOCK_MAP_SIZE);
            -sbi->discard_blks += old_valid_blocks -
                se->valid_blocks;
            +sbi->discard_blks += old_valid_blocks;
            +sbi->discard_blks -= se->valid_blocks;
        } else {
            memcpy(se->discard_map, se->cur_valid_map,
                SIT_VBLOCK_MAP_SIZE);
            -sbi->discard_blks += old_valid_blocks -
                se->valid_blocks;
            +sbi->discard_blks += old_valid_blocks;
            +sbi->discard_blks -= se->valid_blocks;
        }
    }

    -if (sbi->segs_per_sec > 1)
        +if (sbi->segs_per_sec > 1) {


get_sec_entry(sbi, start)->valid_blocks +=
-se->valid_blocks - old_valid_blocks;
+se->valid_blocks;
+get_sec_entry(sbi, start)->valid_blocks -=
+old_valid_blocks;
+
}
}
up_read(&curseg->journal_rwlock);
+
+if (!err && total_node_blocks != valid_node_count(sbi)) {
+f2fs_msg(sbi->sb, KERN_ERR,
+"SIT is corrupted node# %u vs %u",
+total_node_blocks, valid_node_count(sbi));
+set_sbi_flag(sbi, SBI_NEED_FSCK);
+err = -EFSCORRUPTED;
+
+
+return err;
+
}

static void init_free_segmap(struct f2fs_sb_info *sbi)
@@ -3650,6 +3730,41 @@
return init_victim_seemap(sbi);
}

+static int sanity_check_curseg(struct f2fs_sb_info *sbi)
+{
+int i;
+
+/*
+ * In LFS/SSR curseg, .next_blkoff should point to an unused blkaddr;
+ * In LFS curseg, all blkaddr after .next_blkoff should be unused.
+ */
+for (i = 0; i < NO_CHECK_TYPE; i++) {
+struct curseg_info *curseg = CURSEG_I(sbi, i);
+struct seg_entry *se = get_seg_entry(sbi, curseg->segno);
+unsigned int blkofs = curseg->next_blkoff;
+
+if (f2fs_test_bit(blkofs, se->cur_valid_map))
+goto out;
+
+if (curseg->alloc_type == SSR)
+continue;
+
+for (blkofs += 1; blkofs < sbi->blocks_per_seg; blkofs++) {
+if (!f2fs_test_bit(blkofs, se->cur_valid_map))
+continue;
+out:
+f2fs_msg(sbi->sb, KERN_ERR,
+"Current segment's next free block offset is ",
+"inconsistent with bitmap, logtype:%u, ",
+"segno:%u, type:%u, next_blkoff:%u, blkofs:%u",
+i, curseg->segno, curseg->alloc_type,
+curseg->next_blkoff, blkofs);
+return -EFSCORRUPTED;
+
return 0;
+
/*
 * Update min, max modified time for cost-benefit GC algorithm
 */
@@ -3737,13 +3852,19 @@ @ @ -3737,13 +3852,19 @ @
 return err;

/* reinit free segmap based on SIT */
-build_sit_entries(sbi);
+err = build_sit_entries(sbi);
+if (err)
+return err;
+init_free_segmap(sbi);
+err = build_dirty_segmap(sbi);
+if (err)
+return err;
+
+err = sanity_check_curseg(sbi);
+if (err)
+return err;
+
init_min_max_mtime(sbi);
return 0;
}
--- linux-4.15.0.orig/fs/f2fs/segment.h
+++ linux-4.15.0/fs/f2fs/segment.h
@@ -19,6 +19,7 @@
#define DEF_MAX_RECLAIM_PREFREE_SEGMENTS	4096	/* 8GB in maximum */

#define F2FS_MIN_SEGMENTS	9 /* SB + 2 (CP + SIT + NAT) + SSA + MAIN */
+#define F2FS_MIN_META_SEGMENTS	8 /* SB + 2 (CP + SIT + NAT) + SSA */

/* L: Logical segment # in volume, R: Relative segment # in main area */
#define GET_L2R_SEGNO(free_i, segno)	((segno) - (free_i)->start_segno)
@@ -53,13 +54,19 @@ @ @ -53,13 +54,19 @ @
((secno) == CURSEG_I(sbi, CURSEG_COLD_NODE)->segno)
#define MAIN_BLKADDR(sbi)  	(SM_I(sbi)->main_blkaddr)
#define SEG0_BLKADDR(sbi)  	(SM_I(sbi)->seg0_blkaddr)
+#define MAIN_BLKADDR(sbi)  
+(SM_I(sbi) ? SM_I(sbi)->main_blkaddr : 
+le32_to_cpu(F2FS_RAW_SUPER(sbi)->main_blkaddr))
+#define SEG0_BLKADDR(sbi)  
+(SM_I(sbi) ? SM_I(sbi)->seg0_blkaddr : 
+le32_to_cpu(F2FS_RAW_SUPER(sbi)->segment0_blkaddr))

#define MAIN_SEGS(sbi)(SM_I(sbi)->main_segments)
#define MAIN_SECS(sbi)((sbi)->total_sections)

#define TOTAL_SEGS(sbi)(SM_I(sbi)->segment_count)
+#define TOTAL_SEGS(sbi)  
+(SM_I(sbi) ? SM_I(sbi)->segment_count : 
+le32_to_cpu(F2FS_RAW_SUPER(sbi)->segment_count))
#define TOTAL_BLKS(sbi)(TOTAL_SEGS(sbi) << (sbi)->log_blocks_per_seg)

#define MAX_BLKADDR(sbi)(SEG0_BLKADDR(sbi) + TOTAL_BLKS(sbi))
#define GET_SEGOFF_FROM_SEG0(sbi, blk_addr) & ((sbi)->blocks_per_seg - 1))
#define GET_SEGNO(sbi, blk_addr)  
-((((blk_addr) == NULL_ADDR) || ((blk_addr) == NEW_ADDR)) ?
+((!is_valid_data_blkaddr(sbi, blk_addr)) ?
GET_SEGNO_FROM_SEG0(sbi, blk_addr))
#define BLKS_PER_SEC(sbi)  
((sbi)->segs_per_sec * (sbi)->blocks_per_seg)
#define GET_SEC_FROM_SEG(sbi, segno)
-((segno) / (sbi)->segs_per_sec)
#define GET_SEG_FROM_SEC(sbi, secno)
((secno) * (sbi)->segs_per_sec)
#define GET_ZONE_FROM_SEC(sbi, secno)
-((secno) / (sbi)->secs_per_zone)
#define GET_ZONE_FROM_SEG(sbi, segno)
GET_ZONE_FROM_SEC(sbi, GET_SEC_FROM_SEG(sbi, segno))

if (test_and_clear_bit(segno, free_i->free_segmap)) {
free_i->free_segments++;
+if (IS_CURSEC(sbi, secno))
+goto skip_free;
next = find_next_bit(free_i->free_segmap,
start_segno + sbi->segs_per_sec, start_segno);
if (next >= start_segno + sbi->segs_per_sec) {
@@ -421,6 +430,7 @@
free_i->free_sections++;
}
}
+skip_free:
spin_unlock(&free_i->segmap_lock);
}
@@ -646,19 +656,22 @@
f2fs_bug_on(sbi, segno > TOTAL_SEGS(sbi) - 1);
}
-static inline void verify_block_addr(struct f2fs_sb_info *sbi, block_t blk_addr)
+static inline void verify_block_addr(struct f2fs_io_info *fio, block_t blk_addr)
{
-BUG_ON(blk_addr < SEG0_BLKADDR(sbi)
-|| blk_addr >= MAX_BLKADDR(sbi));
+struct f2fs_sb_info *sbi = fio->sbi;
+
+if (__is_meta_io(fio))
+verify_blkaddr(sbi, blk_addr, META_GENERIC);
+else
+verify_blkaddr(sbi, blk_addr, DATA_GENERIC);
}
/*
* Summary block is always treated as an invalid block
*/
-static inline void check_block_count(struct f2fs_sb_info *sbi,
+static inline int check_block_count(struct f2fs_sb_info *sbi,
int segno, struct f2fs_sit_entry *raw_sit)
{
-#ifdef CONFIG_F2FS_CHECK_FS
bool is_valid = test_bit_le(0, raw_sit->valid_map) ? true : false;
int valid_blocks = 0;
int cur_pos = 0, next_pos;
@@ -677,11 +690,25 @@
cur_pos = next_pos;
is_valid = !is_valid;
} while (cur_pos < sbi->blocks_per_seg);
-BUG_ON(GET_SIT_VBLOCKS(raw_sit) != valid_blocks);
-#endif
+
+if (unlikely(GET_SIT_VBLOCKS(raw_sit) != valid_blocks)) {
+f2fs_msg(sbi->sb, KERN_ERR,

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"Mismatch valid blocks %d vs. %d",

GET_SIT_VBLOCKS(raw_sit), valid_blocks);

set_sbi_flag(sbi, SBI_NEED_FSCK);

return -EFSCORRUPTED;

/* check segment usage, and check boundary of a given segment number */

if (unlikely(GET_SIT_VBLOCKS(raw_sit) > sbi->blocks_per_seg

segno > TOTAL_SEGS(sbi) - 1)) {

f2fs_msg(sbi->sb, KERN_ERR,

"Wrong valid blocks %d or segno %u",

GET_SIT_VBLOCKS(raw_sit), segno);

set_sbi_flag(sbi, SBI_NEED_FSCK);

return -EFSCORRUPTED;

}

return 0;

}

static inline pgoff_t current_sit_addr(struct f2fs_sb_info *sbi,

--- linux-4.15.0.orig/fs/f2fs/shrinker.c
+++ linux-4.15.0/fs/f2fs/shrinker.c
@@ -138,6 +138,6 @@

f2fs_shrink_extent_tree(sbi, __count_extent_cache(sbi));

spin_lock(&f2fs_list_lock);
-list_del(&sbi->s_list);
+list_del_init(&sbi->s_list);

spin_unlock(&f2fs_list_lock);
}

--- linux-4.15.0.orig/fs/f2fs/super.c
+++ linux-4.15.0/fs/f2fs/super.c
@@ -828,6 +828,9 @@

int i;

bool dropped;

"unregister procfs/sysfs entries in advance to avoid race case */

f2fs_unregister_sysfs(sbi);

/* prevent remaining shrinker jobs */

kfree(sbi->ckpt);

-f2fs_unregister_sysfs(sbi);
sb->s_fs_info = NULL;
if (sbi->s_chksum_driver)
crypto_free_shash(sbi->s_chksum_driver);
@@ -961,20 +962,23 @@
return PTR_ERR(dquot);
spin_lock(&dq_data_lock);

-limit = (dquot->dq_dqb.dqb_bsoftlimit ?
    - dquot->dq_dqb.dqb_bsoftlimit :
    - dquot->dq_dqb.dqb_bhardlimit) >> sb->s_blocksize_bits;
+limit = min_not_zero(dquot->dq_dqb.dqb_bsoftlimit,
    +dquot->dq_dqb.dqb_bhardlimit);
+if (limit)
+limit >>= sb->s_blocksize_bits;
+
if (limit & & buf->f_blocks > limit) {
-    curblock = dquot->dq_dqb.dqb_curspace >> sb->s_blocksize_bits;
+    curblock = (dquot->dq_dqb.dqb_curspace +
        + dquot->dq_dqb.dqb_rsvspace) >> sb->s_blocksize_bits;
buf->f_blocks = limit;
buf->f_bfree = buf->f_bavail =
    (buf->f_blocks > curblock) ?
    (buf->f_blocks - curblock) : 0;
}

-limit = dquot->dq_dqb.dqb_isoflimit ?
    - dquot->dq_dqb.dqb_isoflimit :
    - dquot->dq_dqb.dqb_ihardlimit;
+limit = min_not_zero(dquot->dq_dqb.dqb_isoflimit,
    +dquot->dq_dqb.dqb_ihardlimit);
+
if (limit & & buf->f_files > limit) {
    buf->f_files = limit;
buf->f_ffree =
    @@ -1332,6 +1336,7 @@
sb->s_flags = (sb->s_flags & ~SB_POSIXACL) |
    (test_opt(sbi, POSIX_ACL) ? SB_POSIXACL : 0);
    +*flags = (*flags & ~SB_LAZYTIME) | (sb->s_flags & SB_LAZYTIME);
return 0;
restore_gc:
if (need_restart_gc) {
    @@ -1425,6 +1430,7 @@
int offset = off & (sb->s_blocksize - 1);
size_t towrite = len;
struct page *page =
    +void *fsdata = NULL;
char *kaddr;
int err = 0;
int tocopy;
retry:
err = a_ops->write_begin(NULL, mapping, off, tocopy, 0,
&page, NULL);
+&page, &fsdata);
if (unlikely(err)) {
if (err == -ENOMEM) {
congestion_wait(BLK_RW_ASYNC, HZ/50);
}
flush_dcache_page(page);
a_ops->write_end(NULL, mapping, off, tocopy, tocopy,
-page, NULL);
+page, fsdata);
offset = 0;
towrite -= tocopy;
off += tocopy;
inode_lock(inode);
F2FS_I(inode)->i_flags |= FS_NOATIME_FL | FS_IMMUTABLE_FL;
-inode_set_flags(inode, S_NOATIME | S_IMMUTABLE,
-S_NOATIME | S_IMMUTABLE);
+f2fs_set_inode_flags(inode);
inode_unlock(inode);
f2fs_mark_inode_dirty_sync(inode, false);

if (!inode || !igrab(inode))
return dquot_quota_off(sb, type);
-f2fs_quota_sync(sb, type);
+err = f2fs_quota_sync(sb, type);
+if (err)
+goto out_put;

err = dquot_quota_off(sb, type);
if (err || f2fs_sb_has_quota_ino(sb))
@@ -1640,7 +1647,7 @@
inode_lock(inode);
F2FS_I(inode)->i_flags &= ~(FS_NOATIME_FL | FS_IMMUTABLE_FL);
-inode_set_flags(inode, 0, S_NOATIME | S_IMMUTABLE,
+S_NOATIME | S_IMMUTABLE);
+f2fs_set_inode_flags(inode);
inode_unlock(inode);
f2fs_mark_inode_dirty_sync(inode, false);
out_put:
@@ -1651,11 +1658,41 @@
void f2fs_quota_off_umount(struct super_block *sb)
 {
 int type;
 +int err;
+ +for (type = 0; type < MAXQUOTAS; type++) {
+ +err = f2fs_quota_off(sb, type);
+ +if (err) {
+ +int ret = dquot_quota_off(sb, type);
- -for (type = 0; type < MAXQUOTAS; type++)
- -f2fs_quota_off(sb, type);
+ +for (type = 0; type < MAXQUOTAS; type++) {
+ +err = f2fs_quota_off(sb, type);
+ +if (err) {
+ +int ret = dquot_quota_off(sb, type);
+ /* In case of checkpoint=disable, we must flush quota blocks.
+ * This can cause NULL exception for node_inode in end_io, since
+ * put_super already dropped it.
+ */
+ +sync_filesystem(sb);
+ }
+ +}
+/*
+ * In case of checkpoint=disable, we must flush quota blocks.
+ */
+ * This can cause NULL exception for node_inode in end_io, since
+ * put_super already dropped it.
+ */
+ +sync_filesystem(sb);
+ }
+ +
+static void f2fs_truncate_quota_inode_pages(struct super_block *sb)
+{ 
+struct quota_info *dqopt = sb_dqopt(sb);
+int type;
+ +for (type = 0; type < MAXQUOTAS; type++) {
+ +if (!dqopt->files[type])
+ +continue;
+ +f2fs_inode_synced(dqopt->files[type]);
+ +}
+ +}
+ +
+int f2fs_get_projid(struct inode *inode, kprojid_t *projid)
+{
+ *projid = F2FS_I(inode)->i_projid;
@@ -1933,16 +1970,18 @@
static int sanity_check_raw_super(struct f2fs_sb_info *sbi, 
struct buffer_head *bh) 
{
+block_t segment_count, segs_per_sec, secs_per_zone, segment_count_main;
+block_t total_sections, blocks_per_seg;
struct f2fs_super_block *raw_super = (struct f2fs_super_block *)
(bh->b_data + F2FS_SUPER_OFFSET);
struct super_block *sb = sbi->sb;
unsigned int blocksize;

- if (F2FS_SUPER_MAGIC != le32_to_cpu(raw_super->magic)) {
+ if (le32_to_cpu(raw_super->magic) != F2FS_SUPER_MAGIC) {
 f2fs_msg(sb, KERN_INFO,
 "Magic Mismatch, valid(0x%x) - read(0x%x)",
 F2FS_SUPER_MAGIC, le32_to_cpu(raw_super->magic));
 - return 1;
 + return -EINVAL;
 }

 /* Currently, support only 4KB page cache size */
 @ @ -1950.7 +1989.7 @@
 f2fs_msg(sb, KERN_INFO,
 "Invalid page_cache_size (%lu), supports only 4KB\n",
 PAGE_SIZE);
 - return 1;
 + return -EFSCORRUPTED;
 }

 /* Currently, support only 4KB block size */
 @ @ -1959.7 +1998.7 @@
 f2fs_msg(sb, KERN_INFO,
 "Invalid blocksize (%u), supports only 4KB\n",
 blocksize);
 - return 1;
 + return -EFSCORRUPTED;
 }

 /* check log blocks per segment */
 @ @ -1967.7 +2006.7 @@
 f2fs_msg(sb, KERN_INFO,
 "Invalid log blocks per segment (%u)\n",
 le32_to_cpu(raw_super->log_blocks_per_seg));
 - return 1;
 + return -EFSCORRUPTED;
 }

 /* Currently, support 512/1024/2048/4096 bytes sector size */
 @ @ -1977.7 +2016.7 @@
F2FS_MIN_LOG_SECTOR_SIZE) {
    f2fs_msg(sb, KERN_INFO, "Invalid log sectorsize (%u)",
    le32_to_cpu(raw_super->log_sectorsize));
    -return 1;
    +return -EFSCORRUPTED;
    }
    
    if (le32_to_cpu(raw_super->log_sectors_per_block) +
    le32_to_cpu(raw_super->log_sectorsize) !=
    le32_to_cpu(raw_super->log_sectors_per_block),
    le32_to_cpu(raw_super->log_sectorsize));
    -return 1;
    +return -EFSCORRUPTED;
    +
    +segment_count = le32_to_cpu(raw_super->segment_count);
    +segment_count_main = le32_to_cpu(raw_super->segment_count_main);
    +segs_per_sec = le32_to_cpu(raw_super->segs_per_sec);
    +secs_per_zone = le32_to_cpu(raw_super->secs_per_zone);
    +total_sections = le32_to_cpu(raw_super->section_count);
    +
    +/* blocks_per_seg should be 512, given the above check */
    +blocks_per_seg = 1 << le32_to_cpu(raw_super->log_blocks_per_seg);
    +
    +if (segment_count > F2FS_MAX_SEGMENT ||
    +segment_count < F2FS_MIN_SEGMENTS) {
    +f2fs_msg(sb, KERN_INFO,
    +"Invalid segment count (%u)",
    +segment_count);
    +return -EFSCORRUPTED;
    +}
    +
    +if (total_sections > segment_count_main || total_sections < 1 ||
    +segs_per_sec > segment_count || !segs_per_sec) {
    +f2fs_msg(sb, KERN_INFO,
    +"Invalid segment/section count (%u, %u x %u)",
    +segment_count, total_sections, segs_per_sec);
    +return -EFSCORRUPTED;
    +}
    +
    +if (segment_count_main != total_sections * segs_per_sec) {
    +f2fs_msg(sb, KERN_INFO,
    +"Invalid segment/section count (%u != %u x %u)",
    +segment_count_main, total_sections, segs_per_sec);
    +return -EFSCORRUPTED;
    +}
    +
if ((segment_count / segs_per_sec) < total_sections) {
  f2fs_msg(sb, KERN_INFO,
  "Small segment_count (%u < %u * %u)",
  segment_count, segs_per_sec, total_sections);
  return -EFSCORRUPTED;
}

if (segment_count > (le64_to_cpu(raw_super->block_count) >> 9)) {
  f2fs_msg(sb, KERN_INFO,
  "Wrong segment_count / block_count (%u > %llu)",
  segment_count, le64_to_cpu(raw_super->block_count));
  return -EFSCORRUPTED;
}

if (secs_per_zone > total_sections || !secs_per_zone) {
  f2fs_msg(sb, KERN_INFO,
  "Wrong secs_per_zone / total_sections (%u, %u)",
  secs_per_zone, total_sections);
  return -EFSCORRUPTED;
}

if (le32_to_cpu(raw_super->extension_count) > F2FS_MAX_EXTENSION) {
  f2fs_msg(sb, KERN_INFO,
  "Corrupted extension count (%u > %u)",
  le32_to_cpu(raw_super->extension_count),
  F2FS_MAX_EXTENSION);
  return -EFSCORRUPTED;
}

if (le32_to_cpu(raw_super->cp_payload) >
  (blocks_per_seg - F2FS_CP_PACKS)) {
  f2fs_msg(sb, KERN_INFO,
  "Insane cp_payload (%u > %u)",
  le32_to_cpu(raw_super->cp_payload),
  blocks_per_seg - F2FS_CP_PACKS);
  return -EFSCORRUPTED;
}

/* check reserved ino info */

le32_to_cpu(raw_super->node_ino),
le32_to_cpu(raw_super->meta_ino),
le32_to_cpu(raw_super->root_ino));
  -return 1;
-}
-
-if (le32_to_cpu(raw_super->segment_count) > F2FS_MAX_SEGMENT) {
  f2fs_msg(sb, KERN_INFO,
  "Invalid segment count (%u)",

-le32_to_cpu(raw_super->segment_count));
-return 1;
+return -EFSCORRUPTED;
}

/* check CP/SIT/NAT/SSA/MAN_ AREA area boundary */
if (sanity_check_area_boundary(sbi, bh))
-return 1;
+return -EFSCORRUPTED;

return 0;
}
@@ -2022,12 +2123,20 @@
struct f2fs_checkpoint *ckpt = F2FS_CKPT(sbi);
unsigned int ovp_segments, reserved_segments;
unsigned int main_segments, blocks_per_seg;
-int i;
+unsigned int sit_segments, nat_segments;
+unsigned int sit_bitmap_size, nat_bitmap_size;
+unsigned int log_blocks_per_seg;
+unsigned int segment_count_main;
+unsigned int cp_pack_start_sum, cp_payload;
+block_t user_block_count;
+int i, j;

total = le32_to_cpu(raw_super->segment_count);
fsmeta = le32_to_cpu(raw_super->segment_count_ckpt);
-fsmeta += le32_to_cpu(raw_super->segment_count_sit);
-fsmeta += le32_to_cpu(raw_super->segment_count_nat);
+sit_segments = le32_to_cpu(raw_super->segment_count_sit);
+fsmeta += sit_segments;
+nat_segments = le32_to_cpu(raw_super->segment_count_nat);
+fsmeta += nat_segments;
+fsmeta += le32_to_cpu(ckpt->rsvd_segment_count);
+fsmeta += le32_to_cpu(ckpt->rsvd_segment_count_ssa);

@@ -2037,13 +2146,23 @@
ovp_segments = le32_to_cpu(ckpt->overprov_segment_count);
reserved_segments = le32_to_cpu(ckpt->rsvd_segment_count);

-if (unlikely(fsmeta < F2FS_MIN_SEGMENTS ||
+if (unlikely(fsmeta < F2FS_MIN_META_SEGMENTS ||
    ovp_segments == 0 || reserved_segments == 0)) {
    f2fs_msg(sbi->sb, KERN_ERR,
    "Wrong layout: check mkfs.f2fs version");
    return 1;
}
+user_block_count = le64_to_cpu(ckpt->user_block_count);
+segment_count_main = le32_to_cpu(raw_super->segment_count_main);
+log_blocks_per_seg = le32_to_cpu(raw_super->log_blocks_per_seg);
+if (!user_block_count || user_block_count >=
+segment_count_main << log_blocks_per_seg) {
+f2fs_msg(sbi->sb, KERN_ERR,
+"Wrong user_block_count: %u", user_block_count);
+return 1;
+
+main_segs = le32_to_cpu(raw_super->segment_count_main);
+blocks_per_seg = sbi->blocks_per_seg;

@@ -2051,11 +2170,65 @@
if (le32_to_cpu(ckpt->cur_node_segno[i]) >= main_segs ||
le16_to_cpu(ckpt->cur_node_blkoff[i]) >= blocks_per_seg)
return 1;
+for (j = i + 1; j < NR_CURSEG_NODE_TYPE; j++) {
+if (le32_to_cpu(ckpt->cur_node_segno[i]) ==
+le32_to_cpu(ckpt->cur_node_segno[j])) {
+f2fs_msg(sbi->sb, KERN_ERR,
+"Node segment (%u, %u) has the same "
+"segno: %u", i, j,
+le32_to_cpu(ckpt->cur_node_segno[i]));
+return 1;
+}
+}
+
+for (i = 0; i < NR_CURSEG_DATA_TYPE; i++) {
+if (le32_to_cpu(ckpt->cur_data_segno[i]) >= main_segs ||
+le16_to_cpu(ckpt->cur_data_blkoff[i]) >= blocks_per_seg)
return 1;
+for (j = i + 1; j < NR_CURSEG_DATA_TYPE; j++) {
+if (le32_to_cpu(ckpt->cur_data_segno[i]) ==
+le32_to_cpu(ckpt->cur_data_segno[j])) {
+f2fs_msg(sbi->sb, KERN_ERR,
+"Data segment (%u, %u) has the same "
+"segno: %u", i, j,
+le32_to_cpu(ckpt->cur_data_segno[i]));
+return 1;
+}
+
+for (i = 0; i < NR_CURSEG_NODE_TYPE; i++) {
+for (j = 0; j < NR_CURSEG_DATA_TYPE; j++) {
+if (le32_to_cpu(ckpt->cur_node_segno[i]) ==
+le32_to_cpu(ckpt->cur_data_segno[j])) {
+f2fs_msg(sbi->sb, KERN_ERR,
"Node segment (%u) and Data segment (%u)"
"has the same segno: %u", i, j,
le32_to_cpu(ckpt->cur_node_segno[i]));
return 1;
}
+
+
sit_bitmap_size = le32_to_cpu(ckpt->sit_ver_bitmap_bytesize);
nat_bitmap_size = le32_to_cpu(ckpt->nat_ver_bitmap_bytesize);
+
+if (sit_bitmap_size != ((sit_segs / 2) << log_blocks_per_seg) / 8 ||
+    nat_bitmap_size != ((nat_segs / 2) << log_blocks_per_seg) / 8) {
+f2fs_msg(sbi->sb, KERN_ERR,
    "Wrong bitmap size: sit: %u, nat:%u",
    sit_bitmap_size, nat_bitmap_size);
+return 1;
+
+CP_pack_start_sum = __start_sum_addr(sbi);
+CP_payload = __cp_payload(sbi);
+if (CP_pack_start_sum < CP_payload + 1 ||
+    CP_pack_start_sum > blocks_per_seg - 1 -
+NR_CURSEG_TYPE) {
+f2fs_msg(sbi->sb, KERN_ERR,
    "Wrong cp_pack_start_sum: %u",
    CP_pack_start_sum);
+return 1;
+
    if (unlikely(f2fs_cp_error(sbi))) {
@@ -2117,8 +2290,12 @@
    if (err)
    return err;
-
-    return percpu_counter_init(&sbi->total_valid_inode_count, 0,
-    err = percpu_counter_init(&sbi->total_valid_inode_count, 0,
-    GFP_KERNEL);
-    if (err)
-        percpu_counter_destroy(&sbi->alloc_valid_block_count);
-    +
-    +return err;
+
#ifdef CONFIG_BLK_DEV_ZONED
@@ -2216,11 +2393,11 @@
}
/* sanity checking of raw super */
- if (sanity_check_raw_super(sbi, bh)) {
+ err = sanity_check_raw_super(sbi, bh);
+ if (err) {
    f2fs_msg(sb, KERN_ERR,
"Can't find valid F2FS filesystem in %dth superblock",
block + 1);
- err = -EINVAL;
  brelse(bh);
  continue;
}   @@ -2719,10 +2896,10 @@

free_meta:
#ifdef CONFIG_QUOTA
+f2fs_truncate_quota_inode_pages(sb);
if (f2fs_sb_has_quota_ino(sb) && !sb_rdonly(sb))
f2fs_quota_offUnmount(sbi->sb);
#endif
-f2fs_sync_inode_meta(sbi);
/*
 * Some dirty meta pages can be produced by recover_orphan_inodes()
 * failed by EIO. Then, iput(node_inode) can trigger balance_fs_bg()
 @@ -2831,6 +3008,12 @@
 { int err;

+if (PAGE_SIZE != F2FS_BLKSIZE) {
+ printk("F2FS not supported on PAGE_SIZE(%lu) != %d\n",
+ PAGE_SIZE, F2FS_BLKSIZE);
+ return -EINVAL;
+ }
+ 
+ f2fs_build_trace_ios();

    err = init_inodetable();
    @@ -2902,4 +3085,5 @@
    MODULE_AUTHOR("Samsung Electronics's Praesto Team");
    MODULE_DESCRIPTION("Flash Friendly File System");
    MODULE_LICENSE("GPL");
    +MODULE_SOFTDEP("pre: crc32");

--- linux-4.15.0.orig/fs/f2fs/sysfs.c
+++ linux-4.15.0/fs/f2fs/sysfs.c
@@ -9,6 +9,7 @@
* it under the terms of the GNU General Public License version 2 as
* published by the Free Software Foundation.
*/
static int segment_info_seq_show(struct seq_file *seq, void *offset)
{
    struct super_block *sb = seq->private;
    struct f2fs_sb_info *sbi = F2FS_SB(sb);
    return 0;
}

static int segment_bits_seq_show(struct seq_file *seq, void *offset)
{
    struct super_block *sb = seq->private;
    struct f2fs_sb_info *sbi = F2FS_SB(sb);
    return 0;
}

static int iostat_info_seq_show(struct seq_file *seq, void *offset)
{
    struct super_block *sb = seq->private;
    struct f2fs_sb_info *sbi = F2FS_SB(sb);
    ret = kobject_init_and_add(&f2fs_feat, &f2fs_feat_ktype,
        NULL, "features");
    if (ret)
        kobject_put(&f2fs_feat);
    kset_unregister(&f2fs_kset);
    f2fs_proc_root = proc_mkdir("fs/f2fs", NULL);
    return ret;
}
init_completion(&sbi->s_kobj_unregister);
err = kobject_init_and_add(&sbi->s_kobj, &f2fs_sb_ktype, NULL, "%s", sb->s_id);
-if (err)
+if (err) {
+kobject_put(&sbi->s_kobj);
+wait_for_completion(&sbi->s_kobj_unregister);
return err;
+
}

if (f2fs_proc_root)
sbi->s_proc = proc_mkdir(sb->s_id, f2fs_proc_root);
@@ -574,7 +583,6 @@
remove_proc_entry(sbi->sb->s_id, f2fs_proc_root);
} 
kobject_del(&sbi->s_kobj);
+kobject_put(&sbi->s_kobj);
+wait_for_completion(&sbi->s_kobj_unregister);
} 
--- linux-4.15.0.orig/fs/f2fs/trace.c
+++ linux-4.15.0/fs/f2fs/trace.c
@@ -61,7 +61,7 @@
set_page_private(page, (unsigned long)pid);
+retry:
if (radix_tree_preload(GFP_NOFS))
return;
@@ -71,12 +72,12 @@
if (p)
 radix_tree_delete(&pids, pid);
-f2fs_radix_tree_insert(&pids, pid, current);
+if (radix_tree_insert(&pids, pid, current)) {
+spin_unlock(&pids_lock);
+radix_tree_preload_end();
+cond_resched();
+goto retry;
+
} 
trace_printk("%3x:%3x %4x %-16s
", 
MAJOR(inode->i_sb->s_dev), MINOR(inode->i_sb->s_dev),
--- linux-4.15.0.orig/fs/f2fs/xattr.c
+++ linux-4.15.0/fs/f2fs/xattr.c
@@ -201,12 +201,17 @@

return handler;
}

static struct f2fs_xattr_entry *__find_xattr(void *base_addr, int index, size_t len, const char *name)
{  
  struct f2fs_xattr_entry *entry;
  list_for_each_xattr(entry, base_addr) {
    if ((void *)(entry) + sizeof(__u32) > last_base_addr ||  
        (void *)XATTR_NEXT_ENTRY(entry) > last_base_addr) {
      return NULL;
    }
    if (entry->e_name_index != index) continue;
    if (entry->e_name_len != len) {
      @ @ -223,11 +228,11 @@
    }  
    struct f2fs_xattr_entry *entry;
    unsigned int inline_size = inline_xattr_size(inode);
    void *max_addr = base_addr + inline_size;
    if ((void *)entry + sizeof(__u32) > max_addr ||  
        (void *)XATTR_NEXT_ENTRY(entry) > max_addr) {
      *last_addr = entry;
      return NULL;
    }
    if (!memcmp(entry->e_name, name, len)) break;
  }
  if (!memcmp(entry->e_name, name, len)) break;
  +/* inline xattr header or entry across max inline xattr size */
  +if (IS_XATTR_LAST_ENTRY(entry) &&  
      (void *)entry + sizeof(__u32) > max_addr) {
    *last_addr = entry;
    return NULL;
  }
  return entry;
}
static int lookup_all_xattrs(struct inode *inode, struct page *ipage,
unsigned int index, unsigned int len,
const char *name, struct f2fs_xattr_entry **xe,
-void **base_addr)
+void **base_addr, int *base_size)
{
-void *cur_addr, *txattr_addr, *last_addr = NULL;
+void *cur_addr, *txattr_addr, *last_txattr_addr;
+void *last_addr = NULL;
 nid_t xnid = F2FS_I(inode)->i_xattr_nid;
unsigned int size = xnid ? VALID_XATTR_BLOCK_SIZE : 0;
unsigned int inline_size = inline_xattr_size(inode);
int err = 0;

-if (!size && !inline_size)
+if (!xnid && !inline_size)
return -ENODATA;

-txattr_addr = kzalloc(inline_size + size + XATTR_PADDING_SIZE,
-GFP_F2FS_ZERO);
+*base_size = XATTR_SIZE(xnid, inode) + XATTR_PADDING_SIZE;
+txattr_addr = kzalloc(*base_size, GFP_F2FS_ZERO);
if (!txattr_addr)
return -ENOMEM;

*last_txattr_addr = (void *)txattr_addr + XATTR_SIZE(xnid, inode);
+
        /* read from inline xattr */
        if (inline_size) {
            err = read_inline_xattr(inode, ipage, txattr_addr);
            @ @ -311,8 +325,10 @ @

*xe = __find_inline_xattr(inode, txattr_addr, &last_addr,
index, len, name);
-if (*xe)
+if (*xe) {
+*base_size = inline_size;
goto check;
+}
}

        /* read from xattr node block */
        @ @ -327,7 +343,11 @ @
else
cur_addr = txattr_addr;

-*xe = __find_xattr(cur_addr, index, len, name);
*xe = __find_xattr(cur_addr, last_txattr_addr, index, len, name);
+if (!*xe) {
  +err = -EFAULT;
  +goto out;
  +}
  +
  check:
  if (IS_XATTR_LAST_ENTRY(*xe)) {
    err = -ENODATA;
  }

  @ @ -471,6 +491,7 @@
  int error = 0;
  unsigned int size, len;
  void *base_addr = NULL;
  +int base_size;

  if (name == NULL)
    return -EINVAL;
  @ @ -481,7 +502,7 @@

  down_read(&F2FS_I(inode)->i_xattr_sem);
  error = lookup_all_xattrs(inode, ipage, index, len, name,
  -&entry, &base_addr);
  +&entry, &base_addr, &base_size);
  up_read(&F2FS_I(inode)->i_xattr_sem);
  if (error)
    return error;
  @ @ -495,6 +516,11 @@

  if (buffer) {
    char *pval = entry->e_name + entry->e_name_len;
    +
    +if (base_size - (pval - (char *)base_addr) < size) {
      +error = -ERANGE;
      +goto out;
      +}
    memcpy(buffer, pval, size);
    }
  error = size;
  @ @ -506,8 +532,9 @@

  ssize_t f2fs_listxattr(struct dentry *dentry, char *buffer, size_t buffer_size)
  {
    struct inode *inode = d_inode(dentry);
    +nid_t xnid = F2FS_I(inode)->i_xattr_nid;
    struct f2fs_xattr_entry *entry;
    -void *base_addr;
    +void *base_addr, *last_base_addr;
    int error = 0;
    size_t rest = buffer_size;
@@ -517,6 +544,8 @@
    if (error)
        return error;

+last_base_addr = (void *)base_addr + XATTR_SIZE(xnid, inode);
+
    list_for_each_xattr(entry, base_addr) {
        const struct xattr_handler *handler =
            f2fs_xattr_handler(entry->e_name_index);
-@@ -524,6 +553,16 @@
+size_t prefix_len;
+size_t size;
+
+if ((void *)(entry) + sizeof(__u32) > last_base_addr ||
+    (void *)XATTR_NEXT_ENTRY(entry) > last_base_addr) {
+    f2fs_msg(dentry->d_sb, KERN_ERR,
+        "inode (%lu) has corrupted xattr",
+        inode->i_ino);
+    set_sbi_flag(F2FS_I_SB(inode), SBI_NEED_FSCK);
+    error = -EFSCORRUPTED;
+    goto cleanup;
+}
+
    if (!handler || (handler->list && !handler->list(dentry)))
        continue;

@@ -563,7 +602,8 @@
    struct page *ipage, int flags)
    {
        struct f2fs_xattr_entry *here, *last;
-void *base_addr;
+void *base_addr, *last_base_addr;
+nid_t xnid = F2FS_I(inode)->i_xattr_nid;
        int found, newsize;
        size_t len;
        __u32 new_hsize;
@@ -587,8 +627,14 @@
        if (error)
            return error;
+
+last_base_addr = (void *)base_addr + XATTR_SIZE(xnid, inode);
+/* find entry with wanted name, */
+here = __find_xattr(base_addr, index, len, name);
+if (!here) {
+    error = -EFAULT;
+    goto exit;
found = IS_XATTR_LAST_ENTRY(here) ? 0 : 1;

--- linux-4.15.0.orig/fs/xattr.h
+++ linux-4.15.0/fs/xattr.h
@@ -74,6 +74,8 @@
entry = XATTR_NEXT_ENTRY(entry)
#define VALID_XATTR_BLOCK_SIZE(PAGE_SIZE - sizeoff(struct node_footer))
#define XATTR_PADDING_SIZE(sizeof(__u32))
+#define XATTR_SIZE(x,i) (((x) ? VALID_XATTR_BLOCK_SIZE : 0) +
+(inline_xattr_size(i)))
#define MIN_OFFSET(i) XATTR_ALIGN(inline_xattr_size(i)) +
VALID_XATTR_BLOCK_SIZE)

--- linux-4.15.0.orig/fs/fat/cache.c
+++ linux-4.15.0/fs/fat/cache.c
@@ -225,7 +225,8 @@
int fat_get_cluster(struct inode *inode, int cluster, int *fclus, int *dclus)
{
 struct super_block *sb = inode->i_sb;
-const int limit = sb->s_maxbytes >> MSDOS_SB(sb)->cluster_bits;
+struct msdos_sb_info *sbi = MSDOS_SB(sb);
+const int limit = sb->s_maxbytes >> sbi->cluster_bits;
 struct fat_entry fatent;
 struct fat_cache_id cid;
 int nr;
@@ -234,6 +235,12 @@
*fatcache.c

 paid
plural
}*

/* prevent the infinite loop of cluster chain */
if (*fclus > limit) {
    fat_fs_error_ratelimit(sb,
    +"%s: detected the cluster chain loop (i_pos %lld)",
    __func__, MSDOS_I(inode)->i_pos, *dclus);
    +return -EIO;
    +
}
if (cluster == 0)
    return 0;

/* prevent the infinite loop of cluster chain */
if (*fclus > limit) {
    fat_fs_error_ratelimit(sb,
    +"%s: detected the cluster chain loop (i_pos %lld)",
    __func__, MSDOS_I(inode)->i_pos, *dclus);
    +return -EIO;
    +
}
nr = -EIO;
goto out;
}
@@ -262,9 +268,8 @@
goto out;
else if (nr == FAT_ENT_FREE) {
    fat_fs_error_ratelimit(sb,
    - "%s: invalid cluster chain (i_pos %lld)",
    - __func__,
    - MSDOS_I(inode)->i_pos);
    +"%s: invalid cluster chain (i_pos %lld)",
    +__func__, MSDOS_I(inode)->i_pos);
    nr = -EIO;
goto out;
} else if (nr == FAT_ENT_EOF) {
    --- linux-4.15.0.orig/fs/fat/dir.c
    +++ linux-4.15.0/fs/fat/dir.c
    @@ -1096,8 +1096,11 @@
    err = -ENOMEM;
goto error;
}
*/ Avoid race with userspace read via bdev */
+lock_buffer(bhs[n]);
memset(bhs[n]-b_data, 0, sb->s_blocksize);
set_buffer_uptodate(bhs[n]);
+unlock_buffer(bhs[n]);
mark_buffer_dirty_inode(bhs[n], dir);

++;
@@ -1154,6 +1157,8 @@
fat_time_unix2fat(sbi, ts, &time, &date, &time_cs);

de = (struct msdos_dir_entry *)bhs[0]->b_data;
*/ Avoid race with userspace read via bdev */
+lock_buffer(bhs[0]);
/* filling the new directory slots ("." and ".." entries ) */
memcpy(de[0].name, MSDOS_DOT, MSDOS_NAME);
memcpy(de[1].name, MSDOS_DOTDOT, MSDOS_NAME);
@@ -1176,6 +1181,7 @@
de[0].size = de[1].size = 0;
memset(de + 2, 0, sb->s_blocksize - 2 * sizeof(*de));
set_buffer_uptodate(bhs[0]);
+unlock_buffer(bhs[0]);
mark_buffer_dirty_inode(bhs[0], dir);

err = fat_zeroed_cluster(dir, blknr, 1, bhs, MAX_BUF_PER_PAGE);
@@ -1233,11 +1239,14 @@
/* fill the directory entry */
copy = min(size, sb->s_blocksize);
+/* Avoid race with userspace read via bdev */
+lock_buffer(bhs[n]);
memcpy(bhs[n]->b_data, slots, copy);
-slots += copy;
-size -= copy;
set_buffer_uptodate(bhs[n]);
+unlock_buffer(bhs[n]);
mark_buffer_dirty_inode(bhs[n], dir);
+slots += copy;
+size -= copy;
if (!size)
break;
n++;
--- linux-4.15.0.orig/fs/fat/fat.h
+++ linux-4.15.0/fs/fat/fat.h
@@ -348,6 +348,11 @@
fatent->fat_inode = NULL;
}

+static inline bool fat_valid_entry(struct msdos_sb_info *sbi, int entry)
+{
+  return FAT_START_ENT <= entry && entry < sbi->max_cluster;
+}
+
extern void fat_ent_access_init(struct super_block *sb);
extern int fat_ent_read(struct inode *inode, struct fat_entry *fatent, int entry);
--- linux-4.15.0.orig/fs/fat/fatent.c
+++ linux-4.15.0/fs/fat/fatent.c
@@ -23,7 +23,7 @@
{
struct msdos_sb_info *sbi = MSDOS_SB(sb);
  int bytes = entry + (entry >> 1);
-WARN_ON(entry < FAT_START_ENT || sbi->max_cluster <= entry);
+WARN_ON(!fat_valid_entry(sbi, entry));
  *offset = bytes & (sb->s_blocksize - 1);
  *blocknr = sbi->fat_start + (bytes >> sb->s_blocksize_bits);
}
@@ -33,7 +33,7 @@
{
struct msdos_sb_info *sbi = MSDOS_SB(sb);
  int bytes = entry << sbi->fatent_shift);
-WARN_ON(entry < FAT_START_ENT || sbi->max_cluster <= entry);
+WARN_ON(!fat_valid_entry(sbi, entry));
  *offset = bytes & (sb->s_blocksize - 1);
*blocknr = sbi->fat_start + (bytes >> sb->s_blocksize_bits);
}
@@ -353,7 +353,7 @@
int err, offset;
sector_t blocknr;

@if (entry < FAT_START_ENT || sbi->max_cluster <= entry) {
+if (!fat_valid_entry(sbi, entry)) {
    fatent_brelse(fatent);
    fat_fs_error(sb, "invalid access to FAT (entry 0x%08x)", entry);
    return -EIO;
@@ -389,8 +389,11 @@
err = -ENOMEM;
    goto error;
+    /* Avoid race with userspace read via bdev */
+    lock_buffer(c_bh);
    memcpy(c_bh->b_data, bhs[n]->b_data, sb->s_blocksize);
    set_buffer_uptodate(c_bh);
    +unlock_buffer(c_bh);
    mark_buffer_dirty_inode(c_bh, sbi->fat_inode);
    if (sb->s_flags & SB_SYNCHRONOUS)
        err = sync_dirty_buffer(c_bh);
@@ -681,6 +684,7 @@
if (ops->ent_get(&fatent) == FAT_ENT_FREE)
    free++;
} while (fat_ent_next(sbi, &fatent));
+cond_resched();
}

sbi->free_clusters = free;
sbi->free_clus_valid = 1;
--- linux-4.15.0.orig/fs/fat/file.c
+++ linux-4.15.0/fs/fat/file.c
@@ -160,12 +160,17 @@
int fat_file_fsync(struct file *filp, loff_t start, loff_t end, int datasync)
{
    struct inode *inode = filp->f_mapping->host;
    -int res, err;
    +int err;
    +
    +err = __generic_file_fsync(filp, start, end, datasync);
    +if (err)
    +return err;

    -res = generic_file_fsync(filp, start, end, datasync);
    err = sync_mapping_buffers(MSDOS_SB(inode->i_sb)->fat_inode->i_mapping);
    +if (err)
    +return err;


-return res ? res : err;
+return blkdev_issue_flush(inode->i_sb->s_bdev, GFP_KERNEL, NULL);
}

--- linux-4.15.0.orig/fs/fat/inode.c
+++ linux-4.15.0/fs/fat/inode.c
@@ -696,13 +696,21 @@
brelse_bh;
 }

+static void fat_reset_iocharset(struct fat_mount_options *opts)
+{
+if (opts->iocharset != fat_default_iocharset) {
+/* Note: opts->iocharset can be NULL here */
+kfree(opts->iocharset);
+opts->iocharset = fat_default_iocharset;
+}
+
+static void delayed_free(struct rcu_head *p)
+{
+struct msdos_sb_info *sbi = container_of(p, struct msdos_sb_info, rcu);
-unload_nls(sbi->nls_disk);
-unload_nls(sbi->nls_io);
-if (sbi->options.iocharset != fat_default_iocharset)
-kfree(sbi->options.iocharset);
+fat_reset_iocharset(&sbi->options);
+kfree(sbi);
+}

@@ -728,6 +736,13 @@
return NULL;

init_rwsem(&ei->truncate_lock);
+/* Zeroing to allow iput() even if partial initialized inode. */
+ei->mmu_private = 0;
+ei->i_start = 0;
+ei->i_logstart = 0;
+ei->i_attrs = 0;
+ei->i_pos = 0;
+return &ei->vfs_inode;
}

@@ -1117,7 +1132,7 @@
opts->fs_fmask = opts->fs_dmask = current_umask();

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opts->allow_utime = -1;
opts->codepage = fat_default_codepage;
-opts->iocharset = fat_default_iocharset;
+fat_reset_iocharset(opts);
if (is_vfat) {
  opts->shortname = VFAT_SFN_DISPLAY_WINNT|VFAT_SFN_CREATE_WIN95;
  opts->rodir = 0;
@@ -1274,8 +1289,7 @@
/* vfat specific */
case Opt_charset:
-    if (opts->iocharset != fat_default_iocharset)
-      kfree(opts->iocharset);
+    fat_reset_iocharset(opts);
      iocharset = match_strdup(&args[0]);
      if (!iocharset)
        return -ENOMEM;
@@ -1359,16 +1373,6 @@
      return 0;
    }

-static void fat_dummy_inode_init(struct inode *inode)
-{
-/* Initialize this dummy inode to work as no-op. */
-MSDOS_I(inode)->mmu_private = 0;
-MSDOS_I(inode)->i_start = 0;
-MSDOS_I(inode)->i_logstart = 0;
-MSDOS_I(inode)->i_attrs = 0;
-MSDOS_I(inode)->i_pos = 0;
-}
-
-static int fat_read_root(struct inode *inode)
{
    struct msdos_sb_info *sbi = MSDOS_SB(inode->i_sb);
@@ -1508,6 +1512,12 @@
goto out;
}

+if (bpb->fat_fat_length == 0 && bpb->fat32_length == 0) {
+    if (!silent)
+      fat_msg(sb, KERN_ERR, "bogus number of FAT sectors");
+    goto out;
+}
+
-out:
@@ -1813,13 +1823,11 @@

fat_inode = new_inode(sb);
if (!fat_inode)
goto out_fail;
-fat_dummy_inode_init(fat_inode);
sbi->fat_inode = fat_inode;

fsinfo_inode = new_inode(sb);
if (!fsinfo_inode)
goto out_fail;
-fat_dummy_inode_init(fsinfo_inode);
fsinfo_inode->i_ino = MSDOS_FSINFO_INO;
sbi->fsinfo_inode = fsinfo_inode;
insert_inode_hash(fsinfo_inode);
@@ -1866,8 +1874,7 @@
iput(fat_inode);
unload_nls(sbi->nls_io);
unload_nls(sbi->nls_disk);
-if (sbi->options.iocharset != fat_default_iocharset)
-kfree(sbi->options.iocharset);
+fat_reset_iocharset(&sbi->options);
sb->s_fs_info = NULL;
kfree(sbi);
return error;
--- linux-4.15.0.orig/fs/fcntl.c
+++ linux-4.15.0/fs/fcntl.c
@@ -32,7 +32,7 @@
#define SETFL_MASK (O_APPEND | O_NONBLOCK | O_NDELAY | O_DIRECT | O_NOATIME)

-static int setfl(int fd, struct file * filp, unsigned long arg)
+int setfl(int fd, struct file * filp, unsigned long arg)
{
 struct inode * inode = file_inode(filp);
 int error = 0;
@@ -63,6 +63,8 @@
if (filp->f_op->check_flags)
 error = filp->f_op->check_flags(arg);
+if (!error && filp->f_op->setfl)
+error = filp->f_op->setfl(filp, arg);
if (error)
 return error;
@@ -83,6 +85,7 @@
 out:
 return error;
 }
+EXPORT_SYMBOL_GPL(setfl);
static void f_modown(struct file *filp, struct pid *pid, enum pid_type type,
    int force)
@@ -772,10 +775,11 @@
{
 struct task_struct *p;
 enum pid_type type;
+unsigned long flags;
 struct pid *pid;
 int group = 1;

-read_lock(&fown->lock);
+read_lock_irqsave(&fown->lock, flags);

type = fown->pid_type;
if (type == PIDTYPE_MAX) {
@@ -793,7 +797,7 @@
 } while_each_pid_task(pid, type, p);
 read_unlock(&tasklist_lock);
 out_unlock_fown:
-read_unlock(&fown->lock);
+read_unlock_irqrestore(&fown->lock, flags);
+read_unlock_irqrestore(&fown->lock, flags);
}

static void send_sigurg_to_task(struct task_struct *p,
@@ -808,10 +812,11 @@
 struct task_struct *p;
 enum pid_type type;
 struct pid *pid;
+unsigned long flags;
 int group = 1;
 int ret = 0;

-read_lock(&fown->lock);
+read_lock_irqsave(&fown->lock, flags);

type = fown->pid_type;
if (type == PIDTYPE_MAX) {
@@ -831,7 +836,7 @@
 } while_each_pid_task(pid, type, p);
 read_unlock(&tasklist_lock);
 out_unlock_fown:
-read_unlock(&fown->lock);
+read_unlock_irqrestore(&fown->lock, flags);
+read_unlock_irqrestore(&fown->lock, flags);
 return ret;
}

--- linux-4.15.0.orig/fs/file.c
static void copy_fdtable(struct fdtable *nfdt, struct fdtable *ofdt)
{
    unsigned int cpy, set;
    BUG_ON(nfdt->max_fds < ofdt->max_fds);

    .full_fds_bits= init_files.full_fds_bits_init,
    .file_lock= __SPIN_LOCK_UNLOCKED(init_files.file_lock),
    .resize_wait= __WAIT_QUEUE_HEAD_INITIALIZER(init_files.resize_wait),
};

static unsigned int find_next_fd(struct fdtable *fdt, unsigned int start)

/**
 * alloc_file - allocate and initialize a 'struct file'
 * @ @ -258.6 +259.7 @@
 { 
    delayed_fput(NULL);
 } 
+EXPORT_SYMBOL_GPL(flush_delayed_fput);

static DECLARE_DELAYED_WORK(delayed_fput_work, delayed_fput);

EXPORT_SYMBOL_GPL(fput);
+EXPORT_SYMBOL_GPL(__fput_sync);

void put_filp(struct file *file)
{
    @ @ -308.6 +311.7 @@
    file_free(file);
}
+EXPORT_SYMBOL_GPL(put_filp);

void __init files_init(void)
{
    --- linux-4.15.0.orig/fs/filesystems.c
    +++ linux-4.15.0/fs/filesystems.c
    @@ -279,7 +279,9 @@
    fs = __get_fs_type(name, len);
    if (!fs & (request_module("fs-%.*s", len, name) == 0)) {
        fs = __get_fs_type(name, len);
-       WARN_ONCE(!fs, "request_module fs-%.*s succeeded, but still no fs?n", len, name);
+       if (!fs)
+          pr_warn_once("request_module fs-%.*s succeeded, but still no fs?n",
+                   len, name);
    }

    if (dot && fs & (!(fs->fs_flags & FS_HAS_SUBTYPE))) {
        --- linux-4.15.0.orig/fs/fs-writeback.c
        +++ linux-4.15.0/fs/fs-writeback.c
        @@ -45,7 +45,6 @@
        struct wb_writeback_work {
            long nr_pages;
            struct super_block *sb;
-           unsigned long *older_than_this;
            enum writeback_sync_modes sync_mode;
            unsigned int tagged_writepages:1;
            unsigned int for_kupdate:1;
            @@ -160,7 +159,9 @@
             struct bdi_writeback *wb)
         {
             assert_spin_locked(&wb->list_lock);
             +assert_spin_locked(&inode->i_lock);

             +inode->i_state &= ~I_SYNC_QUEUED;
             list_del_init(&inode->i_io_list);
             wb_io_lists_depopulated(wb);
         }
        @@ -269,6 +270,7 @@
        if (unlikely(cmpxchg(&inode->i_wb, NULL, wb)))
            wb_put(wb);
    }

+EXPORT_SYMBOL_GPL(__inode_attach_wb);

    /**
     * locked_inode_to_wb_and_lock_list - determine a locked inode's wb and lock it
     * @ @ -331,11 +333,22 @@
     * struct work_struct work;
     */
}
+static void bdi_down_write_wb_switch_rwlock(struct backing_dev_info *bdi)
{+	down_write(&bdi->wb_switch_rwlock);
}+
+
+static void bdi_up_write_wb_switch_rwlock(struct backing_dev_info *bdi)
{+	up_write(&bdi->wb_switch_rwlock);
}+
+
+static void inode_switch_wbs_work_fn(struct work_struct *work)
{+
struct inode_switch_wbs_context *isw =
container_of(work, struct inode_switch_wbs_context, work);
struct inode *inode = isw->inode;
+struct backing_dev_info *bdi = inode_to_bdi(inode);
struct address_space *mapping = inode->i_mapping;
struct bdi_writeback *old_wb = inode->i_wb;
struct bdi_writeback *new_wb = isw->new_wb;
          @@ -344,6 +357,12 @@
void **slot;

/*
 + * If @inode switches cgwb membership while sync_inodes_sb() is
 + * being issued, sync_inodes_sb() might miss it. Synchronize.
 + */
+down_read(&bdi->wb_switch_rwlock);
+
+/*
 * By the time control reaches here, RCU grace period has passed
 * since I_WB_SWITCH assertion and all wb stat update transactions
 * between unlocked_inode_to_wb_begin/end() are guaranteed to be
@@ -435,6 +454,8 @@
spin_unlock(&new_wb->list_lock);
spin_unlock(&old_wb->list_lock);

+up_read(&bdi->wb_switch_rwlock);
+
if (switched) {
    wb_wakeup(new_wb);
    wb_put(old_wb);
@@ -475,16 +496,30 @@
if (inode->i_state & I_WB_SWITCH)
    return;

+/*
 * Avoid starting new switches while sync_inodes_sb() is in

+ * progress. Otherwise, if the down_write protected issue path
+ * blocks heavily, we might end up starting a large number of
+ * switches which will block on the rwsem.
+ */
+if (!down_read_trylock(&bdi->wb_switch_rwsem))
+return;
+
+ isw = kzalloc(sizeof(*isw), GFP_ATOMIC);
+ if (!isw)
+ -return;
+ goto out_unlock;

/* find and pin the new wb */
rcu_read_lock();
memcg_css = css_from_id(new_wb_id, &memory_cgrp_subsys);
 if (memcg_css)
 -isw->new_wb = wb_get_create(bdi, memcg_css, GFP_ATOMIC);
 +if (memcg_css && !css_tryget(memcg_css))
 +memcg_css = NULL;
 rcu_read_unlock();
+ if (!memcg_css)
 +goto out_free;
+
 +isw->new_wb = wb_get_create(bdi, memcg_css, GFP_ATOMIC);
 +css_put(memcg_css);
 if (!isw->new_wb)
 goto out_free;

@@ -502,8 +537,6 @@
 isw->inode = inode;

 -atomic_inc(&isw_nr_in_flight);
 -
 /*
 * In addition to synchronizing among switchers, I_WB_SWITCH tells
 * the RCU protected stat update paths to grab the mapping's
 @@ -511,12 +544,17 @@
 * Let's continue after I_WB_SWITCH is guaranteed to be visible.
 */
call_rcu(&isw->rcu_head, inode_switch_wbs_rcu_fn);
-return;
+
 +atomic_inc(&isw_nr_in_flight);
 +
 +goto out_unlock;

out_free:
if (isw->new_wb)
wb_put(isw->new_wb);
kfree(isw);
+out_unlock:
+up_read(&bdi->wb_switch_rwlock);
}

/**
@@ -551,10 +589,13 @@
spin_unlock(&inode->i_lock);
/*
- * A dying wb indicates that the memcg-blkcg mapping has changed
- * and a new wb is already serving the memcg. Switch immediately.
+ * A dying wb indicates that either the blkcg associated with the
+ * memcg changed or the associated memcg is dying. In the first
+ * case, a replacement wb should already be available and we should
+ * refresh the wb immediately. In the second case, trying to
+ * refresh will keep failing.
 */
-if (unlikely(wb_dying(wbc->wb)))
+if (unlikely(wb_dying(wbc->wb) && !css_is_dying(wbc->wb->memcg_css)))
inode_switch_wbs(inode, wbc->wb_id);
}

@@ -690,6 +731,7 @@
void wbc_account_io(struct writeback_control *wbc, struct page *page,
    size_t bytes)
{
  struct cgroup_subsys_state *css;
-int id;
+
/*
@@ -701,7 +743,12 @@
if (!wbc->wb)
    return;

-id = mem_cgroup_css_from_page(page)->id;
+css = mem_cgroup_css_from_page(page);
+/* dead cgrouops shouldn't contribute to inode ownership arbitration */
+if (!(css->flags & CSS_ONLINE))
+  return;
+
+id = css->id;

if (id == wbc->wb_id) {
  wbc->wb_bytes += bytes;
@@ -745,11 +792,12 @@
/*
if (inode && inode_to_wb_is_valid(inode)) {
struct bdi_writeback *wb;
-bool locked, congested;
+struct wb_lock_cookie lock_cookie = {}; 
+bool congested;

-wb = unlocked_inode_to_wb_begin(inode, &locked);
+wb = unlocked_inode_to_wb_begin(inode, &lock_cookie);
congested = wb_congested(wb, cong_bits);
-unlocked_inode_to_wb_end(inode, locked);
+unlocked_inode_to_wb_end(inode, &lock_cookie);
return congested;
}

@@ -877,7 +925,11 @@
void cgroup_writeback_umount(void)
{
if (atomic_read(&isw_nr_in_flight)) {
-  synchronize_rcu();
+/*
+  * Use rcu_barrier() to wait for all pending callbacks to
+  * ensure that all in-flight wb switches are in the workqueue.
+  */
+  rcu_barrier();
  flush_workqueue(isw_wq);
 }
}
@@ -893,6 +945,9 @@

#else /* CONFIG_CGROUP_WRITEBACK */

+static void bdi_down_write_wb_switch_rwsem(struct backing_dev_info *bdi) {
+static void bdi_up_write_wb_switch_rwsem(struct backing_dev_info *bdi) {
+
static struct bdi_writeback *
locked_inode_to_wb_and_lock_list(struct inode *inode)
__releases(&inode->i_lock)
@@ -993,7 +1048,9 @@
struct bdi_writeback *wb;

wb = inode_to_wb_and_lock_list(inode);
+spin_lock(&inode->i_lock);
inode_io_list_del_locked(inode, wb);
+spin_unlock(&inode->i_lock);
spin_unlock(&wb->list_lock);
}
static void redirty_tail(struct inode *inode, struct bdi_writeback *wb)
+static void redirty_tail_locked(struct inode *inode, struct bdi_writeback *wb)
{
+assert_spin_locked(&inode->i_lock);
+
if (!list_empty(&wb->b_dirty)) {
    struct inode *tail;

    inode->dirtied_when = jiffies;
}
inode_io_list_move_locked(inode, wb, &wb->b_dirty);
+inode->i_state &= ~I_SYNC_QUEUED;
+
+static void redirty_tail(struct inode *inode, struct bdi_writeback *wb)
+{
+spin_lock(&inode->i_lock);
+redirty_tail_locked(inode, wb);
+spin_unlock(&inode->i_lock);
}

/*
#define EXPIRE_DIRTY_ATIME 0x0001
*/

/*
- * Move expired (dirtied before work->older_than_this) dirty inodes from
+ * Move expired (dirtied before dirtied_before) dirty inodes from
* @delaying_queue to @dispatch_queue.
*/
static int move_expired_inodes(struct list_head *delaying_queue,
    struct list_head *dispatch_queue,
    int flags,
    struct wb_writeback_work *work)
+    unsigned long dirtied_before)
{
    unsigned long *older_than_this = NULL;
    unsigned long expire_time;
    LIST_HEAD(tmp);
    struct list_head *pos, *node;
    struct super_block *sb = NULL;
    @ @ -1107,21 +1171,15 @ @
    int do_sb_sort = 0;
int moved = 0;

-if ((flags & EXPIRE_DIRTY_ATIME) == 0)
-older_than_this = work->older_than_this;
-else if (!work->for_sync) {
-expire_time = jiffies - (dirtytime_expire_interval * HZ);
-older_than_this = &expire_time;
-}
while (!list_empty(delaying_queue)) {
inode = wb_inode(delaying_queue->prev);
-if (older_than_this &&
 - inode_dirtied_after(inode, *older_than_this))
+if (inode_dirtied_after(inode, dirtied_before))
break;
list_move(&inode->i_io_list, &tmp);
moved++;
-if (flags & EXPIRE_DIRTY_ATIME)
-set_bit(__I_DIRTY_TIME_EXPIRED, &inode->i_state);
+spin_lock(&inode->i_lock);
+inode->i_state |= I_SYNC_QUEUED;
+spin_unlock(&inode->i_lock);
if (sb_is_blkdev_sb(inode->i_sb))
continue;
if (sb && sb != inode->i_sb)
@@ -1159,18 +1217,22 @@
*                                           |
*                                           +--> dequeue for IO
 *                                           |
-static void queue_io(struct bdi_writeback *wb, struct wb_writeback_work *work)
+static void queue_io(struct bdi_writeback *wb, struct wb_writeback_work *work, 
 + unsigned long dirtied_before)
 |
int moved;
+unsigned long time_expire_jif = dirtied_before;

assert_spin_locked(&wb->list_lock);
list_splice_init(&wb->b_more_io, &wb->b_io);
-moved = move_expired_inodes(&wb->b_dirty, &wb->b_io, 0, work);
+moved = move_expired_inodes(&wb->b_dirty, &wb->b_io, dirtied_before);
+if (!work->for_sync)
+time_expire_jif = jiffies - dirtytime_expire_interval * HZ;
moved += move_expired_inodes(&wb->b_dirty_time, &wb->b_io, 
 - EXPIRE_DIRTY_ATIME, work);
+ time_expire_jif);
if (moved)
wb_io_lists_populated(wb);
-trace_writeback_queue_io(wb, work, moved);
+trace_writeback_queue_io(wb, work, dirtied_before, moved);
static int write_inode(struct inode *inode, struct writeback_control *wbc)
@@ -1264,7 +1326,7 @@
 * writeback is not making progress due to locked
 * buffers. Skip this inode for now.
 */
-redirty_tail(inode, wb);
+redirty_tail_locked(inode, wb);
 return;
 }

@@ -1284,7 +1346,7 @@
 * retrying writeback of the dirty page/inode
 * that cannot be performed immediately.
 */
-redirty_tail(inode, wb);
+redirty_tail_locked(inode, wb);
 }
 } else if (inode->i_state & I_DIRTY) {
 /*
 @@ -1292,10 +1354,11 @@
 * such as delayed allocation during submission or metadata
 * updates after data IO completion.
 */
-redirty_tail(inode, wb);
+redirty_tail_locked(inode, wb);
 } else if (inode->i_state & I_DIRTY_TIME) {
 inode->dirtied_when = jiffies;
 inode_io_list_move_locked(inode, wb, &wb->b_dirty_time);
+inode->i_state &= ~I_SYNC_QUEUED;
 } else {
 /* The inode is clean. Remove from writeback lists. */
 inode_io_list_del_locked(inode, wb);
@@ -1335,25 +1398,25 @@
 }

+ /* If the inode has dirty timestamps and we need to write them, call
+ * mark_inode_dirty_sync() to notify the filesystem about it and to
+ * change I_DIRTY_TIME into I_DIRTY_SYNC.
+ */
+if ((inode->i_state & I_DIRTY_TIME) &&
+ (wbc->sync_mode == WB_SYNC_ALL || wbc->for_sync ||
+ time_after(jiffies, inode->dirtied_time_when +
+ dirtytime_expire_interval * HZ))) {
+ trace_writeback_lazytime(inode);
+ mark_inode_dirty_sync(inode);
+}
/* Some filesystems may redirty the inode during the writeback
* due to delalloc, clear dirty metadata flags right before
* write_inode()
*/
spin_lock(&inode->i_lock);
-
dirty = inode->i_state & I_DIRTY;
-if (inode->i_state & I_DIRTY_TIME) {
  -if (dirty & (I_DIRTY_SYNC | I_DIRTY_DATASYNC)) ||
    -unlikely(inode->i_state & I_DIRTY_TIME_EXPIRED)) ||
    -unlikely(time_after(jiffies,
      -(inode->in_dirtied_time_when +
      -dirtytime_expire_interval * HZ)))) { 
    -dirty |= I_DIRTY_TIME | I_DIRTY_TIME_EXPIRED;
    -trace_writeback_lazytime(inode);
    -
  } else
  -inode->i_state &= ~I_DIRTY_TIME_EXPIRED;
inode->i_state &= ~dirty;
/*
@@ -1374,8 +1437,6 @@
spin_unlock(&inode->i_lock);

-if (dirty & I_DIRTY_TIME)
  -mark_inode_dirty_sync(inode);
/* Don't write the inode if only I_DIRTY_PAGES was set */
if (dirty & ~I_DIRTY_PAGES) {
  int err = write_inode(inode, wbc);
  @@ -1539,8 +1600,8 @@
*/
spin_lock(&inode->i_lock);
if (inode->i_state & (I_NEW | I_FREEING | I_WILL_FREE)) {
  +redirty_tail_locked(inode, wb);
  spin_unlock(&inode->i_lock);
  -redirty_tail(inode, wb);
  continue;
}
if ((inode->i_state & I_SYNC) & wbc.sync_mode != WB_SYNC_ALL) {
  @@ -1681,7 +1742,7 @@
  blk_start_plug(&plug);
  spin_lock(&wb->list_lock);
  if (list_empty(&wb->b_io))
}
- queue_io(wb, &work);
+ queue_io(wb, &work, jiffies);
__writeback_inodes_wb(wb, &work);
spin_unlock(&wb->list_lock);
blk_finish_plug(&plug);
@@ -1701,7 +1762,7 @@
    * takes longer than a dirty_writeback_interval interval, then leave a
    * one-second gap.
    *
-    * older_than_this takes precedence over nr_to_write. So we'll only write back
+    * dirtied_before takes precedence over nr_to_write. So we'll only write back
* all dirty pages if they are all attached to "old" mappings.
*/
static long wb_writeback(struct bdi_writeback *wb,
@@ -1709,14 +1770,11 @@
{
    unsigned long wb_start = jiffies;
    long nr_pages = work->nr_pages;
-    unsigned long oldest_jif;
+    unsigned long dirtied_before = jiffies;
    struct inode *inode;
    long progress;
    struct blk_plug plug;

-    oldest_jif = jiffies;
-    work->older_than_this = &oldest_jif;
-    blk_start_plug(&plug);
-    spin_lock(&wb->list_lock);
    for (;;) {
@@ -1750,14 +1808,14 @@
            * safe.
        */
        if (work->for_kupdate) {
            oldest_jif = jiffies -
+            dirtied_before = jiffies -
            msecs_to_jiffies(dirty_expire_interval * 10);
        } else if (work->for_background)
            oldest_jif = jiffies;
+        dirtied_before = jiffies;

        trace_writeback_start(wb, work);
        if (list_empty(&wb->b_io))
            - queue_io(wb, work);
+        queue_io(wb, work, dirtied_before);
        if (work->sb)
            progress = writeback_sb_inodes(work->sb, wb, work);
        else
struct bdi_writeback, dwork);
long pages_written;

-set_worker_desc("flush-%s", dev_name(wb->bdi->dev));
+set_worker_desc("flush-%s", bdi_dev_name(wb->bdi));
current->flags |= PF_SWAPWRITE;

if (likely(!current_is_workqueue_rescuer()))
@@ -1960,7 +2018,7 @@
} else if (wb_has_dirty_io(wb) && dirty_writeback_interval)
wb_wakeup_delayed(wb);

@@ -2062,28 +2120,6 @@
return ret;
}

-static noinline void block_dump___mark_inode_dirty(struct inode *inode)
-{
-    if (inode->i_ino || strcmp(inode->i_sb->s_id, "bdev")) {
-        struct dentry *dentry;
-        const char *name = ";?";
-        dentry = d_find_alias(inode);
-        if (dentry) {
-            spin_lock(&dentry->d_lock);
-            name = (const char *)dentry->d_name.name;
-        }
-        printk(KERN_DEBUG
-            "%s(%d): dirtied inode %lu (%s) on %s\n",
-            current->comm, task_pid_nr(current), inode->i_ino,
-            name, inode->i_sb->s_id);
-        if (dentry) {
-            spin_unlock(&dentry->d_lock);
-            dput(dentry);
-        }
-    }
-}

/**
 * __mark_inode_dirty - internal function
 */
@@ -2112,7 +2148,6 @@

void __mark_inode_dirty(struct inode *inode, int flags)
{
#define I_DIRTY_INODE (I_DIRTY_SYNC | I_DIRTY_DATASYNC)
struct super_block *sb = inode->i_sb;
int dirtytime;

/*
 * Don't do this for I_DIRTY_PAGES - that doesn't actually
 * dirty the inode itself
 */
@if (flags & (I_DIRTY_SYNC | I_DIRTY_DATASYNC | I_DIRTY_TIME))
+if (flags & (I_DIRTY_INODE | I_DIRTY_TIME))
trace_writeback_dirty_inode_start(inode, flags);

if (sb->s_op->dirty_inode)
@ @ -2144,9 +2179,6 @@
     (dirtytime && (inode->i_state & I_DIRTY_INODE)))
return;

-if (unlikely(block_dump))
-block_dump___mark_inode_dirty(inode);
-
 spin_lock(&inode->i_lock);
if (dirtytime && (inode->i_state & I_DIRTY_INODE))
goto out_unlock_inode;
@ @ -2160,11 +2192,12 @@
inode->i_state |= flags;

/*
 * If the inode is being synced, just update its dirty state.
 * The un locker will place the inode on the appropriate
 * superblock list, based upon its state.
 * If the inode is queued for writeback by flush worker, just
 * update its dirty state. Once the flush worker is done with
 * the inode it will place it on the appropriate superblock
 * list, based upon its state.
 */
-if (inode->i_state & I_SYNC)
+if (inode->i_state & I_SYNC_QUEUED)
goto out_unlock_inode;

/*
@@ -2197,7 +2230,7 @@
 if (dirtytime)
inode->dirtied_time_when = jiffies;

-if (inode->i_state & (I_DIRTY_INODE | I_DIRTY_PAGES))
+if (inode->i_state & I_DIRTY)
dirty_list = &wb->b_dirty;
else
dirty_list = &wb->b_dirty_time;
@@ -2221,8 +2254,6 @@
}
out_unlock_inode:
spin_unlock(&inode->i_lock);
-
-#undef I_DIRTY_INODE
}
EXPORT_SYMBOL(__mark_inode_dirty);
@@ -2422,8 +2453,11 @@
return;
WARN_ON(!rwsem_is_locked(&sb->s_umount));

+/* protect against inode wb switch, see inode_switch_wbs_work_fn() */
+bdi_down_write_wb_switch_rwsem(bdi);
bdi_split_work_to_wbs(bdi, &work, false);
w_b_wait_for_completion(bdi, &done);
+bdi_up_write_wb_switch_rwsem(bdi);

wait_sb_inodes(sb);
}
ASSERTCMP(object->cookie, ==, cookie);
fscache_stat(&fscache_n_object_alloc);

object->debug_id = atomic_inc_return(&fscache_object_debug_id);
#elif -357.6 +358,8 @@

_enter("[%s],{OBJ%x}", cookie->def->name, object->debug_id);

ASSERTCMP(object->cookie, ==, cookie);
+
spin_lock(&cookie->lock);

/* there may be multiple initial creations of this object, but we only
@ @ -396,9 +399,7 @@
spin_unlock(&cache->object_list_lock);
}

/* attach to the cookie */
-object->cookie = cookie;
-atomic_inc(&cookie->usage);
+/* Attach to the cookie. The object already has a ref on it. */
+hlist_add_head(&object->cookie_link, &cookie->backing_objects);

fscache_objlist_add(object);
--- linux-4.15.0.orig/fs/fscache/object.c
+++ linux-4.15.0/fs/fscache/object.c
@@ -318,6 +318,7 @@
object->store_limit_l = 0;
object->cache = cache;
object->cookie = cookie;
+atomic_inc(&cookie->usage);
object->parent = NULL;
#endif CONFIG_FSCACHE_OBJECT_LIST
RB_CLEAR_NODE(&object->objlist_link);
@@ -715,6 +716,9 @@
if (awaken)
wake_up_bit(&cookie->flags, FSCACHE_COOKIE_INVALIDATING);
+if (test_and_clear_bit(FSCACHE_COOKIE_LOOKING_UP, &cookie->flags))
+wake_up_bit(&cookie->flags, FSCACHE_COOKIE_LOOKING_UP);
+
/* Prevent a race with our last child, which has to signal EV_CLEARED
 * before dropping our spinlock.
--- linux-4.15.0.orig/fs/fscache/operation.c
+++ linux-4.15.0/fs/fscache/operation.c
@@ -66,7 +66,8 @@
ASSERT(op->processor != NULL);
ASSERT(fscache_object_is_available(op->object));
ASSERTCMP(atomic_read(&op->usage), >, 0);
-ASSERTCMP(op->state, ==, FSCACHE_OP_ST_IN_PROGRESS);
+ASSERTIFCMP(op->state != FSCACHE_OP_ST_IN_PROGRESS,
+    op->state, ==, FSCACHE_OP_ST_CANCELLED);

fscache_stat(&fscache_n_op_enqueue);
switch (op->flags & FSCACHE_OP_TYPE) {
    @@ -481,7 +482,8 @@
    struct fscache_cache *cache;
    _enter("[OBJ%x OP%x,%d]",
        -    op->object->debug_id, op->debug_id, atomic_read(&op->usage));
    +    op->object ? op->object->debug_id : 0,
    +    op->debug_id, atomic_read(&op->usage));

    ASSERTCMP(atomic_read(&op->usage), >, 0);

--- linux-4.15.0.orig/fs/fscache/page.c
+++ linux-4.15.0/fs/fscache/page.c
@@ -776,6 +776,7 @@
    _enter("[OP%x,%d]", op->op.debug_id, atomic_read(&op->op.usage));

    +again:
    spin_lock(&object->lock);
    cookie = object->cookie;

    @@ -816,10 +817,6 @@
    goto superseded;
    page = results[0];
    _debug("gang %d [%lx]", n, page->index);
    -if (page->index >= op->store_limit) {
    -    fscache_stat(&fscache_n_store_pages_over_limit);
    -    goto superseded;
    -}

    radix_tree_tag_set(&cookie->stores, page->index,
        FSCACHE_COOKIE_STORING_TAG);
    @@ -829,6 +826,9 @@
    spin_unlock(&cookie->stores_lock);
    spin_unlock(&object->lock);

    +if (page->index >= op->store_limit)
    +    goto discard_page;
    +    fscache_stat(&fscache_n_store_pages);
fscache_stat(&fscache_n_cop_write_page);
ret = object->cache->ops->write_page(op, page);
@@ -844,6 +844,11 @@
     _leave("");
     return;

+discard_page:
+fscache_stat(&fscache_n_store_pages_over_limit);
+fscache_end_page_write(object, page);
+goto again;
+
+superseded:
/* this writer is going away and there aren't any more things to
 * write */
--- linux-4.15.0.orig/fs/fuse/acl.c
+++ linux-4.15.0/fs/fuse/acl.c
@@ -19,6 +19,9 @@
     void *value = NULL;
     struct posix_acl *acl;

+if (fuse_is_bad(inode))
+return ERR_PTR(-EIO);
+
+if (!fc->posix_acl || fc->no_getxattr)
return NULL;

@@ -53,6 +56,9 @@
     int ret;
     
+if (fuse_is_bad(inode))
+return -EIO;
+
+if (!(fc->posix_acl || fc->no_setxattr)
return -EOPNOTSUPP;

--- linux-4.15.0.orig/fs/fuse/control.c
+++ linux-4.15.0/fs/fuse/control.c
@@ -107,7 +107,7 @@
     if (!fc)
     return 0;
     
-val = fc->max_background;
+val = READ_ONCE(fc->max_background);
     fuse_conn_put(fc);

     return fuse_conn_limit_read(file, buf, len, ppos, val);
@@ -144,7 +144,7 @@
if (!fc)
return 0;

-val = fc->congestion_threshold;
+val = READ_ONCE(fc->congestion_threshold);
fuse_conn_put(fc);

return fuse_conn_limit_read(file, buf, len, ppos, val);
@@ -211,10 +211,11 @@
if (!dentry)
return NULL;

-fc->ctl_dentry[fc->ctl_ndents++] = dentry;
inode = new_inode(fuse_control_sb);
-!inode)
+!inode) {
+dput(dentry);
return NULL;
+
inode->i_ino = get_next_ino();
inode->i_mode = mode;
@@ -228,6 +229,9 @@
set_nlink(inode, nlink);
inode->i_private = fc;
d_add(dentry, inode);
+
+fc->ctl_dentry[fc->ctl_ndents++] = dentry;
+
return dentry;

@@ -284,7 +288,10 @@
for (i = fc->ctl_ndents - 1; i >= 0; i--) {
struct dentry *dentry = fc->ctl_dentry[i];
d_inode(dentry)->i_private = NULL;
-d_drop(dentry);
+!i) {
+/* Get rid of submounts: */
+d_invalidate(dentry);
+
} 
dput(dentry);
}
drop_nlink(d_inode(fuse_control_sb->s_root));
--- linux-4.15.0.orig/fs/fuse/cuse.c
+++ linux-4.15.0/fs/fuse/cuse.c
@@ -48,6 +48,7 @@
#include <linux/stat.h>
```c
#include <linux/module.h>
#include <linux/uio.h>
+#include <linux/user_namespace.h>

#include "fuse_i.h"

@@ -498,7 +499,7 @@
    if (!cc)
        return -ENOMEM;

-fuse_conn_init(&cc->fc);
+fuse_conn_init(&cc->fc, current_user_ns());

    fud = fuse_dev_alloc(&cc->fc);
    if (!fud) {
        @@ -513,6 +514,7 @@
            fuse_send_init(cc);
            if (rc) {
                fuse_dev_free(fud);
+            fuse_conn_put(&cc->fc);
                return rc;
            }
        file->private_data = fud;
            @@ -615,6 +617,8 @@
            cuse_channel_fops.owner		= THIS_MODULE;
            cuse_channel_fops.open		= cuse_channel_open;
            cuse_channel_fops.release	= cuse_channel_release;
+        /* CUSE is not prepared for FUSE_DEV_IOC_CLONE */
+        cuse_channel_fops.unlocked_ioctl	= NULL;

            cuse_class = class_create(THIS_MODULE, "cuse");
            if (IS_ERR(cuse_class))
                --- linux-4.15.0.orig/fs/fuse/dev.c
                +++ linux-4.15.0/fs/fuse/dev.c
                @@ -114,8 +114,8 @@
                    static void fuse_req_init_context(struct fuse_conn *fc, struct fuse_req *req)
                    {
                        -req->in.h.uid = from_kuid_munged(&init_user_ns, current_fsuid());
                        -req->in.h.gid = from_kgid_munged(&init_user_ns, current_fsgid());
                        +req->in.h.uid = from_kuid(fc->user_ns, current_fsuid());
                        +req->in.h.gid = from_kgid(fc->user_ns, current_fsgid());
                        req->in.h.pid = pid_nr_ns(task_pid(current), fc->pid_ns);
                    }
            @@ -131,6 +131,20 @@
                return !fc->initialized || (for_background && fc->blocked);
                }
```
+static void fuse_drop_waiting(struct fuse_conn *fc)
+
+/**
+ * lockess check of fc->connected is okay, because atomic_dec_and_test()
+ * provides a memory barrier matched with the one in fuse_wait_aborted()
+ * to ensure no wake-up is missed.
+ */
+if (atomic_dec_and_test(&fc->num_waiting) &&
+    !READ_ONCE(fc->connected)) {
+/* wake up aborters */
wake_up_all(&fc->blocked_waitq);
+}

static struct fuse_req *__fuse_get_req(struct fuse_conn *fc, unsigned npages,
   bool for_background)
{
   __set_bit(FR_WAITING, &req->flags);
if (for_background)
   __set_bit(FR_BACKGROUND, &req->flags);
   +if (req->in.h.uid == (uid_t)-1 || req->in.h.gid == (gid_t)-1) {
      fuse_put_request(fc, req);
      return ERR_PTR(-EOVERFLOW);
   }
return req;

out:
atomic_dec(&fc->num_waiting);
fuse_drop_waiting(fc);
return ERR_PTR(err);
}

if (test_bit(FR_WAITING, &req->flags)) {
   __clear_bit(FR_WAITING, &req->flags);
   atomic_dec(&fc->num_waiting);
   fuse_drop_waiting(fc);
}

if (req->stolen_file)
   struct fuse_iqueue *fiq = &fc->iq;

if (test_and_set_bit(FR_FINISHED, &req->flags))

spin_lock(&fiq->waitq.lock);
list_del_init(&req->intr_entry);
@@ -374,15 +392,21 @@
if (test_bit(FR_BACKGROUND, &req->flags)) {
spin_lock(&fc->lock);
clear_bit(FR_BACKGROUND, &req->flags);
-if (fc->num_background == fc->max_background)
+if (fc->num_background == fc->max_background) {
 fc->blocked = 0;
-
-/* Wake up next waiter, if any */
-if (!fc->blocked &
-waitqueue_active(&fc->blocked_waitq))
wake_up(&fc->blocked_waitq);
+} else if (!fc->blocked) {
+/*
+ * Wake up next waiter, if any. It's okay to use
+ * waitqueue_active(), as we've already synced up
+ * fc->blocked with waiters with the wake_up() call
+ * above.
+ */
+if (waitqueue_active(&fc->blocked_waitq))
wake_up(&fc->blocked_waitq);
+
-} else if (fc->num_background == fc->congestion_threshold &&
- fc->connected && fc->sb) {
+if (fc->num_background == fc->congestion_threshold &&
 clear_bdi_congested(fc->sb->s_bdi, BLK_RW_SYNC);
clear_bdi_congested(fc->sb->s_bdi, BLK_RW_ASYNC);
}
@@ -803,14 +828,14 @@
wake_up(&req->waitq);
if (req->end)
req->end(fc, req);
+put_request:
fuse_put_request(fc, req);
}
@@ -803,14 +828,14 @@
{
if (page_mapcount(page) ||
 page->mapping != NULL ||
- page_count(page) != 1 ||
 (page->flags & PAGE_FLAGS_CHECK_AT_PREP &
-(1 << PG_locked |
1 << PG_referenced |
1 << PG_uptodate |
1 << PG_lru |
1 << PG_active |
- 1 << PG_reclaim)) }} {  
+ 1 << PG_reclaim |  
+ 1 << PG_waiters))})  
printk(KERN_WARNING "fuse: trying to steal weird page\n");
printk(KERN_WARNING " page=%p index=%li flags=%08lx, count=%i, mapcount=%i, mapping=%p\n", page,  
page->index, page->flags, page_count(page), page_mapcount(page), page->mapping);  
return 1;  
@@ -825,15 +850,16 @@  
struct page *newpage;  
struct pipe_buffer *buf = cs->pipebufs;  

+get_page(oldpage);  
err = unlock_request(cs->req);  
if (err)  
-return err;  
+goto out_put_old;  

fuse_copy_finish(cs);  

err = pipe_buf_confirm(cs->pipe, buf);  
if (err)  
-return err;  
+goto out_put_old;  
BUG_ON(!cs->nr_segs);  

err = replace_page_cache_page(oldpage, newpage, GFP_KERNEL);  
if (err) {  
unlock_page(newpage);  
-return err;  
+goto out_put_old;  
}  

get_page(newpage);  
@@ -892,14 +918,19 @@  
if (err) {  
unlock_page(newpage);  
put_page(newpage);  
-return err;  
+goto out_put_old;  
}  

unlock_page(oldpage);
+/* Drop ref for ap->pages[] array */
+put_page(oldpage);
+cs->len = 0;
-
+-return 0;
+-err = 0;
+-out_put_old:
+/* Drop ref obtained in this function */
+put_page(oldpage);
+return err;
+
+out_fallback_unlock:
+unlock_page(newpage);
@@ -908,10 +939,10 @@
cs->offset = buf->offset;

err = lock_request(cs->req);
-if (err)
-return err;
+if (!err)
+err = 1;
-
-return 1;
+goto out_put_old;
 } 

static int fuse_ref_page(struct fuse_copy_state *cs, struct page *page,
@@ -923,14 +954,16 @@
if (cs->nr_segs == cs->pipe->buffers)
 return -EIO;

+get_page(page);
err = unlock_request(cs->req);
-if (err)
+if (err) {
+put_page(page);
return err;
+
}

fuse_copy_finish(cs);

buf = cs->pipebufs;
-get_page(page);
buf->page = page;
buf->offset = offset;
buf->len = count;
@@ -1222,6 +1255,9 @@
struct fuse_in *in;

unsigned reqsize;

+if (current_user_ns() != fc->user_ns)
+return -EIO;
+
+restart:
sp鸡汤(&fiq->waitq.lock);
er = -EAGAIN;
@@ -1276,6 +1312,15 @@
goto restart;
}
spin_lock(&fpq->lock);
+/*
+ * Must not put request on fpq->io queue after having been shut down by
+ * fuse_abort_conn()
+ */
+if (!fpq->connected) {
+req->out.h.error = err = -ECONNABORTED;
+goto out_end;
+
+
+}
list_add(&req->list, &fpq->io);
spin_unlock(&fpq->lock);
cs->req = req;
@@ -1299,12 +1344,14 @@
goto out_end;
}
list_move_tail(&req->list, &fpq->processing);
-spin_unlock(&fpq->lock);
+__fuse_get_request(req);
set_bit(FR_SENT, &req->flags);
+spin_unlock(&fpq->lock);
 /* matches barrier in request_wait_answer() */
smp_mb__after_atomic();
if (test_bit(FR_INTERRUPTED, &req->flags))
queue_interrupt(fiq, req);
+fuse_put_request(fc, req);

return reqsize;

@@ -1655,7 +1702,7 @@
offset = outarg->offset & ~PAGE_MASK;
file_size = i_size_read(inode);

-num = outarg->size;
+num = min(outarg->size, fc->max_write);
if (outarg->offset > file_size)
num = 0;
else if (outarg->offset + num > file_size)
@@ -1672,7 +1719,6 @@
    req->in.h.nodeid = outarg->nodeid;
    req->in.numargs = 2;
    req->in.argpages = 1;
@@ -1687,6 +1733,7 @@
    this_num = min_t(unsigned, num, PAGE_SIZE - offset);
    req->pages[req->num_pages] = page;
    +req->page_descs[req->num_pages].offset = offset;
@@ -1827,6 +1876,9 @@
    struct fuse_req *req;
    struct fuse_out_header oh;
+
    if (current_user_ns() != fc->user_ns)
+    return -EIO;
    +
    if (nbytes < sizeof(struct fuse_out_header))
    return -EINVAL;

err = fuse_request_send_notify_reply(fc, req, outarg->notify_unique);
-    if (err)
+    if (err) {
        fuse_retrieve_end(fc, req);
        +fuse_put_request(fc, req);
        +}

    return err;
}
/* Is it an interrupt reply? */
if (req->intr_unique == oh.unique) {
    __fuse_get_request(req);
    spin_unlock(&fpq->lock);
    err = -EINVAL;
    -if (nbytes != sizeof(struct fuse_out_header)) {
    +if (nbytes != sizeof(struct fuse_out_header)) {
        fuse_put_request(fc, req);
        goto err_finish;
    +}
    if (oh.error == -ENOSYS)
        fc->no_interrupt = 1;
    else if (oh.error == -EAGAIN)
        queue_interrupt(&fc->iq, req);
    +fuse_put_request(fc, req);
    fuse_copy_finish(cs);
    return nbytes;
}
if (!fud)
    return -EPERM;
+pipe_lock(pipe);
+bufs = kmalloc(pipe->buffers * sizeof(struct pipe_buffer), GFP_KERNEL);
-if (!bufs)
+if (!bufs) {
    pipe_unlock(pipe);
    return -ENOMEM;
}
-pipe_lock(pipe);
nbuff = 0;
rem = 0;
for (idx = 0; idx < pipe->nrbufs && rem < len; idx++)
    rem += pipe->bufs[(pipe->curbuf + idx) & (pipe->buffers - 1)].len;
ret = -EINVAL;
-if (rem < len) {
    -pipe_unlock(pipe);
    -goto out;
-}
+if (rem < len)
    +goto out_free;
rem = len;
while (rem) {
    pipe->curbuf = (pipe->curbuf + 1) & (pipe->buffers - 1);
    pipe->nrbufs--;
} else {
    -pipe_buf_get(pipe, ibuf);
    +if (!pipe_buf_get(pipe, ibuf))
    +goto out_free;
+
    *obuf = *ibuf;
    obuf->flags &= ~PIPE_BUF_FLAG_GIFT;
    obuf->len = rem;
    ret = fuse_dev_do_write(fud, &cs, len);
+
    +pipe_lock(pipe);
    +out_free:
    for (idx = 0; idx < nbuf; idx++)
        pipe_buf_release(pipe, &bufs[idx]);
    +pipe_unlock(pipe);
-
-out:
    kfree(bufs);
    return ret;
}
set_bit(FR_ABORTED, &req->flags);
if (!test_bit(FR_LOCKED, &req->flags)) {
    set_bit(FR_PRIVATE, &req->flags);
    +__fuse_get_request(req);
    list_move(&req->list, &to_end1);
} spin_unlock(&req->waitq.lock);
while (!list_empty(&to_end1)) {
    req = list_first_entry(&to_end1, struct fuse_req, list);
    +__fuse_get_request(req);
    list_del_init(&req->list);
    request_end(fc, req);
} EXPORT_SYMBOL_GPL(fuse_abort_conn);
+void fuse_wait_aborted(struct fuse_conn *fc)
+
/* matches implicit memory barrier in fuse_drop_waiting() */
+smp_mb();
+wait_event(fc->blocked_waitq, atomic_read(&fc->num_waiting) == 0);
+
+
int fuse_dev_release(struct inode *inode, struct file *file)
{
struct fuse_dev *fud = fuse_get_dev(file);
@@ -2145,9 +2213,15 @@
if (fud) {
struct fuse_conn *fc = fud->fc;
struct fuse_pqueue *fpq = &fud->pq;
+LIST_HEAD(to_end);
+
+spin_lock(&fpq->lock);
WARN_ON(!list_empty(&fpq->io));
-end_requests(fc, &fpq->processing);
+list_splice_init(&fpq->processing, &to_end);
+spin_unlock(&fpq->lock);
+
+end_requests(fc, &to_end);
+
/* Are we the last open device? */
if (atomic_dec_and_test(&fc->dev_count)) {
WARN_ON(fc->iq.fasync != NULL);
--- linux-4.15.0.orig/fs/fuse/dir.c
+++ linux-4.15.0/fs/fuse/dir.c
@@ -187,7 +187,7 @@
int ret;
inode = d_inode_rcu(entry);
-if (inode && is_bad_inode(inode))
+if (inode && fuse_is_bad(inode))
goto invalid;
else if (time_before64(fuse_dentry_time(entry), get_jiffies_64()) ||
(flags & LOOKUP_REVAL)) {
@@ -234,7 +234,8 @@
kfree(forget);
if (ret == -ENOMEM)
goto out;
-if (ret || (outarg.attr.mode ^ inode->i_mode) & S_IFMT)
+if (ret || fuse_invalid_attr(&outarg.attr) ||
+    (outarg.attr.mode ^ inode->i_mode) & S_IFMT)
goto invalid;

forget_all_cached_acls(inode);
+bool fuse_invalid_attr(struct fuse_attr *attr)
+{
+    return !fuse_valid_type(attr->mode) ||
    !attr->size > LLONG_MAX;
+
    int fuse_lookup_name(struct super_block *sb, u64 nodeid, const struct qstr *name,
    struct fuse_entry_out *outarg, struct inode **inode)
    {
        err = -EIO;
        if (!outarg->nodeid)
            goto out_put_forget;
         if (!fuse_valid_type(outarg->attr.mode))
            goto out_put_forget;
         *inode = fuse_iget(sb, outarg->nodeid, outarg->generation,
        struct inode *inode;
        struct dentry *newent;
        bool outarg_valid = true;
         if (fuse_is_bad(dir))
             return ERR_PTR(-EIO);
         -fuse_lock_inode(dir);
         +locked = fuse_lock_inode(dir);
         err = fuse_lookup_name(dir->i_sb, get_node_id(dir), &entry->d_name,
         &outarg, &inode);
         -fuse_unlock_inode(dir);
         +fuse_unlock_inode(dir, locked);
         if (err == -ENOENT) {
             outarg_valid = false;
             err = 0;
             goto out_free_ff;
         }
         err = -EIO;
         -if (!S_ISREG(outentry.attr.mode) || invalid_nodeid(outentry.nodeid))
         +if (!S_ISREG(outentry.attr.mode) || invalid_nodeid(outentry.nodeid) ||
             fuse_invalid_attr(&outentry.attr))
             goto out_free_ff;
ff->fh = outopen.fh;
@@ -495,6 +507,9 @@
struct fuse_conn *fc = get_fuse_conn(dir);
struct dentry *res = NULL;

+if (fuse_is_bad(dir))
+return -EIO;
+
if (d_in_lookup(entry)) {
    res = fuse_lookup(dir, entry, 0);
if (IS_ERR(res))
@@ -542,6 +557,9 @@
    int err;
    struct fuse_forget_link *forget;

+if (fuse_is_bad(dir))
+return -EIO;
+
    forget = fuse_alloc_forget();
if (!forget)
    return -ENOMEM;
@@ -556,7 +574,7 @@
go to out_put_forget_req;

    err = -EIO;
    -if (invalid_nodeid(outarg.nodeid))
+if (invalid_nodeid(outarg.nodeid) || fuse_invalid_attr(&outarg.attr))
    goto out_put_forget_req;

if ((outarg.attr.mode ^ mode) & S_IFMT)
@@ -663,6 +681,9 @@
    struct fuse_conn *fc = get_fuse_conn(dir);
    FUSE_ARGS(args);

+if (fuse_is_bad(dir))
+return -EIO;
+
    args.in.h.opcode = FUSE_UNLINK;
    args.in.h.nodeid = get_node_id(dir);
    args.in.numargs = 1;
@@ -699,6 +720,9 @@
    struct fuse_conn *fc = get_fuse_conn(dir);
    FUSE_ARGS(args);

+if (fuse_is_bad(dir))
+return -EIO;
+
args.in.h.opcode = FUSE_RMDIR;
args.in.h.nodeid = get_node_id(dir);
args.in.numargs = 1;
@@ -777,6 +801,9 @@
struct fuse_conn *fc = get_fuse_conn(olddir);
int err;

+if (fuse_is_bad(olddir))
+return -EIO;
+
if (flags & ~(RENAME_NOREPLACE | RENAME_EXCHANGE))
return -EINVAL;

@@ -829,7 +856,8 @@
spin_lock(&fc->lock);
fi->attr_version = ++fc->attr_version;
-inc_nlink(inode);
+if (likely(inode->i_nlink < UINT_MAX))
+inc_nlink(inode);
spin_unlock(&fc->lock);
fuse_invalidate_attr(inode);
fuse_update_ctime(inode);
@@ -858,8 +886,8 @@
stat->ino = attr->ino;
stat->mode = (inode->i_mode & S_IFMT) | (attr->mode & 07777);
stat->nlink = attr->nlink;
-stat->uid = make_kuid(&init_user_ns, attr->uid);
-stat->gid = make_kgid(&init_user_ns, attr->gid);
+stat->uid = make_kuid(fc->user_ns, attr->uid);
+stat->gid = make_kgid(fc->user_ns, attr->gid);
stat->rdev = inode->i_rdev;
stat->atime.tv_sec = attr->atime;
stat->atime.tv_nsec = attr->atimensec;
@@ -909,8 +937,9 @@
args.out.args[0].value = &outarg;
err = fuse_simple_request(fc, &args);
if (!err) {
-if ((inode->i_mode ^ outarg.attr.mode) & S_IFMT) {
-make_bad_inode(inode);
+if (fuse_invalid_attr(&outarg.attr) ||
+ (inode->i_mode ^ outarg.attr.mode) & S_IFMT) {
+fuse_make_bad(inode);
err = -EIO;
} else {
fuse_change_attributes(inode, &outarg.attr,
@@ -1030,7 +1059,7 @@
const struct cred *cred;
if (fc->allow_other)
-return 1;
+return current_in_userns(fc->user_ns);
cred = current_cred();
if (uid_eq(cred->euid, fc->user_id) &&
@@ -1099,6 +1128,9 @@
bool refreshed = false;
int err = 0;
+if (fuse_is_bad(inode))
+return -EIO;
+
if (!fuse_allow_current_process(fc))
return -EACCES;
@@ -1213,7 +1245,7 @@
if (invalid_nodeid(o->nodeid))
return -EIO;
-if (!fuse_valid_type(o->attr.mode))
+if (fuse_invalid_attr(&o->attr))
return -EIO;
fc = get_fuse_conn(dir);
@@ -1236,7 +1268,7 @@
dput(dentry);
goto retry;
}
-if (is_bad_inode(inode)) {
+if (fuse_is_bad(inode)) {
dput(dentry);
return -EIO;
}
@@ -1332,8 +1364,9 @@
struct fuse_conn *fc = get_fuse_conn(inode);
struct fuse_req *req;
u64 attr_version = 0;
+bool locked;
-if (is_bad_inode(inode))
+if (fuse_is_bad(inode))
return -EIO;
req = fuse_get_req(fc, 1);
@@ -1359,9 +1392,9 @@
fuse_read_fill(req, file, ctx->pos, PAGE_SIZE,

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static int fuse_dir_release(struct inode *inode, struct file *file) {
    -fuse_release_common(file, FUSE_RELEASEDIR);
    +fuse_release_common(file, true);

    return 0;
}
@@ -1430,6 +1463,10 @@
static int fuse_dir_fsync(struct file *file, loff_t start, loff_t end, int datasync) {
    +struct inode *inode = file->f_mapping->host;
    +if (fuse_is_bad(inode))
    +return -EIO;
    +
    return fuse_fsync_common(file, start, end, datasync, 1);
}
@@ -1475,17 +1512,17 @@
return true;
}

-static void iattr_to_fattr(struct iattr *iattr, struct fuse_setattr_in *arg, bool trust_local_cmtime)
+static void iattr_to_fattr(struct fuse_conn *fc, struct iattr *iattr, struct fuse_setattr_in *arg, bool trust_local_cmtime)
{
  unsigned ivalid = iattr->ia_valid;
  if (ivalid & ATTR_MODE)
    arg->valid |= FATTR_MODE, arg->mode = iattr->ia_mode;
  if (ivalid & ATTR_UID)
    -arg->valid |= FATTR_UID, arg->uid = from_kuid(&init_user_ns, iattr->ia_uid);
    +arg->valid |= FATTR_UID, arg->uid = from_kuid(fc->user_ns, iattr->ia_uid);
  if (ivalid & ATTR_GID)
    -arg->valid |= FATTR_GID, arg->gid = from_kgid(&init_user_ns, iattr->ia_gid);
    +arg->valid |= FATTR_GID, arg->gid = from_kgid(fc->user_ns, iattr->ia_gid);
+arg->valid |= FATTR_GID,  arg->gid = from_kgid(fc->user_ns, iattr->ia_gid);
if (ivalid & ATTR_SIZE)
arg->valid |= FATTR_SIZE,  arg->size = iattr->ia_size;
if (ivalid & ATTR_ATIME) {
@@ -1629,14 +1666,38 @@
return err;

if (attr->ia_valid & ATTR_OPEN) {
- if (fc->atomic_o_trunc)
+ /* This is coming from open(..., ... | O_TRUNC); */
+ WARN_ON(!(attr->ia_valid & ATTR_SIZE));
+ WARN_ON(attr->ia_size != 0);
+ if (fc->atomic_o_trunc) {
+ /*
+ * No need to send request to userspace, since actual
+ * truncation has already been done by OPEN. But still
+ * need to truncate page cache.
+ */
+i_size_write(inode, 0);
+truncate_pagecache(inode, 0);
return 0;
+}
file = NULL;
}

if (attr->ia_valid & ATTR_SIZE)
is_truncate = true;

+ /* Flush dirty data/metadata before non-truncate SETATTR */
+ if (is_wb && S_ISREG(inode->i_mode) &&
+ attr->ia_valid &
+ (ATTR_MODE | ATTR_UID | ATTR_GID | ATTR_MTIME_SET |
+ ATTR_TIMES_SET)) {
+ err = write_inode_now(inode, true);
+ if (err)
+ return err;
+ fuse_set_nowrite(inode);
+ fuse_release_nowrite(inode);
+ }
+ if (is_truncate) {
 fuse_set_nowrite(inode);
set_bit(FUSE_I_SIZE_UNSTABLE, &fi->state);
@@ -1646,7 +1707,7 @@
memset(&inarg, 0, sizeof(inarg));
memset(&outarg, 0, sizeof(outarg));
-attr_to_fattr(attr, &inarg, trust_local_cmtime);
+attr_to_fattr(fc, attr, &inarg, trust_local_cmtime);
if (file) {
    struct fuse_file *ff = file->private_data;
    inarg.valid |= FATTR_FH;
    goto error;
}

-    if ((inode->i_mode ^ outarg.attr.mode) & S_IFMT) {
-        make_bad_inode(inode);
+    if (fuse_invalid_attr(&outarg.attr) ||
+        (inode->i_mode ^ outarg.attr.mode) & S_IFMT) {
+        fuse_make_bad(inode);
    err = -EIO;
    goto error;
}
@@ -1665,8 +1726,9 @@

@@ -1722,6 +1784,9 @@
struct file *file = (attr->ia_valid & ATTR_FILE) ? attr->ia_file : NULL;
int ret;

+if (fuse_is_bad(inode))
+return -EIO;
+
+if (!fuse_allow_current_process(get_fuse_conn(inode)))
+return -EACCES;
@@ -1780,6 +1845,9 @@
struct inode *inode = d_inode(path->dentry);
struct fuse_conn *fc = get_fuse_conn(inode);

+if (fuse_is_bad(inode))
+return -EIO;
+
+if (!fuse_allow_current_process(fc))
+return -EACCES;

--- linux-4.15.0.orig/fs/fuse/file.c
+++ linux-4.15.0/fs/fuse/file.c
@@ -17,6 +17,7 @@

#include <linux/swap.h>
#include <linux/falloc.h>
#include <linux/uio.h>
+include <linux/fs.h>

static const struct file_operations fuse_direct_io_file_operations;

@@ -86,12 +87,12 @@
ioput(req->misc.release.inode);
}

- static void fuse_file_put(struct fuse_file *ff, bool sync)
+ static void fuse_file_put(struct fuse_file *ff, bool sync, bool isdir)
{
    if (refcount_dec_and_test(&ff->count)) {
        struct fuse_req *req = ff->reserved_req;

        - if (ff->fc->no_open) {
        + if (ff->fc->no_open && !isdir) {
            /*
             * Drop the release request when client does not
             * implement ‘open’
             @ @ -178,7 +179,9 @ @
             
             file->f_op = &fuse_direct_io_file_operations;
             if (!ff->open_flags & FOPEN_KEEP_CACHE)
                 invalidate_inode_pages2(inode->i_mapping);
             - if (ff->open_flags & FOPEN_NONSEEKABLE)
             + if (ff->open_flags & FOPEN_STREAM)
                 stream_open(inode, file);
             + else if (ff->open_flags & FOPEN_NONSEEKABLE)
                 nonseekable_open(inode, file);
             
             if (fc->atomic_o_trunc && (file->f_flags & O_TRUNC)) {
                 struct fuse_inode *fi = get_fuse_inode(inode);
                 @ @ -199,24 +202,31 @ @
                 {
                     struct fuse_conn *fc = get_fuse_conn(inode);
                     int err;
                     - bool lock_inode = (file->f_flags & O_TRUNC) &&
                     + bool is_wb_truncate = (file->f_flags & O_TRUNC) &&
                       fc->atomic_o_trunc &&
                       fc->writeback_cache;

                     + if (fuse_is_bad(inode))
                     + return -EIO;
                     +
                     err = generic_file_open(inode, file);
                     if (err)
                         return err;

                     - if (lock_inode)
                     + if (is_wb_truncate) {
                         inode_lock(inode);
                         + fuse_set_nowrite(inode);
                     +}
                     err = fuse_do_open(fc, get_node_id(inode), file, isdir);


if (!err)
fuse_finish_open(inode, file);

- if (lock_inode)
+ if (is_wb_truncate) {
+fuse_release_nowrite(inode);
inode_unlock(inode);
+}

return err;
}
@@ -244,10 +254,11 @@
req->in.args[0].value = inarg;
}

-void fuse_release_common(struct file *file, int opcode)
+void fuse_release_common(struct file *file, bool isdir)
{
 struct fuse_file *ff = file->private_data;
 struct fuse_req *req = ff->reserved_req;
+int opcode = isdir ? FUSE_RELEASEDIR : FUSE_RELEASE;

 fuse_prepare_release(ff, file->f_flags, opcode);

@@ -269,7 +280,7 @@
* synchronous RELEASE is allowed (and desirable) in this case
* because the server can be trusted not to screw up.
*/
-fuse_file_put(ff, ff->fc->destroy_req != NULL);
+fuse_file_put(ff, ff->fc->destroy_req != NULL, isdir);
}

static int fuse_open(struct inode *inode, struct file *file)
@@ -285,7 +296,7 @@
if (fc->writeback_cache)
write_inode_now(inode, 1);

-fuse_release_common(file, FUSE_RELEASE);
+fuse_release_common(file, false);

/* return value is ignored by VFS */
return 0;
@@ -299,7 +310,7 @@
* iput(NULL) is a no-op and since the refcount is 1 and everything's
* synchronous, we are fine with not doing igrab() here"
*/
-fuse_file_put(ff, true);}
+fuse_file_put(ff, true, false);
}
EXPORT_SYMBOL_GPL(fuse_sync_release);

@@ -399,7 +410,7 @@
 struct fuse_flush_in inarg;
 int err;

- if (is_bad_inode(inode))
+ if (fuse_is_bad(inode))
     return -EIO;

 if (fc->no_flush)
@@ -447,7 +458,7 @@
 struct fuse_fsync_in inarg;
 int err;

- if (is_bad_inode(inode))
+ if (fuse_is_bad(inode))
     return -EIO;

 inode_lock(inode);
@@ -762,7 +773,7 @@
 int err;

 err = -EIO;
- if (is_bad_inode(inode))
+ if (fuse_is_bad(inode))
     goto out;

 err = fuse_do_readpage(file, page);
@@ -804,7 +815,7 @@
 put_page(page);
 }
 if (req->ff)
- fuse_file_put(req->ff, false);
+ fuse_file_put(req->ff, false, false);
 }

 static void fuse_send_readpages(struct fuse_req *req, struct file *file)
@@ -866,6 +877,7 @@
 }
 if (WARN_ON(req->num_pages >= req->max_pages)) {
+ unlock_page(page);
 fuse_put_request(fc, req);
 return -EIO;
 }


int nr_alloc = min_t(unsigned, nr_pages, FUSE_MAX_PAGES_PER_REQ);

err = -EIO;
-if (is_bad_inode(inode)) +if (fuse_is_bad(inode))
  goto out;

data.file = file;

int err = 0;
ssize_t res = 0;

-if (is_bad_inode(inode)) +if (fuse_is_bad(inode))
  return -EIO;

if (inode->i_size < pos + iov_iter_count(ii))

ssize_t res;
struct inode *inode = file_inode(io->iocb->ki_filp);

-if (is_bad_inode(inode)) +if (fuse_is_bad(inode))
  return -EIO;

res = fuse_direct_io(io, iter, ppos, 0);

struct fuse_io_priv io = FUSE_IO_PRIV_SYNC(iocb);
ssize_t res;

-if (is_bad_inode(inode)) +if (fuse_is_bad(inode))
  return -EIO;
/* Don't allow parallel writes to the same file */
__free_page(req->pages[i]);

if (req->ff)
  -fuse_file_put(req->ff, false);
  +fuse_file_put(req->ff, false, false);
}

static void fuse_writepage_finish(struct fuse_conn *fc, struct fuse_req *req)

{ struct fuse_conn *fc = get_fuse_conn(inode);
struct fuse_inode *fi = get_fuse_inode(inode);
-size_t crop = i_size_read(inode);
-loff_t crop = i_size_read(inode);
struct fuse_req *req;

while (fi->writectr >= 0 && !list_empty(&fi->queued_writes)) {
    ff = __fuse_write_file_get(fc, fi);
    err = fuse_flush_times(inode, ff);
    if (ff)
        -fuse_file_put(ff, 0);
        +fuse_file_put(ff, false, false);

    return err;
}

WARN_ON(wbc->sync_mode == WB_SYNC_ALL);

redirty_page_for_writepage(wbc, page);
+unlock_page(page);
return 0;
}

spin_unlock(&fc->lock);

dec_wb_stat(&bdi->wb, WB_WRITEBACK);
-dec_node_page_state(page, NR_WRITEBACK_TEMP);
+dec_node_page_state(new_req->pages[0], NR_WRITEBACK_TEMP);
wb_writeout_inc(&bdi->wb);
fuse_writepage_free(fc, new_req);
fuse_request_free(new_req);

int err;

err = -EIO;
-if (is_bad_inode(inode))
+if (fuse_is_bad(inode))
    goto out;

-data.inode = inode;
 @@ -1928,7 +1941,7 @@
-err = 0;
+err = 0;
}
if (data.ff)
    -fuse_file_put(data.ff, false);
        +fuse_file_put(data.ff, false, false);
kfree(data.orig_pages);
out:
@@ -2525,7 +2538,16 @@
 struct iovec *iov = iov_page;

 iov->iov_base = (void __user *)arg;
-iov->iov_len = _IOC_SIZE(cmd);
+switch (cmd) {
 +case FS_IOC_GETFLAGS:
 +case FS_IOC_SETFLAGS:
 +iov->iov_len = sizeof(int);
 +break;
 +default:
 +iov->iov_len = _IOC_SIZE(cmd);
 +break;
 +}

 if (!fuse_allow_current_process(fc))
 return -EACCES;

-if (is_bad_inode(inode))
+if (fuse_is_bad(inode))
 return -EIO;

 return fuse_do_ioctl(file, cmd, arg, flags);
@@ -2911,10 +2933,12 @@
 }

 if (io->async) {
 +bool blocking = io->blocking;
 +fuse_aio_complete(io, ret < 0 ? ret : 0, -1);

 /* we have a non-extending, async request, so return */
-if (!io->blocking)
+if (!blocking)
 return -EIOCBQUEUED;

 wait_for_completion(&wait);
@@ -2970,6 +2994,13 @@
 }
 }

+if (!(mode & FALLOC_FL_KEEP_SIZE) &&
offset + length > i_size_read(inode)) {
+err = inode_newsize_ok(inode, offset + length);
+if (err)
+goto out;
+}
+
if (!(mode & FALLOC_FL_KEEP_SIZE))
set_bit(FUSE_I_SIZE_UNSTABLE, &fi->state);

--- linux-4.15.0.orig/fs/fuse/fuse_i.h
+++ linux-4.15.0/fs/fuse/fuse_i.h
@@ -26,6 +26,7 @@
#include <linux/xattr.h>
#include <linux/pid_namespace.h>
#include <linux/refcount.h>
+#include <linux/user_namespace.h>
/** Max number of pages that can be used in a single read request */
#define FUSE_MAX_PAGES_PER_REQ 32
@@ -117,6 +118,8 @@
 FUSE_I_INIT_RDPLUS,
 /** An operation changing file size is in progress */
 FUSE_I_SIZE_UNSTABLE,
+/* Bad inode */
+FUSE_I_BAD,
};

struct fuse_conn;
@@ -466,6 +469,9 @@
 /** The pid namespace for this mount */
 struct pid_namespace *pid_ns;

+/** The user namespace for this mount */
+struct user_namespace *user_ns;
+
+/** Maximum read size */
unsigned max_read;

@@ -687,6 +693,17 @@
 return get_fuse_inode(inode)->nodeid;
 }

+static inline void fuse_make_bad(struct inode *inode)
+{
+remove_inode_hash(inode);
+set_bit(FUSE_I_BAD, &get_fuse_inode(inode)->state);
+}
+static inline bool fuse_is_bad(struct inode *inode)
+{
+    return unlikely(test_bit(FUSE_I_BAD, &get_fuse_inode(inode)->state));
+}

/** Device operations */
extern const struct file_operations fuse_dev_operations;

/* Send RELEASE or RELEASEDIR request */
-void fuse_release_common(struct file *file, int opcode);
+void fuse_release_common(struct file *file, bool isdir);

/* Send FSYNC or FSYNCDIR request */
@@ -739,7 +756,7 @@
-void fuse_release_common(struct file *file, int opcode);
+void fuse_release_common(struct file *file, bool isdir);

/* Abort all requests */
void fuse_abort_conn(struct fuse_conn *fc);
+void fuse_wait_aborted(struct fuse_conn *fc);

/* Invalidate inode attributes */
@@ -852,6 +869,7 @@
-void fuse_abort_conn(struct fuse_conn *fc);
+void fuse_wait_aborted(struct fuse_conn *fc);

/* Initialize fuse_conn */
-void fuse_conn_init(struct fuse_conn *fc);
+void fuse_conn_init(struct fuse_conn *fc, struct user_namespace *user_ns);

/* Release reference to fuse_conn */
@@ -895,6 +913,8 @@
-void fuse_conn_init(struct fuse_conn *fc);
+void fuse_conn_init(struct fuse_conn *fc, struct user_namespace *user_ns);

/* Release reference to fuse_conn */
@@ -964,8 +984,8 @@
-void fuse_conn_init(struct fuse_conn *fc);
+void fuse_conn_init(struct fuse_conn *fc, struct user_namespace *user_ns);

/* Is current process allowed to perform filesystem operation? */
@@ -964,8 +984,8 @@
-void fuse_conn_init(struct fuse_conn *fc);
+void fuse_conn_init(struct fuse_conn *fc, struct user_namespace *user_ns);

int fuse_valid_type(int m);
+bool fuse_invalid_attr(struct fuse_attr *attr);
+
/* Open Source Used In 5GasS Edge AC-4  31449 */
-void fuse_lock_inode(struct inode *inode);
+void fuse_unlock_inode(struct inode *inode, bool locked);
+bool fuse_lock_inode(struct inode *inode);

int fuse_setxattr(struct inode *inode, const char *name, const void *value,
    size_t size, int flags);
--- linux-4.15.0.orig/fs/fuse/inode.c
+++ linux-4.15.0/fs/fuse/inode.c
@@ -171,8 +171,8 @@
inode->i_ino     = fuse_squash_ino(attr->ino);
inode->i_mode    = (inode->i_mode & S_IFMT) | (attr->mode & 07777);
set_nlink(inode, attr->nlink);
    -inode->i_uid     = make_kuid(&init_user_ns, attr->uid);
    -inode->i_gid     = make_kgid(&init_user_ns, attr->gid);
    +inode->i_uid     = make_kuid(fc->user_ns, attr->uid);
    +inode->i_gid     = make_kgid(fc->user_ns, attr->gid);
inode->i_blocks  = attr->blocks;
inode->i_atime.tv_sec   = attr->atime;
inode->i_atime.tv_nsec  = attr->atimensec;
@@ -317,7 +317,7 @@
unlock_new_inode(inode);
    } else if ((inode->i_mode ^ attr->mode) & S_IFMT) { /* Inode has changed type, any I/O on the old should fail */
    -make_bad_inode(inode);
    +fuse_make_bad(inode);
    iput(inode);
    goto retry;
    }
@@ -357,15 +357,21 @@
return 0;
}

-void fuse_lock_inode(struct inode *inode)
+bool fuse_lock_inode(struct inode *inode)
{
    -if (!get_fuse_conn(inode)->parallel_dirops)
    +bool locked = false;
    +
    +if (!get_fuse_conn(inode)->parallel_dirops) {
      mutex_lock(&get_fuse_inode(inode)->mutex);
      +locked = true;
      +}
    +
    +return locked;
}

-void fuse_unlock_inode(struct inode *inode)
+void fuse_unlock_inode(struct inode *inode, bool locked)
{- if (!get_fuse_conn(inode)->parallel_dirops)
  +if (locked)
    mutex_unlock(&get_fuse_inode(inode)->mutex);
-
@@ -391,9 +397,6 @@

  
  -fuse_send_destroy(fc);
  -
  -fuse_abort_conn(fc);
    mutex_lock(&fuse_mutex);
    list_del(&fc->entry);
    fuse_ctl_remove_conn(fc);
@@ -477,7 +480,8 @@
    return err;
  }

- static int parse_fuse_opt(char *opt, struct fuse_mount_data *d, int is_bdev)
- static int parse_fuse_opt(char *opt, struct fuse_mount_data *d, int is_bdev,
+ static int parse_fuse_opt(char *opt, struct fuse_mount_data *d, int is_bdev,
+   struct user_namespace *user_ns)
  
  char *p;
  memset(d, 0, sizeof(struct fuse_mount_data));
@@ -513,7 +517,7 @@
    case OPT_USER_ID:
      if (fuse_match_uint(&args[0], &uv))
        return 0;
-    d->user_id = make_kuid(current_user_ns(), uv);
+    d->user_id = make_kuid(user_ns, uv);
      if (!uid_valid(d->user_id))
        return 0;
    d->user_id_present = 1;
@@ -522,7 +526,7 @@
    case OPT_GROUP_ID:
      if (fuse_match_uint(&args[0], &uv))
        return 0;
-    d->group_id = make_kgid(current_user_ns(), uv);
+    d->group_id = make_kgid(user_ns, uv);
      if (!gid_valid(d->group_id))
        return 0;
    d->group_id_present = 1;
@@ -565,8 +569,8 @@
    struct super_block *sb = root->d_sb;
    struct fuse_conn *fc = get_fuse_conn_super(sb);
- seq_printf(m, ",user_id=%u", from_kuid_munged(&init_user_ns, fc->user_id));
- seq_printf(m, ",group_id=%u", from_kgid_munged(&init_user_ns, fc->group_id));
+ seq_printf(m, ",user_id=%u", from_kuid_munged(fc->user_ns, fc->user_id));
+ seq_printf(m, ",group_id=%u", from_kgid_munged(fc->user_ns, fc->group_id));
if (fc->default_permissions)
  seq_puts(m, ",default_permissions");
if (fc->allow_other)
  @@ -597,7 +601,7 @@
  fpq->connected = 1;
}

-void fuse_conn_init(struct fuse_conn *fc)
+void fuse_conn_init(struct fuse_conn *fc, struct user_namespace *user_ns)
{
  memset(fc, 0, sizeof(*fc));
  spin_lock_init(&fc->lock);
  @@ -621,6 +625,7 @@
  fc->attr_version = 1;
  get_random_bytes(&fc->scramble_key, sizeof(fc->scramble_key));
  fc->pid_ns = get_pid_ns(task_active_pid_ns(current));
+  fc->user_ns = get_user_ns(user_ns);
  }
EXPORT_SYMBOL_GPL(fuse_conn_init);

@@ -630,6 +635,7 @@
  if (fc->destroy_req)
    fuse_request_free(fc->destroy_req);
  put_pid_ns(fc->pid_ns);
+  put_user_ns(fc->user_ns);
  fc->release(fc);
  }
}
@@ -1061,7 +1067,7 @@
  sb->s_flags &= ~(SB_NOSEC | SB_I_VERSION);

- if (!parse_fuse_opt(data, &d, is_bdev))
+ if (!parse_fuse_opt(data, &d, is_bdev, sb->s_user_ns))
  goto err;
  if (is_bdev) {
-    @@ -1086,8 +1092,12 @@
+    if (!file)
+      goto err;
+    if ((file->f_op != &fuse_dev_operations) ||
+      (file->f_cred->user_ns != &init_user_ns))
      goto err;
      if (is_bdev) {
-      @@ -1086,8 +1092,12 @@
+      if (!file)
+        goto err;
+      if ((file->f_op != &fuse_dev_operations) ||
+         (file->f_cred->user_ns != &init_user_ns))
+        goto err;
+      /*
* Require mount to happen from the same user namespace which
* opened /dev/fuse to prevent potential attacks.
*/
@if (file->f_op != &fuse_dev_operations ||
    file->f_cred->user_ns != sb->s_user_ns)
goto err_fput;

fc = kmalloc(sizeof(*fc), GFP_KERNEL);
@@ -1095,7 +1105,7 @@
if (!fc)
goto err_fput;

-fuse_conn_init(fc);
+fuse_conn_init(fc, sb->s_user_ns);
f->release = fuse_free_conn;

fud = fuse_dev_alloc(fc);
@@ -1176,6 +1186,7 @@
fuse_dev_free(fud);
err_put_conn:
fuse_conn_put(fc);
+sb->s_fs_info = NULL;
err_fput:
put(file);
err:
@@ -1189,23 +1200,32 @@
return mount_nodev(fs_type, flags, raw_data, fuse_fill_super);
}

-static void fuse_kill_sb_anon(struct super_block *sb)
+static void fuse_sb_destroy(struct super_block *sb)
{
    struct fuse_conn *fc = get_fuse_conn_super(sb);

    if (fc) {
        +fuse_send_destroy(fc);
        +fuse_abort_conn(fc);
        +fuse_wait_aborted(fc);
        +
down_write(&fc->killsb);
        fc->sb = NULL;
        up_write(&fc->killsb);
    }
}

+static void fuse_kill_sb_anon(struct super_block *sb)
+

---
static struct file_system_type fuse_fs_type = {
    .owner = THIS_MODULE,
    .name = "fuse",
    -.fs_flags = FS_HAS_SUBTYPE,
    +.fs_flags = FS_HAS_SUBTYPE | FS_USERNS_MOUNT,
    .mount = fuse_mount,
    .kill_sb = fuse_kill_sb_anon,
};
@@ -1221,14 +1241,7 @@
static void fuse_kill_sb_blk(struct super_block *sb)
{
    -struct fuse_conn *fc = get_fuse_conn_super(sb);
    -
    -if (fc) {
    -
        -down_write(&fc->killsb);
        -fc->sb = NULL;
        -up_write(&fc->killsb);
        -}
    -
    +fuse_sb_destroy(sb);
    kill_block_super(sb);
}
@@ -1237,7 +1250,7 @@
    .name = "fuseblk",
    .mount = fuse_mount_blk,
    .kill_sb = fuse_kill_sb_blk,
    -.fs_flags = FS_REQUIRES_DEV | FS_HAS_SUBTYPE,
    +.fs_flags = FS_REQUIRES_DEV | FS_HAS_SUBTYPE | FS_USERNS_MOUNT,
};
MODULE_ALIASES_FS("fuseblk");

--- linux-4.15.0.orig/fs/fuse/xattr.c
+++ linux-4.15.0/fs/fuse/xattr.c
@@ -113,6 +113,9 @@
     struct fuse_getxattr_out outarg;
     ssize_t ret;

     +if (fuse_is_bad(inode))
     +return -EIO;
     +
     if (!fuse_allow_current_process(fc))
         return -EACCES;

@@ -178,6 +181,9 @@
     struct dentry *dentry, struct inode *inode,
     const char *name, void *value, size_t size)
 {
+    if (fuse_is_bad(inode))
+        return -EIO;
+
     return fuse_getxattr(inode, name, value, size);
 }

@@ -186,6 +192,9 @@
     const char *name, const void *value, size_t size,
     int flags)
 {
+    if (fuse_is_bad(inode))
+        return -EIO;
+
     if (!value)
         return fuse_removexattr(inode, name);

--- linux-4.15.0.orig/fs/gfs2/bmap.c
+++ linux-4.15.0/fs/gfs2/bmap.c
@@ -305,21 +305,22 @@
 }
 }

-/**
- * lookup_mp_height - helper function for lookup_metapath
- * @ip: the inode
- * @mp: the metapath
- * @h: the height which needs looking up
- */
- static int lookup_mp_height(struct gfs2_inode *ip, struct metapath *mp, int h)
+
+static int __fillup_metapath(struct gfs2_inode *ip, struct metapath *mp,
+        unsigned int x, unsigned int h)
{
     __be64 *ptr = metapointer(h, mp);
     u64 dblock = be64_to_cpu(*ptr);
-    if (!dblock)
-        return h + 1;
-    for (; x < h; x++) {
-+        __be64 *ptr = metapointer(x, mp);
+        u64 dblock = be64_to_cpu(*ptr);
+        int ret;
+        return gfs2_meta_indirect_buffer(ip, h + 1, dblock, &mp->mp_bh[h + 1]);
-        return gfs2_meta_indirect_buffer(ip, h + 1, dblock, &mp->mp_bh[h + 1]);
-    }
-    return h + 1;
+    for (; x < h; x++) {
+        __be64 *ptr = metapointer(x, mp);
+        u64 dblock = be64_to_cpu(*ptr);
+        int ret;
+        return gfs2_meta_indirect_buffer(ip, h + 1, dblock, &mp->mp_bh[h + 1]);
-        return gfs2_meta_indirect_buffer(ip, h + 1, dblock, &mp->mp_bh[h + 1]);
static int lookup_metapath(struct gfs2_inode *ip, struct metapath *mp)
{
    unsigned int end_of_metadata = ip->i_height - 1;
    unsigned int x;
    int ret;

    for (x = 0; x < end_of_metadata; x++) {
        ret = lookup_mp_height(ip, mp, x);
        if (ret)
            goto out;
    }

    ret = ip->i_height;

    out:
    mp->mp_aheight = ret;
    return ret;
}

static int fillup_metapath(struct gfs2_inode *ip, struct metapath *mp, int h)
{  
  unsigned int start_h = h - 1;
  int ret;
  unsigned int x = 0;

  if (h) {  
    /* find the first buffer we need to look up. */
    while (start_h > 0 && mp->mp_bh[start_h] == NULL)
      start_h--;
    for (; start_h < h; start_h++) {  
      ret = lookup_mp_height(ip, mp, start_h);
      if (ret)
        return ret;
      for (x = h - 1; x > 0; x--) {  
        if (mp->mp_bh[x])
          break;
      }
    }  
    return ip->i_height;
  }  
  return __fillup_metapath(ip, mp, x, h);
}

static inline void release_metapath(struct metapath *mp)  
@@ -736,7 +720,7 @@
    __be64 *ptr;
    sector_t lblock;
    sector_t lend;
-   int ret;
+   int ret = 0;
    int eob;
    unsigned int len;
    struct buffer_head *bh;
@@ -748,12 +732,14 @@
    goto out;
 }
-   if ((flags & IOMAP_REPORT) && gfs2_is_stuffed(ip)) {  
-     gfs2_stuffed_iomap(inode, iomap);
-     if (pos >= iomap->length)
-       return -ENOENT;
-   }  
-   return 0;
-   goto out;
+   if (gfs2_is_stuffed(ip)) {  
+     if (flags & IOMAP_REPORT) {  
+       gfs2_stuffed_iomap(inode, iomap);
+       if (pos >= iomap->length)
+         ret = -ENOENT;
+       goto out;
+     }  
 }
+BUG_ON(!(flags & IOMAP_WRITE));
}

lblock = pos >> inode->i_blkbits;
@@ -764,7 +750,7 @@
 iomap->type = IOMAP_HOLE;
 iomap->length = (u64)(lend - lblock) << inode->i_blkbits;
 iomap->flags = IOMAP_F_MERGED;
-bmap_lock(ip, 0);
+bmap_lock(ip, flags & IOMAP_WRITE);

/*
 * Directory data blocks have a struct gfs2_meta_header header, so the
 @ @ -788,7 +774,7 @@
goto do_alloc;

 ret = lookup_metapath(ip, &mp);
-if (ret < 0)
+if (ret)
goto out_release;

 if (mp.mp_aheight != ip->i_height)
@@ -807,27 +793,25 @@
 iomap->flags |= IOMAP_F_BOUNDARY;
 iomap->length = (u64)len << inode->i_blkbits;

 -ret = 0;
-
 out_release:
 release_metapath(&mp);
-bmap_unlock(ip, 0);
+bmap_unlock(ip, flags & IOMAP_WRITE);
 out:
 trace_gfs2_iomap_end(ip, iomap, ret);
 return ret;

do_alloc:
-if (!(flags & IOMAP_WRITE)) {
-if (pos >= i_size_read(inode)) {
+if (flags & IOMAP_WRITE) {
+ret = gfs2_iomap_alloc(inode, iomap, flags, &mp);
+} else if (flags & IOMAP_REPORT) {
+loff_t size = i_size_read(inode);
+if (pos >= size)
+ret = -ENOENT;
-goto out_release;
-}


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-ret = 0;
-iomap->length = hole_size(inode, lblock, &mp);
-goto out_release;
+else if (height <= ip->i_height)
+iomap->length = hole_size(inode, lblock, &mp);
+else
+iomap->length = size - pos;
}
-
-ret = gfs2_iomap_alloc(inode, iomap, flags, &mp);
goto out_release;

@@ -1236,6 +1220,7 @@
gfs2_dinode_out(ip, dibh->b_data);
up_write(&ip->i_rwlock);
gfs2_trans_end(sdp);
+buf_in_tr = false;
}
gfs2_glock_dq_uninit(rd_gh);
cond_resched();
@@ -1336,7 +1321,9 @@
mp.mp_bh[0] = dibh;
ret = lookup_metapath(ip, &mp);
-if (ret == ip->i_height)
+if (ret)
+goto out_metapath;
+if (mp.mp_aheight == ip->i_height)
state = DEALLOC_MP_FULL; /* We have a complete metapath */
else
state = DEALLOC_FILL_MP; /* deal with partial metapath */
@@ -1432,16 +1419,16 @@
case DEALLOC_FILL_MP:
/* Fill the buffers out to the current height. */
ret = fillup_metapath(ip, &mp, mp_h);
-if (ret < 0)
+if (ret)
goto out;

/* If buffers found for the entire strip height */
-if ((ret == ip->i_height) && (mp_h == strip_h)) {
+if (mp.mp_aheight - 1 == strip_h) {
state = DEALLOC_MP_FULL;
break;
}
-if (ret < ip->i_height) /* We have a partial height */
-mp_h = ret - 1;
if (mp.mp_aheight < ip->i_height) /* We have a partial height */
mp_h = mp.mp_aheight - 1;

/* If we find a non-null block pointer, crawl a bit
   higher up in the metadata and try again, otherwise
@ @ -1602,6 +1589,8 @@ }
}

error = gfs2_trans_begin(sdp, RES_DINODE + RES_STATFS + RES_RG_BIT +
+ (unstuff &&
+ gfs2_is_jdata(ip) ? RES_JDATA : 0) +
(sdtp->sd_args.ar_quota == GFS2_QUOTA_OFF ?
 0 : RES_QUOTA), 0);
if (error)
@@ -1602,6 +1589,8 @@
 end_of_file = (i_size_read(&ip->i_inode) + sdtp->sd_sb.sb_bsize - 1) >> shift;
lblock = offset >> shift;
lblock_stop = (offset + len + sdtp->sd_sb.sb_bsize - 1) >> shift;
-if (lblock_stop > end_of_file)
+if (lblock_stop > end_of_file && ip != GFS2_I(sdp->sd_rindex))
return 1;

size = (lblock_stop - lblock) << shift;
--- linux-4.15.0.orig/fs/gfs2/file.c
+++ linux-4.15.0/fs/gfs2/file.c
@@ -807,7 +807,7 @@
 struct gfs2_inode *ip = GFS2_I(inode);
 struct gfs2_alloc_Parms ap = { .aflags = 0, }; 
 unsigned int data_blocks = 0, ind_blocks = 0, rblocks;
-loff_t bytes, max_bytes, max_blks = UINT_MAX;
+loff_t bytes, max_bytes, max_blks;
int error;
const loff_t pos = offset;
const loff_t count = len;
@@ -859,7 +859,8 @@
 return error;
/* ap.allowed tells us how many blocks quota will allow
   * us to write. Check if this reduces max_blks */
-if (ap.allowed && ap.allowed < max_blks)
+max_blks = UINT_MAX;
+if (ap.allowed)
max_blks = ap.allowed;

error = gfs2_inplace_reserve(ip, &ap);
--- linux-4.15.0.orig/fs/gfs2/glock.c
+++ linux-4.15.0/fs/gfs2/glock.c
@@ -107,7 +107,7 @@
static wait_queue_head_t *glock_waitqueue(struct lm_lockname *name) {
    u32 hash = jhash2((u32 *)name, sizeof(*name) / 4, 0);
    +u32 hash = jhash2((u32 *)name, ht_parms.key_len / 4, 0);

    return glock_wait_table + hash_32(hash, GLOCK_WAIT_TABLE_BITS);
}
@@ -140,6 +140,7 @@}
    struct gfs2_sbd *sdp = gl->gl_name.ln_sbd;

+BUG_ON(atomic_read(&gl->gl_revokes));
    rhashtable_remove_fast(&gl_hash_table, &gl->gl_node, ht_parms);
    smp_mb();
    wake_up_glock(gl);
@@ -183,15 +184,19 @@
    void gfs2_glock_add_to_lru(struct gfs2_glock *gl) {
        +if (!(gl->gl_ops->go_flags & GLOF_LRU))
        +return;
        +
        spin_lock(&lru_lock);

        -if (!list_empty(&gl->gl_lru))
        -list_del_init(&gl->gl_lru);
        -else
        +list_del(&gl->gl_lru);
        +list_add_tail(&gl->gl_lru, &lru_list);
        +
        +if (!test_bit(GLF_LRU, &gl->gl_flags)) {
        +set_bit(GLF_LRU, &gl->gl_flags);
        atomic_inc(&lru_count);
        +}

        -list_add_tail(&gl->gl_lru, &lru_list);
        -set_bit(GLF_LRU, &gl->gl_flags);
        spin_unlock(&lru_lock);
    }
@@ -201,7 +206,7 @@
    return;

    spin_lock(&lru_lock);
    -if (!list_empty(&gl->gl_lru)) {
    +if (test_bit(GLF_LRU, &gl->gl_flags)) {
        list_del_init(&gl->gl_lru);
        atomic_dec(&lru_count);
clear_bit(GLF_LRU, &gl->gl_flags);
@@ -865,7 +870,8 @@
 out_free:
kfree(gl->gl_lksb.sb_lvbptr);
 kmem_cache_free(cachep, gl);
-atomic_dec(&sdp->sd_glock_disposal);
+if (atomic_dec_and_test(&sdp->sd_glock_disposal))
 +wake_up(&sdp->sd_glock_wait);

 out:
 return ret;
@@ -1158,8 +1164,7 @@
 !test_bit(GLF_DEMOTE, &gl->gl_flags))
 fast_path = 1;
 }
- if (!test_bit(GLF_LFLUSH, &gl->gl_flags) && demote_ok(gl) &&
- (glops->go_flags & GLOF_LRU))
+ if (!test_bit(GLF_LFLUSH, &gl->gl_flags) && demote_ok(gl))
 gfs2_glock_add_to_lru(gl);

 trace_gfs2_glock_queue(gh, 0);
@@ -1451,9 +1456,11 @@
 while(!list_empty(list)) {
 gl = list_entry(list->next, struct gfs2_glock, gl_lru);
 list_del_init(&gl->gl_lru);
+clear_bit(GLF_LRU, &gl->gl_flags);
 if (!spin_trylock(&gl->gl_lockref.lock)) {
 add_back_to_lru:
 list_add(&gl->gl_lru, &lru_list);
+set_bit(GLF_LRU, &gl->gl_flags);
 atomic_inc(&lru_count);
 continue;
 }
@@ -1461,7 +1468,6 @@
 spin_unlock(&gl->gl_lockref.lock);
 goto add_back_to_lru;
 }
- clear_bit(GLF_LRU, &gl->gl_flags);
 gl->gl_lockref.count++;
 if (demote_ok(gl))
 handle_callback(gl, LM_ST_UNLOCKED, 0, false);
--- linux-4.15.0.orig/fs/gfs2/glops.c
+++ linux-4.15.0/fs/gfs2/glops.c
@@ -89,6 +89,8 @@
 memset(&tr, 0, sizeof(tr));
 INIT_LIST_HEAD(&tr.tr_buf);
 INIT_LIST_HEAD(&tr.tr_databuf);
+INIT_LIST_HEAD(&tr.tr_ail1_list);
INIT_LIST_HEAD(&tr.tr_ail2_list);
tr.tr_revokes = atomic_read(&gl->gl_ail_count);

if (!tr.tr_revokes)
--- linux-4.15.0.orig/fs/gfs2/inode.c
+++ linux-4.15.0/fs/gfs2/inode.c
@@ -715,7 +715,7 @@
    error = gfs2_trans_begin(sdp, blocks, 0);
    if (error)
        goto fail_gunlock2;
+    goto fail_free_inode;

    if (blocks > 1) {
        ip->i_eattr = ip->i_no_addr + 1;
@@ -726,7 +726,7 @@
    error = gfs2_glock_get(sdp, ip->i_no_addr, &gfs2_iopen_glops, CREATE, &io_gl);
    if (error)
        goto fail_gunlock2;
+    goto fail_free_inode;
    BUG_ON(test_and_set_bit(GLF_INODE_CREATING, &io_gl->gl_flags));

@@ -735,7 +735,6 @@
    goto fail_gunlock2;

glock_set_object(ip->i_iopen_gh.gh_gl, ip);
-gfs2_glock_put(io_gl);
gfs2_set_iop(inode);
insert_inode_hash(inode);
@@ -744,17 +743,19 @@
    the gfs2 structures. */
    if (default_acl) {
        error = __gfs2_set_acl(inode, default_acl, ACL_TYPE_DEFAULT);
+    if (error)
+        goto fail_gunlock3;
        posix_acl_release(default_acl);
+    default_acl = NULL;
    }
    if (acl) {
        -if (!error)
        +error = __gfs2_set_acl(inode, acl, ACL_TYPE_ACCESS);
+    if (error)
+        goto fail_gunlock3;
        posix_acl_release(acl);
+acl = NULL;
}

    -if (error)
    -goto fail_gunlock3;
-
    error = security_inode_init_security(&ip->i_inode, &dip->i_inode, name,
            &gfs2_initxattrs, NULL);
    if (error)
@@ -766,6 +767,8 @@
mark_inode_dirty(inode);
d_instantiate(dentry, inode);
+/* After instantiate, errors should result in evict which will destroy
+ * both inode and iopen glocks properly. */
if (file) {
    *opened |= FILE_CREATED;
error = finish_open(file, dentry, gfs2_open_common, opened);
@@ -773,15 +776,15 @@
gfs2_glock_dq_uninit(ghs);
gfs2_glock_dq_uninit(ghs + 1);
clear_bit(GLF_INODE_CREATING, &io_gl->gl_flags);
+gfs2_glock_put(io_gl);
    return error;
fail_gunlock3:
glock_clear_object(io_gl, ip);
gfs2_glock_dq_uninit(ip->i_iopen_gh);
-fail_gunlock2:
-if (io_gl)
-fail_free_inode:
if (ip->i_gl) {
    glock_clear_object(ip->i_gl, ip);
@@ -789,10 +792,8 @@
}gfs2_rsqa_delete(ip, NULL);
fail_free_acls:
    -if (default_acl)
    -posix_acl_release(default_acl);
    -if (acl)
    -posix_acl_release(acl);
+posix_acl_release(default_acl);
+posix_acl_release(acl);
fail_gunlock:
gfs2_dir_no_add(da);
gfs2_glock_dq_uninit(ghs);
@@ -1256,7 +1257,7 @@
 if (!(*opened & FILE_OPENED))
 return finish_no_open(file, d);
dput(d);
-    return 0;
+    return excl && (flags & O_CREAT) ? -EEXIST : 0;
 }

BUG_ON(d != NULL);
--- linux-4.15.0.orig/fs/gfs2/lock_dlm.c
+++ linux-4.15.0/fs/gfs2/lock_dlm.c
@@ -31,9 +31,10 @@
 * @delta is the difference between the current rtt sample and the
 * running average srtt. We add 1/8 of that to the srtt in order to
 * update the current srtt estimate. The variance estimate is a bit
- * more complicated. We subtract the abs value of the @delta from
- * the current variance estimate and add 1/4 of that to the running
- * total.
+ * more complicated. We subtract the current variance estimate from
+ * the abs value of the @delta and add 1/4 of that to the running
+ * total. That's equivalent to 3/4 of the current variance
+ * estimate plus 1/4 of the abs of @delta.
 *
 * Note that the index points at the array entry containing the smoothed
 * mean value, and the variance is always in the following entry
@@ -49,7 +50,7 @@
s64 delta = sample - s->stats[index];
s->stats[index] += (delta >> 3);
index++;
-    s->stats[index] += ((abs(delta) - s->stats[index]) >> 2);
+    s->stats[index] += (s64)(abs(delta) - s->stats[index]) >> 2;
}
/**
 @@ -282,7 +283,6 @@
 {
 struct gfs2_sbd *sdp = gl->gl_name.ln_sbd;
 struct lm_lockstruct *ls = &sdp->sd_lockstruct;
-    int lvb_needs_unlock = 0;
     int error;

 if (gl->gl_lksb.sb_lkid == 0) {
@@ -295,13 +295,15 @@
gfs2_sbstats_inc(gl, GFS2_LKS_DCOUNT);
gfs2_update_request_times(gl);
/* don't want to skip dlm_unlock writing the lvb when lock is ex */

-if (gl->gl_lksb.sb_lvbptr && (gl->gl_state == LM_ST_EXCLUSIVE))
 lvb_needs_unlock = 1;
+/* don't want to call dlm if we've unmounted the lock protocol */
+if (test_bit(DFL_UNMOUNT, &ls->ls_recover_flags)) {
 +gfs2_glock_free(gl);
 +return;
 +}
+/* don't want to skip dlm_unlock writing the lvb when lock has one */

if (test_bit(SDF_SKIP_DLM_UNLOCK, &sdp->sd_flags) &&
 - !lvb_needs_unlock) {
 +!gl->gl_lksb.sb_lvbptr) {
 gfs2_glock_free(gl);
 return;
 }
--- linux-4.15.0.orig/fs/gfs2/log.c
+++ linux-4.15.0/fs/gfs2/log.c
@@ -588,11 +588,20 @@
 bd->bd_bh = NULL;
 bd->bd_ops = &gfs2_revoke_lops;
 sdp->sd_log_num_revoke++;
-atomic_inc(&gl->gl_revokes);
+if (atomic_inc_return(&gl->gl_revokes) == 1)
 +gfs2_glock_hold(gl);
 set_bit(GLF_LFLUSH, &gl->gl_flags);
 list_add(&bd->bd_list, &sdp->sd_log_le_revoke);
 }

+void gfs2_glock_remove_revoke(struct gfs2_glock *gl)
+{
+ if (atomic_dec_return(&gl->gl_revokes) == 0) {
+ clear_bit(GLF_LFLUSH, &gl->gl_flags);
+ gfs2_glock_queue_put(gl);
+ }
+ }
+ void gfs2_write_revolves(struct gfs2_sbd *sdp)
+ {
 struct gfs2_trans *tr;
 @@ -725,8 +734,6 @@
 tr = sdp->sd_log_tr;
 if (tr) {
 sdp->sd_log_tr = NULL;
-INIT_LIST_HEAD(&tr->tr_ail1_list);
-INIT_LIST_HEAD(&tr->tr_ail2_list);
 tr->tr_first = sdp->sd_log_flush_head;

---
if (unlikely (state == SFS_FROZEN))
gfs2_assert_withdraw(sdp, tr->tr_num_buf_new && !tr->tr_num_databuf_new);
@@ -795,8 +802,10 @@
* @new: New transaction to be merged
*/

-static void gfs2_merge_trans(struct gfs2_trans *old, struct gfs2_trans *new)
+static void gfs2_merge_trans(struct gfs2_sbd *sdp, struct gfs2_trans *new)
 { 
 +struct gfs2_trans *old = sdp->sd_log_tr;
 + WARN_ON_ONCE(!test_bit(TR_ATTACHED, &old->tr_flags));

 old->tr_num_buf_new += new->tr_num_buf_new;
@@ -808,6 +817,11 @@
     +list_splice_tail_init(&new->tr_ail1_list, &old->tr_ail1_list);
     +list_splice_tail_init(&new->tr_ail2_list, &old->tr_ail2_list);
     +spin_unlock(&sdp->sd_ail_lock);
 } 

 static void log_refund(struct gfs2_sbd *sdp, struct gfs2_trans *tr)
@@ -819,7 +833,7 @@
 gfs2_log_lock(sdp);

 if (sdp->sd_log_tr) {
-  gfs2_merge_trans(sdp->sd_log_tr, tr);
+  gfs2_merge_trans(sdp, tr);
 } else if (tr->tr_num_buf_new || tr->tr_num_databuf_new) {
  gfs2_assert_withdraw(sdp, test_bit(TR_ALLOCED, &tr->tr_flags));
  sdp->sd_log_tr = tr;
--- linux-4.15.0.orig/fs/gfs2/log.h
+++ linux-4.15.0/fs/gfs2/log.h
@@ -80,6 +80,7 @@
 extern void gfs2_log_shutdown(struct gfs2_sbd *sdp);
 extern int gfs2_logd(void *data);
 extern void gfs2_add_revoke(struct gfs2_sbd *sdp, struct gfs2_bufdata *bd);
+extern void gfs2_glock_remove_revoke(struct gfs2_glock *gl);
 extern void gfs2_write_revokes(struct gfs2_sbd *sdp);

 #endif /* __LOG_DOT_H__ */
--- linux-4.15.0.orig/fs/gfs2/lops.c
+++ linux-4.15.0/fs/gfs2/lops.c
@@ -660,8 +660,7 @@
bd = list_entry(head->next, struct gfs2_bufdata, bd_list);
list_del_init(&bd->bd_list);
gl = bd->bd_gl;
-atomic_dec(&gl->gl_revokes);
-clear_bit(GLF_LFLUSH, &gl->gl_flags);
+gfs2_glock_remove_revoke(gl);
kmem_cache_free(gfs2_bufdata_cachep, bd);
}
}
--- linux-4.15.0.orig/fs/gfs2/ops_fstype.c
+++ linux-4.15.0/fs/gfs2/ops_fstype.c
@@ -72,13 +72,13 @@
if (!sdp)
    return NULL;
-sb->s_fs_info = sdp;
sdp->sd_vfs = sb;
sdp->sd_lkstats = alloc_percpu(struct gfs2_pcpu_lkstats);
if (!sdp->sd_lkstats) {
    kfree(sdp);
    return NULL;
}
+sb->s_fs_info = sdp;

set_bit(SDF_NOJOURNALID, &sdp->sd_flags);
gfs2_tune_init(&sdp->sd_tune);
@@ -161,15 +161,19 @@
return -EINVAL;
                
-/* If format numbers match exactly, we're done. */
- -if (sb->sb_fs_format == GFS2_FORMAT_FS &
-   sb->sb_multihost_format == GFS2_FORMAT_MULTI)
-    return 0;
+if (sb->sb_fs_format != GFS2_FORMAT_FS ||
+   sb->sb_multihost_format != GFS2_FORMAT_MULTI) {
+    fs_warn(sdp, "Unknown on-disk format, unable to mount\n");
+    return -EINVAL;
+}

-    fs_warn(sdp, "Unknown on-disk format, unable to mount\n");
+    if (sb->sb_bsize < 512 || sb->sb_bsize > PAGE_SIZE ||
+       (sb->sb_bsize & (sb->sb_bsize - 1))) {
+        pr_warn("Invalid superblock size\n");
+        return -EINVAL;
+}
-return -EINVAL;
+return 0;
}

static void end_bio_io_page(struct bio *bio)
@@ -922,7 +926,7 @@
}

static const match_table_t nolock_tokens = {
   -{ Opt_jid, "jid=%d\n", },
+{ Opt_jid, "jid=%d", },
   { Opt_err, NULL },
};

@@ -1179,7 +1183,17 @@
goto fail_per_node;
}

-if (!sb_rdonly(sb)) {
+if (sb_rdonly(sb)) {
+struct gfs2_holder freeze_gh;
+error = gfs2_glock_nq_init(sdp->sd_freeze_gl, LM_ST_SHARED,
+  GL_EXACT, &freeze_gh);
+if (error) {
+  fs_err(sdp, "can't make FS RO: %d\n", error);
+  goto fail_per_node;
+}
+gfs2_glock_dq_uninit(&freeze_gh);
+} else {
   error = gfs2_make_fs_rw(sdp);
   if (error) {
     fs_err(sdp, "can't make FS RW: %d\n", error);
@@ -1352,6 +1366,9 @@
struct path path;
int error;

+if (!dev_name || !*dev_name)
+return ERR_PTR(-EINVAL);
+
error = kern_path(dev_name, LOOKUP_FOLLOW, &path);
if (error) {
  pr_warn("path_lookup on %s returned error %d\n",
--- linux-4.15.0.orig/fs/gfs2/quota.c
+++ linux-4.15.0/fs/gfs2/quota.c
@@ -1039,8 +1039,7 @@
u32 x;
int error = 0;
if (capable(CAP_SYS_RESOURCE) ||
    sd->sd_args.ar_quota != GFS2_QUOTA_ON)
return 0;

error = gfs2_quota_hold(ip, uid, gid);
--- linux-4.15.0.orig/fs/gfs2/quota.h
+++ linux-4.15.0/fs/gfs2/quota.h
@@ -45,7 +45,10 @@
{
    struct gfs2_sbd *sdp = GFS2_SB(&ip->i_inode);
    int ret;
-    if (sdp->sd_args.ar_quota == GFS2_QUOTA_OFF)
-        ap->allowed = UINT_MAX; /* Assume we are permitted a whole lot */
+    if (capable(CAP_SYS_RESOURCE) ||
+        sdp->sd_args.ar_quota == GFS2_QUOTA_OFF)
return 0;
ret = gfs2_quota_lock(ip, NO_UID_QUOTA_CHANGE, NO_GID_QUOTA_CHANGE);
if (ret)
    --- linux-4.15.0.orig/fs/gfs2/rgrp.c
+++ linux-4.15.0/fs/gfs2/rgrp.c
@@ -623,7 +623,10 @@
    RB_CLEAR_NODE(&rs->rs_node);

    if (rs->rs_free) {
-        struct gfs2_bitmap *bi = rbm_bi(&rs->rs_rbm);
+        u64 last_block = gfs2_rbm_to_block(&rs->rs_rbm) +
+            rs->rs_free - 1;
+        struct gfs2_rbm last_rbm = { .rgd = rs->rs_rbm.rgd, };
+        struct gfs2_bitmap *start, *last;

        /* return reserved blocks to the rgrp */
BUG_ON(rs->rs_rbm.rgd->rd_reserved < rs->rs_free);
    } @ @ -634,7 +637,13 @@
        will force the number to be recalculated later. */
    rd->rd_extfail_pt += rs->rs_free;
    rs->rs_free = 0;
-    clear_bit(GBF_FULL, &bi->bi_flags);
+    if (gfs2_rbm_from_block(&last_rbm, last_block))
+        return;
+    start = rbm_bi(&rs->rs_rbm);
+    last = rbm_bi(&last_rbm);
+    do
+        clear_bit(GBF_FULL, &start->bi_flags);
+        while (start++ != last);
    }

---
if (gl) {
glock_clear_object(gl, rgd);
+gfs2_rgrp_brelse(rgd);
gfs2_glock_put(gl);
}
gfs2_free_clones(rgd);
+return_all_reservations(rgd);
kfree(rgd->rd_bits);
rgd->rd_bits = NULL;
-return_all_reservations(rgd);
kmem_cache_free(gfs2_rgrpd_cachep, rgd);
}
@@ -980,6 +990,10 @@
if (error < 0)
    return error;

+if (RB_EMPTY_ROOT(&sdp->sd_rindex_tree)) {
+    fs_err(sdp, "no resource groups found in the file system.\n");
+    return -ENOENT;
+}
set_rgrp_preferences(sdp);

sdp->sd_rindex_uptodate = 1;
@@ -1115,7 +1129,7 @@
    * @rgd: the struct gfs2_rgrpd describing the RG to read in
    *
    * Read in all of a Resource Group's header and bitmap blocks.
-   * Caller must eventually call gfs2_rgrp_relese() to free the bitmaps.
+   * Caller must eventually call gfs2_rgrp_brelse() to free the bitmaps.
    *
    * Returns: errno
    */
@@ -1200,7 +1214,7 @@
    rl_flags = be32_to_cpu(rgd->rd_rgl->rl_flags);
    rl_flags &= ~GFS2_RDF_MASK;
    -rgd->rd_flags |= (rl_flags | GFS2_RDF_UPTODATE | GFS2_RDF_CHECK);
+    rgd->rd_flags |= (rl_flags | GFS2_RDF_CHECK);
    if (rgd->rd_rgl->rl_unlinked == 0)
    rgd->rd_flags &= ~GFS2_RDF_CHECK;
    rd->rd_free = be32_to_cpu(rgd->rd_rgl->rl_free);
@@ -1351,6 +1365,9 @@

if (!capable(CAP_SYS_ADMIN))
    return -EPERM;

+if (!test_bit(SDF_JOURNAL_LIVE, &sdp->sd_flags))
+return -EROFS;
+
    if (!blk_queue_discard(q))
    return -EOPNOTSUPP;

@@ -1665,7 +1682,8 @@
    while(1) {
        bi = rbm_bi(rbm);
        -if (test_bit(GBF_FULL, &bi->bi_flags) &&
+        if ((ip == NULL || !gfs2_rs_active(&ip->i_res)) &&
+            test_bit(GBF_FULL, &bi->bi_flags) &&
            (state == GFS2_BLKST_FREE))
            goto next_bitmap;

--- linux-4.15.0.orig/fs/gfs2/super.c
+++ linux-4.15.0/fs/gfs2/super.c
@@ -792,7 +792,7 @@
     int need_endtrans = 0;
     int ret;

-    -if (!(flags & (I_DIRTY_DATASYNC|I_DIRTY_SYNC)))
+    if (!(flags & I_DIRTY_INODE))
        return;
     if (unlikely(test_bit(SDF_SHUTDOWN, &sdp->sd_flags)))
        return;
@@ -846,10 +846,10 @@
     if (error && !test_bit(SDF_SHUTDOWN, &sdp->sd_flags))
         return error;

+flush_workqueue(gfs2_delete_workqueue);
+ktthread_stop(sdp->sd_quotad_process);
+ktthread_stop(sdp->sd_logd_process);

-flush_workqueue(gfs2_delete_workqueue);
-gfs2_quota_sync(sdp->sd_vfs, 0);
-gfs2_statfs_sync(sdp->sd_vfs, 0);
@@ -925,6 +925,7 @@
gfs2_jindex_free(sdp);
    /* Take apart glock structures and buffer lists */
    gfs2_gl_hash_clear(sdp);
    truncate_inode_pages_final(&sdp->sd_aspace);
+gfs2_delete_debugfs_file(sdp);
/* Unmount the locking protocol */
gfs2_lm_unmount(sdp);
@@ -989,11 +990,13 @@
static int gfs2_freeze(struct super_block *sb)
{
    struct gfs2_sbd *sdp = sb->s_fs_info;
    int error = 0;
    +int error;

    mutex_lock(&sdp->sd_freeze_mutex);
    -if (atomic_read(&sdp->sd_freeze_state) != SFS_UNFROZEN)
    +if (atomic_read(&sdp->sd_freeze_state) != SFS_UNFROZEN) {
        error = -EBUSY;
        goto out;
    +}

    if (test_bit(SDF_SHUTDOWN, &sdp->sd_flags)) {
        error = -EINVAL;
        @@ -1035,10 +1038,10 @@
    struct gfs2_sbd *sdp = sb->s_fs_info;

    mutex_lock(&sdp->sd_freeze_mutex);
    -    if (atomic_read(&sdp->sd_freeze_state) != SFS_FROZEN ||
    +    if (atomic_read(&sdp->sd_freeze_state) != SFS_FROZEN ||
        !gfs2_holder_initialized(&sdp->sd_freeze_gh)) {
        mutex_unlock(&sdp->sd_freeze_mutex);
        -    return 0;
        +return -EINVAL;
    }

    gfs2_glock_dq_uninit(&sdp->sd_freeze_gh);
    --- linux-4.15.0.orig/fs/gfs2/trans.c
    +++ linux-4.15.0/fs/gfs2/trans.c
    @@ -56,6 +56,8 @@
    INIT_LIST_HEAD(&tr->tr_databuf);
    INIT_LIST_HEAD(&tr->tr_buf);
    +INIT_LIST_HEAD(&tr->tr_ail1_list);
    +INIT_LIST_HEAD(&tr->tr_ail2_list);

    sb_start_intwrite(sdp->sd_vfs);
    @@ -277,6 +279,8 @@
    list_del_init(&bd->bd_list);
    gfs2_assert_withdraw(sdp, sdp->sd_log_num_revoke);
    sdp->sd_log_num_revoke--;
    +if (bd->bd_gl)
    +gfs2_glock_remove_revoke(bd->bd_gl);
kmem_cache_free(gfs2_bufdata_cachep, bd);
tr->tr_num_revoke_rm++;
if (--n == 0)
--- linux-4.15.0.orig/fs/hfs/bfind.c
+++ linux-4.15.0/fs/hfs/bfind.c
@@ -25,7 +25,19 @@
fd->key = ptr + tree->max_key_len + 2;
hfs_dbg(BNODE_REFS, "find_init: %d (%p)\n", tree->cnid, __builtin_return_address(0));
-mutex_lock(&tree->tree_lock);
+switch (tree->cnid) {
+case HFS_CAT_CNID:
+mutex_lock_nested(&tree->tree_lock, CATALOG_BTREE_MUTEX);
+break;
+case HFS_EXT_CNID:
+mutex_lock_nested(&tree->tree_lock, EXTENTS_BTREE_MUTEX);
+break;
+case HFS_ATTR_CNID:
+mutex_lock_nested(&tree->tree_lock, ATTR_BTREE_MUTEX);
+break;
+default:
+return -EINVAL;
+}
return 0;
}

--- linux-4.15.0.orig/fs/hfs/bnode.c
+++ linux-4.15.0/fs/hfs/bnode.c
@@ -15,16 +15,31 @@
#include "btree.h"
-void hfs_bnode_read(struct hfs_bnode *node, void *buf,
-int off, int len)
+void hfs_bnode_read(struct hfs_bnode *node, void *buf, int off, int len)
{
 struct page *page;
 +int pagenum;
 +int bytes_read;
 +int bytes_to_read;
 +void *vaddr;

 off += node->page_offset;
-page = node->page[0];
+pagenum = off >> PAGE_SHIFT;
+off &= ~PAGE_MASK; /* compute page offset for the first page */

-memcpy(buf, kmap(page) + off, len);


for (bytes_read = 0; bytes_read < len; bytes_read += bytes_to_read) {
    if (pagenum >= node->tree->pages_per_bnode)
        break;
    page = node->page[pagenum];
    bytes_to_read = min_t(int, len - bytes_read, PAGE_SIZE - off);
    vaddr = kmap_atomic(page);
    memcpy(buf + bytes_read, vaddr + off, bytes_to_read);
    kunmap_atomic(vaddr);
    pagenum++;
    off = 0; /* page offset only applies to the first page */
}

u16 hfs_bnode_read_u16(struct hfs_bnode *node, int off)

if (!fd->bnode) {
    if (!tree->root)
        hfs_btree_inc_height(tree);
    fd->bnode = hfs_bnode_find(tree, tree->leaf_head);
    if (IS_ERR(fd->bnode))
        return PTR_ERR(fd->bnode);
    fd->record = -1;
}

new_node = NULL;

if (new_node) {
    if (!new_node->parent) {
        hfs_btree_inc_height(tree);
        new_node->parent = tree->root;
    }
    fd->bnode = hfs_bnode_find(tree, new_node->parent);
    if (IS_ERR(new_node))
        return PTR_ERR(new_node);
    fd->record = -1;
}

new_node = NULL;

if (new_node) {
    if (!new_node->parent) {
        hfs_btree_inc_height(tree);
        new_node->parent = tree->root;
    }
    fd->bnode = hfs_bnode_find(tree, new_node->parent);
    if (IS_ERR(new_node))
        return PTR_ERR(new_node);
    fd->record = -1;
}

u16 hfs_bnode_read_u16(struct hfs_bnode *node, int off)
new_node = NULL;
}

if (!rec & node->parent)
--- linux-4.15.0.orig/fs/hfs/btree.c
+++ linux-4.15.0/fs/hfs/btree.c
@@ -220,25 +220,17 @@
return node;
}

-struct hfs_bnode *hfs_bmap_alloc(struct hfs_btree *tree)
+/* Make sure @tree has enough space for the @rsvd_nodes */
+int hfs_bmap_reserve(struct hfs_btree *tree, int rsvd_nodes)
{
-struct hfs_bnode *node, *next_node;
-struct page **pagep;
-u32 nidx, idx;
-unsigned off;
-u16 off16;
-u16 len;
-u8 *data, byte, m;
-int i;
-
-while (!tree->free_nodes) {
-struct inode *inode = tree->inode;
-u32 count;
-int res;
+while (tree->free_nodes < rsvd_nodes) {
+res = hfs_extend_file(inode);
+if (res)
+return ERR_PTR(res);
+return res;
-HFS_I(inode)->phys_size = inode->i_size =
-(loff_t)HFS_I(inode)->alloc_blocks *
-HFS_SB(tree->sb)->allocblksize;
-@ @ -246,9 +238,26 @@
-tree->sb->s_blocksize_bits;
inode_set_bytes(inode, inode->i_size);
count = inode->i_size >> tree->node_size_shift;
-tree->free_nodes = count - tree->node_count;
+tree->free_nodes += count - tree->node_count;
tree->node_count = count;
} 
+return 0;
struct hfs_bnode *hfs_bmap_alloc(struct hfs_btree *tree) {
  struct hfs_bnode *node, *next_node;
  struct page **pagep;
  u32 nidx, idx;
  unsigned off;
  u16 off16;
  u16 len;
  u8 *data, byte, m;
  int i, res;

  res = hfs_bmap_reserve(tree, 1);
  if (res)
    return ERR_PTR(res);

  nidx = 0;
  node = hfs_bnode_find(tree, nidx);
  nidx -= len * 8;
  i = node->next;
  hfs_bnode_put(node);
  if (!i) {
    /* panic */;
    pr_crit("unable to free bnode %u. bmap not found\n",
      node->this);
    hfs_bnode_put(node);
    return;
  }

  hfs_bnode_put(node);
  node = hfs_bnode_find(tree, i);
  if (IS_ERR(node))
    return;

  --- linux-4.15.0.orig/fs/hfs/btree.h
  +++ linux-4.15.0/fs/hfs/btree.h
  @@ -13,6 +13,13 @@

  #define NODE_HASH_SIZE 256

  /* B-tree mutex nested subclasses */
  enum hfs_btree_mutex_classes {
    CATALOG_BTREE_MUTEX,
    EXTENTS_BTREE_MUTEX,
    ATTR_BTREE_MUTEX,
    +} ;
  +


/* A HFS BTree held in memory */
struct hfs_btree {
    struct super_block *sb;
}

--- linux-4.15.0.orig/fs/hfs/catalog.c
+++ linux-4.15.0/fs/hfs/catalog.c
@@ -97,6 +97,14 @@
     err = hfs_bmap_reserve(fd.tree, 2 * fd.tree->depth);
     if (err)
         goto err2;
+
     hfs_cat_build_key(sb, fd.search_key, cnid, NULL);
     entry_size = hfs_cat_build_thread(sb, &entry, S_ISDIR(inode->i_mode) ?
         HFS_CDR_THD : HFS_CDR_FTH,
@@ -295,6 +303,14 @@
     dst_fd = src_fd;
+
     --- linux-4.15.0.orig/fs/hfs/extent.c
+++ linux-4.15.0/fs/hfs/extent.c
@@ -117,6 +117,10 @@
 if (HFS_I(inode)->flags & HFS_FLG_EXT_NEW) {
     if (res != -ENOENT)
return res;
+ /* Fail early and avoid ENOSPC during the btree operation */
+ res = hfs_bmap_reserve(fd->tree, fd->tree->depth + 1);
+ if (res)
+ 
+ return res;
+
+ hfs_brec_insert(fd, HFS_I(inode)->cached_extents, sizeof(hfs_extent_rec));
+ HFS_I(inode)->flags &= ~(HFS_FLG_EXT_DIRTY|HFS_FLG_EXT_NEW);
+ } else {
+ @ @ -300,7 +304,7 @@
+ return 0;
+
+ blocks = 0;
+ -for (i = 0; i < 3; extent++, i++)
+ +for (i = 0; i < 3; i++)
+ blocks += be16_to_cpu(extent[i].count);
+
+ res = hfs_free_extents(sb, extent, blocks, blocks);
+ @ @ -341,7 +345,9 @@
+ ablock = (u32)block / HFS_SB(sb)->fs_div;
+
+ if (block >= HFS_I(inode)->fs_blocks) {
+ -if (block > HFS_I(inode)->fs_blocks || !create)
+ +if (!create)
+ +return 0;
+ +if (block > HFS_I(inode)->fs_blocks)
+ return -EIO;
+ if (ablock >= HFS_I(inode)->alloc_blocks) {
+ res = hfs_extend_file(inode);
+ -- linux-4.15.0.orig/fs/hfs/inode.c
+ --- linux-4.15.0/fs/hfs/inode.c
+ +++ linux-4.15.0/fs/hfs/inode.c
+ @ @ -642,6 +642,8 @@
+
+ truncate_setsize(inode, attr->ia_size);
+ hfs_file_truncate(inode);
+ 
+ setattr_copy(inode, attr);
+ --- linux-4.15.0.orig/fs/hfs/super.c
+ --- linux-4.15.0/fs/hfs/super.c
+ @ @ -427,14 +427,12 @@
+ if (!res) {
+ if (fd.entrylength > sizeof(rec) || fd.entrylength < 0) {
+ res = -EIO;
+ goto bail;
+ + goto bail_hfs_find;
+ }
hfs_bnode_read(fd.bnode, &rec, fd.entryoffset, fd.entrylength);
}
-if (res) {
-hfs_find_exit(&fd);
-goto bail_no_root;
-
} +if (res)
+goto bail_hfs_find;
res = -EINVAL;
root_inode = hfs_iget(sb, &fd.search_key->cat, &rec);
hfs_find_exit(&fd);
@@ -450,6 +448,8 @@
/* everything's okay */
return 0;

+bail_hfs_find:
+hfs_find_exit(&fd);
bail_no_root:
pr_err("get root inode failed\n");
bail:
--- linux-4.15.0.orig/fs/hfsplus/attributes.c
+++ linux-4.15.0/fs/hfsplus/attributes.c
@@ -217,6 +217,11 @@
if (err)
goto failed_init_create_attr;

+/* Fail early and avoid ENOSPC during the btree operation */
+err = hfs_bmap_reserve(fd.tree, fd.tree->depth + 1);
+if (err)
+goto failed_create_attr;
+
+if (name) {
err = hfsplus_attr_build_key(sb, fd.search_key,(inode->i_ino, name);
@@ -287,6 +292,10 @@
return -ENOENT;
}

+/* Avoid btree corruption */
+hfs_bnode_read(fd->bnode, fd->search_key, +fd->keyoffset, fd->keylength);
+
+err = hfs_brec_remove(fd);
if (err)
    return err;
@@ -313,6 +322,11 @@
if (err)
    return err;
/* Fail early and avoid ENOSPC during the btree operation */
err = hfs_bmap_reserve(fd.tree, fd.tree->depth);
if (err)
    goto out;

if (name) {
    err = hfsplus_attr_build_key(sb, fd.search_key,
        inode->i_ino, name);
    if (new_node) {
        __be32 cnid;
        if (!new_node->parent) {
            hfs_btree_inc_height(tree);
            new_node->parent = tree->root;
        }
        fd->bnode = hfs_bnode_find(tree, new_node->parent);
        /* create index key and entry */
        hfs_bnode_read_key(new_node, fd->search_key, 14);
        /* restore search_key */
        hfs_bnode_read_key(node, fd->search_key, 14);
        +new_node = NULL;
    }
    if (!rec && node->parent)
        return node;
    struct hfs_bnode *hfs_bnode_alloc(struct hfs_btree *tree)
    /* Make sure @tree has enough space for the @rsvd_nodes */
    +int hfs_bmap_reserve(struct hfs_btree *tree, int rsvd_nodes)
    { -struct hfs_bnode *node, *next_node;
        -struct page **pagep;
        -u32 nidx, idx;
        -unsigned off;
        -u16 off16;
        -u16 len;
        -u8 *data, byte, m;
        -int i;
struct inode *inode = tree->inode;
struct hfsplus_inode_info *hip = HFSPLUS_I(inode);

while (!tree->free_nodes) {
    struct inode *inode = tree->inode;
    struct hfsplus_inode_info *hip = HFSPLUS_I(inode);
    u32 count;
    int res;
    if (rsvd_nodes <= 0)
        return 0;
    while (tree->free_nodes < rsvd_nodes) {
        res = hfsplus_file_extend(inode, hfs_bnode_need_zeroout(tree));
        if (res)
            return ERR_PTR(res);
        hip->phys_size = inode->i_size =
            (loff_t)hip->alloc_blocks <<
            HFSPLUS_SB(tree->sb)->alloc_blksz_shift;
            @ @ -369.9 +364.26 @ @
            hip->alloc_blocks << HFSPLUS_SB(tree->sb)->fs_shift;
        inode_set_bytes(inode, inode->i_size);
        count = inode->i_size >> tree->node_size_shift;
        tree->free_nodes += count - tree->node_count;
        tree->node_count = count;
    }
    return 0;
}
+ struct hfs_bnode *hfs_bmap_alloc(struct hfs_btree *tree)
+ {
    struct hfs_bnode *node, *next_node;
    struct page **pagep;
    u32 nidx, idx;
    unsigned off;
    u16 off16;
    u16 len;
    u8 *data, byte, m;
    int i, res;
    +
    res = hfs_bmap_reserve(tree, 1);
    if (res)
        return ERR_PTR(res);

    nidx = 0;
node = hfs_bnode_find(tree, nidx);
@@ -454,14 +466,15 @@
nidx -= len * 8;
i = node->next;
-hfs_bnode_put(node);
if (!i) {
    /* panic */;
    pr_crit("unable to free bnode %u. "
    "bmap not found!\n",
    node->this);
    +hfs_bnode_put(node);
    return;
}
+hfs_bnode_put(node);
node = hfs_bnode_find(tree, i);
if (IS_ERR(node))
    return;
--- linux-4.15.0.orig/fs/hfsplus/catalog.c
+++ linux-4.15.0/fs/hfsplus/catalog.c
@@ -265,6 +265,14 @@
if (err)
    return;
+/*
+ * Fail early and avoid ENOSPC during the btree operations. We may
+ * have to split the root node at most once.
+ */
+err = hfs_bmap_reserve(fd.tree, 2 * fd.tree->depth);
+if (err)
+    goto err2;
+hsplus_cat_build_key_with_cnid(sb, fd.search_key, cnid);
+entry_size = hsplus_fill_cat_thread(sb, &entry,
+S_ISDIR(inode->i_mode) ?
@@ -333,6 +341,14 @@
if (err)
    return;
+/*
+ * Fail early and avoid ENOSPC during the btree operations. We may
+ * have to split the root node at most once.
+ */
+err = hfs_bmap_reserve(fd.tree, 2 * (int)fd.tree->depth - 2);
+if (err)
+    goto out;
+
+if (!str) {


int len;

@@ -433,6 +449,14 @@
    return err;
    dst_fd = src_fd;

+/**
+ * Fail early and avoid ENOSPC during the btree operations. We may
+ * have to split the root node at most twice.
+ */
+err = hfs_bmap_reserve(src_fd.tree, 4 * (int)src_fd.tree->depth - 1);
+if (err)
+    goto out;
+
/* find the old dir entry and read the data */
err = hfsplus_cat_build_key(sb, src_fd.search_key,
    src_dir->i_ino, src_name);
--- linux-4.15.0.orig/fs/hfsplus/dir.c
+++ linux-4.15.0/fs/hfsplus/dir.c
@@ -78,13 +78,13 @@
    cpu_to_be32(HFSP_HARDLINK_TYPE) &&
    entry.file.user_info.fdCreator ==
    cpu_to_be32(HFSP_HFSPLUS_CREATOR) &&
+    HFSPLUS_SB(sb)->hidden_dir &&
    (entry.file.create_date ==
    HFSPLUS_I(HFSPLUS_SB(sb)->hidden_dir)->create_date ||
    entry.file.create_date ==
    HFSPLUS_I(d_inode(sb->s_root))->create_date) &&
    -HFSPLUS_SB(sb)->hidden_dir) {
    +create_date)) {
        struct qstr str;
        char name[32];

--- linux-4.15.0.orig/fs/hfsplus/extents.c
+++ linux-4.15.0/fs/hfsplus/extents.c
@@ -100,6 +100,10 @@
    if (hip->extent_state & HFSPLUS_EXT_NEW) {
    if (res != -ENOENT)
        return res;
+    /** Fail early and avoid ENOSPC during the btree operation */
+    +res = hfs_bmap_reserve(fd->tree, fd->tree->depth + 1);
+    +if (res)
+        +return res;
    hfs_brec_insert(fd, hip->cached_extents,
        sizeof(hfsplus_extent_rec));
    hip->extent_state &= ~((HFSPLUS_EXT_DIRTY | HFSPLUS_EXT_NEW);
ablock = iblock >> sbi->fs_shift;

if (iblock >= hip->fs_blocks) {
  -if (iblock > hip->fs_blocks || !create)
  +if (!create)
    +return 0;
  +if (iblock > hip->fs_blocks)
    return -EIO;
if (ablock >= hip->alloc_blocks) {
  res = hfsplus_file_extend(inode, false);
}

#define hfs_btree_open hfsplus_btree_open
#define hfs_btree_close hfsplus_btree_close
#define hfs_btree_write hfsplus_btree_write
#define hfs_bmap_reserve hfsplus_bmap_reserve
#define hfs_bmap_alloc hfsplus_bmap_alloc
#define hfs_bmap_free hfsplus_bmap_free
#define hfs_bnode_read hfsplus_bnode_read

struct hfs_btree *hfs_btree_open(struct super_block *sb, u32 id);
void hfs_btree_close(struct hfs_btree *tree);
int hfs_btree_write(struct hfs_btree *tree);
+int hfs_bmap_reserve(struct hfs_btree *tree, int rsvd_nodes);
struct hfs_bnode *hfs_bmap_alloc(struct hfs_btree *tree);
void hfs_bmap_free(struct hfs_bnode *node);

--- linux-4.15.0.orig/fs/hfsplus/inode.c
+++ linux-4.15.0/fs/hfsplus/inode.c
@@ -262,6 +262,7 @@
   truncate_setsize(inode, attr->ia_size);
   hfsplus_file_truncate(inode);
   +inode->i_mtime = inode->i_ctime = current_time(inode);
   }

   setattr_copy(inode, attr);
--- linux-4.15.0.orig/fs/hfsplus/super.c
+++ linux-4.15.0/fs/hfsplus/super.c
@@ -524,8 +524,10 @@
   goto out_put_root;
   if (!hfs_brec_read(&fd, &entry, sizeof(entry))) {
     hfs_find_exit(&fd);
   -if (entry.type != cpu_to_be16(HFSPLUS_FOLDER))
     +if (entry.type != cpu_to_be16(HFSPLUS_FOLDER)) {
       +err = -EINVAL;
     }
goto out_put_root;
+
inode = hfsplus_iget(sb, be32_to_cpu(entry.folder.id));
if (IS_ERR(inode)) {
    err = PTR_ERR(inode);
	goto out_put_root;
    }
    
    out_put_hidden_dir:
    +cancel_delayed_work_sync(&sbi->sync_work);
    iput(sbi->hidden_dir);
    out_put_root:
    dput(sb->s_root);
    
--- linux-4.15.0.orig/fs/hugetlbfs/inode.c
+++ linux-4.15.0/fs/hugetlbfs/inode.c
@@ -118,6 +118,16 @@
    pagevec_reinit(pvec);
    }

+/*
+ * Mask used when checking the page offset value passed in via system
+ * calls. This value will be converted to a loff_t which is signed.
+ * Therefore, we want to check the upper PAGE_SHIFT + 1 bits of the
+ * value. The extra bit (-1 in the shift value) is to take the sign
+ * bit into account.
+ */
+#define PGOFF_LOFFT_MAX 
+((((1UL << (PAGE_SHIFT + 1)) - 1) << (BITS_PER_LONG - (PAGE_SHIFT + 1)))
+ static int hugetlbfs_file_mmap(struct file *file, struct vm_area_struct *vma)
+ {
+    struct inode *inode = file_inode(file);
+    vma->vm_ops = &hugetlb_vm_ops;
+    /*
+     - * Offset passed to mmap (before page shift) could have been
+     - * negative when represented as a (l)off_t.
+     - * page based offset in vm_pgoff could be sufficiently large to
+     - * overflow a loff_t when converted to byte offset. This can
+     - * only happen on architectures where sizeof(loff_t) ==
+     - * sizeof(unsigned long). So, only check in those instances.
+     */
+    -if (((loff_t)vma->vm_pgoff << PAGE_SHIFT) < 0)
+        return -EINVAL;
+    +if (sizeof(unsigned long) == sizeof(loff_t)) {
+        +if (vma->vm_pgoff & PGOFF_LOFFT_MAX)
+            return -EINVAL;
+    

+/* must be huge page aligned */
if (vma->vm_pgoff & (~huge_page_mask(h) >> PAGE_SHIFT))
return -EINVAL;

@@ -421,9 +436,7 @@
u32 hash;
index = page->index;
-hash = hugetlb_fault_mutex_hash(h, current->mm,
- &pseudo_vma,
- mapping, index, 0);
+hash = hugetlb_fault_mutex_hash(h, mapping, index);
mutex_lock(&hugetlb_fault_mutex_table[hash]);

/*
@@ -542,7 +555,6 @@
struct address_space *mapping = inode->i_mapping;
struct hstate *h = hstate_inode(inode);
struct vm_area_struct pseudo_vma;
-struct mm_struct *mm = current->mm;
loff_t hpage_size = huge_page_size(h);
unsigned long hpage_shift = huge_page_shift(h);
pgoff_t start, index, end;
@@ -606,8 +618,7 @@
 addr = index * hpage_size;
/* mutex taken here, fault path and hole punch */
-hash = hugetlb_fault_mutex_hash(h, mm, &pseudo_vma, mapping,
- index, addr);
+hash = hugetlb_fault_mutex_hash(h, mapping, index);
mutex_lock(&hugetlb_fault_mutex_table[hash]);

/* See if already present in mapping to avoid alloc/free */
@@ -638,9 +649,10 @@
mutex_unlock(&hugetlb_fault_mutex_table[hash]);

+set_page_huge_active(page);
/*
 * unlock_page because locked by add_to_page_cache()
- * page_put due to reference from alloc_huge_page()
+ * put_page() due to reference from alloc_huge_page()
 */
unlock_page(page);
put_page(page);
@@ -714,11 +726,17 @@
umode_t mode, dev_t dev)
{
    struct inode *inode;
    -struct resv_map *resv_map;
    +struct resv_map *resv_map = NULL;

    -resv_map = resv_map_alloc();
    -if (!resv_map)
    -return NULL;
    +/*
    + * Reserve maps are only needed for inodes that can have associated
    + * page allocations.
    + */
    +if (S_ISREG(mode) || S_ISLNK(mode)) {
    +#resv_map = resv_map_alloc();
    +#if (!resv_map)
    +#return NULL;
    +}

    inode = new_inode(sb);
    if (inode) {
        @-750,8 +768,10 @
        break;
    }
    lockdep_annotate_inode_mutex_key(inode);
    } else
    -kref_put(&resv_map->refs, resv_map_release);
    +#} else {
    +#kref_put(&resv_map->refs, resv_map_release);
    +#}

    return inode;
}

rc = migrate_huge_page_move_mapping(mapping, newpage, page);
if (rc != MIGRATEPAGE_SUCCESS)
return rc;
+
+/*
+ * page_private is subpool pointer in hugetlb pages. Transfer to
+ * new page. PagePrivate is not associated with page_private for
+ * hugetlb pages and can not be set here as only page_huge_active
+ * pages can be migrated.
+ */
+if (page_private(page)) {
    +set_page_private(newpage, page_private(page));
    +set_page_private(page, 0);
if (mode != MIGRATE_SYNC_NO_COPY)
migrate_page_copy(newpage, page);
else

--- linux-4.15.0.orig/fs/inode.c
+++ linux-4.15.0/fs/inode.c
@@ -135,6 +135,7 @@
inode->i_sb = sb;
inode->i_blkbits = sb->s_blocksize_bits;
inode->i_flags = 0;
+atomic64_set(&inode->i_sequence, 0);
atomic_set(&inode->i_count, 1);
inode->i_op = &empty_iops;
inode->i_fop = &no_open_fops;
@@ -177,6 +178,7 @@
mapping->a_ops = &empty_aops;
mapping->host = inode;
mapping->flags = 0;
+mapping->wb_err = 0;
atomic_set(&mapping->i_mmap_writable, 0);
mapping_set_gfp_mask(mapping, GFP_HIGHUSER_MOVABLE);
mapping->private_data = NULL;
@@ -655,6 +657,7 @@
struct inode *inode, *next;
LIST_HEAD(dispose);

+again:
spin_lock(&sb->s_inode_list_lock);
list_for_each_entry_safe(inode, next, &sb->s_inodes, i_sb_list) {
  spin_lock(&inode->i_lock);
@@ -677,6 +680,12 @@
inode_lru_list_del(inode);
spin_unlock(&inode->i_lock);
list_add(&inode->i_lru, &dispose);
+if (need_resched()) {
+spin_unlock(&sb->s_inode_list_lock);
+cond_resched();
+dispose_list(&dispose);
+goto again;
+
}
sp

@@ -1655,7 +1664,7 @@
* This does the actual work of updating an inodes time or version. Must have
* had called mnt_want_write() before calling this.
*/
-static int update_time(struct inode *inode, struct timespec *time, int flags)
+int update_time(struct inode *inode, struct timespec *time, int flags)
  {
  int (*update_time)(struct inode *, struct timespec *, int);

@@ -1664,6 +1673,7 @@

return update_time(inode, time, flags);
  }
+EXPORT_SYMBOL_GPL(update_time);

/**
 * touch_atime-update the access time
@@ -1749,7 +1759,8 @@
*/
int should_remove_suid(struct dentry *dentry)
  {
-umode_t mode = d_inode(dentry)->i_mode;
+struct inode *inode = d_inode(dentry);
+umode_t mode = inode->i_mode;
+struct inode *inode = d_inode(dentry);
+umode_t mode = inode->i_mode;
  int kill = 0;

/* suid always must be killed */
@@ -1763,7 +1774,8 @@

if (unlikely((mode & S_ISGID) && (mode & S_IXGRP)))
  kill |= ATTR_KILL_SGID;

-if (unlikely(kill && !capable(CAP_FSETID) && S_ISREG(mode)))
+if (unlikely(kill && !capable_wrt_inode_uidgid(inode, CAP_FSETID) &&
+S_ISREG(mode)))
  return kill;

return 0;
@@ -1816,8 +1828,13 @@
int kill;
int error = 0;

-/* Fast path for nothing security related */
-/*! (IS_NOSEC(inode))
+/*
+ * Fast path for nothing security related.
+ * As well for non-regular files, e.g. blkdev inodes.
+ * For example, blkdev_write_iter() might get here
+ * trying to remove privs which it is not allowed to.
+ */
+if (IS_NOSEC(inode) || !S_ISREG(inode->i_mode))
  return 0;


kill = dentry_needs_remove_prv(dentry);
@@ -2005,8 +2022,14 @@
inode->i_uid = current_fsuid();
if (dir && dir->i_mode & S_ISGID) {
  inode->i_gid = dir->i_gid;
+
  /* Directories are special, and always inherit S_ISGID */
  if (S_ISDIR(mode))
    mode |= S_ISGID;
+else if ((mode & (S_ISGID | S_IXGRP)) == (S_ISGID | S_IXGRP) &&
+    !in_group_p(inode->i_gid) &&
+    !capable_wrt_inode_uidgid(dir, CAP_FSETID))
+  mode &= ~S_ISGID;
  } else
  inode->i_gid = current_fsgid();
inode->i_mode = mode;
--- linux-4.15.0.orig/fs/internal.h
+++ linux-4.15.0/fs/internal.h
@@ -70,10 +70,8 @@
extern void __init mnt_init(void);
extern int __mnt_want_write(struct vfsmount *);
extern int __mnt_want_write_file(struct file *);
extern int mnt_want_write_file_path(struct file *);
-extern void __mnt_drop_write(struct vfsmount *);
-extern void __mnt_drop_write_file(struct file *);
-extern void mnt_drop_write_file_path(struct file *);
+extern void __mnt_drop_write_file(struct file *);
+extern void mnt_drop_write_file_path(struct file *);
@@ -113,7 +111,6 @@
extern int open_check_o_direct(struct file *);
extern int vfs_open(const struct path *, struct file *, const struct cred *);
-extern struct file *filp_clone_open(struct file *);
/*
 *    inode.c
--- linux-4.15.0.orig/fs/ioctl.c
+++ linux-4.15.0/fs/ioctl.c
@@ -229,7 +229,7 @@
 ret = -EXDEV;
 if (src_file.file->f_path.mnt != dst_file->f_path.mnt)
  goto fdput;
-ret = do_clone_file_range(src_file.file, off, dst_file, destoff, olen);
+ret = vfs_clone_file_range(src_file.file, off, dst_file, destoff, olen);
  fdput:
  fdput(src_file);
  return ret;
struct super_block *sb = file_inode(filp)->i_sb;

@if (!capable(CAP_SYS_ADMIN))
+if (!ns_capable(sb->s_user_ns, CAP_SYS_ADMIN))
return -EPERM;

/* If filesystem doesn't support freeze feature, return. */
struct super_block *sb = file_inode(filp)->i_sb;

-if (!capable(CAP_SYS_ADMIN))
+if (!ns_capable(sb->s_user_ns, CAP_SYS_ADMIN))
return -EPERM;

/* Thaw */
--- linux-4.15.0.orig/fs/iomap.c
+++ linux-4.15.0/fs/iomap.c
@@ -683,6 +683,8 @@

- Private flags for iomap_dio, must not overlap with the public ones in
- iomap.h:
- */
+#define IOMAP_DIO_WRITE_FUA	(1 << 28)
+#define IOMAP_DIO_NEED_SYNC	(1 << 29)
#define IOMAP_DIO_WRITE		(1 << 30)
#define IOMAP_DIO_DIRTY		(1 << 31)

@@ -694,6 +696,7 @@
atomic_t		ref;
unsigned		flags;
terror;
+boolwait_for_completion;

union {
/* used during submission and for synchronous completion: */
@@ -753,9 +756,17 @@
err = invalidate_inode_pages2_range(inode->i_mapping,
offset >> PAGE_SHIFT,
(offset + dio->size - 1) >> PAGE_SHIFT);
-WARN_ON_ONCE(err);
+if (err)
+dio_warn_stale_pagecache(iocb->ki_filp);
}

+/*
+ * If this is a DSYNC write, make sure we push it to stable storage now
+ */

+ * that we've written data.
+ */
+if (ret > 0 && (dio->flags & IOMAP_DIO_NEED_SYNC))
+ret = generic_write_sync(iocb, ret);
+
inode_dio_end(file_inode(iocb->ki_filp));
kfree(dio);

@@ -766,13 +777,8 @@

{ struct iomap_dio *dio = container_of(work, struct iomap_dio, aio.work);
struct kiocb *iocb = dio->iocb;
-bool is_write = (dio->flags & IOMAP_DIO_WRITE);
-ssize_t ret;
-
-ret = iomap_dio_complete(dio);
-if (is_write && ret > 0)
-ret = generic_write_sync(iocb, ret);
-iocb->ki_complete(iocb, ret, 0);
+iocb->ki_complete(iocb, iomap_dio_complete(dio), 0);
}

*/
@@ -794,9 +800,8 @@
iomap_dio_set_error(dio, blk_status_to_errno(bio->bi_status));

if (atomic_dec_and_test(&dio->ref)) {
-    if (is_sync_kiocb(dio->iocb)) {
+    if (dio->wait_for_completion) {
struct task_struct *waiter = dio->submit.waiter;
-
WRITE_ONCE(dio->submit.waiter, NULL);
    wake_up_process(waiter);
} else if (dio->flags & IOMAP_DIO_WRITE) {
@@ -855,7 +860,8 @@
    struct iov_iter iter;
    struct bio *bio;
    bool need_zeroout = false;
-    int nr_pages, ret;
+    bool use_fua = false;
+    int nr_pages, ret = 0;
    size_t copied = 0;

    if ((pos | length | align) & ((1 << blkbits) - 1))
@@ -878,8 +884,20 @@
case IOMAP_MAPPED:
        if (iomap->flags & IOMAP_F_SHARED)
dio->flags |= IOMAP_DIO_COW;

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-if (iomap->flags & IOMAP_F_NEW)
+if (iomap->flags & IOMAP_F_NEW) {
  need_zeroout = true;
} else {
+/*
  * Use a FUA write if we need datasync semantics, this
  * is a pure data IO that doesn't require any metadata
  * updates and the underlying device supports FUA. This
  * allows us to avoid cache flushes on IO completion.
  * */
+if (!((iomap->flags & (IOMAP_F_SHARED|IOMAP_F_DIRTY)) &&
  +  (dio->flags & IOMAP_DIO_WRITE_FUA) &&
  +  blk_queue_fua(bdev_get_queue(iomap->bdev)))
+use_fua = true;
+}
break;
default:
WARN_ON_ONCE(1);
@@ -921,16 +939,26 @@
ret = bio iov_iter_get_pages(bio, &iter);
if (unlikely(ret)) {
+/*
  * We have to stop part way through an IO. We must fall
  * through to the sub-block tail zeroing here, otherwise
  * this short IO may expose stale data in the tail of
  * the block we haven't written data to.
  * */
  bio_put(bio);
-return copied ? copied : ret;
+goto zero_tail;
}

n = bio->bi_iter.bi_size;
if (dio->flags & IOMAP_DIO_WRITE) {
  -bio_set_op_attrs(bio, REQ_OP_WRITE, REQ_SYNC | REQ_IDLE);
+bio->bi_opf = REQ_OP_WRITE | REQ_SYNC | REQ_IDLE;
+if (use_fua)
+bio->bi_opf |= REQ_FUA;
+else
+dio->flags &~ IOMAP_DIO_WRITE_FUA;
task_io_account_write(n);
} else {
  -bio_set_op_attrs(bio, REQ_OP_READ, 0);
+bio->bi_opf = REQ_OP_READ;
  if (dio->flags & IOMAP_DIO_DIRTY)
  bio_set_pages_dirty(bio);
dio->submit.cookie = submit_bio(bio);
} while (nr_pages);

- if (need_zeroout) {
+ /*
+ * We need to zeroout the tail of a sub-block write if the extent type
+ * requires zeroing or the write extends beyond EOF. If we don't zero
+ * the block tail in the latter case, we can expose stale data via mmap
+ * reads of the EOF block.
+ */
+ zero_tail:
+ if (need_zeroout ||
+ ((dio->flags & IOMAP_DIO_WRITE) && pos >= i_size_read(inode))) {
+ /* zero out from the end of the write to the end of the block */
+ pad = pos & (fs_block_size - 1);
+ if (pad)
+ iomap_dio_zero(dio, iomap, pos, fs_block_size - pad);
+ return copied;
+ return copied ? copied : ret;
+ }
+
+/*
+ * iomap_dio_rw() always completes O_[D]SYNC writes regardless of whether the IO
+ * is being issued as AIO or not. This allows us to optimise pure data writes
+ * to use REQ_FUA rather than requiring generic_write_sync() to issue a
+ * REQ_FLUSH post write. This is slightly tricky because a single request here
+ * can be mapped into multiple disjoint IOs and only a subset of the IOs issued
+ * may be pure data writes. In that case, we still need to do a full data sync
+ * completion.
+ */
+ ssize_t
+ iomap_dio_rw(struct kiocb *iocb, struct iov_iter *iter,
+ const struct iomap_ops *ops, iomap_dio_end_io_t end_io)
+ @ @ -968.6 +1013.7 @ @
+ loff_t pos = iocb->ki_pos, start = pos;
+ loff_t end = iocb->ki_pos + count - 1, ret = 0;
+ unsigned int flags = IOMAP_DIRECT;
+ bool wait_for_completion = is_sync_kiocb(iocb);
+ struct blk_plug plug;
+ struct iomap_dio *dio;
+
+ @ @ -989.11 +1035.9 @ @
+ dio->flags = 0;
+
+ dio->submit.iter = iter;
+ - if (is_sync_kiocb(iocb)) {
+ */
dio->submit.waiter = current;
-dio->submit.cookie = BLK_QC_T_NONE;
-dio->submit.last_queue = NULL;
-
+dio->submit.waiter = current;
+dio->submit.cookie = BLK_QC_T_NONE;
+dio->submit.last_queue = NULL;

if (iov_iter_rw(iter) == READ) {
    if (pos >= dio->i_size)
        @@ -1002,8 +1046,21 @@
    if (iter->type == ITER_IOVEC)
        dio->flags |= IOMAP_DIO_DIRTY;
    } else {
        -dio->flags |= IOMAP_DIO_WRITE;
        flags |= IOMAP_WRITE;
        +dio->flags |= IOMAP_DIO_WRITE;
        +
        /* for data sync or sync, we need sync completion processing */
        +if (iocb->ki_flags & IOCB_DSYNC)
        +dio->flags |= IOMAP_DIO_NEED_SYNC;
        +
        +/*
        + * For datasync only writes, we optimistically try using FUA for
        + * this IO. Any non-FUA write that occurs will clear this flag,
        + * hence we know before completion whether a cache flush is
        + * necessary.
        + */
        +if ((iocb->ki_flags & (IOCB_DSYNC | IOCB_SYNC)) == IOCB_DSYNC)
        +dio->flags |= IOMAP_DIO_WRITE_FUA;
    }

    if (iocb->ki_flags & IOCB_NOWAIT) {
        @@ -1018,12 +1075,19 @@
        if (ret)
            goto out_free_dio;

        +/*
        + * Try to invalidate cache pages for the range we're direct
        + * writing. If this invalidation fails, tough, the write will
        + * still work, but racing two incompatible write paths is a
        + * pretty crazy thing to do, so we don't support it 100%.
        + */
        +ret = invalidate_inode_pages2_range(mapping,
            start >> PAGE_SHIFT, end >> PAGE_SHIFT);
        +WARN_ON_ONCE(ret);
        +if (ret)
            dio_warn_stale_pagecache(iocb->ki_filp);
ret = 0;

-if (iov_iter_rw(iter) == WRITE && !is_sync_kiocb(iocb) &&
+if (iov_iter_rw(iter) == WRITE && !wait_for_completion &&
   !inode->i_sb->s_dio_done_wq) {
   ret = sb_init_dio_done_wq(inode->i_sb);
   if (ret < 0)
      @ @ -1038,22+1102,54 @ @
iomap_dio_actor);
   if (ret <= 0) {
      /* magic error code to fall back to buffered I/O */
      -if (ret == -ENOTBLK)
      +if (ret == -ENOTBLK) {
         +wait_for_completion = true;
         ret = 0;
         +}
      break;
   }
   pos += ret;

   -if (iov_iter_rw(iter) == READ && pos >= dio->i_size)
   +if (iov_iter_rw(iter) == READ && pos >= dio->i_size) {
      +/*
      + * We only report that we've read data up to i_size.
      + * Revert iter to a state corresponding to that as
      + * some callers (such as splice code) rely on it.
      + */
      +iov_iter_revert(iter, pos - dio->i_size);
      break;
      +}
   } while ((count = iov_iter_count(iter)) > 0);
   blk_finish_plug(&plug);

   if (ret < 0)
   imap_dio_set_error(dio, ret);

   +/*
   + * If all the writes we issued were FUA, we don't need to flush the
   + * cache on IO completion. Clear the sync flag for this case.
   + */
   +if (dio->flags & IOMAP_DIO_WRITE_FUA)
   +dio->flags &= ~IOMAP_DIO_NEED_SYNC;
   +
   +/*
   + * We are about to drop our additional submission reference, which
   + * might be the last reference to the dio. There are three three
   + * different ways we can progress here:
   + *
(a) If this is the last reference we will always complete and free
*the dio ourselves.
(b) If this is not the last reference, and we serve an asynchronous
*iocb, we must never touch the dio after the decrement, the
*I/O completion handler will complete and free it.
(c) If this is not the last reference, but we serve a synchronous
*iocb, the I/O completion handler will wake us up on the drop
*of the final reference, and we will complete and free it here
*after we got woken by the I/O completion handler.
/
+dio->wait_for_completion = wait_for_completion;
if (!atomic_dec_and_test(&dio->ref)) {
-    if (!is_sync_kiocb(iocb))
+    if (!wait_for_completion)
        return -EIOCBQUEUED;

    for (;;) {
@@ -1070,9 +1166,7 @@
        __set_current_state(TASK_RUNNING);
    }

-    ret = iomap_dio_complete(dio);
-    return ret;
+    return iomap_dio_complete(dio);

out_free_dio:
    kfree(dio);
--- linux-4.15.0.orig/fs/isofs/dir.c
+++ linux-4.15.0/fs/isofs/dir.c
@@ -152,6 +152,7 @@
     printk(KERN_NOTICE "iso9660: Corrupted directory entry" 
         " in block %lu of inode %lu", block,
    (inode->i_ino);
+    brelse(bh);
    return -EIO;
    }

--- linux-4.15.0.orig/fs/isofs/inode.c
+++ linux-4.15.0/fs/isofs/inode.c
@@ -24,6 +24,7 @@
#include <linux/user_namespace.h>
#include <linux/seq_file.h>
#include <linux/blkdev.h>

#ifinclude "isofs.h"
#include "zisofs.h"
unsigned int overriderockperm = 1;
unsigned int uid_set = 1;
unsigned int gid_set = 1;
unsigned char map = '0';
unsigned char check = '0';
unsigned int blocksize = 0;

popt->gid = GLOBAL_ROOT_GID;
popt->uid = GLOBAL_ROOT_UID;
popt->iocharset = NULL;
-popt->utf8 = 0;
popt->overriderockperm = 0;
popt->session = -1;
popt->sbsector = -1;
@@ -389,12 +388,18 @@
case Opt_cruft:
    popt->cruft = 1;
    break;
+  #ifdef CONFIG_JOLIET
    case Opt_utf8:
      -popt->utf8 = 1;
+      kfree(popt->iocharset);
+      popt->iocharset = kstrdup("utf8", GFP_KERNEL);
+      if (!popt->iocharset)
+         return 0;
+    break;
-  #ifdef CONFIG_JOLIET
  case Opt_iocharset:
    -kfree(popt->iocharset);
    popt->iocharset = match_strdup(&args[0]);
    if (!popt->iocharset)
       return 0;
    break;
  #endif
  case Opt_map_a:
@@ -492,7 +497,6 @@
       seq_puts(m, ",nocompress");
       if (sbi->s_overriderockperm) seq_puts(m, ",overriderockperm");
       if (sbi->s_showassoc) seq_puts(m, ",showassoc");
-      if (sbi->s_utf8) seq_puts(m, ",utf8");
+      if (sbi->s_utf8) seq_printf(m, ",utf8");

      if (sbi->s_check) seq_printf(m, ",check=%c", sbi->s_check);
      if (sbi->s_mapping) seq_printf(m, ",map=%c", sbi->s_mapping);
@@ -515,9 +519,10 @@
       seq_printf(m, ",fmode=%o", sbi->s_fmode);
#ifdef CONFIG_JOLIET
- if (sbi->s_nls_iocharset &&
-     strcmp(sbi->s_nls_iocharset->charset, CONFIG_NLS_DEFAULT) != 0)
+ if (sbi->s_nls_iocharset)
    seq_printf(m, "%s", sbi->s_nls_iocharset->charset);
    else
    +seq_puts(m, "iocharset=utf8");
#endif
return 0;
)

* What if bugger tells us to go beyond page size?
*/
+ if (bdev_logical_block_size(s->s_bdev) > 2048) {
    +printk(KERN_WARNING
        "ISOFS: unsupported/invalid hardware sector size %d\n",
        +bdev_logical_block_size(s->s_bdev));
    +goto out_freesbi;
+ }
opt.blocksize = sb_min_blocksize(s, opt.blocksize);

sbi->s_high_sierra = 0; /* default is iso9660 */

if (joliet_level) {
    char *p = opt.iocharset ? opt.iocharset : CONFIG_NLS_DEFAULT;
- sbi->s_nls_iocharset = load_nls(p);
- if (! sbi->s_nls_iocharset) {
-     /* Fail only if explicit charset specified */
-     if (opt.iocharset)
-         sbi->s_nls_iocharset = load_nls_default();
- goto out_freesbi;
- } 
    sbi->s_nls_iocharset = load_nls_default();
} 
#endif

*/
+ sbi->s_gid = opt.gid;
+ sbi->s_uid_set = opt.uid_set;
+ sbi->s_gid_set = opt.gid_set;
+ sbi->s_utf8 = opt.utf8;
sbi->s_nocompress = opt.nocompress;
sbi->s_overriderockperm = opt.overriderockperm;
/
--- linux-4.15.0.orig/fs/isofs/isofs.h
+++ linux-4.15.0/fs/isofs/isofs.h
@@ -44,7 +44,6 @@
unsigned char s_session;
unsigned int  s_high_sierra:1;
unsigned int  s_rock:2;
-unsigned int  s_utf8:1;
unsigned int  s_cruft:1; /* Broken disks with high byte of length
* containing junk */
unsigned int  s_nocompress:1;
--- linux-4.15.0.orig/fs/isofs/joliet.c
+++ linux-4.15.0/fs/isofs/joliet.c
@@ -41,14 +41,12 @@
int
get_joliet_filename(struct iso_directory_record * de, unsigned char *outname, struct inode * inode)
{
-unsigned char utf8;
struct nls_table *nls;
unsigned char len = 0;

-utf8 = ISOFS_SB(inode->i_sb)->s_utf8;
nls = ISOFS_SB(inode->i_sb)->s_nls_iocharset;

-if (utf8) {
+if (!nls) {
    len = utf16s_to_utf8s((const wchar_t *) de->name,
de->name_len[0] >> 1, UTF16_BIG_ENDIAN,
outname, PAGE_SIZE);
--- linux-4.15.0.orig/fs/isofs/namei.c
+++ linux-4.15.0/fs/isofs/namei.c
@@ -102,6 +102,7 @@
printk(KERN_NOTICE "iso9660: Corrupted directory entry"
    " in block %lu of inode %lu", block,
dir->i_ino);
+brelse(bh);
return 0;
}

--- linux-4.15.0.orig/fs/jbd2/checkpoint.c
+++ linux-4.15.0/fs/jbd2/checkpoint.c
@@ -168,7 +168,7 @@
"journal space in %s\n", __func__,
    journal->j_devname);
WARN_ON(1);
-jbd2_journal_abort(journal, 0);
write_lock(&journal->j_state_lock);
} else {
    bh = jh2bh(jh);

    if (buffer_locked(bh)) {
        -spin_unlock(&journal->j_list_lock);
        get_bh(bh);
        +spin_unlock(&journal->j_list_lock);
        wait_on_buffer(bh);
        /* the journal_head may have gone by now */
        BUFFER_TRACE(bh, "brelse");
    }
}

+++ linux-4.15.0/fs/jbd2/commit.c
@@ -189,18 +189,23 @@

    /
    use writepages() because with dealyed allocation we may be doing
    * block allocation in writepages().
    */
    -static int journal_submit_inode_data_buffers(struct address_space *mapping)
    +int jbd2_journal_submit_inode_data_buffers(struct jbd2_inode *jinode)
    {
        -int ret;
        +struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
        struct writeback_control wbc = {
            .sync_mode = WB_SYNC_ALL,
            .nr_to_write = mapping->nrpages * 2,
            .range_start = 0,
            .range_end = i_size_read(mapping->host),
            +.range_start = jinode->i_dirty_start,
            +.range_end = jinode->i_dirty_end,
        };

        -ret = generic_writepages(mapping, &wbc);
        -return ret;
        +*/
    }
+ * submit the inode data buffers. We use writepage
int jbd2_journal_finish_inode_data_buffers(struct jbd2_inode *jinode) {
    struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    
    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
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    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    + struct address_space *mapping = jinode->i_vfs_inode->i_mapping;
    + struct address_space *mapping = jnode
return filemap_fdatawait_range_keep_errors(mapping, 
  jinode->i_dirty_start, 
  jinode->i_dirty_end);
+
+
/*
 * Wait for data submitted for writeout, refile inodes to proper
 * transaction if needed.
@@ -263,10 +272,12 @@
  continue;
  jinode->i_flags |= JI_COMMIT_RUNNING;
 spin_unlock(&journal->j_list_lock);
-err = filemap_fdatawait_keep_errors(
-  jinode->i_vfs_inode->i_mapping);
-if (!ret)
-  ret = err;
+/* wait for the inode data buffers writeout. */
+if (journal->j_finish_inode_data_buffers) {
+  err = journal->j_finish_inode_data_buffers(jinode);
+  if (!ret)
+    ret = err;
+%} 
  spin_lock(&journal->j_list_lock);
  jinode->i_flags &= ~JI_COMMIT_RUNNING;
  smp_mb();
@@ -284,6 +295,8 @@
   &jinode->i_transaction->t_inode_list);
 } else {
  jinode->i_transaction = NULL;
+  jinode->i_dirty_start = 0;
+  jinode->i_dirty_end = 0;
 }
 }
 spin_unlock(&journal->j_list_lock);
@@ -693,9 +706,11 @@
     the last tag we set up. */

tag->t_flags |= cpu_to_be16(JBD2_FLAG_LAST_TAG);
-jbd2_descriptor_block_csum_set(journal, descriptor);
start_journal_io:
+if (descriptor)
+  jbd2_descriptor_block_csum_set(journal, 
+      descriptor);
  for (i = 0; i < bufs; i++) {
   struct buffer_head *bh = wbuf[i];
/*
submit_bh(REQ_OP_WRITE, REQ_SYNC, bh); 
}

cond_resched();
-stats.run.rs_blocks_logged += bufs;

/* Force a new descriptor to be generated next 
   time round the loop. */

err = journal_submit_commit_record(journal, commit_transaction, 
   &cbh, crc32_sum);
if (err)
   -__jbd2_journal_abort_hard(journal);
+__jbd2_journal_abort(journal, err);
}

blk_finish_plug(&plug);

if (unlikely(!buffer_uptodate(bh)))
   err = -EIO;
-jbd2_unfile_log_bh(bh);
+stats.run.rs_blocks_logged++;

/*
 * The list contains temporary buffer heads created by
 */

BUFTRACE(bh, "ph5: control buffer writeout done: unfile");
clear_buffer_jwrite(bh);
-jbd2_unfile_log_bh(bh);
+stats.run.rs_blocks_logged++;
__brelse(bh);/* One for getblk */
/* AKPM: bforget here */
}

err = journal_wait_on_commit_record(journal, cbh);
if (jbd2_has_feature_async_commit(journal) &&

  journal->j_flags & JBD2_BARRIER) {
  blkdev_issue_flush(journal->j_dev, GFP_NOFS, NULL);
  @ @ -958,29 +975,34 @ @
  * it. */

/*
- * A buffer which has been freed while still being journaled by
- * a previous transaction.
- */
-if (buffer_freed(bh)) {
+ * A buffer which has been freed while still being journaled
+ * by a previous transaction, refile the buffer to BJ_Forget of
+ * the running transaction. If the just committed transaction
+ * contains "add to orphan" operation, we can completely
+ * invalidate the buffer now. We are rather through in that
+ * since the buffer may be still accessible when blocksize <
+ * pagesize and it is attached to the last partial page.
+ */
+if (buffer_freed(bh) && !jh->b_next_transaction) {
+struct address_space *mapping;
+
+clear_buffer_freed(bh);
+clear_buffer_jbdirty(bh);
+
+/*
- * If the running transaction is the one containing
- * "add to orphan" operation (b_next_transaction !=
- * NULL), we have to wait for that transaction to
- * commit before we can really get rid of the buffer.
- * So just clear b_modified to not confuse transaction
- * credit accounting and refile the buffer to
- * BJ_Forget of the running transaction. If the just
- * committed transaction contains "add to orphan"
- * operation, we can completely invalidate the buffer
- * now. We are rather through in that since the
- * buffer may be still accessible when blocksize <
- * pagesize and it is attached to the last partial
- * page.
+ * Block device buffers need to stay mapped all the
+ * time, so it is enough to clear buffer_jbdirty and
+ * buffer_freed bits. For the file mapping buffers (i.e.
+ * journalled data) we need to unmap buffer and clear
+ * more bits. We also need to be careful about the check
+ * because the data page mapping can get cleared under
+ * our hands. Note that if mapping == NULL, we don't
+ * need to make buffer unmapped because the page is
+ * already detached from the mapping and buffers cannot
+ * get reused.
+ */
-jh->b_modified = 0;
-if (!jh->b_next_transaction) {
-clear_buffer_freed(bh);
clear_buffer_jbddirty(bh);
+ mapping = READ_ONCE(bh->b_page->mapping);
+ if (mapping && !sb_is_blkdev_sb(mapping->host->i_sb)) {
    clear_buffer_mapped(bh);
    clear_buffer_new(bh);
    clear_buffer_req(bh);
--- linux-4.15.0.orig/fs/jbd2/journal.c
+++ linux-4.15.0/fs/jbd2/journal.c
@@ -97,6 +97,10 @@
EXPORT_SYMBOL(jbd2_journal_force_commit);
EXPORT_SYMBOL(jbd2_journal_inode_add_write);
EXPORT_SYMBOL(jbd2_journal_inode_add_wait);
+EXPORT_SYMBOL(jbd2_journal_inode_ranged_write);
+EXPORT_SYMBOL(jbd2_journal_inode_ranged_wait);
+EXPORT_SYMBOL(jbd2_journal_submit_inode_data_buffers);
+EXPORT_SYMBOL(jbd2_journal_finish_inode_data_buffers);
EXPORT_SYMBOL(jbd2_journal_init_inode);
EXPORT_SYMBOL(jbd2_journal_release_inode);
EXPORT_SYMBOL(jbd2_journal_begin_ordered_truncate);
@@ -977,7 +981,7 @@
}/*
 *
- * This is a variation of __jbd2_update_log_tail which checks for validity of
+ * This is a variation of __jbd2_update_log_tail which checks for validity of
* provided log tail and locks j_checkpoint_mutex. So it is safe against races
* with other threads updating log tail.
*/
@@ -1003,6 +1007,7 @@
static void *jbd2_seq_info_next(struct seq_file *seq, void *v, loff_t *pos)
{
    (*pos)++;
    return NULL;
}                                      
@@ -1359,16 +1364,25 @@
return jbd2_journal_start_thread(journal);
}

+/*
+ * This function expects that the caller will have locked the journal
+ * buffer head, and will return with it unlocked
+ */
static int jbd2_write_superblock(journal_t *journal, int write_flags)
{
    struct buffer_head *bh = journal->j_sb_buffer;
    journal_superblock_t *sb = journal->j_superblock;

int ret;

+/* Buffer got discarded which means block device got invalidated */
+if (!buffer_mapped(bh)) {
+unlock_buffer(bh);
+return -EIO;
+}
+
+ trace_jbd2_write_superblock(journal, write_flags);
+if (!journal->j_flags & JBD2_BARRIER)
+write_flags &= ~(REQ_FUA | REQ_PREFLUSH);
- lock_buffer(bh);
+ if (buffer_write_io_error(bh)) {
+/* 
+ * Oh, dear. A previous attempt to write the journal
+ * Is it already empty? */
+if (is_journal_aborted(journal))
+return -EIO;
+
+ BUG_ON(!mutex_is_locked(&journal->j_checkpoint_mutex));
+jbd_debug(1, "JBD2: updating superblock (start %lu, seq %u)\n",
+ tail_block, tail_tid);
+
+lock_buffer(journal->j_sb_buffer);
+sb->s_sequence = cpu_to_be32(tail_tid);
+sb->s_start = cpu_to_be32(tail_block);
+
+BUG_ON(mutex_is_locked(&journal->j_checkpoint_mutex));
+read_lock(&journal->j_state_lock);
+/* Is it already empty? */
+if (sb->s_start == 0) {
+read_unlock(&journal->j_state_lock);
+lock_buffer(journal->j_sb_buffer);
+if (sb->s_start == 0) /* Is it already empty? */
+unlock_buffer(journal->j_sb_buffer);
+return;
+}
+
+jbd_debug(1, "JBD2: Marking journal as empty (seq %d)\n",
+journal->j_tail_sequence);
+sb->s_sequence = cpu_to_be32(journal->j_tail_sequence);
sb->s_start = cpu_to_be32(0);
-read_unlock(&journal->j_state_lock);

jbd2_write_superblock(journal, write_op);

void jbd2_journal_update_sb_errno(journal_t *journal)
{
    journal_superblock_t *sb = journal->j_superblock;
    int errcode;

    -read_lock(&journal->j_state_lock);
    -jbd_debug(1, "JBD2: updating superblock error (errno %d)\n",
                -journal->j_errno);
    -sb->s_errno = cpu_to_be32(journal->j_errno);
    -read_unlock(&journal->j_state_lock);
    +lock_buffer(journal->j_sb_buffer);
    +errcode = journal->j_errno;
    +if (errcode == -ESHUTDOWN)
        +errcode = 0;
    +jbd_debug(1, "JBD2: updating superblock error (errno %d)\n", errcode);
    +sb->s_errno = cpu_to_be32(errcode);
    jbd2_write_superblock(journal, REQ_SYNC | REQ_FUA);
}

/journal->j_devname);
return -EFSCORRUPTED;
}

/* clear JBD2_ABORT flag initialized in journal_init_common
   * here to update log tail information with the newest seq.
   */
+journal->j_flags &= ~JBD2_ABORT;

/* OK, we've finished with the dynamic journal bits:
   * reinitialise the dynamic contents of the superblock in memory
   */
-if (journal_reset(journal))
goto recovery_error;

-journal->j_flags &= ~JBD2_ABORT;
-journal->j_flags |= JBD2_LOADED;
return 0;

sb = journal->j_superblock;
/* Load the checksum driver if necessary */
+if ((journal->j_chksum_driver == NULL) &&
    INCOMPAT_FEATURE_ON(JBD2_FEATURE_INCOMPAT_CSUM_V3)) {
+    journal->j_chksum_driver = crypto_alloc_shash("crc32c", 0, 0);
+if (IS_ERR(journal->j_chksum_driver)) {
+    printk(KERN_ERR "JBD2: Cannot load crc32c driver.\n");
+    journal->j_chksum_driver = NULL;
+    return 0;
+}
+/* Precompute checksum seed for all metadata */
+    journal->j_csum_seed = jbd2_chksum(journal, ~0, sb->s_uuid,
+    sizeof(sb->s_uuid));
+
+lock_buffer(journal->j_sb_buffer);
+
/* If enabling v3 checksums, update superblock */
if (INCOMPAT_FEATURE_ON(JBD2_FEATURE_INCOMPAT_CSUM_V3)) {
    sb->s_checksum_type = JBD2_CRC32C_CHKSUM;
    sb->s_feature_compat &=
    ~cpu_to_be32(JBD2_FEATURE_COMPAT_CHECKSUM);
-	/* Load the checksum driver */
-    if (journal->j_chksum_driver == NULL) {
-        journal->j_chksum_driver = crypto_alloc_shash("crc32c",
-            0, 0);
-    if (IS_ERR(journal->j_chksum_driver)) {
-        printk(KERN_ERR "JBD2: Cannot load crc32c \
-            driver.\n");
-        journal->j_chksum_driver = NULL;
-        return 0;
-    }
-    /* Precompute checksum seed for all metadata */
-    journal->j_csum_seed = jbd2_chksum(journal, ~0,
-        sb->s_uuid,
-        sizeof(sb->s_uuid));
-}

/* If enabling v1 checksums, downgrade superblock */
@@ -1924,6 +1946,7 @@
    sb->s_feature_compat    |= cpu_to_be32(compat);
    sb->s_feature_ro_compat |= cpu_to_be32(ro);
    sb->s_feature_incompat  |= cpu_to_be32(incompat);
+unlock_buffer(journal->j_sb_buffer);
# undef COMPAT_FEATURE_ON
@@ -2108,20 +2131,27 @@
      * but don't do any other IO. */
 static void __journal_abort_soft (journal_t *journal, int errno)
 {
-   if (journal->j_flags & JBD2_ABORT)
-      return;
+   int old_errno;

-   if (!journal->j_errno)
+   { write_lock(&journal->j_state_lock);
+    old_errno = journal->j_errno;
+   if (!journal->j_errno || errno == -ESHUTDOWN)
       journal->j_errno = errno;

-   __jbd2_journal_abort_hard(journal);
-   
-   if (errno) {
-      jbd2_journal_update_sb_errno(journal);
-      return;
-   }
+   if (journal->j_flags & JBD2_ABORT) {
+      if (old_errno != -ESHUTDOWN && errno == -ESHUTDOWN)
+         jbd2_journal_update_sb_errno(journal);
+      return;
+   }
+   write_unlock(&journal->j_state_lock);
+   
+   __jbd2_journal_abort_hard(journal);
+   jbd2_journal_update_sb_errno(journal);
+   write_lock(&journal->j_state_lock);
+   journal->j_flags |= JBD2_REC_ERR;
+   write_unlock(&journal->j_state_lock);
+
+   /**
+   @@ -2163,11 +2193,6 @@
+      * ext3_error, for example, now uses this
+      * functionality.
+      *
+      - * Errors which originate from within the journaling layer will NOT
+      - * supply an errno; a null errno implies that absolutely no further
+      - * writes are done to the journal (unless there are any already in
+      - * progress).
+      - *
+      */

@@ -2180,11 +2206,6 @@
      if (!journal->j_errno)
      { write_lock(&journal->j_state_lock);
      old_errno = journal->j_errno;
-     if (journal->j_errno || errno == -ESHUTDOWN)
-        journal->j_errno = errno;

-   __jbd2_journal_abort_hard(journal);
-   
-   if (errno) {
-      jbd2_journal_update_sb_errno(journal);
-      return;
-   }
+   if (journal->j_flags & JBD2_ABORT) {
+      if (old_errno != -ESHUTDOWN && errno == -ESHUTDOWN)
+         jbd2_journal_update_sb_errno(journal);
+      return;
+   }
+   write_unlock(&journal->j_state_lock);
+   
+   __jbd2_journal_abort_hard(journal);
+   jbd2_journal_update_sb_errno(journal);
+   write_lock(&journal->j_state_lock);
+   journal->j_flags |= JBD2_REC_ERR;
+   write_unlock(&journal->j_state_lock);
+   
+   /**
+   @@ -2189,11 +2219,6 @@
+      * ext3_error, for example, now uses this
+      * functionality.
+      *
+      - * Errors which originate from within the journaling layer will NOT
+      - * supply an errno; a null errno implies that absolutely no further
+      - * writes are done to the journal (unless there are any already in
+      - * progress).
+      - *
+      */
void jbd2_journal_abort(journal_t *journal, int errno)
@@ -2575,6 +2600,8 @@
    jinode->i_next_transaction = NULL;
    jinode->i_vfs_inode = inode;
    jinode->i_flags = 0;
+    jinode->i_dirty_start = 0;
+    jinode->i_dirty_end = 0;
    INIT_LIST_HEAD(&jinode->i_list);
}

--- linux-4.15.0.orig/fs/jbd2/transaction.c
+++ linux-4.15.0/fs/jbd2/transaction.c
@@ -495,8 +495,10 @@
    EXPORT_SYMBOL(jbd2_journal_free_reserved);

 /**
- * int jbd2_journal_start_reserved(handle_t *handle) - start reserved handle
+ * int jbd2_journal_start_reserved() - start reserved handle
 * @handle: handle to start
+ * @type: for handle statistics
+ * @line_no: for handle statistics
 * 
 * Start handle that has been previously reserved with jbd2_journal_reserve().
 * This attaches @handle to the running transaction (or creates one if there's
@@ -533,6 +535,7 @@
    if (ret < 0) {
+        handle->h_journal = journal;
        jbd2_journal_free_reserved(handle);
        return ret;
    }
@@ -626,6 +629,7 @@
 * int jbd2_journal_restart() - restart a handle .
 * @handle: handle to restart
+ * @nblocks: nr credits requested
+ * @gfp_mask: memory allocation flags (for start_this_handle)
 * 
 * Restart a handle for a multi-transaction filesystem
 * operation.
@@ -830,8 +834,6 @@
 char *frozen_buffer = NULL;
 unsigned long start_lock, time_lock;

-if (is_handle_aborted(handle))
-return -EROFS;
journal = transaction->t_journal;

jbd_debug(5, "journal_head %p, force_copy %d\n", jh, force_copy);
@@ -1046,8 +1048,8 @@
/* For undo access buffer must have data copied */
if (undo && jh->b_committed_data)
goto out;
-if (jh->b_transaction != handle->h_transaction &&
 - jh->b_next_transaction != handle->h_transaction)
+if (READ_ONCE(jh->b_transaction) != handle->h_transaction &&
  READ_ONCE(jh->b_next_transaction) != handle->h_transaction)
goto out;
/*
 * There are two reasons for the barrier here:
 @@ -1075,9 +1077,12 @@
 struct journal_head *jh;
 int rc;

+if (is_handle_aborted(handle))
+return -EROFS;
+
if (jbd2_write_access_granted(handle, bh, false))
return 0;
@@ -1220,11 +1225,15 @@
 struct journal_head *jh;
 char *committed_data = NULL;

-JBUFFER_TRACE(jh, "entry");
+if (is_handle_aborted(handle))
+return -EROFS;
+
if (jbd2_write_access_granted(handle, bh, true))
return 0;

jh = jbd2_journal_add_journal_head(bh);
+JBUFFER_TRACE(jh, "entry");
+
/*
 * Do this first --- it can drop the journal lock, so we want to
 * make sure that obtaining the committed_data is done
 @@ -1335,15 +1344,17 @@

if (is_handle_aborted(handle))
return -EROFS;
-if (!buffer_jbd(bh)) {
 -ret = -EUCLEAN;
 -goto out;
/* We don't grab jh reference here since the buffer must be part
 * of the running transaction.
 */

jh = bh2jh(bh);
+jbd_debug(5, "journal_head %p\n", jh);
+JBUFFER_TRACE(jh, "entry");
+
/*
 * This and the following assertions are unreliable since we may see jh
 * in inconsistent state unless we grab bh_state lock. But this is
@@ -1362,6 +1373,13 @@
 if (jh->b_transaction == transaction &&
     jh->b_jlist != BJ_Metadata) {
     jbd_lock_bh_state(bh);
+    if (jh->b_transaction == transaction &&
+        jh->b_jlist != BJ_Metadata)
+        pr_err("JBD2: assertion failure: h_type=%u h_line_no=%u block_no=%llu jlist=%u\n",
+               handle->h_type, handle->h_line_no,
+               (unsigned long long) bh->b_blocknr,
+               jh->b_jlist);
 J_ASSERT_JH(jh, jh->b_transaction != transaction ||
 jh->b_jlist == BJ_Metadata);
 jbd_unlock_bh_state(bh);
@@ -1370,9 +1388,11 @@
 }

journal = transaction->t_journal;
-jbd_debug(5, "journal_head %p\n", jh);
-JBUFFER_TRACE(jh, "entry");
-
 jbd_lock_bh_state(bh);

if (jh->b_modified == 0) {
@@ -1381,11 +1396,11 @@
 * of the transaction. This needs to be done
 * once a transaction -bzzz
 */
-    jh->b_modified = 1;
+       if (handle->h_buffer_credits <= 0) {
+        ret = -ENOSPC;
+        goto out_unlock_bh;
+    }


+j->b_modified = 1;
handle->b_buffer_credits--;
}

@@ -1570,14 +1585,21 @@
/* However, if the buffer is still owned by a prior
   * (committing) transaction, we can't drop it yet... */
JBUFFER_TRACE(jh, "belongs to older transaction");
-/* ... but we CAN drop it from the new transaction if we
- * have also modified it since the original commit. */
+/* ... but we CAN drop it from the new transaction through
+ * marking the buffer as freed and set j_next_transaction to
+ * the new transaction, so that not only the commit code
+ * knows it should clear dirty bits when it is done with the
+ * buffer, but also the buffer can be checkpointed only
+ * after the new transaction commits. */

- if (j->b_next_transaction) {
- J_ASSERT(j->b_next_transaction == transaction);
+ set_buffer_freed(bh);
+ if (!j->b_next_transaction) {
+ spin_lock(&journal->j_list_lock);
+ j->b_next_transaction = NULL;
+ spin_unlock(&journal->j_list_lock);
+ } else {
+ J_ASSERT(j->b_next_transaction == transaction);

/*
 * only drop a reference if this transaction modified
@@ -1896,6 +1918,9 @@
*/
static void __jbd2_journal_unfile_buffer(struct journal_head *j)
{
+J_ASSERT_JH(j, j->b_transaction != NULL);
+J_ASSERT_JH(j, j->b_next_transaction == NULL);
+__jbd2_journal_temp_unlink_buffer(j);
j->b_transaction = NULL;
jbd2_journal_put_journal_head(j);
@@ -1987,6 +2012,7 @@
{
 struct buffer_head *head;
 struct buffer_head *bh;
+bool has_write_io_error = false;
 int ret = 0;

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J_ASSERT(PageLocked(page));
@@ -2011,11 +2037,26 @@
jbd_unlock_bh_state(bh);
if (buffer_jbd(bh))
goto busy;
+
+/*
+ * If we free a metadata buffer which has been failed to
+ * write out, the jbd2 checkpoint procedure will not detect
+ * this failure and may lead to filesystem inconsistency
+ * after cleanup journal tail.
+ */
+if (buffer_write_io_error(bh)) {
+ pr_err("JBD2: Error while async write back metadata bh %llu.",
+        (unsigned long long)bh->b_blocknr);
+ has_write_io_error = true;
+ }
} while ((bh = bh->b_this_page) != head);

ret = try_to_free_buffers(page);

busy:
+if (has_write_io_error)
+ jbd2_journal_abort(journal, -EIO);
+
return ret;
}

@@ -2213,14 +2254,16 @@
return -EBUSY;
}
/*
- * OK, buffer won't be reachable after truncate. We just set
- * j_next_transaction to the running transaction (if there is
- * one) and mark buffer as freed so that commit code knows it
- * should clear dirty bits when it is done with the buffer.
+ * OK, buffer won't be reachable after truncate. We just clear
+ * b_modified to not confuse transaction credit accounting, and
+ * set j_next_transaction to the running transaction (if there
+ * is one) and mark buffer as freed so that commit code knows
+ * it should clear dirty bits when it is done with the buffer.
+ */
set_buffer_freed(bh);
if (journal->j_running_transaction && buffer_jbddirty(bh))
jh->b_next_transaction = journal->j_running_transaction;
+jh->b_modified = 0;
jbd2_journal_put_journal_head(jh);
spin_unlock(&journal->j_list_lock);
jbd_unlock_bh_state(bh);
@@ -2441,13 +2484,20 @@
was_dirty = test_clear_buffer_jbddirty(bh);
__jbd2_journal_temp_unlink_buffer(jh);
+
+/*
+ * b_transaction must be set, otherwise the new b_transaction won't
+ * be holding jh reference
+ */
+J_ASSERT_JH(jh, jh->b_transaction != NULL);
+
+/
* We set b_transaction here because b_next_transaction will inherit
* our jh reference and thus __jbd2_journal_file_buffer() must not
* take a new one.
* /
-jh->b_transaction = jh->b_next_transaction;
-jh->b_next_transaction = NULL;
+WRITE_ONCE(jh->b_transaction, jh->b_next_transaction);
+WRITE_ONCE(jh->b_next_transaction, NULL);
if (buffer_freed(bh))
jlist = BJ_Forget;
else if (jh->b_modified)
@@ -2485,7 +2535,7 @@
* File inode in the inode list of the handle's transaction
* /
static int jbd2_journal_file_inode(handle_t *handle, struct jbd2_inode *jinode,
-unsigned long flags)
+unsigned long flags, loff_t start_byte, loff_t end_byte)
{
transaction_t *transaction = handle->h_transaction;
journal_t *journal;
@@ -2497,26 +2547,17 @@
jbd_debug(4, "Adding inode %lu, tid:%d\n", jinode->i_vfs_inode->i_ino,
transaction->t_tid);

-/*
- * First check whether inode isn't already on the transaction's
- * lists without taking the lock. Note that this check is safe
- * without the lock as we cannot race with somebody removing inode
- * from the transaction. The reason is that we remove inode from the
- * transaction only in journal_release_jbd_inode() and when we commit
- * the transaction. We are guarded from the first case by holding
- * a reference to the inode. We are safe against the second case
- * because if jinode->i_transaction == transaction, commit code
- * cannot touch the transaction because we hold reference to it,
- * and if jinode->i_next_transaction == transaction, commit code

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- * will only file the inode where we want it.
- */
-if ((jinode->i_transaction == transaction ||
-    jinode->i_next_transaction == transaction) &&
-    (jinode->i_flags & flags) == flags)
-return 0;
-
-spin_lock(&journal->j_list_lock);
-jinode->i_flags |= flags;
+
+if (jinode->i_dirty_end) {
+    jinode->i_dirty_start = min(jinode->i_dirty_start, start_byte);
+    jinode->i_dirty_end = max(jinode->i_dirty_end, end_byte);
+} else {
+    jinode->i_dirty_start = start_byte;
+    jinode->i_dirty_end = end_byte;
+}
+
/* Is inode already attached where we need it? */
if (jinode->i_transaction == transaction ||
    jinode->i_next_transaction == transaction)
@@ -2551,12 +2592,28 @@
int jbd2_journal_inode_add_write(handle_t *handle, struct jbd2_inode *jinode)
{
    return jbd2_journal_file_inode(handle, jinode,
-        JI_WRITE_DATA | JI_WAIT_DATA);
+        JI_WRITE_DATA | JI_WAIT_DATA, 0, LLONG_MAX);
}

int jbd2_journal_inode_add_wait(handle_t *handle, struct jbd2_inode *jinode)
{
    return jbd2_journal_file_inode(handle, jinode,
-        JI_WRITE_DATA | JI_WAIT_DATA);
+        JI_WRITE_DATA, 0, LLONG_MAX);
+
+int jbd2_journal_inode_ranged_write(handle_t *handle,
+    struct jbd2_inode *jinode, loff_t start_byte, loff_t length)
+{
+    return jbd2_journal_file_inode(handle, jinode,
+        JI_WRITE_DATA | JI_WAIT_DATA, start_byte,
+        start_byte + length - 1);
+}
+
+int jbd2_journal_inode_ranged_wait(handle_t *handle, struct jbd2_inode *jinode,
+    loff_t start_byte, loff_t length)
+{
+    return jbd2_journal_file_inode(handle, jinode,
+        JI_WRITE_DATA, JI_WAIT_DATA, start_byte,
+        start_byte + length - 1);
+}

+start_byte, start_byte + length - 1);
}

/*
--- linux-4.15.0.orig/fs/jffs2/compr_rtime.c
+++ linux-4.15.0/fs/jffs2/compr_rtime.c
@@ -37,6 +37,9 @@
int outpos = 0;
int pos=0;

+if (*dstlen <= 3)
+return -1;
+memset(positions,0,sizeof(positions));

while (pos < (*sourcelen) && outpos <= (*dstlen)-2) {
--- linux-4.15.0.orig/fs/jffs2/dir.c
+++ linux-4.15.0/fs/jffs2/dir.c
@@ -209,8 +209,7 @@
__func__, inode->i_ino, inode->i_mode, inode->i_nlink,
f->inocache->pino_nlink, inode->i_mapping->nrpages);

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
return 0;

fail:
@@ -430,8 +429,7 @@
mutex_unlock(&dir_f->sem);
jffs2_complete_reservation(c);

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
return 0;

fail:
@@ -575,8 +573,7 @@
mutex_unlock(&dir_f->sem);
jffs2_complete_reservation(c);

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
return 0;

fail:
int ret;
uint32_t now = get_seconds();

+mutex_lock(&f->sem);
for (fd = f->dents ; fd; fd = fd->next) {
  -if (fd->ino)
  +if (fd->ino) {
    +mutex_unlock(&f->sem);
    return -ENOTEMPTY;
  +}
  +mutex_unlock(&f->sem);
}

ret = jffs2_do_unlink(c, dir_f, dentry->d_name.name,
                      dentry->d_name.len, f, now);

mutex_unlock(&dir_f->sem);
jffs2_complete_reservation(c);

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
return 0;

fail:
--- linux-4.15.0.orig/fs/jffs2/fs.c
+++ linux-4.15.0/fs/jffs2/fs.c
@@ -362,7 +362,6 @@
     ret = -EIO;
 error:
 mutex_unlock(&f->sem);
-jffs2_do_clear_inode(c, f);
-iget_failed(inode);
return ERR_PTR(ret);
}
--- linux-4.15.0.orig/fs/jffs2/readinode.c
+++ linux-4.15.0/fs/jffs2/readinode.c
@@ -672,6 +672,22 @@
     jffs2_free_full_dirent(fd);
 return -EIO;
 }
+/
+/**
+ * we use CONFIG_JFFS2_SUMMARY because without it, we
+ * have checked it while mounting
+ */

#ifdef CONFIG_JFFS2_SUMMARY
+*/

+crc = crc32(0, fd->name, rd->nsize);
+if (unlikely(crc != je32_to_cpu(rd->name_crc))) {
+ JFFS2_NOTICE("name CRC failed on dirent node at"
+ "%#08x: read %#08x, calculated %#08x\n",
+ ref_offset(ref), je32_to_cpu(rd->node_crc), crc);
+ jffs2_mark_node_obsolete(c, ref);
+ jffs2_free_full_dirent(fd);
+ return 0;
+}
+#endif

fd->nhash = full_name_hash(NULL, fd->name, rd->nsize);
@@ -1414,11 +1430,6 @@
jffs2_kill_fragtree(&f->fragtree, deleted?c:NULL);

-if (f->target) {
- kfree(f->target);
- f->target = NULL;
- }
-
- fds = f->dents;
- while(fds) {
- fd = fds;
- --- linux-4.15.0.orig/fs/jffs2/scan.c
- +++ linux-4.15.0/fs/jffs2/scan.c
- @@ -1075,7 +1075,7 @@
- memcpy(&fd->name, rd->name, checkedlen);
- -
crc = crc32(0, fd->name, rd->nsize);
+crc = crc32(0, fd->name, checkedlen);
+if (crc != je32_to_cpu(rd->name_crc)) {
+ pr_notice("%s(): Name CRC failed on node at 0x%08x: Read 0x%08x, calculated 0x%08x\n",
+ __func__, ofs, je32_to_cpu(rd->name_crc), crc);
+ --- linux-4.15.0.orig/fs/jffs2/summary.c
+ +++ linux-4.15.0/fs/jffs2/summary.c
+ @@ -783,6 +783,8 @@
+ dbg_summary("Writing unknown RWCOMPAT_COPY node type %x\n",
+ je16_to_cpu(temp->u.nodetype));
+ jffs2_sum_disable_collecting(c->summary);
+ /* The above call removes the list, nothing more to do */
+ goto bail_rwcompat;
+} else {
+ BUG()/* unknown node in summary information */
+}
@@ -794,6 +796,7 @@
c->summary->sum_num--; 
} 
+ bail_rwlock:

jffs2_sum_reset_collected(c->summary);

--- linux-4.15.0.orig/fs/jffs2/super.c
+++ linux-4.15.0/fs/jffs2/super.c
@@ -47,7 +47,10 @@
static void jffs2_i_callback(struct rcu_head *head)
{
 struct inode *inode = container_of(head, struct inode, i_rcu);
-kmem_cache_free(jffs2_inode_cachep, JFFS2_INODE_INFO(inode));
+struct jffs2_inode_info *f = JFFS2_INODE_INFO(inode);
+  kfree(f->target);
+kmem_cache_free(jffs2_inode_cachep, f);
 }

static void jffs2_destroy_inode(struct inode *inode)
@@ -101,7 +104,8 @@
 struct jffs2_sb_info *c = JFFS2_SB_INFO(sb);
 #ifdef CONFIG_JFFS2_FS_WRITEBUFFER
-  cancel_delayed_work_sync(&c->wbuf_dwork);
+  if (jffs2_is_writebuffered(c))
+    cancel_delayed_work_sync(&c->wbuf_dwork);
#endif
 mutex_lock(&c->alloc_sem);
@@ -285,10 +289,8 @@
 sb->s_fs_info = c;

 ret = jffs2_parse_options(c, data);
-  if (ret) {
-    kfree(c);
+  if (ret)
       return -EINVAL;
  }

/* Initialize JFFS2 superblock locks, the further initialization will
 * be done later */
@@ -342,7 +344,7 @@
static void jffs2_kill_sb(struct super_block *sb)
{
 struct jffs2_sb_info *c = JFFS2_SB_INFO(sb);
-  if (!sb_rdonly(sb))
+  if (!sb_rdonly(sb))

if (c && !sb_rdonly(sb))
jffs2_stop_garbage_collect_thread(c);
kfree(c);
--- linux-4.15.0.orig/fs/jfs/inode.c
+++ linux-4.15.0/fs/jfs/inode.c
@@ -161,7 +161,8 @@
if (test_cflag(COMMIT_Freewmap, inode))
jfs_free_zero_link(inode);

-diFree(inode);
+if (JFS_SBI(inode->i_sb)->ipimap)
+diFree(inode);

/*
 * Free the inode from the quota allocation.
--- linux-4.15.0.orig/fs/jfs/jfs_dmap.c
+++ linux-4.15.0/fs/jfs/jfs_dmap.c
@@ -1669,7 +1669,7 @@
 } else if (rc == -ENOSPC) {
 /* search for next smaller log2 block */
l2nb = BLKSTOL2(nblocks) - 1;
- nblocks = 1 << l2nb;
+ nblocks = 1LL << l2nb;
 } else {
/* Trim any already allocated blocks */
jfs_error(bmp->db_ipbmap->i_sb, "-EIO\n");
--- linux-4.15.0.orig/fs/jfs/jfs_dmap.h
+++ linux-4.15.0/fs/jfs/jfs_dmap.h
@@ -196,7 +196,7 @@
#define dmt_leafidx t1.leafidx
#define dmt_height t1.height
#define dmt_budmin t1.budmin
-#define dmt_stree t1.stree
+#define dmt_stree t2.stree
/*
 * on-disk aggregate disk allocation map descriptor.
--- linux-4.15.0.orig/fs/jfs/jfs_filsys.h
+++ linux-4.15.0/fs/jfs/jfs_filsys.h
@@ -281,5 +281,6 @@
* fsck() must be run to repair
*/
#defineFM_EXTENDFS 0x00000008/* file system extendfs() in progress */
#defineFM_STATE_MAX 0x0000000f/* max value of s_state */

#endif
--- linux-4.15.0.orig/fs/jfs/jfs_logmgr.c
```c
+++ linux-4.15.0/fs/jfs/jfs_logmgr.c
@@ -1338,6 +1338,7 @@
     } else {
         if (memcmp(logsuper->uuid, log->uuid, 16)) {
             jfs_warn("wrong uuid on JFS log device");
+            rc = -EINVAL;
             goto errout20;
         }
         log->size = le32_to_cpu(logsuper->size);
--- linux-4.15.0.orig/fs/jfs/jfs_mount.c
+++ linux-4.15.0/fs/jfs/jfs_mount.c
@@ -49,6 +49,7 @@
 * For now, ignore s_pbsize, l2bfactor. All I/O going through buffer
 * cache.
--- linux-4.15.0.orig/fs/jfs/jfs_txnmgr.c
+++ linux-4.15.0/fs/jfs/jfs_txnmgr.c
@@ -1928,8 +1928,7 @@
 * header ?
 */
 if (tlck->type & tlckTRUNCATE) {
-  /* This odd declaration suppresses a bogus gcc warning */
-  pxd_t pxd = pxd; /* truncated extent of xad */
+  pxd_t pxd; /* truncated extent of xad */
      int twm;
      /*
      */
```

--- linux-4.15.0.orig/fs/jfs/namei.c
unlock_new_inode(ip);
    iput(ip);
} else {
    unlock_new_inode(ip);
    d_instantiate(dentry, ip);
    +d_instantiate_new(dentry, ip);
}

out2:
@@ -313,8 +312,7 @@
unlock_new_inode(ip);
iput(ip);
} else {
    unlock_new_inode(ip);
    d_instantiate(dentry, ip);
    +d_instantiate_new(dentry, ip);
}

out2:
@@ -1059,8 +1057,7 @@
unlock_new_inode(ip);
iput(ip);
} else {
    unlock_new_inode(ip);
    d_instantiate(dentry, ip);
    +d_instantiate_new(dentry, ip);
}

out2:
@@ -1447,8 +1444,7 @@
unlock_new_inode(ip);
iput(ip);
} else {
    unlock_new_inode(ip);
    d_instantiate(dentry, ip);
    +d_instantiate_new(dentry, ip);
}

out1:
--- linux-4.15.0.orig/fs/jfs/xattr.c
+++ linux-4.15.0/fs/jfs/xattr.c
@@ -491,15 +491,17 @@
if (size > PSIZE) {
/*
 * To keep the rest of the code simple. Allocate a
 - * contiguous buffer to work with
* contiguous buffer to work with. Make the buffer large
  * enough to make use of the whole extent.
*/
- ea_buf->xattr = kmalloc(size, GFP_KERNEL);
+ ea_buf->max_size = (size + sb->s_blocksize - 1) &
  ~(sb->s_blocksize - 1);
+ ea_buf->xattr = kmalloc(ea_buf->max_size, GFP_KERNEL);
if (ea_buf->xattr == NULL)
  return -ENOMEM;
e_buf->flag = EA_MALLOC;
- ea_buf->max_size = (size + sb->s_blocksize - 1) &
- ~(sb->s_blocksize - 1);

if (ea_size == 0)
  return 0;
--- linux-4.15.0.orig/fs/kernfs/dir.c
+++ linux-4.15.0/fs/kernfs/dir.c
@@ -619,11 +619,11 @@
static struct kernfs_node *__kernfs_new_node(struct kernfs_root *root,
    const char *name, umode_t mode,
    kuid_t uid, kgid_t gid,
    unsigned flags)
{
    struct kernfs_node *kn;
    u32 gen;
    -int cursor;
    int ret;

    name = kstrdup_const(name, GFP_KERNEL);
    @@ -636,11 +636,11 @@

    idr_preload(GFP_KERNEL);
    spin_lock(&kernfs_idr_lock);
    -cursor = idr_get_cursor(&root->ino_idr);
    ret = idr_alloc_cyclic(&root->ino_idr, kn, 1, 0, GFP_ATOMIC);
    -if (ret >= 0 & & ret < cursor)
    +if (ret >= 0 & & ret < root->last_ino)
        root->next_generation++;
    gen = root->next_generation;
    +root->last_ino = ret;
    spin_unlock(&kernfs_idr_lock);
    idr_preload_end();
    if (ret < 0)
        @@ -649,11 +649,10 @@
    kn->id.generation = gen;
/*
- * set ino first. This barrier is paired with atomic_inc_not_zero in
+ * set ino first. This RELEASE is paired with atomic_inc_not_zero in
* kernfs_find_and_get_node_by_ino
*/
-smp_mb__before_atomic();
-atomic_set(&kn->count, 1);
+atomic_set_release(&kn->count, 1);
atomic_set(&kn->active, KN_DEACTIVATED_BIAS);
RB_CLEAR_NODE(&kn->rb);
@@ -661,8 +660,22 @@
kn->mode = mode;
kn->flags = flags;
+if (!uid_eq(uid, GLOBAL_ROOT_UID) || !gid_eq(gid, GLOBAL_ROOT_GID)) {
+struct iattr iattr = {
+.ia_valid = ATTR_UID | ATTR_GID,
+.ia_uid = uid,
+.ia_gid = gid,
+};
+
+ret = __kernfs_setattr(kn, &iattr);
+if (ret < 0)
+goto err_out3;
+}
+
return kn;
+ err_out3:
+idr_remove(&root->ino_idr, kn->id.ino);
err_out2:
kmem_cache_free(kernfs_node_cache, kn);
err_out1:
@@ -672,11 +685,13 @@
struct kernfs_node *kernfs_new_node(struct kernfs_node *parent,
const char *name, umode_t mode,
+ kuid_t uid, kgid_t gid,
unsigned flags)
{
struct kernfs_node *kn;
-kn = __kernfs_new_node(kernfs_root(parent), name, mode, flags);
+kn = __kernfs_new_node(kernfs_root(parent),
+
name, mode, uid, gid, flags);
if (kn) {

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kernfs_get(parent);
kn->parent = parent;
@@ -946,6 +961,7 @@
root->next_generation = 1;

kn = __kernfs_new_node(root, "", S_IFDIR | S_IRUGO | S_IXUGO,
+ GLOBAL_ROOT_UID, GLOBAL_ROOT_GID,
     KERNFS_DIR);
if (!kn) {
  idr_destroy(&root->ino_idr);
@@ -984,6 +1000,8 @@
  * @parent: parent in which to create a new directory
  * @name: name of the new directory
  * @mode: mode of the new directory
  + * @uid: uid of the new directory
  + * @gid: gid of the new directory
  * @priv: opaque data associated with the new directory
  * @ns: optional namespace tag of the directory
  *
  @@ -991,13 +1009,15 @@
  */
  struct kernfs_node *kernfs_create_dir_ns(struct kernfs_node *parent,
    const char *name, umode_t mode,
    + kuid_t uid, kgid_t gid,
    void *priv, const void *ns)
  {
    struct kernfs_node *kn;
    int rc;
    /* allocate */
    -kn = kernfs_new_node(parent, name, mode | S_IFDIR, KERNFS_DIR);
    +kn = kernfs_new_node(parent, name, S_IRUGO|S_IXUGO|S_IFDIR,
       GLOBAL_ROOT_UID, GLOBAL_ROOT_GID, KERNFS_DIR);
    if (!kn)
      return ERR_PTR(-ENOMEM);
    int rc;
    /* allocate */
    -kn = kernfs_new_node(parent, name, S_IFDIR, KERNFS_DIR);
    +kn = kernfs_new_node(parent, name, mode | S_IFDIR,
       uid, gid, KERNFS_DIR);
    if (!kn)
      return ERR_PTR(-ENOMEM);
    int rc;
    /* allocate */
    -kn = kernfs_new_node(parent, name, S_IRUGO|S_IXUGO|S_IFDIR, KERNFS_DIR);
    +kn = kernfs_new_node(parent, name, S_IRUGO|S_IXUGO|S_IFDIR,
       GLOBAL_ROOT_UID, GLOBAL_ROOT_GID, KERNFS_DIR);
    if (!kn)
      return ERR_PTR(-ENOMEM);

--- linux-4.15.0.orig/fs/kernfs/file.c
+++ linux-4.15.0/fs/kernfs/file.c
{
struct kernfs_open_file *of = kernfs_of(file);
const struct kernfs_ops *ops;
-ssize_t len;
+char *buf;

if (of->atomic_write_len) {
	@-965,6 +965,8 @@
* @parent: directory to create the file in
* @name: name of the file
* @mode: mode of the file
+* @uid: uid of the file
+* @gid: gid of the file
* @size: size of the file
* @ops: kernfs operations for the file
* @priv: private data for the file
@@ -975,7 +977,8 @@ */
 */
struct kernfs_node *__kernfs_create_file(struct kernfs_node *parent,
	const char *name,
- umode_t mode, loff_t size,
+ umode_t mode, kuid_t uid, kgid_t gid,
+ loff_t size,
const struct kernfs_ops *ops,
void *priv, const void *ns,
struct lock_class_key *key)
@@ -986,7 +989,8 @@
flags = KERNFS_FILE;

-kn = kernfs_new_node(parent, name, (mode & S_IALLUGO) | S_IFREG, flags);
+kn = kernfs_new_node(parent, name, (mode & S_IALLUGO) | S_IFREG,
+ uid, gid, flags);
if (!kn)
return ERR_PTR(-ENOMEM);

--- linux-4.15.0.orig/fs/kernfs/inode.c
+++ linux-4.15.0/fs/kernfs/inode.c
@@ -63,7 +63,7 @@
return ret;
}

-static int __kernfs_setattr(struct kernfs_node *kn, const struct iattr *iattr)
+int __kernfs_setattr(struct kernfs_node *kn, const struct iattr *iattr)
{ struct kernfs_iattrs *attrs;
struct iattr *iattrs;
--- linux-4.15.0.orig/fs/kernfs/kernfs-internal.h
+++ linux-4.15.0/fs/kernfs/kernfs-internal.h
@@ -90,6 +90,7 @@
     int kernfs_iop_getattr(const struct path *path, struct kstat *stat,
                         u32 request_mask, unsigned int query_flags);
 ssize_t kernfs_iop_listxattr(struct dentry *dentry, char *buf, size_t size);
+int __kernfs_setattr(struct kernfs_node *kn, const struct iattr *iattr);

/*
 * dir.c
@@ -104,6 +105,7 @@
     int kernfs_add_one(struct kernfs_node *kn);
     struct kernfs_node *kernfs_new_node(struct kernfs_node *parent,
             const char *name, umode_t mode,
+           kuid_t uid, kgid_t gid,
             unsigned flags);
     struct kernfs_node *kernfs_find_and_get_node_by_ino(struct kernfs_root *root,
             unsigned int ino);
--- linux-4.15.0.orig/fs/kernfs/mount.c
+++ linux-4.15.0/fs/kernfs/mount.c
@@ -196,8 +196,10 @@
     return dentry;

     knparent = find_next_ancestor(kn, NULL);
-    -if (WARN_ON(!knparent))
+    +if (WARN_ON(!knparent)) {
+        dput(dentry);
       return ERR_PTR(-EINVAL);
+    }

    do {
        struct dentry *dtmp;
@@ -206,8 +208,10 @@
            if (kn == knparent)
            return dentry;
            kntmp = find_next_ancestor(kn, knparent);
-        -if (WARN_ON(!kntmp))
+        +if (WARN_ON(!kntmp)) {
+            dput(dentry);
             return ERR_PTR(-EINVAL);
+        }

    
        dtmp = lookup_one_len_unlocked(kntmp->name, dentry,
             strlen(kntmp->name));
        dput(dentry);
@@ -316,6 +320,7 @@
            info->root = root;


info->ns = ns;
+INIT_LIST_HEAD(&info->node);

sb = sget_users(fs_type, kernfs_test_super, kernfs_set_super, flags,
&init_user_ns, info);
--- linux-4.15.0.orig/fs/kernfs/symlink.c
+++ linux-4.15.0/fs/kernfs/symlink.c
@@ -21,6 +21,7 @@
 * @target: target node for the symlink to point to
 *
 * Returns the created node on success, ERR_PTR() value on error.
+ * Ownership of the link matches ownership of the target.
 */
struct kernfs_node *kernfs_create_link(struct kernfs_node *parent,
 const char *name,
@@ -28,8 +29,16 @@
{
struct kernfs_node *kn;
int error;
+*uid_t uid = GLOBAL_ROOT_UID;
+*gid_t gid = GLOBAL_ROOT_GID;

-kn = kernfs_new_node(parent, name, S_IFLNK|S_IRWXUGO, KERNFS_LINK);
+if (target->iattr) {
+uid = target->iattr->ia_iattr.ia_uid;
+gid = target->iattr->ia_iattr.ia_gid;
+}
+
+kn = kernfs_new_node(parent, name, S_IFLNK|S_IRWXUGO, uid, gid,
+ KERNFS_LINK);
if (!kn)
return ERR_PTR(-ENOMEM);
@@ -63,6 +72,9 @@
if (base == kn)
break;

+if ((s - path) + 3 >= PATH_MAX)
+return -ENAMETOOLONG;
+
strcpy(s, "./.");
s += 3;
base = base->parent;
@@ -79,7 +91,7 @@
if (len < 2)
    return -EINVAL;
len--;
-if ((s - path) + len > PATH_MAX)
if ((s - path) + len >= PATH_MAX)
return -ENAMETOOLONG;

/* reverse fillup of target string from target to base */
@@ -88,7 +100,7 @@
int slen = strlen(kn->name);

len -= slen;
-strncpy(s + len, kn->name, slen);
+memcpy(s + len, kn->name, slen);
if (len)
s[--len] = '/';

--- linux-4.15.0.orig/fs/libfs.c
+++ linux-4.15.0/fs/libfs.c
@@ -16,6 +16,7 @@
#include <linux/exportfs.h>
#include <linux/writeback.h>
#include <linux/buffer_head.h> /* sync_mapping_buffers */
#include <linux/io.h>
#include <linux/uaccess.h>

EXPORT_SYMBOL(dcache_dir_close);

/* parent is locked at least shared */
 static struct dentry *next_positive(struct dentry *parent,
- struct list_head *from,
+ struct dentry *dentry = cursor->d_parent, *found = NULL;
   struct list_head *p,
   int count)
+/*
+ * Returns an element of siblings' list.
+ * We are looking for <count>th positive after <p>; if
+ * found, dentry is grabbed and passed to caller via *<res>.
+ * If no such element exists, the anchor of list is returned
+ * and *<res> is set to NULL.
+ */
+static struct list_head *scan_positives(struct dentry *cursor,
+ struct list_head *p,
+ loff_t count,
+ struct dentry **res)
{  
+unsigned *seq = &parent->d_inode->i_dir_seq, n;
-struct dentry *res;
-struct list_head *p;
-bool skipped;
-int i;
+struct dentry *dentry = cursor->d_parent, *found = NULL;
retry;
-i = count;
-skipped = false;
-n = smp_load_acquire(seq) & ~1;
-res = NULL;
-rcu_read_lock();
-for (p = from->next; p != &parent->d_subdirs; p = p->next) {
+spin_lock(&dentry->d_lock);
+while ((p = p->next) != &dentry->d_subdirs) {
 struct dentry *d = list_entry(p, struct dentry, d_child);
-if (!simple_positive(d)) {
-skipped = true;
} else if (!--i) {
-res = d;
-break;
} else if (!--count) {
+// we must at least skip cursors, to avoid livelocks
+if (d->d_flags & DCACHE_DENTRY_CURSOR) {
+continue;
+if (simple_positive(d) & !--count) {
+spin_lock_nested(&d->d_lock, DENTRY_D_LOCK_NESTED); 
+if (simple_positive(d))
+found = dget_dlock(d);
+spin_unlock(&d->d_lock);
+if (likely(found))
+break;
+count = 1;
+
+if (need_resched()) {
+list_move(&cursor->d_child, p);
+p = &cursor->d_child;
+spin_unlock(&dentry->d_lock);
+cond_resched();
+spin_lock(&dentry->d_lock);
}
}
-rcu_read_unlock();
-if (skipped) {
-smp_rmb();
-if (unlikely(*seq != n))
-goto retry;
-
-return res;
-
-static void move_cursor(struct dentry *cursor, struct list_head *after)
-{
-struct dentry *parent = cursor->d_parent;
unsigned n, *seq = &parent->d_inode->i_dir_seq;
spin_lock(&parent->d_lock);
for (;;) {
    n = *seq;
    if (!(n & 1) && cmpxchg(seq, n, n + 1) == n)
        break;
    cpu_relax();
}
__list_del(cursor->d_child.prev, cursor->d_child.next);
if (after)
    list_add(&cursor->d_child, after);
else
    list_add_tail(&cursor->d_child, &parent->d_subdirs);
smp_store_release(seq, n + 2);
spin_unlock(&parent->d_lock);
spin_unlock(&dentry->d_lock);
dput(*res);
*res = found;
return p;
}

loff_t dcache_dir_lseek(struct file *file, loff_t offset, int whence)
@@ -153,17 +143,28 @@
return -EINVAL;
}
if (offset != file->f_pos) {
    struct dentry *cursor = file->private_data;
    struct dentry *to = NULL;
    struct list_head *p;
+    inode_lock_shared(dentry->d_inode);
    if (file->f_pos > 2) {
        p = scan_positives(cursor, &dentry->d_subdirs, file->f_pos - 2, &to);
        spin_lock(&dentry->d_lock);
        list_move(&cursor->d_child, p);
        spin_unlock(&dentry->d_lock);
    }
+} else {
+spin_lock(&dentry->d_lock);
+list_del_init(&cursor->d_child);
+spin_unlock(&dentry->d_lock);
+
+dput(to);
+
+inode_unlock_shared(dentry->d_inode);
}
return offset;
}
@@ -185,25 +186,29 @@
{
 struct dentry *dentry = file->f_path.dentry;
 struct dentry *cursor = file->private_data;
-struct list_head *p = &cursor->d_child;
-struct dentry *next;
-bool moved = false;
+struct list_head *anchor = &dentry->d_subdirs;
+struct dentry *next = NULL;
+struct list_head *p;

 if (!dir_emit_dots(file, ctx))
 return 0;

 if (ctx->pos == 2)
- p = &dentry->d_subdirs;
- while ((next = next_positive(dentry, p, 1)) != NULL) {
+ p = anchor;
+ else
+ p = &cursor->d_child;
 +
+ while ((p = scan_positives(cursor, p, 1, &next)) != anchor) {
if (!dir_emit(ctx, next->d_name.name, next->d_name.len,
 d_inode(next)->i_ino, dt_type(d_inode(next))))
 break;
- moved = true;
- p = &next->d_child;
 ctx->pos++;
 } }
- if (moved)
- move_cursor(cursor, p);
+spin_lock(&dentry->d_lock);
+list_move_tail(&cursor->d_child, p);
+spin_unlock(&dentry->d_lock);
+dput(next);
+}
return 0;
}

EXPORT_SYMBOL(dcache_readdir);
@@ -707,6 +712,39 @@
}

EXPORT_SYMBOL(memory_read_from_buffer);

/**
 * memory_read_from_io_buffer - copy data from a io memory mapped buffer
 * @to: the kernel space buffer to read to
 * @count: the maximum number of bytes to read
 * @ppos: the current position in the buffer
 * @from: the buffer to read from
 * @available: the size of the buffer
 *
 * The memory_read_from_buffer() function reads up to @count bytes from the
 * io memory mappy buffer @from at offset @ppos into the kernel space address
 * starting at @to.
 * 
 * On success, the number of bytes read is returned and the offset @ppos is
 * advanced by this number, or negative value is returned on error.
 */

ssize_t memory_read_from_io_buffer(void *to, size_t count, loff_t *ppos,				   const void *from, size_t available)
{
	loff_t pos = *ppos;

	if (pos < 0)
		return -EINVAL;
	if (pos >= available)
		return 0;
	if (count > available - pos)
	
count = available - pos;
	memcpy_fromio(to, from + pos, count);
	*ppos = pos + count;
+
+return count;
+
+EXPORT_SYMBOL(memory_read_from_io_buffer);
+
/*
 * Transaction based IO.
 * The file expects a single write which triggers the transaction, and then
 @@ -798,7 +836,7 @@
 {
 struct simple_attr *attr;

-attrib = kmalloc(sizeof(*attr), GFP_KERNEL);
+attr = kzalloc(sizeof(*attr), GFP_KERNEL);
if (!attr)
    return -ENOMEM;

@@ -838,9 +876,11 @@
    if (ret)
        return ret;

-    if (*ppos) {
+    if (*ppos && attr->get_buf[0]) {
        /* continued read */
        size = strlen(attr->get_buf);
-    } else {
+    } else {
        /* first read */
        u64 val;
        ret = attr->get(attr->data, &val);
        if (ret)
@@ -862,7 +902,7 @@
            size_t len, loff_t *ppos)
        {
            struct simple_attr *attr;
-        u64 val;
+        unsigned long long val;
            size_t size;
            ssize_t ret;

@@ -880,7 +920,9 @@
goto out;

    attr->set_buf[size] = '\0';
-    val = simple_strtoll(attr->set_buf, NULL, 0);
+    ret = kstrtoull(attr->set_buf, 0, &val);
+    if (ret)
+        goto out;
    ret = attr->set(attr->data, val);
    if (ret == 0)
        ret = len; /* on success, claim we got the whole input */
--- linux-4.15.0.orig/fs/lockd/clnt4xdr.c
+++ linux-4.15.0/fs/lockd/clnt4xdr.c
@@ -128,24 +128,14 @@
static int decode_netobj(struct xdr_stream *xdr,
    struct xdr_netobj *obj)
{
-    u32 length;
-    __be32 *p;
+    ssize_t ret;

-p = xdr_inline_decode(xdr, 4);
-if (unlikely(p == NULL))
  goto out_overflow;
-length = be32_to_cpup(p++);
-if (unlikely(length > XDR_MAX_NETOBJ))
  goto out_size;
-obj->len = length;
-obj->data = (u8 *)p;
+ret = xdr_stream_decode_opaque_inline(xdr, (void *)&obj->data,
  +XDR_MAX_NETOBJ);
+if (unlikely(ret < 0))
  +return -EIO;
+obj->len = ret;
{return 0;
-out_size:
-dprintk("NFS: returned netobj was too long: %u\n", length);
-return -EIO;
-out_overflow:
-print_overflow_msg(__func__, xdr);
-return -EIO;
}

/*
--- linux-4.15.0.orig/fs/lockd/clntlock.c
+++ linux-4.15.0/fs/lockd/clntlock.c
@@ -187,7 +187,7 @@
 continue;
 if (!rpc_cmp_addr(nlm_addr(block->b_host), addr))
 continue;
-if (nfs_compare_fh(NFS_FH(file_inode(fl_blocked->fl_file)) ,fh) != 0)
+if (nfs_compare_fh(NFS_FH(locks_inode(fl_blocked->fl_file)), fh) != 0)
 continue;
/* Alright, we found a lock. Set the return status
 * and wake up the caller
--- linux-4.15.0.orig/fs/lockd/clntproc.c
+++ linux-4.15.0/fs/lockd/clntproc.c
@@ -128,7 +128,7 @@
 char *nodename = req->a_host->h_rpcclnt->cl_nodename;

 nlmclnt_next_cookie(&argp->cookie);
-memcpy(&lock->fh, NFS_FH(file_inode(fl->fl_file)) ,sizeof(struct nfs_fh));
+memcpy(&lock->fh, NFS_FH(locks_inode(fl->fl_file)) ,sizeof(struct nfs_fh));
 lock->caller = nodename;
 lock->oh.data = req->a_owner;
 lock->oh.len = snprintf(req->a_owner, sizeof(req->a_owner), "%u@%s",
--- linux-4.15.0.orig/fs/lockd/clntxdr.c
+++ linux-4.15.0/fs/lockd/clntxdr.c
@@ -125,24 +125,14 @@

static int decode_netobj(struct xdr_stream *xdr,
    struct xdr_netobj *obj)
{
    u32 length;
    __be32 *p;
    ssize_t ret;

    p = xdr_inline_decode(xdr, 4);
    if (unlikely(p == NULL))
        goto out_overflow;
    length = be32_to_cpup(p++);
    if (unlikely(length > XDR_MAX_NETOBJ))
        goto out_size;
    obj->len = length;
    obj->data = (u8 *)p;
    ret = xdr_stream_decodeOpaqueInline(xdr, (void *)&obj->data,
        +XDR_MAX_NETOBJ);
    if (unlikely(ret < 0))
        return -EIO;
    obj->len = ret;
    return 0;

out_size:
    dprintf("NFS: returned netobj was too long: %u\n", length);
    return -EIO;
out_overflow:
    print_overflow_msg(__func__, xdr);
    return -EIO;
}

/*
--- linux-4.15.0.orig/fs/lockd/host.c
+++ linux-4.15.0/fs/lockd/host.c
@@ -290,12 +290,11 @@
  WARN_ON_ONCE(host->h_server);

  if (atomic_dec_and_test(&host->h_count)) {
+    if (atomic_dec_and_mutex_lock(&host->h_count, &nlm_host_mutex)) {
      WARN_ON_ONCE(!list_empty(&host->h_lockowners));
      WARN_ON_ONCE(!list_empty(&host->h_granted));
      WARN_ON_ONCE(!list_empty(&host->h_reclaim));

      mutex_lock(&nlm_host_mutex);
      nlm_destroy_host_locked(host);
      mutex_unlock(&nlm_host_mutex);
      }@
      -341,7 +340,7 @@
  @}
struct lockd_net *ln = net_generic(net, lockd_net_id);
@dprintk("lockd: %s(host='%*s', vers=%u, proto=%s)n", __func__,
+@printk("lockd: %s(host='%.*s', vers=%u, proto=%s)n", __func__,
(1)hostname_len, hostname, rqstp->rq_vers,
(rqstp->rq_prot == IPPROTO_UDP ? "udp" : "tcp"));

@@ -431,12 +430,7 @@
/*
 * RPC rebind is required
 */
 if ((clnt = host->h_rpcclnt) != NULL) {
 -if (time_after_eq(jiffies, host->h_nextrebind)) {
 -rpc_force_rebind(clnt);
 -host->h_nextrebind = jiffies + NLM_HOST_REBIND;
 -dprintk("lockd: next rebind in %lu jiffies\n",
 -host->h_nextrebind - jiffies);
 -}
 -nlm_rebind_host(host);
 } else {
 unsigned long increment = nlmsvc_timeout;
 struct rpc_timeout timeparms = {
@@ -484,13 +478,20 @@
 return clnt;
 /*
 */
-% * Force a portmap lookup of the remote lockd port
+-/*
+ * nlm_rebind_host - If needed, force a portmap lookup of the peer's lockd port
+ * @host: NLM host handle for peer
+ * + * This is not needed when using a connection-oriented protocol, such as TCP.
+ * + * The existing autobind mechanism is sufficient to force a rebind when
+ * + * required, e.g. on connection state transitions.
+ */
+ void
+ nlm_rebind_host(struct nlm_host *host)
+ {
+ -dprintk("lockd: rebind host %s\n", host->h_name);
+ +if (host->h_proto != IPPROTO_UDP)
+ +return;
+ +
+ if (host->h_rpcclnt && time_after_eq(jiffies, host->h_nextrebind)) {
+ rpc_force_rebind(host->h_rpcclnt);
+ host->h_nextrebind = jiffies + NLM_HOST_REBIND;
--- linux-4.15.0.orig/fs/lockd/svclock.c
+++ linux-4.15.0/fs/lockd/svclock.c
@@ -405,8 +405,8 @@
static inline void nlm_debug_print_file(char *msg, struct nlm_file *file)
struct inode *inode = file_inode(file->f_file);
+struct inode *inode = locks_inode(file->f_file);

dprintk("lockd: %s %s/%ld",
msg, inode->i_sb->s_id, inode->i_ino);
@@ -414,7 +414,7 @@
{
 struct super_block *sb = datap;

-return sb == file_inode(file->f_file)->i_sb;
+return sb == locks_inode(file->f_file)->i_sb;
}

/**
--- linux-4.15.0.orig/fs/locks.c
+++ linux-4.15.0/fs/locks.c
@@ -2074,6 +2074,13 @@
return -1;
if (IS_REMOTELCK(fl))
return fl->fl_pid;
+/*
+ * If the flock owner process is dead and its pid has been already
+ * freed, the translation below won't work, but we still want to show
+ * flock owner pid number in init pidns.
+ */
+if (ns == &init_pid_ns)
+return (pid_t)fl->fl_pid;
rcu_read_lock();
pid = find_pid_ns(fl->fl_pid, &init_pid_ns);
@@ -2684,7 +2691,7 @@
}
}

if (inode) {
/* userspace relies on this representation of dev_t */
-seq_printf(f, "%d %02x:%02x:%ld ", fl_pid,
+seq_printf(f, "%d %02x:%02x:%lu ", fl_pid,
MAJOR(inode->i_sb->s_dev),
MINOR(inode->i_sb->s_dev), inode->i_ino);
} else {
--- linux-4.15.0.orig/fs/mbcache.c
+++ linux-4.15.0/fs/mbcache.c
@@ -94,6 +94,7 @@
entry->e_key = key;
entry->e_value = value;
entry->e_reusable = reusable;
+entry->e_referenced = 0;
head = mb_cache_entry_head(cache, key);


hlist_bl_lock(head);
hlist_bl_for_each_entry(dup, dup_node, head, e_hash_list) {
    --- linux-4.15.0.orig/fs/minix/inode.c
    +++ linux-4.15.0/fs/minix/inode.c
    @@ -155,6 +155,25 @@
    return 0;
}

+static bool minix_check_superblock(struct super_block *sb)
+{
+    struct minix_sb_info *sbi = minix_sb(sb);
+    +if (sbi->s_imap_blocks == 0 || sbi->s_zmap_blocks == 0)
+        +return false;
+    +
+    +/*
+     * s_max_size must not exceed the block mapping limitation. This check
+     * is only needed for V1 filesystems, since V2/V3 support an extra level
+     * of indirect blocks which places the limit well above U32_MAX.
+     */
+    +if (sbi->s_version == MINIX_V1 &&
+        sb->s_maxbytes > (7 + 512 + 512*512) * BLOCK_SIZE)
+        +return false;
+    +
+    +return true;
+}
+
+static int minix_fill_super(struct super_block *s, void *data, int silent)
+{
+    struct buffer_head *bh;
    @@ -190,7 +209,7 @@
    sbi->s_zmap_blocks = ms->s_zmap_blocks;
    sbi->s_firstdatazone = ms->s_firstdatazone;
    sbi->s_log_zone_size = ms->s_log_zone_size;
-    sbi->s_max_size = ms->s_max_size;
+    s->s_maxbytes = ms->s_max_size;
    s->s_magic = ms->s_magic;
    if (s->s_magic == MINIX_SUPER_MAGIC) {
        sbi->s_version = MINIX_V1;
        @@ -221,7 +240,7 @@
        sbi->s_zmap_blocks = m3s->s_zmap_blocks;
        sbi->s_firstdatazone = m3s->s_firstdatazone;
        sbi->s_log_zone_size = m3s->s_log_zone_size;
-        sbi->s_max_size = m3s->s_max_size;
+        s->s_maxbytes = m3s->s_max_size;
        sbi->s_ninodes = m3s->s_ninodes;
        sbi->s_nzones = m3s->s_zones;
        sbi->s_dirsize = 64;

@@ -233,11 +252,12 @@
    } else
    goto out_no_fs;

+if (!minix_check_superblock(s))
+goto out_illegal_sb;
+
/*
 * Allocate the buffer map to keep the superblock small.
 */
-if (sbi->s_imap_blocks == 0 || sbi->s_zmap_blocks == 0)
-goto out_illegal_sb;
int i = (sbi->s_imap_blocks + sbi->s_zmap_blocks) * sizeof(bh);
map = kzalloc(i, GFP_KERNEL);
if (!map)
@@ -471,6 +491,13 @@
    iget_failed(inode);
    return ERR_PTR(-EIO);
    }
+if (raw_inode->i_nlinks == 0) {
+    printk("MINIX-fs: deleted inode referenced: %lu\n", 
+            inode->i_ino);
+    brelse(bh);
+    iget_failed(inode);
+    return ERR_PTR(-ESTALE);
+}
    inode->i_mode = raw_inode->i_mode;
    i_uid_write(inode, raw_inode->i_uid);
    i_gid_write(inode, raw_inode->i_gid);
@@ -504,6 +531,13 @@
    iget_failed(inode);
    return ERR_PTR(-EIO);
    }
+if (raw_inode->i_nlinks == 0) {
+    printk("MINIX-fs: deleted inode referenced: %lu\n", 
+            inode->i_ino);
+    brelse(bh);
+    iget_failed(inode);
+    return ERR_PTR(-ESTALE);
+}
    inode->i_mode = raw_inode->i_mode;
    i_uid_write(inode, raw_inode->i_uid);
    i_gid_write(inode, raw_inode->i_gid);
--- linux-4.15.0.orig/fs/minix/itree_common.c
+++ linux-4.15.0/fs/minix/itree_common.c
@@ -75,6 +75,7 @@
    int n = 0;
    int i;
int parent = minix_new_block(inode);
+int err = -ENOSPC;

branch[0].key = cpu_to_block(parent);
if (parent) for (n = 1; n < num; n++) {
@@ -85,6 +86,11 @@
    \break;
bh = sb_getblk(inode->i_sb, parent);
+    if (!bh) {
+        minix_free_block(inode, nr);
+        err = -ENOMEM;
+        \break;
+    }\+
    lock_buffer(bh);
    memset(bh->b_data, 0, bh->b_size);
branch[n].bh = bh;
@@ -103,7 +109,7 @@
bforget(branch[i].bh);
for (i = 0; i < n; i++)
    minix_free_block(inode, block_to_cpu(branch[i].key));
-return -ENOSPC;
+return err;
}

static inline int splice_branch(struct inode *inode,
--- linux-4.15.0.orig/fs/minix/itree_v1.c
+++ linux-4.15.0/fs/minix/itree_v1.c
@@ -29,12 +29,12 @@
if (block < 0) {
    printk("MINIX-fs: block_to_path: block %ld < 0 on dev %pg\n",
    block, inode->i_sb->s_bdev);
-} else if (block >= (minix_sb(inode->i_sb)->s_max_size/BLOCK_SIZE)) {
-    if (printk_ratelimit())
-        printk("MINIX-fs: block_to_path: block %ld too big on dev %pg\n",
-        block, inode->i_sb->s_bdev);
-} else if (block < 7) {
-        return 0;
+    return 0;
+}+if ((u64)block * BLOCK_SIZE >= inode->i_sb->s_maxbytes)
+return 0;
+}+if (block < 7) {
    offsets[n++] = block;
} else if ((block - 7) < 512) {
    offsets[n++] = 7;
--- linux-4.15.0.orig/fs/minix/itree_v2.c
if (block < 0) {
    printk("MINIX-fs: block_to_path: block %ld < 0 on dev %pg\n", block, sb->s_bdev);
} else if (((u64)block * (u64)sb->s_blocksize >=
    -minix_sb(sb)->s_max_size) {
    -if (printk_ratelimit())
    -printk("MINIX-fs: block_to_path: ")
    -"block %ld too big on dev %pg\n", block, sb->s_bdev);
} else if (block < DIRCOUNT) {
    return 0;
}
if ((u64)block * (u64)sb->s_blocksize >= sb->s_maxbytes)
    return 0;
+
    +if (block < DIRCOUNT) {
    offsets[n++] = block;
} else if ((block -= DIRCOUNT) < INDIRCOUNT(sb)) {
    offsets[n++] = DIRCOUNT;
--- linux-4.15.0.orig/fs/minix/minix.h
+++ linux-4.15.0/fs/minix/minix.h
@@ -32,7 +32,6 @@
    unsigned long s_zmap_blocks;
    unsigned long s_firstdatazone;
    unsigned long s_log_zone_size;
-    unsigned long s_max_size;
    int s_dirsize;
    int s_namelen;
    struct buffer_head ** s imap;
--- linux-4.15.0.orig/fs/namei.c
+++ linux-4.15.0/fs/namei.c
@@ -222,9 +222,10 @@
    if (len <= EMBEDDED_NAME_MAX) {
        result->name = (char *)result->iname;
    } else if (len <= PATH_MAX) {
+        const size_t size = offsetof(struct filename, iname[1]);
        struct filename *tmp;
        if (len <= EMBEDDED_NAME_MAX) {
            result->name = (char *)result->iname;
            return ERR_PTR(-ENOMEM);
        } else if (len <= PATH_MAX) {
        +const size_t size = offsetof(struct filename, iname[1]);
            struct filename *tmp;
            if (unlikely(!tmp)) {  
                __putname(result);
                return ERR_PTR(-ENOMEM);
            }
            struct filename *tmp;
            if (unlikely(!tmp)) {  
                __putname(result);
                return ERR_PTR(-ENOMEM);
            }
        }
        static bool path_connected(const struct path *path) {
        

struct vfsmount *mnt = path->mnt;
+struct super_block *sb = mnt->mnt_sb;

-/* Only bind mounts can have disconnected paths */
-#if (mnt->mnt_root == mnt->mnt_sb->s_root)
+/* Bind mounts and multi-root filesystems can have disconnected paths */
+#if (!(sb->s_iflags & SB_I_MULTIROOT) && (mnt->mnt_root == sb->s_root))
return true;

return is_subdir(path->dentry, mnt->mnt_root);
@@ -900,8 +902,10 @@
path_put(&last->link);
}

-int sysctl_protected_symlinks __read_mostly = 0;
-int sysctl_protected_hardlinks __read_mostly = 0;
+int sysctl_protected_symlinks __read_mostly = 1;
+int sysctl_protected_hardlinks __read_mostly = 1;
+int sysctl_protected_fifos __read_mostly;
+int sysctl_protected_regular __read_mostly;

/**
 * may_follow_link - Check symlink following for unsafe situations
 @@ -1015,6 +1019,46 @@
 return -EPERM;
 }

+/**
+ * may_create_in_sticky - Check whether an O_CREAT open in a sticky directory
+ * should be allowed, or not, on files that already
+ * exist.
+ * @dir_mode: mode bits of directory
+ * @dir_uid: owner of directory
+ * @inode: the inode of the file to open
+ *
+ * Block an O_CREAT open of a FIFO (or a regular file) when:
+ * - sysctl_protected_fifos (or sysctl_protected_regular) is enabled
+ * - the file already exists
+ * - we are in a sticky directory
+ * - we don't own the file
+ * - the owner of the directory doesn't own the file
+ * - the directory is world writable
+ * If the sysctl_protected_fifos (or sysctl_protected_regular) is set to 2
+ * the directory doesn't have to be world writable: being group writable will
+ * be enough.
+ *
+ * Returns 0 if the open is allowed, -ve on error.
+ */

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+static int may_create_in_sticky(umode_t dir_mode, kuid_t dir_uid,
+struct inode * const inode)
+
+{  
+  if ((!sysctl_protected_fifos && S_ISFIFO(inode->i_mode)) ||
+      (!sysctl_protected_regular && S_ISREG(inode->i_mode)) ||
+      likely(!dir_mode & S_ISVTX)) ||
+      uid_eq(inode->i_uid, dir_uid) ||
+      uid_eq(current_fsuid(), inode->i_uid))
+    return 0;
+
+  if (likely(dir_mode & 0002) ||
+      (dir_mode & 0020 &&
+       (sysctl_protected_fifos >= 2 && S_ISFIFO(inode->i_mode)) ||
+        (sysctl_protected_regular >= 2 && S_ISREG(inode->i_mode))))
+    return -EACCES;
+}
++return 0;
+
+static __always_inline
const char *get_link(struct nameidata *nd)
{
    if (path->dentry->d_sb->s_user_ns != &init_user_ns)
        return -EACCES;

    nd->total_link_count++;
    if (nd->total_link_count >= 40)
        return -ELOOP;

    nd->path.dentry = parent;
    nd->seq = seq;
    if (unlikely(!path_connected(&nd->path)))
        return -ENOENT;
    return -ECHILD;
    break;
} else {
    struct mount *mnt = real_mount(nd->path.mnt);
    int *opened)
{
    struct dentry *dir = nd->path.dentry;
    kuid_t dir_uid = nd->inode->i_uid;
    umode_t dir_mode = nd->inode->i_mode;
    int open_flag = op->open_flag;
    ...
bool will_truncate = (open_flag & O_TRUNC) != 0;
bool got_write = false;
\@@ -3356,9 +3399,15 @@
if (error)
    return error;
audit_inode(nd->name, nd->path.dentry, 0);
-error = -EISDIR;
-if ((open_flag & O_CREAT) && d_is_dir(nd->path.dentry))
-goto out;
+if (open_flag & O_CREAT) {
+    error = -EISDIR;
+    if (d_is_dir(nd->path.dentry))
+        goto out;
+    error = may_create_in_sticky(dir_mode, dir_uid,
+        d_backing_inode(nd->path.dentry));
+    if (unlikely(error))
+        goto out;
+}
error = -ENOTDIR;
if ((nd->flags & LOOKUP_DIRECTORY) && !d_can_lookup(nd->path.dentry))
goto out;
--- linux-4.15.0.orig/fs/namespace.c
+++ linux-4.15.0/fs/namespace.c
@@ -517,6 +517,7 @@
mnt_dec_writers(real_mount(mnt));
preempt_enable();
} +EXPORT_SYMBOL_GPL(__mnt_drop_write);
/**
 * mnt_drop_write - give up write access to a mount
 \@@ -659,12 +660,21 @@
 return 0;
 mnt = real_mount(bastard);
 mnt_add_count(mnt, 1);
+smp_mb(); // see mntput_no_expire()
if (likely(!read_seqretry(&mount_lock, seq)))
    return 0;
if (bastard->mnt_flags & MNT_SYNC_UMOUNT) {
    mnt_add_count(mnt, -1);
 }
+lock_mount_hash();
+if (unlikely(bastard->mnt_flags & MNT_DOOMED)) {
+    mnt_add_count(mnt, -1);
+    unlock_mount_hash();
+    return 1;
+}
unlock_mount_hash();
+/* caller will mntput() */
return -1;
}

hlist_for_each_entry(mp, chain, m_hash) {
  if (mp->m_dentry == dentry) {
    /* might be worth a WARN_ON() */
    -if (d_unlinked(dentry))
      -return ERR_PTR(-ENOENT);
    mp->m_count++;
    return mp;
  }
}

if (d_mountpoint(dentry)) {
  /* might be worth a WARN_ON() */
  if (d_unlinked(dentry))
    return ERR_PTR(-ENOENT);
  mountpoint:
  read_seqlock_excl(&mount_lock);
  mp = lookup_mountpoint(dentry);
}

for aufs, CONFIG_AUFS_BR_FUSE *
+int is_current_mnt_ns(struct vfsmount *mnt)
+{
+  return check_mnt(real_mount(mnt));
+
+EXPORT_SYMBOL_GPL(is_current_mnt_ns);
+
/* vfsmount lock must be held for write */
  goto out_free;
}

-mnt->mnt.mnt_flags = old->mnt.mnt_flags & ~(MNT_WRITE_HOLD|MNT_MARKED);
+mnt->mnt.mnt_flags = old->mnt.mnt_flags;
+mnt->mnt.mnt_flags &= ~(MNT_WRITE_HOLD|MNT_MARKED|MNT_INTERNAL);
/* Don't allow unprivileged users to change mount flags */
if (flag & CL_UNPRIVILEGED) {

mnt->mnt.mnt_flags |= MNT_LOCK_ATIME;
@@ -1194,12 +1212,27 @@
static void mntput_no_expire(struct mount *mnt)
{
    rcu_read_lock();
    -mnt_add_count(mnt, -1);
    -if (likely(mnt->mnt_ns)) { /* shouldn't be the last one */
    +if (likely(READ_ONCE(mnt->mnt_ns))) {
    +/*
    + * Since we don't do lock_mount_hash() here,
    + * ->mnt_ns can change under us. However, if it's
    + * non-NULL, then there's a reference that won't
    + * be dropped until after an RCU delay done after
    + * turning ->mnt_ns NULL. So if we observe it
    + * non-NULL under rcu_read_lock(), the reference
    + * we are dropping is not the final one.
    + */
    +mnt_add_count(mnt, -1);
    rcu_read_unlock();
    return;
    }
    lock_mount_hash();
    +/*
    + * make sure that if __legitimize_mnt() has not seen us grab
    + * mount_lock, we'll see their refcount increment here.
    + */
    +smp_mb();
    +mnt_add_count(mnt, -1);
    if (mnt_get_count(mnt)) {
        rcu_read_unlock();
        unlock_mount_hash();
        @@ -1589,7 +1622,7 @@
        * Special case for "unmounting" root ...  
        * we just try to remount it readonly.
        */
        -if (!capable(CAP_SYS_ADMIN))
        +if (!ns_capable(sb->s_user_ns, CAP_SYS_ADMIN))
            return -EPERM;
            down_write(&sb->s_umount);
            if (!sb_rdonly(sb))
                @@ -1600,8 +1633,13 @@

                namespace_lock();
                lock_mount_hash();
                -event++;

                +/* Recheck MNT_LOCKED with the locks held */
                +retval = -EINVAL;
+if (mnt->mnt.mnt_flags & MNT_LOCKED)
+goto out;
+
+event++;
if (flags & MNT_DETACH) {
    if (!list_empty(&mnt->mnt_list))
        umount_tree(mnt, UMOUNT_PROPAGATE);
@@ -1615,6 +1653,7 @@
    retval = 0;
 }
}
+out:
unlock_mount_hash();
namespace_unlock();
return retval;
@@ -1664,13 +1703,22 @@
return ns_capable(current->nsproxy->mnt_ns->user_ns, CAP_SYS_ADMIN);
}

+#ifdef CONFIG_MANDATORY_FILE_LOCKING
+static bool may_mandlock(void)
+{
+    +pr_warn_once("======================================================
"+    +"WARNING: the mand mount option is being deprecated and\n"
+    +" will be removed in v5.15!\n"
+    +"======================================================\n"));
+    +return capable(CAP_SYS_ADMIN);
+}
+#else
static inline bool may_mandlock(void)
{
   ="#ifdef CONFIG_MANDATORY_FILE_LOCKING
+pr_warn("VFS: 'mand' mount option not supported");
return false;
-#endif
+    -return capable(CAP_SYS_ADMIN);
+
+    +#endif

/*
 * Now umount can handle mount points as well as block devices.
@@ -1705,7 +1753,7 @@
goto dput_and_out;
if (!check_mnt(mnt))
goto dput_and_out;
-if (mnt->mnt.mnt_flags & MNT_LOCKED)
+if (mnt->mnt.mnt_flags & MNT_LOCKED) /* Check optimistically */
goto dput_and_out;
retval = -EPERM;
if (flags & MNT_FORCE && !capable(CAP_SYS_ADMIN))
@@ -1783,8 +1831,14 @@
for (s = r; s; s = next_mnt(s, r)) {
  if (!(flag & CL_COPY_UNBINDABLE) &&
      IS_MNT_UNBINDABLE(s)) {
    s = skip_mnt_tree(s);
    -continue;
    +#if (s->mnt.mnt_flags & MNT_LOCKED) {
    +#/* Both unbindable and locked. */
    +#q = ERR_PTR(-EPERM);
    +#goto out;
    +} else {
    +s = skip_mnt_tree(s);
    +continue;
    +}
  }
  if (!(flag & CL_COPY_MNT_NS_FILE) &&
      is_mnt_ns_file(s->mnt.mnt_root)) {
@@ -1837,11 +1891,25 @@
    { namespace_lock();
      lock_mount_hash();
      -umount_tree(real_mount(mnt), UMOUNT_SYNC);
      +umount_tree(real_mount(mnt), 0);
      unlock.mount_hash();
      namespace_unlock();
    }

+static bool has_locked_children(struct *mnt, struct dentry *dentry)
+{
+  struct *child;
+  +
+  +list_for_each_entry(child, &mnt->mnt.mounts, child) {
+    if (!is_subdir(child->mnt.mnt.mountpoint, dentry))
+      continue;
+    +
+    +if (child->mnt.mnt.mountflags & MNT_LOCKED)
+      return true;
+  }
+  +return false;
+}
+/*
 * clone_private_mount - create a private clone of a path
 * @@ -1856,14 +1924,27 @@
 struct mount *old_mnt = real_mount(path->mnt);
struct mount *new_mnt;
	down_read(&namespace_sem);
if (IS_MNT_UNBINDABLE(old_mnt))
return ERR_PTR(-EINVAL);
+goto invalid;
+
+if (!check_mnt(old_mnt))
+goto invalid;
+
+if (has_locked_children(old_mnt, path->dentry))
+goto invalid;

new_mnt = clone_mnt(old_mnt, path->dentry, CL_PRIVATE);
+up_read(&namespace_sem);
+
if (IS_ERR(new_mnt))
return ERR_CAST(new_mnt);

return &new_mnt->mnt;
+
+invalid:
+up_read(&namespace_sem);
+return ERR_PTR(-EINVAL);
}
EXPORT_SYMBOL_GPL(clone_private_mount);

@@ -1881,6 +1962,7 @@
} return 0;
}
+EXPORT_SYMBOL_GPL(iterate_mounts);

static void cleanup_group_ids(struct mount *mnt, struct mount *end)
{ 
 @@ -2179,19 +2261,6 @@
 return err;
 }
_STATIC_INLINE bool has_locked_children(struct mount *mnt, struct dentry *dentry)
{
-struct mount *child;
-list_for_each_entry(child, &mnt->mnt_mounts, mnt_child) {
-if (!is_subdir(child->mnt_mountpoint, dentry))
-continue;
-
-if (child->mnt.mnt_flags & MNT_LOCKED)
-return true;
/* do loopback mount. */
@@ -2327,7 +2396,7 @@
down_write(&sb->s_umount);
if (ms_flags & MS_BIND)
    err = change_mount_flags(path->mnt, ms_flags);
-else if (!capable(CAP_SYS_ADMIN))
+else if (!ns_capable(sb->s_user_ns, CAP_SYS_ADMIN))
    err = -EPERM;
else
    err = do_remount_sb(sb, sb_flags, data, 0);
@@ -2809,7 +2878,7 @@
    mnt_flags |= MNT_NODIRATIME;
if (flags & MS_STRICTATIME)
    mnt_flags &= ~(MNT_RELATIME | MNT_NOATIME);
-/* The default atime for remount is preservation */
+/* The default atime for remount is preservation */
@@ -3179,8 +3248,8 @@
    /* make certain new is below the root */
    if (!is_path_reachable(new_mnt, new.dentry, &root))
        goto out4;
-    root_mp->m_count++; /* pin it so it won't go away */
-    lock_mount_hash();
+    root_mp->m_count++; /* pin it so it won't go away */
+    lock_mount_hash();
    +root_mp->m_count++; /* pin it so it won't go away */
    detach_mnt(new_mnt, &parent_path);
    detach_mnt(root_mnt, &root_parent);
    if (root_mnt->mnt.mnt_flags & MNT_LOCKED) {
 --- linux-4.15.0.orig/fs/ncpfs/ncplib_kernel.c
+++ linux-4.15.0/fs/ncpfs/ncplib_kernel.c
@@ -981,6 +981,10 @@
    goto out;
 }
*bytes_read = ncp_reply_be16(server, 0);
+if (*bytes_read > to_read) {
+    result = -EINVAL;
+    goto out;
+
 source = ncp_reply_data(server, 2 + (offset & 1));
 memcpy(target, source, *bytes_read);
config NFS_SWAP
bool "Provide swap over NFS support"
default n
-depends on NFS_FS
+depends on NFS_FS && SWAP
select SUNRPC_SWAP
help
This option enables swapon to work on files located on NFS mounts.
@ @ -127,7 +127,8 @@
config PNFS_FLEXFILE_LAYOUT
tristate
depends on NFS_V4_1 && NFS_V3
-default m
+default NFS_V4

config NFS_V4_1_IMPLEMENTATION_ID_DOMAIN
string "NFSv4.1 Implementation ID Domain"
--- linux-4.15.0.orig/fs/nfs/callback_proc.c
+++ linux-4.15.0/fs/nfs/callback_proc.c
@@ -127,6 +127,9 @@
 restart:
 list_for_each_entry_rcu(server, &clp->el_superblocks, client_link) {
 list_for_each_entry(lo, &server->layouts, plh_layouts) {
+if (!pnfs_layout_is_valid(lo))
+continue;
 if (stateid != NULL &&
 !nfs4_stateid_match_other(stateid, &lo->plh_stateid))
 continue;
@@ -213,9 +215,9 @@
 u32 oldseq, newseq;
-/* Is the stateid still not initialised? */
+/* Is the stateid not initialised? */
if (!pnfs_layout_is_valid(lo))
- return NFS4ERR_DELAY;
+ return NFS4ERR_NOMATCHING_LAYOUT;

/* Mismatched stateid? */
if (!nfs4_stateid_match_other(&lo->plh_stateid, new))
@@ -420,11 +422,8 @@
 return htonl(NFS4ERR_SEQ_FALSE_RETRY);
}

-/* Wraparound */
-if (unlikely(slot->seq_nr == 0xFFFFFFFFU)) {
- if (args->csa_sequenceid == 1)
- return htonl(NFS4_OK);
-} else if (likely(args->csa_sequenceid == slot->seq_nr + 1))
+/* Note: wraparound relies on seq_nr being of type u32 */
+if (likely(args->csa_sequenceid == slot->seq_nr + 1))
 return htonl(NFS4_OK);

/* Misordered request */
@@ -436,11 +435,14 @@
  a match. If the slot is in use and the sequence numbers match, the
  client is still waiting for a response to the original request.
 */
-static bool referring_call_exists(struct nfs_client *clp,
+static int referring_call_exists(struct nfs_client *clp,
    uint32_t nrclists,
    struct referring_call_list *rclists)
+ struct referring_call_list *rclists,
+ spinlock_t *lock)
+__releases(lock)
+__acquires(lock)
{
  bool status = false;
  int status = 0;
  int i, j;
  struct nfs4_session *session;
  struct nfs4_slot_table *tbl;
@@ -463,8 +465,10 @@
 for (j = 0; j < rclist->rcl_nrefcalls; j++) {
   ref = &rclist->rcl_refcalls[j];
   +spin_unlock(lock);
   status = nfs4_slot_wait_on_seqid(tbl, ref->rc_slotid,
     ref->rc_sequenceid, HZ >> 1) < 0;
   +spin_lock(lock);
   if (status)
  goto out;
* related callback was received before the response to the original
  * call.
  */
-    if (referring_call_exists(clp, args->csa_nrclists, args->csa_rclists)) {
+    if (referring_call_exists(clp, args->csa_nrclists, args->csa_rclists,
+                              &tbl->slot_tbl_lock) < 0) {
status = htonl(NFS4ERR_DELAY);
goto out_unlock;
    }
--- linux-4.15.0.orig/fs/nfs/callback_xdr.c
+++ linux-4.15.0/fs/nfs/callback_xdr.c
@@ -904,16 +904,21 @@
if (hdr_arg.minorversion == 0) {
    cps.clp = nfs4_find_client_ident(SVC_NET(rqstp), hdr_arg.cb_ident);
-        if (!cps.clp || !check_gss_callback_principal(cps.clp, rqstp)) {
+        if (!cps.clp || !check_gss_callback_principal(cps.clp, rqstp)) {
+            if (cps.clp)
+                nfs_put_client(cps.clp);
goto out_invalidcred;
+        }
    }

cps.minorversion = hdr_arg.minorversion;
    hdr_res.taglen = hdr_arg.taglen;
    hdr_res.tag = hdr_arg.tag;
-        if (encode_compound_hdr_res(&xdr_out, &hdr_res) != 0)
+        if (encode_compound_hdr_res(&xdr_out, &hdr_res) != 0) {
+            if (cps.clp)
+                nfs_put_client(cps.clp);
return rpc_system_err;
-    }
+    }
while (status == 0 && nops != hdr_arg.nops) {
    status = process_op(nops, rqstp, &xdr_in,
    rqstp->rq_argp, &xdr_out, rqstp->rq_resp,
@@ -936,7 +941,7 @@
out_invalidcred:
pr_warn_ratelimited("NFS: NFSv4 callback contains invalid cred\n");
-    return rpc_autherr_badcred;
+    return svc_return_autherr(rqstp, rpc_autherr_badcred);
}
/*
--- linux-4.15.0.orig/fs/nfs/client.c
+++ linux-4.15.0/fs/nfs/client.c
@@ -290,6 +290,7 @@
struct nfs_client *clp;
const struct sockaddr *sap = data->addr;
struct nfs_net *nn = net_generic(data->net, nfs_net_id);
+int error;

again:
list_for_each_entry(clp, &nn->nfs_client_list, cl_share_link) {
@@ -302,9 +303,11 @@
if (clp->cl_cons_state > NFS_CS_READY) {
refcount_inc(&clp->cl_count);
spin_unlock(&nn->nfs_client_lock);
-nfs_wait_client_init_complete(clp);
+error = nfs_wait_client_init_complete(clp);
  +error < 0)
  +return ERR_PTR(error);
  goto again;
}

@@ -403,7 +406,7 @@
if (cl_init->hostname == NULL) {
  WARN_ON(1);
  -return NULL;
  +return ERR_PTR(-EINVAL);
}
/* see if the client already exists */
@@ -415,6 +418,8 @@
spin_unlock(&nn->nfs_client_lock);
if (new)
  new->rpc_ops->free_client(new);
+if (IS_ERR(clp))
+  return clp;
return nfs_found_client(cl_init, clp);
}
if (new) {
@@ -459,7 +464,7 @@
case XPRT_TRANSPORT_RDMA:
if (retrans == NFS_UNSPEC_RETRANS)
to->to_retries = NFS_DEF_TCP_RETRANS;
-  if (timeo == NFS_UNSPEC_TIMEO || to->to_retries == 0)
+  if (timeo == NFS_UNSPEC_TIMEO || to->to_initval == 0)
    to->to_initval = NFS_DEF_TCP_TIMEO * HZ / 10;
  if (to->to_initval > NFS_MAX_TCP_TIMEOUT)
to->to_initval = NFS_MAX_TCP_TIMEOUT;
--- linux-4.15.0.orig/fs/nfs/delegation.c
+++ linux-4.15.0/fs/nfs/delegation.c
@@ -52,6 +52,16 @@
 return false;
 }
+struct nfs_delegation *nfs4_get_valid_delegation(const struct inode *inode)
+{
+struct nfs_delegation *delegation;
+  
+  delegation = rcu_dereference(NFS_I(inode)->delegation);
+  if (nfs4_is_valid_delegation(delegation, 0))
+    return delegation;
+  return NULL;
+}
+
+static int
nfs4_do_check_delegation(struct inode *inode, fmode_t flags, bool mark)
{
  @ @ -91,7 +101,7 @ @
 return nfs4_do_check_delegation(inode, flags, false);
}

-static int nfs_delegation_claim_locks(struct nfs_open_context *ctx, struct nfs4_state *state, const nfs4_stateid *
stateid)
+static int nfs_delegation_claim_locks(struct nfs4_state *state, const nfs4_stateid *
stateid)
{
  struct inode *inode = state->inode;
  struct file_lock *fl;
  @ @ -106,7 +116,7 @ @
 spin_lock(&flctx->flc_lock);
 restart:
 list_for_each_entry(fl, list, fl_list) {
-    if (nfs_file_open_context(fl->fl_file) != ctx)
+    if (nfs_file_open_context(fl->fl_file)->state != state)
      continue;
    spin_unlock(&flctx->flc_lock);

 status = nfs4_lock_delegation_recall(fl, state, stateid);
@@ -151,9 +161,9 @@
 /* Block nfs4_proc_unlck */
 mutex_lock(&sp->so_delegreturn_mutex);
 seq = raw_seqcount_begin(&sp->so_reclaim_seqcount);
-err = nfs4_open_delegation_recall(ctx, state, stateid, type);
+err = nfs4_open_delegation_recall(ctx, state, stateid);
 if (!err)
-err = nfs_delegation_claim_locks(ctx, state, stateid);
+err = nfs_delegation_claim_locks(state, stateid);
if (!err && read_seqcount_retry(&sp->so_reclaim_seqcount, seq))
err = -EAGAIN;
mutex_unlock(&sp->so_delegreturn_mutex);
@@ -224,6 +234,8 @@
spin_lock(&delegation->lock);
if (delegation->inode != NULL)
inode = igrab(delegation->inode);
+if (!inode)
+set_bit(NFS_DELEGATION_INODE_FREEING, &delegation->flags);
spin_unlock(&delegation->lock);
return inode;
}
@@ -853,10 +865,11 @@
list_for_each_entry_rcu(server, &clp->cl_superblocks, client_link) {
list_for_each_entry_rcu(delegation, &server->delegations, super_list) {
-    if (test_bit(NFS_DELEGATION_RETURNING, 
-        &delegation->flags))
-    continue;
-    if (test_bit(NFS_DELEGATION_NEED_RECLAIM, 
-        &delegation->flags)) ||
+    if (test_bit(NFS_DELEGATION_INODE_FREEING, 
+        &delegation->flags)) ||
+    test_bit(NFS_DELEGATION_TEST_EXPIRED, 
+        &delegation->flags)) ||
+    test_bit(NFS_DELEGATION_NEED_RECLAIM, 
&delegation->flags) == 0)
continue;
if (!nfs_sb_active(server->super))
@@ -961,10 +974,11 @@
list_for_each_entry_rcu(server, &clp->cl_superblocks, client_link) {
list_for_each_entry_rcu(delegation, &server->delegations, super_list) {
-    if (test_bit(NFS_DELEGATION_RETURNING, 
-        &delegation->flags))
-    continue;
-    if (test_bit(NFS_DELEGATION_TEST_EXPIRED, 
-        &delegation->flags)) ||
+    if (test_bit(NFS_DELEGATION_INODE_FREEING, 
+        &delegation->flags)) ||
+    test_bit(NFS_DELEGATION_TEST_EXPIRED, 
&delegation->flags) == 0)
continue;
if (!nfs_sb_active(server->super))
@@ -1060,7 +1074,7 @@
if (delegation != NULL &&
    nfs4_stateid_match_other(dst, &delegation->stateid)) {
dst->seqid = delegation->stateid.seqid;
```c
-return ret;
+ret = true;
{
rcu_read_unlock();
out:
--- linux-4.15.0.orig/fs/nfs/delegation.h
+++ linux-4.15.0/fs/nfs/delegation.h
@@ -34,6 +34,7 @@
NFS_DELEGATION_RETURNING,
NFS_DELEGATION_REVOKED,
NFS_DELEGATION_TEST_EXPIRED,
+NFS_DELEGATION_INODE_FREEING,
};

int nfs_inode_set_delegation(struct inode *inode, struct rpc_cred *cred, struct nfs_openres *res);
@@ -59,11 +60,12 @@
/* NFSv4 delegation-related procedures */
int nfs4_proc_delegreturn(struct inode *inode, struct rpc_cred *cred, const nfs4_stateid *stateid, int issync);
-int nfs4_open_delegation_recall(struct nfs_open_context *ctx, struct nfs4_state *state, const nfs4_stateid *stateid,
+int nfs4_open_delegation_recall(struct nfs_open_context *ctx, struct nfs4_state *state, const nfs4_stateid *stateid);
int nfs4_lock_delegation_recall(struct file_lock *fl, struct nfs4_state *state, const nfs4_stateid *stateid);
bool nfs4_copy_delegation_stateid(struct inode *inode, fmode_t flags, nfs4_stateid *dst, struct rpc_cred **cred);
bool nfs4_refresh_delegation_stateid(nfs4_stateid *dst, struct inode *inode);
+struct nfs_delegation *nfs4_get_valid_delegation(const struct inode *inode);
void nfs_mark_delegation_referenced(struct nfs_delegation *delegation);
int nfs4_have_delegation(struct inode *inode, fmode_t flags);
int nfs4_check_delegation(struct inode *inode, fmode_t flags);
--- linux-4.15.0.orig/fs/nfs/dir.c
+++ linux-4.15.0/fs/nfs/dir.c
@@ -162,6 +162,17 @@
bvoid eof;
} nfs_readdir_descriptor_t;

+static
+void nfs_readdir_init_array(struct page *page)
+{
+struct nfs_cache_array *array;
+
+array = kmap_atomic(page);
+memset(array, 0, sizeof(struct nfs_cache_array));
+array->eof_index = -1;
+kunmap_atomic(array);
+}
+/
*/
```
* we are freeing strings created by nfs_add_to_readdir_array()

*/
@@ -174,6 +185,7 @@
array = kmap_atomic(page);
for (i = 0; i < array->size; i++)
kfree(array->array[i].string.name);
+array->size = 0;
kunmap_atomic(array);
}
@@ -541,6 +553,9 @@
xdr_set_scratch_buffer(&stream, page_address(scratch), PAGE_SIZE);

do {
+if (entry->label)
+entry->label->len = NFS4_MAXLABELLEN;
+
status = xdr_decode(desc, entry, &stream);
if (status != 0) {
if (status == -EAGAIN)
@@ -610,6 +625,8 @@
int status = -ENOMEM;
unsigned int array_size = ARRAY_SIZE(pages);
+nfs_readdir_init_array(page);
+
entry.prev_cookie = 0;
entry.cookie = desc->last_cookie;
entry.eof = 0;
@@ -626,8 +643,6 @@
}
array = kmap(page);
-memset(array, 0, sizeof(struct nfs_cache_array));
-array->eof_index = -1;

status = nfs_readdir_alloc_pages(pages, array_size);
if (status < 0)
@@ -681,6 +696,7 @@
unlock_page(page);
return 0;
error:
+nfs_readdir_clear_array(page);
unlock_page(page);
return ret;
}
@@ -688,8 +704,6 @@
static
void cache_page_release(nfs_readdir_descriptor_t *desc)
{
    -if (!desc->page->mapping)
        nfs_readdir_clear_array(desc->page);
    put_page(desc->page);
    desc->page = NULL;
}

/*
 * Returns 0 if desc->dir_cookie was found on page desc->page_index
 * and locks the page to prevent removal from the page cache.
 */
static
    -int find_cache_page(nfs_readdir_descriptor_t *desc)
+int find_and_lock_cache_page(nfs_readdir_descriptor_t *desc)
{
    int res;
    desc->page = get_cache_page(desc);
    if (IS_ERR(desc->page))
        return PTR_ERR(desc->page);
    -res = nfs_readdir_search_array(desc);
    +res = lock_page_killable(desc->page);
    if (res != 0)
        -cache_page_release(desc);
        +goto error;
    +res = -EAGAIN;
    +if (desc->page->mapping != NULL) {
        +res = nfs_readdir_search_array(desc);
        +if (res == 0)
            +return 0;
        +}
        +unlock_page(desc->page);
        +error:
        +cache_page_release(desc);
        return res;
    }

desc->last_cookie = 0;
}
do {
    -res = find_cache_page(desc);
    +res = find_and_lock_cache_page(desc);
} while (res == -EAGAIN);
return res;
desc->eof = true;

cunmap(desc->page);
-cache_page_release(desc);
dfprintk(DIRCACHE, "NFS: nfs_do_filldir() filling ended @ cookie %Lu; returning = %d\n", (unsigned long long)*desc->dir_cookie, res);
return res;

status = nfs_do_filldir(desc);

/* The file offset position represents the dirent entry number. A
break;

res = nfs_do_filldir(desc);
+unlock_page(desc->page);
+cache_page_release(desc);
if (res < 0)
break;
} while (!desc->eof);

return !nfs_check_verifier(dir, dentry, flags & LOOKUP_RCU);

+static int
+nfs_lookup_revalidate_done(struct inode *dir, struct dentry *dentry, int error)
+{
+switch (error) {
+case 1:
+dfprintk(LOOKUPCACHE, "NFS: %s(%pd2) is valid\n", __func__, dentry);
+return 1;
case 0:
    nfs_mark_for_revalidate(dir);
    if (inode && S_ISDIR(inode->i_mode)) {
        /* Purge readdir caches. */
        nfs_zap_caches(inode);
        /* We can’t d_drop the root of a disconnected tree:
         * its d_hash is on the s_anon list and d_drop() would hide
         * it from shrink_dcache_forUnmount(), leading to busy
         * inodes on unmount and further eupses.
         */
        if (IS_ROOT(dentry))
            return 1;
    }
    dprintf(LookupCache, "NFS: %s(%pd2) is invalid
", __func__, dentry);
    return 0;
}

dprintf(LookupCache, "NFS: %s(%pd2) lookup returned error %d
", __func__, dentry, error);
return error;

}

static int
nfs_lookup_revalidate_negative(struct inode *dir, struct dentry *dentry,
        unsigned int flags)
{
    int ret = 1;
    if (nfs_neg_need_reval(dir, dentry, flags)) {
        if (flags & LOOKUP_RCU)
            return -ECHILD;
        ret = 0;
    }
    return nfs_lookup_revalidate_done(dir, dentry, NULL, ret);
}

static int
nfs_lookup_revalidate_dentry(struct inode *dir, struct dentry *dentry,
        struct inode *inode)
{
    nfs_set_verifier(dentry, nfs_save_change_attribute(dir));
    return nfs_lookup_revalidate_done(dir, dentry, inode, 1);
}

static int
nfs_lookup_revalidate_delegated(struct inode *dir, struct dentry *dentry,
        struct inode *inode)
{
    nfs_set_verifier(dentry, nfs_save_change_attribute(dir));
    return nfs_lookup_revalidate_done(dir, dentry, inode, 1);
}


+struct nfs_fh *fhandle;
+struct nfs_fattr *fattr;
+struct nfs4_label *label;
+int ret;
+
+ret = -ENOMEM;
+fhandle = nfs_alloc_fhandle();
+fattr = nfs_alloc_fattr();
+label = nfs4_label_alloc(NFS_SERVER(inode), GFP_KERNEL);
+if (fhandle == NULL || fattr == NULL || IS_ERR(label))
+goto out;
+
+ret = NFS_PROTO(dir)->lookup(dir, &dentry->d_name, fhandle, fattr, label);
+if (ret < 0) {
+if (ret == -ESTALE || ret == -ENOENT)
+ret = 0;
+goto out;
+}
+ret = 0;
+if (nfs_compare_fh(NFS_FH(inode), fhandle))
+goto out;
+if (nfs_refresh_inode(inode, fattr) < 0)
+goto out;
+
+nfs_setsecurity(inode, fattr, label);
+nfs_set_verifier(dentry, nfs_save_change_attribute(dir));
+
+/* set a readdirplus hint that we had a cache miss */
+nfs_force_use_readdirplus(dir);
+ret = 1;
+out:
+nfs_free_fattr(fattr);
+nfs_free_fh(fhandle);
+nfs4_label_free(label);
+return nfs_lookup_revalidate_done(dir, dentry, inode, ret);
+
/*
 * This is called every time the dcache has a lookup hit,
 * and we should check whether we can really trust that
 * If the parent directory is seen to have changed, we throw out the
 * cached dentry and do a new lookup.
 */
-static int nfs_lookup_revalidate(struct dentry *dentry, unsigned int flags)
+static int
+nfs_do_lookup_revalidate(struct inode *dir, struct dentry *dentry,
+ unsigned int flags)
struct inode *dir;
struct inode *inode;
struct dentry *parent;
struct nfs_fh *fhandle = NULL;
struct nfs_fattr *fattr = NULL;
struct nfs4_label *label = NULL;
int error;

if (flags & LOOKUP_RCU) {
  parent = READ_ONCE(dentry->d_parent);
  dir = d_inode_rcu(parent);
  if (!dir)
    return -ECHILD;
} else {
  parent = dget_parent(dentry);
  dir = d_inode(parent);
}

nfs_inc_stats(dir, NFISOS_DENTRYREVALIDATE);
inode = d_inode(dentry);

if (!inode) {
  if (nfs_neg_need_reval(dir, dentry, flags)) {
    if (flags & LOOKUP_RCU)
      return -ECHILD;
    goto out_bad;
  }
  goto out_valid;
}
if (!inode)
  return nfs_lookup_revalidate_negative(dir, dentry, flags);

if (is_bad_inode(inode)) {
  if (flags & LOOKUP_RCU)
    return -ECHILD;
  dfprintk(LOOKUPCACHE, "%s: %pd2 has dud inode\n", __func__, dentry);
  goto out_bad;
}

if (NFS_PROTO(dir)->have_delegation(inode, FMODE_READ))
  goto out_set_verifier;
/* Force a full look up iff the parent directory has changed */
if (!nfs_is_exclusive_create(dir, flags) &&
    nfs_check_verifier(dir, dentry, flags & LOOKUP_RCU)) {
  error = nfs_lookup_verify_inode(inode, flags);
}
if (error) {
    if (error == -ESTALE)
        goto out_bad;
    goto out_valid;
}

nfs_advise_use readdirplus(dir);
goto out_valid;

if (NFS_STALE(inode))
goto out_bad;

-error = -ENOMEM;
-fhandle = nfs_alloc_fhandle();
-fattr = nfs_alloc_fattr();
-if (fhandle == NULL || fattr == NULL)
    goto out_error;
-
-label = nfs4_label_alloc(NFS_SERVER(inode), GFP_NOWAIT);
-if (IS_ERR(label))
    goto out_error;
-
trace_nfs_lookup_revalidate_enter(dir, dentry, flags);
-error = NFS_PROTO(dir)->lookup(dir, &dentry->d_name, fhandle, fattr, label);
+error = nfs_lookup_revalidate_dentry(dir, dentry, inode);
trace_nfs_lookup_revalidate_exit(dir, dentry, flags, error);
-if (error == -ESTALE || error == -ENOENT)
    goto out_bad;
-if (error)
    goto out_error;
-if (nfs_compare_fh(NFS_FH(inode), fhandle))
    goto out_bad;
-if ((error = nfs_refresh_inode(inode, fattr)) != 0)
    goto out_bad;
-
-nfs_setsecurity(inode, fattr, label);
-
-nfs_free_fattr(fattr);
-nfs_free_fhandle(fhandle);
-nfs4_label_free(label);
+return error;
+out_valid:
+return nfs_lookup_revalidate_done(dir, dentry, inode, 1);
+out_bad:
+if (flags & LOOKUP_RCU)
+return -ECHILD;
+return nfs_lookup_revalidate_done(dir, dentry, inode, 0);
+}

/* set a readdirplus hint that we had a cache miss */
-nfs_force_use_readdirplus(dir);
+static int
+__nfs_lookup_revalidate(struct dentry *dentry, unsigned int flags, 
+int (*reval)(struct inode *, struct dentry *, unsigned int))
+
+struct dentry *parent;
+struct inode *dir;
+int ret;

-out_set_verifier:
-nfs_set_verifier(dentry, nfs_save_change_attribute(dir));
- out_valid:
if (flags & LOOKUP_RCU) {
+parent = READ_ONCE(dentry->d_parent);
+dir = d_inode_rcu(parent);
+if (!dir)
+return -ECHILD;
+ret = reval(dir, dentry, flags);
if (parent != READ_ONCE(dentry->d_parent))
return -ECHILD;
-} else
+} else {
+parent = dget_parent(dentry);
+ret = reval(d_inode(parent), dentry, flags);
dput(parent);
-dfprintk(LOOKUPCACHE, "NFS: %s(%pd2) is valid\n", 
-__func__, dentry);
-return 1;
-out_zap_parent:
-nfs_zap_caches(dir);
- out_bad:
-WARN_ON(flags & LOOKUP_RCU);
-nfs_free_fattr(fattr);
-nfs_free_fhandle(fhandle);
-nfs4_label_free(label);
-nfs_mark_for_revalidate(dir);
-if (inode && S_ISDIR(inode->i_mode)) {
-/* Purge readdir caches. */
-nfs_zap_caches(inode);
-*/
-/* We can't d_drop the root of a disconnected tree:
- * its d_hash is on the s_anon list and d_drop() would hide
- * it from shrink_dcache_forUnmount(), leading to busy

- * inodes on unmount and further oopses.
- */
-if (IS_ROOT(dentry))
-goto out_valid;
}
-dput(parent);
-dfprintk(LOOKUPCACHE, "NFS: %s(%pd2) is invalid\n",  
-__func__, dentry);
-return 0;
-out_error:
-WARN_ON(flags & LOOKUP_RCU);
-nfs_free_fattr(fattr);
-nfs_free_fhandle(fhandle);
-nfs4_label_free(label);
-dput(parent);
-dfprintk(LOOKUPCACHE, "NFS: %s(%pd2) lookup returned error %d\n",  
-__func__, dentry, error);
-return error;
+return ret;
+
+static int nfs_lookup_revalidate(struct dentry *dentry, unsigned int flags)  
+{
+return __nfs_lookup_revalidate(dentry, flags, nfs_do_lookup_revalidate);
}  
/*
@@ -1427,7 +1487,7 @@
if (S_ISREG(file->f_path.dentry->d_inode->i_mode))
nfs_file_set_open_context(file, ctx);
else
-err = -ESTALE;
+err = -EOPENSTALE;
out:
return err;
}  
@@ -1553,62 +1613,55 @@
}  
EXPORT_SYMBOL_GPL(nfs_atomic_open);

-static int nfs4_lookup_revalidate(struct dentry *dentry, unsigned int flags)  
+static int  
+nfs4_do_lookup_revalidate(struct inode *dir, struct dentry *dentry,  
+ unsigned int flags)  
+{
 struct inode *inode;
-int ret = 0;
if (!(flags & LOOKUP_OPEN) || (flags & LOOKUP_DIRECTORY))
    -goto no_open;
+goto full_reval;
if (d_mountpoint(dentry))
    -goto no_open;
-if (NFS_SB(dentry->d_sb)->caps & NFS_CAP_ATOMIC_OPEN_V1)
    -goto no_open;
+goto full_reval;
inode = d_inode(dentry);

/* We can't create new files in nfs_open_revalidate(), so we */
/* optimize away revalidation of negative dentries. */
    -if (inode == NULL) {
    -struct dentry *parent;
    -struct inode *dir;
    -
    -if (flags & LOOKUP_RCU) {
    -parent = READ_ONCE(dentry->d_parent);
    -dir = d_inode_rcu(parent);
    -if (!dir)
    -    return -ECHILD;
    -} else {
    -parent = dget_parent(dentry);
    -dir = d_inode(parent);
    -}
    -if (!nfs_neg_need_reval(dir, dentry, flags))
    -ret = 1;
    -else if (flags & LOOKUP_RCU)
    -ret = -ECHILD;
    -if (!(flags & LOOKUP_RCU))
    -dput(parent);
    -else if (parent != READ_ONCE(dentry->d_parent))
    -return -ECHILD;
    -goto out;
    -}
+if (inode == NULL)
+goto full_reval;
+
+if (NFS_PROTO(dir)->have_delegation(inode, FMODE_READ))
+return nfs_lookup_revalidate_delegated(dir, dentry, inode);

/* NFS only supports OPEN on regular files */
if (!S_ISREG(inode->i_mode))
    -goto no_open;
+goto full_reval;
+

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/* We cannot do exclusive creation on a positive dentry */
-if (flags & LOOKUP_EXCL)
-go to no_open;
+if (flags & (LOOKUP_EXCL | LOOKUP_REVAL))
+go to reval_dentry;
+
+/* Check if the directory changed */
+if (!nfs_check_verifier(dir, dentry, flags & LOOKUP_RCU))
+go to reval_dentry;

/* Let f_op->open() actually open (and revalidate) the file */
-ret = 1;
+return 1;
+reval_dentry:
+if (flags & LOOKUP_RCU)
+return -ECHILD;
+return nfs_lookup_revalidate_dentry(dir, dentry, inode);;

-out:
-return ret;
+full_reval:
+return nfs_do_lookup_revalidate(dir, dentry, flags);
+
-no_open:
-return nfs_lookup_revalidate(dentry, flags);
+static int nfs4_lookup_revalidate(struct dentry *dentry, unsigned int flags)
+{
+return __nfs_lookup_revalidate(dentry, flags,
+nfs4_do_lookup_revalidate);
+
@endif /* CONFIG_NFSV4 */

--- linux-4.15.0.orig/fs/nfs/direct.c
+++ linux-4.15.0/fs/nfs/direct.c
@@ -86,10 +86,10 @@
struct nfs_direct_mirror mirrors[NFS_PAGEIO_DESCRIPTOR_MIRROR_MAX];
+mirror_count;

-loff_t	io_start;/* Start offset for I/O */
ssize_t	count, /* bytes actually processed */
max_count,/* max expected count */
bytes_left,/* bytes left to be sent */
-io_start,/* start of IO */
error;/* any reported error */
struct completioncompletion;/* wait for i/o completion */

@@ -98,8 +98,11 @@
struct pnfs_ds_commit_info ds_cinfo; /* Storage for cinfo */
struct work_struct;
intflags;
+/* for write */
#define NFS_ODIRECT_DO_COMMIT(1) /* an unstable reply was received */
#define NFS_ODIRECT_RESCHED_WRITES(2) /* write verification failed */
+/* for read */
+#define NFS_ODIRECT_SHOULD_DIRTY(3) /* dirty user-space page after read */
struct nfs_writeverf verf; /* unstable write verifier */
;
@@ -119,32 +122,49 @@
}

static void
-nfs_direct_good_bytes(struct nfs_direct_req *dreq, struct nfs_pgio_header *hdr)
+nfs_direct_handle_truncated(struct nfs_direct_req *dreq,
+    const struct nfs_pgio_header *hdr,
+    ssize_t dreq_len)
+{
+    struct nfs_direct_mirror *mirror = &dreq->mirrors[hdr->pgio_mirror_idx];
+    
+    if (!(test_bit(NFS_IOHDR_ERROR, &hdr->flags) ||
+        test_bit(NFS_IOHDR_EOF, &hdr->flags)))
+        return;
+    if (dreq->max_count >= dreq_len) {
+        dreq->max_count = dreq_len;
+        if (dreq->count > dreq_len)
+            dreq->count = dreq_len;
+    }
+    if (mirror->count > dreq_len)
+        mirror->count = dreq_len;
+}
+
+static void
+nfs_direct_count_bytes(struct nfs_direct_req *dreq,
+    const struct nfs_pgio_header *hdr)
{
    int i;
    ssize_t count;
    +struct nfs_direct_mirror *mirror = &dreq->mirrors[hdr->pgio_mirror_idx];
    +loff_t hdr_end = hdr->io_start + hdr->good_bytes;
    +ssize_t dreq_len = 0;
WARN_ON_ONCE(dreq->count >= dreq->max_count);
+if (hdr_end > dreq->io_start)
+dreq_len = hdr_end - dreq->io_start;

-if (dreq->mirror_count == 1) {
-dreq->mirrors[hdr->pio_mirror_idx].count += hdr->good_bytes;
-dreq->count += hdr->good_bytes;
} else {
-/* mirrored writes */
-count = dreq->mirrors[hdr->pio_mirror_idx].count;
-if (count + dreq->io_start < hdr->io_start + hdr->good_bytes) {
-count = hdr->io_start + hdr->good_bytes - dreq->io_start;
-dreq->mirrors[hdr->pio_mirror_idx].count = count;
}
-/* update the dreq->count by finding the minimum agreed count from all
- * mirrors */
-count = dreq->mirrors[0].count;
+nfs_direct_handle_truncated(dreq, hdr, dreq_len);
-for (i = 1; i < dreq->mirror_count; i++)
-count = min(count, dreq->mirrors[i].count);
+if (dreq_len > dreq->max_count)
+dreq_len = dreq->max_count;

-dreq->count = count;
-}
+if (mirror->count < dreq_len)
+mirror->count = dreq_len;
+if (dreq->count < dreq_len)
+dreq->count = dreq_len;
}

/*
@@ -241,10 +261,10 @@
data->ds_commit_index);
/* verifier not set so always fail */
-if (verfp->committed < 0)
+if (verfp->committed < 0 || data->res.verf->committed <= NFS_UNSTABLE)
return 1;

-return nfs_direct_cmp_verf(verfp, &data->verf);
+return nfs_direct_cmp_verf(verfp, data->res.verf);
}

/**
@@ -397,22 +417,21 @@

unsigned long bytes = 0;
struct nfs_direct_req *dreq = hdr->dreq;

- if (test_bit(NFS_IOHDR_REDO, &hdr->flags))
  - goto out_put;

  spin_lock(&dreq->lock);
- if (test_bit(NFS_IOHDR_ERROR, &hdr->flags) && (hdr->good_bytes == 0))
  - dreq->error = hdr->error;
  - else
  - nfs_direct_good_bytes(dreq, hdr);
  + if (test_bit(NFS_IOHDR_REDO, &hdr->flags)) {
    + spin_unlock(&dreq->lock);
    + goto out_put;
    + }

  + nfs_direct_count_bytes(dreq, hdr);
  spin_unlock(&dreq->lock);

  while (!list_empty(&hdr->pages)) {
    struct nfs_page *req = nfs_list_entry(hdr->pages.next);
    struct page *page = req->wb_page;

      - if (!PageCompound(page) && bytes < hdr->good_bytes)
      + if (!PageCompound(page) && bytes < hdr->good_bytes &&
      +    (dreq->flags == NFS_ODIRECT_SHOULD_DIRTY))
        set_page_dirty(page);
    bytes += req->wb_bytes;
    nfs_list_remove_request(req);
  }

static void nfs_read_sync_pgio_error(struct list_head *head)
{
  struct nfs_page *req = nfs_list_entry(head->next);
  struct page *page = req->wb_page;

  - if (!PageCompound(page) && bytes < hdr->good_bytes)
  + if (!PageCompound(page) && bytes < hdr->good_bytes &&
  +    (dreq->flags == NFS_ODIRECT_SHOULD_DIRTY))
    set_page_dirty(page);
  bytes += req->wb_bytes;
  nfs_list_remove_request(req);

static void nfs_read_sync_pgio_error(struct list_head *head, int error)
{

  struct nfs_page *req = nfs_list_entry(head->next);
  struct page *page = req->wb_page;

  - if (!PageCompound(page) && bytes < hdr->good_bytes)
  + if (!PageCompound(page) && bytes < hdr->good_bytes &&
  +    (dreq->flags == NFS_ODIRECT_SHOULD_DIRTY))
    set_page_dirty(page);
  bytes += req->wb_bytes;
  nfs_list_remove_request(req);

  l_ctx = nfs_get_lock_context(dreq->ctx);
  if (IS_ERR(l_ctx)) {
    result = PTR_ERR(l_ctx);
    + nfs_direct_req_release(dreq);
    goto out_release;
  }
  dreq->l_ctx = l_ctx;
  if (!is_sync_kiocb(iocb))
    dreq->iocb = iocb;
+if (iter_is_iovec(iter))
+dreq->flags = NFS_ODIRECT_SHOULD_DIRTY;
+nfs_start_io_direct(inode);

NFS_I(inode)->read_io += count;
@@ -638,6 +661,9 @@
nfs_direct_write_scan_commit_list(dreq->inode, &reqs, &cinfo);

dreq->count = 0;
+dreq->max_count = 0;
+list_for_each_entry(req, &reqs, wb_list)
+dreq->max_count += req->wb_bytes;
+dreq->verf.committed = NFS_INVALID_STABLE_HOW;
nfs_clear_pnfs_ds_commit_verifiers(&dreq->ds_cinfo);
for (i = 0; i < dreq->mirror_count; i++)
@@ -657,8 +683,7 @@

list_for_each_entry_safe(req, tmp, &reqs, wb_list) {
    if (!nfs_pageio_add_request(&desc, req)) {
+        nfs_list_add_request(req, &failed);
        spin_lock(&cinfo.inode->i_lock);
        dreq->flags = 0;
        if (desc.pg_error < 0)
@@ -768,19 +793,16 @@
            bool request_commit = false;
            struct nfs_page *req = nfs_list_entry(hdr->pages.next);
-            if (test_bit(NFS_IOHDR_REDO, &hdr->flags))
-              goto out_put;
-            nfs_init_cinfo_from_dreq(&cinfo, dreq);
-            spin_lock(&dreq->lock);
-            if (test_bit(NFS_IOHDR_ERROR, &hdr->flags)) {
-                dreq->error = hdr->error;
+            if (test_bit(NFS_IOHDR_REDO, &hdr->flags)) {
+                spin_unlock(&dreq->lock);
+                goto out_put;
+                }            dreq->flags = 0;
            if (desc.pg_error < 0)
@@ -953,19 +976,16 @@
            dreq->error = read_errno;
            goto out_put;
        }            else {
-            nfs_direct_good_bytes(dreq, hdr);
+            nfs_direct_good_bytes(dreq, hdr);
    }
-            if (dreq->error == 0) {
-                nfs_init_cinfo_from_dreq(&cinfo, dreq);
-                spin_lock(&dreq->lock);
-                if (test_bit(NFS_IOHDR_ERROR, &hdr->flags)) {
-                    dreq->error = hdr->error;
+                else {
+                    spin_unlock(&dreq->lock);
+                    goto out_put;
+                }            dreq->flags = 0;
        if (desc.pg_error < 0)
nfs_direct_count_bytes(dreq, hdr);
if (hdr->good_bytes != 0) {
    if (nfs_write_need_commit(hdr)) {
        if (dreq->flags == NFS_ODIRECT_RESCHED_WRITES)
            request_commit = true;
    }
}

-nfs_write_sync_pgio_error(struct list_head *head);
+static void nfs_write_sync_pgio_error(struct list_head *head, int error)
{
    struct nfs_page *req;

    l_ctx = nfs_get_lock_context(dreq->ctx);
    if (IS_ERR(l_ctx)) {
        result = PTR_ERR(l_ctx);
        goto out_release;
    }
    dreq->l_ctx = l_ctx;
    --- linux-4.15.0.orig/fs/nfs/filelayout/filelayout.c
    +++ linux-4.15.0/fs/nfs/filelayout/filelayout.c
    @@ -717,7 +717,7 @@
    if (unlikely(!p))
        goto out_err;
    fl->fh_array[i]->size = be32_to_cpup(p++);
-    if (sizeof(struct nfs_fh) < fl->fh_array[i]->size) {
+    if (fl->fh_array[i]->size > NFS_MAXFHSIZE) {
        printk(KERN_ERR "NFS: Too big fh %d received %d\n",
               i, fl->fh_array[i]->size);
        goto out_err;
    }
}

lseg = pnfs_update_layout(ino, ctx, pos, count, iomode, strict_iomode,
                          gfp_flags);
-if (!lseg)
-    lseg = ERR_PTR(-ENOMEM);
-    if (IS_ERR(lseg))
         goto out;

lo = NFS_I(ino)->layout;
-status = filelayout_check_deviceid(lo, fl, gfp_flags);
if (status) {
    pnfs_put_lseg(lseg);
- lseg = ERR_PTR(status);
+ lseg = NULL;
}
out:
return lseg;
--- linux-4.15.0.orig/fs/nfs/flexfilelayout/flexfilelayout.c
+++ linux-4.15.0/fs/nfs/flexfilelayout/flexfilelayout.c
@@ -101,7 +101,7 @@
if (unlikely(!p))
 return -ENOBDFS;
fh->size = be32_to_cpup(p++);
-if (fh->size > sizeof(struct nfs_fh)) {
+if (fh->size > NFS_MAXFHSIZE) {
  printk(KERN_ERR "NFS flexfiles: Too big fh received %d\n",
      fh->size);
 return -EOVERFLOW;
@@ -921,9 +921,13 @@
 goto out_mds;
 /* Use a direct mapping of ds_idx to pgio mirror_idx */
-if (WARN_ON_ONCE(pgio->pg_mirror_count !=
- FF_LAYOUT_MIRROR_COUNT(pgio->pg_lseg)))
-goto out_mds;
+if (pgio->pg_mirror_count != FF_LAYOUT_MIRROR_COUNT(pgio->pg_lseg))
+    goto out_eagain;
+for (i = 0; i < pgio->pg_mirror_count; i++) {
 ds = nfs4_ff_layout_prepare_ds(pgio->pg_lseg, i, true);
@@ -942,11 +941,15 @@
 }
 return;
-
+out_eagain:
+pnfs_generic_pg_cleanup(pgio);
+pgio->pg_error = -EAGAIN;
+return;
out_mds:
 pnfs_put_lseg(pgio->pg_lseg);
 pgio->pg_lseg = NULL;
 nfs_pageio_reset_write_mds(pgio);
+pgio->pg_error = -EAGAIN;
}
static unsigned int
@@ -1365,12 +1368,7 @@
task))
 return;
-if (ff_layout_read_prepare_common(task, hdr))
-return;
-
-if (nfs4_set_rw_stateid(&hdr->args.stateid, hdr->args.context,
 hdr->args.lock_context, FMODE_READ) == -EIO)
-rpc_exit(task, -EIO); /* lost lock, terminate I/O */
+ff_layout_read_prepare_common(task, hdr);
}

static void ff_layout_read_call_done(struct rpc_task *task, void *data)
@@ -1539,12 +1537,7 @@
task))
 return;
-
-if (ff_layout_write_prepare_common(task, hdr))
-return;
-
-if (nfs4_set_rw_stateid(&hdr->args.stateid, hdr->args.context,
 hdr->args.lock_context, FMODE_WRITE) == -EIO)
-rpc_exit(task, -EIO); /* lost lock, terminate I/O */
+ff_layout_write_prepare_common(task, hdr);
}

static void ff_layout_write_call_done(struct rpc_task *task, void *data)
@@ -1734,6 +1727,11 @@
 fh = nfs4_ff_layout_select_ds_fh(lseg, idx);
 if (fh)
 hdr->args.fh = fh;
 +
 +if (vers == 4 &&
 +!nfs4_ff_layout_select_ds_stateid(lseg, idx, &hdr->args.stateid))
 +goto out_failed;
 +
 /*
 * Note that if we ever decide to split across DSegs,
 * then we may need to handle dense-like offsets.
@@ -1796,6 +1794,10 @@
 if (fh)
 hdr->args.fh = fh;
 +
 +if (vers == 4 &&
 +!nfs4_ff_layout_select_ds_stateid(lseg, idx, &hdr->args.stateid))
 +goto out_failed;
 +
 /*
 * Note that if we ever decide to split across DSegs,
 * then we may need to handle dense-like offsets.
--- linux-4.15.0.orig/fs/nfs/flexfilelayout/flexfilelayout.h
+++ linux-4.15.0/fs/nfs/flexfilelayout/flexfilelayout.h
@@ -132,16 +132,6 @@
     generic_hdr);
 }

-static inline struct nfs4_deviceid_node *
-FF_LAYOUT_DEVID_NODE(struct pnfs_layout_segment *lseg, u32 idx)
-{
-    -if (idx >= FF_LAYOUT_LSEG(lseg)->mirror_array_cnt ||
-       FF_LAYOUT_LSEG(lseg)->mirror_array[idx] == NULL ||
-       FF_LAYOUT_LSEG(lseg)->mirror_array[idx]->mirror_ds == NULL)
-        return NULL;
-    return &FF_LAYOUT_LSEG(lseg)->mirror_array[idx]->mirror_ds->id_node;
-}

 static inline struct nfs4_ff_layout_ds *
 FF_LAYOUT_MIRROR_DS(struct nfs4_deviceid_node *node)
 {
@@ -151,9 +141,25 @@
 static inline struct nfs4_ff_layout_mirror *
 FF_LAYOUT_COMP(struct pnfs_layout_segment *lseg, u32 idx)
 {
    -if (idx >= FF_LAYOUT_LSEG(lseg)->mirror_array_cnt)
-       return NULL;
-    return FF_LAYOUT_LSEG(lseg)->mirror_array[idx];
+struct nfs4_ff_layout_segment *fls = FF_LAYOUT_LSEG(lseg);
+    +if (idx < fls->mirror_array_cnt)
+       return fls->mirror_array[idx];
+    +return NULL;
+ }
+ static inline struct nfs4_deviceid_node *
+FF_LAYOUT_DEVID_NODE(struct pnfs_layout_segment *lseg, u32 idx)
+{
+    +struct nfs4_ff_layout_mirror *mirror = FF_LAYOUT_COMP(lseg, idx);
+    +if (mirror != NULL) {
+       +struct nfs4_ff_layout_ds *mirror_ds = mirror->mirror_ds;
+       +if (!IS_ERR_OR_NULL(mirror_ds))
+          return &mirror_ds->id_node;
+    }
+    +return NULL;
+ }

 static inline u32
unsigned int maxnum);
struct nfs_fh *
nfs4_ff_layout_select_ds_fh(struct pnfs_layout_segment *lseg, u32 mirror_idx);
+int 
+nfs4_ff_layout_select_ds_stateid(struct pnfs_layout_segment *lseg,
+u32 mirror_idx,
+nfs4_stateid *stateid);

struct nfs4_pnfs_ds *
nfs4_ff_layout_prepare_ds(struct pnfs_layout_segment *lseg, u32 ds_idx,
--- linux-4.15.0.orig/fs/nfs/flexfilelayout/flexfilelayoutdev.c
+++ linux-4.15.0/fs/nfs/flexfilelayout/flexfilelayoutdev.c
@@ -18,7 +18,7 @@
#define NFSDBG_FACILITY		NFSDBG_PNFS_LD

-static unsigned int dataserver_timeo = NFS_DEF_TCP_RETRANS;
+static unsigned int dataserver_timeo = NFS_DEF_TCP_TIMEO;
static unsigned int dataserver_retrans;

static bool ff_layout_has_available_ds(struct pnfs_layout_segment *lseg);
@@ -306,7 +306,7 @@
if (status == 0)
return 0;

-if (mirror->mirror_ds == NULL)
+if (IS_ERR_OR_NULL(mirror->mirror_ds))
return -EINVAL;

dser = kmalloc(sizeof(*dserr), gfp_flags);
@@ -369,6 +369,25 @@
return fh;
}

+int 
+nfs4_ff_layout_select_ds_stateid(struct pnfs_layout_segment *lseg,
+u32 mirror_idx,
+nfs4_stateid *stateid)
+{ 
+struct nfs4_ff_layout_mirror *mirror = FF_LAYOUT_COMP(lseg, mirror_idx);
+ 
+if (!ff_layout_mirror_valid(lseg, mirror, false)) {
+pr_err_ratelimited("NFS: %s: No data server for mirror offset index %d\n", 
+__func__, mirror_idx);
+goto out;
+} 
+ 

nfs4_stateid_copy(stateid, &mirror->stateid);
+return 1;
+out:
+return 0;
+
+/**
+ * nfs4_ff_layout_prepare_ds - prepare a DS connection for an RPC call
+ * @lseg: the layout segment we're operating on
+ */
--- linux-4.15.0.orig/fs/nfs/fscache.c
+++ linux-4.15.0/fs/nfs/fscache.c
@@ -71,6 +71,10 @@
     struct rb_node **p, *parent;
     int diff;

+nfss->fscache_key = NULL;
+nfss->fscache = NULL;
+if (!(nfss->options & NFS_OPTION_FSCACHE))
+    return;
     if (!uniq) {
         uniq = "";
        ulen = 1;
@@ -180,10 +184,11 @@
     */
 void nfs_fscache_init_inode(struct inode *inode)
 {
+struct nfs_server *nfss = NFS_SERVER(inode);
 struct nfs_inode *nfsi = NFS_I(inode);

     nfsi->fscache = NULL;
-    if (!S_ISREG(inode->i_mode))
-        return;
+    if (!(nfss->fscache && S_ISREG(inode->i_mode)))
         return;
     nfsi->fscache = fscache_acquire_cookie(NFS_SB(inode->i_sb)->fscache,
         &nfs_fscache_inode_object_def,
--- linux-4.15.0.orig/fs/nfs/fscache.h
+++ linux-4.15.0/fs/nfs/fscache.h
@@ -171,7 +171,7 @@
 */
 static inline const char *nfs_server_fscache_state(struct nfs_server *server)
 {
-    if (server->fscache && (server->options & NFS_OPTION_FSCACHE))
+    if (server->fscache)
        return "yes";
 return "no ";
 }
--- linux-4.15.0.orig/fs/nfs/inode.c
+++ linux-4.15.0/fs/nfs/inode.c
void nfs_file_set_open_context(struct file *filp, struct nfs_open_context *ctx)
{
    filp->private_data = get_nfs_open_context(ctx);
    set_bit(NFS_CONTEXT_FILE_OPEN, &ctx->flags);
    if (list_empty(&ctx->list))
        nfs_inode_attach_open_context(ctx);
}

continue;
if (pos->mode & (FMODE_READ|FMODE_WRITE)) != mode)
    continue;
    if (!test_bit(NFS_CONTEXT_FILE_OPEN, &pos->flags))
        continue;
    ctx = get_nfs_open_context(pos);
    break;
}
if (ctx) {
    struct inode *inode = d_inode(ctx->dentry);
    clear_bit(NFS_CONTEXT_FILE_OPEN, &ctx->flags);
    /*
    * We fatal error on write before. Try to writeback
    * every page again.
    */
    nfs_fscache_open_file(inode, filp);
    return 0;
}
+EXPORT_SYMBOL_GPL(nfs_open);

/*
* This function is called whenever some part of NFS notices that
*
*/
static int nfs_inode_attrs_need_update(const struct inode *inode, const struct nfs_fattr *fattr)
{
    -const struct nfs_inode *nfsi = NFS_I(inode);
    +unsigned long attr_gencount = NFS_I(inode)->attr_gencount;
    return ((long)fattr->gencount - (long)nfsi->attr_gencount) > 0 ||
            ((long)nfsi->attr_gencount - (long)nfs_read_attr_generation_counter() > 0);
}
+return (long)(fattr->gencount - attr_gencount) > 0 ||
+    (long)(attr_gencount - nfs_read_attr_generation_counter()) > 0;
}
static int nfs_refresh_inode_locked(struct inode *inode, struct nfs_fattr *fattr)

}
nfsi->attrtimeo_timestamp = now;

/* Set the barrier to be more recent than this fattr */
@if ((long)fattr->gencount - (long)nfsi->attr_gencount > 0)
+if ((long)(fattr->gencount - nfsi->attr_gencount) > 0)
nfsi->attr_gencount = fattr->gencount;
@

@@ -2052,7 +2057,7 @@
{
 struct workqueue_struct *wq;
dprintk("RPC: creating workqueue nfsiod\n");
- wq = alloc_workqueue("nfsiod", WQ_MEM_RECLAIM, 0);
+wq = alloc_workqueue("nfsiod", WQ_MEM_RECLAIM | WQ_UNBOUND, 0);
 if (wq == NULL)
 return -ENOMEM;
nfsiod_workqueue = wq;
--- linux-4.15.0.orig/fs/nfs/internal.h
+++ linux-4.15.0/fs/nfs/internal.h
@@ -575,12 +575,14 @@
static inline struct inode *nfs_igrab_and_active(struct inode *inode)
{
 -inode = igrab(inode);
 -if (inode != NULL && !nfs_sb_active(inode->i_sb)) {
 -iput(inode);
 -inode = NULL;
 +struct super_block *sb = inode->i_sb;
 +
 +if (sb && nfs_sb_active(sb)) {
 +if (igrab(inode))
 +return inode;
 +nfs_sb_deactive(sb);
 +}
 -return inode;
 +return NULL;
 } 

static inline void nfs_iput_and_deactive(struct inode *inode)
--- linux-4.15.0.orig/fs/nfs/io.c
+++ linux-4.15.0/fs/nfs/io.c
@@ -99,7 +99,7 @@
{
 if (!test_bit(NFS_INO_ODIRECT, &nfsi->flags)) {
 set_bit(NFS_INO_ODIRECT, &nfsi->flags);
- nfs_wb_all(inode);
+nfs_sync_mapping(inode->i_mapping);
 }
nfs_path - reconstruct the path given an arbitrary dentry
* @base - used to return pointer to the end of devname part of path
- * @dentry - pointer to dentry
+ * @dentry_in - pointer to dentry
* @buffer - result buffer
- * @buflen - length of buffer
+ * @buflen_in - length of buffer
* @flags - options (see below)
*
* Helper function for constructing the server pathname
@
-@ -47,15 +47,19 @@
* the original device (export) name
* (if unset, the original name is returned verbatim)
*/
-char *nfs_path(char **p, struct dentry *dentry, char *buffer, ssize_t buflen,
- unsigned flags)
+char *nfs_path(char **p, struct dentry *dentry_in, char *buffer,
+ ssize_t buflen_in, unsigned flags)
{
  char *end;
  int namelen;
  unsigned seq;
  const char *base;

  rename_retry:
  +buflen = buflen_in;
  +dentry = dentry_in;
  end = buffer+buflen;
  -*--end = '\0';
  buflen--;
if (S_ISDIR(inode->i_mode)) {
    switch(type) {
    case ACL_TYPE_ACCESS:
        alloc = dfacl = get_acl(inode, ACL_TYPE_DEFAULT);
        +alloc = get_acl(inode, ACL_TYPE_DEFAULT);
        if (IS_ERR(alloc))
            goto fail;
        +dfacl = alloc;
        break;

    case ACL_TYPE_DEFAULT:
        -dfacl = acl;
        -alloc = acl = get_acl(inode, ACL_TYPE_ACCESS);
        +alloc = get_acl(inode, ACL_TYPE_ACCESS);
        if (IS_ERR(alloc))
            goto fail;
        +dfacl = acl;
        +acl = alloc;
        break;
    }
    }

    if (acl == NULL) {
        -alloc = acl = posix_acl_from_mode(inode->i_mode, GFP_KERNEL);
        +alloc = posix_acl_from_mode(inode->i_mode, GFP_KERNEL);
        if (IS_ERR(alloc))
            goto fail;
        +acl = alloc;
    }
    status = __nfs3_proc_setacls(inode, acl, dfacl);
    -posix_acl_release(alloc);
    +out:
        +if (acl != orig)
            +posix_acl_release(acl);
        +if (dfacl != orig)
            +posix_acl_release(dfacl);
        return status;
    fail:
        -return PTR_ERR(alloc);
        +status = PTR_ERR(alloc);
        +goto out;
    }

    const struct xattr_handler *nfs3_xattr_handlers[] = {
        --- linux-4.15.0.org/fs/nfs/nfs3proc.c
        +++ linux-4.15.0/fs/nfs/nfs3proc.c
        @ @ .342,7 +342,7 @ @
break;

case NFS3_CREATE_UNCHECKED:
  -goto out;
  +goto out_release_acls;
    }
nfs_fattr_init(data->res.dir_attr);
nfs_fattr_init(data->res.fattr);
@@ -687,7 +687,7 @@
    break;
default:
status = -EINVAL;
-goto out;
+goto out_release_acls;
    }

status = nfs3_do_create(dir, dentry, data);
--- linux-4.15.0.orig/fs/nfs/nfs3xdr.c
+++ linux-4.15.0/fs/nfs/nfs3xdr.c
@@ -34,6 +34,7 @@
*/
#define NFS3_fhandle_sz(1+16)
#define NFS3_fh_sz(NFS3_fhandle_sz)/* shorthand */
+#define NFS3_post_op_fh_sz(1+NFS3_fh_sz)
#define NFS3_sattr_sz(15)
#define NFS3_filename_sz(1+(NFS3_MAXNAMLEN>>2))
#define NFS3_path_sz(1+(NFS3_MAXPATHLEN>>2))
@@ -71,7 +72,7 @@
#define NFS3_readlinkres_sz(1+NFS3_post_op_attr_sz+1)
#define NFS3_readres_sz(1+NFS3_post_op_attr_sz+3)
#define NFS3_writerses_sz(1+NFS3_wcc_data_sz+4)
-+#define NFS3_createres_sz(1+NFS3_fh_sz+NFS3_post_op_attr_sz+NFS3_wcc_data_sz)
++#define NFS3_createres_sz(1+NFS3_post_op_fh_sz+NFS3_post_op_attr_sz+NFS3_wcc_data_sz)
#define NFS3_renameres_sz(1+(2 * NFS3_wcc_data_sz))
#define NFS3_linkres_sz(1+NFS3_post_op_attr_sz+NFS3_wcc_data_sz)
#define NFS3_readdirres_sz(1+NFS3_post_op_attr_sz+2)
@@ -2373,6 +2374,7 @@
    void *data)
    {
struct nfs_commitres *result = data;
+struct nfs_writeverf *verf = result->verf;
enum nfs_stat status;
int error;
@@ -2385,7 +2387,9 @@
result->op_status = status;
if (status != NFS3_OK)
goto out_status;
-error = decode_writeverf3(xdr, &result->verf->verifier);
+error = decode_writeverf3(xdr, &verf->verifier);
+if (!error)
+verf->committed = NFS_FILE_SYNC;
out:
return error;
out_status:
--- linux-4.15.0.orig/fs/nfs/nfs42proc.c
+++ linux-4.15.0/fs/nfs/nfs42proc.c
@@ -58,7 +58,8 @@
static int nfs42_proc_fallocate(struct rpc_message *msg, struct file *filep,
   loff_t offset, loff_t len)
{
-struct nfs_server *server = NFS_SERVER(file_inode(filep));
+struct inode *inode = file_inode(filep);
+struct nfs_server *server = NFS_SERVER(inode);
struct nfs4_exception exception = { };
    struct nfs_lock_context *lock;
int err;
@@ -67,9 +68,13 @@
if (IS_ERR(lock))
    return PTR_ERR(lock);

-exception.inode = file_inode(filep);
+exception.inode = inode;
    exception.state = lock->open_context->state;

+err = nfs_sync_inode(inode);
+if (err)
+goto out;
+
do {
err = _nfs42_proc_fallocate(msg, filep, lock, offset, len);
if (err == -ENOTSUPP) {
@@ -78,7 +83,7 @@
}
err = nfs4_handle_exception(server, err, &exception);
} while (exception.retry);

+out:
    nfs_put_lock_context(lock);
    return err;
}
@@ -116,16 +121,13 @@
return -EOPNOTSUPP;

inode_lock(inode);
-err = nfs_sync_inode(inode);
-if (err)
-goto out_unlock;

err = nfs42_proc_fallocate(&msg, filep, offset, len);
if (err == 0)
truncate_pagecache_range(inode, offset, (offset + len) -1);
if (err == -EOPNOTSUPP)
NFS_SERVER(inode)->caps &= ~NFS_CAP_DEALLOCATE;
-out_unlock:
+
inode_unlock(inode);
return err;
}
@@ -218,9 +220,6 @@
}
}
ssize_t err, err2;

-if (!nfs_server_capable(file_inode(dst), NFS_CAP_COPY))
-return -EOPNOTSUPP;
-
src_lock = nfs_get_lock_context(nfs_file_open_context(src));
if (IS_ERR(src_lock))
return PTR_ERR(src_lock);
@@ -303,7 +302,10 @@
if (status)
return status;
+if (whence == SEEK_DATA && res.sr_eof)
+return -NFS4ERR_NXIO;
+else
+return vfs_setpos(filep, res.sr_offset, inode->i_sb->s_maxbytes);
}
loff_t nfs42_proc_llseek(struct file *filep, loff_t offset, int whence)
--- linux-4.15.0.orig/fs/nfs/nfs42xdr.c
+++ linux-4.15.0/fs/nfs/nfs42xdr.c
@@ -56,37 +56,45 @@
#define decode_clone_maxsz	(op_decode_hdr_maxsz)
#define NFS4_enc_allocate_sz	(compound_encode_hdr_maxsz + \
+ encode_sequence_maxsz + \
+ encode_putfh_maxsz + \
+ encodeAllocate_maxsz + \
+ encode_getattr_maxsz)
#define NFS4_dec_allocate_sz(compound_decode_hdr_maxsz + \
+ decode_sequence_maxsz + \
+ decode_putfh_maxsz + \
#define decode_clone_maxsz(op_decode_hdr_maxsz)
decode_allocate_maxsz \ decode_getattr_maxsz)
#define NFS4_enc_copy_sz(compound_encode_hdr_maxsz + \ encode_sequence_maxsz + \ encode_putfh_maxsz + \ encode_savefh_maxsz + \ encode_copy_maxsz + \ encode_commit_maxsz)
#define NFS4_dec_copy_sz(compound_decode_hdr_maxsz + \ encode_sequence_maxsz + \ decode_putfh_maxsz + \ decode_savefh_maxsz + \ decode_copy_maxsz + \ decode_commit_maxsz)
#define NFS4_enc_deallocate_sz(compound_encode_hdr_maxsz + \ encode_sequence_maxsz + \ encode_putfh_maxsz + \ encode_deallocate_maxsz + \ encode_getattr_maxsz)
#define NFS4_dec_deallocate_sz(compound_decode_hdr_maxsz + \ encode_sequence_maxsz + \ decode_putfh_maxsz + \ decode_deallocate_maxsz + \ decode_getattr_maxsz)
#define NFS4_enc_seek_sz(compound_encode_hdr_maxsz + \ encode_sequence_maxsz + \ encode_putfh_maxsz + \ encode_seek_maxsz)
#define NFS4_dec_seek_sz(compound_decode_hdr_maxsz + \ encode_sequence_maxsz + \ decode_putfh_maxsz + \ decode_seek_maxsz)
#define NFS4_enc_layoutstats_sz(compound_encode_hdr_maxsz + \ encode_sequence_maxsz + \ encode_putfh_maxsz + \ encode_layoutstats_maxsz)
#define NFS4_RENEW_TIMEOUT 0x01

extern struct nfs4_state_owner *nfs4_get_state_owner(struct nfs_server *, struct rpc_cred *, gfp_t);
extern void nfs4_put_state_owner(struct nfs4_state_owner *);
-extern void nfs4_purge_state_owners(struct nfs_server *);
+extern void nfs4_purge_state_owners(struct nfs_server *, struct list_head *);
+extern void nfs4_free_state_owners(struct list_head *head);
extern struct nfs4_state * nfs4_get_open_state(struct inode *, struct nfs4_state_owner *);
extern void nfs4_put_open_state(struct nfs4_state *);
event void nfs4_close_state(struct nfs4_state *, fmode_t);
--- linux-4.15.0.orig/fs/nfs/nfs4client.c
+++ linux-4.15.0/fs/nfs/nfs4client.c
@@ -177,8 +177,11 @@
 struct nfs_client *nfs4_alloc_client(const struct nfs_client_initdata *cl_init)
 {
  int err;
+ char buf[INET6_ADDRSTRLEN + 1];
+ const char *ip_addr = cl_init->ip_addr;
 struct nfs_client *clp = nfs_alloc_client(cl_init);
+ int err;
 +
  if (IS_ERR(clp))
   return clp;
@@ -202,6 +205,44 @@
 #if IS_ENABLED(CONFIG_NFS_V4_1)
i nit_waitqueue_head(&clp->cl_lock_waitq);
 #endif
+
+ if (cl_init->minorversion != 0)
+  __set_bit(NFS_CS_INFINITE_SLOTS, &clp->cl_flags);
+  __set_bit(NFS_CS_DISCRTRY, &clp->cl_flags);
+  __set_bit(NFS_CS_NO_RETRANS_TIMEOUT, &clp->cl_flags);
+  
+  /* Set up the connection to the server before we add add to the
+   * global list.
+   */
+  if (nfs_create_rpc_client(clp, cl_init, RPC_AUTH_GSS_KRB5I);
+  if (err == -EINVAL)
+    nfs_create_rpc_client(clp, cl_init, RPC_AUTH_UNIX);
+  if (err < 0)
+    goto error;
+  /* If no clientaddr= option was specified, find a usable cb address */
+  if (ip_addr == NULL) {
+    struct sockaddr_storage cb_addr;
+    struct sockaddr *sap = (struct sockaddr *)&cb_addr;
+    

err = rpc_localaddr(clp->cl_rpcclient, sap, sizeof(cb_addr));
+if (err < 0)
+goto error;
+err = rpc_ntop(sap, buf, sizeof(buf));
+if (err < 0)
+goto error;
+ip_addr = (const char *)buf;
+
+strlcpy((clp->cl_ipaddr, ip_addr, sizeof(clp->cl_ipaddr));
+
+err = nfs_idmap_new(clp);
+if (err < 0) {
+dprintf("%s: failed to create idmapper. Error = %d\n", 
+__func__, err);
+goto error;
+
+__set_bit(NFS_CS_IDMAP, &clp->cl_res_state);
return clp;

error:
@@ -354,8 +395,6 @@
struct nfs_client *nfs4_init_client(struct nfs_client *clp,
    const struct nfs_client_initdata *cl_init)
{
    char buf[INET6_ADDRSTRLEN + 1];
-const char *ip_addr = cl_init->ip_addr;
 struct nfs_client *old;
 int error;

@@ -363,43 +402,6 @@
/* the client is initialised already */
return clp;

-/* Check NFS protocol revision and initialize RPC op vector */
-    -clp->rpc_ops = &nfs_v4_clientops;
-
-    -if (clp->cl_minorversion != 0)
-       __set_bit(NFS_CS_INFINITE_SLOTS, &clp->cl_flags);
-       __set_bit(NFS_CS_DISCRTRY, &clp->cl_flags);
-       __set_bit(NFS_CS_NO_RETRANS_TIMEOUT, &clp->cl_flags);
-    
-    -error = nfs_create_rpc_client(clp, cl_init, RPC_AUTH_GSS_KRB5I);
-    -if (error == -EINVAL)
-       error = nfs_create_rpc_client(clp, cl_init, RPC_AUTH_UNIX);
-    -if (error < 0)
-       goto error;
-
-    /* If no clientaddr= option was specified, find a usable cb address */
if (ip_addr == NULL) {
  struct sockaddr_storage cb_addr;
  struct sockaddr *sap = (struct sockaddr *)&cb_addr;

  error = rpc_localaddr(clp->cl_rpcclient, sap, sizeof(cb_addr));
  if (error < 0)
    goto error;
  error = rpc_ntop(sap, buf, sizeof(buf));
  if (error < 0)
    goto error;
  ip_addr = (const char *)buf;
}
strlcpy(clp->cl_ipaddr, ip_addr, sizeof(clp->cl_ipaddr));

error = nfs_idmap_new(clp);
if (error < 0) {
  dprintk("%s: failed to create idmapper. Error = %d\n", __func__, error);
  goto error;
}
__set_bit(NFS_CS_IDMAP, &clp->cl_res_state);

error = nfs4_init_client_minor_version(clp);
if (error < 0)
  goto error;
@@ -417,8 +419,8 @@
*/
nfs_mark_client_ready(clp, -EPERM);
}
-nfs_put_client(clp);
clear_bit(NFS_CS_TSM_POSSIBLE, &clp->cl_flags);
+nfs_put_client(clp);
return old;

error:
@@ -739,9 +741,12 @@
static void nfs4_destroy_server(struct nfs_server *server)
{
  LIST_HEAD(freeme);
  +nfs_server_return_all_delegations(server);
  unset_pnfs_layoutdriver(server);
  -nfs4_purge_state_owners(server);
  +nfs4_purge_state_owners(server, &freeme);
  +nfs4_free_state_owners(&freeme);
}
/ * 
@@ -867,8 +872,10 @@
if (IS_ERR(clp))
    return PTR_ERR(clp);

-if (server->nfs_client == clp)
+if (server->nfs_client == clp) {
+    nfs_put_client(clp);
    return -ELOOP;
+} 

/*  
* Query for the lease time on clientid setup or renewal
@@ -932,10 +939,10 @@
*/

/*  
* Session has been established, and the client marked ready.  
- * Set the mount rsize and wsize with negotiated fore channel  
- * attributes which will be bound checked in nfs_server_set_fsinfo.  
+ * Limit the mount rsize, wsize and dtsize using negotiated fore  
+ * channel attributes.  
*/
-*static void nfs4_session_set_rwsize(struct nfs_server *server)
+static void nfs4_session_limit_rwsize(struct nfs_server *server)
{
#ifdef CONFIG_NFS_V4_1
struct nfs4_session *sess;
@@ -948,9 +955,11 @@
sess->fc_attrs.max_resp_sz - nfs41_maxread_overhead;
sess->fc_attrs.max_rqst_sz - nfs41_maxwrite_overhead;

-    if (!server->rsize || server->rsize > server_resp_sz)
+    if (server->dtsize > server_resp_sz)
+        server->dtsize = server_resp_sz;
        server->rsize = server_resp_sz;
-    if (!server->wsize || server->wsize > server_rqst_sz)
+    if (server->wsize > server_rqst_sz)
        server->wsize = server_rqst_sz;
#endif /* CONFIG_NFS_V4_1 */
}
@@ -997,12 +1006,12 @@
(unsigned long long) server->fsid.minor);
nfs_display_fhandle(mntfh, "Pseudo-fs root FH");

-nfs4_session_set_rwsize(server);
-  
  error = nfs_probe_fsinfo(server, mntfh, fattr);
if (error < 0)
goto out;

+nfs4_session_limit_rwsize(server);
+
if (server->namelen == 0 || server->namelen > NFS4_MAXNAMLEN)
server->namelen = NFS4_MAXNAMLEN;

@@ -1226,11 +1235,11 @@
clp->cl_proto, clnt->cl_timeout,
clp->cl_minversion, net);
clear_bit(NFS_MIG_TSM_POSSIBLE, &server->mig_status);
-nfs_put_client(clp);
if (error != 0) {
    nfs_server_insert_lists(server);
    return error;
}
+nfs_put_client(clp);

if (server->nfs_client->cl_hostname == NULL)
server->nfs_client->cl_hostname = kstrdup(hostname, GFP_KERNEL);
--- linux-4.15.0.orig/fs/nfs/nfs4file.c
+++ linux-4.15.0/fs/nfs/nfs4file.c
@@ -50,7 +50,7 @@
return err;
if ((openflags & O_ACCMODE) == 3)
    openflags--;
+return nfs_open(inode, filp);

/* We can't create new files here */
openflags &= ~(O_CREAT|O_EXCL);
@@ -74,13 +74,13 @@
if (IS_ERR(inode)) {
    err = PTR_ERR(inode);
    switch (err) {
        -case -EPERM:
        -case -EACCES:
        -case -EDQUOT:
        -case -EROFS:
        -goto out_put_ctxt;
        default:
+        goto out_put_ctxt;
        +case -ENOENT:
        +case -ESTALE:
        +case -EISDIR:
        +case -ENOTDIR:
case -ELOOP:
goto out_drop;
}
@@ -134,8 +134,10 @@
 struct file *file_out, loff_t pos_out,
         size_t count, unsigned int flags)
 {
+if (!nfs_server_capable(file_inode(file_out), NFS_CAP_COPY))
 +return -EOPNOTSUPP;
 if (file_inode(file_in) == file_inode(file_out))
-    return -EINVAL;
+    return -EOPNOTSUPP;
 return nfs42_proc_copy(file_in, pos_in, file_out, pos_out, count);
 }
@@ -148,7 +150,7 @@
case SEEK_HOLE:
case SEEK_DATA:
 ret = nfs42_proc_llseek(filep, offset, whence);
-    if (ret != -ENOTSUPP)
+    if (ret != -EOPNOTSUPP)
     return ret;
 default:
 return nfs_file_llseek(filep, offset, whence);
--- linux-4.15.0.orig/fs/nfs/nfs4idmap.c
 +++ linux-4.15.0/fs/nfs/nfs4idmap.c
@@ -44,6 +44,7 @@
 struct idmap_legacy_upcalldata {
 struct rpc_pipe_msg pipe_msg;
 struct idmap_msg idmap_msg;
-    struct key_construction*key_cons;
+    struct key*authkey;
    struct idmap *idmap;
    ...
- id_len = snprintf(id_str, sizeof(id_str), "%u", id);
+ id_len = nfs_map_numeric_to_string(id, id_str, sizeof(id_str));
ret = nfs_idmap_get_key(id_str, id_len, type, buf, buflen, idmap);
if (ret < 0)
return -EINVAL;
@@ -384,7 +385,7 @@
{ Opt_find_err, NULL }
}

- static int nfs_idmap_legacy_upcall(struct key_construction *, const char *, void *);
+ static int nfs_idmap_legacy_upcall(struct key *, void *);
static ssize_t idmap_pipe_downcall(struct file *, const char __user *,
    size_t);
static void idmap_release_pipe(struct inode *);
@@ -545,11 +546,12 @@
static void
nfs_idmap_complete_pipe_upcall_locked(struct idmap *idmap, int ret)
{
- struct key_construction *cons = idmap->idmap_upcall_data->key_cons;
+ struct key *authkey = idmap->idmap_upcall_data->authkey;
    kfree(idmap->idmap_upcall_data);
    idmap->idmap_upcall_data = NULL;
    - complete_request_key(cons, ret);
+ complete_request_key(authkey, ret);
+ key_put(authkey);
}

static void
@@ -559,18 +561,21 @@
nfs_idmap_complete_pipe_upcall_locked(idmap, ret);
}

- static int nfs_idmap_legacy_upcall(struct key_construction *cons,
-    const char *op,
-    void *aux)
+ static int nfs_idmap_legacy_upcall(struct key *authkey, void *aux)
{
    struct idmap_legacy_upcalldata *data;
    + struct request_key_auth *rka = get_request_key_auth(authkey);
    struct rpc_pipe_msg *msg;
    struct idmap *idmap = (struct idmap *)aux;
    - struct key *key = cons->key;
    - int ret = -ENOMEM;
+ struct key *key = rka->target_key;
+ int ret = -ENOKEY;
+
/* msg and im are freed in idmap_pipe_destroy_msg */
+ret = -ENOMEM;
data = kzalloc(sizeof(*data), GFP_KERNEL);
if (!data)
goto out1;
@@ -578,7 +583,7 @@
msg = &data->pipe_msg;
im = &data->idmap_msg;
data->idmap = idmap;
-data->key_cons = cons;
+data->authkey = key_get(authkey);

ret = nfs_idmap_prepare_message(key->description, idmap, im, msg);
if (ret < 0)
@@ -596,7 +601,7 @@
out2: kfree(data);
out1: -complete_request_key(cons, ret);
+complete_request_key(authkey, ret);
return ret;
}

@@ -623,7 +628,8 @@
if (strcmp(upcall->im_name, im->im_name) != 0)
brack;
/* Note: here we store the NUL terminator too */
-len = sprintf(id_str, "%d", im->im_id) + 1;
+len = 1 + nfs_map_numeric_to_string(im->im_id, id_str,
 +  sizeof(id_str));
ret = nfs_idmap_instantiate(key, authkey, id_str, len);
brack;
case IDMAP_CONV_IDTONAME:
@@ -642,9 +648,10 @@
static ssize_t
idmap_pipe_downcall(struct file *filp, const char __user *src, size_t mlen)
{
 +struct request_key_auth *rka;
 struct rpc_inode *rpci = RPC_I(file_inode(filp));
 struct idmap *idmap = (struct idmap *)rpci->private;
 -struct key_construction *cons;
 +struct key *authkey;
 struct idmap_msg im;
 size_t namelen_in;
 int ret = -ENOKEY;

if (idmap->idmap_upcall_data == NULL)
goto out_noupcall;

- cons = idmap->idmap_upcall_data->key_cons;
+ authkey = idmap->idmap_upcall_data->authkey;
+ rka = get_request_key_auth(authkey);

if (mlen != sizeof(im)) {
    ret = -ENOSPC;
} 

--- linux-4.15.0.orig/fs/nfs/nfs4proc.c
+++ linux-4.15.0/fs/nfs/nfs4proc.c
@@ -454,9 +454,7 @@
    case -NFS4ERR_FILE_OPEN:
        ret = -EIO;
        return ret;
@@ -547,8 +545,15 @@
    /* Handled in nfs41_sequence_process() */
    goto wait_on_recovery;
@endif  /* defined(CONFIG_NFS_V4_1) */
--- linux-4.15.0.orig/fs/nfs/nfs4proc.c
+++ linux-4.15.0/fs/nfs/nfs4proc.c
@@ -656,7 +663,8 @@
    if (idmap->idmap_upcall_data == NULL)
        goto out_noupcall;

-    cons = idmap->idmap_upcall_data->key_cons;
+    authkey = idmap->idmap_upcall_data->authkey;
+    rka = get_request_key_auth(authkey);

    if (mlen != sizeof(im)) {
        ret = -ENOSPC;
@@ -681,9 +689,9 @@
            ret = nfs_idmap_read_and_verify_message(&im,
                &idmap->idmap_upcall_data->idmap_msg,
                - cons->key, cons->authkey);
+            rka->target_key, authkey);
        if (ret >= 0) {
            - key_set_timeout(cons->key, nfs_idmap_cache_timeout);
+            key_set_timeout(rka->target_key, nfs_idmap_cache_timeout);
            ret = mlen;
        }

--- linux-4.15.0.orig/fs/nfs/nfs4proc.c
+++ linux-4.15.0/fs/nfs/nfs4proc.c
@@ -454,9 +454,7 @@
    case -NFS4ERR_DEADSESSION:
    case -NFS4ERR_SEQ_FALSE_RETRY:
    case -NFS4ERR_SEQ_MISORDERED:
        -dprintf("%s ERROR: %d Reset session\n", __func__,
+        /* Handled in nfs41_sequence_process() */
            errorcode);
        nfs4_schedule_session_recovery(clp->cl_session, errorcode);
    /*/+ */
return ret;
}

res->sr_slot = NULL;
}

+static void nfs4_slot_sequence_record_sent(struct nfs4_slot *slot,
+u32 seqnr)
+{
+if ((s32)(seqnr - slot->seq_nr_highest_sent) > 0)
+slot->seq_nr_highest_sent = seqnr;
+}
+static void nfs4_slot_sequence_acked(struct nfs4_slot *slot,
+u32 seqnr)
+{
+slot->seq_nr_highest_sent = seqnr;
+slot->seq_nr_last_acked = seqnr;
+}
+
+static void nfs4_probe_sequence(struct nfs_client *client, struct rpc_cred *cred,
+struct nfs4_slot *slot)
+{
+struct rpc_task *task = _nfs41_proc_sequence(client, cred, slot, true);
+if (!IS_ERR(task))
+rpc_put_task_async(task);
+}
+
+static int nfs41_sequence_process(struct rpc_task *task,
+struct nfs4_sequence_res *res)
{
struct nfs4_session *session;
struct nfs4_slot *slot = res->sr_slot;
struct nfs_client *clp;
bool interrupted = false;
int status;
int ret = 1;

if (slot == NULL)
@@ -706,20 +732,21 @@
goto out;

session = slot->table->session;
-
-if (slot->interrupted) {
-if (res->sr_status != -NFS4ERR_DELAY)
-slot->interrupted = 0;
interrupted = true;
-
+ clp = session->clp;
+
trace_nfs4_sequence_done(session, res);
+
+ status = res->sr_status;
+
+ if (task->tk_status == -NFS4ERR_DEADSESSION)
+ status = -NFS4ERR_DEADSESSION;
+
+ /* Check the SEQUENCE operation status */
+ switch (res->sr_status) {
+ switch (status) {
+ case 0:
+ /* Mark this sequence number as having been acked */
+ nfs4_slot_sequence_acked(slot, slot->seq_nr);
+ /* Update the slot's sequence and clientid lease timer */
+ slot->seq_done = 1;
- clp = session->clp;
+ do_renew_lease(clp, res->sr_timestamp);
+ /* Check sequence flags */
+ nfs41_handle_sequence_flag_errors(clp, res->sr_status_flags,
+ @ @ -731.9 +758.9 @ @
+ * sr_status remains 1 if an RPC level error occurred.
+ * The server may or may not have processed the sequence
+ * operation..
+ * Mark the slot as having hosted an interrupted RPC call.
+ */
+ slot->interrupted = 1;
+ nfs4_slot_sequence_record_sent(slot, slot->seq_nr);
+ slot->seq_done = 1;
+ goto out;
+ case -NFS4ERR_DELAY:
+ /* The server detected a resend of the RPC call and
+ @ @ -744.34 +771.58 @ @
+ __func__,
+ slot->slot_nr,
+ slot->seq_nr);
+ nfs4_slot_sequence_acked(slot, slot->seq_nr);
+ goto out_retry;
+ case -NFS4ERR_RETRY_UNCACHED_REP:
+ case -NFS4ERR_SEQ_FALSE_RETRY:
+ /*
+ * The server thinks we tried to replay a request.
+ * Retry the call after bumping the sequence ID.
+ */
+ nfs4_slot_sequence_acked(slot, slot->seq_nr);
+ goto retry_new_seq;
case -NFS4ERR_BAD_SLOT:
/*
 * The slot id we used was probably retired. Try again
 * using a different slot id.
 */
-if (slot->seq_nr < slot->table->target_highest_slotid)
+if (slot->slot_nr < slot->table->target_highest_slotid)
goto session_recover;
goto retry_nowait;
case -NFS4ERR_SEQ_MISORDERED:
+nfs4_slot_sequence_record_sent(slot, slot->seq_nr);
/*
 - * Was the last operation on this sequence interrupted?
 - * If so, retry after bumping the sequence number.
 - */
-if (interrupted)
-goto retry_new_seq;
-/*
 - * Could this slot have been previously retired?
 - * If so, then the server may be expecting seq_nr = 1!
 + * Were one or more calls using this slot interrupted?
 + * If the server never received the request, then our
 + * transmitted slot sequence number may be too high. However,
 + * if the server did receive the request then it might
 + * accidentally give us a reply with a mismatched operation.
 + * We can sort this out by sending a lone sequence operation
 + * to the server on the same slot.
 + */
-if (slot->seq_nr != 1) {
-slot->seq_nr = 1;
+if ((s32)(slot->seq_nr - slot->seq_nr_last_acked) > 1) {
+slot->seq_nr--;
+if (task->tk_msg.rpc_proc != &nfs4_procedures[NFSPROC4_CLNT_SEQUENCE]) {
+nfs4_probe_sequence(clp, task->tk_msg.rpc_cred, slot);
+res->sr_slot = NULL;
+}
-goto retry_nowait;
}
-goto session_recover;
-case -NFS4ERR_SEQ_FALSE_RETRY:
-if (interrupted)
-goto retry_new_seq;
+/*
 + * RFC5661:
 + * A retry might be sent while the original request is
 + * still in progress on the replier. The replier SHOULD
 + * deal with the issue by returning NFS4ERR_DELAY as the
 + * reply to SEQUENCE or CB_SEQUENC operation, but
+ * implementations MAY return NFS4ERR_SEQ_MISORDERED.
+ *
+ * Restart the search after a delay.
+ */
+slot->seq_nr = slot->seq_nr_highest_sent;
goto out_retry;
+case -NFS4ERR_BADSESSION:
+case -NFS4ERR_DEADSESSION:
+case -NFS4ERR_CONN_NOT_BOUND_TO_SESSION:
goto session_recover;
default:
/* Just update the slot sequence no. */
@@ -783,8 +834,10 @@
out_noaction:
return ret;
session_recover:
-nfs4_schedule_session_recovery(session, res->sr_status);
goto retry_nowait;
+nfs4_schedule_session_recovery(session, status);
+dprintk("%s ERROR: %d Reset session\n", __func__, status);
+nfs41_sequence_free_slot(res);
goto out;
retry_new_seq:
++slot->seq_nr;
retry_nowait:
@@ -863,17 +916,6 @@
 .rpc_call_done = nfs41_call_sync_done,
};
-}

-}
-struct rpc_task *task;
-
-task = _nfs41_proc_sequence(client, cred, slot, true);
-if (!IS_ERR(task))
-rpc_put_task_async(task);
-}
-
#else /* !CONFIG_NFS_V4_1 */

static void
-nfs4_sequence_process_interrupted(struct nfs_client *client,
-struct nfs4_slot *slot, struct rpc_cred *cred)
-{  
-struct rpc_task *task;
-
-task = _nfs41_proc_sequence(client, cred, slot, true);
-}

#else /* !CONFIG_NFS_V4_1 */

static int nfs4_sequence_process(struct rpc_task *task, struct nfs4_sequence_res *res)
@@ -894,16 +936,15 @@
}  
EXPORT_SYMBOL_GPL(nfs4_sequence_done);

-}
nfs4_sequence_process_interrupted(struct nfs_client *client,
struct nfs4_slot *slot, struct rpc_cred *cred)
+#endif !CONFIG_NFS_V4_1 */
+
+static void nfs41_sequence_res_init(struct nfs4_sequence_res *res)
{ 
-WARN_ON_ONCE(1);
-slot->interrupted = 0;
+res->sr_timestamp = jiffies;
+res->sr_status_flags = 0;
+res->sr_status = 1;
}

-#endif !CONFIG_NFS_V4_1 */
-
static
void nfs4_sequence_attach_slot(struct nfs4_sequence_args *args,
struct nfs4_sequence_res *res,
@@ -915,10 +956,6 @@
args->sa_slot = slot;

res->sr_slot = slot;
-res->sr_timestamp = jiffies;
-res->sr_status_flags = 0;
-res->sr_status = 1;
-
}

int nfs4_setup_sequence(struct nfs_client *client,
@@ -939,31 +976,25 @@
task->tk_timeout = 0;
 }

-for (;;) {
 -spin_lock(&tbl->slot_tbl_lock);
-/* The state manager will wait until the slot table is empty */
-if (nfs4_slot_tbl_draining(tbl) & & !args->sa_privileged)
-goto out_sleep;
-
-slot = nfs4_alloc_slot(tbl);
-if (IS_ERR(slot)) {
-/* Try again in 1/4 second */
-if (slot == ERR_PTR(-ENOMEM))
-task->tk_timeout = HZ >> 2;
-goto out_sleep;
-}
-spin_unlock(&tbl->slot_tbl_lock);
-
nfs4_sequence_process_interrupted(client,
  -slot, task->tk_msg.rpc_cred);
+spin_lock(&tbl->slot_tbl_lock);
+/* The state manager will wait until the slot table is empty */
+if (nfs4_slot_tbl_draining(tbl) && !args->sa_privileged)
+    goto out_sleep;
+
+slot = nfs4_alloc_slot(tbl);
+if (IS_ERR(slot)) {
+    /* Try again in 1/4 second */
+    if (slot == ERR_PTR(-ENOMEM))
+        task->tk_timeout = HZ >> 2;
+    goto out_sleep;
+}
+spin_unlock(&tbl->slot_tbl_lock);

nfs4_sequence_attach_slot(args, res, slot);

trace_nfs4_setup_sequence(session, args);

out_start:
+nfs41_sequence_res_init(res);

call_start(task);
return 0;

atomic_inc(&sp->so_count);
p->o_arg.open_flags = flags;
p->o_arg.fmode = fmode & (FMODE_READ|FMODE_WRITE);
-p->o_arg.umask = current_umask();
p->o_arg.claim = nfs4_map_atomic_open_claim(server, claim);
p->o_arg.share_access = nfs4_map_atomic_open_share(server,
  fmode, flags);
+if (flags & O_CREAT) {
+    p->o_arg.umask = current_umask();
+    p->o_arg.label = nfs4_label_copy(p->a_label, label);
+    if (c->sattr != NULL && c->sattr->ia_valid != 0) {
+        p->o_arg.u.attrs = &p->attrs;
+        memcpy(&p->attrs, c->sattr, sizeof(p->attrs));
+        memcpy(p->o_arg.u.verifier.data, c->verf,
+        +sizeof(p->o_arg.u.verifier.data));
+    }
+}

/* don't put an ACCESS op in OPEN compound if O_EXCL, because ACCESS
 * will return permission denied for all bits until close */
if (!(flags & O_EXCL)) {
p->o_arg.server = server;
p->o_arg.bitmask = nfs4_bitmask(server, label);
p->o_arg.open_bitmap = &nfs4_fattr_bitmap[0];
-p->o_arg.label = nfs4_label_copy(p->a_label, label);
switch (p->o_arg.claim) {
case NFS4_OPEN_CLAIM_NULL:
case NFS4_OPEN_CLAIM_DELEGATE_CUR:
- @ @ -1234,13 +1274,6 @@
case NFS4_OPEN_CLAIM_DELEG_PREV_FH:
p->o_arg.fh = NFS_FH(d_inode(dentry));
} -if (c != NULL && c->sattr != NULL && c->sattr->ia_valid != 0) {
-p->o_arg.u.attrs = &p->attrs;
-memcpy(&p->attrs, c->sattr, sizeof(p->attrs));
-
-memcpy(p->o_arg.u.verifier.data, c->verf,
-sizeof(p->o_arg.u.verifier.data));
-
-p->c_arg.fh = &p->o_res.fh;
-p->c_arg.stateid = &p->o_res.stateid;
p->c_arg.seqid = p->o_arg.seqid;
- @ @ -1303,12 +1336,20 @@
return false;
}

-static int can_open_cached(struct nfs4_state *state, fmode_t mode, int open_mode)
-static int can_open_cached(struct nfs4_state *state, fmode_t mode, int open_mode,
+int open_mode, enum open_claim_type4 claim)
{int ret = 0;

if (open_mode & (O_EXCL|O_TRUNC))
goto out;
+switch (claim) {
+case NFS4_OPEN_CLAIM_NULL:
+case NFS4_OPEN_CLAIM_FH:
+goto out;
+default:
+break;
+}
switch (mode & (FMODE_READ|FMODE_WRITE)) {
case FMODE_READ:
ret |= test_bit(NFS_O_RDONLY_STATE, &state->flags) != 0
- @ @ -1333,8 +1374,6 @@
return 0;
if ((delegation->type & fmode) != fmode)
return 0;
if (test_bit(NFS_DELEGATION_RETURNING, &delegation->flags))
return 0;
switch (claim) {
case NFS4_OPEN_CLAIM_NULL:
case NFS4_OPEN_CLAIM_FH:
static struct nfs4_state *nfs4_try_open_cached(struct nfs4_opendata *opendata) {
struct nfs4_state *state = opendata->state;
struct nfs_inode *nfsi = NFS_I(state->inode);
struct nfs_delegation *delegation;
int open_mode = opendata->o_arg.open_flags;
fmode_t fmode = opendata->o_arg.fmode;
for (;;) {
    spin_lock(&state->owner->so_lock);
    if (can_open_cached(state, fmode, open_mode)) {
        update_open_stateflags(state, fmode);
        spin_unlock(&state->owner->so_lock);
        goto out_return_state;
    }
    spin_unlock(&state->owner->so_lock);
rcu_read_lock();
delegation = rcu_dereference(nfsi->delegation);
delegetion error(nfs4_get_valid_delegation(state->inode);
if (!can_open_delegated(delegation, fmode, claim)) {
    rcu_read_unlock();
break;
return ret;
} 

static int nfs4_handle_delegation_recall_error(struct nfs_server *server, struct nfs4_state *state, const nfs4_stateid *stateid, int err)

static int nfs4_handle_delegation_recall_error(struct nfs_server *server, struct nfs4_state *state, const nfs4_stateid *stateid, struct file_lock *fl, int err)

switch (err) {
default:
    case -NFS4ERR_BAD_HIGH_SLOT:
case -NFS4ERR_CONN_NOT_BOUND_TO_SESSION:
case -NFS4ERR_DEADSESSION:
    -set_bit(NFS_DELEGATED_STATE, &state->flags);
nfs4_schedule_session_recovery(server->nfs_client->cl_session, err);
return -EAGAIN;

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case -NFS4ERR_CLIENTID:
  case -NFS4ERR_CLIENTID:
    -set_bit(NFS_DELEGATED_STATE, &state->flags);
    /* Don't recall a delegation if it was lost */
    nfs4_schedule_lease_recovery(server->nfs_client);
    return -EAGAIN;
  /* case -NFS4ERR_DELAY: */
  case -NFS4ERR_GRACE:
    -set_bit(NFS_DELEGATED_STATE, &state->flags);
    ssleep(1);
    return -EAGAIN;
  case -ENOMEM:
  case -NFS4ERR_DENIED:
    -clear_bit(NFS_DELEGATED_STATE, &state->flags);
    switch (type & (FMODE_READ|FMODE_WRITE)) {
      case FMODE_READ|FMODE_WRITE:
      case FMODE_WRITE:
        if (!test_bit(NFS_O_RDWR_STATE, &state->flags)) {
          err = nfs4_open_recover_helper(opendata, FMODE_READ|FMODE_WRITE);
          if (err)
            break;
          goto out;
        }
        if (!test_bit(NFS_O_WRONLY_STATE, &state->flags)) {
          int nfs4_open_delegation_recall(struct nfs_open_context *ctx,
            -struct nfs4_state *state, const nfs4_stateid *stateid,
            -fmode_t type)
            +struct nfs4_state *state, const nfs4_stateid *stateid)
          {
            struct nfs_server *server = NFS_SERVER(state->inode);
            struct nfs4_opendata *opendata;
            write_seqlock(&state->seqlock);
            nfs4_stateid_copy(&state->stateid, &state->open_stateid);
            write_sequnlock(&state->seqlock);
            -clear_bit(NFS_DELEGATED_STATE, &state->flags);
            -switch (type & (FMODE_READ|FMODE_WRITE)) {
              -case FMODE_READ|FMODE_WRITE:
              -case FMODE_WRITE:
                if (!test_bit(NFS_O_RDWR_STATE, &state->flags)) {
                  err = nfs4_open_recover_helper(opendata, FMODE_READ|FMODE_WRITE);
                  if (err)
                    break;
                  goto out;
                }
                if (!test_bit(NFS_O_WRONLY_STATE, &state->flags)) {
              +if (!test_bit(NFS_O_RDONLY_STATE, &state->flags)) {
                if (err)
                  break;
                goto out;
              +}
err = nfs4_open_recover_helper(opendata, FMODE_WRITE);
if (err)
 -break;
-case FMODE_READ:
 +goto out;
 +}
 +if (!test_bit(NFS_O_RDONLY_STATE, &state->flags)) {
 err = nfs4_open_recover_helper(opendata, FMODE_READ);
 +if (err)
 +goto out;
 +}
+clear_bit(NFS_DELEGATED_STATE, &state->flags);
+out:
 nfs4_opendata_put(opendata);
-return nfs4_handle_delegation_recall_error(server, state, stateid, err);
+return nfs4_handle_delegation_recall_error(server, state, stateid, NULL, err);
}

static void nfs4_open_confirm_prepare(struct rpc_task *task, void *calldata)
@@ -2211,10 +2252,11 @@
 if (data->state != NULL) {
 struct nfs_delegation *delegation;

 -if (can_open_cached(data->state, data->o_arg.fmode, data->o_arg.open_flags))
 +if (can_open_cached(data->state, data->o_arg.fmode,
 + data->o_arg.open_flags, claim))
 goto out_no_action;
 rcu_read_lock();
 -delegation = rcu_dereference(NFS_I(data->state->inode)->delegation);
 +delegation = nfs4_get_valid_delegation(data->state->inode);
 if (can_open_delegated(delegation, data->o_arg.fmode, claim))
 goto unlock_no_action;
 rcu_read_unlock();
@@ -2609,14 +2651,18 @@
 nfs4_stateid_copy(&stateid, &delegation->stateid);
 -if (test_bit(NFS_DELEGATION_REVOKED, &delegation->flags)) ||
 -!test_and_clear_bit(NFS_DELEGATION_TEST_EXPIRED,
 - &delegation->flags)) {
 +if (test_bit(NFS_DELEGATION_REVOKED, &delegation->flags)) {
 rcu_read_unlock();
 nfs_finish_clear_delegation_stateid(state, &stateid);
 return;
 }

 +if (!test_and_clear_bit(NFS_DELEGATION_TEST_EXPIRED,
 +&delegation->flags)) {

rcu_read_unlock();
+return;
+
cred = get_rpccred(delegation->cred);
rcu_read_unlock();
status = nfs41_test_and_free_expired_stateid(server, &stateid, cred);
@@ -2778,7 +2824,7 @@
if (ret != 0)
goto out;

-state = nfs4_opendata_to_nfs4_state(opendata);
+state = _nfs4_opendata_to_nfs4_state(opendata);
ret = PTR_ERR(state);
if (IS_ERR(state))
goto out;
@@ -2814,6 +2860,8 @@
nfs4_schedule_stateid_recovery(server, state);
} out:
+if (!opendata->cancelled)
+nfs4_sequence_free_slot(&opendata->o_res.seq_res);
return ret;
+
@@ -2981,6 +3029,11 @@
exception.retry = 1;
continue;
}
+if (status == -NFS4ERR_EXPIRED) {
+nfs4_schedule_lease_recovery(server->nfs_client);
+exception.retry = 1;
+continue;
+}
if (status == -EAGAIN) {
/* We must have found a delegation */
exception.retry = 1;
@@ -3009,7 +3062,6 @@
};
struct rpc_cred *delegation_cred = NULL;
unsigned long timestamp = jiffies;
-fmode_t fmode;
bool truncate;
int status;

@@ -3017,11 +3069,12 @@
/* Servers should only apply open mode checks for file size changes */
truncate = (arg->iap->ia_valid & ATTR_SIZE) ? true : false;
-fmode = truncate ? FMODE_WRITE : FMODE_READ;
+if (!truncate)
+goto zero_stateid;

- if (nfs4_copy_delegation_stateid(inode, fmode, &arg->stateid, &delegation_cred)) {
+ if (nfs4_copy_delegation_stateid(inode, FMODE_WRITE, &arg->stateid, &delegation_cred)) {
 /* Use that stateid */
 - } else if (truncate && ctx != NULL) {
+ } else if (ctx != NULL && ctx->stateid) {
 struct nfs_lock_context *l_ctx;
 if (!nfs4_valid_open_stateid(ctx->state)) {
 return -EBADF;
 }
@@ -3033,8 +3086,10 @@
nfs_put_lock_context(l_ctx);
 if (status == -EIO)
 return -EBADF;
-} else
+} else {
+zero_stateid:
nfs4_stateid_copy(&arg->stateid, &zero_stateid);
+
 if (delegation_cred)
 msg.rpc_credential = delegation_credential;

@@ -4486,12 +4541,12 @@
quorum cookie, struct page **pages, unsigned int count, bool plus)
 {
 struct inode*dir = d_inode(dentry);
 +struct nfs_server*server = NFS_SERVER(dir);
 struct nfs4_readdir_arg args = {
 .fh = NFS_FH(dir),
 .pages = pages,
 .pgbase = 0,
 .count = count,
 -.bitmask = NFS_SERVER(d_inode(dentry))->attr_bitmask,
 .plus = plus,
 };  
 struct nfs4_readdir_res res;
 @@ -4506,9 +4561,15 @@
dprintk("%s: dentry = %p, cookie = %lu\n", __func__,
dentry,
 (unsigned long long)cookie);
+if (!(server->caps & NFS_CAP_SECURITY_LABEL))
+args.bitmask = server->attr_bitmask_nl;
+else
+args.bitmask = server->attr_bitmask;  
+  

nfs4_setup readdir(cookie, NFS_I(dir)->cookieverf, dentry, &args);
res.pgbase = args.pgbase;
status = nfs4_call_sync(NFS_SERVER(dir)->client, NFS_SERVER(dir), &msg, &args.seq_args, &res.seq_res, 0);
status = nfs4_call_sync(server->client, server, &msg, &args.seq_args, &res.seq_res, 0);
if (status >= 0) {
memcpy(NFS_I(dir)->cookieverf, res.verifier.data, NFS4_VERIFIER_SIZE);
status += args.pgbase;
unsigned int npages = DIV_ROUND_UP(buflen, PAGE_SIZE);
int ret, i;

/* You can't remove system.nfs4_acl: */
+if (buflen == 0)
+return -EINVAL;
if (!nfs4_server_supports_acls(server))
return -EOPNOTSUPP;
if (npages > ARRAY_SIZE(pages))
do {
err = __nfs4_proc_set_acl(inode, buf, buflen);
trace_nfs4_set_acl(inode, err);
+if (err == -NFS4ERR_BADOWNER || err == -NFS4ERR_BADNAME) {
+/*
+ * no need to retry since the kernel
+ * isn't involved in encoding the ACEs.
+ */
+err = -EINVAL;
+break;
+
} err = nfs4_handle_exception(NFS_SERVER(inode), err, &exception);
} while (exception.retry);
return ret;
if (!(fattr.valid & NFS_ATTR_FATTR_V4_SECURITY_LABEL))
return -ENOENT;
@if (buflen < label.len)
+return 0;
+return label.len;
}

static int nfs4_get_security_label(struct inode *inode, void *buf,
@@ -5698,6 +5768,7 @@
static int nfs4_get_security_label(struct inode *inode, void *buf,
@@ -5713,6 +5783,14 @@
if (setclientid.sc_cred) {

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+kfree(clp->cl_acceptor);
clp->cl_acceptor = rpcauth_stringify_acceptor(setclientid.sc_cred);
put_rpccred(setclientid.sc_cred);
}
@@ -5853,8 +5924,10 @@
d_data = (struct nfs4_delegreturndata *)data;

-if (!d_data->lr.roc && nfs4_wait_on_layoutreturn(d_data->inode, task))
+if (!d_data->lr.roc && nfs4_wait_on_layoutreturn(d_data->inode, task)) {
+nfs4_sequence_done(task, &d_data->res.seq_res);
    return;
+}

nfs4_setup_sequence(d_data->res.server->nfs_client,
    &d_data->args.seq_args,
@@ -6440,9 +6513,9 @@
data->arg.new_lock_owner, ret);
} else
    data->cancelled = true;
+trace_nfs4_set_lock(fl, state, &data->res.stateid, cmd, ret);
    rpc_put_task(task);
    dprintk("%s: done, ret = %d!n", __func__, ret);
    return ret;
}
@@ -6590,7 +6663,6 @@
struct task_struct	*task;
struct inode		*inode;
struct nfs_lowner	*owner;
-bool			notified;
};

static int
@@ -6612,11 +6684,11 @@
if (nfs_compare_fh(NFS_FH(waiter->inode), &cbnl->cbnl_fh))
    return 0;

    -waiter->notified = true;
-
/* override "private" so we can use default_wake_function */
wait->private = waiter->task;
-ret = autoremove_wake_function(wait, mode, flags, key);
+ret = woken_wake_function(wait, mode, flags, key);
+if (ret)
+    list_del_init(&wait->entry);
wait->private = waiter;
return ret;
}
@@ -6625,7 +6697,6 @@
 nfs4_retry_setlk(struct nfs4_state *state, int cmd, struct file_lock *request)
 {
 int status = -ERESTARTSYS;
 -unsigned long flags;
-struct nfs4_lock_state *lsp = request->fl_u.nfs4_fl.owner;
 struct nfs_server *server = NFS_SERVER(state->inode);
 struct nfs_client *clp = server->nfs_client;
@@ -6635,8 +6706,7 @@
 .s_dev = server->s_dev );
 struct nfs4_lock_waiter waiter = { .task  = current,
 .inode = state->inode,
- .owner = &owner,
- .notified = false };
+ .owner = &owner};
 wait_queue_entry_t wait;

 /* Don't bother with waitqueue if we don't expect a callback */
@@ -6646,26 +6716,22 @@
 init_wait(&wait);
 wait.private = &waiter;
 wait.func = nfs4_wake_lock_waiter;
-add_wait_queue(q, &wait);
 while(!signalled()) { 
+add_wait_queue(q, &wait);
 status = nfs4_proc_setlk(state, cmd, request);
 -if ((status != -EAGAIN) || IS_SETLK(cmd))
 +if ((status != -EAGAIN) || IS_SETLK(cmd)) { 
 +finish_wait(q, &wait);
 break;
 -
 -status = -ERESTARTSYS;
 -spin_lock_irqsave(&q->lock, flags);
 -if (waiter.notified) {
 -spin_unlock_irqrestore(&q->lock, flags);
 -continue;
 }
 -set_current_state(TASK_INTERRUPTIBLE);
 -spin_unlock_irqrestore(&q->lock, flags);

 -freezable_schedule_timeout(NFS4_LOCK_MAXTIMEOUT);
 +status = -ERESTARTSYS;
 +freezer_do_not_count();
 +wait_woken(&wait, TASK_INTERRUPTIBLE, NFS4_LOCK_MAXTIMEOUT);
 +freezer_count();

+finish_wait(q, &wait);
}

-finish_wait(q, &wait);
return status;
}
#else /* !CONFIG_NFS_V4_1 */
@@ -6738,8 +6804,13 @@
er = nfs4_set_lock_state(state, fl);
if (err != 0)
return err;
-err = _nfs4_do_setlk(state, F_SETLK, fl, NFS_LOCK_NEW);
-return nfs4_handle_delegation_recall_error(server, state, stateid, err);
+do {
+err = _nfs4_do_setlk(state, F_SETLK, fl, NFS_LOCK_NEW);
+if (err != -NFS4ERR_DELAY)
+break;
+ssleep(1);
+} while (err == -NFS4ERR_DELAY);
+return nfs4_handle_delegation_recall_error(server, state, stateid, fl, err);
}

struct nfs_release_lockowner_data {
@@ -7329,9 +7400,11 @@
 * both PNFS and NON_PNFS flags set, and not having one of NON_PNFS, PNFS, or
 * DS flags set.
 */
-static int nfs4_check_cl_exchange_flags(u32 flags)
+static int nfs4_check_cl_exchange_flags(u32 flags, u32 version)
{
-if (flags & ~EXCHGID4_FLAG_MASK_R)
+if (version >= 2 && (flags & ~EXCHGID4_2_FLAG_MASK_R))
+goto out_inval;
+else if (version < 2 && (flags & ~EXCHGID4_FLAG_MASK_R))
goto out_inval;
if ((flags & EXCHGID4_FLAG_USE_PNFS_MDS) &&
-flags & EXCHGID4_FLAG_USE_NON_PNFS))
@@ -7355,10 +7428,19 @@
static void
nfs4_bind_one_conn_to_session_done(struct rpc_task *task, void *calldata)
{
+struct nfs41_bind_conn_to_session_args *args = task->tk_msg.rpc_argp;
+struct nfs_client *clp = args->client;
+switch (task->tk_status) {
+case -NFS4ERR_BADSESSION:
+case -NFS4ERR_DEADSESSION:
+nfs4_schedule_session_recovery(clp->cl_session,
+task->tk_status);
+
}

static const struct rpc_call_ops nfs4_bind_one_conn_to_session_ops = {
    .rpc_call_done = &nfs4_bind_one_conn_to_session_done,
    .rpc_call_done = nfs4_bind_one_conn_to_session_done,
};

/*
@@ -7582,7 +7664,7 @@
    out:
    clp->cl_sp4_flags = flags;
    -return 0;
    +return ret;
    }

struct nfs41_exchange_id_data {
    @ @ -7726,7 +7808,8 @@
    if (status != 0)
        goto out;

    -status = nfs4_check_cl_exchange_flags(resp->flags);
    +status = nfs4_check_cl_exchange_flags(resp->flags,
    +clp->cl_mvops->minor_version);
    if (status != 0)
        goto out;

    @ @ -8401,8 +8484,6 @@
    case -NFS4ERR_BADSESSION:
    case -NFS4ERR_DEADSESSION:
    case -NFS4ERR_CONN_NOT_BOUND_TO_SESSION:
    -nfs4_schedule_session_recovery(clp->cl_session,
    -task->tk_status);
    break;
    default:
    nfs4_schedule_lease_recovery(clp);
    @ @ -8521,6 +8602,8 @@

dprintk("---> %s tk_status => %d\n", __func__, -task->tk_status);

    +nfs4_sequence_free_slot(&lgp->res.seq_res);
    +
    switch (nfs4err) {
    case 0:
        goto out;
    @ @ -8585,7 +8668,6 @@
goto out;

-nfs4_sequence_free_slot(&lgp->res.seq_res);
err = nfs4_handle_exception(server, nfs4err, exception);
if (!status) {
    if (exception->retry)
        @@ -8711,20 +8793,22 @@
        if (IS_ERR(task))
            return ERR_CAST(task);
        status = rpc_wait_for_completion_task(task);
    -if (status == 0) {
    +if (status != 0)
        +goto out;
        +/* if layoutp->len is 0, nfs4_layoutget_prepare called rpc_exit */
        +#if (task->tk_status < 0 || lgp->res.layoutp->len == 0) {
        +status = nfs4_layoutget_handle_exception(task, lgp, &exception);
        +*timeout = exception.timeout;
        -}
        -}
        +} else
        +lseg = pnfs_layout_process(lgp);
        +out:
        trace_nfs4_layoutget(lgp->args.ctx,
            &lgp->args.range,
            &lgp->res.range,
            &lgp->res.stateid,
            status);

        /* if layoutp->len is 0, nfs4_layoutget_prepare called rpc_exit */
        -if (status == 0 && lgp->res.layoutp->len)
        -lseg = pnfs_layout_process(lgp);
        rpc_put_task(task);
        dprintk("<-- %s status=%d\n", __func__, status);
        if (status)
            --- linux-4.15.0.orig/fs/nfs/nfs4session.c
            +++ linux-4.15.0/fs/nfs/nfs4session.c
            @@ -110,6 +110,8 @@
            slot->table = tbl;
            slot->slot_nr = slotid;
            slot->seq_nr = seq_init;
            +slot->seq_nr_highest_sent = seq_init;
            +slot->seq_nr_last_acked = seq_init - 1;
        }
        return slot;
    }
    @@ -276,7 +278,8 @@
p = &tbl->slots;
while (*p) {
    (*p)->seq_nr = ivalue;
    (*p)->interrupted = 0;
    (*p)->seq_nr_highest_sent = ivalue;
    (*p)->seq_nr_last_acked = ivalue - 1;
    p = &(*p)->next;
}

tbl->highest_used_slotid = NFS4_NO_SLOT;
--- linux-4.15.0.orig/fs/nfs/nfs4session.h
+++ linux-4.15.0/fs/nfs/nfs4session.h
@@ -23,8 +23,9 @@
    unsigned long		payment;
    u32													slot_nr;
    u32													seq_nr;
-   	unsigned int		interrupted : 1,
-   				privileged : 1,
+   	   u32					seq_nr_last_acked;
+   	   u32					seq_nr_highest_sent;
+   	unsigned int		privileged : 1,
    seq_done : 1;
};

--- linux-4.15.0.orig/fs/nfs/nfs4state.c
+++ linux-4.15.0/fs/nfs/nfs4state.c
@@ -151,6 +151,10 @@
        * Sustain the lease, even if it's empty. If the clientid4
        * goes stale it's of no use for truning discovery. */
        nfs4_schedule_state_renewal(*result);
    +
    +/* If the client state need to recover, do it. */
    +if (clp->cl_state)
    +    nfs4_schedule_state_manager(clp);
} out:
return status;
@@ -618,24 +622,39 @@
/**
   * nfs4_purge_state_owners - Release all cached state owners
   * @server: nfs_server with cached state owners to release
   + * @head: resulting list of state owners
   *
   * Called at umount time. Remaining state owners will be on
   * the LRU with ref count of zero.
   + * Note that the state owners are not freed, but are added
   + * to the list @head, which can later be used as an argument
   + * to nfs4_free_state_owners.
   */
void nfs4_purge_state_owners(struct nfs_server *server)

void nfs4_purge_state_owners(struct nfs_server *server, struct list_head *head)
{
    struct nfs_client *clp = server->nfs_client;
    struct nfs4_state_owner *sp, *tmp;

    spin_lock(&clp->cl_lock);
    list_for_each_entry_safe(sp, tmp, &server->state_owners_lru, so_lru) {
        list_move(&sp->so_lru, &doomed);
    }
    spin_unlock(&clp->cl_lock);
}

void nfs4_purge_state_owners(struct nfs_server *server, struct list_head *head, struct list_head *doomed)
{
    struct nfs_client *clp = server->nfs_client;
    struct nfs4_state_owner *sp, *tmp;

    spin_lock(&clp->cl_lock);
    list_for_each_entry_safe(sp, tmp, &doomed, so_lru) {
        list_move(&sp->so_lru, head);
        nfs4_remove_state_owner_locked(sp);
    }
    spin_unlock(&clp->cl_lock);
}

void nfs4_free_state_owners(struct list_head *head)
{
    struct nfs4_state_owner *sp, *tmp;

    list_for_each_entry_safe(sp, tmp, head, so_lru) {
        list_del(&sp->so_lru);
        nfs4_free_state_owner(sp);
    }
}

if (nfs4_state_mark_reclaim_nograce(clp, state))
    return -EBADF;

if (!nfs4_inode_find_delegation_state_and_recover(state->inode, &state->stateid))
    dprintk("%s: scheduling stateid recovery for server %s\n", __func__,
        clp->cl_hostname);

set_bit(NFS4CLNT_RUN_MANAGER, &clp->cl_state);
if (test_and_set_bit(NFS4CLNT_MANAGER_RUNNING, &clp->cl_state) != 0)
    return;

module_get(THIS_MODULE);

if (!nfs4_inode_find_delegation_state_and_recover(state->inode, &state->stateid))
    dprintk("%s: scheduling stateid recovery for server %s\n", __func__,
        clp->cl_hostname);
nfs4_schedule_state_manager(clp);
@@ -1482,6 +1504,7 @@
    struct inode *inode = state->inode;
    struct nfs_inode *nfsi = NFS_I(inode);
    struct file_lock *fl;
+    struct nfs4_lock_state *lsp;
    int status = 0;
    struct file_lock_context *flectx = inode->i_flectx;
    struct list_head *list;
@@ -1522,7 +1545,9 @@
    case -NFS4ERR_DENIED:
    case -NFS4ERR_RECLAIM_BAD:
    case -NFS4ERR_RECLAIM_CONFLICT:
-      /* kill_proc(fl->fl_pid, SIGLOST, 1); */
+      lsp = fl->fl_u.nfs4_fl.owner;
+      if (lsp)
+        set_bit(NFS_LOCK_LOST, &lsp->ls_flags);
    status = 0;
  }
  spin_lock(&flectx->fle_lock);
@@ -1808,12 +1833,13 @@
    struct nfs_server *server;
    struct rb_node *pos;
    LIST_HEAD(freeme);
+    int status = 0;

  restart:
  rcu_read_lock();
  list_for_each_entry_rcu(server, &clp->cl_superblocks, client_link) {
-    nfs4_purge_state_owners(server);
+    nfs4_purge_state_owners(server, &freeme);
    spin_lock(&clp->cl_lock);
    for (pos = rb_first(&server->state_owners);
      pos != NULL;
@@ -1842,6 +1868,7 @@
      spin_unlock(&clp->cl_lock);
  }
  rcu_read_unlock();
+  nfs4_free_state_owners(&freeme);
  return 0;
  }

@@ -2444,6 +2471,7 @@
  /* Ensure exclusive access to NFSv4 state */
  do {
    clear_bit(NFS4CLNT_RUN_MANAGER, &clp->cl_state);
/* Ensure exclusive access to NFSv4 state */
  do {
    clear_bit(NFS4CLNT_RUN_MANAGER, &clp->cl_state);
if (test_bit(NFS4CLNT_PURGE_STATE, &clp->cl_state)) {
    section = "purge state";
    status = nfs4_purge_lease(clp);
    @@ -2534,19 +2562,24 @@
}

nfs4_end_drain_session(clp);
-if (test_and_clear_bit(NFS4CLNT_DELEGRETURN, &clp->cl_state)) {
-    nfs_client_return_marked_delegations(clp);
-    continue;
+    nfs4_clear_state_manager_bit(clp);
+    
+    if (!test_and_set_bit(NFS4CLNT_DELEGRETURN_RUNNING, &clp->cl_state)) {
+        if (test_and_clear_bit(NFS4CLNT_DELEGRETURN, &clp->cl_state)) {
+            nfs_client_return_marked_delegations(clp);
+            set_bit(NFS4CLNT_RUN_MANAGER, &clp->cl_state);
+        }
+        clear_bit(NFS4CLNT_DELEGRETURN_RUNNING, &clp->cl_state);
+    }
+}
+nfs4_clear_state_manager_bit(clp);
/* Did we race with an attempt to give us more work? */
-if (clp->cl_state == 0)
-    break;
+    if (!test_bit(NFS4CLNT_RUN_MANAGER, &clp->cl_state))
+        return;
    if (test_and_set_bit(NFS4CLNT_MANAGER_RUNNING, &clp->cl_state) != 0)
-        break;
-    while (refcount_read(&clp->cl_count) > 1);
-    return;
-    while (refcount_read(&clp->cl_count) > 1 && !signalled());
+    goto out_drain;
+ out_error:
if (strlen(section))
    section_sep = ": ";
@@ -2554,6 +2587,7 @@
 " with error %d\n", section_sep, section,
    clp->cl_hostname, -status);
    ssleep(1);
+    out_drain:
    nfs4_end_drain_session(clp);
    nfs4_clear_state_manager_bit(clp);
} --- linux-4.15.0.orig/fs/nfs/nfs4sysctl.c
+++ linux-4.15.0/fs/nfs/nfs4sysctl.c
@@ -32,7 +32,7 @@
.data = &nfs_idmap_cache_timeout,
.maxlen = sizeof(int),
.mode = 0644,
.proc_handler = proc_dointvec_jiffies,
.+proc_handler = proc_dointvec,
},
{ }
;
--- linux-4.15.0.orig/fs/nfs/nfs4trace.h
+++ linux-4.15.0/fs/nfs/nfs4trace.h
@@ -1194,7 +1194,7 @@
 TP_fast_assign(
 __entry->error = error;
 __entry->fhandle = nfs_fhhandle_hash(fhandle);
-+if (inode != NULL) {
+if (!IS_ERR_OR_NULL(inode)) {
 __entry->fileid = NFS_FILEID(inode);
 __entry->dev = inode->i_sb->s_dev;
 } else {
--- linux-4.15.0.orig/fs/nfs/nfs4xdr.c
+++ linux-4.15.0/fs/nfs/nfs4xdr.c
@@ -1132,7 +1132,7 @@
 } else
 *p++ = cpu_to_be32(NFS4_SET_TO_SERVER_TIME);
 }
-+if (bmval[2] & FATTR4_WORD2_SECURITY_LABEL) {
+if (label && (bmval[2] & FATTR4_WORD2_SECURITY_LABEL)) {
 *p++ = cpu_to_be32(label->lfs);
 *p++ = cpu_to_be32(label->pi);
 *p++ = cpu_to_be32(label->len);
@@ -4258,7 +4258,11 @@
 goto out_overflow;
 if (len < NFS4_MAXLABELLEN) {
 if (label) {
-+memcpy(label->label, p, len);
+if (label->len) {
+ +if (label->len < len)
+ +return -ERANGE;
+ +memcpy(label->label, p, len);
+ }
 label->len = len;
labeled->pi = pi;
label->lfs = lfs;
@@ -4417,11 +4421,14 @@

 static int decode_commit(struct xdr_stream *xdr, struct nfs_commitres *res)
 { 
 +struct nfs_writeverf *verf = res->verf;


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int status;

status = decode_op_hdr(xdr, OP_COMMIT);
if (!status)
    -status = decode_write_verifier(xdr, &res->verf->verifier);
+status = decode_write_verifier(xdr, &verf->verifier);
+if (!status)
+    verf->committed = NFS_FILE_SYNC;
return status;
}

@@ -7678,6 +7685,22 @@
    .p_name = #proc, \
    }

+#if defined(CONFIG_NFS_V4_1)
+#define PROC41(proc, argtype, restype)
+PROC(proc, argtype, restype)
+#else
+#define PROC41(proc, argtype, restype)
+STUB(proc)
+#endif
+
+#if defined(CONFIG_NFS_V4_2)
+#define PROC42(proc, argtype, restype)
+PROC(proc, argtype, restype)
+#else
+#define PROC42(proc, argtype, restype)
+STUB(proc)
+#endif
+
+const struct rpc_procinfo nfs4_procedures[] = {
PROC(READ, enc_read, dec_read),
PROC(WRITE, enc_write, dec_write),
@@ -7698,7 +7721,6 @@
PROC(ACCESS, enc_access, dec_access),
PROC(GETATTR, enc_getattr, dec_getattr),
PROC(LOOKUP, enc_lookup, dec_lookup),
-PROC(LOOKUPP, enc_lookupp, dec_lookupp),
PROC(LOOKUP_ROOT, enc_lookup_root, dec_lookup_root),
PROC(REMOVE, enc_remove, dec_remove),
PROC(RENAME, enc_rename, dec_rename),
@@ -7717,33 +7739,30 @@
PROC(RELEASE_LOCKOWNER, enc_release_lockowner, dec_release_lockowner),
PROC(SECINFO, enc_secinfo, dec_secinfo),
PROC(FSID_PRESENT, enc_fsid_present, dec_fsid_present),
-#if defined(CONFIG_NFS_V4_1)
-PROC(EXCHANGE_ID, enc_exchange_id, dec_exchange_id),

-PROC(CREATE_SESSION, enc_create_session, dec_create_session),
-PROC(DESTROY_SESSION, enc_destroy_session, dec_destroy_session),
-PROC(SEQUENCE, enc_sequence, dec_sequence),
-PROC(GETLEASE_TIME, enc_get Lease_time, dec_get Lease_time),
-PROC(RECLAIM_COMPLETE, enc_reclaim_complete, dec_reclaim_complete),
-PROC(GETDEVICEINFO, enc_getdeviceinfo, dec_getdeviceinfo),
-PROC(LAYOUTGET, enc_layoutget, dec_layoutget),
-PROC(LAYOUTCOMMIT, enc_layoutcommit, dec_layoutcommit),
-PROC(LAYOUTRETURN, enc_layoutreturn, dec_layoutreturn),
-PROC(SECINFO_NO_NAME, enc_secinfo_no_name, dec_secinfo_no_name),
-PROC(TEST_STATEID, enc_test_stateid, dec_test_stateid),
-PROC(FREE_STATEID, enc_free_stateid, dec_free_stateid),
+PROC41(DESTROY_CLIENTID, enc_destroy_clientid, dec_destroy_clientid),
+PROC41(BIND_CONN_TO_SESSION,
  enc_bind_conn_to_session, dec_bind_conn_to_session),
+PROC41(SEQUENCE, enc_sequence, dec_sequence),
+PROC41(GETLEASE_TIME, enc_get Lease_time, dec_get Lease_time),
+PROC41(RECLAIM_COMPLETE, enc_reclaim_complete, dec_reclaim_complete),
+PROC41(GETDEVICEINFO, enc_getdeviceinfo, dec_getdeviceinfo),
+PROC(LAYOUTGET, enc_layoutget, dec_layoutget),
+PROC(LAYOUTCOMMIT, enc_layoutcommit, dec_layoutcommit),
+PROC(LAYOUTRETURN, enc_layoutreturn, dec_layoutreturn),
+PROC(SECINFO_NO_NAME, enc_secinfo_no_name, dec_secinfo_no_name),
+PROC41(DESTROY_CLIENTID, enc_destroy_clientid, dec_destroy_clientid),
+PROC41(BIND_CONN_TO_SESSION,
  enc_bind_conn_to_session, dec_bind_conn_to_session),
-PROC41(DESTROY_CLIENTID, enc_destroy_clientid, dec_destroy_clientid),
-PROC41(SEEK, enc_seek, dec_seek),
-PROC41(ALLOCATE, enc_allocate, dec_allocate),
-PROC41(DEALLOCATE, enc_deallocate, dec_deallocate),
-PROC41(LAYOUTSTATS, enc_layoutstats, dec_layoutstats),
-PROC41(CLONE, enc_clone, dec_clone),
-PROC41(COPY, enc_copy, dec_copy),
-PROC41(LAYOUTRETURN, enc_layoutreturn, dec_layoutreturn),
+PROC41(SEEK, enc_seek, dec_seek),
+PROC41(ALLOCATE, enc_allocate, dec_allocate),
+PROC41(DEALLOCATE, enc_deallocate, dec_deallocate),
+PROC41(LAYOUTSTATS, enc_layoutstats, dec_layoutstats),
+PROC41(CLONE, enc_clone, dec_clone),
+PROC41(COPY, enc_copy, dec_copy),
+PROC(LOOKUPP, enc_lookupp, dec_lookupp),

};


static unsigned int nfs_version4_counts[ARRAY_SIZE(nfs4_procedures)];
--- linux-4.15.0.orig/fs/nfs/pagelist.c
+++ linux-4.15.0/fs/nfs/pagelist.c
@@ -132,47 +132,70 @@
 EXPORT_SYMBOL_GPL(nfs_async_iocounter_wait);

 /*
- * nfs_page_group_lock - lock the head of the page group
- * @req - request in group that is to be locked
+ * nfs_page_set_headlock - set the request PG_HEADLOCK
+ * @req: request that is to be locked
 *
- * this lock must be held when traversing or modifying the page
- * group list
+ * this lock must be held when modifying req->wb_head
 *
- * return 0 on success, < 0 on error
 */
int
-int
+nfs_page_group_lock(struct nfs_page *req)
+nfs_page_set_headlock(struct nfs_page *req)
{
-struct nfs_page *head = req->wb_head;
-
-WARN_ON_ONCE(head != head->wb_head);
-
-if (!test_and_set_bit(PG_HEADLOCK, &head->wb_flags))
+if (!test_and_set_bit(PG_HEADLOCK, &req->wb_flags))
    return 0;

- set_bit(PG_CONTENDED1, &head->wb_flags);
+ set_bit(PG_CONTENDED1, &req->wb_flags);
    smp_mb__after_atomic();
- return wait_on_bit_lock(&head->wb_flags, PG_HEADLOCK,
+ return wait_on_bit_lock(&req->wb_flags, PG_HEADLOCK,
     TASK_UNINTERRUPTIBLE);
 }

 /*
- * nfs_page_group_unlock - unlock the head of the page group
- * @req - request in group that is to be unlocked
+ * nfs_page_clear_headlock - clear the request PG_HEADLOCK
+ * @req: request that is to be locked
 */
void
-int
+nfs_page_group_unlock(struct nfs_page *req)
+nfs_page_clear_headlock(struct nfs_page *req)
struct nfs_page *head = req->wb_head;
-WARN_ON_ONCE(head != head->wb_head);

smp_mb__before_atomic();
clear_bit(PG_HEADLOCK, &head->wb_flags);
clear_bit(PG_HEADLOCK, &req->wb_flags);
smp_mb__after_atomic();
-if (!test_bit(PG_CONTENDED1, &head->wb_flags))
+if (!test_bit(PG_CONTENDED1, &req->wb_flags))
return;
-wake_up_bit(&head->wb_flags, PG_HEADLOCK);
+wake_up_bit(&req->wb_flags, PG_HEADLOCK);
+
+/*
+ * nfs_page_group_lock - lock the head of the page group
+ * @req: request in group that is to be locked
+ *
+ * this lock must be held when traversing or modifying the page
+ * group list
+ *
+ * return 0 on success, < 0 on error
+ */
+int
+nfs_page_group_lock(struct nfs_page *req)
+{
+int ret;
+
+ret = nfs_page_set_headlock(req);
+if (ret || req->wb_head == req)
+return ret;
+nfs_page_set_headlock(req->wb_head);
+}
+
+/*
+ * nfs_page_group_unlock - unlock the head of the page group
+ * @req: request in group that is to be unlocked
+ */
+void
+nfs_page_group_unlock(struct nfs_page *req)
+{
+if (req != req->wb_head)
+nfs_page_clear_headlock(req->wb_head);
+nfs_page_clear_headlock(req);
}
/*
@@ -566,7 +589,7 @@
    hdr->res.count = count;
    +hdr->res.count = 0;
    hdr->res.eof = 0;
    hdr->res.verf = &hdr->verf;
    nfs_fattr_init(&hdr->fattr);
@@ -768,8 +791,7 @@
    pageused = 0;
    while (!list_empty(head)) {
        req = nfs_list_entry(head->next);
        -nfs_list_remove_request(req);
        -nfs_list_add_request(req, &hdr->pages);
    +nfs_list_move_request(req, &hdr->pages);
    
    if (!last_page || last_page != req->wb_page) {
        pageused++;
@@ -865,15 +887,6 @@
        pgio->pg_mirror_count = mirror_count;
    }
    */
- * nfs_pageio_stop_mirroring - stop using mirroring (set mirror count to 1)
- * /
-void nfs_pageio_stop_mirroring(struct nfs_pageio_descriptor *pgio)
{-
    -pgio->pg_mirror_count = 1;
    -pgio->pg_mirror_idx = 0;
-}
-
static void nfs_pageio_cleanup_mirroring(struct nfs_pageio_descriptor *pgio)
{
    pgio->pg_mirror_count = 1;
@@ -961,8 +974,7 @@
    }
    if (!nfs_can_coalesce_requests(prev, req, desc))
        return 0;
    -nfs_list_remove_request(req);
    -nfs_list_add_request(req, &mirror->pg_list);
    +nfs_list_move_request(req, &mirror->pg_list);
    mirror->pg_count += req->wb_bytes;
    return 1;
}
@@ -974,20 +986,29 @@
struct nfs_pgio_mirror *mirror = nfs_pgio_current_mirror(desc);

- if (!list_empty(&mirror->pg_list)) {
  int error = desc->pg_ops->pg_doio(desc);
  if (error < 0)
    desc->pg_error = error;
  -else
    +if (list_empty(&mirror->pg_list)) {
      mirror->pg_bytes_written += mirror->pg_count;
    -}
    -if (list_empty(&mirror->pg_list)) {
      -mirror->pg_count = 0;
      -mirror->pg_base = 0;
      +mirror->pg_count = 0;
      +mirror->pg_base = 0;
      +mirror->pg_recoalesce = 0;
    +}
  }
}

+static void
+nfs_pageio_cleanup_request(struct nfs_pageio_descriptor *desc,
+struct nfs_page *req)
+{
+LIST_HEAD(head);
+
+nfs_list_move_request(req, &head);
+desc->pg_completion_ops->error_cleanup(&head, desc->pg_error);
+
/**
 * nfs_pageio_add_request - Attempt to coalesce a request into a page list.
 * @desc: destination io descriptor
 @@ -1025,10 +1046,8 @@
 nfs_page_group_unlock(req);
 desc->pg_moreio = 1;
 nfs_pageio_doio(desc);
 -if (desc->pg_error < 0)
 -return 0;
 -if (mirror->pg_recoalesce)
 -return 0;
 +if (desc->pg_error < 0 || mirror->pg_recoalesce)
 +goto out_cleanup_subreq;
 /* retry add_request for this subreq */
 nfs_page_group_lock(req);
 continue;
 @@ -1061,6 +1080,10 @@
desc->pg_error = PTR_ERR(subreq);
nfs_page_group_unlock(req);
return 0;
+out_cleanup_subreq:
+if (req != subreq)
+nfs_pageio_cleanup_request(desc, subreq);
+return 0;
}

static int nfs_do_recoalesce(struct nfs_pageio_descriptor *desc)
@@ -1070,7 +1093,6 @@
do {
    list_splice_init(&mirror->pg_list, &head);
    -mirror->pg_bytes_written -= mirror->pg_count;
    mirror->pg_count = 0;
    mirror->pg_base = 0;
    mirror->pg_recoalesce = 0;
@@ -1079,7 +1101,6 @@
    struct nfs_page *req;

    req = list_first_entry(&head, struct nfs_page, wb_list);
    -nfs_list_remove_request(req);
    if (__nfs_pageio_add_request(desc, req))
        continue;
    if (desc->pg_error < 0) {
@@ -1110,6 +1131,21 @@
        return ret;
    }

+static void nfs_pageio_error_cleanup(struct nfs_pageio_descriptor *desc)
+{
+    u32 midx;
+    struct nfs_pgio_mirror *mirror;
+    +if (!desc->pg_error)
+        return;
+    +for (midx = 0; midx < desc->pg_mirror_count; midx++) {
+        mirror = &desc->pg_mirrors[midx];
+        +desc->pg_completion_ops->error_cleanup(&mirror->pg_list,
+            +desc->pg_error);
+    }
+}
+
+int nfs_pageio_add_request(struct nfs_pageio_descriptor *desc,
+    struct nfs_page *req)
if (nfs_pgio_has_mirroring(desc))
desc->pg_mirror_idx = midx;
if (!nfs_pageio_add_request_mirror(desc, dupreq))
  goto out_failed;
+goto out_cleanup_subreq;
}

return 1;

+out_cleanup_subreq:
+if (req != dupreq)
+nfs_pageio_cleanup_request(desc, dupreq);
out_failed:
-/*
-* We might have failed before sending any reqs over wire.
-* Clean up rest of the reqs in mirror pg_list.
-* */
-if (desc->pg_error) {
-struct nfs_pgio_mirror *mirror;
-void (*func)(struct list_head *);
-
-/* remember fatal errors */
-if (nfs_error_is_fatal(desc->pg_error))
-nfs_context_set_write_error(req->wb_context,
- desc->pg_error);
-
-func = desc->pg_completion_ops->error_cleanup;
-for (midx = 0; midx < desc->pg_mirror_count; midx++) {
-mirror = &desc->pg_mirrors[midx];
-func(&mirror->pg_list);
-}
-} /* remember fatal errors */
+if (nfs_error_is_fatal(desc->pg_error))
+nfs_context_set_write_error(req->wb_context,
+desc->pg_error);
+nfs_pageio_error_cleanup(desc);
return 0;
}
if (!nfs_do_recoalesce(desc))
break;
@@ -1219,21 +1244,23 @@
int nfs_pageio_resend(struct nfs_pageio_descriptor *desc,
    struct nfs_pgio_header *hdr)
{
    LIST_HEAD(failed);
+    LIST_HEAD(pages);

desc->pg_io_completion = hdr->io_completion;
desc->pg_dreq = hdr->dreq;
-while (!list_empty(&hdr->pages)) {
-    struct nfs_page *req = nfs_list_entry(hdr->pages.next);
+    list_splice_init(&hdr->pages, &pages);
+    while (!list_empty(&pages)) {
+        struct nfs_page *req = nfs_list_entry(pages.next);
-    nfs_list_remove_request(req);
+    nfs_list_remove_request(req);
    if (!nfs_pageio_add_request(desc, req))
-        nfs_list_add_request(req, &failed);
+        break;
+    }
    nfs_pageio_complete(desc);
-    if (!list_empty(&failed)) {
-        list_move(&failed, &hdr->pages);
-        return desc->pg_error < 0 ? desc->pg_error : -EIO;
+    if (!list_empty(&pages)) {
+        int err = desc->pg_error < 0 ? desc->pg_error : -EIO;
+        hdr->completion_ops->error_cleanup(&pages, err);
+        nfs_set_pgio_error(hdr, err, hdr->io_start);
+        return err;
+    }
    return 0;
    }
@@ -1250,6 +1277,8 @@
for (midx = 0; midx < desc->pg_mirror_count; midx++)
nfs_pageio_complete_mirror(desc, midx);

+    if (desc->pg_error < 0)
+    nfs_pageio_error_cleanup(desc);
    if (desc->pg_ops->pg_cleanup)
desc->pg_ops->pg_cleanup(desc);
nfs_pageio_cleanup_mirroring(desc);
@@ -1284,6 +1313,14 @@
}
+ * nfs_pageio_stop_mirroring - stop using mirroring (set mirror count to 1)
+ */
+void nfs_pageio_stop_mirroring(struct nfs_pageio_descriptor *pgio)
+{
+nfs_pageio_complete(pgio);
+}

int __init nfs_init_nfspagecache(void)
{
    nfs_page_cache = kmalloc_cache_create("nfs_page",
    ...
+++ linux-4.15.0/fs/nfs/pnfs.c
@@ -292,8 +292,11 @@
void
pnfs_put_layout_hdr(struct pnfs_layout_hdr *lo)
{
-struct inode *inode = lo->plh_inode;
+struct inode *inode;

+if (!lo)
+return;
+inode = lo->plh_inode;
+pnfs_layoutreturn_before_put_layout_hdr(lo);

    if (refcount_dec_and_lock(&lo->plh_refcount, &inode->i_lock)) {
@@ -740,22 +743,35 @@
struct pnfs_layout_bulk_destroy_byserver_locked(struct nfs_client *clp,
struct nfs_server *server,
struct list_head *layout_list)
+__must_hold(&clp->cl_lock)
+__must_hold(RCU)
{
    struct pnfs_layout_hdr *lo, *next;
    struct inode *inode;
    list_for_each_entry_safe(lo, next, &server->layouts, plh_layouts) {
-    if (test_bit(NFS_LAYOUT_INVALID_STID, &lo->plh_flags))
+    if (test_bit(NFS_LAYOUT_INVALID_STID, &lo->plh_flags) ||
+        test_bit(NFS_LAYOUT_INODE_FREEING, &lo->plh_flags) ||
+        !list_empty(&lo->plh_bulk_destroy))
        continue;
+/* If the sb is being destroyed, just bail */
+if (!nfs_sb_active(server->super))
+break;
    inode = igrab(lo->plh_inode);
-    if (inode == NULL)
-        continue;
-    list_del_init(&lo->plh_layouts);
if (pnfs_layout_add_bulk_destroy_list(inode, layout_list))
-continue;
-rcu_read_unlock();
-spin_unlock(&clp->cl_lock);
-iput(inode);
+if (inode != NULL) {
+list_del_init(&lo->plh_layouts);
+if (pnfs_layout_add_bulk_destroy_list(inode, layout_list))
+continue;
+rcu_read_unlock();
+spin_unlock(&clp->cl_lock);
+iuput(inode);
+} else {
+rcu_read_unlock();
+spin_unlock(&clp->cl_lock);
+set_bit(NFS_LAYOUT_INODE_FREEING, &lo->plh_flags);
+}
+nfs_sb_deactive(server->super);
spin_lock(&clp->cl_lock);
rcu_read_lock();
return -EAGAIN;
@@ -793,7 +809,7 @@
/* Free all lsegs that are attached to commit buckets */
nfs_commit_inode(inode, 0);
pnfs_put_layout_hdr(lo);
-iput(inode);
+nfs_iput_and_deactive(inode);
}
return ret;
}
@@ -1138,10 +1154,15 @@
{
  struct pnfs_layout_hdr *lo = NULL;
  struct nfs_inode *nfsi = NFS_I(ino);
+struct pnfs_layout_range range = {
+  .iomode = IOMODE_ANY,
+  .offset = 0,
+  .length = NFS4_MAX_UINT64,
+};
LIST_HEAD(tmp_list);
nfs4_stateid stateid;
int status = 0;
-bool send;
+bool send, valid_layout;

dprintf("NFS: %s for inode %lu\n", __func__, ino->i_ino);
goto out_put_layout_hdr;
spin_lock(&ino->i_lock);
}
+valid_layout = pnfs_layout_is_valid(lo);
pnfs_clear_layoutcommit(ino, &tmp_list);
-pnfs_mark_matching_lsegs_invalid(lo, &tmp_list, NULL, 0);
+pnfs_mark_matching_lsegs_return(lo, &tmp_list, &range, 0);

-if (NFS_SERVER(ino)->pnfs_curr_ld->return_range) {
-struct pnfs_layout_range range = {
-.iomode= IOMODE_ANY,
-.offset= 0,
-.length= NFS4_MAX_UINT64,
-};
+if (NFS_SERVER(ino)->pnfs_curr_ld->return_range)
NFS_SERVER(ino)->pnfs_curr_ld->return_range(lo, &range);
-}

/* Don't send a LAYOUTRETURN if list was initially empty */
-if (!test_bit(NFS_LAYOUT_RETURN_REQUESTED, &lo->plh_flags)) {
+!valid_layout) {
spin_unlock(&ino->i_lock);
dprintf("NFS: %s no layout segments to return\n", __func__);
goto out_put_layout_hdr;
@@ -1241,10 +1258,12 @@
spin_lock(&ino->i_lock);
lo = nfsi->layout;
if (!lo || !pnfs_layout_is_valid(lo) ||
- test_bit(NFS_LAYOUT_BULK_RECALL, &lo->plh_flags))
+ test_bit(NFS_LAYOUT_BULK_RECALL, &lo->plh_flags)) {
+lo = NULL;
goto out_noroc;
+}
+pnfs_get_layout_hdr(lo);
if (test_bit(NFS_LAYOUT_RETURN_LOCK, &lo->plh_flags))
- pnfs_get_layout_hdr(lo);
spin_unlock(&ino->i_lock);
wait_on_bit(&lo->plh_flags, NFS_LAYOUT_RETURN,
TASK_UNINTERRUPTIBLE);
@@ -1312,10 +1331,12 @@
struct pnfs_layoutdriver_type *ld = NFS_SERVER(ino)->pnfs_curr_ld;
if (ld->prepare_layoutreturn)
ld->prepare_layoutreturn(args);
+pnfs_put_layout_hdr(lo);
return true;
}
if (layoutreturn)
  pnfs_send_layoutreturn(lo, &stateid, iomode, true);
+pnfs_put_layout_hdr(lo);
return false;
}

@@ -1324,14 +1345,25 @@
int ret)
{
  struct pnfs_layout_hdr *lo = args->layout;
+  struct inode *inode = args->inode;
  const nfs4_stateid *arg_stateid = NULL;
  const nfs4_stateid *res_stateid = NULL;
  struct nfs4_xdr_opaque_data *ld_private = args->ld_private;

  -if (ret == 0) {
    -arg_stateid = &args->stateid;
+  switch (ret) {
+    case -NFS4ERR_NOMATCHING_LAYOUT:
+      spin_lock(&inode->i_lock);
+      if (pnfs_layout_is_valid(lo) &&
+          nfs4_stateid_match_other(&args->stateid, &lo->plh_stateid))
+        pnfs_set_plh_return_info(lo, args->range.iomode, 0);
+      spin_unlock(&inode->i_lock);
+      break;
+    case 0:
+      if (res->lrs_present)
+        res_stateid = &res->stateid;
+/* Fallthrough */
+  default:
+    arg_stateid = &args->stateid;
  }
  pnfs_layoutreturn_free_lsegs(lo, arg_stateid, &args->range,
    res_stateid);
@@ -1958,7 +1990,13 @@
  /* We got an entirely new state ID. Mark all segments for the
  * inode invalid, and retry the layoutget
  */
-  pnfs_mark_layout_stateid_invalid(lo, &free_me);
+  struct pnfs_layout_range range = {
+    .iomode = IOMODE_ANY,
+    .length = NFS4_MAX_UINT64,
+  };
+  pnfs_set_plh_return_info(lo, IOMODE_ANY, 0);
+  pnfs_mark_matching_lsegs_return(lo, &lo->plh_return_segs,
+    &range, 0);
+  goto out_forget;
}
NFS_SERVER(ino)->pnfs_curr ld->free_lseg(lseg);  
if (!pnfs_layout_is_valid(lo))  
nfs_commit_inode(ino, 0);  
+pnfs_free_lseg_list(&free_me);  
return ERR_PTR(-EAGAIN);  
}  

assert_spin_locked(&lo->plh_inode->i_lock);  
+
if (test_bit(NFS_LAYOUT_RETURN_REQUESTED, &lo->plh_flags))  
+tmp_list = &lo->plh_return_segs;  
+  
list_for_each_entry_safe(lseg, next, &lo->plh_segs, pls_list)  
if (pnfs_match_lseg_recall(lseg, return_range, seq)) {  
dprintk("%s: marking lseg %p iomode %d 
@@ -2015,6 +2057,8 @@
lseg, lseg->pls_range.iomode,  
lseg->pls_range.offset,  
lseg->pls_range.length);  
+if (test_bit(NFS_LSEG_LAYOUTRETURN, &lseg->pls_flags))  
+tmp_list = &lo->plh_return_segs;  
if (mark_lseg_invalid(lseg, tmp_list))  
continue;  
remaining++;  
@@ -2255,7 +2299,7 @@
nfs_pageio_reset_write_mds(desc);  
mirror->pg_recoalesce = 1;  
}  
-hdr->release(hdr);  
+hdr->completion_ops->completion(hdr);  
}  

static enum pnfs_try_status  
@@ -2378,7 +2422,7 @@
nfs_pageio_reset_read_mds(desc);  
mirror->pg_recoalesce = 1;  
}  
-hdr->release(hdr);  
+hdr->completion_ops->completion(hdr);  
}  

/*  
--- linux-4.15.0.orig/fs/nfs/pnfs.h  
+++ linux-4.15.0/fs/nfs/pnfs.h
enum layoutdriver_policy_flags {
    NFS_LAYOUT_RETURN_REQUESTED, /**< Return this layout ASAP */
    NFS_LAYOUT_INVALID_STID, /**< layout stateid id is invalid */
    NFS_LAYOUT_FIRST_LAYOUTGET, /**< Serialize first layoutget */
    NFS_LAYOUT_INODE_FREEING /**< The inode is being freed */
};

// Fake up some data that will cause nfs_commit_release to retry the writes. */
void pnfs_generic_prepare_to_resend_writes(struct nfs_commit_data *data)
{
    struct nfs_page *first = nfs_list_entry(data->pages.next);
    struct nfs_writeverf *verf = data->res.verf;
    data->task.tk_status = 0;
    memcpy(&data->verf.verifier, &first->wb_verf,
         sizeof(data->verf.verifier));
    data->verf.verifier.data[0]++; /* ensure verifier mismatch */
    memset(&verf->verifier, 0, sizeof(verf->verifier));
    verf->committed = NFS_UNSTABLE;
}
export_symbol_gpl(pnfs_generic_prepare_to_resend_writes);

/* The generic layer is about to remove the req from the commit list.
 * If this will make the bucket empty, it will need to put the lseg reference.
 * Note this must be called holding i_lock
 * Note this must be called holding nfsi->commit_mutex
 */
void
pnfs_generic_clear_request_commit(struct nfs_page *req,
cout -149,9 +148,7 @@
if (list_empty(&b->written)) {
    freeme = b->wlseg;
    b->wlseg = NULL;
    spin_unlock(&cinfo->inode->i_lock);
    pnfs_put_lseg(freeme);
    spin_lock(&cinfo->inode->i_lock);
    goto restart;
} 

LIST_HEAD(pages);
int i;
spin_lock(&cinfo->inode->i_lock);
mutex_lock(&NFS_I(cinfo->inode)->commit_mutex);
for (i = idx; i < fl_cinfo->nbuckets; i++) {
  bucket = &fl_cinfo->buckets[i];
  if (list_empty(&bucket->committing))
    list_for_each(pos, &bucket->committing)
    cinfo->ds->ncommitting--;
list_splice_init(&bucket->committing, &pages);
spin_unlock(&cinfo->inode->i_lock);
mutex_unlock(&NFS_I(cinfo->inode)->commit_mutex);
nfs_retry_commit(&pages, freeme, cinfo, i);
}
spin_unlock(&cinfo->inode->i_lock);
mutex_unlock(&NFS_I(cinfo->inode)->commit_mutex);
}

static unsigned int
struct list_head *pos;

bucket = &cinfo->ds->buckets[data->ds_commit_index];
spin_lock(&cinfo->inode->i_lock);
mutex_lock(&NFS_I(cinfo->inode)->commit_mutex);
list_for_each(pos, &bucket->committing)
  cinfo->ds->ncommitting--;
list_splice_init(&bucket->committing, pages);
data->lseg = bucket->clseg;
bucket->clseg = NULL;
spin_unlock(&cinfo->inode->i_lock);
mutex_unlock(&NFS_I(cinfo->inode)->commit_mutex);
}

EXPORT_SYMBOL_GPL(nfs4_pnfs_ds_add);

static void nfs4_wait_ds_connect(struct nfs4_pnfs_ds *ds)
static int nfs4_wait_ds_connect(struct nfs4_pnfs_ds *ds)
  might_sleep();
-wait_on_bit(&ds->state, NFS4DS_CONNECTING,
-TASK_KILLABLE);
return wait_on_bit(&ds->ds_state, NFS4DS_CONNECTING, TASK_KILLABLE);
}

static void nfs4_clear_ds_conn_bit(struct nfs4_pnfs_ds *ds)
{
    smp_mb__before_atomic();
    clear_bit(NFS4DS_CONNECTING, &ds->ds_state);
    smp_mb__after_atomic();
    wake_up_bit(&ds->ds_state, NFS4DS_CONNECTING);
    clear_and_wake_up_bit(NFS4DS_CONNECTING, &ds->ds_state);
}

static struct nfs_client *(*get_v3_ds_connect)(
    @ @ -731.30 +725.33 @ @
}{
    int err;

    -again:
    -err = 0;
    -if (test_and_set_bit(NFS4DS_CONNECTING, &ds->ds_state) == 0) {
        -if (version == 3) {
            -err = _nfs4_pnfs_v3_ds_connect(mds_srv, ds, timeo,
                retrans);
        } else if (version == 4) {
            -err = _nfs4_pnfs_v4_ds_connect(mds_srv, ds, timeo,
                retrans, minor_version);
        } else {
            dprintk("%s: unsupported DS version %d\n", __func__,
                version);
            -err = -EPROTONOSUPPORT;
        }
    } else if (version == 4) {
        -err = _nfs4_pnfs_v4_ds_connect(mds_srv, ds, timeo,
            retrans, minor_version);
    } else {
        dprintk("%s: unsupported DS version %d\n", __func__,
            version);
        -err = -EPROTONOSUPPORT;
    }

    -nfs4_clear_ds_conn_bit(ds);
    -} else {
        -nfs4_wait_ds_connect(ds);
        -}

    /* what was waited on didn't connect AND didn't mark unavail */
    -if (!ds->ds_clp & !nfs4_test_deviceid_unavailable(devid))
        -goto again;
        +do {
            +err = nfs4_wait_ds_connect(ds);
            +if (err || ds->ds_clp)
                +goto out;
            +if (nfs4_test_deviceid_unavailable(devid))
                +return -ENODEV;
            +} while (test_and_set_bit(NFS4DS_CONNECTING, &ds->ds_state) != 0);
            +
            +if (ds->ds_clp)
goto connect_done;
+
+switch (version) {
+case 3:
+err = _nfs4_pnfs_v3_ds_connect(mds_srv, ds, timeo, retrans);
+break;
+case 4:
+err = _nfs4_pnfs_v4_ds_connect(mds_srv, ds, timeo, retrans,
+        minor_version);
+break;
+default:
+default:
+dprintf("%s: unsupported DS version %d\n", __func__, version);
+err = -EPROTONOSUPPORT;
}

connect_done:
+nfs4_clear_ds_conn_bit(ds);
+out:
/*
 * At this point the ds->ds_clp should be ready, but it might have
 * hit an error.
--- linux-4.15.0.orig/fs/nfs/proc.c
+++ linux-4.15.0/fs/nfs/proc.c
@@ -589,7 +589,8 @@
 * Emulate the eof flag, which isn't normally needed in NFSv2
 * as it is guaranteed to always return the file attributes
 */
-if (hdr->args.offset + hdr->res.count >= hdr->res.fattr->size)
+if ((hdr->res.count == 0 && hdr->args.count > 0) ||
    hdr->args.offset + hdr->res.count >= hdr->res.fattr->size)
hdr->res.eof = 1;
}
return 0;
@@ -610,8 +611,10 @@

static int nfs_write_done(struct rpc_task *task, struct nfs_pgio_header *hdr)
{
-    if (task->tk_status >= 0)
+    if (task->tk_status >= 0) {
+        hdr->res.count = hdr->args.count;
        nfs_writeback_update_inode(hdr);
+    }
    return 0;
}

--- linux-4.15.0.orig/fs/nfs/read.c
+++ linux-4.15.0/fs/nfs/read.c
@@ -205,7 +205,7 @@

static void
-nfs_async_read_error(struct list_head *head)
+nfs_async_read_error(struct list_head *head, int error)
{
struct nfs_page *req;

--- linux-4.15.0.orig/fs/nfs/super.c
+++ linux-4.15.0/fs/nfs/super.c
@@ -1906,6 +1906,11 @@
size_t len;
char *end;

+if (unlikely(!dev_name || !*dev_name)) {
+dfdprintf(MOUNT, "NFS: device name not specified\n");
+return -EINVAL;
+}
+
/* Is the host name protected with square brackets? */
if (*dev_name == '[') {
    end = strchr(++dev_name, ']');
    /* kill possible hostname list: not supported */
    comma = strchr(dev_name, ',');
    if (comma != NULL && comma < end)
        *comma = 0;
    len = comma - dev_name;
}

if (len > maxnamlen)
    memcpy(sap, &data->addr, sizeof(data->addr));
args->nfs_server.addrlen = sizeof(data->addr);
args->nfs_server.port = ntohs(data->addr.sin_port);
-if (!nfs_verify_server_address(sap))
+if (sap->sa_family != AF_INET ||
    !nfs_verify_server_address(sap))
go to out_no_address;

if (!data->flags & NFS_MOUNT_TCP)
    data->acdirmin != nfss->acdirmin / HZ ||
    data->acdirmax != nfss->acdirmax / HZ ||
    data->timeo != (10U * nfss->client->cl_timeout->to_initval / HZ) ||
    (data->options & NFS_OPTION_FSCACHE) != (nfss->options & NFS_OPTION_FSCACHE) ||
    data->nfs_server.port != nfss->port ||
    data->nfs_server.addrlen != nfss->nfs_client->cl_addrlen ||
!rpc_cmp_addr((struct sockaddr *)&data->nfs_server.address,
 @ @ -2409,8 +2416,7 @ @
go to Ebusy;
if (a->acdirmax != b->acdirmax)
go to Ebusy;
-if (b->auth_info.flavor_len > 0 &&
- clnt_a->cl_auth->au_flavor != clnt_b->cl_auth->au_flavor)
+ if (clnt_a->cl_auth->au_flavor != clnt_b->cl_auth->au_flavor)
go to Ebusy;
return 1;
Ebusy:
@@ -2631,6 +2637,8 @@
/* initial superblock/root creation */
 mount_info->fill_super(s, mount_info);
 nfs_get_cache_cookie(s, mount_info->parsed, mount_info->cloned);
+ if (!(server->flags & NFS_MOUNT_UNSHARED))
+s->s_iflags |= SB_I_MULTIROOT;
}

mntroot = nfs_get_root(s, mount_info->mntfh, dev_name);
--- linux-4.15.0.orig/fs/nfs/write.c
+++ linux-4.15.0/fs/nfs/write.c
@@ -236,9 +236,9 @@
 }
/* A writeback failed: mark the page as bad, and invalidate the page cache */
-static void nfs_set_pageerror(struct page *page)
+static void nfs_set_pageerror(struct address_space *mapping)
 {
- nfs_zap_mapping(page_file_mapping(page)->host, page_file_mapping(page));
+ nfs_zap_mapping(mapping->host, mapping);
 }

/*
@@ -406,22 +406,29 @@
 destroy_list = (subreq->wb_this_page == old_head) ?
 NULL : subreq->wb_this_page;
+/* Note: lock subreq in order to change subreq->wb_head */
+nfs_page_set_headlock(subreq);
 WARN_ON_ONCE(old_head != subreq->wb_head);
+
/* make sure old group is not used */
subreq->wb_this_page = subreq;
+ subreq->wb_head = subreq;

 clear_bit(PG_REMOVE, &subreq->wb_flags);
/* Note: races with nfs_page_group_destroy() */
if (!kref_read(&subreq->wb_kref)) {
    /* Check if we raced with nfs_page_group_destroy() */
    if (test_and_clear_bit(PG_TEARDOWN, &subreq->wb_flags)) {
        nfs_page_clear_headlock(subreq);
        nfs_free_request(subreq);
    } else
        nfs_page_clear_headlock(subreq);
}

-subreq->wb_head = subreq;
+nfs_release_request(old_head);
if (test_and_clear_bit(PG_INODE_REF, &subreq->wb_flags)) {
    nfs_release_request(subreq);
    nfs_set_page_writeback(page);
    WARN_ON_ONCE(test_bit(PG_CLEAN, &req->wb_flags));

    -ret = 0;
    +ret = req->wb_context->error;
    /* If there is a fatal error that covers this write, just exit */
    -if (nfs_error_is_fatal_on_server(req->wb_context->error))
    +if (nfs_error_is_fatal_on_server(ret))
        goto out_launder;

    +ret = 0;
    if (!(nfs_pageio_add_request(pgio, req)) {
        ret = pgio->pg_error;
        /*
         * @ @ -633,9 +641,9 @ @
         * nfs_context_set_write_error(req->wb_context, ret);
         * if (nfs_error_is_fatal_on_server(ret))
         *    goto out_launder;
         */
    } else
        +ret = -EAGAIN;
    nfs_redirty_request(req);
    -ret = -EAGAIN;
} else
    nfs_add_stats(page_file_mapping(page)->host, NFSIOS_WRITEPAGES, 1);
    @ @ -643,7 +651,7 @ @
return ret;
out_launder:
nfs_write_error_remove_page(req);
-\treturn ret;
+\treturn 0;
}

static int nfs_do_writepage(struct page *page, struct writeback_control *wbc,
@@ -783,7 +791,6 @@
struct nfs_inode *nfsi = NFS_I(inode);
struct nfs_page *head;

.atomic_long_dec(&nfsi->nrequests);
if (nfs_page_group_sync_on_bit(req, PG_REMOVE)) {
    head = req->wb_head;
@@ -796,8 +803,10 @@
spin_unlock(&mapping->private_lock);
}

-if (test_and_clear_bit(PG_INODE_REF, &req->wb_flags))
+if (test_and_clear_bit(PG_INODE_REF, &req->wb_flags)) {
    nfs_release_request(req);
+\t\tatomic_long_dec(&nfsi->nrequests);
+\t}
}

static void
@@ -994,7 +1003,7 @@
nfs_list_remove_request(req);
if (test_bit(NFS_IOHDR_ERROR, &hdr->flags) &&
    (hdr->good_bytes < bytes)) {
-\t\tnfs_set_pageerror(req->wb_page);
+\t\tnfs_set_pageerror(page_file_mapping(req->wb_page));
    nfs_context_set_write_error(req->wb_context, hdr->error);
go to remove_req;
@@ -1330,7 +1339,8 @@
unsigned int offset, unsigned int count)
{
    struct nfs_open_context *ctx = nfs_file_open_context(file);
-\tstruct inode *inode = page_file_mapping(page)->host;
+\tstruct address_space *mapping = page_file_mapping(page);
+\tstruct inode *inode = mapping->host;
    int status = 0;

    nfs_inc_stats(inode, NFSIOS_VFSUPDATEPAGE);
@@ -1348,7 +1358,7 @@
status = nfs_writepage_setup(ctx, page, offset, count);
if (status < 0)
- nfs_set_pageerror(page);
+ nfs_set_pageerror(mapping);
else
- __set_page_dirty_nobuffers(page);
out:
@@ -1396,20 +1406,27 @@
nfs_release_request(req);
}

-static void nfs_async_write_error(struct list_head *head)
+static void nfs_async_write_error(struct list_head *head, int error)
{
 struct nfs_page*req:

 while (!list_empty(head)) {
 req = nfs_list_entry(head->next);
 nfs_list_remove_request(req);
+ if (nfs_error_is_fatal(error)) {
+ nfs_context_set_write_error(req->wb_context, error);
+ if (nfs_error_is_fatal_on_server(error)) {
+ nfs_write_error_remove_page(req);
+ continue;
+ }
+ }
+ nfs_redirty_request(req);
 }
 }

 static void nfs_async_write_reschedule_io(struct nfs_pgio_header *hdr)
{
- nfs_async_write_error(&hdr->pages);
+ nfs_async_write_error(&hdr->pages, 0);
}

 static const struct nfs_pgio_completion_ops nfs_async_write_completion_ops = {
@@ -1798,6 +1815,7 @@
 static void nfs_commit_release_pages(struct nfs_commit_data *data)
{
+ const struct nfs_writeverf *verf = data->res.verf;
 struct nfs_page*req:
 int status = data->task.tk_status;
 struct nfs_commit_info cinfo;
@@ -1824,7 +1842,8 @@
 /* Okay, COMMIT succeeded, apparently. Check the verifier
  * returned by the server against all stored verfs. */
-if (!nfs_write_verifier_cmp(req->wb_verf, data->verf.verifier)) { 
+if (req->committed > NFS_UNSTABLE &&
+    !nfs_write_verifier_cmp(req->wb_verf, req->verf->verifier)) { 
/* We have a match */
if (req->wb_page) 
nfs_inode_remove_request(req);
@@ -1837,6 +1856,8 @@
set_bit(NFS_CONTEXT_RESEND_WRITES, req->wb_context->flags);
next:
nfs_unlock_and_release_request(req);
+/* Latency breaker */
+cond_resched();
}

nfss = NFS_SERVER(data->inode);
if (atomic_long_read(&nfss->writeback) < NFS_CONGESTION_OFF_THRESH)
@@ -1876,40 +1897,43 @@
return status;
}

-int nfs_commit_inode(struct inode *inode, int how)
+static int __nfs_commit_inode(struct inode *inode, int how,
+    struct writeback_control *wbc)
+{ 
LIST_HEAD(head);
struct nfs_commit_info cinfo;
int may_wait = how & FLUSH_SYNC;
-int error = 0;
-int res;
+int ret, nscan;

nfs_init_cinfo_from_inode(&cinfo, inode);
nfs_commit_begin(cinfo.mds);
-res = nfs_scan_commit(inode, &head, &cinfo);
-if (res)
-error = nfs_generic_commit_list(inode, &head, how, &cinfo);
+for (;;) {
+ret = nscan = nfs_scan_commit(inode, &head, &cinfo);
+if (ret <= 0)
+break;
+ret = nfs_generic_commit_list(inode, &head, how, &cinfo);
+if (ret < 0)
+break;
+ret = 0;
+if (wbc && wbc->sync_mode == WB_SYNC_NONE) {
+if (nscan < wbc->nr_to_write)
+wbc->nr_to_write -= nscan;
+else
+wbc->nr_to_write = 0;


if (nscan < INT_MAX)
    break;
    cond_resched();
}
nfs_commit_end(cinfo.mds);
if (res == 0)
    return res;
if (error < 0)
    goto out_error;
if (!may_wait)
    goto out_mark_dirty;
error = wait_on_commit(cinfo.mds);
if (error < 0)
    return error;
return res;
out_error:
    res = error;
    /* Note: If we exit without ensuring that the commit is complete,
     * we must mark the inode as dirty. Otherwise, future calls to
     * sync_inode() with the WB_SYNC_ALL flag set will fail to ensure
     * that the data is on the disk.
     */
    out_mark_dirty:
    __mark_inode_dirty(inode, I_DIRTY_DATASYNC);
    return res;
    +if (ret || !may_wait)
    +return ret;
    +return wait_on_commit(cinfo.mds);
+
    +int nfs_commit_inode(struct inode *inode, int how)
    +{
    +    __nfs_commit_inode(inode, how, NULL);
    }
EXPORT_SYMBOL_GPL(nfs_commit_inode);

@@ -1919,11 +1943,11 @@
    int flags = FLUSH_SYNC;
    int ret = 0;

-* no commits means nothing needs to be done */
-* if (!atomic_long_read(&nfsi->commit_info.ncommit))
-* return ret;
-    if (wbc->sync_mode == WB_SYNC_NONE) {
+/* no commits means nothing needs to be done */
+    if (!atomic_long_read(&nfsi->commit_info.ncommit))
+    {
+        /* no commits means nothing needs to be done */
+        if (!atomic_long_read(&nfsi->commit_info.ncommit))
/* Don't commit yet if this is a non-blocking flush and there
 * are a lot of outstanding writes for this mapping.
 */
@@ -1934,16 +1958,16 @@
 flags = 0;
 }

-ret = nfs_commit_inode(inode, flags);
-if (ret >= 0) {
-if (wbc->sync_mode == WB_SYNC_NONE) {
-if (ret < wbc->nr_to_write)
-wbc->nr_to_write -= ret;
-else
-wbc->nr_to_write = 0;
-}
-return 0;
-}
+ret = __nfs_commit_inode(inode, flags, wbc);
+if (!ret) {
+if (flags & FLUSH_SYNC)
+return 0;
+} else if (atomic_long_read(&nfsi->commit_info.ncommit))
+goto out_mark_dirty;
+
+check_requests_outstanding:
+if (!atomic_read(&nfsi->commit_info.rpcs_out))
+return ret;

out_mark_dirty:
__mark_inode_dirty(inode, I_DIRTY_DATASYNC);
return ret;
--- linux-4.15.0.orig/fs/nfs_common/grace.c
+++ linux-4.15.0/fs/nfs_common/grace.c
@@ -68,10 +68,14 @@
if (!open)
return !list_empty(grace_list);

+spin_lock(&grace_lock);
list_for_each_entry(lm, grace_list, list) {
-if (lm->block_opens)
+if (lm->block_opens) {
+spin_unlock(&grace_lock);
return true;
+}
}
+spin_unlock(&grace_lock);
return false;
@@ -446,8 +446,19 @@ &resp->common, nfs3svc_encode_entry);
 memcpy(resp->verf, argp->verf, 8);
 resp->count = resp->buffer - argp->buffer;
 if (resp->offset)
-    xdr_encode_hyper(resp->offset, argp->cookie);
+    if (resp->offset) {
+        lloff_t offset = argp->cookie;
+        +
+        +if (unlikely(resp->offset1)) {
+            /* we ended up with offset on a page boundary */
+            *resp->offset = htonl(offset >> 32);
+            *resp->offset1 = htonl(offset & 0xffffffff);
+            resp->offset1 = NULL;
+        } else {
+            xdr_encode_hyper(resp->offset, offset);
+        }
+        resp->offset = NULL;
+    }
 RETURN_STATUS(nfserr);
}
@@ -516,6 +527,7 @@
 else {
     xdr_encode_hyper(resp->offset, offset);
 }
+    resp->offset = NULL;
+}
 RETURN_STATUS(nfserr);
--- linux-4.15.0.orig/fs/nfsd/nfs3xdr.c
+++ linux-4.15.0/fs/nfsd/nfs3xdr.c
@@ -846,9 +846,14 @@
         if (isdotent(name,namlen)) {
             if (namlen == 2) {
                 dchild = dget_parent(dparent);
-                /* filesystem root - cannot return filehandle for "." */
+                /* Don't return filehandle for "." if we're at
+                 * the filesystem or export root:
+                 */
                 if (dchild == dparent)
                     goto out;
                 if (dparent == exp->ex_path.dentry)
goto out;
} else
dchild = dget(dparent);
} else
@@ -923,6 +928,7 @@
} else {
xdr_encode_hyper(cd->offset, offset64);
} +cd->offset = NULL;
}

/*
--- linux-4.15.0.orig/fs/nfsd/nfs4callback.c
+++ linux-4.15.0/fs/nfsd/nfs4callback.c
@@ -939,8 +939,9 @@
 cb->cb_seq_status = 1;
cb->cb_status = 0;
if (minorversion) {
- if (!nfsd41_cb_get_slot(clp, task))
+ if (!cb->cb_holds_slot && !nfsd41_cb_get_slot(clp, task))
 return;
+cb->cb_holds_slot = true;
}
rpc_call_start(task);
@@ -967,6 +968,9 @@
 return true;
}

+if (!cb->cb_holds_slot)
+goto need_restart;
+ switch (cb->cb_seq_status) {
+ case 0:
+ /*
+ @@ -1004,6 +1008,7 @@
+ cb->cb_seq_status);
+ }

+cb->cb_holds_slot = false;
clear_bit(0, &clp->cl_cb_slot_busy);
rpc_wake_up_next(&clp->cl_cb_waitq);
dprintf("%s: freed slot, new seqid=%d\n", __func__.
@@ -1156,6 +1161,8 @@
 err = setup_callback_client(clp, &conn, ses);
 if (err) {
 nfsd4_mark_cb_down(clp, err);
+if (c)
+svc_xprt_put(c->cn_xprt);
return;
}
}
@@ -1211,6 +1218,7 @@
cb->cb_seq_status = 1;
cb->cb_status = 0;
cb->cb_need_restart = false;
+cb->cb_holds_slot = false;
}

void nfsd4_run_cb(struct nfsd4_callback *cb)
--- linux-4.15.0.orig/fs/nfsd/nfs4layouts.c
+++ linux-4.15.0/fs/nfsd/nfs4layouts.c
@@ -683,7 +683,7 @@
/* Client gets 2 lease periods to return it */
cutoff = ktime_add_ns(task->tk_start,
- nn->nfsd4_lease * NSEC_PER_SEC * 2);
+ (u64)nn->nfsd4_lease * NSEC_PER_SEC * 2);
if (ktime_before(now, cutoff)) {
  rpc_delay(task, HZ/100); /* 10 mili-seconds */
--- linux-4.15.0.orig/fs/nfsd/nfs4proc.c
+++ linux-4.15.0/fs/nfsd/nfs4proc.c
@@ -32,6 +32,7 @@
="/** NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS
*/
+ +#include <linux/fs_struct.h>
#include <linux/file.h>
#include <linux/falloc.h>
#include <linux/slab.h>
@@ -252,11 +253,13 @@
/* Note: create modes (UNCHECKED,GUARDED...) are the same
* in NFSv4 as in v3 except EXCLUSIVE4_1.
*/
+ #include <linux/fs_struct.h>
#include <linux/fcntl.h>
#include <linux/falloc.h>
#include <linux/slab.h>
@@ -252,11 +253,13 @@
/* Note: create modes (UNCHECKED,GUARDED...) are the same
* in NFSv4 as in v3 except EXCLUSIVE4_1.
*/
+ #include <linux/fs_struct.h>
current->fs->umask = open->op_umask;
status = do_nfsd_create(rqstp, current_fh, open->op_fname.data,
open->op_fname_len, &open->op_iattr,
+resfh, open->op_createmode,
(u32 *)&open->op_verf.data,
&open->op_truncate, &open->op_created);
+current->fs->umask = 0;

if (!status &
    & open->op_label.len)
nfsd4_security_inode_setsectx(*resfh, &open->op_label, open->op_bmval);
@@ -603,6 +606,7 @@
if (status)
    return status;

    current->fs->umask = create->cr_umask;
switch (create->cr_type) {
    case NF4LNK:
        status = nfsd_symlink(rqstp, &cstate->current_fh,
            @@ -611,20 +615,22 @@
            break;

    case NF4BLK:
        status = nfserr_inval;
        rdev = MKDEV(create->cr_specdata1, create->cr_specdata2);
        if (MAJOR(rdev) != create->cr_specdata1 ||
            MINOR(rdev) != create->cr_specdata2)
            -return nfserr_inval;
            +goto out_umask;
            status = nfsd_create(rqstp, &cstate->current_fh,
                create->cr_name, create->cr_namelen,
                &create->cr_iattr, S_IFBLK, rdev, &resfh);
            break;

    case NF4CHR:
        status = nfserr_inval;
        rdev = MKDEV(create->cr_specdata1, create->cr_specdata2);
        if (MAJOR(rdev) != create->cr_specdata1 ||
            MINOR(rdev) != create->cr_specdata2)
            -return nfserr_inval;
            +goto out_umask;
            status = nfsd_create(rqstp, &cstate->current_fh,
                create->cr_name, create->cr_namelen,
                &create->cr_iattr, S_IFCHR, rdev, &resfh);
            @@ -668,6 +674,8 @@
                fh_dup2(&cstate->current_fh, &resfh);
            out:
            fh_put(&resfh);
            +out_umask:
            +current->fs->umask = 0;
            return status;
    }

    @@ -1032,6 +1040,9 @@
    }
    __be32 status;

    if (!cstate->save_fh.fh_dentry)
        +return nfserr_nofilehandle;
        +
status = nfs4_preprocess_stateid_op(rqstp, cstate, &cstate->save_fh,
   src_stateid, RD_STATE, src, NULL);
if (status) {
@@ -1363,14 +1374,14 @@
   const struct nfsd4_layout_ops *ops;
   struct nfs4_layout_stateid *ls;
   __be32 nfserr;
   -int accmode;
   +int accmode = NFSD_MAY_READ_IF_EXEC;

   switch (lgp->lg_seg.iomode) {
   case IOMODE_READ:
      -accmode = NFSD_MAY_READ;
      +accmode |= NFSD_MAY_READ;
      break;
   case IOMODE_RW:
      -accmode = NFSD_MAY_READ | NFSD_MAY_WRITE;
      +accmode |= NFSD_MAY_READ | NFSD_MAY_WRITE;
      break;
   default:
      dprintk("%s: invalid iomode %d\n",
@@ -1708,6 +1719,7 @@
      if (status) {
      op = &args->ops[0];
      op->status = status;
@@ -661,7 +661,7 @@
      struct cld_upcall {
      struct list_head cu_list;
      struct cld_net*cu_net;
      -struct task_struct*cu_task;
@@ -670,23 +670,18 @@
      {
      int ret;
      struct rpc_pipe_msg msg;
@@ -670,23 +670,18 @@
      {
      int ret;
      struct rpc_pipe_msg msg;
      +struct cld_upcall *cup = container_of(cmsg, struct cld_upcall, cu_msg);

      memset(&msg, 0, sizeof(msg));
      msg.data = cmsg;


msg.len = sizeof(*cmsg);

-/*
- * Set task state before we queue the upcall. That prevents
- * wake_up_process in the downcall from racing with schedule.
- */
-set_current_state(TASK_UNINTERRUPTIBLE);
ret = rpc_queue_upcall(pipe, &msg);
if (ret < 0) {
-set_current_state(TASK_RUNNING);
goto out;
}
-schedule();
+wait_for_completion(&cup->cu_done);

if (msg.errno < 0)
ret = msg.errno;
@@ -753,7 +748,7 @@
if (copy_from_user(&cup->cu_msg, src, mlen) != 0)
return -EFAULT;

-wake_up_process(cup->cu_task);
+complete(&cup->cu_done);
return mlen;
}
@@ -768,7 +763,7 @@
if (msg->errno >= 0)
return;
-wake_up_process(cup->cu_task);
+complete(&cup->cu_done);
}

static const struct rpc_pipe_ops cld_upcall_ops = {
@@ -899,7 +894,7 @@
goto restart_search;
}
}

-new->cu_task = current;
+init_completion(&new->cu_done);
new->cu_msg.cm_vers = CLD_UPCALL_VERSION;
put_unaligned(cn->cn_xid++, &new->cu_msg.cm_xid);
new->cu_net = cn;
--- linux-4.15.0.orig/fs/nfsd/nfs4state.c
+++ linux-4.15.0/fs/nfsd/nfs4state.c
@@ -251,6 +251,8 @@
if (!nbl) {
    nbl = kmalloc(sizeof(*nbl), GFP_KERNEL);
    if (nbl) {
        INIT_LIST_HEAD(&nbl->nbl_list);
        INIT_LIST_HEAD(&nbl->nbl_lru);
        fh_copy_shallow(&nbl->nbl_fh, fh);
        locks_init_lock(&nbl->nbl_lock);
        nfsd4_init_cb(&nbl->nbl_cb, lo->lo_owner.so_client,
                      &@ -268,6 +270,35 @@)
        kfree(nbl);
    }
}

+static void
+remove_blocked_locks(struct nfs4_lockowner *lo)
+
+struct nfs4_client *clp = lo->lo_owner.so_client;
+struct nfsd_net *nn = net_generic(clp->net, nfsd_net_id);
+struct nfsd4_blocked_lock *nbl;
+LIST_HEAD(reaplist);
+
+/* Dequeue all blocked locks */
+spin_lock(&nn->blocked_locks_lock);
+%while (!list_empty(&lo->lo_blocked)) {
+%nbl = list_first_entry(&lo->lo_blocked,
+ +struct nfsd4_blocked_lock,
+ +nbl_list);
+list_del_init(&nbl->nbl_list);
+list_move(&nbl->nbl_lru, &reaplist);
+}
+spin_unlock(&nn->blocked_locks_lock);
+
+/* Now free them */
+while (!list_empty(&reaplist)) {
+   nbl = list_first_entry(&reaplist, struct nfsd4_blocked_lock,
+      +nbl_lru);
+list_del_init(&nbl->nbl_lru);
+posix_unblock_lock(&nbl->nbl_lock);
+free_blocked_lock(nbl);
+}
+}

static int
nfsd4_cb_notify_lock_done(struct nfsd4_callback *cb, struct rpc_task *task)
{
    @@ -439,6 +470,8 @@
    {
        struct file *ret;

        +

        +

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+if (!f)
+return NULL;
spin_lock(&f->fi_lock);
ret = __nfs4_get_fd(f, O_RDWR);
if (!ret) {
@@ -1169,6 +1202,12 @@
nfs4_free_stateowner(sop);
}

+static bool
+nfs4_ol_stateid_unhashed(const struct nfs4_ol_stateid *stp)
+
+return list_empty(&stp->st_profile);
+
+static bool unhash_ol_stateid(struct nfs4_ol_stateid *stp)
{
struct nfs4_file *fp = stp->st_stid.sc_file;
@@ -1236,9 +1275,11 @@
}
lockdep_assert_held(&stp->st_stid.sc_client->cl_lock);

+if (!unhash_ol_stateid(stp))
+return false;
list_del_init(&stp->st_locks);
unhash_stid(&stp->st_stid);
@@ -1303,13 +1344,12 @@
static bool unhash_open_stateid(struct nfs4_ol_stateid *stp,
static void release_lock_stateid(struct nfs4_ol_stateid *stp)
@@ -1303,13 +1344,12 @@
 static void release_open_stateid(struct nfs4_ol_stateid *stp)
{  
u32 slotsize = slot_bytes(ca);  
u32 num = ca->maxreqs;  
  int avail;  
+unsigned long avail, total_avail;  

  spin_lock(&nfsd_drc_lock);  
-  avail = min((unsigned long)NFSD_MAX_MEM_PER_SESSION,  
-    nfsd_drc_max_mem - nfsd_drc_mem_used);  
+  total_avail = nfsd_drc_max_mem - nfsd_drc_mem_used;  
+  avail = min((unsigned long)NFSD_MAX_MEM_PER_SESSION, total_avail);  
/*  
* Never use more than a third of the remaining memory,  
* unless it's the only way to give this client a slot:  
*/  
-  avail = clamp_t(int, avail, slotsize, avail/3);  
+  avail = clamp_t(unsigned long, avail, slotsize, total_avail/3);  
  num = min_t(int, num, avail / slotsize);  
  nfsd_drc_mem_used += num * slotsize;  
  spin_unlock(&nfsd_drc_lock);  
}@ -1866,6 +1906,7 @@
static void  
  _destroy_client(struct nfs4_client *clp)  
{  
+  int i;  
  struct nfs4_openowner *oo;  
  struct nfs4_delegation *dp;  
  struct list_head reaplist;  
}@ -1895,6 +1936,16 @@
  nfs4_get_stateowner(&oo->oo_owner);  
  release_openowner(oo);  
}  
+  for (i = 0; i < OWNER_HASH_SIZE; i++) {  
+    struct nfs4_stateowner *so, *tmp;  
+    list_for_each_entry_safe(so, tmp, &clp->cl_ownerstr_hashtbl[i],  
+      so_strhash) {  
+      /* Should be no openowners at this point */  
+      WARN_ON_ONCE(so->so_is_open_owner);  
+      removeBlocked_locks(lockowner(so));  
+    }  
+  }  
+  nfsd4_return_all_client_layouts(clp);  
  nfsd4_shutdown_callback(clp);  
  if (clp->cl_cb_conn.cb_xprt)  
}@ -3023,12 +3074,17 @@
    (bool)seq->cachethis)
return false;
/*
- * If there's an error than the reply can have fewer ops than
- * the call. But if we cached a reply with *more* ops than the
- * call you're sending us now, then this new call is clearly not
- * really a replay of the old one:
+ * If there's an error then the reply can have fewer ops than
+ * the call.
+ */
+if (slot->sl_opcnt < argp->opcnt && !slot->sl_status)
+return false;
+/*
+ * But if we cached a reply with *more* ops than the call you're
+ * sending us now, then this new call is clearly not really a
+ * replay of the old one:
+ */
-if (slot->sl_opcnt < argp->opcnt)
+if (slot->sl_opcnt > argp->opcnt)
return false;
/* This is the only check explicitly called by spec: */
if (!same_creds(&rqstp->rq_cred, &slot->sl_cred))
@@ -3590,6 +3646,7 @@
switch (s->sc_type) {
    default:
    break;
+case 0:
    case NFS4_CLOSED_STID:
    case NFS4_CLOSED_DELEG_STID:
        ret = nfserr_bad_stateid;
@@ -5722,21 +5779,21 @@
    }

static struct nfs4_ol_stateid *
-finds_lock_stateid(struct nfs4_lockowner *lo, struct nfs4_file *fp)
+find_lock_stateid(const struct nfs4_lockowner *lo, 
		const struct nfs4_ol_stateid *ost) 
{
    struct nfs4_ol_stateid *lst;
-struct nfs4_client *clp = lo->lo_owner.so_client;

    -lockdep_assert_held(&clp->cl_lock);
+lockdep_assert_held(&ost->st_stid.sc_client->cl_lock);

    -list_for_each_entry(lst, &lo->lo_owner.so_stateids, st_perstateowner) {
-    if (lst->st_stid.sc_type != NFS4_LOCK_STID)
-        continue;
-    if (lst->st_stid.sc_file == fp) {
-        refcount_inc(&lst->st_stid.sc_count);


return lst;
+
/* If ost is not hashed, ost->st_locks will not be valid */
+if (!nfs4_ol_stateid_unhashed(ost))
+list_for_each_entry(lst, &ost->st_locks, st_locks) {
+if (lst->st_stateowner == &lo->lo_owner) {
+refcount_inc(&lst->st_stid.sc_count);
+return lst;
+
}
-
}
return NULL;
}

mutex_lock_nested(&stp->st_mutex, OPEN_STATEID_MUTEX);
retry:
spin_lock(&clp->cl_lock);
spin_lock(&fp->fi_lock);
retstp = find_lock_stateid(lo, fp);
+if (nfs4_ol_stateid_unhashed(open_stp))
+goto out_close;
retstp = find_lock_stateid(lo, open_stp);
if (retstp)
+goto out_unlock;
-
+goto out_found;
refcount_inc(&stp->st_stid.sc_count);
stp->st_stid.sc_type = NFS4_LOCK_STID;
stp->st_stateowner = nfs4_get_stateowner(&lo->lo_owner);
@@ -5765,22 +5822,26 @@
stp->st_access_bmap = 0;
stp->st_deny_bmap = open_stp->st_deny_bmap;
stp->st_openstp = open_stp;
+spin_lock(&fp->fi_lock);
list_add(&stp->st_locks, &open_stp->st_locks);
list_add(&stp->st_perstateowner, &lo->lo_owner.so_stateids);
list_add(&stp->st_perfile, &fp->fi_stateids);
-out_unlock:
spin_unlock(&fp->fi_lock);
spin_unlock(&clp->cl_lock);
-if (retstp) {
- if (nfsd4_lock_ol_stateid(retstp) != nfs_ok) {
- nfs4_put_stid(&retstp->st_stid);
- goto retry;
- }
- */ To keep mutex tracking happy */
-mutex_unlock(&stp->st_mutex);
stp = retstp;
-}
return stp;
+out_found:
+spin_unlock(&clp->cl_lock);
+if (nfsd4_lock_ol_stateid(retstp) != nfs_ok) {
+nfs4_put_stid(&retstp->st_stid);
+goto retry;
+}
+/* To keep mutex tracking happy */
+mutex_unlock(&st->st_mutex);
+return retstp;
+out_close:
+spin_unlock(&clp->cl_lock);
+mutex_unlock(&st->st_mutex);
+return NULL;
}

static struct nfs4_ol_stateid *
@@ -5795,7 +5856,7 @@
     new = false;
     spin_lock(&clp->cl_lock);
     lst = find_lock_stateid(lo, fi);
-    lst = find_lock_stateid(lo, ost);
+    lst = find_lock_stateid(lo, ost);
     spin_unlock(&clp->cl_lock);
     if (lst != NULL) {
         if (nfsd4_lock_ol_stateid(lst) == nfs_ok)
@@ -6025,7 +6086,7 @@
     if (fl_flags & FL_SLEEP) {
-        nbl->nbl_time = jiffies;
+        nbl->nbl_time = get_seconds();
         spin_lock(&nn->blocked_locks_lock);
         list_add_tail(&nbl->nbl_list, &lock_sop->lo_blocked);
         list_add_tail(&nbl->nbl_lru, &nn->blocked_locks_lru);
@@ -6279,7 +6340,7 @@
     return status;
 }

     -inode = file_inode(filp);
     +inode = locks_inode(filp);
     flctx = inode->i_flctx;
     if (flctx && !list_empty_careful(&flctx->flc_posix)) {
@@ -6357,6 +6418,7 @@
     spin_unlock(&clp->cl_lock);
free_ol_stateid_reaplist(&reaplist);
+remove_blocked_locks(lo);
nfs4_put_stateowner(&lo->lo_owner);

return status;
@@ -7142,6 +7204,8 @@
 }
 }

+WARN_ON(!list_empty(&nn->blocked_locks_lru));
 +
 for (i = 0; i < CLIENT_HASH_SIZE; i++) {
 while (!list_empty(&nn->unconf_id_hashtbl[i])) {
 clp = list_entry(nn->unconf_id_hashtbl[i].next, struct nfs4_client, cl_idhash);
 @@ -7208,7 +7272,6 @@
 struct nfs4_delegation *dp = NULL;
 struct list_head *pos, *next, reaplist;
 struct nfsd_net *nn = net_generic(net, nfsd_net_id);
-struct nfsd4_blocked_lock *nbl;

 cancel_delayed_work_sync(&nn->laundromat_work);
 locks_end_grace(&nn->nfsd4_manager);
@@ -7229,24 +7292,6 @@
 nfs4_put_stid(&dp->dl_stid);
 }

 -BUG_ON(!list_empty(&reaplist));
 -spin_lock(&nn->blocked_locks_lock);
-while (!list_empty(&nn->blocked_locks_lru)) {
-nbl = list_first_entry(&nn->blocked_locks_lru,
-struct nfsd4_blocked_lock, nbl_lru);
- list_move(&nbl->nbl_lru, &reaplist);
- list_del_init(&nbl->nbl_list);
- }
- spin_unlock(&nn->blocked_locks_lock);
 -
-while (!list_empty(&reaplist)) {
- nbl = list_first_entry(&reaplist,
- struct nfsd4_blocked_lock, nbl_lru);
- list_del_init(&nbl->nbl_lru);
- posix_unblock_lock(&nbl->nbl_lock);
- free_blocked_lock(nbl);
- }
 -
 nfsd4_client_tracking_exit(net);
 nfs4_state_destroy_net(net);
}
--- linux-4.15.0.orig/fs/nfsd/nfs4xdr.c
+++ linux-4.15.0/fs/nfsd/nfs4xdr.c
@@ -33,7 +33,6 @@
 * SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
 */

#include <linux/fs_struct.h>
#include <linux/file.h>
#include <linux/slab.h>
#include <linux/namei.h>
@@ -683,7 +682,7 @@
 status = nfsd4_decode_fattr(argp, create->cr_bmval, &create->cr_iattr,
     &create->cr_acl, &create->cr_label,
-    &current->fs->umask);
+    &create->cr_umask);
 if (status)
    goto out;

@@ -928,7 +927,6 @@
case NFS4_OPEN_NOCREATE:
    break;

case NFS4_OPEN_CREATE:
-    current->fs->umask = 0;
+    &create->cr_umask);
    break;
    case NFS4_CREATE_GUARDED:
    status = nfsd4_decode_fattr(argp, open->op_bmval,
         &open->op_iattr, &open->op_acl, &open->op_label,
-     &current->fs->umask);
+    &open->op_umask);
    if (status)
        goto out;
    break;
@@ -1588,6 +1586,8 @@
gdev->gd_maxcount = be32_to_cpup(p++);
    num = be32_to_cpup(p++);
    if (num) {

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+if (num > 1000)
+goto xdr_error;
READ_BUF(4 * num);
gdev->gd_notify_types = be32_to_cpup(p++);
for (i = 1; i < num; i++) {
  @ @ -2383,8 ++2383,10 @ @
    __be32 status;
  int err;
  struct nfs4_acl *acl = NULL;
  +#ifdef CONFIG_NFSD_V4_SECURITY_LABEL
  void *context = NULL;
  int contextlen;
  +#endif
  bool contextsupport = false;
  struct nfsd4_compoundres *resp = rqstp->rq_resp;
  u32 minorversion = resp->cstate.minorversion;
  @ @ -2861,12 +2863,14 @ @
goto out;
}
  +#ifdef CONFIG_NFSD_V4_SECURITY_LABEL
if (bmval2 & FATTR4_WORD2_SECURITY_LABEL) {
  status = nfsd4_encode_security_label(xdr, rqstp, context,
contextlen);
  if (status)
    goto out;
  +#endif
  attrlen = htonl(xdr->buf->len - attrlen_offset - 4);
  write_bytes_to_xdr_buf(xdr->buf, attrlen_offset, &attrlen, 4);
  @ @ -3082,15 +3086,18 @ @
goto fail;
cd->rd_maxcount -= entry_bytes;
/*
  - * RFC 3530 14.2.24 describes rd_dircount as only a "hint", so
  - * let's always let through the first entry, at least:
  + * RFC 3530 14.2.24 describes rd_dircount as only a "hint", and
  + * notes that it could be zero. If it is zero, then the server
  + * should enforce only the rd_maxcount value.
  */
  -if (!cd->rd_dircount)
    goto fail;
  -name_and_cookie = 4 + 4 * XDR_QUADLEN(namlen) + 8;
  -if (name_and_cookie > cd->rd_dircount && cd->cookie_offset)
    goto fail;
  -cd->rd_dircount = min(cd->rd_dircount, name_and_cookie);
  +#if (cd->rd_dircount) {
+[name_and_cookie = 4 + 4 * XDR_QUADLEN(namlen) + 8;  
+if (name_and_cookie > cd->rd_dircount && cd->cookie_offset)  
+goto fail;  
+cd->rd_dircount -= min(cd->rd_dircount, name_and_cookie);  
+if (!cd->rd_dircount)  
+cd->rd_maxcount = 0;  
+}

cd->cookie_offset = cookie_offset;
skip_entry:  
@@ -3647,7 +3654,8 @@  
nfserr = nfserr_resource;  
goto err_no_verf;
}  
-maxcount = min_t(u32, readdir->rd_maxcount, INT_MAX);  
+maxcount = svc_max_payload(resp->rqstp);  
+maxcount = min_t(u32, readdir->rd_maxcount, maxcount);
/*  
 * Note the rfc defines rd_maxcount as the size of the  
 * READDIR+resok structure, which includes the verifier above  
@@ -3661,7 +3669,7 @@  
 */  
 RFC 3530 14.2.24 allows us to ignore dircount when it's 0: */  
if (!readdir->rd_dircount)  
-readdir->rd_dircount = INT_MAX;  
+readdir->rd_dircount = svc_max_payload(resp->rqstp);
readdir->xdr = xdr;
readdir->rd_maxcount = maxcount;
--- linux-4.15.0.orig/fs/nfsd/nfsctl.c  
+++ linux-4.15.0/fs/nfsd/nfsctl.c  
@@ -788,7 +788,10 @@  
svc_xprt_put(xprt);
}  
out_err:  
-nfsd_destroy(net);  
+if (!list_empty(&nn->nfsd_serv->sv_permsocks))  
+nn->nfsd_serv->sv_nrthreads--;  
+ else  
+ nfsd_destroy(net);  
return err;
}  
@@ -1126,6 +1129,8 @@  
 case 'Y':  
 case 'y':  
 case '1':  
+if (!nn->nfsd_serv)
+return -EBUSY;
nfsd4_end_grace(nn);
break;
default:
--- linux-4.15.0.orig/fs/nfsd/nfsproc.c
+++ linux-4.15.0/fs/nfsd/nfsproc.c
@@ -118,6 +118,13 @@
return nfsd_return_attrs(nfserr, resp);
}

+/* Obsolete, replaced by MNTPROC_MNT. */
+static __be32
+nfsd_proc_root(struct svc_rqst *rqstp)
+{
+return nfs_ok;
+
+/* Look up a path name component
* Note: the dentry in the resp->fh may be negative if the file
@@ -201,6 +208,13 @@
return fh_getattr(&resp->fh, &resp->stat);
}

+/* Reserved */
+static __be32
+nfsd_proc_writecache(struct svc_rqst *rqstp)
+{
+return nfs_ok;
+
+/* Write data to a file
* N.B. After this call resp->fh needs an fh_put
@@ -605,6 +619,7 @@
}.pc_xdrressize = ST+AT,
].pc_decode = nfssvc_decode_void,
[NFSPROC_ROOT] = {
+ .pc_func = nfsd_proc_root,
 .pc_decode = nfssvc_decode_void,
 .pc_encode = nfssvc_encode_void,
 .pc_argsize = sizeof(struct nfsd_void),
@@ -642,6 +657,7 @@
].pc_xdrressize = ST+AT+1+NFSSVC_MAXBLKSIZE_V2/4,
},
[NFSPROC_WRITECACHE] = {
+ .pc_func = nfsd_proc_writecache,
 .pc_decode = nfssvc_decode_void,
.pc_encode = nfssvc_encode_void,
.pc_argsize = sizeof(struct nfsd_void),
--- linux-4.15.0.orig/fs/nfsd/nfssvc.c
+++ linux-4.15.0/fs/nfsd/nfssvc.c
@@ -417,8 +417,7 @@
 return;
 nfsd_shutdown_net(net);
 -printk(KERN_WARNING "nfsd: last server has exited, flushing export 
-    "cache\n");
+pr_info("nfsd: last server has exited, flushing export cache\n");
 nfsd_export_flush(net);
}

--- linux-4.15.0.orig/fs/nfsd/state.h
+++ linux-4.15.0/fs/nfsd/state.h
@@ -70,6 +70,7 @@
 int cb_seq_status;
 int cb_status;
 bool cb_need_restart;
+bool cb_holds_slot;
};

 struct nfsd4_callback_ops {
 @@ -591,7 +592,7 @@
 struct nfsd4_blocked_lock {
 struct list_head nbl_list;
 struct list_head nbl_lru;
-unsigned long nbl_time;
+time_t nbl_time;
 struct file_lock nbl_lock;
 struct knfsd_fh nbl_fh;
 struct nfsd4_callback nbl_cb;
--- linux-4.15.0.orig/fs/nfsd/vfs.c
+++ linux-4.15.0/fs/nfsd/vfs.c
@@ -396,10 +396,23 @@
 bool get_write_count;
 bool size_change = (iap->ia_valid & ATTR_SIZE);

 -if (iap->ia_valid & (ATTR_ATIME | ATTR_MTIME | ATTR_SIZE))
+if (iap->ia_valid & ATTR_SIZE) {
    accmode |= NFSD_MAY_WRITE|NFSD_MAY_OWNER_OVERRIDE;
-if (iap->ia_valid & ATTR_SIZE)
+}
    ftype = S_IFREG;
 +}
 +
+/*
+ * If utimes(2) and friends are called with times not NULL, we should
if (iap->ia_valid & (ATTR_ATIME | ATTR_MTIME)) {
    accmode |= NFSD_MAY_OWNER_OVERRIDE;
    if (!(iap->ia_valid & (ATTR_ATIME_SET | ATTR_MTIME_SET)))
        accmode |= NFSD_MAY_WRITE;
}

/* Callers that do fh_verify should do the fh_want_write: */
get_write_count = !fhp->fh_dentry;
@@ -541,7 +554,8 @@
__be32 nfsd4_clone_file_range(struct file *src, u64 src_pos, struct file *dst,
undef file range(struct file *src, u64 src_pos, struct file *dst,
{ -return nfserrno(do_clone_file_range(src, src_pos, dst, dst_pos, count));
+return nfserrno(vfs_clone_file_range(src, src_pos, dst, dst_pos,
+    count));
}

ssize_t nfsd_copy_file_range(struct file *src, u64 src_pos, struct file *dst,
@@ -1188,6 +1202,9 @@
iap->ia_mode = 0;
iap->ia_mode &= (iap->ia_mode & S_IALLUGO) | type;

    if (!IS_POSIXACL(dirp))
        iap->ia_mode &= ~current.umask();
    +
    err = 0;
    host_err = 0;
    switch (type) {
@ -1399,6 +1416,9 @@
        goto out;
    }

    if (!IS_POSIXACL(dirp))
        iap->ia_mode &= ~current.umask();
    +
    host_err = vfs_create(dirp, dchild, iap->ia_mode, true);
    if (host_err < 0) {
        fh_drop_write(fhp);
        --- linux-4.15.0.orig/fs/nfsd/vfs.h
        +++ linux-4.15.0/fs/nfsd/vfs.h
        @ @ -117,8 +117,11 @@}

    static inline int fh_want_write(struct svc_fh *fh)

{-
    int ret = mnt_want_write(fh->fh_export->ex_path.mnt);
    +int ret;

    +if (fh->fh_want_write)
    +return 0;
    +ret = mnt_want_write(fh->fh_export->ex_path.mnt);
    if (!ret)
        fh->fh_want_write = true;
    return ret;

--- linux-4.15.0.orig/fs/nfsd/xdr4.h
+++ linux-4.15.0/fs/nfsd/xdr4.h
@@ -118,6 +118,7 @@
     } u;
     u32cr_bmval[3]; /* request */
     struct iattrcr_iattr; /* request */
     +inrcr_umask; /* request */
     struct nfsd4_change_info cr_cinfo; /* response */
     struct nfs4_acl *cr_acl;
     struct xdr_netobj cr_label;
@@ -228,6 +229,7 @@
     u32op_why_no_deleg; /* response - DELEG_NONE_EXT only */
     u32op_create; /* request */
     u32op_createmode; /* request */
     +inop_umask; /* request */
     u32op_bmval[3]; /* request */
     struct iattrp_iattr; /* UNCHECKED4, GUARDED4, EXCLUSIVE4_1 */
     nfs4_verifierop_verf __attribute__((aligned(32)));
--- linux-4.15.0.orig/fs/nilfs2/namei.c
+++ linux-4.15.0/fs/nilfs2/namei.c
@@ -46,8 +46,7 @@
     int err = nilfs_add_link(dentry, inode);
     if (!err) {
         -d_instantiate(dentry, inode);
         +d_instantiate_new(dentry, inode);
         return 0;
     }

@@ -243,8 +242,7 @@
     goto out_fail;
 }

 nilfs_mark_inode_dirty(inode);
     -d_instantiate(dentry, inode);
     -unlock_new_inode(inode);
     +d_instantiate_new(dentry, inode);
     out:
if (!err)
  err = nilfs_transaction_commit(dir->i_sb);
--- linux-4.15.0.orig/fs/nilfs2/segment.c
+++ linux-4.15.0/fs/nilfs2/segment.c
@@ -2789,6 +2789,8 @@
if (!nilfs->ns_writer)
  return -ENOMEM;
+  inode_attach_wb(nilfs->ns_bdev->bd_inode, NULL);
+
  err = nilfs_segment_start_thread(nilfs->ns_writer);
if (err)
  kfree(nilfs->ns_writer);
--- linux-4.15.0.orig/fs/nilfs2/sysfs.c
+++ linux-4.15.0/fs/nilfs2/sysfs.c
@@ -73,11 +73,9 @@
#define NILFS_DEV_INT_GROUP_TYPE(name, parent_name) \
static void nilfs_##name##_attr_release(struct kobject *kobj) \
{ \
  struct nilfs_sysfs_##parent_name##_subgroups *subgroups; \
  struct the_nilfs *nilfs = container_of(kobj->parent, \
-    subgroups = nilfs->ns_##parent_name##_subgroups; \
+    subgroups = container_of(kobj, 
    struct nilfs_sysfs_##parent_name##_subgroups, 
               sg_##name##_kobj); \
    complete(&subgroups->sg_##name##_kobj_unregister); \
  } \
static struct kobj_type nilfs_##name##_ktype = { \
  @ @ -103,12 +101,12 @@
err = kobject_init_and_add(kobj, &nilfs_##name##_ktype, parent, 
    #name); \
if (err) \
  -return err;
-  return 0;
+    kobject_put(kobj); 
+  return err; \
} \
static void nilfs_sysfs_delete_##name##_group(struct the_nilfs *nilfs) \
{ \
  @ @ -219,14 +217,14 @@
}
if (err)
+ return err;
+kobject_put(&root->snapshot_kobj);

-return 0;
+ return err;
}

void nilfs_sysfs_delete_snapshot_group(struct nilfs_root *root)
{
-kobject_del(&root->snapshot_kobj);
+kobject_put(&root->snapshot_kobj);
}

/************************************************************************
@@ -1010,7 +1008,7 @@
err = kobject_init_and_add(&nilfs->ns_dev_kobj, &nilfs_dev_ktype, NULL,
    "%s", sb->s_id);
if (err)
-goto free_dev_subgroups;
+goto cleanup_dev_kobject;

err = nilfs_sysfs_create_mounted_snapshots_group(nilfs);
if (err)
@@ -1047,9 +1045,7 @@
nilfs_sysfs_delete_mounted_snapshots_group(nilfs);

cleanup_dev_kobject:
-kobject_del(&nilfs->ns_dev_kobj);
- -
-free_dev_subgroups:
+kojbect_put(&nilfs->ns_dev_kobj);
kfree(nilfs->ns_dev_subgroups);

failed_create_device_group:
@@ -1064,6 +1060,7 @@
nilfs_sysfs_delete_superblock_group(nilfs);
nilfs_sysfs_delete_segector_group(nilfs);
kobject_del(&nilfs->ns_dev_kobj);
+kojbect_put(&nilfs->ns_dev_kobj);
kfree(nilfs->ns_dev_subgroups);
}

--- linux-4.15.0.orig/fs/nilfs2/the_nilfs.c
+++ linux-4.15.0/fs/nilfs2/the_nilfs.c
@@ -806,14 +806,13 @@
void nilfs_put_root(struct nilfs_root *root)
{
    -if (refcount_dec_and_test(&root->count)) {
        -struct the_nilfs *nilfs = root->nilfs;
        +struct the_nilfs *nilfs = root->nilfs;
        -nilfs_sysfs_delete_snapshot_group(root);
        -spin_lock(&nilfs->ns_cptree_lock);
        +if (refcount_dec_and_lock(&root->count, &nilfs->ns_cptree_lock)) {
            rb_erase(&root->rb_node, &nilfs->ns_cptree);
            spin_unlock(&nilfs->ns_cptree_lock);
            +nilfs_sysfs_delete_snapshot_group(root);
            iput(root->ifile);
        }
        kfree(root);
    
--- linux-4.15.0.orig/fs/notify/fanotify/fanotify.c
+++ linux-4.15.0/fs/notify/fanotify/fanotify.c
@@ -92,7 +92,7 @@
    u32 event_mask,
    const void *data, int data_type)
{
-__u32 marks_mask, marks_ignored_mask;
+__u32 marks_mask = 0, marks_ignored_mask = 0;
    const struct path *path = data;

    pr_debug("%s: inode_mark=%p vfsmnt_mark=%p mask=%x data=%p"
@@ -108,24 +108,20 @@
        !d_can_lookup(path->dentry))
        return false;

    -if (inode_mark && vfsmnt_mark) {
-        -marks_mask = (vfsmnt_mark->mask | inode_mark->mask);
-        -marks_ignored_mask = (vfsmnt_mark->ignored_mask | inode_mark->ignored_mask);
-    } else if (inode_mark) {
-        /*
-         * if the event is for a child and this inode doesn't care about
-         * events on the child, don't send it!
-         */
-    }
    -if ((event_mask & FS_EVENT_ON_CHILD) &&
-        !(inode_mark->mask & FS_EVENT_ON_CHILD))
    -return false;
    -marks_mask = inode_mark->mask;
    -marks_ignored_mask = inode_mark->ignored_mask;
    -} else if (vfsmnt_mark) {
    -marks_mask = vfsmnt_mark->mask;
    -marks_ignored_mask = vfsmnt_mark->ignored_mask;
    -} else if (vufsnt_mark) {
    -marks_mask = vufsnt_mark->mask;
    -marks_ignored_mask = vufsnt_mark->ignored_mask;
    -} else if (vufsnt_mark) {
    -marks_mask = vufsnt_mark->mask;
    -marks_ignored_mask = vufsnt_mark->ignored_mask;
    -} else if (vufsnt_mark) {
    -marks_mask = vufsnt_mark->mask;
    -marks_ignored_mask = vufsnt_mark->ignored_mask;
    -} else if (vufsnt_mark) {
    -marks_mask = vufsnt_mark->mask;
    -marks_ignored_mask = vufsnt_mark->ignored_mask;
} else {
-} else {
-BUG();
+/*
+ * if the event is for a child and this inode doesn't care about
+ * events on the child, don't send it!
+ */
+if (inode_mark &&
+ (!event_mask & FS_EVENT_ON_CHILD) ||
+ (inode_mark->mask & FS_EVENT_ON_CHILD)) {
+marks_mask |= inode_mark->mask;
+marks_ignored_mask |= inode_mark->ignored_mask;
+}
+
+if (vfsmnt_mark) {
+marks_mask |= vfsmnt_mark->mask;
+marks_ignored_mask |= vfsmnt_mark->ignored_mask;
+}
+
+if (d_is_dir(path->dentry) &&
--- linux-4.15.0.orig/fs/notify/fsnotify.c
+++ linux-4.15.0/fs/notify/fsnotify.c
@@ -90,6 +90,7 @@
 iput_inode = inode;

 +cond_resched();
 spin_lock(&sb->s_inode_list_lock);
 }
 spin_unlock(&sb->s_inode_list_lock);
@@ -158,9 +159,9 @@
 parent = dget_parent(dentry);
 p_inode = parent->d_inode;

-if (unlikely(!fsnotify_inode_watches_children(p_inode)))
+if (unlikely(!fsnotify_inode_watches_children(p_inode))) {
 __fsnotify_update_child_dentry_flags(p_inode);
-else if (p_inode->i_fsnotify_mask & mask) {
+} else if (p_inode->i_fsnotify_mask & mask & ~FS_EVENT_ON_CHILD) {
 struct name_snapshot name;

 /* we are notifying a parent so come up with the new mask which
 @@ -192,8 +193,9 @@
 struct fsnotify_iter_info *iter_info)
 {
 struct fsnotify_group *group = NULL;
-__u32 inode_test_mask = 0;
-__u32 vfsmount_test_mask = 0;
+__u32 test_mask = (mask & ALL_FSNOTIFY_EVENTS);
__u32 marks_mask = 0;
__u32 marks_ignored_mask = 0;

if (unlikely(!inode_mark && !vfsmount_mark)) {
    BUG();
    @@ -213,29 +215,25 @@
    /* does the inode mark tell us to do something? */
    if (inode_mark) {
        group = inode_mark->group;
        -inode_test_mask = (mask & ~FS_EVENT_ON_CHILD);
        -inode_test_mask &= inode_mark->mask;
        -inode_test_mask &= ~inode_mark->ignored_mask;
        +marks_mask |= inode_mark->mask;
        +marks_ignored_mask |= inode_mark->ignored_mask;
    }

    /* does the vfsmount_mark tell us to do something? */
    if (vfsmount_mark) {
        -vfsmount_test_mask = (mask & ~FS_EVENT_ON_CHILD);
        group = vfsmount_mark->group;
        -vfsmount_test_mask &= vfsmount_mark->mask;
        -vfsmount_test_mask &= ~vfsmount_mark->ignored_mask;
        -if (inode_mark)
            -vfsmount_test_mask &= ~inode_mark->ignored_mask;
        +marks_mask |= vfsmount_mark->mask;
        +marks_ignored_mask |= vfsmount_mark->ignored_mask;
    }

    pr_debug("%s: group=%p to_tell=%p mask=%x inode_mark=%p
        inode_test_mask=%x vfsmount_mark=%p vfsmount_test_mask=%x
        data=%p data_is=%d cookie=%d\n",
        __func__, group, to_tell, mask, inode_mark,
        inode_test_mask, vfsmount_mark, vfsmount_test_mask, data,
        data_is, cookie);

    -if (!inode_test_mask && !vfsmount_test_mask)
        +if (!((test_mask & marks_mask & ~marks_ignored_mask))
            return 0;

    return group->ops->handle_event(group, to_tell, inode_mark,
    @@ -278,14 +276,17 @@
    struct fsnotify_iter_info iter_info = {};
    struct mount *mnt;
    int ret = 0;
    -/* global tests shouldn't care about events on child only the specific event */

__u32 test_mask = (mask & ~FS_EVENT_ON_CHILD);
__u32 test_mask = (mask & ALL_FSNOTIFY_EVENTS);

if (data_is == FSNOTIFY_EVENT_PATH)
mnt = real_mount(((const struct path *)data)->mnt);
else
mnt = NULL;

/* An event "on child" is not intended for a mount mark */
if (mask & FS_EVENT_ON_CHILD)
mnt = NULL;
+
/*
 * Optimization: srcu_read_lock() has a memory barrier which can
 * be expensive. It protects walking the *_fsnotify_marks lists.
 *
@@ -308,16 +309,9 @@
 iter_info.srcu_idx = srcu_read_lock(&fsnotify_mark_srcu);

 -if ((mask & FS_MODIFY) ||
 -   (test_mask & to_tell->i_fsnotify_mask)) {
 -iter_info.inode_mark =
 -fsnotify_first_mark(&to_tell->i_fsnotify_marks);
 -}
 -
 -if (mnt && ((mask & FS_MODIFY) ||
 -   (test_mask & mnt->mnt_fsnotify_mask))) {
 -iter_info.inode_mark =
 -fsnotify_first_mark(&to_tell->i_fsnotify_marks);
 +iter_info.inode_mark =
 +fsnotify_first_mark(&to_tell->i_fsnotify_marks);
 +if (mnt) {
 iterate_info.vfs mount_mark =
 fsnotify_first_mark(&mnt->mnt_fsnotify_marks);
 }
 @@ -368,7 +362,7 @@
 { int ret;

 -BUG_ON(hweight32(ALL_FSNOTIFY_EVENTS) != 23);
 +BUG_ON(hweight32(ALL_FSNOTIFY_BITS) != 23);

 ret = init_srcu_struct(&fsnotify_mark_srcu);
 if (ret)
 --- linux-4.15.0.orig/fs/notify/group.c
 +++ linux-4.15.0/fs/notify/group.c
 @@ -22,6 +22,7 @@
 #include <linux/srcu.h>
#include <linux/rculist.h>
#include <linux/wait.h>
+#include <linux/module.h>
#include <linux/fsnotify_backend.h>
#include "fsnotify.h"
@@ -109,6 +110,7 @@
{
    refcount_inc(&group->refcnt);
}
+EXPORT_SYMBOL_GPL(fsnotify_get_group);

/*
 * Drop a reference to a group. Free it if it's through.
 @@ -118,6 +120,7 @@
 if (refcount_dec_and_test(&group->refcnt))
     fsnotify_final_destroy_group(group);
 }
+EXPORT_SYMBOL_GPL(fsnotify_put_group);

/*
 * Create a new fsnotify_group and hold a reference for the group returned.
 @@ -147,6 +150,7 @@
 return group;
 }
+EXPORT_SYMBOL_GPL(fsnotify_alloc_group);

int fsnotify_fasync(int fd, struct file *file, int on)
{
--- linux-4.15.0.orig/fs/notify/mark.c
+++ linux-4.15.0/fs/notify/mark.c
 @@ -108,6 +108,7 @@
     WARN_ON_ONCE(!refcount_read(&mark->refcnt));
     refcount_inc(&mark->refcnt);
 }
+EXPORT_SYMBOL_GPL(fsnotify_put_mark);

static void __fsnotify_recalc_mask(struct fsnotify_mark_connector *conn)
{
@@ -392,6 +393,7 @@
     mutex_unlock(&group->mark_mutex);
     fsnotify_free_mark(mark);
 }
+EXPORT_SYMBOL_GPL(fsnotify_destroy_mark);

/*
 * Sorting function for lists of fsnotify marks.

Open Source Used In 5GaaS Edge AC-4 31676
int fsnotify_add_mark(struct fsnotify_mark *mark, struct inode *inode, 
    struct vfsmount *mnt, int allow_dups)

EXPORT_SYMBOL_GPL(fsnotify_add_mark);

int fsnotify_add_mark(struct fsnotify_mark *mark, struct inode *inode, 
    struct vfsmount *mnt, int allow_dups)

EXPORT_SYMBOL_GPL(fsnotify_add_mark);

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int fsnotify_add_mark(struct fsnotify_mark *mark, struct inode *inode, 
    struct vfsmount *mnt, int allow_dups)

EXPORT_SYMBOL_GPL(fsnotify_add_mark);

int fsnotify_add_mark(struct fsnotify_mark *mark, struct inode *inode, 
    struct vfsmount *mnt, int allow_dups)}
/* Apply the mst fixups. */
if (post_read_mst_fixup((NTFS_RECORD*)m, vol->mft_record_size)) {

/* FIXME: Try to use the $MFTMirr now. */
--- linux-4.15.0.orig/fs/ocfs2/Makefile
+++ linux-4.15.0/fs/ocfs2/Makefile
@@ -1,5 +1,5 @@

# SPDX-License-Identifier: GPL-2.0
-ccflags-y := -Ifs/ocfs2
+ccflags-y := -I$(src)

obj-$(CONFIG_OCFS2_FS) += \n   ocfs2.o
--- linux-4.15.0.orig/fs/ocfs2/acl.c
+++ linux-4.15.0/fs/ocfs2/acl.c
@@ -264,6 +264,8 @@
   ret = ocfs2_xattr_set(inode, name_index, ",", value, size, 0);
   kfree(value);
   +if (!ret)
   +set_cached_acl(inode, type, acl);

   return ret;
 }
@@ -311,7 +313,9 @@
   acl = ocfs2_get_acl_nolock(inode, type, di_bh);
   +up_read(&OCFS2_I(inode)->ip_xattr_sem);
   ocfs2_inode_unlock_tracker(inode, 0, &oh, had_lock);
   brelse(di_bh);
@@ -330,9 +334,11 @@
   acl = ocfs2_get_acl_nolock(inode, ACL_TYPE_ACCESS, bh);
   +up_read(&OCFS2_I(inode)->ip_xattr_sem);
   ocfs2_inode_unlock_tracker(inode, 0, &oh, had_lock);
   brelse(di_bh);
@@ -330,9 +334,11 @@
   acl = ocfs2_get_acl_nolock(inode, ACL_TYPE_ACCESS, bh);
   -if (IS_ERR(acl) || !acl)
   -return PTR_ERR(acl);
   -return PTR_ERR_OR_ZERO(acl);
   +up_read(&OCFS2_I(inode)->ip_xattr_sem);
   +if (IS_ERR(acl))
   +return PTR_ERR_OR_ZERO(acl);
   ret = __posix_acl_chmod(&acl, GFP_KERNEL, inode->i_mode);
   if (ret)
if (!S_ISLNK(inode->i_mode)) {
  if (osb->s_mount_opt & OCFS2_MOUNT_POSIX_ACL) {
    down_read(&OCFS2_I(dir)->ip_xattr_sem);
    acl = ocfs2_get_acl_nolock(dir, ACL_TYPE_DEFAULT, dir_bh);
    up_read(&OCFS2_I(dir)->ip_xattr_sem);
    if (IS_ERR(acl))
      return PTR_ERR(acl);
  }
}

int ocfs2_convert_inline_data_to_extents(struct inode *inode,
                                           struct buffer_head *di_bh)
{
  int ret, i, has_data, num_pages = 0;
  int ret, has_data, num_pages = 0;
  int need_free = 0;
  u32 bit_off, num;
  handle_t *handle;

  struct ocfs2_super *osb = OCFS2_SB(inode->i_sb);
  struct ocfs2_dinode *di = (struct ocfs2_dinode *)di_bh->b_data;
  struct ocfs2_alloc_context *data_ac = NULL;
  struct page **pages = NULL;
  loff_t end = osb->s_clustersize;

  has_data = i_size_read(inode) ? 1 : 0;

  if (has_data) {
    pages = kmalloc(ocfs2_pages_per_cluster(osb->sb),
                    sizeof(struct page *), GFP_NOFS);
    if (pages == NULL) {
      ret = -ENOMEM;
      mlog_errno(ret);
      return ret;
    }
    ret = ocfs2_reserve_clusters(osb, 1, &data_ac);
    if (ret)
      goto free_pages;

    ret = ocfs2_reserve_clusters(osb, 1, &data_ac);
    if (ret)
      mlog_errno(ret);
    goto free_pages;
  }

  free_pages:
  free_pages;
  return ret;
}
goto out;
}
}

@@ -6931,7 +6922,8 @@
}

if (has_data) {
-unsigned int page_end;
+unsigned int page_end = min_t(unsigned, PAGE_SIZE,
+osb->s_clustersize);
u64 phys;

ret = dquot_alloc_space_nodirty(inode,
@@ -6955,15 +6947,8 @@*/
block = phys = ocfs2_clusters_to_blocks(inode->i_sb, bit_off);

/*
- * Non sparse file systems zero on extend, so no need
- * to do that now.
- */
-#if (!ocfs2_sparse_alloc(osb) &&
- PAGE_SIZE < osb->s_clustersize)
- end = PAGE_SIZE;
- -ret = ocfs2_grab_eof_pages(inode, 0, end, pages, &num_pages);
+ret = ocfs2_grab_eof_pages(inode, 0, page_end, &page,
+ &num_pages);
if (ret) {
 mlog_errno(ret);
 need_free = 1;
@@ -6974,20 +6959,15 @@*/
 * This should populate the 1st page for us and mark
 * it up to date.
 */
- -ret = ocfs2_read_inline_data(inode, pages[0], di_bh);
+ret = ocfs2_read_inline_data(inode, page, di_bh);
if (ret) {
 mlog_errno(ret);
 need_free = 1;
goto out_unlock;
}

-pag
for (i = 0; i < num_pages; i++)
-ocfs2_map_and_dirty_page(inode, handle, 0, page_end,
  - pages[i], i > 0, &phys);
+ocfs2_map_and_dirty_page(inode, handle, 0, page_end, page, 0,
  + &phys);
}

spin_lock(&oi->ip_lock);
@@ -7018,8 +6998,8 @@
}

out_unlock:
-if (pages)
-ocfs2_unlock_and_free_pages(pages, num_pages);
+if (page)
+ocfs2_unlock_and_free_pages(&page, num_pages);

out_commit:
if (ret < 0 && & did_quota)
@@ -7043,8 +7023,6 @@
out:
if (data_ac)
    ocfs2_free_alloc_context(data_ac);
-free_pages:
-kfree(pages);
return ret;
}

@@ -7238,6 +7216,10 @@
struct ocfs2_dinode *di = (struct ocfs2_dinode *)di_bh->b_data;
struct ocfs2_inline_data *idata = &di->id2.i_data;

+#* No need to punch hole beyond i_size. */
+if (start >= i_size_read(inode))
+return 0;
+
if (end > i_size_read(inode))
end = i_size_read(inode);

--- linux-4.15.0.orig/fs/ocfs2/aops.c
+++ linux-4.15.0/fs/ocfs2/aops.c
@@ -2054,7 +2054,8 @@
inode->i_mtime = inode->i_ctime = current_time(inode);
di->i_mtime = di->i_ctime = cpu_to_le64(inode->i_mtime.tv_sec);
di->i_mtime_nsec = di->i_ctime_nsec = cpu_to_le32(inode->i_mtime.tv_nsec);
-ocfs2_update_inode_fsync_trans(handle, inode, 1);
+if (handle)
+ocfs2_update_inode_fsync_trans(handle, inode, 1);
if (handle)
    ocfs2_journal_dirty(handle, wc->w_di_bh);
@@ -2151,13 +2152,30 @@
    struct ocfs2_dio_write_ctxt *dwc = NULL;
    struct buffer_head *di_bh = NULL;
    u64 p_blkno;
-    -loff_t pos = iblock << inode->i_sb->s_blocksize_bits;
+    unsigned int i_blkbits = inode->i_sb->s_blocksize_bits;
+    -loff_t pos = iblock << i_blkbits;
+    sector_t endblk = (i_size_read(inode) - 1) >> i_blkbits;
    unsigned len, total_len = bh_result->b_size;
    int ret = 0, first_get_block = 0;

    len = osb->s_clustersize - (pos & (osb->s_clustersize - 1));
    len = min(total_len, len);

    /*
    + * bh_result->b_size is count in get_more_blocks according to write
    + * "pos" and "end", we need map twice to return different buffer state:
    + * 1. area in file size, not set NEW;
    + * 2. area out file size, set NEW.
    + *
    + * iblock  endblk
    + * |--------|---------|---------|---------|
    + * |<--------area in file------->|
    + */

    +if ((iblock <= endblk) &&
    +   ((iblock + ((len - 1) >> i_blkbits)) > endblk))
    +len = (endblk - iblock + 1) << i_blkbits;
    +mlog(0, "get block of %lu at %llu:%u req %u\n",
    +inode->i_ino, pos, len, total_len);
    @@ -2241,6 +2259,9 @@
    if (desc->c_needs_zero)
        set_buffer_new(bh_result);

        +if (iblock > endblk)
        +set_buffer_new(bh_result);
        +
    /* May sleep in end_io. It should not happen in a irq context. So defer
    + * it to dio work queue. */
    set_buffer_defer_completion(bh_result);
    @@ -2288,7 +2309,7 @@
    struct ocfs2_alloc_context *meta_ac = NULL;
    handle_t *handle = NULL;
loff_t end = offset + bytes;
-int ret = 0, credits = 0, locked = 0;
+int ret = 0, credits = 0;

ocfs2_init_dealloc_ctxt(&dealloc);

@@ -2299,13 +2320,6 @@
!
dwc->dw_orphaned)
goto out;
-/* ocfs2_file_write_iter will get i_mutex, so we need not lock if we
-* are in that context. */
-if (dwc->dw_writer_pid != task_pid_nr(current)) {
-inode_lock(inode);
-locked = 1;
-}
-
-ret = ocfs2_inode_lock(inode, &di_bh, 1);
-if (ret < 0) {
-mlog_errno(ret);
-@@ -2380,8 +2394,6 @@
-if (meta_ac)
-ocfs2_free_alloc_context(meta_ac);
-ocfs2_run_deallocs(osb, &dealloc);
-if (locked)
-inode_unlock(inode);
-ocfs2_dio_free_write_ctx(inode, dwc);
-
-return ret;
-@@ -2404,8 +2416,16 @@
/* this io's submitter should not have unlocked this before we could */
BUG_ON(!ocfs2_iocb_is_rw_locked(iocb));

-!-if (bytes > 0 & & private)
-!ret = ocfs2_dio_end_io_write(inode, private, offset, bytes);
+if (bytes <= 0)
+mlog_ratelimited(ML_ERROR, "Direct IO failed, bytes = %lld",
+ (long long)bytes);
+if (private) {
+if (bytes > 0)
+ret = ocfs2_dio_end_io_write(inode, private, offset,
+ bytes);
+else
+ocfs2_dio_free_write_ctx(inode, private);
+}

ocfs2_iocb_clear_rw_locked(iocb);
int ocfs2_read_blocks_sync(struct ocfs2_super *osb, u64 block, unsigned int nr, struct buffer_head *bhs[]) {
    int status = 0;
    unsigned int i;
    struct buffer_head *bh;
    int new_bh = 0;

    trace_ocfs2_read_blocks_sync((unsigned long long)block, nr);

    if (!nr)
        goto bail;

    /* Don't put buffer head and re-assign it to NULL if it is allocated
     * outside since the caller can't be aware of this alternation!
     * */
    +new_bh = (bhs[0] == NULL);
    +
    for (i = 0 ; i < nr ; i++) {
        if (bhs[i] == NULL) {
            if (bhs[i] == NULL) {
                status = -ENOMEM;
                mlog_errno(status);
                goto bail;
            } else
                break;
        }
    }
    bh = bhs[i];
    
    -clear_buffer_uptodate(bh);
    get_bh(bh); /* for end_buffer_read_sync() */
    bh->b_end_io = end_buffer_read_sync;
    submit_bh(REQ_OP_READ, 0, bh);
}
read_failure:
for (i = nr; i > 0; i--) {
    bh = bhs[i - 1];

    if (unlikely(status)) {
        if (new_bh && bh) {
            /* If middle bh fails, let previous bh
            * finish its read and then put it to
            * aovoid bh leak
            */
            if (!buffer_jbd(bh))
                wait_on_buffer(bh);
            put_bh(bh);
            bhs[i - 1] = NULL;
        } else if (bh && buffer_uptodate(bh)) {
            clear_buffer_uptodate(bh);
        }
        continue;
    }
    /* No need to wait on the buffer if it's managed by JBD. */
    if (!buffer_jbd(bh))
        wait_on_buffer(bh);
    goto read_failure;
}

return status;

/* Caller must provide a bhs[] with all NULL or non-NULL entries, so it
 * will be easier to handle read failure.
 * */
int ocfs2_read_blocks(struct ocfs2_caching_info *ci, u64 block, int nr,
    struct buffer_head *bhs[], int flags,
    int (*validate)(struct super_block *sb,
    struct buffer_head *bh, int flags,
    int (*validate)(struct super_block *sb,
    struct super_block *sb = ocfs2_metadata_cache_get_super(ci);
    new_bh = 0;
trace_ocfs2_read_blocks_begin(ci, (unsigned long long)block, nr, flags);

@@ -213,6 +241,11 @@
goto bail;
}

+/* Don't put buffer head and re-assign it to NULL if it is allocated
+ * outside since the caller can't be aware of this alternation!
+ */
+new_bh = (bhs[0] == NULL);
+
ocfs2_metadata_cache_io_lock(ci);
for (i = 0 ; i < nr ; i++) {
if (bhs[i] == NULL) {
@@ -221,7 +254,8 @@
ocfs2_metadata_cache_io_unlock(ci);
status = -ENOMEM;
mlog_errno(status);
-goto bail;
+/* Don't forget to put previous bh! */
+break;
}
}
bh = bhs[i];
@@ -306,7 +340,6 @@
 continue;
}

-clear_buffer_uptodate(bh);
get_bh(bh); /* for end_buffer_read_sync() */
if (validate)
set_buffer_needs_validate(bh);
@@ -316,16 +349,27 @@
}
}

-status = 0;
-
-read_failure:
for (i = (nr - 1); i >= 0; i--) {
bh = bhs[i];

if (!(flags & OCFS2_BH_READAHEAD)) {
-if (status) {
-/* Clear the rest of the buffers on error */
-put_bh(bh);
-bhs[i] = NULL;

read_failure:
+if (unlikely(status)) {
  /* Clear the buffers on error including those
   * ever succeeded in reading
   */
+if (new_bh && bh) {
  /* If middle bh fails, let previous bh
   * finish its read and then put it to
   * avoid bh leak
   */
+if (!buffer_jbd(bh))
    +wait_on_buffer(bh);
    +put_bh(bh);
    +bhs[i] = NULL;
    +} else if (bh && buffer_uptodate(bh)) {
      +clear_buffer_uptodate(bh);
      +}
    continue;
    }
  /* We know this can't have changed as we hold the
   * for this bh as it's not marked locally
   * uptodate. */
  status = -EIO;
  -put_bh(bh);
  -bhs[i] = NULL;
  -continue;
  +clear_buffer_needs_validate(bh);
  +goto read_failure;
  }
if (buffer_needs_validate(bh)) {
  BUG_ON(buffer_jbd(bh));
  clear_buffer_needs_validate(bh);
  status = validate(sb, bh);
  -if (status) {
    -put_bh(bh);
    -bhs[i] = NULL;
    -continue;
    -}
  +if (status)
    +goto read_failure;
  }
}
o2hb_nego_timeout_handler,
reg, NULL, &reg->hr_handler_list);
if (ret)
    - goto free;
+ goto remove_item;

ret = o2net_register_handler(O2HB_NEGO_APPROVE_MSG, reg->hr_key,
sizeof(struct o2hb_nego_msg),
@@ -2173,6 +2173,12 @@
unregister_handler:
    o2net_unregister_handler_list(&reg->hr_handler_list);
+    remove_item:
+        spin_lock(&o2hb_live_lock);
+        list_del(&reg->hr_all_item);
+        if (o2hb_global_heartbeat_active())
+            clear_bit(reg->hr_region_num, o2hb_region_bitmap);
+        spin_unlock(&o2hb_live_lock);
free:
    kfree(reg);
    return ERR_PTR(ret);
--- linux-4.15.0.orig/fs/ocfs2/cluster/masklog.h
+++ linux-4.15.0/fs/ocfs2/cluster/masklog.h
@@ -178,6 +178,15 @@
    } while (0)
+
#define mlog_ratelimited(mask, fmt, ...)
+    do {
+        static DEFINE_RATELIMIT_STATE(_rs,
+            DEFAULT_RATELIMIT_INTERVAL,
+            DEFAULT_RATELIMIT_BURST);
+        if (__ratelimit(&_rs))
+            mlog(mask, fmt, ##__VA_ARGS__);
+    } while (0)
+
#define mlog_errno(st) ({
    int _st = (st);
    if (_st != -ERESTARTSYS && _st != -EINTR &&
--- linux-4.15.0.orig/fs/ocfs2/cluster/nodemanager.c
+++ linux-4.15.0/fs/ocfs2/cluster/nodemanager.c
@@ -621,13 +621,15 @@
    struct o2nm_node *node = to_o2nm_node(item);
    struct o2nm_cluster *cluster = to_o2nm_cluster(group->cg_item.ci_parent);
-    o2net_disconnect_node(node);
+    if (cluster->cl_nodes[node->nd_num] == node) {
+        o2net_disconnect_node(node);

if (cluster->cl_has_local &&
    (cluster->cl_local_node == node->nd_num)) {
    cluster->cl_has_local = 0;
    cluster->cl_local_node = O2NM_INVALID_NODE_NUM;
o2net_stop_listening(node);
}

/* XXX call into net to stop this node from trading messages */
--- linux-4.15.0.orig/fs/ocfs2/dcache.c
+++ linux-4.15.0/fs/ocfs2/dcache.c
@@ -310,6 +310,18 @@
out_attach:
    spin_lock(&dentry_attach_lock);
+    if (unlikely(dentry->d_fsdata && !alias)) {
+        /* d_fsdata is set by a racing thread which is doing
+         * the same thing as this thread is doing. Leave the racing
+         * thread going ahead and we return here.
+         */
+        spin_unlock(&dentry_attach_lock);
+        iput(dl->dl_inode);
+        ocfs2_lock_res_free(&dl->dl_lockres);
+        kfree(dl);
+        return 0;
+    }
+    dentry->d_fsdata = dl;
+    dl->dl_count++;
+    spin_unlock(&dentry_attach_lock);
--- linux-4.15.0.orig/fs/ocfs2/dir.c
+++ linux-4.15.0/fs/ocfs2/dir.c
@@ -1896,8 +1896,7 @@
    } else {
        continue;
    }
if (le64_to_cpu(de->inode)) {
    unsigned char d_type = DT_UNKNOWN;
--- linux-4.15.0.orig/fs/ocfs2/dlm/Makefile
+++ linux-4.15.0/fs/ocfs2/dlm/Makefile
@@ -1,4 +1,4 @@
-ccflags-y := -Ifs/ocfs2
+ccflags-y := -I$(src)/..

obj-$(CONFIG_OCFS2_FS_O2CB) += ocfs2_dlm.o

--- linux-4.15.0.orig/fs/ocfs2/dlm/dlmdebug.c
+++ linux-4.15.0/fs/ocfs2/dlm/dlmdebug.c
@@ -329,7 +329,7 @@
{
 char *buf;

-buf = (char *) get_zeroed_page(GFP_NOFS);
+buf = (char *) get_zeroed_page(GFP_ATOMIC);
 if (buf) {
     dump_mle(mle, buf, PAGE_SIZE - 1);
     free_page((unsigned long)buf);
--- linux-4.15.0.orig/fs/ocfs2/dlm/dlmdomain.c
+++ linux-4.15.0/fs/ocfs2/dlm/dlmdomain.c
@@ -675,20 +675,6 @@
spin_unlock(&dlm->spinlock);
}

-int dlm_shutting_down(struct dlm_ctxt *dlm)
-{  
-int ret = 0;
-  
- -spin_lock(&dlm_domain_lock);
-  
-  -if (dlm->dlm_state == DLM_CTXT_IN_SHUTDOWN)
-  -ret = 1;
-  
-  -spin_unlock(&dlm_domain_lock);
-  
-  -return ret;
- }
- 
-void dlm_unregister_domain(struct dlm_ctxt *dlm)
{  
  int leave = 0;
--- linux-4.15.0.orig/fs/ocfs2/dlm/dlmdomain.h
+++ linux-4.15.0/fs/ocfs2/dlm/dlmdomain.h
@@ -28,7 +28,30 @@
extern spinlock_t dlm_domain_lock;
extern struct list_head dlm_domains;

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int dlm_shutting_down(struct dlm_ctxt *dlm);
+static inline int dlm_joined(struct dlm_ctxt *dlm)
+
+int ret = 0;
+
+spin_lock(&dlm_domain_lock);
+if (dlm->dlm_state == DLM_CTXT_JOINED)
+ret = 1;
+spin_unlock(&dlm_domain_lock);
+
+return ret;
+
+static inline int dlm_joined(struct dlm_ctxt *dlm)
+
+int ret = 0;
+
+spin_lock(&dlm_domain_lock);
+if (dlm->dlm_state == DLM_CTXT_IN_SHUTDOWN)
+ret = 1;
+spin_unlock(&dlm_domain_lock);
+
+return ret;
+
++-
+
void dlm_fire_domain_eviction_callbacks(struct dlm_ctxt *dlm, int node_num);

--- linux-4.15.0.orig/fs/ocfs2/dlmmaster.c
+++ linux-4.15.0/fs/ocfs2/dlmmaster.c
@@ -589,9 +589,9 @@
res->last_used = 0;

-spin_lock(&dlm->spinlock);
+spin_lock(&dlm->track_lock);
list_add_tail(&res->tracking, &dlm->tracking_list);
-spin_unlock(&dlm->spinlock);
+spin_unlock(&dlm->track_lock);

memset(res->lvb, 0, DLM_LVB_LEN);
memset(res->refmap, 0, sizeof(res->refmap));
--- linux-4.15.0.orig/fs/ocfs2/dlmrecovery.c
+++ linux-4.15.0/fs/ocfs2/dlmrecovery.c
@@ -1378,6 +1378,15 @@
if (!dlm_grab(dlm))
return -EINVAL;


+if (!dlm_joined(dlm)) {
+    mlog(ML_ERROR, "Domain %s not joined! ")
+    "lockres %s, master %u\n",
+    dlm->name, mres->lockname_len,
+    mres->lockname, mres->master);
+    dlm_put(dlm);
+    return -EINVAL;
+}
+
BUG_ON(!(mres->flags & (DLM_MRES_RECOVERY|DLM_MRES_MIGRATION)));

    real_master = mres->master;
--- linux-4.15.0.orig/fs/ocfs2/dlm/dlmunlock.c
+++ linux-4.15.0/fs/ocfs2/dlm/dlmunlock.c
@@ -105,7 +105,8 @@
    enum dlm_status status;
    int actions = 0;
    int in_use;
-   u8 owner;
+   u8 owner;
+   int recovery_wait = 0;

    mlog(0, "master_node = %d, valblk = %d", master_node,
         flags & LKM_VALBLK);
@@ -208,9 +209,17 @@
 }
 if (flags & LKM_CANCEL)
    lock->cancel_pending = 0;
-else
-    lock->unlock_pending = 0;
+
+else {
+    if (!lock->unlock_pending)
+        recovery_wait = 1;
+    else
+        lock->unlock_pending = 0;
+} }

/* get an extra ref on lock.  if we are just switching
@@ -244,6 +248,17 @@
spin_unlock(&res->spinlock);
    wake_up(&res->wq);

+if (recovery_wait) {
+    spin_lock(&res->spinlock);
+/* Unlock request will directly succeed after owner dies,
+ * and the lock is already removed from grant list. We have to
+ * wait for RECOVERING done or we miss the chance to purge it
+ * since the removal is much faster than RECOVERING proc.
+ */
+ __dlm_wait_on_lockres_flags(res, DLM_LOCK_RES_RECOVERING);
+ spin_unlock(&res->spinlock);
+ }
+ /* let the caller's final dlm_lock_put handle the actual kfree */
+ if (actions & DLM_UNLOCK_FREE_LOCK) {
+ /* this should always be coupled with list removal */
--- linux-4.15.0.orig/fs/ocfs2/dlmfs/Makefile
+++ linux-4.15.0/fs/ocfs2/dlmfs/Makefile
@@ -1,4 +1,4 @@
-ccflags-y := -Ifs/ocfs2
+ccflags-y := -I$(src)/..
obj-$(CONFIG_OCFS2_FS) += ocfs2_dlmfs.o

--- linux-4.15.0.orig/fs/ocfs2/dlmglue.c
+++ linux-4.15.0/fs/ocfs2/dlmglue.c
@@ -2486,6 +2486,15 @@
ret = ocfs2_inode_lock_full(inode, ret_bh, ex, OCFS2_LOCK_NONBLOCK);
if (ret == -EAGAIN) {
unlock_page(page);
+/*
+ * If we can't get inode lock immediately, we should not return
+ * directly here, since this will lead to a softlockup problem.
+ * The method is to get a blocking lock and immediately unlock
+ * before returning, this can avoid CPU resource waste due to
+ * lots of retries, and benefits fairness in getting lock.
+ */
+if (ocfs2_inode_lock(inode, ret_bh, ex) == 0)
+ocfs2_inode_unlock(inode, ex);
ret = AOP_TRUNCATED_PAGE;
}
@@ -3413,7 +3422,7 @@
* we can recover correctly from node failure. Otherwise, we may get
* invalid LVB in LKB, but without DLM_SBF_VALNOTVALIDbeing set.
* /
-if (!ocfs2_is_o2cb_active() &&
+if (ocfs2_userspace_stack(osb) &&
 lockres->l_ops->flags & LOCK_TYPE_USES_LVB)
lvb = 1;
@@ -3696,7 +3705,7 @@
oi = OCFS2_I(inode);
oi->ip_dir_lock_gen++;
mlog(0, "generation: %u\n", oi->ip_dir_lock_gen);
-goto out;
+goto out_forget;
}

if (!S_ISREG(inode->i_mode))
@@ -3727,6 +3736,7 @@
    filemap_fdatawait(mapping);
}
+out_forget:
    forget_all_cached_acls(inode);

out:
--- linux-4.15.0.orig/fs/ocfs2/export.c
+++ linux-4.15.0/fs/ocfs2/export.c
@@ -125,10 +125,10 @@
    check_gen:
    if (handle->ih_generation != inode->i_generation) {
        -iput(inode);
+trace_ocfs2_get_dentry_generation((unsigned long long)blkno,
            handle->ih_generation,
            inode->i_generation);
        +iput(inode);
        result = ERR_PTR(-ESTALE);
        goto bail;
    }
@@ -148,16 +148,24 @@
    u64 blkno;
    struct dentry *parent;
    struct inode *dir = d_inode(child);
+    int set;

    trace_ocfs2_get_parent(child, child->d_name.len, child->d_name.name,
        (unsigned long long)OCFS2_I(dir)->ip_blkno);
+status = ocfs2_nfs_sync_lock(OCFS2_SB(dir->i_sb), 1);
+if (status < 0) {
+    mlog(ML_ERROR, "getting nfs sync lock(EX) failed %d\n", status);
+    parent = ERR_PTR(status);
+    goto bail;
+}
+status = ocfs2_inode_lock(dir, NULL, 0);
    if (status < 0) {
        if (status != -ENOENT)
            mlog_errno(status);
parent = ERR_PTR(status);
-goto bail;
+goto unlock_nfs_sync;
}

status = ocfs2_lookup_ino_from_name(dir, ".", 2, &blkno);
@@ -166,11 +174,31 @@
goto bail_unlock;
}

+status = ocfs2_test_inode_bit(OCFS2_SB(dir->i_sb), blkno, &set);
+if (status < 0) {
+if (status == -EINVAL) {
+status = -ESTALE;
+} else
+mlog(ML_ERROR, "test inode bit failed %d\n", status);
+parent = ERR_PTR(status);
+goto bail_unlock;
+}
+
+trace_ocfs2_get_dentry_test_bit(status, set);
+if (!set) {
+status = -ESTALE;
+parent = ERR_PTR(status);
+goto bail_unlock;
+}
+
+parent = d_obtain_alias(ocfs2_iget(OCFS2_SB(dir->i_sb), blkno, 0, 0));

bail_unlock:
ocfs2_inode_unlock(dir, 0);

+unlock_nfs_sync:
+ocfs2_nfs_sync_unlock(OCFS2_SB(dir->i_sb), 1);
+
+bail:
trace_ocfs2_get_parent_end(parent);

--- linux-4.15.0.orig/fs/ocfs2/file.c
+++ linux-4.15.0/fs/ocfs2/file.c
@@ -1250,22 +1250,24 @@
goto bail_unlock;
}
	down_write(&OCFS2_I(inode)->ip_alloc_sem);
handle = ocfs2_start_trans(osb, OCFS2_INODE_UPDATE_CREDITS +
2 * ocfs2_quota_trans_credits(sb));
if (IS_ERR(handle)) {

status = PTR_ERR(handle);
mlog_errno(status);
-goto bail_unlock;
+goto bail_unlock_alloc;
}
status = __dquot_transfer(inode, transfer_to);
if (status < 0)
goto bail_commit;
} else {
+down_write(&OCFS2_I(inode)->ip_alloc_sem);
handle = ocfs2_start_trans(osb, OCFS2_INODE_UPDATE_CREDITS);
if (IS_ERR(handle)) {
status = PTR_ERR(handle);
mlog_errno(status);
-goto bail_unlock;
+goto bail_unlock_alloc;
}
}

@@ -1278,6 +1280,8 @@
bail_commit:
ocfs2_commit_trans(osb, handle);
+bail_unlock_alloc:
+up_write(&OCFS2_I(inode)->ip_alloc_sem);
bail_unlock:
if (status && inode_locked) {
ocfs2_inode_unlock_tracker(inode, 1, &oh, had_lock);
@@ -1531,6 +1535,45 @@
}
}

+/*
 + * zero out partial blocks of one cluster.
 + *
 + * start: file offset where zero starts, will be made upper block aligned.
 + * len: it will be trimmed to the end of current cluster if "start + len"
 + * is bigger than it.
 + */
+static int ocfs2_zeroout_partial_cluster(struct inode *inode,
+u64 start, u64 len)
+{
+int ret;
+u64 start_block, end_block, nr_blocks;
+u64 p_block, offset;
+u32 cluster, p_cluster, nr_clusters;
+struct super_block *sb = inode->i_sb;
+u64 end = ocfs2_align_bytes_to_clusters(sb, start);
if (start + len < end) {
    end = start + len;
}

start_block = ocfs2_blocks_for_bytes(sb, start);
end_block = ocfs2_blocks_for_bytes(sb, end);

nr_blocks = end_block - start_block;
if (!nr_blocks)
    return 0;

cluster = ocfs2_bytes_to_clusters(sb, start);
ret = ocfs2_get_clusters(inode, cluster, &p_cluster,
&nr_clusters, NULL);
if (ret)
    return ret;
if (!p_cluster)
    return 0;

offset = start_block - ocfs2_clusters_to_blocks(sb, cluster);
p_block = ocfs2_clusters_to_blocks(sb, p_cluster) + offset;
return sb_issue_zeroout(sb, p_block, nr_blocks, GFP_NOFS);
}

static int ocfs2_zero_partial_clusters(struct inode *inode, u64 start, u64 len) {
    struct ocfs2_super *osb = OCFS2_SB(inode->i_sb);
    unsigned int csize = osb->s_clustersize;
    handle_t *handle;
    loff_t isize = i_size_read(inode);

    /* The "start" and "end" values are NOT necessarily part of */
    /* @ -1560.6 +1604.26 @@ */
    if ((start & (csize - 1)) == 0 && (end & (csize - 1)) == 0)
        goto out;
    /* No page cache for EOF blocks, issue zero out to disk. */
    if (end > isize) {
        /* zeroout eof blocks in last cluster starting from */
        /* "isize" even "start" > "isize" because it is */
        /* complicated to zeroout just at "start" as "start" */
        /* may be not aligned with block size, buffer write */
        /* would be required to do that, but out of eof buffer */
        /* write is not supported. */
    }
+ret = ocfs2_zeroout_partial_cluster(inode, isize, +end - isize);
+if (ret) {
+mlog_errno(ret);
+goto out;
+}
+if (start >= isize)
+goto out;
+end = isize;
+
+handle = ocfs2_start_trans(osb, OCFS2_INODE_UPDATE_CREDITS);
+if (IS_ERR(handle)) {
+ret = PTR_ERR(handle);
+@ @ -1867,7 +1931,7 @@
+}
+int ret;
+s64 llen;
+-loff_t size;
+-loff_t size, orig_isize;
+struct ocfs2_super *osb = OCFS2_SB(inode->i_sb);
+struct buffer_head *di_bh = NULL;
+handle_t *handle;
+@ @ -1959,6 +2023,15 @@
+default:
+ret = -EINVAL;
+}
+orig_isize = i_size_read(inode);
+/* zeroout eof blocks in the cluster. */
+if (!ret && change_size && orig_isize < size) {
+ret = ocfs2_zeroout_partial_cluster(inode, orig_isize, +size - orig_isize);
+if (!ret)
++i_size_write(inode, size);
+}
+up_write(&OCFS2_I(inode)->ip_alloc_sem);
+if (ret) {
+mlog_errno(ret);
+@ @ -1975,9 +2048,6 @@
+goto out_inode_unlock;
+}
+
-if (change_size && i_size_read(inode) < size)
-i_size_write(inode, size);
-
inode->i_ctime = inode->i_mtime = current_time(inode);
ret = ocfs2_mark_inode_dirty(handle, inode, di_bh);
if (ret < 0)
--- linux-4.15.0.orig/fs/ocfs2/filecheck.c
+++ linux-4.15.0/fs/ocfs2/filecheck.c
@@ -425,11 +425,7 @@
 ret = snprintf(buf + total, remain, "%lu	%u	%s
",
 p->fe_ino, p->fe_done,
 ocfs2_filecheck_error(p->fe_status));
-if (ret < 0) {
- total = ret;
- break;
- }
- if (ret == remain) {
+ if (ret >= remain) {
/* snprintf() didn't fit */
 total = -E2BIG;
 break;
--- linux-4.15.0.orig/fs/ocfs2/ioctl.c
+++ linux-4.15.0/fs/ocfs2/ioctl.c
@@ -290,7 +290,7 @@
 if (inode_alloc)
 inode_lock(inode_alloc);

-if (o2info_coherent(&fi->ifi_req)) {
 +if (inode_alloc && o2info_coherent(&fi->ifi_req)) {
 status = ocfs2_inode_lock(inode_alloc, &bh, 0);
 if (status < 0) {
 mlog_errno(status);
--- linux-4.15.0.orig/fs/ocfs2/journal.c
+++ linux-4.15.0/fs/ocfs2/journal.c
@@ -231,7 +231,8 @@
 /* At this point, we know that no more recovery threads can be
 * launched, so wait for any recovery completion work to
 * complete. */
- flush_workqueue(osb->ocfs2_wq);
+ if (osb->ocfs2_wq)
+ flush_workqueue(osb->ocfs2_wq);

 /*
 * Now that recovery is shut down, and the osb is about to be
@@ -666,23 +667,24 @@
 if (!buffer_uptodate(bh)) {
 mlog(ML_ERROR, "giving me a buffer that's not uptodate\n\n");
 -mlog(ML_ERROR, "b_blocknr=%llu\n",
- (unsigned long long)bh->b_blocknr);
+ (unsigned long long)bh->b_blocknr,
 + (unsigned long long)bh->b_blocknr, bh->b_state);
 lock_buffer(bh);
/*
 * A previous attempt to write this buffer head failed.
 * Nothing we can do but to retry the write and hope for
 * the best.
 + * A previous transaction with a couple of buffer heads fail
 + * to checkpoint, so all the bhs are marked as BH_Write_EIO.
 + * For current transaction, the bh is just among those error
 + * bhs which previous transaction handle. We can't just clear
 + * its BH_Write_EIO and reuse directly, since other bhs are
 + * not written to disk yet and that will cause metadata
 + * inconsistency. So we should set fs read-only to avoid
 + * further damage.
 */
if (buffer_write_io_error(bh) && !buffer_uptodate(bh)) {
    clear_buffer_write_io_error(bh);
    set_buffer_uptodate(bh);
}

- if (!buffer_uptodate(bh)) {
-     unlock_buffer(bh);
-     return -EIO;
+     return ocfs2_error(osb->sb, "A previous attempt to 
+     write this buffer head failed\n");
} unlock_buffer(bh);
}
@@ -895,6 +897,10 @@
    OCFS2_JOURNAL_DIRTY_FL);

    journal->j_journal = j_journal;
+journal->j_journal->j_submit_inode_data_buffers =
+    jbd2_journal_submit_inode_data_buffers;
+journal->j_journal->j_finish_inode_data_buffers =
+    jbd2_journal_finish_inode_data_buffers;
    journal->j_inode = inode;
    journal->j_bh = bh;

@@ -1016,7 +1022,8 @@
    mlog_errno(status);
 }

-if (status == 0) {
 * Shutdown the kernel journal system */
+if (!jbd2_journal_destroy(journal->j_journal) && !status) {
 */
     * Do not toggle if flush was unsuccessful otherwise
     * will leave dirty metadata in a "clean" journal
@@ -1025,9 +1032,6 @@
if (status < 0)
mlog_errno(status);
}
-
-/* Shutdown the kernel journal system */
-jbd2_journal_destroy(journal->j_journal);
journal->j_journal = NULL;

OCFS2_I(inode)->ip_open_count--;
@@ -1080,6 +1084,14 @@
ocfs2_clear_journal_error(osb->sb, journal->j_journal, osb->slot_num);

+if (replayed) {
+jbd2_journal_lock_updates(journal->j_journal);
+status = jbd2_journal_flush(journal->j_journal);
+jbd2_journal_unlock_updates(journal->j_journal);
+if (status < 0)
+mlog_errno(status);
+}
+
+status = ocfs2_journal_toggle_dirty(osb, 1, replayed);
if (status < 0) {
   mlog_errno(status);
@@ -1377,15 +1389,23 @@
   int rm_quota_used = 0, i;
   struct ocfs2_quota_recovery *qrec;

+/* Whether the quota supported. */
+int quota_enabled = OCFS2_HAS_RO_COMPAT_FEATURE(osb->sb,
+     OCFS2_FEATURE_RO_COMPAT_USRQUOTA)
+|| OCFS2_HAS_RO_COMPAT_FEATURE(osb->sb, 
+     OCFS2_FEATURE_RO_COMPAT_GRPQUOTA);
+status = ocfs2_wait_on_mount(osb);
if (status < 0) {
   goto bail;
}

-rm_quota = kzalloc(osb->max_slots * sizeof(int), GFP_NOFS);
-if (!rm_quota) {
-   status = -ENOMEM;
-goto bail;
+if (quota_enabled) {
+   rm_quota = kzalloc(osb->max_slots * sizeof(int), GFP_NOFS);
+   if (!rm_quota) {
+      status = -ENOMEM;
+      goto bail;

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+}  
+} 

restart:
status = ocfs2_super_lock (osb, 1);
@@ -1421,9 +1441,14 @@  
+* then quota usage would be out of sync until some node takes
+* the slot. So we remember which nodes need quota recovery
+* and when everything else is done, we recover quotas. */
+for (i = 0; i < rm_quot.used && rm.quota[i] != slot_num; i++)
+if (i == rm_quot.used)
+rm_quot[rm_quot.used++] = slot_num;
+if (quota_enabled) {
+for (i = 0; i < rm_quot_used
+&& rm_quota[i] != slot_num; i++)
+;
+
+if (i == rm_quot_used)
+rm_quot[rm_quot_used++] = slot_num;
+}

status = ocfs2_recover_node(osb, node_num, slot_num);
skip_recovery:
@@ -1451,16 +1476,19 @@ /* Now it is right time to recover quotas... We have to do this under
+ * superblock lock so that no one can start using the slot (and crash)
+ * before we recover it */
+for (i = 0; i < rm_quot_used; i++) {
+qrec = ocfs2_begin_quota_recovery(osb, rm_quota[i]);
+if (IS_ERR(qrec)) {
+status = PTR_ERR(qrec);
+mlog_errno(status);
+continue;
+
+if (quota_enabled) {
+for (i = 0; i < rm_quota_used; i++) {
+qrec = ocfs2_begin_quota_recovery(osb, rm_quota[i]);
+if (IS_ERR(qrec)) {
+status = PTR_ERR(qrec);
+mlog_errno(status);
+continue;
+
+ocfs2_queue_recovery_completion(osb->journal,
+rm_quota[i],
+NULL, NULL, qrec,
+ORPHAN_NEED_TRUNCATE);
+
+ocfs2_queue_recovery_completion(osb->journal, rm_quota[i],
+NULL, NULL, qrec,
+ORPHAN_NEED_TRUNCATE);
+}

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ocfs2_super_unlock(osb, 1);
@@ -1482,7 +1510,8 @@
  mutex_unlock(&osb->recovery_lock);

- kfree(rm_quota);
+ if (quota_enabled)
+ kfree(rm_quota);

 /* no one is callint kthread_stop() for us so the kthread() api
  * requires that we call do_exit(). And it isn't exported, but
--- linux-4.15.0.orig/fs/ocfs2/journal.h
+++ linux-4.15.0/fs/ocfs2/journal.h
@@ -637,9 +637,11 @@
 {
 struct ocfs2_inode_info *oi = OCFS2_I(inode);

-oi->i_sync_tid = handle->h_transaction->t_tid;
- if (datasync)
-oi->i_datasync_tid = handle->h_transaction->t_tid;
+ if (!is_handle_aborted(handle)) {
+ oi->i_sync_tid = handle->h_transaction->t_tid;
+ if (datasync)
+ oi->i_datasync_tid = handle->h_transaction->t_tid;
+ }

 #endif /* OCFS2_JOURNAL_H */
--- linux-4.15.0.orig/fs/ocfs2/localalloc.c
+++ linux-4.15.0/fs/ocfs2/localalloc.c
@@ -345,13 +345,18 @@
 if (num_used || alloc->id1.bitmap1.i_used || alloc->id1.bitmap1.i_total
 - || la->la_bm_off) {
 - mlog(ML_ERROR, "Local alloc hasn't been recovered!\n"
+ || la->la_bm_off) {
+ mlog(ML_ERROR, "inconsistent detected, clean journal with"
+ " unrecovered local alloc, please run fsck.ocfs2!\n"
+ "found = %u, set = %u, taken = %u, off = %u\n",
       num_used, le32_to_cpu(alloc->id1.bitmap1.i_used),
       le32_to_cpu(alloc->id1.bitmap1.i_total),
       OCFS2_LOCAL_ALLOC(alloc)->la_bm_off);

+ status = -EINVAL;
+ goto bail;
osb->local_alloc_bh = alloc_bh;
osb->local_alloc_state = OCFS2_LA_ENABLED;

struct ocfs2_dinode *alloc = NULL;
cancelDelayedWork(&osb->la_enable_wq);
flushWorkqueue(osb->ocfs2_wq);
if (osb->ocfs2_wq)
    flushWorkqueue(osb->ocfs2_wq);

if (osb->local_alloc_state == OCFS2_LA_UNUSED)
goto out;

#include "ocfs2_ioctl.h"
#include "alloc.h"
#include "localalloc.h"
#include "aops.h"
#include "dlmglue.h"
#include "extent_map.h"

/*
 - * lock allocators, and reserving appropriate number of bits for
 - * meta blocks and data clusters.
 - *
 - * in some cases, we don't need to reserve clusters, just let data_ac
 - * be NULL.
 + * lock allocator, and reserve appropriate number of bits for
 + * meta blocks.
*/
static int ocfs2_lock_allocators_move_extents(struct inode *inode,
    struct ocfs2_extent_tree *et,
    u32 clusters_to_move,
    u32 extents_to_split,
    struct ocfs2_alloc_context **meta_ac,
    struct ocfs2_alloc_context **data_ac,
    int extra_blocks,
    int *credits)
{
goto out;
}

-if (data_ac) {
-ret = ocfs2_reserve_clusters(osb, clusters_to_move, data_ac);
-if (ret) {
-mlog_errno(ret);
-goto out;
-
-
*/
*credits += ocfs2_calc_extend_credits(osb->sb, et->et_root_el);

/* -233,6 +223,7 @@ */
struct ocfs2_refcount_tree *ref_tree = NULL;
u32 new_phys_cpos, new_len;
u64 phys_blkno = ocfs2_clusters_to_blocks(inode->i_sb, phys_cpos);
+int need_free = 0;

if ((ext_flags & OCFS2_EXT_REFCOUNTED) && *len) {
BUG_ON(!ocfs2_is_refcount_inode(inode));
@@ -257,10 +248,10 @@
}
}

-ret = ocfs2_lock_allocators_move_extents(inode, &context->et, *len, 1,
- &context->meta_ac,
- &context->data_ac,
- extra_blocks, &credits);
+ret = ocfs2_lock_meta_allocator_move_extents(inode, &context->et,
+*len, 1,
+&context->meta_ac,
+extra_blocks, &credits);
if (ret) {
 mlog_errno(ret);
 goto out;
@@ -283,6 +274,21 @@
}
}

/*
 * Make sure ocfs2_reserve_cluster is called after
 * __ocfs2_flush_truncate_log, otherwise, dead lock may happen.
 * 
 * If ocfs2_reserve_cluster is called
 * before __ocfs2_flush_truncate_log, dead lock on global bitmap
 * may happen.
 */
+ ret = ocfs2_reserve_clusters(osb, *len, &context->data_ac);
+ if (ret) {
+ mlog_errno(ret);
+ goto out_unlock_mutex;
+ }
+
+ handle = ocfs2_start_trans(osb, credits);
+ if (IS_ERR(handle)) {
+ ret = PTR_ERR(handle);
+ @ @ -308,6 +314,7 @ @
+ if (!partial) {
+ context->range->me_flags &= ~OCFS2_MOVE_EXT_FL_COMPLETE;
+ ret = -ENOSPC;
+ need_free = 1;
+ goto out_commit;
+ }
+
+ mlog_errno(ret);
+ out_commit:
+ if (need_free && context->data_ac) {
+ struct ocfs2_alloc_context *data_ac = context->data_ac;
+ +
+ if (context->data_ac->ac_which == OCFS2_AC_USE_LOCAL)
+ +ocfs2_free_local_alloc_bits(osb, handle, data_ac,
+ +new_phys_cpos, new_len);
+ +else
+ +ocfs2_free_clusters(handle,
+ +data_ac->ac_inode,
+ +data_ac->ac_bh,
+ +ocfs2_clusters_to_blocks(osb->sb, new_phys_cpos),
+ +new_len);
+ +}
+ +
+ ocfs2_commit_trans(osb, handle);
+
+ out_unlock_mutex:
+ @ @ -600,9 +621,10 @ @
+ }
+ }
+
- ret = ocfs2_lock_allocators_move_extents(inode, &context->et, len, 1,
- &context->meta_ac,
- NULL, extra_blocks, &credits);
+ ret = ocfs2_lock_meta_allocator_move_extents(inode, &context->et,
+ len, 1,
if (ret) {
    mlog_errno(ret);
    goto out;
}

--- linux-4.15.0.orig/fs/ocfs2/ocfs2.h
+++ linux-4.15.0/fs/ocfs2/ocfs2.h
@@ -336,8 +336,8 @@
 spinlock_t osb_lock;
 u32 s_next_generation;
 unsigned long osb_flags;
-s16 s_inode_steal_slot;
-s16 s_meta_steal_slot;
+u16 s_inode_steal_slot;
+u16 s_meta_steal_slot;
 atomic_t s_num_inodes_stolen;
 atomic_t s_num_meta_stolen;

--- linux-4.15.0.orig/fs/ocfs2/ocfs2_fs.h
+++ linux-4.15.0/fs/ocfs2/ocfs2_fs.h
@@ -303,7 +303,7 @@
 #define OCFS2_MAX_SLOTS255

 /* Slot map indicator for an empty slot */
-#define OCFS2_INVALID_SLOT -(u16)1
+#define OCFS2_INVALID_SLOT ((u16)-1)

 #define OCFS2_VOL_UUID_LEN 16
 #define OCFS2_MAX_VOL_LABEL_LEN 64
 enum {
 BAD_BLOCK_SYSTEM_INODE = 0,
 GLOBAL_INODE_ALLOC_SYSTEM_INODE,
+#define OCFS2_FIRST_ONLINE_SYSTEM_INODE GLOBAL_INODE_ALLOC_SYSTEM_INODE
 SLOT_MAP_SYSTEM_INODE,
-#define OCFS2_FIRST_ONLINE_SYSTEM_INODE SLOT_MAP_SYSTEM_INODE
 HEARTBEAT_SYSTEM_INODE,
 GLOBAL_BITMAP_SYSTEM_INODE,
 USER_QUOTA_SYSTEM_INODE,
--- linux-4.15.0.orig/fs/ocfs2quota_global.c
+++ linux-4.15.0/fs/ocfs2quota_global.c
@@ -727,7 +727,7 @@
 mutex_lock(&dquot->dq_lock);
 /* Check whether we are not racing with some other dqget() */
-if (atomic_read(&dquot->dq_count) > 1)
+if (dquot_is_busy(dquot))
    goto out;
if (current == osb->dc_task) {
--- linux-4.15.0.orig/fs/ocfs2/refcounttree.c
+++ linux-4.15.0/fs/ocfs2/refcounttree.c
@@ -2946,6 +2946,7 @@
 if (map_end & (PAGE_SIZE - 1))
to = map_end & (PAGE_SIZE - 1);

+retry:
+page = find_or_create_page(mapping, page_index, GFP_NOFS);
+if (!page) {
+ret = -ENOMEM;
@@ -2954,11 +2955,18 @@
 }/*
 */
- * In case PAGE_SIZE <= CLUSTER_SIZE, This page
- * can't be dirtied before we CoW it out.
+ * In case PAGE_SIZE <= CLUSTER_SIZE, we do not expect a dirty
+ * page, so write it back.
+ */
-if (PAGE_SIZE <= OCFS2_SB(sb)->s_clustersize)
-BUG_ON(PageDirty(page));
+if (PAGE_SIZE <= OCFS2_SB(sb)->s_clustersize) {
+if (PageDirty(page)) {
+ /*
+ * write_on_page will unlock the page on return
+ */
+ret = write_one_page(page);
+goto retry;
+}
+}
+
if (!PageUptodate(page)) {
ret = block_read_full_page(page, ocfs2_get_block);
@@ -4250,10 +4258,11 @@
static int ocfs2_reflink(struct dentry *old_dentry, struct inode *dir,
 struct dentry *new_dentry, bool preserve)
 {
- int error;
- if (error, had_lock;
+ int error, had_lock;
 struct inode *inode = d_inode(old_dentry);
 struct buffer_head *old_bh = NULL;
 struct inode *new_orphan_inode = NULL;
+struct ocfs2_lock_holder oh;

 if (!ocfs2_refcount_tree(OCFS2_SB(inode->i_sb)))
 return -EOPNOTSUPP;
goto out;
}

+had_lock = ocfs2_inode_lock_tracker(new_orphan_inode, NULL, 1,
+    &oh);
+if (had_lock < 0) {
+    error = had_lock;
+    mlog_errno(error);
+    goto out;
+}
+
/* If the security isn't preserved, we need to re-initialize them. */
if (!preserve) {
    error = ocfs2_init_security_and_acl(dir, new_orphan_inode,
        &oh,
    if (error)
        mlog_errno(error);
}
-out:
if (!error) {
    error = ocfs2_mv_orphaned_inode_to_new(dir, new_orphan_inode,
        new_dentry);
    if (error)
        mlog_errno(error);
}
+ocfs2_inode_unlock_tracker(new_orphan_inode, 1, &oh, had_lock);
+
+out:
if (new_orphan_inode) {
/*
 * We need to open_unlock the inode no matter whether we
 @@ -4698,22 +4716,23 @@
 /*
 */
 static int ocfs2_relink_inodes_lock(struct inode *s_inode,
-    struct buffer_head **bh1,
+    struct buffer_head **bh_s,
    struct inode *t_inode,
-    struct buffer_head **bh2)
+    struct buffer_head **bh_t)
{
    struct inode *inode1;
    struct inode *inode2;
    struct ocfs2_inode_info *oi1;
    struct ocfs2_inode_info *oi2;

    /* Lock an inode and grab a bh pointing to the inode. */
    struct buffer_head **bh1,
    struct buffer_head **bh_s,
    struct inode *t_inode,
    struct buffer_head **bh2)
    struct buffer_head **bh_t)
{/
struct buffer_head *bh1 = NULL;
struct buffer_head *bh2 = NULL;
bool same_inode = (s_inode == t_inode);
bool need_swap = (inode1->i_ino > inode2->i_ino);
int status;

// First grab the VFS and rw locks. */
lock_two_nondirectories(s_inode, t_inode);
inode1 = s_inode;
inode2 = t_inode;
if (inode1->i_ino > inode2->i_ino)
  if (need_swap)
    swap(inode1, inode2);

status = ocfs2_rwlock(inode1, 1);
trace_ocfs2_double_lock((unsigned long long)oi1->ip_blkno,
(unsigned long long)oi2->ip_blkno);

  if (*bh1)
    *bh1 = NULL;
  if (*bh2)
    *bh2 = NULL;
-
/* We always want to lock the one with the lower lockid first. */
if (oi1->ip_blkno > oi2->ip_blkno)
  mlog_errno(-ENOLCK);

/* lock id1 */
  status = ocfs2_inode_lock_nested(inode1, bh1, 1, OI_LS_REFLINK_TARGET);
  +status = ocfs2_inode_lock_nested(inode1, &bh1, 1,
    +OI_LS_REFLINK_TARGET);
if (status < 0) {
  if (status != -ENOENT)
    mlog_errno(status);
  goto out_cl1;
}
-
/* lock id2 */
if (!same_inode) {
  status = ocfs2_inode_lock_nested(inode2, bh2, 1,
    +status = ocfs2_inode_lock_nested(inode2, &bh2, 1,
      OI_LS_REFLINK_TARGET);
  if (status < 0) {
    if (status != -ENOENT)
      mlog_errno(status);
    goto out_c11;
  }
else
/* If we swapped inode order above, we have to swap the buffer heads
before passing them back to the caller. */

if (need_swap)
swap(bh1, bh2);
*bh_s = bh1;
*bh_t = bh2;

trace_ocfs2_double_lock_end(
(unsigned long long)OCFS2_I(inode1)->ip_blkno,
@@ -4773,8 +4798,7 @@

out_cl1:
ocfs2_inode_unlock(inode1, 1);
brelse(*bh1);
-*bh1 = NULL;
brelse(bh1);
out_rw2:
ocfs2_rwlock_unlock(inode2, 1);
out_i2:
--- linux-4.15.0.orig/fs/ocfs2/stackglue.c
+++ linux-4.15.0/fs/ocfs2/stackglue.c
@@ -48,12 +48,6 @@
*/
static struct ocfs2_stack_plugin *active_stack;

-inline int ocfs2_is_o2cb_active(void)
-{
- return !strcmp(active_stack->sp_name, OCFS2_STACK_PLUGIN_O2CB);
-}
-EXPORT_SYMBOL_GPL(ocfs2_is_o2cb_active);
-
static struct ocfs2_stack_plugin *ocfs2_stack_lookup(const char *name)
{
 struct ocfs2_stack_plugin *p;
 @@ -516,11 +510,7 @@
 list_for_each_entry(p, &ocfs2_stack_list, sp_list) {
 ret = snprintf(buf, remain, "%s\n",
 p->sp_name);
- if (ret < 0) {
- total = ret;
- break;
- }
-} 
- if (ret == remain) { 
  +if (ret >= remain) { 
    /* snprintf() didn't fit */
    total = -E2BIG;
    break;
  } 
@@ -547,7 +537,7 @@
  - if (active_stack) {
    ret = snprintf(buf, PAGE_SIZE, "%s\n",
                  active_stack->sp_name);
  - if (ret == PAGE_SIZE)
    +if (ret >= PAGE_SIZE)
    ret = -E2BIG;
  } 
  spin_unlock(&ocfs2_stack_lock);
--- linux-4.15.0.orig/fs/ocfs2/stackglue.h
+++ linux-4.15.0/fs/ocfs2/stackglue.h
@@ -298,9 +298,6 @@
  int ocfs2_stack_glue_register(struct ocfs2_stack_plugin *plugin);
  void ocfs2_stack_glue_unregister(struct ocfs2_stack_plugin *plugin);

  /* In ocfs2_downconvert_lock(), we need to know which stack we are using */
-#int ocfs2_is_o2cb_active(void);
-extern struct kset *ocfs2_kset;

  #endif /* STACKGLUE_H */
--- linux-4.15.0.orig/fs/ocfs2/suballoc.c
+++ linux-4.15.0/fs/ocfs2/suballoc.c
@@ -895,9 +895,9 @@
  { 
    spin_lock(&osb->osb_lock);
    if (type == INODE_ALLOC_SYSTEM_INODE)
-      osb->s_inode_steal_slot = slot;
-    else if (type == EXTENT_ALLOC_SYSTEM_INODE)
+      osb->s_inode_steal_slot = (u16)slot;
        osb->s_meta_steal_slot = (u16)slot;
    else if (type == EXTENT_ALLOC_SYSTEM_INODE)
      osb->s_meta_steal_slot = slot;
      osb->s_meta_steal_slot = (u16)slot;
      spin_unlock(&osb->osb_lock);
    } 
@@ -2888,9 +2888,12 @@
    goto bail;
  }

  -inode_alloc_inode =
  -ocfs2_get_system_file_inode(osb, INODE_ALLOC_SYSTEM_INODE,
    - suballoc_slot);
if (suballoc_slot == (u16)OCFS2_INVALID_SLOT)
	inode_alloc_inode = ocfs2_get_system_file_inode(osb,
	GLOBAL_INODE_ALLOC_SYSTEM_INODE, suballoc_slot);
else
	inode_alloc_inode = ocfs2_get_system_file_inode(osb,
+GLOBAL_INODE_ALLOC_SYSTEM_INODE, suballoc_slot);
if (!inode_alloc_inode) {
/* the error code could be inaccurate, but we are not able to */
* get the correct one. */
unsigned long commit_interval;
unsigned long mount_opt;
unsigned int atime_quantum;
-signed short slot;
+unsigned short slot;
 int localalloc_opt;
 unsigned intresv_level;
 intdir_resv_level;
 @@ -92,7 +92,7 @@
 unsigned long	commit_interval;
 unsigned long	mount_opt;
 unsigned int	atime_quantum;
@@ -474,9 +474,8 @@
 new = ocfs2_get_system_file_inode(osb, i, osb->slot_num);
 if (!new) {
 ocfs2_release_system_inodes(osb);
@@ -1370,7 +1369,7 @@
 goto bail;
@@ -505,7 +504,7 @@
 new = ocfs2_get_system_file_inode(osb, i, osb->slot_num);
 if (!new) {
 ocfs2_release_system_inodes(osb);
@@ -176,7 +175,7 @@
 goto bail;
@@ -1370,7 +1369,7 @@
 goto bail;
 }
 if (option)
-mopt->slot = (s16)option;
+mopt->slot = (u16)option;
 break;
 case Opt_commit:
if (match_int(&args[0], &option)) {
    @ @ -1734,6 +1733,7 @@
    oi->ip_blkno = 0ULL;
    oi->ip_clusters = 0;
    +oi->ip_next_orphan = NULL;
    ocs2_resv_init_once(&oi->ip_la_data_resv);
    @ @ -2188,11 +2188,17 @@
}

if (ocfs2_clusterinfo_valid(osb)) {
    /**<
     * ci_stack and ci_cluster in ocfs2_cluster_info may not be null
     * terminated, so make sure no overflow happens here by using
     * memcpy. Destination strings will always be null terminated
     * because osb is allocated using kzalloc.
     */
    osb->osb_stackflags =
    OCFS2_RAW_SB(di)->s_cluster_info.ci_stackflags;
    -strlcpy(osb->osb_cluster_stack,
        +memcpy(osb->osb_cluster_stack,
            OCFS2_RAW_SB(di)->s_cluster_info.ci_stack,
            -OCFS2_STACK_LABEL_LEN + 1);
            +OCFS2_STACK_LABEL_LEN);
    if (strlen(osb->osb_cluster_stack) != OCFS2_STACK_LABEL_LEN) {
        mlog(ML_ERROR,
            "couldn't mount because of an invalid ")
        @ @ -2201,9 +2207,9 @@
        status = -EINVAL;
        goto bail;
    }
    -strlcpy(osb->osb_cluster_name,
        +memcpy(osb->osb_cluster_name,
            OCFS2_RAW_SB(di)->s_cluster_info.ci_cluster,
            -OCFS2_CLUSTER_NAME_LEN + 1);
            +OCFS2_CLUSTER_NAME_LEN);
} else {
    /* The empty string is identical with classic tools that
       * don't know about s_cluster_info. */
    --- linux-4.15.0.orig/fs/ocfs2/xattr.c
    +++ linux-4.15.0/fs/ocfs2/xattr.c
    @ @ -638,9 +638,11 @@
    si->value_len);

    if (osb->s_mount_opt & OCFS2_MOUNT_POSIX_ACL) {
        down_read(&OCFS2_I(dir)->ip_xattr_sem);
acl_len = ocfs2_xattr_get_nolock(dir, dir_bh, OCFS2_XATTR_INDEX_POSIX_ACL_DEFAULT, "", NULL, 0);
+up_read(&OCFS2_I(dir)->ip_xattr_sem);
if (acl_len > 0) {
    a_size = ocfs2_xattr_entry_real_size(0, acl_len);
    if (S_ISDIR(mode))
        @@ -3830,7 +3832,6 @@
            u16 blk_per_bucket = ocfs2_blocks_per_xattr_bucket(inode->i_sb);
            int low_bucket = 0, bucket, high_bucket;
            struct ocfs2_xattr_bucket *search;
-    u32 last_hash;
    u64 blkno, lower_blkno = 0;

    search = ocfs2_xattr_bucket_new(inode);
    @@ -3874,8 +3875,6 @@
        if (xh->xh_count)
            xe = &xh->xh_entries[le16_to_cpu(xh->xh_count) - 1];

            -last_hash = le32_to_cpu(xe->xe_name_hash);
-    /* record lower_blkno which may be the insert place. */
-    lower_blkno = blkno;

    --- linux-4.15.0.orig/fs/open.c
    +++ linux-4.15.0/fs/open.c
    @@ -34,6 +34,9 @@

    #include "internal.h"

    +#define CREATE_TRACE_POINTS
    +#include <trace/events/fs.h>
    +
    int do_truncate(struct dentry *dentry, loff_t length, unsigned int time_attrs,
                    struct file *filp)
    {
        @@ -64,6 +67,7 @@
            inode_unlock(dentry->d_inode);
            return ret;
    }
    +#EXPORT_SYMBOL_GPL(do_truncate);

    long vfs_truncate(const struct path *path, loff_t length)
    {
        @@ -379,6 +383,25 @@
            override_cred->cap_permitted;
    }
The new set of credentials can *only* be used in task-synchronous circumstances, and does not need RCU freeing, unless somebody then takes a separate reference to it.

NOTE! This is _only_ true because this credential is used purely for override_creds() that installs it as the subjective cred. Other threads will be accessing ->real_cred, not the subjective cred.

If somebody _does_ make a copy of this (using the 'get_current_cred()' function), that will clear the non_rcu field, because now that other user may be expecting RCU freeing. But normal thread-synchronous cred accesses will keep things non-RCU.

override_cred->non_rcu = 1;

old_cred = override_creds(override_cred);
retry:
res = user_path_at(dfd, filename, lookup_flags, &path);
@@ -691,6 +714,7 @@
}
return 0;
}
+EXPORT_SYMBOL_GPL(open_check_o_direct);

static int do_dentry_open(struct file *f,
    struct inode *inode,
@@ -716,6 +740,12 @@
    return 0;
}

/* Any file opened for execve()/uselib() has to be a regular file. */
+if (unlikely(f->f_flags & FMODE_EXEC && !S_ISREG(inode->i_mode))) {
+    error = -EACCES;
+    goto cleanup_file;
+}
+
if (f->f_mode & FMODE_WRITE && !special_file(inode->i_mode)) {
    error = get_write_access(inode);
    if (unlikely(error))
        @@ -799,9 +829,6 @@
    * on it after finish_open().
    *
    - * On successful return @file is a fully instantiated open file. After this, if
int finish_open(struct file *file, struct dentry *dentry, @ @ -1063,6 +1090,7 @@ } else { fsnotify_open(f); fd_install(fd, f); +trace_do_sys_open(tmp->name, flags, mode); } } putname(tmp); @@ -1206,3 +1234,21 @@
EXPORT_SYMBOL(nonseekable_open);
+
+/*
+ * stream_open is used by subsystems that want stream-like file descriptors.
+ * Such file descriptors are not seekable and don't have notion of position
+ * (file.f_pos is always 0). Contrary to file descriptors of other regular
+ * files, .read() and .write() can run simultaneously.
+ *
+ * stream_open never fails and is marked to return int so that it could be
+ * directly used as file_operations.open.
+ */
+int stream_open(struct inode *inode, struct file *filp)
+{
+filp->f_mode &= ~(FMODE_LSEEK | FMODE_PREAD | FMODE_PWRITE | FMODE_ATOMIC_POS);
+filp->f_mode |= FMODE_STREAM;
+return 0;
+}
+
+EXPORT_SYMBOL(stream_open);
--- linux-4.15.0.orig/fs/orangefs/inode.c
+++ linux-4.15.0/fs/orangefs/inode.c
@@ -269,6 +269,13 @@
else
    stat->result_mask = STATX_BASIC_STATS & ~STATX_SIZE;
    +stat->attributes_mask = STATX_ATTR_IMMUTABLE |
+    STATX_ATTR_APPEND;
+if (inode->i_flags & S_IMMUTABLE)
+    stat->attributes |= STATX_ATTR_IMMUTABLE;
+if (inode->i_flags & S_APPEND)
+    stat->attributes |= STATX_ATTR_APPEND;
return ret;
}

--- linux-4.15.0.orig/fs/orangefs/namei.c
+++ linux-4.15.0/fs/orangefs/namei.c
@@ -75,8 +75,7 @@
d_instantiate(dentry, inode);
	d_instantiate_new(dentry, inode);
 orangefs_set_timeout(dentry);
 ORANGEFS_I(inode)->getattr_time = jiffies - 1;
 ORANGEFS_I(inode)->getattr_mask = STATX_BASIC_STATS;
@@ -327,13 +326,19 @@
 ret = PTR_ERR(inode);
 goto out;
}
+/*
+ * This is necessary because orangefs_inode_getattr will not
+ * re-read symlink size as it is impossible for it to change.
+ * Invalidating the cache does not help. orangefs_new_inode
+ * does not set the correct size (it does not know symname).
+ */
+inode->i_size = strlen(symname);

gossip_debug(GOSSIP_NAME_DEBUG,
        "Assigned symlink inode new number of %pU\n",
        get_khandle_from_ino(inode));

-d_instantiate(dentry, inode);
-unlock_new_inode(inode);
+d_instantiate_new(dentry, inode);
 orangefs_set_timeout(dentry);
 ORANGEFS_I(inode)->getattr_time = jiffies - 1;
 ORANGEFS_I(inode)->getattr_mask = STATX_BASIC_STATS;
@@ -402,8 +407,7 @@
        "Assigned dir inode new number of %pU\n",
        get_khandle_from_ino(inode));

-d_instantiate(dentry, inode);
-unlock_new_inode(inode);
+d_instantiate_new(dentry, inode);
 orangefs_set_timeout(dentry);
 ORANGEFS_I(inode)->getattr_time = jiffies - 1;
 ORANGEFS_I(inode)->getattr_mask = STATX_BASIC_STATS;
--- linux-4.15.0.orig/fs/orangefs/orangefs-debugfs.c
static void *help_next(struct seq_file *m, void *v, loff_t *pos)
{
  (*pos)++;
gossip_debug(GOSSIP_DEBUGFS_DEBUG, "help_next: start\n");

  return NULL;
}

/* Can't do a service_operation if the client is not running... */
rc = is_daemon_in_service();
if (rc) {
  -pr_info("%s: Client not running :%d:\n",
  +pr_info_ratelimited("%s: Client not running :%d:\n",
__func__,
  is_daemon_in_service());
  goto out;
}

out_op_release:
op_release(new_op);
@@ -579,6 +579,11 @@
/* provided sb cleanup */
kill_anon_super(sb);

+if (!ORANGEFS_SB(sb)) {
+  +mutex_lock(&orangefs_request_mutex);
+  +mutex_unlock(&orangefs_request_mutex);
+  +return;
+} }
/*
 * issue the unmount to userspace to tell it to remove the
 * dynamic mount info it has for this superblock
--- linux-4.15.0.orig/fs/overlayfs/copy_up.c
+++ linux-4.15.0/fs/overlayfs/copy_up.c
@@ -58,7 +58,7 @@
 { 
 ssize_t list_size, size, value_size = 0;
char *buf, *name, *value = NULL;
-int uninitialized_var(error);
+int error = 0;
size_t slen;

if (!(old->d_inode->i_opflags & IOP_XATTR) ||
@@ -94,6 +94,14 @@

if (ovl_is_private_xattr(name))
continue;
+
+error = security_inode_copy_up_xattr(name);
+if (error < 0 && error != -EOPNOTSUPP)
+break;
+if (error == 1) {
+error = 0;
+continue; /* Discard */
+
retry:
size = vfs_getxattr(old, name, value, value_size);
if (size == -ERANGE)
@@ -117,13 +125,6 @@
goto retry;
}

-error = security_inode_copy_up_xattr(name);
-if (error < 0 && error != -EOPNOTSUPP)
-break;
-if (error == 1) {
-error = 0;
-continue; /* Discard */
-
error = vfs_setxattr(new, name, value, size, 0);
if (error)
break;
@@ -156,7 +157,7 @@
}

/* Try to use clone_file_range to clone up within the same fs */
-error = vfs_clone_file_range(old_file, 0, new_file, 0, len);
+error = do_clone_file_range(old_file, 0, new_file, 0, len);
if (!error)
goto out;
/* Couldn't clone, so now we try to copy the data */
@@ -211,10 +212,19 @@
{
int err = 0;


/*
 * For the most part we want to set the mode bits before setting
 * the user, otherwise the current context might lack permission
 * for setting the mode. However for sxid/sticky bits we want
 * the operation to fail if the current user isn't privileged
 * towards the resulting inode. So we first set the mode but
 * exclude the sxid/sticky bits, then set the user, then set the
 * mode again if any of the sxid/sticky bits are set.
 */
if (!S_ISLNK(stat->mode)) {
    struct iattr attr = {
        .ia_valid = ATTR_MODE,
        .ia_mode = stat->mode,
        .ia_mode = stat->mode & ~(S_ISUID|S_ISGID|S_ISVTX),
    };
    err = notify_change(upperdentry, &attr, NULL);
    @ @ -226,6 +236,14 @@
};
err = notify_change(upperdentry, &attr, NULL);
}
if (!err)
ovl_set_timestamps(upperdentry, stat);

--- linux-4.15.0.orig/fs/overlayfs/dir.c
+++ linux-4.15.0/fs/overlayfs/dir.c
@@ -396,6 +396,10 @@
if (IS_ERR(upper))
goto out_dput2;
+
+ err = -ESTALE;
+if (d_is_negative(upper) || !IS_WHITEOUT(d_inode(upper)))
+ goto out_dput2;
+
+ err = ovl_create_real(wdir, newdentry, cattr, hardlink, true);
if (err)
goto out_dput2;
@@ -599,6 +603,11 @@
if (err)
goto out_drop_write;
err = ovl_copy_up(new->d_parent);
+if (err)
+goto out_drop_write;
+
+err = ovl_nlink_start(old, &locked);
if (err)
  goto out_drop_write;
@@ -846,8 +855,8 @@

buflen -= thislen;
memcpy(&buf[buflen], name, thislen);
-tmp = dget_dlock(d->d_parent);
spin_unlock(&d->d_lock);
+tmp = dget_parent(d);

dput(d);

d = tmp;
@@ -1030,9 +1039,13 @@
}
} else {
-  if (!d_is_negative(newdentry) &&
-       (new_opaque || !ovl_is_whiteout(newdentry)))
-    goto out_dput;
+  if (!d_is_negative(newdentry)) {
+    if (!new_opaque || !ovl_is_whiteout(newdentry))
+      goto out_dput;
+  } else {
+    if (flags & RENAME_EXCHANGE)
+      goto out_dput;
+  }
}

if (olddentry == trap)
@@ -1040,7 +1053,7 @@
    if (newdentry == trap)
    goto out_dput;

-  if (WARN_ON(olddentry->d_inode == newdentry->d_inode))
+  if (olddentry->d_inode == newdentry->d_inode)
    goto out_dput;

    if (olddentry == trap)
@@ -1047,7 +1059,7 @@
    goto out_dput;

-  if (WARN_ON(olddentry->d_inode == newdentry->d_inode))
+  if (olddentry->d_inode == newdentry->d_inode)
    goto out_dput;

    err = 0;
--- linux-4.15.0.orig/fs/overlayfs/inode.c
+++ linux-4.15.0/fs/overlayfs/inode.c
@@ -110,13 +110,10 @@
that the upper hardlink is not broken.
*/
if (is_dir || lowerstat.nlink == 1 ||
    ovl_test_flag(OVL_INDEX, d_inode(dentry))
+    ovl_test_flag(OVL_INDEX, d_inode(dentry))) {
    stat->ino = lowerstat.ino;
    -if (samefs)
      WARN_ON_ONCE(stat->dev != lowerstat.dev);
    -else
      stat->dev = ovl_get_pseudo_dev(dentry);
    +}
}
if (samefs) {
  /*
@@ -239,7 +236,9 @@
goto out;
if (!value && !upperdentry) {
+old_cred = ovl_override_creds(dentry->d_sb);
err = vfs_getxattr(realdentry, name, NULL, 0);
+revert_creds(old_cred);
if (err < 0)
  goto out_drop_write;
}
@@ -288,7 +287,8 @@
return true;
/* Never list trusted.overlay, list other trusted for superuser only */
-ovl_is_private_xattr(s) && capable(CAP_SYS_ADMIN);
+ovl_is_private_xattr(s) &&
+ns_capable_noaudit(&init_user_ns, CAP_SYS_ADMIN);
}

ssize_t ovl_listxattr(struct dentry *dentry, char *list, size_t size)
@@ -606,6 +606,16 @@
static bool ovl_verify_inode(struct inode *inode, struct dentry *lowerdentry,
    struct dentry *upperdentry)
{
    +if (S_ISDIR(inode->i_mode)) {
    /* Real lower dir moved to upper layer under us? */
    +if (!lowerdentry && ovl_inode_lower(inode))
      return false;
    +
    */ Lookup of an uncovered redirect origin? */
    +if (!upperdentry && ovl_inode_upper(inode))
      return false;
+}
* Allow non-NULL lower inode in ovl_inode even if lowerdentry is NULL.
* This happens when finding a copied up overlay inode for a renamed
@@ -625,33 +635,63 @@
return true;
}
+/
+ * Does overlay inode need to be hashed by lower inode?
+ */
+static bool ovl_hash_bylower(struct super_block *sb, struct dentry *upper,
+ struct dentry *lower, struct dentry *index)
+{
+struct ovl_fs *ofs = sb->s_fs_info;
+
+/* No, if pure upper */
+if (!lower)
+return false;
+
+/* Yes, if already indexed */
+if (index)
+return true;
+
+/* Yes, if won't be copied up */
+if (!ofs->upper_mnt)
+return true;
+
+/* No, if lower hardlink is or will be broken on copy up */
+if ((upper || !ovl_indexdir(sb)) &&
+ !d_is_dir(lower) && d_inode(lower)->i_nlink > 1)
+return false;
+
+/* No, if non-indexed upper with NFS export */
+if (sb->s_export_op && upper)
+return false;
+
+/* Otherwise, hash by lower inode for fsnotify */
+return true;
+}
+
struct inode *ovl_get_inode(struct dentry *dentry, struct dentry *upperdentry,
 struct dentry *index)
{
+struct super_block *sb = dentry->d_sb;
struct dentry *lowerdentry = ovl_dentry_lower(dentry);
struct inode *realinode = upperdentry ? d_inode(upperdentry) : NULL;
struct inode *inode;
/* Already indexed or could be indexed on copy up */
bool indexed = (index || (ovl_indexdir(dentry->d_sb) && !upperdentry));

if (WARN_ON(upperdentry && indexed && !lowerdentry))
    return ERR_PTR(-EIO);

bool bylower = ovl_hash_bylower(sb, upperdentry, lowerdentry, index);
bool is_dir;

if (!realinode)
realinode = d_inode(lowerdentry);

/*
* Copy up origin (lower) may exist for non-indexed upper, but we must
- * not use lower as hash key in that case.
- * Hash inodes that are or could be indexed by origin inode and
- * non-indexed upper inodes that could be hard linked by upper inode.
+ * not use lower as hash key if this is a broken hardlink.
*/

-!t ($IS_DIR(realinode->i_mode) && (upperdentry || indexed)) {
  struct inode *key = d_inode(indexed ? lowerdentry :
      is_dir = S_ISDIR(realinode->i_mode);
  if (upperdentry || bylower) {
    struct inode *key = d_inode(bylower ? lowerdentry :
       upperdentry);
  }
  unsigned int nlink;
  unsigned int nlink = is_dir ? 1 : realinode->i_nlink;

  inode = iget5_locked(dentry->d_sb, (unsigned long) key,
    ovl_inode_test, ovl_inode_set, key);
  if (!inode)
    goto out_nomem;
}

-!nlink = ovl_get_nlink(lowerdentry, upperdentry,
   realinode->i_nlink);
+/* Recalculate nlink for non-dir due to indexing */
+if (!is_dir)
+    nlink = ovl_get_nlink(lowerdentry, upperdentry, nlink);
+set_nlink(inode, nlink);

} else {

inode = new_inode(dentry->d_sb);
+/* Lower hardlink that will be broken on copy up */
+inode = new_inode(sb);
if (!inode)
    goto out_nomem;
ovl_set_flag(OVL_IMPURE, inode);

/* Check for non-merge dir that may have whiteouts */
-if (S_ISDIR(realinode->i_mode)) {
  +if (is_dir) {
    struct ovl_entry *oe = dentry->d_fsdata;

    if (((upperdentry && lowerdentry) || oe->numlower > 1) ||
--- linux-4.15.0.orig/fs/overlayfs/namei.c
+++ linux-4.15.0/fs/overlayfs/namei.c
@@ -55,6 +55,15 @@
      if (s == next)
      goto invalid;
   }
+/*
+ * One of the ancestor path elements in an absolute path
+ * lookup in ovl_lookup_layer() could have been opaque and
+ * that will stop further lookup in lower layers (d->stop=true)
+ * But we have found an absolute redirect in decendant path
+ * element and that should force continue lookup in lower
+ * layers (reset d->stop).
+ */
+d->stop = false;
   } else {
     if (strchr(buf, '/') != NULL)
     goto invalid;
@@ -357,8 +366,10 @@
       fh = ovl_encode_fh(origin, is_upper);
       err = PTR_ERR(fh);
-      if (IS_ERR(fh))
+      if (IS_ERR(fh)) {
          fh = NULL;
         goto fail;
   }
+}

   err = ovl_verify_origin_fh(dentry, fh);
   if (set && err == -ENODATA)
@@ -508,7 +519,7 @@
       index = NULL;
       goto out;
 }
-  +pr_warn_ratelimited("overlayfs: failed inode index lookup (ino=%lu, key=%*s, err=%i);\n"
   +pr_warn_ratelimited("overlayfs: failed inode index lookup (ino=%lu, key=%s, err=%i);\n"
     "overlayfs: mount with '-o index=off' to disable inodes index.\n",
     d_inode(origin)->i_ino, name.len, name.name,
err);
@@ -678,9 +689,6 @@
    stack[ctr].layer = lower.layer;
    ctr++;

    -if (d.stop)
-    -break;
-    -/
/*
 * Following redirects can have security consequences: it's like
 * a symlink into the lower layer without the permission checks.
@@ -697,6 +705,9 @@
 goto out_put;
 }

+if (d.stop)
+    +break;
+    +
+    if (d.redirect && d.redirect[0] == '/' && poe != roe) {
+        poe = roe;

 --- linux-4.15.0.orig/fs/overlayfs/overlayfs.h
+++ linux-4.15.0/fs/overlayfs/overlayfs.h
@@ -139,15 +139,27 @@
 static inline int ovl_do_setxattr(struct dentry *dentry, const char *name,
     const void *value, size_t size, int flags)
 {
     -int err = vfs_setxattr(dentry, name, value, size, flags);
     -pr_debug("setxattr(%pd2, "%s", "%*s", 0x%x) = %i\n",
     -    dentry, name, (int) size, (char *) value, flags, err);
     +struct inode *inode = dentry->d_inode;
     +int err;
     +
     +inode_lock(inode);
     +err = __vfs_setxattr_noperm(dentry, name, value, size, flags);
     +inode_unlock(inode);
     +
     +pr_debug("setxattr(%pd2, "%s", "%*pE\n", %zu, 0x%x) = %i\n",
     +    dentry, name, min((int)size, 48), value, size, flags, err);
     return err;
 }

 static inline int ovl_do_removexattr(struct dentry *dentry, const char *name)
 {
     -int err = vfs_removexattr(dentry, name);
     +struct inode *inode = dentry->d_inode;
     +int err;
     +

inode_lock(inode);
+err = __vfs_removexattr_noperm(dentry, name);
+inode_unlock(inode);
+
+pr_debug("removexattr(%pd2, \"%s\") = %i", dentry, name, err);
return err;
}
--- linux-4.15.0.orig/fs/overlayfs/readdir.c
+++ linux-4.15.0/fs/overlayfs/readdir.c
@@ -296,7 +296,7 @@
 struct file *realfile;
 int err;

-realfile = ovl_path_open(realpath, O_RDONLY | O_DIRECTORY);
+realfile = ovl_path_open(realpath, O_RDONLY | O_LARGEFILE);
if (IS_ERR(realfile))
   return PTR_ERR(realfile);
@@ -593,8 +593,15 @@
 return ERR_PTR(res);
}
if (list_empty(&cache->entries)) {
-/* Good opportunity to get rid of an unnecessary "impure" flag */
-ovl_do_removexattr(ovl_dentry_upper(dentry), OVL_XATTR_IMPURE);
+/*
+ * A good opportunity to get rid of an unneeded "impure" flag.
+ * Removing the "impure" xattr is best effort.
+ */
+if (!ovl_want_write(dentry)) {
+ovl_do_removexattr(ovl_dentry_upper(dentry),
+ OVL_XATTR_IMPURE);
+ovl_drop_write(dentry);
+}
ovl_clear_flag(OVL_IMPURE, d_inode(dentry));
kfree(cache);
return NULL;
@@ -634,6 +641,21 @@
 return orig_ctx->actor(orig_ctx, name, namelen, offset, ino, d_type);
}

+static bool ovl_is_impure_dir(struct file *file)
+{
+struct ovl_dir_file *od = file->private_data;
+struct inode *dir = d_inode(file->f_path.dentry);
+/*
+ * Only upper dir can be impure, but if we are in the middle of
+ * iterating a lower real dir, dir could be copied up and marked
+ * impure. We only want the impure cache if we started iterating
+ * a real upper dir to begin with.
+ */
+ return od->is_upper && ovl_test_flag(OVL_IMPURE, dir);
+
+
+
+ static int ovl_iterate_real(struct file *file, struct dir_context *ctx)
+ {
+ int err;
+ rdt.parent_ino = stat.ino;
+ }
+
- if (ovl_test_flag(OVL_IMPURE, d_inode(dir))) {
+ if (ovl_is_impure_dir(file)) {
+ rdt.cache = ovl_cache_get_impure(&file->f_path);
+ if (IS_ERR(rdt.cache))
+ return PTR_ERR(rdt.cache);
+ }
+ int err;
+ +old_cred = ovl_override_creds(dentry->d_sb);
+ if (!ctx->pos)
+ ovl_dir_reset(file);
+
+ if (ovl_same_sb(dentry->d_sb) &&
+ (ovl_test_flag(OVL_IMPURE, d_inode(dentry)) ||
+ OVL_TYPE_MERGE(ovl_path_type(dentry->d_parent)))) {
+ return ovl_iterate_real(file, ctx);
+ } else {
+ err = iterate_dir(od->realfile, ctx);
+ } goto out;
+
+}
+
+ else {
+ err = iterate_dir(od->realfile, ctx);
+ goto out;
+ }
+
+ if (!od->cache) {
+ struct ovl_dir_cache *cache;
cache = ovl_cache_get(dentry);
+err = PTR_ERR(cache);
if (IS_ERR(cache))
-return PTR_ERR(cache);
+goto out;

od->cache = cache;
ovl_seek_cursor(od, ctx->pos);
@@ -711,7 +738,7 @@
if (!p->ino) {
  err = ovl_cache_update_ino(&file->f_path, p);
  if (err)
-  -return err;
+  +goto out;
  } 
if (!dir_emit(ctx, p->name, p->len, p->ino, p->type))
break;
@@ -719,7 +746,10 @@
od->cursor = p->l_node.next;
ctx->pos++;
}
-return 0;
+err = 0;
+out:
+revert_creds(old_cred);
+return err;
}

static loff_t ovl_dir_llseek(struct file *file, loff_t offset, int origin)
@@ -762,6 +792,19 @@
return res;
}

+static struct file *ovl_dir_open_realfile(struct file *file,
+  struct path *realpath)
+{
+  +struct file *res;
+  +const struct cred *old_cred;
+  +old_cred = ovl_override_creds(file_inode(file)->i_sb);
+  +res = ovl_path_open(realpath, O_RDONLY | (file->f_flags & O_LARGEFILE));
+  +revert_creds(old_cred);
+  +return res;
+}
+
+static int ovl_dir_fsync(struct file *file, loff_t start, loff_t end,
int datasync)
{
    struct dentry *dentry = file->f_path.dentry;
    struct file *realfile = od->realfile;

    /* Nothing to sync for lower */
    +if (!OVL_TYPE_UPPER(ovl_path_type(dentry)))
    +return 0;
    +
    /*
    * Need to check if we started out being a lower dir, but got copied up
    */
    -if (!od->is_upper && OVL_TYPE_UPPER(ovl_path_type(dentry))) {
    +if (!od->is_upper) {
        struct inode *inode = file_inode(file);

        realfile = READ_ONCE(od->upperfile);
    }
    ovl_path_upper(dentry, &upperpath);
    -realfile = ovl_path_open(&upperpath, O_RDONLY);
    +realfile = ovl_dir_open_realfile(file, &upperpath);

    inode_lock(inode);
    if (!od->upperfile) {
        @@ -831,7 +878,7 @@
        return -ENOMEM;
        type = ovl_path_real(file->f_path.dentry, &realpath);
        -realfile = ovl_path_open(&realpath, file->f_flags);
        +realfile = ovl_dir_open_realfile(file, &realpath);
        if (IS_ERR(realfile)) {
            kfree(od);
            return PTR_ERR(realfile);
        }
    }
    const struct inode *inode,
    unsigned int open_flags, unsigned int flags)
{  
    -struct dentry *real;
    +struct dentry *real = NULL, *lower;
    int err;

    if (flags & D_REAL_UPPER)

return real;
}

-real = ovl_dentry_lower(dentry);
-if (!real)
+lower = ovl_dentry_lower(dentry);
+if (!lower)
goto bug;
+real = lower;

/* Handle recursion */
real = d_real(real, inode, open_flags, 0);
@@ -121,8 +122,10 @@
if (!inode || inode == d_inode(real))
return real;
bug:
-WARN(1, "ovl_d_real(%pd4, %s:%lu): real dentry not found
-  inode ? inode->i_sb->s_id : "NULL", inode ? inode->i_ino : 0);
+WARN(1, "%s(%pd4, %s:%lu): real dentry (%p/%lu) not found
+  __func__, dentry, inode ? inode->i_sb->s_id : "NULL",
+  inode ? inode->i_ino : 0, real,
+  real && d_inode(real) ? d_inode(real)->i_ino : 0);
return dentry;
}
@@ -211,6 +214,7 @@
struct ovl_inode *oi = OVL_I(inode);

dput(oi->__upperdentry);
+iput(oi->lower);
kfree(oi->redirect);
ovl_dir_cache_free(inode);
mutex_destroy(&oi->lock);
@@ -520,10 +524,6 @@
bool retried = false;
bool locked = false;

-err = mnt_want_write(mnt);
-if (err)
-goto out_err;
-
inode_lock_nested(dir, I_MUTEX_PARENT);
locked = true;

@@ -588,7 +588,6 @@
goto out_err;
}
out_unlock:
mnt_drop_write(mnt);
if (locked)
inode_unlock(dir);

@@ -703,7 +702,8 @@
 * The inodes index feature needs to encode and decode file
 * handles, so it requires that all layers support them.
 */
-    if (ofs->config.index && !ovl_can_decode_fh(path->dentry->d_sb)) {
+    if (ofs->config.index && ofs->config.upperdir &&
+        !ovl_can_decode_fh(path->dentry->d_sb)) {
        ofs->config.index = false;
        pr_warn("overlayfs: fs on '%s' does not support file handles, falling back to index=off.\n", name);
    }
@@ -902,16 +902,6 @@
    if (err)
goto out;

-err = -EBUSY;
-if (ovl_inuse_trylock(upperpath->dentry)) {
-    ofs->upperdir_locked = true;
-} else if (ofs->config.index) {
-    pr_err("overlayfs: upperdir is in-use by another mount, mount with '-o index=off' to override exclusive upperdir
-    protection.\n");
-    goto out;
-} else {
-    pr_warn("overlayfs: upperdir is in-use by another mount, accessing files from both mounts will result in undefined
-    behavior.\n");
-}
-
- upper_mnt = clone_private_mount(upperpath);
- err = PTR_ERR(upper_mnt);
-if (IS_ERR(upper_mnt)) {
    @ @ -922.6 +912.17 @@
    /* Don't inherit atime flags */
    upper_mnt->mnt_flags &= ~(MNT_NOATIME | MNT_NODIRATIME | MNT_RELATIME);
    ofs->upper_mnt = upper_mnt;
+    +err = -EBUSY;
+    +if (ovl_inuse_trylock(ofs->upper_mnt->mnt_root)) {
+        ofs->upperdir_locked = true;
+    } else if (ofs->config.index) {
+        +pr_err("overlayfs: upperdir is in-use by another mount, mount with '-o index=off' to override exclusive upperdir
+        protection.\n");
+        goto out;
+    } else {
+        +pr_warn("overlayfs: upperdir is in-use by another mount, accessing files from both mounts will result in undefined
+        behavior.\n");

static int ovl_make_workdir(struct ovl_fs *ofs, struct path *workpath)
{
    struct vfsmount *mnt = ofs->upper_mnt;
    struct dentry *temp;
    int err;

    err = mnt_want_write(mnt);
    if (err)
        return err;

    ofs->workdir = ovl_workdir_create(ofs, OVL_WORKDIR_NAME, false);
    if (!ofs->workdir)
        goto out;

    /*
     * Upper should support d_type, else whiteouts are visible. Given
     * @ @ -944,7 +950,7 @ @
     * /
    err = ovl_check_d_type_supported(workpath);
    if (err < 0)
        goto out;

    /*
     * We allowed this configuration and don’t want to break users over
     * @ @ -968,6 +974,7 @ @
     * if (err) {
    ofs->noxattr = true;
    pr_warn("overlayfs: upper fs does not support xattr:\n");
    +err = 0;
    } else {
    vfs_removexattr(ofs->workdir, OVL_XATTR_OPAQUE);
    }
    @ @ -979,7 +986,9 @ @
    pr_warn("overlayfs: upper fs does not support file handles, falling back to index=off:\n");
    }

    -return 0;
    +out:
    +mnt_drop_write(mnt);
+return err;
}

static int ovl_get_workdir(struct ovl_fs *ofs, struct path *upperpath)
@@ -1001,8 +1010,10 @@
goto out;
}
+ofs->workbasedir = dget(workpath.dentry);
+
err = -EBUSY;
- if (ovl_inuse_trylock(workpath.dentry)) {
-    if (ovl_inuse_trylock(ofs->workbasedir)) {
+    if (ovl_inuse_trylock(ofs->workbasedir)) {
ofs->workdir_locked = true;
} else if (ofs->config.index) {
    pr_err("overlayfs: workdir is in-use by another mount, mount with '-o index=off' to override exclusive workdir protection.\n");
@@ -1011,7 +1022,6 @@
    pr_warn("overlayfs: workdir is in-use by another mount, accessing files from both mounts will result in undefined behavior.\n");
}

-ofs->workbasedir = dget(workpath.dentry);
err = ovl_make_workdir(ofs, &workpath);
if (err)
goto out;
@@ -1026,8 +1036,13 @@
static int ovl_get_indexdir(struct ovl_fs *ofs, struct ovl_entry *oe,  
struct path *upperpath)
{
+struct vfsmount *mnt = ofs->upper_mnt;
int err;

+err = mnt_want_write(mnt);
+if (err)  
+return err;
+/* Verify lower root is upper root origin */
err = ovl_verify_origin(upperpath->dentry, oe->lowerstack[0].dentry,  
false, true);
@@ -1055,11 +1070,12 @@
    pr_warn("overlayfs: try deleting index dir or mounting with '-o index=off' to disable inodes index.\n");

out:
+mnt_drop_write(mnt);
return err;
}
-static int ovl_get_lower_layers(struct ovl_fs *ofs, struct path *stack,
-unsigned int numlower)
+static int ovl_get_lower_layers(struct super_block *sb, struct ovl_fs *ofs,
+struct path *stack, unsigned int numlower)
{
    int err;
    unsigned int i;
    @@ -1092,6 +1108,13 @@
    */
    mnt->mnt_flags |= MNT_READONLY | MNT_NOATIME;

    +/*
    + * If any lower mount is nosuid, force the ovl sb to also
    + * be nosuid.
    + */
    +if (mnt->mnt_flags & MNT_NOSUID)
    +sb->s_iflags |= SB_I_NOSUID;
    +
    ofs->lower_layers[ofs->numlower].mnt = mnt;
    ofs->lower_layers[ofs->numlower].pseudo_dev = dev;
    ofs->numlower++;
    @@ -1156,7 +1179,7 @@
    goto out_err;
}

-err = ovl_get_lower_layers(ofs, stack, numlower);
+err = ovl_get_lower_layers(sb, ofs, stack, numlower);
if (err)
goto out_err;

@@ -1237,6 +1260,13 @@
if (!ofs->workdir)
    sb->s_flags |= SB_RDONLY;

+/*
+ * If the upper mount is nosuid, force the ovl sb to also
+ * be nosuid.
+ */
+if (ofs->upper_mnt->mnt_flags & MNT_NOSUID)
+sb->s_iflags |= SB_I_NOSUID;
+
    sb->s_stack_depth = ofs->upper_mnt->mnt_sb->s_stack_depth;
    sb->s_time_gran = ofs->upper_mnt->mnt_sb->s_time_gran;

@@ -1257,11 +1287,16 @@
if (err)
goto out_free_oe;
-if (!ofs->indexdir)
+/* Force r/o mount with no index dir */
+if (!ofs->indexdir) {
+    dput(ofs->workdir);
+    ofs->workdir = NULL;
+    sb->s_flags |= SB_RDONLY;
+}
+
+
-/* Show index=off/on in /proc/mounts for any of the reasons above */
+/* Show index=off in /proc/mounts for forced r/o mount */
if (!ofs->indexdir)
ofs->config.index = false;

@@ -1318,6 +1353,7 @@
    .name = "overlay",
    .mount = ovl_mount,
    .kill_sb = kill_anon_super,
+    .fs_flags = FS_USERNS_MOUNT,
    };
 MODULE_ALIAS_FS("overlay");

--- linux-4.15.0.orig/fs/overlayfs/util.c
+++ linux-4.15.0/fs/overlayfs/util.c
@@ -257,7 +257,7 @@
 if (upperdentry)
     OVL_I(inode)->__upperdentry = upperdentry;
 if (lowerdentry)
-    OVL_I(inode)->lower = d_inode(lowerdentry);
+    OVL_I(inode)->lower = igrab(d_inode(lowerdentry));

     ovl_copyattr(d_inode(upperdentry ?: lowerdentry), inode);
 }
@@ -273,7 +273,7 @@
 */
 smp_wmb();
 OVL_I(inode)->__upperdentry = upperdentry;
- if (!S_ISDIR(upperinode->i_mode) && inode_unhashed(inode)) {
+ if (inode_unhashed(inode)) {
     inode->i_private = upperinode;
     __insert_inode_hash(inode, (unsigned long) upperinode);
 }
struct inode *inode = d_inode(path->dentry);

int err, acc_mode;

if (flags & ~(O_ACCMODE | O_LARGEFILE))
    BUG();

switch (flags & O_ACCMODE) {
    case O_RDONLY:
        acc_mode = MAY_READ;
        break;
    case O_WRONLY:
        acc_mode = MAY_WRITE;
        break;
    default:
        BUG();
        break;
}

err = inode_permission(inode, acc_mode | MAY_OPEN);
if (err)
    return ERR_PTR(err);

/* O_NOATIME is an optimization, don't fail if not permitted */
if (inode_owner_or_capable(inode))
    flags |= O_NOATIME;

return dentry_open(path, flags, current_cred());

int ovl_copy_up_start(struct dentry *dentry)
{
    struct dentry *upperdentry = ovl_dentry_upper(dentry);
    struct dentry *index = NULL;
    struct inode *inode;

    int err;

    err = ovl_get_index_name(lowerdentry, &name);
    goto fail;

out:
    kfree(name.name);
    dput(index);
    return;

--- linux-4.15.0.orig/fse/pipe.c
+++ linux-4.15.0/fs/pipe.c
/*
 * New pipe buffers will be restricted to this size while the user is exceeding
 * their pipe buffer quota. The general pipe use case needs at least two
 * buffers: one for data yet to be read, and one for new data. If this is less
 * than two, then a write to a non-empty pipe may block even if the pipe is not
 * full. This can occur with GNU make jobserver or similar uses of pipes as
 * semaphores: multiple processes may be waiting to write tokens back to the
 * pipe before reading tokens: https://lore.kernel.org/lkml/1628086770.5m8p04n6j.none@localhost/.
 * +
 * + Users can reduce their pipe buffers with F_SETPIPE_SZ below this at their
 * + own risk, namely: pipe writes to non-full pipes may block until the pipe is
 * + emptied.
 * +*/
+#define PIPE_MIN_DEF_BUFFERS 2
+
+/*
 * The max size that a non-root user is allowed to grow the pipe. Can
 * be set by root in /proc/sys/fs/pipe-max-size
 */
@@ -194,9 +209,9 @@
)*	in the tee() system call, when we duplicate the buffers in one
*pipe into another.
*)
-void generic_pipe_buf_get(struct pipe_inode_info *pipe, struct pipe_buffer *buf)
+bool generic_pipe_buf_get(struct pipe_inode_info *pipe, struct pipe_buffer *buf)
{
+get_page(buf->page);
+return try_get_page(buf->page);
} EXPORT_SYMBOL(generic_pipe_buf_get);
@@ -239,6 +254,14 @@
 .get = generic_pipe_buf_get,
 });

+static const struct pipe_buf_operations anon_pipe_buf_nomerge_ops = {
+ .can_merge = 0,
+ .confirm = generic_pipe_buf_confirm,
+ .release = anon_pipe_buf_release,
+ .steal = anon_pipe_buf_steal,
+ .get = generic_pipe_buf_get,
+ };
+ static const struct pipe_buf_operations packet_pipe_buf_ops = {
+ .can_merge = 0,
.confirm = generic_pipe_buf_confirm,
@@ -247,6 +270,12 @@
 .get = generic_pipe_buf_get,
 }

+void pipe_buf_mark_unmergeable(struct pipe_buffer *buf)
+{
+if (buf->ops == &anon_pipe_buf_ops)
+buf->ops = &anon_pipe_buf_nomerge_ops;
+}
+
+static ssize_t
pipe_read(struct kiocb *iocb, struct iov_iter *to)
{
@@ -610,12 +639,17 @@

toomany_pipe_buffers_soft(unsiglong long user_bufs)
{
-return pipe_user_pages_soft && user_bufs >= pipe_user_pages_soft;
+return pipe_user_pages_soft && user_bufs > pipe_user_pages_soft;
 }

static bool too_many_pipe_buffers_hard(unsiglong long user_bufs)
{
-return pipe_user_pages_hard && user_bufs >= pipe_user_pages_hard;
+return pipe_user_pages_hard && user_bufs > pipe_user_pages_hard;
+}
+
+static bool is_unprivileged_user(void)
+{
+return !capable(CAP_SYS_RESOURCE) && !capable(CAP_SYS_ADMIN);
+}

struct pipe_inode_info *alloc_pipe_info(void)
@@ -634,12 +668,12 @@
 
 
user_bufs = account_pipe_buffers(user, 0, pipe_bufs);

-if (too_many_pipe_buffers_soft(user_bufs)) {
-user_bufs = account_pipe_buffers(user, pipe_bufs, 1);
-pipe_bufs = 1;
+if (too_many_pipe_buffers_soft(user_bufs) && is_unprivileged_user()) {
+user_bufs = account_pipe_buffers(user, pipe_bufs, PIPE_MIN_DEF_BUFFERS);
+pipe_bufs = PIPE_MIN_DEF_BUFFERS;
+}

-if (too_many_pipe_buffers_hard(user_bufs))
+if (too_many_pipe_buffers_hard(user_bufs) && is_unprivileged_user())
goto out_revert_acct;

pipe->bufs = kcalloc(pipe_bufs, sizeof(struct pipe_buffer),
@@ -1069,7 +1103,7 @@
if (nr_pages > pipe->buffers &&
    too_many_pipe_buffers_hard(user_bufs) ||
    too_many_pipe_buffers_soft(user_bufs)) &&
-!capable(CAP_SYS_RESOURCE) && !capable(CAP_SYS_ADMIN)) {
+is_unprivileged_user()) {
    ret = -EPERM;
    goto out_revert_acct;
}
--- linux-4.15.0.orig/fs/pnode.c
+++ linux-4.15.0/fs/pnode.c
@@ -266,14 +266,13 @@
if (IS_ERR(child))
    return PTR_ERR(child);
child->mnt.mnt_flags &= ~MNT_LOCKED;
+read_seqlock_excl(&mount_lock);
mnt_set_mountpoint(m, mp, child);
+if (m->mnt_master != dest_master)
+SET_MNT_MARK(m->mnt_master);
+read_sequnlock_excl(&mount_lock);
last_dest = m;
last_source = child;
-!if (m->mnt_master != dest_master) {
-    read_seqlock_excl(&mount_lock);
-    SET_MNT_MARK(m->mnt_master);
-    read_sequnlock_excl(&mount_lock);
-}
hlist_add_head(&child->mnt_hash, list);
return count_mounts(m->mnt_ns, child);
}
--- linux-4.15.0.orig/fs/proc/Makefile
+++ linux-4.15.0/fs/proc/Makefile
@@ -33,3 +33,4 @@
proc-$(CONFIG_PROC_VMCORE)	+= vmcore.o
proc-$(CONFIG_PRINTK)	+= kmsg.o
proc-$(CONFIG_PROC_PAGE_MONITOR)	+= page.o
+proc-y	+= version_signature.o
--- linux-4.15.0.orig/fs/proc/array.c
+++ linux-4.15.0/fs/proc/array.c
@@ -85,6 +85,7 @@
#include <linux/delayacct.h>
#include <linux/seq_file.h>
#include <linux/pid_namespace.h>
+##include <linux/prctl.h>
#include <linux/ptrace.h>
#include <linux/tracehook.h>
#include <linux/string_helpers.h>
@@ -347,6 +348,30 @@
#ifdef CONFIG_SECCOMP
    seq_put_decimal_ull(m, "nSeccomp:\t", p->seccomp.mode);
#endif
+    seq_printf(m, "Speculation_Store_Bypass:\t");
+    switch (arch_prctl_spec_ctrl_get(p, PR_SPEC_STORE_BYPASS)) {
+        case -EINVAL:
+            seq_printf(m, "unknown");
+            break;
+        case PR_SPEC_NOT_AFFECTED:
+            seq_printf(m, "not vulnerable");
+            break;
+        case PR_SPEC_PRCTL | PR_SPEC_FORCE_DISABLE:
+            seq_printf(m, "thread force mitigated");
+            break;
+        case PR_SPEC_PRCTL | PR_SPEC_DISABLE:
+            seq_printf(m, "thread mitigated");
+            break;
+        case PR_SPEC_PRCTL | PR_SPEC_ENABLE:
+            seq_printf(m, "thread vulnerable");
+            break;
+        case PR_SPEC_DISABLE:
+            seq_printf(m, "globally mitigated");
+            break;
+        default:
+            seq_printf(m, "vulnerable");
+            break;
+    }
+seq_putc(m, '\n');
}
@@ -429,7 +454,7 @@
    * a program is not able to use ptrace(2) in that case. It is
    * safe because the task has stopped executing permanently.
    */
-   -if (permitted && (task->flags & PF_DUMPCORE)) {
+   +if (permitted && (task->flags & (PF_EXITING|PF_DUMPCORE))) {
        if (try_get_task_stack(task)) {
            eip = KSTK_EIP(task);
            esp = KSTK_ESP(task);
--- linux-4.15.0.orig/fs/proc/base.c
+++ linux-4.15.0/fs/proc/base.c
@@ -100,6 +100,8 @@
    
    \include "internal.h"
    \include "fd.h"
/* NOTE: *
* Implementing inode permission operations in /proc is almost
* certainly an error. Permission checks need to happen during
* @ @ -140,9 +142,13 @@
#define REG(NAME, MODE, fops)
NOD(NAME, (S_IFREG|(MODE)), NULL, &fops, {})
#define ONE(NAME, MODE, show)
- NOD(NAME, (S_IFREG|(MODE)), 
+ NOD(NAME, (S_IFREG|(MODE)),
 NULL, &proc_single_file_operations,
 { .proc_show = show })
#define ATTR(LSM, NAME, MODE)
+ NOD(NAME, (S_IFREG|(MODE)),
+ NULL, &proc_pid_attr_operations,
+ { .lsm = LSM })
/
* Count the number of hardlinks for the pid_entry table, excluding the .
* @ @ -261,7 +267,7 @@
* Inherently racy -- command line shares address space
* * with code and data.
* */
-rv = access_remote_vm(mm, arg_end - 1, &c, 1, 0);
+rv = access_remote_vm(mm, arg_end - 1, &c, 1, FOLL_ANON);
if (rv <= 0)
go to out_free_page;

@ @ -279,7 +285,7 @@
int nr_read;

_count = min3(count, len, PAGE_SIZE);
-nr_read = access_remote_vm(mm, p, page, _count, 0);
+nr_read = access_remote_vm(mm, p, page, _count, FOLL_ANON);
if (nr_read < 0)
rv = nr_read;
if (nr_read <= 0)
@ @ -325,7 +331,7 @@
bool final;

_count = min3(count, len, PAGE_SIZE);
-nr_read = access_remote_vm(mm, p, page, _count, 0);
+nr_read = access_remote_vm(mm, p, page, _count, FOLL_ANON);
if (nr_read < 0)
rv = nr_read;
if (nr_read <= 0)
@ @ -429,6 +435,20 @@
int err;
int i;

+ /*
+ * The ability to racily run the kernel stack unwinder on a running task
+ * and then observe the unwinder output is scary: while it is useful for
+ * debugging kernel issues, it can also allow an attacker to leak kernel
+ * stack contents.
+ * Doing this in a manner that is at least safe from races would require
+ * some work to ensure that the remote task can not be scheduled; and
+ * even then, this would still expose the unwinder as local attack
+ * surface.
+ * Therefore, this interface is restricted to root.
+ */
+ if (!file_ns_capable(m->file, &init_user_ns, CAP_SYS_ADMIN))
+ return -EACCES;
+
entries = kmalloc(MAX_STACK_TRACE_DEPTH * sizeof(*entries), GFP_KERNEL);
if (!entries)
return -ENOMEM;

int error;
struct inode *inode = d_inode(dentry);
/* Don't let anyone mess with weird proc files */
s_user_ns = inode->i_sb->s_user_ns;
if (!kuid_has_mapping(s_user_ns, inode->i_uid) ||
   !kgid_has_mapping(s_user_ns, inode->i_gid))
   return -EPERM;

error = setattr_prepare(dentry, attr);
if (error)
return error;

while (count > 0) {
   this_len = min_t(int, count, PAGE_SIZE);
   size_t this_len = min_t(size_t, count, PAGE_SIZE);

   if (write & copy_from_user(page, buf, this_len)) {
      copied = -EFAULT;
   }
   @ @ -943,7 +970,7 @@
max_len = min_t(size_t, PAGE_SIZE, count);
this_len = min(max_len, this_len);

-retval = access_remote_vm(mm, (env_start + src), page, this_len, 0);
+retval = access_remote_vm(mm, (env_start + src), page, this_len, FOLL_ANON);

if (retval <= 0) {
  ret = retval;
  @@ -1024,7 +1051,6 @@

static int __set_oom_adj(struct file *file, int oom_adj, bool legacy)
{
  -static DEFINE_MUTEX(oom_adj_mutex);
  struct mm_struct *mm = NULL;
  struct task_struct *task;
  int err = 0;
  @@ -1064,7 +1090,7 @@
  struct task_struct *p = find_lock_task_mm(task);

  if (p) {
    -if (atomic_read(&p->mm->mm_users) > 1) {
+    if (test_bit(MMF_MULTIPROCESS, &p->mm->flags)) {
      mm = p->mm;
      mmgrab(mm);
    }
    @@ -1091,10 +1117,6 @@
    task_lock(p);
    if (!p->vfork_done && process_shares_mm(p, mm)) {
      -pr_info("updating oom_score_adj for %d (%s) from %d to %d because it shares mm with %d (%s). Report if this is
        unexpected.
      
      -task_pid_nr(p), p->comm,
      -p->signal->oom_score_adj, oom_adj,
      -task_pid_nr(task), task->comm);
      p->signal->oom_score_adj = oom_adj;
      if (!legacy && has_capability_noaudit(current, CAP_SYS_RESOURCE))
        p->signal->oom_score_adj_min = (short)oom_adj;
      @@ -1691,6 +1713,12 @@
      kuid_t uid;
      kgid_t gid;

+    +if (unlikely(task->flags & PF_KTHREAD)) {
+      *ruid = GLOBAL_ROOT_UID;
+      *rgid = GLOBAL_ROOT_GID;
+      return;
+    } +
/* Default to the tasks effective ownership */
rcu_read_lock();
cred = __task_cred(task);
@@ -1794,6 +1822,11 @@
}
task_dump_owner(task, inode->i_mode, &stat->uid, &stat->gid);
}
+/* Prevent changes to overridden credentials. */
+if (current_cred() != current_real_cred()) {
+rcu_read_unlock();
+return -EBUSY;
+}
rcu_read_unlock();
return 0;
}
@@ -1907,8 +1940,33 @@
static int dname_to_vma_addr(struct dentry *dentry,
    unsigned long *start, unsigned long *end)
{
    -if (sscanf(dentry->d_name.name, "%lx-%lx", start, end) != 2)
    +const char *str = dentry->d_name.name;
    +unsigned long long sval, eval;
    +unsigned int len;
    +
    +len = _parse_integer(str, 16, &sval);
    +if (len & KSTRTOX_OVERFLOW)
    +return -EINVAL;
    +if (sval != (unsigned long)sval)
    +return -EINVAL;
    +str += len;
    +
    +if (*str != '-
    +return -EINVAL;
    +str++;
    +
    +len = _parse_integer(str, 16, &eval);
    +if (len & KSTRTOX_OVERFLOW)
    +return -EINVAL;
    +if (eval != (unsigned long)eval)
    return -EINVAL;
    +str += len;
    +
    +if (*str != '\0')
    +return -EINVAL;
    +
    +*start = sval;
    +*end = eval;

    return 0;
goto out;

if (!dname_to_vma_addr(dentry, &vm_start, &vm_end)) {
    down_read(&mm->mmap_sem);
    exact_vma_exists = !!find_exact_vma(mm, vm_start, vm_end);
    up_read(&mm->mmap_sem);
    +status = down_read_killable(&mm->mmap_sem);
    +if (!status) {
        +exact_vma_exists = !!find_exact_vma(mm, vm_start,
    +    vm_end);
    +up_read(&mm->mmap_sem);
    +}
}

mmput(mm);
if (rc)
    goto out_mmput;

+r = down_read_killable(&mm->mmap_sem);
+if (rc)
    +goto out_mmput;
+
rc = -ENOENT;
-down_read(&mm->mmap_sem);
-vma = find_exact_vma(mm, vm_start, vm_end);
if (vma & vma->vm_file) {
    -*path = vma->vm_file->f_path;
    +*path = vma_pr_or_file(vma)->f_path;
    path_get(path);
    rc = 0;
}
@@ -2082,7 +2146,11 @@
if (!mm)
    goto out_put_task;
-
(result = -EINTR;
+if (down_read_killable(&mm->mmap_sem))
    +goto out_put_mm;
+
+result = -ENOENT;
-vma = find_exact_vma(mm, vm_start, vm_end);
if (!vma)
    goto out_no_vma;
@@ -2093,6 +2161,7 @@
out_no_vma:
up_read(&mm->mmap_sem);
+out_put_mm:
mmput(mm);
out_put_task:
put_task_struct(task);
@@ -2134,7 +2203,12 @@
mm = get_task_mm(task);
if (!mm)
goingo out_put_task;
-down_read(&mm->mmap_sem);
+
+ret = down_read_killable(&mm->mmap_sem);
+if (ret) {
+mmput(mm);
+goto out_put_task;
+
} }

nr_files = 0;
@@ -2485,6 +2559,13 @@
 }

#ifdef CONFIG_SECURITY
+static int proc_pid_attr_open(struct inode *inode, struct file *file)
+{
+file->private_data = NULL;
+__mem_open(inode, file, PTRACE_MODE_READ_FSCREDS);
+return 0;
+}
+
+static ssize_t proc_pid_attr_read(struct file * file, char __user * buf,
+ size_t count, loff_t *ppos)
+{
+ @ @ -2496,7 +2577,7 @@
+ if (!task)
+ return -ESRCH;
+
-length = security_getprocattr(task,
+length = security_getprocattr(task, PROC_I(inode)->op.lsm,
+ (char*)file->f_path.dentry->d_name.name, &p);
+put_task_struct(task);
+ @ @ -2514,6 +2595,10 @@
+ ssize_t length;
+ struct task_struct *task = get_proc_task(inode);
A task may only write when it was the opener. */
+if (file->private_data != current->mm)
+return -EPERM;
+
+length = -ESRCH;
+if (!task)
+goto out_no_task;
+@ @ -2542,7 +2627,8 @@
+if (length < 0)
+goto out_free;
+
-length = security_setprocattr(file->f_path.dentry->d_name.name,
+length = security_setprocattr(PROC_I(inode)->op.lsm,
+    file->f_path.dentry->d_name.name,
+    page, count);
+mutex_unlock(&current->signal->cred_guard_mutex);
+out_free:
+@ @ -2554,18 +2640,93 @@
}

static const struct file_operations proc_pid_attr_operations = {
+  .open= proc_pid_attr_open,
+  .read= proc_pid_attr_read,
+  .write= proc_pid_attr_write,
+  .llseek= generic_file_llseek,
+  .release= mem_release,
+};

+#define LSM_DIR_OPS(LSM) \n+static int proc_##LSM##_attr_dir_iterate(struct file *filp, \n+  struct dir_context *ctx) \n+{" \n+return proc_pident_readdir(filp, ctx, \n+  LSM##_attr_dir_stuff, \n+  ARRAY_SIZE(LSM##_attr_dir_stuff)); \n+} \n+\n+static const struct file_operations proc_##LSM##_attr_dir_ops = {
+  .read= generic_read_dir, \n+  .iterate= proc_##LSM##_attr_dir_iterate, \n+  .llseek= default_llseek, \n+}; \n+\n+static struct dentry *proc_##LSM##_attr_dir_lookup(struct inode *dir, \n+  struct dentry *dentry, unsigned int flags) \n+{" \n+  return proc_pident_lookup(dir, dentry, \n+    LSM##_attr_dir_stuff, \n+    LSM##_attr_dir_ops, \n+} \n+\n+static struct dentry *proc_##LSM##_attr_dir_lookup(struct inode *dir, \n+  struct dentry *dentry, unsigned int flags) \n+{" \n+  return proc_pident_lookup(dir, dentry, \n+    LSM##_attr_dir_stuff, \n+    LSM##_attr_dir_ops, \n+}
static const struct inode_operations proc_##LSM##_attr_dir_inode_ops = {
    .lookup = proc_##LSM##_attr_dir_lookup,
    .getattr = pid_getattr,
    .setattr = proc_setattr,
}

#ifdef CONFIG_SECURITY_SELINUX
static const struct pid_entry selinux_attr_dir_stuff[] = {
    ATTR("selinux", "current", 0666),
    ATTR("selinux", "prev", 0444),
    ATTR("selinux", "exec", 0666),
    ATTR("selinux", "fscreate", 0666),
    ATTR("selinux", "keycreate", 0666),
    ATTR("selinux", "sockcreate", 0666),
};
LSM_DIR_OPS(selinux);
#endif

#ifdef CONFIG_SECURITY_SMACK
static const struct pid_entry smack_attr_dir_stuff[] = {
    ATTR("smack", "current", 0666),
};
LSM_DIR_OPS(smack);
#endif

#ifdef CONFIG_SECURITY_APPARMOR
static const struct pid_entry apparmor_attr_dir_stuff[] = {
    ATTR("apparmor", "current", 0666),
    ATTR("apparmor", "prev", 0444),
    ATTR("apparmor", "exec", 0666),
};
LSM_DIR_OPS(apparmor);
#endif

static const struct pid_entry attr_dir_stuff[] = {
    REG("current", S_IRUGO|S_IWUGO, proc_pid_attr_operations),
    REG("prev", S_IRUGO, proc_pid_attr_operations),
    REG("exec", S_IRUGO|S_IWUGO, proc_pid_attr_operations),
    REG("fscreate", S_IRUGO|S_IWUGO, proc_pid_attr_operations),
    REG("keycreate", S_IRUGO|S_IWUGO, proc_pid_attr_operations),
    REG("sockcreate", S_IRUGO|S_IWUGO, proc_pid_attr_operations),
    ATTR(NULL, "current", 0666),
    ATTR(NULL, "prev", 0444),
    ATTR(NULL, "exec", 0666),
    ATTR(NULL, "fscreate", 0666),
ATTR(NULL, "keycreate", 0666),
ATTR(NULL, "sockcreate", 0666),
ATTR(NULL, "display_lsm", 0666),
+
+#ifdef CONFIG_SECURITY_SELINUX
+DIR("selinux", 0555,
+    proc_selinux_attr_dir_inode_ops, proc_selinux_attr_dir_ops),
+#endif
+
+#ifdef CONFIG_SECURITY_SMACK
+DIR("smack", 0555,
+    proc_smack_attr_dir_inode_ops, proc_smack_attr_dir_ops),
+#endif
+
+#ifdef CONFIG_SECURITY_APPARMOR
+DIR("apparmor", 0555,
+    proc_apparmor_attr_dir_inode_ops, proc_apparmor_attr_dir_ops),
+#endif
};

static int proc_attr_dir_readdir(struct file *file, struct dir_context *ctx)
--- linux-4.15.0.orig/fs/proc/generic.c
+++ linux-4.15.0/fs/proc/generic.c
@@ -106,8 +106,15 @@
{
    struct inode *inode = d_inode(dentry);
    struct proc_dir_entry *de = PDE(inode);
+s_user_ns = inode->i_sb->s_user_ns;
+if (!kuid_has_mapping(s_user_ns, inode->i_uid) ||
+    !kgid_has_mapping(s_user_ns, inode->i_gid))
+    return -EPERM;
+
    error = setattr_prepare(dentry, iattr);
    if (error)
        return error;
--- linux-4.15.0.orig/fs/proc/inode.c
+++ linux-4.15.0/fs/proc/inode.c
@@ -432,7 +432,7 @@
 struct inode *proc_get_inode(struct super_block *sb, struct proc_dir_entry *de)
 {
-struct inode *inode = new_inode_pseudo(sb);
+struct inode *inode = new_inode(sb);

 struct inode *proc_get_inode(struct super_block *sb, struct proc_dir_entry *de)
if (inode) {
    inode->i_ino = de->low_ino;
}
--- linux-4.15.0.orig/fs/proc/internal.h
+++ linux-4.15.0/fs/proc/internal.h
@@ -58,6 +58,7 @@
    int (*proc_show)(struct seq_file *m,
                     struct pid_namespace *ns, struct pid *pid,
                     struct task_struct *task);
+    const char *lsm;
    }

struct proc_inode {
--- linux-4.15.0.orig/fs/proc/kcore.c
+++ linux-4.15.0/fs/proc/kcore.c
@@ -209,25 +209,34 @@
{
    struct list_head *head = (struct list_head *)arg;
    struct kcore_list *ent;
    +struct page *p;
    +
    +if (!pfn_valid(pfn))
    +return 1;
    +
    +p = pfn_to_page(pfn);
    +if (!memmap_valid_within(pfn, p, page_zone(p)))
    +return 1;

    ent = kmalloc(sizeof(*ent), GFP_KERNEL);
    if (!ent)
        return -ENOMEM;
-    ent->addr = (unsigned long)__va((pfn << PAGE_SHIFT));
+    ent->addr = (unsigned long)page_to_virt(p);
    ent->size = nr_pages << PAGE_SHIFT;

    /* Sanity check: Can happen in 32bit arch...maybe */
    -if (ent->addr < (unsigned long)__va(0))
    +if (!virt_addr_valid(ent->addr))
        goto free_out;

    /* cut not-mapped area. ....from ppc-32 code. */
    if (ULONG_MAX - ent->addr < ent->size)
        ent->size = ULONG_MAX - ent->addr;

    /* cut when vmalloc() area is higher than direct-map area */
    -if (VMALLOC_START > (unsigned long)__va(0)) {
        -if (ent->addr > VMALLOC_START)
            goto free_out;
    +/*
We've already checked virt_addr_valid so we know this address is a valid pointer, therefore we can check against it to determine if we need to trim.

```c
if (VMALLOC_START > ent->addr) {
    if (VMALLOC_START - ent->addr < ent->size)
        ent->size = VMALLOC_START - ent->addr;
}
```

`@@ -375,8 +384,10 @@`
`phdr->p_flags = PF_R|PF_W|PF_X;`
`phdr->p_offset = kc_vaddr_to_offset(m->addr) + dataoff;`
`phdr->p_vaddr = (size_t)m->addr;`
`-if (m->type == KCORE_RAM || m->type == KCORE_TEXT)
+if (m->type == KCORE_RAM)
    phdr->p_paddr = __pa(m->addr);
+else if (m->type == KCORE_TEXT)
+    phdr->p_paddr = __pa_symbol(m->addr);
  else
    phdr->p_paddr = (elf_addr_t)-1;
phdr->p_filesz = phdr->p_memsz = m->size;
```

/* we have to zero-fill user buffer even if no read */
if (copy_to_user(buffer, buf, tsz))
    return -EFAULT;
+} else if (m->type == KCORE_USER) {
+    /* User page is handled prior to normal kernel page: */
+    if (copy_to_user(buffer, (char *)start, tsz))
+        return -EFAULT;
+} else if (kern_addr_valid(start)) {
    unsigned long n;
    /*
     * Using bounce buffer to bypass the hardened user copy kernel text checks.
     */
    -memcpy(buf, (char *) start, tsz);
    -n = copy_to_user(buffer, buf, tsz);
    /*
     - * We cannot distinguish between fault on source
     - * and fault on destination. When this happens
     - * we clear too and hope it will trigger the
     - * EFAULT again.
     - */
     -if (n) {
         -if (clear_user(buffer + tsz - n,
                -n))
            +if (probe_kernel_read(buf, (void *) start, tsz)) {
+if (clear_user(buffer, tsz))
+return -EFAULT;
+} else {
+if (copy_to_user(buffer, buf, tsz))
return -EFAULT;
}
} else {
@@ -550,6 +557,8 @@
static int open_kcore(struct inode *inode, struct file *filp)
{
+if (kernel_is_locked_down("/proc/kcore"))
+return -EPERM;
if (!capable(CAP_SYS_RAWIO))
  return -EPERM;

--- linux-4.15.0.orig/fs/proc/loadavg.c
+++ linux-4.15.0/fs/proc/loadavg.c
@@ -24,7 +24,7 @@
LOAD_INT(avnrun[1]), LOAD_FRAC(avnrun[1]),
LOAD_INT(avnrun[2]), LOAD_FRAC(avnrun[2]),
nr_running(), nr_threads,
-idr_get_cursor(&task_active_pid_ns(current)->idr));
+idr_get_cursor(&task_active_pid_ns(current)->idr) - 1);
return 0;
}

--- linux-4.15.0.orig/fs/proc/nommu.c
+++ linux-4.15.0/fs/proc/nommu.c
@@ -45,7 +45,10 @@
file = region->vm_file;

if (file) {
-struct inode *inode = file_inode(region->vm_file);
+struct inode *inode;
+  file = vmr_pr_or_file(region);
+  inode = file_inode(file);
  dev = inode->i_sb->ss_dev;
  ino = inode->i_ino;
}
--- linux-4.15.0.orig/fs/proc/page.c
+++ linux-4.15.0/fs/proc/page.c
@@ -42,10 +42,12 @@
return -EINVAL;
while (count > 0) {
-if (pfn_valid(pfn)}
ppage = pfnto_page(pfn);
-else
ppage = NULL;
+/*
+ * TODO: ZONE_DEVICE support requires to identify
+ * memmaps that were actually initialized.
+ */
+ppage = pfnto_online_page(pfn);
+
if (!ppage || PageSlab(ppage))
pcount = 0;
else
@@ -214,10 +216,11 @@
return -EINVAL;

while (count > 0) {
- if (pfn_valid(pfn))
- ppage = pfnto_page(pfn);
-else
- ppage = NULL;
-+/*
+ * TODO: ZONE_DEVICE support requires to identify
+ * memmaps that were actually initialized.
+ */
+ppage = pfnto_online_page(pfn);
+
if (put_user(stable_page_flags(ppage), out)) {
ret = -EFAULT;
@@ -259,10 +262,11 @@
return -EINVAL;

while (count > 0) {
- if (pfn_valid(pfn))
- ppage = pfnto_page(pfn);
-else
- ppage = NULL;
-+/*
+ * TODO: ZONE_DEVICE support requires to identify
+ * memmaps that were actually initialized.
+ */
+ppage = pfnto_online_page(pfn);
+
if (ppage)
ino = page_cgroup_ino(ppage);
--- linux-4.15.0.orig/fs/proc/proc_sysctl.c
+++ linux-4.15.0/fs/proc/proc_sysctl.c
@@ -464,7 +464,7 @@
inode = new_inode(sb);
if (!inode)
    goto out;
+return ERR_PTR(-ENOMEM);

inode->i_ino = get_next_ino();

if (unlikely(head->unregistering)) {
    spin_unlock(&sysctl_lock);
    iput(inode);
    -inode = NULL;
    -goto out;
+return ERR_PTR(-ENOENT);
}
ei->sysctl = head;
ei->sysctl_entry = table;

if (root->set_ownership)
    root->set_ownership(head, table, &inode->i_uid, &inode->i_gid);
+else {
+    inode->i_uid = GLOBAL_ROOT_UID;
+    inode->i_gid = GLOBAL_ROOT_GID;
+
}

-out:
    return inode;
}

@ @ -549,10 +551,11 @@
goto out;
}

-err = ERR_PTR(-ENOMEM);
inode = proc_sys_make_inode(dir->i_sb, h ? h : head, p);
-if (!inode)
+if (IS_ERR(inode)) {
+    err = ERR_CAST(inode);
    goto out;
+
}
er = NULL;
d_set_d_op(dentry, &proc_sys_dentry_operations);
-err = ERR_PTR(-ENOMEM);
inode = proc_sys_make_inode(dir->d_sb, head, table);

if (!inode) {
+ if (IS_ERR(inode)) {
    d_lookup_done(child);
    dput(child);
    return false;
}
@@ -707,7 +710,10 @@
    struct ctl_table *table)
{
    bool ret = true;
+    head = sysctl_head_grab(head);
+    if (IS_ERR(head))
+        return false;

    if (S_ISLNK(table->mode)) {
        /* It is not an error if we can not follow the link ignore it */
        static int proc_sys_setattr(struct dentry *dentry, struct iattr *attr)
        {
            struct inode *inode = d_inode(dentry);
+            struct user_namespace *s_user_ns;
            int error;

            if (attr->ia_valid & (ATTR_MODE | ATTR_UID | ATTR_GID))
                return -EPERM;
+            /* Don't let anyone mess with weird proc files */
+            +s_user_ns = inode->i_sb->s_user_ns;
+            +if (!kuid_has_mapping(s_user_ns, inode->i_uid) ||
+            +    !kgid_has_mapping(s_user_ns, inode->i_gid))
+                return -EPERM;
+            error = setattr_prepare(dentry, attr);
            if (error)
                return error;
@@ -1618,8 +1631,11 @@
        -put_links(header);
        -start_unregistering(header);
        + if (parent) {
        +    put_links(header);
        +    start_unregistering(header);
        +}
+    if (!--header->count)
        kfree_rcu(header, rcu);
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--- linux-4.15.0.orig/fs/proc/self.c
+++ linux-4.15.0/fs/proc/self.c
@@ -15,6 +15,13 @@
pid_t tgid = task_tgid_nr_ns(current, ns);
char *name;
+
+/*
+ * Not currently supported. Once we can inherit all of struct pid,
+ * we can allow this.
+ */
+if (current->flags & PF_KTHREAD)
+return ERR_PTR(-EOPNOTSUPP);
+
+if (!tgid)
return ERR_PTR(-ENOENT);
/* 11 for max length of signed int in decimal + NULL term */
@@ -41,7 +48,7 @@
ineode_lock(root_inode);
self = d_alloc_name(s->s_root, "self");
if (self) {
-struct inode *inode = new_inode_pseudo(s);
+struct inode *inode = new_inode(s);
if (inode) {
inode->i_ino = self_inum;
inode->i_mtime = inode->i_atime = inode->i_ctime = current_time(inode);
--- linux-4.15.0.orig/fs/proc/task_mmu.c
+++ linux-4.15.0/fs/proc/task_mmu.c
@@ -169,7 +169,11 @@
if (!mm || !mmget_not_zero(mm))
return NULL;
-
down_read(&mm->mmap_sem);
+if (down_readkillable(&mm->mmap_sem)) {
+mmput(mm);
+return ERR_PTR(-EINTR);
+}
+
hold_task_mempolicy(priv);
inode_lock privat vm = get_gate_vma(mm);
@@ -306,7 +310,10 @@
const char *name = NULL;

if (file) {
-struct inode *inode = file_inode(vma->vm_file);
+struct inode *inode;
+ file = vma_pr_or_file(vma);
+ inode = file_inode(file);
dev = inode->i_sb->s_dev;
ino = inode->i_ino;
pgoff = ((loff_t)vma->vm_pgoff) << PAGE_SHIFT;
@@ -455,7 +462,7 @@
};

static void smaps_account(struct mem_size_stats *mss, struct page *page,
-bool compound, bool young, bool dirty)
+bool compound, bool young, bool dirty, bool locked)
{
 int i, nr = compound ? 1 << compound_order(page) : 1;
 unsigned long size = nr * PAGE_SIZE;
@@ -482,24 +489,31 @@
 else
 mss->private_clean += size;
mss->pss += (u64)size << PSS_SHIFT;
+if (locked)
+mss->pss_locked += (u64)size << PSS_SHIFT;
 return;
 }

 for (i = 0; i < nr; i++, page++) {
 int mapcount = page_mapcount(page);
+unsigned long pss = (PAGE_SIZE << PSS_SHIFT);
 if (mapcount >= 2) {
+if (dirty || PageDirty(page))
 mss->shared_dirty += PAGE_SIZE;
 else
 mss->shared_clean += PAGE_SIZE;
- mss->pss += (PAGE_SIZE << PSS_SHIFT) / mapcount;
+ mss->pss += pss / mapcount;
+if (locked)
+mss->pss_locked += pss / mapcount;
 } else {
 if (dirty || PageDirty(page))
 mss->private_dirty += PAGE_SIZE;
 else
 mss->private_clean += PAGE_SIZE;
- mss->pss += PAGE_SIZE << PSS_SHIFT;
+ mss->pss += pss;
+if (locked)
+mss->pss_locked += pss;
 }
}
struct mem_size_stats *mss = walk->private;
struct vm_area_struct *vma = walk->vma;
+bool locked = !!(vma->vm_flags & VM_LOCKED);
struct page *page = NULL;

if (pte_present(*pte)) {
    if (!page)
        return;

-    smaps_account(mss, page, false, pte_young(*pte), pte_dirty(*pte));
+    smaps_account(mss, page, false, pte_young(*pte), pte_dirty(*pte), locked);
}

#ifdef CONFIG_TRANSPARENT_HUGEPAGE

 struct mem_size_stats *mss = walk->private;
 struct vm_area_struct *vma = walk->vma;
+    bool locked = !!(vma->vm_flags & VM_LOCKED);
 struct page *page;

 /* FOLL_DUMP will return -EFAULT on huge zero page */
 /* pass */;
 else
     VM_BUG_ON_PAGE(1, page);
-    smaps_account(mss, page, true, pmd_young(*pmd), pmd_dirty(*pmd));
+    smaps_account(mss, page, true, pmd_young(*pmd), pmd_dirty(*pmd), locked);
 }
#else
 static void smaps_pmd_entry(pmd_t *pmd, unsigned long addr,

 /* In case of smaps_rollup, reset the value from previous vma */
 +mss->check_shmem_swap = false;
 if (vma->vm_file && shmem_mapping(vma->vm_file->f_mapping)) {
 /* For shared or readonly shmem mappings we know that all
    */
 @ @ -780.18 +798.15 @@

 if (!shmem_swapped || (vma->vm_flags & VM_SHARED) ||
 !(vma->vm_flags & VM_WRITE)) {
-    mss->swap = shmem_swapped;


mss->swap += shmem_swapped;
} else {
    mss->check_shmem_swap = true;
    smaps_walk.pte_hole = smaps_pte_hole;
}
}
#endif

/* mmap_sem is held in m_start */
walk_page_vma(vma, &smaps_walk);
if (vma->vm_flags & VM_LOCKED)
    mss->pss_locked += mss->pss;

if (!rollup_mode) {
    show_map_vma(m, vma, is_pid);
    mss->private_hugetlb >> 10,
    mss->swap >> 10,
    (unsigned long)(mss->swap_pss >> (10 + PSS_SHIFT)),
    (unsigned long)(mss->pss >> (10 + PSS_SHIFT));
if (!rollup_mode) {
    arch_show_smap(m, vma);
}
}

-down_read(&mm->mmap_sem);
+if (down_read_killable(&mm->mmap_sem)) {
+    count = -EINTR;
+    goto out_mm;
+} 
 tlb_gather_mmu(&tlb, mm, 0, -1);
if (type == CLEAR_REFS_SOFT_DIRTY) {
    for (vma = mm->mmap; vma; vma = vma->vm_next) {
@@ -1149,6 +1167,24 @@
        count = -EINTR;
        goto out_mm;
    }
@@ -862,7 +877,7 @@
        (unsigned long)(mss->swap_pss >> (10 + PSS_SHIFT)),
        (unsigned long)(mss->pss >> (10 + PSS_SHIFT));
        (unsigned long)(mss->swap >> (10 + PSS_SHIFT)),
        (unsigned long)(mss->pss >> (10 + PSS_SHIFT));
* like if get_task_mm()
* failed. FIXME: should this
* function have returned
* -ESRCH if get_task_mm()
* failed like if
* get_proc_task() fails?
*/
+up_write(&mm->mmap_sem);
+goto out_mm;
+
for (vma = mm->mmap; vma; vma = vma->vm_next) {
    vma->vm_flags &= ~VM_SOFTDIRTY;
    vma_set_page_prot(vma);
    @ @ -1272,8 +1308,9 @@
    if (pte_swp_soft_dirty(pte))
        flags |= PM_SOFT_DIRTY;
    entry = pte_to_swp_entry(pte);
    -frame = swp_type(entry) |
    -(swp_offset(entry) << MAX_SWAPFILES_SHIFT);
    +if (pm->show_pfn)
        +frame = swp_type(entry) |
        +((addr & ~PMD_MASK) >> PAGE_SHIFT);
        +offset = swp_offset(entry) +
        +(offset << MAX_SWAPFILES_SHIFT);
        +frame = swp_type(entry) |
        +(addr & ~PMD_MASK) >> PAGE_SHIFT);
        flags |= PM_SWAP;
        if (is_migration_entry(entry))
            page = migration_entry_to_page(entry);
            @ @ -1324,9 +1361,14 @@
        #ifdef CONFIG_ARCH_ENABLE_THP_MIGRATION
        else if (is_swap_pmd(pmd)) {
            swp_entry_t entry = pmd_to_swp_entry(pmd);
            unsigned long offset;
            -(swp_offset(entry) << MAX_SWAPFILES_SHIFT);
            +if (pm->show_pfn) {
                +offset = swp_offset(entry) +
                +((addr & ~PMD_MASK) >> PAGE_SHIFT);
                +frame = swp_type(entry) |
                +(offset << MAX_SWAPFILES_SHIFT);
                +}
        flags |= PM_SWAP;
        if (pmd_swp_soft_dirty(pmd))
            flags |= PM_SOFT_DIRTY;
            @ @ -1344,8 +1386,12 @@
        err = add_to_pagemap(addr, &pme, pm);
        if (err)
            break;
        -if (pm->show_pfn && (flags & PM_PRESENT))
            -frame++;
        +if (pm->show_pfn && (flags & PM_PRESENT))
            +frame++;

+if (pm->show_pfn) {
+if (flags & PM_PRESENT)
+frame++;
+else if (flags & PM_SWAP)
+frame += (1 << MAX_SWAPFILES_SHIFT);
+
} } 

spin_unlock(ptl);

return err;

@@ -1514,7 +1560,9 @@
/* overflow ? */
if (end < start_vaddr || end > end_vaddr)
end = end_vaddr;
-down_read(&mm->mmap_sem);
+ret = down_read_killable(&mm->mmap_sem);
+if (ret)
+goto out_free;
ret = walk_page_range(start_vaddr, end, &pagemap_walk);
up_read(&mm->mmap_sem);

@@ -1736,7 +1784,7 @@
struct proc_maps_private *proc_priv = &numa_priv->proc_maps;
struct vm_area_struct *vma = v;
struct numa_maps *md = &numa_priv->md;
-down_read(&mm->mmap_sem);
+ret = down_read_killable(&mm->mmap_sem);
+if (ret)
+goto out_free;
ret = walk_page_range(start_vaddr, end, &pagemap_walk);
up_read(&mm->mmap_sem);

struct proc_maps_private *proc_priv = &numa_priv->proc_maps;
struct vm_area_struct *vma = v;
struct numa_maps *md = &numa_priv->md;
-down_read(&mm->mmap_sem);
+ret = down_read_killable(&mm->mmap_sem);
+if (ret)
+goto out_free;
ret = walk_page_range(start_vaddr, end, &pagemap_walk);
up_read(&mm->mmap_sem);

if (file) {
-struct inode *inode = file_inode(vma->vm_file);
+struct file *file = vma_pr_or_file(vma);
+struct inode *inode = file_inode(file);
+struct mm_struct *mm = vma->vm_mm;
+struct mm_walk walk = {
+hugeltb_entry = gather_hugetlb_stats,
--- linux-4.15.0.orig/fs/proc/task_nommu.c
+++ linux-4.15.0/fs/proc/task_nommu.c
@@ -156,7 +156,10 @@
file = vma->vm_file;
-struct inode *inode = file_inode(vma->vm_file);
+struct inode *inode = file_inode(file);
+struct mm_struct *mm = vma->vm_mm;
+struct mm_walk walk = {
+hugeltb_entry = gather_hugetlb_stats,
--- linux-4.15.0.orig/fs/proc/task_nommu.c
+++ linux-4.15.0/fs/proc/task_nommu.c
@@ -223,7 +226,11 @@
if (!mm || !mmget_not_zero(mm))
return NULL;
-down_read(&mm->mmap_sem);
+if (down_read_killable(&mm->mmap_sem)) {
+ mmput(mm);
+ return ERR_PTR(-EINTR);
+}
+
/* start from the Nth VMA */
for (p = rb_first(&mm->mm_rb); p; p = rb_next(p))
if (n-- == 0)
--- linux-4.15.0.orig/fs/proc/thread_self.c
+++ linux-4.15.0/fs/proc/thread_self.c
@@ -42,7 +42,7 @@
inode_lock(root_inode);
thread_self = d_alloc_name(s->s_root, "thread-self");
if (thread_self) {
- struct inode *inode = new_inode_pseudo(s);
+ struct inode *inode = new_inode(s);
if (inode) {
    inode->i_ino = thread_self_inum;
    inode->i_mtime = inode->i_atime = inode->i_ctime = current_time(inode);
--- linux-4.15.0.orig/fs/proc/version_signature.c
+++ linux-4.15.0/fs/proc/version_signature.c
@@ -0,0 +1,32 @@
+#include <linux/kernel.h>
+#include <linux/module.h>
+#include <linux/fs.h>
+#include <linux/init.h>
+#include <linux/proc_fs.h>
+#include <linux/seq_file.h>
+#include <linux/utsname.h>
+
+static int version_signature_proc_show(struct seq_file *m, void *v) {
+    seq_printf(m, "%s\n", CONFIG_VERSION_SIGNATURE);
+    return 0;
+}
+
+static int version_signature_proc_open(struct inode *inode, struct file *file) {
+    return single_open(file, version_signature_proc_show, NULL);
+}
+
+static const struct file_operations version_signature_proc_fops = {
+    .open= version_signature_proc_open,
+    .read= seq_read,
+    .llseek= seq_lseek,
+    .release= single_release,
+};
+}
static int __init proc_version_signature_init(void)
+
+proc_create("version_signature", 0, NULL, &version_signature_proc_fops);
+return 0;
+
+module_init(proc_version_signature_init);
--- linux-4.15.0.orig/fs/proc/vmcore.c
+++ linux-4.15.0/fs/proc/vmcore.c
@@ -165,6 +165,16 @@
}
/*
 * Architectures which support memory encryption override this.
 */
+ size_t __weak
+copy_oldmem_page_encrypted(unsigned long pfn, char *buf, size_t csize,
 + unsigned long offset, int userbuf)
+
+return copy_oldmem_page(pfn, buf, csize, offset, userbuf);
+
*/

static int copy_to(void *target, void *src, size_t size, int userbuf)
@@ -449,7 +459,7 @@

kaddr = elfnotes_buf + start - elfcorebuf_sz;
if (remap_vmalloc_range_partial(vma, vma->vm_start + len,
-kaddr, tsz))
+kaddr, 0, tsz))
goto fail;
size -= tsz;
start += tsz;
--- linux-4.15.0.orig/fs/pstore/inode.c
+++ linux-4.15.0/fs/pstore/inode.c
@@ -99,11 +99,11 @@

(*pos)++;
data->off += REC_SIZE;
if (data->off + REC_SIZE > ps->total_size)
return NULL;

-(*pos)++;  
return data;
}
struct pstore_ftrace_seq_data *data = v;
struct pstore_ftrace_record *rec;

+if (!data)
+return 0;
+
rec = (struct pstore_ftrace_record *)(ps->record->buf + data->off);

seq_printf(s, "CPU:%d ts:%llu %08lx %08lx %pf <- %pF\n",
@@ -330,10 +333,6 @@
goto fail;
inode->i_mode = S_IFREG | 0444;
inode->i_fop = &pstore_file_operations;
-private = kzalloc(sizeof(*private), GFP_KERNEL);
-if (!private)
-goto fail_alloc;
-private->record = record;

switch (record->type) {
case PSTORE_TYPE_DMESG:
@@ -383,12 +382,16 @@
break;
}

-private = kzalloc(sizeof(*private), GFP_KERNEL);
+private = kzalloc(sizeof(*private), GFP_KERNEL);
+if (!private)
+goto fail_inode;
+
dentry = d_alloc_name(root, name);
if (!dentry)
goto fail_private;

inode->i_size = private->total_size = size;
-
inode->i_private = private;

if (record->time.tv_sec)
@@ -404,7 +407,7 @@

fail_private:
free_pstore_private(private);
-fail_alloc:
+fail_inode:
iput(inode);
-bool pstore_cannot_block_path(enum kmsg_dump_reason reason)
+/
+ * Should pstore_dump() wait for a concurrent pstore_dump()? If
+ * not, the current pstore_dump() will report a failure to dump
+ * and return.
+ */
+static bool pstore_cannot_wait(enum kmsg_dump_reason reason)
{|}
  -* In NMI path, pstore shouldn’t be blocked
  - * regardless of reason.
  -*/
  +/* In NMI path, pstore shouldn’t block regardless of reason. */
  if (in_nmi())
     return true;
}
switch (reason) {
  /* In panic case, other cpus are stopped by smp_send_stop(). */
  case KMSG_DUMP_PANIC:
    /* Emergency restart shouldn’t be blocked by spin lock. */
    /* Emergency restart shouldn’t be blocked. */
    case KMSG_DUMP_EMERG:
      return true;
    default:
      return false;
  }
-EXPORT_SYMBOL_GPL(pstore_cannot_block_path);

#ifdef CONFIG_PSTORE_ZLIB_COMPRESS
  /* Derived from logfs_compress() */
  @ @ -496,23 +497,23 @@
  unsigned long total = 0;
  const char*why;
  unsigned int part = 1;
  unsigned long flags = 0;
  -unsigned longflags = 0;
  -intis_locked;
  intret;

  why = get_reason_str(reason);
if (pstore_cannot_block_path(reason)) {
    is_locked = spin_trylock_irqsave(&psinfo->buf_lock, flags);
    if (!is_locked) {
        pr_err("pstore dump routine blocked in %s path, may corrupt error record\n", in_nmi() ? "NMI" : why);
        if (down_trylock(&psinfo->buf_lock)) {
            /* Failed to acquire lock: give up if we cannot wait. */
            if (pstore_cannot_wait(reason)) {
                pr_err("dump skipped in %s path: may corrupt error record\n", in_nmi() ? "NMI" : why);
                return;
            }
            if (down_interruptible(&psinfo->buf_lock)) {
                pr_err("could not grab semaphore?!\n");
                return;
            }
        } else {
            spin_lock_irqsave(&psinfo->buf_lock, flags);
            is_locked = 1;
        }
        oopscount++;
        while (total < kmsg_bytes) {
            char *dst;
            dst = big_oops_buf && is_locked) {
                dst = big_oops_buf;
                dst_size = big_oops_buf_sz;
            } else {
                dst_size, &dump_size)
        break;
    }
}

if (big_oops_buf && &is_locked) {
    if (big_oops_buf) {
        dst = big_oops_buf;
        dst_size = big_oops_buf_sz;
    } else {
        dst_size, &dump_size))
    break;
}

if (big_oops_buf && &is_locked) {
    if (big_oops_buf) {
        zipped_len = pstore_compress(dst, psinfo->buf,
        header_size + dump_size,
        psinfo->bufsize);
    total += record.size;
    part++;
    }
    if (is_locked)
    spin_unlock_irqrestore(&psinfo->buf_lock, flags);
static struct kmsg_dumper pstore_dumper = {
@@ -594,31 +595,14 @@
#ifdef CONFIG_PSTORE_CONSOLE
static void pstore_console_write(struct console *con, const char *s, unsigned c) {
-const char *e = s + c;
+struct pstore_record record;

-while (s < e) {
-struct pstore_record record;
-unsigned long flags;
-
-pstore_record_init(&record, psinfo);
-record.type = PSTORE_TYPE_CONSOLE;
-
-if (c > psinfo->bufsize)
-c = psinfo->bufsize;
+pstore_record_init(&record, psinfo);
+record.type = PSTORE_TYPE_CONSOLE;

-if (oops_in_progress) {
-if (!spin_trylock_irqsave(&psinfo->buf_lock, flags))
-break;
-} else {
-spin_lock_irqsave(&psinfo->buf_lock, flags);
-}
-record.buf = (char *)s;
-record.size = c;
-psinfo->write(&record);
-spin_unlock_irqrestore(&psinfo->buf_lock, flags);
-s += c;
-c = e - s;
-}
+pstore_record_init(&record, psinfo);
+record.type = PSTORE_TYPE_CONSOLE;

-psinfo->write_user = pstore_write_user_compat;
psinfo = psi;
mutex_init(&psinfo->read_mutex);
+sema_init(&psinfo->buf_lock, 1);
spin_unlock(&pstore_lock);

if (owner && !try_module_get(owner)) {
    return -EINVAL;
}

-allocate_buf_for_compression();
+if (psi->flags & PSTORE_FLAGS_DMESG)
+allocate_buf_forCompression();

if (pstore_is_mounted())
pstore_get_records(0);
--- linux-4.15.0.orig/fs/pstore/ram.c
+++ linux-4.15.0/fs/pstore/ram.c
@@ -161,12 +161,14 @@
    &data_type, &header_length) == 3) {
        +time->tv_nsec *= 1000;
        if (data_type == 'C')
            *compressed = true;
        else
            *compressed = false;
    } else if ( sscanf(buffer, RAMOOPS_KERNMSG_HDR "%lu.%lu-%c\n\n", &time->tv_sec, &time->tv_nsec, &data_type, &header_length) == 2) {
        +time->tv_nsec *= 1000;
        *compressed = false;
    } else {
        time->tv_sec = 0;
-@@ -297,6 +299,7 @@
        GFP_KERNEL);
        if (!tmp_prz)
            return -ENOMEM;
+prz = tmp_prz;
        if (prz)
            free_prz = true;

    while (cxt->ftrace_read_cnt < cxt->max_ftrace_cnt) {
@@ -319,7 +322,6 @@
        goto out;
    }
    record->id = 0;
@@ -433,6 +435,17 @@
    }
prz = cxt->dprzs[cxt->dump_write_cnt];

/*
 * Since this is a new crash dump, we need to reset the buffer in
 * case it still has an old dump present. Without this, the new dump
 * will get appended, which would seriously confuse anything trying
 * to check dump file contents. Specifically, ramoops_read_kmsg_hdr()
 * expects to find a dump header in the beginning of buffer data, so
 * we must to reset the buffer values, in order to ensure that the
 * header will be written to the beginning of the buffer.
 */
persistent_ram_zap(prz);
+
/* Build header and append record contents. */
hlen = ramoops_write_kmsg_hdr(prz, record);
size = record->size;
@@ -711,18 +724,15 @@
{
    struct device *dev = &pdev->dev;
    struct ramoops_platform_data *pdata = dev->platform_data;
+    struct ramoops_platform_data pdata_local;
    struct ramoops_context *cxt = &oops_cxt;
    size_t dump_mem_sz;
    phys_addr_t paddr;
    int err = -EINVAL;

    if (dev_of_node(dev) && !pdata) {
        pdata = devm_kzalloc(&pdev->dev, sizeof(*pdata), GFP_KERNEL);
        if (!pdata) {
            pr_err("cannot allocate platform data buffer\n");
            err = -ENOMEM;
            goto fail_out;
        }
+        pdata = &pdata_local;
+        memset(pdata, 0, sizeof(*pdata));
        err = ramoops_parse_dt(pdev, pdata);
        if (err < 0)
@@ -804,30 +814,36 @@
cxt->pstore.data = cxt;
    }  
        +pdata = &pdata_local;
        +memset(pdata, 0, sizeof(*pdata));

        err = ramoops_parse_dt(pdev, pdata);
        if (err < 0)
@@ -804,30 +814,36 @@
cxt->pstore.data = cxt;
/*
    - * Console can handle any buffer size, so prefer LOG_LINE_MAX. If we
    - * have to handle dumps, we must have at least record_size buffer. And
    - * for ftrace, bufsize is irrelevant (if bufsize is 0, buf will be
    - * ZERO_SIZE_PTR).
    + * Prepare frontend flags based on which areas are initialized.
    + * For ramoops_init_przs() cases, the "max count" variable tells

    */
if (cxt->console_size)
    cxt->pstore.bufsize = 1024; /* LOG_LINE_MAX */
-cxt->pstore.bufsize = max(cxt->record_size, cxt->pstore.bufsize);
-cxt->pstore.buf = kmalloc(cxt->pstore.bufsize, GFP_KERNEL);
-if (!cxt->pstore.buf) {
    -pr_err("cannot allocate pstore buffer\n");
    -err = -ENOMEM;
    -goto fail_clear;
    -
    -spin_lock_init(&cxt->pstore.buf_lock);
    -
    -cxt->pstore.flags = PSTORE_FLAGS_DMESG;
+    cxt->pstore.flags = 0;
+    -if (cxt->max_dump_cnt)
+        cxt->pstore.flags |= PSTORE_FLAGS_DMESG;
    if (cxt->console_size)
        cxt->pstore.flags |= PSTORE_FLAGS_CONSOLE;
-if (cxt->ftrace_size)
+    -if (cxt->max_ftrace_cnt)
+        cxt->pstore.flags |= PSTORE_FLAGS_FTRACE;
    if (cxt->pmsg_size)
        cxt->pstore.flags |= PSTORE_FLAGS_PMSG;
    +/*
        + * Since bufsize is only used for dmesg crash dumps, it
        + * must match the size of the dprz record (after PRZ header
        + * and ECC bytes have been accounted for).
        + */
        +if (cxt->pstore.flags & PSTORE_FLAGS_DMESG) {
            +cxt->pstore.bufsize = cxt->dprzs[0]->buffer_size;
            +cxt->pstore.buf = kzalloc(cxt->pstore.bufsize, GFP_KERNEL);
            +if (!cxt->pstore.buf) {
                +pr_err("cannot allocate pstore crash dump buffer\n");
                +err = -ENOMEM;
                +goto fail_clear;
                +
            }
            +}
        +}
        +
    err = pstore_register(&cxt->pstore);
    if (err) {
        pr_err("registering with pstore failed\n");
        @@ -896,8 +912,22 @@
            ,
        ];
    }
-static void ramoops_register_dummy(void)
+static inline void ramoops_unregister_dummy(void)
+{
+platform_device_unregister(dummy);
+dummy = NULL;
+
+kfree(dummy_data);
+dummy_data = NULL;
+
+
+static void __init ramoops_register_dummy(void)
{
+/*
 + * Prepare a dummy platform data structure to carry the module
 + * parameters. If mem_size isn't set, then there are no module
 + * parameters, and we can skip this.
 + */
 if (!mem_size)
 return;

@@ -930,21 +960,28 @@
 if (IS_ERR(dummy)) {
 pr_info("could not create platform device: %ld\n",
 PTR_ERR(dummy));
+dummy = NULL;
+ramoops_unregister_dummy();
 }
 }

static int __init ramoops_init(void)
{
+int ret;
+
+ramoops_register_dummy();
-return platform_driver_register(&ramoops_driver);
+ret = platform_driver_register(&ramoops_driver);
+if (ret != 0)
+ramoops_unregister_dummy();
+
+return ret;
}
postcore_initcall(ramoops_init);

static void __exit ramoops_exit(void)
{
 platform_driver_unregister(&ramoops_driver);
-platform_device_unregister(dummy);
-kfree(dummy_data);
ramoops_unregister_dummy();
}
module_exit(ramoops_exit);

--- linux-4.15.0.orig/fs/pstore/ram_core.c
+++ linux-4.15.0/fs/pstore/ram_core.c
@@ -421,7 +421,12 @@
vaddr = vmap(pages, page_count, VM_MAP, prot);
kfree(pages);

return vaddr;
+/*
+ * Since vmap() uses page granularity, we must add the offset
+ * into the page here, to get the byte granularity address
+ * into the mapping to represent the actual "start" location.
+ */
+return vaddr + offset_in_page(start);
}

static void *persistent_ram_iomap(phys_addr_t start, size_t size,
@@ -440,6 +445,11 @@
else
va = ioremap_wc(start, size);
+/*
+ * Since request_mem_region() and ioremap() are byte-granularity
+ * there is no need handle anything special like we do when the
+ * vmap() case in persistent_ram_vmap() above.
+ */
return va;
}

@@ -460,7 +470,7 @@
return -ENOMEM;
}

-prz->buffer = prz->vaddr + offset_in_page(start);
+prz->buffer = prz->vaddr;
prz->buffer_size = size - sizeof(struct persistent_ram_buffer);

return 0;
@@ -478,6 +488,11 @@
sig ^= PERSISTENT_RAM_SIG;

if (prz->buffer->sig == sig) {
+if (buffer_size(prz) == 0) { 
+pr_debug("found existing empty buffer\n");
+return 0;
}
if (buffer_size(prz) > prz->buffer_size ||
    buffer_start(prz) > buffer_size(prz))
pr_info("found existing invalid buffer, size %zu, start %zu\n", @@ -507,7 +522,8 @@

    if (prz->vaddr) {
        if (pfn_valid(prz->paddr >> PAGE_SHIFT)) {
            -vunmap(prz->vaddr);
            +/* We must vunmap() at page-granularity. */
            +vunmap(prz->vaddr - offset_in_page(prz->paddr));
        } else {
            iounmap(prz->vaddr);
            release_mem_region(prz->paddr, prz->size);
        }
    } else {
        include <linux/buffer_head.h>
        include "qnx4.h"

        /*
         * A qnx4 directory entry is an inode entry or link info
         * depending on the status field in the last byte. The
         * first byte is where the name start either way, and a
         * zero means it's empty.
         *+
         * Also, due to a bug in gcc, we don't want to use the
         * real (differently sized) name arrays in the inode and
         * link entries, but always the 'de_name[]' one in the
         * fake struct entry.
         *+
         * See
         *+
         *  https://gcc.gnu.org/bugzilla/show_bug.cgi?id=99578#c6
         *+
         * for details, but basically gcc will take the size of the
         * 'name' array from one of the used union entries randomly.
         *+
         * This use of 'de_name[]' (48 bytes) avoids the false positive
         * warnings that would happen if gcc decides to use 'inode.di_name'
         * (16 bytes) even when the pointer and size were to come from
         * 'link.dl_name' (48 bytes).
         *+
         * In all cases the actual name pointer itself is the same, it's
         * only the gcc internal 'what is the size of this field' logic
         * that can get confused.
         */
union qnx4_directory_entry {
  struct {
    const char de_name[48];
    u8 de_pad[15];
    u8 de_status;
  };
  struct qnx4_inode_entry inode;
  struct qnx4_link_info link;
};

static int qnx4_readdir(struct file *file, struct dir_context *ctx) {
  struct inode *inode = file_inode(file);
  unsigned int offset;
  struct buffer_head *bh;
  struct qnx4_inode_entry *de;
  struct qnx4_link_info *le;
  unsigned long blknum;
  int ix, ino;
  int size;
  @ @ -38.27 +73.27 @ @

  ix = (ctx->pos >> QNX4_DIR_ENTRY_SIZE_BITS) % QNX4_INODES_PER_BLOCK;
  for (; ix < QNX4_INODES_PER_BLOCK; ix++, ctx->pos += QNX4_DIR_ENTRY_SIZE) {
    offset = ix * QNX4_DIR_ENTRY_SIZE;
    de = (struct qnx4_inode_entry *) (bh->b_data + offset);
    if (!de->di_fname[0])
      de = (union qnx4_directory_entry *) (bh->b_data + offset);
    if (!de->de_name[0])
      continue;
    if (!(de->de_status & (QNX4_FILE_USED|QNX4_FILE_LINK)))
      continue;
    if (!(de->de_status & QNX4_FILE_LINK))
      size = sizeof(de->inode.di_fname);
    ino = blknum * QNX4_INODES_PER_BLOCK + ix - 1;
    size = strnlen(de->di_fname, size);
    if (!(de->de_status & QNX4_FILE_LINK))
      le = (struct qnx4_link_info*)de;
-ino = (le32_to_cpu(le->dl_inode_blk) - 1) *
+} else {
+size = sizeof(de->link.dl_fname);
+ino = (le32_to_cpu(de->link.dl_inode_blk) - 1) *
QNX4_INODES_PER_BLOCK +
-le->dl_inode_ndx;
+de->link.dl_inode_ndx;
}
-if (!dir_emit(ctx, de->di_fname, size, ino, DT_UNKNOWN)) {
+size = strlen(de->de_name, size);
+QNX4DEBUG(KERN_INFO "qnx4_readdir:%.*s\n", size, name));
+if (!dir_emit(ctx, de->de_name, size, ino, DT_UNKNOWN)) {
 brelse(bh);
 return 0;
}
--- linux-4.15.0.orig/fs/quota/dquot.c
+++ linux-4.15.0/fs/quota/dquot.c
@@ -491,7 +491,7 @@
 mutex_lock(&dquot->dq_lock);
 /* Check whether we are not racing with some other dqget() */
 -if (atomic_read(&dquot->dq_count) > 1)
 +if (dquot_is_busy(dquot))
 goto out_dqlock;
 if (dqopt->ops[dquot->dq_id.type]->release_dqblk) {
 ret = dqopt->ops[dquot->dq_id.type]->release_dqblk(dquot);
@@ -617,7 +617,7 @@
 /* Write all dquot structures to quota files */
 int dquot_writeback_dquots(struct super_block *sb, int type)
 {
-struct list_head *dirty;
+struct list_head dirty;
 struct dquot *dquot;
 struct quota_info *dqopt = sb_dqopt(sb);
 int cnt;
@@ -631,9 +631,10 @@
 if (!sb_has_quota_active(sb, cnt))
 continue;
 spin_lock(&dq_list_lock);
-dirty = &dqopt->info[cnt].dqi_dirty_list;
-while (!list_empty(dirty)) {
-dquot = list_first_entry(dirty, struct dquot,
+/* Move list away to avoid livelock. */
+list_replace_init(&dqopt->info[cnt].dqi_dirty_list, &dirty);
+while (!list_empty(&dirty)) {
+dquot = list_first_entry(&dirty, struct dquot,
 dq_dirty);
WARN_ON(!test_bit(DQ_ACTIVE_B, &dquot->dq_flags));
@ @ -982.6 +983.7 @@
* later.
*/
old_inode = inode;
+cond_resched();
spin_lock(&sb->s_inode_list_lock);
}
spin_unlock(&sb->s_inode_list_lock);
@ @ -1996.8 +1998.8 @@
 &warn_to[cnt]);
if (ret)
go to over_quota;
-re = dquot_add_space(transfer_to[cnt], cur_space, rsv_space, 0,
- &warn_to[cnt]);
+ret = dquot_add_space(transfer_to[cnt], cur_space, rsv_space,
+ DQUOT_SPACE_WARN, &warn_to[cnt]);
if (ret) {
spin_lock(&transfer_to[cnt]->dq_dqb_lock);
dquot_decr_inodes(transfer_to[cnt], inode_usage);
@ @ -2855.68 +2857.73 @@
static int do_proc_dqstats(struct ctl_table *table, int write,
   void __user *buffer, size_t *lenp, loff_t *ppos)
{
-unsigned int type = (int *)table->data - dqstats.stat;
+unsigned int type = (unsigned long *)table->data - dqstats.stat;
+s64 value = percpu_counter_sum(&dqstats.counter[type]);
+
+/* Filter negative values for non-monotonic counters */
+if (value < 0 && (type == DQST_ALLOC_DQUOTS ||
+ type == DQST_FREE_DQUOTS))
+ value = 0;

/* Update global table */
-dqstats.stat[type] =
- percpu_counter_sum_positive(&dqstats.counter[type]);
-return proc_dointvec(table, write, buffer, lenp, ppos);
+dqstats.stat[type] = value;
+return proc_doulongvec_minmax(table, write, buffer, lenp, ppos);
}

static struct ctl_table fs_dqstats_table[] = {
{
 .proccanal = "lookups",
 .data = &dqstats.stat[DQST_LOOKUPS],
 .maxlen = sizeof(int),
+.maxlen = sizeof(unsigned long),
 .mode = 0444,
.proc_handler= do_proc_dqstats,
},
{ .procname= "drops",
.data= &dqstats.stat[DQST_DROPS],
.maxlen= sizeof(int),
+.maxlen= sizeof(unsigned long),
.mode= 0444,
.proc_handler= do_proc_dqstats,
},
{ .procname= "reads",
.data= &dqstats.stat[DQST_READS],
-.maxlen= sizeof(int),
+.maxlen= sizeof(unsigned long),
.mode= 0444,
.proc_handler= do_proc_dqstats,
},
{ .procname= "writes",
.data= &dqstats.stat[DQST_WRITES],
-.maxlen= sizeof(int),
+.maxlen= sizeof(unsigned long),
.mode= 0444,
.proc_handler= do_proc_dqstats,
},
{ .procname= "cache_hits",
.data= &dqstats.stat[DQST_CACHE_HITS],
-.maxlen= sizeof(int),
+.maxlen= sizeof(unsigned long),
.mode= 0444,
.proc_handler= do_proc_dqstats,
},
{ .procname= "allocated_dquot",
.data= &dqstats.stat[DQST_ALLOC_DQUOTS],
-.maxlen= sizeof(int),
+.maxlen= sizeof(unsigned long),
.mode= 0444,
.proc_handler= do_proc_dqstats,
},
{ .procname= "free_dquot",
.data= &dqstats.stat[DQST_FREE_DQUOTS],
-.maxlen= sizeof(int),
+.maxlen= sizeof(unsigned long),
.mode= 0444,
static int check_quotactl_permission(struct super_block *sb, int type, int cmd, qid_t id)
@@ -703,6 +704,7 @@
      type = array_index_nospec(type, MAXQUOTAS);
    /*
     * Quota not supported on this fs? Check this before s_quota_types
@@ -791,7 +793,8 @@
    /* Return true if quotactl command is manipulating quota on/off state */
    static bool quotactl_cmd_onoff(int cmd)
    {
@@ -807,7 +810,7 @@
    if (IS_ERR(tmp))
        return ERR_CAST(tmp);
    -bdev = lookup_bdev(tmp->name);
@@ -873,7 +876,9 @@
    if (IS_ERR(bdev))
        return ERR_CAST(bdev);
    --- linux-4.15.0.orig/fs/quota/quota_tree.c
memset(buf, 0, info->dqi_usable_bs);
return sb->s_op->quota_read(sb, info->dqi_type, buf,
- info->dqi_usable_bs, blk << info->dqi_blocksize_bits);
+ info->dqi_usable_bs, (loff_t)blk << info->dqi_blocksize_bits);
}

static ssize_t write_blk(struct qtree_mem_dqinfo *info, uint blk, char *buf)
@@ -70,7 +70,7 @@
    if (ret != info->dqi_usable_bs) {
        quota_error(sb, "dquota write failed");
        if (ret >= 0)
-@ @ -283,7 +283,7 @@
+    blk);
goto out_buf;
    } -dquot->dq_off = (blk << info->dqi_blocksize_bits) +
+    dquot->dq_off = ((loff_t)blk << info->dqi_blocksize_bits) +
    sizeof(struct qt_disk_dqdbheader) +
    i * info->dqi_entry_size;
    kfree(buf);
@@ -558,7 +558,7 @@
    ret = -EIO;
    goto out_buf;
 } else {
-    ret = (blk << info->dqi_blocksize_bits) + sizeof(struct
+    ret = ((loff_t)blk << info->dqi_blocksize_bits) + sizeof(struct
+        qt_disk_dqdbheader) + i * info->dqi_entry_size;
    }
out_buf:
--- linux-4.15.0.orig/fs/quota/quota_v2.c
+++ linux-4.15.0/fs/quota/quota_v2.c
@@ -158,7 +158,31 @@
    qinfo->dqi_entry_size = sizeof(struct v2r1_disk_dqblk);
    qinfo->dqi_ops = &v2r1_qtree_ops;
    }
+ret = -EUCLEAN;
+/* Some sanity checks of the read headers... */
+if ((loff_t)qinfo->dqi_blocks << qinfo->dqi_blocksize_bits >
+    i_size_read(sb_dqopt(sb)->files[type])) {
+    quota_error(sb, "Number of blocks too big for quota file size (%llu > %llu).",
+ (loff_t)qinfo->dqi_blocks << qinfo->dqi_blocksize_bits,
+ i_size_read(sb_dqopt(sb)->files[type]));
+ goto out_free;
+ }
+ if (qinfo->dqi_free_blk >= qinfo->dqi_blocks) {
+ quota_error(sb, "Free block number too big (%u >= %u).",
+ qinfo->dqi_free_blk, qinfo->dqi_blocks);
+ goto out_free;
+ }
+ if (qinfo->dqi_free_entry >= qinfo->dqi_blocks) {
+ quota_error(sb, "Block with free entry too big (%u >= %u).",
+ qinfo->dqi_free_entry, qinfo->dqi_blocks);
+ goto out_free;
+ }
+ ret = 0;
+ out_free:
+ if (ret)
+ kfree(info->dqi_priv);
+ info->dqi_priv = NULL;
+ }
+ out:
+ up_read(&dqopt->dqio_sem);
+ return ret;
+ }
+ nr = find_get_pages(inode->i_mapping, &pgoff, lpages, pages);
+ nr = find_get_pages_contig(inode->i_mapping, pgoff, lpages, pages);
+ if (nr != lpages)
+ goto out_free_pages; /* leave if some pages were missing */
+
+ }
static ssize_t new_sync_write(struct file *filp, const char __user *buf, size_t len, loff_t *ppos)
{
    return -EINVAL;
}

vfs_readf_t vfs_readf(struct file *file)
{
    const struct file_operations *fop = file->f_op;
    if (fop->read)
        return fop->read;
    if (fop->read_iter)
        return new_sync_read;
    return ERR_PTR(-ENOSYS);
}

EXPORT_SYMBOL_GPL(vfs_readf);

vfs_writef_t vfs_writef(struct file *file)
{
    const struct file_operations *fop = file->f_op;
    if (fop->write)
        return fop->write;
    if (fop->write_iter)
        return new_sync_write;
    return ERR_PTR(-ENOSYS);
}

EXPORT_SYMBOL_GPL(vfs_writef);

ssize_t __kernel_write(struct file *file, const void *buf, size_t count, loff_t *pos)
{
    mm_segment_t old_fs;
    return ret;
}

EXPORT_SYMBOL_GPL(vfs_write);

static inline loff_t file_pos_read(struct file *file)
{
    return file->f_mode & FMODE_STREAM ? 0 : file->f_pos;
}

static inline void file_pos_write(struct file *file, loff_t pos)
SYSCALL_DEFINE3(read, unsigned int, fd, char __user *, buf, size_t, count)
@@ -1214,6 +1241,9 @@
    const struct compat_iovec __user *,vec,
    unsigned long, vlen, loff_t, pos, rwf_t, flags)
{
+    if (pos == -1)
+        return do_compat_readv(fd, vec, vlen, flags);
+    return do_compat_preadv64(fd, vec, vlen, pos, flags);
} #endif
@@ -1320,6 +1350,9 @@
    const struct compat_iovec __user *,vec,
    unsigned long, vlen, loff_t, pos, rwf_t, flags)
{
+    if (pos == -1)
+        return do_compat_writev(fd, vec, vlen, flags);
+    return do_compat_pwritev64(fd, vec, vlen, pos, flags);
} #endif
@@ -1681,6 +1714,34 @@
        return security_file_permission(file, write ? MAY_WRITE : MAY_READ);
    }
+/*
+ * Ensure that we don’t remap a partial EOF block in the middle of something
+ * else. Assume that the offsets have already been checked for block
+ * alignment.
+ *
+ * For deduplication we always scale down to the previous block because we
+ * can’t meaningfully compare post-EOF contents.
+ *
+ * For clone we only link a partial EOF block above the destination file's EOF.
+ */
+static int generic_remap_check_len(struct inode *inode_in,
+    struct inode *inode_out,
+    loff_t pos_out,
+    u64 *len,
+    bool is_dedupe)
+{ u64 blkmask = i_blocksize(inode_in) - 1;
+ if ((len & blkmask) == 0)
+ return 0;
+
+ if (is_dedupe)
+ len &= ~blkmask;
+ else if (pos_out + *len < i_size_read(inode_out))
+ return -EINVAL;
+
+ return 0;
+
*/

/*
 * Check that the two inodes are eligible for cloning, the ranges make
 * @ @ -1787,12 +1848,17 @ @
 * return -EBADE;
 */

+ ret = generic_remap_check_len(inode_in, inode_out, pos_out, len,
+ is_dedupe);
+ if (ret)
+ return ret;
+
return 1;
}

EXPORT_SYMBOL(vfs_clone_file_prep_inodes);

-int vfs_clone_file_range(struct file *file_in, loff_t pos_in,
- struct file *file_out, loff_t pos_out, u64 len)
+int do_clone_file_range(struct file *file_in, loff_t pos_in,
+ struct file *file_out, loff_t pos_out, u64 len)
 {
 struct inode *inode_in = file_inode(file_in);
 struct inode *inode_out = file_inode(file_out);
 @ @ -1839,12 +1905,22 @ @

 return ret;
 }

+EXPORT_SYMBOL(do_clone_file_range);
 +
+int vfs_clone_file_range(struct file *file_in, loff_t pos_in,
+ struct file *file_out, loff_t pos_out, u64 len)
+{
+ int ret;
+
+ file_start_write(file_out);
+ ret = do_clone_file_range(file_in, pos_in, file_out, pos_out, len);
+ file_end_write(file_out);
+return ret;
+
EXPORT_SYMBOL(vfs_clone_file_range);

-/*
- * Read a page's worth of file data into the page cache. Return the page
- * locked.
- */
+/* Read a page's worth of file data into the page cache. */
static struct page *vfs_dedupe_get_page(struct inode *inode, loff_t offset)
{
    struct address_space *mapping;
    put_page(page);
    return ERR_PTR(-EIO);
}

/*
 * Lock two pages, ensuring that we lock in offset order if the pages are from
 * the same file.
 */
+static void vfs_lock_two_pages(struct page *page1, struct page *page2)
+{
+    /* Always lock in order of increasing index. */
+    if (page1->index > page2->index)
+        swap(page1, page2);
+    lock_page(page1);
+    if (page1 != page2)
+        lock_page(page2);
+}
+    
+/* Unlock two pages, being careful not to unlock the same page twice. */
+static void vfs_unlock_two_pages(struct page *page1, struct page *page2)
+{
+    unlock_page(page1);
+    if (page1 != page2)
+        unlock_page(page2);
+}
+
+/*
 * Compare extents of two files to see if they are the same.
 * Caller must have locked both inodes to prevent write races.
 */
dest_page = vfs_dedupe_get_page(dest, destoff);
if (IS_ERR(dest_page)) {
    error = PTR_ERR(dest_page);
    unlock_page(src_page);
    put_page(src_page);
    goto out_error;
}

vfs_lock_two_pages(src_page, dest_page);
/*
 * Now that we've locked both pages, make sure they're still
 * mapped to the file data we're interested in. If not,
 * someone is invalidating pages on us and we lose.
 */
if (!PageUptodate(src_page) || !PageUptodate(dest_page) ||
    src_page->mapping != src->i_mapping ||
    dest_page->mapping != dest->i_mapping) {
    same = false;
    goto unlock;
}

src_addr = kmap_atomic(src_page);
dest_addr = kmap_atomic(dest_page);

kunmap_atomic(dest_addr);
kunmap_atomic(src_addr);
unlock_page(dest_page);
unlock_page(src_page);
unlock:
+vfs_unlock_two_pages(src_page, dest_page);
put_page(dest_page);
put_page(src_page);

--- linux-4.15.0.orig/fs/readdir.c
+++ linux-4.15.0/fs/readdir.c
@@ -65,6 +65,40 @@
EXPORT_SYMBOL(iterate_dir);
/*
 * POSIX says that a dirent name cannot contain NULL or a '/'.
 */
+ * It's not 100% clear what we should really do in this case.
+ * The filesystem is clearly corrupted, but returning a hard
+ * error means that you now don't see any of the other names
+ * either, so that isn't a perfect alternative.
+ *
+ * And if you return an error, what error do you use? Several
+ * filesystems seem to have decided on EUCLEAN being the error
+ * code for EFSCORRUPTED, and that may be the error to use. Or
+ * just EIO, which is perhaps more obvious to users.
+ *
+ * In order to see the other file names in the directory, the
+ * caller might want to make this a "soft" error: skip the
+ * entry, and return the error at the end instead.
+ *
+ * Note that this should likely do a "memchr(name, 0, len)"
+ * check too, since that would be filesystem corruption as
+ * well. However, that case can't actually confuse user space,
+ * which has to do a strlen() on the name anyway to find the
+ * filename length, and the above "soft error" worry means
+ * that it's probably better left alone until we have that
+ * issue clarified.
+ */
+
+static int verify_dirent_name(const char *name, int len)
+{
+    if (!len)
+        return -EIO;
+    if (memchr(name, '/', len))
+        return -EIO;
+    return 0;
+}
+
+/*
* Traditional linux readdir() handling..
* "count=1" is a special case, meaning that the buffer is one
@@ -98,6 +132,9 @@

if (buf->result)
    return -EINVAL;
+buf->result = verify_dirent_name(name, namlen);
+if (buf->result < 0)
+    return buf->result;
    d_ino = ino;
    if (sizeof(d_ino) < sizeof(ino) && d_ino != ino) {
        buf->result = -EOVERFLOW;
@@ -173,6 +210,9 @@
        int reclen = ALIGN(offsetof(struct linux_dirent, d_name) + namlen + 2,
                        sizeof(long));
+
+buf->error = verify_dirent_name(name, namlen);
+if (unlikely(buf->error))
+return buf->error;
buf->error = -EINVAL; /* only used if we fail.. */
if (reclen > buf->count)
return -EINVAL;
@@ -259,6 +299,9 @@
int reclen = ALIGN(offsetof(struct linux_dirent64, d_name) + namlen + 1,
    sizeof(u64));

+buf->error = verify_dirent_name(name, namlen);
+if (unlikely(buf->error))
+return buf->error;
+return reclen > buf->count) 
return -EINVAL;
@@ -351,6 +394,9 @@

if (buf->result)
return -EINVAL;
+buf->result = verify_dirent_name(name, namlen);
+if (buf->result < 0)
+return buf->result;

 d_ino = ino;
if (sizeof(d_ino) < sizeof(ino) && d_ino != ino) {
buf->result = -EOVERFLOW;
--- linux-4.15.0.orig/fs/reiserfs/inode.c
+++ linux-4.15.0/fs/reiserfs/inode.c
@@ -1552,11 +1552,7 @@
* set version 1, version 2 could be used too, because stat data
* key is the same in both versions
*/
-    key.version = KEY_FORMAT_3_5;
-    key.on_disk_key.k_dir_id = dirino;
-    key.on_disk_key.k_objectid = inode->i_ino;
-    key.on_disk_key.k_offset = 0;
-    key.on_disk_key.k_type = 0;
+    _make_cpu_key(&key, KEY_FORMAT_3_5, dirino, inode->i_ino, 0, 0, 3);

 /* look for the object's stat data */
retval = search_item(inode->i_sb, &key, &path_to_sd);
@@ -2096,6 +2092,15 @@
goto out_inserted_sd;
}

+/*
+ * Mark it private if we're creating the privroot
+ * or something under it.
+ */
+if (IS_PRIVATE(dir) || dentry == REISERFS_SB(sb)->priv_root) 
{
inode->i_flags |= S_PRIVATE;
inode->i_opflags &= ~IOP_XATTR;
+
+
if (reiserfs_posixacl(inode->i_sb)) {
    reiserfs_write_unlock(inode->i_sb);
    retval = reiserfs_inherit_default_acl(th, dir, dentry, inode);
    @@ -2110,8 +2115,7 @@
    reiserfs_write_unlock(inode->i_sb, "jdm-13090",
    "ACLs aren't enabled in the fs, 
    "but vfs thinks they are!");
-} else if (IS_PRIVATE(dir))
-    inode->i_flags |= S_PRIVATE;
+
if (security->name) {
    reiserfs_write_unlock(inode->i_sb);
    @@ -2156,7 +2160,8 @@
    out_inserted_sd:
    clear_nlink(inode);
    th->t_trans_id = 0;/* so the caller can't use this handle later */
    -unlock_new_inode(inode); /* OK to do even if we hadn't locked it */
-+if (inode->i_state & I_NEW)
+    unlock_new_inode(inode);
    iput(inode);
    return err;
}
--- linux-4.15.0.orig/fs/reiserfs/journal.c
+++ linux-4.15.0/fs/reiserfs/journal.c
@@ -2643,7 +2643,7 @@
    if (IS_ERR(journal->j_dev_bd)) {
        result = PTR_ERR(journal->j_dev_bd);
        journal->j_dev_bd = NULL;
-+    reiserfs_warning(super, "sh-457",
+    "journal_init_dev: Cannot open '%s': %i",
    jdev_name, result);
    return result;
    @@ -2769,6 +2769,20 @@
goto free_and_return;
}

+/*
+ * Sanity check to see if journal first block is correct.
+ * If journal first block is invalid it can cause
+ * zeroing important superblock members.
+ */
+if (!SB_ONDISK_JOURNALDEVICE(sb) &&
SB_ONDISK_JOURNAL_1st_BLOCK(sb) < SB_JOURNAL_1st_RESERVED_BLOCK(sb)) {
+reiserfs_warning(sb, "journal-1393",
+"journal 1st super block is invalid: 1st reserved block %d, but actual 1st block is %d",
+SB_JOURNAL_1st_RESERVED_BLOCK(sb),
+SB_ONDISK_JOURNAL_1st_BLOCK(sb));
+goto free_and_return;
+
if (journal_init_dev(sb, journal, j_dev_name) != 0) {
reiserfs_warning(sb, "sh-462",
"unable to initialize journal device");
--- linux-4.15.0.orig/fs/reiserfs/namei.c
+++ linux-4.15.0/fs/reiserfs/namei.c
@@ -377,10 +377,13 @@
/*
 * Propagate the private flag so we know we're
- * in the priv tree
+ * in the priv tree. Also clear IOP_XATTR
+ * since we don't have xattrs on xattr files.
*/
-if (IS_PRIVATE(dir))
+if (IS_PRIVATE(dir)) {
  inode->i_flags |= S_PRIVATE;
  inode->i_opflags &= ~IOP_XATTR;
+}
} 
reiserfs_write_unlock(dir->i_sb);
if (retval == IO_ERROR) {
@@ -687,8 +690,7 @@
reiserfs_update_inode_transaction(inode);
reiserfs_update_inode_transaction(dir);

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
retval = journal_end(&th);

out_failed:
@@ -771,8 +773,7 @@
goto out_failed;
}

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
retval = journal_end(&th);
out_failed:
@@ -871,8 +872,7 @@
 /* the above add_entry did not update dir's stat data */
 reiserfs_update_sd(&th, dir);

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
retval = journal_end(&th);
out_failed:
reiserfs_write_unlock(dir->i_sb);
@@ -1187,8 +1187,7 @@
goto out_failed;
}

-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
retval = journal_end(&th);
out_failed:
reiserfs_write_unlock(parent_dir->i_sb);
--- linux-4.15.0.orig/fs/reiserfs/prints.c
+++ linux-4.15.0/fs/reiserfs/prints.c
@@ -76,83 +76,99 @@
}
/* %k */
-
+static void sprintf_cpu_key(char *buf, struct cpu_key *key)
+static int scnprintf_cpu_key(char *buf, size_t size, struct cpu_key *key)
{
if (key)
-sprintf(buf, "[%d %d %s %s]", le32_to_cpu(key->k_dir_id),
-le32_to_cpu(key->k_objectid), le_offset(key),
-le_type(key));
+return scnprintf(buf, size, "[%d %d %s %s]",
 + le32_to_cpu(key->k_dir_id),
 + le32_to_cpu(key->k_objectid), le_offset(key),
 + le_type(key));
else
-sprintf(buf, "[NULL]");
+return scnprintf(buf, size, "[NULL]");
}
/* %K */
-
+static void sprintf_cpu_key(char *buf, struct cpu_key *key)
+static int scnprintf_cpu_key(char *buf, size_t size, struct cpu_key *key)
{
if (key)
-sprintf(buf, "[%d %d %s %s]", key->on_disk_key.k_dir_id,
-key->on_disk_key.k_objectid, reiserfs_cpu_offset(key),
-cpu_type(key));
+return scnprintf(buf, size, "[%d %d %s %s]",
+ key->on_disk_key.k_dir_id,
+ key->on_disk_key.k_objectid,
+ reiserfs_cpu_offset(key), cpu_type(key));
else
-sprintf(buf, "[NULL]");
+return scnprintf(buf, size, "[NULL]");
}

-static void sprintf_de_head(char *buf, struct reiserfs_de_head *deh)
+static int scnprintf_de_head(char *buf, size_t size,
+     struct reiserfs_de_head *deh)
{
if (deh)
-    sprintf(buf,
-        "[offset=%d dir_id=%d objectid=%d location=%d state=%04x]",
-        deh_offset(deh), deh_dir_id(deh), deh_objectid(deh),
-        deh_location(deh), deh_state(deh));
+    return scnprintf(buf, size,
+        "[offset=%d dir_id=%d objectid=%d location=%d state=%04x]",
+        deh_offset(deh), deh_dir_id(deh),
+        deh_objectid(deh), deh_location(deh),
+        deh_state(deh));
else
-sprintf(buf, "[NULL]");
+return scnprintf(buf, size, "[NULL]");
}

-static void sprintf_item_head(char *buf, struct item_head *ih)
+static int scnprintf_item_head(char *buf, size_t size, struct item_head *ih)
{
if (ih) {
    -strcpy(buf,
    -    (ih_version(ih) == KEY_FORMAT_3_6) ? "*3.6* " : "*3.5*");
-    sprintf_le_key(buf + strlen(buf), &(ih->ih_key));
-    sprintf(buf + strlen(buf), ", item_len %d, item_location %d, "
-        "free_space(entry_count) %d",
-        ih_item_len(ih), ih_location(ih), ih_free_space(ih));
+    char *p = buf;
+    char * const end = buf + size;
+    
+    p += scnprintf(p, end - p, "%s",
+        (ih_version(ih) == KEY_FORMAT_3_6) ?
+        "*3.6* " : "*3.5*");
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+ p += scnprintf_le_key(p, end - p, &ih->ih_key);
+ p += scnprintf(p, end - p,
+ " %d %d %d", item_len, item_location, free_space(entry_count));
+ ih_item_len(ih), ih_location(ih),
+ ih_free_space(ih));
+ return p - buf;
} else
- sprintf(buf, "[NULL]");
+ return scnprintf(buf, size, "[NULL]");
}

- static void sprintf_direntry(char *buf, struct reiserfs_dir_entry *de)
+ static int scnprintf_direntry(char *buf, size_t size,
+ struct reiserfs_dir_entry *de)
{ char name[20];
  memcpy(name, de->de_name, de->de_namelen > 19 ? 19 : de->de_namelen);
  name[de->de_namelen > 19 ? 19 : de->de_namelen] = 0;
- sprintf(buf, "%s==>[%d %d]", name, de->de_dir_id, de->de_objectid);
+ return scnprintf(buf, size, "%s==>[%d %d]",
+ name, de->de_dir_id, de->de_objectid);
}

- static void sprintf_block_head(char *buf, struct buffer_head *bh)
+ static int scnprintf_block_head(char *buf, size_t size, struct buffer_head *bh)
{ char dev[10], sizefmt[10];
  sprintf(buf, "level=%d, nr_items=%d, free_space=%d rdkey ",
- B_LEVEL(bh), B_NR_ITEMS(bh), B_FREE_SPACE(bh));
+ B_LEVEL(bh), B_NR_ITEMS(bh), B_FREE_SPACE(bh));
+ return scnprintf(buf, size,
+ "level=%d, nr_items=%d, free_space=%d rdkey ",
+ B_LEVEL(bh), B_NR_ITEMS(bh), B_FREE_SPACE(bh));
}

- static void sprintf_buffer_head(char *buf, struct buffer_head *bh)
+ static int scnprintf_buffer_head(char *buf, size_t size, struct buffer_head *bh)
{ char de[30], sizefmt[10];
  sprintf(buf,
- "dev %pg, size %zd, blocknr %llu, count %d, state 0x%lx, page %p, (%s, %s, %s),
- bh->b_bdev, bh->b_size,
- (unsigned long long)bh->b_blocknr, atomic_read(&(bh->b_count)),
- bh->b_state, bh->b_page,
- buffer_uptodate(bh) ? "UPTODATE" : "!UPTODATE",
- buffer_dirty(bh) ? "DIRTY" : "CLEAN",
- buffer_locked(bh) ? "LOCKED" : "UNLOCKED";
+ return scnprintf(buf, size,
+ "dev %pg, size %zd, blocknr %llu, count %d, state 0x%lx, page %p, (%s, %s, %s),
+ bh->b_bdev, bh->b_size,
+ (unsigned long long)bh->b_blocknr, atomic_read(&(bh->b_count)),
+ bh->b_state, bh->b_page,
+ buffer_uptodate(bh) ? "UPTODATE" : "!UPTODATE",
+ buffer_dirty(bh) ? "DIRTY" : "CLEAN",
- buffer_locked(bh) ? "LOCKED" : "UNLOCKED";
+ return scnprintf(buf, size,
```

+ "dev %pg, size %zd, blocknr %llu, count %d, state 0x%lx, page %p, (%s, %s, %s)",
+ bh->b_bdev, bh->b_size,
+ (unsigned long long)bh->b_blocknr,
+ atomic_read(&(bh->b_count)),
+ bh->b_state, bh->b_page,
+ buffer_upudate(bh) ? "UPTODATE" : "!UPTODATE",
+ buffer_dirty(bh) ? "DIRTY" : "CLEAN",
+ buffer_locked(bh) ? "LOCKED" : "UNLOCKED";
}

-static void sprintf_disk_child(char *buf, struct disk_child *dc)
+
+static int scnprintf_disk_child(char *buf, size_t size, struct disk_child *dc)
{  
-sprintf(buf, "[dc_number=%d, dc_size=%u]", dc_block_number(dc),
-  dc_size(dc));
+  return scnprintf(buf, size, "[dc_number=%d, dc_size=%u]",
+    dc_block_number(dc), dc_size(dc));
}

static char *is_there_reiserfs_struct(char *fmt, int *what)
@@ -189,55 +205,60 @@
char *fmt1 = fmt_buf;
char *k;
char *p = error_buf;
+char * const end = &error_buf[sizeof(error_buf)];
int what;

spin_lock(&error_lock);

-strcpy(fmt1, fmt);
+if (WARN_ON(strscpy(fmt_buf, fmt, sizeof(fmt_buf)) < 0)) {
+  strscpy(error_buf, "format string too long", end - error_buf);
+  goto out_unlock;
+}

while ((k = is_there_reiserfs_struct(fmt1, &what)) != NULL) {
* k = 0;

-p += vsprintf(p, fmt1, args);
+p += vscnprintf(p, end - p, fmt1, args);

switch (what) {
    case 'k':
-  sprintf_le_key(p, va_arg(args, struct reiserfs_key *));
+  p += scnprintf_le_key(p, end - p,
+    va_arg(args, struct reiserfs_key *));
    break;
    case 'K':

-printf_cpu_key(p, va_arg(args, struct cpu_key *));
+p += scnprintf_cpu_key(p, end - p,
+ va_arg(args, struct cpu_key *));
break;

case 'h':
-printf_item_head(p, va_arg(args, struct item_head *));
+p += scnprintf_item_head(p, end - p,
+ va_arg(args, struct item_head *));
break;

case 't':
-printf_direntry(p,
- va_arg(args,
-struct reiserfs_dir_entry *));
+p += scnprintf_direntry(p, end - p,
+va_arg(args, struct reiserfs_dir_entry *));
break;

case 'y':
-printf_disk_child(p,
- va_arg(args, struct disk_child *));
+p += scnprintf_disk_child(p, end - p,
+ va_arg(args, struct disk_child *));
break;

case 'z':
-printf_block_head(p,
- va_arg(args, struct buffer_head *));
+p += scnprintf_block_head(p, end - p,
+ va_arg(args, struct buffer_head *));
break;

case 'b':
-printf_buffer_head(p,
- va_arg(args, struct buffer_head *));
+p += scnprintf_buffer_head(p, end - p,
+ va_arg(args, struct buffer_head *));
break;

case 'a':
-printf_de_head(p,
- va_arg(args, struct reiserfs_de_head *));
+p += scnprintf_de_head(p, end - p,
+ va_arg(args, struct reiserfs_de_head *));
break;
}

-p += strlen(p);
fmt1 = k + 2;
}
-vsprintf(p, fmt1, args);
+p += vscnprintf(p, end - p, fmt1, args);
+out_unlock:
spin_unlock(&error_lock);

}
--- linux-4.15.0.orig/fs/reiserfs/reiserfs.h
+++ linux-4.15.0/fs/reiserfs/reiserfs.h
@@ -271,7 +271,7 @@
  struct mutex j_commit_mutex;
  unsigned int j_trans_id;
  -time_t j_timestamp;
+-time64_t j_timestamp; /* write-only but useful for crash dump analysis */
  struct reiserfs_list_bitmap *j_list_bitmap;
  struct reiserfs_journal_cnode *j_realblock;
@@ -1168,6 +1168,8 @@
 return bmap_nr > ((1LL << 16) - 1);
 }

+extern const struct xattr_handler *reiserfs_xattr_handlers[];
+
/*
 * this says about version of key of all items (but stat data) the
 * object consists of
--- linux-4.15.0.orig/fs/reiserfs/stree.c
+++ linux-4.15.0/fs/reiserfs/stree.c
@@ -387,6 +387,24 @@
 search_path->path_length = ILLEGAL_PATH_ELEMENT_OFFSET;
 }

+static int has_valid_deh_location(struct buffer_head *bh, struct item_head *ih)
+{
+  struct reiserfs_de_head *deh;
+  int i;
+  +
+  +deh = B_I_DEH(bh, ih);
+  +for (i = 0; i < ih_entry_count(ih); i++) {
+  +if (deh_location(&deh[i]) > ih_item_len(ih)) {
+  +reiserfs_warning(NULL, "reiserfs-5094",
+  +  "directory entry location seems wrong %h",
+  +  &deh[i]);
+  +return 0;
+  +}
+  +}
+  +
+  +return 1;
+  +}
+  +
static int is_leaf(char *buf, int blocksize, struct buffer_head *bh)
{
    struct block_head *blkh;
    "(second one): %h", ih);
    return 0;
}
+    if (is_direntry_le_ih(ih)) {
+        if (ih_item_len(ih) < (ih_entry_count(ih) * IH_SIZE)) {
+            reiserfs_warning(NULL, "reiserfs-5093",
+                "item entry count seems wrong %h",
+                ih);
+            return 0;
+        }
+        return has_valid_deh_location(bh, ih);
+    }

prev_location = ih_location(ih);
}

//@ -2250,7 +2277,8 @@
/* also releases the path */
unfix_nodes(&s_ins_balance);
#ifdef REISERQUOTA_DEBUG
-reiserfs_debug(th->t_super, REISERFS_DEBUG_CODE,
+if (inode)
+    reiserfs_debug(th->t_super, REISERFS_DEBUG_CODE,
    "reiserquota insert_item(): freeing %u id=%u type=%c",
    quota_bytes, inode->i_uid, head2type(ih));
#endif
--- linux-4.15.0.orig/fs/reiserfs/super.c
+++ linux-4.15.0/fs/reiserfs/super.c
//@ -629,6 +629,7 @@
reiserfs_write_unlock(s);
mutex_destroy(&REISERFS_SB(s)->lock);
destroy_workqueue(REISERFS_SB(s)->commit_wq);
+kfree(REISERFS_SB(s)->s_jdev);
kfree(s->s_fs_info);
s->s_fs_info = NULL;
}      "turned on.");
return 0;
}
+if (qf_names[qtype] !=
+  REISERFS_SB(s)->s_qf_names[qtype])
+kfree(qf_names[qtype]);
+qf_names[qtype] = NULL;
if (*arg) { /* Some filename specified? */
if (REISERFS_SB(s)->s_qf_names[qtype]
    && strcmp(REISERFS_SB(s)->s_qf_names[qtype],
    else
    *mount_options |= 1 << REISERFS_GRPQUOTA;
} else {
    -if (qf_names[qtype] !=
    -    REISERFS_SB(s)->s_qf_names[qtype])
    -kfree(qf_names[qtype]);
    -qf_names[qtype] = NULL;
    if (qtype == USRQUOTA)
    *mount_options &= ~(1 << REISERFS_USRQUOTA);
    else
    @ @ -1953.7 +1954.7 @ @
    if (!sbi->s_jdev) { @ @ -2052.6 +2053.8 @ @
        SWARN(silent, s, "", "Cannot allocate memory for 
        "journal device name");
        -goto error;
        +goto error_unlocked;
    }
    }
    #ifdef CONFIG_QUOTA
    @ @ -2082.6 +2085.14 @ @
    if (replay_only(s))
        goto error_unlocked;
    +s->s_xattr = reiserfs_xattr_handlers;
    +
    if (bdev_read_only(s->s_bdev) && !sb_rdonly(s)) {
        WARN(silent, s, "clm-7000",
            "Detected readonly device, marking FS readonly");
        @ @ -2241.6 +2252.7 @ @
        unlock_new_inode(root_inode);
    }
    +if (!S_ISDIR(root_inode->i_mode) || !inode_get_bytes(root_inode)) ||
    +    !root_inode->i_size) {
        SWARN(silent, s, "", "corrupt root inode, run fsck");
        +iput(root_inode);
        +errval = -EUCLEAN;
        +goto error;
        +}
    +
    s->s_root = d_make_root(root_inode);
    if (!s->s_root)
        goto error;
    @ @ -1292.10 +1297.6 @ @
kfree(qf_names[j]);


```c

#include <linux/fs.h>
#include <linux/reiserfs.h>
#include <linux/xattr.h>

void delete_xattr(struct xattr *xattr, struct fs_context *ctx)
{
    // Code...
}

```
err = reiserfs_readdir_inode(d_inode(dir), &buf.ctx);
if (err)
    break;
+if (buf.err) {
+    err = buf.err;
+    break;
+}
if (!buf.count)
    break;
for (i = 0; !err && i < buf.count && buf.dentries[i]; i++) {
    out_dir:
dput(dir);
    out:
    /* -ENODATA isn't an error */
    -if (err == -ENODATA)
    */
    + * -ENODATA: this object doesn't have any xattrs
    + * -EOPNOTSUPP: this file system doesn't have xattrs enabled on disk.
    + * Neither are errors
    */
    +if (err == -ENODATA || err == -EOPNOTSUPP)
        err = 0;
    return err;
}
dentry = xattr_lookup(inode, name, XATTR_REPLACE);
if (IS_ERR(dentry)) {
    err = PTR_ERR(dentry);
    return 0;
}
size = namelen + 1;
if (b->buf) {
    if (size > b->size) {
        b->pos = -ERANGE;
        return -ERANGE;
    }
    memcpy(b->buf + b->pos, name, namelen);
    b->buf[b->pos + namelen] = 0;
}
if (d_really_is_negative(dentry))
    return -EINVAL;

if (!dentry->d_sb->s_xattr ||
    get_inode_sd_version(d_inode(dentry)) == STAT_DATA_V1)
    return -EOPNOTSUPP;

if (!dentry->d_sb->s_xattr &&
    get_inode_sd_version(d_inode(dentry)) == STAT_DATA_V1)
    return -EOPNOTSUPP;

dir = open_xa_dir(d_inode(dentry), XATTR_REPLACE);
if (d_really_is_positive(dentry)) {
    d_inode(dentry)->i_flags |= S_PRIVATE;
    d_inode(dentry)->i_opflags &= ~IOP_XATTR;
    reiserfs_info(dentry->d_sb, "Created %s - reserved for xattr ",
        "storage: \n", PRIVROOT_NAME);
}

/* Actual operations that are exported to VFS-land */
-static const struct xattr_handler *reiserfs_xattr_handlers[] = {
+const struct xattr_handler *reiserfs_xattr_handlers[] = {
    #ifdef CONFIG_REISERFS_FS_XATTR
    &reiserfs_xattr_user_handler,
    &reiserfs_xattr_trusted_handler,
    #endif
if (!IS_ERR(dentry)) {
    REISERFS_SB(s)->priv_root = dentry;
    d_set_d_op(dentry, &xattr_lookup_poison_ops);
    if (d_really_is_positive(dentry))
        if (d_really_is_positive(dentry)) {
d_inode(dentry)->i_flags |= S_PRIVATE;
+d_inode(dentry)->i_opflags &= ~IOP_XATTR;
+
} else
 err = PTR_ERR(dentry);
inode_unlock(d_inode(s->s_root));
@@ -978,7 +1004,6 @@

 if (d_really_is_positive(privroot)) {
 -s->s_xattr = reiserfs_xattr_handlers;
inode_lock(d_inode(privroot));
 if (!REISERFS_SB(s)->xattr_root) {
 struct dentry *dentry;
 --- linux-4.15.0.orig/fs/reiserfs/xattr.h
+++ linux-4.15.0/fs/reiserfs/xattr.h
 @ @ -43,7 +43,7 @@

 static inline int reiserfs_xattrs_initialized(struct super_block *sb)
 { -return REISERFS_SB(sb)->priv_root != NULL;
 +return REISERFS_SB(sb)->priv_root && REISERFS_SB(sb)->xattr_root;
 }

 #define xattr_size(size) ((size) + sizeof(struct reiserfs_xattr_header))
 --- linux-4.15.0.orig/fs/reiserfs/xattr_acl.c
+++ linux-4.15.0/fs/reiserfs/xattr_acl.c
 @ @ -320,10 +320,8 @@
 * would be useless since permissions are ignored, and a pain because
 * it introduces locking cycles
 */
- if (IS_PRIVATE(dir)) {
-   inode->i_flags |= S_PRIVATE;
+ if (IS_PRIVATE(inode))
   goto apply_umask;
 -}

 err = posix_acl_create(dir, &inode->i_mode, &default_acl, &acl);
 if (err)
 --- linux-4.15.0.orig/fs/romfs/storage.c
+++ linux-4.15.0/fs/romfs/storage.c
 @ @ -221,10 +221,8 @@
 size_t limit;

 limit = romfs_maxsize(sb);
- if (pos >= limit)
+ if (pos >= limit || buflen > limit - pos)
   return -EIO;

---
-if ( buflen > limit - pos)
-buflen = limit - pos;

#ifdef CONFIG_ROMFS_ON_MTD
if (sb->s_mtd)
--- linux-4.15.0.orig/fs/select.c
+++ linux-4.15.0/fs/select.c
@@ -1002,10 +1002,9 @@
ret = do_sys_poll(ufds, nfds, to);

-if (ret == -EINTR) {
-restart_block->fn = do_restart_poll;
-reterr = -ERESTART_RESTARTBLOCK;
-}
+if (ret == -EINTR)
+ret = set_restart_fn(restart_block, do_restart_poll);
+
return ret;
}

@@ -1027,7 +1026,6 @@
struct restart_block *restart_block;

restart_block = &current->restart_block;
-restart_block->fn = do_restart_poll;
-restart_block->poll.ufds = ufds;
-restart_block->poll.nfds = nfds;

@@ -1038,7 +1036,7 @@
} else
restart_block->poll.has_timeout = 0;

-reterr = -ERESTART_RESTARTBLOCK;
+ret = set_restart_fn(restart_block, do_restart_poll);
+
return ret;
}

--- linux-4.15.0.orig/fs/seq_file.c
+++ linux-4.15.0/fs/seq_file.c
@@ -26,6 +26,9 @@
static void *seq_buf_alloc(unsigned long size)
{
+if (unlikely(size > MAX_RW_COUNT))
+return NULL;
+
return kvmalloc(size, GFP_KERNEL);
if (*ppos == 0)
    m->index = 0;
    m->version = 0;
    m->count = 0;
}

/* Don't assume *ppos is where we left it */
if (unlikely(*ppos != m->read_pos)) {
    /* Don't assume *ppos is where we left it */
    if (unlikely(*ppos != m->read_pos)) {
        --- linux-4.15.0.orig/fs/splice.c
        +++ linux-4.15.0/fs/splice.c
        @@ -332,8 +332,8 @@
        .get = generic_pipe_buf_get,
    }

- static int generic_pipe_buf_nosteal(struct pipe_inode_info *pipe,
-     struct pipe_buffer *buf)
+ int generic_pipe_buf_nosteal(struct pipe_inode_info *pipe,
+    struct pipe_buffer *buf)
    {
        return 1;
    }
}

/* Attempt to initiate a splice from pipe to file. */
/* Attempt to initiate a splice from pipe to file. */
- static long do_splice_from(struct pipe_inode_info *pipe, struct file *out,
-     loff_t *ppos, size_t len, unsigned int flags)
+ long do_splice_from(struct pipe_inode_info *pipe, struct file *out,
+     loff_t *ppos, size_t len, unsigned int flags)
    {
        ssize_t (*splice_write)(struct pipe_inode_info *, struct file *,
            loff_t *ppos, size_t len, unsigned int flags);
        @ @ -850,13 +850,14 @@

        return splice_write(pipe, out, ppos, len, flags);
    }
+EXPORT_SYMBOL_GPL(do_splice_from);

/* Attempt to initiate a splice from a file to a pipe.
   */
long do_splice_to(struct file *in, loff_t *ppos,
    struct pipe_inode_info *pipe, size_t len,
    unsigned int flags)
{
    ssize_t (*splice_read)(struct file *, loff_t *,
        struct pipe_inode_info *, size_t, unsigned int);
    return splice_read(in, ppos, pipe, len, flags);
}

EXPORT_SYMBOL_GPL(do_splice_to);

/**
 * splice_direct_to_actor - splices data directly between two non-pipes
 * @ @ -945,11 +947,17 @@
 * sd->flags &= ~SPLICE_F_NONBLOCK;
 * more = sd->flags & SPLICE_F_MORE;
 *
 * WARN_ON_ONCE(pipe->nrbufs != 0);
 * +
 * while (len) {
 * +unsigned int pipe_pages;
 * +loff_t pos = sd->pos, prev_pos = pos;
 *
 * -ret = do_splice_to(in, &pos, pipe, len, flags);
 * +/* Don't try to read more the pipe has space for. */
 * +pipe_pages = pipe->buffers - pipe->nrbufs;
 * +read_len = min(len, (size_t)pipe_pages << PAGE_SHIFT);
 * +ret = do_splice_to(in, &pos, pipe, read_len, flags);
 * if (unlikely(ret <= 0))
 *     goto out_release;
 *
 * @ @ -1169,8 +1177,15 @@
 *
 * pipe_lock(opipe);
 * ret = wait_for_space(opipe, flags);
 * -if (!ret)
 * +if (!ret) {
 * +unsigned int pipe_pages;
 * +
 * +/* Don't try to read more the pipe has space for. */
 * +pipe_pages = opipe->buffers - opipe->nrbufs;
 * +len = min(len, (size_t)pipe_pages << PAGE_SHIFT);
 * +

ret = do_splice_to(in, &offset, opipe, len, flags);
+
pipe_unlock(opipe);
if (ret > 0)
wakeup_pipe_readers(opipe);
@@ -1571,7 +1586,11 @@
 * Get a reference to this pipe buffer,
 * so we can copy the contents over.
 */
-pipe_buf_get(ipipe, ibuf);
+if (!pipe_buf_get(ipipe, ibuf)) {
 +if (ret == 0)
 +ret = -EFAULT;
 +break;
 +}
 *obuf = *ibuf;
 
 */
@@ -1580,6 +1599,8 @@
 */
obuf->flags &= ~PIPE_BUF_FLAG_GIFT;
+pipe_buf_mark_unmergeable(obuf);
+
obuf->len = len;
opipe->nrbufs++;
ibuf->offset += obuf->len;
@@ -1643,7 +1664,11 @@
 * Get a reference to this pipe buffer,
 * so we can copy the contents over.
 */
-pipe_buf_get(ipipe, ibuf);
+if (!pipe_buf_get(ipipe, ibuf)) {
 +if (ret == 0)
 +ret = -EFAULT;
 +break;
 +}
 obuf = opipe->bufs + nbuf;
*obuf = *ibuf;
@@ -1654,6 +1679,8 @@
 */
obuf->flags &= ~PIPE_BUF_FLAG_GIFT;
+pipe_buf_mark_unmergeable(obuf);
+
if (obuf->len > len)
obuf->len = len;
--- linux-4.15.0.orig/fs/squashfs/block.c
+++ linux-4.15.0/fs/squashfs/block.c
@@ -167,6 +167,8 @@
 }

 if (compressed) {
+ if (!msblk->stream)
+ goto read_failure;
 length = squashfs_decompress(msblk, bh, b, offset, length,
 output);
 if (length < 0)
--- linux-4.15.0.orig/fs/squashfs/cache.c
+++ linux-4.15.0/fs/squashfs/cache.c
@@ -350,6 +350,9 @@

 TRACE("Entered squashfs_read_metadata [%llx:%x]n", *block, *offset);

+ if (unlikely(length < 0))
+ return -EIO;
 +
 while (length) {
 entry = squashfs_cache_get(sb, msblk->block_cache, *block, 0);
 if (entry->error) {
--- linux-4.15.0.orig/fs/squashfs/export.c
+++ linux-4.15.0/fs/squashfs/export.c
@@ -54,12 +54,17 @@
 struct squashfs_sb_info *msblk = sb->s_fs_info;
 int blk = SQUASHFS_LOOKUP_BLOCK(ino_num - 1);
 int offset = SQUASHFS_LOOKUP_BLOCK_OFFSET(ino_num - 1);
-u64 start = le64_to_cpu(msblk->inode_lookup_table[blk]);
+u64 start;
 ___le64 ino;
 int err;

 TRACE("Entered squashfs_inode_lookup, inode_number = %d\n", ino_num);

+ if (ino_num == 0 || (ino_num - 1) >= msblk->inodes)
+ return -EINVAL;
+ start = le64_to_cpu(msblk->inode_lookup_table[blk]);
 err = squashfs_read_metadata(sb, &ino, &start, &offset, sizeof(ino));
 if (err < 0)
 return err;
@@ -124,7 +129,10 @@
 u64 lookup_table_start, u64 next_table, unsigned int inodes)
{
unsigned int length = SQUASHFS_LOOKUP_BLOCK_BYTES(inodes);
+unsigned int indexes = SQUASHFS_LOOKUP_BLOCKS(inodes);
+int n;
+__le64 *table;
+u64 start, end;

TRACE("In read_inode_lookup_table, length %d\n", length);

@@ -134,20 +142,41 @@
if (inodes == 0)
    return ERR_PTR(-EINVAL);

-/* length bytes should not extend into the next table - this check
- * also traps instances where lookup_table_start is incorrectly larger
- * than the next table start
-*/
+/*
+ * The computed size of the lookup table (length bytes) should exactly
+ * match the table start and end points
+*/
-if (lookup_table_start + length > next_table)
+if (length != (next_table - lookup_table_start))
    return ERR_PTR(-EINVAL);

  table = squashfs_read_table(sb, lookup_table_start, length);
+if (IS_ERR(table))
  +return table;

 /*
 - * table[0] points to the first inode lookup table metadata block,
 - * this should be less than lookup_table_start
 + * table0, table[1], ... table[indexes - 1] store the locations
 + * of the compressed inode lookup blocks. Each entry should be
 + * less than the next (i.e. table[0] < table[1]), and the difference
 + * between them should be SQUASHFS_METADATA_SIZE or less.
 + * table[indexes - 1] should be less than lookup_table_start, and
 + * again the difference should be SQUASHFS_METADATA_SIZE or less
 +*/
-if (!IS_ERR(table) && le64_to_cpu(table[0]) >= lookup_table_start) {
+for (n = 0; n < (indexes - 1); n++) {
  +start = le64_to_cpu(table[n]);
  +end = le64_to_cpu(table[n + 1]);
  +}
  +if (start >= end
  +    || (end - start) >
  +    (SQUASHFS_METADATA_SIZE + SQUASHFS_BLOCK_OFFSET)) {
    +kfree(table);
    +return ERR_PTR(-EINVAL);
  +}
+start = le64_to_cpu(table[indexes - 1]);
+if (start >= lookup_table_start ||
+    (lookup_table_start - start) >
+    (SQUASHFS_METADATA_SIZE + SQUASHFS_BLOCK_OFFSET)) {
    kfree(table);
    return ERR_PTR(-EINVAL);
}

--- linux-4.15.0.orig/fs/squashfs/file.c
+++ linux-4.15.0/fs/squashfs/file.c
@@ -194,7 +194,11 @@
    }
    block += SQUASHFS_COMPRESSED_SIZE_BLOCK(size);
 }

for (i = 0; i < blocks; i++) {
-    int size = le32_to_cpu(blist[i]);
+    int size = squashfs_block_size(blist[i]);
+    if (size < 0) {
+        err = size;
+        goto failure;
+    }
    block += SQUASHFS_COMPRESSED_SIZE_BLOCK(size);
    block += NBLKSIZEOFFSET;
    n -= blocks;
@@ -220,11 +224,11 @@
     */
-    static inline int calculate_skip(int blocks)
+    static inline int calculate_skip(u64 blocks)
    {
-        int skip = blocks / ((SQUASHFS_META_ENTRIES + 1)
+        u64 skip = blocks / ((SQUASHFS_META_ENTRIES + 1)
* SQUASHFS_META_INDEXES);
-        return min(SQUASHFS_CACHED_BLKS - 1, skip + 1);
+        return min((u64) SQUASHFS_CACHED_BLKS - 1, skip + 1);
    }

@@ -367,7 +371,24 @@ sizeof(size));
    if (res < 0)
        return res;
    -return le32_to_cpu(size);
+return squashfs_block_size(size);
+}
+
+void squashfs_fill_page(struct page *page, struct squashfs_cache_entry *buffer, int offset, int avail)
+{ 
+int copied;
+void *pageaddr;
+
+pageaddr = kmap_atomic(page);
+copied = squashfs_copy_data(pageaddr, buffer, offset, avail);
+memset(pageaddr + copied, 0, PAGE_SIZE - copied);
+kunmap_atomic(pageaddr);
+
+flush_dcache_page(page);
+if (copied == avail)
+SetPageUptodate(page);
+else
+SetPageError(page);
+
/* Copy data into page cache */
@@ -376,7 +397,6 @@ {
                 
 struct inode *inode = page->mapping->host;
 struct squashfs_sb_info *msblk = inode->i_sb->s_fs_info;
-void *pageaddr;
               int i, mask = (1 << (msblk->block_log - PAGE_SHIFT)) - 1;
               int start_index = page->index & ~mask, end_index = start_index | mask;

@@ -402,12 +422,7 @@
         if (PageUptodate(push_page))
             goto skip_page;
         -pageaddr = kmap_atomic(push_page);
-       squashfs_copy_data(pageaddr, buffer, offset, avail);
-       memset(pageaddr + avail, 0, PAGE_SIZE - avail);
-       kunmap_atomic(pageaddr);
         -flush_dcache_page(push_page);
         -SetPageUptodate(push_page);
         +squashfs_fill_page(push_page, buffer, offset, avail);
         skip_page:
         unlock_page(push_page);
         if (i != page->index)
@@ -416,10 +431,9 @@
 }  

/* Read datablock stored packed inside a fragment (tail-end packed block) */
-static int squashfs_readpage_fragment(struct page *page)
+static int squashfs_readpage_fragment(struct page *page, int expected)
{ 
 struct inode *inode = page->mapping->host;
-struct squashfs_sb_info *msblk = inode->i_sb->s_fs_info;
+struct squashfs_sb_info *msblk = inode->i_sb->s_fs_info;

struct squashfs_cache_entry *buffer = squashfs_get_fragment(inode->i_sb, squashfs_i(inode)->fragment_block, squashfs_i(inode)->fragment_size);
@@ -430,23 +444,16 @@

  s = squashfs_i(inode)->fragment_block,
  squashfs_i(inode)->fragment_size);
else
-    squashfs_copy_cache(page, buffer, i_size_read(inode) &
-      (msblk->block_size - 1),
-    +squashfs_copy_cache(page, buffer, expected,
-      squashfs_i(inode)->fragment_offset);

  squashfs_cache_put(buffer);
  return res;
}

@ static int squashfs_readpage_sparse(struct page *page, int index, int file_end)
+static int squashfs_readpage_sparse(struct page *page, int expected)
{
  struct inode *inode = page->mapping->host;
  struct squashfs_sb_info *msblk = inode->i_sb->s_fs_info;
  int bytes = index == file_end ?
    (i_size_read(inode) & (msblk->block_size - 1)) :
    msblk->block_size;

  -squashfs_copy_cache(page, NULL, bytes, 0);
  +squashfs_copy_cache(page, NULL, expected, 0);
  return 0;
}

@@ -456,6 +463,9 @@

 struct squashfs_sb_info *msblk = inode->i_sb->s_fs_info;
 int index = page->index >> (msblk->block_log - PAGE_SHIFT);  
 int file_end = i_size_read(inode) >> msblk->block_log;
+int expected = index == file_end ?
  +(i_size_read(inode) & (msblk->block_size - 1)) :
    +msblk->block_size;
 int res;
 void *pageaddr;

@@ -474,11 +484,11 @@
 goto error_out;

 if (bsize == 0)
-  res = squashfs_readpage_sparse(page, index, file_end);
+  res = squashfs_readpage_sparse(page, expected);
 else
-  res = squashfs_readpage_block(page, block, bsize);


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+res = squashfs_readpage_block(page, block, bsize, expected);
} else
-res = squashfs_readpage_fragment(page);
+res = squashfs_readpage_fragment(page, expected);

if (!res)
return 0;
--- linux-4.15.0.orig/fs/squashfs/file_cache.c
+++ linux-4.15.0/fs/squashfs/file_cache.c
@@ -20,7 +20,7 @@
#include "squashfs.h"

/* Read separately compressed datablock and memcopy into page cache */
-int squashfs_readpage_block(struct page *page, u64 block, int bsize)
+int squashfs_readpage_block(struct page *page, u64 block, int bsize, int expected)
{
    struct inode *i = page->mapping->host;
    struct squashfs_cache_entry *buffer = squashfs_get_datablock(i->i_sb,
@@ -31,7 +31,7 @@
ERROR("Unable to read page, block %llx, size %x\n", block,
bsize);
else
-squashfs_copy_cache(page, buffer, buffer->length, 0);
+squashfs_copy_cache(page, buffer, expected, 0);

    squashfs_cache_put(buffer);
    return res;
--- linux-4.15.0.orig/fs/squashfs/file_direct.c
+++ linux-4.15.0/fs/squashfs/file_direct.c
@@ -21,10 +21,11 @@
#include "page_actor.h"

/* Read separately compressed datablock directly into page cache */
-int squashfs_readpage_block(struct page *target_page, u64 block, int bsize)
+int squashfs_readpage_block(struct page *target_page, u64 block, int bsize,
+int expected)
{
    struct inode *inode = target_page->mapping->host;
    @@ -83,7 +84,7 @@
* using an intermediate buffer.
*/
    res = squashfs_read_cache(target_page, block, bsize, pages,
-    -page);
```c
+page, expected);
if (res < 0)
goto mark_errored;

@@ -95,6 +96,11 @@
if (res < 0)
goto mark_errored;

+if (res != expected) {
+    res = -EIO;
+    goto mark_errored;
+}
+
/* Last page may have trailing bytes not filled */
bytes = res % PAGE_SIZE;
if (bytes) {
@@ -138,13 +144,12 @@
static int squashfs_read_cache(struct page *target_page, u64 block, int bsize,
-    int pages, struct page **page)
+    int pages, struct page **page, int bytes)
{
    struct inode *i = target_page->mapping->host;
    struct squashfs_cache_entry *buffer = squashfs_get_datablock(i->i_sb,
-        block, bsize);
-    int bytes = buffer->length, res = buffer->error, n, offset = 0;
-    void *pageaddr;
+    int res = buffer->error, n, offset = 0;
    if (res) {
        ERROR("Unable to read page, block %llx, size %x\n", block,
@@ -159,12 +164,7 @@
            if (page[n] == NULL)
                continue;
            -pageaddr = kmap_atomic(page[n]);
-            squashfs_copy_data(pageaddr, buffer, offset, avail);
-            memset(pageaddr + avail, 0, PAGE_SIZE - avail);
-            kunmap_atomic(pageaddr);
-            flush_dcache_page(page[n]);
-            SetPageUptodate(page[n]);
+            squashfs_fill_page(page[n], buffer, offset, avail);
            unlock_page(page[n]);
            if (page[n] != target_page)
                put_page(page[n]);
--- linux-4.15.0.orig/fs/squashfs/fragment.c
+++ linux-4.15.0/fs/squashfs/fragment.c
```

---

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u64 *fragment_block)
{
    struct squashfs_sb_info *msblk = sb->s_fs_info;
    int block = SQUASHFS_FRAGMENT_INDEX(fragment);
    int offset = SQUASHFS_FRAGMENT_INDEX_OFFSET(fragment);
    u64 start_block = le64_to_cpu(msblk->fragment_index[block]);
    int block, offset, size;
    struct squashfs_fragment_entry fragment_entry;
    start_block = le64_to_cpu(msblk->fragment_index[block]);
    size = squashfs_read_metadata(sb, &fragment_entry, &start_block,
        &offset, sizeof(fragment_entry));
    if (fragment >= msblk->fragments)
        return -EIO;
    +block = SQUASHFS_FRAGMENT_INDEX(fragment);
    +offset = SQUASHFS_FRAGMENT_INDEX_OFFSET(fragment);
    +start_block = le64_to_cpu(msblk->fragment_index[block]);

    size = squashfs_read_metadata(sb, &fragment_entry, &start_block,
        &offset, sizeof(fragment_entry));
    return size;

    *fragment_block = le64_to_cpu(fragment_entry.start_block);
    -size = le32_to_cpu(fragment_entry.size);
    return squashfs_block_size(fragment_entry.size);
}
unsigned int length = SQUASHFS_ID_BLOCK_BYTES(no_ids);
+unsigned int indexes = SQUASHFS_ID_BLOCKS(no_ids);
+int n;

__le64 *table;
+u64 start, end;

TRACE("In read_id_index_table, length %d\n", length);

return ERR_PTR(-EINVAL);
*/
- if (id_table_start + length > next_table)
+ if (length != (next_table - id_table_start))
return ERR_PTR(-EINVAL);

if (!IS_ERR(table) && le64_to_cpu(table[0]) >= id_table_start) {
  for (n = 0; n < (indexes - 1); n++) {
    start = le64_to_cpu(table[n]);
    end = le64_to_cpu(table[n + 1]);
    +if (start >= end || (end - start) >
+(SQUASHFS_METADATA_SIZE + SQUASHFS_BLOCK_OFFSET)) { 
+kfree(table);
+return ERR_PTR(-EINVAL);
+

++start = le64_to_cpu(table[indexes - 1]);
+if (start >= id_table_start || (id_table_start - start) >
+(SQUASHFS_METADATA_SIZE + SQUASHFS_BLOCK_OFFSET)) {
+kfree(table);
return ERR_PTR(-EINVAL);
}

--- linux-4.15.0.orig/fs/squashfs/squashfs.h
+++ linux-4.15.0/fs/squashfs/squashfs.h
@@ -67,11 +67,12 @@
 u64, u64, unsigned int);
/* file.c */
+void squashfs_fill_page(struct page *, struct squashfs_cache_entry *, int, int);
void squashfs_copy_cache(struct page *, struct squashfs_cache_entry *, int, int);

/* file_xxx.c */
-extern int squashfs_readpage_block(struct page *, u64, int);
+extern int squashfs_readpage_block(struct page *, u64, int, int);

/* id.c */
extern int squashfs_get_id(struct super_block *, unsigned int, unsigned int *);
--- linux-4.15.0.orig/fs/squashfs/squashfs_fs.h
+++ linux-4.15.0/fs/squashfs/squashfs_fs.h
@@ -30,6 +30,7 @@
 /* size of metadata (inode and directory) blocks */
#define SQUASHFS_METADATA_SIZE		8192
+#define SQUASHFS_BLOCK_OFFSET		2

/* default size of block device I/O */
#ifdef CONFIG_SQUASHFS_4K_DEVBLK_SIZE
@@ -129,6 +130,12 @@
#define SQUASHFS_COMPRESSED_BLOCK(B)={!((B) & SQUASHFS_COMPRESSED_BIT_BLOCK))

+static inline int squashfs_block_size(__le32 raw)
+{
+u32 size = le32_to_cpu(raw);
+return (size >> 25) ? -EIO : size;
+
+"
Inode number ops. Inodes consist of a compressed block number, and an
uncompressed offset within that block.

```
/*
 * Inode number ops. Inodes consist of a compressed block number, and an
 * uncompressed offset within that block.
--- linux-4.15.0.orig/fs/squashfs/squashfs_fs_sb.h
+++ linux-4.15.0/fs/squashfs/squashfs_fs_sb.h
@@ -75,6 +75,8 @@
 unsigned short				block_log;
 long long				bytes_used;
 unsigned int				inodes;
+unsigned int				fragments;
 int					xattr_ids;
+unsigned int				ids;
+unsigned int
});
#endif
--- linux-4.15.0.orig/fs/squashfs/super.c
+++ linux-4.15.0/fs/squashfs/super.c
@@ -175,6 +175,8 @@
 msblk->inode_table = le64_to_cpu(sblk->inode_table_start);
 msblk->directory_table = le64_to_cpu(sblk->directory_table_start);
 msblk->inodes = le32_to_cpu(sblk->inodes);
+msblk->fragments = le32_to_cpu(sblk->fragments);
+msblk->ids = le16_to_cpu(sblk->no_ids);
 flags = le16_to_cpu(sblk->flags);
TRACE("Found valid superblock on %pg\n", sb->s_bdev);
@@ -185,8 +187,8 @@
 TRACE("Filesystem size %lld bytes\n", msblk->bytes_used);
 TRACE("Block size %d\n", msblk->block_size);
-TRACE("Number of inodes %d\n", msblk->inodes);
-TRACE("Number of fragments %d\n", le32_to_cpu(sblk->fragments));
+TRACE("Number of inodes %d\n", msblk->inodes);
+TRACE("Number of fragments %d\n", msblk->fragments);
 TRACE("sblk->inode_table_start %llx\n", msblk->inode_table);
 allocate_id_index_table:
 /* Allocate and read id index table */
-msblk->id_table = squashfs_read_id_index_table(sb,
-le64_to_cpu(sblk->id_table_start), next_table,
-le16_to_cpu(sblk->no_ids));
+le64_to_cpu(sblk->id_table_start), next_table, msblk->ids);
 if (IS_ERR(msblk->id_table)) {
 ERROR("unable to read id index table\n");
 err = PTR_ERR(msblk->id_table);
@@ -272,7 +273,7 @@
 sb->s_export_op = &squashfs_export_ops;
```
handle_fragments:
-fragments = le32_to_cpu(sblk->fragments);
+fragments = msblk->fragments;
if (fragments == 0)
goto check_directory_table;

--- linux-4.15.0.orig/fs/squashfs/xattr.h
+++ linux-4.15.0/fs/squashfs/xattr.h
@@ -30,8 +30,16 @@
static inline __le64 *squashfs_read_xattr_id_table(struct super_block *sb,
 u64 start, u64 *xattr_table_start, int *xattr_ids)
{
+struct squashfs_xattr_id_table *id_table;
+	id_table = squashfs_read_table(sb, start, sizeof(*id_table));
+if (IS_ERR(id_table))
+return (__le64 *) id_table;
+	*xattr_table_start = le64_to_cpu(id_table->xattr_table_start);
+kfree(id_table);
+
ERROR("Xattrs in filesystem, these will be ignored\n");
-*xattr_table_start = start;
return ERR_PTR(-ENOTSUPP);
}

--- linux-4.15.0.orig/fs/squashfs/xattr_id.c
+++ linux-4.15.0/fs/squashfs/xattr_id.c
@@ -44,10 +44,15 @@
struct squashfs_sb_info *msblk = sb->s_fs_info;
int block = SQUASHFS_XATTR_BLOCK(index);
int offset = SQUASHFS_XATTR_BLOCK_OFFSET(index);
-u64 start_block = le64_to_cpu(msblk->xattr_id_table[block]);
+u64 start_block;
struct squashfs_xattr_id id;
int err;

+if (index >= msblk->xattr_ids)
+return -EINVAL;
+
+start_block = le64_to_cpu(msblk->xattr_id_table[block]);
+
er = squashfs_read_metadata(sb, &id, &start_block, &offset,
+sizeof(id));
+if (err < 0)
@@ -63,13 +68,17 @@
/*
Read uncompressed xattr id lookup table indexes from disk into memory
/
- __le64 *squashfs_read_xattr_id_table(struct super_block *sb, u64 start,
+ __le64 *squashfs_read_xattr_id_table(struct super_block *sb, u64 table_start,
u64 *xattr_table_start, int *xattr_ids)
{
  unsigned int len;
+ struct squashfs_sb_info *msblk = sb->s_fs_info;
  unsigned int len, indexes;
  struct squashfs_xattr_id_table *id_table;
  + __le64 *table;
  + u64 start, end;
  + int n;

  id_table = squashfs_read_table(sb, start, sizeof(*id_table));
  + id_table = squashfs_read_table(sb, table_start, sizeof(*id_table));
  if (IS_ERR(id_table))
    return (__le64 *) id_table;

  if (*xattr_ids == 0)
    return ERR_PTR(-EINVAL);

  /* table[0], table[1], ... table[indexes - 1] store the locations
   * of the compressed xattr id blocks. Each entry should be less than
   * the next (i.e. table[0] < table[1]), and the difference between them
   * should be SQUASHFS_METADATA_SIZE or less. table[indexes - 1]
   * should be less than table_start, and again the difference
+ * should be SQUASHFS_METADATA_SIZE or less.
+ *
+ * Finally xattr_table_start should be less than table[0].
+ */
+for (n = 0; n < (indexes - 1); n++) {
+start = le64_to_cpu(table[n]);
+end = le64_to_cpu(table[n + 1]);
+
+if (start >= end || (end - start) >
+(SQUASHFS_METADATA_SIZE + SQUASHFS_BLOCK_OFFSET)) {
+kfree(table);
+return ERR_PTR(-EINVAL);
+}
+
+start = le64_to_cpu(table[indexes - 1]);
+if (start >= table_start || (table_start - start) >
+(SQUASHFS_METADATA_SIZE + SQUASHFS_BLOCK_OFFSET)) {
+kfree(table);
+return ERR_PTR(-EINVAL);
+}

-TRACE("In read_xattr_index_table, length %d\n", len);
+if (*xattr_table_start >= le64_to_cpu(table[0])) {
+kfree(table);
+return ERR_PTR(-EINVAL);
+}

-return squashfs_read_table(sb, start + sizeof(*id_table), len);
+return table;
}
--- linux-4.15.0.orig/fs/statfs.c
+++ linux-4.15.0/fs/statfs.c
@@ -304,19 +304,10 @@
static int put_compat_statfs64(struct compat_statfs64 __user *ubuf, struct kstatfs *kbuf)
{
struct compat_statfs64 buf;
-if (sizeof(ubuf->f_bsize) == 4) {
- if ((kbuf->f_type | kbuf->f_bsize | kbuf->f_namelen |
- kbuf->f_frsize | kbuf->f_flags) & 0xffffffff00000000ULL)
- return -EOVERFLOW;
-/* f_files and f_ffree may be -1; it's okay
- * to stuff that into 32 bits */
- if (kbuf->f_files != 0xffffffffffffffffULL
- & & (kbuf->f_files & 0xffffffff00000000ULL))
- return -EOVERFLOW;
-/* f_files and f_ffree may be -1; it's okay
- * to stuff that into 32 bits */
- if (kbuf->f_ffree != 0xffffffffffffffffULL
- & & (kbuf->f_ffree & 0xffffffff00000000ULL))
- return -EOVERFLOW;
-
-return -EOVERFLOW;
-
+
+if ((kbuf->f_bsize | kbuf->f_frsize) & 0xffffffff00000000ULL)
+return -E OVERFLOW;
+
+memset(&buf, 0, sizeof(struct compat_statfs64));
+buf.f_type = kbuf->f_type;
+buf.f_bsize = kbuf->f_bsize;
--- linux-4.15.0.orig/fs/super.c
+++ linux-4.15.0/fs/super.c
@@ -120,13 +120,23 @@
 sb = container_of(shrink, struct super_block, s_shrink);

 /*
- * Don't call trylock_super as it is a potential
- * scalability bottleneck. The counts could get updated
- * between super_cache_count and super_cache_scan anyway.
- * Call to super_cache_count with shrinker_rwlock held
- * ensures the safety of call to list_lru_shrink_count() and
- * s_op->nr_cached_objects().
+ * We don't call trylock_super() here as it is a scalability bottleneck,
+ * so we're exposed to partial setup state. The shrink_rwlock does not
+ * protect filesystem operations backing list_lru_shrink_count() or
+ * s_op->nr_cached_objects(). Counts can change between
+ * super_cache_count and super_cache_scan, so we really don't need locks
+ * here.
+ *
+ * However, if we are currently mounting the superblock, the underlying
+ * filesystem might be in a state of partial construction and hence it
+ * is dangerous to access it. trylock_super() uses a SB_BORN check to
+ * avoid this situation, so do the same here. The memory barrier is
+ * matched with the one in mount_fs() as we don't hold locks here.
+ */
+if (!((sb->s_flags & SB_BORN)))
+return 0;
+smp_rmb();
+
+if (sb->s_op && sb->s_op->nr_cached_objects)
+total_objects = sb->s_op->nr_cached_objects(sb, sc);

@@ -166,6 +176,7 @@
 security_sb_free(s);
 put_user_ns(s->s_user_ns);
 kfree(s->s_subtype);
+free_preallocated_shrinker(&s->s_shrink);
 /* no delays needed */
 destroy_super_work(&s->destroy_work);
s->s_shrink.count_objects = super_cache_count;
s->s_shrink.batch = 1024;
s->s_shrink.flags = SHRINKER_NUMA_AWARE | SHRINKER_MEMCG_AWARE;
+if (prealloc_shrinker(&s->s_shrink))
+goto fail;
return s;

fail:

hlist_add_head(&s->s_instances, &type->fs_supers);
spin_unlock(&sb_lock);
get_filesystem(type);
-err = register_shrinker(&s->s_shrink);
-if (err) {
-deactivate_locked_super(s);
-s = ERR_PTR(err);
-}
+register_shrinker_prepared(&s->s_shrink);
return s;
}

if (IS_ERR(bdev))
return ERR_CAST(bdev);

+if (current_user_ns() != &init_user_ns) {
+/*
+ * For usersns mounts, disallow mounting if bdev is open for
+ * writing
+ */
+if (!atomic_dec_unless_positive(&bdev->bd_inode->i_writecount)) {
+error = -EBUSY;
+goto error_bdev;
+}
+if (bdev->bd_contains != bdev &&
+ !atomic_dec_unless_positive(&bdev->bd_contains->bd_inode->i_writecount)) {
+atomic_inc(&bdev->bd_inode->i_writecount);
+error = -EBUSY;
+goto error_bdev;
+}
+
+/*
+ * once the super is inserted into the list by sget, s_umount
+ * will protect the lockfs code from trying to start a snapshot
+ */
+return s;
+}
if (bdev->bd_fsfreeze_count > 0) {
    mutex_unlock(&bdev->bd_fsfreeze_mutex);
    error = -EBUSY;
    goto error_bdev;
} else {
    s = sget(fs_type, test_bdev_super, set_bdev_super, flags | SB_NOSEC,
             bdev);
    if ((flags ^ s->s_flags) & SB_RDONLY) {
        deactivate_locked_super(s);
        error = -EBUSY;
        goto error_bdev;
    }
    error_s:
    error = PTR_ERR(s);
    if (current_user_ns() != &init_user_ns) {
        atomic_inc(&bdev->bd_inode->i_writecount);
        if (bdev->bd_contains != bdev)
            atomic_inc(&bdev->bd_contains->bd_inode->i_writecount);
    }
    error_bdev:
    blkdev_put(bdev, mode);
    error:
    @ @ -1146,6 +1178,11 @@
    generic_shutdown_super(sb);
    sync_blockdev(bdev);
    WARN_ON_ONCE(((mode & FMODE_EXCL));
    @ @ -1227,6 +1264,14 @@
    sb = root->d_sb;
    BUG_ON(!sb);
    WARN_ON(!sb->s_bdi);
    */
+ * Write barrier is for super_cache_count(). We place it before setting
+ * SB_BORN as the data dependency between the two functions is the
+ * superblock structure contents that we just set up, not the SB_BORN
+ * flag.
+ */
smp_wmb();

sb->s_flags |= SB_BORN;

error = security_sb_kern_mount(sb, flags, secdata);

int __sb_start_write(struct super_block *sb, int level, bool wait)
{
    bool force_trylock = false;
    int ret = 1;
    
    if (!wait)
        return percpu_down_read_trylock(sb->s_writers.rw_sem + level-1);

    #ifdef CONFIG_LOCKDEP
    /*
     * We want lockdep to tell us about possible deadlocks with freezing
     * but it’s it bit tricky to properly instrument it. Getting a freeze
     * protection works as getting a read lock but there are subtle
     * problems. XFS for example gets freeze protection on internal level
     * twice in some cases, which is OK only because we already hold a
     * freeze protection also on higher level. Due to these cases we have
     * to use wait == F (trylock mode) which must not fail.
     * */
    
    if (wait) {
        int i;
        
        for (i = 0; i < level - 1; i++)
            if (percpu_rwlock_is_held(sb->s_writers.rw_sem + i)) {
                force_trylock = true;
                break;
            }
    }

    #endif
    
    if (wait && !force_trylock)
        percpu_rwlock_read_level(sb->s_writers.rw_sem + level-1);
    else
        ret = percpu_read_lock_level(sb->s_writers.rw_sem + level-1);

    WARN_ON(force_trylock && !ret);
    return ret;
+percpu_down_read(sb->s_writers.rw_sem + level-1);
+return 1;
}
EXPORT_SYMBOL(__sb_start_write);

--- linux-4.15.0.orig/fs/sync.c
+++ linux-4.15.0/fs/sync.c
@@ -28,7 +28,7 @@
 * wait == 1 case since in that case write_inode() functions do
 * sync_dirty_buffer() and thus effectively write one block at a time.
 */
-static int __sync_filesystem(struct super_block *sb, int wait)
+int __sync_filesystem(struct super_block *sb, int wait)
{
    if (wait)
        sync_inodes_sb(sb);
@@ -39,6 +39,7 @@
    return __sync_blockdev(sb->s_bdev, wait);
 }
+EXPORT_SYMBOL_GPL(__sync_filesystem);

/*
 * Write out and wait upon all dirty data associated with this
--- linux-4.15.0.orig/fs/sysfs/dir.c
+++ linux-4.15.0/fs/sysfs/dir.c
@@ -41,6 +41,8 @@
    kn = kernfs_create_dir_ns(parent, kobject_name(kobj),
-            S_IRWXU | S_IRUGO | S_IXUGO, kobj, ns);
-    if (IS_ERR(kn)) {
-        sysfs_warn_dup(parent, kobject_name(kobj));
+    if (IS_ERR(kn)) {
+        sysfs_warn_dup(parent, kobject_name(kobj));
         return -ENOENT;
+    kobject_get_ownership(kobj, &uid, &gid);
+    }
    BUG_ON(!kobj);
@@ -52,8 +54,11 @@
    if (!parent)
        return -ENOENT;
    if (!parent)
+    kobject_get_ownership(kobj, &uid, &gid);
+    }
    struct kernfs_node *parent, *kn;
    +kuid_t uid;
    +kgid_t gid;
    BUG_ON(!kobj);
    @ @ -52,8 +54,11 @@
    if (!parent)
        return -ENOENT;
        +kobject_get_ownership(kobj, &uid, &gid);
        +
        kn = kernfs_create_dir_ns(parent, kobject_name(kobj),
-            S_IRWXU | S_IRUGO | S_IXUGO, kobj, ns);
-            S_IRWXU | S_IRUGO | S_IXUGO, kobj, ns);
+            S_IRWXU | S_IRUGO | S_IXUGO, uid, gid,
+            kobj, ns);
+        if (IS_ERR(kn)) {
+            sysfs_warn_dup(parent, kobject_name(kobj));
+            return -EEXIST)
+        }
+        sysfs_warn_dup(parent, kobject_name(kobj));
        -- linux-4.15.0.orig/fs/sysfs/file.c
+++ linux-4.15.0/fs/sysfs/file.c
@@ -17,6 +17,7 @@
int sysfs_add_file_mode_ns(struct kernfs_node *parent,
    const struct attribute *attr, bool is_bin,
    umode_t mode, const void *ns)
+
    umode_t mode, kuid_t uid, kgid_t gid, const void *ns)
{
    struct lock_class_key *key = NULL;
    const struct kernfs_ops *ops;
    if (!attr->ignore_lockdep)
        key = attr->key ?: (struct lock_class_key *)&attr->skey;
    
    kn = __kernfs_create_file(parent, attr->name, mode & 0777, size, ops,
        (void *)attr, ns, key);
    +
    kn = __kernfs_create_file(parent, attr->name, mode & 0777, uid, gid,
        size, ops, (void *)attr, ns, key);
    if (IS_ERR(kn)) {
        if (PTR_ERR(kn) == -EEXIST)
            sysfs_warn_dup(parent, attr->name);
    }
    return 0;
}

int sysfs_add_file(struct kernfs_node *parent, const struct attribute *attr,
    bool is_bin)
{
    return sysfs_add_file_mode_ns(parent, attr, is_bin, attr->mode, NULL);
}

/**
* sysfs_create_file_ns - create an attribute file for an object with custom ns
* @kobj: object we're creating for
* @kobj: object we're creating for
* @kobj: object we're creating for
* @kobj: object we're creating for
int sysfs_create_file_ns(struct kobject *kobj, const struct attribute *attr,
    const void *ns)
{
    +kuid_t uid;
    +kgid_t gid;
    +

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BUG_ON(!kobj || !kobj->sd || !attr);

-return sysfs_add_file_mode_ns(kobj->sd, attr, false, attr->mode, ns);
+kobject_get_ownership(kobj, &uid, &gid);
+return sysfs_add_file_mode_ns(kobj->sd, attr, false, attr->mode,
  +uid, gid, ns);

}
EXPORT_SYMBOL_GPL(sysfs_create_file_ns);
@@ -360,6 +361,8 @@
 const struct attribute *attr, const char *group)
 {
 struct kernfs_node *parent;
+kuid_t uid;
+kgid_t gid;
 int error;

 if (group) {
 @@ -372,7 +375,9 @@
 if (!parent)
 return -ENOENT;
-error = sysfs_add_file(parent, attr, false);
+kobject_get_ownership(kobj, &uid, &gid);
+error = sysfs_add_file_mode_ns(parent, attr, false,
+    +attr->mode, uid, gid, NULL);
 kernfs_put(parent);

 return error;
@@ -408,6 +413,50 @@
 EXPORT_SYMBOL_GPL(sysfs_chmod_file);

 /**
 + * sysfs_break_active_protection - break "active" protection
 + * @kobj: The kernel object @attr is associated with.
 + * @attr: The attribute to break the "active" protection for.
 + *
 + * With sysfs, just like kernfs, deletion of an attribute is postponed until
 + * all active .show() and .store() callbacks have finished unless this function
 + * is called. Hence this function is useful in methods that implement self
 + * deletion.
 + */
 struct kernfs_node *sysfs_break_active_protection(struct kobject *kobj,
 +const struct attribute *attr)
 +{
 +struct kernfs_node *kn;
 +
+kobject_get(kobj);
+kn = kernfs_find_and_get(kobj->sd, attr->name);
+if (kn)
+kernfs_break_active_protection(kn);
+return kn;
+
+EXPORT_SYMBOL_GPL(sysfs_break_active_protection);
+
+/**
+ * sysfs_unbreak_active_protection - restore "active" protection
+ * @kn: Pointer returned by sysfs_break_active_protection().
+ *
+ * Undo the effects of sysfs_break_active_protection(). Since this function
+ * calls kernfs_put() on the kernfs node that corresponds to the 'attr'
+ * argument passed to sysfs_break_active_protection() that attribute may have
+ * been removed between the sysfs_break_active_protection() and
+ * sysfs_unbreak_active_protection() calls, it is not safe to access @kn after
+ * this function has returned.
+ */
+void sysfs_unbreak_active_protection(struct kernfs_node *kn)
+{
+struct kobject *kobj = kn->parent->priv;
+
+kernfs_unbreak_active_protection(kn);
+kernfs_put(kn);
+kobject_put(kobj);
+
+EXPORT_SYMBOL_GPL(sysfs_unbreak_active_protection);
+
+/**
+ * sysfs_remove_file_ns - remove an object attribute with a custom ns tag
+ * @kobj: object we're acting for
+ * @attr: attribute descriptor
+ * @getns: have we got a ns tag
+ int sysfs_create_bin_file(struct kobject *kobj,
+ const struct bin_attribute *attr)
+
+ uid_t uid;
+kgid_t gid;
+
+ BUG_ON(!kobj || !kobj->sd || !attr);
+
- return sysfs_add_file(kobj->sd, attr->attr, true);
+kobject_get_ownership(kobj, &uid, &gid);
+return sysfs_add_file_mode_ns(kobj->sd, attr->attr, true,
+ attr->attr.mode, uid, gid, NULL);

EXPORT_SYMBOL_GPL(sysfs_create_bin_file);
kernfs_remove_by_name(kobj->sd, attr->attr.name);
}
EXPORT_SYMBOL_GPL(sysfs_remove_bin_file);
+
+/**
+ *
+ * sysfs_emit - scnprintf equivalent, aware of PAGE_SIZE buffer.
+ * @buf: start of PAGE_SIZE buffer.
+ * @fmt: format
+ * @...: optional arguments to @format
+ *
+ * Returns number of characters written to @buf.
+ */
+int sysfs_emit(char *buf, const char *fmt, ...)
+{
+ va_list args;
+ int len;
+ 
+ if (WARN(!buf || offset_in_page(buf),
+ "invalid sysfs_emit: buf:\%p\n", buf))
+ return 0;
+
+ va_start(args, fmt);
+ len = vscnprintf(buf, PAGE_SIZE, fmt, args);
+ va_end(args);
+
+ return len;
+ }
+EXPORT_SYMBOL_GPL(sysfs_emit);
+
+/**
+ *
+ * sysfs_emit_at - scnprintf equivalent, aware of PAGE_SIZE buffer.
+ * @buf: start of PAGE_SIZE buffer.
+ * @at: offset in @buf to start write in bytes
+ * @at must be >= 0 && < PAGE_SIZE
+ * @fmt: format
+ * @...: optional arguments to @fmt
+ *
+ * Returns number of characters written starting at &@buf[@at].
+ */
+int sysfs_emit_at(char *buf, int at, const char *fmt, ...)
+{
+ va_list args;
+ int len;
+
+ if (WARN(!buf || offset_in_page(buf) || at < 0 || at >= PAGE_SIZE,
+ "invalid sysfs_emit_at: buf:\%p\n", buf))
+ return 0;
+
+ va_start(args, fmt);
+ len = vscnprintf(buf, PAGE_SIZE, fmt, args);
+ va_end(args);
+
+ return len;
+ }
static int create_files(struct kernfs_node *parent, struct kobject *kobj, kuid_t uid, kgid_t gid, const struct attribute_group *grp, int update) {
    struct attribute *const *attr;
    mode &= SYSFS_PREALLOC | 0664;
    error = sysfs_add_file_mode_ns(parent, *attr, false,
        mode, NULL);
    +    mode, uid, gid, NULL);
    if (unlikely(error))
        break;
    }
@@ -62,7 +63,7 @@

    const struct attribute_group *grp) {
        struct kernfs_node *kn;
+        kuid_t uid;
+        kgid_t gid;
        int error;

        BUG_ON(!kobj || (!update && !kobj->sd));

--- linux-4.15.0.orig/fs/sysfs/group.c
+++ linux-4.15.0/fs/sysfs/group.c
@@ -33,6 +33,7 @@
     }
 static int create_files(struct kernfs_node *parent, struct kobject *kobj,
                         kuid_t uid, kgid_t gid,
@@ -92,7 +93,8 @@
     const struct attribute_group *grp) {
         struct attribute *const *attr;
+        kuid_t uid;
+        kgid_t gid;
         int error;

         BUG_ON(!kobj || (!update && !kobj->sd));

+EXPORT_SYMBOL_GPL(sysfs_emit_at);
@@ -120,9 +124,11 @@
kobject->name, grp->name ?: "");
return -EINVAL;
}
+kobject_get_ownership(kobj, &uid, &gid);
if (grp->name) {
-kn = kernfs_create_dir(kobj->sd, grp->name,
-     S_IRWXU | S_IRUGO | S_IXUGO, kobj);
+kn = kernfs_create_dir_ns(kobj->sd, grp->name,
+     S_IRWXU | S_IRUGO | S_IXUGO,
+     uid, gid, kobj, NULL);
if (IS_ERR(kn)) {
if (PTR_ERR(kn) == -EEXIST)
sysfs_warn_dup(kobj->sd, grp->name);
@@ -131,7 +137,7 @@
} else
  kn = kobj->sd;
kernfs_get(kn);
-error = create_files(kn, kobj, grp, update);
+error = create_files(kn, kobj, uid, gid, grp, update);
if (error) {
  if (grp->name)
    kernfs_remove(kn);
@@ -283,6 +289,8 @@
const struct attribute_group *grp)
{
  struct kernfs_node *parent;
  +kuid_t uid;
  +kgid_t gid;
  int error = 0;
  struct attribute *const *attr;
  int i;
@@ -291,8 +299,11 @@
      if (!parent)
        return -ENOENT;
      +kobject_get_ownership(kobj, &uid, &gid);
      +for ((i = 0, attr = grp->attrs); *attr && !error; (++i, ++attr))
        -error = sysfs_add_file(parent, *attr, false);
        +error = sysfs_add_file_mode_ns(parent, *attr, false,
        +  (*attr)->mode, uid, gid, NULL);
    if (error) {
      while (--i >= 0)
        kernfs_remove_by_name(parent, (*--attr)->name);
--- linux-4.15.0.orig/fs/sysfs/mount.c
+++ linux-4.15.0/fs/sysfs/mount.c
@@ -28,7 +28,7 @@
struct dentry *root;
void *ns;
-bool new_sb;
+bool new_sb = false;

if ((!flags & SB_KERNMOUNT)) {
if (!kobj_ns_current_may_mount(KOBJ_NS_TYPE_NET)) {
    ns = kobj_ns_grab_current(KOBJ_NS_TYPE_NET);
    root = kernfs_mount_ns(fs_type, flags, sysfs_root, SYSFS_MAGIC, &new_sb, ns);
    if (IS_ERR(root) || !new_sb)
        kobj_ns_drop(KOBJ_NS_TYPE_NET, ns);
    else if (new_sb)
        root->d_sb->s_iflags |= SB_I_USERNS_VISIBLE;
    return root;
}

-- linux-4.15.0.orig/fs/sysfs/symlink.c
+++ linux-4.15.0/fs/sysfs/symlink.c
@@ -107,6 +107,7 @@
{
    return sysfs_do_create_link(kobj, target, name, 0);
}
+EXPORT_SYMBOL_GPL(sysfs_create_link_nowarn);

/*
 * sysfs_delete_link - remove symlink in object's directory.
-- linux-4.15.0.orig/fs/sysfs/sysfs.h
+++ linux-4.15.0/fs/sysfs/sysfs.h
@@ -28,11 +28,10 @@
*/

*/
*/

*/
*/

*/
*/

*/
*/

*/
*/

*/
*/

*/
*/

*/
@@ -275,7 +275,7 @@
    }
    brelse(bh);
    -return 0;
    +return err;
 }

 int sysv_write_inode(struct inode *inode, struct writeback_control *wbc)
--- linux-4.15.0.orig/fs/ubifs/debug.c
+++ linux-4.15.0/fs/ubifs/debug.c
@@ -1129,6 +1129,7 @@
 err = PTR_ERR(dent);
 if (err == -ENOENT)
     break;
-    +kfree(pdent);
     return err;
 }

--- linux-4.15.0.orig/fs/ubifs/dir.c
+++ linux-4.15.0/fs/ubifs/dir.c
@@ -253,6 +253,8 @@
     if (nm.hash) {
         ubifs_assert(fname_len(&nm) == 0);
         ubifs_assert(fname_name(&nm) == NULL);
-        if (nm.hash & ~UBIFS_S_KEY_HASH_MASK)
-            goto done; /* ENOENT */
+        if (nm.hash & ~UBIFS_S_KEY_HASH_MASK)
+            goto done; /* ENOENT */
         dent_key_init_hash(c, &key, dir->i_ino, nm.hash);
         err = ubifs_tnc_lookup_dh(c, &key, dent, nm.minor_hash);
     } else {
@@ -1147,8 +1149,7 @@
 struct ubifs_inode *ui;
 struct ubifs_inode *dir_ui = ubifs_inode(dir);
 struct ubifs_info *c = dir->i_sb->s_fs_info;
-    int err, len = strlen(symname);
+    int err, sz_change, len = strlen(symname);
     struct fscrypt_str disk_link = FSTR_INIT((char *)symname, len + 1);
     struct fscrypt_symlink_data *sd = NULL;
     struct ubifs_budget_req req = { .new_ino = 1, .new_dent = 1,
@@ -1189,6 +1190,8 @@
     if (err)
         goto out_budg;
     +sz_change = CALC_DENT_SIZE(fname_len(&nm));
+    +inode = ubifs_new_inode(c, dir, S_IFLNK | S_IRWXUGO);
     if (IS_ERR(inode)) {
         return err;
     }

err = PTR_ERR(inode);
@@ -1216,10 +1219,8 @@
ostr.len = disk_link.len;
- if (err) {
- kfree(sd);
+ if (err)
   goto out_inode;
- }

sd->len = cpu_to_le16(ostr.len);
disk_link.name = (char *)sd;
@@ -1251,11 +1252,10 @@
goto out_cancel;
mutex_unlock(&dir_ui->ui_mutex);

-ubifs_release_budget(c, &req);
insert_inode_hash(inode);
d_instantiate(dentry, inode);
-fscrypt_free_filename(&nm);
-return 0;
+err = 0;
+goto out_fname;

out_cancel:
   dir->i_size -= sz_change;
@@ -1268,6 +1268,7 @@
fscrypt_free_filename(&nm);
out_budg:
   ubifs_release_budget(c, &req);
+ kfree(sd);
   return err;
}

@@ -1407,7 +1408,10 @@
goto out_release;
}

+spin_lock(&whiteout->i_lock);
whiteout->i_state |= I_LINKABLE;
+spin_unlock(&whiteout->i_lock);
+
whiteout_ui = ubifs_inode(whiteout);
whiteout_ui->data = dev;
whiteout_ui->data_len = ubifs_encode_dev(dev, MKDEV(0, 0));
@@ -1500,7 +1504,11 @@
inc_nlink(whiteout);
mark_inode_dirty(whiteout);
+
+spin_lock(&whiteout->i_lock);
whiteout->i_state &= ~I_LINKABLE;
+spin_unlock(&whiteout->i_lock);
+
iput(whiteout);
}

--- linux-4.15.0.orig/fs/ubifs/file.c
+++ linux-4.15.0/fs/ubifs/file.c
@@ -797,7 +797,9 @@
 if (page_offset > end_index)
 break;
 -page = find_or_create_page(mapping, page_offset, ra_gfp_mask);
+page = pagecache_get_page(mapping, page_offset,
+ FG_P_LOCK|FGP_ACCESSED|FGP_CREAT|FGP_NOWAIT,
+ ra_gfp_mask);
 if (!page)
 break;
if (!PageUptodate(page))
@@ -1391,7 +1393,6 @@
 struct ubifs_info *c = inode->i_sb->s_fs_info;
 struct ubifs_budget_req req = { .dirtied_ino = 1,
  .dirtied_ino_d = ALIGN(ui->data_len, 8) };
-int iflags = I_DIRTY_TIME;
+int iflags = I_DIRTY_SYNC;
 int err, release;

err = ubifs_budget_space(c, &req);
@@ -1406,11 +1407,8 @@
 if (flags & S_MTIME)
inode->i_mtime = *time;
-if (!(inode->i_sb->s_flags & SB_LAZYTIME))
-  iflags |= I_DIRTY_SYNC;
- 
-release = ui->dirty;
-__mark_inode_dirty(inode, iflags);
+__mark_inode_dirty(inode, I_DIRTY_SYNC);
 mutex_unlock(&ui->ui_mutex);
 if (release)
  ubifs_release_budget(c, &req);
--- linux-4.15.0.orig/fs/ubifs/io.c
+++ linux-4.15.0/fs/ubifs/io.c
@@ -237,7 +237,7 @@
 int ubifs_check_node(const struct ubifs_info *c, const void *buf, int inum,
int offs, int quiet, int must_chk_crc)
{
-int err = -EINVAL, type, node_len;
+int err = -EINVAL, type, node_len, dump_node = 1;
uint32_t crc, node_crc, magic;
const struct ubifs_ch *ch = buf;

@@ -290,10 +290,22 @@
out_len:
if (!quiet)
ubifs_err(c, "bad node length %d", node_len);
+if (type == UBIFS_DATA_NODE && node_len > UBIFS_DATA_NODE_SZ)
+dump_node = 0;
out:
if (!quiet) {
ubifs_err(c, "bad node at LEB %d:%d", lnum, offs);
-ubifs_dump_node(c, buf);
+if (dump_node) {
+ubifs_dump_node(c, buf);
+} else {
+int safe_len = min3(node_len, c->leb_size - offs,
+(int)UBIFS_MAX_DATA_NODE_SZ);
+pr_err("prevent out-of-bounds memory access\n");
+pr_err("truncated data node length \%d\n", safe_len);
+pr_err("corrupted data node:\n");
+print_hex_dump(KERN_ERR, "\t", DUMP_PREFIX_OFFSET, 32, 1,
+buf, safe_len, 0);
+}
} else {
} else {
+int safe_len = min3(node_len, c->leb_size - offs,
+(int)UBIFS_MAX_DATA_NODE_SZ);
+pr_err("prevent out-of-bounds memory access\n");
+pr_err("truncated data node length \%d\n", safe_len);
+pr_err("corrupted data node:\n");
+print_hex_dump(KERN_ERR, "\t", DUMP_PREFIX_OFFSET, 32, 1,
+buf, safe_len, 0);
+}
} else {
} else {
dump_stack();
} else {
return err;
@ @ -319,7 +331,7 @@
} else {
uint32_t crc;
@ @ -715,6 +727,10 @@
 * write-buffer.
 */
memcpy(wbuf->buf + wbuf->used, buf, len);
+if (aligned_len > len) {
+ubifs_assert(aligned_len > len);
+ubifs_pad(c, wbuf->buf + wbuf->used + len, aligned_len - len);
+}
if (aligned_len == wbuf->avail) {
    dbg_io("flush jhead %s wbuf to LEB %d:%d",
           -807,13 +823,18 @@)
}

spin_lock(&wbuf->lock);
@if (aligned_len)
+if (aligned_len) {
    /*
     * And now we have what’s left and what does not take whole
     * max. write unit, so write it to the write-buffer and we are
     * done.
     */
    */
    memcpy(wbuf->buf, buf + written, len);
+if (aligned_len > len) {
+    ubifs_assert(aligned_len - len < 8);
+    ubifs_pad(c, wbuf->buf + len, aligned_len - len);
+}
+
}

if (c->leb_size - wbuf->offs >= c->max_write_size)
    wbuf->size = c->max_write_size;
--- linux-4.15.0.orig/fs/ubifs/ioctl.c
+++ linux-4.15.0/fs/ubifs/ioctl.c
@@ -28,6 +28,11 @@
#include <linux/mount.h>
#include "ubifs.h"
+/* Need to be kept consistent with checked flags in ioctl2ubifs() */
+#define UBIFS_SUPPORTED_IOCTL_FLAGS \
+  (FS_COMPR_FL | FS_SYNC_FL | FS_APPEND_FL | \
+   FS_IMMUTABLE_FL | FS_DIRSYNC_FL)
+
+/**
+ * ubifs_set_inode_flags - set VFS inode flags.
+ * @inode: VFS inode to set flags for
+ @@@ -127,7 +132,8 @@
+ @@@ -169,6 +175,9 @@
if (get_user(flags, (int __user *) arg))
    return -EFAULT;

+if (flags & ~UBIFS_SUPPORTED_IOCTL_FLAGS)
+return -EOPNOTSUPP;
+
+if (!S_ISDIR(inode->i_mode))
    flags &= ~FS_DIRSYNC_FL;

--- linux-4.15.0.orig/fs/ubifs/journal.c
+++ linux-4.15.0/fs/ubifs/journal.c
@@ -665,6 +665,11 @@
    spin_lock(&ui->ui_lock);
    ui->synced_i_size = ui->ui_size;
    spin_unlock(&ui->ui_lock);
+if (xent) {
+    spin_lock(&host_ui->ui_lock);
+    host_ui->synced_i_size = host_ui->ui_size;
+    spin_unlock(&host_ui->ui_lock);
+}
    mark_inode_clean(c, ui);
    mark_inode_clean(c, host_ui);
    return 0;
@@ -1388,7 +1393,16 @@
    } else if (err)
        goto out_free;
    else {
-    int dn_len = le32_to_cpu(dn->size);
+    int dn_len = le32_to_cpu(dn->size);
+    +if (dn_len <= dlen)
+        dlen = 0; /* Nothing to do */
+    +
+    +if (dn_len <= 0 || dn_len > UBIFS_BLOCK_SIZE) {
+        ubifs_err(c, "bad data node (block %u, inode %lu)",
+            blk, inode->i_ino);
+        ubifs_dump_node(c, dn);
+        goto out_free;
+    }
+    +
+    +if (dn_len <= dlen)
+        dlen = 0; /* Nothing to do */
    } else 
        err = truncate_data_node(c, inode, blk, dn, &dlen);
--- linux-4.15.0.orig/fs/ubifs/lprops.c
+++ linux-4.15.0/fs/ubifs/lprops.c
@@ -1091,10 +1091,6 @@
    }
}

    -buf = __vmalloc(c->leb_size, GFP_NOFS, PAGE_KERNEL);
-if (!buf)
-  return -ENOMEM;
-
/*/ 
  * After an unclean unmount, empty and freeable LEBs
  * may contain garbage - do not scan them.
@@ -1113,6 +1109,10 @@
 return LPT_SCAN_CONTINUE;
 }

+buf = __vmalloc(c->leb_size, GFP_NOFS, PAGE_KERNEL);
+if (!buf)
+  return -ENOMEM;
+
sleb = ubifs_scan(c, lnum, 0, buf, 0);
if (IS_ERR(sleb)) {
  ret = PTR_ERR(sleb);
--- linux-4.15.0.orig/fs/ubifs/replay.c
+++ linux-4.15.0/fs/ubifs/replay.c
@@ -210,6 +210,39 @@
 }

 /**
 + * inode_still_linked - check whether inode in question will be re-linked.
 + * @c: UBIFS file-system description object
 + * @rino: replay entry to test
 + *
 + * O_TMPFILE files can be re-linked, this means link count goes from 0 to 1.
 + * This case needs special care, otherwise all references to the inode will
 + * be removed upon the first replay entry of an inode with link count 0
 + * is found.
 + */
+static bool inode_still_linked(struct ubifs_info *c, struct replay_entry *rino) {
+  struct replay_entry *r;
+
+  ubifs_assert(rino->deletion);
+  ubifs_assert(key_type(c, &rino->key) == UBIFS_INO_KEY);
+  
+  /* Find the most recent entry for the inode behind @rino and check
+  * whether it is a deletion.
+  */
+  list_for_each_entry_reverse(r, &c->replay_list, list) {
+    ubifs_assert(r->sqnum >= rino->sqnum);
+    if (key_inum(c, &r->key) == key_inum(c, &rino->key) &&
+        key_type(c, &r->key) == UBIFS_INO_KEY)
+      return r->deletion == 0;
+  }
```c
+ 
+
+ ubifs_assert(0);
+ return false;
+
+
+/**
 * apply_replay_entry - apply a replay entry to the TNC.
 * @c: UBIFS file-system description object
 * @r: replay entry to apply
 * @@ -239,6 +272,11 @@
 {  
   ino_t inum = key_inum(c, &r->key);

+if (inode_still_linked(c, r)) {
+ err = 0;
+ break;
+} 
+
 err = ubifs_tnc_remove_ino(c, inum);
 break;
 }
--- linux-4.15.0.orig/fs/ubifs/super.c
+++ linux-4.15.0/fs/ubifs/super.c
@@ -1739,8 +1739,11 @@

dbg_save_space_info(c);

-    for (i = 0; i < c->jhead_cnt; i++)
-    ubifs_wbuf_sync(&c->jheads[i].wbuf);
+    for (i = 0; i < c->jhead_cnt; i++) {
+      err = ubifs_wbuf_sync(&c->jheads[i].wbuf);
+      if (err)
+        ubifs_ro_mode(c, err);
+    }

c->mst_node->flags &= ~cpu_to_le32(UBIFS_MST_DIRTY);
c->mst_node->flags |= cpu_to_le32(UBIFS_MST_NO_ORPHS);
@@ -1806,8 +1809,11 @@
 int err;

 /* Synchronize write-buffers */
-    for (i = 0; i < c->jhead_cnt; i++)
-    ubifs_wbuf_sync(&c->jheads[i].wbuf);
+    for (i = 0; i < c->jhead_cnt; i++) {
+      err = ubifs_wbuf_sync(&c->jheads[i].wbuf);
+      if (err)
```

ubifs_ro_mode(c, err);
+
/*
* We are being cleanly unmounted which means the
int dev, vol;
char *endptr;

+if (!name || !*name)
+return ERR_PTR(-EINVAL);
+
/* First, try to open using the device node path method */
ubi = ubi_open_volume_path(name, mode);
if (!IS_ERR(ubi))
--- linux-4.15.0.orig/fs/ubifs/tnc.c
+++ linux-4.15.0/fs/ubifs/tnc.c
@@ -1164,8 +1164,8 @@
*   o exact match, i.e. the found zero-level znode contains key @key, then %1
*   o not exact match, which means that zero-level znode does not contain
- o @key, then %0 is returned and slot number of the closest branch is stored
- in @n;
+ o @key, then %0 is returned and slot number of the closest branch or %-1
+ is stored in @n; In this case calling tnc_next() is mandatory.
*   o @key is so small that it is even less than the lowest key of the
*     leftmost zero-level node, then %0 is returned and %0 is stored in @n.
+
@@ -1882,43 +1882,42 @@
static int search_dh_cookie(struct ubifs_info *c, const union ubifs_key *key,
    struct ubifs_dent_node *dent, uint32_t cookie,
-    struct ubifs_znode **zn, int *n)
+    struct ubifs_znode **zn, int *n, int exact)
{
int err;
struct ubifs_znode *znode = *zn;
struct ubifs_zbranch *zbr;
union ubifs_key *dkey;

-    for (;;) {
-      if (!err) {
-        err = tnc_next(c, &znode, n);
-      }
-      if (err)
-        goto out;
-    }
+    if (!exact) {
+      err = tnc_next(c, &znode, n);
+if (err)
+return err;
+
+for (;;) {
+ zbr = &znode->zbranch[*n];
+ dkey = &zbr->key;
+
+ if (key_inum(c, dkey) != key_inum(c, key) ||
+ key_type(c, dkey) != key_type(c, key)) {
+err = -ENOENT;
+goto out;
+return -ENOENT;
+}

err = tnc_read_hashed_node(c, zbr, dent);
if (err)
-goto out;
+return err;

if (key_hash(c, key) == key_hash(c, dkey) &&
 le32_to_cpu(dent->cookie) == cookie) {
*zn = znode;
-goto out;
+return 0;
}
-
-
-out:

-return err;
+err = tnc_next(c, &znode, n);
+if (err)
+return err;
+
}
}

static int do_lookup_dh(struct ubifs_info *c, const union ubifs_key *key,
@@ -1937,7 +1936,7 @@
if (unlikely(err < 0))
goto out_unlock;

-err = search_dh_cookie(c, key, dent, cookie, &znode, &n);
+err = search_dh_cookie(c, key, dent, cookie, &znode, &n, err);

out_unlock:
mutex_unlock(&c->tnc_mutex);
@@ -2723,7 +2722,7 @@
if (unlikely(err < 0))
goto out_free;

-err = search_dh_cookie(c, key, dent, cookie, &znode, &n);
+err = search_dh_cookie(c, key, dent, cookie, &znode, &n, err);
if (err)
goto out_free;
}
---
---
--- linux-4.15.0.orig/fs/ubifs/tnc_commit.c
+++ linux-4.15.0/fs/ubifs/tnc_commit.c
@@ -219,7 +219,7 @@
@@ -228,7 +228,7 @@
@@ -243,7 +243,7 @@
* filled, however we do not check there at present.
*/
return lnum; /* Error code */
-*p = lnum;
+c->gap_lebs[p] = lnum;
dbg_gc("LEB %d", lnum);
/*
 * Scan the index LEB. We use the generic scan for this even though
@@ -362,7 +362,7 @@
*/
static int layout_in_gaps(struct ubifs_info *c, int cnt)
{
  int err, leb_needed_cnt, written, *p;
+int err, leb_needed_cnt, written, p = 0, old_idx_lebs, *gap_lebs;

dbg_gc("%d znodes to write", cnt);
@@ -370,9 +370,9 @@
if (!c->gap_lebs)
return -ENOMEM;

-p = c->gap_lebs;
+old_idx_lebs = c->lst.idx_lebs;
 do {
-ubifs_assert(p < c->gap_lebs + c->lst.idx_lebs);
+ubifs_assert(p < c->lst.idx_lebs);
 written = layout_leb_in_gaps(c, p);
 if (written < 0) {
   err = written;
   @@ -398,9 +398,29 @@
 leb_needed_cnt = get_leb_cnt(c, cnt);
   dbg_gc("%d znodes remaining, need %d LEBs, have %d", cnt,
   leb_needed_cnt, c->ileb_cnt);
+/*
+ * Dynamically change the size of @c->gap_lebs to prevent
+ * oob, because @c->lst.idx_lebs could be increased by
+ * function @get_idx_gc_leb (called by layout_leb_in_gaps-
+ * @ubifs_find_dirty_idx_leb) during loop. Only enlarge
+ * @c->gap_lebs when needed.
+ *
+ */
+if (leb_needed_cnt > c->ileb_cnt && p >= old_idx_lebs &&
   + old_idx_lebs < c->lst.idx_lebs) {
   +old_idx_lebs = c->lst.idx_lebs;
   +gap_lebs = krealloc(c->gap_lebs, sizeof(int) *
   + (old_idx_lebs + 1), GFP_NOFS);
   +if (!gap_lebs) {
   +kfree(c->gap_lebs);
   +c->gap_lebs = NULL;
   +return -ENOMEM;
   +}
   +c->gap_lebs = gap_lebs;
   +}
 } while (leb_needed_cnt > c->ileb_cnt);

-*p = -1;
+c->gap_lebs[p] = -1;
 return 0;
}

--- linux-4.15.0.orig/fs/udf/directory.c
+++ linux-4.15.0/fs/udf/directory.c
@@ -152,6 +152,9 @@
 sizeof(struct fileIdentDesc));
 }
 }
+/* Got last entry outside of dir size - fs is corrupted! */
+if (*nf_pos > dir->i_size)
+return NULL;
return fi;
}

--- linux-4.15.0.orig/fs/udf/inode.c
+++ linux-4.15.0/fs/udf/inode.c
@@ -132,21 +132,24 @@
struct udf_inode_info *iinfo = UDF_I(inode);
int want_delete = 0;

-if (!inode->i_nlink && !is_bad_inode(inode)) {
-want_delete = 1;
-udf_setsize(inode, 0);
-udf_update_inode(inode, IS_SYNC(inode));
+if (!is_bad_inode(inode)) {
+want_delete = 1;
+udf_setsize(inode, 0);
+udf_update_inode(inode, IS_SYNC(inode));
+}
+if ((iinfo->i_alloc_type != ICBTAG_FLAG_AD_IN_ICB &&
+inode->i_size != iinfo->i_lenExtents) {
+udf_warn(inode->i_sb,
+"Inode %lu (mode %o) has inode size %llu different from extent length %llu. Filesystem need not be standards
+compliant.
",
+inode->i_ino, inode->i_mode,
+(unsigned long long)inode->i_size,
+(unsigned long long)iinfo->i_lenExtents);
+}
}
truncate_inode_pages_final(&inode->i_data);
invalidate_inode_buffers(inode);
clear_inode(inode);
-if ((iinfo->i_alloc_type != ICBTAG_FLAG_AD_IN_ICB &&
-inode->i_size != iinfo->i_lenExtents) {
-udf_warn(inode->i_sb, "Inode %lu (mode %o) has inode size %llu different from extent length %llu. Filesystem
+inode->i_nlink, inode->i_mode,
+(unsigned long long)inode->i_size,
+(unsigned long long)iinfo->i_lenExtents);
-}
-kfree(iinfo->i_ext.i_data);
iinfo->i_ext.i_data = NULL;
udf_clear_extent_cache(inode);
@@ -470,13 +473,15 @@
return NULL;
}


static int udf_doExtend_file(struct inode *inode, struct extent_position *last_pos,
   struct kernel_long_ad *last_ext,
   sector_t blocks)
+
   loff_t new_block_bytes)
{
-   sector_t add;
+   uint32_t add;
   int count = 0, fake = !(last_ext->extLength & UDF_EXTENT_LENGTH_MASK);
   struct super_block *sb = inode->i_sb;
   struct kernel_lb_addr prealloc_loc = {1};
   @ @ -486,7 +491,7 @@

   /* The previous extent is fake and we should not extend by anything
   * - there's nothing to do... */
   -if (!blocks && fake)
   +if (!new_block_bytes && fake)
   return 0;

   iinfo = UDF_I(inode);
   @ @ -517,13 +522,12 @@
   /* Can we merge with the previous extent? */
   if ((last_ext->extLength & UDF_EXTENT_FLAG_MASK) ==
       EXT_NOT_RECORDED_NOT_ALLOCATED) {
     -add = ((1 << 30) - sb->s_blocksize -
     -last_ext->extLength & UDF_EXTENT_LENGTH_MASK) >>
     -sb->s_blocksize_bits;
     -if (add > blocks)
     -add = blocks;
     -blocks -= add;
     -last_ext->extLength += add << sb->s_blocksize_bits;
     +add = (1 << 30) - sb->s_blocksize -
     +(last_ext->extLength & UDF_EXTENT_LENGTH_MASK);
     +if (add > new_block_bytes)
     +add = new_block_bytes;
     +new_block_bytes -= add;
     +last_ext->extLength += add;
   }

   if (fake) {
   @ @ -536,36 +540,38 @@

   udf_write_aext(inode, last_pos, &last_ext->extLocation,
   @ @ -536,36 +540,38 @@

   udf_write_aext(inode, last_pos, &last_ext->extLocation,
last_ext->extLength, 1);
+
/*
- * We've rewritten the last extent but there may be empty
- * indirect extent after it - enter it.
+ * We've rewritten the last extent. If we are going to add
+ * more extents, we may need to enter possible following
+ * empty indirect extent.
*/
-udf_next_aext(inode, last_pos, &tmploc, &tmplen, 0);
+if (new_block_bytes || prealloc_len)
+udf_next_aext(inode, last_pos, &tmploc, &tmplen, 0);
}

/* Managed to do everything necessary? */
-if (!blocks)
+if (!new_block_bytes)
goto out;

/* All further extents will be NOT_RECORDED_NOT_ALLOCATED */
last_ext->extLocation.logicalBlockNum = 0;
last_ext->extLocation.partitionReferenceNum = 0;
- add = (1 << (30-sb->s_blocksize_bits)) - 1;
- last_ext->extLength = EXT_NOT_RECORDED_NOT_ALLOCATED |
-(add << sb->s_blocksize_bits);
+ add = (1 << 30) - sb->s_blocksize;
+ last_ext->extLength = EXT_NOT_RECORDED_NOT_ALLOCATED | add;

/* Create enough extents to cover the whole hole */
-while (blocks > add) {
+while (new_block_bytes > add) {
+blocks -= add;
+new_block_bytes -= add;
+err = udf_add_aext(inode, last_pos, &last_ext->extLocation,
+ last_ext->extLength, 1);
+if (err)
++count;
}
-if (blocks) {
+if (new_block_bytes) {
 last_ext->extLength = EXT_NOT_RECORDED_NOT_ALLOCATED |
-(blocks << sb->s_blocksize_bits);
+new_block_bytes;
+err = udf_add_aext(inode, last_pos, &last_ext->extLocation,
+ last_ext->extLength, 1);
+if (err)
@@ -596,6 +602,24 @@
return count;
}

/* Extend the final block of the file to final_block_len bytes */
static void udf_do_extend_final_block(struct inode *inode, 
  struct extent_position *last_pos, 
  struct kernel_long_ad *last_ext, 
  uint32_t final_block_len)
{
  struct super_block *sb = inode->i_sb;
  uint32_t added_bytes;

  added_bytes = final_block_len -
    (last_ext->extLength & (sb->s_blocksize - 1));
  last_ext->extLength += added_bytes;
  UDF_I(inode)->i_lenExtents += added_bytes;
  udf_write_aext(inode, last_pos, &last_ext->extLocation, 
    last_ext->extLength, 1);
}

static int udf_extend_file(struct inode *inode, loff_t newsize)
{
  int8_t etype;
  struct super_block *sb = inode->i_sb;
  sector_t first_block = newsize >> sb->s_blocksize_bits, offset;
  unsigned long partial_final_block;
  int adsize;
  struct udf_inode_info *iinfo = UDF_I(inode);
  struct kernel_long_ad extent;
  int err;
  int within_final_block;

  if (iinfo->i_alloc_type == ICBTAG_FLAG_AD_SHORT)
    adsize = sizeof(struct short_ad);

  etype = inode_bmap(inode, first_block, &epos, &eloc, &elen, &offset);
  within_final_block = (etype != -1);

  /* File has extent covering the new size (could happen when extending 
   * inside a block)? */
  if (etype != -1)
    return 0;
}
-if (newsize & (sb->s_blocksize - 1))
-offset++;
-/* Extended file just to the boundary of the last file block */
-if (offset == 0)
-return 0;
-
-/* Truncate is extending the file by 'offset' blocks */
if (!epos.bh && epos.offset == udf_file_entry_alloc_offset(inode)) ||
  (epos.bh && epos.offset == sizeof(struct allocExtDesc))) {
/* File has no extents at all or has empty last
@@ -643,7 +659,22 @@
extent.extLength, 0);
extent.extLength |= etype << 30;
}
-err = udf_do_extend_file(inode, &epos, &extent, offset);
+
+partial_final_block = newsize & (sb->s_blocksize - 1);
+
+/* File has extent covering the new size (could happen when extending
+ * inside a block)?
+ */
+if (within_final_block) {
+/* Extending file within the last file block */
+udf_do_extend_final_block(inode, &epos, &extent,
+  partial_final_block);
+} else {
+loff_t add = ((loff_t)offset << sb->s_blocksize_bits) |
+  partial_final_block;
+err = udf_do_extend_file(inode, &epos, &extent, add);
+}
+
+if (err < 0)
+goto out;
+err = 0;
@@ -745,6 +776,7 @@
/* Are we beyond EOF? */
if (etype == -1) {
  int ret;
+loff_t hole_len;
  isBeyondEOF = true;
  if (count) {
+  if (c)
@@ -760,7 +792,8 @@
  startnum = (offset > 0);
  }
/* Create extents for the hole between EOF and offset */
-ret = udf_do_extend_file(inode, &prev_epos, laarr, offset);
+hole_len = (loff_t)offset << inode->i_blkbits;
+ret = udf_do_extend_file(inode, &prev_epos, laarr, hole_len);
if (ret < 0) {
    *err = ret;
    newblock = 0;
    @ @ -1357.6 +1390.12 @@

    iinfo->i_alloc_type = le16_to_cpu(fe->icbTag.flags) &
    ICBTAG_FLAG_AD_MASK;
    +if (iinfo->i_alloc_type != ICBTAG_FLAG_AD_SHORT &&
    +   iinfo->i_alloc_type != ICBTAG_FLAG_AD_LONG &&
    +   iinfo->i_alloc_type != ICBTAG_FLAG_AD_IN_ICB) {
        +ret = -EIO;
        +goto out;
    +}
    +iinfo->i_unique = 0;
    +iinfo->i_lenEAttr = 0;
    +iinfo->i_lenExtents = 0;
--- linux-4.15.0.orig/fs/udf/misc.c
+++ linux-4.15.0/fs/udf/misc.c
@@ -173,13 +173,22 @@
     else
        offset = le32_to_cpu(eahd->appAttrLocation);
-    +while (offset < iinfo->i_lenEAttr) {
    +    while (offset + sizeof(*gaf) < iinfo->i_lenEAttr) {
        +    uint32_t attrLength;
        +    gaf = (struct genericFormat *)&ea[offset];
        +    attrLength = le32_to_cpu(gaf->attrLength);
        +    /* Detect undersized elements and buffer overflows */
        +    if ((attrLength < sizeof(*gaf)) ||
                (attrLength > (iinfo->i_lenEAttr - offset)))
            break;
        +    if (le32_to_cpu(gaf->attrType) == type &&
                gaf->attrSubtype == subtype)
            return gaf;
        else
            offset += le32_to_cpu(gaf->attrLength);
    +    offset += attrLength;
    }
    }

--- linux-4.15.0.orig/fs/udf/namei.c
+++ linux-4.15.0/fs/udf/namei.c
@@ -622,8 +622,7 @@

if (fibh.sbh != fibh.ebh)
brelse(fibh.ebh);
brelse(fibh.sbh);
-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);

return 0;
}
@@ -733,8 +732,7 @@
inc_nlink(dir);
dir->i_ctime = dir->i_mtime = current_time(dir);
mark_inode_dirty(dir);
-unlock_new_inode(inode);
-d_instantiate(dentry, inode);
+d_instantiate_new(dentry, inode);
if (fibh.sbh != fibh.ebh)
brelse(fibh.ebh);
brelse(fibh.sbh);
@@ -959,6 +957,10 @@
iinfo->i_location.partitionReferenceNum, 0);
epos.bh = udf_tgetblk(sb, block);  
+if (unlikely(!epos.bh)) {
+err = -ENOMEM;
+goto out_no_entry;
+}
lock_buffer(epos.bh);
memset(epos.bh->b_data, 0x00, bsize);
set_buffer_uptodate(epos.bh);
--- linux-4.15.0.orig/fs/udf/super.c
+++ linux-4.15.0/fs/udf/super.c
@@ -113,16 +113,10 @@
return NULL;
lvid = (struct logicalVolIntegrityDesc *)UDF_SB(sb)->s_lvid_bh->b_data;
partnum = le32_to_cpu(lvid->numOfPartitions);
-if ((sb->s_blocksize - sizeof(struct logicalVolIntegrityDescImpUse) -
- offsetof(struct logicalVolIntegrityDesc, impUse)) /
- (2 * sizeof(uint32_t)) < partnum) {
- udf_err(sb, "Logical volume integrity descriptor corrupted 
- (numOfPartitions = %u)!\n", partnum);
- return NULL;
- }
/* The offset is to skip freeSpaceTable and sizeTable arrays */
offset = partnum * 2 * sizeof(uint32_t);
-return (struct logicalVolIntegrityDescImpUse *)&(lvid->impUse[offset]);
+return (struct logicalVolIntegrityDescImpUse *)&(lvid + 1) + offset;
/* UDF filesystem type */
@@ -645,14 +639,11 @@
 struct udf_options uopt;
 struct udf_sb_info *sbi = UDF_SB(sb);
 int error = 0;
-struct logicalVolIntegrityDescImpUse *lvidiu = udf_sb_lvidiu(sb);
 +
+if (!(*flags & SB_RDONLY) && UDF_QUERY_FLAG(sb, UDF_FLAG_RW_INCOMPAT))
+return -EACCES;

 sync_filesystem(sb);
-if (lvidiu) {
-    int write_rev = le16_to_cpu(lvidiu->minUDFWriteRev);
-    if (write_rev > UDF_MAX_WRITE_VERSION && !(*flags & SB_RDONLY))
-        return -EACCES;
-}
+
 uopt.flags = sbi->s_flags;
 uopt.uid   = sbi->s_uid;
@@ -922,16 +913,20 @@
 }

 ret = udf_dstrCS0toUTF8(outstr, 31, pvoldesc->volIdent, 32);
-    if (ret < 0)
-        goto out_bh;
-    
-    strcpy(UDF_SB(sb)->s_volume_ident, outstr, ret);
+    if (ret < 0) {
+        strcpy(UDF_SB(sb)->s_volume_ident, "InvalidName");
+        pr_warn("incorrect volume identification, setting to 
+"InvalidName\n");
+    } else { 
+        strcpy(UDF_SB(sb)->s_volume_ident, outstr, ret);
+    }
+    udf_debug("volIdent[] = \"%s\n\", UDF_SB(sb)->s_volume_ident);

 ret = udf_dstrCS0toUTF8(outstr, 127, pvoldesc->volSetIdent, 128);
-    if (ret < 0)
-        if (ret < 0) {
-            ret = 0;
-            goto out_bh;
-        }
-    outstr[ret] = 0;
+    if (ret < 0) {
+        ret = 0;
+        goto out_bh;
+    }
+    outstr[ret] = 0;
    udf_debug("volSetIdent[] = \"%s\n\", outstr);

@@ -1076,12 +1071,61 @@
return bitmap;
}

+static int check_partition_desc(struct super_block *sb,
+struct partitionDesc *p,
+struct udf_part_map *map)
+{
+bool umap, utable, fmap, ftable;
+struct partitionHeaderDesc *phd;
+
+switch (le32_to_cpu(p->accessType)) {
+case PD_ACCESS_TYPE_READ_ONLY:
+case PD_ACCESS_TYPE_WRITE_ONCE:
+case PD_ACCESS_TYPE_NONE:
+goto force_ro;
+}
+
+/* No Partition Header Descriptor? */
+if (strcmp(p->partitionContents.ident, PD_PARTITION_CONTENTS_NSR02) &&
+    strcmp(p->partitionContents.ident, PD_PARTITION_CONTENTS_NSR03))
+    goto force_ro;
+
+phd = (struct partitionHeaderDesc *)p->partitionContentsUse;
+utable = phd->unallocSpaceTable.extLength;
+umap = phd->unallocSpaceBitmap.extLength;
+ftable = phd->freedSpaceTable.extLength;
+fmap = phd->freedSpaceBitmap.extLength;
+
+/* No allocation info? */
+if (!utable && !umap && !ftable && !fmap)
+    goto force_ro;
+
+/* We don't support blocks that require erasing before overwrite */
+if (ftable || fmap)
+    goto force_ro;
+
+/* UDF 2.60: 2.3.3 - no mixing of tables & bitmaps, no VAT. */
+if (utable && umap)
+    goto force_ro;
+
+if (map->s_partition_type == UDF_VIRTUAL_MAP15 ||
+    map->s_partition_type == UDF_VIRTUAL_MAP20)
+    goto force_ro;
+
+return 0;
+force_ro:
+if (!sb_rdonly(sb))
+    return -EACCES;
+UDF_SET_FLAG(sb, UDF_FLAG_RW_INCOMPAT);
static int udf_fill_partdesc_info(struct super_block *sb, struct partitionDesc *p, int p_index)
{
    struct udf_part_map *map;
    struct udf_sb_info *sbi = UDF_SB(sb);
    struct partitionHeaderDesc *phd;

    map = &sbi->s_partmaps[p_index];

    if (strcmp(p->partitionContents.ident, PD_PARTITION_CONTENTS_NSR02) &&
        strcmp(p->partitionContents.ident, PD_PARTITION_CONTENTS_NSR03))
        err = check_partition_desc(sb, p, map);
    if (err)
        return err;

    /* Skip loading allocation info if we cannot ever write to the fs.
     * This is a correctness thing as we may have decided to force ro mount
     * to avoid allocation info we don't support.
     */
    if (UDF_QUERY_FLAG(sb, UDF_FLAG_RW_INCOMPAT))
        return 0;

    phd = (struct partitionHeaderDesc *)p->partitionContentsUse;

    if (phd->partitionIntegrityTable.extLength)
        udf_debug("partitionIntegrityTable (part %d)\n", p_index);
    if (phd->freedSpaceTable.extLength) {
        struct kernel_lb_addr loc = {
            .logicalBlockNum = le32_to_cpu(
            ret = -EACCES;
            goto out_bh;
        }
        +UDF_SET_FLAG(sb, UDF_FLAG_RW_INCOMPAT);
        ret = udf_load_vat(sb, i, type1_idx);

        return 0;
    }

    return 0;
}
if (ret < 0)
goto out_bh;
@@ -1381,6 +1431,12 @@
(int)spm->numSparingTables);
    return -EIO;
}
+    if (le32_to_cpu(spm->sizeSparingTable) > sb->s_blocksize) {
+        udf_err(sb, "error loading logical volume descriptor: "
+            "Too big sparing table size (%u)\n",
+            le32_to_cpu(spm->sizeSparingTable));
+        return -EIO;
+    }

for (i = 0; i < spm->numSparingTables; i++) {
    loc = le32_to_cpu(spm->locSparingTable[i]);
    @@ -1555,6 +1611,7 @@
        struct udf_sb_info *sbi = UDF_SB(sb);
        struct logicalVolIntegrityDesc *lvid;
        int indirections = 0;
+        u32 parts, impuselen;

        while (++indirections <= UDF_MAX_LVID_NESTING) {
            final_bh = NULL;
            @@ -1581,15 +1638,27 @@
                lvid = (struct logicalVolIntegrityDesc *)final_bh->b_data;
            if (lvid->nextIntegrityExt.extLength == 0)
                return;
            +goto check;

            loc = leea_to_cpu(lvid->nextIntegrityExt);
        }

        udf_warn(sb, "Too many LVID indirections (max %u), ignoring\n", UDF_MAX_LVID_NESTING);
+        out_err:
        brelse(sbi->s_lvid_bh);
        sbi->s_lvid_bh = NULL;
+        return;
+        check:
+            parts = le32_to_cpu(lvid->numOfPartitions);
+            impuselen = le32_to_cpu(lvid->lengthOfImpUse);
+            if (parts >= sb->s_blocksize || impuselen >= sb->s_blocksize ||
+                sizeof(struct logicalVolIntegrityDesc) + impuselen +
+                2 * parts * sizeof(u32) > sb->s_blocksize) {
+                udf_warn(sb, "Corrupted LVID (parts=%u, impuselen=%u), "
+                    "ignoring\n", parts, impuselen);
+            goto out_err;
@@ -2091,8 +2160,9 @@
bool lvid_open = false;

uopt.flags = (1 << UDF_FLAG_USE_AD_IN_ICB) | (1 << UDF_FLAG_STRICT);
-uopt.uid = INVALID_UID;
-uopt.gid = INVALID_GID;
+/* By default we'll use overflow[ug]id when UDF inode [ug]id == -1 */
+uopt.uid = make_kuid(current_user_ns(), overflowuid);
+uopt.gid = make_kgid(current_user_ns(), overflowgid);
 uopt.umask = 0;
 uopt.fmode = UDF_INVALID_MODE;
 uopt.dmode = UDF_INVALID_MODE;
@@ -2204,10 +2274,12 @@
 UDF_MAX_READ_VERSION);
 ret = -EINVAL;
 goto error_out;
-} else if (minUDFWriteRev > UDF_MAX_WRITE_VERSION &&
- !sb_rdonly(sb)) {
- ret = -EACCES;
- goto error_out;
+} else if (minUDFWriteRev > UDF_MAX_WRITE_VERSION) {
+ if (!sb_rdonly(sb)) {
+ ret = -EACCES;
+ goto error_out;
+} +UDF_SET_FLAG(sb, UDF_FLAG_RW_INCOMPAT);
+
 sbi->s_udfrev = minUDFWriteRev;
@@ -2225,10 +2297,12 @@
 }

 if (sbi->s_partmaps[sbi->s_partition].s_partition_flags &
-UDF_PART_FLAG_READ_ONLY &&
- !sb_rdonly(sb)) {
- ret = -EACCES;
- goto error_out;
+UDF_PART_FLAG_READ_ONLY) {
+ if (!sb_rdonly(sb)) {
+ ret = -EACCES;
+ goto error_out;
+} +UDF_SET_FLAG(sb, UDF_FLAG_RW_INCOMPAT);
+}
if (udf_find_fileset(sb, &fileset, &rootdir)) {
	@@ -2462,17 +2536,29 @@
static unsigned int udf_count_free(struct super_block *sb) {
    unsigned int accum = 0;
-struct udf_sb_info *sbi;
+struct udf_sb_info *sbi = UDF_SB(sb);
struct udf_part_map *map;
+unsigned int part = sbi->s_partition;
+int ptype = sbi->s_partmaps[part].s_partition_type;
+
+if (ptype == UDF_METADATA_MAP25) {
+    part = sbi->s_partmaps[part].s_type_specific.s_metadata.
+        s_phys_partition_ref;
+} else if (ptype == UDF_VIRTUAL_MAP15 || ptype == UDF_VIRTUAL_MAP20) {
+    /*
+     * Filesystems with VAT are append-only and we cannot write to
+     * them. Let's just report 0 here.
+     */
+    return 0;
+}
+
-    sbi = UDF_SB(sb);
    if (sbi->s_lvid_bh) {
        struct logicalVolIntegrityDesc *lvid =
            (struct logicalVolIntegrityDesc *)
            sbi->s_lvid_bh->b_data;
-        if (le32_to_cpu(lvid->numOfPartitions) > sbi->s_partition) {
+        if (le32_to_cpu(lvid->numOfPartitions) > part) {
            accum = le32_to_cpu(
-            lvid->freeSpaceTable[sbi->s_partition]);
+            lvid->freeSpaceTable[part]);
            if (accum == 0xFFFFFFFF)
                accum = 0;
        }
    } else if (sbi->s_partition_flags & UDF_PART_FLAG_UNALLOC_BITMAP) {
        accum += udf_count_free_bitmap(sb,
            map->s_uspace.s_bitmap);
    --- linux-4.15.0.orig/fs/udf/truncate.c
+++ linux-4.15.0/fs/udf/truncate.c
@@ -260,6 +260,9 @@
if (map->s_partition_flags & UDF_PART_FLAG_UNALLOC_BITMAP) {
    accum += udf_count_free_bitmap(sb,
        map->s_uspace.s_bitmap);
--- linux-4.15.0.orig/fs/udf/truncate.c
+++ linux-4.15.0/fs/udf/truncate.c
@@ -260,6 +260,9 @@
epos.block = eloc;
epos.bh = udf_tread(sb,
udf_get_lb_pblock(sb, &eloc, 0));
+/* Error reading indirect block */
+if (!epos.bh)
+return;
if (elen)
indirect_ext_len =
(elen + sb->s_blocksize - 1) >>
--- linux-4.15.0.orig/fs/udf/udf_sb.h
+++ linux-4.15.0/fs/udf/udf_sb.h
@@ -31,6 +31,8 @@
#define UDF_FLAG_SESSION_SET	17
#define UDF_FLAG_LASTBLOCK_SET	18
#define UDF_FLAG_BLOCKSIZE_SET	19
+#define UDF_FLAG_RW_INCOMPAT	20	/* Set when we find RW incompatible
++					 * feature */
#define UDF_PART_FLAG_UNALLOC_BITMAP	0x0001
#define UDF_PART_FLAG_UNALLOC_TABLE	0x0002
--- linux-4.15.0.orig/fs/udf/unicode.c
+++ linux-4.15.0/fs/udf/unicode.c
@@ -28,6 +28,9 @@
#include "udf_sb.h"
+#define SURROGATE_MASK 0xfffff800
+#define SURROGATE_PAIR 0x0000d800
+
static int udf_uni2char_utf8(wchar_t uni,
unsigned char *out,
int boundlen)
@@ -37,6 +40,9 @@
if (boundlen <= 0)
return -ENAMETOOLONG;
+#if ((uni & SURROGATE_MASK) == SURROGATE_PAIR)
+#return -EINVAL;
+
if (uni < 0x80) {
out[u_len++] = (unsigned char)uni;
} else if (uni < 0x800) {
@@ -335,6 +341,11 @@
return u_len;
+#/*
+ * Convert CS0 dstring to output charset. Warning: This function may truncate

---
 /* input string if it is too long as it is used for informational strings only
 + * and it is better to truncate the string than to refuse mounting a media.
 + */
 int udf_dstrCS0toUTF8(uint8_t *utf_o, int o_len,
 const uint8_t *ocu_i, int i_len)
 {
 @ @ -343,9 +354,12 @ @
 if (i_len > 0) {
  s_len = ocu_i[i_len - 1];
  if (s_len >= i_len) {
- pr_err("incorrect dstring lengths (%d/%d)\n",
-  s_len, i_len);
- return -EINVAL;
+ pr_warn("incorrect dstring lengths (%d/%d), "
+  truncating\n", s_len, i_len);
  +s_len = i_len - 1;
+/* 2-byte encoding? Need to round properly... */
+ if (ocu_i[0] == 16)
+  s_len -= (s_len - 1) & 2;
  }
 }

 --- linux-4.15.0.orig/fs/ufs/namei.c
 +++ linux-4.15.0/fs/ufs/namei.c
 @@ -39,8 +39,7 @@
 { int err = ufs_add_link(dentry, inode);
  if (!err) {
- unlock_new_inode(inode);
- d_instantiate(dentry, inode);
+ d_instantiate_new(dentry, inode);
   return 0;
  }
 inode_dec_link_count(inode);
@@ -193,8 +192,7 @@
 if (err)
 goto out_fail;

 -unlock_new_inode(inode);
 -d_instantiate(dentry, inode);
+ d_instantiate_new(dentry, inode);
 return 0;

 out_fail:
 --- linux-4.15.0.orig/fs/ufs/super.c
 +++ linux-4.15.0/fs/ufs/super.c
 @@ -99,7 +99,7 @@
 struct ufs_sb_private_info *uspi = UFS_SB(sb)->s_uspi;
struct inode *inode;

-if (ino < UFS_ROOTINO || ino > uspi->s_ncg * uspi->s_ipg)
+if (ino < UFS_ROOTINO || ino > (u64)uspi->s_ncg * uspi->s_ipg)
    return ERR_PTR(-ESTALE);
inode = ufs_iget(sb, ino);
--- linux-4.15.0.orig/fs/ufs/util.h
+++ linux-4.15.0/fs/ufs/util.h
@@ -229,7 +229,7 @@
     case UFS_UID_44BSD:
         return fs32_to_cpu(sb, inode->ui_u3.ui_44.ui_gid);
     case UFS_UID_EFT:
-        if (inode->ui_u1.oldids.ui_suid == 0xFFFF)
+        if (inode->ui_u1.oldids.ui_sgid == 0xFFFF)
            return fs32_to_cpu(sb, inode->ui_u3.ui_sun.ui_gid);
/* Fall through */
    default:
--- linux-4.15.0.orig/fs/userfaultfd.c
+++ linux-4.15.0/fs/userfaultfd.c
@@ -32,11 +32,6 @@
 static struct kmem_cache *userfaultfd_ctx_cachep __read_mostly;

-enum userfaultfd_state {
-    UFFD_STATE_WAIT_API,
-    UFFD_STATE_RUNNING,
-};
-
/*
 * Start with fault_pending_wqh and fault_wqh so they're more likely
 * to be in the same cacheline.
@@ -58,8 +53,6 @@
 unsigned int flags;
 /* features requested from the userspace */
 unsigned int features;
-/* state machine */
-enum userfaultfd_state state;
/* released */
 bool released;
/* mm with one ore more vmas attached to this userfaultfd_ctx */
@@ -91,6 +84,14 @@
 unsigned long len;

+/* internal indication that UFFD_API ioctl was successfully executed */
+#define UFFD_FEATURE_INITIALIZED (1u << 31)
+
static bool userfaultfd_is_initialized(struct userfaultfd_ctx *ctx)
{
+return ctx->features & UFFD_FEATURE_INITIALIZED;
+
+static int userfaultfd_wake_function(wait_queue_entry_t *wq, unsigned mode,
   int wake_flags, void *key)
{
  unsigned long reason)
  {
   struct mm_struct *mm = ctx->mm;
   -pte_t *pte;
   +pte_t *ptep, pte;
   bool ret = true;

   VM_BUG_ON(!rwsem_is_locked(&mm->mm_sem));

   -pte = huge_pte_offset(mm, address, vma_mmu_pagesize(vma));
   -if (!pte)
   +ptep = huge_pte_offset(mm, address, vma_mmu_pagesize(vma));
   +
   +if (!ptep)
   goto out;
   ret = false;
   +pte = huge_ptep_get(ptep);

   /*
   * Lockless access: we're in a wait_event so it's ok if it
   * changes under us.
   */
   -if (huge_pte_none(*pte))
   +if (huge_pte_none(pte))
   ret = true;
   -if (!huge_pte_write(*pte) && (reason & VM_UFFD_WP))
   +if (!huge_pte_write(pte) && (reason & VM_UFFD_WP))
   ret = true;
   out:
   return ret;
   @ @ -625,9 +628,13 @ @

   /* the various vma->vm_userfaultfd_ctx still points to it */
   down_write(&mm->mm_sem);
   +/* no task can run (and in turn coredump) yet */
   +VM_WARN_ON(!mmget_still_valid(mm));
   for (vma = mm->mmap; vma; vma = vma->vm_next)
   -if (vma->vm_userfaultfd_ctx == release_new_ctx)
if (vma->vm_userfaultfd_ctx.ctx == release_new_ctx) {
    vma->vm_userfaultfd_ctx = NULL_VM_UFFD_CTX;
    vma->vm_flags &= ~(VM_UFFD_WP | VM_UFFD_MISSING);
} +
up_write(&mm->mmap_sem);

userfaultfd_ctx_put(release_new_ctx);
@@ -680,7 +687,6 @@
atomic_set(&ctx->refcount, 1);
    ctx->flags = octx->flags;
    ctx->state = UFFD_STATE_RUNNING;
    ctx->features = octx->features;
    ctx->released = false;
    ctx->mm = vma->vm_mm;
@@ -726,9 +732,17 @@
    struct userfaultfd_ctx *ctx;
    ctx = vma->vm_userfaultfd_ctx.ctx;
    -if (ctx && (ctx->features & UFFD_FEATURE_EVENT_REMAP)) { +
    +if (!ctx)
    +return;
    +
    +if (ctx->features & UFFD_FEATURE_EVENT_REMAP) {
        vm_ctx->ctx = ctx;
        userfaultfd_ctx_get(ctx);
+} else {
+/* Drop uffd context if remap feature not enabled */
        vma->vm_userfaultfd_ctx = NULL_VM_UFFD_CTX;
        vma->vm_flags &= ~(VM_UFFD_WP | VM_UFFD_MISSING);
    } }

@@ -848,6 +862,7 @@
/* len == 0 means wake all */
    struct userfaultfd_wake_range range = { .len = 0, };
    unsigned long new_flags;
    bool still_valid;
WRITE_ONCE(ctx->released, true);

@@ -863,6 +878,7 @@
/* len == 0 means wake all */
    struct userfaultfd_wake_range range = { .len = 0, };
    unsigned long new_flags;
    bool still_valid;
    still_valid = mmget_still_valid(mm);
    prev = NULL;
for (vma = mm->mmap; vma; vma = vma->vm_next) {
    cond_resched();
    @@ -873,15 +889,17 @@
    continue;
}

new_flags = vma->vm_flags & ~(VM_UFFD_MISSING | VM_UFFD_WP);
-prev = vma_merge(mm, prev, vma->vm_start, vma->vm_end,
 - new_flags, vma->anon_vma,
 - vma->vm_file, vma->vm_pgoff,
 - vma_policy(vma),
 - NULL_VM_UFFD_CTX);
-if (prev)
 -vma = prev;
-else
 -prev = vma;
+if (still_valid) {
 +prev = vma_merge(mm, prev, vma->vm_start, vma->vm_end,
 + new_flags, vma->anon_vma,
 + vma->vm_file, vma->vm_pgoff,
 + vma_policy(vma),
 + NULL_VM_UFFD_CTX);
 +if (prev)
 +vma = prev;
 +else
 +prev = vma;
+
 vma->vm_flags = new_flags;
 vma->vm_userfaultfd_ctx = NULL_VM_UFFD_CTX;
}
@@ -944,38 +962,33 @@
poll_wait(file, &ctx->fd_wqh, wait);

-switch (ctx->state) {
-switch (ctx->state) {
- -case UFFD_STATE_WAIT_API:
- -case UFFD_STATE_WAIT_API:
-+if (!userfaultfd_is_initialized(ctx))
+if (!userfaultfd_is_initialized(ctx))
 return POLLERR;
-+if (!userfaultfd_is_initialized(ctx))
+if (!userfaultfd_is_initialized(ctx))
 return POLLERR;
- -case UFFD_STATE_RUNNING:
- -case UFFD_STATE_RUNNING:
- */
- */
- -if (unlikely(!(file->f_flags & O_NONBLOCK)))
- -if (unlikely(!(file->f_flags & O_NONBLOCK)))
-return POLLERR;
- -if (unlikely(!(file->f_flags & O_NONBLOCK)))
- -if (unlikely(!(file->f_flags & O_NONBLOCK)))
-return POLLERR;
- */
- */
- - * lockless access to see if there are pending faults
- - * lockless access to see if there are pending faults
- - * pollwait last action is the add_wait_queue but
- - * pollwait last action is the add_wait_queue but
- - * the spin_unlock would allow the waitqueue_active to
- - * the spin_unlock would allow the waitqueue_active to

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- * pass above the actual list_add inside
- * add_wait_queue critical section. So use a full
- * memory barrier to serialize the list_add write of
- * add_wait_queue() with the waitqueue_active read
- * below.
- */
-ret = 0;
-smp_mb();
-if (waitqueue_active(&ctx->fault_pending_wqh))
-ret = POLLIN;
-else if (waitqueue_active(&ctx->event_wqh))
-ret = POLLIN;
-
-return ret;
-default:
-WARN_ON_ONCE(1);
+
+/*
+ * poll() never guarantees that read won't block.
+ * userfaults can be waken before they're read().
+ */
+if (unlikely(!(file->f_flags & O_NONBLOCK)))
return POLLERR;
-}
+/*
+ * lockless access to see if there are pending faults
+ * __pollwait last action is the add_wait_queue but
+ * the spin_unlock would allow the waitqueue_active to
+ * pass above the actual list_add inside
+ * add_wait_queue critical section. So use a full
+ * memory barrier to serialize the list_add write of
+ * add_wait_queue() with the waitqueue_active read
+ * below.
+ */
+ret = 0;
+smp_mb();
+if (waitqueue_active(&ctx->fault_pending_wqh))
+ret = POLLIN;
+else if (waitqueue_active(&ctx->event_wqh))
+ret = POLLIN;
+
+return ret;
}

static const struct file_operations userfaultfd_fops;
@@ -1179,7 +1192,7 @@
struct uffd_msg msg;
int no_wait = file->f_flags & O_NONBLOCK;
if (ctx->state == UFFD_STATE_WAIT_API)
+if (!userfaultfd_is_initialized(ctx))
return -EINVAL;

for (;;) {
@@ -1323,6 +1336,8 @@
goto out;

down_write(&mm->mmap_sem);
+if (!mmget_still_valid(mm))
goto out_unlock;

vma = find_vma_prev(mm, start, &prev);
if (!vma)
@@ -1358,6 +1373,19 @@
	ret = -EINVAL;
if (!vma_can_userfault(cur))
goto out_unlock;
+
+/*
+ * UFFDIO_COPY will fill file holes even without
+ * PROT_WRITE. This check enforces that if this is a
+ * MAP_SHARED, the process has write permission to the backing
+ * file. If VM_MAYWRITE is set it also enforces that on a
+ * MAP_SHARED vma: there is no F_WRITE_SEAL and no further
+ * F_WRITE_SEAL can be taken until the vma is destroyed.
+ */
+ret = -EPERM;
+if (unlikely(!(cur->vm_flags & VM_MAYWRITE)))
goto out_unlock;
+
+/*
+ * If this vma contains ending address, and huge pages
+ * check alignment.
@@ -1403,6 +1431,7 @@
BUG_ON(!vma_can_userfault(vma));
BUG_ON(vma->vm_userfaultfd_ctx.ctx &&
vma->vm_userfaultfd_ctx.ctx != ctx);
+WARN_ON(!(vma->vm_flags & VM_MAYWRITE));
+
+/*
+ * Nothing to do: this vma is already registered into this
@@ -1496,6 +1525,8 @@
goto out;

down_write(&mm->mmap_sem);
+if (!mmget_still_valid(mm))
goto out_unlock;

vma = find_vma_prev(mm, start, &prev);
if (!vma)
goto out_unlock;
@@ -1557,6 +1588,8 @@
if (!vma->vm_userfaultfd_ctx.ctx)
goto skip;
+		WARN_ON(!(vma->vm_flags & VM_MAYWRITE));
+
if (vma->vm_start > start)
start = vma->vm_start;
vma_end = min(end, vma->vm_end);
@@ -1752,9 +1785,10 @@
static inline unsigned int uffd_ctx_features(__u64 user_features)
{
    /*
     - * For the current set of features the bits just coincide
     + * For the current set of features the bits just coincide. Set
     + * UFFD_FEATURE_INITIALIZED to mark the features as enabled.
     */
     -return (unsigned int)user_features;
     +return (unsigned int)user_features | UFFD_FEATURE_INITIALIZED;
}

/*@ -1767,35 +1801,41 @@*/
{
struct uffdio_api uffdio_api;
void __user *buf = (void __user *)arg;
+unsigned int ctx_features;
int ret;
    __u64 features;

    -ret = -EINVAL;
    -if (ctx->state != UFFD_STATE_WAIT_API)
    -goto out;
    ret = -EFAULT;
    if (copy_from_user(&uffdio_api, buf, sizeof(uffdio_api)))
        goto out;
    features = uffdio_api.features;
    -if (uffdio_api_api != UFFD_API || (features & ~UFFD_API_FEATURES)) {
        -memset(&uffdio_api, 0, sizeof(uffdio_api));
        -if (copy_to_user(buf, &uffdio_api, sizeof(uffdio_api)))
            -goto out;
        -ret = -EINVAL;
        -goto out;
    }
+ret = -EINVAL;
+if (uffdio_api.api != UFFD_API || (features & ~UFFD_API_FEATURES))
+goto err_out;
+ret = -EPERM;
+if ((features & UFFD_FEATURE_EVENT_FORK) && !capable(CAP_SYS_PTRACE))
+goto err_out;
/* report all available features and ioctls to userland */
uffdio_api.features = UFFD_API_FEATURES;
uffdio_api.ioctls = UFFD_API_IOCTLS;
ret = -EFAULT;
if (copy_to_user(buf, &uffdio_api, sizeof(uffdio_api)))
goto out;
-ctx->state = UFFD_STATE_RUNNING;
+
/* only enable the requested features for this uffd context */
-ctx->features = uffd_ctx_features(features);
+ctx_features = uffd_ctx_features(features);
+ret = -EINVAL;
+if (cmpxchg(&ctx->features, 0, ctx_features) != 0)
+goto err_out;
+
ret = 0;
out:
return ret;
+err_out:
+memset(&uffdio_api, 0, sizeof(uffdio_api));
+if (copy_to_user(buf, &uffdio_api, sizeof(uffdio_api)))
+ret = -EFAULT;
+goto out;
}

static long userfaultfd_ioctl(struct file *file, unsigned cmd,
@@ -1804,7 +1844,7 @@
int ret = -EINVAL;
 struct userfaultfd_ctx *ctx = file->private_data;

-if (cmd != UFFDIO_API && ctx->state == UFFD_STATE_WAIT_API)
+if (cmd != UFFDIO_API && !userfaultfd_is_initialized(ctx))
 return -EINVAL;

 switch(cmd) {
@@ -1921,7 +1961,6 @@
 atomic_set(&ctx->refcount, 1);
 ctx->flags = flags;
 ctx->features = 0;
-ctx->state = UFFD_STATE_WAIT_API;
 ctx->released = false;
 ctx->mm = current->mm;
/* prevent the mm struct to be freed */
--- linux-4.15.0.orig/fs/xattr.c
+++ linux-4.15.0/fs/xattr.c
@@ -203,11 +203,24 @@
 return error;
 }
+EXPORT_SYMBOL_GPL(__vfs_setxattr_noperm);

-/**
+/**
 * __vfs_setxattr_locked: set an extended attribute while holding the inode
+ * lock
 *
+ * @dentry - object to perform setxattr on
+ * @name - xattr name to set
+ * @value - value to set @name to
+ * @size - size of @value
+ * @flags - flags to pass into filesystem operations
+ * @delegated_inode - on return, will contain an inode pointer that
+ * a delegation was broken on, NULL if none.
+ */
 int
 -vfs_setxattr(struct dentry *dentry, const char *name, const void *value,
-  size_t size, int flags)
+__vfs_setxattr_locked(struct dentry *dentry, const char *name,
+                      const void *value, size_t size, int flags,
+                      struct inode **delegated_inode)
 {
     struct inode *inode = dentry->d_inode;
     int error;
@@ -216,15 +229,51 @@
     if (error)
         goto out;
     error = try_break_deleg(inode, delegated_inode);
     if (error)
         goto out;
+    error = __vfs_setxattr_noperm(dentry, name, value, size, flags);
 out:
+    return error;

```c
int vfs_setxattr(struct dentry *dentry, const char *name, const void *value, size_t size, int flags) {
    struct inode *inode = dentry->d_inode;
    struct inode *delegated_inode = NULL;
    const void *orig_value = value;
    int error;

    if (size && strcmp(name, XATTR_NAME_CAPS) == 0) {
        error = cap_convert_nscap(dentry, &value, size);
        if (error < 0)
            return error;
        size = error;
    }

    retry_deleg:
    inode_lock(inode);
    error = __vfs_setxattr_locked(dentry, name, value, size, flags, &delegated_inode);
    inode_unlock(inode);
    if (delegated_inode) {
        error = break_deleg_wait(&delegated_inode);
        if (!error)
            goto retry_deleg;
    }
    if (value != orig_value)
        kfree(value);
    return error;
}
EXPORT_SYMBOL_GPL(vfs_setxattr);
```

```c
ssize_t __vfs_getxattr(struct dentry *dentry, const char *name, const void *value, size_t size, int flags, struct list_head *wait) {
    struct inode *inode = dentry->d_inode;
    struct dentry_operations *op = &inode->d_op;
    struct xattr *xattr = NULL;
    struct list_head __xattr_list;
    struct task_struct *current;
    __EXPORT_SYMBOL_GPL(__vfs_getxattr);
}
```
/* __vfs_removexattr_noperm - perform removexattr operation without
   performing permission checks. */

/* @dentry - object to perform setxattr on */
/* @name - xattr name to set */
/* returns the result of the internal setxattr or setsecurity operations. */
/* This function requires the caller to lock the inode's i_mutex before it */
/* is executed. It also assumes that the caller will make the appropriate */
/* permission checks. */

int
__vfs_removexattr_noperm(struct dentry *dentry, const char *name)
{
    int error;
    
    error =__vfs_removexattr(dentry, name);
    if (!error) {
        fsnotify_xattr(dentry);
        evm_inode_post_removexattr(dentry, name);
    }
    return error;
}
EXPORT_SYMBOL_GPL(__vfs_removexattr_noperm);

/**
 * __vfs_removexattr_locked: set an extended attribute while holding the inode
 * lock
 * @dentry - object to perform setxattr on
 * @name - name of xattr to remove
 * @delegated_inode - on return, will contain an inode pointer that
 * a delegation was broken on, NULL if none.
 */

int
__vfs_removexattr_locked(struct dentry *dentry, const char *name,
struct inode **delegated_inode)
{
    struct inode *inode = dentry->d_inode;
    int error;
    
    if (error)
        return error;

    -inode_lock(inode);
error = security_inode_removexattr(dentry, name);
if (error)
goto out;

-error = __vfs_removexattr(dentry, name);
+error = try_break_deleg(inode, delegated_inode);
+if (error)
+goto out;

-if (!error) {
-    fsnotify_xattr(dentry);
-    evm_inode_post_removexattr(dentry, name);
-
+    error = __vfs_removexattr_noperm(dentry, name);
}
+error = __vfs_removexattr_locked(dentry, name);
+
+EXPORT_SYMBOL_GPL(__vfs_removexattr_locked);
+
+int
+vfs_removexattr(struct dentry *dentry, const char *name)
+{
+    struct inode *inode = dentry->d_inode;
+    struct inode *delegated_inode = NULL;
+    int error;
+    
+    retry_deleg:
+    inode_lock(inode);
+    error = __vfs_removexattr_locked(dentry, name, &delegated_inode);
    inode_unlock(inode);
    
    +if (delegated_inode) {
    +    error = break_deleg_wait(&delegated_inode);
    +    if (!error)
    +        goto retry_deleg;
    +    }
    
    return error;
}

EXPORT_SYMBOL_GPL(vfs_removexattr);

/*
 * Extended attribute SET operations
 */
@@ -442,12 +547,6 @@
if ((strcmp(kname, XATTR_NAME_POSIX_ACL_ACCESS) == 0) ||
(strcmp(kname, XATTR_NAME_POSIX_ACL_DEFAULT) == 0))
posix_acl_fix_xattr_from_user(kvalue, size);
else if (strcmp(kname, XATTR_NAME_CAPS) == 0) {
  -error = cap_convert_nscap(d, &kvalue, size);
  -if (error < 0)
    -goto out;
  -size = error;
  -}
}

error = vfs_setxattr(d, kname, kvalue, size, flags);
@@ -541,7 +640,7 @@
if (error > 0) {
  if ((strcmp(kname, XATTR_NAME_POSIX_ACL_ACCESS) == 0) ||
      (strcmp(kname, XATTR_NAME_POSIX_ACL_DEFAULT) == 0))
    -posix_acl_fix_xattr_to_user(kvalue, size);
+posix_acl_fix_xattr_to_user(kvalue, error);
  if (size && copy_to_user(value, kvalue, error))
    error = -EFAULT;
} else if (error == -ERANGE && size >= XATTR_SIZE_MAX) {
@@ -951,17 +1050,19 @@
  int err = 0;

  #ifdef CONFIG_FS_POSIX_ACL
  -if (inode->i_acl) {
  -err = xattr_list_one(&buffer, &remaining_size,
  -   XATTR_NAME_POSIX_ACL_ACCESS);
  -if (err)
  -    return err;
  -}
  -if (inode->i_default_acl) {
  -err = xattr_list_one(&buffer, &remaining_size,
  -   XATTR_NAME_POSIX_ACL_DEFAULT);
  -if (err)
  -    return err;
  +if (IS_POSIXACL(inode)) {
  +  if (inode->i_acl) {
  +    err = xattr_list_one(&buffer, &remaining_size,
  +       XATTR_NAME_POSIX_ACL_ACCESS);
  +    if (err)
  +      return err;
  +  }
  +  if (inode->i_default_acl) {
  +    err = xattr_list_one(&buffer, &remaining_size,
  +       XATTR_NAME_POSIX_ACL_DEFAULT);
  +    if (err)
  +      return err;
  +  }

Open Source Used In 5GaaS Edge AC-4  31873
static int xfs_alloc_ag_vextent_small(xfs_alloc_arg_t *,
xfs_btree_cur_t *, xfs_agblock_t *, xfs_extlen_t *, int *
);

/*
 * Size of the AGFL. For CRC-enabled file systems we steal a couple of
 * slots in the beginning of the block for a proper header with the location
 * information and CRC.
 */

unsigned int
xfs_agfl_size(
    struct xfs_mount* mp)
{
    unsigned int size = mp->m_sb.sb_sectsize;
    
    if (xfs_sb_version_hascrc(&mp->m_sb))
        size -= sizeof(struct xfs_agfl);
    
    return size / sizeof(xfs_agblock_t);
}

unsigned int
xfs_refc_block(
    struct xfs_mount* mp)

    /* Check the agfl fields of the agf for inconsistency or corruption. The purpose
    * is to detect an agfl header padding mismatch between current and early v5
    * kernels. This problem manifests as a 1-slot size difference between the
    * on-disk flcount and the active [first, last] range of a wrapped agfl. This
    * may also catch variants of agfl count corruption unrelated to padding. Either
    * way, we'll reset the agfl and warn the user.
static bool xfs_agfl_needs_reset(
    struct xfs_mount *mp,
    struct xfs_agf *agf)
{
    uint32_t f = be32_to_cpu(agf->agf_flfirst);
    uint32_t l = be32_to_cpu(agf->agf_fllast);
    uint32_t c = be32_to_cpu(agf->agf_flcount);
    int agfl_size = xfs_agfl_size(mp);
    int active;

    /* no agfl header on v4 supers */
    if (!xfs_sb_version_hascrc(&mp->m_sb))
        return false;

    /* The agf read verifier catches severe corruption of these fields.
     * Repeat some sanity checks to cover a packed -> unpacked mismatch if
     * the verifier allows it.
     * */
    if (f >= agfl_size || l >= agfl_size)
        return true;
    if (c > agfl_size)
        return true;

    /* Check consistency between the on-disk count and the active range. An
     * agfl padding mismatch manifests as an inconsistent flcount.
     * */
    if (c && l >= f)
        active = l - f + 1;
    else if (c)
        active = agfl_size - f + l + 1;
    else
        active = 0;

    return active != c;
}
+ * The purpose of this mechanism is to handle filesystems affected by the agfl
+ * header padding mismatch problem. A reset keeps the filesystem online with a
+ * relatively minor free space accounting inconsistency rather than suffer the
+ * inevitable crash from use of an invalid agfl block.
+ */
+static void
+xfs_agfl_reset(
+struct xfs_trans*tp,
+struct xfs_buf*agbp,
+struct xfs_perag*pag)
+{
+struct xfs_mount*mp = tp->t_mountp;
+struct xfs_agf*agf = XFS_BUF_TO_AGF(agbp);
+
+ASSERT(pag->pagf_agflreset);
+trace_xfs_agfl_reset(mp, agf, 0, _RET_IP_);
+
+xfs_warn(mp,
+ "WARNING: Reset corrupted AGFL on AG %u. %d blocks leaked. "
+ "Please unmount and run xfs_repair.",
+ pag->pag_agno, pag->pagf_flcount);
+
+agf->agf_flfirst = 0;
+agf->agf_fllast = cpu_to_be32(xfs_agfl_size(mp) - 1);
+agf->agf_flcount = 0;
+xfs_alloc_log_agf(tp, agbp, XFS_AGF_FLFIRST | XFS_AGF_FLLAST |
+ XFS_AGF_FLCOUNT);
+
+pag->pagf_flcount = 0;
+pag->pagf_agflreset = false;
+}
+
+/*
+ * Decide whether to use this allocation group for this allocation.
+ * If so, fix up the btree freelist's size.
+ */
+@@ -2101,6 +2205,10 @@
+
+if (pag->pagf_agflreset)
+xfs_agfl_reset(tp, agbp, pag);
+
+/* If there isn't enough total space or single-extent, reject it. */
+need = xfs_alloc_min_freelist(mp, pag);
+if (!xfs_alloc_space_available(args, need, flags))
+@@ -2253,10 +2361,11 @@
bno = be32_to_cpu(agfl_bno[be32_to_cpu(agf->agf_flfirst)]);
be32_add_cpu(&agf->agf_flfirst, 1);
xfs_trans_brelse(tp, agflbp);
- if (be32_to_cpu(agf->agf_flfirst) == XFS_AGFL_SIZE(mp))
+ if (be32_to_cpu(agf->agf_flfirst) == xfs_agfl_size(mp))
agf->agf_flfirst = 0;

pag = xfs_perag_get(mp, be32_to_cpu(agf->agf_seqno));
+ ASSERT(!pag->pagf_agflreset);
be32_add_cpu(&agf->agf_flcount, -1);
xfs_trans_agflist_delta(tp, -1);
pag->pagf_flcount--; @@ -2364,10 +2473,11 @@
be32_to_cpu(agf->agf_seqno), &agflbp))
return error;
be32_add_cpu(&agf->agf_fllast, 1);
- if (be32_to_cpu(agf->agf_fllast) == XFS_AGFL_SIZE(mp))
+ if (be32_to_cpu(agf->agf_fllast) == xfs_agfl_size(mp))
agf->agf_fllast = 0;

pag = xfs_perag_get(mp, be32_to_cpu(agf->agf_seqno));
+ ASSERT(!pag->pagf_agflreset);
be32_add_cpu(&agf->agf_flcount, 1);
xfs_trans_agflist_delta(tp, 1);
pag->pagf_flcount++; @@ -2382,7 +2492,7 @@
xfs_alloc_log_agf(tp, agbp, logflags);

- ASSERT(be32_to_cpu(agf->agf_flcount) <= XFS_AGFL_SIZE(mp));
+ ASSERT(be32_to_cpu(agf->agf_flcount) <= xfs_agfl_size(mp));

agfl_bno = XFS_BUF_TO_AGFL_BNO(mp, agflbp);
blockp = &agfl_bno[be32_to_cpu(agf->agf_fllast)];
@@ -2415,9 +2525,16 @@
if (!agf->agf_magicnum == cpu_to_be32(XFS_AGF_MAGIC) &&
     XFS_AGF_GOOD_VERSION(be32_to_cpu(agf->agf_versionnum)) &&
     be32_to_cpu(agf->agf_freeblks) <= be32_to_cpu(agf->agf_length) &&
     be32_to_cpu(agf->agf_flfirst) < XFS_AGFL_SIZE(mp) &&
     be32_to_cpu(agf->agf_fllast) < XFS_AGFL_SIZE(mp) &&
     be32_to_cpu(agf->agf_flcount) <= XFS_AGFL_SIZE(mp))
+ be32_to_cpu(agf->agf_flfirst) < xfs_agfl_size(mp) &&
+ be32_to_cpu(agf->agf_fllast) < xfs_agfl_size(mp) &&
+ be32_to_cpu(agf->agf_flcount) <= xfs_agfl_size(mp))
+return false;
+
+if (be32_to_cpu(agf->agf_length) > mp->m_sb.sb_dblocks)
+return false;
if (be32_to_cpu(agf->agf_freeblks) < be32_to_cpu(agf->agf_longest) ||
    be32_to_cpu(agf->agf_freeblks) > be32_to_cpu(agf->agf_length))
return false;

if (be32_to_cpu(agf->agf_levels[XFS_BTNUM_BNO]) < 1 ||
    be32_to_cpu(agf->agf_levels[XFS_BTNUM_RMAP]) > XFS_BTREE_MAXLEVELS))
return false;

if (xfs_sb_version_hasrmapbt(&mp->m_sb) &&
    be32_to_cpu(agf->agf_rmap_blocks) > be32_to_cpu(agf->agf_length))
+return false;
+
/*
 * during growfs operations, the perag is not fully initialised,
 * so we can't use it for any useful checking. growfs ensures we can't
 @@ -2445,6 +2566,11 @@
 return false;

 if (xfs_sb_version_hasreflink(&mp->m_sb) &&
     be32_to_cpu(agf->agf_refcount_blocks) > be32_to_cpu(agf->agf_length))
+return false;
+
*/

extern struct workqueue_struct *xfs_alloc_wq;

+unsigned int xfs_agfl_size(struct xfs_mount *mp);
+/*
+STATIC int
+xfs_attr_try_sf_addname(
+    struct xfs_inode*dp,
+    struct xfs_da_args*args)
+{
+   + struct xfs_mount*mp = dp->i_mount;
+   + int error, error2;
+   +
+   + error = xfs_attr_shortform_addname(args);
+   + if (error == -ENOSPC)
+   +    return error;
+   +
+   + /* Commit the shortform mods, and we're done.
+   + * NOTE: this is also the error path (EEXIST, etc).
+   + */
+   + if (!error && (args->flags & ATTR_KERNOTIME) == 0)
+   + xfs_trans_ichgtime(args->trans, dp, XFS_ICHGTIME_CHG);
+   +
+   + if (mp->m_flags & XFS_MOUNT_WSYNC)
+   + xfs_trans_set_sync(args->trans);
+   +
+   + error2 = xfs_trans_commit(args->trans);
+   + return error ? error : error2;
+   +}

/* Remove the attribute specified in @args. */
+int
+xfs_attr_remove_args(
+    struct xfs_da_args *args)
+{
+    + struct xfs_inode*dp = args->dp;
+    + int error;
+    +
+    + if (!xfs_inode_hasattr(dp)) {
+    +    error = -ENOATTR;
+    + } else if (dp->i_d.di_aformat == XFS_DINODE_FMT_LOCAL) {
+    +/*
+    + * Remove the attribute specified in @args.
+    + */
+    + int
+    + xfs_attr_remove_args(
+    + struct xfs_da_args *args)
+    + {
+    + struct xfs_inode*dp = args->dp;
+    + interror;
+    +
+    + if (!xfs_inode_hasattr(dp)) {
+    +    error = -ENOATTR;
+    + } else if (dp->i_d.di_aformat == XFS_DINODE_FMT_LOCAL) {
+    +/*
+} else if (xfs_bmap_one_block(dp, XFS_ATTR_FORK)) {
+error = xfs_attr_leaf_removename(args);
+} else {
+error = xfs_attr_node_removename(args);
+
+return error;
+
int
xfs_attr_set(
    struct xfs_inode *dp,
@@ -218,7 +269,7 @@
struct xfs_trans_res *tres;
    xfs_fsblock_t firstblock;
    int rsvd = (flags & ATTR_ROOT) != 0;
-    int error, err2, local;
+    int error, local;
    XFS_STATS_INC(mp, xs_attr_set);
@@ -297,30 +348,10 @@
* Try to add the attr to the attribute list in
* the inode.
*/
-error = xfs_attr_shortform_addname(&args);
+error = xfs_attr_try_sf_addname(dp, &args);
    if (error != -ENOSPC) {
        /*
- * Commit the shortform mods, and we're done.
- * NOTE: this is also the error path (EEXIST, etc).
- */
-ASSERT(args.trans != NULL);
-/*
- * If this is a synchronous mount, make sure that
- * the transaction goes to disk before returning
- * to the user.
- */
-    if (mp->m_flags & XFS_MOUNT_WSYNC)
-        xfs_trans_set_sync(args.trans);
-    if (!error && (flags & ATTR_KERNOTIME) == 0) {
-        xfs_trans_ichgtime(args.trans, dp,
-            XFS_ICHGTIME_CHG);
-    }
-    err2 = xfs_trans_commit(args.trans);
-xfs_iunlock(dp, XFS_ILOCK_EXCL);
- return error ? error : err2;
+ return error;
}

/*
@@ -449,17 +480,7 @@
*/
xfs_trans_ijoin(args.trans, dp, 0);

-if (!xfs_inode_hasattr(dp)) {
- error = -ENOATTR;
-} else if (dp->i_d.di_aformat == XFS_DINODE_FMT_LOCAL) {
- ASSERT(dp->i_afp->if_flags & XFS_IFINLINE);
- error = xfs_attr_shortform_remove(&args);
-} else if (xfs_bmap_one_block(dp, XFS_ATTR_FORK)) {
- error = xfs_attr_leaf_removename(&args);
-} else {
- error = xfs_attr_node_removename(&args);
-}
-
+ error = xfs_attr_remove_args(&args);
if (error)
  goto out;

@@ -511,7 +532,14 @@
if (args->flags & ATTR_CREATE)
  return retval;
retval = xfs_attr_shortform_remove(args);
- ASSERT(retval == 0);
+ if (retval)
+    return retval;
+ /*
+ * Since we have removed the old attr, clear ATTR_REPLACE so
+ * that the leaf format add routine won't trip over the attr
+ * not being around.
+ */
+ args->flags &= ~ATTR_REPLACE;
}

if (args->namelen >= XFS_ATTR_SF_ENTSIZE_MAX ||
--- linux-4.15.0.orig/fs/xfs/libxfs/xfs_attr.h
+++ linux-4.15.0/fs/xfs/libxfs/xfs_attr.h
@@ -0,0 +1,161 @@
+/*
+ * Copyright (c) 2000,2002-2003,2005 Silicon Graphics, Inc.
+ * All Rights Reserved.
+ */
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ifndef __XFS_ATTR_H__
define __XFS_ATTR_H__
+
+struct xfs_inode;
+struct xfs_da_args;
+struct xfs_attr_list_context;
+
+#define ATTR_DONTFOLLOW 0x0001 /* -- unused, from IRIX -- */
+#define ATTR_ROOT 0x0002 /* use attrs in root (trusted) namespace */
+#define ATTR_TRUST 0x0004 /* -- unused, from IRIX -- */
+#define ATTR_SECURE 0x0008 /* use attrs in security namespace */
+#define ATTR_CREATE 0x0010 /* pure create: fail if attr already exists */
+#define ATTR_REPLACE 0x0020 /* pure set: fail if attr does not exist */
+
+#define ATTR_KERNOTIME 0x1000 /* [kernel] don't update inode timestamps */
+#define ATTR_KERNOVAL 0x2000 /* [kernel] get attr size only, not value */
+
+#define ATTR_INCOMPLETE 0x4000 /* [kernel] return INCOMPLETE attr keys */
+
#define XFS_ATTR_FLAGS
+{ ATTR_DONTFOLLOW, "DONTFOLLOW" },
+{ ATTR_ROOT, "ROOT" },
+{ ATTR_TRUST, "TRUST" },
+{ ATTR_SECURE, "SECURE" },
+{ ATTR_CREATE, "CREATE" },
+{ ATTR_REPLACE, "REPLACE" },
+{ ATTR_KERNO TIME, "KERNO TIME" },
+{ ATTR_KERNO VAL, "KERNO VAL" },
+{ ATTR_INCOMPLETE, "INCOMPLETE" }
+
+/*
+* The maximum size (into the kernel or returned from the kernel) of an
+* attribute value or the buffer used for an attr_list() call. Larger
+* sizes will result in an ERANGE return code.
+*/
+#define ATTR_MAX_VALUELEN (64*1024) /* max length of a value */
+
+/*
+* Define how lists of attribute names are returned to the user from
+* the attr_list() call. A large, 32bit aligned, buffer is passed in
+* along with its size. We put an array of offsets at the top that each
+* reference an attrlist_ent_t and pack the attrlist_ent_t's at the bottom.
+*/
typedef struct attrlist {
	__s32 al_count; /* number of entries in attrlist */
	__s32 al_more; /* T/F: more attrs (do call again) */
	__s32 al_offset[1]; /* byte offsets of attrs [var-sized] */
} attrlist_t;
+
+/*
+* Show the interesting info about one attribute. This is what the
+* al_offset[i] entry points to.
+*/
typedef struct attrlist_ent /* data from attr_list() */
	__u32 a_valuelen; /* number bytes in value of attr */
	char a_name[1]; /* attr name (NULL terminated) */
} attrlist_ent_t;
+
+/*
+* Given a pointer to the (char*) buffer containing the attr_list() result,
+* and an index, return a pointer to the indicated attribute in the buffer.
+*/
+#define ATTR_ENTRY(buffer, index)
	((attrlist_ent_t *)((char *)buffer)[ (attrlist_t *)(buffer)->al_offset[index] ])
+
+/*
+ * Kernel-internal version of the attrlist cursor.
+ */
+ typedef struct attrlist_cursor_kern {
+   __u32 hashval; /* hash value of next entry to add */
+   __u32 blkno; /* block containing entry (suggestion) */
+   __u32 offset; /* offset in list of equal-hashvals */
+   __u16 pad1; /* padding to match user-level */
+   __u8 pad2; /* padding to match user-level */
+   __u8 initted; /* T/F: cursor has been initialized */
+ } attrlist_cursor_kern_t;
+
+/*========================================================================
+ * Structure used to pass context around among the routines.
+ */
+ typedef void (*put_listent_func_t)(struct xfs_attr_list_context *, int,
+   unsigned char *, int, int);
+
+typedef struct xfs_attr_list_context {
+   struct xfs_trans *tp;
+   struct xfs_inode *dp; /* inode */
+   struct attrlist_cursor_kern *cursor; /* position in list */
+   char *alist; /* output buffer */
+   int seen_enough; /* T/F: seen enough of list? */
+   ssize_t count; /* num used entries */
+   int dupcnt; /* count dup hashvals seen */
+   int bufsize; /* total buffer size */
+   int firstu; /* first used byte in buffer */
+   int flags; /* from VOP call */
+   int resynch; /* T/F: resynch with cursor */
+   put_listent_func_t put_listent; /* list output fmt function */
+   int index; /* index into output buffer */
+ } xfs_attr_list_context_t;
+
+/*========================================================================
+ * Function prototypes for the kernel.
+ */
+
+/*========================================================================
+ * Overall external interface routines.
+ */
+ int xfs_attr_inactive(struct xfs_inode *dp);
+ int xfs_attr_list_int_locked(struct xfs_attr_list_context *);
+ int xfs_attr_list_int(struct xfs_attr_list_context *);
+int xfs_inode_hasattr(struct xfs_inode *ip);
+int xfs_attr_get_ilocked(struct xfs_inode *ip, struct xfs_da_args *args);
+int xfs_attr_get(struct xfs_inode *ip, const unsigned char *name,
+ unsigned char *value, int *valuelenp, int flags);
+int xfs_attr_set(struct xfs_inode *dp, const unsigned char *name,
+ unsigned char *value, int valuelen, int flags);
+int xfs_attr_remove(struct xfs_inode *dp, const unsigned char *name, int flags);
+int xfs_attr_remove_args(struct xfs_da_args *args);
+int xfs_attr_list(struct xfs_inode *dp, char *buffer, int bufsize,
+ int flags, struct attrlist_cursor_kern *cursor);
+
+#endif	/* __XFS_ATTR_H__ */

--- linux-4.15.0.orig/fs/xfs/libxfs/xfs_attr_leaf.c
+++ linux-4.15.0/fs/xfs/libxfs/xfs_attr_leaf.c
@@ -516,8 +516,8 @@
 ASSERT(ifp->if_flags & XFS_IFINLINE);
 }
 xfs_idata_realloc(dp, sizeof(*hdr), XFS_ATTR_FORK);
-hdr = (xfs_attr_sf_hdr_t *)ifp->if_u1.if_data;
-hdr->count = 0;
+hdr = (struct xfs_attr_sf_hdr_t *)ifp->if_u1.if_data;
+memset(hdr, 0, sizeof(*hdr));
 hdr->totsize = cpu_to_be16(sizeof(*hdr));
 xfs_trans_log_inode(args->trans, dp, XFS_ILOG_CORE | XFS_ILOG_ADATA);
 }
@@ -784,9 +784,8 @@
 ASSERT(blkno == 0);
 error = xfs_attr3_leaf_create(args, blkno, &bp);
 if (error) {
- error = xfs_da_shrink_inode(args, 0, bp);
- bp = NULL;
- if (error) 
+ /* xfs_attr3_leaf_create may not have instantiated a block */
+ if (bp && (xfs_da_shrink_inode(args, 0, bp) != 0))
 ggoto out;
 xfs_idata_realloc(dp, sizeof(*hdr), XFS_ATTR_FORK); /* try to put */
 memcpy(ifp->if_u1.if_data, tmpbuffer, sizeof(*hdr)); /* it back */
@@ -1332,7 +1331,9 @@
 for (i = 0; i < XFS_ATTR_LEAF_MAPSIZE; i++) {
 if (ichdr->freemap[i].base == tmp) {
 ichdr->freemap[i].base += sizeof(xfs_attr_leaf_entry_t);
- ichdr->freemap[i].size -= sizeof(xfs_attr_leaf_entry_t);
+ ichdr->freemap[i].size -=
+ min_t(uint16_t, ichdr->freemap[i].size,
+ sizeof(xfs_attr_leaf_entry_t));
 }
ichdr->usedbytes += xfs_attr_leaf_entsize(leaf, args->index);
--- linux-4.15.0.orig/fs/xfs/libxfs/xfs_bmap.c
+++ linux-4.15.0/fs/xfs/libxfs/xfs_bmap.c
@@ -725,12 +725,16 @@
 logflagsp = 0;
 if ((error = xfs_alloc_vextent(&args))) {
 xfs_iroot_realloc(ip, -1, whichfork);
+ASSERT(ifp->if_broot == NULL);
+XFS_IFORK_FMT_SET(ip, whichfork, XFS_DINODE_FMT_EXTENTS);
 xfs_btree_del_cursor(cur, XFS_BTREE_ERROR);
 return error;
 }

 if (WARN_ON_ONCE(args.fsbno == NULLFSBLOCK)) {
 xfs_iroot_realloc(ip, -1, whichfork);
+ASSERT(ifp->if_broot == NULL);
+XFS_IFORK_FMT_SET(ip, whichfork, XFS_DINODE_FMT_EXTENTS);
 xfs_btree_del_cursor(cur, XFS_BTREE_ERROR);
 return -ENOSPC;
 }

 * Root level must use BMAP_BROOT_PTR_ADDR macro to get ptr out.
 */
 level = be16_to_cpu(block->bb_level);
-ASSERT(level > 0);
+if (unlikely(level == 0)) {
+XFS_ERROR_REPORT(__func__, XFS_ERRLEVEL_LOW, mp);
+return -EFSCORRUPTED;
+}
 pp = XFS_BMAP_BROOT_PTR_ADDR(mp, block, 1, ifp->if_broot_bytes);
 bno = be64_to_cpu(*pp);

 case BMAP_LEFT_FILLING | BMAP_RIGHT_FILLING | BMAP_RIGHT_CONTIG:
 /*
  * Filling in all of a previously delayed allocation extent.
  * The right neighbor is contiguous, the left is not.
  * The right neighbor is contiguous, the left is not. Take care
  * with delay -> unwritten extent allocation here because the
  * delalloc record we are overwriting is always written.
  */
 PREV.br_startblock = new->br_startblock;
 PREV.br_blockcount += RIGHT.br_blockcount;
+PREV.br_state = new->br_state;

 xfs_iext_next(ifp, &bma->icur);
 xfs_iext_remove(bma->ip, &bma->icur, state);
@@ -3792,15 +3802,28 @@
XFS_STATS_INC(mp, xs_blk_mapr);

ifp = XFS_IFORK_PTR(ip, whichfork);
+if (!ifp) {
+ /* No CoW fork?  Return a hole. */
+if (whichfork == XFS_COW_FORK) {
+mval->br_startoff = bno;
+mval->br_startblock = HOLESTARTBLOCK;
+mval->br_blockcount = len;
+mval->br_state = XFS_EXT_NORM;
+ *nmap = 1;
+ return 0;
+ }

- /* No CoW fork?  Return a hole. */
- if (whichfork == XFS_COW_FORK && !ifp) {
- mval->br_startoff = bno;
- mval->br_startblock = HOLESTARTBLOCK;
- mval->br_blockcount = len;
- mval->br_state = XFS_EXT_NORM;
- *nmap = 1;
- return 0;
+ /*
+ * A missing attr ifork implies that the inode says we're in
+ * extents or btree format but failed to pass the inode fork
+ * verifier while trying to load it.  Treat that as a file
+ * corruption too.
+ */
+ #ifdef DEBUG
+ xfs_alert(mp, "%s: inode %llu missing fork %d",
+ __func__, ip->i_ino, whichfork);
+ #endif /* DEBUG */
+ return -EFSCORRUPTED;
} }

if (!(ifp->if_flags & XFS_IFEXTENTS)) {
  @ @ -5209.7 +5232.7 @@
  * Make sure we don't touch multiple AGF headers out of order
  * in a single transaction, as that could cause AB-BA deadlocks.
  */
  -if (!wasdel) {
  +if (!wasdel && !isrt) {
  agno = XFS_FSB_TO_AGNO(mp, del.br_startblock);
  if (prev_agno != NULLAGNUMBER && prev_agno > agno)
    break;
  --- linux-4.15.0.orig/fs/xfs/libxfs/xfs_dir2_node.c
  +++ linux-4.15.0/fs/xfs/libxfs/xfs_dir2_node.c
  @ @ -212,6 +212,7 @@
xfs_buf_ioerror(*bpp, -EFSCORRUPTED);
xfs_verifier_error(*bpp);
xfs_trans_brelse(tp, *bpp);
*bpp = NULL;
return -EFSCORRUPTED;
}

--- linux-4.15.0.orig/fs/xfs/libxfs/xfs_format.h
+++ linux-4.15.0/fs/xfs/libxfs/xfs_format.h
@@ -803,24 +803,13 @@
&(XFS_BUF_TO_AGFL(bp)->agfl_bno[0]) : \
(__be32 *)(bp)->b_addr)
- /*
- * Size of the AGFL. For CRC-enabled filesystes we steal a couple of
- * slots in the beginning of the block for a proper header with the
- * location information and CRC.
- *
- */
-#define XFS_AGFL_SIZE(mp) \
-(((mp)->m_sb.sb_sectsize - \
- (xfs_sb_version_hascrc(&((mp)->m_sb)) ? \
- sizeof(struct xfs_agfl) : 0)) / \
- sizeof(xfs_agblock_t))
-
typedef struct xfs_agfl {
__be32		agfl_magicnum;
__be32		agfl_seqno;
uuid_t		agfl_uuid;
__be64		agfl_lsn;
__be32		agfl_crc;
-__be32		agfl_bno[];
+__be32	
tagfl_bno[];
} __attribute__((packed)) xfs_agfl_t;
#define XFS_AGFL_CRC_OFF
#define XFS_DFORK_MAXEXT(dip, mp, w) \
(XFS_DFORK_SIZE(dip, mp, w) / sizeof(struct xfs_bmbt_rec))

+#define XFS_DFORK_MAXEXT(dip, mp, w) \
+(XFS_DFORK_SIZE(dip, mp, w) / sizeof(struct xfs_bmbt_rec))
+
/*
 * Return pointers to the data or attribute forks.
 */
to->di_version = from->di_version;
if (to->di_version == 1) {
    set_nlink(inode, be16_to_cpu(from->di_onlink));
    -to->di_projid_lo = 0;
    -to->di_projid_hi = 0;
    +to->di_projid = 0;
    to->di_version = 2;
} else {
    set_nlink(inode, be32_to_cpu(from->di_nlink));
    -to->di_projid_lo = be16_to_cpu(from->di_projid_lo);
    -to->di_projid_hi = be16_to_cpu(from->di_projid_hi);
    +to->di_projid = (prid_t)be16_to_cpu(from->di_projid_hi) << 16 | be16_to_cpu(from->di_projid_lo);
}

/*
 * @ @ -286,10 +285,10 @@
 *
 * to->di_version = from->di_version;
to->di_format = from->di_format;
    -to->di_uid = cpu_to_be32(from->di_uid);
    -to->di_gid = cpu_to_be32(from->di_gid);
    +inode->i_uid = xfs_uid_to_kuid(be32_to_cpu(from->di_uid));
    +inode->i_gid = xfs_gid_to_kgid(be32_to_cpu(from->di_gid));
to->di_flushiter = be16_to_cpu(from->di_flushiter);
*/

/*
 * @ @ -381,21 +380,65 @@
 */

memset(to->di_pad, 0, sizeof(to->di_pad));
to->di_atime.t_sec = cpu_to_be32(inode->i_atime.tv_sec);
/*@ @ -381,21 +380,65 @@*/
}
}

+static xfs_failaddr_t
+xfs_dinode_verify_fork(
    +struct xfs_dinode*dip,
    +struct xfs_mount*mp,
    +intwhichfork)
+{
+ uint32_t di_nextents = XFS_DFORK_NEXTENTS(dip, whichfork);
+
+ switch (XFS_DFORK_FORMAT(dip, whichfork)) {
+ case XFS_DINODE_FMT_LOCAL:
+ /*
+ * no local regular files yet
+ */
+ if (whichfork == XFS_DATA_FORK) {
+ if (S_ISREG(be16_to_cpu(dip->di_mode)))
+ return __this_address;
+ if (be64_to_cpu(dip->di_size) >
+ XFS_DFORK_SIZE(dip, mp, whichfork))
+ return __this_address;
+ } else if (di_nextents)
+ return __this_address;
+ break;
+ case XFS_DINODE_FMT_EXTENTS:
+ if (di_nextents > XFS_DFORK_MAXEXT(dip, mp, whichfork))
+ return __this_address;
+ break;
+ case XFS_DINODE_FMT_BTREE:
+ if (whichfork == XFS_ATTR_FORK) {
+ if (di_nextents > MAXAEXTNUM)
+ return __this_address;
+ } else if (di_nextents > MAXEXTNUM) {
+ return __this_address;
+ } else if (di_nextents)
+ return __this_address;
+ break;
+ default:
+ return __this_address;
+ }
+
+ return NULL;
+
+ bool
+ xfs_dinode_verify(
+ struct xfs_mount*mp,
+ xfs_ino_t ino,
+ struct xfs_dinode*dip)
+ {
+ xfs_failaddr_tfa;
+ uint16_tmode;
+ uint16_tflags;
+ uint64_tflags2;
+ uint64_tdi_size;
+
+ if (dip->di_magic != cpu_to_be16(XFS_DINODE_MAGIC))
return false;

/* don't allow invalid i_size */
- if (be64_to_cpu(dip->di_size) & (1ULL << 63))
+ di_size = be64_to_cpu(dip->di_size);
+ if (di_size & (1ULL << 63))
  return false;

mode = be16_to_cpu(dip->di_mode);
@@ -403,9 +446,68 @@
return false;

/* No zero-length symlinks/dirs. */
- if ((S_ISLNK(mode) || S_ISDIR(mode)) && dip->di_size == 0)
+ if ((S_ISLNK(mode) || S_ISDIR(mode)) && di_size == 0)
+ return false;
+ */
+ /* Fork checks carried over from xfs_iformat_fork */
+ if (mode &&
+     be32_to_cpu(dip->di_nextents) + be16_to_cpu(dip->di_anextents) >
+     be64_to_cpu(dip->di_nblocks))
+ return false;
+ /* Do we have appropriate data fork formats for the mode? */
+ switch (mode & S_IFMT) {
+ case S_IFIFO:
+     break;
+ case S_IFCHR:
+ case S_IFBLK:
+ case S_IFSOCK:
+     fa = xfs_dinode_verify_fork(dip, mp, XFS_DATA_FORK);
+     if (fa)
+         return false;
+     break;
+ case S_IFREG:
+ case S_IFLNK:
+ case S_IFDIR:
+     fa = xfs_dinode_verify_fork(dip, mp, XFS_DATA_FORK);
+     if (fa)
+         return false;
+     break;
+ case 0:
/* Uninitialized inode ok. */
+break;
+default:
+return false;
+
+if (XFS_DFORK_Q(dip)) {
+fa = xfs_dinode_verify_fork(dip, mp, XFS_ATTR_FORK);
+if (fa)
+return false;
+} else {
+/*
+ * If there is no fork offset, this may be a freshly-made inode
+ * in a new disk cluster, in which case di_aformat is zeroed.
+ * Otherwise, such an inode must be in EXTENTS format; this goes
+ * for freed inodes as well.
+ */
+switch (dip->di_aformat) {
+case 0:
+case XFS_DINODE_FMT_EXTENTS:
+break;
+default:
+return false;
+}
+if (dip->di_anextents)
+return false;
+
+/* only version 3 or greater inodes are extensively verified here */
+if (dip->di_version < 3)
+return true;
+flags = be16_to_cpu(dip->di_flags);
+flags2 = be64_to_cpu(dip->di_flags2);

/* don't allow reflink/cowextsize if we don't have reflink */
+if (!xfs_sb_version_hasreflink(&mp->m_sb))
+return false;
+
+/* only regular files get reflink */
+if ((flags2 & XFS_DIFLAG2_REFLINK) && (mode & S_IFMT) != S_IFREG)
+return false;
+
/* don't let reflink and realtime mix */
if ((flags2 & XFS_DIFLAG2_REFLINK) && (flags & XFS_DIFLAG_REALTIME))
return false;

--- linux-4.15.0.orig/fs/xfs/libxfs/xfs_inode_buff.h
+++ linux-4.15.0/fs/xfs/libxfs/xfs_inode_buff.h
@@ -31,10 +31,7 @@

int8_t	di_version;	/* inode version */
int8_t	di_format;	/* format of di_c data */
-uint16_t	di_flushiter;/* incremented on flush */
-uint32_t	di_uid;	/* owner's user id */
-uint32_t	di_gid;	/* owner's group id */
-uint16_t	di_projid_lo;/* lower part of owner's project id */
-uint16_t	di_projid_hi;/* higher part of owner's project id */
+uint32_t	di_projid;/* owner's project id */
xfs_fsize_t	di_size; /* number of bytes in file */
xfs_rfsblock_t	di_nblocks;/* # of direct & btree blocks used */
xfs_extlen_t	di_extsize;/* basic/minimum extent size for file */
--- linux-4.15.0.orig/fs/xfs/libxfs/xfs_inode_fork.c
+++ linux-4.15.0/fs/xfs/libxfs/xfs_inode_fork.c
@@ -62,69 +62,11 @@

int		error = 0;
xfs_fsize_t             di_size;
-"corrupt dinode %Lu, extent total = %d, nblocks = %Lu."
-(unsigned long long)ip->i_ino,
-(int)(be32_to_cpu(dip->di_nextents) +
-    be16_to_cpu(dip->di_anextents)),
-(unsigned long long)
-    be64_to_cpu(dip->di_nblocks));
-XFS_CORRUPTION_ERROR("xfs_iformat(1)", XFS_ERRLEVEL_LOW,
-    ip->i_mount, dip);
-return -EFSCORRUPTED;
-}
-
-"corrupt dinode %Lu, forkoff = 0x%x."
-(unsigned long long)ip->i_ino,
-dip->di_forkoff);
-XFS_CORRUPTION_ERROR("xfs_iformat(2)", XFS_ERRLEVEL_LOW,
-    ip->i_mount, dip);
-return -EFSCORRUPTED;
-}
-
-"corrupt dinode %Lu, extent total = %d, nblocks = %Lu."
-(unsigned long long)ip->i_ino,
-dip->di_forkoff);
-XFS_CORRUPTION_ERROR("xfs_iformat(3)", XFS_ERRLEVEL_LOW,
-    ip->i_mount, dip);
-return -EFSCORRUPTED;
-}
-
-"corrupt dinode %Lu, extent total = %d, nblocks = %Lu."
-(unsigned long long)ip->i_ino,
-dip->di_forkoff);
-XFS_CORRUPTION_ERROR("xfs_iformat(4)", XFS_ERRLEVEL_LOW,
-    ip->i_mount, dip);
-return -EFSCORRUPTED;
-}
- xfs_warn(ip->i_mount,
- "corrupt dinode %Lu, has realtime flag set.",
- ip->i_ino);
-XFS_CORRUPTION_ERROR("xfs_ifomat(realtime)",
  - XFS_ERRLEVEL_LOW, ip->i_mount, dip);
-return -EFSCORRUPTED;
-
- if (unlikely(xfs_is_reflink_inode(ip) && !S_ISREG(inode->i_mode))) {
  - xfs_warn(ip->i_mount,
  - "corrupt dinode %llu, wrong file type for reflink.",
  - ip->i_ino);
-XFS_CORRUPTION_ERROR("xfs_ifomat(reflink)",
  - XFS_ERRLEVEL_LOW, ip->i_mount, dip);
-return -EFSCORRUPTED;
-
- if (unlikely(xfs_is_reflink_inode(ip) &&
- (ip->i_d.di_flags & XFS_DIFLAG_REALTIME)) {
  - xfs_warn(ip->i_mount,
  - "corrupt dinode %llu, has reflink+realtime flag set.",
  - ip->i_ino);
-xFS_CORRUPTION_ERROR("xfs_ifomat(reflink)",
  - XFS_ERRLEVEL_LOW, ip->i_mount, dip);
-return -EFSCORRUPTED;
-
- switch (inode->i_mode & S_IFMT) {
  case S_IFIFO:
  case S_IFCHR:
  case S_IFBLK:
  case S_IFSOCK:
  - if (unlikely(dip->di_format != XFS_DINODE_FMT_DEV)) {
  -XFS_CORRUPTION_ERROR("xfs_ifomat(3)", XFS_ERRLEVEL_LOW,
  - ip->i_mount, dip);
-return -EFSCORRUPTED;
-}
  ip->i_d.di_size = 0;
 inode->i_rdev = xfs_to_linux_dev_t(xfs_dinode_get_rdev(dip));
 break;
 @ @ -134,32 +76,7 @ @
case S_IFDIR:
 switch (dip->di_format) {
 case XFS_DINODE_FMT_LOCAL:
 /*
 - * no local regular files yet
 - */
  -if (unlikely(S_ISREG(be16_to_cpu(dip->di_mode))) {
- xfs_warn(ip->i_mount,
- "corrupt inode %Lu (local format for regular file).",
- (unsigned long long) ip->i_ino);
-XFS_CORRUPTION_ERROR("xfs_iformat(4)",
- XFS_ERRLEVEL_LOW,
- ip->i_mount, dip);
-return -EFSCORRUPTED;
-}
-
-di_size = be64_to_cpu(dip->di_size);
-if (unlikely(di_size < 0 ||
- di_size > XFS_DFORK_DSIZE(dip, ip->i_mount))) {
- xfs_warn(ip->i_mount,
- "corrupt inode %Lu (bad size %Ld for local inode).",
- (unsigned long long) ip->i_ino,
- (long long) di_size);
-XFS_CORRUPTION_ERROR("xfs_iformat(5)",
- XFS_ERRLEVEL_LOW,
- ip->i_mount, dip);
-return -EFSCORRUPTED;
-}
-
-size = (int)di_size;
-error = xfs_iformat_local(ip, dip, XFS_DATA_FORK, size);
break;
@@ -170,14 +87,11 @@
error = xfs_iformat_btree(ip, dip, XFS_DATA_FORK);
break;
default:
-XFS_ERROR_REPORT("xfs_iformat(6)", XFS_ERRLEVEL_LOW,
- ip->i_mount);
return -EFSCORRUPTED;
}
break;

default:
-XFS_ERROR_REPORT("xfs_iformat(7)", XFS_ERRLEVEL_LOW, ip->i_mount);
return -EFSCORRUPTED;
}
if (error)
--- linux-4.15.0.orig/fs/xfs/libxfs/xfs_rmap.c
+++ linux-4.15.0/fs/xfs/libxfs/xfs_rmap.c
@@ -1373,7 +1373,7 @@
* record for our insertion point. This will also give us the record for
* start block contiguity tests.
*/
-error = xfs_rmap_lookup_le_range(cur, bno, owner, offset, flags,
+error = xfs_rmap_lookup_le_range(cur, bno, owner, offset, oldext,
&PREV, &i);
XFS_WANT_CORRUPTED_GOTO(mp, i == 1, done);

--- linux-4.15.0.orig/fs/libxfs/xfs_trans_resv.c
+++ linux-4.15.0/fs/libxfs/xfs_trans_resv.c
@@ -232,8 +232,6 @@
    worst case split in allocation btrees per extent assuming 4 extents:
    *4 exts * 2 trees * (2 * max depth - 1) * block size
- the inode btree: max depth * blocksize
- the allocation btrees: 2 trees * (max depth - 1) * block size
 */

STATIC uint
xfs_calc_itruncate_reservation(
@@ -245,12 +243,7 @@
    xfs_calc_buf_res(xfs_allocfree_log_count(mp, 4),
-    XFS_FSB_TO_B(mp, 1)) +
-    xfs_calc_buf_res(xfs_allocfree_log_count(mp, 1),
-    XFS_FSB_TO_B(mp, 1)) +
-    xfs_calc_buf_res(2 + mp->m_ialloc_blks +
-    mp->m_in_maxlevels, 0));
+	    XFS_FSB_TO_B(mp, 1)));
}

/*
--- linux-4.15.0.orig/fs/scrub/agheader.c
+++ linux-4.15.0/fs/scrub/agheader.c
@@ -93,7 +93,7 @@
    fl_count = XFS_AGFL_SIZE(mp) - agfl_first + agfl_last + 1;
    if (agfl_count != 0 && fl_count != agfl_count)
      xfs_scrub_block_set_corrupt(sc, sc->sa.agf_bp);
*/

/* first to the end */
-for (i = flfirst; i < XFS_AGFL_SIZE(mp); i++) {
  error = fn(sc, be32_to_cpu(agfl_bno[i]), priv);
  if (error)
    return error;
@@ -466,7 +466,7 @@
    if (agfl_last > agfl_first)
      fl_count = agfl_last - agfl_first + 1;
    else
      fl_count = XFS_AGFL_SIZE(mp) - agfl_first + agfl_last + 1;
    +fl_count = xfs_agfl_size(mp) - agfl_first + agfl_last + 1;
    if (agfl_count != 0 && fl_count != agfl_count)
      xfs_scrub_block_set_corrupt(sc, sc->sa.agf_bp);
Allocate buffer to ensure uniqueness of AGFL entries.*/
agf = XFS_BUF_TO_AGF(sc->sa.agf_bp);
agflcount = be32_to_cpu(agf->agf_flcount);
@if (agflcount > XFS_AGFL_SIZE(sc->mp)) {
}xfs_scrub_block_set_corrupt(sc, sc->sa.agf_bp);
goto out;
}
--- linux-4.15.0.orig/fs/xfs/scrub/bmap.c
+++ linux-4.15.0/fs/xfs/scrub/bmap.c
@@ -66,9 +66,27 @@
*/
if (S_ISREG(VFS_I(sc->ip)->i_mode) &&
    sc->sm->sm_type == XFS_SCRUB_TYPE_BMBTD) {
+struct address_space*mapping = VFS_I(sc->ip)->i_mapping;
+
+inode_dio_wait(VFS_I(sc->ip));
-error = filemap_write_and_wait(VFS_I(sc->ip)->i_mapping);
-@ if (error)
+
+/*
+ * Try to flush all incore state to disk before we examine the
+ * space mappings for the data fork. Leave accumulated errors
+ * in the mapping for the writer threads to consume.
+ *
+ * On ENOSPC or EIO writeback errors, we continue into the
+ * extent mapping checks because write failures do not
+ * necessarily imply anything about the correctness of the file
+ * metadata. The metadata and the file data could be on
+ * completely separate devices; a media failure might only
+ * affect a subset of the disk, etc. We can handle delalloc
+ * extents in the scrubber, so leaving them in memory is fine.
+ */
+error = filemap_fdatawrite(mapping);
+if (!error)
+error = filemap_fdatawait_keep_errors(mapping);
+@ if (error && (error != -ENOSPC && error != -EIO))
goto out;
}
--- linux-4.15.0.orig/fs/xfs/scrub/dir.c
+++ linux-4.15.0/fs/xfs/scrub/dir.c
@@ -170,6 +170,9 @@
xname.type = XFS_DIR3_FT_UNKNOWN;
error = xfs_dir_lookup(sdc->sc->tp, ip, &xname, &lookup_ino, NULL);
+/* ENOENT means the hash lookup failed and the dir is corrupt */
+if (error == -ENOENT)
+error = -EFSCORRUPTED;

if (!xfs_scrub_fblock_process_error(sdc->sc, XFS_DATA_FORK, offset,
    &error))
goto fail_xref;
--- linux-4.15.0.orig/fs/xfs/scrub/inode.c
+++ linux-4.15.0/fs/xfs/scrub/inode.c
@@ -220,8 +220,7 @@
goto bad;
/* rt flags require rt device */
-if ((flags & (XFS_DIFLAG_REALTIME | XFS_DIFLAG_RTINHERIT)) &&
-    !mp->m_rtdev_targp)
+if ((flags & XFS_DIFLAG_REALTIME) && !mp->m_rtdev_targp)
goto bad;

/* new rt bitmap flag only valid for rbmino */
--- linux-4.15.0.orig/fs/xfs/xfs_attr_list.c
+++ linux-4.15.0/fs/xfs/xfs_attr_list.c
@@ -566,6 +566,7 @@
attriblist_ent_t *aep;
int arraytop;

+ASSERT(!context->seen_enough);
ASSERT(!(context->flags & ATTR_KERNOVAL));
ASSERT((context->count >= 0));
ASSERT(context->count < (ATTR_MAX_VALUELEN/8));
--- linux-4.15.0.orig/fs/xfs/xfs_bmap_util.c
+++ linux-4.15.0/fs/xfs/xfs_bmap_util.c
@@ -903,6 +903,7 @@
        xfs_filblks_tallocatesize_fsb;
xfs_extlen_textsz, temp;
xfs_fileoff_tstartoffset_fsb;
+xfs_fileoff_tendoffset_fsb;
xfs_fsb_lblocks_firstfsb;
        intquota_flag;
@@ -932,7 +933,8 @@
imapp = &imaps[0];
nimaps = 1;
        startoffset_fsb = XFS_B_TO_FSBT(mp, offset);
-allocatesize_fsb = XFS_B_TO_FSB(mp, count);
+xallocatesize_fsb = XFS_B_TO_FSB(mp, offset + count);
+allocatesize_fsb = endoffset_fsb - startoffset_fsb;

/*
   * Allocate file space until done or until there is an error
@@ -1131,7 +1133,7 @@
return 0;
}

-static int
+int
xfs_flush_unmap_range(
 struct xfs_inode *ip,
 xfs_off_t offset,
 @ @ -1283,11 +1285,7 @ @
 * Writeback and invalidate cache for the remainder of the file as we're
 * about to shift down every extent from offset to EOF.
 */
-error = filemap_write_and_wait_range(VFS_I(ip)->i_mapping, offset, -1);
-if (error)
-return error;
-error = invalidate_inode_pages2_range(VFS_I(ip)->i_mapping,
-offset >> PAGE_SHIFT, -1);
+error = xfs_flush_unmap_range(ip, offset, XFS_ISIZE(ip));
 if (error)
 return error;

--- linux-4.15.0.orig/fs/xfs/xfs_bmap_util.h
+++ linux-4.15.0/fs/xfs/xfs_bmap_util.h
@@ -88,6 +88,8 @@
 xfs_daddr_t xfs_fsb_to_db(struct xfs_inode *ip, xfs_fsblock_t fsb);

 xfs_extnum_t xfs_bmap_count_leaves(struct xfs_ifork *ifp, xfs_filblks_t *count);
+int   xfs_flush_unmap_range(struct xfs_inode *ip, xfs_off_t offset,
+  xfs_off_t len);
 int xfs_bmap_count_blocks(struct xfs_trans *tp, struct xfs_inode *ip,
   int whichfork, xfs_extnum_t *nextents,
   xfs_filblks_t *count);
--- linux-4.15.0.orig/fs/xfs/xfs_buf.c
+++ linux-4.15.0/fs/xfs/xfs_buf.c
@@ -60,6 +60,32 @@
 #define xb_to_gfp(flags) 
 (((flags) & XBF_READ_AHEAD) ? __GFP_NORETRY : GFP_NOFS) | __GFP_NOWARN)

+/*
+ * Locking orders
+ *
+ * xfs_buf_ioacct_inc:
+ * xfs_buf_ioacct_dec:
+ *b_sema (caller holds)
+ * b_lock
+ *
+ * xfs_buf_stale:
+ *b_sema (caller holds)
static inline int xfs_buf_is_vmapped(
    @@ -985,8 +1011,18 @@
    ASSERT(atomic_read(&bp->b_hold) > 0);

    -release = atomic_dec_and_lock(&bp->b_hold, &pag->pag_buf_lock);
    +/*
    + * We grab the b_lock here first to serialise racing xfs_buf_rele()
    + * calls. The pag_buf_lock being taken on the last reference only
    + * serialises against racing lookups in xfs_buf_find(). IOWs, the second
    + * to last reference we drop here is not serialised against the last
    + * reference until we take bp->b_lock. Hence if we don't grab b_lock
    + * first, the last "release" reference can win the race to the lock and
    + * free the buffer before the second-to-last reference is processed,
    + * leading to a use-after-free scenario.
    + */
    spin_lock(&bp->b_lock);
    +release = atomic_dec_and_lock(&bp->b_hold, &pag->pag_buf_lock);
    if (!release) {
        /*
        * Drop the in-flight state if the buffer is already on the LRU
        @@ -1150,8 +1186,10 @@
        bp->b_ops->verify_read(bp);
        }

        -if (!bp->b_error)
        +if (!bp->b_error) {
            +bp->b_flags &= ~XBF_WRITE_FAIL;
            bp->b_flags |= XBF_DONE;
            +}


if (bp->b_iiodone)
 (*bp->b_iiodone))(bp);
@@ -1209,7 +1247,7 @@
 bp->b_flags |= XBF_WRITE;
 bp->b_flags &= ~(XBF_ASYNC | XBF_READ | XBF_DELWRI_Q |
 -XxBF_WRITE_FAIL | XBF_DONE);
+XBF_DONE);

 error = xfs_buf_submit_wait(bp);
 if (error) {
 @@ -1704,7 +1742,7 @@
 * zero. If the value is already zero, we need to reclaim the
 * buffer, otherwise it gets another trip through the LRU.
 */
-if (!atomic_add_unless(&bp->b_lru_ref, -1, 0)) {
+if (atomic_add_unless(&bp->b_lru_ref, -1, 0)) {
 spin_unlock(&bp->b_lock);
 return LRU_ROTATE;
 }
@@ -1991,7 +2029,7 @@
 * side. We need to move the buffer onto the io_list
 * at this point so the caller can still access it.
 */
-bp->b_flags &= ~(_XBF_DELWRI_Q | XBF_WRITE_FAIL);
+bp->b_flags &= ~_XBF_DELWRI_Q;
 bp->b_flags |= XBF_WRITE | XBF_ASYNC;
 if (wait_list) {
 xfs_buf_hold(bp);
--- linux-4.15.0.orig/fs/xfs/xfs_buf_item.c
+++ linux-4.15.0/fs/xfs/xfs_buf_item.c
@@ -1221,9 +1221,23 @@
} /*
- * Requeue a failed buffer for writeback
+ * Requeue a failed buffer for writeback.
+ * Return true if the buffer has been re-queued properly, false otherwise
+ * We clear the log item failed state here as well, but we have to be careful
+ * about reference counts because the only active reference counts on the buffer
+ * may be the failed log items. Hence if we clear the log item failed state
+ * before queuing the buffer for IO we can release all active references to
+ * the buffer and free it, leading to use after free problems in
+ * if (wait_list) {
+ xfs_buf_delwri_queue. It makes no difference to the buffer or log items which
+ order we process them in - the buffer is locked, and we own the buffer list
+ so nothing on them is going to change while we are performing this action.


Hence we can safely queue the buffer for IO before we clear the failed log item state, therefore always having an active reference to the buffer and avoiding the transient zero-reference state that leads to use-after-free.

Return true if the buffer was added to the buffer list, false if it was already on the buffer list.

```
bool xfs_buf_resubmit_failedBuffers(
    struct list_head*buffer_list
){
    struct xfs_log_item*next;
    bool ret;
    ret = xfs_buf_delwri_queue(bp, buffer_list);

    /* Clear XFS_LI_FAILED flag from all items before resubmit */
    for (; lip; lip = next)
      xfs_clear_li_failed(lip);
    /* Add this buffer back to the delayed write list */
    return ret;
}
```
- * space before we took the AGF buffer lock are now on disk, and the
+ * space before we take the AGF buffer lock are now on disk, and the
* volatile disk cache is flushed.
 */

xfs_log_force(mp, XFS_LOG_SYNC);

+error = xfs_alloc_read_agf(mp, NULL, agno, 0, &agbp);
+if (error || !agbp)
+goto out_put_perag;
+
+cur = xfs_allocbt_init_cursor(mp, NULL, agbp, agno, XFS_BTNUM_CNT);
+
/*
 * Look up the longest btree in the AGF and start with it.
 */

--- linux-4.15.0.orig/fs/xfs/xfs_file.c
+++ linux-4.15.0/fs/xfs/xfs_file.c
@@ -448,6 +448,12 @
if (size <= 0)
return size;

+/*
+ * Capture amount written on completion as we can't reliably account
+ * for it on submission.
+ */
+XFS_STATS_ADD(ip->i_mount, xs_write_bytes, size);
+
if (flags & IOMAP_DIO_COW) {
    error = xfs_reflink_end_cow(ip, offset, size);
    if (error)
@@ -557,6 +563,9 @@
} else {
    count = iov_iter_count(from);
    */
- * If we are doing unaligned IO, we can't allow any other overlapping IO
+ * If we are doing unaligned IO, we can't allow any other overlapping IO

in-flight at the same time or we risk data corruption. Wait for all
other IO to drain before we submit. If the IO is aligned, demote the
iolock if we had to take the exclusive lock in
xfs_file_aio_write_checks() for other reasons.
*/
if (unaligned_io) {
  /* If we are going to wait for other DIO to finish, bail */
  if (iocb->ki_flags & IOCB_NOWAIT) {
    return -EAGAIN;
  } else {
    inode_dio_wait(inode);
  }
} else if (iolock == XFS_IOLOCK_EXCL) {
  xfs_ilock_demote(ip, XFS_IOLOCK_EXCL);
  iolock = XFS_IOLOCK_SHARED;
  @ @ -588,6 +593,14 @@

  trace_xfs_file_direct_write(ip, count, iocb->ki_pos);
  ret = iomap_dio_rw(iocb, from, &xfs_iomap_ops, xfs_dio_write_end_io);
  +
  +/*
  + * If unaligned, this is the only IO in-flight. If it has not yet
  + * completed, wait on it before we release the iolock to prevent
  + * subsequent overlapping IO.
  + */
  +if (ret == -EIOCBQUEUED && unaligned_io)
    inode_dio_wait(inode);
  out:
  xfs_iunlock(ip, iolock);
  @ @ -633,7 +646,16 @@
  }
out:
  xfs_iunlock(ip, iolock);
  -return error ? error : ret;
  +if (error)
    +return error;
  +
  +if (ret > 0) {
    +XFS_STATS_ADD(ip->i_mount, xs_write_bytes, ret);
    +/* Handle various SYNC-type writes */
    +ret = generic_write_sync(iocb, ret);
    +}
  +return ret;
}
STATIC ssize_t
@@ -703,6 +725,12 @@
out:
if (iolock)
xfs_iunlock(ip, iolock);
+
+if (ret > 0) {
+XFS_STATS_ADD(ip->i_mount, xs_write_bytes, ret);
+/* Handle various SYNC-type writes */
+ret = generic_write_sync(iocb, ret);
+}
return ret;
}

@@ -727,8 +755,9 @@
return -EIO;

if (IS_DAX(inode))
-ret = xfs_file_dax_write(iocb, from);
-else if (iocb->ki_flags & IOCB_DIRECT) {
+return xfs_file_dax_write(iocb, from);
+
+if (iocb->ki_flags & IOCB_DIRECT) {
/*
 * Allow a directio write to fall back to a buffered
 * write *only* in the case that we're doing a reflink
@@ -736,20 +765,11 @@
 * allow an operation to fall back to buffered mode.
 */
ret = xfs_file_dio_aio_write(iocb, from);
-if (ret == -EREMCHG)
-goto buffered;
-} else {
-buffered:
-ret = xfs_file_buffered_aio_write(iocb, from);
+if (ret != -EREMCHG)
+return ret;
+
-if (ret > 0) {
-XFS_STATS_ADD(ip->i_mount, xs_write_bytes, ret);
-
-/* Handle various SYNC-type writes */
-ret = generic_write_sync(iocb, ret);
-}
+return xfs_file_buffered_aio_write(iocb, from);


```c
#define XFS_FALLOC_FL_SUPPORTED

if (error)
go to out_unlock;
} else if (mode & FALLOC_FL_INSERT_RANGE) {
    unsigned int blksize_mask = i_blocksize(inode) - 1;
    unsigned int blksize_mask2 = i_blocksize(inode) - 1;
    loff_t i_size = i_size_read(inode);

    new_size = i_size_read(inode) + len;
    if (offset & blksize_mask || len & blksize_mask) {
        error = -EINVAL;
go to out_unlock;
    }

    /* check the new inode size does not wrap through zero */
    if (new_size > inode->i_sb->s_maxbytes) {
        /* New inode size must not exceed ->s_maxbytes, accounting for
         * possible signed overflow.
         */
        if (inode->i_sb->s_maxbytes - isize < len) {
            error = -EFBIG;
go to out_unlock;
        }
        new_size = isize + len;
    }

    /* Offset should be less than i_size */
    if (offset >= i_size_read(inode)) {
        if (offset >= isize) {
            error = -EINVAL;
go to out_unlock;
        }
    }
}

static inline bool
xfs_is_write_fault(
    struct vm_fault *vmf)
{
    return (vmf->flags & FAULT_FLAG_WRITE) &&
           (vmf->vma->vm_flags & VM_SHARED);
}

static int
```
xfs_filemap_fault(
    struct vm_fault*vmf)
@@ -1071,7 +1103,7 @@
/* DAX can shortcut the normal fault path on write faults! */
    return __xfs_filemap_fault(vmf, PE_SIZE_PTE,
    IS_DAX(file_inode(vmf->vma->vm_file)) &&
    -(vmf->flags & FAULT_FLAG_WRITE));
+xfs_is_write_fault(vmf));
}

static int
@@ -1084,7 +1116,7 @@
/* DAX can shortcut the normal fault path on write faults! */
    return __xfs_filemap_fault(vmf, pe_size,
    -(vmf->flags & FAULT_FLAG_WRITE));
+xfs_is_write_fault(vmf));
}

static int
--- linux-4.15.0.orig/fs/xfs/xfs_fsmap.c
+++ linux-4.15.0/fs/xfs/xfs_fsmap.c
@@ -273,6 +273,9 @@
/* Are we just counting mappings? */
    if (info->head->fmh_count == 0) {
        +if (info->head->fmh_entries == UINT_MAX)
+        return -ECANCELED;
        +
        if (rec_daddr > info->next_daddr)
            info->head->fmh_entries++;

--- linux-4.15.0.orig/fs/xfs/xfs_fsops.c
+++ linux-4.15.0/fs/xfs/xfs_fsops.c
@@ -294,7 +294,7 @@
{
    agfl_bno = XFS_BUF_TO_AGFL_BNO(mp, bp);
    -for (bucket = 0; bucket < XFS_AGFL_SIZE(mp); bucket++)
    +for (bucket = 0; bucket < xfs_agfl_size(mp); bucket++)
        agfl_bno[bucket] = cpu_to_be32(NULLAGBLOCK);

    error = xfs_bwrite(bp);
--- linux-4.15.0.orig/fs/xfs/xfs_icache.c
+++ linux-4.15.0/fs/xfs/xfs_icache.c
@@ -295,6 +295,9 @@
    uint32_t generation = inode->i_generation;
    uint64_t version = inode->i_version;
}
umode_inode = inode->i_mode;
+dev_tdev = inode->i_rdev;
+kuid_tuid = inode->i_uid;
+kgid_tgid = inode->i_gid;

error = inode_init_always(mp->m_super, inode);

@@ -302,10 +305,53 @@
inode->i_generation = generation;
inode->i_version = version;
inode->i_mode = mode;
+inode->i_rdev = dev;
+inode->i_uid = uid;
+inode->i_gid = gid;
return error;
}

/*
 * If we are allocating a new inode, then check what was returned is
 * actually a free, empty inode. If we are not allocating an inode,
 * then check we didn't find a free inode.
 * *
 * * Returns:
 * +0 if the inode free state matches the lookup context
 * +ENOENT if the inode is free and we are not allocating
 * +EFSCORRUPTED if there is any state mismatch at all
 * */
+static int
+xfs_iget_check_free_state(
+struct xfs_inode *ip,
+int flags)
+
+%if (flags & XFS_IGET_CREATE) {
+"If we are allocating a new inode, then check what was returned is
+actually a free, empty inode. If we are not allocating an inode,
+then check we didn't find a free inode.
+
+Returns:
+-0 if the inode free state matches the lookup context
+-ENOENT if the inode is free and we are not allocating
+-EFSCORRUPTED if there is any state mismatch at all
+
+%if (VFS_I(ip)->i_mode != 0) {
+xfs_warn(ip->i_mount,
+"Corruption detected! Free inode 0x%llx not marked free! (mode 0x%x)",
+ip->i_ino, VFS_I(ip)->i_mode);
+return -EFSCORRUPTED;
+
+%if (ip->i_d.di_nblocks != 0) {
+xfs_warn(ip->i_mount,
+"Corruption detected! Free inode 0x%llx has blocks allocated!",
+ip->i_ino);
+return -EFSCORRUPTED;
+
+return 0;
+}  
+ /* should be an allocated inode */  
+if (VFS_I(ip)->i_mode == 0)  
+return -ENOENT;  
+ }  
+return 0;  
+}  
+
+/*
 * Check the validity of the inode we just found it the cache
 */
static int
@@ -354,12 +400,12 @@
}
/*
 - * If lookup is racing with unlink return an error immediately.
 + * Check the inode free state is valid. This also detects lookup
 + * racing with unlinks.
 */
-if (VFS_I(ip)->i_mode == 0 && !(flags & XFS_IGET_CREATE)) {
-error = -ENOENT;
+error = xfs_iget_check_free_state(ip, flags);
+if (error)
goto out_error;
-}

/*
 * If IRECLAIMABLE is set, we've torn down the VFS inode already.
@@ -475,10 +521,14 @@
trace_xfs_iget_miss(ip);

-if ((VFS_I(ip)->i_mode == 0) && !(flags & XFS_IGET_CREATE)) {
-error = -ENOENT;
+ 
+/*
 + * Check the inode free state is valid. This also detects lookup
 + * racing with unlinks.
 + */
+error = xfs_iget_check_free_state(ip, flags);
+if (error)
goto out_destroy;
-}

/*
 * Preload the radix tree so we can insert safely under the
struct xfs_mount *mp = container_of(to_delayed_work(work),
struct xfs_mount, m_eofblocks_work);
+  
+  if (!sb_start_write_trylock(mp->m_super))
+    return;
+  xfs_icache_free_eofblocks(mp, NULL);
+  sb_end_write(mp->m_super);
+  xfs_queue_eofblocks(mp);
}

struct xfs_mount *mp = container_of(to_delayed_work(work),
struct xfs_mount, m_cowblocks_work);
+  
+  if (!sb_start_write_trylock(mp->m_super))
+    return;
+  xfs_icache_free_cowblocks(mp, NULL);
+  sb_end_write(mp->m_super);
+  xfs_queue_cowblocks(mp);
}

goto out_ifunlock;
xfs_iunpin_wait(ip);
}
-  if (xfs_iflags_test(ip, XFS_ISTALE) || xfs_inode_clean(ip)) {
+  if (xfs_inode_clean(ip)) {
    xfs_ifunlock(ip);
    goto reclaim;
  }
-  if (xfs_iflags_test(ip, XFS_ISTALE) || xfs_inode_clean(ip)) {
+  if (xfs_inode_clean(ip)) {
    xfs_ifunlock(ip);
    goto reclaim;
  }
  if (xfs_iflags_test(ip, XFS_ISTALE) || xfs_inode_clean(ip)) {
    xfs_iunlock(ip, XFS_ILOCK_EXCL);
    xfs_qm_dqdetach(ip);
    xfs_iunlock(ip, XFS_ILOCK_EXCL);
    +ASSERT(xfs_inode_clean(ip));
    __xfs_inode_free(ip);
    return error;
  }
  if ((eofb->eof_flags & XFS_EOF_FLAGS_PRID) &&
-    xfs_get_projid(ip) != eofb->eof_prid)
+ ip->i_d.di_projid != eofb->eof_prid)
return 0;

return 1;
@@ -1397,7 +1458,7 @@
return 1;

if ((eofb->eof_flags & XFS_EOF_FLAGS_PRID) &&
    xfs_get_projid(ip) == eofb->eof_prid)
+ ip->i_d.di_projid == eofb->eof_prid)
return 1;

return 0;
--- linux-4.15.0.orig/fs/xfs/xfs_inode.c
+++ linux-4.15.0/fs/xfs/xfs_inode.c
@@ -752,6 +752,7 @@
xfs_buf_t**ialloc_context,
xfs_inode_t**ipp)
 {
 +struct inode*dir = pip ? VFS_I(pip) : NULL;
 struct xfs_mount *mp = tp->t_mountp;
 xfs_ino_tino;
xfs_inode_t*ip;
@@ -794,17 +795,17 @@
 if (ip->i_d.di_version == 1)
 ip->i_d.di_version = 2;

-inode->i_mode = mode;
set_nlink(inode, nlink);
-ip->i_d.di_uid = xfs_kuid_to_uid(current_fsuid());
-ip->i_d.di_gid = xfs_kgid_to_gid(current_fsgid());
inode->i_rdev = rdev;
-xfs_set_projid(ip, prid);
+ip->i_d.di_projid = prid;

-if (pip && XFS_INHERIT_GID(pip)) {
+ip->i_d.di_gid = pip->i_d.di_gid;
 -if ((VFS_I(pip)->i_mode & S_ISGID) && &S_ISDIR(mode))
-inode->i_mode |= S_ISGID;
+if (dir && !((dir->i_mode & S_ISGID) &&
+ (mp->m_flags & XFS_MOUNT_GRPID)) {
+inode->i_uid = current_fsuid();
+inode->i_gid = dir->i_gid;
+inode->i_mode = mode;
+} else {
+inode_init_owner(inode, dir, mode);
}
/*
@@ -812,9 +813,8 @@
* ID or one of the supplementary group IDs, the S_ISGID bit is cleared
* (and only if the irix_sgid_inherit compatibility variable is set).
*/
- if ((irix_sgid_inherit) &&
-     (inode->i_mode & S_ISGID) &&
-     (!in_group_p(xfs_gid_to_kgid(ip->i_d.di_gid))))
+ if (irix_sgid_inherit &&
     (inode->i_mode & S_ISGID) && !in_group_p(inode->i_gid))
inode->i_mode &= ~S_ISGID;

ip->i_d.di_size = 0;
@@ -1153,8 +1153,7 @@
/*
* Make sure that we have allocated dquot(s) on disk.
*/
- error = xfs_qm_vop_dqalloc(dp, xfs_kuid_to_uid(current_fsuid()),
-                        xfs_kgid_to_gid(current_fsgid()), prid,
+ error = xfs_qm_vop_dqalloc(dp, current_fsuid(), current_fsgid(), prid,
                        XFS_QMOPT_QUOTALL | XFS_QMOPT_INHERIT,
                        &udqp, &gdqp, &pdqp);
 if (error)
@@ -1316,8 +1315,7 @@
/*
* Make sure that we have allocated dquot(s) on disk.
*/
- error = xfs_qm_vop_dqalloc(dp, xfs_kuid_to_uid(current_fsuid()),
-                        xfs_kgid_to_gid(current_fsgid()), prid,
+ error = xfs_qm_vop_dqalloc(dp, current_fsuid(), current_fsgid(), prid,
                        XFS_QMOPT_QUOTALL | XFS_QMOPT_INHERIT,
                        &udqp, &gdqp, &pdqp);
 if (error)
@@ -1335,7 +1333,7 @@
 if (error)
go_to_trans_cancel;

- error = xfs_dir_ialloc(&tp, dp, mode, 1, 0, prid, &ip, NULL);
+ error = xfs_dir_ialloc(&tp, dp, mode, 0, 0, prid, &ip, NULL);
 if (error)
go_to_trans_cancel;

@@ -1432,7 +1430,7 @@
* the tree quota mechanism could be circumvented.
*/
 if (unlikely((tdp->i_d.di_flags & XFS_DIFLAG_PROJINHERIT) &&
-             (xfs_get_projid(tdp) != xfs_get_projid(sip)))
+             tdp->i_d.di_projid != sip->i_d.di_projid)) {

error = -EXDEV;
goto error_return;
}
@@ -1798,11 +1796,32 @@
return error;
}

/*
 * We do not hold the inode locked across the entire rolling transaction
 * here. We only need to hold it for the first transaction that
 * xfs_ifree() builds, which may mark the inode XFS_ISTALE if the
 * underlying cluster buffer is freed. Relogging an XFS_ISTALE inode
 * here breaks the relationship between cluster buffer invalidation and
 * stale inode invalidation on cluster buffer item journal commit
 * completion, and can result in leaving dirty stale inodes hanging
 * around in memory.
 *
 * We have no need for serialising this inode operation against other
 * operations - we freed the inode and hence reallocation is required
 * and that will serialise on reallocating the space the deferops need
 * to free. Hence we can unlock the inode on the first commit of
 * the transaction rather than roll it right through the deferops. This
 * avoids relogging the XFS_ISTALE inode.
 *
 * We check that xfs_ifree() hasn't grown an internal transaction roll
 * by asserting that the inode is still locked when it returns.
 */
xfs_ilock(ip, XFS_ILOCK_EXCL);
- xfs_trans_ijoin(tp, ip, 0);
+xfs_trans_ijoin(tp, ip, XFS_ILOCK_EXCL);

xfs_defer_init(&dfops, &first_block);
error = xfs_ifree(tp, ip, &dfops);
+ASSERT(xfs_isilocked(ip, XFS_ILOCK_EXCL));
if (error) {
 /*
 * If we fail to free the inode, shut down. The cancel
 @@ -1815,7 +1834,6 @@
xfs_force_shutdown(mp, SHUTDOWN_META_IO_ERROR);
 }
 xfs_trans_cancel(tp);
- xfs_iunlock(ip, XFS_ILOCK_EXCL);
return error;
}

@@ -1839,7 +1857,6 @@
xfs_notice(mp, "%s: xfs_trans_commit returned error \%d",
 __func__, error);
- xfs_iunlock(ip, XFS_ILOCK_EXCL);
  return 0;
}

@ @ -1937,11 +1954,8 @ @
}

/*/ 
- * This is called when the inode's link count goes to 0 or we are creating a 
- * tmpfile via O_TMPFILE. In the case of a tmpfile, @ignore_linkcount will be 
- * set to true as the link count is dropped to zero by the VFS after we've 
- * created the file successfully, so we have to add it to the unlinked list 
- * while the link count is non-zero. 
+ * This is called when the inode's link count has gone to 0 or we are creating 
+ * a tmpfile via O_TMPFILE. The inode @ip must have nlink == 0.
+ *
+ * We place the on-disk inode on a list in the AGI. It will be pulled from this 
+ * list when the inode is freed. 
@ @ -1961,6 +1975,7 @@
toffset;
terror;

+ASSERT(VFS_I(ip)->i_nlink == 0);
ASSERT(VFS_I(ip)->i_mode != 0);

/*/ @ @ -2885,11 +2900,9 @@

/*/ 
- * Prepare the tmpfile inode as if it were created through the VFS. 
- * Otherwise, the link increment paths will complain about nlink 0->1. 
- * Drop the link count as done by d_tmpfile(), complete the inode setup 
- * and flag it as linkable. 
+ * Complete the inode setup and flag it as linkable. nlink is already 
+ * zero, so we can skip the drop_nlink. 
+ */
- drop_nlink(VFS_I(tmpfile));
  xfs_setup_iops(tmpfile);
xfs_finish_inode_setup(tmpfile);
VFS_I(tmpfile)->i_state |= I_LINKABLE;
@ @ -2991,7 +3004,7 @@
- * treed quota mechanism would be circumvented. 
+ */
if (unlikely((target_dp->i_d.di_flags & XFS_DIFLAG_PROJINHERIT) &&
- (xfs_get_projid(target_dp) != xfs_get_projid(src_ip)))
  if (unlikely((target_dp->i_d.di_flags & XFS_DIFLAG_PROJINHERIT) &&
+ target_dp->i_d.di_projid != src_ip->i_d.di_projid))
  error = -EXDEV;
goto out_trans_cancel;
}
@@ -3005,7 +3018,8 @@
 &dfops, &first_block, spaceres);

/*
- * Set up the target.
+ * Check for expected errors before we dirty the transaction
+ * so we can return an error without a transaction abort.
 */
if (target_ip == NULL) {
/*
@@ -3017,6 +3031,46 @@
 if (error)
goto out_trans_cancel;
}
+} else {
+/*
+ * If target exists and it's a directory, check that whether
+ * it can be destroyed.
+ */
+if (S_ISDIR(VFS_I(target_ip)->i_mode) &&
+ !xfs_dir_isempty(target_ip) ||
+ (VFS_I(target_ip)->i_nlink > 2)) {
+error = -EEXIST;
+goto out_trans_cancel;
+}
+}
+
+/*
+ * Directory entry creation below may acquire the AGF. Remove
+ * the whiteout from the unlinked list first to preserve correct
+ * AGI/AGF locking order. This dirties the transaction so failures
+ * after this point will abort and log recovery will clean up the
+ * mess.
+ *
+ * For whiteouts, we need to bump the link count on the whiteout
+ * inode. After this point, we have a real link, clear the tmpfile
+ * state flag from the inode so it doesn't accidentally get misused
+ * in future.
+ */
+if (wip) {
+ASSERT(VFS_I(wip)->i_nlink == 0);
+error = xfs_iunlink_remove(tp, wip);
+if (error)
goto out_trans_cancel;
+
+xfs_bumplink(tp, wip);
/* Set up the target. */

if (target_ip == NULL) {
/* If target does not exist and the rename crosses
* directories, adjust the target directory link count
*/
}
} else { /* target_ip != NULL */
/* If target exists and it's a directory, check that both
* target and source are directories and that target can be
* destroyed, or that neither is a directory.
*/

-# (S_ISDIR(VFS_I(target_ip)->i_mode)) {
--
/* Make sure target dir is empty.
*/
--
-# !((xsfs_dir_isempty(target_ip)) ||
-# (VFS_I(target_ip)->i_nlink > 2)) {
-error = -EEXIST;
-goto out_trans_cancel;
-}
-}
-
/*
* Link the source inode under the target name.
* If the source inode is a directory and we are moving
* it across directories, its ".." entry will be
*/
if (error)
goto out_bmap_cancel;

/*
* For whiteouts, we need to bump the link count on the whiteout inode.
* This means that failures all the way up to this point leave the inode
* on the unlinked list and so cleanup is a simple matter of dropping
* the remaining reference to it. If we fail here after bumping the link
* count, we're shutting down the filesystem so we'll never see the
* intermediate state on disk.
*/
-if (wip) {
-ASSERT(VFS_I(wip)->i_nlink == 0);
error = xfs_bumplink(tp, wip);
-if (error)
-goto out_bmap_cancel;
-error = xfs_iunlink_remove(tp, wip);
-if (error)
-goto out_bmap_cancel;
-xfs_trans_log_inode(tp, wip, XFS_ILOG_CORE);
-
-/*
- * Now we have a real link, clear the "I'm a tmpfile" state
- * flag from the inode so it doesn't accidentally get misused in
- * future.
- */
-VFS_I(wip)->i_state &= ~I_LINKABLE;
-
-xfs_trans_ichgttime(tp, src_dp, XFS_ICHGTIME_MOD | XFS_ICHGTIME_CHG);
-xfs_trans_log_inode(tp, src_dp, XFS_ILOG_CORE);
if (new_parent)
--- linux-4.15.0.orig/fs/xfs/xfs_inode.h
+++ linux-4.15.0/fs/xfs/xfs_inode.h
@@ -177,30 +177,11 @@
return ret;
}
-/*
- * Project quota id helpers (previously projid was 16bit only
- * and using two 16bit values to hold new 32bit projid was chosen
- * to retain compatibility with "old" filesystems).
- */
-static inline prid_t
-xfs_get_projid(struct xfs_inode *ip)
-{  
-return (prid_t)ip->i_d.di_projid_hi << 16 | ip->i_d.di_projid_lo;
-}
-
-static inline void
-xfs_set_projid(struct xfs_inode *ip,
-prid_t projid)
-{  
-ip->i_d.di_projid_hi = (uint16_t) (projid >> 16);
-ip->i_d.di_projid_lo = (uint16_t) (projid & 0xffff);
-}
-
-static inline prid_t
-xfs_get_initial_prid(struct xfs_inode *dp)
{
if (dp->i_d.di_flags & XFS_DIFLAG_PROJINHERIT)
-return xfs_get_projid(dp);
+return dp->i_d.di_projid;

return XFS_PROJID_DEFAULT;
}
--- linux-4.15.0.orig/fs/xfs/xfs_inode_item.c
+++ linux-4.15.0/fs/xfs/xfs_inode_item.c
@@ -322,10 +322,10 @@
to->di_version = from->di_version;
to->di_format = from->di_format;
-to->di_uid = from->di_uid;
-to->di_gid = from->di_gid;
-to->di_projid_lo = from->di_projid_lo;
-to->di_projid_hi = from->di_projid_hi;
+to->di_uid = xfs_kuid_to_uid(inode->i_uid);
+to->di_gid = xfs_kgid_to_gid(inode->i_gid);
+to->di_projid_lo = from->di_projid & 0xffff;
+to->di_projid_hi = from->di_projid >> 16;

memset(to->di_pad, 0, sizeof(to->di_pad));
memset(to->di_pad3, 0, sizeof(to->di_pad3));
--- linux-4.15.0.orig/fs/xfs/xfs_ioctl.c
+++ linux-4.15.0/fs/xfs/xfs_ioctl.c
@@ -909,7 +909,7 @@
    fa.fsx_cowextsize = ip->i_d.di_cowextsize << ip->i_mount->m_sb.sb_blocklog;
    fa.fsx_projid = xfs_get_projid(ip);
    if (attr) {
if (attr) {
    if (ip->i_afp) {
@@ -1102,7 +1102,8 @@
        if (fa->fsx_xflags & FS_XFLAG_DAX) {
            if (!S_ISREG(inode->i_mode) || S_ISDIR(inode->i_mode))
                return -EINVAL;
        -if (bdev_dax_supported(sb, sb->s_blocksize) < 0)
        +if (!bdev_dax_supported(xfs_find_bdev_for_inode(VFS_I(ip)),
        +sb->s_blocksize))
            return -EINVAL;
    }

@@ -1318,7 +1319,7 @@
            if (current_user_ns() == &init_user_ns)
                return 0;
-
if (xfs_get_projid(ip) != fa->fsx_projid)
+if (ip->i_d.di_projid != fa->fsx_projid)
+  return -EINVAL;
if ((fa->fsx_xflags & FS_XFLAG_PROJINHERIT) !=
    (ip->i_d.di_flags & XFS_DIFLAG_PROJINHERIT))
  @@ -1355,9 +1356,9 @@
    * because the i_ * dquot fields will get updated anyway.
    */
if (XFS_IS_QUOTA_ON(mp)) {
  -code = xfs_qm_vop_dqalloc(ip, ip->i_d.di_uid,
  - ip->i_d.di_gid, fa->fsx_projid,
  - XFS_QMOPT_PQUOTA, &udqp, NULL, &pdqp);
  +code = xfs_qm_vop_dqalloc(ip, VFS_I(ip)->i_uid,
    +VFS_I(ip)->i_gid, fa->fsx_projid,
    +XFS_QMOPT_PQUOTA, &udqp, NULL, &pdqp);
  if (code)
    return code;
} /* out of quota */
if (XFS_IS_QUOTA_RUNNING(mp) && XFS_IS_PQUOTA_ON(mp) &&
    xfs_get_projid(ip) != fa->fsx_projid) {
  + ip->i_d.di_projid != fa->fsx_projid) {
    code = xfs_qm_vop_chown_reserve(tp, ip, udqp, NULL, pdqp,
    capable(CAP_FOWNER) ? XFS_QMOPT_FORCE_RES : 0);
    if (code)
      return code;
} /* out of quota */
  @@ -1381,7 +1382,7 @@
  if (XFS_IS_QUOTA_RUNNING(mp) && XFS_IS_PQUOTA_ON(mp) &&
    xfs_get_projid(ip) != fa->fsx_projid) {
    + ip->i_d.di_projid != fa->fsx_projid) {
      olddquot = xfs_qm_vop_chown(tp, ip,
      &ip->i_pdquot, pdqp);
    }
    ASSERT(ip->i_d.di_version > 1);
    -xfs_set_projid(ip, fa->fsx_projid);
    +ip->i_d.di_projid = fa->fsx_projid;
  }

/* Change the ownerships and register project quota modifications */
  @@ -1625,7 +1626,7 @@
  error = 0;
  out_free_buf:
  kmem_free(buf);
  -return 0;
  +return error;
struct getfsmap_info {
    int done;
    int error;

    return xfs_icache_free_eofblocks(mp, &keofb);
    +sb_start_write(mp->m_super);
    +error = xfs_icache_free_eofblocks(mp, &keofb);
    +sb_end_write(mp->m_super);
    +return error;
}

default:
--- linux-4.15.0.orig/fs/xfs/xfs_ioctl32.c
+++ linux-4.15.0/fs/xfs/xfs_ioctl32.c
@@ -252,6 +252,32 @@
        int done;
        int error;
        +/*
        + * Output structure handling functions. Depending on the command,
        + * either the xfs_bstat and xfs_inogrp structures are written out
        + * to userpace memory via bulkreq.ubuffer. Normally the compat
        + * functions and structure size are the correct ones to use ...
        + */
        +inumbers_fmt_pf inumbers_func = xfs_inumbers_fmt_compat;
        +bulkstat_one_pf bs_one_func = xfs_bulkstat_one_compat;
        +size_t bs_one_size = sizeof(struct compat_xfs_bstat);
        +
        +#ifdef CONFIG_X86_X32
        +if (in_x32_syscall()) {
        +/*
        + * ... but on x32 the input xfs_fsop_bulkreq has pointers
        + * which must be handled in the "compat" (32-bit) way, while
        + * the xfs_bstat and xfs_inogrp structures follow native 64-
        + * bit layout convention. So adjust accordingly, otherwise
        + * the data written out in compat layout will not match what
        + * x32 userspace expects.
        + */
        +inumbers_func = xfs_inumbers_fmt;
        +bs_one_func = xfs_bulkstat_one;
        +bs_one_size = sizeof(struct xfs_bstat);
        +}
        +#endif
        +
        /* done = 1 if there are more stats to get and if bulkstat */
if (cmd == XFS_IOC_FSBULKSTAT_32) {
    error = xfs_bulkstat(mp, &inlast, &count,
                        bulkreq.ubuffer, xfs_bulkstat_compat);
    +bulkreq.ubuffer, inumbers_func);
} else if (cmd == XFS_IOC_FSBULKSTAT_SINGLE_32) {
    int res;
    -error = xfs_bulkstat_one_compat(mp, inlast, bulkreq.ubuffer,
    -sizeof(compat_xfs_bstat_t), NULL, &res);
    +error = bs_one_func(mp, inlast, bulkreq.ubuffer,
    +bs_one_size, NULL, &res);
} else if (cmd == XFS_IOC_FSBULKSTAT_32) {
    error = xfs_bulkstat(mp, &inlast, &count,
                        -xfs_bulkstat_one_compat, sizeof(compat_xfs_bstat_t),
                        +bs_one_func, bs_one_size,
                        bulkreq.ubuffer, &done);
} else
    error = -EINVAL;
    @ @ -347,6 +373,7 @@
    int error;
    attrlist_cursor_kern_t*cursor;
    +compat_xfs_fsop_attrlist_request_t__user *p = arg;
    compat_xfs_fsop_attrlist_request_t al_hreq;
    struct dentry*dentry;
    char*kbuf;
    @ @ -381,6 +408,11 @@
    if (error)
        goto out_kfree;

    +if (copy_to_user(&p->pos, cursor, sizeof(attrlist_cursor_kern_t))) {
        +error = -EFAULT;
        +goto out_kfree;
    +}
    +
    if (copy_to_user(compat_ptr(al_hreq.buffer), kbuf, al_hreq.buflen))
        error = -EFAULT;

--- linux-4.15.0.orig/fs/xfs/xfs_iops.c
+++ linux-4.15.0/fs/xfs/xfs_iops.c
@@ -202,9 +202,18 @@
        xfs_setup_iops(ip);
if (tmpfile)
+ if (tmpfile) {
+ /*
+ * The VFS requires that any inode fed to d_tmpfile must have
+ * nlink == 1 so that it can decrement the nlink in d_tmpfile.
+ * However, we created the temp file with nlink == 0 because
+ * we're not allowed to put an inode with nlink > 0 on the
+ * unlinked list. Therefore we have to set nlink to 1 so that
+ * d_tmpfile can immediately set it back to zero.
+ */
+ set_nlink(inode, 1);
+ d_tmpfile(dentry, inode);
- else
+ } else
+ d_instantiate(dentry, inode);
+
+ xfs_finish_inode_setup(ip);
@@ -523,6 +532,10 @@
+	/*
+ * Note: If you add another clause to set an attribute flag, please
+ * update attributes_mask below.
+ */
+ if (ip->i_d.di_flags & XFS_DIFLAG_IMMUTABLE)
stat->attributes |= STATX_ATTR_IMMUTABLE;
+ if (ip->i_d.di_flags & XFS_DIFLAG_APPEND)
@@ -530,6 +543,10 @@
if (ip->i_d.di_flags & XFS_DIFLAG_NODUMP)
stat->attributes |= STATX_ATTR_NODUMP;
+	stat->attributes_mask |= (STATX_ATTR_IMMUTABLE |
+ STATX_ATTR_APPEND |
+ STATX_ATTR_NODUMP);
+ switch (inode->i_mode & S_IFMT) {
+ case S_IFBLK:
+ case S_IFCHR:
+ @ @ -565,9 +673,7 @@
+ */
+ ASSERT(udqp == NULL);
+ ASSERT(gdqp == NULL);
+ error = xfs_qm_vop_dqalloc(ip, xfs_kuid_to_uid(uid),
+ xfs_kgid_to_gid(gid),
+ xfs_get_projid(ip),
+ error = xfs_qm_vop_dqalloc(ip, uid, gid, ip->i_d.di_projid,
+ qflags, &udqp, &gdqp, NULL);
if (error)
    return error;
@@ -727,7 +742,6 @@
    olddquot1 = xfs_qm_vop_chown(tp, ip,
&ip->i_udquot, udqp);
    }
    -ip->i_d.di_uid = xfs_kuid_to_uid(uid);
    inode->i_uid = uid;
    }
    if (!gid_eq(igid, gid)) {
    @@ -739,7 +753,6 @@
    olddquot2 = xfs_qm_vop_chown(tp, ip,
&ip->i_gdquot, gdqp);
    }
    -ip->i_d.di_gid = xfs_kgid_to_gid(gid);
    inode->i_gid = gid;
    }
    @@ -787,6 +800,7 @@
    out_cancel:
    xfs_trans_cancel(tp);
    +xfs_iunlock(ip, XFS_ILOCK_EXCL);
    out_dqrele:
    xfs_qm_dqrele(udqp);
    xfs_qm_dqrele(gdqp);
    @@ -832,7 +846,7 @@
    ASSERT(xfs_isilocked(ip, XFS_MMAPLOCK_EXCL));
    ASSERT(S_ISREG(inode->i_mode));
    ASSERT((iattr->ia_valid & (ATTR_UID|ATTR_GID|ATTR_ATIME|ATTR_ATIME_SET|
    -ATTR_MTIME_SET|ATTR_TIMES_SET)) == 0);
    +ATTR_MTIME_SET|ATTR_TIMES_SET)) == 0);
    oldsize = inode->i_size;
    newsize = iattr->ia_size;
    @@ -876,6 +890,16 @@
    if (newsize > oldsize) {
    error = xfs_zero_eof(ip, newsize, oldsize, &did_zeroing);
    } else {
    +/*
    + * iomap won’t detect a dirty page over an unwritten block (or a
    + * cow block over a hole) and subsequently skips zeroing the
    + * newly post-EOF portion of the page. Flush the new EOF to
    + * convert the block before the pagecache truncate.
    + */
    +error = filemap_write_and_wait_range(inode->i_mapping, newsize,
    +    newsize);
    +if (error)
+return error;
error = iomap_truncate_page(inode, newsize, &did_zeroing,
&xfs_iomap_ops);
}
/* make the inode look hashed for the writeback code */
hlist_add_fake(&inode->i_hash);

- inode->i_uid    = xfs_uid_to_kuid(ip->i_d.di_uid);
- inode->i_gid    = xfs_gid_to_kgid(ip->i_d.di_gid);

i_size_write(inode, ip->i_d.di_size);

--- linux-4.15.0.orig/fs/xfs/xfs_itable.c
+++ linux-4.15.0/fs/xfs/xfs_itable.c
@@ -75,11 +75,11 @@
/* xfs_iget returns the following without needing
 * further change.
 */
-buf->bs_projid_lo = dic->di_projid_lo;
-buf->bs_projid_hi = dic->di_projid_hi;
+buff->bs_projid_lo = dic->di_projid & 0xFFFF;
+buff->bs_projid_hi = dic->di_projid >> 16;
buf->bs_ino = ino;
-buf->bs_uid = dic->di_uid;
-buf->bs_gid = dic->di_gid;
+buff->bs_uid = xfs_kuid_to_uid(inode->i_uid);
+buff->bs_gid = xfs_kgid_to_gid(inode->i_gid);
buf->bs_size = dic->di_size;

buf->bs_nlink = inode->i_nlink;
--- linux-4.15.0.orig/fs/xfs/xfs_log.c
+++ linux-4.15.0/fs/xfs/xfs_log.c
@@ -1568,6 +1568,8 @@
if (iclog->ic_bp)
xfs_buf_free(iclog->ic_bp);
kmem_free(iclog);
+if (prev_iclog == log->l_iclog)
+break;
}
spinlock_destroy(&log->l_icloglock);
xfs_buf_free(log->l_xbuf);
@@ -2699,11 +2701,6 @@
int funcdidcallbacks; /* flag: function did callbacks */
int repeats;/* for issuing console warnings if
 * looping too many times */
- int wake = 0;

spin_lock(&log->l_icloglock);
first_iclog = iclog = log->l_iclog;
@@ -2901,11 +2902,9 @@
if (log->l_iclog->ic_state & (XLOG_STATE_ACTIVE|XLOG_STATE_IOERROR))
- wake = 1;
- spin_unlock(&log->l_icloglock);
-
- if (wake)
- wake_up_all(&log->l_flush_wait);
+
+ spin_unlock(&log->l_icloglock);
 }

@@ -4067,7 +4066,9 @@
 * item committed callback functions will do this again under lock to
 * avoid races.
 */
+ spin_lock(&log->l_cilp->xc_push_lock);
+ wake_up_all(&log->l_cilp->xc_commit_wait);
+ spin_unlock(&log->l_cilp->xc_push_lock);
 xlog_state_do_callback(log, XFS_LI_ABORTED, NULL);

#ifdef XFSERRORDEBUG
--- linux-4.15.0.orig/fs/xfs/xfs_mount.h
+++ linux-4.15.0/fs/xfs/xfs_mount.h
@@ -353,6 +353,7 @@
 char		pagi_inodeok;	/* The agi is ok for inodes */
 uint8_t		pagf_levels[XFS_BTNUM_AGF];
 /* # of levels in bno & cnt btree */
+ bool		pagf_agflreset; /* agfl requires reset before use */
 uint32_t		pagf_flcount; /* count of blocks in freelist */
 xfs_extlen_t		pagf_freeblks; /* total free blocks */
 xfs_extlen_t		pagf_longest; /* longest free space */
--- linux-4.15.0.orig/fs/xfs/xfs_pnfs.c
+++ linux-4.15.0/fs/xfs/xfs_pnfs.c
@@ -140,7 +140,7 @@
 goto out_unlock;
 error = invalidate_inode_pages2(inode->i_mapping);
 if (WARN_ON_ONCE(error))
- return error;
+ goto out_unlock;

 end_fsb = XFS_B_TO_FSB(mp, (xfs_ufssize_t)offset + length);
 offset_fsb = XFS_B_TO_FSBT(mp, offset);
--- linux-4.15.0.orig/fs/xfs/xfs_qm.c
+++ linux-4.15.0/fs/xfs/xfs_qm.c
@@ -345,7 +345,8 @@
 ASSERT(xfs_isilocked(ip, XFS_LOCK_EXCL));
if (XFS_IS_UQUOTA_ON(mp) && !ip->i_udquot) {
    error = xfs_qm_dqattach_one(ip, ip->i_d.di_uid, XFS_DQ_USER,
                               XFS_KUID_TO_UID(VFS_I(ip)->i_uid), XFS_DQ_USER,
                               flags & XFS_QMOPT_DQALLOC, &ip->i_udquot);
    if (error)
        @@ -354,7 +355,8 @@
}

if (XFS_IS_GQUOTA_ON(mp) && !ip->i_gdquot) {
    error = xfs_qm_dqattach_one(ip, ip->i_d.di_gid, XFS_DQ_GROUP,
                               XFS_KGID_TO_GID(VFS_I(ip)->i_gid), XFS_DQ_GROUP,
                               flags & XFS_QMOPT_DQALLOC, &ip->i_gdquot);
    if (error)
        @@ -363,7 +365,7 @@
}

if (XFS_IS_PQUOTA_ON(mp) && !ip->i_pdquot) {
    error = xfs_qm_dqattach_one(ip, ip->i_d.di_projid, XFS_DQ_PROJ,
                               XFS_GET_PROJID(ip), XFS_DQ_PROJ,
                               flags & XFS_QMOPT_DQALLOC, &ip->i_pdquot);
    if (error)
        @@ -1189,21 +1191,21 @@
        * and quotaoffs don't race. (Quotachecks happen at mount time only).
        */
    if (XFS_IS_UQUOTA_ON(mp)) {
        error = xfs_qm_quotacheck_dqadjust(ip, ip->i_d.di_uid,
                                             XFS_DQ_USER, nblks, rtblks);
        if (error)
            goto error0;
    }

    if (XFS_IS_GQUOTA_ON(mp)) {
        error = xfs_qm_quotacheck_dqadjust(ip, ip->i_d.di_gid,
                                             XFS_DQ_GROUP, nblks, rtblks);
        if (error)
            goto error0;
    }

    if (XFS_IS_PQUOTA_ON(mp)) {
        error = xfs_qm_quotacheck_dqadjust(ip, xfs_get_projid(ip),
                                             XFS_DQ_PROJ, nblks, rtblks);
        if (error)
            goto error0;
    }
}
error = xfs_qm_quotacheck_dqadjust(ip, ip->i_d.di_projid, XFS_DQ_PROJ, nblks, rtblks);
if (error)
goto error0;

int xfs_qm_vop_dqalloc(
    struct xfs_inode*ip,
    -xfs_dqid_t uid,
    -xfs_dqid_t gid,
    +kuid_t uid,
    +kgid_t gid,
    prid_t prid,
    uint flags,
    struct xfs_dquot**O_udqpp,
    @@ -1655,6 +1657,7 @@
    struct xfs_dquot**O_pdqpp)
{
    struct xfs_mount*mp = ip->i_mount;
    +struct inode*inode = VFS_I(ip);
    struct xfs_dquot*uq = NULL;
    struct xfs_dquot*gq = NULL;
    struct xfs_dquot*pq = NULL;
    @@ -1668,7 +1671,7 @@
    xfs_ilock(ip, lockflags);
    if ((flags & XFS_QMOPT_INHERIT) && XFS_INHERIT_GID(ip))
        -gid = ip->i_d.di_gid;
        +gid = inode->i_gid;
        /*
        * Attach the dquot(s) to this inode, doing a dquot allocation
        @@ -1683,7 +1686,7 @@
        }
    if ((flags & XFS_QMOPT_UQUOTA) && XFS_IS_UQUOTA_ON(mp)) {
        -if (ip->i_d.di_uid != uid) {
        +if (!uid_eq(inode->i_uid, uid)) {
            /*
            * What we need is the dquot that has this uid, and
            * if we send the inode to dqget, the uid of the inode
            @@ -1694,7 +1697,7 @@
            * holding ilock.
            */
            xfs_iunlock(ip, lockflags);
            -error = xfs_qm_dqget(mp, NULL, uid,
            +error = xfs_qm_dqget(mp, NULL, xfs_kuid_to_uid(uid),
                XFS_DQ_USER,
XFS_QMOPT_DQALLOC | XFS_QMOPT_DOWARN,
@@ -1719,9 +1722,9 @@
}
}
if ((flags & XFS_QMOPT_GQUOTA) && XFS_IS_GQUOTA_ON(mp)) {
- if (ip->i_d.di_gid != gid) {
+ if (!gid_eq(inode->i_gid, gid)) {
 xfs_iunlock(ip, lockflags);
- error = xfs_qm_dqget(mp, NULL, gid,
+ error = xfs_qm_dqget(mp, NULL, xfs_kgid_to_gid(gid),
XFS_DQ_GROUP,
XFS_QMOPT_DQALLOC | XFS_QMOPT_DOWARN,
@@ -1739,7 +1742,7 @@
}
}
if ((flags & XFS_QMOPT_PQUOTA) && XFS_IS_PQUOTA_ON(mp)) {
- if (xfs_get_projid(ip) != prid) {
+ if (ip->i_d.di_projid != prid) {
 xfs_iunlock(ip, lockflags);
error = xfs_qm_dqget(mp, NULL, (xfs_dqid_t)prid,
XFS_DQ_PROJ,
@@ -1853,7 +1856,8 @@
XFS_QMOPT_RES_RTBLKS : XFS_QMOPT_RES_REGBLKS;

if (XFS_IS_UQUOTA_ON(mp) && udqp &&
- ip->i_d.di_uid != be32_to_cpu(udqp->q_core.d_id)) {
+ xfs_kuid_to_uid(VFS_I(ip)->i_uid) !=
+ be32_to_cpu(udqp->q_core.d_id)) {
udq_delblkss = udqp;
/*
 * If there are delayed allocation blocks, then we have to
@@ -1866,7 +1870,8 @@
}
}
if (XFS_IS_GQUOTA_ON(ip->i_mount) && gdqp &&
- ip->i_d.di_gid != be32_to_cpu(gdqp->q_core.d_id)) {
+ xfs_kgid_to_gid(VFS_I(ip)->i_gid) !=
+ be32_to_cpu(gdqp->q_core.d_id)) {
gdq_delblks = gdqp;
if (delblks) {
ASSERT(ip->i_gdquot);
@@ -1875,7 +1880,7 @@
}

if (XFS_IS_PQUOTA_ON(ip->i_mount) && pdqp &&
- xfs_get_projid(ip) != be32_to_cpu(pdqp->q_core.d_id)) {
ip->i_d.di_projid != be32_to_cpu(pdqp->q_core.d_id)) {  
  prjflags = XFS_QMOPT_ENOSPC;
  pdq_delblks = pdqp;
  if (delblks) {
    @@ -1963,20 +1968,23 @@
  
  ip->i_udquot = xfs_qm_dqhold(udqp);
  xfs_trans_mod_dquot(tp, udqp, XFS_TRANS_DQ_ICOUNT, 1);
  }
  if (gdqp && XFS_IS_GQUOTA_ON(mp)) {
    ASSERT(ip->i_gdquot == NULL);
    -ASSERT(ip->i_d.di_gid == be32_to_cpu(gdqp->q_core.d_id));
    +ASSERT(xfs_kgid_to_gid(VFS_I(ip)->i_gid) ==
            +be32_to_cpu(gdqp->q_core.d_id));
    + ip->i_gdquot = xfs_qm_dqhold(gdqp);
    xfs_trans_mod_dquot(tp, gdqp, XFS_TRANS_DQ_ICOUNT, 1);
  }
  if (pdqp && XFS_IS_PQUOTA_ON(mp)) {
    ASSERT(ip->i_pdquot == NULL);
    -ASSERT(xfs_get_projid(ip) == be32_to_cpu(pdqp->q_core.d_id));
    +ip->i_pdquot = xfs_qm_dqhold(pdqp);
    xfs_trans_mod_dquot(tp, pdqp, XFS_TRANS_DQ_ICOUNT, 1);
  }

  --- linux-4.15.0.orig/fs/xfs/xfs_qm_bhv.c
  +++ linux-4.15.0/fs/xfs/xfs_qm_bhv.c
  @@ -52,7 +52,7 @@
    statp->f_files = limit;
  statp->f_ffree =
    (statp->f_files > dqp->q_res_icount) ?
    - (statp->f_ffree - dqp->q_res_icount) : 0;
    + (statp->f_files - dqp->q_res_icount) : 0;
    }
  }

  @@ -72,7 +72,7 @@
  xfs_mount_t*mp = ip->i_mount;
  xfs_dquot_t*dqp;

    -if (!xfs_qm_dqget(mp, NULL, xfs_get_projid(ip), XFS_DQ_PROJ, 0, &dqp)) {
    +if (!xfs_qm_dqget(mp, NULL, ip->i_d.di_projid, XFS_DQ_PROJ, 0, &dqp)) {

extern int xfs_qm_vop_dqalloc(struct xfs_inode *, xfs_dqid_t, xfs_dqid_t, 
prid_t, uint, struct xfs_dquot **, struct xfs_dquot **, 
struct xfs_dquot **);

else
static inline int
-xfs_qm_vop_dqalloc(struct xfs_inode *ip, xfs_dqid_t uid, xfs_dqid_t gid, 
+xfq_m_qvop_dqalloc(struct xfs_inode *ip, kuid_t kuid, kgid_t kgid, 
prid_t prid, uint flags, struct xfs_dquot **udqp, 
struct xfs_dquot **gdqp, struct xfs_dquot **pdqp)
{
--- linux-4.15.0.orig/fs/xfs/xfs_quotaops.c
+++ linux-4.15.0/fs/xfs/xfsquotaops.c
@@ -214,6 +214,12 @@

if (uflags & ~(FS_USER_QUOTA | FS_GROUP_QUOTA | FS_PROJ_QUOTA))
  return -EINVAL;
+
+if (uflags & ~(FS_USER_QUOTA | FS_GROUP_QUOTA | FS_PROJ_QUOTA))
+  return -EINVAL;
+
+if (uflags & FS_USER_QUOTA)
flags |= XFS_DQ_USER;
if (uflags & FS_GROUP_QUOTA)
--- linux-4.15.0.orig/fs/xfs/xfs_reflink.c
+++ linux-4.15.0/fs/xfs/xfs_reflink.c
@@ -316,6 +316,7 @@

if (error)
  return error;
+xfs_trim_extent(imap, got.br_startoff, got.br_blockcount);
trace_xfs_reflink_cow_alloc(ip, &got);
return 0;
}
unmap_len = irec->br_startoff + irec->br_blockcount - destoff;

/* If we're not just clearing space, then do we have enough quota? */
-if (real_extent) {
    -error = xfs_trans_reserve_quota_nblks(tp, ip,
        -irec->br_blockcount, 0, XFS_QMOPT_RES_REGBLKS);
    -if (error)
        -goto out_cancel;
    -}

+/*
 * Reserve quota for this operation. We don't know if the first unmap
 * in the dest file will cause a bmap btree split, so we always reserve
 * at least enough blocks for that split. If the extent being mapped
 * in is written, we need to reserve quota for that too.
 * */
+qres = XFS_EXTENTADD_SPACE_RES(mp, XFS_DATA_FORK);
+if (real_extent)
    +qres += irec->br_blockcount;
+error = xfs_trans_reserve_quota_nblks(tp, ip, qres, 0,
    +XFS_QMOPT_RES_REGBLKS);
+if (error)
    +goto out_cancel;

trace_xfs_reflink_remap(ip, irec->br_startoff,
    irec->br_blockcount, irec->br_startblock);

/* If this isn't a real mapping, we're done. */
-if (ret)
    goto out_unlock;

-/* Zap any page cache for the destination file's range. */
- truncate_inode_pages_range(&inode_out->i_data, pos_out,
- PAGE_ALIGN(pos_out + len) - 1);
+
*/
+ * If pos_out > EOF, we may have dirtied blocks between EOF and
+ * pos_out. In that case, we need to extend the flush and unmap to cover
+ * from EOF to the end of the copy length.
+ */
+if (pos_out > XFS_ISIZE(dest)) {
+loff_t flen = len + (pos_out - XFS_ISIZE(dest));
+ret = xfs_flush_unmap_range(dest, XFS_ISIZE(dest), flen);
+} else {
+ret = xfs_flush_unmap_range(dest, pos_out, len);
+}
+if (ret)
+goto out_unlock;

/*
 * Carry the cowextsize hint from src to dest if we're sharing the
--- linux-4.15.0.orig/fs/xfs/xfs_rtalloc.c
+++ linux-4.15.0/fs/xfs/xfs_rtalloc.c
@@ -257,6 +257,9 @@
end = XFS_BLOCKTOBIT(mp, bbno + 1) - 1;
 i <= end;
 i++) {
+/* Make sure we don't scan off the end of the rt volume. */
+maxlen = min(mp->m_sb.sb_rextents, i + maxlen) - i;
+}
+/*
 * See if there's a free extent of maxlen starting at i.
 * If it's not so then next will contain the first non-free.
@@ -448,6 +451,14 @@
 if (bno >= mp->m_sb.sb_rextents)
 bno = mp->m_sb.sb_rextents - 1;
+
+/* Make sure we don't run off the end of the rt volume. */
+maxlen = min(mp->m_sb.sb_rextents, bno + maxlen) - bno;
+if (maxlen < minlen) {
+*rtblock = NULLRTBLOCK;
+return 0;
+}
+
+/*
 * Try the exact allocation first.
+*/
@@ -1003,10 +1014,13 @@
xfs_ilock(mp->m_rbmip, XFS_ILOCK_EXCL);
 xfs_trans_ijoin(tp, mp->m_rbmip, XFS_ILOCK_EXCL);
/*
 * Update the bitmap inode's size.
 * Update the bitmap inode's size ondisk and incore. We need
 * to update the incore size so that inode inactivation won't
 * punch what it thinks are "posteof" blocks.
 */
mp->m_rbmip->i_d.di_size =
  nsbp->sb_rbmblocks * nsbp->sb_blocksize;
+i_size_write(VFS_I(mp->m_rbmip), mp->m_rbmip->i_d.di_size);
xfs_trans_log_inode(tp, mp->m_rbmip, XFS_ILOG_CORE);
/*
 * Get the summary inode into the transaction.
*/
xfs_ilock(mp->m_rsumip, XFS_ILOCK_EXCL);
xfs_trans_ijoin(tp, mp->m_rsumip, XFS_ILOCK_EXCL);
/*
 * Update the summary inode's size.
 * Update the summary inode's size. We need to update the
 * incore size so that inode inactivation won't punch what it
 * thinks are "posteof" blocks.
 */
mp->m_rsumip->i_d.di_size = nmp->m_rsumsize;
+i_size_write(VFS_I(mp->m_rsumip), mp->m_rsumip->i_d.di_size);
xfs_trans_log_inode(tp, mp->m_rsumip, XFS_ILOG_CORE);
/*
 * Copy summary data from old to new sizes.
*/
xfs_sb_t *sbp;

if (sbp->sb_rbmino == NULLFSINO)
  return 0;
error = xfs_iget(mp, NULL, sbp->sb_rbmino, 0, 0, &mp->m_rbmip);
if (error)
  return error;
ASSERT(mp->m_rbmip != NULL);
-ASSERT(sbp->sb_rsumino != NULLFSINO);
+error = xfs_iget(mp, NULL, sbp->sb_rsumino, 0, 0, &mp->m_rsumip);
if (error) {
  IRELE(mp->m_rbmip);
  --- linux-4.15.0.orig/fs/xfs/xfs_stats.c
  +++ linux-4.15.0/fs/xfs/xfs_stats.c
  @@ -142,7 +142,7 @@
  int j;

  seq_printf(m, "qm");
  -for (j = XFSSTAT_END_IBT_V2; j < XFSSTAT_END_XQMSTAT; j++)
for (j = XFSSTAT_END_REFCOUNT; j < XFSSTAT_END_XQMSTAT; j++)
seq_printf(m, " %u", counter_val(xfsstats.xs_stats, j));
seq_putc(m, '\n');
return 0;
--- linux-4.15.0.orig/fs/xfs/xfs_super.c
+++ linux-4.15.0/fs/xfs/xfs_super.c
@@ -1649,11 +1649,17 @@
sb->s_flags |= SB_I_VERSION;

if (mp->m_flags & XFS_MOUNT_DAX) {
    bool rtdev_is_dax = false, datadev_is_dax;
+    xfs_warn(mp,
        "DAX enabled. Warning: EXPERIMENTAL, use at your own risk");

-error = bdev_dax_supported(sb, sb->s_blocksize);
-if (error) {
+    datadev_is_dax = bdev_dax_supported(mp->m_ddev_targp->bt_bdev,
+        +sb->s_blocksize);
+    if (mp->m_rtdev_targp)
+        rtdev_is_dax = bdev_dax_supported(
+            +mp->m_rtdev_targp->bt_bdev, sb->s_blocksize);
+    if (!rtdev_is_dax && !datadev_is_dax) {
          xfs_alert(mp,
              "DAX unsupported by block device. Turning off DAX.");
        mp->m_flags &= ~XFS_MOUNT_DAX;
@@ -1718,6 +1724,7 @@
        out_close_devices:
        xfs_close_devices(mp);
        out_free_fsnname:
+        +sb->s_fs_info = NULL;
        xfs_free_fsnname(mp);
        kfree(mp);
        out:
@@ -1735,6 +1742,10 @@
{
struct xfs_mount*mp = XFS_M(sb);

+/* if ->fill_super failed, we have no mount to tear down */
+if (!sb->s_fs_info)
+return;
+    xfs_notice(mp, "Unmounting Filesystem");
        xfs_filestreamUnmount(mp);
        xfsUnmountfs(mp);
@@ -1744,6 +1755,8 @@
        xfs_destroy_percpu_counts(mp);
        xfs_destroy_mount_workqueues(mp);
xfs_close_devices(mp);
+
+sb->s_fs_info = NULL;
xfs_free_fname(mp);
kfree(mp);
}
@@ -1763,6 +1776,9 @@
struct super_block*sb,
struct shrink_control*sc)
{
+/* Paranoia: catch incorrect calls during mount setup or teardown */
+if (WARN_ON_ONCE(!sb->s_fs_info))
+return 0;
return xfs_reclaim_inodes_count(XFS_M(sb));
}

--- linux-4.15.0.orig/fs/xfs/xfs_sysfs.h
+++ linux-4.15.0/fs/xfs/xfs_sysfs.h
@@ -44,9 +44,11 @@
struct xfs_kobj*parent_kobj,
const char*name)
{
+struct kobject*parent;
+
+parent = parent_kobj ? &parent_kobj->kobject : NULL;
init_completion(&kobj->complete);
-return kobject_init_and_add(&kobj->kobject, ktype,
- &parent_kobj->kobject, "%s", name);
+return kobject_init_and_add(&kobj->kobject, ktype, parent, "%s", name);
}

static inline void
--- linux-4.15.0.orig/fs/xfs/xfs_trace.h
+++ linux-4.15.0/fs/xfs/xfs_trace.h
@@ -1477,7 +1477,7 @@
__entry->tlen);

-TRACE_EVENT(xfs_agf,
+DECLARE_EVENT_CLASS(xfs_agf_class,
TP_PROTO(struct xfs_mount *mp, struct xfs_agf *agf, int flags,
  unsigned long caller_ip),
TP_ARGS(mp, agf, flags, caller_ip),
@@ -1533,6 +1533,13 @@
  __entry->longest,
 (void *)__entry->caller_ip)
);
+#define DEFINE_AGF_EVENT(name) \
+DEFINE_EVENT(xfs_agf_class, name, \
+  TP_PROTO(struct xfs_mount *mp, struct xfs_agf *agf, int flags, \
+    unsigned long caller_ip), \
+  TP_ARGS(mp, agf, flags, caller_ip))
+DEFINE_AGF_EVENT(xfs_agf);
+DEFINE_AGF_EVENT(xfs_agfl_reset);

TRACE_EVENT(xfs_free_extent,
TP_PROTO(struct xfs_mount *mp, xfs_agnumber_t agno, xfs_agblock_t agbno,
--- linux-4.15.0.orig/fs/xfs/xfs_trans_dquot.c
+++ linux-4.15.0/fs/xfs/xfs_trans_dquot.c
@@ -669,7 +669,7 @@
 } }
 if (ninos > 0) {
-  total_count = be64_to_cpu(dqp->q_core.d_icount) + ninos;
+  total_count = dqp->q_res_icount + ninos;
  timer = be32_to_cpu(dqp->q_core.d_itimer);
  warns = be16_to_cpu(dqp->q_core.d_iwarns);
  warnlimit = dqp->q_mount->m_quotainfo->qi_iwarnlimit;
--- linux-4.15.0.orig/fs/xfs/xfs_trans_inode.c
+++ linux-4.15.0/fs/xfs/xfs_trans_inode.c
@@ -49,6 +49,7 @@
 ASSERT(iip->ili_lock_flags == 0);
 iip->ili_lock_flags = lock_flags;
+ASSERT(!xfs_iflags_test(ip, XFS_ISTALE));

/*
 * Get a log_item_desc to point at the new item.
 @@ -98,6 +99,7 @@
 } 
 ASSERT(ip->i_itemp != NULL);
 ASSERT(xfs_isilocked(ip, XFS_ILOCK_EXCL));
+ASSERT(!xfs_iflags_test(ip, XFS_ISTALE));
/*
 * Record the specific change for fdatasync optimisation. This
--- linux-4.15.0.orig/fs/xfs/xfs_xattr.c
+++ linux-4.15.0/fs/xfs/xfs_xattr.c
@@ -141,6 +141,9 @@
 char *offset;
 int arraytop;

 +if (context->count < 0 || context->seen_enough)
 +return;
 +
 if (!context->alist)
 goto compute_size;

--- linux-4.15.0.orig/include/acpi/acconfig.h
+++ linux-4.15.0/include/acpi/acconfig.h
@@ -123,7 +123,7 @@
 /* Maximum object reference count (detects object deletion issues) */

 -#define ACPI_MAX_REFERENCE_COUNT        0x1000
+#define ACPI_MAX_REFERENCE_COUNT        0x4000

 /* Default page size for use in mapping memory for operation regions */

--- linux-4.15.0.orig/include/acpi/acpi_bus.h
+++ linux-4.15.0/include/acpi/acpi_bus.h
@@ -212,7 +212,7 @@
 struct acpi_device_pnp {
     acpi_bus_id bus_id; /* Object name */
 +int instance_no; /* Instance number of this object */
     struct acpi_pnp_type type; /* ID type */
     acpi_bus_address bus_address; /* _ADR */
     char *unique_id; /* _UID */
     †@ @ -343,10 +344,16 †@
     bool put_online;1;
    
};

@@ -245,6 +245,7 @@

 struct acpi_device_pnp {
     acpi_bus_id bus_id; /* Object name */
 +int instance_no; /* Instance number of this object */
     struct acpi_pnp_type type; /* ID type */
     acpi_bus_address bus_address; /* _ADR */
     char *unique_id; /* _UID */
     †@ @ -343,10 +344,16 †@
     bool put_online;1;
    
};
+struct acpi_device_properties {
+const guid_t *guid;
+const union acpi_object *properties;
+struct list_head list;
+};
+
/* ACPI Device Specific Data (_DSD) */
struct acpi_device_data {
 const union acpi_object *pointer;
 -const union acpi_object *properties;
 +struct list_head properties;
 const union acpi_object *of_compatible;
 struct list_head subnodes;
};
@@ -619,7 +626,6 @@

 bool acpi_pm_device_can_wakeup(struct device *dev);
 int acpi_pm_device_sleep_state(struct device *, int *, int);
 int acpi_pm_set_device_wakeup(struct device *dev, bool enable);
 -int acpi_pm_set_bridge_wakeup(struct device *dev, bool enable);
 #else
 static inline void acpi_pm_wakeup_event(struct device *dev)
 {
 @@ -650,10 +656,6 @@
 return -ENODEV;
 }
 -static inline int acpi_pm_set_bridge_wakeup(struct device *dev, bool enable)
 -{
 -return -ENODEV;
 -}
 #endif

 #ifdef CONFIG_ACPI_SLEEP
 --- linux-4.15.0.org/include/acpi/actbl1.h
 +++ linux-4.15.0/include/acpi/actbl1.h
 @@ -1149,7 +1149,8 @@
 ACPI_NFIT_TYPE_CONTROL_REGION = 4,
 ACPI_NFIT_TYPE_DATA_REGION = 5,
 ACPI_NFIT_TYPE_FLUSH_ADDRESS = 6,
-ACPI_NFIT_TYPE_RESERVED = 7 /* 7 and greater are reserved */
+ACPI_NFIT_TYPE_CAPABILITIES = 7,
 +ACPI_NFIT_TYPE_RESERVED = 8 /* 8 and greater are reserved */
 };
 
 /*
 @@ -1281,6 +1282,69 @@
 u64 hint_address[1]; /* Variable length */
*/ 7: Platform Capabilities Structure */
+
+struct acpi_nfit_capabilities {
+struct acpi_nfit_header header;
+u8 highest_capability;
+u8 reserved[3];/* Reserved, must be zero */
+u32 capabilities;
+u32 reserved2;
+};
+
+/* Capabilities Flags */
+
+#define ACPI_NFIT_CAPABILITY_CACHE_FLUSH   (1)/* 00: Cache Flush to NVDIMM capable */
+#define ACPI_NFIT_CAPABILITY_MEM_FLUSH     (1<<1)/* 01: Memory Flush to NVDIMM capable */
+#define ACPI_NFIT_CAPABILITY_MEM_MIRRORING (1<<2)/* 02: Memory Mirroring capable */
+
+ /*
+ * NFIT/DVDIMM device handle support - used as the _ADR for each NVDIMM
+ */
+struct nfit_device_handle {
+u32 handle;
+};
+
+/* Device handle construction and extraction macros */
+
+#define ACPI_NFIT_DIMM_NUMBER_MASK          0x0000000F
+#define ACPI_NFIT_CHANNEL_NUMBER_MASK       0x000000F0
+#define ACPI_NFIT_MEMORY_ID_MASK            0x00000F00
+#define ACPI_NFIT_SOCKET_ID_MASK            0x0000F000
+#define ACPI_NFIT_NODE_ID_MASK              0xFFF0000
+
+#define ACPI_NFIT_DIMM_NUMBER_OFFSET        0
+#define ACPI_NFIT_CHANNEL_NUMBER_OFFSET     4
+#define ACPI_NFIT_MEMORY_ID_OFFSET          8
+#define ACPI_NFIT_SOCKET_ID_OFFSET          12
+#define ACPI_NFIT_NODE_ID_OFFSET            16
+
+/* Macro to construct a NFIT/NVDIMM device handle */
+
+#define ACPI_NFIT_BUILD_DEVICE_HANDLE(dimm, channel, memory, socket, node) \
+( ((dimm))                                         | \
+((channel)  << ACPI_NFIT_CHANNEL_NUMBER_OFFSET)  | \
+((memory)   << ACPI_NFIT_MEMORY_ID_OFFSET)       | \
+((socket)   << ACPI_NFIT_SOCKET_ID_OFFSET)       | \
+((node)     << ACPI_NFIT_NODE_ID_OFFSET))
/* Macros to extract individual fields from a NFIT/NVDIMM device handle */
+
+define ACPI_NFIT_GET_DIMM_NUMBER(handle) \
+((handle) & ACPI_NFIT_DIMM_NUMBER_MASK)
+
+define ACPI_NFIT_GET_CHANNEL_NUMBER(handle) \
+((handle) & ACPI_NFIT_CHANNEL_NUMBER_MASK) >> ACPI_NFIT_CHANNEL_NUMBER_OFFSET)
+
+define ACPI_NFIT_GET_MEMORY_ID(handle) \
+((handle) & ACPI_NFIT_MEMORY_ID_MASK) >> ACPI_NFIT_MEMORY_ID_OFFSET)
+
+define ACPI_NFIT_GET_SOCKET_ID(handle) \
+((handle) & ACPI_NFIT_SOCKET_ID_MASK) >> ACPI_NFIT_SOCKET_ID_OFFSET)
+
+define ACPI_NFIT_GET_NODE_ID(handle) \
+((handle) & ACPI_NFIT_NODE_ID_MASK) >> ACPI_NFIT_NODE_ID_OFFSET)
+
+*******************************************************************************
+* PDTT - Processor Debug Trigger Table (ACPI 6.2)
@example -1376.6 +1440.20 @@
+/* Attributes describing cache */
+define ACPI_PPTT_MASK_CACHE_TYPE_DATA (0x0)/* Cache line is allocated on read */
+define ACPI_PPTT_MASK_CACHE_TYPE_INSTR (1<<2)/* Instruction cache */
+define ACPI_PPTT_MASK_CACHE_TYPE_DATA (2<<2)/* Unified I & D cache */
+define ACPI_PPTT_MASK_CACHE_TYPE_DATA (3<<2)/* Alternate representation of above */
+
+define ACPI_PPTT_MASK_WRITE_POLICY (0x0)/* Data cache */
+define ACPI_PPTT_MASK_WRITE_POLICY (1<<4)/* Instruction cache */
+define ACPI_PPTT_MASK_WRITE_POLICY (2<<2)/* Unified I & D cache */
+define ACPI_PPTT_MASK_WRITE_POLICY (3<<2)/* Alternate representation of above */
+
+define ACPI_PPTT_MASK_CACHE_POLICY_WB (0x0)/* Cache is write back */
+define ACPI_PPTT_MASK_CACHE_POLICY_WT (0x1)/* Cache is write through */
+
/* 2: ID Structure */

struct acpi_pptt_id {
    --- linux-4.15.0.orig/include/acpi/actbl2.h
+++ linux-4.15.0/include/acpi/actbl2.h
@@ -810,6 +810,7 @@
        u8 pxm;
    u8 reserved1;
    u16 reserved2;
+    u32 id_mapping_index;
/* Values for Model field above */
--- linux-4.15.0.orig/include/acpi/actypes.h
+++ linux-4.15.0/include/acpi/actypes.h
@@ -556,11 +556,12 @@
#define ACPI_MAKE_RSDP_SIG(dest)        (memcpy (ACPI_CAST_PTR (char, (dest)), ACPI_SIG_RSDP, 8))
*/

/* Algorithm to obtain access bit width. */
+#define ACPI_ACCESS_BIT_WIDTH(size) (1 << ((size) + 2))
+#define ACPI_ACCESS_BYTE_WIDTH(size) (1 << ((size) - 1))

/* Algorithm to obtain access bit or byte width. */
Can be used with access_width of struct acpi_generic_address and access_size of
* struct acpi_resource_generic_register.
*/
--- linux-4.15.0.orig/include/acpi/processor.h
+++ linux-4.15.0/include/acpi/processor.h
@@ -291,6 +291,14 @@
}
@endif

+static inline int call_on_cpu(int cpu, long (*fn)(void *), void *arg,
+    bool direct)
+{
+  if (direct || (is_percpu_thread() && &cpu == smp_processor_id()))
+    return fn(arg);
+  return work_on_cpu(cpu, fn, arg);
+}
+
+/* in processor_perflib.c */

#ifdef CONFIG_CPU_FREQ
--- linux-4.15.0.orig/include/asm-generic/4level-fixup.h
+++ linux-4.15.0/include/asm-generic/4level-fixup.h
@@ -3,7 +3,7 @@
#define _4LEVEL_FIXUP_H
#define __ARCH_HAS_4LEVEL_HACK
-#define __PAGETABLE_PUD_FOLDED
+#define __PAGETABLE_PUD_FOLDED 1
#define PUD_SHIFT			PGDIR_SHIFT
#define PUD_SIZE			PGDIR_SIZE
--- linux-4.15.0.orig/include/asm-generic/5level-fixup.h

#define __ARCH_HAS_4LEVEL_HACK
-#define __PAGETABLE_PUD_FOLDED
+#define __PAGETABLE_PUD_FOLDED 1
#define PUD_SHIFTPGDIR_SHIFT
#define PUD_SIZEPGDIR_SIZE
--- linux-4.15.0.orig/include/asm-generic/5level-fixup.h

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```c
#define __ARCH_HAS_5LEVEL_H
#define __PAGETABLE_P4D_FOLDED
#define __PAGETABLE_P4D_FOLDED 1
#define P4D_SHIFT			PGDIR_SHIFT
#define P4D_SIZE			PGDIR_SIZE

/*
 * smp_cond_load_acquire() - (Spin) wait for cond with ACQUIRE ordering
 * @ptr: pointer to the variable to wait on
 * @cond: boolean expression to wait for
 * * Equivalent to using smp_load_acquire() on the condition variable but employs
 * the control dependency of the wait to reduce the barrier on many platforms.
 * * Equivalent to using READ_ONCE() on the condition variable.
 * * Due to C lacking lambda expressions we load the value of *ptr into a
 * pre-named variable @VAL to be used in @cond.
 */
#endif smpl_cond_load_acquire
#define smpl_cond_load_acquire(ptr, cond_expr) ({
    typeof(ptr) __PTR = (ptr);
    typeof(*ptr) VAL;
    for (;;) {
    break;
    }\}
```
```
cpu_relax();
}\
-smp_acquire__after_ctrl_dep();
VAL;\
})
#endif

/**
 * smp_cond_load_acquire() - (Spin) wait for cond with ACQUIRE ordering
 * @ptr: pointer to the variable to wait on
 * @cond: boolean expression to wait for
 *
 * Equivalent to using smp_load_acquire() on the condition variable but employs
 * the control dependency of the wait to reduce the barrier on many platforms.
 */
#ifndef smp_cond_load_acquire
#define smp_cond_load_acquire(ptr, cond_expr) ({
  typeof(*ptr) _val;
  _val = smp_cond_load_relaxed(ptr, cond_expr);
  smp_acquire__after_ctrl_dep();
  _val;
})
#endif
#endif /* !__ASSEMBLY__ */
#endif /* __ASM_GENERIC_BARRIER_H */
--- linux-4.15.0.orig/include/asm-generic/bug.h
+++ linux-4.15.0/include/asm-generic/bug.h
@@ -52,6 +52,7 @@
 #ifndef HAVE_ARCH_BUG
 #define BUG() do { 
   printk("BUG: failure at %s:%d/%s()!
", __FILE__, __LINE__, __func__); 
+   barrier_before_unreachable(); 
   panic("BUG!"); 
 } while (0)
#endif
@@ -93,8 +94,10 @@
 warn_slowpath_fmt_taint(__FILE__, __LINE__, taint, arg)
 #else
 extern __printf(1, 2) void __warn_printk(const char *fmt, ...);
-#define __WARN() __WARN_TAINT(TAINT_WARN)
-#define __WARN_printf(arg...) do { __warn_printk(arg); __WARN(); } while (0)
+#define __WARN() do { 
+  printk(KERN_WARNING CUT_HERE); __WARN_TAINT(TAINT_WARN); 
+  __warn_printk(arg...); __WARN_TAINT(taint); __WARN_TAINT(taint); 
 } while (0)
+#define __WARN_printf(arg...) __WARN_printf_taint(TAINT_WARN, arg)
#define __WARN_printf_taint(taint, arg...)				
do { __warn_printk(arg); __WARN_TAINT(taint); } while (0)
```
# endif
--- linux-4.15.0.orig/include/asm-generic/futex.h
+++ linux-4.15.0/include/asm-generic/futex.h
@@ -23,7 +23,9 @@
 *
 * Return:
 * 0 - On success
- * <0 - On error
+ * -EFAULT - User access resulted in a page fault
+ * -EAGAIN - Atomic operation was unable to complete due to contention
+ * -ENOSYS - Operation not supported
 */
static inline int
arch_futex_atomic_op_inuser(int op, u32 oparg, int *oval, u32 __user *uaddr)
@@ -85,7 +87,9 @@ *
 *
 * Return:
 * 0 - On success
- * <0 - On error
+ * -EFAULT - User access resulted in a page fault
+ * -EAGAIN - Atomic operation was unable to complete due to contention
+ * -ENOSYS - Function not implemented (only if !HAVE_FUTEX_CMPXCHG)
 */
static inline int
futex_atomic_cmpxchg_inatomic(u32 *uval, u32 __user *uaddr,
--- linux-4.15.0.orig/include/asm-generic/getorder.h
+++ linux-4.15.0/include/asm-generic/getorder.h
@@ -7,24 +7,6 @@
#include <linux/compiler.h>
#include <linux/log2.h>
/*
- * Runtime evaluation of get_order()
- */
-*/
-static inline __attribute_const__
-int __get_order(unsigned long size)
-{ 
- int order;
-
- size--;
- size >>= PAGE_SHIFT;
- #if BITS_PER_LONG == 32
- order = fls(size);
- #else
- order = fls64(size);
- #endif
- return order;
-}
/**
 * get_order - Determine the allocation order of a memory size
 * @size: The size for which to get the order
 * to hold an object of the specified size.
 * The result is undefined if the size is 0.
 * This function may be used to initialise variables with compile time
 * evaluations of constants.
 */
#define get_order(n)
-(_builtin_constant_p(n) ? (
-((n) == 0UL) ? BITS_PER_LONG - PAGE_SHIFT :
-(((n) < (1UL << PAGE_SHIFT)) ? 0 :
- ilog2((n) - 1) - PAGE_SHIFT + 1)
-) :
-__get_order(n)
-)
+
+static inline __attribute_const__ int get_order(unsigned long size)
+{
+if (__builtin_constant_p(size)) {
+if (!size)
+return BITS_PER_LONG - PAGE_SHIFT;
+
+if (size < (1UL << PAGE_SHIFT))
+return 0;
+
+return ilog2((size) - 1) - PAGE_SHIFT + 1;
+
+
+size--; 
+size >>= PAGE_SHIFT;
+#if BITS_PER_LONG == 32
+return fls(size);
+#else
+return fls64(size);
+#endif
+
+
+#endif/* __ASSEMBLY__ */

--- linux-4.15.0.orig/include/asm-generic/io.h
+++ linux-4.15.0/include/asm-generic/io.h
@@ -351,6 +351,8 @@
#define IO_SPACE_LIMIT 0xffff
#ifndef __ASSEMBLY__
#include <asm-generic/pgtable-nop4d-hack.h>
#else
++
#endif

--- linux-4.15.0.orig/include/asm-generic/pgtable-nopmd.h
+++ linux-4.15.0/include/asm-generic/pgtable-nopmd.h
@@ -8,7 +8,7 @@

typedef struct { pgd_t pgd; } p4d_t;

--- linux-4.15.0.orig/include/asm-generic/pgtable-nopmd.h
+++ linux-4.15.0/include/asm-generic/pgtable-nopmd.h
@@ -8,7 +8,7 @@

struct mm_struct;

--- linux-4.15.0.orig/include/asm-generic/pgtable-nopmd.h
+++ linux-4.15.0/include/asm-generic/pgtable-nopmd.h
@@ -8,7 +8,7 @@

-#define __PAGETABLE_PMD_FOLDED
+#define __PAGETABLE_PMD_FOLDED 1
/*
 * Having the pmd type consist of a pud gets the size right, and allows
--- linux-4.15.0.orig/include/asm-generic/pgtable-nopud.h
+++ linux-4.15.0/include/asm-generic/pgtable-nopud.h
@@ -9,7 +9,7 @@
 #else
 #include <asm-generic/pgtable-nop4d.h>

-#define __PAGETABLE_PUD_FOLDED
+#define __PAGETABLE_PUD_FOLDED 1

/*
 * Having the pud type consist of a p4d gets the size right, and allows
--- linux-4.15.0.orig/include/asm-generic/pgtable.h
+++ linux-4.15.0/include/asm-generic/pgtable.h
@@ -309,6 +309,21 @@
 extern pgtable_t pgtable_trans_huge_withdraw(struct mm_struct *mm, pmd_t *pmdp);
 #endif

+#ifdef CONFIG_TRANSPARENT_HUGEPAGE
+/*
+ * This is an implementation of pmdp_establish() that is only suitable for an
+ * architecture that doesn't have hardware dirty/accessed bits. In this case we
+ * can't race with CPU which sets these bits and non-atomic aproach is fine.
+ */
+static inline pmd_t generic_pmdp_establish(struct vm_area_struct *vma,
+unsigned long address, pmd_t *pmdp, pmd_t pmd)
+{
+  pmd_t old_pmd = *pmdp;
+  set_pmd_at(vma->vm_mm, address, pmdp, pmd);
+  return old_pmd;
+}
+#endif

#ifndef __HAVE_ARCH_PMDP_INVALIDATE
extern void pmdp_invalidate(struct vm_area_struct *vma, unsigned long address,
pmd_t *pmdp);
@@ -976,6 +991,8 @@
int pmd_set_huge(pmd_t *pmd, phys_addr_t addr, pgprot_t prot);
int pud_clear_huge(pud_t *pud);
int pmd_clear_huge(pmd_t *pmd);
+int pud_free_pmd_page(pud_t *pud, unsigned long addr);
+int pmd_free_pte_page(pmd_t *pmd, unsigned long addr);
#else /* !CONFIG_HAVE_ARCH_HUGE_VMAP */
static inline int p4d_set_huge(p4d_t *p4d, phys_addr_t addr, pgprot_t prot)
{ 
@@ -1001,6 +1018,14 @@

return 0;
}
+
static inline int pud_free_pmd_page(pud_t *pud, unsigned long addr)
+
static inline int pmd_free_pte_page(pmd_t *pmd, unsigned long addr)
+
#endif /* CONFIG_HAVE_ARCH_HUGE_VMAP */

#ifndef __HAVE_ARCH_FLUSH_PMD_TLB_RANGE
@@ -1030,11 +1055,19 @@
static inline void init_espfix_bsp(void) { }
#endif

#ifndef __ASSEMBLY__
+#ifdef __HAVE_ARCH_PFN_MODIFY_ALLOWED
+static inline bool pfn_modify_allowed(unsigned long pfn, pgprot_t prot)
+static inline bool arch_has_pfn_modify_check(void)
+#endif /* !_HAVE_ARCH_PFN_MODIFY_ALLOWED */
+#endif /* !__ASSEMBLY__ */

#ifndef has_transparent_hugepage
#endif
#endif

+#ifndef mm_p4d_folded
+#define mm_p4d_folded(mm)	__is_defined(__PAGETABLE_P4D_FOLDED)
+#endif

/*
 * On some architectures it depends on the mm if the p4d/pud or pmd
 * layer of the page table hierarchy is folded or not.
 */
+#ifndef mm_p4d_folded
+#define mm_p4d_folded(mm)__is_defined(__PAGETABLE_P4D_FOLDED)
+#endif

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typedef struct qspinlock {
    atomic_t val;
    union {
        atomic_t _val;
    }
};

/* By using the whole 2nd least significant byte for the pending bit, we can allow better optimization of the lock acquisition for the pending bit holder. */
#ifdef __LITTLE_ENDIAN
    struct {
        u8 locked;
        u8 pending;
    };
    struct {
        u16 locked_pending;
        u16 tail;
    };
#else
    struct {
        u16 tail;
        u16 locked_pending;
    };
    struct {
        u8 reserved[2];
        u8 pending;
        u8 locked;
    };
#endif
#elifdef
#elifdef
#endif /* _ASM_GENERIC_PGTABLE_H */
/*
 * Initializer
 */
#define __ARCH_SPIN_LOCK_UNLOCKED { ATOMIC_INIT(0) }
+
#define __ARCH_SPIN_LOCK_UNLOCKED { { .val = ATOMIC_INIT(0) } }

/*
 * Bitfields in the atomic value:
--- linux-4.15.0.orig/include/asm-generic/tpb.h
+++ linux-4.15.0/include/asm-generic/tpb.h
@@ -15,6 +15,7 @@
#endif _ASM_GENERIC__TLB_H
#define _ASM_GENERIC__TLB_H
#include <linux/mmu_notifier.h>
#include <linux/swap.h>
#include <asm/pgalloc.h>
#include <asm/tpbflush.h>
@@ -117,6 +118,8 @@
void tlb_flush_mmu(struct mmu_gather *tlb);
void arch_tlb_finish_mmu(struct mmu_gather *tlb,
    unsigned long start, unsigned long end, bool force);
+void tlb_flush_pmd_range(struct mmu_gather *tlb, unsigned long address,
+    unsigned long size);
extern bool __tlb_remove_page_size(struct mmu_gather *tlb, struct page *page,
    int page_size);

@@ -138,6 +141,16 @@
} __tlb_end_vma(tlb, vma)
    do {
    __tlb_end_vma(tlb, vma)

+static inline void tlb_flush_mmu_tlbonly(struct mmu_gather *tlb)
+{
+    if (!tlb->end)
+        return;
+    tlb_flush(tlb);
+    mmu_notifier_invalidate_range(tlb->mm, tlb->start, tlb->end);
+    __tlb_reset_range(tlb);
+}
+
+static inline void tlb_remove_page_size(struct mmu_gather *tlb,
    struct page *page, int page_size)
{
    __tlb_end_vma(tlb, vma)
#define __tlb_end_vma(tlb, vma)\do {

-if (!tlb->fullmm && tlb->end) {
  tlb_flush(tlb);
  __tlb_reset_range(tlb);
-}
+if (!tlb->fullmm)
  tlb_flush_mmu_tlbonly(tlb);
} while (0)

#ifndef tlb_end_vma
--- linux-4.15.0.orig/include/asm-generic/topology.h
+++ linux-4.15.0/include/asm-generic/topology.h
@@ -48,7 +48,7 @@
#ifdef CONFIG_NEED_MULTIPLE_NODES
 #define cpumask_of_node(node)((node) == 0 ? cpu_online_mask : cpu_none_mask)
#else
- #define cpumask_of_node(node)((void)node, cpu_online_mask)
+ #define cpumask_of_node(node)((void)(node), cpu_online_mask)
#endif
#endif
#ifndef pcibus_to_node
--- linux-4.15.0.orig/include/asm-generic/vmlinux.lds.h
+++ linux-4.15.0/include/asm-generic/vmlinux.lds.h
@@ -170,7 +170,7 @@
#endif
#ifdef CONFIG_SERIAL_EARLYCON
-#define EARLYCON_TABLE() STRUCT_ALIGN();
+#define EARLYCON_TABLE() . = ALIGN(8);
 VMLINUX_SYMBOL(__earlycon_table) = .;
 KEEP(*(__earlycon_table))
 VMLINUX_SYMBOL(__earlycon_table_end) = .;
@@ -254,7 +254,8 @@
 */

#define PAGE_ALIGNED_DATA(page_align)
 . = ALIGN(page_align);
-.*(data..page_aligned)
+.*(data..page_aligned)
+ . = ALIGN(page_align);

#define READ_MOSTLY_DATA(align)
 . = ALIGN(align);
@@ -277,6 +278,7 @@
 */
#endif RO_AFTER_INIT_DATA
#define RO_AFTER_INIT_DATA
+. = ALIGN(8);
 VMLINUX_SYMBOL(__start_ro_after_init) = .;
 *(data..ro_after_init)
VMLINUX_SYMBOL(__end_ro_after_init) = .;
@@ -332,7 +334,7 @@
     
 /* Built-in firmware blobs */
-	.builtin_fw        : AT(ADDR(.builtin_fw) - LOAD_OFFSET) {
+	.builtin_fw : AT(ADDR(.builtin_fw) - LOAD_OFFSET) ALIGN(8) {
     VMLINUX_SYMBOL(__start_builtin_fw) = .;
     KEEP(*(.builtin_fw))
     VMLINUX_SYMBOL(__end_builtin_fw) = .;
@@ -461,9 +463,13 @@
     *
     #define TEXT_TEXT
     ALIGN_FUNCTION();
-	-*(.text.hot TEXT_MAIN .text.fixup .text.unlikely))
+	-*(.text.hot .text.hot.*)
+	-*(TEXT_MAIN .text.fixup)
+	-*(.text.unlikely .text.unlikely.*)
+	-*(.text.unknown .text.unknown.*)
     *(.text..refcount)
     *(.ref.text)
     *(.text.asan.* .text.tsan.*)
     MEM_KEEP(init.text))
     MEM_KEEP(exit.text))
@@ -622,7 +628,9 @@
 . = ALIGN(bss_align);
 .bss : AT(ADDR(bss) - LOAD_OFFSET) {
 BSS_FIRST_SECTIONS
-	+. = ALIGN(PAGE_SIZE);
+	+. = ALIGN(PAGE_SIZE);
 *(.bss..page_aligned)
+	+. = ALIGN(PAGE_SIZE);
 *(.dynbss)
 *(BSS_MAIN)
 *(COMMON)
@@ -666,8 +674,13 @@
 /* DWARF 4 */
 .debug_types0 : { *(.debug_types) }
 /* DWARF 5 */
+	+.debug_addr0 : { *(.debug_addr) }
+	+.debug_line_str0 : { *(.debug_line_str) }
+	+.debug_loclists0 : { *(.debug_loclists) }
+	+.debug_macro0 : { *(.debug_macro) }
-	-.debug_addr0 : { *(.debug_addr) }
+	+.debug_names0 : { *(.debug_names) }
+	+.debug_rnglists0 : { *(.debug_rnglists) }
+	+.debug_str_offsets0 : { *(.debug_str_offsets) }
/* Stabs debugging sections. */
#define STABS_DEBUG
@@ -699,7 +712,7 @@
- . = ALIGN(6);
+ . = ALIGN(2);
.orc_unwind : AT(ADDR(.orc_unwind) - LOAD_OFFSET) {\nVMLINUX_SYMBOL(__stop_orc_unwind_ip) = .;\nKEEP(*(.orc_unwind_ip))\n@@ -792,6 +805,7 @@
<stdio
#define PERCPU_DECRYPTED_SECTION
. = ALIGN(PAGE_SIZE);
+*.data..decrypted)
+*(.data..percpu..decrypted)
. = ALIGN(PAGE_SIZE);
#else
--- linux-4.15.0.orig/include/crypto/acompress.h
+++ linux-4.15.0/include/crypto/acompress.h
@ @ -152,6 +152,8 @@
 * crypto_free_acomp() -- free ACOMPRESS tfm handle
 *
 * @tfm: ACOMPRESS tfm handle allocated with crypto_alloc_acomp()
+ *
+ * If @tfm is a NULL or error pointer, this function does nothing.
+ */
static inline void crypto_free_acomp(struct crypto_acomp *tfm)
{
--- linux-4.15.0.orig/include/crypto/acompress.h
+++ linux-4.15.0/include/crypto/acompress.h
@ @ -152,6 +152,8 @@
 **
 * crypto_free_aead() - zeroize and free aead handle
 *
@tfm: cipher handle to be freed
+ *
+ * If @tfm is a NULL or error pointer, this function does nothing.
+ */
static inline void crypto_free_aead(struct crypto_aead *tfm)
{
--- linux-4.15.0.orig/include/crypto/aead.h
+++ linux-4.15.0/include/crypto/aead.h
@ @ -152,6 +152,8 @@
 **
 + crypto_free_aead() - free ACOMPRESS tfm handle
+ *
+ * If @tfm is a NULL or error pointer, this function does nothing.
+ */
static inline void crypto_free_aead(struct crypto_aead *tfm)
{
--- linux-4.15.0.orig/include/crypto/akcipher.h
+++ linux-4.15.0/include/crypto/akcipher.h
@ @ -152,6 +152,8 @@
 * crypto_free_akcipher() - free AKCIPHER tfm handle
 *
 * @tfm: AKCIPHER tfm handle allocated with crypto_alloc_akcipher()
+ *
static inline void crypto_free_ahash(struct crypto_ahash *tfm)
{
  int crypto_ahash_setkey(struct crypto_ahash *tfm, const u8 *key,
  unsigned int keylen);
}

static inline void crypto_free_akcipher(struct crypto_akcipher *tfm)
{
  unsigned int reqsize;
  bool has_setkey;
  struct crypto_tfm base;
};

static inline bool crypto_ahash_has_setkey(struct crypto_ahash *tfm)
{
  return tfm->has_setkey;
}

static inline int crypto_ahash_import(struct ahash_request *req, const void *in)
{
  return crypto_ahash_reqtfm(req)->import(req, in);
}
static inline int crypto_ahash_init(struct ahash_request *req)
{
    return crypto_ahash_reqtfm(req)->init(req);
}

static inline void crypto_free_shash(struct crypto_shash *tfm)
{
    if (crypto_shash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
        return -ENOKEY;
    return crypto_shash_alg(tfm)->import((struct crypto_shash_alg *)tfm, in);
}

static inline int crypto_shash_init(struct shash_desc *desc)
{
    return crypto_shash_alg(desc->tfm)->init(desc);
}

static inline int crypto_ahash_init(struct ahash_request *req)
{
    return crypto_ahash_reqtfm(req)->init(req);
}

static inline void crypto_free_shash(struct crypto_shash *tfm)
{
    if (crypto_shash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
        return -ENOKEY;
    return crypto_shash_alg(tfm)->import(desc, in);
}

static inline int crypto_shash_init(struct shash_desc *desc)
{
    return crypto_shash_alg(desc->tfm)->init(desc);
}

static inline int crypto_ahash_init(struct ahash_request *req)
{
    return crypto_ahash_reqtfm(req)->init(req);
}

static inline void crypto_free_shash(struct crypto_shash *tfm)
{
    if (crypto_shash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
        return -ENOKEY;
    return crypto_shash_alg(tfm)->import(desc, in);
}

static inline int crypto_shash_init(struct shash_desc *desc)
{
    return crypto_shash_alg(desc->tfm)->init(desc);
}

static inline int crypto_ahash_init(struct ahash_request *req)
{
    return crypto_ahash_reqtfm(req)->init(req);
}

static inline void crypto_free_shash(struct crypto_shash *tfm)
{
    if (crypto_shash_get_flags(tfm) & CRYPTO_TFM_NEED_KEY)
        return -ENOKEY;
    return crypto_shash_alg(tfm)->import(desc, in);
}

static inline int crypto_shash_init(struct shash_desc *desc)
{
    return crypto_shash_alg(desc->tfm)->init(desc);
}
+return crypto_sha_hash_alg(tfm)->init(desc);
}

/**
 * --- linux-4.15.0.orig/include/crypto/if_alg.h
 * +++ linux-4.15.0/include/crypto/if_alg.h
 * @@ -34,8 +34,8 @@
 * struct sock *parent;

 -unsigned int refcnt;
 -unsigned int nokey_refcnt;
 +atomic_t refcnt;
 +atomic_t nokey_refcnt;

 const struct af_alg_type *type;
 void *private;
 * --- linux-4.15.0.orig/include/crypto/internal/hash.h
 * +++ linux-4.15.0/include/crypto/internal/hash.h
 * @@ -82,13 +82,9 @@
 * struct ahash_instance *inst);
 * void ahash_free_instance(struct crypto_instance *inst);

 -int sha_hash_no_setkey(struct crypto_sha_hash *tfm, const u8 *key,
 - unsigned int keylen);
 +bool crypto_sha_hash_alg_has_setkey(struct sha_hash_alg *alg);

 -static inline bool crypto_sha_hash_alg_has_setkey(struct sha_hash_alg *alg)
 -{
 -return alg->setkey != sha_hash_no_setkey;
 -}
 +bool crypto_hash_alg_has_setkey(struct hash_alg_common *halg);

 int crypto_init_ahash_spawn(struct crypto_ahash_spawn *spawn,
  struct hash_alg_common *alg,
 * --- linux-4.15.0.orig/include/crypto/kpp.h
 * +++ linux-4.15.0/include/crypto/kpp.h
 * @@ -159,6 +159,8 @@
 * @tfm: KPP tfm handle allocated with crypto_alloc_kpp()
 * * crypto_free_kpp() - free KPP tfm handle
 * *
 * @tfm: KPP tfm handle allocated with crypto_alloc_kpp()
 *+
 *+ If @tfm is a NULL or error pointer, this function does nothing.
 */
 static inline void crypto_free_kpp(struct crypto_kpp *tfm)
 {
 * --- linux-4.15.0.orig/include/crypto/poly1305.h
 * +++ linux-4.15.0/include/crypto/poly1305.h

int crypto_poly1305_init(struct shash_desc *desc);
-int crypto_poly1305_setkey(struct crypto_shash *tfm,
   - const u8 *key, unsigned int keylen);
unsigned int crypto_poly1305_setdesckey(struct poly1305_desc_ctx *dctx,
   const u8 *src, unsigned int srclen);
int crypto_poly1305_update(struct shash_desc *desc,
--- linux-4.15.0.orig/include/crypto/public_key.h
+++ linux-4.15.0/include/crypto/public_key.h
@@ -35,9 +35,9 @@
    struct public_key_signature {
        struct asymmetric_key_id *auth_ids[2];
        u8 *s; /* Signature */
-u32 s_size; /* Number of bytes in signature */
-u8 *digest;
-u8 digest_size; /* Number of bytes in digest */
+u32 s_size; /* Number of bytes in signature */
+u32 digest_size; /* Number of bytes in digest */
    const char *pkey_algo;
    const char *hash_algo;
    
--- linux-4.15.0.orig/include/crypto/rng.h
+++ linux-4.15.0/include/crypto/rng.h
@@ -116,6 +116,8 @@
** *
static inline void crypto_free_rng(void *)
{
--- linux-4.15.0.orig/include/crypto/skcipher.h
+++ linux-4.15.0/include/crypto/skcipher.h
@@ -206,6 +206,8 @@
** *
static inline void crypto_free_skcipher(void *)
{
--- linux-4.15.0.orig/include/drm/drm_atomic.h
+++ linux-4.15.0/include/drm/drm_atomic.h
@@ -134,6 +134,15 @@
* &drm_pending_vblank_event pointer to clean up private events.
*/
struct drm_pending_vblank_event *event;
+
+/**
+ * @abort_completion:
+ *
+ * A flag that's set after drm_atomic_helper_setup_commit takes a second
+ * reference for the completion of $drm_crtc_state.event. It's used by
+ * the free code to remove the second reference if commit fails.
+ */
+bool abort_completion;
};

struct __drm_planes_state {
    struct __drm_crtcs_state {
        struct __drm_crtcs_state { /* ... */
            struct drm_crtc *ptr;
            struct drm_crtc_state *state, *old_state, *new_state;
            +
            +/**
            + * @commit:
            + *
            + * A reference to the CRTC commit object that is kept for use by
            + * drm_atomic_helper_wait_for_flip_done() after
            + * drm_atomic_helper_commit_hw_done() is called. This ensures that a
            + * concurrent commit won't free a commit object that is still in use.
            + */
            +struct drm_crtc_commit *commit;
            +
            +s32 __user *out_fence_ptr;
            +
        }
        unsigned last_vblank_count;
    }
};

--- linux-4.15.0.orig/include/drm/drm_cache.h
+++ linux-4.15.0/include/drm/drm_cache.h
@@ -45,6 +45,24 @@
     return false;
 #elif defined(CONFIG_MIPS) && defined(CONFIG_CPU_LOONGSON3)
     return false;
+  #elif defined(CONFIG_ARM) || defined(CONFIG_ARM64)
+    /*
+     * The DRM driver stack is designed to work with cache coherent devices
+     * only, but permits an optimization to be enabled in some cases, where
+     * for some buffers, both the CPU and the GPU use uncached mappings,
+     * removing the need for DMA snooping and allocation in the CPU caches.
+     */
+    +
+    */
     +#elif defined(CONFIG_ARM) || defined(CONFIG_ARM64)
     +/
     */
     */
     */
};

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will use cached mappings nonetheless. On x86 platforms, this does not
seem to matter, as uncached CPU mappings will snoop the caches in any
case. However, on ARM and arm64, enabling this optimization on a
platform where NoSnoop is ignored results in loss of coherency, which
breaks correct operation of the device. Since we have no way of
detecting whether NoSnoop works or not, just disable this
optimization entirely for ARM and arm64.

*/

return false;
#else
return true;
#endif
--- linux-4.15.0.orig/include/drm/drm_crtc_helper.h
+++ linux-4.15.0/include/drm/drm_crtc_helper.h
@@ -77,5 +77,6 @@
void drm_kms_helper_poll_disable(struct drm_device *dev);
void drm_kms_helper_poll_enable(struct drm_device *dev);
+bool drm_kms_helper_is_poll_worker(void);

@end
--- linux-4.15.0.orig/include/drm/drm_debugfs_crc.h
+++ linux-4.15.0/include/drm/drm_debugfs_crc.h
@@ -43,6 +43,7 @@
 * @lock: protects the fields in this struct
 * @source: name of the currently configured source of CRCs
 * @opened: whether userspace has opened the data file for reading
+ * @overflow: whether an overflow occurred.
 * @entries: array of entries, with size of %DRM_CRC_ENTRIES_NR
 * @head: head of circular queue
 * @tail: tail of circular queue
@@ -52,7 +53,7 @@
struct drm_crtc_crc {
    spinlock_t lock;
    const char *source;
-    bool opened;
+    bool opened, overflow;
    struct drm_crtc_crc_entry *entries;
    int head, tail;
    size_t values_cnt;
--- linux-4.15.0.orig/include/drm/drm_device.h
+++ linux-4.15.0/include/drm/drm_device.h
@@ -146,7 +146,13 @@
 * races and imprecision over longer time periods, hence exposing a
 * hardware vblank counter is always recommended.
 *
- * If non-zeor, &drm_crtc_funcs.get_vblank_counter must be set.
+ * This is the statically configured device wide maximum. The driver
+ * can instead choose to use a runtime configurable per-crtc value
+ * &drm_vblank_crtc.max_vblank_count, in which case @max_vblank_count
+ * must be left at zero. See drm_crtc_set_max_vblank_count() on how
+ * to use the per-crtc value.
+ *
+ * If non-zero, &drm_crtc_funcs.get_vblank_counter must be set.
+ */

u32 max_vblank_count; /**< size of vblank counter register */

--- linux-4.15.0.orig/include/drm/drm_displayid.h
+++ linux-4.15.0/include/drm/drm_displayid.h
@@ -40,6 +40,7 @@
#define DATA_BLOCK_DISPLAY_INTERFACE 0x0f
#define DATA_BLOCK_STEREO_DISPLAY_INTERFACE 0x10
#define DATA_BLOCK_TILED_DISPLAY 0x12
+#define DATA_BLOCK_CTA 0x81

#define DATA_BLOCK_VENDOR_SPECIFIC 0x7f

@@ -90,4 +91,13 @@
struct displayid_block base;
struct displayid_detailed_timings_1 timings[0];
};
+
+#define for_each_displayid_db(displayid, block, idx, length) \
+for ((block) = (struct displayid_block *)&(displayid)[idx]; \
+     (idx) + sizeof(struct displayid_block) <= (length) && \
+     (idx) + sizeof(struct displayid_block) + (block)->num_bytes <= (length) && \
+     (block)->num_bytes > 0; \
+     (idx) += (block)->num_bytes + sizeof(struct displayid_block), \
+     (block) = (struct displayid_block *)&(displayid)[idx])
+
@endif

--- linux-4.15.0.orig/include/drm/drm_dp_helper.h
+++ linux-4.15.0/include/drm/drm_dp_helper.h
@@ -453,6 +453,7 @@
#define DP_ADAPTER_CTRL			    0x1a0
#define DP_ADAPTER_CTRL_FORCE_LOAD_SENSE   (1 << 0)
--- linux-4.15.0.orig/include/drm/drm_dp_mst_helper.h
+++ linux-4.15.0/include/drm/drm_dp_mst_helper.h
@@ -313,7 +313,7 @@
]+
struct drm_dp_query_payload_ack_reply {

#define DP_PSR_FRAME_CAPTURE		    (1 << 3)
#define DP_PSR_SELECTIVE_UPDATE	    (1 << 4)
#define DP_PSR_IRQ_HPD_WITH_CRC_ERRORS	    (1 << 5)
+#define DP_PSR_ENABLE_PSR2		    (1 << 6) /* eDP 1.4a */
#define DP_ADAPTER_CTRL			    0x1a0
#define DP_ADAPTER_CTRL_FORCE_LOAD_SENSE	    (1 << 0)
--- linux-4.15.0.orig/include/drm/drm_dp_mst_helper.h
+++ linux-4.15.0/include/drm/drm_dp_mst_helper.h
@@ -313,7 +313,7 @@
]+
struct drm_dp_query_payload_ack_reply {
u8 port_number;
-u8 allocated_pbn;
+u16 allocated_pbn;
};

struct drm_dp_sideband_msg_req_body {
--- linux-4.15.0.orig/include/drm/drm_drv.h
+++ linux-4.15.0/include/drm/drm_drv.h
@@ -55,6 +55,7 @@
#define DRIVER_ATOMIC			0x10000
#define DRIVER_KMS_LEGACY_CONTEXT 0x20000
#define DRIVER_SYNCOBJ 0x40000
+#define DRIVER_PREFER_XBGR_30BPP 0x80000

/**
 * struct drm_driver - DRM driver structure
--- linux-4.15.0.orig/include/drm/drm_edid.h
+++ linux-4.15.0/include/drm/drm_edid.h
@@ -214,9 +214,9 @@
#define DRM_EDID_HDMI_DC_Y444 (1 << 3)

/* YCBCR 420 deep color modes */
-#define DRM_EDID_YCBCR420_DC_48 (1 << 6)
-#define DRM_EDID_YCBCR420_DC_36 (1 << 5)
-#define DRM_EDID_YCBCR420_DC_30 (1 << 4)
+#define DRM_EDID_YCBCR420_DC_48 (1 << 2)
+#define DRM_EDID_YCBCR420_DC_36 (1 << 1)
+#define DRM_EDID_YCBCR420_DC_30 (1 << 0)
#define DRM_EDID_YCBCR420_DC_MASK (DRM_EDID_YCBCR420_DC_48 |
  DRM_EDID_YCBCR420_DC_36 |
  DRM_EDID_YCBCR420_DC_30)
--- linux-4.15.0.orig/include/drm/drm_ioctl.h
+++ linux-4.15.0/include/drm/drm_ioctl.h
@@ -68,6 +68,7 @@
unsigned long arg);
#define DRM_IOCTL_NR(n) _IOC_NR(n)
+#define DRM_IOCTL_TYPE(n) _IOC_TYPE(n)
#define DRM_MAJOR 226

/**
 * current one with the new plane configurations in the new
 * plane_state.
 * + * Drivers should also swap the framebuffers between current plane
* state (&drm_plane.state) and new_state.
* This is required since cleanup for async commits is performed on
* the new state, rather than old state like for traditional commits.
* Since we want to give up the reference on the current (old) fb
* instead of our brand new one, swap them in the driver during the
* async commit.
+ *
* FIXME:
* - It only works for single plane updates
* - Async Pageflips are not supported yet
--- linux-4.15.0.orig/include/drm/drm_panel.h
+++ linux-4.15.0/include/drm/drm_panel.h
@@ -24,6 +24,7 @@
#endif __DRM_PANEL_H__
#define __DRM_PANEL_H__

+%include <linux/errno.h>
+include <linux/errno.h>
+include <linux/list.h>

--- linux-4.15.0.orig/include/drm/drm_vblank.h
+++ linux-4.15.0/include/drm/drm_vblank.h
@@ -113,6 +113,26 @@
 */
 u32 last;
/**
+ * @max_vblank_count:
+ *
+ * Maximum value of the vblank registers for this crtc. This value +1
+ * will result in a wrap-around of the vblank register. It is used
+ * by the vblank core to handle wrap-accounts.
+ *
+ * If set to zero the vblank core will try to guess the elapsed vblanks
+ * between times when the vblank interrupt is disabled through
+ * high-precision timestamps. That approach is suffering from small
+ * races and imprecision over longer time periods, hence exposing a
+ * hardware vblank counter is always recommended.
+ *
+ * This is the runtime configurable per-crtc maximum set through
+ * drm_crtc_set_max_vblank_count(). If this is used the driver
+ * must leave the device wide &drm_device.max_vblank_count at zero.
+ *
+ * If non-zero, &drm_crtc_funcs.get_vblank_counter must be set.
+ */
+u32 max_vblank_count;
+/**
* @inmodeset: Tracks whether the vblank is disabled due to a modeset.
* For legacy driver bit 2 additionally tracks whether an additional
void drm_crtc_vblank_off(struct drm_crtc *crtc);
void drm_crtc_vblank_reset(struct drm_crtc *crtc);
void drm_crtc_vblank_on(struct drm_crtc *crtc);
-void drm_crtc_accurate_vblank_count(struct drm_crtc *crtc);
+u32 drm_crtc_accurate_vblank_count(struct drm_crtc *crtc);

bool drm_calc_vbltimestamp_from_scanoutpos(struct drm_device *dev,
    unsigned int pipe, int *max_error,
    void drm_calc_timestamping_constants(struct drm_crtc *crtc,
    const struct drm_display_mode *mode);
wait_queue_head_t *drm_crtc_vblank_waitqueue(struct drm_crtc *crtc);
+void drm_crtc_set_max_vblank_count(struct drm_crtc *crtc,
    u32 max_vblank_count);
#endif
--- linux-4.15.0.orig/include/drm/drm_vma_manager.h
+++ linux-4.15.0/include/drm/drm_vma_manager.h
@@ -41,6 +41,7 @@

tbool readonly:1;
struct drm_vma_offset_manager {
    rwlock_t vm_lock;
    struct drm_mm_node vm_node;
    struct rb_root vm_files;
+    bool readonly:1;
};

--- linux-4.15.0.orig/include/drm/i915_pciids.h
+++ linux-4.15.0/include/drm/i915_pciids.h
@@ -364,33 +364,70 @@

#define INTEL_AML_GT2_IDS(info) 
    INTEL_VGA_DEVICE(0x593B, info) /* Halo GT4 */

+/* AML/KBL Y GT2 */
+##define INTEL_AML_GT2_IDS(info) 
+INTEL_VGA_DEVICE(0x591C, info), /* ULX GT2 */
+INTEL_VGA_DEVICE(0x87C0, info) /* ULX GT2 */
+
#define INTEL_KBL_IDS(info) 
    INTEL_KBL_GT1_IDS(info),
    INTEL_KBL_GT2_IDS(info),
    INTEL_KBL_GT3_IDS(info),
-    INTEL_KBL_GT4_IDS(info)
+    INTEL_KBL_GT4_IDS(info),
+    INTEL_AML_GT2_IDS(info)

/* CFL S */
#define INTEL_CFL_S_GT1_IDS(info) 

+/* CFL S */
##define INTEL_CFL_S_GT1_IDS(info) 

INTEL_VGA_DEVICE(0x3E90, info), /* SRV GT1 */
-INTEL_VGA_DEVICE(0x3E93, info)  /* SRV GT1 */
+INTEL_VGA_DEVICE(0x3E93, info), /* SRV GT1 */
+INTEL_VGA_DEVICE(0x3E99, info)  /* SRV GT1 */

#define INTEL_CFL_S_GT2_IDS(info) 
INTEL_VGA_DEVICE(0x3E91, info), /* SRV GT2 */
INTEL_VGA DEVICE(0x3E92, info), /* SRV GT2 */
-INTEL_VGA_DEVICE(0x3E96, info)  /* SRV GT2 */
+INTEL_VGA_DEVICE(0x3E96, info), /* SRV GT2 */
+INTEL_VGA_DEVICE(0x3E98, info), /* SRV GT2 */
+INTEL_VGA_DEVICE(0x3E9A, info)  /* SRV GT2 */

/* CFL H */
#define INTEL_CFL_H_GT2_IDS(info) 
INTEL_VGA DEVICE(0x3E9B, info), /* Halo GT2 */
INTEL_VGA_DEVICE(0x3E94, info)  /* Halo GT2 */

-/* CFL U */
+/* CFL U GT2 */
+#define INTEL_CFL_U_GT2_IDS(info) 
+INTEL_VGA_DEVICE(0x3EA9, info)  
+/* CFL U GT3 */
#define INTEL_CFL_U_GT3_IDS(info) 
+INTEL_VGA_DEVICE(0x3EA5, info), /* ULT GT3 */
INTEL_VGA DEVICE(0x3EA6, info), /* ULT GT3 */
INTEL_VGA_DEVICE(0x3EA7, info), /* ULT GT3 */
-INTEL_VGA_DEVICE(0x3EA8, info), /* ULT GT3 */
-INTEL_VGA_DEVICE(0x3EA5, info)  /* ULT GT3 */
+INTEL_VGA_DEVICE(0x3EA8, info)  /* ULT GT3 */
+
+/* WHL/CFL U GT1 */
+#define INTEL_WHL_U_GT1_IDS(info) 
+INTEL_VGA_DEVICE(0x3EA1, info)  
+/* WHL/CFL U GT2 */
+#define INTEL_WHL_U_GT2_IDS(info) 
+INTEL_VGA DEVICE(0x3EA0, info)  
+/* WHL/CFL U GT3 */
+#define INTEL_WHL_U_GT3_IDS(info) 
+INTEL_VGA_DEVICE(0x3EA2, info), 
+INTEL_VGA DEVICE(0x3EA3, info), 
+INTEL_VGA_DEVICE(0x3EA4, info)  
+#define INTEL_CFL_IDS(info)  
+INTEL_CFL_S_GT1_IDS(info)  

+INTEL_CFL_S_GT2_IDS(info), \
+INTEL_CFL_H_GT2_IDS(info), \
+INTEL_CFL_U_GT2_IDS(info), \
+INTEL_CFL_U_GT3_IDS(info), \
+INTEL_WHL_U_GT1_IDS(info), \
+INTEL_WHL_U_GT2_IDS(info), \
+INTEL_WHL_U_GT3_IDS(info)

/* CNL U 2+2 */
#define INTEL_CNL_U_GT2_IDS(info) \
--- linux-4.15.0.orig/include/dt-bindings/clock/mt2701-clk.h
+++ linux-4.15.0/include/dt-bindings/clock/mt2701-clk.h
@@ -176,7 +176,8 @@
#define CLK_TOP_AUD_EXT1156
#define CLK_TOP_AUD_EXT2157
#define CLK_TOP_NFI1X_PAD158
-#define CLK_TOP_NR159
+#define CLK_TOP_AXISEL_D4159
+#define CLK_TOP_NR160

/* APMIXEDSYS */

--- linux-4.15.0.orig/include/dt-bindings/clock/rk3328-cru.h
+++ linux-4.15.0/include/dt-bindings/clock/rk3328-cru.h
@@ -178,7 -178,7 @@
#define HCLK_TSP309
#define HCLK_GMAC310
#define HCLK_I2S0_8CH311
-#define HCLK_I2S1_8CH313
+#define HCLK_I2S1_8CH312
#define HCLK_I2S2_2CH313
#define HCLK_SPDIF_8CH314
#define HCLK_VOP315
--- linux-4.15.0.orig/include/dt-bindings/power/r8a77970-sysc.h
+++ linux-4.15.0/include/dt-bindings/power/r8a77970-sysc.h
@@ -19,10 +19,10 @@
#define R8A77970_PD_CR713
#define R8A77970_PD_CA53_SCU21
#define R8A77970_PD_A2IR023
-#define R8A77970_PD_A3IR24
+#define R8A77970_PD_A3IR24
#define R8A77970_PD_A2IR127
-#define R8A77970_PD_A2IR228
-#define R8A77970_PD_A2IR329
+#define R8A77970_PD_A2DP28
+#define R8A77970_PD_A2CN29
#define R8A77970_PD_A2SC030
#define R8A77970_PD_A2SC131

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--- linux-4.15.0.orig/include/dt-bindings/reset/amlogic,meson8b-reset.h
+++ linux-4.15.0/include/dt-bindings/reset/amlogic,meson8b-reset.h
@@ -95,9 +95,9 @@
#define RESET_VD_RMEM			64
#define RESET_AUDIN			65
#define RESET_DBLK			66
-#define RESET_PIC_DC			66
-#define RESET_PSC			66
-#define RESET_NAND			66
+#define RESET_PIC_DC			67
+#define RESET_PSC			68
+#define RESET_NAND			69
#define RESET_GE2D			70
#define RESET_PARSER_REG		71
#define RESET_PARSER_FETCH		72
--- linux-4.15.0.orig/include/keys/big_key-type.h
+++ linux-4.15.0/include/keys/big_key-type.h
@@ -21,6 +21,6 @@
 extern void big_key_revoke(struct key *key);
 extern void big_key_destroy(struct key *key);
 extern void big_key_describe(const struct key *big_key, struct seq_file *m);
-extern long big_key_read(const struct key *key, char __user *buffer, size_t buflen);
+extern long big_key_read(const struct key *key, char *buffer, size_t buflen);

 #endif /* _KEYS_BIG_KEY_TYPE_H */
--- linux-4.15.0.orig/include/keys/request_key_auth-type.h
+++ linux-4.15.0/include/keys/request_key_auth-type.h
@@ -0,0 +1,36 @@
+/* request_key authorisation token key type
+ *
+ * Copyright (C) 2005 Red Hat, Inc. All Rights Reserved.
+ * Written by David Howells (dhowells@redhat.com)
+ *
+ * This program is free software; you can redistribute it and/or
+ * modify it under the terms of the GNU General Public Licence
+ * as published by the Free Software Foundation; either version
+ * 2 of the Licence, or (at your option) any later version.
+ */
+
+#ifndef _KEYS_REQUEST_KEY_AUTH_TYPE_H
+#define _KEYS_REQUEST_KEY_AUTH_TYPE_H
+
+  #include <linux/key.h>
+
+* Authorisation record for request_key().
+ */
+struct request_key_auth {
+  struct key*target_key;
+  struct key*dest_keyring;
+  const struct cred*cred;
+  void*callout_info;
+  size_tcallout_len;
+  pid_tpid;
+  charop[8];
+} __randomize_layout;
+
+static inline struct request_key_auth *get_request_key_auth(const struct key *key)
+{
+  return key->payload.data[0];
+}
+
+#endif /* _KEYS_REQUEST_KEY_AUTH_TYPE_H */
--- linux-4.15.0.orig/include/keys/system_keyring.h
+++ linux-4.15.0/include/keys/system_keyring.h
@@ -35,6 +35,7 @@
#define restrict_link_by_builtin_and_secondary_trusted restrict_link_by_builtin_trusted
@end

+extern struct pkcs7_message *pkcs7;
+#ifdef CONFIG_SYSTEM_BLACKLIST_KEYRING
extern int mark_hash_blacklisted(const char *hash);
extern int is_hash_blacklisted(const u8 *hash, size_t hash_len,
@@ -47,6 +48,20 @@
}
@end

+endif

+#ifdef CONFIG_SYSTEM_REVOCATION_LIST
+extern int add_key_to_revocation_list(const char *data, size_t size);
+extern int is_key_on_revocation_list(struct pkcs7_message *pkcs7);
+endif
+
+static inline int add_key_to_revocation_list(const char *data, size_t size)
+{
+  return 0;
+}
+static inline int is_key_on_revocation_list(struct pkcs7_message *pkcs7)
+{
+  return -ENOKEY;
+}
+endif
+
+ifndef CONFIG_IMA_BLACKLIST_KEYRING
extern struct key *ima_blacklist_keyring;

--- linux-4.15.0.orig/include/keys/user-type.h
+++ linux-4.15.0/include/keys/user-type.h
@@ -31,7 +31,7 @@
 struct user_key_payload {
 struct rcu_head
   rcu; /* RCU destructor */
-unsigned short
dataLEN;
+unsigned short
dataLEN __aligned(__alignof__(u64)); /* actual data */
   char data[0]; /* actual data */
 }; 

extern struct key_type key_type_user;
@@ -45,8 +45,7 @@
 extern void user_revoke(struct key *key);
 extern void user_destroy(struct key *key);
 extern void user_describe(const struct key *user, struct seq_file *m);
-extern long user_read(const struct key *key,
-                      char __user *buffer, size_t buflen);
+extern long user_read(const struct key *key, char *buffer, size_t buflen);

static inline const struct user_key_payload *user_key_payload_rcu(const struct key *key)
{
--- linux-4.15.0.orig/include/kvm/arm_psci.h
+++ linux-4.15.0/include/kvm/arm_psci.h
@@ -0,0 +1,63 @@
+/*
+ * Copyright (C) 2012,2013 - ARM Ltd
+ * Author: Marc Zyngier <marc.zyngier@arm.com>
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License version 2 as
+ * published by the Free Software Foundation.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program. If not, see <http://www.gnu.org/licenses/>.
+ */
+ +
+#ifdef __KVM_ARM_PSCI_H__
+#define __KVM_ARM_PSCI_H__
+
+#include <linux/kvm_host.h>
+#include <uapi/linux/psci.h>
+
+#define KVM_ARM_PSCI_0_1 PSCI_VERSION(0, 1)
+\#define KVM_ARM_PSCI_0_2_PSCI_VERSION(0, 2)
+\#define KVM_ARM_PSCI_1_0_PSCI_VERSION(1, 0)
+
+\#define KVM_ARM_PSCI_LATEST KVM_ARM_PSCI_1_0
+
+/*
+ * We need the KVM pointer independently from the vcpu as we can call
+ * this from HYP, and need to apply kern_hyp_va on it...
+ */
+static inline int kvm_psci_version(struct kvm_vcpu *vcpu, struct kvm *kvm)
+{
+  /*
+   * Our PSCI implementation stays the same across versions from
+   * v0.2 onward, only adding the few mandatory functions (such
+   * as FEATURES with 1.0) that are required by newer
+   * revisions. It is thus safe to return the latest, unless
+   * userspace has instructed us otherwise.
+   */
+  if (test_bit(KVM_ARM_VCPU_PSCI_0_2, vcpu->arch.features)) {
+    if (vcpu->kvm->arch.psci_version)
+      return vcpu->kvm->arch.psci_version;
+    return KVM_ARM_PSCI_LATEST;
+  }
+  return KVM_ARM_PSCI_0_1;
+}
+
+int kvm_hvc_call_handler(struct kvm_vcpu *vcpu);
+
+struct kvm_one_reg;
+
+int kvm_arm_get_fw_num_regs(struct kvm_vcpu *vcpu);
+int kvm_arm_copy_fw_reg_indices(struct kvm_vcpu *vcpu, u64 __user *uindices);
+int kvm_arm_get_fw_reg(struct kvm_vcpu *vcpu, const struct kvm_one_reg *reg);
+int kvm_arm_set_fw_reg(struct kvm_vcpu *vcpu, const struct kvm_one_reg *reg);
+
+#endif /* __KVM_ARM_PSCI_H__ */
--- linux-4.15.0.orig/include/kvm/arm_vgic.h
+++ linux-4.15.0/include/kvm/arm_vgic.h
@@ -232,7 +232,7 @@
   u64			propbaser;
 /* Protects the lpi_list and the count value below. */
-    spinlock_t		lpi_list_lock;
+    raw_spinlock_t		lpi_list_lock;
   struct list_head	lpi_list_head;

 /* Protects the lpi_list and the count value below. */
-    spinlock_t		lpi_list_lock;
+    raw_spinlock_t		lpi_list_lock;
   struct list_head	lpi_list_head;

---
int lpi_list_count;

@@ -339,6 +339,7 @@
 void kvm_vgic_load(struct kvm_vcpu *vcpu);
 void kvm_vgic_put(struct kvm_vcpu *vcpu);
+void kvm_vgic_vmcr_sync(struct kvm_vcpu *vcpu);

#define irqchip_in_kernel(k) (!!((k)->arch.vgic.in_kernel))
#define vgic_initialized(k) ((k)->arch.vgic.initialized)
@@ -349,6 +350,7 @@
 bool kvm_vcpu_has_pending_irqs(struct kvm_vcpu *vcpu);
 void kvm_vgic_synce_hwstate(struct kvm_vcpu *vcpu);
 void kvm_vgic_flush_hwstate(struct kvm_vcpu *vcpu);
+void kvm_vgic_resetMapped_irq(struct kvm_vcpu *vcpu, u32 vintid);

void vgic_v3_dispatch_sgi(struct kvm_vcpu *vcpu, u64 reg);

--- linux-4.15.0.orig/include/linux/acpi.h
+++ linux-4.15.0/include/linux/acpi.h
@@ -99,7 +99,7 @@
 static inline void acpi_preset_companion(struct device *dev,
         struct acpi_device *parent, u64 addr)
 {
- ACPI_COMPANION_SET(dev, acpi_find_child_device(parent, addr, NULL));
+ ACPI_COMPANION_SET(dev, acpi_find_child_device(parent, addr, false));
 }

 static inline const char *acpi_dev_name(struct acpi_device *adev)
@@ -228,10 +228,14 @@
 void __acpi_unmap_table(void __iomem *map, unsigned long size);
 int early_acpi_boot_init(void);
 int acpi_boot_init (void);
+void acpi_boot_table_prepare (void);
 void acpi_boot_table_init (void);
 int acpi_mps_check (void);
 int acpi_numa_init (void);

+int acpi_locate_initial_tables (void);
+void acpi_reserve_initial_tables (void);
+void acpi_table_init_complete (void);
 int acpi_table_init (void);
 int acpi_table_parse(char *id, acpi_tbl_table_handler handler);
 int __init acpi_table_parse_entries(char *id, unsigned long table_size,
@@ -324,7 +328,10 @@
 #ifdef CONFIG_X86_IO_APIC
 extern int acpi_get_override_irq(u32 gsi, int *trigger, int *polarity);
 #else

---

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#define acpi_get_override_irq(gsi, trigger, polarity) (-1)
+static inline int acpi_get_override_irq(u32 gsi, int *trigger, int *polarity)
+{
+    return -1;
+}
#endif

/*
* This function undoes the effect of one call to acpi_register_gsi().
@@ -441,6 +448,9 @@
int acpi_check_region(resource_size_t start, resource_size_t n,
    const char *name);

+acpi_status acpi_release_memory(acpi_handle handle, struct resource *res,
+    u32 level);
+ int acpi_resources_are_enforced(void);

#ifdef CONFIG_HIBERNATION
@@ -708,9 +718,12 @@
    return 0;
 }

+static inline void acpi_boot_table_prepare(void)
+{
+    
+
static inline void acpi_boot_table_init(void)
{
    -return;
}

static inline int acpi_mps_check(void)
@@ -781,6 +794,13 @@
    return -ENODEV;
 }

+static inline struct platform_device *
+acpi_create_platform_device(struct acpi_device *adev,
+    struct property_entry *properties)
+{
+    return NULL;
+}
+
static inline bool acpi_dma_supported(struct acpi_device *adev)
{
    return false;
@@ -886,26 +906,18 @@
    void acpi_subsys_complete(struct device *dev);
int acpi_subsys_suspend_late(struct device *dev);
int acpi_subsys_suspend_noirq(struct device *dev);
-int acpi_subsys_resume_noirq(struct device *dev);
-int acpi_subsys_resume_early(struct device *dev);
int acpi_subsys_suspend(struct device *dev);
-int acpi_subsys_freeze_late(struct device *dev);
-int acpi_subsys_freeze_noirq(struct device *dev);
-int acpi_subsys_thaw_noirq(struct device *dev);
+int acpi_subsys_poweroff(struct device *dev);

#else
static inline int acpi_dev_resume_early(struct device *dev) { return 0; }
static inline int acpi_subsys_prepare(struct device *dev) { return 0; }
static inline void acpi_subsys_complete(struct device *dev) {}
static inline int acpi_subsys_suspend_late(struct device *dev) { return 0; }
static inline int acpi_subsys_suspend_noirq(struct device *dev) { return 0; }
-static inline int acpi_subsys_resume_noirq(struct device *dev) { return 0; }
-static inline int acpi_subsys_resume_early(struct device *dev) { return 0; }
static inline int acpi_subsys_suspend(struct device *dev) { return 0; }
static inline int acpi_subsys_freeze(struct device *dev) { return 0; }
-static inline int acpi_subsys_freeze_late(struct device *dev) { return 0; }
-static inline int acpi_subsys_freeze_noirq(struct device *dev) { return 0; }
-static inline int acpi_subsys_thaw_noirq(struct device *dev) { return 0; }
+static inline int acpi_subsys_poweroff(struct device *dev) { return 0; }
#endif

#define CONFIG_ACPI
@@ -1048,6 +1060,15 @@
MAX_ACPI_REFERENCE_ARGS, args);
}

+static inline bool acpi_dev_has_props(const struct acpi_device *adev)
+{
+return !list_empty(&adev->data.properties);
+}
+
+struct acpi_device_properties *
+acpi_data_add_props(struct acpi_device_data *data, const guid_t *guid,
+ const union acpi_object *properties);
+
+int acpi_node_prop_get(const struct fwnode_handle *fwnode, const char *propname,
+ void **valptr);
int acpi_dev_prop_read_single(struct acpi_device *adev,
@@ -1266,4 +1287,8 @@
}
#endif

+int find_acpi_cpu_topology(unsigned int cpu, int level);
+int find_acpi_cpu_topology_package(unsigned int cpu);
+int find_acpi_cache_topology(int cpu, int level);
+
+#endif	/*_LINUX_ACPI_H*/
--- linux-4.15.0.orig/include/linux/ahci_platform.h
+++ linux-4.15.0/include/linux/ahci_platform.h
@@ -23,6 +23,8 @@
 struct platform_device;
 struct scsi_host_template;

+int ahci_platform_enable_phys(struct ahci_host_priv *hpriv);
+void ahci_platform_disable_phys(struct ahci_host_priv *hpriv);
 int ahci_platform_enable_clks(struct ahci_host_priv *hpriv);
 void ahci_platform_disable_clks(struct ahci_host_priv *hpriv);
 int ahci_platform_enable_regulators(struct ahci_host_priv *hpriv);
--- linux-4.15.0.orig/include/linux/arm-smccc.h
+++ linux-4.15.0/include/linux/arm-smccc.h
@@ -14,14 +14,16 @@
 #ifndef __LINUX_ARM_SMCCC_H
 #define __LINUX_ARM_SMCCC_H
+#include <uapi/linux/const.h>
+
+/*
+ * This file provides common defines for ARM SMC Calling Convention as
+ * specified in
+ */

-#define ARM_SMCCC_STD_CALL0
-#define ARM_SMCCC_FAST_CALL1
+#define ARM_SMCCC_STD_CALL AC(0,U)
+#define ARM_SMCCC_FAST_CALL AC(1,U)
#define ARM_SMCCC_TYPE_SHIFT31

#define ARM_SMCCC_SMC_320 0
#define ARM_SMCCC_QUIRK_NONE0
#define ARM_SMCCC_QUIRK_QCOM_A61 /* Save/restore register a6 */

+#define ARM_SMCCC_VERSION_1_00x10000
+#define ARM_SMCCC_VERSION_1_10x10001
+
+#define ARM_SMCCC_VERSION_FUNC_ID\
+ARM_SMCCC_CALL_VAL(ARM_SMCCC_FAST_CALL,\
+0, 0)\n+
+#define ARM_SMCCC_ARCH_FEATURES_FUNC_ID
+ARM_SMCCC_CALL_VAL(ARM_SMCCC_FAST_CALL,
+ ARM_SMCCC_SMC_32,
+ 0, 1)
+
+#define ARM_SMCCC_ARCH_WORKAROUND_1
+ARM_SMCCC_CALL_VAL(ARM_SMCCC_FAST_CALL,
+ ARM_SMCCC_SMC_32,
+ 0, 0x8000)
+
+#define ARM_SMCCC_ARCH_WORKAROUND_2
+ARM_SMCCC_CALL_VAL(ARM_SMCCC_FAST_CALL,
+ ARM_SMCCC_SMC_32,
+ 0, 0x7fff)
+
 ifndef __ASSEMBLY__

#include <linux/linkage.h>
@@ -130,5 +155,161 @@
#define arm_smccc_hvc_quirk(...) __arm_smccc_hvc(__VA_ARGS__)

/* SMCCC v1.1 implementation madness follows */
 ifndef CONFIG_ARM64
+
+define SMCCC_SMC_INST"smc#0"
+define SMCCC_HVC_INST"hvc#0"
+
+elif defined(CONFIG_ARM)
+include <asm/opcodes-sec.h>
+include <asm/opcodes-virt.h>
+
+define SMCCC_SMC_INST__SMC(0)
+define SMCCC_HVC_INST__HVC(0)
+
+endif
+
+define __count_args(_0, _1, _2, _3, _4, _5, _6, _7, _8, x, ...) x
+
+define __count_args(...)						
+__count_args(__VA_ARGS__, 7, 6, 5, 4, 3, 2, 1, 0)
+
+define __constraint_write_0						
+"+r" (r0), "+&r" (r1), "+&r" (r2), "+&r" (r3)
+
define __constraint_write_1						
+"+r" (r0), "+r" (r1), "+&r" (r2), "+&r" (r3)
+
define __constraint_write_2						
+"+r" (r0), "+r" (r1), "+r" (r2), "+&r" (r3)

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+\#define __constraint_write_3
+"+r" (r0), "+r" (r1), "+r" (r2), "+r" (r3)
+\#define __constraint_write_4 __constraint_write_3
+\#define __constraint_write_5 __constraint_write_4
+\#define __constraint_write_6 __constraint_write_5
+\#define __constraint_write_7 __constraint_write_6
+
+\#define __constraint_read_0
+\#define __constraint_read_1
+\#define __constraint_read_2
+\#define __constraint_read_3
+\#define __constraint_read_4 "r" (r4)
+\#define __constraint_read_5 __constraint_read_4, "r" (r5)
+\#define __constraint_read_6 __constraint_read_5, "r" (r6)
+\#define __constraint_read_7 __constraint_read_6, "r" (r7)
+
+\#define __declare_arg_0(a0, res)
+struct arm_smccc_res *___res = res;
+register unsigned long r0 asm("r0") = (u32)a0;
+register unsigned long r1 asm("r1");
+register unsigned long r2 asm("r2");
+register unsigned long r3 asm("r3")
+
+\#define __declare_arg_1(a0, a1, res)
+typeof(a1) __a1 = a1;
+struct arm_smccc_res *___res = res;
+register unsigned long r0 asm("r0") = (u32)a0;
+register unsigned long r1 asm("r1") = __a1;
+register unsigned long r2 asm("r2");
+register unsigned long r3 asm("r3")
+
+\#define __declare_arg_2(a0, a1, a2, res)
+typeof(a1) __a1 = a1;
+typeof(a2) __a2 = a2;
+struct arm_smccc_res *___res = res;
+register unsigned long r0 asm("r0") = (u32)a0;
+register unsigned long r1 asm("r1") = __a1;
+register unsigned long r2 asm("r2") = __a2;
+register unsigned long r3 asm("r3")
+
+\#define __declare_arg_3(a0, a1, a2, a3, res)
+typeof(a1) __a1 = a1;
+typeof(a2) __a2 = a2;
+typeof(a3) __a3 = a3;
+struct arm_smccc_res *___res = res;
+register unsigned long r0 asm("r0") = (u32)a0;
+register unsigned long r1 asm("r1") = __a1;
+register unsigned long r2 asm("r2") = __a2;
+register unsigned long r3 asm("r3")
+register unsigned long r3 asm("r3") = __a3
+
+#define __declare_arg_4(a0, a1, a2, a3, a4, res)
+typeof(a4) __a4 = a4;
+__declare_arg_3(a0, a1, a2, a3, res);
+register unsigned long r4 asm("r4") = __a4
+
+#define __declare_arg_5(a0, a1, a2, a3, a4, a5, res)
+typeof(a5) __a5 = a5;
+__declare_arg_4(a0, a1, a2, a3, a4, res);
+register unsigned long r5 asm("r5") = __a5
+
+#define __declare_arg_6(a0, a1, a2, a3, a4, a5, a6, res)
+typeof(a6) __a6 = a6;
+__declare_arg_5(a0, a1, a2, a3, a4, a5, res);
+register unsigned long r6 asm("r6") = __a6
+
+#define __declare_arg_7(a0, a1, a2, a3, a4, a5, a6, a7, res)
+typeof(a7) __a7 = a7;
+__declare_arg_6(a0, a1, a2, a3, a4, a5, a6, res);
+register unsigned long r7 asm("r7") = __a7
+
+#define ___declare_args(count, ...) __declare_arg_ ## count(__VA_ARGS__)
+#define __declare_args(count, ...)  ___declare_args(count, __VA_ARGS__)
+
+#define ___constraints(count)
+: __constraint_write_ ## count
+: __constraint_read_ ## count
+: "memory"
+#define ___constraints(count) ___constraints(count)
+
+#define __arm_smccc_1_1(inst, ...)
+do {
+__declare_args(__count_args(__VA_ARGS__), __VA_ARGS__);
+asm volatile(inst "\n"
+__constraints(__count_args(__VA_ARGS__));
+if (__res) {
*__res = (typeof(*__res)){r0, r1, r2, r3};
} while (0)
+
+/
*/
+ * We have an output list that is not necessarily used, and GCC feels
+ * entitled to optimise the whole sequence away. "volatile" is what
+ * makes it stick.
+ */
+#define __arm_smccc_1_1(inst, ...)
+do {
+__declare_args(__count_args(__VA_ARGS__), __VA_ARGS__);
+asm volatile(inst "\n"
+__constraints(__count_args(__VA_ARGS__));
+if (__res) {
*__res = (typeof(*__res)){r0, r1, r2, r3};
} while (0)
+
+*/
+ * arm_smccc_1_1_smc() - make an SMCCC v1.1 compliant SMC call
+ *
This is a variadic macro taking one to eight source arguments, and an optional return structure.

@a0-a7: arguments passed in registers 0 to 7
@res: result values from registers 0 to 3

This macro is used to make SMC calls following SMC Calling Convention v1.1.
The content of the supplied parameter are copied to registers 0 to 7 prior to the SMC instruction. The return values are updated with the content from register 0 to 3 on return from the SMC instruction if not NULL.

#define arm_smccc_1_1_smc(...) __arm_smccc_1_1(SMCCC_SMC_INST, __VA_ARGS__)

This is a variadic macro taking one to eight source arguments, and an optional return structure.
@a0-a7: arguments passed in registers 0 to 7
@res: result values from registers 0 to 3

This macro is used to make HVC calls following SMC Calling Convention v1.1.
The content of the supplied parameter are copied to registers 0 to 7 prior to the HVC instruction. The return values are updated with the content from register 0 to 3 on return from the HVC instruction if not NULL.

#define arm_smccc_1_1_hvc(...) __arm_smccc_1_1(SMCCC_HVC_INST, __VA_ARGS__)

Return codes defined in ARM DEN 0070A:
#define SMCCC_RET_SUCCESS 0
#define SMCCC_RET_NOT_SUPPORTED -1
#define SMCCC_RET_NOT_REQUIRED -2

@endif /*__ASSEMBLY__/*/
@endif /*__LINUX_ARM_SMCCC_H*/
--- linux-4.15.0.orig/include/linux/arm_sdei.h
+++ linux-4.15.0/include/linux/arm_sdei.h
@@ -0,0 +1,79 @@

// SPDX-License-Identifier: GPL-2.0
// Copyright (C) 2017 Arm Ltd.
#ifndef __LINUX_ARM_SDEI_H
#define __LINUX_ARM_SDEI_H

#include <uapi/linux/arm_sdei.h>

enum sdei_conduit_types {
    CONDUIT_INVALID = 0,
Conduit SMC,

Conduit HVC,

#include <asm/sdei.h>

/* Arch code should override this to set the entry point from firmware... */
#ifndef sdei_arch_get_entry_point
#define sdei_arch_get_entry_point(conduit)(0)
#endif

/* When an event occurs sdei_event_handler() will call a user-provided callback like this in NMI context on the CPU that received the event. */
typedef int (sdei_event_callback)(u32 event, struct pt_regs *regs, void *arg);

/* Register your callback to claim an event. The event must be described by firmware. */
int sdei_event_register(u32 event_num, sdei_event_callback *cb, void *arg);

/* Calls to sdei_event_unregister() may return EINPROGRESS. Keep calling it until it succeeds. */
int sdei_event_unregister(u32 event_num);

int sdei_event_enable(u32 event_num);
int sdei_event_disable(u32 event_num);

#ifdef CONFIG_ARM_SDE_INTERFACE
/* For use by arch code when CPU hotplug notifiers are not appropriate. */
int sdei_mask_local_cpu(void);
int sdei_unmask_local_cpu(void);
#else
static inline int sdei_mask_local_cpu(void) { return 0; }
static inline int sdei_unmask_local_cpu(void) { return 0; }
#endif /* CONFIG_ARM_SDE_INTERFACE */

/* This struct represents an event that has been registered. The driver maintains a list of all events, and which ones are registered. (Private events have one entry in the list, but are registered on each CPU). A pointer to this struct is passed to firmware, and back to the event handler. The event handler can then use this to invoke the registered... */
/* callback, without having to walk the list.
+ *
+ * For CPU private events, this structure is per-cpu.
+ */
+struct sdei_registered_event {
+/* For use by arch code: */
+struct pt_regs interrupted_regs;
+
sdei_event_callback *callback;
+void *callback_arg;
+u32 event_num;
+u8 priority;
+};
+
+/* The arch code entry point should then call this when an event arrives. */
+int notrace sdei_event_handler(struct pt_regs *regs,
+struct sdei_registered_event *arg);
+
+/* arch code may use this to retrieve the extra registers. */
+int sdei_api_event_context(u32 query, u64 *result);
+
+#endif /* __LINUX_ARM_SDEI_H */
--- linux-4.15.0.orig/include/linux/ata.h
+++ linux-4.15.0/include/linux/ata.h
@@ -448,6 +448,8 @@
ATA_SET_MAX_UNLOCK = 0x03,
ATA_SET_MAX_FREEZE_LOCK = 0x04,
ATA_SET_MAX_PASSWD_DMA = 0x05,
+ATA_SET_MAX_UNLOCK_DMA = 0x06,
/* feature values for DEVICE CONFIGURATION OVERLAY */
ATA_DCO_RESTORE = 0xC0,
--- linux-4.15.0.orig/include/linux/atalk.h
+++ linux-4.15.0/include/linux/atalk.h
@@ -108,7 +108,7 @@
#define AARP_RESOLVE_TIME (10 * HZ)

extern struct datalink_proto *ddp_dl, *aarp_dl;
-extern void aarp_proto_init(void);
+extern int aarp_proto_init(void);

/* Inter module exports */

@@ -151,19 +151,29 @@
extern int sysctl_aarp_resolve_time;

#endif CONFIG_SYSCTL
-extern void atalk_register_sysctl(void);
+extern int atalk_register_sysctl(void);
extern void atalk_unregister_sysctl(void);
#else
-#define atalk_register_sysctl() (do { } while(0))
-#define atalk_unregister_sysctl() (do { } while(0))
+static inline int atalk_register_sysctl(void)
+{
+    return 0;
+}
+static inline void atalk_unregister_sysctl(void)
+{
+}
#endif

#ifdef CONFIG_PROC_FS
extern int atalk_proc_init(void);
extern void atalk_proc_exit(void);
#else
-#define atalk_proc_init() ({ 0; })
-#define atalk_proc_exit() (do { } while(0))
+static inline int atalk_proc_init(void)
+{
+    return 0;
+}
+static inline void atalk_proc_exit(void)
+{
+}
#endif /* CONFIG_PROC_FS */

#elif defined CONFIG_PROC_FS

#endif /* LINUX_ATALK_H */
--- linux-4.15.0.org/include/linux/atmdev.h
+++ linux-4.15.0/include/linux/atmdev.h
@@ -214,6 +214,7 @@
struct atm_skb_data {
    struct atm_vcc *vcc;  /* ATM VCC */
    unsigned long atm_options;  /* ATM layer options */
+    unsigned int acct_truesize;  /* truesize accounted to vcc */
};

#define VCC_HTABLE_SIZE 32
@@ -241,6 +242,10 @@
void atm_dev_release_vccs(struct atm_dev *dev);

+static inline void atm_account_tx(struct atm_vcc *vcc, struct sk_buff *skb)
+{
+/*
+ * Because ATM skbs may not belong to a sock (and we don't
+ * necessarily want to), skb->truesize may be adjusted,
+ * escaping the hack in pskb_expand_head() which avoids
+ * doing so for some cases. So stash the value of truesize
+ * at the time we accounted it, and atm_pop_raw() can use
+ * that value later, in case it changes.
+ */
+refcount_add(skb->truesize, &sk_atm(vcc)->sk_wmem_alloc);
+ATM_SKB(skb)->acct_truesize = skb->truesize;
+ATM_SKB(skb)->atm_options = vcc->atm_options;
+
static inline void atm_force_charge(struct atm_vcc *vcc, int truesize)
{

--- linux-4.15.0.orig/include/linux/atomic.h
+++ linux-4.15.0/include/linux/atomic.h
@@ -654,6 +654,7 @@}
#endif
+
#define atomic_cond_read_relaxed(v, c) smp_cond_load_relaxed(&(v)->counter, (c))
#define atomic_cond_read_acquire(v, c) smp_cond_load_acquire(&(v)->counter, (c))

#ifdef CONFIG_GENERIC_ATOMIC64
@@ -1075,6 +1076,7 @@}
#endif
+
#define atomic64_cond_read_relaxed(v, c) smp_cond_load_relaxed(&(v)->counter, (c))
#define atomic64_cond_read_acquire(v, c) smp_cond_load_acquire(&(v)->counter, (c))

#include <asm-generic/atomic-long.h>
--- linux-4.15.0.orig/include/linux/backing-dev-defs.h
+++ linux-4.15.0/include/linux/backing-dev-defs.h
@@ -22,7 +22,6 @@
*/
enum wb_state {
    WB_registered, /* bdi_register() was done */
    -WB_shutting_down, /* wb_shutdown() in progress */
    WB_writeback_running, /* Writeback is in progress */
    WB_has_dirty_io, /* Dirty inodes on ->b_{dirty|io|more_io} */
    WB_start_all, /* nr_pages == 0 (all) work pending */
@@ -189,6 +188,8 @@
#ifdef CONFIG_CGROUP_WRITEBACK
struct radix_tree_root cgwb_tree; /* radix tree of active cgroup wbs */
struct rb_root cgwb_congested_tree; /* their congested states */
+struct mutex cgwb_release_mutex; /* protect shutdown of wb structs */
+struct rw_semaphore wb_switch_rwsem; /* no cgwb switch while syncing */
#else
struct bdi_writeback_congested *wb_congested;
#endif
@@ -223,6 +224,11 @@
set_wb_congested(bdi->wb.congested, sync);
}
+struct wb_lock_cookie {
+  bool locked;
+  unsigned long flags;
+};
+
#ifdef CONFIG_CGROUP_WRITEBACK
/**
 @@ -252,6 +258,14 @@
 */
static inline void wb_put(struct bdi_writeback *wb) {
  +if (WARN_ON_ONCE(!wb->bdi)) {
  +/*
  + * A driver bug might cause a file to be removed before bdi was
  + * initialized.
  + */
  +return;
  +}
  +
  if (wb != &wb->bdi->wb)
     percpu_ref_put(&wb->refcnt);
}
--- linux-4.15.0.orig/include/linux/backing-dev.h
+++ linux-4.15.0/include/linux/backing-dev.h
@@ -13,6 +13,7 @@
#include <linux/fs.h>
#include <linux/sched.h>
#include <linux/blkdev.h>
+#include <linux/device.h>
#include <linux/writeback.h>
#include <linux/blk-cgroup.h>
#include <linux/backing-dev-defs.h>
@@ -346,7 +347,7 @@
/**
 * unlocked_inode_to_wb_begin - begin unlocked inode wb access transaction
 * @inode: target inode
- * @lockedp: temp bool output param, to be passed to the end function
+ * @cookie: output param, to be passed to the end function
 * 
 * The caller wants to access the wb associated with @inode but isn't

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* holdings inode->i_lock, mapping->tree_lock or wb->list_lock. This
  @@ -354,12 +355,12 @@
  * association doesn't change until the transaction is finished with
  * unlocked_inode_to_wb_end().
  *
  - * The caller must call unlocked_inode_to_wb_end() with *lockdep
  - * afterwards and can't sleep during transaction. IRQ may or may not be
  - * disabled on return.
  + * The caller must call unlocked_inode_to_wb_end() with *cookie afterwards and
  + * can't sleep during the transaction. IRQs may or may not be disabled on
  + * return.
  */
static inline struct bdi_writeback *
unlocked_inode_to_wb_begin(struct inode *inode, bool *lockedp)
{
  rcu_read_lock();
  if (unlikely(*lockedp))
    spin_lock_irq(&inode->i_mapping->tree_lock);
}

static inline void unlocked_inode_to_wb_end(struct inode *inode, bool locked)
{
  if (unlikely(locked))
    spin_unlock_irq(&inode->i_mapping->tree_lock);
}

/*
  * Protected by either !I_WB_SWITCH + rcu_read_lock() or tree_lock.
  @@ -382,12 +383,13 @@
  */
*/

/*
 * unlocked_inode_to_wb_end - end inode wbs access transaction
 * @inode: target inode
 * @locked: *lockedp from unlocked_inode_to_wb_begin()
 * @cookie: @cookie from unlocked_inode_to_wb_begin()
 */
static inline void unlocked_inode_to_wb_end(struct inode *inode, bool locked)
{
  -spin_unlock_irq(&inode->i_mapping->tree_lock);
  +if (unlikely(cookie->locked))
    spin_unlock_irqrestore(&inode->i_mapping->tree_lock, cookie->flags);
}
rcu_read_unlock();
}
@@ -434,12 +436,13 @@
}
}

static inline struct bdi_writeback *
-unlocked_inode_to_wb_begin(struct inode *inode, bool *lockedp)
+unlocked_inode_to_wb_begin(struct inode *inode, struct wb_lock_cookie *cookie)
{
    return inode_to_wb(inode);
}

@@ -495,4 +498,13 @@
(1 << WB_async_congested));
}

+extern const char *bdi_unknown_name;
+static inline const char *bdi_dev_name(struct backing_dev_info *bdi)
+{
+    if (!bdi || !bdi->dev)
+        return bdi_unknown_name;
+    return dev_name(bdi->dev);
+}
+
#endif /* _LINUX_BACKING_DEV_H */
--- linux-4.15.0.orig/include/linux/bcma/bcma_soc.h
+++ linux-4.15.0/include/linux/bcma/bcma_soc.h
@@ -6,6 +6,7 @@
struct bcma_soc {
    struct bcma_bus bus;
+    struct device *dev;
};

int __init bcma_host_soc_register(struct bcma_soc *soc);
--- linux-4.15.0.orig/include/linux/bio.h
+++ linux-4.15.0/include/linux/bio.h
@@ -123,6 +123,11 @@
return NULL;
+static inline bool bio_full(struct bio *bio)  
+{  
+return bio->bi_vcnt >= bio->bi_max_vecs;  
+}  
+  
/*  
* will die  
*/  
@@ -248,7 +253,7 @@  
{  
if (count != 1) {  
bio->bi_flags |= (1 << BIO_REFFED);  
-smp_mb__before_atomic();  
+smp_mb();  
}  
atomic_set(&bio->__bi_cnt, count);  
}  
@@ -447,6 +452,10 @@  
extern int bio_add_page(struct bio *, struct page *, unsigned int,unsigned int);  
extern int bio_add_pc_page(struct request_queue *, struct bio *, struct page *,  
 unsigned int, unsigned int);  
+bool __bio_try_merge_page(struct bio *bio, struct page *, unsigned int,len, unsigned int off);  
+void __bio_add_page(struct bio *bio, struct page *, unsigned int,len, unsigned int off);  
int bio_iov_iter_get_pages(struct bio *,struct iov_iter *,enum rq_map_data);  
extern struct bio *bio_map_user_iov(struct request_queue *,  
@@ -489,6 +498,7 @@  
extern struct bio_vec *bvec_alloc(gfp_t, int, unsigned long *, mempool_t *);  
extern void bvec_free(mempool_t *, struct bio_vec *, unsigned int);  
extern unsigned int bvec_nr_vecs(unsigned short idx);  
+extern const char *bio_devname(struct bio *,char *buffer);  

#define bio_set_dev(bio, bdev) do {  
#define bio_dev(bio) disk_devt((bio)->bi_disk)  
#define bio_devname(bio, buf)  
-#bdevname(bio_dev(bio), (buf))  
-  
#endif CONFIG_BLK_CGROUP  
int bio_associate_blkcg(struct bio *bio, struct cgroup_subsys_state *blkcg_css);  
void bio_disassociate_task(struct bio *bio);  
--- linux-4.15.0.orig/include/linux/bitfield.h  
+++ linux-4.15.0/include/linux/bitfield.h
#define FIELD_FIT(_mask, _val)
({
- __BF_FIELD_CHECK(_mask, 0ULL, _val, "FIELD_FIT: ");
+ __BF_FIELD_CHECK(_mask, 0ULL, 0ULL, "FIELD_FIT: ");
!(((typeof(_mask))_val) << __bf_shf(_mask)) & ~(_mask));
})

--- linux-4.15.0.orig/include/linux/bitmap.h
+++ linux-4.15.0/include/linux/bitmap.h
@@ -96,6 +96,14 @@
*/

/*
 * Allocation and deallocation of bitmap.
 * +* Provided in lib(bitmap.c to avoid circular dependency.
 * +*/
+extern unsigned long *bitmap_alloc(unsigned int nbits, gfp_t flags);
+extern unsigned long *bitmap_zalloc(unsigned int nbits, gfp_t flags);
+extern void bitmap_free(const unsigned long *bitmap);
+
+/*
 * lib(bitmap.c provides these functions:
 */

@@ -194,8 +202,13 @@
#define BITMAP_FIRST_WORD_MASK(start) (~0UL << ((start) & (BITS_PER_LONG - 1)))
#define BITMAP_LAST_WORD_MASK(nbits) (~0UL >> (-(nbits) & (BITS_PER_LONG - 1)))

+/*
 * The static inlines below do not handle constant nbits==0 correctly,
 * +* so make such users (should any ever turn up) call the out-of-line
 * +* versions.
 * +*/
 #define small_const_nbits(nbits) \
-(__builtin_constant_p(nbits) && (nbits) <= BITS_PER_LONG)
+(__builtin_constant_p(nbits) && (nbits) <= BITS_PER_LONG && (nbits) > 0)

static inline void bitmap_zero(unsigned long *dst, unsigned int nbits)
{
    __bitmap_complement(dst, src, nbits);
}

+ifdef __LITTLE_ENDIAN
+define BITMAP_MEM_ALIGNMENT 8
+else

*dst = (*src & BITMAP_LAST_WORD_MASK(nbits)) >> shift;
--- linux-4.15.0.orig/include/linux/bitops.h
+++ linux-4.15.0/include/linux/bitops.h
@@ -2,29 +2,10 @@
#ifndef _LINUX_BITOPS_H
#define _LINUX_BITOPS_H
#include <asm/types.h>
+#include <linux/bits.h>
#endif

/*
 * Create a contiguous bitmask starting at bit position @l and ending at
 * position @h. For example
 * GENMASK_UPLL(39, 21) gives us the 64bit vector 0x000000ffffe00000.
 * /
#define GENMASK(h, l) \
	(((~0UL) - (1UL << (l)) + 1) & (~0UL >> (BITS_PER_LONG - 1 - (h))))
#define GENMASK_UPLL(h, l) \
	a((~0ULL) - (1ULL << (l)) + 1) & \
	(~0ULL >> (BITS_PER_LONG_LONG - 1 - (h))))
	
/*
extern unsigned int __sw_hweight8(unsigned int w);
extern unsigned int __sw_hweight16(unsigned int w);
@ @ -69,7 +50,7 @@

static __always_inline unsigned long hweight_long(unsigned long w) 
{
    return sizeof(w) == 4 ? hweight32(w) : hweight64(w);
+return sizeof(w) == 4 ? hweight32(w) : hweight64((__u64)w);
}

/**
@ @ -79,7 +60,7 @@
*/
static inline __u64 rol64(__u64 word, unsigned int shift)
{  
-    return (word << shift) | (word >> (64 - shift));
+    return (word << (shift & 63)) | (word >> ((-shift) & 63));
}  
/**  
@@ -89,7 +70,7 @@*/
*/
static inline __u64 ror64(__u64 word, unsigned int shift)
{  
-    return (word >> shift) | (word << (64 - shift));
+    return (word >> (shift & 63)) | (word << ((-shift) & 63));
}  
/**  
@@ -99,7 +80,7 @@*/
*/
static inline __u32 rol32(__u32 word, unsigned int shift)
{  
-    return (word << shift) | (word >> ((-shift) & 31));
+    return (word << (shift & 31)) | (word >> ((-shift) & 31));
}  
/**  
@@ -109,7 +90,7 @@*/
*/
static inline __u32 ror32(__u32 word, unsigned int shift)
{  
-    return (word >> shift) | (word << (32 - shift));
+    return (word >> (shift & 31)) | (word << ((-shift) & 31));
}  
/**  
@@ -119,7 +100,7 @@*/
*/
static inline __u16 rol16(__u16 word, unsigned int shift)
{  
-    return (word << shift) | (word >> (16 - shift));
+    return (word << (shift & 15)) | (word >> ((-shift) & 15));
}  
/**  
@@ -129,7 +110,7 @@*/
*/
static inline __u16 ror16(__u16 word, unsigned int shift)
{  
-    return (word >> shift) | (word << (16 - shift));
+    return (word >> (shift & 15)) | (word << ((-shift) & 15));
static inline __u8 rol8(__u8 word, unsigned int shift)
{
    return (word << shift) | (word >> (8 - shift));
}

static inline __u8 ror8(__u8 word, unsigned int shift)
{
    return (word >> (shift & 7)) | (word << ((-shift) & 7));
}

#define set_mask_bits(ptr, mask, bits)
({
    const typeof(*ptr) mask___ = (mask), bits___ = (bits);
    typeof(*(ptr)) old__, new__;
    do {
        old__ = READ_ONCE(*(ptr));
        new__ = (old__ & ~mask___) | bits___;
    } while (cmpxchg(ptr, old__, new__) != old__); 
    new__;
}

#define set_mask_bits(ptr, _mask, _bits)
({
    const typeof(*ptr) mask = (_mask), bits = (_bits);
    typeof(*ptr) old, new;
    do {
        old = READ_ONCE(*ptr);
        new = (old & ~mask) | bits;
    } while (cmpxchg(ptr, old, new) != old);
    new;
})

#ifdef __KERNEL__

#endif

--- linux-4.15.0.orig/include/linux/bitrev.h
+++ linux-4.15.0/include/linux/bitrev.h

```c
#define __constant_bitrev32(x)\n  ({\n    u32 __x = x;\n    __x = (__x >> 16) | (__x << 16);\n    __x = ((__x & (u32)0xFF00FF00UL) >> 8) | ((__x & (u32)0x00FF00FFUL) << 8);\n    __x = ((__x & (u32)0xF0F0F0F0UL) >> 4) | ((__x & (u32)0x0F0F0F0FUL) << 4);\n    __x = ((__x & (u32)0xCCCCCCCCUL) >> 2) | ((__x & (u32)0x33333333UL) << 2);\n    __x = ((__x & (u32)0xAAAAAAAAUL) >> 1) | ((__x & (u32)0x55555555UL) << 1);\n    __x;\n  })

#define __constant_bitrev16(x)\n  ({\n    u16 __x = x;\n    __x = (__x >> 8) | (__x << 8);\n    __x = ((__x & (u16)0xF0F0U) >> 4) | ((__x & (u16)0x0F0FU) << 4);\n    __x = ((__x & (u16)0xCCCCU) >> 2) | ((__x & (u16)0x3333U) << 2);\n    __x = ((__x & (u16)0xAAAAU) >> 1) | ((__x & (u16)0x5555U) << 1);\n    __x;\n  })

#define __constant_bitrev8x4(x)\n  ({\n    u32 __x = x;\n    __x = ((__x & (u32)0xF0F0F0F0UL) >> 4) | ((__x & (u32)0x0F0F0F0FUL) << 4);\n    __x = ((__x & (u32)0xCCCCCCCCUL) >> 2) | ((__x & (u32)0x33333333UL) << 2);\n    __x = ((__x & (u32)0xAAAAAAAAUL) >> 1) | ((__x & (u32)0x55555555UL) << 1);\n    __x;\n  })
```

```c
#define __constant_bitrev8(x) 
{"\n  u8 __x = x;\n  __x = ((__x >> 4) | ((__x << 4));
  __x = ((__x & (u8)0xCCU) >> 2) | ((__x & (u8)0x33U) << 2);
  __x = ((__x & (u8)0xAAU) >> 1) | ((__x & (u8)0x55U) << 1);
  __x;\n"
 }

#define bitrev32(x) 
--- linux-4.15.0.orig/include/linux/bits.h
+++ linux-4.15.0/include/linux/bits.h
@@ -0,0 +1,26 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef __LINUX_BITS_H
+#define __LINUX_BITS_H
+#include <asm/bitsperlong.h>
+
+#define BIT(nr)  (1UL << (nr))
+#define BIT_ULL(nr)  (1ULL << (nr))
+#define BIT_MASK(nr)  (1UL << ((nr) % BITS_PER_LONG))
+#define BIT_WORD(nr)  ((nr) / BITS_PER_LONG)
+#define BIT_ULL_MASK(nr)  (1ULL << ((nr) % BITS_PER_LONG_LONG))
+#define BIT_ULL_WORD(nr)  ((nr) / BITS_PER_LONG_LONG)
+#define BITS_PER_BYTE 8
+
+/*
 * Create a contiguous bitmask starting at bit position @l and ending at
 * position @h. For example
 * GENMASK_ULL(39, 21) gives us the 64bit vector 0x000000ffffe00000.
 */
+#define GENMASK(l, h) 
+((~0ULL) - (1ULL << (l)) + 1) & (~0ULL >> (BITS_PER_LONG_LONG - 1 - (h)))
+
+#define GENMASK_ULL(l, h) 
+((~0ULL) - (1ULL << (l)) + 1) & (~0ULL >> (BITS_PER_LONG_LONG - 1 - (h)))
+
+#endif /*__LINUX_BITS_H */
--- linux-4.15.0.orig/include/linux/blk-cgroup.h
+++ linux-4.15.0/include/linux/blk-cgroup.h
```

---

Open Source Used In 5GaaS Edge AC-4 31993
### blkg_lookup - look up blkg for the specified request queue

- **@q**: request_queue of interest

**Look up blkg for @q at the root level. See also blkg_lookup().
**

```c
static inline struct blkcg_gq *blkg_root_lookup(struct request_queue *q) {
	struct blkcg_gq *blkg;

+rcu_read_lock();
+blkg = blkg_lookup(&blkcg_root, q);
+rcu_read_unlock();
+
+return blkg;
+
+/

* blkg_to_pdata - get policy private data
* @blkg: blkg of interest
* @pol: policy of interest
@@ -734,6 +751,7 @@
#ifdef CONFIG_BLOCK
static inline struct blkcg_gq *blkg_lookup(struct blkcg *blkcg, void *key) { return NULL; }
+static inline struct blkcg_gq *blkg_root_lookup(struct request_queue *q) { return NULL; }
static inline int blkcg_init_queue(struct request_queue *q) { return 0; }
static inline void blkcg_drain_queue(struct request_queue *q) { }
static inline void blkcg_exit_queue(struct request_queue *q) { }
--- linux-4.15.0.orig/include/linux/blk-mq.h
+++ linux-4.15.0/include/linux/blk-mq.h
@@ -32,9 +32,10 @@
struct sbitmap		ctx_map;
struct blk_mq_ctx	*dispatch_from;
+unsigned int	dispatch_busy;
-struct blk_mq_ctx**ctxs;
unsigned intnr_ctx;
+struct blk_mq_ctx**ctxs;
wait_queue_entry_t	dispatch_wait;
atomic_t		wait_index;
--- linux-4.15.0.orig/include/linux/blk_types.h
+++ linux-4.15.0/include/linux/blk_types.h
struct blk_mq_ctx*dispatch_from;
+unsigned intdispatch_busy;
-struct blk_mq_ctx**ctxs;
unsigned intnr_ctx;
+struct blk_mq_ctx**ctxs;
wait_queue_entry_tdispatch_wait;
atomic_rwlock_twait_index;
```
/*
 * Block error status values. See block/blk-core/blk_errors for the details.
 * Alpha cannot write a byte atomically, so we need to use 32-bit value.
 */
#if defined(CONFIG_ALPHA) && !defined(__alpha_bwx__)
typedef u32 __bitwise blk_status_t;
#else
typedef u8 __bitwise blk_status_t;
#endif
#define BLK_STS_OK 0
#define BLK_STS_NOTSUPP ((__force blk_status_t)1)
#define BLK_STS_TIMEOUT ((__force blk_status_t)2)
#define BLK_STS_AGAIN ((__force blk_status_t)12)

+#/*
 * BLK_STS_DEVRESOURCE is returned from the driver to the block layer if
 * device related resources are unavailable, but the driver can guarantee
 * that the queue will be rerun in the future once resources become
 * available again. This is typically the case for device specific
 * resources that are consumed for IO. If the driver fails allocating these
 * resources, we know that inflight (or pending) IO will free these
 * resource upon completion.
 * This is different from BLK_STSRESOURCE in that it explicitly references
 * a device specific resource. For resources of wider scope, allocation
 * failure can happen without having pending IO. This means that we can't
 * rely on request completions freeing these resources, as IO may not be in
 * flight. Examples of that are kernel memory allocations, DMA mappings, or
 * any other system wide resources.
 */
+#define BLK_STS_DEVRESOURCE ((__force blk_status_t)13)
+
+struct blk_issue_stat {
  u64 stat;
};
unsigned int io_opt;
@@ -354,7 +355,6 @@
unsigned int discard_granularity;
unsigned int discard_alignment;

-unsigned short logical_block_size;
unsigned short max_segments;
unsigned short max_integrity_segments;
unsigned short discard_segments;
@@ -570,7 +570,7 @@
unsigned int sg_reserved_size;
int node;
#ifdef CONFIG_BLK_DEV_IO_TRACE
-struct blk_trace *blk_trace;
+struct blk_trace __rcu *blk_trace;
struct mutex blk_trace_mutex;
#endif
/*
 @@ -753,6 +753,7 @@
#define blk_queue_quiesced(q) test_bit(QUEUE_FLAG_QUIESCED, &(q)->queue_flags)
#define blk_queue_preempt_only(q) 
 test_bit(QUEUE_FLAG_PREEMPT_ONLY, &(q)->queue_flags)
 +#define blk_queue_fua(q) test_bit(QUEUE_FLAG_FUA, &(q)->queue_flags)

 extern int blk_set_preempt_only(struct request_queue *q);
 extern void blk_clear_preempt_only(struct request_queue *q);
@@ -1012,6 +1013,19 @@
}

/*
 + * The basic unit of block I/O is a sector. It is used in a number of contexts
 + * in Linux (blk, bio, genhd). The size of one sector is 512 = 2**9
 + * bytes. Variables of type sector_t represent an offset or size that is a
 + * multiple of 512 bytes. Hence these two constants.
 + */
 +#ifndef SECTOR_SHIFT
 +#define SECTOR_SHIFT 9
 +#endif
 +#ifndef SECTOR_SIZE
 +#define SECTOR_SIZE (1 << SECTOR_SHIFT)
 +#endif
 +
 +/*
 * blk_rq_pos(): the current sector
 * blk_rq_bytes(): bytes left in the entire request
 * blk_rq_cur_bytes(): bytes left in the current segment
 @@ -1038,12 +1052,12 @@
static inline unsigned int blk_rq_sectors(const struct request *rq) {
  return blk_rq_bytes(rq) >> 9;
}

static inline unsigned int blk_rq_cur_sectors(const struct request *rq) {
  return blk_rq_bytes(rq) >> SECTOR_SHIFT;
}

/*
@@ -1063,7 +1077,8 @@
  int op)
  
  if (unlikely(op == REQ_OP_DISCARD || op == REQ_OP_SECURE_ERASE))
-    return min(q->limits.max_discard_sectors, UINT_MAX >> 9);
+    return min(q->limits.max_discard_sectors,
+              UINT_MAX >> SECTOR_SHIFT);

  if (unlikely(op == REQ_OP_WRITE_SAME))
    return q->limits.max_write_same_sectors;
@@ -1084,8 +1099,8 @@
  if (!q->limits.chunk_sectors)
    return q->limits.max_sectors;

-    return q->limits.chunk_sectors -
-    (offset & (q->limits.chunk_sectors - 1));
+    return min(q->limits.max_sectors, (unsigned int)(q->limits.chunk_sectors -
+              (offset & (q->limits.chunk_sectors - 1))));
  }

static inline unsigned int blk_rq_get_max_sectors(struct request *rq, 
@@ -1176,7 +1191,7 @@
    unsigned int max_write_same_sectors);
 extern void blk_queue_max_write_zeroes_sectors(struct request_queue *q, 
    unsigned int max_write_same_sectors);
-extern void blk_queue_logical_block_size(struct request_queue *, unsigned short);
+extern void blk_queue_logical_block_size(struct request_queue *, unsigned int);
 extern void blk_queue_physical_block_size(struct request_queue *, unsigned int);
 extern void blk_queue_alignment_offset(struct request_queue *q, 
    unsigned int alignment);
@@ -1374,16 +1389,21 @@
 static inline int sb_issue_discard(struct super_block *sb, sector_t block, 
    sector_t nr_blocks, gfp_t gfp_mask, unsigned long flags)
  
-    return blkdev_issue_discard(sb->s_bdev, block << (sb->s_blocksize_bits - 9),
nr_blocks << (sb->s_blocksize_bits - 9),
+ return blkdev_issue_discard(sb->s_bdev,
+ block << (sb->s_blocksize_bits -
+ SECTOR_SHIFT),
+ nr_blocks << (sb->s_blocksize_bits -
+ SECTOR_SHIFT),
    gfp_mask, flags);
}
static inline int sb_issue_zeroout(struct super_block *sb, sector_t block,
sector_t nr_blocks, gfp_t gfp_mask)
{
return blkdev_issue_zeroout(sb->s_bdev,
- block << (sb->s_blocksize_bits - 9),
- nr_blocks << (sb->s_blocksize_bits - 9),
+ block << (sb->s_blocksize_bits -
+ SECTOR_SHIFT),
+ nr_blocks << (sb->s_blocksize_bits -
+ SECTOR_SHIFT),
    gfp_mask, 0);
}

return q->limits.max_segment_size;
}

static inline unsigned short queue_logical_block_size(struct request_queue *q)
{
int retval = 512;

return retval;
}

- static inline unsigned short bdev_logical_block_size(struct block_device *bdev)
+ static inline unsigned int bdev_logical_block_size(struct block_device *bdev)
{
return queue_logical_block_size(bdev_get_queue(bdev));
}

static inline int queue_limit_alignment_offset(struct queue_limits *lim, sector_t sector)
{
unsigned int granularity = max(lim->physical_block_size, lim->io_min);
-unsigned int alignment = sector_div(sector, granularity >> 9) << 9;
+unsigned int alignment = sector_div(sector, granularity >> SECTOR_SHIFT)
+<< SECTOR_SHIFT;

return (granularity + lim->alignment_offset - alignment) % granularity;
return 0;

/* Why are these in bytes, not sectors? */
alignment = lim->discard_alignment >> SECTOR_SHIFT;
+granularity = lim->discard_granularity >> SECTOR_SHIFT;
if (!granularity)
    return 0;

offset = (granularity + alignment - offset) % granularity;

/* Turn it back into bytes, gaah */
-return offset << 9;
+return offset << SECTOR_SHIFT;
}

static inline int bdev_discard_alignment(struct block_device *bdev)
--- linux-4.15.0.orig/include/linux/blktrace_api.h
+++ linux-4.15.0/include/linux/blktrace_api.h
@@ -51,9 +51,13 @@
#endif
#define blk_add_cgroup_trace_msg(q, cg, fmt, ...)
        
-struct blk_trace *bt = (q)->blk_trace;
-        
-        
+struct blk_trace *bt;
+
+rcu_read_lock();
+bt = rcu_dereference((q)->blk_trace);
+if (unlikely(bt))
+__trace_note_message(bt, cg, fmt, ##__VA_ARGS__);
+rcu_read_unlock();
} while (0)
#define blk_add_trace_msg(q, fmt, ...)
        blk_add_cgroup_trace_msg(q, NULL, fmt, ##__VA_ARGS__)
@@ -61,10 +65,14 @@
static inline bool blk_trace_note_message_enabled(struct request_queue *q)
        
-struct blk_trace *bt = q->blk_trace;
-        if (likely(!bt))
-            return false;
-        return bt->act_mask & BLK_TC_NOTIFY;
+struct blk_trace *bt;
+bool ret;
+rcu_read_lock();
+bt = rcu_dereference(q->blk_trace);
+ret = bt && (&bt->act_mask & BLK_TC_NOTIFY);
+rcu_read_unlock();
+return ret;
}

extern void blk_add_driver_data(struct request_queue *q, struct request *rq,
@@ -116,7 +124,13 @@
static inline sector_t blk_rq_trace_sector(struct request *rq)
{
    return blk_rq_is_passthrough(rq) ? 0 : blk_rq_pos(rq);
+/
+    /* Tracing should ignore starting sector for passthrough requests and
+    requests where starting sector didn’t get set.
+    */
+    if (blk_rq_is_passthrough(rq) || blk_rq_pos(rq) == (sector_t)-1)
+    return 0;
+    return blk_rq_pos(rq);
}

static inline unsigned int blk_rq_trace_nr_sectors(struct request *rq)
--- linux-4.15.0.orig/include/linux/bpf.h
+++ linux-4.15.0/include/linux/bpf.h
@@ -24,10 +24,13 @@
/* map is generic key/value storage optionally accesible by eBPF programs */
struct bpf_map_ops {
    /* funcs callable from userspace (via syscall) */
    int (*map_alloc_check)(union bpf_attr *attr);
+    struct bpf_map *(*map_alloc)(union bpf_attr *attr);
    struct bpf_map *(*map_release)(struct bpf_map *map, struct file *map_file);
    void (*map_free)(struct bpf_map *map);
    int (*map_get_next_key)(struct bpf_map *map, void *key, void *next_key);
+    void (*map_release_uref)(struct bpf_map *map);
+    void *(*map_lookup_elem_sys_only)(struct bpf_map *map, void *key);

    /* funcs callable from userspace and from eBPF programs */
    void *(*map_lookup_elem)(struct bpf_map *map, void *key);
@@ -384,7 +387,6 @@
    int bpf_fd_array_map_update_elem(struct bpf_map *map, struct file *map_file,
        void *key, void *value, u64 map_flags);
    int bpf_fd_array_map_lookup_elem(struct bpf_map *map, void *key, u32 *value);
-    void (*map_release_uref)(struct bpf_map *map);
    int bpf_fd_htab_map_update_elem(struct bpf_map *map, struct file *map_file,
        void *key, void *value, u64 map_flags);
    int bpf_fd_htab_map_lookup_elem(struct bpf_map *map, void *key, u32 *value);

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struct bpf_map *map_ptr;
+
+/* Max size from any of the above. */
+unsigned long raw;
+
/* Fixed part of pointer offset, pointer types only */
s32 off;
@@ -99,6 +102,7 @@
struct bpf_verifier_state {
  struct bpf_reg_state regs[MAX_BPF_REG];
  struct bpf_verifier_state *parent;
+
  bool speculative;
  int allocated_stack;
  struct bpf_stack_state *stack;
};
@@ -109,13 +113,25 @@
struct bpf_verifier_state_list *next;
}

+/* Possible states for alu_state member. */
+#define BPF_ALU_SANITIZE_SRC	(1U << 0)
+#define BPF_ALU_SANITIZE_DST	(1U << 1)
+#define BPF_ALU_NEG_VALUE	(1U << 2)
+#define BPF_ALU_NON_POINTER	(1U << 3)
+#define BPF_ALU_IMMEDIATE	(1U << 4)
+>{!!
+  BPF_ALU_SANITIZE_BPF_ALU_SANITIZE_SRC |
+  BPF_ALU_SANITIZE_DST)
+
struct bpf_insn_aux_data {
  union {
    enum bpf_reg_type ptr_type; /* pointer type for load/store insns */
    -struct bpf_map *map_ptr; /* pointer for call insn into lookup_elem */
    unsigned long map_state; /* pointer/poison value for maps */
    u32 alu_limit; /* limit for add/sub register with pointer */
  };
  int ctx_field_size; /* the ctx field size for load insn, maybe 0 */
  +int sanitize_stack_off; /* stack slot to be cleared */
  bool seen; /* this insn was processed by the verifier */
  +u8 alu_state; /* used in combination with alu_limit */
};

#define MAX_USED_MAPS 64 /* max number of maps accessed by one eBPF program */
@@ -145,6 +161,8 @@
* one verifier_env per bpf_check() call
*/

struct bpf_verifier_env {
  u32 insn_idx;
  u32 prev_insn_idx;
  struct bpf_prog *prog; /* eBPF program being verified */
  const struct bpf_verifier_ops *ops;
  struct bpf_verifier_stack_elem *head; /* stack of verifier states to be processed */

  --- linux-4.15.0.orig/include/linux/buffer_head.h
  +++ linux-4.15.0/include/linux/buffer_head.h
  @@ -187,6 +187,8 @@
    void __brelse(struct buffer_head *);
    void __bforget(struct buffer_head *);
    void __breadahead(struct block_device *, sector_t block, unsigned int size);
    +void __breadahead_gfp(struct block_device *, sector_t block, unsigned int size,
    +  gfp_t gfp);
    struct buffer_head *__bread_gfp(struct block_device *,
    +  gfp_t gfp);
    struct buffer_head *)__bread_gfp(struct block_device *,
    +  sector_t block, unsigned size, gfp_t gfp);
    void invalidate_bh_lrus(void);
    @@ -319,6 +321,12 @@
    __breadahead(sb->s_bdev, block, sb->s_blocksize);
  }

  +static inline void
  +sb_breadahead_unmovable(struct super_block *sb, sector_t block)
  +{
    +__breadahead_gfp(sb->s_bdev, block, sb->s_blocksize, 0);
    +}
  +
  +static inline struct buffer_head *
  +sb_getblk(struct super_block *sb, sector_t block)
  +{
    +__breadahead_gfp(sb->s_bdev, block, sb->s_blocksize, 0);
  }

  #else/* !CONFIG_GENERIC_BUG */

  +static inline void *find_bug(unsigned long bugaddr)
  +{
    +return NULL;
  +}

  +static inline enum bug_trap_type report_bug(unsigned long bug_addr,
    struct pt_regs *regs)
  +{
    +

  #endif

--- linux-4.15.0.orig/include/linux/bug.h
+++ linux-4.15.0/include/linux/bug.h
@@ -47,6 +47,11 @@

    +static inline void *find_bug(unsigned long bugaddr)
    +{
    +return NULL;
    +}

    +static inline enum bug_trap_type report_bug(unsigned long bug_addr,
    +struct pt_regs *regs)
    +{
    +

--- linux-4.15.0.orig/include/linux/build_bug.h
+++ linux-4.15.0/include/linux/build_bug.h

#ifndef __GENKSYMS__
/* genksyms gets confused by _Static_assert */
#define _Static_assert(expr, ...)
#endif

#endif /* __LINUX_BUILD_BUG_H */
--- linux-4.15.0.orig/include/linux/bvec.h
+++ linux-4.15.0/include/linux/bvec.h
@@ -119,10 +119,17 @@
 return true;
 }

+static inline void bvec_iter_skip_zero_bvec(struct bvec_iter *iter)
+{
+    iter->bi_bvec_done = 0;
+    iter->bi_idx++;
+}
+
+#define for_each_bvec(bvl, bio_vec, iter, start)
#     for (iter = (start);
#      (iter).bi_size &&
#      ((bvl = bvec_iter_bvec((bio_vec), (iter))), 1);
-     bvec_iter_advance((bio_vec), &(iter), (bvl).bv_len))
+     (bvl).bv_len ? (void)bvec_iter_advance((bio_vec), &(iter),
+               (bvl).bv_len) : bvec_iter_skip_zero_bvec(&(iter)))

#endif /* __LINUX_BVEC_ITER_H */
--- linux-4.15.0.orig/include/linux/cacheinfo.h
+++ linux-4.15.0/include/linux/cacheinfo.h
@@ -34,9 +34,8 @@
 * @shared_cpu_map: logical cpumask representing all the cpus sharing
 *     this cache node
 * @attributes: bitfield representing various cache attributes
- * @of_node: if devicetree is used, this represents either the cpu node in
- *     case there's no explicit cache node or the cache node itself in the
- *     device tree
+ * @fw_token: Unique value used to determine if different cacheinfo
+ *     structures represent a single hardware cache instance.
 * @disable_sysfs: indicates whether this node is visible to the user via
 *     sysfs or not
 * @priv: pointer to any private data structure specific to particular
@@ -65,8 +64,7 @@
 #define CACHE_ALLOCATE_POLICY_MASK
 (CACHE_READ_ALLOCATE | CACHE_WRITE_ALLOCATE)
#define CACHE_ID BIT(4)
-
-struct device_node *of_node;
+void *fw_token;
bool disable_sysfs;
void *priv;
};
@@ -78,27 +76,26 @@
bool cpu_map_populated;
};

-/*
- * Helpers to make sure "func" is executed on the cpu whose cache
- * attributes are being detected
- */
-#define DEFINE_SMP_CALL_CACHE_FUNCTION(func)
- static inline void _##func(void *ret)
- {
- int cpu = smp_processor_id();
- *(int *)ret = __##func(cpu);
- }

-\int func(unsigned int cpu)\n-
-\int ret;\n-
smp_call_function_single(cpu, __##func, &ret, true);\n-return ret;\n-
-
-struct cpu_cacheinfo *get_cpu_cacheinfo(unsigned int cpu);
-int init_cache_level(unsigned int cpu);
-int populate_cache_leaves(unsigned int cpu);
+int cache_setup_acpi(unsigned int cpu);
+#ifndef CONFIG_ACPI
+/*
+ * acpi_find_last_cache_level is only called on ACPI enabled
+ * platforms using the PPTT for topology. This means that if
+ * the platform supports other firmware configuration methods
+ * we need to stub out the call when ACPI is disabled.
+ * ACPI enabled platforms not using PPTT won't be making calls
+ * to this function so we need not worry about them.
+ */
+static inline int acpi_find_last_cache_level(unsigned int cpu)
+{
+ return 0;
+}
+#else
+int acpi_find_last_cache_level(unsigned int cpu);
const struct attribute_group *cache_get_priv_group(struct cacheinfo *this_leaf);

/*
 * @ @ -90,6 +91,36 @@
 * #define get_can_dlc(i)(min_t(__u8, (i), CAN_MAX_DLC))
 * #define get_canfd_dlc(i)(min_t(__u8, (i), CANFD_MAX_DLC))
 *
 * Check for outgoing skbs that have not been created by the CAN subsystem */
 * +static inline bool can_skb_headroom_valid(struct net_device *dev,
 * + struct sk_buff *skb)
 * +{
 * +/* af_packet creates a headroom of HH_DATA_MOD bytes which is fine */
 * +if (WARN_ON_ONCE(skb_headroom(skb) < sizeof(struct can_skb_priv)))
 * +return false;
 * +
 * +/* af_packet does not apply CAN skb specific settings */
 * +if (skb->ip_summed == CHECKSUM_NONE) {
 * +/* init headroom */
 * +can_skb_prv(skb)->ifindex = dev->ifindex;
 * +can_skb_prv(skb)->skbcnt = 0;
 * +
 * +skb->ip_summed = CHECKSUM_UNNECESSARY;
 * +
 * +/* preform proper loopback on capable devices */
 * +if (dev->flags & IFF_ECHO)
 * +skb->pkt_type = PACKET_LOOPBACK;
 * +else
 * +skb->pkt_type = PACKET_HOST;
 * +
 * +skb.reset_mac_header(skb);
 * +skb.reset_network_header(skb);
 * +skb.reset_transport_header(skb);
 * +}
 * +
 * +return true;
 * +}
 * +
 */
/* Drop a given socketbuffer if it does not contain a valid CAN frame. */
static inline bool can_dropped_invalid_skb(struct net_device *dev,
    struct sk_buff *skb)
@@ -107,6 +138,9 @@
} else
    goto inval_skb;

+if (!can_skb_headroom_valid(dev, skb))
+    goto inval_skb;
  return false;

inval_skb:
@@ -163,6 +197,7 @@
void can_put_echo_skb(struct sk_buff *skb, struct net_device *dev,
    unsigned int idx);
+struct sk_buff *__can_get_echo_skb(struct net_device *dev, unsigned int idx, u8 *len_ptr);
unsigned int can_get_echo_skb(struct net_device *dev, unsigned int idx);
void can_free_echo_skb(struct net_device *dev, unsigned int idx);

--- linux-4.15.0.orig/include/linux/can/rx-offload.h
+++ linux-4.15.0/include/linux/can/rx-offload.h
@@ -41,7 +41,12 @@
int can_rx_offload_add_fifo(struct net_device *dev, struct can_rx_offload *offload, unsigned int weight);
int can_rx_offload_irq_offload_timestamp(struct can_rx_offload *offload, u64 reg);
int can_rx_offload_irq_offload_fifo(struct can_rx_offload *offload);
-int can_rx_offload_irq_queue_err_skb(struct can_rx_offload *offload, struct sk_buff *skb);
+int can_rx_offload_queue_sorted(struct can_rx_offload *offload,
+    struct sk_buff *skb, unsigned int idx, u32 timestamp);
+unsigned int can_rx_offload_get_echo_skb(struct can_rx_offload *offload,
+    unsigned int idx, u32 timestamp);
+int can_rx_offload_queue_tail(struct can_rx_offload *offload,
+    struct sk_buff *skb);  
void can_rx_offload_reset(struct can_rx_offload *offload);
void can_rx_offload_del(struct can_rx_offload *offload);
void can_rx_offload_enable(struct can_rx_offload *offload);
--- linux-4.15.0.orig/include/linux/can/skb.h
+++ linux-4.15.0/include/linux/can/skb.h
@@ -49,8 +49,12 @@
static inline void can_skb_set_owner(struct sk_buff *skb, struct sock *sk)
    -if (sk) {
        sock_hold(sk);
+      /* If the socket has already been closed by user space, the
+         * refcount may already be 0 (and the socket will be freed
+         * after the last TX skb has been freed). So only increase

+ * socket refcount if the refcount is > 0.
+ */
+if (sk && refcount_inc_not_zero(&sk->sk_refcnt)) {
    skb->destructor = sock_efree;
    skb->sk = sk;
}
@@ -61,21 +65,17 @@
*/
static inline struct sk_buff *can_create_echo_skb(struct sk_buff *skb)
{
    if (skb_shared(skb)) {
-        struct sk_buff *nskb = skb_clone(skb, GFP_ATOMIC);
+        struct sk_buff *nskb;
            if (likely(nskb)) {
                can_skb_set_owner(nskb, skb->sk);
                consume_skb(skb);
                return nskb;
            } else {
                kfree_skb(skb);
                return NULL;
            }
        +nskb = skb_clone(skb, GFP_ATOMIC);
+    } else if (unlikely(!nskb)) {
+        kfree_skb(skb);
+        return NULL;
    }
-    /* we can assume to have an unshared skb with proper owner */
-    return skb;
-    can_skb_set_owner(nskb, skb->sk);
-    consume_skb(skb);
-    return nskb;
    }"
enum ccp_aes_mode mode;
enum ccp_aes_action action;

+u32 authsize;
+
struct scatterlist *key;

u32 key_len;/* In bytes */

int (*update_authorizer)(struct ceph_auth_client *ac, int peer_type,
                        struct ceph_auth_handshake *auth);

int (*add_authorizer_challenge)(struct ceph_auth_client *ac,
                                struct ceph_authorizer *a,
                                void *challenge_buf,
                                int challenge_buf_len);

int (*verify_authorizer_reply)(struct ceph_auth_client *ac,
                               struct ceph_authorizer *a);

void (*invalidate_authorizer)(struct ceph_auth_client *ac,
                              int peer_type,
                              struct ceph_auth_handshake *a);

int ceph_auth_add_authorizer_challenge(struct ceph_auth_client *ac,
                                        struct ceph_authorizer *a,
                                        void *challenge_buf,
                                        int challenge_buf_len);

int ceph_auth_verify_authorizer_reply(struct ceph_auth_client *ac,
                                      struct ceph_authorizer *a);

int ceph_auth_invalidate_authorizer(struct ceph_auth_client *ac,
                                    int peer_type,
                                    struct ceph_auth_handshake *a);

int ceph_decode_buffer(struct ceph_buffer **b, void **p, void *end);

static inline void ceph_buffer_put(struct ceph_buffer *b)
{
    -kref_put(&b->kref, ceph_buffer_release);
    if (b)
        +kref_put(&b->kref, ceph_buffer_release);
}

int ceph_decode_buffer(struct ceph_buffer **b, void **p, void *end);

--- linux-4.15.0.orig/include/linux/ceph/buffer.h
+++ linux-4.15.0/include/linux/ceph/buffer.h
@@ @ -30,7 +30,8 @@
DEFINE_CEPH_FEATURE(59, 1, FS_BTIME)
DEFINE_CEPH_FEATURE(59, 1, FS_CHANGE_ATTR) // overlap
DEFINE_CEPH_FEATURE(59, 1, MSG_ADDR2) // overlap
-DEFINE_CEPH_FEATURE(60, 1, BLKIN_TRACING) // *do not share this bit*
+DEFINE_CEPH_FEATURE(60, 1, OSD_RECOVERY_DELETES) // *do not share this bit*
+DEFINE_CEPH_FEATURE(61, 1, CEPHX_V2) // *do not share this bit*
-DEFINE_CEPH_FEATURE(61, 1, RESERVED2) // unused, but slow down!
DEFINE_CEPH_FEATURE(62, 1, RESERVED) // do not use; used as a sentinal
DEFINE_CEPH_FEATURE_DEPRECATED(63, 1, RESERVED_BROKEN, LUMINOUS) // client-facing

@@ -204,12 +204,14 @@
CEPH_FEATURE_OSD_PRIMARY_AFFINITY |	|
-CEPH_FEATURE_MSGR_KEEPALIVE2 |
CEPH_FEATURE_OSD_POOLRESEND |	+	CEPH_FEATURE_MDS_QUOTA |
CEPH_FEATURE_CRUSH_V4 |
CEPH_FEATURE_NEW_OSDOP_ENCodings |
CEPH_FEATURE_SERVER_JEWEL |
CEPH_FEATURE_MON_STATEFUL_SUB |
CEPH_FEATURE_CRUSH_TUNABLES5 |
- CEPH_FEATURE_NEW_OSDOPREPLY_ENCODING
+ CEPH_FEATURE_NEW_OSDOPREPLY_ENCODING |
+ CEPH_FEATURE_CEPHX_V2)

#define CEPH_FEATURES_REQUIRED_DEFAULT \
(CEPH_FEATURE_NOSRCADDR |
--- linux-4.15.0.orig/include/linux/ceph/ceph_fs.h
+++ linux-4.15.0/include/linux/ceph/ceph_fs.h
@@ -134,6 +134,7 @@
#define CEPH_MSG_CLIENT_LEASE           0x311
#define CEPH_MSG_CLIENT_SNAP            0x312
#define CEPH_MSG_CLIENT_CAPRELEASE      0x313
+#define CEPH_MSG_CLIENT_QUOTA           0x314
/* pool ops */
#define CEPH_MSG_POOLOP_REPLY           48
@@ -807,4 +808,20 @@
} __attribute__ ((packed));
/* followed by my snap list, then prior parent snap list */

+/*
+ * quotas
+ */
+struct ceph_mds_quota {
+ __le64 ino;/* ino */
+ __le64 rbytes;/* dir stats */
*/
+__le64 rfiles;
+__le64 rsubdirs;
+__u8 struct_v;/* compat */
+__u8 struct_compat;
+__le32 struct_len;
+__le64 max_bytes;/* quota max. bytes */
+__le64 max_files;/* quota max. files */
+} __attribute__ ((packed));
+
#endif
--- linux-4.15.0.orig/include/linux/ceph/libceph.h
+++ linux-4.15.0/include/linux/ceph/libceph.h
@@ -81,7 +81,13 @@
#define CEPH_MSG_MAX_FRONT_LEN (16*1024*1024)
#define CEPH_MSG_MAX_MIDDLE_LEN (16*1024*1024)
-#define CEPH_MSG_MAX_DATA_LEN (16*1024*1024)
+
+/*
+ * Handle the largest possible rbd object in one message.
+ * There is no limit on the size of cephfs objects, but it has to obey
+ * rsize and wsize mount options anyway.
+ */
+#define CEPH_MSG_MAX_DATA_LEN (32*1024*1024)
#define CEPH_AUTH_NAME_DEFAULT "guest"

@@ -285,6 +291,8 @@
extern int __ceph_open_session(struct ceph_client *client,
    unsigned long started);
extern int ceph_open_session(struct ceph_client *client);
+int ceph_wait_for_latest_osdmap(struct ceph_client *client,
+    unsigned long timeout);
/* pagevec.c */
extern void ceph_release_page_vector(struct page **pages, int num_pages);
--- linux-4.15.0.orig/include/linux/ceph/messenger.h
+++ linux-4.15.0/include/linux/ceph/messenger.h
@@ -31,6 +31,9 @@
struct ceph_auth_handshake *(*get_authorizer) (struct ceph_connection *con,
     int *proto, int force_new);
int (*add_authorizer_challenge)(struct ceph_connection *con,
+void *challenge_buf,
+int challenge_buf_len);
int (*verify_authorizer_reply) (struct ceph_connection *con);
int (*invalidate_authorizer)(struct ceph_connection *con);
attempt for this connection, client */
    u32 peer_global_seq; /* peer's global seq for this connection */

+struct ceph_auth_handshake *auth;
int auth_retry; /* true if we need a newer authorizer */
-void *auth_reply_buf; /* where to put the authorizer reply */
-int auth_reply_buf_len;

struct mutex mutex;

--- linux-4.15.0.orig/include/linux/ceph/msgr.h
+++ linux-4.15.0/include/linux/ceph/msgr.h
@@ -91,7 +91,7 @@
#define CEPH_MSGR_TAG_SEQ           13 /* 64-bit int follows with seen seq number */
#define CEPH_MSGR_TAG_KEEPALIVE2    14 /* keepalive2 byte + ceph_timespec */
#define CEPH_MSGR_TAG_KEEPALIVE2_ACK 15 /* keepalive2 reply */
-+#define CEPH_MSGR_TAG_CHALLENGE_AUTHORIZER 16 /* cephx v2 doing server challenge */
+
/*
 * connection negotiation
--- linux-4.15.0.orig/include/linux/cgroup-defs.h
+++ linux-4.15.0/include/linux/cgroup-defs.h
@@ -202,6 +202,7 @@
*/
 struct list_head tasks;
 struct list_head mg_tasks;
 +struct list_head dying_tasks;

 /* all css_task_iters currently walking this cset */
 struct list_head task_iters;
 @@ -339,6 +340,11 @@
       */
       * Dying cgroups are cgroups which were deleted by a user,
       * but are still existing because someone else is holding a reference.
       * max_descendants is a maximum allowed number of descent cgroups.
       + *
       + * nr_descendants and nr_dying_descendants are protected
       + * by cgroup_mutex and css_set_lock. It's fine to read them holding
       + * any of cgroup_mutex and css_set_lock; for writing both locks
       + * should be held.
       */
   int nr_descendants;
   int nr_dying_descendants;
@@ -405,6 +411,7 @@
       */
       * specific task are charged to the dom_cgrp.
       */
   struct cgroup *dom_cgrp;
# Ifdef __LITTLE_ENDIAN
struct {
    u8 is_data;
    u8 unused : 6;
    u8 no_refcnt : 1;
    u8 padding;
    u16 prioidx;
    u32 classid;
} __packed;
#endif
u64 val;
/* updaters and return part of the previous pointer as the prioidx or
 * classid. Such races are short-lived and the result isn't critical.
 */
-static inline u16 sock_cgroup_prioidx(struct sock_cgroup_data *skcd)
+static inline u16 sock_cgroup_prioidx(const struct sock_cgroup_data *skcd)
{
    /* fallback to 1 which is always the ID of the root cgroup */
    return (skcd->is_data & 1) ? skcd->prioidx : 1;
}

-static inline u32 sock_cgroup_classid(struct sock_cgroup_data *skcd)
+static inline u32 sock_cgroup_classid(const struct sock_cgroup_data *skcd)

/* cgroup basic resource statistics */
struct cgroup_cpu_stat __percpu *cpu_stat;
void (*cancel_fork)(struct task_struct *task);
void (*fork)(struct task_struct *task);
void (*exit)(struct task_struct *task);
-void (*free)(struct task_struct *task);
+void (*release)(struct task_struct *task);
void (*bind)(struct cgroup_subsys_state *root_css);

bool early_init;1;
union {
    struct {
        u8 is_data;
    }
    struct {
        u8 unused ; 6;
        u8 no_refcnt ; 1;
        u8 padding ;
        u16 prioidx ;
        u32 classid ;
        u8 padding ;
        u8 unused ; 6;
        u8 no_refcnt ; 1;
        u8 is_data ;
    } __packed;
} __LITTLE_ENDIAN
u64 val;
/* updaters and return part of the previous pointer as the prioidx or
 * classid. Such races are short-lived and the result isn't critical.
 */
-static inline u16 sock_cgroup_prioidx(struct sock_cgroup_data *skcd)
+static inline u16 sock_cgroup_prioidx(const struct sock_cgroup_data *skcd)
{
    /* fallback to 1 which is always the ID of the root cgroup */
    return (skcd->is_data & 1) ? skcd->prioidx : 1;
}

-static inline u32 sock_cgroup_classid(struct sock_cgroup_data *skcd)
+static inline u32 sock_cgroup_classid(const struct sock_cgroup_data *skcd)
return (skcd->is_data & 1) ? skcd->classid : 0;

#define CSS_TASK_ITER_THREADED (1U << 1)
#define CSS_TASK_ITER_SKIPPED  (1U << 16)

struct css_task_iter {
    struct cgroup_subsys*ss;
    struct list_head*task_pos;
    struct list_head*tasks_head;
    struct list_head*mg_tasks_head;
    struct list_head*dying_tasks_head;
    struct list_head*cur_tasks_head;
    struct css_set*cur_cset;
    struct css_set*cur_dcset;
    struct task_struct*cur_task;
}

extern void cgroup_cancel_fork(struct task_struct *p);
extern void cgroup_post_fork(struct task_struct *p);
void cgroup_exit(struct task_struct *p);
void cgroup_release(struct task_struct *p);
int cgroup_init_early(void);

rcu_read_lock();
while (true) {
    css = task_css(task, subsys_id);
    -if (likely(css_tryget_online(css)))
    +/*
*/
+ * Can't use css_tryget_online() here. A task which has
+ * PF_EXITING set may stay associated with an offline css.
+ * If such task calls this function, css_tryget_online()
+ * will keep failing.
+ */
+if (likely(css_tryget(css)))
break;
cpu_relax();
}
@@ -669,6 +681,7 @@
static inline void cgroup_cancel_fork(struct task_struct *p) {}
static inline void cgroup_post_fork(struct task_struct *p) {}
static inline void cgroup_exit(struct task_struct *p) {}
+static inline void cgroup_release(struct task_struct *p) {}
static inline void cgroup_free(struct task_struct *p) {}

static inline int cgroup_init_early(void) { return 0; }
@@ -759,6 +772,7 @@
void cgroup_sk_alloc_disable(void);
void cgroup_sk_alloc(struct sock_cgroup_data *skcd);
+void cgroup_sk_clone(struct sock_cgroup_data *skcd);
void cgroup_sk_free(struct sock_cgroup_data *skcd);

static inline struct cgroup *sock_cgroup_ptr(struct sock_cgroup_data *skcd)
@@ -772,7 +786,7 @@
*/
 v = READ_ONCE(skcd->val);

 -if (v & 1)
 +if (v & 3)
 return &cgrp_dfl_root.cgrp;

 return (struct cgroup *) (unsigned long)v ?: &cgrp_dfl_root.cgrp;
@@ -784,6 +798,7 @@
#else /* CONFIG_CGROUP_DATA */

 static inline void cgroup_sk_alloc(struct sock_cgroup_data *skcd) {}
+static inline void cgroup_sk_clone(struct sock_cgroup_data *skcd) {}
 static inline void cgroup_sk_free(struct sock_cgroup_data *skcd) {}

 #endif/* CONFIG_CGROUP_DATA */
 --- linux-4.15.0.orig/include/linux/clk-provider.h
 +++ linux-4.15.0/include/linux/clk-provider.h
 @@ -412,7 +412,7 @@
 unsigned long divider_recalc_rate(struct clk_hw *hw, unsigned long parent_rate,
 unsigned int val, const struct clk_div_table *table,
long divider_round_rate_parent(struct clk_hw *hw, struct clk_hw *parent,
    unsigned long rate, unsigned long *prate,
    const struct clk_div_table *table,
unsigned long flags);
unsigned long flags, unsigned long width);
long divider_round_rate_parent(const struct clk_hw *hw, struct clk_hw *parent,
    unsigned long rate, unsigned long *prate,
    const struct clk_div_table *table,
unsigned long flags);
unsigned long clk_hw_get_rate(const struct clk_hw *hw);
unsigned long __clk_get_flags(struct clk *clk);
unsigned long clk_hw_get_flags(const struct clk_hw *hw);
+#define clk_hw_can_set_rate_parent(hw) \
  (clk_hw_get_flags((hw)) & CLK_SET_RATE_PARENT)
+
bool clk_hw_is_prepared(const struct clk_hw *hw);
bool clk_hw_is_enabled(const struct clk_hw *hw);
bool __clk_is_enabled(struct clk *clk);
unsigned long clk_hw_get_rate(const struct clk_hw *hw);

int __clk_determine_rate(struct clk_hw *core, struct clk_rate_request *req);
int __clk_mux_determine_rate_closest(struct clk_hw *hw,
    struct clk_rate_request *req);
int clk_mux_determine_rate_flags(struct clk_hw *hw,
    struct clk_rate_request *req,
+ unsigned long flags);
void clk_hw_reparent(struct clk_hw *hw, struct clk_hw *new_parent);
void clk_hw_set_rate_range(struct clk_hw *hw, unsigned long min_rate,
    unsigned long max_rate);

--- linux-4.15.0.orig/include/linux/coda.h
+++ linux-4.15.0/include/linux/coda.h
@@ -58,8 +58,7 @@
#ifndef _CODA_HEADER_
#define _CODA_HEADER_
#if defined(__linux__)
typedef unsigned long long u_quad_t;
-#endif
-#undef __linux__
#include <uapi/linux/coda.h>
@end

#include <uapi/linux/coda.h>
@end
--- linux-4.15.0.orig/include/linux/coda_psdev.h
+++ linux-4.15.0/include/linux/coda_psdev.h
@@ -19,6 +19,17 @@
    struct mutex	    vc_mutex;
    }

+/* messages between coda filesystem in kernel and Venus */
+struct upc_req {
+    struct list_head	uc_chain;
+    caddr_t			uc_data;
+    u_short			uc_flags;

-öffn Source Used In 5GasS Edge AC-4  32015
+u_shortuc_inSize; /* Size is at most 5000 bytes */
+u_shortuc_outSize;
+u_shortuc_opcode; /* copied from data to save lookup */
+intuc_unique;
+wait_queue_head_t uctuc_sleep; /* process' wait queue */
+
};

static inline struct venus_comm *coda_vcp(struct super_block *sb)
{

	/*
--- linux-4.15.0.orig/include/linux/compat.h
+++ linux-4.15.0/include/linux/compat.h
@ @-68,6 +68,9 @@
compat_size_t ss_size;
] compat_stack_t;
#endif
+#ifndef COMPAT_MINSIGSTKSZ
+#define COMPAT_MINSIGSTKSZ MINSIGSTKSZ
+#endif

#define compat_jiffies_to_clock_t(x)\((((unsigned long)(x) * COMPAT_USER_HZ) / HZ)\)
@@ -321,8 +324,6 @@
struct compat_mq_attr;
struct compat_msgbuf;

-extern void compat_exit_robust_list(struct task_struct *curr);
-
asmlinkage long
compat_sys_set_robust_list(struct compat_robust_list_head __user *head,
	compat_size_t len);
--- linux-4.15.0.orig/include/linux/compiler-clang.h
+++ linux-4.15.0/include/linux/compiler-clang.h
@@ -17,5 +17,24 @@
*/
#define __UNIQUE_ID(prefix) __PASTE(__PASTE(__UNIQUE_ID_, prefix), __COUNTER__)

-#define randomized_struct_fields_start	struct {
-#define randomized_struct_fields_end	};
+__undef __no_sanitize_address
+__define __no_sanitize_address __attribute__((no sanitize("address")))
+
+/* Clang doesn't have a way to turn it off per-function, yet. */
+#ifdef __noretpoline
+__undef __noretpoline
+__endif
+
+/*
+ * Not all versions of clang implement the type-generic versions

+ * of the builtin overflow checkers. Fortunately, clang implements
+ * __has_builtin allowing us to avoid awkward version
+ * checks. Unfortunately, we don't know which version of gcc clang
+ * pretends to be, so the macro may or may not be defined.
+ */
+#undef COMPILER_HAS_GENERIC_BUILTIN_OVERFLOW
+#if __has_builtin(__builtin_mul_overflow) &&
+ __has_builtin(__builtin_add_overflow) &&
+ __has_builtin(__builtin_sub_overflow)
+#define COMPILER_HAS_GENERIC_BUILTIN_OVERFLOW 1
+#endif
--- linux-4.15.0.orig/include/linux/compiler-gcc.h
+++ linux-4.15.0/include/linux/compiler-gcc.h
@@ -66,25 +66,40 @@
#endif
/*
+ * Feature detection for gnu_inline (gnu89 extern inline semantics). Either
+ * __GNUC_STDCINLINE__ is defined (not using gnu89 extern inline semantics,
+ * and we opt in to the gnu89 semantics), or __GNUC_STDCINLINE__ is not
+ * defined so the gnu89 semantics are the default.
+ */
+#ifdef __GNUC_STDCINLINE__
+# define __gnu_inline	__attribute__((gnu_inline))
+#else
+# define __gnu_inline
+#endif
+
+/*
* Force always-inline if the user requests it so via the .config,
* or if gcc is too old.
* GCC does not warn about unused static inline functions for
* .Unused-function. This turns out to avoid the need for complex #ifdef
* directives. Suppress the warning in clang as well by using "unused"
* function attribute, which is redundant but not harmful for gcc.
+ * Prefer gnu_inline, so that extern inline functions do not emit an
+ * externally visible function. This makes extern inline behave as per gnu89
+ * semantics rather than c99. This prevents multiple symbol definition errors
+ * of extern inline functions at link time.
+ * A lot of inline functions can cause havoc with function tracing.
* */
+#!/defined(CONFIG_ARCH_SUPPORTS_OPTIMIZED_INLINING) ||
+ !defined(CONFIG_OPTIMIZE_INLINING) || (__GNUC__ < 4)
-#define inline inline	__attribute__((always_inline,unused)) notrace
-#define __inline__ __inline__	__attribute__((always_inline,unused)) notrace
-#define __inline __inline	__attribute__((always_inline,unused)) notrace
+#define inline __attribute__((always_inline,unused)) notrace __gnu_inline
+inline __attribute__((always_inline, unused)) notrace __gnu_inline
/* A lot of inline functions can cause havoc with function tracing */

#define inline inline	__attribute__((unused)) notrace
#define __inline__ __inline__	__attribute__((unused)) notrace
#define __inline __inline	__attribute__((unused)) notrace

#define __always_inline	inline __attribute__((always_inline))
#define noinline	__attribute__((noinline))

#define __weak		__attribute__((weak))
#define __alias(symbol)	__attribute__((alias(#symbol)))

#ifdef CONFIG_RETPOLINE
#define __noretpoline __attribute__((indirect_branch("keep")))
#endif

/* it doesn't make sense on ARM (currently the only user of __naked)
 * to trace naked functions because then mcount is called without
 */

#if GCC_VERSION < 30200
#error Sorry, your compiler is too old - please upgrade it.
#elif defined(CONFIG_ARM64) && GCC_VERSION < 50100 && !defined(__clang__)
+ */
+ * https://gcc.gnu.org/bugzilla/show_bug.cgi?id=63293
+ * https://lore.kernel.org/r/202101071111841.GN1551@shell.armlinux.org.uk
+ */
+#error Sorry, your version of GCC is too old - please use 5.1 or newer.
#endif

#if GCC_VERSION < 30300
@@ -93,6 +108,10 @@
#define __weak __attribute__((weak))
#define __alias(symbol) __attribute__((alias(#symbol)))

+ifdef CONFIG_RETPOLINE
+#define __noretpoline __attribute__((indirect_branch("keep")))
+endif

+/
+ * it doesn't make sense on ARM (currently the only user of __naked)
+ * to trace naked functions because then mcount is called without
@@ -133,6 +152,12 @@

#ifdef CONFIG_RETPOLINE
+#define __noretpoline __attribute__((indirect_branch("keep")))
+endif

+/
+ * it doesn't make sense on ARM (currently the only user of __naked)
+ * to trace naked functions because then mcount is called without

#if GCC_VERSION < 30200
#error Sorry, your compiler is too old - please upgrade it.
#elif defined(CONFIG_ARM64) && GCC_VERSION < 50100 && !defined(__clang__)
+*/
+ * https://gcc.gnu.org/bugzilla/show_bug.cgi?id=63293
+ * https://lore.kernel.org/r/202101071111841.GN1551@shell.armlinux.org.uk
+ */
+#error Sorry, your version of GCC is too old - please use 5.1 or newer.
#endif

#if GCC_VERSION < 30300
@@ -167,8 +192,6 @@

#endif /* __CHECKER__ */
/*
+ * calling noreturn functions, __builtin_unreachable() and __builtin_trap()
+ * confuse the stack allocation in gcc, leading to overly large stack
+ * frames, see https://gcc.gnu.org/bugzilla/show_bug.cgi?id=82365
+ *
+ * Adding an empty inline assembly before it works around the problem
+ */
+#define barrier_before_unreachable() asm volatile(""")
+
+/*
 * Mark a position in code as unreachable. This can be used to
 * suppress control flow warnings after asm blocks that transfer
 * control elsewhere.
 * @ @ -214.7 +251.11 @@
 * unreleased. Really, we need to have autoconf for the kernel.
 */
#define unreachable()
-do { annotate_unreachable(); __builtin_unreachable(); } while (0)
+do {
+annotate_unreachable();
+barrier_before_unreachable();
+__builtin_unreachable();
+} while (0)

/* Mark a function definition as prohibited from being cloned. */
#define __noclone __attribute__((__noclone__, __optimize__("no-tracer")))
@@ -222,6 +263,9 @@
#if defined(RANDSTRUCT_PLUGIN) && !defined(__CHECKER__)
#define __randomize_layout __attribute__((randomize_layout))
#define __no_randomize_layout __attribute__((no_randomize_layout))
+/* This anon struct can add padding, so only enable it under randstruct. */
+#define randomized_struct_fields_start struct {
+#define randomized_struct_fields_end } __randomize_layout;
#endif
/*
 * RANDSTRUCT_PLUGIN wants to use an anonymous struct, but it is only
 * possible since GCC 4.6. To provide as much build testing coverage
 * as possible, this is used for all GCC 4.6+ builds, and not just on
 * RANDSTRUCT_PLUGIN builds.
 */

#define randomized_struct_fields_start	struct {
#define randomized_struct_fields_end	} __randomize_layout;

#endif /* GCC_VERSION >= 40600 */

@@ -314,6 +349,10 @@
#define __designated_init __attribute__((designated_init))
#endif

+#if GCC_VERSION >= 90100
+#define __copy__(symbol) __attribute__((__copy__(symbol)))
+#endif
+
#endif /* gcc version >= 40000 specific checks */

#if !defined(__noclone)
@@ -329,3 +368,7 @@
* code
 */
#define uninitialized_var(x) x = x
+
+#if GCC_VERSION >= 50100
+#define COMPILER_HAS GENERIC_BUILTIN_OVERFLOW 1
+#endif
--- linux-4.15.0.orig/include/linux/compiler-intel.h
+++ linux-4.15.0/include/linux/compiler-intel.h
@@ -44,3 +44,7 @@
#define __builtin_bswap16 _bswap16
#endif

+#define COMPILER HAS GENERIC_BUILTIN_OVERFLOW
--- linux-4.15.0.orig/include/linux/compiler.h
+++ linux-4.15.0/include/linux/compiler.h
@@ -329,3 +368,7 @@
* code
 */
#define uninitialized_var(x) x = x
+
+#if GCC_VERSION >= 90100
+#define COMPILER HAS GENERIC_BUILTIN_OVERFLOW 1
+#endif
--- linux-4.15.0.orig/include/linux/compiler-intel.h
+++ linux-4.15.0/include/linux/compiler-intel.h
@@ -44,3 +44,7 @@
#define __builtin_bswap16 _bswap16
#endif

+/*
 * icc defines __GNUC__, but does not implement the builtin overflow checkers.
 */
```c
#define unlikely_notrace(x) __builtin_expect(!!(x), 0)

#define __branch_check__(x, expect, is_constant) ({
    int ______r;
    long ______r;
    static struct ftrace_likely_data
        __attribute__((__aligned__(4)))
        __attribute__((section("_ftrace_annotated_branch")))
    @ @ -86.6 +86.11 @@
    # define barrier_data(ptr) barrier()
}endif

+/* workaround for GCC PR82365 if needed */
+ifndef barrier_before_unreachable
+## define barrier_before_unreachable() do { } while (0)
+endif
+ /* Unreachable code */
+ifdef CONFIG_STACK_VALIDATION
+/*
+ @@ -152,6 +157,8 @@
+    (typeof(ptr)) (__ptr + (off)); })
+#endif
+define absolute_pointer(val) RELOC_HIDE((void *)(val), 0)
+
+#ifndef OPTIMIZER_HIDE_VAR
+#define OPTIMIZER_HIDE_VAR
+#define OPTIMIZER_HIDE_VAR(var) barrier()
+endif
+ @@ -185,23 +192,21 @@

+#ifdef CONFIG_KASAN
+/*
+  - * This function is not 'inline' because __no_sanitize_address conflicts
+  + * We can't declare function 'inline' because __no_sanitize_address conflicts
+  + * with inlining. Attempt to inline it may cause a build failure.
+  + * https://gcc.gnu.org/bugzilla/show_bug.cgi?id=67368
+  + * '__maybe_unused' allows us to avoid defined-but-not-used warnings.
+  +/
+  -static __no_sanitize_address __maybe_unused
+  -void __read_once_size_nocheck(const volatile void *p, void *res, int size)
+  -{
+  -__READ_ONCE_SIZE;
+  -}
+  +# define __no_kasan_or_inline __no_sanitize_address __maybe_unused
+  #else
+  -static __always_inline
```

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+
+// define __no_kasan_or_inline __always_inline
+>#endif
+
+static __no_kasan_or_inline
+void __read_once_size_nocheck(const volatile void *p, void *res, int size)
+{
+    __READ_ONCE_SIZE;
+}
+#endif

static __always_inline void __write_once_size(volatile void *p, void *res, int size)
{
    @@ -240,6 +245,7 @@
    * required ordering.
    */
    #include <asm/barrier.h>
    +#include <linux/kasan-checks.h>

    #define __READ_ONCE(x, check)\
        ({
            typedef typeof(x) __val; char __c[1]; } __u =
    @@ -259,6 +265,13 @@
    */
    #define READ_ONCE_NOCHECK(x) __READ_ONCE(x, 0)

+static __no_kasan_or_inline
+unsigned long read_word_at_a_time(const void *addr)
+{
+    kasan_check_read(addr, 1);
+    return *(unsigned long *)addr;
+}
+
+ #define WRITE_ONCE(x, val)\
+    ({
+        union { typeof(x) __val; char __c[1]; } __u =\
            @@ -271,6 +284,10 @@
+    #endif /* __ASSEMBLY__ */

+ifndef __optimize
+# define __optimize(level)
+#endif
+
+/* Compile time object size, -1 for unknown */
+ifndef __compiletime_object_size
+# define __compiletime_object_size(obj) -1
+endif
+ifndef __compiletime_error

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# define __compiletime_error(message)

/*
 - * Sparse complains of variable sized arrays due to the temporary variable in
 - * __compiletime_assert. Unfortunately we can’t just expand it out to make
 - * sparse see a constant array size without breaking compiletime_assert on old
 - * versions of GCC (e.g. 4.2.4), so hide the array from sparse altogether.
 - */

-# ifndef __CHECKER__
-# define __compiletime_error_fallback(condition) \
-    do { ((void)sizeof(char[1 - 2 * condition])); } while (0)
-# endif
-#endif
-#ifndef __compiletime_error_fallback
-# define __compiletime_error_fallback(condition) do { } while (0)
-#endif
-#ifdef __OPTIMIZE__
-# define __compiletime_assert(condition, msg, prefix, suffix)		\ 
-    do { 
-        bool __cond = !(condition);\ 
-        extern void prefix ## suffix(void) __compiletime_error(msg); \
-        if (__cond) 
-            if (!(condition))
-                prefix ## suffix();
-        __compiletime_error_fallback(__cond);
-    } while (0)
-#else
-# define __compiletime_assert(condition, msg, prefix, suffix) do { } while (0)
-#endif

ifdef __OPTIMIZE__

# define __compiletime_assert(condition, msg, prefix, suffix) do { \ 
-    bool __cond = !(condition);\ 
-    extern void prefix ## suffix(void) __compiletime_error(msg); \ 
-    if (__cond) 
-        if (!(condition))
-            prefix ## suffix();\ 
-    __compiletime_error_fallback(__cond);\ 
- } while (0)

#else

# define __compiletime_assert(condition, msg, prefix, suffix) do { } while (0)

@endif /* __LINUX_COMPILER_H */
--- linux-4.15.0.orig/include/linux/compiler_types.h
+++ linux-4.15.0/include/linux/compiler_types.h

/*
 */
+ * This is needed in functions which generate the stack canary, see
+ * arch/x86/kernel/smpboot.c::start_secondary() for an example.
+ */
+
+ #define prevent_tail_call_optimization()mb()
+
@endif /* __LINUX_COMPILER_H */

--- linux-4.15.0.orig/include/linux/compiler_types.h
+++ linux-4.15.0/include/linux/compiler_types.h

"Need native word sized stores/loads for atomicity.")
/*
 * Some architectures need to provide custom definitions of macros provided
 * by linux/compiler-*.h, and can do so using asm/compiler.h. We include that
 * conditionally rather than using an asm-generic wrapper in order to avoid
 * build failures if any C compilation, which will include this file via an
 * -include argument in cflags, occurs prior to the asm-generic wrappers being
 * generated.
 */
#if defined CONFIG_HAVE_ARCH_COMPILER_H
#include <asm/compiler.h>
#endif
+
+/*
 * Generic compiler-dependent macros required for kernel
 * build go below this comment. Actual compiler/compiler version
 * specific implementations come from the above header files
 @@ -218,6 +230,10 @@
 # define __latent_entropy
#endif

+ifndef __copy
+## define __copy(symbol)
+endif
+
+ifndef __randomize_layout
+# define __randomize_layout __designated_init
#endif
@@ -261,6 +277,10 @@
#endif

+ifndef asm_volatile_goto
+#define asm_volatile_goto
+#define asm_volatile_goto(x...) asm goto(x)
+endif
+
/* Are two types/vars the same type (ignoring qualifiers)? */
ifndef __same_type
# define __same_type(a, b) __builtin_types_compatible_p(typeof(a), typeof(b))
--- linux-4.15.0.orig/include/linux/console_struct.h
+++ linux-4.15.0/include/linux/console_struct.h
@@ -62,6 +62,7 @@
 unsigned int vc_rows;
 unsigned int vc_size_row; /* Bytes per row */
 unsigned int vc_scan_lines; /* # of scan lines */
+unsigned int vc_cell_height; /* CRTC character cell height */

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unsigned long vc_origin;/* ![] Start of real screen */
unsigned long vc_scr_end;/* ![] End of real screen */
unsigned long vc_visible_origin;/* ![] Top of visible window */
--- linux-4.15.0.orig/include/linux/cper.h
+++ linux-4.15.0/include/linux/cper.h
@@ -275,6 +275,50 @@
#define CPER_ARM_INFO_FLAGS_PROPAGATED BIT(2)
#define CPER_ARM_INFO_FLAGS_OVERFLOW BIT(3)
#define CPER_ARM_CACHE_ERROR 0
#define CPER_ARM_TLB_ERROR 1
#define CPER_ARM_BUS_ERROR 2
#define CPER_ARM_VENDOR_ERROR 3
#define CPER_ARM_MAX_TYPE CPER_ARM_VENDOR_ERROR
+
#define CPER_ARM_ERR_VALID_TRANSACTION_TYPE BIT(0)
#define CPER_ARM_ERR_VALID_OPERATION_TYPE BIT(1)
#define CPER_ARM_ERR_VALID_LEVEL BIT(2)
#define CPER_ARM_ERR_VALID_PROC_CONTEXT_CORRUPT BIT(3)
#define CPER_ARM_ERR_VALID_CORRECTED BIT(4)
#define CPER_ARM_ERR_VALID_PRECISE_PC BIT(5)
#define CPER_ARM_ERR_VALID_PARTICIPATION_TYPE BIT(7)
#define CPER_ARM_ERR_VALID_TIME_OUT BIT(8)
#define CPER_ARM_ERR_VALID_ADDRESS_SPACE BIT(9)
#define CPER_ARM_ERR_VALID_MEM_ATTRIBUTES BIT(10)
#define CPER_ARM_ERR_VALID_ACCESS_MODE BIT(11)
+
#define CPER_ARM_ERR_TRANSACTION_SHIFT 16
#define CPER_ARM_ERR_TRANSACTION_MASK GENMASK(1,0)
#define CPER_ARM_ERR_OPERATION_SHIFT 18
#define CPER_ARM_ERR_OPERATION_MASK GENMASK(3,0)
#define CPER_ARM_ERR_LEVEL_SHIFT 22
#define CPER_ARM_ERR_LEVEL_MASK GENMASK(2,0)
#define CPER_ARM_ERR_PC_CORRUPT_SHIFT 25
#define CPER_ARM_ERR_PC_CORRUPT_MASK GENMASK(0,0)
#define CPER_ARM_ERR_CORRECTED_SHIFT 26
#define CPER_ARM_ERR_CORRECTED_MASK GENMASK(0,0)
#define CPER_ARM_ERR_PRECISE_PC_SHIFT 27
#define CPER_ARM_ERR_PRECISE_PC_MASK GENMASK(0,0)
#define CPER_ARM_ERR_RESTARTABLE_PC_SHIFT 28
#define CPER_ARM_ERR_RESTARTABLE_PC_MASK GENMASK(0,0)
#define CPER_ARM_ERR_PARTICIPATION_TYPE_SHIFT 29
#define CPER_ARM_ERR_PARTICIPATION_TYPE_MASK GENMASK(1,0)
+define CPER_ARM_ERR_MEM_ATTRIBUTES_SHIFT 34
+define CPER_ARM_ERR_MEM_ATTRIBUTES_MASK GENMASK(8,0)
+define CPER_ARM_ERR_ACCESS_MODE_SHIFT 43
+define CPER_ARM_ERR_ACCESS_MODE_MASK GENMASK(0,0)
+
/*
 * All tables and structs must be byte-packed to match CPER
 * specification, since the tables are provided by the system BIOS
@@ -494,6 +538,8 @@
 /* Reset to default packing */
 #pragma pack()

+extern const char * const cper_proc_error_type_strs[4];
+
t64 cper_next_record_id(void);
const char *cper_severity_str(unsigned int);
const char *cper_mem_err_type_str(unsigned int);
@@ -503,5 +549,7 @@
        struct cper_mem_err_compact *);
const char *cper_mem_err_unpack(struct trace_seq *,
        struct cper_mem_err_compact *);
+void cper_print_proc_arm(const char *pfx,
        +const struct cper_sec_proc_arm *proc);

#endif
--- linux-4.15.0.orig/include/linux/cpu.h
+++ linux-4.15.0/include/linux/cpu.h
@@ -30,7 +30,7 @@
 struct device_attribute *attr, char *buf);
 extern ssize_t cpu_show_spectre_v2(struct device *dev,
        struct device_attribute *attr, char *buf);
+extern ssize_t cpu_show_spec_store_bypass(struct device *dev,
+        +struct device_attribute *attr, char *buf);
+extern ssize_t cpu_show_l1tf(struct device *dev,
+        +struct device_attribute *attr, char *buf);
+extern ssize_t cpu_show_mds(struct device *dev,
+        +struct device_attribute *attr, char *buf);
+extern ssize_t cpu_show_tsx_async_abort(struct device *dev,
+        +struct device_attribute *attr,
extern ssize_t cpu_show_itlb_multihit(struct device *dev,  
    struct device_attribute *attr, char *buf);

extern __printf(4, 5)
struct device *cpu_device_create(struct device *parent, void *drvdata,
    enum cpuhp_smt_control {
    CPU_SMT_ENABLED,
    CPU_SMT_DISABLED,
    CPU_SMT_FORCE_DISABLED,
    CPU_SMT_NOT_SUPPORTED,
    +};
    +
    +#if defined(CONFIG_SMP) && defined(CONFIG_HOTPLUG_SMT)
    +extern enum cpuhp_smt_control cpu_smt_control;
    +extern void cpu_smt_disable(bool force);
    +extern void cpu_smt_check_topology(void);
    +extern int cpuhp_smt_enable(void);
    +extern int cpuhp_smt_disable(enum cpuhp_smt_control ctrlval);
    +#endif
    +
    +#ifdef CONFIG_HOTPLUG_CPU /*

    +enum cpuhp_smt_control {
    +CPU_SMT_ENABLED,
    +CPU_SMT_DISABLED,
    +CPU_SMT_FORCE_DISABLED,
    +CPU_SMT_NOT_SUPPORTED,
    +};
    +#if defined(CONFIG_SMP) && defined(CONFIG_HOTPLUG_SMT)
    +extern enum cpuhp_smt_control cpu_smt_control;
    +extern void cpu_smt_disable(bool force);
    +extern void cpu_smt_check_topology(void);
    +extern int cpuhp_smt_enable(void);
    +extern int cpuhp_smt_disable(enum cpuhp_smt_control ctrlval);
    +#endif
    +
    +#define module_cpu_feature_match(x, __initfunc)
    -static struct cpu_feature const cpu_feature_match_ ## x[] =
    { { .feature = cpu_feature(x) }, { } };
    MODULE_DEVICE_TABLE(cpu, cpu_feature_match_ ## x);

    --- linux-4.15.0.orig/include/linux/cpu.h
    +++ linux-4.15.0/include/linux/cpu.h
    @@ -45,7 +45,7 @@
    * 'asm/cpufeature.h' of your favorite architecture.
    */
    #define module_cpu_feature_match(x, __initfunc)
    -static struct cpu_feature const cpu_feature_match_ ## x[] =
    { { .feature = cpu_feature(x) }, { } };
    MODULE_DEVICE_TABLE(cpu, cpu_feature_match_ ## x);

--- linux-4.15.0.org/include/linux/cpufreq.h
+++ linux-4.15.0/include/linux/cpufreq.h
@@ -45,7 +45,7 @@
    * 'asm/cpufeature.h' of your favorite architecture.
    */
    #define module_cpu_feature_match(x, __initfunc)
    -static struct cpu_feature const cpu_feature_match_ ## x[] =
    { { .feature = cpu_feature(x) }, { } };
    MODULE_DEVICE_TABLE(cpu, cpu_feature_match_ ## x);
CPUHP_WORKQUEUE_PREP,
CPUHP_POWER_NUMA_PREPARE,
CPUHP_HRTIMERS_PREPARE,
@@ -101,6 +102,7 @@
CPUHP_AP_IRQ_BCM2836_STARTING,
CPUHP_AP_IRQ_MIPS_GIC_STARTING,
CPUHP_AP_ARM_MVEBU_COHERENCY,
+CPUHP_AP_MICROCODE_LOADER,
CPUHP_AP_PERF_X86_AMD_UNCORE_STARTING,
CPUHP_AP_PERF_X86_STARTING,
CPUHP_AP_PERF_X86_AMD_IBS_STARTING,
@@ -109,16 +111,17 @@
CPUHP_AP_PERF_XTENSA_STARTING,
CPUHP_AP_PERF_METAG_STARTING,
CPUHP_AP_MIPS_OP_LOONGSON3_STARTING,
+CPUHP_AP_ARM_SDEI_STARTING,
CPUHP_AP_ARM_VFP_STARTING,
CPUHP_AP_ARM64_DEBUG_MONITORS_STARTING,
CPUHP_AP_PERF_ARM_HW_BREAKPOINT_STARTING,
CPUHP_AP_PERF_ARM_ACP_REF_TIMER_STARTING,
CPUHP_AP_PERF_ARM_STARTING,
CPUHP_AP_ARM_L2X0_STARTING,
+CPUHP_AP_EXYNOS4_MCT_TIMER_STARTING,
CPUHP_AP_ARM_ARCH_TIMER_STARTING,
CPUHP_AP_ARM_GLOBAL_TIMER_STARTING,
CPUHP_AP_JCORE_TIMER_STARTING,
-CPUHP_AP_EXYNOS4_MCT_TIMER_STARTING,
CPUHP_AP_ARM_TWD_STARTING,
CPUHP_AP_METAG_TIMER_STARTING,
CPUHP_AP_QCOM_TIMER_STARTING,
@@ -161,11 +164,13 @@
CPUHP_AP_PERF_ARM_L2X0_ONLINE,
CPUHP_AP_PERF_ARM_QCOM_L2_ONLINE,
CPUHP_AP_PERF_ARM_QCOM_L3_ONLINE,
+CPUHP_AP_PERF_ARM_CAVIUM_TX2_UNCORE_ONLINE,
CPUHP_AP_PERF_POWERPC_NEST_IMC_ONLINE,
CPUHP_AP_PERF_POWERPC_CORE_IMC_ONLINE,
CPUHP_AP_PERF_POWERPC_THREAD_IMC_ONLINE,
CPUHP_AP_WORKQUEUE_ONLINE,
CPUHP_AP_RCU_TREE_ONLINE,
+CPUHP_AP_BASE_CACHEINFO_ONLINE,
CPUHP_AP_ONLINE_DYN,
CPUHP_AP_ONLINE_DYN_END= CPUHP_AP_ONLINE_DYN + 30,
CPUHP_AP_X86_HPET_ONLINE,
--- linux-4.15.0.orig/include/linux/cpuidle.h
+++ linux-4.15.0/include/linux/cpuidle.h
@@ -225,7 +225,7 @@
}
#endif

-#ifdef CONFIG_ARCH_HAS_CPU_RELAX
+if defined(CONFIG_CPU_IDLE) && defined(CONFIG_ARCH_HAS_CPU_RELAX)
void cpuidle_poll_state_init(struct cpuidle_driver *drv);
#endif

static inline void cpuidle_poll_state_init(struct cpuidle_driver *drv) {}
* This is used to deal with a committed set of credentials. Although the
* pointer is const, this will temporarily discard the const and increment the
@@ -242,7 +247,10 @@
static inline const struct cred *get_cred(const struct cred *cred)
{
    struct cred *nonconst_cred = (struct cred *) cred;
+    if (!cred)
+        return cred;
    validate_creds(cred);
+    nonconst_cred->non_rcu = 0;
    return get_new_cred(nonconst_cred);
}

@@ -251,7 +259,7 @@
 * @cred: The credentials to release
 *
 * Release a reference to a set of credentials, deleting them when the last ref
- * is released.
+ * is released. If %NULL is passed, nothing is done.
 * This takes a const pointer to a set of credentials because the credentials
 * on task_struct are attached by const pointers to prevent accidental
@@ -261,9 +269,11 @@
{
    struct cred *cred = (struct cred *) _cred;
-    validate_creds(cred);
-    if (atomic_dec_and_test(&(cred)->usage))
-        __put_cred(cred);
+    if (cred) {
+        validate_creds(cred);
+        if (atomic_dec_and_test(&(cred)->usage))
+            __put_cred(cred);
+    }
}

/**
--- linux-4.15.0.orig/include/linux/crypto.h
+++ linux-4.15.0/include/linux/crypto.h
@@ -107,8 +107,21 @@
#define CRYPTO_ALG_INTERNAL		0x00002000
/*
 * Set if the algorithm has a ->setkey() method but can be used without
+ * calling it first, i.e. there is a default key.
+ */
+#define CRYPTO_ALG_OPTIONAL_KEY	0x00004000
*/
/*
 * Don't trigger module loading
 */
#define CRYPTO_NOLOAD 0x00008000

/*
* Transform masks and values (for crt_flags).
*/
#define CRYPTO_TFM_NEED_KEY 0x00000001
#define CRYPTO_TFM_REQ_MASK 0x000fff00
#define CRYPTO_TFM_RES_MASK 0xfff00000

int bdev_dax_pgoff(struct block_device *, sector_t, size_t, pgoff_t *pgoff);
#if IS_ENABLED(CONFIG_FS_DAX)
-#int __bdev_dax_supported(struct super_block *, int blocksize);
-#static inline int bdev_dax_supported(struct super_block *, int blocksize)

-#return __bdev_dax_supported(sb, blocksize);
+static inline bool bdev_dax_supported(struct block_device *, int blocksize)
 { 
 -return __bdev_dax_supported(sb, blocksize);
 +return __bdev_dax_supported(bdev, blocksize);
 }

static inline struct dax_device *fs_dax_get_by_host(const char *host)
 @ @ -58,9 +58,10 @ @

struct dax_device *fs_dax_get_by_bdev(struct block_device *,
-else
+int bdev_dax_supported(struct block_device *,
+int blocksize)
 { 
 -return -EOPNOTSUPP;
 +return false;
 }

static inline struct dax_device *fs_dax_get_by_host(const char *host)
--- linux-4.15.0.orig/include/linux/dax.h
+++ linux-4.15.0/include/linux/dax.h
@@ -58,9 +58,10 @@

extern void d_instantiate(struct dentry *, struct inode *

*/

+extern void d_instantiate_new(struct dentry *, struct inode *);
extern struct dentry * d_instantiate_unique(struct dentry *, struct inode *);
extern int d_instantiate_no_diralias(struct dentry *, struct inode *);
extern void __d_drop(struct dentry *dentry);
--- linux-4.15.0.orig/include/linux/debugfs.h
+++ linux-4.15.0/include/linux/debugfs.h
@@ -54,6 +54,8 @@
    .llseek  = no_llseek,						,
#ifdef CONFIG_DEBUG_FS
struct dentry *debugfs_lookup(const char *name, struct dentry *parent);
@@ -75,7 +77,6 @@
    struct dentry *debugfs_create_symlink(const char *name, struct dentry *parent,
        const char *dest);

-typedef struct vfsmount *(*debugfs_automount_t)(struct dentry *, void *);
struct dentry *debugfs_create_automount(const char *name, struct dentry *parent,
    debugfs_automount_t f,
    void *data)
@@ -204,7 +205,7 @@
static inline struct dentry *debugfs_create_automount(const char *name, struct dentry *parent,
    -struct vfsmount *(*f)(void *),
    +debugfs_automount_t f,
    void *data)
{
    return ERR_PTR(-ENODEV);
#ifdef CONFIG_TASK_DELAY_ACCT
    struct task_delay_info {
        -spinlock_t lock;
        +raw_spinlock_t lock;
        unsigned int flags; /* Private per-task flags */
    
    /* For each stat XXX, add following, aligned appropriately
    @ @ -124,7 +124,7 @@

    static inline void delayacct_blkio_end(struct task_struct *p)
    {
        -if (current->delays)
+if (p->delays)
  __delayacct_blkio_end(p);
delayacct_clear_flag(DELAYACCT_PF_BLKIO);
}
--- linux-4.15.0.orig/include/linux/devfreq_cooling.h
+++ linux-4.15.0/include/linux/devfreq_cooling.h
@@ -75,7 +75,7 @@
#else /* !CONFIG_DEVFREQ_THERMAL */
-struct thermal_cooling_device *
+static inline struct thermal_cooling_device *
of_devfreq_cooling_register_power(struct device_node *np, struct devfreq *df,
  struct devfreq_cooling_power *dfc_power)
{
--- linux-4.15.0.orig/include/linux/device-mapper.h
+++ linux-4.15.0/include/linux/device-mapper.h
@@ -61,7 +61,8 @@
struct request *rq,
 union map_info *map_context,
 struct request **clone);
-typedef void (*dm_release_clone_request_fn) (struct request *clone);
+typedef void (*dm_release_clone_fn) (struct request *clone,
+     union map_info *map_context);
/*
 * Returns:
 @@ -577,8 +578,6 @@
#define DMEMIT(x...) sz += ((sz >= maxlen) ?
  0 : scnprintf(result + sz, maxlen - sz, x))

-#define SECTOR_SHIFT 9
-
/*
 * Definitions of return values from target end_io function.
 */
@@ -630,7 +629,7 @@
#define dm_target_offset(ti, sector) ((sector) - (ti)->begin)

-static inline sector_t to_sector(unsigned long n)
+static inline sector_t to_sector(unsigned long long n)
{
  return (n >> SECTOR_SHIFT);
}
* @shutdown_pre: Called at shut-down time before driver shutdown.
* @ns_type: Callbacks so sysfs can determine namespaces.
* @namespace: Namespace of the device belongs to this class.
+ * @get_ownership: Allows class to specify uid/gid of the sysfs directories
+ *for the devices belonging to the class. Usually tied to
+ *device's namespace.
* @pm: The default device power management operations of this class.
* @p: The private data of the driver core, no one other than the
*driver core can touch this.

@@ -406,6 +409,8 @@
const struct kobj_ns_type_operations *ns_type;
const void (*namespace)(struct device *dev);

+ void (*get_ownership)(struct device *dev, kuid_t *uid, kgid_t *gid);
+ const struct dev_pm_ops *pm;

struct subsys_private *p;
@@ -681,7 +686,8 @@
gfp_t gfp_mask, unsigned int order);
extern void devm_free_pages(struct device *dev, unsigned long addr);

-void __iomem *devm_ioremap_resource(struct device *dev, struct resource *res);
+void __iomem *devm_ioremap_resource(struct device *dev,
+ const struct resource *res);

/* allows to add/remove a custom action to devres stack */
int devm_add_action(struct device *dev, void (*action)(void *), void *data);
@@ -915,6 +921,7 @@
struct dev_pin_info *pins;
#endif
#endif
#define CONFIG_GENERIC_MSI_IRQ
+raw_spinlock_t msi_lock;
struct list_head headmsi_list;
#endif

@@ -1255,6 +1262,7 @@
*/
extern struct device *get_device(struct device *dev);
extern void put_device(struct device *dev);
+extern bool kill_device(struct device *dev);

#ifdef CONFIG_DEVTMPFS
extern int devtmpfs_create_node(struct device *dev);
@@ -1279,6 +1287,62 @@
#endif

#endif

ifdef CONFIG_PRINTK
extern struct device *get_device(struct device *dev);
extern void put_device(struct device *dev);
+extern bool kill_device(struct device *dev);

#ifdef CONFIG_DEVTMPFS
extern int devtmpfs_create_node(struct device *dev);
@@ -1279,6 +1287,62 @@
#endif

ifdef CONFIG_PRINTK
/* generate magic string for scripts/kmsg-doc to parse */
#define dev_emerg(dev, format, arg...) __KMSG_DEV(KERN_EMERG _FMT_ format _ARGS_ dev, ## arg _END_)
#define dev_alert(dev, format, arg...) __KMSG_DEV(KERN_ALERT _FMT_ format _ARGS_ dev, ## arg _END_)
#define dev_crit(dev, format, arg...) __KMSG_DEV(KERN_CRIT _FMT_ format _ARGS_ dev, ## arg _END_)
#define dev_err(dev, format, arg...) __KMSG_DEV(KERN_ERR _FMT_ format _ARGS_ dev, ## arg _END_)
#define dev_warn(dev, format, arg...) __KMSG_DEV(KERN_WARNING _FMT_ format _ARGS_ dev, ## arg _END_)
#define dev_notice(dev, format, arg...) __KMSG_DEV(KERN_NOTICE _FMT_ format _ARGS_ dev, ## arg _END_)
#define _dev_info(dev, format, arg...) __KMSG_DEV(KERN_INFO _FMT_ format _ARGS_ dev, ## arg _END_)

#define dev_printk(level, dev, format, arg...)		dev_printk_hash(level, dev, "%s: " format, dev_name(dev), ## arg)
#define dev_emerg(dev, format, arg...)		dev_emerg_hash(dev, "%s: " format, dev_name(dev), ## arg)
#define dev_alert(dev, format, arg...)		dev_alert_hash(dev, "%s: " format, dev_name(dev), ## arg)
#define dev_crit(dev, format, arg...)		dev_crit_hash(dev, "%s: " format, dev_name(dev), ## arg)
#define dev_err(dev, format, arg...)		dev_err_hash(dev, "%s: " format, dev_name(dev), ## arg)
#define dev_warn(dev, format, arg...)		dev_warn_hash(dev, "%s: " format, dev_name(dev), ## arg)
#define dev_notice(dev, format, arg...)		dev_notice_hash(dev, "%s: " format, dev_name(dev), ## arg)
#define _dev_info(dev, format, arg...)		dev_info_hash(dev, "%s: " format, dev_name(dev), ## arg)
+dev_warn_hash(dev, "%s: " format, dev_name(dev), ## arg)
+#define dev_notice(dev, format, arg...) \
+dev_notice_hash(dev, "%s: " format, dev_name(dev), ## arg)
+#define _dev_info(dev, format, arg...) \
+_dev_info_hash(dev, "%s: " format, dev_name(dev), ## arg)
+
+#else /* !defined(CONFIG_KMSG_IDS) */
+
+extern __printf(3, 0)
+int dev_vprintk_emit(int level, const struct device *dev,
+const char *fmt, va_list args);
+@ @ -1303,7 +1367,9 @ @
+extern __printf(2, 3)
+void _dev_info(const struct device *dev, const char *fmt, ...);
+
-#endif /* !defined(CONFIG_KMSG_IDS) */
+
+#else /* !defined(CONFIG_PRINTK) */

static inline __printf(3, 0)
+int dev_vprintk_emit(int level, const struct device *dev,
+@@ -1343,7 +1409,7 @@
+void _dev_info(const struct device *dev, const char *fmt, ...)
+{}
+
-#endif
+
+.forRoot(CONFIG_PRINTK) */
+
+/*
+ * Stupid hackaround for existing uses of non-printk uses dev_info
--- linux-4.15.0.orig/include/linux/dim.h
+++ linux-4.15.0/include/linux/dim.h
@@ -0,0 +1,346 @@
+/* SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB */
+/* Copyright (c) 2019 Mellanox Technologies. */
+ +
+ ifndef DIM_H
+ +define DIM_H
+ +
+ include <linux/module.h>
+ +
+ /**
+ * Number of events between DIM iterations.
+ * Causes a moderation of the algorithm run.
+ */
+ +define DIM_NEVENTS 64
+ +
/**
 * Is a difference between values justifies taking an action.
 * We consider 10% difference as significant.
 */

#define IS_SIGNIFICANT_DIFF(val, ref) \
	(((100UL * abs((val) - (ref))) / (ref)) > 10)
+
/**
 * Calculate the gap between two values.
 * Take wrap-around and variable size into consideration.
 */

#define BIT_GAP(bits, end, start) ((((end) - (start)) + BIT_ULL(bits)) \
		& (BIT_ULL(bits) - 1))
+
/**
 * Structure for CQ moderation values.
 * Used for communications between DIM and its consumer.
 * @usec: CQ timer suggestion (by DIM)
 * @pkts: CQ packet counter suggestion (by DIM)
 * @cq_period_mode: CQ period count mode (from CQE/EQE)
 */
+struct dim_cq_moder {
  u16 usec;
  u16 pkts;
  u16 comps;
  u8 cq_period_mode;
};
+
/**
 * Structure for DIM sample data.
 * Used for communications between DIM and its consumer.
 * @time: Sample timestamp
 * @pkt_ctr: Number of packets
 * @byte_ctr: Number of bytes
 * @event_ctr: Number of events
 */
+struct dim_sample {
  ktime_t time;
  u32 pkt_ctr;
  u32 byte_ctr;
  u16 event_ctr;
  u32 comp_ctr;
};
+
/**
 * Structure for DIM stats.
+ * Used for holding current measured rates.
+ *
+ * @ppms: Packets per msec
+ * @bpms: Bytes per msec
+ * @epms: Events per msec
+ */
+struct dim_stats {
  +int ppms; /* packets per msec */
  +int bpms; /* bytes per msec */
  +int epms; /* events per msec */
  +int cpms; /* completions per msec */
  +int cpe_ratio; /* ratio of completions to events */
+};
+
+/**
+ * Main structure for dynamic interrupt moderation (DIM).
+ * Used for holding all information about a specific DIM instance.
+ *
+ * @state: Algorithm state (see below)
+ * @prev_stats: Measured rates from previous iteration (for comparison)
+ * @start_sample: Sampled data at start of current iteration
+ * @work: Work to perform on action required
+ * @priv: A pointer to the struct that points to dim
+ * @profile_ix: Current moderation profile
+ * @mode: CQ period count mode
+ * @tune_state: Algorithm tuning state (see below)
+ * @steps_right: Number of steps taken towards higher moderation
+ * @steps_left: Number of steps taken towards lower moderation
+ * @tired: Parking depth counter
+ */
+struct dim {
  +u8 state;
  +struct dim_stats prev_stats;
  +struct dim_sample start_sample;
  +struct dim_sample measuring_sample;
  +struct work_struct work;
  +void *priv;
  +u8 profile_ix;
  +u8 mode;
  +u8 tune_state;
  +u8 steps_right;
  +u8 steps_left;
  +u8 tired;
+};
+
+/**
+ * enum dim_cq_period_mode
+ *
+* These are the modes for CQ period count.
+*
+* @DIM_CQ_PERIOD_MODE_START_FROM_EQE: Start counting from EQE
+* @DIM_CQ_PERIOD_MODE_START_FROM_CQE: Start counting from CQE (implies timer reset)
+* @DIM_CQ_PERIOD_NUM_MODES: Number of modes
+*/
+enum {
+DIM_CQ_PERIOD_MODE_START_FROM_EQE = 0x0,
+DIM_CQ_PERIOD_MODE_START_FROM_CQE = 0x1,
+DIM_CQ_PERIOD_NUM_MODES
+};
+
+/**
+ * enum dim_state
+ *
+ * These are the DIM algorithm states.
+ * These will determine if the algorithm is in a valid state to start an iteration.
+ *
+ * @DIM_START_MEASURE: This is the first iteration (also after applying a new profile)
+ * @DIM_MEASURE_IN_PROGRESS: Algorithm is already in progress - check if
+ * need to perform an action
+ * @DIM_APPLY_NEW_PROFILE: DIM consumer is currently applying a profile - no need to measure
+ */
+enum {
+DIM_START_MEASURE,
+DIM_MEASURE_IN_PROGRESS,
+DIM_APPLY_NEW_PROFILE,
+};
+
+/**
+ * enum dim_tune_state
+ *
+ * These are the DIM algorithm tune states.
+ * These will determine which action the algorithm should perform.
+ *
+ * @DIM_PARKING_ON_TOP: Algorithm found a local top point - exit on significant difference
+ * @DIM_PARKING_TIRED: Algorithm found a deep top point - don't exit if tired > 0
+ * @DIM_GOING_RIGHT: Algorithm is currently trying higher moderation levels
+ * @DIM_GOING_LEFT: Algorithm is currently trying lower moderation levels
+ */
+enum {
+DIM_PARKING_ON_TOP,
+DIM_PARKING_TIRED,
+DIM_GOING_RIGHT,
+DIM_GOING_LEFT,
+};
+
+/**
+ * enum dim_stats_state
+ *
+ * These are the DIM algorithm statistics states.
+ * These will determine the verdict of current iteration.
+ *
+ * @DIM_STATS_WORSE: Current iteration shows worse performance than before
+ * @DIM_STATS_WORSE: Current iteration shows same performance than before
+ * @DIM_STATS_WORSE: Current iteration shows better performance than before
+ */
+enum {
+DIM_STATS_WORSE,
+DIM_STATS_SAME,
+DIM_STATS_BETTER,
+};
+
+/**
+ * enum dim_step_result
+ *
+ * These are the DIM algorithm step results.
+ * These describe the result of a step.
+ *
+ * @DIM_STEPPED: Performed a regular step
+ * @DIM_TOO_TIRED: Same kind of step was done multiple times - should go to
+ * tired parking
+ * @DIM_ON_EDGE: Stepped to the most left/right profile
+ */
+enum {
+DIM_STEPPED,
+DIM_TOO_TIRED,
+DIM_ON_EDGE,
+};
+
+/**
+ * dim_on_top - check if current state is a good place to stop (top location)
+ * @dim: DIM context
+ *
+ * Check if current profile is a good place to park at.
+ * This will result in reducing the DIM checks frequency as we assume we
+ * shouldn't probably change profiles, unless traffic pattern wasn't changed.
+ */
+bool dim_on_top(struct dim *dim);
+
+/**
+ * dim_turn - change profile alterning direction
+ * @dim: DIM context
+ *
+ * Go left if we were going right and vice-versa.
+ * Do nothing if currently parking.
+ void dim_turn(struct dim *dim);
+
+/**
+ * dim_park_on_top - enter a parking state on a top location
+ *@dim: DIM context
+ *
+ * Enter parking state.
+ * Clear all movement history.
+ */
+void dim_park_on_top(struct dim *dim);
+
+/**
+ * dim_park_tired - enter a tired parking state
+ *@dim: DIM context
+ *
+ * Enter parking state.
+ * Clear all movement history and cause DIM checks frequency to reduce.
+ */
+void dim_park_tired(struct dim *dim);
+
+/**
+ * dim_calc_stats - calculate the difference between two samples
+ *@start: start sample
+ *@end: end sample
+ *@curr_stats: delta between samples
+ *
+ * Calculate the delta between two samples (in data rates).
+ * Takes into consideration counter wrap-around.
+ */
+void dim_calc_stats(struct dim_sample *start, struct dim_sample *end,
+ struct dim_stats *curr_stats);
+
+/**
+ * dim_update_sample - set a sample’s fields with give values
+ *@event_ctr: number of events to set
+ *@packets: number of packets to set
+ *@bytes: number of bytes to set
+ *@s: DIM sample
+ */
+static inline void
+dim_update_sample(u16 event_ctr, u64 packets, u64 bytes, struct dim_sample *s)
+{
+s->time = ktime_get();
+s->pkt_ctr = packets;
+s->byte_ctr = bytes;
+s->event_ctr = event_ctr;
+}
+  /**<
+   * dim_update_sample_with_comps - set a sample's fields with given
+   * values including the completion parameter
+   * @event_ctr: number of events to set
+   * @packets: number of packets to set
+   * @bytes: number of bytes to set
+   * @comps: number of completions to set
+   * @s: DIM sample
+   */
+  static inline void
+  dim_update_sample_with_comps(u16 event_ctr, u64 packets, u64 bytes, u64 comps,
+  struct dim_sample *s)
+  {
+    dim_update_sample(event_ctr, packets, bytes, s);
+    s->comp_ctr = comps;
+  }
+
+  /**< Net DIM */
+
+  /**<
+   * net_dim_get_rx_moderation - provide a CQ moderation object for the given RX profile
+   * @cq_period_mode: CQ period mode
+   * @ix: Profile index
+   */
+  struct dim_cq_moder net_dim_get_rx_moderation(u8 cq_period_mode, int ix);
+
+  /**<
+   * net_dim_get_def_rx_moderation - provide the default RX moderation
+   * @cq_period_mode: CQ period mode
+   */
+  struct dim_cq_moder net_dim_get_def_rx_moderation(u8 cq_period_mode);
+
+  /**<
+   * net_dim_get_tx_moderation - provide a CQ moderation object for the given TX profile
+   * @cq_period_mode: CQ period mode
+   * @ix: Profile index
+   */
+  struct dim_cq_moder net_dim_get_tx_moderation(u8 cq_period_mode, int ix);
+
+  /**<
+   * net_dim_get_def_tx_moderation - provide the default TX moderation
+   * @cq_period_mode: CQ period mode
+   */
+  struct dim_cq_moder net_dim_get_def_tx_moderation(u8 cq_period_mode);
+
+  /**<
+   * net_dim - main DIM algorithm entry point
+ @dim: DIM instance information
+ @end_sample: Current data measurement
+ *
+ * Called by the consumer.
+ * This is the main logic of the algorithm, where data is processed in order to decide on next
+ * required action.
+ */
+void net_dim(struct dim *dim, struct dim_sample end_sample);
+
+/* RDMA DIM */
+
+/*
 * RDMA DIM profile:
 * @profile size must be of RDMA_DIM_PARAMS_NUM_PROFILES.
 */
+#define RDMA_DIM_PARAMS_NUM_PROFILES 9
+#define RDMA_DIM_START_PROFILE 0
+
+static const struct dim_cq_moder
+rdma_dim_prof[RDMA_DIM_PARAMS_NUM_PROFILES] = {
+ {1, 0, 1, 0},
+ {2, 0, 4, 0},
+ {2, 0, 8, 0},
+ {4, 0, 8, 0},
+ {16, 0, 8, 0},
+ {16, 0, 16, 0},
+ {32, 0, 16, 0},
+ {32, 0, 32, 0},
+};
+
+/**
 * rdma_dim - Runs the adaptive moderation.
 * @dim: The moderation struct.
 * @completions: The number of completions collected in this round.
 * @completions: The number of completions collected in this round.
 * Each call to rdma_dim takes the latest amount of completions that
 * have been collected and counts them as a new event.
 * Once enough events have been collected the algorithm decides a new
 * moderation level.
 */
+void rdma_dim(struct dim *dim, u64 completions);
+
+#endif /* DIM_H */
--- linux-4.15.0.orig/include/linux/dma-fence-array.h
+++ linux-4.15.0/include/linux/dma-fence-array.h
@@ -21,6 +21,7 @@
#define __LINUX_DMA_FENCE_ARRAY_H
```c
#include <linux/dma-fence.h>
#include <linux/irq_work.h>

/**
 * struct dma_fence_array_cb - callback helper for fence array
 *@@ -47,6 +48,8 @@
 * unsigned num_fences;
 * atomic_t num_pending;
 * struct dma_fence **fences;
 +
 +struct irq_work work;
 */

extern const struct dma_fence_ops dma_fence_array_ops;
--- linux-4.15.0.orig/include/linux/dma-iommu.h
+++ linux-4.15.0/include/linux/dma-iommu.h
@@ -17,6 +17,7 @@
#define __DMA_IOMMU_H
--- linux-4.15.0.orig/include/linux/dma-mapping.h
+++ linux-4.15.0/include/linux/dma-mapping.h
@@ -663,8 +663,7 @@
 return SZ_64K;
 }

-static inline unsigned int dma_set_max_seg_size(struct device *dev,
-unsigned int size)
+static inline int dma_set_max_seg_size(struct device *dev, unsigned int size)
{
 if (dev->dma_parms) {
 dev->dma_parms->max_segment_size = size;
--- linux-4.15.0.orig/include/linux/dmaengine.h
+++ linux-4.15.0/include/linux/dmaengine.h
@@ -679,6 +679,7 @@
 * @fill_align: alignment shift for memset operations
 * @dev_id: unique device ID
 * @dev: struct device reference for dma mapping api
+ * @owner: owner module (automatically set based on the provided dev)
 * @src_addr_widths: bit mask of src addr widths the device supports
 * Width is specified in bytes, e.g. for a device supporting
 * a width of 4 the mask should have BIT(4) set.
@@ -742,6 +743,7 @@
```
int dev_id;
struct device *dev;
+struct module *owner;

u32 src_addr_widths;
u32 dst_addr_widths;
@@ -1366,8 +1368,11 @@
static inline int dmaengine_desc_set_reuse(struct dma_async_tx_descriptor *tx)
{
struct dma_slave_caps caps;
+int ret;

-dma_get_slave_caps(tx->chan, &caps);
+ret = dma_get_slave_caps(tx->chan, &caps);
+if (ret)
+  return ret;

if (caps.descriptor_reuse) {
  tx->flags |= DMA_CTRL_REUSE;
  --- linux-4.15.0.orig/include/linux/dmar.h
  +++ linux-4.15.0/include/linux/dmar.h
  @@ -39,6 +39,7 @@
  /* DMAR Flags */
  #define DMAR_INTR_REMAP0x1
  #define DMAR_X2APIC_OPT_OUT0x2
  +#define DMAR_PLATFORM_OPT_IN0x4

  struct intel_iommu;

  @@ -170,6 +171,8 @@
  { return 0; }
  #endif /* CONFIG_IRQ_REMAP */

+extern bool dmar_platform_optin(void);
+  +
+  +#else /* CONFIG_DMAR_TABLE */

  static inline int dmar_device_add(void *handle)
  @@ -182,6 +185,11 @@
  return 0;
  }

+static inline bool dmar_platform_optin(void)
+{ 
+  +return false;
+  +} 
+  +
#endif /* CONFIG_DMAR_TABLE */

struct irte {
    @@ -265,11 +273,6 @@
    #define PDA_LOW_BIT    26
    #define PDA_HIGH_BIT   32

    -enum {
    -    IRQ_REMAP_XAPIC_MODE,
    -    IRQ_REMAP_X2APIC_MODE,
    -};

    /* Can't use the common MSI interrupt functions
     * since DMAR is not a pci device
     */
--- linux-4.15.0.orig/include/linux/edac.h
+++ linux-4.15.0/include/linux/edac.h
@@ -17,6 +17,7 @@
    #include <linux/completion.h>
    #include <linux/workqueue.h>
    #include <linux/debugfs.h>
+    #include <linux/numa.h>

    #define EDAC_DEVICE_NAME_LEN	31

@@ -667,6 +668,6 @@
    /*
     * Maximum number of memory controllers in the coherent fabric.
     */
-    #define EDAC_MAX_MCS	16
+    #define EDAC_MAX_MCS2 * MAX_NUMNODES

    #endif
--- linux-4.15.0.orig/include/linux/eeprom_93xx46.h
+++ linux-4.15.0/include/linux/eeprom_93xx46.h
@@ -16,6 +16,8 @@
    #define EEPROM_93XX46_QUIRK_SINGLE_WORD_READ	(1 << 0)
    /* Instructions such as EWEN are (addrlen + 2) in length. */
    #define EEPROM_93XX46_QUIRK_INSTRUCTION_LENGTH	(1 << 1)
+    /* Add extra cycle after address during a read */
+    #define EEPROM_93XX46_QUIRK_EXTRA_READ_CYCLEBIT(2)

    /*
     * optional hooks to control additional logic
--- linux-4.15.0.orig/include/linux/efi.h
+++ linux-4.15.0/include/linux/efi.h
@@ -395,8 +395,8 @@
    u32 attributes;

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typedef struct {
    u32 get_bar_attributes;
    u32 set_bar_attributes;
    -uint64_t romsize;
    -void *romimage;
    +u64 romsize;
    +u32 romimage;
} efi_pci_io_protocol_32;

typedef struct {
    u64 attributes;
    u64 get_bar_attributes;
    u64 set_bar_attributes;
    -uint64_t romsize;
    -void *romimage;
    +u64 romsize;
    +u64 romimage;
} efi_pci_io_protocol_64;

typedef struct {
    efi_guid_t guid;

#define EFI_IMAGE_SECURITY_DATABASE_GUID EFI_GUID(0xd719b2cb, 0x3d3a, 0x4596, 0xa3, 0xbc, 0xda, 0xd0, 0x0e, 0x67, 0x65, 0x6f)
#define EFI_SHIM_LOCK_GUID EFI_GUID(0x605dab50, 0xe046, 0x4300, 0xab, 0xb6, 0x3d, 0xd8, 0x10, 0xdd, 0x8b, 0x23)

#define EFI_CERT_SHA256_GUID EFI_GUID(0xc1c41626, 0x504c, 0x4092, 0xac, 0xa9, 0xa9, 0x2b, 0xf9, 0x36, 0x93, 0x43, 0x28)
#define EFI_CERT_X509_GUID EFI_GUID(0xa5c059a1, 0x94e4, 0x4aa7, 0x87, 0xb5, 0x0b, 0x15, 0x5c, 0x2b, 0xf0, 0x72)
#define EFI_CERT_X509_SHA256_GUID EFI_GUID(0x3bd2a492, 0x96c0, 0x4079, 0xb4, 0x20, 0xfc, 0xf9, 0x8e, 0xf1, 0x03, 0xed)
+
/*
 * This GUID is used to pass to the kernel proper the struct screen_info
 * structure that was populated by the stub based on the GOP protocol instance
 @ @ .637.6 +641.7 @ @
#define LINUX_EFI_ARM_SCREEN_INFO_TABLE_GUID EFI_GUID(0xe03fc20a, 0x85dc, 0x406e, 0xb9, 0xe0e, 0xa4, 0xb5, 0x02, 0x37, 0x1d, 0x95)
#define LINUX_EFI_LOADER_ENTRY_GUID EFI_GUID(0x4a67b082, 0x0a4c, 0x41cf, 0xb6, 0xc7, 0x44, 0x0b, 0x29, 0xbb, 0xc8, 0x4f)
#define LINUX_EFI_RANDOM_SEED_TABLE_GUID EFI_GUID(0x1ce1e5be, 0x7eb, 0x42f2, 0x81, 0xe5, 0x8a, 0xad, 0xf1, 0x80, 0xf5, 0xb7)
#define LINUX_EFI_MOK_VARIABLE_TABLE_GUID EFI_GUID(0xc451ed2b, 0x9694, 0x45d3, 0xba, 0xba, 0xed, 0x9f, 0x89, 0x88, 0xa3, 0x89)

typedef struct {
    efi_guid_t guid;
typedef struct {
    efi_guid_t signature_owner;
    u8 signature_data[];
} efi_signature_data_t;

typedef struct {
    efi_guid_t signature_type;
    u32 signature_list_size;
    u32 signature_header_size;
    u32 signature_size;
    u8 signature_header[];
    /* efi_signature_data_t signatures[][] */
} efi_signature_list_t;

typedef u8 efi_sha256_hash_t[32];

typedef struct {
    efi_sha256_hash_t to_be_signed_hash;
    efi_time_t time_of_revocation;
} efi_cert_x509_sha256_t;

/* All runtime access to EFI goes through this structure: */

unsigned long properties_table; /* properties table */
unsigned long mem_attr_table; /* memory attributes table */
unsigned long rng_seed; /* UEFI firmware random seed */
unsigned long mokvar_table; /* MOK variable config table */
efi_get_time_t *get_time;
efi_set_time_t *set_time;
efi_get_wakeup_time_t *get_wakeup_time;

extern void efi_map_pal_code (void);
extern void efi_memmap_walk (efi_freemem_callback_t callback, void *arg);
extern void efi_gettimeofday (struct timespec64 *ts);
#ifdef CONFIG_EFI
extern void efi_enter_virtual_mode (void); /* switch EFI to virtual mode, if possible */
#else
static inline void efi_enter_virtual_mode (void) {}
#endif
#ifdef CONFIG_X86
extern void efi_late_init(void);
extern void efi_free_boot_services(void);
char * __init efi_md_typeattr_format(char *buf, size_t size,
    const efi_memory_desc_t *md);

+typedef void (*efi_element_handler_t)(const char *source,
    const void *element_data,
    size_t element_size);
+extern int __init parse_efi_signature_list(
    const char *source,
    const void *data, size_t size,
    efi_element_handler_t (*get_handler_for_guid)(const efi_guid_t *));
+
/**
 * efi_range_is_wc - check the WC bit on an address range
 * @start: starting kvirt address
 */
#define EFI_DBG			8	/* Print additional debug info at runtime */
#define EFI_NX_PE_DATA		9	/* Can runtime data regions be mapped non-executable? */
#define EFI_MEM_ATTR		10	/* Did firmware publish an EFI_MEMORY_ATTRIBUTES table? */
+#define EFI_SECURE_BOOT		11	/* Are we in Secure Boot mode? */
+
+enum efi_secureboot_mode {
    efi_secureboot_mode_unset,
    efi_secureboot_mode_unknown,
    efi_secureboot_mode_disabled,
    efi_secureboot_mode_enabled,
+};

#define CONFIG_EFI
/*
 @@ -1118,6 +1166,7 @@
 extern void efi_reboot(enum reboot_mode reboot_mode, const char *__unused);

 extern bool efi_is_table_address(unsigned long phys_addr);
+extern void __init efi_set_secure_boot(enum efi_secureboot_mode mode);
 #else
 static inline bool efi_enabled(int feature)
 { 
 @@ -1136,6 +1185,7 @@
 { 
 return false;
 }
+static inline void efi_set_secure_boot(enum efi_secureboot_mode mode) {}
 #endif

 extern int efi_status_to_err(efi_status_t status);
 @@ -1518,15 +1568,14 @@
struct screen_info *si, efi_guid_t *proto,
unsigned long size); 

-bool efi_runtime_disabled(void);  
+#ifdef CONFIG_EFI  
+extern bool efi_runtime_disabled(void);  
+#else  
+static inline bool efi_runtime_disabled(void) { return true; }  
+#endif  
+  extern void efi_call_virt_check_flags(unsigned long flags, const char *call); 

-enum efi_secureboot_mode {  
-    efi_secureboot_mode_unset,  
-    efi_secureboot_mode_unknown,  
-    efi_secureboot_mode_disabled,  
-    efi_secureboot_mode_enabled,  
-};  
enum efi_secureboot_mode efi_get_secureboot(efi_system_table_t *sys_table); 

#ifdef CONFIG_RESET_ATTACK_MITIGATION  
@@ -1603,4 +1652,36 @@  
    u8 bits[];  
}; 

+/*  
+ * The LINUX_EFI_MOK_VARIABLE_TABLE_GUID config table can be provided  
+ * to the kernel by an EFI boot loader. The table contains a packed  
+ * sequence of these entries, one for each named MOK variable.  
+ * The sequence is terminated by an entry with a completely NULL  
+ * name and 0 data size.  
+ */  
+struct efi_mokvar_table_entry {  
+    char name[256];  
+    u64 data_size;  
+    u8 data[];  
+} __attribute__((packed));  
+  
+#ifdef CONFIG_LOAD_UEFI_KEYS  
+extern void __init efi_mokvar_table_init(void);  
+extern struct efi_mokvar_table_entry *efi_mokvar_entry_next(  
+    struct efi_mokvar_table_entry **mokvar_entry);  
+extern struct efi_mokvar_table_entry *efi_mokvar_entry_find(const char *name);  
+#else  
+static inline void efi_mokvar_table_init(void) { }  
+static inline struct efi_mokvar_table_entry *efi_mokvar_entry_next(  
+    struct efi_mokvar_table_entry **mokvar_entry)  
+{  

+return NULL;
+
+static inline struct efi_mokvar_table_entry *efi_mokvar_entry_find(
+const char *name)
+{
+return NULL;
+
+#endif
+
+#endif /* _LINUX_EFI_H */
--- linux-4.15.0.orig/include/linux/elfcore.h
+++ linux-4.15.0/include/linux/elfcore.h
@@ -58,6 +58,7 @@
 }
 #endif

+if (defined(CONFIG_UML) && defined(CONFIG_X86_32)) || defined(CONFIG_IA64)
+/*
 * These functions parameterize elf_core_dump in fs/binfmt_elf.c to write out
 * extra segments containing the gate DSO contents. Dumping its
@@ -72,5 +73,26 @@
 extern int
 elf_core_write_extra_data(struct coredump_params *cprm);
 extern size_t elf_core_extra_data_size(void);
+*/
+static inline Elf_Half elf_core_extra_phdrs(void)
+{
+return 0;
+
+static inline int elf_core_write_extra_phdrs(struct coredump_params *cprm, loff_t offset)
+{
+return 1;
+
+static inline int elf_core_write_extra_data(struct coredump_params *cprm)
+{
+return 1;
+
+static inline size_t elf_core_extra_data_size(void)
+{
+return 0;
+
+#endif

#endif /* _LINUX_ELFCORE_H */
--- linux-4.15.0.orig/include/linux/elfnote.h
+++ linux-4.15.0/include/linux/elfnote.h
@@ -54,7 +54,7 @@.popsection;
#define ELFNOTE(name, type, desc)
-ELFNOTE_START(name, type, "")
+ELFNOTE_START(name, type, "a")
desc;
ELFNOTE_END

--- linux-4.15.0.orig/include/linux/etherdevice.h
+++ linux-4.15.0/include/linux/etherdevice.h
@@ -31,7 +31,7 @@
#endif __KERNEL__
struct device;
int eth_platform_get_mac_address(struct device *dev, u8 *mac_addr);
-unsigned char *arch_get_platform_get_mac_address(void);
+unsigned char *arch_get_platform_mac_address(void);
u32 eth_get_headlen(void *data, unsigned int max_len);
__be16 eth_type_trans(struct sk_buff *skb, struct net_device *dev);
extern const struct header_ops eth_header_ops;
--- linux-4.15.0.orig/include/linux/ethtool.h
+++ linux-4.15.0/include/linux/ethtool.h
@@ -310,6 +310,8 @@
* fields should be ignored (use %__ETHTOOL_LINK_MODE_MASK_NBITS
* instead of the latter), any change to them will be overwritten
* by kernel. Returns a negative error code or zero.
+ * @get_fecparam: Get the network device Forward Error Correction parameters.
+ * @set_fecparam: Set the network device Forward Error Correction parameters.
*
* All operations are optional (i.e. the function pointer may be set
* to %NULL) and callers must take this into account. Callers must
--- linux-4.15.0.orig/include/linux/eventfd.h
+++ linux-4.15.0/include/linux/eventfd.h
@@ -11,6 +11,8 @@
#include <linux/fcntl.h>
#include <linux/wait.h>
+#include <linux/percpu-defs.h>
+#include <linux/percpu.h>
/
* CAREFUL: Check include/uapi/asm-generic/fcntl.h when defining
@@ -41,6 +43,13 @@
int eventfd_ctx_remove_wait_queue(struct eventfd_ctx *ctx, wait_queue_entry_t *wait,
 __u64 *cnt);
+DECLARE_PER_CPU(int, eventfd_wake_count);
static inline bool eventfd_signal_count(void) {
    return this_cpu_read(eventfd_wake_count);
}

#else /* CONFIG_EVENTFD */

/*
@@ -79,6 +88,11 @@
    return -ENOSYS;
 }

+static inline bool eventfd_signal_count(void) {
    return false;
 } 
+
#endif /* _LINUX_EVENTFD_H */
--- linux-4.15.0.orig/include/linux/extcon.h
+++ linux-4.15.0/include/linux/extcon.h
@@ -278,6 +278,29 @@
 struct extcon_dev *edev, unsigned int id,
 struct notifier_block *nb) { }

+static inline int extcon_register_notifier_all(struct extcon_dev *edev,
+    struct notifier_block *nb) { 
+    return 0;
+}

+static inline int extcon_unregister_notifier_all(struct extcon_dev *edev,
+    struct notifier_block *nb) {
+    return 0;
+}

+static inline int devm_extcon_register_notifier_all(struct device *dev,
+    struct extcon_dev *edev,
+    struct notifier_block *nb) {
+    return 0;
+}

+static inline int devm_extcon_unregister_notifier_all(struct device *dev,
+    struct extcon_dev *edev,
+    struct notifier_block *nb) {
+    return 0;
+}

+static inline void devm_extcon_unregister_notifier_all(struct device *dev,
+    struct extcon_dev *edev,
+  struct notifier_block *nb) [ ]
+
static inline struct extcon_dev *extcon_get_extcon_dev(const char *extcon_name)
{
  return ERR_PTR(-ENODEV);
--- linux-4.15.0.orig/include/linux/fb.h
+++ linux-4.15.0/include/linux/fb.h
@@ -725,8 +725,6 @@
 extern const unsigned char *fb_firmware_edid(struct device *device);
 extern void fb_edid_to_monspecs(unsigned char *edid,
     struct fb_monspecs *specs);
-extern void fb_edid_add_monspecs(unsigned char *edid,
-    struct fb_monspecs *specs);
 extern void fb_destroy_modedb(struct fb_videomode *modedb);
 extern int fb_find_mode_cvt(struct fb_videomode *mode, int margins, int rb);
 extern unsigned char *fb_ddc_read(struct i2c_adapter *adapter);
@@ -800,7 +798,6 @@
 extern const char *fb_mode_option;
 extern const struct fb_videomode vesa_modes[];
-extern const struct fb_videomode cea_modes[65];
 extern const struct dmt_videomode dmt_modes[];

 struct fb_modelist {
 --- linux-4.15.0.orig/include/linux/fdttable.h
+++ linux-4.15.0/include/linux/fdttable.h
@@ -10,6 +10,7 @@
 #include <linux/compiler.h>
 #include <linux/spinlock.h>
 #include <linux/rcupdate.h>
+#include <linux/nospec.h>
 #include <linux/types.h>
 #include <linux/init.h>
 #include <linux/fs.h>
@@ -82,8 +83,10 @@
 {
 struct fdttable *fdt = rcu_dereference_raw(files->fdt);

-  if (fd < fdt->max_fds)
+  if (fd < fdt->max_fds) {
+    fd = array_index_nospec(fd, fdt->max_fds);
    return rcu_dereference_raw(fdt->fd[fd]);
  }
  return NULL;
 }
struct path;
extern struct file *alloc_file(const struct path *, fmode_t mode,
    const struct file_operations *fop);
+extern struct file *get_empty_filp(void);

static inline void fput_light(struct file *file, int fput_needed)
{
    --- linux-4.15.0.orig/include/linux/filter.h
+++ linux-4.15.0/include/linux/filter.h
@@ -20,6 +20,7 @@
[91x776]struct path;
[91x761]extern struct file *alloc_file(const struct path *, fmode_t mode,
[91x746]const struct file_operations *fop);
+[91x731]extern struct file *get_empty_filp(void);
[91x701]static inline void fput_light(struct file *file, int fput_needed)
[91x686]{
--- linux-4.15.0.orig/include/linux/filter.h
+++ linux-4.15.0/include/linux/filter.h
@@ -20,6 +20,7 @@
[91x671]}
((struct bpf_insn) {
\t.code  = CLASS | BPF_MOV | BPF_X,
\t.dst_reg = DST,
\t.src_reg = SRC,
\t.off   = 0,
\t.imm   = 0 })
+
#define BPF_MOV64_REG(DST, SRC) ((struct bpf_insn) {
\t.code  = BPF_ALU64 | BPF_MOV | BPF_X,
@@ -151,6 +163,14 @@
\t.off   = 0,
\t.imm   = IMM })
+
#define BPF_RAW_REG(insn, DST, SRC) ((struct bpf_insn) {
\t.code  = (insn).code,
\t.dst_reg = DST,
\t.src_reg = SRC,
\t.off   = (insn).off,
\t.imm   = (insn).imm })
+
/* BPF_LD_IMM64 macro encodes single 'load 64-bit immediate' insn */
#define BPF_LD_IMM64(DST, IMM) BPF_LD_IMM64_RAW(DST, 0, IMM)
@@ -449,7 +469,9 @@
struct bpf_binary_header {
    unsigned int pages;
-    u8 image[];
+    /* Some arches need word alignment for their instructions */
+    u8 image[]={ __aligned(4);
    }
;
struct bpf_prog {
    @@ -601,16 +623,34 @@
        return prog->type == BPF_PROG_TYPE_UNSPEC;
    }
-
-    static inline bool
-    @-bpf_ctx_narrow_access_ok(u32 off, u32 size, const u32 size_default)
+    static inline u32 bpf_ctx_off_adjust_machine(u32 size)
{ 
    -bool off_ok;
+    const u32 size_machine = sizeof(unsigned long);
    +
    +if (size > size_machine && size % size_machine == 0)
\[\text{size} = \text{size}_\text{machine};\]
\[+\]
\[+\text{return size};\]
\[+\]
\[+\text{static inline bool} \text{bpf_ctx_narrow_align_ok}(u32 \text{off}, u32 \text{size}_\text{access},\]
\[+ u32 \text{size}_\text{default})\]
\[+\]
\[+\text{size}_\text{default} = \text{bpf_ctx_off_adjust_machine}(\text{size}_\text{default});\]
\[+\text{size}_\text{access} = \text{bpf_ctx_off_adjust_machine}(\text{size}_\text{access});\]
\[+\]
\[+\text{#ifdef } \text{__LITTLE_ENDIAN}\]
\[+\text{-off}_\text{ok} = (\text{off} \& (\text{size}_\text{default} - 1)) == 0;\]
\[+\text{+return } (\text{off} \& (\text{size}_\text{default} - 1)) == 0;\]
\[+\text{\#else}\]
\[+\text{-off}_\text{ok} = (\text{off} \& (\text{size}_\text{default} - 1)) + \text{size} == \text{size}_\text{default};\]
\[+\text{+return } (\text{off} \& (\text{size}_\text{default} - 1)) + \text{size}_\text{access} == \text{size}_\text{default};\]
\[+\text{\#endif}\]
\[+\text{-return off}_\text{ok} && \text{size} <= \text{size}_\text{default} && (\text{size} \& (\text{size} - 1)) == 0;\]
\[+\]
\[+\text{static inline bool } \text{bpf_ctx_narrow_access_ok}(u32 \text{off}, u32 \text{size}, u32 \text{size}_\text{default})\]
\[+\]
\[+\text{return } \text{bpf_ctx_narrow_align_ok}(\text{off}, \text{size}, \text{size}_\text{default}) &&\]
\[+\text{size} <= \text{size}_\text{default} && (\text{size} \& (\text{size} - 1)) == 0;\]
\[+\]
\[+\text{#define } \text{bpf_classic_proglen}(fprog) (fprog->len * \text{sizeof}(fprog->filter[0]))\]
\[+\text{@@ -636,6 +676,7 @@}\]
\text{static inline void } \text{bpf_jit_binary_lock_ro}(\text{struct bpf_binary_header }*\text{hdr})\]
\[+\text{\{\}}\]
\[+\text{\text{WARN_ON_ONCE(set_memory_ro((unsigned long)hdr, hdr->pages));}}\]
\[+\text{+set_memory_x((unsigned long)hdr, hdr->pages);}\]
\[+\text{\}}\]
\[+\text{static inline void } \text{bpf_jit_binary_unlock_ro}(\text{struct bpf_binary_header }*\text{hdr})\]
\[+\text{@@ -753,6 +803,9 @@}\]
\text{extern int } \text{bpf_jit_enable};\]
\text{extern int } \text{bpf_jit_harden};\]
\text{extern int } \text{bpf_jit_kallsyms};\]
\text{+extern long } \text{bpf_jit_limit};\]
\[+\text{typedef void }(*\text{bpf_jit_fill_hole_t})(\text{void }*\text{area}, \text{unsigned int }\text{size});\]
\[+\text{@@ -761,7 +803,9 @@}\]
\text{unsigned int } \text{alignment,}\]
\text{bpf_jit_fill_hole_t } \text{bpf_fill_ill_insns);}
void bpf_jit_binary_free(struct bpf_binary_header *hdr);
-
+u64 bpf_jit_alloc_exec_limit(void);
+void *bpf_jit_alloc_exec(unsigned long size);
+void bpf_jit_free_exec(void *addr);
void bpf_jit_free(struct bpf_prog *fp);

struct bpf_prog *bpf_jit_blind_constants(struct bpfProg *fp);
--- linux-4.15.0.orig/include/linux/font.h
+++ linux-4.15.0/include/linux/font.h
@@ -32,6 +32,7 @@
#define ACORN8x8_IDX	8
#define	MINI4x6_IDX	9
#define FONT6x10_IDX	10
+#define TER16x32_IDX	11
extern const struct font_desc	font_vga_8x8,
font_vga_8x16,
@@ -43,7 +44,8 @@
font_sun_12x22,
font_acorn_8x8,
font_mini_4x6,
-font_6x10;
+font_6x10,
+font_ter_16x32;
/* Find a font with a specific name */
@@ -57,4 +59,17 @@
/* Max. length for the name of a predefined font */
#define MAX_FONT_NAME	32

+#define REFCOUNT(fd)(((int *)(fd))[-1])
+#define FNTSIZE(fd)(((int *)(fd))[-2])
+#define FNTCHARCNT(fd)(((int *)(fd))[-3])
+#define FNTSUM(fd)(((int *)(fd))[-4])
+
+#define FONT_EXTRA_WORDS 4
+
+struct font_data {
+unsigned int extra[FONT_EXTRA_WORDS];
+const unsigned char data[];
+} __packed;
+
#endif /* _VIDEO_FONT_H */
--- linux-4.15.0.orig/include/linux/fs.h
+++ linux-4.15.0/include/linux/fs.h
extern int leases_enable, lease_break_time;
extern int sysctl_protected_symlinks;
extern int sysctl_protected_hardlinks;
+extern int sysctl_protected_fifos;
+extern int sysctl_protected_regular;

typedef __kernel_rwf_t rwf_t;

/+1 -72.6 +72.8 @@
/* Has write method(s) */
#define FMODE_CAN_WRITE ((__force fmode_t)0x40000)

+ /* File is stream-like */
+ #define FMODE_STREAM ((__force fmode_t)0x200000)
+ /* File was opened by fanotify and shouldn't generate fanotify events */
+ #define FMODE_NONOTIFY ((__force fmode_t)0x4000000)

static inline struct file *get_file(struct file *f)

static inline struct file *get_file(struct file *f)

/* can be called from interrupts */
extern void kill_fasync(struct fasync_struct **, int, int);

+extern int setfl(int fd, struct file * filp, unsigned long arg);
extern void __f_setown(struct file *filp, struct pid *, enum pid_type, int force);
extern int f_setown(struct file *filp, unsigned long arg, int force);
extern void f_delown(struct file *filp);

#define SB_I_CGROUPWB 0x00000001 /* cgroup-aware writeback enabled */
#define SB_I_NOEXEC 0x00000002 /* Ignore executables on this fs */
#define SB_I_NODEV 0x00000004 /* Ignore devices on this fs */
/* sb->s_iflags to limit user namespace mounts */
#define SB_I_USERNS_VISIBLE	0x00000010 /* fstype already mounted */
@@ -1712,6 +1721,7 @@
 ssize_t (*sendpage) (struct file *, struct page *, int, size_t, loff_t *, int);
 unsigned long (*get_unmapped_area)(struct file *, unsigned long, unsigned long, unsigned long, unsigned long, unsigned long);
 int (*checkflags)(int);
+int (*setfl)(struct file *, unsigned long);
 int (*flock) (struct file *, int, struct file_lock *);
 ssize_t (*splice_write)(struct pipe_inode_info *, struct file *, loff_t *, size_t, int);
 ssize_t (*splice_read)(struct file *, loff_t *, struct pipe_inode_info *, size_t, int);
@@ -1782,6 +1792,12 @@
 struct iovec *fast_pointer,
 struct iovec **ret_pointer);
+typedef ssize_t (*vfs_readf_t)(struct file *, char __user *, size_t, loff_t *);
+typedef ssize_t (*vfs_writef_t)(struct file *, const char __user *, size_t,
+                              loff_t *);
+vfs_readf_t vfs_readf(struct file *file);
+vfs_writef_t vfs_writef(struct file *file);
+
 extern ssize_t __vfs_read(struct file *, char __user *, size_t, loff_t *);
 extern ssize_t vfs_read(struct file *, char __user *, size_t, loff_t *);
 extern ssize_t vfs_write(struct file *, char __user *, size_t, loff_t *);
@@ -1792,8 +1808,10 @@
 extern int vfs_clone_file_range(struct file *file, loff_t pos_in,
       struct file *file_out, loff_t pos_out, u64 len);
 extern int vfs_dedupe_file_range_compare(struct inode *src, loff_t srcoff,
       struct inode *dest, loff_t destoff,
       loff_t len, bool *is_same);
@@ -1832,6 +1850,10 @@
 struct shrink_control *);
 long (*free_cached_objects)(struct super_block *,
       struct shrink_control *);
+if defined(CONFIG_BLK_DEV_LOOP) || defined(CONFIG_BLK_DEV_LOOP_MODULE)
+/* and aufs */
+typedef file (*real_loop)(struct file *);
+endif
};
/*
 * I_OVL_INUSE Used by overlayfs to get exclusive ownership on upper
 * and work dirs among overlayfs mounts.
 * + I_SYNC_QUEUED Inode is queued in b_io or b_more_io writeback lists.
 * + Used to detect that mark_inode_dirty() should not move
 * + inode between dirty lists.
 * +
 * Q: What is the difference between I_WILL_FREE and I_FREEING?
 */
#define I_DIRTY_SYNC (1 << 0)
#define I_DIO_WAKEUP (1 << __I_DIO_WAKEUP)
#define I_LINKABLE (1 << 10)
#define I_DIRTY_TIME (1 << 11)
#define I_DIRTY_TIME_EXPIRED (1 << 12)
#define I_WB_SWITCH (1 << 13)
#define I_OVL_INUSE (1 << 14)
#define I_DIRTY (I_DIRTY_SYNC | I_DIRTY_DATASYNC | I_DIRTY_PAGES)
#define I_DIRTY_INODE (I_DIRTY_SYNC | I_DIRTY_DATASYNC)
#define I_DIRTY (I_DIRTY_INODE | I_DIRTY_PAGES)
#define I_DIRTY_ALL (I_DIRTY | I_DIRTY_TIME)

extern void __mark_inode_dirty(struct inode *, int);
extern void ihold(struct inode * inode);
extern void iput(struct inode *);
extern int generic_update_time(struct inode *, struct timespec *, int);
+extern int update_time(struct inode *, struct timespec *, int);
+extern struct file *getname_flags(const char __user *, int, int *);
return false;
} #endif

/* /sys/fs */
extern struct kobject *fs_kobj;

#ifndef FS_OPEN'S
extern struct kobject *fs_kobj;
#endif

/* sys/fs */
extern struct kobject *fs_kobj;

/*
 * file_open_root(struct dentry *, struct vfsmount *,
 * const char *, int, umode_t);
 * extern struct file *dentry_open(const struct path *, int, const struct cred *);
 * +extern struct file *filp_clone_open(struct file *);
 * extern int filp_close(struct file *, fl_owner_t id);
 * extern struct filename *getname_flags(const char __user *, int, int *);
 * @ @ -2481,6 +2509,7 @@
 * return false;
 */
#else
#endif
+extern int __sync_filesystem(struct super_block *, int);
extern int sync_filesystem(struct super_block *);
extern const struct file_operations def_blk_fops;
extern const struct file_operations def_chr_fops;
@@ -2551,7 +2580,7 @@
#define BLKDEV_MAJOR_MAX512
extern const char *__bdevname(dev_t, char *buffer);
extern const char *bdevname(struct block_device *bdev, char *buffer);
 extern struct block_device *lookup_bdev(const char *);
+extern struct block_device *lookup_bdev(const char *, int mask);
 extern void blkdev_show(struct seq_file *,off_t);

#else
@@ -2590,6 +2619,8 @@
extern int filemap_fdatawait_keep_errors(struct address_space *mapping);
extern int filemap_fdatawait_range(struct address_space *, loff_t lstart,
     loff_t lend);
+extern int filemap_fdatawait_range_keep_errors(struct address_space *mapping,
+loff_t start_byte, loff_t end_byte);

static inline int filemap_fdatawait(struct address_space *mapping)
{
@@ -2729,19 +2760,6 @@
__sb_end_write(file_inode(file)->i_sb, SB_FREEZE_WRITE);
}

-static inline int do_clone_file_range(struct file *file_in, loff_t pos_in,
-    struct file *file_out, loff_t pos_out,
-    u64 len)
-{
-    int ret;
-    -
-    -file_start_write(file_out);
-    -ret = vfs_clone_file_range(file_in, pos_in, file_out, pos_out, len);
-    -file_end_write(file_out);
-    -
-    -return ret;
-    -}
-    -
/*
 * get_write_access() gets write permission for a file.
 * put_write_access() releases this write permission.
@@ -2972,6 +2990,7 @@
extern loff_t no_seek_end_llseek(struct file *, loff_t, int);
extern int generic_file_open(struct inode * inode, struct file * filp);
extern int nonseekable_open(struct inode * inode, struct file * filp);
+extern int stream_open(struct inode * inode, struct file * filp);


```c
#ifdef CONFIG_BLOCK
typedef void (dio_submit_t)(struct bio *bio, struct inode *inode,
@@ -2992,6 +3011,7 @@

void dio_end_io(struct bio *bio);
+void dio_warn_stale_pagecache(struct file *filp);

ssize_t __blockdev_direct_IO(struct kiocb *iocb, struct inode *inode,
  struct block_device *bdev, struct iov_iter *iter,
@@ -3204,7 +3224,7 @@

if (!vma_is_dax(vma))
  return false;
inode = file_inode(vma->vm_file);
-if (inode->i_mode == S_IFCHR)
+if (S_ISCHR(inode->i_mode))
  return false; /* device-dax */
  return true;
}
@@ -3408,6 +3428,7 @@

extern bool path_noexec(const struct path *path);
+extern bool path_nosuid(const struct path *path);
extern void inode_nohighmem(struct inode *inode);

#endif /* _LINUX_FS_H */
--- linux-4.15.0.orig/include/linux/fscache-cache.h
+++ linux-4.15.0/include/linux/fscache-cache.h
@@ -183,8 +183,7 @@
static inline void fscache_retrieval_complete(struct fscache_retrieval *op,
  int n_pages)
{
  -atomic_sub(n_pages, &op->n_pages);
-if (atomic_read(&op->n_pages) <= 0)
+if (atomic_sub_return_relaxed(n_pages, &op->n_pages) <= 0)
    fscache_op_complete(&op->op, true);
}

--- linux-4.15.0.orig/include/linux/fscrypt.h
+++ linux-4.15.0/include/linux/fscrypt.h
@@ -193,7 +193,7 @@
* in an encrypted directory tree use the same encryption policy.
 *
* Return: 0 on success, -ENOKEY if the directory's encryption key is missing,
- * -EPERM if the link would result in an inconsistent encryption policy, or
+ * -EXDEV if the link would result in an inconsistent encryption policy, or
* another -errno code.
```
static inline int fscrypt_prepare_link(struct dentry *old_dentry,
@@ -223,7 +223,7 @@
    * We also verify that the rename will not violate the constraint that all files
    * in an encrypted directory tree use the same encryption policy.
    *
-   * Return: 0 on success, -ENOKEY if an encryption key is missing, -EPERM if the
+   * Return: 0 on success, -ENOKEY if an encryption key is missing, -EXDEV if the
    * rename would cause inconsistent encryption policies, or another -errno code.
 */
static inline int fscrypt_prepare_rename(struct inode *old_dir,
--- linux-4.15.0.orig/include/linux/fsl/guts.h
+++ linux-4.15.0/include/linux/fsl/guts.h
@@ -16,6 +16,7 @@
#define __FSL_GUTS_H__
#include <linux/types.h>
#include <linux/io.h>

/**
 * Global Utility Registers.
--- linux-4.15.0.orig/include/linux/fsl_ifc.h
+++ linux-4.15.0/include/linux/fsl_ifc.h
@@ -274,6 +274,8 @@
/* Auto Boot Mode */
#define IFC_NAND_NCFGR_BOOT0		0x80000000
+/* SRAM Initialization */
#define IFC_NAND_NCFGR_SRAM_INIT_EN	0x20000000
/* Addressing Mode-ROW0+n/COL0 */
#define IFC_NAND_NCFGR_ADDR_MODE_RC0	0x00000000
/* Addressing Mode-ROW0+n/COL0+n */
@@ -734,11 +736,7 @@
    u32 res19[0x10];
    __be32 nand_fsr;
    u32 res20;
-   /* The V1 nand_eccstat is actually 4 words that overlaps the
-    * V2 nand_eccstat.
-   */
-   __be32 v1_nand_eccstat[2];
-   __be32 v2_nand_eccstat[6];
+   __be32 nand_eccstat[8];
    u32 res21[0x1c];
    __be32 nanndcr;
    u32 res22[0x2];
--- linux-4.15.0.orig/include/linux/fsnotify_backend.h
+++ linux-4.15.0/include/linux/fsnotify_backend.h
@@ -68,15 +68,20 @@
#define ALL_FSNOTIFY_PERM_EVENTS (FS_OPEN_PERM | FS_ACCESS_PERM)

+/* Events that can be reported to backends */
#define ALL_FSNOTIFY_EVENTS (FS_ACCESS | FS_MODIFY | FS_ATTRIB |
 FS_CLOSE_WRITE | FS_CLOSE_NOWRITE | FS_OPEN |
 FS_MOVED_FROM | FS_MOVED_TO | FS_CREATE |
 FS_DELETE | FS_DELETE_SELF | FS_MOVE_SELF |
 FS_UNMOUNT | FS_Q_OVERFLOW | FS_IN_IGNORED |
 - FS_OPEN_PERM | FS_ACCESS_PERM | FS_EXCL_UNLINK |
 - FS_ISDIR | FS_IN_ONESHOT | FS_DN_RENAME |
 + FS_OPEN_PERM | FS_ACCESS_PERM | FS_DN_RENAME)
 +
+/* Extra flags that may be reported with event or control handling of events */
+#define ALL_FSNOTIFY_FLAGS  (FS_EXCL_UNLINK | FS_ISDIR | FS_IN_ONESHOT |
 FS_DN_MULTISHOT | FS_EVENT_ON_CHILD)
+
+#define ALL_FSNOTIFY_BITS  (ALL_FSNOTIFY_EVENTS | ALL_FSNOTIFY_FLAGS)
+
struct fsnotify_group;
struct fsnotify_event;
struct fsnotify_mark;
union /**< Object pointer [lock] */
struct inode *inode;
struct vfsmount *mnt;
-};
-union {
 -struct hlist_head list;
 /* Used listing heads to free after srcu period expires */
 struct fsnotify_mark_connector *destroy_next;
};
+struct hlist_head list;
};

/*
 --- linux-4.15.0.orig/include/linux/ftrace.h
+++ linux-4.15.0/include/linux/ftrace.h
 @ @ -767,7 +767,9 @ @
 #ifdef CONFIG_FUNCTION_GRAPH_TRACER

 /* for init task */
-#define INIT_FTRACE_GRAPH.ret_stack = NULL,
+#define INIT_FTRACE_GRAPH\
 +.ret_stack= NULL,\n +.tracing_graph_pause= ATOMIC_INIT(0),

 /*
* Stack of return addresses for functions
@@ -797,8 +799,8 @@
extern void return_to_handler(void);

extern int
-ftrace_push_return_trace(unsigned long ret, unsigned long func, int *depth,
-unsigned long frame_pointer, unsigned long *retp);
+function_graph_enter(unsigned long ret, unsigned long func,
+unsigned long frame_pointer, unsigned long *retp);

unsigned long ftrace_graph_ret_addr(struct task_struct *task, int *idx,
   unsigned long ret, unsigned long *retp);
--- linux-4.15.0.orig/include/linux/futex.h
+++ linux-4.15.0/include/linux/futex.h
@@ @ -2,7 +2,9 @@
#ifndef _LINUX_FUTEX_H
#define _LINUX_FUTEX_H
+#include <linux/sched.h>
 #include <linux/ktime.h>
+#include <uapi/linux/futex.h>

struct inode;
@@ @ -12,9 +14,6 @@
long do_futex(u32 __user *uaddr, int op, u32 val, ktime_t *timeout,
   u32 __user *uaddr2, u32 val2, u32 val3);

-extern int
-handle_futex_death(u32 __user *uaddr, struct task_struct *curr, int pi);
-
/*
 * Futexes are matched on equal values of this key.
 * The key type depends on whether it's a shared or private mapping.
@@ @ -35,43 +34,57 @@
union futex_key {
 struct {
 +u64 i_seq;
 unsigned long pgoff;
-struct inode *inode;
-int offset;
+unsigned int offset;
 } shared;
 struct {
 +union {
 +struct mm_struct *mm;
 +u64 __tmp;
unsigned long address;
- struct mm_struct *mm;
- int offset;
+ unsigned int offset;
} private;

struct {
+ u64 ptr;
 unsigned long word;
- void *ptr;
- int offset;
+ unsigned int offset;
} both;

#define FUTEX_KEY_INIT (union futex_key) { .both = { .ptr = NULL } }

#define FUTEX_KEY_INIT (union futex_key) { .both = { .ptr = 0ULL } }

#ifdef CONFIG_FUTEX
- extern void exit_robust_list(struct task_struct *curr);
- #ifdef CONFIG_HAVE_FUTEX_CMPXCHG
- #define futex_cmpxchg_enabled 1
- #else
- extern int futex_cmpxchg_enabled;
- #endif
- #else
- static inline void exit_robust_list(struct task_struct *curr)
+ enum {
+ FUTEX_STATE_OK,
+ FUTEX_STATE_EXITING,
+ FUTEX_STATE_DEAD,
+ }
+ static inline void futex_init_task(struct task_struct *tsk)
{ }
- }
+ tsk->robust_list = NULL;
+ #ifdef CONFIG_COMPAT
+ tsk->compat_robust_list = NULL;
+ #endif
+ INIT_LIST_HEAD(&tsk->pi_state_list);
+ tsk->pi_state_cache = NULL;
+ tsk->futex_state = FUTEX_STATE_OK;
+ mutex_init(&tsk->futex_exit_mutex);
+ }

- #ifdef CONFIG_FUTEX_PI
- extern void exit_pi_state_list(struct task_struct *curr);

---

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+void futext_exit_recursive(struct task_struct *tsk);
+void futext_exit_release(struct task_struct *tsk);
+void futext_exec_release(struct task_struct *tsk);
+
+long do_futex(u32 __user *uaddr, int op, u32 val, ktime_t *timeout,
+u32 __user *uaddr2, u32 val2, u32 val3);
#else
-static inline void exit_pi_state_list(struct task_struct *curr)
-{
-}
+static inline void futext_init_task(struct task_struct *tsk) { }
+static inline void futext_exit_recursive(struct task_struct *tsk) { }
+static inline void futext_exit_release(struct task_struct *tsk) { }
+static inline void futext_exec_release(struct task_struct *tsk) { }
#endif
#endif
--- linux-4.15.0.orig/include/linux/genalloc.h
+++ linux-4.15.0/include/linux/genalloc.h
@@ -51,7 +51,8 @@
unsigned long size,
unsigned long start,
unsigned int nr,
-void *data, struct gen_pool *pool);
+void *data, struct gen_pool *pool,
+unsigned long start_addr);

/*
 * General purpose special memory pool descriptor.
@@ -131,24 +132,24 @@
extern unsigned long gen_pool_first_fit(unsigned long *map, unsigned long size,
unsigned long start, unsigned int nr, void *data,
-struct gen_pool *pool);
+struct gen_pool *pool, unsigned long start_addr);

extern unsigned long gen_pool_fixed_alloc(unsigned long *map, unsigned long size,
unsigned long start, unsigned int nr,
-void *data, struct gen_pool *pool);
+void *data, struct gen_pool *pool, unsigned long start_addr);

extern unsigned long gen_pool_first_fit_align(unsigned long *map,
unsigned long size, unsigned long start, unsigned int nr,
-void *data, struct gen_pool *pool);
+void *data, struct gen_pool *pool, unsigned long start_addr);

extern unsigned long gen_pool_first_fit_order_align(unsigned long *map,
unsigned long size, unsigned long start, unsigned int nr,
-void *data, struct gen_pool *pool);
+void *data, struct gen_pool *pool, unsigned long start_addr);

extern unsigned long gen_pool_best_fit(unsigned long *map, unsigned long size,
unsigned long start, unsigned int nr, void *data,
-struct gen_pool *pool);
+struct gen_pool *pool, unsigned long start_addr);

extern struct gen_pool *devm_gen_pool_create(struct device *dev,
--- linux-4.15.0.orig/include/linux/genhd.h
+++ linux-4.15.0/include/linux/genhd.h
@@ -128,7 +128,7 @@
 struct disk_stats dkstats;
 #endif
 struct percpu_ref ref;
-struct rcu_head rcu_head;
+struct rcu_work rcu_work;
};

#define GENHD_FL_REMOVABLE 1
@@ -367,7 +367,9 @@
 part_stat_add(cpu, gendiskp, field, -subnd)
 void part_in_flight(struct request_queue *q, struct hd_struct *part,
-unsigned int inflight[2]);
+unsigned int inflight[2]);
+void part_in_flight_rw(struct request_queue *q, struct hd_struct *part,
+unsigned int inflight[2]);
 void part_dec_in_flight(struct request_queue *q, struct hd_struct *part,
 int rw);
 void part_inc_in_flight(struct request_queue *q, struct hd_struct *part,
@@ -579,6 +581,7 @@
 extern int blk_alloc_devt(struct hd_struct *part, dev_t *devt);
 extern void blk_free_devt(dev_t devt);
 +extern void blk_invalidate_devt(dev_t devt);
 extern dev_t blk_lookup_devt(const char *name, int partno);
 extern char *disk_name (struct gendisk *hd, int partno, char *buf);

@@ -710,9 +713,11 @@
 static inline void part_nr_sects_write(struct hd_struct *part, sector_t size)
 { 
 #if BITS_PER_LONG==32 && defined(CONFIG_LBDAF) && defined(CONFIG_SMP)
 +preempt_disable();
 write_seqcount_begin(&part->nr_sects_seq);
 part->nr_sects = size;

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write_seqcount_end(&part->nr_sects_seq);
+preempt_enable();
#elseif BITS_PER_LONG==32 && defined(CONFIG_LBDAF) && defined(CONFIG_PREEMPT)
preempt_disable();
part->nr_sects = size;
--- linux-4.15.0.orig/include/linux/genl_magic_struct.h
+++ linux-4.15.0/include/linux/genl_magic_struct.h
@@ -191,6 +191,7 @@
switch (0) {
#include GENL_MAGIC_INCLUDE_FILE
+case 0:
;
}  
}  
@@ -209,6 +210,7 @@
switch (0) {
#include GENL_MAGIC_INCLUDE_FILE
+case 0:
;
}  
}  
@@ -218,7 +220,8 @@
static inline void ct_assert_unique_##s_name##_attributes(void)
{
switch (0) {
-s_fields
+static inline void ct_assert_unique_##s_name##_attributes(void)
+case 0:
;
}  
}  
--- linux-4.15.0.orig/include/linux/gfp.h
+++ linux-4.15.0/include/linux/gfp.h
@@ -308,6 +308,29 @@
return !!((gfp_flags & __GFP_DIRECT_RECLAIM));
}  
+/**
+ * gfpflags_normal_context - is gfp_flags a normal sleepable context?
+ * @gfp_flags: gfp_flags to test
+ * @
+ * Test whether @gfp_flags indicates that the allocation is from the
+ * %current context and allowed to sleep.
+ *
+ * An allocation being allowed to block doesn't mean it owns the %current
+ * context. When direct reclaim path tries to allocate memory, the
+ */


allocation context is nested inside whatever %current was doing at the
time of the original allocation. The nested allocation may be allowed
to block but modifying anything %current owns can corrupt the outer
text's expectations.
+ *
+ %true result from this function indicates that the allocation context
+ can sleep and use anything that's associated with %current.
+ */
static inline bool gfpflags_normal_context(const gfp_t gfp_flags)
{
+ (gfp_flags & (__GFP_DIRECT_RECLAIM | __GFP_MEMALLOC)) ==
+ __GFP_DIRECT_RECLAIM;
+
+ #ifdef CONFIG_HIGHMEM
#define OPT_ZONE_HIGHMEM ZONE_HIGHMEM
#else
--- linux-4.15.0.orig/include/linux/gpio.h
+++ linux-4.15.0/include/linux/gpio.h
@@ -230,30 +230,6 @@
return -EINVAL;

-static inline int
-gpiochip_add_pin_range(struct gpio_chip *chip, const char *pinctl_name,
- unsigned int gpio_offset, unsigned int pin_offset,
- unsigned int npins)
-{
- WARN_ON(1);
- return -EINVAL;
-}
-
-static inline int
-gpiochip_add_pingroup_range(struct gpio_chip *chip,
- struct pinctrl_dev *pctldev,
- unsigned int gpio_offset, const char *pin_group)
-{
- WARN_ON(1);
- return -EINVAL;
-}
-
-static inline void
-gpiochip_remove_pin_ranges(struct gpio_chip *chip)
-{ 
- WARN_ON(1);
- return -EINVAL;
- } 
-
-static inline int
-devm_gpio_request(struct device *dev, unsigned gpio,
const char *label) {
--- linux-4.15.0.orig/include/linux/gpio/consumer.h
+++ linux-4.15.0/include/linux/gpio/consumer.h
@@ -217,7 +217,7 @@
might_sleep();

/* GPIO can never have been requested */
-WARN_ON(1);
+WARN_ON(desc);
}

static inline void gpiod_put_array(struct gpio_descs *descs)
@@ -225,7 +225,7 @@
might_sleep();

/* GPIO can never have been requested */
-WARN_ON(1);
+WARN_ON(descs);
}

static inline struct gpio_desc *__must_check
@@ -278,7 +278,7 @@
might_sleep();

/* GPIO can never have been requested */
-WARN_ON(1);
+WARN_ON(desc);
}

static inline void devm_gpiod_put_array(struct device *dev,
@@ -287,32 +287,32 @@
might_sleep();

/* GPIO can never have been requested */
-WARN_ON(1);
+WARN_ON(descs);
}

static inline void gpiod_get_direction(const struct gpio_desc *desc)
{
/* GPIO can never have been requested */
-WARN_ON(1);
+WARN_ON(desc);
return -ENOSYS;
}

static inline int gpiod_direction_input(struct gpio_desc *desc)
{
{  /* GPIO can never have been requested */
- WARN_ON(1);
+ WARN_ON(desc);
  return -ENOSYS;
}
static inline int gpiod_direction_output(struct gpio_desc *desc, int value)
{  /* GPIO can never have been requested */
- WARN_ON(1);
+ WARN_ON(desc);
  return -ENOSYS;
}
static inline int gpiod_direction_output_raw(struct gpio_desc *desc, int value)
{  /* GPIO can never have been requested */
- WARN_ON(1);
+ WARN_ON(desc);
  return -ENOSYS;
}

static inline int gpiod_get_value(const struct gpio_desc *desc)
{  /* GPIO can never have been requested */
- WARN_ON(1);
+ WARN_ON(desc);
  return 0;
}
static inline int gpiod_get_array_value(unsigned int array_size,
@@ -328,25 +328,25 @@
int *value_array)
{  /* GPIO can never have been requested */
- WARN_ON(1);
+ WARN_ON(desc_array);
  return 0;
}
static inline void gpiod_set_value(struct gpio_desc *desc, int value)
{  /* GPIO can never have been requested */
- WARN_ON(1);
+ WARN_ON(desc);
}
static inline void gpiod_set_array_value(unsigned int array_size,
 struct gpio_desc **desc_array,
 int *value_array)
static inline int gpiod_get_raw_value(const struct gpio_desc *desc)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
    return 0;
}

static inline int gpiod_get_array_value(unsigned int array_size, int *value_array)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc_array);
    return 0;
}

static inline void gpiod_set_raw_value(struct gpio_desc *desc, int value)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
}

static inline void gpiod_set_array_value(unsigned int array_size, struct gpio_desc **desc_array, int *value_array)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc_array);
}

static inline int gpiod_get_value_cansleep(const struct gpio_desc *desc)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
    return 0;
}

static inline int gpiod_get_array_value_cansleep(unsigned int array_size, int *value_array)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc_array);
    return 0;
}
WARN_ON(desc_array);
return 0;
}
static inline void gpiod_set_value_cansleep(struct gpio_desc *desc, int value)
{
    /* GPIO can never have been requested */
    WARN_ON(1);
    +WARN_ON(desc);
}
static inline void gpiod_set_array_value_cansleep(unsigned int array_size,
    struct gpio_desc **desc_array,
    int *value_array)
{
    /* GPIO can never have been requested */
    WARN_ON(1);
    +WARN_ON(desc_array);
}
static inline int gpiod_get_raw_value_cansleep(const struct gpio_desc *desc)
{
    /* GPIO can never have been requested */
    WARN_ON(1);
    +WARN_ON(desc);
    return 0;
}
static inline int gpiod_get_raw_array_value_cansleep(unsigned int array_size,
    struct gpio_desc **desc_array,
    int *value_array)
{
    /* GPIO can never have been requested */
    WARN_ON(1);
    +WARN_ON(desc_array);
    return 0;
}
static inline void gpiod_set_raw_value_cansleep(struct gpio_desc *desc,
    int value)
{
    /* GPIO can never have been requested */
    WARN_ON(1);
    +WARN_ON(desc);
}
static inline void gpiod_set_raw_array_value_cansleep(unsigned int array_size,
    struct gpio_desc **desc_array,
    int *value_array)
{
    /* GPIO can never have been requested */
    WARN_ON(1);
    +WARN_ON(desc_array);
}
static inline int gpiod_set_debounce(struct gpio_desc *desc, unsigned debounce)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
    return -ENOSYS;
}

static inline int gpiod_is_active_low(const struct gpio_desc *desc)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
    return 0;
}

static inline int gpiod_cansleep(const struct gpio_desc *desc)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
    return 0;
}

static inline int gpiod_to_irq(const struct gpio_desc *desc)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
    return -EINVAL;
}

static inline struct gpio_desc *gpio_to_desc(unsigned gpio)
{
    return ERR_PTR(-EINVAL);
    +return NULL;
}

static inline int desc_to_gpio(const struct gpio_desc *desc)
{
    /* GPIO can never have been requested */
    -WARN_ON(1);
    +WARN_ON(desc);
    return -EINVAL;
}

--- linux-4.15.0.orig/include/linux/gpio/driver.h
+++ linux-4.15.0/include/linux/gpio/driver.h

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unsigned int num_parents;

/**
 * @parent_irq:
 * 
 * For use by gpiochip_set_cascaded_irqchip()
 * */
unsigned int parent_irq;

/**
 * @parents:
 *
 * A list of interrupt parents of a GPIO chip. This is owned by the
--- linux-4.15.0.orig/include/linux/hardirq.h
+++ linux-4.15.0/include/linux/hardirq.h
@@ -60,8 +60,14 @@
*/
extern void irq_exit(void);

#ifndef arch_nmi_enter
#define arch_nmi_enter() do { } while (0)
#define arch_nmi_exit() do { } while (0)
#endif

#define nmi_enter()						\
  do {							\
  +arch_nmi_enter();				\n  printk_nmi_enter();				\n  lockdep_off();				\n  ftrace_nmi_enter();				\n  @@ -80,6 +86,7 @@
  ftrace_nmi_exit();				\n  lockdep_on();				\n  printk_nmi_exit();				\n  +arch_nmi_exit();				\n  } while (0)
@endif /* LINUX_HARDIRQ_H */

--- linux-4.15.0.orig/include/linux/hdmi.h
+++ linux-4.15.0/include/linux/hdmi.h
@@ -101,8 +101,8 @@
HDMI_EXTENDED_COLORIMETRY_XV_YCC_601,
HDMI_EXTENDED_COLORIMETRY_XV_YCC_709,
HDMI_EXTENDED_COLORIMETRY_S_YCC_601,
-HDMI_EXTENDED_COLORIMETRY_ADOBE_YCC_601,
-HDMI_EXTENDED_COLORIMETRY_ADOBE_RGB,
+HDMI_EXTENDED_COLORIMETRY_OPYCC_601,
Open Source Used In 5GaaS Edge AC-4  32079

+HDMI_EXTENDED_COLORIMETRY_OPRGB,

/* The following EC values are only defined in CEA-861-F. */
HDMI_EXTENDED_COLORIMETRY_BT2020_CONST_LUM,
--- linux-4.15.0.orig/include/linux/hid-debug.h
+++ linux-4.15.0/include/linux/hid-debug.h
@@ -24,7 +24,10 @@
#ifdef CONFIG_DEBUG_FS

+##include <linux/kfifo.h>
+
#define HID_DEBUG_BUFSIZE 512
+#define HID_DEBUG_FIFOSIZE 512

void hid_dump_input(struct hid_device *, struct hid_usage *, __s32);
void hid_dump_report(struct hid_device *, int , u8 *, int);
@@ -37,11 +40,8 @@
void hid_debug_exit(void);
void hid_debug_event(struct hid_device *, char *,
|

- struct hid_debug_list {
  -char *hid_debug_buf;
  -int head;
  -int tail;
  +DECLARE_KFIFO_PTR(hid_debug_fifo, char);
  struct fasync_struct *fasync;
  struct hid_device *hdev;
  struct list_head node;
@@ -64,4 +64,3 @@
#endif
#endif

--- linux-4.15.0.orig/include/linux/hid-sensor-hub.h
+++ linux-4.15.0/include/linux/hid-sensor-hub.h
@@ -177,6 +177,7 @@
*
* @attr_usage_id:	Attribute usage id as per spec
* @report_id:	Report id to look for
+* @is_signed:   If true then fields < 32 bits will be sign-extended
* @flag:	Synchronous or asynchronous read
+* @is_signed:   If true then fields < 32 bits will be sign-extended
* Issues a synchronous or asynchronous read request for an input attribute.
* Returns data upto 32 bits.
@@ -190,7 +191,8 @@
int sensor_hub_input_attr_get_raw_value(struct hid_sensor_hub_device *hsdev,
 u32 usage_id,
u32 attr_usage_id, u32 report_id,
- enum sensor_hub_read_flags flag
+ enum sensor_hub_read_flags flag,
+ bool is_signed
);

/**
--- linux-4.15.0.orig/include/linux/hid.h
+++ linux-4.15.0/include/linux/hid.h
@@ -263,6 +263,8 @@
#define HID_CP_SELECTION	0x000c0080
#define HID_CP_MEDIASELECTION	0x000c0087
#define HID_CP_SELECTDISC0x000c00ba
+##define HID_CP_VOLUMEUPT0x000c00e9
+##define HID_CP_VOLUMEDEA0x000c00ea
#define HID_CP_PLAYBACKSPEED0x000c00f1
#define HID_CP_PROXIMITY0x000c0109
#define HID_CP_SPEAKERSYSTEM0x000c0160
@@ -342,6 +344,7 @@
#define HID_QUIRK_SKIP_OUTPUT_REPORTS0x00010000
#define HID_QUIRK_SKIP_OUTPUT_REPORT_ID0x00020000
#define HID_QUIRK_NO_OUTPUT_REPORTS_ON_INTR_EP0x00040000
+##define HID_QUIRK_HAVE_SPECIAL_DRIVER0x00080000
#define HID_QUIRK_FULLSPEED_INTERVAL0x10000000
#define HID_QUIRK_NO_INIT_REPORTS0x20000000
#define HID_QUIRK_NO_IGNORE0x40000000
@@ -399,6 +402,7 @@

struct hid_local {
  unsigned usage[HID_MAX_USAGES]; /* usage array */
+  u8 usage_size[HID_MAX_USAGES]; /* usage size array */
  unsigned collection_index[HID_MAX_USAGES]; /* collection index array */
  unsigned usage_index;
  unsigned usage_minimum;
@@ -477,7 +481,7 @@
};

#define HID_MIN_BUFFER_SIZE464/* make sure there is at least a packet size of space */
-#define HID_MAX_BUFFER_SIZE4096/* 4kb */
+##define HID_MAX_BUFFER_SIZE8192/* 8kb */
#define HID_CONTROL_FIFO_SIZE256/* to init devices with >100 reports */
#define HID_OUTPUT_FIFO_SIZE64
@@ -513,6 +517,12 @@
HID_TYPE_USBNONE
]

+enum hid_battery_status {
+HID_BATTERY_UNKNOWN = 0,
+HID_BATTERY_QUERIED,/* Kernel explicitly queried battery strength */
+HID_BATTERY_REPORTED,/* Device sent unsolicited battery strength report */
+};
+
struct hid_driver;
struct hid_ll_driver;

@@ -555,7 +565,8 @@
__s32 battery_max;
__s32 battery_report_type;
__s32 battery_report_id;
-bool battery_reported;
+enum hid_battery_status battery_status;
+bool battery_avoid_query;
#endif

unsigned int status; /* see STAT flags above */
@@ -671,6 +682,7 @@
  * to be called)
  * @dyn_list: list of dynamically added device ids
  * @dyn_lock: lock protecting @dyn_list
  + * @match: check if the given device is handled by this driver
  * @probe: new device inserted
  * @remove: device removed (NULL if not a hot-plug capable driver)
  * @report_table: on which reports to call raw_event (NULL means all)
  @@ -683,6 +695,8 @@
  * @input_mapped: invoked on input registering after mapping an usage
  * @input_configured: invoked just before the device is registered
  * @feature_mapping: invoked on feature registering
+  + * @bus_add_driver: invoked when a HID driver is about to be added
+  + * @bus_removed_driver: invoked when a HID driver has been removed
  * @suspend: invoked on suspend (NULL means nop)
  * @resume: invoked on resume if device was not reset (NULL means nop)
  * @reset_resume: invoked on resume if device was reset (NULL means nop)
  @@ -711,6 +725,7 @@
  struct list_head dyn_list;
  spinlock_t dyn_lock;

+bool (*match)(struct hid_device *dev, bool ignore_special_driver);
int (*probe)(struct hid_device *dev, const struct hid_device_id *id);
void (*remove)(struct hid_device *dev);

@@ -736,6 +751,8 @@
 void (*feature_mapping)(struct hid_device *hdev,
 struct hid_field *field,
 struct hid_usage *usage);
+void (*bus_add_driver)(struct hid_driver *driver);
+void (*bus_removed_driver)(struct hid_driver *driver);

#ifdef CONFIG_PM
int (*suspend)(struct hid_device *hdev, pm_message_t message);
int (*resume)(struct hid_device *hdev);
#endif

extern int hid_add_device(struct hid_device *);
extern void hid_destroy_device(struct hid_device *);

+extern struct bus_type hid_bus_type;
+
extern int __must_check __hid_register_driver(struct hid_driver *,
struct module *, const char *mod_name);

void (*bus_removed_driver)(struct hid_driver *driver);
int (*suspend)(struct hid_device *hdev, pm_message_t message);
int (*resume)(struct hid_device *hdev);
int hid_add_device(struct hid_device *);
void hid_destroy_device(struct hid_device *);

+extern struct bus_type hid_bus_type;
+
int hid_set_field(struct hid_field *, unsigned, __s32);
-int hid_input_report(struct hid_device *, int type, u8 *, int, int);
+int hid_input_report(struct hid_device *, int type, u8 *, int, int);
int hidinput_find_field(struct hid_device *hid, unsigned int type, unsigned int code, struct hid_field **field);
struct hid_field *hidinput_get_led_field(struct hid_device *hid);
unsigned int hidinput_count_leds(struct hid_device *hid);

void hidinput_disconnect(struct hid_device *);

int hid_connect(struct hid_device *hid, unsigned int connect_mask);
void hid_disconnect(struct hid_device *hid);

const struct hid_device_id *hid_match_id(struct hid_device *hdev,
		struct hid_device_id *id);
const struct hid_device_id *hid_match_one_id(const struct hid_device *hdev,
		const struct hid_device_id *id);
const struct hid_device_id *hid_match_device(struct hid_device *hdev,
		struct hid_driver *hdrv);
s32 hid_snto32(__u32 value, unsigned n);
__u32 hid_field_extract(const struct hid_device *hid, __u8 *report,
	unsigned offset, unsigned n);

static inline void hid_map_usage(struct hid_input *hidinput,
struct hid_usage *usage, unsigned long **bit, int *max,
	__u8 type, __u16 c)

/* @max: maximal valid usage->code to consider later (out parameter)
 * @type: input event type (EV_KEY, EV_REL, ...)
 * @c: code which corresponds to this usage and type
 + * The value pointed to by @bit will be set to NULL if either @type is
 + * an unhandled event type, or if @c is out of range for @type. This
 + * can be used as an error condition.
 */
static inline void hid_map_usage(struct hid_input *hidinput,
struct hid_usage *usage, unsigned long **bit, int *max,
	__u8 type, __u16 c)
```c
/**
 * @report: the report we want to know the length
 */
static inline int hid_report_len(struct hid_report *report)
{
    return DIV_ROUND_UP(report->size, 8) + (report->id > 0);
}

int hid_report_raw_event(struct hid_device *hid, int type, u8 *data, u32 size,
int interrupt);

/* HID quirks API */
unsigned long hid_lookup_quirk(const struct hid_device *hdev);
int hid_quirks_init(char **quirks_param, __u16 bus, int count);
void hid_quirks_exit(__u16 bus);

#define hid_pidff_init NULL

#endif
```
```c
#define hid_printk(level, hid, fmt, arg...) 
-dev_printk(level, &(hid)->dev, fmt, ##arg)
#define hid_emerg(hid, fmt, arg...) 
-dev_emerg(&(hid)->dev, fmt, ##arg)
#define hid_crit(hid, fmt, arg...) 
-dev_crit(&(hid)->dev, fmt, ##arg)
#define hid_alert(hid, fmt, arg...) 
-dev_alert(&(hid)->dev, fmt, ##arg)
#define hid_err(hid, fmt, arg...) 
-dev_err(&(hid)->dev, fmt, ##arg)
#define hid_notice(hid, fmt, arg...) 
-dev_notice(&(hid)->dev, fmt, ##arg)
#define hid_warn(hid, fmt, arg...) 
-dev_warn(&(hid)->dev, fmt, ##arg)
#define hid_info(hid, fmt, arg...) 
-dev_info(&(hid)->dev, fmt, ##arg)
#define hid_dbg(hid, fmt, arg...) 
-dev_dbg(&(hid)->dev, fmt, ##arg)
#endif
--- linux-4.15.0.orig/include/linux/hil_mlc.h
+++ linux-4.15.0/include/linux/hil_mlc.h
@@ -103,7 +103,7 @@
 /* Methods for back-end drivers, e.g. hp_sdc_mlc */
 */
```
typedef int (hil_mlc_cts) (hil_mlc *mlc);
-typedef void (hil_mlc_out) (hil_mlc *mlc);
+typedef int (hil_mlc_out) (hil_mlc *mlc);
typedef int (hil_mlc_in) (hil_mlc *mlc, suseconds_t timeout);

struct hil_mlc_devinfo {
    --- linux-4.15.0.orig/include/linux/hmm.h
    +++ linux-4.15.0/include/linux/hmm.h
    @@ -437,8 +437,7 @@
        * enough and allocate struct page for it.
        *
        * The device driver can wrap the hmm_devmem struct inside a private device
    -    * driver struct. The device driver must call hmm_devmem_remove() before the
    -    * device goes away and before freeing the hmm_devmem struct memory.
        +    * driver struct.
        */
    struct hmm_devmem *hmm_devmem_add(const struct hmm_devmem_ops *ops, 
        struct device *device,
        @@ -445,12 +445,10 @@
    void hmm_devmem_remove(struct hmm_devmem *devmem);
    */
    * hmm_devmem_page_set_drvdata - set per-page driver data field
    --- linux-4.15.0.orig/include/linux/host1x.h
    +++ linux-4.15.0/include/linux/host1x.h
    @@ -322,6 +322,8 @@
        struct list_head clients;

        bool registered;
        +
        +struct device_dma_parameters dma_parms;
    }

    static inline struct host1x_device *to_host1x_device(struct device *dev)
    --- linux-4.15.0.orig/include/linux/hrtimer.h
    +++ linux-4.15.0/include/linux/hrtimer.h
    @@ -408,12 +408,18 @@
        extern bool hrtimer_active(const struct hrtimer *timer);
    */
    -    * Helper function to check, whether the timer is on one of the queues
    +    */
        + * hrtimer_is_queued = check, whether the timer is on one of the queues
        + * @timer: Timer to check
static inline bool hrtimer_is_queued(struct hrtimer *timer)
{
	/* The READ_ONCE pairs with the update functions of timer->state */
	return !(READ_ONCE(timer->state) & HRTIMER_STATE_ENQUEUED);
}

extern bool move_huge_pmd(struct vm_area_struct *vma, unsigned long old_addr,
unsigned long new_addr, unsigned long old_end,
pmd_t *old_pmd, pmd_t *new_pmd);
extern int change_huge_pmd(struct vm_area_struct *vma, pmd_t *pmd,
unsigned long addr, pgprot_t newprot,
int prot_numa);

enum transparent_hugepage_flag {
TRANSPARENT_HUGEPAGE_FLAG,
TRANSPARENT_HUGEPAGE_REQ_MADV_FLAG,
...
@@ -140,6 +138,8 @@

 int huge_pmd_unshare(struct mm_struct *mm, unsigned long *addr, pte_t *ptep);
 +void adjust_range_if_pmd_sharing_possible(struct vm_area_struct *vma,
 +unsigned long *start, unsigned long *end);
 struct page *follow_huge_addr(struct mm_struct *mm, unsigned long address,
 int write);
 struct page *follow_huge_pd(struct vm_area_struct *vma,
 @@ -169,6 +169,18 @@
 return 0;
 }

 +static inline int huge_pmd_unshare(struct mm_struct *mm, unsigned long *addr,
 +pte_t *ptep)
 +{
 +return 0;
 +}
 +
 +static inline void adjust_range_if_pmd_sharing_possible(  
 +struct vm_area_struct *vma,
 +unsigned long *start, unsigned long *end)
 +{
 +}
 +
 +#define follow_hugelb_page(m,v,p,vs,a,b,i,w,n)({ BUG(); 0; })
 +#define follow_huge_addr(mm, addr, write)ERR_PTR(-EINVAL)
 +#define copy_hugelb_page_range(src, dst, vma)({ BUG(); 0; })
 @@ -455,17 +467,6 @@
 return h - hstates;
 }

 #define __basepage_index(struct page *page);
-/* Return page->index in PAGE_SIZE units */
-static inline pgoff_t basepage_index(struct page *page)
-{
-    -if (!PageCompound(page))
-        return page->index;
-    -
-    -return __basepage_index(page);
-}
-
-extern int dissolve_free_huge_page(struct page *page);
-extern int dissolve_free_huge_pages(unsigned long start_pfn,
    unsigned long end_pfn);
@@ -502,6 +503,11 @@
void hugetlb_report_usage(struct seq_file *m, struct mm_struct *mm);

+static inline void hugetlb_count_init(struct mm_struct *mm)
+{
+atomic_long_set(&mm->hugetlb_usage, 0);
+}
+
static inline void hugetlb_count_add(long l, struct mm_struct *mm)
{
atomic_long_add(l, &mm->hugetlb_usage);
@@ -519,6 +525,9 @@
    set_huge_pte_at(mm, addr, ptep, pte);
 }
#endif
+
+void set_page_huge_active(struct page *page);
+
#else /* CONFIG_HUGETLB_PAGE */
struct hstate {};
#define alloc_huge_page(v, a, r) NULL
@@ -557,11 +566,6 @@
    return 0;
 }

-static inline pgoff_t basepage_index(struct page *page)
-{
-    return page->index;
-}
-
static inline int dissolve_free_huge_page(struct page *page)
{
    return 0;
@@ -584,6 +588,10 @@
    return &mm->page_table_lock;
 }

+static inline void hugetlb_count_init(struct mm_struct *mm)
+{
+}
+
+static inline void hugetlb_report_usage(struct seq_file *f, struct mm_struct *m)
{
}

--- linux-4.15.0.orig/include/linux/hyperv.h
+++ linux-4.15.0/include/linux/hyperv.h
@@ -422,6 +422,8 @@
    CHANNELMSG_19				= 19,
CHANNELMSG_20= 20,
CHANNELMSG_TL_CONNECT_REQUEST= 21,
+CHANNELMSG_22= 22,
+CHANNELMSG_TL_CONNECT_RESULT= 23,
CHANNELMSG_COUNT
};
@@ -878,6 +880,13 @@
bool probe_done;

+ /*
+ * We must offload the handling of the primary/sub channels
+ * from the single-threaded vmbus_connection.work_queue to
+ * two different workqueue, otherwise we can block
+ * vmbus_connection.work_queue and hang: see vmbus_process_offer().
+ */
+struct work_struct add_channel_work;
};

static inline bool is_hvsock_channel(const struct vmbus_channel *c)
@@ -1035,6 +1044,8 @@
extern int vmbus_teardown_gpadl(struct vmbus_channel *channel,
u32 gpadl_handle);

+ void vmbus_reset_channel_cb(struct vmbus_channel *channel);
+
extern int vmbus_recvpacket(struct vmbus_channel *channel,
    void *buffer,
u32 bufferlen,
@@ -1131,8 +1142,9 @@
    u32 bytes_avail_towrite;
};

-void hv_ringbuffer_get_debuginfo(const struct hv_ring_buffer_info *ring_info,
-    struct hv_ring_buffer_debug_info *debug_info);
+int hv_ringbuffer_get_debuginfo(const struct hv_ring_buffer_info *ring_info,
+    struct hv_ring_buffer_debug_info *debug_info);

/* Vmbus interface */
#define vmbus_driver_register(driver)
--- linux-4.15.0.orig/include/linux/i2c-algo-pca.h
+++ linux-4.15.0/include/linux/i2c-algo-pca.h
@@ -53,6 +53,20 @@
#define I2C_PCA_CON_SI 0x08 /* Serial Interrupt */
#define I2C_PCA_CON_CR 0x07 /* Clock Rate (MASK) */
/**
 + * struct pca_i2c_bus_settings - The configured PCA i2c bus settings
 + * @mode: Configured i2c bus mode
 + * @tlow: Configured SCL LOW period
 + * @thi: Configured SCL HIGH period
 + * @clock_freq: The configured clock frequency
 + */
+struct pca_i2c_bus_settings {
+int mode;
+int tlow;
+int thi;
+int clock_freq;
+};

struct i2c_algo_pca_data {
    void *data; /* private low level data */
    void (*write_byte)(void *data, int reg, int val);
    int i2c_clock;
    int chip;
    struct pca_i2c_bus_settings bus_settings;
};

int i2c_pca_add_bus(struct i2c_adapter *);
--- linux-4.15.0.orig/include/linux/i2c.h
+++ linux-4.15.0/include/linux/i2c.h
@@ -246,6 +246,7 @@
    char name[ I2C_NAME_SIZE ];
    struct i2c_adapter *adapter;/* the adapter we sit on*/
    struct device dev;/* the device structure*/
+   int init_irq;/* irq set at initialization*/
    int irq;/* irq issued by device*/
    struct list_head detected;
#if IS_ENABLED(CONFIG_I2C_SLAVE)
@@ -564,6 +565,8 @@
    /* clock stretching is not supported */
    #define I2C_AQ_NO_CLK_STRETCH BIT(4)
+   /* adapter cannot do repeated START */
+   #define I2C_AQ_NO_REP_START BIT(7)
    /*
    * i2c_adapter is the structure used to identify a physical i2c bus along
    */
+   /*
    * i2c_adapter is the structure used to identify a physical i2c bus along
    * adapter cannot do repeated START */
    
    return (msg->addr << 1) | (msg->flags & I2C_M_RD ? 1 : 0);
}
+u8 *i2c_get_dma_safe_msg_buf(struct i2c_msg *msg, unsigned int threshold);
+void i2c_release_dma_safe_msg_buf(struct i2c_msg *msg, u8 *buf);
+
+int i2c_handle_smbus_host_notify(struct i2c_adapter *adap, unsigned short addr);
/**
+* module_i2c_driver() - Helper macro for registering a modular I2C driver
--- linux-4.15.0.org/include/linux/i8253.h
+++ linux-4.15.0/include/linux/i8253.h
@@ -21,6 +21,7 @@
#define PIT_LATCH((PIT_TICK_RATE + HZ/2) / HZ)

extern raw_spinlock_t i8253_lock;
+extern bool i8253_clear_counter_on_shutdown;
extern struct clock_event_device i8253_clockevent;
extern void clockevent_i8253_init(bool oneshot);

--- linux-4.15.0.org/include/linux/icmpv6.h
+++ linux-4.15.0/include/linux/icmpv6.h
@@ -3,6 +3,7 @@
#define _LINUX_ICMPV6_H

#include <linux/skbuff.h>
+#include <linux/ipv6.h>
#include <uapi/linux/icmpv6.h>
static inline struct icmp6hdr *icmp6_hdr(const struct sk_buff *skb)
@@ -13,21 +14,64 @@
#include <linux/netdevice.h>
#if IS_ENABLED(CONFIG_IPV6)
-extern void icmpv6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info);
+typedef void ip6_icmp_send_t(struct sk_buff *skb, u8 type, u8 code, __u32 info,
+ const struct in6_addr *force_saddr);
+ const struct in6_addr *force_saddr,
+ const struct inet6_skb_parm *parm);
+void icmp6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info,
+const struct in6_addr *force_saddr,
+const struct inet6_skb_parm *parm);
+#if IS_BUILTIN(CONFIG_IPV6)
+static inline void __icmpv6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info,
+ const struct inet6_skb_parm *parm)
+{
+icmp6_send(skb, type, code, info, NULL, parm);
+}
+static inline int inet6_register_icmp_sender(ip6_icmp_send_t *fn)
+{
+BUILD_BUG_ON(fn !icmp6_send);
return 0;
+
static inline int inet6_unregister_icmp_sender(ip6_icmp_send_t *fn)
+
BUILD_BUG_ON(fn != icmp6_send);
+return 0;
+
#else
+extern void __icmpv6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info,
+ const struct inet6_skb_parm *parm);
+extern int inet6_register_icmp_sender(ip6_icmp_send_t *fn);
+extern int inet6_unregister_icmp_sender(ip6_icmp_send_t *fn);
+#endif
+
+static inline void icmpv6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info)
+
+__icmpv6_send(skb, type, code, info, IP6CB(skb));
+
+int ip6_err_gen_icmpv6_unreach(struct sk_buff *skb, int nhs, int type,
+ unsigned int data_len);
+
#if IS_ENABLED(CONFIG_NF_NAT)
+void icmpv6_ndo_send(struct sk_buff *skb_in, u8 type, u8 code, __u32 info);
+#else
+static inline void icmpv6_ndo_send(struct sk_buff *skb_in, u8 type, u8 code, __u32 info)
+
+struct inet6_skb_parm parm = { 0 };
+__icmpv6_send(skb_in, type, code, info, &parm);
+
+#endif
+
#else

static inline void icmpv6_send(struct sk_buff *skb,
+ u8 type, u8 code, __u32 info)
+{}
+
+static inline void icmpv6_ndo_send(struct sk_buff *skb,
+ u8 type, u8 code, __u32 info)
+{}
+
#endif

--- linux-4.15.0.orig/include/linux/ide.h
+++ linux-4.15.0/include/linux/ide.h
@@ -165,7 +165,6 @@


/*
 * Timeouts for various operations:
--- linux-4.15.0.orig/include/linux/idr.h
+++ linux-4.15.0/include/linux/idr.h
@@ -206,7 +206,7 @@
   is convenient for a "not found" value.
 */
#define idr_for_each_entry(idr, entry, id)				
-   for (id = 0; ((entry) = idr_get_next(idr, &(id))) != NULL; ++id)
+   for (id = 0; ((entry) = idr_get_next(idr, &(id))) != NULL; id += 1U)
#define idr_for_each_entry_ext(idr, entry, id)				
   for (id = 0; ((entry) = idr_get_next_ext(idr, &(id))) != NULL; ++id)

--- linux-4.15.0.orig/include/linux/ieee80211.h
+++ linux-4.15.0/include/linux/ieee80211.h
@@ -622,6 +622,15 @@
 
+static inline bool ieee80211_is_any_nullfunc(__le16 fc)
+	{return (ieee80211_is_nullfunc(fc) || ieee80211_is_qos_nullfunc(fc));}
+++ /* element iteration helpers */
+struct element {
+  u8 id;
+  u8 datalen;
+  u8 data[];
+} __packed;
+ /* element iteration helpers */
+#define for_each_element(_elem, _data, _datalen)

+for (_elem = (const struct element *)(_data); \n+    (const u8 *)(_data) + (_datalen) - (const u8 *)_elem >= \n+(int)sizeof(*_elem) &&  \n+    (const u8 *)(_data) + (_datalen) - (const u8 *)_elem >= \n+(int)sizeof(*_elem) + _elem->datalen; \n+    _elem = (const struct element *)(_elem->data + _elem->datalen)) \n+
+#define for_each_element(id, _id, data, datalen) \n+for_each_element(element, data, datalen) \n+if (element->id == (_id)) \n+
+#define for_each_element_extid(element, extid, data, datalen) \n+for_each_element(element, data, datalen) \n+if (element->id == WLAN_EID_EXTENSION && \n+    element->datalen > 0 && \n+    element->data[0] == (extid)) \n+
+#define for_each_subelement(sub, element) \n+for_each_element(sub, (element)->data, (element)->datalen) \n+
+#define for_each_subelement_id(sub, id, element) \n+for_each_element_id(sub, id, (element)->data, (element)->datalen) \n+
+#define for_each_subelement_extid(sub, extid, element) \n+for_each_subelement_extid(sub, extid, (element)->data, (element)->datalen) \n+
+/**
+ * for_each_element_completed - determine if element parsing consumed all data
+ * @element: element pointer after for_each_element() or friends
+ * @data: same data pointer as passed to for_each_element() or friends
+ * @datalen: same data length as passed to for_each_element() or friends
+ *
+ * This function returns %true if all the data was parsed or considered
+ * while walking the elements. Only use this if your for_each_element() loop
+ * cannot be broken out of, otherwise it always returns %false.
+ *
+ * If some data was malformed, this returns %false since the last parsed
+ * element will not fill the whole remaining data.
+ */
+static inline bool for_each_element_completed(const struct element *element, \n+      const void *data, size_t datalen) \n+{ \n+    return (const u8 *)element == (const u8 *)data + datalen; \n+} \n+
#endif /* LINUX_IEEE80211_H */
--- linux-4.15.0.orig/include/linux/if_arp.h
+++ linux-4.15.0/include/linux/if_arp.h
```c
    case ARPHRD_TUNNEL6:
    case ARPHRD_SIT:
    case ARPHRD_IPGRE:
+    case ARPHRD_IP6GRE:
    case ARPHRD_VOID:
    case ARPHRD_NONE:
+    case ARPHRD_RAWIP:
        return false;
    default:
        return true;
```

```c
+    /* Prefer this version in TX path, instead of
+     * skb_reset_mac_header() + eth_hdr()
+     */
+    static inline struct ethhdr *skb_eth_hdr(const struct sk_buff *skb)
+    {
+        return (struct ethhdr *)skb->data;
+    }
```

```c
    static inline struct ethhdr *inner_eth_hdr(const struct sk_buff *skb)
    {
        return (struct ethhdr *)skb_inner_mac_header(skb);
    }
    
    if (likely(success)) {
        structvlan_pcpu_stats *pcpu_stats;
```

```c
        pcpu_stats = this_cpu_ptr(vlan->pcpu_stats);
        if (likely(success)) {
            structvlan_pcpu_stats *pcpu_stats;
```
extern void unregister_pppox_proto(int proto_num);
extern void pppox_unbind_sock(struct sock *sk); /* delete ppp-channel binding */
extern int pppox_ioctl(struct socket *sock, unsigned int cmd, unsigned long arg);
+extern int pppox_compat_ioctl(struct socket *sock, unsigned int cmd, unsigned long arg);
+
+#define PPPOEIOCSFWD32 _IOW(0xB1,0, compat_size_t)

/* PPPoX socket states */
enum {

--- linux-4.15.0.orig/include/linux/if_vlan.h
+++ linux-4.15.0/include/linux/if_vlan.h
@@ -30,6 +30,8 @@
#define VLAN_ETH_DATA_LEN 1500 /* Max. octets in payload */
#define VLAN_ETH_FRAME_LEN 1518 /* Max. octets in frame sans FCS */

+#define VLAN_MAX_DEPTH 8 /* Max. number of nested VLAN tags parsed */
+
/*
 * struct vlan_hdr - vlan header
 * @h_vlan_TCI: priority and VLAN ID
 @ @ -300,32 +302,47 @ @
 }

/**
 - * __vlan_insert_tag - regular VLAN tag inserting
 + * __vlan_insert_inner_tag - inner VLAN tag inserting
 + * @skb: skb to tag
 + * @vlan_proto: VLAN encapsulation protocol
 + * @vlan_tci: VLAN TCI to insert
 + * @mac_len: MAC header length including outer vlan headers
 + *
 - * Inserts the VLAN tag into @skb as part of the payload
 + * Inserts the VLAN tag into @skb as part of the payload at offset mac_len
 * Returns error if skb_cow_head fails.
 * 
 * Does not change skb->protocol so this function can be used during receive.
 */
-static inline int __vlan_insert_tag(struct sk_buff *skb,
-  __be16 vlan_proto, u16 vlan_tci)
+static inline int __vlan_insert_inner_tag(struct sk_buff *skb,
 +  __be16 vlan_proto, u16 vlan_tci,
 +  unsigned int mac_len)
 { 
 struct vlan_ethhdr *veth;

 if (skb_cow_head(skb, VLAN_HLEN) < 0)
     return -ENOMEM;
- skb_push(skb, VLAN_HLEN);
+ skb_push(skb, VLAN_HLEN);

- skb_push(skb, VLAN_HLEN);
+ skb_push(skb, VLAN_HLEN);

- /* Move the MAC addresses to the beginning of the new header. */
- memmove(skb->data, skb->data + VLAN_HLEN, 2 * ETH_ALEN);
+ /* Move the MAC header sans proto to the beginning of the new header. */
+ if (likely(mac_len > ETH_TLEN))
+ memmove(skb->data, skb->data + VLAN_HLEN, mac_len - ETH_TLEN);
skb->mac_header -= VLAN_HLEN;

+ veth = (struct vlan_ethhdr *)(skb->data + mac_len - ETH_HLEN);
+ veth = skb_push(skb, VLAN_HLEN);
+ /* first, the ethernet type */
+ skb_h_vlan_proto = vlan_proto;
+ if (likely(mac_len >= ETH_TLEN)) {
+ skb->data has space for h_vlan_proto
+ */
+ skb_h_vlan_proto = vlan_proto;
+ } else {
+ skb->data has no space for h_vlan_proto
+ */
+ skb_h_vlan_encapsulated_proto = skb->protocol;
+ }

+ /* now, the TCI */
+ skb->h_vlan_TCI = htons(vlan_tci);
@@ -334,12 +351,30 @@
}
#endif

/**
- * vlan_insert_tag - regular VLAN tag inserting
+ * __vlan_insert_tag - regular VLAN tag inserting
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
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+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * skb: skb to tag
+ * Insert the VLAN tag into @skb as part of the payload
+ * Returns error if skb_cow_head fails.
+ */
+static inline int __vlan_insert_tag(struct sk_buff *skb,
+ be16 vlan_proto, u16 vlan_tci)
+{ return __vlan_insert_inner_tag(skb, vlan_proto, vlan_tci, ETH_HLEN);
**vlan_insert_inner_tag** - inner VLAN tag inserting

* @skb: skb to tag
* @vlan_proto: VLAN encapsulation protocol
* @vlan_tci: VLAN TCI to insert
* @mac_len: MAC header length including outer vlan headers
* 
* Inserts the VLAN tag into @skb as part of the payload at offset mac_len
* Returns a VLAN tagged skb. If a new skb is created, @skb is freed.
* 
* Following the skb_unshare() example, in case of error, the calling function
* doesn't have to worry about freeing the original skb.
* 
* Does not change skb->protocol so this function can be used during receive.
*/

```
static inline struct sk_buff *vlan_insert_inner_tag(struct sk_buff *skb,
	    __be16 vlan_proto,
	    u16 vlan_tci,
	    unsigned int mac_len)
{
    int err;

    err = __vlan_insert_inner_tag(skb, vlan_proto, vlan_tci, mac_len);
    if (err) {
        dev_kfree_skb_any(skb);
        return NULL;
    }
```

**vlan_insert_tag** - regular VLAN tag inserting

* @skb: skb to tag
* @vlan_proto: VLAN encapsulation protocol
* @vlan_tci: VLAN TCI to insert
* 
* Inserts the VLAN tag into @skb as part of the payload
* Returns a VLAN tagged skb. If a new skb is created, @skb is freed.
* 
* Following the skb_unshare() example, in case of error, the calling function
* doesn't have to worry about freeing the original skb.
* 
* Does not change skb->protocol so this function can be used during receive.
*/

```
static inline struct sk_buff *vlan_insert_tag(struct sk_buff *skb,
    __be16 vlan_proto, u16 vlan_tci)
```

**
+static inline struct sk_buff *vlan_insert_tag(struct sk_buff *skb, 
+    __be16 vlan_proto, u16 vlan_tci) 
+{
+    return vlan_insert_inner_tag(skb, vlan_proto, vlan_tci, ETH_HLEN); 
+}
+
+/**
+ * vlan_insert_tag_set_proto - regular VLAN tag inserting
+ * @skb: skbuff to tag
+ * @vlan_proto: VLAN encapsulation protocol
+ * @depth: number of embedded VLAN headers
+ * Returns the EtherType of the packet, regardless of whether it is
+ * vlan encapsulated (normal or hardware accelerated) or not.
+ */
-static inline __be16 __vlan_get_protocol(struct sk_buff *skb, __be16 type,
+static inline __be16 __vlan_get_protocol(const struct sk_buff *skb, __be16 type,
int *depth)
{|}
-unsigned int vlan_depth = skb->mac_len;
+unsigned int vlan_depth = skb->mac_len, parse_depth = VLAN_MAX_DEPTH;

/* if type is 802.1Q/AD then the header should already be
 * present at mac_len - VLAN_HLEN (if mac_len > 0), or at
 @@ -479,10 +536,10 @@
 vlan_depth = ETH_HLEN;
 } 
 do {
-struct vlan_hdr *vh;
+struct vlan_hdr vhdr, *vh;

-if (unlikely(!pskb_may_pull(skb, 
-    vlan_depth + VLAN_HLEN)))
+vh = skb_header_pointer(skb, vlan_depth, sizeof(vhdr), &vhdr);
 +if (unlikely((vh || !--parse_depth))
    return 0;

-vh = (struct vlan_hdr *)(skb->data + vlan_depth);
 type = vh->h_vlan_encapsulated_proto;
 vlan_depth += VLAN_HLEN;
 } while (eth_type_vlan(type));
 @@ -522,11 +578,25 @@
 * Returns the EtherType of the packet, regardless of whether it is
 * vlan encapsulated (normal or hardware accelerated) or not.
 */
-static inline __be16 vlan_get_protocol(struct sk_buff *skb) 
+static inline __be16 vlan_get_protocol(const struct sk_buff *skb)
{| 
    return __vlan_get_protocol(skb, skb->protocol, NULL);
+/* A getter for the SKB protocol field which will handle VLAN tags consistently
+ * whether VLAN acceleration is enabled or not.
+ */
+static inline __be16 skb_protocol(const struct sk_buff *skb, bool skip_vlan)
+{
+    if (!skip_vlan)
+        /* VLAN acceleration strips the VLAN header from the skb and
+         * moves it to skb->vlan_proto
+         */
+        return skb_vlan_tag_present(skb) ? skb->vlan_proto : skb->protocol;
+    return vlan_get_protocol(skb);
+}
+
+static inline void vlan_set_encap_proto(struct sk_buff *skb,
+    struct vlan_hdr *vhdr)
+
-static inline bool skb_vlan_tagged_multi(const struct sk_buff *skb)
+static inline bool skb_vlan_tagged_multi(struct sk_buff *skb)
+
+    __be16 protocol = skb->protocol;
+
+    if (likely(!eth_type_vlan(protocol)))
+        return false;
+
+    if (unlikely(!pskb_may_pull(skb, VLAN_ETH_HLEN)))
+        return false;
+
+    veh = (struct vlan_ethhdr *)skb->data;
+    protocol = veh->h_vlan_encapsulated_proto;
+}
+
+static inline netdev_features_t vlan_features_check(const struct sk_buff *skb,
+    netdev_features_t features)
+
+    if (skb_vlan_tagged_multi(skb)) {
+        __be16 protocol = skb->protocol;
+
+        if (likely(!eth_type_vlan(protocol)))
+            return false;
+
+        veh = (struct vlan_ethhdr *)skb->data;
+        protocol = veh->h_vlan_encapsulated_proto;
+    }
+
+    if (unlikely(!pskb_may_pull(skb, VLAN_ETH_HLEN)))
+        return false;
+
+    if (likely(!eth_type_vlan(protocol)))
+        return false;
+
+    veh = (struct vlan_ethhdr *)skb->data;
+    protocol = veh->h_vlan_encapsulated_proto;
+}

--- linux-4.15.0.orig/include/linux/iio/adc/ad_sigma_delta.h
bool irq_dis;

bool bus_locked;
+bool keep_cs_asserted;

uint8_t tcomm;

size_t iio_dma_buffer_data_available(struct iio_buffer *buffer);
int iio_dma_buffer_set_bytes_per_datum(struct iio_buffer *buffer, size_t bpd);
+int iio_dma_buffer_set_length(struct iio_buffer *buffer, unsigned int length);
int iio_dma_buffer_init(struct iio_dma_buffer_queue *queue, struct iio_buffer *buffer);

int (*request_update)(struct iio_buffer *buffer);
-int (*set_length)(struct iio_buffer *buffer, int length);
+int (*set_length)(struct iio_buffer *buffer, unsigned int length);

int (*enable)(struct iio_buffer *buffer, struct iio_dev *indio_dev);
int (*disable)(struct iio_buffer *buffer, struct iio_dev *indio_dev);
*/

struct iio_buffer {
    /** @length: Number of datums in buffer. */
    -int length;
    +unsigned int length;

    /** @bytes_per_datum: Size of individual datum including timestamp. */
    -int bytes_per_datum;
    +size_t bytes_per_datum;

    /**
     * @access: Buffer access functions associated with the
     */
    +int (*access)(struct iio_buffer *buffer, struct iio_dev *indio_dev);

    /*
     * 0 on success, negative error number on failure.
     */
```c
#define devm_iio_device_register(dev, indio_dev) \
  __devm_iio_device_register((dev), (indio_dev), THIS_MODULE);
+  __devm_iio_device_register((dev), (indio_dev), THIS_MODULE)
int __devm_iio_device_register(struct device *dev, struct iio_dev *indio_dev,
  struct module *this_mod);
void devm_iio_device_unregister(struct device *dev, struct iio_dev *indio_dev);
--- linux-4.15.0.orig/include/linux/inet_diag.h
+++ linux-4.15.0/include/linux/inet_diag.h
@@ -2,15 +2,10 @@
#include <net/netlink.h>
#include <uapi/linux/inet_diag.h>
-struct net;
-struct sock;
-struct inet_hashinfo;
-struct nattr;
-struct nlmsghdr;
-struct sk_buff;
-struct netlink_callback;

struct inet_diag_handler {
  void(*dump)(struct sk_buff *skb,
@@ -62,6 +57,17 @@
    void inet_diag_msg_common_fill(struct inet_diag_msg *r, struct sock *sk);

+static inline size_t inet_diag_msg_attrs_size(void)
+{
+  +return nla_total_size(1) /* INET_DIAG_SHUTDOWN */
+    + nla_total_size(1) /* INET_DIAG_TOS */
+  +#if IS_ENABLED(CONFIG_IPV6)
+    + nla_total_size(1) /* INET_DIAG_TCLASS */
+    + nla_total_size(1) /* INET_DIAG_SKV6ONLY */
+  +#endif
+    + nla_total_size(4) /* INET_DIAG_MARK */
+    + nla_total_size(4); /* INET_DIAG_CLASS_ID */
+  +}
int inet_diag_msg_attrs_fill(struct sock *sk, struct sk_buff *skb,
    struct inet_diag_msg *r, int ext,
    struct user_namespace *user_ns, bool net_admin);
--- linux-4.15.0.orig/include/linux/inetdevice.h
+++ linux-4.15.0/include/linux/inetdevice.h
@@ -37,7 +37,9 @@
    unsigned long mr_v1_seen;
```

unsigned long mr_v2_seen;
unsigned long mr_maxdelay;
unsigned char mr_qrv;
+unsigned long mr_qi; /* Query Interval */
+unsigned long mr_qri; /* Query Response Interval */
+unsigned char mr_qrv; /* Query Robustness Variable */
unsigned char mr_gq_running;
unsigned char mr_ifc_count;
struct timer_list mr_gq_timer; /* general query timer */

--- linux-4.15.0.orig/include/linux/init.h
+++ linux-4.15.0/include/linux/init.h
@@ -5,6 +5,13 @@
#include <linux/compiler.h>
#include <linux/types.h>
+/* Built-in __init functions needn't be compiled with retpoline */
+#if defined(__noretpoline) && !defined(MODULE)
+#define __noinitretpoline __noretpoline
+#else
+#define __noinitretpoline
+#endif
+
+/* These macros are used to mark some functions or * 
+ initialized data (doesn't apply to uninitialized data) 
+ as `initialization' functions. The kernel can take this 
@ @ -40,7 +47,7 @@

/* These are for everybody (although not all archs will actually * 
 discard it in modules) */
-#define __init__section(.init.text) __cold __latent_entropy
+#define __init__section(.init.text) __cold __latent_entropy __noinitretpoline
#define __initdata__section(.init.data)
#define __initconst__section(.init.rodata)
#define __exitdata__section(.exit.data)
--- linux-4.15.0.orig/include/linux/input/elan-i2c-ids.h
+++ linux-4.15.0/include/linux/input/elan-i2c-ids.h
@@ -0,0 +1,83 @@
+/* Elan I2C/SMBus Touchpad device whitelist 
+ * Copyright (c) 2013 ELAN Microelectronics Corp. 
+ * Author: (Duson Lin) <dusonlin@emc.com.tw>
+ * Author: KT Liao <kt.liao@emc.com.tw>
+ * Version: 1.6.3 
+ * Based on cyapa driver:
+ * copyright (c) 2011-2012 Cypress Semiconductor, Inc.


/*
 * Copyright (c) 2011-2012 Google, Inc.
 * This program is free software; you can redistribute it and/or modify it
 * under the terms of the GNU General Public License version 2 as published
 * by the Free Software Foundation.
 * Trademarks are the property of their respective owners.
 */

#ifndef __ELAN_I2C_IDS_H
#define __ELAN_I2C_IDS_H

#include <linux/mod_devicetable.h>

static const struct acpi_device_id elan_acpi_id[] = {
    { "ELAN0000", 0 },
    { "ELAN0100", 0 },
    { "ELAN0600", 0 },
    { "ELAN0601", 0 },
    { "ELAN0602", 0 },
    { "ELAN0603", 0 },
    { "ELAN0604", 0 },
    { "ELAN0605", 0 },
    { "ELAN0606", 0 },
    { "ELAN0607", 0 },
    { "ELAN0608", 0 },
    { "ELAN0609", 0 },
    { "ELAN060B", 0 },
    { "ELAN060C", 0 },
    { "ELAN060F", 0 },
    { "ELAN0610", 0 },
    { "ELAN0611", 0 },
    { "ELAN0612", 0 },
    { "ELAN0615", 0 },
    { "ELAN0616", 0 },
    { "ELAN0617", 0 },
    { "ELAN0618", 0 },
    { "ELAN0619", 0 },
    { "ELAN061A", 0 },
    { "ELAN061B", 0 }, /* not working on the Lenovo Legion Y7000 */
    { "ELAN061C", 0 },
    { "ELAN061D", 0 },
    { "ELAN061E", 0 },
    { "ELAN061F", 0 },
    { "ELAN0620", 0 },
    { "ELAN0621", 0 },
    { "ELAN0622", 0 },
    { "ELAN0623", 0 },
};
#endif /* __ELAN_I2C_IDS_H */
```c
+
+{ "ELAN0624", 0 },
+
+{ "ELAN0625", 0 },
+
+{ "ELAN0626", 0 },
+
+{ "ELAN0627", 0 },
+
+{ "ELAN0628", 0 },
+
+{ "ELAN0629", 0 },
+
+{ "ELAN062A", 0 },
+
+{ "ELAN062B", 0 },
+
+{ "ELAN062C", 0 },
+
+{ "ELAN062D", 0 },
+
+{ "ELAN062E", 0 }, /* Lenovo V340 Whiskey Lake U */
+
+{ "ELAN062F", 0 }, /* Lenovo V340 Comet Lake U */
+
+{ "ELAN0631", 0 },
+
+{ "ELAN0632", 0 },
+
+{ "ELAN0633", 0 }, /* Lenovo S145 */
+
+{ "ELAN0634", 0 }, /* Lenovo V340 Ice lake */
+
+{ "ELAN0635", 0 }, /* Lenovo V1415-III */
+
+{ "ELAN0636", 0 }, /* Lenovo V1415-Dali */
+
+{ "ELAN0637", 0 }, /* Lenovo V1415-IGLR */
+
+{ "ELAN1000", 0 },
+
+
+};
+
+#endif /* __ELAN_I2C_IDS_H */
--- linux-4.15.0.orig/include/linux/integrity.h
+++ linux-4.15.0/include/linux/integrity.h
@@ -14,6 +14,7 @@
enum integrity_status {
  INTEGRITY_PASS = 0,
  +INTEGRITY_PASS_IMMUTABLE,
  INTEGRITY_FAIL,
--- linux-4.15.0.orig/include/linux/intel-iommu.h
+++ linux-4.15.0/include/linux/intel-iommu.h
@@ -112,6 +112,7 @@
    * Extended Capability Register
    */

+#define ecap_dit(e) ((e >> 41) & 0x1)
#define ecap_pasid(e) ((e >> 40) & 0x1)
#define ecap_pss(e) ((e >> 35) & 0x1f)
#define ecap_eafs(e) ((e >> 34) & 0x1)
@@ -282,6 +283,8 @@
#define QI_DEV_IOTLB_SID(sid) ((u64)((sid) & 0xffff) << 32)
#define QI_DEV_IOTLB_QDEP(qdep) (((qdep) & 0x1f) << 16)
#define QI_DEV_IOTLB_ADDR(addr) ((u64)(addr) & VTD_PAGE_MASK)
``
```c
#define QI_DEV_IOTLB_PFSID(pfsid) (((u64)(pfsid & 0xf) << 12) |  
+ ((u64)((pfsid >> 4) & 0xfff) << 52))
#define QI_DEV_IOTLB_SIZE
#define QI_DEV_IOTLB_MAX_INVS

#define QI_DEV_EIOTLB_ADDR(a) (((u64)(a) & VTD_PAGE_MASK)  
#define QI_DEV_EIOTLB_SIZE (((u64)(a)1) << 11)
-#define QI_DEV_EIOTLB_GLOB(g) ((u64)g)
+#define QI_DEV_EIOTLB_GLOB(g) ((u64)(g) & 0x1)
+#define QI_DEV_EIOTLB_PASID(p) ((u64)((p) & 0xffff) << 32)
#define QI_DEV_EIOTLB_SID(sid) ((u64)((sid) & 0xffff) << 16)
#define QI_DEV_EIOTLB_QDEP(qd) ((u64)((qd) & 0x1f) << 4)
+#define QI_DEV_EIOTLB_PFSID(pfsid) (((u64)(pfsid & 0xf) << 12) |  
+ ((u64)((pfsid >> 4) & 0xfff) << 52))
#define QI_DEV_EIOTLB_MAX_INVS
#define QI_PGRP_IDX(idx) (((u64)(idx)) << 55)

struct iommu_device iommu; /* IOMMU core code handle */  
int node;  
unsigned int flags; /* Software defined flags */  
+ struct dmar_drhd_unit *drhd;
};

static inline void __iommu_flush_cache(  
    u8 fm, u64 type);  
extern void qi_flush_iotlb(struct intel_iommu *iommu, u16 did, u64 addr,  
    unsigned int size_order, u64 type);  
extern void qi_flush_dev_iotlb(struct intel_iommu *iommu, u16 sid, u16 qdep,  
    u64 addr, unsigned mask);  
extern void qi_flush_dev_iotlb(struct intel_iommu *iommu, u16 sid, u16 qdep,  
    u64 addr, unsigned mask);  
extern void qi_flush_dev_iotlb(struct intel_iommu *iommu, u16 sid, u64 pfsid,  
    u64 addr, unsigned mask);  
extern int qi_submit_sync(struct qi_desc *desc, struct intel_iommu *iommu);  
extern int dmar_ir_support(void);  
--- linux-4.15.0.orig/include/linux/intel-svm.h  
+++ linux-4.15.0/include/linux/intel-svm.h  
@@ -130,7 +130,7 @@  
BUG();
}

-static int intel_svm_is_pasid_valid(struct device *dev, int pasid)
```
+static inline int intel_svm_is_pasid_valid(struct device *dev, int pasid)
{
    return -EINVAL;
}
--- linux-4.15.0.orig/include/linux/io-mapping.h
+++ linux-4.15.0/include/linux/io-mapping.h
@@ -120,9 +120,12 @@
    unsigned long size)
{
    +iomap->iomem = ioremap_wc(base, size);
    +if (!imap->iomem)
    +return NULL;
    +
    imap->base = base;
    imap->size = size;
    -imap->iomem = ioremap_wc(base, size);
#if defined(pgprot_noncached_wc) /* archs can't agree on a name ... */
    iomap->prot = pgprot_noncached_wc(PAGE_KERNEL);
#elif defined(pgprot_writecombine)
--- linux-4.15.0.orig/include/linux/io.h
+++ linux-4.15.0/include/linux/io.h
@@ -75,6 +75,8 @@
    void __iomem *devm_ioremap(struct device *dev, resource_size_t offset,
        resource_size_t size);
    +void __iomem *devm_ioremap_uc(struct device *dev, resource_size_t offset,
    +  resource_size_t size);
    void __iomem *devm_ioremap_nocache(struct device *dev, resource_size_t offset,
        resource_size_t size);
    void __iomem *devm_ioremap_wc(struct device *dev, resource_size_t offset,
--- linux-4.15.0.orig/include/linux/iocontext.h
+++ linux-4.15.0/include/linux/iocontext.h
@@ -8,6 +8,7 @@
 enum {
    ICQ_EXITED		= 1 << 2,
    +ICQ_DESTROYED		= 1 << 3,
     
 }:

/*
--- linux-4.15.0.orig/include/linux/iommu.h
+++ linux-4.15.0/include/linux/iommu.h
@@ @ -124,6 +124,7 @@
    DOMAIN_ATTR_FSL_PAMU_ENABLE,
    DOMAIN_ATTR_FSL_PAMU_V1,
    DOMAIN_ATTR_NESTING,/* two stages of translation */
    +DOMAIN_ATTR_DMA_USE_FLUSH_QUEUE,
DOMAIN_ATTR_MAX.

void copy_reserved_iova(struct iova_domain *from, struct iova_domain *to);
void init_iova_domain(struct iova_domain *iovad, unsigned long granule,
unsigned long start_pfn);
+bool has_iova_flush_queue(struct iova_domain *iovad);
int init_iova_flush_queue(struct iova_domain *iovad,
   iova_flush_cb flush_cb, iova_entry_dtor entry_dtor);
struct iova *find_iova(struct iova_domain *iovad, unsigned long pfn);

+static inline bool has_iova_flush_queue(struct iova_domain *iovad)
+{
+    return false;
+}
+
+static inline int init_iova_flush_queue(struct iova_domain *iovad,
   iova_flush_cb flush_cb,
   iova_entry_dtor entry_dtor)

#define IPV6_H

#include <uapi/linux/ipv6.h>
+#include <uapi/linux/icmpv6.h>

#define ipv6_optlen(p) (((p)->hdrlen+1) << 3)
#define ipv6_authlen(p) (((p)->hdrlen+2) << 2)

#define autoconf;

extern struct ipv6_params ipv6_defaults;
#include <linux/icmpv6.h>
#include <linux/tcp.h>
#include <linux/udp.h>

--- linux-4.15.0.orig/include/linux/irq.h
+++ linux-4.15.0/include/linux/irq.h
@@ -213,6 +213,10 @@
 * IRQD_SINGLE_TARGET- IRQ allows only a single affinity target
 * IRQD_DEFAULT_TRIGGER_SET- Expected trigger already been set
* IRQD_CAN_RESERVE- Can use reservation mode
+ * IRQD_MSI_NOMASK_QUIRK- Non-maskable MSI quirk for affinity change
+ * required
+ * IRQD_AFFINITY_ON_ACTIVATE- Affinity is set on activation. Don't call
+ * irq_chip::irq_set_affinity() when deactivated.
*/
enum {
IRQD_TRIGGER_MASK = 0xf,
#define IRQD_SINGLE_TARGET = (1 << 24),
#define IRQD_DEFAULT_TRIGGER_SET = (1 << 25),
#define IRQD_CAN_RESERVE = (1 << 26),
+ IRQD_MSI_NOMASK_QUIRK = (1 << 27),
+ IRQD_AFFINITY_ON_ACTIVATE = (1 << 29),
};
#define __irqd_to_state(d) ACCESS_PRIVATE((d)->common, state_use_accessors)
return __irqd_to_state(d) & IRQD_CAN_RESERVE;
} 
+static inline void irqd_set_msi_nomask_quirk(struct irq_data *d)
+{ 
+ __irqd_to_state(d) |= IRQD_MSI_NOMASK_QUIRK;
+} 
+ 
+static inline void irqd_clr_msi_nomask_quirk(struct irq_data *d)
+{ 
+ __irqd_to_state(d) &= ~IRQD_MSI_NOMASK_QUIRK;
+} 
+ 
+static inline bool irqd_msi_nomask_quirk(struct irq_data *d)
+{ 
+return __irqd_to_state(d) & IRQD_MSI_NOMASK_QUIRK;
+} 
+ 
+static inline void irqd_set_affinity_on_activate(struct irq_data *d)
+{ 
+ __irqd_to_state(d) |= IRQD_AFFINITY_ON_ACTIVATE;
+} 
+ 
+static inline bool irqd_affinity_on_activate(struct irq_data *d)
+{ 
+return __irqd_to_state(d) & IRQD_AFFINITY_ON_ACTIVATE;
+} 
+ 
+#undef __irqd_to_state
static inline irq_hw_number_t irqd_to_hwirq(struct irq_data *d)
@@ -508,6 +539,7 @@
 * IRQCHIP_SKIP_SET_WAKE: Skip chip irq_set_wake(), for this irq chip
 * IRQCHIP_ONESHOT_SAFE: One shot does not require mask/unmask
 * IRQCHIP_EOI_THREADED: Chip requires eoi() on unmask in threaded mode
+ * IRQCHIP_AFFINITY_PRE_STARTUP: Default affinity update before startup
 */
enum {
  IRQCHIP_SETTYPE_MASKED = (1 <<  0),
@@ -517,6 +549,7 @@
  IRQCHIP_SKIP_SET_WAKE = (1 <<  4),
  IRQCHIP_ONESHOT_SAFE = (1 <<  5),
  IRQCHIP_EOI_THREADED = (1 <<  6),
+ IRQCHIP_AFFINITY_PRE_STARTUP = (1 << 10),
};
#include <linux/irqdesc.h>
@@ -556,7 +589,12 @@
#endif
#if defined(CONFIG_SMP) && defined(CONFIG_GENERIC_PENDING_IRQ)
-void irq_move_irq(struct irq_data *data);
+void __irq_move_irq(struct irq_data *data);
+static inline void irq_move_irq(struct irq_data *data)
+{
+ if (unlikely(irqd_is_setaffinity_pending(data)))
+   __irq_move_irq(data);
+}
void irq_move_masked_irq(struct irq_data *data);
void irq_force_complete_move(struct irq_desc *desc);
#else
@@ -1149,7 +1187,8 @@
 void irq_matrix_assign_system(struct irq_matrix *m, unsigned int bit, bool replace);
 int irq_matrix_reserve_managed(struct irq_matrix *m, const struct cpumask *msk);
 void irq_matrix_remove_managed(struct irq_matrix *m, const struct cpumask *msk);
- int irq_matrix_alloc_managed(struct irq_matrix *m, unsigned int cpu);
+ int irq_matrix_alloc_managed(struct irq_matrix *m, const struct cpumask (*mapped_cpu);
  unsigned int *mapped_cpu);
 void irq_matrix_reserve(struct irq_matrix *m);
 void irq_matrix_remove_reserved(struct irq_matrix *m);
 int irq_matrix_alloc(struct irq_matrix *m, const struct cpumask *msk,
--- linux-4.15.0.orig/include/linux/irqchip/arm-gic-v3.h
+++ linux-4.15.0/include/linux/irqchip/arm-gic-v3.h
@@ -153,7 +153,7 @@
#define GICR_PROPBASER_nCnBASIC_GIC_BASED_CACHEABILITY(GICR_PROPBASER, INNER, nCnB)
#define GICR_PROPBASER_nC_GIC_BASED_CACHEABILITY(GICR_PROPBASER, INNER, nC)
#define GICR_PROPBASER_RaWtGIC_BASED_CACHEABILITY(GICR_PROPBASER, INNER, RaWt)
-#define GICR_PROPBASER_RaWbGIC_BASED_CACHEABILITY(GICR_PROPBASER, INNER, RaWb)
+\#define GICR_PROPBASE_RaWbGIC_BASER_CACHEABILITY(GICR_PROPBASE, INNER, RaWb)
+\#define GICR_PROPBASE_WaWtGIC_BASER_CACHEABILITY(GICR_PROPBASE, INNER, WaWt)
+\#define GICR_PROPBASE_RaWaWtGIC_BASER_CACHEABILITY(GICR_PROPBASE, INNER, RaWaWt)
@@ -180,7 +180,7 @@
+\#define GICR_PENDBASE_nCnB	GIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, nCnB)
+\#define GICR_PENDBASE_nC	GIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, nC)
# define GICR_PENDBASE_RaWbGIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, RaWb)
-#define GICR_PENDBASE_RaWtGIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, RaWt)
+\#define GICR_PENDBASE_RaWbGIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, RaWb)
+\#define GICR_PENDBASE_WaWtGIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, WaWt)
+\#define GICR_PENDBASE_WaWbGIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, WaWb)
+\#define GICR_PENDBASE_RaWaWtGIC_BASER_CACHEABILITY(GICR_PENDBASE, INNER, RaWaWt)
@@ -239,7 +239,7 @@
+\#define GICR_VPROPBASER_nCnB	GIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, nCnB)
+\#define GICR_VPROPBASER_nC	GIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, nC)
# define GICR_VPROPBASER_RaWbGIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, RaWb)
-#define GICR_VPROPBASER_RaWtGIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, RaWt)
+\#define GICR_VPROPBASER_RaWbGIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, RaWb)
+\#define GICR_VPROPBASER_WaWtGIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, WaWt)
+\#define GICR_VPROPBASER_WaWbGIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, WaWb)
+\#define GICR_VPROPBASER_RaWaWtGIC_BASER_CACHEABILITY(GICR_VPROPBASER, INNER, RaWaWt)
@@ -265,7 +265,7 @@
+\#define GICR_VPENDBASE_nCnB	GIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, nCnB)
+\#define GICR_VPENDBASE_nC	GIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, nC)
# define GICR_VPENDBASE_RaWbGIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, RaWb)
-#define GICR_VPENDBASE_RaWtGIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, RaWt)
+\#define GICR_VPENDBASE_RaWbGIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, RaWb)
+\#define GICR_VPENDBASE_WaWtGIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, WaWt)
+\#define GICR_VPENDBASE_WaWbGIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, WaWb)
+\#define GICR_VPENDBASE_RaWaWtGIC_BASER_CACHEABILITY(GICR_VPENDBASE, INNER, RaWaWt)
@@ -307,7 +307,7 @@
+\#define GITS_TYPER_PLPIS		(1UL << 0)
+\#define GITS_TYPER_VLPIS		(1UL << 1)
+\#define GITS_TYPER_ITT_ENTRY_SIZE_SHIFT	4
-\#define GITS_TYPER_ITT_ENTRY_SIZE(r)	((((r) >> GITS_TYPER_ITT_ENTRY_SIZE_SHIFT) & 0x1f) + 1)
+\#define GITS_TYPER_ITT_ENTRY_SIZE(r)	((((r) >> GITS_TYPER_ITT_ENTRY_SIZE_SHIFT) & 0xf) + 1)
+\#define GITS_TYPER_IDBITS_SHIFT8
+\#define GITS_TYPER_DEVBITS_SHIFT13
\#define GITS_TYPER_DEVBITS(r)(((r) >> GITS_TYPER_DEVBITS_SHIFT) & (0x1f + 1))
@@ -338,7 +338,7 @@
+\#define GITS_CBASER_nCnB	GIC_BASER_CACHEABILITY(GITS_CBASER, INNER, nCnB)
+\#define GITS_CBASER_nC	GIC_BASER_CACHEABILITY(GITS_CBASER, INNER, nC)
-\#define GITS_CBASER_RaWtGIC_BASER_CACHEABILITY(GITS_CBASER, INNER, RaWt)
+\#define GITS_CBASER_RaWbGIC_BASER_CACHEABILITY(GITS_CBASER, INNER, RaWt)
+\#define GITS_CBASER_RaWaWtGIC_BASER_CACHEABILITY(GITS_CBASER, INNER, RaWaWt)
```c
#define GITS_CBASER_WaWt	GIC_BASER_CACHEABILITY(GITS_CBASER, INNER, WaWt)
#define GITS_CBASER_WaWb	GIC_BASER_CACHEABILITY(GITS_CBASER, INNER, WaWb)
#define GITS_CBASER_RaWaWt	GIC_BASER_CACHEABILITY(GITS_CBASER, INNER, RaWaWt)
@@ -362,7 +362,7 @@
#define GITS_BASER_nCnB		GIC_BASER_CACHEABILITY(GITS_BASER, INNER, nCnB)
#define GITS_BASER_nC		GIC_BASER_CACHEABILITY(GITS_BASER, INNER, nC)
#define GITS_BASER_RaWt		GIC_BASER_CACHEABILITY(GITS_BASER, INNER, RaWt)
-#define GITS_BASER_RaWb		GIC_BASER_CACHEABILITY(GITS_BASER, INNER, RaWt)
+#define GITS_BASER_RaWb		GIC_BASER_CACHEABILITY(GITS_BASER, INNER, RaWb)
#define GITS_BASER_WaWt		GIC_BASER_CACHEABILITY(GITS_BASER, INNER, WaWt)
#define GITS_BASER_WaWb		GIC_BASER_CACHEABILITY(GITS_BASER, INNER, WaWb)
#define GITS_BASER_RaWaWt	GIC_BASER_CACHEABILITY(GITS_BASER, INNER, RaWaWt)
@@ -503,6 +503,7 @@
#define ICH_HCR_EN		(1 << 0)
#define ICH_HCR_UIE		(1 << 1)
+#define ICH_HCR_NPIE		(1 << 3)
#define ICH_HCR_TC		(1 << 10)
#define ICH_HCR_TALL0		(1 << 11)
#define ICH_HCR_TALL1		(1 << 12)
--- linux-4.15.0.orig/include/linux/irqchip/arm-gic.h
+++ linux-4.15.0/include/linux/irqchip/arm-gic.h
@@ -84,6 +84,7 @@
#define GICH_HCR_EN		(1 << 0)
#define GICH_HCR_UIE		(1 << 1)
+#define GICH_HCR_NPIE		(1 << 3)
#define GICH_HCR_TALL0	(1 << 11)
#define GICH_HCR_TALL1	(1 << 12)
--- linux-4.15.0.orig/include/linux/irqdesc.h
+++ linux-4.15.0/include/linux/irqdesc.h
@@ -65,6 +65,7 @@
unsigned int		core_internal_state__do_not_mess_with_it;
unsigned int		depth;		/* nested irq disables */
unsigned int		wake_depth;	/* nested wake enables */
+unsigned int		tot_count;
unsigned int		irq_count;	/* For detecting broken IRQs */
unsigned long		last_unhandled;	/* Aging timer for unhandled count */
unsigned int		irqs_unhandled;
--- linux-4.15.0.orig/include/linux/irqdomain.h
+++ linux-4.15.0/include/linux/irqdomain.h
@@ -188,7 +188,7 @@
IRQ_DOMAIN_FLAG_HIERARCHY	= (1 << 0),
/* Irq domain name was allocated in __irq_domain_add() */
-IRQ_DOMAIN_NAME_ALLOCATED	= (1 << 6),
+IRQ_DOMAIN_NAME_ALLOCATED	= (1 << 1),
```
/* Irq domain is an IPI domain with virq per cpu */
IRQ_DOMAIN_FLAG_IPI_PER_CPU = (1 << 2),
@@ -203,6 +203,13 @@
IRQ_DOMAIN_FLAG_MSI_REMAP = (1 << 5),
/*
+ * Quirk to handle MSI implementations which do not provide
+ * masking. Currently known to affect x86, but partially
+ * handled in core code.
+ */
+IRQ_DOMAIN_MSI_NOMASK_QUIRK = (1 << 6),
+
+ /* Flags starting from IRQ_DOMAIN_FLAG_NONCORE are reserved
+ for implementation specific purposes and ignored by the
+ core code. */
--- linux-4.15.0.orig/include/linux/jbd2.h
+++ linux-4.15.0/include/linux/jbd2.h
@@ -418,27 +418,58 @@
#define JI_WAIT_DATA (1 << __JI_WAIT_DATA)
/**
- * struct jbd_inode is the structure linking inodes in ordered mode
- * present in a transaction so that we can sync them during commit.
+ * struct jbd_inode - The jbd_inode type is the structure linking inodes in
+ * ordered mode present in a transaction so that we can sync them during commit.
+ */
+ struct jbd2_inode {
+-/* Which transaction does this inode belong to? Either the running
+ * transaction or the committing one. [j_list_lock] */
+-/**
+- * @i_transaction:
+- *
+- * Which transaction does this inode belong to? Either the running
+- * transaction or the committing one. [j_list_lock]
+- */
+ transaction_t *i_transaction;
+
+/* Pointer to the running transaction modifying inode's data in case
+ * there is already a committing transaction touching it. [j_list_lock] */
+-/**
+- * @i_next_transaction:
+- *
+- * Pointer to the running transaction modifying inode's data in case
+- * there is already a committing transaction touching it. [j_list_lock]
+- */
+ transaction_t *i_next_transaction;
/* List of inodes in the i_transaction [j_list_lock] */

/**
 * @i_list: List of inodes in the i_transaction [j_list_lock]
 */
struct list_head i_list;

/* VFS inode this inode belongs to [constant during the lifetime
 * of the structure] */
/**
 * @i_vfs_inode:
 * VFS inode this inode belongs to [constant for lifetime of structure]
 */
struct inode *i_vfs_inode;

/* Flags of inode [j_list_lock] */
/**
 * @i_flags: Flags of inode [j_list_lock]
 */
unsigned long i_flags;

/**
 * @i_dirty_start:
 * Offset in bytes where the dirty range for this inode starts.
 */
loff_t i_dirty_start;

/**
 * @i_dirty_end:
 * Inclusive offset in bytes where the dirty range for this inode
 * ends. [j_list_lock]
 */
loff_t i_dirty_end;

*/

struct jbd2_revoke_table_s;

/* struct handle_s - The handle_s type is the concrete type associated with
 * handle_t.
 */
* @h_transaction: Which compound transaction is this update a part of?
* @h_journal: Which journal handle belongs to - used iff h_reserved set.
* @h_rsv_handle: Handle reserved for finishing the logical operation.
* @h_buffer_credits: Number of remaining buffers we are allowed to dirty.
* @h_ref: Reference count on this handle
- * @h_err: Field for caller's use to track errors through large fs operations
- * @h_sync: flag for sync-on-close
- * @h_jdata: flag to force data journaling
- * @h_aborted: flag indicating fatal error on handle
+ * @h_ref: Reference count on this handle.
+ * @h_err: Field for caller's use to track errors through large fs operations.
+ * @h_sync: Flag for sync-on-close.
+ * @h_jdata: Flag to force data journaling.
+ * @h_reserved: Flag for handle for reserved credits.
+ * @h_aborted: Flag indicating fatal error on handle.
+ * @h_type: For handle statistics.
+ * @h_line_no: For handle statistics.
+ * @h_start_jiffies: Handle Start time.
+ * @h_requested_credits: Holds @h_buffer_credits after handle is started.
+ * @saved_alloc_context: Saved context while transaction is open.
**/

/* Docbook can't yet cope with the bit fields, but will leave the documentation */
@@ -462,32 +501,23 @@
struct jbd2_journal_handle
 {
 union {
- /* Which compound transaction is this update a part of? */
 transaction_t*h_transaction;
 /* Which journal handle belongs to - used iff h_reserved set */
 journal_t*h_journal;
-};

- /* Handle reserved for finishing the logical operation */
 handle_t*h_rsv_handle;
 -
- /* Number of remaining buffers we are allowed to dirty: */
 inth_buffer_credits;
 -
- /* Reference count on this handle */
 inth_ref;
 -
- /* Field for caller's use to track errors through large fs */
- /* operations */
 inth_err;

/* Flags [no locking] */
-unsigned inth_sync:1;/* sync-on-close */
-unsigned inth_jdata:1;/* force data journaling */
-unsigned inth_reserved:1;/* handle with reserved credits */
-unsigned inth_aborted:1;/* fatal error on handle */
-unsigned inth_type:8;/* for handle statistics */
-unsigned inth_line_no:16;/* for handle statistics */
unsigned int h_sync:	1;
unsigned int h_jdata:	1;
unsigned int h_reserved:	1;
unsigned int h_aborted:	1;
unsigned int h_type:	8;
unsigned int h_line_no:	16;

unsigned long h_start_jiffies;
unsigned int h_requested_credits;

/*
 * List of inodes whose data we've modified in data=ordered mode.
 * List of inodes associated with the transaction; e.g., ext4 uses
 * this to track inodes in data=ordered and data=journal mode that
 * need special handling on transaction commit; also used by ocfs2.
 * [j_list_lock]
*/

struct list_head t_inode_list;

/*
 * struct journal_s - The journal_s type is the concrete type associated with
 * journal_t.
 * @j_flags:  General journaling state flags
 * @j_errno:  Is there an outstanding uncleared error on the journal (from a
 * prior abort)?
 * @j_sb_buffer: First part of superblock buffer
 * @j_superblock: Second part of superblock buffer
 * @j_format_version: Version of the superblock format
 * @j_state_lock: Protect the various scalars in the journal
 * @j_barrier_count: Number of processes waiting to create a barrier lock
 * @j_barrier: The barrier lock itself
 * @j_running_transaction: The current running transaction..
 * @j_committing_transaction: the transaction we are pushing to disk
 * @j_checkpoint_transactions: a linked circular list of all transactions
 * waiting for checkpointing
 * @j_wait_transactionlocked: Wait queue for waiting for a locked transaction
 * to start committing, or for a barrier lock to be released
 * @j_wait_done_commit: Wait queue for waiting for commit to complete
 * @j_wait_commit: Wait queue to trigger commit
 * @j_wait_updates: Wait queue to wait for updates to complete
 * @j_wait_reserved: Wait queue to wait for reserved buffer credits to drop
 * @j_checkpoint_mutex: Mutex for locking against concurrent checkpoints
 * @j_head: Journal head - identifies the first unused block in the journal
 * @j_tail: Journal tail - identifies the oldest still-used block in the
 * journal.
 * @j_free: Journal free - how many free blocks are there in the journal?
 */
- @j_first: The block number of the first usable block
- @j_last: The block number one beyond the last usable block
- @j_dev: Device where we store the journal
- @j_blocksize: blocksize for the location where we store the journal.
- @j_blk_offset: starting block offset for into the device where we store the journal
- @j_fs_dev: Device which holds the client fs. For internal journal this will be equal to @j_dev
- @j_reserved_credits: Number of buffers reserved from the running transaction
- @j_maxlen: Total maximum capacity of the journal region on disk.
- @j_list_lock: Protects the buffer lists and internal buffer state.
- @j_inode: Optional inode where we store the journal. If present, all journal block numbers are mapped into this inode via bmap().
- @j_tail_sequence: Sequence number of the oldest transaction in the log
- @j_transaction_sequence: Sequence number of the next transaction to grant
- @j_commit_sequence: Sequence number of the most recently committed transaction
- @j_commit_request: Sequence number of the most recent transaction wanting commit
- @j_uuid: Uuid of client object.
- @j_task: Pointer to the current commit thread for this journal
- @j_max_transaction_buffers: Maximum number of metadata buffers to allow in a single compound commit transaction
- @j_commit_interval: What is the maximum transaction lifetime before we begin a commit?
- @j_commit_timer: The timer used to wakeup the commit thread
- @j_revoke_lock: Protect the revoke table
- @j_revoke: The revoke table - maintains the list of revoked blocks in the current transaction.
- @j_revoke_table: alternate revoke tables for @j_revoke
- @j_wbuf: array of buffer_heads for jbd2_journal_commit_transaction
- @j_wbufsize: maximum number of buffer_heads allowed in @j_wbuf, the number that will fit in @j_blocksize
- @j_last_sync_writer: most recent pid which did a synchronous write
- @j_history_lock: Protect the transactions statistics history
- @j_proc_entry: procfs entry for the jbd statistics directory
- @j_stats: Overall statistics
- @j_private: An opaque pointer to fs-private information.
- @j_trans_commit_map: Lockdep entity to track transaction commit dependencies

-}

struct journal_s
{
  /* General journaling state flags [j_state_lock] */
  unsigned long j_flags;

  /* General journaling state flags [j_state_lock] */
  unsigned long j_flags;

/*
* @j_errno:
* Is there an outstanding uncleared error on the journal (from a prior
* abort)? [j_state_lock]
*/
int j_errno;

/* The superblock buffer */
/**
 * @j_sb_buffer: The first part of the superblock buffer.
 * @
 */
struct buffer_head *j_sb_buffer;

/**
 * @j_superblock: The second part of the superblock buffer.
 * @
 */
journal_superblock_t *j_superblock;

/* Version of the superblock format */
/**
 * @j_format_version: Version of the superblock format.
 * @
 */
int j_format_version;

/* Protect the various scalars in the journal
/**
 * @j_state_lock: Protect the various scalars in the journal.
 * @
 */
rwlock_t *j_state_lock;

/*
**
* @j_barrier_count:
* @
* Number of processes waiting to create a barrier lock [j_state_lock]
*/
int j_barrier_count;

/* The barrier lock itself */
/**
 * @j_barrier: The barrier lock itself.
 * @
 */
struct mutex *j_barrier;
/**
 * @j_running_transaction:
 * Transactions: The current running transaction...
 * [j_state_lock] [caller holding open handle]
 */
transaction_t*j_running_transaction;

/**
 * @j_committing_transaction:
 * the transaction we are pushing to disk
 * [j_state_lock] [caller holding open handle]
 */
transaction_t*j_committing_transaction;

/**
 * @j_checkpoint_transactions:
 * ... and a linked circular list of all transactions waiting for
 * checkpointing. [j_list_lock]
 */
transaction_t*j_checkpoint_transactions;

/**
 * @j_wait_transaction_locked:
 * Wait queue for waiting for a locked transaction to start committing,
 * or for a barrier lock to be released
 */
wait_queue_head_t*j_wait_transaction_locked;

/**
 * @j_wait_done_commit: Wait queue for waiting for commit to complete.
 */
wait_queue_head_t*j_wait_done_commit;

/**
 * @j_wait_commit: Wait queue to trigger commit.
 */
wait_queue_head_t*j_wait_commit;
/* Wait queue to wait for updates to complete */
+/**
+ * @j_wait_updates: Wait queue to wait for updates to complete.
+ */
wait_queue_head_t j_wait_updates;

/* Wait queue to wait for reserved buffer credits to drop */
+/**
+ * @j_wait_reserved:
+ *
+ * Wait queue to wait for reserved buffer credits to drop.
+ */
wait_queue_head_t j_wait_reserved;

/* Semaphore for locking against concurrent checkpoints */
+/**
+ * @j_checkpoint_mutex:
+ *
+ * Semaphore for locking against concurrent checkpoints.
+ */
struct mutex j_checkpoint_mutex;

/* List of buffer heads used by the checkpoint routine. This
 * was moved from jbd2_log_do_checkpoint() to reduce stack
 * usage. Access to this array is controlled by the
 */
struct buffer_head*j_chkpt_bhs[JBD2_NR_BATCH];

/* Journal head: identifies the first unused block in the journal.
 * [j_state_lock]
 */
unsigned long j_head;

/* @j_tail:
/*
 * Journal tail: identifies the oldest still-used block in the journal.
 * [j_state_lock]
 */
unsigned long j_tail;

/*
/**
 * @j_free:
 */
unsigned long j_free;

/*
/**
 * @j_first:
 */
unsigned long j_first;

/*
/**
 * @j_last:
 */
unsigned long j_last;

/*
/**
 * @j_dev: Device where we store the journal.
 */
struct block_device*j_dev;

/*
/**
 * @j_blocksize: Block size for the location where we store the journal.
 */
int j_blocksize;
+ * @j_blk_offset:
+ *
+ * Starting block offset into the device where we store the journal.
+ */
unsigned long long j_blk_offset;
+
+/**
+ * @j_devname: Journal device name.
+ */
char j_devname[BDEVNAME_SIZE+24];
-
-/* Total maximum capacity of the journal region on disk. */
+/**
+ * @j_maxlen: Total maximum capacity of the journal region on disk.
+ */
unsigned int j_maxlen;
-
-/* Number of buffers reserved from the running transaction */
+/**
+ * @j_reserved_credits:
+ *
+ * Number of buffers reserved from the running transaction.
+ */
atomic_t j_reserved_credits;
-
-/* Protects the buffer lists and internal buffer state. */
+/**
+ * @j_list_lock: Protects the buffer lists and internal buffer state.
+ */
spinlock_t j_list_lock;
-
-/* Optional inode where we store the journal. If present, all */
-/* journal block numbers are mapped into this inode via */
-/* bmap(). */
+/**
+ * @j_inode:
+ *
+ * Optional inode where we store the journal. If present, all
+ * journal block numbers are mapped into this inode via bmap().
+ */
struct inode*j_inode;

+ /*
+ /**
+ * @j_tail_sequence:
+ *
+ * Sequence number of the oldest transaction in the log [j_state_lock]
+ */
tid_tj_tail_sequence;

+ /*
+ /**
+ * @j_transaction_sequence:
+ *
+ * Sequence number of the next transaction to grant [j_state_lock]
+ */
tid_tj_transaction_sequence;

+ /*
+ /**
+ * @j_commit_sequence:
+ *
+ * Sequence number of the most recently committed transaction
+ * [j_state_lock].
+ */
tid_tj_commit_sequence;

+ /*
+ /**
+ * @j_commit_request:
+ *
+ * Sequence number of the most recent transaction wanting commit
+ * [j_state_lock]
+ */
tid_tj_commit_request;

+ /*
+ /**
+ * @j_uuid:
+ *
+ * Journal uuid: identifies the object (filesystem, LVM volume etc)
+ * backed by this journal. This will eventually be replaced by an array
+ * of uuids, allowing us to index multiple devices within a single
+ * @@ .958,85 +1015,172 @@
+ */
__u8*j_uuid[16]:
/* Pointer to the current commit thread for this journal */

+**
+ * @j_task: Pointer to the current commit thread for this journal.
+ */
struct task_struct *j_task;

/*
+**
+ * @j_max_transactionBuffers:
+ *
+ * Maximum number of metadata buffers to allow in a single compound
+ * commit transaction
+ */
int j_max_transaction_buffers;

/*
+**
+ * @j_commit_interval:
+ *
+ * What is the maximum transaction lifetime before we begin a commit?
+ */
unsigned long j_commit_interval;

/* The timer used to wakeup the commit thread: */

+**
+ * @j_commit_timer: The timer used to wakeup the commit thread.
+ */
struct timer_list *j_commit_timer;

/* The revoke table: maintains the list of revoked blocks in the
 * current transaction. [j_revoke_lock]
+**
+ * @j_revoke_lock: Protect the revoke table.
+ */
spinlock_t j_revoke_lock;

+* @j_revoke:
+ *
+ * The revoke table - maintains the list of revoked blocks in the
+ * current transaction.
+ */
struct jbd2_revoke_table_s *j_revoke;
+ * @j_revoke_table: Alternate revoke tables for j_revoke.
+ */
struct jbd2_revoke_table_s *j_revoke_table[2];

-/*
- * array of bhs for jbd2_journal_commit_transaction
-/**
+ * @j_wbuf: Array of bhs for jbd2_journal_commit_transaction.
+ */
struct buffer_head**j_wbuf;
+
+/**
+ * @j_wbufsize:
+ *
+ * Size of @j_wbuf array.
+ */
int j_wbufsize;

-/*
- * this is the pid of the last person to run a synchronous operation
- * through the journal
-/**
+ * @j_last_sync_writer:
+ *
+ * The pid of the last person to run a synchronous operation
+ * through the journal.
+ */
pid_t j_last_sync_writer;

-/*
- * the average amount of time in nanoseconds it takes to commit a
- */
+ * @j_average_commit_time:
+ *
+ * The average amount of time in nanoseconds it takes to commit a
+ * transaction to disk. [j_state_lock]
+ */
u64 j_average_commit_time;

-/*
- * minimum and maximum times that we should wait for
- * additional filesystem operations to get batched into a
- * synchronous handle in microseconds
- */
+ * @j_min_batch_time:
+ *
+ * Minimum time that we should wait for additional filesystem operations
+ * to get batched into a synchronous handle in microseconds.
u32 j_min_batch_time;

+/**
+ * @j_max_batch_time:
+ *
+ * Maximum time that we should wait for additional filesystem operations
+ * to get batched into a synchronous handle in microseconds.
+ */
+u32 j_max_batch_time;

-/* This function is called when a transaction is closed */
+/**
+ * @j_commit_callback:
+ *
+ * This function is called when a transaction is closed.
+ */
+void (*j_commit_callback)(journal_t *,
transaction_t *);

+/**
+ * @j_submit_inode_data_buffers:
+ *
+ * This function is called for all inodes associated with the
+ * committing transaction marked with JI_WRITE_DATA flag
+ * before we start to write out the transaction to the journal.
+ */
+int (*j_submit_inode_data_buffers)(
(struct jbd2_inode *);
+
+/**
+ * @j_finish_inode_data_buffers:
+ *
+ * This function is called for all inodes associated with the
+ * committing transaction marked with JI_WAIT_DATA flag
+ * after we have written the transaction to the journal
+ * but before we write out the commit block.
+ */
+int (*j_finish_inode_data_buffers)(
(struct jbd2_inode *);
+
/*
 * Journal statistics
 */
+
+/**
+ * @j_history_lock: Protect the transactions statistics history.
+ */
spinlock_tj_history_lock;
+
+/**
+ * @j_proc_entry: procfs entry for the jbd statistics directory.
+ */
struct proc_dir_entry*j_proc_entry;
+
+/**
+ * @j_stats: Overall statistics.
+ */
struct transaction_stats_s j_stats;

-/* Failed journal commit ID */
+/**
+ * @j_failed_commit: Failed journal commit ID.
+ */
unsigned intj_failed_commit;

-/* Reference to checksum algorithm driver via cryptoapi */
+/**
+ * @j_chksum_driver:
+ * 
+ * Reference to checksum algorithm driver via cryptoapi.
+ */
struct crypto_shash *j chksum_driver;

-/* Precomputed journal UUID checksum for seeding other checksums */
+/**
+ * @j_csum_seed:
+ */
+ u32 j_csum_seed;

#ifdef CONFIG_DEBUG_LOCK_ALLOC
-/*
+/**
+ * @j_trans_commit_map:

```c
void *j_private;
```

```c
/* An opaque pointer to fs-private information. ext3 puts its
 * superblock pointer here
 * superblock pointer here.
 */
```
Lockdep entity to track transaction commit dependencies. Handles
hold this "lock" for read, when we wait for commit, we acquire the
"lock" for writing. This matches the properties of jbd2 journalling

extern int jbd2_journal_force_commit_nested(journal_t *);
extern int jbd2_journal_inode_add_write(handle_t *handle, struct jbd2_inode *inode);
extern int jbd2_journal_inode_add_wait(handle_t *handle, struct jbd2_inode *inode);
+extern int jbd2_journal_inode_ranged_write(handle_t *handle,
  +struct jbd2_inode *inode, loff_t start_byte,
  +loff_t length);
+extern int jbd2_journal_inode_ranged_wait(handle_t *handle,
  +struct jbd2_inode *inode, loff_t start_byte,
  +loff_t length);
+extern int jbd2_journal_submit_inode_data_buffers(
  +struct jbd2_inode *jinode);
+extern int jbd2_journal_finish_inode_data_buffers(
  +struct jbd2_inode *jinode);
extern int jbd2_journal_begin_ordered_truncate(journal_t *journal,
  struct jbd2_inode *inode, loff_t new_size);
extern void jbd2_journal_init_jbd_inode(struct jbd2_inode *jinode,
  struct inode *inode);

static inline unsigned long jbd2_log_space_left(journal_t *journal)
{
  /* Allow for rounding errors */
-unsigned long free = journal->j_free - 32;
+long free = journal->j_free - 32;

  if (journal->j_committing_transaction) {
    unsigned long committing = atomic_read(&journal->
      @ @ -1467,7 +1621,7 @ @
    /* Transaction + control blocks */
    free -= committing + (committing >> JBD2_CONTROL_BLOCKS_SHIFT);
  }
  -return free;
+return max_t(long, free, 0);
}

/*
--- linux-4.15.0.orig/include/linux/kconfig.h
+++ linux-4.15.0/include/linux/kconfig.h
@@ -4,6 +4,12 @@
#include <generated/autoconf.h>
+ifdef CONFIG_CPU_BIG_ENDIAN
+#define __BIG_ENDIAN 4321
+else

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```c
#define __LITTLE_ENDIAN 1234
#endif

#define __ARG_PLACEHOLDER_1 0,
#define __take_second_arg(__ignored, val, ...) val

/* Make sure we always have all types and struct attributes defined. */
#include <linux/compiler_types.h>
#endif /* __LINUX_KCONFIG_H */

--- linux-4.15.0.orig/include/linux/kcore.h
+++ linux-4.15.0/include/linux/kcore.h
@@ -10,6 +10,7 @@
 KCORE_VMALLOC,
 KCORE_RAM,
 KCORE_VMEMMAP,
+KCORE_USER,
 KCORE_OTHER,
 );

--- linux-4.15.0.orig/include/linux/kdev_t.h
+++ linux-4.15.0/include/linux/kdev_t.h
@@ -21,61 +21,61 @@
 }))
/* acceptable for old filesystems */
-static inline bool old_valid_dev(dev_t dev)
+static __always_inline bool old_valid_dev(dev_t dev)
 { return MAJOR(dev) < 256 && MINOR(dev) < 256;
 }

-static inline u16 old_encode_dev(dev_t dev)
+static __always_inline u16 old_encode_dev(dev_t dev)
 { return (MAJOR(dev) << 8) | MINOR(dev);
 }

-static inline dev_t old_decode_dev(u16 val)
+static __always_inline dev_t old_decode_dev(u16 val)
 { return MKDEV((val >> 8) & 255, val & 255);
 }
```
-static inline u32 new_encode_dev(dev_t dev)
+static __always_inline u32 new_encode_dev(dev_t dev)
{
  unsigned major = MAJOR(dev);
  unsigned minor = MINOR(dev);
  return (minor & 0xff) | (major << 8) | ((minor & ~0xff) << 12);
}

-static inline dev_t new_decode_dev(u32 dev)
+static __always_inline dev_t new_decode_dev(u32 dev)
{
  unsigned major = (dev & 0xfff00) >> 8;
  unsigned minor = (dev & 0xff) | ((dev >> 12) & 0xfff00);
  return MKDEV(major, minor);
}

-static inline u64 huge_encode_dev(dev_t dev)
+static __always_inline u64 huge_encode_dev(dev_t dev)
{
  return new_encode_dev(dev);
}

-static inline dev_t huge_decode_dev(u64 dev)
+static __always_inline dev_t huge_decode_dev(u64 dev)
{
  return new_decode_dev(dev);
}

-static inline int sysv_valid_dev(dev_t dev)
+static __always_inline int sysv_valid_dev(dev_t dev)
{
  return MAJOR(dev) < (1<<14) && MINOR(dev) < (1<<18);
}

-static inline u32 sysv_encode_dev(dev_t dev)
+static __always_inline u32 sysv_encode_dev(dev_t dev)
{
  return MINOR(dev) | (MAJOR(dev) << 18);
}

-static inline unsigned sysv_major(u32 dev)
+static __always_inline unsigned sysv_major(u32 dev)
{
  return (dev >> 18) & 0x3fff;
}

-static inline unsigned sysv_minor(u32 dev)
+static __always_inline unsigned sysv_minor(u32 dev)
```c
{ 
    return dev & 0x3ffff;
} 
--- linux-4.15.0.orig/include/linux/kernel.h
+++ linux-4.15.0/include/linux/kernel.h
@@ -72,8 +72,8 @@
#define u64_to_user_ptr(x) (
    
    -typecheck(u64, x);
-    (void __user *)(uintptr_t)x;
+    typecheck(u64, (x));
+    (void __user *)(uintptr_t)(x);
    )

@@ -101,7 +101,8 @@
#define DIV_ROUND_DOWN_ULL(ll, d) 
   ( { unsigned long long _tmp = (ll); do_div(_tmp, d); _tmp; })

-#define DIV_ROUND_UP_ULL(ll, d)	DIV_ROUND_DOWN_ULL((ll) + (d) - 1, (d))
+#define DIV_ROUND_UP_ULL(ll, d) 
+DIV_ROUND_DOWN_ULL((unsigned long long)(ll) + (d) - 1, (d))

#if BITS_PER_LONG == 32
# define DIV_ROUND_UP_SECTOR_T(ll,d) DIV_ROUND_UP_ULL(ll, d)
@@ -306,6 +307,23 @@
{ }
@endif

+#ifdef CONFIG_LOCK_DOWN_KERNEL
+extern bool __kernel_is_locked_down(const char *what, bool first);
+#else
+static inline bool __kernel_is_locked_down(const char *what, bool first)
+{
+    return false;
+}
+#endif
+
+#define kernel_is_locked_down(what)
+    ( {
+        static bool message_given;
+        bool locked_down = __kernel_is_locked_down(what, !message_given);
+        message_given = true;
+        locked_down;
+    })
+
/* Internal, do not use. */
```
int __must_check_kstroul(const char *s, unsigned int base, unsigned long *res);
int __must_check_kstrtol(const char *s, unsigned int base, long *res);
--- linux-4.15.0.orig/include/linux/kernfs.h
+++ linux-4.15.0/include/linux/kernfs.h
@@ -15,6 +15,7 @@
 #include <linux/lockdep.h>
 #include <linux/rbtree.h>
 #include <linux/atomic.h>
 +#include <linux/uidgid.h>
 #include <linux/wait.h>

 struct file;
 @@ -185,6 +186,7 @@
 /* private fields, do not use outside kernfs proper */
 struct idr		ino_idr;
 +u32			last_ino;
 u32			next_generation;
 struct kernfs_syscall_ops *syscall_ops;
@@ -325,12 +327,14 @@
 struct kernfs_node *kernfs_create_dir_ns(struct kernfs_node *parent,
 const char *name, umode_t mode,
 + kuid_t uid, kgid_t gid,
 void *priv, const void *ns);
 struct kernfs_node *kernfs_create_empty_dir(struct kernfs_node *parent,
 const char *name);
 struct kernfs_node *__kernfs_create_file(struct kernfs_node *parent,
- const char *name,
- umode_t mode, loff_t size,
+ const char *name, umode_t mode,
+ kuid_t uid, kgid_t gid,
+ loff_t size,
 const struct kernfs_ops *ops,
 void *priv, const void *ns,
 struct lock_class_key *key);
 @@ -415,12 +419,14 @@
 static inline struct kernfs_node *
 kernfs_create_dir_ns(struct kernfs_node *parent, const char *name,
 - umode_t mode, void *priv, const void *ns)
 + umode_t mode, kuid_t uid, kgid_t gid,
 + void *priv, const void *ns)
 { return ERR_PTR(-ENOSYS); }

 static inline struct kernfs_node *
 __kernfs_create_file(struct kernfs_node *parent, const char *name,
- umode_t mode, loff_t size, const struct kernfs_ops *ops,
+ umode_t mode, kuid_t uid, kgid_t gid,
+ loff_t size, const struct kernfs_ops *ops,
    void *priv, const void *ns, struct lock_class_key *key)
{ return ERR_PTR(-ENOSYS); }

@@ -498,12 +504,15 @@
kernfs_create_dir(struct kernfs_node *parent, const char *name, umode_t mode,
    void *priv)
{
-return kernfs_create_dir_ns(parent, name, mode, priv, NULL);
+return kernfs_create_dir_ns(parent, name, mode,
+    GLOBAL_ROOT_UID, GLOBAL_ROOT_GID,
+    priv, NULL);
}

static inline struct kernfs_node *
kernfs_create_file_ns(struct kernfs_node *parent, const char *name,
-    umode_t mode, loff_t size, const struct kernfs_ops *ops,
+    umode_t mode, kuid_t uid, kgid_t gid,
+    loff_t size, const struct kernfs_ops *ops,
    void *priv, const void *ns)
{
    struct lock_class_key *key = NULL;
@@ -511,15 +520,17 @@
#ifdef CONFIG_DEBUG_LOCK_ALLOC
key = (struct lock_class_key *)&ops->lockdep_key;
#endif
-return __kernfs_create_file(parent, name, mode, size, ops, priv, ns,
-    key);
+return __kernfs_create_file(parent, name, mode, uid, gid,
+    size, ops, priv, ns, key);
}

static inline struct kernfs_node *
kernfs_create_file(struct kernfs_node *parent, const char *name, umode_t mode,
loff_t size, const struct kernfs_ops *ops, void *priv)
{
    return kernfs_create_file_ns(parent, name, mode, size, ops, priv, NULL);
+return kernfs_create_file_ns(parent, name, mode,
+    GLOBAL_ROOT_UID, GLOBAL_ROOT_GID,
+    size, ops, priv, NULL);
}

static inline int kernfs_remove_by_name(struct kernfs_node *parent,
--- linux-4.15.0.orig/include/linux/kexec.h
+++ linux-4.15.0/include/linux/kexec.h
@@ -217,6 +217,11 @@
/* Information for loading purgatory */
struct purgatory_info purgatory_info;
#endif
+
+#ifdef CONFIG_IMA_KEXEC
+ /* Virtual address of IMA measurement buffer for kexec syscall */
+ void *ima_buffer;
+ #endif
}

/* kexec interface functions */
--- linux-4.15.0.orig/include/linux/key-type.h
+++ linux-4.15.0/include/linux/key-type.h
@@ -18,15 +18,6 @@
#ifdef CONFIG_KEYS

- * key under-construction record
- * - passed to the request_key actor if supplied
- */
- struct key_construction {
- struct key *key; /* key being constructed */
- struct key *authkey; /* authorisation for key being constructed */
- }
-
- /* Pre-parsed payload, used by key add, update and instantiate.
- *
- * This struct will be cleared and data and datalen will be set with the data
- @@ -47,8 +38,7 @@
- time64_t expiry; /* Expiry time of key */
 } __randomize_layout;

typedef int (*request_key_actor_t)(struct key_construction *key,
- const char *op, void *aux);
+ struct key *auth_key, void *aux);

/* Preparsed matching criterion.
@@ -135,7 +125,7 @@
- much is copied into the buffer
- * shouldn't do the copy if the buffer is NULL
- */
- long (*read)(const struct key *key, char __user *buffer, size_t buflen);
+ long (*read)(const struct key *key, char *buffer, size_t buflen);

/* handle request_key() for this type instead of invoking
 * /sbin/request-key (optional)
@@ -170,20 +160,20 @@
    const void *data,
    size_t datalen,
    struct key *keyring,
-   struct key *instkey);
+   struct key *authkey);

 extern int key_reject_and_link(struct key *key,
    unsigned timeout,
    unsigned error,
-   struct key *keyring,
-   struct key *instkey);
-extern void complete_request_key(struct key_construction *cons, int error);
+   struct key *authkey);
+extern void complete_request_key(struct key *authkey, int error);

 static inline int key_negate_and_link(struct key *key,
    unsigned timeout,
    struct key *keyring,
-   struct key *instkey)
+   struct key *authkey)
{
    return key_reject_and_link(key, timeout, ENOKEY, keyring, authkey);
}

 extern int generic_key_instantiate(struct key *key, struct key_preparsed_payload *prep);
--- linux-4.15.0.orig/include/linux/key.h
+++ linux-4.15.0/include/linux/key.h
@@ -249,6 +249,7 @@
 #define KEY_ALLOC_BUILT_IN		0x0004	/* Key is built into kernel */
 #define KEY_ALLOC_BYPASS_RESTRICTION	0x0008	/* Override the check on restricted keyrings */
 #define KEY_ALLOC_UID_KEYRING		0x0010	/* allocating a user or user session keyring */
+#define KEY_ALLOC_SET_KEEP		0x0020	/* Set the KEEP flag on the key/keyring */

 extern int key_revoke(struct key *key);
 extern void key_invalidate(struct key *key);
--- linux-4.15.0.orig/include/linux/kfifo.h
+++ linux-4.15.0/include/linux/kfifo.h
@@ -113,7 +113,8 @@

 * define __is_kfifo_ptr(fifo) sizeof(*fifo) == sizeof(struct __kfifo)
 * DECLARE_KFIFO_PTR - macro to declare a fifo pointer object

 */

-#define __is_kfifo_ptr(fifo)(sizeof(*fifo) == sizeof(struct __kfifo))
+#define __is_kfifo_ptr(fifo)(sizeof(*fifo) == sizeof(STRUCT_KFIFO_PTR(typeof(*(fifo)->type))))

 /*
  * DECLARE_KFIFO_PTR - macro to declare a fifo pointer object
--- linux-4.15.0.orig/include/linux/kgdb.h
+++ linux-4.15.0/include/linux/kgdb.h
@@ -317,7 +317,7 @@
 extern int kgdb_single_step;
 extern atomic_t kgdb_active;
 #define in_dbg_master() \ 
- (raw_smp_processor_id() == atomic_read(&kgdb_active))
+ (irqs_disabled() && (smp_processor_id() == atomic_read(&kgdb_active)))
 extern bool dbg_is_early;
 extern bool dbg_is_early;
 extern bool dbg_is_early;

@@ -15,6 +15,7 @@
 extern void __khugepaged_exit(struct mm_struct *mm);
 extern int khugepaged_enter_vma_merge(struct vm_area_struct *vma,
       unsigned long vm_flags);
+extern void khugepaged_min_free_kbytes_update(void);

 #define khugepaged_enabled() \ 
 (transparent_hugepage_flags & \ 
 @@ -73,6 +74,10 @@
 {
     return 0;
 }
+ static inline void khugepaged_min_free_kbytes_update(void)
+{
+}
+}
+}
+}
+}
+#define CONFIG_TRANSPARENT_HUGEPAGE */

#endif /* _LINUX_KHUGEPAGED_H */
--- linux-4.15.0.orig/include/linux/kobject.h
+++ linux-4.15.0/include/linux/kobject.h
@@ -27,6 +27,7 @@
 #include <linux/wait.h>
 #include <linux/atomic.h>
 #include <linux/workqueue.h>
+#include <linux/uidgid.h>

#define UEVENT_HELPER_PATH_LEN 256
#define UEVENT_NUM_ENVP 32 /* number of env pointers */
@@ -115,14 +116,34 @@
 extern void kobject_get_ownership(struct kobject *kobj, kuid_t *uid, kgid_t *gid);

 extern const void *kobject_namespace(struct kobject *kobj);
+extern void kobject_get_ownership(struct kobject *kobj,
+     kuid_t *uid, kgid_t *gid);
extern char *kobject_get_path(struct kobject *kobj, gfp_t flag);

+/**
+ * kobject_has_children - Returns whether a kobject has children.
+ * @kobj: the object to test
+ *
+ * This will return whether a kobject has other kobjects as children.
+ *
+ * It does NOT account for the presence of attribute files, only sub
+ * directories. It also assumes there is no concurrent addition or
+ * removal of such children, and thus relies on external locking.
+ */
+static inline bool kobject_has_children(struct kobject *kobj)
+{
+WARN_ON_ONCE(kref_read(&kobj->kref) == 0);
+
+return kobj->sd && kobj->sd->dir.subdirs;
+
+}
+
+struct kobj_type {
void (*release)(struct kobject *kobj);
const struct sysfs_ops *sysfs_ops;
struct attribute **default_attrs;
const struct kobj_ns_type_operations *(*child_ns_type)(struct kobject *kobj);
const void *(*namespace)(struct kobject *kobj);
+void (*get_ownership)(struct kobject *kobj, kuid_t *uid, kgid_t *gid);
};

struct kobj_uevent_env {
--- linux-4.15.0.orig/include/linux/kprobes.h
+++ linux-4.15.0/include/linux/kprobes.h
@@ -198,6 +198,7 @@
struct kretprobe *rp;
kprobe_opcode_t *ret_addr;
struct task_struct *task;
+void *fp;
char data[0];
};

@@ -267,10 +268,13 @@
extern void show_registers(struct pt_regs *regs);
extern void kprobes_inc_nmissed_count(struct kprobe *p);
extern bool arch_within_kprobe_blacklist(unsigned long addr);
+extern int arch_populate_kprobe_blacklist(void);
extern bool arch_kprobe_on_func_entry(unsigned long offset);
extern bool kprobe_on_func_entry(kprobe_opcode_t *addr, const char *sym, unsigned long offset);

extern bool within_kprobe_blacklist(unsigned long addr);
extern int kprobe_add_ksym_blacklist(unsigned long entry);
extern int kprobe_add_area_blacklist(unsigned long start, unsigned long end);

struct kprobe_insn_cache {
    struct mutex mutex;
    return this_cpu_ptr(&kprobe_ctlblk);
}

+extern struct kprobe kprobe_busy;
+void kprobe_busy_begin(void);
+void kprobe_busy_end(void);
+
kprobe_opcode_t *kprobe_lookup_name(const char *name, unsigned int offset);
int register_kprobe(struct kprobe *p);
void unregister_kprobe(struct kprobe *p);

--- linux-4.15.0.orig/include/linux/kthread.h
+++ linux-4.15.0/include/linux/kthread.h
@@ -32,6 +32,9 @@
 unsigned int cpu,
 const char *namefmt);

+void kthread_set_per_cpu(struct task_struct *k, int cpu);
+bool kthread_is_per_cpu(struct task_struct *k);
+
/**
 * kthread_run - create and wake a thread.
 * @threadfn: the function to run until signal_pending(current).
 @@ -62,6 +65,7 @@
 int kthread_park(struct task_struct *k);
 void kthread_unpark(struct task_struct *k);
 void kthread_parkme(void);
+void kthread_park_complete(struct task_struct *k);

 int kthreadadd(void *unused);
 extern struct task_struct *kthreadadd_task;
--- linux-4.15.0.orig/include/linux/kvm_host.h
+++ linux-4.15.0/include/linux/kvm_host.h
 @@ -27,6 +27,7 @@
 #include <linux/irqbypass.h>
 #include <linux/swait.h>
 #include <linux/refcount.h>
+#include <linux/nospec.h>
 #include <asm/signal.h>

 #include <linux/kvm.h>
 @@ -139,7 +140,7 @@
extern struct kmem_cache *kvm_vcpu_cache;

-extern spinlock_t kvm_lock;
+extern struct mutex kvm_lock;
extern struct list_head vm_list;

struct kvm_io_range {
@@ -184,7 +185,7 @@
    struct list_head queue;
    struct kvm_vcpu *vcpu;
    struct mm_struct *mm;
-gva_t gva;
+tgpa_t cr2_or_gpa;
    unsigned long addr;
    struct kvm_arch_async_pf arch;
    bool wakeup_all;
@@ -192,8 +193,8 @@
 void kvm_clear_async_pf_completion_queue(struct kvm_vcpu *vcpu);
 void kvm_check_async_pf_completion(struct kvm_vcpu *vcpu);
-int kvm_setup_async_pf(struct kvm_vcpu *vcpu, gva_t gva, unsigned long hva,
-    struct kvm_arch_async_pf *arch);
+int kvm_setup_async_pf(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa,
+    unsigned long hva, struct kvm_arch_async_pf *arch);
int kvm_async_pf_wakeup_all(struct kvm_vcpu *vcpu);
#endif

@@ -204,6 +205,32 @@
 READING_SHADOW_PAGE_TABLES,
 ];
+
+#define KVM_UNMAPPED_PAGE ((void *) 0x500 + POISON_POINTER_DELTA)
+
+struct kvm_host_map {
+/*
+ * Only valid if the 'pfn' is managed by the host kernel (i.e. There is
+ * a 'struct page' for it. When using mem= kernel parameter some memory
+ * can be used as guest memory but they are not managed by host
+ * kernel).
+ * If 'pfn' is not managed by the host kernel, this field is
+ * initialized to KVM_UNMAPPED_PAGE.
+ */
+ struct page *page;
+ void *hva;
+kvm_pfn_t pfn;
+kvm_pfn_t gfn;
+};
+
+/
+ * Used to check if the mapping is valid or not. Never use 'kvm_host_map'
+ * directly to check for that.
+ */
static inline bool kvm_vcpu_mapped(struct kvm_host_map *map)
{
    return !!map->hva;
}
+
/*
* Sometimes a large or cross-page mmio needs to be broken up into separate
* exits for userspace servicing.
@@ -483,10 +510,10 @@
static inline struct kvm_vcpu *kvm_get_vcpu(struct kvm *kvm, int i)
{
    /* Pairs with smp_wmb() in kvm_vm_ioctl_create_vcpu, in case
    * the caller has read kvm->online_vcpus before (as is the case
    * for kvm_for_each_vcpu, for example).
    * */
    int num_vcpus = atomic_read(&kvm->online_vcpus);
    i = array_index_nospec(i, num_vcpus);
    +
    /* Pairs with smp_wmb() in kvm_vm_ioctl_create_vcpu. */
    smp_rmb();
    return kvm->vcpus[i];
}@@ -570,6 +597,7 @@
static inline struct kvm_memslots *__kvm_memslots(struct kvm *kvm, int as_id)
{
    as_id = array_index_nospec(as_id, KVM_ADDRESS_SPACE_NUM);
    return srcu_dereference_check(kvm->memslots[as_id], &kvm->srcu,
lockdep_is_held(&kvm->slots_lock) ||
!refcount_read(&kvm->users_count));
@@ -625,7 +653,7 @@
kvm_arch_prepare_memory_region(struct kvm *kvm,
int kvm_arch_create_memslot(struct kvm *kvm, struct kvm_memory_slot *slot,
unsigned long npages);
    -void kvm_arch_memslots_updated(struct kvm *kvm, struct kvm_memslots *slots);
    +void kvm_arch_memslots_updated(struct kvm *kvm, u64 gen);
    int kvm_arch_prepare_memory_region(struct kvm *kvm,
struct kvm_memory_slot *memslot,
const struct kvm_userspace_memory_region *mem,
@@ -672,6 +700,7 @@
kvm_set_pfn_accessed(kvm_pfn_t pfn);
vortex_set_pfn(kvm_pfn_t pfn);
+void kvm_release_pfn(kvm_pfn_t pfn, bool dirty, struct gfn_to_pfn_cache *cache);
int kvm_read_guest_page(struct kvm *kvm, gfn_t gfn, void *data, int offset,
 int len);
int kvm_read_guest_atomic(struct kvm *kvm, gpa_t gpa, void *data,
@@ -686,21 +715,28 @@
 int kvm_write_guest_cached(struct kvm *kvm, struct gfn_to_hva_cache *ghc,
 void *data, unsigned long len);
int kvm_write_guest_offset Cached(struct kvm *kvm, struct gfn_to_hva_cache *ghc,
- void *data, int offset, unsigned long len);
+ void *data, unsigned int offset,
+ unsigned long len);
int kvm_gfn_to_hva cache_init(struct kvm *kvm, struct gfn_to_hva_cache *ghc,
 gpa_t gpa, unsigned long len);
int kvm_clear_guest_page(struct kvm *kvm, gfn_t gfn, int offset, int len);
int kvm_clear_guest(struct kvm *kvm, gpa_t gpa, unsigned long len);
struct kvm_memory_slot *gfn_to_memslot(struct kvm *kvm, gfn_t gfn);
bool kvm_is_visible_gfn(struct kvm *kvm, gfn_t gfn);
-unsigned long kvm_host_page_size(struct kvm *kvm, gfn_t gfn);
+unsigned long kvm_host_page_size(struct kvm_vcpu *vcpu, gfn_t gfn);
void mark_page_dirty(struct kvm *kvm, gfn_t gfn);

struct kvm_memslots *vcpu_memslots(struct kvm_vcpu *vcpu);
struct kvm_memory_slot *vcpu_gfn_to_memslot(struct kvm_vcpu *vcpu, gfn_t gfn);
kvm_pfn_t vcpu_gfn_to_pfn_atomic(struct kvm_vcpu *vcpu, gfn_t gfn);
kvm_pfn_t vcpu_gfn_to_pfn(struct kvm_vcpu *vcpu, gfn_t gfn);
+int vcpu_map(struct kvm_vcpu *vcpu, gpa_t gpa, struct kvm_host_map *map);
+int vcpu_map_gfn(struct kvm_vcpu *vcpu, gfn_t gfn, struct kvm_host_map *map,
+ struct kvm_host_page_cache *cache, bool atomic);
+struct kvm_guest_to_host_map *vcpu_cache;
+void vcpu_unmap(struct kvm_vcpu *vcpu, struct kvm_host_map *map, bool dirty);
+int vcpu_unmap_gfn(struct kvm_vcpu *vcpu, struct kvm_guest_to_host_map *map,
+ struct gfn_to_pfn_cache *cache, bool dirty, bool atomic);
unsigned long vcpu_guest_to_host(struct kvm_vcpu *vcpu, gfn_t gfn);  
unsigned long vcpu_gfn_to_hva(struct kvm_vcpu *vcpu, gfn_t gfn, bool *writable);
int vcpu_read_guest_page(struct kvm_vcpu *vcpu, gfn_t gfn, void *data, int offset,
@@ -806,6 +842,7 @@
 int kvm_arch_vcpu_runnable(struct kvm_vcpu *vcpu);
 bool kvm_arch_vcpu_in_kernel(struct kvm_vcpu *vcpu);
 int kvm_arch_vcpu_should_kick(struct kvm_vcpu *vcpu);
+bool kvm_arch_dy_runnable(struct kvm_vcpu *vcpu);

#if defined __KVM_HAVE_ARCH_VM_ALLOC
static inline struct kvm *kvm_arch_alloc_vm(void)
@@ -887,6 +924,7 @@
 void vcpu_kick(struct kvm_vcpu *vcpu);

 bool kvm_is_reserved_pfn(kvm_pfn_t pfn);
+bool kvm_is_zone_device_pfn(kvm_pfn_t pfn);
struct kvm_irq_ack_notifier {
    struct hlist_node link;
    start = slot + 1;
}

- if (gfn >= memslots[start].base_gfn &&
+ if (start < slots->used_slots && gfn >= memslots[start].base_gfn &&
     gfn < memslots[start].base_gfn + memslots[start].npages) {
atomic_set(&slots->lru_slot, start);
return &memslots[start];
}

static inline unsigned long
__gfn_to_hva_memslot(struct kvm_memory_slot *slot, gfn_t gfn)
{
    return slot->userspace_addr + (gfn - slot->base_gfn) * PAGE_SIZE;
+ /*
+   * The index was checked originally in search_memslots. To avoid
+   * that a malicious guest builds a Spectre gadget out of e.g. page
+   * table walks, do not let the processor speculate loads outside
+   * the guest's registered memslots.
+   */
+    unsigned long offset = gfn - slot->base_gfn;
+    offset = array_index_nospec(offset, slot->npages);
+    return slot->userspace_addr + offset * PAGE_SIZE;
}

static inline int memslot_id(struct kvm *kvm, gfn_t gfn)

struct kvm_stat_data {
    int offset;
+    int mode;
    struct kvm *kvm;
};

const char *name;
int offset;
enum kvm_stat_kind kind;
+    int mode;
};
extern struct kvm_stats_debugfs_item debugfs_entries[];
extern struct dentry *kvm_debugfs_dir;

#endif CONFIG_HAVE_KVM_IRQ_ROUTING
#ifdef CONFIG_S390
#define KVM_MAX_IRQ_ROUTES 4096 //FIXME: we can have more than that...
#else defined(CONFIG_ARM64)
#define KVM_MAX_IRQ_ROUTES 4096
#else
#define KVM_MAX_IRQ_ROUTES 1024
#endif
#define KVM_MAX_IRQ_ROUTES 4096 /* might need extension/rework in the future */

bool kvm_arch_can_set_irq_routing(struct kvm *kvm);
int kvm_set_irq_routing(struct kvm *kvm,
@@ -1105,7 +1147,6 @@
{
    }
#endif
-void kvm_arch_irq_routing_update(struct kvm *kvm);

static inline int kvm_ioeventfd(struct kvm *kvm, struct kvm_ioeventfd *args)
{
@@ -1114,6 +1155,8 @@
    }
#endif /* CONFIG_HAVE_KVM_EVENTFD */

+void kvm_arch_irq_routing_update(struct kvm *kvm);
+
+static inline void kvm_make_request(int req, struct kvm_vcpu *vcpu)
+
+typedef int (*kvm_vm_thread_fn_t)(struct kvm *kvm, uintptr_t data);
+
+int kvm_vm_create_worker_thread(struct kvm *kvm, kvm_vm_thread_fn_t thread_fn,
+uintptr_t data, const char *name,
+struct task_struct **thread_ptr);
+
+#endif
--- linux-4.15.0.orig/include/linux/kvm_types.h
+++ linux-4.15.0/include/linux/kvm_types.h
@@ -32,7 +32,7 @@
enum kvm_mr_change;

-#include <asm/types.h>
+include <linux/types.h>
/*
 * Address types:
 * @ @ -63.4 +63.11 @ @
 * struct kvm_memory_slot *memslot;
 * 
 *+struct gfn_to_pfn_cache {
 * +u64 generation;
 * +gfn_t gfn;
 * +kvm_pfn_t pfn;
 * +bool dirty;
 * +};
 * 
 *+#endif /*__KVM_TYPES_H__*/
 */

--- linux-4.15.0.orig/include/linux/libata.h
+++ linux-4.15.0/include/linux/libata.h
@@ -38,6 +38,7 @@
 #include <linux/acpi.h>
 #include <linux/cdrom.h>
 #include <linux/sched.h>
+#include <linux/async.h>
 /*
 * Define if arch has non-standard setup. This is a __PCI__ standard
 * @ @ -211.6 +212.7 @ @
 * ATA_FLAG_SLAVE_POSS = (1 << 0), /* host supports slave dev */
 * 
 */
 ATA_FLAG_SLAVE_POSS = (1 << 0), /* host supports slave dev */
 ATA_FLAG_SATA = (1 << 1),
 ATA_FLAG_NO_LPM = (1 << 2), /* host not happy with LPM */
 ATA_FLAG_NO_LOG_PAGE = (1 << 5), /* do not issue log page read */
 ATA_FLAG_NO_ATAPI = (1 << 6), /* No ATAPI support */
 ATA_FLAGPIO_DMA = (1 << 7), /* PIO cmds via DMA */
 @ @ -438.6 +440.8 @ @
 ATA_HORKAGE_NO_DMA_LOG = (1 << 23), /* don’t use DMA for log read */
 ATA_HORKAGE_NOTRIM = (1 << 24), /* don’t use TRIM */
 ATA_HORKAGE_MAX_SEC_1024 = (1 << 25), /* Limit max sects to 1024 */
+ATA_HORKAGE_MAX_TRIM_128M = (1 << 26), /* Limit max trim size to 128M */
+ATA_HORKAGE_NO_NCQ_ON_ATI = (1 << 27), /* Disable NCQ on ATI chipset */

 */
 /* DMA mask for user DMA control: User visible values; DO NOT
 * renumber */
 @ @ -501.6 +505.7 @ @
 */

 enum ata_completion_errors {
 +AC_ERR_OK = 0, /* no error */
 AC_ERR_DEV = (1 << 0), /* device reported error */
AC_ERR_HSM= (1 << 1), /* host state machine violation */
AC_ERR_TIMEOUT= (1 << 2), /* timeout */
@@ -523,7 +528,8 @@
ATA_LPM_MAX_POWER,
ATA_LPM_MED_POWER,
ATA_LPM_MED_POWER_WITH_DIPM, /* Med power + DIPM as win IRST does */
-ATA_LPM_MIN_POWER,
+ATA_LPM_MIN_POWER_WITH_PARTIAL, /* Min Power + partial and slumber */
+ATA_LPM_MIN_POWER, /* Min power + no partial (slumber only) */
}

enum ata_lpm_hints {
@@ -884,6 +890,8 @@
    async_cookie_t		cookie;
+	int			em_message_type;
+	void*private_data;

@@ -905,9 +913,9 @@
/*
 * Command execution
 */
-int (*qc_defer)(struct ata_queued_cmd *qc);
-int (*check_atapi_dma)(struct ata_queued_cmd *qc);
-void (*qc_prep)(struct ata_queued_cmd *qc);
+int (*qc_defer)(struct ata_queued_cmd *qc);
+int (*check_atapi_dma)(struct ata_queued_cmd *qc);
+enum ata_completion_errors (*qc_prep)(struct ata_queued_cmd *qc);
unsigned int (*qc_issue)(struct ata_queued_cmd *qc);
bool (*qc_fill_rtf)(struct ata_queued_cmd *qc);

@@ -1171,7 +1179,7 @@
extern const char *ata_mode_string(unsigned long xfer_mask);
extern unsigned long ata_id_xfermask(const u16 *id);
extern int ata_std_qc_defer(struct ata_queued_cmd *qc);
-extern void ata_noop_qc_prep(struct ata_queued_cmd *qc);
+extern enum ata_completion_errors ata_noop_qc_prep(struct ata_queued_cmd *qc);
extern void ata_sg_init(struct ata_queued_cmd *qc, struct scatterlist *sg,
    unsigned int n_elem);
extern unsigned int ata_dev_classify(const struct ata_taskfile *tf);
@@ -1229,6 +1237,7 @@
};

extern int pci_test_config_bits(struct pci_dev *pdev, const struct pci_bits *bits);
+extern void ata_pci_shutdown_one(struct pci_dev *pdev);


extern void ata_pci_remove_one(struct pci_dev *pdev);

#ifdef CONFIG_PM
@@ -1884,9 +1893,9 @@
    .sg_tablesize= LIBATA_MAX_PRD,
    .dma_boundary= ATA_DMA_BOUNDARY

-extern void ata_bmdma_qc_prep(struct ata_queued_cmd *qc);
+extern enum ata_completion_errors ata_bmdma_qc_prep(struct ata_queued_cmd *qc);
extern unsigned int ata_bmdma_qc_issue(struct ata_queued_cmd *qc);
+extern enum ata_completion_errors ata_bmdma_dumb_qc_prep(struct ata_queued_cmd *qc);
extern unsigned int ata_bmdma_port_intr(struct ata_port *ap,
          struct ata_queued_cmd *qc);
extern irqreturn_t ata_bmdma_interrupt(int irq, void *dev_instance);
--- linux-4.15.0.orig/include/linux/libfdt_env.h
+++ linux-4.15.0/include/linux/libfdt_env.h
@@ -2,10 +2,14 @@
#endif _LIBFDT_ENV_H
#define _LIBFDT_ENV_H

+#include <linux/kernel.h> /* For INT_MAX */
#include <linux/string.h>

#include <asm/byteorder.h>

+#define INT32_MAX S32_MAX
+#define UINT32_MAX U32_MAX

typedef __be16 fdt16_t;
typedef __be32 fdt32_t;
typedef __be64 fdt64_t;
--- linux-4.15.0.orig/include/linux/libnvdimm.h
+++ linux-4.15.0/include/linux/libnvdimm.h
@@ -47,6 +47,17 @@
            /* region flag indicating to direct-map persistent memory by default */
            ND_REGION_PAGEMAP = 0,
            *
            + * Platform ensures entire CPU store data path is flushed to pmem on
            + * system power loss.
            + */
            +ND_REGION_PERSIST_CACHE = 1,
            */
            + * Platform provides mechanisms to automatically flush outstanding
            + * write data from memory controller to pmem on system power loss.
            + * (ADR)
            + */
ND_REGION_PERSIST_MEMCTRL = 2,

/* mark newly adjusted resources as requiring a label update */
DPARESOURCE_ADJUSTED = 1 << 0,
--- linux-4.15.0.orig/include/linux/list.h
+++ linux-4.15.0/include/linux/list.h
@@ -285,6 +285,36 @@
__list_cut_position(list, head, entry);
}

+/**
 + * list_cut_before - cut a list into two, before given entry
 + * @list: a new list to add all removed entries
 + * @head: a list with entries
 + * @entry: an entry within head, could be the head itself
 + * This helper moves the initial part of @head, up to but
 + * excluding @entry, from @head to @list. You should pass
 + * in @entry an element you know is on @head. @list should
 + * be an empty list or a list you do not care about losing
 + * its data.
 + * If @entry == @head, all entries on @head are moved to
 + * @list.
 + */
 +static inline void list_cut_before(struct list_head *list,
 +				   struct list_head *head,
 +				   struct list_head *entry)
 +{
 +if (head->next == entry) {
 +
 INIT_LIST_HEAD(list);
 +return;
 +}
 +list->next = head->next;
 +list->next->prev = list;
 +list->prev = entry->prev;
 +entry->prev = head;
 +}
 +
 static inline void __list_splice(const struct list_head *list,
       struct list_head *prev,
       struct list_head *next)
@@ -455,6 +485,15 @@
       pos = n, n = pos->prev)

 /**
 + * list_entry_is_head - test if the entry points to the head of the list
+ * @pos: the type * to cursor
+ * @head: the head for your list.
+ * @member: the name of the list_head within the struct.
+ */
+#define list_entry_is_head(pos, head, member)
+&(&pos->member == (head))
+
+/**
 * list_for_each_entry - iterate over list of given type
 * @pos: the type * to use as a loop cursor.
 * @head: the head for your list.
 */
define list_for_each_entry(pos, head, member)
for (pos = list_first_entry(head, typeof(*pos), member);
 - &pos->member != (head);
 + !list_entry_is_head(pos, head, member);
   pos = list_next_entry(pos, member))

/**
define list_for_each_entry_reverse(pos, head, member)
for (pos = list_last_entry(head, typeof(*pos), member);
 - &pos->member != (head);
 + !list_entry_is_head(pos, head, member);
   pos = list_prev_entry(pos, member))

/**
define list_for_each_entry_continue(pos, head, member)
for (pos = list_next_entry(pos, member);
 - &pos->member != (head);
 + !list_entry_is_head(pos, head, member);
   pos = list_next_entry(pos, member))

/**
define list_for_each_entry_continue_reverse(pos, head, member)
for (pos = list_prev_entry(pos, member);
 - &pos->member != (head);
 + !list_entry_is_head(pos, head, member);
   pos = list_prev_entry(pos, member))

/**
* Iterate over list of given type, continuing from current position.
* /
#define list_for_each_entry_from(pos, head, member) 
- for (; &pos->member != (head);
+ for (; !list_entry_is_head(pos, head, member);
   pos = list_next_entry(pos, member))

/**
 @@ -537,7 +576,7 @@
 * Iterate backwards over list of given type, continuing from current position.
 * /
#define list_for_each_entry_from_reverse(pos, head, member)
- for (; &pos->member != (head);
+ for (; !list_entry_is_head(pos, head, member);
   pos = list_prev_entry(pos, member))

/**
 @@ -550,7 +589,7 @@
 #define list_for_each_entry_safe(pos, n, head, member)
 for (pos = list_first_entry(head, typeof(*pos), member),
 n = list_next_entry(pos, member);
- &pos->member != (head);
+ !list_entry_is_head(pos, head, member);
   pos = n, n = list_next_entry(n, member))

/**
 @@ -566,7 +605,7 @@
 #define list_for_each_entry_safe_continue(pos, n, head, member) 
 for (pos = list_next_entry(pos, member),
 n = list_next_entry(pos, member);
- &pos->member != (head);
+ !list_entry_is_head(pos, head, member);
   pos = n, n = list_next_entry(n, member))

/**
 @@ -581,7 +620,7 @@
 */
#define list_for_each_entry_safe_from(pos, n, head, member) 
for (n = list_next_entry(pos, member);
- &pos->member != (head);
+ !list_entry_is_head(pos, head, member);
   pos = n, n = list_next_entry(n, member))

/**
 @@ -597,7 +636,7 @@
 */
#define list_for_each_entry_safe_reverse(pos, n, head, member)
for (pos = list_last_entry(head, typeof(*pos), member),
 n = list_prev_entry(pos, member);
- &pos->member != (head); \
+ !list_entry_is_head(pos, head, member); \
    pos = n, n = list_prev_entry(n, member))

/**
--- linux-4.15.0.orig/include/linux/list_lru.h
+++ linux-4.15.0/include/linux/list_lru.h
@@ -52,6 +52,7 @@
struct list_lru_node *node;
#if defined(CONFIG_MEMCG) && !defined(CONFIG_SLOB)
struct list_head list;
+bool memcg_aware;
#endif
};

--- linux-4.15.0.orig/include/linux/list_nulls.h
+++ linux-4.15.0/include/linux/list_nulls.h
@@ -72,10 +72,10 @@
struct hlist_nulls_node *first = h->first;

n->next = first;
-n->pprev = &h->first;
+WRITE_ONCE(n->pprev, &h->first);
h->first = n;
if (!is_a_nulls(first))
-first->pprev = &n->next;
+WRITE_ONCE(first->pprev, &n->next);
}

static inline void __hlist_nulls_del(struct hlist_nulls_node *n)
@@ -85,13 +85,13 @@
WRITE_ONCE(*pprev, next);
if (!is_a_nulls(next))
-next->pprev = pprev;
+WRITE_ONCE(next->pprev, pprev);
}

static inline void hlist_nulls_del(struct hlist_nulls_node *n)
{
__hlist_nulls_del(n);
-n->pprev = LIST_POISON2;
+WRITE_ONCE(n->pprev, LIST_POISON2);
}

/**
--- linux-4.15.0.orig/include/linux/lockd/lockd.h
+++ linux-4.15.0/include/linux/lockd/lockd.h
static inline struct inode *nlmsvc_file_inode(struct nlm_file *file)
{
    return file_inode(file->f_file);
    return locks_inode(file->f_file);
}

static inline int __nlm_privileged_request4(const struct sockaddr *sap)
static inline int nlm_compare_locks(const struct file_lock *fl1,
    const struct file_lock *fl2)
{
    return file_inode(fl1->fl_file) == file_inode(fl2->fl_file)
    return locks_inode(fl1->fl_file) == locks_inode(fl2->fl_file)
        && fl1->fl_pid   == fl2->fl_pid
        && fl1->fl_owner == fl2->fl_owner
        && fl1->fl_start == fl2->fl_start
    --- linux-4.15.0.orig/include/linux/lockdep.h
+++ linux-4.15.0/include/linux/lockdep.h
@@ -51,6 +51,8 @@
    return lock->key == key;
}

+struct lock_class *lockdep_hlock_class(struct held_lock *hlock); } +
+void lockdep_is_held(struct held_lock *hlock),

/* Acquire a lock. */

#define lockdep_depth(tsk)(0)
#define lockdep_is_held(lock)(1)
#define lockdep_is_held_type(l, r)(1)

#define lockdep_assert_held(l)
do { (void)(l); } while (0)
--- linux-4.15.0.orig/include/linux/log2.h
+++ linux-4.15.0/include/linux/log2.h
@@ -313,6 +313,8 @@
    return __builtin_constant_p(n) ? (
        (n) == 1) ? 1 :
        (1UL << (ilog2((n) - 1) + 1))
@@ -442,6 +444,7 @@
#define lockdep_is_held_type(l, r)(1)
#define lockdep_assert_held(l)
do { (void)(l); } while (0)
--- linux-4.15.0.orig/include/linux/logic_pio.h
+++ linux-4.15.0/include/linux/logic_pio.h
@@ -0,0 +1,124 @@
+// SPDX-License-Identifier: GPL-2.0+
+/*
+ * Copyright (C) 2017 HiSilicon Limited, All Rights Reserved.
+ * Author: Gabriele Paoloni <gabriele.paoloni@huawei.com>
+ * Author: Zhichang Yuan <yuanzhichang@hisilicon.com>
+ */
+
+ifndef __LINUX_LOGIC_PIO_H
+define __LINUX_LOGIC_PIO_H
+
+include <linux/fwnode.h>
+
+enum {
+LOGIC_PIO_INDIRECT,/* Indirect IO flag */
+LOGIC_PIO_CPU_MMIO,/* Memory-mapped IO flag */
+};
+
+struct logic_pio_hwaddr {
+struct list_head list;
+struct fwnode_handle *fwnode;
+resource_size_t hw_start;
+resource_size_t io_start;
+resource_size_t size; /* range size populated */
+unsigned long flags;
+
+void *hostdata;
+const struct logic_pio_host_ops *ops;
+};
+
+struct logic_pio_host_ops {
+u32 (*in)(void *hostdata, unsigned long addr, size_t dwidth);
+void (*out)(void *hostdata, unsigned long addr, u32 val,
+size_t dwidth);
+u32 (*ins)(void *hostdata, unsigned long addr, void *buffer,
+size_t dwidth, unsigned int count);
+void (*outs)(void *hostdata, unsigned long addr, const void *buffer,
+size_t dwidth, unsigned int count);
+};
+
+ifndef CONFIG_INDIRECT_PIO
+u8 logic_inb(unsigned long addr);
+void logic_outb(u8 value, unsigned long addr);
+void logic_outw(u16 value, unsigned long addr);
+void logic_outl(u32 value, unsigned long addr);
+u16 logic_inw(unsigned long addr);
u32 logic_inl(unsigned long addr);
void logic_outb(u8 value, unsigned long addr);
void logic_outw(u16 value, unsigned long addr);
void logic_outl(u32 value, unsigned long addr);
void logic_insb(unsigned long addr, void *buffer, unsigned int count);
void logic_insl(unsigned long addr, void *buffer, unsigned int count);
void logic_insw(unsigned long addr, void *buffer, unsigned int count);
void logic_outsb(unsigned long addr, const void *buffer, unsigned int count);
void logic_outsw(unsigned long addr, const void *buffer, unsigned int count);
void logic_outsl(unsigned long addr, const void *buffer, unsigned int count);
+
+ifndef inb
+define inb logic_inb
+endif
+
+ifndef inw
+define inw logic_inw
+endif
+
+ifndef inl
+define inl logic_inl
+endif
+
+ifndef outb
+define outb logic_outb
+endif
+
+ifndef outw
+define outw logic_outw
+endif
+
+ifndef outl
+define outl logic_outl
+endif
+
+ifndef insb
+define insb logic_insb
+endif
+
+ifndef insw
+define insw logic_insw
+endif
+
+ifndef insl
+define insl logic_insl
+endif
+
+ifndef outsb
#define outsb logic_outsb
#endif
+
#ifndef outsw
#define outsw logic_outsw
#endif
+
#ifndef outsl
#define outsl logic_outsl
#endif
+
/*
 * We reserve 0x4000 bytes for Indirect IO as so far this library is only
 * used by the HiSilicon LPC Host. If needed, we can reserve a wider IO
 * area by redefining the macro below.
 */
+#define PIO_INDIRECT_SIZE 0x4000
+#define MMIO_UPPER_LIMIT (IO_SPACE_LIMIT - PIO_INDIRECT_SIZE)
#else
#define MMIO_UPPER_LIMIT IO_SPACE_LIMIT
#endif /* CONFIG_INDIRECT_PIO */

struct logic_pio_hwaddr *find_io_range_by_fwnode(struct fwnode_handle *fwnode);
unsigned long logic_pio_trans_hwaddr(struct fwnode_handle *fwnode,
	resource_size_t hw_addr, resource_size_t size);

int logic_pio_register_range(struct logic_pio_hwaddr *newrange);
void logic_pio_unregister_range(struct logic_pio_hwaddr *range);
resource_size_t logic_pio_to_hwaddr(unsigned long pio);
unsigned long logic_pio_trans_cpuaddr(resource_size_t hw_addr);

#endif /* __LINUX_LOGIC_PIO_H */
--- linux-4.15.0.orig/include/linux/lsm_hooks.h
+++ linux-4.15.0/include/linux/lsm_hooks.h
@@ -1229,7 +1229,7 @@
 *	@cred contains the credentials to use.
 *	@ns contains the user namespace we want the capability in
 *	writeln contains the capability <include/linux/capability.h>.
- *	@audit contains whether to write an audit message or not
+ *	@opts contains options for the capable check <include/linux/security.h>
 *Return 0 if the capability is granted for @tsk.
 * @syslog:
 *Check permission before accessing the kernel message ring or changing
@@ -1405,8 +1405,10 @@
    const kernel_cap_t *effective,
    const kernel_cap_t *inheritable,
    const kernel_cap_t *permitted);
  -int (*capable)(const struct cred *cred, struct user_namespace *ns,
    -int cap, int audit);
int (*capable)(const struct cred *cred,  
struct user_namespace *ns,  
int cap,  
unsigned int opts);
int (*quotactl)(int cmds, int type, int id, struct super_block *sb);
int (*quota_on)(struct dentry *dentry);
int (*syslog)(int type);

int (*capable)(const struct cred *cred,  
struct user_namespace *ns,  
int cap,  
unsigned int opts);
int (*quotactl)(int cmds, int type, int id, struct super_block *sb);
int (*quota_on)(struct dentry *dentry);
int (*syslog)(int type);

@@ -1966,9 +1968,38 @@
 struct list_head*head;
 union security_list_options hook;
 char*lsm;
 int lsm_index;
 } __randomize_layout;

/*
 + * The maximum number of major security modules.
 + * Used to avoid excessive memory management while
 + * mapping global and module specific secids.
 + *
 + * Currently SELinux, Smack, AppArmor, TOMOYO
 + * Oh, but Casey needs to come up with the right way
 + * to identify a "major" module, so use the total number
 + * of modules (including minor) for now.
 + * Minor: Capability, Yama, LoadPin
 + */
+#define LSM_MAX_MAJOR 8
+
+/*
 + * Security blob size or offset data.
 + */
+struct lsm_blob_sizes {
+ int lbs_cred;
+ int lbs_file;
+ int lbs_inode;
+ int lbs_ipc;
+ int lbs_key;
+ int lbs_msg_msg;
+ int lbs_sock;
+ int lbs_superblock;
+ int lbs_task;
+};
+
+/*
 + * Initializing a security_hook_list structure takes
 + * up a lot of space in a source file. This macro takes
 + * care of the common case and reduces the amount of
 @@ -1980,6 +2011,7 @@
 extern struct security_hook_heads security_hook_heads;

extern char *lsm_names;

+extern void security_add_blobs(struct lsm_blob_sizes *needed);
extern void security_add_hooks(struct security_hook_list *hooks, int count, char *lsm);

@@ -2013,7 +2045,7 @@
#define __lsm_ro_after_init __ro_after_init
#endif /* CONFIG_SECURITY_WRITABLE_HOOKS */

-extern int __init security_module_enable(const char *module);
+extern bool __init security_module_enable(const char *lsm, const bool stacked);
extern void __init capability_add_hooks(void);
#ifdef CONFIG_SECURITY_YAMA
extern void __init yama_add_hooks(void);
@@ -2026,4 +2058,12 @@
static inline void loadpin_add_hooks(void) { }
#endif

+extern int lsm_cred_alloc(struct cred *cred, gfp_t gfp);
+extern int lsm_inode_alloc(struct inode *inode);
+
+#ifdef CONFIG_SECURITY
+void lsm_early_cred(struct cred *cred);
+void lsm_early_inode(struct inode *inode);
+#endif
+
+#endif /* !__LINUX_LSM_HOOKS_H */
#define to_mdio_driver(d)\
container_of(to_mdio_common_driver(d), struct mdio_driver, mdiodrv)
--- linux-4.15.0.orig/include/linux/memblock.h
+++ linux-4.15.0/include/linux/memblock.h
@@ -187,7 +187,6 @@
  unsigned long *end_pfn);
 void __next_mem_pfn_range(int *idx, int nid, unsigned long *out_start_pfn,
  unsigned long *out_end_pfn, int *out_nid);
-unsigned long memblock_next_valid_pfn(unsigned long pfn, unsigned long max_pfn);
/**
 * for_each_mem_pfn_range - early memory pfn range iterator
--- linux-4.15.0.orig/include/linux/memcontrol.h
+++ linux-4.15.0/include/linux/memcontrol.h
@@ -48,13 +48,13 @@
 MEMCG_MAX,
 MEMCG_OOM,
-MEMCG_NR_EVENTS,
+MEMCG_OOM_KILL,
+MEMCG_NR_MEMORY_EVENTS,
 };

 struct mem_cgroup_reclaim_cookie {
 @@ -88,7 +88,7 @@
 struct mem_cgroup_stat_cpu {
 long count[MEMCG_NR_STAT];
-unsigned long events[MEMCG_NR_EVENTS];
+unsigned long events[NR_VM_EVENT_ITEMS];
 unsigned long nr_page_events;
 unsigned long targets[MEM_CGROUP_NTARGETS];
 };
@@ -108,7 +108,10 @@
 */
 struct mem_cgroup_per_node {
 struct lruvec lruvec;
-struct lruvec_stat __percpu *lruvec_stat;
+struct lruvec_stat __percpu *lruvec_stat_cpu;
+atomic_long_truvec_stat[NR_VM_NODE_STAT_ITEMS];
+
unsigned long lru_zone_size[MAX_NR_ZONES][NR_LRU_LISTS];

struct mem_cgroup_reclaim_iteriter[DEF_PRIORITY + 1];
@@ -153,6 +156,15 @@
KMEM_ONLINE,
};

+if defined(CONFIG_SMP)
+struct memcg_padding {
+char x[0];
+} __cacheline_internodealigned_in_smp;
+#define MEMCG_PADDING(name) struct memcg_padding name;
+#else
+#define MEMCG_PADDING(name)
+#endif
+
/*
 * The memory controller data structure. The memory controller controls both
 * page cache and RSS per cgroup. We would eventually like to provide
 @@ -199,7 +211,7 @@
 /* OOM-Killer disable */
 int oom_kill_disable;
 /* handle for "memory.events" */
+/* memory.events */
 struct cgroup_file events_file;

/* protect arrays of thresholds */
@@ -219,18 +231,26 @@
 * mem_cgroup ? And what type of charges should we move ?
 */
 unsigned long move_charge_at_immigrate;
-/*
- * set > 0 if pages under this cgroup are moving to other cgroup.
- */
-atomic_t moving_account;
/* taken only while moving_account > 0 */
spinlock_t move_lock;
-struct task_struct*move_lock_task;
unsigned long move_lock_flags;
+
+MEMCG_PADDING(_pad1_);
+
/*
 * percpu counter.
 + * set > 0 if pages under this cgroup are moving to other cgroup.
/*
-struct mem_cgroup_stat_cpu __percpu *stat;
+atomic_t moving_account;
+struct task_struct *move_lock_task;
+
+/* memory.stat */
+struct mem_cgroup_stat_cpu __percpu *stat_cpu;
+
+MEMCG_PADDING(_pad2_);
+
+atomic_long_t stat[MEMCG_NR_STAT];
+atomic_long_t events[NR_VM_EVENT_ITEMS];
+atomic_long_t memory_events[MEMCG_NR_MEMORY_EVENTS];

unsigned long socket_pressure;

@@ -265,6 +285,12 @@
 /* WARNING: nodeinfo must be the last member here */
};
+
+ * size of first charge trial. "32" comes from vmscan.c's magic value.
+ * TODO: maybe necessary to use big numbers in big irons.
+ */
+#define MEMCG_CHARGE_BATCH 32U
+
+extern struct mem_cgroup *root_mem_cgroup;

static inline bool mem_cgroup_disabled(void)
@@ -272,13 +298,6 @@
    return !cgroup_subsys_enabled(memory_cgrp_subsys);
 }

-struct mem_cgroup_event(struct mem_cgroup *memcg, 
-    enum memcg_event_item event)
-{
-    -this_cpu_inc(memcg->stat->events[event]);
-    -cgroup_file_notify(&memcg->events_file);
-}
-
-bool mem_cgroup_low(struct mem_cgroup *root, struct mem_cgroup *memcg);

int mem_cgroup_try_charge(struct page *page, struct mm_struct *mm, 
@@ -488,36 +507,47 @@
    void __unlock_page_memcg(struct mem_cgroup *memcg);
    void unlock_page_memcg(struct page *page);

-/* idx can be of type enum memcg_stat_item or node_stat_item */

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/*
 * idx can be of type enum memcg_stat_item or node_stat_item.
 * Keep in sync with memcg_exact_page_state().
 * /

static inline unsigned long memcg_page_state(struct mem_cgroup *memcg,
     int idx)
{
    long val = 0;
    int cpu;
    
    for_each_possible_cpu(cpu)
    val += per_cpu(memcg->stat->count[idx], cpu);
    
    if (val < 0)
        val = 0;
    return val;
}

/* idx can be of type enum memcg_stat_item or node_stat_item */
static inline void __mod_memcg_state(struct mem_cgroup *memcg,
     int idx, int val)
{
    if (!mem_cgroup_disabled())
        __this_cpu_add(memcg->stat->count[idx], val);
    long x;
    
    if (mem_cgroup_disabled())
        return;
    
    x = val + __this_cpu_read(memcg->stat_cpu->count[idx]);
    if (unlikely(abs(x) > MEMCG_CHARGE_BATCH)) {
        atomic_long_add(x, &memcg->stat[idx]);
        x = 0;
    }
    __this_cpu_write(memcg->stat_cpu->count[idx], x);
}

/* idx can be of type enum memcg_stat_item or node_stat_item */
static inline void mod_memcg_state(struct mem_cgroup *memcg,
     int idx, int val)
-if (!mem_cgroup_disabled())
-this_cpu_add(memcg->stat->count[idx], val);
+unsigned long flags;
+
+local_irq_save(flags);
+__mod_memcg_state(memcg, idx, val);
+local_irq_restore(flags);
}

/**
 @@ -555,89 +585,116 @@
 enum node_stat_item idx)
 {
 struct mem_cgroup_per_node *pn;
-long val = 0;
-int cpu;
+long x;

 if (mem_cgroup_disabled())
 return node_page_state(lruvec_pgdat(lruvec), idx);

 pn = container_of(lruvec, struct mem_cgroup_per_node, lruvec);
-foreach_possible_cpu(cpu)
-.val += per_cpu(pn->lruvec_stat->count[idx], cpu);
-
-if (val < 0)
-val = 0;
-
-return val;
+x = atomic_long_read(&pn->lruvec_stat[idx]);
+#ifdef CONFIG_SMP
+if (x < 0)
+x = 0;
+#endif
+return x;
}

static inline void __mod_lruvec_state(struct lruvec *lruvec,
 enum node_stat_item idx, int val)
{
 struct mem_cgroup_per_node *pn;
+long x;

+/* Update node */
 __mod_node_page_state(lruvec_pgdat(lruvec), idx, val);
+if (mem_cgroup_disabled())
 return;
Open Source Used In 5GaaS Edge AC-4 32163

```c
+ pn = container_of(lruvec, struct mem_cgroup_per_node, lruvec);
+ */ Update memcg */
+ __mod_memcg_state(pn->memcg, idx, val);
- __this_cpu_add(pn->lruvec_stat->count[idx], val);
+ */ Update lruvec */
+ x = val + __this_cpu_read(pn->lruvec_stat_cpu->count[idx]);
+ if (unlikely(abs(x) > MEMCG_CHARGE_BATCH)) {
  atomic_long_add(x, &pn->lruvec_stat[idx]);
  x = 0;
} + __this_cpu_write(pn->lruvec_stat_cpu->count[idx], x);
}

static inline void mod_lruvec_state(struct lruvec *lruvec,
    enum node_stat_item idx, int val)
{
  struct mem_cgroup_per_node *pn;
  unsigned long flags;

  -mod_node_page_state(lruvec_pgdat(lruvec), idx, val);
  -if (mem_cgroup_disabled())
    return;
  -pn = container_of(lruvec, struct mem_cgroup_per_node, lruvec);
  -mod_memcg_state(pn->memcg, idx, val);
  -this_cpu_add(pn->lruvec_stat->count[idx], val);
  +local_irq_save(flags);
  +__mod_lruvec_state(lruvec, idx, val);
  +local_irq_restore(flags);
}

static inline void __mod_lruvec_page_state(struct page *page,
    enum node_stat_item idx, int val)
{
  struct mem_cgroup_per_node *pn;
  pg_data_t *pgdat = page_pgdat(page);
  struct lruvec *lruvec = lruvec;

  -mod_node_page_state(lruvec_pgdat(lruvec), idx, val);
  -if (mem_cgroup_disabled() || !page->mem_cgroup)
    return;
  -pn = container_of(lruvec, struct mem_cgroup_per_node, lruvec);
  -mod_memcg_state(page->mem_cgroup, idx, val);
  -this_cpu_add(page->lruvec_stat->count[idx], val);
  +local_irq_save(flags);
  +__mod_lruvec_state(page, idx, val);
  +local_irq_restore(flags);
}
```
static inline void mod_lruvec_page_state(struct page *page,
    enum node_stat_item idx, int val)
{
    -struct mem_cgroup_per_node *pn;
    +unsigned long flags;

    -mod_node_page_state(page_pgdat(page), idx, val);
    -if (mem_cgroup_disabled() || !page->mem_cgroup)
        -return;
    -mod_memcg_state(page->mem_cgroup, idx, val);
    -pn = page->mem_cgroup->nodeinfo[page_to_nid(page)];
    -this_cpu_add(pn->lruvec_stat->count[idx], val);
    +local_irq_save(flags);
    +__mod_lruvec_page_state(page, idx, val);
    +local_irq_restore(flags);
}

unsigned long mem_cgroup_soft_limit_reclaim(pg_data_t *pgdat, int order,
    gfp_t gfp_mask,
    unsigned long *total_scanned);

+static inline void __count_memcg_events(struct mem_cgroup *memcg,
    enum vm_event_item idx,
    unsigned long count)
+
    unsigned long x;
    +
    +if (mem_cgroup_disabled())
        +return;
    +
    +x = count + __this_cpu_read(memcg->stat_cpu->events[idx]);
    +if (unlikely(x > MEMCG_CHARGE_BATCH)) {
        +atomic_long_add(x, &memcg->events[idx]);
        +x = 0;
    +}
    +__this_cpu_write(memcg->stat_cpu->events[idx], x);
    +}

static inline void count_memcg_events(struct mem_cgroup *memcg,
    enum vm_event_item idx,
    unsigned long count)
{  
    if (!mem_cgroup_disabled())
    -this_cpu_add(memcg->stat->events[idx], count);
+unsigned long flags;
+
+local_irq_save(flags);
+_count_memcg_events(memcg, idx, count);
+local_irq_restore(flags);
}

/* idx can be of type enum memcg_stat_item or node_stat_item */
static inline void count_memcg_page_event(struct page *page,
    - int idx)
+  enum vm_event_item idx)
{
  if (page->mem_cgroup)
    count_memcg_events(page->mem_cgroup, idx, 1);
rcu_read_lock();
memcg = mem_cgroup_from_task(rcu_dereference(mm->owner));
  -if (likely(memcg)) {
  -this_cpu_inc(memcg->stat->events[idx]);
  -if (idx == OOM_KILL)
  -cgroup_file_notify(&memcg->events_file);
  -}
  +if (likely(memcg))
  +count_memcg_events(memcg, idx, 1);
rcu_read_unlock();
  }
+  
+static inline void memcg_memory_event(struct mem_cgroup *memcg,
+    enum memcg_memory_event event)
  +{  
+atomic_long_inc(&memcg->memory_events[event]);
  +cgroup_file_notify(&memcg->events_file);
  +}
+  
+static inline void memcg_memory_event_mm(struct mm_struct *mm,
+    enum memcg_memory_event event)
  +{  
+struct mem_cgroup *memcg;
  +
  +if (mem_cgroup_disabled())
  +return;
  +
+rcu_read_lock();
  +memcg = mem_cgroup_from_task(rcu_dereference(mm->owner));

+if (likely(memcg))
+memcg_memory_event(memcg, event);
+rcu_read_unlock();
+}
+
+#ifdef CONFIG_TRANSPARENT_HUGEPAGE
void mem_cgroup_split_huge_fixup(struct page *head);
@endif
@@ -676,8 +753,13 @@
return true;
}
-
--static inline void mem_cgroup_event(struct mem_cgroup *memcg,
-    enum memcg_event_item event)
+static inline void memcg_memory_event(struct mem_cgroup *memcg,
+    enum memcg_memory_event event)
+{
+}
+
+static inline void memcg_memory_event_mm(struct mm_struct *mm,
+    enum memcg_memory_event event)
{
}

--- linux-4.15.0.orig/include/linux/memory_hotplug.h
+++ linux-4.15.0/include/linux/memory_hotplug.h
@@ -20,14 +20,16 @@
* walkers which rely on the fully initialized page->flags and others
* should use this rather than pfn_valid && pfn_to_page
*/
-#define pfn_to_online_page(pfn)
{
-    struct page *___page = NULL;
-    unsigned long ___nr = pfn_to_section_nr(pfn);
-
-    if (___nr < NR_MEM_SECTIONS && online_section_nr(___nr))
-        ___page = pfn_to_page(pfn);
-    ___page;
+
+define pfn_to_online_page(pfn)
+
+%define pfn_to_online_page(pfn) 
+
+{
+    struct page *___page = NULL; 
+    unsigned long ___pfn = pfn; 
+    unsigned long ___nr = pfn_to_section_nr(___pfn); 
+    
+    if (___nr < NR_MEM_SECTIONS && online_section_nr(___nr)) 
+        ___page = pfn_to_page(___pfn); 
+    ___page; 

void mem_hotplug_begin(void);
void mem_hotplug_done(void);

+void set_default_mem_hotplug_zone(enum zone_type zone);
+extern void set_zone_contiguous(struct zone *zone);
extern void clear_zone_contiguous(struct zone *zone);

static inline void mem_hotplug_begin(void) {}
static inline void mem_hotplug_done(void) {}

+static inline void set_default_mem_hotplug_zone(enum zone_type zone) {}
+
static inline bool movable_node_is_enabled(void)
{
    return false;

extern int walk_memory_range(unsigned long start_pfn, unsigned long end_pfn,
void *arg, int (*func)(struct memory_block *, void *));
+extern int __add_memory(int nid, u64 start, u64 size);
extern int add_memory(int nid, u64 start, u64 size);
extern int add_memory_resource(int nid, struct resource *resource, bool online);
extern int arch_add_memory(int nid, u64 start, u64 size, bool want_memblock);

unsigned long pnum);
extern bool allow_online_pfn_range(int nid, unsigned long pfn, unsigned long nr_pages,
int online_type);
-extern struct zone *zone_for_pfn_range(int online_type, int nid, unsigned start_pfn,
-unsigned long nr_pages);
+extern struct zone *zone_for_pfn_range(int online_type, int nid,
+unsigned long start_pfn, unsigned long nr_pages);
#endif /* __LINUX_MEMORY_HOTPLUG_H */
--- linux-4.15.0.orig/include/linux/mfd/abx500/ux500_chargalg.h
+++ linux-4.15.0/include/linux/mfd/abx500/ux500_chargalg.h
@@ -15,7 +15,7 @@
 * - POWER_SUPPLY_TYPE_USB,
 * because only them store as drv_data pointer to struct ux500_charger.
 */
-#define psy_to_ux500_charger(x) power_supply_get_drvdata(psy)
+#define psy_to_ux500_charger(x) power_supply_get_drvdata(x)

/* Forward declaration */
struct ux500_charger;
--- linux-4.15.0.orig/include/linux/mfd/da9063/registers.h
+++ linux-4.15.0/include/linux/mfd/da9063/registers.h
@@ -215,9 +215,9 @@
 /* DA9063 Configuration registers */
 /* OTP */
+defineDA9063_REG_OTP_CONT	0x101
+defineDA9063_REG_OTP_ADDR	0x102
+defineDA9063_REG_OTP_DATA	0x103
 /* Customer Trim and Configuration */
 DEFINE_DA9063_REG_T_OFFSET	0x104
--- linux-4.15.0.orig/include/linux/mfd/intel_soc_pmic.h
+++ linux-4.15.0/include/linux/mfd/intel_soc_pmic.h
@@ -25,6 +25,7 @@
 int irq;
 struct regmap *regmap;
 struct regmap_irq_chip_data *irq_chip_data;
+struct regmap_irq_chip_data *irq_chip_data_pwrbtn;
 struct regmap_irq_chip_data *irq_chip_data_tmu;
 struct regmap_irq_chip_data *irq_chip_data_bcu;
 struct regmap_irq_chip_data *irq_chip_data_adc;
 --- linux-4.15.0.orig/include/linux/mfd/max77620.h
+++ linux-4.15.0/include/linux/mfd/max77620.h
@@ -136,8 +136,8 @@
 #define MAX20024_FPS_PERIOD_MAX_US	2560
 #define MAX77620_REG_FPS_GPIO1	0x54
 #define MAX77620_REG_FPS_GPIO2	0x55
--- linux-4.15.0.orig/include/linux/mfd/max8997.h
+++ linux-4.15.0/include/linux/mfd/max8997.h
@@ -178,7 +178,6 @@
 struct max8997_platform_data {
 /* IRQ */
 int ono;
- int wakeup;
+ int wakeup;
 */ --- PMIC --- */
struct max8997_regulator_data *regulators;

--- linux-4.15.0.orig/include/linux/mfd/mc13xxx.h
+++ linux-4.15.0/include/linux/mfd/mc13xxx.h
@@ -247,6 +247,7 @@
#define MC13XXX_ADC0_TSMOD0 (1 << 12)
#define MC13XXX_ADC0_TSMOD1 (1 << 13)
#define MC13XXX_ADC0_TSMOD2 (1 << 14)
+#define MC13XXX_ADC0_CHRGRAWDIV (1 << 15)
#define MC13XXX_ADC0_ADINC1 (1 << 16)
#define MC13XXX_ADC0_ADINC2 (1 << 17)

--- linux-4.15.0.orig/include/linux/mfd/palmas.h
+++ linux-4.15.0/include/linux/mfd/palmas.h
@@ -3733,6 +3733,9 @@
#define TPS65917_REGEN3_CTRL_MODE_ACTIVE 0x01
#define TPS65917_REGEN3_CTRL_MODE_ACTIVE_SHIFT 0x00
+/* POWERHOLD Mask field for PRIMARY_SECONDARY_PAD2 register */
+#define TPS65917_PRIMARY_SECONDARY_PAD2_GPIO_5_MASK 0xC

/* Registers for function RESOURCE */
#define TPS65917_REGEN1_CTRL 0x2
#define TPS65917_PLLEN_CTRL 0x3

--- linux-4.15.0.orig/include/linux/mfd/rk808.h
+++ linux-4.15.0/include/linux/mfd/rk808.h
@@ -443,7 +443,7 @@
enum {
    RK805_ID = 0x8050,
    RK808_ID = 0x0000,
-RK818_ID = 0x8181,
+RK818_ID = 0x8180,
    Rusra_ID = 0x8180,
};

struct rk808 {
    --- linux-4.15.0.orig/include/linux/mfd/rt5033-private.h
    +++ linux-4.15.0/include/linux/mfd/rt5033-private.h
    @@ -203,13 +203,13 @@
#define RT5033_REGULATOR_BUCK_VOLTAGE_MIN1000000U
#define RT5033_REGULATOR_BUCK_VOLTAGE_MAX3000000U
#define RT5033_REGULATOR_BUCK_VOLTAGE_STEP1000000U
-#define RT5033_REGULATOR_BUCK_VOLTAGE_STEP_NUM32
+#define RT5033_REGULATOR_BUCK_VOLTAGE_STEP_NUM21

    /* RT5033 regulator LDO output voltage uV */
#define RT5033_REGULATOR_LDO_VOLTAGE_MIN1200000U
#define RT5033_REGULATOR_LDO_VOLTAGE_MAX3000000U
#define RT5033_REGULATOR_LDO_VOLTAGE_STEP1000000U
-#define RT5033_REGULATOR_LDO_VOLTAGE_STEP_NUM32

#define RT5033_REGULATOR_LDO_VOLTAGE_STEP_NUM 19
/* RT5033 regulator SAFE LDO output voltage uV */
#define RT5033_REGULATOR_SAFE_LDO_VOLTAGE 4900000U
--- linux-4.15.0.orig/include/linux/miscdevice.h
+++ linux-4.15.0/include/linux/miscdevice.h
@@ -57,6 +57,7 @@
 #define UHID_MINOR 239
 #define USERIO_MINOR 240
 #define VHOST_VSOCK_MINOR 241
+#define RFKILL_MINOR 242
 #define MISC_DYNAMIC_MINOR 255

 struct device;
--- linux-4.15.0.orig/include/linux/mlx4/device.h
+++ linux-4.15.0/include/linux/mlx4/device.h
@@ -633,6 +633,7 @@
 u32 vf_caps;
 bool wol_port[MLX4_MAX_PORTS + 1];
 struct mlx4_rate_limit_caps rl_caps;
+bool map_clock_to_user;
};

 struct mlx4_buf_list {
--- linux-4.15.0.orig/include/linux/mlx5/driver.h
+++ linux-4.15.0/include/linux/mlx5/driver.h
@@ -442,8 +442,8 @@
 struct mlx5_core_rsc_common common; /* must be first */
 u32 srqn;
 intmax;
-intmax_gs;
-intmax_avail_gather;
+size_t max_gs;
+size_t max_avail_gather;
 intwqe_shift;
 void (*event)(struct mlx5_core_srq *, enum mlx5_event);
@@ -753,6 +753,8 @@
 };}

 struct mlx5_td {
+/* protects tirs list changes while tirs refresh */
+struct mutex list_lock;
 struct list_head tirs_list;
 u32 tdn;
 };
struct {
    struct mlx5_rsvd_gids reserved_gids;
    -atomic_t roce_en;
    +u32 roce_en;
} roce;

#ifdef CONFIG_MLX5_FPGA
struct mlx5_fpga_device *fpga;
#endif

struct delayed_work cb_timeout_work;
void *context;
idx;
+struct completion handling;
struct completion done;
struct mlx5_cmd *cmd;
struct work_struct work;

void mlx5_health_cleanup(struct mlx5_core_dev *dev);
int mlx5_health_init(struct mlx5_core_dev *dev);
void mlx5_start_health_poll(struct mlx5_core_dev *dev);
-void mlx5_stop_health_poll(struct mlx5_core_dev *dev);
+void mlx5_stop_health_poll(struct mlx5_core_dev *dev, bool disable_health);
void mlx5_drain_health_wq(struct mlx5_core_dev *dev);
void mlx5_trigger_health_work(struct mlx5_core_dev *dev);
void mlx5_drain_health_recovery(struct mlx5_core_dev *dev);
#endif

static inline const struct cpumask *
-mlx5_get_vector_affinity(struct mlx5_core_dev *dev, int vector)
+mlx5_get_vector_affinity_hint(struct mlx5_core_dev *dev, int vector)
{
    -const struct cpumask *mask;
    -struct irq_desc *desc;
    -unsigned int irq;
    -int eqn;
    -int err;
    -
    -err = mlx5_vector2eqn(dev, vector, &eqn, &irq);
    -if (err)
      -return NULL;
    -
    -desc = irq_to_desc(irq);
    -
    #ifdef CONFIG_GENERIC_IRQ_EFFECTIVE_AFF_MASK
    -mask = irq_data_get_effective_affinity_mask(&desc->irq_data);
    -
    #else
    -mask = desc->irq_common_data.affinity;
    -
    #endif
    -return mask;
}
+return dev->priv.irq_info[vector + MLX5_EQ_VEC_COMP_BASE].mask;
}

#endif /* MLX5_DRIVER_H */

--- linux-4.15.0.orig/include/linux/mlx5/fs.h
+++ linux-4.15.0/include/linux/mlx5/fs.h
@@ -164,6 +164,7 @@
 struct mlx5_fc *mlx5_flow_rule_counter(struct mlx5_flow_handle *handler);
 struct mlx5_fc *mlx5_fc_create(struct mlx5_core_dev *dev, bool aging);
 void mlx5_fc_destroy(struct mlx5_core_dev *dev, struct mlx5_fc *counter);
+u64 mlx5_fc_query_lastuse(struct mlx5_fc *counter);
 void mlx5_fc_query_cached(struct mlx5_fc *counter,
   u64 *bytes, u64 *packets, u64 *lastuse);
int mlx5_fs_add_rx_underlay_qpn(struct mlx5_core_dev *dev, u32 underlay_qpn);
--- linux-4.15.0.orig/include/linux/mlx5/mlx5_ifc.h
+++ linux-4.15.0/include/linux/mlx5/mlx5_ifc.h
@@ -324,11 +324,11 @@
 u8         reserved_at_60[0x18];
 u8         log_max_ft_num[0x8];

-u8         reserved_at_80[0x18];
+u8         reserved_at_80[0x10];
+u8         log_max_flow_counter[0x8];
 u8         log_max_destination[0x8];

-u8         log_max_flow_counter[0x8];
-u8         reserved_at_a8[0x10];
+u8         reserved_at_al[0x18];
 u8         log_max_flow[0x8];

 u8         reserved_at_c0[0x40];
@@ -614,7 +614,8 @@
 u8         reserved_at_1a4[0x1];
 u8         nic_flow_table[0x1];
-u8         eswitch_flow_table[0x1];
+u8         eswitch_manager[0x1];
 u8         early_vf_enable[0x1];

@@ -861,7 +862,7 @@
 u8         reserved_at_1a4[0x1];
u8      mcam_reg[0x1];
u8      pcam_reg[0x1];
@@ -5398,7 +5399,12 @@
struct mlx5_ifc_cqc_bits cq_context;

-u8      reserved_at_280[0x60];
+u8      reserved_at_280[0x60];
+
+ u8      cq_umem_valid[0x1];
+u8      reserved_at_2e1[0x1f];
+
+u8      reserved_at_300[0x580];

u8      pas[0][0x40];
};
@@ -8734,8 +8740,6 @@

u8      syndrome[0x20];

-u8      reserved_at_40[0x40];
-
struct mlx5_ifc_lagc_bits ctx;
};

--- linux-4.15.0.orig/include/linux/mm.h
+++ linux-4.15.0/include/linux/mm.h
@@ -154,7 +154,9 @@
* mmap() functions).
 */

-extern struct kmem_cache *vm_area_cachep;
+struct vm_area_struct *vm_area_alloc(struct mm_struct *);
+struct vm_area_struct *vm_area_dup(struct vm_area_struct *);
+void vm_area_free(struct vm_area_struct *);

#ifndef CONFIG_MMU
extern struct rb_root nommu_region_tree;
@@ -558,12 +560,13 @@

extern void kvfree(const void *addr);
+extern void kvfree_sensitive(const void *addr, size_t len);

-static inline atomic_t *compound_mapcount_ptr(struct page *page)
-{
-    return &page[1].compound_mapcount;
-}
+/*
  + * Mapcount of compound page as a whole, does not include mapped sub-pages.
  + *
  + * Must be called only for compound pages or any their tail sub-pages.
  + */
static inline int compound_mapcount(struct page *page)
{
    VM_BUG_ON_PAGE(!PageCompound(page), page);
@@ -583,10 +586,16 @@
        int __page_mapcount(struct page *page);

+/*
  + * Mapcount of 0-order page; when compound sub-page, includes
  + * compound_mapcount().
  + *
  + * Result is undefined for pages which cannot be mapped into userspace.
  + * For example SLAB or special types of pages. See function page_has_type().
  + * They use this place in struct page differently.
  + */
static inline int page_mapcount(struct page *page)
{
-    VM_BUG_ON_PAGE(PageSlab(page), page);
    if (unlikely(PageCompound(page)))
        return __page_mapcount(page);
    return atomic_read(&page->_mapcount) + 1;
@@ -834,6 +843,10 @@
#endif /* CONFIGDEVICE_PRIVATE || CONFIGDEVICE_PUBLIC */

+/* 127: arbitrary random number, small enough to assemble well */
+#define page_ref_zero_or_close_to_overflow(page) \
+((unsigned int) page_ref_count(page) + 127u <= 127u)
+
static inline void get_page(struct page *page)
{
    page = compound_head(page);
@@ -841,10 +854,19 @@
* Getting a normal page or the head of a compound page
* requires to already have an elevated page->refcount.
 */
-VM_BUG_ON_PAGE(page_ref_count(page) <= 0, page);
+VM_BUG_ON_PAGE(page_ref_zero_or_close_to_overflow(page), page);
    page_ref_inc(page);
}
+static inline __must_check bool try_get_page(struct page *page)
+
+\{ 
+    page = compound_head(page);
+    if (WARN_ON_ONCE(page_ref_count(page) <= 0))
+        return false;
+    page_ref_inc(page);
+    return true;
+\} 
+
+static inline void put_page(struct page *page)
+\{
+    page = compound_head(page);
+    \} 
+endif
+
+extern void vma_do_file_update_time(struct vm_area_struct *, const char[], int);
+extern struct file *vma_do_pr_or_file(struct vm_area_struct *, const char[]);
+    int);
+extern void vma_do_get_file(struct vm_area_struct *, const char[]), int);
+extern void vma_do_fput(struct vm_area_struct *, const char[]), int);
+
+\#define vma_file_update_time(vma)vma_do_file_update_time(vma, __func__, __LINE__) 
+\#define vma_pr_or_file(vma)vma_do_pr_or_file(vma, __func__, __LINE__)
+\#define vma_get_file(vma)vma_do_get_file(vma, __func__, __LINE__)
+\#define vma_fput(vma)vma_do_fput(vma, __func__, __LINE__)
+
+\#ifndef CONFIG_MMU 
+extern struct file *vmr_do_pr_or_file(struct vm_region *, const char[]), int);
+extern void vmr_do_fput(struct vm_region *, const char[]), int);
+
+\#define vmr_pr_or_file(region)vmr_do_pr_or_file(region, __func__, __LINE__)
+\#define vmr_fput(region)vmr_do_fput(region, __func__, __LINE__)
+\#endif /* !CONFIG_MMU */
+
+extern int access_process_vm(struct task_struct *tsk, unsigned long addr, void *buf, int len,
+unsigned int gup_flags);
+extern int access_remote_vm(struct mm_struct *mm, unsigned long addr,
+\} 
+endif /* !CONFIG_MMU */
+
+extern int access_process_vm(struct task_struct *tsk, unsigned long addr, void *buf, int len,
+unsigned int gup_flags);
+extern int access_remote_vm(struct mm_struct *mm, unsigned long addr,
+\} 
+static inline void mm_inc_nr_puds(struct mm_struct *mm)
+\{ 
+    if (mm_pud_folded(mm))
+        return;
+    atomic_long_add(PTRS_PER_PUD * sizeof(pud_t), &mm->pgtables_bytes);
static inline void mm_dec_nr_puds(struct mm_struct *mm)
{
+if (mm_pud_folded(mm))
+return;
atomic_long_sub(PTRS_PER_PUD * sizeof(pud_t), &mm->pgtables_bytes);
}
#endif
@@ -1669,11 +1717,15 @@
static inline void mm_inc_nr_pmds(struct mm_struct *mm)
{
+if (mm_pmd_folded(mm))
+return;
atomic_long_add(PTRS_PER_PMD * sizeof(pmd_t), &mm->pgtables_bytes);
}
static inline void mm_dec_nr_pmds(struct mm_struct *mm)
{
+if (mm_pmd_folded(mm))
+return;
atomic_long_sub(PTRS_PER_PMD * sizeof(pmd_t), &mm->pgtables_bytes);
}
#endif
@@ -2062,7 +2114,7 @@

static inline bool range_in_vma(struct vm_area_struct *vma,
+                              unsigned long start, unsigned long end)
+{ return (vma && vma->vm_start <= start && end <= vma->vm_end); +}
+#ifdef CONFIG_MMU
pgprot_t vm_get_page_prot(unsigned long vm_flags);
void vma_set_page_prot(struct vm_area_struct *vma);
@@ -2435,6 +2493,7 @@
#define FOLL_MLOCK 0x1000 /* lock present pages */
#define FOLL_REMOTE 0x2000 /* we are working on non-current tsk/mm */
#define FOLL_COW 0x4000 /* internal GUP flag */
+#define FOLL_ANON 0x8000 /* don't do file mappings */

static inline int vm_fault_to_errno(int vm_fault, int foll_flags)
{
@@ -2447,6 +2506,15 @@
    return 0;
}

+#ifndef io_remap_pfn_range
+static inline int io_remap_pfn_range(struct vm_area_struct *vma,
+    unsigned long addr, unsigned long pfn,
+    unsigned long size, pgprot_t prot)
+{
+    return remap_pfn_range(vma, addr, pfn, size, pgprot_decrypted(prot));
+}  
+#endif
+
typedef int (*pte_fn_t)(pte_t *pte, pgtable_t token, unsigned long addr,
    void *data);
extern int apply_to_page_range(struct mm_struct *mm, unsigned long address,
@@ -2600,6 +2668,7 @@
    MF_MSG_NON_PMD_HUGE,
    MF_MSG_UNMAP_FAILED,
    MF_MSG_DIRTY_SWAPCACHE,
--- linux-4.15.0.orig/include/linux/mm_inline.h
+++ linux-4.15.0/include/linux/mm_inline.h
@@ -127,10 +127,4 @@
#define lru_to_page(head) (list_entry((head)->prev, struct page, lru))

-#ifdef arch_unmap_kpfn
-extern void arch_unmap_kpfn(unsigned long pfn);
-#else
-#endif
-#endif

--- linux-4.15.0.orig/include/linux/mm_types.h
+++ linux-4.15.0/include/linux/mm_types.h
@@ -242,6 +242,11 @@

typedef unsigned long vm_flags_t;

#define VMACACHE_SIZE 64

static inline atomic_t *compound_mapcount_ptr(struct page *page) 
{ 
+ return &page[1].compound_mapcount; 
+ } 
+
/* 
* A region containing a mapping of a non-memory backed file under NOMMU 
* conditions. These are held in a global tree and are pinned by the VMAs that 
@email -255.6 +260.7 @
unsigned long long vm_top;/* region allocated to here */
unsigned long long vm_pgoff;/* the offset in vm_file corresponding to vm_start */
struct file *vm_file;/* the backing file or NULL */
+struct file *vm_prfile;/* the virtual backing file or NULL */

int vm_usage;/* region usage count (access under nommu_region_sem) */
bool vm_icache_flushed : 1; /* true if the icache has been flushed for 
@email -329.6 +335.7 @
unsigned long long vm_pgoff;/* Offset (within vm_file) in PAGE_SIZE 
units */
struct file * vm_file;/* File we map to (can be NULL). */
+struct file *vm_prfile;/* shadow of vm_file */
void * vm_private_data;/* was vm_pte (shared mem) */

#define VMACACHE_SIZE 64
struct mm_struct 

struct vm_area_struct *mmap;/* list of VMAs */
struct rb_root mm_rb;
- u32 vmacache_seqnum; /* per-thread vmacache */
+u64 vmacache_seqnum; /* per-thread vmacache */

#define CONFIG_MMU

unsigned long (*get_unmapped_area) (struct file *filp,
unsigned long addr, unsigned long len,
--- linux-4.15.0.orig/include/linux/mm_types_task.h
+++ linux-4.15.0/include/linux/mm_types_task.h
@email -32.7 +32.7 @
#define VMACACHE_MASK (VMACACHE_SIZE - 1)

struct vmacache {
- u32 seqnum;
+u64 seqnum;
struct vm_area_struct *vmas[VMACACHE_SIZE];
};
 MMC Physical partitions */

struct mmc_part {
  -unsigned intsize;/* partition size (in bytes) */
  +u64size;/* partition size (in bytes) */
  unsigned intpart_cfg;/* partition type */
  charname[MAX_MMC_PART_NAME_LEN];
  boolforce_ro;/* to make boot parts RO by default */

--- linux-4.15.0.orig/include/linux/mmc/host.h
+++ linux-4.15.0/include/linux/mmc/host.h
@@ -226,7 +226,7 @@
*/

#define MMC_CAP_UHS_SDR50(1 << 18)/* Host supports UHS SDR50 mode */
#define MMC_CAP_UHS_SDR104(1 << 19)/* Host supports UHS SDR104 mode */
#define MMC_CAP_UHS_DDR50(1 << 20)/* Host supports UHS DDR50 mode */
-/* (1 << 21) is free for reuse */
+#define MMC_CAP_UHS	(MMC_CAP_UHS_SDR12 | MMC_CAP_UHS_SDR25 |
+                      MMC_CAP_UHS_SDR50 | MMC_CAP_UHS_SDR104 |
+                      MMC_CAP_UHS_DDR50)
+#define MMC_CAP_SYNC_RUNTIME_PM	(1 << 21)/* Synced runtime PM suspends. */
+#define MMC_CAP_NEED_RSP_BUSY	(1 << 22)/* Commands with R1B can't use R1. */
+#define MMC_CAP_DRIVER_TYPE_A(1 << 23)/* Host supports Driver Type A */
+#define MMC_CAP_DRIVER_TYPE_C(1 << 24)/* Host supports Driver Type C */
+#define MMC_CAP_DRIVER_TYPE_D(1 << 25)/* Host supports Driver Type D */
@ @ -344,6 +348,7 @@
#define MMC_CAP2_HS400_1_2V	(1 << 16)/* Can support HS400 1.2V */
#define MMC_CAP2_HS400(MMC_CAP2_HS400_1_8V |
  + MMC_CAP2_HS400_1_2V)
+#define MMC_CAP2_HSX00_1_8V	(MMC_CAP2_HS200_1_8V_SDR | MMC_CAP2_HS400_1_8V)
+#define MMC_CAP2_HSX00_1_2V	(MMC_CAP2_HS200_1_2V_SDR | MMC_CAP2_HS400_1_2V)
#define MMC_CAP2_SDIO_IRQ_NOTHREAD (1 << 17)
#define MMC_CAP2_NO_WRITE_PROTECT (1 << 18)/* No physical write protect pin, assume that card is always read-write */
@ @ -380,6 +385,7 @@
unsigned intoing_retune:1;/* re-tuning in progress */
unsigned intretune_now:1;/* do re-tuning at next req */
unsigned intretune_paused:1;/* re-tuning is temporarily disabled */
+unsigned intretune_crc_disable:1;/* don't trigger retune upon crc */

intrescan_disable;/* disable card detection */
intrescan_entered;/* used with nonremovable devices */
@ @ -478,6 +484,15 @@

void mmc_cqe_request_done(struct mmc_host *host, struct mmc_request *mrq);

+/*
+ * May be called from host driver's system/runtime suspend/resume callbacks,
+ * to know if SDIO IRQs has been claimed.
+ static inline bool sdio_irq_claimed(struct mmc_host *host)
+ {
+ return host->sdio_irqs > 0;
+ }
+
static inline void mmc_signal_sdio_irq(struct mmc_host *host)
{
 host->ops->enable_sdio_irq(host, 0);
--- linux-4.15.0.orig/include/linux/mmc/sdio_func.h
+++ linux-4.15.0/include/linux/mmc/sdio_func.h
@@ -159,4 +159,10 @@
extern mmc_pm_flag_t sdio_get_host_pm_caps(struct sdio_func *func);
extern int sdio_set_host_pm_flags(struct sdio_func *func, mmc_pm_flag_t flags);
+extern void sdio_retune_crc_disable(struct sdio_func *func);
+extern void sdio_retune_crc_enable(struct sdio_func *func);
+
+extern void sdio_retune_hold_now(struct sdio_func *func);
+extern void sdio_retune_release(struct sdio_func *func);
+
 #endif /* LINUX_MMC_SDIO_FUNC_H */
--- linux-4.15.0.orig/include/linux/mmc/sdio_ids.h
+++ linux-4.15.0/include/linux/mmc/sdio_ids.h
@@ -35,6 +35,7 @@
#define SDIO_DEVICE_ID_BROADCOM_4335 0x4335
#define SDIO_DEVICE_ID_BROADCOM_43362 0xa962
+define SDIO_DEVICE_ID_BROADCOM_43364 0xa9a4
#define SDIO_DEVICE_ID_BROADCOM_43430 0xa9a6
#define SDIO_DEVICE_ID_BROADCOM_4345 0x4345
#define SDIO_DEVICE_ID_BROADCOM_43455 0xa9bf
@@ -66,6 +67,8 @@
#define SDIO_VENDOR_ID_TI_WL1271 0x4076
+define SDIO_VENDOR_ID_TI_WL1251 0x9066
#define SDIO_VENDOR_ID_STE 0x0020
#define SDIO_DEVICE_ID_STE_CW1200 0x2280
--- linux-4.15.0.orig/include/linux/mmdebug.h
+++ linux-4.15.0/include/linux/mmdebug.h
@@ -37,10 +37,22 @@
BUG();						\}						}
@@ -37,10 +37,22 @@
BUG();
} while (0)
-#define VM_WARN_ON(cond) WARN_ON(cond)
-#define VM_WARN_ON_ONCE(conda) WARN_ON_ONCE(conda)
-#define VM_WARN_ONCE(conda, format...) WARN_ONCE(conda, format)
-#define VM_WARN(conda, format...) WARN(conda, format)
+#define VM_WARN_ON_ONCE_PAGE(conda, page)({
+static bool __section(.data.once) __warned;
+int __ret_warn_once = !!(conda);
+
+if (unlikely(__ret_warn_once && !__warned)) {
+dump_page(page, "VM_WARN_ON_ONCE_PAGE(" __stringify(conda)")");
+__warned = true;
+WARN_ON(1);
+}
+unlikely(__ret_warn_once);
+)
+#define VM_BUG_ON(cond) (void)BUILD_BUG_ON_INVALID(cond)
+#define VM_BUG_ON_ONCE(conda) (void)BUILD_BUG_ON_INVALID(cond)
+#define VM_BUG_ON_PAGE(cond, page) VM_BUG_ON_PAGE(conda, page) VM_BUG_ON(conda)
@@ -48,6 +60,7 @@
+#define VM_WARN_ON_ONCE_PAGE(conda, page) BUILD_BUG_ON_INVALID(conda)
+#define VM_BUG_ON_ONCE_PAGE(conda, page) BUILD_BUG_ON_INVALID(conda)
+#define VM_BUG_ON_PAGE(conda, page) VM_BUG_ON_PAGE(conda, page) VM_BUG_ON(conda)
@endif
--- linux-4.15.0.orig/include/linux/mmzone.h
+++ linux-4.15.0/include/linux/mmzone.h
@@ -636,8 +637,7 @@
 
 NR_VMSCAN_IMMEDIATE,/
 * Prioritise for reclaim when writeback ends */
 NR_DIRTIED,/
 * page dirtyings since bootup */
 NR_WRITTEN,/
 * page writings since bootup */
+NR INDIRECTLY RECLAIMABLE_BYTES, /* measured in bytes */
 NR_VM_NODE_STAT_ITEMS
 ];
@@ -636,8 +637,7 @@
 #ifdef CONFIG_MEMORY_HOTPLUG
 /*
 * Must be held any time you expect node_start_pfn, node_present_pages
- * or node_spanned_pages stay constant. Holding this will also
- * guarantee that any pfn_valid() stays that way.
+ * or node_spanned_pages stay constant.
 */

---
* `pgdat_resize_lock()` and `pgdat_resize_unlock()` are provided to
* manipulate node_size_lock without checking for CONFIG_MEMORY_HOTPLUG.

--- linux-4.15.0.orig/include/linux/mnt_namespace.h
+++ linux-4.15.0/include/linux/mnt_namespace.h
@@ -6,11 +6,14 @@
 struct mnt_namespace;
 struct fs_struct;
 struct user_namespace;
+struct vfsmount;

 extern struct mnt_namespace *copy_mnt_ns(unsigned long, struct mnt_namespace *,
 struct user_namespace *, struct fs_struct *);
 extern void put_mnt_ns(struct mnt_namespace *ns);

+extern int is_current_mnt_ns(struct vfsmount *mnt);
+
 extern const struct file_operations proc_mounts_operations;
 extern const struct file_operations proc_mountinfo_operations;
 extern const struct file_operations proc_mountstats_operations;
--- linux-4.15.0.orig/include/linux/mod_devicetable.h
+++ linux-4.15.0/include/linux/mod_devicetable.h
@@ -293,7 +293,7 @@
 #define INPUT_DEVICE_ID_LED_MAX		0x0f
 #define INPUT_DEVICE_ID_SND_MAX		0x07
 #define INPUT_DEVICE_ID_FF_MAX		0x7f
-#define INPUT_DEVICE_ID_SW_MAX		0x0f
+#define INPUT_DEVICE_ID_SW_MAX		0x10
 #define INPUT_DEVICE_ID_PROP_MAX	0x1f
 #define INPUT_DEVICE_ID_MATCH_BUS	1
@@ -519,9 +519,9 @@
 #define MDIO_NAME_SIZE		32
 #define MDIO_MODULE_PREFIX	"mdio:
-#define MDIO_ID_FMT
+#define MDIO_ID_FMT
 "%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d%d"
 +#define MDIO_ID_ARGS(_id) \
 -(_id)>>31, ((_id)>>30) & 1, ((_id)>>29) & 1, ((_id)>>28) & 1, \
 +(_id)>>31) & 1, ((_id)>>30) & 1, ((_id)>>29) & 1, ((_id)>>28) & 1, \
 ((_id)>>27) & 1, ((_id)>>26) & 1, ((_id)>>25) & 1, ((_id)>>24) & 1, \
 ((_id)>>23) & 1, ((_id)>>22) & 1, ((_id)>>21) & 1, ((_id)>>20) & 1, \
 ((_id)>>19) & 1, ((_id)>>18) & 1, ((_id)>>17) & 1, ((_id)>>16) & 1, \
 @ @ -589,6 +589,10 @ @
 /*
 * MODULE_DEVICE_TABLE expects this struct to be called x86cpu_device_id.
 * Although gcc seems to ignore this error, clang fails without this define.
Note: The ordering of the struct is different from upstream because the static initializers in kernels < 5.7 still use C89 style while upstream has been converted to proper C99 initializers.

#define x86cpu_device_id x86_cpu_id
struct x86_cpu_id {
    __u16 model;
    __u16 feature;/* bit index */
    kernel_ulong_t driver_data;
    __u16 steppings;
};

#define X86_FEATURE_MATCH(x) \
    (@,-597,6,+601,7 @) \
#define X86_VENDOR_ANY 0xffff \
#define X86_FAMILY_ANY 0 \
#define X86_MODEL_ANY 0 \
#define X86_STEPPING_ANY 0 \
#define X86_FEATURE_ANY 0 /* Same as FPU, you can't test for that */

/*
--- linux-4.15.0.orig/include/linux/module.h
+++ linux-4.15.0/include/linux/module.h
@@ -128,13 +128,13 @@
#define module_init(initfn) static inline initcall_t __maybe_unused __inittest(void) { return initfn; } \
-int init_module(void) __attribute__((alias(#initfn))); \
+int init_module(void) __copy(initfn) __attribute__((alias(#initfn))); \

*/ This is only required if you want to be unloadable. */
#define module_exit(exitfn) static inline exitcall_t __maybe_unused __exittest(void) { return exitfn; } \
-void cleanup_module(void) __attribute__((alias(#exitfn))); \
+void cleanup_module(void) __copy(exitfn) __attribute__((alias(#exitfn))); 

@endef

static inline void module_bug_cleanup(struct module *mod) {} #endif /* CONFIG_GENERIC_BUG */

+#ifdef CONFIG_RETPOLINE
+extern bool retpoline_module_ok(bool has_retpoline);
+#else

Open Source Used In 5GasS Edge AC-4 32183
static inline bool retpoline_module_ok(bool has_retpoline)
+
+{  
+  return true;
+}
+#endif

#ifdef CONFIG_MODULE_SIG
static inline bool module_sig_ok(struct module *module)
{
    --- linux-4.15.0.orig/include/linux/mount.h
    +++ linux-4.15.0/include/linux/mount.h
    @ @ -86,6 +86,8 @@

    struct path;
    extern struct vfsmount *clone_private_mount(const struct path *path);
    +extern int __mnt_want_write(struct vfsmount *);
    +extern void __mnt_drop_write(struct vfsmount *);

    struct file_system_type;
    extern struct vfsmount *vfs_kern_mount(struct file_system_type *type,
    --- linux-4.15.0.orig/include/linux/msi.h
    +++ linux-4.15.0/include/linux/msi.h
    @ @ -116,6 +116,14 @@
    list_first_entry(dev_to_msi_list((dev)), struct msi_desc, list)
    #define for_each_msi_entry(desc, dev)\n    list_for_each_entry((desc), dev_to_msi_list((dev)), list)
    +#define for_each_msi_entry_safe(desc, tmp, dev)\n    +#define for_each_msi_vector(desc, __irq, dev)\n    +
    +for_each_msi_entry_safe((desc), (tmp), dev_to_msi_list((dev)), list)
    +#define for_each_msi_vector(desc, __irq, dev)\n    +
    +for_each_msi_entry((desc), (dev))\n    +if (((desc)->irq)\n    +for (__irq = (desc)->irq;\n    +  __irq < (((desc)->irq + (desc)->nvec_used);\n    +  __irq++)

#ifdef CONFIG_PCI_MSI
    #define first_pci_msi_entry(pdev) first_msi_entry(&(pdev)->dev)
    --- linux-4.15.0.orig/include/linux/msi.h
    +++ linux-4.15.0/include/linux/msi.h
    @ @ -142,7 +150,7 @@
    void __pci_write_msi_msg(struct msi_desc *entry, struct msi_msg *msg);

    u32 __pci_msi_desc_mask_irq(struct msi_desc *desc, u32 flag);
    -u32 __pci_msi_desc_mask_irq(struct msi_desc *desc, u32 mask, u32 flag);
    +void __pci_msi_desc_mask_irq(struct msi_desc *desc, u32 mask, u32 flag);
    void pci_msi_mask_irq(struct irq_data *data);
    void pci_msi_unmask_irq(struct irq_data *data);

    --- linux-4.15.0.orig/include/linux/mtd/flashchip.h
    +++ linux-4.15.0/include/linux/mtd/flashchip.h
unsigned int write_suspended:1;
unsigned int erase_suspended:1;
unsigned long in_progress_block_addr;
+unsigned long in_progress_block_mask;

struct mutex mutex;
wait_queue_head_t wq; /* Wait on here when we're waiting for the chip
--- linux-4.15.0.orig/include/linux/mtd/map.h
+++ linux-4.15.0/include/linux/mtd/map.h
@@ -270,75 +270,67 @@
#define INVALIDATE_CACHED_RANGE(map, from, size) \do { if (map->inval_cache) map->inval_cache(map, from, size); } while (0)

-static inline int map_word_equal(struct map_info *map, map_word val1, map_word val2)
-{  
-int i;
   
-for (i = 0; i < map_words(map); i++) {
   -if (val1.x[i] != val2.x[i])
   -return 0;
   -}  
   -return 1;
   -}

-static inline map_word map_word_and(struct map_info *map, map_word val1, map_word val2)
-{  
-map_word r;
-int i;
   
-for (i = 0; i < map_words(map); i++)
-r.x[i] = val1.x[i] & val2.x[i];
   -
   -return r;
   -}

-static inline map_word map_word_clr(struct map_info *map, map_word val1, map_word val2)
-{  
-map_word r;
-int i;
   
-for (i = 0; i < map_words(map); i++)
-r.x[i] = val1.x[i] & ~val2.x[i];
   -
   -return r;
   -}
- static inline map_word map_word_or(struct map_info *map, map_word val1, map_word val2)
  - {
    - map_word r;
    - int i;
    -
    - for (i = 0; i < map_words(map); i++)
      - r.x[i] = val1.x[i] | val2.x[i];
    - return r;
  - }

- static inline int map_word_andequal(struct map_info *map, map_word val1, map_word val2, map_word val3)
  - {
    - int i;
    -
    - for (i = 0; i < map_words(map); i++) {
      - if ((val1.x[i] & val2.x[i]) != val3.x[i])
        - return 0;
      - }
    - return 1;
  - }

- static inline int map_word_bitsset(struct map_info *map, map_word val1, map_word val2)
  - {
    - int i;
    -
    - for (i = 0; i < map_words(map); i++) {
      - if (val1.x[i] & val2.x[i])
        - return 1;
    - } return 0;
  - }

+ #define map_word_equal(map, val1, val2)
+ ({
+ int i, ret = 1;
+ for (i = 0; i < map_words(map); i++) {
+ if ((val1).x[i] != (val2).x[i]) {
+ ret = 0;
+ break;
+ }
+ }
+ return ret;
+ })

+ #define map_word_and(map, val1, val2)
+ ({
+ int i, ret = 1;
+ for (i = 0; i < map_words(map); i++) {
+ if ((val1).x[i] & (val2).x[i]) {
+ ret = 0;
+ break;
+ }
+ }
+ return ret;
+ })
+map_word r;
+int i;
+for (i = 0; i < map_words(map); i++)
+r.x[i] = (val1).x[i] & (val2).x[i];
+r;
+
+#define map_word_clr(map, val1, val2)
+({
+map_word r;
+int i;
+for (i = 0; i < map_words(map); i++)
+r.x[i] = (val1).x[i] & ~(val2).x[i];
+r;
+
+
+#define map_word_or(map, val1, val2)
+({
+map_word r;
+int i;
+for (i = 0; i < map_words(map); i++)
+r.x[i] = (val1).x[i] | (val2).x[i];
+r;
+
+
+#define map_word_andequal(map, val1, val2, val3)
+({
+int i, ret = 1;
+for (i = 0; i < map_words(map); i++) {
+if (((val1).x[i] & (val2).x[i]) != (val3).x[i]) {
+ret = 0;
+break;
+
+
+#define map_word_bitsset(map, val1, val2)
+({
+int i, ret = 0;
+for (i = 0; i < map_words(map); i++) {
+if (((val1).x[i] & (val2).x[i]) != (val3).x[i]) {
+ret = 1;
+break;
+
+
+if (((val1).x[i] & (val2).x[i]) == (val3).x[i]) {
+ret = 0;
+break;
+

static inline map_word map_word_load(struct map_info *map, const void *ptr) {
    return dev_of_node(&mtd->dev);
}

static inline int mtd_oobavail(struct mtd_info *mtd, struct mtd_oob_ops *ops) {
    return ops->mode == MTD_OPS_AUTO_OOB ? mtd->oobavail : mtd->oobsize;
}

if (!dsr & DSR_AVAILABLE))
    printk(KERN_NOTICE"DSR.15: (0) Device not Available\n");
    -if (prog_status & 0x03)
    +if ((prog_status & 0x03) == 0x03)
    printk(KERN_NOTICE"DSR.9,8: (11) Attempt to program invalid "
        "half with 41h command \n");
else if (prog_status & 0x02)
    printk(KERN_NOTICE"DSR.15: (0) Device not Available\n");

+void nand_release(struct nand_chip *chip);
/* Unregister the MTD device and free resources held by the NAND device */
-void nand_release(struct mtd_info *mtd);
+void nand_release(struct nand_chip *chip);
/* Internal helper for board drivers which need to override command function */
void nand_wait_ready(struct mtd_info *mtd);
#define NAND_CI_CELLTYPE_MSK	0x0C
#define NAND_CI_CELLTYPE_SHIFT	2
#include <linux/mtd/flashchip.h>
#include <linux/mtd/bbm.h>
/* Keep gcc happy */
-struct nand_chip;
-
/* ONFI features */
#define ONFI_FEATURE_16_BIT_BUS (1 << 0)
#define ONFI_FEATURE_EXT_PARAM_PAGE (1 << 7)
--- linux-4.15.0.orig/include/linux/mutex.h
+++ linux-4.15.0/include/linux/mutex.h
@@ -183,7 +183,7 @@
 # define mutex_lock_interruptible_nested(lock, subclass) mutex_lock_interruptible(lock)
 # define mutex_lock_killable_nested(lock, subclass) mutex_lock_killable(lock)
 # define mutex_lock_nest_lock(lock, nest_lock) mutex_lock(lock)
-# define mutex_lock_io_nested(lock, subclass) mutex_lock(lock)
+# define mutex_lock_io_nested(lock, subclass) mutex_lock_io(lock)
#endif

/*
--- linux-4.15.0.orig/include/linux/net.h
+++ linux-4.15.0/include/linux/net.h
@@ -83,6 +83,12 @@
 #endif /* ARCH_HAS_SOCKET_TYPES */
 */

+/**
+ * enum sock_shutdown_cmd - Shutdown types
+ * @SHUT_RD: shutdown receptions
+ * @SHUT_WR: shutdown transmissions
+ * @SHUT_RDWR: shutdown receptions/transmissions
+ */
enum sock_shutdown_cmd {
  SHUT_RD,
  SHUT_WR,
--- linux-4.15.0.orig/include/linux/netdev_features.h
+++ linux-4.15.0/include/linux/netdev_features.h
@@ -11,6 +11,8 @@
#define _LINUX_NETDEV_FEATURES_H
#include <linux/types.h>
#include <linux/bitops.h>
#include <asm/byteorder.h>

typedef u64 netdev_features_t;

@@ -143,8 +145,26 @@
#define NETIF_F_HW_ESP_TX_CSUM __NETIF_F(HW_ESP_TX_CSUM)
#define NETIF_F_RX_UDP_TUNNEL_PORT __NETIF_F(RX_UDP_TUNNEL_PORT)

-#define for_each_netdev_feature(mask_addr, bit)\
# Static inline function to find the next feature with the highest number of the range of start till 0.

```c
static inline int find_next_netdev_feature(u64 feature, unsigned long start) {
    /* like BITMAP_LAST_WORD_MASK() for u64
     * this sets the most significant 64 - start to 0.
     */
    feature &= ~0ULL >> (-start & ((sizeof(feature) * 8) - 1));
    return fls64(feature) - 1;
}
```

# Macro to iterate over netdev features

```c
#define for_each_netdev_feature(mask_addr, bit) \  	for ((bit) = find_next_netdev_feature((mask_addr), \  					(NETDEV_FEATURE_COUNT); \  					(bit) >= 0; \  					(bit) = find_next_netdev_feature((mask_addr), (bit) - 1))
```

---

/* Features valid for ethtool to change */
/* = all defined minus driver/device-class-related */
--- linux-4.15.0.orig/include/linux/netdevice.h
+++ linux-4.15.0/include/linux/netdevice.h
@@ -272,6 +272,7 @@
const struct net_device *dev,
const unsigned char *haddr);
bool (*validate)(const char *ll_header, unsigned int len);
+__be16 (*parse_protocol)(const struct sk_buff *skb);
};

/* These flag bits are private to the generic network queueing */
@@ -1380,6 +1381,7 @@
 * @IFF_PHONY_HEADROOM: the headroom value is controlled by an external
 * entity (i.e. the master device for bridged veth)
 * @IFF_MACSEC: device is a MACsec device
+: @IFF_L3MDEV_RX_HANDLER: only invoke the rx handler of L3 master device */
enum netdev_priv_flags {
IFF_802_1Q_VLAN		= 1<<0,
IFF_RXFH_CONFIGURED	= 1<<25,
IFF_PHONY_HEADROOM	= 1<<26,
IFF_MACSEC			= 1<<27,
+IFF_L3MDEV_RX_HANDLER		= 1<<28,
};
#define IFF_802_1Q_VLAN
#define IFF_TEAM
#define IFF_RXFH_CONFIGURED
#define IFF_MACSEC
+#define IFF_L3MDEV_RX_HANDLER

/**
 * struct net_device - The DEVICE structure.
 * @perm_addr: Permanent hw address
 * @addr_assign_type: Hw address assignment type
 * @addr_len: Hardware address length
 + @upper_level: Maximum depth level of upper devices.
 + @lower_level: Maximum depth level of lower devices.
 * @neigh_priv_len: Used in neigh_alloc()
 * @dev_id: Used to differentiate devices that share
 * the same link layer address
 * @ -1669,8 +1675,6 @@
 unsigned longbase_addr;

 int irq;

-atomic_t carrier_changes;
-
/
* Some hardware also needs these fields (state, dev_list,
 * napi_list, unreg_list, close_list) but they are not
 * @ -1708,6 +1712,10 @@
 atomic_long_t tx_dropped;
 atomic_long_t trx_nohandler;

+/* Stats to monitor link on/off, flapping */
+atomic_t carrier_up_count;
+atomic_t carrier_down_count;
+
ifdef CONFIG_WIRELESS_EXT
const struct iw_handler_def *wireless_handlers;
struct iw_public_data *wireless_data;
 * @ -1742,6 +1750,11 @@
 unsigned char if_port;
 unsigned char dma;

+/* Note: dev->mtu is often read without holding a lock.
 + * Writers usually hold RTNL.
 + * It is recommended to use READ_ONCE() to annotate the reads,
 + * and to use WRITE_ONCE() to annotate the writes.
 + */
unsigned int mtu;
unsigned int min_mtu;
unsigned int max_mtu;

@@ -1756,6 +1769,8 @@
unsigned char perm_addr[MAX_ADDR_LEN];
unsigned char addr_assign_type;
unsigned char addr_len;
+unsigned char upper_level;
+unsigned char lower_level;
unsigned short neigh_priv_len;
unsigned short dev_id;
unsigned short dev_port;
@@ -2335,6 +2350,13 @@
struct netlink_ext_ack*extack;
};

+struct netdev_notifier_info_ext {
+ struct netdev_notifier_info info; /* must be first */
+ union {
+ u32 mtu;
+ } ext;
+};
+
+ struct netdev_notifier_change_info {
+ struct netdev_notifier_info info; /* must be first */
+ unsigned int flags_changed;
+ @ @ -2469,7 +2491,7 @@
+ int init_dummy_netdev(struct net_device *dev);

DECLARE_PER_CPU(int, xmit_recursion);
#define XMIT_RECURSION_LIMIT 10
+#define XMIT_RECURSION_LIMIT 8

static inline int dev_recursion_level(void)
{
@@ -2703,11 +2725,31 @@
 if (PTR_ERR(pp) != -EINPROGRESS)
 NAPI_GRO_CB(skb)->flush |= flush;
 }
+static inline void skb_gro_flush_final_remcsum(struct sk_buff *skb,
 + struct sk_buff **pp,
 + int flush,
 + struct gro_remcsum *grc)
 +{
 +if (PTR_ERR(pp) != -EINPROGRESS) {
 + NAPI_GRO_CB(skb)->flush |= flush;
 + skb_gro_remcsum_cleanup(skb, grc);
 + skb->remcsun_offload = 0;
static inline void skb_gro_flush_final(struct sk_buff *skb, struct sk_buff **pp, int flush)
{
    NAPI_GRO_CB(skb)->flush |= flush;
}

static inline void skb_gro_flush_final_remcsum(struct sk_buff *skb, struct sk_buff **pp,
                                             int flush, struct gro_remcsum *grc)
{
    NAPI_GRO_CB(skb)->flush |= flush;
    skb_gro_remcsum_cleanup(skb, grc);
    skb->remcsum_offload = 0;
}
#endif

static inline int dev_hard_header(struct sk_buff *skb, struct net_device *dev,
@@ -2731,6 +2773,15 @@
return dev->header_ops->parse(skb, haddr);
}

+static inline __be16 dev_parse_header_protocol(const struct sk_buff *skb)
+{
    const struct net_device *dev = skb->dev;
    
    if (!dev->header_ops || !dev->header_ops->parse_protocol)
+        return 0;
    +return dev->header_ops->parse_protocol(skb);
+}
+ /* ll_header must have at least hard_header_len allocated */
+static inline bool dev_validate_header(const struct net_device *dev,
    char *ll_header, int len)
@@ -3315,6 +3366,7 @@
return NET_RX_DROP;
}

-skb_scrub_packet(skb, true);
+skb_scrub_packet(skb, !net_eq(dev_net(dev), dev_net(skb->dev)));
skb->priority = 0;
return 0;
}
@@ -3529,7 +3581,7 @@
if (debug_value == 0)/* no output */
return 0;
/* set low N bits */
-return (1 << debug_value) - 1;
+return (1U << debug_value) - 1;
}

static inline void __netif_tx_lock(struct netdev_queue *txq, int cpu)
@@ -3675,6 +3727,7 @@
local_bh_disable();
cpu = smp_processor_id();
+spin_lock(&dev->tx_global_lock);
for (i = 0; i < dev->num_tx_queues; i++) {
 struct netdev_queue *txq = netdev_get_tx_queue(dev, i);

@@ -3682,6 +3735,7 @@
netif_tx_stop_queue(txq);
__netif_tx_unlock(txq);
} 
+spin_unlock(&dev->tx_global_lock);
local_bh_enable();
}

@@ -4218,6 +4272,11 @@
return dev->priv_flags & IFF_SUPP_NOFCS;
}

+static inline bool netif_has_l3_rx_handler(const struct net_device *dev)
+{
+return dev->priv_flags & IFF_L3MDEV_RX_HANDLER;
+}
+
static inline bool netif_is_l3_master(const struct net_device *dev)
{
return dev->priv_flags & IFF_L3MDEV_MASTER;
@@ -4402,8 +4461,8 @@
WARN(1, "netdevice: %s\n" format, netdev_name(dev), ##args)

#define netdev_WARN_ONCE(dev, condition, format, arg...)
-WARN_ONCE(1, "netdevice: %s\n" format, netdev_name(dev))
+#define netdev_WARN_ONCE(dev, format, args...)

---

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WARN_ONCE(1, "netdevice: %s%s\n" format, netdev_name(dev),
netdev_reg_state(dev), ##args)

/* netif printk helpers, similar to netdev_printk */
--- linux-4.15.0.orig/include/linux/netfilter/ipset/ip_set.h
+++ linux-4.15.0/include/linux/netfilter/ipset/ip_set.h
@@ -312,7 +312,7 @@
 extern ip_set_id_t ip_set_get_byname(struct net *net,
 const char *name, struct ip_set **set);
 extern void ip_set_put_byindex(struct net *net, ip_set_id_t index);
-extern const char *ip_set_name_byindex(struct net *net, ip_set_id_t index);
+extern void ip_set_name_byindex(struct net *net, ip_set_id_t index, char *name);
 extern ip_set_id_t ip_set_nfnl_get_byindex(struct net *net, ip_set_id_t index);
 extern void ip_set_nfnl_put(struct net *net, ip_set_id_t index);

@@ -445,13 +445,6 @@
 } sizeof(*addr));
 }

-/* Calculate the bytes required to store the inclusive range of a-b */
-static inline int
-bitmap_bytes(u32 a, u32 b)
-{
-\treturn 4 * (((b - a + 8) / 8) + 3) / 4);
-}
-
#include <linux/netfilter/ipset/ip_set_timeout.h>
#include <linux/netfilter/ipset/ip_set_comment.h>
#include <linux/netfilter/ipset/ip_set_counter.h>
--- linux-4.15.0.orig/include/linux/netfilter/ipset/ip_set_timeout.h
+++ linux-4.15.0/include/linux/netfilter/ipset/ip_set_timeout.h
@@ -65,8 +65,14 @@

-/* Used only when dumping a set, protected by rcu_read_lock_bh() */
+/* Used only when dumping a set, protected by rcu_read_lock() */
 static inline int
 ip_set_put_comment(struct sk_buff *skb, const struct ip_set_comment *comment)
 {
-\tstruct ip_set_comment_rcu *c = rcu_dereference_bh(comment->c);
+\tstruct ip_set_comment_rcu *c = rcu_dereference(comment->c);
+\tstruct ip_set_comment_rcu *c = rcu_dereference(comment->c);

 if (!c)
 return 0;
--- linux-4.15.0.orig/include/linux/netfilter/ipset/ip_set_timeout.h
+++ linux-4.15.0/include/linux/netfilter/ipset/ip_set_timeout.h
@@ -65,8 +65,14 @@
static inline u32
ip_set_timeout_get(const unsigned long *timeout)
{
    return *timeout == IPSET_ELEM_PERMANENT ? 0 :
            jiffies_to_msecs(*timeout - jiffies)/MSEC_PER_SEC;
+u32 t;
+
+if (*timeout == IPSET_ELEM_PERMANENT)
    return 0;
+
+t = jiffies_to_msecs(*timeout - jiffies)/MSEC_PER_SEC;
+/* Zero value in userspace means no timeout */
+return t == 0 ? 1 : t;
}
#endif /* __KERNEL__ */
--- linux-4.15.0.orig/include/linux/netfilter/nf_conntrack_pptp.h
+++ linux-4.15.0/include/linux/netfilter/nf_conntrack_pptp.h
@@ -5,7 +5,7 @@
#include <linux/netfilter/nf_conntrack_common.h>

-extern const char *const pptp_msg_name[];
+const char *pptp_msg_name(u_int16_t msg);

/* state of the control session */
enum pptp_ctrlsess_state {
    --- linux-4.15.0.orig/include/linux/netfilter/nf_conntrack_sctp.h
    +++ linux-4.15.0/include/linux/netfilter/nf_conntrack_sctp.h
    @@ -9,6 +9,8 @@
    enum sctp_conntrack state;

    __be32 vtag[IP_CT_DIR_MAX];
+u8 last_dir;
+u8 flags;
};

#endif /* _NF_CONNTRACK_SCTP_H */
--- linux-4.15.0.orig/include/linux/netfilter/nfnetworklink.h
+++ linux-4.15.0/include/linux/netfilter/nfnetworklink.h
@@ -41,8 +41,7 @@
    int nfnetlink_send(struct skb *skb, struct net *net, u32 portid,
         unsigned int group, int echo, gfp_t flags);
    int nfnetlink_set_err(struct net *net, u32 portid, u32 group, int error);
-int nfnetlink_unicast(struct skb *skb, struct net *net, u32 portid,
+int nfnetlink_unicast(struct skb *skb, struct net *net, u32 portid);
static inline u16 nfnl_msg_type(u8 subsys, u8 msg_type)
{
    --- linux-4.15.0.orig/include/linux/netfilter/x_tables.h
    +++ linux-4.15.0/include/linux/netfilter/x_tables.h
        @ @ -285,6 +285,8 @@
    bool xt_find_jump_offset(const unsigned int *offsets,
        unsigned int target, unsigned int size);

    +int xt_check_proc_name(const char *name, unsigned int size);
    +int xt_check_match(struct xt_matchchk_param *, unsigned int size, u_int8_t proto,
        bool inv_proto);
    int xt_check_target(struct xt_tgchk_param *, unsigned int size, u_int8_t proto,
        @ @ -299,6 +301,7 @@
            void *xt_copy_counters_from_user(const void __user *user, unsigned int len,
            struct xt_counters_info *info, bool compat);
            +struct xt_counters *xt_counters_alloc(unsigned int counters);
            struct xt_table *xt_register_table(struct net *net,
                const struct xt_table *table,
            @ @ -370,7 +373,7 @@
            * since addend is most likely 1
            */
            __this_cpu_add(xt_recseq.sequence, addend);
            -smp_wmb();
            +smp_mb();

            return addend;
        } @ @ -505,7 +508,7 @@

        int xt_compat_add_offset(u_int8_t af, unsigned int offset, int delta);
        void xt_compat_flush_offsets(u_int8_t af);
        -void xt_compat_init_offsets(u_int8_t af, unsigned int number);
        +int xt_compat_init_offsets(u8 af, unsigned int number);
        int xt_compat_calc_jump(u_int8_t af, unsigned int offset);

        int xt_compat_match_offset(const struct xt_match *match);
        --- linux-4.15.0.orig/include/linux/nfs4.h
        +++ linux-4.15.0/include/linux/nfs4.h
            @ @ -457,7 +457,12 @@

        #define NFS4_DEBUG 1

        -/* Index of predefined Linux client operations */
        +/*
        + * Index of predefined Linux client operations

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To ensure that /proc/net/rpc/nfs remains correctly ordered, please append only to this enum when adding new client operations.

```c
enum {
    NFSPROC4_CLNT_NULL = 0, /**< Unused */
    NFSPROC4_CLNT_ACCESS,
    NFSPROC4_CLNT_GETATTR,
    NFSPROC4_CLNT_LOOKUP,
    NFSPROC4_CLNT_LOOKUPP,
    NFSPROC4_CLNT_LOOKUP_ROOT,
    NFSPROC4_CLNT_REMOVE,
    NFSPROC4_CLNT_RENAME,
    NFSPROC4_CLNT_SECINFO,
    NFSPROC4_CLNT_FSID_PRESENT,

    /* nfs41 */
    NFSPROC4_CLNT_EXCHANGE_ID,
    NFSPROC4_CLNT_CREATE_SESSION,
    NFSPROC4_CLNT_DESTROY_SESSION,
    NFSPROC4_CLNT_BIND_CONN_TO_SESSION,
    NFSPROC4_CLNT_DESTROY_CLIENTID,

    /* nfs42 */
    NFSPROC4_CLNT_SEEK,
    NFSPROC4_CLNT_ALLOCATE,
    NFSPROC4_CLNT_FREEALLOCATE,
    NFSPROC4_CLNT_LAYOUTSTATS,
    NFSPROC4_CLNT_CLONE,
    NFSPROC4_CLNT_COPY,
    NFSPROC4_CLNT_LOOKUPP,
};
```

/* nfs41 types */
--- linux-4.15.0.orig/include/linux/nfs_fs.h
+++ linux-4.15.0/include/linux/nfs_fs.h
@@ -78,6 +78,7 @@
 #define NFS_CONTEXT_RESEND_WRITES(1)
 #define NFS_CONTEXT_BAD(2)
 #define NFS_CONTEXT_UNLOCK(3)
+#define NFS_CONTEXT_FILE_OPEN(4)
 int error;

struct list_head list;
--- linux-4.15.0.orig/include/linux/nfs_page.h
+++ linux-4.15.0/include/linux/nfs_page.h
@@ -142,6 +142,8 @@
 extern int nfs_page_group_lock(struct nfs_page *);
 extern void nfs_page_group_unlock(struct nfs_page *);
 extern bool nfs_page_group_sync_on_bit(struct nfs_page *, unsigned int);
+extern int nfs_page_set_headlock(struct nfs_page *);
+extern void nfs_page_clear_headlock(struct nfs_page *);
 extern bool nfs_async_iocounter_wait(struct rpc_task *, struct nfs_lock_context *);

 /*
 @@ -164,6 +166,16 @@
 list_add_tail(&req->wb_list, head);
 }

+/**
+ * nfs_list_move_request - Move a request to a new list
+ * @req: request
+ * @head: head of list into which to insert the request.
+ */
+static inline void
+nfs_list_move_request(struct nfs_page *req, struct list_head *head)
+{
+list_move_tail(&req->wb_list, head);
+}

 /**
 * nfs_list_remove_request - Remove a request from its wb_list
 --- linux-4.15.0.orig/include/linux/nfs_xdr.h
+++ linux-4.15.0/include/linux/nfs_xdr.h
@@ -1520,7 +1520,7 @@
};

 struct nfs_pgio_completion_ops {
-void(*error_cleanup)(struct list_head *head);
+void(*error_cleanup)(struct list_head *head, int);
 void(*init_hdr)(struct nfs_pgio_header *hdr);
 void(*completion)(struct nfs_pgio_header *hdr);
 void(*reschedule_io)(struct nfs_pgio_header *hdr);
--- linux-4.15.0.orig/include/linux/nmi.h
+++ linux-4.15.0/include/linux/nmi.h
@@ -113,6 +113,8 @@
 void watchdog_nmi_stop(void);
 void watchdog_nmi_start(void);
 int watchdog_nmi_probe(void);
+int watchdog_nmi_enable(unsigned int cpu);
+void watchdog_nmi_disable(unsigned int cpu);
/**
 * touch_nmi_watchdog - restart NMI watchdog timeout.
--- linux-4.15.0.orig/include/linux/nospec.h
+++ linux-4.15.0/include/linux/nospec.h
@@ -0,0 +1,68 @@
+// SPDX-License-Identifier: GPL-2.0
+// Copyright(c) 2018 Linus Torvalds. All rights reserved.
+// Copyright(c) 2018 Alexei Starovoitov. All rights reserved.
+// Copyright(c) 2018 Intel Corporation. All rights reserved.
+
+#ifndef _LINUX_NOSPEC_H
+#define _LINUX_NOSPEC_H
+#include <asm/barrier.h>
+
+struct task_struct;
+
+/**
+ * array_index_mask_nospec() - generate a ~0 mask when index < size, 0 otherwise
+ * @index: array element index
+ * @size: number of elements in array
+ *
+ * When @index is out of bounds (@index >= @size), the sign bit will be
+ * set. Extend the sign bit to all bits and invert, giving a result of
+ * zero for an out of bounds index, or ~0 if within bounds [0, @size).
+ */
+#ifndef array_index_mask_nospec
+static inline unsigned long array_index_mask_nospec(unsigned long index,
+int size)
+{
+    /* Always calculate and emit the mask even if the compiler
+       thinks the mask is not needed. The compiler does not take
+       into account the value of @index under speculation.
+    */
+OPTIMIZER_HIDE_VAR(index);
+    return ~(long)(index | (size - 1UL - index)) >> (BITS_PER_LONG - 1);
+}
+#endif
+
+/**
+ * array_index_nospec - sanitize an array index after a bounds check
+ *
+ * For a code sequence like:
+ *
+ * if (index < size) {
+ *     index = array_index_nospec(index, size);
+ *     val = array[index];
+ */
+*/
+ *         } 
+ *         }     } 
+ * ...if the CPU speculates past the bounds check then 
+ * array_index_nospec() will clamp the index within the range of [0, 
+ * size). 
+ */
+#define array_index_nospec(index, size)
+(\ 
+typeof(index) _i = (index);\ 
+typeof(size) _s = (size);\ 
+unsigned long _mask = array_index_mask_nospec(_i, _s);\ 
+\ 
+BUILD_BUG_ON(sizeof(_i) > sizeof(long));\ 
+BUILD_BUG_ON(sizeof(_s) > sizeof(long));\ 
+\ 
+(typeof(_i)) (_i & _mask);\ 
+}) 
+*/ Speculation control prctl */
+int arch_prctl_spec_ctrl_get(struct task_struct *task, unsigned long which);
+int arch_prctl_spec_ctrl_set(struct task_struct *task, unsigned long which,
+    unsigned long ctrl);
+*/ Speculation control for seccomp enforced mitigation */
+void arch_seccomp_spec_mitigate(struct task_struct *task);
+
+#endif /* _LINUX_NOSPEC_H */
--- linux-4.15.0.orig/include/linux/of.h
+++ linux-4.15.0/include/linux/of.h
@@ -142,11 +142,16 @@
 extern struct device_node *of_stdout;
 extern raw_spinlock_t devtree_lock;

-/* flag descriptions (need to be visible even when !CONFIG_OF) */
-#define OF_DYNAMIC 1 /* node and properties were allocated via kmalloc */
-#define OF_DETACHED 2 /* node has been detached from the device tree */
-#define OF_POPULATED 3 /* device already created */
-#define OF_POPULATED_BUS 4 /* of_platform_populate recursed to children of this node */
+/*
 * struct device_node flag descriptions 
 * (need to be visible even when !CONFIG_OF)
 +*/
+#define OF_DYNAMIC 1 /* (and properties) allocated via kmalloc */
+#define OF_DETACHED 2 /* detached from the device tree */
+#define OF_POPULATED 3 /* device already created */
+#define OF_POPULATED_BUS 4 /* platform bus created for children */
+#define OF_OVERLAY 5 /* allocated for an overlay */
+#define OF_OVERLAY_FREE_CSET 6 /* in overlay cset being freed */
#define OF_BAD_ADDR	((u64)-1)

@@ -235,8 +240,8 @@
static inline u64 of_read_number(const __be32 *cell, int size)
{
    u64 r = 0;
-    while (size--)
-        r = (r << 32) | be32_to_cpu(*(cell++));
+    for (; size--; cell++)
+        r = (r << 32) | be32_to_cpu(*cell);
    return r;
}

@@ -294,6 +299,8 @@
extern struct device_node *of_get_next_available_child(
    const struct device_node *node, struct device_node *prev);

+extern struct device_node *of_get_compatible_child(const struct device_node *parent,
+    const char *compatible);
extern struct device_node *of_get_child_by_name(const struct device_node *node,
    const char *name);

@@ -631,6 +638,12 @@
return false;
}

+static inline struct device_node *of_get_compatible_child(const struct device_node *parent,
+    const char *compatible)
+{
+    return NULL;
+}
+
static inline struct device_node *of_get_child_by_name(
    const struct device_node *node,
    const char *name)
@@ -927,6 +940,12 @@
#define of_node_cmp(s1, s2)strcasecmp((s1), (s2))
#endif

+static inline int of_prop_val_eq(struct property *p1, struct property *p2)
+{
+    return p1->length == p2->length &&
+           !memcmp(p1->value, p2->value, (size_t)p1->length);
+}
+
#if defined(CONFIG_OF) && defined(CONFIG_NUMA)
extern int of_node_to_nid(struct device_node *np);
#else

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```c
#define _OF_DECLARE(table, name, compat, fn, fn_type)			
static const struct of_device_id __of_table_##name		
__used __section(__##table##_of_table)			
+ __aligned(__alignof__(struct of_device_id))
				
= { .compatible = compat,
				.data = (fn == (fn_type)NULL) ? fn : fn  }
#endif
```

--- linux-4.15.0.orig/include/linux/oom.h
+++ linux-4.15.0/include/linux/oom.h
@@ -45,6 +45,7 @@
{
}
return 0;
}

+void __oom_reap_task_mm(struct mm_struct *mm);
+
extern unsigned long oom_badness(struct task_struct *p,
struct mem_cgroup *memcg, const nodemask_t *nodemask,
unsigned long totalpages);
--- linux-4.15.0.orig/include/linux/overflow.h
+++ linux-4.15.0/include/linux/overflow.h
@@ -0,0 +1,310 @@
/* SPDX-License-Identifier: GPL-2.0 OR MIT */
+#ifndef __LINUX_OVERFLOW_H
+#define __LINUX_OVERFLOW_H
#
+/* In the fallback code below, we need to compute the minimum and
+ * maximum values representable in a given type. These macros may also
+ * be useful elsewhere, so we provide them outside the
+ * COMPILER_HAS_GENERIC_BUILTIN_OVERFLOW block.
+ * It would seem more obvious to do something like
+ *
+ * #define type_min(T) (T)(is_signed_type(T) ? (T)1 << (8*sizeof(T)-1) : 0)
+ * #define type_max(T) (T)(is_signed_type(T) ? ((T)1 << (8*sizeof(T)-1)) - 1 : ~(T)0)
+ */
```
+ * Unfortunately, the middle expressions, strictly speaking, have
+ * undefined behaviour, and at least some versions of gcc warn about
+ * the type_max expression (but not if -fsanitize=undefined is in
+ * effect; in that case, the warning is deferred to runtime...).
+ *
+ * The slightly excessive casting in type_min is to make sure the
+ * macros also produce sensible values for the exotic type _Bool. [The
+ * overflow checkers only almost work for _Bool, but that's
+ * a-feature-not-a-bug, since people shouldn't be doing arithmetic on
+ * _Bools. Besides, the gcc builtins don't allow _Bool* as third
+ * argument.]
+ *
+ * Idea stolen from
+ * https://mail-index.netbsd.org/tech-misc/2007/02/05/0000.html -
+ * credit to Christian Biere.
+ */
+#define is_signed_type(type)       (((type)(-1)) < (type)1)
+#define __type_half_max(type) ((type)1 << (8*sizeof(type) - 1 - is_signed_type(type)))
+#define type_max(T) ((T)((__type_half_max(T) - 1) + __type_half_max(T)))
+#define type_min(T) ((T)((T)-type_max(T)-(T)1))

#ifdef COMPILER_HAS_GENERIC_BUILTIN_OVERFLOW
+/*
 + * For simplicity and code hygiene, the fallback code below insists on
 + * a, b and *d having the same type (similar to the min() and max() 
 + * macros), whereas gcc's type-generic overflow checkers accept
 + * different types. Hence we don't just make check_add_overflow an 
 + * alias for __builtin_add_overflow, but add type checks similar to 
 + * below.
 + */
+#define check_add_overflow(a, b, d) ({
+typeof(a) __a = (a);
+typeof(b) __b = (b);
+typeof(d) __d = (d);
+(void) (&__a == &__b);
+(void) (&__a == __d);
+__builtin_add_overflow(__a, __b, __d);
+})
+#define check_sub_overflow(a, b, d) ({
+typeof(a) __a = (a);
+typeof(b) __b = (b);
+typeof(d) __d = (d);
+(void) (&__a == &__b);
+(void) (&__a == __d);
+__builtin_sub_overflow(__a, __b, __d);
+})
+ #define check_mul_overflow(a, b, d) ({
+    typeof(a) __a = (a);
+    typeof(b) __b = (b);
+    typeof(d) __d = (d);
+    (void) (&__a == &__b);
+    (void) (&__a == __d);
+    __builtin_mul_overflow(__a, __b, __d);
+ })
+
+ #else
+
+ /* Checking for unsigned overflow is relatively easy without causing UB. */
+ #define __unsigned_add_overflow(a, b, d) ({
+    typeof(a) __a = (a);
+    typeof(b) __b = (b);
+    typeof(d) __d = (d);
+    (void) (&__a == &__b);
+    (void) (&__a == __d);
+    *__d = __a + __b;
+    *__d < __a;
+ })
+ #define __unsigned_sub_overflow(a, b, d) ({
+    typeof(a) __a = (a);
+    typeof(b) __b = (b);
+    typeof(d) __d = (d);
+    (void) (&__a == &__b);
+    (void) (&__a == __d);
+    *__d = __a - __b;
+    __a < __b;
+ })
+ /*
+ * If one of a or b is a compile-time constant, this avoids a division.
+ */
+ #define __unsigned_mul_overflow(a, b, d) ({
+    typeof(a) __a = (a);
+    typeof(b) __b = (b);
+    typeof(d) __d = (d);
+    (void) (&__a == &__b);
+    (void) (&__a == __d);
+    *__d = __a * __b;
+    __builtin_constant_p(__b) ?
+      __b > 0 && __a > type_max(typeof(__a)) / __b : 
+      __a > 0 && __b > type_max(typeof(__b)) / __a;
+ })
+ /*
For signed types, detecting overflow is much harder, especially if we want to avoid UB. But the interface of these macros is such that we must provide a result in *d, and in fact we must produce the result promised by gcc’s builtins, which is simply the possibly wrapped-around value. Fortunately, we can just formally do the operations in the widest relevant unsigned type (u64) and then truncate the result - gcc is smart enough to generate the same code with and without the (u64) casts.

Adding two signed integers can overflow only if they have the same sign, and overflow has happened iff the result has the opposite sign.

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+ * (a < -1 && (b > MIN/a || b < MAX/a))
+ * (a == -1 && b == MIN)
+ *
+ * The redundant casts of -1 are to silence an annoying -Wtype-limits
+ * (included in -Wextra) warning: When the type is u8 or u16, the
+ * __b_c_e in check_mul_overflow obviously selects
+ * __unsigned_mul_overflow, but unfortunately gcc still parses this
+ * code and warns about the limited range of __b.
+ */
+
+#define __signed_mul_overflow(a, b, d) ({
+typeof(a) __a = (a);
+typeof(b) __b = (b);
+typeof(d) __d = (d);
+typeof(a) __tmax = type_max(typeof(a));
+typeof(a) __tmin = type_min(typeof(a));
+(void) (&__a == &__b);
+(void) (&__a == __d);
+*__d = (u64)__a * (u64)__b;
+(__b > 0   && (__a > __tmax/__b || __a < __tmin/__b)) ||
+(__b < (typeof(__b))-1  && (__a > __tmin/__b || __a < __tmax/__b)) || 
+(__b == (typeof(__b))-1 && __a == __tmin);
+})
+
+
+#define check_add_overflow(a, b, d)
+__builtin_choose_expr(is_signed_type(typeof(a)),
+__signed_add_overflow(a, b, d),
+__unsigned_add_overflow(a, b, d))
+
+#define check_sub_overflow(a, b, d)
+__builtin_choose_expr(is_signed_type(typeof(a)),
+__signed_sub_overflow(a, b, d),
+__unsigned_sub_overflow(a, b, d))
+
+#define check_mul_overflow(a, b, d)
+__builtin_choose_expr(is_signed_type(typeof(a)),
+__signed_mul_overflow(a, b, d),
+__unsigned_mul_overflow(a, b, d))
+
+
+endif /* COMPILER_HAS_GENERIC_BUILTIN_OVERFLOW */
+
+/** check_shl_overflow() - Calculate a left-shifted value and check overflow
+ * @a: Value to be shifted
+ * @s: How many bits left to shift
+ * @d: Pointer to where to store the result
+
+ * Computes *@d = (@a << @s)
+ *
+ * Returns true if '*'d' cannot hold the result or when 'a << s' doesn't
+ * make sense. Example conditions:
+ * - 'a << s' causes bits to be lost when stored in '*'d.
+ * - 's' is garbage (e.g. negative) or so large that the result of
+ * - 'a << s' is guaranteed to be 0.
+ * - 'a' is negative.
+ * - 'a << s' sets the sign bit, if any, in '*'d'.
+ *
+ * '*'d' will hold the results of the attempted shift, but is not
+ * considered "safe for use" if false is returned.
+ */
+ #define check_shl_overflow(a, s, d) ({
+typeof(a) _a = a;
+typeof(s) _s = s;
+typeof(d) _d = d;
+u64 _a_full = _a;
+unsigned int _to_shift =
+ _s >= 0 && _s < 8 * sizeof(*d) ? _s : 0;
+*d = (_a_full << _to_shift);
+(_to_shift != _s || *_d < 0 || _a < 0 ||
+ (*_d >> _to_shift) != _a);
+})
+
+#*#**
+ * array_size() - Calculate size of 2-dimensional array.
+ *
+ * @a: dimension one
+ * @b: dimension two
+ *
+ * Calculates size of 2-dimensional array: @a * @b.
+ *
+ * Returns: number of bytes needed to represent the array or SIZE_MAX on
+ * overflow.
+ */
+ #static inline __must_check size_t array_size(size_t a, size_t b)
+ {
+size_t bytes;
+
+if (check_mul_overflow(a, b, &bytes))
+return SIZE_MAX;
+
+return bytes;
+}
+ * array3_size() - Calculate size of 3-dimensional array.
+ *
+ * @a: dimension one
+ * @b: dimension two
+ * @c: dimension three
+ *
+ * Calculates size of 3-dimensional array: @a * @b * @c.
+ *
+ * Returns: number of bytes needed to represent the array or SIZE_MAX on
+ * overflow.
+ */
+static inline __must_check size_t array3_size(size_t a, size_t b, size_t c)
+
+size_t bytes;
+
+if (check_mul_overflow(a, b, &bytes))
+ return SIZE_MAX;
+if (check_mul_overflow(bytes, c, &bytes))
+ return SIZE_MAX;
+
+return bytes;
+}
+
+static inline __must_check size_t __ab_c_size(size_t n, size_t size, size_t c)
+
+size_t bytes;
+
+if (check_mul_overflow(n, size, &bytes))
+ return SIZE_MAX;
+if (check_add_overflow(bytes, c, &bytes))
+ return SIZE_MAX;
+
+return bytes;
+}
+
+/**
+ * struct_size() - Calculate size of structure with trailing array.
+ * @p: Pointer to the structure.
+ * @member: Name of the array member.
+ * @n: Number of elements in the array.
+ *
+ * Calculates size of memory needed for structure @p followed by an
+ * array of @n @member elements.
+ *
+ * Return: number of bytes needed or SIZE_MAX on overflow.
+ */
+define struct_size(p, member, n)\n+ __ab_c_size(n,\n
+ sizeof(*((p)->member) + __must_be_array((p)->member),
+ sizeof(*p))
+
+#endif /* __LINUX_OVERFLOW_H */
--- linux-4.15.0.orig/include/linux/padata.h
+++ linux-4.15.0/include/linux/padata.h
@@ -24,7 +24,6 @@
 #include <linux/workqueue.h>
 #include <linux/spinlock.h>
 #include <linux/list.h>
-#include <linux/timer.h>
 #include <linux/notifier.h>
 #include <linux/kobject.h>
@@ -85,18 +84,14 @@
 * @serial: List to wait for serialization after reordering.
 * @pwork: work struct for parallelization.
 * @swork: work struct for serialization.
- * @pd: Backpointer to the internal control structure.
 * @work: work struct for parallelization.
- * @reorder_work: work struct for reordering.
 * @num_obj: Number of objects that are processed by this cpu.
 * @cpu_index: Index of the cpu.
 */
 struct padata_parallel_queue {
    struct padata_list parallel;
    struct padata_list reorder;
-   struct parallel_data *pd;
    struct work_struct work;
-   struct work_struct reorder_work;
    atomic_t num_obj;
    int cpu_index;
};
@@ -122,10 +117,10 @@
 * @reorder_objects: Number of objects waiting in the reorder queues.
 * @refcnt: Number of objects holding a reference on this parallel_data.
 * @max_seq_nr: Maximal used sequence number.
+ * @cpu: Next CPU to be processed.
 * @cpumask: The cpumasks in use for parallel and serial workers.
+ * @reorder_work: work struct for reordering.
 * @lock: Reorder lock.
- * @processed: Number of already processed objects.
- * @timer: Reorder timer.
 */
 struct parallel_data {
    struct padata_instance*pinst;
    @ @ -134,10 +129,10 @@
    atomic_t reorder_objects;
atomic_t refcnt;
atomic_t seq_nr;
+int cpu;
struct padata_cpumask cpumask;
+struct work_struct reorder_work;
spinlock_t lock __cacheline_aligned;
-unsigned int processed;
-struct timer_list timer;}

/**
--- linux-4.15.0.orig/include/linux/page-flags.h
+++ linux-4.15.0/include/linux/page-flags.h
@@ -264,7 +264,7 @@
 __PAGEFLAG(Locked, locked, PF_NO_TAIL)
 PAGEFLAG(Waiters, waiters, PF_ONLY_HEAD) __CLEARPAGEFLAG(Waiters, waiters, PF_ONLY_HEAD)
 -PAGEFLAG(Error, error, PF_NO_COMPOUND) TESTCLEARFLAG(Error, error, PF_NO_COMPOUND)
 +PAGEFLAG(Error, error, PF_NO_TAIL) TESTCLEARFLAG(Error, error, PF_NO_TAIL)
 PAGEFLAG(Referenced, referenced, PF_HEAD)
 TESTCLEARFLAG(Referenced, referenced, PF_HEAD)
 __SETPAGEFLAG(Referenced, referenced, PF_HEAD)
@@ -565,12 +565,28 @@
 *
 * Unlike PageTransCompound, this is safe to be called only while
 * split_huge_pmd() cannot run from under us, like if protected by the
- * MMU notifier, otherwise it may result in page->_mapcount < 0 false
+ * MMU notifier, otherwise it may result in page->_mapcount check false
 * positives.
 + *
 + * We have to treat page cache THP differently since every subpage of it
 + * would get _mapcount inc'ed once it is PMD mapped. But, it may be PTE
 + * mapped in the current process so comparing subpage's _mapcount to
 + * compound_mapcount to filter out PTE mapped case.
 */
static inline int PageTransCompoundMap(struct page *page)
{
-return PageTransCompound(page) && atomic_read(&page->_mapcount) < 0;
+struct page *head;
+
+if (!PageTransCompound(page))
+return 0;
+
+if (PageAnon(page))
+return atomic_read(&page->_mapcount) < 0;
+
+head = compound_head(page);
+/* File THP is PMD mapped and not PTE mapped */
return atomic_read(&page->_mapcount) ==
  atomic_read(compound_mapcount_ptr(head));
}

/*
--- linux-4.15.0.orig/include/linux/pagemap.h
+++ linux-4.15.0/include/linux/pagemap.h
@@ -403,7 +403,7 @@
 */
static inline pgoff_t page_to_index(struct page *page)
@@ -422,15 +422,16 @@
return pgoff;
}

+extern pgoff_t hugetlb_basepage_index(struct page *page);
+
+ /*
+ - * Get index of the page within radix-tree (but not for hugetlb pages).
+ * (TODO: remove once hugetlb pages will have ->index in PAGE_SIZE)
+ */
+static inline pgoff_t page_to_index(struct page *page)
@@ -422,15 +422,16 @@
return pgoff;
}

+extern pgoff_t hugetlb_basepage_index(struct page *page);
+
+ /*
+ - * Get the offset in PAGE_SIZE.
+ * (TODO: hugepage should have ->index in PAGE_SIZE)
+ */
+static inline pgoff_t page_to_pgoff(struct page *page)
{
  if (unlikely(PageHeadHuge(page)))
    return page->index << compound_order(page);
  
+if (unlikely(PageHuge(page)))
  +return hugetlb_basepage_index(page);
  return page_to_index(page);
}

--- linux-4.15.0.orig/include/linux/pci-aspm.h
+++ linux-4.15.0/include/linux/pci-aspm.h
@@ -24,43 +24,12 @@
#define PCIE_LINK_STATE_CLKPM	4

#ifdef CONFIG_PCIEASPM
-void pcie_aspm_init_link_state(struct pci_dev *pdev);
-void pcie_aspm_exit_link_state(struct pci_dev *pdev);
-void pcie_aspm_pm_state_change(struct pci_dev *pdev);
-void pcie_aspm_powersave_config_link(struct pci_dev *pdev);
#endif
void pci_disable_link_state(struct pci_dev *pdev, int state);
void pci_disable_link_state_locked(struct pci_dev *pdev, int state);
void pcie_no_aspm(void);

#ifdef CONFIG_PCIEASPM_DEBUG /* this depends on CONFIG_PCIEASPM */
-void pcie_aspm_create_sysfs_dev_files(struct pci_dev *pdev);
-void pcie_aspm_remove_sysfs_dev_files(struct pci_dev *pdev);
#else
-void pcie_aspm_create_sysfs_dev_files(struct pci_dev *pdev) {}  
-void pcie_aspm_remove_sysfs_dev_files(struct pci_dev *pdev) {}  
#endif

--- linux-4.15.0.orig/include/linux/pci-epc.h
+++ linux-4.15.0/include/linux/pci-epc.h
@@ -63,6 +63,7 @@
 * @bitmap: bitmap to manage the PCI address space
 * @pages: number of bits representing the address region
 * @lock: mutex to protect bitmap
 +*/
 struct pci_epc_mem {
  phys_addr_t phys_base;
unsigned long *bitmap;
size_t pagen_size;
int pages;
/* mutex to protect against concurrent access for memory allocation*/
+struct mutex lock;
};

/**
--- linux-4.15.0.orig/include/linux/pci.h
+++ linux-4.15.0/include/linux/pci.h
@@ -259,6 +259,7 @@
 PCIE_SPEED_2_5GT = 0x14,
 PCIE_SPEED_5_GT = 0x15,
 PCIE_SPEED_8_0GT = 0x16,
+PCIE_SPEED_16_0GT = 0x17,
 PCI_SPEED_UNKNOWN = 0xff,
}

@@ -341,15 +342,20 @@
 D3cold, not set for devices
 powered on/off by the
 corresponding bridge */
+unsigned int skip_bus_pm:1; /* Internal: Skip bus-level PM */
 unsigned int ignore_hotplug:1; /* Ignore hotplug events */
 unsigned int hotplug_user_indicators:1; /* SlotCtl indicators
 controlled exclusively by
 user sysfs */
+unsigned int clear_retrain_link:1; /* Need to clear Retrain Link
 + bit manually */
 unsigned int d3_delay; /* D3->D0 transition time in ms */
 unsigned int d3cold_delay; /* D3cold->D0 transition time in ms */

 #ifdef CONFIG_PCIEASPM
 struct pcie_link_state *link_state; /* ASPM link state */
+unsigned int ltr_path:1; /* Latency Tolerance Reporting
 + supported from root to here */
#endif

 pci_channel_state_t error_state; /* current connectivity state */
@@ -367,6 +373,9 @@
 bool match_driver; /* Skip attaching driver */
 /* These fields are used by common fixups */
 unsigned int transparent:1; /* Subtractive decode PCI bridge */
+unsigned int io_window:1; /* Bridge has I/O window */
+unsigned int pref_window:1; /* Bridge has pref mem window */
+unsigned int pref_64_window:1; /* Pref mem window is 64-bit */
 unsigned int multifunction:1; /* Part of multi-function device */
/* keep track of device state */
unsigned int is_added:1;
@@ -390,6 +399,14 @@
unsigned int reset_fn:1;
unsigned int is_hotplug_bridge:1;
unsigned int is_thunderbolt:1; /* Thunderbolt controller */
+/*
+ * Devices marked being untrusted are the ones that can potentially
+ * execute DMA attacks and similar. They are typically connected
+ * through external ports such as Thunderbolt but not limited to
+ * that. When an IOMMU is enabled they should be getting full
+ * mappings to make sure they cannot access arbitrary memory.
+ */
+unsigned int intuntrusted:1;
unsigned int __aer_firmware_first_valid:1;
unsigned int __aer_firmware_first:1;
unsigned int broken_intx_masking:1; /* INTx masking can't be used */
@@ -1072,6 +1089,7 @@
int pci_set_cacheline_size(struct pci_dev *dev);
#define HAVE_PCI_SET_MWI
int __must_check pci_set_mwi(struct pci_dev *dev);
+int __must_check pcim_set_mwi(struct pci_dev *dev);
int pci_try_set_mwi(struct pci_dev *dev);
void pci_clear_mwi(struct pci_dev *dev);
void pci_intx(struct pci_dev *dev, int enable);
@@ -1122,7 +1140,6 @@
void __iomem __must_check *pci_map_rom(struct pci_dev *pdev, size_t *size);
void pci_unmap_rom(struct pci_dev *pdev, void __iomem *rom);
size_t pci_get_rom_size(struct pci_dev *pdev, void __iomem *rom, size_t size);
 void __iomem __must_check *pci_platform_rom(struct pci_dev *pdev, size_t *size);

/ * Power management related routines */
int pci_save_state(struct pci_dev *dev);
@@ -1232,10 +1249,13 @@
void *alignf_data);
-int pci_register_io_range(phys_addr_t addr, resource_size_t size);
+int pci_register_io_range(struct fwnode_handle *fwnode, phys_addr_t addr,
+resource_size_t size);
unsigned long pci_address_to_pio(phys_addr_t addr);
phys_addr_t pci_pio_to_address(unsigned long pio);
int pci_remap_iocard(const struct resource *res, phys_addr_t phys_addr);
+int devm_pci_remap_iocard(struct device *dev, const struct resource *res,
+ phys_addr_t phys_addr);
void pci_unmap_iocard(struct resource *res);
void __iomem *devm_pci_remap_cfgspace(struct device *dev,
 resource_size_t offset,
static inline void pci_disable_device(struct pci_dev *dev) {
}
static inline int pci_assign_resource(struct pci_dev *dev, int i)
{
    return -EBUSY;
}

static inline int __pci_register_driver(struct pci_driver *drv,  
    struct module *owner) 
+static inline int __must_check __pci_register_driver(struct pci_driver *drv, 
    struct module *owner, 
    const char *mod_name)
{
    return 0;
}
static inline int pci_register_driver(struct pci_driver *drv)
{
    return 0;
}

#define dev_is_pf(d) (false)
static inline bool pci_acs_enabled(struct pci_dev *pdev, u16 acs_flags)
{
    return false;
}
+static inline int pci_irqd_intx_xlate(struct irq_domain *d,  
    struct device_node *node, 
    const u32 *intspec, 
    unsigned int intsize, 
    unsigned long *out_hwiirq, 
    unsigned int *out_type)
+{
    return -EINVAL;
}
#endif /* CONFIG_PCI */

/* Include architecture-dependent settings and functions */
#define pci_printk(level, pdev, fmt, arg...)
    dev_printk(level, &(pdev)->dev, fmt, ##arg)

#define pci_emerg(pdev, fmt, arg...)
    dev_emerg(&(pdev)->dev, fmt, ##arg)
#define pci_alert(pdev, fmt, arg...)
    dev_alert(&(pdev)->dev, fmt, ##arg)
#define pci_crit(pdev, fmt, arg...)
    dev_crit(&(pdev)->dev, fmt, ##arg)
#define pci_err(pdev, fmt, arg...)
    dev_err(&(pdev)->dev, fmt, ##arg)
#define pci_warn(pdev, fmt, arg...)
    dev_warn(&(pdev)->dev, fmt, ##arg)
#define pci_notice(pdev, fmt, arg...)
    dev_notice(&(pdev)->dev, fmt, ##arg)
#define pci_info(pdev, fmt, arg...)
    dev_info(&(pdev)->dev, fmt, ##arg)
#define pci_dbg(pdev, fmt, arg...)
    dev_dbg(&(pdev)->dev, fmt, ##arg)

#endif /* LINUX_PCI_H */
--- linux-4.15.0.orig/include/linux/pci_ids.h
+++ linux-4.15.0/include/linux/pci_ids.h
@@ -1624,8 +1644,9 @@
static inline void pci_disable_device(struct pci_dev *dev) {
    return -EBUSY;
}

@@ -1686,6 +1707,13 @@
#define dev_is_pf(d) (false)
static inline bool pci_acs_enabled(struct pci_dev *pdev, u16 acs_flags)
{
    return false;
}
+static inline int pci_irqd_intx_xlate(struct irq_domain *d, 
+    struct device_node *node, 
+    const u32 *intspec, 
+    unsigned int intsize, 
+    unsigned long *out_hwiirq, 
+    unsigned int *out_type)
+{
    return -EINVAL;
}
#endif /* CONFIG_PCI */

/* Include architecture-dependent settings and functions */
#define pci_printk(level, pdev, fmt, arg...)
    dev_printk(level, &(pdev)->dev, fmt, ##arg)

#define pci_emerg(pdev, fmt, arg...)
    dev_emerg(&(pdev)->dev, fmt, ##arg)
#define pci_alert(pdev, fmt, arg...)
    dev_alert(&(pdev)->dev, fmt, ##arg)
#define pci_crit(pdev, fmt, arg...)
    dev_crit(&(pdev)->dev, fmt, ##arg)
#define pci_err(pdev, fmt, arg...)
    dev_err(&(pdev)->dev, fmt, ##arg)
#define pci_warn(pdev, fmt, arg...)
    dev_warn(&(pdev)->dev, fmt, ##arg)
#define pci_notice(pdev, fmt, arg...)
    dev_notice(&(pdev)->dev, fmt, ##arg)
#define pci_info(pdev, fmt, arg...)
    dev_info(&(pdev)->dev, fmt, ##arg)
#define pci_dbg(pdev, fmt, arg...)
    dev_dbg(&(pdev)->dev, fmt, ##arg)

#endif /* LINUX_PCI_H */
#define PCI_CLASS_MULTIMEDIA_PHONE 0x0402
+#define PCI_CLASS_MULTIMEDIA_HD_AUDIO 0x0403
#define PCI_CLASS_MULTIMEDIA_OTHER 0x0480

#define PCI_BASE_CLASS_MEMORY 0x05
@@ -143,6 +144,8 @@
/* Vendors and devices. Sort key: vendor first, device next. */

+#define PCI_VENDOR_ID_LOONGSON 0x0014
+
#define PCI_VENDOR_ID_TTTECH 0x0357
#define PCI_VENDOR_ID_TTTECH_MC3220 0x00a
@@ -538,6 +541,11 @@
#define PCI_DEVICE_ID_AMD_16H_NB_F4 0x1534
#define PCI_DEVICE_ID_AMD_16H_M30H_NB_F3 0x1583
#define PCI_DEVICE_ID_AMD_16H_M30H_NB_F4 0x1584
+#define PCI_DEVICE_ID_AMD_17H_DF_F3 0x1463
+#define PCI_DEVICE_ID_AMD_17H_M10H_DF_F3 0x15eb
+#define PCI_DEVICE_ID_AMD_17H_M30H_DF_F3 0x1493
+#define PCI_DEVICE_ID_AMD_17H_M70H_DF_F3 0x1443
+#define PCI_DEVICE_ID_AMD_CN17H_F3 0x1703
#define PCI_DEVICE_ID_AMD_LANCE 0x2000
#define PCI_DEVICE_ID_AMD_LANCE_HOME 0x2001
@@ -1129,6 +1137,8 @@
#define PCI_VENDOR_ID_TCONRAD 0x10da
#define PCI_VENDOR_ID_TCONRAD_TOKENRING 0x0508

+#define PCI_VENDOR_ID_ROHM 0x10db
+
#define PCI_VENDOR_ID_NVIDIA 0x10de
#define PCI_DEVICE_ID_NVIDIA_TNT 0x0020
#define PCI_DEVICE_ID_NVIDIA_TNT2 0x0028
@@ -1323,6 +1333,7 @@
#define PCI_DEVICE_ID_NVIDIA_NFORCE_MCP78S_SMBUS 0x0752
#define PCI_DEVICE_ID_NVIDIA_NFORCE_MCP77_IDE 0x0759
#define PCI_DEVICE_ID_NVIDIA_NFORCE_MCP73_SMBUS 0x07D8
+#define PCI_DEVICE_ID_NVIDIA_GEFORCE_320M 0x08A0
#define PCI_DEVICE_ID_NVIDIA_NFORCE_MCP79_SMBUS 0x0AA2
#define PCI_DEVICE_ID_NVIDIA_NFORCE_MCP89_SATA 0x0D85
@@ -1331,6 +1342,7 @@
#define PCI_VENDOR_ID_AMCC 0x10e8
+#define PCI_VENDOR_ID_AMPERE 0x1def
#define PCI_VENDOR_ID_INTERG 0x10ea
#define PCI_DEVICE_ID_INTERG_16820x1682
@@ -1811,6 +1823,12 @@
#define PCI_VENDOR_ID_NVIDIA_SGS 0x12d2
#define PCI_DEVICE_ID_NVIDIA_SGS_RIVA128 0x0018
+
#define PCI_VENDOR_ID_PERICOM 0x12D8
#define PCI_DEVICE_ID_PERICOM_PI7C9X79510x7951
#define PCI_DEVICE_ID_PERICOM_PI7C9X79520x7952
#define PCI_DEVICE_ID_PERICOM_PI7C9X79540x7954
#define PCI_DEVICE_ID_PERICOM_PI7C9X79580x7958
+
#define PCI_SUBVENDOR_ID_CHASE_PCIFAST 0x12E0
#define PCI_SUBDEVICE_ID_CHASE_PCIFAST40x0031
#define PCI_SUBDEVICE_ID_CHASE_PCIFAST80x0021
@@ -1933,6 +1951,8 @@
#define PCI_VENDOR_ID_DIGIGRAM 0x1369
#define PCI_SUBDEVICE_ID_DIGIGRAM_LX6464ES_SERIAL_SUBSYSTEM 0xc001
#define PCI_SUBDEVICE_ID_DIGIGRAM_LX6464ES_CAE_SERIAL_SUBSYSTEM 0xc002
+
#define PCI_SUBDEVICE_ID_DIGIGRAM_LX6464ESE_SERIAL_SUBSYSTEM 0xc021
#define PCI_SUBDEVICE_ID_DIGIGRAM_LX6464ESE_CAE_SERIAL_SUBSYSTEM 0xc022

#define PCI_VENDOR_ID_KAWASAKI 0x136b
#define PCI_DEVICE_ID_MCHIP_KL5A720020xff01
@@ -2345,6 +2365,8 @@
#define PCI_VENDOR_ID_SYNOPSYS 0x16c3
+
#define PCI_VENDOR_ID_USR 0x16ec
+
#define PCI_VENDOR_ID_VITESSE 0x1725
#define PCI_DEVICE_ID_VITESSE_VSC71740x7174
@@ -2379,6 +2401,8 @@
#define PCI_DEVICE_ID_RDC_R60610x6061
#define PCI_DEVICE_ID_RDC_D10100x1010
+
#define PCI_VENDOR_ID_GL10x17a0
+
#define PCI_VENDOR_ID_LENOVO 0x17aa

#define PCI_VENDOR_ID_HUAWEI 0x19e5
#define PCI_VENDOR_ID_NETRONOME 0x19ee
-#define PCI_DEVICE_ID_NETRONOME_NFP32000x3200
-#define PCI_DEVICE_ID_NETRONOME_NFP3240x3240
#define PCI_DEVICE_ID_NETRONOME_NFP4000x4000
#define PCI_DEVICE_ID_NETRONOME_NFP6000x6000
#define PCI_DEVICE_ID_NETRONOME_NFP6000_VF0x6003
@@ -2541,6 +2563,8 @@
#define PCI_VENDOR_ID_ASMEDIA		0x1b21
+#define PCI_VENDOR_ID_AMAZON_ANAPURNA_LABS0x1c36
+
#define PCI_VENDOR_ID_CIRCUITCO0x1cc8
#define PCI_SUBSYSTEM_ID_CIRCUITCO_MINNOWBOARD0x0001
@@ -3062,4 +3086,6 @@
#define PCI_VENDOR_ID_OCZ0x1b85
+#define PCI_VENDOR_ID_NCUBE0x10ff
+
#endif /* _LINUX_PCI_IDS_H */
--- linux-4.15.0.orig/include/linux/percpu-defs.h
+++ linux-4.15.0/include/linux/percpu-defs.h
@@ -176,8 +176,7 @@
* Declaration/definition used for per-CPU variables that should be accessed
* as decrypted when memory encryption is enabled in the guest.
*/
-#if defined(CONFIG_VIRTUALIZATION) && defined(CONFIG_AMD_MEM_ENCRYPT)
-
+#ifdef CONFIG_AMD_MEM_ENCRYPT
#define DECLARE_PER_CPU_DECRYPTED(type, name)		DECLARE_PER_CPU_SECTION(type, name, "..decrypted")
--- linux-4.15.0.orig/include/linux/percpu-rwsem.h
+++ linux-4.15.0/include/linux/percpu-rwsem.h
@@ -133,7 +133,7 @@
lock_release(&sem->rw_sem.dep_map, 1, ip);
#ifdef CONFIG_RWSEM_SPIN_ON_OWNER
	sem->rw_sem.owner = NULL;
+template CONFIG_RWSEM_SPIN_ON_OWNER
if (!read)
-sem->rw_sem.owner = NULL;
+sem->rw_sem.owner = RWSEM_OWNER_UNKNOWN;
#endif
}
@@ -141,6 +141,10 @@
bool read, unsigned long ip)
{
    lock_acquire(&sem->rw_sem.dep_map, 0, 1, read, 1, NULL, ip);
+#ifdef CONFIG_RWSEM_SPIN_ON_OWNER

+if (!read)
+sem->rw_sem.owner = current;
+#endif

#endif
--- linux-4.15.0.orig/include/linux/percpu_counter.h
+++ linux-4.15.0/include/linux/percpu_counter.h
@@ -78,9 +78,9 @@
static inline s64 percpu_counter_read_positive(struct percpu_counter *fbc)
 {
 -s64 ret = fbc->count;
 +/* Prevent reloads of fbc->count */
 +s64 ret = READ_ONCE(fbc->count);
 
 -barrier(); /* Prevent reloads of fbc->count */
 if (ret >= 0)
- return ret;
+ return ret;
 return 0;
--- linux-4.15.0.orig/include/linux/perf/arm_pmu.h
+++ linux-4.15.0/include/linux/perf/arm_pmu.h
@@ -110,6 +110,7 @@
 void(*stop)(struct arm_pmu *);
 void(*reset)(void *);
 int(*map_event)(struct perf_event *event);
+int(*filter_match)(struct perf_event *event);
 intnum_events;
 u64 max_period;
 bool secure_access; /* 32-bit ARM only */
--- linux-4.15.0.orig/include/linux/perf_event.h
+++ linux-4.15.0/include/linux/perf_event.h
@@ -409,7 +409,7 @@
 /* Set up pmu-private data structures for an AUX area */
 */
 -void *(*setup_aux)(int cpu, void **pages,
+void *(*setup_aux)(struct perf_event *event, void **pages,
 int nr_pages, bool overwrite);
 /* optional */
 
 @@ -447,6 +447,11 @@
 /* Filter events for PMU-specific reasons. */
 int (*filter_match)(struct perf_event *event); /* optional */
 +
+/*
+ * Check period value for PERF_EVENT_IOC_PERIOD ioctl.
+ */
+}
+ */
+ int (*check_period)(struct perf_event *event, u64 value); /* optional */
};

/**
@@ -462,7 +467,7 @@ /*
struct perf_addr_filter {
 struct list_head entry;
- struct inode *inode;
+ struct path *path;
 unsigned long offset;
 unsigned long size;
 unsigned int range : 1,
@@ -1151,6 +1156,11 @@ int perf_event_max_stack_handler(struct ctl_table *table, int write, 
 void __user *buffer, size_t *lenp, loff_t *ppos);

+ static inline bool perf_paranoid_any(void)
+ { 
+ return sysctl_perf_event_paranoid > 2;
+ } 
+ 
+ static inline bool perf_paranoid_tracepoint_raw(void)
+ { 
+ return sysctl_perf_event_paranoid > -1;
+ }

--- linux-4.15.0.orig/include/linux/pfn_t.h
+++ linux-4.15.0/include/linux/pfn_t.h
@@ -10,13 +10,15 @@
* PFN_FLAGS_TRACE \
+{ PFN_SPECIAL, "SPECIAL" }, \ 
+{ PFN_SG_CHAIN, "SG_CHAIN" }, \ 
+{ PFN_SG_LAST, "SG_LAST" }, \ 
+{ PFN_DEV, "DEV" }, \ 
@@ -120,4 +122,15 @@
@endif 
@endif /*__HAVE_ARCH_PTE_DEVMAP */
```c
#ifdef __HAVE_ARCH_PTE_SPECIAL
static inline bool pfn_t_special(pfn_t pfn)
{
    return (pfn.val & PFN_SPECIAL) == PFN_SPECIAL;
}
#else
static inline bool pfn_t_special(pfn_t pfn)
{
    return false;
}
#endif /* __HAVE_ARCH_PTE_SPECIAL */
#endif /* _LINUX_PFN_T_H_ */
--- linux-4.15.0.orig/include/linux/phy.h
+++ linux-4.15.0/include/linux/phy.h
@@ -372,6 +372,7 @@
 * is_pseudo_fixed_link: Set to true if this phy is an Ethernet switch, etc.
 * has_fixups: Set to true if this phy has fixups/quirks.
 * suspended: Set to true if this phy has been suspended successfully.
+ * suspended_by_mdio_bus: Set to true if this phy was suspended by MDIO bus.
 * sysfs_links: Internal boolean tracking sysfs symbolic links setup/removal.
 * loopback_enabled: Set true if this phy has been loopbacked successfully.
 * state: state of the PHY for management purposes
@@ -410,6 +411,7 @@
     bool is_pseudo_fixed_link;
     bool has_fixups;
     bool suspended;
+    bool suspended_by_mdio_bus;
     bool sysfs_links;
     bool loopback_enabled;
@@ -819,6 +820,7 @@
 /* Interrupt and Polling infrastructure */
 struct work_struct phy_queue;
 struct delayed_work state_queue;
@@ -880,6 +882,10 @@

 struct mutex lock;
@@ -819,6 +820,7 @@
 int phy_init_hw(struct phy_device *phydev);
 int phy_suspend(struct phy_device *phydev);
 int phy_resume(struct phy_device *phydev);
+int phy_resume(struct phy_device *phydev);
 int phy_loopback(struct phy_device *phydev, bool enable);
 struct phy_device *phy_attach(struct_net_device *dev, const char *bus_id, phy_interface_t interface);
```
int phy_drivers_register(struct phy_driver *new_driver, int n, struct module *owner);

void phy_state_machine(struct work_struct *work);

void phy_change(struct phy_device *phydev);
void phy_change_work(struct work_struct *work);
void phy_mac_interrupt(struct phy_device *phydev, int new_link);
void phy_start_machine(struct phy_device *phydev);

--- linux-4.15.0.orig/include/linux/pipe_fs_i.h
+++ linux-4.15.0/include/linux/pipe_fs_i.h
@@ -108,18 +108,20 @@
/*
 * Get a reference to the pipe buffer.
 */
-void (*get)(struct pipe_inode_info *, struct pipe_buffer *);
+bool (*get)(struct pipe_inode_info *, struct pipe_buffer *);

/**
 * pipe_buf_get - get a reference to a pipe_buffer
 * @pipe: the pipe that the buffer belongs to
 * @buf: the buffer to get a reference to
 + *
 + * Return: %true if the reference was successfully obtained.
 */
-static inline void pipe_buf_get(struct pipe_inode_info *pipe,
+static inline __must_check bool pipe_buf_get(struct pipe_inode_info *pipe,
 struct pipe_buffer *buf)
{
-buf->ops->get(pipe, buf);
+return buf->ops->get(pipe, buf);
}

/**
 @@ -179,10 +181,12 @@
 void free_pipe_info(struct pipe_inode_info *);

 /* Generic pipe buffer ops functions */
-void generic_pipe_buf_get(struct pipe_inode_info *, struct pipe_buffer *);
+bool generic_pipe_buf_get(struct pipe_inode_info *, struct pipe_buffer *);
int generic_pipe_buf_confirm(struct pipe_inode_info *, struct pipe_buffer *);
int generic_pipe_buf_steal(struct pipe_inode_info *, struct pipe_buffer *);
+int generic_pipe_buf_nosteal(struct pipe_inode_info *, struct pipe_buffer *);
void generic_pipe_buf_release(struct pipe_inode_info *, struct pipe_buffer *);
+void pipe_buf_mark_unmergeable(struct pipe_buffer *buf);

extern const struct pipe_buf_operations nosteal_pipe_buf_ops;

--- linux-4.15.0.orig/include/linux/platform_data/dma-dw.h
+++ linux-4.15.0/include/linux/platform_data/dma-dw.h
@@ -49,6 +49,7 @@
 * @data_width: Maximum data width supported by hardware per AHB master
 *(in bytes, power of 2)
 * @multi_block: Multi block transfers supported by hardware per channel.
+ * @protctl: Protection control signals setting per channel.
 */

struct dw_dma_platform_data {
  unsigned int nr_channels;
@@ -65,6 +66,11 @@
  unsigned char nr_masters;
  unsigned char data_width[DW_DMA_MAX_NR_MASTERS];
  unsigned char multi_block[DW_DMA_MAX_NR_CHANNELS];
+#define CHAN_PROTCTL_PRIVILEGED BIT(0)
+#define CHAN_PROTCTL_BUFFERABLE BIT(1)
+#define CHAN_PROTCTL_CACHEABLE BIT(2)
+#define CHAN_PROTCTL_MASK GENMASK(2, 0)
  unsigned char protctl;
};

#endif /* _PLATFORM_DATA_DMA_DW_H */
--- linux-4.15.0.orig/include/linux/platform_data/dma-ep93xx.h
+++ linux-4.15.0/include/linux/platform_data/dma-ep93xx.h
@@ -85,7 +85,7 @@
 ep93xx_dma_chan_direction(struct dma_chan *chan)
 { 
  if (!ep93xx_dma_chan_is_m2p(chan))
-    return DMA_NONE;
+    return DMA_TRANS_NONE;
    
 /* even channels are for TX, odd for RX */
 return (chan->chan_id % 2 == 0) ? DMA_MEM_TO_DEV : DMA_DEV_TO_MEM;
--- linux-4.15.0.orig/include/linux/platform_data/dma-imx-sdma.h
+++ linux-4.15.0/include/linux/platform_data/dma-imx-sdma.h
@@ -51,7 +51,10 @@
 /* End of v2 array */
s32 zcanfd_2_mcu_addr;
s32 zqspi_2_mcu_addr;
+s32 mcu_2_ecspi_addr;
/* End of v3 array */
+s32 mcu_2_zqspi_addr;
+/* End of v4 array */
};

/**
--- linux-4.15.0.orig/include/linux/platform_data/ina2xx.h
+++ linux-4.15.0/include/linux/platform_data/ina2xx.h
@@ -1,7 +1,7 @@
/*
 * Driver for Texas Instruments INA219, INA226 power monitor chips
 *
- * Copyright (C) 2012 Lothar Felten <l-felten@ti.com>
+ * Copyright (C) 2012 Lothar Felten <lothar.felten@gmail.com>
 *
 * This program is free software; you can redistribute it and/or modify
 * it under the terms of the GNU General Public License version 2 as
 --- linux-4.15.0.orig/include/linux/platform_data/x86/clk-pmc-atom.h
+++ linux-4.15.0/include/linux/platform_data/x86/clk-pmc-atom.h
@@ -35,10 +35,13 @@
 *
 * @base:	PMC clock register base offset
 * @clks:	pointer to set of registered clocks, typically 0..5
+ * @critical:	flag to indicate if firmware enabled pmc_plt_clks
+ * should be marked as critical or not
 */

 struct pmc_clk_data {
 void __iomem *base;
 const struct pmc_clk *clks;
+bool critical;
};

#endif /* __PLATFORM_DATA_X86_CLK_PMC_ATOM_H */
--- linux-4.15.0.orig/include/linux/pm.h
+++ linux-4.15.0/include/linux/pm.h
@@ -556,9 +556,10 @@
* These flags can be set by device drivers at the probe time. They need not be
* cleared by the drivers as the driver core will take care of that.
*
- * NEVER_SKIP: Do not skip system suspend/resume callbacks for the device.
+ * NEVER_SKIP: Do not skip all system suspend/resume callbacks for the device.
 * SMART_PREPARE: Check the return value of the driver's ->prepare callback.
 * SMART_SUSPEND: No need to resume the device from runtime suspend.
 + * LEAVE_SUSPENDED: Avoid resuming the device during system resume if possible.
 * 
 * Setting SMART_PREPARE instructs bus types and PM domains which may want
* system suspend/resume callbacks to be skipped for the device to return 0 from
@ @ -572,10 +573,14 @@
* necessary from the driver's perspective. It also may cause them to skip
* invocations of the ->suspend_late and ->suspend_noirq callbacks provided by
* the driver if they decide to leave the device in runtime suspend.
+ *
+ * Setting LEAVE_SUSPENDED informs the PM core and middle-layer code that the
+ * driver prefers the device to be left in suspend after system resume.
 */
-#define DPM_FLAG_NEVER_SKIP	BIT(0)
-#define DPM_FLAG_SMART_PREPARE	BIT(1)
-#define DPM_FLAG_SMART_SUSPEND	BIT(2)
+#define DPM_FLAG_NEVER_SKIP	BIT(0)
+#define DPM_FLAG_SMART_PREPARE	BIT(1)
+#define DPM_FLAG_SMART_SUSPEND	BIT(2)
+#define DPM_FLAG_LEAVE_SUSPENDED	BIT(3)

struct dev_pm_info {
  pm_message_t		power_state;
@@ -597,6 +602,8 @@
  bool wakeup_path:1;
  boolsyscore:1;
  boolno_pm_callbacks:1;/* Owned by the PM core */
+unsigned intmust_resume:1;/* Owned by the PM core */
+unsigned intmay_skip_resume:1;/* Set by subsystems */
#else
  unsigned intshould_wakeup:1;
#endif
@@ -766,6 +773,7 @@
 extern void pm_generic_complete(struct device *dev);

 extern void dev_pm_skip_next_resume_phases(struct device *dev);
+extern bool dev_pm_may_skip_resume(struct device *dev);
 extern bool dev_pm_smart_suspend_and_suspended(struct device *dev);

 #else /* !CONFIG_PM_SLEEP */
--- linux-4.15.0.orig/include/linux/pm_opp.h
+++ linux-4.15.0/include/linux/pm_opp.h
@@ -25,6 +25,7 @@
 enum dev_pm_opp_event {
   OPP_EVENT_ADD, OPP_EVENT_REMOVE, OPP_EVENT_ENABLE, OPP_EVENT_DISABLE,
+   OPP_EVENT_ADJUST_VOLTAGE,
   
 enum dev_pm_opp_event {
@@ -84,6 +85,7 @@
 extern unsigned long dev_pm_opp_get_voltage(struct dev_pm_opp *opp);
unsigned long dev_pm_opp_get_freq(struct dev_pm_opp *opp);
+struct regulator *dev_pm_opp_get_regulator(struct device *dev);

bool dev_pm_opp_is_turbo(struct dev_pm_opp *opp);

@@ -108,6 +110,9 @@
    unsigned long u_volt);
 void dev_pm_opp_remove(struct device *dev, unsigned long freq);

+int dev_pm_opp_adjust_voltage(struct device *dev, unsigned long freq,
+   unsigned long u_volt);
+int dev_pm_opp_enable(struct device *dev, unsigned long freq);

int dev_pm_opp_disable(struct device *dev, unsigned long freq);
@@ -210,6 +215,13 @@
{
}

+static inline int
+dev_pm_opp_adjust_voltage(struct device *dev, unsigned long freq,
+   unsigned long u_volt)
+{
+    return 0;
+}
+
+static inline int dev_pm_opp_enable(struct device *dev, unsigned long freq)
{
    return 0;
--- linux-4.15.0.orig/include/linux/pnp.h
+++ linux-4.15.0/include/linux/pnp.h
@@ -220,10 +220,8 @@
#define global_to_pnp_card(n) list_entry(n, struct pnp_card, global_list)
#define protocol_to_pnp_card(n) list_entry(n, struct pnp_card, protocol_list)
#define to_pnp_card(n) container_of(n, struct pnp_card, dev)

#define pnp_for_each_card(card) 	
	for((card) = global_to_pnp_card(pnp_cards.next); 
	(card) != global_to_pnp_card(&pnp_cards); 
	(card) = global_to_pnp_card((card)->global_list.next))
+
+list_for_each_entry(card, &pnp_cards, global_list)

struct pnp_card_link {
    struct pnp_card *card;
@@ -276,14 +274,9 @@
#define card_to_pnp_dev(n) list_entry(n, struct pnp_dev, card_list)
#define protocol_to_pnp_dev(n) list_entry(n, struct pnp_dev, protocol_list)


```c
#define to_pnp_dev(n) container_of(n, struct pnp_dev, dev)
#define pnp_for_each_dev(dev) \
  for((dev) = global_to_pnp_dev(pnp_global.next); \
      (dev) != global_to_pnp_dev(&pnp_global); \
      (dev) = global_to_pnp_dev((dev)->global_list.next))
#define card_for_each_dev(card,dev) \
  for((dev) = card_to_pnp_dev((card)->devices.next); \
      (dev) != card_to_pnp_dev(&card->devices); \
      (dev) = card_to_pnp_dev((dev)->card_list.next))
+#define pnp_for_each_dev(dev) list_for_each_entry(dev, &pnp_global, global_list) 
+#define card_for_each_dev(card, dev)	\ 
  list_for_each_entry(dev, &(card)->devices, card_list) 
#define pnp_dev_name(dev) (dev)->name

static inline void *pnp_get_drvdata(struct pnp_dev *pdev) { }
```

```c
#define to_pnp_protocol(n) list_entry(n, struct pnp_protocol, protocol_list)
#define protocol_for_each_card(protocol,card) \
  for((card) = protocol_to_pnp_card((protocol)->cards.next); \
      (card) != protocol_to_pnp_card(&(protocol)->cards); \
      (card) = protocol_to_pnp_card((card)->protocol_list.next))
#define protocol_for_each_dev(protocol,dev) \
  for((dev) = protocol_to_pnp_dev((protocol)->devices.next); \
      (dev) != protocol_to_pnp_dev(&(protocol)->devices); \
      (dev) = protocol_to_pnp_dev((dev)->protocol_list.next))
+#define protocol_for_each_card(protocol, card)	\ 
  list_for_each_entry(card, &(protocol)->cards, protocol_list) 
+#define protocol_for_each_dev(protocol, dev)	\ 
  list_for_each_entry(dev, &(protocol)->devices, protocol_list)
```

```c
extern struct bus_type pnp_bus_type;
```

```c
--- linux-4.15.0.orig/include/linux_poll.h
+++ linux-4.15.0/include/linux_poll.h
@@ -15,7 +15,11 @@
 extern struct ctl_table epoll_table[]; /* for sysctl */
 /* ~832 bytes of stack space used max in sys_select/sys_poll before allocating additional memory. */
+/*ifdef __clang__*/
+#define MAX_STACK_ALLOC 768
+/*else
 +#define MAX_STACK_ALLOC 832
 +endif
 #define FRONTEND_STACK_ALLOC256
 #define SELECT_STACK_ALLOCFRONTEND_STACK_ALLOC
 #define POLL_STACK_ALLOCFRONTEND_STACK_ALLOC
```
--- linux-4.15.0.orig/include/linux/posix-clock.h
+++ linux-4.15.0/include/linux/posix-clock.h
@@ -82,29 +82,32 @@
 *
 * @ops:     Functional interface to the clock
 * @cdev:    Character device instance for this clock
- * @kref:    Reference count.
+ * @dev:     Pointer to the clock's device.
 * @rwsem:   Protects the 'zombie' field from concurrent access.
 * @zombie:  If 'zombie' is true, then the hardware has disappeared.
- * @release: A function to free the structure when the reference count reaches
- *         zero. May be NULL if structure is statically allocated.
 *
 * Drivers should embed their struct posix_clock within a private
 * structure, obtaining a reference to it during callbacks using
 * container_of().
+ *
+ * Drivers should supply an initialized but not exposed struct device
+ * to posix_clock_register(). It is used to manage lifetime of the
+ * driver's private structure. It's 'release' field should be set to
+ * a release function for this private structure.
 */
struct posix_clock {
    struct posix_clock_operations ops;
    struct cdev cdev;
-   struct kref kref;
+   struct device *dev;
    struct rw_semaphore rwsem;
    bool zombie;
-   void (*release)(struct posix_clock *clk);
};

/**
 * posix_clock_register() - register a new clock
- * @clk:   Pointer to the clock. Caller must provide 'ops' and 'release'
- * @devid: Allocated device id
+ * @clk:   Pointer to the clock. Caller must provide 'ops' field
+ * @dev:   Pointer to the initialized device. Caller must provide
+ *         'release' field
 *
 * A clock driver calls this function to register itself with the
 * clock device subsystem. If `clk' points to dynamically allocated
@@ -113,7 +116,7 @@
 *
 * Returns zero on success, non-zero otherwise.
 */
-int posix_clock_register(struct posix_clock *clk, dev_t devid);
+int posix_clock_register(struct posix_clock *clk, struct device *dev);
/**
 * posix_clock_unregister() - unregister a clock
 * linux-4.15.0.orig/include/linux/posix-timers.h
 +++ linux-4.15.0/include/linux/posix-timers.h
 @@ -82,8 +82,8 @@
clockid_t		it_clock;
timer_t			it_id;
int			it_active;
-intit_overrun;
-intit_overrun_last;
+s64it_overrun;
+s64it_overrun_last;
intit_requeue_pending;
intit_sigev_notify;
ktime_t		it_interval;
--- linux-4.15.0.orig/include/linux/power/bq27xxx_battery.h
+++ linux-4.15.0/include/linux/power/bq27xxx_battery.h
 @@ -47,7 +47,6 @@
capacity;
 energy;
 flags;
-int power_avg;
 health;

};
--- linux-4.15.0.orig/include/linux/power/max17042_battery.h
+++ linux-4.15.0/include/linux/power/max17042_battery.h
 @@ -82,7 +82,7 @@
 MAX17042_RelaxCFG= 0x2A,
 MAX17042_MiscCFG= 0x2B,
 MAX17042_TGAIN= 0x2C,
-MAX17042_TOFF= 0x2D,
+MAX17042_TOFF= 0x2D,
 MAX17042_CGAIN= 0x2E,
 MAX17042_COFF= 0x2F,
--- linux-4.15.0.orig/include/linux/power_supply.h
+++ linux-4.15.0/include/linux/power_supply.h
 @@ -251,6 +251,7 @@
 spinlock_t changed_lock;
 bool changed;
 bool initialized;
+bool removing;
 atomic_t use_cnt;
 #ifdef CONFIG_THERMAL
 struct thermal_zone_device *tzd;
--- linux-4.15.0.orig/include/linux/prandom.h
+++ linux-4.15.0/include/linux/prandom.h
@ @ -0,0 +1,110 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+/
+ * include/linux/prandom.h
+ *
+ * Include file for the fast pseudo-random 32-bit
generation.
+ */
+
+ifndef _LINUX_PRANDOM_H
+#define _LINUX_PRANDOM_H
+#elseinclude <linux/types.h>
+#include <linux/percpu.h>
+
+u32 prandom_u32(void);
+void prandom_bytes(void *buf, size_t nbytes);
+void prandom_seed(u32 seed);
+void prandom_reseed_late(void);
+
+#if BITS_PER_LONG == 64
+/*
 * The core SipHash round function. Each line can be executed in
 * parallel given enough CPU resources.
 */
+
+#define PRND_SIPROUND(v0, v1, v2, v3) (\
+ v0 += v1, v1 = rol64(v1, 13), v2 += v3, v3 = rol64(v3, 16), \\
+ v1 ^= v0, v0 = rol64(v0, 32), v3 ^= v2, \\
+ v0 += v3, v3 = rol64(v3, 21), v2 += v1, v1 = rol64(v1, 17), \\
+ v3 ^= v0, v1 ^= v2, v2 = rol64(v2, 32) \\
+ )
+
+#define PRND_K0 (0x736f6d6570736575 ^ 0x6c7967656e657261)
+#define PRND_K1 (0x646f72616e646f6d ^ 0x7465646279746573)
+
+#elif BITS_PER_LONG == 32
+/*
 * On 32-bit machines, we use HSipHash, a reduced-width version of SipHash.
 * This is weaker, but 32-bit machines are not used for high-traffic
 * applications, so there is less output for an attacker to analyze.
 */
+
+#define PRND_SIPROUND(v0, v1, v2, v3) (\
+ v0 += v1, v1 = rol32(v1,  5), v2 += v3, v3 = rol32(v3,  8), \\
+ v1 ^= v0, v0 = rol32(v0, 16), v3 ^= v2, \\
+ v0 += v3, v3 = rol32(v3,  7), v2 += v1, v1 = rol32(v1, 13), \\
+ v3 ^= v0, v1 ^= v2, v2 = rol32(v2, 16) \\
+ )
+
+#define PRND_K0 0x6c796765
+#define PRND_K1 0x74656462
+
+#else
+#error Unsupported BITS_PER_LONG
+#endif
+
+struct rnd_state {
+    __u32 s1, s2, s3, s4;
+};
+
+u32 prandom_u32_state(struct rnd_state *state);
+void prandom_bytes_state(struct rnd_state *state, void *buf, size_t nbytes);
+void prandom_seed_full_state(struct rnd_state __percpu *pcpu_state);
+
+#define prandom_init_once(pcpu_state)			\
+    DO_ONCE(prandom_seed_full_state, (pcpu_state))
+
+/**
+ * prandom_u32_max - returns a pseudo-random number in interval [0, ep_ro)
+ * @ep_ro: right open interval endpoint
+ *
+ * Returns a pseudo-random number that is in interval [0, ep_ro). Note
+ * that the result depends on PRNG being well distributed in [0, ~0U]
+ * u32 space. Here we use maximally equidistributed combined Tausworthe
+ * generator, that is, prandom_u32(). This is useful when requesting a
+ * random index of an array containing ep_ro elements, for example.
+ *
+ * Returns: pseudo-random number in interval [0, ep_ro)
+ */
+static inline u32 prandom_u32_max(u32 ep_ro)
+{
+    return (u32)(((u64) prandom_u32() * ep_ro) >> 32);
+}
+
+/*
+ * Handle minimum values for seeds
+ */
+static inline u32 __seed(u32 x, u32 m)
+{
+    return (x < m) ? x + m : x;
+}
+
+/**
+ * prandom_seed_state - set seed for prandom_u32_state().
+ * @state: pointer to state structure to receive the seed.
+ * @seed: arbitrary 64-bit value to use as a seed.
+ */
+static inline void prandom_seed_state(struct rnd_state *state, u64 seed)


```c
+u32 i = ((seed >> 32) ^ (seed << 10) ^ seed) & 0xffffffffUL;
+
+state->s1 = __seed(i,  2U);
+state->s2 = __seed(i,  8U);
+state->s3 = __seed(i, 16U);
+state->s4 = __seed(i, 128U);
+
+/* Pseudo random number generator from numerical recipes. */
+static inline u32 next_pseudo_random32(u32 seed)
+{
+  return seed * 1664525 + 1013904223;
+}
+
+#endif
--- linux-4.15.0.orig/include/linux/printk.h
+++ linux-4.15.0/include/linux/printk.h
@@ -148,9 +148,13 @@
#ifdef CONFIG_PRINTK_NMI
  extern void printk_nmi_enter(void);
  extern void printk_nmi_exit(void);
+  extern void printk_nmi_direct_enter(void);
+  extern void printk_nmi_direct_exit(void);
#else
  static inline void printk_nmi_enter(void) { }
  static inline void printk_nmi_exit(void) { }
+  static inline void printk_nmi_direct_enter(void) { }
+  static inline void printk_nmi_direct_exit(void) { }
#endif /* PRINTK_NMI */

#ifdef CONFIG_PRINTK
@@ -285,6 +289,27 @@
#define pr_fmt(fmt) fmt
#endif

+#if defined(__KMSG_CHECKER) && defined(KMSG_COMPONENT) 
+
+/* generate magic string for scripts/kmsg-doc to parse */
+#define pr_printk_hash(level, format, ...)
+  __KMSG_PRINT(level _FMT_ format _ARGS_ __VA_ARGS__ _END_)
+
+#elif defined(CONFIG_KMSG_IDS) && defined(KMSG_COMPONENT)
+
+/* format element '%pj' prints the six digit jhash of a string */
+#define _pr_printk_hash(pfx, fmt, ...) 
+  printk(pfx fmt, pfx fmt + __builtin_strlen(pfx), ##__VA_ARGS__)
+#define pr_printk_hash(level, format, ...)
```

---
/* These can be used to print at the various log levels.
* All of these will print unconditionally, although note that pr_debug()
* or CONFIG_DYNAMIC_DEBUG is set.
*/
#define pr_emerg(fmt, ...)    	pr_printk_hash(KERN_EMERG, fmt, ##__VA_ARGS__) 
#define pr_alert(fmt, ...)    	pr_printk_hash(KERN_ALERT, fmt, ##__VA_ARGS__) 
#define pr_crit(fmt, ...)     	pr_printk_hash(KERN_CRIT, fmt, ##__VA_ARGS__) 
#define pr_err(fmt, ...)      	pr_printk_hash(KERN_ERR, fmt, ##__VA_ARGS__) 
#define pr_warning(fmt, ...)  	pr_printk_hash(KERN_WARNING, fmt, ##__VA_ARGS__) 
#define pr_warn    pr_warning 
#define pr_notice(fmt, ...)   	pr_printk_hash(KERN_NOTICE, fmt, ##__VA_ARGS__) 
#define pr_info(fmt, ...)     	pr_printk_hash(KERN_INFO, fmt, ##__VA_ARGS__) 
*/

/* Like KERN_CONT, pr_cont() should only be used when continuing
 * a line with no newline ("\n") enclosed. Otherwise it defaults
 --- linux-4.15.0.orig/include/linux/projid.h
+++ linux-4.15.0/include/linux/projid.h
@@ -48,6 +48,11 @@
  return !projid_eq(projid, INVALID_PROJID);
 }

+static inline bool projid_valid_eq(kprojid_t left, kprojid_t right)
+{
return projid_eq(left, right) && projid_valid(left);}
+
#endif CONFIG_USER_NS

extern kprojid_t make_kprojid(struct user_namespace *from, projid_t projid);
--- linux-4.15.0.orig/include/linux/property.h
+++ linux-4.15.0/include/linux/property.h
@@ -206,7 +206,7 @@
#define PROPERTY_ENTRY_INTEGER_ARRAY(_name_, _type_, _val_)
-{
+{
  .name = _name_,
  .length = ARRAY_SIZE(_val_) * sizeof(_type_),
  .is_array = true,
@@ -224,7 +224,7 @@
PROPERTY_ENTRY_INTEGER_ARRAY(_name_, u64, _val_)

#define PROPERTY_ENTRY_STRING_ARRAY(_name_, _val_)
-{
+{
  .name = _name_,
  .length = ARRAY_SIZE(_val_) * sizeof(const char *),
  .is_array = true,
@@ -233,7 +233,7 @@
}

#define PROPERTY_ENTRY_INTEGER(_name_, _type_, _val_)
-{
+{
  .name = _name_,
  .length = sizeof(_type_),
  .is_string = false,
@@ -250,15 +250,15 @@
PROPERTY_ENTRY_INTEGER(_name_, u64, _val_)

#define PROPERTY_ENTRY_STRING(_name_, _val_)
-{
+{
  .name = _name_,
  .length = sizeof(const char *),
  .is_string = true,
  { .value = { .str = _val_ } },
}
#define PROPERTY_ENTRY_BOOL(_name_)
-{
+(struct property_entry) {
    .name = _name_,
}

--- linux-4.15.0.orig/include/linux/psci.h
+++ linux-4.15.0/include/linux/psci.h
@@ -25,7 +25,19 @@
int psci_cpu_init_idle(unsigned int cpu);
int psci_cpu_suspend_enter(unsigned long index);

+enum psci_conduit {
+    PSCI_CONDUIT_NONE,
+    PSCI_CONDUIT_SMC,
+    PSCI_CONDUIT_HVC,
+};
+
+enum smccc_version {
+    SMCCC_VERSION_1_0,
+    SMCCC_VERSION_1_1,
+};
+
+struct psci_operations {
+    u32 (*get_version)(void);
+    int (*cpu_suspend)(u32 state, unsigned long entry_point);
+    int (*cpu_off)(u32 state);
+    int (*cpu_on)(unsigned long cpuid, unsigned long entry_point);
+    enum psci_conduit conduit;
+    enum smccc_version smccc_version;
+};

extern struct psci_operations psci_ops;

#if defined(CONFIG_ARM_PSCI_FW) && defined(CONFIG_ACPI)
    int __init psci_acpi_init(void);
    bool __init acpi_psci_present(void);
    bool __init acpi_psci_use_hvc(void);
    +bool acpi_psci_use_hvc(void);
#else
    static inline int psci_acpi_init(void) { return 0; }
    static inline bool acpi_psci_present(void) { return false; }
    +static inline bool acpi_psci_use_hvc(void) { return false; }
#endif
#ifndef __LINUX_PSCI_H__
--- linux-4.15.0.orig/include/linux/pstore.h
+++ linux-4.15.0/include/linux/pstore.h
@@ -26,7 +26,7 @@
 #include <linux/errno.h>
 #include <linux/kmsg_dump.h>
 #include <linux/mutex.h>
-#include <linux/spinlock.h>
+#include <linux/semaphore.h>
 #include <linux/time.h>
 #include <linux/types.h>
@@ -88,9 +88,12 @@
 * @owner: module which is repsonsible for this backend driver
 * @name: name of the backend driver
 *
- * @buf_lock: spinlock to serialize access to @buf
+ * @buf_lock: semaphore to serialize access to @buf
 * @buf: preallocated crash dump buffer
- * @bufsize: size of @buf available for crash dump writes
+ * @bufsize: size of @buf available for crash dump bytes (must match
+ * smallest number of bytes available for writing to a
+ * backend entry, since compressed bytes don't take kindly
+ * to being truncated)
 *
- * @read_mutex: serializes @open, @read, @close, and @erase callbacks
+ * @flags: bitfield of frontends the backend can accept writes for
@@ -170,7 +173,7 @@
 struct module*owner;
 char*name;

-spinlock_tbuf_lock;
+struct semaphore buf_lock;
 char*buf;
 size_tbufsize;
@@ -196,7 +199,6 @@
 extern int pstore_register(struct pstore_info *);
 extern void pstore_unregister(struct pstore_info *);
-extern bool pstore_cannot_block_path(enum kmsg_dump_reason reason);

 struct pstore_ftrace_record {
 unsigned long ip;
--- linux-4.15.0.orig/include/linux/pti.h
+++ linux-4.15.0/include/linux/pti.h
@@ -6,6 +6,7 @@
 struct pstore_ftrace_record {
#include <asm/pti.h>
#else
static inline void pti_init(void) { }
+static inline void pti_finalize(void) { }
#endif
#endif
--- linux-4.15.0.orig/include/linux/ptp_clock_kernel.h
+++ linux-4.15.0/include/linux/ptp_clock_kernel.h
@@ -205,6 +205,14 @@
 extern int ptp_clock_index(struct ptp_clock *ptp);

 /**
+ * scaled_ppm_to_ppb() - convert scaled ppm to ppb
+ * @ppm: Parts per million, but with a 16 bit binary fractional field
+ */
+
+extern long scaled_ppm_to_ppb(long ppm);
+
+/**
+ * ptp_find_pin() - obtain the pin index of a given auxiliary function
+ * @ptp: The clock obtained from ptp_clock_register().
--- linux-4.15.0.orig/include/linux/ptr_ring.h
+++ linux-4.15.0/include/linux/ptr_ring.h
@@ -451,9 +451,14 @@
 __PTR_RING_PEEK_CALL_v; \
})

+/* Not all gfp_t flags (besides GFP_KERNEL) are allowed. See
+ * documentation for vmalloc for which of them are legal.
+ */
+static inline void **__ptr_ring_init_queue_alloc(unsigned int size, gfp_t gfp) {
+    -return kcalloc(size, sizeof(void *), gfp);
+    if (size > KMALLOC_MAX_SIZE / sizeof(void *))
+        return NULL;
+    return kvmalloc_array(size, sizeof(void *), gfp | __GFP_ZERO);
+}

static inline void __ptr_ring_set_size(struct ptr_ring *r, int size) {
    else if (destroy)
        destroy(ptr);

+if (producer >= size)
    producer = 0;
__ptr_ring_set_size(r, size);
r->producer = producer;
r->consumer_head = 0;
@@ -586,7 +593,7 @@
spin_unlock(&(r)->producer_lock);
spin_unlock_irqrestore(&(r)->consumer_lock, flags);

-kfree(old);
+kvfree(old);

return 0;
}
@@ -626,7 +633,7 @@
for (i = 0; i < nrings; ++i)
-kfree(queues[i]);
+kvfree(queues[i]);

kfree(queues);

@@ -634,7 +641,7 @@
omem:
while (--i >= 0)
-kfree(queues[i]);
+kvfree(queues[i]);

kfree(queues);

@@ -649,7 +656,7 @@
if (destroy)
while ((ptr = ptr_ring_consume(r)))
destroy(ptr);
-kfree(r->queue);
+kvfree(r->queue);
}
```c
#define PTRACE_MODE_REALCREDS 0x10

/* shorthands for READ/ATTACH and FSCREDS/REALCREDS combinations */
#define PTRACE_MODE_READ_FSCREDS (PTRACE_MODE_READ | PTRACE_MODE_FSCREDS)

--- linux-4.15.0.orig/include/linux/pwm.h
+++ linux-4.15.0/include/linux/pwm.h
@@ -639,7 +639,6 @@
    
    #ifdef CONFIG_PWM_SYSFS
    void pwmchip_sysfs_export(struct pwm_chip *chip);
-void pwmchip_sysfs_unexport_children(struct pwm_chip *chip);
    
    #endif
    
--- linux-4.15.0.orig/include/linux/qcom_scm.h
+++ linux-4.15.0/include/linux/qcom_scm.h
@@ -62,6 +62,9 @@
    extern int qcom_scm_io_readl(phys_addr_t addr, unsigned int *val);
    extern int qcom_scm_io_writel(phys_addr_t addr, unsigned int val);
    #else
+    #include <linux/errno.h>
+
    static inline
    int qcom_scm_set_cold_boot_addr(void *entry, const cpumask_t *cpus)
    {
    --- linux-4.15.0.orig/include/linux/qed/qed_chain.h
+++ linux-4.15.0/include/linux/qed/qed_chain.h
@@ @ -97,6 +97,11 @@
            u32 cons_idx;
        }
        
+    struct addr_tbl_entry {
+        void *virt_addr;
+        dma_addr_t dma_map;
+    }
+    
```

struct qed_chain {
    /* fastpath portion of the chain - required for commands such
     * as produce / consume.
     */
    struct qed_chain {
        /* Fastpath portions of the PBL [if exists] */
        struct {
            /* Table for keeping the virtual addresses of the chain pages,
             * respectively to the physical addresses in the pbl table.
             */
            /* Table for keeping the virtual and physical addresses of the
             * chain pages, respectively to the physical addresses
             * in the pbl table.
             */
            void **pp_virt_addr_tbl;
            struct addr_tbl_entry *pp_addr_tbl;
        }
        union {
            union {
                struct qed_chain_pbl_u16 q16;
                struct addr_tbl_entry *pp_addr_tbl;
            }
            union {
                struct qed_chain_pbl_u32 q32;
                struct addr_tbl_entry *pp_addr_tbl;
            }
        }
    }

    static inline u16 qed_chain_get_elem_left(struct qed_chain *p_chain) {
        u16 elem_per_page = p_chain->elem_per_page;
        u32 prod = p_chain->u.chain16.prod_idx;
        u32 cons = p_chain->u.chain16.cons_idx;
        u16 used;

        used = (u16) (((u32)0x10000 +
                (u32)prod - cons) - (u32)prod / elem_per_page - cons / elem_per_page);

        return (u16)(p_chain->capacity - used);
    }

    static inline u32 qed_chain_get_elem_left_u32(struct qed_chain *p_chain) {
        u16 elem_per_page = p_chain->elem_per_page;
        u64 prod = p_chain->u.chain32.prod_idx;
        u64 cons = p_chain->u.chain32.cons_idx;
        u32 used;

        return (u32)(p_chain->capacity - used);
    }
}
used = ((u64)0x100000000ULL +
    (u64)p_chain->u.chain32.prod_idx) -
    (u64)p_chain->u.chain32.cons_idx);
+if (prod < cons)
+    prod += (u64)U32_MAX + 1;
+
+used = (u32)(prod - cons);
if (p_chain->mode == QED_CHAIN_MODE_NEXT_PTR)
-    used -= p_chain->u.chain32.prod_idx / p_chain->elem_per_page -
-    p_chain->u.chain32.cons_idx / p_chain->elem_per_page;
+    used -= (u32)(prod / elem_per_page - cons / elem_per_page);
return p_chain->capacity - used;
}
@@ -287,7 +299,7 @@
*(u32 *)page_to_inc = 0;
page_index = *(u32 *)page_to_inc;
}
-    *p_next_elem = p_chain->pbl.pp_virt_addr_tbl[page_index];
+    *p_next_elem = p_chain->pbl.pp_addr_tbl[page_index].virt_addr;
}
}

@@ -537,7 +549,7 @@
p_chain->pbl_sp.p_phys_table = 0;
p_chain->pbl_sp.p_virt_table = NULL;
-p_chain->pbl.pp_virt_addr_tbl = NULL;
+p_chain->pbl.pp_addr_tbl = NULL;
}
/**
@@ -575,11 +587,11 @@
static inline void qed_chain_init_pbl_mem(struct qed_chain *p_chain,
    void *p_virt_pbl,
    dma_addr_t p_phys_pbl,
    void **pp_virt_addr_tbl)
+    struct addr_tbl_entry *pp_addr_tbl)
{
    p_chain->pbl_sp.p_phys_table = p_phys_pbl;
p_chain->pbl_sp.p_virt_table = p_virt_pbl;
-p_chain->pbl.pp_virt_addr_tbl = NULL;
+    p_chain->pbl.pp_addr_tbl = pp_addr_tbl;
}
/**
@@ -644,7 +656,7 @@
break;

case QED_CHAIN_MODE_PBL:
last_page_idx = p_chain->page_cnt - 1;
-p_virt_addr = p_chain->pbl.pp_virt_addr_tbl[last_page_idx];
+p_virt_addr = p_chain->pbl.pp_addr_tbl[last_page_idx].virt_addr;
b break;
}
/* p_virt_addr points at this stage to the last page of the chain */
@@ -663,6 +675,37 @@
static inline void qed_chain_set_prod(struct qed_chain *p_chain,
                   u32 prod_idx, void *p_prod_elem)
{
+  if (p_chain->mode == QED_CHAIN_MODE_PBL) {
+    u32 cur_prod, page_mask, page_cnt, page_diff;
+    +cur_prod = is_chain_u16(p_chain) ? p_chain->u.chain16.prod_idx :
+      p_chain->u.chain32.prod_idx;
+    +
+    /* Assume that number of elements in a page is power of 2 */
+    +page_mask = ~p_chain->elem_per_page_mask;
+    +
+    /* Use "cur_prod - 1" and "prod_idx - 1" since producer index
+     * reaches the first element of next page before the page index
+     * is incremented. See qed_chain_produce().
+     * Index wrap around is not a problem because the difference
+     * between current and given producer indices is always
+     * positive and lower than the chain's capacity.
+     */
+    +page_diff = (((cur_prod - 1) & page_mask) -
+      ((prod_idx - 1) & page_mask)) /
+      p_chain->elem_per_page;
+    +
+    +page_cnt = qed_chain_get_page_cnt(p_chain);
+    +if (is_chain_u16(p_chain))
+      +p_chain->pbl.c.u16.prod_page_idx =
+      +(p_chain->pbl.c.u16.prod_page_idx -
+        page_diff + page_cnt) % page_cnt;
+    +else
+      +p_chain->pbl.c.u32.prod_page_idx =
+      +(p_chain->pbl.c.u32.prod_page_idx -
+        page_diff + page_cnt) % page_cnt;
+    +}
+
+if (is_chain_u16(p_chain))
p_chain->u.chain16.prod_idx = (u16) prod_idx;
else
@@ -685,7 +728,7 @@
    page_cnt = qed_chain_get_page_cnt(p_chain);
for (i = 0; i < page_cnt; i++)
- memset(p_chain->pbl.pp_virt_addr_tbl[i], 0,
+ memset(p_chain->pbl.pp_virt_addr_tbl[i].virt_addr, 0,
       QED_CHAIN_PAGE_SIZE);
}

--- linux-4.15.0.orig/include/linux/quota.h
+++ linux-4.15.0/include/linux/quota.h
@@ -263,7 +263,7 @@
};

struct dqstats {
- int stat[_DQST_DQSTAT_LAST];
+ unsigned long stat[_DQST_DQSTAT_LAST];
 struct percpu_counter counter[_DQST_DQSTAT_LAST];
};

--- linux-4.15.0.orig/include/linux/quotaops.h
+++ linux-4.15.0/include/linux/quotaops.h
@@ -22,7 +22,7 @@
 /* i_mutex must being held */
 static inline bool is_quota_modification(struct inode *inode, struct iattr *ia) {
- return (ia->ia_valid & ATTR_SIZE && ia->ia_size != inode->i_size) ||
+ return (ia->ia_valid & ATTR_SIZE) ||
    (ia->ia_valid & ATTR_UID && !uid_eq(ia->ia_uid, inode->i_uid)) ||
    (ia->ia_valid & ATTR_GID && !gid_eq(ia->ia_gid, inode->i_gid));
 }
@@ -51,6 +51,16 @@
 atomic_inc(&dquot->dq_count);
 return dquot;
 }
+ +
 + static inline bool dquot_is_busy(struct dquot *dquot) {
+ if (test_bit(DQ_MOD_B, &dquot->dq_flags))
+ return true;
+ if (atomic_read(&dquot->dq_count) > 1)
+ return true;
+ return false;
+ }
+ +
 void dqput(struct dquot *dquot);
 int dquot_scan_active(struct super_block *sb,
 int (*fn)(struct dquot *dquot, unsigned long priv),
--- linux-4.15.0.orig/include/linux/random.h
+++ linux-4.15.0/include/linux/random.h

unsigned long randomize_page(unsigned long start, unsigned long range);

u32 prandom_u32(void);
void prandom_bytes(void *buf, size_t nbytes);
void prandom_seed(u32 seed);
void prandom_reseed_late(void);

struct rnd_state {
	__u32 s1, s2, s3, s4;
};

u32 prandom_u32_state(struct rnd_state *state);
void prandom_bytes_state(struct rnd_state *state, void *buf, size_t nbytes);
void prandom_seed_full_state(struct rnd_state __percpu *pcpu_state);

#define prandom_init_once(pcpu_state)			
	DO_ONCE(prandom_seed_full_state, (pcpu_state))

/**
 * prandom_u32_max - returns a pseudo-random number in interval [0, ep_ro)
 * @ep_ro: right open interval endpoint
 * *
 * Returns a pseudo-random number that is in interval [0, ep_ro). Note
 * that the result depends on PRNG being well distributed in [0, ~0U]
 * u32 space. Here we use maximally equidistributed combined Tausworthe
 * generator, that is, prandom_u32(). This is useful when requesting a
 * random index of an array containing ep_ro elements, for example.
 * *
 * * Returns: pseudo-random number in interval [0, ep_ro)
 * *
 */
static inline u32 prandom_u32_max(u32 ep_ro)
{
	return (u32)(((u64) prandom_u32() * ep_ro) >> 32);
}

/*
 * Handle minimum values for seeds
 * *
 */
static inline u32 __seed(u32 x, u32 m)
{
	return (x < m) ? x + m : x;
}

/**
 * prandom_seed_state - set seed for prandom_u32_state().
 * @state: pointer to state structure to receive the seed.
 */
- * @seed: arbitrary 64-bit value to use as a seed.
+ * This is designed to be standalone for just prandom
+ * users, but for now we include it from <linux/random.h>
+ * for legacy reasons.
+ */
-static inline void prandom_seed_state(struct rnd_state *state, u64 seed)
-{  
-    u32 i = (seed >> 32) ^ (seed << 10) ^ seed;
-    
-    state->s1 = __seed(i, 2U);
-    state->s2 = __seed(i, 8U);
-    state->s3 = __seed(i, 16U);
-    state->s4 = __seed(i, 128U);
- }
+
+#include <linux/prandom.h>

#define CONFIG_ARCH_RANDOM
#include <asm/archrandom.h>
@@ -192,10 +143,4 @@
}
#endif

/* Pseudo random number generator from numerical recipes. */
-static inline u32 next_pseudo_random32(u32 seed)
-{  
-    return seed * 1664525 + 1013904223;
- }

-#endif /* _LINUX_RANDOM_H */
--- linux-4.15.0.orig/include/linux/rculist_nulls.h
+++ linux-4.15.0/include/linux/rculist_nulls.h
@@ -34,7 +34,7 @@
{
    if (!hlist_nulls_unhashed(n)) {
       __hlist_nulls_del(n);
-        n->pprev = NULL;
+        WRITE_ONCE(n->pprev, NULL);
    }  
}

@@ -66,7 +66,7 @@
 static inline void hlist_nulls_del_rcu(struct hlist_nulls_node *n)
 {  
    __hlist_nulls_del(n);
-        n->pprev = LIST_POISON2;
+        WRITE_ONCE(n->pprev, LIST_POISON2);
    }  

	
n->next = first;
-n->pprev = &h->first;
  +WRITE_ONCE(n->pprev, &h->first);
rcu_assign_pointer(hlist_nulls_first_rcu(h), n);
if (!is_a_nulls(first))
  -first->pprev = &n->next;
  +WRITE_ONCE(first->pprev, &n->next);
+}
+
+/**
+ * hlist_nulls_add_tail_rcu
+ * @n: the element to add to the hash list.
+ * @h: the list to add to.
+ *
+ * Description:
+ * Adds the specified element to the specified hlist_nulls,
+ * while permitting racing traversals.
+ *
+ * The caller must take whatever precautions are necessary
+ * (such as holding appropriate locks) to avoid racing
+ * with another list-mutation primitive, such as hlist_nulls_add_head_rcu()
+ * or hlist_nulls_del_rcu(), running on this same list.
+ * However, it is perfectly legal to run concurrently with
+ * the _rcu list-traversal primitives, such as
+ * hlist_nulls_for_each_entry_rcu(), used to prevent memory-consistency
+ * problems on Alpha CPUs. Regardless of the type of CPU, the
+ * list-traversal primitive must be guarded by rcu_read_lock().
+ */
+static inline void hlist_nulls_add_tail_rcu(struct hlist_nulls_node *n,
+    struct hlist_nulls_head *h)
+{
+struct hlist_nulls_node *i, *last = NULL;
+
+/* Note: write side code, so rcu accessors are not needed. */
+for (i = h->first; !is_a_nulls(i); i = i->next)
+last = i;
+
+if (last) {
+n->next = last->next;
+n->pprev = &last->next;
+rcu_assign_pointer(hlist_next_rcu(last), n);
+} else {
+hlist_nulls_add_head_rcu(n, h);
+}
static inline void __rcu_read_lock(void)
{
    if (IS_ENABLED(CONFIG_PREEMPT_COUNT))
        preempt_disable();
    __rcu_read_lock();
}

static inline void __rcu_read_unlock(void)
{
    if (IS_ENABLED(CONFIG_PREEMPT_COUNT))
        preempt_enable();
    __acquire(RCU);
}

static inline void synchronize_rcu(void)
{
    __rcu_read_lock();
    __acquire(RCU);
}

--- linux-4.15.0.orig/include/linux/ab8500.h
+++ linux-4.15.0/include/linux/ab8500.h
@@ -38,14 +38,11 @@
    AB8505_SYSCLKREQ_4,
    AB8505_LDO_ANA,
    AB8505_SYSCLKREQ_2,
-AB8505_SYSCLKREQ_4,
    AB8505_NUM_REGULATORS,
};
* These modes can be OR'ed together to make up a mask of valid register modes.

*/

#define REGULATOR_MODE_INVALID 0x0
#define REGULATOR_MODE_FAST 0x1
#define REGULATOR_MODE_NORMAL 0x2
#define REGULATOR_MODE_IDLE 0x4

static inline int regulator_set_load(struct regulator *regulator, int load_uA) {
    return REGULATOR_MODE_NORMAL;
    +return 0;
}

static inline int regulator_allow_bypass(struct regulator *regulator, int floor) {
    return -EINVAL;
}

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 + * GNU General Public License for more details.
 + */

#ifndef __QCOM_SMD_REGULATOR_H_
#define __QCOM_SMD_REGULATOR_H_
+
#endif

+if IS_ENABLED(CONFIG_REGULATOR_QCOM_SMD_RPM)
+int qcom_rpm_set_floor(struct regulator *regulator, int floor);
+int qcom_rpm_set_corner(struct regulator *regulator, int corner);
+#else
+static inline int qcom_rpm_set_floor(struct regulator *regulator, int floor) {
+    return -EINVAL;
+}
+static inline int qcom_rpm_set_corner(struct regulator *regulator, int corner) {
+    return -EINVAL;
+}

--- linux-4.15.0.orig/include/linux/regulator/consumer.h
+++ linux-4.15.0/include/linux/regulator/consumer.h
@@ -80,6 +80,7 @@
*/

#define REGULATOR_MODE_INVALID 0x0
#define REGULATOR_MODE_FAST 0x1
#define REGULATOR_MODE_NORMAL 0x2
#define REGULATOR_MODE_IDLE 0x4
@@ -507,7 +508,7 @@
static inline int regulator_set_load(struct regulator *regulator, int load_uA) {
    return REGULATOR_MODE_NORMAL;
    +return 0;
}

static inline int regulator_allow_bypass(struct regulator *regulator, int floor) {
    return -EINVAL;
}

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 + * GNU General Public License for more details.
 + */

#ifndef __QCOM_SMD_REGULATOR_H_
#define __QCOM_SMD_REGULATOR_H_
+
#endif

+if IS_ENABLED(CONFIG_REGULATOR_QCOM_SMD_RPM)
+int qcom_rpm_set_floor(struct regulator *regulator, int floor);
+int qcom_rpm_set_corner(struct regulator *regulator, int corner);
+#else
+static inline int qcom_rpm_set_floor(struct regulator *regulator, int floor) {
+    return -EINVAL;
+}
+static inline int qcom_rpm_set_corner(struct regulator *regulator, int corner) {
+    return -EINVAL;
+}
#ifdef
+
+#endif
--- linux-4.15.0.orig/include/linux/relay.h
+++ linux-4.15.0/include/linux/relay.h
@@ -66,7 +66,7 @@
 struct kref kref; /* channel refcount */
 void *private_data; /* for user-defined data */
 size_t last_toobig; /* tried to log event > subbuf size */
-struct rchan_buf ** __percpu buf; /* per-cpu channel buffers */
+struct rchan_buf * __percpu *buf; /* per-cpu channel buffers */
 int is_global; /* One global buffer? */
 struct list_head list; /* for channel list */
 struct dentry *parent; /* parent dentry passed to open */
--- linux-4.15.0.orig/include/linux/reset-controller.h
+++ linux-4.15.0/include/linux/reset-controller.h
@@ -7,7 +7,7 @@
 struct reset_controller_dev;
/**
 - * struct reset_control_ops
+ * struct reset_control_ops - reset controller driver callbacks
 *
+ * @reset: for self-deasserting resets, does all necessary
+     things to reset the device
--- linux-4.15.0.orig/include/linux/reset.h
+++ linux-4.15.0/include/linux/reset.h
@@ -20,22 +20,16 @@
 int index, bool shared,
 bool optional);
 void reset_control_put(struct reset_control *rstc);
+int __device_reset(struct device *dev, bool optional);
 struct reset_control *__devm_reset_control_get(struct device *dev,
     const char *id, int index, bool shared,
     bool optional);

-int __must_check device_reset(struct device *dev);
-
 struct reset_control *devm_reset_control_array_get(struct device *dev,
     bool shared, bool optional);
 struct reset_control *of_reset_control_array_get(struct device_node *np,
     bool shared, bool optional);

-static inline int device_reset_optional(struct device *dev)
-{
-    return device_reset(dev);
-}
ifdef
#define

static inline int reset_control_reset(struct reset_control *rstc)
{
}

static inline int __must_check device_reset(struct device *dev)
{
-WARN_ON(1);
-return -ENOTSUPP;
-
-
-static inline int device_reset_optional(struct device *dev)
+static inline int __device_reset(struct device *dev, bool optional)
{
-return -ENOTSUPP;
+return optional ? 0 : -ENOTSUPP;
}

static inline struct reset_control *__of_reset_control_get(
@@ -109,6 +97,16 @@
#endif /* CONFIG_RESET_CONTROLLER */

+static inline int __must_check device_reset(struct device *dev)
+{
+__device_reset(dev, false);
+}
+
+static inline int device_reset_optional(struct device *dev)
+{
+__device_reset(dev, true);
+}
+
/**
 * reset_control_get_exclusive - Lookup and obtain an exclusive reference
 * to a reset controller.
 @@ -127,9 +125,6 @@
 static inline struct reset_control *
 __must_check reset_control_get_exclusive(struct device *dev, const char *id)
 {
-#ifdef CONFIG_RESET_CONTROLLER
-WARN_ON(1);
-#endif

 return __reset_control_get(dev, id, 0, false, false);
}
__must_check devm_reset_control_get_exclusive(struct device *dev,
   const char *id)
{
    #ifndef CONFIG_RESET_CONTROLLER
    WARN_ON(1);
    #endif
    return __devm_reset_control_get(dev, id, 0, false, false);
}

--- linux-4.15.0.orig/include/linux/rhashtable.h
+++ linux-4.15.0/include/linux/rhashtable.h
@@ -152,25 +152,25 @@
/**
 * struct rhashtable - Hash table handle
 * @tbl: Bucket table
- * @nelems: Number of elements in table
- * @key_len: Key length for hashfn
- * @p: Configuration parameters
- * @max elems: Maximum number of elements in table
+ * @p: Configuration parameters
+ * @max elems: Maximum number of elements in table
+ * @rhlist: True if this is an rhtable
+ * @run_work: Deferred worker to expand/shrink asynchronously
+ * @mutex: Mutex to protect current/future table swapping
+ * @lock: Spin lock to protect walker list
+ * @nelems: Number of elements in table
 */
struct rhashtable {
  struct bucket_table __rcu*tbl;
-atomic_t nelems;
  unsigned intkey_len;
-struct rhashtable_params*p;
  unsigned intmax elems;
+struct rhashtable_params*p;
  bool rhlist;
  struct work_struct*run_work;
  struct mutex mutex;
  spinlock_t lock;
+atomic_t nelems;
};

/**
@@ -750,8 +750,10 @@
if (!key ||
    (params.obj_cmpfn ?
        params.obj_cmpfn(&arg, rht_obj(ht, head)) :
-    rhashtable_compare(&arg, rht_obj(ht, head)))

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```c
+     rhashtable_compare(&arg, rht_obj(ht, head))) { 
+     pprev = &head->next; 
continue; 
+ }

data = rht_obj(ht, head);

--- linux-4.15.0.orig/include/linux/ring_buffer.h
+++ linux-4.15.0/include/linux/ring_buffer.h
@@ -123,7 +123,7 @@
unsigned long *lost_events);
struct ring_buffer_iter *
-ring_buffer_read_prepare(struct ring_buffer *buffer, int cpu);
+ring_buffer_read_prepare(struct ring_buffer *buffer, int cpu, gfp_t flags);
void ring_buffer_read_prepare_sync(void);
void ring_buffer_read_start(struct ring_buffer_iter *iter);
void ring_buffer_read_finish(struct ring_buffer_iter *iter);
@@ -160,6 +160,7 @@
void ring_buffer_record_off(struct ring_buffer *buffer);
void ring_buffer_record_on(struct ring_buffer *buffer);
int ring_buffer_record_is_on(struct ring_buffer *buffer);
+int ring_buffer_record_is_set_on(struct ring_buffer *buffer);
void ring_buffer_record_disable_cpu(struct ring_buffer *buffer, int cpu);
void ring_buffer_record_enable_cpu(struct ring_buffer *buffer, int cpu);

--- linux-4.15.0.orig/include/linux/rmap.h
+++ linux-4.15.0/include/linux/rmap.h
@@ -98,7 +98,8 @@
* do a final flush if necessary */
TTU_RMAP_LOCKED		= 0x80, /* do not grab rmap lock: 
* caller holds it */
-TTU_SPLIT_FREEZE	= 0x100, /* freeze pte under splitting thp */
+TTU_SPLIT_FREEZE	= 0x100, /* freeze pte under splitting thp */
+TTU_SYNC		= 0x200, /* avoid racy checks with PVMW_SYNC */
};
#endif CONFIG_MMU
@@ -214,7 +215,8 @@
static inline void page_vma_mapped_walk_done(struct page_vma_mapped_walk *pvmw)
{ 
-    if (pvmw->pte)
+ /* HugeTLB pte is set to the relevant page table entry without pte_mapped. */
+    if (pvmw->pte && !PageHuge(pvmw->page))
    pte_unmap(pvmw->pte);
    if (pvmw->ptl)
    spin_unlock(pvmw->ptl);
```
--- linux-4.15.0.orig/include/linux/rtmutex.h
+++ linux-4.15.0/include/linux/rtmutex.h
@@ -106,7 +106,14 @@
 extern void __rt_mutex_init(struct rt_mutex *lock, const char *name, struct lock_class_key *key);
 extern void rt_mutex_destroy(struct rt_mutex *lock);
 
+#ifdef CONFIG_DEBUG_LOCK_ALLOC
+extern void rt_mutex_lock_nested(struct rt_mutex *lock, unsigned int subclass);
+#define rt_mutex_lock(lock) rt_mutex_lock_nested(lock, 0)
+#else
 extern void rt_mutex_lock(struct rt_mutex *lock);
+#define rt_mutex_lock_nested(lock, subclass) rt_mutex_lock(lock)
+#endif

 extern int rt_mutex_lock_interruptible(struct rt_mutex *lock);
 extern int rt_mutex_timed_lock(struct rt_mutex *lock,
 struct hrtimer_sleeper *timeout);
--- linux-4.15.0.orig/include/linux/rtnetlink.h
+++ linux-4.15.0/include/linux/rtnetlink.h
@@ -19,10 +19,11 @@
 void rtmsg_ifinfo(int type, struct net_device *dev, unsigned change, gfp_t flags);
 void rtmsg_ifinfo_newnet(int type, struct net_device *dev, unsigned int change,
 -    gfp_t flags, int *new_nsid);
+    gfp_t flags, int *new_nsid, int new_ifindex);
 struct sk_buff *rtmsg_ifinfo_build_skb(int type, struct net_device *dev,
 -    unsigned change, u32 event,
+    gfp_t flags, int *new_nsid);
+    gfp_t flags, int *new_nsid,
+    int new_ifindex);
 void rtmsg_ifinfo_send(struct sk_buff *skb, struct net_device *dev,
 gfp_t flags);

--- linux-4.15.0.orig/include/linux/rtssx_common.h
+++ linux-4.15.0/include/linux/rtssx_common.h
@@ -0,0 +1,50 @@
+/* Driver for Realtek driver-based card reader
+ *
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+ *
+ * Author:
+ * Wei WANG <wei_wang@realsil.com.cn>
+ */
+
+#ifndef __RTSX_COMMON_H
#define __RTSX_COMMON_H
+
#define DRV_NAME_RTSX_PCI	"rtsx_pci"
#define DRV_NAME_RTSX_PCI_SDMMC	"rtsx_pci_sdmmc"
#define DRV_NAME_RTSX_PCI_MS	"rtsx_pci_ms"
+
#define RTSX_REG_PAIR(addr, val)((u32)(addr) << 16) | (u8)(val))
+
#define RTSX_SSC_DEPTH_4M0x01
#define RTSX_SSC_DEPTH_2M0x02
#define RTSX_SSC_DEPTH_1M0x03
#define RTSX_SSC_DEPTH_500K0x04
#define RTSX_SSC_DEPTH_250K0x05
+
#define RTSX_SD_CARD		0
#define RTSX_MS_CARD		1
+
#define CLK_TO_DIV_N		0
#define DIV_N_TO_CLK		1
+
struct platform_device;
+
struct rtsx_slot {
	struct platform_device	*p_dev;
	void			(*card_event)(struct platform_device *p_dev);
+};
+
#endif
--- linux-4.15.0.orig/include/linux/rtsx_pci.h
+++ linux-4.15.0/include/linux/rtsx_pci.h
@@ -0,0 +1,1367 @@
+/* Driver for Realtek PCI-Express card reader
+ *
+ * Copyright(c) 2009-2013 Realtek Semiconductor Corp. All rights reserved.
+ *
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+ * under the terms of the GNU General Public License as published by the
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+ * with this program; if not, see <http://www.gnu.org/licenses/>.  
+ *
+ * Author:  
+ *   Wei WANG <wei_wang@realsil.com.cn>  
+ */

#ifndef __RTSX_PCI_H
#define __RTSX_PCI_H

#include <linux/sched.h>
#include <linux/pci.h>
#include <linux/rtsx_common.h>

#define MAX_RW_REG_CNT	1024
#define RTSX_HCBAR	0x00
#define RTSX_HCBCTLR	0x04
#define STOP_CMD	(0x01 << 28)
#define READ_REG_CMD	0
#define WRITE_REG_CMD	1
#define CHECK_REG_CMD	2
#define RTSX_HDBAR	0x08
#define SG_INT	0x04
#define SG_END	0x02
#define SG_VALID	0x01
#define SG_NO_OP	0x00
#define SG_TRANS_DATA	(0x02 << 4)
#define SG_LINK_DESC	(0x03 << 4)
#define RTSX_HDBCTLR	0x0C
#define SDMA_MODE	0x00
#define ADMA_MODE	(0x02 << 26)
#define STOP_DMA	(0x01 << 28)
#define TRIG_DMA	(0x01 << 31)
#define RTSX_HAIMR	0x10
#define HAIMR_TRANS_START	(HAIMR_TRANS_START | HAIMR_READ)
#define HAIMR_READ0x00
#define HAIMR_WRITE	(0x01 << 30)
#define HAIMR_READ_START	(HAIMR_TRANS_START | HAIMR_READ)
/*
 * macros for easy use
 */
#define rtsx_pci_writel(pcr, reg, value) \
    iowrite32(value, (pcr)->remap_addr + reg)
#define rtsx_pci_readl(pcr, reg) \

+ioread32((pcr)->remap_addr + reg)
+#define rtsx_pci_writew(pcr, reg, value) \
+iowrite16(value, (pcr)->remap_addr + reg)
+#define rtsx_pci_readw(pcr, reg) \
+ioread16((pcr)->remap_addr + reg)
+#define rtsx_pci_writeb(pcr, reg, value) \
+iowrite8(value, (pcr)->remap_addr + reg)
+#define rtsx_pci_readb(pcr, reg) \
+ioread8((pcr)->remap_addr + reg)
+
+#define rtsx_pci_read_config_byte(pcr, where, val) \
+pci_read_config_byte((pcr)->pci, where, val)
+
+#define rtsx_pci_write_config_byte(pcr, where, val) \
+pci_write_config_byte((pcr)->pci, where, val)
+
+#define rtsx_pci_read_config_dword(pcr, where, val) \
+pci_read_config_dword((pcr)->pci, where, val)
+
+#define rtsx_pci_write_config_dword(pcr, where, val) \
+pci_write_config_dword((pcr)->pci, where, val)
+
+STATE_TRANS_NONE		0
+STATE_TRANS_CMD			1
+STATE_TRANS_BUF			2
+STATE_TRANS_SG			3
+
+TRANS_NOT_READY			0
+TRANS_RESULT_OK			1
+TRANS_RESULT_FAIL		2
+TRANS_NO_DEVICE		3
+
+RTSX_RESV_BUF_LEN		4096
+HOST_CMDS_BUF_LEN		1024
+HOST_SG_TBL_BUF_LEN		(RTSX_RESV_BUF_LEN - HOST_CMDS_BUF_LEN)
+HOST_SG_TBL_ITEMS		(HOST_SG_TBL_BUF_LEN / 8)
+MAX_SG_ITEM_LEN			0x80000
+HOST_TO_DEVICE			0
+DEVICE_TO_HOST			1
+
+OUTPUT_3V3			0
+OUTPUT_1V8			1
+
+RTSX_PHASE_MAX			32
+RX_TUNING_CNT			3
+
+MS_CFG			0xFD40
+SAMPLE_TIME_RISING		0xFD40
+#define SAMPLE_TIME_FALLING 0x80
+#define PUSH_TIME_DEFAULT 0x00
+#define PUSH_TIME_ODD 0x40
+#define NO_EXTEND_TOGGLE 0x00
+#define EXTEND_TOGGLE_CHK 0x20
+#define MS_BUS_WIDTH_10x00
+#define MS_BUS_WIDTH_40x10
+#define MS_BUS_WIDTH_80x18
+#define MS_2K_SECTOR_MODE 0x04
+#define MS_512_SECTOR_MODE 0x00
+#define MS_TOGGLE_TIMEOUT_EN 0x00
+#define MS_TOGGLE_TIMEOUT_DISEN 0x01
+#define MS_NO_CHECK_INT 0x02
+#define MS_TPCx0xFD41
+#define MS_TRANS_CFGx0xFD42
+#define WAIT_INT 0x80
+#define NO_WAIT_INT 0x00
+#define NO_AUTO_READ_INT_REG 0x00
+#define AUTO_READ_INT_REG 0x40
+#define MS_CRC16_ERR 0x20
+#define MS_RDY_TIMEOUT 0x10
+#define MS_INT_CMDNK 0x08
+#define MS_INT_BREQ 0x04
+#define MS_INT_ERR 0x02
+#define MS_INT_CED 0x01
+#define MS_TRANSFER 0xFD43
+#define MS_TRANSFER_START 0x80
+#define MS_TRANSFER_END 0x40
+#define MS_TRANSFER_ERR 0x20
+#define MS_BS_STATE 0x10
+#define MS_TM_READBYTES 0x00
+#define MS_TM_NORMAL_READ 0x01
+#define MS_TM_WRITEBYTES 0x04
+#define MS_TM_NORMAL_WRITE 0x05
+#define MS_TM_AUTO_READ 0x08
+#define MS_TM_AUTO_WRITE 0x0C
+#define MS_INT_REG 0xFD44
+#define MS_BYTE_CNT 0xFD45
+#define MS_SECTOR_CNT_L 0xFD46
+#define MS_SECTOR_CNT_H 0xFD47
+#define MS_DBUS_H 0xFD48
+
+##define SD_CFG1 0xFDA0
+##define SD_CLK_DIVIDE_0 0x00
+##define SD_CLK_DIVIDE_256 0xC0
+##define SD_CLK_DIVIDE_128 0x80
+##define SD_BUS_WIDTH_1BIT 0x00
+##define SD_BUS_WIDTH_4BIT 0x01

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**Open Source Used In 5GasS Edge AC-4 32259**
+#define SD_BUS_WIDTH_8BIT0x02
+#define SD_ASYNC_FIFO_NOT_RST0x10
+#define SD_20_MODE0x00
+#define SD_DDR_MODE0x04
+#define SD_30_MODE0x08
+#define SD_CLK_DIVIDE_MASK0xC0
+#define SD_MODE_SELECT_MASK0x0C
+#define SD_CFG20xFD0A
+#define SD_CALCULATE_CRC70x00
+#define SD_NO_CALCULATE_CRC70x80
+#define SD_CHECK_CRC160x00
+#define SD_NO_CHECK_CRC160x40
+#define SD_NO_CHECK_WAIT_CRC_TO0x20
+#define SD_WAIT_BUSY_END0x08
+#define SD_NO_WAIT_BUSY_END0x00
+#define SD_CHECK_CRC70x00
+#define SD_NO_CHECK_CRC70x04
+#define SD_RSP_LEN_00x00
+#define SD_RSP_LEN_60x01
+#define SD_RSP_LEN_170x02
+#define SD_RSP_TYPE_R00x04
+#define SD_RSP_TYPE_R10x01
+#define SD_RSP_TYPE_R1b0x09
+#define SD_RSP_TYPE_R20x02
+#define SD_RSP_TYPE_R30x05
+#define SD_RSP_TYPE_R40x05
+#define SD_RSP_TYPE_R50x01
+#define SD_RSP_TYPE_R60x01
+#define SD_RSP_TYPE_R70x01
+#define SD_CFG30xFD0A
+#define SD30_CLK_END_EN0x10
+#define SD_RSP_80CLK_TIMEOUT_EN0x01
+  +
+  +#define SD_STAT10xFD0A
+  +#define SD_CRC7_ERR0x80
+  +#define SD_CRC16_ERR0x40
+  +#define SD_CRC_WRITE_ERR0x20
+  +#define SD_CRC_WRITE_ERR_MASK0x1C
+  +#define GET_CRC_TIME_OUT0x02
+  +#define SD_TUNINGCOMPARE_ERR0x01
+  +#define SD_STAT20xFD0A
+  +#define SD_RSP_80CLK_TIMEOUT0x01
  +
  +#define SD_BUS_STAT0xFD0A
  +#define SD_CLK_TOGGLE_EN0x08
  +#define SD_CLK_FORCE_STOP0x40
  +#define SD_DAT3_STATUS0x10
  +#define SD_DAT2_STATUS0x08
+define SD_DAT1_STATUS 0x04
+define SD_DAT0_STATUS 0x02
+define SD_CMD_STATUS 0x01
+define SD_PAD_CTL 0xFDA6
+define SD_IO_USING_1V8 0x80
+define SD_IO_USING_3V3 0x7F
+define TYPE_A_DRIVING 0x00
+define TYPE_B_DRIVING 0x01
+define TYPE_C_DRIVING 0x02
+define TYPE_D_DRIVING 0x03
+define SD_SAMPLE_POINT_CTL 0xFDA7
+define DDR_FIX_RX_DAT0 0x00
+define DDR_VAR_RX_DAT0 0x80
+define DDR_FIX_RX_DAT_EDGE 0x00
+define DDR_FIX_RX_DAT_14_DELAY 0x40
+define DDR_FIX_RX_CMD 0x00
+define DDR_VAR_RX_CMD 0x20
+define DDR_FIX_RX_CMD_POS_EDGE 0x00
+define DDR_FIX_RX_CMD_14_DELAY 0x10
+define SD20_RX_POS_EDGE 0x00
+define SD20_RX_14_DELAY 0x08
+define SD20_RX_SEL_MASK 0x08
+define SD_PUSH_POINT_CTL 0xFDA8
+define DDR_FIX_TX_CMD_DAT 0x00
+define DDR_VAR_TX_CMD_DAT 0x80
+define DDR_FIX_TX_DAT_14_TSU 0x00
+define DDR_FIX_TX_DAT_12_TSU 0x40
+define DDR_FIX_TX_CMD_NEG_EDGE 0x00
+define DDR_FIX_TX_CMD_14_AHEAD 0x20
+define SD20_TX_NEG_EDGE 0x00
+define SD20_TX_14_AHEAD 0x10
+define SD20_TX_SEL_MASK 0x10
+define DDR_VAR_SDCALLK_POL_SWAP 0x01
+define SD_CMD0 0xFDA9
+define SD_CMD_START 0x80
+define SD_CMD0x40
+define SD_CMD10xFDA
+define SD_CMD20xFDAB
+define SD_CMD30xFDAC
+define SD_CMD40xFDAD
+define SD_CMD50xFDAE
+define SD_BYTE_CNT_L0xFDFA
+define SD_BYTE_CNT_H0xFDAB
+define SD_BLOCK_CNT_L0xFDFA
+define SD_BLOCK_CNT_H0xFDAB
+define SD_TRANSFER0xFD3
+define SD_TRANSFER_START0xFD0
+define SD转让_END0xFD0
+define SD_STAT_IDLE 0x20
// Open Source Used In 5GaaS Edge AC-4

#define SD_VPCLK1_CTL 0xFC2B
#define PHASE_SELECT_MASK 0x1F
#define SD_DCMP50_CTL 0xFC2C
#define SD_DCMP51_CTL 0xFC2D
#define SD_VPTX_CTL SD_VPCLK0_CTL
#define SD_VPRX_CTL SD_VPCLK1_CTL
#define PHASE_CHANGE 0x80
#define PHASE_NOT_RESET 0x40
#define SD_DCMP55_TX_CTL 0xFC2E
#define SD_DCMP55_RX_CTL 0xFC2F
#define DCMPS_CHANGE 0x80
#define DCMPS_CHANGE_DONE 0x40
#define DCMPS_ERROR 0x20
#define DCMPS_CURRENT_PHASE 0x1F
#define CARD_CLK_SOURCE 0xFC2E
#define CRC_FIX_CLK (0x00 << 0)
#define CRC_VAR_CLK0 (0x01 << 0)
#define CRC_VAR_CLK1 (0x02 << 0)
#define SD30_FIX_CLK (0x00 << 2)
#define SD30_VAR_CLK0 (0x01 << 2)
#define SD30_VAR_CLK1 (0x02 << 2)
#define SAMPLE_FIX_CLK (0x00 << 4)
#define SAMPLE_VAR_CLK0 (0x01 << 4)
#define SAMPLE_VAR_CLK1 (0x02 << 4)
#define CARD_PWR_CTL 0xFD50
#define PMOS_STRG_MASK 0x10
#define PMOS_STRG_800mA 0x10
#define PMOS_STRG_400mA 0x00
#define SD_POWER_OFF 0x03
#define SD_PARTIAL_POWER_ON 0x01
#define SD_POWER_OFF0x00
#define SD_POWER_ON0x00
#define SD_POWER_MASK0x03
#define MS_POWER_OFF0x0C
#define MS_PARTIAL_POWER_ON0x04
#define MS_POWER_OFF0x00
#define MS_POWER_MASK0x0C
#define BPP_POWER_OFF0x0F
#define BPP_POWER_5_PERCENT_ON0x0E
#define BPP_POWER_10_PERCENT_ON0x0C
#define BPP_POWER_15_PERCENT_ON0x08
#define BPP_POWER_ON0x00
#define BPP_POWER_MASK0x0F
#define SD_VCC_PARTIAL_POWER_ON0x02
#define SD_VCC_POWER_ON0x00
#define CARD_CLK_SWITCH0xFD51
#define RTL8411B_PACKAGE_MODE0xFD51
#define CARD_SHARE_MODE0xFD52
#define CARD_SHARE_MASK0xFD52
+#define CARD_SHARE_MULTI_LUN0x00
+#define CARD_SHARE_NORMAL0x00
+#define CARD_SHARE_48_SD0x04
+#define CARD_SHARE_48_MS0x08
+#define CARD_SHARE_BAROSSA_SD0x01
+#define CARD_SHARE_BAROSSA_MS0x02
+#define CARD_DRIVE_SEL0xFD53
+#define MS_DRIVE_8mA(0x01 << 6)
+#define MMC_DRIVE_8mA(0x01 << 4)
+#define XD_DRIVE_8mA(0x01 << 2)
+#define GPIO_DRIVE_8mA0x01
+#define RTS5209_CARD_DRIVE_DEFAULT(MS_DRIVE_8mA | MMC_DRIVE_8mA |
+XD_DRIVE_8mA | GPIO_DRIVE_8mA)
+#define RTL8411_CARD_DRIVE_DEFAULT(MS_DRIVE_8mA | MMC_DRIVE_8mA |
+XD_DRIVE_8mA)
+#define RTSX_CARD_DRIVE_DEFAULT(MS_DRIVE_8mA | GPIO_DRIVE_8mA)
+
+#define CARD_STOP0xFD54
+#define SPI_STOP0x01
+#define XD_STOP0x02
+#define SD_STOP0x04
+#define MS_STOP0x08
+#define SPI_CLR_ERR0x10
+#define XD_CLR_ERR0x20
+#define SD_CLR_ERR0x40
+#define MS_CLR_ERR0x80
+#define CARD_OE0xFD55
+#define SD_OUTPUT_EN0x04
+#define MS_OUTPUT_EN0x08
+#define CARD_AUTO_BLINK0xFD56
+#define CARD_GPIO дир0xFD57
+#define CARD_GPIO0xFD58
+#define CARD_DATA_SOURCE0xFD5B
+#define PINGPONG BUFFER0x01
+#define RING BUFFER0x00
+#define SD30_CLK_DRIVE_SEL0xFD5A
+#define DRIVER_TYPE_A0x05
+#define DRIVER_TYPE_B0x03
+#define DRIVER_TYPE_C0x02
+#define DRIVER_TYPE_D0x01
+#define CARD_SELECT0xFD5C
+#define SD_MOD_SEL2
+#define MS_MOD_SEL3
+#define SD30_DRIVE_SEL0xFD5E
+#define CFG_DRIVER_TYPE_A0x02
+#define CFG_DRIVER_TYPE_B0x03
+#define CFG_DRIVER_TYPE_C0x01
+#define CFG_DRIVER_TYPE_D0x00
+#define SD30_CMD_DRIVE_SEL	0xFD5E
+#define SD30_DAT_DRIVE_SEL	0xFD5F
+#define CARD_CLK_EN	0xFD69
+#define SD_CLK_EN	0x04
+#define MS_CLK_EN	0x08
+#define SD40_CLK_EN	0x10
+#define SDIO_CTRL0xFD6B
+#define CD_PAD_CTL	0xFD73
+#define CD_DISABLE_MASK	0x07
+#define MS_CD_DISABLE	0x04
+#define SD_CD_DISABLE	0x02
+#define XD_CD_DISABLE	0x01
+#define CD_DISABLE	0x07
+#define CD_ENABLE	0x00
+#define MS_CD_EN_ONLY	0x03
+#define SD_CD_EN_ONLY	0x05
+#define XD_CD_EN_ONLY	0x06
+#define FORCE_CD_LOW_MASK	0x38
+#define FORCE_CD_XD_LOW	0x08
+#define FORCE_CD_SD_LOW	0x10
+#define FORCE_CD_MS_LOW	0x20
+#define CD_AUTO_DISABLE	0x40
+#define FPDCTL0xFD6C
+#define SSC_POWER_DOWN	0x01
+#define SD_OC_POWER_DOWN	0x02
+#define ALL_POWER_DOWN	0x03
+#define OC_POWER_DOWN	0x02
+#define PDINFO0xFD6D
+  +
+  +#define CLK_CTL0xFD6E
+  +#define CHANGE_CLK0xFD6F
+  +#define CLK_LOW_FREQ0xFD70
+  +
+  +#define CLK_DIV0xFD71
+  +#define CLK_DIV_10x01
+  +#define CLK_DIV_20x02
+  +#define CLK_DIV_40x03
+  +#define CLK_DIV_80x05
+  +#define CLK_SELOxFD73
+  +
+  +#define SSC_DIV_N_00xFD74
+  +#define SSC_DIV_N_10xFD75
+  +#define SSC_CTL0xFD76
+  +#define SSC_RSTB0xFD77
+  +#define SSC_8X_EN0xFD78
+  +#define SSC_FIX_FRAC0xFD79
+  +#define SSC_SEL_1M0xFD7A
+  +#define SSC_SEL_2M0xFD7B

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+#define    SSC_SEL_4M			0x10
+#define    SSC_SEL_8M			0x18
+#define SSC_CTL2			0xFC12
+#define    SSC_DEPTH_MASK		0x07
+#define    SSC_DEPTH_DISALBE		0x00
+#define    SSC_DEPTH_4M			0x01
+#define    SSC_DEPTH_2M			0x02
+#define    SSC_DEPTH_1M			0x03
+#define    SSC_DEPTH_500K		0x04
+#define    SSC_DEPTH_250K		0x05
+#define RCCTL0xFC14
+
+##define FPGA_PULL_CTL0xFC1D
+##define OLT_LED_CTL0xFC1E
+##define LED_SHINE_MASK0x08
+##define LED_SHINE_EN0x08
+##define LED_SHINE_DISABLE0x00
+##define GPIO_CTL0xFC1F
+
+##define LDO_CTL0xFC1E
+##define BPP_AsIC_1V70x00
+##define BPP_AsIC_1V80x01
+##define BPP_AsIC_1V90x02
+##define BPP_AsIC_2V00x03
+##define BPP_AsIC_2V70x04
+##define BPP_AsIC_2V80x05
+##define BPP_AsIC_3V20x06
+##define BPP_AsIC_3V30x07
+##define BPP_REG_TUNED180x07
+##define BPP_TUNED18_SHIFT_84025
+##define BPP_TUNED18_SHIFT_84114
+##define BPP_PAD_MASK0x04
+##define BPP_PAD_3V30x04
+##define BPP_PAD_1V80x00
+##define BPP_LDO_POWB0x03
+##define BPP_LDO_ON0x00
+##define BPP_LDO_SUSPEND0x02
+##define BPP_LDO_OFF0x03
+##define EFUSE_CTL0xFC30
+##define EFUSE_ADD0xFC31
+##define SYS_VER0xFC32
+##define EFUSE_DATAL0xFC34
+##define EFUSE_DATAH0xFC35
+
+##define CARD_PULL_CTL0xFD60
+##define CARD_PULL_CTL0xFD61
+##define CARD_PULL_CTL30xFD62
+##define CARD_PULL_CTL40xFD63
/* PCI Express Related Registers */
#define IRQEN0			0xFE20
#define IRQSTAT0			0xFE21
#define DMA_DONE_INT		0x80
#define SUSPEND_INT		0x40
#define LINK_RDY_INT		0x20
#define LINK_DOWN_INT		0x10
#define IRQEN1			0xFE22
#define IRQSTAT1			0xFE23
#define TLPRIENT0		0x2E24
#define TLPRSTAT0		0x2E25
#define TLPTIEN0		0x2E26
#define TLPTSTAT0		0x2E27
#define DMATC0			0xFE28
#define DMATC1			0xFE29
#define DMATC2			0xFE2A
#define DMATC3			0xFE2B
#define DMACTL			0xFE2C
#define DMA_RST			0x80
#define DMA_BUSY			0x04
#define DMA_DIR_TO_CARD		0x00
#define DMA_DIR_FROM_CARD		0x02
#define DMA_EN			0x01
#define DMA_128			(0 << 4)
#define DMA_256			(1 << 4)
#define DMA_512			(2 << 4)
#define DMA_1024			(3 << 4)
#define DMA_PACK_SIZE_MASK	0x30
#define PHYDATA0		0xFE3D
#define CFGADDR0		0xFE35
#define CFGADDR1		0xFE36
#define CFGDATA0		0xFE37
#define CFGDATA1		0xFE38
#define CFGDATA2		0xFE39
#define CFGDATA3		0xFE3A
#define CFGRWCTL		0xFE3B
#define PHYRWCTL		0xFE3C
#define PHYDATA0		0xFE3D
+#define PHYDATA1 0xFE3E
+#define PHYADDR 0xFE3F
+#define MSGRXDATA0 0xFE40
+#define MSGRXDATA1 0xFE41
+#define MSGRXDATA2 0xFE42
+#define MSGRXDATA3 0xFE43
+#define MSGTXDATA0 0xFE44
+#define MSGTXDATA1 0xFE45
+#define MSGTXDATA2 0xFE46
+#define MSGTXDATA3 0xFE47
+#define MSGTXCTL 0xFE48
+#define LTR_CTL 0xFE4A
+#define LTR_TX_EN_MASK 0x01
+#define LTR_TX_EN_1 0x01
+#define LTR_TX_EN_0 0
+#define LTR_LATENCY_MODE_MASK 0x03
+#define LTR_LATENCY_MODE_HW 0
+#define LTR_LATENCY_MODE_SW 0x01
+#define OBFF_CFG 0xFE4C
+#define OBFF_EN_MASK 0x03
+#define OBFF_DISABLE 0
+
+#define CDRESUMECTL 0xFE52
+#define WAKE_SEL_CTL 0xFE54
+#define PCLK_CTL 0xFE55
+
+#define FORCE_ASPM_CTL 0x10
+#define FORCE_ASPM_VAL_MASK 0x03
+#define FORCE_ASPM_L1_EN 0x02
+#define FORCE_ASPM_L0_EN 0x01
+#define FORCE_ASPM_NO_ASPM 0
+#define PM_CLK_FORCE_CTL 0xFE58
+#define CLK_PM_EN 0x01
+#define FUNC_FORCE_CTL 0xFE59
+#define FUNC_FORCE_UPME_XMT_DBG 0x02
+#define PERST_GLITCH_WIDTH 0xFE5C
+#define CHANGE_LINK_STATE 0xFE5B
+#define RESET_LOAD_REG 0xFE5E
+#define EFUSE_CONTENT 0xFE5F
+#define HOST_SLEEP_STATE 0xFE60
+#define HOST_ENTER_S1 0x01
+#define HOST_ENTER_S3 0x00
+
+#define SDIO_CFG 0xFE70
+#define PM_EVENT_DEBUG 0xFE71
+#define PME_DEBUG_00x08
+#define NFTS_TX_CTRL0xFE72
+
+#define PWR_GATE_CTRL0xFE75
+#define PWR_GATE_EN0x01
+#define LDO3318_PWR_MASK0x06
+#define LDO_ON0x00
+#define LDO_SUSPEND0x04
+#define LDO_OFF0x06
+#define PWD_SUSPEND_EN0xFE76
+#define LDO_PWR_SEL0xFE78
+
+#define L1SUB_CONFIG10xFE8D
+#define AUX_CLK_ACTIVE_SEL_MASK0x01
+#define MAC_CKSW_DONE0x00
+#define L1SUB_CONFIG20xFE8E
+#define L1SUB_AUTO_CFG0x02
+#define L1SUB_CONFIG30xFE8F
+#define L1OFF_MBIAS2_EN_5250BIT(7)
+
+#define DUMMY_REG_RESET_00xFE90
+#define IC_VERSION_MASK0x0F
+
+#define REG_VREF0xFE97
+#define PWD_SUSPEND_EN0x10
+#define RTS5260_DMA_RST_CTL_00xFEBF
+#define RTS5260_DMA_RST0x80
+#define RTS5260_ADMA3_RST0x40
+#define AUTOLOAD_CFG_BASE0xFF00
+#define RELINK_TIME_MASK0x01
+#define PETXCFG0xFF03
+#define FORCE_CLKREQ_DELINK_MASKBIT(7)
+#define FORCE_CLKREQ_LOW0x80
+#define FORCE_CLKREQ_HIGH0x00
+
+#define PM_CTRL10xFF44
+#define CD_RESUME_EN_MASK0xF0
+
+#define PM_CTRL20xFF45
+#define PM_CTRL30xFF46
+#define SDIO_SEND_PME_EN0x80
+#define FORCE_RC_MODE_ON0x40
+#define FORCE_RX50_LINK_ON0x20
+#define D3_DELINK_MODE_EN0x10
+#define USE_PESRTB_CTL_DELINK0x08
+#define DELAY_PIN_WAKE0x04
+#define RESET_PIN_WAKE0x02
+#define PM_WAKE_EN0x01
+\#define PM_CTRL40xFF47
+
+\#/ Memory mapping */
+\#define SRAM_BASE0xEE600
+\#define RBUF_BASE0xFF400
+\#define PPBUF_BASE10xFF800
+\#define PPBUF_BASE20xFA00
+\#define IMAGE_FLAG_ADDR0xCE80
+\#define IMAGE_FLAG_ADDR10xCE81
+
+\#define RREF_CFG0xFF6C
+\#define RREF_VBGSEL_MASK0x38
+\#define RREF_VBGSEL_1V250x28
+
+\#define OOBS_CONFIG0xFF6E
+\#define OOBS_AUTOK_DIS0x80
+\#define OOBS_VAL_MASK0x1F
+
+\#define LDO_DV18_CFG0xFF70
+\#define LDO_DV18_SR_MASK0x40
+\#define DV331812_MASK0x70
+\#define DV331812_330x70
+\#define DV331812_170x30
+
+\#define LDO_CONFIG20xFF71
+\#define LDO_D3318_33V0x07
+\#define LDO_D3318_33V0x07
+\#define LDO_D3318_33V0x02
+\#define DV331812_VDD10x04
+\#define DV331812_POWERON0x08
+\#define DV331812_POWEROFF0x00
+
+\#define LDO_VCC_CFG0x0xFF72
+\#define LDO_VCC_LMTVTH_MASK0x03
+\#define LDO_VCC_LMTVTH_2A0x010
+\#/RTS5260*/
+\#define RTS5260_DVCC_TUNE_MASK0x70
+\#define RTS5260_DVCC_330x70
+
+\#define LDO_VCC_CFG10xFF73
+\#define LDO_VCC_REF_TUNE_MASK0x30
+\#define LDO_VCC_REF_1V20x20
+\#define LDO_VCC_TUNE_MASK0x07
+\#define LDO_VCC_1V80x04
+\#define LDO_VCC_3V30x07
+\#define LDO_VCC_LMT_EN0x08
+\#/RTS5260*/
+#define LDO_POW_SDVDD1_MASK 0x08
+#define LDO_POW_SDVDD1_ON 0x08
+#define LDO_POW_SDVDD1_OFF 0x00
+
+#define LDO_VIO_CFG0xFF75
+#define LDO_VIO_SR_MASK 0xC0
+#define LDO_VIO_SR_ON 0x40
+#define LDO_VIO_REF_TUNE_MASK 0x30
+#define LDO_VIO_REF_1V2 0x20
+#define LDO_VIO_TUNE_MASK 0x07
+#define LDO_VIO_1V7 0x03
+#define LDO_VIO_1V80x4
+#define LDO_VIO_3V30x07
+
+#define LDO_DV12S_CFG0xFF76
+#define LDO_REF12_TUNE_MASK 0x18
+#define LDO_REF12_TUNE_DF 0x10
+#define LDO_D12_TUNE_MASK 0x07
+#define LDO_D12_TUNE_DF 0x04
+
+#define LDO_AV12S_CFG0xFF77
+#define LDO_AV12S_TUNE_MASK 0x07
+#define LDO_AV12S_TUNE_DF 0x04
+
+#define SD40_LDO_CTL10xFE7D
+#define SD40_VIO_TUNE_MASK 0x70
+#define SD_VIO_LDO_1V8 0x40
+#define SD_VIO_LDO_3V3 0x70
+
+#define RTS5260_AUTOLOAD_CFG40xFF7F
+#define RTS5260_MIMO_DISABLE0x8A
+
+#define RTS5260_REG_GPIO_CTL00xFC1A
+#define RTS5260_REG_GPIO_MASK 0x01
+#define RTS5260_REG_GPIO_ON 0x01
+#define RTS5260_REG_GPIO_OFF 0x00
+
+#define PWR_GLOBAL_CTRL0xF200
+#define PCIE_L1_2_EN0xFD
+#define PCIE_L1_1_EN0xA
+#define PCIE_L1_0_EN0x9
+#define PWR_FE_CTL0xF201
+#define PCIE_L1_2_PD_FE_EN0x0C
+#define PCIE_L1_1_PD_FE_EN0xA
+#define PCIE_L1_0_PD_FE_EN0x9
+#define CFG_PCIE_APHY_OFF_00xF204
+#define CFG_PCIE_APHY_OFF_0_DEFAULT0xBF
+#define CFG_PCIE_APHY_OFF_1	0xF205
+#define CFG_PCIE_APHY_OFF_1_DEFAULT	0xFF
+#define CFG_PCIE_APHY_OFF_2	0xF206
+#define CFG_PCIE_APHY_OFF_2_DEFAULT	0x01
+#define CFG_PCIE_APHY_OFF_3	0xF207
+#define CFG_PCIE_APHY_OFF_3_DEFAULT	0x00
+#define CFG_L1_0_PCIE_MAC_RET_VALUE	0xF20C
+#define CFG_L1_0_PCIE_DPHY_RET_VALUE	0xF20E
+#define CFG_L1_0_SYS_RET_VALUE	0xF210
+#define CFG_L1_0_CRC_MISC_RET_VALUE	0xF212
+#define CFG_L1_0_CRC_SD30_RET_VALUE	0xF214
+#define CFG_L1_0_CRC_SD40_RET_VALUE	0xF216
+#define CFG_LP_FPWM_VALUE	0xF219
+#define CFG_LP_FPWM_VALUE_DEFAULT	0x18
+#define PWC_CDR	0xF253
+#define PWC_CDR_DEFAULT	0x03
+#define CFG_L1_0_RET_VALUE_DEFAULT	0x1B
+#define CFG_L1_0_CRC_MISC_RET_VALUE_DEFAULT	0x0C

+/* OCPCTL */
+#define SD_DETECT_EN	0x08
+#define SD_OCP_INT_EN	0x04
+#define SD_OCP_INT_CLR	0x02
+#define SD_OC_CLR	0x01

+/* SDVIO */
+#define SDVIO_DETECT_EN	(1 << 7)
+#define SDVIO_OCP_INT_EN	(1 << 6)
+#define SDVIO_OCP_INT_CLR	(1 << 5)
+#define SDVIO_OC_CLR	(1 << 4)

+/* OCPSTAT */
+#define SD_OCP_DETECT	0x08
+#define SD_OC_NOW	0x04
+#define SD_OC_EVER	0x02

+/* SDVIO OC */
+#define SDVIO_OC_NOW	(1 << 6)
+#define SDVIO_OC_EVER	(1 << 5)

+/* OCP related registers */
+#define REG_OCPCTL	0xFD6A
+#define REG_OCPSTAT	0xFD6E
+#define REG_OCPPARA1	0xFD6B
+#define REG_OCPPARA2	0xFD6D

+/* rts5260 DV3318 OCP-related registers */
+#define REG_DV3318_OCPCTL	0xFD89
+#define DV3318_OCP_TIME_MASK	0xF0
+#define DV3318_DETECT_EN	0x08
```c
#define DV3318_OCP_INT_EN		0x04
#define DV3318_OCP_INT_CLR		0x02
#define DV3318_OCP_CLR			0x01
+
#define REG_DV3318_OCPSTAT		0xFD8A
#define DV3318_OCP_GLITCH_TIME_MASK	0xF0
#define DV3318_OCP_DETECT		0x08
#define DV3318_OCP_NOW			0x04
#define DV3318_OCP_EVER			0x02
+
#define SD_OCP_GLITCH_MASK		0x0F
+
/* OCPPARA1 */
#define SDVIO_OCP_TIME_600x00
#define SDVIO_OCP_TIME_1000x10
#define SDVIO_OCP_TIME_2000x20
#define SDVIO_OCP_TIME_4000x30
#define SDVIO_OCP_TIME_6000x40
#define SDVIO_OCP_TIME_8000x50
#define SDVIO_OCP_TIME_11000x60
#define SDVIO_OCP_TIME_MASK		0x70
+
#define SD_OCP_TIME_600x00
#define SD_OCP_TIME_1000x01
#define SD_OCP_TIME_2000x02
#define SD_OCP_TIME_4000x03
#define SD_OCP_TIME_6000x04
#define SD_OCP_TIME_8000x05
#define SD_OCP_TIME_11000x06
#define SD_OCP_TIME_MASK		0x07
+
/* OCPPARA2 */
#define SDVIO_OCP_THD_1900x00
#define SDVIO_OCP_THD_2500x10
#define SDVIO_OCP_THD_3200x20
#define SDVIO_OCP_THD_3800x30
#define SDVIO_OCP_THD_4400x40
#define SDVIO_OCP_THD_5000x50
#define SDVIO_OCP_THD_5700x60
#define SDVIO_OCP_THD_6300x70
#define SDVIO_OCP_THD_MASK0x70
+
#define SD_OCP_THD_4500x00
#define SD_OCP_THD_5500x01
#define SD_OCP_THD_6500x02
#define SD_OCP_THD_7500x03
#define SD_OCP_THD_8500x04
#define SD_OCP_THD_9500x05
```
+define SD_OCP_THD_1050x06
+define SD_OCP_THD_1150x07
+define SD_OCP_THD_MASKx07
+
+define SDVIO_OCP_GLITCH_MASKx0F
+define SDVIO_OCP_GLITCH_NONEx00
+define SDVIO_OCP_GLITCH_50U0x10
+define SDVIO_OCP_GLITCH_100U0x20
+define SDVIO_OCP_GLITCH_200U0x30
+define SDVIO_OCP_GLITCH_600U0x40
+define SDVIO_OCP_GLITCH_800U0x50
+define SDVIO_OCP_GLITCH_1M0x60
+define SDVIO_OCP_GLITCH_2M0x70
+define SDVIO_OCP_GLITCH_3M0x80
+define SDVIO_OCP_GLITCH_4M0x90
+define SDVIO_OCP_GLITCH_5M0xA0
+define SDVIO_OCP_GLITCH_6M0xB0
+define SDVIO_OCP_GLITCH_7M0xC0
+define SDVIO_OCP_GLITCH_8M0xD0
+define SDVIO_OCP_GLITCH_9M0xE0
+define SDVIO_OCP_GLITCH_10M0xF0
+
+define SD_OCP_GLITCH_MASKx0F
+define SD_OCP_GLITCH_NONEx00
+define SD_OCP_GLITCH_50Ux01
+define SD_OCP_GLITCH_100Ux02
+define SD_OCP_GLITCH_200Ux03
+define SD_OCP_GLITCH_600Ux04
+define SD_OCP_GLITCH_800Ux05
+define SD_OCP_GLITCH_1M0x06
+define SD_OCP_GLITCH_2M0x07
+define SD_OCP_GLITCH_3M0x08
+define SD_OCP_GLITCH_4M0x09
+define SD_OCP_GLITCH_5M0xA
+define SD_OCP_GLITCH_6M0xB
+define SD_OCP_GLITCH_7M0xC
+define SD_OCP_GLITCH_8M0xD
+define SD_OCP_GLITCH_9M0xE
+define SD_OCP_GLITCH_10M0xF
+
+/* Phy register */
+define PHY_PCRx00
+define PHY_PCR_FORCE_CODEx0xB000
+define PHY_PCR_OOBS_CALI_500x0800
+define PHY_PCR_OOBS_VCM_080x0200
+define PHY_PCR_OOBS_SEN_900x040
+define PHY_PCR_RX10Kx0002
+define PHY_PCR_RX10Kx0001
+  +
+  +#define PHY_RCR00x01
+  +#define PHY_RCR10x02
+  +#define PHY_RCR1_ADPTIME_40x0400
+  +#define PHY_RCR1_VCO_COARSE0x001F
+  +#define PHY_RCR1_INIT_27S0x0A1F
+  +#define PHY_SSCCR20x02
+  +#define PHY_SSCCR2_PLL_NCODE0x0A00
+  +#define PHY_SSCCR2_TIME0x001C
+  +#define PHY_SSCCR2_TIME2_WIDTH0x0003
+  +
+  +#define PHY_RCR20x03
+  +#define PHY_RCR2_EMPHASISEN0x8000
+  +#define PHY_RCR2_NADJR0x4000
+  +#define PHY_RCR2_CDR_SR_20x0100
+  +#define PHY_RCR2_FREQSEL_120x0040
+  +#define PHY_RCR2_CDR_SC_120x0010
+  +#define PHY_RCR2_CALIB_LATE0x0002
+  +#define PHY_RCR2_INIT_27S0x0C152
+  +#define PHY_SSCCR30x03
+  +#define PHY_SSCCR3_STEP_IN0x2740
+  +#define PHY_SSCCR3_CHECK_DELAY0x0008
+  +#define PHY_ANA030x03
+  +#define PHY_ANA03_TIMER_MAX0x2700
+  +#define PHY_ANA03_OOBS_DEB_EN0x0040
+  +#define PHY_CMU_DEBUG_EN0x0008
+  +
+  +#define PHY_RTCR0x04
+  +#define PHY_RDR0x05
+  +#define PHY_RDR_RXDSLEN_190x4000
+  +#define PHY_SSC_AUTO_PWD0x0600
+  +#define PHY_TCR0x06
+  +#define PHY_TCR10x07
+  +#define PHY_TUNE0x08
+  +#define PHY_TUNE_TUNEREF_100x4000
+  +#define PHY_TUNE_VBGSEL_12520x0C00
+  +#define PHY_TUNE_SDBUS_330x0200
+  +#define PHY_TUNE_TUNED180x01C0
+  +#define PHY_TUNE_TUNED120x0020
+  +#define PHY_TUNE_TUNEA120x0004
+  +#define PHY_TUNE_VOLTAGE_MASK0xFC3F
+  +#define PHY_TUNE_VOLTAGE_3V30x03C0
+  +#define PHY_TUNE_D18_1V80x0100
+  +#define PHY_TUNE_D18_1V70x0080
+  +#define PHY_ANA080x08
+  +#define PHY_ANA08_RX_EQ_DCGAIN0x5000
+  +#define PHY_ANA08_SEL_RX_EN0x0400
+  +#define PHY_ANA08_RX_EQ_VAL0x03C0
+#define PHY_ANA08_SCP0x0020
+#define PHY_ANA08_SEL_1PI0x0004
+
+##define PHY_IMR0x09
+##define PHY_BPCR0x0A
+##define PHY_BPCR_IBRXSEL0x0400
+##define PHY_BPCR_IBTXSEL0x0100
+##define PHY_BPCR_IB_FILTER0x0080
+##define PHY_BPCR_CMIRROR_EN0x0040
+
+##define PHY_BIST0x0B
+##define PHY_RAW_L0x0C
+##define PHY_RAW_H0x0D
+##define PHY_RAW_DATA0x0E
+##define PHY_HOST_CLK_CTRL0x0F
+##define PHY_DMR0x10
+##define PHY_BACR0x11
+##define PHY_BACR_BASIC_MASK0xFFF3
+##define PHY_IER0x12
+##define PHY_BCSR0x13
+##define PHY_BPR0x14
+##define PHY_BPNR20x15
+##define PHY_BPNR0x16
+##define PHY_BRNR20x17
+##define PHY_BENR0x18
+##define PHY_REV0x19
+##define PHY_REV_RESV0x000
+##define PHY_REV_RXIDLE_LATCHED0x1000
+##define PHY_REV_P1_EN0x0800
+##define PHY_REV_RXIDLE_EN0x0400
+##define PHY_REV_CLKREQ_TX_EN0x0200
+##define PHY_REV_CLKREQ_RX_EN0x0100
+##define PHY_REV_CLKREQ_DT_1_00x0040
+##define PHY_REV_STOP_CLKRD0x0020
+##define PHY_REV_RX_PWST0x0008
+##define PHY_REV_STOP_CLKWR0x0004
+##define PHY_REV0x19
+##define PHY_REV0_FILTER_OUT0x3800
+##define PHY_REV0_CDR_BYPASS_PFD0x0100
+##define PHY_REV0_CDR_RX_IDLE_BYPASS0x0002
+
+##define PHY_FLD0x1A
+##define PHY_ANA1A0x1A
+##define PHY_ANA1A_TXR_LOOPBACK0x0200
+##define PHY_ANA1A_RXT_BIST0x0500
+##define PHY_ANA1A_TXR_BIST0x0040
+##define PHY_ANA1A_REVOx0006
+##define PHY_FLD0_INIT_27S0x2546
+#define PHY_FLD10x1B
+#define PHY_FLD20x1C
+#define PHY_FLD30x1D
+#define PHY_FLD3_TIMER_40x0800
+#define PHY_FLD3_TIMER_60x0020
+#define PHY_FLD3_RXDELINK0x0004
+#define PHY_FLD3_INIT_27S0x0004
+#define PHY_ANA1D0x1D
+#define PHY_ANA1D_DEBUG_ADDR0x0004
+define PHY_FLD00x1D
+define PHY_FLD0_CLK_REQ_20C0x8000
+define PHY_FLD0_RX_IDLE_EN0x1000
+define PHY_FLD0_BIT_ERR_RSTN0x0800
+define PHY_FLD0_BER_COUNT0x01E0
+define PHY_FLD0_BER_TIMER0x001E
+define PHY_FLD0_CHECK_EN0x0001
+
+define PHY_FLD40x1E
+define PHY_FLD4_FLDEN_SEL0x4000
+define PHY_FLD4_REQ_REF0x2000
+define PHY_FLD4_RXAMP_OFF0x1000
+define PHY_FLD4_REQ_ADDA0x0800
+define PHY_FLD4_BER_COUNT0x00E0
+define PHY_FLD4_BER_TIMER0x000A
+define PHY_FLD4_BER_CHK_EN0x0001
+define PHY_FLD4_INIT_27S0x5C7F
+define PHY_DIG1E0x1E
+define PHY_DIG1E_REV0x4000
+define PHY_DIG1E_D0_X_D10x1000
+define PHY_DIG1E_RX_ON_HOST0x0800
+define PHY_DIG1E_RCLK_REF_HOST0x0400
+define PHY_DIG1E_RCLK_TX_EN_KEEP0x0040
+define PHY_DIG1E_RCLK_TX_TERM_KEEP0x0020
+define PHY_DIG1E_RCLK_RX_EIDLE_ON0x0010
+define PHY_DIG1E_TX_TERM_KEEP0x0008
+define PHY_DIG1E_RX_TERM_KEEP0x0004
+define PHY_DIG1E_TX_EN_KEEP0x0002
+define PHY_DIG1E_RX_EN_KEEP0x0001
+define PHY_DUM_REG0x1F
+
+define PCR_ASPM_SETTING_REG10x160
+define PCR_ASPM_SETTING_REG20x168
+define PCR_ASPM_SETTING_5260x178
+
+define PCR_SETTING_REG10x724
+define PCR_SETTING_REG20x814
+define PCR_SETTING_REG30x747
+
+define rtsx_pci_init_cmd(pcr)((pcr)->ci = 0)
+
+define RTS5227_DEVICE_ID 0x5227
+#define RTS_MAX_TIMES_FREQ_REDUCTION 8
+
+struct rtsx_pcr;
+
+struct pcr_handle {
+struct rtsx_pcr* pcr;
+};
+
+struct pcr_ops {
+int (*write_phy)(struct rtsx_pcr *pcr, u8 addr, u16 val);
+int (*read_phy)(struct rtsx_pcr *pcr, u8 addr, u16 *val);
+int(*extra_init_hw)(struct rtsx_pcr *pcr);
+int(*optimize_phy)(struct rtsx_pcr *pcr);
+int(*turn_on_led)(struct rtsx_pcr *pcr);
+int(*turn_off_led)(struct rtsx_pcr *pcr);
+int(*enable_auto_blink)(struct rtsx_pcr *pcr);
+int(*disable_auto_blink)(struct rtsx_pcr *pcr);
+int(*card_power_on)(struct rtsx_pcr *pcr, int card);
+int(*card_power_off)(struct rtsx_pcr *pcr, int card);
+int(*switch_output_voltage)(struct rtsx_pcr *pcr, u8 voltage);
+unsigned int(*cd_deglitch)(struct rtsx_pcr *pcr);
+int(*conv_clk_and_div_n)(int clk, int dir);
+void(*fetch_vendor_settings)(struct rtsx_pcr *pcr);
+void(*force_power_down)(struct rtsx_pcr *pcr, u8 pm_state);
+void(*stop_cmd)(struct rtsx_pcr *pcr);
+
+void (*set_aspm)(struct rtsx_pcr *pcr, bool enable);
+int (*set_ltr_latency)(struct rtsx_pcr *pcr, u32 latency);
+int (*set_l1off_sub)(struct rtsx_pcr *pcr, u8 val);
+void (*set_l1off_cfg_sub_d0)(struct rtsx_pcr *pcr, int active);
+void (*full_on)(struct rtsx_pcr *pcr);
+void (*power_saving)(struct rtsx_pcr *pcr);
+void (*enable_ocp)(struct rtsx_pcr *pcr);
+void (*disable_ocp)(struct rtsx_pcr *pcr);
+void (*init_ocp)(struct rtsx_pcr *pcr);
+void (*process_ocp)(struct rtsx_pcr *pcr);
+int (*get_ocpstat)(struct rtsx_pcr *pcr, u8 *val);
+void (*clear_ocpstat)(struct rtsx_pcr *pcr);
+};
+
+enum PDEV_STAT {PDEV_STAT_IDLE, PDEV_STAT_RUN};
+
+#define ASPM_L1_1_EN_MASKBIT(3)
+#define ASPM_L1_2_EN_MASKBIT(2)
#define PM_L1_1_EN_MASK BIT(1)
#define PM_L1_2_EN_MASK BIT(0)

#define ASPM_L1_1_EN BIT(0)
#define ASPM_L1_2_EN BIT(1)
#define PM_L1_1_EN BIT(2)
#define PM_L1_2_EN BIT(3)
#define LTR_L1SS_PWR_GATE_EN BIT(4)
#define L1_SNOOZE_TEST_EN BIT(5)

#define LTR_L1SS_PWR_GATE_CHECK_CARD_EN BIT(6)

enum dev_aspm_mode {
    DEV_ASPM_DYNAMIC,
    DEV_ASPM_BACKDOOR,
    DEV_ASPM_STATIC,
    DEV_ASPM_DISABLE,
};

/*
 * struct rtsx_cr_option - card reader option
 * @dev_flags: device flags
 * @force_clkreq_0: force clock request
 * @ltr_en: enable ltr mode flag
 * @ltr_enabled: ltr mode in configure space flag
 * @ltr_active: ltr mode status
 * @ltr_active_latency: ltr mode active latency
 * @ltr_idle_latency: ltr mode idle latency
 * @ltr_l1off_latency: ltr mode l1off latency
 * @dev_aspm_mode: device aspm mode
 * @l1_snooze_delay: l1 snooze delay
 * @ltr_l1off_sspwrgate: ltr l1off sspwrgate
 * @ltr_l1off_snooze_sspwrgate: ltr l1off snooze sspwrgate
 * @ocp_en: enable ocp flag
 * @sd_400mA_ocp_thd: 400mA ocp thd
 * @sd_800mA_ocp_thd: 800mA ocp thd
 */
struct rtsx_cr_option {
    u32 dev_flags;
    bool force_clkreq_0;
    bool ltr_en;
    bool ltr_enabled;
    bool ltr_active;
    u32 ltr_active_latency;
    u32 ltr_idle_latency;
    u32 ltr_l1off_latency;
    enum dev_aspm_mode dev_aspm_mode;
    u32 l1_snooze_delay;
    u8 ltr_l1off_sspwrgate;
+u8 ltr_11off_snooze_sspwrgate;
+bool ocp_en;
+u8 sd_400mA_ocp_thd;
+u8 sd_800mA_ocp_thd;
+};
+
+/*
+ * struct rtsx_hw_param - card reader hardware param
+ * @interrupt_en: indicate which interrupt enable
+ * @ocp_glitch: ocp glitch time
+ */
+struct rtsx_hw_param {
+u32 interrupt_en;
+u8 ocp_glitch;
+};
+
+#define rtsx_set_dev_flag(cr, flag) \
+((cr)->option.dev_flags |= (flag))
+#define rtsx_clear_dev_flag(cr, flag) \
+((cr)->option.dev_flags &= ~(flag))
+#define rtsx_check_dev_flag(cr, flag) \
+((cr)->option.dev_flags & (flag))
+
+/*
+ * struct rtsx_pcr -
+ */
+unsigned int iid;
+int pcie_cap;
+struct rtsx_cr_option option;
+struct rtsx_hw_param hw_param;
+
+/*
+ */
+unsigned long addr;
+void __iomem*remap_addr;
+int irq;
+
+/*
+ */
+void* rtsx_resv_buf;
+dma_addr_t trtsx_resv_buf_addr;
+
+void* host_cmds_ptr;
+dma_addr_t host_cmds_addr;
+int ci;
+
+void* host_sg_tbl_ptr;
+dma_addr_t host_sg_tbl_addr;
+int sgi;
+
u32 bier;

+ char trans_result;
+ unsigned int card_inserted;
+ unsigned int card_removed;
+ unsigned int card_exist;
+ struct delayed_workcarddet_work;
+ struct delayed_workidle_work;
+ spinlock_t
+ struct mutex pcr_mutex;
+ struct completion *done;
+ struct completion *finish_me;
+ unsigned int cur_clock;
+ bool remove_pci;
+ bool msi_en;

+#define EXTRA_CAPS_SD_SDR50 (1 << 0)
+#define EXTRA_CAPS_SD_SDR104 (1 << 1)
+#define EXTRA_CAPS_SD_DDR50 (1 << 2)
+#define EXTRA_CAPS_MMC_HSDDR (1 << 3)
+#define EXTRA_CAPS_MMC_HS200 (1 << 4)
+#define EXTRA_CAPS_MMC_8BIT (1 << 5)
+ u32 extra_caps;

+#define IC_VER_A 0
+#define IC_VER_B 1
+#define IC_VER_C 2
+#define IC_VER_D 3
+ u8 ic_version;

+ u8 sd30_drive_sel_1v8;
+ u8 sd30_drive_sel_3v3;
+ u8 card_drive_sel;
+#define ASPM_L1_EN0x02
+ u8 aspm_en;
+ bool aspm_enabled;

+#define PCR_MS_PMOS (1 << 0)
+#define PCR_REVERSE_SOCKET (1 << 1)
+ u32 flags;

+ u32 tx_initial_phase;
+ u32 rx_initial_phase;
+ const u32 *sd_pull_ctl_enable_tbl;
+ const u32 *sd_pull_ctl_disable_tbl;
const u32 *ms_pull_ctl_enable_tbl;
const u32 *ms_pull_ctl_disable_tbl;
const struct pcr_ops *ops;
enum PDEV_STAT state;
u16 reg_pm_ctrl3;
int num_slots;
struct rtsx_slot *slots;
u8 dma_error_count;
u8 ocp_stat;
u8 ocp_stat2;
};

#define PID_524A 0x524A
#define PID_5249 0x5249
#define PID_5250 0x5250
#define PID_525A 0x525A
#define PID_5260 0x5260

#define CHK_PCI_PID(pcr, pid) ((pcr)->pci->device == (pid))
#define PCI_VID(pcr) ((pcr)->pci->vendor)
#define PCI_PID(pcr) ((pcr)->pci->device)
#define is_version(pcr, pid, ver) ((CHK_PCI_PID(pcr, pid) && (pcr)->ic_version == (ver))
#define pcr_dbg(pcr, fmt, arg...)
    dev_dbg(&(pcr)->pci->dev, fmt, ##arg)

#define SDR104_PHASE(val) ((val) & 0xFF)
#define SDR50_PHASE(val) (((val) >> 8) & 0xFF)
#define DDR50_PHASE(val) (((val) >> 16) & 0xFF)
#define SDR104_TX_PHASE(pcr) SDR104_PHASE((pcr)->tx_initial_phase)
#define SDR50_TX_PHASE(pcr) SDR50_PHASE((pcr)->tx_initial_phase)
#define DDR50_TX_PHASE(pcr) DDR50_PHASE((pcr)->tx_initial_phase)
#define SDR104_RX_PHASE(pcr) SDR104_PHASE((pcr)->rx_initial_phase)
#define SDR50_RX_PHASE(pcr) SDR50_PHASE((pcr)->rx_initial_phase)
#define DDR50_RX_PHASE(pcr) DDR50_PHASE((pcr)->rx_initial_phase)
#define SET_CLOCK_PHASE(sdr104, sdr50, ddr50)
     (((ddr50) << 16) | ((sdr50) << 8) | (sdr104))

void rtsx_pci_start_run(struct rtsx_pcr *pcr);
int rtsx_pci_write_register(struct rtsx_pcr *pcr, u16 addr, u8 mask, u8 data);
int rtsx_pci_read_register(struct rtsx_pcr *pcr, u16 addr, u8 *data);
int rtsx_pci_write_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 val);
int rtsx_pci_read_phy_register(struct rtsx_pcr *pcr, u8 addr, u16 *val);
void rtsx_pci_stop_cmd(struct rtsx_pcr *pcr);
+void rtsx_pci_add_cmd(struct rtsx_pcr *pcr,
  +u8 cmd_type, u16 reg_addr, u8 mask, u8 data);
+void rtsx_pci_send_cmd_no_wait(struct rtsx_pcr *pcr);
+int rtsx_pci_send_cmd(struct rtsx_pcr *pcr, int timeout);
+int rtsx_pci_transfer_data(struct rtsx_pcr *pcr, struct scatterlist *sglist,
  +int num_sg, bool read, int timeout);
+int rtsx_pci_dma_map_sg(struct rtsx_pcr *pcr, struct scatterlist *sglist,
  +int num_sg, bool read);
+void rtsx_pci_dma_unmap_sg(struct rtsx_pcr *pcr, struct scatterlist *sglist,
  +int num_sg, bool read);
+int rtsx_pci_dma_transfer(struct rtsx_pcr *pcr, struct scatterlist *sglist,
  +int count, bool read, int timeout);
+int rtsx_pci_read_ppbuf(struct rtsx_pcr *pcr, u8 *buf, int buf_len);
+int rtsx_pci_write_ppbuf(struct rtsx_pcr *pcr, u8 *buf, int buf_len);
+int rtsx_pci_card_pull_ctl_enable(struct rtsx_pcr *pcr, int card);
+int rtsx_pci_card_pull_ctl_disable(struct rtsx_pcr *pcr, int card);
+int rtsx_pci_switch_clock(struct rtsx_pcr *pcr, unsigned int card_clock,
  +u8 ssc_depth, bool initial_mode, bool double_clk, bool vpclk);
+int rtsx_pci_card_power_on(struct rtsx_pcr *pcr, int card);
+int rtsx_pci_card_power_off(struct rtsx_pcr *pcr, int card);
+int rtsx_pci_card_exclusive_check(struct rtsx_pcr *pcr, int card);
+int rtsx_pci_switch_output_voltage(struct rtsx_pcr *pcr, u8 voltage);
+unsigned int rtsx_pci_card_exist(struct rtsx_pcr *pcr);
+void rtsx_pci_complete_unfinished_transfer(struct rtsx_pcr *pcr);
+
+static inline u8 *rtsx_pci_get_cmd_data(struct rtsx_pcr *pcr)
+{
  +return (u8 *)(pcr->host_cmds_ptr);
  +}
+
+static inline int rtsx_pci_update_cfg_byte(struct rtsx_pcr *pcr, int addr,
  +u8 mask, u8 append)
+{
  +int err;
  +u8 val;
  +
  +err = pci_read_config_byte(pcr->pci, addr, &val);
  +if (err < 0)
  +return err;
  +return pci_write_config_byte(pcr->pci, addr, (val & mask) | append);
  +}
+
+static inline void rtsx_pci_write_be32(struct rtsx_pcr *pcr, u16 reg, u32 val)
+{
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, reg, 0xFF, val >> 24);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, reg + 1, 0xFF, val >> 16);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, reg + 2, 0xFF, val >> 8);
  +rtsx_pci_add_cmd(pcr, WRITE_REG_CMD, reg + 3, 0xFF, val);
static inline int rtsx_pci_update_phy(struct rtsx_pcr *pcr, u8 addr, u16 mask, u16 append) {
  int err;
  u16 val;

  err = rtsx_pci_read_phy_register(pcr, addr, &val);
  if (err < 0)
    return err;
  return rtsx_pci_write_phy_register(pcr, addr, (val & mask) | append);
}

#ifndef __RTSX_USB_H
#define __RTSX_USB_H

#include <linux/usb.h>

/* related module names */
#define RTSX_USB_SD_CARD	0
#define RTSX_USB_MS_CARD	1

/* Driver for Realtek RTS5139 USB card reader */
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* Author:
* Roger Tseng <rogerable@realtek.com>
*/

#ifndef __RTSX_USB_H
#define __RTSX_USB_H
#include <linux/usb.h>

/* related module names */
#define RTSX_USB_SD_CARD	0
#define RTSX_USB_MS_CARD	1
/* endpoint numbers */
#define EP_BULK_OUT1
#define EP_BULK_IN2
#define EP_INTR_IN3
+
/* USB vendor requests */
#define RTSX_USB_REQ_REG_OP	0x00
#define RTSX_USB_REQ_POLL	0x02
+
/* miscellaneous parameters */
#define MIN_DIV_N60
#define MAX_DIV_N120
+
#define MAX_PHASE15
#define RX_TUNING_CNT3
+
#define QFN240
#define LQFP481
+
#define CHECK_PKG(ucr, pkg)((ucr)->package == (pkg))
+
/* data structures */
struct rtsx_ucr {
  u16			vendor_id;
  u16			product_id;
+
  int			package;
  u8			ic_version;
 ,boolis_rts5179;
+
  unsigned int	
cur_clk;
+
  u8*cmd_buf;
  unsigned intcmd_idx;
  u8*rsp_buf;
+
  struct usb_device*pusb_dev;
  struct usb_interface*pusb_intf;
  struct usb_sg_requestcurrent_sg;
  unsigned char*iobuf;
  dma_addr_tiobuf_dma;
+
  struct timer_list*sg_timer;
  struct mutex
dev_mutex;
+
};
+
/* buffer size */
#define IOBUF_SIZE	1024
+
*/ prototypes of exported functions */
+extern int rtsx_usb_get_card_status(struct rtsx_ucr *ucr, u16 *status);
+
+extern int rtsx_usb_read_register(struct rtsx_ucr *ucr, u16 addr, u8 *data);
+extern int rtsx_usb_write_register(struct rtsx_ucr *ucr, u16 addr, u8 mask,
+u8 data);
+
+extern int rtsx_usb_ep0_write_register(struct rtsx_ucr *ucr, u16 addr, u8 mask,
+u8 data);
+extern int rtsx_usb_ep0_read_register(struct rtsx_ucr *ucr, u16 addr,
+u8 *data);
+
+extern void rtsx_usb_add_cmd(struct rtsx_ucr *ucr, u8 cmd_type,
+u16 reg_addr, u8 mask, u8 data);
+extern int rtsx_usb_send_cmd(struct rtsx_ucr *ucr, u8 flag, int timeout);
+extern int rtsx_usb_get_rsp(struct rtsx_ucr *ucr, int rsp_len, int timeout);
+extern int rtsx_usb_transfer_data(struct rtsx_ucr *ucr, unsigned int pipe,
+ void *buf, unsigned int len, int use_sg,
+ unsigned int *act_len, int timeout);
+
+extern int rtsx_usb_read_ppbuf(struct rtsx_ucr *ucr, u8 *buf, int buf_len);
+extern int rtsx_usb_write_ppbuf(struct rtsx_ucr *ucr, u8 *buf, int buf_len);
+
+extern void rtsx_usb_card_exclusive_check(struct rtsx_ucr *ucr, int card);
+
+ /* card status */
+ #define SD_CD		0x01
+ #define MS_CD		0x02
+ #define XD_CD		0x04
+ #define CD_MASK		(SD_CD | MS_CD | XD_CD)
+ #define SD_WP		0x08
+
+ /* reader command field offset & parameters */
+ #define PACKET_TYPE4
+ #define CNT_H5
+ #define CNT_L6
+ #define STAGE_FLAG7
+ #define CMD_OFFSET8
+ #define SEQ_WRITE_DATA_OFFSET12
+ +
+ #define BATCH_CMD0
+ #define SEQ_READ1
+ #define SEQ_WRITE2
+define STAGE_R 0x01
+define STAGE_DI 0x02
+define STAGE_DO 0x04
+define STAGE_MS_STATUS 0x08
+define STAGE_XD_STATUS 0x10
+define MODE_C 0x00
+define MODE_CR(STAGE_R)
+define MODE_CDIR(STAGE_R | STAGE_DI)
+define MODE_CDOR(STAGE_R | STAGE_DO)
+
+define EP0_OP_SHIFT 14
+define EP0_READ_REG_CMD 2
+define EP0_WRITE_REG_CMD 3
+
+define rtsx_usb_cmd_hdr_tag(ucr) do {
+ ucr->cmd_buf[0] = 'R';
+ ucr->cmd_buf[1] = 'T';
+ ucr->cmd_buf[2] = 'C';
+ ucr->cmd_buf[3] = 'R';
+} while (0)
+
+static inline void rtsx_usb_init_cmd(struct rtsx_ucr *ucr) {
+ rtsx_usb_cmd_hdr_tag(ucr);
+ ucr->cmd_idx = 0;
+ ucr->cmd_buf[PACKET_TYPE] = BATCH_CMD;
+}
+
+/* internal register address */
+define FPDCTL 0xFC00
+define SSC_DIV_N_0 0xFC07
+define SSC_CTL1 0xFC09
+define SSC_CTL2 0xFC0A
+define CFG_MODE 0xFC0E
+define CFG_MODE_1 0xFC0F
+define RCCTL 0xFC14
+define SOF_WDOG 0xFC28
+define SYS_DUMMY0 0xFC30
+
+define MS_BLKEND 0xFD30
+define MS_READ_START 0xFD31
+define MS_READ_COUNT 0xFD32
+define MS_WRITE_START 0xFD33
+define MS_WRITE_COUNT 0xFD34
+define MS_COMMAND 0xFD35
+define MS_OLD_BLOCK_0 0xFD36
+\#define MS_OLD_BLOCK_10xFD37
+\#define MS_NEW_BLOCK_00xFD38
+\#define MS_NEW_BLOCK_10xFD39
+\#define MS_LOG_BLOCK_00xFD3A
+\#define MS_LOG_BLOCK_10xFD3B
+\#define MS_BUS_WIDTH0xFD3C
+\#define MS_PAGE_START0xFD3D
+\#define MS_PAGE_LENGTH0xFD3E
+\#define MS_CFG0xFD40
+\#define MS_TPC0xFD41
+\#define MS_TRANSFER0xFD42
+\#define MS_INT_REG0xFD43
+\#define MS_BYTE_CNT0xFD44
+\#define MS_SECTOR_CNT_10xFD45
+\#define MS_SECTOR_CNT_H0xFD46
+\#define MS_DBUS_H0xFD47
+  +\#define CARD_DMA1_CTL0xFD5C
+\#define CARD_PULL_CTL10xFD60
+\#define CARD_PULL_CTL20xFD61
+\#define CARD_PULL_CTL30xFD62
+\#define CARD_PULL_CTL40xFD63
+\#define CARD_PULL_CTL50xFD64
+\#define CARD_PULL_CTL60xFD65
+\#define CARD_EXIST0xFD6F
+\#define CARD_INT_PEND0xFD71
+  +\#define LDO_POWER_CFG0xFD7B
+  +\#define SD_CFG10xFD7B
+\#define SD_CFG20xFD7B
+\#define SD_CFG30xFD7B
+\#define SD_STAT10xFD7B
+\#define SD_STAT20xFD7B
+\#define SD_BUS_STAT0xFD7B
+\#define SD_PAD_CTL0xFD7B
+\#define SD_SAMPLE_POINT_CTL0xFD7B
+\#define SD_PUSH_POINT_CTL0xFD7B
+\#define SD_CMD00xFD7B
+\#define SD_CMD10xFD7B
+\#define SD_CMD20xFD7B
+\#define SD_CMD30xFD7B
+\#define SD_CMD40xFD7B
+\#define SD_CMD50xFD7B
+\#define SD_BYTE_CNT_L0xFD7B
+\#define SD_BYTE_CNT_H0xFD7B
+\#define SD_BLOCK_CNT_L0xFD7B
+#define SD_BLOCK_CNT_H0xFDB2
+#define SD_TRANSFER0xFDB3
+#define SD_CMD_STATE0xFDB5
+#define SD_DATA_STATE0xFDB6
+#define SD_VPCLK0_CTL0xC2A
+#define SD_VPCLK1_CTL0xC2B
+#define SD_DCMP0_CTL0xC2C
+#define SD_DCMP1_CTL0xC2D
+
+#define CARD_DMA1_CTL0xFD5C
+
+#define HW_VERSION0xFC01
+
+#define SSC_CLK_FPGA_SEL0xFC02
+#define CLK_DIV0xFC03
+#define SFSM_ED0xFC04
+
+#define CD_DEGLITCH_WIDTH0xC20
+#define CD_DEGLITCH_EN0xC21
+#define AUTO_DELINK_EN0xC23
+
+#define FPGA_PULL_CTL0xFC1D
+#define CARD_CLK_SOURCE0xFC2E
+
+#define CARD_SHARE_MODE0xFD51
+#define CARD_DRIVE_SEL0xFD52
+#define CARD_STOP0xFD53
+#define CARD_OE0xFD54
+#define CARD_AUTO_BLINK0xFD55
+#define CARD_GPIO0xFD56
+#define SD30_DRIVE_SEL0xFD57
+
+#define CARD_DATA_SOURCE0xFD5D
+#define CARD_SELECT0xFD5E
+
+#define CARD_CLK_EN0xFD79
+#define CARD_PWR_CTL0xFD7A
+
+#define OCPCTL0xFD80
+#define OCP PARA10xFD81
+#define OCP PARA20xFD82
+#define OCP STAT0xFD83
+
+#define HS_USB_STAT0xFE01
+#define HS_VCONTROL0xFE26
+#define HS_VSTAIN0xFE27
+#define HS_VLOADM0xFE28
+#define HS_VSTATOUT0xFE29
+  +#define MC_IRQ0xFF00
+  +#define MC_IRQEN0xFF01
+  +#define MC_FIFO_CTL0xFF02
+  +#define MC_FIFO_BC00xFF03
+  +#define MC_FIFO_BC10xFF04
+  +#define MC_FIFO_STAT0xFF05
+  +#define MC_FIFO_MODE0xFF06
+  +#define MC_FIFO_RD_PTR00xFF07
+  +#define MC_FIFO_RD_PTR10xFF08
+  +#define MC_DMA_CTL0xFF10
+  +#define MC_DMA_TC00xFF11
+  +#define MC_DMA_TC10xFF12
+  +#define MC_DMA_TC20xFF13
+  +#define MC_DMA_TC30xFF14
+  +#define MC_DMA_RST0xFF15
+
+  +#define RBUF_SIZE_MASK0xFBFF
+  +#define RBUF_BASE0xF000
+  +#define PPBUF_BASE10xF800
+  +#define PPBUF_BASE20xFA00
+  +  +/* internal register value macros */
+  +#define POWER_OFF0x03
+  +#define PARTIAL_POWER_ON0x02
+  +#define POWER_ON0x00
+  +#define POWER_MASK0x03
+  +#define LDO3318_PWR_MASK0x0C
+  +#define LDO_ON0x00
+  +#define LDO_SUSPEND0x08
+  +#define LDO_OFF0x0C
+  +#define DV3318_AUTO_PWR_OFF0x10
+  +#define FORCE_LDO_POWERB0x60
+
+  +/* LDO_POWER_CFG */
+  +#define TUNE_SD18_MASK0x1C
+  +#define TUNE_SD18_1V70x00
+  +#define TUNE_SD18_1V8(0x01 << 2)
+  +#define TUNE_SD18_1V9(0x02 << 2)
+  +#define TUNE_SD18_2V0(0x03 << 2)
+  +#define TUNE_SD18_2V7(0x04 << 2)
+  +#define TUNE_SD18_2V8(0x05 << 2)
+  +#define TUNE_SD18_2V9(0x06 << 2)
+  +#define TUNE_SD18_3V3(0x07 << 2)
+
+  +/* CLK_DIV */
+  +#define CLK_CHANGE0x80
+  +#define CLK_DIV_10x00
+define CLK_DIV_20x01
+define CLK_DIV_40x02
+define CLK_DIV_80x03
+
+define SSC_POWER_MASK0x01
+define SSC_POWER_DOWN0x01
+define SSC_POWER_ON0x00
+
+define FPGA_VER0x80
+define HW_VER_MASK0x0F
+
+define EXTEND_DMA1_ASYNC_SIGNAL0x02
+
+/* CFG_MODE*/
+define XTAL_FREE0x80
+define CLK_MODE_MASK0x03
+define CLK_MODE_12M_XTAL0x00
+define CLK_MODE_NON_XTAL0x01
+define CLK_MODE_24M_OSC0x02
+define CLK_MODE_48M_OSC0x03
+
+/* CFG_MODE_1*/
+define RTS51790x02
+
+define NYET_EN0x01
+define NYET_MSK0x01
+
+define SD30_DRIVE_MASK0x07
+define SD20_DRIVE_MASK0x03
+
+define DISABLE_SD_CD0x08
+define DISABLE_MS_CD0x10
+define DISABLE_XD_CD0x20
+define SD_CD_DEGLITCH_EN0x01
+define MS_CD_DEGLITCH_EN0x02
+define XD_CD_DEGLITCH_EN0x04
+
+define CARD_SHARE_LQFP480x04
+define CARD_SHARE_QFN240x00
+define CARD_SHARE_LQFP_SEL0x04
+define CARD_SHARE_XD0x00
+define CARD_SHARE_SD0x01
+define CARD_SHARE_MS0x02
+define CARD_SHARE_MASK0x03
+
+
+/* SD30_DRIVE_SEL */
+define DRIVER_TYPE_A0x05
#define DRIVER_TYPE_B 0x03
#define DRIVER_TYPE_C 0x02
#define DRIVER_TYPE_D 0x01

+/
#define DRIVER_TYPE_B 0x03
#define DRIVER_TYPE_C 0x02
#define DRIVER_TYPE_D 0x01
+/
*/ SD_BUS_STAT */
#define SD_CLK_TOGGLE_EN 0x80
#define SD_CLK_FORCE_STOP 0x40
#define SD_DAT3_STATUS 0x10
#define SD_DAT2_STATUS 0x08
#define SD_DAT1_STATUS 0x04
#define SD_DAT0_STATUS 0x02
#define SD_CMD_STATUS 0x01
+
*/ SD_PAD_CTL */
#define SD_IO_USING_1V8 0x80
#define SD_IO_USING_3V3 0x7F
#define TYPE_A_DRIVING 0x00
#define TYPE_B_DRIVING 0x01
#define TYPE_C_DRIVING 0x02
#define TYPE_D_DRIVING 0x03
+
*/ CARD_CLK_EN */
#define SD_CLK_EN 0x04
#define MS_CLK_EN 0x08
+
*/ CARD_SELECT */
#define SD_MOD_SEL 2
#define MS_MOD_SEL 3
+
*/ CARD_SHARE_MODE */
#define CARD_SHARE_LQFP480x04
#define CARD_SHARE_QFN240x00
#define CARD_SHARE_LQFP_SEL0x04
#define CARD_SHARE_XD0x00
#define CARD_SHARE_SD0x01
#define CARD_SHARE_MS0x02
#define CARD_SHARE_MASK 0x03
+
*/ SSC_CTL1 */
#define SSC_RSTB0x80
#define SSC_8X_EN0x40
#define SSC_FIX_FRAC0x20
#define SSC_SEL_1M0x00
#define SSC_SEL_2M0x08
#define SSC_SEL_4M0x10
#define SSC_SEL_8M0x18
+
#define SSC_DEPTH_MASK		0x03
#define SSC_DEPTH_DISABLE	0x00
#define SSC_DEPTH_2M		0x01
#define SSC_DEPTH_1M		0x02
#define SSC_DEPTH_512K	0x03
+
/* SD_VPCLK0_CTL */
#define PHASE_CHANGE	0x80
#define PHASE_NOT_RESET	0x40
+
/* SD_TRANSFER */
#define SD_TRANSFER_START	0x80
#define SD_TRANSFER_END	0x40
#define SD_STAT_IDLE	0x20
#define SD_TRANSFER_ERR	0x10
#define SD_TM_NORMAL_WRITE	0x00
#define SD_TM_AUTO_WRITE_30	0x01
#define SD_TM_AUTO_WRITE_40	0x02
#define SD_TM_AUTO_READ_30	0x05
#define SD_TM_AUTO_READ_40	0x06
#define SD_TM_CMD_RSP	0x08
+
/* SD_CFG1 */
#define SD_CLK_DIVIDE_0	0x00
#define SD_CLK_DIVIDE_256	0xC0
#define SD_CLK_DIVIDE_128	0x80
#define SD_CLK_DIVIDE_MASK	0xC0
#define SD_BUS_WIDTH_1BIT	0x00
#define SD_BUS_WIDTH_4BIT	0x01
#define SD_BUS_WIDTH_8BIT	0x02
#define SD_ASYNC_FIFO_RST	0x10
#define SD_20_MODE	0x00
#define SD_DDR_MODE	0x04
#define SD_30_MODE	0x08
+
/* SD_CFG2 */
#define SD_CALCULATE_CRC7	0x00
#define SD_NO_CALCULATE_CRC7	0x80
#define SD_CHECK_CRC16	0x00
#define SD_NO_CHECK_CRC16	0x40
#define SD_WAIT_CRC_TO_EN	0x20
#define SD_WAIT_BUSY_END	0x08
+define SD_NO_WAIT_BUSY_END 0x00
+define SD_CHECK_CRC0x00
+define SD_NO_CHECK_CRC0x04
+define SD_RSP_LEN_0x00
+define SD_RSP_LEN_60x01
+define SD_RSP_LEN_170x02
+define SD_RSP_TYPE_R0x04
+define SD_RSP_TYPE_R1x01
+define SD_RSP_TYPE_R1b0x09
+define SD_RSP_TYPE_R2x02
+define SD_RSP_TYPE_R30x05
+define SD_RSP_TYPE_R40x05
+define SD_RSP_TYPE_R50x01
+define SD_RSP_TYPE_R60x01
+define SD_RSP_TYPE_R70x01
+
+/* SD_STAT1 */
+define SD_CRC7_ERR 0x80
+define SD_CRC16_ERR 0x40
+define SD_CRC_WRITE_ERR 0x20
+define SD_CRC_WRITE_ERR_MASK 0x1C
+define GET_CRC_TIME_OUT 0x02
+define SD_TUNING_COMPARE_ERR 0x01
+
+/* SD_DATA_STATE */
+define SD_DATA_IDLE 0x80
+
+/* CARD_DATA_SOURCE */
+define PINGPONG_BUFFER 0x01
+define RING_BUFFER 0x00
+
+/* CARD_OE */
+define SD_OUTPUT_EN 0x04
+define MS_OUTPUT_EN 0x08
+
+/* CARD_STOP */
+define SD_STOP 0x04
+define MS_STOP 0x08
+define SD_CLR_ERR 0x40
+define MS_CLR_ERR 0x80
+
+/* CARD_CLK_SOURCE */
+define CRC_FIX_CLK (0x00 << 0)
+define CRC_VAR_CLK0 (0x01 << 0)
+define CRC_VAR_CLK1 (0x02 << 0)
+define SD30_FIX_CLK (0x00 << 2)
+define SD30_VAR_CLK0 (0x01 << 2)
+define SD30_VAR_CLK1 (0x02 << 2)
+// define SAMPLE_FIX_CLK(0x00 << 4)
+// define SAMPLE_VAR_CLK0(0x01 << 4)
+// define SAMPLE_VAR_CLK1(0x02 << 4)
+
+/* SD_SAMPLE_POINT_CTL */
+// define DDR_FIX_RX_DAT 0x00
+// define DDR_VAR_RX_DAT 0x80
+// define DDR_FIX_RX_DAT_EDGE 0x00
+// define DDR_FIX_RX_DAT_14_DELAY 0x40
+// define DDR_FIX_RX_CMD 0x00
+// define DDR_VAR_RX_CMD 0x20
+// define DDR_FIX_RX_CMD_POS_EDGE 0x00
+// define DDR_FIX_RX_CMD_14_DELAY 0x10
+// define SD20_RX_POS_EDGE 0x00
+// define SD20_RX_14_DELAY 0x08
+// define SD20_RX_SEL_MASK 0x08
+
+/* SD_PUSH_POINT_CTL */
+// define DDR_FIX_TX_CMD_DAT 0x00
+// define DDR_VAR_TX_CMD_DAT 0x80
+// define DDR_FIX_TX_DAT_14_TSU 0x00
+// define DDR_FIX_TX_DAT_12_TSU 0x40
+// define DDR_FIX_TX_CMD_NEG_EDGE 0x00
+// define DDR_FIX_TX_CMD_14_AHEAD 0x20
+// define SD20_TX_NEG_EDGE 0x00
+// define SD20_TX_14_AHEAD 0x10
+// define SD20_TX_SEL MASK 0x10
+// define DDR_VAR_SDCLK_POL_SWAP 0x01
+
+/* MS_CFG */
+// define SAMPLE_TIME_RISING 0x00
+// define SAMPLE_TIME_FALLING 0x80
+// define PUSH_TIME_DEFAULT 0x00
+// define PUSH_TIME_ODD 0x40
+// define NO EXTEND_TOGGLE 0x00
+// define EXTEND_TOGGLE_CHK 0x20
+// define MS_BUS_WIDTH_1 0x00
+// define MS_BUS_WIDTH_4 0x10
+// define MS_BUS_WIDTH_8 0x18
+// define MS_2K_SECTOR_MODE 0x04
+// define MS_512_SECTOR_MODE 0x00
+// define MS_TOGGLE_TIMEOUT_EN 0x00
+// define MS_TOGGLE_TIMEOUT_DISEN 0x01
+// define MS_NO_CHECK_INT 0x02
+
+/* MS_TRANS_CFG */
+// define WAIT_INT 0x80
+// define NO_WAIT_INT 0x00
+\#define NO_AUTO_READ_INT_REG 0x00
+\#define AUTO_READ_INT_REG 0x40
+\#define MS_CRC16_ERR 0x20
+\#define MS_RDY_TIMEOUT 0x10
+\#define MS_INT_CMDNK 0x08
+\#define MS_INT_BREQ 0x04
+\#define MS_INT_ERR 0x02
+\#define MS_INT_CED 0x01
+
+/** MS_TRANSFER */
+\#define MS_TRANSFER_START 0x80
+\#define MS_TRANSFER_END 0x40
+\#define MS_TRANSFER_ERR 0x20
+\#define MS_BS_STATE 0x10
+\#define MS_TM_READ_BYTES 0x00
+\#define MS_TM_NORMAL_READ 0x01
+\#define MS_TM_WRITE_BYTES 0x04
+\#define MS_TM_NORMAL_WRITE 0x05
+\#define MS_TM_AUTO_READ 0x08
+\#define MS_TM_AUTO_WRITE 0x0C
+\#define MS_TM_SET_CMD 0x06
+\#define MS_TM_COPY_PAGE 0x07
+\#define MS_TM_MULTI_READ 0x02
+\#define MS_TM_MULTI_WRITE 0x03
+
+/** MC_FIFO_CTL */
+\#define FIFO_FLUSH 0x01
+
+/** MC_DMA_RST */
+\#define DMA_RESET 0x01
+
+/** MC_DMA_CTL */
+\#define DMA_TC_EQ_0 0x80
+\#define DMA_DIR_TO_CARD 0x00
+\#define DMA_DIR_FROM_CARD 0x02
+\#define DMA_EN 0x01
+\#define DMA_128(0 << 2)
+\#define DMA_256(1 << 2)
+\#define DMA_512(2 << 2)
+\#define DMA_1024(3 << 2)
+\#define DMA_PACK_SIZE_MASK 0x0C
+
+/** CARD_INT_PEND */
+\#define XD_INT 0x10
+\#define MS_INT 0x08
+\#define SD_INT 0x04
+
+/** LED operations*/
static inline int rtsx_usb_turn_on_led(struct rtsx_ucr *ucr)
{
    return rtsx_usb_ep0_write_register(ucr, CARD_GPIO, 0x03, 0x02);
}

static inline int rtsx_usb_turn_off_led(struct rtsx_ucr *ucr)
{
    return rtsx_usb_ep0_write_register(ucr, CARD_GPIO, 0x03, 0x03);
}

/* HW error clearing */
static inline void rtsx_usb_clear_fsm_err(struct rtsx_ucr *ucr)
{
    rtsx_usb_ep0_write_register(ucr, SFSM_ED, 0xf8, 0xf8);
}

static inline void rtsx_usb_clear_dma_err(struct rtsx_ucr *ucr)
{
    rtsx_usb_ep0_write_register(ucr, MC_FIFO_CTL,
        FIFO_FLUSH, FIFO_FLUSH);
    rtsx_usb_ep0_write_register(ucr, MC_DMA_RST, DMA_RESET, DMA_RESET);
}

/* Setting bit 0 of the owner field with other non-zero bits will indicate
 * that the rwsem is writer-owned with an unknown owner.
 */
#define RWSEM_OWNER_UNKNOWN ((struct task_struct *)-1L)

extern struct rw_semaphore *rwsem_down_read_failed(struct rw_semaphore *sem);
extern struct rw_semaphore *rwsem_down_read_failed_killable(struct rw_semaphore *sem);
extern struct rw_semaphore *rwsem_down_write_failed(struct rw_semaphore *sem);

#define CONFIG_SGL_ALLOC

struct scatterlist *sgl_alloc_order(unsigned long long length,
    unsigned int order, bool chainable,
    gfp_t gfp, unsigned int *nent_p);
+struct scatterlist *sgl_alloc(unsigned long long length, gfp_t gfp,
 + unsigned int *nent_p);
+void sgl_free_order(struct scatterlist *sgl, int order);
+void sgl_free(struct scatterlist *sgl);
+#endif /* CONFIG_SGL_ALLOC */
+
+size_t sg_copy_buffer(struct scatterlist *sgl, unsigned int nents, void *buf,
+ size_t buflen, off_t skip, bool to_buffer);

--- linux-4.15.0.orig/include/linux/sched.h
+++ linux-4.15.0/include/linux/sched.h
@@ -113,17 +113,36 @@
#ifdef CONFIG_DEBUG_ATOMIC_SLEEP
+/*
+ * Special states are those that do not use the normal wait-loop pattern. See
+ * the comment with set_special_state().
+ */
+#define is_special_task_state(state) (((state) & (__TASK_STOPPED | __TASK_TRACED | TASK_DEAD))
+
#define __set_current_state(state_value)
    do {
        WARN_ON_ONCE(is_special_task_state(state_value));
        current->task_state_change = _THIS_IP_;
        current->state = (state_value);
    } while (0)
+
#define set_current_state(state_value)
    do {
        WARN_ON_ONCE(is_special_task_state(state_value));
        current->task_state_change = _THIS_IP_;
        smp_store_mb(current->state, (state_value));
    } while (0)
+
#define set_special_state(state_value)
    do {
        unsigned long flags; /* may shadow */
        WARN_ON_ONCE(!is_special_task_state(state_value));
        raw_spin_lock_irqsave(&current->pi_lock, flags);
        current->task_state_change = _THIS_IP_;
        current->state = (state_value);
        raw_spin_unlock_irqrestore(&current->pi_lock, flags);
    } while (0)
#else
+/*
+ * set_current_state() includes a barrier so that the write of current->state
The above is typically ordered against the wakeup, which does:

- *need_sleep = false;
- *wake_up_state(p, TASK_UNINTERRUPTIBLE);
+ *   need_sleep = false;
+ *   wake_up_state(p, TASK_UNINTERRUPTIBLE);

Where wake_up_state() (and all other wakeup primitives) imply enough barriers to order the store of the variable against wakeup.

- * This is obviously fine, since they both store the exact same value.
+ * However, with slightly different timing the wakeup TASK_RUNNING store can
+ * also collide with the TASK_UNINTERRUPTIBLE store. Loosing that store is not
+ * a problem either because that will result in one extra go around the loop
+ * and our @cond test will save the day.

- * Also see the comments of try_to_wake_up().
struct seccomp
/* Thread group tracking: */
t32			parent_exec_id;
t32			self_exec_id;
/* Protection against (de-)allocation: mm, files, fs, tty, keyrings, mems_allowed, mempolicy: */
spinlock_talloc_lock;
#endif
struct list_head*pi_state_list;
struct futex_pi_state*pi_state_cache;
+struct mutexfutex_exit_mutex;
+unsigned intinftutex_state;
#endif
#ifdef CONFIG_PERF_EVENTS
struct perf_event_context*perf_event_ctxp[perf_nr_task_contexts];
#endif
#ifdef CONFIG_FUNCTION_GRAPH_TRACER
/* Index of current stored address in ret_stack: */
int			curr_ret_stack;
+int			curr_ret_depth;
#endif
/* Stack of return addresses for return function tracing: */
struct ftrace_ret_stack*ret_stack;
#define PF_IDLE			0x00000002	/* I am an IDLE thread */
#define PF_EXITING	0x00000004	/* Getting shut down */
#define PF_EXITPIDONE	0x00000008	/* PI exit done on shut down */
#define PF_VCPU			0x00000010	/* I’m a virtual CPU */
#define PF_WQ_WORKER		0x00000020	/* I’m a workqueue worker */
#define PF_FORKNOEXEC	0x00000040	/* Forked but didn’t exec */
#define tsk_used_math(p)			((p)->flags & PF_USED_MATH)
#define used_math()			tsk_used_math(current)
+static __always_inline bool is_percpu_thread(void)
+static __always_inline bool is_percpu_thread(void)
{ }
#define PFA_NO_NEW_PRIVS		0	/* May not gain new privileges. */
#define PFA_SPREAD_PAGE			1	/* Spread page cache over cpuset */
#define PFA_SPREAD_SLAB /* Spread some slab caches over cpuset */
-
+#define PFA_SPEC_SSB_DISABLE /* Speculative Store Bypass disabled */
+#define PFA_SPEC_SSB_FORCE_DISABLE /* Speculative Store Bypass force disabled */
+#define PFA_SPEC_IB_DISABLE /* Indirect branch speculation restricted */
+#define PFA_SPEC_IB_FORCE_DISABLE /* Indirect branch speculation permanently restricted */

#define TASK_PFA_TEST(name, func)
static inline bool task_##func(struct task_struct *p)
@@ -1378,6 +1423,20 @@
 TASK_PFA_SET(SPREAD_SLAB, spread_slab)
 TASK_PFA_CLEAR(SPREAD_SLAB, spread_slab)

+TASK_PFA_TEST(SPEC_SSB_DISABLE, spec_ssb_disable)
+TASK_PFA_SET(SPEC_SSB_DISABLE, spec_ssb_disable)
+TASK_PFA_CLEAR(SPEC_SSB_DISABLE, spec_ssb_disable)
 +
+TASK_PFA_TEST(SPEC_SSB_FORCE_DISABLE, spec_ssb_force_disable)
+TASK_PFA_SET(SPEC_SSB_FORCE_DISABLE, spec_ssb_force_disable)
 +
+TASK_PFA_TEST(SPEC_IB_DISABLE, spec_ib_disable)
+TASK_PFA_SET(SPEC_IB_DISABLE, spec_ib_disable)
+TASK_PFA_CLEAR(SPEC_IB_DISABLE, spec_ib_disable)
 +
+TASK_PFA_TEST(SPEC_IB_FORCE_DISABLE, spec_ib_force_disable)
+TASK_PFA_SET(SPEC_IB_FORCE_DISABLE, spec_ib_force_disable)
 +
static inline void
current_restore_flags(unsigned long orig_flags, unsigned long flags)
{
@@ -1621,9 +1680,9 @@
 static inline unsigned int task_cpu(const struct task_struct *p)
 {
 #ifdef CONFIG_THREAD_INFO_IN_TASK
-return p->cpu;
+return READ_ONCE(p->cpu);
 #else
-return task_thread_info(p)->cpu;
+return READ_ONCE(task_thread_info(p)->cpu);
 #endif
 }

--- linux-4.15.0.orig/include/linux/sched/coredump.h
+++ linux-4.15.0/include/linux/sched/coredump.h
@@ -71,6 +71,8 @@
 #define MMF_HUGE_ZERO_PAGE /* mm has ever used the global huge zero page */
 #define MMF_DISABLE_THP /* disable THP for all VMAs */
 #define MMF_OOM_VICTIM /* mm is the oom victim */
+#define MMF_OOM_REAP_QUEUED 26 /* mm was queued for oom_reaper */
+#define MMF_MULTIPROCESS 27 /* mm is shared between processes */
#define MMF_DISABLE_THP_MASK (1 << MMF_DISABLE_THP)

#define MMF_INIT_MASK (MMF_DUMPABLE_MASK | MMF_DUMP_FILTER_MASK |
--- linux-4.15.0.orig/include/linux/sched/cpufreq.h
+++ linux-4.15.0/include/linux/sched/cpufreq.h
@@ -15,6 +15,8 @@
#defined SCHED_CPUFREQ_RT_DL(SCHED_CPUFREQ_RT | SCHED_CPUFREQ_DL)

#if defined CONFIG_CPU_FREQ
+struct cpufreq_policy;
+
+struct update_util_data {
+    void (*func)(struct update_util_data *data, u64 time, unsigned int flags);
+};
@@ -23,6 +25,7 @@
    void (*func)(struct update_util_data *data, u64 time,
    unsigned int flags);
    void cpufreq_remove_update_util_hook(int cpu);
+#ifdef CONFIG_CPU_FREQ
+    bool cpufreq_this_cpu_can_update(struct cpufreq_policy *policy);
#endif /* CONFIG_CPU_FREQ */

#endif /* _LINUX_SCHED_CPUFREQ_H */
--- linux-4.15.0.orig/include/linux/sched/mm.h
+++ linux-4.15.0/include/linux/sched/mm.h
@@ -57,6 +57,33 @@
 }
 }
 
+void mmdrop(struct mm_struct *mm);
+
+/*
+ * This has to be called after a get_task_mm()/mmget_not_zero()
+ * followed by taking the mmap_sem for writing before modifying the
+ * vmas or anything the coredump pretends not to change from under it.
+ *
+ * It also has to be called when mmgrab() is used in the context of
+ * the process, but then the mm_count refcount is transferred outside
+ * the context of the process to run down_write() on that pinned mm.
+ *
+ * NOTE: find_extend_vma() called from GUP context is the only place
+ * that can modify the "mm" (notably the vm_start/end) under mmap_sem
+ * for reading and outside the context of the process, so it is also
+ * the only case that holds the mmap_sem for reading that must call
+ * this function. Generally if the mmap_sem is hold for reading
+ * there's no need of this check after get_task_mm()/mmget_not_zero().
+ */
/* This function can be obsoleted and the check can be removed, after
 * the coredump code will hold the mmap_sem for writing before
 * invoking the ->core_dump methods.
 */
static inline bool mmget_still_valid(struct mm_struct *mm)
{
    return likely(!mm->core_state);
}

/**
 * mmget() - Pin the address space associated with a &struct mm_struct.
 * @mm: The address space to pin.
 * @@ -100.8 +127.10 @@
 * @ succeeds.
 */
extern struct mm_struct *mm_access(struct task_struct *task, unsigned int mode);
-/* Remove the current tasks stale references to the old mm_struct */
-extern void mm_release(struct task_struct *, struct mm_struct *);
+/* Remove the current tasks stale references to the old mm_struct on exit() */
+extern void exit_mm_release(struct task_struct *, struct mm_struct *);
+/* Remove the current tasks stale references to the old mm_struct on exec() */
+extern void exec_mm_release(struct task_struct *, struct mm_struct *);

#if defined(CONFIG_MEMCG)
extern void mm_update_next_owner(struct mm_struct *mm);
@@ -144,7 +173,8 @@
 * another oom-unkillable task does this it should blame itself.
 */
rcu_read_lock();
- ret = tsk->vfork_done && tsk->real_parent->mm == tsk->mm;
+ ret = tsk->vfork_done &&
+ rcu_dereference(tsk->real_parent)->mm == tsk->mm;
rcu_read_unlock();

return ret;
--- linux-4.15.0.orig/include/linux/sched/numa_balancing.h
+++ linux-4.15.0/include/linux/sched/numa_balancing.h
@@ -34,7 +34,7 @@
static inline void set_numabalancing_state(bool enabled)
 extern void task_numa_fault(int last_node, int node, int pages, int flags);
 extern pid_t task_numa_group_id(struct task_struct *p);
 extern void set_numabalancing_state(bool enabled);
-extern void task_numa_free(struct task_struct *);
+extern void task_numa_free(struct task_struct *, bool final);
 extern void task_numa_free(struct task_struct *, struct page *, struct page *page);
 extern bool should_numa_migrate_memory(struct task_struct *, struct page *, struct page *, struct page *page);
#else
@@ -34,7 +34,7 @@
static inline void set_numabalancing_state(bool enabled)
static inline void task_numa_free(struct task_struct *p) {
}

static inline void task_numa_free(struct task_struct *p, bool final) {
}

static inline bool should_numa_migrate_memory(struct task_struct *p, ...) {
}

static inline bool should_numa_migrate_memory(struct task_struct *p) {
    ...
}

---
+++ linux-4.15.0/include/linux/sched/signal.h
@@ -280,7 +280,7 @@

    spin_lock_irq(&current->sighand->siglock);
    if (current->jobctl & JOBCTL_STOP_DEQUEUED)
        set_special_state(TASK_STOPPED);
+    spin_unlock_irq(&current->sighand->siglock);

    schedule();
@@ -377,10 +377,20 @@

    clear_tsk_thread_flag(tsk, TIF_RESTORE_SIGMASK);
    return test_tsk_thread_flag(tsk, TIF_RESTORE_SIGMASK);
+
static inline void clear_tsk_restore_sigmask(struct task_struct *tsk) {
    clear_tsk_thread_flag(tsk, TIF_RESTORE_SIGMASK);
}
+
static inline void clear_restore_sigmask(void) {
    clear_thread_flag(TIF_RESTORE_SIGMASK);
}
+
static inline bool test_tsk_restore_sigmask(struct task_struct *tsk) {
    return test_tsk_thread_flag(tsk, TIF_RESTORE_SIGMASK);
+
static inline bool test_restore_sigmask(void) {
    return test_thread_flag(TIF_RESTORE_SIGMASK);
+
static inline void clear_tsk_restore_sigmask(struct task_struct *tsk) {
    tsk->restore_sigmask = false;
+
static inline void clear_restore_sigmask(void)
current->restore_sigmask = false;
@@ -406,6 +420,10 @@
{
    return current->restore_sigmask;
}
+static inline bool test_tsk_restore_sigmask(struct task_struct *tsk)
+{
+    return tsk->restore_sigmask;
+}
static inline bool test_and_clear_restore_sigmask(void)
{
    if (!current->restore_sigmask)
--- linux-4.15.0.orig/include/linux/sched/smt.h
+++ linux-4.15.0/include/linux/sched/smt.h
@@ -0,0 +1,20 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+#ifndef _LINUX_SCHED_SMT_H
+#define _LINUX_SCHED_SMT_H
+
#include <linux/static_key.h>
+
+#ifdef CONFIG_SCHED_SMT
+extern struct static_key_false sched_smt_present;
+
+static __always_inline bool sched_smt_active(void)
+{
+    return static_branch_likely(&sched_smt_present);
+}
+#else
+static inline bool sched_smt_active(void) { return false; }
+#endif
+
+void arch_smt_update(void);
+
+#endif
--- linux-4.15.0.orig/include/linux/sched/task.h
+++ linux-4.15.0/include/linux/sched/task.h
@@ -39,6 +39,8 @@
extern void proc_caches_init(void);

+extern void fork_init(void);
+
extern void release_task(struct task_struct * p);

+#ifdef CONFIG_HAVE_COPY_THREAD_TLS
@@ -75,7 +77,7 @@
extern long do_fork(unsigned long, unsigned long, unsigned long, int __user *, int __user *);
struct task_struct *fork_idle(int);
extern pid_t kernel_thread(int (*fn)(void *), void *arg, unsigned long flags);
-extern long kernel_wait4(pid_t, int *, int, struct rusage *);
+extern long kernel_wait4(pid_t, int __user *, int, struct rusage *);

extern void free_task(struct task_struct *tsk);

--- linux-4.15.0.orig/include/linux/sched/topology.h
+++ linux-4.15.0/include/linux/sched/topology.h
@@ -177,10 +177,10 @@
#define SDTL_OVERLAP 0x01

struct sd_data {
-struct sched_domain **__percpu sd;
-struct sched_domain_shared **__percpu sds;
-struct sched_group **__percpu sg;
-struct sched_group_capacity **__percpu sgc;
+struct sched_domain *__percpu *sd;
+struct sched_domain_shared *__percpu *sds;
+struct sched_group *__percpu *sg;
+struct sched_group_capacity *__percpu *sgc;
};

struct sched_domain_topology_level {
--- linux-4.15.0.orig/include/linux/seccomp.h
+++ linux-4.15.0/include/linux/seccomp.h
@@ -4,8 +4,9 @@
#include <uapi/linux/seccomp.h>
-#define SECCOMP_FILTER_FLAG_MASK (SECCOMP_FILTER_FLAG_TSYNC | 
- SECCOMP_FILTER_FLAG_LOG)
+#define SECCOMP_FILTER_FLAG_MASK (SECCOMP_FILTER_FLAG_TSYNC | 
+ SECCOMP_FILTER_FLAG_LOG | 
+ SECCOMP_FILTER_FLAG_SPEC_ALLOW)

#ifdef CONFIG_SECCOMP

--- linux-4.15.0.orig/include/linux/security.h
+++ linux-4.15.0/include/linux/security.h
@@ -57,9 +57,12 @@
 struct xfrm_sec_ctx;
 struct mm_struct;

+/* Default (no) options for the capable function */
+#define CAP_OPT_NONE 0x0
 /* If capable should audit the security request */
static inline int security_capable(const struct cred *cred,
    struct user_namespace *ns, int cap, unsigned int opts)
{
    return cap_capable(cred, ns, cap, SECURITY_CAP_AUDIT);
    }

static inline int security_capable_noaudit(const struct cred *cred,
    struct user_namespace *ns, int cap)
{
    return cap_capable(cred, ns, cap, SECURITY_CAP_NOAUDIT);
    }

static inline int security_quotactl(int cmds, int type, int id,
    int flags)
{ }

static inline int security_inode_getsecurity(struct inode *inode, const char *name, void **buffer, bool alloc)
{
    return -EOPNOTSUPP;
    }

static inline int security_inode_setsecurity(struct inode *inode, const char *name, const void *value, size_t size, int flags)
{ return 0; }

static inline void security_d_instantiate(struct dentry *dentry, struct inode *inode)
{ }

static inline int security_getprocattr(struct task_struct *p, char *name, char **value)
{ return -EINVAL; }

static inline int security_setprocattr(const char *lsm, char *name, void *value, size_t size)
{ return -EINVAL; }

static inline int security_getprocattr(struct task_struct *p, char *name, char **value)
{ return -EINVAL; }

static inline int security_setprocattr(const char *lsm, char *name, void *value, size_t size)
{ return -EINVAL; }
```c
#else
+static inline void __init init_lockdown(void)
+{
+}
+#endif
+
#endif /* !__LINUX_SECURITY_H */

--- linux-4.15.0.orig/include/linux/selection.h
+++ linux-4.15.0/include/linux/selection.h
@@ -13,8 +13,8 @@
 struct tty_struct;
 -extern struct vc_data *sel_cons;
 struct tty_struct;
+struct vc_data;

 extern void clear_selection(void);
 extern int set_selection(const struct tiocl_selection __user *sel, struct tty_struct *tty);
@@ -23,6 +23,8 @@
 extern int mouse_reporting(void);
 extern void mouse_report(struct tty_struct * tty, int butt, int mrx, int mry);

+bool vc_is_sel(struct vc_data *vc);
+
 extern int console_blanked;

 extern const unsigned char color_table[];
--- linux-4.15.0.orig/include/linux/seq_buf.h
+++ linux-4.15.0/include/linux/seq_buf.h
@@ -30,7 +30,7 @@
 }

 static inline void
-seq_buf_init(struct seq_buf *s, unsigned char *buf, unsigned int size)
+seq_buf_init(struct seq_buf *s, char *buf, unsigned int size)
 {
  s->buffer = buf;
  s->size = size;
--- linux-4.15.0.orig/include/linux/seqlock.h
+++ linux-4.15.0/include/linux/seqlock.h
```
* usual consistency guarantee. It is one wmb cheaper, because we can
* collapse the two back-to-back wmb(s).
*
* Note that, writes surrounding the barrier should be declared atomic (e.g.
* via WRITE_ONCE): a) to ensure the writes become visible to other threads
* atomically, avoiding compiler optimizations; b) to document which writes are
* meant to propagate to the reader critical section. This is necessary because
* neither writes before and after the barrier are enclosed in a seq-writer
* critical section that would ensure readers are aware of ongoing writes.
*
* seqcount_t seq;
* bool X = true, Y = false;
*
* void write(void)
* {
*   Y = true;
*   WRITE_ONCE(Y, true);
*   raw_write_seqcount_barrier(seq);
*   X = false;
*   WRITE_ONCE(X, false);
* }

static inline void raw_write_seqcount_barrier(seqcount_t *s)
/* flags must be updated while holding port mutex */
@@ -348,13 +349,14 @@
    }

 struct earlycon_id {
-   char name[16];
+   char name[15];
+   char name_term; /* In case compiler didn't '"' term name */
   char compatible[128];
   int (*setup)(struct earlycon_device *, const char *options);
 -} __aligned(32);
+};

-extern const struct earlycon_id __earlycon_table[];
-extern const struct earlycon_id __earlycon_table_end[];
+extern const struct earlycon_id *__earlycon_table[];
+extern const struct earlycon_id *__earlycon_table_end[];

#if defined(CONFIG_SERIAL_EARLYCON) && !defined(MODULE)
#define EARLYCON_USED_OR_UNUSED __used
@@ -362,12 +364,19 @@
#define EARLYCON_USED_OR_UNUSED __maybe_unused
#endif

#define OF_EARLYCON_DECLARE(_name, compat, fn) \
   static const struct earlycon_id __UNIQUE_ID(__earlycon_##_name) \
     EARLYCON_USED_OR_UNUSED __section(__earlycon_table) \
     \ 
+ #define _OF_EARLYCON_DECLARE(_name, compat, fn, unique_id) \
+     static const struct earlycon_id unique_id \
+     EARLYCON_USED_OR_UNUSED __initconst \ 
+     = { .name = __stringify(_name), \ 
+          .compatible = compat, \ 
+          .setup = fn };
+};
+static const struct earlycon_id EARLYCON_USED_OR_UNUSED \ 
+   __section(__earlycon_table) \ 
+   * const __PASTE(__p, unique_id) = &unique_id
+
+ define OF_EARLYCON_DECLARE(_name, compat, fn) \
+   _OF_EARLYCON_DECLARE(_name, compat, fn, \ 
+   \ 
+ #define EARLYCON_DECLARE(_name, fn) OF_EARLYCON_DECLARE(_name, "", fn) 

@@ -466,8 +475,42 @@
\}


return 0;
}
+static inline int
+uart_prepare_sysrq_char(struct uart_port *port, unsigned int ch)
+{
+if (port->sysrq) {
+if (ch && time_before(jiffies, port->sysrq)) {
+port->sysrq_ch = ch;
+port->sysrq = 0;
+return 1;
+}
+port->sysrq = 0;
+}
+return 0;
+}
+static inline void
+uart_unlock_and_check_sysrq(struct uart_port *port, unsigned long irqflags)
+{
+int sysrq_ch;
+
+sysrq_ch = port->sysrq_ch;
+sysrq_ch = port->sysrq_ch;
+port->sysrq_ch = 0;
+
+spin_unlock_irqrestore(&port->lock, irqflags);
+
+if (sysrq_ch)
+handle_sysrq(sysrq_ch);
+}
#else
-#define uart_handle_sysrq_char(port,ch) ({ (void)port; 0; })
+static inline int
+uart_handle_sysrq_char(struct uart_port *port, unsigned int ch) { return 0; }
+static inline int
+uart_prepare_sysrq_char(struct uart_port *port, unsigned int ch) { return 0; }
+static inline void
+uart_unlock_and_check_sysrq(struct uart_port *port, unsigned long irqflags)
+{
+spin_unlock_irqrestore(&port->lock, irqflags);
+}
#endif

/*
--- linux-4.15.0.orig/include/linux/shmem_fs.h
+++ linux-4.15.0/include/linux/shmem_fs.h
@@ -25,10 +25,13 @@

};

struct shmem_sb_info {
+struct mutex idr_lock;
+bool idr_nouse;
+struct idr idr; /* manages inode-number */
unsigned long max_blocks; /* How many blocks are allowed */
struct percpu_counter used_blocks; /* How many are allocated */
-unsigned long max_inodes; /* How many inodes are allowed */
-unsigned long free_inodes; /* How many are left for allocation */
+int max_inodes; /* How many inodes are allowed */
+int free_inodes; /* How many are left for allocation */
spinlock_t stat_lock; /* Serialize shmem_sb_info changes */
umode_t mode; /* Mount mode for root directory */
unsigned char huge; /* Whether to try for hugepages */
--- linux-4.15.0.orig/include/linux/shrinker.h
+++ linux-4.15.0/include/linux/shrinker.h
@@ -75,6 +75,9 @@
#define SHRINKER_NUMA_AWARE (1 << 0)
#define SHRINKER_MEMCG_AWARE (1 << 1)

-extern int register_shrinker(struct shrinker *);
-extern void unregister_shrinker(struct shrinker *);
+extern int prealloc_shrinker(struct shrinker *shrinker);
+extern void register_shrinker_prepared(struct shrinker *shrinker);
+extern int register_shrinker(struct shrinker *shrinker);
+extern void unregister_shrinker(struct shrinker *shrinker);
+extern void free_preallocated_shrinker(struct shrinker *shrinker);
#endif
--- linux-4.15.0.orig/include/linux/signal.h
+++ linux-4.15.0/include/linux/signal.h
@@ -34,7 +34,7 @@
#endif
-enum siginfo_layout siginfo_layout(int sig, int si_code);
+enum siginfo_layout siginfo_layout(unsigned sig, int si_code);
/*
 * Define some primitives to manipulate sigset_t.
 @@ -268,6 +268,9 @@
extern void exit_signals(struct task_struct *tsk);
extern void kernel_sigaction(int, __sighandler_t);

+#define SIG_KTHREAD ((__force __sighandler_t)2)
+#define SIG_KTHREAD_KERNEL ((__force __sighandler_t)3)
+
static inline void allow_signal(int sig)
{
/*
 @@ -275,7 +278,17 @@

* know it'll be handled, so that they don't get converted to
* SIGKILL or just silently dropped.
*/
-kernel_sigaction(sig, (__force __sighandler_t)2);
+kernel_sigaction(sig, SIG_KTHREAD);
+
+static inline void allow_kernel_signal(int sig)
+{
+ /*
+  * Kernel threads handle their own signals. Let the signal code
+  * know signals sent by the kernel will be handled, so that they
+  * don't get silently dropped.
+  */
+  +kernel_sigaction(sig, SIG_KTHREAD_KERNEL);
+}

static inline void disallow_signal(int sig)
--- linux-4.15.0.orig/include/linux/siphash.h
+++ linux-4.15.0/include/linux/siphash.h
@@ -21,6 +21,11 @@
    u64 key[2];
    } siphash_key_t;

+static inline bool siphash_key_is_zero(const siphash_key_t *key)
+{
+  return !(key->key[0] | key->key[1]);
+}
+
+u64 __siphash_aligned(const void *data, size_t len, const siphash_key_t *key);
#ifndef CONFIG_HAVE_EFFICIENT_UNALIGNED_ACCESS
u64 __siphash_unaligned(const void *data, size_t len, const siphash_key_t *key);
--- linux-4.15.0.orig/include/linux/sizes.h
+++ linux-4.15.0/include/linux/sizes.h
@@ -8,6 +8,8 @@
    #ifndef __LINUX_SIZES_H__
    #include <linux/const.h>
    #define __LINUX_SIZES_H__

+#include <linux/constants.h>
+
#define SZ_10x00000001
#define SZ_20x00000002
#define SZ_40x00000004
@@ -44,4 +46,6 @@
#define SZ_1Gx400000000
#define SZ_2Gx80000000

+#define SZ_4G_AC(0x100000000, ULL)
# ifndef /* __LINUX_SIZES_H__ */
--- linux-4.15.0.orig/include/linux/skbuff.h
+++ linux-4.15.0/include/linux/skbuff.h
@@ -625,6 +625,7 @@
 * @hash: the packet hash
 * @queue_mapping: Queue mapping for multiqueue devices
 * @xmit_more: More SKBs are pending for this queue
+ * @pfmemalloc: skb was allocated from PFMEMALLOC reserves
 * @ndisc_nodetype: router type (from link layer)
 * @ooo_okay: allow the mapping of a socket to a queue to be changed
 * @l4_hash: indicate hash is a canonical 4-tuple hash over transport
 @@ -671,9 +672,14 @@
 unsigned long dev_scratch;
 }
=size
-struct rb_noderbnode; /* used in netem & tcp stack */
+struct rb_noderbnode; /* used in netem, ip4 defrag, and tcp stack */
+struct list_head list;
union {
	struct sock sk;
+int ip_defrag_offset;
};
-struct sock sk;
union {

tstamp;
peeked:1,
head_frag:1,
xmit_more:1,
-__unused:1; /* one bit hole */
+pfmemalloc:1;
/* fields enclosed in headers_start/headers_end are copied */
* using a single memcpy() in __copy_skb_header() 
@@ -748,31 +754,30 @@
__u8 pkt_type_offset[0];
__u8 pkt_type:3;
-__u8 pfmemalloc:1;
__u8 ignore_df:1;
-__u8 nf_trace:1;
__u8 ip_summed:2;
__u8 ooo_okay:1;
__u8			l4_hash:1;
__u8			sw_hash:1;
__u8			wifi_acked_valid:1;
__u8			wifi_acked:1;
-  
__u8			no_fcs:1;
/* Indicates the inner headers are valid in the skbuff. */
__u8encapsulation:1;
__u8encap_hdr_csum:1;
__u8csum_valid:1;
+
__u8csum_complete_sw:1;
__u8csum_level:2;
__u8csum_not_inet:1;
-  
__u8		
dst_pending_confirm:1;
#endif
__u8ndisc_nodetype:2;
#endif
__u8ipvs_property:1;
+
__u8inner_protocol_type:1;
__u8remcsum_offload:1;
#endif
CONFIG_NET_SWITCHDEV
@@ -1231,7 +1236,8 @@
return skb->hash;
}
-
__u32 skb_get_hash_perturb(const struct sk_buff *skb, u32 perturb);
+__u32 skb_get_hash_perturb(const struct sk_buff *skb, 
+const siphash_key_t *perturb);

static inline __u32 skb_get_hash_raw(const struct sk_buff *skb)
{
@@ -1291,13 +1297,31 @@
}

+static inline void skb_zcopy_set_nouarg(struct sk_buff *skb, void *val)
+{
+skb_shinfo(skb)->destructor_arg = (void *)((uintptr_t) val | 0x1UL);
+skb_shinfo(skb)->tx_flags |= SKBTX_ZEROCOPY_FRAG;
+}
+
+static inline bool skb_zcopy_is_nouarg(struct sk_buff *skb)
+{
+return (uintptr_t) skb_shinfo(skb)->destructor_arg & 0x1UL;
+}
static inline void *skb_zcopy_get_nouarg(struct sk_buff *skb) {
    return (void *)((uintptr_t) skb_shinfo(skb)->destructor_arg & ~0x1UL);
}

/* Release a reference on a zerocopy structure */
static inline void skb_zcopy_clear(struct sk_buff *skb, bool zerocopy) {
    struct ubuf_info *uarg = skb_zcopy(skb);
    if (uarg) {
        if (uarg->callback == sock_zerocopy_callback) {
            if (skb_zcopy_is_nouarg(skb)) {
                /* no notification callback */
            } else if (uarg->callback == sock_zerocopy_callback) {
                uarg->zerocopy = uarg->zerocopy && zerocopy;
                sock_zerocopy_put(uarg);
            } else {
                @ @ -1331,6 +1355,19 @@
            }
        }
    }
}

/**
 * skb_queue_empty_lockless - check if a queue is empty
 * @list: queue head
 * *
 * Returns true if the queue is empty, false otherwise.
 * This variant can be used in lockless contexts.
 * */
static inline bool skb_queue_empty_lockless(const struct sk_buff_head *list) {
    return READ_ONCE(list->next) == (const struct sk_buff *) list;
}

/**
 * skb_queue_is_last - check if skb is the last entry in the queue
 * @list: queue head
 * @skb: buffer
 * @ @ -1606,7 +1643,7 @@
 */
static inline struct sk_buff *skb_peek_tail(const struct sk_buff_head *list_) {
    struct sk_buff *skb = list_->prev;
    if (skb == (struct sk_buff *)list_)}
skb = NULL;
@@ -1626,6 +1663,18 @@
}

/**
 + * skb_queue_len_lockless - get queue length
 + * @list_: list to measure
 + *
 + * Return the length of an &sk_buff queue.
 + * This variant can be used in lockless contexts.
 + */
+static inline __u32 skb_queue_len_lockless(const struct sk_buff_head *list_)
+{
+    return READ_ONCE(list_->qlen);
+}
+
+/**
 + * __skb_queue_head_init - initialize non-spinlock portions of sk_buff_head
 + * @list: queue to initialize
 +
 + @@ -1674,10 +1723,14 @@
             struct sk_buff *first = list->next;
             struct sk_buff *last = list->prev;
             -newsk->next = next;
-            -newsk->prev = prev;
-            -next->prev = prev->next = newsk;
-            -list->qlen++;
+            /* See skb_queue_empty_lockless() and skb_peek_tail() 
+             * for the opposite READ_ONCE()
+             */
+            WRITE_ONCE(newsk->next, next);
+            WRITE_ONCE(newsk->prev, prev);
+            WRITE_ONCE(next->prev, newsk);
+            WRITE_ONCE(prev->next, newsk);
+            WRITE_ONCE(list->qlen, list->qlen + 1);
+        }
+
        static inline void __skb_queue_splice(const struct sk_buff_head *list,
@@ -1687,11 +1740,11 @@
             struct sk_buff *first = list->next;
             struct sk_buff *last = list->prev;
             -first->prev = prev;
-            -prev->next = first;
+            WRITE_ONCE(first->prev, prev);
+            WRITE_ONCE(prev->next, first);
- last->next = next;
- next->prev = last;
+ WRITE_ONCE(last->next, next);
+ WRITE_ONCE(next->prev, last);
}

/**
@@ -1828,12 +1881,12 @@
{
 struct sk_buff *next, *prev;

- list->qlen--; 
+ WRITE_ONCE(list->qlen, list->qlen - 1);
 next = skb->next;
 prev = skb->prev;
 skb->next = skb->prev = NULL;
- next->prev = prev;
- prev->next = next;
+ WRITE_ONCE(next->prev, prev);
+ WRITE_ONCE(prev->next, next);
}

/**
@@ -2344,7 +2397,7 @@
 return;
 else if (skb_flow_dissect_flow_keys(skb, &keys, 0))
 skb_set_transport_header(skb, keys.control.thoff);
- else
+ else if (offset_hint >= 0)
 skb_set_transport_header(skb, offset_hint);
 }

@@ -2539,7 +2592,7 @@
{
 if (likely(!skb_zcopy(skb)))
 return 0;
- if (skb_uarg(skb)->callback == sock_zerocopy_callback)
+ if (!skb_zcopy_is_nouarg(skb) && 
 + skb_uarg(skb)->callback == sock_zerocopy_callback)
 return 0;
 return skb_copy_ubufs(skb, gfp_mask);
 }
@@ -2568,7 +2622,7 @@
kfree_skb(skb);
}

-void skb_rbtree_purge(struct rb_root *root);
+unsigned int skb_rbtree_purge(struct rb_root *root);
void *netdev_alloc_frag(unsigned int fragsz);

/**
 * skb_frag_off() - Returns the offset of a skb fragment
 * @frag: the paged fragment
 */
static inline unsigned int skb_frag_off(const skb_frag_t *frag)
{
    return frag->page_offset;
}

/**
 * skb_frag_page - retrieve the page referred to by a paged fragment
 * @frag: the paged fragment
 */
@-2945,8 +3008,9 @@
*is untouched. Otherwise it is extended. Returns zero on
*succes. The skb is freed on error if @free_on_error is true.
*/
static inline int __must_check __skb_put_padto(struct sk_buff *skb,
 static int __sk_buff_padto(struct sk_buff *
 return __sk_buff_padto(skb, len, true);
} @-3122,6 +3186,7 @@
return skb->data;
}

+int skb_put_padto(struct sk_buff *skb, unsigned int len);
/**
 * skb_put_padto - insert len bytes at the end of skb
 * @skb: buffer to trim
 */

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static inline int pskb_trim_rcsum(struct sk_buff *skb, unsigned int len)
{
    if (likely(len >= skb->len))
        return 0;
    if (skb->ip_summed == CHECKSUM_COMPLETE)
        skb->ip_summed = CHECKSUM_NONE;
    return __pskb_trim(skb, len);
    return pskb_trim_rcsum_slow(skb, len);
}

static inline int __skb_trim_rcsum(struct sk_buff *skb, unsigned int len)

void skb_scrub_packet(struct sk_buff *skb, bool xnet);
unsigned int skb_gso_transport_seglen(const struct sk_buff *skb);
bool skb_gso_validate_mtu(const struct sk_buff *skb, unsigned int mtu);
+bool skb_gso_validate_mac_len(const struct sk_buff *skb, unsigned int len);
struct sk_buff *skb_segment(struct sk_buff *skb, netdev_features_t features);
struct sk_buff *skb_vlan_untag(struct sk_buff *skb);
int skb_ensure_writable(struct sk_buff *skb, int write_len);

+/**
+ * skb_gso_mac_seglen - Return length of individual segments of a gso packet
+ *
+ * skb_gso_mac_seglen is used to determine the real size of the
+ * individual segments, including MAC/L2, Layer3 (IP, IPv6) and L4
+ * headers (TCP/UDP).
+ */
+static inline unsigned int skb_gso_mac_seglen(const struct sk_buff *skb)
+
/* Local Checksum Offload.
 * Compute outer checksum based on the assumption that the
 * inner checksum will be offloaded later.
--- linux-4.15.0.orig/include/linux/slab.h
+++ linux-4.15.0/include/linux/slab.h
@@ -31,6 +31,8 @@
#define SLAB_HWCACHE_ALIGN((slab_flags_t __force)0x00002000U)
 /* Use GFP_DMA memory */
#define SLAB_CACHE_DMA	((slab_flags_t __force)0x00004000U)
+#define SLAB_CACHE_DMA32	((slab_flags_t __force)0x00008000U)
 /* DEBUG: Store the last owner for bug hunting */
#define SLAB_STORE_USER	((slab_flags_t __force)0x00010000U)
 /* Panic if kmem_cache_create() fails */
--- linux-4.15.0.orig/include/linux/slub_def.h
+++ linux-4.15.0/include/linux/slub_def.h
@@ -88,7 +88,8 @@
 int object_size;/* The size of an object without meta data */
 int offset;/* Free pointer offset. */
 #ifdef CONFIG_SLUB_CPU_PARTIAL
-#define cpu_partial 0 /* Number of per cpu partial objects to keep around */
+#define cpu_partial unsigned int
+       cpu_partial;
 #endif
 struct kmem_cache_order_objects oo;

@@ -151,8 +152,12 @@
 #ifdef CONFIG_SYSFS
 #define SLAB_SUPPORTS_SYSFS
+void sysfs_slab_unlink(struct kmem_cache *);
 void sysfs_slab_release(struct kmem_cache *);
#else
+static inline void sysfs_slab_unlink(struct kmem_cache *s)
+{
+}
+}
 static inline void sysfs_slab_release(struct kmem_cache *s)
 {
 }
--- linux-4.15.0.orig/include/linux/smp.h
+++ linux-4.15.0/include/linux/smp.h
@@ -53,7 +53,7 @@
 smp_call_func_t func, void *info, bool wait,
 gfp_t gfp_flags);
-int smp_call_function_single_async(int cpu, call_single_data_t *csd);
+int smp_call_function_single_async(int cpu, struct __call_single_data *csd);

#ifdef CONFIG_SMP
--- linux-4.15.0.orig/include/linux/smpboot.h
+++ linux-4.15.0/include/linux/smpboot.h
@@ -31,7 +31,7 @@
 * @thread_comm:	The base name of the thread */

 struct smp_hotplug_thread {
-struct task_struct __percpu*store;
+struct task_struct	* __percpu *store;
 struct list_head	list;
 int(*thread_should_run)(unsigned int cpu);
 void(*thread_fn)(unsigned int cpu);
--- linux-4.15.0.orig/include/linux/socket.h
+++ linux-4.15.0/include/linux/socket.h
@@ -26,7 +26,7 @@
 /*	1003.1g requires sa_family_t and that sa_data is char.
 */
-
+
 struct sockaddr {
 sa_family_t	sa_family;	/* address family, AF_xxx*/
 char		sa_data[14];	/* 14 bytes of protocol address*/
@@ -44,7 +44,7 @@
 /*
 * system, not 4.3. Thus msg_accrights(len) are now missing. They
 * belong in an obscure libc emulation or the bin.
 */
-
+
 struct msghdr {
 void*msg_name; /* ptr to socket address structure */
 intmsg_name len; /* size of socket address structure */
@@ -54,7 +54,7 @@
 unsigned intmsg_flags; /* flags on received message */
 struct kiocb*msg_iocb; /* ptr to iocb for async requests */
 }
-
+
 struct user_msghdr {
 void__user *msg_name; /* ptr to socket address structure */
 intmsg_name len; /* size of socket address structure */
@@ -122,7 +122,7 @@
 /*
 * inside range, given by msg -> msg_controllen before using
 * ancillary object DATA. --ANK (980731)
 */
-
+
 static inline struct cmsghdr *__cmsg_nxthdr(void *__ctl, __kernel_size_t __size,
             struct cmsghdr *__cmsg) {

/* Maximum queue length specifiable by listen. */
#define SOMAXCONN 128

/* Flags we can use with send/ and recv. */
/* Flags we can use with send/ and recv. 
   Added those for 1003.1g not all are supported yet */
#define MSG_OOB 1
#define MSG_PEEK 2
#define MSG_DONTROUTE 4

--- linux-4.15.0.orig/include/linux/spi/spi.h
+++ linux-4.15.0/include/linux/spi/spi.h
@@ -452,6 +452,9 @@
#define SPI_MASTER_GPIO_SS BIT(5) /**< GPIO CS must select slave */

+/* flag indicating this is a non-devres managed controller */
+bool devm_allocated;
+
+/* flag indicating this is an SPI slave controller */
+bool slave;

@@ -638,6 +641,25 @@
return __spi_alloc_controller(host, size, true);
}

+struct spi_controller *__devm_spi_alloc_controller(struct device *dev,
+ unsigned int size,
+ bool slave);
+
+static inline struct spi_controller *devm_spi_alloc_master(struct device *dev,
+ unsigned int size)
+{
+ return __devm_spi_alloc_controller(dev, size, false);
+}
+
+static inline struct spi_controller *devm_spi_alloc_slave(struct device *dev,
+ unsigned int size)
+{
+ if (!IS_ENABLED(CONFIG_SPI_SLAVE))
+ return NULL;
+}
+
+if (!IS_ENABLED(CONFIG_SPI_SLAVE))
+return NULL;
+
+return __devm_spi_alloc_controller(dev, size, true);
+}
extern int spi_register_controller(struct spi_controller *ctrlr);
extern int devm_spi_register_controller(struct device *dev,
struct spi_controller *ctrlr);
--- linux-4.15.0.orig/include/linux/splice.h
+++ linux-4.15.0/include/linux/splice.h
@@ -87,4 +87,10 @@
extern const struct pipe_buf_operations page_cache_pipe_buf_ops;
extern const struct pipe_buf_operations default_pipe_buf_ops;
+
+extern long do_splice_from(struct pipe_inode_info *pipe, struct file *out,
+ loff_t *ppos, size_t len, unsigned int flags);
+extern long do_splice_to(struct file *in, loff_t *ppos,
+ struct pipe_inode_info *pipe, size_t len,
+ unsigned int flags);
#endif
--- linux-4.15.0.orig/include/linux/srcutree.h
+++ linux-4.15.0/include/linux/srcutree.h
@@ -40,7 -40,7 +40,7 @@
unsigned long srcu_unlock_count[2];/* Unlocks per CPU. */
*/
/* Update-side state. */
-raw_spinlock_t __private lock ____cacheline_internodealigned_in_smp;
+spinlock_t __private lock ____cacheline_internodealigned_in_smp;
struct rcu_segeblist srcu_cblist;/* List of callbacks.*/
unsigned long srcu_gp_seq_needed;/* Furthest future GP needed. */
unsigned long srcu_gp_seq_needed_exp;/* Furthest future exp GP. */
@@ -58,7 +58,7 @@
 * Node in SRCU combining tree, similar in function to rcu_data.
 */
struct srcu_node {
-raw_spinlock_t __private lock;
+spinlock_t __private lock;
unsigned long srcu_have_cbs[4];/* GP seq for children */
/* having CBs, but only */
/* is > ->srcu_gq_seq. */
@@ -78,7 +78,7 @@
struct srcu_node *level[RCU_NUM_LVLS + 1];
/* First node at each level. */
struct mutex srcu_cb_mutex;/* Serialize CB preparation. */
-raw_spinlock_t __private lock;/* Protect counters */
+spinlock_t __private lock;/* Protect counters */
struct mutex srcu_gp_mutex;/* Serialize GP work. */
unsigned int srcu_idx;/* Current rdr array element. */
unsigned long srcu_gp_seq;/* Grace-period seq #. */
@@ -107,7 +107,7 @@
#define __SRCU_STRUCT_INIT(name)					{								

.sda = &name##_srcu_data,\
.lock = __RAW_SPIN_LOCK_UNLOCKED(name.lock),\
+lock = __SPIN_LOCK_UNLOCKED(name.lock),\
.srcu_gp_seq_needed = 0 - 1,\
__SRCU_DEP_MAP_INIT(name)\
}\
--- linux-4.15.0.orig/include/linux/stmmac.h\
+++ linux-4.15.0/include/linux/stmmac.h\
@@ -183,6 +183,7 @@
struct clk *pclk;\
struct clk *clk_ptp_ref;\
unsigned int clk_ptp_rate;\
+unsigned int clk_ref_rate;\
struct reset_control *stmmac_rst;\
struct stmmac_axi *axi;\
int has_gmac4;\
--- linux-4.15.0.orig/include/linux/stop_machine.h\
+++ linux-4.15.0/include/linux/stop_machine.h\
@@ -138,7 +138,7 @@
const struct cpumask *cpus);\
#else/* CONFIG_SMP || CONFIG_HOTPLUG_CPU */\

-static inline int stop_machine_cpuslocked(cpu_stop_fn_t fn, void *data,\
+static __always_inline int stop_machine_cpuslocked(cpu_stop_fn_t fn, void *data,\
     const struct cpumask *cpus)\
{
    unsigned long flags;\
@@ -149,14 +149,15 @@
    return ret;\
 }

-static inline int stop_machine(cpu_stop_fn_t fn, void *data,\
-    const struct cpumask *cpus)\
-{
-    const struct cpumask *cpus)
+static __always_inline int\n+stop_machine(cpu_stop_fn_t fn, void *data, const struct cpumask *cpus)\
+{
    return stop_machine_cpuslocked(fn, data, cpus);\
 }

-static inline int stop_machine_from_inactive_cpu(cpu_stop_fn_t fn, void *data,\
-    const struct cpumask *cpus)\
-{
-    const struct cpumask *cpus)
+static __always_inline int\n+stop_machine_from_inactive_cpu(cpu_stop_fn_t fn, void *data,\
+    const struct cpumask *cpus)\
+{
    return stop_machine(fn, data, cpus);\
 }
--- linux-4.15.0.orig/include/linux/string.h
+++ linux-4.15.0/include/linux/string.h
@@ -28,8 +28,12 @@
size_t strlcpy(char *, const char *, size_t);
#endif
ifndef __HAVE_ARCH_STRSCPY
ssize_t __must_check strscpy(char *, const char *, size_t);
+ssize_t strscpy(char *, const char *, size_t);
#endif
+
/* Wraps calls to strscpy()/memset(), no arch specific code required */
+ssize_t strscpy_pad(char *dest, const char *src, size_t count);
+
ifndef __HAVE_ARCH_STRCAT
extern char * strcat(char *, const char *);
#endif
@@ -142,6 +146,9 @@
ifndef __HAVE_ARCH_MEMCMP
extern int memcmp(const void *, const void *, __kernel_size_t);
#endif
+ifndef __HAVE_ARCH_BCMP
+extern int bcmp(const void *, const void *, __kernel_size_t);
+#endif
ifndef __HAVE_ARCH_MEMCHR
extern void * memchr(const void *, int, __kernel_size_t);
#endif
@@ -200,6 +207,8 @@
extern ssize_t memory_read_from_buffer(void *, size_t count, loff_t *, const void *, size_t available);
+extern ssize_t memory_read_from_io_buffer(void *, size_t count, loff_t *, const void *, size_t available);
/**
 strstarts - does @str start with @prefix?
@@ -235,6 +244,31 @@

extern __kernel_size_t __underlying_strlen(const char *);
#endif
ifndef __NO_FORTIFY
+extern void *__underlying_memchr(const void *, int, __kernel_size_t size) __RENAME(memchr);
+extern int __underlying_memcmp(const void *, const void *, __kernel_size_t size) __RENAME(memcmp);
+extern void *__underlying_memcpy(void *, const void *, __kernel_size_t size) __RENAME(memcpy);
+extern void *__underlying_memmove(void *, const void *, __kernel_size_t size) __RENAME(memmove);
+extern void *__underlying_memset(void *, int, __kernel_size_t size) __RENAME(memset);
+extern char *__underlying_strcat(char *, const char *, __kernel_size_t size) __RENAME(strcat);
+extern char *__underlying_strncpy(char *, const char *, __kernel_size_t size) __RENAME(strncpy);
+extern __kernel_size_t __underlying_strlen(const char *, __kernel_size_t size) __RENAME(strlen);
extern char *__underlying_strncat(char *p, const char *q, __kernel_size_t count) __RENAME(strncat);
extern char *__underlying_strncpy(char *p, const char *q, __kernel_size_t size) __RENAME(strncpy);

#define __underlying_memchr __builtin_memchr
#define __underlying_memcmp __builtin_memcmp
#define __underlying_memcpy __builtin_memcpy
#define __underlying_memmove __builtin_memmove
#define __underlying_strlen __builtin_strlen
#define __underlying_strcat __builtin_strcat
#define __underlying_strcpy __builtin_strcpy
#define __underlying_strncpy __builtin_strncpy
#define __underlying_strncat __builtin_strncat
#endif

__FORTIFY_INLINE char *strncpy(char *p, const char *q, __kernel_size_t size)
{
    size_t p_size = __builtin_object_size(p, 0);
    if (p_size < size)
        return __underlying_strncpy(p, q, size);
    return __builtin_strncpy(p, q, size);
}

__FORTIFY_INLINE char *strcat(char *p, const char *q)
{
    size_t p_size = __builtin_object_size(p, 0);
    if (p_size == (size_t)-1)
        return __underlying_strcat(p, q);
    if (strlcat(p, q, p_size) >= p_size)
        __write_overflow();
    return p;
}

/* Work around gcc excess stack consumption issue */
if (p_size == (size_t)-1)
    __builtin_constant_p(p[p_size - 1]) && p[p_size - 1] == '\0')
    return __underlying_strlen(p);
return p;

__write_overflow();
if (len >= p_size)
    __write_overflow();
- __builtin_memcpy(p, q, len);
+ __underlying_memcpy(p, q, len);
    p[len] = '0';
}
    return ret;
@@ -309,12 +343,12 @@
    size_t p_size = __builtin_object_size(p, 0);
    size_t q_size = __builtin_object_size(q, 0);
    if (p_size == (size_t)-1 && q_size == (size_t)-1)
-    return __builtin_strncat(p, q, count);
+    return __underlying_strncat(p, q, count);
    p_len = strlen(p);
    copy_len = strnlen(q, count);
    if (p_size < p_len + copy_len + 1)
    fortified_panic(__func__);
-__builtin_memcpy(p + p_len, q, copy_len);
+__underlying_memcpy(p + p_len, q, copy_len);
    p[p_len + copy_len] = '0';
    return p;
}@ -326,7 +360,7 @@
__write_overflow();
    if (p_size < size)
    fortified_panic(__func__);
-__builtin_memcpy(p + p_len, q, copy_len);
+__underlying_memcpy(p + p_len, q, copy_len);
    return __underlying_memset(p, c, size);
}

__FORTIFY_INLINE void *memcpy(void *p, const void *q, __kernel_size_t size)
@@ -341,7 +375,7 @@
    if (p_size < size || q_size < size)
    fortified_panic(__func__);
    return __builtin_memcpy(p, q, size);
+    return __underlying_memcpy(p, q, size);
}

__FORTIFY_INLINE void *memmove(void *p, const void *q, __kernel_size_t size)
@@ -356,7 +390,7 @@
    if (p_size < size || q_size < size)
    fortified_panic(__func__);
    return __builtin_memmove(p, q, size);
+    return __underlying_memmove(p, q, size);
}

extern void *__real_memscan(void *, int, __kernel_size_t) __RENAME(memscan);
@@ -382,7 +416,7 @@
if (p_size < size || q_size < size)
    fortify_panic(__func__);
-    return __builtin_memcmp(p, q, size);
+    return __underlying_memcmp(p, q, size);
}

__FORTIFY_INLINE void *memchr(const void *p, int c, __kernel_size_t size)
@@ -392,7 +426,7 @@
    __read_overflow();
    if (p_size < size)
        fortify_panic(__func__);
-    return __builtin_memchr(p, c, size);
+    return __underlying_memchr(p, c, size);
    }

void *__real_memchr_inv(const void *s, int c, size_t n) __RENAME(memchr_inv);
@@ -423,11 +457,22 @@
    size_t p_size = __builtin_object_size(p, 0);
    size_t q_size = __builtin_object_size(q, 0);
    if (p_size == (size_t)-1 && q_size == (size_t)-1)
-        return __builtin_strcpy(p, q);
+        return __underlying_strcpy(p, q);
        memcpy(p, q, strlen(q) + 1);
        return p;
    }

+A/* Don't use these outside the FORITFY_SOURCE implementation */
+#undef __underlying_memchr
+#undef __underlying_memcmp
+#undef __underlying_memcpy
+#undef __underlying_memmove
+#undef __underlying_memset
+#undef __underlying_memmove
+#undef __underlying_memcpy
+#undef __underlying_strcat
+#undef __underlying_strncpy
+#undef __underlying_strcat
+#undef __underlying_strncpy
#endif

/**
--- linux-4.15.0.orig/include/linux/stringhash.h
+++ linux-4.15.0/include/linux/stringhash.h
@@ -50,9 +50,9 @@
 * losing bits).  This also has the property (wanted by the dcache)
 * that the msbits make a good hash table index.
 */
-static inline unsigned long end_name_hash(unsigned long hash)

}
+static inline unsigned int end_name_hash(unsigned long hash)
{  
  -return __hash_32((unsigned int)hash);
+return hash_long(hash, 32);
}

/*
--- linux-4.15.0.orig/include/linux/sunrpc/clnt.h
+++ linux-4.15.0/include/linux/sunrpc/clnt.h
@@ -156,6 +156,7 @@
 void		rpc_shutdown_client(struct rpc_clnt *);
 void		rpc_release_client(struct rpc_clnt *);
+void		rpc_task_release_transport(struct rpc_task *);
 void		rpc_task_release_client(struct rpc_task *);

 intrpcb_create_local(struct net *);
--- linux-4.15.0.orig/include/linux/sunrpc/gss_api.h
+++ linux-4.15.0/include/linux/sunrpc/gss_api.h
@@ -83,6 +83,7 @@
 u32	service;
 char*name;
 char*auth_domain_name;
+struct auth_domain *domain;
 bool datatouch;
};

--- linux-4.15.0.orig/include/linux/sunrpc/sched.h
+++ linux-4.15.0/include/linux/sunrpc/sched.h
@@ -188,7 +188,6 @@
 struct rpc_wait_queue {
 spinlock_t	lock;
 struct list_head
tasks[RPC_NR_PRIORITY];/* task queue for each priority level */
-pid_t			owner; /* process id of last task serviced */
 unsigned char	maxpriority;/* maximum priority (0 if queue is not a priority queue) */
 unsigned char	priority;/* current priority */
 unsigned char	nr;/* # tasks remaining for cookie */
@@ -204,7 +203,6 @@
 */
 * from a single cookie. The aim is to improve
 * performance of NFS operations such as read/write.
 */
-#define RPC_BATCH_COUNT	16
#define RPC_IS_PRIORITY(q)((q)->maxpriority > 0)

/*
--- linux-4.15.0.orig/include/linux/sunrpc/svc.h
+++ linux-4.15.0/include/linux/sunrpc/svc.h
@@ -271,6 +271,7 @@
"
#define RQ_VICTIM(5) /* about to be shut down */
#define RQ_BUSY(6) /* request is busy */
#define RQ_DATA(7) /* request has data */
#define RQ_AUTHERR(8) /* Request status is auth error */

unsigned long rq_flags; /* flags field */

void *rq_argp; /* decoded arguments */
struct svc_cacherep *rq_cacherep; /* cache info */
struct task_struct *rq_task; /* service thread */
spinlock_t rq_lock; /* per-request lock */
+
struct net *rq_bc_net; /* pointer to backchannel's
 + * net namespace
 + */
};

#define SVC_NET(svc_rqst)(svc_rqst->rq_xprt->xpt_net)
#define SVC_NET(rqst) (rqst->rq_xprt ? rqst->rq_xprt->xpt_net : rqst->rq_bc_net)

/* Rigorous type checking on sockaddr type conversions */

void svc_reserve(struct svc_rqst *rqstp, int space);
struct svc_pool * svc_pool_for_cpu(struct svc_serv *serv, int cpu);
char * svc_print_addr(struct svc_rqst *, char *, size_t);
+
__be32 svc_return_autherr(struct svc_rqst *rqstp, __be32 auth_err);

#define RPC_MAX_ADDRBUFLEN(U)

--- linux-4.15.0.orig/include/linux/sunrpc/svcauth_gss.h
+++ linux-4.15.0/include/linux/sunrpc/svcauth_gss.h
@@ -21,7 +21,8 @@
 void gss_svc_shutdown(void);
 int gss_svc_init_net(struct net *net);
 void gss_svc_shutdown_net(struct net *net);
-int svcauth_gss_register_pseudoflavor(u32 pseudoflavor, char * name);
+struct auth_domain *svcauth_gss_register_pseudoflavor(u32 pseudoflavor,
         + char *name);
 u32 svcauth_gss_flavor(struct auth_domain *dom);

#ifendf /*__KERNEL__ */
--- linux-4.15.0.orig/include/linux/sunrpc/xdr.h
+++ linux-4.15.0/include/linux/sunrpc/xdr.h
@@ -26,8 +26,7 @@
 #define XDR_QUADLEN(l)((l) + 3) >> 2)
 /*
- * Generic opaque `network object.' At the kernel level, this type
- * is used only by lockd.
+ * Generic opaque `network object.'
 */

#define XDR_MAX_NETOBJ1024
struct xdr_netobj {
    --- linux-4.15.0.orig/include/linux/sunrpc/xprt.h
+++ linux-4.15.0/include/linux/sunrpc/xprt.h
@@ -316,6 +316,7 @@
    struct rpc_xprt *(*setup)(struct xprt_create *);
    struct module*owner;
    charname[32];
+    const char *netid[];
    };

/*
@@ -438,6 +439,11 @@
    return test_and_set_bit(XPRT_CONNECTED, &xprt->state);
 }

+static inline int xprt_close_wait(struct rpc_xprt *xprt)
+{
+    return test_bit(XPRT_CLOSE_WAIT, &xprt->state);
+}
+static inline void xprt_set_bound(struct rpc_xprt *xprt)
+{
+    test_and_set_bit(XPRT_BOUND, &xprt->state);
+}
+extern bool pm_suspend_via_s2idle(void);
+extern void __init pm_states_init(void);
+extern void s2idle_set_ops(const struct platform_s2idle_ops *ops);
+extern void s2idle_wake(void);
@@ -282,6 +283,7 @@
+static inline bool pm_suspend_via_s2idle(void) { return false; }
static inline void pm_set_resume_via_firmware(void) {
    static inline void pm_suspend_via_s2idle(void) {
    static inline int pm_suspend(suspend_state_t state) { return -ENOSYS; }
@@ -384,6 +386,8 @@
    static inline void suspend_set_ops(const struct platform_suspend_ops *ops) {}
    static inline int pm_suspend(suspend_state_t state) { return -ENOSYS; }
@@ -384,6 +386,8 @@
    extern void swssusp_set_page_free(struct page *);
    extern void swssusp_unset_page_free(struct page *);
extern unsigned long get_safe_page(gfp_t gfp_mask);
+extern asmlinkage int swsusp_arch_suspend(void);
+extern asmlinkage int swsusp_arch_resume(void);

extern void hibernation_set_ops(const struct platform_hibernation_ops *ops);
extern int hibernate(void);
--- linux-4.15.0.orig/include/linux/swab.h
+++ linux-4.15.0/include/linux/swab.h
@@ -7,6 +7,7 @@
# define swab16 __swab16
# define swab32 __swab32
# define swab64 __swab64
+# define swab __swab
# define swahw32 __swahw32
# define swahb32 __swahb32
# define swahw64 __swahw64
--- linux-4.15.0.orig/include/linux/swap.h
+++ linux-4.15.0/include/linux/swap.h
@@ -155,9 +155,9 @@
*/
* Max bad pages in the new format..
*/
-#define __swapoffset(x) ((unsigned long)&((union swap_header *)0)->x)
#define MAX_SWAP_BADPAGES \
-((__swapoffset(magic.magic) - __swapoffset(info.badpages)) / sizeof(int))
+(offsetof(union swap_header, magic.magic) - \ 
+ offsetof(union swap_header, info.badpages)) / sizeof(int))

enum {
  SWP_USED = (1 << 0), /* is slot in swap_info[] used? */
  @ @ -232.7 +232.6 @ @
unsigned long flags; /* SWP_USED etc: see above */
signed short prio; /* swap priority of this type */
struct plist_node list; /* entry in swap_active_head */
-struct plist_node avail_lists[MAX_NUMNODES]; /* entry in swap_avail_heads */
signed char type; /* strange name for an index */
unsigned intmax; /* extent of the swap_map */
unsigned char *swap_map; /* vmalloc'ed array of usage counts */
  @ @ -273.6 +272.16 @ @
 */
struct work_struct discard_work; /* discard worker */
struct swap_cluster_list discard_clusters; /* discard clusters list */
+struct plist_node avail_lists[0]; /*
+ * entries in swap_avail_heads, one
+ * entry per node.
+ * Must be last as the number of the
+ * array is nr_node_ids, which is not
+ * a fixed value so have to allocate

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* dynamically.
* And it has to be an array so that
* plist_for_each_* can work.
* */
};

#endif CONFIG_64BIT
@@ -366,14 +375,8 @@
extern int node_reclaim_mode;
extern int sysctl_min_unmapped_ratio;
extern int sysctl_min_slab_ratio;
-extern int node_reclaim(struct pglist_data *, gfp_t, unsigned int);
#else
#define node_reclaim_mode 0
-static inline int node_reclaim(struct pglist_data *pgdat, gfp_t mask,
-unsigned int order)
-{
-    return 0;
-}
#endif

extern int page_evictable(struct page *page);
--- linux-4.15.0.orig/include/linux/swapfile.h
+++ linux-4.15.0/include/linux/swapfile.h
@@ -10,5 +10,7 @@
extern struct plist_head swap_active_head;
extern struct swap_info_struct *swap_info[];
extern int try_to_unuse(unsigned int, bool, unsigned long);
+extern unsigned long generic_max_swapfile_size(void);
+extern unsigned long max_swapfile_size(void);

#endif /* _LINUX_SWAPFILE_H */
--- linux-4.15.0.orig/include/linux/swapops.h
+++ linux-4.15.0/include/linux/swapops.h
@@ -377,7 +377,8 @@
}}
#endif

-#if defined(CONFIG_MEMORY_FAILURE) || defined(CONFIG_MIGRATION)
+#if defined(CONFIG_MEMORY_FAILURE) || defined(CONFIG_MIGRATION) ||
+    defined(CONFIG_DEVICE_PRIVATE)
static inline int non_swap_entry(swp_entry_t entry)
{
    return swp_type(entry) >= MAX_SWAPFILES;
--- linux-4.15.0.orig/include/linux/switchtec.h
+++ linux-4.15.0/include/linux/switchtec.h
@@ -237,8 +237,8 @@
u64 xlate_addr;
static inline void sysfs_remove_file_ns(struct kobject *kobj,    
const struct attribute *attr, 
const void *ns) 
@@ -493,6 +512,17 @@
{
}

+__printf(2, 3)
+static inline int sysfs_emit(char *buf, const char *fmt, ...)
+{
+return 0;
+}
+
+__printf(3, 4)
+static inline int sysfs_emit_at(char *buf, int at, const char *fmt, ...)
+{
+return 0;
+}
@endif /* CONFIG_SYSFS */

static inline int __must_check sysfs_create_file(struct kobject *kobj,
--- linux-4.15.0.orig/include/linux/tc.h
+++ linux-4.15.0/include/linux/tc.h
@@ -84,6 +84,7 @@
device. */
struct devicedev;/* Generic device interface. */
struct resourceresource;/* Address space of this device. */
+u64dma_mask;/* DMA addressable range. */
char[9];
charname[9];
charfirmware[9];
--- linux-4.15.0.orig/include/linux/tcp.h
+++ linux-4.15.0/include/linux/tcp.h
@@ -218,6 +218,8 @@
reord:1;/* reordering detected */
} rack;
u16advmss;/* Advertised MSS*/
+u8tlp_retrans:1;/* TLP is a retransmission */
+unused_1:7;
u32chrono_start;/* Start time in jiffies of a TCP chrono */
u32chrono_stat[3];/* Time in jiffies for chrono_stat stats */
u8chrono_type:2;/* current chronograph type */
@@ -240,7 +242,7 @@
save_syn:1;/* Save headers of SYN packet */
is_cwnd_limited:1;/* forward progress limited by snd_cwnd? */
syn_smc:1;/* SYN includes SMC */
-u32tlp_high_seq/* snd_nxt at the time of TLP retransmit. */
+u32tlp_high_seq/* snd_nxt at the time of TLP */
/* RTT measurement */
tcp_mstamp; /* most recent packet received/sent */
@@ -344,7 +346,7 @@
 /* Receiver queue space */
 struct {
     int space;
+    u32 space;
     u32 seq;
     u64 time;
 } rcvq_space;
@@ -460,4 +462,8 @@
 return (user_mss && user_mss < mss) ? user_mss : mss;
 }
+
+int tcp_skb_shift(struct sk_buff *to, struct sk_buff *from, int pcount,
+     int shiftlen);
+
#endif /* _LINUX_TCP_H */
--- linux-4.15.0.orig/include/linux/thread_info.h
+++ linux-4.15.0/include/linux/thread_info.h
@@ -11,6 +11,7 @@
#include <linux/types.h>
#include <linux/bug.h>
#include <linux/restart_block.h>
+#include <linux/errno.h>
#ifdef CONFIG_THREAD_INFO_IN_TASK
/*
@@ -39,15 +40,23 @@
 #ifdef __KERNEL__
+#ifndef arch_set_restart_data
+#define arch_set_restart_data
+define arch_set_restart_data(restart) do { } while (0)
+#endif
+
+static inline long set_restart_fn(struct restart_block *restart,
+    long (*fn)(struct restart_block *))
+{
+    restart->fn = fn;
+    arch_set_restart_data(restart);
+    return -ERESTART_RESTARTBLOCK;
+}
+
+#endif /* THREAD_ALIGN */
```c
#define THREAD_ALIGN THREAD_SIZE
#endif

-#if IS_ENABLED(CONFIG_DEBUG_STACK_USAGE) || IS_ENABLED(CONFIG_DEBUG_KMEMLEAK)
-# define THREADINFO_GFP(GFP_KERNEL_ACCOUNT | __GFP_ZERO)
-#else
-# define THREADINFO_GFP(GFP_KERNEL_ACCOUNT)
-#endif
+#define THREADINFO_GFP(GFP_KERNEL_ACCOUNT | __GFP_ZERO)

/*
 * flag set/clear/test wrappers
--- linux-4.15.0.orig/include/linux/thunderbolt.h
+++ linux-4.15.0/include/linux/thunderbolt.h
@@ -45,12 +45,16 @@
 * @TB_SECURITY_USER: User approval required at minimum
 * @TB_SECURITY_SECURE: One time saved key required at minimum
 * @TB_SECURITY_DPONLY: Only tunnel Display port (and USB)
+ * @TB_SECURITY_USBONLY: Only tunnel USB controller of the connected
+ * Thunderbolt dock (and Display Port). All PCIe
+ * links downstream of the dock are removed.
+*/
enum tb_security_level {
    TB_SECURITY_NONE,
    TB_SECURITY_USER,
    TB_SECURITY_SECURE,
    TB_SECURITY_DPONLY,
    +TB_SECURITY_USBONLY,
};

/**
@@ -65,6 +69,7 @@
 * @cm_ops: Connection manager specific operations vector
 * @index: Linux assigned domain number
 * @security_level: Current security level
+ * @nboot_acl: Number of boot ACLs the domain supports
 * @privdata: Private connection manager specific data
 */
struct tb {
    @ @ -77,6 +82,7 @@
    const struct tb_cm_ops *cm_ops;
    int index;
    enum tb_security_level security_level;
    +size_t nboot_acl;
    unsigned long privdata[0];
};
@@ -237,6 +243,7 @@
u16 receive_ring);
int tb_xdomain_disable_paths(struct tb_xdomain *xd);
struct tb_xdomain *tb_xdomain_find_by_uuid(struct tb *tb, const uuid_t *uuid);
+struct tb_xdomain *tb_xdomain_find_by_route(struct tb *tb, u64 route);

static inline struct tb_xdomain *
tb_xdomain_find_by_uuid_locked(struct tb *tb, const uuid_t *uuid)
@@ -248,6 +255,18 @@
mutex_unlock(&tb->lock);
return xd;
+
+static inline struct tb_xdomain *
tb_xdomain_find_by_route_locked(struct tb *tb, u64 route)
+{
+struct tb_xdomain *xd;
+
+mutex_lock(&tb->lock);
+xd = tb_xdomain_find_by_route(tb, route);
+mutex_unlock(&tb->lock);
+
+return xd;
}

static inline struct tb_xdomain *tb_xdomain_get(struct tb_xdomain *xd)
--- linux-4.15.0.orig/include/linux/time.h
+++ linux-4.15.0/include/linux/time.h
@@ -96,4 +96,17 @@
*/
#define time_after32(a, b)((s32)((u32)(b) - (u32)(a)) < 0)
#define time_before32(b, a) time_after32(a, b)
+
+/**
+ * time_between32 - check if a 32-bit timestamp is within a given time range
+ * @t: the time which may be within [l,h]
+ * @l: the lower bound of the range
+ * @h: the higher bound of the range
+ * time_before32(t, l, h) returns true if @l <= @t <= @h. All operands are
+ * treated as 32-bit integers.
+ *
+ * Equivalent to !(time_before32(@t, @l) || time_after32(@t, @h)).
+ */
+#define time_between32(t, l, h) ((u32)(h) - (u32)(l)) >= (u32)(t) - (u32)(l))
#endif
--- linux-4.15.0.orig/include/linux/time64.h
+++ linux-4.15.0/include/linux/time64.h
static inline s64 timespec64_to_ns(const struct timespec64 *ts) {
    /* Prevent multiplication overflow */
    if ((unsigned long long)ts->tv_sec >= KTIME_SEC_MAX)
        return KTIME_MAX;
    return ((s64) ts->tv_sec * NSEC_PER_SEC) + ts->tv_nsec;
}

static inline void do_gettimeofday(struct timeval *tv) {
    struct timespec64 now;
    ktime_get_real_ts64(&now);
    tv->tv_sec = now.tv_sec;
    tv->tv_usec = now.tv_nsec/1000;
}

static inline unsigned long get_seconds(void) {
    return ktime_get_real_seconds();
}

/* does not take xtime_lock */
struct timespec __current_kernel_time(void);

struct timerqueue_head {
    struct rb_root head;
    struct timerqueue_node *next;
    struct rb_root_cached rb_root;
};

struct timerqueue_head {  
    struct rb_root head;
    struct timerqueue_node *next;
    struct rb_root_cached rb_root;
};
static inline struct timerqueue_node *timerqueue_getnext(struct timerqueue_head *head)
{
    return head->next;
}

static inline void timerqueue_init(struct timerqueue_node *node)
{
    node->head = RB_ROOT;
    node->next = NULL;
    node->rb_root = RB_ROOT_CACHED;
}

#endif /* _LINUX_TIMERQUEUE_H */

--- linux-4.15.0.orig/include/linux/tpm.h
+++ linux-4.15.0/include/linux/tpm.h
@@ -48,8 +48,11 @@
ut8 (*status) (struct tpm_chip *chip);
bool (*update_timeouts)(struct tpm_chip *chip,
unsigned long *timeout_cap);
+int (*go_idle)(struct tpm_chip *chip);
+int (*cmd_ready)(struct tpm_chip *chip);
int (*request_locality)(struct tpm_chip *chip, int loc);
-relinquish_locality)(struct tpm_chip *chip, int loc);
+int (*relinquish_locality)(struct tpm_chip *chip, int loc);
+void (*clk_enable)(struct tpm_chip *chip, bool value);
}

#if defined(CONFIG_TCG_TPM) || defined(CONFIG_TCG_TPM_MODULE)
--- linux-4.15.0.orig/include/linux/trace_seq.h
+++ linux-4.15.0/include/linux/trace_seq.h
@@ -12,7 +12,7 @@
*/
struct trace_seq {
    unsigned char		buffer[PAGE_SIZE];
};
char *trace_seq_buffer_ptr(struct trace_seq *s)
{
  return s->buffer + seq_buf_used(&s->seq);
}

static inline char *tracepoint_string() is used to save the string address for userspace

/* Values for .flags field of tty_buffer */

+extern const struct tty_port_client_operations tty_port_default_client_ops;

+struct tty_port {
  struct tty_bufhead buf; /* Locked internally */
  struct tty_struct *tty; /* Back pointer */
  struct termiox *termiox; /* May be NULL for unsupported */
  char name[64];
  struct pid *pgrp; /* Protected by ctrl lock */
}
/*
 * Writes protected by both ctrl lock and legacy mutex, readers must use
 * at least one of them.
 */

struct pid *session;
unsigned long flags;
int count;

#define TTY_PTY_LOCK 16/* pty private */
#define TTY_NO_WRITE_SPLIT 17/* Preserve write boundaries to driver */
#define TTY_HUPPED 18/* Post driver->hangup() */
#define TTY_HUPPING 19/* Hangup in progress */
#define TTY_LDISC_CHANGING 20/* Change pending - non-block IO */
#define TTY_LDISC_HALTED 22/* Line discipline is halted */

/* Values for tty->flow_change */

int tty_standard_install(struct tty_driver *driver, struct tty_struct *tty);

int tty_set_ldisc(struct tty_struct *tty, int disc);

int tty_release(struct inode *inode, struct file *filp);

static inline bool tty_io_nonblock(struct tty_struct *tty, struct file *file)
{
  return file->f_flags & O_NONBLOCK ||
    test_bit(TTY_LDISC_CHANGING, &tty->flags);
}

static inline bool tty_io_error(struct tty_struct *tty)
{
  return test_bit(TTY_IO_ERROR, &tty->flags);
}

extern struct tty_struct *tty_kopen(dev_t device);
extern void tty_kclose(struct tty_struct *tty);
extern int tty_dev_name_to_number(const char *name, dev_t *number);
extern int tty_ldisc_lock(struct tty_struct *tty, unsigned long timeout);
extern void tty_ldisc_unlock(struct tty_struct *tty);

static inline void tty_kref_put(struct tty_struct *tty)
{ }

static inline void tty_kref(struct tty_struct *tty, int idx);

extern int tty_release_struct(struct tty_struct *tty, int idx);

extern int tty_release(struct inode *inode, struct file *filp);

extern void tty_init_termios(struct tty_struct *tty);

extern void tty_save_termios(struct tty_struct *tty);

extern int tty_standard_install(struct tty_driver *driver, struct tty_struct *tty);

extern void tty_set_ldisc(struct tty_struct *tty, int disc);
extern int tty_ldisc_setup(struct tty_struct *tty, struct tty_struct *o_tty);
extern void tty_ldisc_release(struct tty_struct *tty);
-extern void tty_ldisc_init(struct tty_struct *tty);
+extern int __must_check tty_ldisc_init(struct tty_struct *tty);
extern void tty_ldisc_deinit(struct tty_struct *tty);
extern int tty_ldisc_receive_buf(struct tty_ldisc *ld, const unsigned char *p,
    char *f, int count);
--- linux-4.15.0.orig/include/linux/tty_driver.h
+++ linux-4.15.0/include/linux/tty_driver.h
@@ -236,7 +236,7 @@
 * Called when the device receives a TIOCGICOUNT ioctl. Passed a kernel
 * structure to complete. This method is optional and will only be called
 - * if provided (otherwise EINVAL will be returned).
+ * if provided (otherwise ENOTTY will be returned).
 */

#include <linux/export.h>
--- linux-4.15.0.orig/include/linux/u64_stats_sync.h
+++ linux-4.15.0/include/linux/u64_stats_sync.h
@@ -69,12 +69,13 @@
 
 }; 

+#if BITS_PER_LONG == 32 && defined(CONFIG_SMP)
+#define u64_stats_init(syncp)seqcount_init(&(syncp)->seq)
+#else
+static inline void u64_stats_init(struct u64_stats_sync *syncp)
+{
-#if BITS_PER_LONG == 32 && defined(CONFIG_SMP)
-    seqcount_init(&syncp->seq);
-#endif
+
}
+#endif

static inline void u64_stats_update_begin(struct u64_stats_sync *syncp)
{
    @@ -90,6 +91,28 @@
 #endif
 }

+static inline unsigned long
+u64_stats_update_begin_irqsave(struct u64_stats_sync *syncp)
+{
+    unsigned long flags = 0;
+    +
+    +#if BITS_PER_LONG==32 && defined(CONFIG_SMP)
+        local_irq_save(flags);
+write_seqcount_begin(&syncp->seq);
+#endif
+return flags;
+}
+
+static inline void
+u64_stats_update_end_irqrestore(struct u64_stats_sync *syncp,
+unsigned long flags)
+{
+#if BITS_PER_LONG==32 && defined(CONFIG_SMP)
+write_seqcount_end(&syncp->seq);
+local_irq_restore(flags);
+#endif
+}
+
static inline void u64_stats_update_begin_raw(struct u64_stats_sync *syncp)
{
#if BITS_PER_LONG==32 && defined(CONFIG_SMP)
--- linux-4.15.0.orig/include/linux/uaccess.h
+++ linux-4.15.0/include/linux/uaccess.h
@@ -243,6 +243,17 @@
extern long __probe_kernel_read(void *dst, const void *src, size_t size);
/*
+ * probe_user_read(): safely attempt to read from a location in user space
+ * @dst: pointer to the buffer that shall take the data
+ * @src: address to read from
+ * @size: size of the data chunk
+ *
+ * Safely read from address @src to the buffer at @dst. If a kernel fault
+ * happens, handle that and return -EFAULT.
+ */
+extern long probe_user_read(void *dst, const void __user *src, size_t size);
+
+/*
+ * probe_kernel_write(): safely attempt to write to a location
+ * @dst: address to write to
+ * @src: pointer to the data that shall be written
+ */
+extern long notrace probe_kernel_write(void *dst, const void *src, size_t size);
+extern long notrace __probe_kernel_write(void *dst, const void *src, size_t size);
+
+/*
+ * probe_user_write(): safely attempt to write to a location in user space
+ * @dst: address to write to
+ * @src: pointer to the data that shall be written
+ * @size: size of the data chunk
+ */
+ * Safely write to address @dst from the buffer at @src. If a kernel fault
+ * happens, handle that and return -EFAULT.
+ */
+ extern long notrace probe_user_write(void __user *dst, const void *src, size_t size);
+ extern long notrace __probe_user_write(void __user *dst, const void *src, size_t size);
+ extern long strncpy_from_unsafe(char *dst, const void *unsafe_addr, long count);
+ extern long strncpy_from_unsafe_user(char *dst, const void __user *unsafe_addr,
+ + long count);
+ extern long strnlen_unsafe_user(const void __user *unsafe_addr, long count);
+
+*/
+ * probe_kernel_address(): safely attempt to read from a location
+ @@ -267,7 +293,7 @@
+ probe_kernel_read(&retval, addr, sizeof(retval))
+
+ #ifndef user_access_begin
+ -#define user_access_begin() do { } while (0)
+ +#define user_access_begin(type, ptr, len) access_ok(type, ptr, len)
+ #define user_access_end() do { } while (0)
+ #define unsafe_get_user(x, ptr, err) do { if (unlikely(__get_user(x, ptr))) goto err; } while (0)
+ #define unsafe_put_user(x, ptr, err) do { if (unlikely(__put_user(x, ptr))) goto err; } while (0)
+ --- linux-4.15.0.orig/include/linux/uio_driver.h
+ +++ linux-4.15.0/include/linux/uio_driver.h
+ @@ -14,6 +14,7 @@
+ +#ifndef _UIO_DRIVER_H_
+ +#define _UIO_DRIVER_H_
+
+ +#include <linux/device.h>
+ #include <linux/fs.h>
+ #include <linux/interrupt.h>
+
+ @@ -68,12 +69,13 @@
+ struct uio_device {
+ - struct module *owner;
+ - struct device *dev;
+ + struct device *dev;
+ int minor;
+ atomic_t event;
+ struct fasync_struct *async_queue;
+ wait_queue_head_t wait;
+ struct uio_info *info;
+ + struct mutex info_lock;
+ struct kobject *map_dir;
+ struct kobject *portio_dir;
+ }
+ --- linux-4.15.0.orig/include/linux/usb.h
struct device dev;/* interface specific device info */
struct device *usb_dev;
-atomic_t pm_usage_cnt;/* usage counter for autosuspend */
struct work_struct reset_ws;/* for resets in atomic context */
};
#define to_usb_interface(d) container_of(d, struct usb_interface, dev)
@@ -407,11 +405,11 @@
};
/* ----------------------------------------------------------------------- */
--- linux-4.15.0.orig/include/linux/usb/composite.h
+++ linux-4.15.0/include/linux/usb/composite.h
@@ -54,6 +54,9 @@
/* big enough to hold our biggest descriptor */
#define USB_COMP_EP0_BUFSIZ 1024
+/* OS feature descriptor length <= 4kB */
+#define USB_COMP_EP0_OS_DESC_BUFSIZ 4096
+
#define USB_MS_TO_HS_INTERVAL(x) (ilog2((x * 1000 / 125)) + 1)
struct usb_configuration;
@@ -246,6 +249,9 @@
int usb_interface_id(struct usb_configuration *, struct usb_function *);
+int config_ep_by_speed_and_alt(struct usb_gadget *g, struct usb_function *f,
struct usb_ep *_ep, u8 alt);
+
int config_ep_by_speed(struct usb_gadget *g, struct usb_function *f,
struct usb_ep *_ep);

--- linux-4.15.0.orig/include/linux/usb/ehci_def.h
+++ linux-4.15.0/include/linux/usb/ehci_def.h
@@ -151,7 +151,7 @@
#define PORT_OWNER	(1<<13) /* true: companion hc owns this port */
#define PORT_POWER	(1<<12) /* true: has power (see PPC) */
#define PORT_USB11(x) (((x)&(3<<10)) == (1<<10))/* USB 1.1 device */
-/* 11:10 for detecting lowspeed devices (reset vs release ownership) */
+#define PORT_LS_MASK	(3<<10)/* Link status (SE0, K or J */
/* 9 reserved */
#define PORT_LPM	(1<<9) /* LPM transaction */
#define PORT_RESET	(1<<8) /* reset port */
--- linux-4.15.0.orig/include/linux/usb/irda.h
+++ linux-4.15.0/include/linux/usb/irda.h
@@ -119,11 +119,22 @@
* 6 - 115200 bps
* 7 - 576000 bps
* 8 - 1.152 Mbps
- * 9 - 5 mbps
+ * 9 - 4 Mbps
+ * 10..15 - Reserved
/*
#define USB_IRDA_STATUS_LINK_SPEED	0x0f

+#define USB_IRDA_LS_NO_CHANGE	0
+#define USB_IRDA_LS_2400	1
+#define USB_IRDA_LS_9600	2
+#define USB_IRDA_LS_19200	3
+#define USB_IRDA_LS_38400	4
+#define USB_IRDA_LS_57600	5
+#define USB_IRDA_LS_115200	6
+#define USB_IRDA_LS_576000	7
+#define USB_IRDA_LS_1152000	8
+#define USB_IRDA_LS_4000000	9
+
/* The following is a 4-bit value used only for
 * outbound header:
 */
#define USB_IRDA_STATUS_LINK_SPEED0x0f

+#define USB_IRDA_LS_NO_CHANGE0
+#define USB_IRDA_LS_24001
+#define USB_IRDA_LS_96002
+#define USB_IRDA_LS_192003
+#define USB_IRDA_LS_384004
+#define USB_IRDA_LS_576005
+#define USB_IRDA_LS_1152006
+#define USB_IRDA_LS_5760007
+#define USB_IRDA_LS_11520008
+#define USB_IRDA_LS_40000009
+
/* The following is a 4-bit value used only for
 * outbound header:
 */
#define USB_IRDA_STATUS_LINK_SPEED0x0f

+bool hnp_work_init;
bool state_changed;
;
--- linux-4.15.0.orig/include/linux/usb/pd.h
+++ linux-4.15.0/include/linux/usb/pd.h
@@ -268,7 +268,7 @@
#define PD_T_SENDER_RESPONSE 60 /* 24 - 30 ms, relaxed */
#define PD_T_SOURCE_ACTIVITY 45
#define PD_T_SINK_ACTIVITY 135
-#define PD_T_SINK_WAIT_CAP 240
+#define PD_T_SINK_WAIT_CAP 310 /* 310 - 620 ms */
#define PD_T_PS_TRANSITION 500
#define PD_T_SRC_TRANSITION 35
#define PD_T_DRP_SNK 40
@@ -285,6 +285,7 @@
#define PD_T_ERROR_RECOVERY 100 /* minimum 25 is insufficient */
#define PD_T_SRCSWAPSTDBY 625 /* Maximum of 650ms */
#define PD_T_NEWSRC 250 /* Maximum of 275ms */
+#define PD_T_SWAP_SRC_START 20 /* Minimum of 20ms */

#define PD_T_DRP_TRY 100 /* 75 - 150 ms */
#define PD_T_DRP_TRYWAIT 600 /* 400 - 800 ms */
--- linux-4.15.0.orig/include/linux/usb/quirks.h
+++ linux-4.15.0/include/linux/usb/quirks.h
@@ -63,4 +63,13 @@
*/
#define USB_QUIRK_DISCONNECT_SUSPEND BIT(12)
/* Device needs a pause after every control message. */
+#define USB_QUIRK_DELAY_CTRL_MSG BIT(13)
+/* Hub needs extra delay after resetting its port. */
+#define USB_QUIRK_HUB_SLOW_RESET BIT(14)
+/* device has blacklisted endpoints */
+#define USB_QUIRK_ENDPOINT_BLACKLIST BIT(15)
+#endif /* __LINUX_USB_QUIRKS_H */

--- linux-4.15.0.orig/include/linux/usb/usbnet.h
+++ linux-4.15.0/include/linux/usb/usbnet.h
@@ -83,6 +83,8 @@
#		#define EVENT_LINK_CHANGE 11
#		#define EVENT_SET_RX_MODE 12
#		#define EVENT_NO_IP_ALIGN 13
+u32			trx_speed;	/* in bps - NOT Mbps */
+u32			tx_speed;	/* in bps - NOT Mbps */
};
static inline struct usb_driver *driver_of(struct usb_interface *intf)
--- linux-4.15.0.orig/include/linux/usb_usual.h
+++ linux-4.15.0/include/linux/usb_usual.h
@@ -84,6 +84,10 @@
 /* Cannot handle REPORT_LUNS */
 US_FLAG(ALWAYS_SYNC, 0x20000000)
 /* lies about caching, so always sync */
+US_FLAG(NO_SAME, 0x40000000)
+/* Cannot handle WRITE_SAME */
+US_FLAG(SENSE_AFTER_SYNC, 0x80000000)
+/* Do REQUEST_SENSE after SYNCHRONIZE_CACHE */

#define US_FLAG(name, value) US_FL_##name = value, 
enum { US_DO_ALL_FLAGS }:
--- linux-4.15.0.orig/include/linux/verification.h
+++ linux-4.15.0/include/linux/verification.h
@@ -13,6 +13,12 @@
#define _LINUX_VERIFICATION_H
/*
 * Indicate that both builtin trusted keys and secondary trusted keys
 * should be used.
 */
+#define VERIFY_USE_SECONDARY_KEYRING ((struct key *)1UL)
+
+/*
 * The use to which an asymmetric key is being put.
 */
enum key_being_used_for {
--- linux-4.15.0.orig/include/linux/vga_switcheroo.h
+++ linux-4.15.0/include/linux/vga_switcheroo.h
@@ -84,8 +84,8 @@
 /* Client identifier. Audio clients use the same identifier & 0x100.
 */
 enum vga_switcheroo_client_id {
-  VGA_SWITCHEROO_UNKNOWN_ID = -1,
-  VGA_SWITCHEROO_IGD,
+  VGA_SWITCHEROO_UNKNOWN_ID = 0x1000,
+  VGA_SWITCHEROO_IGD = 0,
  VGA_SWITCHEROO_DIS,
  VGA_SWITCHEROO_MAX_CLIENTS,
};
@@ -151,7 +151,7 @@
 bool driver_power_control);
 int vga_switcheroo_register_audio_client(struct pci_dev *pdev,
 const struct vga_switcheroo_client_ops *ops,
  - enum vga_switcheroo_client_id id);
void vga_switcheroo_client_fb_set(struct pci_dev *dev, 
  struct fb_info *info);
@@ -168,11 +168,8 @@
 bool vga_switcheroo_client_probe_defer(struct pci_dev *pdev);
 enum vga_switcheroo_state vga_switcheroo_get_client_state(struct pci_dev *dev);

-void vga_switcheroo_set_dynamic_switch(struct pci_dev *pdev, enum vga_switcheroo_state dynamic);
-
 int vga_switcheroo_init_domain_pm_ops(struct device *dev, struct dev_pm_domain *domain);
 void vga_switcheroo_fini_domain_pm_ops(struct device *dev);
-#if defined(vga_switcheroo_init_domain_pm_optimus_hdmi_audio)

else

 static inline void vga_switcheroo_unregister_client(struct pci_dev *dev) {} 
 @@ -183,7 +180,7 @@
 enum vga_switcheroo_handler_flags_t handler_flags) { return 0; }
 static inline int vga_switcheroo_register_audio_client(struct pci_dev *pdev, 
 const struct vga_switcheroo_client_ops *ops,
-enum vga_switcheroo_client_id id) { return 0; }
+struct pci_dev *vga_dev) { return 0; }
 static inline void vga_switcheroo_unregister_handler(void) {}
 static inline int vga_switcheroo_get_client_state(struct pci_dev *dev) { return
 else

 static inline void vga_switcheroo_unregister_client(struct pci_dev *dev) {} 
 } }
list_for_each_entry(vq, &vdev->vqs, list)
+
/**
 * virtio_driver - operations for a virtio I/O driver
 * @driver: underlying device driver (populate name and owner).
--- linux-4.15.0.orig/include/linux/virtio_net.h
+++ linux-4.15.0/include/linux/virtio_net.h
@@ -3,24 +3,53 @@
#define _LINUX_VIRTIO_NET_H

#include <linux/if_vlan.h>
+include <uapi/linux/tcp.h>
+include <uapi/linux/udp.h>
#include <uapi/linux/virtio_net.h>

+static inline int virtio_net_hdr_set_proto(struct sk_buff *skb,
+ const struct virtio_net_hdr *hdr)
+{
+switch (hdr->gso_type & ~VIRTIO_NET_HDR_GSO_ECN) {
+case VIRTIO_NET_HDR_GSO_TCPV4:
+case VIRTIO_NET_HDR_GSO_UDP:
+skb->protocol = cpu_to_be16(ETH_P_IP);
+break;
+case VIRTIO_NET_HDR_GSO_TCPV6:
+skb->protocol = cpu_to_be16(ETH_P_IPV6);
+break;
+default:
+return -EINVAL;
+}
+
+static inline int virtio_net_hdr_to_skb(struct sk_buff *skb,
const struct virtio_net_hdr *hdr,
bool little_endian)
{
unsigned int gso_type = 0;
unsigned int thlen = 0;
unsigned int p_off = 0;
unsigned int ip_proto;

if (hdr->gso_type != VIRTIO_NET_HDR_GSO_NONE) {
switch (hdr->gso_type & ~VIRTIO_NET_HDR_GSO_ECN) {
case VIRTIO_NET_HDR_GSO_TCPV4:
gso_type = SKB_GSO_TCPV4;
+ip_proto = IPPROTO_TCP;
thlen = sizeof(struct tcphdr);
}
break;
case VIRTIO_NET_HDR_GSO_TCPV6:
gso_type = SKB_GSO_TCPV6;
+ip_proto = IPPROTO_TCP;
+thlen = sizeof(struct tcphdr);
break;
case VIRTIO_NET_HDR_GSO_UDP:
gso_type = SKB_GSO_UDP;
+ip_proto = IPPROTO_UDP;
+thlen = sizeof(struct udphdr);
break;
default:
return -EINVAL;
@@ -33,23 +62,73 @@
return -EINVAL;
}

+skb_reset_mac_header(skb);
+
if (hdr->flags & VIRTIO_NET_HDR_F_NEEDS_CSUM) {
 -u16 start = __virtio16_to_cpu(little_endian, hdr->csum_start);
 -u16 off = __virtio16_to_cpu(little_endian, hdr->csum_offset);
 +u32 start = __virtio16_to_cpu(little_endian, hdr->csum_start);
 +u32 off = __virtio16_to_cpu(little_endian, hdr->csum_offset);
 +u32 needed = start + max_t(u32, thlen, off + sizeof(__sum16));
 +
 +if (!skb_may_pull(skb, needed))
+return -EINVAL;

if (!skb_partial_csum_set(skb, start, off))
return -EINVAL;
+
+p_off = skb_transport_offset(skb) + thlen;
+if (!pskb_may_pull(skb, p_off))
+return -EINVAL;
+} else {
 /* gso packets without NEEDS_CSUM do not set transport_offset.
 + * probe and drop if does not match one of the above types.
 + */
 +if (gso_type && skb->network_header) {
+struct flow_keys keys;
+
+if (!skb->protocol) {
+__be16 protocol = dev_parse_header_protocol(skb);
+
+virtio_net_hdr_set_proto(skb, hdr);
+if (protocol && protocol != skb->protocol)
+return -EINVAL;

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if (hdr->gso_type != VIRTIO_NET_HDR_GSO_NONE) {
    u16 gso_size = __virtio16_to_cpu(little_endian, hdr->gso_size);
    struct skb_shared_info *shinfo = skb_shinfo(skb);

    skb_shinfo(skb)->gso_size = gso_size;
    skb_shinfo(skb)->gso_type = gso_type;
    -/* Header must be checked, and gso_segs computed. */
    -skb_shinfo(skb)->gso_type |= SKB_GSO_DODGY;
    -skb_shinfo(skb)->gso_segs = 0;
    +/* Too small packets are not really GSO ones. */
    +if (skb->len - p_off > gso_size) {
        shinfo->gso_size = gso_size;
        shinfo->gso_type = gso_type;
        +
        +/* Header must be checked, and gso_segs computed. */
        +shinfo->gso_type |= SKB_GSO_DODGY;
        +shinfo->gso_segs = 0;
        +}
    }

    return 0;
    @@ -58,7 +137,8 @@
static inline int virtio_net_hdr_from_skb(const struct sk_buff *skb,  
  struct virtio_net_hdr *hdr,  
  bool little_endian,  
  - bool has_data_valid)  
+ bool has_data_valid,  
+ int vlan_hlen)  
{  
  memset(hdr, 0, sizeof(*hdr)); /* no info leak */
  
@@ -83,12 +163,8 @@

if (skb->ip_summed == CHECKSUM_PARTIAL) {
  hdr->flags = VIRTIO_NET_HDR_F_NEEDS_CSUM;
- if (skb_vlan_tag_present(skb))
-     hdr->csum_start = __cpu_to_virtio16(little_endian,
-                                        skb_checksum_start_offset(skb) + VLAN_HLEN);
- else
-     hdr->csum_start = __cpu_to_virtio16(little_endian,
-                                        skb_checksum_start_offset(skb));
+     hdr->csum_start = __cpu_to_virtio16(little_endian,
+                                        skb_checksum_start_offset(skb) + vlan_hlen);
  hdr->csum_offset = __cpu_to_virtio16(little_endian, skb->csum_offset);
} else if (has_data_valid &&
--- linux-4.15.0.orig/include/linux/virtio_ring.h
+++ linux-4.15.0/include/linux/virtio_ring.h
@@ -63,7 +63,7 @@
    */
    * Creates a virtqueue and allocates the descriptor ring. If
    * may_reduce_num is set, then this may allocate a smaller ring than
-    * expected. The caller should query virtqueue_get_ring_size to learn
+    * expected. The caller should query virtqueue_get_vring_size to learn
    * the actual size of the ring.
    */
    struct virtqueue *vring_create_virtqueue(unsigned int index,
--- linux-4.15.0.orig/include/linux/virtio_vsock.h
+++ linux-4.15.0/include/linux/virtio_vsock.h
@@ -149,7 +149,8 @@
    void virtio_transport_destruct(struct vsock_sock *vsk);
    void virtio_transport_recv_pkt(struct virtio_transport *t,
+    struct virtio_transport *t,
    struct virtio_vsock_pkt *pkt);
    void virtio_transport_free_pkt(struct virtio_vsock_pkt *pkt);
    void virtio_transport_free_pkt(struct virtio_transport *t,
    struct virtio_vsock_sock *vvs, struct virtio_vsock_pkt *pkt);
    void virtio_transport_get_credit(struct virtio_vsock_sock *vvs, u32 wanted);
--- linux-4.15.0.orig/include/linux/vm_event_item.h
+++ linux-4.15.0/include/linux/vm_event_item.h
@@ -105,7 +105,6 @@
        VMACACHE_FULL_FLUSHES,
    #endif
    #ifdef CONFIG_SWAP
-    SWAP_RA,
+-    extern void vmacache_flush_all(struct mm_struct *, struct mm_struct *mm);
 extern void vmacache_update(unsigned long addr, struct vm_area_struct *newvma);
 extern struct vm_area_struct *vmacache_find(struct mm_struct *, unsigned long addr);
    #endif /* __LINUX_VMACACHE_H */
--- linux-4.15.0.orig/include/linux/vmalloc.h
+++ linux-4.15.0/include/linux/vmalloc.h
@@ -102,12 +102,13 @@
 extern int remap_vmalloc_range_partial(struct vm_area_struct *, void *kaddr,
              unsigned long uaddr, void *kaddr,
              unsigned long size);
-void vmalloc_sync_all(void);
+-void vmalloc_sync_all(void);
+void vmalloc_sync_mappings(void);
+void vmalloc_sync_unmappings(void);
 /* Lowlevel-APIs (not for driver use!)
/*
 * A single VMCI device has an upper limit of 128MB on the amount of
 * memory that can be used for queue pairs.
 * + memory that can be used for queue pairs. Since each queue pair
 * + consists of at least two pages, the memory limit also dictates the
 * + number of queue pairs a guest can create.
 */
#define VMCI_MAX_GUEST_QP_MEMORY (128 * 1024 * 1024)
#define VMCI_MAX_GUEST_QP_COUNT (VMCI_MAX_GUEST_QP_MEMORY / PAGE_SIZE / 2)

/*
 * There can be at most PAGE_SIZE doorbells since there is one doorbell
 * + per byte in the doorbell bitmap page.
 */
#define VMCI_MAX_GUEST_DOORBELL_COUNT PAGE_SIZE

/*
 * Queues with pre-mapped data pages must be small, so that we don't pin
 */
extern char vt_dont_switch;
extern bool vt_dont_switch;
extern int default_utf8;
extern int global_cursor_default;

--- linux-4.15.0.orig/include/linux/wait_bit.h
+++ linux-4.15.0/include/linux/wait_bit.h
@@ -262,4 +262,21 @@
    return out_of_line_wait_on_atomic_t(val, action, mode);

-extern char vt_dont_switch;
+extern bool vt_dont_switch;
 extern int default_utf8;
 extern int global_cursor_default;

--- linux-4.15.0.orig/include/linux/vt_kern.h
+++ linux-4.15.0/include/linux/vt_kern.h
@@ -130,7 +130,8 @@
    return false;
 }

-extern char vt_dont_switch;
+extern bool vt_dont_switch;
 extern int default_utf8;
 extern int global_cursor_default;

--- linux-4.15.0.orig/include/linux/vm_wvmc_defs.h
+++ linux-4.15.0/include/linux/vm_wvmc_defs.h
@@ -68,9 +68,18 @@
 */
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 * + per byte in the doorbell bitmap page.
 */
#define VMCI_MAX_GUEST_DOORBELL_COUNT PAGE_SIZE

/*
 * Queues with pre-mapped data pages must be small, so that we don't pin
 */
+/**
+ * clear_and_wake_up_bit - clear a bit and wake up anyone waiting on that bit
+ *
+ * @bit: the bit of the word being waited on
+ * @word: the word being waited on, a kernel virtual address
+ *
+ * You can use this helper if bitflags are manipulated atomically rather than
+ * non-atomically under a lock.
+ */
+static inline void clear_and_wake_up_bit(int bit, void *word)
+{
+clear_bit_unlock(bit, word);
+/* See wake_up_bit() for which memory barrier you need to use. */
+smp_mb__after_atomic();
+wake_up_bit(word, bit);
+
+#endif /* _LINUX_WAIT_BIT_H */
--- linux-4.15.0.orig/include/linux/workqueue.h
+++ linux-4.15.0/include/linux/workqueue.h
@@ -13,6 +13,7 @@
#include <linux/threads.h>
#include <linux/atomic.h>
#include <linux/cpumask.h>
+include <linux/rcupdate.h>
#include <linux/workqueue.h>

struct workqueue_struct;

@@ -120,6 +121,14 @@
int cpu;
};

+struct rcu_work {
+struct work_struct work;
+struct rcu_head rcu;
+
+/* target workqueue ->rcu uses to queue ->work */
+struct workqueue_struct *wq;
+};
+
+/**
+ * struct workqueue_attrs - A struct for workqueue attributes.
+ *
+ @@ -151,6 +160,11 @@
return container_of(work, struct delayed_work, work);
static inline struct rcu_work *to_rcu_work(struct work_struct *work) 
{ 
return container_of(work, struct rcu_work, work); 
}

struct execute_work { 
struct work_struct work; 
};

#define INIT_DEFERRABLE_WORK_ONSTACK(_work, _func) 
__INIT_DELAYED_WORK_ONSTACK(_work, _func, TIMER_DEFERRABLE)

#define INIT_RCU_WORK(_work, _func) 
INIT_WORK(&(_work)->work, (_func))

#define INIT_RCU_WORK_ONSTACK(_work, _func) 
INIT_WORK_ONSTACK(&(_work)->work, (_func))

/**
 * work_pending - Find out whether a work item is currently pending
 * @work: The work item in question
 *
 * @return: 1 if work is pending, 0 otherwise
 */

extern bool mod_deferred_work_on(int cpu, struct workqueue_struct *wq,
struct deferred_work *dwork, unsigned long delay);
extern bool mod_deferred_work_on(int cpu, struct workqueue_struct *wq,
struct deferred_work *dwork, unsigned long delay);
+extern bool queue_rcu_work(struct workqueue_struct *wq, struct rcu_work *rwork);
+extern bool flush_rcu_work(struct rcu_work *rwork);
+
extern void flush_workqueue(struct workqueue_struct *wq);
extern void drain_workqueue(struct workqueue_struct *wq);
+extern bool flush_rcu_work(struct workqueue_struct *wq, struct rcu_work *rwork);

+extern bool flush_rcu_work(struct rcu_work *rwork);
+
extern void workqueue_set_max_active(struct workqueue_struct *wq,
 int max_active);
+extern struct work_struct *current_work(void);
 extern bool current_is_workqueue_rescuer(void);
 extern bool workqueue_congested(int cpu, struct workqueue_struct *wq);
 extern unsigned int work_busy(struct work_struct *work);

--- linux-4.15.0.orig/include/linux/xattr.h
+++ linux-4.15.0/include/linux/xattr.h
@@ -54,6 +54,7 @@
 int __vfs_setxattr_noperm(struct dentry *, const char *, const void *, size_t, int);
 int vfs_setxattr(struct dentry *, const char *, const void *, size_t, int);
 int __vfs_removexattr(struct dentry *, const char *);
+int __vfs_removexattr_noperm(struct dentry *dentry, const char *name);
int vfs_removexattr(struct dentry *, const char *);

ssize_t generic_listxattr(struct dentry *dentry, char *buffer, size_t buffer_size);
--- linux-4.15.0.orig/include/linux/zsmalloc.h
+++ linux-4.15.0/include/linux/zsmalloc.h
@@ -36,7 +36,7 @@
 struct zs_pool_stats {
 /* How many pages were migrated (freed) */
 -unsigned long pages_compacted;
+atomic_long_t pages_compacted;
    
};

struct zs_pool;
--- linux-4.15.0.orig/include/math-emu/soft-fp.h
+++ linux-4.15.0/include/math-emu/soft-fp.h
@@ -138,7 +138,7 @@
 _FP_FRAC_ADDI_##wc(X, _FP_WORK_ROUND);		
 } while (0)
-#define _FP_ROUND_ZERO(wc, X)		0
+#define _FP_ROUND_ZERO(wc, X)(void)0
#define _FP_ROUND_PINF(wc, X)				
--- linux-4.15.0.orig/include/media/cec.h
+++ linux-4.15.0/include/media/cec.h
@@ -163,6 +163,7 @@
 unsigned int transmit_queue_sz;
 struct list_head wait_queue;
 struct cec_data *transmitting;
+bool transmit_in_progress;
 struct task_struct *kthread_config;
 struct completion config_completion;
@@ -449,4 +450,74 @@
 cec_s_phys_addr(adap, CEC_PHYS_ADDR_INVALID, false);
 }

+/**
+ * cec_get_edid_spa_location() - find location of the Source Physical Address
+ * @edid: the EDID
+ * @size: the size of the EDID
+ * @transmit_in_progress: indicates if the transmission is in progress
+ * This EDID is expected to be a CEA-861 compliant, which means that there are
+ * at least two blocks and one or more of the extensions blocks are CEA-861
+ */
+ * blocks.
+ *
+ * The returned location is guaranteed to be <= size-2.
+ *
+ * This is an inline function since it is used by both CEC and V4L2.
+ * Ideally this would go in a module shared by both, but it is overkill to do
+ * that for just a single function.
+ */
+static inline unsigned int cec_get_edid_spa_location(const u8 *edid,
+    unsigned int size)
+{
+  unsigned int blocks = size / 128;
+  unsigned int block;
+  
+  /* Sanity check: at least 2 blocks and a multiple of the block size */
+  if (blocks < 2 || size % 128)
+    return 0;
+  
+  /* If there are fewer extension blocks than the size, then update
+     'blocks'. It is allowed to have more extension blocks than the size,
+     since some hardware can only read e.g. 256 bytes of the EDID, even
+     though more blocks are present. The first CEA-861 extension block
+     should normally be in block 1 anyway.
+ */
+  if (edid[0x7e] + 1 < blocks)
+    blocks = edid[0x7e] + 1;
+  
+  for (block = 1; block < blocks; block++)
+  {
+    unsigned int offset = block * 128;
+    
+    /* Skip any non-CEA-861 extension blocks */
+    if (edid[offset] != 0x02 || edid[offset + 1] != 0x03)
+      continue;
+    
+    /* search Vendor Specific Data Block (tag 3) */
+    u8 tag = edid[offset + 2] >> 5;
+    
+    /* Check if there are Data Blocks */
+    if (tag <= 4)
+      continue;
+    else
+    {
+      unsigned int i = offset + 4;
+      unsigned int end = offset + d;
+      
+      /* Note: 'end' is always < 'size' */
+      do 
+        u8 tag = edid[i] >> 5;
+u8 len = edid[i] & 0x1f;
+
+if (tag == 3 &
+   len >= 5 &
+   edid[i + 1] == 0x03 &
+   edid[i + 2] == 0x0c &
+   edid[i + 3] == 0x00)
+return i + 4;
+i += len + 1;
+} while (i < end);
+
+return 0;
+
+#endif /* _MEDIA_CEC_H */

--- linux-4.15.0.orig/include/media/davinci/vpbe.h
+++ linux-4.15.0/include/media/davinci/vpbe.h
@@ -92,7 +92,7 @@
 struct encoder_config_info *ext_encoders;
 /* amplifier information goes here */
 struct amp_config_info *amp;
-int num_outputs;
+unsigned int num_outputs;
/* Order is venc outputs followed by LCD and then external encoders */
 struct vpbe_output *outputs;
}
--- linux-4.15.0.orig/include/media/v4l2-device.h
+++ linux-4.15.0/include/media/v4l2-device.h
@@ -268,7 +268,7 @@
 struct v4l2_subdev *__sd;					n__v4l2_device_call_subdevs_p(v4l2_dev, __sd,				!(grpid) || __sd->grp_id == (grpid), o, f ,				(grpid) == 0 || __sd->grp_id == (grpid), o, f ,
##args);					while (0)
@@ -280,7 +280,7 @@
 ({										struct v4l2_subdev *__sd;						__v4l2_device_call_subdevs_until_err_p(v4l2_dev, __sd,
-!(grpid) || __sd->grp_id == (grpid), o, f ,
+(grpid) == 0 || __sd->grp_id == (grpid), o, f ,
##args);
} while (0)

@@ -294,8 +294,8 @@
 struct v4l2_subdev *__sd;
 
 \__v4l2_device_call_subdevs_p(v4l2_dev, __sd,\n-!(grpid) || __sd->grp_id == (grpid), o, f ,
+(grpid) == 0 || __sd->grp_id == (grpid), o, f ,
##args);
})

@@ -294,8 +294,8 @@
 struct v4l2_subdev *__sd;
 
 \__v4l2_device_call_subdevs_until_err_p(v4l2_dev, __sd,\n-!(grpid) || __sd->grp_id == (grpid), o, f ,
+(grpid) == 0 || __sd->grp_id == (grpid), o, f ,
##args);
})


\_\_v4l2\_device\_call\_subdevs\_p(v4l2\_dev, \_sd, \\
-!(grpmsk) \&\& \(_sd->grp\_id\ &\& (grpmask)), o, f ,
-##args);\
+(grpmask) == 0 \&\& \(_sd->grp\_id\ &\& (grpmask)), o, \\
+f, ##args);\
} while (0)

/*
 * @prio: priority of the file handler, as defined by &enum v4l2\_priority
 * @wait: event' s wait queue
 * @subscribe\_lock: serialise changes to the subscribed list; guarantee that
 * the add and del event callbacks are orderly called
 * @subscribed: list of subscribed events
 * @available: list of events waiting to be dequeued
 * @navailable: number of available events at @available list
 * @sequence: event sequence number
 */

struct v4l2\_fh {

/* Events */
wait\_queue\_head\_twait;
+\ struct mutex\_subscribe\_lock;
struct list\_heads\_subscribed;
struct list\_head\_available;
unsigned int navailable;
--- linux-4.15.0.orig/include/media/v4l2-rect.h
+++ linux-4.15.0/include/media/v4l2-rect.h
@@ -75,10 +75,10 @@
r->left = boundary->left;
if (r->top < boundary->top)
  r->top = boundary->top;
-if (r->left + r->width > boundary->width)
  r->left = boundary->width - r->width;
-if (r->top + r->height > boundary->height)
  r->top = boundary->height - r->height;
+if (r->left + r->width > boundary->left + boundary->width)
  r->left = boundary->left + boundary->width - r->width;
+if (r->top + r->height > boundary->top + boundary->height)
  r->top = boundary->top + boundary->height - r->height;
}

/**
   * @s_gpio: set GPIO pins. Very simple right now, might need to be extended with
   * a direction argument if needed.
   *
   * + * @command: called by in-kernel drivers in order to call functions internal
   * + * to subdev drivers driver that have a separate callback.
   * + *
   * + * @ioctl: called at the end of ioctl() syscall handler at the V4L2 core.
   * + * used to provide support for private ioctls used on the driver.
   *
   * @command: called by in-kernel drivers in order to call functions internal
   * to subdev drivers driver that have a separate callback.
   * to ioctl: called at the end of ioctl() syscall handler at the V4L2 core.
   * used to provide support for private ioctls used on the driver.

int (*load_fw)(struct v4l2_subdev *sd);
int (*reset)(struct v4l2_subdev *sd, u32 val);
int (*s_gpio)(struct v4l2_subdev *sd, u32 val);
+long (*command)(struct v4l2_subdev *sd, unsigned int cmd, void *arg);
long (*ioctl)(struct v4l2_subdev *sd, unsigned int cmd, void *arg);
#if !defined(CONFIG_COMPAT
long (*compat_ioctl32)(struct v4l2_subdev *sd, unsigned int cmd,
--- linux-4.15.0.orig/include/media/videobuf2-core.h
+++ linux-4.15.0/include/media/videobuf2-core.h
@@ -546,6 +546,7 @@
unsigned int		start_streaming_called:1;
unsigned interror:1;
unsigned intwaiting_forBuffers:1;
+unsigned intwaiting_in_dqbuf:1;
unsigned intis_multiplanar:1;
unsigned intis_output:1;
unsigned intcopy_timestamp:1;
--- linux-4.15.0.orig/include/misc/ocxl-config.h
+++ linux-4.15.0/include/misc/ocxl-config.h
@@ -0,0 +1,45 @@
+// SPDX-License-Identifier: GPL-2.0+
+// Copyright 2017 IBM Corp.
#ifndef _OCXL_CONFIG_H_
#define _OCXL_CONFIG_H_

/*
 * This file lists the various constants used to read the
 * configuration space of an opencapi adapter.
 *
 * It follows the specification for opencapi 3.0
 */

#define OCXL_EXT_CAP_ID_DVSEC 0x23

#define OCXL_DVSEC_VENDOR_OFFSET 0x4
#define OCXL_DVSEC_ID_OFFSET 0x8
#define OCXL_DVSEC_TL_ID 0xF000
#define OCXL_DVSEC_TL_BACKOFF_TIMERS 0x10
#define OCXL_DVSEC_TL_RECV_CAP 0x18
#define OCXL_DVSEC_TL_SEND_CAP 0x20
#define OCXL_DVSEC_TL_RECV_RATE 0x30
#define OCXL_DVSEC_TL_SEND_RATE 0x50
#define OCXL_DVSEC_FUNC_ID 0xF001
#define OCXL_DVSEC_FUNC_OFF_INDEX 0x08
#define OCXL_DVSEC_FUNC_OFF_ACTAG 0x0C
#define OCXL_DVSEC_AFU_INFO_ID 0xF003
#define OCXL_DVSEC_AFU_INFO_AFU_IDX 0x0A
#define OCXL_DVSEC_AFU_INFO_OFF 0x0C
#define OCXL_DVSEC_AFU_INFO_DATA 0x10
#define OCXL_DVSEC_AFU_CTRL_ID 0xF004
#define OCXL_DVSEC_AFU_CTRL_AFU_IDX 0x0A
#define OCXL_DVSEC_AFU_CTRL_TERM_PASID 0x0C
#define OCXL_DVSEC_AFU_CTRL_ENABLE 0x0F
#define OCXL_DVSEC_AFU_CTRL_PASID_SUP 0x10
#define OCXL_DVSEC_AFU_CTRL_PASID_EN 0x11
#define OCXL_DVSEC_AFU_CTRL_PASID_BASE 0x14
#define OCXL_DVSEC_AFU_CTRL_ACTAG_SUP 0x18
#define OCXL_DVSEC_AFU_CTRL_ACTAG_EN 0x1A
#define OCXL_DVSEC_AFU_CTRL_ACTAG_BASE 0x1C
#define OCXL_DVSEC_VENDOR_ID 0xF0F0
#define OCXL_DVSEC_VENDOR_CFG_VERS 0x0C
#define OCXL_DVSEC_VENDOR_TLX_VERS 0x10
#define OCXL_DVSEC_VENDOR_DLX_VERS 0x20

#endif /* _OCXL_CONFIG_H_ */
--- linux-4.15.0.orig/include/misc/ocxl.h
+++ linux-4.15.0/include/misc/ocxl.h
@@ -0,0 +1,223 @@
+ifndef _MISC_OCXL_H_
+define _MISC_OCXL_H_
+
+include <linux/pci.h>
+
+/*
+ * Opencapi drivers all need some common facilities, like parsing the
+ * device configuration space, adding a Process Element to the Shared
+ * Process Area, etc...
+ *
+ * The ocxl module provides a kernel API, to allow other drivers to
+ * reuse common code. A bit like a in-kernel library.
+ */
+
+#define OCXL_AFU_NAME_SZ   (24+1) /* add 1 for NULL termination */
+
+/*
+ * The following 2 structures are a fairly generic way of representing
+ * the configuration data for a function and AFU, as read from the
+ * configuration space.
+ */
+struct ocxl_afu_config {
  u8 idx;
  int dvsec_afu_control_pos; /* offset of AFU control DVSEC */
  char name[OCXL_AFU_NAME_SZ];
  u8 version_major;
  u8 version_minor;
  u8 afuc_type;
  u8 afum_type;
  u8 profile;
  u8 global_mmio_bar;   /* global MMIO area */
  u64 global_mmio_offset;
  u32 global_mmio_size;
  u8 pp_mmio_bar;      /* per-process MMIO area */
  u64 pp_mmio_offset;
  u32 pp_mmio_stride;
  u8 log_mem_size;
  u8 pasid_supported_log;
  u16 actag_supported;
};

+struct ocxl_fn_config {
  int dvsec_tl_pos;   /* offset of the Transaction Layer DVSEC */
  int dvsec_function_pos; /* offset of the Function DVSEC */
  int dvsec_afu_info_pos; /* offset of the AFU information DVSEC */
  s8 max_pasid_log;
  s8 max_afu_index;
};
+ /*
+ * Read the configuration space of a function and fill in a
+ * ocxl_fn_config structure with all the function details
+ */
+extern int ocxl_config_read_function(struct pci_dev *dev,
+struct ocxl_fn_config *fn);
+
+ /*
+ * Check if an AFU index is valid for the given function.
+ *
+ * AFU indexes can be sparse, so a driver should check all indexes up
+ * to the maximum found in the function description
+ */
+extern int ocxl_config_check_afu_index(struct pci_dev *dev,
+struct ocxl_fn_config *fn, int afu_idx);
+
+ /*
+ * Read the configuration space of a function for the AFU specified by
+ * the index 'afu_idx'. Fills in a ocxl_afu_config structure
+ */
+extern int ocxl_config_read_afu(struct pci_dev *dev,
+struct ocxl_fn_config *fn,
+struct ocxl_afu_config *afu,
+u8 afu_idx);
+
+ /*
+ * Get the max PASID value that can be used by the function
+ */
+extern int ocxl_config_get_pasid_info(struct pci_dev *dev, int *count);
+
+ /*
+ * Tell an AFU, by writing in the configuration space, the PASIDs that
+ * it can use. Range starts at 'pasid_base' and its size is a multiple
+ * of 2
+ *
+ * 'afu_control_offset' is the offset of the AFU control DVSEC which
+ * can be found in the function configuration
+ */
+extern void ocxl_config_set_afu_pasid(struct pci_dev *dev,
+int afu_control_offset,
+int pasid_base, u32 pasid_count_log);
+
+ /*
+ * Get the actag configuration for the function:
+ * 'base' is the first actag value that can be used.
+ * 'enabled' it the number of actags available, starting from base.
+ * 'supported' is the total number of actags desired by all the AFUs
+ * of the function.
+ */
+extern int oclx_config_get_actag_info(struct pci_dev *dev,
+u16 *base, u16 *enabled, u16 *supported);
+
+/*
+ * Tell a function, by writing in the configuration space, the actags
+ * it can use.
+ *
+ * 'func_offset' is the offset of the Function DVSEC that can found in
+ * the function configuration
+ */
+extern void oclx_config_set_actag(struct pci_dev *dev, int func_offset,
+u32 actag_base, u32 actag_count);
+
+/*
+ * Tell an AFU, by writing in the configuration space, the actags it
+ * can use.
+ *
+ * 'afu_control_offset' is the offset of the AFU control DVSEC for the
+ * desired AFU. It can be found in the AFU configuration
+ */
+extern void oclx_config_set_afu_actag(struct pci_dev *dev,
+int afu_control_offset,
+int actag_base, int actag_count);
+
+/*
+ * Enable/disable an AFU, by writing in the configuration space.
+ *
+ * 'afu_control_offset' is the offset of the AFU control DVSEC for the
+ * desired AFU. It can be found in the AFU configuration
+ */
+extern void oclx_config_set_afu_state(struct pci_dev *dev,
+int afu_control_offset, int enable);
+
+/*
+ * Set the Transaction Layer configuration in the configuration space.
+ * Only needed for function 0.
+ *
+ * It queries the host TL capabilities, find some common ground
+ * between the host and device, and set the Transaction Layer on both
+ * accordingly.
+ */
+extern int oclx_config_set_TL(struct pci_dev *dev, int tl_dvsec);
+
+/*
+ * Request an AFU to terminate a PASID.
+ * Will return once the AFU has acked the request, or an error in case
+ * The hardware can only terminate one PASID at a time, so caller must
+ * guarantee some kind of serialization.
+ *
+ * 'afu_control_offset' is the offset of the AFU control DVSEC for the
+ * desired AFU. It can be found in the AFU configuration
+ */
+extern int ocxl_config_terminate_pasid(struct pci_dev *dev,
+int afu_control_offset, int pasid);
+
+ Set up the opencapi link for the function.
+ *
+ * When called for the first time for a link, it sets up the Shared
+ * Process Area for the link and the interrupt handler to process
+ * translation faults.
+ *
+ * Returns a 'link handle' that should be used for further calls for
+ * the link
+ */
+extern int ocxl_link_setup(struct pci_dev *dev, int PE_mask,
+void **link_handle);
+
+ Remove the association between the function and its link.
+ */
+extern void ocxl_link_release(struct pci_dev *dev, void *link_handle);
+
+ Add a Process Element to the Shared Process Area for a link.
+ * The process is defined by its PASID, pid, tid and its mm_struct.
+ *
+ * 'xsl_err_cb' is an optional callback if the driver wants to be
+ * notified when the translation fault interrupt handler detects an
+ * address error.
+ * 'xsl_err_data' is an argument passed to the above callback, if
+ * defined
+ */
+extern int ocxl_link_add_pe(void *link_handle, int pasid, u32 pidr, u32 tidr,
+u64 amr, struct mm_struct *mm,
+void (*xsl_err_cb)(void *data, u64 addr, u64 dsisr),
+void *xsl_err_data);
+
+ Update values within a Process Element
+ *
+ * link_handle: the link handle associated with the process element
+ * pasid: the PASID for the AFU context
+ * tid: the new thread id for the process element
+ */
+extern int ocxl_link_update_pe(void *link_handle, int pasid, __u16 tid);
+
+/*
+ * Remove a Process Element from the Shared Process Area for a link
+ */
+extern int ocxl_link_remove_pe(void *link_handle, int pasid);
+
+/*
+ * Allocate an AFU interrupt associated to the link.
+ *
+ * 'hw_irq' is the hardware interrupt number
+ * 'obj_handle' is the 64-bit object handle to be passed to the AFU to
+ * trigger the interrupt.
+ * On P9, 'obj_handle' is an address, which, if written, triggers the
+ * interrupt. It is an MMIO address which needs to be remapped (one
+ * page).
+ */
+extern int ocxl_link_irq_alloc(void *link_handle, int *hw_irq,
+u64 *obj_handle);
+
+/*
+ * Free a previously allocated AFU interrupt
+ */
+extern void ocxl_link_free_irq(void *link_handle, int hw_irq);
+ +#endif /* _MISC_OCXL_H_ */

--- linux-4.15.0.orig/include/net/act_api.h
+++ linux-4.15.0/include/net/act_api.h
@@ -14,6 +14,7 @@
 struct tcf_idrinfo {
     spinlock_t lock;
     struct idr action_idr;
+	struct net *net;
 }; struct tc_action_ops;
@@ -68,7 +69,8 @@
 {dtm->install = jiffies_to_clock_t(jiffies - stm->install);
 dtm->lastuse = jiffies_to_clock_t(jiffies - stm->lastuse);
 -dtm->firstuse = jiffies_to_clock_t(jiffies - stm->firstuse);
+dtm->firstuse = stm->firstuse ?
+    jiffies_to_clock_t(jiffies - stm->firstuse) : 0;
 dtm->expires = jiffies_to_clock_t(stm->expires);
 }

...
static inline
-int tc_action_net_init(struct tc_action_net *tn,
+int tc_action_net_init(struct net *net, struct tc_action_net *tn,
     const struct tc_action_ops *ops)
{
    int err = 0;
    if (!tn->idrinfo)
        return -ENOMEM;
    tn->ops = ops;
    tn->idrinfo->net = net;
    spin_lock_init(&tn->idrinfo->lock);
    idr_init(&tn->idrinfo->action_idr);
    return err;

--- linux-4.15.0.orig/include/net/addrconf.h
+++ linux-4.15.0/include/net/addrconf.h
@@ -221,8 +221,10 @@
     const struct in6_addr *addr);
 int (*ipv6_sock_mc_drop)(struct sock *sk, int ifindex,
                        const struct in6_addr *addr);
-int (*ipv6_dst_lookup)(struct net *net, struct sock *sk,
-int (*ipv6_dst_lookup_flow)(struct net *net, const struct dst_entry **dst, struct flowi6 *fl6);
+struct dst_entry *(*ipv6_dst_lookup_flow)(struct net *net,
+     const struct sock *sk,
+     struct flowi6 *fl6,
     const struct in6_addr *final_dst);
     void (*udpv6_encap_enable)(void);
     void (*ndisc_send_na)(struct net_device *dev, const struct in6_addr *daddr,
                         const struct in6_addr *solicited_addr,
@@ -266,6 +268,7 @@
     const struct in6_addr *addr);
 int ipv6_sock_ac_drop(struct sock *sk, int ifindex,
                        const struct in6_addr *addr);
+void __ipv6_sock_ac_close(struct sock *sk);
 void ipv6_sock_ac_close(struct sock *sk);

 int __ipv6_dev_ac_inc(struct inet6_dev *idev, const struct in6_addr *addr);
--- linux-4.15.0.orig/include/net/af_unix.h
+++ linux-4.15.0/include/net/af_unix.h
@@ -10,6 +10,7 @@
     void unix_destruct_scm(struct sk_buff *skb);
void unix_gc(void);
void wait_for_unix_gc(void);
struct sock *unix_get_socket(struct file *filp);
--- linux-4.15.0.orig/include/net/af_vsock.h
+++ linux-4.15.0/include/net/af_vsock.h
@@ -64,7 +64,8 @@
    struct list_head pending_links;
    struct list_head accept_queue;
    bool rejected;
-      struct delayed_work dwork;
+      struct delayed_work connect_work;
+      struct delayed_work pending_work;
    struct delayed_work close_work;
    bool close_work_scheduled;
    u32 peer_shutdown;
@@ -77,7 +78,6 @@
    s64 vsock_stream_has_data(struct vsock_sock *vsk);
    s64 vsock_stream_has_space(struct vsock_sock *vsk);
    -void vsock_pending_work(struct work_struct *work);
    struct sock *__vsock_create(struct net *net,
       struct socket *sock,
       struct sock *parent,
--- linux-4.15.0.orig/include/net/arp.h
+++ linux-4.15.0/include/net/arp.h
@@ -18,6 +18,7 @@
     return val * hash_rnd[0];
 }

+ifdef CONFIG_INET
 static inline struct neighbour *__ipv4_neigh_lookup_noref(struct net_device *dev, u32 key)
{
  if (dev->flags & (IFF_LOOPBACK | IFF_POINTOPOINT))
@@ -25,6 +26,13 @@
     return __neigh_lookup_noref(&arp_tbl, neigh_key_eq32, arp_hashfn, &key, dev);
 }
+} else
+static inline
+struct neighbour *__ipv4_neigh_lookup_noref(struct net_device *dev, u32 key)
+{ }
+return NULL;
+
+endif

static inline struct neighbour *__ipv4_neigh_lookup(struct net_device *dev, u32 key)
{ --- linux-4.15.0.orig/include/net/ax25.h
void __ax25_put_route(ax25_route *ax25_rt);

+extern rwlock_t ax25_route_lock;
+
+static inline void ax25_route_lock_use(void)
+{
+    read_lock(&ax25_route_lock);
+}
+
+static inline void ax25_route_lock_unuse(void)
+{
+    read_unlock(&ax25_route_lock);
+}
+
+static inline void ax25_put_route(ax25_route *ax25_rt)
+{
    if (refcount_dec_and_test(&ax25_rt->refcount))
    }

int bt_sock_wait_state(struct sock *sk, int state, unsigned long timeo);
int bt_sock_wait_ready(struct sock *sk, unsigned long flags);

void bt_accept_enqueue(struct sock *parent, struct sock *sk, bool bh);

void bt_accept_dequeue(struct sock *parent, struct socket *newsock);

--- linux-4.15.0.orig/include/net/bluetooth/hci.h
+++ linux-4.15.0/include/net/bluetooth/hci.h
@@ -260,6 +260,7 @@
    HCI_VENDOR_DIAG,
    HCI_FORCE_BREDR_SMP,
    HCI_FORCE_STATIC_ADDR,
+    HCI_CMD_PENDING,

--- linux-4.15.0.orig/include/net/bluetooth/hci_core.h
+++ linux-4.15.0/include/net/bluetooth/hci_core.h
@@ -178,6 +178,9 @@
# define HCI_MAX_SHORT_NAME_LENGTH 10

+/* Min encryption key size to match with SMP */
+#define HCI_MIN_ENC_KEY_SIZE		7
/* Default LE RPA expiry time, 15 minutes */ #define HCI_DEFAULT_RPA_TIMEOUT		(15 * 60)

__u16		le_max_tx_time;
__u16		le_max_rx_len;
__u16		le_max_rx_time;
+__u8le_max_key_size;
+__u8le_min_key_size;
__u16		discov_interleaved_timeout;
__u16	conn_info_min_age;
__u16	conn_info_max_age;
@@ -253,6 +256,8 @@
__u16		state;
+bool		amp;
};

struct hci_conn_params {
@@ -895,7 +901,7 @@
v16 conn_timeout);
struct hci_conn *hci_connect_le(struct hci_dev *hdev, bdaddr_t *dst,
 u8 dst_type, u8 sec_level, u16 conn_timeout,
-"role);
+"role, bdaddr_t *direct_rpa);
struct hci_conn *hci_connect_acl(struct hci_dev *hdev, bdaddr_t *dst,
 u8 sec_level, u8 auth_type);
struct hci_conn *hci_connect_sco(struct hci_dev *hdev, int type, bdaddr_t *dst,
@@ -1026,6 +1032,7 @@
void hci_free_dev(struct hci_dev *hdev);
int hci_register_dev(struct hci_dev *hdev);
void hci_unregister_dev(struct hci_dev *hdev);
+void hci_cleanup_dev(struct hci_dev *hdev);
int hci_suspend_dev(struct hci_dev *hdev);
int hci_resume_dev(struct hci_dev *hdev);
@@ -1249,16 +1256,34 @@
conn->security_cfm_cb(conn, status);
}

-#static inline void hci_encrypt_cfm(struct hci_conn *conn, __u8 status,
-__u8 encrypt)
+static inline void hci_encrypt_cfm(struct hci_conn *conn, __u8 status)
+{ struct hci_c8 *cb;

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+__u8 encrypt;

-if (conn->sec_level == BT_SECURITY_SDP)
-conn->sec_level = BT_SECURITY_LOW;
+if (conn->state == BT_CONFIG) {
+if (!status)
+conn->state = BT_CONNECTED;

-if (conn->pending_sec_level > conn->sec_level)
-conn->sec_level = conn->pending_sec_level;
+hci_connect_cfm(conn, status);
+hci_conn_drop(conn);
+return;
+}
+
+if (!test_bit(HCI_CONN_ENCRYPT, &conn->flags))
+encrypt = 0x00;
+else if (test_bit(HCI_CONN_AES_CCM, &conn->flags))
+encrypt = 0x02;
+else
+encrypt = 0x01;
+
+if (!status) {
+if (conn->sec_level == BT_SECURITY_SDP)
+conn->sec_level = BT_SECURITY_LOW;
+
+if (conn->pending_sec_level > conn->sec_level)
+conn->sec_level = conn->pending_sec_level;
+}

mutex_lock(&hci_cb_list_lock);
list_for_each_entry(cb, &hci_cb_list, list) {
--- linux-4.15.0.orig/include/net/bluetooth/l2cap.h
+++ linux-4.15.0/include/net/bluetooth/l2cap.h
@@ -619,6 +619,8 @@
struct sk_buff		*(*alloc_skb) (struct l2cap_chan *chan,
 unsigned long hdr_len,
 unsigned long len, int nb);
+int			(*filter) (struct l2cap_chan * chan,
+ struct sk_buff *skb);
};

struct l2cap_conn {
--- linux-4.15.0.orig/include/net/bonding.h
+++ linux-4.15.0/include/net/bonding.h
@@ -139,12 +139,6 @@
 int mode;
};
-struct netdev_notify_work {
-struct delayed_workwork;
-struct net_device*dev;
-struct netdev_bonding_info bonding_info;
-};
-

struct slave {
struct net_device *dev; /* first - useful for panic debug */
struct bonding *bond; /* our master */
@@ -155,7 +149,6 @@
unsigned long target_last_arp_rx[BOND_MAX_ARP_TARGETS];
s8   link;/* one of BOND_LINK_XXXX */
s8   link_new_state;/* one of BOND_LINK_XXXX */
-s8   new_link;
u8     backup:1, /* indicates backup slave. Value corresponds with
        BOND_STATE_ACTIVE and BOND_STATE_BACKUP */
inactive:1, /* indicates inactive slave */
@@ -172,10 +165,16 @@
#ifdef CONFIG_NET_POLL_CONTROLLER
struct netpoll *np;
#endif
+struct delayed_work notify_work;
struct kobject kobj;
struct rtnl_link_stats64 slave_stats;
};

+static inline struct slave *to_slave(struct kobject *kobj)
+{
+    return container_of(kobj, struct slave, kobj);
+}
+
struct bond_up_slave {
unsigned intcount;
struct rcu_head rcu;
@@ -198,6 +197,7 @@
struct   slave __rcu *primary_slave;
struct   bond_up_slave __rcu *slave_arr; /* Array of usable slaves */
bool   force_primary;
+u32    nest_level;
s32    slave_cnt; /* never change this value outside the attach/detach wrappers */
int    (*recv_probe)(const struct sk_buff *, struct bonding *,
                        struct slave *);
@@ -523,7 +523,7 @@
bond_commit_link_state(struct slave *slave, bool notify)
{
    -if (slave->link == slave->link_new_state)
+if (slave->link_new_state == BOND_LINK_NOCHANGE)
    return;

slave->link = slave->link_new_state;
@@ -718,6 +718,9 @@
/* exported from bond_netlink.c */
extern struct rtnl_link_ops bond_link_ops;

+/* exported from bond_sysfs_slave.c */
+extern const struct sysfs_ops slave_sysfs_ops;
+
static inline void bond_tx_drop(struct net_device *dev, struct sk_buff *skb)
{
    atomic_long_inc(&dev->tx_dropped);
--- linux-4.15.0.orig/include/net/busy_poll.h
+++ linux-4.15.0/include/net/busy_poll.h
@@ -48,7 +48,7 @@
static inline bool sk_can_busy_loop(const struct sock *sk)
{
    -return sk->sk_ll_usec && !signal_pending(current);
+return READ_ONCE(sk->sk_ll_usec) && !signal_pending(current);
}

bool sk_busy_loop_end(void *p, unsigned long start_time);
@@ -134,7 +134,7 @@
static inline void sk_mark_napi_id(struct sock *sk, const struct sk_buff *skb)
{
#ifdef CONFIG_NET_RX_BUSY_POLL
    -sk->sk_napi_id = skb->napi_id;
+WRITE_ONCE(sk->sk_napi_id, skb->napi_id);
#endif
}

@@ -143,8 +143,8 @@
const struct sk_buff *skb)
{
#ifdef CONFIG_NET_RX_BUSY_POLL
    -if (!sk->sk_napi_id)
-    sk->sk_napi_id = skb->napi_id;
+if (!READ_ONCE(sk->sk_napi_id))
+    WRITE_ONCE(sk->sk_napi_id, skb->napi_id);
#endif
}

--- linux-4.15.0.orig/include/net/caif/caif_dev.h
+++ linux-4.15.0/include/net/caif/caif_dev.h
@@ -119,7 +119,7 @@
* The link_support layer is used to add any Link Layer specific
* framing.
*/

```c
// linux-4.15.0.orig/include/net/caif/cfcnfg.h
+++ linux-4.15.0/include/net/caif/cfcnfg.h
@@ -62,7 +62,7 @@
 * @fcs:	Specify if checksum is used in CAIF Framing Layer.
 * @head_room:Head space needed by link specific protocol.
 */
-void
+int
  cfcnfg_add_phy_layer(struct cfcnfg *cnfg,
  struct net_device *dev, struct cflayer *phy_layer,
  enum cfcnfg_phy_preference pref,
--- linux-4.15.0.orig/include/net/caif/cfpkt.h
+++ linux-4.15.0/include/net/caif/cfpkt.h
@@ -32,6 +32,33 @@
 */
 int cfpkt_extr_head(struct cfpkt *pkt, void *data, u16 len);

+static inline u8 cfpkt_extr_head_u8(struct cfpkt *pkt)
+{
+  u8 tmp;
+  +
+  +
+  +
+  return tmp;
+}
+
+static inline u16 cfpkt_extr_head_u16(struct cfpkt *pkt)
+{
+  __le16 tmp;
+  +
+  +
+  +
+  return le16_to_cpu(tmp);
+}
+
+static inline u32 cfpkt_extr_head_u32(struct cfpkt *pkt)
+{
+  __le32 tmp;
+  +
+  +
+  +
```

+return le32_to_cpu(tmp);
+
*/

/* Peek header from packet. */
* Reads data from packet without changing packet.
--- linux-4.15.0.orig/include/net/caif/cfserl.h
+++ linux-4.15.0/include/net/caif/cfserl.h
@@ -9,4 +9,5 @@
#include <net/caif/caif_layer.h>

struct cflayer *cfserl_create(int instance, bool use_stx);
+void cfserl_release(struct cflayer *layer);
#endif
--- linux-4.15.0.orig/include/net/cfg80211.h
+++ linux-4.15.0/include/net/cfg80211.h
@@ -2843,6 +2843,9 @@
*
@end_radar_detection: Start radar detection in the driver.
*
+ @end_cac: End running CAC, probably because a related CAC
+ * was finished on another phy.
+ *
+ * @update_ft_ies: Provide updated Fast BSS Transition information to the
* driver. If the SME is in the driver/firmware, this information can be
* used in building Authentication and Reassociation Request frames.
@@ -3148,6 +3151,8 @@
struct net_device *dev,
 struct cfg80211_chan_def *chandef,
 u32 cac_time_ms);
+void(*end_cac)(struct wiphy *wiphy,
+ struct net_device *dev);
int(*update_ft_ies)(struct wiphy *wiphy, struct net_device *dev,
 struct cfg80211_update_ft_ies_params *ftie);
int(*crit_proto_start)(struct wiphy *wiphy,
@@ -3220,7 +3225,8 @@
* on wiphy_new(), but can be changed by the driver if it has a good
* reason to override the default
* @WIPHY_FLAG_4ADDR_AP: supports 4addr mode even on AP (with a single station
+ * on a VLAN interface)
+ * on a VLAN interface). This flag also serves an extra purpose of
+ * supporting 4ADDR AP mode on devices which do not support AP/VLAN iftype.
* @WIPHY_FLAG_4ADDR_STATION: supports 4addr mode even as a station
* @WIPHY_FLAG_CONTROL_PORT_PROTOCOL: This device supports setting the
* control port protocol ethertype. The device also honours the
@@ -4332,7 +4338,8 @@
* Return: 0 on success. Non-zero on error.
int ieee80211_data_to_8023_exthdr(struct sk_buff *skb, struct ethhdr *ehdr,
   const u8 *addr, enum nl80211_iftype iftype);
+	const u8 *addr, enum nl80211_iftype iftype,
   bool is_amsdu);

int ieee80211_data_to_8023(struct sk_buff *skb, const u8 *addr, enum nl80211_iftype iftype)
{    return ieee80211_data_to_8023_exthdr(skb, NULL, addr, iftype);
+
return ieee80211_data_to_8023_exthdr(skb, NULL, addr, iftype, false);
}

void cfg80211_send_layer2_update(struct net_device *dev, const u8 *addr);
+
void cfg80211_get_drvinfo(struct net_device *dev, struct ethtool_drvinfo *info);

+ void cfg80211_iftype_allowed - check whether the interface can be allowed
+ @wiphy: the wiphy
+ @iftype: interface type
+ @is_4addr: use_4addr flag, must be '0' when check_swif is '1'
+ @check_swif: check iftype against software interfaces
+ Check whether the interface is allowed to operate; additionally, this API
+ can be used to check iftype against the software interfaces when
+ * check_swif is '1'.
+ */
+bool cfg80211_iftype_allowed(struct wiphy *wiphy, enum nl80211_iftype iftype,
+    bool is_4addr, u8 check_swif);
+
+ /* Logging, debugging and troubleshooting/diagnostic helpers. */
+
+ /* wiphy_printk helpers, similar to dev_printk */
--- linux-4.15.0.orig/include/net/dsa.h
+++ linux-4.15.0/include/net/dsa.h
@@ -192,6 +192,7 @@
    unsigned int\t\tindex;
    const char\t\t*name;
    const struct dsa_port*cpu_dp;
+    const char\t\t*mac;
    struct device_node*dn;
    unsigned int\t\tageing_time;
    u8\t\t\tstp_state;
--- linux-4.15.0.orig/include/net/dst.h
+++ linux-4.15.0/include/net/dst.h
@@ -110,7 +110,7 @@
    struct dst_metrics {
        u32\t\tmetrics[RTAX_MAX];
        refcount_trefcnt;
-}:
+\} __aligned(4):
*/ Low pointer bits contain DST_METRICS_FLAGS */
extern const struct dst_metrics dst_default_metrics;

u32 *dst_cow_metrics_generic(struct dst_entry *dst, unsigned long old);
@@ -330,8 +330,9 @@
    skb_dst_force(struct sk_buff *skb)
-        @ @ .330,8 +330,9 @@
+        @ @ .330,8 +330,9 @@
    * @ skb: buffer
    *
    * If dst is not yet refcounted and not destroyed, grab a ref on it.
    + * Returns true if dst is refcounted.
    */
-        static inline void skb_dst_force(struct sk_buff *skb)
+        static inline bool skb_dst_force(struct sk_buff *skb)
            |
if (skb_dst_is_noref(skb)) {
    struct dst_entry \*dst = skb_dst(skb);
    @ @ .342,6 +343,8 @@

    skb->_skb_refdst = (unsigned long)dst;
    }
    +
    +return skb->_skb_refdst != 0UL;
}
static inline struct neighbour *dst_neigh_lookup_skb(const struct dst_entry *dst, struct sk_buff *skb)
{
    struct neighbour *n = dst->ops->neigh_lookup(dst, skb, NULL);
    /* The packets from tunnel devices (eg bareudp) may have only
     * metadata in the dst pointer of skb. Hence a pointer check of
     * neigh_lookup is needed.
     */
    if (dst->ops->neigh_lookup)
        n = dst->ops->neigh_lookup(dst, skb, NULL);
    return IS_ERR(n) ? NULL : n;
}

struct dst_entry *dst = skb_dst(skb);
if (dst && dst->ops->update_pmtu)
    dst->ops->update_pmtu(dst, NULL, skb, mtu);
/* update dst pmtu but not do neighbor confirm */
static inline void skb_dst_update_pmtu_no_confirm(struct sk_buff *skb, u32 mtu)
{
    struct dst_entry *dst = skb_dst(skb);
    if (dst && dst->ops->update_pmtu)
        dst->ops->update_pmtu(dst, NULL, skb, mtu, false);
return NULL;
--- linux-4.15.0.orig/include/net/dst_ops.h
+++ linux-4.15.0/include/net/dst_ops.h
@@ -27,7 +27,8 @@
 struct dst_entry *(*negative_advice)(struct dst_entry *);
 void(*link_failure)(struct sk_buff *);
 void(*update_pmtu)(struct dst_entry *dst, struct sock *sk,
- struct sk_buff *skb, u32 mtu);
+ struct sk_buff *skb, u32 mtu,
+ bool confirm_neigh);
 void(*redirect)(struct dst_entry *dst, struct sock *sk,
- struct sk_buff *skb);
+ int(*local_out)(struct net *net, struct sock *sk, struct sk_buff *skb);
--- linux-4.15.0.orig/include/net/fib_rules.h
+++ linux-4.15.0/include/net/fib_rules.h
@@ -102,6 +102,7 @@
 [FRA_OIFNAME] = { .type = NLA_STRING, .len = IFNAMSIZ - 1 }, \
 [FRA_PRIORITY] = { .type = NLA_U32 }, \
 [FRA_FWMARK] = { .type = NLA_U32 }, \
+[FRA_TUN_ID] = { .type = NLA_U64 }, \
 [FRA_FWMASK] = { .type = NLA_U32 }, \
 [FRA_TABLE] = { .type = NLA_U32 }, \
 [FRA.Suppress_prefixlen] = { .type = NLA_U32 }, \
--- linux-4.15.0.orig/include/net/flow_dissector.h
+++ linux-4.15.0/include/net/flow_dissector.h
@@ -4,6 +4,8 @@
 
 #include <linux/types.h>
 #include <linux/in6.h>
+#include <linux/siphash.h>
+#include <linux/string.h>
 #include <uapi/linux/if_ether.h>

 /**
 @@ -229,7 +231,7 @@
 struct flow_keys {
 struct flow_dissector_key_control control;
 #define FLOW_KEYS_HASH_START_FIELD basic
-struct flow_dissector_key_basic basic;
+struct flow_dissector_key_basic basic __aligned(SIPHASH_ALIGNMENT);
 struct flow_dissector_key_tags tags;
 struct flow_dissector_key_vlan vlan;
 struct flow_dissector_key_keyid keyid;
@@ -283,4 +285,12 @@
 return ((char *)target_container) + flow_dissector->offset[key_id];
 }
+static inline void
+flow_dissector_init_keys(struct flow_dissector_key_control *key_control,
+ struct flow_dissector_key_basic *key_basic)
+{
+memset(key_control, 0, sizeof(*key_control));
+memset(key_basic, 0, sizeof(*key_basic));
+
+
#endif
--- linux-4.15.0.orig/include/net/fq.h
+++ linux-4.15.0/include/net/fq.h
@@ -70,7 +70,7 @@
struct list_head backlogs;
 spinlock_t lock;
 u32 flows_cnt;
-u32 perturbation;
+siphash_key_t perturbation;
 u32 limit;
 u32 memory_limit;
--- linux-4.15.0.orig/include/net/fq_impl.h
+++ linux-4.15.0/include/net/fq_impl.h
@@ -118,7 +118,7 @@
 lockdep_assert_held(&fq->lock);

-hash = skb_get_hash_perturb(skb, fq->perturbation);
+hash = skb_get_hash_perturb(skb, &fq->perturbation);
 idx = reciprocal_scale(hash, fq->flows_cnt);
 flow = &fq->flows[idx];
@@ -307,7 +307,7 @@
 INIT_LIST_HEAD(&fq->backlogs);
 spin_lock_init(&fq->lock);
 fq->flows_cnt = max_t(u32, flows_cnt, 1);
-fq->perturbation = prandom_u32();
-fq->quantum = 300;
-fq->limit = 8192;
-fq->memory_limit = 16 << 20; /* 16 MBytes */
--- linux-4.15.0.orig/include/net/genetlink.h
+++ linux-4.15.0/include/net/genetlink.h
@@ -34,12 +34,6 @@
 * do additional, common, filtering and return an error
 * @post_doit: called after an operation's doit callback, it may
 * undo operations done by pre_doit, for example release locks
- * @mcast_bind: a socket bound to the given multicast group (which
- * is given as the offset into the groups array)
void(*post_doit)(const struct genl_ops *ops,
   struct sk_buff *skb,
   struct genl_info *info);

-void(*mcast_bind)(struct net *net, int group);
-void(*mcast_unbind)(struct net *net, int group);
struct nlattr **attrbuf;/* private */
const struct genl_ops *ops;
const struct genl_multicast_group *mcgrps;

#include <netinet/icmp.h>

struct icmp_err {
   __be32 errno;
   struct sk_buff *skb;
   struct net;

   -void icmp_send(struct sk_buff *skb_in, int type, int code, __be32 info);
   +void __icmp_send(struct sk_buff *skb_in, int type, int code, __be32 info,
      const struct ip_options *opt);
   +static inline void icmp_send(struct sk_buff *skb_in, int type, int code, __be32 info)
      {
      +__icmp_send(skb_in, type, code, info, &IPCB(skb_in)->opt);
      +}
   +
   +#if IS_ENABLED(CONFIG_NF_NAT)
   +void icmpndo_send(struct sk_buff *skb_in, int type, int code, __be32 info);
   +#else
   +static inline void icmpndo_send(struct sk_buff *skb_in, int type, int code, __be32 info)
      {
      +struct ip_options opts = { 0 };
      +__icmp_send(skb_in, type, code, info, &opts);
      +}
   +#endif
   +
int icmp_rcv(struct sk_buff *skb);
void icmp_err(struct sk_buff *skb, u32 info);
int icmp_init(void);
--- linux-4.15.0.orig/include/ife.h
+++ linux-4.15.0/include/ife.h
@@ -12,7 +12,8 @@
 void *ife_encode(struct sk_buff *skb, u16 metalen);
 void *ife_decode(struct sk_buff *skb, u16 *metalen);
-void *ife_tlv_meta_decode(void *skbdata, u16 *attrtype, u16 *dlen, u16 *totlen);
+void *ife_tlv_meta_decode(void *skbdata, const void *ifehdr_end, u16 *attrtype,
+ u16 *dlen, u16 *totlen);
int ife_tlv_meta_encode(void *skbdata, u16 attrtype, u16 dlen,
 const void *dval);
--- linux-4.15.0.orig/include/inet_connection_sock.h
+++ linux-4.15.0/include/inet_connection_sock.h
@@ -136,8 +136,8 @@
};

#define ICSK_CA_PRIV_SIZE (13 * sizeof(u64))

@endif /* _INET_CONNECTION_SOCK_H */
--- linux-4.15.0.orig/include/inet_ecn.h
+++ linux-4.15.0/include/inet_ecn.h
@@ -4,6 +4,7 @@
 #include <net/inet_sock.h>
 #include <net/dsfield.h>
--- linux-4.15.0.orig/include/net/inet_frag.h
+++ linux-4.15.0/include/net/inet_frag.h
@@ -2,14 +2,20 @@
 #ifndef __NET_FRAG_H__
 #define __NET_FRAG_H__

+#include <linux/rhashtable.h>
+
+struct netns_frags {
+    /* Keep atomic mem on separate cachelines in structs that include it */
+    atomic_t ____cacheline_aligned_in_smp;
+    /* sysctls */
+    long high_thresh;
+    long low_thresh;
+    int timeout;
+    int max_dist;
+    struct inet_frags *f;
+    +
+    struct rhashtable ____cacheline_aligned_in_smp;
+    +
+    /* Keep atomic mem on separate cachelines in structs that include it */
+    atomic_long_t ____cacheline_aligned_in_smp;
+    +
+    /* Keep atomic mem on separate cachelines in structs that include it */
+    atomic_long_tmem ____cacheline_aligned_in_smp;
+    +
+};
+
/**
@@ -25,130 +31,115 @@
 INET_FRAG_COMPLETE= BIT(2),
};

+struct frag_v4_compare_key {
+    __be32 saddr;
+    __be32 daddr;
+    u32 user;
+    u32 vif;
+    __be16 id;
+    u16 protocol;
+};
+
+struct frag_v6_compare_key {
+    struct in6_addr saddr;
+    struct in6_addr daddr;
+    u32 user;
+    u32 vif;
+    __be16 id;
+    u16 protocol;
+};
**

* struct inet_frag_queue - fragment queue
*
- * @lock: spinlock protecting the queue
+ * @node: rhash node
+ * @key: keys identifying this frag.
* @timer: queue expiration timer
- * @list: hash bucket list
+ * @lock: spinlock protecting this frag
* @refcnt: reference count of the queue
* @fragments: received fragments head
+ * @rb_fragments: received fragments rb-tree root
* @fragments_tail: received fragments tail
+ * @last_run_head: the head of the last "run". see ip_fragment.c
* @stamp: timestamp of the last received fragment
* @len: total length of the original datagram
* @meat: length of received fragments so far
* @flags: fragment queue flags
* @max_size: maximum received fragment size
* @net: namespace that this frag belongs to
- * @list_evictor: list of queues to forcefully evict (e.g. due to low memory)
+ * @rcu: rcu head for freeing deferall
*/

struct inet_frag_queue {
- spinlock_t lock;
+ struct rhash_head node;
+ union {
+ struct frag_v4_compare_key v4;
+ struct frag_v6_compare_key v6;
+ } key;

struct timer_list list_timer;
- struct hlist_node list_node;
+ spinlock_t lock;
refcount_t refcnt;
- struct sk_buff *fragments;
+ struct sk_buff *fragments; /* used in 6lopwpvpan IPv6. */
+ struct rb_root rb_fragments; /* Used in IPv4/IPv6. */
struct sk_buff *fragments_tail;
+ struct sk_buff *last_run_head;
ktime_t stamp;
int len;
int meat;
__u8 flags;
u16 max_size;
- struct netns_frags *net;
- struct hlist_node list_evictor;
-};
-
-#define INETFRAGS_HASHSZ 1024
-
-/* averaged:
- * max_depth = default ipfrag_high_thresh / INETFRAGS_HASHSZ /
- * rounded up (SKB_TRUELEN(0) + sizeof(struct ipq or
- * struct frag_queue))
- */
-#define INETFRAGS_MAXDEPTH 128
-
-struct inet_frag_bucket {
-struct hlist_head chain;
-spinlock_t	chain_lock;
+struct netns_frags *net;
+struct rcu_head rcu;
};

struct inet_frags {
-struct inet_frag_bucket hash[INETFRAGS_HASHSZ];
-
-struct work_struct frags_work;
-unsigned int next_bucket;
-unsigned long last_rebuild_jiffies;
-bool rebuild;
-
-/* The first call to hashfn is responsible to initialize
- * rnd. This is best done with net_get_random_once.
- */
-u32 rnd;
-seqlock_trnd_seqlock;
unsigned int qsize;

-unsigned int(*hashfn)(const struct inet_frag_queue *);
-bool(*match)(const struct inet_frag_queue *q,
- const void *arg);
void(*constructor)(struct inet_frag_queue *q,
- const void *arg);
void(*destructor)(struct inet_frag_queue *);
void(*frag_expire)(struct timer_list *);
struct kmem_cache*frags_cachep;
const char*frags_cache_name;
+struct rhashtable_params rhash_params;
};

int inet_frags_init(struct inet_frags *);
void inet_frags_fini(struct inet_frags *);
static inline void inet_frags_init_net(struct netns_frags *nf)
{
    atomic_set(&nf->mem, 0);
    atomic_long_set(&nf->mem, 0);
    return rhashtable_init(&nf->rhashtable, &nf->f->rhash_params);
}

void inet_frags_exit_net(struct netns_frags *nf, struct inet_frags *f);
void inet_frags_exit_net(struct netns_frags *nf);

void inet_frag_kill(struct inet_frag_queue *q, struct inet_frags *f);
void inet_frag_destroy(struct inet_frag_queue *q, struct inet_frags *f);
struct inet_frag_queue *inet_frag_find(struct netns_frags *nf, void *key, unsigned int hash);
void inet_frag_kill(struct inet_frag_queue *q);
void inet_frag_destroy(struct inet_frag_queue *q);
struct inet_frag_queue *inet_frag_find(struct netns_frags *nf, void *key);

void inet_frag_maybe_warn_overflow(struct inet_frag_queue *q, const char *prefix);
/* Free all skbs in the queue; return the sum of their truesizes. */
unsigned int inet_frag_rbtree_purge(struct rb_root *root);

static inline void inet_frag_put(struct inet_frag_queue *q, struct inet_frags *f)
{
    if (refcount_dec_and_test(&q->refcnt))
        inet_frag_destroy(q, f);
}

static inline bool inet_frag_evicting(struct inet_frag_queue *q)
{
    return !hlist_unhashed(&q->list_evictor);
    inet_frag_destroy(q);
}

/* Memory Tracking Functions. */

static inline int frag_mem_limit(struct netns_frags *nf)
{
    return atomic_read(&nf->mem);
}

static inline void sub_frag_mem_limit(struct netns_frags *nf, int i)
{
    atomic_sub(i, &nf->mem);
}
return atomic_long_read(&nf->mem);
}

static inline void add_frag_mem_limit(struct netns_frags *nf, int i)
+static inline void sub_frag_mem_limit(struct netns_frags *nf, long val)
{
-atomic_add(i, &nf->mem);
+atomic_long_sub(val, &nf->mem);
}

static inline int sum_frag_mem_limit(struct netns_frags *nf)
+static inline void add_frag_mem_limit(struct netns_frags *nf, long val)
{
-return atomic_read(&nf->mem);
+atomic_long_add(val, &nf->mem);
}

/* RFC 3168 support : */
@@ -162,4 +153,16 @@
extern const u8 ip_frag_ecn_table[16];

+/* Return values of inet_frag_queue_insert() */
+#define IPFRAG_OK
+#define IPFRAG_DUP1
+#define IPFRAG_OVERLAP2
+int inet_frag_queue_insert(struct inet_frag_queue *q, struct sk_buff *skb,
+    int offset, int end);
+void *inet_frag_reasm_prepare(struct inet_frag_queue *q, struct sk_buff *skb,
+    struct sk_buff *parent);
+void inet_frag_reasm_finish(struct inet_frag_queue *q, struct sk_buff *head,
+    void *reasm_data);
+struct sk_buff *inet_frag_pull_head(struct inet_frag_queue *q);
+
+#endif
--- linux-4.15.0.orig/include/net/inet_hashtables.h
+++ linux-4.15.0/include/net/inet_hashtables.h
@@ -106,12 +106,18 @@
 struct hlist_head	chain;
 };

-/* Sockets can be hashed in established or listening table
+/* Sockets can be hashed in established or listening table.
+ * We must use different 'nulls' end-of-chain value for all hash buckets :
+ * A socket might transition from ESTABLISH to LISTEN state without
+ * RCU grace period. A lookup in ehash table needs to handle this case.
 */
```c
#define LISTENING_NULLS_BASE (1U << 29)
struct inet_listen_hashbucket {
    spinlock_t lock;
    struct hlist_head head;
    union {
        struct hlist_head head;
        struct hlist_nulls_head nulls_head;
    };
};

/* This is for listening sockets, thus all sockets which possess wildcards. */
--- linux-4.15.0.orig/include/net/inet_sock.h
+++ linux-4.15.0/include/net/inet_sock.h
@@ -130,12 +130,6 @@
     return sk->sk_bound_dev_if;
 }

- static inline struct ip_options_rcu *ireq_opt_deref(const struct inet_request_sock *ireq)
- {
-     return rcu_dereference_check(ireq->ireq_opt,
-         refcount_read(&ireq->req.rsk_refcnt) > 0);
- }
-
- struct inet_cork {
    unsigned int flags;
    __be32 addr;
    --- linux-4.15.0.orig/include/net/inet_timewait_sock.h
+++ linux-4.15.0/include/net/inet_timewait_sock.h
@@ -43,6 +43,7 @@
    #define tw_family __tw_common.skc_family
    #define tw_state __tw_common.skc_state
    #define tw_reuse __tw_common.skc_reuse
+    #define tw_reuseport __tw_common.skc_reuseport
    #define tw_ipv6only __tw_common.skc_ipv6only
    #define tw_bound_dev_if __tw_common.skc_bound_dev_if
    #define tw_node __tw_common.skc_nulls_node
-     --- linux-4.15.0.orig/include/net/inetpeer.h
+++ linux-4.15.0/include/net/inetpeer.h
@@ -39,6 +39,7 @@
    u32 metrics[RTAX_MAX];
    u32 rate_tokens; /* rate limiting for ICMP */
    +u32 n_redirects;
    unsigned long rate_last;
/
*/
/*
 * Once inet_peer is queued for deletion (refcnt == 0), following field
--- linux-4.15.0.orig/include/net/ip.h
+++ linux-4.15.0/include/net/ip.h
```

---
return --iph->ttl;
}

+static inline int ip_mtu_locked(const struct dst_entry *dst)
+{
+const struct rtable *rt = (const struct rtable *)dst;
+
+return rt->rt_mtu_locked || dst_metric_locked(dst, RTAX_MTU);
+}
+
+static inline
int ip_dont_fragment(const struct sock *sk, const struct dst_entry *dst)
{
@@ -333,7 +340,7 @@

return  pmtudisc == IP_PMTUDISC_DO ||
(pmtudisc == IP_PMTUDISC_WANT &&
 - !(dst_metric_locked(dst, RTAX_MTU)));
+ !ip_mtu_locked(dst));
}

static inline bool ip_sk_accept_pmtu(const struct sock *sk)
@@ -357,12 +364,18 @@
    bool forwarding)
{
    struct net *net = dev_net(dst->dev);
+unsigned int mtu;

    if (net->ipv4.sysctl_ip_fwd_use_pmtu ||
- dst_metric_locked(dst, RTAX_MTU)) ||
+ ip_mtu_locked(dst)) ||
    !forwarding)
return dst_mtu(dst);

+/* 'forwarding = true' case should always honour route mtu */
+mtu = dst_metric_raw(dst, RTAX_MTU);
+if (mtu)
+return mtu;
+
return min(READ_ONCE(dst->dev->mtu), IP_MAX_MTU);
}

@@ -563,7 +576,6 @@
return skb;
}
#endif
-int ip_frag_mem(struct net *net);
void ip_options_fragment(struct sk_buff *skb);
+int __ip_options_compile(struct net *net, struct ip_options *opt,
+    struct sk_buff *skb, __be32 *info);
int ip_options_compile(struct net *net, struct ip_options *opt,
    struct sk_buff *skb);
int ip_options_get(struct net *net, struct ip_options_rcu **optp,
    unsigned char __user *data, int optlen);
void ip_options_undo(struct ip_options *opt);
void ip_forward_options(struct sk_buff *skb);
-int ip_options_rcv_srr(struct sk_buff *skb);
+int ip_options_rcv_srr(struct sk_buff *skb, struct net_device *dev);

/*
* Functions provided by ip_sockglue.c
@@ -636,4 +650,9 @@
int ip_misc_proc_init(void);
#endif	/* _IP_H */
--- linux-4.15.0.orig/include/net/ip6_fib.h
+++ linux-4.15.0/include/net/ip6_fib.h
@@ -241,8 +241,7 @@
    u32 cookie = 0;
-if (rt->rt6i_flags & RTF_PCPU ||
-    (unlikely(!list_empty(&rt->rt6i_uncached)) && rt->dst.from))
+if (rt->dst.from)
    rt = (struct rt6_info *)(rt->dst.from);
rt6_get_cookie_safe(rt, &cookie);
--- linux-4.15.0.orig/include/net/ip6_route.h
+++ linux-4.15.0/include/net/ip6_route.h
@@ -170,6 +170,9 @@
void rt6_remove_prefsrc(struct inet6_ifaddr *ifp);
void rt6_clean_tohost(struct net *net, struct in6_addr *gateway);
+void rt6_uncached_list_add(struct rt6_info *rt);
+void rt6_uncached_list_del(struct rt6_info *rt);
+
static inline const struct rt6_info *skb_rt6_info(const struct sk_buff *skb)
{
    const struct dst_entry *dst = skb_dst(skb);
    @@ -212,13 +215,14 @@
    return rt->rt6i_flags & RTF_ANYCAST ||
    (rt->rt6i_dst.plen < 127 &&
    !((rt->rt6i_flags & (RTF_GATEWAY | RTF_NONEXTHOP)) &&
    ipv6_addr_equal(&rt->rt6i_dst.addr, daddr));
}

int ip6_fragment(struct net *net, struct sock *sk, struct sk_buff *skb,
int (*output)(struct net *, struct sock *, struct sk_buff *));

-static inline int ip6_skb_dst_mtu(struct sk_buff *skb)
+static inline unsigned int ip6_skb_dst_mtu(struct sk_buff *skb)
{
    struct ipv6_pinfo *np = skb->sk && !dev_recursion_level() ?
    inet6_sk(skb->sk) : NULL;
    @@ -239,8 +243,8 @@
        inet6_sk(sk)->pmtudisc == IPV6_PMTUDISC_OMIT;
}

-static inline struct in6_addr *rt6_nexthop(struct rt6_info *rt,
-    struct in6_addr *daddr)
+static inline const struct in6_addr *rt6_nexthop(const struct rt6_info *rt,
+    const struct in6_addr *daddr)
{
    if (rt->rt6i_flags & RTF_GATEWAY)
        return &rt->rt6i_gateway;
--- linux-4.15.0.orig/include/net/ip6_tunnel.h
+++ linux-4.15.0/include/net/ip6_tunnel.h
@@ -152,9 +152,12 @@
        memset(skb->cb, 0, sizeof(struct inet6_skb_parm));
        pkt_len = skb->len - skb_inner_network_offset(skb);
        err = ip6_local_out(dev_net(skb_dst(skb)->dev), sk, skb);
        @ -152.9 +152.12 @@
        -if (unlikely(net_xmit_eval(err)))
        -pkt_len = -1;
        -iptunnel_xmit_stats(dev, pkt_len);
+    if (dev) {
+        -if (unlikely(net_xmit_eval(err)))
+        +pkt_len = -1;
+        +iptunnel_xmit_stats(dev, pkt_len);
#ifndef Open Source Used In 5GaaS Edge AC-4

--- linux-4.15.0.orig/include/net/ip_fib.h
+++ linux-4.15.0/include/net/ip_fib.h
@@ @-59.6 +59.7 @@

int fnhe_genid;
__be32 fnhe_daddr;
u32 fnhe_pmtu;
bool fnhe_mtu_locked;
__be32 fnhe_gw;
unsigned long fnheExpires;
struct rtable __rcu*fnhe_rth_input;
@@ @-229.7 +230.7 @@
  struct netlink_ext_ack *extack);
int fib_table_dump(struct fib_table *table, struct sk_buff *skb,
  struct netlink_callback *cb);
-int fib_table_flush(struct net *net, struct fib_table *table);
+int fib_table_flush(struct net *net, struct fib_table *table, bool flush_all);
struct fib_table *fib_trie_unmerge(struct fib_table *main_tb);
void fib_table_flush_external(struct fib_table *table);
void fib_free_table(struct fib_table *tb);
@@ @-368.6 +369.7 @@
int fib_sync_down_dev(struct net_device *dev, unsigned long event, bool force);
int fib_sync_down_addr(struct net_device *dev, __be32 local);
int fib_sync_up(struct net_device *dev, unsigned int nh_flags);
+void fib_sync_mtu(struct net_device *dev, u32 orig_mtu);

#ifdef CONFIG_IP_ROUTE_MULTIPATH
int fib_multipath_hash(const struct fib_info *fi, const struct flowi4 *fl4,
--- linux-4.15.0.orig/include/net/ip_tunnels.h
+++ linux-4.15.0/include/net/ip_tunnels.h
@@ @-100.6 +100.28 @@
}

struct metadata_dst;
+/* A fan overlay /8 (250.0.0.0/8, for example) maps to exactly one /16
  + underlay (10.88.0.0/16, for example). Multiple local addresses within
  + the /16 may be used, but a particular overlay may not span
  + multiple underlay subnets.
  + *
  + We store one underlay, indexed by the overlay's high order octet.
  + */
+#define FAN_OVERLAY_CNT256
+
+ struct ip_fan_map {
  +__be32 underlay;
+__be32overlay;
+u16underlay_prefix;
+u16overlay_prefix;
+u32overlay_mask;
+struct list_headlist;
+struct rcu_headrcu;
+
+struct ip_tunnel_fan {
+struct list_headfan_maps;
+};

struct ip_tunnel {
struct ip_tunnel__rcu*next;
@@ -134,6 +156,7 @@
#endif
struct ip_tunnel_prl_entry__rcu *prl;/* potential router list */
unsigned intprl_count;/* # of entries in PRL */
+struct ip_tunnel_fanfan;
unsigned intip_tnl_net_id;
struct gro_cellsgro_cells;
__u32fwmark;
@@ -160,6 +183,11 @@
#define TUNNEL_OPTIONS_PRESENT \
(TUNNEL_GENEVE_OPT | TUNNEL_VXLAN_OPT | TUNNEL_ERSPAN_OPT)

+static inline int fan_has_map(const struct ip_tunnel_fan *fan)
+{
+return !list_empty(&fan->fan_maps);
+}
+
struct tnl_ptk_info {
__be16 flags;
__be16 proto;
@@ -305,6 +333,26 @@
int ip_tunnel_encap_setup(struct ip_tunnel *t,
    struct ip_tunnel_encap *ipencap);

+static inline bool pskb_inet_may_pull(struct sk_buff *skb)
+{
+int nhlen;
+
+switch(skb->protocol) {
+    +#if IS_ENABLED(CONFIG_IPV6)
+        case htons(ETH_P_IPV6):
+            nhlen = sizeof(struct ipv6hdr);
+            break;
+        +#endif
+    +}
case htons(ETH_P_IP):
    nhlen = sizeof(struct iphdr);
    break;
default:
    nhlen = 0;
}

return pskb_network_may_pull(skb, nhlen);

static inline int ip_encap_hlen(struct ip_tunnel_encap *e)
{
    const struct ip_tunnel_encap_ops *ops;

    struct ip_vs_sync_buff *sync_buff;
    unsigned long sync_queue_len;
    unsigned int sync_queue_delay;
    struct netns_ipvs *ipvs;

    struct ip_vs_sync_thread_data;

    /* How much time to keep dests in trash */
    #define IP_VS_DEST_TRASH_PERIOD (120 * HZ)

    struct delayed_work defense_work; /* Work handler */
    int drop_rate;
    int drop_counter;
    int old_secure_tcp;
    atomic_t dropentry;
    /* locks in ctl.c */
    spinlock_t dropentry_lock; /* drop entry handling */
    spinlock_t tsync_lock;
    struct ipvs_master_sync_state *ms;
    spinlock_t tsync_lock;
    struct task_struct **backup_threads;
    struct ip_vs_sync_thread_data *master_tinfo;
    struct ip_vs_sync_thread_data *backup_tinfo;
    int threads_mask;
    volatile int sync_state;
    struct mutex sync_mutex;

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-/* Really using conntrack? */
-static inline bool ip_vs_conn_uses_conntrack(struct ip_vs_conn *cp,
  struct sk_buff *skb)
+/* Using old conntrack that can not be redirected to another real server? */
+static inline bool ip_vs_conn_uses_old_conntrack(struct ip_vs_conn *cp,
  struct sk_buff *skb)
{
  #ifdef CONFIG_IP_VS_NFCT
    enum ip_contrack_info ctinfo;
    struct nf_conn *ct;
    
    if (!(cp->flags & IP_VS_CONN_F_NFCT))
      return false;
    ct = nf_ct_get(skb, &ctinfo);
    if (ct)
      return true;
  #endif
  return false;
}

--- linux-4.15.0.orig/include/net/ipv6.h
+++ linux-4.15.0/include/net/ipv6.h
@@ -353,14 +353,7 @@
 struct ipv6_txoptions *ipv6_renew_options(struct sock *sk,
     struct ipv6_txoptions *opt,
     int newtype,
-  struct ipv6_opt_hdr __user *newopt,
-  int newoptlen);
-struct ipv6_txoptions *
-ipv6_renew_options_kern(struct sock *sk,
-struct ipv6_txoptions *opt,
-struct ipv6_opt_hdr __user *newopt,
-int newoptlen);
-struct ipv6_txoptions *
-ipv6_renew_options_kern(struct sock *sk,
-struct ipv6_txoptions *opt,
-int newtype,
-struct ipv6_opt_hdr *newopt,
-int newoptlen);
+ struct ipv6_opt_hdr *newopt);
 struct ipv6_txoptions *ipv6_fixup_options(struct ipv6_txoptions *opt_space,
 struct ipv6_txoptions *opt);

@@ -378,15 +371,8 @@
     idev->cnf.accept_ra;
 }

-#if IS_ENABLED(CONFIG_IPV6)
-static inline int ip6_frag_mem(struct net *net) { return sum_frag_mem_limit(&net->ipv6.frags);
int __ipv6_addr_type(const struct in6_addr *addr);
}
#endif

-struct inet_frag_queue;
-
-enum ip6_defrag_users {
-IP6_DEFFRAG_LOCAL_DELIVER,
IP6_DEFFRAG_CONNTRACK_IN,
__IP6_DEFFRAG_CONNTRACK_IN= IP6_DEFFRAG_CONNTRACK_IN + USHRT_MAX,
IP6_DEFFRAG_CONNTRACK_OUT,
__IP6_DEFFRAG_CONNTRACK_OUT= IP6_DEFFRAG_CONNTRACK_OUT + USHRT_MAX,
IP6_DEFFRAG_CONNTRACK_BRIDGE_IN,
__IP6_DEFFRAG_CONNTRACK_BRIDGE_IN = IP6_DEFFRAG_CONNTRACK_BRIDGE_IN + USHRT_MAX,
-};
-
-struct ip6_create_arg {
-__be32 id;
-u32 user;
-const struct in6_addr *src;
-const struct in6_addr *dst;
-int iif;
-u8 ecn;
-};
-
-void ip6_frag_init(struct inet_frag_queue *q, const void *a);
-bool ip6_frag_match(const struct inet_frag_queue *q, const void *a);
-
-/*
- *Equivalent of ipv4 struct ip
- */
-struct frag_queue {
-struct inet_frag_queue;
-
-__be32id; /* fragment id*/
-u32user;
-struct in6_addrsaddr;
-struct in6_addrdaddr;
- int iif;
- unsigned int icsum;
  __u16 nhoffset;
- u8ecn;
- }
-
- void ip6_expire_frag_queue(struct net *net, struct frag_queue *fq,
  struct inet_frags *frags);
-
  static inline bool ipv6_addr_any(const struct in6_addr *a)
  {
    #if defined(CONFIG_HAVE_EFFICIENT_UNALIGNED_ACCESS) && BITS_PER_LONG == 64
    @@ -835,7 +777,7 @@
      * to minimize possibility that any useful information to an
      * attacker is leaked. Only lower 20 bits are relevant.
      */
      -rol32(hash, 16);
    +hash = rol32(hash, 16);

    flowlabel = (__force __be32)hash & IPV6_FLOWLABEL_MASK;

    @@ -901,6 +843,11 @@
    return htonl(tclass << IPV6_TCLASS_SHIFT) | flowlabel;
  }
+
  +static inline __be32 flowi6_get_flowlabel(const struct flowi6 *fl6)
  +{
    +return fl6->flowlabel & IPV6_FLOWLABEL_MASK;
    +}
    +
    /*
     * Prototypes exported by ipv6
     */
    @@ -955,7 +902,7 @@
    int ip6_dst_lookup(struct net *net, struct sock *sk, struct dst_entry **dst,
      struct flowi6 *fl6);
    -struct dst_entry *ip6_dst_lookup_flow(const struct sock *sk, struct flowi6 *fl6,
      struct dst_entry *ip6_dst_lookup_flow(struct net *net, const struct sock *sk, struct flowi6 *fl6,
      const struct in6_addr *final_dst);
    struct dst_entry *ip6_sk_dst_lookup_flow(struct sock *sk, struct flowi6 *fl6,
      const struct in6_addr *final_dst);
    --- linux-4.15.0.org/include/net/ipv6_frag.h
    +++ linux-4.15.0/include/net/ipv6_frag.h
    @@ -0,0 +1,110 @@
    /*# SPDX-License-Identifier: GPL-2.0 */
    +#ifndef _IPV6_FRAG_H

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```
#define _IPV6_FRAG_H
#include <linux/kernel.h>
#include <net/addrconf.h>
#include <net/ipv6.h>
#include <net/inet_frag.h>

enum ip6_defrag_users {
  IP6_DEFrag_LOCAL_DELIVER,
  IP6_DEFrag_CONNTRACK_IN,
  __IP6_DEFrag_CONNTRACK_IN = IP6_DEFrag_CONNTRACK_IN + USHRT_MAX,
  IP6_DEFrag_CONNTRACK_OUT,
  __IP6_DEFrag_CONNTRACK_OUT = IP6_DEFrag_CONNTRACK_OUT + USHRT_MAX,
  IP6_DEFrag_CONNTRACK_BRIDGE_IN,
  __IP6_DEFrag_CONNTRACK_BRIDGE_IN = IP6_DEFrag_CONNTRACK_BRIDGE_IN + USHRT_MAX,
};

/*
 * Equivalent of ipv4 struct ip
 */
struct frag_queue {
  struct inet_frag_queue q;
  int iif;
  __u16 nhoffset;
  u8 ecn;
};

#if IS_ENABLED(CONFIG_IPV6)
static inline void ip6frag_init(struct inet_frag_queue *q, const void *a)
{
  struct frag_queue *fq = container_of(q, struct frag_queue, q);
  const struct frag_v6_compare_key *key = a;
  q->key.v6 = *key;
  fq->ecn = 0;
}

static inline u32 ip6frag_key_hashfn(const void *data, u32 len, u32 seed)
{
  return jhash2(data,
      sizeof(struct frag_v6_compare_key) / sizeof(u32), seed);
}

static inline u32 ip6frag_obj_hashfn(const void *data, u32 len, u32 seed)
{
  const struct inet_frag_queue *fq = data;
  +
```

+return jhash2((const u32 *)&fq->key.v6, 
+    sizeof(struct frag_v6_compare_key) / sizeof(u32), seed); 
+
+static inline int 
+ip6frag_obj_cmpfn(struct rhashtable_compare_arg *arg, const void *ptr) 
+{ 
+    const struct frag_v6_compare_key *key = arg->key; 
+    const struct inet_frag_queue *fq = ptr; 
+    
+    return !!memcmp(&fq->key, key, sizeof(*key)); 
+} 
+
+static inline void 
+ip6frag_expire_frag_queue(struct net *net, struct frag_queue *fq) 
+{ 
+    struct net_device *dev = NULL; 
+    struct sk_buff *head; 
+    
+    rcu_read_lock(); 
+    spin_lock(&fq->q.lock); 
+    
+    if (fq->q.flags & INET_FRAG_COMPLETE) 
+        goto out; 
+    
+    inet_frag_kill(&fq->q); 
+    
+    dev = dev_get_by_index_rcu(net, fq->iif); 
+    if (!dev) 
+        goto out; 
+    
+    __IP6_INC_STATS(net, __in6_dev_get(dev), IPSTATS_MIB_REASMFAILS); 
+    __IP6_INC_STATS(net, __in6_dev_get(dev), IPSTATS_MIB_REASMTIMEOUT); 
+    
+    /* Don't send error if the first segment did not arrive. */ 
+    if (!(fq->q.flags & INET_FRAG_FIRST_IN)) 
+        goto out; 
+    
+    /* sk_buff::dev and sk_buff::rbnode are unionized. So we 
+     * pull the head out of the tree in order to be able to 
+     * deal with head->dev. 
+     */ 
+    head = inet_frag_pull_head(&fq->q); 
+    if (!head) 
+        goto out; 
+    head->dev = dev; 
+    spin_unlock(&fq->q.lock); 
+}
+ icmpv6_send(head, ICMPV6_TIME_EXCEED, ICMPV6_EXC_FRAGTIME, 0);
+ kfree_skb(head);
+ goto out_rcu_unlock;
+
+ out:
+ spin_unlock(&fq->q.lock);
+ out_rcu_unlock:
+ rcu_read_unlock();
+ inet_frag_put(&fq->q);
+
+ #endif
+ #endif

--- linux-4.15.0.orig/include/net/l3mdev.h
+++ linux-4.15.0/include/net/l3mdev.h
@@ -142,7 +142,8 @@
if (netif_is_l3_slave(skb->dev))
    master = netdev_master_upper_dev_get_rcu(skb->dev);
-else if (netif_is_l3_master(skb->dev))
+else if (netif_is_l3_master(skb->dev) ||
    netif_has_l3_rx_handler(skb->dev))
    + netif_has_l3_rx_handler(skb->dev))
    master = skb->dev;

if (master && master->l3mdev_ops->l3mdev_l3_rcv)
--- linux-4.15.0.orig/include/net/llc.h
+++ linux-4.15.0/include/net/llc.h
@@ -66,6 +66,7 @@
    struct hlist_nulls_head sk_laddr_hash[LLC_SK_LADDR_HASH_ENTRIES];
    struct hlist_head sk_dev_hash[LLC_SK_DEV_HASH_ENTRIES];
+	struct rcu_head rcu;

};

static inline
@@ -116,6 +117,11 @@
    refcount_inc(&sap->refcnt);
    }

+static inline bool llc_sap_hold_safe(struct llc_sap *sap)
+{
+    return refcount_inc_not_zero(&sap->refcnt);
+}
+
+ void llc_sap_close(struct llc_sap *sap);

static inline void llc_sap_put(struct llc_sap *sap)
--- linux-4.15.0.orig/include/net/llc_conn.h
struct sock *llc_sk_alloc(struct net *net, int family, gfp_t priority,
        struct proto *prot, int kern);
+void llc_sk_stop_all_timers(struct sock *sk, bool sync);
void llc_sk_free(struct sock *sk);

void llc_sk_reset(struct sock *sk);
--- linux-4.15.0.orig/include/net/llc_pdu.h
+++ linux-4.15.0/include/net/llc_pdu.h
@@ -50,9 +52,10 @@
#define LLC_PDU_TYPE_U_XID (LLC_PDU_TYPE_U + sizeof(struct llc_xid_info))
/* Known SAP addresses */
#define LLC_GLOBAL_SAP 0xFF
#define LLC_NULL_SAP 0x00 /* not network-layer visible */
@@ -230,9 +233,18 @@
static inline void llc_pdu_header_init(struct sk_buff *skb, u8 type,
                                       u8 ssap, u8 dsap, u8 cr)
{
-  const int hlen = type == LLC_PDU_TYPE_U ? 3 : 4;
  int hlen = 4; /* default value for I and S types */
  struct llc_pdu_un *pdu;
  /* Lengths of frame formats */
  #define LLC_PDU_LEN_I /* header and 2 control bytes */
  #define LLC_PDU_LEN_S4
  #define LLC_PDU_LEN_U /* header and 1 control byte */
  +#define LLC_PDU_LEN_I /* header and 2 control bytes */
  +#define LLC_PDU_LEN_S4
  +#define LLC_PDU_LEN_U /* header and 1 control byte */
  +#define LLC_PDU_LEN_U_XID (LLC_PDU_LEN_U + sizeof(struct llc_xid_info))
  /* header and 1 control byte and XID info */
  +#define LLC_PDU_TYPE_U_XID (LLC_PDU_TYPE_U + sizeof(struct llc_xid_info))
  /* 8-bit control field */
  +#define LLC_PDU_TYPE_MASK 0x03
  +#define LLC_PDU_TYPE_I /* first bit */
  +#define LLC_PDU_TYPE_S1 /* first two bits */
  +#define LLC_PDU_TYPE_U3 /* first two bits */
  +#define LLC_PDU_TYPE_I0 /* first bit */
  +#define LLC_PDU_TYPE_S1 /* first two bits */
  +#define LLC_PDU_TYPE_U3 /* first two bits */
  +#define LLC_PDU_TYPE_U_XID4 /* private type for detecting XID commands */

  #define LLC_PDU_TYPE_IS_I(pdu) ((!(pdu->ctrl_1 & LLC_PDU_TYPE_I_MASK)) ? 1 : 0)
  const int hlen = type == LLC_PDU_TYPE_U ? 3 : 4;
  int hlen = 4; /* default value for I and S types */

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switch (type) {
    case LLC_PDU_TYPE_U:
        hlen = 3;
        break;
    case LLC_PDU_TYPE_U_XID:
        hlen = 6;
        break;
}

skb_push(skb, hlen);
skb_reset_network_header(skb);
pdu = llc_pdu_un_hdr(skb);
@@ -374,7 +386,10 @@
xid_info->fmt_id = LLC_XID_FMT_ID;/* 0x81 */
xid_info->type = svcs_supported;
xid_info->rw = rx_window << 1;/* size of receive window */
-skb_put(skb, sizeof(struct llc_xid_info));
+
+/* no need to push/put since llc_pdu_header_init() has already
+ * pushed 3 + 3 bytes
+ */
}

/**
--- linux-4.15.0.orig/include/net/mac80211.h
+++ linux-4.15.0/include/net/mac80211.h
@@ -4141,7 +4141,7 @@
 * The TX headroom reserved by mac80211 for its own tx_status functions.
 * This is enough for the radiotap header.
 */
#define IEEE80211_TX_STATUS_HEADROOM14
+#define IEEE80211_TX_STATUS_HEADROOMALIGN(14, 4)

/**
 * ieee80211_sta_set_buffered - inform mac80211 about driver-buffered frames
--- linux-4.15.0.orig/include/net/neighbour.h
+++ linux-4.15.0/include/net/neighbour.h
@@ -429,8 +429,8 @@
 {
     unsigned long now = jiffies;

-    if (neigh->used != now)
-        neigh->used = now;
+    if (READ_ONCE(neigh->used) != now)
+        WRITE_ONCE(neigh->used, now);
    if (!(neigh->nud_state&(NUD_CONNECTED|NUD_DELAY|NUD_PROBE)))
        return __neigh_event_send(neigh, skb);
    return 0;
static inline int neigh_hh_output(const struct hh_cache *hh, struct sk_buff *skb) {
    unsigned int hh_alen = 0;
    unsigned int seq;
    unsigned int hh_len;

    do {
        seq = read_seqbegin(&hh->hh_lock);
        hh_len = hh->hh_len;
        hh_len = READ_ONCE(hh->hh_len);
        if (likely(hh_len <= HH_DATA_MOD)) {
            /* this is inlined by gcc */
            memcpy(skb->data - HH_DATA_MOD, hh->hh_data, HH_DATA_MOD);
            hh_alen = HH_DATA_MOD;
            skb_push(skb, hh_len);
            return dev_queue_xmit(skb);
        } else {
            unsigned int hh_alen = HH_DATA_ALIGN(hh_len);
            memcpy(skb->data - hh_alen, hh->hh_data, hh_alen);
            if (likely(skb_headroom(skb) >= hh_alen)) {
                memcpy(skb->data - hh_alen, hh->hh_data, hh_alen);
            } else {
                unsigned int hh_alen = HH_DATA_ALIGN(hh_len);
                memcpy(skb->data - hh_alen, hh->hh_data, hh_alen);
                if (likely(skb_headroom(skb) >= hh_alen)) {
                    memcpy(skb->data - hh_alen, hh->hh_data, hh_alen);
                } else {
                    skb_push(skb, hh_len);
                    if (WARN_ON_ONCE(skb_headroom(skb) < hh_alen)) {
                        kfree_skb(skb);
                        return NET_XMIT_DROP;
                    }
                    __skb_push(skb, hh_len);
                    return dev_queue_xmit(skb);
                }
            }
        }
    } while (read_seqretry(&hh->hh_lock, seq));
}
--- linux-4.15.0.orig/include/net/net_namespace.h
+++ linux-4.15.0/include/net/net_namespace.h
@@ -10,6 +10,7 @@
 #include <linux/workqueue.h>
 #include <linux/list.h>
 #include <linux/sysctl.h>
+#include <linux/uidgid.h>

 #include <net/flow.h>
 #include <net/netns/core.h>
@@ -56,6 +57,7 @@
 */
 spinlock_trues_mod_lock;

+u32 hash_mix;
atomic64_t cookie_gen;

 struct list_head list; /* list of network namespaces */
@@ -120,6 +122,7 @@
 #endif
 #if IS_ENABLED(CONFIG_NF_DEFrag_IPV6)
 struct netns_nf_fragnf_frag;
+struct ctl_table_header *nf_frag_frags_hdr;
 #endif
 struct sock*nfnl;
 struct sock*nfnl_stash;
@@ -161,7 +164,19 @@
 return old_net;
 }
+static inline void net_ns_get_ownership(const struct net *net, kuid_t *uid, kgid_t *gid);
+void net_ns_get_ownership(const struct net *net, kuid_t *uid, kgid_t *gid);
+void net_ns_barrier(void);
+struct ns_common *get_net_ns(struct ns_common *ns);
#else /* CONFIG_NET_NS */
 #include <linux/sched.h>
 #include <linux/nsproxy.h>
@@ -173,7 +180,19 @@
 return old_net;
 }
+static inline void net_ns_get_ownership(const struct net *net, kuid_t *uid, kgid_t *gid);
+{ *
+*uid = GLOBAL_ROOT_UID;
+*gid = GLOBAL_ROOT_GID;
+}
static inline void net_ns_barrier(void) {}

static inline struct ns_common *get_net_ns(struct ns_common *ns)
{
    return ERR_PTR(-EINVAL);
}
#endif /* CONFIG_NET_NS */

#define __net_initconst __initconst
#endif

int peernet2id_alloc(struct net *net, struct net *peer);
#define peernet2id Alloc (struct net *net, struct net *peer, gfp_t gfp);
int peernet2id(struct net *net, struct net *peer);
bool peernet_has_id(struct net *net, struct net *peer);
struct net *get_net_ns_by_id(struct net *net, int id);
-struct net_device *setup_pre_routing(struct sk_buff *skb);
+struct net_device *setup_pre_routing(struct sk_buff *skb, const struct net *net);

#if IS_ENABLED(CONFIG_IPV6)
int br_validate_ipv6(struct net *net, struct sk_buff *skb);
#endif

#include <net/netfilter/br_netfilter.h>
@@ -48,8 +48,8 @@
return port ? &port->br->fake_rtable : NULL;
}

-struct net_device *setup_pre_routing(struct sk_buff *skb);
+struct net_device *setup_pre_routing(struct sk_buff *skb, const struct net *net);

#if IS_ENABLED(CONFIG_IPV6)
int br_validate_ipv6(struct net *net, struct sk_buff *skb);
#endif

#include <net/netfilter/ipv4/nf_nat_masquerade.h>
@@ -9,7 +9,7 @@
const struct nf_nat_range *range,
const struct net_device *out);

-void nf_nat_masquerade_ipv4_register_notifier(void);
+int nf_nat_masquerade_ipv4_register_notifier(void);
void nf_nat_masquerade_ipv4_unregister_notifier(void);

#endif /*_NF_NAT_MASQUERADE_IPV4_H_ */

#include <net/netfilter/ipv6/nf_nat_masquerade.h>
@@ -5,7 +5,7 @@
unsigned int
+ nf_nat_masquerade_ipv6(struct sk_buff *skb, const struct nf_nat_range *range,
const struct net_device *out);
void nf_nat_masquerade_ipv6_register_notifier(void);
+int nf_nat_masquerade_ipv6_register_notifier(void);
void nf_nat_masquerade_ipv6_unregister_notifier(void);

@endef /* _NF_NAT_MASQUERADE_IPV6_H_ */
--- linux-4.15.0.orig/include/net/netfilter/nf_conntrack.h
+++ linux-4.15.0/include/net/netfilter/nf_conntrack.h
@@ -80,7 +80,7 @@
 struct hlist_node	nat_bysource;
 #endif
 /* all members below initialized via memset */
-@u8 __nfct_init_offset[0];
+@struct { } __nfct_init_offset;

 /* If we were expected by an expectation, this will be it */
 struct nf_conn *master;
@@ -315,6 +315,8 @@
 gfp_t flags);
 void nf_ct_tmpl_free(struct nf_conn *tmpl);
+u32 nf_ct_get_id(const struct nf_conn *ct);
+
 static inline void
 nf_ct_set(struct sk_buff *skb, struct nf_conn *ct, enum ip_conntrack_info info)
 {   
 --- linux-4.15.0.orig/include/net/netfilter/nf_conntrack_count.h
+++ linux-4.15.0/include/net/netfilter/nf_conntrack_count.h
@@ -0,0 +1,15 @@
+#ifndef _NF_CONNTRACK_COUNT_H
+#define _NF_CONNTRACK_COUNT_H
+
+unsigned int nf_conncount_lookup(struct net *net, struct hlist_head *head, struct
+const struct nf_conntrack_tuple *tuple,
+const struct nf_conntrack_zone *zone,
+bool *addit);
+
+bool nf_conncount_add(struct hlist_head *head,
+const struct nf_conntrack_tuple *tuple,
+const struct nf_conntrack_zone *zone);
+
+void nf_conncount_cache_free(struct hlist_head *hhead);
+
+#endif
--- linux-4.15.0.orig/include/net/netfilter/nf_log.h
+++ linux-4.15.0/include/net/netfilter/nf_log.h
@@ -107,6 +107,7 @@
 u8 proto, int fragment, unsigned int offset,
unsigned int logflags);
void nf_log_dump_sk_uid_gid(struct nf_log_buf *m, struct sock *sk);
+void nf_log_dump_vlan(struct nf_log_buf *m, const struct sk_buff *skb);
void nf_log_dump_packet_common(struct nf_log_buf *m, u_int8_t pf,
    unsigned int hooknum, const struct sk_buff *skb,
    const struct net_device *in,
--- linux-4.15.0.orig/include/net/netfilter/nf_tables.h
+++ linux-4.15.0/include/net/netfilter/nf_tables.h
@@ -136,6 +136,8 @@
static inline void nft_data_copy(u32 *dst, const struct nft_data *src,
    unsigned int len)
{
+if (len % NFT_REG32_SIZE)
    +dst[len / NFT_REG32_SIZE] = 0;
memcpy(dst, src, len);
}
@@ -177,6 +179,7 @@
int nft_data_init(const struct nft_ctx *ctx,
    struct nft_data *data, unsigned int size,
    struct nft_data_desc *desc, const struct nla **nla);
+void nft_data_hold(const struct nft_data *data, enum nft_data_types type);
void nft_data_release(const struct nft_data *data, enum nft_data_types type);
int nft_data_dump(struct sk_buff *skb, int attr, const struct nft_data *data,
    enum nft_data_types type, unsigned int len);
@@ -736,6 +739,10 @@
    int(*init)(const struct nft_ctx *ctx,
        const struct nft_expr *expr,
        const struct nlattr * const tb[]);
+void(*activate)(const struct nft_ctx *ctx,
+    const struct nft_expr *expr);
+void(*deactivate)(const struct nft_ctx *ctx,
+    const struct nft_expr *expr);
void(*destroy)(const struct nft_ctx *ctx,
    const struct nft_expr *expr);
int(*dump)(struct sk_buff *skb,
@@ -759,7 +766,8 @@
*/
struct nft_expr {
    const struct nft_expr_ops *ops;
    -unsigned char data[];
+unsigned char data[]
+__attribute__((aligned(__alignof__(u64))));
};
static inline void *nft_expr_priv(const struct nft_expr *expr)
--- linux-4.15.0.orig/include/net/netns/hash.h
+++ linux-4.15.0/include/net/netns/hash.h
#ifndef __NET_NS_HASH_H__
#define __NET_NS_HASH_H__

#include <net/net_namespace.h>

static inline u32 net_hash_mix(const struct net *net)
{
    #ifdef CONFIG_NET_NS
    
    * shift this right to eliminate bits, that are
    * always zeroed
    * */
    -
    - return (u32)(((unsigned long)net) >> L1_CACHE_SHIFT);
    #else
    - return 0;
    #endif
    +return net->hash_mix;
    }
#endif

--- linux-4.15.0.orig/include/net/netns/ipv4.h
+++ linux-4.15.0/include/net/netns/ipv4.h
@@ -9,6 +9,7 @@
#include <linux/uidgid.h>
#include <net/inet_frag.h>
#include <linux/rcupdate.h>
+include <linux/siphash.h>
struct tcpm_hash_bucket;
struct ctl_table_header;
@@ -109,6 +110,7 @@
#endif
int sysctl_tcp_mtu_probing;
int sysctl_tcp_base_mss;
+int sysctl_tcp_min_snd_mss;
int sysctl_tcp_probe_threshold;
u32 sysctl_tcp_probe_interval;
@@ -205,5 +207,6 @@
unsigned intipmr_seq;/* protected by rtnl_mutex */
atomic_t rtg_genid;
+siphash_key_tip_id_key;
};

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#endif
--- linux-4.15.0.orig/include/net/netns/ipv6.h
+++ linux-4.15.0/include/net/netns/ipv6.h
@@ -103,7 +103,6 @@
 #if IS_ENABLED(CONFIG_NF_DEFRAG_IPV6)
 struct netns_nf_frag {
     struct netns_sysctl_ipv6 sysctl;
-    struct netns_frags frags;
+    struct netns_frags frags;
 };}
 #endif
--- linux-4.15.0.orig/include/net/netns/xfrm.h
+++ linux-4.15.0/include/net/netns/xfrm.h
@@ -70,7 +70,9 @@
 #if IS_ENABLED(CONFIG_IPV6)
 struct dst_ops xfrm6_dst_ops;
 #endif
+    spinlock_t xfrm_state_lock;
+    seqcount_t xfrm_state_hash_generation;
+    spinlock_t xfrm_policy_lock;
 struct mutex xfrm_cfg_mutex;
 };}
 --- linux-4.15.0.orig/include/net/nexthop.h
+++ linux-4.15.0/include/net/nexthop.h
@@ -7,7 +7,7 @@
 static inline int rtnh_ok(const struct rtnexthop *rtnh, int remaining) {
     return remaining >= sizeof(*rtnh) &&
     return remaining >= (int)sizeof(*rtnh) &&
-    rtnh->rtnh_len >= sizeof(*rtnh) &&
+    rtnh->rtnh_len >= sizeof(*rtnh) &&
         rtnh->rtnh_len <= remaining;
 }
--- linux-4.15.0.orig/include/net/nfc/hci.h
+++ linux-4.15.0/include/net/nfc/hci.h
@@ -87,7 +87,7 @@
 /* According to specification 102 622 chapter 4.4 Pipes,
  * the pipe identifier is 7 bits long.
 */
-#define NFC_HCI_MAX_PIPES 127
+#define NFC_HCI_MAX_PIPES 128
 struct nfc_hci_init_data {
     u8 gate_count;
     struct nfc_hci_gate gates[NFC_HCI_MAX_CUSTOM_GATES];
--- linux-4.15.0.orig/include/net/nfc/nci_core.h
+++ linux-4.15.0/include/net/nfc/nci_core.h

According to specification 102 622 chapter 4.4 Pipes, the pipe identifier is 7 bits long.

#define NCI_HCI_MAX_PIPES 127

struct nci_hci_gate {
    u8 gate;
    struct sk_buff **resp;
}

struct nci_hci_dev *
cni_hci_allocate(struct nci_dev *ndev);
void nci_hci_deallocate(struct nci_dev *ndev);
int nci_hci_send_event(struct nci_dev *ndev, u8 gate, u8 event,
    const u8 *param, size_t param_len);
int nci_hci_send_cmd(struct nci_dev *ndev, u8 gate,
    --- linux-4.15.0.orig/include/net/phonet/pep.h
+++ linux-4.15.0/include/net/phonet/pep.h
@@ -63,10 +63,11 @@
    u8		state_after_reset;/* reset request */
    u8		error_code;/* any response */
    u8		pep_type;/* status indication */
-    u8		data[1];
+    u8		data0;/* anything else */
    +u8data[1];
    +u8data[];
};
-#define other_pep_type	data[1]
+#define other_pep_type	data[0]

static inline struct pnpipehdr *pnp_hdr(struct sk_buff *skb)
{
    --- linux-4.15.0.orig/include/net/pkt_cls.h
+++ linux-4.15.0/include/net/pkt_cls.h
@@ -32,7 +32,7 @@
};

struct tcf_block_cb;
-bool tcf_queue_work(struct work_struct *work);
+bool tcf_queue_work(struct rcu_work *rwork, work_func_t func);

#ifdef CONFIG_NET_CLS
struct tcf_chain *
tcf_chain_get(struct tcf_block *block, u32 chain_index,
@@ -186,31 +186,38 @@
return xchg(clp, cl);
}

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static inline unsigned long
_cls_set_class(struct Qdisc *q, unsigned long *clp, unsigned long cl)

+static inline void
__tcf_bind_filter(struct Qdisc *q, struct tcf_result *r, unsigned long base)
{
 unsigned long old_cl;

 sch_tree_lock(q);
 old_cl = __cls_set_class(clp, cl);
 sch_tree_unlock(q);
 return old_cl;

 cl = q->ops->cl_ops->bind_tcf(q, base, r->classid);
 cl = __cls_set_class(&r->class, cl);
 if (cl)
 q->ops->cl_ops->unbind_tcf(q, cl);
}

static inline void
tcf_bind_filter(struct tcf_proto *tp, struct tcf_result *r, unsigned long base)
{
 struct Qdisc *q = tp->chain->block->q;
 unsigned long cl;

 /* Check q as it is not set for shared blocks. In that case,
 * setting class is not supported.
 */
 if (!q)
 return;
 cl = q->ops->cl_ops->bind_tcf(q, base, r->classid);
 cl = cls_set_class(q, &r->class, cl);
 if (cl)
 sch_tree_lock(q);
 __tcf_bind_filter(q, r, base);
 sch_tree_unlock(q);
}

+static inline void
__tcf_unbind_filter(struct Qdisc *q, struct tcf_result *r)
{
 unsigned long cl;

 if ((cl = __cls_set_class(&r->class, 0)) != 0)
 q->ops->cl_ops->unbind_tcf(q, cl);
}

@@@@ -218,12 +225,10 @@
tcf_unbind_filter(struct tcf_proto *tp, struct tcf_result *r)
struct Qdisc *q = tp->chain->block->q;
-unsigned long cl;

if (!q)
    return;
-    if ((cl = __cls_set_class(&r->class, 0)) != 0)
-        q->ops->cl_ops->unbind_tcf(q, cl);
+        __tcf_unbind_filter(q, r);
}

struct tcf_exts {
    @@ -240,12 +245,13 @@
        int police;
    }

    static inline int tcf_exts_init(struct tcf_exts *exts, int action, int police)
+    static inline int tcf_exts_init(struct tcf_exts *exts, struct net *net,
+        int action, int police)
    {
        #ifdef CONFIG_NET_CLS_ACT
            exts->type = 0;
            exts->nr_actions = 0;
-        exts->net = NULL;
+        exts->net = net;
        exts->actions = kcalloc(TCA_ACT_MAX_PRIO, sizeof(struct tc_action *),
            GFP_KERNEL);
        if (!exts->actions)
            --- linux-4.15.0.orig/include/net/psample.h
+++ linux-4.15.0/include/net/psample.h
@@ -12,11 +12,14 @@
                u32 group_num;
                u32 refcount;
                u32 seq;
                +struct rcu_head rcu;
    }

    struct psample_group *psample_group_get(struct net *net, u32 group_num);
    void psample_group_put(struct psample_group *group);
+
    struct sk_buff;
+
    +#if IS_ENABLED(CONFIG_PSAMPLE)

        void psample_sample_packet(struct psample_group *group, struct sk_buff *skb,
            --- linux-4.15.0.orig/include/net/red.h
+++ linux-4.15.0/include/net/red.h
@@ -168,14 +168,24 @@

v->qcount = -1;
}

-static inline bool red_check_params(u32 qth_min, u32 qth_max, u8 Wlog)
+static inline bool red_check_params(u32 qth_min, u32 qth_max, u8 Wlog,
+    u8 Scell_log, u8 *stab)
{
-    if (fls(qth_min) + Wlog > 32)
+    if (fls(qth_min) + Wlog >= 32)
        return false;
-    if (fls(qth_max) + Wlog > 32)
+    if (fls(qth_max) + Wlog >= 32)
        return false;
+    if (Scell_log >= 32)
        return false;
    if (qth_max < qth_min)
        return false;
+    if (stab) {
+        int i;
+        for (i = 0; i < RED_STAB_SIZE; i++)
+            if (stab[i] >= 32)
+                return false;
+    }
    return true;
}

--- linux-4.15.0.orig/include/net/regulatory.h
+++ linux-4.15.0/include/net/regulatory.h
@@ -78,7 +78,7 @@
int wiphy_idx;
enum nl80211_reg_initiator initiator;
enum nl80211_user_reg_hint_type user_reg_hint_type;
-    char alpha2[2];
+    char alpha2[3];
enum nl80211_dfs_regions dfs_region;
bool intersect;
bool processed;
--- linux-4.15.0.orig/include/net/request_sock.h
+++ linux-4.15.0/include/net/request_sock.h
@@ -183,7 +183,7 @@
static inline bool reqsk_queue_empty(const struct request_sock_queue *queue)
{
-    return queue->rskq_accept_head == NULL;
+    return READ_ONCE(queue->rskq_accept_head) == NULL;
}
static inline struct request_sock *reqsk_queue_remove(struct request_sock_queue *queue, 
@@ -195,7 +195,7 @@
  req = queue->rskq_accept_head;
  if (req) {
    sk_acceptq_removed(parent);
-  queue->rskq_accept_head = req->dl_next;
+  WRITE_ONCE(queue->rskq_accept_head, req->dl_next);
    if (queue->rskq_accept_head == NULL)
      queue->rskq_accept_tail = NULL;
  }
--- linux-4.15.0.orig/include/net/route.h
+++ linux-4.15.0/include/net/route.h
@@ -63,7 +63,8 @@
   __be32		rt_gateway;
/* Miscellaneous cached information */
-  u32		rt_pmtu;
+  u32		rt_mtu_locked:1,
+  rt_pmtu:31;
   u32rt_table_id;

@@ -227,6 +228,9 @@
 void fib_add_ifaddr(struct in_ifaddr *);
 void fib_del_ifaddr(struct in_ifaddr *, struct in_ifaddr *);

+void rt_add_uncached_list(struct rtable *rt);
+void rt_del_uncached_list(struct rtable *rt);
+
static inline void ip_rt_put(struct rtable *rt)
 {
    /* dst_release() accepts a NULL parameter.
--- linux-4.15.0.orig/include/net/rtnetlink.h
+++ linux-4.15.0/include/net/rtnetlink.h
@@ -33,6 +33,7 @@
    *
    @list: Used internally
    *@kind: Identifier
+    *@netsns_refund: Physical device, move to init_net on netsns exit
    *@maxtype: Highest device specific netlink attribute number
    *@policy: Netlink policy for device specific attribute validation
    *@validate: Optional validation function for netlink/changelink parameters
    @ @ -.92.6 +93.7 @@
  unsigned int(*get_num_tx_queues)(void);
   unsigned int(*get_num_rx_queues)(void);

+boolnetsns_refund;
   intslave_maxtype;

const struct nla_policy*slave_policy;
int(*slave_changelink)(struct net_device *dev,
--- linux-4.15.0.orig/include/net/sch_generic.h
+++ linux-4.15.0/include/net/sch_generic.h
@@ -227,7 +227,8 @@
void **, bool);
int(*delete)(struct tcf_proto*, void *, bool);
void(*walk)(struct tcf_proto*, struct tcf_walker *arg);
-void(*bind_class)(void *, u32, unsigned long);
+void(*bind_class)(void *, u32, unsigned long,
+ void *, unsigned long);

/* rtnetlink specific */
int(*dump)(struct net*, struct tcf_proto*, void *,
@@ -280,7 +281,6 @@
struct net *net;
struct Qdisc *q;
struct list_head cb_list;
-struct work_struct work;
};

static inline void qdisc_cb_private_validate(const struct sk_buff *skb, int sz)
@@ -313,6 +313,11 @@
return q;
}

+static inline struct Qdisc *qdisc_root_bh(const struct Qdisc *qdisc)
+{
+return rcu_dereference_bh(qdisc->dev_queue->qdisc);
+}
+
+static inline struct Qdisc *qdisc_root_sleeping(const struct Qdisc *qdisc)
+
+return qdisc->dev_queue->qdisc_sleeping;
@@ -736,6 +741,16 @@
*to_free = skb;
}

+static inline void __qdisc_drop_all(struct sk_buff *skb,
+ struct sk_buff **to_free)
+{ 
+if (skb->prev)
+skb->prev->next = *to_free;
+else
+skb->next = *to_free;
+*to_free = skb;
+} 
+ 

static inline unsigned int __qdisc_queue_drop_head(struct Qdisc *sch, 
    struct qdisc_skb_head *qh, 
    struct sk_buff **to_free) 
@@ -854,6 +869,15 @@ 
qdisc_qstats_drop(sch); 
return NET_XMIT_DROP; 
+} 
+ 
+static inline int qdisc_drop_all(struct sk_buff *skb, struct Qdisc *sch, 
+    struct sk_buff **to_free) 
+{ 
+__qdisc_drop_all(skb, to_free); 
+qdisc_qstats_drop(sch); 
+ 
+return NET_XMIT_DROP; 
} 

/* Length to Time (L2T) lookup in a qdisc_rate_table, to determine how 
--- linux-4.15.0.orig/include/net/sctp/checksum.h 
+++ linux-4.15.0/include/net/sctp/checksum.h 
@@ -61,7 +61,7 @@ 
static inline __le32 sctp Compute_cksum(const struct sk_buff *skb, 
unsigned int offset) 
{ 
-struct sctphdr *sh = sctp_hdr(skb); 
+struct sctphdr *sh = (struct sctphdr *)(skb->data + offset); 
const struct skb_checksum_ops ops = { 
    .update = sctp_csum_update, 
    .combine = sctp_csum_combine, 
--- linux-4.15.0.orig/include/net/sctp/command.h 
+++ linux-4.15.0/include/net/sctp/command.h 
@@ -104,7 +104,6 @@ 
SCTP_CMD_T1_RETRAN, /* Mark for retransmission after T1 timeout */ 
SCTP_CMD_UPDATE_INITTAG, /* Update peer init tag */ 
SCTP_CMD_SEND_MSG, /* Send the whole use message */ 
-SCTP_CMD_SEND_NEXT_ASCONF, /* Send the next ACONF after ACK */ 
SCTP_CMD_PURGE_ASCONF_QUEUE, /* Purge all asconf queues.*/ 
SCTP_CMD_SET_ASOC, /* Restore association context */ 
SCTP_CMD_LAST 
--- linux-4.15.0.orig/include/net/sctp/constants.h 
+++ linux-4.15.0/include/net/sctp/constants.h 
@@ -348,8 +348,7 @@ 
#define SCTP_SCOPE_POLICY_MAX SCTP_SCOPE_POLICY_LINK

/* Based on IPv4 scoping <draft-stewart-tsvwg-sctp-ipv4-00.txt>, 
- * SCTP IPv4 unusable addresses: 0.0.0.0/8, 224.0.0.0/4, 198.18.0.0/24, 
- * 192.88.99.0/24. 

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/* SCTP IPv4 unusable addresses: 0.0.0.0/8, 224.0.0.0/4, 192.88.99.0/24.
 * Also, RFC 8.4, non-unicast addresses are not considered valid SCTP
 * addresses.
 */
@@ -357,15 +356,16 @@
((htonl(INADDR_BROADCAST) == a) \  
 ipv4_is_multicast(a) \  
 ipv4_is_zeronet(a) \  
- ipv4_is_test_198(a) \  
+ ipv4_is_anycast_6to4(a))

/* Flags used for the bind address copy functions. */
#define SCTP_ADDR6_ALLOWED 0x00000001 /* IPv6 address is allowed by
+#define SCTP_ADDR4_ALLOWED 0x00000001 /* IPv4 address is allowed by
 local sock family */
-#define SCTP_ADDR4_PEERSUPP 0x00000002 /* IPv4 address is supported by
+#define SCTP_ADDR6_ALLOWED 0x00000002 /* IPv6 address is allowed by
 peer */
-#define SCTP_ADDR6_PEERSUPP 0x00000004 /* IPv6 address is supported by
 peer */
+#define SCTP_ADDR6_PEERSUPP 0x00000008 /* IPv6 address is supported by
 peer */

/* Reasons to retransmit. */
--- linux-4.15.0.orig/include/net/sctp/sctp.h
+++ linux-4.15.0/include/net/sctp/sctp.h
@@ -103,6 +103,8 @@
 /*
 * sctp/socket.c
 */
+int sctp_inet_connect(struct socket *sock, struct sockaddr *uaddr,
+    int addr_len, int flags);
 int sctp_backlog_rcv(struct sock *sk, struct sk_buff *skb);
 int sctp_inet_listen(struct socket *sock, int backlog);
 void sctp_write_space(struct sock *sk);
@@ -428,7 +430,7 @@
 /*
 * This mimics the behavior of skb_set_owner_r
 */
- sk->sk_forward_alloc -= event->rmem_len;
+ sk_mem_charge(sk, event->rmem_len);
}

/* Tests if the list has one and only one entry. */
@@ -614,10 +616,15 @@
 return t->dst;
 }
+static inline __u32 sctp_dst_mtu(const struct dst_entry *dst)
+{
+    return SCTP_TRUNC4(max_t(__u32, dst_mtu(dst),
+        SCTP_DEFAULT_MINSEGMENT));
+
+    static inline bool scpt_transport_pmtu_check(struct sctp_transport *t)
+    {
+        _u32 pmtu = max_t(size_t, SCTP_TRUNC4(dst_mtu(t->dst)),
+        SCTP_DEFAULT_MINSEGMENT);
+        _u32 pmtu = sctp_dst_mtu(t->dst);
+        if (t->pathmtu == pmtu)
+            return true;
+    
+    --- linux-4.15.0.orig/include/net/sctp/structs.h
+    +++ linux-4.15.0/include/net/sctp/structs.h
+    @@ -442,7 +442,7 @@
+        struct sock *sk);
+        struct sock *sk);
+        void(*from_addr_param) (union sctp_addr *,
+        void(*from_addr_param) (union sctp_addr *,
+            union sctp_addr_param *,
+            union sctp_addr_param *,
+            __be16 port, int iif);
+        int(*to_addr_param) (const union sctp_addr *,
+        int(*to_addr_param) (const union sctp_addr *,
+            @ @ -1958,6 +1961,8 @@
+        /* What socket does this endpoint belong to? */
+        struct sock *sk;
+        struct sock *sk;
+    +/* Cache netns and it won't change once set */
+    +struct net *net;
+    +
+    /* This is where we receive inbound chunks. */
+    /* This is where we receive inbound chunks. */
+    struct sctp_inq  inqueue;
+    struct sctp_inq  inqueue;
+    @ @ -127,6 +127,7 @@
+    __u64 abandoned_unsent[SCTP_PR_INDEX(MAX) + 1];
+    __u64 abandoned_unsent[SCTP_PR_INDEX(MAX) + 1];
+    +
+    +struct rcu_head rcu;
+    +
+    --- linux-4.15.0.orig/include/net/slhc_vj.h
+    +++ linux-4.15.0/include/net/slhc_vj.h
+    @@ -127,6 +127,7 @@
struct cstate {  
byte_tcs_this;/* connection id number (xmit) */  
+bool initialized;/* true if initialized */  
struct cstate *next;/* next in ring (xmit) */  
struct iphdr cs_ip;/* ip/tcp hdr from most recent packet */  
struct tcphdr cs_tcp;  
--- linux-4.15.0.orig/include/net/sock.h  
+++ linux-4.15.0/include/net/sock.h  
@@ -293,6 +293,7 @@  *
@sk_filter: socket filtering instructions  
* @sk_timer: sock cleanup timer  
* @sk_stamp: time stamp of last packet received  
+ * @sk_stamp_seq: lock for accessing sk_stamp on 32 bit architectures only  
* @sk_tsflags: SO_TIMESTAMPING socket options  
* @sk_tskey: counter to disambiguate concurrent tsstamp requests  
* @sk_zckey: counter to order MSG_ZEROCOPY notifications  
@@ -458,10 +459,15 @@  
u32 sk_ack_backlog;  
u32 sk_max_ack_backlog;  
kuid_tsk_uid;  
+spinlock_tsk_peer_lock;  
struct pid*sk_peer_pid;  
const struct cred*sk_peer_cred;  
+  
long sk_rcvtimeo;  
time_tsk_stamp;  
+#if BITS_PER_LONG==32  
+seqlock_tsk_stamp_seq;  
+#endif  
u16 sk_tsflags;  
u8 sk_shutdown;  
u32 sk_tskey;  
@@ -683,11 +689,22 @@  
hlist_add_head_rcu(&sk->sk_node, list);  
}  

+static inline void sk_add_node_tail_rcu(struct sock *sk, struct hlist_head *list)  
+{  
+sock_hold(sk);  
hlist_add_tail_rcu(&sk->sk_node, list);  
+}  
+  
static inline void sk_nulls_add_node_rcu(struct sock *sk, struct hlist_nulls_head *list)  
{  
hlist_nulls_add_head_rcu(&sk->sk_nulls_node, list);  
}  

+static inline void __sk_nulls_add_node_tail_rcu(struct sock *sk, struct hlist_nulls_head *list)
{  
+hlist_nulls_add_tail_rcu(&sk->sk_nulls_node, list);
}

static inline void sk_nulls_add_node_rcu(struct sock *sk, struct hlist_nulls_head *list)
{
sock_hold(sk);
@@ -806,6 +823,8 @@
{
return static_key_false(&memalloc_socks);
}
+
+void __receive_sock(struct file *file);
#endif

static inline int sk_memalloc_socks(void)
@@ -813,6 +832,8 @@
return 0;
}
+
+static inline void __receive_sock(struct file *file)
#

static inline gfp_t sk_gfp_mask(const struct sock *sk, gfp_t gfp_mask)
@@ -911,8 +932,8 @@
{
int cpu = raw_smp_processor_id();

-if (unlikely(sk->sk_incoming_cpu != cpu))
-sk->sk_incoming_cpu = cpu;
+if (unlikely(READ_ONCE(sk->sk_incoming_cpu) != cpu))
+WRITE_ONCE(sk->sk_incoming_cpu, cpu);
}

static inline void sock_rps_record_flow_hash(__u32 hash)
@@ -1231,7 +1252,7 @@
percpu_counter_inc(sk->sk_prot->sockets_allocated);
}

-static inline int
+static inline u64
sk_sockets_allocated_read_positive(struct sock *sk)
{
return percpu_counter_read_positive(sk->sk_prot->sockets_allocated);
@@ -1461,6 +1482,7 @@
lock_sock_nested(sk, 0);
+void __release_sock(struct sock *sk);
void release_sock(struct sock *sk);

/* BH context may only use the following locking interface. */
@@ -1685,7 +1707,6 @@
static inline void sk_set_socket(struct sock *sk, struct socket *sock)
{
    -sk_tx_queue_clear(sk);
    sk->sk_socket = sock;
}
@@ -1739,7 +1760,8 @@
static inline void sk_set_txhash(struct sock *sk)
{
    -sk->sk_txhash = net_tx_rndhash();
    +/* This pairs with READ_ONCE() in skb_set_hash_from_sk() */
    +WRITE_ONCE(sk->sk_txhash, net_tx_rndhash());
}
static inline void sk_rethink_txhash(struct sock *sk)
@@ -2013,9 +2035,12 @@
static inline void skb_set_hash_from_sk(struct sk_buff *skb, struct sock *sk)
{
    if (sk->sk_txhash) {
        +/* This pairs with WRITE_ONCE() in sk_set_txhash() */
        +u32 txhash = READ_ONCE(sk->sk_txhash);
        +
        +if (txhash) {
            skb->l4_hash = 1;
            -skb->hash = sk->sk_txhash;
            +skb->hash = txhash;
        }
    }
    
    @@ -2134,12 +2159,17 @@
    * sk_page_frag - return an appropriate page_frag
    * @sk: socket
    *
    - * If socket allocation mode allows current thread to sleep, it means its
    - * safe to use the per task page_frag instead of the per socket one.
    + * Use the per task page_frag instead of the per socket one for
    + * optimization when we know that we're in the normal context and owns
    + * everything that's associated with %current.
+ * gfpflags_allow_blocking() isn't enough here as direct reclaim may nest
+ * inside other socket operations and end up recursing into sk_page_frag()
+ * while it's already in use.
+ */
static inline struct page_frag *sk_page_frag(struct sock *sk)
{
    if (gfpflags_normal_context(sk->sk_allocation))
    return &current->task_frag;

    return &sk->sk_frag;
}

atomic_add(segs, &sk->sk_drops);
}

+static inline ktime_t sock_read_timestamp(struct sock *sk)
+
+static inline void sock_write_timestamp(struct sock *sk, ktime_t kt)
+
+void __sock_recv_timestamp(struct msghdr *msg, struct sock *sk, struct sk_buff *skb);
void __sock_recv_wifi_status(struct msghdr *msg, struct sock *sk,
__sock_recv_timestamp(msg, sk, skb);
else
  -sk->sk_stamp = kt;
+sock_write_timestamp(sk, kt);

if (sock_flag(sk, SOCK_WIFI_STATUS) && skb->wifi_acked_valid)
  __sock_recv_wifi_status(msg, sk, skb);
@@ -2259,9 +2317,9 @@
if (sk->sk_flags & FLAGS_TS_OR_DROPS || sk->sk_tsflags & TSFLAGS_ANY)
  __sock_recv_ts_and_drops(msg, sk, skb);
else if (unlikely(sock_flag(sk, SOCK_TIMESTAMP)))
  -sk->sk_stamp = skb->tstamp;
+sock_write_timestamp(sk, skb->tstamp);
else if (unlikely(sk->sk_stamp == SK_DEFAULT_STAMP))
  -sk->sk_stamp = 0;
+sock_write_timestamp(sk, 0);
}

void __sock_tx_timestamp(__u16 tsflags, __u8 *tx_flags);
--- linux-4.15.0.orig/include/net/tc_act/tc_gact.h
+++ linux-4.15.0/include/net/tc_act/tc_gact.h
@@ -56,7 +56,7 @@
static inline u32 tcf_gact_goto_chain_index(const struct tc_action *a)
{
  -return a->goto_chain->index;
+return READ_ONCE(a->tcfa_action) & TC_ACT_EXT_VAL_MASK;
}

static inline u32 tcf_gact_goto_chain_index(const struct tc_action *a)
{...

--- linux-4.15.0.orig/include/net/tc_act/tc_tunnel_key.h
+++ linux-4.15.0/include/net/tc_act/tc_tunnel_key.h
@@ -18,7 +18,6 @@
struct tcf_tunnel_key_params {
  struct rcu_head	rcu;
  int			tcft_action;
-  int			action;
  struct metadata_dst     *tcft_enc_metadata;
};

--- linux-4.15.0.orig/include/net/tcp.h
+++ linux-4.15.0/include/net/tcp.h
@@ -52,8 +52,10 @@
extern struct percpu_counter tcp_orphan_count;
#define MAX_TCP_HEADER	(128 + MAX_HEADER)
+#define MAX_TCP_HEADER \L1_CACHE_ALIGN(128 + MAX_HEADER)
#define MAX_TCP_OPTION_SPACE 40
+define TCP_MIN_SND_MSS 48
+define TCP_MIN_GSO_SIZE(TCP_MIN_SND_MSS - MAX_TCP_OPTION_SPACE)

/*
 * Never offer a window over 32767 without using window scaling. Some
@@ -257,7 +259,7 @@
mem_cgroup_under_socket_pressure(sk->sk_memcg))
return true;

-return tcp_memory_pressure;
+return READ_ONCE(tcp_memory_pressure);
}
/*
 * The next routines deal with comparing 32 bit unsigned ints
@@ -342,6 +344,7 @@
struct pipe_inode_info *pipe, size_t len,
unsigned int flags);

+void tcp_enter_quickack_mode(struct sock *sk, unsigned int max_quickacks);
static inline void tcp_dec_quickack_mode(struct sock *sk,
const unsigned int pkts)
{
@@ -467,19 +470,27 @@
}
static inline void tcp_synq_overflow(const struct sock *sk)
{
-unsigned long last_overflow = tcp_sk(sk)->rx_opt.ts_recent_stamp;
+unsigned long last_overflow = READ_ONCE(tcp_sk(sk)->rx_opt.ts_recent_stamp);
unsigned long now = jiffies;

-if (time_after(now, last_overflow + HZ))
-tcp_sk(skb)->rx_opt.ts_recent_stamp = now;
+if (!time_between32(now, last_overflow, last_overflow + HZ))
+WRITE_ONCE(tcp_sk(skb)->rx_opt.ts_recent_stamp, now);
}

/* syncookies: no recent synqueue overflow on this listening socket? */
static inline bool tcp_synq_no_recent_overflow(const struct sock *sk)
{
-unsigned long last_overflow = tcp_sk(skb)->rx_opt.ts_recent_stamp;
+unsigned long last_overflow = READ_ONCE(tcp_sk(skb)->rx_opt.ts_recent_stamp);
unsigned long now = jiffies;

-if (time_after(now, last_overflow + TCP_SYNCOOKIE_VALID))
-tcp_skb(skb)->rx_opt.ts_recent_stamp = now;
+if (!time_between32(now, last_overflow, last_overflow + TCP_SYNCOOKIE_VALID))
+WRITE_ONCE(tcp_skb(skb)->rx_opt.ts_recent_stamp, now);
}

*/
+ tcp_synq_overflow() could update .ts_recent_stamp after we read
+ jiffies but before we store .ts_recent_stamp into last_overflow,
+ which could lead to rejecting a valid syncookie.
+ */
+return !time_between32(jiffies, last_overflow - HZ,
+   last_overflow + TCP_SYNCOOKIE_VALID);
}

static inline u32 tcp_cookie_time(void)
@@ -536,6 +547,7 @@
void tcp_send_active_reset(struct sock *sk, gfp_t priority);
int tcp_send_synack(struct sock *);
void tcp_push_one(struct sock *, u32 rcv_nxt);
+void __tcp_send_ack(struct sock *sk, u32 rcv_nxt);
void tcp_send_ack(struct sock *sk);
void tcp_send_delayed_ack(struct sock *sk);
void tcp_send_loss Probe(struct sock *sk);
@@ -828,6 +840,11 @@
*/
static inline int tcp_v6_iif(const struct sk_buff *skb)
{
+return TCP_SKB_CB(skb)->header.h6.iif;
+}
+
+static inline int tcp_v6_iif_l3_slave(const struct sk_buff *skb)
+{
+bool l3_slave = ipv6_l3mdev_skb(TCP_SKB_CB(skb)->header.h6.flags);
+
return l3_slave ? skb->skb_iif : TCP_SKB_CB(skb)->header.h6.iif;
@@ -901,8 +918,6 @@
CA_EVENT_LOSS,/* loss timeout */
CA_EVENT_ECN_NO_CE,/* ECT set, but not CE marked */
CA_EVENT_ECN_IS_CE,/* received CE marked IP packet */
-C畴VETEDEAYED_ACK,/* Delayed ack is sent */
-C畴VETE_NON_DELAYED_ACK,
};

/* Information about inbound ACK, passed to cong_ops->in_ack_event() */
@@ -1006,7 +1021,8 @@
void tcp_get_available_congestion_control(char *buf, size_t len);
void tcp_get_allowed_congestion_control(char *buf, size_t len);
int tcp_set_allowed_congestion_control(char *allowed);
-int tcp_set_congestion_control(struct sock *sk, const char *name, bool load, bool reinit);
+int tcp_set_congestion_control(struct sock *sk, const char *name, bool load,
+   bool reinit, bool cap_net_admin);
u32 tcp_slow_start(struct tcp_sock *tp, u32 acked);
void tcp_cong_avoid_ai(struct tcp_sock *tp, u32 w, u32 acked);
/* Note: caller must be prepared to deal with negative returns */
static inline int tcp_space(const struct sock *sk) {
  return tcp_win_from_space(sk, sk->sk_rcvbuf - sk->sk_backlog.len - atomic_read(&sk->sk_rmem_alloc));
}

return skb_rb_first(&sk->tcp_rtx_queue);
}

+static inline struct sk_buff *tcp_rtx_queue_tail(const struct sock *sk) {
  skb_rb_last(&sk->tcp_rtx_queue);
}

+static inline struct sk_buff *tcp_write_queue_head(const struct sock *sk) {
  return skb_peek(&sk->sk_write_queue);
}

/* tcp_recovery.c */
-extern void tcp_rack_mark_lost(struct sock *sk);
+extern bool tcp_rack_mark_lost(struct sock *sk);
extern void tcp_rack_advance(struct tcp_sock *tp, u8 sacked, u32 end_seq, u64 xmit_time);
extern void tcp_rack_reo_timeout(struct sock *sk);
-extern void tcp_get_available_ulp(char *buf, size_t len);
-extern void tcp_cleanup_ulp(struct sock *sk);
+
+#define MODULE_ALIAS_TCP_ULP(name)
  __MODULE_INFO(alias, alias_userspace, name);
  __MODULE_INFO(alias, alias_tcp_ulp, "tcp-ulp-" name)
+
/* Call BPF_SOCK_OPS program that returns an int. If the return value
 * is < 0, then the BPF op failed (for example if the loaded BPF
 * program does not support the chosen operation or there is no BPF
 * --- linux-4.15.0.orig/include/net/tls.h
 * +++ linux-4.15.0/include/net/tls.h
 * @@ -79,11 +79,13 @@
 * TLS_PENDING_CLOSED_RECORD
 * ];
+
+union tls_crypto_context {
struct tls_crypto_info info;
+struct tls12_crypto_info_aes_gcm_128 aes_gcm_128;
+
struct tls_context {
-union {
-struct tls_crypto_info crypto_send;
-} 
+union tls_crypto_context crypto_send;

void *priv_ctx;

@@ -100,6 +102,7 @@
struct scatterlist *partially_sent_record;
u16 partially_sent_offset;
unsigned long flags;
+bool in_tcp_sendpages;

u16 pending_open_record_frags;
int (*push_pending_record)(struct sock *sk, int flags);
@@ -209,8 +212,8 @@
/* we can use IV for nonce explicit according to spec */
buf[0] = record_type;
-buf[1] = TLS_VERSION_MINOR(ctx->crypto_send.version);
-buf[2] = TLS_VERSION_MAJOR(ctx->crypto_send.version);
+buf[1] = TLS_VERSION_MINOR(ctx->crypto_send.info.version);
+buf[2] = TLS_VERSION_MAJOR(ctx->crypto_send.info.version);
/* size KTLS_DTLS_HEADER_SIZE + KTLS_DTLS_NONCE_EXPLICIT_SIZE */
buf[3] = pkt_len >> 8;
buf[4] = pkt_len & 0xFF;
--- linux-4.15.0.orig/include/net/transp_v6.h
+++ linux-4.15.0/include/net/transp_v6.h
@@ -45,8 +45,15 @@
struct flowi6 *fl6, struct ipcm6_cookie *ipc6,
 struct sockcm_cookie *sockc);

-void ip6_dgram_sock_seq_show(struct seq_file *seq, struct sock *sp,
-    __u16 srcp, __u16 destp, int int bucket);
+void __ip6_dgram_sock_seq_show(struct seq_file *seq, struct sock *sp,
+    __u16 srcp, __u16 destp, int bucket);
+static inline void
+ip6_dgram_sock_seq_show(struct seq_file *seq, struct sock *sp, __u16 srcp,
+    __u16 destp, int bucket)
+{
+    __ip6_dgram_sock_seq_show(seq, sp, srcp, destp, sk_rmem_alloc_get(sp),
+        bucket);
```c
#define LOOPBACK4_IPV6 cpu_to_be32(0x7f000006)

--- linux-4.15.0.orig/include/net/udp.h
+++ linux-4.15.0/include/net/udp.h
@@ -244,6 +244,11 @@
 return htons((((u64) hash * (max - min)) >> 32) + min);
 }
+
+static inline int udp_rqueue_get(struct sock *sk)
+{
+ return sk_rmem_alloc_get(sk) - READ_ONCE(udp_sk(sk)->forward_deficit);
+}
+
+/* net/ipv4/udp.c */
void udp_destruct_sock(struct sock *sk);
void skb_consume_udp(struct sock *sk, struct sk_buff *skb, int len);
--- linux-4.15.0.orig/include/net/udplite.h
+++ linux-4.15.0/include/net/udplite.h
@@ -64,6 +64,7 @@
 UDP_SKB_CB(skb)->cscov = cscov;
 if (skb->ip_summed == CHECKSUM_COMPLETE)
 skb->ip_summed = CHECKSUM_NONE;
+ skb->csum_valid = 0;
 }
return 0;
--- linux-4.15.0.orig/include/net/vxlan.h
+++ linux-4.15.0/include/net/vxlan.h
@@ -236,6 +236,8 @@
 struct net *net; /* netns for packet i/o */
 struct vxlan_rdst default_dst; /* default destination */
+
+struct ip_tunnel_fan fan;
+
 struct timer_list age_timer;
 spinlock_t hash_lock;
 unsigned int addrcnt;
--- linux-4.15.0.orig/include/net/xfrm.h
+++ linux-4.15.0/include/net/xfrm.h
@@ -323,7 +323,6 @@
 xfrm_policy_unregister_afinfo(const struct xfrm_policy_afinfo *afinfo);
 void km_policy_notify(struct xfrm_policy *xp, int dir,
 const struct km_event *c);
-void xfrm_policy_cache_flush(void);
 void km_state_notify(struct xfrm_state *x, const struct km_event *c);
```

struct xfrm_tmpl;
@@ -1367,6 +1366,23 @@ return atomic_read(&x->tunnel_users);
 }

+static inline bool xfrm_id_proto_valid(u8 proto)
+{
+    switch (proto) {
+    case IPPROTO_AH:
+    case IPPROTO_ESP:
+    case IPPROTO_COMP:
+    #if IS_ENABLED(CONFIG_IPV6)
+    case IPPROTO_ROUTING:
+    case IPPROTO_DSTOPTS:
+    #endif
+    case IPPROTO_PROTO_ANY:
+        return true;
+    default:
+        return false;
+    }
+    return false;
+
+ /* IPSEC_PROTO_ANY only matches 3 IPsec protocols, 0 could match all. */
+ static inline int xfrm_id_proto_match(u8 proto, u8 userproto)
+ { return (!userproto || proto == userproto ||
+ void *);

void xfrm_policy_walk_done(struct xfrm_policy_walk *walk, struct net *net);
int xfrm_policy_insert(int dir, struct xfrm_policy *policy, int excl);
-struct xfrm_policy *xfrm_policy_bysel_ctx(struct net *net, u32 mark,
-struct xfrm_selector *sel, int dir, struct xfrm_policy *policy, int excl);
+struct xfrm_policy *xfrm_policy_bysel_ctx(struct net *net, u32 mark,
+const struct xfrm_selector *sel, int dir, struct xfrm_policy *policy, int excl);
-struct xfrm_policy *xfrm_policy_byid(struct net *net, u32 mark, u8, int dir,
-    u8 type, int dir, int delete, int *err);
+struct xfrm_policy *xfrm_policy_byid(struct net *net, u32 mark, u8, int dir,
+    u8 type, int dir, int delete, int *err);
+struct xfrm_policy *xfrm_policy_byid(struct net *net,
+    const struct xfrm_mark *mark, u8,
+    int dir, u32 id, int delete, int *err);
int xfrm_policy_flush(struct net *net, u8 type, bool task_valid);
void xfrm_policy_hash_rebuild(struct net *net);
+struct xfrm_policy_hash_rebuild(struct net *net);
void xfrm_get_acqseq(void);
@@ -1658,13 +1674,15 @@
 static inline int xfrm_replay_clone(struct xfrm_state *x,
 struct xfrm_state *orig)
- x->replay_esn = kzalloc(xfrm_replay_state_esn_len(orig->replay_esn),
+ x->replay_esn = kmemdup(orig->replay_esn,
+xfrm_replay_state_esn_len(orig->replay_esn),
GFP_KERNEL);
if (!x->replay_esn)
return -ENOMEM;
- x->replay_esn->bmp_len = orig->replay_esn->bmp_len;
-x->replay_esn->replay_window = orig->replay_esn->replay_window;
-
-x->preplay_esn = kmemdup(x->replay_esn,
-xfrm_replay_state_esn_len(x->replay_esn),
+x->preplay_esn = kmemdup(orig->preplay_esn,
+xfrm_replay_state_esn_len(orig->preplay_esn),
GFP_KERNEL);
-if (!x->preplay_esn) {
-kfree(x->replay_esn);
+if (!x->preplay_esn)
return -ENOMEM;
} return 0;
}
--- linux-4.15.0.orig/include/rdma/ib_addr.h
+++ linux-4.15.0/include/rdma/ib_addr.h
@@ -130,6 +130,8 @@
        const unsigned char *dst_dev_addr);
 int rdma_addr_size(struct sockaddr *addr);
 +int rdma_addr_size_in6(struct sockaddr_in6 *addr);
 +int rdma_addr_size_kss(struct __kernel_sockaddr_storage *addr);
 int rdma_addr_find_smac_by_sgid(union ib_gid *sgid, u8 *smac, u16 *vlan_id);
 int rdma_addr_find_l2_eth_by_grh(const union ib_gid *sgid,
 --- linux-4.15.0.orig/include/rdma/ib_umem.h
+++ linux-4.15.0/include/rdma/ib_umem.h
@@ -48,7 +48,6 @@
        int writable;
        int hugetlb;
    struct work_struct *work;
-struct pid *pid;
    struct mm_struct *mm;
    unsigned longdiff;
    struct ib_umem_odp *odp_data;
--- linux-4.15.0.orig/include/rdma/ib_verbs.h
+++ linux-4.15.0/include/rdma/ib_verbs.h
@@ -68,6 +68,7 @@
extern struct workqueue_struct *ib_wq;
extern struct workqueue_struct *ib_comp_wq;
+extern struct workqueue_struct *ib_comp_unbound_wq;

union ib_gid {
  u8 raw[16];
  @ @ -283.8 +284.8 @ @
};

enum ib_tm_cap_flags {
  /* Support tag matching on RC transport */
  -IB_TM_CAP_RC = 1 << 0,
  /* Support tag matching with rendezvous offload for RC transport */
  +IB_TM_CAP_RNDV_RC = 1 << 0,
};

struct ib_tm_caps {
  @@ -307,7 +308,7 @@
  __attribute_const__ enum ib_rate mult_to_ib_rate(int mult);
}

enum rdma_ah_attr_type {
  +RDMA_AH_ATTR_TYPE_UNDEFINED,
  RDMA_AH_ATTR_TYPE_IB,
  RDMA_AH_ATTR_TYPE_ROCE,
  RDMA_AH_ATTR_TYPE_OPA,
  @@ -983,9 +985,9 @@
  u32 invalidate_rkey;
  } ex;
  u32 src_qp;
  +u32 slid;
  int wc_flags;
  u16 pkey_index;
  -u32 slid;
  u8 sl;
  u8 did_path_bits;
  u8 sport_num; /* valid only for DR SMPs on switches */
  @@ -1131,7 +1133,7 @@
  struct ib_qp_capcap;
enum ib_sig_type sq_sig_type;
enum ib_qp_type qp_type;
-enum ib_qp_create_flags create_flags;
+u32 create_flags;

/*
 * Only needed for special QP types, or when using the RW API.
 @@ -1263,21 +1265,27 @@
 */

enum ib_wr_opcode {
-IB_WR_RDMA_WRITE,
-IB_WR_RDMA_WRITE_WITH_IMM,
-IB_WR_SEND,
-IB_WR_SEND_WITH_IMM,
-IB_WR_RDMA_READ,
-IB_WR_ATOMIC_CMP_AND_SWP,
-IB_WR_ATOMIC_FETCH_AND_ADD,
-IB_WR_LSO,
-IB_WR_SEND_WITH_INV,
-IB_WR_RDMA_READ_WITH_INV,
-IB_WR_LOCAL_INV,
-IB_WR_REG_MR,
-IB_WR_MASKED_ATOMIC_CMP_AND_SWP,
-IB_WR_MASKED_ATOMIC_FETCH_AND_ADD,
+/* These are shared with userspace */
+IB_WR_RDMA_WRITE = IB_UVERBS_WR_RDMA_WRITE,
+IB_WR_RDMA_WRITE_WITH_IMM = IB_UVERBS_WR_RDMA_WRITE_WITH_IMM,
+IB_WR_SEND = IB_UVERBS_WR_SEND,
+IB_WR_SEND_WITH_IMM = IB_UVERBS_WR_SEND_WITH_IMM,
+IB_WR_RDMA_READ = IB_UVERBS_WR_RDMA_READ,
+IB_WR_ATOMIC_CMP_AND_SWP = IB_UVERBS_WR_ATOMIC_CMP_AND_SWP,
+IB_WR_ATOMIC_FETCH_AND_ADD = IB_UVERBS_WR_ATOMIC_FETCH_AND_ADD,
+IB_WR_LSO = IB_UVERBS_WR_TSO,
+IB_WR_SEND_WITH_INV = IB_UVERBS_WR_SEND_WITH_INV,
+IB_WR_RDMA_READ_WITH_INV = IB_UVERBS_WR_RDMA_READ_WITH_INV,
+IB_WR_LOCAL_INV = IB_UVERBS_WR_LOCAL_INV,
+IB_WR_MASKED_ATOMIC_CMP_AND_SWP =
+IB_UVERBS_WR_MASKED_ATOMIC_CMP_AND_SWP,
+IB_WR_MASKED_ATOMIC_FETCH_AND_ADD =
+IB_UVERBS_WR_MASKED_ATOMIC_FETCH_AND_ADD,
+
+/* These are kernel only and can not be issued by userspace */
+IB_WR_REG_MR = 0x20,
 IB_WR_REG_SIG_MR,
+
/* reserve values for low level drivers' internal use.
 * These values will not be used at all in the ib core layer.
typedef void (*ib_comp_handler)(struct ib_cq *cq, void *cq_context);

enum ib_poll_context {
    IB_POLL_DIRECT, /* caller context, no hw completions */
    IB_POLL_SOFTIRQ, /* poll from softirq context */
    IB_POLL_WORKQUEUE, /* poll from workqueue */
    IB_POLL_DIRECT, /* caller context, no hw completions */
    IB_POLL_SOFTIRQ, /* poll from softirq context */
    IB_POLL_WORKQUEUE, /* poll from workqueue */
    IB_POLL_UNBOUND_WORKQUEUE, /* poll from unbound workqueue */
};

struct ib_cq {
    struct irq_poll iop;
    struct work_struct work;
    struct workqueue_struct *comp_wq;
};

struct ib_srq {
    struct workqueue_struct *comp_wq;
};

+static inline bool ib_access_writable(int access_flags)
{ 
+    /* We have writable memory backing the MR if any of the following 
+     * access flags are set. "Local write" and "remote write" obviously 
+     * require write access. "Remote atomic" can do things like fetch and 
+     * add, which will modify memory, and "MW bind" can change permissions 
+     * by binding a window. 
+     */
+    return access_flags &
+        (IB_ACCESS_LOCAL_WRITE | IB_ACCESS_REMOTE_WRITE |
+         IB_ACCESS_REMOTE_ATOMIC | IB_ACCESS_MW_BIND);
+}

/**
 * ib_check_mr_status: lightweight check of MR status.
 * This routine may provide status checks on a selected
 */
__attribute__((warn_unused_result))
grh->traffic_class = traffic_class;
/*Get AH type */
/**
 * rdma_ah_find_type - Return address handle type.
 * @dev: Device to be checked
 * @port_num: Port number
 */
static inline enum rdma_ah_attr_type rdma_ah_find_type(struct ib_device *dev,
-       u32 port_num)
+       u8 port_num)
{
- if ((rdma_protocol_roce(dev, port_num)) ||
- (rdma_protocol_iwarp(dev, port_num)))
+ if (rdma_protocol_roce(dev, port_num))
 return RDMA_AH_ATTR_TYPE_ROCE;
- else if ((rdma_protocol_ib(dev, port_num)) &&
- (rdma_cap_opa_ah(dev, port_num)))
- return RDMA_AH_ATTR_TYPE_OPA;
- else
+ if (rdma_protocol_ib(dev, port_num)) {
+ if (rdma_cap_opa_ah(dev, port_num))
+ return RDMA_AH_ATTR_TYPE_OPA;
+ return RDMA_AH_ATTR_TYPE_IB;
+ }
+ return RDMA_AH_ATTR_TYPE_UNDEFINED;
}
/**
--- linux-4.15.0.orig/include/rdma/rdma_cm.h
+++ linux-4.15.0/include/rdma/rdma_cm.h
@@ -284,6 +284,9 @@
*/
int rdma_listen(struct rdma_cm_id *id, int backlog);

+void rdma_lock_handler(struct rdma_cm_id *id);
+void rdma_unlock_handler(struct rdma_cm_id *id);
+
/**
 * rdma_accept - Called to accept a connection request or response.
 * @id: Connection identifier associated with the request.
 @@ -298,6 +301,9 @@
 * In the case of error, a reject message is sent to the remote side and the
 * state of the qp associated with the id is modified to error, such that any
 * previously posted receive buffers would be flushed.
 * +
 * This function is for use by kernel ULPs and must be called from under the
 * handler callback.
int rdma_accept(struct rdma_cm_id *id, struct rdma_conn_param *conn_param);

--- linux-4.15.0.orig/include/rdma/rdma_vt.h
+++ linux-4.15.0/include/rdma/rdma_vt.h
@@ -409,7 +409,7 @@
   spinlock_t pending_lock; /* protect pending mmap list */

 /* CQ */
-struct kthread_worker *worker; /* per device cq worker */
+struct kthread_worker __rcu *worker; /* per device cq worker */
   u32 n_cqs_allocated; /* number of CQs allocated for device */
   spinlock_t n_cqs_lock; /* protect count of in use cqs */

 --- linux-4.15.0.orig/include/scsi/libfcoe.h
+++ linux-4.15.0/include/scsi/libfcoe.h
@@ -79,7 +79,7 @@
   * It must not change after fcoe_ctlr_init() sets it.
   */

 enum fip_mode {
   FIP_MODE_AUTO = FIP_ST_AUTO,
   FIP_MODE_AUTO,
   FIP_MODE_NON_FIP,
   FIP_MODE_FABRIC,
   FIP_MODE_VN2VN,
   * @vn_mac:VN_Node assigned MAC address for data
   */

 struct fcoe_rport {
   +struct fc_rport_priv rdata;
   unsigned long time;
   u16 fcoe_len;
   u16 flags;
   @ @ -250,7 +251,7 @ @
   };

 /* FIP API functions */
-void fcoe_ctlr_init(struct fcoe_ctlr *, enum fip_state);
+void fcoe_ctlr_init(struct fcoe_ctlr *, enum fip_mode);
 void fcoe_ctlr_destroy(struct fcoe_ctlr *);
 void fcoe_ctlr_link_up(struct fcoe_ctlr *);
 int fcoe_ctlr_link_down(struct fcoe_ctlr *);
 @ @ -260,7 +261,7 @ @
   struct fc_frame *
   };

 /* libfcoe func */
-u64 fcoe_wwn_from_mac(unsigned char mac[], unsigned int, unsigned int);
+u64 fcoe_wwn_from_mac(unsigned char mac[MAX_ADDR_LEN], unsigned int, unsigned int);
int fcoe_libfc_config(struct fc_lport *, struct fcoe_ctlr *,
    const struct libfc_function_template *, int init_fcp);

u32 fcoe_fc_crc(struct fc_frame *fp);

--- linux-4.15.0.orig/include/scsi/libiscsi.h
+++ linux-4.15.0/include/scsi/libiscsi.h
@@ -145,6 +145,9 @@
    void*dd_data;/* driver/transport data */
};

+/* invalid scsi_task pointer */
+#define INVALID_SCSI_TASK(struct iscsi_task *)-1
+
static inline int iscsi_task_has_unsol_data(struct iscsi_task *task)
{
    return task->unsol_r2t.data_length > task->unsol_r2t.sent;

--- linux-4.15.0.orig/include/scsi/libsas.h
+++ linux-4.15.0/include/scsi/libsas.h
@@ -75,16 +75,15 @@
PHYE_RESUME_TIMEOUT,
+PHYE_SHUTDOWN,
PHYE_NUM_EVENTS,
};

enum discover_event {
    DISCE_DISCOVER_DOMAIN = 0U,
    DISCE_REVALIDATE_DOMAIN,
    -DISCE_PROBE,
    DISCE_SUSPEND,
    DISCE_RESUME,
    -DISCE_DESTRUCT,
    DISC_NUM_EVENTS,
};

@@ -261,6 +260,7 @@
struct dev_list;
struct disco_list;
struct destroy_list;
+struct sas_port_del_list;
enum   sas_linkrate linkrate;
struct sas_work work;
@@ -292,6 +292,7 @@
struct asd_sas_event {
    struct sas_work work;
    struct asd_sas_phy *phy;
+int event;
    struct sas_work work;
    struct asd_sas_phy *phy;
+int event;
static inline struct asd_sas_event *to_asd_sas_event(struct work_struct *work)
@@ -301,17 +302,24 @@
return ev;
}

+static inline void INIT_SAS_EVENT(struct asd_sas_event *ev,
+  void (*fn)(struct work_struct *),
+  struct asd_sas_phy *phy, int event)
+{
+  INIT_SAS_WORK(&ev->work, fn);
+  ev->phy = phy;
+  ev->event = event;
+}
+
+#define SAS_PHY_SHUTDOWN_THRES   1024
+
/* The phy pretty much is controlled by the LLDD.
 * The class only reads those fields.
 */
struct asd_sas_phy {
  /* private: */
  -struct asd_sas_event   port_events[PORT_NUM_EVENTS];
  -struct asd_sas_event   phy_events[PHY_NUM_EVENTS];
  -
  -unsigned long port_events_pending;
  -unsigned long phy_events_pending;
  -
  +atomic_t event_nr;
  +int in_shutdown;
  int error;
  int suspended;
}

struct device *dev; /* should be set */
struct module *lldd_module; /* should be set */

+struct workqueue_struct *event_q;
+struct workqueue_struct *disco_q;
+
+u8 *sas_addr; /* must be set */
+u8 hashed_sas_addr[HASHED_SAS_ADDR_SIZE];

@@ -399,6 +410,8 @@
struct list_head eh_done_q; /* complete via scsi_eh_flush_done_q */
struct list_head eh_ata_q; /* scmds to promote from sas to ata eh */
+int event_thres;
);

#define SHOST_TO_SAS_HA(_shost) (*(struct sas_ha_struct **)(_shost)->hostdata)
@@ -670,6 +683,7 @@
  sector_t capacity, int *hsc);
 extern struct scsi_transport_template *
 sas_domain_attach_transport(struct sas_domain_function_template *);
+extern struct device_attribute dev_attr_phy_event_threshold;

 int sas_discover_root_expander(struct domain_device *);

--- linux-4.15.0.orig/include/scsi/scsi.h
+++ linux-4.15.0/include/scsi/scsi.h
@@ -47,6 +47,8 @@
 */
 status &= 0xfe;
 return ((status == SAM_STAT_GOOD) ||
+(status == SAM_STAT_CONDITION_MET) ||
+/* Next two "intermediate" statuses are obsolete in SAM-4 */
 (status == SAM_STAT_INTERMEDIATE) ||
 (status == SAM_STAT_INTERMEDIATE_CONDITION_MET) ||
 /* FIXME: this is obsolete in SAM-3 */
--- linux-4.15.0.orig/include/scsi/scsi_cmnd.h
+++ linux-4.15.0/include/scsi/scsi_cmnd.h
@@ -69,6 +69,9 @@
 struct list_head list; /* scsi_cmnd participates in queue lists */
 struct list_head eh_entry; /* entry for the host eh_cmd_q */
 struct delayed_work abort_work;
+	+struct rcu_head rcu;
+	+int eh_eflags;/* Used by error handlr */

/*
--- linux-4.15.0.orig/include/scsi/scsi_common.h
+++ linux-4.15.0/include/scsi/scsi_common.h
@@ -25,6 +25,13 @@
 scsi_varlen_cdb_length(cmnd) : COMMAND_SIZE(cmnd[0]);
 }

+static inline unsigned char
+scsi_command_control(const unsigned char *cmnd)
+{  
+  return (cmnd[0] == VARIABLE_LENGTH_CMD) ?
+  cmnd[1] : cmnd[COMMAND_SIZE(cmnd[0]) - 1];
+}
+ /* Returns a human-readable name for the device */
+ extern const char *scsi_device_type(unsigned type);

--- linux-4.15.0.orig/include/scsi/scsi_dbg.h
+++ linux-4.15.0/include/scsi/scsi_dbg.h
@@ -6,8 +6,6 @@
 struct scsi_device;
 struct scsi_sense_hdr;

#define SCSI_LOG_BUFSIZE 128
-
 extern void scsi_print_command(struct scsi_cmnd *);
 extern size_t __scsi_format_command(char *, size_t,
     const unsigned char *, size_t);
--- linux-4.15.0.orig/include/scsi/scsi_eh.h
+++ linux-4.15.0/include/scsi/scsi_eh.h
@@ -32,6 +32,7 @@
 struct scsi_eh_save {
    /* saved state */
    int result;
    +unsigned int resid_len;
    int eh_eflags;
    enum dma_data_direction data_direction;
    unsigned underflow;
--- linux-4.15.0.orig/include/scsi/scsi_host.h
+++ linux-4.15.0/include/scsi/scsi_host.h
@@ -452,6 +452,9 @@
    /* True if the controller does not support WRITE SAME */
    unsigned no_write_same:1;

    +/* True if the low-level driver supports blk-mq only */
    +unsigned force_blk mq:1;
    +
    +/*
    * Countdown for host blocking with no commands outstanding.
    */
--- linux-4.15.0.orig/include/scsi/scsi_transport_fc.h
+++ linux-4.15.0/include/scsi/scsi_transport_fc.h
@@ -139,8 +139,8 @@
#define FC_PORTSPEED_50GBIT0x200
#define FC_PORTSPEED_100GBIT0x400
#define FC_PORTSPEED_25GBIT0x800
-#define FC_PORTSPEED_64BIT0x1000
-#define FC_PORTSPEED_128BIT0x2000
+#define FC_PORTSPEED_64GBIT0x1000
+#define FC_PORTSPEED_128GBIT0x2000
#define FC_PORTSPEED_NOT_NEGOTIATED(1 << 15) /* Speed not established */
extern void iscsi_free_session(struct iscsi_cls_session *session);
extern struct iscsi_cls_conn *iscsi_create_conn(struct iscsi_cls_session *sess,
int dd_size, uint32_t cid);
+extern void iscsi_put_conn(struct iscsi_cls_conn *conn);
+extern void iscsi_get_conn(struct iscsi_cls_conn *conn);
extern int iscsi_destroy_conn(struct iscsi_cls_conn *conn);
extern void iscsi_unblock_session(struct iscsi_cls_session *session);
extern void iscsi_block_session(struct iscsi_cls_session *session);
--- linux-4.15.0.orig/include/soc/arc/mcip.h
+++ linux-4.15.0/include/soc/arc/mcip.h
@@ -36,10 +37,14 @@
 #define CMD_GFRC_SET_CORE	0x47
 +#define CMD_GFRC_READ_CORE	0x48
 #define CMD_IDU_ENABLE	0x71
 #define CMD_IDU_DISABLE	0x72

#define ARC_REG_MCIP_BCR0x0d0
#define ARC_REG_MCIP_IDU_BCR0x0D5
+##define ARC_REG_GFRC_BUILD0x0D6
#define ARC_REG_MCIP_CMD0x600
#define ARC_REG_MCIP_WDATA0x601
#define ARC_REG_MCIP_READBACK0x602
@@ -36,10 +37,14 @@
 #define CMD_SEMA_RELEASE0x12

#define CMD_DEBUG_SET_MASK0x34
+##define CMD_DEBUG_READ_MASK0x35
#define CMD_DEBUG_SET_SELECT0x36
+##define CMD_DEBUG_READ_SELECT0x37

#define CMD_GFRC_READ_LO0x42
#define CMD_GFRC_READ_HI0x43
+##define CMD_GFRC_SET_CORE0x47
+##define CMD_GFRC_READ_CORE0x48

#define CMD_IDU_ENABLE0x71
#define CMD_IDU_DISABLE0x72
static inline int rpi_firmware_property(struct rpi_firmware *fw, u32 tag, void *data, size_t len)
{
    return 0;
    +return -ENOSYS;
}

static inline int rpi_firmware_property_list(struct rpi_firmware *fw, void *data, size_t tag_size)
{
    return 0;
    +return -ENOSYS;
}

static inline struct rpi_firmware *rpi_firmware_get(struct device_node *firmware_node)
* @metadata_set: metadata set flag, true when set
* @next_track: has userspace signal next track transition, true when set
+ * @partial_drain: undergoing partial_drain for stream, true when set
* @private_data: pointer to DSP private data
*/

struct snd_compr_stream {
@@ -83,6 +84,7 @@
  enum snd_compr_direction direction;
  bool metadata_set;
  bool next_track;
+  bool partial_drain;
  void *private_data;
};
@@ -186,7 +188,14 @@
        if (snd_BUG_ON(!stream))
            return;

        stream->runtime->state = SNDRV_PCM_STATE_SETUP;
+/* for partial_drain case we are back to running state on success */
+if (stream->partial_drain) {
+    stream->runtime->state = SNDRV_PCM_STATE_RUNNING;
+    stream->partial_drain = false; /* clear this flag as well */
+} else {
+    stream->runtime->state = SNDRV_PCM_STATE_SETUP;
+}
+    wake_up(&stream->runtime->sleep);
    }

--- linux-4.15.0.orig/include/sound/control.h
+++ linux-4.15.0/include/sound/control.h
@@ -23,6 +23,7 @@
 */

#include <linux/wait.h>
+#include <linux/nospec.h>
#include <sound/asound.h>

#define snd_kcontrol_chip(kcontrol) ((kcontrol)->private_data)
@@ -148,12 +149,14 @@

static inline unsigned int snd_ctl_get_ioffnum(struct snd_kcontrol *kctl, struct snd_ctl_elem_id *id)
{
        -return id->numid - kctl->id.numid;
+unsigned int ioff = id->numid - kctl->id.numid;
+return array_index_nospec(ioff, kctl->count);
}
static inline unsigned int snd_ctl_get_ioffidx(struct snd_kcontrol *kctl, struct snd_ctl_elem_id *id)
{
    -return id->index - kctl->id.index;
    +unsigned int ioff = id->index - kctl->id.index;
    +return array_index_nospec(ioff, kctl->count);
}

static inline unsigned int snd_ctl_get_ioff(struct snd_kcontrol *kctl, struct snd_ctl_elem_id *id)
--- linux-4.15.0.orig/include/sound/hdaudio.h
+++ linux-4.15.0/include/sound/hdaudio.h
@@ -227,9 +227,6 @@
#define HDA_UNSOL_QUEUE_SIZE	64
#define HDA_MAX_CODECS		8	/* limit by controller side */

-/* HD Audio class code */
-#define PCI_CLASS_MULTIMEDIA_HD_AUDIO	0x0403
-
/*
* CORB/RIRB
*
@@ -356,6 +353,7 @@
 void snd_hdac_bus_stop_cmd_io(struct hdac_bus *bus);
 void snd_hdac_bus_enter_link_reset(struct hdac_bus *bus);
 void snd_hdac_bus_exit_link_reset(struct hdac_bus *bus);
+int snd_hdac_bus_reset_link(struct hdac_bus *bus, bool full_reset);

 void snd_hdac_bus_update_rirb(struct hdac_bus *bus);
 int snd_hdac_bus_handle_stream_irq(struct hdac_bus *bus, unsigned int status,
--- linux-4.15.0.orig/include/sound/pcm_oss.h
+++ linux-4.15.0/include/sound/pcm_oss.h
@@ -57,6 +57,7 @@
 struct mutex params_lock;
 +atomic_t rw_ref;/* concurrent read/write accesses */
 #ifdef CONFIG_SND_PCM_OSS_PLUGINS
 struct snd_pcm_plugin *plugin_first;
 struct snd_pcm_plugin *plugin_last;
--- linux-4.15.0.orig/include/sound/pcm_params.h
+++ linux-4.15.0/include/sound/pcm_params.h
 @@ -247,11 +247,13 @@
 static inline int snd_interval_single(const struct snd_interval *i)
 {
     return (i->min == i->max ||
         -(i->min + 1 == i->max && i->openmax));
     +(i->min + 1 == i->max && (i->openmin || i->openmax));
 }
static inline int snd_interval_value(const struct snd_interval *i) {
+if (i->openmin && !i->openmax)
+return i->max;
return i->min;
}

--- linux-4.15.0.orig/include/sound/rawmidi.h
+++ linux-4.15.0/include/sound/rawmidi.h
@@ -76,6 +76,7 @@
 size_t avail_min;/* min avail for wakeup */
 size_t avail;/* max used buffer for wakeup */
 size_t xruns;/* over/underruns counter */
+int buffer_ref;/* buffer reference count */
/* misc */
spinlock_t lock;
wait_queue_head_t sleep;
@@ -92,9 +93,9 @@
 struct list_head list;/* list of all substream for given stream */
 int stream;/* direction */
 int number;/* substream number */
-unsigned int opened: 1,/* open flag */
- append: 1;/* append flag (merge more streams) */
- active_sensing: 1;/* send active sensing when close */
+bool opened; /* open flag */
+ append: 1;/* append flag (merge more streams) */
+ active_sensing: 1;/* send active sensing when close */
int use_count;/* use counter (for output) */
size_t bytes;
struct snd_rawmidi *rmidi;
--- linux-4.15.0.orig/include/sound/rt5670.h
+++ linux-4.15.0/include/sound/rt5670.h
@@ -15,6 +15,7 @@
 int jd_mode;
 bool in2_diff;
 bool dev_gpio;
+bool gpio1_is_ext_spk_en;

 bool dmic_en;
unsigned int dmic1_data_pin;
--- linux-4.15.0.orig/include/sound/soc-dapm.h
+++ linux-4.15.0/include/sound/soc-dapm.h
@@ -349,6 +349,8 @@
#define SND_SOC_DAPM_WILL_PMD 0x80 /* called at start of sequence */
#define SND_SOC_DAPM_PRE_POST_PMD |
(SND_SOC_DAPM_PRE_PMD | SND_SOC_DAPM_POST_PMD)
+#define SND_SOC_DAPM_PRE_POST_PMU \
+(SND_SOC_DAPM_PRE_PMU | SND_SOC_DAPM_POST_PMU)

/* convenience event type detection */
#define SND_SOC_DAPM_EVENT_ON(e)
@@ -401,6 +403,7 @@
int snd_soc_dapm_link_dai_widgets(struct snd_soc_card *card);
void snd_soc_dapm_connect_dai_link_widgets(struct snd_soc_card *card);
int snd_soc_dapm_new_pcm(struct snd_soc_card *card,
+struct snd_soc_pcm_runtime *rtd,
const struct snd_soc_pcm_stream *params,
unsigned int num_params,
struct snd_soc_dapm_widget *source,
--- linux-4.15.0.orig/include/target/iscsi/iscsi_target_core.h
+++ linux-4.15.0/include/target/iscsi/iscsi_target_core.h
@@ -673,7 -673,7 @+
atomic_t		session_close;
/* connection list */
struct list_head	sess_conn_list;
struct list_head	cr_active_list;
--- linux-4.15.0.orig/include/trace/events/afs.h
+++ linux-4.15.0/include/trace/events/afs.h
@@ -72,7 +72,7 @@
EM(afs_call_trace_free,"FREE " ) \  
EM(afs_call_trace_put,"PUT ") \  
EM(afs_call_trace_wake,"WAKE ") \  
-E_(afs_call_trace_work,"WORK ")  
+F_(afs_call_trace_work,"QUEUE")

# define afs_fs_operations \  
EM(afs_FS_FetchData,"FS.FetchData") \  
--- linux-4.15.0.orig/include/trace/events/btrfs.h
+++ linux-4.15.0/include/trace/events/btrfs.h
@@ -332,7 +332,7 @@
		__entry->extent_end	= (start + btrfs_file_extent_ram_bytes(l, fi));
		__entry->extent_start= start;
		__entry->extent_end= (start + btrfs_file_extent_ram_bytes(l, fi));
		}

TP_printk_btrfs(
--- linux-4.15.0.orig/include/trace/events/ext4.h
+++ linux-4.15.0/include/trace/events/ext4.h
@@ -225,6 +225,26 @@
)
(unsigned long) __entry->ino, __entry->drop)
);

+TRACE_EVENT(ext4_nfs_commit_metadata,
+TPPROTO(struct inode *inode),
+
+TP_ARGS(inode),
+
+TP_STRUCT__entry(
+  __field(dev_t,dev)
+  __field(ino_t,ino)
+),
+
+TP_fast_assign(
+  __entry->dev= inode->i_sb->s_dev;
+  __entry->ino= inode->i_ino;
+),
+
+TP_printf("dev %d,%d ino %lu",
+ MAJOR(__entry->dev), MINOR(__entry->dev),
+ (unsigned long) __entry->ino)
+);
+
TRACE_EVENT(ext4_mark_inode_dirty,
TPPROTO(struct inode *inode, unsigned long IP),

--- linux-4.15.0.orig/include/trace/events/fs.h
+++ linux-4.15.0/include/trace/events/fs.h
@@ -0,0 +1,53 @@
+#undef TRACE_SYSTEM
+#define TRACE_SYSTEM fs
+
+﻿#if !defined(_TRACE_FS_H) || defined(TRACE_HEADER_MULTI_READ)
+  #define _TRACE_FS_H
+
+  #include <linux/fs.h>
+  #include <linux/tracepoint.h>
+
+  +TRACE_EVENT(do_sys_open,
+  +TPPROTO(const char *filename, int flags, int mode),
+  +TP_ARGS(filename, flags, mode),
+  +TP_STRUCT__entry(
+  +__string(filename, filename)
+  +__field(int, flags)
+  +__field(int, mode)
+open_exec(
+        const char *filename,
+        struct __entry __entry,
+        int flags, int mode,
+        int blocks, int blk_addr,
+        int blksz, int data_flags, int tag,
+        int can_retune, int doing_retune,
+        int retune_now, int need_retune,
+        int hold_retune, int retune_period)
+);
TP_ARGS(ip, parent_ip),

TP_STRUCT__entry(  
	__field(u32, caller_offs)  
	__field(u32, parent_offs)  
+__field(s32, caller_offs)  
+__field(s32, parent_offs)  
),

TP_fast_assign(  
-__entry->caller_offs = (u32)(ip - (unsigned long)_stext);  
-__entry->parent_offs = (u32)(parent_ip - (unsigned long)_stext);  
+__entry->caller_offs = (s32)(ip - (unsigned long)_stext);  
+__entry->parent_offs = (s32)(parent_ip - (unsigned long)_stext);  
),

TP_printk("caller=%pF parent=%pF",  
--- linux-4.15.0.orig/include/trace/events/rxrpc.h
+++ linux-4.15.0/include/trace/events/rxrpc.h
@@ -60,6 +60,7 @@  
rxrpc_client_chan_disconnect,  
rxrpc_client_chan_pass,  
rxrpc_client_chan_unstarted,  
+rxrpc_client_chan_wait_failed,  
rxrpc_client_cleanup,  
rxrpc_client_count,  
rxrpc_client_discard,  
@@ -232,6 +233,7 @@  
EM(rxrpc_client_chan_disconnect,"ChDisc")\  
EM(rxrpc_client_chan_pass,"ChPass")\  
EM(rxrpc_client_chan_unstarted,"ChUnst")\  
+EM(rxrpc_client_chan_wait_failed,"ChWtFl")\  
EM(rxrpc_client_cleanup,"Clean ")\  
EM(rxrpc_client_count,"Count ")\  
EM(rxrpc_client_discard,"Discar")\  
@@ -363,7 +365,7 @@  
EM(rxrpc_cong_begin_retransmission," Retrans")\  
EM(rxrpc_cong_cleared_nacks," Cleared")\  
EM(rxrpc_cong_new_low_nack," NewLowN")\  
-EM(rxrpc_cong_no_change,""")\  
+EM(rxrpc_cong_no_change,"-"\)  
EM(rxrpc_cong_progress," Progres")\  
EM(rxrpc_cong_retransmit_again," ReTxAgn")\  
EM(rxrpc_cong_rtt_window_end," RttWinE")\  
--- linux-4.15.0.orig/include/trace/events/sched.h
+++ linux-4.15.0/include/trace/events/sched.h
#ifdef CREATE_TRACE_POINTS
static inline long __trace_sched_switch_state(bool preempt, struct task_struct *p)
{
    unsigned int state;

    #ifdef CONFIG_SCHED_DEBUG
    BUG_ON(p != current);
    #endif /* CONFIG_SCHED_DEBUG */

    if (preempt)
        return TASK_REPORT_MAX;

    -return 1 << task_state_index(p);
/+*
/+ * task_state_index() uses fls() and returns a value from 0-8 range.
/+ * Decrement it by 1 (except TASK_RUNNING state i.e 0) before using
/+ * it for left shift operation to get the correct task->state
/+ * mapping.
/+ */
+state = task_state_index(p);
+
+return state ? (1 << (state - 1)) : state;
#endif /* CREATE_TRACE_POINTS */

@@ -159,9 +169,14 @@
(__entry->prev_state & (TASK_REPORT_MAX - 1)) ?
    __print_flags(__entry->prev_state & (TASK_REPORT_MAX - 1), "|",
    { 0x01, "S" }, { 0x02, "D" }, { 0x04, "T" },
    { 0x08, "t" }, { 0x10, "X" }, { 0x20, "Z" },
    { 0x40, "P" }, { 0x80, "I" }) :
        +{ TASK_INTERRUPTIBLE, "S" },
        +{ TASK_UNINTERRUPTIBLE, "D" },
        +{ __TASK_STOPPED, "T" },
        +{ __TASK_TRACED, "t" },
        +{ EXIT_DEAD, "X" },
        +{ EXIT_ZOMBIE, "Z" },
        +{ TASK_PARKED, "P" },
        +{ TASK_DEAD, "I" }) :
            "R",

    __entry->prev_state & TASK_REPORT_MAX ? "+" : "",
@@ -435,7 +450,9 @@
    memcpy(__entry->comm, tsk->comm, TASK_COMM_LEN);
    __entry->pid= tsk->pid;
    __entry->oldprio= tsk->prio;

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- __entry->newprio = pi_task ? pi_task->prio : tsk->prio;
+ __entry->newprio = pi_task ?
+   min(tsk->normal_prio, pi_task->prio) :
+   tsk->normal_prio;
/* XXX SCHED_DEADLINE bits missing */

--- linux-4.15.0.orig/include/trace/events/target.h
+++ linux-4.15.0/include/trace/events/target.h
@@ -140,6 +140,7 @@
    __field( unsigned int, opcode)
    __field( unsigned int, data_length)
    __field( unsigned int, task_attribute)
+    __field( unsigned char, control)
    __array( unsigned char, cdb, TCM_MAX_COMMAND_SIZE)
    __string( initiator, cmd->se_sess->se_node_acl->initiatorname)
 ),
@@ -149,6 +150,7 @@
    __entry->opcode = cmd->t_task_cdb[0];
    __entry->data_length = cmd->data_length;
    __entry->task_attribute = cmd->sam_task_attr;
+    __entry->control = scsi_command_control(cmd->t_task_cdb);
    memcpy(__entry->cdb, cmd->t_task_cdb, TCM_MAX_COMMAND_SIZE);
    __assign_str(initiator, cmd->se_sess->se_node_acl->initiatorname);
 ),
@@ -158,9 +160,7 @@
    __entry->opcode = cmd->t_task_cdb[0];
    __entry->data_length = cmd->data_length;
    __entry->task_attribute = cmd->sam_task_attr;
-    scsi_command_size(__entry->cdb) <= 16 ?
-        __entry->cdb[scsi_command_size(__entry->cdb) - 1] :
-        __entry->cdb[1]
+        __entry->control
    )
 );

@@ -175,6 +175,7 @@
    __field( unsigned int, opcode)
    __field( unsigned int, data_length)
    __field( unsigned int, task_attribute)
+    __field( unsigned char, control)
    __field( unsigned char, scsi_status)
    __field( unsigned char, sense_length)
    __array( unsigned char, cdb, TCM_MAX_COMMAND_SIZE)
@@ -187,6 +188,7 @@
    __entry->opcode = cmd->t_task_cdb[0];
    __entry->data_length = cmd->data_length;
    __entry->task_attribute = cmd->sam_task_attr;
+ _entry->control= scsi_command_control(cmd->t_task_cdb);
  __entry->scsi_status = cmd->scsi_status;
  __entry->sense_length = cmd->scsi_status == SAM_STAT_CHECK_CONDITION ?
    min(18, ((u8 *) cmd->sense_buffer)[SPC_ADD_SENSE_LEN_OFFSET] + 8) : 0;
@ @ -203,9 +205,7 @@
    show_opcode_name(__entry->opcode),
    __entry->data_length, __print_hex(__entry->cdb, 16),
    show_task_attribute_name(__entry->task_attribute),
-  scsi_command_size(__entry->cdb) <= 16 ?
-    __entry->cdb[scsi_command_size(__entry->cdb) - 1] :
-    __entry->cdb[1]
+  __entry->control
 )
);

--- linux-4.15.0.orig/include/trace/events/timer.h
+++ linux-4.15.0/include/trace/events/timer.h
@@ -136,6 +136,20 @@
    TP_ARGS(timer)
    );

+#define decode_clockid(type)\
+    __print_symbolic(type,\
+        { CLOCK_REALTIME,"CLOCK_REALTIME" },\
+        { CLOCK_MONOTONIC,"CLOCK_MONOTONIC" },\
+        { CLOCK_BOOTTIME,"CLOCK_BOOTTIME" },\
+        { CLOCK_TAI,"CLOCK_TAI" })
+    
+#define decode_hrtimer_mode(mode)\
+    __print_symbolic(mode,\
+        { HRTIMER_MODE_ABS,"ABS" },\
+        { HRTIMER_MODE_REL,"REL" },\
+        { HRTIMER_MODE_ABS_PINNED,"ABS|PINNED" },\
+        { HRTIMER_MODE_REL_PINNED,"REL|PINNED" })
+    
/**
 * hrtimer_init - called when the hrtimer is initialized
 * @hrtimer: pointer to struct hrtimer
@ @ -162,10 +176,8 @@
 ),
TP_printk("hrtimer=%p clockid=%s mode=%s", __entry->hrtimer,
-  __entry->clockid == CLOCK_REALTIME ?
-  "CLOCK_REALTIME" : "CLOCK_MONOTONIC",
-  __entry->mode == HRTIMER_MODE_ABS ?
-  "HRTIMER_MODE_ABS" : "HRTIMER_MODE_REL")
+  decode_clockid(__entry->clockid),
+  decode_hrtimer_mode(__entry->mode))
/**
--- linux-4.15.0.orig/include/trace/events/wbt.h
+++ linux-4.15.0/include/trace/events/wbt.h
@@ -33,7 +33,8 @@
 TP_fast_assign(
    __entry->name, dev_name(bdi->dev), 32);
+strlcpy(__entry->name, dev_name(bdi->dev),
+ARRAY_SIZE(__entry->name));
 __entry->rmean = stat[0].mean;
 __entry->rmin = stat[0].min;
 __entry->rmax = stat[0].max;
@@ -67,7 +68,8 @@
 TP_fast_assign(
    __entry->name, dev_name(bdi->dev), 32);
+strlcpy(__entry->name, dev_name(bdi->dev),
+ARRAY_SIZE(__entry->name));
 __entry->lat = div_u64(lat, 1000);
@@ -103,7 +105,8 @@
 TP_fast_assign(
    __entry->name, dev_name(bdi->dev), 32);
+strlcpy(__entry->name, dev_name(bdi->dev),
+ARRAY_SIZE(__entry->name));
 __entry->msg = msg;
 __entry->step = step;
 __entry->window = div_u64(window, 1000);
@@ -138,7 +141,8 @@
 TP_fast_assign(
    __entry->name, dev_name(bdi->dev), 32);
+strlcpy(__entry->name, dev_name(bdi->dev),
+ARRAY_SIZE(__entry->name));
 __entry->status = status;
 __entry->step = step;
 __entry->inflight = inflight;
--- linux-4.15.0.orig/include/trace/events/writeback.h
+++ linux-4.15.0/include/trace/events/writeback.h
@@ -20,7 +20,6 @@
TP_fast_assign(
    -strncpy(__entry->name,
            dev_name(inode_to_bdi(inode)->dev) : "(unknown)", 32);
    +strncpy_pad(__entry->name,
                 bdi->dev ? dev_name(bdi->dev) : "(unknown)", 32);
    __entry->ino = inode->i_ino;
    __entry->sync_mode = wbc->sync_mode;
    __entry->cgroup_ino = __trace_wbc_assign_cgroup(wbc);
    @ @ -176,8 +175,8 @@
    ),

TP_fast_assign(
    -strncpy(__entry->name,
            dev_name(inode_to_bdi(inode)->dev) : "(unknown)", 32);
    +strncpy_pad(__entry->name,
                 bdi->dev ? dev_name(bdi->dev) : "(unknown)", 32);
    __entry->ino = inode->i_ino;
    __entry->sync_mode = wbc->sync_mode;
    __entry->cgroup_ino = __trace_wbc_assign_cgroup(wbc);
    @ @ -220,8 +219,7 @@
    __field(unsigned int, cgroup_ino)
    ),

TP_fast_assign(
    -strncpy(__entry->name,
            dev_name(wb->bdi->dev) : "(unknown)", 32);
    +strncpy_pad(__entry->name, bdi->dev_name(wb->bdi), 32);
    __entry->nr_pages = work->nr_pages;
__entry->sb_dev = work->sb ? work->sb->s_dev : 0;
__entry->sync_mode = work->sync_mode;
@@ -274,7 +272,7 @@
 __field(unsigned int, cgroup_ino)
 ),
 TP_fast_assign(
-    __entry->name, dev_name(wb->bdi->dev), 32);
+    __entry->name, bdi_dev_name(wb), 32);
 __entry->cgroup_ino = __trace_wb_assign_cgroup(wb);
 ),
 TP_printk("bdi %s: cgroup_ino=%u",
@@ -296,7 +294,7 @@
 __array(char, name, 32)
 ),
 TP_fast_assign(
-    __entry->name, dev_name(bdi->dev), 32);
+    __entry->name, bdi_dev_name(bdi), 32);
 ),
 TP_printk("bdi %s",
@@ -321,7 +319,7 @@
 __field(unsigned int, cgroup_ino)
 ),
 TP_fast_assign(
-    __entry->name, dev_name(bdi->dev), 32);
+    __entry->name, bdi_dev_name(bdi), 32);
 __entry->nr_to_write = wbc->nr_to_write;
 __entry->pages_skipped = wbc->pages_skipped;
 __entry->sync_mode = wbc->sync_mode;
@@ -360,8 +358,9 @@
 TRACE_EVENT(writeback_queue_io,
 TP_PROTO(struct bdi_writeback *wb,
-    unsigned long dirtied_before,
+    unsigned long dirtied_before, moved),
-    int moved),
+    unsigned long dirtied_before, moved),
 TP_ARGS(wb, work, moved),
+TP_ARGS(wb, work, dirtied_before, moved),
 TP_STRUCT__entry(
    __array(char, name, 32)
    __field(unsigned int, older)
@@ -371,19 +370,17 @@
    __field(unsigned int, cgroup_ino)
 ),
 TP_fast_assign(
-    unsigned long *older_than_this = work->older_than_this;
-    __entry->name, dev_name(wb->bdi->dev), 32);
+    __entry->name, dev_name(wb->bdi->dev), 32);
-    __entry->older = older_than_this ? *older_than_this : 0;
-    __entry->age = older_than_this ?
+    __entry->older = older_than_this ?

- (jiffies - older_than_this) * 1000 / HZ : -1;
+strncpy_pad((__entry->name, bdi_dev_name(wb->bdi), 32);
+__entry->older= dirtied_before;
+__entry->age= (jiffies - dirtied_before) * 1000 / HZ;
__entry->moved= moved;
__entry->reason= work->reason;
__entry->cgroup_ino= __trace_wb_assign_cgroup(wb);
),
TP_printk("bdi %s: older=%lu age=%ld enqueue=%d reason=%s cgroup_ino=%u",
__entry->name,
-__entry->older,/* older_than_this in jiffies */
-__entry->age,/* older_than_this in relative milliseconds */
+__entry->older,/* dirtied_before in jiffies */
+__entry->age,/* dirtied_before in relative milliseconds */
__entry->moved,
__print_symbolic(__entry->reason, WB_WORK_REASON),
__entry->cgroup_ino
@@ -458,7 +455,7 @@
),
TP_fast_assign(
-strlcpy(__entry->bdi, dev_name(wb->bdi->dev), 32);
+strncpy_pad(__entry->bdi, bdi_dev_name(wb->bdi), 32);
__entry->write_bw= KBps(wb->write_bandwidth);
__entry->avg_write_bw= KBps(wb->avg_write_bandwidth);
__entry->dirty_rate= KBps(dirty_rate);
@@ -523,7 +520,7 @@
),
unsigned long freerun = (thresh + bg_thresh) / 2;
-strlcpy(__entry->bdi, dev_name(wb->bdi->dev), 32);
+strncpy_pad(__entry->bdi, bdi_dev_name(wb->bdi), 32);
__entry->limit= global_wb_domain.dirty_limit;
__entry->setpoint= (global_wb_domain.dirty_limit +
@@ -583,8 +580,8 @@
),
TP_fast_assign(
-strcmp(__entry->name,
-    dev_name(inode_to_bdi(inode)->dev), 32);
+strcmp(__entry->name,
+    bdi_dev_name(inode_to_bdi(inode)), 32);
__entry->ino= inode->i_ino;
__entry->state= inode->i_state;
__entry->dirtied_when= inode->dirtied_when;
@@ -657,8 +654,8 @@
TP_fast_assign(
- strncpy(__entry->name,
- dev_name(inode_to_bdi(inode)->dev), 32);
+ strcpy_pad(__entry->name,
+ bdi_dev_name(inode_to_bdi(inode)), 32);
__entry->ino = inode->i_ino;
__entry->state = inode->i_state;
__entry->dirtied_when = inode->dirtied_when;
--- linux-4.15.0.orig/include/trace/events/xen.h
+++ linux-4.15.0/include/trace/events/xen.h
@@ -66,7 +66,11 @@
 TP_PROTO(xen_mc_callback_fn_t fn, void *data),
 TP_ARGS(fn, data),
 TP_STRUCT__entry(    __field(xen_mc_callback_fn_t, fn)
+   /*
+    * Use field_struct to avoid is_signed_type()
+    * comparison of a function pointer.
+   */
+   __field_struct(xen_mc_callback_fn_t, fn)
   __field(void *, data)
 ),
 TP_fast_assign(     @@ -352,23 +356,7 @@
 DEFINE_XEN_MMU_PGD_EVENT(xen_mmu_pgd_pin);
 DEFINE_XEN_MMU_PGD_EVENT(xen_mmu_pgd_unpin);

-TRACE_EVENT(xen_mmu_flush_tlb_all,
- TP_PROTO(int x),
- TP_ARGS(x),
- TP_STRUCT__entry(__array(char, x, 0)),
- TP_fast_assign((void)x),
- TP_printk("%s", "")
- );
-
-TRACE_EVENT(xen_mmu_flush_tlb,
- TP_PROTO(int x),
- TP_ARGS(x),
- TP_STRUCT__entry(__array(char, x, 0)),
- TP_fast_assign((void)x),
- TP_printk("%s", "")
- );
-
-TRACE_EVENT(xen_mmu_flush_tlb_single,
+TRACE_EVENT(xen_mmu_flush_tlb_one_user,
   TP_PROTO(unsigned long addr),
   TP_ARGS(addr),
   TP_Printk("%s", "")
- );
-
/*
 * Different engines serve different roles, and there may be more than one
 * engine serving each role. enum drm_i915_gem_engine_class provides a
 * classification of the role of the engine, which may be used when requesting
 * operations to be performed on a certain subset of engines, or for providing
 * information about that group.
 * */

enum drm_i915_gem_engine_class {
    I915_ENGINE_CLASS_RENDER = 0,
    I915_ENGINE_CLASS_COPY = 1,
    I915_ENGINE_CLASS_VIDEO = 2,
    I915_ENGINE_CLASS_VIDEO_ENHANCE = 3,
    I915_ENGINE_CLASS_INVALID = -1
};

/* Each region is a minimum of 16k, and there are at most 255 of them. */
#define I915_NR_TEX_REGIONS 255 /* table size 2k - maximum due to use */

/* Query whether every context (both per-file default and user created) is
 * isolated (insofar as HW supports). If this parameter is not true, then
 * freshly created contexts may inherit values from an existing context,
 * rather than default HW values. If true, it also ensures (insofar as HW
 * supports) that all state set by this context will not leak to any other
 * context.
 * */

#define I915_PARAM_HAS_CONTEXT_ISOLATION 50

/* As not every engine across every gen support contexts, the returned
 * value reports the support of context isolation for individual engines by
 * returning a bitmask of each engine class set to true if that class supports
 * isolation.
 * */
#define I915_PARAM_HAS_EXEC_FENCE_ARRAY 49
@@ -863,7 +894,7 @@
 * struct drm_i915_gem_exec_fence *fences.
 */
 __u64 cliprects_ptr;
-#define I915_EXEC_RING_MASK              (7<<0)
+#define I915_EXEC_RING_MASK              (0x3f)
 #define I915_EXEC_DEFAULT                (0<<0)
 #define I915_EXEC_RENDER                 (1<<0)
 #define I915_EXEC_BSD                    (2<<0)
--- linux-4.15.0.orig/include/uapi/drm/virtgpu_drm.h
+++ linux-4.15.0/include/uapi/drm/virtgpu_drm.h
@@ -63,6 +63,7 @@
 
 struct drm_virtgpu_getparam {
     __u64 param;
--- linux-4.15.0.orig/include/uapi/linux/arm_sdei.h
+++ linux-4.15.0/include/uapi/linux/arm_sdei.h
@@ -0,0 +1,73 @@
+/* SPDX-License-Identifier: GPL-2.0 WITH Linux-syscall-note */
+/* Copyright (C) 2017 Arm Ltd. */
+#ifndef _UAPI_LINUX_ARM_SDEI_H
+#define _UAPI_LINUX_ARM_SDEI_H
+
+#define SDEI_1_0_FN_BASE			0xC4000020
+#define SDEI_1_0_MASK				0xFFFFFFE0
+#define SDEI_1_0_FN(n)				(SDEI_1_0_FN_BASE + (n))
+
+#define SDEI_1_0_FN_SDEI_VERSIONSDEI_1_0_FN(0x00)
+#define SDEI_1_0_FN_SDEI_EVENT_REGISTERSSDEI_1_0_FN(0x01)
+#define SDEI_1_0_FN_SDEI_EVENT_ENABLESSDEI_1_0_FN(0x02)
+#define SDEI_1_0_FN_SDEI_EVENT_DISABLESSDEI_1_0_FN(0x03)
+#define SDEI_1_0_FN_SDEI_EVENT_CONTEXTSDEI_1_0_FN(0x04)
+#define SDEI_1_0_FN_SDEI_EVENT_COMPLETESSDEI_1_0_FN(0x05)
+#define SDEI_1_0_FN_SDEI_EVENT_COMPLETE_AND_RESUMESDEI_1_0_FN(0x06)
+#define SDEI_1_0_FN_SDEI_EVENT_UNREGISTRASSDEI_1_0_FN(0x07)
+#define SDEI_1_0_FN_SDEI_EVENT_STATUSSDEI_1_0_FN(0x08)
+#define SDEI_1_0_FN_SDEI_EVENT_INFOSDEI_1_0_FN(0x09)
+#define SDEI_1_0_FN_SDEI_EVENT_ROUTING_SETSSDEI_1_0_FN(0x0A)
+#define SDEI_1_0_FN_SDEI_PE_MASKSDEI_1_0_FN(0x0B)
+#define SDEI_1_0_FN_SDEI_PE_UNMASKSDEI_1_0_FN(0x0C)
+#define SDEI_1_0_FN_SDEI_INTERRUPT_BINDSDEI_1_0_FN(0x0D)
+#define SDEI_1_0_FN_SDEI_INTERRUPT_RELEASESDEI_1_0_FN(0x0E)
+#define SDEI_1_0_FN_SDEI_PRIVATE_RESETSDEI_1_0_FN(0x11)
+#define SDEI_1_0_FN_SDEI_SHARED_RESETSDEI_1_0_FN(0x12)
#define SDEI_VERSION_MAJOR_SHIFT 48
#define SDEI_VERSION_MAJOR_MASK 0x7fff
#define SDEI_VERSION_MINOR_SHIFT 32
#define SDEI_VERSION_MINOR_MASK 0xffff
#define SDEI_VERSION_VENDOR_SHIFT 0
#define SDEI_VERSION_VENDOR_MASK 0xffffffff

#define SDEI_VERSION_MAJOR(x) (x >> SDEI_VERSION_MAJOR_SHIFT & SDEI_VERSION_MAJOR_MASK)
#define SDEI_VERSION_MINOR(x) (x >> SDEI_VERSION_MINOR_SHIFT & SDEI_VERSION_MINOR_MASK)
#define SDEI_VERSION_VENDOR(x) (x >> SDEI_VERSION_VENDOR_SHIFT & SDEI_VERSION_VENDOR_MASK)

/* SDEI return values */
#define SDEI_SUCCESS 0
#define SDEI_NOT_SUPPORTED -1
#define SDEI_INVALID_PARAMETERS -2
#define SDEI_DENIED -3
#define SDEI_PENDING -5
#define SDEI_OUT_OF_RESOURCE -10

/* EVENT_REGISTER flags */
#define SDEI_EVENT_REGISTER_RM_ANY 0
#define SDEI_EVENT_REGISTER_RM_PE 1

/* EVENT_STATUS return value bits */
#define SDEI_EVENT_STATUS_RUNNING 2
#define SDEI_EVENT_STATUS_ENABLED 1
#define SDEI_EVENT_STATUS_REGISTERED 0

/* EVENT_COMPLETE status values */
#define SDEI_evHandled 0
#define SDEI_evFailed 1

/* GET_INFO values */
#define SDEI_EVENT_INFO_EV_TYPE 0
#define SDEI_EVENT_INFO_EV_SIGNALED 1
#define SDEI_EVENT_INFO_EV_PRIORITY 2
#define SDEI_EVENT_INFO_EV_ROUTING_MODE 3
#define SDEI_EVENT_INFO_EV_ROUTING_AFF 4

/* and their results */
#define SDEI_EVENT_TYPE_PRIVATE 0
#define SDEI_EVENT_TYPE_SHARED 1
#define SDEI_EVENT_PRIORITY_NORMAL 0
#define SDEI_EVENT_PRIORITY_CRITICAL 1
#ifdef __AUFS_TYPE_H__
#define __AUFS_TYPE_H__

#define AUFS_NAME "aufs"

#define pr_fmt(fmt)	AUFS_NAME " %s:%d: " fmt, __func__, __LINE__
#include <linux/sched.h>
#undef pr_fmt
#define pr_fmt(fmt) \
		AUFS_NAME " %s:%d:%.*s[%d]: " fmt, __func__, __LINE__, \ 
		(int)sizeof(current->comm), current->comm, current->pid
#else
#include <stdint.h>
#include <sys/types.h>
#endif /* __KERNEL__ */

#include <linux/limits.h>

#define AUFS_VERSION "4.15-20180219"

/* Copyright (C) 2005-2017 Junjiro R. Okajima */
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/* GNU General Public License for more details. */
/* You should have received a copy of the GNU General Public License */
/* along with this program. If not, see <http://www.gnu.org/licenses/>. */
/* */
/* Define it before including all other headers. */
/* sched.h may use pr_* macros before defining "current", so define the */
/* no-current version first, and re-define later. */
/* */
#define pr_fmt(fmt)AUFS_NAME " %s:%d: " fmt, __func__, __LINE__
#include <linux/sched.h>
#undef pr_fmt
#define pr_fmt(fmt) \
		AUFS_NAME " %s:%d:%.*s[%d]: " fmt, __func__, __LINE__, \ 
		(int)sizeof(current->comm), current->comm, current->pid
#else
#include <stdint.h>
#include <sys/types.h>
#endif /* __KERNEL__ */

#include <linux/limits.h>

#define AUFS_VERSION "4.15-20180219"

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/* todo? move this to linux-2.6.19/include/magic.h */
#define AUFS_SUPER_MAGIC ('a' << 24 | 'u' << 16 | 'f' << 8 | 's')

/* ---------------------------------------------------------------------- */

#ifdef CONFIG_AUFS_BRANCH_MAX_127
typedef int8_t aufs_bindex_t;
#else
typedef int16_t aufs_bindex_t;
#endif
#undef AUFS_BRANCH_MAX
#define AUFS_BRANCH_MAX 511
#ifdef CONFIG_AUFS_BRANCH_MAX_1023
#define AUFS_BRANCH_MAX 1023
#elif defined(CONFIG_AUFS_BRANCH_MAX_32767)
#define AUFS_BRANCH_MAX 32767
#endif
#endif /* __KERNEL__ */

/* ---------------------------------------------------------------------- */

#define AUFS_FSTYPE AUFS_NAME
#define AUFS_ROOT_INO 2
#define AUFS_FIRST_INO 11
#define AUFS_WH_PFX ".wh."
#define AUFS_WH_PFX_LEN (int)sizeof(AUFS_WH_PFX) - 1
#define AUFS_WH_TMP_LEN 4
/* a limit for rmdir/rename a dir and copyup */
#define AUFS_MAX_NAMELEN (NAME_MAX
  - AUFS_WH_PFX_LEN * 2 /* doubly whiteouted */
  - 1 /* dot */
  - AUFS_WH_TMP_LEN) /* hex */
#define AUFS_XINO_FNAME ".xino"
#define AUFS_XINO_DEFPATH "/tmp/" AUFS_XINO_FNAME
#define AUFS_XINO_DEF_SEC 30 /* seconds */
#define AUFS_XINO_DEF_TRUNC 45 /* percentage */
#define AUFS_DIRWH_DEF 3
#define AUFS_RDCACHE_DEF 10 /* seconds */
#define AUFS_RDCACHE_MAX 3600 /* seconds */
#define AUFS_RDBLK_DEF 512 /* bytes */
+#define AUFS_RDHASH_DEF 32
+#define AUFS_WKQ_NAME AUFS_NAME "d"
+#define AUFS_MFS_DEF_SEC30 /* seconds */
+#define AUFS_MFS_MAX_SEC3600 /* seconds */
+#define AUFS_FHSM_CACHE_DEF_SEC30 /* seconds */
+#define AUFS_PLINK_WARN50 /* number of plinks in a single bucket */
+
+ /* pseudo-link maintenance under /proc */
+#define AUFS_PLINK_MAINT_NAME"plink_maint"
+#define AUFS_PLINK_MAINT_DIR"fs" AUFS_NAME
+#define AUFS_PLINK_MAINT_PATH AUFS_PLINK_MAINT_DIR "/" AUFS_PLINK_MAINT_NAME
+
+ /* dirren, renamed dir */
+#define AUFS_DR_INFO_PFX AUFS_WH_PFX ".dr."
+#define AUFS_DR_BRHINO_NAME AUFS_WH_PFX "hino"
+
+ /* whiteouted doubly */
+#define AUFS_WH_DR_INFO_PFX AUFS_WH_PFX AUFS_DR_INFO_PFX
+#define AUFS_WH_DR_BRHINO AUFS_WH_PFX AUFS_DR_BRHINO_NAME
+
+ /* branch permissions and attributes */
+#define AUFS_BRPERM_RW "rw"
+#define AUFS_BRPERM_RO "ro"
+#define AUFS_BRPERM_RR "rr"
+#define AUFS_BRATTR_COO_REG "coo_reg"
+#define AUFS_BRATTR_COO_ALL "coo_all"
+#define AUFS_BRATTR_FHSM "fhsm"
+#define AUFS_BRATTR_UNPIN "unpin"
+#define AUFS_BRATTR_ICEX "icex"
+#define AUFS_BRATTR_ICEX_SEC "icexsec"
+#define AUFS_BRATTR_ICEX_SYS "icexsys"
+#define AUFS_BRATTR_ICEX_TR "icextr"
+#define AUFS_BRATTR_ICEX_USR "icexusr"
+#define AUFS_BRATTR_ICEX_OTH "icexoth"
+#define AUFS_BRRATTR_WH "wh"
+#define AUFS_BRWATTR_NLWH "nolwh"
+#define AUFS_BRWATTR_MOO "moo"
+ #define AuBrPerm_RW		1		/* writable, hardlinkable wh */
+ #define AuBrPerm_RO(1 << 1)/* readonly */
+ #define AuBrPerm_RR(1 << 2)/* natively readonly */
+ #define AuBrPerm_Mask(AuBrPerm_RW | AuBrPerm_RO | AuBrPerm_RR)
+ 
+ #define AuBrAttr_COO_REG(1 << 3)/* copy-up on open */
+ #define AuBrAttr_COO_ALL(1 << 4)
+ #define AuBrAttr_COO_Mask(AuBrAttr_COO_REG | AuBrAttr_COO_ALL)
+ 
+ #define AuBrAttr_FHSM(1 << 5)/* file-based hsm */
+ #define AuBrAttr_UNPIN(1 << 6)/* rename-able top dir of
+ branch. meaningless since
+ linux-3.18-rc1 */
+ 
+ /* ignore error in copying XATTR */
+ #define AuBrAttr_ICEX_SEC(1 << 7)
+ #define AuBrAttr_ICEX_SYS(1 << 8)
+ #define AuBrAttr_ICEX_TR(1 << 9)
+ #define AuBrAttr_ICEX_USR(1 << 10)
+ #define AuBrAttr_ICEX_OTH(1 << 11)
+ #define AuBrAttr_ICEX(AuBrAttr_ICEX_SEC
+ | AuBrAttr_ICEX_SYS\n+ | AuBrAttr_ICEX_TR\n+ | AuBrAttr_ICEX_USR\n+ | AuBrAttr_ICEX_OTH)
+ 
+ #define AuBrRAttr_WH(1 << 12)/# whiteout-able */
+ #define AuBrRAttr_MaskAuBrRAttr_WH
+ 
+ #define AuBrWAttr_NoLinkWH(1 << 13)/# un-hardlinkable whiteouts */
+ #define AuBrWAttr_MOO(1 << 14)/# move-up on open */
+ #define AuBrWAttr_Mask(AuBrWAttr_NoLinkWH | AuBrWAttr_MOO)
+ 
+ #define AuBrAttr_CMOO_Mask(AuBrAttr_COO_Mask | AuBrWAttr_MOO)
+ 
+ /* #warning test userspace */
+ #ifdef __KERNEL__
+ #ifndef CONFIG_AUFS_FHSM
+ #undef AuBrAttr_FHSM
+ #define AuBrAttr_FHSM 0
+ #endif
+ #ifndef CONFIG_AUFS_XATTR
+ #ifndef AuBrAttr_ICEX
+ #define AuBrAttr_ICEX0
+ #define AuBrAttr_ICEX_SEC0
+ #define AuBrAttr_ICEX_SYS0
+ #endif
+ #endif
+
+return brperm & AuBrAttr_FHSM;
+
+/* ---------------------------------------------------------------------- */
+/* ioctl */
+enum {
+/* readdir in userspace */
+AuCtl_RDU,
+AuCtl_RDU_INO,
+
+AuCtl_WBR_FD,/* pathconf wrapper */
+AuCtl_IBUSY,/* busy inode */
+AuCtl_MVDOWN,/* move-down */
+AuCtl_BR,/* info about branches */
+AuCtl_FHSM_FD/* connection for fhsm */
+} ;
+
+/* borrowed from linux/include/linux/kernel.h */
+#ifndef ALIGN
+#define ALIGN(x, a) __ALIGN_MASK(x, (typeof(x))(a)-1)
+#define __ALIGN_MASK(x, mask) (((x)+(mask))&~(mask))
+#endif
+
+/* borrowed from linux/include/linux/compiler-gcc3.h */
+#ifndef __aligned
+#define __aligned(x) __attribute__((aligned(x)))
+#endif
+
+#ifdef __KERNEL__
+#ifndef __packed
+#define __packed __attribute__((packed))
+#endif
+#endif
+
+struct au_rdu_cookie {
+uint64_t h_pos;
+int16_t bindex;
+uint8_t flags;
+uint8_t pad;
+uint32_t generation;
+} __aligned(8);
+
+struct au_rdu_ent {
+uint64_t ino;
+int16_t bindex;
+uint8_t type;
+uint8_t nlen;
+} __aligned(8);
```c
uint8_t wh;
char name[0];
} __aligned(8);

static inline int au_rdu_len(int nlen)
{
    /* include the terminating NULL */
    return ALIGN(sizeof(struct au_rdu_ent) + nlen + 1,
    + sizeof(uint64_t));
}

union au_rdu_ent_ul {
    struct au_rdu_ent __user*e;
    uint64_t ul;
};

enum {
    AufsCtlRduV_SZ,
    AufsCtlRduV_End
};

struct aufs_rdu {
    /* input */
    union {
        uint64_t sz; /* AuCtl_RDU */
        uint64_t nent; /* AuCtl_RDU_INO */
    };
    union au_rdu_ent_ul ent;
    uint16_t verify[AufsCtlRduV_End];
    /* input/output */
    uint32_t blk;
    /* output */
    union au_rdu_ent_ultail;
    /* number of entries which were added in a single call */
    uint64_t nrent;
    uint8_t full;
    uint8_t shwh;
    struct au_rdu_cookie cookie;
} __aligned(8);

/* ---------------------------------------------------------------------- */

/* dirren. the branch is identified by the filename who contains this */
struct au_drinfo {
    uint64_t ino;
```
union {
  uint8_t oldnamelen;
  uint64_t _padding;
} __aligned(8);

struct au_drinfo_fdata {
  uint32_t magic;
  struct au_drinfo drinfo;
} __aligned(8);

#define AUFS_DRINFO_MAGIC_V1 ('a' << 24 | 'd' << 16 | 'r' << 8 | 0x01)
#define AUFS_DRINFO_MAGIC_V2 ('a' << 24 | 'd' << 16 | 'r' << 8 | 0x02)

/* future */

struct aufs_wbr_fd {
  uint32_t oflags;
  int16_t brid;
} __aligned(8);

/* ---------------------------------------------------------------------- */

struct aufs_ibusy {
  uint64_t ino, h_ino;
  int16_t bindex;
} __aligned(8);

/* ---------------------------------------------------------------------- */

/* error code for move-down */
/* the actual message strings are implemented in aufs-util.git */
enum {
  EAU_MVDOWN_OPAQUE = 1,
  EAU_MVDOWN_WHITEOUT,
  EAU_MVDOWN_UPPER,
  EAU_MVDOWN_BOTTOM,
  EAU_MVDOWN_NOUPPER,
  EAU_MVDOWN_NOLOWERBR,
  EAU_Last
};

/* flags for move-down */
#define AUFS_MVDOWN_DMSG 1
#define AUFS_MVDOWN_OWLOWER (1 << 1) /* overwrite lower */
#define AUFS_MVDOWN_KUPPER (1 << 2) /* keep upper */
+#define AUFS_MVDOWN_ROLOWER  (1 << 3)  /* do even if lower is RO */
+#define AUFS_MVDOWN_ROLOWER_R (1 << 4)  /* did on lower RO */
+#define AUFS_MVDOWN_ROUPPER  (1 << 5)  /* do even if upper is RO */
+#define AUFS_MVDOWN_ROUPPER_R (1 << 6)  /* did on upper RO */
+#define AUFS_MVDOWN_BRID_UPPER (1 << 7)  /* upper brid */
+#define AUFS_MVDOWN_BRID_LOWER (1 << 8)  /* lower brid */
+#define AUFS_MVDOWN_FHSM_LOWER(1 << 9)  /* find fhsm attr for lower */
+#define AUFS_MVDOWN_STFS(1 << 10)  /* req. stfs */
+#define AUFS_MVDOWN_STFS_FAILED(1 << 11)  /* output: stfs is unusable */
+#define AUFS_MVDOWN_BOTTOM(1 << 12)  /* output: no more lowers */
+
+/* index for move-down */
+enum {
+    AUFS_MVDOWN_UPPER,
+    AUFS_MVDOWN_LOWER,
+    AUFS_MVDOWN_NARRAY
+};
+
+/* additional info of move-down */
+/* number of free blocks and inodes. */
+/* subset of struct kstatfs, but smaller and always 64bit. */
+/* */
+struct aufs_stfs {
+    uint64_t f_blocks;
+    uint64_t f_bavail;
+    uint64_t f_files;
+    uint64_t f_ffree;
+};
+
+struct aufs_stbr {
+    int16_t brid;  /* optional input */
+    int16_t bindex;  /* output */
+    struct aufs_stfs stfs;  /* output when AUFS_MVDOWN_STFS set */
+} __aligned(8);
+
+struct aufs_mvdown {
+    uint32_t flags;  /* input/output */
+    struct aufs_stbr stbr[AUFS_MVDOWN_NARRAY];  /* input/output */
+    int8_t tau_errno;  /* output */
+} __aligned(8);
+
+union aufs_brinfo {
+    /* PATH_MAX may differ between kernel-space and user-space */
+    char spacer[4096];
+    struct {
+int16_t tid;
+int perm;
+char path[0];
+
+} __aligned(8);
+
+/* --------------------------------------------------------------- */
+
+#define AuCtlType 'A'
+#define AUFS_CTL_RDU _IOWR(AuCtlType, AuCtl_RDU, struct aufs_rdu)
+#define AUFS_CTL_RDU_INO _IOWR(AuCtlType, AuCtl_RDU_INO, struct aufs_rdu)
+#define AUFS_CTL_WBR_FD _IOW(AuCtlType, AuCtl_WBR_FD, struct aufs_wbr_fd)
+#define AUFS_CTL_IBUSY _IOWR(AuCtlType, AuCtl_IBUSY, struct aufs_ibusy)
+#define AUFS_CTL_MVDOWN _IOWR(AuCtlType, AuCtl_MVDOWN, struct aufs_mvdown)
+#define AUFS_CTL_BRINFO _IOW(AuCtlType, AuCtl_BR, union aufs_brinfo)
+#define AUFS_CTL_FHSM_FD _IOW(AuCtlType, AuCtl_FHSM_FD, int)
+
+#endif /* __AUFS_TYPE_H__ */
--- linux-4.15.0.orig/include/uapi/linux/bpf.h
+++ linux-4.15.0/include/uapi/linux/bpf.h
@@ -995,7 +995,8 @@
 #define BPF_DEVCG_DEV_CHAR (1ULL << 1)

 struct bpf_cgroup_dev_ctx {
-__u32 access_type; /* (access << 16) | type */
+__u32 access_type;
     __u32 major;
     __u32 minor;
   };
--- linux-4.15.0.orig/include/uapi/linux/btrfs_tree.h
+++ linux-4.15.0/include/uapi/linux/btrfs_tree.h
@@ -456,6 +456,7 @@
 #define BTRFS_SUPER_FLAG_SEEDING (1ULL << 32)
 #define BTRFS_SUPER_FLAG_METADUMP (1ULL << 33)
 +#define BTRFS_SUPER_FLAG_METADUMP_V2 (1ULL << 34)

 /*
 --- linux-4.15.0.orig/include/uapi/linux/cec-funcs.h
+++ linux-4.15.0/include/uapi/linux/cec-funcs.h
@@ -952,7 +952,8 @@
 msg->msg[1] = CEC_MSG_GIVE_DECK_STATUS;
 msg->msg[2] = status_req;

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static inline void cec_ops_give_deck_status(const struct cec_msg *msg, 
@@ -1056,7 +1057,8 @@
    msg->len = 3;
    msg->msg[1] = CEC_MSG_GIVE_TUNER_DEVICE_STATUS;
    msg->msg[2] = status_req;
-    msg->reply = reply ? CEC_MSG_TUNER_DEVICE_STATUS : 0;
+    msg->reply = (reply && status_req != CEC_OP_STATUS_REQ_OFF) ?
+                   CEC_MSG_TUNER_DEVICE_STATUS : 0;
    }
}

static inline void cec_ops_give_tuner_device_status(const struct cec_msg *msg, 
--- linux-4.15.0.orig/include/uapi/linux/cec.h
+++ linux-4.15.0/include/uapi/linux/cec.h
@@ -791,8 +791,8 @@
#define CEC_MSG_SELECT_DIGITAL_SERVICE 0x93
#define CEC_MSG_TUNER_DEVICE_STATUS 0x07
/* Recording Flag Operand (rec_flag) */
-#define CEC_OP_REC_FLAG_USED 0
-#define CEC_OP_REC_FLAG_NOT_USED 1
+#define CEC_OP_REC_FLAG_NOT_USED 0
+#define CEC_OP_REC_FLAG_USED 1
/* Tuner Display Info Operand (tuner_display_info) */
#define CEC_OP_TUNER_DISPLAY_INFO_DIGITAL 0
#define CEC_OP_TUNER_DISPLAY_INFO_NONE 1
--- linux-4.15.0.orig/include/uapi/linux/coda_psdev.h
+++ linux-4.15.0/include/uapi/linux/coda_psdev.h
@@ -7,19 +7,6 @@
#define CODA_PSDEV_MAJOR 67
#define MAX_CODADEVS 5 /* how many do we allow */
-
-/* messages between coda filesystem in kernel and Venus */
-struct upc_req {
-    struct list_head uc_chain;
-    caddr_t uc_data;
-    u_short uc_flags;
-    u_short uc_inSize; /* Size is at most 5000 bytes */
-    u_short uc_outSize;
-    u_short uc_opcode; /* copied from data to save lookup */
-    int uc_unique;
-    wait_queue_head_t uc_sleep; /* process' wait queue */
-};
-
#define CODA_REQ_ASYNC 0x1
#define CODA_REQ_READ 0x2
#define CODA_REQ_WRITE 0x4
--- linux-4.15.0.orig/include/uapi/linux/const.h
+++ linux-4.15.0/include/uapi/linux/const.h
@@ -25,4 +25,9 @@
#define _BITUL(x)(_AC(1,UL) << (x))
#define _BITULL(x)(_AC(1,ULL) << (x))
+
+#define __ALIGN_KERNEL(x, a)__ALIGN_KERNEL_MASK(x, (typeof(x))(a) - 1)
+#define __ALIGN_KERNEL_MASK(x, mask)((x) + (mask)) & ~(mask))
+
+#define __KERNEL_DIV_ROUND_UP(n, d) (((n) + (d) - 1) / (d))
+
#endif /* !_LINUX_CONST_H */
--- linux-4.15.0.orig/include/uapi/linux/coresight-stm.h
+++ linux-4.15.0/include/uapi/linux/coresight-stm.h
@@ -2,8 +2,10 @@
#ifndef __UAPI_CORESIGHT_STM_H_
#define __UAPI_CORESIGHT_STM_H_
-
#define STM_FLAG_TIMESTAMPED BIT(3)
#define STM_FLAG_GUARANTEED BIT(7)
+
#include <linux/const.h>
+
#define STM_FLAG_TIMESTAMPED _BITUL(3)
#define STM_FLAG_GUARANTEED _BITUL(7)

/*
 * The CoreSight STM supports guaranteed and invariant timing
--- linux-4.15.0.orig/include/uapi/linux/ethtool.h
+++ linux-4.15.0/include/uapi/linux/ethtool.h
@@ -14,7 +14,7 @@
 static inline __u64 ethtool_get_flow_spec_ring(__u64 ring_cookie)
 {
     return ETHTOOL_RX_FLOW_SPEC_RING & ring_cookie;
-};
+;
 */

#include <linux/kernel.h>
#include <linux/const.h>
#include <linux/types.h>
#include <linux/if_ether.h>

static inline __u64 ethtool_get_flow_spec_ring(__u64 ring_cookie)
{
    return ETHTOOL_RX_FLOW_SPEC_RING & ring_cookie;
  -};
+;

---
static inline __u64 ethtool_get_flow_spec_ring_vf(__u64 ring_cookie) {
    return (ETHTOOL_RX_FLOW_SPEC_RING_VF & ring_cookie) >> ETHTOOL_RX_FLOW_SPEC_RING_VF_OFF;
}
+

/**
 * struct ethtool_rxnfc - command to get or set RX flow classification rules
 * linux-4.15.0.orig/include/uapi/linux/fuse.h
 +++ linux-4.15.0/include/uapi/linux/fuse.h
 @ @ -216,10 +216,12 @@
 * FOPEN_DIRECT_IO: bypass page cache for this open file
 * FOPEN_KEEP_CACHE: don't invalidate the data cache on open
 * FOPEN_NONSEEKABLE: the file is not seekable
 + * FOPEN_STREAM: the file is stream-like (no file position at all)
 */
#define FOPEN_DIRECT_IO(1 << 0)
#define FOPEN_KEEP_CACHE(1 << 1)
#define FOPEN_NONSEEKABLE(1 << 2)
+#define FOPEN_STREAM(1 << 4)

/**
 * INIT request/reply flags
 * linux-4.15.0.orig/include/uapi/linux/i2c.h
 +++ linux-4.15.0/include/uapi/linux/i2c.h
 @ @ -72,6 +72,9 @@
 #define I2C_M_RD	0x0001 /* read data, from slave to master */
 /* I2C_M_RD is guaranteed to be 0x0001! */
 #define I2C_M_TEN	0x0010 /* this is a ten bit chip address */
+#define I2C_M_DMA_SAFE	0x0200 /* the buffer of this message is DMA safe */
 +/* makes only sense in kernelspace */
 +/* userspace buffers are copied anyway */
 #define I2C_M_RECV_LEN	0x0400 /* length will be first received byte */
 #define I2C_M_NO_RD_ACK0x0800/* if I2C_FUNC_PROTOCOL_MANGLING */
 #define I2C_M_IGNORE_NAK0x1000/* if I2C_FUNC_PROTOCOL_MANGLING */
 --- linux-4.15.0.orig/include/uapi/linux/if_alg.h
 +++ linux-4.15.0/include/uapi/linux/if_alg.h
 @ @ -24,6 +24,22 @@
 __u8 salg_name[64];
 );
+
+/*
+ * Linux v4.12 and later removed the 64-byte limit on salg_name[]; it's now an
+ * arbitrary-length field. We had to keep the original struct above for source
+ * compatibility with existing userspace programs, though. Use the new struct
+ * below if support for very long algorithm names is needed. To do this,
+ * allocate sizeof(struct sockaddr_alg_new) + strlen(algname) + 1’ bytes, and
+ * copy algnam (including the null terminator) into salg_name.
+ */
+ struct sockaddr_alg_new {
+ __u16 salg_family;
+ __u8 salg_type[14];
+ __u32 salg_feat;
+ __u32 salg_mask;
+ __u8 salg_name[];
+ };
+
+ struct af_alg_iv {
+ __u32 ivlen;
+ __u8 iv[0];
+
--- linux-4.15.0.orig/include/uapi/linux/if_ether.h
+++ linux-4.15.0/include/uapi/linux/if_ether.h
@@ -23,7 +23,6 @@
#define _UAPI_LINUX_IF_ETHER_H
#include <linux/types.h>
-#include <linux/libc-compat.h>
*/
* IEEE 802.3 Ethernet magic constants. The frame sizes omit the preamble
@@ -31,6 +30,7 @@
#define ETH_ALEN	6	/* Octets in one ethernet addr */
define ETH_TLEN2/* Octets in ethernet type field */
define ETH_HLEN14/* Total octets in header. */
define ETH_ZLEN60/* Min. octets in frame sans FCS */
define ETH_DATA_LEN1500/* Max. octets in payload */
@@ -150,6 +150,11 @@
 *This is an Ethernet frame header.
 */

+/* allow libcs like musl to deactivate this, glibc does not implement this. */
+ifndef __UAPI_DEF_ETHHDR
+define __UAPI_DEF_ETHHDR1
+endif
+
+if __UAPI_DEF_ETHHDR
struct ethhdr {
unsigned char h_dest[ETH_ALEN];/* destination eth addr*/
--- linux-4.15.0.orig/include/uapi/linux/if_link.h
+++ linux-4.15.0/include/uapi/linux/if_link.h
@@ -161,6 +161,9 @@
IFLA_EVENT,
IFLA_NEW_NETNSID,
IFLA_IF_NETNSID,
+IFLA_CARRIER_UP_COUNT,
+IFLA_CARRIER_DOWN_COUNT,
+IFLA_NEW_IFINDEX,
__IFLA_MAX
};

@@ -513,6 +516,7 @@
IFLA_VXLAN_COLLECT_METADATA,
IFLA_VXLAN_LABEL,
IFLA_VXLAN_GPE,
+IFLA_VXLAN_FAN_MAP = 33,
__IFLA_VXLAN_MAX
};
#define IFLA_VXLAN_MAX(__IFLA_VXLAN_MAX - 1)
--- linux-4.15.0.orig/include/uapi/linux/if_tun.h
+++ linux-4.15.0/include/uapi/linux/if_tun.h
@@ -57,6 +57,7 @@
*/
#define TUNSETVNETBE _IOW('T', 222, int)
#define TUNGETVNETBE _IOR('T', 223, int)
+#define TUNSETCARRIER _IOW('T', 226, int)

/* TUNSETIFF ifr flags */
#define IFF_TUN		0x0001
--- linux-4.15.0.orig/include/uapi/linux/if_tunnel.h
+++ linux-4.15.0/include/uapi/linux/if_tunnel.h
@@ -77,6 +77,10 @@
IFLA_IPTUN_ENCAP_DPORT,
IFLA_IPTUN_COLLECT_METADATA,
IFLA_IPTUN_FWMARK,
+__IFLA_IPTUN_VENDOR_BREAK, /* Ensure new entries do not hit the below. */
+IFLA_IPTUN_FAN_MAP = 33,
+__IFLA_IPTUN_MAX,
};
#define IFLA_IPTUN_MAX(__IFLA_IPTUN_MAX - 1)
@@ -157,4 +161,20 @@

#define IFLA_VTI_MAX(__IFLA_VTI_MAX - 1)
+enum {
+IFLA_FAN_UNSPEC,
+IFLA_FAN_MAPPING,
+__IFLA_FAN_MAX,
+};
#define IFLA_VTI_MAX(__IFLA_VTI_MAX - 1)

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```c
#define IFLA_FAN_MAX (__IFLA_FAN_MAX - 1)

struct ifla_fan_map {
    __be32			underlay;
    __be32			overlay;
    __u16			underlay_prefix;
    __u16			overlay_prefix;
};

#endif /* _UAPI_IF_TUNNEL_H_ */
```

---

```c
#include <uapi/linux/in.h>
```

---

```c
#define INADDR_NONE		((unsigned long int) 0xffffffff)
```

---

```c
#define INADDR_DUMMY		((unsigned long int) 0xc0000008)
```

---

```c
#define IN_LOOPBACKNET127
```

---

```c
#include <uapi/linux/inet_diag.h>
```

---

```c
INET_DIAG_TCLASS,
INET_DIAG_SKMEMINFO,
INET_DIAG_SHUTDOWN,
-INET_DIAG_DCTCPINFO,
-INET_DIAG_PROTOCOL,  /* response attribute only */

/* Next extenstions cannot be requested in struct inet_diag_req_v2:
   its field idiag_ext has only 8 bits. */

+INET_DIAG_DCTCPINFO, /* request as INET_DIAG_VEGASINFO */
+INET_DIAG_PROTOCOL, /* response attribute only */
INET_DIAG_SKV6ONLY,
INET_DIAG_LOCALS,
INET_DIAG_PEERS,
INET_DIAG_PAD,
-INET_DIAG_MARK,
-INET_DIAG_BBRINFO,
-INET_DIAG_CLASS_ID,
+INET_DIAG_MARK,/* only with CAP_NET_ADMIN */
+INET_DIAG_BBRINFO,/* request as INET_DIAG_VEGASINFO */
```
/* request as INET_DIAG_TCLASS */
INET_DIAG_CLASS_ID,
/* request as INET_DIAG_TCLASS */
INET_DIAG_MD5SIG,
__INET_DIAG_MAX,
};
--- linux-4.15.0.orig/include/uapi/linux/input-event-codes.h
+++ linux-4.15.0/include/uapi/linux/input-event-codes.h
@@ -743,6 +743,15 @@
#define ABS_MISC		0x28
+/*
+ * 0x2e is reserved and should not be used in input drivers.
+ * It was used by HID as ABS_MISC+6 and userspace needs to detect if
+ * the next ABS_* event is correct or is just ABS_MISC + n.
+ * We define here ABS_RESERVED so userspace can rely on it and detect
+ * the situation described above.
+ */
+#define ABS_RESERVED0x2e
+
#define ABS_MT_SLOT		0x2f	/* MT slot being modified */
#define ABS_MT_TOUCH_MAJOR	0x30	/* Major axis of touching ellipse */
#define ABS_MT_TOUCH_MINOR	0x31	/* Minor axis (omit if circular) */
@@ -785,7 +794,8 @@
#define SW_LINEIN_INSERT	0x0d  /* set = inserted */
#define SW_MUTE_DEVICE		0x0e  /* set = device disabled */
#define SW_PEN_INSERTED		0x0f  /* set = pen inserted */
-#define SW_MAX			0x0f
+#define SW_MACHINE_COVER	0x10  /* set = cover closed */
+#define SW_MAX			0x10
#define SW_CNT			(SW_MAX+1)
/*----- CAPI commands -----*/
#define CAPI_ALERT		    0x01
--- linux-4.15.0.orig/include/uapi/linux/isdn/capicmd.h
+++ linux-4.15.0/include/uapi/linux/isdn/capicmd.h
@@ -16,6 +16,7 @@
#define CAPI_MSG_BASELEN		8
#define CAPI_DATA_B3_REQ_LEN	(CAPI_MSG_BASELEN+4+4+2+2+2)
#define CAPI_DATA_B3_RESP_LEN(CAPI_MSG_BASELEN+4+2)
+#define CAPI_DISCONNECT_B3_RESP_LEN(CAPI_MSG_BASELEN+4)
/*----- CAPI commands -----*/
#define CAPI_ALERT 0x01
--- linux-4.15.0.orig/include/uapi/linux/kd.h
+++ linux-4.15.0/include/uapi/linux/kd.h
@@ -46,6 +46,8 @@
#define KD_GRAPHICS	0x01
#define KD_TEXT0	0x02	/* obsolete */
#define KD_TEXT1	0x03	/* obsolete */
```c
#define KD_TRANSPARENT 0x04
#define KDGETMODE 0x4B3B /* get current mode */

#define KDMAPDISP 0x4B3C /* map display into address space */
--- linux-4.15.0.orig/include/uapi/linux/kernel.h
+++ linux-4.15.0/include/uapi/linux/kernel.h
@@ -3,13 +3,6 @@
#define _UAPI_LINUX_KERNEL_H
#include <linux/sysinfo.h>
-/*
- * `kernel.h' contains some often-used function prototypes etc
- */
-#define __ALIGN_KERNEL(x, a) __ALIGN_KERNEL_MASK(x, (typeof(x))(a) - 1)
-#define __ALIGN_KERNEL_MASK(x, mask) (((x) + (mask)) & ~(mask))
-#define __KERNEL_DIV_ROUND_UP(n, d) (((n) + (d) - 1) / (d))
+#include <linux/const.h>
#endif /* _UAPI_LINUX_KERNEL_H */
--- linux-4.15.0.orig/include/uapi/linux/keyctl.h
+++ linux-4.15.0/include/uapi/linux/keyctl.h
@@ -65,7 +65,12 @@
/* keyctl structures */
struct keyctl_dh_params {
  __s32 private;
  union {
+    __s32 priv;
+  };
    __s32 prime;
    __s32 base;
  };
--- linux-4.15.0.orig/include/uapi/linux/kvm.h
+++ linux-4.15.0/include/uapi/linux/kvm.h
@@ -189,9 +189,11 @@
#define KVM_EXIT_HYPERV_SYNIC 1
#define KVM_EXIT_HYPERV_HCALL 2
__u32 type;
+__u32 pad1;
union {
  struct {
+    __u32 msr;
  }
```
+__u32 pad2;
+__u64 control;
+__u64 evt_page;
+__u64 msg_page;
@@ -733,9 +735,10 @@
#define KVM_VM_PPC_HV 1
#define KVM_VM_PPC_PR 2

-/* on MIPS, 0 forces trap & emulate, 1 forces VZ ASE */
-#define KVM_VM_MIPS_TE0
+/* on MIPS, 0 indicates auto, 1 forces VZ ASE, 2 forces trap & emulate */
+#define KVM_VM_MIPS_AUTO0
#define KVM_VM_MIPS_VZ 1
+#define KVM_VM_MIPS_TE 2

#define KVM_S390_SIE_PAGE_OFFSET 1
@@ -761,6 +764,7 @@
#define KVM_TRACE_PAUSE __KVM_DEPRECATED_MAIN_0x07
#define KVM_TRACE_DISABLE __KVM_DEPRECATED_MAIN_0x08
#define KVM_GET_EMULATED_CPUID _IOWR(KVMIO, 0x09, struct kvm_cpuid2)
+#define KVM_GET_MSR_FEATURE_INDEX_LIST _IOWR(KVMIO, 0x0a, struct kvm_msr_list)

/*
 * Extension capability list.
 @ @ -934,6 +938,7 @ @
#define KVM_CAP_S390_AIS_MIGRATION 150
#define KVM_CAP_PPC_GET_CPU_CHAR 151
#define KVM_CAP_S390_BPB 152
+#define KVM_CAP_GET_MSR_FEATURES 153
#endif /* _UAPI_LIBC_COMPAT_H */
--- linux-4.15.0.orig/include/uapi/linux/lightnvm.h
+++ linux-4.15.0/include/uapi/linux/lightnvm.h
@@ -264,10 +264,4 @@
#endif /* __GLIBC__ */
--- linux-4.15.0.orig/include/uapi/linux/libc-compat.h
+++ linux-4.15.0/include/uapi/linux/libc-compat.h
@@ -264,15 +264,4 @@

/* Definitions for if_ether.h */
-/* allow libcs like musl to deactivate this, glibc does not implement this. */
-#ifndef __UAPI_DEF_ETHHDR
-#define __UAPI_DEF_ETHHDR
-#endif
-
-#endif /* __UAPI_LIBC_COMPAT_H */
--- linux-4.15.0.orig/include/uapi/linux/libc-compat.h
+++ linux-4.15.0/include/uapi/linux/libc-compat.h
@@ -264,15 +264,4 @@

#endif /* _UAPI_LIBC_COMPAT_H */
#define _UAPI_LINUX_LIGHTNVM_H

#ifndef __KERNEL__
-#include <linux/kernel.h>
+#include <linux/const.h>
#include <linux/ioc wildcard.h>
#ifdef /
#ifndef __KERNEL__ */ */
#include <stdio.h>
--- linux-4.15.0.orig/include/uapi/linux/mmc/ioctl.h
+++ linux-4.15.0/include/uapi/linux/mmc/ioctl.h
@@ -3,6 +3,7 @@
#include <linux/types.h>
+--- linux-4.15.0.orig/include/uapi/linux/mnt.h
+++ linux-4.15.0/include/uapi/linux/mnt.h
@@ -10,7 +10,9 @@
* The MS-DOS filesystem constants/structures
 */

#ifndef SECTOR_SIZE
#define SECTOR_SIZE 512 /* sector size (bytes) */
#endif
#define SECTOR_BITS 9 /* log2(SECTOR_SIZE) */
#define MSDOS_DPB (MSDOS_DPS) /* dir entries per block */
#define MSDOS_DPB_BITS 4 /* log2(MSDOS_DPB) */
--- linux-4.15.0.orig/include/uapi/linux/nbd.h
+++ linux-4.15.0/include/uapi/linux/nbd.h
@@ -53,6 +53,9 @@
/* These are client behavior specific flags. */
#define NBD_CFLAG_DESTROY_ON_DISCONNECT(1 << 0) /* delete the nbd device on disconnect. */

/* define NBD_CFLAG_DISCONNECT_ON_CLOSE (1 << 1) */ disconnect the nbd device on
close by last opener.
*/

/* userspace doesn't need the nbd_device structure */

--- linux-4.15.0.orig/include/uapi/linux/ncsi.h
+++ linux-4.15.0/include/uapi/linux/ncsi.h
@@ -0,0 +1,115 @@
+/
+ * Copyright Samuel Mendoza-Jonas, IBM Corporation 2018.
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
+
+ #ifndef __UAPI_NCSI_NETLINK_H__
+ #define __UAPI_NCSI_NETLINK_H__
+
+ enum ncsi_nl_commands - supported NCSI commands
+ * @NCSI_CMD_UNSPEC: unspecified command to catch errors
+ * @NCSI_CMD_PKG_INFO: list package and channel attributes. Requires
+ * NCSI_ATTR_IFINDEX. If NCSI_ATTR_PACKAGE_ID is specified returns the
+ * specific package and its channels - otherwise a dump request returns
+ * all packages and their associated channels.
+ * @NCSI_CMD_SET_INTERFACE: set preferred package and channel combination.
+ * Requires NCSI_ATTR_IFINDEX and the preferred NCSI_ATTR_PACKAGE_ID and
+ * optionally the preferred NCSI_ATTR_CHANNEL_ID.
+ * @NCSI_CMD_CLEAR_INTERFACE: clear any preferred package/channel combination.
+ * Requires NCSI_ATTR_IFINDEX.
+ * @NCSI_CMD_MAX: highest command number
+ */
+ enum ncsi_nl_commands {
+ NCSI_CMD_UNSPEC,
+ NCSI_CMD_PKG_INFO,
+ NCSI_CMD_SET_INTERFACE,
+ NCSI_CMD_CLEAR_INTERFACE,
+ __NCSI_CMD_AFTER_LAST,
+ NCSI_CMD_MAX = __NCSI_CMD_AFTER_LAST - 1
+ }
+
+ enum ncsi_nl_attrs - General NCSI netlink attributes
+ * @NCSI_ATTR_UNSPEC: unspecified attributes to catch errors
+ * @NCSI_ATTR_IFINDEX: ifindex of network device using NCSI
+ * @NCSI_ATTR_PACKAGE_LIST: nested array of NCSI_PKG_ATTR attributes
+ * @NCSI_ATTR_PACKAGE_ID: package ID
+ * @NCSI_ATTR_CHANNEL_ID: channel ID
+ * @NCSI_ATTR_MAX: highest attribute number
+ */
+enum ncsi_nl_attrs {
+NCSI_ATTR_UNSPEC,
+NCSI_ATTR_IFINDEX,
+NCSI_ATTR_PACKAGE_LIST,
+NCSI_ATTR_PACKAGE_ID,
+NCSI_ATTR_CHANNEL_ID,
+
+__NCSI_ATTR_AFTER_LAST,
+NCSI_ATTR_MAX = __NCSI_ATTR_AFTER_LAST - 1
+};
+
+/**
+ * enum ncsi_nl_pkgAttrs - NCSI netlink package-specific attributes
+ *
+ * @NCSI_PKG_ATTR_UNSPEC: unspecified attributes to catch errors
+ * @NCSI_PKG_ATTR: nested array of package attributes
+ * @NCSI_PKG_ATTR_ID: package ID
+ * @NCSI_PKG_ATTR_FORCED: flag signifying a package has been set as preferred
+ * @NCSI_PKG_ATTR_CHANNEL_LIST: nested array of NCSI_CHANNEL_ATTR attributes
+ * @NCSI_PKG_ATTR_MAX: highest attribute number
+ */
+enum ncsi_nl_pkgAttrs {
+NCSI_PKG_ATTR_UNSPEC,
+NCSI_PKG_ATTR,
+NCSI_PKG_ATTR_ID,
+NCSI_PKG_ATTR_FORCED,
+
+__NCSI_PKG_ATTR_AFTER_LAST,
+NCSI_PKG_ATTR_MAX = __NCSI_PKG_ATTR_AFTER_LAST - 1
+};
+
+/**
+ * enum ncsi_nl_channelAttrs - NCSI netlink channel-specific attributes
+ *
+ * @NCSI_CHANNEL_ATTR_UNSPEC: unspecified attributes to catch errors
+ * @NCSI_CHANNEL_ATTR: nested array of channel attributes
+ * @NCSI_CHANNEL_ATTR_ID: channel ID
+ * @NCSI_CHANNEL_ATTR_VERSION_MAJOR: channel major version number
+ * @NCSI_CHANNEL_ATTR_VERSION_MINOR: channel minor version number
+ * @NCSI_CHANNEL_ATTR_VERSION_STR: channel version string
+ * @NCSI_CHANNEL_ATTR_LINK_STATE: channel link state flags
+ * @NCSI_CHANNEL_ATTR_ACTIVE: channels with this flag are in
+ * @NCSI_CHANNEL_ACTIVE state
+ * @NCSI_CHANNEL_ATTR_FORCED: flag signifying a channel has been set as
+ * preferred
+ * @NCSI_CHANNEL_ATTR_VLAN_LIST: nested array of NCSI_CHANNEL_ATTR_VLAN_IDs
+ * @NCSI_CHANNEL_ATTR_VLAN_ID: VLAN ID being filtered on this channel
+ * @NCSI_CHANNEL_ATTR_MAX: highest attribute number
+ */
+enum ncsi_nl_channel_attrs {
+ NCSI_CHANNEL_ATTR_UNSPEC,
+ NCSI_CHANNEL_ATTR
+ NCSI_CHANNEL_ATTR_ID,
+ NCSI_CHANNEL_ATTR_VERSION_MAJOR,
+ NCSI_CHANNEL_ATTR_VERSION_MINOR,
+ NCSI_CHANNEL_ATTR_VERSION_STR,
+ NCSI_CHANNEL_ATTR_LINK_STATE,
+ NCSI_CHANNEL_ATTR_ACTIVE,
+ NCSI_CHANNEL_ATTR_FORCED,
+ NCSI_CHANNEL_ATTR_VLAN_LIST,
+ NCSI_CHANNEL_ATTR_VLAN_ID,
+ + NCSI_CHANNEL_ATTR_AFTER_LAST,
+ NCSI_CHANNEL_ATTR_MAX = __NCSI_CHANNEL_ATTR_AFTER_LAST - 1
+ };
+
@endif /* __UAPI_NCSI_NETLINK_H__ */
--- linux-4.15.0.orig/include/uapi/linux/ndctl.h
+++ linux-4.15.0/include/uapi/linux/ndctl.h
@@ -176,37 +176,31 @@
static inline const char *nvdimm_bus_cmd_name(unsigned cmd)
{
- static const char * const names[] = {
- [ND_CMD_ARS_CAP] = "ars_cap",
- [ND_CMD_ARS_START] = "ars_start",
- [ND_CMD_ARS_STATUS] = "ars_status",
- [ND_CMD_CLEAR_ERROR] = "clear_error",
- [ND_CMD_CALL] = "cmd_call",
- []
- -
- if (cmd < ARRAY_SIZE(names) && names[cmd])
- return names[cmd];
- return "unknown";
+ switch (cmd) {
+ case ND_CMD_ARS_CAP:return "ars_cap";
+ case ND_CMD_ARS_START:return "ars_start";
+case ND_CMD_ARC_STATUS: return "ars_status";
+case ND_CMD_CLEAR_ERROR: return "clear_error";
+case ND_CMD_CALL: return "cmd_call";
+default: return "unknown";
+
static inline const char *nvdimm_cmd_name(unsigned cmd)
{
  static const char * const names[] = {
    [ND_CMD_SMART] = "smart",
    [ND_CMD_SMART_THRESHOLD] = "smart_thresh",
    [ND_CMD_DIMM_FLAGS] = "flags",
    [ND_CMD_GET_CONFIG_SIZE] = "get_size",
    [ND_CMD_GET_CONFIG_DATA] = "get_data",
    [ND_CMD_SET_CONFIG_DATA] = "set_data",
    [ND_CMD_VENDOR_EFFECT_LOG_SIZE] = "effect_size",
    [ND_CMD_VENDOR_EFFECT_LOG] = "effect_log",
    [ND_CMD_VENDOR] = "vendor",
    [ND_CMD_CALL] = "cmd_call",
  };

  if (cmd < ARRAY_SIZE(names) && names[cmd])
    return names[cmd];
  return "unknown";
+
  switch (cmd) {
    case ND_CMD_SMART: return "smart";
    case ND_CMD_SMART_THRESHOLD: return "smart_thresh";
    case ND_CMD_DIMM_FLAGS: return "flags";
    case ND_CMD_GET_CONFIG_SIZE: return "get_size";
    case ND_CMD_GET_CONFIG_DATA: return "get_data";
    case ND_CMD_SET_CONFIG_DATA: return "set_data";
    case ND_CMD_VENDOR_EFFECT_LOG_SIZE: return "effect_size";
    case ND_CMD_VENDOR_EFFECT_LOG: return "effect_log";
    case ND_CMD_VENDOR: return "vendor";
    case ND_CMD_CALL: return "cmd_call";
    default: return "unknown";
  }
}

#define ND_IOCTL 'N'
@@ -307,6 +301,7 @@
#define NVDIMM_FAMILY_HPE1 1
#define NVDIMM_FAMILY_HPE2 2
#define NVDIMM_FAMILY_MSFT 3
+#define NVDIMM_FAMILY_HYPERV 4

#define ND_IOCTL_CALL _IOWR(ND_IOCTL, ND_CMD_CALL, \
struct nd_cmd_pkg)
--- linux-4.15.0.orig/include/uapi/linux/netfilter/nf_tables.h
+++ linux-4.15.0/include/uapi/linux/netfilter/nf_tables.h
@@ -125,7 +125,7 @@
 * NFTA_LIST_ELEM: list element (NLA_NESTED)
 */

enum nft_list_attributes {
- NFTA_LIST_UNPEC,
+ NFTA_LIST_UNSPEC,
 NFTA_LIST_ELEM,
 __NFTA_LIST_MAX
};
--- linux-4.15.0.orig/include/uapi/linux/netfilter/nfnetlink_chelper.h
+++ linux-4.15.0/include/uapi/linux/netfilter/nfnetlink_chelper.h
@@ -5,7 +5,7 @@
#define NFCT_HELPER_STATUS_DISABLED 0
#define NFCT_HELPER_STATUS_ENABLED 1

-enum nfnl_acct_msg_types {
+enum nfnl_cthelper_msg_types {
 NFNL_MSG_CTHELPER_NEW,
 NFNL_MSG_CTHELPER_GET,
 NFNL_MSG_CTHELPER_DEL,
--- linux-4.15.0.orig/include/uapi/linux/netfilter/x_tables.h
+++ linux-4.15.0/include/uapi/linux/netfilter/x_tables.h
@@ -1,7 +1,7 @@
/* SPDX-License-Identifier: GPL-2.0 WITH Linux-syscall-note */
#define _UAPI_X_TABLES_H
#define _UAPI_X_TABLES_H
-#include <linux/kernel.h>
+#include <linux/const.h>
+#include <linux/types.h>

#define XT_FUNCTION_MAXNAMELEN 30
--- linux-4.15.0.orig/include/uapi/linux/netfilter/xt_SECMARK.h
+++ linux-4.15.0/include/uapi/linux/netfilter/xt_SECMARK.h
@@ -20,4 +20,10 @@
 char secctx[SECMARK_SECCTX_MAX];
 }

+struct xt_secmark_target_info_v1 {
  +__u8 mode;
  +char secctx[SECMARK_SECCTX_MAX];
  +__u32 secid;
  +};

+endif /*_XT_SECMARK_H_target */
--- linux-4.15.0.orig/include/uapi/linux/netfilter/xt_cgroup.h
```c
+++#define XT_CGROUP_PATH_MAX512
+
+struct xt_cgroup_info_v2 {
+__u8 has_path;
+__u8 has_classid;
+__u8 invert_path;
+__u8 invert_classid;
+union {
+char path[XT_CGROUP_PATH_MAX];
+__u32 classid;
+};
+
+/* kernel internal data */
+void*priv __attribute__((aligned(8)));
+};
+
+#endif /* _UAPI_XT_CGROUP_H */
--- linux-4.15.0.orig/include/uapi/linux/netfilter/xt_nfacct.h
+++ linux-4.15.0/include/uapi/linux/netfilter/xt_nfacct.h
@@ -11,4 +11,9 @@
struct nf_acct*nfacct;
}

+struct xt_nfacct_match_info_v1 {
+char name[NFACCT_NAME_MAX];
+struct nf_acct*nfacct __attribute__((aligned(8)));
+};
+
+#endif /* _XT_NFACCT_MATCH_H */
--- linux-4.15.0.orig/include/uapi/linux/netfilter/xt_sctp.h
+++ linux-4.15.0/include/uapi/linux/netfilter/xt_sctp.h
@@ -41,19 +41,19 @@
#define SCTP_CHUNKMAP_SET(chunkmap, type) \
  do {
    (chunkmap)[type / bytes(__u32)] |= \
    ~1u << (type % bytes(__u32));
  } while (0)

#define SCTP_CHUNKMAP_CLEAR(chunkmap, type) \
  do {
    (chunkmap)[type / bytes(__u32)] &\n    ~(1u << (type % bytes(__u32)));\n  } while (0)
```

---
#define SCTP_CHUNKMAP_IS_SET(chunkmap, type) \
({
								
((chunkmap)[type / bytes (__u32)] & 
-1 << (type % bytes (__u32))) ? 1: 0;
+(1u << (type % bytes (__u32)))) ? 1: 0;
})

#define SCTP_CHUNKMAP_RESET(chunkmap) 

#include <linux/if_vlan.h>
#include <linux/if_pppox.h>

+#ifndef __KERNEL__
#include <limits.h> /* for INT_MIN, INT_MAX */
+endif
+
/* Bridge Hooks */
/* After promisc drops, checksum checks. */
#define NF_BR_PRE_ROUTING	0

--- linux-4.15.0.orig/include/uapi/linux/netlink.h
+++ linux-4.15.0/include/uapi/linux/netlink.h
@@ -2,7 +2,7 @@
#ifndef _UAPI__LINUX_NETLINK_H
#define _UAPI__LINUX_NETLINK_H
#define _UAPI__LINUX_NETLINK_H

-#include <linux/kernel.h>
+#include <linux/const.h>
#include <linux/socket.h> /* for __kernel_sa_family_t */
+include <linux/types.h>

--- linux-4.15.0.orig/include/uapi/linux/nfs4.h
+++ linux-4.15.0/include/uapi/linux/nfs4.h
@@ -136,6 +136,8 @@
#define EXCHGID4_FLAG_UPD_CONFIRMED_REC_A	0x40000000
#define EXCHGID4_FLAG_CONFIRMED_R		0x80000000
+
+#define EXCHGID4_FLAG_SUPP_FENCE_OPS		0x00000004
/* Since the validity of these bits depends on whether
* they're set in the argument or response, have separate
@@ -143,6 +145,7 @@
*/
#define EXCHGID4_FLAG_MASK_A			0x40070103
#define EXCHGID4_FLAG_MASK_R			0x80070103
+  #define EXCHGID4_2_FLAG_MASK_R			0x80070107
#define SEQ4_STATUS_CB_PATH_DOWN		0x00000001
#define SEQ4_STATUS_CB_GSS_CONTEXTS_EXPIRING	0x00000002
--- linux-4.15.0.orig/include/uapi/linux/nilfs2_ondisk.h
+++ linux-4.15.0/include/uapi/linux/nilfs2_ondisk.h
@@ -29,7 +29,7 @@
#include <linux/types.h>
#include <linux/magic.h>
-
+  #include <asm/byteorder.h>
#define NILFS_INODE_BMAP_SIZE	7
@@ -533,19 +533,19 @@
static inline void								nilfs_checkpoint_set_##name(struct nilfs_checkpoint *cp)		{									
cp->cp_flags = cpu_to_le32(le32_to_cpu(cp->cp_flags) |				   (1UL << NILFS_CHECKPOINT_##flag));	ncp->cp_flags = __cpu_to_le32(__le32_to_cpu(cp->cp_flags) |				     (1UL << NILFS_CHECKPOINT_##flag));	}
static inline void								nilfs_checkpoint_clear_##name(struct nilfs_checkpoint *cp)		{									
cp->cp_flags = cpu_to_le32(le32_to_cpu(cp->cp_flags) &
+cp->cp_flags = __cpu_to_le32(__le32_to_cpu(cp->cp_flags) &
  ~(1UL << NILFS_CHECKPOINT_##flag));
}
static inline int								nilfs_checkpoint_##name(const struct nilfs_checkpoint *cp)		{										nreturn !!(le32_to_cpu(cp->cp_flags) &
+return !!(__le32_to_cpu(cp->cp_flags) &
  (1UL << NILFS_CHECKPOINT_##flag));
}
@@ -595,20 +595,20 @@
static inline void								nilfs_segment_usage_set_##name(struct nilfs_segment_usage *su)		{									
su->su_flags = cpu_to_le32(le32_to_cpu(su->su_flags) |
+su->su_flags = __cpu_to_le32(__le32_to_cpu(su->su_flags) |
  (1UL << NILFS_SEGMENT_USAGE_##flag));
}
static inline void
nilfs_segment_usage_clear_##name(struct nilfs_segment_usage *su)
{ 
  su->su_flags =
  -cpu_to_le32(le32_to_cpu(su->su_flags)) &
  +_cpu_to_le32(__le32_to_cpu(su->su_flags)) &
    ~(1UL << NILFS_SEGMENT_USAGE_##flag));
}

static inline int
nilfs_segment_usage_##name(const struct nilfs_segment_usage *su)
{ 
  return !(le32_to_cpu(su->su_flags) &
  return !(__le32_to_cpu(su->su_flags) &
    (1UL << NILFS_SEGMENT_USAGE_##flag)));
}

static inline void
nilfs_segment_usage_set_clean(struct nilfs_segment_usage *su)
{ 
  su->su_lastmod = cpu_to_le64(0);
  su->su_nblocks = cpu_to_le32(0);
  su->su_flags = cpu_to_le32(0);
  su->su_lastmod = __cpu_to_le64(0);
  su->su_nblocks = __cpu_to_le32(0);
  su->su_flags = __cpu_to_le32(0);
}

static inline int
nilfs_segment_usage_clean(const struct nilfs_segment_usage *su)
{ 
  return !le32_to_cpu(su->su_flags);
  return !__le32_to_cpu(su->su_flags);
}

/**
 --- linux-4.15.0.orig/include/uapi/linux/nl80211.h
+++ linux-4.15.0/include/uapi/linux/nl80211.h
@@ -2618,6 +2618,8 @@
 #define NL80211_ATTR_KEYS NL80211_ATTR_KEYS
 #define NL80211_ATTR_FEATURE_FLAGS NL80211_ATTR_FEATURE_FLAGS
 +#define NL80211_WIPHY_NAME_MAXLEN64
  +
  #define NL80211_MAX_SUPP_RATES32
  #define NL80211_MAX_SUPP_HT_RATES77
  #define NL80211_MAX_SUPP_REG_RULES64

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--- linux-4.15.0.org/include/uapi/linux/pci_regs.h
+++ linux-4.15.0/include/uapi/linux/pci_regs.h
@@ -520,6 +520,7 @@
#define PCI_EXP_LNKCAP_SLS_2_5GB 0x00000001 /* LNKCAP2 SLS Vector bit 0 */
#define PCI_EXP_LNKCAP_SLS_5_0GB 0x00000002 /* LNKCAP2 SLS Vector bit 1 */
#define PCI_EXP_LNKCAP_SLS_8_0GB 0x00000003 /* LNKCAP2 SLS Vector bit 2 */
+#define PCI_EXP_LNKCAP_SLS_16_0GB 0x00000004 /* LNKCAP2 SLS Vector bit 3 */
#define PCI_EXP_LNKCAP_MLW 0x000003f0 /* Maximum Link Width */
#define PCI_EXP_LNKCAP_ASPMS 0x00000c00 /* ASPM Support */
#define PCI_EXP_LNKCAP_L0SEL 0x00000700 /* L0s Exit Latency */
@@ -547,6 +548,7 @@
#define PCI_EXP_LNKSTA_CLS_2_5GB 0x0001 /* Current Link Speed 2.5GT/s */
#define PCI_EXP_LNKSTA_CLS_5_0GB 0x0002 /* Current Link Speed 5.0GT/s */
#define PCI_EXP_LNKSTA_CLS_8_0GB 0x0003 /* Current Link Speed 8.0GT/s */
+#define PCI_EXP_LNKSTA_CLS_16_0GB 0x0004 /* Current Link Speed 16.0GT/s */
#define PCI_EXP_LNKSTA_NLW 0x03f0 /* Negotiated Link Width */
#define PCI_EXP_LNKSTA_NLW_X1 0x0010 /* Current Link Width x1 */
#define PCI_EXP_LNKSTA_NLW_X2 0x0020 /* Current Link Width x2 */
@@ -644,8 +646,9 @@
#define PCI_EXP_LNKCAP2_SLS_2_5GB 0x00000002 /* Supported Speed 2.5GT/s */
#define PCI_EXP_LNKCAP2_SLS_5_0GB 0x00000004 /* Supported Speed 5.0GT/s */
#define PCI_EXP_LNKCAP2_SLS_8_0GB 0x00000008 /* Supported Speed 8.0GT/s */
+#define PCI_EXP_LNKCAP2_SLS_16_0GB 0x00000010 /* Supported Speed 16GT/s */
#define PCI_EXP_LNKCAP2_CROSSLINK 0x00000100 /* Crosslink supported */
#define PCI_EXP_LNKCTL2 48 /* Link Control 2 */
#define PCI_EXP_LNKSTA2 50 /* Link Status 2 */
--- linux-4.15.0.orig/include/uapi/linux/perf_event.h
+++ linux-4.15.0/include/uapi/linux/perf_event.h
@@ -1034,7 +1034,7 @@
#define PERF_MEM_SNOOPX_FWD 0x01 /* forward */
/* 1 free */
-#define PERF_MEM_SNOOPX_SHIFT 37
+#define PERF_MEM_SNOOPX_SHIFT 38
/* locked instruction */
#define PERF_MEM_LOCK NA0x01 /* not available */
--- linux-4.15.0.orig/include/uapi/linux/prctl.h
+++ linux-4.15.0/include/uapi/linux/prctl.h
@@ -1034,7 +1034,7 @@
#define PR_SVE_VL_LEN_MASK 0xffff
#define PR_SVE_VL_INHERIT (1 << 17) /* inherit across exec */
/* Per task speculation control */
+#define PR_GET_SPECULATION_CTRL	52
+#define PR_SET_SPECULATION_CTRL	53
+/* Speculation control variants */
+# define PR_SPEC_STORE_BYPASS	0
+# define PR_SPEC_INDIRECT_BRANCH	1
+/* Return and control values for PR_SET/GET_SPECULATION_CTRL */
+# define PR_SPEC_NOT_AFFECTED	0
+# define PR_SPEC_PRCTL	((1UL << 0)
+# define PR_SPEC_ENABLE	((1UL << 1)
+# define PR_SPEC_DISABLE	((1UL << 2)
+# define PR_SPEC_FORCE_DISABLE	((1UL << 3)
+
+*/
+ * Control the LSM specific peer information
+ *
+ * The Ubuntu kernel provides an early preview of LSM Stacking. Use these
+ * PRCTLS at your own risk. Their values are not guaranteed to be stable in the
+ * case of colliding with an upstream PRCTL.
+ */
+#define	PR_GET_DISPLAY_LSM	1000000
+#define	PR_SET_DISPLAY_LSM	1000001
+ #endif /* _LINUX_PRCTL_H */
--- linux-4.15.0.orig/include/uapi/linux/psci.h
+++ linux-4.15.0/include/uapi/linux/psci.h
@@ -88,6 +88,9 @@

#define PSCI_VERSION_MINOR(ver)	
((ver) & PSCI_VERSION_MINOR_MASK)
+#define PSCI_VERSION(maj, min)						(
+													((maj) << PSCI_VERSION_MAJOR_SHIFT) & PSCI_VERSION_MAJOR_MASK) | 
+													((min) & PSCI_VERSION_MINOR_MASK))

/* PSCI features decoding (>=1.0) */
#define PSCI_1_0_FEATURES_CPU_SUSPEND_PF_SHIFT	1
--- linux-4.15.0.orig/include/uapi/linux/raid/md_p.h
+++ linux-4.15.0/include/uapi/linux/raid/md_p.h
@@ -329,6 +329,7 @@

#define	MD_FEATURE_JOURNAL	512 /* support write cache */
#define	MD_FEATURE_PPL	1024 /* support PPL */
#define	MD_FEATURE_MULTIPLE_PPLS	2048 /* support for multiple PPLs */
+#define	MD_FEATURE_RAID0_LAYOUT	4096 /* layout is meaningful for RAID0 */
#define	MD_FEATURE_ALL	(MD_FEATURE_BITMAP_OFFSET |MD_FEATURE_RECOVERY_OFFSET 
|MD_FEATURE_JOURNAL |MD_FEATURE_PPL)

---

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struct r5l_payload_header {
    --- linux-4.15.0.orig/include/uapi/linux/random.h
    +++ linux-4.15.0/include/uapi/linux/random.h
    @@ -35,6 +35,9 @@
    /* Clear the entropy pool and associated counters. (Superuser only.) */
    #define RNDCLEARPOOL_IO( 'R', 0x06 )

    */* Reseed CRNG. (Superuser only. )* /
    +#define RNDRESEEDCRNG_IO( 'R', 0x07 )
    +
    struct rand_pool_info {
        int entropy_count;
        intbuf_size;
        --- linux-4.15.0.orig/include/uapi/linux/sctp.h
        +++ linux-4.15.0/include/uapi/linux/sctp.h
        @@ -521,6 +521,8 @@
        #define SCTP_ASSOC_CHANGE_DENIED0x0004
        #define SCTP_ASSOC_CHANGE_FAILED0x0008
        +#define SCTP_STREAM_CHANGE_DENIEDSCTP_ASSOC_CHANGE_DENIED
        +#define SCTP_STREAM_CHANGE_FAILEDSCTP_ASSOC_CHANGE_FAILED
        struct sctp_stream_change_event {
            __u16 strchange_type;
            __u16 strchange_flags;
            @@ -1100,6 +1102,7 @@
            /* SCTP Stream schedulers */
            enum sctp_sched_type {
                SCTP_SS_FCFS,
                +SCTP_SS_DEFAULT = SCTP_SS_FCFS,
                SCTP_SS_PRIO,
                SCTP_SS_RR,
                SCTP_SS_MAX = SCTP_SS_RR
                --- linux-4.15.0.orig/include/uapi/linux/seccomp.h
                +++ linux-4.15.0/include/uapi/linux/seccomp.h
                @@ -17,8 +17,9 @@
                #define SECCOMP_GET_ACTION_AVAIL2
                /* Valid flags for SECCOMP_SET_MODE_FILTER */
                -#define SECCOMP_FILTER_FLAG_TSYNC1
                +#define SECCOMP_FILTER_FLAG_TSYNC2
                +#define SECCOMP_FILTER_FLAG_TSYNC(1UL << 0)
                +#define SECCOMP_FILTER_FLAG_LOG(1UL << 1)
                +#define SECCOMP_FILTER_FLAG_SPEC_ALLOW(1UL << 2)
/*
 * All BPF programs must return a 32-bit value.
--- linux-4.15.0.orig/include/uapi/linux/serial_core.h
+++ linux-4.15.0/include/uapi/linux/serial_core.h
@@ -76,6 +76,9 @@
#define PORT_SUNZILOG	38
#define PORT_SUNSAB	39
+/* Nuvoton UART */
+#define PORT_NPCM40
+
/* Intel EG20 */
#define PORT_PCH_8LINE44
#define PORT_PCH_2LINE45
@@ -278,4 +281,7 @@
/* MediaTek BTIF */
#define PORT_MTK_BTIF117
+/* Sunix UART */
+#define PORT_SUNIX121
+
#endif /* _UAPILINUX_SERIAL_CORE_H */
--- linux-4.15.0.orig/include/uapi/linux/serial_reg.h
+++ linux-4.15.0/include/uapi/linux/serial_reg.h
@@ -62,6 +62,7 @@
* ST16C654:	 8  16  56  60		 8  16  32  56	PORT_16654
* TI16C750:	 1  16  32  56		xx  xx  xx  xx	PORT_16750
* TI16C752:	 8  16  56  60		 8  16  32  56
+ /* OX16C950:	16  32 112 120		16  32  64 112	PORT_16C950
* Tegra: 1  4  8 1416 8  4 1PORT_TEGRA
*/
#define UART_FCR_R_TRIG_00	0x00
--- linux-4.15.0.orig/include/uapi/linux/serio.h
+++ linux-4.15.0/include/uapi/linux/serio.h
@@ -9,7 +9,7 @@
#ifndef _UAPI_SERIO_H
#define _UAPI_SERIO_H
-
+#include <linux/const.h>
#include <linux/ioctl.h>
#define SPIOCSTYPE	_IOW('q', 0x01, unsigned long)
@@ -18,10 +18,10 @@
/*
 * bit masks for use in "interrupt" flags (3rd argument)
 */
-#define SERIO_TIMEOUT	BIT(0)
+/* _UAPILINUX_SERIAL_REG_H */
--- linux-4.15.0.orig/include/uapi/linux/serio_reg.h
+++ linux-4.15.0/include/uapi/linux/serio_reg.h
@@ -1,6 +1,6 @@
-/*
+/*
 * bit masks for use in "interrupt" flags (3rd argument)
 */
-#define SERIO_TIMEOUT	BIT(0)
/*
 * Serio types
 --- linux-4.15.0.orig/include/uapi/linux/snmp.h
 +++ linux-4.15.0/include/uapi/linux/snmp.h
 @@ -56,6 +56,7 @@
 IPSTATS_MIB_ECT1PKTS,/* InECT1Pkts */
 IPSTATS_MIB_ECT0PKTS,/* InECT0Pkts */
 IPSTATS_MIB_CEPKTS,/* InCEPkts */
+IPSTATS_MIB_REASM_OVERLAPS,/* ReasmOverlaps */
 __IPSTATS_MIB_MAX
];

 @@ -276,6 +277,7 @@
 LINUX_MIB_TCPKEEPALIVE,/* TCPKeepAlive */
 LINUX_MIB_TCPMTUPFAIL,/* TCPMTUPFail */
 LINUX_MIB_TCPMTUPSUCCESS,/* TCPMTUPSuccess */
+LINUX_MIB_TCPWQUEUETOOBIG,/* TCPWqueueTooBig */
 __LINUX_MIB_MAX
];

 --- linux-4.15.0.orig/include/uapi/linux/swab.h
 +++ linux-4.15.0/include/uapi/linux/swab.h
 @@ -4,6 +4,7 @@
 #include <linux/types.h>
 #include <linux/compiler.h>
+#include <asm/bitsperlong.h>
 #include <asm/swab.h>

 /*
 @@ -132,6 +133,15 @@
 __fswab64(x))
 #endif

+static __always_inline unsigned long __swab(const unsigned long y)
+{
+    #if __BITS_PER_LONG == 64
+        return __swab64(y);
+    #else /* __BITS_PER_LONG == 32 */
+        return __swab32(y);
+endif
+
/**
 * __swahw32 - return a word-swapped 32-bit value
 * @x: value to wordswap
 --- linux-4.15.0.orig/include/uapi/linux/sysctl.h
+++ linux-4.15.0/include/uapi/linux/sysctl.h
@@ -23,7 +23,7 @@
 ifndef _UAPI_LINUX_SYSCTL_H
 #define _UAPI_LINUX_SYSCTL_H

-#include <linux/kernel.h>
+/#include <linux/const.h>
 #include <linux/types.h>
 #include <linux/compiler.h>

--- linux-4.15.0.orig/include/uapi/linux/tipc_config.h
+++ linux-4.15.0/include/uapi/linux/tipc_config.h
@@ -302,8 +302,10 @@
tlv_ptr = (struct tlv_desc *)tlv;
tlv_ptr->tlv_type = htons(type);
tlv_ptr->tlv_len  = htons(tlv_len);
-if (len && data)
+if (len && data) {
	memcpy(TLV_DATA(tlv_ptr), data, tlv_len);
+memset(TLV_DATA(tlv_ptr) + len, 0, TLV_SPACE(len) - tlv_len);
+}
return TLV_SPACE(len);
}

@@ -400,8 +402,10 @@
tcm_hdr->tcm_len   = htonl(msg_len);
tcm_hdr->tcm_type  = htons(cmd);
tcm_hdr->tcm_flags = htons(flags);
-if (data_len &&& data)
+if (data_len && data) {
	memcpy(TCM_DATA(msg), data, data_len);
+memset(TCM_DATA(msg) + data_len, 0, TCM_SPACE(data_len) - msg_len);
+}
return TCM_SPACE(data_len);
}

--- linux-4.15.0.orig/include/uapi/linux/usb/audio.h
+++ linux-4.15.0/include/uapi/linux/usb/audio.h
@@ -370,7 +370,7 @@
}
return (protocol == UAC_VERSION_1) ?
desc->baSourceID[desc->bNrInPins + 4] :
-desc->baSourceID[desc->bNrInPins + 6];
+2; /* in UAC2, this value is constant */
}

static inline __u8 *uac_processing_unit_bmControls(struct uac_processing_unit_descriptor *desc,
@@ -378,7 +378,7 @@
 return (protocol == UAC_VERSION_1) ?
 &desc->baSourceID[desc->bNrInPins + 5] :
- &desc->baSourceID[desc->bNrInPins + 7];
+ &desc->baSourceID[desc->bNrInPins + 6];
}

static inline __u8 uac_processing_unit_iProcessing(struct uac_processing_unit_descriptor *desc,
--- linux-4.15.0.orig/include/uapi/linux/usb/ch9.h
+++ linux-4.15.0/include/uapi/linux/usb/ch9.h
@@ -364,6 +364,9 @@
 /* USB String descriptors can contain at most 126 characters. */
 #define USB_MAX_STRING_LEN	126
 
/* USB_DT_STRING: String descriptor */
struct usb_string_descriptor {
 __u8  bLength;
--- linux-4.15.0.orig/include/uapi/linux/usb/charger.h
+++ linux-4.15.0/include/uapi/linux/usb/charger.h
@@ -14,18 +14,18 @@
 * ACA (Accessory Charger Adapters)
 */
 enum usb_charger_type {
-UNKNOWN_TYPE,
-SDP_TYPE,
-DCP_TYPE,
-CDP_TYPE,
-ACA_TYPE,
+UNKNOWN_TYPE = 0,
+SDP_TYPE = 1,
+DCP_TYPE = 2,
+CDP_TYPE = 3,
+ACA_TYPE = 4,
};

/* USB charger state */
enum usb_charger_state {
-USB_CHARGER_DEFAULT,
-USB_CHARGER_PRESENT,
-USB_CHARGER_ABSENT,
+USB_CHARGER_DEFAULT = 0,
+USB_CHARGER_PRESENT = 1,
+USB_CHARGER_ABSENT = 2,
};

#endif /* _UAPI__LINUX_USB_CHARGER_H */
--- linux-4.15.0.orig/include/uapi/linux/vfio.h
+++ linux-4.15.0/include/uapi/linux/vfio.h
@@ -200,6 +200,7 @@
#define VFIO_DEVICE_FLAGSPLATFORM (1 << 2) /* vfio-platform device */
#define VFIO_DEVICE_FLAGS_AMBA (1 << 3) /* vfio-amba device */
#define VFIO_DEVICE_FLAGS_CCW(1 << 4) /* vfio-ccw device */
+#define VFIO_DEVICE_FLAGS_AP (1 << 5) /* vfio-ap device */
__u32 num_regions; /* Max region index + 1 */
__u32 num_irqs; /* Max IRQ index + 1 */
}
@@ -215,6 +216,7 @@
#define VFIO_DEVICE_API_PLATFORM_STRING "vfio-platform"
#define VFIO_DEVICE_API_AMBA_STRING "vfio-amba"
#define VFIO_DEVICE_API_CCW_STRING "vfio-ccw"
+#define VFIO_DEVICE_API_AP_STRING "vfio-ap"

/**
 * VFIO_DEVICE_GET_REGION_INFO - _IOWR(VFIO_TYPE, VFIO_BASE + 8,
 --- linux-4.15.0.orig/include/uapi/linux/videodev2.h
+++ linux-4.15.0/include/uapi/linux/videodev2.h
@@ -225,8 +225,8 @@
/* For RGB colorspaces such as produces by most webcams. */
 V4L2_COLORSPACE_SRGB = 8,
-/* AdobeRGB colorspace */
-V4L2_COLORSPACE_ADOBERGB = 9,
+/* opRGB colorspace */
+V4L2_COLORSPACE_OPRGB = 9,

/* BT.2020 colorspace, used for UHDTV. */
V4L2_COLORSPACE_BT2020 = 10,
@@ -258,7 +258,7 @@

 * V4L2_COLORSPACE_SRGB, V4L2_COLORSPACE_JPEG: V4L2_XFER_FUNC_SRGB
 */
 * V4L2_COLORSPACE_ADOBERGB: V4L2_XFER_FUNC_ADOBERGB
+ * V4L2_COLORSPACE_OPRGB: V4L2_XFER_FUNC_OPRGB
 */
 * V4L2_COLORSPACE_SMPTE240M: V4L2_XFER_FUNC_SMPTE240M

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V4L2_XFER_FUNC_DEFAULT = 0,
V4L2_XFER_FUNC_709   = 1,
V4L2_XFER_FUNC_SRGB  = 2,
-V4L2_XFER_FUNC_ADOBERGB = 3,
+V4L2_XFER_FUNC_OPRGB = 3,
V4L2_XFER_FUNC_SMPTE240M = 4,
V4L2_XFER_FUNC_NONE  = 5,
V4L2_XFER_FUNC_DCI_P3 = 6,
@@ -281,7 +281,7 @@
* V4L2_COLORSPACE_SMPTE170M, V4L2_COLORSPACE_470_SYSTEM_M,
* V4L2_COLORSPACE_470_SYSTEM_BG, V4L2_COLORSPACE_SRGB,
- * V4L2_COLORSPACE_ADOBERGB and V4L2_COLORSPACE_JPEG: V4L2_YCBCR_ENC_601
+ * V4L2_COLORSPACE_OPRGB and V4L2_COLORSPACE_JPEG: V4L2_YCBCR_ENC_601
* V4L2_COLORSPACE_REC709 and V4L2_COLORSPACE_DCI_P3: V4L2_YCBCR_ENC_709
* @@ -362,9 +362,9 @@

enum v4l2_quantization {
/
- * The default for R'G'B' quantization is always full range, except
- * for the BT2020 colorspace. For Y'CbCr the quantization is always
- * limited range, except for COLORSPACE_JPEG: this is full range.
+ * The default for R'G'B' quantization is always full range.
+ * For Y'CbCr the quantization is always limited range, except
+ * for COLORSPACE_JPEG: this is full range.
*/
V4L2_QUANTIZATION_DEFAULT = 0,
V4L2_QUANTIZATION_FULL_RANGE = 1,
@@ -373,14 +373,24 @@

/ *
* Determine how QUANTIZATION_DEFAULT should map to a proper quantization.
- * This depends on whether the image is RGB or not, the colorspace and the
- * Y'CbCr encoding.
+ * This depends on whether the image is RGB or not, the colorspace.

The Y'CbCr encoding is not used anymore, but is still there for backwards compatibility.

```
#define V4L2_MAP_QUANTIZATION_DEFAULT(is_rgb_or_hsv, colsp, ycbcr_enc)  
- (((is_rgb_or_hsv) && (colsp) == V4L2_COLORSPACE_BT2020) ? 
- ((is_rgb_or_hsv) || (colsp) == V4L2_COLORSPACE_JPEG) ? 
- ((is_rgb_or_hsv) && (colsp) == V4L2_COLORSPACE_BT2020) ? 
+ V4L2_QUANTIZATION_LIM_RANGE : 
+ V4L2_QUANTIZATION_LIM_RANGE : V4L2_QUANTIZATION_LIM_RANGE) 
+ */
+ * Deprecated names for opRGB colorspace (IEC 61966-2-5)
+ */
+ * WARNING: Please don't use these deprecated defines in your code, as
+ * there is a chance we have to remove them in the future.
+ */
+ #ifndef __KERNEL__
+ #define V4L2_COLORSPACE_ADOBERGB V4L2_COLORSPACE_OPRGB
+ #define V4L2_XFER_FUNC_ADOBERGB V4L2_XFER_FUNC_OPRGB
+ #endif
```

```
enum v4l2_priority {
    V4L2_PRIORITY_UNSET = 0, /* not initialized */
    @ @ -635.6 +645.7 @ @
#define V4L2_PIX_FMT_VC1_ANNEX_L v4l2_fourcc('V', 'C', '1', 'L') /* SMPTE 421M Annex L compliant stream */
#define V4L2_PIX_FMT_VP8 v4l2_fourcc('V', 'P', '8', '0') /* VP8 */
#define V4L2_PIX_FMT_VP9 v4l2_fourcc('V', 'P', '9', '0') /* VP9 */
+#define V4L2_PIX_FMT_HEVC v4l2_fourcc('H', 'E', 'V', 'C') /* HEVC aka H.265 */
```

```
/* Vendor-specific formats */
#define V4L2_PIX_FMT_CPIA1 v4l2_fourcc('C', 'P', 'I', 'A') /* cpia1 YUV */
--- linux-4.15.0.orig/include/uapi/linux/wireless.h
+++ linux-4.15.0/include/uapi/linux/wireless.h
@ @ -74.6 +74.12 @ @
#include <linux/socket.h> /* for "struct sockaddr" et al*/
#include <linux/if.h> /* for IFNAMSIZ and co... */
```

```
+ ifndef __KERNEL__
+ #include <linux/stddef.h> /* for offsetof */
+ #else
+ #include <stddef.h> /* for offsetof */
+ #endif
+ /*
/**************************** VERSION ****************************/
/
* This constant is used to know the availability of the wireless
/* iw_point events are special. First, the payload (extra data) come at
* the end of the event, so they are bigger than IW_EV_POINT_LEN. Second,
* we omit the pointer, so start at an offset. */
#define IW_EV_POINT_OFF (((char *) &(((struct iw_point *) NULL)->length)) - \
	(char *) NULL)
#define IW_EV_POINT_LEN (IW_EV_LCP_LEN + sizeof(struct iw_point) - \ 
	IW_EV_POINT_OFF)

--- linux-4.15.0.orig/include/uapi/linux/xfrm.h
+++ linux-4.15.0/include/uapi/linux/xfrm.h
@@ -304,7 +304,7 @@
XFRMA_PROTO,/* __u8 */
XFRMA_ADDRESS_FILTER,/* struct xfrm_address_filter */
XFRMA_PAD,
-XFRMA_OFFLOAD_DEV,/* struct xfrm_state_offload */
+XFRMA_OFFLOAD_DEV,/* struct xfrm_user_offload */
XFRMA_OUTPUT_MARK,/* __u32 */
__XFRMA_MAX

--- linux-4.15.0.orig/include/uapi/misc/cxl.h
+++ linux-4.15.0/include/uapi/misc/cxl.h
@@ -20,20 +20,22 @@
__u64 work_element_descriptor;
__u64 amr;
__s16 num_interrupts;
-__s16 reserved1;
-__s32 reserved2;
+__u16 tid;
+__s32 reserved1;
+__u64 reserved2;
+__u64 reserved3;
+__u64 reserved4;
+__u64 reserved5;
-__u64 reserved6;
};

#define CXL_START_WORK_AMR0x0000000000000001ULL
#define CXL_START_WORK_NUM_IRQS0x0000000000000002ULL
#define CXL_START_WORK_ERR_FF0x0000000000000004ULL
+#define CXL_START_WORK_TID0x0000000000000008ULL
#define CXL_START_WORK_ALL(CXL_START_WORK_AMR \ 
 CXL_START_WORK_NUM_IRQS \ 
 - CXL_START_WORK_ERR_FF) 
 + CXL_START_WORK_ERR_FF \ 
 + CXL_START_WORK_TID)
/* Possible modes that an afu can be in */
--- linux-4.15.0.org/include/uapi/misc/ocxl.h
+++ linux-4.15.0/include/uapi/misc/ocxl.h
@@ -0,0 +1,80 @@
+/* SPDX-License-Identifier: GPL-2.0+ WITH Linux-syscall-note */
+/* Copyright 2017 IBM Corp. */
+ifndef _UAPI_MISC_OCXL_H
+define _UAPI_MISC_OCXL_H
+
+include <linux/types.h>
+include <linux/ioctl.h>
+
+enum ocxl_event_type {
+OCXL_AFU_EVENT_XSL_FAULT_ERROR = 0,
+};
+
+#define OCXL_KERNEL_EVENT_FLAG_LAST 0x0001 /* This is the last event pending */
+
+struct ocxl_kernel_event_header {
+__u16 type;
+__u16 flags;
+__u32 reserved;
+};
+
+struct ocxl_kernel_event_xsl_fault_error {
+__u64 addr;
+__u64 dsisr;
+__u64 count;
+__u64 reserved;
+};
+
+struct ocxl_ioctl_attach {
+__u64 amr;
+__u64 reserved1;
+__u64 reserved2;
+__u64 reserved3;
+};
+
+struct ocxl_ioctl_metadata {
+__u16 version; // struct version, always backwards compatible
+
+// Version 0 fields
+__u8 afu_version_major;
+__u8 afu_version_minor;
+__u32 pasid;// PASID assigned to the current context
+
+__u64 pp_mmio_size;// Per PASID MMIO size
__u64 global_mmio_size;
+
+// End version 0 fields
+
+__u64 reserved[13]; // Total of 16*u64
+
+
+struct ocxl_ioctl_p9_wait {
+__u16 thread_id; // The thread ID required to wake this thread
+__u16 reserved1;
+__u32 reserved2;
+__u64 reserved3[3];
+};
+
 equipment
+__define OCXL_IOCCTL_FEATURES_FLAGS0_P9_WAIT 0x01
+
+__define OCXL_IOCCTL_ATTACH_IOW(OCXL_MAGIC, 0x10, struct ocxl_ioctl_attach)
+__define OCXL_IOCCTL_IRQ_ALLOC_IOR(OCXL_MAGIC, 0x11, __u64)
+__define OCXL_IOCCTL_IRQ_FREE_IOW(OCXL_MAGIC, 0x12, __u64)
+__define OCXL_IOCCTL_IRQ_SET_FD_IOW(OCXL_MAGIC, 0x13, struct ocxl_ioctl_irq_fd)
+__define OCXL_IOCCTL_GET_METADATA_IOR(OCXL_MAGIC, 0x14, struct ocxl_ioctl_metadata)
+__define OCXL_IOCCTL_ENABLE_P9_WAIT_IOR(OCXL_MAGIC, 0x15, struct ocxl_ioctl_p9_wait)
+__define OCXL_IOCCTL_GET_FEATURES_IOR(OCXL_MAGIC, 0x16, struct ocxl_ioctl_features)
+
+__endif /* __UAPI_MISC_OCXL_H */

struct hns_roce_ib_create_cq {
__u64 buf_addr;
__u64 db_addr;
+};
+
+struct hns_roce_ib_create_cq_resp {
__u64 cqn; /* Only 32 bits used, 64 for compat */

+struct hns_roce_ib_create_qp_resp {
+  __u64 cap_flags;
+};

+enum ib_uverbs_wr_opcode {
+  IB_UVERBS_WR_RDMA_WRITE = 0,
+  IB_UVERBS_WR_RDMA_WRITE_WITH_IMM = 1,
+  IB_UVERBS_WR_SEND = 2,
+  IB_UVERBS_WR_SEND_WITH_IMM = 3,
+  IB_UVERBS_WR_RDMA_READ = 4,
+  IB_UVERBS_WR_ATOMIC_CMP_AND_SWP = 5,
+  IB_UVERBS_WR_ATOMIC_FETCH_AND_ADD = 6,
+  IB_UVERBS_WR_LOCAL_INV = 7,
+  IB_UVERBS_WR_BIND_MW = 8,
+  IB_UVERBS_WR_SEND_WITH_INV = 9,
+  IB_UVERBS_WR_TSO = 10,
+  IB_UVERBS_WR_RDMA_READ_WITH_INV = 11,
+  IB_UVERBS_WR_MASKED_ATOMIC_CMP_AND_SWP = 12,
+  IB_UVERBS_WR_MASKED_ATOMIC_FETCH_AND_ADD = 13,
+};  /* Review enum ib_wr_opcode before modifying this */
+
+struct ib_uverbs_send_wr {
  __u64 wr_id;
  ...
};
__u32 num_sge;
-_u32 opcode;
+_u32 opcode;/* see enum ib_uverbs_wr_opcode */
__u32 send_flags;
union {
__u32 imm_data;
--- linux-4.15.0.orig/include/uapi/rdma/mlx5-abi.h
+++ linux-4.15.0/include/uapi/rdma/mlx5-abi.h
@@ -307,7 +307,7 @@
MLX5_RX_HASH_SRC_PORT_UDP= 1 << 6,
MLX5_RX_HASH_DST_PORT_UDP= 1 << 7,
/* Save bits for future fields */
-MLX5_RX_HASH_INNER	= 1 << 31
+MLX5_RX_HASH_INNER	= (1UL << 31),
};

struct mlx5_ib_create_qp_rss {
--- linux-4.15.0.orig/include/uapi/rdma/vmw_pvrdma-abi.h
+++ linux-4.15.0/include/uapi/rdma/vmw_pvrdma-abi.h
@@ -76,6 +76,7 @@
PVRDMA_WR_MASKED_ATOMIC_FETCH_AND_ADD,
PVRDMA_WR_BIND_MW,
PVRDMA_WR_REG_SIG_MR,
+PVRDMA_WR_ERROR,
};

e enum pvrdma_wc_status {
--- linux-4.15.0.orig/include/uapi/sound/asoc.h
+++ linux-4.15.0/include/uapi/sound/asoc.h
@@ -139,6 +139,11 @@
#define SND_SOC_TPLG_DAI_FLGBIT_SYMMETRIC_CHANNELS (1 << 1)
#define SND_SOC_TPLG_DAI_FLGBIT_SYMMETRIC_SAMPLEBITS (1 << 2)

+/* DAI clock gating */
+#define SND_SOC_TPLG_DAI_CLK_GATE_UNDEFINED0
+#define SND_SOC_TPLG_DAI_CLK_GATE_GATED1
+#define SND_SOC_TPLG_DAI_CLK_GATE_CONT2
+
/* DAI physical PCM data formats.
* Add new formats to the end of the list.
*/
@@ -160,6 +165,18 @@
#define SND_SOC_TPLG_LNK_FLGBIT_SYMMETRIC_SAMPLEBITS (1 << 2)
#define SND_SOC_TPLG_LNK_FLGBIT_VOICE_WAKEUP (1 << 3)

+/* DAI topology BCLK parameter
* For the backwards capability, by default codec is blclk master
+*/
```c
+#define SND_SOC_TPLG_BCLK_CM  0 /* codec is bclk master */
+#define SND_SOC_TPLG_BCLK_CS  1 /* codec is bclk slave */
+
+ /* DAI topology FSYNC parameter */
+ /* For the backwards capability, by default codec is fsync master */
+ */
+#define SND_SOC_TPLG_FSYNC_CM  0 /* codec is fsync master */
+#define SND_SOC_TPLG_FSYNC_CS  1 /* codec is fsync slave */
+
+/* Block Header. */
+/* This header precedes all object and object arrays below. */
@@ -312,11 +329,11 @@
__le32 size;            /* in bytes of this structure */
__le32 id;              /* unique ID - used to match */
__le32 fmt;              /* SND_SOC_DAI_FORMAT_ format value */
-__u8 clock_gated;       /* 1 if clock can be gated to save power */
+__u8 clock_gated;       /* SND_SOC_TPLG_DAI_CLK_GATE_ value */
__u8 invert_bclk;       /* 1 for inverted BCLK, 0 for normal */
__u8 invert_fsync;      /* 1 for inverted frame clock, 0 for normal */
-__u8 bclk_master;       /* 1 for master of BCLK, 0 for slave */
-__u8 fsync_master;      /* 1 for master of FSYNC, 0 for slave */
+__u8 bclk_master;       /* SND_SOC_TPLG_BCLK_ value */
+__u8 fsync_master;      /* SND_SOC_TPLG_FSYNC_ value */
__u8 mclk_direction;    /* 0 for input, 1 for output */
__le16 reserved;        /* for 32bit alignment */
__le32 mclk_rate;       /* MCLK or SYSCLK frequency in Hz */
--- linux-4.15.0.orig/include/video/udlfb.h
+++ linux-4.15.0/include/video/udlfb.h
@@ -88,7 +88,7 @@
#define MIN_RAW_PIX_BYTES	2
#define MIN_RAW_CMD_BYTES	(RAW_HEADER_BYTES + MIN_RAW_PIX_BYTES)
-#define DL_DEFIO_WRITE_DELAY    5 /* fb_deferred_io.delay in jiffies */
+#define DL_DEFIO_WRITE_DELAY    msecs_to_jiffies(HZ <= 300 ? 4 : 10) /* optimal value for 720p video */
#define DL_DEFIO_WRITE_DISABLE   (HZ*60) /* "disable" with long delay */
/
/* remove these once align.h patch is taken into kernel */
--- linux-4.15.0.orig/include/xen/balloon.h
+++ linux-4.15.0/include/xen/balloon.h
@@ -44,8 +44,3 @@
{
}
#endif

#endif CONFIG_XEN_BALLOON_MEMORY_HOTPLUG
-struct resource;
-void arch_xen_balloon_init(struct resource *hostmem_resource);
```
unsigned xen_evtchn_nr_channels(void);

-int bind_evtchn_to_irq(unsigned int evtchn);
-int bind_evtchn_to_irqhandler(unsigned int evtchn,
+int bind_evtchn_to_irq(evtchn_port_t evtchn);
+int bind_evtchn_to_irq_lateeoi(evtchn_port_t evtchn);
+int bind_evtchn_to_irqhandler(evtchn_port_t evtchn,
    irq_handler_t handler,
    unsigned long irqflags, const char *devname,
    void *dev_id);
+int bind_evtchn_to_irqhandler_lateeoi(evtchn_port_t evtchn,
    irq_handler_t handler,
    unsigned long irqflags, const char *devname,
    void *dev_id);
int bind_virq_to_irq(unsigned int virq, unsigned int cpu, bool percpu);
int bind_virq_to_irqhandler(unsigned int virq, unsigned int cpu,
    irq_handler_t handler,
    @ @ -30,13 +36,21 @@
    const char *devname,
    void *dev_id);
int bind_interdomain_evtchn_to_irq(unsigned int remote_domain,
    unsigned int remote_port);
+ evtchn_port_t remote_port);
+int bind_interdomain_evtchn_to_irq_lateeoi(unsigned int remote_domain,
+ evtchn_port_t remote_port);
int bind_interdomain_evtchn_to_irqhandler(unsigned int remote_domain,
    unsigned int remote_port,
+ evtchn_port_t remote_port,
    irq_handler_t handler,
    unsigned long irqflags,
    const char *devname,
    void *dev_id);
+int bind_interdomain_evtchn_to_irqhandler_lateeoi(unsigned int remote_domain,
+ evtchn_port_t remote_port,
    irq_handler_t handler,
unsigned long irqflags,
const char *devname,
void *dev_id);


void unbind_from_irqhandler(unsigned int irq, void *dev_id);

+ * Send late EOI for an IRQ bound to an event channel via one of the *_lateeoi
+ * functions above.
+ */
+void xen_irq_lateeoi(unsigned int irq, unsigned int eoi_flags);
+/* Signal an event was spurious, i.e. there was no action resulting from it. */
+#define XEN_EOI_FLAG_SPURIOUS0x00000001
+
+#define XEN_IRQ_PRIORITY_MAX EVTCHN_FIFO_PRIORITY_MAX
+#define XEN_IRQ_PRIORITY_DEFAULT EVTCHN_FIFO_PRIORITY_DEFAULT
+#define XEN_IRQ_PRIORITY_MIN EVTCHN_FIFO_PRIORITY_MIN
@ @ -59.7 +81.7 @@
void xen_send_IPI_one(unsigned int cpu, enum ipi_vector vector);
void rebind_evtchn_irq(int evtchn, int irq);
-int xen_rebind_evtchn_to_cpu(int evtchn, unsigned tcpu);
+int xen_set_affinity_evtchn(struct irq_desc *desc, unsigned int tcpu);

static inline void notify_remote_via_evtchn(int port)
{
--- linux-4.15.0.orig/include/xen/grant_table.h
+++ linux-4.15.0/include/xen/grant_table.h
@ @ -157.6 +157.7 @@
map->flags = flags;
map->ref = ref;
map->dom = domid;
+map->status = 1; /* arbitrary positive value */
}

static inline void
--- linux-4.15.0.orig/include/xen/xen-ops.h
+++ linux-4.15.0/include/xen/xen-ops.h
@ @ -41.7 +41.7 @@

extern unsigned long *xen_contiguous_bitmap;

-#ifdef CONFIG_XEN_PV
+##if defined(CONFIG_XEN_PV) || defined(CONFIG_ARM) || defined(CONFIG_ARM64)

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int xen_create_contiguous_region(phys_addr_t pstart, unsigned int order,
unsigned int address_bits,
dma_addr_t *dma_handle);
--- linux-4.15.0.orig/include/xen/xenbus.h
+++ linux-4.15.0/include/xen/xenbus.h
@@ -59,6 +59,15 @@
/* Path being watched. */
const char *node;

+unsigned int nr_pending;
+
+/* Called just before enqueing new event while a spinlock is held.
+ * The event will be discarded if this callback returns false.
+ */
+bool (*will_handle)(struct xenbus_watch *,
+ const char *path, const char *token);
+
/* Callback (executed in a process context with no locks held). */
void (*callback)(struct xenbus_watch *,
const char *path, const char *token);
@@ -178,8 +187,6 @@
struct work_struct;

-void xenbus_probe(struct work_struct *);
-
#define XENBUS_IS_ERR_READ(str) ({
	if (!IS_ERR(str) && strlen(str) == 0) {
	kfree(str);

@@ -192,10 +199,14 @@
int xenbus_watch_path(struct xenbus_device *dev, const char *path,
+    bool (*will_handle)(struct xenbus_watch *,
+    const char *, const char *),
+    void (*callback)(struct xenbus_watch *,
+    const char *, const char *));
-
__printf(4, 5)
+__printf(5, 6)
int xenbus_watch_pathfmt(struct xenbus_device *dev, struct xenbus_watch *watch,
+    bool (*will_handle)(struct xenbus_watch *,
+    const char *, const char *),
+    void (*callback)(struct xenbus_watch *,
+    const char *, const char *),
    const char *fmt, ...);
--- linux-4.15.0.orig/init/Kconfig
+++ linux-4.15.0/init/Kconfig
config COMPIL_TEST
bool "Compile also drivers which will not load"
-depends on !UML
-default n
+depends on HAS_IOMEM
help
  Some drivers can be compiled on a different platform than they are
  intended to be run on. Despite they cannot be loaded there (or even
  but you may wish to use a different default here to make a minimal
  system more usable with less configuration.

+config VERSION_SIGNATURE
+string "Arbitrary version signature"
+help
+  This string will be created in a file, /proc/version_signature. It
+  is useful in determining arbitrary data about your kernel. For instance,
+  if you have several kernels of the same version, but need to keep track
+  of a revision of the same kernel, but not affect it's ability to load
+  compatible modules, this is the easiest way to do that.
+
+config SWAP
bool "Support for paging of anonymous memory (swap)"
depends on MMU && BLOCK
@@ -499,7 +507,8 @@

config LOG_BUF_SHIFT
int "Kernel log buffer size (16 => 64KB, 17 => 128KB)"
-range 12 25
+range 12 25 if !H8300
+range 12 19 if H8300
-default 17
depends on PRINTK
help
--- linux-4.15.0.orig/init/do_mounts.c
+++ linux-4.15.0/init/do_mounts.c
@@ -548,6 +548,7 @@
 void __init prepare_namespace(void)
 {
   int is_floppy;
+  int err;

   if (root_delay) {
     printk(KERN_INFO "Waiting %d sec before mounting root device...
",}
@@ -601,6 +602,13 @@
 devtmpfs_mount("dev");

sys_mount(".", "/", NULL, MS_MOVE, NULL);
sys_chroot(".");
#ifdef CONFIG_BLOCK
+/* recreate the /dev/root */
+err = create_dev("/dev/root", ROOT_DEV);
+
+if (err < 0)
+pr_emerg("Failed to create /dev/root: %d\n", err);
+#endif
}

static bool is_tmpfs;
--- linux-4.15.0.orig/init/initramfs.c
+++ linux-4.15.0/init/initramfs.c
@@ -532,7 +532,7 @@
unsigned long crashk_start = (unsigned long)__va(crashk_res.start);
unsigned long crashk_end = (unsigned long)__va(crashk_res.end);
#endif
@if (do_retain_initrd)
+if (do_retain_initrd || !initrd_start)
goto skip;

#ifdef CONFIG_KEXEC_CORE
@@ -620,13 +620,12 @@
printk(KERN_INFO "Trying to unpack rootfs image as initramfs...
"); err = unpack_to_rootfs((char *)initrd_start,
initrd_end - initrd_start);
-if (!err) {
- free_initrd();
+if (!err)
 goto done;
-} else {
- clean_rootfs();
- unpack_to_rootfs(__initramfs_start, __initramfs_size);
- }
+
+ clean_rootfs();
+ unpack_to_rootfs(__initramfs_start, __initramfs_size);
+
 printk(KERN_INFO "rootfs image is not initramfs (%s)" "; looks like an initrd\n", err);
 fd = sys_open("/initrd.image", 
@@ -640,7 +639,6 @@
 written, initrd_end - initrd_start);

 sys_close(fd);
- free_initrd();
}
done:
/* empty statement */;
@@ -650,9 +648,9 @@
initrd_end - initrd_start);
if (err)
printk(KERN_EMERG "Initramfs unpacking failed: %s\n", err);
-free_initrd();
#endif
+	free_initrd();
flush_delayed_fput();
/*
 * Try loading default modules from initramfs. This gives
--- linux-4.15.0.orig/init/main.c
+++ linux-4.15.0/init/main.c
@@ -99,7 +99,6 @@
static int kernel_init(void *);
extern void init_IRQ(void);
-extern void fork_init(void);
extern void radix_tree_init(void);

/*
@@ -544,13 +543,15 @@
ssetup_command_line(command_line);
setup_nr_cpu_ids();
setup_per_cpu_areas();
-boot_cpu_state_init();
smp_prepare_boot_cpu();/* arch-specific boot-cpu hooks */
+boot_cpu_hotplug_init();

build_all_zonelists(NULL);
page_alloc_init();

pr_notice("Kernel command line: %s\n", boot_command_line);
+/* parameters may set static keys */
+jump_label_init();
parsed_early_param();
after_dashes = parse_args("Booting kernel",
static_command_line, __start___param,
@@ -560,8 +561,6 @@
parse_args("Setting init args", after_dashes, NULL, 0, -1, -1,
  NULL, set_init_arg);

-jump_label_init();
-
/*
 * These use large bootmem allocations and must precede
* **kmem_cache_init()**
@@ -669,7 +668,6 @@
    initrd_start = 0;
}
#endif
-page_ext_init();
kmemleak_init();
ddebug_objects_mem_init();
setup_per_cpu_pageset();
@@ -714,6 +712,8 @@
 /* Do the rest non-__init'ed, we're now alive */
 rest_init();
+
 +prevent_tail_call_optimization();
}

/* Call all constructor functions linked into the kernel. */
@@ -801,16 +801,16 @@

 static int __init_or_module do_one_initcall_debug(initcall_t fn)
 {
 -ktime_t calltime, delta, rettime;
 +unsigned long long calltime, delta, rettime;
   unsigned long long duration;
   int ret;

   printk(KERN_DEBUG "calling \%pF \@ \%i\n", fn, task_pid_nr(current));
   -calltime = ktime_get();
 +calltime = local_clock();
   ret = fn();
   -rettime = ktime_get();
   -delta = ktime_sub(rettime, calltime);
   -duration = (unsigned long long) ktime_to_ns(delta) >> 10;
   +rettime = local_clock();
   +delta = rettime - calltime;
   +duration = delta >> 10;
   printf(KERN_DEBUG \"initcall \%pF returned \%d after \%lld usecs\n\", fn, ret, duration);

 @@ -980,6 +980,13 @@
 static void mark_readonly(void)
 {
   if (rodata_enabled) {
+/*
+ * load_module() results in W+X mappings, which are cleaned up
+ * with call_rcu_sched(). Let's make sure that queued work is
+ * flushed so that we don't hit false positives looking for


+ * insecure pages which are W+X.
+ */
+rcu_barrier_sched();
mark_rodata_ro();
rodata_test();
} else
@@ -1002,6 +1009,13 @@
ftrace_free_init_mem();
free_initmem();
mark_readonly();
+
+/*
+ * Kernel mappings are now finalized - update the userspace page-table
+ * to finalize PTI.
+ */
+pti_finalize();
+
+system_state = SYSTEM_RUNNING;
numa_default_policy();

@@ -1053,7 +1067,7 @@
set_mems_allowed(node_states[N_MEMORY]);

-cad_pid = task_pid(current);
+cad_pid = get_pid(task_pid(current));

smp_prepare_cpus(setup_max_cpus);

@@ -1068,6 +1082,8 @@
sched_init_smp();

page_alloc_init_late();
+/* Initialize page ext after all struct pages are initialized. */
+page_ext_init();

do_basic_setup();

--- linux-4.15.0.orig/init/version.c
+++ linux-4.15.0/init/version.c
@@ -43,7 +43,11 @@
/* FIXED STRINGS! Don't touch! */
const char linux_banner[] =
"Linux version " UTS_RELEASE " (" LINUX_COMPILE_BY "@"
-"", LINUX_COMPILE_HOST ") (" LINUX_COMPILER ") " UTS_VERSION ";
+"", LINUX_COMPILE_HOST ") (" LINUX_COMPILER ") " UTS_VERSION
+"" "")"
const char linux_proc_banner[] =
"%s version %s"
--- linux-4.15.0.orig/ipc/mqueue.c
+++ linux-4.15.0/ipc/mqueue.c
@@ -372,9 +372,9 @@
{
  struct mqueue_inode_info *info;
  struct user_struct *user;
-unsigned long mq_bytes, mq_treesize;
  struct ipc_namespace *ipc_ns;
-struct msg_msg *msg;
+struct msg_msg *msg, *nmsg;
+LIST_HEAD(tmp_msg);

clear_inode(inode);

@@ -385,20 +385,27 @@
  info = MQUEUE_I(inode);
  spin_lock(&info->lock);
  while ((msg = msg_get(info)) != NULL)
-    free_msg(msg);
+    list_add_tail(&msg->m_list, &tmp_msg);
  kfree(info->node_cache);
  spin_unlock(&info->lock);

-/* Total amount of bytes accounted for the mqueue */
- mq_treesize = info->attr.mq_maxmsg * sizeof(struct msg_msg) +
-            min_t(unsigned int, info->attr.mq_maxmsg, MQ_PRIO_MAX) *
-            sizeof(struct posix_msg_tree_node);
- mq_bytes = mq_treesize + (info->attr.mq_maxmsg *
-              info->attr.mq_msgsize);
+list_for_each_entry_safe(msg, nmsg, &tmp_msg, m_list) {
+    list_del(&msg->m_list);
+    free_msg(msg);
+}

  user = info->user;
  if (user) {
+unsigned long mq_bytes, mq_treesize;
+ /* Total amount of bytes accounted for the mqueue */
+ mq_treesize = info->attr.mq_maxmsg * sizeof(struct msg_msg) +
+            min_t(unsigned int, info->attr.mq_maxmsg, MQ_PRIO_MAX) *
+            sizeof(struct posix_msg_tree_node);
+mq_bytes = mq_treesize + (info->attr.mq_maxmsg * info->attr.mq_msgsize);
+
spin_lock(&mq_lock);
user->mq_bytes -= mq_bytes;
/+--- linux-4.15.0.orig/ipc/msg.c
+++ linux-4.15.0/ipc/msg.c
@@ -119,7 +119,7 @@
 key_t key = params->key;
 int msgflg = params->flg;

-msq = kvmalloc(sizeof(*msq), GFP_KERNEL);
+msq = kvmalloc(sizeof(*msq), GFP_KERNEL_ACCOUNT);
if (unlikely(!msq))
 return -ENOMEM;

--- linux-4.15.0.orig/ipc/msgutil.c
+++ linux-4.15.0/ipc/msgutil.c
@@ -18,6 +18,7 @@
 #include <linux/utsname.h>
 #include <linux/proc_ns.h>
 #include <linux/uaccess.h>
+#include <linux/sched.h>

 #include "util.h"

@@ -64,6 +65,9 @@
 pseg = &msg->next;
 while (len > 0) {
  struct msg_msgseg *seg;
+-cond_resched();
 +
 alen = min(len, DATALEN_SEG);
 seg = kmalloc(sizeof(*seg) + alen, GFP_KERNEL_ACCOUNT);
 if (seg == NULL)
@@ -176,6 +180,8 @@
 kfree(msg);
 while (seg != NULL) {
  struct msg_msgseg *tmp = seg->next;
+-cond_resched();
 kfree(seg);
 seg = tmp;
 }
--- linux-4.15.0.orig/ipc/sem.c
+++ linux-4.15.0/ipc/sem.c
@@ -84,6 +84,7 @@
 #include <linux/nsproxy.h>
 #include <linux/ipc_namespace.h>
 #include <linux/sched/wake_q.h>
+#include <linux/nospec.h>
 #include <linux/uaccess.h>
 #include "util.h"
 @@ -333,6 +334,7 @@
 int nsops)
 {
 struct sem *sem;
+int idx;

 if (nsops != 1) {
 /* Complex operation - acquire a full lock */
@@ -350,7 +352,8 @@
 * Both facts are tracked by use_global_mode.
 */
 -sem = &sma->sems[sops->sem_num];
+idx = array_index_nospec(sops->sem_num, sma->sem_nsems);
 +sem = &sma->sems[idx];

 /*
 * Initial check for use_global_lock. Just an optimization,
@@ -457,7 +460,7 @@
 return NULL;

 size = sizeof(*sma) + nsems * sizeof(sma->sems[0]);
 -sma = kvmalloc(size, GFP_KERNEL);
+smac = kvmalloc(size, GFP_KERNEL_ACCOUNT);
 if (unlikely(!sma))
 return NULL;

@@ -608,7 +611,8 @@
 un = q->undo;

 for (sop = sops; sop < sops + nsops; sop++) {
-curr = &sma->sems[sop->sem_num];
+int idx = array_index_nospec(sop->sem_num, sma->sem_nsems);
 +curr = &sma->sems[idx];
 sem_op = sop->sem_op;
 result = curr->semval;

@@ -688,7 +692,9 @@
 * until the operations can go through.
for (sop = sops; sop < sops + nsops; sop++) {
    curr = &sma->sems[sop->sem_num];
    int idx = array_index_nospec(sop->sem_num, sma->sem_nsems);
    curr = &sma->sems[idx];
    sem_op = sop->sem_op;
    result = curr->semval;

    return -EIDRM;
}

+semnum = array_index_nospec(semnum, sma->sem_nsems);
curr = &sma->sems[semnum];

ipc_assert_locked_object(&sma->sem_perm);
err = -EIDRM;
goto out_unlock;
}

+semnum = array_index_nospec(semnum, nsems);
curr = &sma->sems[semnum];

switch (cmd) {
    undo_list = current->sysvsem.undo_list;
    if (!undo_list) {
        undo_list = kzalloc(sizeof(*undo_list), GFP_KERNEL_ACCOUNT);
        if (undo_list == NULL)
            return -ENOMEM;
        spin_lock_init(&undo_list->lock);
    }

    undo_list = current->sysvsem.undo_list;
    if (!undo_list) {
        undo_list = kzalloc(sizeof(*undo_list), GFP_KERNEL_ACCOUNT);
        if (undo_list == NULL)
            return -ENOMEM;
        spin_lock_init(&undo_list->lock);
        rcu_read_unlock();

        /* step 2: allocate new undo structure */
        new = kzalloc(sizeof(struct sem_undo) + sizeof(short)*nsems, GFP_KERNEL_ACCOUNT);
        if (new) {
            ipc_rcu_putref(&sma->sem_perm, sem_rcu_free);
            return ERR_PTR(-ENOMEM);
        }
    }

    return -E2BIG;
    if (nsops > SEMOPM_FAST) {
sops = kvmalloc(sizeof(*sops)*nsops, GFP_KERNEL);
if (sops == NULL)
    return -ENOMEM;
}
@@ -2015,7 +2024,8 @@
*/
if (nsops == 1) {
    struct sem *curr;
    curr = &sma->sems[sops->sem_num];
+    int idx = array_index_nospec(sops->sem_num, sma->sem_nsems);
    curr = &sma->sems[idx];

    if (alter) {
        if (sma->complex_count) {
@@ -2042,7 +2052,7 @@
    }

    do {
        -queue.status = -EINTR;
+WRITE_ONCE(queue.status, -EINTR);
        queue.sleeper = current;
@@ -2249,11 +2259,9 @@

        -/* we are the last process using this ulp, acquiring ulp->lock
        - * isn't required. Besides that, we are also protected against
        - * IPC_RMID as we hold sma->sem_perm lock now
        - */
+        spin_lock(&ulp->lock);
+        list_del_rcu(&un->list_proc);
+        spin_unlock(&ulp->lock);

        /* perform adjustments registered in un */
        for (i = 0; i < sma->sem_nsems; i++) {
@@ -203,6 +203,12 @@
            -- linux-4.15.0.orig/ipc/shm.c
            +++ linux-4.15.0/ipc/shm.c
            @@ -203,6 +203,12 @@
        if (IS_ERR(shp))
            return PTR_ERR(shp);
@@ -2042,7 +2052,7 @@
        if (shp->shm_file != sfd->file) {
+            /* ID was reused */
+            shm_unlock(shp);
+            return -EINVAL;


+ shp->shm_atim = ktime_get_real_seconds();
+ shp->shm_lprid = task_tgid_vnr(current);
+ shp->shm_nattch++;
@@ -386,6 +392,17 @@
    return sfd->vm_ops->fault(vmf);
 }

+static int shm_split(struct vm_area_struct *vma, unsigned long addr)
{+
    struct file *file = vma->vm_file;
+    struct shm_file_data *sfd = shm_file_data(file);
    +
    +if (sfd->vm_ops && sfd->vm_ops->split)
    +return sfd->vm_ops->split(vma, addr);
    +
    +return 0;
+}
+
#if defined CONFIG_NUMA
static int shm_set_policy(struct vm_area_struct *vma, struct mempolicy *new)
{
    /*
    - * In case of remap_file_pages() emulation, the file can represent
    - * removed IPC ID: propogate shm_lock() error to caller.
    + * In case of remap_file_pages() emulation, the file can represent an
    + * IPC ID that was removed, and possibly even reused by another shm
    + * segment already. Propagate this case as an error to caller.
    */
    ret = __shm_open(vma);
    if (ret)
        @ @ -445.6 +463.7 @ @
    struct shm_file_data *sfd = shm_file_data(file);
    put_ipc_ns(sfd->ns);
+    fput(sfd->file);
    shm_file_data(file) = NULL;
    kfree(sfd);
    return 0;
    @ @ -510.6 +529.7 @ @
    .open= shm_open,/* callback for a new vm-area open */
    .close= shm_close,/* callback for when the vm-area is released */
    .fault= shm_fault,
    +.split= shm_split,
#if defined(CONFIG_NUMA)
  .set_policy = shm_set_policy,
  .get_policy = shm_get_policy,
@@ -545,7 +565,7 @@
  ns->shm_tot + numpages > ns->shm_ctlall)
  return -ENOSPC;

  -shp = kvmalloc(sizeof(*shp), GFP_KERNEL);
  +shp = kvmalloc(sizeof(*shp), GFP_KERNEL_ACCOUNT);
  if (unlikely(!shp))
  return -ENOMEM;

@@ -1290,14 +1310,17 @@
    if (addr & (shmlba - 1)) {
        /*
         - * Round down to the nearest multiple of shmlba.
         - * For sane do_mmap_pgoff() parameters, avoid
         - * round downs that trigger nil-page and MAP_FIXED.
         - */
         -if ((shmflg & SHM_RND) && addr >= shmlba)
         -addr &= ~(shmlba - 1);
         -else
         +if (shmflg & SHM_RND) {
         +addr &= ~(shmlba - 1); /* round down */
         +
         +/*
         + * Ensure that the round-down is non-nil
         + * when remapping. This can happen for
         + * cases when addr < shmlba.
         + */
         +if (!addr && (shmflg & SHM_REMAP))
         +goto out;
         +} else
         #ifndef __ARCH_FORCE_SHMLBA
         if (addr & ~PAGE_MASK)
         #endif
         @@ -1380,7 +1403,16 @@
         file->f_mapping = shp->shm_file->f_mapping;
         sfd->id = shp->shm_perm.id;
         sfd->ns = get_ipc_ns(ns);
         -sfd->file = shp->shm_file;
         +/*
         + * We need to take a reference to the real shm file to prevent the
         + * pointer from becoming stale in cases where the lifetime of the outer
         + * file extends beyond that of the shm segment. It's not usually
         + * possible, but it can happen during remap_file_pages() emulation as
         */

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+ * that unmaps the memory, then does ->mmap() via file reference only.
+ * We'll deny the ->mmap() if the shm segment was since removed, but to
+ * detect shm ID reuse we need to compare the file pointers.
+ */
+sfd->file = get_file(shp->shm_file);
sfd->vm_ops = NULL;

err = security_mmap_file(file, prot, flags);
--- linux-4.15.0.orig/ipc/util.c
+++ linux-4.15.0/ipc/util.c
@@ -763,21 +763,21 @@
total++;}
}

+ipc = NULL;
if (total >>= ids->in_use)
 return NULL;
+goto out;

for (; pos < IPCMNI; pos++) {
 ipc = idr_find(&ids->ipcs_idr, pos);
if (ipc != NULL) {
- *new_pos = pos + 1;
+rcu_read_lock();
 ipc_lock_object(ipc);
- return ipc;
+break;
}
}

-/* Out of range - return NULL to terminate iteration */
- *new_pos = pos + 1;
+out:
 +*new_pos = pos + 1;
+return ipc;
}

static void *sysvipc_proc_next(struct seq_file *s, void *it, loff_t *pos)
--- linux-4.15.0.orig/kernel/Makefile
+++ linux-4.15.0/kernel/Makefile
@@ -30,6 +30,7 @@
# Don't self-instrument.
KCOV_INSTRUMENT_kcov.o := n
KASAN_SANITIZE_kcov.o := n
+CFLAGS_kcov.o := $(call cc-option, -fno-conserve-stack -fno-stack-protector)

# cond_syscall is currently not LTO compatible
CFLAGS_sys_ni.o = $(DISABLE_LTO)
@@ -48,9 +49,6 @@
 obj-$(CONFIG_STACKTRACE) += stacktrace.o
 obj-y += time/
 obj-$(CONFIG_FUTEX) += futex.o
-ifeq ($(CONFIG_COMPAT),y)
-obj-$(CONFIG_FUTEX) += futex_compat.o
-endif
 obj-$(CONFIG_GENERIC_ISA_DMA) += dma.o
 obj-$(CONFIG_SMP) += smp.o
 ifneq ($(CONFIG_SMP),y)
@@ -92,7 +90,6 @@
 obj-$(CONFIG_TASKSTATS) += taskstats.o tsacct.o
 obj-$(CONFIG_TRACEPOINTS) += tracepoint.o
 obj-$(CONFIG_LATENCYTOP) += latencytop.o
-obj-$(CONFIG_ELFCORE) += elfcore.o
 obj-$(CONFIG_FUNCTION_TRACER) += trace/
 obj-$(CONFIG_TRACING) += trace/
 obj-$(CONFIG_TRACE_CLOCK) += trace/
--- linux-4.15.0.orig/kernel/acct.c
+++ linux-4.15.0/kernel/acct.c
@@ -227,7 +227,7 @@
 filp_close(file, NULL);
 return PTR_ERR(internal);
 }
-err = mnt_want_write(internal);
+err = __mnt_want_write(internal);
 if (err) {
 mntput(internal);
 kfree(acct);
@@ -252,7 +252,7 @@
 old = xchg(&ns->bacct, &acct->pin);
 mutex_unlock(&acct->lock);
 pin_kill(old);
-mnt_drop_write(mnt);
+__mnt_drop_write(mnt);
 mntput(mnt);
 return 0;
 }
--- linux-4.15.0.orig/kernel/async.c
+++ linux-4.15.0/kernel/async.c
@@ -84,20 +84,24 @@
 static async_cookie_t lowest_in_progress(struct async_domain *domain)
 {
-struct list_head *pending;
+struct async_entry *first = NULL;
 async_cookie_t ret = ASYNC_COOKIE_MAX;
 unsigned long flags;

 static async_cookie_t lowest_in_progress(struct async_domain *domain)
spin_lock_irqsave(&async_lock, flags);

-if (domain)
-pending = &domain->pending;
-else
-pending = &async_global_pending;
+if (domain) {
+ if (!list_empty(&domain->pending))
+ first = list_first_entry(&domain->pending,
+ struct async_entry, domain_list);
+ } else {
+ if (!list_empty(&async_global_pending))
+ first = list_first_entry(&async_global_pending,
+ struct async_entry, global_list);
+ }

-if (!list_empty(pending))
-ret = list_first_entry(pending, struct async_entry,
- struct async_entry, domain_list)->cookie;
+if (first)
+ret = first->cookie;

spin_unlock_irqrestore(&async_lock, flags);
return ret;
--- linux-4.15.0.orig/kernel/audit.c
+++ linux-4.15.0/kernel/audit.c
@@ -853,7 +853,7 @@
return 0;
}

-int audit_send_list(void *dest)
+int audit_send_list_thread(void *dest)
{
 struct audit_netlink_list *dest = _dest;
 struct sk_buff *skb;
@@ -897,19 +897,30 @@
return NULL;

+static void audit_free_reply(struct audit_reply *reply)
+{
+ if (!reply)
+ return;
+ if (reply->skb)
+ kfree_skb(reply->skb);
+ if (reply->net)
static int audit_send_reply_thread(void *arg)
{
    struct audit_reply *reply = (struct audit_reply *)arg;
    struct sock *sk = audit_get_sk(reply->net);

    mutex_lock(&audit_cmd_mutex);
    mutex_unlock(&audit_cmd_mutex);

    /* Ignore failure. It'll only happen if the sender goes away, 
     because our timeout is set to infinite. */
    -netlink_unicast(sk, reply->skb, reply->portid, 0);
    -put_net(reply->net);
    -kfree(reply);
    +netlink_unicast(audit_get_sk(reply->net), reply->skb, reply->portid, 0);
    +reply->skb = NULL;
    +audit_free_reply(reply);
    return 0;
}

@@ -923,35 +934,32 @@
* @payload: payload data
* @size: payload size
 *
- * Allocates an skb, builds the netlink message, and sends it to the port id.
- * No failure notifications.
+ * Allocates a skb, builds the netlink message, and sends it to the port id.
+ */
static void audit_send_reply(struct sk_buff *request_skb, int seq, int type, int done,
                            int multi, const void *payload, int size)
{
    struct net *net = sock_net(NETLINK_CB(request_skb).sk);
    struct sk_buff *skb;
    struct task_struct *tsk;
    struct audit_reply *reply = kmalloc(sizeof(struct audit_reply), GFP_KERNEL);
    if (!reply)
        return;

    skb = audit_make_reply(seq, type, done, multi, payload, size);
    if (!skb)
        goto out;

    *payload: payload data
    * @size: payload size
    *
    - * Allocates an skb, builds the netlink message, and sends it to the port id.
    - * No failure notifications.
    + * Allocates a skb, builds the netlink message, and sends it to the port id.
    */

    +reply = kzalloc(sizeof(*reply), GFP_KERNEL);
    if (!reply)
        return;

    skb = audit_make_reply(seq, type, done, multi, payload, size);
    if (!skb)
        goto out;

    /* Ignore failure. It'll only happen if the sender goes away,
     because our timeout is set to infinite. */
    -netlink_unicast(sk, reply->skb, reply->portid, 0);
    -put_net(reply->net);
    -kfree(reply);
    +netlink_unicast(audit_get_sk(reply->net), reply->skb, reply->portid, 0);
    +reply->skb = NULL;
    +audit_free_reply(reply);
    return 0;
}
reply->skb = audit_make_reply(seq, type, done, multi, payload, size);
if (!reply->skb)
goto err;
reply->net = get_net(sock_net(NETLINK_CB(request_skb).sk));
reply->portid = NETLINK_CB(request_skb).portid;
reply->skb = skb;

out:
kfree_skb(skb);
-kfree(reply);
+if (!IS_ERR(tsk))
+return;
+return;
+err:
+audit_free_reply(reply);
}

ab = audit_log_start(NULL, GFP_KERNEL, AUDIT_FEATURE_CHANGE);
+if (!ab)
+return;
audit_log_task_info(ab, current);
audit_log_format(ab, " feature=%s old=%u new=%u old_lock=%u new_lock=%u res=%d",
audit_feature_names[which], !!old_feature, !!new_feature,
@@ -1065,13 +1075,11 @@
audit_log_end(ab);
}

-static int audit_set_feature(struct sk_buff *skb)
+static int audit_set_feature(struct audit_features *uaf)
{
-struct audit_features *uaf;
-int i;

BUILD_BUG_ON(AUDIT_LAST_FEATURE + 1 > ARRAY_SIZE(audit_feature_names));
-uaf = nlmsg_data(nlmsg_hdr(skb));

/* if there is ever a version 2 we should handle that here */
u32 seq;
void* data;
+int data_len;
int err;
struct audit_buffer* ab;

u16 msg_type = nlh->nlmsg_type;

seq = nlh->nlmsg_seq;
data = nlmsg_data(nlh);
+data_len = nlmsg_len(nlh);

switch (msg_type) {
case AUDIT_GET: {
    struct audit_status s;
    /* guard against past and future API changes */
    /* memcpy(&s, data, min_t(size_t, sizeof(s), nlmsg_len(nlh))); */
    memcpy(&s, data, min_t(size_t, sizeof(s), data_len));
    if (s.mask & AUDIT_STATUS_ENABLED) {
        err = audit_set_enabled(s.enabled);
        if (err < 0)
            return err;
    }
    break;
case AUDIT_SET_FEATURE:
    err = audit_set_feature(skb);
    +if (data_len < sizeof(struct audit_features))
    +return -EINVAL;
    err = audit_set_feature(data);
    if (err)
        return err;
    break;
case AUDIT_FIRST_USER_MSG2 ...
    case AUDIT_LAST_USER_MSG2:
        if (!audit_enabled && msg_type != AUDIT_USER_AVC)
            return 0;
        else
            /* exit early if there isn't at least one character to print */
            if (data_len < 2)
                return -EINVAL;
        err = audit_filter(msg_type, AUDIT_FILTER_USER);
        if (err == 1) { /* match or error */
            char* str = data;
        }
```c
err = 0;
if (msg_type == AUDIT_USER_TTY) {
    err = tty_audit_push();
    break;
}
audit_log_common_recv_msg(&ab, msg_type);
-if (msg_type != AUDIT_USER_TTY)
+if (msg_type != AUDIT_USER_TTY) {
+    /* ensure NULL termination */
+    str[data_len - 1] = '0';
    audit_log_format(ab, " msg='%.*s",
         AUDIT_MESSAGE_TEXT_MAX,
            (char *)data);
    -else {
        int size;
        +str);
+    } else {
        audit_log_format(ab, " data=");
        -size = nlmsg_len(nlh);
        -if (size > 0 &&
        -    ((unsigned char *)data)[size - 1] == '0')
        -    size--;
        -audit_log_n_untrustedstring(ab, data, size);
        +if (data_len > 0 && str[data_len - 1] == '0')
        +data_len--;
        +audit_log_n_untrustedstring(ab, str, data_len);
    }
    audit_log_end(ab);
    break;
} else {
    case AUDIT_ADD_RULE:
    case AUDIT_DEL_RULE:
    -if (nlmsg_len(nlh) < sizeof(struct audit_rule_data))
    +if (data_len < sizeof(struct audit_rule_data))
        return -EINVAL;
    if (audit_enabled == AUDIT_LOCKED) {
        audit_log_common_recv_msg(&ab, AUDIT_CONFIG_CHANGE);
        audit_log_end(ab);
        return -EPERM;
    }
    -err = audit_rule_change(msg_type, seq, data, nlmsg_len(nlh));
    +err = audit_rule_change(msg_type, seq, data, data_len);
    break;
    case AUDIT_LIST_RULES:
```
err = audit_list_rules_send(skb, seq);
@@ -1339,7 +1354,7 @@
case AUDIT_MAKE_EQUIV: {
    void *bufp = data;
    u32 sizes[2];
    -size_t msglen = nlmsg_len(nlh);
+    size_t msglen = data_len;
    char *old, *new;

    err = -EINVAL;
@@ -1415,7 +1430,7 @@
    memset(&s, 0, sizeof(s));
    /* guard against past and future API changes */
    -memcpy(&s, data, min_t(size_t, sizeof(s), nlmsg_len(nlh)));
+    memcpy(&s, data, min_t(size_t, sizeof(s), data_len));
    /* check if new data is valid */
    if ((s.enabled != 0 && s.enabled != 1) ||
        (s.log_passwd != 0 && s.log_passwd != 1))
--- linux-4.15.0.orig/kernel/audit.h
+++ linux-4.15.0/kernel/audit.h
@@ -248,7 +248,7 @@
 struct audit_chunk {
     struct list_head hash;
     +unsigned long key;
     struct fsnotify_mark mark;
     struct list_head trees;/* with root here */
     int dead;
@@ -171,21 +172,6 @@
     return (unsigned long)inode;
 }

-/*
- * Function to return search key in our hash from chunk. Key 0 is special and
- * should never be present in the hash.
- */
-
-static unsigned long chunk_to_key(struct audit_chunk *chunk)
-{
- *
- * We have a reference to the mark so it should be attached to a
- * connector.
- */
-if (WARN_ON_ONCE(!chunk->mark.connector))
-return 0;
-return (unsigned long)chunk->mark.connector->inode;
-}
-
static inline struct list_head *chunk_hash(unsigned long key)
{
unsigned long n = key / L1_CACHE_BYTES;
@
/* hash_lock & entry->lock is held by caller */
static void insert_hash(struct audit_chunk *chunk)
{
-unsigned long key = chunk_to_key(chunk);
struct list_head *list;

if (!(chunk->mark.flags & FSNOTIFY_MARK_FLAG_ATTACHED))
return;
-list = chunk_hash(key);
+WARN_ON_ONCE(!chunk->key);
+list = chunk_hash(chunk->key);
list_add_rcu(&chunk->hash, list);
}

@
struct audit_chunk *p;

list_for_each_entry_rcu(p, list, hash) {
-if (chunk_to_key(p) == key) {
+if (p->key == key) {
 atomic_long_inc(&p->refs);
 return p;
 }
@
chunk->dead = 1;
spin_lock(&hash_lock);
+new->key = chunk->key;
list_replace_init(&chunk->trees, &new->trees);
if (owner->root == chunk) {
 list_del_init(&owner->same_root);
@
new->root = chunk;
list_add(&tree->same_root, &chunk->trees);
}
+chunk->key = inode_to_key(inode);
insert_hash(chunk);
spin_unlock(&hash_lock);
spin_unlock(&entry->lock);
@@ -461,6 +449,7 @@
fsnotify_put_mark(old_entry);
return 0;
}
+chunk->key = old->key;
list_replace_init(&old->trees, &chunk->trees);
for (n = 0, p = chunk->owners; n < old->count; n++, p++) {
struct audit_tree *s = old->owners[n].owner;
@@ -658,7 +647,7 @@
/* this could be NULL if the watch is dying else where... */
node->index |= 1U<<31;
if (iterate_mounts(compare_root,
- (void *)chunk_to_key(chunk),
+ (void *)(chunk->key),
   root_mnt))
node->index &= ~(1U<<31);
}
--- linux-4.15.0.orig/kernel/audit_watch.c
+++ linux-4.15.0/kernel/audit_watch.c
@@ -316,8 +316,6 @@
if (oentry->rule.exe)
audit_remove_mark(oentry->rule.exe);
-
audit_watch_log_rule_change(r, owatch, "updated_rules");
-
call_rcu(&oentry->rcu, audit_free_rule_rcu);
}
@@ -365,12 +363,12 @@
struct dentry *d = kern_path_locked(watch->path, parent);
if (IS_ERR(d))
    return PTR_ERR(d);
+inode_unlock(d_backing_inode(parent->dentry));
if (d_is_positive(d)) {
/* update watch filter fields */
    watch->dev = d->d_sb->s_dev;
    watch->ino = d_backing_inode(d)->i_ino;
}+
inode_unlock(d_backing_inode(parent->dentry));
dput(d);
return 0;
}
struct path parent_path;
int h, ret = 0;

+/*
 + * When we will be calling audit_add_to_parent, krule->watch might have
 + * been updated and watch might have been freed.
 + * So we need to keep a reference of watch.
 + */
+audit_get_watch(watch);
+mutex_unlock(&audit_filter_mutex);

/* Avoid calling path_lookup under audit_filter_mutex. */
mutex_lock(&audit_filter_mutex);

-if (ret)
+if (ret) {
+audit_put_watch(watch);
return ret;
+

/* either find an old parent or attach a new one */
parent = audit_find_parent(d_backing_inode(parent_path.dentry));

-list = &audit_inode_hash[h];
error:
path_put(&parent_path);
+audit_put_watch(watch);
return ret;
}

--- linux-4.15.0.orig/kernel/auditfilter.c
+++ linux-4.15.0/kernel/auditfilter.c
@@ -426,7 +426,7 @@
return -EINVAL;
break;
case AUDIT_EXE:
-if (f->op != Audit_equal)
+if (f->op != Audit_not_equal && f->op != Audit_equal)
return -EINVAL;
if (entry->rule.listnr != AUDIT_FILTER_EXIT)
return -EINVAL;

bufp = data->buf;
for (i = 0; i < data->field_count; i++) {

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struct audit_field *f = &entry->rule.fields[i];
+u32 f_val;

err = -EINVAL;

@@ -462,12 +463,12 @@
goto exit_free;

f->type = data->fields[i];
-f->val = data->values[i];
+f_val = data->values[i];
/* Support legacy tests for a valid loginuid */
- if ((f->type == AUDIT_LOGINUID) && (f->val == AUDIT_UID_UNSET)) {
-+if ((f->type == AUDIT_LOGINUID) && (f_val == AUDIT_UID_UNSET)) {
+ f->type = AUDIT_LOGINUID_SET;
  -f->val = 0;
  +f_val = 0;
   entry->rule.pflags |= AUDIT_LOGINUID_LEGACY;
 }

@@ -483,7 +484,7 @@ case AUDIT_SUID:
 case AUDIT_FSUID:
 case AUDIT_OBJ_UID:
  -f->uid = make_kuid(current_user_ns(), f->val);
-+f->uid = make_kuid(current_user_ns(), f_val);
  if (!uid_valid(f->uid))
     goto exit_free;
  break;
@@ -492,12 +493,13 @@ case AUDIT_SGID:
 case AUDIT_FSGID:
 case AUDIT_OBJ_GID:
  -f->gid = make_kgid(current_user_ns(), f->val);
-+f->gid = make_kgid(current_user_ns(), f_val);
  if (!gid_valid(f->gid))
     goto exit_free;
  break;
 case AUDIT_SESSIONID:
 case AUDIT_ARCH:
  +f->val = f_val;
   entry->rule.arch_f = f;
  break;
 case AUDIT_SUBJ_USER:
@@ -510,11 +512,13 @@ case AUDIT_OBJ_TYPE:
 case AUDIT_OBJ_LEV_LOW:
case AUDIT_OBJ_LEV_HIGH:
    -str = audit_unpack_string(&bufp, &remain, f->val);
    -if (IS_ERR(str))
    +str = audit_unpack_string(&bufp, &remain, f_val);
    +if (IS_ERR(str)) {
        +err = PTR_ERR(str);
        goto exit_free;
    -entry->rule.buflen += f->val;
    -
    +
    +entry->rule.buflen += f_val;
    +f->lsm_str = str;
    err = security_audit_rule_init(f->type, f->op, str,
        (void **)&f->lsm_rule);
    /* Keep currently invalid fields around in case they
     @@ -523,68 +527,71 @@
     pr_warn("audit rule for LSM \%s\ is invalid\n", str);
     err = 0;
    -}
    -if (err) {
    -kfree(str);
    +} else if (err)
    goto exit_free;
    -} else
    -f->lsm_str = str;
    break;
  case AUDIT_WATCH:
    -str = audit_unpack_string(&bufp, &remain, f->val);
    -if (IS_ERR(str))
    +str = audit_unpack_string(&bufp, &remain, f_val);
    +if (IS_ERR(str)) {
        +err = PTR_ERR(str);
        goto exit_free;
    -entry->rule.buflen += f->val;
    -
    -
    +err = audit_to_watch(&entry->rule, str, f->val, f->op);
    +}
    +err = audit_to_watch(&entry->rule, str, f_val, f->op);
    if (err) {
        kfree(str);
        goto exit_free;
    }
    +entry->rule.buflen += f_val;
    break;
  case AUDIT_DIR:
    -str = audit_unpack_string(&bufp, &remain, f->val);
    -if (IS_ERR(str))
+str = audit_unpack_string(&bufp, &remain, f_val);
+if (IS_ERR(str)) {
+    +err = PTR_ERR(str);
+    goto exit_free;
-    entry->rule.buflen += f->val;
+
+  }
+err = audit_make_tree(&entry->rule, str, f->op);
-kfree(str);
+    if (err)
+    goto exit_free;
+    entry->rule.buflen += f_val;
break;
+case AUDIT_INODE:
+    f->val = f_val;
+err = audit_to_inode(&entry->rule, f);
if (err)
    goto exit_free;
+    entry->rule.buflen += f_val;
}break;
+case AUDIT_FILTERKEY:
-    if (entry->rule.filterkey || f->val > AUDIT_MAX_KEY_LEN)
-        goto exit_free;
-    str = audit_unpack_string(&bufp, &remain, f->val);
-    if (IS_ERR(str)) {
-        +err = PTR_ERR(str);
-        goto exit_free;
-    }
-    entry->rule.buflen += f->val;
-
-    +audit_mark = audit_alloc_mark(&entry->rule, str, f->val);
-
+
+    +audit_mark = audit_alloc_mark(&entry->rule, str, f_val);

if (IS_ERR(audit_mark)) {
    kfree(str);
    err = PTR_ERR(audit_mark);
    goto exit_free;
}
+entry->rule.buflen += f_val;
entry->rule.exe = audit_mark;
break;
+default:
+f->val = f_val;
+break;
}
}

@@ -1119,22 +1126,24 @@
int err = 0;
struct audit_entry *entry;

-entry = audit_data_to_entry(data, datasz);
-if (IS_ERR(entry))
-return PTR_ERR(entry);
-
switch (type) {
 case AUDIT_ADD_RULE:
+entry = audit_data_to_entry(data, datasz);
+if (IS_ERR(entry))
+return PTR_ERR(entry);
 err = audit_add_rule(entry);
 audit_log_rule_change("add_rule", &entry->rule, !err);
 break;
 case AUDIT_DEL_RULE:
+entry = audit_data_to_entry(data, datasz);
+if (IS_ERR(entry))
+return PTR_ERR(entry);
 err = audit_del_rule(entry);
 audit_log_rule_change("remove_rule", &entry->rule, !err);
 break;
 default:
-err = -EINVAL;
 WARN_ON(1);
+return -EINVAL;
}

if (err || type == AUDIT_DEL_RULE) {
@@ -1153,11 +1162,8 @@
 /*
 int audit_list_rules_send(struct sk_buff *request_skb, int seq)
 {

---
-u32 portid = NETLINK_CB(request_skb).portid;
-struct net *net = sock_net(NETLINK_CB(request_skb).sk);
struct task_struct *tsk;
struct audit_netlink_list *dest;
-int err = 0;

/* We can't just spew out the rules here because we might fill
 * the available socket buffer space and deadlock waiting for
 @ @ -1165.25 +1171.26 @@
 * happen if we're actually running in the context of auditctl
 * trying to _send_ the stuff */

-dest = kmalloc(sizeof(struct audit_netlink_list), GFP_KERNEL);
+dest = kmalloc(sizeof(*dest), GFP_KERNEL);
if (!dest)
  return -ENOMEM;
-dest->net = get_net(net);
-dest->portid = portid;
+dest->net = get_net(sock_net(NETLINK_CB(request_skb).sk));
+dest->portid = NETLINK_CB(request_skb).portid;
skb_queue_head_init(&dest->q);
mutex_lock(&audit_filter_mutex);
audit_list_rules(seq, &dest->q);
mutex_unlock(&audit_filter_mutex);

-tsk = kthread_run(audit_send_list, dest, "audit_send_list");
+tsk = kthread_run(audit_send_list_thread, dest, "audit_send_list");
if (IS_ERR(tsk)) {
  skb_queue_purge(&dest->q);
+put_net(dest->net);
  kfree(dest);
  -err = PTR_ERR(tsk);
  +return PTR_ERR(tsk);
}

-return err;
+return 0;
}

int audit_comparator(u32 left, u32 op, u32 right)
--- linux-4.15.0.orig/kernel/auditsc.c
+++ linux-4.15.0/kernel/auditsc.c
@@ -471,6 +471,8 @@
 break;
 case AUDIT_EXE:
      result = audit_exe_compare(tsk, rule->exe);
+if (f->op == Audit_not_equal)
+result = !result;
break;
case AUDIT_UID:
result = audit_uid_comparator(cred->uid, f->op, f->uid);
@@ -1100,7 +1102,7 @@
}
/* write as much as we can to the audit log */
-if (len_buf > 0) {
+if (len_buf >= 0) {
/* NOTE: some magic numbers here - basically if we
*    can't fit a reasonable amount of data into the
*    existing audit buffer, flush it and start with
@@ -1272,8 +1274,12 @@
break;
case AUDIT_KERN_MODULE:
  audit_log_format(ab, "name=");
  -audit_log_untrustedstring(ab, context->module.name);
-  kfree(context->module.name);
+  if (context->module.name) {
+    audit_log_untrustedstring(ab, context->module.name);
+    kfree(context->module.name);
+  } else
+  audit_log_format(ab, "(null)");
+break;
  }
audit_log_end(ab);
@@ -2408,8 +2414,9 @@
{
  struct audit_context *context = current->audit_context;

-  context->module.name = kmalloc(strlen(name) + 1, GFP_KERNEL);
-  strcpy(context->module.name, name);
+  context->module.name = kstrdup(name, GFP_KERNEL);
+  if (!context->module.name)
+    audit_log_lost("out of memory in __audit_log_kern_module");
  context->type = AUDIT_KERN_MODULE;
}
--- linux-4.15.0.orig/kernel/bounds.c
+++ linux-4.15.0/kernel/bounds.c
@@ @ -13,7 +13,7 @@
#include <linux/log2.h>
#include <linux/spinlock_types.h>

-void foo(void)
+int main(void)
/* The enum constants to put into include/generated/bounds.h */
DEFINE(NR_PAGEFLAGS, __NR_PAGEFLAGS);
@@ -23,4 +23,6 @@
#endif
DEFINE(SPINLOCK_SIZE, sizeof(spinlock_t));
/* End of constants */
+
+return 0;
}
--- linux-4.15.0.orig/kernel/bpf/Makefile
+++ linux-4.15.0/kernel/bpf/Makefile
@@ -1,5 +1,6 @@
# SPDX-License-Identifier: GPL-2.0
obj-y := core.o
+CCFLAGS_core.o += $(call cc-disable-warning, override-init)

obj-$ (CONFIG_BPF_SYSCALL) += syscall.o verifier.o inode.o helpers.o tnum.o
obj-$ (CONFIG_BPF_SYSCALL) += hashtab.o arraymap.o percpu_freelist.o bpf_lru_list.o lpm_trie.o
map_in_map.o
--- linux-4.15.0.orig/kernel/bpf/arraymap.c
+++ linux-4.15.0/kernel/bpf/arraymap.c
@@ -26,8 +26,10 @@
{
    int i;

    -for (i = 0; i < array->map.max_entries; i++)
+for (i = 0; i < array->map.max_entries; i++) {
        free_percpu(array->pptrs[i]);
        +cond_resched();
+    }
}

static int bpf_array_alloc_percpu(struct bpf_array *array)
@@ -43,6 +45,7 @@
return -ENOMEM;
}
array->pptrs[i] = ptr;
+cond_resched();
}

return 0;
@@ -52,11 +55,11 @@
static struct bpf_map *array_map_alloc(union bpf_attr *attr)
{
    bool percpu = attr->map_type == BPF_MAP_TYPE_PERCPU_ARRAY;
    -int numa_node = bpf_map_attr_numa_node(attr);
+int ret, numa_node = bpf_map_attr_numa_node(attr);
u32 elem_size, index_mask, max_entries;
bool unpriv = !capable(CAP_SYS_ADMIN);
+u64 cost, array_size, mask64;
struct bpf_array *array;
-u64 array_size, mask64;

/* check sanity of attributes */
if (attr->max_entries == 0 || attr->key_size != 4 ||
   @ @ -101.8 +104.19 @@
array_size += (u64) max_entries * elem_size;

/* make sure there is no u32 overflow later in round_up() */
-if (array_size >= U32_MAX - PAGE_SIZE)
+cost = array_size;
+if (cost >= U32_MAX - PAGE_SIZE)
return ERR_PTR(-ENOMEM);
+if (percpu) {
+cost += (u64)attr->max_entries * elem_size * num_possible_cpus();
+if (cost >= U32_MAX - PAGE_SIZE)
+return ERR_PTR(-ENOMEM);
+}
+cost = round_up(cost, PAGE_SIZE) >> PAGE_SHIFT;
+ret = bpf_map_precharge_memlock(cost);
+if (ret < 0)
+return ERR_PTR(ret);

/* allocate all map elements and zero-initialize them */
array = bpf_map_area_alloc(array_size, numa_node);
@@ -118,20 +132,13 @@
array->map.max_entries = attr->max_entries;
array->map.map_flags = attr->map_flags;
array->map.numa_node = numa_node;
+array->map.pages = cost;
array->elem_size = elem_size;

-if (!percpu)
-goto out;
-
-array_size += (u64) attr->max_entries * elem_size * num_possible_cpus();
-
-if (array_size >= U32_MAX - PAGE_SIZE ||
- bpf_array_alloc_percpu(array)) {
+if (percpu && bpf_array_alloc_percpu(array)) {
 bpf_map_area_free(array);
return ERR_PTR(-ENOMEM);
}
-out:
array->map.pages = round_up(array_size, PAGE_SIZE) >> PAGE_SHIFT;

return &array->map;
}
@ @ -464,7 +471,7 @@
}

/* decrement refcnt of all bpf_progs that are stored in this map */
-void bpf_fd_array_map_clear(struct bpf_map *map)
+static void bpf_fd_array_map_clear(struct bpf_map *map)
{
 struct bpf_array *array = container_of(map, struct bpf_array, map);
 int i;
 @@ -482,6 +489,7 @@
 .map_fd_get_ptr = prog_fd_array_get_ptr,
 .map_fd_put_ptr = prog_fd_array_put_ptr,
 .map_fd_sys_lookup_elem = prog_fd_array_sys_lookup_elem,
+ .map_release_uref = bpf_fd_array_map_clear,
 };

static struct bpf_event_entry *bpf_event_entry_gen(struct file *perf_file,
--- linux-4.15.0.orig/kernel/bpf/bpf_lru_list.c
+++ linux-4.15.0/kernel/bpf/bpf_lru_list.c
@@ -505,13 +505,14 @@
static void bpf_common_lru_push_free(struct bpf_lru *lru,
 struct bpf_lru_node *node)
 {
 +u8 node_type = READ_ONCE(node->type);
 unsigned long flags;

-if (WARN_ON_ONCE(node->type == BPF_LRU_LIST_T_FREE) ||
 -WARN_ON_ONCE(node->type == BPF_LRU_LOCAL_LIST_T_FREE))
+if (WARN_ON_ONCE(node_type == BPF_LRU_LIST_T_FREE) ||
 +WARN_ON_ONCE(node_type == BPF_LRU_LOCAL_LIST_T_FREE))
 return;

-if (node->type == BPF_LRU_LOCAL_LIST_T_PENDING) {
+if (node_type == BPF_LRU_LOCAL_LIST_T_PENDING) {
 struct bpf_lru_locallist *loc_l;

 loc_l = per_cpu_ptr(lru->common_lru.local_list, node->cpu);
--- linux-4.15.0.orig/kernel/bpf/cgroup.c
+++ linux-4.15.0/kernel/bpf/cgroup.c
@@ -95,7 +95,7 @@
 enum bpf_attach_type type,
 struct bpf_prog_array __rcu **array)
 {
-struct bpf_prog_array __rcu *progs;
+struct bpf_prog_array *progs;
struct bpf_prog_list *pl;
struct cgroup *p = cgrp;
int cnt = 0;
@@ -120,13 +120,12 @@
     &p->bpf.progs[type], node) {
 if (!pl->prog)
     continue;
-    rcu_dereference_protected(progs, 1)->
-    progs[cnt++] = pl->prog;
+    progs->progs[cnt++] = pl->prog;
}
p = cgroup_parent(p);
} while (p);

-*array = progs;
+rcu_assign_pointer(*array, progs);
 return 0;
}
@@ -568,6 +567,8 @@
    enum bpf_access_type type,
    struct bpf_insn_access_aux *info)
 {
+    const int size_default = sizeof(__u32);
+    
    if (type == BPF_WRITE)
        return false;

@@ -576,8 +577,17 @@
/* The verifier guarantees that size > 0. */
    if (off % size != 0)
        return false;
    -if (size != sizeof(__u32))
    -return false;
+    switch (off) {
+    case bpf_ctx_range(struct bpf_cgroup_dev_ctx, access_type):
+    bpf_ctx_record_field_size(info, size_default);
+    if (!bpf_ctx_narrow_access_ok(off, size, size_default))
+        return false;
+    break;
+    default:
+if (size != size_default)
+    return false;
+    
        return true;
---

```c
#define DST regs[insn->dst_reg]
#define SRC regs[insn->src_reg]
#define FP regs[BPF_REG_FP]
#define AX regs[BPF_REG_AX]
#define ARG1 regs[BPF_REG_ARG1]
#define CTX regs[BPF_REG_CTX]
#define IMM insn->imm

BPF_OP(insn->code) != BPF_EXIT;
```

- static void bpf_adj_branches(struct bpf_prog *prog, u32 pos, u32 delta)
+ static int bpf_adj_delta_to_off(struct bpf_insn *insn, u32 pos, u32 delta,
+                                 u32 curr, const bool probe_pass)
{
    const s32 off_min = S16_MIN, off_max = S16_MAX;
    s32 off = insn->off;
    +
    +if (curr < pos && curr + off + 1 > pos)
    +off += delta;
    +else if (curr > pos + delta && curr + off + 1 <= pos + delta)
    +off -= delta;
    +if (off < off_min || off > off_max)
    +return -ERANGE;
    +if (!probe_pass)
    +insn->off = off;
    +return 0;
+
+}
+
+static int bpf_adj_branches(struct bpf_prog *prog, u32 pos, u32 delta,
+                            const bool probe_pass)
+{
+    u32 i, insn_cnt = prog->len + (probe_pass ? delta : 0);
+    struct bpf_insn *insn = prog->insn;
-    u32 i, insn_cnt = prog->len;
+    int ret = 0;
+
    for (i = 0; i < insn_cnt; i++, insn++) {
        u8 code;
        +
        +/* In the probing pass we still operate on the original,
        + * unpatched image in order to check overflows before we
        + * do any other adjustments. Therefore skip the patchlet.
        + */
    ```
+if (probe_pass && i == pos) {
+i += delta + 1;
+insn++;
+}
+code = insn->code;
if (!bpf_is_jmp_and_has_target(insn))
continue;
-
-/* Adjust offset of jmps if we cross boundaries. */
-#if (i < pos && i + insn->off + 1 > pos)
-insn->off += delta;
-else if (i > pos + delta && i + insn->off + 1 <= pos + delta)
-insn->off -= delta;
+/* Adjust offset of jmps if we cross patch boundaries. */
+ret = bpf_adj_delta_to_off(insn, pos, delta, i,
+    probe_pass);
+if (ret)
+break;
}
+
+return ret;
}

struct bpf_prog *bpf_patch_insn_single(struct bpf_prog *prog, u32 off,
    const struct bpf_insn *patch, u32 len)
{
    u32 insn_adj_cnt, insn_rest, insn_delta = len - 1;
    +const u32 cnt_max = S16_MAX;
    struct bpf_prog *prog_adj;

    /* Since our patchlet doesn't expand the image, we're done. */
    @@ -258,6 +291,15 @@
    insn_adj_cnt = prog->len + insn_delta;

    /* Reject anything that would potentially let the insn->off
     * target overflow when we have excessive program expansions.
     * We need to probe here before we do any reallocation where
     * we afterwards may not fail anymore.
     */
    +if (insn_adj_cnt > cnt_max &&
        bpf_adj_branches(prog, off, insn_delta, true))
        return NULL;
+
    /* Several new instructions need to be inserted. Make room
     * for them. Likely, there's no need for a new allocation as
     * last page could have large enough tailroom.
    @@ -283,12 +325,22 @@

sizeof(*patch) * insn_rest);
memcpy(prog_adj->insnsi + off, patch, sizeof(*patch) * len);

-bpf_adj_branches(prog_adj, off, insn_delta);
+/* We are guaranteed to not fail at this point, otherwise
+ * the ship has sailed to reverse to the original state. An
+ * overflow cannot happen at this point.
+ */
+BUG_ON(bpf_adj_branches(prog_adj, off, insn_delta, false));

return prog_adj;
}

#ifdef CONFIG_BPF_JIT
+/* All BPF JIT sysctl knobs here. */
+int bpf_jit_enable __read_mostly = IS_BUILTIN(CONFIG_BPF_JIT_ALWAYS_ON);
+int bpf_jit_harden __read_mostly;
+int bpf_jit_kallsyms __read_mostly;
+long bpf_jit_limit __read_mostly;
+
static __always_inline void
bpf_get_prog_addr_region(const struct bpf_prog *prog,
unsigned long *symbol_start,
@@ -370,8 +422,6 @@
static LIST_HEAD(bpf_kallsyms);
static struct latch_tree_root bpf_tree __cacheline_aligned;

-int bpf_jit_kallsyms __read_mostly;
-
static void bpf_prog_ksym_node_add(struct bpf_prog_aux *aux)
{
WARN_ON_ONCE(!list_empty(&aux->ksym_lnode));
@@ -498,27 +548,75 @@
return ret;
}

+static atomic_long_t bpf_jit_current;
+
+/* Can be overridden by an arch's JIT compiler if it has a custom,
+ * dedicated BPF backend memory area, or if neither of the two
+ * below apply.
+ */
+u64 __weak bpf_jit_alloc_exec_limit(void)
+{
+##if defined(MODULES_VADDR)
+return MODULES_END - MODULES_VADDR;
+##else
+return VMALLOC_END - VMALLOC_START;
+}
```c
#ifdef
+
+static int __init bpf_jit_charge_init(void)
+{
+ /* Only used as heuristic here to derive limit. */
+ bpf_jit_limit = min_t(u64, round_up(bpf_jit_alloc_exec_limit() >> 2,
+ PAGE_SIZE), LONG_MAX);
+ return 0;
+ }
+pure_initcall(bpf_jit_charge_init);
+
+static int bpf_jit_charge_modmem(u32 pages)
+{
+ if (atomic_long_add_return(pages, &bpf_jit_current) >
+   (bpf_jit_limit >> PAGE_SHIFT)) {
+     if (!capable(CAP_SYS_ADMIN)) {
+       atomic_long_sub(pages, &bpf_jit_current);
+       return -EPERM;
+     }
+   }
+ return 0;
+ }
+
+static void bpf_jit_uncharge_modmem(u32 pages)
+{
+   atomic_long_sub(pages, &bpf_jit_current);
+ }
+
+static struct bpf_binary_header *
bpf_jit_binary_alloc(unsigned int proglen, u8 **image_ptr,
   unsigned int alignment,
   bpf_jit_fill_hole_t bpf_fill_ill_insns)
{
   struct bpf_binary_header *hdr;
   unsigned int size, hole, start;
   --size = round_up(proglen + sizeof(*hdr) + 128, PAGE_SIZE);
   --pages = size / PAGE_SIZE;
+ if (bpf_jit_charge_modmem(pages))
+ return NULL;
```
hdr = module_alloc(size);
-if (hdr == NULL)
+if (!hdr) {
+bpf_jit_uncharge_modmem(pages);
    return NULL;
    +}

    /* Fill space with illegal/arch-dep instructions. */
    bpf_fill_ill_insns(hdr, size);

    -hdr->pages = size / PAGE_SIZE;
    +hdr->pages = pages;
    hole = min_t(unsigned int, size - (proglen + sizeof(*hdr)),
        PAGE_SIZE - sizeof(*hdr));
    start = (get_random_int() % hole) & ~(alignment - 1);
    @@ -531,7 +629,10 @@

    void bpf_jit_binary_free(struct bpf_binary_header *hdr)
    {
        +u32 pages = hdr->pages;
        +
        module_memfree(hdr);
        +bpf_jit_uncharge_modmem(pages);
        }

    /* This symbol is only overridden by archs that have different
    @@ -552,8 +653,6 @@
    bpf_prog_unlock_free(fp);
    }

    -int bpf_jit_harden __read_mostly;
    -
    static int bpf_jit_blind_insn(const struct bpfInsn *from,
        const struct bpfInsn *aux,
        struct bpfInsn *to_buff)
    @@ -565,6 +664,23 @@
        BUILD_BUG_ON(BPF_REG_AX + 1 != MAX_BPF_JIT_REG);
        BUILD_BUG_ON(MAX_BPF_REG + 1 != MAX_BPF_JIT_REG);

        +/* Constraints on AX register:
        + * AX register is inaccessible from user space. It is mapped in
        + * all JITs, and used here for constant blinding rewrites. It is
        + * typically "stateless" meaning its contents are only valid within
        + * the executed instruction, but not across several instructions.
        + * There are a few exceptions however which are further detailed
        + * below.
        + */
Constant blinding is only used by JITs, not in the interpreter.
In restricted circumstances, the verifier can also use the AX register for rewrites as long as they do not interfere with the above cases!

```c
if (from->dst_reg == BPF_REG_AX || from->src_reg == BPF_REG_AX)
    goto out;

if (from->imm == 0 &&
    (from->code == (BPF_ALU | BPF_MOV | BPF_K) ||
     from->code == (BPF_ALU64 | BPF_MOV | BPF_K))) {
```

static unsigned int ___bpf_prog_run(u64 *regs, const struct bpf_insn *insn,
    u64 *stack) {
    u64 tmp;
    static const void *jumptable[256] = {
        [0 ... 255] = &&default_label,
    /* Now overwrite non-defaults ... */
    @ @ -778.7 +894.6 @ @
    u32 tail_call_cnt = 0;
    void *ptr;
    int off;
    +u64 tmp;

    #define CONT { insn++; goto select_insn; }
    #define CONT_JMP { insn++; goto select_insn; }
    @ @ -950.14 +1066.10 @ @
    (*s64 *) &DST) >>= IMM;
    CONT;
    ALU64_MOD_X:
    -if (unlikely(SRC == 0))
        -return 0;
        div64_u64_rem(DST, SRC, &tmp);
        DST = tmp;
        CONT;
    ALU_MOD_X:
    -if (unlikely((u32)SRC == 0))
        -return 0;
        tmp = (u32) DST;
        DST = do_div(tmp, (u32) SRC);
        CONT;
        @ @ -970.13 +1082.9 @ @
        DST = do_div(tmp, (u32) IMM);
        CONT;
    ALU64_DIV_X:
    -if (unlikely(SRC == 0))
        -return 0;
```
```
DST = div64_u64(DST, SRC);
CONT;
ALU_DIV_X:
- if (unlikely((u32)SRC == 0))
  - return 0;
  @ @ -1242.7 +1350.7 @@
  * BPF_R0 - 8/16/32-bit skb data converted to cpu endianness
*/

-ptr = bpf_load_pointer((struct sk_buff *) (unsigned long) CTX, off, 4, &tmp);
+ptr = bpf_load_pointer((struct sk_buff *) (unsigned long) CTX, off, 4, &AX);
if (likely(ptr != NULL)) {
  BPF_R0 = get_unaligned_be32(ptr);
  CONT;
  @ @ -1252.7 +1360.7 @@
LD_ABS_H: /* BPF_R0 = ntohs(*u16 *) (skb->data + imm32) */
off = IMM;
load_half:
- ptr = bpf_load_pointer((struct sk_buff *) (unsigned long) CTX, off, 2, &tmp);
+ ptr = bpf_load_pointer((struct sk_buff *) (unsigned long) CTX, off, 2, &AX);
if (likely(ptr != NULL)) {
  BPF_R0 = get_unaligned_be16(ptr);
  CONT;
  @ @ -1262.7 +1370.7 @@
LD_ABS_B: /* BPF_R0 = *(u8 *) (skb->data + imm32) */
off = IMM;
load_byte:
- ptr = bpf_load_pointer((struct sk_buff *) (unsigned long) CTX, off, 1, &tmp);
+ ptr = bpf_load_pointer((struct sk_buff *) (unsigned long) CTX, off, 1, &AX);
if (likely(ptr != NULL)) {
  BPF_R0 = *(u8 *)ptr;
  CONT;
  @ @ -1291.7 +1399.7 @@
static unsigned int PROG_NAME(stack_size)(const void *ctx, const struct bpf_insn *insn) {
  u64 stack[stack_size / sizeof(u64)];
  -u64 regs[MAX_BPF_REG];
  +u64 regs[MAX_BPF_EXT_REG];
  FP = (u64) (unsigned long) &stack[ARRAY_SIZE(stack)];
  ARG1 = (u64) (unsigned long) ctx;
  @ @ -1319.9 +1427.13 @@
}

#else
static unsigned int __bpf_prog_ret0(const void *ctx,
    const struct bpf_insn *insn)
{
    /* If this handler ever gets executed, then BPF_JIT_ALWAYS_ON
       * is not working properly, so warn about it!
       */
    WARN_ON_ONCE(1);
    return 0;
}
#endif

fp->bpf_func = interpreters[(round_up(stack_depth, 32) / 32) - 1];
#else
    fp->bpf_func = __bpf_prog_ret0_warn;
#endif

/* eBPF JITs can rewrite the program in case constant */
struct bpf_cpu_map_entry *__cpu_map_entry_alloc(u32 qsize, u32 cpu, int map_id)
{
    gfp_t gfp = GFP_ATOMIC|__GFP_NOWARN;
    struct bpf_cpu_map_entry *rcpu;
    int numa, err;
    synchronize_rcu();

    /* Make sure CPU is a valid possible cpu */
    if (!cpu_possible(key_cpu))
        if (key_cpu >= nr_cpumask_bits || !cpu_possible(key_cpu))
            return -ENODEV;
    if (qsize == 0) {
       synchronize_rcu();

        /* Make sure prior __dev_map_entry_free() have completed. */
+rcu_barrier();
+
/* To ensure all pending flush operations have completed wait for flush
 * bitmap to indicate all flush_needed bits to be zero on _all_ cpus.
 * Because the above synchronize_rcu() ensures the map is disconnected
@@ -235,10 +238,11 @@
if (unlikely(!dev))
    continue;

-__clear_bit(bit, bitmap);
netdev = dev->dev;
if (likely(netdev->netdev_ops->ndo_xdp_flush))
    netdev->netdev_ops->ndo_xdp_flush(netdev);
+
+__clear_bit(bit, bitmap);
}
}

@@ -388,8 +392,7 @@
struct bpf_dtab_netdev *dev, *odev;

dev = READ_ONCE(dtab->netdev_map[i]);
-if (!dev ||
-    dev->dev->ifindex != netdev->ifindex)
+if (dev == dev->dev)
    continue;
odev = cmpxchg(&dtab->netdev_map[i], dev, NULL);
if (dev == odev)
--- linux-4.15.0.orig/kernel/bpf/hashtab.c
+++ linux-4.15.0/kernel/bpf/hashtab.c
@@ -501,18 +501,30 @@
return insn - insn_buf;
}

-static void *htab_lru_map_lookup_elem(struct bpf_map *map, void *key)
+static __always_inline void *__htab_lru_map_lookup_elem(struct bpf_map *map,
+                                                          void *key, const bool mark)
+
{ struct htab_elem *l = __htab_map_lookup_elem(map, key);

    if (l) {
        -bpf_lru_node_set_ref(&l->lru_node);
        +bpf_lru_node_set_ref(&l->lru_node);
        return l->key + round_up(map->key_size, 8);
    }

    return NULL;

+static void *htab_lru_map_lookup_elem(struct bpf_map *map, void *key)
+{
+return __htab_lru_map_lookup_elem(map, key, true);
+}
+
+static void *htab_lru_map_lookup_elem_sys(struct bpf_map *map, void *key)
+{
+return __htab_lru_map_lookup_elem(map, key, false);
+}
+
static u32 htab_lru_map_gen_lookup(struct bpf_map *map,
        struct bpf_insn *insn_buf)
{
@@ -636,29 +648,26 @@
        struct htab_elem *l = container_of(head, struct htab_elem, rcu);
        struct bpf_htab *htab = l->htab;

        /* must increment bpf_prog_active to avoid kprobe+bpf triggering while
         * we're calling kfree, otherwise deadlock is possible if kprobes
         * are placed somewhere inside of slub
         */
        -preempt_disable();
        -__this_cpu_inc(bpf_prog_active);
        -htab_elem_free(htab, l);
        -__this_cpu_dec(bpf_prog_active);
        -preempt_enable();
    }

    -static void free_htab_elem(struct bpf_htab *htab, struct htab_elem *l)
+static void htab_put_fd_value(struct bpf_htab *htab, struct htab_elem *l)
    {
        struct bpf_map *map = &htab->map;
        +void *ptr;

        if (map->ops->map_fd_put_ptr) {
            -void *ptr = fd_htab_map_get_ptr(map, l);
            -
            +ptr = fd_htab_map_get_ptr(map, l);
            map->ops->map_fd_put_ptr(ptr);
        }
        +

        +static void free_htab_elem(struct bpf_htab *htab, struct htab_elem *l)
        +{
        +htab_put_fd_value(htab, l);
if (htab_is_prealloc(htab)) {
- pcpu_freelist_push(htab->freelist, &l->fnode);
+ __pcpu_freelist_push(htab->freelist, &l->fnode);
} else {
 atomic_dec(&htab->count);
 l->htab = htab;
@@ -716,11 +725,12 @@
 */
 pl_new = this_cpu_ptr(htab->extraelems);
 l_new = *pl_new;
+htab_put_fd_value(htab, old_elem);
 *pl_new = old_elem;
} else {
 struct pcpu_freelist_node *l;

-l = pcpu_freelist_pop(htab->freelist);
+l = __pcpu_freelist_pop(htab->freelist);
 if (!l)
 return ERR_PTR(-E2BIG);
 l_new = container_of(l, struct htab_elem, fnode);
@@ -733,13 +743,15 @@
 * old element will be freed immediately.
 * Otherwise return an error
 */
-atomic_dec(&htab->count);
-return ERR_PTR(-E2BIG);
+l_new = ERR_PTR(-E2BIG);
+goto dec_count;
} l_new = kmalloc_node(htab->elem_size, GFP_ATOMIC | __GFP_NOWARN,
htab->map.numa_node);
-if (!l_new)
-return ERR_PTR(-ENOMEM);
+if (!l_new)
+l_new = ERR_PTR(-ENOMEM);
+goto dec_count;
}
memcpy(l_new->key, key, key_size);
@@ -752,7 +764,8 @@
 GFP_ATOMIC | __GFP_NOWARN);
if (!pptr) {
 kfree(l_new);
@@ -752,7 +764,8 @@
 return ERR_PTR(-ENOMEM);
+ l_new = ERR_PTR(-ENOMEM);
+goto dec_count;
}
memcpy(l_new->key, key, key_size);
@@ -752,7 +764,8 @@
 GFP_ATOMIC | __GFP_NOWARN);
if (!pptr) {
 kfree(l_new);
return ERR_PTR(-ENOMEM);
+l_new = ERR_PTR(-ENOMEM);
+goto dec_count;
}
l_new->hash = hash;
return l_new;
+dec_count:
+atomic_dec(&htab->count);
+return l_new;
}

static int check_flags(struct bpf_htab *htab, struct htab_elem *l_old,
@@ -766,6 +779,9 @@
l_new->hash = hash;
return l_new;
+dec_count:
+atomic_dec(&htab->count);
+return l_new;
}

int bpf_percpu_hash_copy(struct bpf_map *map, void *key, void *value)
{
-struct bpf_htab *htab = container_of(map, struct bpf_htab, map);
struct htab_elem *l;
void __percpu *pptr;
int ret = -ENOENT;
@@ -1203,8 +1219,9 @@
l = __htab_map_lookup_elem(map, key);
if (!l)
goto out;
-if (htab_is_lru(htab))
- bpf_lru_node_set_ref(&l->lru_node);
+
+ /* We do not mark LRU map element here in order to not mess up
+ * eviction heuristics when user space does a map walk.
+ */
  pptr = htab_elem_get_ptr(l, map->key_size);
  for_each_possible_cpu(cpu) {
    bpf_long_memcpy(value + off,
if (ret)
    return ERR_PTR(ret);

@@ -408,19 +408,6 @@
}防出口_SYMBOL(bpf_prog_get_type_path);

-static void bpf_evict_inode(struct inode *inode)
-{
-  enum bpf_type type;
-  
-  truncate_inode_pages_final(&inode->i_data);
-  clear_inode(inode);
-  
-  if (S_ISLNK(inode->i_mode))
-    kfree(inode->i_link);
-  if (!bpf_inode_type(inode, &type))
-    bpf_any_put(inode->i_private, type);
-  
/*
 * Display the mount options in /proc/mounts.
 */
@@ -433,11 +420,28 @@
return 0;
}

+static void bpf_destroy_inode_deferred(struct rcu_head *head)
+{
+  struct inode *inode = container_of(head, struct inode, i_rcu);
+  enum bpf_type type;
+  
+  if (S_ISLNK(inode->i_mode))
+    kfree(inode->i_link);
+  if (!bpf_inode_type(inode, &type))
+    bpf_any_put(inode->i_private, type);
+  free_inode_nonrcu(inode);
+}
+
+static void bpf_destroy_inode(struct inode *inode)
+{
+  call_rcu(&inode->i_rcu, bpf_destroy_inode_deferred);
+}
+
+static const struct super_operations bpf_super_ops = {
   .statfs		= simple_statfs,
   .drop_inode	= generic_delete_inode,
   .show_options	= bpf_show_options,
enum {
    --- linux-4.15.0.orig/kernel/bpf/lpm_trie.c
    +++ linux-4.15.0/kernel/bpf/lpm_trie.c
    @@ -430,6 +430,7 @@}
    }
    
    if (!node || node->prefixlen != key->prefixlen ||
    + node->prefixlen != matchlen ||
    (node->flags & LPM_TREE_NODE_FLAG_IM)) {
        ret = -ENOENT;
        goto out;
    }
    @@ -560,7 +561,10 @@
    struct lpm_trie_node __rcu **slot;
    struct lpm_trie_node *node;

    -raw_spin_lock(&trie->lock);
    + /* Wait for outstanding programs to complete
    + * update/lookup/delete/get_next_key and free the trie.
    + */
    + synchronize_rcu();

    /* Always start at the root and walk down to a node that has no
     * children. Then free that node, nullify its reference in the parent
    @@ -571,10 +575,9 @@
    slot = &trie->root;

    for (;;) {
        -node = rcu_dereference_protected(*slot,
        -lockdep_is_held(&trie->lock));
        +node = rcu_dereference_protected(*slot, 1);
        if (!node)
            goto unlock;
        +goto out;

        if (rcu_access_pointer(node->child[0])) {
            slot = &node->child[0];
            @@ -592,8 +595,8 @@}
        }
    }

    -unlock:
    -raw_spin_unlock(&trie->lock);
    +out:
    +kfree(trie);
static int trie_get_next_key(struct bpf_map *map, void *key, void *next_key)
{
    struct bpf_map *inner_map, *inner_map_meta;
    u32 inner_map_meta_size;
    struct fd f;

    f = fdget(inner_map_ufd);
    return ERR_PTR(-EINVAL);
}

likely

inner_map_meta = kzalloc(sizeof(*inner_map_meta), GFP_USER);
inner_map_meta_size = sizeof(*inner_map_meta);
/* In some cases verifier needs to access beyond just base map. */
if (inner_map->ops == &array_map_ops)
    inner_map_meta_size = sizeof(struct bpf_array);
+
inner_map_meta = kzalloc(inner_map_meta_size, GFP_USER);
if (!inner_map_meta) {
    fdput(f);
    return ERR_PTR(-ENOMEM);
}

/* Misc members not needed in bpf_map_meta_equal() check. */
inner_map_meta->key_size = inner_map->key_size;
inner_map_meta->value_size = inner_map->value_size;
inner_map_meta->map_flags = inner_map->map_flags;
-inner_map_meta->ops = inner_map->max_entries;
inner_map_meta->max_entries = inner_map->max_entries;

/* Misc members not needed in bpf_map_meta_equal() check. */
+inner_map_meta->ops = inner_map->max_entries;
if (inner_map->ops == &array_map_ops) {
    +inner_map_meta->unpriv_array = inner_map->unpriv_array;
    +container_of(inner_map_meta, struct bpf_array, map)->index_mask =
        container_of(inner_map, struct bpf_array, map)->index_mask;
}
+
fdput(f);
return inner_map_meta;
}
free_percpu(s->freelist);

- static inline void __pcpu_freelist_push(struct pcpu_freelist_head *head, 
- struct pcpu_freelist_node *node)
+ static inline void ___pcpu_freelist_push(struct pcpu_freelist_head *head, 
+ struct pcpu_freelist_node *node)
{
    raw_spin_lock(&head->lock);
    node->next = head->first;
    @ @ .37,12 +37,22 @ @
    raw_spin_unlock(&head->lock);
}

-void pcpu_freelist_push(struct pcpu_freelist *s, 
+void __pcpu_freelist_push(struct pcpu_freelist *s, 
struct pcpu_freelist_node *node)
{
    struct pcpu_freelist_head *head = this_cpu_ptr(s->freelist);

      __pcpu_freelist_push(head, node);
    +__pcpu_freelist_push(head, node);
    +#
    +
    +void pcpu_freelist_push(struct pcpu_freelist *s, 
    +struct pcpu_freelist_node *node)
    +{
    +unsigned long flags;
    +
    +local_irq_save(flags);
    +__pcpu_freelist_push(s, node);
    +local_irq_restore(flags);
    }

void pcpu_freelist_populate(struct pcpu_freelist *s, void *buf, u32 elem_size, 
@@ -63,7 +73,7 @@
for_each_possible_cpu(cpu) {
again:
    head = per_cpu_ptr(s->freelist, cpu);
-    __pcpu_freelist_push(head, buf);
+    ___pcpu_freelist_push(head, buf);
    i++;
    buf += elem_size;
    if (i == nr elems)
@@ -74,14 +84,12 @@
    local_irq_restore(flags);
}
struct pcpu_freelist_node *pcpu_freelist_pop(struct pcpu_freelist *s) {
    struct pcpu_freelist_head *head;
    struct pcpu_freelist_node *node;
    unsigned long flags;
    int orig_cpu, cpu;

    local_irq_save(flags);
    orig_cpu = cpu = raw_smp_processor_id();
    while (1) {
        head = per_cpu_ptr(s->freelist, cpu);
        node = head->first;
        if (node) {
            head->first = node->next;
            raw_spin_unlock_irqrestore(&head->lock, flags);
            return node;
        }
        raw_spin_unlock(&head->lock);
        cpu = cpumask_next(cpu, cpu_possible_mask);
        if (cpu >= nr_cpu_ids)
            cpu = 0;
        if (cpu == orig_cpu) {
            local_irq_restore(flags);
            return NULL;
        }
    }
}

+ struct pcpu_freelist_node *pcpu_freelist_pop(struct pcpu_freelist *s) {
+ {
+ struct pcpu_freelist_node *ret;
+ unsigned long flags;
+ local_irq_save(flags);
+ ret = __pcpu_freelist_pop(s);
+ local_irq_restore(flags);
+ return ret;
+ }
--- linux-4.15.0.orig/kernel/bpf/percpu_freelist.h
+++ linux-4.15.0/kernel/bpf/percpu_freelist.h
@@ -89,16 +97,25 @@
 node = head->first;
 if (node) {
     head->first = node->next;
@@ -89,16 +97,25 @@
     raw_spin_unlock_irqrestore(&head->lock, flags);
     + raw_spin_unlock(&head->lock);
     return node;
 }
 raw_spin_unlock(&head->lock);
 cpu = cpumask_next(cpu, cpu_possible_mask);
 if (cpu >= nr_cpu_ids)
    cpu = 0;
- if (cpu == orig_cpu) {
-     local_irq_restore(flags);
-     if (cpu == orig_cpu)
-         return NULL;
- }
+ + struct pcpu_freelist_node *pcpu_freelist_pop(struct pcpu_freelist *s) {
+ {
+ struct pcpu_freelist_node *ret;
+ unsigned long flags;
+ local_irq_save(flags);
+ ret = __pcpu_freelist_pop(s);
+ local_irq_restore(flags);
+ return ret;
+ }

orig = xchg(&stab->bpf_parse, NULL);
if (orig)
+ bpf_prog_put(orig);
orig = xchg(&stab->bpf_verdict, NULL);
if (orig)
+ bpf_prog_put(orig);
+
const struct bpf_map_ops sock_map_ops = {
.map_alloc = sock_map_alloc,
.map_free = sock_map_free,
@@ -887,6 +898,7 @@
.map_get_next_key = sock_map_get_next_key,
.map_update_elem = sock_map_update_elem,
.map_delete_elem = sock_map_delete_elem,
+.map_release_uref = sock_map_release,
};

BPF_CALL_4(bpf_sock_map_update, struct bpf_sock_ops_kern *, bpf_sock,
--- linux-4.15.0.orig/kernel/bpf/stackmap.c
+++ linux-4.15.0/kernel/bpf/stackmap.c
@@ -31,7 +31,8 @@
static int prealloc elems_and_freelist(struct bpf_stack_map *smap)
{
- u32 elem_size = sizeof(struct stack_map_bucket) + smap->map.value_size;
+ u64 elem_size = sizeof(struct stack_map_bucket) +
+ (u64)smap->map.value_size;
 int err;

 smap->elems = bpf_map_area_alloc(elem_size * smap->map.max_entries,
@@ -74,6 +75,8 @@
 /* hash table size must be power of 2 */
 n_buckets = roundup_pow_of_two(attr->max_entries);
 +if (!n_buckets)
+return ERR_PTR(-E2BIG);

 cost = n_buckets * sizeof(struct stack_map_bucket *) + sizeof(*smap);
if (cost >= U32_MAX - PAGE_SIZE)
--- linux-4.15.0.orig/kernel/bpf/syscall.c
+++ linux-4.15.0/kernel/bpf/syscall.c
@@ @ -26,6 +26,7 @@
 #include <linux/cred.h>
 #include <linux/timekeeping.h>
 #include <linux/ctype.h>
+#include <linux/nospec.h>
#define IS_FD_ARRAY(map) ((map)->map_type == BPF_MAP_TYPE_PROG_ARRAY || 
 (map)->map_type == BPF_MAP_TYPE_PERF_EVENT_ARRAY || 

static struct bpf_map *find_and_alloc_map(union bpf_attr *attr)
{
    const struct bpf_map_ops *ops;
    u32 type = attr->map_type;
    struct bpf_map *map;
    int err;

    if (type >= ARRAY_SIZE(bpf_map_types))
        return ERR_PTR(-EINVAL);

    type = array_index_nospec(type, ARRAY_SIZE(bpf_map_types));
    ops = bpf_map_types[type];
    if (!ops)
        return ERR_PTR(-EINVAL);

    map = ops->map_alloc(attr);
    if (ops->map_alloc_check) {
        err = ops->map_alloc_check(attr);
        if (err)
            return ERR_PTR(err);
    }

    map->ops = ops;
    map->map_type = type;
    return map;
}

static void bpf_map_put_uref(struct bpf_map *map)
{
    if (atomic_dec_and_test(&map->usercnt)) {
        if (map->ops->map_release_uref)
            map->ops->map_release_uref(map);
    }
}

static void bpf_fd_array_map_clear(struct bpf_fd_array *fd_map)
{
    if (atomic_dec_and_test(&fd_map->usercnt)) {
        if (fd_map->ops->map_release_uref)
            fd_map->ops->map_release_uref(fd_map);
        fd_map->usercnt = 0;
    }
}

static struct bpf_fd_array_ops *bpf_fd_array_alloc_check(struct bpf_fd_array *fd_map)
{
    if (bpf_fd_array_map_clear(fd_map))
        return NULL;

    return fd_map->ops->map_alloc_check(fd_map);
err = bpf_map_new_fd(map, f_flags);
if (err < 0) {
    /* failed to allocate fd.
     * - bpf_map_put() is needed because the above
     * + bpf_map_put_with_uref() is needed because the above
     *   bpf_map_alloc_id() has published the map
     * to the userspace and the userspace may
     * have refcnt-ed it through BPF_MAP_GET_FD_BY_ID.
     * */
    bpf_map_put(map);
    bpf_map_put_with_uref(map);
    return err;
}

err = bpf_fd_htab_map_lookup_elem(map, key, value);
} else {
    rcu_read_lock();
    ptr = map->ops->map_lookup_elem(map, key);
    if (map->ops->map_lookup_elem_sys_only)
        ptr = map->ops->map_lookup_elem_sys_only(map, key);
    else
        ptr = map->ops->map_lookup_elem(map, key);
    if (ptr)
        memcpy(value, ptr, value_size);
    rcu_read_unlock();
}

static void maybe_wait_bpf_programs(struct bpf_map *map)
{
    /* Wait for any running BPF programs to complete so that
     * userspace, when we return to it, knows that all programs
     * that could be running use the new map value.
     */
    if (map->map_type == BPF_MAP_TYPE_HASH_OF_MAPS ||
        map->map_type == BPF_MAP_TYPE_ARRAY_OF_MAPS)
        synchronize_rcu();
}

#define BPF_MAP_UPDATE_ELEM_LAST_FIELD flags

static int map_update_elem(union bpf_attr *attr)
{
    __this_cpu_dec(bpf_prog_active);
    preempt_enable();
}

Open Source Used In 5GaaS Edge AC-4 32566
maybe_wait_bpf_programs(map);
out:
if (!err)
trace_bpf_map_update_elem(map, ufd, key, value);
rcu_read_unlock();
__this_cpu_dec(bpf_prog_active);
preempt_enable();
maybe_wait_bpf_programs(map);

if (!err)
trace_bpf_map_delete_elem(map, ufd, key);

static int find_prog_type(enum bpf_prog_type type, struct bpf_prog *prog)
{
    if (type >= ARRAY_SIZE(bpf_prog_types) || !bpf_prog_types[type])
        return -EINVAL;
    type = array_index_nospec(type, ARRAY_SIZE(bpf_prog_types));
    ops = bpf_prog_types[type];
    if (!ops)
        return -EINVAL;
    if (!bpf_prog_is_dev_bound(prog->aux))
        prog->aux->ops = bpf_prog_types[type];
    else
        prog->aux->ops = &bpf_offload_prog_ops;
    prog->type = type;
    if (err)
        goto free_used_maps;

    err = bpf_prog_new_fd(prog);
    if (err < 0) {
        /* failed to allocate fd.
         * bpf_prog_put() is needed because the above
         * bpf_prog_alloc_id() has published the prog
         * to the userspace and the userspace may
         * have refcnt-ed it through BPF_PROG_GET_FD_BY_ID.
         */
        bpf_prog_put(prog);
        return err;
    }
}
Upon success of bpf_prog_alloc_id(), the BPF prog is effectively publicly exposed. However, retrieving via bpf_prog_get_fd_by_id() will take another reference, therefore it cannot be gone underneath us.

Only for the time /after/ successful bpf_prog_new_fd() and before returning to userspace, we might just hold one reference and any parallel close on that fd could rip everything out. Hence, below notifications must happen before bpf_prog_new_fd().

Also, any failure handling from this point onwards must be using bpf_prog_put() given the program is exposed.

bpf_prog_kallsyms_add(prog);
trace_bpf_prog_load(prog, err);
+
+err = bpf_prog_new_fd(prog);
+if (err < 0)
+bpf_prog_put(prog);
return err;

free_used_maps:
@@ -1546,7 +1586,7 @@
fd = bpf_map_new_fd(map, f_flags);
if (fd < 0)
  -bpf_map_put(map);
+bpf_map_put_with_uref(map);
return fd;
}
@@ -1556,7 +1596,7 @@
union bpf_attr __user *uattr)
{
struct bpf_prog_info __user *uinfo = u64_to_user_ptr(attr->info.info);
-struct bpf_prog_info info = {};
+struct bpf_prog_info info;
info_len = attr->info.info_len;
char __user *uinsn;
@@ -1567,6 +1607,7 @@
return err;
info_len = min_t(u32, sizeof(info), info_len);

+memset(&info, 0, sizeof(info));
if (copy_from_user(&info, uinfo, info_len))
  return -EFAULT;
union bpf_attr __user *uattr)
{
    struct bpf_map_info __user *uinfo = u64_to_user_ptr(attr->info.info);
    struct bpf_map_info info = {};
    u32 info_len = attr->info.info_len;
    int err;

    return err;
    info_len = min_t(u32, sizeof(info), info_len);
    memset(&info, 0, sizeof(info));
    info.type = map->map_type;
    info.id = map->id;
    info.key_size = map->key_size;

    SYSCALL_DEFINE3(bpf, int, cmd, union bpf_attr __user *, uattr, unsigned int, size)
    {
        union bpf_attr attr = {};
        +union bpf_attr attr;
        int err;
    
        -if (!capable(CAP_SYS_ADMIN) && sysctl_unprivileged_bpf_disabled)
        +if (sysctl_unprivileged_bpf_disabled && !capable(CAP_SYS_ADMIN))
        return -EPERM;

        err = check_uarg_tail_zero(uattr, sizeof(attr), size);
        size = min_t(u32, size, sizeof(attr));

        /* copy attributes from user space, may be less than sizeof(bpf_attr) */
        +memset(&attr, 0, sizeof(attr));
        if (copy_from_user(&attr, uattr, size) != 0)
        return -EFAULT;

        --- linux-4.15.0.orig/kernel/bpf/verifier.c
        +++ linux-4.15.0/kernel/bpf/verifier.c
        @@ -20,6 +20,7 @@
        #include <linux/file.h>
        #include <linux/vmalloc.h>
        #include <linux/stringify.h>
        +#include <linux/sched/signal.h>

        #include "disasm.h"
#define BPF_COMPLEXITY_LIMIT_INSNS 131072
#define BPF_COMPLEXITY_LIMIT_STACK 1024
+#define BPF_COMPLEXITY_LIMIT_STATES 64

-#define BPF_MAP_PTR_POISON ((void *)0xeB9F + POISON_POINTER_DELTA)
+#define BPF_MAP_PTR_UNPRIV 1UL
+#define BPF_MAP_PTR_POISON((void *)((0xeB9FUL << 1) + \)
+ POISON_POINTER_DELTA))
+#define BPF_MAP_PTR(X)((struct bpf_map *)((X) & ~BPF_MAP_PTR_UNPRIV))
+
+static bool bpf_map_ptr_poisoned(const struct bpf_insn_aux_data *aux)
+{
+  return BPF_MAP_PTR(aux->map_state) == BPF_MAP_PTR_POISON;
+}
+
+static bool bpf_map_ptr_unpriv(const struct bpf_insn_aux_data *aux)
+{
+  return aux->map_state & BPF_MAP_PTR_UNPRIV;
+}
+
+static void bpf_map_ptr_store(struct bpf_insn_aux_data *aux,
+    const struct bpf_map *map, bool unpriv)
+{
+  BUILD_BUG_ON((unsigned long)BPF_MAP_PTR_POISON & BPF_MAP_PTR_UNPRIV);
+  unpriv |= bpf_map_ptr_unpriv(aux);
+  aux->map_state = (unsigned long)map |
+    (unpriv ? BPF_MAP_PTR_UNPRIV : 0UL);
+}

struct bpf_call_arg_meta {
  struct bpf_map *map_ptr;
  @ @ -279,7 +303,7 @ @
  for (i = 0; i < state->allocated_stack / BPF_REG_SIZE; i++) {
    if (state->stack[i].slot_type[0] == STACK_SPILL)
      verbose(env, " fp%d=%s",
- MAX_BPF_STACK + i * BPF_REG_SIZE,
+(-i - 1) * BPF_REG_SIZE,
    reg_type_str[state->stack[i].spilled_ptr.type]);
  }
  verbose(env, "un");
  @ @ -392,7 +416,8 @ @
}

static struct bpf_verifier_state *push_stack(struct bpf_verifier_env *env,
  int insn_idx, int prev_insn_idx)
int insn_idx, int prev_insn_idx, bool speculative) {
    struct bpf_verifier_state *cur = env->cur_state;
    struct bpf_verifier_stack_elem *elem;
    err = copy_verifier_state(&elem->st, cur);
    if (err)
        goto err;
    elem->st.speculative |= speculative;
    if (env->stack_size > BPF_COMPLEXITY_LIMIT_STACK) {
        goto err;
    }
}

static void __mark_reg_known(struct bpf_reg_state *reg, u64 imm) {
    reg->id = 0;
    memset(((u8 *)reg) + sizeof(reg->type), 0,
           offsetof(struct bpf_reg_state, var_off) - sizeof(reg->type));
    reg->var_off = tnum_const(imm);
    reg->smin_value = (s64)imm;
    reg->smax_value = (s64)imm;
}

static void __mark_reg_unknown(struct bpf_reg_state *reg) {
    reg->id = 0;
    memset(reg, 0, offsetof(struct bpf_reg_state, var_off));
    reg->type = SCALAR_VALUE;
    reg->var_off = tnum_unknown;
    __mark_reg_unbounded(reg);
}

static int check_stack_write(struct bpf_verifier_env *env,
                             struct bpf_verifier_state *state, int off,
                             int size, int value_regno) {
    int i, slot = -off - 1, spi = slot / BPF_REG_SIZE, err;
    /* Clear id, off, and union(map_ptr, range) */
    /* Clear type, id, off, and union(map_ptr, range) and
     * padding between 'type' and union
     * */
    return 0;
@@ -722,8 +753,33 @@
    state->stack[spi].spilled_ptr = state->regs[value_regno];
    state->stack[spi].spilled_ptr.live |= REG_LIVE_WRITTEN;

    -for (i = 0; i < BPF_REG_SIZE; i++)
    +for (i = 0; i < BPF_REG_SIZE; i++) {
        +if (state->stack[spi].slot_type[i] == STACK_MISC &&
            +!env->allow_ptr_leaks) {
            +int *poff = &env->insn_aux_data[insn_idx].sanitize_stack_off;
            +int soff = (-spi - 1) * BPF_REG_SIZE;
            +/* detected reuse of integer stack slot with a pointer
               + which means either llvm is reusing stack slot or
               + an attacker is trying to exploit CVE-2018-3639
               + (speculative store bypass)
               + Have to sanitize that slot with preemptive
               + store of zero.
               + */
            +if (*poff && *poff != soff) {
                +/* disallow programs where single insn stores
                   + into two different stack slots, since verifier
                   + cannot sanitize them
                   + */
                +verbose(env,
                    +"insn %d cannot access two stack slots fp%d and fp%d",
                    +insn_idx, *poff, soff);
                +return -EINVAL;
            }
            +*poff = soff;
        }
        state->stack[spi].slot_type[i] = STACK_SPILL;
    } else {
        /* regular write of data into stack */
        state->stack[spi].spilled_ptr = (struct bpf_reg_state) {};
    }
}

+static int check_stack_access(struct bpf_verifier_env *env,
    +const struct bpf_reg_state *reg,
    +int off, int size)
+{
  /* Stack accesses must be at a fixed offset, so that we
  + can determine what type of data were returned. See
  + check_stack_read().
  + */
  +if (!tnum_is_const(reg->var_off)) {
+char tn_buf[48];
+
+tnum_strn(tn_buf, sizeof(tn_buf), reg->var_off);
+verbose(env, "variable stack access var_off=%s off=%d size=%d\n",
+tn_buf, off, size);
+return -EACCES;
+
+if (off >= 0 || off < -MAX_BPF_STACK) {
+verbose(env, "invalid stack off=%d size=%d\n", off, size);
+return -EACCES;
+
+return 0;
+
+/* check read/write into map element returned by bpf_map_lookup_elem() */
static int __check_map_access(struct bpf_verifier_env *env, u32 regno, int off,
int size, bool zero_size_allowed)
@@ -827,13 +908,17 @@
/* The minimum value is only important with signed
* comparisons where we can't assume the floor of a
* value is 0. If we are using signed variables for our
* index'es we need to make sure that whatever we use
* will have a set floor within our range.
*/
@if (reg->smin_value < 0) {
+if (reg->smin_value < 0 &&
+ (reg->smin_value == S64_MIN ||
+ (off + reg->smin_value != (s64)(s32)(off + reg->smin_value)) ||
+ reg->smin_value + off < 0)) {
verbose(env, "R%d min value is negative, either use unsigned index or do a if (index >=0) check.\n", regno);
return -EACCES;
@@ -985,6 +1070,13 @@
return reg->type == PTR_TO_CTX;
}

+static bool is_pkt_reg(struct bpf_verifier_env *env, int regno)
+{
+const struct bpf_reg_state *reg = cur_regs(env) + regno;
+
+return type_is_pkt_pointer(reg->type);
+}
static int check_pkt_ptr_alignment(struct bpf_verifier_env *env,
    const struct bpf_reg_state *reg,
    int off, int size, bool strict)
}@@ -1045,10 +1137,10 @@
}

static int check_ptr_alignment(struct bpf_verifier_env *env,
    const struct bpf_reg_state *reg, int off, int size)
+
    const struct bpf_reg_state *reg, int off,
    int size, bool strict_alignment_once)
{
-bool strict = env->strict_alignment;
+bool strict = env->strict_alignment || strict_alignment_once;
const char *pointer_desc = "";

switch (reg->type) {
@@ -1079,6 +1171,30 @@
            strict);
}

+static int check_ctx_reg(struct bpf_verifier_env *env,
+    const struct bpf_reg_state *reg, int regno)
+{
+/* Access to ctx or passing it to a helper is only allowed in
+ * its original, unmodified form.
+ */
+    +if (reg->off) {
+        verbose(env, "dereference of modified ctx ptr R%d off=%d disallowed\n",
+            regno, reg->off);
+        +return -EACCES;
+    }
+    +if (!tnum_is_const(reg->var_off) || reg->var_off.value) {
+        char tn_buf[48];
+        +tnum_strn(tn_buf, sizeof(tn_buf), reg->var_off);
+        +verbose(env, "variable ctx access var_off=%s disallowed\n", tn_buf);
+        +return -EACCES;
+    }
+    +return 0;
+}
+
+ /* truncate register to smaller size (in bytes)
+ * must be called with size < BPF_REG_SIZE
	
static int check_mem_access(struct bpf_verifier_env *env, int insn_idx, u32 regno, int off,
    int bpf_size, enum bpf_access_type t,
    int value_regno, bool strict_alignment_once) {
    struct bpf_verifier_state *state = env->cur_state;
    struct bpf_reg_state *regs = cur_regs(env);
    return size;
    /* alignment checks will add in reg->off themselves */
    -err = check_ptr_alignment(env, reg, off, size);
    +err = check_ptr_alignment(env, reg, off, size, strict_alignment_once);
    if (err)
        return err;
}

verbose(env, "R%d leaks addr into ctx\n", value_regno);
return -EACCES;
}
/* ctx accesses must be at a fixed offset, so that we can
 * determine what type of data were returned.
 */
-if (reg->off) {
    -verbose(env,
        -"dereference of modified ctx ptr R%d off=%d+%d, ctx+const is allowed, ctx+const+const is not\n",
        -regno, reg->off, off - reg->off);
    -return -EACCES;
    -}
    -if (!tnum_is_const(reg->var_off) || reg->var_off.value) {
        -char tn_buf[48];
        -tnum_strn(tn_buf, sizeof(tn_buf), reg->var_off);
        -verbose(env,
            -"variable ctx access var_off=%s off=%d size=%d",
            -tn_buf, off, size);
        -return -EACCES;
        -}
    +err = check_ctx_reg(env, reg, regno);
    +if (err < 0)
        +return err;
+ err = check_ctx_access(env, insn_idx, off, size, t, &reg_type);
if (err && t == BPF_READ && value_regno >= 0) {
/* ctx access returns either a scalar, or a
 @@ -1177,38 +1280,21 @@
 else
 mark_reg_known_zero(env, regs,
    value_regno);
-reg[value_regno].id = 0;
-reg[value_regno].off = 0;
-reg[value_regno].range = 0;
-reg[value_regno].type = reg_type;
 }
}

} else if (reg->type == PTR_TO_STACK) {
 /* stack accesses must be at a fixed offset, so that we can
 * determine what type of data were returned.
 * See check_stack_read().
 */
-if (!tnum_is_const(reg->var_off)) {
-char tn_buf[48];
-
-tnum_strn(tn_buf, sizeof(tn_buf), reg->var_off);
-verbose(env, "variable stack access var_off=%s off=%d size=%d",
-tn_buf, off, size);
-return -EACCES;
-
} 
off += reg->var_off.value;
-if (off >= 0 || off < -MAX_BPF_STACK) {
-verbose(env, "invalid stack off=%d size=%d\n", off, 
-size);
-return -EACCES;
-}
+err = check_stack_access(env, reg, off, size);
+if (err)
+return err;

if (env->prog->aux->stack_depth < -off)
env->prog->aux->stack_depth = -off;

if (t == BPF_WRITE)
err = check_stack_write(env, state, off, size,
    value_regno);
+value_regno, insn_idx);
else
err = check_stack_read(env, state, off, size,
    value_regno);
@@ -1265,21 +1351,23 @@
return -EACCES;
}

-if (is_ctx_reg(env, insn->dst_reg)) {
-verbose(env, "BPF_XADD stores into R%d context is not allowed\n", 
-insn->dst_reg);
+if (is_ctx_reg(env, insn->dst_reg) || 
+ is_pkt_reg(env, insn->dst_reg)) {
+verbose(env, "BPF_XADD stores into R%d %s is not allowed\n", 
+insn->dst_reg, is_ctx_reg(env, insn->dst_reg) ? 
+"context" : "packet");
return -EACCES;
}

/* check whether atomic_add can read the memory */
err = check_mem_access(env, insn_idx, insn->dst_reg, insn->off, 
- BPF_SIZE(insn->code), BPF_READ, -1);
+ BPF_SIZE(insn->code), BPF_READ, -1, true);
if (err)
return err;

/* check whether atomic_add can write into the same memory */
return check_mem_access(env, insn_idx, insn->dst_reg, insn->off, 
-BPF_SIZE(insn->code), BPF_WRITE, -1);
+BPF_SIZE(insn->code), BPF_WRITE, -1, true);
}

/*@ -1423,6 +1511,9 @@
expected_type = PTR_TO_CTX;
if (type != expected_type)
goto err_type;
+err = check_ctx_reg(env, reg, regno);
+if (err < 0)
+return err;
} else if (arg_type == ARG_PTR_TO_MEM ||
arg_type == ARG_PTR_TO_MEM_OR_NULL ||
arg_type == ARG_PTR_TO_UNINIT_MEM) {
@@ -1684,6 +1775,29 @@
}

+static int
+record_func_map(struct bpf_verifier_env *env, struct bpf_call_arg_meta *meta, 
+int func_id, int insn_idx)
+{
+struct bpf_insn_aux_data *aux = &env->insn_aux_data[insn_idx];
+}
+if (func_id != BPF_FUNC_tail_call &&
+    func_id != BPF_FUNC_map_lookup_elem)
+return 0;
+if (meta->map_ptr == NULL) {
+verbose(env, "kernel subsystem misconfigured verifier\n");
+return -EINVAL;
+}
+
+if (!BPF_MAP_PTR(aux->map_state))
+bpf_map_ptr_store(aux, meta->map_ptr,
+    meta->map_ptr->unpriv_array);
+else if (BPF_MAP_PTR(aux->map_state) != meta->map_ptr)
+bpf_map_ptr_store(aux, BPF_MAP_PTR_POISON,
+    meta->map_ptr->unpriv_array);
+return 0;
+
+static int check_call(struct bpf_verifier_env *env, int func_id, int insn_idx)
{
    struct bpf_func_proto *fn = NULL;
    err = check_func_arg(env, BPF_REG_2, fn->arg2_type, &meta);
    if (err)
        return err;
    if (func_id == BPF_FUNC_tail_call) {
        if (meta.map_ptr == NULL) {
            verbose(env, "verifier bug\n");
            return -EINVAL;
        }
        env->insn_aux_data[insn_idx].map_ptr = meta.map_ptr;
    } else if (BPF_MAP_PTR(aux->map_state) != meta->map_ptr)
+bpf_map_ptr_store(aux, BPF_MAP_PTR_POISON,
        meta->map_ptr->unpriv_array);
    return 0;
}
BPF_WRITE, -1, false); if (err) return err; }
}
@@ -1782,12 +1894,9 @@
} else if (fn->ret_type == RET_VOID) {
    regs[BPF_REG_0].type = NOT_INIT;
} else if (fn->ret_type == RET_PTR_TO_MAP_VALUE_OR_NULL) {
    -struct bpf_insn_aux_data *insn_aux;
    -
    -regs[BPF_REG_0].type = PTR_TO_MAP_VALUE_OR_NULL;
    /* There is no offset yet applied, variable or fixed */
    mark_reg_known_zero(env, regs, BPF_REG_0);
    -regs[BPF_REG_0].off = 0;
    /* remember map_ptr, so that check_map_access() */
    /* can check value size boundary of memory access */
    /* to map element returned from bpf_map_lookup_elem() */
    @ @ -1799,11 +1908,6 @@
    } else {
        verbose(env, "unknown return type %d of func %s#%d
", fn->ret_type, func_id_name(func_id), func_id);
    }
@@ -1874,6 +1978,257 @@
    return true;
}
}

+static struct bpf_insn_aux_data *cur_aux(struct bpf_verifier_env *env)
+
+{
+    return &env->insn_aux_data[env->insn_idx];
+
+}
+
+enum {
+    REASON_BOUNDS = -1,
+    REASON_TYPE = -2,
+    REASON_PATHS = -3,
+    REASON_LIMIT = -4,
+    REASON_STACK = -5,
+};
+
+static int retrieve_ptr_limit(const struct bpf_reg_state *ptr_reg,
+        u32 *alu_limit, bool mask_to_left)
+{ 
+u32 max = 0, ptr_limit = 0; 
+
+switch (ptr_reg->type) { 
+case PTR_TO_STACK:  
+/* Offset 0 is out-of-bounds, but acceptable start for the  
+ * left direction, see BPF_REG_FP. Also, unknown scalar  
+ * offset where we would need to deal with min/max bounds is  
+ * currently prohibited for unprivileged.  
+ */  
+max = MAX_BPF_STACK + mask_to_left;  
+ptr_limit = -(ptr_reg->var_off.value + ptr_reg->off); 
+break;  
+case PTR_TO_MAP_VALUE:  
+max = ptr_reg->map_ptr->value_size;  
+ptr_limit = (mask_to_left ?  
+ptr_reg->smin_value :  
+ptr_reg->umax_value) + ptr_reg->off;  
+break;  
+default:  
+return REASON_TYPE;  
+}  
+
+if (ptr_limit >= max)  
+return REASON_LIMIT;  
+*alu_limit = ptr_limit;  
+return 0;  
+}  
+
+static bool can_skip_alu_sanitation(const struct bpf_verifier_env *env,  
+const struct bpf_insn *insn)  
+{  
+return env->allow_ptr_leaks || BPF_SRC(insn->code) == BPF_K;  
+}  
+
+static int update_alu_sanitation_state(struct bpf_insn_aux_data *aux,  
+u32 alu_state, u32 alu_limit)  
+{  
+/* If we arrived here from different branches with different  
+ * state or limits to sanitize, then this won't work.  
+ */  
+if (aux->alu_state &&  
+ (aux->alu_state != alu_state ||  
+ aux->alu_limit != alu_limit))  
+return REASON_PATHS;  
+
+/* Corresponding fixup done in fixup_bpf_calls(). */  
+aux->alu_state = alu_state;
```c
+aux->alu_limit = alu_limit;
+return 0;
+}
+
+static int sanitize_val_alu(struct bpf_verifier_env *env,
+    struct bpf_insn *insn)
+{
+struct bpf_insn_aux_data *aux = cur_aux(env);
+
+if (can_skip_alu_sanitation(env, insn))
+return 0;
+
+return update_alu_sanitation_state(aux, BPF_ALU_NON_POINTER, 0);
+}
+
+static bool sanitize_needed(u8 opcode)
+{
+return opcode == BPF_ADD || opcode == BPF_SUB;
+}
+
+struct bpf_sanitize_info {
+struct bpf_insn_aux_data aux;
+bool mask_to_left;
+};
+
+static int sanitize_ptr_alu(struct bpf_verifier_env *env,
    struct bpf_insn *insn,
    const struct bpf_reg_state *ptr_reg,
    const struct bpf_reg_state *off_reg,
    struct bpf_reg_state *dst_reg,
    struct bpf_sanitize_info *info,
    const bool commit_window)
+{
+struct bpf_insn_aux_data *aux = commit_window ? cur_aux(env) : &info->aux;
+struct bpf_verifier_state *vstate = env->cur_state;
+bool off_is_imm = tnum_is_const(off_reg->var_off);
+bool off_is_neg = off_reg->smin_value < 0;
+bool ptr_is_dst_reg = ptr_reg == dst_reg;
+u8 opcode = BPF_OP(insn->code);
+u32 alu_state, alu_limit;
+struct bpf_reg_state tmp;
+bool ret;
+int err;
+
+if (can_skip_alu_sanitation(env, insn))
+return 0;
+
+/* We already marked aux for masking from non-speculative
```

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+ * paths, thus we got here in the first place. We only care
+ * to explore bad access from here.
+ */
+if (vstate->speculative)
+goto do_sim;
+
+if (!commit_window) {
+if (!tnum_is_const(off_reg->var_off) &&
+  (off_reg->smin_value < 0) != (off_reg->smax_value < 0))
+return REASON_BOUNDS;
+
+info->mask_to_left = (opcode == BPF_ADD && off_is_neg) ||
+  (opcode == BPF_SUB && !off_is_neg);
+}
+
+err = retrieve_ptr_limit(ptr_reg, &alu_limit, info->mask_to_left);
+if (err < 0)
+return err;
+
+if (commit_window) {
+  /* In commit phase we narrow the masking window based on
+     * the observed pointer move after the simulated operation.
+     */
+  alu_state = info->aux.alu_state;
+  alu_limit = abs(info->aux.alu_limit - alu_limit);
+}
+else {
+  alu_state = off_is_neg ? BPF_ALU_NEG_VALUE : 0;
+  alu_state |= off_is_imm ? BPF_ALU_IMMEDIATE : 0;
+  alu_state |= ptr_is_dst_reg ?
+    BPF_ALU_SANITIZE_SRC : BPF_ALU_SANITIZE_DST;
+}
+
+err = update_alu_sanitation_state(aux, alu_state, alu_limit);
+if (err < 0)
+return err;
+do_sim:
+  /* If we're in commit phase, we're done here given we already
+     * pushed the truncated dst_reg into the speculative verification
+     * stack.
+     * Also, when register is a known constant, we rewrite register-based
+     * operation to immediate-based, and thus do not need masking (and as
+     * a consequence, do not need to simulate the zero-truncation either).
+     */
+  if (commit_window || off_is_imm)
+return 0;
+
+  /* Simulate and find potential out-of-bounds access under
+   */
+ * speculative execution from truncation as a result of
+ * masking when off was not within expected range. If off
+ * sits in dst then we temporarily need to move ptr there
+ * to simulate dst (== 0) +/-= ptr. Needed, for example,
+ * for cases where we use K-based arithmetic in one direction
+ * and truncated reg-based in the other in order to explore
+ * bad access.
+ */
+if (!ptr_is_dst_reg) {
+tmp = *dst_reg;
+*dst_reg = *ptr_reg;
+}
+ret = push_stack(env, env->insn_idx + 1, env->insn_idx, true);
+if (!ptr_is_dst_reg && ret)
+*dst_reg = tmp;
+return !ret ? REASON_STACK : 0;
+
+static int sanitize_err(struct bpf_verifier_env *env,
+const struct bpf_insn *insn, int reason,
+const struct bpf_reg_state *off_reg,
+const struct bpf_reg_state *dst_reg)
+{
+static const char *err = "pointer arithmetic with it prohibited for !root";
+const char *op = BPF_OP(insn->code) == BPF_ADD ? "add" : "sub";
+u32 dst = insn->dst_reg, src = insn->src_reg;
+
+switch (reason) {
+case REASON_BOUNDS:
+verbose(env, "R%d has unknown scalar with mixed signed bounds, %s\n", 
+off_reg == dst_reg ? dst : src, err);
+break;
+case REASON_TYPE:
+verbose(env, "R%d has pointer with unsupported alu operation, %s\n", 
+off_reg == dst_reg ? src : dst, err);
+break;
+case REASON_PATHS:
+verbose(env, "R%d tried to %s from different maps, paths or scalars, %s\n", 
+dst, op, err);
+break;
+case REASON_LIMIT:
+verbose(env, "R%d tried to %s beyond pointer bounds, %s\n", 
+dst, op, err);
+break;
+case REASON_STACK:
+verbose(env, "R%d could not be pushed for speculative verification, %s\n", 
+dst, err);
+break;
+default:
+verbose(env, "verifier internal error: unknown reason (%d)\n", 
+reason);
+break;
+
+return -EACCES;
+
+static int sanitize_check_bounds(struct bpf_verifier_env *env,
+const struct bpf_insn *insn,
+const struct bpf_reg_state *dst_reg)
+{
+u32 dst = insn->dst_reg;
+
+"/* For unprivileged we require that resulting offset must be in bounds
+in order to be able to sanitize access later on.
+ */
+if (env->allow_ptr_leaks)
+return 0;
+
+switch (dst_reg->type) {
+case PTR_TO_STACK:
+if (check_stack_access(env, dst_reg, dst_reg->off +
+dst_reg->var_off.value, 1)) {
+verbose(env, "R%d stack pointer arithmetic goes out of range, 
+"prohibited for !root\n", dst);
+return -EACCES;
+}
+break;
+case PTR_TO_MAP_VALUE:
+if (check_map_access(env, dst, dst_reg->off, true)) {
+verbose(env, "R%d pointer arithmetic of map value goes out of range, 
+"prohibited for !root\n", dst);
+return -EACCES;
+}
+break;
+default:
+break;
+
+switch (dst_reg->type) {
+case PTR_TO_STACK:
+if (check_stack_access(env, dst_reg, dst_reg->off +
+dst_reg->var_off.value, 1)) {
+verbose(env, "R%d stack pointer arithmetic goes out of range, 
+"prohibited for !root\n", dst);
+return -EACCES;
+}
+break;
+case PTR_TO_MAP_VALUE:
+if (check_map_access(env, dst, dst_reg->off, 1, false)) {
+verbose(env, "R%d pointer arithmetic of map value goes out of range, 
+"prohibited for !root\n", dst);
+return -EACCES;
+}
+break;
+default:
+break;
+
+/* Handles arithmetic on a pointer and a scalar: computes new min/max and var_off.
+ Caller should also handle BPF_MOV case separately.
+ If we return -EACCES, caller may want to try again treating pointer as a
+ @ @ -1890,8 +2245,10 @ @
smin_ptr = ptr_reg->smin_value, smax_ptr = ptr_reg->smax_value;

u64 umin_val = off_reg->umin_value, umax_val = off_reg->umax_value,

umin_ptr = ptr_reg->umin_value, umax_ptr = ptr_reg->umax_value;
+struct bpf_sanitize_info info = {};

u8 opcode = BPF_OP(insn->code);

u32 dst = insn->dst_reg;
+int ret;

dst_reg = &regs[dst];

@@ -1938,6 +2295,13 @@
 !check_reg_sane_offset(env, ptr_reg, ptr_reg->type))
 return -EINVAL;

+if (sanitize_needed(opcode)) {
+ret = sanitize_ptr_alu(env, insn, ptr_reg, off_reg, dst_reg,
+ &info, false);
+if (ret < 0)
+return sanitize_err(env, insn, ret, off_reg, dst_reg);
+}
+
switch (opcode) {
  case BPF_ADD:
  /* We can take a fixed offset as long as it doesn't overflow
   @@ -1952,7 +2316,7 @@
   dst_reg->umax_value = umax_ptr;
   dst_reg->var_off = ptr_reg->var_off;
   dst_reg->off = ptr_reg->off + smin_val;
   -dst_reg->range = ptr_reg->range;
   +dst_reg->raw = ptr_reg->raw;
   break;
  }
  /* A new variable offset is created. Note that off_reg->off
   @@ -1982,10 +2346,11 @@
   }
   dst_reg->var_off = tnum_add(ptr_reg->var_off, off_reg->var_off);
   dst_reg->off = ptr_reg->off;
   +dst_reg->raw = ptr_reg->raw;
   if (reg_is_pkt_pointer(ptr_reg)) {
   dst_reg->id = ++env->id_gen;
   /* something was added to pkt_ptr, set range to zero */
   -dst_reg->range = 0;
   +dst_reg->raw = 0;
   }
   break;
  case BPF_SUB:
   @@ -2014,7 +2379,7 @@
   dst_reg->var_off = ptr_reg->var_off;
   }}
dst_reg->id = ptr_reg->id;
dst_reg->off = ptr_reg->off - smin_val;
-dst_reg->range = ptr_reg->range;
+dst_reg->raw = ptr_reg->raw;
break;
}
/* A new variable offset is created. If the subtrahend is known
@@ -2040,11 +2405,12 @@
}
dst_reg->var_off = tnum_sub(ptr_reg->var_off, off_reg->var_off);
dst_reg->off = ptr_reg->off;
+dst_reg->raw = ptr_reg->raw;
if (reg_is_pkt_pointer(ptr_reg)) {
dst_reg->id = ++env->id_gen;
/* something was added to pkt_ptr, set range to zero */
if (smin_val < 0)
-dst_reg->range = 0;
+dst_reg->raw = 0;
} 
break;
case BPF_AND:
@@ -2067,6 +2433,16 @@
__update_reg_bounds(dst_reg);
__reg_deduce_bounds(dst_reg);
__reg_bound_offset(dst_reg);
+    
+    if (sanitize_check_bounds(env, insn, dst_reg) < 0)
+        return -EACCES;
+    if (sanitize_needed(opcode)) {
+        ret = sanitize_ptr_alu(env, insn, dst_reg, off_reg, dst_reg,
+            &info, true);
+        if (ret < 0)
+            return sanitize_err(env, insn, ret, off_reg, dst_reg);
+    }
+ return 0;
}
@@ -2085,6 +2461,16 @@
s64 smin_val, smax_val;
u64 umin_val, umax_val;
u64 insn_bitness = (BPF_CLASS(insn->code) == BPF_ALU64) ? 64 : 32;
+int ret;
+
+    if (insn_bitness == 32) {
+    /* Relevant for 32-bit RSH: Information can propagate towards
+      * LSB, so it isn't sufficient to only truncate the output to
+      * 32 bits.
coerce_reg_to_size(dst_reg, 4);
coerce_reg_to_size(&src_reg, 4);
}
smin_val = src_reg.smin_value;
smax_val = src_reg.smax_value;
return 0;
}

if (sanitize_needed(opcode)) {
ret = sanitize_val_alu(env, insn);
if (ret < 0)
return sanitize_err(env, insn, ret, NULL, NULL);
}

switch (opcode) {
case BPF_ADD:
if (signed_add_overflows(dst_reg->smin_value, smin_val))
if (BPF_CLASS(insn->code) != BPF_ALU64) {
/* 32-bit ALU ops are (32,32)->32 */
coerce_reg_to_size(dst_reg, 4);
-coerce_reg_to_size(&src_reg, 4);
}
__reg_deduce_bounds(dst_reg);
/* an arbitrary scalar. Disallow all math except
* pointer subtraction */
-if (opcode == BPF_SUB){
+if (opcode == BPF_SUB && env->allow_ptr_leaks) {
mark_reg_unknown(env, regs, insn->dst_reg);
return 0;
}
return err;

if (BPF_SRC(insn->code) == BPF_X) {
+struct bpf_reg_state *src_reg = regs + insn->src_reg;
+struct bpf_reg_state *dst_reg = regs + insn->dst_reg;
+if (BPF_CLASS(insn->code) == BPF_ALU64) {
/* case: R1 = R2
* copy register state to dest reg */
-regs[insn->dst_reg] = regs[insn->src_reg];
+dst_reg = *src_reg;
+dst_reg->live |= REG_LIVE_WRITTEN;
} else {
    /* R1 = (u32) R2 */
    if (is_pointer_value(env, insn->src_reg)) {
        @ @ -2460.9 +2854.14 @ @
        "R%d partial copy of pointer",
        insn->src_reg);
        return -EACCES;
    } else if (src_reg->type == SCALAR_VALUE) {
        +dst_reg = *src_reg;
        +dst_reg->live |= REG_LIVE_WRITTEN;
    } else {
        +mark_reg_unknown(env, regs,
            +insn->dst_reg);
    }
    -mark_reg_unknown(env, regs, insn->dst_reg);
    -coerce_reg_to_size(&regs[insn->dst_reg], 4);
    +coerce_reg_to_size(dst_reg, 4);
} else {
    /* case: R = imm */
    @@ -2623.6 +3022.79 @@
}
}

+/* compute branch direction of the expression */
+* compute branch direction of the expression "if (reg opcode val) goto target;"
+ /* and return:
+ * 1 - branch will be taken and "goto target" will be executed
+ * 0 - branch will not be taken and fall-through to next insn
+ * -1 - unknown. Example: "if (reg < 5)" is unknown when register value range [0,10]
+ */
+static int is_branch_taken(struct bpf_reg_state *reg, u64 val, u8 opcode)
+{
+    if (__is_pointer_value(false, reg))
+        return -1;
+    switch (opcode) {
+        case BPF_JEQ:
+            if (tnum_is_const(reg->var_off))
+                return !!tnum_equals_const(reg->var_off, val);
+            break;
+        case BPF_JNE:
+            if (tnum_is_const(reg->var_off))
+                return !tnum_equals_const(reg->var_off, val);
+            break;
+    }
case BPF_JGT:
    if (reg->umin_value > val)
        return 1;
    else if (reg->umax_value <= val)
        return 0;
    break;

case BPF_JSGT:
    if (reg->smin_value > (s64)val)
        return 1;
    else if (reg->smax_value < (s64)val)
        return 0;
    break;

case BPF_JLT:
    if (reg->umax_value < val)
        return 1;
    else if (reg->umin_value >= val)
        return 0;
    break;

case BPF_JSLT:
    if (reg->smax_value < (s64)val)
        return 1;
    else if (reg->smin_value >= (s64)val)
        return 0;
    break;

case BPF_JGE:
    if (reg->umin_value >= val)
        return 1;
    else if (reg->umax_value < val)
        return 0;
    break;

case BPF_JSGE:
    if (reg->smin_value >= (s64)val)
        return 1;
    else if (reg->smax_value < (s64)val)
        return 0;
    break;

case BPF_JLE:
    if (reg->umax_value <= val)
        return 1;
    else if (reg->umin_value > val)
        return 0;
    break;

case BPF_JSLE:
    if (reg->smax_value <= (s64)val)
        return 1;
    else if (reg->smin_value > (s64)val)
        return 0;
    break;
/* Adjusts the register min/max values in the case that the dst_reg is the
 * variable register that we are working on, and src_reg is a constant or we're
 * simply doing a BPF_K check.
 * @ @ -2971,8 +3443,9 @@
 *     struct bpf_insn *insn, int *insn_idx)
 * }
 * struct bpf_verifier_state *other_branch, *this_branch = env->cur_state;
 *-struct bpf_reg_state *regs = this_branch->regs, *dst_reg;
 +struct bpf_reg_state *regs = this_branch->regs, *dst_reg, *src_reg = NULL;
 u8 opcode = BPF_OP(insn->code);
 +int pred = -1;
 int err;

 if (opcode > BPF_JSL) {
 @ @ -2996,6 +3469,7 @@
 insn->src_reg);
 return -EACCES;
 }
 +src_reg = &regs[insn->src_reg];
 } else {
 if (insn->src_reg != BPF_REG_0) {
     verbose(env, "BPF_JMP uses reserved fields\n");
 @ @ -3010,27 +3484,25 @@
 dst_reg = &regs[insn->dst_reg];

 /* detect if R == 0 where R was initialized to zero earlier */
 -if (BPF_SRC(insn->code) == BPF_K &&
 - (opcode == BPF_JEQ || opcode == BPF_JNE) &&
 - dst_reg->type == SCALAR_VALUE &&
 - tnum_equals_const(dst_reg->var_off, insn->imm)) { 
 -if (opcode == BPF_JEQ) { 
 -/* if (imm == imm) goto pc+off;
 - * only follow the goto, ignore fall-through
 - */
 -*insn_idx += insn->off;
 -return 0;
 -} else { 
 -/* if (imm != imm) goto pc+off;
 - * only follow fall-through branch, since
 - * that's where the program will go
 - */
 -return 0;
if (BPF_SRC(insn->code) == BPF_K)
    pred = is_branch_taken(dst_reg, insn->imm, opcode);
else if (src_reg->type == SCALAR_VALUE &&
    tnum_is_const(src_reg->var_off))
    pred = is_branch_taken(dst_reg, src_reg->var_off.value,
        opcode);
if (pred == 1) {
    /* only follow the goto, ignore fall-through */
    *insn_idx += insn->off;
    return 0;
} else if (pred == 0) {
    /* only follow fall-through branch, since
     * that's where the program will go
     */
    +return 0;
}

-other_branch = push_stack(env, *insn_idx + insn->off + 1, *insn_idx);
+other_branch = push_stack(env, *insn_idx + insn->off + 1, *insn_idx,
    false);
if (!other_branch)
    return -EFAULT;

static int check_ld_abs(struct bpf_verifier_env *env, struct bpf_insn *insn)
{
    struct bpf_reg_state *regs = cur_regs(env);
    +static const int ctx_reg = BPF_REG_6;
    u8 mode = BPF_MODE(insn->code);
    int i, err;

    /* check whether implicit source operand (register R6) is readable */
    -err = check_reg_arg(env, BPF_REG_6, SRC_OP);
    +err = check_reg_arg(env, ctx_reg, SRC_OP);
    if (err)
        return err;

    -if (regs[BPF_REG_6].type != PTR_TO_CTX) {
        +if (regs[ctx_reg].type != PTR_TO_CTX) {
            verbose(env,
                "at the time of BPF_LD_ABS|IND R6 != pointer to skb\n");
            return -EINVAL;
        }
    }
err = check_ctx_reg(env, &regs[ctx_reg], ctx_reg);
if (err < 0)
    return err;
/* reset caller saved regs to unreadable */
for (i = 0; i < CALLER_SAVED_REGS; i++) {
    mark_reg_not_init(env, regs, caller_saved[i]);
}

/* Verification state from speculative execution simulation */
/* * must never prune a non-speculative execution one. */
if (old->speculative && !cur->speculative)
    return false;

idmap = kcalloc(ID_MAP_SIZE, sizeof(struct idpair), GFP_KERNEL);
/* If we failed to allocate the idmap, just say it's not safe */
if (!idmap)
    return false;

for (i = 0; i < CALLER_SAVED_REGS; i++) {
    mark_reg_not_init(env, regs, caller_saved[i]);
}

/* there were no equivalent states, remember current one. */
   technically the current state is not proven to be safe yet, *
   but it will either reach bpf_exit (which means it's safe) or *
int i, err;
+int i, err, states_cnt = 0;

sl = env->explored_states[insn_idx];
if (!sl)
    return 1;
sl = sl->next;
++states_cnt;
}

/* Verification state from speculative execution simulation */
/* * must never prune a non-speculative execution one. */
if (old->speculative && !cur->speculative)
    return false;

idmap = kcalloc(ID_MAP_SIZE, sizeof(struct idpair), GFP_KERNEL);
/* If we failed to allocate the idmap, just say it's not safe */
if (!idmap)
    return false;

for (i = 0; i < CALLER_SAVED_REGS; i++) {
    mark_reg_not_init(env, regs, caller_saved[i]);
}
-int insn_idx, prev_insn_idx = 0;
int insn_processed = 0;
bool do_print_state = false;

@@ -3845,19 +4331,20 @@
env->cur_state = state;
init_reg_state(env, state->regs);
state->parent = NULL;
-insn_idx = 0;
+state->speculative = false;
+
for (;;) {
 struct bpf_insn *insn;
 u8 class;
 int err;

-if (insn_idx >= insn_cnt) {
+-if (env->insn_idx >= insn_cnt) {
+verbose(env, "invalid insn idx %d insn_cnt %d\n",
-insn_idx, insn_cnt);
+-insn_idx, insn_cnt);
+env->insn_idx, insn_cnt);
 return -EFAULT;
 }

-insn = &insns[insn_idx];
+insn = &insns[env->insn_idx];
 class = BPF_CLASS(insn->code);

 if (++insn_processed > BPF_COMPLEXTY_LIMIT_INSNS) {
 @@ -3867,46 +4354,54 @@
 return -E2BIG;
 }

 -err = is_state_visited(env, insn_idx);
 +err = is_state_visited(env, env->insn_idx);
 if (err < 0)
 return err;
 if (err == 1) {
 /* found equivalent state, can prune the search */
 if (env->log.level) {
 if (do_print_state)
 -verbose(env, "\n from %d to %d: safe\n",
 -prev_insn_idx, insn_idx);
 +verbose(env, "\n from %d to %d\n: safe\n",
 +prev_insn_idx, env->insn_idx,
 +env->cur_state->speculative ?
 +" (speculative execution)" : "");
 else
-verbose(env, "\%d: safe\n", insn_idx);
+verbose(env, "\%d: safe\n", env->insn_idx);
}
goto process_bpf_exit;

@if (signal_pending(current))
+return -EAGAIN;
+
@if (need_resched())
cond_resched();

if (env->log.level > 1 || (env->log.level && do_print_state)) {
    if (env->log.level > 1)
-verbose(env, "\%d:\n", insn_idx);
+-verbose(env, "\%d:\n", env->insn_idx);
    else
-verbose(env, "\nfrom \%d to \%d:\n",
-prev_insn_idx, insn_idx);
+-verbose(env, "\nfrom \%d to \%d\n", env->prev_insn_idx, env->insn_idx,
+env->cur_state->speculative ?
+" (speculative execution)" : "");
print_verifier_state(env, state);
do_print_state = false;
}

if (env->log.level) {
    -verbose(env, "\%d:\n", insn_idx);
    +verbose(env, "\%d:\n", env->insn_idx);
    print_bpf_insn(verbose, env, insn,
        env->allow_ptr_leaks);
}

-err = ext_analyzer_insn_hook(env, insn_idx, prev_insn_idx);
+err = ext_analyzer_insn_hook(env, env->insn_idx, env->prev_insn_idx);
if (err)
return err;

regs = cur_regs(env);
-env->insn_aux_data[insn_idx].seen = true;
+env->insn_aux_data[env->insn_idx].seen = true;
+
if (class == BPF_ALU || class == BPF_ALU64) {
err = check_alu_op(env, insn);
if (err)
@@ -3931,13 +4426,13 @@
/* check that memory (src_reg + off) is readable,
* the state of dst_reg will be updated by this func
*/
-err = check_mem_access(env, insn_idx, insn->src_reg, insn->off,
-    BPF_SIZE(insn->code), BPF_READ,
-    insn->dst_reg);
+err = check_mem_access(env, env->insn_idx, insn->src_reg,
+    insn->off, BPF_SIZE(insn->code),
+    BPF_READ, insn->dst_reg, false);
if (err)
    return err;

-prev_src_type = &env->insn_aux_data[insn_idx].ptr_type;
+prev_src_type = &env->insn_aux_data[env->insn_idx].ptr_type;
if (*prev_src_type == NOT_INIT) {
    /* saw a valid insn
   @@ -3964,10 +4459,10 @@
    enum bpf_reg_type *prev_dst_type, dst_reg_type;

    if (BPF_MODE(insn->code) == BPF_XADD) {
        -err = check_xadd(env, insn_idx, insn);
        +err = check_xadd(env, env->insn_idx, insn);
        if (err)
            return err;
        -insn_idx++;
        +env->insn_idx++;
        continue;
    }
   @@ -3983,13 +4513,13 @@

dst_reg_type = regs[insn->dst_reg].type;

    /* check that memory (dst_reg + off) is writeable */
-err = check_mem_access(env, insn_idx, insn->src_reg, insn->off,
-    BPF_SIZE(insn->code), BPF_WRITE,
-    insn->src_reg);
+err = check_mem_access(env, env->insn_idx, insn->src_reg,
+    insn->off, BPF_SIZE(insn->code),
+    BPF_WRITE, insn->src_reg, false);
if (err)
    return err;

-prev_dst_type = &env->insn_aux_data[insn_idx].ptr_type;
+prev_dst_type = &env->insn_aux_data[env->insn_idx].ptr_type;
if (*prev_dst_type == NOT_INIT) {
    *prev_dst_type = dst_reg_type;
   @@ -4018,9 +4513,9 @@
/* check that memory (dst_reg + off) is writeable */
-err = check_mem_access(env, insn_idx, insn->dst_reg, insn->off,
-    BPF_SIZE(insn->code), BPF_WRITE,
-    -1);
+err = check_mem_access(env, env->insn_idx, insn->dst_reg,
+    insn->off, BPF_SIZE(insn->code),
+    BPF_WRITE, -1, false);
if (err)
return err;

@@ -4036,7 +4531,7 @@
return -EINVAL;
}

-err = check_call(env, insn->imm, insn_idx);
+err = check_call(env, insn->imm, env->insn_idx);
if (err)
return err;

@@ -4049,7 +4544,7 @@
return -EINVAL;
}

-insn_idx += insn->off + 1;
+env->insn_idx += insn->off + 1;
continue;

} else if (opcode == BPF_EXIT) {
@@ -4080,7 +4575,8 @@
if (err)
return err;
process_bpf_exit:
-err = pop_stack(env, &prev_insn_idx, &insn_idx);
+err = pop_stack(env, &env->prev_insn_idx,
+    &env->insn_idx);
if (err < 0) {
if (err != -ENOENT)
return err;
@@ -4090,7 +4586,7 @@
continue;
}
} else {
-err = check_cond_jmp_op(env, insn, &insn_idx);
+err = check_cond_jmp_op(env, insn, &env->insn_idx);
if (err)
return err;
if (err)
    return err;

-insn_idx++;
-env->insn_aux_data[insn_idx].seen = true;
+env->insn_idx++;
+env->insn_aux_data[env->insn_idx].seen = true;
} else {
    verbose(env, "invalid BPF_LD mode\n");
    return -EINVAL;
    @@ -4118,7 +4614,7 @@
    return -EINVAL;
 }

-insn_idx++;
+env->insn_idx++;
}

verbose(env, "processed %d insns, stack depth %d\n", insn_processed,
    @@ -4239,7 +4735,7 @@
 /* hold the map. If the program is rejected by verifier,
  * the map will be released by release_maps() or it
  * will be used by the valid program until it's unloaded
+  * and all maps are released in free_used_maps()
  */
 map = bpf_map_inc(map, false);
 if (IS_ERR(map)) {
    @@ -4389,6 +4885,34 @@
    else
        continue;

+if (type == BPF_WRITE &&
+    env->insn_aux_data[i + delta].sanitize_stack_off) {
+    struct bpf_insn patch[] = {
+        /* Sanitize suspicious stack slot with zero.
+         * There are no memory dependencies for this store,
+         * since it's only using frame pointer and immediate
+         * constant of zero
+         */
+        BPF_ST_MEM(BPF_DW, BPF_REG_FP,
+                   env->insn_aux_data[i + delta].sanitize_stack_off,
+                   0),
+        /* the original STX instruction will immediately
+         * overwrite the same stack slot with appropriate value
+         */
/*
 * is_narrower_load = size < ctx_field_size;
 * if (is_narrower_load) {
 * u32 size_default = bpf_ctx_off_adjust_machine(ctx_field_size);
 * u32 off = insn->off;
 * u8 size_code;
 * }
 * else if (ctx_field_size == 8)
 * size_code = BPF_DW;
 *
 * -insn->off = off & ~(ctx_field_size - 1);
 * +insn->off = off & ~(size_default - 1);
 * insn->code = BPF_LDX | BPF_MEM | size_code;
 * }

(1 << size * 8) - 1);
else
insn_buf[cnt++] = BPF_ALU64_IMM(BPF_AND, insn->dst_reg,
-(1 << size * 8) - 1);
+(1ULL << size * 8) - 1);
}

new_prog = bpf_patch_insn_data(env, i + delta, insn_buf, cnt);
*/
struct bpf_insn insn_buf[16];
struct bpf prog *new_prog;
struct bpf_map *map_ptr;
int i, cnt, delta = 0;

for (i = 0; i < insn_cnt; i++, insn++) {
- if (insn->code == (BPF_ALU | BPF_MOD | BPF_X))
+ if (insn->code == (BPF_ALU64 | BPF_MOD | BPF_X))
+ insn->code == (BPF_ALU64 | BPF_DIV | BPF_X))
+ insn->code == (BPF_ALU | BPF_DIV | BPF_X))
-/* due to JIT bugs clear upper 32-bits of src register
- */
- insn_buf[0] = BPF_MOV32_REG(insn->src_reg, insn->src_reg);
- insn_buf[1] = *insn;
- cnt = 2;
+ bool is64 = BPF_CLASS(insn->code) == BPF_ALU64;
+ struct bpf_insn mask_and_div[] = {
+  BPF_MOV_REG(BPF_CLASS(insn->code), BPF_REG_AX, insn->src_reg),
+  /* [R,W]x div 0 -> 0 */
+  BPF_JMP_IMM(BPF_JEQ, BPF_REG_AX, 0, 2),
+  BPF_RAW_REG(*insn, insn->dst_reg, BPF_REG_AX),
+  BPF_JMP_IMM(BPF_JA, 0, 0, 1),
+  BPF_ALU_REG(BPF_CLASS(insn->code), BPF_XOR, insn->dst_reg, insn->dst_reg),
+  
+  struct bpf_insn mask_and_mod[] = {
+    BPF_MOV_REG(BPF_CLASS(insn->code), BPF_REG_AX, insn->src_reg),
+    BPF_JMP_IMM(BPF_JEQ, BPF_REG_AX, 0, 1 + (is64 ? 0 : 1)),
+    BPF_RAW_REG(*insn, insn->dst_reg, BPF_REG_AX),
+    BPF_JMP_IMM(BPF_JA, 0, 0, 1),
+    BPF_MOV32_REG(insn->dst_reg, insn->dst_reg),
+  
+  };
+  struct bpf_insn *patchlet;
+  
+  if (insn->code == (BPF_ALU64 | BPF_DIV | BPF_X))
+  if (insn->code == (BPF_ALU | BPF_DIV | BPF_X)) {
+    patchlet = mask_and_div;
+    cnt = ARRAY_SIZE(mask_and_div);
+  } else {
+    patchlet = mask_and_mod;
+    cnt = ARRAY_SIZE(mask_and_mod) - (is64 ? 2 : 0);
+  }
+  
+  new_prog = bpf_patch_insn_data(env, i + delta, patchlet, cnt);
+  if (!new_prog)
+    return -ENOMEM;
  
}
+delta += cnt - 1;
+env->prog = prog = new_prog;
+insn = new_prog->insnsi + i + delta;
+continue;
+}
+
+if (insn->code == (BPF_ALU64 | BPF_ADD | BPF_X) ||
+ insn->code == (BPF_ALU64 | BPF_SUB | BPF_X)) {
+const u8 code_add = BPF_ALU64 | BPF_ADD | BPF_X;
+const u8 code_sub = BPF_ALU64 | BPF_SUB | BPF_X;
+struct bpf_insn insns_buf[16];
+struct bpf_insn *patch = &insns_buf[0];
+bool issrc, isneg, isimm;
+u32 off_reg;
+
+aux = &env->insn_aux_data[i + delta];
+if (!aux->alu_state ||
+ aux->alu_state == BPF_ALU_NON_POINTER)
+continue;
+
+isneg = aux->alu_state & BPF_ALU_NEG_VALUE;
+issrc = (aux->alu_state & BPF_ALU_SANITIZE) ==
+BPF_ALU_SANITIZE_SRC;
+isimm = aux->alu_state & BPF_ALU_IMMEDIATE;
+
+off_reg = issrc ? insn->src_reg : insn->dst_reg;
+if (isimm) {
+ *patch++ = BPF_MOV32_IMM(BPF_REG_AX, aux->alu_limit);
+} else {
+ if (isneg)
+ *patch++ = BPF_ALU64_IMM(BPF_MUL, off_reg, -1);
+ *patch++ = BPF_MOVS32_IMM(BPF_REG_AX, aux->alu_limit);
+ *patch++ = BPF_ALU64_REG(BPF_SUB, BPF_REG_AX, off_reg);
+ *patch++ = BPF_ALU64_REG(BPF_OR, BPF_REG_AX, off_reg);
+ *patch++ = BPF_ALU64_REG(BPF_NEG, BPF_REG_AX, off_reg);
+ *patch++ = BPF_ALU64_IMM(BPF_ARSH, BPF_REG_AX, 63);
+ *patch++ = BPF_ALU64_IMM(BPF_AND, BPF_REG_AX, off_reg);
+ }
+if (!issrc)
+ *patch++ = BPF_MOVS64_REG(insns->dst_reg, insns->src_reg);
+insns->src_reg = BPF_REG_AX;
+if (isneg)
+ insns->code = insns->code == code_add ?
+ code_sub : code_add;
+ *patch++ = *insn;
+if (issrc && isneg && !isimm)
+ *patch++ = BPF_ALU64_IMM(BPF_MUL, off_reg, -1);
+cnt = patch - insns_buf;
new_prog = bpf_patch_insn_data(env, i + delta, insn_buf, cnt);
if (!new_prog)
    return -ENOMEM;
insn->imm = 0;
insn->code = BPF_JMP | BPF_TAIL_CALL;

+aux = &env->insn_aux_data[i + delta];
+if (!bpf_map_ptr_unpriv(aux))
+continue;
+
/* instead of changing every JIT dealing with tail_call
 * emit two extra insns:
 * if (index >= max_entries) goto out;
 * index &= array->index_mask;
 * to avoid out-of-bounds cpu speculation
 */
-map_ptr = env->insn_aux_data[i + delta].map_ptr;
-if (map_ptr == BPF_MAP_PTR_POISON) {
+if (bpf_map_ptr_poisoned(aux)) {
        verbose(env, "tail_call abusing map_ptr\n")
        return -EINVAL;
    }
} -if (!map_ptr->unpriv_array)
-continue;
+
+map_ptr = BPF_MAP_PTR(aux->map_state);
insn_buf[0] = BPF_JMP_IMM(BPF_JGE, BPF_REG_3,
    map_ptr->max_entries, 2);
insn_buf[1] = BPF_ALU32_IMM(BPF_AND, BPF_REG_3,
@@ -4547,9 +5152,12 @@
/*
 if (ebpf_jit_enabled() && BITS_PER_LONG == 64 &&
     insn->imm == BPF_FUNCS_map_lookup_elem) {
-map_ptr = env->insn_aux_data[i + delta].map_ptr;
-if (map_ptr == BPF_MAP_PTR_POISON ||
-if (!map_ptr->ops->map_gen_lookup)
+aux = &env->insn_aux_data[i + delta];
+if (bpf_map_ptr_poisoned(aux))
+goto patch_call_imm;
+
+map_ptr = BPF_MAP_PTR(aux->map_state);
+if (!map_ptr->ops->map_gen_lookup)
+goto patch_call_imm;

    cnt = map_ptr->ops->map_gen_lookup(map_ptr, insn_buf);
    @@ -4754,7 +5362,7 @@
err_release_maps:
if (!env->prog->aux->used_maps)
    /* if we didn't copy map pointers into bpf_prog_info, release
     * them now. Otherwise free_bpf_prog_info() will release them.
     * + * them now. Otherwise free_used_maps() will release them.
     */
    release_maps(env);
*prog = env->prog;
--- linux-4.15.0.orig/kernel/capability.c
+++ linux-4.15.0/kernel/capability.c
@@ -299,7 +299,7 @@
-int ret;
+int ret;
rcu_read_lock();
-ret = security_capable(__task_cred(t), ns, cap);
+ret = security_capable(__task_cred(t), ns, cap, CAP_OPT_NONE);
rcu_read_unlock();

return (ret == 0);
@@ -340,7 +340,7 @@
-int ret;
+int ret;
rcu_read_lock();
-ret = security_capable_noaudit(__task_cred(t), ns, cap);
+ret = security_capable(__task_cred(t), ns, cap, CAP_OPT_NOAUDIT);
rcu_read_unlock();

return (ret == 0);
@@ -363,7 +363,9 @@
-return has_ns_capability_noaudit(t, &init_user_ns, cap);
+static bool ns_capable_common(struct user_namespace *ns, int cap, bool audit)
+static bool ns_capable_common(struct user_namespace *ns,
+    int cap,
+    unsigned int opts)
+{ endcapable;
+    BUG();
+}
+}
-capable = audit ? security_capable(current_cred(), ns, cap) :
-    security_capable_noaudit(current_cred(), ns, cap);
+capable = security_capable(current_cred(), ns, cap, opts);
    if (capable == 0) {
        current->flags |= PF_SUPERPRIV;

bool ns_capable(struct user_namespace *ns, int cap)
{
    return ns_capable_common(ns, cap, CAP_OPT_NONE);
}
EXPORT_SYMBOL(ns_capable);

bool ns_capable_noaudit(struct user_namespace *ns, int cap)
{
    return ns_capable_common(ns, cap, CAP_OPT_NOAUDIT);
}
EXPORT_SYMBOL(ns_capable_noaudit);

bool file_ns_capable(const struct file *file, struct user_namespace *ns, int cap)
{
    if (WARN_ON_ONCE(!cap_valid(cap)))
        return false;
    if (security_capable(file->f_cred, ns, cap, CAP_OPT_NONE) == 0)
        return true;
    return false;
}

int ret = 0; /* An absent tracer adds no restrictions */
const struct cred *cred;
rcu_read_lock();
cred = rcu_dereference(tsk->ptracer_cred);
if (cred)
    ret = security_capable_noaudit(cred, ns, CAP_SYS_PTRACE);
rpu_read_unlock();
return (ret == 0);

--- linux-4.15.0.orig/kernel/cgroup/cgroup-v1.c
+++ linux-4.15.0/kernel/cgroup/cgroup-v1.c
@@ -501,6 +501,7 @@
p++;
if (p >= end) {
  
+ (*pos)++;
  return NULL;
} else {
  
  *pos = *p;
@@ -823,7 +824,7 @@
    pathbuf = kmalloc(PATH_MAX, GFP_KERNEL);
    agentbuf = kstrdup(cgrp->root->release_agent_path, GFP_KERNEL);
    -if (!pathbuf || !agentbuf)
+if (!pathbuf || !agentbuf || !strlen(agentbuf))
      goto out;

    spin_lock_irq(&css_set_lock);
@@ -860,6 +861,10 @@
    struct cgroup *cgrp = kn->priv;
    int ret;

+/* do not accept 'n' to prevent making /proc/<pid>/cgroup unparsable */
+if (strchr(new_name_str, '\n'))
  +return -EINVAL;
+
  if (kernfs_type(kn) != KERNFS_DIR)
    return -ENOTDIR;
  if (kn->parent != new_parent)
--- linux-4.15.0.orig/kernel/cgroup/cgroup.c
+++ linux-4.15.0/kernel/cgroup/cgroup.c
@@ -189,7 +189,7 @@
    */
    static u16 have_fork_callback __read_mostly;
    static u16 have_exit_callback __read_mostly;
-  static u16 have_free_callback __read_mostly;
+  static u16 have_release_callback __read_mostly;
    static u16 have_canfork_callback __read_mostly;

    /* cgroup namespace for init task */
@@ -206,7 +206,8 @@
 static int cgroup_apply_control(struct cgroup *cgrp);
 static void cgroup_finalize_control(struct cgroup *cgrp, int ret);
- static void css_task_iter_advance(struct css_task_iter *it);
+ static void css_task_iter_skip(struct css_task_iter *it,
       struct task_struct *task);
 static int cgroup_destroy_locked(struct cgroup *cgrp);
 static struct cgroup_subsys_state *css_create(struct cgroup *cgrp,
struct cgroup_subsys *ss);
@@ -666,6 +667,7 @@
    .dom_cset= &init_css_set,
    .tasks= LIST_HEAD_INIT(init_css_set.tasks),
    .mg_tasks= LIST_HEAD_INIT(init_css_set.mg_tasks),
+    .dying_tasks= LIST_HEAD_INIT(init_css_set.dying_tasks),
    .task_iters= LIST_HEAD_INIT(init_css_set.task_iters),
    .threaded_csets= LIST_HEAD_INIT(init_css_set.threaded_csets),
    .cgrp_links= LIST_HEAD_INIT(init_css_set.cgrp_links),
@@ -769,6 +771,21 @@
    cgroup_update_populated(link->cgrp, populated);
 }

+/*
+ * @task is leaving, advance task iterators which are pointing to it so
+ * that they can resume at the next position. Advancing an iterator might
+ * remove it from the list, use safe walk. See css_task_iter_skip() for
+ * details.
+ */
+static void css_set_skip_task_iters(struct css_set *cset,
+    struct task_struct *task)
+{
+    struct css_task_iter *it, *pos;
+    list_for_each_entry_safe(it, pos, &cset->task_iters, iters_node)
+        css_task_iter_skip(it, task);
+}
+
+/**
+ * css_set_move_task - move a task from one css_set to another
+ * @task: task being moved
+ @@ -794,22 +811,9 @@
+ css_set_update_populated(to_cset, true);
+    if (from_cset) {
+        struct css_task_iter *it, *pos;
+        for_each_entry_safe(it, pos, &from_cset->task_iters, iters_node)
+            css_task_iter_skip(it, task);
+    }
+/**
+ */
+ * @task is leaving, advance task iterators which are
+ * pointing to it so that they can resume at the next
+ * position. Advancing an iterator might remove it from
+ * the list, use safe walk. See css_task_iter_advance*() for
+ * details.
+ */
+list_for_each_entry_safe(it, pos, &from_cset->task_iters,
+    iters_node)
if (it->task_pos == &task->cg_list)
 css_task_iter_advance(it);
+
css_set_skip_task_iters(from_cset, task);
list_del_init(&task->cg_list);
if (!css_set_populated(from_cset))
css_set_update_populated(from_cset, false);

@cset->dom_cset = cset;
INIT_LIST_HEAD(&cset->tasks);
INIT_LIST_HEAD(&cset->mg_tasks);
+INIT_LIST_HEAD(&cset->dying_tasks);
INIT_LIST_HEAD(&cset->task_iters);
INIT_LIST_HEAD(&cset->threaded_csets);
INIT_HLIST_NODE(&cset->hlist);

}@ -1724.7 +1729.7 @@

*root_flags = 0;

@if (!data)
+if (!data || *data == '\0')
return 0;

while ((token = strsep(&data, ","))) != NULL) {
@@ -1987,6 +1992,7 @@
    struct cgroup_namespace *ns)
 {
    struct dentry *dentry;
-bool new_sb;
+bool new_sb = false;

dentry = kernfs_mount(fs_type, flags, root->kf_root, magic, &new_sb);

@@ -1997,12 +2003,14 @@*/
    if (!IS_ERR(dentry) && ns != &init_cgroup_ns) {
    struct dentry *nsdentry;
+    struct super_block *sb = dentry->d_sb;
    struct cgroup *cgrp;

    mutex_lock(&cgroup_mutex);
-@ @ -1997,12 +2003,14 @@
    spin_unlock_irq(&css_set_lock);
    mutex_unlock(&cgroup_mutex);

    -nsdentry = kernfs_node_dentry(cgrp->kn, dentry->d_sb);
+nsdentry = kernfs_node_dentry(cgrp->kn, sb);
    dput(dentry);
+if (IS_ERR(nsdentry))
+deactivate_locked_super(sb);

dentry = nsdentry;
}

-if (IS_ERR(dentry) || !new_sb)
+if (!new_sb)
cgroup_put(&root->cgrp);

return dentry;
@@ -2815,11 +2823,12 @@
}

/**
 - * cgroup_save_control - save control masks of a subtree
 + * cgroup_save_control - save control masks and dom_cgrp of a subtree
 * @cgrp: root of the target subtree
 * *
 - * Save ->subtree_control and ->subtree_ss_mask to the respective old_
 - * prefixed fields for @cgrp's subtree including @cgrp itself.
 + * Save ->subtree_control, ->subtree_ss_mask and ->dom_cgrp to the
 + * respective old_ prefixed fields for @cgrp's subtree including @cgrp
 + * itself.
 */

static void cgroup_save_control(struct cgroup *cgrp)
{
 @@ -2829,6 +2838,7 @@
cgroup_for_each_live_descendant_pre(dsct, d_css, cgrp) {
 dsct->old_subtree_control = dsct->subtree_control;
 dsct->old_subtree_ss_mask = dsct->subtree_ss_mask;
 +dsct->old_dom_cgrp = dsct->dom_cgrp;
 }
@@ -2854,11 +2864,12 @@
}

/**
 - * cgroup_restore_control - restore control masks of a subtree
 + * cgroup_restore_control - restore control masks and dom_cgrp of a subtree
 * @cgrp: root of the target subtree
 * *
 - * Restore ->subtree_control and ->subtree_ss_mask from the respective old_
 - * prefixed fields for @cgrp's subtree including @cgrp itself.
 + * Restore ->subtree_control, ->subtree_ss_mask and ->dom_cgrp from the
 + * respective old_ prefixed fields for @cgrp's subtree including @cgrp
 + * itself.
 */

static void cgroup_restore_control(struct cgroup *cgrp)
{
    cgroup_for_each_live_descendant_post(dsct, d_css, cgrp) {
        dsct->subtree_control = dsct->old_subtree_control;
        dsct->subtree_ss_mask = dsct->old_subtree_ss_mask;
        +dsct->dom_cgrp = dsct->old_dom_cgrp;
    }
}

for_each_subsys(ss, ssid) {
    struct cgroup_subsys_state *css = cgroup_css(dsct, ss);

    -WARN_ON_ONCE(css && percpu_ref_is_dying(&css->refcnt));
    if (!!(cgroup_ss_mask(dsct) & (1 << ss->id)))
        continue;

    return PTR_ERR(css);
}

WARN_ON_ONCE(percpu_ref_is_dying(&css->refcnt));
if (css_visible(css)) {
    ret = css_populate_dir(css);
    if (ret)
        continue;
}

WARN_ON_ONCE(percpu_ref_is_dying(&css->refcnt));
if (css)
    continue;

WARN_ON_ONCE(percpu_ref_is_dying(&css->refcnt));
if (css->parent && !!(cgroup_ss_mask(dsct) & (1 << ss->id)))
    kill_css(css);
}

struct cgroup *parent = cgroup_parent(cgrp);
struct cgroup *dom_cgrp = parent->dom_cgrp;
+struct cgroup *dsct;
+struct cgroup_subsys_state *d_css;
int ret;

lockdep_assert_held(&cgroup_mutex);
@@ -3183,6 +3197,16 @@
if (cgroup_is_threaded(cgrp))
    return 0;

+/*
+ * If @cgroup is populated or has domain controllers enabled, it
+ * can't be switched. While the below cgroup_can_be_thread_root()
+ * test can catch the same conditions, that's only when @parent is
+ * not mixable, so let's check it explicitly.
+ */
+if (cgroup_is_populated(cgrp) ||
    cgrp->subtree_control & ~cgrp_dfl_threaded_ss_mask)
    return -EOPNOTSUPP;
+
/* we're joining the parent's domain, ensure its validity */
if (!cgroup_is_valid_domain(dom_cgrp) ||
    !cgroup_can_be_thread_root(dom_cgrp))
@@ -3194,12 +3218,13 @@
*/
cgroup_save_control(cgrp);

-cgrp->dom_cgrp = dom_cgrp;
+cgroup_for_each_live_descendant_pre(dsct, d_css, cgrp)
+    if (dsct == cgrp || cgroup_is_threaded(dsct))
+        dsct->dom_cgrp = dom_cgrp;
+
ret = cgroup_apply_control(cgrp);
if (!ret)
    parent->nr_threaded_children++;
else
    -cgrp->dom_cgrp = cgrp;
+cgroup_finalize_control(cgrp, ret);
return ret;
@@ -3231,7 +3256,8 @@
if (strcmp(strstrip(buf), "threaded"))
    return -EINVAL;

-cgrp = cgroup_kn_lock_live(of->kn, false);
+/* drain dying csses before we re-apply (threaded) subtree control */
+cgrp = cgroup_kn_lock_live(of->kn, true);
if (!cgrp)
    return -ENOENT;
@@ -3523,7 +3549,9 @@
key = &cft->lockdep_key;
#endif
kn = __kernfs_create_file(cgrp->kn, cgroup_file_name(cgrp, cft, name),
- cgroup_file_mode(cft), 0, cft->kf_ops, cft,
+ cgroup_file_mode(cft),
+ GLOBAL_ROOT_UID, GLOBAL_ROOT_GID,
+ 0, cft->kf_ops, cft,
    NULL, key);
if (IS_ERR(kn))
return PTR_ERR(kn);
@@ -4089,15 +4117,22 @@
it->task_pos = NULL;
}
-} while (!css_set_populated(cset));
+} while (!css_set_populated(cset) && list_empty(&cset->dying_tasks));

-if (!list_empty(&cset->tasks))
+if (!list_empty(&cset->tasks)) {
    it->task_pos = cset->tasks.next;
-else
+} else if (!list_empty(&cset->mg_tasks)) {
    it->task_pos = cset->mg_tasks.next;
+} else {
    it->task_pos = cset->dying_tasks.next;
+} else {
    it->dying_tasks_head = &cset->dying_tasks;
+}

it->tasks_head = &cset->tasks;
it->mg_tasks_head = &cset->mg_tasks;
+it->dying_tasks_head = &cset->dying_tasks;

/*
 * We don't keep css_sets locked across iteration steps and thus
 @@ -4123,32 +4158,68 @@
 list_add(&it->iters_node, &cset->task_iters);
 }

+static void css_task_iter_skip(struct css_task_iter *it,
+    struct task_struct *task)
+{
+    lockdep_assert_held(&css_set_lock);
+    +if (it->task_pos == &task->cg_list) {
+        it->task_pos = it->task_pos->next;
+    +it->flags |= CSS_TASK_ITER_SKIPPED;


static void css_task_iter_advance(struct css_task_iter *it)
{
    struct list_head *next;
    struct task_struct *task;

    lockdep_assert_held(&css_set_lock);

    repeat:
        /*
        * Advance iterator to find next entry. cset->tasks is consumed
        * first and then ->mg_tasks. After ->mg_tasks, we move onto the
        * next cset.
        */

        next = it->task_pos->next;

        -if (next == it->tasks_head)
            next = it->mg_tasks_head->next;
        +if (it->task_pos)
            /* Advance iterator to find next entry. cset->tasks is
            * consumed first and then ->mg_tasks. After ->mg_tasks,
            * we move onto the next cset.
            */
            +if (it->flags & CSS_TASK_ITER_SKIPPED)
                it->flags &= ~CSS_TASK_ITER_SKIPPED;
                else
                    it->task_pos = it->task_pos->next;
            -else
                it->task_pos = next;
        +*/
        +if (it->flags & CSS_TASK_ITER_SKIPPED)
            it->flags &= ~CSS_TASK_ITER_SKIPPED;
        +else
            it->task_pos = it->task_pos->next;

        -if (next == it->mg_tasks_head)
            +if (it->task_pos == it->tasks_head) { 
                it->task_pos = it->mg_tasks_head->next;
                it->cur_tasks_head = it->mg_tasks_head;
            +}
            +if (it->task_pos == it->mg_tasks_head) {
                it->task_pos = it->dying_tasks_head->next;
                it->cur_tasks_head = it->dying_tasks_head;
            +}
            +if (it->task_pos == it->dying_tasks_head)
                css_task_iter_advance_css_set(it);
        +} else {
            /* called from start, proceed to the first cset */
            css_task_iter_advance_css_set(it);
        -else
            it->task_pos = next;
        +}
/* if PROCS, skip over tasks which aren't group leaders */
if ((it->flags & CSS_TASK_ITER_PROCS) && it->task_pos &&
    !thread_group_leader(list_entry(it->task_pos, struct task_struct,
        cg_list)))
goto repeat;
if (!it->task_pos)
    return;

    task = list_entry(it->task_pos, struct task_struct, cg_list);
if (it->flags & CSS_TASK_ITER_PROCS) {
    /* if PROCS, skip over tasks which aren't group leaders */
    if (!thread_group_leader(task))
        goto repeat;
    /* and dying leaders w/o live member threads */
    if (it->cur_tasks_head == it->dying_tasks_head &&
        !atomic_read(&task->signal->live))
        goto repeat;
} else {
    /* skip all dying ones */
    if (it->cur_tasks_head == it->dying_tasks_head)
        goto repeat;
}
}

/**
 @@ -4182,7 +4253,7 @@
     it->cset_head = it->cset_pos;

     -css_task_iter_advance_css_set(it);
     +css_task_iter_advance(it);

     spin_unlock_irq(&css_set_lock);
 }@@ -4204,6 +4275,10 @@

 spin_lock_irq(&css_set_lock);

 +/* @it may be half-advanced by skips, finish advancing */
 +if (it->flags & CSS_TASK_ITER_SKIPPED)
     +css_task_iter_advance(it);
 +
     if (it->task_pos) {
         it->cur_task = list_entry(it->task_pos, struct task_struct,
             cg_list);
 @@ -4251,6 +4326,9 @@
struct kernfs_open_file *of = s->private;
struct css_task_iter *it = of->priv;

+if (pos)
+(*pos)++;
+
return css_task_iter_next(it);
}

@@ -4266,7 +4344,7 @@
* from position 0, so we can simply keep iterating on !0 *pos.
 */
if (!it) {
-  if (WARN_ON_ONCE((*pos)++))
+  if (WARN_ON_ONCE((*pos)))
  return ERR_PTR(-EINVAL);

it = kzalloc(sizeof(*it), GFP_KERNEL);
@@ -4274,10 +4352,11 @@
  return ERR_PTR(-ENOMEM);
of->priv = it;
css_task_iter_start(&cgrp->self, iter_flags, it);
-} else if (!(*pos)++) {
+} else if (!(*pos)) {
  css_task_iter_end(it);
css_task_iter_start(&cgrp->self, iter_flags, it);
-}
+} else
+  return it->cur_task;

return cgroup_procs_next(s, NULL, NULL);
}
@@ -4598,9 +4677,11 @@
if (cgroup_on_dfl(cgrp))
cgroup_stat_flush(cgrp);

+spin_lock_irq(&css_set_lock);
for (tcgrp = cgroup_parent(cgrp); tcgrp;
  tcgrp = cgroup_parent(tcgrp))
tcgrp->nr_dying_descendants--;
+spin_unlock_irq(&css_set_lock);

cgroup_idr_remove(&cgrp->root->cgroup_idr, cgrp->id);
cgrp->id = -1;
@@ -4806,12 +4887,14 @@
if (ret)
goto out_idr_free;
spin_lock_irq(&css_set_lock);
for (tcgrp = cgrp; tcgrp; tcgrp = cgroup_parent(tcgrp)) {
    cgrp->ancestor_ids[tcgrp->level] = tcgrp->id;
}

if (tcgrp != cgrp)
    tcgrp->nr_descendants++;
+
spin_unlock_irq(&css_set_lock);

if (notify_on_release(parent))
    set_bit(CGRP_NOTIFY_ON_RELEASE, &cgrp->flags);
@@ -5096,10 +5179,12 @@
if (parent && cgroup_is_threaded(cgrp))
    parent->nr_threaded_children--;
+
spin_lock_irq(&css_set_lock);
for (tcgrp = cgroup_parent(cgrp); tcgrp; tcgrp = cgroup_parent(tcgrp)) {
    tcgrp->nr_descendants--;
    tcgrp->nr_dying_descendants++;
}
+
spin_unlock_irq(&css_set_lock);

cgroup1_check_for_release(parent);
@@ -5175,7 +5260,7 @@
have_fork_callback |= (bool)ss->fork << ss->id;
have_exit_callback |= (bool)ss->exit << ss->id;
-have_free_callback |= (bool)ss->free << ss->id;
+have_release_callback |= (bool)ss->release << ss->id;
have_canfork_callback |= (bool)ss->can_fork << ss->id;
/* At system boot, before all subsystems have been
@@ -5224,8 +5309,6 @@
return 0;
}
-
-static u16 cgroup_disable_mask __initdata;
-
/**
 * cgroup_init - cgroup initialization
 * @ @ -5285,12 +5368,8 @@
 * disabled flag and cftype registration needs kmalloc,
 * both of which aren't available during early_init.
 */
-if (cgroup_disable_mask & (1 << ssid)) {
    static_branch_disable(cgroup_subsys_enabled_key[ssid]);
}
- printk(KERN_INFO "Disabling %s control group subsystem\n", ss->name);
+ if (!cgroup_ssid_enabled(ssid))
  continue;
- }

if (cgroup1_ssid_disabled(ssid))
printk(KERN_INFO "Disabling %s control group subsystem in v1 mounts\n", @ @ -5599,6 +5678,7 @@
if (!list_empty(&tsk->cg_list)) {
  spin_lock_irq(&css_set_lock);
  css_set_move_task(tsk, cset, NULL, false);
+ list_add_tail(&tsk->cg_list, &cset->dying_tasks);
  cset->nr_tasks--;
  spin_unlock_irq(&css_set_lock);
} else {
  @ @ -5611,16 +5691,26 @@
} while_each_subsys_mask();
}

-void cgroup_free(struct task_struct *task)
+void cgroup_release(struct task_struct *task)
{
- struct css_set *cset = task_css_set(task);
 struct cgroup_subsys *ss;
 int ssid;

- do_each_subsys_mask(ss, ssid, have_free_callback) {
- ss->free(task);
+ do_each_subsys_mask(ss, ssid, have_release_callback) {
+ ss->release(task);
} while_each_subsys_mask();

+if (use_task_css_set_links) {
+ spin_lock_irq(&css_set_lock);
+ css_set_skip_task_iters(task_css_set(task), task);
+ list_del_init(&task->cg_list);
+ spin_unlock_irq(&css_set_lock);
+}
+}
+
+void cgroup_free(struct task_struct *task)
+{
+ struct css_set *cset = task_css_set(task);
  put_css_set(cset);
}
if (strcmp(token, ss->name) &&
    strcmp(token, ss->legacy_name))
continue;
-cgroup_disable_mask |= 1 << i;
+static_branch_disable(cgroup_subsys_enabled_key[i]);
+pr_info("Disabling %s control group subsystem\n",
+ss->name);
}
}
return 1;
@@ -5794,19 +5887,14 @@

void cgroup_sk_alloc(struct sock_cgroup_data *skcd)
{
-#if (cgroup_sk_alloc_disabled)
+    if (cgroup_sk_alloc_disabled) {
+        skcd->no_refcnt = 1;
+        return;
+    }

-/* Socket clone path */
-#if (skcd->val) {
-     /*
- * We might be cloning a socket which is left in an empty
- * cgroup and the cgroup might have already been rmdir'd.
- * Don't use cgroup_get_live().
- * /
-     cgroup_get(sock_cgroup_ptr(skcd));
+/* Don't associate the sock with unrelated interrupted task's cgroup. */
+     if (in_interrupt())
+         return;
- } 

rcu_read_lock();

@@ -5824,8 +5912,26 @@
rcu_read_unlock();
 }

+void cgroup_sk_clone(struct sock_cgroup_data *skcd)
+{ 
+/* Socket clone path */
+    if (skcd->val) {
+        if (skcd->no_refcnt)
+            return;
+    */
+    */ We might be cloning a socket which is left in an empty
+ * cgroup and the cgroup might have already been rmdir'd.
+ * Don't use cgroup_get_live().
+ */
+cgroup_get(sock_cgroup_ptr(skcd));
+
void cgroup_sk_free(struct sock_cgroup_data *skcd)
{
  if (skcd->no_refcnt)
    return;
  cgroup_put(sock_cgroup_ptr(skcd));
}

--- linux-4.15.0.orig/kernel/cgroup/cpuset.c
+++ linux-4.15.0/kernel/cgroup/cpuset.c
@@ -2431,10 +2431,23 @@
spin_unlock_irqrestore(&callback_lock, flags);
}

+/**
+ * cpuset_cpus_allowed_fallback - final fallback before complete catastrophe.
+ * @tsk: pointer to task_struct with which the scheduler is struggling
+ *
+ * Description: In the case that the scheduler cannot find an allowed cpu in
+ * tsk->cpus_allowed, we fall back to task_cs(tsk)->cpus_allowed. In legacy
+ * mode however, this value is the same as task_cs(tsk)->effective_cpus,
+ * which will not contain a sane cpumask during cases such as cpu hotplugging.
+ * This is the absolute last resort for the scheduler and it is only used if
+ * _every_ other avenue has been traveled.
+ */
+
void cpuset_cpus_allowed_fallback(struct task_struct *tsk)
{
  rcu_read_lock();
  do_set_cpus_allowed(tsk, task_cs(tsk)->effective_cpus);
  do_set_cpus_allowed(tsk, is_in_v2_mode() ?
                      task_cs(tsk)->cpus_allowed : cpu_possible_mask);
  rcu_read_unlock();

/*
--- linux-4.15.0.orig/kernel/cgroup/pids.c
+++ linux-4.15.0/kernel/cgroup/pids.c
@@ -48,7 +48,7 @@
* %PIDS_MAX = (%PID_MAX_LIMIT + 1).
 */
atomic64_t counter;
-int64_t limit;
+atomic64_t limit;

/* Handle for "pids.events" */
struct cgroup_file events_file;
@@ -76,8 +76,8 @@
if (!pids)
    return ERR_PTR(-ENOMEM);
-pids->limit = PIDS_MAX;
atomic64_set(&pids->counter, 0);
+atomic64_set(&pids->limit, PIDS_MAX);
atomic64_set(&pids->events_limit, 0);
return &pids->css;
}
@@ -149,13 +149,14 @@
for (p = pids; parent_pids(p); p = parent_pids(p)) {
    int64_t new = atomic64_add_return(num, &p->counter);
+    int64_t limit = atomic64_read(&p->limit);
    /*
     * Since new is capped to the maximum number of pid_t, if
     * p->limit is %PIDS_MAX then we know that this test will never
     * fail.
     */
     
     if (new > limit)
         goto revert;
     }
@@ -247,7 +248,7 @@
pids_uncharge(pids, 1);
}

-static void pids_free(struct task_struct *task)
+static void pids_release(struct task_struct *task)
{
struct pids_cgroup *pids = css_pids(task_css(task, pids_cgrp_id));

@@ -280,7 +281,7 @@
    /* Limit updates don't need to be mutex'd, since it isn't
    * critical that any racing fork()s follow the new limit.
    */
     
     -pids->limit = limit;
+atomic64_set(&pids->limit, limit);
    return nbytes;
}
@@ -288,7 +289,7 @@
{
    struct cgroup_subsys_state *css = seq_css(sf);
    struct pids_cgroup *pids = css_pids(css);
-   int64_t limit = pids->limit;
+   int64_t limit = atomic64_read(&pids->limit);

    if (limit >= PIDS_MAX)
       seq_printf(sf, "%s\n", PIDS_MAX_STR);
@@ -342,7 +343,7 @@
 .cancel_attach = pids_cancel_attach,
 .can_fork= pids_can_fork,
 .cancel_fork= pids_cancel_fork,
-   .free= pids_free,
+   .release= pids_release,
 .legacy_cftypes=pids_files,
 .dfl_cftypes=pids_files,
 .threaded= true,
--- linux-4.15.0.orig/kernel/compat.c
+++ linux-4.15.0/kernel/compat.c
@@ -34,6 +34,7 @@
{
    struct compat_timex tx32;

+memset(txc, 0, sizeof(struct timex));
    if (copy_from_user(&tx32, utp, sizeof(struct compat_timex)))
       return -EFAULT;
@@ -418,10 +419,9 @@
    bitmap_size = ALIGN(bitmap_size, BITS_PER_COMPAT_LONG);
    nr_compat_longs = BITS_TO_COMPAT_LONGS(bitmap_size);

    -if (!access_ok(VERIFY_READ, umask, bitmap_size / 8))
+if (!user_access_begin(VERIFY_READ, umask, bitmap_size / 8))
       return -EFAULT;

    -user_access_begin();
    while (nr_compat_longs > 1) {
       compat_ulong_t l1, l2;
       unsafe_get_user(l1, umask++, Efault);
@@ -448,10 +448,9 @@
    bitmap_size = ALIGN(bitmap_size, BITS_PER_COMPAT_LONG);
    nr_compat_longs = BITS_TO_COMPAT_LONGS(bitmap_size);

    -if (!access_ok(VERIFY_WRITE, umask, bitmap_size / 8))
+if (!user_access_begin(VERIFY_WRITE, umask, bitmap_size / 8))
       return -EFAULT;
# USB camera

+CONFIG_MEDIA_SUPPORT=m
+CONFIG_MEDIA_CAMERA_SUPPORT=y
+CONFIG_MEDIA_USB_SUPPORT=y
+CONFIG_USB_VIDEO_CLASS=m
+CONFIG_USB_M5602=m
+CONFIG_USB_STV06XX=m
+CONFIG_USB_GL860=m
+CONFIG_USB_GSPCA_BENQ=m
+CONFIG_USB_GSPCA_CONEX=m
+CONFIG_USB_GSPCA_CPIA1=m
+CONFIG_USB_GSPCA_DTCS033=m
+CONFIG_USB_GSPCA_ETOMS=m
+CONFIG_USB_GSPCA_FINEPIX=m
+CONFIG_USB_GSPCA_JEILINJ=m
+CONFIG_USB_GSPCA_IL2005BCD=m
+CONFIG_USB_GSPCA_KINECT=m
+CONFIG_USB_GSPCA_KONICA=m
+CONFIG_USB_GSPCA_MARS=m
+CONFIG_USB_GSPCA_MR97310A=m
+CONFIG_USB_GSPCA_NW80X=m
+CONFIG_USB_GSPCA_OV519=m
+CONFIG_USB_GSPCA_OV534=m
+CONFIG_USB_GSPCA_OV534_9=m
+CONFIG_USB_GSPCA_PAC207=m
+CONFIG_USB_GSPCA_PAC7302=m
+CONFIG_USB_GSPCA_PAC7311=m
+CONFIG_USB_GSPCA_SE401=m
+CONFIG_USB_GSPCA_SN9C2028=m
+CONFIG_USB_GSPCA_SN9C20X=m
+CONFIG_USB_GSPCA_SONIXB=m
+CONFIG_USB_GSPCA_SONIXJ=m
+CONFIG_USB_GSPCA_SPCA500=m
+CONFIG_USB_GSPCA_SPCA501=m
+CONFIG_USB_GSPCA_SPCA505=m
+CONFIG_USB_GSPCA_SPCA506=m
+CONFIG_USB_GSPCA_SPCA508=m
+CONFIG_USB_GSPCA_SPCA561=m
+CONFIG_USB_GSPCA_SPCA1528=m
+CONFIG_USB_GSPCA_SQ905=m
+CONFIG_USB_GSPCA_SQ905C=m
+CONFIG_USB_GSPCA_SQ930X=m
+CONFIG_USB_GSPCA_STK014=m
+CONFIG_USB_GSPCA_STK1135=m
+CONFIG_USB_GSPCA_STV0680=m
+CONFIG_USB_GSPCA_SUNPLUS=m
+CONFIG_USB_GSPCA_T613=m
+CONFIG_USB_GSPCA_TOPRO=m
+CONFIG_USB_GSPCA_TOUPTEK=m
+CONFIG_USB_GSPCA_TV8532=m
+CONFIG_USB_GSPCA_VC032X=m
+CONFIG_USB_GSPCA_VICAM=m
+CONFIG_USB_GSPCA_XIRLINK_CIT=m
+CONFIG_USB_GSPCA_ZC3XX=m
+CONFIG_USB_LAN78XX=m
+CONFIG_USB_PWC=m
+CONFIG_USB_ZR364XX=m
+CONFIG_USB_STKWEBCAM=m
+CONFIG_USB_S2255=m
+
+## USB serial
+CONFIG_USB_SERIAL=y
+CONFIG_USB_SERIAL_CONSOLE=y
+CONFIG_USB_SERIAL_GENERIC=y
+CONFIG_USB_SERIAL_SIMPLE=m
+CONFIG_USB_SERIAL_AIRCABLE=m
+CONFIG_USB_SERIAL_ARK3116=m
+CONFIG_USB_SERIAL_BELKIN=m
+CONFIG_USB_SERIAL_CH341=m
+CONFIG_USB_SERIAL_WHITEHEAT=m
+CONFIG_USB_SERIAL_DIGI_ACCELEPORT=m
+CONFIG_USB_SERIAL_CP210X=m
+CONFIG_USB_SERIAL_CYPRESS_M8=m
+CONFIG_USB_SERIAL_EMPEG=m
+CONFIG_USB_SERIAL_FTDI_SIO=m
+CONFIG_USB_SERIAL_VISOR=m
+CONFIG_USB_SERIAL_IPAQ=m
+CONFIG_USB_SERIAL_IR=m
+CONFIG_USB_SERIAL_EDGEPORT=m
+CONFIG_USB_SERIAL_EDGEPORT_TI=m
+CONFIG_USB_SERIAL_F81232=m
+CONFIG_USB_SERIAL_GARMIN=m
+CONFIG_USB_SERIAL_IPW=m
+CONFIG_USB_SERIAL_IUU=m
+CONFIG_USB_SERIAL_KEYSPAN_PDA=m
+CONFIG_USB_SERIAL_KLSI=m
+CONFIG_USB_SERIAL_KOBIL_SCT=m
+CONFIG_USB_SERIAL_MCT_U232=m
+CONFIG_USB_SERIAL_MOS7720=m
+CONFIG_USB_SERIAL_MOS7840=m
+CONFIG_USB_SERIAL_MXUPORT=m
+CONFIG_USB_SERIAL_NAVMAN=m
+CONFIG_USB_SERIAL_PL2303=m
+CONFIG_USB_SERIAL_OTI16858=m
+CONFIG_USB_SERIAL_QCAUX=m
+CONFIG_USB_SERIAL_QUALCOMM=m
+CONFIG_USB_SERIAL_SPCP8X5=m
+CONFIG_USB_SERIAL_SAFE=m
+CONFIG_USB_SERIAL_SIERRA_WIRELESS=m
+CONFIG_USB_SERIAL_SYMBOL=m
+CONFIG_USB_SERIAL_TI=m
+CONFIG_USB_SERIAL_CYBERJACK=m
+CONFIG_USB_SERIAL_XIRCOM=m
+CONFIG_USB_SERIAL_OPTION=m
+CONFIG_USB_SERIAL_OMNINET=m
+CONFIG_USB_SERIAL_OPTICON=m
+CONFIG_USB_SERIAL_XSENS_MT=m
+CONFIG_USB_SERIAL_WISHBONE=m
+CONFIG_USB_SERIAL_SSU100=m
+CONFIG_USB_SERIAL_QT2=m
+
+%# USB gadget
+CONFIG_USB_GADGET=y
+CONFIG_USB_GADGET_VBUS_DRAW=500
+CONFIG_USB_CONFIGFS=m
+CONFIG_USB_CONFIGFS_F_FS=y
+CONFIG_USB_ZERO=m
+CONFIG_USB_ETH=m
+CONFIG_USB_MASS_STORAGE=m
+CONFIG_USB_G_SERIAL=m
+CONFIG_NEW_LEDS=y
+
+%# USB Eth
+CONFIG_USB_USBNET=y
+CONFIG_USB_NET_AX88179_178A=y
+CONFIG_USB_NET_AX8817X=y
+CONFIG_USB_CATC=m
+CONFIG_USB_KAWETH=m
+CONFIG_USB_PEGASUS=m
+CONFIG_USB_RTL8150=y
+CONFIG_USB_RTL8152=y
+CONFIG_USB_NET_SR9700=m
+CONFIG_USB_NET_SR9800=m
+CONFIG_USB_NET_SMSC75XX=m
+CONFIG_USB_NET_SMSC95XX=m
+CONFIG_USB_NET_MCS7830=m
+
+## USB device class
+CONFIG_USB_ACM=m
+CONFIG_USB_PRINTER=m
+CONFIG_USB_WDM=m
+
+## LEDs
+CONFIG_LEDS_CLASS=y
+CONFIG_LEDS_GPIO=y
+CONFIG_LEDS_TRIGGERS=y
+CONFIG_LEDS_TRIGGER_HEARTBEAT=y
+CONFIG_LEDS_TRIGGER_CPU=y
+CONFIG_LEDS_TRIGGER_TIMER=y
+CONFIG_LEDS_TRIGGER_ONESHOT=y
+CONFIG_LEDS_TRIGGER_GPIO=y
+CONFIG_LEDS_TRIGGER_DEFAULT_ON=y
+CONFIG_LEDS_TRIGGER_BACKLIGHT=y
+CONFIG_LEDS_TRIGGER_DISK=y
+CONFIG_LEDS_TRIGGER_MTD=y
+CONFIG_LEDS_TRIGGER_TRANSIENT=y
+CONFIG_LEDS_TRIGGER_PANIC=y
+CONFIG_MAC80211_LEDS=y
+
+## systemd
+CONFIG_IPV6=y
+CONFIG_NAMESPACES=y
+CONFIG_NET_NS=y
+CONFIG_DEVPTS_MULTIPLE_INSTANCES=y
+CONFIG_DEVTMPS=y
+CONFIG_CGROUPS=y
+CONFIG_INOTIFY_USER=y
+CONFIG_SIGNALFD=y
+CONFIG_TIMERFD=y
+CONFIG_EPOLL=y
+CONFIG_NET=y
+CONFIG_SYSFS=y
+CONFIG_PROC_FS=y
+CONFIG_FHANDLE=y
+CONFIG_CGROUP_DEVICE=y
+CONFIG_CGROUP_CPUACCT=y
+CONFIG_CGROUP_SCHED=y
+CONFIG_FAIR_GROUP_SCHED=y
+CONFIG_BLK_CGROUP=y
+CONFIG_DNS_RESOLVER=y
+CONFIG_EXT2_FS=y
+CONFIG_EXT2_FS_XATTR=y
+CONFIG_EXT2_FS_POSIX_ACL=y
+CONFIG_EXT2_FS_SECURITY=y
+CONFIG_EXT3_FS=y
+CONFIG_EXT3_FS_XATTR=y
+CONFIG_EXT3_FS_POSIX_ACL=y
+CONFIG_EXT3_FS_SECURITY=y
+CONFIG_EXT4_FS=y
+CONFIG_EXT4_FS_POSIX_ACL=y
+CONFIG_EXT4_FS_SECURITY=y
+CONFIG_TMPFS_POSIX_ACL=y
+CONFIG_AUTOFS4_FS=y
+CONFIG_TMPFS_XATTR=y
+CONFIG_SCHEDSTATS=y
+CONFIG_SCHED_DEBUG=y
+
+# NFS server
+CONFIG_ROOT_NFS=y
+CONFIG_NFSD=m
+CONFIG_NFSD_V3=y
+CONFIG_NFSD_V3_ACL=y
+
+# HID
+CONFIG_HID_APPLE=y
+CONFIG_HID_LOGITECH=m
+CONFIG_HID_MAGICMOUSE=m
+CONFIG_HID_MICROSOFT=m
+CONFIG_HID_PLANTRONICS=m
+CONFIG_INPUT_TOUCHSCREEN=y
+CONFIG_TOUCHSCREEN_USB_COMPOSITE=m
+CONFIG_HID_MULTITOUCH=m
+
+#misc
+CONFIG_CPU_FREQ=y
+CONFIG_CPU_FREQ_DEFAULT_GOV_ONDEMAND=y
+CONFIG_CPU_FREQ_GOV_USERSPACE=y
+CONFIG_CPU_FREQ_GOV_PERFORMANCE=y
+CONFIG_CPU_FREQ_GOV POWERSAVE=y
+CONFIG_CPU_FREQ_GOV_ONDEMAND=y
+CONFIG_CPU_FREQ_GOV_CONSERVATIVE=y
+CONFIG_CPU_FREQ_GOV_SCHEDUTIL=y
+CONFIG_CPU_FREQ_STAT=y
+CONFIG_PRINTK_TIME=y
+CONFIG_STACKTRACE=y
+CONFIG_MMC_BLOCK_MINORS=32
+CONFIG_GPIO_SYSFS=y
+CONFIG_SND_USB=m
+CONFIG_SND_USB_AUDIO=y
+CONFIG_RFKILL=y
+CONFIG_BINFMT_MISC=m
+CONFIG_IP_NF_FILTER=m
+CONFIG_IP_NF_NAT=m
+CONFIG_IP_NF_TARGET_MASQUERADE=m
+CONFIG_IP_NF_IPTABLES=m
+CONFIG_IP_NF_MANGLE=m
+CONFIG_IP_NF_RAW=m
+CONFIG_IP_NF_SECURITY=m
+CONFIG_NETFILTER_XT_MATCH_ADDRTYPE=m
+CONFIG_NETFILTER_XT_MATCH_CONNTRACK=m
+CONFIG_NETFILTER_XT_MATCH_HASHLIMIT=m
+CONFIG_NETFILTER_XT_TARGET_HL=m
+CONFIG_NETFILTER_XT_MATCH_HL=m
+CONFIG_NF_TABLES=m
+CONFIG_NF_TABLES_INET=m
+CONFIG_NF_TABLES_NETDEV=m
+CONFIG_NF_TABLES_IPV4=m
+CONFIG_NF_TABLES_ARP=m
+CONFIG_NF_TABLES_IPV6=m
+CONFIG_NF_TABLES_BRIDGE=m
+CONFIG_NF_NAT=y
+CONFIG_NF_NAT_IPV4=y
+CONFIG_NF_NAT_NEEDED=y
+CONFIG_NF_CONNTRACK=m
+CONFIG_NF_CONNTRACK_MARK=y
+CONFIG_NF_CONNTRACK_SECMARK=y
+CONFIG_NF_CONNTRACK_ZONES=y
+CONFIG_NF_CONNTRACK_EVENTS=y
+CONFIG_NF_CONNTRACK_TIMEOUT=y
+CONFIG_NF_CONNTRACK_TIMESTAMP=y
+CONFIG_NF_CONNTRACK_LABELS=y
+CONFIG_NF_CONNTRACK_AMANDA=m
+CONFIG_NF_CONNTRACK_FTP=m
+CONFIG_NF_CONNTRACK_H323=m
+CONFIG_NF_CONNTRACK_IRC=m
+CONFIG_NF_CONNTRACK_BROADCAST=m
+CONFIG_NF_CONNTRACK_NETBIOS_NS=m
+CONFIG_NF_CONNTRACK_SNMP=m
+CONFIG_NF_CONNTRACK_PPTP=m
+CONFIG_NF_CONNTRACK_SANE=m
+CONFIG_NF_CONNTRACK_SIP=m
+CONFIG_NF_CONNTRACK_TFTP=m
+CONFIG_NF_CONNTRACK_IPV4=m
+CONFIG_NF_CONNTRACK_IPV6=m
+CONFIG_USER_NS=y
+CONFIG_SECCOMP=y
+CONFIG_CGROUP_PIDS=y
+CONFIG_CGROUP_NET_PRIO=y
+CONFIG_CGROUP_PERF=y
+CONFIG_BLK_CGROUP=y
+CONFIG_BLK_DEV_THROTTLING=y
+CONFIG_CFQ_GROUP_IOSCHED=y
+CONFIG_NET_SCHED=y
+CONFIG_NET_CLS_CGROUP=m
+CONFIG_NET_SCH_FQ_Codel=m
+CONFIG_NET_SCH_FQ=m
+CONFIG_CFS_BANDWIDTH=y
+CONFIG_IP_VS=m
+CONFIG_VXLAN=m
+CONFIG_XFRM_ALGO=m
+CONFIG_XFRM_USER=m
+CONFIG_IPVLAN=m
+CONFIG_MACVLAN=m
+CONFIG_DUMMY=m
+CONFIG_BTRFS_FS=m
+CONFIG_OVERLAY_FS=m
+CONFIG_MEMCG=y
+CONFIG_MEMCG_SWAP=y
+CONFIG_POSIX_MQUEUE=y
+
+## Extended IPV6 support
+CONFIG_IPV6_ROUTER_PREF=y
+CONFIG_IPV6_ROUTE_INFO=y
+CONFIG_IPV6_MIP6=m
+CONFIG_IPV6_ILA=m
+CONFIG_INET6_TUNNEL=m
+CONFIG_IPV6_VTl=m
+CONFIG_IPV6_SIT_6RD=y
+CONFIG_IPV6_TUNNEL=m
+CONFIG_IPV6_GRE=m
+CONFIG_IPV6_MULTIPLE_TABLES=y
+CONFIG_IPV6_SUBTREES=y
+CONFIG_IPV6_MROUTE=y
+CONFIG_IPV6_MROUTE_MULTIPLE_TABLES=y
+CONFIG_IPV6_PIMSM_V2=y
+CONFIG_NF_NAT_MASQUERADE_IPV6=m
+CONFIG_NF_DUP_IPV6=m
+CONFIG_NF_REJECT_IPV6=m
+CONFIG_NF_LOG_IPV6=m
+CONFIG_NF_NAT_IPV6=m
+CONFIG_NFT_CHAIN_NAT_IPV6=m
+CONFIG_NFT_CHAIN_ROUTE_IPV4=m
+CONFIG_NFT_CHAIN_ROUTE_IPV6=m
+CONFIG_NFT_DUP_IPV6=m
+CONFIG_IP6_NF_IPTABLES=m
+CONFIG_IP6_NF_MATCH_AH=m
+CONFIG_IP6_NF_MATCH_EUI64=m
+CONFIG_IP6_NF_MATCH_FRAG=m
+CONFIG_IP6_NF_MATCH_OPTS=m
+CONFIG_IP6_NF.Match_HL=m
+CONFIG_IP6_NF_MATCH_IPV6HEADER=m
+CONFIG_IP6_NF_MATCH_MH=m
+CONFIG_IP6_NF_MATCH_RPFILTER=m
+CONFIG_IP6_NF_TARGET_RT=m
+CONFIG_IP6_NF_FILTER=m
+CONFIG_IP6_NF_TARGET_REJECT=m
+CONFIG_IP6_NF_TARGET_SYNPROXY=m
+CONFIG_IP6_NF_MANGLE=m
+CONFIG_IP6_NF_RAW=m
+CONFIG_IP6_NF_SECURITY=m
+CONFIG_IP6_NF_NAT=m
+CONFIG_IP6_NF_TARGET_MASQUERADE=m
+CONFIG_IP6_NF_TARGET_NPT=m

+  +# 6LOWPAN
+CONFIG_6LOWPAN=m
+CONFIG_6LOWPAN_NHC=m
+CONFIG_6LOWPAN_NHC_DEST=m
+CONFIG_6LOWPAN_NHC_FRAGMENT=m
+CONFIG_6LOWPAN_NHC_HOP=m
+CONFIG_6LOWPAN_NHC_IPV6=m
+CONFIG_6LOWPAN_NHC_MOBILITY=m
+CONFIG_6LOWPAN_NHC_ROUTING=m
+CONFIG_6LOWPAN_NHC_UDP=m
+CONFIG_IEEE802154=m
+CONFIG_IEEE802154_NL802154_EXPERIMENTAL=y
+CONFIG_IEEE802154_SOCKET=m
+CONFIG_IEEE802154_6LOWPAN=m
+CONFIG_IEEE802154_DRIVERS=m
+CONFIG_IEEE802154_FAKELB=m
+CONFIG_IEEE802154_AT86RF230=m
+CONFIG_IEEE802154_AT86RF230_DEBUGFS=y
+CONFIG_IEEE802154_MRF24J40=m
+CONFIG_IEEE802154_CC2520=m
+CONFIG_IEEE802154_ATUSB=m
+CONFIG_MAC802154=m

+  +# Extended BT support
+CONFIG_BT=m
+CONFIG_BT_BREDR=y
+CONFIG_BT_RFCOMM=m
+CONFIG_BT_RFCOMM_TTY=y
+CONFIG_BT_BNEP=m
+CONFIG_BT_BNEP_MC_FILTER=y
+CONFIG_BT_BNEP_PROTO_FILTER=y
+CONFIG_BT_CMTP=m
+CONFIG_BT_HIDP=m
+CONFIG_BT_HS=y
+CONFIG_BT_LE=y
+CONFIG_BT_LEDS=y
+CONFIG_BT_DEBUGFS=y
+CONFIG_BT_HCIBTUSB=m
+CONFIG_BT_HCIBTSDIO=m
+CONFIG_BT_HCIUART=m
+CONFIG_BT_HCIUART_H4=y
+CONFIG_BT_HCIUART_BCSP=y
+CONFIG_BT_HCIUART_3WIRE=y
+CONFIG_BT_6LOWPAN=m
+
+# Extended WLAN support
+CONFIG_CFG80211_WEXT=y
+
+# Legacy instruction support for arm64
+CONFIG_ARMV8_DEPRECATED=y
+CONFIG_SWP_EMULATION=y
+CONFIG_CP15_BARRIER_EMULATION=y
+CONFIG_SETEND_EMULATION=y
+
+# Enable DM_CRYPT
+CONFIG_MD=y
+CONFIG_BLK_DEV_DM=m
+CONFIG_DM_CRYPT=m
--- linux-4.15.0.orig/kernel/cpu.c
+++ linux-4.15.0/kernel/cpu.c
@@ -3,6 +3,7 @@
*/
+ inclusion <linux/sched/mmm.h>
#include <linux/proc_fs.h>
#include <linux/smp.h>
#include <linux/init.h>
@@ -3,7 +3,6 @@
#include <linux/sched/signal.h>
#include <linux/sched/hotplug.h>
#include <linux/sched/task.h>
+#include <linux/sched/smt.h>
#include <linux/unistd.h>
#include <linux/cpu.h>
#include <linux/oom.h>
@@ -4,6 +4,7 @@
#include <linux/relay.h>
#include <linux/slab.h>
#include <linux/percpu-rwsem.h>
+#include <linux/cpuset.h>

#include <trace/events/power.h>
#define CREATE_TRACE_POINTS
@@ -60,6 +63,7 @@
    bool rollback;
    bool single;
    bool bringup;
+    bool booted_once;
    struct hlist_node* node;
    struct hlist_node* last;
    enum cpuhp_state cb_state;
@@ -312,6 +316,15 @@
 void lockdep_assert_cpus_held(void)
 {
  /*
+   * We can't have hotplug operations before userspace starts running,
+   * and some init codepaths will knowingly not take the hotplug lock.
+   * This is all valid, so mute lockdep until it makes sense to report
+   * unheld locks.
+   */
+   if (system_state < SYSTEM_RUNNING)
+      return;
+   percpu_rwlock_assert_held(&cpu_hotplug_lock);
  }

@@ -346,6 +359,67 @@
 EXPORT_SYMBOL_GPL(cpu_hotplug_enable);
#endif /* CONFIG_HOTPLUG_CPU */

+/*
+ * Architectures that need SMT-specific errata handling during SMT hotplug
+ * should override this.
+ */
+void __weak arch_smt_update(void) { }
+
+ifdef CONFIG_HOTPLUG_SMT
+enum cpuhp_smt_control cpu_smt_control __read_mostly = CPU_SMT_ENABLED;
+
+void __init cpu_smt_disable(bool force)
+{
+    if (cpu_smt_control == CPU_SMT_FORCE_DISABLED ||
+        cpu_smt_control == CPU_SMT_NOT_SUPPORTED)
+        return;
+endif /* CONFIG_HOTPLUG_SMT */
+ if (force) {
+ pr_info("SMT: Force disabled\n");
+ cpu_smt_control = CPU_SMT_FORCE_DISABLED;
+ } else {
+ pr_info("SMT: disabled\n");
+ cpu_smt_control = CPU_SMT_DISABLED;
+ }
+ }
+
+ /*
+ * The decision whether SMT is supported can only be done after the full
+ * CPU identification. Called from architecture code.
+ */
+ 
+ void __init cpu_smt_check_topology(void)
+ {
+ if (!topology_smt_supported())
+ cpu_smt_control = CPU_SMT_NOT_SUPPORTED;
+ }
+
+ static int __init smt_cmdline_disable(char *str)
+ {
+ cpu_smt_disable(str && !strcmp(str, "force");
+ return 0;
+ }
+
+ early_param("nosmt", smt_cmdline_disable);
+
+ static inline bool cpu_smt_allowed(unsigned int cpu)
+ {
+ if (cpu_smt_control == CPU_SMT_ENABLED)
+ return true;
+ 
+ if (topology_is_primary_thread(cpu))
+ return true;
+ 
+ /*
+ * On x86 it's required to boot all logical CPUs at least once so
+ * that the init code can get a chance to set CR4.MCE on each
+ * CPU. Otherwise, a broadcasted MCE observing CR4.MCE=0b on any
+ * core will shutdown the machine.
+ */
+ return !per_cpu(cpuhp_state, cpu).booted_once;
+ }
+
+ static inline bool cpu_smt_allowed(unsigned int cpu) { return true; }
+ 
+ static inline enum cpuhp_state
cpuhp_set_state(struct cpuhp_cpu_state *st, enum cpuhp_state target)
{
    if (WARN_ON_ONCE(!cpu_online(cpu)))
        return -ECANCELED;

    /* Unpark the stopper thread and the hotplug thread of the target cpu */
    stop_machine_unpark(cpu);
    /* Unpark the hotplug thread of the target cpu */
    kthread_unpark(st->thread);

    /* SMT soft disabling on X86 requires to bring the CPU out of the
    BIOS 'wait for SIPI' state in order to set the CR4.MCE bit. The
    CPU marked itself as booted_once in cpu_notify_starting() so the
    cpu_smt_allowed() check will now return false if this is not the
    primary sibling.
    */
    if (!cpu_smt_allowed(cpu))
        return -ECANCELED;

    if (st->target <= CPUHP_AP_ONLINE_IDLE)
        return 0;

    return bringup_wait_for_ap(cpu);
}

static int finish_cpu(unsigned int cpu)
{
    struct task_struct *idle = idle_thread_get(cpu);
    struct mm_struct *mm = idle->active_mm;

    /* idle_task_exit() will have switched to &init_mm, now
    clean up any remaining active_mm state.
    */
    if (mm != &init_mm)
        idle->active_mm = &init_mm;
    mmdrop(mm);
    return 0;
}

/* Hotplug state machine related functions */

---
+static inline bool can_rollback_cpu(struct cpuhp_cpu_state *st) {
+  if (IS_ENABLED(CONFIG_HOTPLUG_CPU))
+    return true;
+  /*
+   * When CPU hotplug is disabled, then taking the CPU down is not
+   * possible because takedown_cpu() and the architecture and
+   * subsystem specific mechanisms are not available. So the CPU
+   * which would be completely unplugged again needs to stay around
+   * in the current state.
+   */
+  return st->state <= CPUHP_BRINGUP_CPU;
+
+static int cpuhp_up_callbacks(unsigned int cpu, struct cpuhp_cpu_state *st,
+enum cpuhp_state target)
{ @@ -476,8 +588,10 @@
  st->state++;
  ret = cpuhp_invoke_callback(cpu, st->state, true, NULL, NULL);
  if (ret) {
-    st->target = prev_state;
-    undo_cpu_up(cpu, st);
+    if (can_rollback_cpu(st)) {
+      st->target = prev_state;
+      undo_cpu_up(cpu, st);
+    }
  }
  break;
  }
@@ -522,15 +636,15 @@
  bool bringup = st->bringup;
  enum cpuhp_state state;

+if (WARN_ON_ONCE(!st->should_run))
+  return;
+
+/*
+ * ACQUIRE for the cpuhp_should_run() load of ->should_run. Ensures
+ * that if we see ->should_run we also see the rest of the state.
+ */
+ smp_mb();

-if (WARN_ON_ONCE(!st->should_run))
-  return;
-
cpuhp_lock_acquire(bringup);

if (st->single) {
    kthread_unpark(this_cpu_read(cpuhp_state.thread));
}

/*
 * Serialize hotplug trainwrecks outside of the cpu_hotplug_lock
 * protected region.
 * The operation is still serialized against concurrent CPU hotplug via
 * cpu_add_remove_lock, i.e. CPU map protection. But it is _not_
 * serialized against other hotplug related activity like adding or
 * removing of state callbacks and state instances, which invoke either the
 * startup or the teardown callback of the affected state.
 * This is required for subsystems which are unfixable vs. CPU hotplug and
 * evade lock inversion problems by scheduling work which has to be
 * completed _before_ cpu_up()/cpu_down() returns.
 * Don't even think about adding anything to this for any new code or even
 * drivers. It's only purpose is to keep existing lock order trainwrecks
 * working.
 * For cpu_down() there might be valid reasons to finish cleanups which are
 * not required to be done under cpu_hotplug_lock, but that's a different
 * story and would be not invoked via this.
 */
static void cpu_up_down_serialize_trainwrecks(bool tasks_frozen)
{
    /*
    * cpusets delegate hotplug operations to a worker to "solve" the
    * lock order problems. Wait for the worker, but only if tasks are
    * _not_ frozen (suspend, hibernate) as that would wait forever.
    * The wait is required because otherwise the hotplug operation
    * returns with inconsistent state, which could even be observed in
    * user space when a new CPU is brought up. The CPU plug uevent
    * would be delivered and user space reacting on it would fail to
    * move tasks to the newly plugged CPU up to the point where the
    * work has finished because up to that point the newly plugged CPU
    * is not assignable in cpusets/cgroups. On unplug that's not
    * necessarily a visible issue, but it is still inconsistent state,
    * which is the real problem which needs to be "fixed". This can't
    * prevent the transient state between scheduling the work and
    * returning from waiting for it.
    */
}
+ */
+if (!tasks_frozen)
cpuset_wait_for_hotplug();
+} 
+
#ifdef CONFIG_HOTPLUG_CPU
+ifndef arch_clear_mm_cpumask_cpu
+#define arch_clear_mm_cpumask_cpu(cpu, mm) cpumask_clear_cpu(cpu, mm_cpumask(mm))
+#endif
+
/**
* clear_tasks_mm_cpumask - Safely clear tasks' mm_cpumask for a CPU
* @cpu: a CPU id
* @t: find_lock_task_mm(p);
if (!t)
continue;
-cpumask_clear_cpu(cpu, mm_cpumask(t->mm));
+arch_clear_mm_cpumask_cpu(cpu, t->mm);
task_unlock(t);
}
rcu_read_unlock();
@ -758,7 +922,6 @@

/* Park the smpboot threads */
kthread_park(per_cpu_ptr(&cpuhp_state, cpu)->thread);
-smpboot_park_threads(cpu);

/*
* Prevent irq alloc/free while the dying cpu reorganizes the
* @ -843,7 +1006,8 @@
ret = cpuhp_invoke_callback(cpu, st->state, false, NULL, NULL);
if (ret) {
st->target = prev_state;
-undo_cpu_down(cpu, st);
+if (st->state < prev_state)
+undo_cpu_down(cpu, st);
break;
}
}

@ -896,7 +1060,7 @@
* to do the further cleanups.
*/
ret = cpuhp_down_callbacks(cpu, st, target);
-if (ret && st->state > CPUHP_TEARDOWN_CPU && st->state < prev_state) {
+if (ret && st->state >= CPUHP_TEARDOWN_CPU && st->state < prev_state) {
cpuhp_reset_state(st, prev_state);
__cpuhp_kick_up(st);
lockup_detector_cleanup();
+arch_smt_update();
+cpu_up_down_serialize_trainwrecks(tasks_frozen);
return ret;
}

+static int cpu_down_maps_locked(unsigned int cpu, enum cpuhp_state target)
+
+if (cpu_hotplug_disabled)
+return -EBUSY;
+return _cpu_down(cpu, 0, target);
+
static int do_cpu_down(unsigned int cpu, enum cpuhp_state target)
{
int err;

cpu_maps_update_begin();
-
-if (cpu_hotplug_disabled) {
-err = -EBUSY;
-goto out;
-}
-
-out:
+err = cpu_down_maps_locked(cpu, target);
cpu_maps_update_done();
return err;
}

rcu_cpu_starting(cpu); /* Enables RCU usage on this CPU. */
+st->booted_once = true;
while (st->state < target) {
st->state++;
ret = cpuhp_invoke_callback(cpu, st->state, true, NULL, NULL);
}

*/
* Called from the idle task. Wake up the controlling task which brings the
- * stopper and the hotplug thread of the upcoming CPU up and then delegates
- * the rest of the online bringup to the hotplug thread.
+ * hotplug thread of the upcoming CPU up and then delegates the rest of the
+ * online bringup to the hotplug thread.
*/

```c
void cpuhp_online_idle(enum cpuhp_state state)
{
@@ -976,6 +1142,12 @@
    if (state != CPUHP_AP_ONLINE_IDLE)
        return;

+/*
+ * Unpart the stopper thread before we start the idle loop (and start
+ * scheduling); this ensures the stopper task is always available.
+ */
+stop_machine_unpark(smp_processor_id());
+
    st->state = CPUHP_AP_ONLINE_IDLE;
    complete_ap_thread(st, true);
}
```

```c
@@ -1036,6 +1208,8 @@
    ret = cpuhp_up_callbacks(cpu, st, target);
    out:
    cpus_write_unlock();
+    arch_smt_update();
+    cpu_up_down_serialize_trainwrecks(tasks_frozen);
    return ret;
}
```

```c
@@ -1062,6 +1236,10 @@
    err = -EBUSY;
    goto out;
}
+    if (!cpu_smt_allowed(cpu)) {
+        err = -EPERM;
+        goto out;
+    }

er = _cpu_up(cpu, 0, target);
out:
@@ -1286,7 +1464,7 @@
    [CPUHP_BRINGUP_CPU] = {
        .name = "cpu:bringup",
        .startup.single = bringup_cpu,
-        .teardown.single = NULL,
+        .teardown.single = finish_cpu,
        .cant_stop = true,
    },
/*
@@ -1344,7 +1522,7 @@
[CPUHP_AP_SMPBOOT_THREADS] = {
    .name = "smpboot/threads:online",
    .startup.single = smpboot_unpark_threads,
-   .teardown.single = NULL,
+   .teardown.single = smpboot_park_threads,
},
[CPUHP_AP_IRQ_AFFINITY_ONLINE] = {
    .name = "irq/affinity:online",
@@ -1841,6 +2019,9 @@
if (ret)
    return ret;

+if (fail < CPUHP_OFFLINE || fail > CPUHP_ONLINE)
+return -EINVAL;
+
/*
 * Cannot fail STARTING/DYING callbacks.
 */
@@ -1918,10 +2099,172 @@
 NULL
;
#endif CONFIG_HOTPLUG_SMT
+
+static const char *smt_states[] = {
+[CPU_SMT_ENABLED] = "on",
+[CPU_SMT_DISABLED] = "off",
+[CPU_SMT_FORCE_DISABLED] = "forceoff",
+[CPU_SMT_NOT_SUPPORTED] = "notsupported",
+};
+
+static ssize_t
+show_smt_control(struct device *dev, struct device_attribute *attr, char *buf)
+{
+    return snprintf(buf, PAGE_SIZE - 2, "%s\n", smt_states[cpu_smt_control]);
+}
+
+static void cpuhp_offline_cpu_device(unsigned int cpu)
+
+struct device *dev = get_cpu_device(cpu);
+
+dev->offline = true;
+/
+* Tell user space about the state change */
+kobject_uevent(&dev->kobj, KOBJ_OFFLINE);
+}
+
+static void cpuhp_online_cpu_device(unsigned int cpu)
+{  
+struct device *dev = get_cpu_device(cpu);
+
+dev->offline = false;
+/* Tell user space about the state change */
+kobject_uevent(&dev->kobj, KOBJ_ONLINE);
+}
+
+int cpuhp_smt_disable(enum cpuhp_smt_control ctrlval)
+{
+int cpu, ret = 0;
+
+cpu_maps_update_begin();
+for_each_online_cpu(cpu) {
+if (topology_is_primary_thread(cpu))
+continue;
+ret = cpu_down_maps_locked(cpu, CPUHP_OFFLINE);
+if (ret)
+break;
+/*
+ * As this needs to hold the cpu maps lock it's impossible
+ * to call device_offline() because that ends up calling
+ * cpu_down() which takes cpu maps lock. cpu maps lock
+ * needs to be held as this might race against in kernel
+ * abusers of the hotplug machinery (thermal management).
+ *
+ * So nothing would update device:offline state. That would
+ * leave the sysfs entry stale and prevent onlining after
+ * smt control has been changed to 'off' again. This is
+ * called under the sysfs hotplug lock, so it is properly
+ * serialized against the regular offline usage.
+ */
+cpuhp_offline_cpu_device(cpu);
+}
+if (!ret)
+cpu_smt_control = ctrlval;
+cpu_maps_update_done();
+return ret;
+}
+
+int cpuhp_smt_enable(void)
+{
+int cpu, ret = 0;
+
+cpu_maps_update_begin();
+cpu_smt_control = CPU_SMT_ENABLED;
+for_each_present_cpu(cpu) {
+/* Skip online CPUs and CPUs on offline nodes */
+}
+if (cpu_online(cpu) || !node_online(cpu_to_node(cpu)))
+continue;
+ret = _cpu_up(cpu, 0, CPUHP_ONLINE);
+if (ret)
+break;
+/* See comment in cpuhp_smt_disable() */
+cpuhp_online_cpu_device(cpu);
+
+cpu_maps_update_done();
+return ret;
+
+static ssize_t
+store_smt_control(struct device *dev, struct device_attribute *attr,
+  const char *buf, size_t count)
+{
+  int ctrlval, ret;
+
+  if (sysfs_streq(buf, "on"))
+    ctrlval = CPU_SMT_ENABLED;
+  else if (sysfs_streq(buf, "off"))
+    ctrlval = CPU_SMT_DISABLED;
+  else if (sysfs_streq(buf, "forceoff"))
+    ctrlval = CPU_SMT_FORCE_DISABLED;
+  else
+    return -EINVAL;
+
+  if (cpu_smt_control == CPU_SMT_FORCE_DISABLED)
+    return -EPERM;
+
+  if (cpu_smt_control == CPU_SMT_NOT_SUPPORTED)
+    return -ENODEV;
+
+  ret = lock_device_hotplug_sysfs();
+  if (ret)
+    return ret;
+
+  if (ctrlval != cpu_smt_control) {
+    switch (ctrlval) {
+      case CPU_SMT_ENABLED:
+        ret = cpuhp_smt_enable();
+        break;
+      case CPU_SMT_DISABLED:
+        ret = cpuhp_smt_disable(ctrlval);
+        break;
+      +}
+    +}

unlock_device_hotplug();
return ret ? ret : count;
+
static DEVICE_ATTR(control, 0644, show_smt_control, store_smt_control);
+
static ssize_t
show_smt_active(struct device *dev, struct device_attribute *attr, char *buf)
+
bool active = topology_max_smt_threads() > 1;
+
return snprintf(buf, PAGE_SIZE - 2, "%d\n", active);
+
static DEVICE_ATTR(active, 0444, show_smt_active, NULL);
+
static struct attribute *cpuhp_smt_attrs[] = {
+&dev_attr_control.attr,
+&dev_attr_active.attr,
+NULL
+};
+
static const struct attribute_group cpuhp_smt_attr_group = {
+.attrs = cpuhp_smt_attrs,
+.name = "smt",
+NULL
+};
+
static int __init cpu_smt_state_init(void)
+
return sysfs_create_group(&cpu_subsys.dev_root->kobj,
+&cpuhp_smt_attr_group);
+
+
static int __init cpuhp_sysfs_init(void)
{
int cpu, ret;
+
ret = cpu_smt_state_init();
+if (ret)
+return ret;
+
ret = sysfs_create_group(&cpu_subsys.dev_root->kobj,
+&cpuhp_cpu_root_attr_group);
if (ret)
/*
 * Must be called _AFTER_ setting up the per_cpu areas
 */
void __init boot_cpu_state_init(void)
{
#ifdef CONFIG_SMP
	per_cpu_ptr(&cpuhp_state, smp_processor_id())->booted_once = true;
#endif
per_cpu_ptr(&cpuhp_state, smp_processor_id())->state = CPUHP_ONLINE;
}

/*
 * These are used for a global "mitigations=" cmdline option for toggling
 * optional CPU mitigations.
 */
enum cpu_mitigations {
	CPU_MITIGATIONS_OFF,
	CPU_MITIGATIONS_AUTO,
	CPU_MITIGATIONS_AUTO_NOSMT,
};

static enum cpu_mitigations cpu_mitigations __ro_after_init =
	CPU_MITIGATIONS_AUTO;

static int __init mitigations_parse_cmdline(char *arg)
{
#if (!strcmp(arg, "off"))
	cpu_mitigations = CPU_MITIGATIONS_OFF;
#else if (!strcmp(arg, "auto"))
	cpu_mitigations = CPU_MITIGATIONS_AUTO;
#else if (!strcmp(arg, "auto,nosmt"))
	cpu_mitigations = CPU_MITIGATIONS_AUTO_NOSMT;
#else
	pr_crit("Unsupported mitigations=%s, system may still be vulnerable\n", arg);
#endif
+return 0;
}
early_param("mitigations", mitigations_parse_cmdline);

+/* mitigations=off */
+bool cpu_mitigations_off(void)
+{
+return cpu_mitigations == CPU_MITIGATIONS_OFF;
+}
+EXPORT_SYMBOL_GPL(cpu_mitigations_off);
+ /* mitigations=auto,nosmt */
+ bool cpu_mitigations_auto_nosmt(void)
+ {
+ return cpu_mitigations == CPU_MITIGATIONS_AUTO_NOSMT;
+ }
+ EXPORT_SYMBOL_GPL(cpu_mitigations_auto_nosmt);

--- linux-4.15.0.orig/kernel/cpu_pm.c
+++ linux-4.15.0/kernel/cpu_pm.c
@@ -89,7 +89,7 @@
*/
int cpu_pm_enter(void)
{
.-int nr_calls;
+int nr_calls = 0;
int ret = 0;

ret = cpu_pm_notify(CPU_PM_ENTER, -1, &nr_calls);
@@ -140,7 +140,7 @@
*/
int cpu_cluster_pm_enter(void)
{
.-int nr_calls;
+int nr_calls = 0;
int ret = 0;

ret = cpu_pm_notify(CPU_CLUSTER_PM_ENTER, -1, &nr_calls);
--- linux-4.15.0.orig/kernel/cred.c
+++ linux-4.15.0/kernel/cred.c
@@ -147,7 +147,10 @@
BUG_ON(cred == current->cred);
BUG_ON(cred == current->real_cred);

- if (security_cred_alloc_blank(new, GFP_KERNEL) < 0)
+ if (security_cred_alloc_blank(new, GFP_KERNEL_ACCOUNT) < 0)
    goto error;

@@ -217,7 +220,7 @@
new->magic = CRED_MAGIC;
@endif

- if (security_cred_alloc_blank(new, GFP_KERNEL) < 0)
+ if (security_cred_alloc_blank(new, GFP_KERNEL_ACCOUNT) < 0)
goto error;
return new;
@@ -258,6 +261,7 @@
old = task->cred;
memcpy(new, old, sizeof(struct cred));

+new->non_rcu = 0;
atomic_set(&new->usage, 1);
set_cred_subscribers(new, 0);
get_group_info(new->group_info);
@@ -275,7 +279,7 @@
new->security = NULL;
#endif

-if (security_prepare_creds(new, old, GFP_KERNEL) < 0)
+if (security_prepare_creds(new, old, GFP_KERNEL_ACCOUNT) < 0)
goto error;
validate_creds(new);
return new;
@@ -448,6 +452,15 @@
if (task->mm)
set_dumpable(task->mm, suid_dumpable);
task->pdeath_signal = 0;
+/*
+ * If a task drops privileges and becomes nondumpable,
+ * the dumpability change must become visible before
+ * the credential change; otherwise, a __ptrace_may_access()
+ * racing with this change may be able to attach to a task it
+ * shouldn't be able to attach to (as if the task had dropped
+ * privileges without becoming nondumpable).
+ * Pairs with a read barrier in __ptrace_may_access().
+ */
smp_wmb();
}

@@ -528,7 +541,19 @@
validate_creds(old);
validate_creds(new);
-get_cred(new);
+ /*
+ * NOTE! This uses 'get_new_cred()' rather than 'get_cred()'.
+ *
+ * That means that we do not clear the 'non_rcu' flag, since
+ * we are only installing the cred into the thread-synchronous
+ * '-cred' pointer, not the '-real_cred' pointer that is
+ * visible to other threads under RCU.
Also note that we did validate_creds() manually, not depending on the validation in 'get_cred().

get_new_cred((struct cred *)new);
alter_cred_subscribers(new, 1);
cru_assign_pointer(current->cred, new);
alter_cred_subscribers(old, -1);
-kdebug("prepare_kernel_cred() alloc %p", new);
-
-if (daemon)
-old = get_task_credential(daemon);
-else
-old = get_credential(&init_cred);
+kdebug("clone_credential() alloc %p", new);

validate_creds(old);

*new = *old;
+new->non_rcu = 0;
atomic_set(&new->usage, 1);
set_credential_subscribers(new, 0);
get_uid(new->user);
@@ -628,18 +646,50 @@
#ifndef CONFIG_SECURITY
new->security = NULL;
#endif
-if (security_prepare_creds(new, old, GFP_KERNEL) < 0)
+if (security_prepare_creds(new, old, GFP_KERNEL_ACCOUNT) < 0)
goto error;

-put_credential(old);
-validate_creds(new);
-return new;

error:
-put_credential(new);
-put_credential(old);
-return NULL;
}
+EXPORT_SYMBOL(clone_credential);
+
/**
 + * prepare_kernel_credential - Prepare a set of credentials for a kernel service
 + * @daemon: A userspace daemon to be used as a reference
 + *
 + * Prepare a set of credentials for a kernel service. This can then be used to
 + * override a task's own credentials so that work can be done on behalf of that
 + * task that requires a different subjective context.
 + *
 + * @daemon is used to provide a base for the security record, but can be NULL.
 + * If @daemon is supplied, then the security data will be derived from that;
 + * otherwise they'll be set to 0 and no groups, full capabilities and no keys.
 + *
 + * The caller may change these controls afterwards if desired.
struct cred *prepare_kernel_cred(struct task_struct *daemon) {
    const struct cred *old;
    struct cred *new;

    if (daemon)
        old = get_task_cred(daemon);
    else
        old = get_cred(&init_cred);

    new = clone_cred(old);
    put_cred(old);
    return new;
}

EXPORT_SYMBOL(prepare_kernel_cred);
static int __init opt_kgdb_con(char *str)
-
-kdb_use_con = 1;
-return 0;
-}
-
-early_param("kgdbcon", opt_kgdb_con);
-
module_param(kgdb_use_con, int, 0644);
module_param(kgdbreboot, int, 0644);
@@ -444,6 +436,7 @@
if (exception_level > 1) {
  dump_stack();
  +kgdb_io_module_registered = false;
  panic("Recursive entry to debugger");
}
@@ -488,6 +481,7 @@
arch_kgdb_ops.disable_hw_break(regs);

acquirelock:
+rcu_read_lock();
/*
 * Interrupts will be restored by the 'trap return' code, except when
 * single stepping.
@@ -535,6 +529,8 @@
arch_kgdb_ops.correct_hw_break();
if (trace_on)
  tracing_on();
+kgdb_info[cpu].debuggerinfo = NULL;
+kgdb_info[cpu].task = NULL;
  kgdb_info[cpu].exception_state &=
  ~(DCPU_WANT_MASTER | DCPU_IS_SLAVE);
  kgdb_info[cpu].enter_kgdb--;
@@ -542,6 +538,7 @@
  atomic_dec(&slaves_in_kgdb);
  dbg_touch_watchdogs();
  local_irq_restore(flags);
+rcu_read_unlock();
  return 0;
}
cpu_relax();
@@ -560,6 +557,7 @@
  raw_spin_unlock(&dbg_master_lock);
  dbg_touch_watchdogs();
  local_irq_restore(flags);
rcu_read_unlock();

goto acquirelock;

if (trace_on) tracing_on();

+kgdb_info[cpu].debuggerinfo = NULL;
+kgdb_info[cpu].task = NULL;
kgdb_info[cpu].exception_state &= ~(DCPU_WANT_MASTER | DCPU_IS_SLAVE);
kgdb_info[cpu].enter_kgdb--;
raw_spin_unlock(&dbg_master_lock);
dbg_touch_watchdogs();
local_irq_restore(flags);
+rcu_read_unlock();

return kgdb_info[cpu].ret_state;
}

static int __init opt_kgdb_con(char *str)
+
+kgdb_use_con = 1;
+
+if (kgdb_io_module_registered && !kgdb_con_registered) {
+ register_console(&kgdbcons);
+ kgdb_con_registered = 1;
+}
+
+return 0;
+
+early_param("kgdbcon", opt_kgdb_con);
+
#ifdef CONFIG_MAGIC_SYSRQ
static void sysrq_handle_dbg(int key)
{
--- linux-4.15.0.orig/kernel/debug/kdb/kdb_bt.c
+++ linux-4.15.0/kernel/debug/kdb/kdb_bt.c
@@ -179,14 +179,23 @@
kdb_printf("no process for cpu %ld\n", cpu);
}
return 0;
}
```c
-kdb_printf("btc: cpu status: ");
kdb_parse("cpu\n");
for_each_online_cpu(cpu) {
    -sprintf(buf, "btt 0x%p\n", KDB_TSK(cpu));
+    void *kdb_tsk = KDB_TSK(cpu);
    +/* If a CPU failed to round up we could be here */
    +if (!kdb_tsk) {
    +    kdb_printf("WARNING: no task for cpu %ld\n", cpu);
    +    continue;
    +} 
    +
    +sprintf(buf, "btt 0x%px\n", kdb_tsk);
kdb_parse(buf);
touch_nmi_watchdog();
}
--- linux-4.15.0.orig/kernel/debug/kdb/kdb_debugger.c
+++ linux-4.15.0/kernel/debug/kdb/kdb_debugger.c
@@ -118,13 +118,6 @@
kdb_bp_remove();
KDB_STATE_CLEAR(DOING_SS);
KDB_STATE_SET(PAGER);
-/* zero out any offline cpu data */
-for_each_present_cpu(i) {
-    if (!cpu_online(i)) {
-        kgdb_info[i].debuggerinfo = NULL;
-        kgdb_info[i].task = NULL;
-    }
-}
-}
if (ks->err_code == DIE_OOPS || reason == KDB_REASON_OOPS) {
ks->pass_exception = 1;
KDB_FLAG_SET(CATASTROPHIC);
--- linux-4.15.0.orig/kernel/debug/kdb/kdb_io.c
+++ linux-4.15.0/kernel/debug/kdb/kdb_io.c
@@ -216,7 +216,7 @@
int count;
int i;
int diag, dtab_count;
-int key;
+int key, buf_size, ret;
```
diag = kdbgetintenv("DTABCOUNT", &dtab_count);
@@ -336,9 +336,8 @@
else
    p_tmp = tmpbuffer;
    len = strlen(p_tmp);
-    count = kallsyms_symbol_complete(p_tmp, -
-      sizeof(tmpbuffer) -
-      (p_tmp - tmpbuffer));
+    buf_size = sizeof(tmpbuffer) - (p_tmp - tmpbuffer);
+    count = kallsyms_symbol_complete(p_tmp, buf_size);
    if (tab == 2 && count > 0) {
        kdb_printf("%d symbols are found.", count);
        if (count > dtab_count) {
            @@ -350,9 +349,13 @@
                kdb_printf("\n");
                for (i = 0; i < count; i++) {
                    -if (WARN_ON(!kallsyms_symbol_next(p_tmp, i)))
                    +ret = kallsyms_symbol_next(p_tmp, i, buf_size);
                    +if (WARN_ON(!ret))
                        break;
                    -kdb_printf("%s ", p_tmp);
                    +if (ret != -E2BIG)
                        kdb_printf("%s ", p_tmp);
                    +else
                        kdb_printf("%s... ", p_tmp);
                    *(p_tmp + len) = '\0';
                }
    if (i >= dtab_count)
@@ -676,12 +679,16 @@
        size_avail = sizeof(kdb_buffer) - len;
goto kdb_print_out;
    }
-    if (kdb_grepping_flag >= KDB_GREPPING_FLAG_SEARCH)
+    if (kdb_grepping_flag >= KDB_GREPPING_FLAG_SEARCH) {
      /*
        * This was a interactive search (using '/' at more
-       * prompt) and it has completed. Clear the flag.
+       * prompt) and it has completed. Replace the \0 with
+       * its original value to ensure multi-line strings
+       * are handled properly, and return to normal mode.
+       */
+      *cphold = replaced_byte;
+      kdb_grepping_flag = 0;
+    }
+  */
/*
  * at this point the string is a full line and
  * should be printed, up to the null.
*/
if (reason == KDB_REASON_DEBUG) {
/* special case below */
} else {
- kdb_printf("Entering kdb (current=0x%p, pid %d) ",
+ kdb_printf("Entering kdb (0x%px, pid %d) ",
    kdb_current, kdb_current ? kdb_current->pid : 0);
#if defined(CONFIG_SMP)
kdb_printf("on processor %d ", raw_smp_processor_id());
@ @ -1198,7 +1198,7 @@
*/
switch (db_result) {
    case KDB_DB_BPT:
- kdb_printf("Entering kdb (0x%p, pid %d) ",
+ kdb_printf("Entering kdb (0x%px, pid %d) ",
    kdb_current, kdb_current->pid);
#if defined(CONFIG_SMP)
kdb_printf("on processor %d ", raw_smp_processor_id());
@ @ -1566,6 +1566,7 @@

int symbolic = 0;
int valid = 0;
int phys = 0;
+int raw = 0;

kdbgetintenv("MDCOUNT", &mdcount);
kdbgetintenv("RADIX", &radix);
@ @ -1575,9 +1576,10 @@
repeat = mdcount * 16 / bytesperword;

if (strcmp(argv[0], "mdr") == 0) {
- if (argc != 2)
+ if (argc == 2 || (argc == 0 && last_addr != 0))
+ valid = raw = 1;
+ else
    return KDB_ARGCOUNT;
- valid = 1;
} else if (isdigit(argv[0][2])) {
    bytesperword = (int)(argv[0][2] - '0');
    if (bytesperword == 0) {
        @ @ -1613,7 +1615,10 @@
        radix = last_radix;
        bytesperword = last_bytesperword;
        repeat = last_repeat;
- mdcount = ((repeat * bytesperword) + 15) / 16;
+ if (raw)
+ mdcount = repeat;
else
+mdcount = ((repeat * bytesperword) + 15) / 16;
}

if (argc) {
@@ -1630,7 +1635,10 @@
diag = kdbgetularg(argv[nextarg], &val);
if (!diag) {
    mdcount = (int) val;
    -repeat = mdcount * 16 / bytesperword;
    +if (raw)
    +repeat = mdcount;
    +else
    +repeat = mdcount * 16 / bytesperword;
}
}
if (argc >= nextarg+1) {
@@ -1640,8 +1648,15 @@
}
}

-if (strcmp(argv[0], "mdr") == 0)
-return kdb_mdr(addr, mdcount);
+if (strcmp(argv[0], "mdr") == 0) {
+    int ret;
+    +last_addr = addr;
+    +ret = kdb_mdr(addr, mdcount);
+    +last_addr += mdcount;
+    +last_repeat = mdcount;
+    +last_bytesperword = bytesperword; // to make REPEAT happy
+    +return ret;
+}

switch (radix) {
    case 10:
@@ -2022,7 +2037,7 @@
if (mod->state == MODULE_STATE_UNFORMED)
    continue;

-    kdb_printf("%-20s%8u 0x%p ", mod->name,
-    +kdb_printf("%-20s%8u 0x%p ", mod->name,
-                   mod->core_layout.size, (void *)mod);

#ifdef CONFIG_MODULE_UNLOAD
    kdb_printf("%-4d ", module_refcount(mod));
    @@ -2033,7 +2048,7 @@
    kdb_printf(" (Loading)\n);
- kdb_printf(" 0x%p", mod->core_layout.base);
+ kdb_printf(" 0x%px", mod->core_layout.base);

#ifdef CONFIG_MODULE_UNLOAD
{
  @@ -2315,7 +2330,7 @@
    return;
    cpu = kdb_process_cpu(p);
- kdb_printf("0x%p %8d %8d  %d %4d   %c  0x%p %c%s\n",
+ kdb_printf("0x%px %8d %8d  %d %4d   %c  0x%px %c%s\n",
       (void *)p, p->pid, p->parent->pid,
       kdb_task_has_cpu(p), kdb_process_cpu(p),
       kdb_task_state_char(p),
  @ @ -2328,7 +2343,7 @@
} else {
  if (KDB_TSK(cpu) != p)
    kdb_printf(" Error: does not match running ")
- "process table (0x%p)\n", KDB_TSK(cpu));
+ "process table (0x%px)\n", KDB_TSK(cpu));
  }
}
@@ -2619,7 +2634,7 @@
  diag = kdbgetularg(argv[3], &whichcpu);
  if (diag)
    return diag;
- if (!cpu_online(whichcpu)) {
+ if (whichcpu >= nr_cpu_ids || !cpu_online(whichcpu)) {
    kdb_printf("cpu %ld is not online\n", whichcpu);
    return KDB_BADCPUNUM;
  }
  @ @ -2707,7 +2722,7 @@
 for each_kdbcmd(kp, i) {
   if (kp->cmd_name && (strcmp(kp->cmd_name, cmd) == 0)) {
     kdb_printf("Duplicate kdb command registered: ")
     +"%s, func %p help %s\n", cmd, func, help);
     return 1;
   }
 }
--- linux-4.15.0.orig/kernel/debug/kdb/kdb_private.h
+++ linux-4.15.0/kernel/debug/kdb/kdb_private.h
@@ -83,7 +83,7 @@
    unsigned long sym_start;
    unsigned long sym_end;
  } kdb_symtab_t;
-extern int kallsyms_symbol_next(char *prefix_name, int flag);
extern int kallsyms_symbol_next(char *prefix_name, int flag, int buf_size);
extern int kallsyms_symbol_complete(char *prefix_name, int max_len);

/* Exported Symbols for kernel loadable modules to use. */
#define kdb_do_each_thread(g, p) do_each_thread(g, p)
#define kdb_while_each_thread(g, p) while_each_thread(g, p)

+-#define GFP_KDB (in_interrupt() ? GFP_ATOMIC : GFP_KERNEL)
+-#define GFP_KDB (in_dbg_master() ? GFP_ATOMIC : GFP_KERNEL)

extern void *debug_kmalloc(size_t size, gfp_t flags);
extern void debug_kfree(void *);
--- linux-4.15.0.orig/kernel/debug/kdb/kdb_support.c
+++ linux-4.15.0/kernel/debug/kdb/kdb_support.c
@@ -40,7 +40,7 @@
int kdbgetsymval(const char *symname, kdb_symtab_t *symtab)
 {
  if (KDB_DEBUG(AR))
  -kdb_printf("kdbgetsymval: symname=%s, symtab=%p\n", symname, symtab);
  +kdb_printf("kdbgetsymval: symname=%s, symtab=%px\n", symname, symtab);
  memset(symtab, 0, sizeof(*symtab));
  symtab->sym_start = kallsyms_lookup_name(symname);
@@ -88,7 +88,7 @@
      char *knt1 = NULL;
      if (addr < 4096)
      @ @ -129,13 +129,13 @@
@@ -129,13 +129,13 @@
  if (i >= ARRAY_SIZE(kdb_name_table)) {
    debug_kfree(kdb_name_table[0]);
    -memcpy(kdb_name_table, kdb_name_table+1,
    +memmove(kdb_name_table, kdb_name_table+1,
    sizeof(kdb_name_table[0]) *
    (ARRAY_SIZE(kdb_name_table)-1));
  } else {
    debug_kfree(knt1);
    knt1 = kdb_name_table[i];
    -memcpy(kdb_name_table+i, kdb_name_table+i+1,
    +memmove(kdb_name_table+i, kdb_name_table+i+1,
    sizeof(kdb_name_table[0]) *
    (ARRAY_SIZE(kdb_name_table)-i-1));
symtab->mod_name = "kernel";
if (KDB_DEBUG(AR))
    kdb_printf("kdbnearsym: returns %d symtab->sym_start=0x%lx, ",
            symtab->mod_name="%p (%s)/u", ret,
            symtab->sym_start, symtab->mod_name, symtab->sym_name,
            symtab->sym_name);

/* Parameters: *
   * prefix_name  prefix of a symbol name to lookup
   * flag  0 means search from the head, 1 means continue search.
   * buf_size maximum length that can be written to prefix_name
   * buffer

   * Returns: *
   * 1 if a symbol matches the given prefix.
   * 0 if no string found

int kallsyms_symbol_next(char *prefix_name, int flag)
{
    int prefix_len = strlen(prefix_name);
    static loff_t pos;
    while ((name = kdb_walk_kallsyms(&pos))) {
        if (strncmp(name, prefix_name, prefix_len) == 0) {
            strncpy(prefix_name, name, strlen(name)+1);
            return 1;
        }
    }
    return 0;
}

if (dah_first) {
    h_used = (struct debug_alloc_header *)debug_alloc_pool;
    h_used->size;
    kdb_printf("%s: h_used %p size %d\n", __func__, h_used,
        h_used->size);
} else {
    do {
        h_used = (struct debug_alloc_header *)

((char *)h_free + dah_overhead + h_free->size);
-kdb_printf("%s: h_used %p size %d caller %p\n",
  +kdb_printf("%s: h_used %px size %d caller %px\n",
    __func__, h_used, h_used->size, h_used->caller);
  h_free = (struct debug_alloc_header *)
    (debug_alloc_pool + h_free->next);
@@ -902,7 +902,7 @@
((char *)h_free + dah_overhead + h_free->size);
if ((char *)h_used - debug_alloc_pool !=
  sizeof(debug_alloc_pool_aligned))
-kdb_printf("%s: h_used %p size %d caller %p\n",
  +kdb_printf("%s: h_used %px size %d caller %px\n",
    __func__, h_used, h_used->size, h_used->caller);
out:
spin_unlock(&dap_lock);
--- linux-4.15.0.orig/kernel/delayacct.c
+++ linux-4.15.0/kernel/delayacct.c
@@ -44,23 +44,24 @@
{
  tsk->delays = kmem_cache_zalloc(delayacct_cache, GFP_KERNEL);
  if (tsk->delays)
    +raw_spin_lock_init(&tsk->delays->lock);
    -spin_lock_init(&tsk->delays->lock);
  ++raw_spin_lock_init(&tsk->delays->lock);
}
/*
 * Finish delay accounting for a statistic using its timestamps (@start),
 * accumalator (@total) and @count
 */
-static void delayacct_end(spinlock_t *lock, u64 *start, u64 *total, u32 *count)
+static void delayacct_end(raw_spinlock_t *lock, u64 *start, u64 *total,
  +			  u32 *count)
{
  s64 ns = ktime_get_ns() - *start;
  unsigned long flags;

  if (ns > 0) {
    -spin_lock_irqsave(lock, flags);
    +raw_spin_lock_irqsave(lock, flags);
    *total += ns;
    (*count)++;
    -spin_unlock_irqrestore(lock, flags);
    +raw_spin_unlock_irqrestore(lock, flags);
  }
}
@@ -127,7 +128,7 @@
/* zero XXX_total, non-zero XXX_count implies XXX stat overflowed */

- spin_lock_irqsave(&tsk->delays->lock, flags);
+ raw_spin_lock_irqsave(&tsk->delays->lock, flags);

  tmp = d->blkio_delay_total + tsk->delays->blkio_delay;
  d->blkio_delay_total = (tmp < d->blkio_delay_total) ? 0 : tmp;
  tmp = d->swapin_delay_total + tsk->delays->swapin_delay;
  @ @ -137,7 +138,7 @@
  d->blkio_count += tsk->delays->blkio_count;
  d->swapin_count += tsk->delays->swapin_count;
  d->freepages_count += tsk->delays->freepages_count;
- spin_unlock_irqrestore(&tsk->delays->lock, flags);
+ raw_spin_unlock_irqrestore(&tsk->delays->lock, flags);

  return 0;
}

unsigned long flags;

- spin_lock_irqsave(&tsk->delays->lock, flags);
+ raw_spin_lock_irqsave(&tsk->delays->lock, flags);

  ret = nsec_to_clock_t(tsk->delays->blkio_delay +
                        tsk->delays->swapin_delay);
- spin_unlock_irqrestore(&tsk->delays->lock, flags);
+ raw_spin_unlock_irqrestore(&tsk->delays->lock, flags);

  return ret;
}

--- linux-4.15.0.orig/kernel/events/callchain.c
+++ linux-4.15.0/kernel/events/callchain.c
@@ -119,23 +119,20 @@
  goto exit;
}

- if (count > 1) {
- /* If the allocation failed, give up */
- if (!callchain_cpus_entries)
- err = -ENOMEM;
- /*
- * If requesting per event more than the global cap,
- * return a different error to help userspace figure
- * this out.
- *
- * And also do it here so that we have &callchain_mutex held.
- */
- if (event_max_stack > sysctl_perf_event_max_stack)
- err = -EOVERFLOW;


/*
 * If requesting per event more than the global cap,
 * return a different error to help userspace figure
 * this out.
 * + * And also do it here so that we have &callchain_mutex held.
 */
+if (event_max_stack > sysctl_perf_event_max_stack) {
  +err = -EOVERFLOW;
  goto exit;
}
-err = alloc_callchain_buffers();
+if (count == 1)
  +err = alloc_callchain_buffers();
exit:
if (err)
  atomic_dec(&nr_callchain_events);
--- linux-4.15.0.orig/kernel/events/core.c
+++ linux-4.15.0/kernel/events/core.c
@@ -94,11 +94,11 @@
 * @info:	the function call argument
 *
 * Calls the function @func when the task is currently running. This might
- * be on the current CPU, which just calls the function directly
+ * be on the current CPU, which just calls the function directly. This will
+ * retry due to any failures in smp_call_function_single(), such as if the
+ * task_cpu() goes offline concurrently.
 *
- * returns: @func return value, or
- * -ESRCH - when the process isn't running
- * -EAGAIN - when the process moved away
+ * returns @func return value or -ESRCH or -ENXIO when the process isn't running
 */
static int
task_function_call(struct task_struct *p, remote_function_f func, void *info)
@@ -111,11 +111,17 @@
};
int ret;

-do {
 -ret = smp_call_function_single(task_cpu(p), remote_function, &data, 1);
 +for (;;) {
 +ret = smp_call_function_single(task_cpu(p), remote_function,
 + &data, 1);
 if (!ret)
 ret = data.ret;
 -} while (ret == -EAGAIN);
+if (ret != -EAGAIN)
+break;
+
+cond_resched();
+
return ret;
}

@@ -397,8 +403,13 @@
*   0 - disallow raw tracepoint access for unpriv
*   1 - disallow cpu events for unpriv
*   2 - disallow kernel profiling for unpriv
+ *   3 - disallow all unpriv perf event use
*/
-int sysctl_perf_event_paranoid__read_mostly = 2;
+#ifdef CONFIG_SECURITY_PERF_EVENTS_RESTRICT
+int sysctl_perf_event_paranoid__read_mostly = 3;
+#else
+int sysctl_perf_event_paranoid__read_mostly = 1;
+#endif

/* Minimum for 512 kiB + 1 user control page */
int sysctl_perf_event_mlock__read_mostly = 512 + (PAGE_SIZE / 1024); /* 'free' kiB per user */
@@ -436,18 +447,18 @@

void __user *buffer, size_t *lenp,
loff_t *ppos)
{
-\tint ret = proc_dointvec_minmax(table, write, buffer, lenp, ppos);
-
-\tif (ret || !write)
-\t\treturn ret;
-
+int ret;
+int perf_cpu = sysctl_perf_cpu_time_max_percent;
+/*
+ * If throttling is disabled don't allow the write:
+ */
-\tif (sysctl_perf_cpu_time_max_percent == 100 ||
-\tsysctl_perf_cpu_time_max_percent == 0)
-\tif (write && (perf_cpu == 100 || perf_cpu == 0))
-\t\treturn -EINVAL;
+
+ret = proc_dointvec_minmax(table, write, buffer, lenp, ppos);
+\tif (ret || !write)
+\t\treturn ret;
+
max_samples_per_tick = DIV_ROUND_UP(sysctl_perf_event_sample_rate, HZ);
perf_sample_period_ns = NSEC_PER_SEC / sysctl_perf_event_sample_rate;
update_perf_cpu_limits();
@@ -724,9 +735,15 @@

static inline void update_cgrp_time_from_cpuctx(struct perf_cpu_context *cpuctx)
{
-    struct perf_cgroup *cgrp_out = cpuctx->cgrp;
-    if (cgrp_out)
-        __update_cgrp_time(cgrp_out);
+    struct perf_cgroup *cgrp = cpuctx->cgrp;
+    struct cgroup_subsys_state *css;
+    if (cgrp) {
+        for (css = &cgrp->css; css; css = css->parent) {
+            cgrp = container_of(css, struct perf_cgroup, css);
+            __update_cgrp_time(cgrp);
+        }
+    }
}

static inline void update_cgrp_time_from_event(struct perf_event *event)
@@ -754,6 +771,7 @@
{
    struct perf_cgroup *cgrp;
    struct perf_cgroup_info *info;
+    struct cgroup_subsys_state *css;
    /*
     * ctx->lock held by caller
    @@ -764,8 +782,12 @@
     return;
    cgrp = perf_cgroup_from_task(task, ctx);
    -info = this_cpu_ptr(cgrp->info);
    -info->timestamp = ctx->timestamp;
+    for (css = &cgrp->css; css; css = css->parent) {
+        cgrp = container_of(css, struct perf_cgroup, css);
+        info = this_cpu_ptr(cgrp->info);
+        info->timestamp = ctx->timestamp;
+    }
    }
}

static DEFINE_PER_CPU(struct list_head, cgrp_cpuctx_list);
@@ -937,27 +959,39 @@
if (!is_cgroup_event(event))
    return;

static
if (add && ctx->nr_cgroups++)
return;
else if (!add && --ctx->nr_cgroups)
return;
/*
 * Because cgroup events are always per-cpu events,
 * this will always be called from the right CPU.
 */
cpuctx = __get_cpu_context(ctx);
-cpuctx_entry = &cpuctx->cgrp_cpuctx_entry;
/* cpuctx->cgrp is NULL unless a cgroup event is active in this CPU. */
-if (add) {
+ if (add && !cpuctx->cgrp) {
+ struct perf_cgroup *cgrp = perf_cgroup_from_task(current, ctx);
+
- list_add(cpuctx_entry, this_cpu_ptr(&cgrp_cpuctx_list));
+ list_add(cpuctx_entry, this_cpu_ptr(&cgrp_cpuctx_list));
if (cgroup_is_descendant(cgrp->css.cgroup, event->cgrp->css.cgroup))
cpuctx->cgrp = cgrp;
- } else {
- list_del(cpuctx_entry);
+ list_del(cpuctx_entry);
- cpuctx->cgrp = NULL;
 } +
+ if (add && ctx->nr_cgroups++)
+ return;
+ else if (!add && --ctx->nr_cgroups)
+ return;
+ /* no cgroup running */
+ if (!add)
+ cpuctx->cgrp = NULL;
+ +cpuctx_entry = &cpuctx->cgrp_cpuctx_entry;
+ if (add)
+ list_add(cpuctx_entry, this_cpu_ptr(&cgrp_cpuctx_list));
+ else
+ list_del(cpuctx_entry);
}

#else /* !CONFIG_CGROUP_PERF */

#pragma -1231,6 +1265,7 @@
* perf_event_context::lock
* perf_event::mmap_mutex
* mmap_sems
* perf_addr_filters_head::lock
* cpu_hotplug_lock
* pmus_lock
@@ -1810,8 +1845,8 @@
event->pmu->del(event, 0);
event->oncpu = -1;

- if (event->pending_disable) {
- event->pending_disable = 0;
+ if (READ_ONCE(event->pending_disable) >= 0) {
+ WRITE_ONCE(event->pending_disable, -1);
state = PERF_EVENT_STATE_OFF;
}
perf_event_set_state(event, state);
@@ -1999,7 +2034,8 @@

void perf_event_disable_inatomic(struct perf_event *event)
{
- event->pending_disable = 1;
+ WRITE_ONCE(event->pending_disable, smp_processor_id());
 /* can fail, see perf_pending_event_disable() */
 irq_work_queue(&event->pending);
}

@@ -2246,7 +2282,7 @@
 struct perf_event_context *task_ctx, enum event_type_t event_type)
 {
- enum event_type_t ctx_event_type = event_type & EVENT_ALL;
+ enum event_type_t ctx_event_type;
 bool cpu_event = !!(event_type & EVENT_CPU);

 /*
@@ -2256,6 +2292,8 @@
 if (event_type & EVENT_PINNED)
 event_type |= EVENT_FLEXIBLE;

+ctx_event_type = event_type & EVENT_ALL;
 +
 perf_pmu_disable(cpuctx->ctx.pmu); 
 if (task_ctx)
 task_ctx_sched_out(cpuctx, task_ctx, event_type);
@@ -2315,6 +2353,18 @@
 raw_spin_lock(&task_ctx->lock);


ifdef CONFIG_CGROUP_PERF
+if (is_cgroup_event(event)) {  
+  /* If the current cgroup doesn't match the event's  
+   * cgroup, we should not try to schedule it.  
+   */  
+  struct perf_cgroup *cgrp = perf_cgroup_from_task(current, ctx);  
+  reprogram = cgroup_is_descendant(cgrp->css.cgroup,  
+                                  event->cgrp->css.cgroup);  
+}  
+endif
+
if (reprogram) {  
  ctx_sched_out(ctx, cpuctx, EVENT_TIME);  
  add_event_to_ctx(event, ctx);  
  goto out;  
}
+
/* If this is a pinned event it must be running on this CPU */
+if (event->attr.pinned && event->oncpu != smp_processor_id()) {  
+  ret = -EBUSY;  
+  goto out;  
+}
+
/*
 * If the event is currently on this CPU, its either a per-task event,  
 * or local to this CPU. Furthermore it means its ACTIVE (otherwise  
 @ @ -3782,7 +3838,9 @@
 cpuctx = per_cpu_ptr(pmu->pmu_cpu_context, cpu);
 ctx = &cpuctx->ctx;
 get_ctx(ctx);
 +raw_spin_lock_irqsave(&ctx->lock, flags);
 +ctx->pin_count;
 +raw_spin_unlock_irqrestore(&ctx->lock, flags);

 return ctx;
 }
 @ @ -4110,6 +4168,9 @@
 if (event->ctx)  
 put_ctx(event->ctx);

 +if (event->hw.target)  
 +put_task_struct(event->hw.target);
 +
 exclusive_event_destroy(event);
module_put(event->pmu->module);

@@ -4622,6 +4683,11 @@
}
}

+static int perf_event_check_period(struct perf_event *event, u64 value)
+{
+    return event->pmu->check_period(event, value);
+}
+
+static int perf_event_period(struct perf_event *event, u64 __user *arg)
+
{  
    u64 value;
    @@ -4638,6 +4704,12 @@
    if (event->attr.freq && value > sysctl_perf_event_sample_rate)
        return -EINVAL;

    +if (perf_event_check_period(event, value))
        return -EINVAL;
    +
    +if (!event->attr.freq && (value & (1ULL << 63)))
        return -EINVAL;
    +
    +event_function_call(event, __perf_event_period, &value);

    return 0;
    @@ -4913,6 +4985,7 @@
    unlock:
   rcu_read_unlock();
}
+EXPORT_SYMBOL_GPL(perf_event_update_userpage);

static int perf_mmap_fault(struct vm_fault *vmf)
{
    @@ -5073,11 +5146,11 @@
    static void perf_mmap_close(struct vm_area_struct *vma)
    {
        struct perf_event *event = vma->vm_file->private_data;
-        struct ring_buffer *rb = ring_buffer_get(event);
        struct user_struct *mmap_user = rb->mmap_user;
        int mmap_locked = rb->mmap_locked;
        unsigned long size = perf_data_size(rb);
        +bool detach_rest = false;

        if (event->pmu->event_unmapped)
            event->pmu->event_unmapped(event, vma->vm_mm);
mutex_unlock(&event->mmap_mutex);
}

-atomic_dec(&rb->mmap_count);
+if (atomic_dec_and_test(&rb->mmap_count))
+detach_rest = true;

if (!atomic_dec_and_mutex_lock(&event->mmap_count, &event->mmap_mutex))
goto out_put;
@@ -5117,7 +5191,7 @@
mutex_unlock(&event->mmap_mutex);

/* If there's still other mmap()s of this buffer, we're done. */
-if (atomic_read(&rb->mmap_count))
+if (!detach_rest)
  goto out_put;

/*
@@ -5313,7 +5387,15 @@
*/
user_lock_limit *= num_online_cpus();

-user_locked = atomic_long_read(&user->locked_vm) + user_extra;
+user_locked = atomic_long_read(&user->locked_vm);
+user_locked = atomic_long_read(&user->locked_vm);
+
+/*
+ * sysctl_perf_event_mlock may have changed, so that
+ * user->locked_vm > user_lock_limit
+ */
+if (user_locked > user_lock_limit)
+user_locked = user_lock_limit;
+user_locked += user_extra;

if (user_locked > user_lock_limit)
extra = user_locked - user_lock_limit;
@@ -5435,10 +5517,45 @@
} }
 }

case PERF_WATCHDOG:

+static void perf_pending_event_disable(struct perf_event *event)
+{
+int cpu = READ_ONCE(event->pending_disable);
+if (cpu < 0)
+return;
+if (cpu == smp_processor_id())
+{ }
WRITE_ONCE(event->pending_disable, -1);

perf_event_disable_local(event);
return;
+
+
*/
+ * CPU-ACPU-B
+ *
+ * perf_event_disable_inatomic()
+ * @pending_disable = CPU-A;
+ * irq_work_queue();
+ *
+ * sched-out
+ * @pending_disable = -1;
+ *
+ *sched-in
+ *perf_event_disable_inatomic()
+ * @pending_disable = CPU-B;
+ * irq_work_queue(); // FAILS
+ *
+ * irq_work_run()
+ * perf_pending_event()
+ *
+ * But the event runs on CPU-B and wants disabling there.
+ */
+irq_work_queue_on(&event->pending, cpu);
+
static void perf_pending_event(struct irq_work *entry)
{
-struct perf_event *event = container_of(entry,
-struct perf_event, pending);
+struct perf_event *event = container_of(entry, struct perf_event, pending);

int rctx;

rctx = perf_swevent_get_recursion_context();
@@ -5447,10 +5564,7 @@
* and we won't recurse 'further'.
*/

-if (event->pending_disable) {
-event->pending_disable = 0;
-perf_event_disable_local(event);
-}
+perf_pending_event_disable(event);

if (event->pending_wakeup) {
  event->pending_wakeup = 0;
if (user_mode(regs)) {
    regs_user->abi = perf_reg_abi(current);
    regs_user->regs = regs;
} else if (current->mm) {
    perf_get_regs_user(regs_user, regs, regs_user_copy);
} else {
    regs_user->abi = PERF_SAMPLE_REGS_ABI_NONE;
}
unsigned long sp;
unsigned int rem;
u64 dyn_size;
+mm_segment_t fs;

/*
 * We dump:
 @@ -5606,7 +5721,10 @@
 /* Data. */
     sp = perf_user_stack_pointer(regs);
     +fs = get_fs();
     +set_fs(USER_DS);
     rem = __output_copy_user(handle, (void *) sp, dump_size);
     +set_fs(fs);
     dyn_size = dump_size - rem;

     perf_output_skip(handle, rem);
 @@ -5726,7 +6097,8 @@
 if (read_format & PERF_FORMAT_TOTAL_TIME_RUNNING)
     values[n++] = running;

     if (leader != event)
         + (leader->state == PERF_EVENT_STATE_ACTIVE))
     leader->pmu->read(leader);

     values[n++] = perf_event_count(leader);
 @@ -5978,9 +6097,12 @@
     * Try IRQ-safe __get_user_pages_fast first.
     * If failed, leave phys_addr as 0.
     */
     -if ((current->mm != NULL) &&
       - (__get_user_pages_fast(virt, 1, 0, &p) == 1))
       -phys_addr = page_to_phys(p) + virt % PAGE_SIZE;
     +if (current->mm != NULL) {
       +pagefault_disable();
       +if (__get_user_pages_fast(virt, 1, 0, &p) == 1)
phys_addr = page_to_phys(p) + virt % PAGE_SIZE;
pagefault_enable();
+

if (p)
put_page(p);
@@ -6300,7 +6422,7 @@
raw_spin_lock_irqsave(&ifh->lock, flags);
list_for_each_entry(filter, &ifh->list, entry) {
- if (filter->inode) {
+ if (filter->path.dentry) {
 event->addr_filters_offs[count] = 0;
 restart++;
 } @@ -6372,7 +6494,7 @@
 static int __perf_pmu_output_stop(void *info)
 { struct perf_event *event = info;
- struct pmu *pmu = event->pmu;
+ struct pmu *pmu = event->ctx->pmu;
 struct perf_cpu_context *cpuctx = this_cpu_ptr(pmu->pmu_cpu_context);
 struct remote_output ro = {
 .rb = event->rb,
 @@ -6466,10 +6588,17 @@
goto out;
 task_event->event_id.pid = perf_event_pid(event, task);
 -task_event->event_id.ppid = perf_event_pid(event, current);
 -
- task_event->event_id.tid = perf_event_tid(event, task);
- -task_event->event_id.ptid = perf_event_tid(event, current);
+ +if (task_event->event_id.header.type == PERF_RECORD_EXIT) {
+ task_event->event_id.ppid = perf_event_pid(event,
+ task->real_parent);
+ task_event->event_id.ptid = perf_event_pid(event,
+ task->real_parent);
+ } else { /* PERF_RECORD_FORK */
+ task_event->event_id.ppid = perf_event_pid(event, current);
+ task_event->event_id.ptid = perf_event_tid(event, current);
+ }

 task_event->event_id.time = perf_event_clock(event);

 @@ -6793,6 +6922,7 @@
 struct perf_output_handle handle;
 struct perf_sample_data sample;
int size = mmap_event->event_id.header.size;
+u32 type = mmap_event->event_id.header.type;
int ret;

if (!perf_event_mmap_match(event, data))
@@ -6836,6 +6966,7 @@
perf_output_end(&handle);
out:
    mmap_event->event_id.header.size = size;
+    mmap_event->event_id.header.type = type;
}

static void perf_event_mmap_event(struct perf_mmap_event *mmap_event)
@@ -6965,7 +7096,11 @@
struct file *file, unsigned long offset,
       unsigned long size)
{
  -if (filter->inode != file_inode(file))
  +/* d_inode(NULL) won't be equal to any mapped user-space file */
  +if (!filter->path.dentry)
  +return false;
  +
  +if (d_inode(filter->path.dentry) != file_inode(file))
    return false;

  if (filter->offset > offset + size)
@@ -7929,6 +8064,8 @@
goto unlock;

list_for_each_entry_rcu(event, &ctx->event_list, event_entry) {
  +if (event->cpu != smp_processor_id())
  +continue;
  if (event->attr.type != PERF_TYPE_TRACEPOINT)
    continue;
@@ -8170,8 +8307,7 @@
struct perf_addr_filter *filter, *iter;

list_for_each_entry_safe(filter, iter, filters, entry) {
  -if (filter->inode)
  -iput(filter->inode);
  +path_put(&filter->path);
    list_del(&filter->entry);
    kfree(filter);
@@ -8254,7 +8390,7 @@
            return;

if (!ifh->nr_file_filters)
            return;

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- mm = get_task_mm(event->ctx->task);
+ mm = get_task_mm(task);
if (!mm)
goto restart;

@@ -8268,7 +8404,7 @@
 * Adjust base offset if the filter is associated to a binary
 * that needs to be mapped:
 */
@if (filter->inode)
+if (filter->path.dentry)
    event->addr_filters_offs[count] =
    perf_addr_filter_apply(filter, mm);

@@ -8341,7 +8477,6 @@
{
    struct perf_addr_filter *filter = NULL;
    char *start, *orig, *filename = NULL;
-    struct path path;
    substring_t args[MAX_OPT_ARGS];
    int state = IF_STATE_ACTION, token;
    unsigned int kernel = 0;
@@ -8404,6 +8539,7 @@
    if (token == IF_SRC_FILE || token == IF_SRC_FILEADDR) {
        int fpos = filter->range ? 2 : 1;
+
        kfree(filename);
        filename = match_strdup(&args[fpos]);
        if (!filename) {
            ret = -ENOMEM;
@@ -8442,22 +8578,18 @@
        */
    ret = -EOPNOTSUPP;
    if (!event->ctx->task)
-        goto fail_free_name;
+        goto fail;

    /* look up the path and grab its inode */
    -ret = kern_path(filename, LOOKUP_FOLLOW, &path);
+ret = kern_path(filename, LOOKUP_FOLLOW,
+                &filter->path);
    if (ret)
-        goto fail_free_name;
-        filter->inode = igrab(d_inode(path.dentry));
-    path_put(&path);
-    kfree(filename);
filename = NULL;
+goto fail;

ret = -EINVAL;
-if (!filter->inode ||
-   !S_ISREG(filter->inode->i_mode))
/* free_filters_list() will iput() */
+if (!filter->path.dentry ||
+   !S_ISREG(d_inode(filter->path.dentry)
+   ->i_mode))
goto fail;

event->addr_filters.nr_file_filters++;
@@ -8472,13 +8604,13 @@
if (state != IF_STATE_ACTION)
goto fail;

+kfree(filename);
kfree(orig);

return 0;

-fail_free_name:
-kfree(filename);
fail:
+kfree(filename);
free_filters_list(filters);
kfree(orig);

@@ -8835,6 +8967,11 @@
return 0;
}

+static int perf_event_nop_int(struct perf_event *event, u64 value)
+{
+return 0;
+}
+
static DEFINE_PER_CPU(unsigned int, nop_txn_flags);

static void perf_pmu_start_txn(struct pmu *pmu, unsigned int flags)
@@ -8906,9 +9043,7 @@
if (pmu->task_ctx_nr > perf_invalid_context)
return;

-mutex_lock(&pmus_lock);
free_percpu(pmu->pmu_cpu_context);
-mutex_unlock(&pmus_lock);


pmu->pmu_disable = perf_pmu_nop_void;

+if (!pmu->check_period)
+pmu->check_period = perf_event_nop_int;
+
+if (!pmu->event_idx)
+pmu->event_idx = perf_event_idx_default;

void perf_pmu_unregister(struct pmu *pmu) {
    -int remove_device;
    -
    mutex_lock(&pmus_lock);
    -remove_device = pmu_bus_running;
    list_del_rcu(&pmu->entry);
    -mutex_unlock(&pmus_lock);

    /*
    * We dereference the pmu list under both SRCU and regular RCU, so
    */
    @ @ -9181,13 +9315,14 @@
    free_percpu(pmu->pmu_disable_count);
    if (pmu->type >= PERF_TYPE_MAX)
    idr_remove(&pmu_idr, pmu->type);
    -if (remove_device) {
    +if (pmu_bus_running) {
    if (pmu->nr_addr_filters)
    device_remove_file(pmu->dev, &dev_attr_nr_addr_filters);
    device_del(pmu->dev);
    put_device(pmu->dev);
    }
    free_pmu_context(pmu);
    +mutex_unlock(&pmus_lock);
    }
    EXPORT_SYMBOL_GPL(perf_pmu_unregister);

    init_waitqueue_head(&event->waitq);
    +event->pending_disable = -1;
    init_irq_work(&event->pending, perf_pending_event);
mutex_init(&event->mmap_mutex);
@@ -9454,6 +9590,7 @@
            * and we cannot use the ctx information because we need the
            * pmu before we get a ctx.
            */
+get_task_struct(task);
event->hw.target = task;
}
@@ -9537,6 +9674,20 @@
goto err_per_task;
}

+/*
 + * Clone the parent's vma offsets: they are valid until exec()
 + * even if the mm is not shared with the parent.
 + */
+if (event->parent) {
+struct perf_addr_filters_head *ifh = perf_event_addr_filters(event);
+raw_spin_lock_irq(&ifh->lock);
+memcpy(event->addr_filters_offs,
+       event->parent->addr_filters_offs,
+       pmu->nr_addr_filters * sizeof(unsigned long));
+raw_spin_unlock_irq(&ifh->lock);
+}
+
/* force hw sync on the address filters */
event->addr_filters_gen = 1;
}
@@ -9569,6 +9720,8 @@
perf_detach_cgroup(event);
if (event->ns)
put_pid_ns(event->ns);
+if (event->hw.target)
+put_task_struct(event->hw.target);
kfree(event);

return ERR_PTR(err);
@@ -9690,9 +9843,9 @@
    */
if (attr->sample_stack_user >= USHRT_MAX)
  -ret = -EINVAL;
+return -EINVAL;
else if (!IS_ALIGNED(attr->sample_stack_user, sizeof(u64)))
  -ret = -EINVAL;

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```c
+return -EINVAL;
}

if (attr->sample_type & PERF_SAMPLE_REGS_INTR)
@@ -9881,6 +10034,9 @@
if (flags & ~PERF_FLAG_ALL)
return -EINVAL;

+if (perf_paranoid_any() &amp;&amp; !capable(CAP_SYS_ADMIN))
+return -EACCES;
+
err = perf_copy_attr(attr_uptr, &attr);
if (err)
return err;
@@ -10353,7 +10509,7 @@
goto err_unlock;
}

-perf_install_in_context(ctx, event, cpu);
+perf_install_in_context(ctx, event, event-&gt;cpu);
perf_unpin_context(ctx);
mutex_unlock(&ctx-&gt;mutex);

--- linux-4.15.0.orig/kernel/events/hw_breakpoint.c
+++ linux-4.15.0/kernel/events/hw_breakpoint.c
@@ -427,16 +427,9 @@
* modify_user_hw_breakpoint - modify a user-space hardware breakpoint
* @bp: the breakpoint structure to modify
* @attr: new breakpoint attributes
- * @triggered: callback to trigger when we hit the breakpoint
- * @tsk: pointer to 'task_struct' of the process to which the address belongs
 */
int modify_user_hw_breakpoint(struct perf_event *bp, struct perf_event_attr *attr)
{
-u64 old_addr = bp-&gt;attr.bp_addr;
-u64 old_len = bp-&gt;attr.bp_len;
-int old_type = bp-&gt;attr.bp_type;
-int err = 0;
-
/*
 * modify_user_hw_breakpoint can be invoked with IRQs disabled and hence it
 * will not be possible to raise IPIs that invoke __perf_event_disable.
 @@ -451,27 +444,18 @@
bp-&gt;attr.bp_addr = attr-&gt;bp_addr;
bp-&gt;attr.bp_type = attr-&gt;bp_type;
bp-&gt;attr.bp_len = attr-&gt;bp_len;
+bp-&gt;attr.disabled = 1;
```

if (attr->disabled)
    goto end;
-
    -err = validate_hw_breakpoint(bp);
    -if (!err)
        perf_event_enable(bp);
    +if (!attr->disabled) {
    +int err = validate_hw_breakpoint(bp);

    -if (err) {
        -bp->attr.bp_addr = old_addr;
        -bp->attr.bp_type = old_type;
        -bp->attr.bp_len = old_len;
        -if (!bp->attr.disabled)
            perf_event_enable(bp);
        +if (err)
        +return err;
    }
    +return err;

    -return err;
    +perf_event_enable(bp);
    +bp->attr.disabled = 0;

} end:
    bp->attr.disabled = attr->disabled;
-
    return 0;
}

EXPORT_SYMBOL_GPL(modify_user_hw_breakpoint);
--- linux-4.15.0.orig/kernel/events/internal.h
+++ linux-4.15.0/kernel/events/internal.h
@@ -213,7 +213,7 @@
    rctx = 3;
    else if (in_irq())
        rctx = 2;
-else if (in_softirq())
+else if (in_serving_softirq())
        rctx = 1;
    else
        rctx = 0;
--- linux-4.15.0.orig/kernel/events/ring_buffer.c
+++ linux-4.15.0/kernel/events/ring_buffer.c
@@ -14,6 +14,7 @@

 #include <linux/slab.h>
 #include <linux/circ_buf.h>
 #include <linux/poll.h>
 +#include <linux/nospec.h>
#include "internal.h"

again:
+/
+ * In order to avoid publishing a head value that goes backwards,
+ * we must ensure the load of @rb->head happens after we've
+ * incremented @rb->nest.
+ *
+ * Otherwise we can observe a @rb->head value before one published
+ * by an IRQ/NMI happening between the load and the increment.
+ */
+barrier();
head = local_read(&rb->head);

/*
- * IRQ/NMI can happen here, which means we can miss a head update.
+ * IRQ/NMI can happen here and advance @rb->head, causing our
+ * load above to be stale.
 */

-if (!local_dec_and_test(&rb->nest))
+/
+ * If this isn't the outermost nesting, we don't have to update
+ * @rb->user_page->data_head.
+ */
+if (local_read(&rb->nest) > 1) {
+local_dec(&rb->nest);
goto out;
+}

/*
 * Since the mmap() consumer (userspace) can run on a different CPU:
 */
smp_wmb(); /* B, matches C */

/*
 * Now check if we missed an update -- rely on previous implied
 * compiler barriers to force a re-read.
 */
-WRITE_ONCE(rb->user_page->data_head = head);

/*
- * We must publish the head before decrementing the nest count,
+ * otherwise an IRQ/NMI can publish a more recent head value and our
+ * write will (temporarily) publish a stale value.
 */
+barrier()
+localset(&rb->nest, 0);
+
+/
+ * Ensure we decrement @rb->nest before we validate the @rb->head.
+ * Otherwise we cannot be sure we caught the 'last' nested update.
+ */
+barrier();
if (unlikely(head != local_read(&rb->head))) {
local_inc(&rb->nest);
go to again;
}@ -392,7 +418,7 @@
* store that will be enabled on successful return
*/
if (!handle->size) { /* A, matches D */
-event->pending_disable = 1;
+event->pending_disable = smp_processor_id();
perf_output_wakeup(handle);
local_set(&rb->aux_nest, 0);
go to err_put;
}@ -464,13 +490,13 @@
   handle->aux_flags);
}

-rb->user_page->aux_head = rb->aux_head;
+WRI TE_ONCE(rb->user_page->aux_head, rb->aux_head);
if (rb_need_aux_wakeup(rb))
wakeup = true;

if (wakeup) {
if (handle->aux_flags & PERF_AUX_FLAG_TRUNCATED)
-handle->event->pending_disable = 1;
+handle->event->pending_disable = smp_processor_id();
perf_output_wakeup(handle);
}
}@ -496,7 +522,7 @@

rb->aux_head += size;

-rb->user_page->aux_head = rb->aux_head;
+WRI TE_ONCE(rb->user_page->aux_head, rb->aux_head);
if (rb_need_aux_wakeup(rb)) {
perf_output_wakeup(handle);
handle->wakeup = rb->aux_wakeup + rb->aux_watermark;
}@ -646,7 +672,7 @@
go to out;
-rb->aux_priv = event->pmu->setup_aux(event->cpu, rb->aux_pages, nr_pages,
   overwrite);
if (!rb->aux_priv)
goto out;
@@ -722,6 +748,9 @@
size = sizeof(struct ring_buffer);
size += nr_pages * sizeof(void *);
+if (order_base_2(size) >= PAGE_SHIFT+MAX_ORDER)
+goto fail;
+
+rb = kzalloc(size, GFP_KERNEL);
+if (!rb)
goto fail;
@@ -867,8 +896,10 @@
return NULL;
/* AUX space */
-if (pgoff >= rb->aux_pgoff)
-    return virt_to_page(rb->aux_pages[pgoff - rb->aux_pgoff]);
+if (pgoff >= rb->aux_pgoff) {
+    int aux_pgoff = array_index_nospec(pgoff - rb->aux_pgoff, rb->aux_nr_pages);
+    return virt_to_page(rb->aux_pages[aux_pgoff]);
+}
}

{return __perf_mmap_to_page(rb, pgoff);  
--- linux-4.15.0.orig/kernel/events/uprobes.c
+++ linux-4.15.0/kernel/events/uprobes.c
@@ -612,11 +612,7 @@
if (ret)
goto out;
-/* uprobe_write_opcode() assumes we don't cross page boundary */
-BUG_ON((uprobe->offset & ~PAGE_MASK) +
-UPROBE_SWBP_INSN_SIZE > PAGE_SIZE);
-
-smp_wmb(); /* pairs with rmb() in find_active_uprobe() */
+smp_wmb(); /* pairs with the smp_rmb() in handle_swbp() */
set_bit(UPROBE_COPY_INSN, &uprobe->flags);

out:
@@ -894,6 +890,13 @@
if (offset > i_size_read(inode))
return -EINVAL;
+/*
 + * This ensures that copy_from_page() and copy_to_page() can't cross page boundary.
 + */
+if (!IS_ALIGNED(offset, UPROBE_SWBP_INSN_SIZE))
+return -EINVAL;
+
retry:
uprobe = alloc_uprobe(inode, offset);
if (!uprobe)
    return -EINVAL;

uprobe_opcode_t opcode;
int result;

+if (WARN_ON_ONCE(!IS_ALIGNED(vaddr, UPROBE_SWBP_INSN_SIZE)))
+return -EINVAL;
+
pagefault_disable();
result = __get_user(opcode, (uprobe_opcode_t __user *)vaddr);
pagefault_enable();

sigill:
uprobe_warn(current, "handle uretprobe, sending SIGILL.");
-force_sig_info(SIGILL, SEND_SIG_FORCED, current);
+force_sig(SIGILL, current);
}

if (!uprobe) {
    if (is_swbp > 0) {
        /* No matching uprobe; signal SIGTRAP. */
-send_sig(SIGTRAP, current, 0);
+force_sig(SIGTRAP, current);
    } else {
/*
 * Either we raced with uprobe_unregister() or we can't
 @ @ -1910,10 +1916,18 @@
 * After we hit the bp, _unregister + _register can install the
 * new and not-yet-analyzed uprobe at the same address, restart.
 */
-smp_rmb(); /* pairs with wmb() in install_breakpoint() */
if (unlikely(!test_bit(UPROBE_COPY_INSN, &uprobe->flags)))
goto out;

+/*
+ * Pairs with the smp_wmb() in prepare_uprobe().
+ *
+ * Guarantees that if we see the UPROBE_COPYInsn bit set, then
+ * we must also see the stores to &uprobe->arch performed by the
+ * prepare_uprobe() call.
+ */
+smp_rmb();
+
+/* Tracing handlers use ->utask to communicate with fetch methods */
if (!get_utask())
goto out;
@@ -1962,7 +1976,7 @@
if (unlikely(err)) {
    uprobe_warn(current, "execute the probed insn, sending SIGILL.");
    -force_sig_info(SIGILL, SEND_SIG_FORCED, current);
    +force_sig(SIGILL, current);
}
}

--- linux-4.15.0.orig/kernel/exit.c
+++ linux-4.15.0/kernel/exit.c
@@ -193,6 +193,7 @@
rcu_read_unlock();

PROC_FLUSH_TASK(p);
cgroup_release(p);

WRITE_LOCK_IRQ(&tasklist_lock);
ptrace_release_task(p);
@@ -306,7 +307,7 @@
        MB (A)      MB (B)
        [L] cond    [L] tsk
+/
-smp_rmb(); /* (B) */
+smp_mb(); /* (B) */

/*
 * Avoid using task_rcu_dereference() magic as long as we are careful,
@@ -496,7 +497,7 @@
 struct mm_struct *mm = current->mm;
 struct core_state *core_state;

-mm_release(current, mm);
+exit_mm_release(current, mm);
if (!mm)
return;
sync_mm_rss(mm);
up_read(&mm->mmap_sem);

self.task = current;
-self.next = xchg(&core_state->dumper.next, &self);
+if (self.task->flags & PF_SIGNALED)
+self.next = xchg(&core_state->dumper.next, &self);
+else
+self.task = NULL;

/*
 * Implies mb(), the result of xchg() must be visible
 * to core_state->dumper.
 * @ @ -557,12 +561,14 @@
 * return NULL;
 */

-find_child_reaper(struct task_struct *father)
+static struct task_struct *find_child_reaper(struct task_struct *father,
+struct list_head *dead)

struct pid_namespace *pid_ns = task_active_pid_ns(father);
struct task_struct *reaper = pid_ns->child_reaper;
+struct task_struct *p, *n;

if (likely(reaper != father))
return reaper;
@@ -574,10 +580,12 @@

write_unlock_irq(&tasklist_lock);
-if (unlikely(pid_ns == &init_pid_ns)) {
-panic("Attempted to kill init! exitcode=0x%08x
",
-+father->signal->group_exit_code ?: father->exit_code);
+
+list_for_each_entry_safe(p, n, dead, ptrace_entry) {
+list_del_init(&p->ptrace_entry);
+release_task(p);
+}
+
zap_pid_ns_processes(pid_ns);
write_lock_irq(&tasklist_lock);

* Can drop and reacquire tasklist_lock */
-reaper = find_child_reaper(father);
+reaper = find_child_reaper(father, dead);
if (list_empty(&father->children))
return;

@@ -765,8 +773,12 @@
struct task_struct *tsk = current;
int group_dead;

-profile_task_exit(tsk);
-kcov_task_exit(tsk);
+/*
+ * We can get here from a kernel oops, sometimes with preemption off.
+ * Start by checking for critical errors.
+ * Then fix up important state like USER_DS and preemption.
+ * Then do everything else.
+ */

WARN_ON(blk_needs_flush_plug(tsk));

@@ -784,6 +796,16 @@
*/
set_fs(USER_DS);

+if (unlikely(in_atomic())) {
+pr_info("note: %s[%d] exited with preempt_count %d\n",
+current->comm, task_pid_nr(current),
+preempt_count());
+preempt_count_set(PREEMPT_ENABLED);
+}
+profile_task_exit(tsk);
+kcov_task_exit(tsk);
+
ptrace_event(PTRACE_EVENT_EXIT, code);

validate_creds_for_do_exit(tsk);
@@ -794,39 +816,12 @@
*/
if (unlikely(tsk->flags & PF_EXITING)) {
pr_alert("Fixing recursive fault but reboot is needed!\n");
-/*
- * We can do this unlocked here. The futex code uses
- * this flag just to verify whether the pi state
- * cleanup has been done or not. In the worst case it
- * loops once more. We pretend that the cleanup was
- * done as there is no way to return. Either the
- * OWNER_DIED bit is set by now or we push the blocked
- * task into the wait for ever nirwana as well.
  - */
- tsk->flags |= PF_EXITPIDONE;
+ futex_exit_recursive(tsk);
set_current_state(TASK_UNINTERRUPTIBLE);
schedule();
}

exit_signals(tsk);  /* sets PF_EXITING */
  /*
  * Ensure that all new tsk->pi_lock acquisitions must observe
  * PF_EXITING. Serializes against futex.c:attach_to_pi_owner().
  */
  - smp_mb();
  /*
  * Ensure that we must observe the pi_state in exit_mm() ->
  * mm_release() -> exit_pi_state_list().
  */
  - raw_spin_lock_irq(&tsk->pi_lock);
  - raw_spin_unlock_irq(&tsk->pi_lock);
  
  if (unlikely(in_atomic())) {
    -pr_info("note: %s[%d] exited with preempt_count %d\n",
      current->comm, task_pid_nr(current),
      preempt_count());
    -preempt_count_set(PREEMPT_ENABLED);
    /* sync mm's RSS info before statistics gathering */
    if (tsk->mm)
      @ @ -834,6 +829,14 @ @
      acct_update_integrals(tsk);
      group_dead = atomic_dec_and_test(&tsk->signal->live);
      if (group_dead) {
        +/*
        + * If the last thread of global init has exited, panic
        + * immediately to get a useable coredump.
        + */
        +if (unlikely(is_global_init(tsk)))
          +panic("Attempted to kill init! exitcode=0x%08x\n",
            +tsk->signal->group_exit_code ?: (int)code);
        +#ifdef CONFIG_POSIX_TIMERS
        hrtimer_cancel(&tsk->signal->real_timer);
        exit_itimers(tsk->signal);
        @ @ -893,12 +896,6 @ @
        /* Make sure we are holding no locks:
        */

debug_check_no_locks_held();
/**
 - * We can do this unlocked here. The futext code uses this flag
 - * just to verify whether the pi state cleanup has been done
 - * or not. In the worst case it loops once more.
 - */
tsk->flags |= PF_EXITPIDONE;

if (tsk->io_context)
   exit_io_context(tsk);
@@ -1610,10 +1607,9 @@
   if (!infop)
      return err;

-if (!access_ok(VERIFY_WRITE, infop, sizeof(*infop)))
+if (!user_access_begin(VERIFY_WRITE, infop, sizeof(*infop)))
   return -EFAULT;

-user_access_begin();
unsafe_put_user(signo, &infop->si_signo, Efault);
unsafe_put_user(0, &infop->si_errno, Efault);
unsafe_put_user(info.cause, &infop->si_code, Efault);
@@ -1738,10 +1734,9 @@
   if (!infop)
      return err;

-if (!access_ok(VERIFY_WRITE, infop, sizeof(*infop)))
+if (!user_access_begin(VERIFY_WRITE, infop, sizeof(*infop)))
   return -EFAULT;

-user_access_begin();
unsafe_put_user(signo, &infop->si_signo, Efault);
unsafe_put_user(0, &infop->si_errno, Efault);
unsafe_put_user(info.cause, &infop->si_code, Efault);
--- linux-4.15.0.orig/kernel/fork.c
+++ linux-4.15.0/kernel/fork.c
@@ -102,6 +102,11 @@
#define CREATE_TRACE_POINTS
#include <trace/events/task.h>
+#ifdef CONFIG_USER_NS
+extern int unprivileged_userns_clone;
+#else
+  #define unprivileged_userns_clone 0
+#endif

/*
 * Minimum number of threads to boot the kernel
void __weak arch_release_thread_stack(unsigned long *stack) {
#if !defined(CONFIG_ARCH_THREAD_STACK_ALLOCATOR)
  /*
   * Clear stale pointers from reused stack. */
  memset(s->addr, 0, THREAD_SIZE);
  #endif
  + tsk->stack_vm_area = s;
  +tsk->stack = s->addr;
  return s->addr;
}

if (stack) {
  tsk->stack_vm_area = find_vm_area(stack);
  +tsk->stack = stack;
  return stack;
} else
struct page *page = alloc_pages_node(node, THREADINFO_GFP,
 THREAD_SIZE_ORDER);
  -return page ? page_address(page) : NULL;
  +if (likely(page)) {
    +tsk->stack = page_address(page);
    +return tsk->stack;
  +}
  +return NULL;
#endif
}
static unsigned long *alloc_thread_stack_node(struct task_struct *tsk, int node)
{
    return kmem_cache_alloc_node(thread_stack_cache, THREADINFO_GFP, node);
    unsigned long *stack;
    stack = kmem_cache_alloc_node(thread_stack_cache, THREADINFO_GFP, node);
    tsk->stack = stack;
    return stack;
}

static void free_thread_stack(struct task_struct *tsk)
{
    struct kmem_cache *fs_cachep;

    struct kmem_cache *vm_area_cachep;

    /* SLAB cache for mm_struct structures */
    struct kmem_cache *vm_area_cachep;
    static struct kmem_cache *vm_area_cachep;

    /* SLAB cache for mm_struct structures (tsk->mm) */
    static struct kmem_cache *mm_cachep;

    struct vm_area_struct *vm_area_alloc(struct mm_struct *mm)
    {
        struct vm_area_struct *vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);
        if (vma) {
            vma->vm_mm = mm;
            INIT_LIST_HEAD(&vma->anon_vma_chain);
            return vma;
        }
    }

    struct vm_area_struct *vm_area_dup(struct vm_area_struct *orig)
    {
        struct vm_area_struct *new = kmem_cache_alloc(vm_area_cachep, GFP_KERNEL);
        if (new) {
            *new = *orig;
            INIT_LIST_HEAD(&new->anon_vma_chain);
            return new;
        }
    }

    void vm_area_free(struct vm_area_struct *vma)
    {
        kmem_cache_free(vm_area_cachep, vma);
    }
static void account_kernel_stack(struct task_struct *tsk, int account)
{
    void *stack = task_stack_page(tsk);
    return; /* Better to leak the stack than to free prematurely */
}

account_kernel_stack(tsk, -1);
-arch_release_thread_stack(tsk->stack);
free_thread_stack(tsk);
tsk->stack = NULL;
#ifdef CONFIG_VMAP_STACK
WARN_ON(tsk == current);
cgroup_free(tsk);
-task_numa_free(tsk);
+task_numa_free(tsk, true);
security_task_free(tsk);
exit_creds(tsk);
delayacct_tsk_free(tsk);
#endif
if (mpnt->vm_flags & VM_ACCOUNT) {
    unsigned long len = vma_pages(mpnt);
    continue;
}
charge = 0;
+/*
 + Don't duplicate many vmas if we've been oom-killed (for
 + example)
 + */
+if (fatal_signal_pending(current)) {
    retval = -EINTR;
    goto out;
}
if (tmp = kvmalloc_cachep(GFP_KERNEL)) {
    *tmp = *mpnt;
    INIT_LIST_HEAD(&tmp->anon_vma_chain);
    retval = vma_dup_policy(mpnt, tmp);
    if (retval)
goto fail_nomem_policy;
@@ -676,7 +718,7 @@
      struct inode *inode = file_inode(file);
      struct address_space *mapping = file->f_mapping;

      -get_file(file);
      +vma_get_file(tmp);
      if (tmp->vm_flags & VM_DENYWRITE)
        atomic_dec(&inode->i_writecount);
      i_mmap_lock_write(mapping);
@@ -733,7 +775,7 @@
      fail_nomem_anon_vma_fork:
      mpol_put(vma_policy(tmp));
      fail_nomem_policy:
      -kmem_cache_free(vm_area_cachep, tmp);
      +vm_area_free(tmp);
      fail_nomem:
      retval = -ENOMEM;
      vm_unacct_memory(charge);
@@ -791,6 +833,15 @@
      #endif
    }

    +static __always_inline void mm_clear_owner(struct mm_struct *mm,
    + struct task_struct *p)
    +{
    +#ifdef CONFIG_MEMCG
    +if (mm->owner == p)
    +WRITE_ONCE(mm->owner, NULL);
    +#endif
    +}
    +
    +static void mm_init_owner(struct mm_struct *mm, struct task_struct *p)
    {
    +#ifdef CONFIG_MEMCG
    @@ -833,6 +884,7 @@
    mm->pmd_huge_pte = NULL;
    #endif
    mm_init_uprobes_state(mm);
    +hugetlb_count_init(mm);

    if (current->mm) {
      mm->flags = current->mm->flags & MMF_INIT_MASK;
@@ -1125,24 +1177,8 @@
      * restoring the old one. . .
      * Eric Biederman 10 January 1998
      */
      -void mm_release(struct task_struct *tsk, struct mm_struct *mm)
static void mm_release(struct task_struct *tsk, struct mm_struct *mm)
{
    /* Get rid of any futexes when releasing the mm */
    #ifdef CONFIG_FUTEX
    ifdef CONFIG_COMPAT
    ifdef CONFIG_COMPAT
    #endif
    #endif
    if (unlikely(tsk->robust_list)) {
        exit_robust_list(tsk);
        tsk->robust_list = NULL;
    }
    if (unlikely(tsk->compat_robust_list)) {
        compat_exit_robust_list(tsk);
        tsk->compat_robust_list = NULL;
    }
    #endif
    if (unlikely(!list_empty(&tsk->pi_state_list)))
        exit_pi_state_list(tsk);
    uprobe_free_utask(tsk);

    /* Get rid of any cached register state */
    complete_vfork_done(tsk);
}

void exit_mm_release(struct task_struct *tsk, struct mm_struct *mm)
{
    tutex_exit_release(tsk);
    mm_release(tsk, mm);
}

void exec_mm_release(struct task_struct *tsk, struct mm_struct *mm)
{
    tutex_exec_release(tsk);
    mm_release(tsk, mm);
}

/*
 * Allocate a new mm structure and copy contents from the
 * mm structure of the passed in task structure.
 */
void mm_release(struct task_struct *tsk, struct mm_struct *mm)
{
    futex_exit_release(tsk);
    mm_release(tsk, mm);
}

/*
 * don't put binfmt in mmput, we haven't got module yet */
free_pt:

fail_nomem:
@@ -1347,7 +1396,9 @@
     return -ENOMEM;
     atomic_set(&sig->count, 1);
+    spin_lock_irq(&current->sighand->siglock);
     memcpy(sig->action, current->sighand->action, sizeof(sig->action));
+    spin_unlock_irq(&current->sighand->siglock);
     return 0;
 }

@@ -1523,6 +1574,40 @@
 #endif /* #ifdef CONFIG_TASKS_RCU */
 }

+static void __delayed_free_task(struct rcu_head *rhp)
+{
+    struct task_struct *tsk = container_of(rhp, struct task_struct, rcu);
+    +    free_task(tsk);
+   +}
+    +
+    +static __always_inline void delayed_free_task(struct task_struct *tsk)
+    {    +        if (IS_ENABLED(CONFIG_MEMCG))
+            call_rcu(&tsk->rcu, __delayed_free_task);
+        else
+            free_task(tsk);
+        +}
+    +
+    +static void copy_oom_score_adj(u64 clone_flags, struct task_struct *tsk)
+    {    +        /* Skip if kernel thread */
+        +        +        /* Skip if spawning a thread or using vfork */
+        +        +        /* We need to synchronize with __set_oom_adj */
+        +        +mutex_lock(&oom_adj_mutex);
+        +        +        +set_bit(MMF_MULTIPROCESS, &tsk->mm->flags);
+        +        +        /* Update the values in case they were changed after copy_signal */
+        +        +        +tsk->signal->oom_score_adj = current->signal->oom_score_adj;
+        +        +        +tsk->signal->oom_score_adj_min = current->signal->oom_score_adj_min;
+        +        +        +mutex_unlock(&oom_adj_mutex);
+        +
+        +

/*
 * This creates a new process as a copy of the old one,
 * but does not actually start it yet.
 *@ @ -1550,6 +1635,10 @*
 if ((clone_flags & (CLONE_NEWUSER|CLONE_FS)) == (CLONE_NEWUSER|CLONE_FS))
 return ERR_PTR(-EINVAL);
+
+if ((clone_flags & CLONE_NEWUSER) && !unprivileged_userns_clone)
+if (!capable(CAP_SYS_ADMIN))
+return ERR_PTR(-EPERM);
+
/*
 * Thread groups must share signals as well, and detached threads
 * can only be started up within the thread group.
 @ @ -1667,8 +1756,6 @*

posix_cpu_timers_init(p);

-p->start_time = ktime_get_ns();
-p->real_start_time = ktime_get_boot_ns();
p->io_context = NULL;
p->audit_context = NULL;
cgroup_fork(p);
@@ -1667,8 +1756,6 @@
p->io_context = NULL;
p->audit_context = NULL;
cgroup_fork(p);
#endif
"
* sigaltstack should be cleared when sharing the same VM
*/
@@ -1801,14 +1885,9 @@
/* ok, now we should be set up.. */
p->pid = pid_nr(pid);
if (clone_flags & CLONE_THREAD) {
    p->exit_signal = -1;
    p->group_leader = current->group_leader;
    p->tgid = current->tgid;
} else {
    -if (clone_flags & CLONE_PARENT)
    -	  p->exit_signal = current->group_leader->exit_signal;
    else
    -p->exit_signal = (clone_flags & CSIGNAL);
    p->group_leader = p;
    p->tgid = p->pid;
}
@@ -1833,6 +1912,17 @@
goto bad_fork_free_pid;

/*
 + * From this point on we must avoid any synchronous user-space
 + * communication until we take the tasklist-lock. In particular, we do
 + * not want user-space to be able to predict the process start-time by
 + * stalling fork(2) after we recorded the start_time but before it is
 + * visible to the system.
 + */
 +
 + p->start_time = ktime_get_ns();
 + p->real_start_time = ktime_get_boot_ns();
 +
 + /*
 * Make it visible to the rest of the system, but dont wake it up yet.
 * Need tasklist lock for parent etc handling!
 */
@@ -1842,9 +1932,14 @@
if (clone_flags & (CLONE_PARENT|CLONE_THREAD)) {
    p->real_parent = current->real_parent;
    p->parent_exec_id = current->parent_exec_id;
+    if (clone_flags & CLONE_THREAD)
+        p->exit_signal = -1;
+    else
+        p->exit_signal = current->group_leader->exit_signal;
} else {
    p->real_parent = current;
    p->parent_exec_id = current->self_exec_id;
+    p->exit_signal = (clone_flags & CSIGNAL);
}
klp_copy_process(p);
@@ -1928,6 +2023,8 @@
trace_task_newtask(p, clone_flags);
uprobe_copy_process(p, clone_flags);

+copy_oom_score_adj(clone_flags, p);
+
return p;

bad_fork_cancel_cgroup:
@@ -1946,8 +2043,10 @@
bad_fork_cleanup_namespaces:
exit_task_namespaces(p);
bad_fork_cleanup_mm:
-if (p->mm)
+if (p->mm) {
+mm_clear_owner(p->mm, p);
mmput(p->mm);
+
} bad_fork_cleanup_signal:
if (!(clone_flags & CLONE_THREAD))
free_signal_struct(p->signal);
@@ -1978,7 +2077,7 @@
bad_fork_free:
p->state = TASK_DEAD;
put_task_stack(p);
-free_task(p);
+delayed_free_task(p);
fork_out:
return ERR_PTR(retval);
}
@@ -2343,6 +2442,12 @@
if (unshare_flags & CLONE_NEWNS)
unshare_flags |= CLONE_FS;

+if ((unshare_flags & CLONE_NEWUSER) && !unprivileged_userns_clone) {
+err = -EPERM;
+if (!capable(CAP_SYS_ADMIN))
+goto bad_unshare_out;
+
} err = check_unshare_flags(unshare_flags);
if (err)
goto bad_unshare_out;
@@ -2458,7 +2563,7 @@
struct ctl_table t;
int ret;
int threads = max_threads;
-int min = MIN_THREADS;
+int min = 1;
int max = MAX_THREADS;

t = *table;
@@ -2470,7 +2575,7 @@
if (ret || !write)
    return ret;

-set_max_threads(threads);
+max_threads = threads;

return 0;
}
--- linux-4.15.0.orig/kernel/futex.c
+++ linux-4.15.0/kernel/futex.c
@@ -44,6 +44,7 @@
*  along with this program; if not, write to the Free Software
*  Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
 */
+#include <linux/compat.h>
#include <linux/slab.h>
#include <linux/poll.h>
#include <linux/fs.h>
@@ -173,8 +174,10 @@
* double_lock hb() and double_unlock hb(), respectively.
 */

-#ifndef CONFIG_HAVE_FUTEX_CMPXCHG
-int __read_mostly futex_cmpxchg_enabled;
+#ifdef CONFIG_HAVE_FUTEX_CMPXCHG
+#define futex_cmpxchg_enabled 1
+#else
+static int __read_mostly futex_cmpxchg_enabled;
+#endif

/*
@@ -338,6 +341,12 @@
 */
@endif /* CONFIG_FAIL_FUTEX */

+#ifdef CONFIG_COMPAT
+static void compat_exit_robust_list(struct task_struct *curr);
+#else
+static inline void compat_exit_robust_list(struct task_struct *curr) { }
+#endif
+
Open Source Used In 5GaaS Edge AC-4 32695
static inline void futex_get_mm(union futex_key *key)
{
    mmgrab(key->private.mm);
    /*
     * @ @ -392,9 +401,9 @ @
     */
}

static struct futex_hash_bucket *hash_futex(union futex_key *key)
{
    u32 hash = jhash2((u32*)&key->both.word,
    - (sizeof(key->both.word)+sizeof(key->both.ptr))/4,
    +u32 hash = jhash2((u32 *)key, offsetof(typeof(*key), both.offset) / 4,
    +key->both.offset);
    +
    return &futex_queues[hash & (futex_hashsize - 1)];
}

switch (key->both.offset & (FUT_OFF_INODE|FUT_OFF_MMSHARED)) {
    case FUT_OFF_INODE:
        -ihold(key->shared.inode); /* implies smp_mb(); (B) */
        +smp_mb(); /* explicit smp_mb(); (B) */
        break;
    case FUT_OFF_MMSHARED:
        futex_get_mm(key); /* implies smp_mb(); (B) */
        @@ -470,7 +479,6 @@
    }
}

switch (key->both.offset & (FUT_OFF_INODE|FUT_OFF_MMSHARED)) {
    case FUT_OFF_INODE:
        -ihold(key->shared.inode);
    }
    break;
    case FUT_OFF_MMSHARED:
        mmdrop(key->private.mm);
        @@ -478,6 +486,46 @@
    }
}

+/*
+ * Generate a machine wide unique identifier for this inode.
+ * + This relies on u64 not wrapping in the life-time of the machine; which with
+ * + 1ns resolution means almost 585 years.
+ * + This further relies on the fact that a well formed program will not unmap
+ * + the file while it has a (shared) futex waiting on it. This mapping will have
+ * + a file reference which pins the mount and inode.
+ * + If for some reason an inode gets evicted and read back in again, it will get
+ * + a new sequence number and will _NOT_ match, even though it is the exact same
It is important that `match_futex()` will never have a false-positive, esp. for PI futexes that can mess up the state. The above argues that false-negatives are only possible for malformed programs.

```c
static u64 get_inode_sequence_number(struct inode *inode)
{
    static atomic64_t i_seq;
    u64 old;

    /* Does the inode already have a sequence number? */
    old = atomic64_read(&inode->i_sequence);
    if (likely(old))
        return old;
    for (;;) {
        u64 new = atomic64_add_return(1, &i_seq);
        if (WARN_ON_ONCE(!new))
            continue;
        old = atomic64_cmpxchg_relaxed(&inode->i_sequence, 0, new);
        if (old)
            return old;
        return new;
    }
}

/**
 * get_futex_key() - Get parameters which are the keys for a futex
 * @uaddr: virtual address of the futex
 * @key: The key words are stored in @key on success.
 * @fshared: For shared mappings, it's (page->index, file_inode(vma->vm_file),
 *          offset_within_page). For private mappings, it's (uaddr, current->mm).
 * @fshared: We can usually work out the index without swapping in the page.
 * @fshared: For shared mappings (when @fshared), the key is:
 *          ( inode->i_sequence, page->index, offset_within_page )
 *          [ also see get_inode_sequence_number() ]
 * @fshared: For private mappings (or when !@fshared), the key is:
 *          ( current->mm, address, 0 )
 * @fshared: This allows (cross process, where applicable) identification of the futex
 * @fshared: without keeping the page pinned for the duration of the FUTEX_WAIT.
 */
```
lock_page() might sleep, the caller should not hold a spinlock.
*/
@@ -632,8 +686,6 @@ key->private.mm = mm;
     key->private.address = address;

-get_futex_key_refs(key); /* implies smp_mb(); (B) */
-
} else {
    struct inode *inode;

 @@ -665,40 +717,14 @@
     goto again;
 }

-/*
- * Take a reference unless it is about to be freed. Previously
- * this reference was taken by ihold under the page lock
- * pinning the inode in place so i_lock was unnecessary. The
- * only way for this check to fail is if the inode was
- * truncated in parallel which is almost certainly an
- * application bug. In such a case, just retry.
- *
- * We are not calling into get_futex_key_refs() in file-backed
- * cases, therefore a successful atomic_inc return below will
- * guarantee that get_futex_key() will still imply smp_mb(); (B).
- */
-if (!atomic_inc_not_zero(&inode->i_count)) {
-    rcu_read_unlock();
-    put_page(page);
-    goto again;
-}
-
-/* Should be impossible but lets be paranoid for now */
-if (WARN_ON_ONCE(inode->i_mapping != mapping)) {
-    err = -EFAULT;
-    rcu_read_unlock();
-    iput(inode);
-    goto out;
-}
-
-     key->both.offset |= FUT_OFF_INODE; /* inode-based key */
-     key->shared.inode = inode;
-     key->shared.pgoff = basepage_index(tail);
+     key->shared.i_seq = get_inode_sequence_number(inode);
+     key->shared.pgoff = page_to_pgoff(tail);
rcu_read_unlock();
}

+get_futex_key_refs(key); /* implies smp_mb(); (B) */ 
+ 
out:
put_page(page);
return err;
@@ -813,6 +839,29 @@
return pi_state;
}

+static void pi_state_update_owner(struct futex_pi_state *pi_state, 
+ struct task_struct *new_owner)
+{
+struct task_struct *old_owner = pi_state->owner;
+
+lockdep_assert_held(&pi_state->pi_mutex.wait_lock);
+
+if (old_owner) {
+raw_spin_lock(&old_owner->pi_lock);
+WARN_ON(list_empty(&pi_state->list));
+list_del_init(&pi_state->list);
+raw_spin_unlock(&old_owner->pi_lock);
+}
+
+if (new_owner) {
+raw_spin_lock(&new_owner->pi_lock);
+WARN_ON(!list_empty(&pi_state->list));
+list_add(&pi_state->list, &new_owner->pi_state_list);
+pi_state->owner = new_owner;
+raw_spin_unlock(&new_owner->pi_lock);
+}
+
static void get_pi_state(struct futex_pi_state *pi_state)
{
WARN_ON_ONCE(!atomic_inc_not_zero(&pi_state->refcount));
@@ -835,17 +884,12 @@
* and has cleaned up the pi_state already
 */
if (pi_state->owner) {
-struct task_struct *owner;
+unsigned long flags;

-raw_spin_lock_irq(&pi_state->pi_mutex.wait_lock);
-owner = pi_state->owner;
-if (owner) {
-raw_spin_lock(&owner->pi_lock);
-list_del_init(&pi_state->list);
-raw_spin_unlock(&owner->pi_lock);
-}
-rt_mutex_proxy_unlock(&pi_state->pi_mutex, owner);
-raw_spin_unlock_irq(&pi_state->pi_mutex.wait_lock);
+raw_spin_lock_irqsave(&pi_state->pi_mutex.wait_lock, flags);
+pi_state_update_owner(pi_state, NULL);
+rt_mutex_proxy_unlock(&pi_state->pi_mutex);
+raw_spin_unlock_irqrestore(&pi_state->pi_mutex.wait_lock, flags);
}

if (current->pi_state_cache) {
@@ -887,7 +931,7 @@
    * Kernel cleans up PI-state, but userspace is likely hosed.
    * (Robust-futex cleanup is separate and might save the day for userspace.)
    */
-void exit_pi_state_list(struct task_struct *curr)
+static void exit_pi_state_list(struct task_struct *curr)
{
    struct list_head *next, *head = &curr->pi_state_list;
    struct futex_pi_state *pi_state;
@@ -957,7 +1001,8 @@
}
raw_spin_unlock_irq(&curr->pi_lock);
}
-
+#else
+static inline void exit_pi_state_list(struct task_struct *curr) { }
#endif

/*
@@ -1007,7 +1052,8 @@
    * FUTEX_OWNER_DIED bit. See [4]
    *
    * [10] There is no transient state which leaves owner and user space
- * TID out of sync.
+ * TID out of sync. Except one error case where the kernel is denied
+ * write access to the user address, see fixup_pi_state_owner().
    *
    *
    * Serialization and lifetime rules:
@@ -1166,12 +1212,99 @@
    return ret;
    }

+/**
+ * wait_for_owner_exiting - Block until the owner has exited
+ */
+ @exiting: Pointer to the exiting task
+ *
+ * Caller must hold a refcount on @exiting.
+ */
+static void wait_for_owner_exiting(int ret, struct task_struct *exiting)
+
+if (ret != -EBUSY) {
+WARN_ON_ONCE(exiting);
+return;
+}
+
+if (WARN_ON_ONCE(ret == -EBUSY && !exiting))
+return;
+
+mutex_lock(&exiting->futex_exit_mutex);
+/
+ * No point in doing state checking here. If the waiter got here
+ * while the task was in exec()->exec_futex_release() then it can
+ * have any FUTEX_STATE_* value when the waiter has acquired the
+ * mutex. OK, if running, EXITING or DEAD if it reached exit()
+ * already. Highly unlikely and not a problem. Just one more round
+ * through the futex maze.
+ */
+mutex_unlock(&exiting->futex_exit_mutex);
+
+put_task_struct(exiting);
+}
+
+static int handle_exit_race(u32 __user *uaddr, u32 uval,
+struct task_struct *tsk)
+
+u32 uval2;
+
+/
+ * If the futex exit state is not yet FUTEX_STATE_DEAD, tell the
+ * caller that the alleged owner is busy.
+ */
+if (tsk && tsk->futex_state != FUTEX_STATE_DEAD)
+return -EBUSY;
+
+/
+ * Reread the user space value to handle the following situation:
+ *
+ * CPU0CPU1
+ *
+ * sys_exit()sys_futex()
+ * do_exit() futex_lock_pi()
+ * futex_lock_pi_atomic()
exit_signals(tsk)  No waiters:
*   tsk->flags |= PF_EXITING;  *uaddr == 0x00000PID
+ mm_release(tsk)  Set waiter bit
+ exit_robust_list(tsk) {  *uaddr = 0x80000PID;
+  Set owner died  attach_to_pi_owner() {
+  *uaddr = 0xC0000000;  tsk = get_task(PID);
+  } if (!tsk->flags & PF_EXITING) {
+  ...  attach();
+  tsk->futex_state =  } else {
+FUTEX_STATE_DEAD;  if (tsk->futex_state !=
+ FUTEX_STATE_DEAD)
+  return -EAGAIN;
+  return -ESRCH;  <-- FAIL
+ }
+
+ Returning ESRCH unconditionally is wrong here because the
+ user space value has been changed by the exiting task.
+
+ The same logic applies to the case where the exiting task is
+ already gone.
+ */
+if (get_futex_value_locked(&uval2, uaddr))
+return -EFAULT;
+
/* If the user space value has changed, try again. */
+if (uval2 != uval)
+return -EAGAIN;
+
+ The exiting task did not have a robust list, the robust list was
+ corrupted or the user space value in *uaddr is simply bogus.
+ Give up and tell user space.
+ */
+return -ESRCH;
+
/*
 * Lookup the task for the TID provided from user space and attach to
 * it after doing proper sanity checks.
 */
-static int attach_to_pi_owner(u32 uval, union futex_key *key,
-   struct futex_pi_state **ps)
+static int attach_to_pi_owner(u32 __user *uaddr, u32 uval, union futex_key *key,
+   struct futex_pi_state **ps,
+   struct task_struct **exiting)
{
pid_t pid = uval & FUTEX_TID_MASK;
struct futex_pi_state *pi_state;
/*
 * We are the first waiter - try to look up the real owner and attach
 * the new pi_state to it, but bail out when TID = 0 [1]
 * + *
 * + * The 'pid check is paranoid. None of the call sites should end up
 * + * with pid == 0, but better safe than sorry. Let the caller retry
 * */
if (!pid)
    return -ESRCH;
+return -EAGAIN;
p = futex_find_get_task(pid);
if (!p)
    return -ESRCH;
+return handle_exit_race(uaddr, uval, NULL);

if (unlikely(p->flags & PF_KTHREAD)) {
    put_task_struct(p);
    @ @ -1193,22 +1329,33 @ @
}

/*
 - * We need to look at the task state flags to figure out,
 - * whether the task is exiting. To protect against the do_exit
 - * change of the task flags, we do this protected by
 - * p->pi_lock:
 - * We need to look at the task state to figure out, whether the
 - * task is exiting. To protect against the change of the task state
 - * in futex_exit_release(), we do this protected by p->pi_lock:
 */
raw_spin_lock_irq(&p->pi_lock);
-if (unlikely(p->flags & PF_EXITING)) {
+if (unlikely(p->futex_state != FUTEX_STATE_OK)) {
    /*
    - * The task is on the way out. When PF_EXITPIDONE is
    - * set, we know that the task has finished the
    - * cleanup:
    - * The task is on the way out. When the futex state is
    - * FUTEX_STATE_DEAD, we know that the task has finished
    - * the cleanup:
    */
-int ret = (p->flags & PF_EXITPIDONE) ? -ESRCH : -EAGAIN;
+int ret = handle_exit_race(uaddr, uval, p);

    raw_spin_unlock_irq(&p->pi_lock);
    -put_task_struct(p);
+/*
 + * If the owner task is between FUTEX_STATE_EXITING and
FUTEX_STATE_DEAD then store the task pointer and keep
the reference on the task struct. The calling code will
drop all locks, wait for the task to reach
FUTEX_STATE_DEAD and then drop the refcount. This is
required to prevent a live lock when the current task
preempted the exiting task between the two states.
*/
if (ret == -EBUSY)
*exiting = p;
else
put_task_struct(p);
return ret;
}

callcode 1247,7 +1394,8 callcode 1262,18 +1410,20 static int lookup_pi_state(u32 __user *uaddr, u32 uval,
struct futex_hash_bucket *hb,
-union futex_key *key, struct futex_pi_state **ps)
+union futex_key *key, struct futex_pi_state **ps,
+struct task_struct **exiting)
{
struct futex_q *top_waiter = futex_top_waiter(hb, key);

return attach_to_pi_owner(uval, key, ps);
+return attach_to_pi_owner(uaddr, uval, key, ps, exiting);
}

static int lock_pi_update_atomic(u32 __user *uaddr, u32 uval, u32 newval)
{
+int err;
u32 uninitialized_var(curval);

if (unlikely(should_fail_futex(true)))
return -EFAULT;

-if (unlikely(cmpxchg_futex_value_locked(&curval, uaddr, uval, newval)))
-return -EFAULT;
+err = cmpxchg_futex_value_locked(&curval, uaddr, uval, newval);
+if (unlikely(err))
+return err;

/* If user space value changed, let the caller retry */
return curval != uval ? -EAGAIN : 0;
*lookup
* @task: the task to perform the atomic lock work for. This will
* be "current" except in the case of requeue pi.
+ * @exiting: Pointer to store the task pointer of the owner task
+ * which is in the middle of exiting
+ * @set_waiters: force setting the FUTEX_WAITERS bit (1) or not (0)
+ *
* Return:

- <0 - error

* The hb->lock and futex_key refs shall be held by the caller.
+ *
+ * @exiting is only set when the return value is -EBUSY. If so, this holds
+ * a refcount on the exiting task on return and the caller needs to drop it
+ * after waiting for the exit to complete.
+ */
static int futex_lock_pi_atomic(u32 __user *uaddr, struct futex_hash_bucket *hb,
union futex_key *key,
struct futex_pi_state **ps,
+ struct task_struct *task,
+ struct task_struct **exiting,
+ int set_waiters)
{
  u32 uval, newval, vpid = task_pid_vnr(task);
  struct futex_q *top_waiter;
  @@ -1370,7 +1528,7 @@
  * attach to the owner. If that fails, no harm done, we only
  * set the FUTEX_WAITERS bit in the user space variable.
  */
  -return attach_to_pi_owner(uval, key, ps);
  +return attach_to_pi_owner(uaddr, newval, key, ps, exiting);
}

/**
@@ -1405,11 +1563,7 @@
if (WARN(q->pi_state || q->rt_waiter, "refusing to wake PI futex\n"))
  return;

- /* Queue the task for later wakeup for after we've released
- * the hb->lock. wake_q_add() grabs reference to p.
- */
- wake_q_add(wake_q, p);
+get_task_struct(p);
  __unqueue_futex(q);
The waiting task can free the futex_q as soon as q->lock_ptr = NULL

smp_store_release(&q->lock_ptr, NULL);

+ * Queue the task for later wakeup for after we've released
+ * the hb->lock. wake_q_add() grabs reference to p.
+ */
+wake_q_add(wake_q, p);
+put_task_struct(p);

newval = FUTEX_WAITERS | task_pid_vnr(new_owner);

-if (unlikely(should_fail_futex(true)))
-ret = -EFAULT;
-
-if (cmpxchg_futex_value_locked(&curval, uaddr, uval, newval)) {
+if (unlikely(should_fail_futex(true))) {
 ret = -EFAULT;
+goto out_unlock;
+}

 } else if (curval != uval) {
+ret = cmpxchg_futex_value_locked(&curval, uaddr, uval, newval);
+if (!ret && (curval != uval)) {
 /*
 * If a unconditional UNLOCK_PI operation (user space did not
 * try the TID->0 transition) raced with a waiter setting the
 @ @ -1472,26 +1633,15 @@
 ret = -EINVAL;
 }

-if (ret)
-goto out_unlock;
-
-/*
 */
-raw_spin_lock(&pi_state->owner->pi_lock);
-WARN_ON(list_empty(&pi_state->list));
-list_del_init(&pi_state->list);
-raw_spin_unlock(&pi_state->owner->pi_lock);
-
-raw_spin_lock(&new_owner->pi_lock);
-WARN_ON(list_empty(&pi_state->list));
-list_add(&pi_state->list, &new_owner->pi_state_list);
-pi_state->owner = new_owner;
-raw_spin_unlock(&new_owner->pi_lock);
-
-postunlock = __rt_mutex_futex_unlock(&pi_state->pi_mutex, &wake_q);
+if (!ret) {
+/*
+ * This is a point of no return; once we modified the uval
+ * there is no going back and subsequent operations must
+ * not fail.
+ */
+pi_state_update_owner(pi_state, new_owner);
+postunlock = __rt_mutex_futex_unlock(&pi_state->pi_mutex, &wake_q);
+
out_unlock:
raw_spin_unlock_irq(&pi_state->pi_mutex.wait_lock);
@@ -1654,32 +1804,32 @@
double_lock_hb(hb1, hb2);
op_ret = futex_atomic_op_inuser(op, uaddr2);
if (unlikely(op_ret < 0)) {
-
double_unlock_hb(hb1, hb2);
-
#endif CONFIG_MMU
-/*
- * we don't get EFAULT from MMU faults if we don't have an MMU,
- * but we might get them from range checking
- */
-ret = op_ret;
-goto out_put_keys;
-#endif
-
-if (unlikely(op_ret != -EFAULT)) {
+if (!IS_ENABLED(CONFIG_MMU)) {
+unlikely(op_ret != -EFAULT && op_ret != -EAGAIN)) {
+/*
+ * we don't get EFAULT from MMU faults if we don't have
+ * an MMU, but we might get them from range checking
+ */
-ret = op_ret;
-goto out_put_keys;
- ret = fault_in_user_writeable(uaddr2);
- if (ret)
- goto out_put_keys;
+ if (op_ret == -EFAULT) {
+ ret = fault_in_user_writeable(uaddr2);
+ if (ret)
+ goto out_put_keys;
+ }

- if (!(flags & FLAGS_SHARED))
+ if (!(flags & FLAGS_SHARED)) {
+ cond_resched();
+ goto retry_private;
+ }

put_futex_key(&key2);
put_futex_key(&key1);
+ cond_resched();
+ goto retry;
}

@@ -1788,6 +1938,8 @@
* @key1:	the from futex key
* @key2:	the to futex key
* @ps:		address to store the pi_state pointer
+ * @exiting:	Pointer to store the task pointer of the owner task
+ * which is in the middle of exiting
* @set_waiters:force setting the FUTEX_WAITERS bit (1) or not (0)
*
* Try and get the lock on behalf of the top waiter if we can do it atomically.
@@ -1795,16 +1947,20 @@
* then direct futex_lock_pi_atomic() to force setting the FUTEX_WAITERS bit.
* hb1 and hb2 must be held by the caller.
*
+ * @exiting is only set when the return value is -EBUSY. If so, this holds
+ * a refcount on the exiting task on return and the caller needs to drop it
+ * after waiting for the exit to complete.
+ *
* Return:
* - 0 - failed to acquire the lock atomically;
* - >0 - acquired the lock, return value is vpid of the top_waiter
* - <0 - error
*/
- static int futex_proxy_trylock_atomic(u32 __user *pifutex,
- struct futex_hash_bucket *hb1,
- struct futex_hash_bucket *hb2,
struct futex_pi_state **ps, int set_waiters)
+
static int
futex_proxy_trylock_atomic(u32 __user *pifutex, struct futex_hash_bucket *hb1,
+ struct futex_hash_bucket *hb2, union futex_key *key1,
+ union futex_key *key2, struct futex_pi_state **ps,
+ struct task_struct **exiting, int set_waiters)
{
    struct futex_q *top_waiter = NULL;
    u32 curval;
    vpid = task_pid_vnr(top_waiter->task);
    ret = futex_lock_pi_atomic(pifutex, hb2, key2, ps, top_waiter->task,
- set_waiters);
+ exiting, set_waiters);
    if (ret == 1) {
        requeue_pi_wake_futex(top_waiter, key2, hb2);
        return vpid;
    }
}

if (requeue_pi && (task_count - nr_wake < nr_requeue)) {
+ struct task_struct *exiting = NULL;
+
/*
 * Attempt to acquire uaddr2 and wake the top waiter. If we
 * intend to requeue waiters, force setting the FUTEX_WAITERS
 @ @ -1977,7 +2135,8 @@
 * faults rather in the requeue loop below.
 */
ret = futex_proxy_trylock_atomic(uaddr2, hb1, hb2, &key1,
- &key2, &pi_state, nr_requeue);
+ &key2, &pi_state,
+ &exiting, nr_requeue);
/

/*
 * At this point the top_waiter has either taken uaddr2 or is
 @ @ -2004,7 +2163,8 @@
 * If that call succeeds then we have pi_state and an
 * initial refcount on it.
 */
- ret = lookup_pi_state(uaddr2, ret, hb2, &key2, &pi_state);
+ ret = lookup_pi_state(uaddr2, ret, hb2, &key2,
+ &pi_state, &exiting);
}

switch (ret) {
if (!ret)
goto retry;
goto out;
+case -EBUSY:
case -EAGAIN:
	/*
 * Two reasons for this:
- * - Owner is exiting and we just wait for the
+ * - EBUSY: Owner is exiting and we just wait for the
 * exit to complete.
- * - The user space value changed.
+ * - EAGAIN: The user space value changed.
 */
double_unlock_hb(hb1, hb2);
hb_waiters_dec(hb2);
put_futex_key(&key2);
put_futex_key(&key1);
+/*
 * Handle the case where the owner is in the middle of
 * exiting. Wait for the exit to complete otherwise
 * this task might loop forever, aka. live lock.
 */
+wait_for_owner_exiting(ret, exiting);
cond_resched();
goto retry;
default:
//@ -2297,18 +2464,13 @@
spin_unlock(q->lock_ptr);
}

-static int fixup_pi_state_owner(u32 __user *uaddr, struct futex_q *q,
-struct task_struct *argowner)
+static int __fixup_pi_state_owner(u32 __user *uaddr, struct futex_q *q,
 + struct task_struct *argowner)
 {
+u32 uval, uninitialized_var(curval), newval, newtid;
 struct futex_pi_state *pi_state = q->pi_state;
 -u32 uval, uninitialized_var(curval), newval;
 struct task_struct *oldowner, *newowner;
 -u32 newtid;
-int ret;
 -
-lockdep_assert_held(q->lock_ptr);
 -
-raw_spin_lock_irq(&pi_state->pi_mutex.wait_lock);
+int err = 0;
oldowner = pi_state->owner;

@@ -2342,21 +2504,31 @@
 * We raced against a concurrent self; things are
 * already fixed up. Nothing to do.
 */
-ret = 0;
-goto out_unlock;
+return 0;
 }

if (__rt_mutex_futex_trylock(&pi_state->pi_mutex)) { 
-/* We got the lock after all, nothing to fix. */
-ret = 0;
-goto out_unlock;
+/* We got the lock. pi_state is correct. Tell caller. */
+return 1;
 }

/*
 - * Since we just failed the trylock; there must be an owner.
 + * The trylock just failed, so either there is an owner or
 + * there is a higher priority waiter than this one.
 */
newowner = rt_mutex_owner(&pi_state->pi_mutex);
-BUG_ON(!newowner);
+-BUG_ON(!newowner);
+/*
 + * If the higher priority waiter has not yet taken over the
 + * rtmutex then newowner is NULL. We can't return here with
 + * that state because it's inconsistent vs. the user space
 + * state. So drop the locks and try again. It's a valid
 + * situation and not any different from the other retry
 + * conditions.
 + */
+if (unlikely(!newowner)) {
+err = -EAGAIN;
+goto handle_err;
+} 
} else {
WARN_ON_ONCE(argowner != current);
if (oldowner == current) {
@@ -2364,8 +2536,7 @@
 * We raced against a concurrent self; things are
 * already fixed up. Nothing to do.
 */
-ret = 0;
-goto out_unlock;
+return 1;
newowner = argowner;

if (!pi_state->owner)
newtid |= FUTEX_OWNER_DIED;

if (get_futex_value_locked(&uval, uaddr))
goto handle_fault;
+err = get_futex_value_locked(&uval, uaddr);
+if (err)
+goto handle_err;

for (;;) {
newval = (uval & FUTEX_OWNER_DIED) | newtid;

if (cmpxchg_futex_value_locked(&curval, uaddr, uval, newval))
goto handle_fault;
+err = cmpxchg_futex_value_locked(&curval, uaddr, uval, newval);
+if (err)
+goto handle_err;
+
if (curval == uval)
break;
uval = curval;
@@ -2392,41 +2566,41 @@
 * We fixed up user space. Now we need to fix the pi_state
 * itself.
 */
-if (pi_state->owner != NULL) {
-raw_spin_lock(&pi_state->owner->pi_lock);
-WARN_ON(list_empty(&pi_state->list));
-list_del_init(&pi_state->list);
-raw_spin_unlock(&pi_state->owner->pi_lock);
-}
-
-pi_state->owner = newowner;
-
-raw_spin_lock(&newowner->pi_lock);
-WARN_ON(list_empty(&pi_state->list));
-list_add(&pi_state->list, &newowner->pi_state_list);
-raw_spin_unlock(&newowner->pi_lock);
-raw_spin_unlock_irq(&pi_state->pi_mutex.wait_lock);
+pi_state_update_owner(pi_state, newowner);

-return 0;
+return argowner == current;
/ * To handle the page fault we need to drop the locks here. That gives
 * the other task (either the highest priority waiter itself or the
 * task which stole the rtmutex) the chance to try the fixup of the
 * pi_state. So once we are back from handling the fault we need to
 * check the pi_state after reacquiring the locks and before trying to
 * do another fixup. When the fixup has been done already we simply
 * return.
 + * In order to reschedule or handle a page fault, we need to drop the
 + locks here. In the case of a fault, this gives the other task
 + (either the highest priority waiter itself or the task which stole
 + the rtmutex) the chance to try the fixup of the pi_state. So once we
 + are back from handling the fault we need to check the pi_state after
 + reacquiring the locks and before trying to do another fixup. When
 + the fixup has been done already we simply return.
 *
 * Note: we hold both hb->lock and pi_mutex->wait_lock. We can safely
 * drop hb->lock since the caller owns the hb->futex_q relation.
 * Dropping the pi_mutex->wait_lock requires the state revalidate.
 */
-handle_fault:
+handle_err:
    raw_spin_unlock_irq(&pi_state->pi_mutex.wait_lock);
    spin_unlock(q->lock_ptr);

-ret = fault_in_user_writeable(uaddr);
+switch (err) {
+    case -EFAULT:
+        err = fault_in_user_writeable(uaddr);
+        break;
+    case -EAGAIN:
+        cond_resched();
+        err = 0;
+        break;
+    default:
+        WARN_ON_ONCE(1);
+        break;
+}

    spin_lock(q->lock_ptr);
    raw_spin_lock_irq(&pi_state->pi_mutex.wait_lock);
    @@ -2434,17 +2608,44 @@
 /*
 * Check if someone else fixed it for us:
 */
-if (pi_state->owner != oldowner) {
-ret = 0;
-goto out_unlock;
{
+if (pi_state->owner != oldowner)
+return argowner == current;

-if (ret)
-goto out_unlock;
+/** Retry if err was -EAGAIN or the fault in succeeded */
+if (!err)
+goto retry;

-goto retry;
+/**
+ * fault_in_user_writeable() failed so user state is immutable. At
+ * best we can make the kernel state consistent but user state will
+ * be most likely hosed and any subsequent unlock operation will be
+ * rejected due to PI futex rule [10].
+ *
+ * Ensure that the rtmutex owner is also the pi_state owner despite
+ * the user space value claiming something different. There is no
+ * point in unlocking the rtmutex if current is the owner as it
+ * would need to wait until the next waiter has taken the rtmutex
+ * to guarantee consistent state. Keep it simple. Userspace asked
+ * for this wreckaged state.
+ *
+ * The rtmutex has an owner - either current or some other
+ * task. See the EAGAIN loop above.
+ */
+pi_state_update_owner(pi_state, rt_mutex_owner(&pi_state->pi_mutex));

-out_unlock:
+return err;
+}
+
+static int fixup_pi_state_owner(u32 __user *uaddr, struct futex_q *q,
+struct task_struct *argowner)
+{
+struct futex_pi_state *pi_state = q->pi_state;
+int ret;
+
+lockdep_assert_held(q->lock_ptr);
+
+raw_spin_lock_irq(&pi_state->pi_mutex.wait_lock);
+
+ret = __fixup_pi_state_owner(uaddr, q, argowner);
+raw_spin_unlock_irq(&pi_state->pi_mutex.wait_lock);
+return ret;
+}
static int fixup_owner(u32 __user *uaddr, struct futex_q *q, int locked)
{
    int ret = 0;
    
    if (locked) {
        /*
         * Got the lock. We might not be the anticipated owner if we
         * stable state, anything else needs more attention.
         */
        if (q->pi_state->owner != current)
            ret = fixup_pi_state_owner(uaddr, q, current);
        goto out;
        
        /*
         * Another speculative read; pi_state->owner == current is unstable
         * but needs our attention.
         */
        if (q->pi_state->owner == current)
            ret = fixup_pi_state_owner(uaddr, q, NULL);
        goto out;
    }

    /*
    * Paranoia check. If we did not take the lock, then we should not be
    * the owner of the rt_mutex.
    * the owner of the rt_mutex. Warn and establish consistent state.
    */
    if (rt_mutex_owner(&q->pi_state->pi_mutex) == current)
        printk(KERN_ERR "fixup_owner: ret = %d pi-mutex: %p pi-state %p
", ret,
                q->pi_state->pi_mutex.owner,
                q->pi_state->owner);
    goto out;
    
    +if (WARN_ON_ONCE(rt_mutex_owner(&q->pi_state->pi_mutex) == current))
        return fixup_pi_state_owner(uaddr, q, current);
    
    out:
    return ret ? ret : locked;
    +return 0;
/**
   @@ -2683,14 +2875,13 @@
   goto out;

   restart = &current->restart_block;
   -restart->fn = futex_wait_restart;
   restart->futex.uaddr = uaddr;
   restart->futex.val = val;
   restart->futex.time = *abs_time;
   restart->futex.bitset = bitset;
   restart->futex.flags = flags | FLAGS_HAS_TIMEOUT;

   -ret = -ERESTART_RESTARTBLOCK;
   +ret = set_restart_fn(restart, futex_wait_restart);

   out:
   if (to) {
      @@ -2730,7 +2921,7 @@
       ktime_t *time, int trylock)
    }
    struct hrtimer_sleeper timeout, *to = NULL;
    -struct futex_pi_state *pi_state = NULL;
    +struct task_struct *exiting = NULL;
    struct rt_mutex_waiter rt_waiter;
    struct futex_hash_bucket *hb;
    struct futex_q q = futex_q_init;
    @@ -2758,7 +2949,8 @@
    retry_private:
     hb = queue_lock(&q);

     -ret = futex_lock_pi_atomic(uaddr, hb, &q.key, &q.pi_state, current, 0);
     +ret = futex_lock_pi_atomic(uaddr, hb, &q.key, &q.pi_state, current,
       +&exiting, 0);
     if (unlikely(ret)) {
       /*
        * Atomic work succeeded and we got the lock,
        @@ -2771,15 +2963,22 @@
        goto out_unlock_put_key;
        case -EFAULT:
        goto uaddr_faulted;
        +case -EBUSY:
        case -EAGAIN:
       /*
        * Two reasons for this:
        - * - Task is exiting and we just wait for the
        + * - EBUSY: Task is exiting and we just wait for the

queue_unlock(hb);
put_futex_key(&q.key);
+
/*
 + Handle the case where the owner is in the middle of
 + exiting. Wait for the exit to complete otherwise
 + this task might loop forever, aka. live lock.
 + */
+wait_for_owner_exiting(ret, exiting);
cond_resched();
goto retry;
default:
@@ -2811,35 +3010,39 @@
+ and BUG when futex_unlock_pi() interleaves with this.
 *
 + Therefore acquire wait_lock while holding hb->lock, but drop the
 - * latter before calling rt_mutex_start_proxy_lock(). This still fully
 - * serializes against futex_unlock_pi() as that does the exact same
 - * lock handoff sequence.
 + * latter before calling __rt_mutex_start_proxy_lock(). This
 + * interleaves with futex_unlock_pi() -- which does a similar lock
 + * handoff -- such that the latter can observe the futex_q::pi_state
 + * before __rt_mutex_start_proxy_lock() is done.
 + */
raw_spin_lock_irq(&q.pi_state->pi_mutex.wait_lock);
spin_unlock(q.lock_ptr);
+
+__rt_mutex_start_proxy_lock() unconditionally enqueues the @rt_waiter
+ such that futex_unlock_pi() is guaranteed to observe the waiter when
+ it sees the futex_q::pi_state.
+ */
ret = __rt_mutex_start_proxy_lock(&q.pi_state->pi_mutex, &rt_waiter, current);
raw_spin_unlock_irq(&q.pi_state->pi_mutex.wait_lock);

if (ret) {
    if (ret == 1)
ret = 0;
-    spin_lock(q.lock_ptr);
-    goto no_block;
+    goto cleanup;
}

-    if (unlikely(to))
hrtimer_start_expires(&to->timer, HRTIMER_MODE_ABS);

ret = rt_mutex_wait_proxy_lock(&q.pi_state->pi_mutex, to, &rt_waiter);

+cleanup:
spin_lock(q.lock_ptr);
/*
 - * If we failed to acquire the lock (signal/timeout), we must
 + * If we failed to acquire the lock (deadlock/signal/timeout), we must
 * first acquire the hb->lock before removing the lock from the
 - * rt_mutex waitqueue, such that we can keep the hb and rt_mutex
 - * wait lists consistent.
+ * rt_mutex waitqueue, such that we can keep the hb and rt_mutex wait
+ * lists consistent.
 * * In particular; it is important that futex_unlock_pi() can not
* observe this inconsistency.
@@ -2860,23 +3063,9 @@
if (res)
ret = (res < 0) ? res : 0;

-/*
-* If fixup_owner() faulted and was unable to handle the fault, unlock
-* it and return the fault to userspace.
-* */
-if (ret && (rt_mutex_owner(&q.pi_state->pi_mutex) == current)) {
- pi_state = q.pi_state;
- get_pi_state(pi_state);
-}
-
-/* Unqueue and drop the lock */
unqueue_me_pi(&q);

-if (pi_state) {
-rt_mutex_futex_unlock(&pi_state->pi_mutex);
-put_pi_state(pi_state);
-}
-
-goto out_put_key;

out_unlock_put_key:
@@ -2963,6 +3152,10 @@
* there is no point where we hold neither; and therefore
* wake_futex_pi() must observe a state consistent with what we
* observed.
+ *
+ * In particular; this forces __rt_mutex_start_proxy() to
+ * complete such that we're guaranteed to observe the
+ * rt_waiter. Also see the WARN in wake_futex_pi().
+ /*
+ raw_spin_lock_irq(&pi_state->pi_mutex.wait_lock);
+ spin_unlock(&hb->lock);
+ @@ -2987,10 +3180,8 @@
+ * A unconditional UNLOCK_PI op raced against a waiter
+ * setting the FUTEX_WAITERS bit. Try again.
+ */
+ -if (ret == -EAGAIN) {
+ -put_futex_key(&key);
+ -goto retry;
+ -}
+ +if (ret == -EAGAIN)
+ +goto pi_retry;
+ /*
+ * wake_futex_pi has detected invalid state. Tell user
+ * space.
+ @@ -3005,9 +3196,19 @@
+ * preserve the WAITERS bit not the OWNER_DIED one. We are the
+ * owner.
+ */
+ -if (cmpxchg_futex_value_locked(&curval, uaddr, uval, 0)) {
+ +if ((ret = cmpxchg_futex_value_locked(&curval, uaddr, uval, 0))) {
+ spin_unlock(&hb->lock);
+ -goto pi_faulted;
+ +switch (ret) {
+ +case -EFAULT:
+ +goto pi_faulted;
+ +
+ +case -EAGAIN:
+ +goto pi_retry;
+ +
+ +default:
+ +WARN_ON_ONCE(1);
+ +goto out_putkey;
+ +}
+ }
+ */
+ @@ -3021,6 +3222,11 @@
+ put_futex_key(&key);
+ return ret;
+ +pi_retry:
+ +put_futex_key(&key);
+ +cond_resched();
+ +goto retry;
+ +
pi_faulted:
put_futex_key(&key);

@@ -3125,7 +3331,6 @@
 u32 __user *uaddr2)
 {
 struct hrtimer_sleeper timeout, *to = NULL;
-struct futex_pi_state *pi_state = NULL;
 struct rt_mutex_waiter rt_waiter;
 struct futex_hash_bucket *hb;
 union futex_key key2 = FUTEX_KEY_INIT;
@@ -3210,16 +3415,17 @@
 if (q.pi_state && (q.pi_state->owner != current)) {
     spin_lock(q.lock_ptr);
     ret = fixup_pi_state_owner(uaddr2, &q, current);
-    if (ret && rt_mutex_owner(&q.pi_state->pi_mutex) == current) {
-        pi_state = q.pi_state;
-        get_pi_state(pi_state);
-    }
-} /*
 * Drop the reference to the pi state which
 * the requeue_pi() code acquired for us.
 */
     put_pi_state(q.pi_state);
     spin_unlock(q.lock_ptr);
+/*
+ * Adjust the return value. It's either -EFAULT or
+ * success (1) but the caller expects 0 for success.
+ */
+ret = ret < 0 ? ret : 0;
 } } else {
 struct rt_mutex *pi_mutex;
@@ -3250,25 +3456,10 @@
 if (res)
     ret = (res < 0) ? res : 0;
-    /* If fixup_pi_state_owner() faulted and was unable to handle
-     * the fault, unlock the rt_mutex and return the fault to
-     * userspace.
-     */
-    if (ret && rt_mutex_owner(&q.pi_state->pi_mutex) == current) {
-        pi_state = q.pi_state;
-        get_pi_state(pi_state);
-    }
-} /* Unqueue and drop the lock. */
unqueue_me_pi(&q);
}

-if (pi_state) {
-rt_mutex_futex_unlock(&pi_state->pi_mutex);
-put_pi_state(pi_state);
-}
-
-if (ret == -EINTR) {
/*
 * We've already been requeued, but cannot restart by calling
 @ @ .3374,54 +3565,115 @ @
 return ret;
 }

+/* Constants for the pending_op argument of handle_futex_death */
+#define HANDLE_DEATH_PENDINGtrue
+#define HANDLE_DEATH_LISTfalse
+
/*
 * Process a futex-list entry, check whether it's owned by the
 * dying task, and do notification if so:
 */
-int handle_futex_death(u32 __user *uaddr, struct task_struct *curr, int pi)
+static int handle_futex_death(u32 __user *uaddr, struct task_struct *curr,
+bool pi, bool pending_op)
{
 u32 uval, uninitialized_var(nval), mval;
+int err;
 +
retry:
 if (get_user(uval, uaddr))
 return -1;

-if ((uval & FUTEX_TID_MASK) == task_pid_vnr(curr)) {
-/* Ok, this dying thread is truly holding a futex
 - * of interest. Set the OWNER_DIED bit atomically
 - * via cmpxchg, and if the value had FUTEX_WAITERS
 - * set, wake up a waiter (if any). (We have to do a
 - * futex_wake() even if OWNER_DIED is already set -
 - * to handle the rare but possible case of recursive
 - * thread-death.) The rest of the cleanup is done in
 - * userspace.

- */
-mval = (uval & FUTEX_WAITERS) | FUTEX_OWNER_DIED;
- */
- * We are not holding a lock here, but we want to have
- * the pagefault_disable/enable() protection because
- * we want to handle the fault gracefully. If the
- * access fails we try to fault in the futex with R/W
- * verification via get_user_pages. get_user() above
- * does not guarantee R/W access. If that fails we
- * give up and leave the futex locked.
- */
-*/
-if (cmpxchg_futex_value_locked(&nval, uaddr, uval, mval)) {
+ /*
+ * Special case for regular (non PI) futexes. The unlock path in
+ * user space has two race scenarios:
+ *
+ * 1. The unlock path releases the user space futex value and
+ * before it can execute the futex() syscall to wake up
+ * waiters it is killed.
+ *
+ * 2. A woken up waiter is killed before it can acquire the
+ * futex in user space.
+ *
+ * In both cases the TID validation below prevents a wakeup of
+ * potential waiters which can cause these waiters to block
+ * forever.
+ *
+ * In both cases the following conditions are met:
+ *
+ * 1) task->robust_list->list_op_pending != NULL
+ * @pending_op == true
+ * 2) User space futex value == 0
+ * 3) Regular futex: @pi == false
+ *
+ * If these conditions are met, it is safe to attempt waking up a
+ * potential waiter without touching the user space futex value and
+ * trying to set the OWNER_DIED bit. The user space futex value is
+ * uncontended and the rest of the user space mutex state is
+ * consistent, so a woken waiter will just take over the
+ * uncontended futex. Setting the OWNER_DIED bit would create
+ * inconsistent state and malfunction of the user space owner died
+ * handling.
+ */
+if (pending_op && !pi && !uval) {
+futex_wake(uaddr, 1, 1, FUTEX_BITSET_MATCH_ANY);
+return 0;
+}
+if ((uval & FUTEX_TID_MASK) != task_pid_vnr(curr))
+return 0;
+
+/*
+ * Ok, this dying thread is truly holding a futex
+ * of interest. Set the OWNER_DIED bit atomically
+ * via cmpxchg, and if the value had FUTEX_WAITERS
+ * set, wake up a waiter (if any). (We have to do a
+ * futex_wake() even if OWNER_DIED is already set -
+ * to handle the rare but possible case of recursive
+ * thread-death.) The rest of the cleanup is done in
+ * userspace.
+ */
+mval = (uval & FUTEX_WAITERS) | FUTEX_OWNER_DIED;
+
+/*
+ * We are not holding a lock here, but we want to have
+ * the pagefault_disable/enable() protection because
+ * we want to handle the fault gracefully. If the
+ * access fails we try to fault in the futex with R/W
+ * verification via get_user_pages. get_user() above
+ * does not guarantee R/W access. If that fails we
+ * give up and leave the futex locked.
+ */
+if ((err = cmpxchg_futex_value_locked(&nval, uaddr, uval, mval))) {
+switch (err) {
+case -EFAULT:
+  if (fault_in_user_writeable(uaddr))
+    return -1;
+  goto retry;
+}
+break;
+default:
+  WARN_ON_ONCE(1);
+  return err;
+}
+
+/*
- * Wake robust non-PI futexes here. The wakeup of
- * PI futexes happens in exit_pi_state():
- */
-/*
- if (!pi && (uval & FUTEX_WAITERS))
- futex_wake(uaddr, 1, 1, FUTEX_BITSET_MATCH_ANY);
+default:
+  WARN_ON_ONCE(1);
+  return err;
+}
+}
+if (nval != uval)
+goto retry;
+
+/*
+ * Wake robust non-PI futexes here. The wakeup of
+ * PI futexes happens in exit_pi_state():
+ */
+if (!pi && (uval & FUTEX_WAITERS))
futex_wake(uaddr, 1, 1, FUTEX_BITSET_MATCH_ANY);
+return 0;
}

@@ -3449,7 +3701,7 @@
 *
 * We silently return on any sign of list-walking problem.
 */
-void exit_robust_list(struct task_struct *curr)
+static void exit_robust_list(struct task_struct *curr)
{
 struct robust_list_head __user *head = curr->robust_list;
 struct robust_list __user *entry, *next_entry, *pending;
@@ -3490,10 +3742,11 @@
 * A pending lock might already be on the list, so
 * don't process it twice:
 */
-if (entry != pending)
+if (entry != pending) {
if (handle_futex_death((void __user *)entry + futex_offset,
-   curr, pi))
+   curr, pi, HANDLE_DEATH_LIST))
  return;
+}
 if (rc)
 return;
entry = next_entry;
@@ -3507,9 +3760,118 @@
cond_resched();
}

-if (pending)
+if (pending) {
   handle_futex_death((void __user *)pending + futex_offset,
      -curr, pip);
+   curr, pip, HANDLE_DEATH_PENDING);
+}
+}
static void futex_cleanup(struct task_struct *tsk) {
  if (unlikely(tsk->robust_list)) {
    exit_robust_list(tsk);
    tsk->robust_list = NULL;
  }

  #ifdef CONFIG_COMPAT
  if (unlikely(tsk->compat_robust_list)) {
    compat_exit_robust_list(tsk);
    tsk->compat_robust_list = NULL;
  }
  #endif

  if (unlikely(!list_empty(&tsk->pi_state_list)))
    exit_pi_state_list(tsk);
}

/**
 * futex_exit_recursive - Set the tasks futex state to FUTEX_STATE_DEAD
 * @tsk: task to set the state on
 *
 * Set the futex exit state of the task lockless. The futex waiter code
 * observes that state when a task is exiting and loops until the task has
 * actually finished the futex cleanup. The worst case for this is that the
 * waiter runs through the wait loop until the state becomes visible.
 *
 * This is called from the recursive fault handling path in do_exit().
 *
 * This is best effort. Either the futex exit code has run already or
 * not. If the OWNER_DIED bit has been set on the futex then the waiter can
 * take it over. If not, the problem is pushed back to user space. If the
 * futex exit code did not run yet, then an already queued waiter might
 * block forever, but there is nothing which can be done about that.
 */
void futex_exit_recursive(struct task_struct *tsk) {
  /* If the state is FUTEX_STATE_EXITING then futex_exit_mutex is held */
  if (tsk->futex_state == FUTEX_STATE_EXITING)
    mutex_unlock(&tsk->futex_exit_mutex);
  tsk->futex_state = FUTEX_STATE_DEAD;
}

static void futex_cleanup_begin(struct task_struct *tsk) {
  /* Prevent various race issues against a concurrent incoming waiter */
+ * including live locks by forcing the waiter to block on
+ * tsk->futex_exit_mutex when it observes FUTEX_STATE_EXITING in
+ * attach_to_pi_owner().
+ */
+ mutex_lock(&tsk->futex_exit_mutex);
+ /*
+ * Switch the state to FUTEX_STATE_EXITING under tsk->pi_lock.
+ *
+ * This ensures that all subsequent checks of tsk->futex_state in
+ * attach_to_pi_owner() must observe FUTEX_STATE_EXITING with
+ * tsk->pi_lock held.
+ *
+ * It guarantees also that a pi_state which was queued right before
+ * the state change under tsk->pi_lock by a concurrent waiter must
+ * be observed in exit_pi_state_list().
+ */
+ raw_spin_lock_irq(&tsk->pi_lock);
+ tsk->futex_state = FUTEX_STATE_EXITING;
+ raw_spin_unlock_irq(&tsk->pi_lock);
+ }
+
+static void futex_cleanup_end(struct task_struct *tsk, int state)
+{
+ /*
+ * Lockless store. The only side effect is that an observer might
+ * take another loop until it becomes visible.
+ */
+ tsk->futex_state = state;
+ /*
+ * Drop the exit protection. This unblocks waiters which observed
+ * FUTEX_STATE_EXITING to reevaluate the state.
+ */
+ mutex_unlock(&tsk->futex_exit_mutex);
+ }
+
+void futex_exec_release(struct task_struct *tsk)
+{
+ /*
+ * The state handling is done for consistency, but in the case of
+ * exec() there is no way to prevent further damage as the PID stays
+ * the same. But for the unlikely and arguably buggy case that a
+ * futex is held on exec(), this provides at least as much state
+ * consistency protection which is possible.
+ */
+ futex_cleanup_begin(tsk);
+ futex_cleanup(tsk);
+/*
+ * Reset the state to FUTEX_STATE_OK. The task is alive and about
+ * exec a new binary.
+ */
+futex_cleanup_end(tsk, FUTEX_STATE_OK);
+}
+
+void futex_exit_release(struct task_struct *tsk)
+{
+futex_cleanup_begin(tsk);
+futex_cleanup(tsk);
+futex_cleanup_end(tsk, FUTEX_STATE_DEAD);
}
long do_futex(u32 __user *uaddr, int op, u32 val, ktime_t *timeout,
@@ -3523,8 +3885,7 @@
if (op & FUTEX_CLOCK_REALTIME) {
flags |= FLAGS_CLOCKRT;
-if (cmd != FUTEX_WAIT && cmd != FUTEX_WAIT_BITSET && \
- cmd != FUTEX_WAIT_REQUEUE_PI)
+if (cmd != FUTEX_WAIT_BITSET &&cmd != FUTEX_WAIT_REQUEUE_PI)
return -ENOSYS;
}
@@ -3605,6 +3966,193 @@
return do_futex(uaddr, op, val, tp, uaddr2, val2, val3);
}
+#ifdef CONFIG_COMPAT
+/*
+ * Fetch a robust-list pointer. Bit 0 signals PI futexes:
+ */
+static inline int
+compat_fetch_robust_entry(compat_uptr_t *uentry, struct robust_list __user **entry,
+ compat_uptr_t __user *head, unsigned int *pi)
+{
+if (get_user(*uentry, head))
+return -EFAULT;
+
+*entry = compat_ptr((*uentry) & ~1);
+*pi = (unsigned int)(*uentry) & 1;
+
+return 0;
+}
+
+static void __user *futex_uaddr(struct robust_list __user *entry,
+compat_long_t futex_offset)
+{

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compat_uptr_t base = ptr_to_compat(entry);
void __user *uaddr = compat_ptr(base + futex_offset);
+
+return uaddr;
+
+/*
+ * Walk curr->robust_list (very carefully, it's a userspace list!)
+ * and mark any locks found there dead, and notify any waiters.
+ *
+ * We silently return on any sign of list-walking problem.
+ */
+static void compat_exit_robust_list(struct task_struct *curr)
+
+static void compat_exit_robust_list(struct task_struct *curr)
+{
+struct compat_robust_list_head __user *head = curr->compat_robust_list;
+struct robust_list __user *entry, *next_entry, *pending;
+unsigned int limit = ROBUST_LIST_LIMIT, pi, pip;
+unsigned int uninitialized_var(next_pi);
+compat_uptr_t uentry, next_uentry, upending;
+futex_offset;
+int rc;
+}
+if (!futex_cmpxchg_enabled)
+return;
+
+/*
+ * Fetch the list head (which was registered earlier, via
+ * sys_set_robust_list()):
+ */
+if (compat_fetch_robust_entry(&uentry, &entry, &head->list.next, &pi))
+return;
+
+/*
+ * Fetch the relative futex offset:
+ */
+if (get_user(futex_offset, &head->futex_offset))
+return;
+
+/*
+ * Fetch any possibly pending lock-add first, and handle it
+ * if it exists:
+ */
+if (compat_fetch_robust_entry(&upending, &pending,
+    &head->list_op_pending, &pip))
+return;
+
+next_entry = NULL;/* avoid warning with gcc */
+while (entry != (struct robust_list __user *) &head->list) {
+/*
+ * Fetch the next entry in the list before calling
+ * handle_futex_death:
+ */
+rc = compat_fetch_robust_entry(&next_uentry, &next_entry,
+(compat_uptr_t __user *)&entry->next, &next_pi);
+/*
+ * A pending lock might already be on the list, so
+ * dont process it twice:
+ */
+if (entry != pending) {
+void __user *uaddr = futex_uaddr(entry, futex_offset);
+
+if (handle_futex_death(uaddr, curr, pi,
+HANDLE_DEATH_LIST))
+return;
+
+}
+if (rc)
+return;
+uentry = next_uentry;
+entry = next_entry;
+pi = next_pi;
+/*
+ * Avoid excessively long or circular lists:
+ */
+if (!--limit)
+break;
+
+cond_resched();
+
+if (pending) {
+void __user *uaddr = futex_uaddr(pending, futex_offset);
+
+handle_futex_death(uaddr, curr, pip, HANDLE_DEATH_PENDING);
+
+
+}
+}
+
+COMPAT_SYSCALL_DEFINE2(set_robust_list,
+struct compat_robust_list_head __user *, head,
+compat_size_t, len)
+{
+if (!futex_cmpxchg_enabled)
+return -ENOSYS;
+
+if (unlikely(len != sizeof(*head)))
+return -EINVAL;
+
+current->compat_robust_list = head;
+
+return 0;
+{
+struct compat_robust_list_head __user *head;
+unsigned long ret;
+struct task_struct *p;
+
+if (!futex_cmpxchg_enabled)
+return -ENOSYS;
+
+rcu_read_lock();
+
+ret = -ESRCH;
+if (!pid)
+  p = current;
+else {
+  p = find_task_by_vpid(pid);
+  if (!p)
+    goto err_unlock;
+
+  ret = -EPERM;
+  if (!ptrace_may_access(p, PTRACE_MODE_READ_REALCREDS))
+    goto err_unlock;
+
+  head = p->compat_robust_list;
+  rcu_read_unlock();
+
+  if (put_user(sizeof(*head), len_ptr))
+    return -EFAULT;
+  return put_user(ptr_to_compat(head), head_ptr);
+
+err_unlock:
+  rcu_read_unlock();
+
+  return ret;
+
+
+COMPAT_SYSCALL_DEFINE6(futex, u32 __user *, uaddr, int, op, u32, val,
+struct compat_timespec __user *, utime, u32 __user *, uaddr2,
+u32, val3)
+
{+struct timespec ts;
+ktime_t, *tp = NULL;
+int val2 = 0;
int cmd = op & FUTEX_CMD_MASK;
+
if (utime && (cmd == FUTEX_WAIT || cmd == FUTEX_LOCK_PI ||
    cmd == FUTEX_WAIT_BITSET ||
    cmd == FUTEX_WAIT_REQUEUE_PI)) {
    if (compat_get timespec(&ts, utime))
        return -EFAULT;
    if (!timespec_valid(&ts))
        return -EINVAL;

    t = timespec_to_ktime(ts);
    if (cmd == FUTEX_WAIT)
        t = ktime_add_safe(ktime_get(), t);
    tp = &t;
}

if (cmd == FUTEX_REQUEUE || cmd == FUTEX_CMP_REQUEUE ||
    cmd == FUTEX_CMP_REQUEUE_PI || cmd == FUTEX_WAKE_OP)
    val2 = (int) (unsigned long) utime;
+
return do_futex(uaddr, op, val, tp, uaddr2, val2, val3);
}
#endif /* CONFIG_COMPAT */

static void __init futex_detect_cmpxchg(void)
{
    ifndef CONFIG_HAVE_FUTEX_CMPXCHG
        --- linux-4.15.0.orig/kernel/gcov/fs.c
        +++ linux-4.15.0/kernel/gcov/fs.c
        @@ -109,9 +109,9 @@
            }
        struct gcov_iterator *iter = data;

        (*pos)++;
        if (gcov_iter_next(iter))
            return NULL;
    -*pos)++;

    return iter;
}

--- linux-4.15.0.orig/kernel/gcc_4_7.c
++ linux-4.15.0/kernel/gcc_4_7.c
@@ -19.7 +19.9 @@
#include <linux/vmalloc.h>
#include "gcov.h"

-#if (__GNUC__ >= 7)
+##if (__GNUC__ >= 10)
+##define GCOV_COUNTERS			8
+#elif (__GNUC__ >= 7)
#define GCOV_COUNTERS 9
+#elif (__GNUC__ > 5) || (__GNUC__ == 5 && __GNUC_MINOR__ >= 1)
#define GCOV_COUNTERS 10
--- linux-4.15.0.orig/kernel/hung_task.c
+++ linux-4.15.0/kernel/hung_task.c
@@ -15,6 +15,7 @@
#include <linux/lockdep.h>
#include <linux/export.h>
#include <linux/sysctl.h>
+/#include <linux/suspend.h>
#include <linux/utsname.h>
#include <linux/sched/signal.h>
#include <linux/sched/debug.h>
@@ -33,7 +34,7 @@
* is disabled during the critical section. It also controls the size of
* the RCU grace period. So it needs to be upper-bound.
*/
-#define HUNG_TASK_BATCHING 1024
+#define HUNG_TASK_LOCK_BREAK (HZ / 10)

/*
 * Zero means infinite timeout - no checking done:
 @@ -44,6 +45,7 @@
 static int __read_mostly did_panic;
 static bool hung_task_show_lock;
+static bool hung_task_call_panic;

 static struct task_struct *watchdog_task;
@@ -102,8 +104,11 @@
}

trace_sched_process_hang(t);

-if (!sysctl_hung_task_warnings && !sysctl_hung_task_panic)
-return;
+if (sysctl_hung_task_panic) {
+console_verbose();
+hung_task_show_lock = true;
+hung_task_call_panic = true;
+}

/*
 * Ok, the task did not get scheduled for more than 2 minutes,
 @@ -125,13 +130,6 @@
}
touch_nmi_watchdog();
-
-if (sysct1_hung_task_panic) {
- if (hung_task_show_lock)
- debug_show_all_locks();
- trigger_all_cpu_backtrace();
- panic("hung_task: blocked tasks");
- }
} }

/*
@@ -165,7 +163,7 @@
static void check_hung_uninterruptible_tasks(unsigned long timeout)
 {
 int max_count = sysctl_hung_task_check_count;
- int batch_count = HUNG_TASK_BATCHING;
+ unsigned long last_break = jiffies;
 struct task_struct *g, *t;

 /*
@@ -180,10 +178,10 @@
 for_each_process_thread(g, t) {
 if (!max_count--)
 goto unlock;
- if (!--batch_count) {
- batch_count = HUNG_TASK_BATCHING;
+ if (time_after(jiffies, last_break + HUNG_TASK_LOCK_BREAK)) {
+ if (!rcu_lock_break(g, t))
 goto unlock;
+ last_break = jiffies;
 } 
 /* use "==" to skip the TASK_KILLABLE tasks waiting on NFS */
 if (t->state == TASK_UNINTERRUPTIBLE)
@@ -193,6 +191,10 @@
 rcu_read_unlock();
 if (hung_task_show_lock)
 debug_show_all_locks();
+ if (hung_task_call_panic) {
+ trigger_all_cpu_backtrace();
+ panic("hung_task: blocked tasks");
+ }
 }
 */

 static long hung_timeout_jiffies(unsigned long last_checked,
@@ -231,6 +233,28 @@
 
 EXPORT_SYMBOL_GPL(reset_hung_task_detector);
static bool hung_detector_suspended;
+
static int hungtask_pm_notify(struct notifier_block *self,
   unsigned long action, void *hcpu)
+
switch (action) {
  case PM_SUSPEND_PREPARE:
  case PM_HIBERNATION_PREPARE:
  case PM_RESTORE_PREPARE:
    hung_detector_suspended = true;
    break;
  case PM_POST_SUSPEND:
  case PM_POST_HIBERNATION:
  case PM_POST_RESTORE:
    hung_detector_suspended = false;
    break;
  default:
    +default:
    break;
  +]
  +return NOTIFY_OK;
  +}
+
/*
 * kthread which checks for tasks stuck in D state
 */
@@ -245,7 +269,8 @@
 long t = hung_timeout_jiffies(hung_last_checked, timeout);

  if (t <= 0) {
    if (!atomic_xchg(&reset_hung_task, 0))
      +if (!atomic_xchg(&reset_hung_task, 0) &&
        !hung_detector_suspended)
        +check_hung_uninterruptible_tasks(timeout);
    hung_last_checked = jiffies;
    continue;
@@ -259,6 +284,10 @@
 static int __init hung_task_init(void)
 {
   atomic_notifier_chain_register(&panic_notifier_list, &panic_block);
+   /* Disable hung task detector on suspend */
+   pm_notifier(hungtask_pm_notify, 0);
+   watchdog_task = kthread_run(watchdog, NULL, "khungtaskd");

   return 0;
--- linux-4.15.0.orig/kernel/irq/Kconfig
+++ linux-4.15.0/kernel/irq/Kconfig
# Generic IRQ IPI support
config GENERIC_IRQ_IPI
bool
+select IRQ_DOMAIN_HIERARCHY

# Generic MSI interrupt support
config GENERIC_MSI_IRQ
@@ -117,6 +118,10 @@
config IRQ_FORCED_THREADING
    bool
+config IRQ_FORCED_THREADING_DEFAULT
+bool "Use IRQ threading by default"
+depends on IRQ_FORCED_THREADING
+
+config SPARSE_IRQ
bool "Support sparse irq numbering" if MAY_HAVE_SPARSE_IRQ

---help---
--- linux-4.15.0.orig/kernel/irq/affinity.c
+++ linux-4.15.0/kernel/irq/affinity.c
@@ -39,7 +39,7 @@
{
    cpumask_var_t *masks;
    int node;
@@ -62,7 +62,7 @@
    return NULL;
}

-static cpumask_var_t *alloc_node_to_present_cpumask(void)
+static cpumask_var_t *alloc_node_to_cpumask(void)
{
    cpumask_var_t *masks;
    int node;
@@ -71,22 +71,22 @@
    kfree(masks);
}

-static void free_node_to_present_cpumask(cpumask_var_t *masks)
+static void free_node_to_cpumask(cpumask_var_t *masks)
{
    int node;
@@ -71,22 +71,22 @@
kfree(masks);
}

-static void build_node_to_present_cpumask(cpumask_var_t *masks)
+static void build_node_to_cpumask(cpumask_var_t *masks)
{
    int cpu;
```c
    for_each_present_cpu(cpu)
    +for_each_possible_cpu(cpu)
    cpumask_set_cpu(cpu, masks[cpu_to_node(cpu)]);
}

-static int get_nodes_in_cpumask(cpumask_var_t *node_to_present_cpumask,
+static int get_nodes_in_cpumask(cpumask_var_t *node_to_cpumask,
    const struct cpumask *mask, nodemask_t *nodemsk)
{
    int n, nodes = 0;

    /* Calculate the number of nodes in the supplied affinity mask */
    for_each_node(n) {
        -if (cpumask_intersects(mask, node_to_present_cpumask[n])) {
        +if (cpumask_intersects(mask, node_to_cpumask[n])) {
            node_set(n, *nodemsk);
            nodes++;
        }
    }

    return nodes;
}

/**
 * irq_create_affinity_masks - Create affinity masks for multiqueue spreading
 * @nvecs:	The total number of vectors
 * @affd:	Description of the affinity requirements
 * @
 * Returns the masks pointer or NULL if allocation failed.
 */

-struct cpumask *
+static int irq_build_affinity_masks(const struct irq_affinity *affd,
    int startvec, int numvecs,
    cpumask_var_t *node_to_cpumask,
    const struct cpumask *cpu_mask,
    struct cpumask *nmsk,
    struct cpumask *masks)
{
    int n, nodes, cpus_per_vec, extra_vecs, done = 0;
    int last_affv = affd->pre_vectors + numvecs;
    nodemask_t nodemsk = NODE_MASK_NONE;
    cpumask_var_t nmsk, *node_to_present_cpumask;
```
-*/
- */ If there aren't any vectors left after applying the pre/post
- */ vectors don't bother with assigning affinity.
- */
-if (!affv)
-return NULL;
-
-if (!zalloc_cpumask_var(&nmsk, GFP_KERNEL))
-return NULL;
-
masks = kcalloc(nvecs, sizeof(*masks), GFP_KERNEL);
-if (!masks)
-goto out;
-
-node_to_present_cpumask = alloc_node_to_present_cpumask();
-if (!node_to_present_cpumask)
-goto out;
-
-/* Fill out vectors at the beginning that don't need affinity */
-for (curvec = 0; curvec < affd->pre_vectors; curvec++)
-cpumask_copy(masks + curvec, irq_default_affinity);
+if (!cpumask_weight(cpu_mask))
+return 0;
-/* Stabilize the cpumasks */
-get_online_cpus();
-
-nodes = get_nodes_in Cpumask(node_to_present Cpumask);
-nodes = get_nodes_in Cpumask(node_to Cpumask, cpu_present_mask,
-     &nodemsk);
+nodes = get_nodes_in Cpumask(node_to_cpumask, cpu_mask, &nodemsk);
/
* If the number of nodes in the mask is greater than or equal the
* number of vectors we just spread the vectors across the nodes.
*/
-if (affv <= nodes) {
+if (numvecs <= nodes) {
  for_each_node_mask(n, nodemsk) {
-cpumask_copy(masks + curvec,
-     node_to_present_cpumask[n]);
+cpumask_or(masks + curvec, masks + curvec, node_to_cpumask[n]);
  if (++curvec == last_affv)
-    break;
+    curvec = affd->pre_vectors;
  }
  -goto done;
+done = numvecs;
for_each_node_mask(n, nodemsk) {
    int ncpus, v, vecs_to_assign, vecs_per_node;

    /* Spread the vectors per node */
    vecs_per_node = (affv - (curvec - affd->pre_vectors)) / nodes;
    vecs_per_node = (numvecs - (curvec - affd->pre_vectors)) / nodes;

    /* Get the cpus on this node which are in the mask */
    cpumask_and(nmsk, cpu_mask, node_to_cpumask[n]);

    /* Calculate the number of cpus per vector */
    ncpus = cpumask_weight(nmsk);
    irq_spread_init_one(masks + curvec, nmsk, cpus_per_vec);
}

- if (curvec >= last_affv)
  + done += v;
  + if (done >= numvecs)
    break;
  + if (curvec >= last_affv)
    + curvec = affd->pre_vectors;
- nodes;
}

-done:
  - out:
  + return done;
  + }
  +
  +/**
  + * irq_create_affinity_masks - Create affinity masks for multiqueue spreading
  + * @nvecs: The total number of vectors
  + * @affd: Description of the affinity requirements
  + *
  + * Returns the masks pointer or NULL if allocation failed.
  + */
  + struct cpumask *
  + irq_create_affinity_masks(int nvecs, const struct irq_affinity *affd)
  + {
  + int affvecs = nvecs - affd->pre_vectors - affd->post_vectors;
  + int curvec, usedvecs;
  + cpumask_var_t nmsk, npresmsk, *node_to_cpumask;
  + struct cpumask *masks = NULL;
+ */
+ * If there aren't any vectors left after applying the pre/post
+ * vectors don't bother with assigning affinity.
+ */
+if (nvecs == affd->pre_vectors + affd->post_vectors)
+return NULL;
+
+if (!zalloc_cpumask_var(&nmsk, GFP_KERNEL))
+return NULL;
+
+if (!zalloc_cpumask_var(&npresmsk, GFP_KERNEL))
+goto outcpumsk;
+
+node_to_cpumask = alloc_node_to_cpumask();
+if (!node_to_cpumask)
+goto outnpresmsk;
+
+masks = kcalloc(nvecs, sizeof(*masks), GFP_KERNEL);
+if (!masks)
+goto outnodemsk;
+
+/* Fill out vectors at the beginning that don't need affinity */
+for (curvec = 0; curvec < affd->pre_vectors; curvec++)
+cpumask_copy(masks + curvec, irq_default_affinity);
+
+/* Stabilize the cpumasks */
+get_online_cpus();
+build_node_to_cpumask(node_to_cpumask);
+
+/* Spread on present CPUs starting from affd->pre_vectors */
+usedvecs = irq_build_affinity_masks(affd, curvec, affvecs,
+    node_to_cpumask, cpu_present_mask,
+    nmsk, masks);
+
+/* Spread on non present CPUs starting from the next vector to be
+ * handled. If the spreading of present CPUs already exhausted the
+ * vector space, assign the non present CPUs to the already spread
+ * out vectors.
+ */
+if (usedvecs >= affvecs)
+curvec = affd->pre_vectors;
+else
+curvec = affd->pre_vectors + usedvecs;
+cpumask_andnot(npresmsk, cpu_possible_mask, cpu_present_mask);
+usedvecs += irq_build_affinity_masks(affd, curvec, affvecs,
+    node_to_cpumask, npresmsk,
+ nmsk, masks);
put_online_cpus();

/* Fill out vectors at the end that don't need affinity */
+if (usedvecs >= affvecs)
+curvec = affd->pre_vectors + affvecs;
+else
+curvec = affd->pre_vectors + usedvecs;
for (; curvec < nvecs; curvec++)
cpumask_copy(masks + curvec, irq_default_affinity);
-out:
+outnodemsk:
+free_node_to_cpumask(node_to_cpumask);
+outnpresmsk:
+free_cpumask_var(npresmsk);
+outcpumsk:
free_cpumask_var(nmsk);
return masks;
}
@@ -214,7 +263,7 @@
return 0;
get_online_cpus();
-ret = min_t(int, cpumask_weight(cpu_present_mask), vecs) + resv;
+ret = min_t(int, cpumask_weight(cpu_possible_mask), vecs) + resv;
put_online_cpus();
return ret;
}
--- linux-4.15.0.orig/kernel/irq/autoprobe.c
+++ linux-4.15.0/kernel/irq/autoprobe.c
@@ -71,7 +71,7 @@
raw_spin_lock_irq(&desc->lock);
if (!desc->action && irq_settings_can_probe(desc)) {
 desc->istate |= IRQS_AUTODETECT | IRQS_WAITING;
-out:
+outnodemsk:
+free_node_to_cpumask(node_to_cpumask);
+outnpresmsk:
+free_cpumask_var(npresmsk);
+outcpumsk:
free_cpumask_var(nmsk);
return masks;
}
@@ -92,7 +92,7 @@
/* It triggered already - consider it spurious. */
if (!(desc->istate & IRQS_WAITING)) {
 desc->istate &= ~IRQS_AUTODETECT;
-irq_shutdown(desc);
+irq_shutdown_and_deactivate(desc);
} else

if (i < 32)
mask |= 1 << i;
@@ -129,7 +129,7 @@
mask |= 1 << i;

desc->istate &= ~IRQS_AUTODETECT;
-irq_shutdown(desc);
+irq_shutdown_and_deactivate(desc);
}
raw_spin_unlock_irq(&desc->lock);
}
@@ -171,7 +171,7 @@
nr_of_irqs++;
}
desc->istate &= ~IRQS_AUTODETECT;
-irq_shutdown(desc);
+irq_shutdown_and_deactivate(desc);
} raw_spin_unlock_irq(&desc->lock);
}
--- linux-4.15.0.orig/kernel/irq/chip.c
+++ linux-4.15.0/kernel/irq/chip.c
@@ -267,8 +267,11 @@
}} else {
    switch (__irq_startup_managed(desc, aff, force)) {
    case IRQ_STARTUP_NORMAL:
+    if (d->chip->flags & IRQCHIP_AFFINITY_PRE_STARTUP)
+    irq_setup_affinity(desc);
    ret = __irq_startup(desc);
-    irq_setup_affinity(desc);
+    if (!(d->chip->flags & IRQCHIP_AFFINITY_PRE_STARTUP))
+    irq_setup_affinity(desc);
    break;
    case IRQ_STARTUP_MANAGED:
    irq_do_set_affinity(d, aff, false);
@@ -294,11 +297,11 @@
return 0;
}

-void irq_activate_and_startup(struct irq_desc *desc, bool resend)
+int irq_activate_and_startup(struct irq_desc *desc, bool resend)
{
    if (WARN_ON(irq_activate(desc)))
-    return;
-    irq_startup(desc, resend, IRQ_START_FORCE);
+    return 0;
+    return irq_startup(desc, resend, IRQ_START_FORCE);
static void __irq_disable(struct irq_desc *desc, bool mask);
@@ -316,6 +319,12 @@
 }
 irq_state_clr_started(desc);
 }
+}
+
+void irq_shutdown_and_deactivate(struct irq_desc *desc)
+{
+ irq_shutdown(desc);
+ /*
+ * This must be called even if the interrupt was never started up,
+ * because the activation can happen before the interrupt is
@@ -857,7 +866,11 @@
 {
 struct irq_chip *chip = irq_desc_get_chip(desc);

- kstat_incr_irqs_this_cpu(desc);
+ /*
+ * PER CPU interrupts are not serialized. Do not touch
+ * desc->tot_count.
+ */
+ __kstat_incr_irqs_this_cpu(desc);

 if (chip->irq_ack)
 chip->irq_ack(&desc->irq_data);
@@ -886,7 +899,11 @@
 unsigned int irq = irq_desc_get_irq(desc);
 irqreturn_t res;

- kstat_incr_irqs_this_cpu(desc);
+ /*
+ * PER CPU interrupts are not serialized. Do not touch
+ * desc->tot_count.
+ */
+ __kstat_incr_irqs_this_cpu(desc);

 if (chip->irq_ack)
 chip->irq_ack(&desc->irq_data);
@@ -1378,6 +1395,10 @@
 int irq_chip_set_wake_parent(struct irq_data *data, unsigned int on)
 {
 data = data->parent_data;
+ if (data->chip->flags & IRQCHIP_SKIP_SET_WAKE)
+ return 0;
if (data->chip->irq_set_wake)
    return data->chip->irq_set_wake(data, on);

--- linux-4.15.0.orig/kernel/irq/cpuhotplug.c
+++ linux-4.15.0/kernel/irq/cpuhotplug.c
@@ -115,7 +115,7 @@
     irqd_set_managed_shutdown(d);
     irq_shutdown(desc);
     return false;
 } affinity = cpu_online_mask;
--- linux-4.15.0.orig/kernel/irq/debugfs.c
+++ linux-4.15.0/kernel/irq/debugfs.c
@@ -114,6 +114,7 @@
 BIT_MASK_DESCR(IRQD_AFFINITY_MANAGED),
 BIT_MASK_DESCR(IRQD_MANAGED_SHUTDOWN),
 BIT_MASK_DESCR(IRQD_CAN_RESERVE),
+BITE MASK_DESCR(IRQD_MSI_NOMASK_QUIRK),
 BIT_MASK_DESCR(IRQD_FORWARDED_TO_VCPU),

--- linux-4.15.0.orig/kernel/irq/internals.h
+++ linux-4.15.0/kernel/irq/internals.h
@@ -76,10 +76,11 @@
#define IRQ_START_COND false

extern int irq_activate(struct irq_desc *desc);
-extern void irq_activate_and_startup(struct irq_desc *desc, bool resend);
+extern int irq_activate_and_startup(struct irq_desc *desc, bool resend);
 extern int irq_startup(struct irq_desc *desc, bool resend, bool force);

extern void irq_shutdown(struct irq_desc *desc);
+extern void irq_shutdown_and_deactivate(struct irq_desc *desc);
 extern void irq_enable(struct irq_desc *desc);
 extern void irq_disable(struct irq_desc *desc);
 extern void irq_percpu_enable(struct irq_desc *desc, unsigned int cpu);
@@ -94,6 +95,10 @@
 extern void irq_mark_irq(unsigned int irq);
 #endif

+extern int __irq_get_irqchip_state(struct irq_data *data,
    + enum irqchip_irq_state which,
    + bool *state);
+}
extern void init_kstat_irqs(struct irq_desc *desc, int node, int nr);

irqreturn_t __handle_irq_event_percpu(struct irq_desc *desc, unsigned int *flags);
@@ -121,8 +126,6 @@
extern bool irq_can_set_affinity_usr(unsigned int irq);

-extern int irq_select_affinity_usr(unsigned int irq);
- extern void irq_set_thread_affinity(struct irq_desc *desc);

extern int irq_do_set_affinity(struct irq_data *data,
@@ -242,12 +245,18 @@
#undef __irqd_to_state

-static inline void kstat_incr_irqs_this_cpu(struct irq_desc *desc)
+-static inline void __kstat_incr_irqs_this_cpu(struct irq_desc *desc)
+ {
+    __this_cpu_inc(*desc->kstat_irqs);
+    __this_cpu_inc(kstat.irqs_sum);
+ }

+static inline void kstat_incr_irqs_this_cpu(struct irq_desc *desc)
+ {
+     __kstat_incr_irqs_this_cpu(desc);
+     desc->tot_count++;
+ } 

+static inline int irq_desc_get_node(struct irq_desc *desc)
+ {
+     return irq_common_data_get_node(&desc->irq_common_data);
+     --- linux-4.15.0.orig/kernel/irq/irqdesc.c
+++ linux-4.15.0/kernel/irq/irqdesc.c
@@ -119,6 +119,7 @@
desc->depth = 1;
desc->irq_count = 0;
desc->irqs_unhandled = 0;
+desc->tot_count = 0;
desc->name = NULL;
desc->owner = owner;
for_each_possible_cpu(cpu)
@@ -276,6 +277,18 @@
}
}

+static void irq_sysfs_del(struct irq_desc *desc)
+ {
+}
+/*
 + * If irq_sysfs_init() has not yet been invoked (early boot), then
 + * irq_kobj_base is NULL and the descriptor was never added.
 + * kobject_del() complains about a object with no parent, so make
 + * it conditional.
 + */
+if (irq_kobj_base)
+kobject_del(&desc->kobj);
+
static int __init irq_sysfs_init(void)
{
    struct irq_desc *desc;
    @@ -306,6 +319,7 @@
    };

    static void irq_sysfs_add(int irq, struct irq_desc *desc) {}
+static void irq_sysfs_del(struct irq_desc *desc) {}

    #endif /* CONFIG_SYSFS */

    @@ -419,7 +433,7 @@
    */
    -kobject_del(&desc->kobj);
    +irq_sysfs_del(desc);
    delete_irq_desc(irq);

    /*
    @@ -535,6 +549,7 @@
    alloc_masks(&desc[i], node);
    raw_spin_lock_init(&desc[i].lock);
    lockdep_set_class(&desc[i].lock, &irq_desc_lock_class);
+    mutex_init(&desc[i].request_mutex);
    desc_set_defaults(i, &desc[i], node, NULL, NULL);
    }
    return arch_early_irq_init();
    @@ -897,11 +912,15 @@
    unsigned int kstat_irqs(unsigned int irq)
    {
        struct irq_desc *desc = irq_to_desc(irq);
        -int cpu;
        unsigned int sum = 0;
        +int cpu;

        if (!desc || !desc->kstat_irqs)
            return 0;
        

+ if (!irq_settings_is_per_cpu_devid(desc) &&
+ !irq_settings_is_per_cpu(desc))
+ return desc->tot_count;
+
for_each_possible_cpu(cpu)
    sum += *(per_cpu_ptr(desc->kstat_irqs, cpu));

return sum;
--- linux-4.15.0.orig/kernel/irq/irqdomain.c
+++ linux-4.15.0/kernel/irq/irqdomain.c
@@ -146,6 +146,7 @@
switch (fwid->type) {
    case IRQCHIP_FWNODE_NAMED:
    case IRQCHIP_FWNODE_NAMED_ID:
+        domain->fwnode = fwnode;
        domain->name = kstrdup(fwid->name, GFP_KERNEL);
    if (!domain->name) {
        kfree(domain);
@@ -181,7 +182,7 @@
* unhappy about. Replace them with ':', which does
* the trick and is not as offensive as '\...'
*/
-name = kstrdup(of_node_full_name(of_node), GFP_KERNEL);
+name = kasprintf(GFP_KERNEL, "%pOF", of_node);
if (!name) {
    kfree(domain);
    return NULL;
@@ -1362,14 +1363,26 @@
unsigned int irq_base,
    unsigned int nr_irqs)
{
    -if (domain->ops->free)
    -domain->ops->free(domain, irq_base, nr_irqs);
    +unsigned int i;
    +
    +if (!domain->ops->free)
    +return;
    +
    +for (i = 0; i < nr_irqs; i++) {
    +if (irq_domain_get_irq_data(domain, irq_base + i))
    +domain->ops->free(domain, irq_base + i, 1);
    +}
}

int irq_domain_alloc_irqs_hierarchy(struct irq_domain *domain,
    unsigned int irq_base,
    unsigned int nr_irqs, void *arg)
{
    +if (!domain->ops->alloc) {
+pr_debug("domain->ops->alloc() is NULL\n");
+return -ENOSYS;
+
+return domain->ops->alloc(domain, irq_base, nr_irqs, arg);
+
return -EINVAL;
}

-if (!domain->ops->alloc) {
+pr_debug("domain->ops->alloc() is NULL\n");
-return -ENOSYS;
-
-
if (realloc && irq_base >= 0) {
  irq = irq_base;
} else {
  pr -1536,6 +1544,7 @@
  if (rv) {
      /* Restore the original irq_data. */
      *root_irq_data = *child_irq_data;
      kfree(child_irq_data);
      goto error;
      
      --- linux-4.15.0.orig/kernel/irq/manage.c
      +++ linux-4.15.0/kernel/irq/manage.c
      @@ -14,6 +14,7 @@
      #include <linux/module.h>
      #include <linux/random.h>
      #include <linux/interrupt.h>
      +#include <linux/irqdomain.h>
      #include <linux/slab.h>
      #include <linux/sched.h>
      #include <linux/sched/rt.h>
      @@ -24,18 +25,25 @@
      #include "internals.h"

      #ifdef CONFIG_IRQ_FORCED_THREADING
      -__read_mostly bool force irqthreads;
      +#read_mostly bool force irqthreads = IS_ENABLED(CONFIG_IRQ_FORCED_THREADING_DEFAULT);

      static int __init setup_forced_irqthreads(char *arg)
      {
        force_irqthreads = true;
        return 0;

+static int __init setup_no_irqthreads(char *arg)
+{
+force_irqthreads = false;
+return 0;
+
+}
early_param("threadirqs", setup_forced_irqthreads);
+early_param("nothreadirqs", setup_no_irqthreads);
#endif

-static void __synchronize_hardirq(struct irq_desc *desc)
+static void __synchronize_hardirq(struct irq_desc *desc, bool sync_chip)
{
+struct irq_data *irqd = irq_desc_get_irq_data(desc);
bool inprogress;

do {
@@ -51,6 +59,20 @@
/* Ok, that indicated we're done: double-check carefully. */
raw_spin_lock_irqsave(&desc->lock, flags);
inprogress = irqd_irq_inprogress(&desc->irq_data);
+
+/*
+ * If requested and supported, check at the chip whether it
+ * is in flight at the hardware level, i.e. already pending
+ * in a CPU and waiting for service and acknowledge.
+ */
+if (!inprogress && sync_chip) {
+/*
+ * Ignore the return code. inprogress is only updated
+ * when the chip supports it.
+ */
++__irq_get_irqchip_state(irqd, IRQCHIP_STATE_ACTIVE,
+&inprogress);
+}
raw_spin_unlock_irqrestore(&desc->lock, flags);

/* Oops, that failed? */
@@ -73,13 +95,18 @@
*Returns: false if a threaded handler is active.
*
*This function may be called - with care - from IRQ context.
+ *
+ *It does not check whether there is an interrupt in flight at the
+ *hardware level, but not serviced yet, as this might deadlock when
+ *called with interrupts disabled and the target CPU of the interrupt
+ *is the current CPU.
+ */
bool synchronize_hardirq(unsigned int irq)
{
    struct irq_desc *desc = irq_to_desc(irq);

    if (desc) {
        __synchronize_hardirq(desc);
        __synchronize_hardirq(desc, false);
        return !atomic_read(&desc->threads_active);
    }
}

/* to complete before returning. If you use this function while
 * holding a resource the IRQ handler may need you will deadlock.
 * This function may be called - with care - from IRQ context.
 * Can only be called from preemptible code as it might sleep when
 * an interrupt thread is associated to @irq.
 * It optionally makes sure (when the irq chip supports that method)
 * that the interrupt is not pending in any CPU and waiting for
 * service.
 */
void synchronize_irq(unsigned int irq)
{
    struct irq_desc *desc = irq_to_desc(irq);

    if (desc) {
        __synchronize_hardirq(desc);
        __synchronize_hardirq(desc, true);
    }
    /*
     * We made sure that no hardirq handler is
     * running. Now verify that no threaded handlers are
     */
    set_bit(IRQTF_AFFINITY, &action->thread_flags);
}

#ifdef CONFIG_GENERIC_IRQ_EFFECTIVE_AFF_MASK
static void irq_validate_effective_affinity(struct irq_data *data)
{
    const struct cpumask *m = irq_data_get_effective_affinity_mask(data);
    struct irq_chip *chip = irq_data_get_irq_chip(data);

    return;
    pr_warn_once("irq_chip %s did not update eff. affinity mask of irq %u\n",
        chip->name, data->irq);
#endif
+static inline void irq_init_effective_affinity(struct irq_data *data,  
+    const struct cpumask *mask)  
+{  
+    cpumask_copy(irq_data_get_effective_affinity_mask(data), mask);  
+}  
+#else  
+static inline void irq_validate_effective_affinity(struct irq_data *data) { }  
+static inline void irq_init_effective_affinity(struct irq_data *data,  
+    const struct cpumask *mask) { }  
+#endif  
+  
+int irq_do_set_affinity(struct irq_data *data, const struct cpumask *mask,  
+bool force)
+{  
+    return ret;  
+}
+
+    #ifdef CONFIG_GENERIC_PENDING_IRQ
+    static inline int irq_set_affinity_pending(struct irq_data *data,  
+    const struct cpumask *dest)  
+    {  
+        struct irq_desc *desc = irq_data_to_desc(data);  
+        irqd_set_move_pending(data);  
+        irq_copy_pending(desc, dest);  
+        return 0;  
+    }  
+    #else  
+    static inline int irq_set_affinity_pending(struct irq_data *data,  
+    const struct cpumask *dest)  
+    {  
+        return -EBUSY;  
+    }  
+    #endif  
+    +static int irq_try_set_affinity(struct irq_data *data,  
+    const struct cpumask *dest, bool force)
+    {  
+        int ret = irq_do_set_affinity(data, dest, force);  
+        /*
+        * In case that the underlying vector management is busy and the
+        * architecture supports the generic pending mechanism then utilize
+        * this to avoid returning an error to user space.
+        */
+    }
+if (ret == -EBUSY && !force)
+ret = irq_set_affinity_pending(data, dest);
+return ret;
+
+static bool irq_set_affinity_deactivated(struct irq_data *data,
+ const struct cpumask *mask, bool force)
+{
+struct irq_desc *desc = irq_data_to_desc(data);
+
+/*
+ * Handle irq chips which can handle affinity only in activated
+ * state correctly
+ *
+ * If the interrupt is not yet activated, just store the affinity
+ * mask and do not call the chip driver at all. On activation the
+ * driver has to make sure anyway that the interrupt is in a
+ * useable state so startup works.
+ */
+if (!IS_ENABLED(CONFIG_IRQ_DOMAIN_HIERARCHY) ||
    irqd_is_activated(data) || !irqd_affinity_on_activate(data))
+return false;
+
cpumask_copy(desc->irq_common_data.affinity, mask);
+irq_init_effective_affinity(data, mask);
+irqd_set(data, IRQD_AFFINITY_SET);
+return true;
+
int irq_set_affinity_locked(struct irq_data *data, const struct cpumask *mask,
 bool force)
{
 @@ -215,8 +314,11 @@
 if (!chip || !chip->irq_set_affinity)
 return -EINVAL;

-if (irq_can_move_pcntxt(data)) {
-    ret = irq_do_set_affinity(data, mask, force);
+if (irq_set_affinity_deactivated(data, mask, force))
+    return 0;
+
+if (irq_can_move_pcntxt(data) && !irqd_is_setaffinity_pending(data)) {
+    ret = irq_try_set_affinity(data, mask, force);
} else {
    irqd_set_move_pending(data);
    irq_copy_pending(desc, mask);
@@ -224,7 +326,11 @@
if (desc->affinity_notify) {
kref_get(&desc->affinity_notify->kref);
schedule_work(&desc->affinity_notify->work);
+if (!schedule_work(&desc->affinity_notify->work)) {
+/* Work was already scheduled, drop our extra ref */
+kref_put(&desc->affinity_notify->kref,
+ desc->affinity_notify->release);
+}
}
irqd_set(data, IRQD_AFFINITY_SET);
@@ -323,8 +429,13 @@
desc->affinity_notify = notify;
raw_spin_unlock_irqrestore(&desc->lock, flags);

-if (old_notify)
+if (old_notify) {
+if (cancel_work_sync(&old_notify->work)) {
+/* Pending work had a ref, put that one too */
+kref_put(&old_notify->kref, old_notify->release);
+}
+kref_put(&old_notify->kref, old_notify->release);
+}

return 0;
}
@@ -360,6 +471,9 @@

cpumask_and(&mask, cpu_online_mask, set);
+if (cpumask_empty(&mask))
+cpumask_copy(&mask, cpu_online_mask);
+
if (node != NUMA_NO_NODE) {
const struct cpumask *nodemask = cpumask_of_node(node);
@@ -377,23 +491,9 @@
{
return irq_select_affinity(irq_desc_get_irq(desc));
}
-#endif
-
-/* Called when a bogus affinity is set via /proc/irq
- */
-int irq_select_affinity_usr(unsigned int irq)
-{
-struct irq_desc *desc = irq_to_desc(irq);
unsigned long flags;
-int ret;
+#endif /* CONFIG_AUTO_IRQ_AFFINITY */
+#endif /* CONFIG_SMP */

-raw_spin_lock_irqsave(&desc->lock, flags);
-ret = irq_setup_affinity(desc);
-raw_spin_unlock_irqrestore(&desc->lock, flags);
-return ret;
-}
-#endif

/**
 * irq_set_vcpu_affinity - Set vcpu affinity for the interrupt
 */
static int irq_wait_for_interrupt(struct irqaction *action)
{
-set_current_state(TASK_INTERRUPTIBLE);
+for (;;) {
+set_current_state(TASK_INTERRUPTIBLE);

-while (!kthread_should_stop()) {
+if (kthread_should_stop()) {
+/* may need to run one last time */
+if (test_and_clear_bit(IRQTF_RUNTHREAD,
+ &action->thread_flags)) {
+__set_current_state(TASK_RUNNING);
+return 0;
+}
+__set_current_state(TASK_RUNNING);
+return -1;
+}

#if (test_and_clear_bit(IRQTF_RUNTHREAD,
 &action->thread_flags))
@@ -767,10 +877,7 @@
 return 0;
 }
 schedule();
-set_current_state(TASK_INTERRUPTIBLE);
 }
-__set_current_state(TASK_RUNNING);
-return -1;
 }

/*
 @@ -882,8 +989,15 @@
irqreturn_t ret;

local_bh_disable();
+if (!IS_ENABLED(CONFIG_PREEMPT_RT_BASE))
+local_irq_disable();
ret = action->thread_fn(action->irq, action->dev_id);
+if (ret == IRQ_HANDLED)
+atomic_inc(&desc->threads_handled);
+
irq_finalize_oneshot(desc, action);
+if (!IS_ENABLED(CONFIG_PREEMPT_RT_BASE))
+local_irq_enable();
local_bh_enable();
return ret;
}
@@ -899,6 +1013,9 @@
irqreturn_t ret;

ret = action->thread_fn(action->irq, action->dev_id);
+if (ret == IRQ_HANDLED)
+atomic_inc(&desc->threads_handled);
+
irq_finalize_oneshot(desc, action);
return ret;
}
@@ -976,8 +1093,6 @@
irq_thread_check_affinity(desc, action);

action_ret = handler_fn(desc, action);
-if (action_ret == IRQ_HANDLED)
-atomic_inc(&desc->threads_handled);
if (action_ret == IRQ_WAKE_THREAD)
irq_wake_secondary(desc, action);

@@ -987,11 +1102,8 @@
/*
 * This is the regular exit path. __free_irq() is stopping the
 * thread via kthread_stop() after calling
 - * synchronize_irq(). So neither IRQTF_RUNTHREAD nor the
 - * oneshot mask bit can be set. We cannot verify that as we
 - * cannot touch the oneshot mask at this point anymore as
 - * __setup_irq() might have given out currents thread_mask
 - * again.
 + * synchronize_hardirq(). So neither IRQTF_RUNTHREAD nor the
 + * oneshot mask bit can be set.
 */
task_work_cancel(current, irq_thread_dtor);
return 0;
if (new->flags & (IRQF_NO_THREAD | IRQF_PERCPU | IRQF_ONESHOT))
return 0;

/*
 * No further action required for interrupts which are requested as
 * threaded interrupts already
 */
+if (new->handler == irq_default_primary_handler)
+return 0;
+
+new->flags |= IRQF_ONESHOT;

/*
 @@ -1038,7 +1157,7 @@
 * thread handler. We force thread them as well by creating a
 * secondary action.
 */
-@ -1038,7 +1157,7 @@
-if (new->handler != irq_default_primary_handler & new->thread_fn) {
-    if (new->handler & new->thread_fn) {
/* Allocate the secondary action */
third
new->secondary = kzalloc(sizeof(struct irqaction), GFP_KERNEL);
+    if (!new->secondary)
@@ -1207,8 +1326,10 @@
/* Protects against a concurrent __free_irq() call which might wait
 * for synchronize_irq() to complete without holding the optional
 * chip bus lock and desc->lock.
 */
-@ -1563,6 +1684,7 @@
-if this was the last handler, shut down the IRQ line: */
-if (!desc->action) {
    irq_settings_clr_disable_unlazy(desc);
+/* Only shutdown. Deactivate after synchronize_hardirq() */
    irq_shutdown(desc);
}

/*
 * Drop bus_lock here so the changes which were done in the chip
 * callbacks above are synced out to the irq chips which hang
- * behind a slow bus (I2C, SPI) before calling synchronize_irq().
+ * behind a slow bus (I2C, SPI) before calling synchronize_hardirq().
 *
* Aside of that the bus_lock can also be taken from the threaded
* handler in irq_finalize_oneshot() which results in a deadlock
- * because synchronize_irq() would wait forever for the thread to
+ * because kthread_stop() would wait forever for the thread to
* complete, which is blocked on the bus lock.
*
* The still held desc->request_mutex() protects against a
@@ -1591,8 +1713,12 @@
unregister_handler_proc(irq, action);

-/* Make sure it's not being used on another CPU: */
-synchronize_irq(irq);
+/*
+ * Make sure it's not being used on another CPU and if the chip
+ * supports it also make sure that there is no (not yet serviced)
+ * interrupt in flight at the hardware level.
+ */
+__synchronize_hardirq(desc, true);

#ifdef CONFIG_DEBUG_SHIRQ
/
@@ -1610,6 +1736,12 @@
} #endif
+/*
+ * The action has already been removed above, but the thread writes
+ * its oneshot mask bit when it completes. Though request_mutex is
+ * held across this which prevents __setup_irq() from handing out
+ * the same bit to a newly requested action.
+ */
if (action->thread) {
    kthread_stop(action->thread);
    put_task_struct(action->thread);
@@ -1626,6 +1758,14 @@
        /* require it to deallocate resources over the slow bus.
        */
    chip_bus_lock(desc);
+/*
+ * There is no interrupt on the fly anymore. Deactivate it
+ * completely.
+ */
+raw_spin_lock_irqsave(&desc->lock, flags);
+irq_domain_deactivate_irq(&desc->irq_data);
raw_spin_unlock_irqrestore(&desc->lock, flags);
+ irq_release_resources(desc);
chip_bus_sync_unlock(desc);
irq_remove_timings(desc);
@@ -2111,6 +2251,28 @@
}
EXPORT_SYMBOL_GPL(__request_percpu_irq);

+int __irq_get_irqchip_state(struct irq_data *data, enum irqchip_irq_state which,
+    bool *state)
+{
+    struct irq_chip *chip;
+    int err = -EINVAL;
+    do {
+        chip = irq_data_get_irq_chip(data);
+        if (chip->irq_get_irqchip_state)
+            break;
+    #ifdef CONFIG_IRQ_DOMAIN_HIERARCHY
+        data = data->parent_data;
+    #else
+        data = NULL;
+    #endif
+    } while (data);
+    if (data)
+        err = chip->irq_get_irqchip_state(data, which, state);
+    return err;
+
/**
 * __irq_get_irqchip_state - returns the irqchip state of a interrupt.
 * @irq: Interrupt line that is forwarded to a VM
 @@ -2129,7 +2291,6 @@
 {
 struct irq_desc *desc;
 struct irq_data *data;
-struct irq_chip *chip;
 unsigned long flags;
 int err = -EINVAL;

 @@ -2139,19 +2300,7 @@

data = irq_desc_get_irq_data(desc);

- do {
-     chip = irq_data_get_irq_chip(data);

-if (chip->irq_get_irqchip_state)
-break;
#endif CONFIG_IRQ_DOMAIN_HIERARCHY
-data = data->parent_data;
#else
-data = NULL;
#endif
} while (data);
-
-if (data)
-err = chip->irq_get_irqchip_state(data, which, state);
+err = __irq_get_irqchip_state(data, which, state);

irq_put_desc_busunlock(desc, flags);
return err;
--- linux-4.15.0.orig/kernel/irq/matrix.c
+++ linux-4.15.0/kernel/irq/matrix.c
@@ -10,12 +10,14 @@
#include <linux/cpu.h>
#include <linux/irq.h>
-#define IRQ_MATRIX_SIZE	(BITS_TO_LONGS(IRQ_MATRIX_BITS) * sizeof(unsigned long))
+#define IRQ_MATRIX_SIZE	(BITS_TO_LONGS(IRQ_MATRIX_BITS))

struct cpumap {
    unsigned int available;
    unsigned int intallocated;
    unsigned int intmanaged;
    unsigned int intmanaged_allocated;
    bool initialized;
    bool online;
    unsigned long alloc_map[IRQ_MATRIX_SIZE];
    unsigned long managed_map[IRQ_MATRIX_SIZE];
@@ -81,9 +83,11 @@
BUG_ON(cm->online);

-bitmap_zero(cm->alloc_map, m->matrix_bits);
-cm->available = m->alloc_size - (cm->managed + m->systembits_inalloc);
-cm->allocated = 0;
+if (!cm->initialized) {
+    cm->available = m->alloc_size;
+    cm->available -= cm->managed + m->systembits_inalloc;
+    cm->initialized = true;
+}
    m->global_available += cm->available;
    cm->online = true;
    m->online_maps++;
return area;
}

/* Find the best CPU which has the lowest vector allocation count */
static unsigned int matrix_find_best_cpu(struct irq_matrix *m,
const struct cpumask *msk)
{
unsigned int cpu, best_cpu, maxavl = 0;
struct cpumap *cm;

best_cpu = UINT_MAX;
for_each_cpu(cpu, msk) {
    cm = per_cpu_ptr(m->maps, cpu);
    if (!cm->online || cm->available <= maxavl)
        continue;
    best_cpu = cpu;
    maxavl = cm->available;
}
return best_cpu;
}

/* Find the best CPU which has the lowest number of managed IRQs allocated */
static unsigned int matrix_find_best_cpu_managed(struct irq_matrix *m,
const struct cpumask *msk)
{
unsigned int cpu, best_cpu, allocated = UINT_MAX;
struct cpumap *cm;

best_cpu = UINT_MAX;
for_each_cpu(cpu, msk) {
    cm = per_cpu_ptr(m->maps, cpu);
    if (!cm->online || cm->managed_allocated > allocated)
        continue;
    best_cpu = cpu;
    allocated = cm->managed_allocated;
}
return best_cpu;
}

/**
 * irq_matrix_assign_system - Assign system wide entry in the matrix
 */
int irq_matrix_alloc_managed(struct irq_matrix *m, unsigned int cpu)
{
    struct cpumap *cm = per_cpu_ptr(m->maps, cpu);
    unsigned int bit, end = m->alloc_end;
    unsigned int *mapped_cpu;

    cm = per_cpu_ptr(m->maps, cpu);
    end = m->alloc_end;
    /* Get managed bit which are not allocated */
    bitmap_andnot(m->scratch_map, cm->managed_map, cm->alloc_map, end);
    bit = find_first_bit(m->scratch_map, end);

    if (cpumask_empty(msk))
        return -EINVAL;
    if (cpu == UINT_MAX)
        return -ENOSPC;
    cm = per_cpu_ptr(m->maps, cpu);
    end = m->alloc_end;
    /* Get managed bit which are not allocated */
    bitmap_andnot(m->scratch_map, cm->managed_map, cm->alloc_map, end);
    bit = find_first_bit(m->scratch_map, end);
    return -ENOSPC;
}

int irq_matrix_alloc(struct irq_matrix *m, const struct cpumask *msk,
    bool reserved, unsigned int *mapped_cpu)
{
    unsigned int best_cpu, maxavl = 0;
    unsigned int cpu, bit;
    struct cpumap *cm;
    unsigned int bit;

    best_cpu = UINT_MAX;
    for_each_cpu(cpu, msk) {
        cm = per_cpu_ptr(m->maps, cpu);
    }
+/
+ * Not required in theory, but matrix_find_best_cpu() uses
+ * for_each_cpu() which ignores the cpumask on UP .
+ */
+if (cpumask_empty(msk))
+return -EINVAL;

-if (!cm->online || cm->available <= maxavl)
-continue;
+cpu = matrix_find_best_cpu(m, msk);
+if (cpu == UINT_MAX)
+return -ENOSPC;

-best_cpu = cpu;
-maxavl = cm->available;
-
+cm = per_cpu_ptr(m->maps, cpu);
+bit = matrix_alloc_area(m, cm, 1, false);
+if (bit >= m->alloc_end)
+return -ENOSPC;
+cm->allocated++;
+cm->available--;
+m->total_allocated++;
+m->global_available--;
+if (reserved)
+m->global_reserved--;
+*mapped_cpu = cpu;
+trace_irq_matrix_alloc(bit, cpu, m, cm);
+return bit;

-if (maxavl) {
- cm = per_cpu_ptr(m->maps, best_cpu);
- bit = matrix_alloc_area(m, cm, 1, false);
- if (bit < m->alloc_end) {
- cm->allocated++;
- cm->available--;
- m->total_allocated++;
- m->global_available--;
- if (reserved)
- m->global_reserved--;
- *mapped_cpu = best_cpu;
- trace_irq_matrix_alloc(bit, best_cpu, m, cm);
- return bit;
- }
- }
- return -ENOSPC;
}
/**
 @ @ -370,14 +425,20 @@
 if (WARN_ON_ONCE(bit < m->alloc_start || bit >= m->alloc_end))
 return;

 -if (cm->online) {
 -clear_bit(bit, cm->alloc_map);
 -cm->allocated--; 
 +if (WARN_ON_ONCE(!test_and_clear_bit(bit, cm->alloc_map)))
 +return;
 +
 +cm->allocated--; 
 +if(managed)
 +cm->managed_allocated--;
 +
 +if (cm->online)
 m->total_allocated--; 
 -if (!managed) {
 -cm->available++; 
 +
 +cm->available++; 
 +if (cm->online)
 m->global_available++;
 -} 
 }
 trace_irq_matrix_free(bit, cpu, m, cm);
 }
@@ -439,13 +500,14 @@
 seq_printf(sf, "Total allocated: %6u\n", m->total_allocated);
 seq_printf(sf, "System: %u: %*pbl\n", nsys, m->matrix_bits, 
     m->system_map);
-seq_printf(sf, "%*s| CPU | avl | man | act | vectors\n", ind, " ");
+seq_printf(sf, "%*s| CPU | avl | man | mac | act | vectors\n", ind, " ");
cpus_read_lock();
for_each_online_cpu(cpu) {
    struct cpumap *cm = per_cpu_ptr(m->maps, cpu);

-seq_printf(sf, "%*s %4d  %4u  %4u  %4u  %*pbl\n", ind, " ",
    - cpu, cm->available, cm->managed, cm->allocated,
+seq_printf(sf, "%*s %4d  %4u  %4u  %4u  %4u  %*pbl\n", ind, " ",
    + cpu, cm->available, cm->managed,
    + cm->managed_allocated, cm->allocated,
        m->matrix_bits, cm->alloc_map);
 }
 cpus_read_unlock();
--- linux-4.15.0.orig/kernel/irq/migration.c
+++ linux-4.15.0/kernel/irq/migration.c
void irq_move_masked_irq(struct irq_data *idata)
{
    struct irq_desc *desc = irq_data_to_desc(idata);
-    struct irq_chip *chip = desc->irq_data.chip;
+    struct irq_data *data = &desc->irq_data;
+    struct irq_chip *chip = data->chip;

    -if (likely(!irqd_is_setaffinity_pending(&desc->irq_data)))
+    if (likely(!irqd_is_setaffinity_pending(data)))
        return;

    -irqd_clr_move_pending(&desc->irq_data);
+    irqd_clr_move_pending(data);

    /*
     * Paranoia: cpu-local interrupts shouldn’t be calling in here anyway.
     */
    -if (irqd_is_per_cpu(&desc->irq_data)) {
+    if (irqd_is_per_cpu(data)) {
        WARN_ON(1);
        return;
    }
    @@ -73,13 +74,24 @@
    * For correct operation this depends on the caller
    * masking the irqs.
    */
    -if (cpumask_any_and(desc->pending_mask, cpu_online_mask) < nr_cpu_ids)
        irq_do_set_affinity(&desc->irq_data, desc->pending_mask, false);
+    if (cpumask_any_and(desc->pending_mask, cpu_online_mask) < nr_cpu_ids) {
+        int ret;
+        
+        +ret = irq_do_set_affinity(data, desc->pending_mask, false);
+        +/*
+        + * If the there is a cleanup pending in the underlying
+        + * vector management, reschedule the move for the next
+        + * interrupt. Leave desc->pending_mask intact.
+        + */
+        +if (ret == -EBUSY) {
+            irqd_set_move_pending(data);
+            return;
+        }
+    }
    cpumask_clear(desc->pending_mask);
}

-void irq_move_irq(struct irq_data *idata)
+void __irq_move_irq(struct irq_data *idata)
bool masked;

idata = irq_desc_get_irq_data(irq_data_to_desc(idata));
-if (likely(!irqd_is_setaffinity_pending(idata)))
 return;
-
if (unlikely(irqd_irq_disabled(idata)))
 return;

--- linux-4.15.0.orig/kernel/irq/msi.c
+++ linux-4.15.0/kernel/irq/msi.c
@@ -90,9 +102,6 @@
 /*
 idata = irq_desc_get_irq_data(irq_data_to_desc(idata));

- if (likely(!irqd_is_setaffinity_pending(idata)))
- return;
- 
if (unlikely(irqd_irq_disabled(idata)))
 return;

can_reserve = msi_check_reservation_mode(domain, info, dev);

-for_each_msi_entry(desc, dev) {
-virq = desc->irq;
-if (desc->nvec_used == 1)
-dev_dbg(dev, "irq %d for MSI
", virq);
-else
+ /*
+ * This flag is set by the PCI layer as we need to activate
+ * the MSI entries before the PCI layer enables MSI in the
+ * card. Otherwise the card latches a random msi message.
+ */
+if (!(info->flags & MSI_FLAG_ACTIVATE_EARLY))
+goto skip_activate;
+
+for_each_msi_vector(desc, i, dev) {
+if (desc->irq == i) {
+virq = desc->irq;
+dev_dbg(dev, "irq [%d-%d] for MSI
",
+ virq, virq + desc->nvec_used - 1);
+ /^*
 - * This flag is set by the PCI layer as we need to activate
 - * the MSI entries before the PCI layer enables MSI in the
 - * card. Otherwise the card latches a random msi message.
 - */
 -if (!(info->flags & MSI_FLAG_ACTIVATE_EARLY))
 -continue;
 +}

-irq_data = irq_domain_get_irq_data(domain, desc->irq);
-if (!can_reserve)
irq_data = irq_domain_get_irq_data(domain, i);
if (!can_reserve) {
    irqd_clr_can_reserve(irq_data);
    if (domain->flags & IRQ_DOMAIN_MSI_NOMASK QUIRK)
        irqd_set_msi_nomask_quirk(irq_data);
    ret = irq_domain_activate_irq(irq_data, can_reserve);
    if (ret)
        goto cleanup;
}
+skip_activate:
/
* If these interrupts use reservation mode, clear the activated bit
* so request_irq() will assign the final vector.
*/
if (can_reserve) {
    for_each_msi_entry(desc, dev) {
        irq_data = irq_domain_get_irq_data(domain, desc->irq);
        for_each_msi_vector(desc, i, dev) {
            irq_data = irq_domain_get_irq_data(domain, i);
            irqd_clr_activated(irq_data);
        }
    }
    return 0;
}
cleanup:
    for_each_msi_entry(desc, dev) {
        struct irq_data *irqd;
        if (desc->irq == virq)
            break;
        irqd = irq_domain_get_irq_data(domain, desc->irq);
        if (irqd_is_activated(irqd))
            irq_domain_deactivate_irq(irqd);
    }
    msi_domain_free_irqs(domain, dev);
    return ret;
} @ @ -481,7 +475,15 @ @
*/
void msi_domain_free_irqs(struct irq_domain *domain, struct device *dev)
{
    struct irq_data *irq_data;
    struct msi_desc *desc;
    int i;
    +
for_each_msi_vector(desc, i, dev) {
    irq_data = irq_domain_get_irq_data(domain, i);
    if (irqd_is_activated(irq_data))
        irq_domain_deactivate_irq(irq_data);
}

for_each_msi_entry(desc, dev) {
    /*
    --- linux-4.15.0.orig/kernel/irq/proc.c
    +++ linux-4.15.0/kernel/irq/proc.c
    @@ -117,6 +117,28 @@
    return show_irq_affinity(AFFINITY_LIST, m);
    }
    
    #ifndef CONFIG_AUTO_IRQ_AFFINITY
    static inline int irq_select_affinity_usr(unsigned int irq)
    {
        /*
        * If the interrupt is started up already then this fails. The
        * interrupt is assigned to an online CPU already. There is no
        * point to move it around randomly. Tell user space that the
        * selected mask is bogus.
        * *
        * If not then any change to the affinity is pointless because the
        * startup code invokes irq_setup_affinity() which will select
        * a online CPU anyway.
        */
        +return -EINVAL;
        +}
    #else
        /* ALPHA magic affinity auto selector. Keep it for historical reasons. */
        +static inline int irq_select_affinity_usr(unsigned int irq)
        +{
        +    return irq_select_affinity(irq);
        +}
    +#endif

    static ssize_t write_irq_affinity(int type, struct file *file,
                                       const char __user *buffer, size_t count, loff_t *pos)
    --- linux-4.15.0.orig/kernel/irq/resend.c
    +++ linux-4.15.0/kernel/irq/resend.c
    @@ -38,6 +38,8 @@
    irq = find_first_bit(irqs_resend, nr_irqs);
    clear_bit(irq, irqs_resend);
    desc = irq_to_desc(irq);
    +if (!desc)
    +continue;
    local_irq_disable();
desc->handle_irq(desc);
local_irq_enable();

--- linux-4.15.0.orig/kernel/irq_work.c
+++ linux-4.15.0/kernel/irq_work.c
@@ -56,61 +56,70 @@
} /*
 */

-/* Enqueue the irq_work @work on @cpu unless it's already pending
- somewhere.
- *
- Can be re-enqueued while the callback is still in progress.
- */
 */
#endif /* CONFIG_SMP */

-bool irq_work_queue_on(struct irq_work *work, int cpu)
+static void __irq_work_queue_local(struct irq_work *work)
{
    /* All work should have been flushed before going offline */
-WARN_ON_ONCE(cpu_is_offline(cpu));
-
-#ifdef CONFIG_SMP
-
-/* Arch remote IPI send/receive backend aren't NMI safe */
-WARN_ON_ONCE(in_nmi());
+/* If the work is "lazy", handle it from next tick if any */
+if (work->flags & IRQ_WORK_LAZY) {
+    if (llist_add(&work->llnode, this_cpu_ptr(&lazy_list)) &&
+        tick_nohz_tick_stopped())
+        arch_irq_work_raise();
+} else {
+    if (llist_add(&work->llnode, this_cpu_ptr(&raised_list)))
+        arch_irq_work_raise();
+}
+
+/* Enqueue the irq work @work on the current CPU */
+bool irq_work_queue(struct irq_work *work)
+{
+    /* Only queue if not already pending */
+    if (!irq_work_claim(work))
        return false;
+
+    if (llist_add(&work->llnode, &per_cpu(raised_list, cpu)))
+        arch_send_call_function_single_ipi(cpu);
+
+    #else /* ifdef CONFIG_SMP */
+    irq_work_queue(work);
+} /* irq_work_queue_on */
+/* Queue the entry and raise the IPI if needed. */
+preempt_disable();
+__irq_work_queue_local(work);
+preempt_enable();

return true;
}
+EXPORT_SYMBOL_GPL(irq_work_queue);

+/* Enqueue the irq work @work on the current CPU */
+bool irq_work_queue(struct irq_work *work)
+
+/* Enqueue the irq_work @work on @cpu unless it's already pending
+ somewhere.
+ */
+bool irq_work_queue_on(struct irq_work *work, int cpu)
+
+ifndef CONFIG_SMP
+return irq_work_queue(work);
+
+else /* CONFIG_SMP: */
+/* All work should have been flushed before going offline */
+WARN_ON_ONCE(cpu_is_offline(cpu));
+
+/* Only queue if not already pending */
+if (!irq_work_claim(work))
+return false;

+/* Queue the entry and raise the IPI if needed. */
+preempt_disable();
-
+/* If the work is "lazy", handle it from next tick if any */
+-if (work->flags & IRQ_WORK_LAZY) {
+ -if (llist_add(&work->llnode, this_cpu_ptr(&lazy_list)) &&
+ -tick_nohz_tick_stopped())
+ -arch_irq_work_raise();
+ +if (cpu != smp_processor_id()) {
+ - if (llist_add(&work->llnode, this_cpu_ptr(&raised_list)))
+ -arch_irq_work_raise();
+ + if (cpu != smp_processor_id()) {
+ +/* Arch remote IPI send/receive backend aren't NMI safe */
+ +WARN_ON_ONCE(in_nmi());
+ +if (llist_add(&work->llnode, &per_cpu(raised_list, cpu)))
+ +arch_send_call_function_single_ipi(cpu);
+ } else {
+ -if (llist_add(&work->llnode, this_cpu_ptr(&raised_list)))
+ -arch_irq_work_raise();
+ +__irq_work_queue_local(work);
bool irq_work_needs_cpu(void) {
  int v, v1;
  STATIC_KEY_CHECK_USE(key);
  +lockdep_assert_cpus_held();

  /*
   * Careful if we get concurrent static_key_slow_inc() calls;
   * The negative count check is valid even when a negative
   * key->enabled is in use by static_key_slow_inc(); a
   * key->enabled is in use by static_key_slow_inc();
   */

  if (atomic_read(&key->enabled) > 0) {
    WARN_ON_ONCE(atomic_read(&key->enabled) != 1);
  }
  void static_key_enable_cpuslocked(struct static_key *key) {
    STATIC_KEY_CHECK_USE(key);
    +lockdep_assert_cpus_held();

    void static_key_disable_cpuslocked(struct static_key *key) {
      STATIC_KEY_CHECK_USE(key);
      +lockdep_assert_cpus_held();

    if (atomic_read(&key->enabled) != 1) {
      WARN_ON_ONCE(atomic_read(&key->enabled) != 0);
      unsigned long rate_limit,
      struct delayed_work *work)
    }
    +lockdep_assert_cpus_held();
  }
  */

} -
preempt_enable();

return true;
+#endif /* CONFIG_SMP */
} -EXPORT_SYMBOL_GPL(irq_work_queue);
+
bool irq_work_needs_cpu(void) {
  int v, v1;
  STATIC_KEY_CHECK_USE(key);
  +lockdep_assert_cpus_held();

  /*
   * Careful if we get concurrent static_key_slow_inc() calls;
   */

  if (atomic_read(&key->enabled) > 0) {
    WARN_ON_ONCE(atomic_read(&key->enabled) != 1);
  }
  void static_key_enable_cpuslocked(struct static_key *key) {
    STATIC_KEY_CHECK_USE(key);
    +lockdep_assert_cpus_held();

    void static_key_disable_cpuslocked(struct static_key *key) {
      STATIC_KEY_CHECK_USE(key);
      +lockdep_assert_cpus_held();

    if (atomic_read(&key->enabled) != 1) {
      WARN_ON_ONCE(atomic_read(&key->enabled) != 0);
      unsigned long rate_limit,
      struct delayed_work *work)
    }
    +lockdep_assert_cpus_held();
  }
  */

  /* The negative count check is valid even when a negative
   * key->enabled is in use by static_key_slow_inc(); a
   */
+++ linux-4.15.0/kernel/kallsyms.c
@@ -297,8 +297,10 @@
    {
    char namebuf[KSYM_NAME_LEN];

    -if (is_ksym_addr(addr))
    -return !!get_symbol_pos(addr, symbolsize, offset);
    +if (is_ksym_addr(addr)) {
    +get_symbol_pos(addr, symbolsize, offset);
    +return 1;
    +}
    return !!module_address_lookup(addr, symbolsize, offset, NULL, namebuf) ||
           !!__bpf_address_lookup(addr, symbolsize, offset, namebuf);
}
--- linux-4.15.0.orig/kernel/kcov.c
+++ linux-4.15.0/kernel/kcov.c
@@ -56,7 +56,7 @@
    struct task_struct *t;
    {
    -static bool check_kcov_mode(enum kcov_mode needed_mode, struct task_struct *t)
    +static notrace bool check_kcov_mode(enum kcov_mode needed_mode, struct task_struct *t)
    {
    enum kcov_mode mode;

    @@ -78,7 +78,7 @@
    return mode == needed_mode;
    }

    -static unsigned long canonicalize_ip(unsigned long ip)
    +static notrace unsigned long canonicalize_ip(unsigned long ip)
    {
    #ifdef CONFIG_RANDOMIZE_BASE
    ip -= kaslr_offset();
    @@ -112,7 +112,7 @@
    EXPORT_SYMBOL(__sanitizer_cov_trace_pc);

    #ifdef CONFIG_KCOV_ENABLE_COMPARISONS
    -static void write_comp_data(u64 type, u64 arg1, u64 arg2, u64 ip)
    +static notrace void write_comp_data(u64 type, u64 arg1, u64 arg2, u64 ip)
    {
    struct task_struct *t;
    u64 *area;
    @@ -241,7 +241,8 @@

    void kcov_task_init(struct task_struct *t)
    {
    -t->kcov_mode = KCOV_MODE_DISABLED;
    +t->kcov_mode = KCOV_MODE_ENABLED;
+WRITE_ONCE(t->kcov_mode, KCOV_MODE_DISABLED);
+barrier();
t->kcov_size = 0;
t->kcov_area = NULL;
t->kcov = NULL;
@@ -358,7 +359,8 @@*/
    if (kcov->mode != KCOV_MODE_INIT || !kcov->area)
        return -EINVAL;
    if (kcov->t != NULL)
@@ -370,7 +372,6 @@
    #endif
    else
        return -EINVAL;
    /* Cache in task struct for performance. */
    t->kcov_size = kcov->size;
    t->kcov_area = kcov->area;
--- linux-4.15.0.orig/kernel/kexec.c
+++ linux-4.15.0/kernel/kexec.c
@@ -202,6 +202,13 @@
 return -EPERM;
 /*
 * kexec can be used to circumvent module loading restrictions, so
+ * prevent loading in that case
+ */
+if (kernel_is_locked_down("kexec of unsigned images"))
+    return -EPERM;
+    *
+/*
+ * Verify we have a legal set of flags
+ * This leaves us room for future extensions.
+/*
--- linux-4.15.0.orig/kernel/kexec_core.c
+++ linux-4.15.0/kernel/kexec_core.c
@@ -301,6 +301,8 @@
{
    struct page *pages;

+    if (fatal_signal_pending(current))
+        return NULL;
    pages = alloc_pages(gfp_mask & ~__GFP_ZERO, order);
if (pages) {
    unsigned int count, i;
    /* Ensure that these pages are decrypted if SME is enabled. */
    +if (pages)
        +arch_kexec_post_alloc_pages(page_address(pages), 1 << order, 0);
    +return pages;
}

result = -ENOMEM;
goto out;
}
+arch_kexec_post_alloc_pages(page_address(page), 1, 0);
ptr = kmap(page);
ptr += maddr & ~PAGE_MASK;
mchunk = min_t(size_t, mbytes,
        result = copy_from_user(ptr, buf, uchunk);
kexec_flush_icache_page(page);
kunmap(page);
+arch_kexec_pre_free_pages(page_address(page), 1);
if (result) {
    result = -EFAULT;
goto out;
}

#ifdef CONFIG_KEXEC_JUMP
if (kexec_image->preserve_context) {
    -lock_system_sleep();
    pm_prepare_console();
    error = freeze_processes();
    if (error) {
        @ -1181,7 +1188,6 @
thaw_processes();
    Restore_console:
    pm_restore_console();
    -unlock_system_sleep();
}
#endif

--- linux-4.15.0.orig/kernel/kexec_file.c
+++ linux-4.15.0/kernel/kexec_file.c
@@ -95,6 +95,11 @@
vfree(pi->sechdr);
pi->sechdr = NULL;

+#ifdef CONFIGIMA_KEXEC
+vfree(image->ima_buffer);
+image->ima_buffer = NULL;
+#endif /* CONFIGIMA_KEXEC */
+
/* See if architecture has anything to cleanup post load */
arch_kimage_file_post_load_cleanup(image);

@@ -255,6 +260,13 @@
if (!capable(CAP_SYS_BOOT) || kexec_load_disabled)
    return -EPERM;

+/* Don't permit images to be loaded into trusted kernels if we're not
+ * going to verify the signature on them
+ */
+if (!IS_ENABLED(CONFIG_KEXEC_VERIFY_SIG) &&
+    kernel_is_locked_down("kexec of unsigned images"))
+    return -EPERM;
+
/* Make sure we have a legal set of flags */
if (flags != (flags & KEXEC_FILE_FLAGS))
    return -EINVAL;
@@ -550,8 +562,10 @@
sha_region_sz = KEXEC_SEGMENT_MAX * sizeof(struct kexec_sha_region);
sha_regions = vzalloc(sha_region_sz);
    if (!sha_regions)
+    { ret = -ENOMEM; 
go to out_free_desc:
+    }

desc->tfm = tfm;
desc->flags = 0;
--- linux-4.15.0.orig/kernel/kmod.c
+++ linux-4.15.0/kernel/kmod.c
@@ -120,7 +120,7 @@
* invoke it.
*
* If module auto-loading support is disabled then this function
-* becomes a no-operation.
+* simply returns -ENOENT.
 */
int __request_module(bool wait, const char *fmt, ...)
{

WARN_ON_ONCE(wait && current_is_async());

if (!modprobe_path[0])
    -return 0;
+return -ENOENT;

va_start(args, fmt);
ret = vsnprintf(module_name, MODULE_NAME_LEN, fmt, args);
--- linux-4.15.0.orig/kernel/kprobes.c
+++ linux-4.15.0/kernel/kprobes.c
@@ -483,6 +483,7 @@
*/
static void do_optimize_kprobes(void)
{
+lockdep_assert_held(&text_mutex);
/*
   * The optimization/unoptimization refers online_cpus via
   * stop_machine() and cpu-hotplug modifies online_cpus.
@@ -500,9 +501,7 @@
         list_empty(&optimizing_list))
    return;

    -mutex_lock(&text_mutex);
    arch_optimize_kprobes(&optimizing_list);
    -mutex_unlock(&text_mutex);
    }

/*
@@ -513,6 +512,7 @@
{
    struct optimized_kprobe *op, *tmp;

    +lockdep_assert_held(&text_mutex);
    /* See comment in do_optimize_kprobes() */
    lockdep_assert_cpus_held();

    @@ -520,10 +520,11 @@
    if (list_empty(&unoptimizing_list))
        return;

        -mutex_lock(&text_mutex);
        arch_unoptimize_kprobes(&unoptimizing_list, &freeing_list);
    /* Loop free_list for disarming */
    list_for_each_entry_safe(op, tmp, &freeing_list, list) {
        /* Switching from detour code to origin */
        +op->kp.flags &= ~KPROBE_FLAG_OPTIMIZED;
    /* Disarm probes if marked disabled */

if (kprobe_disabled(&op->kp))
arch_disarm_kprobe(&op->kp);
@@ -537,7 +538,6 @@
else
list_del_init(&op->list);
}
-mutex_unlock(&text_mutex);
}

/* Reclaim all kprobes on the free_list */
@@ -546,8 +546,14 @@
struct optimized_kprobe *op, *tmp;

list_for_each_entry_safe(op, tmp, &freeing_list, list) {
  -BUG_ON(!kprobe_unused(&op->kp));
  list_del_init(&op->list);
  +if (WARN_ON_ONCE(!kprobe_unused(&op->kp))) {
  +/*
  + * This must not happen, but if there is a kprobe
  + * still in use, keep it on kprobes hash list.
  + */
  +continue;
  +}
  free_aggr_kprobe(&op->kp);
}
}
@@ -563,6 +569,7 @@
{
mutex_lock(&kprobe_mutex);
cpus_read_lock();
+mutex_lock(&text_mutex);
/* Lock modules while optimizing kprobes */
mutex_lock(&module_mutex);

@@ -590,12 +597,14 @@
do_free_cleaned_kprobes();

mutex_unlock(&module_mutex);
+mutex_unlock(&text_mutex);
cpus_read_unlock();
-mutex_unlock(&kprobe_mutex);

/* Step 5: Kick optimizer again if needed */
if (!list_empty(&optimizing_list) || !list_empty(&unoptimizing_list))
kick_kprobe_optimizer();
+
+mutex_unlock(&kprobe_mutex);
}
/* Wait for completing optimization and unoptimization */
//@ -617,6 +626,18 @@
mutex_unlock(&kprobe_mutex);
}

+static bool optprobe_queued_unopt(struct optimized_kprobe *op)
+{
+  struct optimized_kprobe *_op;
+
+  list_for_each_entry(_op, &unoptimizing_list, list) {
+    if (op == _op)
+      return true;
+  }
+
+  return false;
+}
+
+/* Optimize kprobe if p is ready to be optimized */
static void optimize_kprobe(struct kprobe *p)
{
//@ -638,17 +659,21 @@
return;

+/* Check if it is already optimized. */
-if (op->kp.flags & KPROBE_FLAG_OPTIMIZED)
+if (op->kp.flags & KPROBE_FLAG_OPTIMIZED) {
+  if (optprobe_queued_unopt(op)) {
+    /* This is under unoptimizing. Just dequeue the probe */
+    list_del_init(&op->list);
+  }
+  return;
+}

-op->kp.flags |= KPROBE_FLAG_OPTIMIZED;

-/* This is under unoptimizing. Just dequeue the probe */
-list_del_init(&op->list);
-else {
-  list_add(&op->list, &optimizing_list);
-  kick_kprobe_optimizer();
-}
+/* On unoptimizing/optimizing_list, op must have OPTIMIZED flag */
+if (WARN_ON_ONCE(!list_empty(&op->list)))
+  return;
+
+  list_add(&op->list, &optimizing_list);
+kick_kprobe_optimizer();

{  
lockdep_assert_cpus_held();
arch_unoptimize_kprobe(op);
+op->kp.flags &= ~KPROBE_FLAG_OPTIMIZED;
if (kprobe_disabled(&op->kp))
arch_disarm_kprobe(&op->kp);
}
  
/* Short cut to direct unoptimizing */
@@ -656,6 +681,7 @@
{
lockdep_assert_cpus_held();
arch_unoptimize_kprobe(op);
+top->kp.flags &= ~KPROBE_FLAG_OPTIMIZED;
if (kprobe_disabled(&op->kp))
arch_disarm_kprobe(&op->kp);
}
@@ -669,38 +695,40 @@
return;  /* This is not an optprobe nor optimized */

op = container_of(p, struct optimized_kprobe, kp);
-if (!kprobe_optimized(p)) {
-/* Unoptimized or unoptimizing case */
-   if (force && !list_empty(&op->list)) {
-      /* Only if this is unoptimizing kprobe and forced,
-      * forcibly unoptimize it. (No need to unoptimize
-      * unoptimized kprobe again :)                        
-      */
-      list_del_init(&op->list);
-      force_unoptimize_kprobe(op);
-   }
-}
+if (!kprobe_optimized(p))
+return;
+
-op->kp.flags &= ~KPROBE_FLAG_OPTIMIZED;
-if (!list_empty(&op->list)) {
-/* Dequeue from the optimization queue */
-list_del_init(&op->list);
-if (optprobe_queued_unopt(op)) {
+/* Forcibly unoptimize the kprobe here, and queue it
+ * in the freeing list for release afterwards.
+ */
+force_unoptimize_kprobe(op);
+list_mover(&op->list, &freeing_list);
+}
+} else {
+/* Dequeue from the optimizing queue */
+list_del_init(&op->list);
+op->kp.flags &= ~KPROBE_FLAG_OPTIMIZED;

} 
return;
}
+

/* Optimized kprobe case */
-if (force)
+if (force) {
/* Forcibly update the code: this is a special case */
force_unoptimize_kprobe(op);
-else {
+
} else {
+} else {
list_add(&op->list, &unoptimizing_list);
kick_kprobe_optimizer();
}
}

/* Cancel unoptimizing for reusing */
-static void reuse_unused_kprobe(struct kprobe *ap)
+static int reuse_unused_kprobe(struct kprobe *ap)
{
struct optimized_kprobe *op;

@@ -710,14 +738,15 @@
* there is still a relative jump) and disabled.
*/
op = container_of(ap, struct optimized_kprobe, kp);
-if (unlikely(list_empty(&op->list)))
-_warn_on_once(list_empty(&op->list));
-printk(KERN_WARNING "Warning: found a stray unused 
-"aggrprobe@%p\n", ap->addr);
+WARN_ON_ONCE(list_empty(&op->list));
/* Enable the probe again */
ap->flags &= ~KPROBE_FLAG_DISABLED;
/* Optimize it again (remove from op->list) */
-BUG_ON(!kprobe_optready(ap));
+if (!kprobe_optready(ap))
+return -EINVAL;
optimize_kprobe(ap);
+return 0;
}

/* Remove optimized instructions */
@@ -942,11 +971,16 @@
#define kprobe_disarmed(p) kprobe_disabled(p)
#define wait_for_kprobe_optimizer() do {} while (0)

-/* There should be no unused kprobes can be reused without optimization */
-static void reuse_unused_kprobe(struct kprobe *ap)
+static int reuse_unused_kprobe(struct kprobe *ap)
{
  /*
   * If the optimized kprobe is NOT supported, the aggr kprobe is
   * released at the same time that the last aggregated kprobe is
   * unregistered.
   * Thus there should be no chance to reuse unused kprobe.
   */
  printk(KERN_ERR "Error: There should be no unused kprobe here.\n");
  -BUG_ON(kprobe_unused(ap));
  +return -EINVAL;
}

static void free_aggr_kprobe(struct kprobe *p)
@@ -984,7 +1018,7 @@

ret = ftrace_set_filter_ip(&kprobe_ftrace_ops,
   (unsigned long)p->addr, 0, 0);
-WARN(ret < 0, "Failed to arm kprobe-ftrace at %p (%d)\n", p->addr, ret);
+WARN(ret < 0, "Failed to arm kprobe-ftrace at %pS (%d)\n", p->addr, ret);
  kprobe_ftrace_enabled++;
  if (kprobe_ftrace_enabled == 1) {
    ret = register_ftrace_function(&kprobe_ftrace_ops);
@@ -1004,12 +1038,21 @@
  ret = ftrace_set_filter_ip(&kprobe_ftrace_ops,
   (unsigned long)p->addr, 1, 0);
-WARN(ret < 0, "Failed to disarm kprobe-ftrace at %p (%d)\n", p->addr, ret);
+WARN(ret < 0, "Failed to disarm kprobe-ftrace at %pS (%d)\n", p->addr, ret);
  }
}
#else /* !CONFIG_KPROBES_ON_FTRACE */
-#define prepare_kprobe(p) arch_prepare_kprobe(p)
-#define arm_kprobe_ftrace(p) do {} while (0)
-#define disarm_kprobe_ftrace(p) do {} while (0)
+static inline int prepare_kprobe(struct kprobe *p)
+{
+  return arch_prepare_kprobe(p);
+}
+
+static inline void arm_kprobe_ftrace(struct kprobe *p)
+{
+}
+
+static inline void disarm_kprobe_ftrace(struct kprobe *p)
+{
+}
#endif
/* Arm a kprobe with text_mutex */
@@ -1182,6 +1225,26 @@
}
NOKPROBE_SYMBOL(kretprobe_table_unlock);

+struct kprobe kprobe_busy = {
+.addr = (void *) get_kprobe,
+};
+
+void kprobe_busy_begin(void)
+{
+struct kprobe_ctlblk *kcb;
+
+preempt_disable();
+__this_cpu_write(current_kprobe, &kprobe_busy);
+kcb = get_kprobe_ctlblk();
+kcb->kprobe_status = KPROBE_HIT_ACTIVE;
+
+void kprobe_busy_end(void)
+{
+__this_cpu_write(current_kprobe, NULL);
+preempt_enable();
+
+/*
  * This function is called from finish_task_switch when task tk becomes dead,
  * so that we can recycle any function-return probe instances associated
@@ -1199,6 +1262,8 @@
/* Early boot.  kretprobe_table_locks not yet initialized. */
return;

+kprobe_busy_begin();
+
INIT_HLIST_HEAD(&empty_rp);
hash = hash_ptr(tk, KPROBE_HASH_BITS);
head = &kretprobe_inst_table[hash];
@@ -1212,6 +1277,8 @@
hlist_del(&ri->hlist);
kfree(ri);
}
+
+kprobe_busy_end();
}
NOKPROBE_SYMBOL(kprobe_flush_task);

@@ -1320,9 +1387,12 @@
goto out;
init_aggr_kprobe(ap, orig_p);

-} else if (kprobe_unused(ap))
+} else if (kprobe_unused(ap)) {

/* This probe is going to die. Rescue it */
-reuse_unused_kprobe(ap);
+ret = reuse_unused_kprobe(ap);
+if (ret)
+goto out;
+

if (kprobe_gone(ap)) {
/*
@@ -1490,7 +1560,8 @@
/* Ensure it is not in reserved area nor out of text */
if (!kernel_text_address((unsigned long) p->addr) ||
    within_kprobe_blacklist((unsigned long) p->addr) ||
- jump_label_text_reserved(p->addr, p->addr)) {
+ jump_label_text_reserved(p->addr, p->addr) ||
+ find_bug((unsigned long)p->addr)) {
ret = -EINVAL;
goto out;
}
@@ -1927,6 +1998,10 @@
if (!kprobe_on_func_entry(rp->kp.addr, rp->kp.symbol_name, rp->kp.offset))
 return -EINVAL;

+/* If only rp->kp.addr is specified, check reregistering kprobes */
+if (rp->kp.addr && check_kprobe_rereg(&rp->kp))
+return -EINVAL;
+
if (kretprobe_blacklist_size) {
 addr = kprobe_addr(&rp->kp);
if (IS_ERR(addr))
@@ -2055,6 +2130,9 @@
 {
 struct kprobe *kp;

+if (WARN_ON_ONCE(kprobe_gone(p)))
+return;
+
p->flags |= KPROBE_FLAG_GONE;
if (kprobe_aggrprobe(p)) {
/*
@@ -2072,6 +2150,14 @@
 * the original probed function (which will be freed soon) any more.
 */
 arch_remove_kprobe(p);
+/
+ * The module is going away. We should disarm the kprobe which
+ * is using ftrace, because ftrace framework is still available at
+ * MODULE_STATE_GOING notification.
+ */
+if (kprobe_ftrace(p) && !kprobe_disabled(p) && !kprobes_all_disarmed)
+disarm_kprobe_ftrace(p);
}

/* Disable one kprobe */
@@ -2124,14 +2210,56 @@
}
EXPORT_SYMBOL_GPL(enable_kprobe);

+/* Caller must NOT call this in usual path. This is only for critical case */
void dump_kprobe(struct kprobe *kp)
{
- printk(KERN_WARNING "Dumping kprobe:\n");
- printk(KERN_WARNING "Name: %s\nAddress: %p\nOffset: %x\n",
- kprobe->symbol_name, kp->addr, kp->offset);
+ pr_err("Dumping kprobe:\n");
+ pr_err("Name: %s\nOffset: %x\nAddress: %pS\n",
+ kp->symbol_name, kp->offset, kp->addr);
} NOKPROBE_SYMBOL(dump_kprobe);

+int kprobe_add_ksym_blacklist(unsigned long entry)
+{
+ struct kprobe_blacklist_entry *ent;
+ unsigned long offset = 0, size = 0;
+ 
+ if (!kernel_text_address(entry) ||
+ !kallsyms_lookup_size_offset(entry, &size, &offset))
+ return -EINVAL;
+ 
+ ent = kmalloc(sizeof(*ent), GFP_KERNEL);
+ if (!ent)
+ return -ENOMEM;
+ 
+ ent->start_addr = entry;
+ ent->end_addr = entry + size;
+ INIT_LIST_HEAD(&ent->list);
+ list_add_tail(&ent->list, &kprobe_blacklist);
+ 
+ return (int)size;
+} +
+ /* Add all symbols in given area into kprobe blacklist */
+int kprobe_add_area_blacklist(unsigned long start, unsigned long end)
  +{
      unsigned long entry;
      int ret = 0;
      +for (entry = start; entry < end; entry += ret) {
        ret = kprobe_add_ksym_blacklist(entry);
        +if (ret < 0)
          +return ret;
        +if (ret == 0) /* In case of alias symbol */
          +ret = 1;
        +}
      +return 0;
      +}
      +
  +int __init __weak arch_populate_kprobe_blacklist(void)
  +{
      +return 0;
      +}
  +
  /*
   * Lookup and populate the kprobe_blacklist.
   *
   @@ -2143,29 +2271,24 @@
   static int __init populate_kprobe_blacklist(unsigned long *start,
       unsigned long *end)
   {
      unsigned long entry;
      unsigned long *iter;
      -struct kprobe_blacklist_entry *ent;
      unsigned long entry, offset = 0, size = 0;
      +int ret;
      
      for (iter = start; iter < end; iter++) {
        entry = arch_deref_entry_point((void *)*iter);
        -if (!kernel_text_address(entry) ||
          -!kallsyms_lookup_size_offset(entry, &size, &offset)) {
          -pr_err("Failed to find blacklist at %p\n",
          -(void *)entry);
          +ret = kprobe_add_ksym_blacklist(entry);
          +if (ret == -EINVAL)
            continue;
          -}
          -
          -ent = kmalloc(sizeof(*ent), GFP_KERNEL);
          -if (!ent)
            -return -ENOMEM;
-ent->start_addr = entry;
-ent->end_addr = entry + size;
-INIT_LIST_HEAD(&ent->list);
-list_add_tail(&ent->list, &kprobe_blacklist);
+if (ret < 0)
+return ret;
}
-return 0;
+
+"/* Symbols in __kprobes_text are blacklisted */
+ret = kprobe_add_area_blacklist((unsigned long)__kprobes_text_start,
+(unsigned long)__kprobes_text_end);
+
+return ret ?: arch Populate_kprobe_blacklist();
}

/* Module notifier call back, checking kprobes on the module */
@@ -2190,7 +2313,10 @@
mutex_lock(&kprobe_mutex);
for (i = 0; i < KPROBE_TABLE_SIZE; i++) {
    head = &kprobe_table[i];
  hlist_for_each_entry_rcu(p, head, hlist)
+  hlist_for_each_entry_rcu(p, head, hlist) { 
+    if (kprobe_gone(p))
+    continue;
+
+    if (within_module_init((unsigned long)p->addr, mod) ||
+        (checkcore &&
+         within_module_core((unsigned long)p->addr, mod)) { 
@@ -2207,6 +2333,7 @@
  */
    kill_kprobe(p);
    }
+}
}
mutex_unlock(&kprobe_mutex);
return NOTIFY_DONE;
@@ -2383,8 +2510,16 @@
struct kprobe_blacklist_entry *ent =
    list_entry(v, struct kprobe_blacklist_entry, list);

-seq_printf(m, "0x%p-0x%p%pt%p%ps%u", (void *)ent->start_addr,
- (void *)ent->end_addr, (void *)ent->start_addr);
+/*
+ * If /proc/kallsyms is not showing kernel address, we won't
+ * show them here either.
+ */
+if (!kallsyms_show_value())

		ent->start_addr = entry;
		ent->end_addr = entry + size;
-INIT_LIST_HEAD(&ent->list);
-list_add_tail(&ent->list, &kprobe_blacklist);
+if (ret < 0)
+return ret;
}
-return 0;
+
+"/* Symbols in __kprobes_text are blacklisted */
+ret = kprobe_add_area_blacklist((unsigned long)__kprobes_text_start,
+(unsigned long)__kprobes_text_end);
+
+return ret ?: arch Populate_kprobe_blacklist();
}

/* Module notifier call back, checking kprobes on the module */
@@ -2190,7 +2313,10 @@
mutex_lock(&kprobe_mutex);
for (i = 0; i < KPROBE_TABLE_SIZE; i++) {
    head = &kprobe_table[i];
  hlist_for_each_entry_rcu(p, head, hlist)
+  hlist_for_each_entry_rcu(p, head, hlist) { 
+    if (kprobe_gone(p))
+    continue;
+
+    if (within_module_init((unsigned long)p->addr, mod) ||
+        (checkcore &&
+         within_module_core((unsigned long)p->addr, mod)) { 
@@ -2207,6 +2333,7 @@
  */
    kill_kprobe(p);
    }
+}
}
mutex_unlock(&kprobe_mutex);
return NOTIFY_DONE;
@@ -2383,8 +2510,16 @@
struct kprobe_blacklist_entry *ent =
    list_entry(v, struct kprobe_blacklist_entry, list);

-seq_printf(m, "0x%p-0x%p%pt%p%ps%u", (void *)ent->start_addr,
- (void *)ent->end_addr, (void *)ent->start_addr);
+/*
+ * If /proc/kallsyms is not showing kernel address, we won't
+ * show them here either.
+ */
+if (!kallsyms_show_value())


+seq_printf(m, "0x%px-0x%px\t%p\n", NULL, NULL,
+ (void *)ent->start_addr);
+else
+seq_printf(m, "0x%px-0x%px\t%p\n", (void *)ent->start_addr,
+ (void *)ent->end_addr, (void *)ent->start_addr);
return 0;
}

@@ -2533,7 +2668,7 @@
if (!dir)
return -ENOMEM;

-file = debugfs_create_file("list", 0444, dir, NULL,
+file = debugfs_create_file("list", 0400, dir, NULL,
&debugfs_kprobes_operations);
if (!file)
goto error;
@@ -2543,7 +2678,7 @@
if (!file)
goto error;

-file = debugfs_create_file("blacklist", 0444, dir, NULL,
+file = debugfs_create_file("blacklist", 0400, dir, NULL,
&debugfs_kprobe_blacklist_ops);
if (!file)
goto error;
--- linux-4.15.0.orig/kernel/kthread.c
+++ linux-4.15.0/kernel/kthread.c
@@ -55,7 +55,6 @@
KTHREAD_IS_PER_CPU = 0,
KTHREAD_SHOULD_STOP,
KTHREAD_SHOULD_PARK,
-KTHREAD_IS_PARKED,
-};

static inline void set_kthread_struct(void *kthread)
@@ -177,14 +176,12 @@
static void __kthread_parkme(struct kthread *self)
{
-__set_current_state(TASK_PARKED);
-while (test_bit(KTHREAD_SHOULD_PARK, &self->flags)) {
-if (!test_and_set_bit(KTHREAD_IS_PARKED, &self->flags))
-complete(&self->parked);
+for (;;) {
+set_current_state(TASK_PARKED);
+if (!test_bit(KTHREAD_SHOULD_PARK, &self->flags))
+break;
schedule();
-__set_current_state(TASK_PARKED);
}
clear_bit(KTHREAD_IS_PARKED, &self->flags);
__set_current_state(TASK_RUNNING);

@@ -194,6 +191,11 @@
}
EXPORT_SYMBOL_GPL(kthread_parkme);

+void kthread_park_complete(struct task_struct *k)
+{
+complete(&to_kthread(k)->parked);
+}
+
+static int kthread(void *create)
+{
+/* Copy data: it's on kthread's stack */
+@@ -301,6 +303,17 @@
+ new kernel thread.
+*/
+if (unlikely(wait_for_completion_killable(&done))) {
+int i = 0;
+
+/*
+ * I got SIGKILL, but wait for 10 more seconds for completion
+ * unless chosen by the OOM killer. This delay is there as a
+ * workaround for boot failure caused by SIGKILL upon device
+ * driver initialization timeout.
+ */
+while (i++ < 10 && !test_tsk_thread_flag(current, TIF_MEMDIE))
+if (wait_for_completion_timeout(&done, HZ))
goto ready;
+/*
+ * If I was SIGKILLED before kthreadd (or new kernel thread)
+ * calls complete(), leave the cleanup of this structure to
+ */
+wait_for_completion(&done);
+
+ready:
+task = create->result;
+if (!IS_ERR(task)) {
+static const struct sched_param param = { .sched_priority = 0 };
+char name[TASK_COMM_LEN];
+
-vsnprintf(task->comm, sizeof(task->comm), namefmt, args);
/*
 * task is already visible to other tasks, so updating
 * COMM must be protected.
 */
vsnprintf(name, sizeof(name), namefmt, args);
set_task_comm(task, name);
/*
 * root may have changed our (kthread's) priority or CPU mask.
 * The kernel thread should not inherit these properties.
 *
@@ -433,11 +453,36 @@
return p;
kthread_bind(p, cpu);
/* CPU hotplug need to bind once again when unparking the thread. */
-set_bit(KTHREAD_IS_PER_CPU, &to_kthread(p)->flags);
to_kthread(p)->cpu = cpu;
return p;
}

+void kthread_set_per_cpu(struct task_struct *k, int cpu)
+{
+struct kthread *kthread = to_kthread(k);
+if (!kthread)
+return;
+
+WARN_ON_ONCE(!(k->flags & PF_NO_SETAFFINITY));
+
+if (cpu < 0) {
+clear_bit(KTHREAD_IS_PER_CPU, &kthread->flags);
+return;
+}
+
+kthread->cpu = cpu;
+set_bit(KTHREAD_IS_PER_CPU, &kthread->flags);
+}
+
+bool kthread_is_per_cpu(struct task_struct *k)
+{
+struct kthread *kthread = to_kthread(k);
+if (!kthread)
+return false;
+
+return test_bit(KTHREAD_IS_PER_CPU, &kthread->flags);
+}
+
/**
 * kthread_unpark - unpark a thread created by kthread_create().
 * @k:thread created by kthread_create().
 @@ -450,22 +495,15 @@
{  
struct kthread *kthread = to_kthread(k);

-clear_bit(KTHREAD_SHOULD_PARK, &kthread->flags);
/
  * We clear the IS_PARKED bit here as we don't wait
  * until the task has left the park code. So if we'd
  * park before that happens we'd see the IS_PARKED bit
  * which might be about to be cleared.
+  * Newly created kthread was parked when the CPU was offline.
+  * The binding was lost and we need to set it again.
  */
-if (test_and_clear_bit(KTHREAD_IS_PARKED, &kthread->flags)) {
  /*
  * Newly created kthread was parked when the CPU was offline.
  * The binding was lost and we need to set it again.
  * */
-if (test_bit(KTHREAD_IS_PER_CPU, &kthread->flags))
  -__kthread_bind(k, kthread->cpu, TASK_PARKED);
-wake_up_state(k, TASK_PARKED);
}  
+if (test_bit(KTHREAD_IS_PER_CPU, &kthread->flags))
  +__kthread_bind(k, kthread->cpu, TASK_PARKED);
+
+clear_bit(KTHREAD_SHOULD_PARK, &kthread->flags);
+wake_up_state(k, TASK_PARKED);
}  
EXPORT_SYMBOL_GPL(kthread_unpark);

@@ -488,12 +526,13 @@
if (WARN_ON(k->flags & PF_EXITING))
return -ENOSYS;

-if (!test_bit(KTHREAD_IS_PARKED, &kthread->flags)) {
-  set_bit(KTHREAD_SHOULD_PARK, &kthread->flags);
-  if (k != current) {
-wait_for_completion(&kthread->parked);
-  }
+if (WARN_ON_ONCE(test_bit(KTHREAD_SHOULD_PARK, &kthread->flags)))
+  return -EBUSY;
+
+set_bit(KTHREAD_SHOULD_PARK, &kthread->flags);
+if (k != current) {
+wake_up_process(k);
+wait_for_completion(&kthread->parked);
}
return 0;
@@ -830,7 +869,8 @@
 /* Move the work from worker->delayed_work_list. */
 WARN_ON_ONCE(list_empty(&work->node));
 list_del_init(&work->node);
-kthread_insert_work(worker, work, &worker->work_list);
+if (!work->canceling)
+kthread_insert_work(worker, work, &worker->work_list);

 spin_unlock(&worker->lock);
 }
@@ -951,8 +991,38 @@
 EXPORT_SYMBOL_GPL(kthread_flush_work);

 /*
 - * This function removes the work from the worker queue. Also it makes sure
 - * that it won't get queued later via the delayed work's timer.
 + * Make sure that the timer is neither set nor running and could
 + * not manipulate the work list_head any longer.
 + *
 + * The function is called under worker->lock. The lock is temporary
 + * released but the timer can't be set again in the meantime.
 + */
+static void kthread_cancel_delayed_work_timer(struct kthread_work *work,
+    unsigned long *flags)
+{
+    struct kthread_delayed_work *dwork =
+        container_of(work, struct kthread_delayed_work, work);
+    struct kthread_worker *worker = work->worker;
+    
+    /*
+     * del_timer_sync() must be called to make sure that the timer
+     * callback is not running. The lock must be temporary released
+     * to avoid a deadlock with the callback. In the meantime,
+     * any queuing is blocked by setting the canceling counter.
+     */
+    work->canceling++;
+    spin_unlock_irqrestore(&worker->lock, *flags);
+    del_timer_sync(&dwork->timer);
+    spin_lock_irqsave(&worker->lock, *flags);
+    work->canceling--;
+} 
+ 
+/*
 + This function removes the work from the worker queue.
 + *
 + * It is called under worker->lock. The caller must make sure that
 + * the timer used by delayed work is not running, e.g. by calling

+ * kthread_cancel_delayed_work_timer().
+ *
+ * The work might still be in use when this function finishes. See the
+ * current_work proceed by the worker.
@@ -960,28 +1030,8 @@
+ * Return: %true if @work was pending and successfully canceled,
+ * %false if @work was not pending
+ */
-static bool __kthread_cancel_work(struct kthread_work *work, bool is_dwork,
-  unsigned long *flags)
+static bool __kthread_cancel_work(struct kthread_work *work)
{ }
-/* Try to cancel the timer if exists. */
-if (is_dwork) {
-  struct kthread_delayed_work *dwork =
-  container_of(work, struct kthread_delayed_work, work);
-  struct kthread_worker *worker = work->worker;
-  -
-  /*
-  * del_timer_sync() must be called to make sure that the timer
-  * callback is not running. The lock must be temporary released
-  * to avoid a deadlock with the callback. In the meantime,
-  * any queuing is blocked by setting the canceling counter.
-  */
-  -work->canceling++;;
-  spin_unlock_irqrestore(&worker->lock, *flags);
-  del_timer_sync(&dwork->timer);
-  spin_lock_irqsave(&worker->lock, *flags);
-  -work->canceling--;;
-  -
-  /*
-  * Try to remove the work from a worker list. It might either
-  * be from worker->work_list or from worker->delayed_work_list.
@@ -1034,11 +1084,23 @@
 /* Work must not be used with >1 worker, see kthread_queue_work() */
 WARN_ON_ONCE(work->worker != worker);
-/* Do not fight with another command that is canceling this work. */
+/*
+ * Temporary cancel the work but do not fight with another command
+ * that is canceling the work as well.
+ *
+ * It is a bit tricky because of possible races with another
+ * mod_delayed_work() and cancel_delayed_work() callers.
+ *
+ * The timer must be canceled first because worker->lock is released
+ * when doing so. But the work can be removed from the queue (list)
kthread_cancel_delayed_work_timer(work, &flags);
if (work->canceling)
goto out;
ret = __kthread_cancel_work(work);

-ret = __kthread_cancel_work(work, true, &flags);
fast_queue:
__kthread_queue_delayed_work(worker, dwork, delay);
out:
			@ @ -1060,7 +1122,10 @@
/* Work must not be used with >1 worker, see kthread_queue_work(). */
WARN_ON_ONCE(work->worker != worker);

-ret = __kthread_cancel_work(work, is_dwork, &flags);
+if (is_dwork)
+kthread_cancel_delayed_work_timer(work, &flags);
+
+ret = __kthread_cancel_work(work);

if (worker->current_work != work)
goto out_fast;
--- linux-4.15.0.orig/kernel/livepatch/core.c
+++ linux-4.15.0/kernel/livepatch/core.c
@@ -30,6 +30,7 @@
#include <linux/completion.h>
+#include <linux/memory.h>
#include <asm/cacheflush.h>
#include "core.h"
#include "patch.h"
@@ -619,6 +620,9 @@
if (!func->old_name || !func->new_func)
return -EINVAL;
+if (strlen(func->old_name) >= KSYM_NAME_LEN)
+return -EINVAL;

INIT_LIST_HEAD(&func->stack_node);
func->patched = false;
@@ -646,16 +650,21 @@
struct klp_func *func;
int ret;

+ * only when it can be queued again so that the return value can
+ * be used for reference counting.
+ */
+kthread_cancel_delayed_work_timer(work, &flags);
if (work->canceling)
goto out;
ret = __kthread_cancel_work(work);

if (worker->current_work != work)
goto out_fast;
mutex_lock(&text_mutex);
+
module_disable_ro(patch->mod);
ret = klp_write_object_relocations(patch->mod, obj);
if (ret) {
module_enable_ro(patch->mod, true);
+mutex_unlock(&text_mutex);
return ret;
}

arch_klp_init_object_loaded(patch, obj);
module_enable_ro(patch->mod, true);

+mutex_unlock(&text_mutex);
+
klp_for_each_func(obj, func) {
ret = klp_find_object_symbol(obj->name, func->old_name,
    func->old_sympos,
@@ -692,6 +701,9 @@
if (!obj->funcs)
return -EINVAL;
+	if (klp_is_module(obj) && strlen(obj->name) >= MODULE_NAME_LEN)
	return -EINVAL;
+
obj->patched = false;
obj->mod = NULL;
@@ -961,6 +973,7 @@
pr_warn("patch '%s' failed for module '%s', refusing to load module '%s'",
    patch->mod->name, obj->mod->name, obj->mod->name);
mod->klp_alive = false;
+obj->mod = NULL;
klp_cleanup_module_patches_limited(mod, patch);
mutex_unlock(&klp_mutex);

--- linux-4.15.0.orig/kernel/locking/lockdep.c
+++ linux-4.15.0/kernel/locking/lockdep.c
@@ -140,7 +140,7 @@
unsigned long nr_lock_classes;
static struct lock_class lock_classes[MAX_LOCKDEP_KEYS];

-static inline struct lock_class *hlock_class(struct held_lock *hlock)
+inline struct lock_class *lockdep_hlock_class(struct held_lock *hlock)
{
    if (!hlock->class_idx) {
        /*
@@ -151,6 +151,8 @@
return lock_classes + hlock->class_idx - 1;
}

EXPORT_SYMBOL_GPL(lockdep_hlock_class);
#define hlock_class(hlock) lockdep_hlock_class(hlock)

#ifdef CONFIG_LOCK_STAT
static DEFINE_PER_CPU(struct lock_class_stats[MAX_LOCKDEP_KEYS], cpu_lock_stats);
#endif

if (IS_ERR(class)) {
    debug_locks_off();
    printk("INFO: trying to register non-static key\n");
    printk("the code is fine but needs lockdep annotation.\n");
    printk("The code is fine but needs lockdep annotation, or maybe\n");
    printk("you didn't initialize this object before use?\n");
    printk("turning off the locking correctness validator.\n");
    dump_stack();
    return NULL;
}

this.parent = NULL;
this.class = class;

raw_local_irq_save(flags);
+current->lockdep_recursion = 1;
arch_spin_lock(&lockdep_lock);
ret = __lockdep_count_forward_deps(&this);
arch_spin_unlock(&lockdep_lock);
raw_local_irq_restore(flags);
+current->lockdep_recursion = 0;
return ret;
}

this.parent = NULL;
this.class = class;

raw_local_irq_save(flags);
+current->lockdep_recursion = 1;
arch_spin_lock(&lockdep_lock);
ret = __lockdep_count_backward_deps(&this);
arch_spin_unlock(&lockdep_lock);
raw_local_irq_restore(flags);
+current->lockdep_recursion = 0;
return ret;
return ret;
}
@@ -3342,17 +3349,17 @@
if (depth) {
    hlock = curr->held_locks + depth - 1;
    if (hlock->class_idx == class_idx && nest_lock) {
        -if (hlock->references) {
-        /* Check: unsigned int references:12, overflow.
-        */
-        -if (DEBUG_LOCKS_WARN_ON(hlock->references == (1 << 12)-1))
-        -return 0;
-        +if (!references)
-            +references++;
        +if (!hlock->references)
        hlock->references++;
        -} else {
        -hlock->references = 2;
        -}
        +hlock->references += references;
        +
        +/* Overflow */
        +if (DEBUG_LOCKS_WARN_ON(hlock->references < references))
        +return 0;
    return 1;
}
@@ -3620,6 +3627,9 @@
    unsigned int depth;
    int i;

    +if (unlikely(!debug_locks))
    +return 0;
    +
    depth = curr->lockdep_depth;
    /*
     * This function is about (re)setting the class of a held lock.
-@ @ -4139,7 +4149,7 @@
-}
     */
    unsigned long flags;

    -if (unlikely(!lock_stat))
    +if (unlikely(!lock_stat || !debug_locks))
    return;

    if (unlikely(current->lockdep_recursion))
unsigned long flags;

if (unlikely(!lock_stat))
+if (unlikely(!lock_stat || !debug_locks))
    return;

if (unlikely(current->lockdep_recursion))
    return;

-local_irq_save(flags);
+raw_local_irq_save(flags);
for (i = 0; i < curr->lockdep_depth; i++) {
    hlock = curr->held_locks + i;

    print_freed_lock_bug(curr, mem_from, mem_from + mem_len, hlock);
    break;
}
-local_irq_restore(flags);
+raw_local_irq_restore(flags);
}
EXPORT_SYMBOL_GPL(debug_check_no_locks_freed);

--- linux-4.15.0.orig/kernel/locking/lockdep_proc.c
+++ linux-4.15.0/kernel/locking/lockdep_proc.c
@@ -224,7 +224,6 @@
static int lockdep_stats_show(struct seq_file *m, void *v)
{
-    struct lock_class *class;
    unsigned long nr_unused = 0, nr_uncategorized = 0,
        nr_irq_safe = 0, nr_irq_unsafe = 0,
        nr_softirq_safe = 0, nr_softirq_unsafe = 0,
@@ -234,6 +234,9 @@
        nr_hardirq_read_safe = 0, nr_hardirq_read_unsafe = 0,
        sum_forward_deps = 0;

+#ifdef CONFIG_PROVE_LOCKING
+    struct lock_class *class;
+    +
+    list_for_each_entry(class, &all_lock_classes, lock_entry) {

    if (class->usage_mask == 0)
        @@ -265,13 +267,13 @@
if (class->usage_mask & LOCKF_ENABLED_HARDIRQ_READ)  
nr_hardirq_read_unsafe++;

-#ifdef CONFIG_PROVE_LOCKING
sum_forward_deps += lockdep_count_forward_deps(class);
-#endif
}
#endif CONFIG_DEBUG_LOCKDEP
DEBUG_LOCKS_WARN_ON(debug_atomic_read(nr_unused_locks) != nr_used);
#endif
+
+
+seq_printf(m, " lock-classes: %11lu [max: %lu]n",
nr_lock_classes, MAX_LOCKDEP_KEYS);
seq_printf(m, " direct dependencies: %11lu [max: %lu]n",
@@ -428,7 +430,7 @@
seq_time(m, lt->min);
seq_time(m, lt->max);
seq_time(m, lt->total);
-#seq_time(m, lt->nr ? div_s64(lt->total, lt->nr) : 0);
+seq_time(m, lt->nr ? div64_u64(lt->total, lt->nr) : 0);
}

static void seq_stats(struct seq_file *m, struct lock_stat_data *data)
--- linux-4.15.0.orig/kernel/locking/locktorture.c
+++ linux-4.15.0/kernel/locking/locktorture.c
@@ -715,8 +715,7 @@
{
    bool fail = 0;
    int i, n_stress;
-    long max = 0;
-    long min = statp[0].n_lock_acquired;
    +long max = 0, min = statp ? statp[0].n_lock_acquired : 0;
    long long sum = 0;
    n_stress = write ? cxt.nrealwriters_stress : cxt.nrealreaders_stress;
@@ -724,10 +723,10 @@
    if (statp[i].n_lock_fail)
        fail = true;
    sum += statp[i].n_lock_acquired;
-    if (max < statp[i].n_lock_fail)
-        max = statp[i].n_lock_fail;
-    if (min > statp[i].n_lock_fail)
-        min = statp[i].n_lock_fail;
+    if (max < statp[i].n_lock_acquired)
+        max = statp[i].n_lock_acquired;
+    if (min > statp[i].n_lock_acquired)
+        min = statp[i].n_lock_acquired;
    n_stress = write ? cxt.nrealwriters_stress : cxt.nrealreaders_stress;
* such, only perform the underlying torture-specific cleanups, * and avoid anything related to locktorture. */
@ -823,7 +822,7 @@
@if (!cxt.lwsa)
+if (!cxt.lwsa && !cxt.lrsa)
    goto end;

if (writer_tasks) {
@@ -898,6 +897,13 @@
    firsterr = -EINVAL;
    goto unwind;
}
+
+if (nwriters_stress == 0 && nreaders_stress == 0) {
+    pr_alert("lock-torture: must run at least one locking thread\n");
+    firsterr = -EINVAL;
+    goto unwind;
+}
+
+if (cxt.cur_ops->init)
+    cxt.cur_ops->init();

#endif
/* Initialize the statistics so that each run gets its own numbers. */
+if (nwriters_stress) {
+    lock_is_write_held = 0;
+    cxt.lwsa = kmalloc(sizeof(*cxt.lwsa) * cxt.nrealwriters_stress, GFP_KERNEL);
+    if (cxt.lwsa == NULL) {
+        VERBOSE_TOROUT_STRING("cxt.lwsa: Out of memory");
+        firsterr = -ENOMEM;
+        goto unwind;
+    }
+
+    if (cxt.cur_ops->init)
+        cxt.cur_ops->init();

-@ -921,17 +927,19 @@
#ifendif

/*! Initialize the statistics so that each run gets its own numbers. */
+if (nwriters_stress) {
+    lock_is_write_held = 0;
+    cxt.lwsa = kmalloc(sizeof(*cxt.lwsa) * cxt.nrealwriters_stress, GFP_KERNEL);
+    if (cxt.lwsa == NULL) {
+        VERBOSE_TOROUT_STRING("cxt.lwsa: Out of memory");
+        firsterr = -ENOMEM;
+        goto unwind;
+    }

    lock_is_write_held = 0;
    cxt.lwsa = kmalloc(sizeof(*cxt.lwsa) * cxt.nrealwriters_stress, GFP_KERNEL);
    if (cxt.lwsa == NULL) {
        -VERBOSE_TOROUT_STRING("cxt.lwsa: Out of memory");
        -firsterr = -ENOMEM;
        -goto unwind;
    }
-
    for (i = 0; i < cxt.nrealwriters_stress; i++) {
        -cxt.lwsa[i].n_lock_fail = 0;
}
-ctx.lwsa[i].n_lock_acquired = 0;
+for (i = 0; i < ctx.nrealwriters_stress; i++) {
+ctx.lwsa[i].n_lock_fail = 0;
+ctx.lwsa[i].n_lock_acquired = 0;
+
}
}

if (ctx.cur_ops->readlock) {
  @@ -948,19 +956,21 @@
  cxt.nrealreaders_stress = ctx.nrealwriters_stress;
 }

-ctx.lrsa = kmalloc(sizeof(*cxt.lrsa) * cxt.nrealreaders_stress, GFP_KERNEL);
-if (ctx.lrsa == NULL) {
-VERBOSE_TOROUT_STRING("ctx.lrsa: Out of memory");
-firsterr = -ENOMEM;
-kfree(ctx.lwsa);
-ctx.lwsa = NULL;
-goto unwind;
-
-
-for (i = 0; i < ctx.nrealreaders_stress; i++) {
-ctx.lrsa[i].n_lock_fail = 0;
-ctx.lrsa[i].n_lock_acquired = 0;
+if (nreaders_stress) {
+  lock_is_read_held = 0;
+  cxt.lrsa = kmalloc(sizeof(*cxt.lrsa) * cxt.nrealreaders_stress, GFP_KERNEL);
+  if (ctx.lrsa == NULL) {
+    VERBOSE_TOROUT_STRING("ctx.lrsa: Out of memory");
+    firsterr = -ENOMEM;
+    kfree(ctx.lwsa);
+    ctx.lwsa = NULL;
+    goto unwind;
+  }
+  
+  for (i = 0; i < cxt.nrealreaders_stress; i++) {
+    cxt.lrsa[i].n_lock_fail = 0;
+    cxt.lrsa[i].n_lock_acquired = 0;
+  }
+
}

@goto unwind;
if (cxt.cur_ops->readlock) {
    --- linux-4.15.0.orig/kernel/locking/qrwlock.c
    +++ linux-4.15.0/kernel/locking/qrwlock.c
    @@ -70,6 +70,8 @@ */
    void queued_write_lock_slowpath(struct qrwlock *lock)
    {
        +int cnts;
        +
        /* Put the writer into the wait queue */
        arch_spin_lock(&lock->wait_lock);

        @@ -83,9 +85,8 @@ */

        /* When no more readers or writers, set the locked flag */
        do {
            -atomic_cond_read_acquire(&lock->cnts, VAL == _QW_WAITING);
            -} while (atomic_cmpxchg_relaxed(&lock->cnts, _QW_WAITING,
                _QW_LOCKED) != _QW_WAITING);
            +cnts = atomic_cond_read_relaxed(&lock->cnts, VAL == _QW_WAITING);
            +} while (!atomic_try_cmpxchg_acquire(&lock->cnts, &cnts, _QW_LOCKED));
        unlock:
        arch_spin_unlock(&lock->wait_lock);
    }
    --- linux-4.15.0.orig/kernel/locking/qspinlock.c
    +++ linux-4.15.0/kernel/locking/qspinlock.c
    @@ -77,6 +77,18 @@ */
    #endif

    /* The pending bit spinning loop count.
    * This heuristic is used to limit the number of lockword accesses
    * made by atomic_cond_read_relaxed when waiting for the lock to
+ * transition out of the "== _Q_PENDING_VAL" state. We don't spin
+ * indefinitely because there's no guarantee that we'll make forward
+ * progress.
+ */
+#ifndef _Q_PENDING_LOOPS
+#define _Q_PENDING_LOOPS	1
+#endif
+
+/*
* Per-CPU queue node structures; we can never have more than 4 nested
* contexts: task, softirq, hardirq, nmi.
*
@@ -114,42 +126,19 @@
#define _Q_LOCKED_PENDING_MASK (_Q_LOCKED_MASK | _Q_PENDING_MASK)

-/*
- * By using the whole 2nd least significant byte for the pending bit, we
- * can allow better optimization of the lock acquisition for the pending
- * bit holder.
- *
- * This internal structure is also used by the set_locked function which
- * is not restricted to _Q_PENDING_BITS == 8.
- */
-struct __qspinlock {
-union {
-atomic_t val;
-#ifdef __LITTLE_ENDIAN
-union {
-struct {
-u8locked;
-u8pending;
-};
-struct {
-u16locked_pending;
-u16tail;
-};
-#else
-struct {
-u16tail;
-u16locked_pending;
-};
-struct {
-u8reserved[2];
-u8pending;
-u8locked;
-};
-#endif
-};
-endif
-};
```c
#endif
*/

/**
+ * clear_pending - clear the pending bit.
+ * @lock: Pointer to queued spinlock structure
+ *
+ * *,1,* -> *,0,*
+ */
+static __always_inline void clear_pending(struct qspinlock *lock)
+{
+WRITE_ONCE(lock->pending, 0);
+
+}

+/**
* clear_pending_set_locked - take ownership and clear the pending bit.
* @lock: Pointer to queued spinlock structure
*
@@ -159,9 +148,7 @@
*/
+static __always_inline void clear_pending_set_locked(struct qspinlock *lock)
+{
+WRITE_ONCE(lock->locked_pending, _Q_LOCKED_VAL);
+}

/**
@@ -170,25 +157,34 @@
* @tail : The new queue tail code word
* Return: The previous queue tail code word
* *
- * xchg(lock, tail)
+ * xchg(lock, tail), which heads an address dependency
* *
* p,* ,* -> n,*,* ; prev = xchg(lock, node)
+*/
+static __always_inline u32 xchg_tail(struct qspinlock *lock, u32 tail)
+{
+WRITE_ONCE(lock->locked_pending, _Q_LOCKED_VAL);
+}

+/**
@@ -170,25 +157,34 @@
* @tail : The new queue tail code word
* Return: The previous queue tail code word
* *
- * xchg(lock, tail)
+ * xchg(lock, tail), which heads an address dependency
* *
* p,* ,* -> n,*,* ; prev = xchg(lock, node)
+*/
+static __always_inline u32 xchg_tail(struct qspinlock *lock, u32 tail)
+{
+WRITE_ONCE(lock->locked_pending, _Q_LOCKED_VAL);
+}
```

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tail >> _Q_TAIL_OFFSET) << _Q_TAIL_OFFSET;
}

#else /* _Q_PENDING_BITS == 8 */

/**
 * clear_pending - clear the pending bit.
 * @lock: Pointer to queued spinlock structure
 * *
 * @* , 1, * -> * , 0, *
 * */
+static __always_inline void clear_pending(struct qspinlock *lock)
+{
+atomic_andnot(_Q_PENDING_VAL, &lock->val);
+}
+
+/**
 * clear_pending_set_locked - take ownership and clear the pending bit.
 * @lock: Pointer to queued spinlock structure
 *
 * @ -230.6 +226.20 @@
 #endif /* _Q_PENDING_BITS == 8 */

/**
 * queued_fetch_set_pending_acquire - fetch the whole lock value and set pending
 * @lock : Pointer to queued spinlock structure
 * Return: The previous lock value
 *
 * *, *, * -> *, 1, *
 * */
 +#ifndef queued_fetch_set_pending_acquire
+static __always_inline u32 queued_fetch_set_pending_acquire(struct qspinlock *lock)
+{
+return atomic_fetch_or_acquire(_Q_PENDING_VAL, &lock->val);
+}
+#endif
+
+/**
 * set_locked - Set the lock bit and own the lock
 * @lock: Pointer to queued spinlock structure
 *
 * @ -237.9 +247.7 @@
 */
 static __always_inline void set_locked(struct qspinlock *lock)
 |
 -struct __qspinlock *l = (void *)lock;
 -
 -WRITE_ONCE(l->locked, _Q_LOCKED_VAL);
WRITE_ONCE(lock->locked, _Q_LOCKED_VAL);
}

void queued_spin_lock_slowpath(struct qspinlock *lock, u32 val)
{
    struct mcs_spinlock *prev, *next, *node;
    u32 new, old, tail;
    int idx;

    BUILD_BUG_ON(CONFIG_NR_CPUS >= (1U << _Q_TAIL_CPU_BITS));
    return;

    /*
     * wait for in-progress pending->locked hand-overs
     * Wait for in-progress pending->locked hand-overs with a bounded
     * number of spins so that we guarantee forward progress.
     *
     * 0,1,0 -> 0,0,1
     */
    if (val == _Q_PENDING_VAL) {
        while ((val = atomic_read(&lock->val)) == _Q_PENDING_VAL)
            cpu_relax();
        int cnt = _Q_PENDING_LOOPS;
        val = smp_cond_load_acquire(&lock->val.counter,
+        (VAL != _Q_PENDING_VAL) || !cnt--);
    }

    /*
     * If we observe any contention; queue.
     */
    if (val & ~_Q_LOCKED_MASK)
+    goto queue;
+    /*
     * trylock || pending
     *
     */
    -for (;;) {
        -/*
        - * If we observe any contention; queue.
        */
        -if (val & ~_Q_LOCKED_MASK)
            -goto queue;
        +
        +/*
        * trylock || pending
        *
        * 0,0,0 -> 0,0,1 ; trylock
        */
    -for (;;) {
        -/*
        - * If we observe any contention; queue.
        */
        -*/
        -if (val & ~_Q_LOCKED_MASK)
goto queue;
-
new = _Q_LOCKED_VAL;
-if (val == new)
new |= _Q_PENDING_VAL;
-
/*
 * Acquire semantic is required here as the function may
 * return immediately if the lock was free.
 */
-old = atomic_cmpxchg_acquire(&lock->val, val, new);
-if (old == val)
-break;
-
val = old;
-
+val = queued_fetch_set_pending_acquire(lock);

/*
 * we won the trylock
 + * If we observe any contention; undo and queue.
 */
-if (new == _Q_LOCKED_VAL)
-return;
+if (unlikely(val & ~_Q_LOCKED_MASK)) {
+if (!!(val & _Q_PENDING_MASK))
+clear_pending(lock);
+goto queue;
+}

/*
 * we're pending, wait for the owner to go away.
 + * We're pending, wait for the owner to go away.
 * *
 + *,1,1 -> *,1,0
 + * 0,1,1 -> 0,1,0
 *
 * this wait loop must be a load-acquire such that we match the
 * store-release that clears the locked bit and create lock
 * sequentiality; this is because not all clear_pending_set_locked()
 * implementations imply full barriers.
 + * sequentiality; this is because not all
 + * clear_pending_set_locked() implementations imply full
 + * barriers.
 */
-smp_cond_load_acquire(&lock->val.counter, !(!(VAL & _Q_LOCKED_MASK));
+if (val & _Q_LOCKED_MASK)
+smp_cond_load_acquire(&lock->val.counter, !!(VAL & _Q_LOCKED_MASK));
clear_pending_set_locked(lock);
return;

tail = encode_tail(smp_processor_id(), idx);
node += idx;

+ /*
+ * Ensure that we increment the head node->count before initialising
+ * the actual node. If the compiler is kind enough to reorder these
+ * stores, then an IRQ could overwrite our assignments.
+ */
+ barrier();
+
+ node->locked = 0;
+ node->next = NULL;
+ pv_init_node(node);
+ /*
+ if (old & _Q_TAIL_MASK) {
+ prev = decode_tail(old);
+ /*
+ - * The above xchg_tail() is also a load of @lock which generates,
+ - * through decode_tail(), a pointer.
+ - *
+ - * The address dependency matches the RELEASE of xchg_tail()
+ - * such that the access to @prev must happen after.
+ * We must ensure that the stores to @node are observed before
+ * the write to prev->next. The address dependency from
+ * xchg_tail is not sufficient to ensure this because the read
+ * component of xchg_tail is unordered with respect to the
+ * initialisation of @node.
+ */
+ -smp_read_barrier_depends();
+ -WRITE_ONCE(prev->next, node);
+ +smp_store_release(&prev->next, node);
+
+ pv_wait_node(node, prev);
+ arch_mcs_spin_lock_contended(&node->locked);
* claim the lock:

* n,0,0 -> 0,0,1 : lock, uncontended
- * ,0,0 -> *,0,1 : lock, contended
+ * *,0 -> *,1 : lock, contended
*
- * If the queue head is the only one in the queue (lock value == tail),
- * clear the tail code and grab the lock. Otherwise, we only need
- * to grab the lock.
+ * If the queue head is the only one in the queue (lock value == tail)
+ * and nobody is pending, clear the tail code and grab the lock.
+ * Otherwise, we only need to grab the lock.
*/

- for (;;) {
-/* In the PV case we might already have _Q_LOCKED_VAL set */
-if ((val & _Q_TAIL_MASK) != tail) {
- set_locked(lock);
- break;
- }
+
+/* In the PV case we might already have _Q_LOCKED_VAL set */
+if ((val & _Q_TAIL_MASK) == tail) {
+/*
+ * The smp_cond_load_acquire() call above has provided the
+ * necessary acquire semantics required for locking. At most
+ * two iterations of this loop may be ran.
+ * necessary acquire semantics required for locking.
+ */
-old = atomic_cmpxchg_relaxed(&lock->val, val, _Q_LOCKED_VAL);
-if (old == val)
- goto release; /* No contention */
-}
-
+val = old;
+ goto release; /* No contention */
}

+/* Either somebody is queued behind us or _Q_PENDING_VAL is set */
+set_locked(lock);
+
+/*
* contended path: wait for next if not observed yet, release.
*/
--- linux-4.15.0.orig/kernel/locking/qspinlock_paravirt.h
+++ linux-4.15.0/kernel/locking/qspinlock_paravirt.h
@@ -87,8 +87,6 @@
#define queued_spin_trylock(l) pv_hybrid_queued_unfair_trylock(l)
static inline bool pv_hybrid_queued_unfair_trylock(struct qspinlock *lock)
{  
-struct __qspinlock *l = (void *)lock;
-
/*
 * Stay in unfair lock mode as long as queued mode waiters are
 * present in the MCS wait queue but the pending bit isn't set.
@@ -97,7 +95,7 @@
  int val = atomic_read(&lock->val);

  if (!((val & _Q_LOCKED_PENDING_MASK) &&
-    (cmpxchg_acquire(&l->locked, 0, _Q_LOCKED_VAL) == 0)) |
+    (cmpxchg_acquire(&lock->locked, 0, _Q_LOCKED_VAL) == 0)) |
    qstat_inc(qstat_pv_lock_stealing, true);
  return true;
}
@@ -117,16 +115,7 @@
#if _Q_PENDING_BITS == 8
static __always_inline void set_pending(struct qspinlock *lock)
{
-  struct __qspinlock *l = (void *)lock;
-
-  WRITE_ONCE(l->pending, 1);
-}
-
-static __always_inline void clear_pending(struct qspinlock *lock)
-{
-  struct __qspinlock *l = (void *)lock;
-
-  WRITE_ONCE(l->pending, 0);
+WRITE_ONCE(lock->pending, 1);
 }

/*
@@ -136,10 +125,8 @@
*/
  static __always_inline int trylock_clear_pending(struct qspinlock *lock)
{
-  struct __qspinlock *l = (void *)lock;
-
-  return !READ_ONCE(l->locked) &&
-    (cmpxchg_acquire(&l->locked_pending, _Q_PENDING_VAL, _Q_LOCKED_VAL) == _Q_PENDING_VAL);
+return !READ_ONCE(lock->locked) &&
+    (cmpxchg_acquire(&lock->locked_pending, _Q_PENDING_VAL, _Q_LOCKED_VAL) == _Q_PENDING_VAL);
 }
#endif /* _Q_PENDING_BITS == 8 */
@@ -148,11 +135,6 @@
atomic_or(_Q_PENDING_VAL, &lock->val);
static __always_inline void clear_pending(struct qspinlock *lock) {
    atomic_andnot(_Q_PENDING_VAL, &lock->val);
}

static __always_inline int trylock_clear_pending(struct qspinlock *lock) {
    int val = atomic_read(&lock->val);
    if ((loop & PV_PREV_CHECK_MASK) != 0)
        return false;
    return READ_ONCE(prev->state) != vcpu_running;
}

/* */
static void pv_kick_node(struct qspinlock *lock, struct mcs_spinlock *node) {
    struct pv_node *pn = (struct pv_node *)node;
    struct __qspinlock *l = (void *)lock;
    /* If the vCPU is indeed halted, advance its state to match that of */
    /* the hash table later on at unlock time, no atomic instruction is */
    /* needed. */
    WRITE_ONCE(l->locked, _Q_SLOW_VAL);
    WRITE_ONCE(lock->locked, _Q_SLOW_VAL);
    (void)pv_hash(lock, pn);
}

pv_wait_head_or_lock(struct qspinlock *lock, struct mcs_spinlock *node) {
    struct pv_node *pn = (struct pv_node *)node;
    struct __qspinlock *l = (void *)lock;
    struct qspinlock **lp = NULL;
    int waitcnt = 0;
    int loop;
    @ -479,13 +459,13 @@
    * Matches the __pv_queued_spin_unlock(). */
-if (xchg(&l->locked, _Q_SLOW_VAL) == 0) {
+if (xchg(&lock->locked, _Q_SLOW_VAL) == 0) {
  /*
   * The lock was free and now we own the lock.
   * Change the lock value back to _Q_LOCKED_VAL
   * and unhash the table.
   */
-WRITE_ONCE(l->locked, _Q_LOCKED_VAL);
+WRITE_ONCE(lock->locked, _Q_LOCKED_VAL);
WRITE_ONCE(*lp, NULL);
goto gotlock;
}
@@ -493,7 +473,7 @@
WRITE_ONCE(pn->state, vcpu_hashed);
qstat_inc(qstat_pv_wait_head, true);
qstat_inc(qstat_pv_wait_again, waitcnt);
-pv_wait(&l->locked, _Q_SLOW_VAL);
+pv_wait(&lock->locked, _Q_SLOW_VAL);
/*
 * Because of lock stealing, the queue head vCPU may not be
@@ -518,7 +498,6 @@
__visible void
__pv_queued_spin_unlock_slowpath(struct qspinlock *lock, u8 locked)
{
 -struct __qspinlock *l = (void *)lock;
 struct pv_node *node;

if (unlikely(locked != _Q_SLOW_VAL)) {
 @@ -547,7 +526,7 @@
 * Now that we have a reference to the (likely) blocked pv_node,
 * release the lock.
 */
-smp_store_release(&l->locked, 0);
+smp_store_release(&lock->locked, 0);
/*
 * At this point the memory pointed at by lock can be freed/reused,
@@ -573,7 +552,6 @@
 ifndef __pv_queued_spin_unlock
 __visible void __pv_queued_spin_unlock(struct qspinlock *lock)
 {
 -struct __qspinlock *l = (void *)lock;
 u8 locked;
 /*
@@ -581,7 +559,7 @@
 * unhash. Otherwise it would be possible to have multiple @lock

* entries, which would be BAD.
*/
-locked = cmpxchg_release(&l->locked, _Q_LOCKED_VAL, 0);
+locked = cmpxchg_release(&lock->locked, _Q_LOCKED_VAL, 0);
if (likely(locked == _Q_LOCKED_VAL))
return;

--- linux-4.15.0.orig/kernel/locking/rtmutex.c
+++ linux-4.15.0/kernel/locking/rtmutex.c
@@ -1466,6 +1466,29 @@
 rt_mutex_postunlock(&wake_q);
 }

+static inline void __rt_mutex_lock(struct rt_mutex *lock, unsigned int subclass)
+{
+  +might_sleep();
+  +mutex_acquire(&lock->dep_map, subclass, 0, _RET_IP_);
+  +rt_mutex_fastlock(lock, TASK_UNINTERRUPTIBLE, rt_mutex_slowlock);
+}
+
+#ifndef CONFIG_DEBUG_LOCK_ALLOC
+/**
+ * rt_mutex_lock_nested - lock a rt_mutex
+ *
+ * @lock: the rt_mutex to be locked
+ * @subclass: the lockdep subclass
+ */
+void __sched rt_mutex_lock_nested(struct rt_mutex *lock, unsigned int subclass)
+{
+  __rt_mutex_lock(lock, subclass);
+}
+EXPORT_SYMBOL_GPL(rt_mutex_lock_nested);
+#endif
+
+#ifndef CONFIG_DEBUG_LOCK_ALLOC
/**
 * rt_mutex_lock - lock a rt_mutex
 *
@@ -1473,12 +1496,10 @@
 */
 void __sched rt_mutex_lock(struct rt_mutex *lock)
 {
 -might_sleep();
-  +mutex_acquire(&lock->dep_map, 0, 0, _RET_IP_);
-  +rt_mutex_fastlock(lock, TASK_UNINTERRUPTIBLE, rt_mutex_slowlock);
+  __rt_mutex_lock(lock, 0);

EXPORT_SYMBOL_GPL(rt_mutex_lock);
+#endif

/**
 * rt_mutex_lock_interruptible - lock a rt_mutex interruptible
 * @lock - 1698,19 +1719,39 @@
 * possible because it belongs to the pi_state which is about to be freed
 * and it is not longer visible to other tasks.
 */
-void rt_mutex_proxy_unlock(struct rt_mutex *lock,
  - struct task_struct *proxy_owner)
+void rt_mutex_proxy_unlock(struct rt_mutex *lock)
{
  debug_rt_mutex_proxy_unlock(lock);
  rt_mutex_set_owner(lock, NULL);
}

+/**
 + * __rt_mutex_start_proxy_lock() - Start lock acquisition for another task
 + * @lock: the rt_mutex to take
 + * @waiter: the pre-initialized rt_mutex_waiter
 + * @task: the task to prepare
 + *
 + * Starts the rt_mutex acquire; it enqueues the @waiter and does deadlock
 + * detection. It does not wait, see rt_mutex_wait_proxy_lock() for that.
 + *
 + * NOTE: does _NOT_ remove the @waiter on failure; must either call
 + * rt_mutex_wait_proxy_lock() or rt_mutex_cleanup_proxy_lock() after this.
 + *
 + * Returns:
 + *  0 - task blocked on lock
 + *  1 - acquired the lock for task, caller should wake it up
 + *  <0 - error
 + *
 + * Special API call for PI-futex support.
 + */
int __rt_mutex_start_proxy_lock(struct rt_mutex *lock,
  struct rt_mutex_waiter *waiter,
  struct task_struct *task)
{
  int ret;

  lockdep_assert_held(&lock->wait_lock);
  +
  if (try_to_take_rt_mutex(lock, task, NULL))
    return 1;
ret = 0;
}

-if (unlikely(ret))
-remove_waiter(lock, waiter);
-
ddebug_rt_mutex_print_deadlock(waiter);

return ret;

int rt_mutex_start_proxy_lock(struct rt_mutex *lock, struct rt_mutex_waiter *waiter, struct rt_mutex_waiter *task, struct rt_mutex_referenced *rme);

- * Starts the rt_mutex acquire; it enqueues the @waiter and does deadlock
- * detection. It does not wait, see rt_mutex_wait_proxy_lock() for that.
- *
- * NOTE: unlike __rt_mutex_start_proxy_lock this _DOES_ remove the @waiter
- * on failure.
- *
- * Returns:
- *  0 - task blocked on lock
- *  1 - acquired the lock for task, caller should wake it up
- * <0 - error
- *
- * Special API call for FUTEX_REQUEUE_PI support.
- * Special API call for PI-futex support.
- */

int rt_mutex_start_proxy_lock(struct rt_mutex *lock, struct rt_mutex_waiter *waiter, struct rt_mutex_referenced *rme);

raw_spin_lock_irq(&lock->wait_lock);
ret = __rt_mutex_start_proxy_lock(lock, waiter, task);
+if (unlikely(ret))
+remove_waiter(lock, waiter);
raw_spin_unlock_irq(&lock->wait_lock);

return ret;

- * Attempt to clean up after a failed rt_mutex_wait_proxy_lock().
- * Attempt to clean up after a failed __rt_mutex_start_proxy_lock() or
- * rt_mutex_wait_proxy_lock().
- *
- * Unless we acquired the lock; we're still enqueued on the wait-list and can
* in fact still be granted ownership until we're removed. Therefore we can
--- linux-4.15.0.orig/kernel/locking/rtmutex_common.h
+++ linux-4.15.0/kernel/locking/rtmutex_common.h
@@ -132,8 +132,7 @@
 extern struct task_struct *rt_mutex_next_owner(struct rt_mutex *lock);
 extern void rt_mutex_init_proxy_locked(struct rt_mutex *lock,
     struct task_struct *proxy_owner);
-extern void rt_mutex_proxy_unlock(struct rt_mutex *lock,
-    struct task_struct *proxy_owner);
+extern void rt_mutex_proxy_unlock(struct rt_mutex *lock);
 extern void rt_mutex_init_waiter(struct rt_mutex_waiter *waiter);
 extern int __rt_mutex_start_proxy_lock(struct rt_mutex *lock,
     struct rt_mutex_waiter *waiter,
--- linux-4.15.0.orig/kernel/locking/rwsem-xadd.c
+++ linux-4.15.0/kernel/locking/rwsem-xadd.c
@@ -130,6 +130,7 @@
 {
     struct rwsem_waiter *waiter, *tmp;
     long oldcount, woken = 0, adjustment = 0;
+    struct list_head wlist;

 /*
 * Take a peek at the queue head waiter such that we can determine
 @@ -188,26 +189,25 @@
 * of the queue. We know that woken will be at least 1 as we accounted
 * for above. Note we increment the 'active part' of the count by the
 * number of readers before waking any processes up.
+ *
+ * We have to do wakeup in 2 passes to prevent the possibility that
+ * the reader count may be decremented before it is incremented. It
+ * is because the to-be-woken waiter may not have slept yet. So it
+ * may see waiter->task got cleared, finish its critical section and
+ * do an unlock before the reader count increment.
+ *
+ * 1) Collect the read-waiters in a separate list, count them and
+ * fully increment the reader count in rwsem.
+ * 2) For each waiters in the new list, clear waiter->task and
+ * put them into wake_q to be woken up later.
 */
-struct task_struct *tsk;
+list_for_each_entry_safe(waiter, tmp, &sem->wait_list, list) {
  -list_for_each_entry(waiter, &sem->wait_list, list) {
    if (waiter->type == RWSEM_WAITING_FOR_WRITE)
      break;

    woken++;
  } -tsk = waiter->task;


wake_q_add(wake_q, tsk);
list_del(&waiter->list);

/*
 * Ensure that the last operation is setting the reader
 * waiter to nil such that rwsem_down_read_failed() cannot
 * race with do_exit() by always holding a reference count
 * to the task to wakeup.
 * */
smp_store_release(&waiter->task, NULL);

+adjustment = woken * RWSEM_ACTIVE_READ_BIAS - adjustment;
if (list_empty(&sem->wait_list)) {
  @ @ -217,6 +217,29 @ @
if (adjustment)
  atomic_long_add(adjustment, &sem->count);
  +
  +/* 2nd pass */
  +list_for_each_entry_safe(waiter, tmp, &wlist, list) {
  +struct task_struct *tsk;
  +
  +tsk = waiter->task;
  +get_task_struct(tsk);
  +
  +/*
  + * Ensure calling get_task_struct() before setting the reader
  + * waiter to nil such that rwsem_down_read_failed() cannot
  + * race with do_exit() by always holding a reference count
  + * to the task to wakeup.
  + */
  +smp_store_release(&waiter->task, NULL);
  +/*
  + * Ensure issuing the wakeup (either by us or someone else)
  + * after setting the reader waiter to nil.
  + */
  +wake_q_add(wake_q, tsk);
  +/* wake_q_add() already take the task ref */
  +put_task_struct(tsk);
  +}
}

/*
 @ @ -352,16 +375,15 @@
struct task_struct *owner;
bool ret = true;
BUILD_BUG_ON(!rwsem_has_anonymous_owner(RWSEM_OWNER_UNKNOWN));
+
if (need_resched())
    return false;

rcu_read_lock();
owner = READ_ONCE(sem->owner);
-if (!rwsem_owner_is_writer(owner)) {
   /*
   * Don't spin if the rwsem is readers owned.
   * /
   -ret = !rwsem_owner_is_reader(owner);
   +if (!owner || !is_rwlock_owner_spinnable(owner)) {
      +ret = !owner;/* !owner is spinnable */
      goto done;
   }

   @@ -382,11 +404,11 @@
   {
   struct task_struct *owner = READ_ONCE(sem->owner);

   -if (!rwsem_owner_is_writer(owner))
   -goto out;
   +if (!is_rwlock_owner_spinnable(owner))
   +return false;

   rcu_read_lock();
   -while (sem->owner == owner) {
   +while (owner && (READ_ONCE(sem->owner) == owner)) {
      /*
      * Ensure we emit the owner->on_cpu, dereference _after_
      * checking sem->owner still matches owner, if that fails,
      @@ -408,12 +430,12 @@
      cpu_relax();
   } rcu_read_unlock();
   -out:
   +
      /*
      * If there is a new owner or the owner is not set, we continue
      * spinning.
      */
   -return !rwsem_owner_is_reader(READ_ONCE(sem->owner));
   +return is_rwlock_owner_spinnable(READ_ONCE(sem->owner));
   }

static bool rwsem_optimistic_spin(struct rw_semaphore *sem)
might_sleep();
__down_read(sem);
+rwsem_set_reader_owned(sem);
}

EXPORT_SYMBOL(down_read_non_owner);

EXPORT_SYMBOL(up_read_non_owner);

#ifdef CONFIG_RWSEM_SPIN_ON_OWNER
/*
 * The owner field of the rw_semaphore structure will be set to
 * - RWSEM_READ_OWNED when a reader grabs the lock. A writer will clear
 * + RWSEM_READER_OWNED when a reader grabs the lock. A writer will clear
 * the owner field when it unlocks. A reader, on the other hand, will
 * not touch the owner field when it unlocks.
 * - * In essence, the owner field now has the following 3 states:
 * + * In essence, the owner field now has the following 4 states:
 * 1) 0
 * - lock is free or the owner hasn't set the field yet
 * 2) RWSEM_READER_OWNED
 * - lock is currently or previously owned by readers (lock is free
 * + or not set by owner yet)
 * 3) Other non-zero value
 * - a writer owns the lock
 * + 3) RWSEM_ANONYMOUSLY_OWNED bit set with some other bits set as well
 * + lock is owned by an anonymous writer, so spinning on the lock
 * + owner should be disabled.
 * + 4) Other non-zero value
 * + - a writer owns the lock and other writers can spin on the lock owner.
 */
#define RWSEM_READER_OWNED((struct task_struct *)1UL)
#define RWSEM_ANONYMOUSLY_OWNED(1UL << 0)
#define RWSEM_READER_OWNED((struct task_struct *)RWSEM_ANONYMOUSLY_OWNED)
#endif
WRITE_ONCE(sem->owner, RWSEM_READER_OWNED);
}

static inline bool rwsem_owner_is_writer(struct task_struct *owner)
+/*
+ * Return true if the a rwsem waiter can spin on the rwsem's owner
+ * and steal the lock, i.e. the lock is not anonymously owned.
+ * N.B. !owner is considered spinnable.
+ */
+static inline bool is_rwsem_owner_spinnable(struct task_struct *owner)
{
  return !((unsigned long)owner & RWSEM_ANONYMOUSLY_OWNED);
}

static inline bool rwsem_owner_is_reader(struct task_struct *owner)
+/*
+ * Return true if rwsem is owned by an anonymous writer or readers.
+ */
+static inline bool rwsem_has_anonymous_owner(struct task_struct *owner)
{
  return (unsigned long)owner & RWSEM_ANONYMOUSLY_OWNED;
}

static inline void rwsem_set_owner(struct rw_semaphore *sem)

static void spin_dump(raw_spinlock_t *lock, const char *msg)
{
  struct task_struct *owner = NULL;
  struct task_struct *owner = READ_ONCE(lock->owner);

  -if (lock->owner && lock->owner != SPINLOCK_OWNER_INIT)
    -owner = lock->owner;
  +if (owner == SPINLOCK_OWNER_INIT)
    +owner = NULL;
  printk(KERN_EMERG "BUG: spinlock %s on CPU#%d, %s/%d\n",
    msg, raw_smp_processor_id(),
    current->comm, task_pid_nr(current));

  printk(KERN_EMERG " lock: %pS, .magic: %08x, .owner: %s/%d, \\
    .owner_cpu: %d\n",
    lock, lock->magic,
    owner ? owner->comm : "<none>",

owner ? task_pid_nr(owner) : -1,  
-lock->owner_cpu;
+READ_ONCE(lock->owner_cpu));
dump_stack();
}

@@ -80,16 +80,16 @@
static inline void
d debug_spin_lock_before(raw_spinlock_t *lock)
{
-SPIN_BUG_ON(lock->magic != SPINLOCK_MAGIC, lock, "bad magic");
-SPIN_BUG_ON(lock->owner == current, lock, "recursion");
-SPIN_BUG_ON(lock->owner_cpu == raw_smp_processor_id(),
+SPIN_BUG_ON(READ_ONCE(lock->magic) != SPINLOCK_MAGIC, lock, "bad magic");
+SPIN_BUG_ON(READ_ONCE(lock->owner) == current, lock, "recursion");
+SPIN_BUG_ON(READ_ONCE(lock->owner_cpu) == raw_smp_processor_id(),
lock, "cpu recursion");
}

static inline void debug_spin_lock_after(raw_spinlock_t *lock)
{
-lock->owner_cpu = raw_smp_processor_id();
-lock->owner = current;
+WRITE_ONCE(lock->owner_cpu, raw_smp_processor_id());
+WRITE_ONCE(lock->owner, current);
}

static inline void debug_spin_unlock(raw_spinlock_t *lock)
@@ -99,8 +99,8 @@
SPIN_BUG_ON(lock->owner != current, lock, "wrong owner");
SPIN_BUG_ON(lock->owner_cpu != raw_smp_processor_id(),
lock, "wrong CPU");
-lock->owner = SPINLOCK_OWNER_INIT;
-lock->owner_cpu = -1;
+WRITE_ONCE(lock->owner, SPINLOCK_OWNER_INIT);
+WRITE_ONCE(lock->owner_cpu, -1);
}

/*
@@ -183,8 +183,8 @@
static inline void debug_write_lock_after(rwlock_t *lock)
{
-lock->owner_cpu = raw_smp_processor_id();
-lock->owner = current;
+WRITE_ONCE(lock->owner_cpu, raw_smp_processor_id());
+WRITE_ONCE(lock->owner, current);
}
static inline void debug_write_unlock(rwlock_t *lock)
@@ -193,8 +193,8 @@
    RWLOCK_BUG_ON(lock->owner != current, lock, "wrong owner");
    RWLOCK_BUG_ON(lock->owner_cpu != raw_smp_processor_id(),
        lock, "wrong CPU");
-   lock->owner = SPINLOCK_OWNER_INIT;
-   lock->owner_cpu = -1;
+   WRITE_ONCE(lock->owner, SPINLOCK_OWNER_INIT);
+   WRITE_ONCE(lock->owner_cpu, -1);
}

void do_raw_write_lock(rwlock_t *lock)
--- linux-4.15.0.orig/kernel/locking/test-ww_mutex.c
+++ linux-4.15.0/kernel/locking/test-ww_mutex.c
@@ -260,7 +260,7 @@
{
    struct test_cycle *cycle = container_of(work, typeof(*cycle), work);
    struct ww_acquire_ctx ctx;
-   int err;
+   int err, erra = 0;

    ww_acquire_init(&ctx, &ww_class);
    ww_mutex_lock(&cycle->a_mutex, &ctx);
@@ -270,17 +270,19 @@
    err = ww_mutex_lock(cycle->b_mutex, &ctx);
    if (err == -EDEADLK) {
        +err = 0;
-ww_mutex_unlock(&cycle->a_mutex);
        +ww_mutex_unlock(&cycle->a_mutex);
    }
    if (!err)
-ww_mutex_unlock(&cycle->a_mutex);
-ww_mutex_unlock(&cycle->a_mutex);
+if (!erra)
+    +ww_mutex_unlock(&cycle->a_mutex);
+ww_acquire_fini(&ctx);

    -cycle->result = err;
    +cycle->result = err ?: erra;
}

static int __test_cycle(unsigned int nthreads)
--- linux-4.15.0.orig/kernel/memremap.c
+++ linux-4.15.0/kernel/memremap.c
@@ -248,13 +248,16 @@

 EXPORT_SYMBOL(device_private_entry_fault);
 #endif /* CONFIG_DEVICE_PRIVATE */

-static void pgmap_radix_release(struct resource *res)
+static void pgmap_radix_release(struct resource *res, unsigned long end_pgoff)
 {
     unsigned long pgoff, order;

     mutex_lock(&pgmap_lock);
     -foreach_order_pgoff(res, order, pgoff)
+foreach_order_pgoff(res, order, pgoff) {
         +if (pgoff >= end_pgoff)
             +break;
         radix_tree_delete(&pgmap_radix, PHYS_PFN(res->start) + pgoff);
     +}
     mutex_unlock(&pgmap_lock);

     synchronize_rcu();
@@ -301,14 +304,15 @@
 /* pages are dead and unused, undo the arch mapping */
 align_start = res->start & ~(SECTION_SIZE - 1);
-align_size = ALIGN(resource_size(res), SECTION_SIZE);
+align_size = ALIGN(res->start + resource_size(res), SECTION_SIZE)
 + align_start;

     mem_hotplug_begin();
     arch_remove_memory(align_start, align_size);
     mem_hotplug_done();

     untrack_pfn(NULL, PHYS_PFN(align_start), align_size);
-    pgmap_radix_release(res);
+    pgmap_radix_release(res, -1);
     dev_WARN_ONCE(dev, pgmap->altmap && pgmap->altmap->alloc,
         "%s: failed to free all reserved pages\n", __func__);
conflict_pgmap = get_dev_pagemap(PHYS_PFN(align_start), NULL);
if (conflict_pgmap) {
    dev_WARN(dev, "Conflicting mapping in same section\n");
    put_dev_pagemap(conflict_pgmap);
    return ERR_PTR(-ENOMEM);
}
conflict_pgmap = get_dev_pagemap(PHYS_PFN(align_end), NULL);
if (conflict_pgmap) {
    dev_WARN(dev, "Conflicting mapping in same section\n");
    put_dev_pagemap(conflict_pgmap);
    return ERR_PTR(-ENOMEM);
}

is_ram = region_intersects(align_start, align_size,
IORESOURCE_SYSTEM_RAM, IORES_DESC_NONE);

-is_ram == REGION_MIXED) {
    WARN_ONCE(1, "%s attempted on mixed region %pr\n", __func__, res);
+is_ram != REGION_DISJOINT) {
    WARN_ONCE(1, "%s attempted on %s region %pr\n", __func__,
    is_ram == REGION_MIXED ? "mixed" : "ram", res);
    return ERR_PTR(-ENXIO);
}
-is_ram == REGION_INTERSECTS)
-return __va(res->start);
-
if (!ref)
return ERR_PTR(-EINVAL);

mutex_lock(&pgmap_lock);
error = 0;
-align_end = align_start + align_size - 1;

foreach_order_pgoff(res, order, pgoff) {
    struct dev_pagemap *dup;
    untrack_pfn(NULL, PHYS_PFN(align_start), align_size);
    err_pfn_remap:
    err_radix:
    -pgmap_radix_release(res);
    +pgmap_radix_release(res, pgoff);
    devres_free(page_map);
return ERR_PTR(error);
}
-EXPORT_SYMBOL(devm_memremap_pages);
+EXPORT_SYMBOL_GPL(devm_memremap_pages);

unsigned long vmem_altmap_offset(struct vmem_altmap *altmap)
{
    __ClearPageActive(page);
    __ClearPageWaiters(page);

    -page->mapping = NULL;
    mem_cgroup_uncharge(page);

    page->pgmap->page_free(page, page->pgmap->data);
    --- linux-4.15.0.orig/kernel/module.c
    +++ linux-4.15.0/kernel/module.c
    @@ -76,14 +76,9 @@
    
    /*
    * Modules' sections will be aligned on page boundaries
    - * to ensure complete separation of code and data, but
    - * only when CONFIG STRICT_MODULE_RWX=y
    + * to ensure complete separation of code and data
    */
    ifdef CONFIG STRICT_MODULE_RWX
    # define debug_align(X) ALIGN(X, PAGE_SIZE)
    -else
    -# define debug_align(X) (X)
    -endif

    /* If this is set, the section belongs in the init part of the module */
    #define INIT OFFSET MASK (1UL << (BITS_PER_LONG-1))
    @@ -1028,6 +1023,8 @@
    strlcpy(last unloaded_module, mod->name, sizeof(last unloaded_module));

    free_module(mod);
    +/* someone could wait for the module in add_unformed_module() */
    +wake_up_all(&module_wq);
    return 0;
out:
    mutex Unlock(&module_mutex);
    @@ -1209,8 +1206,10 @@
    -kobject synth_uevent(&mk, buffer, size_t count)
    |
    -kobject synth_uevent(&mk->kobj, buffer, count);
    -return count;
struct module_attribute module_uevent =
@@ -1472,7 +1471,8 @@
{
struct module_sect_attr *sattr =
container_of(mattr, struct module_sect_attr, mattr);
-return sprintf(buf, "0x%pK
", (void *)sattr->address);
+return sprintf(buf, "0x%px\n", kptr_restrict < 2 ?
+ (void *)sattr->address : NULL);
}

static void free_sect_attrs(struct module_sect_attrs *sect_attrs)
@@ -1701,6 +1701,8 @@
return ret;
}

+static void module_remove_modinfo_attrs(struct module *mod, int end);
+
static int module_add_modinfo_attrs(struct module *mod)
{
struct module_attribute *attr;
@@ -1715,24 +1717,36 @@
return -ENOMEM;
temp_attr = mod->modinfo_attrs;
-for (i = 0; (attr = modinfo_attrs[i]) && !error; i++) {
+for (i = 0; (attr = modinfo_attrs[i]); i++) {
  if (!attr->test || attr->test(mod)) {
    memcpy(temp_attr, attr, sizeof(*temp_attr));
    sysfs_attr_init(&temp_attr->attr);
+    if (error)
+      goto error_out;
    ++temp_attr;
  }
  }
+}
+error_out:
+if (i > 0)
+  module_remove_modinfo_attrs(mod, --i);
else
+kfree(mod->modinfo_attrs);
return error;
}

-static void module_remove_modinfo_attrs(struct module *mod)
+static void module_remove_modinfo_attrs(struct module *mod, int end)
{
 struct module_attribute *attr;
 int i;

 for (i = 0; (attr = &mod->modinfo_attrs[i]); i++) {
 +if (end >= 0 && i > end)
 +break;
 /* pick a field to test for end of list */
 if (!attr->attr.name)
 break;
 @@ -1779,7 +1793,6 @@
 if (err)
 mod_kobject_put(mod);

 -/* delay uevent until full sysfs population */
 out:
 return err;
 } @@ -1816,11 +1829,10 @@
 add_sect_attrs(mod, info);
 add_notes_attrs(mod, info);

 -kobject_uevent(&mod->mkobj.kobj, KOBJ_ADD);
 return 0;

 out_unreg_modinfo_attrs:
-module_remove_modinfo_attrs(mod);
+module_remove_modinfo_attrs(mod, -1);
 out_unreg_param:
 module_param_sysfs_remove(mod);
 out_unreg HOLDERS:
 @@ -1856,7 +1868,7 @@
 }
 }

 -static void module_remove_modinfo_attrs(struct module *mod)
+static void module_remove_modinfo_attrs(struct module *mod, int end)
{
 }

 @@ -1872,14 +1884,14 @@
static void mod_sysfs_teardown(struct module *mod) {
    del_usage_links(mod);
    -module_remove_modinfo_attrs(mod);
    +module_remove_modinfo_attrs(mod, -1);
    module_param_sysfs_remove(mod);
    kobject_put(mod->mkobj.drivers_dir);
    kobject_put(mod->holders_dir);
    mod_sysfs_fini(mod);
}

-#ifdef CONFIG STRICT_MODULE_RWX
+,#ifdef CONFIG_ARCH HAS STRICT MODULE_RWX
/*
 * LKM RO/NX protection: protect module's text/ro-data
 * from modification and any data from execution.
 @@ -1902,6 +1914,7 @@
     layout->text_size >> PAGE_SHIFT);
 */
+#ifdef CONFIG STRICT_MODULE_RWX
static void frob_rodata(const struct module_layout *layout,
    int (*set_memory)(unsigned long start, int num_pages))
{
    @@ -1951,6 +1964,7 @@
        return;
        frob_text(&mod->core_layout, set_memory_ro);
        frob_rodata(&mod->core_layout, set_memory_ro);
        frob_text(&mod->init_layout, set_memory_ro);
        frob_rodata(&mod->init_layout, set_memory_ro);
    @@ -2033,11 +2047,23 @@
        frob_writable_data(layout, set_memory_x);
    }
-#else
+,#else /* !CONFIG STRICT_MODULE_RWX */
static void disable_ro_nx(const struct module_layout *layout) { }
static void module_enable_nx(const struct module *mod) { }
static void module_disable_nx(const struct module *mod) { }
-#endif
+,#endif /* CONFIG STRICT_MODULE_RWX */
+
+static void module_enable_x(const struct module *mod) {
+    frob_text(&mod->core_layout, set_memory_x);
+    frob_text(&mod->init_layout, set_memory_x);
+}  
+static void disable_ro_nx(const struct module_layout *layout) { }  
+static void module_enable_nx(const struct module *mod) { }  
+static void module_disable_nx(const struct module *mod) { }  
+static void module-enable-x(const struct module *mod) { }  
+#![else /* !CONFIG_ARCH_HAS_STRICT_MODULE_RWX */
+endif /* !CONFIG_ARCH_HAS_STRICT_MODULE_RWX */

#ifdef CONFIG_LIVEPATCH
/*
 @@ -2239,6 +2265,21 @@
 return 0;
 */

+static bool ignore_undef_symbol(Elf_Half emachine, const char *name)
+{  
+  /* On x86, PIC code and Clang non-PIC code may have call foo@PLT. GNU as
+  * before 2.37 produces an unreferenced _GLOBAL_OFFSET_TABLE_ on x86-64.
+  * i386 has a similar problem but may not deserve a fix.
+  */
+  + * If we ever have to ignore many symbols, consider refactoring the code to
+  + * only warn if referenced by a relocation.
+  */
+  if (emachine == EM_386 || emachine == EM_X86_64)
+    return !strcmp(name, "_GLOBAL_OFFSET_TABLE_".toggle);
+  return false;
+}
+
+ /* Change all symbols so that st_value encodes the pointer directly. */
+ static int simplify_symbols(struct module *mod, const struct load_info *info)
+ {  
+   @@ -2284,8 +2325,10 @@
+   break;
+ break;
+ }
-
-/* Ok if weak. */
-if (!ksym && ELF_ST_BIND(sym[i].st_info) == STB_WEAK)
+/* Ok if weak or ignored. */
+if (!ksym &&
+  (ELF_ST_BIND(sym[i].st_info) == STB_WEAK ||
+   ignore_undef_symbol(info->hdr->e_machine, name)))
break;

pr_warn("%s: Unknown symbol %s (err %li)\n",
@@ -2789,7 +2832,8 @@
}
/* Not having a signature is only an error if we're strict. */
-if (err == -ENOKEY && !sig_enforce)
+if (err == -ENOKEY && !sig_enforce &&
+      !kernel_is_locked_down("Loading of unsigned modules"))
err = 0;

return err;
@@ -2863,6 +2907,15 @@
}
#endif /* CONFIG_LIVEPATCH */

+static void check_modinfo_retpoline(struct module *mod, struct load_info *info)
+{
+  if (retpoline_module_ok(get_modinfo(info, "retpoline")))
+    return;
+  pr_warn("%s: loading module not compiled with retpoline compiler.\n",
+            mod->name);
+}
+
+/* Sets info->hdr and info->len. */
+static int copy_module_from_user(const void __user *umod, unsigned long len,
+      struct load_info *info)
+{
+  add_taint_module(mod, TAINT_OOT_MODULE, LOCKDEP_STILL_OK);
+}

+check_modinfo_retpoline(mod, info);
+
+if (get_modinfo(info, "staging")) {
+  add_taint_module(mod, TAINT_CRAP, LOCKDEP_STILL_OK);
+  pr_warn("%s: module is from the staging directory, the quality ",
+            mod->name);
+  sched_annotate_sleep();
+  mutex_lock(&module_mutex);
+  mod = find_module_all(name, strlen(name), true);
+  -ret = !mod || mod->state == MODULE_STATE_LIVE
+    || mod->state == MODULE_STATE_GOING;
+  +ret = !mod || mod->state == MODULE_STATE_LIVE;
+  mutex_unlock(&module_mutex);
+
+  return ret;
+}
+/* Delay uevent until module has finished its init routine */
+kobject_uevent(&mod->mkobj.kobj, KOBJ_ADD);
We need to finish all async code before the module init sequence is done. This has potential to deadlock. For example, a newly walking this with preempt disabled. In all the failure paths, we call synchronize_sched(), but we don't want to slow down the success path, so use actual RCU here.

Note that module_alloc() on most architectures creates W+X page mappings which won't be cleaned up until do_free_init() runs. Any code such as mark_rodata_ro() which depends on those mappings to be cleaned up needs to sync with the queued work - ie

rcu_barrier_sched()

/*
call_rcu_sched(&freeinit->rcu, do_free_init);
mutex_unlock(&module_mutex);
@ @ -3552.8 +3614.7 @@
mutex_lock(&module_mutex);
old = find_module_all(mod->name, strlen(mod->name), true);
if (old != NULL) {
    if (old->state == MODULE_STATE_COMING
        || old->state == MODULE_STATE_UNFORMED) {
        /* Wait in case it fails to load. */
        mutex_unlock(&module_mutex);
        err = wait_event_interruptible(module_wq,
        @ @ -3592.6 +3653.7 @@

module_enable_ro(mod, false);
module_enable_nx(mod);
+module_enable_x(mod);

/* Mark state as coming so strong_try_module_get() ignores us,
 * but kallsyms etc. can see us. */
@@ -3779,6 +3841,7 @@
    MODULE_STATE_GOING, mod);
klp_module_going(mod);
bug_cleanup:
+mod->state = MODULE_STATE_GOING;
/* module_bug_cleanup needs module_mutex protection */
mutex_lock(&module_mutex);
module_bug_cleanup(mod);
@@ -4052,7 +4115,7 @@

for (i = 0; i < kallsyms->num_symtab; i++)
if (strcmp(name, symname(kallsyms, i)) == 0 &&
    kallsyms->symtab[i].st_info != 'U')
+    kallsyms->symtab[i].st_shndx != SHN_UNDEF)
return kallsyms->symtab[i].st_value;
return 0;
}
@@ -4098,6 +4161,10 @@
if (mod->state == MODULE_STATE_UNFORMED)
continue;
for (i = 0; i < kallsyms->num_symtab; i++) {
+
+if (kallsyms->symtab[i].st_shndx == SHN_UNDEF)
+continue;
+
ret = fn(data, symname(kallsyms, i),
mod, kallsyms->symtab[i].st_value);
if (ret != 0)
@@ -4212,7 +4279,7 @@
m->private = kallsyms_show_value() ? NULL : (void *)8ul;
}

-return 0;
+return err;
}

static const struct file_operations proc_modules_operations = {
--- linux-4.15.0.orig/kernel/module_signing.c
+++ linux-4.15.0/kernel/module_signing.c
@@ -81,6 +81,6 @@
}

return verify_pkcs7_signature(mod, modlen, mod + modlen, sig_len,
- NULL, VERIFYING_MODULE_SIGNATURE,
+ (void *)1UL, VERIFYING_MODULE_SIGNATURE,
     NULL, NULL);
}
--- linux-4.15.0.orig/kernel/notifier.c
+++ linux-4.15.0/kernel/notifier.c
@@ -552,7 +552,7 @@

int register_die_notifier(struct notifier_block *nb)
{
-vmalloc_sync_all();
+vmalloc_sync_mappings();
return atomic_notifier_chain_register(&die_chain, nb);
}

EXPORT_SYMBOL_GPL(register_die_notifier);
--- linux-4.15.0.orig/kernel/padata.c
+++ linux-4.15.0/kernel/padata.c
@@ -34,6 +34,8 @@
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#define MAX_OBJ_NUM 1000

+static void padata_free_pd(struct parallel_data *pd);
+
static int padata_index_to_cpu(struct parallel_data *pd, int cpu_index)
{
  int cpu, target_cpu;
  @@ -164,23 +166,12 @@
  */
static struct padata_priv *padata_get_next(struct parallel_data *pd)
{
  -int cpu, num_cpus;
  -unsigned int next_nr, next_index;
  struct padata_parallel_queue *next_queue;
  struct padata_priv *padata;
  struct padata_list *reorder;
  +int cpu = pd->cpu;

  -num_cpus = cpumask_weight(pd->cpumask.pcpu);
  -
  -/*
  - * Calculate the percpu reorder queue and the sequence
  - * number of the next object.
  - */
  -next_nr = pd->processed;
  -next_index = next_nr % num_cpus;
  -cpu = padata_index_to_cpu(pd, next_index);
  next_queue = per_cpu_ptr(pd->pqueue, cpu);
  -
  reorder = &next_queue->reorder;

  spin_lock(&reorder->lock);
  @@ -191,7 +182,8 @@
  list_del_init(&padata->list);
  atomic_dec(&pd->reorder_objects);

  -pd->processed++;
  +pd->cpu = cpumask_next_wrap(cpu, pd->cpumask.pcpu, -1,
  +    false);

  spin_unlock(&reorder->lock);
  goto out;
  @@ -214,6 +206,7 @@
  struct padata_priv *padata;
  struct padata_serial_queue *squeue;
  struct padata_instance *pinst = pd->pinst;
  +struct padata_parallel_queue *next_queue;
/*
 * We need to ensure that only one cpu can work on dequeueing of
 * so exit immediately.
 */
if (PTR_ERR(padata) == -ENODATA) {
    del_timer(&pd->timer);
    spin_unlock_bh(&pd->lock);
    return;
}

/*
 * The next object that needs serialization might have arrived to
 * the reorder queues in the meantime, we will be called again
 * from the timer function if no one else cares for it.
 * the reorder queues in the meantime.
 * Ensure reorder queue is read after pd->lock is dropped so we see
 * new objects from another task in padata_do_serial. Pairs with
 * smp_mb__after_atomic in padata_do_serial.
 */
- if (atomic_read(&pd->reorder_objects)
  && !(pinst->flags & PADATA_RESET))
  mod_timer(&pd->timer, jiffies + HZ);
- else
  del_timer(&pd->timer);
  smp_mb();

  return;
+ next_queue = per_cpu_ptr(pd->pqueue, pd->cpu);
+ if (!list_empty(&next_queue->reorder.list))
+ queue_work(pinst->wq, &pd->reorder_work);
}

static void invoke_padata_reorder(struct work_struct *work)
{
    struct padata_parallel_queue *pqueue;
    struct parallel_data *pd;

    local_bh_disable();
    -pqueue = container_of(work, struct padata_parallel_queue, reorder_work);
    -pd = pqueue->pd;
    +pd = container_of(work, struct parallel_data, reorder_work);
    padata_reorder(pd);
    local_bh_enable();
}
static void padata_reorder_timer(struct timer_list *t) {
    struct parallel_data *pd = from_timer(pd, t, timer);
    unsigned int weight;
    int target_cpu, cpu;

    cpu = get_cpu();

    /* We don't lock pd here to not interfere with parallel processing
     * padata_reorder() calls on other CPUs. We just need any CPU out of
     * the cpumask.pcpu set. It would be nice if it's the right one but
     * it doesn't matter if we're off to the next one by using an outdated
     * pd->processed value.
     */
    weight = cpumask_weight(pd->cpumask.pcpu);
    target_cpu = padata_index_to_cpu(pd, pd->processed % weight);

    /* ensure to call the reorder callback on the correct CPU */
    if (cpu != target_cpu) {
        struct padata_parallel_queue *pqueue;
        struct padata_instance *pinst;

        /* The timer function is serialized wrt itself -- no locking
         * needed.
         */
        pinst = pd->pinst;
        pqueue = per_cpu_ptr(pd->pqueue, target_cpu);
        queue_work_on(target_cpu, pinst->wq, &pqueue->reorder_work);
    } else {
        padata_reorder(pd);
    }

    put_cpu();
}

static void padata_serial_worker(struct work_struct *serial_work) {
    struct padata_serial_queue *squeue;
    struct parallel_data *pd;
    LIST_HEAD(local_list);
    int cnt;

    local_bh_disable();
    squeue = container_of(serial_work, struct padata_serial_queue, work);
    pd = squeue->pd;
    LIST_HEAD(local_list);
    +int cnt;

    local_bh_disable();
    squeue = container_of(serial_work, struct padata_serial_queue, work);
    squeue->serial.list = &local_list;
    spin_unlock(&squeue->serial.lock);
+cnt = 0;
+
while (!list_empty(&local_list)) {
    struct padata_priv *padata;

    list_del_init(&padata->list);
    padata->serial(padata);
    -atomic_dec(&pd->refcnt);
    +cnt++;
}
local_bh_enable();
+
+if (atomic_sub_and_test(cnt, &pd->refcnt))
+padata_free_pd(pd);
}

/**
@@ -361,40 +323,23 @@
*/

void padata_do_serial(struct padata_priv *padata)
{
    -int cpu;
    -struct padata_parallel_queue *pqueue;
    -struct parallel_data *pd;
    -int reorder_via_wq = 0;
    -
    -pd = padata->pd;
    -
    -cpu = get_cpu();
    -
    -/ * We need to run on the same CPU padata_do_parallel(..., padata, ..)
    - * was called on -- or, at least, enqueue the padata object into the
    - * correct per-cpu queue.
    - */
    -if (cpu != padata->cpu) {
        -reorder_via_wq = 1;
        -cpu = padata->cpu;
        -}
    -
    -pqueue = per_cpu_ptr(pd->pqueue, cpu);
    +struct parallel_data *pd = padadata->pd;
    +struct padata_parallel_queue *pqueue = per_cpu_ptr(pd->pqueue,
    +    +    +padata->cpu);

    spin_lock(&pqueue->reorder_lock);
    -atomic_inc(&pd->reorder_objects);


list_add_tail(&padata->list, &pqueue->reorder.list);
+atomic_inc(&pd->reorder_objects);
spin_unlock(&pqueue->reorder.lock);

-put_cpu();
-
-/* If we're running on the wrong CPU, call padata_reorder() via a
- * kernel worker.
+/
+ * Ensure the addition to the reorder list is ordered correctly
+ * with the trylock of pd->lock in padata_reorder. Pairs with smp_mb
+ * in padata_reorder.
+/
-if (reorder_via_wq)
-queue_work_on(cpu, pd->pinst->wq, &pqueue->reorder_work);
-else
-padata_reorder(pd);
+smp_mb__after_atomic();
+
+padata_reorder(pd);
}
EXPORT_SYMBOL(padata_do_serial);

@@ -450,14 +395,12 @@
continue;
}

-pqueue->pd = pd;
pqueue->cpu_index = cpu_index;
cpu_index++;

__padata_list_init(&pqueue->reorder);
__padata_list_init(&pqueue->parallel);
INIT_WORK(&pqueue->work, padata_parallel_worker);
-INIT_WORK(&pqueue->reorder_work, invoke_padata_reorder);
atomic_set(&pqueue->num_obj, 0);
}
}
@@ -485,12 +428,13 @@
padata_init_pqueues(pd);
padata_init_squeues(pd);
-timer_setup(&pd->timer, padata_reorder_timer, 0);
atomic_set(&pd->seq_nr, -1);
atomic_set(&pd->reorder_objects, 0);
-atomic_set(&pd->refcnt, 0);
+atomic_set(&pd->refcnt, 1);
pd->pinst = pinst;
spin_lock_init(&pd->lock);
+pd->cpu = cpumask_first(pd->cpumask.pcpu);
+INIT_WORK(&pd->reorder_work, invoke_padata_reorder);

return pd;

@@ -513,31 +457,6 @@
kfree(pd);
 }

-/* Flush all objects out of the padata queues. */
-static void padata_flush_queues(struct parallel_data *pd)
-{  
-+int cpu;
-+struct padata_parallel_queue *pqueue;
-+struct padata_serial_queue *squeue;
-
-+for_each_cpu(cpu, pd->cpumask.pcpu) {
-+pqueue = per_cpu_ptr(pd->pqueue, cpu);
-+flush_work(&pqueue->work);
-+}
-
-+del_timer_sync(&pd->timer);
-
-+if (atomic_read(&pd->reorder_objects))
-+padata_reorder(pd);
-
-+for_each_cpu(cpu, pd->cpumask.cbcpu) {
-+squeue = per_cpu_ptr(pd->squeue, cpu);
-+flush_work(&squeue->work);
-+}
-
-+BUG_ON(atomic_read(&pd->refcnt) != 0);
-
-}

-static void __padata_start(struct padata_instance *pinst)
{  
-pinst->flags |= PADATA_INIT;
@@ -551,10 +470,6 @@
pinst->flags &= ~PADATA_INIT;
+
+synchronize_rcu();
-
-+get_online_cpus();
-+padata_flush_queues(pinst->pd);
-+put_online_cpus();
}
/* Replace the internal control structure with a new one. */
@@ -575,8 +490,8 @@
if (!cpumask_equal(pd_old->cpumask.cbcpu, pd_new->cpumask.cbcpu))
notification_mask |= PADATA_CPU_SERIAL;
-padata_flush_queues(pd_old);
-padata_free_pd(pd_old);
+if (atomic_dec_and_test(&pd_old->refcnt))
+    padata_free_pd(pd_old);

if (notification_mask)
    blocking_notifier_call_chain(&pinst->cpumask_change_notifier,
@@ -679,8 +594,8 @@
struct cpumask *serial_mask, *parallel_mask;
int err = -EINVAL;

-mutex_lock(&pinst->lock);
get_online_cpus();
+mutex_lock(&pinst->lock);

switch (cpumask_type) {
    case PADATA_CPU_PARALLEL:
@@ -698,8 +613,8 @@
        err = __padata_set_cpumasks(pinst, parallel_mask, serial_mask);

out:
    -put_online_cpus();
    mutex_unlock(&pinst->lock);
+    put_online_cpus();

    return err;
}
@@ -766,7 +681,7 @@
{
    struct parallel_data *pd = NULL;

    -if (cpumask_test_cpu(cpu, cpu_online_mask)) {
    +if (!cpumask_test_cpu(cpu, cpu_online_mask)) {

        if (!padata_validate_cpumask(pinst, pinst->cpumask.pcpu) ||
        !padata_validate_cpumask(pinst, pinst->cpumask.cbcpu))
@@ -842,7 +757,7 @@
            return ret;
        }

        -static int padata_cpu_prep_down(unsigned int cpu, struct hlist_node *node)
        +static int padata_cpu_dead(unsigned int cpu, struct hlist_node *node)
        {
        

struct padata_instance *pinst;
int ret;

static void __padata_free(struct padata_instance *pinst)
{
    #ifdef CONFIG_HOTPLUG_CPU
    +cpuhp_state_remove_instance_nocalls(CPUHP_PADATA_DEAD, &pinst->node);
    cpuhp_state_remove_instance_nocalls(hp_online, &pinst->node);
    #endif

    return pinst;

    #ifdef CONFIG_HOTPLUG_CPU
    cpuhp_state_add_instance_nocalls_cpuslocked(hp_online, &pinst->node);
    +cpuhp_state_add_instance_nocalls_cpuslocked(CPUHP_PADATA_DEAD,
        +    &pinst->node);
    #endif

    return ret;  

    ret = cpuhp_setup_state_multi(CPUHP_AP_ONLINE_DYN, "padata:online",
        -    padata_cpu_online,
        -    padata_cpu_prep_down);
 +    padata_cpu_online, NULL);
if (ret < 0)
    return ret;
hp_online = ret;
 +    +ret = cpuhp_setup_state_multi(CPUHP_PADATA_DEAD, "padata:dead",
    +    NULL, padata_cpu_dead);
+if (ret < 0) {
 +    cpuhp_remove_multi_state(hp_online);
 +    return ret;
 +}
return 0;
}
module_init(padata_driver_init);

static __exit void padata_driver_exit(void)
{
    +cpuhp_remove_multi_state(CPUHP_PADATA_DEAD);
    cpuhp_remove_multi_state(hp_online);
}
module_exit(padata_driver_exit);

--- linux-4.15.0.orig/kernel/panic.c
+++ linux-4.15.0/kernel/panic.c
#include <linux/kmsg_dump.h>
#include <linux/kallsyms.h>
#include <linux/notifier.h>
#include <linux/vt_kern.h>
#include <linux/module.h>
#include <linux/random.h>
#include <linux/ftrace.h>

* after setting panic_cpu) from invoking panic() again.
 */
local_irq_disable();
+preempt_disable_notrace();

/*
 * It's possible to come here directly from a panic-assertion and

* We may have ended up stopping the CPU holding the lock (in

*/
__visible void __stack_chk_fail(void)
{
-panic("stack-protector: Kernel stack is corrupted in: %p\n",
+panic("stack-protector: Kernel stack is corrupted in: %pB",
__builtin_return_address(0));
}
EXPORT_SYMBOL(__stack_chk_fail);
--- linux-4.15.0.orig/kernel/params.c
+++ linux-4.15.0/kernel/params.c
@@ -108,13 +108,19 @@
     return parameqn(a, b, strlen(a)+1);
 }
-#ifdef CONFIG_VT
+static void param_check_unsafe(const struct kernel_param *kp)
+static bool param_check_unsafe(const struct kernel_param *kp,
+     const char *doing)
+
	if (kp->flags & KERNEL_PARAM_FL_UNSAFE) {

pr_warn("Setting dangerous option %s - tainting kernel\n", kp->name);
add_taint(TAINT_USER, LOCKDEP_STILL_OK);
+
+if (kp->flags & KERNEL_PARAM_FL_HWPARAM &&
+ kernel_is_locked_down("Command line-specified device addresses, irqs and dma channels"))
+return false;
+return true;
}

static int parse_one(char *param,
@@ -144,8 +150,10 @@
pr_debug("handling %s with %p\n", param, params[i].ops->set);
kernel_param_lock(params[i].mod);
-param_check_unsafe(&params[i]);
-err = params[i].ops->set(val, &params[i]);
+if (param_check_unsafe(&params[i], doing))
+err = params[i].ops->set(val, &params[i]);
+else
+err = -EPERM;
kernel_param_unlock(params[i].mod);
return err;
}
@@ -553,6 +561,12 @@
return count;
}

+#ifdef CONFIG_MODULES
+#define mod_name(mod) (mod)->name
+#else
+#define mod_name(mod) "unknown"
+#endif
+
+/* sysfs always hands a nul-terminated string in buf. We rely on that. */
static ssize_t param_attr_store(struct module_attribute *mattr,
@@ -565,8 +579,10 @@
return -EPERM;
kernel_param_lock(mk->mod);
-param_check_unsafe(attribute->param);
-err = attribute->param->ops->set(buf, attribute->param);
+if (param_check_unsafe(attribute->param, mod_name(mk->mod)))
+err = attribute->param->ops->set(buf, attribute->param);
+else
+err = -EPERM;
kernel_param_unlock(mk->mod);
if (!err)
  return len;
--- linux-4.15.0.orig/kernel/pid.c
+++ linux-4.15.0/kernel/pid.c
@@ -183,7 +183,7 @@
  idr_preload_end();

 if (nr < 0) {
-    retval = nr;
+    retval = (nr == -ENOSPC) ? -EAGAIN : nr;
      goto out_free;
  }

 out_free:
 spin_lock_irq(&pidmap_lock);
-while (++i <= ns->level)
-  idr_remove(&ns->idr, (pid->numbers + i)->nr);
+while (++i <= ns->level) {
+    upid = pid->numbers + i;
+    idr_remove(&upid->ns->idr, upid->nr);
+  }

 /* On failure to allocate the first pid, reset the state */
 if (ns->pid_allocated == PIDNS_ADDING)
--- linux-4.15.0.orig/kernel/pid_namespace.c
+++ linux-4.15.0/kernel/pid_namespace.c
@@ -56,7 -56,7 @@
  snprintf(pcache->name, sizeof(pcache->name), "pid_%d", nr_ids);
  cachep = kmem_cache_create(pcache->name, sizeof(struct pid) + (nr_ids - 1) * sizeof(struct upid),
-    0, SLAB_HWCACHE_ALIGN, NULL);
+    0, SLAB_HWCACHE_ALIGN | SLAB_ACCOUNT, NULL);
  if (cachep == NULL)
    goto err_cachep;

 read_lock(&tasklist_lock);
-force_sig(SIGKILL, pid_ns->child_reaper);
+send_sig(SIGKILL, pid_ns->child_reaper, 1);
 read_unlock(&tasklist_lock);

do_exit(0);
--- linux-4.15.0.orig/kernel/power/Kconfig
+++ linux-4.15.0/kernel/power/Kconfig
@@ -105,6 +105,7 @@
def_bool y
depends on SUSPEND || HIBERNATE_CALLBACKS
select PM
+select SRCU

config PM_SLEEP_SMP
def_bool y
--- linux-4.15.0.orig/kernel/power/hibernate.c
+++ linux-4.15.0/kernel/power/hibernate.c
@@ -70,7 +70,7 @@

bool hibernation_available(void)
{
    return (nohibernate == 0);
+    return nohibernate == 0 && !kernel_is_locked_down("Hibernation");
}

/**
@@ -258,6 +258,11 @@

+__weak int arch_resume_nosmt(void)
+{
+    +return 0;
+}
+
+/**
+ * create_image - Create a hibernation image.
+ * @platform_mode: Whether or not to use the platform driver.
@@ -322,6 +327,10 @@
Enable_cpus:
    /* Allow architectures to do nosmt-specific post-resume dances */
    +if (!in_suspend)
+        error = arch_resume_nosmt();
+    +Platform_finish:
+    platform_finish(platform_mode);

@@ -824,17 +833,6 @@
/* Check if the device is there */
swsusp_resume_device = name_to_dev_t(resume_file);
-*/
- * name_to_dev_t is ineffective to verify partition if resume_file is in
- * integer format. (e.g. major:minor)
- */
-if (isdigit(resume_file[0]) && resume_wait) {
  int partno;
  while (!get_gendisk(swsusp_resume_device, &partno))
    usleep(10);
-}
-
if (!swsusp_resume_device) {
  /*
   * Some device discovery might still be in progress; we need
   * error = freeze_processes();
   * if (error)
   * goto Close_Finish;
   *
   * error = freeze_kernel_threads();
   * if (error) {
   *   thaw_processes();
   *   goto Close_Finish;
   *
   *   error = load_image_and_restore();
   *   thaw_processes();
   *   Finish:
  */
  power_attr(resume);
  +static ssize_t resume_offset_show(struct kobject *kobj,
    + struct kobj_attribute *attr, char *buf)
    +{
      +return sprintf(buf, "%llu", (unsigned long long)swsusp_resume_block);
    +}
  +
  +static ssize_t resume_offset_store(struct kobject *kobj,
    + struct kobj_attribute *attr, const char *buf,
    + size_t n)
    +{
      +unsigned long long offset;
      +int rc;
      +
      +rc = kstrtol(buf, 0, &offset);
      +if (rc)
        +return rc;
      +swsusp_resume_block = offset;
+ return n;
+
+ power_attr(resume_offset);
+
static ssize_t image_size_show(struct kobject *kobj, struct kobject_attribute *attr,
    char *buf)
{
    @@ -1106,6 +1134,7 @@

    static struct attribute * g[] = {
        &disk_attr.attr,
        +&resume_offset_attr.attr,
        &resume_attr.attr,
        &image_size_attr.attr,
        &reserved_size_attr.attr,
--- linux-4.15.0.orig/kernel/power/power.h
+++ linux-4.15.0/kernel/power/power.h
@@ -104,9 +104,6 @@
extern dev_t swsusp_resume_device;
 extern sector_t swsusp_resume_block;

-extern asmlinkage int swsusp_arch_suspend(void);
-extern asmlinkage int swsusp_arch_resume(void);
-
extern int create_basic_memory_bitmaps(void);
extern void free_basic_memory_bitmaps(void);
extern int hibernate_preallocate_memory(void);
--- linux-4.15.0.orig/kernel/power/snapshot.c
+++ linux-4.15.0/kernel/power/snapshot.c
@@ -736,8 +736,15 @@
     * We have found the zone. Now walk the radix tree to find the leaf node
     * for our PFN.
     */
     +
     +/*
     +  * If the zone we wish to scan is the the current zone and the
     +  * pfn falls into the current node then we do not need to walk
     +  * the tree.
     +  */
     node = bm->cur.node;
   -if (((pfn - zone->start_pfn) & ~BM_BLOCK_MASK) == bm->cur.node_pfn)
   +if (zone == bm->cur.zone &&
       + ((pfn - zone->start_pfn) & ~BM_BLOCK_MASK) == bm->cur.node_pfn)
     goto node_found;

     node = zone->rtree;
--- linux-4.15.0.orig/kernel/power/suspend.c
+++ linux-4.15.0/kernel/power/suspend.c
@@ -60,7 +60,13 @@
 static DECLARE_WAIT_QUEUE_HEAD(s2idle_wait_head);

 enum s2idle_states __read_mostly s2idle_state;
- static DEFINE_SPINLOCK(s2idle_lock);
+ static DEFINE_RAW_SPINLOCK(s2idle_lock);
+ 
+ bool pm_suspend_via_s2idle(void)
+ {
+ return mem_sleep_current == PM_SUSPEND_TO_IDLE;
+ }
+ EXPORT_SYMBOL_GPL(pm_suspend_via_s2idle);

 void s2idle_set_ops(const struct platform_s2idle_ops *ops)
 { 
@@ -78,12 +84,12 @@
 
 trace_suspend_resume(TPS("machine_suspend"), PM_SUSPEND_TO_IDLE, true);

- spin_lock_irq(&s2idle_lock);
+ raw_spin_lock_irq(&s2idle_lock);
 if (pm_wakeup_pending())
   goto out;

 s2idle_state = S2IDLE_STATE_ENTER;
- spin_unlock_irq(&s2idle_lock);
+ raw_spin_unlock_irq(&s2idle_lock);

 get_online_cpus();
 cpuidle_resume();
@@ -97,11 +103,11 @@
 cpuidle_pause();
 put_online_cpus();

- spin_lock_irq(&s2idle_lock);
+ raw_spin_lock_irq(&s2idle_lock);

 out:
 s2idle_state = S2IDLE_STATE_NONE;
- spin_unlock_irq(&s2idle_lock);
+ raw_spin_unlock_irq(&s2idle_lock);

 trace_suspend_resume(TPS("machine_suspend"), PM_SUSPEND_TO_IDLE, false);
 }
@@ -156,12 +162,12 @@
 } 

unsigned long flags;

-spin_lock_irqsave(&s2idle_lock, flags);
+raw_spin_lock_irqsave(&s2idle_lock, flags);
if (s2idle_state > S2IDLE_STATE_NONE) {
  s2idle_state = S2IDLE_STATE_WAKE;
  wake_up(&s2idle_wait_head);
}
-spin_unlock_irqrestore(&s2idle_lock, flags);
+raw_spin_unlock_irqrestore(&s2idle_lock, flags);
} EXPORT_SYMBOL_GPL(s2idle_wake);

--- linux-4.15.0.orig/kernel/power/swap.c
+++ linux-4.15.0/kernel/power/swap.c
@@ -491,10 +491,10 @@
 unsigned int flags, int error)
 {
 if (!error) {
-    flush_swap_writer(handle);
+    flush_swap_writer(handle);
    pr_info("S");
    error = mark_swapfiles(handle, flags);
    pr_cont("\n");
+    flush_swap_writer(handle);
  }

 if (error)
 --- linux-4.15.0.orig/kernel/power/user.c
+++ linux-4.15.0/kernel/power/user.c
@@ -52,6 +52,9 @@
 if (!hibernation_available())
 return -EPERM;

+if (kernel_is_locked_down("/dev/snapshot"))
+return -EPERM;
+lock_system_sleep();

 if (!atomic_add_unless(&snapshot_device_available, -1, 0)) {
  res = PAGE_SIZE - pg_offp;
 }

+if (!data_of(data->handle)) {
+res = -EINVAL;
+goto unlock;
+}
res = simple_write_to_buffer(data_of(data->handle), res, &pg_offp,
buf, count);
if (res > 0)
--- linux-4.15.0.orig/kernel/printk/internal.h
+++ linux-4.15.0/kernel/printk/internal.h
@@ -19,11 +19,16 @@
#ifdef CONFIG_PRINTK
#define PRINTK_SAFE_CONTEXT_MASK 0x3fffffff
#ifdef PRINTK_NMI_DEFERRED_CONTEXT_MASK 0x40000000
+#define PRINTK_NMI_DIRECT_CONTEXT_MASK 0x40000000
#define PRINTK_NMI_CONTEXT_MASK 0x80000000
extern raw_spinlock_t logbuf_lock;

+#_printf(5, 0)
+int vprintk_store(int facility, int level,
+ const char *dict, size_t dictlen,
+ const char *fmt, va_list args);
+
__printf(1, 0) int vprintk_store(int facility, int level,
+ const char *dict, size_t dictlen,
+ const char *fmt, va_list args);
+
__printf(1, 0) int vprintk_default(const char *fmt, va_list args);
__printf(1, 0) int vprintk_deferred(const char *fmt, va_list args);
__printf(1, 0) int vprintk_func(const char *fmt, va_list args);
@@ -54,6 +59,8 @@
local_irq_enable();
} while (0)

+void defer_console_output(void);
+
#else
__printf(1, 0) int vprintk_func(const char *fmt, va_list args) { return 0; }
--- linux-4.15.0.orig/kernel/printk/printk.c
+++ linux-4.15.0/kernel/printk/printk.c
@@ -418,6 +418,7 @@
/* the next printk record to write to the console */
static u64 console_seq;
static u32 console_idx;
+static u64 exclusive_console_stop_seq;

/* the next printk record to read after the last 'clear' command */
static u64 clear_seq;
static u32 console_idx;
+static u64 exclusive_console_stop_seq;

/* record buffer */
#define LOG_ALIGN __alignof__(struct printk_log)
#define __LOG_BUF_LEN (1 << CONFIG_LOG_BUF_SHIFT)
+#define LOG_BUF_LEN_MAX (u32)(1 << 31)
static char __log_buf[__LOG_BUF_LEN] __aligned(LOG_ALIGN);
static char *log_buf = __log_buf;
static u32 log_buf_len = __LOG_BUF_LEN;
@@ -1032,18 +1034,28 @@
static unsigned long __initdata new_log_buf_len;

/* we practice scaling the ring buffer by powers of 2 */
static void __init log_buf_len_update(unsigned size)
+static void __init log_buf_len_update(u64 size)
{
+    if (size > (u64)LOG_BUF_LEN_MAX) {
+        size = (u64)LOG_BUF_LEN_MAX;
+        pr_err("log_buf over 2G is not supported.\n");
+    }
+    if (size)
+        size = roundup_pow_of_two(size);
+    if (size > log_buf_len)
+        new_log_buf_len = size;
+        new_log_buf_len = (unsigned long)size;
}

/* save requested log_buf_len since it's too early to process it */
static int __init log_buf_len_setup(char *str)
{
    unsigned size = memparse(str, &str);
+u64 size;
+    if (!str)
+        return -EINVAL;
+    size = memparse(str, &str);

    log_buf_len_update(size);

    @@ -1088,7 +1100,7 @@
    { unsigned long flags;
    char *new_log_buf;
    -int free;
    +unsigned int free;

    if (log_buf != __log_buf)
        return;
    @@ -1108,7 +1120,7 @@
    }

    if (unlikely(!new_log_buf)) {
        pr_err("log_buf_len: %ld bytes not available\n",
+pr_err("log_buf_len: %lu bytes not available\n",
new_log_buf_len);
return;
}
@@ -1121,8 +1133,8 @@
memcpy(log_buf, __log_buf, __LOG_BUF_LEN);
logbuf_unlock_irqrestore(flags);

-pr_info("log_buf_len: %d bytes\n", log_buf_len);
-pr_info("early log buf free: %d(%d%%)\n",
+pr_info("log_buf_len: %u bytes\n", log_buf_len);
+pr_info("early log buf free: %u(%u%%)\n",
free, (free * 100) / __LOG_BUF_LEN);
}
@@ -1544,6 +1556,146 @@

/ *
+ * Special console_lock variants that help to reduce the risk of soft-lockups.
+ * They allow to pass console_lock to another printk() call using a busy wait.
+ */
+
+#ifdef CONFIG_LOCKDEP
+static struct lockdep_map console_owner_dep_map = {
+ .name = "console_owner"
+};
+#endif
+
+static DEFINE_RAW_SPINLOCK(console_owner_lock);
+static struct task_struct *console_owner;
+static bool console_waiter;
+
+/**
+ * console_lock_spinning_enable - mark beginning of code where another
+ * thread might safely busy wait
+ *
+ * This basically converts console_lock into a spinlock. This marks
+ * the section where the console_lock owner can not sleep, because
+ * there may be a waiter spinning (like a spinlock). Also it must be
+ * ready to hand over the lock at the end of the section.
+ */
+static void console_lock_spinning_enable(void)
+{
+raw_spin_lock(&console_owner_lock);
+console_owner = current;
+raw_spin_unlock(&console_owner_lock);
+

The waiter may spin on us after setting console_owner */
spin_acquire(&console_owner_dep_map, 0, 0, _THIS_IP_);
*
+
+/**
+ * console_lock_spinning_disable_and_check - mark end of code where another
+ * thread was able to busy wait and check if there is a waiter
+ *
+ * This is called at the end of the section where spinning is allowed.
+ * It has two functions. First, it is a signal that it is no longer
+ * safe to start busy waiting for the lock. Second, it checks if
+ * there is a busy waiter and passes the lock rights to her.
+ *
+ * Important: Callers lose the lock if there was a busy waiter.
+ * They must not touch items synchronized by console_lock
+ * in this case.
+ *
+ * Return: 1 if the lock rights were passed, 0 otherwise.
+ */
+static int console_lock_spinning_disable_and_check(void)
+{
+int waiter;
+
+raw_spin_lock(&console_owner_lock);
+waiter = READ_ONCE(console_waiter);
+console_owner = NULL;
+raw_spin_unlock(&console_owner_lock);
+
+if (!waiter) {
+spin_release(&console_owner_dep_map, 1, _THIS_IP_);
+return 0;
+}
+
+/* The waiter is now free to continue */
+WRITE_ONCE(console_waiter, false);
+
+spin_release(&console_owner_dep_map, 1, _THIS_IP_);
+
+/*
+ * Hand off console_lock to waiter. The waiter will perform
+ * the up(). After this, the waiter is the console_lock owner.
+ */
+mutex_release(&console_lock_dep_map, 1, _THIS_IP_);
+return 1;
+}
+
+/**
+ * console_trylock_spinning - try to get console_lock by busy waiting
This allows to busy wait for the console_lock when the current owner is running in specially marked sections. It means that the current owner is running and cannot reschedule until it is ready to lose the lock.

Return: 1 if we got the lock, 0 otherwise

static int console_trylock_spinning(void)
{
    struct task_struct *owner = NULL;
    bool waiter;
    bool spin = false;
    unsigned long flags;
    
    if (console_trylock())
        return 1;
    
    printk_safe_enter_irqsave(flags);
    
    raw_spin_lock(&console_owner_lock);
    owner = READ_ONCE(console_owner);
    waiter = READ_ONCE(console_waiter);
    if (!waiter && owner && owner != current) {
        WRITE_ONCE(console_waiter, true);
        spin = true;
    }
    raw_spin_unlock(&console_owner_lock);
    
    // If there is an active printk() writing to the consoles, instead of having it write our data too, see if we can offload that load from the active printer, and do some printing ourselves.
    // Go into a spin only if there isn't already a waiter spinning, and there is an active printer, and that active printer isn't us (recursive printk?).
    
    if (!spin) {
        printk_safe_exit_irqrestore(flags);
        return 0;
    }
    
    // We spin waiting for the owner to release us
    spin_acquire(&console_owner_dep_map, 0, 0, _THIS_IP_);
    // Owner will clear console_waiter on hand off
    while (READ_ONCE(console_waiter))
        cpu_relax();
+spin_release(&console_owner_dep_map, 1, _THIS_IP_);
+
+printk_safe_exit_irqrestore(flags);
+/
+ * The owner passed the console lock to us.
+ * Since we did not spin on console lock, annotate
+ * this as a trylock. Otherwise lockdep will
+ * complain.
+ */
+mutex_acquire(&console_lock_dep_map, 0, 1, _THIS_IP_);
+
+return 1;
+
+*/
* Call the console drivers, asking them to write out
* log_buf[start] to log_buf[end - 1].
* The console_lock must be held.
@@ -1680,28 +1832,16 @@
return log_store(facility, level, lflags, 0, dict, dictlen, text, text_len);
}

-asmlinkage int vprintk_emit(int facility, int level,
-    const char *dict, size_t dictlen,
-    const char *fmt, va_list args)
+/* Must be called under logbuf_lock. */
+int vprintk_store(int facility, int level,
+    const char *dict, size_t dictlen,
+    const char *fmt, va_list args)
{
    static char textbuf[LOG_LINE_MAX];
    char *text = textbuf;
    size_t text_len;
    enum log_flags lflags = 0;
    -unsigned long flags;
    -int printed_len;
    -bool in_sched = false;

    -if (level == LOGLEVEL_SCHED) {
    -level = LOGLEVEL_DEFAULT;
    -in_sched = true;
    -}
    -
    -boot_delay_msec(level);
    -printk_delay();
    -
    */ This stops the holder of console_sem just where we want him */
    -logbuf_lock_irqsave(flags);
/*
 * The printf needs to come first; we need the syslog
 * prefix which might be passed-in as a parameter.
 * @ @ -1742.21 +1882.54 @ @
 * if (dict)
 * lflags |= LOG_PREFIX|LOG_NEWLINE;
 *
 * -printed_len = log_output(facility, level, lflags, dict, dictlen, text, text_len);
 * +return log_output(facility, level, lflags, dict, dictlen, text, text_len);
 * +
 * +asmlinkage int vprintk_emit(int facility, int level,
 * +const char *dict, size_t dictlen,
 * +const char *fmt, va_list args)
 * +{
 * +int printed_len;
 * +bool in_sched = false, pending_output;
 * +unsigned long flags;
 * +u64 curr_log_seq;
 * +
 * +if (level == LOGLEVEL_SCHED) {
 * +level = LOGLEVEL_DEFAULT;
 * +in_sched = true;
 * +}
 * +
 * +boot_delay_msec(level);
 * +printk_delay();
 * +
 * +/* This stops the holder of console_sem just where we want him */
 * +logbuf_lock_irqsave(flags);
 * +curr_log_seq = log_next_seq;
 * +printed_len = vprintk_store(facility, level, dict, dictlen, fmt, args);
 * +pending_output = (curr_log_seq != log_next_seq);
 * logbuf_unlock_irqrestore(flags);
 *
 * /* If called from the scheduler, we can not call up(). */
 * -if (!in_sched) {
 * +if (!in_sched && pending_output) {
 * +/*
 * +* Disable preemption to avoid being preempted while holding
 * +* console_sem which would prevent anyone from printing to
 * +* console
 * +*/
 * +preempt_disable();
 * */
 * +* Try to acquire and then immediately release the console
 * +* semaphore. The release will print out buffers and wake up
 */
* /dev/kmsg and syslog() users.

*/

@if (console_trylock())
+if (console_trylock_spinning())
console_unlock();
+preempt_enable();
}

@if (pending_output)
+wake_up_klogd();
return printed_len;
}

EXPORT_SYMBOL(vprintk_emit);

@@ -1842,6 +2015,7 @@
static u32 syslog_idx;
static u64 console_seq;
static u32 console_idx;
+static u64 exclusive_console_stop_seq;
static u64 log_first_seq;
static u32 log_first_idx;
static u64 log_next_seq;
@@ -1855,6 +2029,8 @@
static ssize_t msg_print_ext_body(char *buf, size_t size,
 char *dict, size_t dict_len,
 char *text, size_t text_len) { return 0; }
+static void console_lock_spinning_enable(void) { }
+static int console_lock_spinning_disable_and_check(void) { return 0; }
static void call_console_drivers(const char *ext_text, size_t ext_len,
 const char *text, size_t len) {}
static size_t msg_print_text(const struct printk_log *msg,
@@ -1923,6 +2099,9 @@
char *s, *options, *brl_options = NULL;
int idx;

+if (str[0] == 0)
+return 1;
+
if (_braille_console_setup(&str, &brl_options))
return 1;

@@ -2069,20 +2248,7 @@
return 0;
}

console_locked = 1;

- * When PREEMPT_COUNT disabled we can't reliably detect if it's
- * safe to schedule (e.g. calling printk while holding a spin_lock),
- * because preempt_disable()/preempt_enable() are just barriers there
- * and preempt_count() is always 0.
- *
- * RCU read sections have a separate preemption counter when
- * PREEMPT_RCU enabled thus we must take extra care and check
- * rcu_preempt_depth(), otherwise RCU read sections modify
- * preempt_count().
- */

```c
-cpu_may_schedule = !oops_in_progress &&
-preemptible() &&
-!rcu_preempt_depth();
+cpu_may_schedule = 0;
return 1;
```

```
EXPORT_SYMBOL(console_trylock);
@@ -2190,8 +2356,9 @@
{
    if (console_seq < log_first_seq) {
        len = sprintf(text, "** %u printk messages dropped **\n",
            (unsigned)(log_first_seq - console_seq));
        +len = sprintf(text,
            "** %llu printk messages dropped **\n",
            log_first_seq - console_seq);
        /* messages are gone, move to first one */
        console_seq = log_first_seq;
        @@ -2215,6 +2382,12 @@
goto skip;
    }
    /* Output to all consoles once old messages replayed. */
+    if (unlikely(exclusive_console &&
+        console_seq >= exclusive_console_stop_seq)) {
+        exclusive_console = NULL;
+    }
    +
    len += msg_print_text(msg, false, text + len, sizeof(text) - len);
    if (nr_ext_console_drivers) {
        ext_len = msg_print_ext_header(ext_text,
            @@ -2229,19 +2402,30 @@
        console_seq++;
        raw_spin_unlock(&logbuf_lock);
+
        /* While actively printing out messages, if another printk()
        + were to occur on another CPU, it may wait for this one to
        + finish. This task can not be preempted if there is a
        + waiter waiting to take over.
```
console_lock_spinning_enable();
stop_critical_timings(); /* don't trace print latency */
call_console_drivers(ext_text, ext_len, text, len);
start_critical_timings();

if (console_lock_spinning_disable_and_check()) {
printk_safe_exit_irqrestore(flags);
goto out;
}

printk_safe_exit_irqrestore(flags);

if (do_cond_resched)
cond_resched();
}

console_locked = 0;

/* Release the exclusive_console once it is used */
-if (unlikely(exclusive_console))
-exclusive_console = NULL;
+console_locked = 0;

raw_spin_unlock(&logbuf_lock);

@@ -2261,6 +2445,7 @@
if (retry && console_trylock())
goto again;

out:
if (wake_klogd)
wake_up_klogd();
}
@@ -2521,15 +2706,20 @@
* for us.
*/
logbuf_lock_irqsave(flags);
-console_seq = syslog_seq;
-console_idx = syslog_idx;
-logbuf_unlock_irqrestore(flags);
/*
 * We're about to replay the log buffer. Only do this to the
 * just-registered console to avoid excessive message spam to
 * the already-registered consoles.
 * +
 * + Set exclusive_console with disabled interrupts to reduce
 * + race window with eventual console_flush_on_panic() that

/* ignores console_lock. */

exclusive_console = newcon;
exclusive_console_stop_seq = console_seq;
console_seq = syslog_seq;
console_idx = syslog_idx;
logbuf_unlock_irqrestore(flags);
}

console_unlock();

console_sysfs_notify();

int vprintk_deferred(const char *fmt, va_list args)
+

void defer_console_output(void)
{
- int r;
-
- r = vprintk_emit(0, LOGLEVEL_SCHED, NULL, 0, fmt, args);
- preempt_disable();
-__this_cpu_or(printk_pending, PRINTK_PENDING_OUTPUT);
-irq_work_queue(this_cpu_ptr(&wake_up_klogd_work));
-preempt_enable();
+
+
+int vprintk_deferred(const char *fmt, va_list args)
+
+ int r;
+
+ r = vprintk_emit(0, LOGLEVEL_SCHED, NULL, 0, fmt, args);
+defer_console_output();

return r;
}

/* move first record forward until length fits into the buffer */
seq = dumper->cur_seq;
idx = dumper->cur_idx;
while (l > size && seq < dumper->next_seq) {
   struct printk_log *msg = log_from_idx(idx);
   l -= msg_print_text(msg, true, NULL, 0);
}
static DEFINE_PER_CPU(struct printk_safe_seq_buf, safe_print_seq);
static DEFINE_PER_CPU(int, printk_context);

+static DEFINE_RAW_SPINLOCK(safe_read_lock);
+
#if defined CONFIG_PRINTK_NMI
static DEFINE_PER_CPU(struct printk_safe_seq_buf, nmi_print_seq);
#endif
@@ -82,6 +84,7 @@
{
    int add;
    size_t len;
    +va_list ap;

again:
    len = atomic_read(&s->len);
@@ -100,7 +103,9 @@
    if (!len)
        smp_rmb();

-    add = vscnprintf(s->buffer + len, sizeof(s->buffer) - len, fmt, args);
    +va_copy(ap, args);
    +    add = vscnprintf(s->buffer + len, sizeof(s->buffer) - len, fmt, ap);
    +va_end(ap);
    if (!add)
        return 0;
@@ -188,8 +193,6 @@
*/
static void __printk_safe_flush(struct irq_work *work)
{
    -static raw_spinlock_t read_lock =
    -RAW_SPIN_LOCK_INITIALIZER(read_lock);
    struct printk_safe_seq_buf *s =
    container_of(work, struct printk_safe_seq_buf, work);
    unsigned long flags;
@@ -203,7 +206,7 @@
    * different CPUs. This is especially important when printing
    * a backtrace.
    */
    -raw_spin_lock_irqsave(&read_lock, flags);
    +raw_spin_lock_irqsave(&safe_read_lock, flags);

    i = 0;
    more:
@@ -240,7 +243,7 @@

    out:
report_message_lost(s);
-raw_spin_unlock_irqrestore(&read_lock, flags);
+raw_spin_unlock_irqrestore(&safe_read_lock, flags);
}

/**
@@ -278,7 +281,7 @@
 * Make sure that we could access the main ring buffer.
 * Do not risk a double release when more CPUs are up.
 */
-if (in_nmi() && raw_spin_is_locked(&logbuf_lock)) {
+if (raw_spin_is_locked(&logbuf_lock)) {
    if (num_online_cpus() > 1)
        return;

@@ -286,6 +289,14 @@
raw_spin_lock_init(&logbuf_lock);
}

+if (raw_spin_is_locked(&safe_read_lock)) {
+    if (num_online_cpus() > 1)
+        return;
+    +
+    +debug_locks_off();
+    +raw_spin_lock_init(&safe_read_lock);
+} +
+printk_safe_flush();
}

@@ -303,26 +314,35 @@
return printk_safe_log_store(s, fmt, args);
}

-void printk_nmi_enter(void)
+void notrace printk_nmi_enter(void)
{
    -/*
    -* The size of the extra per-CPU buffer is limited. Use it only when
    -* the main one is locked. If this CPU is not in the safe context,
    -* the lock must be taken on another CPU and we could wait for it.
    -*/
    -if (((this_cpu_read(printk_context) & PRINTK_SAFE_CONTEXT_MASK) &&
    -raw_spin_is_locked(&logbuf_lock)) {
    -this_cpu_or(printk_context, PRINTK_NMI_CONTEXT_MASK);
    -} else {
    -this_cpu_or(printk_context, PRINTK_NMI_DEFERRED_CONTEXT_MASK);
    -}
+this_cpu_or(printk_context, PRINTK_NMI_CONTEXT_MASK);
}

-void printk_nmi_exit(void)
+void notrace printk_nmi_exit(void)
{
-this_cpu_and(printk_context,
- ~(PRINTK_NMI_CONTEXT_MASK | PRINTK_NMI_DEFERRED_CONTEXT_MASK));
+this_cpu_and(printk_context, ~PRINTK_NMI_CONTEXT_MASK);
+
+/
+ * Marks a code that might produce many messages in NMI context
+ * and the risk of losing them is more critical than eventual
+ * reordering.
+ *
+ * It has effect only when called in NMI context. Then printk()
+ * will try to store the messages into the main logbuf directly
+ * and use the per-CPU buffers only as a fallback when the lock
+ * is not available.
+ */
+void printk_nmi_direct_enter(void)
+{
+if (this_cpu_read(printk_context) & PRINTK_NMI_CONTEXT_MASK)
+this_cpu_or(printk_context, PRINTK_NMI_DIRECT_CONTEXT_MASK);
+
+void printk_nmi_direct_exit(void)
+{
+this_cpu_and(printk_context, ~PRINTK_NMI_DIRECT_CONTEXT_MASK);
+
#else
@@ -360,6 +380,20 @@

__printf(1, 0) int vprintk_func(const char *fmt, va_list args)
{
+/*
+ * Try to use the main logbuf even in NMI. But avoid calling console
+ * drivers that might have their own locks.
+ */
+if (((this_cpu_read(printk_context) & PRINTK_NMI_DIRECT_CONTEXT_MASK) &
+ raw_spin_trylock(&logbuf_lock)) {
+int len;
+
+len = vprintk_store(0, LOGLEVEL_DEFAULT, NULL, 0, fmt, args);
+raw_spin_unlock(&logbuf_lock);
+ defer_console_output();
+ return len;
+ }
+
+ /* Use extra buffer in NMI when logbuf_lock is taken or in safe mode. */
+ if (this_cpu_read(printk_context) & PRINTK_NMI_CONTEXT_MASK)
+ return vprintk_nmi(fmt, args);
+ @ @ -368,13 +402,6 @@
+ if (this_cpu_read(printk_context) & PRINTK_SAFE_CONTEXT_MASK)
+ return vprintk_safe(fmt, args);
+
+ /* Use the main logbuf when logbuf_lock is available in NMI.
+ * But avoid calling console drivers that might have their own locks.
+ */
+ -if (this_cpu_read(printk_context) & PRINTK_NMI_DEFERRED_CONTEXT_MASK)
+ -return vprintk_deferred(fmt, args);
+ -
+ /* No obstacles. */
+ return vprintk_default(fmt, args);
}
- prof_shift = par;
- pr_info("kernel schedule profiling enabled (shift: %ld)\n",
+ prof_shift = clamp(par, 0, BITS_PER_LONG - 1);
+ pr_info("kernel schedule profiling enabled (shift: %u)\n",
 prof_shift);
} else if (!strncmp(str, kvmstr, strlen(kvmstr))) {
  prof_on = KVM_PROFILING;
  if (str[strlen(kvmstr)] == ',')
    str += strlen(kvmstr) + 1;
  if (get_option(&str, &par))
    - prof_shift = par;
+ prof_shift = clamp(par, 0, BITS_PER_LONG - 1);
  pr_info("kernel KVM profiling enabled (shift: %ld)\n",
+ pr_info("kernel KVM profiling enabled (shift: %u)\n",
 prof_shift);
} else if (get_option(&str, &par)) {
  - prof_shift = par;
+ prof_shift = clamp(par, 0, BITS_PER_LONG - 1);
  prof_on = CPU_PROFILING;
  - pr_info("kernel profiling enabled (shift: %ld)\n",
+ pr_info("kernel profiling enabled (shift: %u)\n",
 prof_shift);
}
return 1;
@@ -467,7 +468,7 @@
unsigned long p = *ppos;
ssize_t read;
char *pnt;
-unsigned int sample_step = 1 << prof_shift;
+unsigned long sample_step = 1UL << prof_shift;

profile_flip_buffers();
if (p >= (prof_len+1)*sizeof(unsigned int))
--- linux-4.15.0.orig/kernel/ptrace.c
+++ linux-4.15.0/kernel/ptrace.c
@@ -29,6 +29,7 @@
#include <linux/hw_breakpoint.h>
#include <linux/cn_proc.h>
#include <linux/compat.h>
+include <linux/sched/signal.h>

/*
 * Access another process' address space via ptrace.
 */
@@ -77,9 +78,7 @@
 static void ptrace_link(struct task_struct *child, struct task_struct *new_parent)
 {
-rcu_read_lock();

- __ptrace_link(child, new_parent, __task_cred(new_parent));
- rcu_read_unlock();
+ __ptrace_link(child, new_parent, current_cred());
}

/**
 @ @ -164,6 +163,21 @@
 spin_unlock(&child->sighand->siglock);
 }

+static bool looks_like_a_spurious_pid(struct task_struct *task)
+{
+    if (task->exit_code != ((PTRACE_EVENT_EXEC << 8) | SIGTRAP))
+        return false;
+    if (task_pid_vnr(task) == task->ptrace_message)
+        return false;
+ /*
+ * The tracee changed its pid but the PTRACE_EVENT_EXEC event
+ * was not wait()ed, most probably debugger targets the old
+ * leader which was destroyed in de_thread().
+ */
+    return true;
+
+/* Ensure that nothing can wake it up, even SIGKILL */
+static bool ptrace_freeze_traced(struct task_struct *task)
+{
+    if (task_is_traced(task) && !looks_like_a_spurious_pid(task) &&
+        !__fatal_signal_pending(task)) {
+        task->state = __TASK_TRACED;
+        return true;
+    }
+    spin_lock_irq(&task->sighand->siglock);
-    if (task_is_traced(task) && !__fatal_signal_pending(task)) {
+    if (task_is_traced(task) && !looks_like_a_spurious_pid(task) &&
+        !__fatal_signal_pending(task)) {
        task->state = __TASK_TRACED;
        ret = true;
+    }
+    return ret;
+}

-static int ptrace_has_cap(struct user_namespace *ns, unsigned int mode)
+static bool ptrace_has_cap(struct user_namespace *ns, unsigned int mode)
+{
    if (mode & PTRACE_MODE_NOAUDIT)
        return has_ns_capability_noaudit(current, ns, CAP_SYS_PTRACE);
-else
+else
    return false;


return has_ns_capability(current, ns, CAP_SYS_PTRACE);
+return ns_capable_noaudit(ns, CAP_SYS_PTRACE);
+return ns_capable(ns, CAP_SYS_PTRACE);
}

/* Returns 0 on success, -errno on denial. */
@@ -322,6 +336,16 @@
return -EPERM;
ok:
rcu_read_unlock();
+/*
+ * If a task drops privileges and becomes nondumpable (through a syscall
+ * like setresuid()) while we are trying to access it, we must ensure
+ * that the dumpability is read after the credentials; otherwise,
+ * we may be able to attach to a task that we shouldn't be able to
+ * attach to (as if the task had dropped privileges without becoming
+ * nondumpable).
+ * Pairs with a write barrier in commit_creds().
+ */
+smp_rmb();
mm = task->mm;
if (mm &&
    ((get_dumpable(mm) != SUID_DUMP_USER) &&
@@ -703,6 +727,10 @@
if (arg.nr < 0)
return -EINVAL;
+/* Ensure arg.off fits in an unsigned long */
+if (arg.off > ULONG_MAX)
+return 0;
+
if (arg.flags & PTRACE_PEEKSIGINFO_SHARED)
pending = &child->signal->shared_pending;
else
@@ -710,18 +738,20 @@
for (i = 0; i < arg.nr; ) {
    siginfo_t info;
    s32 off = arg.off + i;
    +unsigned long off = arg.off + i;
    +bool found = false;

    spin_lock_irq(&child->sighand->siglock);
    list_for_each_entry(q, &pending->list, list) {
        if (!off--)
            +found = true;
        copy_siginfo(&info, &q->info);
        break;
spin_unlock_irq(&child->sighand->siglock);

if (off >= 0) /* beyond the end of the list */
+if (!found) /* beyond the end of the list */
break;

#ifdef CONFIG_COMPAT
@@ -925,18 +955,26 @@
ret = ptrace_setsiginfo(child, &siginfo);
break;

-case PTRACE_GETSIGMASK:
+case PTRACE_GETSIGMASK: {
+    sigset_t *mask;
+    if (addr != sizeof(sigset_t)) {
+        ret = -EINVAL;
+        break;
+    }

-if (copy_to_user(datavp, &child->blocked, sizeof(sigset_t)))
+if (test_tsk_restore_sigmask(child))
+    mask = &child->saved_sigmask;
+else
+    mask = &child->blocked;
+    if (copy_to_user(datavp, mask, sizeof(sigset_t)))
ret = -EFAULT;
else
    ret = 0;

    break;
+}

-case PTRACE_SETSIGMASK: {
+case PTRACE_SETSIGMASK: {
sigset_t new_set;
@@ -962,6 +1000,8 @@
child->blocked = new_set;
spin_unlock_irq(&child->sighand->siglock);

+clear_tsk_restore_sigmask(child);
+    ret = 0;
    break;
}
if (torture_cleanup_begin())
    return;
+if (!cur_ops) {
+    torture_cleanup_end();
+    return;
+
    }

if (reader_tasks) {
for (i = 0; i < nrealreaders; i++)
    pr_alert(" %s", perf_ops[i]->name);
    pr_alert("\n");
firsterr = -EINVAL;
+cur_ops = NULL;
go_to unwind;
}
if (cur_ops->init)
--- linux-4.15.0.orig/kernel/rcu/rcutorture.c
+++ linux-4.15.0/kernel/rcu/rcutorture.c
@@ -1435,7 +1435,7 @@
VERBOSE_TOROUT_STRING("rcu_torture_stall end holdoff");
} else
    } if (!kthread_should_stop()) {
+    stop_at = ktime_get_seconds() + stall_cpu;
while (ULONG_CMP_LT((unsigned long)ktime_get_seconds(),
+      stop_at))
    continue; /* Induce RCU CPU stall warning. */
if (stall_cpu_irqsoff)
local_irq_enable();
pr_alert("rcu_torture_stall start on CPU %d\n",
    smp_processor_id());
-while (ULONG_CMP_LT(get_seconds(), stop_at))
+while (ULONG_CMP_LT((unsigned long)ktime_get_seconds(),
+    stop_at))
continue; /* RCU CPU stall is expected behavior in following code. */
rcu_read_lock();
if (stall_cpu_irqsoff)
local_irq_disable();
pr_alert("rcu_torture_stall start on CPU \%d\n",
    smp_processor_id());
-while (ULONG_CMP_LT(get_seconds(), stop_at))
+while (ULONG_CMP_LT((unsigned long)ktime_get_seconds(),
+    stop_at))
continue; /* Induce RCU CPU stall warning. */
if (stall_cpu_irqsoff)
local_irq_enable();
cur_ops->cb_barrier();
return;
+
    }
+if (!cur_ops) {
+    torture_cleanup_end();
+    return;
rcu_torture_barrier_cleanup();
torture_stop_kthread(rcu_torture_stall, stall_task);
pr_alert(" %s", torture_ops[i]->name);
pr_alert("un");
firsterr = -EINVAL;
+cur_ops = NULL;
goto unwind;
}
if (cur_ops->fqs == NULL && fqs_duration != 0) {
static void srcu_reschedule(struct srcu_struct *sp, unsigned long delay);
static void process_srcu(struct work_struct *work);

/+* Wrappers for lock acquisition and release, see raw_spin_lock_rcu_node(). */
+/* Wrappers for lock acquisition and release, see raw_spin_lock_rcu_node(). */
+#define spin_lock_rcu_node(p)
+do {
+spin_lock(&ACCESS_PRIVATE(p, lock));
+smp_mb__after_unlock_lock();
+} while (0)
+
+/* Define spin_unlock_rcu_node(p) spin_unlock(&ACCESS_PRIVATE(p, lock))
+ */
+/* Define spin_unlock_rcu_node(p) spin_unlock(&ACCESS_PRIVATE(p, lock))
+ */
+/* Define spin_unlock_irq_rcu_node(p) spin_unlock_irq(&ACCESS_PRIVATE(p, lock))
+ */
+/* Define spin_unlock_irq_rcu_node(p) spin_unlock_irq(&ACCESS_PRIVATE(p, lock))
+ */
+/* Define spin_unlock_irqsave_rcu_node(p, flags) spin_unlock_irqsave(&ACCESS_PRIVATE(p, lock), flags)
+ */
+/* Define spin_unlock_irqsave_rcu_node(p, flags) spin_unlock_irqsave(&ACCESS_PRIVATE(p, lock), flags)
+ */
+/* Define spin_unlock_irqrestore_rcu_node(p, flags) spin_unlock_irqrestore(&ACCESS_PRIVATE(p, lock), flags)
+ */
+/* Define spin_unlock_irqrestore_rcu_node(p, flags) spin_unlock_irqrestore(&ACCESS_PRIVATE(p, lock), flags)
+ */
+/* Initialize SRCU combining tree. Note that statically allocated
+ srcu_struct structures might already have srcu_read_lock() and
/* Each pass through this loop initializes one srcu_node structure. */
rcu_for_each_node_breadth_first(sp, snp) {
-raw_spin_lock_init(&ACCESS_PRIVATE(snp, lock));
+spin_lock_init(&ACCESS_PRIVATE(snp, lock));
WARN_ON_ONCE(ARRAY_SIZE(snp->srcu_have_cbs) !=
    ARRAY_SIZE(snp->srcu_data_have_cbs));
for (i = 0; i < ARRAY_SIZE(snp->srcu_have_cbs); i++) {
    spin_lock_init(&ACCESS_PRIVATE(snp, lock));
    for_each_possible_cpu(cpu) {
        sdp = per_cpu_ptr(sp->sda, cpu);
-raw_spin_lock_init(&ACCESS_PRIVATE(sdp, lock));
+spin_lock_init(&ACCESS_PRIVATE(sdp, lock));
        rcu_segcblist_init(&sdp->srcu_cblist);
        sdp->srcu_cblist_invoking = false;
        sdp->srcu_gp_seq_needed = sp->srcu_gp_seq;
    }
}
EXPORT_SYMBOL_GPL(__init_srcu_struct);
/* Don't re-initialize a lock while it is held. */
dbg_check_no_locks_freed((void *)sp, sizeof(*sp));
lockdep_init_map(&sp->dep_map, name, key, 0);
-raw_spin_lock_init(&ACCESS_PRIVATE(sp, lock));
+spin_lock_init(&ACCESS_PRIVATE(sp, lock));
return init_srcu_struct_fields(sp, false);
}
raw_spin_unlock_irqrestore_rcu_node(sp, flags);
+spin_unlock_irqrestore_rcu_node(sp, flags);
}
/*
 @@ -414,10 +441,12 @@
 lockdep_assert_held(&sp->lock);
 WARN_ON_ONCE(ULONG_CMP_GE(sp->srcu_gp_seq, sp->srcu_gp_seq_needed));
 +spin_lock_rcu_node(sdp); /* Interrupts already disabled. */
 rcu_segeclist_advance(&sdp->srcu_cblist,
     rcu_seq_current(sp->srcu_gp_seq));
(void)rcu_segeclist_accelerate(&sdp->srcu_cblist,
     rcu_seq_snap(sp->srcu_gp_seq));
+spin_lock_irq_rcu_node(sdp); /* Interrupts remain disabled. */
 smp_mb(); /* Order prior store to ->srcu_gp_seq_needed vs. GP start. */
 rcu_seq_start(sp->srcu_gp_seq);
 state = rcu_seq_state(READ_ONCE(sp->srcu_gp_seq));
 @@ -513,7 +542,7 @@
 mutex_lock(&sp->srcu_cb_mutex);
 /* End the current grace period. */
 -raw_spin_lock_irq_rcu_node(sp);
 +spin_lock_irq_rcu_node(sp);
 idx = rcu_seq_state(sp->srcu_gp_seq);
 WARN_ON_ONCE(idx != SRCU_STATE_SCAN2);
 cbdelay = srcu_get_delay(sp);
 @@ -522,7 +551,7 @@
 gpseq = rcu_seq_current(sp->srcu_gp_seq);
 if (ULONG_CMP_LT(sp->srcu_gp_seq_needed_exp, gpseq))
     sp->srcu_gp_seq_needed_exp = gpseq;
 -raw_spin_unlock_irq_rcu_node(sp);
 +spin_unlock_irq_rcu_node(sp);
 mutex_unlock(&sp->srcu_gp_mutex);
 /* A new grace period can start at this point. But only one. */
 @@ -530,7 +569,7 @@
 idx = rcu_seq_ctr(gpseq) % ARRAY_SIZE(snp->srcu_have_cbs);
 idxnext = (idx + 1) % ARRAY_SIZE(snp->srcu_have_cbs);
 rcu_for_each_node_breadth_first(sp, snp) {
 -raw_spin_lock_irq_rcu_node(snp);
 +spin_lock_irq_rcu_node(snp);
 cbs = false;
 if (snp >= sp->level[rcu_num_lvls - 1])
     cbs = snp->srcu_have_cbs[idx] == gpseq;
 @@ -540,7 +569,7 @@
 snp->srcu_gp_seq_needed_exp = gpseq;
 mask = snp->srcu_data_have_cbs[idx];
snp->srcu_data_have_cbs[idx] = 0;
-raw_spin_unlock_irq_rcu_node(snp);
+spin_unlock_irq_rcu_node(snp);
if (cbs)
srcu_schedule_cbs_snp(sp, snp, mask, cbdelay);

@@ -548,11 +577,11 @@
if (!gpseq & counter_wrap_check))
for (cpu = snp->grplo; cpu <= snp->grphi; cpu++) {
  sdp = per_cpu_ptr(sp->sda, cpu);
-raw_spin_lock_irqsave_rcu_node(sdp, flags);
+spin_lock_irqsave_rcu_node(sdp, flags);
if (ULONG_CMP_GE(gpseq,
  sdp->srcu_gp_seq_needed + 100))
  sdp->srcu_gp_seq_needed = gpseq;
-raw_spin_unlock_irqrestore_rcu_node(sdp, flags);
+spin_unlock_irqrestore_rcu_node(sdp, flags);
}
}

@@ -560,17 +589,17 @@
mutex_unlock(&sp->srcu_cb_mutex);

/* Start a new grace period if needed. */
-raw_spin_lock_irq_rcu_node(sp);
+spin_lock_irq_rcu_node(sp);
gpseq = rcu_seq_current(&sp->srcu_gp_seq);
if (!rcu_seq_state(gpseq) &&
    ULONG_CMP_LT(gpseq, sp->srcu_gp_seq_needed)) {
  srcu_gp_start(sp);
-raw_spin_unlock_irq_rcu_node(sp);
+spin_unlock_irq_rcu_node(sp);
/* Throttle expedited grace periods: Should be rare! */
srcu_reschedule(sp, rcu_seq_ctr(gpseq) & 0x3ff
    ? 0 : SRCU_INTERVAL);
} else {
  -raw_spin_unlock_irq_rcu_node(sp);
+spin_unlock_irq_rcu_node(sp);
}
}

@@ -590,18 +619,18 @@
if (rcu_seq_done(&sp->srcu_gp_seq, s) ||
    ULONG_CMP_GE(READ_ONCE(snp->srcu_gp_seq_needed_exp), s))
  return;
-raw_spin_lock_irqsave_rcu_node(snp, flags);
+spin_lock_irqsave_rcu_node(snp, flags);
if (ULONG_CMP_GE(snp->srcu_gp_seq_needed_exp, s)) {
raw_spin_unlock_irqrestore_rcu_node(snp, flags);
return;
}
WRITE_ONCE(snp->srcu_gp_seq_needed_exp, s);
raw_spin_unlock_irqrestore_rcu_node(snp, flags);
spin_unlock_irqrestore_rcu_node(snp, flags);
}
raw_spin_lock_irqsave_rcu_node(sp, flags);
spin_lock_irqsave_rcu_node(sp, flags);
if (!ULONG_CMP_LT(sp->srcu_gp_seq_needed_exp, s))
sp->srcu_gp_seq_needed_exp = s;
raw_spin_unlock_irqrestore_rcu_node(sp, flags);
spin_unlock_irqrestore_rcu_node(sp, flags);
}
/*
@@ -623,12 +652,12 @@
for (; snp != NULL; snp = snp->srcu_parent) {
  if (rcu_seq_done(&sp->srcu_gp_seq, s) && snp != sdp->mynode)
    return; /* GP already done and CBs recorded. */
-raw_spin_lock_irqsave_rcu_node(snp, flags);
+spin_lock_irqsave_rcu_node(snp, flags);
  if (ULONG_CMP_GE(snp->srcu_have_cbs[idx], s)) {
    snp_seq = snp->srcu_have_cbs[idx];
    if (snp == sdp->mynode && snp_seq == s)
      snp->srcu_data_have_cbs[idx] |= sdp->grpmask;
-raw_spin_unlock_irqrestore_rcu_node(snp, flags);
+spin_unlock_irqrestore_rcu_node(snp, flags);
    if (snp == sdp->mynode && snp_seq != s) {
      srcu_schedule_cbs_sdp(sdp, do_norm
       ? SRCU_INTERVAL
@@ -644,11 +673,11 @@
snp->srcu_data_have_cbs[idx] |= sdp->grpmask;
    if (!do_norm && ULONG_CMP_LT(snp->srcu_gp_seq_needed_exp, s))
      snp->srcu_gp_seq_needed_exp = s;
-raw_spin_unlock_irqrestore_rcu_node(snp, flags);
+spin_unlock_irqrestore_rcu_node(snp, flags);
    spin_unlock_irqrestore_rcu_node(snp, flags);
  }
/* Top of tree, must ensure the grace period will be started. */
-raw_spin_lock_irqsave_rcu_node(sp, flags);
+spin_lock_irqsave_rcu_node(sp, flags);
if (ULONG_CMP_LT(sp->srcu_gp_seq_needed, s)) {
/*
* Record need for grace period s.  Pair with load
@@ -667,7 +696,7 @@
queue_delayed_work(system_power_efficient_wq, &sp->work,
srcu_get_delay(sp);
}
-raw_spin_unlock_irqrestore_rcu_node(sp, flags);
+spin_unlock_irqrestore_rcu_node(sp, flags);
}
/*
@@ -830,7 +859,7 @@
rhp->func = func;
local_irq_save(flags);
sdp = this_cpu_ptr(sp->sda);
-raw_spin_lock_rcu_node(sdp);
+spin_lock_rcu_node(sdp);
rcu_segecblist_enqueue(&sdp->srcu_cblist, rhp, false);
rcu_segecblist_advance(&sdp->srcu_cblist,
    rcu_seq_current(&sp->srcu_gp_seq));
@@ -844,7 +873,7 @@
sdp->srcu_gp_seq_needed_exp = s;
needexp = true;
}
-raw_spin_unlock_irqrestore_rcu_node(sdp, flags);
+spin_unlock_irqrestore_rcu_node(sdp, flags);
if (needgp)
srcu_funnel_gp_start(sp, sdp, s, do_norm);
else if (needexp)
@@ -900,7 +929,7 @@
*/

/*
* Make sure that later code is ordered after the SRCU grace
- * period.  This pairs with the raw_spin_lock_irq_rcu_node()
+ * period.  This pairs with the spin_lock_irq_rcu_node()
* in srcu_invoke_callbacks().  Unlike Tree RCU, this is needed
* because the current CPU might have been totally uninvolved with
* (and thus unordered against) that grace period.
@@ -1024,7 +1053,7 @@
*/
for_each_possible_cpu(cpu) {
    sdp = per_cpu_ptr(sp->sda, cpu);
    -raw_spin_lock_irq_rcu_node(sdp);
+spin_lock_irq_rcu_node(sdp);
    atomic_inc(&sp->srcu_barrier_cpu_cnt);
    sdp->srcu_barrier_head.func = srcu_barrier_cb;
    debug_rcu_head_queue(&sdp->srcu_barrier_head);
    @@ -1033,7 +1062,7 @@
    debug_rcu_head_unqueue(&sdp->srcu_barrier_head);
    atomic_dec(&sp->srcu_barrier_cpu_cnt);
}
-raw_spin_unlock_irq_rcu_node(sdp);
spin_unlock_irq_rcu_node(sdp);
}

/* Remove the initial count, at which point reaching zero can happen. */
@@ -1082,17 +1111,17 @@
 /* ^^^ */
 idx = rcu_seq_state(smp_load_acquire(&sp->srcu_gp_seq)); /* ^^^ */
 if (idx == SRCU_STATE_IDLE) {
- raw_spin_lock_irq_rcu_node(sp);
 + spin_lock_irq_rcu_node(sp);
 if (ULONG_CMP_GE(sp->srcu_gp_seq, sp->srcu_gp_seq_needed)) {
 WARN_ON_ONCE(rcu_seq_state(sp->srcu_gp_seq));
- raw_spin_unlock_irq_rcu_node(sp);
 + spin_unlock_irq_rcu_node(sp);
 mutex_unlock(&sp->srcu_gp_mutex);
 return;
 }
 idx = rcu_seq_state(READ_ONCE(sp->srcu_gp_seq));
 if (idx == SRCU_STATE_IDLE)
 srcu_gp_start(sp);
- raw_spin_unlock_irq_rcu_node(sp);
 + spin_unlock_irq_rcu_node(sp);
 if (idx != SRCU_STATE_IDLE) {
 mutex_unlock(&sp->srcu_gp_mutex);
 return; /* Someone else started the grace period. */
@@ -1141,19 +1170,19 @@
 sdp = container_of(work, struct srcu_data, work.work);
 sp = sdp->sp;
 rcu_cblist_init(&ready_cbs);
- raw_spin_lock_irq_rcu_node(sdp);
 + spin_lock_irq_rcu_node(sdp);
 rcu_segcblist_advance(&sdp->srcu_cblist,
     rcu_seq_current(&sp->srcu_gp_seq));
 if (sdp->srcu_cblist_invoking ||
- !rcu_segcblist_ready_cbs(&sdp->srcu_cblist)) {
- raw_spin_unlock_irq_rcu_node(sdp);
 + spin_unlock_irq_rcu_node(sdp);
 return; /* Someone else on the job or nothing to do. */
 }

 /* We are on the job! Extract and invoke ready callbacks. */
 sdp->srcu_cblist_invoking = true;
 rcu_segcblist_extract_done_cbs(&sdp->srcu_cblist, &ready_cbs);
- raw_spin_unlock_irq_rcu_node(sdp);
 + spin_unlock_irq_rcu_node(sdp);
 rhp = rcu_cblist_dequeue(&ready_cbs);
 for (; rhp != NULL; rhp = rcu_cblist_dequeue(&ready_cbs)) {
 debug_rcu_head_unqueue(rhp);
* Update counts, accelerate new callbacks, and if needed, schedule another round of callback invocation. */

```
-traw_spin_lock_irq_rcu_node(sdp);
+spin_lock_irq_rcu_node(sdp);
rcu_segeclist_insert_count(&sdp->srcu_cblist, &ready_cbs);
(void)rcu_segeclist_accelerate(&sdp->srcu_cblist,
    rcu_seq_snap(&sp->srcu_gp_seq));
sdp->srcu_cblist_invoking = false;
more = rcu_segeclist_ready_cbs(&sdp->srcu_cblist);
-traw_spin_unlock_irq_rcu_node(sdp);
+spin_unlock_irq_rcu_node(sdp);
if (more)
srcu_schedule_cbs_sdp(sdp, 0);
}
```

```
bool pushgp = true;

-traw_spin_lock_irq_rcu_node(sp);
+spin_lock_irq_rcu_node(sp);
if (ULONG_CMP_GE(sp->srcu_gp_seq, sp->srcu_gp_seq_needed)) {
    if (!WARN_ON_ONCE(rcu_seq_state(sp->srcu_gp_seq))) {
        /* All requests fulfilled, time to go idle. */
        @@ -1185,7 +1224,7 @@
        /* Outstanding request and no GP. Start one. */
        srcu_gp_start(sp);
    }
-traw_spin_unlock_irq_rcu_node(sp);
+spin_unlock_irq_rcu_node(sp);
}
```

```
if (pushgp)
queue_delayed_work(system_power_efficient_wq, &sp->work, delay);
--- linux-4.15.0.orig/kernel/rcu/tree.c
+++ linux-4.15.0/kernel/rcu/tree.c
@@ -1855,15 +1855,23 @@

/*
 - * Awaken the grace-period kthread for the specified flavor of RCU.
 - * Don't do a self-awaken, and don't bother awakening when there is
 - * nothing for the grace-period kthread to do (as in several CPUs
 - * raced to awaken, and we lost), and finally don't try to awaken
 - * a kthread that has not yet been created.
 + * Awaken the grace-period kthread. Don't do a self-awaken (unless in
 + * an interrupt or softirq handler), and don't bother awakening when there
 + * is nothing for the grace-period kthread to do (as in several CPUs raced
```
+ * to awaken, and we lost), and finally don't try to awaken a kthread that
+ * has not yet been created. If all those checks are passed, track some
+ * debug information and awaken.
+ *
+ * So why do the self-wakeup when in an interrupt or softirq handler
+ * in the grace-period kthread's context? Because the kthread might have
+ * been interrupted just as it was going to sleep, and just after the final
+ * pre-sleep check of the awaken condition. In this case, a wakeup really
+ * is required, and is therefore supplied.
+ */
static void rcu_gp_kthread_wake(struct rcu_state *rsp)
{
  -if (current == rsp->gp_kthread |
  +if ((current == rsp->gp_kthread &&
  +    !in_interrupt() && !in_serving_softirq()) ||
      !READ_ONCE(rsp->gp_flags) ||
      !rsp->gp_kthread)
    return;
@@ -2839,6 +2847,15 @@
rchu_bh_qs();
 rcu_preempt_check_callbacks();
+/* The load-acquire pairs with the store-release setting to true. */
+if (smp_load_acquire(this_cpu_ptr(&rcu_dynticks.rcu_urgent_qs))) {
+/* Idle and userspace execution already are quiescent states. */
+if (!rcu_is_cpu_rrupt_from_idle() && !user) {
+  set_tsk_need_resched(current);
+  set_preempt_need_resched();
+}
+  __this_cpu_write(rcu_dynticks.rcu_urgent_qs, false);
+
+}
if (rcu_pending())
  invoke_rcu_core();
if (user)
  --- linux-4.15.0.orig/kernel/rcu/tree_exp.h
+++ linux-4.15.0/kernel/rcu/tree_exp.h
@@ -534,7 +534,7 @@
 spin_unlock(&rnp->exp_lock);
 }

smp_mb(); /* All above changes before wakeup. */
-wake_up_all(&rnp->exp_wq[rucu_seq_ctr(rsp->expedited_sequence) & 0x3]);
+wake_up_all(&rnp->exp_wq[rucu_seq_ctr(s) & 0x3]);
}
trace_rcu_exp_grace_period(rsp->name, s, TPS("endwake"));
mutex_unlock(&rnp->exp_lock);
--- linux-4.15.0.orig/kernel/rcu/tree_plugin.h
+++ linux-4.15.0/kernel/rcu/tree_plugin.h
@@ -561,8 +561,14 @@
t = list_entry(rnp->gp_tasks->prev,  
    struct task_struct, rcu_node_entry);
-list_for_each_entry_continue(t, &rnp->blkd_tasks, rcu_node_entry)
+list_for_each_entry_continue(t, &rnp->blkd_tasks, rcu_node_entry) {  
+/*
+ * We could be printing a lot while holding a spinlock.
+ * Avoid triggering hard lockup.
+ */
+touch_nmi_watchdog();
+sched_show_task(t);
+}
raw_spin_unlock_irqrestore_rcu_node(rnp, flags);
}

@@ -1678,6 +1684,12 @@
char *ticks_title;
unsigned long ticks_value;

+/*
+ * We could be printing a lot while holding a spinlock. Avoid
+ * triggering hard lockup.
+ */
+touch_nmi_watchdog();
+
if (rsp->gpnum == rdp->gpnum) {
    ticks_title = "ticks this GP";
    ticks_value = rdp->ticks_this_gp;
--- linux-4.15.0.orig/kernel/rcu/update.c
+++ linux-4.15.0/kernel/rcu/update.c
@@ -52,6 +52,7 @@

#define CREATE_TRACE_POINTS

@@ -301,6 +302,7 @@
    current->lockdep_recursion == 0;
}
EXPORT_SYMBOL_GPL(debug_lockdep_rcu_enabled);
+NOKPROBE_SYMBOL(debug_lockdep_rcu_enabled);

/**
 * rcu_read_lock_held() - might we be in RCU read-side critical section?
@@ -422,11 +424,13 @@

debug_object_init(head, &rcuhead_debugdescr);
} +EXPORT_SYMBOL_GPL(init_rcu_head);

void destroy_rcu_head(struct rcu_head *head)
{
  debug_object_free(head, &rcuhead_debugdescr);
} +EXPORT_SYMBOL_GPL(destroy_rcu_head);

static bool rcuhead_is_static_object(void *addr)
{
  --- linux-4.15.0.orig/kernel/reboot.c
  +++ linux-4.15.0/kernel/reboot.c
  @@ -539,22 +539,22 @@
  break;
  
  case 's':
  -{
  -int rc;
  -
  -if (isdigit(*(str+1))) {
  -rc = kstrtoint(str+1, 0, &reboot_cpu);
  -if (rc)
  -return rc;
  - isdigit(*(str+3))) {
  -rc = kstrtoint(str+3, 0, &reboot_cpu);
  -if (rc)
  -return rc;
  -} else
  +if (isdigit(*(str+1)))
  +reboot_cpu = simple_strtoul(str+1, NULL, 0);
  + isdigit(*(str+3)))
  +reboot_cpu = simple_strtoul(str+3, NULL, 0);
  +else
  reboot_mode = REBOOT_SOFT;
  +if (reboot_cpu >= num_possible_cpus()) {
  +pr_err("Ignoring the CPU number in reboot= option. "
  + "CPU %d exceeds possible cpu number %d\n",
  + reboot_cpu, num_possible_cpus());
  +reboot_cpu = 0;
  +break;
  +}
  break;
  -}
  +
case 'g':
    reboot_mode = REBOOT_GPIO;
    break;

--- linux-4.15.0.orig/kernel/relay.c
+++ linux-4.15.0/kernel/relay.c
@@ -163,7 +163,7 @@
{
    struct rchan_buf *buf;

    if (chan->n_subbufs > UINT_MAX / sizeof(size_t *))
+    if (chan->n_subbufs > KMALLOC_MAX_SIZE / sizeof(size_t *))
        return NULL;

    buf = kzalloc(sizeof(struct rchan_buf), GFP_KERNEL);
@@ -196,6 +196,7 @@

    static void relay_destroy_channel(struct kref *kref)
    {
        struct rchan *chan = container_of(kref, struct rchan, kref);
+        free_percpu(chan->buf);
        kfree(chan);
    }

@@ -427,6 +428,8 @@

dentry = chan->cb->create_buf_file(tmpname, chan->parent,
    S_IRUSR, buf,
    &chan->is_global);
+    if (IS_ERR(dentry))
+        dentry = NULL;

    kfree(tmpname);
@@ -460,7 +463,7 @@

dentry = chan->cb->create_buf_file(NULL, NULL,
    S_IRUSR, buf,
    &chan->is_global);
-    if (WARN_ON(dentry))
+    if (IS_ERR_OR_NULL(dentry))
        goto free_buf;
    }
@@ -578,6 +581,11 @@

    chan->buf = alloc_percpu(struct rchan_buf *);
+    if (!chan->buf) {
+        kfree(chan);
+        return NULL;
+    }

    return NULL;
chan->version = RELAYFS_CHANNEL_VERSION;
chan->n_subbufs = n_subbufs;
chan->subbuf_size = subbuf_size;

kref_put(&chan->kref, relay_destroy_channel);
mux_unlock(&relay_channels_mutex);
-kfree(chan);
return NULL;
}
EXPORT_SYMBOL_GPL(relay_open);
--- linux-4.15.0.orig/kernel/resource.c
+++ linux-4.15.0/kernel/resource.c
@@ -351,24 +351,27 @@
EXPORT_SYMBOL(release_resource);

-/**
- * Finds the lowest iomem resource existing within [res->start..res->end).
- * The caller must specify res->start, res->end, res->flags, and optionally
- * desc. If found, returns 0, res is overwitten, if not found, returns -1.
- * This function walks the whole tree and not just first level children until
- * and unless first_level_children_only is true.
- */
+/**
+ * Finds the lowest iomem resource that covers part of [start..end]. The
+ * caller must specify start, end, flags, and desc (which may be
+ * IORES_DESC_NONE).
+ */
+ * If a resource is found, returns 0 and *res is overwritten with the part
+ * of the resource that's within [start..end]; if none is found, returns
+ * -ENODEV. Returns -EINVAL for invalid parameters.
+ */
+ * This function walks the whole tree and not just first level children
+ * unless @first_level_children_only is true.
+ */
-static int find_next_iomem_res(struct resource *res, unsigned long desc,
-    bool first_level_children_only)
+static int find_next_iomem_res(resource_size_t start, resource_size_t end,
+    unsigned long flags, unsigned long desc,
+    bool first_level_children_only,
+    struct resource *res)
{  
-resource_size_t start, end;
 struct resource *p;
 bool sibling_only = false;

 BUG_ON(!res);

-start = res->start;
-end = res->end;
BUG_ON(start >= end);

if (first_level_children_only)
@@ -377,7 +380,7 @@
read_lock(&resource_lock);

for (p = iomem_resource.child; p; p = next_resource(p, sibling_only)) {
- if ((p->flags & res->flags) != res->flags)
+ if ((p->flags & flags) != flags)
    continue;
    if ((desc != IORES_DESC_NONE) && (desc != p->desc))
        continue;
@@ -385,39 +388,38 @@
p = NULL;
break;
}
- if ((p->end >= start) && (p->start < end))
+ if ((p->end >= start) && (p->start <= end))
    break;
}

+if (p) {
+ /* copy data */
+ res->start = max(start, p->start);
+ res->end = min(end, p->end);
+ res->flags = p->flags;
+ res->desc = p->desc;
+ }
+ read_unlock(&resource_lock);
- if (!p)
- return -1;
- /* copy data */
- if (res->start < p->start)
- res->start = p->start;
- if (res->end > p->end)
- res->end = p->end;
- res->flags = p->flags;
- res->desc = p->desc;
- return 0;
+ return p ? 0 : -ENODEV;
}

-static int __walk_iomem_res_desc(struct resource *res, unsigned long desc,
- bool first_level_children_only,
- void *arg,
+static int __walk_iomem_res_desc(resource_size_t start, resource_size_t end,
 + unsigned long flags, unsigned long desc,
 + bool first_level_children_only, void *arg,
 int (*func)(struct resource *, void *))
{
 -u64 orig_end = res->end;
 +struct resource res;
 int ret = -1;

 -while ((res->start < res->end) &&
 -  !find_next_iomem_res(res, desc, first_level_children_only)) {
 -ret = (*func)(res, arg);
 +while (start < end &&
 +   !find_next_iomem_res(start, end, flags, desc,
 +    first_level_children_only, &res)) {
 +ret = (*func)(&res, arg);
 if (ret)
 break;

 -res->start = res->end + 1;
 -res->end = orig_end;
 +start = res.end + 1;
 }

 return ret;
@@ -440,13 +442,7 @@
 int walk_iomem_res_desc(unsigned long desc, unsigned long flags, u64 start,
 u64 end, void *arg, int (*func)(struct resource *, void *))
 {
 -struct resource res;
 -
 -res.start = start;
 -res.end = end;
 -res.flags = flags;
 -
 -return __walk_iomem_res_desc(&res, desc, false, arg, func);
 +return __walk_iomem_res_desc(start, end, flags, desc, false, arg, func);
 }

 /*
@@ -459,13 +455,9 @@
 int walk_system_ram_res(u64 start, u64 end, void *arg,
 int (*func)(struct resource *, void *))
 {
 -struct resource res;
 +unsigned long flags = IORESOURCE_SYSTEM_RAM | IORESOURCE_BUSY;

struct resource res;
unsigned long start, end;
unsigned long flags;
pfn = (res.start + PAGE_SIZE - 1) >> PAGE_SHIFT;
end_pfn = (res.end + 1) >> PAGE_SHIFT;
if (end_pfn > pfn)
ret = (*func)(pfn, end_pfn - pfn, arg);
if (ret)
break;
-res.start = res.end + 1;
-res.end = orig_end;
+start = res.end + 1;
}
return ret;
}
@@ -651,7 +639,8 @@
alloc.start = constraint->alignf(constraint->alignf_data, &avail,
size, constraint->align);
alloc.end = alloc.start + size - 1;
-if (resource_contains(&avail, &alloc)) {
+if (alloc.start <= alloc.end &&
+ resource_contains(&avail, &alloc)) {
new->start = alloc.start;
new->end = alloc.end;
return 0;
--- linux-4.15.0.orig/kernel/sched/autogroup.c
+++ linux-4.15.0/kernel/sched/autogroup.c
@@ -7,6 +7,7 @@
#include <linux/utsname.h>
#include <linux/security.h>
#include <linux/export.h>
+#include <linux/nospec.h>

unsigned int __read_mostly sysctl_sched_autogroup_enabled = 1;
static struct autogroup autogroup_default;
@@ -213,7 +214,7 @@
next = HZ / 10 + jiffies;
ag = autogroup_task_get(p);
-shares = scale_load(sched_prio_to_weight[nice + 20]);
+idx = array_index_nospec(nice + 20, 40);

if (nice < MIN_NICE || nice > MAX_NICE)
return -EINVAL;
@@ -231,7 +232,9 @@
next = HZ / 10 + jiffies;
ag = autogroup_task_get(p);
-shares = scale_load(sched_prio_to_weight[nice + 20]);
+idx = array_index_nospec(nice + 20, 40);
shares = scale_load(sched_prio_to_weight[idx]);

down_write(&ag->lock);
err = sched_group_set_shares(ag->tg, shares);
--- linux-4.15.0.orig/kernel/sched/core.c
+++ linux-4.15.0/kernel/sched/core.c
@@ -23,12 +23,15 @@
#include <linux/mmu_context.h>
#include <linux/module.h>
#include <linux/nmi.h>
+#include <linux/nospec.h>
#include <linux/prefetch.h>
#include <linux/profile.h>
#include <linux/security.h>
#include <linux/syscalls.h>
#include <linux/sched/isolation.h>

+#include <linux/kthread.h>
+
#include <asm/switch_to.h>
#include <asm/tlb.h>
#ifdef CONFIG_PARAVIRT
@@ -135,11 +138,12 @@
+[[L]] ->on_rq
+RELEASE (rq->lock)
+
- * If we observe the old cpu in task_rq_lock, the acquire of
+ * If we observe the old CPU in task_rq_lock(), the acquire of
* the old rq->lock will fully serialize against the stores.
*
- * If we observe the new CPU in task_rq_lock, the acquire will
- * pair with the WMB to ensure we must then also see migrating.
+ * If we observe the new CPU in task_rq_lock(), the address
+ * dependency headed by '[L] rq = task_rq()' and the acquire
+ * will pair with the WMB to ensure we then also see migrating.
+ */
if (likely(rq == task_rq(p) && !task_on_rq_migrating(p)) { 
 rq_pin_lock(rq, rf);
@@ -434,10 +438,11 @@
* its already queued (either by us or someone else) and will get the
* wakeup due to that.
*
- * This cmpxchg() implies a full barrier, which pairs with the write
- * barrier implied by the wakeup in wake_up_q().
+ * In order to ensure that a pending wakeup will observe our pending
+ * state, even in the failed case, an explicit smp_mb() must be used.
+ */
-if (cmpxchg(&node->next, NULL, WAKE_Q_TAIL))

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```c
smp_mb__before_atomic();
if (cmpxchg_relaxed(&node->next, NULL, WAKE_Q_TAIL))
    return;

get_task_struct(task);
@@ -508,7 +513,8 @@
unsigned long flags;
raw_spin_lock_irqsave(&rq->lock, flags);
    -resched_curr(rq);
+if (cpu_online(cpu) || cpu == smp_processor_id())
+    resched_curr(rq);
raw_spin_unlock_irqrestore(&rq->lock, flags);
}
@@ -903,6 +909,33 @@
#endif CONFIG_SMP
+
+static inline bool is_per_cpu_kthread(struct task_struct *p)
+{
+    if (!(p->flags & PF_KTHREAD))
+        return false;
+    if (p->nr_cpus_allowed != 1)
+        return false;
+    return true;
+}
+
+/*
+ * Per-CPU kthreads are allowed to run on !active && online CPUs, see
+ * __set_cpus_allowed_ptr() and select_fallback_rq().
+ */
+static inline bool is_cpu_allowed(struct task_struct *p, int cpu)
+{
+    if (!cpumask_test_cpu(cpu, &p->cpus_allowed))
+        return false;
+    if (is_per_cpu_kthread(p))
+        return cpu_online(cpu);
+    return cpu_active(cpu);
+}
+
+/*
+ * This is how migration works:
+ */
```
lockdep_assert_held(&rq->lock);

p->on_rq = TASK_ON_RQ_MIGRATING;
+WRITE_ONCE(p->on_rq, TASK_ON_RQ_MIGRATING);
dequeue_task(rq, p, DEQUEUE_NOCLOCK);
set_task_cpu(p, new_cpu);
rq_unlock(rq, rf);
static struct rq *__migrate_task(struct rq *rq, struct rq_flags *rf,
    struct task_struct *p, int dest_cpu)
{
    @@ -960,16 +993,8 @@
        if (!is_cpu_allowed(p, dest_cpu))
            return rq;
    } else {
        if (!unlikely(!cpu_active(dest_cpu)))
            return rq;
    }

    /* Affinity changed (again). */
    if (!cpumask_test_cpu(dest_cpu, &p->cpus_allowed))
      return rq;

    if (cpumask_equal(&p->cpus_allowed, new_mask))
      goto out;

    if (!cpumask_intersects(new_mask, cpu_valid_mask)) {
        dest_cpu = cpumask_any_and(cpu_valid_mask, new_mask);
        if (dest_cpu >= nr_cpu_ids) {
            ret = -EINVAL;
            goto out;
        }
    } else {
        if (task_running(rq, p) || p->state == TASK_WAKING) {
            struct migration_arg arg = { p, dest_cpu };
            /* Need help from migration thread: drop lock and wait. */
            for (;;) {
        }
 Any allowed, online CPU? */
for_each_cpu(dest_cpu, &p->cpus_allowed) {
  if (!(p->flags & PF_KTHREAD) && !cpu_active(dest_cpu))
    continue;
  if (!cpu_online(dest_cpu))
    if (!is_cpu_allowed(p, dest_cpu))
      goto out;
}
@if (unlikely(!is_cpu_allowed(p, cpu)))
cpu = select_fallback_rq(task_cpu(p), p);
return cpu;
/*
 * Remove function-return probe instances associated with this
 * task and put them back on the free list.
 */
-kprobe_flush_task(prev);
/*
 * Remove function-return probe instances associated with this
 * task and put them back on the free list.
 */
+kprobe_flush_task(prev);
/* Task is done with its stack. */
-put_task_stack(prev);
+/* Task is done with its stack. */
}
+put_task_stack(prev);
-put_task_struct(prev);
+put_task_struct(prev);
+break;
+
+case TASK_PARKED:
+kthread_park_complete(prev);
+break;
+}
}

tick_nohz_task_switch();
@@ -3383,23 +3414,8 @@

void __noreturn do_task_dead(void)
{
  /*
   - * The setting of TASK_RUNNING by try_to_wake_up() may be delayed
   - * when the following two conditions become true.
   - * - There is race condition of mmap_sem (It is acquired by
   - *  exit_mm()), and
   - * - SMI occurs before setting TASK_RUNNING.
   - * (or hypervisor of virtual machine switches to other guest)
   - * As a result, we may become TASK_RUNNING after becoming TASK_DEAD
   - *
   - * To avoid it, we have to wait for releasing tsk->pi_lock which
   - * is held by try_to_wake_up()
   - */
-raw_spin_lock_irq(&current->pi_lock);
-raw_spin_unlock_irq(&current->pi_lock);
-
/* Causes final put_task_struct in finish_task_switch(): */
-__set_current_state(TASK_DEAD);
+set_special_state(TASK_DEAD);

/* Tell freezer to ignore us: */
current->flags |= PF_NOFREEZE;
@@ -3737,7 +3753,8 @@

*/
if (dl_prio(prio)) {
  if (!dl_prio(p->normal_prio) ||
-    (pi_task && dl_entity_preempt(&pi_task->dl, &p->dl))) {
+    (pi_task && dl_prio(pi_task->prio) &&
+     dl_entity_preempt(&pi_task->dl, &p->dl))) {
    p->dl.dl_boosted = 1;
    queue_flag |= ENQUEUE_REPLENISH;
  } else

schedstat_inc(rq->yld_count);
current->sched_class->yield_task(rq);

/*
 * Since we are going to call schedule() anyway, there's
 * no need to preempt or enable interrupts:
 */
preempt_disable();
-rq_unlock(rq, &rf);
+rq_unlock_irq(rq, &rf);
sched_preempt_enable_no_resched();
schedule();

EXPORT_SYMBOL(io_schedule_timeout);

-void io_schedule(void)
+void __sched io_schedule(void)
{
    int token;

    @ @ -5273,10 +5286,11 @@
struct rq *rq = cpu_rq(cpu);
unsigned long flags;

    +__sched_fork(0, idle);
    +
    raw_spin_lock_irqsave(&idle->pi_lock, flags);
    raw_spin_lock(&rq->lock);

    __sched_fork(0, idle);
    idle->state = TASK_RUNNING;
    idle->se.exec_start = sched_clock();
    idle->flags |= PF_IDLE;
    @ @ -5430,12 +5444,14 @@
struct mm_struct *mm = current->active_mm;

    BUG_ON(cpu_online(smp_processor_id()));
    +BUG_ON(current != this_rq()->idle);

    if (mm != &init_mm) {
        switch_mm(mm, &init_mm, current);
        finish_arch_post_lock_switch();
    }
    -mmdrop(mm);
    +

Open Source Used In 5GaaS Edge AC-4  32888
ifdef CONFIG_SCHED_SMT
+/*
+ * When going up, increment the number of cores with SMT present.
+ */
+if (cpumask_weight(cpu_smt_mask(cpu)) == 2)
+static_branch_inc_cpuslocked(&sched_smt_present);
+endif
set_cpu_active(cpu, true);

if (sched_smp_initialized) {
 *@ -5689.6 +5712.14 @@
 */
synchronize_rcu_mult(call_rcu, call_rcu_sched);

ifdef CONFIG_SCHED_SMT
+/*
+ * When going down, decrement the number of cores with SMT present.
+ */
+if (cpumask_weight(cpu_smt_mask(cpu)) == 2)
+static_branch_dec_cpuslocked(&sched_smt_present);
+endif
+
+if (!sched_smp_initialized)
return 0;

@ @ -5742.22 +5773.6 @@
}
#endif

ifdef CONFIG_SCHED_SMT
-DEFINE_STATIC_KEY_FALSE(sched_smt_present);
-
-static void sched_init_smt(void)
-{
-/*
- * We've enumerated all CPUs and will assume that if any CPU
- * has SMT siblings, CPU0 will too.
- */
-if (cpumask_weight(cpu_smt_mask(0)) > 1)
-static_branch_enable(&sched_smt_present);
-}
-#else
-static inline void sched_init_smt(void) { }
-#endif
-
void __init sched_init_smp(void)
{
 sched_init_numa();
 @@ -5765,11 +5780,14 @@
 /*
 * There’s no userspace yet to cause hotplug operations; hence all the
 * CPU masks are stable and all blatant races in the below code cannot
- * happen.
+ * happen. The hotplug lock is nevertheless taken to satisfy lockdep,
+ * but there won’t be any contention on it.
 */
+cpus_read_lock();
 mutex_lock(&sched_domains_mutex);
 sched_init_domains(cpu_active_mask);
 mutex_unlock(&sched_domains_mutex);
+cpus_read_unlock();

 /* Move init over to a non-isolated CPU */
 if (set_cpus_allowed_ptr(current, housekeeping_cpumask(HK_FLAG_DOMAIN)) < 0)
 @@ -5779,8 +5797,6 @@
 init_sched_rt_class();
 init_sched_dl_class();

- sched_init_smt();
- }
- sched_smp_initialized = true;
 }

@@ -6363,10 +6379,6 @@
 #ifdef CONFIG_RT_GROUP_SCHED
 if (!sched_rt_can_attach(css_tg(css), task))
 return -EINVAL;
-#else
- */ We don’t support RT-tasks being in separate groups */
- if (task->sched_class != &fair_sched_class)
- return -EINVAL;
- #endif
- */
 */
 * Serialize against wake_up_new_task() such that if its
 @@ -6401,6 +6413,8 @@
 static int cpu_shares_write_u64(struct cgroup_subsys_state *css,
 struct cftype *cftype, u64 shareval)
 {
 Open Source Used In 5GasS Edge AC-4 32890
+if (shareval > scale_load_down(ULONG_MAX))
+shareval = MAX_SHARES;
return sched_group_set_shares(css_tg(css), scale_load(shareval));
}

@@ -6503,8 +6517,10 @@
period = ktime_to_ns(tg->cfs_bandwidth.period);
if (cfs_quota_us < 0)
quota = RUNTIME_INF;
-else
+else if ((u64)cfs_quota_us <= U64_MAX / NSEC_PER_USEC)
quota = (u64)cfs_quota_us * NSEC_PER_USEC;
+else
+return -EINVAL;

return tg_set_cfs_bandwidth(tg, period, quota);
}
@@ -6526,6 +6542,9 @@

u64 quota, period;

+if ((u64)cfs_period_us > U64_MAX / NSEC_PER_USEC)
+return -EINVAL;
+period = (u64)cfs_period_us * NSEC_PER_USEC;
quota = tg->cfs_bandwidth.quota;

@@ -6610,13 +6629,18 @@
parent_quota = parent_b->hierarchical_quota;

/*
- * Ensure max(child_quota) <= parent_quota, inherit when no
+ * Ensure max(child_quota) <= parent_quota. On cgroup2,
+ * always take the min. On cgroup1, only inherit when no
+ * limit is set:
+*/
-if (quota == RUNTIME_INF)
-quotas = parent_quota;
-else if (parent_quota != RUNTIME_INF && quota > parent_quota)
-return -EINVAL;
+if (cgroup_subsys_on_dfl(cpu_cgrp_subsys)) {
+quota = min(quota, parent_quota);
+} else {
+if (quota == RUNTIME_INF)
+quota = parent_quota;
+else if (parent_quota != RUNTIME_INF && quota > parent_quota)
+return -EINVAL;
+}
cfs_b->hierarchical_quota = quota;

@@ -6795,11 +6819,15 @@
 struct cftype *cft, s64 nice)
 {
 unsigned long weight;
+int idx;

 if (nice < MIN_NICE || nice > MAX_NICE)
 return -ERANGE;

- weight = sched_prio_to_weight[NICE_TO_PRIO(nice) - MAX_RT_PRIO];
+ weight = sched_prio_to_weight[NICE_TO_PRIO(nice) - MAX_RT_PRIO];
+ idx = NICE_TO_PRIO(nice) - MAX_RT_PRIO;
+ idx = array_index_nospec(idx, 40);
+ weight = sched_prio_to_weight[idx];
+ return sched_group_set_shares(css_tg(css), scale_load(weight));
 }
 #endif
 @@ -6821,7 +6849,7 @@
{
 char tok[21];/* U64_MAX */

- if (!sscanf(buf, "%s %llu", tok, periodp))
+ if (sscanf(buf, "%20s %llu", tok, periodp) < 1)
 return -EINVAL;

 *periodp *= NSEC_PER_USEC;
 --- linux-4.15.0.orig/kernel/sched/cpufreq.c
+++ linux-4.15.0/kernel/sched/cpufreq.c
@@ -9,6 +11,8 @@
 * published by the Free Software Foundation.
 */

+#include <linux/cpufreq.h>
+
#include "sched.h"

DEFINE_PER_CPU(struct update_util_data *, cpufreq_update_util_data);
@@ -61,3 +63,19 @@
 rcu_assign_pointer(per_cpu(cpufreq_update_util_data, cpu), NULL);
 }
 EXPORT_SYMBOL_GPL(cpufreq_remove_update_util_hook);
+
+/**
+ * cpufreq_this_cpu_can_update - Check if cpufreq policy can be updated.
+ * @policy: cpufreq policy to check.
+ */

+*/
bool cpufreq_this_cpu_can_update(struct cpufreq_policy *policy) {
	return cpumask_test_cpu(smp_processor_id(), policy->cpus) ||
		(policy->dvfs_possible_from_any_cpu &&
	 rcu_dereference_sched(*this_cpu_ptr(&cpufreq_update_util_data)));
}

--- linux-4.15.0.orig/kernel/sched/cpufreq_schedutil.c
+++ linux-4.15.0/kernel/sched/cpufreq_schedutil.c
@@ -90,12 +90,10 @@
* by the hardware, as calculating the frequency is pointless if
* we cannot in fact act on it.
*
- * For the slow switching platforms, the kthread is always scheduled on
- * the right set of CPUs and any CPU can find the next frequency and
- * schedule the kthread.
+ * This is needed on the slow switching platforms too to prevent CPUs
+ * going offline from leaving stale IRQ work items behind.
 */
-if (sg_policy->policy->fast_switch_enabled &&
+ !cpufreq_this_cpu_can_update(sg_policy->policy))
return false;

if (sg_policy->work_in_progress)
@@ -282,7 +280,8 @@
/* Do not reduce the frequency if the CPU has not been idle
* recently, as the reduction is likely to be premature then.
*/
- if (busy && next_f < sg_policy->next_freq) {
+ if (busy && next_f < sg_policy->next_freq &&
+ sg_policy->next_freq != UINT_MAX) {
next_f = sg_policy->next_freq;
/* Reset cached freq as next_freq has changed */
@@ -440,9 +439,17 @@
    NULL
    ];
+static void sugov_tunables_free(struct kobject *kobj)
+{
+    struct gov_attr_set *attr_set = container_of(kobj, struct gov_attr_set, kobj);
+    

static struct kobj_type sugov_tunables_ktype = {
    .default_attrs = sugov_attributes,
    .sysfs_ops = &governor_sysfs_ops,
    .release = &sugov_tunables_free,
};

/********************** cpufreq governor interface **********************/
@@ -533,12 +540,10 @@
    return tunables;
}

-static void sugov_tunables_free(struct sugov_tunables *tunables)
+static void sugov_clear_global_tunables(void)
{
    if (!have_governor_per_policy())
        global_tunables = NULL;
-    -kfree(tunables);
+    -sugov_clear_global_tunables();
}

static int sugov_init(struct cpufreq_policy *policy)
@@ -599,15 +604,15 @@
    policy->governor_data = NULL;
    -sugov_tunables_free(tunables);
+    sugov_clear_global_tunables();

    stop_kthread:
    sugov_kthread_stop(sg_policy);
    -
+    free_sg_policy:
        mutex_unlock(&global_tunables_lock);

+    free_sg_policy:
        sugov_policy_free(sg_policy);

    disable_fast_switch:
@@ -628,7 +633,7 @@
        policy->governor_data = NULL;
        if (!count)
            -sugov_tunables_free(tunables);
+            sugov_tunables_free(tunables);
```c
sugov_clear_global_tunables();

mutex_unlock(&global_tunables_lock);

--- linux-4.15.0.orig/kernel/sched/cputime.c
+++ linux-4.15.0/kernel/sched/cputime.c
@@ -743,7 +743,7 @@
 write_seqcount_begin(&vtime->seqcount);
 /* We might have scheduled out from guest path */
-if (current->flags & PF_VCPU)
+if (tsk->flags & PF_VCPU)
 vtime_account_guest(tsk, vtime);
 else
 __vtime_account_system(tsk, vtime);
@@ -786,7 +786,7 @@
*/
 write_seqcount_begin(&vtime->seqcount);
 __vtime_account_system(tsk, vtime);
-current->flags |= PF_VCPU;
+tsk->flags |= PF_VCPU;
 write_seqcount_end(&vtime->seqcount);
}
EXPORT_SYMBOL_GPL(vtime_guest_enter);
@@ -797,7 +797,7 @@
 write_seqcount_begin(&vtime->seqcount);
 vtime_account_guest(tsk, vtime);
 -current->flags &= ~PF_VCPU;
+tsk->flags &= ~PF_VCPU;
 write_seqcount_end(&vtime->seqcount);
}
EXPORT_SYMBOL_GPL(vtime_guest_exit);
--- linux-4.15.0.orig/kernel/sched/deadline.c
+++ linux-4.15.0/kernel/sched/deadline.c
@@ -217,7 -217,6 @@
 if (dl_se->dl_runtime == 0)
 return;
-WARN_ON(hrtimer_active(&dl_se->inactive_timer));
 WARN_ON(dl_se->dl_non_contending);

 zeralag_time = dl_se->deadline -
 @@ -234,7 +233,7 @@
 * If the "0-lag time" already passed, decrease the active
 * utilization now, instead of starting a timer
 */
-if (zerolag_time < 0) {
```
if ((zerolag_time < 0) || hrtimer_active(&dl_se->inactive_timer)) {
    if (dl_task(p))
        sub_running_bw(dl_se->dl_bw, dl_rq);
    if (!dl_task(p) || p->state == TASK_DEAD) {
        @ @ -1084.7 +1083.7 @@
        * should be larger than 2^(64 - 20 - 8), which is more than 64 seconds.
        * So, overflow is not an issue here.
    */
    -u64 grub_reclaim(u64 delta, struct rq *rq, struct sched_dl_entity *dl_se)
+static u64 grub_reclaim(u64 delta, struct rq *rq, struct sched_dl_entity *dl_se)
{ u64 u_inact = rq->dl.this_bw - rq->dl.running_bw; /* Utot - Uact */
  u64 u_act;
@@ -2023,8 +2022,14 @@
  sub_rq_bw(next_task->dl.dl_bw, &rq->dl);
  set_task_cpu(next_task, later_rq->cpu);
  add_rq_bw(next_task->dl.dl_bw, &later_rq->dl);
+  
+  /**
+   * Update the later_rq clock here, because the clock is used
+   * by the cpufreq_update_util() inside add_running_bw().
+  */
  +update_rq_clock(later_rq);
  add_running_bw(next_task->dl.dl_bw, &later_rq->dl);
  -activate_task(later_rq, next_task, 0);
  +activate_task(later_rq, next_task, ENQUEUE_NOCLOCK);
  ret = 1;

  resched_curr(later_rq);
  @@ -2346,7 +2351,7 @@
  u64 period = global_rt_period();
  u64 new_bw = to_ratio(period, runtime);
  struct dl_bw *dl_b;
-  int cpu, ret = 0;
+  int cpu, cpus, ret = 0;
  unsigned long flags;
  /*
@@ -2361,9 +2366,10 @@
  for_each_possible_cpu(cpu) {
    rcu_read_lock_sched();
    dl_b = dl_bw_of(cpu);
+    cpus = dl_bw_cpus(cpu);

    raw_spin_lock_irqsave(&dl_b->lock, flags);
    -if (new_bw < dl_b->total_bw)
+    if (new_bw * cpus < dl_b->total_bw)
      ret = -EBUSY;
raw_spin_unlock_irqrestore(&dl_b->lock, flags);

@@ -2563,6 +2569,7 @@
dl_se->dl_bw = 0;
dl_se->dl_density = 0;
+dl_se->dl_boosted = 0;
dl_se->dl_throttled = 0;
dl_se->dl_yielded = 0;
dl_se->dl_non_contending = 0;
@@ -2652,8 +2659,6 @@
#endif
#ifdef CONFIG_SCHED_DEBUG
-extern void print_dl_rq(struct seq_file *m, int cpu, struct dl_rq *dl_rq);
-
void print_dl_stats(struct seq_file *m, int cpu)
{
print_dl_rq(m, cpu, &cpu_rq(cpu)->dl);
--- linux-4.15.0.orig/kernel/sched/debug.c
+++ linux-4.15.0/kernel/sched/debug.c
@@ -21,8 +21,6 @@
#include "sched.h"

-static DEFINE_SPINLOCK(sched_debug_lock);
-
/*
 * This allows printing both to /proc/sched_debug and
 * to the console
@@ -339,6 +337,7 @@
{
static struct ctl_table *cpu_entries;
static struct ctl_table **cpu_idx;
+static bool init_done = false;
char buf[32];
int i;

@@ -368,7 +367,10 @@
if (!cpumask_available(sd_sysctl_cpus)) {
if (!alloc_cpumask_var(&sd_sysctl_cpus, GFP_KERNEL))
return;
+
}

+if (!init_done) {
+init_done = true;
/+* init to possible to not have holes in @cpu_entries */
cpumask_copy(sd_sysctl_cpus, cpu_possible_mask);

Open Source Used In 5GaaS Edge AC-4  32897
#ifdef CONFIG_CGROUP_SCHED
+static DEFINE_SPINLOCK(sched_debug_lock);
static char group_path[PATH_MAX];

-static char *task_group_path(struct task_group *tg)
+static void task_group_path(struct task_group *tg, char *path, int plen)
{
-    if (autogroup_path(tg, group_path, PATH_MAX))
+    if (autogroup_path(tg, path, plen))
        return;

-    cgroup_path(tg->css.cgroup, group_path, PATH_MAX);
-    return group_path;
+    cgroup_path(tg->css.cgroup, path, plen);
+
+/*
+ * Only 1 SEQ_printf_task_group_path() caller can use the full length
+ * group_path[] for cgroup path. Other simultaneous callers will have
+ * to use a shorter stack buffer. A "..." suffix is appended at the end
+ * of the stack buffer so that it will show up in case the output length
+ * matches the given buffer size to indicate possible path name truncation.
+ */
+#define SEQ_printf_task_group_path(m, tg, fmt...)			\
+{									\+	if (spin_trylock(&sched_debug_lock)) {				\+	    task_group_path(tg, group_path, sizeof(group_path));	\+	    SEQ_printf(m, fmt, group_path);				\+	    spin_unlock(&sched_debug_lock);				\+	} else {							\+	    char buf[128];						\+	    char *bufend = buf + sizeof(buf) - 3;			\+	    task_group_path(tg, buf, bufend - buf);\+	    strcpy(bufend - 1, "...");\+	    SEQ_printf(m, fmt, buf);\+	} \+	} \+								\}
#endif

SEQ_printf(m, " %d %d", task_node(p), task_numa_group_id(p));
#endif
#endif CONFIG_CGROUP_SCHED
SEQ_printf(m, " %s", task_group_path(task_group(p)));
+#endif

SEQ_printf(m, "\n");
@@ -527,7 +551,7 @@
unsigned long flags;
#ifdef CONFIG_FAIR_GROUP_SCHED
-SEQ_printf(m, "cfs_rq[%d]:%s\n", cpu, task_group_path(cfs_rq->tg));
+SEQ_printf_task_group_path(m, cfs_rq->tg, "cfs_rq[%d]:%s\n", cpu);
#else
SEQ_printf(m, "cfs_rq[%d]\n", cpu);
#endif
@@ -595,7 +619,7 @@
void print_rt_rq(struct seq_file *m, int cpu, struct rt_rq *rt_rq)
{
#ifdef CONFIG_RT_GROUP_SCHED
-SEQ_printf(m, "rt_rq[%d]:%s\n", cpu, task_group_path(rt_rq->tg));
+SEQ_printf_task_group_path(m, rt_rq->tg, "rt_rq[%d]:%s\n", cpu);
#else
SEQ_printf(m, "rt_rq[%d]\n", cpu);
#endif
@@ -647,7 +671,6 @@
static void print_cpu(struct seq_file *m, int cpu)
{
struct rq *rq = cpu_rq(cpu);
-unsigned long flags;
#ifdef CONFIG_X86
{
@@ -706,13 +729,11 @@
}#undef P
-spin_lock_irqsave(&sched_debug_lock, flags);
print_cfs_stats(m, cpu);
print_rt_stats(m, cpu);
print_dl_stats(m, cpu);
print_rq(m, rq, cpu);
-spin_unlock_irqrestore(&sched_debug_lock, flags);
SEQ_printf(m, "\n");
}
--- linux-4.15.0.orig/kernel/sched/fair.c
+++ linux-4.15.0/kernel/sched/fair.c
@@ -300,76 +300,99 @@

return grp->my_q;
}

static inline void list_add_leaf_cfs_rq(struct cfs_rq *cfs_rq)
{  
- if (!cfs_rq->on_list) {
- struct rq *rq = rq_of(cfs_rq);
- int cpu = cpu_of(rq);
- struct rq *rq = rq_of(cfs_rq);
- int cpu = cpu_of(rq);
+ if (cfs_rq->on_list) {
+ return rq->tmp_alone_branch == &rq->leaf_cfs_rq_list;
+ 
+ cfs_rq->on_list = 1;
+ 
+ /*
+ * Ensure we either appear before our parent (if already
+ * enqueued) or force our parent to appear after us when it is
+ * enqueued. The fact that we always enqueue bottom-up
+ * reduces this to two cases and a special case for the root
+ * cfs_rq. Furthermore, it also means that we will always reset
+ * tmp_alone_branch either when the branch is connected
+ * to a tree or when we reach the top of the tree
+ */
+ if (cfs_rq->tg->parent &&
+ cfs_rq->tg->parent->cfs_rq[cpu]->on_list) {
/*
 * Ensure we either appear before our parent (if already
 * enqueued) or force our parent to appear after us when it is
 * enqueued. The fact that we always enqueue bottom-up
 * reduces this to two cases and a special case for the root
 * cfs_rq. Furthermore, it also means that we will always reset
 * tmp_alone_branch either when the branch is connected
 * to a tree or when we reach the beg of the tree
 * If parent is already on the list, we add the child
 * just before. Thanks to circular linked property of
 * the list, this means to put the child at the tail
 * of the list that starts by parent.
 */
- if (cfs_rq->tg->parent &&
- cfs_rq->tg->parent->cfs_rq[cpu]->on_list) {
 /*
 * If parent is already on the list, we add the child
 * just before. Thanks to circular linked property of
 * the list, this means to put the child at the tail
 * of the list that starts by parent.

- */
- list_add_tail_rcu(&cfs_rq->leaf_cfs_rq_list,
- &cfs_rq->tg->parent->cfs_rq[cpu]->leaf_cfs_rq_list));
- */
- * The branch is now connected to its tree so we can
- * reset tmp_alone_branch to the beginning of the
- * list.
- */
- rq->tmp_alone_branch = &rq->leaf_cfs_rq_list;
- } else if (!cfs_rq->tg->parent) {
- */
- * cfs rq without parent should be put
- * at the tail of the list.
- */
- list_add_tail_rcu(&cfs_rq->leaf_cfs_rq_list,
- &rq->leaf_cfs_rq_list);
- */
- * We have reach the beg of a tree so we can reset
- * tmp_alone_branch to the beginning of the list.
- */
- rq->tmp_alone_branch = &rq->leaf_cfs_rq_list;
- } else {
- */
- * The parent has not already been added so we want to
- * make sure that it will be put after us.
- * tmp_alone_branch points to the beg of the branch
- * where we will add parent.
- */
- list_add_rcu(&cfs_rq->leaf_cfs_rq_list,
- rq->tmp_alone_branch);
- */
- * update tmp_alone_branch to points to the new beg
- * of the branch
- */
- rq->tmp_alone_branch = &cfs_rq->leaf_cfs_rq_list;
- }
+ list_add_tail_rcu(&cfs_rq->leaf_cfs_rq_list,
+ &(cfs_rq->tg->parent->cfs_rq[cpu]->leaf_cfs_rq_list));
+ */
+ * The branch is now connected to its tree so we can
+ * reset tmp_alone_branch to the beginning of the
+ * list.
+ */
+ rq->tmp_alone_branch = &rq->leaf_cfs_rq_list;
+ return true;
+ }

-cfs_rq->on_list = 1;
+if (!cfs_rq->tg->parent) {
+ /*
+ * cfs rq without parent should be put
+ * at the tail of the list.
+ */
+ list_add_tail_rcu(&cfs_rq->leaf_cfs_rq_list,
+ &rq->leaf_cfs_rq_list);
+ /*
+ * We have reach the top of a tree so we can reset
+ * tmp_alone_branch to the beginning of the list.
+ */
+ rq->tmp_alone_branch = &rq->leaf_cfs_rq_list;
+ return true;
+ }
+
+ /*
+ * The parent has not already been added so we want to
+ * make sure that it will be put after us.
+ * tmp_alone_branch points to the begin of the branch
+ * where we will add parent.
+ */
+ list_add_rcu(&cfs_rq->leaf_cfs_rq_list, rq->tmp_alone_branch);
+ /*
+ * update tmp_alone_branch to points to the new begin
+ * of the branch
+ */
+ rq->tmp_alone_branch = &cfs_rq->leaf_cfs_rq_list;
+ return false;
+
} static inline void list_del_leaf_cfs_rq(struct cfs_rq *cfs_rq) {
if (cfs_rq->on_list) {
 + struct rq *rq = rq_of(cfs_rq);
 + /*
 + * With cfs_rq being unthrottled/throttled during an enqueue,
 + * it can happen the tmp_alone_branch points the a leaf that
 + * we finally want to del. In this case, tmp_alone_branch moves
 + * to the prev element but it will point to rq->leaf_cfs_rq_list
 + * at the end of the enqueue.
 + */
 + if (rq->tmp_alone_branch == &cfs_rq->leaf_cfs_rq_list)
 + rq->tmp_alone_branch = cfs_rq->leaf_cfs_rq_list.prev;
 + list_del_rcu(&cfs_rq->leaf_cfs_rq_list);
 cfs_rq->on_list = 0;
}
+static inline void assert_list_leaf_cfs_rq(struct rq *rq)  
+{  
+  SCHED_WARN_ON(rq->tmp_alone_branch != &rq->leaf_cfs_rq_list);  
+}  
+
+/* Iterate thr' all leaf cfs_rq's on a runqueue */
#define for_each_leaf_cfs_rq_safe(rq, cfs_rq, pos)			  
list_for_each_entry_safe(cfs_rq, pos, &rq->leaf_cfs_rq_list, 
@@ -458,14 +481,19 @@  
return NULL;  
}  
-
+static inline void list_add_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+static inline bool list_add_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+  {  
+    return true;  
+  }  
+
+static inline void list_del_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+  {  
+
+static inline void assert_list_leaf_cfs_rq(struct rq *rq)  
+static inline void list_add_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+static inline bool list_add_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+static inline void assert_list_leaf_cfs_rq(struct rq *rq)  
+static inline void list_del_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+static inline void assert_list_leaf_cfs_rq(struct rq *rq)  
+static inline void list_add_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+static inline bool list_add_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+static inline void assert_list_leaf_cfs_rq(struct rq *rq)  
+static inline void list_del_leaf_cfs_rq(struct cfs_rq *cfs_rq)  
+
@@ -750,11 +778,12 @@
* To solve this problem, we also cap the util_avg of successive tasks to  
* only 1/2 of the left utilization budget:  
*  
- *   util_avg_cap = (1024 - cfs_rq->avg.util_avg) / 2^n  
+ *   util_avg_cap = (cpu_scale - cfs_rq->avg.util_avg) / 2^n  
*  
- * where n denotes the nth task.  
+ * where n denotes the nth task and cpu_scale the CPU capacity.  
*  
- * For example, a simplest series from the beginning would be like:  
+ * For example, a CPU with 1024 of capacity, a simplest series from  
+ * the beginning would be like:  
*  
- * task util_avg: 512, 256, 128, 64, 32, 16, 8, ...  
+ * task util_avg: 512, 256, 128, 64, 32, 16, 8, ...  
* cfs_rq util_avg: 512, 768, 896, 960, 992, 1008, 1016, ...
@@ -766,7 +795,8 @@
struct cfs_rq *cfs_rq = cfs_rq_of(se);
struct sched_avg *sa = &se->avg;
-long cap = (long)(SCHED_CAPACITY_SCALE - cfs_rq->avg.util_avg) / 2;
+long cpu_scale = arch_scale_cpu_capacity(NULL, cpu_of(rq_of(cfs_rq)));
+long cap = (long)(cpu_scale - cfs_rq->avg.util_avg) / 2;

if (cap > 0) {
if (cfs_rq->avg.util_avg != 0) {
@@ -2017,6 +2047,10 @@
if (p->last_task_numa_placement) {
    delta = runtime - p->last_sum_exec_runtime;
    *period = now - p->last_task_numa_placement;
    +
    +/* Avoid time going backwards, prevent potential divide error: */
    +if (unlikely((s64)*period < 0))
    +*period = 0;
    } else {
        delta = p->se.avg.load_sum;
        *period = LOAD_AVG_MAX;
@@ -2345,13 +2379,23 @@
return;
}

-void task_numa_free(struct task_struct *p)
+/*
+ * Get rid of NUMA statictics associated with a task (either current or dead).
+ * If @final is set, the task is dead and has reached refcount zero, so we can
+ * safely free all relevant data structures. Otherwise, there might be
+ * concurrent reads from places like load balancing and procfs, and we should
+ * reset the data back to default state without freeing ->numa_faults.
+ */
+void task_numa_free(struct task_struct *p, bool final)
{
    struct numa_group *grp = p->numa_group;
    -void *numa_faults = p->numa_faults;
    +unsigned long *numa_faults = p->numa_faults;
    unsigned long flags;
    int i;

    +if (!numa_faults)
        +return;
    +
    if (grp) {
        spin_lock_irqsave(&grp->lock, flags);
    for (i = 0; i < NR_NUMA_HINTFAULT_STATS * nr_node_ids; i++)
@@ -2364,8 +2408,14 @@
            put_numa_group(grp);
        spin_unlock_irqrestore(&grp->lock, flags);
    }
-p->numa_faults = NULL;
kfree(numa_faults);
+if (final) {
+p->numa_faults = NULL;
kfree(numa_faults);
+} else {
+p->total_numa_faults = 0;
+for (i = 0; i < NR_NUMA_HINT_FAULT_STATS * nr_node_ids; i++)
+numa_faults[i] = 0;
+
}
}

/**
@@ -2614,7 +2664,7 @@
@@ -2722,6 +2772,17 @@
WRITE_ONCE(*ptr, res);
} while (0)

+/*
+ * Remove and clamp on negative, from a local variable.
+ * A variant of sub_positive(), which does not use explicit load-store
+ * and is thus optimized for local variable updates.
+ */
+#define lsub_positive(_ptr, _val) do {
+typeof(_ptr) ptr = (_ptr);
+*ptr -= min_t(typeof(*ptr), *ptr, _val);
+} while (0)
+
#ifdef CONFIG_SMP
@@ -4150,7 +4211,7 @@
/*
 * XXX we want to get rid of these helpers and use the full load resolution.
@@ -4150,7 +4211,7 @@
 */
-if ((flags & (DEQUEUE_SAVE | DEQUEUE_MOVE)) == DEQUEUE_SAVE)
+if ((flags & (DEQUEUE_SAVE | DEQUEUE_MOVE)) != DEQUEUE_SAVE)
void __refill_cfs_bandwidth_runtime(struct cfs_bandwidth *cfs_b)
{
    u64 now;

    -if (cfs_b->quota == RUNTIME_INF)
        return;

    -now = sched_clock_cpu(smp_processor_id());
    -cfs_b->runtime = cfs_b->quota;
    -cfs_b->runtime_expires = now + ktime_to_ns(cfs_b->period);
    +if (cfs_b->quota != RUNTIME_INF)
        cfs_b->runtime = cfs_b->quota;
}

static inline struct cfs_bandwidth *tg_cfs_bandwidth(struct task_group *tg)
{
    struct task_group *tg = cfs_rq->tg;
    struct cfs_bandwidth *cfs_b = tg_cfs_bandwidth(tg);
    -u64 amount = 0, min_amount, expires;
    -cfs_b->idle = 0;
    }
-/*
- * we may have advanced our local expiration to account for allowed
- * spread between our sched_clock and the one on which runtime was
- * issued.
- */
-if ((s64)(expires - cfs_rq->runtime_expires) > 0)
cfs_rq->runtime_expires = expires;

return cfs_rq->runtime_remaining > 0;
}

-/*
- * Note: This depends on the synchronization provided by sched_clock and the
- * fact that rq->clock snapshots this value.
- */
-static void expire_cfs_rq_runtime(struct cfs_rq *cfs_rq)
{
-struct cfs_bandwidth *cfs_b = tg_cfs_bandwidth(cfs_rq->tg);

-/* if the deadline is ahead of our clock, nothing to do */
-if (likely((s64)(rq_clock(rq_of(cfs_rq)) - cfs_rq->runtime_expires) < 0))
-return;

-/* If the local deadline has passed we have to consider the
- * possibility that our sched_clock is 'fast' and the global deadline
- * has not truly expired.
- */
-/* Fortunately we can check determine whether this the case by checking
- * whether the global deadline has advanced. It is valid to compare
- * cfs_b->runtime_expires without any locks since we only care about
- * exact equality, so a partial write will still work.
- */
-
-if (cfs_rq->runtime_expires != cfs_b->runtime_expires) {
-/* extend local deadline, drift is bounded above by 2 ticks */
cfs_rq->runtime_expires += TICK_NSEC;
} else {
-/* global deadline is ahead, expiration has passed */
cfs_rq->runtime_remaining = 0;
}

static void __account_cfs_rq_runtime(struct cfs_rq *cfs_rq, u64 delta_exec)
{
dock delta_exec before expiring quota (as it could span periods) */
cfs_rq->runtime_remaining -= delta_exec;
expire_cfs_rq_runtime(cfs_rq);

if (likely(cfs_rq->runtime_remaining > 0))
return;

+if (cfs_rq->throttled)
+return;

/*
 * if we're unable to extend our runtime we resched so that the active
 * hierarchy can be throttled
@@ -4566,6 +4579,10 @@
 /* adjust cfs_rq_clock_task() */
cfs_rq->throttled_clock_task_time += rq_clock_task(rq) -
        cfs_rq->throttled_clock_task;
+
+/* Add cfs_rq with already running entity in the list */
+if (cfs_rq->nr_running >= 1)
+list_add_leaf_cfs_rq(cfs_rq);
}

return 0;
@@ -4577,8 +4594,10 @@
struct cfs_rq *cfs_rq = tg->cfs_rq[cpu_of(rq)];

/* group is entering throttled state, stop time */
- if (!cfs_rq->throttle_count)
+ if (!cfs_rq->throttle_count) {
    cfs_rq->throttled_clock_task = rq_clock_task(rq);
    +list_del_leaf_cfs_rq(cfs_rq);
+}
    cfs_rq->throttle_count++;

return 0;
@@ -4624,9 +4643,13 @@
/*
 * Add to the _head_ of the list, so that an already-started
 * distribute_cfs_runtime will not see us
 * distribute_cfs_runtime will not see us. If distribute_cfs_runtime is
 * not running add to the tail so that later runqueues don't get starved.
 */
-list_add_rcu(&cfs_rq->throttled_list, &cfs_b->throttled_cfs_rq);
+if (cfs_b->distribute_running)
+list_add_rcu(&cfs_rq->throttled_list, &cfs_b->throttled_cfs_rq);
+else
+list_add_tail_rcu(&cfs_rq->throttled_list, &cfs_b->throttled_cfs_rq);
/* 
 * If we're the first throttled task, make sure the bandwidth 
 * @ @ -4677,6 +4700,8 @@
 * break;
 */

+assert_list_leaf_cfs_rq(rq);
+
+if (!se)
+add_nr_running(rq, task_delta);

@@ -4685,8 +4710,7 @@
+resched_curr(rq);

static u64 distribute_cfs_runtime(struct cfs_bandwidth *cfs_b, u64 remaining)
{
struct cfs_rq *cfs_rq;
+u64 runtime;
@@ -4702,13 +4726,15 @@
+/* By the above check, this should never be true */
+SCHED_WARN_ON(cfs_rq->runtime_remaining > 0);
+
+runtime = -cfs_rq->runtime_remaining + 1;
+if (runtime > remaining)
+runtime = remaining;
+remaining -= runtime;
+
+ cfs_rq->runtime_remaining += runtime;
+-cfs_rq->runtime_expires = expires;

/* we check whether we're throttled above */
if (cfs_rq->runtime_remaining > 0)
@@ -4733,7 +4759,7 @@
*/
static int do_sched_cfs_period_timer(struct cfs_bandwidth *cfs_b, int overrun)
{
-u64 runtime, runtime_expires;
+u64 runtime;
 int throttled;

/* no need to continue the timer with no bandwidth constraint */
account preceding periods in which throttling occurred */
cfs_b->nr_throttled += overrun;

runtime_expires = cfs_b->runtime_expires;
-
/*
 * This check is repeated as we are holding onto the new bandwidth while
 * we unthrottle. This can potentially race with an unthrottled group
 *
 * in us over-using our runtime if it is all used during this loop, but
 * only by limited amounts in that extreme case.
 */
while (throttled && cfs_b->runtime > 0) {
while (throttled && cfs_b->runtime > 0 && !cfs_b->distribute_running) {
runtime = cfs_b->runtime;
runtime = distribute_cfs_runtime(cfs_b, runtime);
raw_spin_unlock(&cfs_b->lock);
/* we can't nest cfs_b->lock while distributing bandwidth */
while (throttled && cfs_b->runtime > 0 && !cfs_b->distribute_running) {
runtime = cfs_b->runtime; runtime -= min(runtime, cfs_b->runtime);
raw_spin_unlock(&cfs_b->lock);
}
-while (throttled && cfs_b->runtime > 0) {
while (throttled && cfs_b->runtime > 0 && !cfs_b->distribute_running) {
runtime = cfs_b->runtime;
runtime = distribute_cfs_runtime(cfs_b, runtime);
throttled = !list_empty(&cfs_b->throttled_cfs_rq);
}
/*
static int runtime_refresh_within(struct cfs_bandwidth *cfs_b, u64 min_expire)
{
struct hrtimer *refresh_timer = &cfs_b->period_timer;
-u64 remaining;
+s64 remaining;

/* if the call-back is running a quota refresh is already occurring */
if (hrtimer_callback_running(refresh_timer))

/* is a quota refresh about to occur? */
remaining = ktime_to_ns(hrtimer_expires_remaining(refresh_timer));
-remaining < min_expire)
+if (remaining < (s64)min_expire)
return 1;
}
return 0;
@@ -4851,8 +4876,7 @@
 return;

 raw_spin_lock(&cfs_b->lock);
- if (cfs_b->quota != RUNTIME_INF &&
-     cfs_rq->runtime_expires == cfs_b->runtime_expires) {
+ if (cfs_b->quota != RUNTIME_INF) {
    cfs_b->runtime += slack_runtime;

    /* we are under rq->lock, defer unthrottling using a timer */
@@ -4884,10 +4908,14 @@
 static void do_sched_cfs_slack_timer(struct cfs_bandwidth *cfs_b)
 {
     u64 runtime = 0, slice = sched_cfs_bandwidth_slice();
-     u64 expires;
+     if (runtime)
+         cfs_b->distribute_running = 1;
+     raw_spin_unlock(&cfs_b->lock);
+     return;
+ }
+ if (runtime_refresh_within(cfs_b, min_bandwidth_expiration)) {
     raw_spin_unlock(&cfs_b->lock);
     return;
@@ -4896,17 +4924,19 @@
     if (cfs_b->quota != RUNTIME_INF && cfs_b->runtime > slice)
         runtime = cfs_b->runtime;
-     expires = cfs_b->runtime_expires;
+     if (runtime)
+         cfs_b->distribute_running = 1;
     +
     raw_spin_unlock(&cfs_b->lock);

     if (!runtime)
         return;

-     runtime = distribute_cfs_runtime(cfs_b, runtime, expires);
+     runtime = distribute_cfs_runtime(cfs_b, runtime);

     raw_spin_lock(&cfs_b->lock);
-     if (expires == cfs_b->runtime_expires)
-         cfs_b->runtime -= min(runtime, cfs_b->runtime);
+     lsub_positive(&cfs_b->runtime, runtime);
+cfs_b->distribute_running = 0;
raw_spin_unlock(&cfs_b->lock);
}

@@ -4981,12 +5011,15 @@
return HRTIMER_NORESTART;
}

+extern const u64 max_cfs_quota_period;
+
static enum hrtimer_restart sched_cfs_period_timer(struct hrtimer *timer)
{
struct cfs_bandwidth *cfs_b =
container_of(timer, struct cfs_bandwidth, period_timer);
int overrun;
int idle = 0;
+int count = 0;

raw_spin_lock(&cfs_b->lock);
for (;;) {
@@ -4994,6 +5027,36 @@
if (!overrun)
break;

+if (++count > 3) {
+u64 new, old = ktime_to_ns(cfs_b->period);
+
+/*
+ * Grow period by a factor of 2 to avoid losing precision.
+ * Precision loss in the quota/period ratio can cause __cfs_schedulable
+ * to fail.
+ */
+new = old * 2;
+if (new < max_cfs_quota_period) {
+cfs_b->period = ns_to_ktime(new);
+cfs_b->quota *= 2;
+
+pr_warn_ratelimited(
+"cfs_period_timer[cpu%d]: period too short, scaling up (new cfs_period_us = %lld, cfs_quota_us = %lld)\n",
+smp_processor_id(),
+div_u64(new, NSEC_PER_USEC),
+div_u64(cfs_b->quota, NSEC_PER_USEC));
+} else {
+pr_warn_ratelimited(
+"cfs_period_timer[cpu%d]: period too short, but cannot scale up without losing precision (cfs_period_us = %lld, cfs_quota_us = %lld)\n",
+smp_processor_id(),
+div_u64(old, NSEC_PER_USEC),

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+div_u64(cfs_b->quota, NSEC_PER_USEC));
+
+/* reset count so we don't come right back in here */
+count = 0;
+
+idle = do_sched_cfs_period_timer(cfs_b, overrun);
+
#if (idle)
@@ -5015,6 +5078,7 @@
cfs_b->period_timer.function = sched_cfs_period_timer;
hrtimer_init(&cfs_b->slack_timer, CLOCK_MONOTONIC, HRTIMER_MODE_REL);
cfs_b->slack_timer.function = sched_cfs_slack_timer;
+cfs_b->distribute_running = 0;
#

static void init_cfs_rq_runtime(struct cfs_rq *cfs_rq)
@@ -5102,6 +5166,12 @@
}

#else /* CONFIG_CFS_BANDWIDTH */
+
+static inline bool cfs_bandwidth_used(void)
+{
+ return false;
+}
+
+static inline u64 cfs_rq_clock_task(struct cfs_rq *cfs_rq)
+{
+ return rq_clock_task(rq_of(cfs_rq));
@@ -5249,6 +5319,23 @@
if (!se)
 add_nr_running(rq, 1);
+
+if (cfs_bandwidth_used()) {
+/*
+ * When bandwidth control is enabled; the cfs_rq_throttled()
+ * breaks in the above iteration can result in incomplete
+ * leaf list maintenance, resulting in triggering the assertion
+ * below.
+ */
+ for_each_sched_entity(se) {
+ cfs_rq = cfs_rq_of(se);
+ +
+ if (list_add_leaf_cfs_rq(cfs_rq))
+ break;
+ }
assert_list_leaf_cfs_rq(rq);
+
+hrtick_update(rq);
}

#ifdef CONFIG_SCHED_SMT
+DEFINE_STATIC_KEY_FALSE(sched_smt_present);
+EXPORT_SYMBOL_GPL(sched_smt_present);

static inline void set_idle_cores(int cpu, int val)
{
    
/*
static int select_idle_cpu(struct task_struct *p, struct sched_domain *sd, int target)
{
+struct cpumask *cpus = this_cpu_cpumask_var_ptr(select_idle_mask);
struct sched_domain *this_sd;
u64 avg_cost, avg_idle;
u64 time, cost;
@@ -6168,11 +6258,11 @@

time = local_clock();

-foreach_cpu_wrap(cpu, sched_domain_span(sd), target) {
+cpumask_and(cpus, sched_domain_span(sd), &p->cpus_allowed);
+    +foreach_cpu_wrap(cpu, cpus, target) {
+        if (!--nr)
+            return -1;
+        -if (!cpumask_test_cpu(cpu, &p->cpus_allowed))
+            continue;
+        if (idle_cpu(cpu))
+            break;
+    }
+    if (!can_migrate_task(p, env))
+        goto next;
+
-    load = task_h_load(p);
+    /*
+     * Depending of the number of CPUs and tasks and the
cgroup hierarchy, task_h_load() can return a null
+     * value. Make sure that env->imbalance decreases
* otherwise detach_tasks() will stop only after
detaching up to loop_max tasks.
+ */
+load = max_t(unsigned long, task_h_load(p), 1);
+
if (sched_feat(LB_MIN) && load < 16 && !env->sd->nr_balance_failed)
goto next;
@@ -7360,24 +7458,20 @@
 for_each_leaf_cfs_rq_safe(rq, cfs_rq, pos) {
 struct sched_entity *se;

-/* throttled entities do not contribute to load */
-if (throttled_hierarchy(cfs_rq))
-continue;
-
-if (update_cfs_rq_load_avg(cfs_rq_clock_task(cfs_rq), cfs_rq))
 update_rg_load_avg(cfs_rq, 0);

-/* Propagate pending load changes to the parent, if any: */
-se = cfs_rq->tg->se[cpu];
-if (se && !skip_blocked_update(se))
-update_load_avg(cfs_rq_of(se), se, 0);
-
 /*
 * There can be a lot of idle CPU cgroups. Don't let fully
 * decayed cfs_rq's linger on the list.
 */
-if (cfs_rq_is_decayed(cfs_rq))
 list_del_leaf_cfs_rq(cfs_rq);
+
+/* Propagate pending load changes to the parent, if any: */
+se = cfs_rq->tg->se[cpu];
+if (se && !skip_blocked_update(se))
+update_load_avg(cfs_rq_of(se), se, UPDATE_TG);
 }
 rq_unlock_irqrestore(rq, &rf);
}@@ -7397,10 +7491,10 @@
 if (cfs_rq->last_h_load_update == now)
 return;

-cfs_rq->h_load_next = NULL;
+WRITE_ONCE(cfs_rq->h_load_next, NULL);
for_each_sched_entity(se) {
 cfs_rq = cfs_rq_of(se);
-cfs_rq->h_load_next = se;
+WRITE_ONCE(cfs_rq->h_load_next, se);
if (cfs_rq->last_h_load_update == now)
break;
}
@@ -7410,7 +7504,7 @@
cfs_rq->last_h_load_update = now;
}

while ((se = cfs_rq->h_load_next) != NULL) {
load = cfs_rq->h_load;
load = div64_u32(load * se->avg.load_avg,
cfs_rq_load_avg(cfs_rq) + 1);
@@ -8691,9 +8785,10 @@
out_balanced:
/*
 * We reach balance although we may have faced some affinity
- * constraints. Clear the imbalance flag if it was set.
+ * constraints. Clear the imbalance flag only if other tasks got
+ * a chance to move and fix the imbalance.
*/
-if (sd_parent) {
+if (sd_parent && !(env.flags & LBF_ALL_PINNED)) {
int *group_imbalance = &sd_parent->groups->sgc->imbalance;

if (*group_imbalance)
@@ -8711,13 +8806,22 @@
sd->nr_balance_failed = 0;

out_one_pinned:
+ld_moved = 0;
+
+/*
+ * idle_balance() disregards balance intervals, so we could repeatedly
+ * reach this code, which would lead to balance_interval skyrocketting
+ * in a short amount of time. Skip the balance_interval increase logic
+ * to avoid that.
+ */
+if (env.idle == CPU_NEWLY_IDLE)
+goto out;
+
+ /* tune up the balancing interval */
if (((env.flags & LBF_ALL_PINNED) &&
sd->balance_interval < MAX_PINNED_INTERVAL) ||
(sd->balance_interval < sd->max_interval))
sd->balance_interval *= 2;
-
-ld_moved = 0;
out:
return ld Moved;
}
@@ -8966,6 +9070,8 @@

 * - When one of the busy CPUs notice that there may be an idle rebalancing
 * needed, they will kick the idle load balancer, which then does idle
 * load balancing for all the idle CPUs.
+ * - HK_FLAG_MISC CPUs are used for this task, because HK_FLAG_SCHED not set
+ * anywhere yet.
 */
static struct {
  cpumask_var_t idle_cpus_mask;
@@ -8975,18 +9081,20 @@
static inline int find_new_ilb(void)
{
  int ilb = cpumask_first(nohz.idle_cpus_mask);
+int ilb;

  -if (ilb < nr_cpu_ids && idle_cpu(ilb))
  -return ilb;
+for_each_cpu_and(ilb, nohz.idle_cpus_mask,
+     housekeeping_cpumask(HK_FLAG_MISC)) {
+  if (idle_cpu(ilb))
+    return ilb;
+}

  return nr_cpu_ids;
}

/ *
- * Kick a CPU to do the nohz balancing, if it is time for it. We pick the
- * nohz_load_balancer CPU (if there is one) otherwise fallback to any idle
- * CPU (if there is one).
+ * Kick a CPU to do the nohz balancing, if it is time for it. We pick any
+ * idle CPU in the HK_FLAG_MISC housekeeping set (if there is one).
 */
static void nohz_balancer_kick(void)
{
@@ -9513,7 +9621,8 @@

- A task which has been woken up by try_to_wake_up() and
- waiting for actually being woken up by sched_ttwu_pending().
 */
-if (!se->sum_exec_runtime || p->state == TASK_WAKING)
+if (!se->sum_exec_runtime ||
+    (p->state == TASK_WAKING && p->sched_remote_wakeup))
  return true;

  return false;
struct cfs_rq *cfs_rq;

+list_add_leaf_cfs_rq(cfs_rq_of(se));
+
/* Start to propagate at parent */
se = se->parent;

for_each_sched_entity(se) {
  cfs_rq = cfs_rq_of(se);

- if (cfs_rq_throttled(cfs_rq))
- break;
+ if (!cfs_rq_throttled(cfs_rq)) {
+ update_load_avg(cfs_rq, se, UPDATE_TG);
+ list_add_leaf_cfs_rq(cfs_rq);
+ continue;
+ }

- update_load_avg(cfs_rq, se, UPDATE_TG);
+ if (list_add_leaf_cfs_rq(cfs_rq))
+ break;
}
}
#else
@@ -9749,18 +9864,18 @@
void online_fair_sched_group(struct task_group *tg)
{
  struct sched_entity *se;
+ struct rq_flags rf;
  struct rq *rq;
  int i;

  for_each_possible_cpu(i) {
    rq = cpu_rq(i);
    se = tg->se[i];
    - raw_spin_lock_irq(&rq->lock);
+ rq_lock_irq(rq, &rf);
    update_rq_clock(rq);
    attach_entity_cfs_rq(se);
    sync_throttle(tg, i);
    - raw_spin_unlock_irq(&rq->lock);
+ rq_unlock_irq(rq, &rf);
  }
}
raw_spin_lock(&rt_rq->rt_runtime_lock);
+if (!sched_feat(RT_RUNTIME_SHARE) && rt_rq->rt_runtime != RUNTIME_INF)
+rt_rq->rt_runtime = rt_b->rt_runtime;
skip = !rt_rq->rt_time && !rt_rq->rt_nr_running;
raw_spin_unlock(&rt_rq->rt_runtime_lock);
if (skip) continue;

raw_spin_lock(&rq->lock);
+update_rq_clock(rq);
+
if (rt_rq->rt_time) {
64 runtime;

if (rq->rd->rto_cpu < 0)
-cpu = rto_next_cpu(rq);
+cpu = rto_next_cpu(rq->rd);
raw_spin_unlock(&rq->rd->rto_lock);

rto_start_unlock(&rq->rd->rto_loop_start);
-if (cpu >= 0)
+if (cpu >= 0) {
+/* Make sure the rd does not get freed while pushing */
+sched_get_rd(rq->rd);
+irq_work_queue_on(&rq->rd->rto_push_work, cpu);
+}
}
/* Called from hardirq context */
void rto_push_irq_work_func(struct irq_work *work)
{
+struct root_domain *rd =
+container_of(work, struct root_domain, rto_push_work);
struct rq *rq;
int cpu;

raw_spin_unlock(&rq->lock);
}
@@ -2013,18 +2021,20 @@
raw_spin_unlock(&rq->lock);
}
raw_spin_lock(&rq->rd->rto_lock);
+raw_spin_lock(&rd->rto_lock);

/* Pass the IPI to the next rt overloaded queue */
-cpu = rto_next_cpu(rq);
+cpu = rto_next_cpu(rd);

-raw_spin_unlock(&rq->rd->rto_lock);
+raw_spin_unlock(&rd->rto_lock);

-raw_spin_lock(&rq->rd->rto_lock);
+raw_spin_lock(&rd->rto_lock);

-if (cpu < 0)
+if (cpu < 0) {
+sched_put_rd(rd);
return;
+}

/* Try the next RT overloaded CPU */
-irq_work_queue_on(&rq->rd->rto_push_work, cpu);
+irq_work_queue_on(&rd->rto_push_work, cpu);
}
#endif /* HAVE_RT_PUSH_IPI */

@@ -2212,7 +2222,7 @@
if (p->nr_cpu_allowed > 1 && rq->rt.overloaded)
queue_push_tasks(rq);
#endif /* CONFIG_SMP */
-if (p->prio < rq->curr->prio)
+if (p->prio < rq->curr->prio && cpu_online(cpu_of(rq)))
resched_curr(rq);
}
}
@@ -2523,6 +2533,8 @@
rt_runtime = (u64)rt_runtime_us * NSEC_PER_USEC;
if (rt_runtime_us < 0)
rt_runtime = RUNTIME_INF;

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+else if ((u64)rt_runtime_us > U64_MAX / NSEC_PER_USEC)
  +return -EINVAL;

return tg_set_rt_bandwidth(tg, rt_period, rt_runtime);
}
@@ -2543,6 +2555,9 @@
{
  u64 rt_runtime, rt_period;

  +if (rt_period_us > U64_MAX / NSEC_PER_USEC)
  +return -EINVAL;
  +
  rt_period = rt_period_us * NSEC_PER_USEC;
  rt_runtime = tg->rt_bandwidth.rt_runtime;

  @@ -2681,8 +2696,6 @@
}

#ifdef CONFIG_SCHED_DEBUG
-extern void print_rt_rq(struct seq_file *m, int cpu, struct rt_rq *rt_rq);
- void print_rt_stats(struct seq_file *m, int cpu)
{
  rt_rq_iter_t iter;
  --- linux-4.15.0.orig/kernel/sched/sched-pelt.h
  +++ linux-4.15.0/kernel/sched/sched-pelt.h
 @@ -1,7 +1,7 @@
  /* SPDX-License-Identifier: GPL-2.0 */
  /* Generated by Documentation/scheduler/sched-pelt; do not modify. */

  -static const u32 runnable_avg_yN_inv[] = {
  +static const u32 runnable_avg_yN_inv[] __maybe_unused = {
    0xffffffff, 0xfa83b2da, 0xf5257d14, 0xefe4b99a, 0xeac0c6e6, 0xe5b906e6,
    0xe0ccdeeb, 0xdbfbb796, 0xd744fcc9, 0xd2a81d91, 0xcce248c14, 0xc9b9bd85,
    0xc5672a10, 0xc12c4cc9, 0xbd08a39e, 0xb8fbaf46, 0xb504f333, 0xb123f581,
  --- linux-4.15.0.orig/kernel/sched/sched.h
  +++ linux-4.15.0/kernel/sched/sched.h
 @@ -88,7 +89,13 @@
  #include <linux/sched/task_stack.h>
  #include <linux/sched/cputime.h>
  #include <linux/sched/init.h>
  +#include <linux/sched/smt.h>

  #include <linux/u64_stats_sync.h>
  #include <linux/kernel_stat.h>
  @@ -88,7 +89,13 @@
  #ifdef CONFIG_64BIT
    # define NICE_0_LOAD_SHIFT(SCHED_FIXEDPOINT_SHIFT + SCHED_FIXEDPOINT_SHIFT)
# define scale_load(w) ((w) << SCHED_FIXEDPOINT_SHIFT)
-# define scale_load_down(w) ((w) >> SCHED_FIXEDPOINT_SHIFT)
+# define scale_load_down(w)  
+{(  
+unsigned long __w = (w);  
+if (__w)  
+_w = max(2UL, __w >> SCHED_FIXEDPOINT_SHIFT);  
+_w;  
+)}  
#else  
# define NICE_0_LOAD_SHIFT (SCHED_FIXEDPOINT_SHIFT)  
# define scale_load(w) (w)  
@@ -184,30 +191,6 @@

void __dl_clear_params(struct task_struct *p);

-/*  
-* To keep the bandwidth of -deadline tasks and groups under control  
-* we need some place where:  
-* - store the maximum -deadline bandwidth of the system (the group);  
-* - cache the fraction of that bandwidth that is currently allocated.  
-*  
-* This is all done in the data structure below. It is similar to the  
-* one used for RT-throttling (rt_bandwidth), with the main difference  
-* that, since here we are only interested in admission control, we  
-* do not decrease any runtime while the group "executes", neither we  
-* need a timer to replenish it.  
-*  
-* With respect to SMP, the bandwidth is given on a per-CPU basis,  
-* meaning that:  
-* - dl_bw (< 100%) is the bandwidth of the system (group) on each CPU;  
-* - dl_total_bw array contains, in the i-eth element, the currently  
-* allocated bandwidth on the i-eth CPU.  
-* Moreover, groups consume bandwidth on each CPU, while tasks only  
-* consume bandwidth on the CPU they're running on.  
-* Finally, dl_total_bw_cpu is used to cache the index of dl_total_bw  
-* that will be shown the next time the proc or cgroup controls will  
-* be red. It on its turn can be changed by writing on its own  
-* control.  
-* */

struct dl_bandwidth {  
raw_spinlock_t dl_runtime_lock;  
u64 dl_runtime;  
@@ -219,6 +202,24 @@
return sysctl_sched_rt_runtime >= 0;  
}

+/*
To keep the bandwidth of -deadline tasks under control
we need some place where:
- store the maximum -deadline bandwidth of each cpu;
- cache the fraction of bandwidth that is currently allocated in
each root domain;

This is all done in the data structure below. It is similar to the
one used for RT-throttling (rt_bandwidth), with the main difference
that, since here we are only interested in admission control, we
do not decrease any runtime while the group "executes", neither we
need a timer to replenish it.

With respect to SMP, bandwidth is given on a per root domain basis,
meaning that:
- bw (< 100%) is the deadline bandwidth of each CPU;
- total_bw is the currently allocated bandwidth in each root domain;

```
struct dl_bw {
    raw_spinlock_t lock;
    u64 bw, total_bw;
    ktime_t period;
    u64 quota, runtime;
    s64 hierarchical_quota;
    u64 runtime_expires;
    int idle, period_active;
    short idle;
    short period_active;
    struct hrtimer period_timer, slack_timer;
    struct list_head throttled_cfs_rq;

    /* statistics */
    int nr_periods, nr_throttled;
    u64 throttled_time;
    bool distribute_running;
}
```

#ifdef CONFIG_CFS_BANDWIDTH
int runtime_enabled;
-u64 runtime_expires;
s64 runtime_remaining;

u64 throttled_clock, throttled_clock_task;
```
extern void init_defrootdomain(void);
extern int sched_init_domains(const struct cpumask *cpu_map);
extern void rq_attach_root(struct rq *rq, struct root_domain *rd);
+extern void sched_get_rd(struct root_domain *rd);
+extern void sched_put_rd(struct root_domain *rd);

#ifdef HAVE_RT_PUSH_IPI
extern void rto_push_irq_work_func(struct irq_work *work);
#endif

#ifdef CONFIG_SCHED_SMT
-extern struct static_key_false sched_smt_present;
-extern void __update_idle_core(struct rq *rq);

static inline void update_idle_core(struct rq *rq)
@@ -1215,9 +1216,9 @@
       smp_wmb();
   #ifdef CONFIG_THREAD_INFO_IN_TASK
       -p->cpu = cpu;
-       +WRITE_ONCE(p->cpu, cpu);
-       #else
-       -task_thread_info(p)->cpu = cpu;
-       +WRITE_ONCE(task_thread_info(p)->cpu, cpu);
-       #endif
+       p->wake_cpu = cpu;
+       #endif
@@ -1277,7 +1278,7 @@
      0;
  #undef SCHED_FEAT

-#define sched_feat(x) (sysctl_sched_features & (1UL << __SCHED_FEAT_##x))
+define sched_feat(x) !!((sysctl_sched_features & (1UL << __SCHED_FEAT_##x))

  #endif /* SCHED_DEBUG && HAVE_JUMP_LABEL */
@@ -1318,7 +1319,7 @@

static inline int task_on_rq_migrating(struct task_struct *p)
{
    -return p->on_rq == TASK_ON_RQ_MIGRATING;
+return READ_ONCE(p->on_rq) == TASK_ON_RQ_MIGRATING;
}
#ifndef prepare_arch_switch
@@ -1992,8 +1993,9 @@
extern void print_cfs_stats(struct seq_file *m, int cpu);
extern void print_rt_stats(struct seq_file *m, int cpu);
extern void print_dll_stats(struct seq_file *m, int cpu);
-extern void -print_cfs_rq(struct seq_file *m, int cpu, struct cfs_rq *cfs_rq);
+extern void print_cfs_rq(struct seq_file *m, int cpu, struct cfs_rq *cfs_rq);
+extern void print_rt_rq(struct seq_file *m, int cpu, struct rt_rq *rt_rq);
+extern void print_dll_rq(struct seq_file *m, int cpu, struct dl_rq *dl_rq);
#ifdef CONFIG_NUMA_BALANCING
extern void show_numa_stats(struct task_struct *p, struct seq_file *m);
--- linux-4.15.0.orig/kernel/sched/topology.c
+++ linux-4.15.0/kernel/sched/topology.c
@@ -259,6 +259,19 @@
call_rcu_sched(&old_rd->rcu, free_rootdomain);
 }
+void sched_get_rd(struct root_domain *rd)
+{
+ atomic_inc(&rd->refcount);
+ }
+void sched_put_rd(struct root_domain *rd)
+{
+ if (!atomic_dec_and_test(&rd->refcount))
+ return;
+ call_rcu_sched(&rd->rcu, free_rootdomain);
+ }
+static int init_rootdomain(struct root_domain *rd)
+ {
+ if (!zalloc_cpumask_var(&rd->span, GFP_KERNEL))
@@ -472,7 +485,7 @@
 struct s_data {
-struct sched_domain **__percpu sd;
+struct sched_domain *__percpu *sd;
 struct root_domain*rd;
 }; 
@@ -1090,7 +1103,7 @@
sd_flags = (*tl->sd_flags);
 if (WARN_ONCE(sd_flags & ~TOPOLOGY_SD_FLAGS,
 "wrong sd_flags in topology description\n"))
-sd_flags &= ~TOPOLOGY_SD_FLAGS;
+sd_flags &= TOPOLOGY_SD_FLAGS;

*sd = (struct sched_domain){
  .min_interval= sd_weight,
@@ -1287,7 +1300,7 @@
  n = sched_max_numa_distance;

  -if (sched_domains_numa_levels <= 1) {
  +if (sched_domains_numa_levels <= 2) {
      sched_numa_topology_type = NUMA_DIRECT;
      return;
    }
@@ -1321,7 +1334,7 @@
  int level = 0;
  int i, j, k;

  -sched_domains_numa_distance = kzalloc(sizeof(int) * nr_node_ids, GFP_KERNEL);
  +sched_domains_numa_distance = kzalloc(sizeof(int) * (nr_node_ids + 1), GFP_KERNEL);
  if (!sched_domains_numa_distance)
    return;
  @@ -1372,9 +1385,6 @@
    break;
  }

  -if (!level)
  -return;
  -
  /*
* 'level' contains the number of unique distances
* --- linux-4.15.0.orig/kernel/sched/wait.c
+++ linux-4.15.0/kernel/sched/wait.c
@@ -395,35 +395,36 @@
    if (condition)
    *      break;
    *
-    *    p->state = mode;condition = true;
-    *    smp_mb(); // Asmp_wmb(); // C
-    *    if (!wq_entry->flags & WQ_FLAG_WOKEN)wq_entry->flags |= WQ_FLAG_WOKEN;
-    *    schedule()try_to_wake_up();
-    *    p->state = TASK_RUNNING; ~~~~~~~~~~~~~~~~~~~
-    *    wq_entry->flags &= ~WQ_FLAG_WOKEN;condition = true;
-    *    smp_mb() / Bsmmp_wmb(); // C
-    *    wq_entry->flags |= WQ_FLAG_WOKEN;
-    * }
- * remove_wait_queue(&wq_head, &wait);
+ * // in wait_woken() // in woken_wake_function()
    *
    + * p->state = mode; wq_entry->flags |= WQ_FLAG_WOKEN;
    + * smp_mb(); // Atry_to_wake_up();
    + * if (!((wq_entry->flags & WQ_FLAG_WOKEN))) <full barrier>
        + * schedule(); if (p->state & mode)
        + * p->state = TASK_RUNNING; p->state = TASK_RUNNING;
        + * wq_entry->flags &= ~WQ_FLAG_WOKEN; ~~~~~~~~~~~~~
        + * smp_mb(); // Bcondition = true;
        + * } smp_mb(); // C
    + * remove_wait_queue(&wq_head, &wait); wq_entry->flags |= WQ_FLAG_WOKEN;
*/

long wait_woken(struct wait_queue_entry *wq_entry, unsigned mode, long timeout)
{
    -set_current_state(mode); /* A */
/*
- * The above implies an smp_mb(), which matches with the smp_wmb() from
- * woken_wake_function() such that if we observe WQ_FLAG_WOKEN we must
- * also observe all state before the wakeup.
+ * The below executes an smp_mb(), which matches with the full barrier
+ * executed by the try_to_wake_up() in woken_wake_function() such that
+ * either we see the store to wq_entry->flags in woken_wake_function()
+ * or woken_wake_function() sees our store to current->state.
*/
+set_current_state(mode); /* A */
if (!(wq_entry->flags & WQ_FLAG_WOKEN) && !is_kthread_should_stop())
timeout = schedule_timeout(timeout);
__set_current_state(TASK_RUNNING);
/*
- * The below implies an smp_mb(), it too pairs with the smp_wmb() from
- * woken_wake_function() such that we must either observe the wait
- * condition being true _OR_ WQ_FLAG_WOKEN such that we will not miss
- * an event.
+ * The below executes an smp_mb(), which matches with the smp_mb() (C)
+ * in woken_wake_function() such that either we see the wait condition
+ * being true or the store to wq_entry->flags in woken_wake_function()
+ * follows ours in the coherence order.
*/
smp_store_mb(wq_entry->flags, wq_entry->flags & ~WQ_FLAG_WOKEN); /* B */

@@ -433,14 +434,8 @@

int woken_wake_function(struct wait_queue_entry *wq_entry, unsigned mode, int sync, void *key)
{
-/*
- * Although this function is called under waitqueue lock, LOCK

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- * doesn't imply write barrier and the users expects write
- * barrier semantics on wakeup functions. The following
- * smp_wmb() is equivalent to smp_wmb() in try_to_wake_up()
- * and is paired with smp_store_mb() in wait_woken().
- */
-smp_wmb(); /* C */
+/* Pairs with the smp_store_mb() in wait_woken. */
+smp_mb(); /* C */

wq_entry->flags |= WQ_FLAG_WOKEN;

return default_wake_function(wq_entry, mode, sync, key);
--- linux-4.15.0.orig/kernel/seccomp.c
+++ linux-4.15.0/kernel/seccomp.c
@@ -19,6 +19,8 @@
#include <linux/compat.h>
#include <linux/coredump.h>
#include <linux/kmemleak.h>
+#include <linux/nospec.h>
+#include <linux/prctl.h>
#include <linux/sched.h>
#include <linux/sched/task_stack.h>
#include <linux/seccomp.h>
@@ -34,7 +36,7 @@
#include <linux/filter.h>
#include <linux/pid.h>
-include <linux/security.h>
+include <linux/capability.h>
#include <linux/tracehook.h>
#include <linux/uaccess.h>

@@ -227,8 +229,11 @@
return true;
 }

+void __weak arch_seccomp_spec_mitigate(struct task_struct *task) { }
+
static inline void seccomp_assign_mode(struct task_struct *
-unsigned long seccomp_mode)
+unsigned long seccomp_mode,
+unsigned long flags)
{
assert_spin_locked(&task->sighand->siglock);

@@ -238,6 +243,9 @@
+* filter) is set.
+*/
+smp_mb__before_atomic();
/* Assume default seccomp processes want spec flaw mitigation. */
+if ((flags & SECCOMP_FILTER_FLAG_SPEC_ALLOW) == 0)
+arch_seccomp_spec_mitigate(task);
set_tsk_thread_flag(task, TIF_SECCOMP);
}

@@ -305,7 +313,7 @@
 * without dropping the locks.
 *
 */
-static inline void seccomp_sync_threads(void)
+static inline void seccomp_sync_threads(unsigned long flags)
{
    struct task_struct *thread, *caller;

@@ -346,7 +354,8 @@
 * allow one thread to transition the other.
 */
    if (thread->seccomp.mode == SECCOMP_MODE_DISABLED)
-    seccomp_assign_mode(thread, SECCOMP_MODE_FILTER);
+    seccomp_assign_mode(thread, SECCOMP_MODE_FILTER,
+        flags);
    }
}

@@ -374,8 +383,7 @@
 /* behavior of privileged children. */
 */
    if (!task_no_new_privs(current) &&
-    security_capable_noaudit(current_cred(), current_user_ns(),
-    CAP_SYS_ADMIN) != 0)
+    !ns_capable_noaudit(current_user_ns(), CAP_SYS_ADMIN))
    return ERR_PTR(-EACCES);

    /* Allocate a new seccomp_filter */
@@ -469,7 +477,7 @@
    /* Now that the new filter is in place, synchronize to all threads. */
    if (flags & SECCOMP_FILTER_FLAG_TSYNC)
        seccomp_sync_threads();
+    seccomp_sync_threads(flags);

    return 0;
}
@@ -766,6 +774,8 @@
    const bool recheck_after_trace)
{
    BUG();

Open Source Used In 5GaaS Edge AC-4 32929
+return -1;
}
#endif

@@ -818,7 +828,7 @@
#ifdef TIF_NOTSC
disable_TSC();
#endif
-seccomp_assign_mode(current, seccomp_mode);
+seccomp_assign_mode(current, seccomp_mode, 0);
ret = 0;

out:
@@ -876,7 +886,7 @@
/* Do not free the successfully attached filter. */
prepared = NULL;
-seccomp_assign_mode(current, seccomp_mode);
+seccomp_assign_mode(current, seccomp_mode, flags);
out:
spin_unlock_irq(&current->sighand->siglock);
if (flags & SECCOMP_FILTER_FLAG_TSYNC)
--- linux-4.15.0.orig/kernel/signal.c
+++ linux-4.15.0/kernel/signal.c
@@ -77,10 +77,19 @@
handler = sig_handler(t, sig);

+/* SIGKILL and SIGSTOP may not be sent to the global init */
+if (unlikely(is_global_init(t) & sig_kernel_only(sig)))
+return true;
+if (unlikely(t->signal->flags & SIGNAL_UNKILLABLE) &&
+ handler == SIG_DFL && !(force && sig_kernel_only(sig)))
return 1;

+/* Only allow kernel generated signals to this kthread */
+if (unlikely((t->flags & PF_KTHREAD) &&
+ (handler == SIG_KTHREAD_KERNEL) && !force))
+return true;
+
return sig_handler_ignored(handler, sig);
}

@@ -370,27 +379,32 @@
{
struct sigqueue *q = NULL;

+return -1;
}
#endif

@@ -818,7 +828,7 @@
#ifdef TIF_NOTSC
disable_TSC();
#endif
-seccomp_assign_mode(current, seccomp_mode);
+seccomp_assign_mode(current, seccomp_mode, 0);
ret = 0;

out:
@@ -876,7 +886,7 @@
/* Do not free the successfully attached filter. */
prepared = NULL;
-seccomp_assign_mode(current, seccomp_mode);
+seccomp_assign_mode(current, seccomp_mode, flags);
out:
spin_unlock_irq(&current->sighand->siglock);
if (flags & SECCOMP_FILTER_FLAG_TSYNC)
--- linux-4.15.0.orig/kernel/signal.c
+++ linux-4.15.0/kernel/signal.c
@@ -77,10 +77,19 @@
handler = sig_handler(t, sig);

+/* SIGKILL and SIGSTOP may not be sent to the global init */
+if (unlikely(is_global_init(t) & sig_kernel_only(sig)))
+return true;
+if (unlikely(t->signal->flags & SIGNAL_UNKILLABLE) &&
+ handler == SIG_DFL && !(force && sig_kernel_only(sig)))
return 1;

+/* Only allow kernel generated signals to this kthread */
+if (unlikely((t->flags & PF_KTHREAD) &&
+ (handler == SIG_KTHREAD_KERNEL) && !force))
+return true;
+
return sig_handler_ignored(handler, sig);
}
struct user_struct *user;
+int sigpending;

/*
 * Protect access to @t credentials. This can go away when all
 * callers hold rcu read lock.
 + *
 + * NOTE! A pending signal will hold on to the user refcount,
 + * and we get/put the refcount only when the sigpending count
 + * changes from/to zero.
 */
rcu_read_lock();
-user = get_uid(__task_cred(t)->user);
-atomic_inc(&user->sigpending);
+user = __task_cred(t)->user;
+sigpending = atomic_inc_return(&user->sigpending);
+if (sigpending == 1)
+get_uid(user);
rcu_read_unlock();

-if (override_rlimit ||
 - atomic_read(&user->sigpending) <=
 -task_rlimit(t, RLIMIT_SIGPENDING)) {
 +if (override_rlimit || likely(sigpending <= task_rlimit(t, RLIMIT_SIGPENDING))) {
 q = kmem_cache_alloc(sigqueue_cachep, flags);
 } else {
 print_dropped_signal(sig);
 }

if (unlikely(q == NULL)) {
-atomic_dec(&user->sigpending);
-free_uid(user);
+if (atomic_dec_and_test(&user->sigpending))
+free_uid(user);
} else {
INIT_LIST_HEAD(&q->list);
q->flags = 0;
@@ -404,8 +418,8 @@
}{
if (q->flags & SIGQUEUE_PREALLOC)
return;
-atomic_dec(&q->user->sigpending);
-free_uid(q->user);
+if (atomic_dec_and_test(&q->user->sigpending))
+free_uid(q->user);
kmem_cache_free(sigqueue_cachep, q);
}
+static int dequeue_synchronous_signal(siginfo_t *info)
+{
+struct task_struct *tsk = current;
+struct sigpending *pending = &tsk->pending;
+struct sigqueue *q, *sync = NULL;
+
+/*
+ * Might a synchronous signal be in the queue?
+ */
+if (!((pending->signal.sig[0] & ~tsk->blocked.sig[0]) & SYNCHRONOUS_MASK))
+return 0;
+
+/*
+ * Return the first synchronous signal in the queue.
+ */
+list_for_each_entry(q, &pending->list, list) {
+/* Synchronous signals have a postive si_code */
+if ((q->info.si_code > SI_USER) &&
+    (sigmask(q->info.si_signo) & SYNCHRONOUS_MASK)) {
+sync = q;
+goto next;
+}
+}
+return 0;
+next:
+
+/*
+ * Check if there is another siginfo for the same signal.
+ */
+list_for_each_continue(q, &pending->list, list) {
+if (q->info.si_signo == sync->info.si_signo)
+goto still_pending;
+}
+
+/* Remove signals in mask from the pending set and queue.*/
+sigdelset(&pending->signal, sync->info.si_signo);
+recalc_sigpending();
+still_pending:
+list_del_init(&sync->list);
+copy_siginfo(info, &sync->info);
+__sigqueue_free(sync);
+return info->si_signo;
+}
result = TRACE_SIGNAL_IGNORED;
if (!prepare_signal(sig, t,
 -from_ancestor_ns || (info == SEND_SIG_FORCED))
+from_ancestor_ns || (info == SEND_SIG_PRIV) || (info == SEND_SIG_FORCED))
goto ret;

pending = group ? &t->signal->shared_pending : &t->pending;
* This is only possible if parent == real_parent.
* Check if it has changed security domain.
*/
-if (tsk->parent_exec_id != tsk->parent->self_exec_id)
+if (tsk->parent_exec_id != READ_ONCE(tsk->parent->self_exec_id))
sig = SIGCHLD;
}

/*
 * We're committing to trapping. TRACED should be visible before
 * TRAPPING is cleared; otherwise, the tracer might fail do_wait().
 * Also, transition to TRACED and updates to ->jobctl should be
 * atomic with respect to siglock and should be done after the arch
 * hook as siglock is released and regrabbed across it.
 */
+ *
+ * TRACER   TRACEE
+ *
+ * ptrace_attach()
+ * [L] wait_on_bit(JOBCTL_TRAPPING)[S] set_special_state(TRACED)
+ * do_wait()
+ * set_current_state()    smp_wmb();
+ * ptrace_do_wait()
+ * wait_task_stopped()
+ * task_stopped_code()
+ * [L] task_is_traced()[S] task_clear_jobctl_trapping();
*/
-set_current_state(TASK_TRACED);
+smp_wmb();

current->last_siginfo = info;
current->exit_code = exit_code;
if (task_participate_group_stop(current))
notify = CLD_STOPPED;

_set_current_state(TASK_STOPPED);
+set_special_state(TASK_STOPPED);
spin_unlock_irq(&current->sighand->siglock);

/*
@@ -2212,6 +2281,16 @@
goto relock;
}

+/* Has this task already been marked for death? */
+if (signal_group_exit(signal)) {
+    ksig->info.si_signo = signr = SIGKILL;
+    sigdelset(&current->pending.signal, SIGKILL);
+    trace_signal_deliver(SIGKILL, SEND_SIG_NOINFO,
+                      &sighand->action[SIGKILL - 1]);
+    recalc_sigpending();
+    goto fatal;
+
+    for (;;) {
+    }
+}
+
+/* Signals generated by the execution of an instruction
+ need to be delivered before any other pending signals
+ so that the instruction pointer in the signal stack
+ frame points to the faulting instruction.
+ */
+signr = dequeue_synchronous_signal(&ksig->info);
+if (!signr)
+signr = dequeue_signal(current, &current->blocked, &ksig->info);

if (!signr)
break; /* will return 0 */
@@ -2307,6 +2394,7 @@
continue;
}

fatal:
spin_unlock_irq(&sighand->siglock);

/*
 @@ -2671,7 +2759,7 @@
 }
 #endif

-enum siginfo_layout siginfo_layout(int sig, int si_code)
+enum siginfo_layout siginfo_layout(unsigned sig, int si_code)
 {
 enum siginfo_layout layout = SIL_KILL;
 if ((si_code > SI_USER) && (si_code < SI_KERNEL)) {
 @@ -3184,7 +3272,8 @@
 }

 static int
 -do_sigaltstack (const stack_t *ss, stack_t *oss, unsigned long sp)
+do_sigaltstack (const stack_t *ss, stack_t *oss, unsigned long sp,
+size_t min_ss_size)
 {
 struct task_struct *t = current;

 @@ -3214,7 +3303,7 @@
 ss_size = 0;
 ss_sp = NULL;
 } else {
- if (unlikely(ss_size < MINSIGSTKSZ))
+ if (unlikely(ss_size < min_ss_size))
 return -ENOMEM;
 }

 @@ -3232,7 +3321,8 @@
 if (uss &&& copy_from_user(&new, uss, sizeof(stack_t)))
 return -EFAULT;
 err = do_sigaltstack(uss ? &new : NULL, uoss ? &old : NULL,
- current_user_stack_pointer());
+ current_user_stack_pointer(),
+ MINSIGSTKSZ);
 if (!err && uoss &&& copy_to_user(uoss, &old, sizeof(stack_t)))
 err = -EFAULT;
 return err;
@@ -3243,7 +3333,8 @@
 stack_t new;
 if (copy_from_user(&new, uss, sizeof(stack_t)))
 return -EFAULT;
- (void)do_sigaltstack(&new, NULL, current_user_stack_pointer());
+ (void)do_sigaltstack(&new, NULL, current_user_stack_pointer(),
+ MINSIGSTKSZ);
/* squash all but EFAULT for now */
return 0;
}@@ -3278,7 +3369,8 @@
uss.ss_size = uss32.ss_size;
}
ret = do_sigaltstack(uss_ptr ? &uss : NULL, &uoss,
    - compat_user_stack_pointer());
+ compat_user_stack_pointer(),
+ COMPAT_MINSIGSTKSZ);
if (ret >= 0 && uoss_ptr) {
    compat_stack_t old;
    memset(&old, 0, sizeof(old));
--- linux-4.15.0.orig/kernel/smp.c
+++ linux-4.15.0/kernel/smp.c
@@ -103,12 +103,12 @@
* previous function call. For multi-cpu calls its even more interesting
* as we'll have to ensure no other cpu is observing our csd.
*/
-static __always_inline void csd_lock_wait(call_single_data_t *csd)
+static __always_inline void csd_lock_wait(struct __call_single_data *csd)
{ smp_cond_load_acquire(&csd->flags, !(VAL & CSD_FLAG_LOCK));
}
-static __always_inline void csd_lock(call_single_data_t *csd)
+static __always_inline void csd_lock(struct __call_single_data *csd)
{ csd_lock_wait(csd);
    csd->flags |= CSD_FLAG_LOCK;
@@ -121,7 +121,7 @@
smp_wmb();
}
-static __always_inline void csd_unlock(call_single_data_t *csd)
+static __always_inline void csd_unlock(struct __call_single_data *csd)
{ WARN_ON(!(csd->flags & CSD_FLAG_LOCK));
@@ -138,7 +138,7 @@
* for execution on the given CPU. data must already have
* ->func, ->info, and ->flags set.
*/
-static int generic_exec_single(int cpu, call_single_data_t *csd,
+static int generic_exec_single(int cpu, struct __call_single_data *csd,
    spm_call_func_t func, void *info)
{ if (cpu == smp_processor_id()) {
NOTE: Be careful, there is unfortunately no current debugging facility to validate the correctness of this serialization.

```c
int smp_call_function_single_async(int cpu, call_single_data_t *csd)
```

```c
int smp_call_function_single_async(int cpu, struct __call_single_data *csd)
{
  int err = 0;

  kfree(td);
  return PTR_ERR(tsk);
}
```

```c
/*
 * Park the thread so that it could start right on the CPU when it is available.
--- linux-4.15.0.orig/kernel/smpboot.c
+++ linux-4.15.0/kernel/smpboot.c
@@ -187,6 +187,7 @@
    kthread_set_per_cpu(tsk, cpu);
 */
```

```c
/*
 * If ksoftirqd is scheduled, we do not want to process pending softirqs right now. Let ksoftirqd handle this at its own rate, to get fairness, unless we're doing some of the synchronous softirqs.
*/
```

```c
static bool ksoftirqd_running(void)
```

```c
#define SOFTIRQ_NOW_MASK ((1 << HI_SOFTIRQ) | (1 << TASKLET_SOFTIRQ))
```

```c
static bool ksoftirqd_running(unsigned long pending)
{
  struct task_struct *tsk = __this_cpu_read(ksoftirqd);

  if (pending & SOFTIRQ_NOW_MASK)
    return false;

  return tsk && (tsk->state == TASK_RUNNING);
}
```

```c
/*
 * lockdep_assert_irqs_disabled();

+if (preempt_count() == cnt)
+trace_preempt_on(CALLER_ADDR0, get_lock_parent_ip());
+if (softirq_count() == (cnt & SOFTIRQ_MASK))
```
trace_softirqs_on(_RET_IP_);
-preempt_count_sub(cnt);
+
+__preempt_count_sub(cnt);
}

/*@ -325,7 +333,7 @@

pending = local_softirq_pending();

-if (pending && !ksoftirqd_running())
+if (pending && !ksoftirqd_running(pending))
do_softirq_own_stack();

local_irq_restore(flags);
/*@ -352,7 +360,7 @@

static inline void invoke_softirq(void)
{
-if (ksoftirqd_running())
+if (ksoftirqd_running(local_softirq_pending()))
return;

if (!force_irqthreads) {
/*@ -383,7 +391,7 @@

/*@ Make sure that timer wheel updates are propagated */
if ((idle_cpu(cpu) && !need_resched()) || tick_nohz_full_cpu(cpu)) {
-if (!in_interrupt())
+if (!in_irq())
tick_nohz_irq_exit();
}
#endif
--- linux-4.15.0.orig/kernel/stop_machine.c
+++ linux-4.15.0/kernel/stop_machine.c
@@ -21,6 +21,7 @@
#include <linux/smpboot.h>
#include <linux/atomic.h>
#include <linux/nmi.h>
+#include <linux/sched/wake_q.h>

/* Structure to determine completion condition and record errors. May
@@ -36,7 +37,7 @@
 struct cpu_stopper {
 struct task_struct*thread;


spinlock_t lock;
+raw_spinlock_t lock;
bool enabled; /* is this stopper enabled? */
struct list_head works; /* list of pending works */

@@ -65,26 +66,32 @@
}  

static void __cpu_stop_queue_work(struct cpu_stopper *stopper,
-struct cpu_stop_work *work)
+struct cpu_stop_work *work,
+struct wake_q_head *wakeq)
{
    list_add_tail(&work->list, &stopper->works);
-    wake_up_process(stopper->thread);
-    preempt_disable();
-    spin_lock_irqsave(&stopper->lock, flags);
-    enabled = stopper->enabled;
-    if (enabled)
-        __cpu_stop_queue_work(stopper, work);
-    else if (work->done)
-        cpu_stop_signal_done(work->done);
-    spin_unlock_irqrestore(&stopper->lock, flags);

+    raw_spin_lock_irqsave(&stopper->lock, flags);
+    enabled = stopper->enabled;
+    if (enabled)
+        __cpu_stop_queue_work(stopper, work, &wakeq);
+    else if (work->done)
+        cpu_stop_signal_done(work->done);
+    raw_spin_unlock_irqrestore(&stopper->lock, flags);
+    preempt_disable();
+    preempt_enable();

    return enabled;
}

@@ -229,14 +236,26 @@
{
    struct cpu_stopper *stopper1 = per_cpu_ptr(&cpu_stopper, cpu1);
    struct cpu_stopper *stopper2 = per_cpu_ptr(&cpu_stopper, cpu2);
+    DEFINE_WAKE_Q(wakeq);
int err;
+
retry:
- spin_lock_irq(&stopper1->lock);
- spin_lock_nested(&stopper2->lock, SINGLE_DEPTH_NESTING);
+ /*
+ * The waking up of stopper threads has to happen in the same
+ * scheduling context as the queueing. Otherwise, there is a
+ * possibility of one of the above stoppers being woken up by another
+ * CPU, and preemting us. This will cause us to not wake up the other
+ * stopper forever.
+ */
+ preempt_disable();
+ raw_spin_lock_irq(&stopper1->lock);
+ raw_spin_lock_nested(&stopper2->lock, SINGLE_DEPTH_NESTING);

- err = -ENOENT;
- if (!stopper1->enabled || !stopper2->enabled)
+ if (!stopper1->enabled || !stopper2->enabled) {
+ err = -ENOENT;
 goto unlock;
+ }
+
+ /*
+ * Ensure that if we race with __stop_cpus() the stoppers won't get
+ * queued up in reverse order leading to system deadlock.
@ @ -247,22 +266,31 @@
+ * It can be falsely true but it is safe to spin until it is cleared,
+ * queue_stop_cpus_work() does everything under preempt_disable().
+ */
- err = -EDEADLK;
- if (unlikely(stop_cpus_in_progress))
- goto unlock;
+ if (unlikely(stop_cpus_in_progress)) {
+ err = -EDEADLK;
+ goto unlock;
+ }

 err = 0;
- __cpu_stop_queue_work(stopper1, work1);
- __cpu_stop_queue_work(stopper2, work2);
+ __cpu_stop_queue_work(stopper1, work1, &wakeq);
+ __cpu_stop_queue_work(stopper2, work2, &wakeq);
+ unlock:
- spin_unlock(&stopper2->lock);
- spin_unlock_irq(&stopper1->lock);
+ raw_spin_unlock(&stopper2->lock);
raw_spin_unlock_irq(&stopper1->lock);

if (unlikely(err == -EDEADLK)) {
    preempt_enable();
    while (stop_cpus_in_progress)
        cpu_relax();
    goto retry;
}

wake_up_q(&wakeq);
preadmit_enable();
return err;
}
/**
 @@ -448,9 +476,9 @@
 unsigned long flags;
 int run;

-spin_lock_irqsave(&stopper->lock, flags);
+raw_spin_lock_irqsave(&stopper->lock, flags);
 run = !list_empty(&stopper->works);
-spin_unlock_irqrestore(&stopper->lock, flags);
+raw_spin_unlock_irqrestore(&stopper->lock, flags);
 return run;
 }
@@ -461,13 +489,13 @@
 repeat:
 work = NULL;
-spin_lock_irq(&stopper->lock);
+raw_spin_lock_irq(&stopper->lock);
 if (!list_empty(&stopper->works)) {
     work = list_first_entry(&stopper->works, struct cpu_stop_work, list);
     list_del_init(&work->list);
 }
-spin_unlock_irq(&stopper->lock);
+raw_spin_unlock_irq(&stopper->lock);

if (work) {
    cpu_stop_fn_t fn = work->fn;
    @@ -541,7 +569,7 @@
    for_each_possible_cpu(cpu) {
        struct cpu_stopper *stopper = &per_cpu(cpu_stopper, cpu);
        }
spin_lock_init(&stopper->lock);
+raw_spin_lock_init(&stopper->lock);
INIT_LIST_HEAD(&stopper->works);
}

--- linux-4.15.0.orig/kernel/sys.c
+++ linux-4.15.0/kernel/sys.c
@@ -61,6 +61,8 @@
#include <linux/uidgid.h>
#include <linux/cred.h>
+
#include <linux/nospec.h>
+
#include <linux/kmsg_dump.h>
/* Move somewhere else to avoid recompiling? */
#include <generated/utsrelease.h>
@@ -1139,6 +1141,21 @@
DECLARE_RWSEM(uts_sem);

#define COMPAT_UTS_MACHINE
+static char compat_uts_machine[__OLD_UTS_LEN+1] = COMPAT_UTS_MACHINE;
+
+static int __init parseCompat_uts_machine(char *arg)
++{
+strncpy(compat_uts_machine, arg, __OLD_UTS_LEN);
+compat_uts_machine[__OLD_UTS_LEN] = 0;
+return 0;
+}
+
+early_param("compat_uts_machine", parseCompat_uts_machine);
+
+#ifdef COMPAT_UTS_MACHINE
+#include override_architecture(name) \ 
+(personality(current->personality) == PER_LINUX32 & & \ 
+copy_to_user(name->machine, COMPAT_UTS_MACHINE, \ 
@@ -1180,18 +1197,19 @@
SYSCALL_DEFINE1(newuname, struct new_utsname __user *, name)
{
-int errno = 0;
+struct new_utsname tmp;

down_read(&uts_sem);
-if (copy_to_user(name, utsname(), sizeof *name))
-errno = -EFAULT;
+memcpy(&tmp, utsname(), sizeof(tmp));
up_read(&uts_sem);
+if (copy_to_user(name, &tmp, sizeof(tmp)))
+return -EFAULT;

-if (!errno && override_release(name->release, sizeof(name->release)))
-errno = -EFAULT;
-if (!errno && override_architecture(name))
-errno = -EFAULT;
-return errno;
+if (override_release(name->release, sizeof(name->release)))
+return -EFAULT;
+if (override_architecture(name))
+return -EFAULT;
+return 0;
}

#ifdef __ARCH_WANT_SYS_OLD_UNAME
@@ -1200,55 +1218,48 @@
*/
SYSCALL_DEFINE1(uname, struct old_utsname __user *, name)
{
-int error = 0;
+struct old_utsname tmp;

if (!name)
return -EFAULT;

down_read(&uts_sem);
-if (copy_to_user(name, utsname(), sizeof(*name)))
-error = -EFAULT;
+memcpy(&tmp, utsname(), sizeof(tmp));
up_read(&uts_sem);
+if (copy_to_user(name, &tmp, sizeof(tmp)))
+return -EFAULT;

-if (!error && override_release(name->release, sizeof(name->release)))
-error = -EFAULT;
-if (!error && override_architecture(name))
-error = -EFAULT;
-return error;
+if (override_release(name->release, sizeof(name->release)))
+return -EFAULT;
+if (override_architecture(name))
+return -EFAULT;
+return 0;
}
SYSCALL_DEFINE1(olduname, struct oldold_utsname __user *, name)
{
    int error;
    struct oldold_utsname tmp;
    if (!name)
        return -EFAULT;
    if (!access_ok(VERIFY_WRITE, name, sizeof(struct oldold_utsname)))
        return -EFAULT;
    memset(&tmp, 0, sizeof(tmp));
down_read(&uts_sem);
    if (copy_to_user(name, &tmp, sizeof(tmp)))
        return -EFAULT;
    if (override_architecture(name))
        return -EFAULT;
    if (override_release(name->release, sizeof(name->release)))
        return -EFAULT;
    return 0;
}
if (len < 0 || len > __NEW_UTS_LEN)  
return -EINVAL;  
-down_write(&uts_sem);  
erno = -EFAULT;  
if (!copy_from_user(tmp, name, len)) {  
+struct new_utsname *u = utsnname();  
+struct new_utsname *u;  
+down_write(&uts_sem);  
+u = utsnname();  
mempyc(u->nodename, tmp, len);  
memset(u->nodename + len, 0, sizeof(u->nodename) - len);  
erno = 0;  
uts_proc_notify(UTS_PROC_HOSTNAME);  
+up_write(&uts_sem);  
}  
-up_write(&uts_sem);  
return errno;  
}
return 0;
}

#endif
@@ -1313,17 +1326,18 @@
if (len < 0 || len > __NEW_UTS_LEN)
    return -EINVAL;
-down_write(&uts_sem);
    errno = -EFAULT;
if (!copy_from_user(tmp, name, len)) {
    -struct new_utsname *u = utsname();
    +struct new_utsname *u;
    +down_write(&uts_sem);
    +u = utsname();
    memcpy(u->domainname, tmp, len);
    memset(u->domainname + len, 0, sizeof(u->domainname) - len);
    errno = 0;
    uts_proc_notify(UTS_PROC_DOMAINNAME);
    +up_write(&uts_sem);
    }
    -up_write(&uts_sem);
    return errno;
}

@@ -1399,6 +1413,7 @@
if (resource >= RLIM_NLIMITS)
    return -EINVAL;
+resource = array_index_nospec(resource, RLIM_NLIMITS);
    task_lock(current->group_leader);
    x = current->signal->rlim[resource];
    task_unlock(current->group_leader);
@@ -1418,6 +1433,7 @@
if (resource >= RLIM_NLIMITS)
    return -EINVAL;
+resource = array_index_nospec(resource, RLIM_NLIMITS);
    task_lock(current->group_leader);
    r = current->signal->rlim[resource];
    task_unlock(current->group_leader);
@@ -1868,7 +1884,7 @@
((unsigned long)prctl_map->__m1 __op				\(unsigned long)prctl_map->__m2) ? 0 : -EINVAL
    error = __prctl_check_order(start_code, <, end_code);
    -error |= __prctl_check_order(start_data, <, end_data);
    +error |= __prctl_check_order(start_data,<=, end_data);
error |= __prctl_check_order(start_brk, <=, brk);
error |= __prctl_check_order(arg_start, <=, arg_end);
error |= __prctl_check_order(env_start, <=, env_end);
@@ -1879,13 +1895,6 @@
error = -EINVAL;

/*
 - * @brk should be after @end_data in traditional maps.
 - */
-if (prctl_map->start_brk <= prctl_map->end_data || 
 - prctl_map->brk <= prctl_map->end_data)
-goto out;
-
-/*
 * Neither we should allow to override limits if they set.
 */
if (check_data_rlimit(rlimit(RLIMIT_DATA), prctl_map->brk,
@@ -2190,6 +2199,17 @@
return 1;
}

+int __weak arch_prctl_spec_ctrl_get(struct task_struct *t, unsigned long which)
+{
+return -EINVAL;
+}
+
+int __weak arch_prctl_spec_ctrl_set(struct task_struct *t, unsigned long which,
+    unsigned long ctrl)
+{
+return -EINVAL;
+}
+
+SYSCALL_DEFINE5(prctl, int, option, unsigned long, arg2, unsigned long, arg3,
+    unsigned long, arg4, unsigned long, arg5)
+
@@ -2398,6 +2418,16 @@
case PR_SVE_GET_VL:
    error = SVE_GET_VL();
    break;
+case PR_GET_SPECULATION_CTRL:
+    if (arg3 || arg4 || arg5)
+        return -EINVAL;
+    error = arch_prctl_spec_ctrl_get(me, arg2);
+    break;
+case PR_SET_SPECULATION_CTRL:
+    if (arg4 || arg5)
+        return -EINVAL;
+    error = arch_prctl_spec_ctrl_set(me, arg2, arg3);
+break;
default:
error = -EINVAL;
break;
--- linux-4.15.0.orig/kernel/sysctl.c
+++ linux-4.15.0/kernel/sysctl.c
@@ -68,6 +68,8 @@
#include <linux/mount.h>
#include <linux/pipe_fs_i.h>
+#include "../lib/kstrtox.h"
+
#include <linux/uaccess.h>
#include <asm/processor.h>

@@ -105,6 +107,9 @@
extern char core_pattern[];
extern unsigned int core_pipe_limit;
#endif
+#ifdef CONFIG_USER_NS
+extern int unprivileged_userns_clone;
+#endif
extern int pid_max;
extern int pid_max_min, pid_max_max;
extern int percpu_pagelist_fraction;
@@ -125,7 +130,9 @@
static int __maybe_unused one = 1;
static int __maybe_unused two = 2;
static int __maybe_unused four = 4;
+static unsigned long zero_ul;
static unsigned long one_ul = 1;
+static unsigned long long_max = LONG_MAX;
static int one_hundred = 100;
static int one_thousand = 1000;
#ifndef CONFIG_PRINTK
@@ -513,6 +520,15 @@
     .proc_handler= proc_dointvec,
 },
#endif
+#ifdef CONFIG_USER_NS
+
+    .procname="unprivileged_userns_clone",
+    .data= &unprivileged_userns_clone,
+    .maxlen= sizeof(int),
+    .mode= 0644,
+    .proc_handler= proc_dointvec,
+}
+#endif
ifdef CONFIG_PROC_SYSCTL
{
    .procname = "tainted",
    .data = &sysctl_drop_caches,
    .maxlen = sizeof(int),
    .mode = 0644,
    .proc_handler = drop_caches_sysctl_handler,
    .extra1 = &one,
    .extra2 = &four,
    .maxlen = sizeof(files_stat.max_files),
    .mode = 0644,
    .proc_handler = proc_doulongvec_minmax,
    .extra1 = &zero_ul,
    .extra2 = &long_max,
},
{
    .procname = "nr_open",
    .extra2 = &one,
},
{
    .procname = "protected_fifos",
    .data = &sysctl_protected_fifos,
    .maxlen = sizeof(int),
    .mode = 0600,
    .proc_handler = proc_dointvec_minmax,
    .extra1 = &zero,
    .extra2 = &two,
},
{
    .procname = "protected_regular",
    .data = &sysctl_protected_regular,
    .maxlen = sizeof(int),
    .mode = 0600,
    .proc_handler = proc_dointvec_minmax,
    .extra1 = &zero,
    .extra2 = &two,
},
{
    .procname = "suid_dumpable",
    .data = &suid_dumpable,
    .maxlen = sizeof(int),
    .extra1 = &one,
}
/**
 * strtoul_lenient - parse an ASCII formatted integer from a buffer and only
 * fail on overflow
 *
 * @cp: kernel buffer containing the string to parse
 * @endp: pointer to store the trailing characters
 * @base: the base to use
 * @res: where the parsed integer will be stored
 *
 * In case of success 0 is returned and @res will contain the parsed integer,
 * @endp will hold any trailing characters.
 * This function will fail the parse on overflow. If there wasn't an overflow
 * the function will defer the decision what characters count as invalid to the
 * caller.
 *
 * @static int strtoul_lenient(const char *cp, char **endp, unsigned int base,
 * unsigned long *res)
 *
 * {unsigned long long result;
 * int rv;
 * 
 * cp = _parse_integer_fixup_radix(cp, &base);
 * rv = _parse_integer(cp, base, &result);
 * if ((rv & KSTRTOX_OVERFLOW) || (result != (unsigned long)result))
 * return -ERANGE;
 *
 * cp += rv;
 * 
 * if (endp)
 * *endp = (char *)cp;
 *
 * *res = (unsigned long)result;
 * return 0;
 * }
 *
 * #define TMPBUFLEN 22
 */

/**
 * proc_get_long - reads an ASCII formatted integer from a user buffer
 * @ @ -2082,7 +2153,8 @@
 * if (!isdigit(*p))
 * return -EINVAL;
 *
 * -*val = simple_strtoul(p, &p, 0);
 * +if (strtoul_lenient(p, &p, 0, val))
 * +return -EINVAL;
 */
len = p - tmp;

@@ -2517,7 +2589,16 @@
struct do_proc_dointvec_minmax_conv_param *param = data;
if (write) {
    -int val = *negp ? -*lvalp : *lvalp;
+int val;
+if (*negp) {
+    -if (*lvalp > (unsigned long) INT_MAX + 1)
+        return -EINVAL;
+    val = -*lvalp;
+} else {
+    -if (*lvalp > (unsigned long) INT_MAX)
+        return -EINVAL;
+    val = *lvalp;
+}
    if ((param->min && *param->min > val) || 
        (param->max && *param->max < val))
        return -EINVAL;
@@ -2738,6 +2819,8 @@
    bool neg;

    left -= proc_skip_spaces(&p);
+if (!left)
+break;

    err = proc_get_long(&p, &left, &val, &neg,
        proc_wspace_sep,
@@ -2747,8 +2830,10 @@
    if (neg)
        continue;
    val = convmul * val / convdiv;
-    -if ((min && val < *min) || (max && val > *max))
-        -continue;
+    -if ((min && val < *min) || (max && val > *max)) {
+        err = -EINVAL;
+        break;
+    }
* i = val;
} else {
    val = convdiv * (*i) / convmul;
--- linux-4.15.0.orig/kernel/task_work.c
+++ linux-4.15.0/kernel/task_work.c
@@ -116,3 +116,4 @@
} while (work);
}
static struct taskstats *taskstats_tgid_alloc(struct task_struct *tsk) {
    struct signal_struct *sig = tsk->signal;
    struct taskstats *stats = NULL, *stats_new;

    if (sig->stats || thread_group_empty(tsk))
        goto ret;
    /* Pairs with smp_store_release() below. */
    if (stats || thread_group_empty(tsk))
        return stats;

    /* No problem if kmem_cache_zalloc() fails */
    stats_new = kmem_cache_zalloc(taskstats_cache, GFP_KERNEL);
    spin_lock_irq(&tsk->sighand->siglock);
    if (!sig->stats) {
        sig->stats = stats;
        stats = NULL;
    } else {
        /* Pairs with smp_store_release() above and order the
         * kmem_cache_zalloc().
         * */
        smp_store_release(&sig->stats, stats_new);
        stats = stats_new;
        stats_new = NULL;
    }
    spin_unlock_irq(&tsk->sighand->siglock);

    /* Send pid data out on exit */
unsigned long flags;
struct rtc_device *rtc = to_rtc_device(dev);
struct wakeup_source *__ws;

int ret = 0;

if (rtcdev)
return -EBUSY;

spin_lock_irqsave(&rtcdev_lock, flags);
if (!rtcdev) {
if (!try_module_get(rtc->owner)) {
 spin_unlock_irqrestore(&rtcdev_lock, flags);
 -return -1;
 +ret = -1;
 +goto unlock;
 }
}

rtcdev = rtc;

ws = __ws;
__ws = NULL;
unlock:
spin_unlock_irqrestore(&rtcdev_lock, flags);

wakeup_source_unregister(__ws);

-return 0;
+return ret;
}

static inline void alarmtimer_rtc_timer_init(void)

static void __alarm_init(struct alarm *alarm, enum alarmtimer_type type,
 enum alarmtimer_restart (*function)(struct alarm *, ktime_t))
 {
timerqueue_init(&alarm->node);
+alarm->timer.function = alarmtimer_fired;
 +alarm->function = function;
 +alarm->type = type;
 +alarm->state = ALARMTIMER_STATE_INACTIVE;
alarm_init - Initialize an alarm structure

void alarm_init(struct alarm *alarm, enum alarntimer_type type, enum alarntimer_restart (*function)(struct alarm *, ktime_t))
{
    timerqueue_init(&alarm->node);
    hrtimer_init(&alarm->timer, alarm_bases[type].base_clockid, -HRTIMER_MODE_ABS);
    alarm->timer.function = alarntimer_fired;
    alarm->function = function;
    alarm->type = type;
    alarm->state = ALARMTIMER_STATE_INACTIVE;
    HRTIMER_MODE_ABS);
    __alarm_init(alarm, type, function);
}
EXPORT_SYMBOL_GPL(alarm_init);

alarm_timer_forward - Forward the timer

static int alarm_timer_forward(struct k_itimer *timr, ktime_t now)
{
    struct alarm *alarm = &timr->it.alarm.alarmtimer;

    return alarm_forward(alarm, timr->it_interval, now);
}

alarm_get_time_remaining - Get time remaining

static s64 alarm_get_time_remaining(struct k_itimer *timr, ktime_t now)
{
    struct alarm *alarm = &timr->it.alarm.alarmtimer;

    return ktime_sub(alarm->node.expires, now);
}

alarntimer_type - Type of alarm timer

enum  alarntimer_type type;

if (!alarntimer_get_rtcdev())
{
-return -ENOTSUPP;
+return -EOPNOTSUPP;

if (!capable(CAP_WAKE_ALARM))
    return -EPERM;
@@ -719,6 +728,8 @@

    _set_current_state(TASK_RUNNING);

+destroy_hrtimer_on_stack(&alarm->timer);
+
    if (!alarm->data)
        return 0;

@@ -740,6 +751,15 @@

    return -ERESTART_RESTARTBLOCK;
 }

+static void
+alarm_init_on_stack(struct alarm *alarm, enum alarmtimer_type type,
+    enum alarmtimer_restart (*function)(struct alarm *, ktime_t))
+{
    hrtimer_init_on_stack(&alarm->timer, alarm_bases[type].base_clockid,
        HRTIMER_MODE_ABS);
    __alarm_init(alarm, type, function);
+} +

/**
 * alarm_timer_nsleep_restart - restartblock alarmtimer nsleep
 * @restart: ptr to restart block
 @@@ -752,7 +772,7 @@
        ktime_t exp = restart->nanosleep.expires;
 struct alarm alarm;

 -alarm_init(&alarm, type, alarmtimer_nsleep_wakeup);
 +alarm_init_on_stack(&alarm, type, alarmtimer_nsleep_wakeup);

    return alarmtimer_do_nsleep(&alarm, exp, type);
 } @@ -776,7 +796,7 @@
 int ret = 0;

    if (!alarmtimer_get_rtcdev())
        return -ENOTSUPP;
+return -EOPNOTSUPP;

    if (flags & ~TIMER_ABSTIME)
        return -EINVAL;
if (!capable(CAP_WAKE_ALARM))
return -EPERM;

-alarm_init(&alarm, type, alarmtimer_nsleep_wakeup);
+alarm_init_on_stack(&alarm, type, alarmtimer_nsleep_wakeup);

exp = timespec64_to_ktime(*tsreq);
/* Convert (if necessary) to absolute time */
if (flags != TIMER_ABSTIME) {
    ktime_t now = alarm_bases[type].gettime();
    -exp = ktime_add(now, exp);
    +
    +exp = ktime_add_safe(now, exp);
}

ret = alarmtimer_do_nsleep(&alarm, exp, type);
@@ -801,9 +822,9 @@
if (flags == TIMER_ABSTIME)
return -ERESTARTNOHAND;

-restart->fn = alarm_timer_nsleep_restart;
restart->nanosleep.clockid = type;
restart->nanosleep.expires = exp;
+set_restart_fn(restart, alarm_timer_nsleep_restart);
return ret;
}

--- linux-4.15.0.orig/kernel/time/clocksource.c
+++ linux-4.15.0/kernel/time/clocksource.c
@@ -119,6 +119,16 @@
static int watchdog_running;
static atomic_t watchdog_reset_pending;

+static void inline clocksource_watchdog_lock(unsigned long *flags)
+{
+spin_lock_irqsave(&watchdog_lock, *flags);
+}
+
+static void inline clocksource_watchdog_unlock(unsigned long *flags)
+{
+spin_unlock_irqrestore(&watchdog_lock, *flags);
+}
+
static int clocksource_watchdog_kthread(void *data);
static void __clocksource_change_rating(struct clocksource *cs, int rating);

@@ -142,9 +152,19 @@
cs->flags &= ~(CLOCK_SOURCE_VALID_FOR_HRES | CLOCK_SOURCE_WATCHDOG);

+/*
+ * If the clocksource is registered clocksource_watchdog_kthread() will
+ * re-rate and re-select.
+ */
+if (list_empty(&cs->list)) {
+cs->rating = 0;
+return;
+
+if (cs->mark_unstable)
+cs->mark_unstable(cs);

+/* kick clocksource_watchdog_kthread() */
+if (finished_booting)
+schedule_work(&watchdog_work);
+
+spin_lock_irqsave(&watchdog_lock, flags);
+if (!(cs->flags & CLOCK_SOURCE_UNSTABLE)) {
+-if (list_empty(&cs->wd_list))
+list_add(&cs->wd_list, &watchdog_list);
+__clocksource_unstable(cs);
+
+next_cpu = cpumask_next(raw_smp_processor_id(), cpu_online_mask);
+if (next_cpu >= nr_cpu_ids)
+next_cpu = cpumask_first(cpu_online_mask);
+watchdog_timer.expires += WATCHDOG_INTERVAL;
+add_timer_on(&watchdog_timer, next_cpu);
+
+/*
+ * Arm timer if not already pending: could race with concurrent
+ * pair clocksource_stop_watchdog() clocksource_start_watchdog().
+ */
+if (!timer_pending(&watchdog_timer)) {
+watchdog_timer.expires += WATCHDOG_INTERVAL;
+add_timer_on(&watchdog_timer, next_cpu);
+
+out:
+spin_unlock(&watchdog_lock);
+
+@ @ -319,9 +346,8 @ @
static void clocksource_enqueue_watchdog(struct clocksource *cs)
{
-unsigned long flags;
+INIT_LIST_HEAD(&cs->wd_list);

-spin_lock_irqsave(&watchdog_lock, flags);
if (cs->flags & CLOCK_SOURCE_MUST_VERIFY) {
/* cs is a clocksource to be watched. */
list_add(&cs->wd_list, &watchdog_list);
@@ -331,7 +357,6 @@
if (cs->flags & CLOCK_SOURCE_IS_CONTINUOUS)
 cs->flags |= CLOCK_SOURCE_VALID_FOR_HRES;
} -spin_unlock_irqrestore(&watchdog_lock, flags);
}

static void clocksource_select_watchdog(bool fallback)
@@ -373,9 +398,6 @@

static void clocksource_dequeue_watchdog(struct clocksource *cs)
{
-unsigned long flags;
-
-spin_lock_irqsave(&watchdog_lock, flags);
if (cs != watchdog) {
if (cs->flags & CLOCK_SOURCE_MUST_VERIFY) {
/* cs is a watched clocksource. */
@@ -384,21 +406,19 @@
clocksource_stop_watchdog();
}
}
-spin_unlock_irqrestore(&watchdog_lock, flags);
}

static int __clocksource_watchdog_kthread(void)
{
struct clocksource *cs, *tmp;
unsigned long flags;
-LIST_HEAD(unstable);
int select = 0;

spin_lock_irqsave(&watchdog_lock, flags);
list_for_each_entry_safe(cs, tmp, &watchdog_list, wd_list) {
if (cs->flags & CLOCK_SOURCE_UNSTABLE) {
list_del_init(&cs->wd_list);
-list_add(&cs->wd_list, &unstable);
+__clocksource_change_rating(cs, 0);
select = 1;
}
if (cs->flags & CLOCK_SOURCE_RESELECT) {
    clocksource_stop_watchdog();
    spin_unlock_irqrestore(&watchdog_lock, flags);

    /* Needs to be done outside of watchdog lock */
    list_for_each_entry_safe(cs, tmp, &unstable, wd_list) {
       list_del_init(&cs->wd_list);
       __clocksource_change_rating(cs, 0);
    }
    return select;
}

static bool clocksource_is_watchdog(struct clocksource *cs) { return false; }
void clocksource_mark_unstable(struct clocksource *cs) {

+static inline void clocksource_watchdog_lock(unsigned long *flags) { }
+static inline void clocksource_watchdog_unlock(unsigned long *flags) { }
+
#endif /* CONFIG_CLOCKSOURCE_WATCHDOG */

/**
 ** int __clocksource_register_scale(struct clocksource *cs, u32 scale, u32 freq)
 **
 +unsigned long flags;

 /* Initialize mult/shift and max_idle_ns */
 __clocksource_update_freq_scale(cs, scale, freq);

 /* Add clocksource to the clocksource list */
 mutex_lock(&clocksource_mutex);
 +
 +clocksource_watchdog_lock(&flags);
 clocksource_enqueue(cs);
 clocksource_enqueue_watchdog(cs);
 +clocksource_watchdog_unlock(&flags);
 +
 clocksource_select();
 clocksource_select_watchdog(false);
 mutex_unlock(&clocksource_mutex);

 void clocksource_change_rating(struct clocksource *cs, int rating)
 {
unsigned long flags;

mutex_lock(&clocksource_mutex);
clocksource_watchdog_lock(&flags);
clocksource_watchdog_unlock(&flags);

clocksource_select();
clocksource_select_watchdog(false);
mutex_unlock(&clocksource_mutex);
@@ -817,6 +845,8 @@

/*
static int clocksource_unbind(struct clocksource *cs)
 {
 +unsigned long flags;
 +
 if (clocksource_is_watchdog(cs)) {
 /* Select and try to install a replacement watchdog. */
clocksource_select_watchdog(true);
 @@ -830,8 +860,12 @@
 if (curr_clocksource == cs)
 return -EBUSY;
 }
 +
+clocksource_watchdog_lock(&flags);
clocksource_dequeue_watchdog(cs);
list_del_init(&cs->list);
+clocksource_watchdog_unlock(&flags);
+
+return 0;
 }

--- linux-4.15.0.orig/kernel/time/hrtimer.c
+++ linux-4.15.0/kernel/time/hrtimer.c
@@ -843,7 +843,8 @@
 base->cpu_base->active_bases |= 1 << base->index;

-timer->state = HRTIMER_STATE_ENQUEUED;
+/* Pairs with the lockless read in hrtimer_is_queued() */
+WRITE_ONCE(timer->state, HRTIMER_STATE_ENQUEUED);

return timerqueue_add(&base->active, &timer->node);
}
@@ -865,7 +866,8 @@
 struct hrtimer_cpu_base *cpu_base = base->cpu_base;
 u8 state = timer->state;

---
timer->state = newstate;

/* Pairs with the lockless read in hrtimer_is_queued() */
WRITE_ONCE(timer->state, newstate);
if (!(state & HRTIMER_STATE_ENQUEUED))
    return;

static inline int
remove_hrtimer(struct hrtimer *timer, struct hrtimer_clock_base *base, bool restart)
{
    if (hrtimer_is_queued(timer)) {
        u8 state = timer->state;
        if (state & HRTIMER_STATE_ENQUEUED) {
            int reprogram;
            /*
             * POSIX magic: Relative CLOCK_REALTIME timers are not affected by
             * clock modifications, so they needs to become CLOCK_MONOTONIC to
             * ensure POSIX compliance.
             */
            if (clock_id == CLOCK_REALTIME && mode & HRTIMER_MODE_REL)
                clock_id = CLOCK_MONOTONIC;
            base = hrtimer_clockid_to_base(clock_id);
            
            restart = &current->restart_block;
            restart->fn = hrtimer_nanosleep_restart;
            restart->nanosleep.clockid = t.timer.base->clockid;
            restart->nanosleep.expires = hrtimer_get_expires_tv64(&t.timer);
            +set_restart_fn(restart, hrtimer_nanosleep_restart);
            out:
            destroy_hrtimer_on_stack(&t.timer);
            return ret;
        }
    }

    /*
     */
    cpu_base = raw_cpu_ptr(hrtimer_bases);

    -if (clock_id == CLOCK_REALTIME && mode != HRTIMER_MODE_ABS)
    +/
    + * POSIX magic: Relative CLOCK_REALTIME timers are not affected by
    + * clock modifications, so they needs to become CLOCK_MONOTONIC to
    + * ensure POSIX compliance.
    + */
    +if (clock_id == CLOCK_REALTIME && mode & HRTIMER_MODE_REL)
    clock_id = CLOCK_MONOTONIC;
    base = hrtimer_clockid_to_base(clock_id);

    restart = &current->restart_block;
    restart->fn = hrtimer_nanosleep_restart;
    restart->nanosleep.clockid = t.timer.base->clockid;
    restart->nanosleep.expires = hrtimer_get_expires_tv64(&t.timer);
    +set_restart_fn(restart, hrtimer_nanosleep_restart);
    out:
    destroy_hrtimer_on_stack(&t.timer);
    return ret;

--- linux-4.15.0.orig/kernel/time/itimer.c
+++ linux-4.15.0/kernel/time/itimer.c
@@ -153,10 +153,6 @@
   u64 oval, nval, ointerval, ninterval;
   struct cpu_itimer *it = &tsk->signal->it[clock_id];
- /*
- * Use the to_ktime conversion because that clamps the maximum
- * value to KTIME_MAX and avoid multiplication overflows.
- */
- nval = ktime_to_ns(timeval_to_ktime(value->it_value));
ninterval = ktime_to_ns(timeval_to_ktime(value->it_interval));

--- linux-4.15.0.orig/kernel/time/ntp.c
+++ linux-4.15.0/kernel/time/ntp.c
@@ -43,6 +43,7 @@
#define MAX_TICKADJ 500LL /* usecs */
#define MAX_TICKADJ_SCALED 
((MAX_TICKADJ * NSEC_PER_USEC) << NTP_SCALE_SHIFT) / NTP_INTERVAL_FREQ)
+#define MAX_TAI_OFFSET 100000

/*
 * phase-lock loop variables
 @@ -700,7 +701,8 @@
time_constant = max(time_constant, 0l);
 }

-if (txc->modes & ADJ_TAI && txc->constant > 0)
+if (txc->modes & ADJ_TAI &&
+txc->constant >= 0 && txc->constant <= MAX_TAI_OFFSET)
 *time_tai = txc->constant;

if (txc->modes & ADJ_OFFSET)
--- linux-4.15.0.orig/kernel/time/posix-clock.c
+++ linux-4.15.0/kernel/time/posix-clock.c
@@ -27,8 +27,6 @@
#include "posix-timers.h"

-static void delete_clock(struct kref *kref);
-
-/*
- * Returns NULL if the posix_clock instance attached to 'fp' is old and stale.
- */
-@@ -138,7 +136,7 @@
-err = 0;
-if (!err) {
-kref_get(&clk->kref);
+get_device(clk->dev);
-fp->private_data = clk;
 }
-out:
if (clk->ops.release)
err = clk->ops.release(clk);

-kref_put(&clk->kref, delete_clock);
+put_device(clk->dev);

fp->private_data = NULL;

-int posix_clock_register(structposix_clock *clk, dev_t devid)
+int posix_clock_register(structposix_clock *clk, struct device *dev)
{
  int err;

  -kref_init(&clk->kref);
  init_rwlock(&clk->rwsem);

cdev_init(&clk->cdev, &posix_clock_file_operations);
+err = cdev_device_add(&clk->cdev, dev);
+if (err) {
+  pr_err("%s unable to add device %d:%d\n", 
+    dev_name(dev), MAJOR(dev->devt), MINOR(dev->devt));
+  return err;
+}
clk->cdev.owner = clk->ops.owner;
-err = cdev_add(&clk->cdev, devid, 1);
+clk->dev = dev;

-return err;
+return 0;
}
EXPORT_SYMBOL_GPL(posix_clock_register);

-static void delete_clock(structkref *kref)
-{
-  struct posix_clock *clk = container_of(kref, struct posix_clock, kref);
-  -if (clk->release)
-  -clk->release(clk);
-}

void posix_clock_unregister(structposix_clock *clk)
{
  -cdev_del(&clk->cdev);
+cdev_device_del(&clk->cdev, clk->dev);

down-write(&clk->rwsem);
clk->zombie = true;
up-write(&clk->rwsem);

-kref_put(&clk->kref, delete_clock);
+put_device(clk->dev);
}
EXPORT_SYMBOL_GPL(posix_clock_unregister);

--- linux-4.15.0.orig/kernel/time/posix-cpu-timers.c
+++ linux-4.15.0/kernel/time/posix-cpu-timers.c
@@ -84,7 +84,7 @@
 continue;
 timer->it.cpu.expires += incr;
 -timer->it_overrun += 1 << i;
 +timer->it_overrun += 1LL << i;
 delta -= incr;
 }
@@ -374,7 +374,8 @@
 struct sighand_struct *sighand;
 struct task_struct *p = timer->it.cpu.task;

-WARN_ON_ONCE(p == NULL);
+if (WARN_ON_ONCE(!p))
+return -EINVAL;

/*
 * Protect against sighand release/switch in exit/exec and process/
@@ -579,7 +580,8 @@
 u64 old_expires, new_expires, old_incr, val;
 int ret;

-WARN_ON_ONCE(p == NULL);
+if (WARN_ON_ONCE(!p))
+return -EINVAL;

/*
 * Use the to_ktime conversion because that clamps the maximum
@@ -685,6 +687,7 @@
 */
timer->it.cpu.incr = timespec64_to_ns(&new->it_interval);
+timer->it_interval = ns_to_ktime(timer->it.cpu.incr);
static void posix_cpu_timer_get(struct k_itimer *timer, struct itimerspec64 *itp)
{
    u64 now;
    struct task_struct *p = timer->it.cpu.task;
    +u64 now;

    -WARN_ON_ONCE(p == NULL);
    +if (WARN_ON_ONCE(!p))
        +return;

    /*
     * Easy part: convert the reload time.
    
    */
    static void posix_cpu_timer_rearm(struct k_itimer *timer)
    {
        +struct task_struct *p = timer->it.cpu.task;
        struct sighand_struct *sighand;
        unsigned long flags;
        -struct task_struct *p = timer->it.cpu.task;
        u64 now;

        -WARN_ON_ONCE(p == NULL);
        +if (WARN_ON_ONCE(!p))
            +return;

        /*
         * Fetch the current sample and update the timer's expiry time.
         */
        {
            u64 now;

            -WARN_ON_ONCE(clock_idx == CPUCLOCK_SCHED);
            +if (WARN_ON_ONCE(clock_idx >= CPUCLOCK_SCHED))
                +return;
            +
            cpu_timer_sample_group(clock_idx, tsk, &now);

            if (oldval) {
                @ @ -1347,8 +1354,8 @@
                if (flags & TIMER_ABSTIME)
                    return -ERESTARTNOHAND;
                
                -restart_block->fn = posix_cpu_nsleep_restart;

                return -ERESTARTNOHAND;
            }
    }
restart_block->nanosleep.clockid = which_clock;
+set_restart_fn(restart_block, posix_cpu_nsleep_restart);
}
return error;
}
--- linux-4.15.0.orig/kernel/time/posix-timers.c
+++ linux-4.15.0/kernel/time/posix-timers.c
@@ -50,6 +50,7 @@
#include <linux/export.h>
#include <linux/hashtable.h>
#include <linux/compat.h>
+#include <linux/nospec.h>
#include "timekeeping.h"
#include "posix-timers.h"
@@ -282,16 +283,23 @@
}
__initcall(init_posix_timers);
+/
+* The siginfo si_overrun field and the return value of timer_getoverrun(2)
+* are of type int. Clamp the overrun value to INT_MAX
+*/
+static inline int timer_overrun_to_int(struct k_itimer *timr, int baseval)
+{
+s64 sum = timr->it_overrun_last + (s64)baseval;
+
+return sum > (s64)INT_MAX ? INT_MAX : (int)sum;
+}
+
static void common_hrtimer_rearm(struct k_itimer *timr)
{
    struct hrtimer *timer = &timr->it.real.timer;

    -if (!timr->it_interval)
        -return;
    -
    -timr->it_overrun += (unsigned int) hrtimer_forward(timer,
        -timer->base->get_time(),
        -timr->it_interval);
    +timr->it_overrun += hrtimer_forward(timer, timer->base->get_time(),
        +timr->it_interval);
    hrtimer_restart(timer);
}

@@ -315,15 +323,15 @@
if (!timr)
    return;

-if (timr->it_requeue_pending == info->si_sys_private) {
+if (timr->it_interval && timr->it_requeue_pending == info->si_sys_private) {
    timr->kclock->timer_rearm(timr);

    timr->it_active = 1;
    timr->it_overrun_last = timr->it_overrun;
    -timr->it_overrun = -1;
+timr->it_overrun = -1LL;
    ++timr->it_requeue_pending;

    -info->si_overrun += timr->it_overrun_last;
+info->si_overrun = timer_overrun_to_int(timr, info->si_overrun);
} }

unlock_timer(timr, flags);
@@ -417,9 +425,8 @@
    now = ktime_add(now, kj);
 } #endif
-    -timr->it_overrun += (unsigned int)
-        hrtimer_forward(timer, now, timr->it_interval);
+    timr->it_overrun += hrtimer_forward(timer, now, timr->it_interval);
    ret = HRTIMER_RESTART;
    ++timr->it_requeue_pending;
    timr->it_active = 1;
@@ -523,7 +530,7 @@
    new_timer->it_id = (timer_t) new_timer_id;
    new_timer->it_clock = which_clock;
    new_timer->kclock = kc;
    -new_timer->it_overrun = -1;
+new_timer->it_overrun = -1LL;

    if (event) {
        rcu_read_lock();
@@ -644,11 +651,11 @@
        return __hrtimer_expires_remaining_adjusted(timer, now);
    }

-static int common_hrtimer_forward(struct k_itimer *timr, ktime_t now)
+static s64 common_hrtimer_forward(struct k_itimer *timr, ktime_t now)
{ struct hrtimer *timer = &timr->it.real.timer;

    -return (int)hrtimer_forward(timer, now, timr->it_interval);
+return hrtimer_forward(timer, now, timr->it_interval);
if (iv && (timr->it_requeue_pending & REQUEUE_PENDING || sig_none))
-timr->it_overrun += kc->timer_forward(timr, now);
+timr->it_overrun += (int)kc->timer_forward(timr, now);

remaining = kc->timer_remaining(timr, now);
/* Return 0 only, when the timer is expired and not pending */
@@ -788,7 +795,7 @@
if (!timr)
    return -EINVAL;
-overrun = timr->it_overrun_last;
+overrun = timer_overrun_to_int(timr, 0);
unlock_timer(timr, flags);

return overrun;
@@ -1165,8 +1172,8 @@

static const struct k_clock *clockid_to_kclock(const clockid_t id)
{
   -if (id < 0)
   -err = compat_put_timex(utp, &ktx);
   +if (err >= 0 && compat_put_timex(utp, &ktx))
   +return -EFAULT;

   return err;
}
@@ -1346,11 +1353,15 @@

-err = kc->clock_adj(which_clock, &ktx);

-if (err >= 0)
-if (err >= 0)
+if (err >= 0 && compat_put_timex(utp, &ktx))
+return -EFAULT;

return err;
}
+return posix_clocks[array_index_nospec(idx, ARRAY_SIZE(posix_clocks))];
}
--- linux-4.15.0.orig/kernel/time/posix-timers.h
+++ linux-4.15.0/kernel/time/posix-timers.h
@@ -19,7 +19,7 @@
    void (*timer_get)(struct k_itimer *timr,
                      struct itimerspec64 *cur_setting);
    void (*timer_rearm)(struct k_itimer *timr);
-    int (*timer_forward)(struct k_itimer *timr, ktime_t now);
+    s64 (*timer_forward)(struct k_itimer *timr, ktime_t now);
    ktime_t (*timer_remaining)(struct k_itimer *timr, ktime_t now);
    int (*timer_try_to_cancel)(struct k_itimer *timr);
    void (*timer_arm)(struct k_itimer *timr, ktime_t expires,
--- linux-4.15.0.orig/kernel/time/sched_clock.c
+++ linux-4.15.0/kernel/time/sched_clock.c
@@ -275,7 +275,7 @@
    return cd.read_data[seq & 1].epoch_cyc;
 }

-static int sched_clock_suspend(void)
+int sched_clock_suspend(void)
{
    struct clock_read_data *rd = &cd.read_data[0];

    @@ -286,7 +286,7 @@
    return 0;
 }

-static void sched_clock_resume(void)
+void sched_clock_resume(void)
{
    struct clock_read_data *rd = &cd.read_data[0];

    --- linux-4.15.0.orig/kernel/time/tick-broadcast-hrtimer.c
+++ linux-4.15.0/kernel/time/tick-broadcast-hrtimer.c
@@ @ -44,34 +44,39 @@
 */
 static int bc_set_next(ktime_t expires, struct clock_event_device *bc)
{
    -int bc_moved;
    /*
     - * We try to cancel the timer first. If the callback is on
     - * flight on some other cpu then we let it handle it. If we
     - * were able to cancel the timer nothing can rearm it as we
     - * own broadcast_lock.
     + * This is called either from enter/exit idle code or from the
     + * broadcast handler. In all cases tick_broadcast_lock is held.
     */

 --- Open Source Used In 5GaaS Edge AC-4  32969 ---
However we can also be called from the event handler of
ce_broadcast_hrtimer itself when it expires. We cannot
restart the timer because we are in the callback, but we
can set the expiry time and let the callback return
HRTIMER_RESTART.

hrtimer_cancel() cannot be called here neither from the
broadcast handler nor from the enter/exit idle code. The idle
code can run into the problem described in bc_shutdown() and the
broadcast handler cannot wait for itself to complete for obvious
reasons.

Since we are in the idle loop at this point and because
hrtimer_{start/cancel} functions call into tracing,
calls to these functions must be bound within RCU_NONIDLE.
Each caller tries to arm the hrtimer on its own CPU, but if the
hrtimer callback function is currently running, then
hrtimer_start() cannot move it and the timer stays on the CPU on
which it is assigned at the moment.

As this can be called from idle code, the hrtimer_start()
invocation has to be wrapped with RCU_NONIDLE() as
hrtimer_start() can call into tracing.

RCU_NONIDLE({
		bc_moved = hrtimer_try_to_cancel(&bctimer) >= 0;
		if (bc_moved)
			hrtimer_start(&bctimer, expires,
		\HRTIMER_MODE_ABS_PINNED);});
if (bc_moved) {
    /* Bind the "device" to the cpu */
    bc->bound_on = smp_processor_id();
} else if (bc->bound_on == smp_processor_id()) {
    hrtimer_set_expires(&bctimer, expires);
}
RCU_NONIDLE(
      hrtimer_start(&bctimer, expires, HRTIMER_MODE_ABS_PINNED);
      /*
      * The core tick broadcast mode expects bc->bound_on to be set
      * correctly to prevent a CPU which has the broadcast hrtimer
      * armed from going deep idle.
      * As tick_broadcast_lock is held, nothing can change the cpu
      * base which was just established in hrtimer_start() above. So
      * the below access is safe even without holding the hrtimer
      * base lock.
      */
      bc->bound_on = bctimer.base->cpu_base->cpu;
@@ -97,10 +102,6 @@
{  
    ce_broadcast_hrtimer.event_handler(&ce_broadcast_hrtimer);

    -if (clockevent_state_oneshot(&ce_broadcast_hrtimer))
    -if (ce_broadcast_hrtimer.next_event != KTIME_MAX)
    -return HRTIMER_RESTART;
    -
    return HRTIMER_NORESTART;
}

--- linux-4.15.0.orig/kernel/time/tick-broadcast.c
+++ linux-4.15.0/kernel/time/tick-broadcast.c
@@ -612,6 +612,14 @@
    now = ktime_get();
    /* Find all expired events */
    for_each_cpu(cpu, tick_broadcast_oneshot_mask) {
        +/*
        + * Required for !SMP because for_each_cpu() reports
        + * unconditionally CPU0 as set on UP kernels.
        + */
        +if (!IS_ENABLED(CONFIG_SMP) &&
        +    cpumask_empty(tick_broadcast_oneshot_mask))
        +break;
        +
        td = &per_cpu(tick_cpu_device, cpu);
        if (td->evtdev->next_event <= now) {
            cpumask_set_cpu(cpu, tmpmask);
            --- linux-4.15.0.orig/kernel/time/tick-common.c
+++ linux-4.15.0/kernel/time/tick-common.c
@@ -490,6 +491,7 @@
        if (tick_freeze_depth == num_online_cpus()) {
            trace_suspend_resume(TPS("timekeeping_freeze"),
                smp_processor_id(), true);
            +sched_clock_suspend();
            timekeeping_suspend();
        }
} else {
tick_suspend_local();
@@ -513,9 +515,11 @@
if (tick_freeze_depth == num_online_cpus()) {
timekeeping_resume();
+ sched_clock_resume();
trace_suspend_resume(TPS("timekeeping_freeze"),
       smp_processor_id(), false);
} else {
+ touch_softlockup_watchdog();
tick_resume_local();
}

--- linux-4.15.0.orig/kernel/time/tick-sched.c
+++ linux-4.15.0/kernel/time/tick-sched.c
@@ -61,8 +61,9 @@
/*
 * Do a quick check without holding jiffies_lock:
+ * The READ_ONCE() pairs with two updates done later in this function.
 */
-delta = ktime_sub(now, last_jiffies_update);
+delta = ktime_sub(now, READ_ONCE(last_jiffies_update));
if (delta < tick_period)
    return;

@@ -73,8 +74,9 @@
    last_jiffies_update = ktime_add(last_jiffies_update, tick_period);
/* Slow path for long timeouts */
if (unlikely(delta >= tick_period)) {

    delta = ktime_sub(delta, tick_period);
-    last_jiffies_update = ktime_add(last_jiffies_update, -tick_period);
+/* Pairs with the lockless read in this function. */
+    WRITE_ONCE(last_jiffies_update, +kt ime_add(last_jiffies_update, tick_period));

    /* Pairs with the lockless read in this function. */
    if (unlikely(delta >= tick_period)) {
        ticks = ktime_divns(delta, incr);

-    last_jiffies_update = ktime_add_ns(last_jiffies_update, - incr * ticks);
+/* Pairs with the lockless read in this function. */
+    WRITE_ONCE(last_jiffies_update, +kt ime_add_ns(last_jiffies_update, +})
static inline bool local_timer_softirq_pending(void)
{
    return local_softirq_pending() & TIMER_SOFTIRQ;
}

static ktime_t tick_nohz_stop_sched_tick(struct tick_sched *ts,
@@ -797,12 +801,13 @@

    hrtimer_set_expires(&ts->sched_timer, tick);
    -
    -if (ts->nohz_mode == NOHZ_MODE_HIGHRES)
    -hrtimer_start_expires(&ts->sched_timer, HRTIMER_MODE_ABS_PINNED);
    -else
    +if (ts->nohz_mode == NOHZ_MODE_HIGHRES) {
    +hrtimer_start(&ts->sched_timer, tick, HRTIMER_MODE_ABS_PINNED);
    +} else {
    +hrtimer_set_expires(&ts->sched_timer, tick);
    tick_program_event(tick, 1);
    +}
    +
    out:
    */
    *
    Update the estimated sleep length until the next timer
@@ -884,7 +889,7 @@
    if (unlikely(local_softirq_pending() & cpu_online(cpu))) {
        static int ratelimit;
        
        -if (ratelimit < 10 &&
        +if (ratelimit < 10 && !in_softirq() &&
            (local_softirq_pending() & SOFTIRQ_STOP_IDLE_MASK)) {
            pr_warn("NOHZ: local_softirq_pending %02x\n",
                (unsigned int) local_softirq_pending());
--- linux-4.15.0.orig/kernel/time/time.c
+++ linux-4.15.0/kernel/time/time.c
@@ -28,6 +28,7 @@
    */

    #include <linux/export.h>
    +#include <linux/kernel.h>
#include <linux/timex.h>
#include <linux/capability.h>
#include <linux/timekeeper_internal.h>

struct timezone __user *, tz)
{
    if (likely(tv != NULL)) {
        struct timeval ktv;
        do_gettimeofday(&ktv);
        if (compat_put_timeval(&ktv, tv))
            return -EFAULT;
    }

    if (unlikely(tz != NULL)) {
        struct timezone __user *, tz)
    }

    if (tv) {
        struct timespec64 ts;
        ktime_get_real_ts64(&ts);
        if (put_user(ts.tv_sec, &tv->tv_sec) ||
            put_user(ts.tv_nsec / 1000, &tv->tv_usec))
            return -EFAULT;
    }

    if (tz) {
        return (j + (HZ / MSEC_PER_SEC) - 1)/(HZ / MSEC_PER_SEC);
    } else
        #if BITS_PER_LONG == 32
            return (HZ_TO_MSEC_MUL32 * j) >> HZ_TO_MSEC_SHR32;
        #else
            return DIV_ROUND_UP(j * HZ_TO_MSEC_NUM, HZ_TO_MSEC_DEN);
        #endif
    #endif

    --- linux-4.15.0.orig/kernel/time/timekeeping.c
    +++ linux-4.15.0/kernel/time/timekeeping.c
static struct {
    seqcount_t seq;
    struct timekeeper timekeeper;
} tk_core ____cacheline_aligned;

static DEFINE_RAW_SPINLOCK(timekeeper_lock);
static struct timekeeper shadow_timekeeper;

EXPORT_SYMBOL_GPL(get_device_system_crosststamp);

/**
 * do_gettimeofday - Returns the time of day in a timeval
 * @tv: pointer to the timeval to be set
 * @* tv: pointer to the timeval to be set
 * NOTE: Users should be converted to using getnstimeofday()
 */
void do_gettimeofday(struct timeval *tv)
{
    struct timespec64 now;

    getnstimeofday64(&now);
    tv->tv_sec = now.tv_sec;
    tv->tv_usec = now.tv_nsec/1000;
}
EXPORT_SYMBOL_GPL(do_gettimeofday);

/**
 * do_settimeofday64 - Sets the time of day.
 * @ts: pointer to the timespec64 variable containing the new time
 */
EXPORT_SYMBOL_GPL(getboottime64);
unsigned long get_seconds(void) {
    struct timekeeper *tk = &tk_core.timekeeper;
    return tk->xtime_sec;
} 
EXPORT_SYMBOL(get_seconds);

struct timespec __current_kernel_time(void) {
    struct timekeeper *tk = &tk_core.timekeeper;
    extern void timekeeping_warp_clock(void);
    extern int timekeeping_suspend(void);
    extern void timekeeping_resume(void);
    +#ifdef CONFIG_GENERIC_SCHED_CLOCK
    +extern int sched_clock_suspend(void);
    +extern void sched_clock_resume(void);
    +#else
    +static inline int sched_clock_suspend(void) { return 0; }
    +static inline void sched_clock_resume(void) { } 
    +#endif
    extern void do_timer(unsigned long ticks);
    extern void update_wall_time(void);
    extern void do_timer(unsigned long ticks);
    extern void update_wall_time(void);
    #include <linux/sched/debug.h>
    #include <linux/slab.h>
    #include <linux/compat.h>
    +#include <linux/random.h>
    #include <linux/uaccess.h>
    #include <asm/unistd.h>
    @ @ -502,8 +503,8 @@
    * Force expire obscene large timeouts to expire at the
    * capacity limit of the wheel.
    */
    -if ( expires >= WHEEL_TIMEOUT_CUTOFF )
    -expires = WHEEL_TIMEOUT_MAX;
    +#ifdef CONFIG_GENERIC_SCHED_CLOCK
    +#ifdef CONFIG_GENERIC_SCHED_CLOCK
    >+if ( delta >= WHEEL_TIMEOUT_CUTOFF )
    >+expires = clk + WHEEL_TIMEOUT_MAX;
}

idx = calc_index(expires, LVL_DEPTH - 1);
* Set the next expiry time and kick the CPU so it can reevaluate the
* wheel:
*/
-base->next_expiry = timer->expires;
+if (time_before(timer->expires, base->clk)) {
+/*
+ * Prevent from forward_timer_base() moving the base->clk
+ * backward
+ */
+base->next_expiry = base->clk;
+} else {
+base->next_expiry = timer->expires;
+}
wake_up_nohz_cpu(base->cpu);
}

@@ -883,10 +892,13 @@
* If the next expiry value is > jiffies, then we fast forward to
* jiffies otherwise we forward to the next expiry value.
*/
-if (time_after(base->next_expiry, jnow))
-else
+if (time_after(base->next_expiry, jnow)) {
+base->clk = jnow;
+} else {
+if (WARN_ON_ONCE(time_before(base->next_expiry, base->clk)))
+return;
+base->clk = base->next_expiry;
+}
#else
static inline struct timer_base *
@@ -1582,24 +1594,26 @@
static int collect_expired_timers(struct timer_base *base,
 struct hlist_head *heads)
{
+unsigned long now = READ_ONCE(jiffies);
+
/*
 * NOHZ optimization. After a long idle sleep we need to forward the
 * base to current jiffies. Avoid a loop by searching the bitfield for
 * the next expiring timer.
 */
-if ((long)(jiffies - base->clk) > 2) {
+if ((long)(now - base->clk) > 2) {
 unsigned long next = __next_timer_interrupt(base);
/*
 * If the next timer is ahead of time forward to current
 * jiffies, otherwise forward to the next expiry time:
 */
- if (time_after(next, jiffies)) {
+ if (time_after(next, now)) {
/*
 * The call site will increment base->clk and then
 * terminate the expiry loop immediately.
 */
- base->clk = jiffies;
+ base->clk = now;
 return 0;
 }
 base->clk = next;
@@ -1649,6 +1663,22 @@
 raw_spin_lock_irq(&base->lock);

+/*
+ * timer_base::must_forward_clk must be cleared before running
+ * timers so that any timer functions that call mod_timer() will
+ * not try to forward the base. Idle tracking / clock forwarding
+ * logic is only used with BASE_STD timers.
+ *
+ * The must_forward_clk flag is cleared unconditionally also for
+ * the deferrable base. The deferrable base is not affected by idle
+ * tracking and never forwarded, so clearing the flag is a NOOP.
+ *
+ * The fact that the deferrable base is never forwarded can cause
+ * large variations in granularity for deferrable timers, but they
+ * can be deferred for long periods due to idle anyway.
+ */
+ base->must_forward_clk = false;
+ while (time_after_eq(jiffies, base->clk)) {

 levels = collect_expired_timers(base, heads);
@@ -1668,19 +1698,6 @@
 { 
 struct timer_base *base = this_cpu_ptr(&timer_bases[BASE_STD]);

-/*
-* must_forward_clk must be cleared before running timers so that any
-* timer functions that call mod_timer will not try to forward the
-* base. Idle tracking / clock forwarding logic is only used with
-* BASE_STD timers.
* The deferrable base does not do idle tracking at all, so we do
* not forward it. This can result in very large variations in
* granularity for deferrable timers, but they can be deferred for
* long periods due to idle.
* */
-base->must_forward_clk = false;
-
__run_timers(base);
if (IS_ENABLED(CONFIG_NO_HZ_COMMON))
__run_timers(this_cpu_ptr(&timer_bases[BASE_DEF]));
raw_spin_lock_irq(&new_base->lock);
raw_spin_lock_nested(&old_base->lock, SINGLE_DEPTH_NESTING);

+/*
+ * The current CPUs base clock might be stale. Update it
+ * before moving the timers over.
+ */
+forward_timer_base(new_base);
+
BUG_ON(old_base->running_timer);

for (i = 0; i < WHEEL_SIZE; i++)
--- linux-4.15.0.orig/kernel/time/timer_list.c
+++ linux-4.15.0/kernel/time/timer_list.c
@@ -289,23 +289,6 @@
SEQ_printf(m, "\n");
}

static int timer_list_show(struct seq_file *m, void *v)
-{
-struct timer_list_iter *iter = v;
-
-if (iter->cpu == -1 && !iter->second_pass)
-timer_list_header(m, iter->now);
-else if (iter->second_pass)
-print_cpu(m, iter->cpu, iter->now);
-#ifdef CONFIG_GENERIC_CLOCKEVENTS
-else if (iter->cpu == -1 && &iter->second_pass)
-timer_list_show_tickdevices_header(m);
-else
-print_tickdevice(m, tick_get_device(iter->cpu), iter->cpu);
-#endif
-return 0;
-}
-
void sysrq_timer_list_show(void)
u64 now = ktime_to_ns(ktime_get());
return;

+##ifdef CONFIG_PROC_FS
+static int timer_list_show(struct seq_file *m, void *v)
+{
+    struct timer_list_iter *iter = v;
+    if (iter->cpu == -1 & & !iter->second_pass)
+        timer_list_header(m, iter->now);
+    else if (!iter->second_pass)
+        print_cpu(m, iter->cpu, iter->now);
+    #ifdef CONFIG_GENERIC_CLOCKEVENTS
+    else if (iter->cpu == -1 & & iter->second_pass)
+        timer_list_show_tickdevices_header(m);
+    else
+        print_tickdevice(m, tick_get_device(iter->cpu), iter->cpu);
+    #endif
+    return 0;
+}
+
+static void *move_iter(struct timer_list_iter *iter, loff_t offset)
+{
+    for (; offset; offset--) {
+        return 0;
+    }
+}
+
+static void *move_iter(struct timer_list_iter *iter, loff_t offset)
+
static void blk_trace_cleanup(struct blk_trace *bt)
+synchronize_rcu();
blk_trace_free(bt);
put_probe_ref();
}
@@ -494,6 +498,9 @@
if (!buts->buf_size || !buts->buf_nr)
return -EINVAL;

+if (!blk_debugfs_root)
+return -ENOENT;
+
strncpy(buts->name, name, BLKTRACE_BDEV_SIZE);
buts->name[BLKTRACE_BDEV_SIZE - 1] = '\0';

@@ -503,6 +510,16 @@
*/
strreplace(buts->name, '/', '_');

+/*
+ * bdev can be NULL, as with scsi-generic, this is a helpful as
+ * we can be.
+ */
+if (q->blk_trace) {
+pr_warn("Concurrent blktraces are not allowed on %s\n",
+buts->name);
+return -EBUSY;
+}
+
bt = kzalloc(sizeof(*bt), GFP_KERNEL);
if (!bt)
return -ENOMEM;
@@ -516,17 +533,34 @@
if (!bt->msg_data)
goto err;
-
-#ifdef CONFIG_BLK_DEBUG_FS
-/*
-* When tracing whole make_request drivers (multiqueue) block devices,
-* reuse the existing debugfs directory created by the block layer on
-* init. For request-based block devices, all partitions block devices,
+ * When tracing whole make_request drivers (multiqueue) block devices,
+ * reuse the existing debugfs directory created by the block layer on
+ * init. For request-based block devices, all partitions block devices,
+ */
* directory that will be removed once the trace ends.
+ */
+if (q->mq_ops && bdev && bdev == bdev->bd_contains)
+dir = q->debugfs_dir;
+else
+#endif
bt->dir = dir = debugfs_create_dir(buts->name, blk_debugfs_root);
if (!dir)
goto err;
+
+ As blktrace relies on debugfs for its interface the debugfs directory
+ is required, contrary to the usual mantra of not checking for debugfs
+ files or directories.
+ */
+if (IS_ERR_OR_NULL(dir)) {
+pr_warn("debugfs_dir not present for %s so skipping\n",
+butts->name);
+ret = -ENOENT;
+goto err;
+
bt->dev = dev;
atomic_set(&bt->dropped, 0);
INIT_LIST_HEAD(&bt->running_list);
ret = 0;
err:
-if (dir && !bt->dir)
-dput(dir);
if (ret)
blk_trace_free(bt);
return ret;

static int __blk_trace_startstop(struct request_queue *q, int start)
{
int ret;
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;

+bt = rcu_dereference_protected(q->blk_trace,
+ lockdep_is_held(&q->blk_trace_mutex));
if (bt == NULL)
return -EINVAL;

void blk_trace_shutdown(struct request_queue *q)
mutex_lock(&q->blk_trace_mutex);
-
-if (q->blk_trace) {
+if (rcu_dereference_protected(q->blk_trace,
    lockdep_is_held(&q->blk_trace_mutex))) {
    __blk_trace_startstop(q, 0);
    __blk_trace_remove(q);
}
@@ -771,8 +805,10 @@
static union kernfs_node_id *
    blk_trace_bio_get_cgid(struct request_queue *q, struct bio *bio)
{
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;

+/* We don't use the 'bt' value here except as an optimization... */
+bt = rcu_dereference_protected(q->blk_trace, 1);
if (!bt || !(blk_tracer_flags.val & TRACE_BLK_OPT_CGROUP))
    return NULL;
@@ -817,10 +853,14 @@
    unsigned int nr_bytes, u32 what,
    union kernfs_node_id *cgid)
{
-struct blk_trace *bt = rq->q->blk_trace;
+struct blk_trace *bt;

-/* We don't use the 'bt' value here except as an optimization... */
+bt = rcu_dereference(rq->q->blk_trace);
if (likely(!bt)) {
    rcu_read_unlock();
    return;
+
    if (blk_rq_is_passthrough(rq))
        what |= BLK_TC_ACT(BLK_TC_PC);
@@ -829,6 +869,7 @@
    __blk_add_trace(bt, blk_rq_trace_sector(rq), nr_bytes, req_op(rq),
        rq->cmd_flags, what, error, 0, NULL, cgid);
    +rcu_read_unlock();
    }
}

static void blk_add_trace_rq_insert(void *ignore,
@@ -874,14 +915,19 @@
static void blk_add_trace_bio(struct request_queue *q, struct bio *bio,
u32 what, int error)
{
    struct blk_trace *bt = q->blk_trace;
    
    if (likely(!bt))
        rcu_read_lock();
    bt = rcu_dereference(q->blk_trace);
    if (likely(!bt)) {
        rcu_read_unlock();
        return;
    }
    __blk_add_trace(bt, bio->bi_iter.bi_sector, bio->bi_iter.bi_size,
        bio_op(bio), bio->bi_opf, what, error, 0, NULL,
        blk_trace_bio_get_cgid(q, bio));
    rcu_read_unlock();
}

static void blk_add_trace_bio_bounce(void *ignore,
@@ -926,11 +972,14 @@
    if (bio)
        blk_add_trace_bio(q, bio, BLK_TA_GETRQ, 0);
    else {
        struct blk_trace *bt = q->blk_trace;
        struct blk_trace *bt;
        rcu_read_lock();
        bt = rcu_dereference(q->blk_trace);
        if (bt)
            __blk_add_trace(bt, 0, 0, rw, 0, BLK_TA_GETRQ, 0, 0,
                NULL, NULL);
        rcu_read_unlock();
    }
}

    @ @ -942,27 +991,35 @ @
    if (bio)
        blk_add_trace_bio(q, bio, BLK_TA_SLEEPRQ, 0);
    else {
        struct blk_trace *bt = q->blk_trace;
        struct blk_trace *bt;
        rcu_read_lock();
        bt = rcu_dereference(q->blk_trace);
        if (bt)
            __blk_add_trace(bt, 0, 0, rw, 0, BLK_TA_SLEEPRQ, 0, 0,
                NULL, NULL);
static void blk_add_trace_plug(void *ignore, struct request_queue *q)
{
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;

+rcu_read_lock();
+bt = rcu_dereference(q->blk_trace);
if (bt)
  __blk_add_trace(bt, 0, 0, 0, BLK_TA_PLUG, 0, 0, NULL, NULL);
+rcu_read_unlock();
}

dynamic void blk_add_trace_unplug(void *ignore, struct request_queue *q,
  unsigned int depth, bool explicit)
{
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;

+rcu_read_lock();
+bt = rcu_dereference(q->blk_trace);
if (bt) {
  __be64 rpdu = cpu_to_be64(depth);
  u32 what;
  @@ -974,22 +1031,28 @@
    __blk_add_trace(bt, 0, 0, 0, 0, BLK_TA_UNPLUG, 0, 0, NULL, NULL);
  }
+rcu_read_unlock();
}

dynamic void blk_add_trace_split(void *ignore, 
  struct request_queue *q, struct bio *bio, 
  unsigned int pdu)
{
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;

+rcu_read_lock();
+bt = rcu_dereference(q->blk_trace);
if (bt) {
  __be64 rpdu = cpu_to_be64(pdu);
  __blk_add_trace(bt, bio->bi_iter.bi_sector, 
  bio->bi_iter.bi_size, bio_op(bio), bio->bi_opf, 
  bio->
-BLK_TA_SPLIT, bio->bi_status, sizeof(rpdu),
-&rpdu, blk_trace_bio_get_cgid(q, bio));
+BLK_TA_SPLIT,
+blk_status_to_errno(bio->bi_status),
+sizeof(rpdu), &rpdu,
+blk_trace_bio_get_cgid(q, bio));
}
+rcu_read_unlock();
}

/**
@@ -1009,19 +1072,25 @@
 struct request_queue *q, struct bio *bio,
      dev_t dev, sector_t from)
 {
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;
 struct blk_io_trace_remap r;

 -if (likely(!bt))
 +rcu_read_lock();
 +bt = rcu_dereference(q->blk_trace);
 +if (likely(!bt)) {
 +rcu_read_unlock();
 return;
 +}

  r.device_from = cpu_to_be32(dev);  
  r.device_to = cpu_to_be32(bio_dev(bio));
  r.sector_from = cpu_to_be64(from);

  __blk_add_trace(bt, bio->bi_iter.bi_sector, bio->bi_iter.bi_size,
-bio_op(bio), bio->bi_opf, BLK_TA_REMAP, bio->bi_status,
+bio_op(bio), bio->bi_opf, BLK_TA_REMAP,
+blk_status_to_errno(bio->bi_status),
+sizeof(r), &r, blk_trace_bio_get_cgid(q, bio));
 +rcu_read_unlock();
 }

 /**
@@ -1042,11 +1111,15 @@
 struct request *rq, dev_t dev,
      sector_t from)
 {
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;
 struct blk_io_trace_remap r;

if (likely(!bt))
+rcu_read_lock();
+bt = rcu_dereference(q->blk_trace);
+if (likely(!bt)) {
+rcu_read_unlock();
return;
+
}

r.device_from = cpu_to_be32(dev);
r.device_to = cpu_to_be32(disk_dev(rq->rq_disk));
@@ -1055,6 +1128,7 @@
__blk_add_trace(bt, blk_rq_pos(rq), blk_rq_bytes(rq),
rq_data_dir(rq), 0, BLK_TA_REMAP, 0,
sizeof(r), &r, blk_trace_request_get_cgid(q, rq));
+rcu_read_unlock();
}

/**
@@ -1072,14 +1146,19 @@
struct request *rq,
void *data, size_t len)
{
-struct blk_trace *bt = q->blk_trace;
+struct blk_trace *bt;

-if (likely(!bt))
+rcu_read_lock();
+bt = rcu_dereference(q->blk_trace);
+if (likely(!bt)) {
+rcu_read_unlock();
return;
+
}

__blk_add_trace(bt, blk_rq_trace_sector(rq), blk_rq_bytes(rq), 0, 0,
BLK_TA_DRV_DATA, 0, len, data,
blk_trace_request_get_cgid(q, rq));
+rcu_read_unlock();
}
EXPORT_SYMBOL_GPL(blk_add_driver_data);
@@ -1231,21 +1310,10 @@
static __u64 get_pdu_int(const struct trace_entry *ent, bool has_cg)
{
-const __u64 *val = pdu_start(ent, has_cg);
+const __be64 *val = pdu_start(ent, has_cg);
return be64_to_cpu(*val);
}
-static void get_pdu_remap(const struct trace_entry *ent,
- struct blk_io_trace_remap *r, bool has_cg)
-
-const struct blk_io_trace_remap *__r = pdu_start(ent, has_cg);
-__u64 sector_from = __r->sector_from;
-
-device_from = be32_to_cpu(__r->device_from);
-device_to = be32_to_cpu(__r->device_to);
-sector_from = be64_to_cpu(sector_from);
-
-typedef void (blk_log_action_t) (struct trace_iterator *iter, const char *act,
-bool has_cg);

@@ -1371,13 +1439,13 @@
static void blk_log_remap(struct trace_seq *s, const struct trace_entry *ent, bool has_cg)
{
-struct blk_io_trace_remap r = { .device_from = 0, };
+
-const struct blk_io_trace_remap *__r = pdu_start(ent, has_cg);
-get_pdu_remap(ent, &r, has_cg);
-trace_seq_printf(s, "%llu + %u <- (%d,%d) %llu
",
- t_sector(ent), t_sec(ent),
- MAJOR(r.device_from), MINOR(r.device_from),
- (unsigned long long)r.sector_from);
+
+MAJOR(be32_to_cpu(__r->device_from)),
+MINOR(be32_to_cpu(__r->device_from)),
+be64_to_cpu(__r->sector_from));
}

static void blk_log_plug(struct trace_seq *s, const struct trace_entry *ent, bool has_cg)
@@ -1605,7 +1673,16 @@
if (bt == NULL)
return -EINVAL;

+if (bt->trace_state == Blktrace_running) {
+bt->trace_state = Blktrace_stopped;
+spin_lock_irq(&running_trace_lock);
+list_del_init(&bt->running_list);
+spin_unlock_irq(&running_trace_lock);
+relay_flush(bt->rchan);
+}
+
+put_probe_ref();
+synchronize_rcu();
+blk_trace_free(bt);
return 0;
}
@@ -1767,6 +1844,7 @@
struct hd_struct *p = dev_to_part(dev);
struct request_queue *q;
struct block_device *bdev;
+struct blk_trace *bt;
ssize_t ret = -ENXIO;

bdev = bdget(part_dev(p));
@@ -1779,21 +1857,23 @@
mutex_lock(&q->blk_trace_mutex);
+bt = rcu_dereference_protected(q->blk_trace,
 + lockdep_is_held(&q->blk_trace_mutex));
if (attr == &dev_attr_enable) {
- ret = sprintf(buf, "%u\n", !!q->blk_trace);
+ ret = sprintf(buf, "%u\n", !!bt);
go to out_unlock_bdev;
}

@if (q->blk_trace == NULL)
+if (bt == NULL)
 ret = sprintf(buf, "disabled\n");
else if (attr == &dev_attr_act_mask)
- ret = blk_trace_mask2str(buf, q->blk_trace->act_mask);
+ ret = blk_trace_mask2str(buf, bt->act_mask);
else if (attr == &dev_attr_pid)
- ret = sprintf(buf, "%u\n", q->blk_trace->pid);
+ ret = sprintf(buf, "%u\n", bt->pid);
else if (attr == &dev_attr_start_lba)
- ret = sprintf(buf, "%llu\n", q->blk_trace->start_lba);
+ ret = sprintf(buf, "%llu\n", bt->start_lba);
else if (attr == &dev_attr_end_lba)
- ret = sprintf(buf, "%llu\n", q->blk_trace->end_lba);
+ ret = sprintf(buf, "%llu\n", bt->end_lba);
out_unlock_bdev:
mutex_unlock(&q->blk_trace_mutex);
@@ -1810,6 +1890,7 @@
struct block_device *bdev;
 struct request_queue *q;
 struct hd_struct *p;
+struct blk_trace *bt;
u64 value;
ssize_t ret = -EINVAL;

mutex_lock(&q->blk_trace_mutex);

+bt = rcu_dereference_protected(q->blk_trace,
+   lockdep_is_held(&q->blk_trace_mutex));
if (attr == &dev_attr_enable) {
  +if (!!value == !!bt) {
    +ret = 0;
  +}
  +goto out_unlock_bdev;
} if (value)
ret = blk_trace_setup_queue(q, bdev);
else
@@ -1849,18 +1936,21 @@
}

ret = 0;
-if (q->blk_trace == NULL)
+if (bt == NULL) {
ret = blk_trace_setup_queue(q, bdev);
+bt = rcu_dereference_protected(q->blk_trace,
+   lockdep_is_held(&q->blk_trace_mutex));
+
if (ret == 0) {
  if (attr == &dev_attr_act_mask)
    -q->blk_trace->act_mask = value;
  +bt->act_mask = value;
  else if (attr == &dev_attr_pid)
    -q->blk_trace->pid = value;
  +bt->pid = value;
  else if (attr == &dev_attr_start_lba)
    -q->blk_trace->start_lba = value;
  +bt->start_lba = value;
  else if (attr == &dev_attr_end_lba)
    -q->blk_trace->end_lba = value;
  +bt->end_lba = value;
}

out_unlock_bdev:
--- linux-4.15.0.orig/kernel/trace/bpf_trace.c
+++ linux-4.15.0/kernel/trace/bpf_trace.c
@@ -176,11 +176,13 @@
i++;
 } else if (fmt[i] == 'p' || fmt[i] == 's') {
 mod[fmt_cnt]++;
-i++;

if (!isspace(fmt[i]) && !ispunct(fmt[i]) && fmt[i] != 0)
+ /* disallow any further format extensions */
+ if (fmt[i + 1] != 0 &&
+     !isspace(fmt[i + 1]) &&
+     !ispunct(fmt[i + 1]))
+ return -EINVAL;
+ fmt_cnt++;
- if (fmt[i - 1] == 's') {
+ if (fmt[i] == 's') {
    if (str_seen)
    /* allow only one '%s' per fmt string */
    return -EINVAL;
    @@ -636,7 +638,41 @@
         .arg3_type = ARG_ANYTHING,
         }

-  BPF_CALL_3(bpf_perf_prog_read_value_tp, struct bpf_perf_event_data_kern *, ctx,
+  static const struct bpf_func_proto *tp_prog_func_proto(enum bpf_func_id func_id)
+  {*
+    switch (func_id) {
+      case BPF_FUNC_perf_event_output:
+        return &bpf_perf_event_output_proto_tp;
+      case BPF_FUNC_get_stackid:
+        return &bpf_get_stackid_proto_tp;
+      default:
+        return tracing_func_proto(func_id);
+    }
+  }
+  +
+  +static bool tp_prog_is_valid_access(int off, int size, enum bpf_access_type type,
+  struct bpf_insn_access_aux *info)
+  {*
+    if (off < sizeof(void *) || off > PERF_MAX_TRACE_SIZE)
+      return false;
+    if (type != BPF_READ)
+      return false;
+    if (off % size != 0)
+      return false;
+    +BUILD_BUG_ON(PERF_MAX_TRACE_SIZE % sizeof(__u64));
+    return true;
+  }
+  +
+  +const struct bpf_verifier_ops tracepoint_verifier_ops = {
+    .get_func_proto = tp_prog_func_proto,
+    .is_valid_access = tp_prog_is_valid_access,
+    +};
+    +
const struct bpf_prog_ops tracepoint_prog_ops = {
+
+BPF_CALL_3(bpf_perf_prog_read_value, struct bpf_perf_event_data_kern *, ctx,
     struct bpf_perf_event_value *, buf, u32, size)
{
int err = -EINVAL;
@@ -653,8 +689,8 @@
    return err;
}

-static const struct bpf_func_proto bpf_perf_prog_read_value_proto_tp = {
-        .func           = bpf_perf_prog_read_value_tp,
+static const struct bpf_func_proto bpf_perf_prog_read_value_proto = {
+        .func           = bpf_perf_prog_read_value,
            .gpl_only       = true,
            .ret_type       = RET_INTEGER,
            .arg1_type      = ARG_PTR_TO_CTX,
@@ -662,7 +698,7 @@
            .arg3_type      = ARG_CONST_SIZE,
    }

-static const struct bpf_func_proto *tp_prog_func_proto(enum bpf_func_id func_id)
+static const struct bpf_func_proto *pe_prog_func_proto(enum bpf_func_id func_id)
{
switch (func_id) {
    case BPF_FUNC_perf_event_output:
@@ -670,34 +706,12 @@
    case BPF_FUNC_get_stackid:
        return &bpf_get_stackid_proto_tp;
    case BPF_FUNC_perf_prog_read_value:
-t	    return &bpf_perf_prog_read_value_proto_tp;
+    return &bpf_perf_prog_read_value_proto;
    default:
        return tracing_func_proto(func_id);
    }
}

-static bool tp_prog_is_valid_access(int off, int size, enum bpf_access_type type,
-     struct bpf_insn_access_aux *info)
-{
-    if (off < sizeof(void *) || off >= PERF_MAX_TRACE_SIZE)
-        return false;
-    if (type != BPF_READ)
-        return false;
-    if (off % size != 0)
-        return false;
-    

BUILD_BUG_ON(PERF_MAX_TRACE_SIZE % sizeof(__u64));
-return true;
-
-const struct bpf_verifier_ops tracepoint_verifier_ops = {
- .get_func_proto = tp_prog_func_proto,
- .is_valid_access = tp_prog_is_valid_access,
-};
-
-const struct bpf_prog_ops tracepoint_prog_ops = {
-
-static bool pe_prog_is_valid_access(int off, int size, enum bpf_access_type type,
- struct bpf_insn_access_aux *info)
- {
@@ -708,8 +722,14 @@ return false;
- if (type != BPF_READ)
- return false;
- if (off % size != 0) {
-+ if (off % size != 0) {
-+ if (sizeof(unsigned long) != 4)
-+ if (size != 8)
-+ if (off % size != 4)
-+ return false;
+}

 switch (off) {
 case bpf_ctx_range(struct bpf_perf_event_data, sample_period):
@@ -754,7 +774,7 @@
 }
 }

 const struct bpf_verifier_ops perf_event_verifier_ops = {
- .get_func_proto= tp_prog_func_proto,
+ .get_func_proto= pe_prog_func_proto,
- .is_valid_access= tp_prog_is_valid_access,
+ .convert_ctx_access= pe_prog_convert_ctx_access,
- .convert_ctx_access= pe_prog_convert_ctx_access,
-};
- --- linux-4.15.0.orig/kernel/trace/ftrace.c
- +++ linux-4.15.0/kernel/trace/ftrace.c
- @@ -33,6 +33,7 @@
 #include <linux/list.h>
 #include <linux/hash.h>
 #include <linux/rcupdate.h>
+##include <linux/kprobes.h>
```c
#include <trace/events/sched.h>

@@ -592,8 +593,7 @@
#endif
@@ -619,7 +619,8 @@
/* Divide only 1000 for ns^2 -> us^2 conversion.
 * trace_print_graph_duration will divide 1000 again.
 */
-do_div(stddev, rec->counter * (rec->counter - 1) * 1000);
+stddev = div64_ul(stddev, rec->counter * (rec->counter - 1) * 1000);
}
```
+ftrace_find_tramp_ops_any_other(struct dyn_ftrace *rec, struct ftrace_ops *op_exclude);
+static struct ftrace_ops *
+ftrace_find_tramp_ops_next(struct dyn_ftrace *rec, struct ftrace_ops *ops);
+
+static bool __ftrace_hash_rec_update(struct ftrace_ops *ops,
   int filter_hash,
   bool inc)
@@ -1815,15 +1823,17 @@
 }

/ *
 - * If the rec had TRAMP enabled, then it needs to
 - * be cleared. As TRAMP can only be enabled iff
 - * there is only a single ops attached to it.
 - * In otherwords, always disable it on decrementing.
 - * In the future, we may set it if rec count is
 - * decremented to one, and the ops that is left
 - * has a trampoline.
 + * The TRAMP needs to be set only if rec count
 + * is decremented to one, and the ops that is
 + * left has a trampoline. As TRAMP can only be
 + * enabled if there is only a single ops attached
 + * to it.
 */
-rec->flags &= ~FTRACE_FL_TRAMP;
+if (ftrace_rec_count(rec) == 1 &&
    + ftrace_find_tramp_ops_any_other(rec, ops))
+rec->flags |= FTRACE_FL_TRAMP;
+else
+rec->flags &= ~FTRACE_FL_TRAMP;

/ *
 * flags will be cleared in ftrace_check_record()
 @@ -2008,19 +2018,20 @@
 
 static void print_ip_ins(const char *fmt, const unsigned char *p)
 {
 +char ins[MCOUNT_INSN_SIZE];
  int i;

  +if (probe_kernel_read(ins, p, MCOUNT_INSN_SIZE)) { 
  +printk(KERN_CONT "%s[FAULT] %p\n", fmt, p);
  +return;
  +}
  +
  printk(KERN_CONT "%s", fmt);

  for (i = 0; i < MCOUNT_INSN_SIZE; i++)
-printk(KERN_CONT "%s%02x", i ? ":" : "", p[i]);
+printk(KERN_CONT "%s%02x", i ? ":" : "", ins[i]);
}

-static struct ftrace_ops *
-ftrace_find_tramp_ops_any(struct dyn_ftrace *rec);
-static struct ftrace_ops *
-ftrace_find_tramp_ops_next(struct dyn_ftrace *rec, struct ftrace_ops *ops);
-
enum ftrace_bug_type ftrace_bug_type;
const void *ftrace_expected;

@@ -2254,6 +2265,24 @@
}

static struct ftrace_ops *
+ftrace_find_tramp_ops_any_other(struct dyn_ftrace *rec, struct ftrace_ops *op_exclude)
+{
+    struct ftrace_ops *op;
+    unsigned long ip = rec->ip;
+    +do_for_each_ftrace_op(op, ftrace_ops_list) {
+        +if (op == op_exclude || !op->trampoline)
+            +continue;
+        +if (hash_contains_ip(ip, op->func_hash))
+            +return op;
+    +} while_for_each_ftrace_op(op);
+    +return NULL;
+}
+
+static struct ftrace_ops *
ftrace_find_tramp_ops_next(struct dyn_ftrace *rec,
    struct ftrace_ops *op)
{
@@ -3149,6 +3178,14 @@
hnd = &iter->probe_entry->hlist;

    hash = iter->probe->ops.func_hash->filter_hash;
+/
+/*
+ * A probe being registered may temporarily have an empty hash
+ * and it's at the end of the func_probes list.
+ */
+if (!hash || hash == EMPTY_HASH)
+return NULL;

+ size = 1 << hash->size_bits;

retry:
@@ -3586,21 +3623,22 @@
struct ftrace_hash *hash;
struct list_head *mod_head;
struct trace_array *tr = ops->private;
-int ret = 0;
+int ret = -ENOMEM;

ftrace_ops_init(ops);

if (unlikely(ftrace_disabled))
    return -ENODEV;

+if (tr && trace_array_get(tr) < 0)
+    return -ENODEV;
+
    iter = kzalloc(sizeof(*iter), GFP_KERNEL);
    if (!iter)
        goto out;
-    if (trace_parser_get_init(&iter->parser, FTRACE_BUFF_MAX)) {
-        kfree(iter);
-        return -ENOMEM;
-    }
+    if (trace_parser_get_init(&iter->parser, FTRACE_BUFF_MAX))
+        goto out;

    iter->ops = ops;
    iter->flags = flag;
@@ -3630,13 +3668,13 @@
    if (!iter->hash) {
        trace_parser_put(&iter->parser);
        kfree(iter);
-       ret = -ENOMEM;
+       ret = -ENOMEM;
        goto out_unlock;
    } else
    iter->hash = hash;

    +ret = 0;
    +
    if (file->f_mode & FMODE_READ) {
        iter->pg = ftrace_pages_start;

            

/* Failed */
free_ftrace_hash(iter->hash);
trace_parser_put(&iter->parser);
-kfree(iter);
}
} else
file->private_data = iter;
/*@ -3648,7 +3686,6 @@
out_unlock:
mutex_unlock(&ops->func_hash->regex_lock);
+
out:
+if (ret) {
+kfree(iter);
+if (tr)
+trace_array_put(tr);
+}
+
return ret;
}

/*@ -4247,10 +4291,13 @@
struct ftrace_func_entry *entry;
struct ftrace_func_map *map;
struct hlist_head *hhd;
-int size = 1 << mapper->hash.size_bits;
-int i;
+int size, i;
+
+if (!mapper)
+return;

if (free_func && mapper->hash.count) {
+size = 1 << mapper->hash.size_bits;
for (i = 0; i < size; i++) {
 hhd = &mapper->hash.buckets[i];
 hlist_for_each_entry(entry, hhd, hlist) {
/*@ -4342,12 +4389,21 @@
 mutex_unlock(&ftrace_lock);
 */
 /* Note, there's a small window here that the func_hash->filter_hash
 + may be NULL or empty. Need to be careful when reading the loop.
 + */
 mutex_lock(&probe->ops.func_hash->regex_lock);
orig_hash = &probe->ops.func_hash->filter_hash;
old_hash = *orig_hash;
hash = alloc_and_copy_ftrace_hash(FTRACE_HASH_DEFAULT_BITS, old_hash);

if (!hash) {
  ret = -ENOMEM;
  goto out;
}
ret = ftrace_match_records(hash, glob, strlen(glob));

/* Nothing found? */
@@ -4456,7 +4512,6 @@
func_g.type = filter_parse_regex(glob, strlen(glob),
    &func_g.search, &not);
func_g.len = strlen(func_g.search);
-func_g.search = glob;

/* we do not support '!' for function probes */
if (WARN_ON(not))
@@ -5015,8 +5070,11 @@

parser = &iter->parser;
if (trace_parser_loaded(parser)) {
  int enable = !(iter->flags & FTRACE_ITER_NOTRACE);
  +
  parser->buffer[parser->idx] = 0;
  -ftrace_match_records(iter->hash, parser->buffer, parser->idx);
  +ftrace_process_regex(iter, parser->buffer,
  +        parser->idx, enable);
  }

trace_parser_put(parser);
@@ -5044,6 +5102,8 @@

mutex_unlock(&iter->ops->func_hash->regex_lock);
free_ftrace_hash(iter->hash);
+if (iter->tr)
+trace_array_put(iter->tr);
kfree(iter);

return 0;
@@ -5083,8 +5143,8 @@

static DEFINE_MUTEX(graph_lock);

-struct ftrace_hash *ftrace_graph_hash = EMPTY_HASH;
enum graph_filter_type {
    GRAPH_FILTER_NOTRACE = 0,
    @ @ -5356,8 +5416,15 @@

    mutex_unlock(&graph_lock);

    /* Wait all users are no longer using the old hash */
    -synchronize_sched();
    +/*
    + * We need to do a hard force of sched synchronization.
    + * This is because we use preempt_disable() to do RCU, but
    + * the function tracers can be called where RCU is not watching
    + * (like before user_exit()). We cannot rely on the RCU
    + * infrastructure to do the synchronization, thus we must do it
    + * ourselves.
    + */
    +schedule_on_each_cpu(ftrace_sync);

    free_ftrace_hash(old_hash);
    }
    @ @ -5503,6 +5570,7 @@
    if (ops->flags & FTRACE_OPS_FL_ENABLED)
    ftrace_shutdown(ops, 0);
    ops->flags |= FTRACE_OPS_FL_DELETED;
    +ftrace_free_filter(ops);
    mutex_unlock(&ftrace_lock);
    }
    @ @ -5669,8 +5737,11 @@
    int cnt = 0;

    for (ops = ftrace_ops_list; ops != &ftrace_list_end; ops = ops->next) {
        -if (ops_references_rec(ops, rec)) {
        -    cnt++;
        +if (ops_references_rec(ops, rec)) {
        +    cnt++;
        +if (ops->flags & FTRACE_OPS_FL_SAVE_REGS)
        +    rec->flags |= FTRACE_FL_REGS;
        +}
        +}

    return cnt;
    @ @ -5847,8 +5918,8 @@
    if (ftrace_start_up)
cnt += referenced_filters(rec);

/* This clears FTRACE_FL_DISABLED */
-rec->flags = cnt;
+rec->flags &= ~FTRACE_FL_DISABLED;
+rec->flags += cnt;

if (ftrace_start_up &&& cnt) {
  int failed = __ftrace_replace_code(rec, 1);
  @@ -6292,14 +6363,14 @@
  tr->ops->func = ftrace_stub;
}

-static inline void
+static nokprobe_inline void
__ftrace_ops_list_func(unsigned long ip, unsigned long parent_ip,
   struct ftrace_ops *ignored, struct pt_regs *regs)
{
  struct ftrace_ops *op;
  int bit;

  -bit = trace_test_and_set_recursion(TRACE_LIST_START, TRACE_LIST_MAX);
  +bit = trace_test_and_set_recursion(TRACE_LIST_START);
  if (bit < 0)
    return;

  @@ -6352,11 +6423,13 @@
  {
    __ftrace_ops_list_func(ip, parent_ip, NULL, regs);
  }
+NOKPROBE_SYMBOL(ftrace_ops_list_func);
#else
  static void ftrace_ops_no_ops(unsigned long ip, unsigned long parent_ip)
  {
    __ftrace_ops_list_func(ip, parent_ip, NULL, NULL);
  }
+NOKPROBE_SYMBOL(ftrace_ops_no_ops);
#endif

/*
 @@ -6369,20 +6442,19 @@
  {
    __ftrace_ops_list_func(ip, parent_ip, NULL, NULL);
  }
+NOKPROBE_SYMBOL(ftrace_ops_no_ops);
#endif

/*
 @@ -6369,20 +6442,19 @@
  {
    int bit;

    -if ((op->flags & FTRACE_OPS_FL_RCU) && !rcu_is_watching())
    -return;
    -
    -bit = trace_test_and_set_recursion(TRACE_LIST_START, TRACE_LIST_MAX);

```c
+bit = trace_test_and_set_recursion(TRACE_LIST_START);
if (bit < 0)
return;

preempt_disable_notrace();

-op->func(ip, parent_ip, op, regs);
+if (!(op->flags & FTRACE_OPS_FL_RCU) || rcu_is_watching())
+op->func(ip, parent_ip, op, regs);

preempt_enable_notrace();
trace_clear_recursion(bit);
}
+NOKPROBE_SYMBOL(ftrace_ops_assist_func);

/**
 * ftrace_ops_get_func - get the function a trampoline should call
 * @ tr
 * @ v: index in function pids list
 * @ pos: to track pids in function pids list
 * @ enable: to enable or disable function pids list
 * @ pid: pointer to store the pid
 * @ @ @ -6448,12 +6520,12 @@
if (enable) {
  register_trace_sched_process_fork(ftrace_pid_follow_sched_process_fork,
    tr);
  -register_trace_sched_process_exit(ftrace_pid_follow_sched_process_exit,
    +register_trace_sched_process_free(ftrace_pid_follow_sched_process_exit,
    tr);
} else {
  unregister_trace_sched_process_fork(ftrace_pid_follow_sched_process_fork,
    tr);
  -unregister_trace_sched_process_exit(ftrace_pid_follow_sched_process_exit,
    +unregister_trace_sched_process_free(ftrace_pid_follow_sched_process_exit,
    tr);
}
@@ -6526,9 +6598,10 @@
struct trace_array *tr = m->private;
struct trace_pid_list *pid_list = rcu_dereference_sched(tr->function_pids);

-if (v == FTRACE_NO_PIDS)
+if (v == FTRACE_NO_PIDS) {
  +(*pos)++;
  return NULL;
  -
  +}
  return trace_pid_next(pid_list, v, pos);
}
@@ -6853,9 +6926,9 @@
```
if (t->ret_stack == NULL) {
    atomic_set(&t->tracing_graph_pause, 0);
    atomic_set(&t->trace_overrun, 0);
    t->curr_ret_stack = -1;
    t->curr_ret_depth = -1;
    /* Make sure the tasks see the -1 first: */
    smp_wmb();
    t->ret_stack = ret_stack_list[start++];
}

static void
graph_init_task(struct task_struct *t, struct ftrace_ret_stack *ret_stack)
{
    atomic_set(&t->tracing_graph_pause, 0);
    atomic_set(&t->trace_overrun, 0);
    t->ftrace_timestamp = 0;
    /* make curr_ret_stack visible before we add the ret_stack */
    void ftrace_graph_init_idle_task(struct task_struct *t, int cpu)
    {
        t->curr_ret_stack = -1;
        t->curr_ret_depth = -1;
        /*
        * The idle task has no parent, it either has its own
        * stack or no stack at all.
        */
        if (ftrace_graph_active) {
            struct ftrace_ret_stack *ret_stack;
            /* Used for which event context the event is in.
               * NMI = 0
               * IRQ = 1
               * SOFTIRQ = 2
               * NORMAL = 3
               * TRANSITION = 0
               * NMI = 1
               * IRQ = 2
               * SOFTIRQ = 3
               * NORMAL = 4
               */
enum {
    RB_CTX_TRANSITION,
    RB_CTX_NMI,
    RB_CTX_IRQ,
    RB_CTX_SOFTIRQ,
}

preempt_disable_notrace();
time = rb_time_stamp(buffer);
-preempt_enable_no_resched_notrace();
+preempt_enable_notrace();

return time;
}

/* Check if the available memory is there first */
+i = si_mem_available();
+if (i < nr_pages)  
+return -ENOMEM;
+
for (i = 0; i < nr_pages; i++) {
    struct page *page;
    /*
     * Always succeed at resizing a non-existent buffer:
     */
    if (!buffer)
-return size;
+return 0;

/* Make sure the requested buffer exists */
if (cpu_id != RING_BUFFER_ALL_CPUS &&
    !cpumask_test_cpu(cpu_id, buffer->cpumask))
-    return size;
+    return 0;

nr_pages = DIV_ROUND_UP(size, BUF_PAGE_SIZE);

mutex_unlock(&buffer->mutex);
-    return size;
+    return 0;

out_err:
for_each_buffer_cpu(buffer, cpu) {
    @@ -1769,7 +1778,7 @@
        *
        * a bit of overhead in something as critical as function tracing,
        * we use a bitmask trick.
        *
-        * bit 0 = NMI context
-        * bit 1 = IRQ context
-        * bit 2 = SoftIRQ context
-        * bit 3 = normal context.
+        * bit 1 = NMI context
+        * bit 2 = IRQ context
+        * bit 3 = SoftIRQ context
+        * bit 4 = normal context.
        *
        * This works because this is the order of contexts that can
        * preempt other contexts. A SoftIRQ never preempts an IRQ
    @@ -2540,10 +2549,10 @@
        * this way, and it
        * just so happens that it is the same bit corresponding to
        * the current context.
        *
        + * Now the TRANSITION bit breaks the above slightly. The TRANSITION bit
        + * is set when a recursion is detected at the current context, and if
        + * the TRANSITION bit is already set, it will fail the recursion.
        + * This is needed because there's a lag between the changing of
        + * interrupt context and updating the preempt count. In this case,
        + * a false positive will be found. To handle this, one extra recursion
        + * is allowed, and this is done by the TRANSITION bit. If the TRANSITION
        + * bit is already set, then it is considered a recursion and the function
ends. Otherwise, the TRANSITION bit is set, and that bit is returned.

On the trace_recursive_unlock(), the TRANSITION bit will be the first to be cleared. Even if it wasn't the context that set it. That is, if an interrupt comes in while NORMAL bit is set and the ring buffer is called before preempt_count() is updated, since the check will be on the NORMAL bit, the TRANSITION bit will then be set. If an NMI then comes in, it will set the NMI bit, but when the NMI code does the trace_recursive_unlock() it will clear the TRANSITION bit and leave the NMI bit set. But this is fine, because the interrupt code that set the TRANSITION bit will then clear the NMI bit when it calls trace_recursive_unlock(). If another NMI comes in, it will set the TRANSITION bit and continue.

Note: The TRANSITION bit only handles a single transition between context.

static __always_inline int
@@ -2581,8 +2614,16 @@
bit = pc & NMI_MASK ? RB_CTX_NMI :
    pc & HARDIRQ_MASK ? RB_CTX_IRQ : RB_CTX_SOFTIRQ;

-   if (unlikely(val & (1 << bit)))
-     return 1;
+   if (unlikely(val & (1 << bit))) {
+     /*
+      * It is possible that this was called by transitioning
+      * between interrupt context, and preempt_count() has not
+      * been updated yet. In this case, use the TRANSITION bit.
+      */
+     bit = RB_CTX_TRANSITION;
+     +if (val & (1 << bit))
+        +return 1;
+   }

    val |= (1 << bit);
    cpu_buffer->current_context = val;
@@ -3004,10 +3045,30 @@
if (unlikely(!head))
    return true;

-   return reader->read == rb_page_commit(reader) &&
-      (commit == reader ||
-      (commit == head &&
-       head->read == rb_page_commit(commit));
-*/  Reader should exhaust content in reader page */
+   +if (reader->read != rb_page_commit(reader))
+      +return false;
/*
 * If writers are committing on the reader page, knowing all
 * committed content has been read, the ring buffer is empty.
 */
if (commit == reader)
    return true;

/*
 * If writers are committing on a page other than reader page
 * and head page, there should always be content to read.
 */
if (commit != head)
    return false;

/* Writers are committing on the head page, we just need
 * to care about there’re committed data, and the reader will
 * swap reader page with head page when it is to read data.
 */
return rb_page_commit(commit) == 0;
}

/**
 @@ -3096,6 +3157,22 @@
 }

 /**
 + * ring_buffer_record_is_set_on - return true if the ring buffer is set writable
 + * @buffer: The ring buffer to see if write is set enabled
 + *
 + * Returns true if the ring buffer is set writable by ring_buffer_record_on().
 + * Note that this does NOT mean it is in a writable state.
 + *
 + * It may return true when the ring buffer has been disabled by
 + * ring_buffer_record_disable(), as that is a temporary disabling of
 + * the ring buffer.
 + */
+int ring_buffer_record_is_set_on(struct ring_buffer *buffer)
+{
+    return !(atomic_read(&buffer->record_disabled) & RB_BUFFER_OFF);
+}
+
+/**
 * ring_buffer_record_disable_cpu - stop all writes into the cpu_buffer
 * @buffer: The ring buffer to stop writes to.
 * @cpu: The CPU buffer to stop
 @@ -3978,6 +4055,7 @@

* ring_buffer_read_prepare - Prepare for a non consuming read of the buffer
* @buffer: The ring buffer to read from
* @cpu: The cpu buffer to iterate over
+ * @flags: gfp flags to use for memory allocation
* 
* This performs the initial preparations necessary to iterate
* through the buffer. Memory is allocated, buffer recording
@@ -3995,7 +4073,7 @@
* This overall must be paired with ring_buffer_read_finish.
* /

struct ring_buffer_iter *
-    ring_buffer_read_prepare(struct ring_buffer *buffer, int cpu)
+    ring_buffer_read_prepare(struct ring_buffer *buffer, int cpu, gfp_t flags)
{
    struct ring_buffer_per_cpu *cpu_buffer;
    struct ring_buffer_iter *iter;
@@ -4003,7 +4081,7 @@
    if (!cpumask_test_cpu(cpu, buffer->cpumask))
        return NULL;

-    iter = kmalloc(sizeof(*iter), GFP_KERNEL);
+    iter = kmalloc(sizeof(*iter), flags);
    if (!iter)
        return NULL;

@@ -4195,6 +4273,8 @@
    if (!cpumask_test_cpu(cpu, buffer->cpumask))
        return;
+/* prevent another thread from changing buffer sizes */
+    mutex_lock(&buffer->mutex);

    atomic_inc(&buffer->resize_disabled);
    atomic_inc(&cpu_buffer->record_disabled);
@@ -4218,6 +4298,8 @@
    atomic_dec(&cpu_buffer->record_disabled);
    atomic_dec(&buffer->resize_disabled);
    +
    +mutex_unlock(&buffer->mutex);
} 
EXPORT_SYMBOL_GPL(ring_buffer_reset_cpu);
pid_list = kmalloc(sizeof(*pid_list), GFP_KERNEL);
- if (!pid_list)
+ if (!pid_list) {
+ trace_parser_put(&parser);
 return -ENOMEM;
+ }

pid_list->pid_max = READ_ONCE(pid_max);

@@ -505,6 +507,7 @@

pid_list->pids = vzalloc((pid_list->pid_max + 7) >> 3);
 if (!pid_list->pids) {
+ trace_parser_put(&parser);
 kfree(pid_list);
 return -ENOMEM;
 }  
@@ -894,7 +897,7 @@
 EXPORT_SYMBOL_GPL(__trace_bputs);

#ifdef CONFIG_TRACER_SNAPSHOT
- static void tracing_snapshot_instance(struct trace_array *tr)
+ void tracing_snapshot_instance(struct trace_array *tr)
 {  
 struct tracer *tracer = tr->current_trace;
 unsigned long flags;
@@ -950,7 +953,7 @@
 struct trace_buffer *size_buf, int cpu_id);
 static void set_buffer_entries(struct trace_buffer *buf, unsigned long val);

- static int alloc_snapshot(struct trace_array *tr)
+ int tracing_alloc_snapshot_instance(struct trace_array *tr)
 {  
 int ret;
@@ -996,7 +999,7 @@
 struct trace_array *tr = &global_trace;
 int ret;

- ret = alloc_snapshot(tr);
+ ret = tracing_alloc_snapshot_instance(tr);
 WARN_ON(ret < 0);

 return ret;
@@ -1366,6 +1369,12 @@

 arch_spin_lock(&tr->max_lock);
Inherit the recordable setting from trace_buffer */
+if (ring_buffer_record_is_set_on(tr->trace_buffer.buffer))
+ring_buffer_record_on(tr->max_buffer.buffer);
+else
+ring_buffer_record_off(tr->max_buffer.buffer);
+
buf = tr->trace_buffer.buffer;
tr->trace_buffer.buffer = tr->max_buffer.buffer;
tr->max_buffer.buffer = buf;
@@ -1534,6 +1543,7 @@
pr_info("Running postponed tracer tests:\n");

+tracing_selftest_running = true;
list_for_each_entry_safe(p, n, &postponed_selftests, list) {
ret = run_tracer_selftest(p->type);
/* If the test fails, then warn and remove from available_tracers */
@@ -1552,6 +1562,7 @@
list_del(&p->list);
kfree(p);
}
+tracing_selftest_running = false;

out:
mutex_unlock(&trace_types_lock);
@@ -1726,9 +1737,6 @@
};
static struct saved_cmdlines_buffer *savedcmd;

-/* temporary disable recording */
-atomic_t trace_record_taskinfo_disabled __read_mostly;
-
static inline char *get_saved_cmdlines(int idx)
{
return &savedcmd->saved_cmdlines[idx * TASK_COMM_LEN];
@@ -1917,14 +1925,13 @@
static int trace_save_cmdline(struct task_struct *tsk)
{
    unsigned pid, idx;
    unsigned tpid, idx;

    /* treat recording of idle task as a success */
    if (!tsk->pid)
        return 1;

    -if (unlikely(tsk->pid > PID_MAX_DEFAULT))
    -return 0;
+tpid = tsk->pid & (PID_MAX_DEFAULT - 1);

/*
 * It's not the end of the world if we don't get
 @@ -1935,26 +1942,15 @@
 if (!arch_spin_trylock(&trace_cmdline_lock))
 return 0;

 -idx = savedcmd->map_pid_to_cmdline[tsk->pid];
 +idx = savedcmd->map_pid_to_cmdline[tpid];
 if (idx == NO_CMDLINE_MAP) {
  idx = (savedcmd->cmdline_idx + 1) % savedcmd->cmdline_num;

 */
 - * Check whether the cmdline buffer at idx has a pid
 - * mapped. We are going to overwrite that entry so we
 - * need to clear the map_pid_to_cmdline. Otherwise we
 - * would read the new comm for the old pid.
 - */
 -pid = savedcmd->map_cmdline_to_pid[idx];
 -if (pid != NO_CMDLINE_MAP)
 -savedcmd->map_cmdline_to_pid[pid] = NO_CMDLINE_MAP;
 -
 -savedcmd->map_cmdline_to_pid[idx] = tsk->pid;
 -savedcmd->map_pid_to_cmdline[tsk->pid] = idx;
 -
 +savedcmd->map_pid_to_cmdline[tpid] = idx;
 savedcmd->cmdline_idx = idx;
 }

 +savedcmd->map_cmdline_to_pid[idx] = tsk->pid;
 set_cmdline(idx, tsk->comm);

 arch_spin_unlock(&trace_cmdline_lock);
 @@ -1965,6 +1961,7 @@
 static void __trace_find_cmdline(int pid, char comm[])
 {
  unsigned map;
 +int tpid;

 if (!pid) {
  strcpy(comm, "<idle>");
 @@ -1976,16 +1973,16 @@
 return;
 }

 -if (pid > PID_MAX_DEFAULT) {
 -strcpy(comm, "<...>");


return;
tpid = pid & (PID_MAX_DEFAULT - 1);
map = savedcmd->map_pid_to_cmdline[tpid];
if (map != NO_CMDLINE_MAP) {
    tpid = savedcmd->map_cmdline_to_pid[map];
    if (tpid == pid) {
        strlcpy(comm, get_saved_cmdlines(map), TASK_COMM_LEN);
        return;
    }
}
- map = savedcmd->map_pid_to_cmdline[pid];
- if (map != NO_CMDLINE_MAP)
- strlcpy(comm, get_saved_cmdlines(map), TASK_COMM_LEN);
- else
- strcpy(comm, "<...>");
+ strcpy(comm, "<...>");
}

void trace_find_cmdline(int pid, char comm[])
@@ -2024,8 +2021,6 @@
{
if (unlikely(!(flags & (TRACE_RECORD_CMDLINE | TRACE_RECORD_TGID))))
    return true;
-if (atomic_read(&trace_record_taskinfo_disabled) || !tracing_is_on())
-    return true;
if (!__this_cpu_read(trace_taskinfo_save))
    return false;
@@ -2274,7 +2269,7 @@
(entry = this_cpu_read(trace_buffered_event))) {
  /* Try to use the per cpu buffer first */
  val = this_cpu_inc_return(trace_buffered_event_cnt);
-    if (val == 1) {
-        if ((len < (PAGE_SIZE - sizeof(*entry) - sizeof(entry->array[0]))) && val == 1) {
+        if ((len < (PAGE_SIZE - sizeof(*entry) - sizeof(entry->array[0]))) && val == 1) {
            trace_event_setup(entry, type, flags, pc);
            entry->array[0] = len;
            return entry;
@@ -2398,7 +2393,7 @@
* two. They are not that meaningful.
  */
  ftrace_trace_stack(tr, buffer, flags, regs ? 0 : STACK_SKIP, pc, regs);
  -ftrace_trace_userstack(buffer, flags, pc);
  +ftrace_trace_userstack(tr, buffer, flags, pc);
}

/*
size *= sizeof(unsigned long);

event = __trace_buffer_lock_reserve(buffer, TRACE_STACK,
    sizeof(*entry) + size, flags, pc);
+ (sizeof(*entry) - sizeof(entry->caller)) + size,
+ flags, pc);
if (!event)
    goto out;
entry = ring_buffer_event_data(event);
@@ -2729,14 +2725,15 @@
static DEFINE_PER_CPU(int, user_stack_count);

void
-ftrace_trace_userstack(struct ring_buffer *buffer, unsigned long flags, int pc)
+ftrace_trace_userstack(struct trace_array *tr,
    struct ring_buffer *buffer, unsigned long flags, int pc)
{
    struct trace_event_call *call = &event_user_stack;
    struct ring_buffer_event *event;
    struct userstack_entry *entry;
    struct stack_trace trace;

    -if (!(global_trace.trace_flags & TRACE_ITER_USERSTACKTRACE))
    +if (!(tr->trace_flags & TRACE_ITER_USERSTACKTRACE))
        return;

    /*
    @@ -2812,7 +2809,7 @@
    /* Interrupts must see nesting incremented before we use the buffer */
    barrier();
    -return &buffer->buffer[buffer->nesting][0];
    +return &buffer->buffer[buffer->nesting - 1][0];
    }

    static void put_trace_buf(void)
    @@ -2958,6 +2955,7 @@
    }
    EXPORT_SYMBOL_GPL(trace_vbprintk);

    +__printf(3, 0)
    static int
    __trace_array_vprintk(struct ring_buffer *buffer,
        unsigned long ip, const char *fmt, va_list args)
    @@ -3012,12 +3010,14 @@
        return len;
    }

int trace_array_vprintk(struct trace_array *tr,
unsigned long ip, const char *fmt, va_list args)
{
    return __trace_array_vprintk(tr->trace_buffer.buffer, ip, fmt, args);
}

int trace_array_printk(struct trace_array *tr,
unsigned long ip, const char *fmt, ...) {
    if (!tr)
        return -ENOENT;
    va_start(ap, fmt);
    ret = trace_array_vprintk(tr, ip, fmt, ap);
    va_end(ap);
    return ret;
}

int trace_array_printk_buf(struct ring_buffer *buffer,
unsigned long ip, const char *fmt, ...) {
    return ret;
}

int trace_vprintk(unsigned long ip, const char *fmt, va_list args)
{
    return trace_array_vprintk(&global_trace, ip, fmt, args);
}

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- if (!iter->snapshot)
  - atomic_dec(&trace_record_taskinfo_disabled);
    - trace_access_unlock(iter->cpu_file);
  trace_event_read_unlock();
}
@@ -3365,8 +3364,8 @@
print_event_info(buf, m);

  -seq_printf(m, "#           TASK-PID   CPU#   %s  TIMESTAMP  FUNCTION
", tgid ? "TGID ": "");
  -seq_printf(m, "#              | |       |    %s     |         |
", tgid ? "  |      " : "");
+seq_printf(m, "#           TASK-PID   %s CPU#   TIMESTAMP  FUNCTION
", tgid ? "TGID ": "");
+seq_printf(m, "#              | |     %s    |       |         |
", tgid ? "  |      " : "");
}
static void print_func_help_header_irq(struct trace_buffer *buf, struct seq_file *m,
@@ -3376,6 +3375,8 @@
  tgid_space[] = "          ";
  space[] = "  ";
  +print_event_info(buf, m);
  +
  seq_printf(m, "#                          %s  _-----=> irqs-off
", tgid ? tgid_space : space);
  seq_printf(m, "#                          %s / _----=> need-resched
", tgid ? tgid_space : space);
  seq_printf(m, "#                          %s||| /     delay
", tgid ? tgid_space : space);
  @ @ -3386,9 +3387,9 @@
  tgid ? tgid_space : space);
  seq_printf(m, "#                          %s
", tgid ? tgid_space : space);
  -seq_printf(m, "#           TASK-PID CPU#%s
", tgid ? "TGID ": "");
  +seq_printf(m, "#           TASK-PID %sCPU#  TIMESTAMP FUNCTION
", tgid ? "TGID ": "");
  +seq_printf(m, "#              | |     %s    |       |         |
", tgid ? "  |      " : "");
  tgid ? "  |      " : "");
}
@@ -3894,7 +3895,8 @@
if (iter->cpu_file == RING_BUFFER_ALL_CPUS) {
  for_each_tracing_cpu(cpu) {
    -ring_buffer_read_prepare(iter->trace_buffer->buffer, cpu);
+ring_buffer_read_prepare(iter->trace_buffer->buffer,
    + cpu, GFP_KERNEL);
  }

Open Source Used In 5GaaS Edge AC-4 33015
ring_buffer_read_prepare_sync();
for_each_tracing_cpu(cpu) {
    /* -3904,7+3906,8 */
} else {
    cpu = iter->cpu_file;
    iter->buffer_iter[cpu] =
        ring_buffer_read_prepare(iter->trace_buffer->buffer, cpu);
    +ring_buffer_read_prepare(iter->trace_buffer->buffer, +
        cpu, GFP_KERNEL);
    ring_buffer_read_prepare_sync();
    ring_buffer_read_start(iter->buffer_iter[cpu]);
    tracing_iter_reset(iter, cpu);
    /* -4140,9+4143,14 */
if (tracing_disabled)
    return -ENODEV;

+if (trace_array_get(tr) < 0)
+return -ENODEV;
+
ret = seq_open(file, &show_traces_seq_ops);
  -if (ret)
  +if (ret) {
  +trace_array_put(tr);
  return ret;
  +}

m = file->private_data;
if (trace_array_get(tr) < 0)
    return -ENODEV;
+
ret = seq_open(file, &show_traces_seq_ops);
  -if (ret)
  +if (ret) {
  +trace_array_put(tr);
  return ret;
  +}

+static int show_traces_release(struct inode *inode, struct file *file)
+{
+struct trace_array *tr = inode->i_private;
+    +trace_array_put(tr);
+    return seq_release(inode, file);
+}
+
static ssize_t
tracing_write_stub(struct file *filp, const char __user *ubuf,
    size_t count, loff_t *ppos)
    /* -4180,8+4196,8 */
static const struct file_operations show_traces_fops = {
    .open= show_traces_open,
    .read= seq_read,
    .release= seq_release,
int set_tracer_flag(struct trace_array *tr, unsigned int mask, int enabled)
{
    if ((mask == TRACE_ITER_RECORD_TGID) ||
        (mask == TRACE_ITER_RECORD_CMD))
        lockdep_assert_held(&event_mutex);
    /* do nothing if flag is already set */
    if (!(tr->trace_flags & mask) == !enabled)
        return 0;
    mutex_lock(&event_mutex);
    mutex_lock(&trace_types_lock);
    for (i = 0; trace_options[i]; i++) {
        ret = set_tracer_option(tr, cmp, neg);
    }
    mutex_unlock(&trace_types_lock);
    mutex_unlock(&event_mutex);

    /* If the first trailing whitespace is replaced with \0 by strstrip,
    */
    static void *saved_tgids_next(struct seq_file *m, void *v, loff_t *pos)
    {
        int *ptr = v;
        int pid = ++(*pos);

        -if (*pos || m->count)
            ptr++;

    -(*pos)++;
    -for (; ptr <= &tgid_map[PID_MAX_DEFAULT]; ptr++) {
        -if (trace_find_tgid(*ptr))
            return ptr;
    -}
+if (pid > PID_MAX_DEFAULT)
+return NULL;

-return NULL;
+return &tgid_map[pid];
}

static void *saved_tgids_start(struct seq_file *m, loff_t *pos)
{
-void *v;
-loff_t l = 0;
-
-if (!tgid_map)
+if (!tgid_map || *pos > PID_MAX_DEFAULT)
  return NULL;

-v = &tgid_map[0];
-while (l <= *pos) {
-v = saved_tgids_next(m, v, &l);
-if (!v)
  -return NULL;
-
  return v;
+return &tgid_map[*pos];
}

static void saved_tgids_stop(struct seq_file *m, void *v)
@@ -4773,9 +4778,14 @@
static int saved_tgids_show(struct seq_file *m, void *v)
{
-int pid = (int *)v - tgid_map;
+int *entry = (int *)v;
+int pid = entry - tgid_map;
+int tgid = *entry;
+
+if (tgid == 0)
+  return SEQ_SKIP;
-seq_printf(m, "%d %d\n", pid, trace_find_tgid(pid));
+seq_printf(m, "%d %d\n", pid, tgid);
  return 0;
}
@@ -5406,7 +5416,7 @@
#endif CONFIG_TRACER_MAX_TRACE
if (t->use_max_tr && !had_max_tr) {
    ret = alloc_snapshot(tr);
+    ret = tracing_alloc_snapshot_instance(tr);
    if (ret < 0)
        goto out;
}
@@ -5597,7 +5607,6 @@
return ret;

fail:
-kfree(iter->trace);
kfree(iter);
-__trace_array_put(tr);
mutex_unlock(&trace_types_lock);
@@ -5740,6 +5749,7 @@
    sizeof(struct trace_iterator) -
    offsetof(struct trace_iterator, seq));
cpumask_clear(iter->started);
+    trace_seq_init(&iter->seq);
iter->pos = -1;

trace_event_read_lock();
@@ -6383,11 +6393,13 @@
break;
} #endif
-    if (!tr->allocated_snapshot) {
-        ret = alloc_snapshot(tr);
-        if (ret < 0)
-            break;
-    }
+    if (tr->allocated_snapshot)
+        ret = resize_buffer_duplicate_size(&tr->max_buffer,
+                                            &tr->trace_buffer, iter->cpu_file);
+    else
+        ret = tracing_alloc_snapshot_instance(tr);
+        if (ret < 0)
+            break;
local_irq_disable();
/* Now, we’re going to swap */
if (iter->cpu_file == RING_BUFFER_ALL_CPUS)
@@ -6708,28 +6720,36 @@
struct ring_buffer*buffer;
void*page;
int cpu;
-intref;
+refcount_trefcount;
};
+static void buffer_ref_release(struct buffer_ref *ref)
+{
+if (!refcount_dec_and_test(&ref->refcount))
+return;
+ring_buffer_free_read_page(ref->buffer, ref->cpu, ref->page);
+kfree(ref);
+}
+
static void buffer_pipe_buf_release(struct pipe_inode_info *pipe,
    struct pipe_buffer *buf)
{
struct buffer_ref *ref = (struct buffer_ref *)buf->private;

-if (--ref->ref)
-return;
-
-ring_buffer_free_read_page(ref->buffer, ref->cpu, ref->page);
-kfree(ref);
+buffer_ref_release(ref);
buf->private = 0;
}

-static void buffer_pipe_buf_get(struct pipe_inode_info *pipe,
+static bool buffer_pipe_buf_get(struct pipe_inode_info *pipe,
    struct pipe_buffer *buf)
{
struct buffer_ref *ref = (struct buffer_ref *)buf->private;

-ref->ref++;
+if (refcount_read(&ref->refcount) > INT_MAX/2)
+return false;
+
+refcount_inc(&ref->refcount);
+return true;
}

/* Pipe buffer operations for a buffer. */
@@ -6737,7 +6757,7 @@
   .can_merge	= 0,
   .confirm	= generic_pipe_buf_confirm,
   .release	= buffer_pipe_buf_release,
-  .steal	= generic_pipe_buf_steal,
+  .steal	= generic_pipe_buf_nosteal,
   .get	= buffer_pipe_buf_get,
}

@@ -6750,11 +6770,7 @@
struct buffer_ref *ref = 
(struct buffer_ref *)spd->partial[i].private;

-if (--ref->ref) 
-return;
-
-ring_buffer_free_read_page(ref->buffer, ref->cpu, ref->page); 
-kfree(ref); 
+buffer_ref_release(ref); 
spd->partial[i].private = 0;
}

@@ -6809,7 +6825,7 @@
break;
} 

-ref->ref = 1; 
+refcount_set(&ref->refcount, 1); 
ref->buffer = iter->trace_buffer->buffer; 
ref->page = ring_buffer_alloc_read_page(ref->buffer, iter->cpu_file); 
if (IS_ERR(ref->page)) { 
@@ -7105,7 +7121,7 @@
return ret;
out_reg:
-ret = alloc_snapshot(tr); 
+ret = tracing_alloc_snapshot_instance(tr); 
if (ret < 0) 
goto out;
@@ -7342,9 +7358,11 @@
if (val != 0 && val != 1) 
return -EINVAL;
+mutex_lock(&event_mutex); 
mutex_lock(&trace_types_lock); 
ret = set_tracer_flag(tr, 1 << index, val); 
mutex_unlock(&trace_types_lock); 
+mutex_unlock(&event_mutex); 
if (ret < 0) 
return ret;
@@ -7540,7 +7558,9 @@
if (buffer) { 
mutex_lock(&trace_types_lock); 
-if (val) { 
+if (!!val == tracer_tracing_is_on(tr)) {

}
+val = 0; /* do nothing */
+} else if (val) {
    tracer_tracing_on(tr);
    if (tr->current_trace->start)
        tr->current_trace->start(tr);
@
+allocate_snapshot = false;
@endif
+
+/*
+ * Because of some magic with the way alloc_per_cpu() works on
+ * x86_64, we need to synchronize the pgd of all the tables,
+ * otherwise the trace events that happen in x86_64 page fault
+ * handlers can't cope with accessing the chance that a
+ * alloc_per_cpu()'d memory might be touched in the page fault trace
+ * event. Oh, and we need to audit all other alloc_per_cpu() and vmalloc()
+ * calls in tracing, because something might get triggered within a
+ * page fault trace event!
+ */
+vmalloc_sync_mappings();
+
+return 0;
}

@
+local_irq_save(flags);
+printk_nmi_direct_enter();
+
/* Simulate the iterator */
trace_init_global_iter(&iter);
@
+cnt++;
@
-/* reset all but tr, trace, and overruns */
-memset(&iter.seq, 0,
-    sizeof(struct trace_iterator) -
-    offsetof(struct trace_iterator, seq));
+trace_iterator_reset(&iter);
+iter.iter_flags |= TRACE_FILE_LAT_FMT;
-iter.pos = -1;
+
if (trace_find_next_entry_inc(&iter) != NULL) {
    int ret;
@
+
for_each_tracing_cpu(cpu) {
    atomic_dec(&per_cpu_ptr(iter.trace_buffer->data, cpu)->disabled);
}
-    atomic_dec(&dump_running);
+    atomic_dec(&dump_running);
+    printk_nmi_direct_exit();
local_irq_restore(flags);
}
EXPORT_SYMBOL_GPL(ftrace_dump);
@@ -8375,7 +8406,7 @@
go to out_free_buffer_mask;

/* Only allocate trace_printk buffers if a trace_printk exists */
-    if (__stop___trace_bprintfk_fmt != __start___trace_bprintfk_fmt)
+    if (&__stop___trace_bprintfk_fmt != &__start___trace_bprintfk_fmt)
    /* Must be called before global_trace.buffer is allocated */
    trace_printk_init_buffers();

--- linux-4.15.0.orig/kernel/trace/trace.h
+++ linux-4.15.0/kernel/trace/trace.h
@@ -459,23 +459,8 @@
 * When function tracing occurs, the following steps are made:
 *   If arch does not support a ftrace feature:
 *    call internal function (uses INTERNAL bits) which calls...
-    * If callback is registered to the "global" list, the list
-    * function is called and recursion checks the GLOBAL bits.
-    * then this function calls...
-    * The function callback, which can use the FTRACE bits to
-        check for recursion.
-    *
-    * Now if the arch does not suppport a feature, and it calls
-    * the global list function which calls the ftrace callback
-    * all three of these steps will do a recursion protection.
-    * There's no reason to do one if the previous caller already
-    * did. The recursion that we are protecting against will
-    * go through the same steps again.
-    *
-    * To prevent the multiple recursion checks, if a recursion
-    * bit is set that is higher than the MAX bit of the current
-    * check, then we know that the check was made by the previous
-    * caller, and we can skip the current check.
*/
enum {
    TRACE_BUFFER_BIT,
    TRACE_FTRACE_NMI_BIT,
    TRACE_FTRACE_IRQ_BIT,
    TRACE_FTRACE_SIRQ_BIT,
/* INTERNAL_BITs must be greater than FTRACE_BITs */
/* Internal use recursion bits */
TRACE_INTERNAL_BIT,
TRACE_INTERNAL_NMI_BIT,
TRACE_INTERNAL_IRQ_BIT,
TRACE_INTERNAL_SIRQ_BIT,
+TRACE_INTERNAL_TRANSITION_BIT,

TRACE_BRANCH_BIT,
/*
@@ -504,21 +491,59 @@
* can only be modified by current, we can reuse trace_recursion.
*/
TRACE_IRQ_BIT,
+	/* Set if the function is in the set_graph_function file */
+TRACE_GRAPH_BIT,
+
+/*
+ * In the very unlikely case that an interrupt came in
+ * at a start of graph tracing, and we want to trace
+ * the function in that interrupt, the depth can be greater
+ * than zero, because of the preempted start of a previous
+ * trace. In an even more unlikely case, depth could be 2
+ * if a softirq interrupted the start of graph tracing,
+ * followed by an interrupt preempting a start of graph
+ * tracing in the softirq, and depth can even be 3
+ * if an NMI came in at the start of an interrupt function
+ * that preempted a softirq start of a function that
+ * preempted normal context!!!! Luckily, it can't be
+ * greater than 3, so the next two bits are a mask
+ * of what the depth is when we set TRACE_GRAPH_BIT
+ */
+
+TRACE_GRAPH_DEPTH_START_BIT,
+TRACE_GRAPH_DEPTH_END_BIT,
};

#define trace_recursion_set(bit) 
	do { (current)->trace_recursion |= (1<<(bit)); } while (0)
#define trace_recursion_clear(bit) 
	do { (current)->trace_recursion &= ~(1<<(bit)); } while (0)
#define trace_recursion_test(bit) 
	((current)->trace_recursion & (1<<(bit)))

+define trace_recursion_depth() \
+((current)->trace_recursion >> TRACE_GRAPH_DEPTH_START_BIT) & 3)
+#define trace_recursion_set_depth(depth) \
+do { \

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current->trace_recursion &= ~(3 << TRACE_GRAPH_DEPTH_START_BIT);
+(depth) & 3) <<= TRACE_GRAPH_DEPTH_START_BIT;
+} while (0)
+
#define TRACE_CONTEXT_BITS 4

#define TRACE_FTRACE_START TRACE_FTRACE_BIT
-#define TRACE_FTRACE_MAX((1 << (TRACE_FTRACE_START + TRACE_CONTEXT_BITS)) - 1)

#define TRACE_LIST_START TRACE_INTERNAL_BIT
-#define TRACE_LIST_MAX ((1 << (TRACE_LIST_START + TRACE_CONTEXT_BITS)) - 1)

-#define TRACE_CONTEXT_MASK TRACE_LIST_MAX
+#define TRACE_CONTEXT_MASK ((1 << (TRACE_LIST_START + TRACE_CONTEXT_BITS)) - 1)
+
+enum {
+TRACE_CTX_NMI,
+TRACE_CTX_IRQ,
+TRACE_CTX_SOFTIRQ,
+TRACE_CTX_NORMAL,
+TRACE_CTX_TRANSITION,
+};

static __always_inline int trace_get_context_bit(void)
{
  @ @ -526,30 +551,36 @ @

  if (in_interrupt()) {
    if (in_nmi())
      -bit = 0;
      +bit = TRACE_CTX_NMI;

    else if (in_irq())
      -bit = 1;
      +bit = TRACE_CTX_IRQ;
    else
      -bit = 2;
      +bit = TRACE_CTX_SOFTIRQ;
  } else
      -bit = 3;
      +bit = TRACE_CTX_NORMAL;

  return bit;
}

-static __always_inline int trace_test_and_set_recursion(int start, int max)
+static __always_inline int trace_test_and_set_recursion(int start)
{
unsigned int val = current->trace_recursion;
int bit;

-/* A previous recursion check was made */
-if ((val & TRACE_CONTEXT_MASK) > max)
-return 0;
-
bit = trace_get_context_bit() + start;
-if (unlikely(val & (1 << bit)))
-return -1;
+if (unlikely(val & (1 << bit))) {
+/*
+ * It could be that preempt_count has not been updated during
+ * a switch between contexts. Allow for a single recursion.
+ */
+bit = start + TRACE_CTX_TRANSITION;
+if (trace_recursion_test(bit))
+return -1;
+trace_recursion_set(bit);
+barrier();
+return bit;
+}

val |= 1 << bit;
current->trace_recursion = val;
@@ -562,9 +593,6 @@
{
unsigned int val = current->trace_recursion;

-if (!bit)
-return;
-
bit = 1 << bit;
val &= ~bit;

@@ -687,13 +715,15 @@
#endif /* CONFIG_TRACER_MAX_TRACE */

#endif /* CONFIG_STACKTRACE*/
-void ftrace_trace_userstack(struct ring_buffer *buffer, unsigned long flags,
+void ftrace_trace_userstack(struct trace_array *tr,
			    struct ring_buffer *buffer, unsigned long flags,
			    int pc);

void __trace_stack(struct trace_array *tr, unsigned long flags, int skip,
			    int pc);
#else
-static inline void ftrace_trace_userstack(struct ring_buffer *buffer, unsigned long flags, int pc)
{
}
@@ -834,21 +864,39 @@ unsigned long flags, int pc);

#ifdef CONFIG_DYNAMIC_FTRACE
-extern struct ftrace_hash *ftrace_graph_hash;
-extern struct ftrace_hash *ftrace_graph_notrace_hash;
+extern struct ftrace_hash __rcu *ftrace_graph_hash;
+extern struct ftrace_hash __rcu *ftrace_graph_notrace_hash;

-static inline int ftrace_graph_addr(unsigned long addr)
+static inline int ftrace_graph_addr(struct ftrace_graph_ent *trace)
{
+unsigned long addr = trace->func;
+int ret = 0;
+struct ftrace_hash *hash;

preempt_disable_notrace();

-if (ftrace_hash_empty(ftrace_graph_hash)) {
+/*
+ * Have to open code "rcu_dereference_sched()" because the
+ * function graph tracer can be called when RCU is not
+ * "watching".
+ * Protected with schedule_on_each_cpu(ftrace_sync)
+ */
+hash = rcu_dereference_protected(ftrace_graph_hash, !preemptible());
+ +if (ftrace_hash_empty(hash)) [
+ ret = 1;
+ goto out;
+ }

-if (ftrace_lookup_ip(ftrace_graph_hash, addr)) {
+if (ftrace_lookup_ip(hash, addr)) {
+ /*
+ * This needs to be cleared on the return functions
+ * when the depth is zero.
+ */
+trace_recursion_set(TRACE_GRAPH_BIT);
+trace_recursion_set_depth(trace->depth);
/*
 * If no irqs are to be traced, but a set_graph_function
 * is set, and called by an interrupt handler, we still
 @@ -866,20 +914,37 @@
 return ret;
 }

+static inline void ftrace_graph_addr_finish(struct ftrace_graph_ret *trace)
+{
+if (trace_recursion_test(TRACE_GRAPH_BIT) &&
+ trace->depth == trace_recursion_depth())
+trace_recursion_clear(TRACE_GRAPH_BIT);
+}
+
static inline int ftrace_graph_notrace_addr(unsigned long addr)
{
int ret = 0;
+struct ftrace_hash *notrace_hash;

preempt_disable_notrace();

-if (ftrace_lookup_ip(ftrace_graph_notrace_hash, addr))
+/
+ * Have to open code "rcu_dereference_sched()" because the
+ * function graph tracer can be called when RCU is not
+ * "watching".
+ * Protected with schedule_on_each_cpu(ftrace_sync)
+ */
+notrace_hash = rcu_dereference_protected(ftrace_graph_notrace_hash,
+ !preemptible());
+
+if (ftrace_lookup_ip(ntrace_hash, addr))
ret = 1;

preempt_enable_notrace();
return ret;
}

else
-static inline int ftrace_graph_addr(unsigned long addr)
+static inline int ftrace_graph_addr(struct ftrace_graph_ent *trace)
{
return 1;
}

@@ -888,6 +953,8 @@
{
return 0;
}
+static inline void ftrace_graph_addr_finish(struct ftrace_graph_ret *trace) 
+{ } 
#endif /* CONFIG_DYNAMIC_FTRACE */

extern unsigned int fgraph_max_depth;
@@ -895,7 +962,8 @@
static inline bool ftrace_graph_ignore_func(struct ftrace_graph_ent *trace) 
{ 
  /* trace it when it is-nested-in or is a function enabled. */
-  return !(trace->depth || ftrace_graph_addr(trace->func)) ||
+  return !(trace_recursion_test(TRACE_GRAPH_BIT) ||
+            ftrace_graph_addr(trace)) ||
    (trace->depth < 0) ||
    (fgraph_max_depth && trace->depth >= fgraph_max_depth);
} 
@@ -1812,6 +1880,35 @@
static inline void trace_event_eval_update(struct trace_eval_map **map, int len) { } 
#endif

+ifdef CONFIG_TRACER_SNAPSHOT
+void tracing_snapshot_instance(struct trace_array *tr);
+int tracing_alloc_snapshot_instance(struct trace_array *tr); 
+else 
+static inline void tracing_snapshot_instance(struct trace_array *tr) { } 
+static inline int tracing_alloc_snapshot_instance(struct trace_array *tr) 
+{ 
+  return 0;
+} 
+#endif
+
extern struct trace_iterator *tracepoint_print_iter;

+/*
+ * Reset the state of the trace_iterator so that it can read consumed data.
+ * Normally, the trace_iterator is used for reading the data when it is not
+ * consumed, and must retain state.
+ */
+static __always_inline void trace_iterator_reset(struct trace_iterator *iter) 
+{ 
+  const size_t offset = offsetof(struct trace_iterator, seq);
+  
+  /*
+   * Keep gcc from complaining about overwriting more than just one
+   * member in the structure.
+   */
+  memset((char *)iter + offset, 0, sizeof(struct trace_iterator) - offset);
+  
+  iter->pos = -1;
#ifndef /* _LINUX_KERNEL_TRACE_H */
--- linux-4.15.0.orig/kernel/trace/trace_clock.c
+++ linux-4.15.0/kernel/trace/trace_clock.c
@@ -94,33 +94,49 @@
{
    unsigned long flags;
    int this_cpu;
    -u64 now;
+u64 now, prev_time;

    local_irq_save(flags);

    this_cpu = raw_smp_processor_id();
    -now = sched_clock_cpu(this_cpu);
+now = sched_clock_cpu(this_cpu);

 */
-/*
-* If in an NMI context then dont risk lockups and return the
-* cpu_clock() time:
+* The global clock "guarantees" that the events are ordered
+* between CPUs. But if two events on two different CPUS call
+* trace_clock_global at roughly the same time, it really does
+* not matter which one gets the earlier time. Just make sure
+* that the same CPU will always show a monotonic clock.
+ *
+* Use a read memory barrier to get the latest written
+* time that was recorded.
+*/
-if (unlikely(in_nmi()))
-goto out;
+smp_rmb();
+prev_time = READ_ONCE(trace_clock_struct.prev_time);
+now = sched_clock_cpu(this_cpu);

-arch_spin_lock(&trace_clock_struct.lock);
+/*
* Make sure that now is always greater than or equal to prev_time */
+if ((s64)(now - prev_time) < 0)
+now = prev_time;

 */
-/*
-* TODO: if this happens often then maybe we should reset
-* my_scd->clock to prev_time+1, to make sure
-* we start ticking with the local clock from now on?
+* If in an NMI context then dont risk lockups and simply return
+* the current time.
+*/
-if ((s64)(now - trace_clock_struct.prev_time) < 0)
now = trace_clock_struct.prev_time + 1;
-
trace_clock_struct.prev_time = now;
-
arch_spin_unlock(&trace_clock_struct.lock);
+if (unlikely(in_nmi()))
+goto out;
+
/* Tracing can cause strange recursion, always use a try lock */
+if (arch_spin_trylock(&trace_clock_struct.lock)) {
+/* Reread prev_time in case it was already updated */
+prev_time = READ_ONCE(trace_clock_struct.prev_time);
+if ((s64)(now - prev_time) < 0)
+now = prev_time;
+
+trace_clock_struct.prev_time = now;
+
+/* The unlock acts as the wmb for the above rmb */
+arch_spin_unlock(&trace_clock_struct.lock);
+
} out:
local_irq_restore(flags);

--- linux-4.15.0.orig/kernel/trace/trace_entries.h
+++ linux-4.15.0/kernel/trace/trace_entries.h
@@ -179,7 +179,7 @@
F_STRUCT(
    __field(int,size)
    -__dynamic_array(unsigned long,caller)
    +__array(unsigned long,caller,FTRACE_STACK_ENTRIES)
 ),
F_printk("=> (\ IP_FMT \)
@@ -356,7 +356,7 @@
    __field(unsigned int,seqnum)
 ),
-F_printk("cnt:u:ts:%010lu,%010lu\tinner:%llu\touter:%llu\tnmi-ts:%llu\tnmi-count:%u\n",
+F_printk("cnt:u:ts:%010lu,%010lu\tinner:%llu\touter:%llu\tnmi-ts:%llu\tnmi-count:%u\n",
    __entry->seqnum,
    __entry->tv_sec,
    __entry->tv_nsec,
--- linux-4.15.0.orig/kernel/trace/trace_events.c
+++ linux-4.15.0/kernel/trace/trace_events.c
@@ -326,7 +326,8 @@
 struct trace_event_file *file;
 struct trace_array *tr;
mutex_lock(&event_mutex);
+lockdep_assert_held(&event_mutex);
+
do_for_each_event_file(tr, file) {

    if (!(file->flags & EVENT_FILE_FL_ENABLED))
@@ -340,7 +341,6 @@
clear_bit(EVENT_FILE_FL_RECORDED_CMD_BIT, &file->flags);
    }
} while_for_each_event_file();
-mutex_unlock(&event_mutex);

void trace_event_enable_tgid_record(bool enable)
@@ -348,7 +348,8 @@
struct trace_event_file *file;
struct trace_array *tr;

-mutex_lock(&event_mutex);
+lockdep_assert_held(&event_mutex);
+
do_for_each_event_file(tr, file) {
    if (!(file->flags & EVENT_FILE_FL_ENABLED))
        continue;
@@ -362,7 +363,6 @@
&file->flags);
    }
} while_for_each_event_file();
-mutex_unlock(&event_mutex);

static int __ftrace_event_enable_disable(struct trace_event_file *file,
@@ -533,12 +533,12 @@
    if (enable) {
        register_trace_prio_sched_process_fork(event_filter_pid_sched_process_fork,
            tr, INT_MIN);
-        register_trace_prio_sched_process_exit(event_filter_pid_sched_process_exit,
+        register_trace_prio_sched_process_free(event_filter_pid_sched_process_exit,
            tr, INT_MAX);
    } else {
        unregister_trace_sched_process_fork(event_filter_pid_sched_process_fork,
            tr);
-        unregister_trace_sched_process_exit(event_filter_pid_sched_process_exit,
+        unregister_trace_sched_process_free(event_filter_pid_sched_process_exit,
            tr);
    }
}
char *event = NULL, *sub = NULL, *match;
int ret;

+if (!tr)
+return -ENOENT;

/*
 * The buf format can be <subsystem>:<event-name>
 *  *:<event-name> means any event by that name.

mutex_lock(&event_mutex);
list_for_each_entry(file, &tr->events, list) {
  call = file->event_call;
  -if (!trace_event_name(call) || !call->class || !call->class->reg)
  +if ((call->flags & TRACE_EVENT_FL_IGNORE_ENABLE) ||
      !trace_event_name(call) || !call->class || !call->class->reg)
continue;

if (system && strcmp(call->class->system, system->name) != 0)
  char buf[32];
  int len;

  -if (*ppos)
  -return 0;
  -
  if (unlikely(!id))
    return -ENODEV;

static int regex_match_front(char *str, struct regex *r, int len)
{
  +if (len < r->len)
  +return 0;

  if (strncmp(str, r->pattern, r->len) == 0)
    return 1;
  return 0;
}

for (i = 0; i < len; i++) {
  if (buff[i] == '*') {
    if (!i) {
      *search = buff + 1;
      type = MATCH_END_ONLY;
    } else if (i == len - 1) {

if (type == MATCH_END_ONLY)
@@ -410,14 +412,14 @@
buff[i] = 0;
break;
} else /* pattern continues, use full glob */
-type = MATCH_GLOB;
-break;
+return MATCH_GLOB;
}
} else if (strchr("\[\?\", buff[i])) {
-type = MATCH_GLOB;
-break;
+return MATCH_GLOB;
}
}
+if (buff[0] == '*')
+*search = buff + 1;

return type;
}
--- linux-4.15.0.orig/kernel/trace/trace_events_hist.c
+++ linux-4.15.0/kernel/trace/trace_events_hist.c
@@ -415,7 +415,9 @@
if (WARN_ON_ONCE(!field))
go to out;

-if (is_string_field(field)) {
+/* Pointers to strings are just pointers and dangerous to dereference */
+if (is_string_field(field) &&
+ (field->filter_type != FILTER_PTR_STRING)) {
flags |= HIST_FIELD_FL_STRING;

if (field->filter_type == FILTER_STATIC_STRING)
@@ -907,17 +909,16 @@
field = key_field->field;
if (field->filter_type == FILTER_DYN_STRING)
size = *(u32 *)(rec + field->offset) >> 16;
-else if (field->filter_type == FILTER_PTR_STRING)
- size = strlen(key);
else if (field->filter_type == FILTER_STATIC_STRING)
 size = field->size;
/* ensure NULL-termination */
 if (size > key_field->size - 1)
 size = key_field->size - 1;
-}

-memcpy(compound_key + key_field->offset, key, size);
+strncpy(compound_key + key_field->offset, (char *)key, size);
+} else
+memcpy(compound_key + key_field->offset, key, size);
+
static void event_hist_trigger(struct event_trigger_data *data, void *rec)
--- linux-4.15.0.orig/kernel/trace/trace_events_trigger.c
+++ linux-4.15.0/kernel/trace/trace_events_trigger.c
@@ -127,9 +127,10 @@
{
    struct trace_event_file *event_file = event_file_data(m->private);

-    if (t == SHOW_AVAILABLE_TRIGGERS)
+    if (t == SHOW_AVAILABLE_TRIGGERS) {
+        (*pos)++;
    return NULL;
-    
+    }
    return seq_list_next(t, &event_file->triggers, pos);
 }

@@ -222,11 +223,17 @@
static int trigger_process_regex(struct trace_event_file *file, char *buff)
{
    char *command, *next = buff;
    +char *command, *next;
    struct event_command *p;
    int ret = -EINVAL;

+    next = buff = skip_spaces(buff);
    command = strsep(&next, ": 	");
+    if (next) {
+        next = skip_spaces(next);
+        if (!*next)
+            next = NULL;
+    }
    command = (command[0] != '!') ? command : command + 1;

    mutex_lock(&trigger_cmd_mutex);
@@ -482,9 +489,10 @@
    struct trace_event_file *file;

    list_for_each_entry(file, &tr->events, list) {
-    struct event_trigger_data *data;
-    list_for_each_entry_rcu(data, &file->triggers, list) {
+    struct event_trigger_data *data, *n;
+    list_for_each_entry_safe(data, n, &file->triggers, list) {


trace_event_trigger_enable_disable(file, 0);
+list_del_rcu(&data->list);
if (data->ops->free)
data->ops->free(data->ops, data);
}
@@ -628,8 +636,14 @@
int ret;

/* separate the trigger from the filter (t:n [if filter]) */
-if (param && isdigit(param[0]))
+if (param && isdigit(param[0])) {
trigger = strsep(&param, " \t");
+if (param) {
+param = skip_spaces(param);
+if (!*param)
+param = NULL;
+}
+
trigger_ops = cmd_ops->get_trigger_ops(cmd, trigger);

@@ -641,6 +655,7 @@
trigger_data->count = -1;
trigger_data->ops = trigger_ops;
trigger_data->cmd_ops = cmd_ops;
+trigger_data->private_data = file;
INIT_LIST_HEAD(&trigger_data->list);
INIT_LIST_HEAD(&trigger_data->named_list);

@@ -678,6 +693,8 @@
goto out_free;

trigger_data->count = -1;
trigger_data->ops = trigger_ops;
trigger_data->cmd_ops = cmd_ops;
+trigger_data->private_data = file;
INIT_LIST_HEAD(&trigger_data->list);
INIT_LIST_HEAD(&trigger_data->named_list);

@@ -696,6 +711,8 @@
out_reg:
+/* Up the trigger_data count to make sure reg doesn't free it on failure */
+event_trigger_init(trigger_ops, trigger_data);
ret = cmd_ops->reg(glob, trigger_ops, trigger_data, file);
/*
* The above returns on success the # of functions enabled,
@@ -685,11 +702,13 @@
* Consider no functions a failure too.
*/
if (!ret) {
+cmd_ops->unreg(glob, trigger_ops, trigger_data, file);
ret = -ENOENT;
-goto out_free;
-} else if (ret < 0)
-goto out_free;
-ret = 0;
+} else if (ret > 0)
+ret = 0;
+
+/** Down the counter of trigger_data or free it if not used anymore */
+event_trigger_free(trigger_ops, trigger_data);
+out:
+return ret;
+
/** The filter is for the 'trigger' event, not the triggered event */
ret = create_event_filter(file->event_call, filter_str, false, &filter);
-if (ret)
-goto out;
+/*
+ * If create_event_filter() fails, filter still needs to be freed.
+ * Which the calling code will do with data->filter.
+ */
+assign:
+tmp = rcu_access_pointer(data->filter);
+
static void
snapshot_trigger(struct event_trigger_data *data, void *rec)
{
-tracing_snapshot();
+struct trace_event_file *file = data->private_data;
+
+if (file)
+tracing_snapshot_instance(file->tr);
+else
+tracing_snapshot();
}

static void
@ @ -1061,14 +1087,10 @@
struct event_trigger_data *data,
 struct trace_event_file *file)
{
-int ret = register_trigger(glob, ops, data, file);
-
-if (ret > 0 && tracing_alloc_snapshot() != 0) {
-unregister_trigger(glob, ops, data, file);
-ret = 0;
-}
+if (tracing_alloc_snapshot_instance(file->tr) != 0)
+return 0;
-return ret;
+return register_trigger(glob, ops, data, file);
}

static int
@@ -1341,6 +1363,11 @@
     trigger = strsep(&param, " 	");
 if (!trigger)
 return -EINVAL;
+if (param) {
+    param = skip_spaces(param);
+    if (!*param)
+        param = NULL;
+}

     system = strsep(&trigger, ":");
 if (!trigger)
@@ -1394,6 +1421,9 @@
 goto out;
 }

+/* Up the trigger_data count to make sure nothing frees it on failure */
+event_trigger_init(trigger_ops, trigger_data);
+if (trigger) {
+    number = strsep(&trigger, ":");
+}
@@ -1444,6 +1474,7 @@
 goto out_disable;
 /* Just return zero, not the number of enabled functions */
 ret = 0;
+event_trigger_free(trigger_ops, trigger_data);
 out:
 return ret;
@@ -1454,7 +1485,7 @@
 out_free:
 if (cmd_ops->set_filter)
     cmd_ops->set_filter(NULL, trigger_data, NULL);
-kfree(trigger_data);
+event_trigger_free(trigger_ops, trigger_data);
 kfree(enable_data);
 goto out;
}
--- linux-4.15.0.orig/kernel/trace/trace_functions.c
+++ linux-4.15.0/kernel/trace/trace_functions.c
@@ -138,7 +138,7 @@
 pc = preempt_count();
preempt_disable_notrace();

-bit = trace_test_and_set_recursion(TRACE_FTRACE_START, TRACE_FTRACE_MAX);
+bit = trace_test_and_set_recursion(TRACE_FTRACE_START);
if (bit < 0)
    goto out;

--- linux-4.15.0.orig/kernel/trace/trace_functions_graph.c
+++ linux-4.15.0/kernel/trace/trace_functions_graph.c
@@ -118,8 +118,8 @@
 struct trace_seq *s, u32 flags);

 /* Add a function return address to the trace stack on thread info.*/
-int
-ftrace_push_return_trace(unsigned long ret, unsigned long func, int *depth,
+static int
+ftrace_push_return_trace(unsigned long ret, unsigned long func,
 unsigned long frame_pointer, unsigned long *retp)
{
    unsigned long long calltime;
    @ @ -177.9 +177.31 @@
    #ifdef HAVE_FUNCTION_GRAPH_RET_ADDR_PTR
        current->ret_stack[index].retp = retp;
    #endif
    -*depth = current->curr_ret_stack;
    +return 0;
    +}
    +int function_graph_enter(unsigned long ret, unsigned long func,
    + unsigned long frame_pointer, unsigned long *retp)
    +{
        +struct ftrace_graph_ent trace;
        +
        +trace.func = func;
        +trace.depth = ++current->curr_ret_depth;
        +
        +if (ftrace_push_return_trace(ret, func,
            + frame_pointer, retp))
            +goto out;
        +
        +/* Only trace if the calling function expects to */
        +if (!ftrace_graph_entry(&trace))
            +goto out_ret;
        return 0;
    + out_ret:
    +current->curr_ret_stack--;
    + out:
+current->curr_ret_depth--;  
+return -EBUSY;
}

/* Retrieve a function return address to the trace stack on thread info. */
@@ -241,7 +263,13 @@
trace->func = current->ret_stack[index].func;
trace->calltime = current->ret_stack[index].calltime;
trace->overrun = atomic_read(&current->trace_overrun);
-trace->depth = index;
+trace->depth = current->curr_ret_depth--;
+/*
+ * We still want to trace interrupts coming in if
+ * max_depth is set to 1. Make sure the decrement is
+ * seen before ftrace_graph_return.
+ */
+barrier();
}

/*
@@ -255,6 +283,12 @@

ftrace_pop_return_trace(&trace, &ret, frame_pointer);
trace.rettime = trace_clock_local();
+ftrace_graph_return(&trace);
+/*
+ * The ftrace_graph_return() may still access the current
+ * ret_stack structure, we need to make sure the update of
+ * curr_ret_stack is after that.
+ */
+barrier();
current->curr_ret_stack--;
/*
@@ -267,13 +301,6 @@
return ret;
}

-/*
- * The trace should run after decrementing the ret counter
- * in case an interrupt were to come in. We don't want to
- * lose the interrupt if max_depth is set.
- */
- ftrace_graph_return(&trace);
-
if (unlikely(!ret)) {
  ftrace_graph_stop();
  WARN_ON(1);
@@ -482,6 +509,8 @@
int cpu;
int pc;

+ ftrace_graph_addr_finish(trace);
+
local_irq_save(flags);
cpu = raw_smp_processor_id();
data = per_cpu_ptr(tr->trace_buffer.data, cpu);
@@ -505,6 +534,8 @@
static void trace_graph_thresh_return(struct ftrace_graph_ret *trace)
{
+ ftrace_graph_addr_finish(trace);
+
if (tracing_thresh &&
   (trace->rettime - trace->calltime < tracing_thresh))
return;
@@ -831,6 +862,7 @@
struct ftrace_graph_ret *graph_ret;
struct ftrace_graph_ent *call;
unsigned long long duration;
+int cpu = iter->cpu;
int i;

graph_ret = &ret_entry->ret;
@@ -839,7 +871,6 @@
if (data) {
struct fgraph_cpu_data *cpu_data;
-int cpu = iter->cpu;

cpu_data = per_cpu_ptr(data->cpu_data, cpu);
@@ -869,6 +900,9 @@
trace_seq_printf(s, "%ps();\n", (void *)call->func);
+
+print_graph_irq(iter, graph_ret->func, TRACE_GRAPH_RET,
+cpu, iter->ent->pid, flags);
+return trace_handle_return(s);
}

--- linux-4.15.0.orig/kernel/trace/trace_hwlat.c
+++ linux-4.15.0/kernel/trace/trace_hwlat.c
@@ -152,7 +152,7 @@
if (enter)
nmi_ts_start = time_get();
else
    -nmi_total_ts = time_get() - nmi_ts_start;
+    nmi_total_ts += time_get() - nmi_ts_start;

if (enter)
    @ @ -258,6 +258,8 @@
/* Keep a running maximum ever recorded hardware latency */
    if (sample > tr->max_latency)
        tr->max_latency = sample;
+    if (outer_sample > tr->max_latency)
+        tr->max_latency = outer_sample;
}

out:
    @ @ -270,6 +272,7 @@
static void move_to_next_cpu(void)
{
    struct cpumask *current_mask = &save_cpumask;
+    struct trace_array *tr = hwlat_trace;
    int next_cpu;

    if (disable_migrate)
        @ @ -283,7 +286,7 @@
        goto disable;

    get_online_cpus();
    -cpumask_and(current_mask, cpu_online_mask, tracing_buffer_mask);
+    cpumask_and(current_mask, cpu_online_mask, tr->tracing_cpumask);
    next_cpu = cpumask_next(smp_processor_id(), current_mask);
    put_online_cpus();

    @ @ -357,7 +360,7 @@
/* Just pick the first CPU on first iteration */
    current_mask = &save_cpumask;
    get_online_cpus();
    -cpumask_and(current_mask, cpu_online_mask, tracing_buffer_mask);
+    cpumask_and(current_mask, cpu_online_mask, tr->tracing_cpumask);
    next_cpu = cpumask_first(current_mask);

--- linux-4.15.0.orig/kernel/trace/trace_irqsoff.c
+++ linux-4.15.0/kernel/trace/trace_irqsoff.c
@@ -208,6 +208,8 @@
    unsigned long flags;
    int pc;

    +ftrace_graph_addr_finish(trace);
if (!func_prolog_dec(tr, &data, &flags))
return;

--- linux-4.15.0.orig/kernel/trace/trace_kdb.c
+++ linux-4.15.0/kernel/trace/trace_kdb.c
@@ -41,24 +41,22 @@
kdb_printf("Dumping ftrace buffer:\n");

-/* reset all but tr, trace, and overruns */
-memset(&iter.seq, 0,
-  - sizeof(struct trace_iterator) -
-  - offsetof(struct trace_iterator, seq));
+trace_iterator_reset(&iter);
 iter.iter_flags |= TRACE_FILE_LAT_FMT;
-iter.pos = -1;

 if (cpu_file == RING_BUFFER_ALL_CPUS) {
 for_each_tracing_cpu(cpu) {
   iter.buffer_iter[cpu] =
   -ring_buffer_read_prepare(iter.trace_buffer->buffer, cpu);
+ring_buffer_read_prepare(iter.trace_buffer->buffer,
+  + cpu, GFP_ATOMIC);
   ring_buffer_read_start(iter.buffer_iter[cpu]);
   tracing_iter_reset(&iter, cpu);
 } else {
   iter.cpu_file = cpu_file;
   iter.buffer_iter[cpu_file] =
   -ring_buffer_read_prepare(iter.trace_buffer->buffer, cpu_file);
+ring_buffer_read_prepare(iter.trace_buffer->buffer,
+  + cpu_file, GFP_ATOMIC);
   ring_buffer_read_start(iter.buffer_iter[cpu_file]);
   tracing_iter_reset(&iter, cpu_file);
 }
--- linux-4.15.0.orig/kernel/trace/trace_kprobe.c
+++ linux-4.15.0/kernel/trace/trace_kprobe.c
@@ -71,9 +71,23 @@
 return strncmp(mod->name, name, len) == 0 && name[len] == ':';
}

-static nokprobe_inline bool trace_kprobe_is_on_module(struct trace_kprobe *tk)
+static nokprobe_inline bool trace_kprobe_module_exist(struct trace_kprobe *tk)
{   
-  return !!strchr(trace_kprobe_symbol(tk), ':');
+  char *p;
+  bool ret;

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+ if (!tk->symbol)
+ return false;
+ p = strchr(tk->symbol, ':');
+ if (!p)
+ return true;
+ *p = '0';
+ mutex_lock(&module_mutex);
+ ret = !!find_module(tk->symbol);
+ mutex_unlock(&module_mutex);
+ *p = ':';
+ return ret;
}

static nokprobe_inline unsigned long trace_kprobe_nhit(struct trace_kprobe *tk)
@@ -376,11 +390,10 @@
static int
enable_trace_kprobe(struct trace_kprobe *tk, struct trace_event_file *file)
{
+struct event_file_link *link = NULL;
int ret = 0;

if (file) {
-struct event_file_link *link;
-
link = kmalloc(sizeof(*link), GFP_KERNEL);
if (!link) {
ret = -ENOMEM;
@@ -400,6 +413,18 @@
else
ret = enable_kprobe(&tk->rp.kp);
}
+ if (ret) {
+ if (file) {
+ /* Notice the if is true on not WARN() */
+ if (!WARN_ON_ONCE(!link))
+ list_del_rcu(&link->list);
+ kfree(link);
+ tk->tp.flags &= ~TP_FLAG_TRACE;
+ } else {
+ tk->tp.flags &= ~TP_FLAG_PROFILE;
+ }
+ }
+ out:
return ret;
}
@@ -477,21 +502,13 @@
    ret = register_kprobe(&tk->kp);

    -if (ret == 0)
    +if (ret == 0) {
        tk->tp.flags |= TP_FLAG_REGISTERED;
    -else {
        -pr_warn("Could not insert probe at %s+%lu: %d\n",
         -trace_kprobe_symbol(tk), trace_kprobe_offset(tk), ret);
        -if (ret == -ENOENT && trace_kprobe_is_on_module(tk)) {
            -pr_warn("This probe might be able to register after target module is loaded. Continue\n");
            -ret = 0;
        -} else if (ret == -EILSEQ) {
            -pr_warn("Probing address(0x%p) is not an instruction boundary.\n",
             -tk->rp.kp.addr);
            -ret = -EINVAL;
        -}
    -} else if (ret == -EILSEQ) {
        +pr_warn("Probing address(0x%p) is not an instruction boundary.\n",
         +tk->rp.kp.addr);
        +ret = -EINVAL;
    }
    -
    return ret;
}

@@ -554,6 +571,11 @@

 /* Register k*probe */
 ret = __register_trace_kprobe(tk);
 +if (ret == -ENOENT && !trace_kprobe_module_exist(tk)) {
 +pr_warn("This probe might be able to register after target module is loaded. Continue\n");
 +ret = 0;
 +}
 +
 if (ret < 0)
 unregister_kprobe_event(tk);
 else
@@ -635,7 +657,7 @@
 char *symbol = NULL, *event = NULL, *group = NULL;
 int maxactive = 0;
 char *arg;
-unsigned long offset = 0;
+long offset = 0;
 void *addr = NULL;
 char buf[MAX_EVENT_NAME_LEN];
symbol = argv[1];
/* TODO: support .init module functions */
ret = traceprobe_split_symbol_offset(symbol, &offset);
-if (ret) {
+if (ret || offset < 0 || offset > UINT_MAX) {
  pr_info("Failed to parse either an address or a symbol.
); return ret;
}
int i;

seq_putc(m, trace_kprobe_is_return(tk) ? 'r' : 'p');
+if (trace_kprobe_is_return(tk) && tk->rp.maxactive)
+seq_printf(m, "%d", tk->rp.maxactive);
seq_printf(m, ":%s/%s", tk->tp.call.class->system,
trace_event_name(&tk->tp.call));

--- linux-4.15.0.orig/kernel/trace/trace_output.c
+++ linux-4.15.0/kernel/trace/trace_output.c
@@ -594,7 +594,7 @@
  unsigned int tgid = trace_find_tgid(entry->pid);
@@ -606,6 +605,8 @@
  trace_seq_printf(s, "(%5d) ", tgid);
 }
+trace_seq_printf(s, ".%03d] ", iter->cpu);
+if (tr->trace_flags & TRACE_ITER_IRQ_INFO)
  trace_print_lat_fmt(s, entry);

--- linux-4.15.0.orig/kernel/trace/trace_probe.c
+++ linux-4.15.0/kernel/trace/trace_probe.c
@@ -320,7 -320,7 @@
+int traceprobe_split_symbol_offset(char *symbol, long *offset)
{"/ * Split symbol and offset. */
-int traceprobe_split_symbol_offset(char *symbol, unsigned long *offset)
+int traceprobe_split_symbol_offset(char *symbol, long *offset)
char *tmp;
int ret;
@@ -328,13 +328,11 @@ if (!offset)
    return -EINVAL;

-tmp = strchr(symbol, '+');
+tmp = strpbrk(symbol, "+-");
if (tmp) {
    /* skip sign because kstrtoul doesn't accept '+' */
    -ret = kstrtoul(tmp + 1, 0, offset);
    +ret = kstrtol(tmp, 0, offset);
    if (ret)
        return ret;

    *tmp = \0;
} else
    *offset = 0;
--- linux-4.15.0.orig/kernel/trace/trace_probe.h
+++ linux-4.15.0/kernel/trace/trace_probe.h
@@ -353,7 +353,7 @@
    extern void traceprobe_update_arg(struct probe_arg *arg);
    extern void traceprobe_free_probe_arg(struct probe_arg *arg);

-extern int traceprobe_split_symbol_offset(char *symbol, unsigned long *offset);
+extern int traceprobe_split_symbol_offset(char *symbol, long *offset);

    /* Sum up total data length for dynamic arrays (strings) */
    static nokprobe_inline int
    --- linux-4.15.0.orig/kernel/trace/trace_sched_switch.c
    +++ linux-4.15.0/kernel/trace/trace_sched_switch.c
    @@ -89,8 +89,10 @@
    
    static void tracing_start_sched_switch(int ops)
    {
        -bool sched_register = (!sched_cmdline_ref && !sched_tgid_ref);
        +bool sched_register;
        +
        mutex_lock(&sched_register_mutex);
        +sched_register = (!sched_cmdline_ref && !sched_tgid_ref);

        switch (ops) {
        case RECORD_CMDLINE:
            --- linux-4.15.0.orig/kernel/trace/trace_sched_wakeup.c
            +++ linux-4.15.0/kernel/trace/trace_sched_wakeup.c
            @@ -270,6 +270,8 @@
            unsigned long flags;
            int pc;
+ftrace_graph_addr_finish(trace);
+
+if (!func_prolog_preempt_disable(tr, &data, &pc))
+    return;

@@ -638,7 +640,7 @@
 if (ret) {
     pr_info("wakeup trace: Couldn't activate tracepoint"
             " probe to kernel_sched_migrate_task\n");
@@ -656,6 +658,8 @@
     pr_cont("*callback not called once (%d)* ",
             "Recursion allows for transitions between context,
             " and may call the callback twice.
@@ -492,8 +492,13 @@
             pr_cont("*callback not called once (or twice) (%d)* ",
             trace_selftest_recursion_cnt);
     goto out;
--- linux-4.15.0.orig/kernel/trace/trace_selftest.c
+++ linux-4.15.0/kernel/trace/trace_selftest.c
 @@ -492,8 +492,13 @@
         unregister_ftrace_function(&test_rec_probe);

         ret = -1;
         -if (trace_selftest_recursion_cnt != 1) {
                 pr_cont("*callback not called once (%d)* ",
                 "Recursion allows for transitions between context,
                 " and may call the callback twice.
+ if (trace_selftest_recursion_cnt != 1 &&
+     trace_selftest_recursion_cnt != 2) {
+     pr_cont("*callback not called once (or twice) (%d)* ",
+             trace_selftest_recursion_cnt);
         goto out;
         }
--- linux-4.15.0.orig/kernel/trace/trace_stack.c
+++ linux-4.15.0/kernel/trace/trace_stack.c
 @@ -196,6 +196,11 @@
         local_irq_restore(flags);
/* Some archs may not define MCOUNT_INSN_SIZE */
#endif
#define MCOUNT_INSN_SIZE 0
#endif

static void
stack_trace_call(unsigned long ip, unsigned long parent_ip,
struct ftrace_ops *op, struct pt_regs *pt_regs)
... linux-4.15.0.orig/kernel/trace/trace_stat.c
+++ linux-4.15.0/kernel/trace/trace_stat.c
@@ -278,18 +278,22 @@
d_tracing = tracing_init_dentry();
if (IS_ERR(d_tracing))
    return 0;
+return -ENODEV;

stat_dir = tracefs_create_dir("trace_stat", d_tracing);
-if (!stat_dir)
+if (!stat_dir) {
    pr_warn("Could not create tracefs 'trace_stat' entry\n");
+    return -ENOMEM;
+}
    return 0;
}

static int init_stat_file(struct stat_session *session)
{
    -if (!stat_dir && tracing_stat_init())
+    int ret = -EINVAL;
+    if (!stat_dir && (ret = tracing_stat_init()))
+        return ret;

    session->file = tracefs_create_file(session->ts->name, 0644,
        stat_dir,
        @ @ -302,7 +306,7 @ @
    int register_stat_tracer(struct tracer_stat *trace)
    {
        struct stat_session *session, *node;
        -int ret;
+        int ret = -EINVAL;

        if (!trace)
            return -EINVAL;
        @ @ -313,17 +317,15 @ @
/* Already registered? */
mutex_lock(&all_stat_sessions_mutex);
list_for_each_entry(node, &all_stat_sessions, session_list) {
  if (node->ts == trace) {
    mutex_unlock(&all_stat_sessions_mutex);
    return -EINVAL;
  }
  if (node->ts == trace)
    goto out;
}
mutex_unlock(&all_stat_sessions_mutex);

+ret = -ENOMEM;
/* Init the session */
session = kzalloc(sizeof(*session), GFP_KERNEL);
if (!session)
  goto out;
+ret = 0;
/* Register */
mutex_lock(&all_stat_sessions_mutex);
list_add_tail(&session->session_list, &all_stat_sessions);
mutex_unlock(&all_stat_sessions_mutex);

session->ts = trace;
INIT_LIST_HEAD(&session->session_list);
ret = init_stat_file(session);
if (ret) {
destroy_session(session);
  return ret;
  goto out;
}

void unregister_stat_tracer(struct tracer_stat *trace)
#include <linux/module.h>
#include <linux/uaccess.h>

struct list_head		list;
struct trace_uprobe_filter	filter;
struct uprobe_consumer		consumer;
+struct path			path;
struct inode			*inode;
char				*filename;
unsigned long			offset;

return;

ret = strncpy_from_user(dst, src, maxlen);
+if (ret == maxlen)
+dst[ret - 1] = '0';
+else if (ret >= 0)
+/*
+ * Include the terminating null byte. In this case it
+ * was copied by strncpy_from_user but not accounted
+ * for in ret.
+ */
+ret++;

if (ret < 0) {/* Failed to fetch string */
((u8 *)get_rloc_data(dest))[0] = \0;
@@ -287,7 +297,7 @@
for (i = 0; i < tu->tp.nr_args; i++)
traceprobe_free_probe_arg(&tu->tp.args[i]);

-iput(tu->inode);
+path_put(&tu->path);
kfree(tu->tp.call.class->system);
kfree(tu->tp.call.name);
kfree(tu->filename);
@@ -361,7 +371,6 @@
static int create_trace_uprobe(int argc, char **argv)
{
    struct trace_uprobe *tu;
    -struct inode *inode;
    char *arg, *event, *group, *filename;
    char buf[MAX_EVENT_NAME_LEN];
    struct path path;
    @ @ -369,7 +378,6 @@
    bool is_delete, is_return;
    int i, ret;


inode = NULL;
ret = 0;
is_delete = false;
is_return = false;
@@ -435,21 +443,16 @@
}
/* Find the last occurrence, in case the path contains ':' too. */
arg = strrchr(argv[1], ':');
-if (!arg) {
  ret = -EINVAL;
-goto fail_address_parse;
-}
+if (!arg)
+return -EINVAL;

  *arg++ = '\0';
filename = argv[1];
ret = kern_path(filename, LOOKUP_FOLLOW, &path);
if (ret)
-goto fail_address_parse;
-
inode = igrab(d_inode(path.dentry));
-path_put(&path);
+return ret;

-if (!inode || !S_ISREG(inode->i_mode)) {
+if (!d_is_reg(path.dentry)) {
  ret = -EINVAL;
-goto fail_address_parse;
  }
@@ -488,7 +491,7 @@
-goto fail_address_parse;
  }
  tu->offset = offset;
-tu->inode = inode;
+tu->path = path;
tu->filename = kstrdup(filename, GFP_KERNEL);

  if (!tu->filename) {
@@ -556,7 +559,7 @@
return ret;

fail_address_parse:
-iput(inode);
+path_put(&path);

  pr_info("Failed to parse address or file.
");
/* Don't print "0x (null)" when offset is 0 */
if (tu->offset) {
    seq_printf(m, "0x%p", (void *)tu->offset);
} else {
    switch (sizeof(void *)) {
        case 4:
            goto err_flags;
    }
}

list_del_rcu(&link->list);
/* synchronize with u{,ret}probe_trace_func */
synchronize_sched();
synchronize_rcu();
kfree(link);

if (!list_empty(&tu->tp.files))
    WARN_ON(!uprobe_filter_is_empty(&tu->filter));
uprobe_unregister(tu->inode, tu->offset, &tu->consumer);

uprobe_buffer_disable();
--- linux-4.15.0.org/kernel/trace/tracing_map.c
+++ linux-4.15.0/kernel/trace/tracing_map.c
@@ -90,8 +90,8 @@
 #define DEFINE_TRACING_MAP_CMP_FN(type)\
 static int tracing_map_cmp_##type(void *val_a, void *val_b)\
 {
-    type a = *(type *)val_a;\
-    type b = *(type *)val_b;\
+    type a = (type)(*(u64 *)val_a);\
+    type b = (type)(*(u64 *)val_b);\
    
    return (a > b) ? 1 : ((a < b) ? -1 : 0);
}
--- linux-4.15.0.org/kernel/tracepoint.c
/* Called in removal of a func but failed to allocate a new tp_funcs */
+static void tp_stub_func(void)
+{
+    return;
+
+}
+
static inline void *allocate_probes(int count)
{
    struct tp_probes *p = kmalloc(count * sizeof(struct tracepoint_func)
@@ -98,6 +104,7 @@
        struct tracepoint_func *old, *new;
        int nr_probes = 0;
        +int stubfuncs = 0;
        int pos = -1;

if (WARN_ON(!tp_func->func))
@@ -114,14 +121,34 @@
        old[nr_probes].func == tp_func->func &&
            old[nr_probes].data == tp_func->data)
    return ERR_PTR(-EEXIST);
    +if (old[nr_probes].func == tp_stub_func)
    +    stubfuncs++;
    }
}
-/* + 2 : one for new probe, one for NULL func */
-+new = allocate_probes(nr_probes + 2);
-/* + 2 : one for new probe, one for NULL func - stub functions */
+new = allocate_probes(nr_probes + 2 - stubfuncs);
if (new == NULL)
    return ERR_PTR(-ENOMEM);
if (old) {
    -if (pos < 0) {
        +if (stubfuncs) {
            /* Need to copy one at a time to remove stubs */
            +int probes = 0;
            +
            +pos = -1;
            +for (nr_probes = 0; old[nr_probes].func; nr_probes++) {
                +if (old[nr_probes].func == tp_stub_func)
                    +continue;
                +if (pos < 0 && old[nr_probes].prio < prio)
                    +pos = probes++;
new[probes++] = old[nr_probes];
+
+nr_probes = probes;
+if (pos < 0)
+pos = probes;
+else
+nr_probes--; /* Account for insertion */
+
+} else if (pos < 0) {
+pos = nr_probes;
+memcpy(new, old, nr_probes * sizeof(struct tracepoint_func));
} else {
@@ -155,8 +182,9 @@
/* (N -> M), (N > 1, M >= 0) probes */
if (tp_func->func) {
for (nr_probes = 0; old[nr_probes].func; nr_probes++) {
-  if (old[nr_probes].func == tp_func->func &&
-      old[nr_probes].data == tp_func->data)
+  if ((old[nr_probes].func == tp_func->func &&
+       old[nr_probes].data == tp_func->data) ||
+       old[nr_probes].func == tp_stub_func)
+  nr_del++;}
}

@@ -175,14 +203,32 @@
/* N -> M, (N > 1, M > 0) */
/* + 1 for NULL */
new = allocate_probes(nr_probes - nr_del + 1);
-  if (new == NULL)
-    return ERR_PTR(-ENOMEM);
-  for (i = 0; old[i].func; i++)
-    if (old[i].func != tp_func->func &&
-        old[i].data != tp_func->data)
-      new[j++] = old[i];
-  new[nr_probes - nr_del].func = NULL;
-  *funcs = new;
+  if (new) {
+    for (i = 0; old[i].func; i++)
+      if ((old[i].func != tp_func->func
+           || old[i].data != tp_func->data)
+          && old[i].func != tp_stub_func)
+        new[j++] = old[i];
+    new[nr_probes - nr_del].func = NULL;
+    *funcs = new;
+  } else {
+    /* Failed to allocate, replace the old function
+    * with calls to tp_stub_func.
+    */
+  
+}
for (i = 0; old[i].func; i++)
    if (old[i].func == tp_func->func &&
        old[i].data == tp_func->data) {
        old[i].func = tp_stub_func;
        /* Set the prio to the next event. */
        if (old[i + 1].func)
            old[i].prio =
            old[i + 1].prio;
        else
            old[i].prio = -1;
    }
    *funcs = old;
}
debug_print_probes(*funcs);
return old;

if (IS_ERR(old)) {
    WARN_ON_ONCE(1);
return PTR_ERR(old);
}

if (tp_funcs == old)
    /* Failed allocating new tp_funcs, replaced func with stub */
    return 0;
if (!tp_funcs) {
    /* Removed last function */

--- linux-4.15.0.orig/kernel/umh.c
+++ linux-4.15.0/kernel/umh.c
@@ -13,6 +13,7 @@
#include <linux/cred.h>
#include <linux/file.h>
#include <linux/fdtable.h>
+ include <linux/fs_struct.h>
+ include <linux/workqueue.h>
+ include <linux/security.h>
+ include <linux/mount.h>

spin_unlock_irq(&current->sighand->siglock);

/ *
+ * Initial kernel threads share their FS with init, in order to
+ * get the init root directory. But we've now created a new
+ * thread that is going to execve a user process and has its own
+ * 'struct fs_struct'. Reset umask to the default.
+ */
+ current->fs->umask = 0022;
+
+ /*
+ * Our parent (unbound workqueue) runs with elevated scheduling
+ * priority. Avoid propagating that into the userspace child.
+ */

@ @ -404,6 +413,11 @ @
* Runs a user-space application. The application is started
* asynchronously if wait is not set, and runs as a child of system workqueues.
* (ie. it runs with full root capabilities and optimized affinity).
+ *
+ * Note: successful return value does not guarantee the helper was called at
+ * all. You can't rely on sub_info->{init,cleanup} being called even for
+ * UMH_WAIT_* wait modes as STATIC_USERMODEHELPER_PATH="" turns all helpers
+ * into a successful no-op.
*/

int call_usermodehelper_exec(struct subprocess_info *sub_info, int wait)
{
    --- linux-4.15.0.orig/kernel/up.c
    +++ linux-4.15.0/kernel/up.c
    @@ -23,7 +23,7 @@
}

EXPORT_SYMBOL(smp_call_function_single);

-int smp_call_function_single_async(int cpu, call_single_data_t *csd)
+int smp_call_function_single_async(int cpu, struct __call_single_data *csd)
{
    unsigned long flags;

    --- linux-4.15.0.orig/kernel/user_namespace.c
    +++ linux-4.15.0/kernel/user_namespace.c
    @@ -26,6 +26,12 @@
    #include <linux/bsearch.h>
    #include <linux/sort.h>
/*
 * sysctl determining whether unprivileged users may unshare a new
 * users. Allowed by default
 * */

#define UNPRIVILEGED_USERS_CLONE 1;

static struct kmem_cache *user_ns_cachep __read_mostly;
static DEFINE_MUTEX(userns_state_mutex);

unsigned idx;
struct uid_gid_extent extent;
char *kbuf = NULL, *pos, *next_line;
ssize_t ret = -EINVAL;

/* Only allow < page size writes at the beginning of the file */
if ((*ppos != 0) || (count >= PAGE_SIZE))
    return -EINVAL;

/* Slurp in the user data */
kbuf = memdup_user_nul(buf, count);
if (IS_ERR(kbuf))
    return PTR_ERR(kbuf);

/* Parse the user data */
ret = -EINVAL;
pos = kbuf;

if (!new_idmap_permitted(file, ns, cap_setid, &new_map))
go to out;

-ret = sort_idmaps(&new_map);
-if (ret < 0)
-goto out;
-
ret = -EPERM;
/* Map the lower ids from the parent user namespace to the
 * kernel global id space.
 @@ -1007,6 +1005,14 @@
e->lower_first = lower_first;
 }

+/*
 + * If we want to use binary search for lookup, this clones the extent
 + * array and sorts both copies.
 + */
+ret = sort_idmaps(&new_map);
+if (ret < 0)
+goto out;
+
/* Install the map */
if (new_map.nr_extents <= UID_GID_MAP_MAX_BASE_EXTENTS) {
    memcpy(map->extent, new_map.extent,
@@ -1235,6 +1241,7 @@
    }
    return in_userns(target_ns, current_user_ns());
 }
+EXPORT_SYMBOL(current_in_userns);

static inline struct user_namespace *to_user_ns(struct ns_common *ns)
{
    --- linux-4.15.0.orig/kernel/utsname_sysctl.c
+++ linux-4.15.0/kernel/utsname_sysctl.c
@@ -18,7 +18,7 @@
#ifdef CONFIG_PROC_SYSCTL

-static void *get_uts(struct ctl_table *table, int write)
+static void *get_uts(struct ctl_table *table)
{
    char *which = table->data;
    struct uts_namespace *uts_ns;
@@ -26,21 +26,9 @@
    which = (which - (char *)&init_uts_ns) + (char *)uts_ns;
-if (!write)
-down_read(&uts_sem);
-else
-down_write(&uts_sem);
return which;
}

-static void put_uts(struct ctl_table *table, int write, void *which)
-{  
-if (!write)
-up_read(&uts_sem);
-else
-up_write(&uts_sem);
-}
-
/*
 * Special case of dostring for the UTS structure. This has locks
 * to observe. Should this be in kernel/sys.c ????
 @@ -50,13 +38,34 @@
 |
 struct ctl_table uts_table;
 int r;
+char tmp_data[__NEW_UTS_LEN + 1];
 +
 memcpys(&uts_table, table, sizeof(uts_table));
 -uts_table.data = get_uts(table, write);
 +uts_table.data = tmp_data;
 +
+/*
 + * Buffer the value in tmp_data so that proc_dostring() can be called
 + * without holding any locks.
 + * We also need to read the original value in the write==1 case to
 + * support partial writes.
 + */
+down_read(&uts_sem);
+memcpys(tmp_data, get_uts(table), sizeof(tmp_data));
+up_read(&uts_sem);
 r = proc_dostring(&uts_table, write, buffer, lenp, ppos);
-put_uts(table, write, uts_table.data);

-if (write)
+if (write) {
+/*
 + * Write back the new value.
 + * Note that, since we dropped uts_sem, the result can
 + * theoretically be incorrect if there are two parallel writes
 + * at non-zero offsets to the same sysctl.
 + */

down_write(&uts_sem);
memcpy(get_uts(table), tmp_data, sizeof(tmp_data));
up_write(&uts_sem);
proc_sys_poll_notify(table->poll);
}

return r;
}
--- linux-4.15.0.orig/kernel/watchdog.c
+++ linux-4.15.0/kernel/watchdog.c
@@ -165,6 +165,8 @@

#ifdef CONFIG_SOFTLOCKUP_DETECTOR

+#define SOFTLOCKUP_RESETULONG_MAX
+
/* Global variables, exported for sysctl */
unsigned int __read_mostly softlockup_panic =
CONFIG_BOOTPARAM_SOFTLOCKUP_PANIC_VALUE;
@@ -266,16 +268,16 @@
*/
-void touch_softlockup_watchdog_sched(void)
+notrace void touch_softlockup_watchdog_sched(void)
{
/*
* Preemption can be enabled. It doesn't matter which CPU's timestamp
* gets zeroed here, so use the raw_ operation.
*/
-raw_cpu_write(watchdog_touch_ts, 0);
+raw_cpu_write(watchdog_touch_ts, SOFTLOCKUP_RESET);
}

-void touch_softlockup_watchdog(void)
+notrace void touch_softlockup_watchdog(void)
{

touch_softlockup_watchdog_sched();
wq_watchdog_touch(raw_smp_processor_id());
@@ -296,14 +298,14 @@
/* the softlockup check.
*/
for_each_cpu(cpu, &watchdog_allowed_mask)
-per_cpu(watchdog_touch_ts, cpu) = 0;
+per_cpu(watchdog_touch_ts, cpu) = SOFTLOCKUP_RESET;
wq_watchdog_touch(-1);


void touch_softlockup_watchdog_sync(void)
{
    __this_cpu_write(softlockup_touch_sync, true);
    __this_cpu_write(watchdog_touch_ts, 0);
    __this_cpu_write(watchdog_touch_ts, SOFTLOCKUP_RESET);
}

static int is_softlockup(unsigned long touch_ts)
@@ -355,7 +357,7 @@
/* .. and repeat */
hrtimer_forward_now(hrtimer, ns_to_ktime(sample_period));

    -if (touch_ts == 0) {
    +if (touch_ts == SOFTLOCKUP_RESET) {
        if (unlikely(__this_cpu_read(softlockup_touch_sync))) {
            /*
             * If the time stamp was touched atomically
             --- linux-4.15.0.orig/kernel/watchdog_hld.c
             +++ linux-4.15.0/kernel/watchdog_hld.c
             @@ -29,7 +29,7 @@
             static unsigned long hardlockup_allcpu_dumped;
             static atomic_t watchdog_cpus = ATOMIC_INIT(0);

             -void arch_touch_nmi_watchdog(void)
             +#include <linux/kvm_para.h>
             +notrace void arch_touch_nmi_watchdog(void)
             {
             /*
             /*
             * Using __raw here because some code paths have
             --- linux-4.15.0.orig/kernel/workqueue.c
             +++ linux-4.15.0/kernel/workqueue.c
             @@ -49,6 +49,7 @@
             #include <linux/uaccess.h>
             #include <linux/sched/isolation.h>
             #include <linux/nmi.h>
             +#include <linux/kvm_para.h>
             
             #include "workqueue_internal.h"

             @@ -1379,21 +1380,22 @@
             */
             lockdep_assert_irqs_disabled();

             -debug_work_activate(work);
             /* if draining, only works from the same workqueue are allowed */
             if (unlikely(wq->flags & __WQ_DRAINING) &&
                 WARN_ON_ONCE(!is_chained_work(wq)))
                 return;
}
retry:
-if (req_cpu == WORK_CPU_UNBOUND)
-cpu = wq_select_unbound_cpu(raw_smp_processor_id());
-
/* pwq which will be used unless @work is executing elsewhere */
-if (!(wq->flags & WQ_UNBOUND))
-pwq = per_cpu_ptr(wq->cpu_pwqs, cpu);
-else
+if (wq->flags & WQ_UNBOUND) {
+cpu = wq_select_unbound_cpu(raw_smp_processor_id());
+pwq = unbound_pwq_by_node(wq, cpu_to_node(cpu));
+} else {
+if (req_cpu == WORK_CPU_UNBOUND)
+cpu = raw_smp_processor_id();
+pwq = per_cpu_ptr(wq->cpu_pwqs, cpu);
+
/*
 * If @work was previously on a different pool, it might still be
@@ -1460,6 +1462,7 @@
 worklist = &pwq->delayed_works;
 */
+debug_work_activate(work);
insert_work(pwq, work, worklist, work_flags);

spin_unlock(&pwq->pool->lock);
@@ -1604,6 +1607,40 @@
}
EXPORT_SYMBOL_GPL(mod_delayed_work_on);
+
+static void rcu_work_rcufn(struct rcu_head *rcu)
+{
+struct rcu_work *rwork = container_of(rcu, struct rcu_work, rcu);
+
+/* read the comment in __queue_work() */
+local_irq_disable();
+__queue_work(WORK_CPU_UNBOUND, rwork->wq, &rwork->work);
+local_irq_enable();
+}
+
+/**
+ * queue_rcu_work - queue work after a RCU grace period
+ * @wq: workqueue to use
+ * @rwork: work to queue
+ *
+ * Return: %false if @rwork was already pending, %true otherwise. Note
that a full RCU grace period is guaranteed only after a %true return.
+ * While @rwork is guaranteed to be executed after a %false return, the
+ * execution may happen before a full RCU grace period has passed.
+ */
bool queue_rcu_work(struct workqueue_struct *wq, struct rcu_work *rwork)
{+
+struct work_struct *work = &rwork->work;
+
+if (!test_and_set_bit(WORK_STRUCT_PENDING_BIT, work_data_bits(work))) {
+    rwork->wq = wq;
+    call_rcu(&rwork->rcu, rcu_work_rcufn);
+    return true;
+}
+
+return false;
+
+EXPORT_SYMBOL(queue_rcu_work);
+
/**
 * worker_enter_idle - enter idle state
 * @worker: worker which is entering idle state
 @@ -1695,12 +1732,6 @@
 mutex_lock(&pool->attach_mutex);
 /*
- *
- * set_cpus_allowed_ptr() will fail if the cpumask doesn't have any
- * online CPUs. It'll be re-applied when any of the CPUs come up.
- *
- *-set_cpus_allowed_ptr(worker->task, pool->attrs->cpumask);
- *
- */
- *
 * The pool->attach_mutex ensures %POOL_DISASSOCIATED remains
 * stable across this function. See the comments above the
 * flag definition for details.
 @@ -1708,6 +1739,9 @@
 if (pool->flags & POOL_DISASSOCIATED)
     worker->flags |= WORKER_UNBOUND;
+
+if (worker->rescue_wq)
++set_cpus_allowed_ptr(worker->task, pool->attrs->cpumask);
+ list_add_tail(&worker->node, &pool->workers);

mutex_unlock(&pool->attach_mutex);
@@ -2365,8 +2399,14 @@
 /*
  if (need_to_create_worker(pool)) {
    spin_lock(&wq_mayday_lock);
    */
- get_pwq(pwq);
- list_move_tail(&pwq->mayday_node, &wq->maydays);

+ * Queue iff we aren’t racing destruction
+ * and somebody else hasn’t queued it already.
+ */
+ if (wq->rescuer && list_empty(&pwq->mayday_node)) {
+ get_pwq(pwq);
+ list_add_tail(&pwq->mayday_node, &wq->maydays);
+ }
spin_unlock(&wq_mayday_lock);
}
}
@@ -2605,6 +2645,9 @@
if (WARN_ON(!wq_online))
    return;

+ lock_map_acquire(&wq->lockdep_map);
+ lock_map_release(&wq->lockdep_map);
+ mutex_lock(&wq->mutex);

/*
 @@ -2796,7 +2839,8 @@
 } Export_SYMBOL_GPL(drain_workqueue);

 -static bool start_flush_work(struct work struct *work, struct wq_barrier *barr)
+static bool start_flush_work(struct work struct *work, struct wq_barrier *barr, 
+    bool from_cancel)
{ 
    struct worker *worker = NULL;
    struct worker_pool *pool;
    @@ -2838,7 +2882,8 @@
* workqueues the deadlock happens when the rescuer stalls, blocking
* forward progress.
*/
- if (pwq->wq->saved_max_active == 1 || pwq->wq->rescuer) {
+ if (!from_cancel &&
+    (pwq->wq->saved_max_active == 1 || pwq->wq->rescuer)) {
lock_map_acquire(&pwq->wq->lockdep_map);
lock_map_release(&pwq->wq->lockdep_map);
}
@@ -2849,6 +2894,30 @@
    return false;
}

+static bool __flush_work(struct work_struct *work, bool from_cancel)
struct wq_barrier barr;

if (WARN_ON(!wq_online))
    return false;

if (WARN_ON(!work->func))
    return false;

if (!from_cancel) {
    lock_map_acquire(&work->lockdep_map);
    lock_map_release(&work->lockdep_map);
    }

if (start_flush_work(work, &barr, from_cancel)) {
    wait_for_completion(&barr.done);
    destroy_work_on_stack(&barr.work);
    return true;
} else {
    return false;
}

bool flush_work(struct work_struct *work)
{
    -struct wq_barrier barr;
    -
    -if (WARN_ON(!wq_online))
        -return false;
    -
    -if (start_flush_work(work, &barr)) {
        -wait_for_completion(&barr.done);
        -destroy_work_on_stack(&barr.work);
        -return true;
    -} else {
        -return false;
    -}
    +return __flush_work(work, false);
}
EXPORT_SYMBOL_GPL(flush_work);

}@ -2939,7 +2997,7 @
* isn't executing.
if (wq_online)
-flush_work(work);
+__flush_work(work, true);

clear_work_data(work);

EXPORT_SYMBOL(flush_delayed_work);

+/**
+ * flush_rcu_work - wait for a rwork to finish executing the last queueing
+ * @rwork: the rcu work to flush
+ *
+ * Return:
+ * %true if flush_rcu_work() waited for the work to finish execution,
+ * %false if it was already idle.
+ */
+bool flush_rcu_work(struct rcu_work *rwork)
+{
+if (test_bit(WORK_STRUCT_PENDING_BIT, work_data_bits(&rwork->work))) {
+rcu_barrier();
+flush_work(&rwork->work);
+return true;
+} else {
+return flush_work(&rwork->work);
+}
+}
+EXPORT_SYMBOL(flush_rcu_work);

static bool __cancel_work(struct work_struct *work, bool is_dwork)
{
unsigned long flags;

unbound_release_work);
struct workqueue_struct *wq = pwq->wq;
struct worker_pool *pool = pwq->pool;
-bool is_last;
+bool is_last = false;

-if (WARN_ON_ONCE(!(wq->flags & WQ_UNBOUND)))
-unbound_release_work);
struct workqueue_struct *wq = pwq->wq;
struct worker_pool *pool = pwq->pool;
-bool is_last;
+bool is_last = false;

-if (Warn_ON_ONCE(!(wq->flags & WQ_UNBOUND)))
+if (!list_empty(&pwq->pwqs_node)) {
if (WARN_ON_ONCE(!(wq->flags & WQ_UNBOUND)))
return;

mutex_lock(&wq->mutex);
list_del_rcu(&pwq->pwqs_node);
is_last = list_empty(&wq->pwqs);
mutex_unlock(&wq->mutex);
mutex_lock(&wq->mutex);
list_del_rcu(&pwq->pwqs_node);
is_last = list_empty(&wq->pwqs);
mutex_unlock(&wq->mutex);
}

mutex_lock(&wq_pool_mutex);
put_unbound_pool(pool);
@
* is updated and visible.
*/
if (!freezable || !workqueue_freezing) {
+bool kick = false;
+
+ pwq->max_active = wq->saved_max_active;

while (!list_empty(&pwq->delayed_works) &&
- pwq->nr_active < pwq->max_active)
 + pwq->nr_active < pwq->max_active) {
pwq_activate_first_delayed(pwq);
+kick = true;
+
+}

/*
 * Need to kick a worker after thawed or an unbound wq's
- * max_active is bumped. It's a slow path. Do it always.
+ * max_active is bumped. In realtime scenarios, always kicking a
+ * worker will cause interference on the isolated cpu cores, so
+ * let's kick iff work items were activated.
*/
-wake_up_worker(pwq->pool);
+if (kick)
+wake_up_worker(pwq->pool);
} else {
  pwq->max_active = 0;
}
@
struct pool_workqueue *pwq;
int node;
+/

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/* Remove it from sysfs first so that sanity check failure doesn't
 * lead to sysfs name conflicts.
 */
+workqueue_sysfs_unregister(wq);
+
/* drain it before proceeding with destruction */
drain_workqueue(wq);

+/* kill rescuer, if sanity checks fail, leave it w/o rescuer */
+if (wq->rescuer) {
+struct worker *rescuer = wq->rescuer;
+
+/* this prevents new queueing */
+spin_lock_irq(&wq_mayday_lock);
+wq->rescuer = NULL;
+spin_unlock_irq(&wq_mayday_lock);
+
+/* rescuer will empty maydays list before exiting */
+kthread_stop(rescuer->task);
+kfree(rescuer);
+}
+
/* sanity checks */
mutex_lock(&wq->mutex);
for_each_pwq(pwq, wq) {
@@ -4102,11 +4213,6 @@
 list_del_rcu(&wq->list);
 mutex_unlock(&wq_pool_mutex);

-workqueue_sysfs_unregister(wq);
-
-if (wq->rescuer)
-kthread_stop(wq->rescuer->task);
-
-if (!(wq->flags & WQ_UNBOUND)) {
+EXPORT_SYMBOL_GPL(workqueue_set_max_active);

/*
 * current_work - retrieve %current task's work struct
 */
+* current_work - retrieve %current task's work struct
 + *
 + * Determine if %current task is a workqueue worker and what it's working on.
 + * Useful to find out the context that the %current task is running in.
 + *
 + * Return: work struct if %current task is a workqueue worker, %NULL otherwise.
 + */
+struct work_struct *current_work(void)
+
+struct worker *worker = current_wq_worker();
+
+return worker ? worker->current_work : NULL;
+
+EXPORT_SYMBOL(current_work);
+
+/**
+ * current_is_workqueue_rescuer - is %current workqueue rescuer?
+ *
+ * Determine whether %current is a workqueue rescuer. Can be used from
+ **
+-pr_cont(" pwq %d:\n", pool->id);
+pr_cont(" active=%d/%d refcnt=%d%s\n",
++pwq->nr_active, pwq->max_active,
+!list_empty(&pwq->mayday_node) ? " MAYDAY" : "");

hash_for_each(pool->busy_hash, bkt, worker, hentry) {
    @ -5310,7 +5433,7 @@

    ret = device_register(&wq_dev->dev);
    if (ret) {
        -kfree(wq_dev);
+put_device(&wq_dev->dev);
        wq->wq_dev = NULL;
        return ret;
    }
    @ -5391,6 +5514,7 @@
    }

    unsigned long thresh = READ_ONCE(wq_watchdog_thresh) * HZ;
    bool lockup_detected = false;
+unsigned long now = jiffies;
    struct worker_pool *pool;
    int pi;

    @ -5405,6 +5529,12 @@
    if (list_empty(&pool->worklist))
        continue;

+/*
+ * If a virtual machine is stopped by the host it can look to
+ * the watchdog like a stall.
+ */
+kvm_check_and_clear_guest_paused();
/* get the latest of pool and touched timestamps */
pool_ts = READ_ONCE(pool->watchdog_ts);
touched = READ_ONCE(wq_watchdog_touched);

/* did we stall? */
@if (time_after(jiffies, ts + thresh)) {
+if (time_after(now, ts + thresh)) {
lockup_detected = true;
pr_emerg("BUG: workqueue lockup - pool");
pr_cont_pool_info(pool);
pr_cont(" stuck for %us!n",
-jiffies_to_msecs(jiffies - pool_ts) / 1000);
+jiffies_to_msecs(now - pool_ts) / 1000);
}
}

mod_timer(&wq_watchdog_timer, jiffies + thresh);

-void wq_watchdog_touch(int cpu)
+notrace void wq_watchdog_touch(int cpu)
{
if (cpu >= 0)
  per_cpu(wq_watchdog_touched_cpu, cpu) = jiffies;
--- linux-4.15.0.orig/lib/Kconfig
+++ linux-4.15.0/lib/Kconfig
@@ -55,6 +55,22 @@
config ARCH_HAS_FAST_MULTIPLIER
  bool

+config INDIRECT_PIO
+bool "Access I/O in non-MMIO mode"
+depends on ARM64
+help
+  On some platforms where no separate I/O space exists, there are I/O
+  hosts which can not be accessed in MMIO mode. Using the logical PIO
+  mechanism, the host-local I/O resource can be mapped into system
+  logic PIO space shared with MMIO hosts, such as PCI/PCIe, then the
+  system can access the I/O devices with the mapped-logic PIO through
+  I/O accessors.
+
+  This way has relatively little I/O performance cost. Please make
  sure your devices really need this configure item enabled.
+
+ When in doubt, say N.
+
+ config CRC_CCITT
+ tristate "CRC-CCITT functions"
+ help
+ @ @ -409,6 +425,10 @@
+ depends on !NO_DMA
+ default y
+
+config SGL_ALLOC
+bool
+default n
+
+ config DMA_NOOP_OPS
+bool
+depends on HAS_DMA && (!64BIT || ARCH_DMA_ADDR_T_64BIT)
+ @ @ -523,6 +543,14 @@
+ Digital signature verification. Currently only RSA is supported.
+ Implementation is done using GnuPG MPI library
+
+config DIMLIB
+bool "DIM library"
+default y
+help
+ Dynamic Interrupt Moderation library.
+ Implements an algorithm for dynamically change CQ moderation values
+ according to run time performance.
+ #
#
# libfdt files, only selected if needed.
#
--- linux-4.15.0.orig/lib/Kconfig.debug
+++ linux-4.15.0/lib/Kconfig.debug
@@ -217,7 +217,7 @@
config FRAME_WARN
int "Warn for stack frames larger than (needs gcc 4.4)"
range 0 8192
- default 0 if KASAN
+ default 3072 if KASAN_EXTRA
default 2048 if GCC_PLUGIN_LATENT_ENTROPY
default 1280 if (!64BIT && PARISC)
default 1024 if (!64BIT && !PARISC)
@@ -569,7 +569,7 @@
int "Maximum kmemleak early log entries"
depends on DEBUG_KMEMLEAK
range 200 40000
- default 400
+ default 16000
Kmemleak must track all the memory allocations to avoid reporting false positives. Since memory may be allocated or
depends on HAVE_HARDLOCKUP_DETECTOR_PERF || HAVE_HARDLOCKUP_DETECTOR_ARCH
select LOCKUP_DETECTOR
select HARDLOCKUP_DETECTOR_PERF if HAVE_HARDLOCKUP_DETECTOR_PERF
- select HARDLOCKUP_DETECTOR_ARCH if HAVE_HARDLOCKUP_DETECTOR_ARCH
help
Say Y here to enable the kernel to act as a watchdog to detect hard lockups.
depends on m
depends on BLOCK && (64BIT || LBDAF) # for XFS, BTRFS
depends on NETDEVICES && NET_CORE && INET # for TUN
+ depends on BLOCK
select TEST_LKM
select XFS_FS
select TUN
--- linux-4.15.0.orig/lib/Kconfig.kasan
+++ linux-4.15.0/lib/Kconfig.kasan
@@ -6,6 +6,7 @@
 config KASAN
 bool "KASan: runtime memory debugger"
depends on SLUB || (SLAB && !DEBUG_SLAB)
+ select SLUB_DEBUG if SLUB
 select CONSTRUCTORs
 select STACKDEPOT
 help
@@ -20,6 +21,17 @@
 Currently CONFIG_KASAN doesn't work with CONFIG_DEBUG_SLAB
 (the resulting kernel does not boot).
+config KASAN_EXTRA
+bool "KAsan: extra checks"
+depends on KASAN && DEBUG_KERNEL && !COMPILE_TEST
+help
+ This enables further checks in the kernel address sanitizer, for now
+ it only includes the address-use-after-scope check that can lead
+ to excessive kernel stack usage, frame size warnings and longer
+ compile time.
+ https://gcc.gnu.org/bugzilla/show_bug.cgi?id=81715 has more
+ +
+ choice
prompt "Instrumentation type"
depends on KASAN
--- linux-4.15.0.orig/lib/Makefile
+++ linux-4.15.0/lib/Makefile
@@ -17,6 +17,17 @@
KCOV_INSTRUMENT_debugobjects.o := n
KCOV_INSTRUMENT_dynamic_debug.o := n

+# Early boot use of cmdline, don't instrument it
+ifdef CONFIG_AMD_MEM_ENCRYPT
+KASAN_SANITIZE_string.o := n
+
+ifdef CONFIG_FUNCTION_TRACER
+CFLAGS_REMOVE_string.o = -pg
+endif
+
+CFLAGS_string.o := $(call cc-option, -fno-stack-protector)
+endif
+
l-$ (CONFIG_TEST_SYSCTL) += test_sysctl.o
obj-$ (CONFIG_TEST_HASH) += test_hash.o test_siphash.o
obj-$ (CONFIG_TEST_KASAN) += test_kasan.o
+CFLAGS_test_kasan.o += -fno-builtin
obj-$ (CONFIG_TEST_KSTRTOX) += test-kstrtox.o
obj-$ (CONFIG_TEST_LIST_SORT) += test_list_sort.o
obj-$ (CONFIG_TEST_LKM) += test_module.o
@@ -52,6 +63,7 @@
obj-$ (CONFIG_CHECK_SIGNATURE) += check_signature.o
obj-$ (CONFIG_DEBUG_LOCKING_API_SELFTESTS) += locking-selftest.o

+obj-y += logic_pio.o
+
obj-$ (CONFIG_GENERIC_HWEIGHT) += lweight.o

obj-$ (CONFIG_BTREE) += btree.o
@@ -178,6 +192,7 @@
obj-$ (CONFIG_GLOB_SELFTEST) += globtest.o

obj-$ (CONFIG_MPILIB) += mpi/
+obj-$ (CONFIG_DIMLIB) += dim/
obj-$ (CONFIG_SIGNATURE) += digsig.o

lib-$ (CONFIG_CLZ_TAB) += clz_tab.o
@@ -246,6 +261,8 @@
obj-$ (CONFIG_UBSAN) += ubsan.o

UBSAN_SANITIZE_ubsan.o := n
obj-$\$(CONFIG_SBITMAP)\$ \rightleftharpoons \$\text{bitmap.o}\$

--- linux-4.15.0.orig/lib/assoc_array.c
+++ linux-4.15.0/lib/assoc_array.c
@@ -781,9 +781,11 @@
 new_s0->index_key[i] =
 ops->get_key_chunk(index_key, i * ASSOC_ARRAY_KEY_CHUNK_SIZE);

-\tblank = ULONG_MAX << (level & ASSOC_ARRAY_KEY_CHUNK_MASK);
-\tpr_devel("blank off \[%zu\] %d: %lx\n", keylen - 1, level, blank);
-\tnew_s0->index_key[keylen - 1] &= ~blank;
+\tif (level & ASSOC_ARRAY_KEY_CHUNK_MASK) {
+\t\tblank = ULONG_MAX << (level & ASSOC_ARRAY_KEY_CHUNK_MASK);
+\t\tpr_devel("blank off \[%zu\] %d: %lx\n", keylen - 1, level, blank);
+\tnew_s0->index_key[keylen - 1] &= ~blank;
+\t}

/* This now reduces to a node splitting exercise for which we'll need
 * to regenerate the disparity table.
--- linux-4.15.0.orig/lib/bitmap.c
+++ linux-4.15.0/lib/bitmap.c
@@ -13,6 +13,8 @@
 #include <linux/bitops.h>
 #include <linux/bug.h>
 #include <linux/kernel.h>
+  \#include <linux/slab.h>
+  \#include <linux/mm.h>
  \#include <linux/string.h>
  \#include <linux/uaccess.h>

@@ -468,14 +470,15 @@
 * ranges if list is specified or hex digits grouped into comma-separated
 * sets of 8 digits/set. Returns the number of characters written to buf.
 *
-\t* It is assumed that \@buf is a pointer into a PAGE_SIZE area and that
-\t* sufficient storage remains at \@buf to accommodate the
-\t* bitmap_print_to_pagebuf() output.
+\t* It is assumed that \@buf is a pointer into a PAGE_SIZE, page-aligned
+\t* area and that sufficient storage remains at \@buf to accommodate the
+\t* bitmap_print_to_pagebuf() output. Returns the number of characters
+\t* actually printed to \@buf, excluding terminating \'\0\'.
+*/
int bitmap_print_to_pagebuf(bool list, char *buf, const unsigned long *maskp,
    int nmaskbits)

- ptdiff_t len = PTR_ALIGN(buf + PAGE_SIZE - 1, PAGE_SIZE) - buf;
+ ptdiff_t len = PAGE_SIZE - offset_in_page(buf);

int n = 0;

if (len > 1)
		if (!(a <= b) || !(used_size <= group_size))
+      if (!(a <= b) || group_size == 0 || !(used_size <= group_size))
      return -EINVAL;
      if (b >= nmaskbits)
      return -ERANGE;

EXPORT_SYMBOL(bitmap_copy_le);
#endif
+
+unsigned long *bitmap_alloc(unsigned int nbits, gfp_t flags)
+{
+  return kmalloc_array(BITS_TO_LONGS(nbits), sizeof(unsigned long),
+                      flags);
+
+ EXPORT_SYMBOL(bitmap_alloc);
+
+unsigned long *bitmap_zalloc(unsigned int nbits, gfp_t flags)
+{
+  return bitmap_alloc(nbits, flags | __GFP_ZERO);
+
+ EXPORT_SYMBOL(bitmap_zalloc);
+
+void bitmap_free(const unsigned long *bitmap)
+{
+  kfree(bitmap);
+
+ EXPORT_SYMBOL(bitmap_free);

--- linux-4.15.0.orig/lib/bsearch.c
+++ linux-4.15.0/lib/bsearch.c
@@ -11,6 +11,7 @@

#include <linux/export.h>
#include <linux/bsearch.h>
+include <linux/kprobes.h>

/*
 * bsearch - binary search an array of elements
 *@ @ -53,3 +54,4 @@
return NULL;
}
EXPORT_SYMBOL(bsearch);
+NOKPROBE_SYMBOL(bsearch);
--- linux-4.15.0.orig/lib/bug.c
+++ linux-4.15.0/lib/bug.c
@@ -150,33 +150,32 @@
return BUG_TRAP_TYPE_NONE;

bug = find_bug(bugaddr);
+if (!bug)
+return BUG_TRAP_TYPE_NONE;

file = NULL;
line = 0;
-wARNING = 0;

-if (bug) {
 #ifdef CONFIG_DEBUG_BUGVERBOSE
 #ifdef CONFIG_GENERIC_BUG_RELATIVE_POINTERS
 -file = bug->file;
 +file = bug->file;
 #else
 -file = (const char *)bug + bug->file_disp;
 +file = (const char *)bug + bug->file_disp;
 #endif
 -line = bug->line;
 +line = bug->line;
 #endif
 -warning = (bug->flags & BUGFLAG_WARNING) != 0;
 -once = (bug->flags & BUGFLAG_ONCE) != 0;
 -done = (bug->flags & BUGFLAG_DONE) != 0;
 -
 -if (warning && once) {
 -if (done)
 -return BUG_TRAP_TYPE_WARN;
 -
 /*
 - * Since this is the only store, concurrency is not an issue.
 - */
 -bug->flags |= BUGFLAG_DONE;
 -
+warning = (bug->flags & BUGFLAG_WARNING) != 0;
+once = (bug->flags & BUGFLAG_ONCE) != 0;
+done = (bug->flags & BUGFLAG_DONE) != 0;
+
+if (warning && once) {
+if (done)
+return BUG_TRAP_TYPE_WARN;
+
+﻿#
+ * Since this is the only store, concurrency is not an issue.
+ */
+bug->flags |= BUGFLAG_DONE;
}

if (warning) {
@@ -191,7 +190,7 @@
if (file)
pr_crit("kernel BUG at %s:%u!
", file, line);
else
-    pr_crit("Kernel BUG at %p [verbose debug info unavailable]\n",
+    pr_crit("Kernel BUG at %pB [verbose debug info unavailable]\n",
(void *)bugaddr);

return BUG_TRAP_TYPE_BUG;
--- linux-4.15.0.orig/lib/crc32.c
+++ linux-4.15.0/lib/crc32.c
@@ -327,7 -327,7 +327,7 @@
    return crc;
 }

-#if CRC_LE_BITS == 1
+#if CRC_BE_BITS == 1
u32 __pure crc32_be(u32 crc, unsigned char const *p, size_t len)
{
    return crc32_be_generic(crc, p, len, NULL, CRCPOLY_BE);
--- linux-4.15.0.orig/lib/crc32test.c
+++ linux-4.15.0/lib/crc32test.c
@@ -683,7 -683,6 @@
    /* reduce OS noise */
    local_irq_save(flags);
    -local_irq_disable();

    nsec = ktime_get_ns();
    for (i = 0; i < 100; i++) {
    @ @ -694,7 +693,6 @@
    nsec = ktime_get_ns() - nsec;

    local_irq_restore(flags);
    -local_irq_enable();

    pr_info("crc32c: CRC_LE_BITS = %d\n", CRC_LE_BITS);

    @ @ -768,7 +766,6 @@
/* reduce OS noise */
local_irq_save(flags);
local_irq_disable();

nsec = ktime_get_ns();
for (i = 0; i < 100; i++) {
    nsec = ktime_get_ns() - nsec;
}

local_irq_restore(flags);
local_irq_enable();

pr_info("crc32: CRC_LE_BITS = %d, CRC_BE_BITS = %d\n",
        CRC_LE_BITS, CRC_BE_BITS);
--- linux-4.15.0.orig/lib/debug_locks.c
+++ linux-4.15.0/lib/debug_locks.c
@@ -37,7 +37,7 @@*/
int debug_locks_off(void)
{
    if (__debug_locks_off()) {
+    if (debug_locks && __debug_locks_off()) {
        if (!debug_locks_silent) {
            console_verbose();
            return 1;
        }
    }
    --- linux-4.15.0.orig/lib/debugobjects.c
+++ linux-4.15.0/lib/debugobjects.c
@@ -111,7 +111,6 @@
    if (new)
        return;
    -kmemleak_ignore(new);
        raw_spin_lock_irqsave(&pool_lock, flags);
    hlist_add_head(&new->node, &obj_pool);
    debug_objects_allocated++;
@@ -322,9 +321,12 @@
        limit++;
        if (is_on_stack)
            -pr_warn("object is on stack, but not annotated\n");
+pr_warn("object %p is on stack %p, but NOT annotated\n", addr,
+        task_stack_page(current));
        else
            -pr_warn("object is not on stack, but annotated\n");
+pr_warn("object %p is NOT on stack %p, but annotated\n", addr,
+        task_stack_page(current));
+            +pr_warn("object %p is on stack %p, but NOT
+    annotated\n", addr,
WARN_ON(1);
}

@@ -1082,7 +1084,6 @@
obj = kmem_cache_zalloc(obj_cache, GFP_KERNEL);
if (!obj)
    goto free;
-kmemleak_ignore(obj);
    hlist_add_head(&obj->node, &objects);
}

@@ -1138,7 +1139,8 @@
obj_cache = kmem_cache_create("debug_objects_cache",
    sizeof (struct debug_obj), 0,
    - SLAB_DEBUG_OBJECTS, NULL);
+ SLAB_DEBUG_OBJECTS | SLAB_NOLEAKTRACE,
+    NULL);

if (!obj_cache || debug_objects_replace_static_objects()) {
    debug_objects_enabled = 0;
--- linux-4.15.0.orig/lib/decompress_unlz4.c
+++ linux-4.15.0/lib/decompress_unlz4.c
@@ -115,6 +115,9 @@
    error("data corrupted");
    goto exit_2;
} else if (size < 4) {
+/* empty or end-of-file */
+    goto exit_3;
}

chunksize = get_unaligned_le32(inp);
@@ -128,6 +131,10 @@
    continue;
}

+if (!fill && chunksize == 0) {
+    /* empty or end-of-file */
+    goto exit_3;
+}

if (posp)
    *posp += 4;
@@ -187,6 +194,7 @@
}
+exit_3:
ret = 0;
exit_2:
if (!input)
--- linux-4.15.0.orig/lib/devres.c
+++ linux-4.15.0/lib/devres.c
@@ -44,6 +44,35 @@
EXPORT_SYMBOL(devm_ioremap);

/**
+ * devm_ioremap_uc - Managed ioremap_uc()
+ * @dev: Generic device to remap IO address for
+ * @offset: Resource address to map
+ * @size: Size of map
+ *
+ * Managed ioremap_uc(). Map is automatically unmapped on driver detach.
+ */
+void __iomem *devm_ioremap_uc(struct device *dev, resource_size_t offset,
+    resource_size_t size)
+{
+    void __iomem **ptr, *addr;
+
+    ptr = devres_alloc(devm_ioremap_release, sizeof(*ptr), GFP_KERNEL);
+    if (!ptr)
+        return NULL;
+
+    addr = ioremap_uc(offset, size);
+    if (addr) {
+        *ptr = addr;
+        devres_add(dev, ptr);
+    } else
+        devres_free(ptr);
+
+    return addr;
+}
+EXPORT_SYMBOL(devm_ioremap_uc);
+
+/**
+ * devm_ioremap_nocache - Managed ioremap_nocache()
+ * @dev: Generic device to remap IO address for
+ * @offset: Resource address to map
+ @ @ -132,7 +161,8 @@
+    *if (IS_ERR(base))
+    *return PTR_ERR(base);
+ */
-void __iomem *devm_ioremap_resource(struct device *dev, struct resource *res)
+void __iomem *devm_ioremap_resource(struct device *dev,
const struct resource *res)
{
resource_size_t size;
const char *name;
--- linux-4.15.0.orig/lib/dim/Makefile
+++ linux-4.15.0/lib/dim/Makefile
@@ -0,0 +1,7 @@
+#
+# DIM Dynamic Interrupt Moderation library
+#
+
+obj-S(CONFIG_DIMLIB) += dimlib.o
+
dimlib-y := dim.o net_dim.o rdma_dim.o
--- linux-4.15.0.orig/lib/dim/dim.c
+++ linux-4.15.0/lib/dim/dim.c
@@ -0,0 +1,83 @@
+/*
+ * Copyright (c) 2019, Mellanox Technologies inc. All rights reserved.
+ */
+
+#include <linux/dim.h>
+
+bool dim_on_top(struct dim *dim)
+{
+switch (dim->tune_state) {
+case DIM_PARKING_ON_TOP:
+case DIM_PARKING_TIRED:
+return true;
+
+case DIM_GOING_RIGHT:
+return (dim->steps_left > 1) && (dim->steps_right == 1);
+default: /* DIM_GOING_LEFT */
+return (dim->steps_right > 1) && (dim->steps_left == 1);
+
+} EXPORT_SYMBOL(dim_on_top);
+
+void dim_turn(struct dim *dim)
+{
+switch (dim->tune_state) {
+case DIM_PARKING_ON_TOP:
+case DIM_PARKING_TIRED:
+break;
+case DIM_GOING_RIGHT:
+dim->tune_state = DIM_GOING_LEFT;
+dim->steps_left = 0;
+break;
case DIM_GOING_LEFT:
    dim->tune_state = DIM_GOING_RIGHT;
    dim->steps_right = 0;
    break;
+
+EXPORT_SYMBOL(dim_turn);
+
+void dim_park_on_top(struct dim *dim)
+{
+    +dim->steps_right = 0;
+    +dim->steps_left = 0;
+    +dim->tired = 0;
+    +dim->tune_state = DIM_PARKING_ON_TOP;
+}
+EXPORT_SYMBOL(dim_park_on_top);
+
+void dim_park_tired(struct dim *dim)
+{
+    +dim->steps_right = 0;
+    +dim->steps_left = 0;
+    +dim->tune_state = DIM_PARKING_TIRED;
+}
+EXPORT_SYMBOL(dim_park_tired);
+
+void dim_calc_stats(struct dim_sample *start, struct dim_sample *end,
+    struct dim_stats *curr_stats)
+{
+/* u32 holds up to 71 minutes, should be enough */
+    +u32 delta_us = ktime_us_delta(end->time, start->time);
+    +u32 npkts = BIT_GAP(BITS_PER_TYPE(u32), end->pkt_ctr, start->pkt_ctr);
+    +u32 nbytes = BIT_GAP(BITS_PER_TYPE(u32), end->byte_ctr,
+        start->byte_ctr,
+    +    start->byte_ctr);
+    +u32 ncomps = BIT_GAP(BITS_PER_TYPE(u32), end->comp_ctr,
+        start->comp_ctr);
+    +
+    +if (!delta_us)
+        +return;
+    +curr_stats->ppms = DIV_ROUND_UP(npkts * USEC_PER_MSEC, delta_us);
+    +curr_stats->bpms = DIV_ROUND_UP(nbytes * USEC_PER_MSEC, delta_us);
+    +curr_stats->epms = DIV_ROUND_UP(DIM_NEVENTS * USEC_PER_MSEC,
+
+        +delta_us);
+    +curr_stats->cpms = DIV_ROUND_UP(ncomps * USEC_PER_MSEC, delta_us);
+    +if (curr_stats->epms != 0)
+        +curr_stats->cpe_ratio = DIV_ROUND_DOWN_ULL(
+            curr_stats->cpms * 100, curr_stats->epms);
+    +else
+    +return;
curr_stats->cpe_ratio = 0;
+
+}
+EXPORT_SYMBOL(dim_calc_stats);

--- linux-4.15.0.orig/lib/dim/net_dim.c
+++ linux-4.15.0/lib/dim/net_dim.c
@@ -0,0 +1,246 @@
+// SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB
+*/
+ * Copyright (c) 2018, Mellanox Technologies inc. All rights reserved.
+ */
+
+#include <linux/dim.h>
+
+/*
+ * Net DIM profiles:
+ * There are different set of profiles for each CQ period mode.
+ * There are different set of profiles for RX/TX CQs.
+ * Each profile size must be of NET_DIM_PARAMS_NUM_PROFILES
+ */
+#define NET_DIM_PARAMS_NUM_PROFILES 5
+#define NET_DIM_DEFAULT_RX_CQ_MODERATION_PKTS_FROM_EQE 256
+#define NET_DIM_DEFAULT_TX_CQ_MODERATION_PKTS_FROM_EQE 128
+#define NET_DIM_DEF_PROFILE_CQE 1
+#define NET_DIM_DEF_PROFILE_EQE 1
+
+#define NET_DIM_RX_EQE_PROFILES { 
+    {1, NET_DIM_DEFAULT_RX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {8, NET_DIM_DEFAULT_RX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {64, NET_DIM_DEFAULT_RX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {128, NET_DIM_DEFAULT_RX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {256, NET_DIM_DEFAULT_RX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+}
+
+#define NET_DIM_TX_EQE_PROFILES { 
+    {2, 256}, \ 
+    {8, 128}, \ 
+    {16, 64}, \ 
+    {32, 64}, \ 
+    {64, 64} \ 
+}
+
+#define NET_DIM_RX_CQE_PROFILES { 
+    {2, 64}, \ 
+    {8, 32}, \ 
+    {16, 16}, \ 
+}
+
+#define NET_DIM_TX_CQE_PROFILES { 
+    {1, NET_DIM_DEFAULT_TX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {8, NET_DIM_DEFAULT_TX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {32, NET_DIM_DEFAULT_TX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {64, NET_DIM_DEFAULT_TX_CQ_MODERATION_PKTS_FROM_EQE}, \ 
+    {128, NET_DIM_DEFAULT_TX_CQ_MODERATION_PKTS_FROM_EQE} \ 
+}
```c
#define NET_DIM_TX_CQE_PROFILES { 
	{5, 128}, 
	{8, 64}, 
	{16, 32}, 
	{32, 32}, 
	{64, 32} 
+
+
static const struct dim_cq_moder
+rx_profile[DIM_CQ_PERIOD_NUMModes][NET_DIM_PARAMS_NUM_PROFILES] = {
+NET_DIM_RX_EQE_PROFILES,
+NET_DIM_RX_CQE_PROFILES,
+};
+
+static const struct dim_cq_moder
+tx_profile[DIM_CQ_PERIOD_NUMModes][NET_DIM_PARAMS_NUM_PROFILES] = {
+NET_DIM_TX_EQE_PROFILES,
+NET_DIM_TX_CQE_PROFILES,
+};
+
+struct dim_cq_moder
+net_dim_get_rx_moderation(u8 cq_period_mode, int ix)
+{
+struct dim_cq_moder cq_moder = rx_profile[cq_period_mode][ix];
+
+cq_moder.cq_period_mode = cq_period_mode;
+return cq_moder;
+}
+EXPORT_SYMBOL(net_dim_get_rx_moderation);
+
+struct dim_cq_moder
+net_dim_get_def_rx_moderation(u8 cq_period_mode)
+{
+u8 profile_ix = cq_period_mode == DIM_CQ_PERIOD_MODE_START_FROM_CQE ?
+NET_DIM_DEF_PROFILE_CQE : NET_DIM_DEF_PROFILE_EQE;
+
+return net_dim_get_rx_moderation(cq_period_mode, profile_ix);
+}
+EXPORT_SYMBOL(net_dim_get_def_rx_moderation);
+
+struct dim_cq_moder
+net_dim_get_tx_moderation(u8 cq_period_mode, int ix)
+{
+struct dim_cq_moder cq_moder = tx_profile[cq_period_mode][ix];
+
+cq_moder.cq_period_mode = cq_period_mode;
```
+return cq_moder;
+}
+EXPORT_SYMBOL(net_dim_get_tx_moderation);
+
+struct dim_cq_moder
+net_dim_get_def_tx_moderation(u8 cq_period_mode)
+{
+u8 profile_ix = cq_period_mode == DIM_CQ_PERIOD_MODE_START_FROM_CQE ?
+NET_DIM_DEF_PROFILE_CQE : NET_DIM_DEF_PROFILE_EQE;
+
+return net_dim_get_tx_moderation(cq_period_mode, profile_ix);
+}
+EXPORT_SYMBOL(net_dim_get_def_tx_moderation);
+
+static int net_dim_step(struct dim *dim)
+{
+if (dim->tired == (NET_DIM_PARAMS_NUM_PROFILES * 2))
+return DIM_TOO_TIRED;
+
+switch (dim->tune_state) {
+case DIM_PARKING_ON_TOP:
+break;
+case DIM_PARKING_TIRED:
+break;
+case DIM_GOING_RIGHT:
+if (dim->profile_ix == (NET_DIM_PARAMS_NUM_PROFILES - 1))
+return DIM_ON_EDGE;
+dim->profile_ix++;
+dim->steps_right++;
+break;
+case DIM_GOING_LEFT:
+if (dim->profile_ix == 0)
+return DIM_ON_EDGE;
+dim->profile_ix--;
+dim->steps_left++;
+break;
+}
+
+dim->tired++;
+return DIM_STEPPED;
+}
+
+static void net_dim_exit_parking(struct dim *dim)
+{
+dim->tune_state = dim->profile_ix ? DIM_GOING_LEFT : DIM_GOING_RIGHT;
+net_dim_step(dim);
+}
+
+static int net_dim_stats_compare(struct dim_stats *curr,
struct dim_stats *prev)
+
+if (!prev->bpms)
+  return curr->bpms ? DIM_STATS_BETTER : DIM_STATS_SAME;
+  
+if (IS_SIGNIFICANT_DIFF(curr->bpms, prev->bpms))
+  return (curr->bpms > prev->bpms) ? DIM_STATS_BETTER :
+     DIM_STATS_WORSE;
+  
+if (!prev->ppms)
+  return curr->ppms ? DIM_STATS_BETTER : DIM_STATS_SAME;
+  
+if (IS_SIGNIFICANT_DIFF(curr->ppms, prev->ppms))
+  return (curr->ppms > prev->ppms) ? DIM_STATS_BETTER :
+     DIM_STATS_WORSE;
+  
+if (!prev->epms)
+  return DIM_STATS_SAME;
+  
+if (IS_SIGNIFICANT_DIFF(curr->epms, prev->epms))
+  return (curr->epms < prev->epms) ? DIM_STATS_BETTER :
+     DIM_STATS_WORSE;
+  
+return DIM_STATS_SAME;
+
+
+static bool net_dim_decision(struct dim_stats *curr_stats, struct dim *dim)
+
+);
+
+int prev_state = dim->tune_state;
+int prev_ix = dim->profile_ix;
+int stats_res;
+int step_res;
+
+switch (dim->tune_state) {
+  case DIM_PARKING_ON_TOP:
+    stats_res = net_dim_stats_compare(curr_stats,
+        &dim->prev_stats);
+    if (stats_res != DIM_STATS_SAME)
+      net_dim_exit_parking(dim);
+    break;
+
+  case DIM_PARKING_TIRED:
+    dim->tired--;
+    if (!dim->tired)
+      net_dim_exit_parking(dim);
+    break;
+"
+case DIM_GOING_RIGHT:
+case DIM_GOING_LEFT:
+stats_res = net_dim_stats_compare(curr_stats,
+   &dim->prev_stats);
+if (stats_res != DIM_STATS_BETTER)
+dim_turn(dim);
+
+if (dim_on_top(dim)) {
+dim_park_on_top(dim);
+break;
+}
+
+step_res = net_dim_step(dim);
+switch (step_res) {
+case DIM_ON_EDGE:
+dim_park_on_top(dim);
+break;
+case DIM_TOO_TIRED:
+dim_park_tired(dim);
+break;
+}
+
+break;
+
+if (prev_state != DIM_PARKING_ON_TOP ||
+    dim->tune_state != DIM_PARKING_ON_TOP)
+dim->prev_stats = *curr_stats;
+
+return dim->profile_ix != prev_ix;
+}

void net_dim(struct dim *dim, struct dim_sample end_sample)
{
struct dim_stats curr_stats;
	n16 nevents;

switch (dim->state) {
+case DIM_MEASURE_IN_PROGRESS:
+nevents = BIT_GAP(BITS_PER_TYPE(u16),
+   end_sample.event_ctr,
+   dim->start_sample.event_ctr);
+if (nevents < DIM_NEVENTS)
+break;
+
+dim_calc_stats(&(dim->start_sample, &end_sample, &curr_stats);
+if (net_dim_decision(&curr_stats, dim)) {
+dim->state = DIM_APPLY_NEW_PROFILE;
+schedule_work(&dim->work);
+break;
+}
+/* fall through */
+case DIM_START_MEASURE:
+dim_update_sample(end_sample.event_ctr, end_sample.pkt_ctr,
+end_sample.byte_ctr, &dim->start_sample);
+dim->state = DIM_MEASURE_IN_PROGRESS;
+break;
+case DIM_APPLY_NEW_PROFILE:
+break;
+}
+
+EXPORT_SYMBOL(net_dim);
--- linux-4.15.0.orig/lib/dim/rdma_dim.c
+++ linux-4.15.0/lib/dim/rdma_dim.c
@@ -0,0 +1,108 @@
+// SPDX-License-Identifier: GPL-2.0 OR Linux-OpenIB
+/*
+ * Copyright (c) 2019, Mellanox Technologies inc. All rights reserved.
+ */
+
+static int rdma_dim_step(struct dim *dim)
+
+{ if (dim->tune_state == DIM_GOING_RIGHT) {
+   if (dim->profile_ix == (RDMA_DIM_PARAMS_NUM_PROFILES - 1))
+     return DIM_ON_EDGE;
+   dim->profile_ix++;
+   dim->steps_right++;
+   }
+   if (dim->profile_ix == 0)
+     return DIM_ON_EDGE;
+   dim->profile_ix--;
+   dim->steps_left++;
+   }
+   return DIM_STEPPED;
+}
+
+static int rdma_dim_stats_compare(struct dim_stats *curr,
+struct dim_stats *prev)
+
+{ if (curr->cpms)
+   return DIM_STATS_SAME;
+}
+if (IS_SIGNIFICANT_DIFF(curr->cpms, prev->cpms))
+return (curr->cpms > prev->cpms) ? DIM_STATS_BETTER :
+DIM_STATS_WORSE;
+
+if (IS_SIGNIFICANT_DIFF(curr->cpe_ratio, prev->cpe_ratio))
+return (curr->cpe_ratio > prev->cpe_ratio) ? DIM_STATS_BETTER :
+DIM_STATS_WORSE;
+
+return DIM_STATS_SAME;
+
+static bool rdma_dim_decision(struct dim_stats *curr_stats, struct dim *dim)
+{
+int prev_ix = dim->profile_ix;
+u8 state = dim->tune_state;
+int stats_res;
+int step_res;
+
+if (state != DIM_PARKING_ON_TOP && state != DIM_PARKING_TIRED) {
+stats_res = rdma_dim_stats_compare(curr_stats,
+&dim->prev_stats);
+switch (stats_res) {
+case DIM_STATS_SAME:
+if (curr_stats->cpe_ratio <= 50 * prev_ix)
+dim->profile_ix = 0;
+break;
+case DIM_STATS_WORSE:
+break;
+case DIM_STATS_BETTER:
+/* fall through */
+case DIM_STATS_BETTER:
+break;
+}
+
+dim->prev_stats = *curr_stats;
+
+return dim->profile_ix != prev_ix;
+}
+
+void rdma_dim(struct dim *dim, u64 completions)
+{
+struct dim_sample *curr_sample = &dim->measuring_sample;
+struct dim_stats curr_stats;
+u32 nevents;
+dim_update_sample_with_comps(curr_sample->event_ctr + 1, 0, 0,
+    curr_sample->comp_ctr + completions,
+    &dim->measuring_sample);
+
+switch (dim->state) {
+case DIM_MEASURE_IN_PROGRESS:
+    nevents = curr_sample->event_ctr - dim->start_sample.event_ctr;
+    if (nevents < DIM_NEVENTS)
+        break;
+    dim_calc_stats(&dim->start_sample, curr_sample, &curr_stats);
+    if (rdma_dim_decision(&curr_stats, dim)) {
+        dim->state = DIM_APPLY_NEW_PROFILE;
+        schedule_work(&dim->work);
+        break;
+    }
+    /* fall through */
+    case DIM_START_MEASURE:
+        dim->state = DIM_MEASURE_IN_PROGRESS;
+        dim_update_sample_with_comps(curr_sample->event_ctr, 0, 0,
+            curr_sample->comp_ctr,
+            &dim->start_sample);
+        break;
+    case DIM_APPLY_NEW_PROFILE:
+        break;
+    }
+    +}
+
+EXPORT_SYMBOL(rdma_dim);
--- linux-4.15.0.orig/lib/div64.c
+++ linux-4.15.0/lib/div64.c
@@ -109,7 +109,7 @@
        quot = div_u64_rem(dividend, divisor, &rem32);
        *remainder = rem32;
    } else {
-        int n = 1 + fls(high);
+        int n = fls(high);
        quot = div_u64(dividend >> n, divisor >> n);

        if (quot != 0)
            @ @ -147,7 +147,7 @@
        if (high == 0) {
            quot = div_u64(dividend, divisor);
        } else {
-            int n = 1 + fls(high);
+            int n = fls(high);
            quot = div_u64(dividend >> n, divisor >> n);

            if (quot != 0)
spin_unlock_irqrestore(&bucket->lock, flags);
+cond_resched();
}

EXPORT_SYMBOL(debug_dma_dump_mappings);

if (unlikely(dma_debug_disabled()))
return;

+for_each_sg(sg, s, nents, i) {
+check_for_stack(dev, sg_page(s), s->offset);
+if (!PageHighMem(sg_page(s)))
+check_for_illegal_area(dev, sg_virt(s), s->length);
+
+for_each_sg(sg, s, mapped_ents, i) {
entry = dma_entry_alloc();
if (!entry)
@@ -1417,12 +1424,6 @@
entry->sg_call_ents   = nents;
entry->sg_mapped_ents = mapped_ents;

-check_for_stack(dev, sg_page(s), s->offset);
-
-if (!PageHighMem(sg_page(s))) {
-check_for_illegal_area(dev, sg_virt(s), sg_dma_len(s));
-}
-
-add_dma_entry(entry);
}
}

--- linux-4.15.0.orig/lib/dump_stack.c
+++ linux-4.15.0/lib/dump_stack.c
@@ -46,7 +46,12 @@
washed_locked = 1;
} else {
local_irq_restore(flags);
cpu_relax();
+/*
+ * Wait for the lock to release before jumping to
+ * atomic_cmpxchg() in order to mitigate the thundering herd
+ * problem.
+ */
+do { cpu_relax(); } while (atomic_read(&dump_lock) != -1);
goto retry;
}

--- linux-4.15.0.orig/lib/dynamic_debug.c
+++ linux-4.15.0/lib/dynamic_debug.c
@@ -85,22 +85,22 @@
{ _DPRINTK_FLAGS_NONE, '_' },
};

+struct flagsbuf { char buf[ARRAY_SIZE(opt_array)+1]; };
+
/* format a string into buf[] which describes the _ddebug's flags */
-static char *ddebug_describe_flags(struct _ddebug *dp, char *buf,
-    size_t maxlen)
+static char *ddebug_describe_flags(unsigned int flags, struct flagsbuf *fb)
{
-    char *p = buf;
+    char *p = fb->buf;
    int i;

-    BUG_ON(maxlen < 6);
    for (i = 0; i < ARRAY_SIZE(opt_array); ++i)
        if (dp->flags & opt_array[i].flag)
            *p++ = opt_array[i].opt_char;
-    if (p == buf)
+    if (p == fb->buf)
        *p++ = '_';
    *p = '\0';

-    return buf;
+    return fb->buf;
}

#define vpr_info(fmt, ...)

@@ -142,7 +142,7 @@
    mutex_lock(&ddebug_lock);
@@ -199,8 +199,7 @@
    vpr_info("changed %s:%d [%s]%s=%s\n",
        trim_prefix(dp->filename), dp->lineno,
struct ddebug_iter *iter = m->private;
struct _ddebug *dp = p;
- char flagsbuf[10];
+ struct flagsbuf flags;

vpr_info("called m=%p p=%p
", m, p);

seq_printf(m, "%s:%u [%s]%s =%s ",
  trim_prefix(dp->filename), dp->lineno,
  iter->table->mod_name, dp->function,
- ddebug_describe_flags(dp, flagsbuf, sizeof(flagsbuf));
+ ddebug_describe_flags(dp->flags, &flags));
seq_escape(m, dp->format, "\t\r\n\"");
seq_puts(m, "\"n");

--- linux-4.15.0.orig/lib/errseq.c
+++ linux-4.15.0/lib/errseq.c
@@ -111,25 +111,22 @@
 * errseq_sample - grab current errseq_t value
 * @eseq: pointer to errseq_t to be sampled
 *
- * This function allows callers to sample an errseq_t value, marking it as
- * "seen" if required.
+ * This function allows callers to initialise their errseq_t variable.
+ * If the error has been "seen", new callers will not see an old error.
+ * If there is an unseen error in @eseq, the caller of this function will
+ * see it the next time it checks for an error.
+ *
+ * Context: Any context.
+ * Return: The current errseq value.
+ *
errseq_t errseq_sample(errseq_t *eseq)
{
  errseq_t old = READ_ONCE(*eseq);
  -errseq_t new = old;

  /*
  - * For the common case of no errors ever having been set, we can skip
  */

--- linux-4.15.0.orig/lib/errseq.c
+++ linux-4.15.0/lib/errseq.c
@@ -111,25 +111,22 @@
 * errseq_sample - grab current errseq_t value
 * @eseq: pointer to errseq_t to be sampled
 *
- * This function allows callers to sample an errseq_t value, marking it as
- * "seen" if required.
+ * This function allows callers to initialise their errseq_t variable.
+ * If the error has been "seen", new callers will not see an old error.
+ * If there is an unseen error in @eseq, the caller of this function will
+ * see it the next time it checks for an error.
+ *
+ * Context: Any context.
+ * Return: The current errseq value.
+ *
errseq_t errseq_sample(errseq_t *eseq)
{
  errseq_t old = READ_ONCE(*eseq);
  -errseq_t new = old;

  /*
  - * For the common case of no errors ever having been set, we can skip
  */

--- linux-4.15.0.orig/lib/errseq.c
+++ linux-4.15.0/lib/errseq.c
@@ -111,25 +111,22 @@
 * errseq_sample - grab current errseq_t value
 * @eseq: pointer to errseq_t to be sampled
 *
- * This function allows callers to sample an errseq_t value, marking it as
- * "seen" if required.
+ * This function allows callers to initialise their errseq_t variable.
+ * If the error has been "seen", new callers will not see an old error.
+ * If there is an unseen error in @eseq, the caller of this function will
+ * see it the next time it checks for an error.
+ *
+ * Context: Any context.
+ * Return: The current errseq value.
+ *
errseq_t errseq_sample(errseq_t *eseq)
{
  errseq_t old = READ_ONCE(*eseq);
  -errseq_t new = old;

  /*
  - * For the common case of no errors ever having been set, we can skip
  */
/* marking the SEEN bit. Once an error has been set, the value will
 never go back to zero.
 */

if (old != 0) {
    new |= ERRSEQ_SEEN;
    if (old != new)
        cmpxchg(eseq, old, new);
}
return new;

/* If nobody has seen this error yet, then we can be the first. */
if (!(old & ERRSEQ_SEEN))
    old = 0;
return old;
}
EXPORT_SYMBOL(errseq_sample);

--- linux-4.15.0.orig/lib/find_bit.c
+++ linux-4.15.0/lib/find_bit.c
@@ -133,18 +133,6 @@

#ifdef __BIG_ENDIAN
-/* include/linux/byteorder does not support "unsigned long" type */
-static inline unsigned long ext2_swab(const unsigned long y)
-{
-    +#if BITS_PER_LONG == 64
-        return (unsigned long) __swab64((u64) y);
-    +#elif BITS_PER_LONG == 32
-        return (unsigned long) __swab32((u32) y);
-    +#else
-        #error BITS_PER_LONG not defined
-    +#endif
-}
-#
-#if !defined(find_next_bit_le) || !defined(find_next_zero_bit_le)
-static unsigned long _find_next_bit_le(const unsigned long *addr,
unsigned long nbits, unsigned long start, unsigned long invert)
@@ -157,7 +145,7 @@
        tmp = addr[start / BITS_PER_LONG] ^ invert;

    /* Handle 1st word. */
-    tmp &= ext2_swab(BITMAP_FIRST_WORD_MASK(start));
+    tmp &= swab(BITMAP_FIRST_WORD_MASK(start));
    start = round_down(start, BITS_PER_LONG);

    while (tmp) {
        tmp = addr[start / BITS_PER_LONG] ^ invert;
-return min(start + __ffs(ext2_swab(tmp)), nbits);
+return min(start + __ffs(swab(tmp)), nbits);
}
#endif

--- linux-4.15.0.orig/lib/fonts/Kconfig
+++ linux-4.15.0/lib/fonts/Kconfig
@@ -109,6 +109,15 @@
  big letters (like the letters used in the SPARC PROM). If the
  standard font is unreadable for you, say Y, otherwise say N.

+config FONT_TER16x32
+bool "Terminus 16x32 font (not supported by all drivers)"
+depends on FRAMEBUFFER_CONSOLE && (!SPARC && FONTS || SPARC)
+help
+  Terminus Font is a clean, fixed width bitmap font, designed
+  for long (8 and more hours per day) work with computers.
+  This is the high resolution, large version for use with HiDPI screens.
+  If the standard font is unreadable for you, say Y, otherwise say N.
+
+config FONT_AUTOSELECT
+def_bool y
+depends on !FONT_8x8
@@ -121,6 +130,7 @@
depends on !FONT_SUN8x16
depends on !FONT_SUN12x22
depends on !FONT_10x18
+depends on !FONT_TER16x32
select FONT_8x16
endif # FONT_SUPPORT
--- linux-4.15.0.orig/lib/fonts/Makefile
+++ linux-4.15.0/lib/fonts/Makefile
@@ -14,6 +14,7 @@
     font-objs-$(CONFIG_FONT_ACORN_8x8) += font_acorn_8x8.o
     font-objs-$(CONFIG_FONT_MINI_4x6) += font_mini_4x6.o
     font-objs-$(CONFIG_FONT_6x10) += font_6x10.o
+font-objs-$(CONFIG_FONT_TER16x32) += font_ter16x32.o

 font-objs += $(font-objs-y)

--- linux-4.15.0.orig/lib/fonts/font_10x18.c
+++ linux-4.15.0/lib/fonts/font_10x18.c
@@ -8,8 +8,8 @@
     #define FONTDATAMAX 9216
-static const unsigned char fontdata_10x18[FONDDATAMAX] = {
  -
+static const struct font_data fontdata_10x18 = {
+  { 0, 0, FONTDATAMAX, 0 }, {
/* 0 0x00 '^@' */
  0x00, 0x00, /* 0000000000 */
  0x00, 0x00, /* 0000000000 */
  @ @ -5129.8 +5129.7 @@
  0x00, 0x00, /* 0000000000 */
  0x00, 0x00, /* 0000000000 */
  0x00, 0x00, /* 0000000000 */
  -
-};
+} ;

const struct font_desc font_10x18 = {
  @ @ -5138.7 +5137.7 @@
  .name = "10x18",
  .width = 10,
  .height = 18,
  .data = fontdata_10x18,
  +.data = fontdata_10x18.data,
  ifdef __sparc__
  .pref = 5,
  #else
  --- linux-4.15.0.orig/lib/fonts/font_6x10.c
  +++ linux-4.15.0/lib/fonts/font_6x10.c
  @ @ -1.8 +1.10 @@
  // SPDX-License-Identifier: GPL-2.0
  #include <linux/font.h>

-static const unsigned char fontdata_6x10[] = {
+#define FONTDATAMAX 2560

+static const struct font_data fontdata_6x10 = {
+  { 0, 0, FONTDATAMAX, 0 }, {
/* 0 0x00 '^@' */
  0x00, /* 00000000 */
  0x00, /* 00000000 */
  @ @ -3074.14 +3076.13 @@
  0x00, /* 00000000 */
  0x00, /* 00000000 */
  0x00, /* 00000000 */
  -
  -};
+} ;
const struct font_desc font_6x10 = {
    .idx= FONT6x10_IDX,
    .name= "6x10",
    .width= 6,
    .height= 10,
    .data= fontdata_6x10,
    .pref= 0,
};
--- linux-4.15.0.orig/lib/fonts/font_6x11.c
+++ linux-4.15.0/lib/fonts/font_6x11.c
@@ -9,8 +9,8 @@
#define FONTDATAMAX (11*256)

-static const unsigned char fontdata_6x11[FONTDATAMAX] = {
-    /* 0 0x00 '^@' */
-    0x00, /* 00000000 */
-    0x00, /* 00000000 */
-    0x00, /* 00000000 */
-    ...
-};
+static const struct font_data fontdata_6x11 = {
+    { 0, 0, FONTDATAMAX, 0 },
+    /* 0 0x00 '^@' */
+    0x00, /* 00000000 */
+    0x00, /* 00000000 */
+    0x00, /* 00000000 */
+    ...
+};

const struct font_desc font_vga_6x11 = {
    @ @ -3338.8 +3338.7 @ @
    .name= "ProFont6x11",
    .width= 6,
    .height= 11,
    .data= fontdata_6x11,
    .pref= -2000,
};
--- linux-4.15.0.orig/lib/fonts/font_7x14.c
+++ linux-4.15.0/lib/fonts/font_7x14.c
@@ -8,8 +8,8 @@
#define FONTDATAMAX 3584

const struct font_desc font_vga_6x11 = {
    @ @ -3347.7 +3346.7 @ @
    .name= "ProFont6x11",
    .width= 6,
    .height= 11,
    .data= fontdata_6x11,
    .data= fontdata_6x11.data,
    /* Try avoiding this font if possible unless on MAC */
    .pref= -2000,
};
--- linux-4.15.0.orig/lib/fonts/font_7x14.c
+++ linux-4.15.0/lib/fonts/font_7x14.c
@@ -8,8 +8,8 @@
static const unsigned char fontdata_7x14[FONTDATAMAX] = {
    { 0, 0, FONTDATAMAX, 0 }, {
        /* 0 0x00 '^@' */
        0x00, /* 0000000 */
        0x00, /* 0000000 */
        @ @ -4105,8 +4105,7 @ @
        0x00, /* 0000000 */
        0x00, /* 0000000 */
        0x00, /* 0000000 */
    };

const struct font_desc font_7x14 = {
    .name = "7x14",
    .width = 7,
    .height = 14,
    .data = fontdata_7x14,
};

--- linux-4.15.0.orig/lib/fonts/font_8x16.c
+++ linux-4.15.0/lib/fonts/font_8x16.c
@@ -10,8 +10,8 @@
#define FONTDATAMAX 4096

static const unsigned char fontdata_8x16[FONTDATAMAX] = {
    { 0, 0, FONTDATAMAX, 0 }, {
        /* 0 0x00 '^@' */
        0x00, /* 00000000 */
        0x00, /* 00000000 */
        @ @ -4619,8 +4619,7 @ @
        0x00, /* 00000000 */
        0x00, /* 00000000 */
        0x00, /* 00000000 */
    };

const struct font_desc font_vga_8x16 = {
@@ -4628,7 +4627,7 @@
[91x776].name	= "VGA8x16",
[91x761].width	= 8,
[91x746].height	= 16,
[91x731]-	.data	= fontdata_8x16,
[91x716]+	.data	= fontdata_8x16.data,
[91x701].pref	= 0,
[91x686]};
EXPORT_SYMBOL(font_vga_8x16);
--- linux-4.15.0.orig/lib/fonts/font_8x8.c
+++ linux-4.15.0/lib/fonts/font_8x8.c
@@ -9,8 +9,8 @@
#define FONTDATAMAX 2048

-static const unsigned char fontdata_8x8[FONTDATAMAX] = {
-  
+static const struct font_data fontdata_8x8 = {
+  0, 0, FONTDATAMAX, 0 }, {
 /* 0 0x00 '^@' */
  0x00, /* 00000000 */
  0x00, /* 00000000 */
@@ -2570,8 +2570,7 @@
  0x00, /* 00000000 */
  0x00, /* 00000000 */
-};
+} }

const struct font_desc font_vga_8x8 = {
@@ -2579,6 +2578,6 @@
[91x296].name	= "VGA8x8",
[91x281].width	= 8,
[91x266].height	= 8,
[91x251]-	.data	= fontdata_8x8,
[91x236]+	.data	= fontdata_8x8.data,
[91x221].pref	= 0,
[91x206]};
--- linux-4.15.0.orig/lib/fonts/font_acorn_8x8.c
+++ linux-4.15.0/lib/fonts/font_acorn_8x8.c
@@ -3,7 +3,10 @@
#include <linux/font.h>

-static const unsigned char acorndata_8x8[] = {
+##define FONTDATAMAX 2048

--- linux-4.15.0.orig/lib/fonts/font_acorn_8x8.c
+++ linux-4.15.0/lib/fonts/font_acorn_8x8.c
@@ -3,7 +3,10 @@
+static const struct font_data acorndata_8x8 = {
+{ 0, 0, FONTDATAMAX, 0 }, {
/* 00 */ 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* ^@ */
/* 01 */ 0x7e, 0x81, 0xa5, 0x81, 0xbd, 0x99, 0x81, 0x7e, /* ^A */
/* 02 */ 0x7e, 0xff, 0xbd, 0xff, 0xc3, 0xe7, 0xff, 0x7e, /* ^B */
@ @ -260,14 +263,14 @@
/* FD */ 0x38, 0x04, 0x18, 0x20, 0x3c, 0x00, 0x00, 0x00,
/* FE */ 0x00, 0x00, 0x00, 0x3c, 0x00, 0x00, 0x00,
/* FF */ 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
-};
+
const struct font_desc font_acorn_8x8 = {
.idx = ACORN8x8_IDX,
.name = "Acorn8x8",
.width = 8,
.height = 8,
.data = acorndata_8x8,
};

#define FONTDATAMAX 1536

-static const unsigned char fontdata_mini_4x6[FONTDATAMAX] = {
-}
+
+static const struct font_data fontdata_mini_4x6 = {
+{ 0, 0, FONTDATAMAX, 0 }, {
/* */
/* Char 0: ' ' */
0xee, /* = [*** ] */
@ @ -2145,14 +2145,14 @@
0xee, /* = [*** ] */
0x00, /* = [ ] */
/* */
-};
+
const struct font_desc font_mini_4x6 = {
.idx = MINI4x6_IDX,
.name = "MINI4x6",
.width = 4,
.height = 6,
- .data = fontdata_mini_4x6,
+ .data = fontdata_mini_4x6.data,
 .pref = 3,
};

--- linux-4.15.0.orig/lib/fonts/font_pearl_8x8.c
+++ linux-4.15.0/lib/fonts/font_pearl_8x8.c
@@ -14,8 +14,8 @@
#define FONTDATAMAX 2048

- static const unsigned char fontdata_pearl8x8[FONTDATAMAX] = {
+ static const struct font_data fontdata_pearl8x8 = {
+   { 0, 0, FONTDATAMAX, 0 }, {
      /* 0 0x00 '^@' */
      0x00, /* 00000000 */
      0x00, /* 00000000 */
      @ @ -2575,14 +2575,13 @@
      0x00, /* 00000000 */
      0x00, /* 00000000 */
      0x00, /* 00000000 */
-    -};
+    +};

 const struct font_desc font_pearl_8x8 = {
   .idx = PEARL8x8_IDX,
   .name = "PEARL8x8",
   .width = 8,
   .height = 8,
- .data = fontdata_pearl8x8,
+ .data = fontdata_pearl8x8.data,
   .pref = 2,
};

--- linux-4.15.0.orig/lib/fonts/font_sun12x22.c
+++ linux-4.15.0/lib/fonts/font_sun12x22.c
@@ -3,8 +3,8 @@
#define FONTDATAMAX 11264

- static const unsigned char fontdata_sun12x22[FONTDATAMAX] = {
+ static const struct font_data fontdata_sun12x22 = {
+   { 0, 0, FONTDATAMAX, 0 }, {
      /* 0 0x00 '^@' */
      0x00, 0x00, /* 00000000 */
      0x00, 0x00, /* 00000000 */
      0x00, 0x00, /* 00000000 */

const struct font_desc font_sun_12x22 = {
    .name = "SUN12x22",
    .width = 12,
    .height = 22,
    .data = fontdata_sun12x22,
    .data = fontdata_sun12x22.data,
    .pref = 5,
} ;

const struct font_desc font_sun_8x16 = {
    .idx = SUN8x16_IDX,
    .name = "SUN8x16",
    .width = 8,
    .height = 16,
    .data = fontdata_sun8x16,
    .data = fontdata_sun8x16.data,
    .pref = 10,
} ;
// SPDX-License-Identifier: GPL-2.0
#include <linux/font.h>
#include <linux/module.h>

#define FONTDATAMAX 16384

static const unsigned char fontdata_ter16x32[FONTDATAMAX] = {
    0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
    0x00, 0x00, 0x00, 0x00, 0x03f, 0xf8, 0x7f, 0xfc,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
    0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
+0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff,
+0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff,
+0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff,
+0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff,
+0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, /* 10 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x03, 0xfe, 0x03, 0xfe,
+0x00, 0x1e, 0x00, 0x3e, 0x00, 0x76, 0x00, 0xe6,
+0x01, 0xc6, 0x03, 0x86, 0x3f, 0xe0, 0x7f, 0xf0,
+0xf0, 0x78, 0xe0, 0x38, 0xe0, 0x38, 0xe0, 0x38,
+0xe0, 0x38, 0xe0, 0x38, 0xe0, 0x38, 0xf0, 0x78,
+0x7f, 0xf0, 0x3f, 0xe0, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 11 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x1f, 0xf0, 0x3f, 0xf8,
+0x78, 0x3c, 0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c,
+0x70, 0x1c, 0x70, 0x1c, 0x78, 0x3c, 0x3f, 0x88,
+0x1f, 0xf0, 0x03, 0x80, 0x03, 0x80, 0x03, 0x80,
+0x7f, 0xf0, 0x7f, 0xf0, 0x03, 0x80, 0x03, 0x80,
+0x03, 0x80, 0x03, 0x80, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 12 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x03, 0xfe, 0x03, 0xfe,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c, 0x38, 0x1c,
+0x0e, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x03, 0x80,
+0x01, 0xc0, 0x00, 0xe0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 40 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0,
+0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0,
+0x00, 0xe0, 0x01, 0xc0, 0x01, 0xc0, 0x00, 0xe0, 0x00, 0xe0,
+0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0,
+0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0,
+0x00, 0xe0, 0x03, 0x80, 0x01, 0xc0, 0xe0, 0x00, 0xe0, 0x00,
+0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0,
+0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0, 0x00, 0xe0,
+0x00, 0xe0, 0x07, 0xc0, 0x03, 0x80, 0x0e, 0x00, 0x00, 0x00, /* 41 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 42 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 43 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 44 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, /* 45 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
Open Source Used In 5GaaS Edge AC-4 33116
+0x1c, 0x70, 0x1c, 0x70, 0x38, 0x38, 0x38, 0x38,
+0x70, 0x1c, 0x70, 0x1c, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,/* 88 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x70, 0x1c, 0x70, 0x1c,
+0x70, 0x1c, 0x38, 0x38, 0x38, 0x38, 0x1c, 0x70,
+0x1c, 0x70, 0x0e, 0xe0, 0xe0, 0xe0, 0x07, 0xc0,
+0x07, 0xc0, 0x03, 0x80, 0x03, 0x80, 0x03, 0x80,
+0x03, 0x80, 0x03, 0x80, 0x03, 0x80, 0x03, 0x80,
+0x03, 0x80, 0x03, 0x80, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,/* 89 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x7f, 0xfc, 0x7f, 0xfc,
+0x00, 0x1c, 0x00, 0x1c, 0x00, 0x1c, 0x00, 0x38,
+0x00, 0x70, 0x00, 0xe0, 0x01, 0xc0, 0x03, 0x80,
+0x07, 0x00, 0xe0, 0x00, 0x1c, 0x00, 0x38, 0x00,
+0x70, 0x00, 0x70, 0x00, 0x70, 0x00, 0x70, 0x00,
+0x7f, 0xfc, 0x7f, 0xfc, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,/* 90 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x0c, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
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+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
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+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
+0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e, 0x0e,
Open Source Used In 5GaaS Edge AC-4  33126

+0x7f, 0x00, 0x70, 0x00, 0x70, 0x00, 0x78, 0x1c,
+0x3f, 0xcf, 0x1f, 0xf8, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00/ 130 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x3f, 0xf0, 0x3f, 0xf8, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x1c, 0x1f, 0xc0, 0x00, 0x00, 0x00, 0x00,
+0x70, 0x1c, 0x70, 0x1c, 0x78, 0x1c, 0x78, 0x1c,
+0x3f, 0xc0, 0x1f, 0xcf, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,/ 131 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x1c, 0x70, 0x1c, 0x70,
+0x1c, 0x70, 0x1c, 0x70, 0x00, 0x00, 0x00, 0x00,
+0x3f, 0xf0, 0x3f, 0xf8, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x1c, 0x1f, 0xc0, 0x00, 0x00, 0x00, 0x00,
+0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x78, 0x1c,
+0x3f, 0xc0, 0x1f, 0xcf, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,/* 132 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x3f, 0xf0, 0x3f, 0xf8, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x1c, 0x1f, 0xc0, 0x00, 0x00, 0x00, 0x00,
+0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x78, 0x1c,
+0x3f, 0xc0, 0x1f, 0xcf, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,/* 133 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x3f, 0xf0, 0x3f, 0xf8, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x1c, 0x1f, 0xc0, 0x00, 0x00, 0x00, 0x00,
+0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x78, 0x1c,
+0x3f, 0xc0, 0x1f, 0xcf, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,/* 134 */
+0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
+0x3f, 0xf0, 0x3f, 0xf8, 0x00, 0x00, 0x00, 0x00,
+0x00, 0x1c, 0x1f, 0xc0, 0x00, 0x00, 0x00, 0x00,
+0x70, 0x1c, 0x70, 0x1c, 0x70, 0x1c, 0x78, 0x1c,
Open Source Used In 5GaaS Edge AC-4 33128
Open Source Used In 5GaaS Edge AC-4 33132
Open Source Used In 5GaaS Edge AC-4 33143
+ idx= TER16x32_IDX,
+ name= "TER16x32",
+ width= 16,
+ height = 32,
+ data= fontdata_ter16x32,
+#ifdef __sparc__
+ pref= 5,
+#else
+ pref= -1,
+#endif
+}

--- linux-4.15.0.orig/lib/fonts/fonts.c
+++ linux-4.15.0/lib/fonts/fonts.c
@@ -25,47 +25,51 @@
 static const struct font_desc *fonts[] = {
 #ifdef CONFIG_FONT_8x8
 #undef NO_FONTS
- &font_vga_8x8,
+&font_vga_8x8,
 #endif
 #ifdef CONFIG_FONT_8x16
 #undef NO_FONTS
- &font_vga_8x16,
+&font_vga_8x16,
 #endif
 #ifdef CONFIG_FONT_6x11
 #undef NO_FONTS
- &font_vga_6x11,
+&font_vga_6x11,
 #endif
 #ifdef CONFIG_FONT_7x14
 #undef NO_FONTS
- &font_7x14,
+&font_7x14,
 #endif
 #ifdef CONFIG_FONT_SUN8x16
 #undef NO_FONTS
- &font_sun_8x16,
+&font_sun_8x16,
 #endif
 #ifdef CONFIG_FONT_SUN12x22
 #undef NO_FONTS
- &font_sun_12x22,
+&font_sun_12x22,
 #endif
 #ifdef CONFIG_FONT_10x18
 #undef NO_FONTS
- &font_10x18,
+&font_10x18,
#endif
#endif CONFIG_FONT_ACORN_8x8
#undef NO_FONTS
-  &font_acorn_8x8,
+&font_acorn_8x8,
#endif
#endif CONFIG_FONT_PEARL_8x8
#undef NO_FONTS
-  &font_pearl_8x8,
+&font_pearl_8x8,
#endif
#endif CONFIG_FONT_MINI_4x6
#undef NO_FONTS
-  &font_mini_4x6,
+&font_mini_4x6,
#endif
#endif CONFIG_FONT_6x10
#undef NO_FONTS
-  &font_6x10,
+&font_6x10,
+#endif
+endif CONFIG_FONT_TER16x32
+#undef NO_FONTS
+&font_ter_16x32,
#endif
}

@@ -86,16 +90,16 @@
*specified font.
 *
 */
-
const struct font_desc *find_font(const char *name)
{
  - unsigned int i;
  +unsigned int i;

  - for (i = 0; i < num_fonts; i++)
    - if (!strcmp(fonts[i]->name, name))
      - return fonts[i];
    - return NULL;
+for (i = 0; i < num_fonts; i++)
+if (!strcmp(fonts[i]->name, name))
+return fonts[i];
+return NULL;
}
+EXPORT_SYMBOL(find_font);
/**
 * chosen font.
 *
 */

const struct font_desc *get_default_font(int xres, int yres, u32 font_w,
    u32 font_h)
{
    int i, c, cc;
    const struct font_desc *f, *g;
    int i, c, cc, res;
    const struct font_desc *f, *g;

    g = NULL;
    cc = -10000;
    for(i=0; i<num_fonts; i++) {
        f = fonts[i];
        c = f->pref;
        g = NULL;
        cc = -10000;
        for (i = 0; i < num_fonts; i++) {
            f = fonts[i];
            c = f->pref;
            #if defined(__mc68000__)
            #ifdef CONFIG_FONT_PEARL_8x8
                -if (MACH_IS_AMIGA && f->idx == PEARL8x8_IDX)
                    -c = 100;
            #endif
            #ifdef CONFIG_FONT_6x11
                -if (MACH_IS_MAC && xres < 640 && f->idx == VGA6x11_IDX)
                    -c = 100;
            #endif
            #endif
            -if ((yres < 400) == (f->height <= 8))
                -c += 1000;
            -
            -if ((font_w & (1 << (f->width - 1))) &&
                (font_h & (1 << (f->height - 1)))
                -c += 1000;
            #endif
            #endif
            -if ((yres < 400) == (f->height <= 8))
                +c += 1000;
            
    return g;
}
static inline size_t chunk_size(const struct gen_pool_chunk *chunk) {
    * users set the same bit, one user will return remain bits, otherwise
    * return 0.
    */
    return bitmap_set_ll(map, start, nr);
}

const int bitmap_set_ll(unsigned long *map, int start, int nr) {
    unsigned long *p = map + BIT_WORD(start);
    const int size = start + nr;
    int bits_to_set = BITS_PER_LONG - (start % BITS_PER_LONG);
    if (c > cc) {
        cc = c;
        g = f;
    }
    if (cc < size) {
        cc = size;
        g = f;
    }
}

EXPORT_SYMBOL(find_font);
EXPORT_SYMBOL(get_default_font);
MODULE_AUTHOR("James Simmons <jsimmons@users.sf.net> ");
--- linux-4.15.0.orig/lib/genalloc.c
+++ linux-4.15.0/lib/genalloc.c
@@ -35,6 +35,7 @@
 #include <linux/interrupt.h>
 #include <linux/genalloc.h>
 #include <linux/of_device.h>
+#include <linux/vmalloc.h>
 static inline size_t chunk_size(const struct gen_pool_chunk *chunk) {
    * users set the same bit, one user will return remain bits, otherwise
    * return 0.
    */
    return bitmap_set_ll(map, start, nr);
}

const int bitmap_set_ll(unsigned long *map, int start, int nr) {
    unsigned long *p = map + BIT_WORD(start);
    const int size = start + nr;
    int bits_to_set = BITS_PER_LONG - (start % BITS_PER_LONG);
unsigned long mask_to_set = BITMAP_FIRST_WORD_MASK(start);

-while (nr - bits_to_set >= 0) {
+while (nr >= bits_to_set) {
  if (set_bits_ll(p, mask_to_set))
    return nr;
  nr -= bits_to_set;
}@ -117,14 +118,15 @@
  * users clear the same bit, one user will return remain bits,
  * otherwise return 0.
*/
-static int bitmap_clear_ll(unsigned long *map, int start, int nr)
+static unsigned long
+bitmap_clear_ll(unsigned long *map, unsigned long start, unsigned long nr)
{
  unsigned long *p = map + BIT_WORD(start);
-const int size = start + nr;
+const unsigned long size = start + nr;
  int bits_to_clear = BITS_PER_LONG - (start % BITS_PER_LONG);
  unsigned long mask_to_clear = BITMAP_FIRST_WORD_MASK(start);

-while (nr - bits_to_clear >= 0) {
+while (nr >= bits_to_clear) {
  if (clear_bits_ll(p, mask_to_clear))
    return nr;
  nr -= bits_to_clear;
}@ -183,11 +185,11 @@
  size_t size, int nid)
{
  struct gen_pool_chunk *chunk;
-  int nbits = size >> pool->min_alloc_order;
-  int nbytes = sizeof(struct gen_pool_chunk) +
+  unsigned long nbits = size >> pool->min_alloc_order;
+  unsigned long nbytes = sizeof(struct gen_pool_chunk) +
    BITS_TO_LONGS(nbits) * sizeof(long);

-  chunk = kzalloc_node(nbytes, GFP_KERNEL, nid);
+  chunk = vzalloc_node(nbytes, nid);
  if (unlikely(chunk == NULL))
    return -ENOMEM;

@@ -241,7 +243,7 @@
  struct list_head *_chunk, *_next_chunk;
  struct gen_pool_chunk *chunk;
  int order = pool->min_alloc_order;
-  int bit, end_bit;
+  unsigned long bit, end_bit;
list_for_each_safe(_chunk, _next_chunk, &pool->chunks) {  
chunk = list_entry(_chunk, struct gen_pool_chunk, next_chunk);
@@ -251,7 +253,7 @@
bit = find_next_bit(chunk->bits, end_bit, 0);
BUG_ON(bit < end_bit);

- kfree(chunk);
+ vfree(chunk);
}
kfree_const(pool->name);
kfree(pool);
@@ -292,7 +294,7 @@
struct gen_pool_chunk *chunk;
unsigned long addr = 0;
int order = pool->min_alloc_order;
- int nbits, start_bit, end_bit, remain;
+ unsigned long nbits, start_bit, end_bit, remain;

#if !defined(CONFIG_ARCH_HAVE_NMI_SAFE_CMPXCHG
BUG_ON(in_nmi());
@@ -311,7 +313,7 @@
end_bit = chunk_size(chunk) >> order;
retry:
start_bit = algo(chunk->bits, end_bit, start_bit,
- nbits, data, pool);
+ nbits, data, pool, chunk->start_addr);
if (start_bit >= end_bit)
continue;
remain = bitmap_set_ll(chunk->bits, start_bit, nbits);
@@ -375,7 +377,7 @@
}
struct gen_pool_chunk *chunk;
int order = pool->min_alloc_order;
- int start_bit, nbits, remain;
+ unsigned long start_bit, nbits, remain;

#if !defined(CONFIG_ARCH_HAVE_NMI_SAFE_CMPXCHG
BUG_ON(in_nmi());
@@ -525,7 +527,7 @@ */
unsigned long gen_pool_first_fit(unsigned long *map, unsigned long size,
unsigned long start, unsigned int nr, void *data,
- struct gen_pool *pool)
+ struct gen_pool *pool, unsigned long start_addr)
{
return bitmap_find_next_zero_area(map, size, start, nr, 0);
}
@@ -543,16 +545,19 @@
unsigned long gen_pool_first_fit_align(unsigned long *map, unsigned long size, 
unsigned long start, unsigned int nr, void *data, 
-struct gen_pool *pool) 
+struct gen_pool *pool, unsigned long start_addr) 
{
struct genpool_data_align *alignment;
-unsigned long align_mask;
+unsigned long align_mask, align_off;
int order;

alignment = data;
order = pool->min_alloc_order;
align_mask = ((alignment->align + (1UL << order) - 1) >> order) - 1;
-return bitmap_find_next_zero_area(map, size, start, nr, align_mask);
+align_off = (start_addr & (alignment->align - 1)) >> order;
+
+return bitmap_find_next_zero_area_off(map, size, start, nr,
+    align_mask, align_off);
}
EXPORT_SYMBOL(gen_pool_first_fit_align);

unsigned long gen_pool_fixed_alloc(unsigned long *map, unsigned long size, 
unsigned long start, unsigned int nr, void *data, 
-struct gen_pool *pool) 
+struct gen_pool *pool, unsigned long start_addr) 
{
struct genpool_data_fixed *fixed_data;
int order;
@@ -567,7 +572,7 @@
 */
 unsigned long gen_pool_first_fit_order_align(unsigned long *map, unsigned long size, 
 unsigned long start, unsigned int nr, void *data, 
-struct gen_pool *pool) 
+unsigned int nr, void *data, struct gen_pool *pool, 
+unsigned long start_addr) 
{
unsigned long align_mask = roundup_pow_of_two(nr) - 1;
@@ -624,7 +630,7 @@
 */
 unsigned long gen_pool_best_fit(unsigned long *map, unsigned long size, 
 unsigned long start, unsigned int nr, void *data, 
-struct gen_pool *pool) 
+struct gen_pool *pool, unsigned long start_addr) 
{
unsigned long align_mask = roundup_pow_of_two(nr) - 1;

@@ -624,7 +630,7 @@
 */
 unsigned long gen_pool_best_fit(unsigned long *map, unsigned long size, 
 unsigned long start, unsigned int nr, void *data, 
-struct gen_pool *pool) 
+struct gen_pool *pool, unsigned long start_addr) 
{
unsigned long start_bit = size;
unsigned long len = size + 1;
@@ -633,7 +639,7 @@
index = bitmap_find_next_zero_area(map, size, start, nr, 0);

while (index < size) {
    -int next_bit = find_next_bit(map, size, index + nr);
    +unsigned long next_bit = find_next_bit(map, size, index + nr);
    if ((next_bit - index) < len) {
        len = next_bit - index;
        start_bit = index;
--- linux-4.15.0.orig/lib/idr.c
+++ linux-4.15.0/lib/idr.c
@@ -111,13 +111,27 @@
{
    struct radix_tree_iter iter;
    void __rcu **slot;
    +void *entry = NULL;

    -slot = radix_tree_iter_find(&idr->idr_rt, &iter, *nextid);
    +radix_tree_for_each_slot(slot, &idr->idr_rt, &iter, *nextid) {
    +entry = rcu_dereference_raw(*slot);
    +if (!entry)
    +    continue;
    +if (!radix_tree_deref_retry(entry))
    +    break;
    +if (slot != (void *)&idr->idr_rt.rnode &&
    +entry != (void *)RADIX_TREE_INTERNAL_NODE)
    +break;
    +slot = radix_tree_iter_retry(&iter);
    +}
    if (!slot)
        return NULL;
    +if (WARN_ON_ONCE(iter.index > INT_MAX))
    +    return NULL;
    +
    *nextid = iter.index;
    -return rcu_dereference_raw(*slot);
    +return entry;
}
EXPORT_SYMBOL(idr_get_next);

--- linux-4.15.0.orig/lib/ioremap.c
+++ linux-4.15.0/lib/ioremap.c
@@ -91,7 +91,8 @@
if (ioremap_pmd_enabled() &&
    +if (WARN_ON_ONCE(iter.index > INT_MAX))
    +    return NULL;
    +
    *nextid = iter.index;
    -return rcu_dereference_raw(*slot);
    +return entry;
}
EXPORT_SYMBOL(ioremap_get_next);

if (ioremap_pmd_enabled()) &&
((next - addr) == PMD_SIZE) &&
- IS_ALIGNED(phys_addr + addr, PMD_SIZE)) {
+ IS_ALIGNED(phys_addr + addr, PMD_SIZE) &&
+ pmd_free_pte_page(pmd, addr)) {
  if (pmd_set_huge(pmd, phys_addr + addr, prot))
    continue;
}
@@ -117,7 +118,8 @@

if (ioremap_pud_enabled() &&
  (next - addr) == PUD_SIZE) &&
- IS_ALIGNED(phys_addr + addr, PUD_SIZE)) {
+ IS_ALIGNED(phys_addr + addr, PUD_SIZE) &&
+ pud_free_pmd_page(pud, addr)) {
  if (pud_set_huge(pud, phys_addr + addr, prot))
    continue;
}
--- linux-4.15.0.orig/lib/iov_iter.c
+++ linux-4.15.0/lib/iov_iter.c
@@ -417,7 +417,7 @@

int err;
struct iovec v;

-if (!(i->type & (ITER_BVEC|ITER_KVEC))) {
+if (iter_is_iovec(i)) {
  iterate_iovec(i, bytes, v, iov, skip, ({
    err = fault_in_pages_readable(v.iov_base, v.iov_len);
    if (unlikely(err))
@@ -687,8 +687,21 @@

static inline bool page_copy_sane(struct page *page, size_t offset, size_t n)
{
-  struct page *head = compound_head(page);
-  size_t v = n + offset + page_address(page) - page_address(head);
-  struct page *head;
+  /*
+   * The general case needs to access the page order in order
+   * to compute the page size.
+   * However, we mostly deal with order-0 pages and thus can
+   * avoid a possible cache line miss for requests that fit all
+   * page orders.
+   */
+  if (n <= v && v <= PAGE_SIZE)
+    return true;
+  +
+  +head = compound_head(page);
+v += (page - head) << PAGE_SHIFT;

if (likely(n <= v && v <= (PAGE_SIZE << compound_order(head))))
    return true;
--- linux-4.15.0.orig/lib/kfifo.c
+++ linux-4.15.0/lib/kfifo.c
@@ -82,7 +82,8 @@
    size /= esize;

-size = roundup_pow_of_two(size);
+if (!is_power_of_2(size))
+    size = rounddown_pow_of_two(size);

fifo->in = 0;
fifo->out = 0;
--- linux-4.15.0.orig/lib/klist.c
+++ linux-4.15.0/lib/klist.c
@@ -336,8 +336,9 @@
    struct klist_node *last = i->i_cur;
    struct klist_node *prev;
    unsigned long flags;
-    spin_lock(&i->i_klist->k_lock);
+    spin_lock_irqsave(&i->i_klist->k_lock, flags);
    if (last) {
        prev = to_klist_node(last->n_node.prev);
-        spin_unlock(&i->i_klist->k_lock);
+        spin_unlock_irqrestore(&i->i_klist->k_lock, flags);
        if (put && last)
            put(last);
    }

if (put && last)
    put(last);
--- linux-4.15.0.orig/lib/klist.c
+++ linux-4.15.0/lib/klist.c
@@ -356,7 +357,7 @@
    struct klist_node *last = i->i_cur;
    struct klist_node *prev;
    unsigned long flags;
-    spin_lock(&i->i_klist->k_lock);
+    spin_lock_irqsave(&i->i_klist->k_lock, flags);
    if (last) {
        prev = to_klist_node(last->n_node.prev);
        spin_unlock(&i->i_klist->k_lock);
+        spin_unlock_irqrestore(&i->i_klist->k_lock, flags);
        if (put && last)
            put(last);
next = to_klist_node(last->n_node.next);
@@ -397,7 +399,7 @@
next = to_klist_node(next->n_node.next);
}

-spin_unlock(&i->i_klist->k_lock);
+spin_unlock_irqrestore(&i->i_klist->k_lock, flags);

if (put && last)
put(last);
--- linux-4.15.0.orig/lib/kobject.c
+++ linux-4.15.0/lib/kobject.c
@@ -37,6 +37,25 @@
return kobj->ktype->namespace(kobj);
}

+/**
+ * kobject_get_ownership - get sysfs ownership data for @kobj
+ * @kobj: kobject in question
+ * @uid: kernel user ID for sysfs objects
+ * @gid: kernel group ID for sysfs objects
+ *
+ * Returns initial uid/gid pair that should be used when creating sysfs
+ * representation of given kobject. Normally used to adjust ownership of
+ * objects in a container.
+ */
+void kobject_get_ownership(struct kobject *kobj, kuid_t *uid, kgid_t *gid)
+{
+*uid = GLOBAL_ROOT_UID;
+*gid = GLOBAL_ROOT_GID;
+
+if (kobj->ktype->get_ownership)
+kobj->ktype->get_ownership(kobj, uid, gid);
+}
+
/*
 * populate_dir - populate directory with attributes.
 * @kobj: object we're working on.
 @@ -127,7 +146,7 @@
 int cur = strlen(kobject_name(parent));
 /* back up enough to print this name with '/' */
 length -= cur;
-strcpy(path + length, kobject_name(parent));
+memcpy(path + length, kobject_name(parent), cur);
 *(path + --length) = '/';
 }

@@ -234,14 +253,12 @@
/* be noisy on error issues */

if (error == -EEXIST)
    -WARN(1, "%s failed for %s with "
    -  "-EEXIST, don't try to register things with "
    -  "the same name in the same directory.
"
    -  "__func__, kobject_name(kobj));
    +pr_err("%s failed for %s with -EEXIST, don't try to register things with the same name in the same directory.
"
    +  __func__, kobject_name(kobj));
else
    -WARN(1, "%s failed for %s (error: %d parent: %s)"
    -  __func__, kobject_name(kobj), error,
    -  parent ? kobject_name(parent) : "none");
    +pr_err("%s failed for %s (error: %d parent: %s)
"
    +  __func__, kobject_name(kobj), error,
    +  parent ? kobject_name(parent) : "none");
} else
    kobj->state_in_sysfs = 1;

@@ -874,9 +891,16 @@
    kfree(kset);
}

+void kset_get_ownership(struct kobject *kobj, kuid_t *uid, kgid_t *gid)
+{
+    if (kobj->parent)
+        kobject_get_ownership(kobj->parent, uid, gid);
+}
+
+static struct kobj_type kset_ktype = {
+    .sysfs_ops = &kobj_sysfs_ops,
+    .release = kset_release,
+    .get_ownership = kset_get_ownership,
+};
+
/**
 * --- linux-4.15.0.orig/lib/kobject_uevent.c
 * +++ linux-4.15.0/lib/kobject_uevent.c
 * @@ -271,12 +271,13 @@
 */

static int init_uevent_argv(struct kobj_uevent_env *env, const char *subsystem)
{
    +int buffer_size = sizeof(env->buf) - env->buflen;
    int len;

    -len = strlcpy(&env->buf[env->buflen], subsystem,
    -    sizeof(env->buf) - env->buflen);

    -len = strlcpy(&env->buf[env->buflen], subsystem,
    -    sizeof(env->buf) - env->buflen);

    /*
-if (len >= (sizeof(env->buf) - env->buflen)) {
  WARN(1, KERN_ERR "init_uevent_argv: buffer size too small\n");
+len = strlcpy(&env->buf[env->buflen], subsystem, buffer_size);
+if (len >= buffer_size) {
  pr_warn("init_uevent_argv: buffer size of %d too small, needed %d\n",
         buffer_size, len);
  return -ENOMEM;
}

@@ -394,6 +395,13 @@
int i = 0;
int retval = 0;

+/*
+ * Mark "remove" event done regardless of result, for some subsystems
+ * do not want to re-trigger "remove" event via automatic cleanup.
+ */
+if (action == KOBJ_REMOVE)
+kobj->state_remove_uevent_sent = 1;
+
pr_debug("kobject: '%s' (%p): %s\n",
    kobject_name(kobj), kobj, __func__);

@@ -495,10 +503,6 @@
kobj->state_add_uevent_sent = 1;
break;

-case KOBJ_REMOVE:
-kobj->state_remove_uevent_sent = 1;
-break;
-
  case KOBJ_UNBIND:
    zap_modalias_env(env);
    break;
--- linux-4.15.0.orig/lib/kstrtox.c
+++ linux-4.15.0/lib/kstrtox.c
@@ -39,20 +39,22 @@
/*
 * Convert non-negative integer string representation in explicitly given radix
 * to an integer.
 * + to an integer. A maximum of max_chars characters will be converted.
 * + *
 * Return number of characters consumed maybe or-ed with overflow bit.
 * If overflow occurs, result integer (incorrect) is still returned.
 * *
 * Don't you dare use this function.
 */
unsigned int _parse_integer(const char *s, unsigned int base, unsigned long long *p)
+
unsigned int _parse_integer_limit(const char *s, unsigned int base, unsigned long long *p,
+ size_t max_chars)
{
unsigned long long res;
unsigned int rv;

res = 0;
rv = 0;
-while (1) {
+while (max_chars--) {
unsigned int c = *s;
unsigned int lc = c | 0x20; /* don't tolower() this line */
unsigned int val;
@@ -82,6 +84,11 @@
return rv;
}

+unsigned int _parse_integer(const char *s, unsigned int base, unsigned long long *p)
+{
+return _parse_integer_limit(s, base, p, INT_MAX);
+}
+
static int _kstrtoull(const char *s, unsigned int base, unsigned long long *res)
{
unsigned long long _res;
--- linux-4.15.0.orig/lib/kstrtox.h
+++ linux-4.15.0/lib/kstrtox.h
@@ -4,6 +4,8 @@
#define KSTRTOX_OVERFLOW (1U << 31)
const char * _parse_integer_fixup_radix(const char *s, unsigned int *base);
+unsigned int _parse_integer_limit(const char *s, unsigned int base, unsigned long long *res,
+ size_t max_chars);
unsigned int _parse_integer(const char *s, unsigned int base, unsigned long long *res);

#define pr_fmt(fmt)	"LOGIC PIO: " fmt
--- linux-4.15.0.orig/lib/logic_pio.c
+++ linux-4.15.0/lib/logic_pio.c
@@ -0,0 +1,318 @@
+// SPDX-License-Identifier: GPL-2.0+
+/*
+ * Copyright (C) 2017 HiSilicon Limited, All Rights Reserved.
+ * Author: Gabriele Paoloni <gabriele.paoloni@huawei.com>
+ * Author: Zhichang Yuan <yuanzhichang@hisilicon.com>
+ */
+ +#define pr_fmt(fmt)"LOGIC PIO: " fmt


```c
#include <linux/of.h>
#include <linux/io.h>
#include <linux/logic_pio.h>
#include <linux/mm.h>
#include <linux/rculist.h>
#include <linux/sizes.h>
#include <linux/slab.h>

/* The unique hardware address list */
static LIST_HEAD(io_range_list);
static DEFINE_MUTEX(io_range_mutex);

/* Consider a kernel general helper for this */
#define in_range(b, first, len)        ((b) >= (first) && (b) < (first) + (len))

/**
 * logic_pio_register_range - register logical PIO range for a host
 * @new_range: pointer to the IO range to be registered.
 * @returns: 0 on success, the error code in case of failure.
 * @returns: -EEXIST if the range already exists, which should be considered a success.
 */
int logic_pio_register_range(struct logic_pio_hwaddr *new_range)
{
    struct logic_pio_hwaddr *range;
    resource_size_t start;
    resource_size_t end;
    resource_size_t mmio_end = 0;
    resource_size_t iio_sz = MMIO_UPPER_LIMIT;
    int ret = 0;

    if (!new_range || !new_range->fwnode || !new_range->size)
        return -EINVAL;

    start = new_range->hw_start;
    end = new_range->hw_start + new_range->size;

    mutex_lock(&io_range_mutex);
    list_for_each_entry(range, &io_range_list, list) {
        if (range->fwnode == new_range->fwnode) {
            /* range already there */
            ret = -EEXIST;
            goto end_register;
        }
    }

    +if (!new_range || !new_range->fwnode || !new_range->size)
        return -EINVAL;
    +
    +start = new_range->hw_start;
    +end = new_range->hw_start + new_range->size;
    +
    +mutex_lock(&io_range_mutex);
    +
    +list_for_each_entry(range, &io_range_list, list) {
    +if (range->fwnode == new_range->fwnode) {
    +/* range already there */
        +ret = -EEXIST;
        +goto end_register;
        +}
```

---

**Open Source Used In 5GaaS Edge AC-4  33161**
if (range->flags == LOGIC_PIO_CPU_MMIO &&
   new_range->flags == LOGIC_PIO_CPU_MMIO) {
  /* for MMIO ranges we need to check for overlap */
  if (start >= range->hw_start + range->size ||
      end < range->hw_start) {
    mmio_end = range->io_start + range->size;
  } else {
    ret = -EFAULT;
    goto end_register;
  }

  else if (range->flags == LOGIC_PIO_INDIRECT &&
           new_range->flags == LOGIC_PIO_INDIRECT) {
    iio_sz += range->size;
  }

  /* range not registered yet, check for available space */
  if (new_range->flags == LOGIC_PIO_CPU_MMIO) {
    if (mmio_end + new_range->size - 1 > MMIO_UPPER_LIMIT) {
      /* if it's too big check if 64K space can be reserved */
      if (mmio_end + SZ_64K - 1 > MMIO_UPPER_LIMIT) {
        ret = -E2BIG;
        goto end_register;
      }
      new_range->size = SZ_64K;
      pr_warn("Requested IO range too big, new size set to 64K\n");
    }
    new_range->io_start = mmio_end;
  } else if (new_range->flags == LOGIC_PIO_INDIRECT) {
    if (iio_sz + new_range->size - 1 > IO_SPACE_LIMIT) {
      ret = -E2BIG;
      goto end_register;
    }
    new_range->io_start = iio_sz;
  } else {
    /* invalid flag */
    ret = -EINVAL;
    goto end_register;
  }

  list_add_tail_rcu(&new_range->list, &io_range_list);

end_register:
  mutex_unlock(&io_range_mutex);
  return ret;
}
+ * logic_pio_unregister_range - unregister a logical PIO range for a host
+ * @range: pointer to the IO range which has been already registered.
+ *
+ * Unregister a previously-registered IO range node.
+ */
+\void logic_pio_unregister_range(struct logic_pio_hwaddr *range)
+{
+mutex_lock(&io_range_mutex);
+list_del_rcu(&range->list);
+mutex_unlock(&io_range_mutex);
+synchronize_rcu();
+
+/**
+ * find_io_range_by_fwnode - find logical PIO range for given FW node
+ * @fwnode: FW node handle associated with logical PIO range
+ *
+ * Returns pointer to node on success, NULL otherwise.
+ *
+ * Traverse the io_range_list to find the registered node for @fwnode.
+ */
+\struct logic_pio_hwaddr *find_io_range_by_fwnode(struct fwnode_handle *fwnode)
+{
+struct logic_pio_hwaddr *range, *found_range = NULL;
+
+rcu_read_lock();
+list_for_each_entry_rcu(range, &io_range_list, list) {
+if (range->fwnode == fwnode) {
+found_range = range;
+break;
+}
+}
+
+rcu_read_unlock();
+
+return found_range;
+
+/** Return a registered range given an input PIO token */
+\static struct logic_pio_hwaddr *find_io_range(unsigned long pio)
+{
+struct logic_pio_hwaddr *range, *found_range = NULL;
+
+rcu_read_lock();
+list_for_each_entry_rcu(range, &io_range_list, list) {
+if (in_range(pio, range->io_start, range->size)) {
+found_range = range;
+break;
+}
+rcu_read_unlock();
+
+if (!found_range)
+pr_err("PIO entry token 0x%lx invalid\n", pio);
+
+return found_range;
+
+/**
+ * logic_pio_to_hwaddr - translate logical PIO to HW address
+ * @pio: logical PIO value
+ *
+ * Returns HW address if valid, ~0 otherwise.
+ *
+ * Translate the input logical PIO to the corresponding hardware address.
+ * The input PIO should be unique in the whole logical PIO space.
+ */
+resource_size_t logic_pio_to_hwaddr(unsigned long pio)
+{
+struct logic_pio_hwaddr *range;
+
+range = find_io_range(pio);
+if (range)
+return range->hw_start + pio - range->io_start;
+
+return (resource_size_t)~0;
+
+/**
+ * logic_pio_trans_hwaddr - translate HW address to logical PIO
+ * @fwnode: FW node reference for the host
+ * @addr: Host-relative HW address
+ * @size: size to translate
+ *
+ * Returns Logical PIO value if successful, ~0UL otherwise
+ */
+unsigned long logic_pio_trans_hwaddr(struct fwnode_handle *fwnode,
+    resource_size_t addr, resource_size_t size)
+{
+struct logic_pio_hwaddr *range;
+
+range = find_io_range_by_fwnode(fwnode);
+if (!range || range->flags == LOGIC_PIO_CPU_MMIO) {
+pr_err("IO range not found or invalid\n");
+return ~0UL;
+}
+if (range->size < size) {
resource size %pa cannot fit in IO range size %pa

return ~0UL;
+
return addr - range->hw_start + range->io_start;
+
unsigned long logic_pio_trans_cpuaddr(resource_size_t addr)
+
struct logic_pio_hwaddr *range;
+
rcu_read_lock();
+list_for_each_entry_rcu(range, &io_range_list, list) {
+if (range->flags != LOGIC_PIO_CPU_MMIO)
+continue;
+if (in_range(addr, range->hw_start, range->size)) {
+unsigned long cpuaddr;
+
cpuaddr = addr - range->hw_start + range->io_start;
+
rcu_read_unlock();
+return cpuaddr;
+}
+
rcu_read_unlock();
+
pr_err("addr %pa not registered in io_range_list\n", &addr);
+
return ~0UL;
+
#if defined(CONFIG_INDIRECT_PIO) && defined(PCI_IOBASE)
+define BUILD_LOGIC_IO(bw, type)
+
type logic_in##bw(unsigned long addr)
+
ret = read##bw(PCI_IOBASE + addr);
+} else if (addr >= MMIO_UPPER_LIMIT && addr < IO_SPACE_LIMIT) {
+struct logic_pio_hwaddr *entry = find_io_range(addr);
+
ret = entry->ops->in(entry->hostdata, addr, sizeof(type));
+else
+WARN_ON_ONCE(1);
+
if (addr < MMIO_UPPER_LIMIT) {
+ret = read##bw(PCI_IOBASE + addr);
+} else if (addr >= MMIO_UPPER_LIMIT && addr < IO_SPACE_LIMIT) {
+struct logic_pio_hwaddr *entry = find_io_range(addr);
+
if (entry && entry->ops)
+ret = entry->ops->in(entry->hostdata, addr, sizeof(type));
+else
+WARN_ON_ONCE(1);
+}
void logic_out##bw(type value, unsigned long addr)
{
    if (addr < MMIO_UPPER_LIMIT) {
        write##bw(value, PCI_IOBASE + addr);
    } else if (addr >= MMIO_UPPER_LIMIT && addr < IO_SPACE_LIMIT) {
        struct logic_pio_hwaddr *entry = find_io_range(addr);
        if (entry && entry->ops)
            entry->ops->out(entry->hostdata, addr, value, sizeof(type));
        else
            WARN_ON_ONCE(1);
    }
}

void logic_ins##bw(unsigned long addr, void *buffer, unsigned int count)
{
    if (addr < MMIO_UPPER_LIMIT) {
        reads##bw(PCI_IOBASE + addr, buffer, count);
    } else if (addr >= MMIO_UPPER_LIMIT && addr < IO_SPACE_LIMIT) {
        struct logic_pio_hwaddr *entry = find_io_range(addr);
        if (entry && entry->ops)
            entry->ops->ins(entry->hostdata, addr, buffer, sizeof(type), count);
        else
            WARN_ON_ONCE(1);
    }
}

void logic_outs##bw(unsigned long addr, const void *buffer, unsigned int count)
{
    if (addr < MMIO_UPPER_LIMIT) {
        writes##bw(PCI_IOBASE + addr, buffer, count);
    } else if (addr >= MMIO_UPPER_LIMIT && addr < IO_SPACE_LIMIT) {
        struct logic_pio_hwaddr *entry = find_io_range(addr);
        if (entry && entry->ops)
            entry->ops->outs(entry->hostdata, addr, buffer, sizeof(type), count);
        else
            WARN_ON_ONCE(1);
+BUILD_LOGIC_IO(b, u8)
+EXPORT_SYMBOL(logic_inb);
+EXPORT_SYMBOL(logic_insb);
+EXPORT_SYMBOL(logic_outb);
+EXPORT_SYMBOL(logic_outsb);
+
+BUILD_LOGIC_IO(w, u16)
+EXPORT_SYMBOL(logic_inw);
+EXPORT_SYMBOL(logic_insw);
+EXPORT_SYMBOL(logic_outw);
+EXPORT_SYMBOL(logic_outsw);
+
+BUILD_LOGIC_IO(l, u32)
+EXPORT_SYMBOL(logic_inl);
+EXPORT_SYMBOL(logic_insl);
+EXPORT_SYMBOL(logic_outl);
+EXPORT_SYMBOL(logic_outsl);
+
+#endif /* CONFIG_INDIRECTPIO && PCI_IOBASE */
--- linux-4.15.0.orig/lib/mpi/longlong.h
+++ linux-4.15.0/lib/mpi/longlong.h
@@ -671,7 +671,7 @@
************** MIPS/64 **************
***************************************/
#if (defined(__mips) && __mips >= 3) && W_TYPE_SIZE == 64
-#if defined(__mips_isa_rev) && __mips_isa_rev >= 6
+#if defined(__mips_isa_rev) && __mips_isa_rev >= 6 && defined(CONFIG_CC_IS_GCC)
*/
* GCC ends up emitting a __multi3 intrinsic call for MIPS64r6 with the plain C
* code below, so we special case MIPS64r6 until the compiler can do better.
@@ -756,22 +756,22 @@
 do { \
 if (__builtin_constant_p(bh) && (bh) == 0) \n __asm__ ("(a\%I4\|add\%I4c) \%1,\%3,%4u\{aze\|addze\} \%0,\%2" \
 -: ":=r" ((USItype)(sh)), \n -:"=\&r" ((USItype)(sl)) \n +:"=\&r" (sh), \n +:"=\&r" (sl) \n : ":=\&r" ((USItype)(ah)), \n "%r" ((USItype)(al)), \n "%r" ((USItype)(bl)));
 else if (__builtin_constant_p(bh) && (bh) == ~(USItype) 0) \n __asm__ ("(a\%I4\|add\%I4c) \%1,\%3,%4u\{ame\|addme\} \%0,\%2" \
 -: ":=r" ((USItype)(sh)), \n -:"=\&r" ((USItype)(sl)) \n
else \
__asm__ ("{a%I5|add%I5c} %1, %4, %5\n\t{ae|adde} %0, %2, %3" \
- : "=r" ((USItype)(ah)), \
- : "=&r" ((USItype)(al)), \
- : "%r" ((USItype)(bl))); \
else \
__asm__ ("{a%I5|add%I5c} %1, %4, %5\n\t{sf|subf%I5c} %0, %2, %3" \
- : "=r" ((USItype)(sh)), \
- : "=&r" ((USItype)(sl)) \
- : "%r" ((USItype)(bh)), \
- : "%r" ((USItype)(al)), \
- : "r" ((USItype)(bl))); \
@ @ -781,36 +781,36 @@
do { \
if (__builtin_constant_p(ah) && (ah) == 0) \
__asm__ ("{sf%I3|subf%I3c} %1, %4, %3\n\t{sfze|subfze} %0" \
- : "=r" ((USItype)(sh)), \
- : "=&r" ((USItype)(sl)) \
- : "r" ((USItype)(ah)), \
- : "rl" ((USItype)(ah)), \
- : "r" ((USItype)(al)), \
- : "r" ((USItype)(bl))); \
else if (__builtin_constant_p(ah) && (ah) == ~(USItype) 0) \
__asm__ ("{sf%I3|subf%I3c} %1, %4, %3\n\t{sfme|subfme} %0" \
- : "=r" ((USItype)(sh)), \
- : "=&r" ((USItype)(sl)) \
- : "r" ((USItype)(bh)), \
- : "rl" ((USItype)(al)), \
- : "r" ((USItype)(bl))); \
else if (__builtin_constant_p(bh) && (bh) == 0) \
__asm__ ("{sf%I3|subf%I3c} %1, %4, %3\n\t{ame|addme} %0" \
- : "=r" ((USItype)(sh)), \
- : "=&r" ((USItype)(sl)) \
- : "r" ((USItype)(ah)), \
- : "rl" ((USItype)(al)), \
- : "r" ((USItype)(bl))); \
else if (__builtin_constant_p(bh) && (bh) == ~(USItype) 0) \
__asm__ ("{sf%I3|subf%I3c} %1, %4, %3\n\t{aze|addze} %0" \
- : "=r" ((USItype)(sh)), \
- : "=&r" ((USItype)(sl)) \
+ : "=r" (sh), \
+ : "=r" (sl) \
- : "r" ((USItype)(ah)), \
- : "rl" ((USItype)(ah)), \
- : "r" ((USItype)(al)), \
- : "r" ((USItype)(bl))); 
```
do { \
USItype __m0 = (m0), __m1 = (m1); \
__asm__ ("mulhwu %0,%1,%2" \n: "=r" ((USItype) ph) \
: "%r" (__m0), \n"r" (__m1)); \
(pl) = __m0 * __m1; \
--- linux-4.15.0.orig/lib/mpi/mpi-pow.c 
+++ linux-4.15.0/lib/mpi/mpi-pow.c 
@@ -37,6 +37,7 @@
int mpi_powm(MPI res, MPI base, MPI exp, MPI mod) 
{ 
mpi_ptr_t mp_marker = NULL, bp_marker = NULL, ep_marker = NULL; 
+struct karatsuba_ctx karactx = {}; 
mpi_ptr_t xp_marker = NULL; 
mpi_ptr_t tspace = NULL; 
mpi_ptr_t rp, ep, mp, bp; 
@@ -164,13 +165,11 @@ 
int c; 
mpi_limb_t e; 
mpi_limb_t carry_limb; 
-struct karatsuba_ctx karactx; 

xp = xp_marker = mpi_alloc_limb_space(2 * (msize + 1)); 
if (xp) 
goto enomem; 

-memset(&karactx, 0, sizeof karactx); 
negative_result = (ep[0] & 1) && base->sign; 

i = esize - 1; 
@@ -295,8 +294,6 @@ 
if (mod_shift_cnt)
mpihelp_rshift(rp, rsz, mod_shift_cnt);
MPN_NORMALIZE(rp, rsz);
-
-mpihelp_release_karatsuba_ctx(&karactx);
}

if (negative_result && rsz) {
@@ -313,6 +310,7 @@
leave:
rc = 0;
enomem:
+mpihelp_release_karatsuba_ctx(&karactx);
if (assign_rp)
mpi_assign_limb_space(res, rp, size);
if (mp_marker)
--- linux-4.15.0.orig/lib/mpi/mpiutil.c
+++ linux-4.15.0/lib/mpi/mpiutil.c
@@ -91,7 +91,7 @@
return 0;/* no need to do it */

if (a->d) {
-p = kmalloc(nlimbs * sizeof(mpi_limb_t), GFP_KERNEL);
+p = kcalloc(nlimbs, sizeof(mpi_limb_t), GFP_KERNEL);
if (!p)
return -ENOMEM;
memcpy(p, a->d, a->alloced * sizeof(mpi_limb_t));
--- linux-4.15.0.orig/lib/nlattr.c
+++ linux-4.15.0/lib/nlattr.c
@@ -402,7 +402,7 @@
int attrlen = nla_len(nla);
int d;

-if (attrlen > 0 && buf[attrlen - 1] == '\0')
+while (attrlen > 0 && buf[attrlen - 1] == '\0')
attrlen--;

d = attrlen - len;
--- linux-4.15.0.orig/lib/nmi_backtrace.c
+++ linux-4.15.0/lib/nmi_backtrace.c
@@ -87,11 +87,9 @@

bool nmi_cpu_backtrace(struct pt_regs *regs)
{
-static arch_spinlock_t lock = __ARCH_SPIN_LOCK_UNLOCKED;
int cpu = smp_processor_id();

if (cpumask_test_cpu(cpu, to_cpumask(backtrace_mask)))
-arch_spin_lock(&lock);
if (regs && cpu_in_idle(instruction_pointer(regs))) {
    pr_warn("NMI backtrace for cpu %d skipped: idling at%pS\n", cpu, (void *)instruction_pointer(regs));
    @@ -102,7 +100,6 @@
    } else
    dump_stack();
    } -arch_spin_unlock(&lock);
    cpumask_clear_cpu(cpu, to_cpumask(backtrace_mask));
    return true;
}
--- linux-4.15.0.orig/lib/radix-tree.c
+++ linux-4.15.0/lib/radix-tree.c
@@ -1611,11 +1611,9 @@
    static void __rcu **skip_siblings(struct radix_tree_node **nodep, void __rcu **slot, struct radix_tree_iter *iter)
    {
    -void *sib = node_to_entry(slot - 1);
    -
    while (iter->index < iter->next_index) {
    -*nodep = rcu_dereference_raw(*slot);
    -if (*nodep && *nodep != sib)
    +if (*nodep && !is_sibling_entry(iter->node, *nodep))
    return slot;
    slot++;
    iter->index = __radix_tree_iter_add(iter, 1);
    @@ -1630,7 +1628,7 @@
    struct radix_tree_iter *iter, unsigned flags)
    {
    unsigned tag = flags & RADIX_TREE_ITER_TAG_MASK;
    -struct radix_tree_node *node = rcu_dereference_raw(*slot);
    +struct radix_tree_node *node;
    slot = skip_siblings(&node, slot, iter);
    @@ -2035,10 +2033,12 @@
    unsigned long index, void *item)
    {
    struct radix_tree_node *node = NULL;
    -void __rcu **slot;
    +void __rcu **slot = NULL;
    void *entry;
    
    entry = __radix_tree_lookup(root, index, &node, &slot);
    +if (!slot)
    +return NULL;
    if (entry && (!is_idr(root) || node_tag_get(root, node, IDR_FREE, get_slot_offset(node, slot))))
return NULL;
@@ -2180,7 +2180,7 @@
offset = radix_tree_find_next_bit(node, IDR_FREE, 
offset + 1);
start = next_index(start, node, offset);
-if (start > max)
+if (start > max || start == 0)
return ERR_PTR(-ENOSPC);
while (offset == RADIX_TREE_MAP_SIZE) {
offset = node->offset + 1;
--- linux-4.15.0.orig/lib/raid6/Makefile
+++ linux-4.15.0/lib/raid6/Makefile
@@ -18,6 +18,21 @@
ifeq ($(CONFIG_ALTIVEC),y)
altivec_flags := -maltivec $(call cc-option,-mabi=altivec)
+
+ifeq ($(cc-name),clang)
+## clang ppc port does not yet support -maltivec when -msoft-float is
+## enabled. A future release of clang will resolve this
+## https://bugs.llvm.org/show_bug.cgi?id=31177
+CFLAGS_REMOVE_altivec1.o += -msoft-float
+CFLAGS_REMOVE_altivec2.o += -msoft-float
+CFLAGS_REMOVE_altivec4.o += -msoft-float
+CFLAGS_REMOVE_altivec8.o += -msoft-float
+CFLAGS_REMOVE_altivec8.o += -msoft-float
+CFLAGS_REMOVE_vpermxor1.o += -msoft-float
+CFLAGS_REMOVE_vpermxor2.o += -msoft-float
+CFLAGS_REMOVE_vpermxor4.o += -msoft-float
+CFLAGS_REMOVE_vpermxor8.o += -msoft-float
+endif
endif
# The GCC option -ffreestanding is required in order to compile code containing
@@ -25,7 +40,7 @@
ifeq ($(CONFIG_KERNEL_MODE_NEON),y)
NEON_FLAGS := -ffreestanding
ifeq ($(ARCH),arm)
-NEON_FLAGS += -mfloat-abi=softfp -mfpu=neon
+NEON_FLAGS += -march=armv7-a -mfloat-abi=softfp -mfpu=neon
endif
CFLAGS_recov_neon_inner.o += $(NEON_FLAGS)
ifeq ($(ARCH),arm64)
--- linux-4.15.0.orig/lib/raid6/algos.c
+++ linux-4.15.0/lib/raid6/algos.c
@@ -159,6 +159,10 @@
for (bestgenperf = 0, bestxorperf = 0, best = NULL, algo = raid6_algos; *algo; algo++) {
if (!best || (*algo)->prefer >= best->prefer) {
    /* 2 ^ (RAID6_TIME_JIFFIES_LG2 - 0.5) */
    const unsigned long raid6_time_jiffies =
        ((1 << RAID6_TIME_JIFFIES_LG2) * 181) >> 8;
    if ((*algo)->valid && !(*algo)->valid())
        continue;

    while ((j1 = jiffies) == j0)
        cpu_relax();
    while (time_before(jiffies,
       j1 + (1<<RAID6_TIME_JIFFIES_LG2))) {
        (*algo)->gen_syndrome(disks, PAGE_SIZE, *dptrs);
        perf++;
    }
    best = *algo;

    pr_info("raid6: %-8s gen() %5ld MB/s\n", (*algo)->name,
       (perf*HZ) >> (20-16+RAID6_TIME_JIFFIES_LG2));
    perf+=;

    if (!(*algo)->xor_syndrome)
        continue;
    while ((j1 = jiffies) == j0)
        cpu_relax();
    while (time_before(jiffies,
       j1 + (1<<RAID6_TIME_JIFFIES_LG2))) {
        (*algo)->xor_syndrome(disks, start, stop,
            PAGE_SIZE, *dptrs);
        perf++;
    }
    bestxorperf = perf;

    pr_info("raid6: %-8s xor() %5ld MB/s\n", (*algo)->name,
        ((perf*HZ) >> (20-16+RAID6_TIME_JIFFIES_LG2+1)) * 1448) >> 10);
}

if (best) {
    pr_info("raid6: using algorithm %s gen() %ld MB/s\n", (*algo)->name,
        ((perf*HZ) >> (20-16+RAID6_TIME_JIFFIES_LG2+1)) * 1448) >> 10);
}
typedef uint8x16_t unative_t;

-statistic NBYTES(x) ((unative_t){x,x,x,x, x,x,x,x, x,x,x,x, x,x,x,x})
#define NSIZE int

/*
int d, z, z0;

register unative_t wd$$, wq$$, wp$$, w1$$, w2$$;
-const unative_t x1d = NBYTES(0x1d);
+const unative_t x1d = vdupq_n_u8(0x1d);

z0 = disks - 3;/* Highest data disk */
p = dptr[z0+1];/* XOR parity */
@@ -92,7 +91,7 @@
int d, z, z0;

register unative_t wd$$, wq$$, wp$$, w1$$, w2$$;
-const unative_t x1d = NBYTES(0x1d);
+const unative_t x1d = vdupq_n_u8(0x1d);

z0 = stop;/* P/Q right side optimization */
p = dptr[disks-2];/* XOR parity */
--- linux-4.15.0.orig/lib/raid6/recov_neon_inner.c
+++ linux-4.15.0/lib/raid6/recov_neon_inner.c
@@ -10,11 +10,6 @@
#include <arm_neon.h>

-static const uint8x16_t x0f = {
-0x0f, 0x0f, 0x0f, 0x0f, 0x0f, 0x0f, 0x0f, 0x0f,
-0x0f, 0x0f, 0x0f, 0x0f, 0x0f, 0x0f, 0x0f, 0x0f,
- ];
-
#endif CONFIG_ARM
/*
 * AArch32 does not provide this intrinsic natively because it does not
@ @ -41,6 +36,7 @@
uint8x16_t pm1 = vld1q_u8(pbmul + 16);
uint8x16_t qm0 = vld1q_u8(qmul);
uint8x16_t qm1 = vld1q_u8(qmul + 16);
+uint8x16_t x0f = vdupq_n_u8(0x0f);
/*
 * while ( bytes-- ) { 
@ @ -87,6 +83,7 @@
{ 
uint8x16_t qm0 = vld1q_u8(qmul);
uint8x16_t qm1 = vld1q_u8(qmul + 16);
+uint8x16_t x0f = vdupq_n_u8(0x0f);
/*
 * while (bytes--) { 
--- linux-4.15.0.orig/lib/raid6/test/Makefile
+++ linux-4.15.0/lib/raid6/test/Makefile
@@ -27,7 +27,7 @@
CFLAGS += -I../../../arch/arm/include -mfpu=neon
       HAS_NEON = yes
endif
-ifeq ($(ARCH),arm64)
+ifeq ($(ARCH),aarch64)
CFLAGS += -I../../../arch/arm64/include
       HAS_NEON = yes
endif
@@ -41,7 +41,7 @@
gcc -c -x assembler - >&/dev/null &&
       rm ./-.o && echo -DCONFIG_AS_AVX512=1)
else ifeq ($(HAS_NEON),yes)
-       OBJS += neon.o neon1.o neon2.o neon4.o neon8.o
+       OBJS += neon.o neon1.o neon2.o neon4.o neon8.o recov_neon.o recov_neon_inner.o
CFLAGS += -DCONFIG_KERNEL_MODE_NEON=1
else
       HAS_ALTIVEC := $(shell printf '#include <altivec.h>
vvector int a;
' |
--- linux-4.15.0.orig/lib/raid6/unroll.awk
+++ linux-4.15.0/lib/raid6/unroll.awk
@@ @ @ -13,7 +13,7 @@
for (i = 0; i < rep; ++i) {
     tmp = $0
     gsub(/\$\$/s, i, tmp)
```c
#include <linux/sched.h>
#include <asm/unaligned.h>

#ifdef CONFIG_RANDOM32_SELFTEST
static void __init prandom_state_selftest(void);
#else
static inline void prandom_state_selftest(void)
{
}
#endif

static DEFINE_PER_CPU(struct rnd_state, net_rand_state) __latent_entropy;

/**
 * prandom_u32_state - seeded pseudo-random number generator.
 * @state: pointer to state structure holding seeded state.
 *
 u32 prandom_u32_state(state);

t -random_u32 - pseudo random number generator
 -
 -A 32 bit pseudo-random number is generated using a fast
 -algorithm suitable for simulation. This algorithm is NOT
 -considered safe for cryptographic use.
 - */
-u32 prandom_u32(void)
{
 struct rnd_state *state = &get_cpu_var(net_rand_state);
 u32 res;

 -res = prandom_u32_state(state);
 -put_cpu_var(net_rand_state);
 -
 -return res;
 -}
-EXPORT_SYMBOL(prandom_u32);
-/**
 * prandom_bytes_state - get the requested number of pseudo-random bytes
 */
```

/*
 * @$state$: pointer to state structure holding seeded state.
 @@ -119,20 +90,6 @@
 }
 EXPORT_SYMBOL(prandom_bytes_state);

 /*
 - *prandom_bytes - get the requested number of pseudo-random bytes
 - *@buf: where to copy the pseudo-random bytes to
 - *@bytes: the requested number of bytes
 - */
 -void prandom_bytes(void *buf, size_t bytes)
 -{
 -struct rnd_state *state = &get_cpu_var(net_rand_state);
 -
 -prandom_bytes_state(state, buf, bytes);
 -put_cpu_var(net_rand_state);
 -}
 -EXPORT_SYMBOL(prandom_bytes);
 -
 static void prandom_warmup(struct rnd_state *state)
 {
 /* Calling RNG ten times to satisfy recurrence condition */
 @@ -148,96 +105,6 @@
 prandom_u32_state(state);
 }

 -static u32 __extract_hwseed(void)
 -{
 -unsigned int val = 0;
 -
 -(void)(arch_get_random_seed_int(&val) ||
 - arch_get_random_int(&val));
 -
 -return val;
 -}
 -
 -static void prandom_seed_early(struct rnd_state *state, u32 seed,
 -			   bool mix_with_hwseed)
 -{
 -#define LCG(x) ((x) * 69069U)/* super-duper LCG */
 -#define HWSEED() (mix_with_hwseed ? __extract_hwseed() : 0)
 -state->s1 = __seed(HWSEED() ^ LCG(seed), 2U);
 -state->s2 = __seed(HWSEED() ^ LCG(state->s1), 8U);
 -state->s3 = __seed(HWSEED() ^ LCG(state->s2), 16U);
 -state->s4 = __seed(HWSEED() ^ LCG(state->s3), 128U);
 -}
 -
prandom_seed - add entropy to pseudo random number generator
@seed: seed value

Add some additional seeding to the prandom pool.

void prandom_seed(u32 entropy)
{
    int i;
    for_each_possible_cpu(i) {
        struct rnd_state *state = &per_cpu(net_rand_state, i);
        state->s1 = __seed(state->s1 ^ entropy, 2U);
        prandom_warmup(state);
    }
}

EXPORT_SYMBOL(prandom_seed);

Generate some initially weak seeding values to allow to start the prandom_u32() engine.

int __init prandom_init(void)
{
    int i;
    prandom_state_selftest();
    for_each_possible_cpu(i) {
        struct rnd_state *state = &per_cpu(net_rand_state, i);
        u32 weak_seed = (i + jiffies) ^ random_get_entropy();
        prandom_seed_early(state, weak_seed, true);
        prandom_warmup(state);
    }
    return 0;
}
core_initcall(prandom_init);

static void __prandom_timer(struct timer_list *unused);

static DEFINE_TIMER(seed_timer, __prandom_timer);
-static void __prandom_timer(struct timer_list *unused)
{
    u32 entropy;
    unsigned long expires;
    -
    -get_random_bytes(&entropy, sizeof(entropy));
    -prandom_seed(entropy);
    -
    /* reseed every ~60 seconds, in [40 .. 80] interval with slack */
    -expires = 40 + prandom_u32_max(40);
    -seed_timer.expires = jiffies + msecs_to_jiffies(expires * MSEC_PER_SEC);
    -
    -add_timer(&seed_timer);
    -
}
-
-static void __init __prandom_start_seed_timer(void)
{
    seed_timer.expires = jiffies + msecs_to_jiffies(40 * MSEC_PER_SEC);
    -add_timer(&seed_timer);
    -
    -
void prandom_seed_full_state(struct rnd_state __percpu *pcpu_state)
{
    int i;
    @ @ -257.51 +124.6 @ @
}
EXPORT_SYMBOL(prandom_seed_full_state);

-/
- *Generate better values after random number generator
- *is fully initialized.
- */
-static void __prandom_reseed(bool late)
{
    unsigned long flags;
    -static bool latch = false;
    -static DEFINE_SPINLOCK(lock);
    -
    /* Asking for random bytes might result in bytes getting
    * moved into the nonblocking pool and thus marking it
    * as initialized. In this case we would double back into
    * this function and attempt to do a late reseed.
    * Ignore the pointless attempt to reseed again if we're
    * already waiting for bytes when the nonblocking pool
    * got initialized.
    */
    -
    /* only allow initial seeding (late == false) once */

if (!spin_trylock_irqsave(&lock, flags))
return;
-
if (latch & & !late)
goto out;
-
latch = true;
prandom_seed_full_state(&net_rand_state);
out:
spin_unlock_irqrestore(&lock, flags);
-
void prandom_reseed_late(void)
{
 __prandom_reseed(true);
-
-
static int __init prandom_reseed(void)
{
 __prandom_reseed(false);
 __prandom_start_seed_timer();
return 0;
-
 late_initcall(prandom_reseed);
-
#if defined CONFIG_RANDOM32_SELFTEST
 static struct prandom_test1 {
 u32 seed;
@@ -421,7 +243,28 @@
 {  407983964U, 921U,  728767059U },
 static void __init prandom_state_selftest(void)
 +static u32 __extract_hwseed(void)
 +=
 +unsigned int val = 0;
 +
 +*(void)(arch_get_random_seed_int(&val) ||
 + arch_get_random_int(&val));
 +
 +return val;
+
 +static void prandom_seed_early(struct rnd_state *state, u32 seed,
 + bool mix_with_hwseed)
 +{
 +#define LCG(x) ((x) * 69069U)/* super-duper LCG */
 +#define HWSEED() (mix_with_hwseed ? __extract_hwseed() : 0)


+state->s1 = __seed(HWSEED() ^ LCG(seed), 2U);
+state->s2 = __seed(HWSEED() ^ LCG(state->s1), 8U);
+state->s3 = __seed(HWSEED() ^ LCG(state->s2), 16U);
+state->s4 = __seed(HWSEED() ^ LCG(state->s3), 128U);
+
+
+static int __init prandom_state_selftest(void)
{  
  int i, j, errors = 0, runs = 0;
  bool error = false;
  @@ -461,5 +304,266 @@
  pr_warn("prandom: %d/%d self tests failed\n", errors, runs);
  else
  pr_info("prandom: %d self tests passed\n", runs);
  +return 0;
  +}
  +core_initcall(prandom_state_selftest);
  +#endif
  +
  +/*
  + * The prandom_u32() implementation is now completely separate from the
  + * prandom_state() functions, which are retained (for now) for compatibility.
  + *
  + * Because of (ab)use in the networking code for choosing random TCP/UDP port
  + * numbers, which open DoS possibilities if guessable, we want something
  + * stronger than a standard PRNG. But the performance requirements of
  + * the network code do not allow robust crypto for this application.
  + *
  + * So this is a homebrew Junior Spaceman implementation, based on the
  + * lowest-latency trustworthy crypto primitive available, SipHash.
  + * (The authors of SipHash have not been consulted about this abuse of
  + * their work.)
  + *
  + * Standard SipHash-2-4 uses 2n+4 rounds to hash n words of input to
  + * one word of output. This abbreviated version uses 2 rounds per word
  + * of output.
  + */
  +
  +struct siprand_state {
  +unsigned long v0;
  +unsigned long v1;
  +unsigned long v2;
  +unsigned long v3;
  +};
  +
  +static DEFINE_PER_CPU(struct siprand_state, net_rand_state) __latent_entropy;
  +
  +/*

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This is the core CPRNG function. As "pseudorandom", this is not used
for truly valuable things, just intended to be a PITA to guess.
For maximum speed, we do just two SipHash rounds per word. This is
the same rate as 4 rounds per 64 bits that SipHash normally uses,
so hopefully it's reasonably secure.

There are two changes from the official SipHash finalization:
- We omit some constants XORed with v2 in the SipHash spec as irrelevant;
  they are there only to make the output rounds distinct from the input
  rounds, and this application has no input rounds.
- Rather than returning v0^v1^v2^v3, return v1+v3.
  If you look at the SipHash round, the last operation on v3 is
  "v3 ^= v0", so "v0 ^ v3" just undoes that, a waste of time.
  Likewise "v1 ^= v2". (The rotate of v2 makes a difference, but
  it still cancels out half of the bits in v2 for no benefit.)
  Second, since the last combining operation was xor, continue the
  pattern of alternating xor/add for a tiny bit of extra non-linearity.

#pragma warning(push)  // silence warning about useless nones
#pragma warning(disable:4189)

static inline u32 siprand_u32(struct siprand_state *s)
{
    unsigned long v0 = s->v0, v1 = s->v1, v2 = s->v2, v3 = s->v3;
    PRND_SIPROUND(v0, v1, v2, v3);
    PRND_SIPROUND(v0, v1, v2, v3);
    s->v0 = v0;  s->v1 = v1;  s->v2 = v2;  s->v3 = v3;
    return v1 + v3;
}

u32 prandom_u32(void)
{
    struct siprand_state *state = get_cpu_ptr(&net_rand_state);
    u32 res = siprand_u32(state);
    put_cpu_ptr(&net_rand_state);
    return res;
}

EXPORT_SYMBOL(prandom_u32);

#pragma warning(pop)

prandom_u32 - pseudo random number generator

A 32 bit pseudo-random number is generated using a fast
algorithm suitable for simulation. This algorithm is NOT
considered safe for cryptographic use.

u32 prandom_u32(void)
{
    struct siprand_state *state = get_cpu_ptr(&net_rand_state);
    u32 res = siprand_u32(state);
    put_cpu_ptr(&net_rand_state);
    return res;
}

EXPORT_SYMBOL(prandom_u32);

prandom_u32 - get the requested number of pseudo-random bytes
+ @buf: where to copy the pseudo-random bytes to
+ @bytes: the requested number of bytes
+ */
+ void prandom_bytes(void *buf, size_t bytes)
+ {
+ struct siprand_state *state = get_cpu_ptr(&net_rand_state);
+ u8 *ptr = buf;
+ +
+ while (bytes >= sizeof(u32)) {
+ put_unaligned(siprand_u32(state), (u32 *)ptr);
+ ptr += sizeof(u32);
+ bytes -= sizeof(u32);
+ +} //while
+ +
+ if (bytes > 0) {
+ u32 rem = siprand_u32(state);
+ +
+ do {
+ *ptr++ = (u8)rem;
+ rem >>= BITS_PER_BYTE;
+ } while (--bytes > 0);
+ +}
+ put_cpu_ptr(&net_rand_state);
+ } //prandom_bytes
+ EXPORT_SYMBOL(prandom_bytes);
+
+ /**
+ prandom_seed - add entropy to pseudo random number generator
+ *
+ *
+ *
+ * Add some additional seed material to the prandom pool.
+ * The "entropy" is actually our IP address (the only caller is
+ * the network code), not for unpredictability, but to ensure that
+ * different machines are initialized differently.
+ */
+ void prandom_seed(u32 entropy)
+ {
+ int i;
+ +
+ add_device_randomness(&entropy, sizeof(entropy));
+ +
+ for_each_possible_cpu(i) {
+ struct siprand_state *state = per_cpu_ptr(&net_rand_state, i);
+ unsigned long v0 = state->v0, v1 = state->v1;
+ unsigned long v2 = state->v2, v3 = state->v3;
+ +
+ do {
+ v3 ^= entropy;
PRND_SIPROUND(v0, v1, v2, v3);
PRND_SIPROUND(v0, v1, v2, v3);
v0 ^= entropy;
} while (unlikely(!v0 || !v1 || !v2 || !v3));
+
WRITE_ONCE(state->v0, v0);
WRITE_ONCE(state->v1, v1);
WRITE_ONCE(state->v2, v2);
WRITE_ONCE(state->v3, v3);
+
EXPORT_SYMBOL(prandom_seed);
+
/*
 * Generate some initially weak seeding values to allow
 * the prandom_u32() engine to be started.
 */
static int __init prandom_init_early(void)
{
    int i;
    unsigned long v0, v1, v2, v3;

    if (!arch_get_random_long(&v0))
        v0 = jiffies;
    if (!arch_get_random_long(&v1))
        v1 = random_get_entropy();
    v2 = v0 ^ PRND_K0;
    v3 = v1 ^ PRND_K1;

    for_each_possible_cpu(i) {
        struct siprand_state *state;

        v3 ^= i;
        PRND_SIPROUND(v0, v1, v2, v3);
        PRND_SIPROUND(v0, v1, v2, v3);
        v0 ^= i;

        state = per_cpu_ptr(&net_rand_state, i);
        state->v0 = v0;  state->v1 = v1;
        state->v2 = v2;  state->v3 = v3;
    }

    return 0;
}
core_initcall(prandom_init_early);

/* Stronger reseeding when available, and periodically thereafter. */
+static void prandom_reseed(struct timer_list *unused);
+
+static DEFINE_TIMER(seed_timer, prandom_reseed);
+
+static void prandom_reseed(struct timer_list *unused)
+{
+unsigned long expires;
+int i;
+
+/*
+ * Reinitialize each CPU's PRNG with 128 bits of key.
+ * No locking on the CPUs, but then somewhat random results are,
+ * well, expected.
+ */
+for_each_possible_cpu(i) {
+struct siprand_state *state;
+unsigned long v0 = get_random_long(), v2 = v0 ^ PRND_K0;
+unsigned long v1 = get_random_long(), v3 = v1 ^ PRND_K1;
+#if BITS_PER_LONG == 32
+int j;
+
+/*
+ * On 32-bit machines, hash in two extra words to
+ * approximate 128-bit key length. Not that the hash
+ * has that much security, but this prevents a trivial
+ * 64-bit brute force.
+ */
+for (j = 0; j < 2; j++) {
+unsigned long m = get_random_long();
+
+v3 ^= m;
+PRND_SIPROUND(v0, v1, v2, v3);
+PRND_SIPROUND(v0, v1, v2, v3);
+v0 ^= m;
+}
+#endif
+
+/*
+ * Probably impossible in practice, but there is a
+ * theoretical risk that a race between this reseeding
+ * and the target CPU writing its state back could
+ * create the all-zero SipHash fixed point.
+ *
+ * To ensure that never happens, ensure the state
+ * we write contains no zero words.
+ */
+state = per_cpu_ptr(&net_rand_state, i);
+WRITE_ONCE(state->v0, v0 ? v0 : -1ul);
+WRITE_ONCE(state->v1, v1 ? v1 : -1ul);
WRITE_ONCE(state->v2, v2 ? v2 : -1ul);
WRITE_ONCE(state->v3, v3 ? v3 : -1ul);
+
+/* reseed every ~60 seconds, in [40 .. 80) interval with slack */
+expires = round_jiffies(jiffies + 40 * HZ + prandom_u32_max(40 * HZ));
+mod_timer(&seed_timer, expires);
+}
+
+/*
+ * The random ready callback can be called from almost any interrupt.
+ * To avoid worrying about whether it's safe to delay that interrupt
+ * long enough to seed all CPUs, just schedule an immediate timer event.
+ */
+static void prandom_timer_start(struct random_ready_callback *unused)
+{
+mod_timer(&seed_timer, jiffies);
+
+/*
+ * Start periodic full reseeding as soon as strong
+ * random numbers are available.
+ */
+static int __init prandom_init_late(void)
+{
+static struct random_ready_callback random_ready = {
+    .func = prandom_timer_start
+};
+int ret = add_random_ready_callback(&random_ready);
+
+if (ret == -EALREADY) {
+prandom_timer_start(&random_ready);
+ret = 0;
+
+return ret;
+}
+late_initcall(prandom_init_late);
--- linux-4.15.0.orig/lib/reed_solomon/decode_rs.c
+++ linux-4.15.0/lib/reed_solomon/decode_rs.c
@@ -42,8 +42,18 @@
BUG_ON(pad < 0 || pad >= nn);

/* Does the caller provide the syndrome ? */
-if (s != NULL)
+if (s != NULL) {
+for (i = 0; i < nroots; i++) {
+/* The syndrome is in index form,
/* so nn represents zero */
+ /* */
+if (s[i] != nn)
+goto decode;
+}
+
+/* syndrome is zero, no errors to correct */
+return 0;
+

/* form the syndromes; i.e., evaluate data(x) at roots of */
+g(x) */
@@ -99,9 +109,9 @@
if (no_eras > 0) {
    /* Init lambda to be the erasure locator polynomial */
    lambda[1] = alpha_to[rs_modnn(rs,
        -prim * (nn - 1 - eras_pos[0]));
        +prim * (nn - 1 - (eras_pos[0] + pad))];
    for (i = 1; i < no_eras; i++) {
        -u = rs_modnn(rs, prim * (nn - 1 - eras_pos[i]));
        +u = rs_modnn(rs, prim * (nn - 1 - (eras_pos[i] + pad)));
    for (j = i + 1; j > 0; j--) {
        tmp = index_of[lambda[j - 1]];
        if (tmp != nn) {
            --- linux-4.15.0.orig/lib/rhashtable.c
            +++ linux-4.15.0/lib/rhashtable.c
            @ @ -364,6 +364,7 @ @
            err = rhashtable_rehash_chain(ht, old_hash);
            if (err)
                return err;
            +cond_resched();
    }

    /* Publish the new table pointer. */
    @@ -458,8 +459,12 @@
    else if (tbl->nest)
        err = rhashtable_rehash_alloc(ht, tbl, tbl->size);

        -if (!err)
        -err = rhashtable_rehash_table(ht);
        +if (!err || err == -EEXIST) {
            +int nerr;
            +nerr = rhashtable_rehash_table(ht);
            +err = err ?: nerr;
        }

    mutex_unlock(&ht->mutex);
if (!key ||
   (ht->p.obj_cmpfn ?
       ht->p.obj_cmpfn(&arg, rht_obj(ht, head)) :
       rhashtable_compare(&arg, rht_obj(ht, head)))) {
		pprev = &head->next;
	continue;
}

if (!ht->rhlist)
    return rht_obj(ht, head);

static size_t rounded_hashtable_size(const struct rhashtable_params *params)
{
    return max(roundup_pow_of_two(params->nelem_hint * 4 / 3),
               (unsigned long)params->min_size);
}

static u32 rhashtable_jhash2(const void *key, u32 length, u32 seed)
{
    struct bucket_table *tbl;
    size_t size;

    size = HASH_DEFAULT_SIZE;
    
    if ((!params->key_len && !params->obj_hashfn) ||
        (params->obj_hashfn && !params->obj_cmpfn))
        return -EINVAL;
    
    ht->p.min_size = max_t(u16, ht->p.min_size, HASH_MIN_SIZE);

    -size = rounded_hashtable_size(&ht->p);
    +size = rounded_hashtable_size(&ht->p);
if (params->locks_mul)
ht->p.locks_mul = roundup_pow_of_two(params->locks_mul);
@@ -1055,17 +1067,19 @@
void (*free_fn)(void *ptr, void *arg),
    void *arg)
{
-    struct bucket_table *tbl;
+    struct bucket_table *tbl, *next_tbl;
    unsigned int i;

cancel_work_sync(&ht->run_work);

    mutex_lock(&ht->mutex);
    tbl = rht_dereference(ht->tbl, ht);
+restart:
    if (free_fn) {
        for (i = 0; i < tbl->size; i++) {
            struct rhash_head *pos, *next;

+            cond_resched();
            for (pos = rht_dereference(*rht_bucket(tbl, i), ht),
                next = !rht_is_a_nulls(pos) ?
                rht_dereference(pos->next, ht) : NULL;
@@ -1077,7 +1091,12 @@
            }
        }

+    next_tbl = rht_dereference(tbl->future_tbl, ht);
    bucket_table_free(tbl);
+    if (next_tbl) {
+        tbl = next_tbl;
+        goto restart;
+    }
    mutex_unlock(&ht->mutex);
    }
EXPORT_SYMBOL_GPL(rhashtable_free_and_destroy);
--- linux-4.15.0.orig/lib/sbitmap.c
+++ linux-4.15.0/lib/sbitmap.c
@@ -338,7 +338,7 @@
         * Pairs with the memory barrier in sbq_wake_up() to ensure that
         * the batch size is updated before the wait counts.
         */
-    smp_mb__before_atomic();
+    smp_mb();
    for (i = 0; i < SBQ_WAIT_QUEUES; i++)
        atomic_set(&sbq->ws[i].wait_cnt, 1);
}
--- linux-4.15.0.orig/lib/scatterlist.c
+++ linux-4.15.0/lib/scatterlist.c
@@ -317,7 +317,7 @@
     table->nents = ++table->orig_nents;

-  return -ENOMEM;
+  return -ENOMEM;
}

sg_init_table(sg, alloc_size);
@@ -474,6 +474,111 @@
}

EXPORT_SYMBOL(sg_alloc_table_from_pages);

+#ifdef CONFIG_SGL_ALLOC
+
+/**
+ * sgl_alloc_order - allocate a scatterlist and its pages
+ * @length: Length in bytes of the scatterlist. Must be at least one
+ * @order: Second argument for alloc_pages()
+ * @chainable: Whether or not to allocate an extra element in the scatterlist
+ * @for scatterlist chaining purposes
+ * @gfp: Memory allocation flags
+ * @nent_p: [out] Number of entries in the scatterlist that have pages
+ *
+ * Returns: A pointer to an initialized scatterlist or %NULL upon failure.
+ */
+struct scatterlist *sgl_alloc_order(unsigned long long length,
+                                    unsigned int order, bool chainable,
+                                    gfp_t gfp, unsigned int *nent_p)
+{
+    struct scatterlist *sgl, *sg;
+    struct page *page;
+    unsigned int nent, nalloc;
+    u32 elem_len;
+    
+    nent = round_up(length, PAGE_SIZE << (PAGE_SHIFT + order));
+    /* Check for integer overflow */
+    if (length > (nent << (PAGE_SHIFT + order)))
+        return NULL;
+    nalloc = nent;
+    if (chainable) {
+        /* Check for integer overflow */
+        if (nalloc + 1 < nalloc)
+            return NULL;
+        nalloc++;
+    }
+    
+    /*
sgl = kmalloc_array(nalloc, sizeof(struct scatterlist),
    (gfp & ~GFP_DMA) | __GFP_ZERO);
if (!sgl)
    return NULL;
sg_init_table(sgl, nent);
sg = sgl;
while (length) {
    elem_len = min_t(u64, length, PAGE_SIZE << order);
    page = alloc_pages(gfp, order);
    if (!page) {
        sg_free_order(sgl, order);
        return NULL;
    }
    sg_set_page(sg, page, elem_len, 0);
    length -= elem_len;
    sg = sg_next(sg);
} WARN_ON_ONCE(sg);
if (nent_p)
    *nent_p = nent;
return sgl;
}
EXPORT_SYMBOL(sgl_alloc_order);

/**
 * sgl_alloc - allocate a scatterlist and its pages
 * @length: Length in bytes of the scatterlist
 * @gfp: Memory allocation flags
 * @nent_p: [out] Number of entries in the scatterlist
 *
 * Returns: A pointer to an initialized scatterlist or %NULL upon failure.
 */
struct scatterlist *sgl_alloc(unsigned long long length, gfp_t gfp,
    unsigned int *nent_p)
{
    return sgl_alloc_order(length, 0, false, gfp, nent_p);
}EXPORT_SYMBOL(sgl_alloc);

/**
 * sgl_free_order - free a scatterlist and its pages
 * @sgl: Scatterlist with one or more elements
 * @order: Second argument for __free_pages()
 *
 * void sgl_free_order(struct scatterlist *sgl, int order)
 */
struct scatterlist *sg;
struct page *page;

for (sg = sgl; sg; sg = sg_next(sg)) {
    page = sg_page(sg);
    if (page)
        __free_pages(page, order);
}
kfree(sgl);

EXPORT_SYMBOL(sgl_free_order);

/**
 * sgl_free - free a scatterlist and its pages
 * @sgl: Scatterlist with one or more elements
 */
void sgl_free(struct scatterlist *sgl)
{
    sgl_free_order(sgl, 0);
}
EXPORT_SYMBOL(sgl_free);

#if !defined(CONFIG_SGL_ALLOC)

void __sg_page_iter_start(struct sg_page_iter *piter,
    struct scatterlist *sglist, unsigned int nents,
    unsigned long pgoffset)
{
    if (!miter->__remaining) {
        struct scatterlist *sg;
        unsigned long pgoffset;

        if (!__sg_page_iter_next(&miter->piter))
            return false;
        sg = miter->piter.sg;
        pgoffset = miter->piter.sg_pgoffset;

        if (!__sg_page_iter_next(&miter->piter))
            return false;

        sg = miter->piter.sg;
        pgoffset = miter->piter.sg_pgoffset;

        -miter->__offset = pgoffset ? 0 : sg->offset;
        +miter->__offset = miter->piter.sg_pgoffset ? 0 : sg->offset;
        +miter->piter.sg_pgoffset += miter->__offset >> PAGE_SHIFT;
        +miter->__offset &= PAGE_SIZE - 1;
        miter->__remaining = sg->offset + sg->length -
            (pgoffset << PAGE_SHIFT) - miter->__offset;
    } else {
        miter->__remaining = min_t(unsigned long, miter->__remaining,
            miter->piter.sg_pgoffset << PAGE_SHIFT) -
            miter->__offset;
    }
}
#endif /* CONFIG_SGL_ALLOC */

@end -537,17 +642,18 @@

return false;

sg = miter->piter.sg;
-pgoffset = miter->piter.sg_pgoffset;

-miter->__offset = pgoffset ? 0 : sg->offset;
+miter->__offset = miter->piter.sg_pgoffset ? 0 : sg->offset;
+miter->piter.sg_pgoffset += miter->__offset >> PAGE_SHIFT;
+miter->__offset &= PAGE_SIZE - 1;
miter->__remaining = sg->offset + sg->length -
    (pgoffset << PAGE_SHIFT) - miter->__offset;
+    (miter->piter.sg_pgoffset << PAGE_SHIFT) -
+    miter->__offset;
miter->__remaining = min_t(unsigned long, miter->__remaining,
WARN_ON(s->size == 0);

    /* Add 1 to len for the trailing null byte which must be there */
    len += 1;
    +
    if (seq_buf_can_fit(s, len)) {
        memcpy(s->buffer + s->len, str, len);
        s->len += len;
    } /* Don't count the trailing null byte against the capacity */
    +s->len += len - 1;
    return 0;
}
seq_buf_set_overflow(s);
WARN_ON(s->size == 0);

+BUILD_BUG_ON(MAX_MEMHEX_BYTES * 2 >= HEX_CHARS);
+
    while (len) {
        -start_len = min(len, HEX_CHARS - 1);
        +start_len = min(len, MAX_MEMHEX_BYTES);
        "if define \_\_BIG\_ENDIAN"
        for (i = 0, j = 0; i < start_len; i++) {
            +else
            "@ @ -238,12 +244,14 @ @"
            break;

        /* j increments twice per loop */
        -len -= j / 2;
        hex[j++] = ' ';

        seq_buf_putmem(s, hex, j);
        if (seq_buf_has_overflowed(s))
            return -1;
        +
        +len -= start_len;
        +data += start_len;
    } /* j increments twice per loop */
    return 0;
}
+++ linux-4.15.0/lib/stackdepot.c
@@ -78,7 +78,7 @@
static int depot_index;
static int next_slab_initied;
static size_t depot_offset;
-static DEFINE_SPINLOCK(depot_lock);
+static DEFINE_RAW_SPINLOCK(depot_lock);

static bool init_stack_slab(void **prealloc)
{
@@ -92,15 +92,19 @@
    return true;
    if (stack_slabs[depot_index] == NULL) {
        stack_slabs[depot_index] = *prealloc;
+        *prealloc = NULL;
    } else {
        -stack_slabs[depot_index + 1] = *prealloc;
+        /* If this is the last depot slab, do not touch the next one. */
+        if (depot_index + 1 < STACK_ALLOC_MAX_SLABS) {
+            stack_slabs[depot_index + 1] = *prealloc;
+            *prealloc = NULL;
+        }
+    }
    /*
     * This smp_store_release pairs with smp_load_acquire() from
     * [next_slab_initied] above and in depot_save_stack().
     *
    
    smp_store_release(&next_slab_initied, 1);
    }
    -*prealloc = NULL;
    return true;

@@ -249,7 +253,7 @@
    prealloc = page_address(page);
    }

-spin_lock_irqsave(&depot_lock, flags);
+raw_spin_lock_irqsave(&depot_lock, flags);

    found = find_stack(*bucket, trace->entries, trace->nr_entries, hash);
    if (!found) {
        @@ -273,7 +277,7 @@
            WARN_ON(!init_stack_slab(&prealloc));
        }

-spin_unlock_irqrestore(&depot_lock, flags);
+raw-spin_unlock_irqrestore(&depot_lock, flags);
    exit:
if (prealloc) {
/* Nobody used this memory, ok to free it */
--- linux-4.15.0.orig/lib/string.c
+++ linux-4.15.0/lib/string.c
@@ -158,11 +158,9 @@
 * @src: Where to copy the string from
 * @count: Size of destination buffer
 * - * Copy the string, or as much of it as fits, into the dest buffer.
 * - * The routine returns the number of characters copied (not including
 * - * the trailing NUL) or -E2BIG if the destination buffer wasn't big enough.
 * - * The behavior is undefined if the string buffers overlap.
 * - * The destination buffer is always NUL terminated, unless it's zero-sized.
 * + * Copy the string, or as much of it as fits, into the dest buffer. The
 * + * behavior is undefined if the string buffers overlap. The destination
 * + * buffer is always NUL terminated, unless it's zero-sized.
 * + Preferred to strlecpy() since the API doesn't require reading memory
 * + from the src string beyond the specified "count" bytes, and since
 * @@ -172,8 +170,10 @@
 * + Preferred to strncpy() since it always returns a valid string, and
 * + doesn't unnecessarily force the tail of the destination buffer to be
 * + zeroed. If the zeroing is desired, it's likely cleaner to use strscpy()
 * + with an overflow test, then just memset() the tail of the dest buffer.
 * + zeroed. If zeroing is desired please use strscpy_pad().
 * +
 * + Return: The number of characters copied (not including the trailing
 * + %NUL) or -E2BIG if the destination buffer wasn't big enough.
 * /*
 ssize_t strscpy(char *dest, const char *src, size_t count)
 {
 @@ -203,7 +203,7 @@
 while (max >= sizeof(unsigned long)) {
 unsigned long c, data;
 -c = *(unsigned long *)(src+res);
 +c = read_word_at_a_time(src+res);
 if (has_zero(c, &data, &constants)) {
     data = prep_zero_mask(c, data, &constants);
     data = create_zero_mask(data);
 @@ -236,6 +236,63 @@
 EXPORT_SYMBOL(strscpy);
 #endif

 #**
+ * stpcpy - copy a string from src to dest returning a pointer to the new end
+ * of dest, including src's %NUL-terminator. May overrun dest.
+ * @dest: pointer to end of string being copied into. Must be large enough
+*
to receive copy.
+ * @src: pointer to the beginning of string being copied from. Must not overlap
+*
dest.
+*
+ * stpcpy differs from strcpy in a key way: the return value is a pointer
+ * to the new %NUL-terminating character in @dest. (For strcpy, the return
+ * value is a pointer to the start of @dest). This interface is considered
+ * unsafe as it doesn't perform bounds checking of the inputs. As such it's
+ * not recommended for usage. Instead, its definition is provided in case
+ * the compiler lowers other libcalls to stpcpy.
+ */
+char *stpcpy(char *__restrict__ dest, const char *__restrict__ src);
+char *stpcpy(char *__restrict__ dest, const char *__restrict__ src)
+{
+while ((*dest++ = *src++) != '\0')
+/* nothing */;
+return --dest;
+}
+EXPORT_SYMBOL(stpcpy);
+
+/**
+ * strscpy_pad() - Copy a C-string into a sized buffer
+ * @dest: Where to copy the string to
+ * @src: Where to copy the string from
+ * @count: Size of destination buffer
+*
+ * Copy the string, or as much of it as fits, into the dest buffer. The
+ * behavior is undefined if the string buffers overlap. The destination
+ * buffer is always %NUL terminated, unless it's zero-sized.
+*
+ * If the source string is shorter than the destination buffer, zeros
+ * the tail of the destination buffer.
+*
+ * For full explanation of why you may want to consider using the
+ * 'strscpy' functions please see the function docstring for strscpy().
+*
+ * Return: The number of characters copied (not including the trailing
+*
%NUL) or -E2BIG if the destination buffer wasn't big enough.
+ */
+ssize_t strscpy_pad(char *dest, const char *src, size_t count)
+{
+ssize_t written;
+
+written = strscpy(dest, src, count);
+if (written < 0 || written == count - 1)
+return written;
+

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+memset(dest + written + 1, 0, count - written - 1);
+
+return written;
+}
+EXPORT_SYMBOL(strscpy_pad);
+
+#ifndef __HAVE_ARCH_STRCAT
/**
* strcat - Append one \%NUL-terminated string to another
@@ -865,6 +922,26 @@
EXPORT_SYMBOL(memcmp);
#endif

+#ifndef __HAVE_ARCH_BCMP
/**
+ * bcmp - returns 0 if and only if the buffers have identical contents.
+ * @a: pointer to first buffer.
+ * @b: pointer to second buffer.
+ * @len: size of buffers.
+ *
+ * The sign or magnitude of a non-zero return value has no particular
+ * meaning, and architectures may implement their own more efficient bcmp(). So
+ * while this particular implementation is a simple (tail) call to memcmp, do
+ * not rely on anything but whether the return value is zero or non-zero.
+ */
+#undef bcmp
+int bcmp(const void *a, const void *b, size_t len)
+{
+return memcmp(a, b, len);
+}
+EXPORT_SYMBOL(bcmp);
+#endif

+#ifndef __HAVE_ARCH_MEMSCAN
/**
* memscan - Find a character in an area of memory.
--- linux-4.15.0.orig/lib/strncpy_from_user.c
+++ linux-4.15.0/lib/strncpy_from_user.c
@@ -23,17 +23,11 @@
* hit it), 'max' is the address space maximum (and we return
* -EFAULT if we hit it).
*/
-static inline long do_strncpy_from_user(char *dst, const char __user *src, long count, unsigned long max)
+static inline long do_strncpy_from_user(char *dst, const char __user *src, long count, unsigned long max)
{
    const struct word_at_a_time constants = WORD_AT_A_TIME_CONSTANTS;
    -long res = 0;
    
    // Remaining code...

if (max > count)
  max = count;

unsigned long res = 0;
if (IS_UNALIGNED(src, dst))
goto byte_at_a_time;

unsigned long max = max_addr - src_addr;
long retval;

+/*
+ * Truncate 'max' to the user-specified limit, so that
+ * we only have one limit we need to check in the loop
+ */
+if (max > count)
+  max = count;
+
ksan_check_write(dst, count);
check_object_size(dst, count, false);
-user_access_begin();
-reval = do_strncpy_from_user(dst, src, count, max);
-user_access_end();
-return retval;
+if (user_access_begin(VERIFY_READ, src, max)) {
+  retval = do_strncpy_from_user(dst, src, count, max);
+  user_access_end();
+  return retval;
+}
}
return -EFAULT;
}
/* we only have one limit we need to check in the loop */

if (max > count)
max = count;

/*
 * Do everything aligned. But that means that we
 * need to also expand the maximum..
 */

align = (sizeof(long) - 1) & (unsigned long)src;
align = (sizeof(unsigned long) - 1) & (unsigned long)src;
src -= align;
max += align;

unsigned long max = max_addr - src_addr;
long retval;

-user_access_begin();
-retval = do_strnlen_user(str, count, max);
-user_access_end();
-return retval;
/+*
+ * Truncate 'max' to the user-specified limit, so that
+ * we only have one limit we need to check in the loop
+ */
+if (max > count)
+max = count;
+
+if (user_access_begin(VERIFY_READ, str, max)) {
+retval = do_strnlen_user(str, count, max);
+user_access_end();
+return retval;
+}
}
return 0;

--- linux-4.15.0.orig/lib/swiotlb.c
+++ linux-4.15.0/lib/swiotlb.c
@@ -17,6 +17,8 @@
* 08/12/11 beckyb Add highmem support
*/

#define pr_fmt(fmt) "software IO TLB: " fmt
+
#include <linux/cache.h>
#include <linux/dma-mapping.h>
#include <linux/mm.h>
void swiotlb_print_info(void) {
    unsigned long bytes = io_tlb_nslabs << IO_TLB_SHIFT;
    unsigned char *vstart, *vend;

    if (no_iotlb_memory) {
        pr_warn("software IO TLB: No low mem\n");
        return;
    }

    vstart = phys_to_virt(io_tlb_start);
    vend = phys_to_virt(io_tlb_end);
    -printk(KERN_INFO "software IO TLB [mem %#010llx-%#010llx] (%luMB) mapped at [%p-%p]\n",
    +pr_info("mapped [mem %#010llx-%#010llx] (%luMB)\n",
        (unsigned long long)io_tlb_start,
        (unsigned long long)io_tlb_end,
        bytes >> 20, vstart, vend - 1);
    +bytes >> 20);
}

/*
@@ -256,6 +254,7 @@
    io_tlb_orig_addr[i] = INVALID_PHYS_ADDR;
 } 
 io_tlb_index = 0;
+no_iotlb_memory = false;

    if (verbose)
        swiotlb_print_info();
@@ -287,10 +286,12 @@
    if (vstart && !swiotlb_init_with_tbl(vstart, io_tlb_nslabs, verbose))
        return;

    -if (io_tlb_start)
    +if (io_tlb_start) {
        memblock_free_early(io_tlb_start,
            PAGE_ALIGN(io_tlb_nslabs << IO_TLB_SHIFT));
        -pr_warn("Cannot allocate SWIOTLB buffer");
        +io_tlb_start = 0;
        +}
        +pr_warn("Cannot allocate buffer");
        no_iotlb_memory = true;
    }

@@ -332,8 +333,8 @@
return -ENOMEM;

}  
if (order != get_order(bytes)) {
  -printk(KERN_WARNING "Warning: only able to allocate %ld MB 
  - " "for software IO TLB\n", (PAGE_SIZE << order) >> 20);
  +pr_warn("only able to allocate %ld MB\n",
  +(PAGE_SIZE << order) >> 20);
  io_tlb_nslabs = SLABS_PER_PAGE << order;
}
rc = swiotlb_late_init_with_tbl(vstart, io_tlb_nslabs);
@@ -392,6 +393,7 @@
   io_tlb_orig_addr[i] = INVALID_PHYS_ADDR;
}
io_tlb_index = 0;
+no_iotlb_memory = false;

swiotlb_print_info();

@@ -586,7 +588,7 @@
    not_found:
    spin_unlock_irqrestore(&io_tlb_lock, flags);
    -if (printk_ratelimit())
+if (!(attrs & DMA_ATTR_NO_WARN) && printk_ratelimit())
    dev_warn(hwdev, "swiotlb buffer is full (sz: %zd bytes)\n", size);
    return SWIOTLB_MAP_ERROR;
  found:
@@ -713,6 +715,7 @@
 swiotlb_alloc_coherent(struct device *hwdev, size_t size, 
   dma_addr_t *dma_handle, gfp_t flags)
{
+bool warn = !(flags & __GFP_NOWARN);
   dma_addr_t dev_addr;
   void *ret;
   int order = get_order(size);
@@ -738,8 +741,8 @@
    * GFP_DMA memory; fall back on map_single(), which
    * will grab memory from the lowest available address range.
    */
-phys_addr_t paddr = map_single(hwdev, 0, size,
-    DMA_FROM_DEVICE, 0);
+phys_addr_t paddr = map_single(hwdev, 0, size, DMA_FROM_DEVICE,
+    warn ? 0 : DMA_ATTR_NO_WARN);
   if (paddr == SWIOTLB_MAP_ERROR)
   goto err_warn;
@@ -769,9 +772,11 @@
   return ret;
err_warn:
-pr_warn("swiotlb: coherent allocation failed for device %s size=%zu\n",
-dev_name(hwdev), size);
-dump_stack();
+if (warn && printk_ratelimit()) {
+pr_warn("coherent allocation failed for device %s size=%zu\n",
+dev_name(hwdev), size);
+dump_stack();
+}

return NULL;
}
@@ -796,34 +801,6 @@
}
EXPORT_SYMBOL(swiotlb_free_coherent);

-static void
-swiotlb_full(struct device *dev, size_t size, enum dma_data_direction dir,
-     int do_panic)
-{
-if (swiotlb_force == SWIOTLB_NO_FORCE)
-return;
-
-/*
- * Ran out of IOMMU space for this operation. This is very bad.
- * Unfortunately the drivers cannot handle this operation properly.
- * unless they check for dma_mapping_error (most don't)
- * When the mapping is small enough return a static buffer to limit
- * the damage, or panic when the transfer is too big.
- */
-dev_err_ratelimited(dev, "DMA: Out of SW-IOMMU space for %zu bytes\n", 
-     size);
-
-if (size <= io_tlb_overflow || !do_panic)
-return;
-
-if (dir == DMA_BIDIRECTIONAL)
-panic("DMA: Random memory could be DMA accessed\n");
-if (dir == DMA_FROM_DEVICE)
-panic("DMA: Random memory could be DMA written\n");
-if (dir == DMA_TO_DEVICE)
-panic("DMA: Random memory could be DMA read\n");
-}
-
/*
 * Map a single buffer of the indicated size for DMA in streaming mode. The
 * physical address to use is returned.
/* Oh well, have to allocate and map a bounce buffer. */
map = map_single(dev, phys, size, dir, attrs);
-if (map == SWIOTLB_MAP_ERROR) {
  -swiotlb_full(dev, size, dir, 1);
+if (map == SWIOTLB_MAP_ERROR)
    return swiotlb_phys_to_dma(dev, io_tlb_overflow_buffer);
-}

dev_addr = swiotlb_phys_to_dma(dev, map);

if (map == SWIOTLB_MAP_ERROR) {
  /* Don't panic here, we expect map_sg users
to do proper error handling. */
  -swiotlb_full(hwdev, sg->length, dir, 0);
  attrs |= DMA_ATTR_SKIP_CPU_SYNC;
  swiotlb_unmap_sg_attrs(hwdev, sgl, i, dir,
                        attrs);
--- linux-4.15.0.orig/lib/test_bitmap.c
+++ linux-4.15.0/lib/test_bitmap.c
@@ -218,6 +218,10 @@
{EINVAL, "1", NULL, 8, 0},
{EINVAL, "0", NULL, 8, 0},
{EINVAL, "10-1", NULL, 8, 0},
+{EINVAL, "0-31:", NULL, 8, 0},
+{EINVAL, "0-31:0", NULL, 8, 0},
+{EINVAL, "0-31:0/0", NULL, 8, 0},
+{EINVAL, "0-31:1/0", NULL, 8, 0},
{EINVAL, "0-31:10/1", NULL, 8, 0},
};

@@ -430,23 +434,32 @@
unsigned int start, nbits;

for (start = 0; start < 1024; start += 8) {
  -memset(bmap1, 0x5a, sizeof(bmap1));
  -memset(bmap2, 0x5a, sizeof(bmap2));
  for (nbits = 0; nbits < 1024 - start; nbits += 8) {
    +memset(bmap1, 0x5a, sizeof(bmap1));
    +memset(bmap2, 0x5a, sizeof(bmap2));
    +bitmap_set(bmap1, start, nbits);
    __bitmap_set(bmap2, start, nbits);
    -if (!bitmap_equal(bmap1, bmap2, 1024))
      +if (!bitmap_equal(bmap1, bmap2, 1024)) {
        printk("set not equal %d %d\n", start, nbits);
-if (!__bitmap_equal(bmap1, bmap2, 1024))
+failed_tests++;
+
+if (!__bitmap_equal(bmap1, bmap2, 1024)) {
    printk("set not __equal %d %d\n", start, nbits);
+failed_tests++;
+

    bitmap_clear(bmap1, start, nbits);
    __bitmap_clear(bmap2, start, nbits);
-    if (!bitmap_equal(bmap1, bmap2, 1024)) {
+    if (!bitmap_equal(bmap1, bmap2, 1024)) {
        printk("clear not equal %d %d\n", start, nbits);
-        if (!__bitmap_equal(bmap1, bmap2, 1024)) {
+        if (!__bitmap_equal(bmap1, bmap2, 1024)) {
            printk("clear not __equal %d %d\n", start,
            nbits);
+            failed_tests++;
+        } }
+
+    } }
+
+} }
+
+
--- linux-4.15.0.orig/lib/test_bpf.c
+++ linux-4.15.0/lib/test_bpf.c
@@ -83,6 +83,7 @@
 __u32 result;
 } test[MAX_SUBTESTS];
 int (*fill_helper)(struct bpf_test *self);
+int expected_errcode; /* used when FLAG_EXPECTED_FAIL is set in the aux */
 _u8 frag_data[MAX_DATA];
 int stack_depth; /* for eBPF only, since tests don't call verifier */
 }
@@ -2003,10 +2004,14 @@
 { { 4, 0 }, { 5, 10 } }
 },
 {
-"INT: DIV by zero",
+/* This one doesn't go through verifier, but is just raw insn
+ * as opposed to cBPF tests from here. Thus div by 0 tests are
+ * done in test_verifier in BPF kselftests.
+ */
+"INT: DIV by -1",
.u.insns_int = {
 BPF_ALU64_REG(BPF_MOV, R6, R1),
 -BPF_ALU64_IMM(BPF_MOV, R7, 0),
 +BPF_ALU64_IMM(BPF_MOV, R7, -1),
BPF_LD_ABS(BPF_B, 3),
BPF_ALU32_REG(BPF_DIV, R0, R7),
BPF_EXIT_INSN()
@@ -2022,7 +2027,9 @@
},
CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
{ },
-{ }
+{ },
+.fill_helper = NULL,
+.expected_errcode = -EINVAL,
},
"check: div_k_0",
@@ -2032,7 +2039,9 @@
},
CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
{ },
-{ }
+{ },
+.fill_helper = NULL,
+.expected_errcode = -EINVAL,
},
"check: unknown insn",
@@ -2043,7 +2052,9 @@
},
CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
{ },
-{ }
+{ },
+.fill_helper = NULL,
+.expected_errcode = -EINVAL,
},
"check: out of range spill/fill",
@@ -2053,7 +2064,9 @@
},
CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
{ },
-{ }
+{ },
+.fill_helper = NULL,
+.expected_errcode = -EINVAL,
},
"JUMPS + HOLES",
@@ -2145,6 +2158,8 @@
CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
{ },
{ },
+fill_helper = NULL,
+expected_errcode = -EINVAL,
,
"check: LDX + RET X",
@@ -2155,6 +2170,8 @@
CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
{ },
{ },
+fill_helper = NULL,
+expected_errcode = -EINVAL,
,
/* Mainly checking JIT here. */
"M[]: alt STX + LDX",
@@ -2329,6 +2346,8 @@
CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
{ },
{ },
+fill_helper = NULL,
+expected_errcode = -EINVAL,
,
/* Passes checker but fails during runtime. */
"LD [SKF_AD_OFF-1]",
@@ -4415,8 +4434,8 @@
.u.insns_int = {
BPF_LD_IMM64(R0, 0),
BPF_LD_IMM64(R1, 0xfffffffffffffffffLL),
-BPF_STX_MEM(BPF_W, R10, R1, -40),
-BPF_LDX_MEM(BPF_W, R0, R10, -40),
+BPF_STX_MEM(BPF_DW, R10, R1, -40),
+BPF_LDX_MEM(BPF_DW, R0, R10, -40),
BPF_EXIT_INSN(),
},
INTERNAL,
@@ -5391,6 +5410,7 @@
{ },
{ },
.fill_helper = bpf_fill_maxinsns4,
+expected_errcode = -EINVAL,
,
/* Mainly checking JIT here. */
"BPF_MAXINSNS: Very long jump",
@@ -5403,21 +5423,31 @@
/* Mainly checking JIT here. */
"BPF_MAXINSNS: Ctx heavy transformations",

{ },
  +#if defined(CONFIG_BPF_JIT_ALWAYS_ON) && defined(CONFIG_S390)
  +CLASSIC | FLAG_EXPECTED_FAIL,
  +#else
  CLASSIC,
  +#endif
  { },
  { 1, !!(SKB_VLAN_TCI & VLAN_TAG_PRESENT) },
  { 10, !!(SKB_VLAN_TCI & VLAN_TAG_PRESENT) }
},
.fill_helper = bpf_fill_maxinsn6,
+.expected_errcode = -ENOTSUPP,
},
/* Mainly checking JIT here. */
"BPF_MAXINSNS: Call heavy transformations",
{ },
  +#if defined(CONFIG_BPF_JIT_ALWAYS_ON) && defined(CONFIG_S390)
  +CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
  +#else
  CLASSIC | FLAG_NO_DATA,
  +#endif
  { },
  { { 1, 0 }, { 10, 0 } },
.fill_helper = bpf_fill_maxinsn7,
+.expected_errcode = -ENOTSUPP,
},
/* Mainly checking JIT here. */
"BPF_MAXINSNS: Jump heavy test",
@@ -5446,19 +5476,30 @@
{ "BPF_MAXINSNS: Jump, gap, jump, ...",
  { },
  +#if defined(CONFIG_BPF_JIT_ALWAYS_ON) && defined(CONFIG_S390)
  +CLASSIC | FLAG_NO_DATA | FLAG_EXPECTED_FAIL,
  +#else
  CLASSIC | FLAG_NO_DATA,
  +#endif
  { },
  { 0, 0xababcbac } },
.fill_helper = bpf_fill_maxinsn11,
+.expected_errcode = -ENOTSUPP,
},
{ "BPF_MAXINSNS: ld_abs+get_processor_id",
  { },
  +#if defined(CONFIG_BPF_JIT_ALWAYS_ON) && defined(CONFIG_S390)
  +CLASSIC | FLAGEXPECTED_FAIL,
+#else
CLASSIC,
+#endif
{
,
{ 1, 0xb0e },
.fill_helper = bpf_fill_ld_abs_get_processor_id,
+.expected_errcode = -ENOTSUPP,
},
+!defined(CONFIG_BPF_JIT_ALWAYS_ON) && defined(CONFIG_S390))
{
"BPF_MAXINSNS: ld_abs+vlan_push/pop",
,
" +5516.7
{ 2, 10 }
.fill_helper = bpf_fill_jump_around_ld_abs,
},
+endif
/*
 * LD_IND / LD_ABS on fragmented SKBs
 */
@@ -6236,7 +6278,7 @@
/* Verifier rejected filter as expected. */
*err = 0;
@@ -6328,7 +6370,14 @@
u64 duration;
u32 ret;
-#if (test->test[i].data_size == 0 &&
+* NOTE: Several sub-tests may be present, in which case
+ a zero [data_size, result] tuple indicates the end of
+ the sub-test array. The first test is always run,
+ even if both data_size and result happen to be zero.
+ */
+if (i > 0 &&
+ test->test[i].data_size == 0 &&
+ test->test[i].result == 0)
break;
@@ -6444,6 +6493,93 @@
return test_id < test_range[0] || test_id > test_range[1];
}
+static __init struct sk_buff *build_test_skb(void)
+
+u32 headroom = NET_SKB_PAD + NET_IP_ALIGN + ETH_HLEN;
+struct sk_buff *skb[2];
+struct page *page[2];
+int i, data_size = 8;
+
+for (i = 0; i < 2; i++) {
+page[i] = alloc_page(GFP_KERNEL);
+if (!page[i]) {
+if (i == 0)
+goto err_page0;
+else
+goto err_page1;
+}
+
+/* this will set skb[i]->head_frag */
+skb[i] = dev_alloc_skb(headroom + data_size);
+if (!skb[i]) {
+if (i == 0)
+goto err_skb0;
+else
+goto err_skb1;
+}
+
+skb_reserve(skb[i], headroom);
+skb_put(skb[i], data_size);
+skb[i]->protocol = htons(ETH_P_IP);
+skb_reset_network_header(skb[i]);
+skb_set_mac_header(skb[i], -ETH_HLEN);
+
+skb_add_rx_frag(skb[i], 0, page[i], 0, 64, 64);
+// skb_headlen(skb[i]): 8, skb[i]->head_frag = 1
+
+/* setup shinfo */
+skb_shinfo(skb[0])->gso_size = 1448;
+skb_shinfo(skb[0])->gso_type = SKB_GSO_TCPV4;
+skb_shinfo(skb[0])->gso_type |= SKB_GSO_DODGY;
+skb_shinfo(skb[0])->gso_segs = 0;
+skb_shinfo(skb[0])->frag_list = skb[1];
+
+/* adjust skb[0]'s len */
+skb[0]->len += skb[1]->len;
+skb[0]->data_len += skb[1]->data_len;
+skb[0]->truesize += skb[1]->truesize;
+return skb[0];
+
+err_skb1:
+__free_page(page[1]);
+err_page1:
+kfree_skb(skb[0]);
+err_skb0:
+__free_page(page[0]);
+err_page0:
+return NULL;
+
+static __init int test_skb_segment(void)
+{
+    netdev_features_t features;
+    struct sk_buff *skb, *segs;
+    int ret = -1;
+
+    features = NETIF_F_SG | NETIF_F_GSO_PARTIAL | NETIF_F_IP_CSUM |
+               NETIF_F_IPV6_CSUM;
+    features |= NETIF_F_RXCSUM;
+    skb = build_test_skb();
+    if (!skb) {
+        pr_info("%s: failed to build_test_skb", __func__);  
+        goto done;
+    }
+    segs = skb_segment(skb, features);
+    if (!IS_ERR(segs)) {
+        kfree_skb_list(segs);
+        ret = 0;
+        pr_info("%s: success in skb_segment!", __func__);  
+        } else {
+            pr_info("%s: failed in skb_segment!", __func__);  
+            
+        kfree_skb(skb);
+        done:
+        return ret;
+    }
+
+    static __init int test_bpf(void)
+    {
+        int i, err_cnt = 0, pass_cnt = 0;
+        return ret;
+
+        ret = test_bpf();
+-
destroy_bpf_tests();
-return ret;
+if (ret)
+return ret;
+
+return test_skb_segment();
}

static void __exit test_bpf_exit(void)
--- linux-4.15.0.orig/lib/test_debug_virtual.c
+++ linux-4.15.0/lib/test_debug_virtual.c
@@ -5,6 +5,7 @@
#include <linux/vmalloc.h>
#include <linux/slab.h>
#include <linux/sizes.h>
+#include <linux/io.h>
#include <asm/page.h>
ifdef CONFIG_MIPS
--- linux-4.15.0.orig/lib/test_find_bit.c
+++ linux-4.15.0/lib/test_find_bit.c
@@ -118,7 +118,12 @@
test_find_next_bit(bitmap, BITMAP_LEN);
test_find_next_zero_bit(bitmap, BITMAP_LEN);
test_find_last_bit(bitmap, BITMAP_LEN);
-test_find_first_bit(bitmap, BITMAP_LEN);
+
+/*
+ * test_find_first_bit() may take some time, so
+ * traverse only part of bitmap to avoid soft lockup.
+ */
+test_find_first_bit(bitmap, BITMAP_LEN / 10);

pr_err("\nStart testing find_bit() with sparse bitmap\n");

--- linux-4.15.0.orig/lib/test_firmware.c
+++ linux-4.15.0/lib/test_firmware.c
@@ -222,30 +222,30 @@
mutex_lock(&test_fw_mutex);

-len += snprintf(buf, PAGE_SIZE,
+len += scnprintf(buf, PAGE_SIZE - len,
 "Custom trigger configuration for: %s\n", dev_name(dev));

if (test_fw_config->name)
-len += snprintf(buf+len, PAGE_SIZE,

+len += scnprintf(buf+len, PAGE_SIZE - len, "name:\t%s
", test_fw_config->name);
else
+len += snprintf(buf+len, PAGE_SIZE, +len += scnprintf(buf+len, PAGE_SIZE - len, "name:\tEMTPY\n");

+len += snprintf(buf+len, PAGE_SIZE, +len += scnprintf(buf+len, PAGE_SIZE - len, "num_requests:\t%u\n", test_fw_config->num_requests);

+len += snprintf(buf+len, PAGE_SIZE, +len += scnprintf(buf+len, PAGE_SIZE - len, "send_uevent:\t\t%s\n", test_fw_config->send_uevent ? "FW_ACTION_HOTPLUG" : "FW_ACTION_NOHOTPLUG");
+len += snprintf(buf+len, PAGE_SIZE, +len += scnprintf(buf+len, PAGE_SIZE - len, "sync_direct:\t\t%s\n", test_fw_config->sync_direct ? "true" : "false");
+len += snprintf(buf+len, PAGE_SIZE, +len += scnprintf(buf+len, PAGE_SIZE - len, "read_fw_idx:\t%u\n", test_fw_config->read_fw_idx);

mutex_unlock(&test_fw_mutex);
@@ -359,7 +359,7 @@
{
return config_test_show_str(buf, test_fw_config->name);
}

-static DEVICE_ATTR(config_name, 0644, config_name_show, config_name_store);
+static DEVICE_ATTR_RW(config_name);

static ssize_t config_num_requests_store(struct device *dev, struct device_attribute *attr, @ @ -371,6 +371,7 @@
if (test_fw_config->reqs) {
pr_err("Must call release_all_firmware prior to changing config\n");
rc = -EINVAL;
+mutex_unlock(&test_fw_mutex);
goto out;
}
mutex_unlock(&test_fw_mutex);
@@ -388,8 +389,7 @@
{
return test_dev_config_show_u8(buf, test_fw_config->num_requests);
}
-static DEVICE_ATTR(config_num_requests, 0644, config_num_requests_show,
- config_num_requests_store);
+static DEVICE_ATTR_RW(config_num_requests);

static ssize_t config_sync_direct_store(struct device *dev,
struct device_attribute *attr,
@@ -411,8 +411,7 @@
{
  return test_dev_config_show_bool(buf, test_fw_config->sync_direct);
}
-static DEVICE_ATTR(config_sync_direct, 0644, config_sync_direct_show,
- config_sync_direct_store);
+static DEVICE_ATTR_RW(config_sync_direct);

static ssize_t config_send_uevent_store(struct device *dev,
struct device_attribute *attr,
@@ -428,8 +427,7 @@
{
  return test_dev_config_show_bool(buf, test_fw_config->send_uevent);
}
-static DEVICE_ATTR(config_send_uevent, 0644, config_send_uevent_show,
- config_send_uevent_store);
+static DEVICE_ATTR_RW(config_send_uevent);

static ssize_t config_read_fw_idx_store(struct device *dev,
struct device_attribute *attr,
@@ -445,8 +443,7 @@
{
  return test_dev_config_show_u8(buf, test_fw_config->read_fw_idx);
}
-static DEVICE_ATTR(config_read_fw_idx, 0644, config_read_fw_idx_show,
- config_read_fw_idx_store);
+static DEVICE_ATTR_RW(config_read_fw_idx);

static ssize_t trigger_request_store(struct device *dev,
@@ -837,6 +834,7 @@
if (req->fw->size > PAGE_SIZE) {
  pr_err("Testing interface must use PAGE_SIZE firmware for now\n");
  rc = -EINVAL;
+  goto out;
}
  memcpy(buf, req->fw->data, req->fw->size);

@@ -893,8 +891,11 @@
return -ENOMEM;
rc = __test_firmware_config_init();

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-if (rc)
+if (rc) {
+kfree(test_fw_config);
+pr_err("could not init firmware test config: %d\n", rc);
-return rc;
+
rc = misc_register(&test_fw_misc_device);
if (rc) {
--- linux-4.15.0.orig/lib/test_hexdump.c
+++ linux-4.15.0/lib/test_hexdump.c
@@ -81,7 +81,7 @@
 const char *q = *result++;
 size_t amount = strlen(q);

-strncpy(p, q, amount);
+memcpy(p, q, amount);
 p += amount;

 *p++ = '\';
--- linux-4.15.0.orig/lib/test_kasan.c
+++ linux-4.15.0/lib/test_kasan.c
@@ -126,6 +126,7 @@
 if (!ptr1 || !ptr2) {
 pr_err("Allocation failed\n");
 kfree(ptr1);
+kfree(ptr2);
 return;
 }

 static noninline void __init ksize_unpoisons_memory(void)
 {
 char *ptr;
-size_t size = 123, real_size = size;
+size_t size = 123, real_size;

 pr_info("ksize() unpoisons the whole allocated chunk\n");
 ptr = kmalloc(size, GFP_KERNEL);
--- linux-4.15.0.orig/lib/test_kmod.c
+++ linux-4.15.0/lib/test_kmod.c
@@ -632,7 +632,7 @@
 config->test_driver = NULL;
-kconfig->test_driver = NULL;
+config->test_fs = NULL;
 }

 kfree_const(config->test_fs);
-config->test_driver = NULL;
+config->test_fs = NULL;
}
static void kmod_config_free(struct kmod_test_device *test_dev)
{
    return config_test_show_str(&test_dev->config_mutex, buf,
        config->test_driver);
}

static DEVICE_ATTR(config_test_driver, 0644, config_test_driver_show,
    config_test_driver_store);

static DEVICE_ATTR_RW(config_test_driver);

static ssize_t config_test_fs_store(struct device *dev,
    struct device_attribute *attr,
{
    return config_test_show_str(&test_dev->config_mutex, buf,
        config->test_fs);
}

static DEVICE_ATTR(config_test_fs, 0644, config_test_fs_show,
    config_test_fs_store);

static DEVICE_ATTR_RW(config_test_fs);

static int trigger_config_run_type(struct kmod_test_device *test_dev,
    enum kmod_test_case test_case,
{
    switch (test_case) {
    case TEST_KMOD_FS_TYPE:
        kfree_const(config->test_fs);
        config->test_driver = NULL;
        config->test_fs = NULL;
        copied = config_copy_test_fs(config, test_str,
            strlen(test_str));
        break;
    case TEST_KMOD_FS_TYPE:
        kfree_const(config->test_fs);
        config->test_driver = NULL;
        config->test_fs = NULL;
        copied = config_copy_test_fs(config, test_str,
            strlen(test_str));
        break;
    }

    return test_dev_config_show_int(test_dev, buf, config->num_threads);
}

static DEVICE_ATTR(config_num_threads, 0644, config_num_threads_show,
    config_num_threads_store);

static DEVICE_ATTR_RW(config_num_threads);

static ssize_t config_test_case_store(struct device *dev,
    struct device_attribute *attr,
{
    return test_dev_config_show_uint(test_dev, buf, config->test_case);
}

static DEVICE_ATTR(config_test_case, 0644, config_test_case_show,
    config_test_case_store);

static DEVICE_ATTR_RW(config_test_case);
static ssize_t test_result_show(struct device *dev,
struct device_attribute *attr,
@@ -1049,7 +1045,7 @@
return test_dev_config_show_int(test_dev, buf, config->test_result);
}
-static DEVICE_ATTR(test_result, 0644, test_result_show, test_result_store);
+static DEVICE_ATTR_RW(test_result);

#define TEST_KMOD_DEV_ATTR(name) &dev_attr_##name.attr

@@ -1145,7 +1141,7 @@
mutex_lock(&reg_dev_mutex);

/* int should suffice for number of devices, test for wrap */
-if (unlikely(num_test_devs + 1) < 0) {
+if (num_test_devs + 1 == INT_MAX) {
    pr_err("reached limit of number of test devices\n");
go_to;
    }
@@ -1217,7 +1213,6 @@
dev_info(test_dev->dev, "removing interface\n");
misc_deregister(&test_dev->misc_dev);
-kfree(&test_dev->misc_dev.name);

mutex_unlock(&test_dev->config_mutex);
mutex_unlock(&test_dev->trigger_mutex);
--- linux-4.15.0.orig/lib/test_rhashtable.c
+++ linux-4.15.0/lib/test_rhashtable.c
@@ -79,6 +79,21 @@
struct test_obj *objs;

+static u32 my_hashfn(const void *data, u32 len, u32 seed)
+{
+    const struct test_obj_rhl *obj = data;
+    +return (obj->value.id % 10) << RHT_HASH_RESERVED_SPACE;
+}
+static int my_cmpfn(struct rhashtable_compare_arg *arg, const void *obj)
+{
+    const struct test_obj_rhl *test_obj = obj;
+    +const struct test_obj_val *val = arg->key;
+    +return test_obj->value.id - val->id;

static struct rhashtable_params test_rht_params = {
    .head_offset = offsetof(struct test_obj, node),
    .key_offset = offsetof(struct test_obj, value),
    .nulls_base = (3U << RHT_BASE_SHIFT),
};

+static struct rhashtable_params test_rht_params_dup = {
    .head_offset = offsetof(struct test_obj_rhl, list_node),
    .key_offset = offsetof(struct test_obj_rhl, value),
    .key_len = sizeof(struct test_obj_val),
    .hashfn = jhash,
    .obj_hashfn = my_hashfn,
    .obj_cmpfn = my_cmpfn,
    .nelem_hint = 128,
    .automatic_shrinking = false,
+};
+
static struct semaphore prestart_sem;
static struct semaphore startup_sem = __SEMAPHORE_INITIALIZER(startup_sem, 0);

@ -469,6 +495,119 @@
return err;
}

+static unsigned int __init print_ht(struct rhltable *rhlt)
+{
+    struct rhashtable *ht;
+    const struct bucket_table *tbl;
+    char buff[512] = "";
+    unsigned int i, cnt = 0;
+    
+    ht = &rhlt->ht;
+    tbl = rht_dereference(ht->tbl, ht);
+    for (i = 0; i < tbl->size; i++) {
+        struct rhash_head *pos, *next;
+        struct test_obj_rhl *p;
+        
+        pos = rht_dereference(tbl->buckets[i], ht);
+        next = !rht_is_a_nulls(pos) ? rht_dereference(pos->next, ht) : NULL;
+        
+        while (!rht_is_a_nulls(pos)) {
+            sprintf(buff, "%s\nbucket[%d] -> ", buff, i);
+            
+            if (!rht_is_a_nulls(pos)) {
+                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+            }
+            
+            while (!rht_is_a_nulls(pos)) {
+                
+                if (!rht_is_a_nulls(pos)) {
+                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                }
+                
+                while (!rht_is_a_nulls(pos)) {
+                    
+                    if (!rht_is_a_nulls(pos)) {
+                        printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                    }
+                    
+                    while (!rht_is_a_nulls(pos)) {
+                        
+                        if (!rht_is_a_nulls(pos)) {
+                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                        }
+                        
+                        while (!rht_is_a_nulls(pos)) {
+                            
+                            if (!rht_is_a_nulls(pos)) {
+                                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                            }
+                            
                            while (!rht_is_a_nulls(pos)) {
+                                
+                                if (!rht_is_a_nulls(pos)) {
+                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                }
+                                
                                while (!rht_is_a_nulls(pos)) {
+                                    
+                                    if (!rht_is_a_nulls(pos)) {
+                                        printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                    }
+                                    
                                    while (!rht_is_a_nulls(pos)) {
+                                        
                                        if (!rht_is_a_nulls(pos)) {
+                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                        }
+                                        
                                        while (!rht_is_a_nulls(pos)) {
+                                            
                                            if (!rht_is_a_nulls(pos)) {
+                                                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                            }
+                                            
                                            while (!rht_is_a_nulls(pos)) {
+                                                
                                                if (!rht_is_a_nulls(pos)) {
+                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                }
+                                                
                                                while (!rht_is_a_nulls(pos)) {
+                                                    
                                                    if (!rht_is_a_nulls(pos)) {
+                                                        printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                    }
+                                                    
                                                    while (!rht_is_a_nulls(pos)) {
+                                                        
                                                        if (!rht_is_a_nulls(pos)) {
+                                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                        }
+                                                        
                                                        while (!rht_is_a_nulls(pos)) {
+                                                            
                                                            if (!rht_is_a_nulls(pos)) {
+                                                                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                            }
+                                                            
                                                            while (!rht_is_a_nulls(pos)) {
+                                                                
                                                                if (!rht_is_a_nulls(pos)) {
+                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                }
+                                                                
                                                                while (!rht_is_a_nulls(pos)) {
+                                                                    
                                                                    if (!rht_is_a_nulls(pos)) {
+                                                                        printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                    }
+                                                                    
                                                                    while (!rht_is_a_nulls(pos)) {
+                                                                        
                                                                        if (!rht_is_a_nulls(pos)) {
+                                                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                        }
+                                                                        
                                                                        while (!rht_is_a_nulls(pos)) {
+                                                                            
                                                                            if (!rht_is_a_nulls(pos)) {
+                                                                                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                            }
+                                                                            
                                                                            while (!rht_is_a_nulls(pos)) {
+                                                                                
                                                                                if (!rht_is_a_nulls(pos)) {
+                                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                }
+                                                                                
                                                                                while (!rht_is_a_nulls(pos)) {
+                                                                                    
                                                                                    if (!rht_is_a_nulls(pos)) {
+                                                                                        printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                    }
+                                                                                    
                                                                                    while (!rht_is_a_nulls(pos)) {
+                                                                                        
                                                                                        if (!rht_is_a_nulls(pos)) {
+                                                                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                        }
+                                                                                        
                                                                                        while (!rht_is_a_nulls(pos)) {
+                                                                                            
                                                                                            if (!rht_is_a_nulls(pos)) {
+                                                                                                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                            }
+                                                                                            
                                                                                            while (!rht_is_a_nulls(pos)) {
+                                                                                                
                                                                                                if (!rht_is_a_nulls(pos)) {
+                                                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                }
+                                                                                                
                                                                                                while (!rht_is_a_nulls(pos)) {
+                                                                                                    
                                                                                                    if (!rht_is_a_nulls(pos)) {
+                                                                                                        printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                    }
+                                                                                                    
                                                                                                    while (!rht_is_a_nulls(pos)) {
+                                                                                                        
                                                                                                        if (!rht_is_a_nulls(pos)) {
+                                                                                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                        }
+                                                                                                        
                                                                                                        while (!rht_is_a_nulls(pos)) {
+                                                                                                            
                                                                                                            if (!rht_is_a_nulls(pos)) {
+                                                                                                                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                            }
+                                                                                                            
                                                                                                            while (!rht_is_a_nulls(pos)) {
+                                                                                                                
                                                                                                                if (!rht_is_a_nulls(pos)) {
+                                                                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                }
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                                                                                                                while (!rht_is_a_nulls(pos)) {
+                                                                                                                    
                                                                                                                    if (!rht_is_a_nulls(pos)) {
+                                                                                                                        printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                    }
+                                                                                                                    
                                                                                                                    while (!rht_is_a_nulls(pos)) {
+                                                                                                                        
                                                                                                                        if (!rht_is_a_nulls(pos)) {
+                                                                                                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                        }
+                                                                                                                        
                                                                                                                        while (!rht_is_a_nulls(pos)) {
+                                                                                                                            
                                                                                                                            if (!rht_is_a_nulls(pos)) {
+                                                                                                                                printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                            }
+                                                                                                                            
                                                                                                                            while (!rht_is_a_nulls(pos)) {
+                                                                                                                                
                                                                                                                                if (!rht_is_a_nulls(pos)) {
+                                                                                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                                }
+                                                                                                                                    
                                                                                                                                    while (!rht_is_a_nulls(pos)) {
+                                                                                                                                        
                                                                                                                                        if (!rht_is_a_nulls(pos)) {
+                                                                                                                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                                        }
+                                                                                                                                            
                                                                                                                                            while (!rht_is_a_nulls(pos)) {
+                                                                                                                                                
                                                                                                                                                if (!rht_is_a_nulls(pos)) {
+                                                                                                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                                                }
+                                                                                                                                                    
                                                                                                                                                    while (!rht_is_a_nulls(pos)) {
+                                                                                                                                                        
                                                                                                                                                        if (!rht_is_a_nulls(pos)) {
+                                                                                                                                                            printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                                                        }
+                                                                                                                                                            
                                                                                                                                                            while (!rht_is_a_nulls(pos)) {
+                                                                                                                                                                
                                                                                                                                                                if (!rht_is_a_nulls(pos)) {
+                                                                                                                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                                                                }
+                                                                                                                                                                    
                                                                                                                                                                    while (!rht_is_a_nulls(pos)) {
+                                                                                                                                                                                                                    
                                                                                                                                                                                                                    if (!rht_is_a_nulls(pos)) {
+                                                                                                                                                                                                                    printf(buff, "%s\nbucket[%d] -> ", buff, i);
+                                                                                                                                                    }
+                                                                                            }
+                                                                                        }
+                                                                                    }
+                                                                                }
+                                                                            }
+                                                                        }
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+                                                            }
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+                                                }
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+                                        }
+                                    }
+                                }
+                            }
+                        }
+                    }
+                }
+            }
+        }
+    }
+}
```c
+struct rhlist_head *list = container_of(pos, struct rhlist_head, rhead);
+sprintf(buf, "%s[", buff);
++do {
++pos = &list->rhead;
++list = rht_dereference(list->next, ht);
++p = rht_obj(ht, pos);
++
++sprintf(buf, "%s val %d (tid=%d)%s", buff, p->value.id, p->value.tid,
++list? ", " : " ");
++cnt++;
++} while (list);
++
++pos = next,
++next = !rht_is_a_nulls(pos) ?
++rht_dereference(pos->next, ht) : NULL;
++
++sprintf(buf, "%s]%s", buff, !rht_is_a_nulls(pos) ? " -> " : "");
++}
++}
++printk(KERN_ERR "\n---- ht: ----%s
-------------
", buff);
++
++return cnt;
++}
++
+static int __init test_insert_dup(struct test_obj_rhl *rhl_test_objects,
++  int cnt, bool slow)
++{
++struct rhltable *rhlt;
++unsigned int i, ret;
++const char *key;
++int err = 0;
++
++rhlt = kmalloc(sizeof(*rhlt), GFP_KERNEL);
++if (WARN_ON(!rhlt))
++    return -EINVAL;
++err = rhltable_init(rhlt, &test_rht_params_dup);
++if (WARN_ON(err)) {
++    kfree(rhlt);
++    return err;
++}
++
++for (i = 0; i < cnt; i++) {
++    rhl_test_objects[i].value.tid = i;
++    key = rht_obj(&rhlt->ht, &rhl_test_objects[i].list_node.rhead);
++    key += test_rht_params_dup.key_offset;
++    if (slow) {
++        rhlt->ht.key = key;
++        ret = rhltable_insert(rhlt, &rhl_test_objects[i].list_node.rhead);
++    } else {
++        ret = rhltable_insert(rhlt, &rhl_test_objects[i].list_node.rhead);
++    }
++}
++}
```
err = PTR_ERR(rhashtable_insert_slow(&rhlt->ht, key, &rhl_test_objects[i].list_node.rhead));
if (err == -EAGAIN)
    err = 0;
} else
err = rhtable_insert(rhlt, &rhl_test_objects[i].list_node, test_rht_params_dup);
if (WARN(err, "error %d on element %d/%d (%s)n", err, i, cnt, slow? "slow" : "fast"))
goto skip_print;
}
+
ret = print_ht(rhlt);
WARN(ret != cnt, "missing rhtable elements (%d != %d, %s)n", ret, cnt, slow? "slow" : "fast");
+
+skip_print:
rhtable_destroy(rhlt);
kfree(rhlt);
+
+return 0;
+
+static int __init test_insert_duplicates_run(void)
{+
+struct test_obj_rhl rhl_test_objects[3] = { };+
+
+pr_info("test inserting duplicates\n");+
+/* two different values that map to same bucket */+
rhl_test_objects[0].value.id = 1;
rhl_test_objects[1].value.id = 21;
+
+/* and another duplicate with same as [0] value */+
+ * which will be second on the bucket list */+
rhl_test_objects[2].value.id = rhl_test_objects[0].value.id;
+
+test_insertDup(rhl_test_objects, 2, false);
+test_insertDup(rhl_test_objects, 3, false);
+test_insertDup(rhl_test_objects, 2, true);
+test_insertDup(rhl_test_objects, 3, true);
+
+return 0;
+
+}
+
static int thread_lookup_test(struct thread_data *tdata)
{
    unsigned int entries = tdata->entries;
    @ @ -617,6 +756,8 @ @
do_div(total_time, runs);
pr_info("Average test time: %llu\n", total_time);

@test_insert_duplicates_run();
+
if (!tcount)
return 0;

--- linux-4.15.0.orig/lib/test_string.c
+++ linux-4.15.0/lib/test_string.c
@@ -35,7 +35,7 @@
 fail:
kfree(p);
if (i < 256)
-    return (i << 24) | (j << 16) | k;
+    return (i << 24) | (j << 16) | k | 0x8000;
    return 0;
}

@@ -71,7 +71,7 @@
 fail:
kfree(p);
if (i < 256)
-    return (i << 24) | (j << 16) | k;
+    return (i << 24) | (j << 16) | k | 0x8000;
    return 0;
}

@@ -107,7 +107,7 @@
 fail:
kfree(p);
if (i < 256)
-    return (i << 24) | (j << 16) | k;
+    return (i << 24) | (j << 16) | k | 0x8000;
    return 0;
}

--- linux-4.15.0.orig/lib/timerqueue.c
+++ linux-4.15.0/lib/timerqueue.c
@@ -39,9 +39,10 @@
 */
bool timerqueue_add(struct timerqueue_head *head, struct timerqueue_node *node)
{
    -struct rb_node **p = &head->head.rb_node;
+struct rb_node **p = &head->rb_root.rb_node;
    struct rb_node *parent = NULL;
    -struct timerqueue_node *ptr;
+struct timerqueue_node *ptr;

bool leftmost = true;

/* Make sure we don't add nodes that are already added */
WARN_ON_ONCE(!RB_EMPTY_NODE(&node->node));

while (*p) {
  parent = *p;
  ptr = rb_entry(parent, struct timerqueue_node, node);
  if (node->expires < ptr->expires)
    p = &(*p)->rb_left;
  else
    p = &(*p)->rb_right;
  leftmost = false;
}
rb_link_node(&node->node, parent, p);
rb_insert_color_cached(&node->node, &head->rb_root, leftmost);

if (!head->next || node->expires < head->next->expires)
  return true;
return false;

EXPORT_SYMBOL_GPL(timerqueue_add);

WARN_ON_ONCE(RB_EMPTY_NODE(&node->node));

/* update next pointer */
if (head->next == node) {
  struct rb_node *rbn = rb_next(&node->node);
  head->next = rb_entry_safe(rbn, struct timerqueue_node, node);
}
rb_erase_cached(&node->node, &head->rb_root);
RB_CLEAR_NODE(&node->node);
return head->next != NULL;

EXPORT_SYMBOL_GPL(timerqueue_del);
static s_max get_signed_val(struct type_descriptor *type, unsigned long val)
static s_max get_signed_val(struct type_descriptor *type, void *val)
{
    if (is_inline_int(type)) {
        unsigned extra_bits = sizeof(s_max)*8 - type_bit_width(type);
        return ((s_max)val) << extra_bits >> extra_bits;
    } else {
        unsigned long ulong_val = (unsigned long)val;
        return ((s_max)ulong_val) << extra_bits >> extra_bits;
    }
}

static bool val_is_negative(struct type_descriptor *type, unsigned long val)
static bool val_is_negative(struct type_descriptor *type, void *val)
{
    return type_is_signed(type) && get_signed_val(type, val) < 0;
}

static u_max get_unsigned_val(struct type_descriptor *type, unsigned long val)
static u_max get_unsigned_val(struct type_descriptor *type, void *val)
{
    if (is_inline_int(type))
        return val;
    else {
        return (unsigned long)val;
    }
}

static void val_to_string(char *str, size_t size, struct type_descriptor *type,
    unsigned long value)
{
    if (type_is_int(type)) {
        if (type_bit_width(type) == 128) {
            // Handle 128-bit integer conversion
        } else {
            // Handle 64-bit integer conversion
        }
    }
}
current->in_ubsan--; }

-static void handle_overflow(struct overflow_data *data, unsigned long lhs, unsigned long rhs, char op) +static void handle_overflow(struct overflow_data *data, void *lhs, void *rhs, char op) {

  struct type_descriptor *type = data->type;@@ -196,8 +198,7 @@
    @ @ -196,8 +198,7 @@
  }

  void __ubsan_handle_add_overflow(struct overflow_data *data, unsigned long lhs, unsigned long rhs) +void *lhs, void *rhs) {
    handle_overflow(data, lhs, rhs, '+');@@ -205,23 +206,21 @@
    @ @ -205,23 +206,21 @@
    EXPORT_SYMBOL(__ubsan_handle_add_overflow);

    void __ubsan_handle_sub_overflow(struct overflow_data *data, unsigned long lhs, unsigned long rhs) +void *lhs, void *rhs) {
      handle_overflow(data, lhs, rhs, '-');
    }
    EXPORT_SYMBOL(__ubsan_handle_sub_overflow);

    void __ubsan_handle_mul_overflow(struct overflow_data *data, unsigned long lhs, unsigned long rhs) +void *lhs, void *rhs) {
      handle_overflow(data, lhs, rhs, '*');
    }
    EXPORT_SYMBOL(__ubsan_handle_mul_overflow);

    void __ubsan_handle_negate_overflow(struct overflow_data *data, unsigned long old_val) +void *old_val) {
      unsigned long flags;
    char old_val_str[VALUE_LENGTH];@@ -242,8 +241,7 @@
void __ubsan_handle_divrem_overflow(struct overflow_data *data,
    unsigned long lhs,
    unsigned long rhs)
+void *lhs, void *rhs)
{
    unsigned long flags;
    char rhs_val_str[VALUE_LENGTH];
    @@ -265,14 +263,14 @@
}
EXPORT_SYMBOL(__ubsan_handle_divrem_overflow);

-static void handle_null_ptr_deref(struct type_mismatch_data *data)
+static void handle_null_ptr_deref(struct type_mismatch_data_common *data)
{
    unsigned long flags;
    -if (suppress_report(&data->location))
+if (suppress_report(data->location))
        return;

    -ubsan_prologue(&data->location, &flags);
+ubsan_prologue(data->location, &flags);
    pr_err("%s null pointer of type %s\n",
        type_check_kinds[data->type_check_kind],
        @@ -281,15 +279,15 @@
    ubsan_epilogue(&flags);
}

-static void handle_missaligned_access(struct type_mismatch_data *data,
+static void handle_misaligned_access(struct type_mismatch_data_common *data,
    unsigned long ptr)
{
    unsigned long flags;
    -if (suppress_report(&data->location))
+if (suppress_report(data->location))
        return;

    -ubsan_prologue(&data->location, &flags);
+ubsan_prologue(data->location, &flags);
    pr_err("%s misaligned address %p for type %s\n",
        type_check_kinds[data->type_check_kind],
        @@ -299,15 +297,15 @@
    ubsan_epilogue(&flags);

static void handle_object_size_mismatch(struct type_mismatch_data *data,
unsigned long ptr)
{
  unsigned long flags;

  if (suppress_report(&data->location))
    return;

  ubSAN_prologue(&data->location, &flags);
  pr_err("%s address %p with insufficient space\n",
           type_check_kinds[data->type_check_kind],
           (void *) ptr);
  ubSAN_epilogue(&flags);
}

void __ubsan_handle_type_mismatch(struct type_mismatch_data *data,
 void *ptr)
{
  struct type_mismatch_data_common common_data = {
    .location = &data->location,
    .type = data->type,
    .alignment = data->alignment,
    .type_check_kind = data->type_check_kind
  };
  ubSAN_type_mismatch_common(&common_data, (unsigned long)ptr);
}

EXPORT_SYMBOL(__ubsan_handle_type_mismatch);
+void __ubsan_handle_type_mismatch_v1(struct type_mismatch_data_v1 *data,
+void *ptr)
+{
+
+struct type_mismatch_data_common common_data = {
+.location = &data->location,
+.type = data->type,
+.alignment = 1UL << data->log_alignment,
+.type_check_kind = data->type_check_kind
+};
+
+ubsan_type_mismatch_common(&common_data, (unsigned long)ptr);
+
+EXPORT_SYMBOL(__ubsan_handle_type_mismatch_v1);
+
+void __ubsan_handlenonnull_return(structnonnull_return_data *data)
+{
+unsigned long flags;
+@@ -348,7 +374,7 @@
+export_symbol(__ubsan_handlenonnull_return);
+
+void __ubsan_handle_vla_bound_not_positive(struct vla_bound_data *data,
+-unsigned long bound)
+void *bound)
+{
+unsigned long flags;
+char bound_str[VALUE_LENGTH];
+@@ -365,8 +391,7 @@
+}
+export_symbol(__ubsan_handle_vla_bound_not_positive);
+
+-void __ubsan_handle_out_of_bounds(struct out_of_bounds_data *data,
+-unsigned long index)
+-void __ubsan_handle_out_of_bounds(struct out_of_bounds_data *data, void *index)
+{unsigned long flags;
+char index_str[VALUE_LENGTH];
+@@ -384,7 +409,7 @@
+}
+export_symbol(__ubsan_handle_out_of_bounds);
+
+void __ubsan_handle_shift_out_of_bounds(struct shift_out_of_bounds_data *data,
+-unsigned long lhs, unsigned long rhs)
+void *lhs, void *rhs)
+{
+unsigned long flags;
+struct type_descriptor *rhs_type = data->rhs_type;
+@@ -423,8 +448,7 @@
EXPORT_SYMBOL(__ubsan_handle_shift_out_of_bounds);

-void __noreturn
-__ubsan_handle_builtin_unreachable(struct unreachable_data *data)
+void __ubsan_handle_builtin_unreachable(struct unreachable_data *data)
{
  unsigned long flags;

  @@ -436,7 +460,7 @@
  EXPORT_SYMBOL(__ubsan_handle_builtin_unreachable);

  void __ubsan_handle_load_invalid_value(struct invalid_value_data *data,
-unsigned long val)
+void *val)
{
  unsigned long flags;
  char val_str[VALUE_LENGTH];
  --- linux-4.15.0.orig/lib/ubsan.h
  +++ linux-4.15.0/lib/ubsan.h
  @@ -37,6 +37,20 @@
  unsigned char type_check_kind;
  
  +struct type_mismatch_data_v1 {
  +struct source_location location;
  +struct type_descriptor *type;
  +unsigned char log_alignment;
  +unsigned char type_check_kind;
  +};
  +
  +struct type_mismatch_data_common {
  +struct source_location *location;
  +struct type_descriptor *type;
  +unsigned long alignment;
  +unsigned char type_check_kind;
  +};
  +
  struct nonnull_arg_data {
  struct source_location location;
  struct source_location attr_location;
  --- linux-4.15.0.orig/lib/usercopy.c
  +++ linux-4.15.0/lib/usercopy.c
  @@ -20,7 +20,7 @@
  #endif

  ifndefInline_COPY_TO_USER
  -unsigned long _copy_to_user(void *to, const void __user *from, unsigned long n)
unsigned long _copy_to_user(void __user *to, const void *from, unsigned long n)
{
    might_fault();
    if (likely(access_ok VERIFY_WRITE, to, n)))
    {
        --- linux-4.15.0.orig/lib/vsprintf.c
        +++ linux-4.15.0/lib/vsprintf.c
        @@ -48,6 +48,31 @@
        #include <linux/string_helpers.h>
        #include "kstrtox.h"

        +static unsigned long long simple_strntoull(const char *startp, size_t max_chars,
          + char **endp, unsigned int base)
          +{
            +const char *cp;
            +unsigned long long result = 0ULL;
            +size_t prefix_chars;
            +unsigned int rv;
            +
            +cp = _parse_integer_fixup_radix(startp, &base);
            +prefix_chars = cp - startp;
            +if (prefix_chars < max_chars) {
                +rv = _parse_integer_limit(cp, base, &result, max_chars - prefix_chars);
                /* FIXME */
                +cp += (rv & ~KSTRTOX_OVERFLOW);
                +} else {
                    /* Field too short for prefix + digit, skip over without converting */
                    +cp = startp + max_chars;
                    +}
            +
            +if (endp)
            +*endp = (char *)cp;
            +
            +return result;
            +}
            +
            /**<
             * simple_strtoull - convert a string to an unsigned long long
             * @cp: The start of the string
             */
            unsigned long long simple_strtoull(const char *cp, char **endp, unsigned int base)
            {
                unsigned long long result;
                unsigned int rv;
                -cp = _parse_integer_fixup_radix(cp, &base);
                -rv = _parse_integer(cp, base, &result);
                -/* FIXME */
-cp += (rv & ~KSTRTOX_OVERFLOW);
-
-if (endp)
-*endp = (char *)cp;
-
-return result;
+return simple_strntoull(cp, INT_MAX, endp, base);
}
EXPORT_SYMBOL(simple_strtoull);

@@ -104,6 +118,21 @@
}
EXPORT_SYMBOL(simple_strtol);

+static long long simple_strntoll(const char *cp, size_t max_chars, char **endp, 
+unsigned int base)
+{
+/*
+ * simple_strntoull() safely handles receiving max_chars==0 in the
+ * case cp[0] == '-' && max_chars == 1.
+ * If max_chars == 0 we can drop through and pass it to simple_strntoull()
+ * and the content of *cp is irrelevant.
+ */
+if (*cp == '-' && max_chars > 0)
+return -simple_strntoull(cp + 1, max_chars - 1, endp, base);
+
+return simple_strntoull(cp, max_chars, endp, base);
+}
+
+/*
+ * simple_strtoll() - convert a string to a signed long long
+ * @cp: The start of the string
+ @ @ -114,10 +143,7 @ @
+ */
long long simple_strtoll(const char *cp, char **endp, unsigned int base)
{
-if (*cp == '-') 
-return -simple_strtoull(cp + 1, endp, base);
-
- return simple_strtoull(cp, endp, base);
+return simple_strtoull(cp, INT_MAX, endp, base);
}
EXPORT_SYMBOL(simple_strtoll);

@@ -1447,9 +1473,6 @@
return string(buf, end, NULL, spec);

switch (fmt[1]) {


-case 'r':
  return number(buf, end, clk_get_rate(clk), spec);
-
  case 'n':
  default:
  
  #ifdef CONFIG_COMMON_CLK
  @@ -1660,19 +1683,22 @@
  return number(buf, end, (unsigned long int)ptr, spec);
  }

-num = number(buf, end, clk_get_rate(clk), spec);
-
-static bool have_filled_random_ptr_key __read_mostly;
+static DEFINE_STATIC_KEY_TRUE(not_filled_random_ptr_key);
 static siphash_key_t ptr_key __read_mostly;

-#ifdef CONFIG_COMMON_CLK
-@@ -1686,7+1712,8 @@
- if (!ret) {
- return 0;
- } else if (ret == -EALREADY) {
-   fill_random_ptr_key(&random_ready);
-+/* This is in preemptible context */
-+enable_ptr_key_workfn(&enable_ptr_key_work);
- return 0;
- }


unsigned long hashval;
const int default_width = 2 * sizeof(ptr);

{-1700,7 +1727,7 @ @}
@if (unlikely(!have_filled_random_ptr_key)) {
+if (static_branch_unlikely(&not_filled_random_ptr_key)) {
spec.field_width = default_width;
/* string length must be less than default_width */
return string(buf, end, "Connor", spec);
}@ -1727,6 +1754,29 @ @
return number(buf, end, hashval, spec);
}

+ifdef CONFIG_KMSG_IDS
+
+unsigned long __jhash_string(const char *str);
+
+static noinline_for_stack
+char *jhash_string(char *buf, char *end, const char *str, const char *fmt)
+{
+struct printf_spec spec;
+unsigned long long num;
+
+num = __jhash_string(str);
+
+spec.type = FORMAT_TYPE_PTR;
+spec.field_width = 6;
+spec.flags = SMALL | ZEROPAD;
+spec.base = 16;
+spec.precision = -1;
+
+return number(buf, end, num, spec);
+}
+
+endif
+
/*@ -1821,6 +1871,7 @@*/
* Show a '%p' thing. A kernel extension is that the '%p' is followed
* by an extra set of alphanumeric characters that are extended format
* p page flags (see struct page) given as pointer to unsigned long
* g gfp flags (GFP_* and __GFP_*) given as pointer to gfp_t
* v vma flags (VM_*) given as pointer to unsigned long
* - 'j' Kernel message catalog jhash for System z
* - 'O' For a kobject based struct. Must be one of the following:
* - 'OF[fnPcCF]' For a device tree object
* Without any optional arguments prints the full_name
const int default_width = 2 * sizeof(void *);

- if (!ptr && *fmt != 'K') {
+ if (!ptr && *fmt != 'K' && *fmt != 'x') {
/*
 * Print (null) with the same width as a pointer so it makes
 * tabular output look nice.
@@ -1958,8 +2009,13 @@
case 'F':
 return device_node_string(buf, end, ptr, spec, fmt + 1);
 }
+break;
 case 'x':
 return pointer_string(buf, end, ptr, spec);
+#ifdef CONFIG_KMSG_IDS
+case 'j':
+return jhash_string(buf, end, ptr, fmt);
+#endif
}
/* default is to _not_ leak addresses, hash before printing */
@@ -3044,25 +3100,13 @@
break;

if (is_sign)
- val.s = qualifier != 'L' ?
- simple_strtol(str, &next, base) :
- simple_strtoll(str, &next, base);
+ val.s = simple_strntoll(str,
+ field_width >= 0 ? field_width : INT_MAX,
+ &next, base);
 else
- val.u = qualifier != 'L' ?
- simple_strtoull(str, &next, base) :
- simple_strtoul(str, &next, base);
- 
- if (field_width > 0 && next - str > field_width) {
- _parse_integer_fixup_radix(str, &base);
- while (next - str > field_width) {
- if (is_sign)
- val.s = div_s64(val.s, base);
- else
- val.u = div_u64(val.u, base);
- --next;
- }
- }
- }
+val.u = simple_strntoull(str,
+ field_width >= 0 ? field_width : INT_MAX,
+ &next, base);

switch (qualifier) {
    case 'H':/* that's 'hh' in format */
    --- linux-4.15.0.orig/lib/zlib_inflate/inffast.c
    +++ linux-4.15.0/lib/zlib_inflate/inffast.c
    @@ -10,17 +10,6 @@ @ @
    #ifndef ASMINF
    
    /* Allow machine dependent optimization for post-increment or pre-increment.
     - Based on testing to date,
     - Pre-increment preferred for:
     -   - PowerPC G3 (Adler)
     -   - MIPS R5000 (Randers-Pehrson)
     - Post-increment preferred for:
     -   - none
     - No measurable difference:
     -   - Pentium III (Anderson)
     -   - M68060 (Nikl)
     - */
    union uu {
        unsigned short us;
        unsigned char b[2];
    @@ -38,16 +27,6 @@ @ @
    return mm.us;
    }
    
    #ifdef POSTINC
    -# define OFF 0
    -# define PUP(a) *(a)++
    -# define UP_UNALIGNED(a) get_unaligned16((a)++)
    -#else
    -# define OFF 1
    -# define PUP(a) *++(a)
    -# define UP_UNALIGNED(a) get_unaligned16(++(a))
    -#endif
    -
    /*
     Decode literal, length, and distance codes and write out the resulting
     literal and match bytes until either not enough input or output is
    @@ -115,9 +94,9 @@ @ @
    
    /* copy state to local variables */
    state = (struct inflate_state *)strm->state;
    - in = strm->next_in - OFF;
+ in = strm->next_in;
last = in + (strm->avail_in - 5);
- out = strm->next_out - OFF;
+ out = strm->next_out;
  beg = out - (start - strm->avail_out);
  end = out + (strm->avail_out - 257);
#endif INFLATE_STRICT
@@ -138,9 +117,9 @@
   input data or output space */
   do {
     if (bits < 15) {
-       hold += (unsigned long)(PUP(in)) << bits;
+       hold += (unsigned long)(*in++) << bits;
       bits += 8;
-       hold += (unsigned long)(PUP(in)) << bits;
+       hold += (unsigned long)(*in++) << bits;
       bits += 8;
     }
     this = lcode[hold & lmask];
@@ -150,14 +129,14 @@
   bits -= op;
   op = (unsigned)(this.op);
   if (op == 0) {                          /* literal */
-     PUP(out) = (unsigned char)(this.val);
+     *out++ = (unsigned char)(this.val);
   }
   else if (op & 16) {                     /* length base */
     len = (unsigned)(this.val);
-    op &= 15;                           /* number of extra bits */
+    op &= 15;                           /* number of extra bits */
     if (op) {
       if (bits < op) {
-         hold += (unsigned long)(PUP(in)) << bits;
+         hold += (unsigned long)(*in++) << bits;
         bits += 8;
       }
       len += (unsigned)hold & ((1U << op) - 1);
@@ -165,9 +144,9 @@
   bits -= op;
   }
  if (bits < 15) {
-    hold += (unsigned long)(PUP(in)) << bits;
+    hold += (unsigned long)(*in++) << bits;
    bits += 8;
-    hold += (unsigned long)(PUP(in)) << bits;
+    hold += (unsigned long)(*in++) << bits;
    bits += 8;
  }
  this = dcode[hold & dmask];
dist = (unsigned)(this.val);
op &= 15; /* number of extra bits */
if (bits < op) {
    hold += (unsigned long)(PUP(in)) << bits;
+    hold += (unsigned long)(*in++) << bits;
    bits += 8;
    if (bits < op) {
        hold += (unsigned long)(PUP(in)) << bits;
+        hold += (unsigned long)(*in++) << bits;
        bits += 8;
    }
}

state->mode = BAD;
break;

from = window - OFF;
+from = window;
if (write == 0) { /* very common case */
    from += wsize - op;
    if (op < len) { /* some from window */
        len -= op;
        do {
-            PUP(out) = PUP(from);
+            *out++ = *from++;
        } while (--op);
        from = out - dist; /* rest from output */
    }
}

if (op < len) { /* some from end of window */
    len -= op;
    do {
-        PUP(out) = PUP(from);
+        *out++ = *from++;
    } while (--op);
-    from = window - OFF;
+    from = window;
if (write < len) { /* some from start of window */
    op = write;
    len -= op;
    do {
-        PUP(out) = PUP(from);
+        *out++ = *from++;
    } while (--op);
    from = out - dist; /* rest from output */
}
if (op < len) { /* some from window */
    len -= op;
    do {
        PUP(out) = PUP(from);
        *out++ = *from++;
    } while (--op);
    from = out - dist; /* rest from output */
}
}
while (len > 2) {
    PUP(out) = PUP(from);
    PUP(out) = PUP(from);
    PUP(out) = PUP(from);
    *out++ = *from++;
    *out++ = *from++;
    *out++ = *from++;
    len -= 3;
}
if (len) {
    PUP(out) = PUP(from);
    *out++ = *from++;
    if (len > 1)
        PUP(out) = PUP(from);
    *out++ = *from++;
}
}
else {
    from = out - dist; /* copy direct from output */
    /* minimum length is three */
    /* Align out addr */
    if (len > 0)
        PUP(out) = PUP(from);
    if (len > 1)
        PUP(out) = PUP(from);
    *out++ = *from++;
}
else {
    from = out - dist; /* copy direct from output */
    /* minimum length is three */
    /* Align out addr */
    if (!((long)(out - 1 + OFF) & 1)) { // not aligned
        PUP(out) = PUP(from);
        if (!((long)(out - 1) & 1)) { // not aligned
            *out++ = *from++;
            len--;
        }
        sout = (unsigned short *)(out - OFF);
    } else { // aligned
        sout = (unsigned short *)(out - OFF);
    }
    if (dist > 2) {
        loops = len >> 1;
        do
        #ifdef CONFIG_HAVE_EFFICIENT_UNALIGNED_ACCESS
            PUP(sout) = PUP(sfrom);
        #endif
            PUP(sout) = PUP(sfrom);
            if (dist > 1)
                *sout++ = *(sfrom + 1);
            sout += loops;
            // output aligned
        } while (sout < out - dist);
        // output not aligned
    }
    PUP(out) = PUP(from);
    PUP(out) = PUP(from);
    PUP(out) = PUP(from);
    *out++ = *from++;
    *out++ = *from++;
    *out++ = *from++;
    len -= 3;
}
if (len) {
    PUP(out) = PUP(from);
    *out++ = *from++;
    if (len > 1)
        PUP(out) = PUP(from);
    *out++ = *from++;
}
}
+ *sout++ = *sfrom++;
#else
- PUP(sout) = UP_UNALIGNED(sfrom);
+ *sout++ = get_unaligned16(sfrom++);
#endif
while (--loops);
-out = (unsigned char *)sout + OFF;
-from = (unsigned char *)sfrom + OFF;
+out = (unsigned char *)sout;
+from = (unsigned char *)sfrom;
} else { /* dist == 1 or dist == 2 */
unsigned short pat16;
-pat16 = *(sout-1+OFF);
+pat16 = *(sout-1);
if (dist == 1) {
  union uu mm;
  /* copy one char pattern to both bytes */
  @ @ -296,12 +275,12 @ @
} loops = len >> 1;
do
- PUP(sout) = pat16;
+ *sout++ = pat16;
while (--loops);
-out = (unsigned char *)sout + OFF;
+out = (unsigned char *)sout;
}
if (len & 1)
-PUP(out) = PUP(from);
+*out++ = *from++;
}
else if ((op & 64) == 0) {          /* 2nd level distance code */
@@ -336,8 +315,8 @@
  hold &= (1U << bits) - 1;

  /* update state and return */
- strm->next_in = in + OFF;
- strm->next_out = out + OFF;
+ strm->next_in = in;
+ strm->next_out = out;
  strm->avail_in = (unsigned)(in < last ? 5 + (last - in) : 5 - (in - last));
  strm->avail_out = (unsigned)(out < end ?
    257 + (end - out) : 257 - (out - end)));
--- linux-4.15.0.orig/mm/Kconfig
+++ linux-4.15.0/mm/Kconfig
@@ -649,6 +649,8 @@
depends on ARCH_SUPPORTS_DEFERRED_STRUCT_PAGE_INIT
depends on NO_BOOTMEM && MEMORY_HOTPLUG
depends on !FLATMEM
+depends on !NEED_PER_CPU_KM
+depends on 64BIT
help
   Ordinarily all struct pages are initialised during early boot in a
   single thread. On very large machines this can take a considerable
   @@ -707,12 +709,12 @@
config HMM
bool
+select MMU_NOTIFIER
select MIGRATE_VMA_HELPER

config HMM_MIRROR
bool "HMM mirror CPU page table into a device page table"
depends on ARCH_HAS_HMM
-select MMU_NOTIFIER
select HMM
help
   Select HMM_MIRROR if you want to mirror range of the CPU page table of a
--- linux-4.15.0.orig/mm/Makefile
+++ linux-4.15.0/mm/Makefile
@@ -39,7 +39,7 @@
   debug.o $(mmu-y)
+   prfile.o debug.o $(mmu-y)

obj-y += init-mm.o

--- linux-4.15.0.orig/mm/backing-dev.c
+++ linux-4.15.0/mm/backing-dev.c
@@ -19,6 +19,7 @@
     EXPORT_SYMBOL_GPL(noop_backing_dev_info);

     static struct class *bdi_class;
+    const char *bdi_unknown_name = "(unknown)";

     /*
     * bdi_lock protects updates to bdi_list. bdi_list has RCU reader side
     @@ -126,6 +127,7 @@
        bdi, &bdi_debug_stats_fops);
     if (!bdi->debug_stats) {
         debugfs_remove(bdi->debug_dir);
+        bdi->debug_dir = NULL;

     *
return -ENOMEM;
}

@@ -259,8 +261,8 @@
{
    int err;

    -bdi_wq = alloc_workqueue("writeback", WQ_MEM_RECLAIM | WQ_FREEZABLE |
    - WQ_UNBOUND | WQ_SYSFS, 0);
    +bdi_wq = alloc_workqueue("writeback", WQ_MEM_RECLAIM | WQ_UNBOUND |
    + WQ_SYSFS, 0);
    if (!bdi_wq)
        return -ENOMEM;

@@ -369,15 +371,8 @@
spin_lock_bh(&wb->work_lock);
    if (!test_and_clear_bit(WB_registered, &wb->state)) {
        spin_unlock_bh(&wb->work_lock);
        /*
        * Wait for wb shutdown to finish if someone else is just
        * running wb_shutdown(). Otherwise we could proceed to wb /
        * bdi destruction before wb_shutdown() is finished.
        * */
        -wait_on_bit(&wb->state, WB_shutting_down, TASK_UNINTERRUPTIBLE);
        return;
    }
    -set_bit(WB_shutting_down, &wb->state);
    spin_unlock_bh(&wb->work_lock);

cgwb_remove_from_bdi_list(wb);
@@ -389,12 +384,6 @@
spin_lock_bh(&wb->work_lock);
    mod_delayed_work(bdi_wq, &wb->dwork, 0);
    flush_delayed_work(&wb->dwork);
    WARN_ON(!list_empty(&wb->work_list));
    /*
    * Make sure bit gets cleared after shutdown is finished. Matches with
    * the barrier provided by test_and_clear_bit() above.
    */
    -smp_wmb();
    -clear_bit(WB_shutting_down, &wb->state);
}

static void wb_exit(struct bdi_writeback *wb)
@@ -422,6 +411,7 @@

static DEFINE_SPINLOCK(cgwb_lock);
+static struct workqueue_struct *cgwb_release_wq;
/**
 * wb_congested_get_create - get or create a wb_congested
 * @ @ -517,10 +507,12 @@
 * struct bdi_writeback *wb = container_of(work, struct bdi_writeback,
 * release_work);
 +
 * @ @ -532,7 +524,7 @@
 *
 * @ @ -706,6 +698,8 @@
 */

 static void cgwb_kill(struct bdi_writeback *wb)
 INIT_RADIX_TREE(&bdi->cgwb_tree, GFP_ATOMIC);
 bdi->cgwb_congested_tree = RB_ROOT;
 +
 +mutex_init(&bdi->cgwb_release_mutex);
 +init_rwsem(&bdi->wb_switch_rwsem);
 ret = wb_init(&bdi->wb, bdi, 1, GFP_KERNEL);
 if (!ret) {
 @ @ -726,7 +720,10 @@
 spin_lock_irq(&cgwb_lock);
 radix_tree_for_each_slot(slot, &bdi->cgwb_tree, &iter, 0)
 cgwb_kill(*slot);
 +spin_unlock_irq(&cgwb_lock);
 +
 +mutex_lock(&bdi->cgwb_release_mutex);
 +spin_lock_irq(&cgwb_lock);
 while (!list_empty(&bdi->wb_list)) {
 wb = list_first_entry(&bdi->wb_list, struct bdi_writeback,
 bdi_node);
 @ @ -735,6 +732,7 @@
 spin_lock_irq(&cgwb_lock);
 }

 +mutex_lock(&wb->bdi->cgwb_release_mutex);
 wb_shutdown(wb);

css_put(wb->memcg_css);
css_put(wb->blkcg_css);
+mutex_unlock(&wb->bdi->cgwb_release_mutex);

fprop_local_destroy_percpu(&wb->memcg_completions);
percpu_ref_exit(&wb->refcnt);
@ @ -532,7 +524,7 @@
{  
 struct bdi_writeback *wb = container_of(refcnt, struct bdi_writeback,
 refcnt);
 -schedule_work(&wb->release_work);
 +queue_work(cgwb_release_wq, &wb->release_work);
 }

+mutex_lock(&wb->bdi->cgwb_release_mutex);
wb_shutdown(wb);

fprop_local_destroy_percpu(&wb->memcg_completions);
percpu_ref_exit(&wb->refcnt);
@ @ -532,7 +524,7 @@
spin_unlock_irq(&cgwb_lock);
+mutex_unlock(&bdi->cgwb_release_mutex);
}

/**
@@ -796,6 +794,21 @@
spin_unlock_irq(&cgwb_lock);
}

+static int __init cgwb_init(void)
+{
+/*
+ * There can be many concurrent release work items overwhelming
+ * system_wq. Put them in a separate wq and limit concurrency.
+ * There's no point in executing many of these in parallel.
+ */
+cgwb_release_wq = alloc_workqueue("cgwb_release", 0, 1);
+if (!cgwb_release_wq)
+return -ENOMEM;
+
+return 0;
+}
+subsys_initcall(cgwb_init);
+
#else /* CONFIG_CGROUP_WRITEBACK */

static int cgwb_bdi_init(struct backing_dev_info *bdi)
--- linux-4.15.0.orig/mm/cma.c
+++ linux-4.15.0/mm/cma.c
@@ -105,8 +105,10 @@
cma->bitmap = kzalloc(bitmap_size, GFP_KERNEL);
-!cma->bitmap)
+!cma->bitmap) {
+cma->count = 0;
return -ENOMEM;
+}
+subsys_initcall(cgwb_init);
+
#else/* CONFIG_CGROUP_WRITEBACK */

cma->bitmap = kzalloc(bitmap_size, GFP_KERNEL);

-if (!cma->bitmap)
+if (!cma->bitmap) {
+cma->count = 0;
return -ENOMEM;
+}

WARN_ON_ONCE(!pfn_valid(pfn));
zone = page_zone(pfn_to_page(pfn));
@@ -275,6 +277,12 @@
alignment = max(alignment, (phys_addr_t)PAGE_SIZE * max_t(unsigned long, MAX_ORDER - 1, pageblock_order));
+if (fixed && base & (alignment - 1)) {
+ret = -EINVAL;
+pr_err("Region at %pa must be aligned to %pa bytes\n",}
+&base, &alignment);
+goto err;
+
base = ALIGN(base, alignment);
size = ALIGN(size, alignment);
limit &= ~(alignment - 1);
if (limit == 0 || limit > memblock_end) limit = memblock_end;

+if (base + size > limit) {
+ret = -EINVAL;
+pr_err("Size (%pa) of region at %pa exceeds limit (%pa)\n",
+&size, &base, &limit);
+goto err;
+}
+
/* Reserve memory */
if (fixed) {
if (memblock_is_region_reserved(base, size) ||
@@ -348,12 +363,14 @@
ret = cma_init_reserved_mem(base, size, order_per_bit, name, res_cma);
if (ret)
-goto err;
+goto free_mem;
}

pr_info("Reserved %ld MiB at %pa\n", (unsigned long)size / SZ_1M,
-&base);
return 0;
+
+free_mem:
+memblock_free(base, size);

err:
pr_err("Failed to reserve %ld MiB\n", (unsigned long)size / SZ_1M);
return ret;
@@ -362,23 +379,26 @@
ifndef CONFIG_CMA_DEBUG
static void cma_debug_show_areas(struct cma *cma)
{
-unsigned long next_zero_bit, next_set_bit;
+unsigned long next_zero_bit, next_set_bit, nr_zero;
unsigned long start = 0;
-unsigned int nr_zero, nr_total = 0;
+unsigned long nr_part, nr_total = 0;
+unsigned long nbits = cma_bitmap_maxno(cma);

mutex_lock(&cma->lock);
pr_info("number of available pages: ");
for (;;) {
    next_zero_bit = find_next_zero_bit(cma->bitmap, cma->count, start);
    if (next_zero_bit >= cma->count)
        next_zero_bit = find_next_zero_bit(cma->bitmap, nbits, start);
    if (next_zero_bit >= nbits)
        break;
    next_set_bit = find_next_bit(cma->bitmap, cma->count, next_zero_bit);
    nr_zero = next_set_bit - next_zero_bit;
    pr_cont("%s%u@%lu", nr_total ? "+" : "", nr_zero, next_zero_bit);
    nr_total += nr_zero;
    start = next_zero_bit + nr_zero;
}
pr_cont("=> %u free of %lu total pages
", nr_total, cma->count);
mutex_unlock(&cma->lock);
#else
    --- linux-4.15.0.orig/mm/cma_debug.c
    +++ linux-4.15.0/mm/cma_debug.c
    @@ -58,7 +58,7 @@
    mutex_lock(&cma->lock);
    for (;;) {
        start = find_next_zero_bit(cma->bitmap, bitmap_maxno, end);
        if (start >= cma->count)
            if (start >= bitmap_maxno)
                break;
        end = find_next_bit(cma->bitmap, bitmap_maxno, start);
        maxchunk = max(end - start, maxchunk);
        --- linux-4.15.0.orig/mm/compaction.c
        +++ linux-4.15.0/mm/compaction.c
        @@ -1540,6 +1540,17 @@
        unsigned long end_pfn = zone_end_pfn(zone);
        const bool sync = cc->mode != MIGRATE_ASYNC;

        /*
         * These counters track activities during zone compaction. Initialize
         * them before compacting a new zone.
         */
        +cc->total_migrate_scanned = 0;
        +cc->total_free_scanned = 0;
        +cc->nr_migratepages = 0;
        +cc->nr_freepages = 0;
+INIT_LIST_HEAD(&cc->freepages);
+INIT_LIST_HEAD(&cc->migratepages);
+
cc->migratetype = gfpflags_to_migratetype(cc->gfp_mask);
ret = compaction_suitable(zone, cc->order, cc->alloc_flags,
cceclasszone_idx);
@@ -1703,10 +1714,6 @@
{
enum compact_result ret;
struct compact_control cc = {
- .nr_freepages = 0,
- .nr_migratepages = 0,
- .total_migrate_scanned = 0,
- .total_free_scanned = 0,
.order = order,
.gfp_mask = gfp_mask,
.zone = zone,
@@ -1719,8 +1726,6 @@
          .ignore_skip_hint = (prio == MIN_COMPACT_PRIORITY),
          .ignore_block_suitable = (prio == MIN_COMPACT_PRIORITY)
    };
-INIT_LIST_HEAD(&cc.freepages);
-INIT_LIST_HEAD(&cc.migratepages);

ret = compact_zone(zone, &cc);
@@ -1819,8 +1824,6 @@
struct zone *zone;
struct compact_control cc = {
 .order = -1,
@@ -1834,11 +1837,7 @@
if (!populated_zone(zone))
continue;

-cc.nr_freepages = 0;
-cc.nr_migratepages = 0;
cc.zone = zone;
-INIT_LIST_HEAD(&cc.freepages);
-INIT_LIST_HEAD(&cc.migratepages);

compact_zone(zone, &cc);
@@ -1947,8 +1946,6 @@
struct zone *zone;
struct compact_control cc = {
    .order = pgdat->kcompactd_max_order,
    .total_migrate_scanned = 0,
    .total_free_scanned = 0,
    .classzone_idx = pgdat->kcompactd_classzone_idx,
    .mode = MIGRATE_SYNC_LIGHT,
    .ignore_skip_hint = false,

    cc.nr_freepages = 0;
    cc.nr_migratepages = 0;
    cc.total_migrate_scanned = 0;
    cc.total_free_scanned = 0;
    cc.zone = zone;
    INIT_LIST_HEAD(&cc.freepages);
    INIT_LIST_HEAD(&cc.migratepages);
    
    if (kthread_should_stop())
        return;
    +
    +cc.zone = zone;
    status = compact_zone(zone, &cc);

    if (status == COMPACT_SUCCESS) {
        --- linux-4.15.0.orig/mm/debug.c
        +++ linux-4.15.0/mm/debug.c
        @@ -100,7 +100,7 @@
        void dump_mm(const struct mm_struct *mm)
            {
                -pr_emerg("mm %px mmap %px seqnum %d task_size %lu\n"
                +pr_emerg("mm %px mmap %px seqnum %llu task_size %lu\n"
                #ifdef CONFIG_MMU
                "get_unmapped_area %px\n"
                #endif
                @@ -128,7 +128,7 @@
                "tlb_flush_pending %d\n"
                "def_flags: %#lx(%pGv)\n",
                -mm, mm->mmap, mm->vmacache_seqnum, mm->task_size,
                +mm, mm->mmap, (long long) mm->vmacache_seqnum, mm->task_size,
                #ifdef CONFIG_MMU
                mm->get_unmapped_area,
                #endif
                --- linux-4.15.0.orig/mm/fadvise.c
/* Careful about overflows. Len == 0 means "as much as possible" */
-endbyte = offset + len;

+/*
+ * Careful about overflows. Len == 0 means "as much as possible". Use
+ * unsigned math because signed overflows are undefined and UBSan
+ * complains.
+ */
+endbyte = (u64)offset + (u64)len;
if (!len || endbyte < len)
endbyte = -1;
else
	/*
	The page at end_index will be inclusively discarded according
	by invalidate_mapping_pages(), so subtracting 1 from
	end_index means we will skip the last page. But if endbyte
	not is page aligned or is at the end of the file, we should not skip

that page - discarding the last page is safe enough.
	*/
+if (((endbyte & ~PAGE_MASK) != ~PAGE_MASK &&
+    endbyte != inode->i_size - 1) {
/* First page is tricky as 0 - 1 = -1, but pgoff_t
 * is unsigned, so the end_index >= start_index
 * check below would be true and we'll discard the whole
--- linux-4.15.0.orig/mm/filemap.c
+++ linux-4.15.0/mm/filemap.c
@@ -438,7 +438,8 @@
       .range_end = end,
       .range_end = end,
   
-!mapping_cap_writeback_dirty(mapping))
+!mapping_cap_writeback_dirty(mapping) ||
   !mapping_tagged(mapping, PAGECACHE_TAG_DIRTY))
return 0;

wbc_attach_fdatawrite_inode(&wbc, mapping->host);
EXCEPTION_SYMBOL(filemap_fdatawait_range);
/**
 * filemap_fdatawait_range_keep_errors - wait for writeback to complete
 * @mapping: address space structure to wait for
 * @start_byte: offset in bytes where the range starts
 * @end_byte: offset in bytes where the range ends (inclusive)
 * Walk the list of under-writeback pages of the given address space in the
 * given range and wait for all of them. Unlike filemap_fdatawait_range(),
 * this function does not clear error status of the address space.
 * Use this function if callers don’t handle errors themselves. Expected
 * call sites are system-wide / filesystem-wide data flushers: e.g. sync(2),
 * fsfreeze(8)
 */
int filemap_fdatawait_range_keep_errors(struct address_space *mapping,
	loff_t start_byte, loff_t end_byte)
{
	__filemap_fdatawait_range(mapping, start_byte, end_byte);
	return filemap_check_and_keep_errors(mapping);
}
EXPORT_SYMBOL(filemap_fdatawait_range_keep_errors);

/**
 * file_fdatawait_range - wait for writeback to complete
 * @file: file pointing to address space structure to wait for
 * @start_byte: offset in bytes where the range starts
 */
#error = radix_tree_preload(gfp_mask & ~__GFP_HIGHMEM);
+error = radix_tree_preload(gfp_mask & GFP_RECLAIM_MASK);
if (error) {
    struct address_space *mapping = old->mapping;
    void (*freepage)(struct page *);
@@ -786,7 +809,7 @@
    return error;
}
-error = radix_tree_maybe_preload(gfp_mask & ~__GFP_HIGHMEM);
+error = radix_tree_maybe_preload(gfp_mask & GFP_RECLAIM_MASK);
if (error) {
    if (!huge)
        mem_cgroup_cancel_charge(page, memcg, false);
@@ -1585,8 +1608,7 @@
        __SetPageReferenced(page);
-err = add_to_page_cache_lru(page, mapping, offset,
-gfp_mask & GFP_RECLAIM_MASK);
+err = add_to_page_cache_lru(page, mapping, offset, gfp_mask);
if (unlikely(err)) {
    put_page(page);
    page = NULL;
    @ @ -2389,7 +2411,7 @@
if (!page)
return -ENOMEM;

-ret = add_to_page_cache_lru(page, mapping, offset, gfp_mask & GFP_KERNEL);
+ret = add_to_page_cache_lru(page, mapping, offset, gfp_mask);
if (ret == 0)
    ret = mapping->a_ops->readpage(file, page);
else if (ret == -EEXIST)
    @ @ -2704,7 +2726,7 @@
int ret = VM_FAULT_LOCKED;

sb_start_pagefault(inode->i_sb);
-file_update_time(vmf->vma->vm_file);
+vma_file_update_time(vmf->vma);
lock_page(page);
if (page->mapping != inode->i_mapping) {
    unlock_page(page);
    @ @ -2866,6 +2888,14 @@
unlock_page(page):
    goto out;
}
+
+/
+ * A previous I/O error may have been due to temporary
+ * failures.
+ * Clear page error before actual read, PG_error will be
+ * set again if read page fails.
+ */
+ClearPageError(page);
    goto filler;
out:
--- linux-4.15.0.orig/mm/gup.c
+++ linux-4.15.0/mm/gup.c
@@ -61,13 +61,22 @@
}

/*
- * FOLL_FORCE can write to even unwritable pte's, but only
- * after we've gone through a COW cycle and they are dirty.
+ * FOLL_FORCE or a forced COW break can write even to unwritable pte's,
but only after we've gone through a COW cycle and they are dirty.
*/
static inline bool can_follow_write_pte(pte_t pte, unsigned int flags)
{
  return pte_write(pte) ||
  ((flags & FOLL_FORCE) && (flags & FOLL_COW) && pte_dirty(pte));
  return pte_write(pte) || ((flags & FOLL_COW) && pte_dirty(pte));
}

/*
 * A (separate) COW fault might break the page the other way and
 * get_user_pages() would return the page from what is now the wrong
 * VM. So we need to force a COW break at GUP time even for reads.
 * */
static inline bool should_force_cow_break(struct vm_area_struct *vma, unsigned int flags)
{
  return is_cow_mapping(vma->vm_flags) && (flags & (FOLL_GET));
}

static struct page *follow_page_pte(struct vm_area_struct *vma,
if (flags & FOLL_GET) {
  -get_page(page);
  +if (unlikely(!try_get_page(page))) {
    +page = ERR_PTR(-ENOMEM);
    +goto out;
    +}
    +/*
    * drop the pgmap reference now that we hold the page */
    if (pgmap) {
      +@ @ -280,7 +292,10 @@
      if (pmd_trans_unstable(pmd))
        ret = -EBUSY;
      } else {
        -get_page(page);
        +if (unlikely(!try_get_page(page))) {
          +spin_unlock(ptl);
          +return ERR_PTR(-ENOMEM);
        +}
        spin_unlock(ptl);
        lock_page(page);
        ret = split_huge_page(page);
      +@ @ -436,11 +451,14 @@
      pgd = pgd_offset_k(address);
    else
      pgd = pgd_offset_gate(mm, address);
BUG_ON(pgd_none(*pgd));
+if (pgd_none(*pgd))
+return -EFAULT;
p4d = p4d_offset(pgd, address);
-BUG_ON(p4d_none(*p4d));
+if (p4d_none(*p4d))
+return -EFAULT;
pud = pud_offset(p4d, address);
-BUG_ON(pud_none(*pud));
+if (pud_none(*pud))
+return -EFAULT;
pmd = pmd_offset(pud, address);
if (!pmd_present(*pmd))
return -EFAULT;
@@ -464,7 +482,10 @@
if (is_device_public_page(*page))
goto unmap;
}
-get_page(*page);
+if (unlikely(!try_get_page(*page))) {
+ret = -ENOMEM;
+goto unmap;
+}
out:
ret = 0;
unmap:
@@ -544,6 +565,9 @@
if (vm_flags & (VM_IO | VM_PFNMAP))
return -EFAULT;
+if (gup_flags & FOLL_ANON && !vma_is_anonymous(vma))
+return -EFAULT;
+
if (write) {
if (!((vm_flags & VM_WRITE)) {
if (!((gup_flags & FOLL_FORCE))
@@ -679,12 +703,18 @@
if (!vma || check_vma_flags(vma, gup_flags))
return i ? : -EFAULT;
if (is_vm_hugetlb_page(vma)) {
+if (should_force_cow_break(vma, foll_flags))
+foll_flags |= FOLL_WRITE;
i = follow_hugetlb_page(mm, vma, pages, vmas,
&start, &nr_pages, i,
-gup_flags, nonblocking);
+foll_flags, nonblocking);
continue;
}
if (should_force_cow_break(vma, foll_flags))
    foll_flags |= FOLL_WRITE;
+
retry:
/*
 * If we have a pending SIGKILL, don't keep faulting pages and
*/
int locked = 0;
long ret = 0;

-VM_BUG_ON(start & ~PAGE_MASK);
-VM_BUG_ON(len != PAGE_ALIGN(len));
end = start + len;

for (nstart = start; nstart < end; nstart = nend) {
    @ @ -1354,7 +1382,8 @@
}#endif

-static void undo_dev_pagemap(int *nr, int nr_start, struct page **pages)
+static void __maybe_unused undo_dev_pagemap(int *nr, int nr_start,
    struct page **pages)
{
    while ((*nr) - nr_start) {
        struct page *page = pages[--(*nr)];
        @ @ -1364,6 +1393,20 @@
    }
}

+/*
 + * Return the compound head page with ref appropriately incremented,
 + * or NULL if that failed.
 + */
+static inline struct page *try_get_compound_head(struct page *page, int refs)
+{
+struct page *head = compound_head(page);
+if (WARN_ON_ONCE(page_ref_count(head) < 0))
+    return NULL;
+if (unlikely(!page_cache_add_speculative(head, refs)))
+    return NULL;
+return head;
+}

#ifdef __HAVE_ARCH_PTE_SPECIAL
static int gup_pte_range(pmd_t pmd, unsigned long addr, unsigned long end,
    int write, struct page **pages, int *nr)
VM_BUG_ON(!pfn_valid(pte_pfn(pte)));
page = pte_page(pte);
-head = compound_head(page);

-if (!page_cache_get_speculative(head))
+head = try_get_compound_head(page, 1);
+if (!head)
  goto pte_unmap;

if (unlikely(pte_val(pte) != pte_val(*ptep))) {
@@ -1398,9 +1441,9 @@
VM_BUG_ON(!pfn_valid(pte_pfn(pte)));
page = pte_page(pte);
-head = compound_head(page);

-if (!page_cache_get_speculative(head))
+head = try_get_compound_head(page, 1);
+if (!head)
  goto pte_unmap;

if (unlikely(pte_val(pte) != pte_val(*ptep))) {
@@ -1466,32 +1509,48 @@
return 1;
}

-static int __gup_device_huge_pmd(pmd_t pmd, unsigned long addr,
+static int __gup_device_huge_pmd(pmd_t orig, pmd_t *pmdp, unsigned long addr,
unsigned long end, struct page **pages, int *nr)
{
  unsigned long fault_pfn;
  int nr_start = *nr;

    fault_pfn = pmd_pfn(pmd) + ((addr & ~PMD_MASK) >> PAGE_SHIFT);
-  return __gup_device_huge(fault_pfn, addr, end, pages, nr);
+  return __gup_device_huge(fault_pfn, addr, end, pages, nr);

    if (!__gup_device_huge(fault_pfn, addr, end, pages, nr))
      return 0;
+
+    if (unlikely(pmd_val(orig) != pmd_val(*pmdp))) {
+      undo_dev_pagemap(nr, nr_start, pages);
+      return 0;
+    }
+    return 1;

-static int __gup_device_huge_pud(pud_t pud, unsigned long addr,
+static int __gup_device_huge_pud(pud_t orig, pud_t *pudp, unsigned long addr,
unsigned long end, struct page **pages, int *nr)
{
  unsigned long fault_pfn;
  int nr_start = *nr;

    fault_pfn = pud_pfn(pud) + ((addr & ~PUD_MASK) >> PAGE_SHIFT);
-  return __gup_device_huge(fault_pfn, addr, end, pages, nr);
+  return __gup_device_huge(fault_pfn, addr, end, pages, nr);

    if (!__gup_device_huge(fault_pfn, addr, end, pages, nr))
      return 0;
+if (unlikely(pud_val(orig) != pud_val(*pudp))) {
+undo_dev_pagemap(nr, nr_start, pages);
+return 0;
+
+return 1;
}
#else
+static int __gup_device_huge_pmd(pmd_t orig, pmd_t *pmdp, unsigned long addr,
+unsigned long end, struct page **pages, int *nr)
+
+BUILD_BUG();
+return 0;
}

+static int __gup_device_huge_pud(pud_t pud, unsigned long addr,
+unsigned long end, struct page **pages, int *nr)
+
+BUILD_BUG();
@@ -1509,7 +1568,7 @@
+if (pmd_devmap(orig))
+return __gup_device_huge_pmd(orig, addr, end, pages, nr);
+return __gup_device_huge_pmd(orig, pmdp, addr, end, pages, nr);

+refs = 0;
+page = pmd_page(orig) + ((addr & ~PMD_MASK) >> PAGE_SHIFT);
+@@ -1520,8 +1579,8 @@
+refs++;
+} while (addr += PAGE_SIZE, addr != end);

+head = compound_head(pmd_page(orig));
+if (!page_cache_add_speculative(head, refs)) {
+head = try_get_compound_head(pmd_page(orig), refs);
+if (!head) {
+*nr -= refs;
+return 0;
+
+}
@@ -1547,7 +1606,7 @@
+return 0;
}

+if (pud_devmap(orig))
+return __gup_device_huge_pud(orig, addr, end, pages, nr);
+return __gup_device_huge_pud(orig, pudp, addr, end, pages, nr);
refs = 0;
page = pud_page(orig) + ((addr & ~PUD_MASK) >> PAGE_SHIFT);
@@ -1558,8 +1617,8 @@
refs++;
} while (addr += PAGE_SIZE, addr != end);

-head = compound_head(pud_page(orig));
-if (!page_cache_add_speculative(head, refs)) {
+head = try_get_compound_head(pud_page(orig), refs);
+if (!head) {
 *nr -= refs;
 return 0;
 }
@@ -1595,8 +1654,8 @@
refs++;
} while (addr += PAGE_SIZE, addr != end);

-head = compound_head(pgd_page(orig));
-if (!page_cache_add_speculative(head, refs)) {
+head = try_get_compound_head(pgd_page(orig), refs);
+if (!head) {
 *nr -= refs;
 return 0;
 }
@@ -1626,7 +1685,8 @@
if (!pmd_present(pmd))
 return 0;

-if (unlikely(pmd_trans_huge(pmd) || pmd_huge(pmd))) {
+if (unlikely(pmd_trans_huge(pmd) || pmd_huge(pmd) ||
+ pmd_devmap(pmd))) {
/*
 * NUMA hinting faults need to be handled in the GUP
 * slowpath for accounting purposes and so that they
@@ -1751,6 +1811,10 @@
/*
 * Like get_user_pages_fast() except it's IRQ-safe in that it won't fall back to
 * the regular GUP. It will only return non-negative values.
 + *
 + * Careful, careful! COW breaking can go either way, so a non-write
 + * access can get ambiguous page results. If you call this function without
 + * 'write' set, you'd better be sure that you're ok with that ambiguity.
 */
int __get_user_pages_fast(unsigned long start, int nr_pages, int write,
 struct page **pages)
@@ -1778,6 +1842,12 @@
 *
 * We do not adopt an rcu_read_lock(.) here as we also want to
* block IPIs that come from THPs splitting.
+ *
+ * NOTE! We allow read-only gup_fast() here, but you'd better be
+ * careful about possible COW pages. You'll get _a_ COW page, but
+ * not necessarily the one you intended to get depending on what
+ * COW event happens after this. COW may break the page copy in a
+ * random direction.
+ */

if (gup_fast_permitted(start, nr_pages, write)) {
    len = (unsigned long) nr_pages << PAGE_SHIFT;
    end = start + len;

    if (nr_pages <= 0)
        return 0;
    +
    if (unlikely(!access_ok(write ? VERIFY_WRITE : VERIFY_READ,
          (void __user *)start, len)))
        return 0;
    +return -EFAULT;
+
    */
    +* The FAST_GUP case requires FOLL_WRITE even for pure reads,
    +* because get_user_pages() may need to cause an early COW in
    +* order to avoid confusing the normal COW routines. So only
    +* targets that are already writable are safe to do by just
    +* looking at the page tables.
    +*/
    if (gup_fast_permitted(start, nr_pages, write)) {
        local_irq_disable();
        -gup_pgd_range(addr, end, write, pages, &nr);
        +gup_pgd_range(addr, end, 1, pages, &nr);
        local_irq_enable();
        ret = nr;
    }
    
--- linux-4.15.0.orig/mm/gup_benchmark.c
+++ linux-4.15.0/mm/gup_benchmark.c
@@ -19,11 +19,15 @@
struct gup_benchmark *gup)
{
    ktime_t start_time, end_time;
    -unsigned long i, nr, nr_pages, addr, next;
    +unsigned long i, nr_pages, addr, next;
    +int nr;
    struct page **pages;

    +if (gup->size > ULONG_MAX)
nr_pages = gup->size / PAGE_SIZE;
if (!pages)
    return -ENOMEM;
    
end_time = ktime_get();
--- linux-4.15.0.orig/mm/hmm.c
+++ linux-4.15.0/mm/hmm.c
@@ -277,7 +277,8 @@
    unsigned long end,
    struct mm_walk *walk)
{
-    struct hmm_range *range = walk->private;
+    struct hmm_vma_walk *hmm_vma_walk = walk->private;
+    struct hmm_range *range = hmm_vma_walk->range;
    hmm_pfn_t *pfns = range->pfns;
    unsigned long i;

@@ -766,7 +767,6 @@
devmem = container_of(ref, struct hmm_devmem, ref);
    percpu_ref_exit(ref);
    -devm_remove_action(devmem->device, &hmm_devmem_ref_exit, data);
 }
static void hmm_devmem_release(void *data)
{
    struct hmm_devmem *devmem = data;
    struct resource *resource = devmem->resource;
    if (percpu_ref_tryget_live(&devmem->ref)) {
        dev_WARN(dev, "%s: page mapping is still live!\n", __func__);
        percpu_ref_put(&devmem->ref);
    }
    /* pages are dead and unused, undo the arch mapping */
    start_pfn = (resource->start & ~(PA_SECTION_SIZE - 1)) >> PAGE_SHIFT;
    npages = ALIGN(resource_size(resource), PA_SECTION_SIZE) >> PAGE_SHIFT;
    percpu_ref_put(&devmem->ref);
    return ret;
}

static int hmm_devmem_match(struct device *dev, void *data, void *match_data)
{
    struct hmm_devmem *devmem = data;
    return devmem->resource == match_data;
}

static void hmm_devmem_pages_remove(struct hmm_devmem *devmem)
{
    devres_release(devmem->device, &hmm_devmem_release,
          &hmm_devmem_match, devmem->resource);
}

/*
 * hmm_devmem_add() - hotplug ZONE_DEVICE memory for device memory
 */

static_branch_enable(&device_private_key);

-devmem = devres_alloc_node(&hmm_devmem_release, sizeof(*devmem),
- GFP_KERNEL, dev_to_node(device));
+devmem = devm_kzalloc(device, sizeof(*devmem), GFP_KERNEL);
if (!devmem)
return ERR_PTR(-ENOMEM);

@@ -1014,11 +996,11 @@
ret = percpu_ref_init(&devmem->ref, &hmm_devmem_ref_release,
0, GFP_KERNEL);
if (ret)
-goto error_percpu_ref;
+return ERR_PTR(ret);

-ret = devm_add_action(device, hmm_devmem_ref_exit, &devmem->ref);
+ret = devm_add_action_or_reset(device, hmm_devmem_ref_exit, &devmem->ref);
if (ret)
-goto error_devm_add_action;
+return ERR_PTR(ret);

size = ALIGN(size, PA_SECTION_SIZE);
addr = min((unsigned long)iomem_resource.end,
@@ -1038,16 +1020,12 @@
devmem->resource = devm_request_mem_region(device, addr, size,
    dev_name(device));
-if (!devmem->resource) {
-    ret = -ENOMEM;
-    goto error_no_resource;
-}
+if (!devmem->resource)
+    return ERR_PTR(-ENOMEM);
break;
} 
-if (!devmem->resource) {
-    ret = -ERANGE;
-    goto error_no_resource;
-}
+if (!devmem->resource)
+    return ERR_PTR(-ERANGE);

devmem->resource->desc = IORES_DESC_DEVICE_PRIVATE_MEMORY;
devmem->pfn_first = devmem->resource->start >> PAGE_SHIFT;
@@ -1056,30 +1034,15 @@
ret = hmm_devmem_pages_create(devmem);
if (ret)
- goto error_pages;
-
-devres_add(device, devmem);
+return ERR_PTR(ret);

-ret = devm_add_action(device, hmm_devmem_ref_kill, &devmem->ref);
-if (ret) {
- hmm_devmem_remove(devmem);
+ret = devm_add_action_or_reset(device, hmm_devmem_release, devmem);
+if (ret)
 return ERR_PTR(ret);
-
}

return devmem;
-
-error_pages:
- devm_release_mem_region(device, devmem->resource->start,
- resource_size(devmem->resource));
- error_no_resource:
- error_devm_add_action:
- hmm_devmem_ref_kill(&devmem->ref);
- hmm_devmem_ref_exit(&devmem->ref);
- error_percpu_ref:
- devres_free(devmem);
- return ERR_PTR(ret);
}
-EXPORT_SYMBOL(hmm_devmem_add);
+EXPORT_SYMBOL_GPL(hmm_devmem_add);

struct hmm_devmem *hmm_devmem_add_resource(const struct hmm_devmem_ops *ops,
 struct device *device,
@@ -1093,8 +1056,7 @@
 static_branch_enable(&device_private_key);

-devmem = devres_alloc_node(&hmm_devmem_release, sizeof(*devmem),
- GFP_KERNEL, dev_to_node(device));
+devmem = devm_kzalloc(device, sizeof(*devmem), GFP_KERNEL);
 if (!devmem)
 return ERR_PTR(-ENOMEM);
@@ -1098,12 +1059,12 @@
 ret = percpu_ref_init(&devmem->ref, &hmm_devmem_ref_release,
 0, GFP_KERNEL);
 if (ret)
- goto error_percpu_ref;
+ return ERR_PTR(ret);
ret = devm_add_action(device, hmm_devmem_ref_exit, &devmem->ref);
+ret = devm_add_action_or_reset(device, hmm_devmem_ref_exit,
+&devmem->ref);
if (ret)
-goto error_devm_add_action;
-
+return ERR_PTR(ret);

devmem->pfn_first = devmem->resource->start >> PAGE_SHIFT;
devmem->pfn_last = devmem->pfn_first +
@@ -1121,58 +1083,20 @@
ret = hmm_devmem_pages_create(devmem);
if (ret)
-goto error_devm_add_action;
+return ERR_PTR(ret);
-devres_add(device, devmem);
+ret = devm_add_action_or_reset(device, hmm_devmem_release, devmem);
+if (ret)
+return ERR_PTR(ret);

-ret = devm_add_action(device, hmm_devmem_ref_kill, &devmem->ref);
-if (ret) {
-hmm_devmem_remove(devmem);
+ret = devm_add_action_or_reset(device, hmm_devmem_ref_kill,
+&devmem->ref);
+if (ret)
+return ERR_PTR(ret);
-
+return devmem;
-
-error_devm_add_action:
-hmm_devmem_ref_kill(&devmem->ref);
-hmm_devmem_ref_exit(&devmem->ref);
-error_percpu_ref:
-devres_free(devmem);
-return ERR_PTR(ret);
-}
-EXPORT_SYMBOL(hmm_devmem_add_resource);
-
-/*
- * hmm_devmem_remove() - remove device memory (kill and free ZONE DEVICE)
- *
- */
- * @devmem: hmm_devmem struct use to track and manage the ZONE_DEVICE memory
- *
This will hot-unplug memory that was hotplugged by hmm_devmem_add on behalf of the device driver. It will free struct page and remove the resource that reserved the physical address range for this device memory.

```c
- *
- void hmm_devmem_remove(struct hmm_devmem *devmem)
  - {
    - resource_size_t start, size;
    - struct device *device;
    - bool cdm = false;
    -
    - if (!devmem)
      - return;
    -
    - device = devmem->device;
    - start = devmem->resource->start;
    - size = resource_size(devmem->resource);
    -
    - cdm = devmem->resource->desc == IORES_DESC_DEVICE_PUBLIC_MEMORY;
    - hmm_devmem_ref_kill(&devmem->ref);
    - hmm_devmem_ref_exit(&devmem->ref);
    - hmm_devmem_pages_remove(devmem);
    -
    - if (!cdm)
      - devm_release_mem_region(device, start, size);
  }
-EXPORT_SYMBOL(hmm_devmem_remove);
+EXPORT_SYMBOL_GPL(hmm_devmem_add_resource);
```

A device driver that wants to handle multiple devices memory through a

```c
/*
 * A device driver that wants to handle multiple devices memory through a
--- linux-4.15.0.orig/mm/huge_memory.c
+++ linux-4.15.0/mm/huge_memory.c
@@ -33,6 +33,7 @@
#include <linux/page_idle.h>
#include <linux/shmem_fs.h>
#include <linux/oom.h>
+include <linux/page_owner.h>
#include <asm/tlb.h>
#include <asm/pgalloc.h>
@@ -162,16 +163,13 @@
  }
  ssize_t ret = count;
-    if (!memcmp("always", buf,
   - min(sizeof("always")-1, count)) {
+    if (sysfs_streq(buf, "always")) {
      clear_bit(TRANSPARENT_HUGEPAGE_REQ_MADV_FLAG, &transparent_hugepage_flags);
```
set_bit(TRANSPARENT_HUGEPAGE_FLAG, &transparent_hugepage_flags);
-} else if (!memcmp("madvise", buf,
  - min(sizeof("madvise")-1, count))) {
+} else if (sysfs_streq(buf, "madvise")) {
  clear_bit(TRANSPARENT_HUGEPAGE_FLAG, &transparent_hugepage_flags);
  set_bit(TRANSPARENT_HUGEPAGE_REQ_MADV_FLAG, &transparent_hugepage_flags);
  -} else if (!memcmp("never", buf,
  - min(sizeof("never")-1, count))) {
+} else if (sysfs_streq(buf, "never")) {
  clear_bit(TRANSPARENT_HUGEPAGE_FLAG, &transparent_hugepage_flags);
  clear_bit(TRANSPARENT_HUGEPAGE_REQ_MADV_FLAG, &transparent_hugepage_flags);
} else
@@ -235,32 +233,27 @@
    struct kobj_attribute *attr,
    const char *buf, size_t count)
{
  -if (!memcmp("always", buf,
     - min(sizeof("always")-1, count))) {
+  if (sysfs_streq(buf, "always")) {
    clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
    clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_OR_MADV_FLAG, &transparent_hugepage_flags);
    clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_REQ_MADV_FLAG, &transparent_hugepage_flags);
    set_bit(TRANSPARENT_HUGEPAGE_DEFRAG_DIRECT_FLAG, &transparent_hugepage_flags);
    -} else if (!memcmp("defer+madvise", buf,
     - min(sizeof("defer+madvise")-1, count))) {
+    } else if (sysfs_streq(buf, "defer+madvise")) {
      clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
      clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_OR_MADV_FLAG, &transparent_hugepage_flags);
      clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_REQ_MADV_FLAG, &transparent_hugepage_flags);
      set_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
      -} else if (!memcmp("defer", buf,
        - min(sizeof("defer")-1, count))) {
+      } else if (sysfs_streq(buf, "defer")) {
        clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
        clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_OR_MADV_FLAG, &transparent_hugepage_flags);
        clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_REQ_MADV_FLAG, &transparent_hugepage_flags);
        set_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
        -} else if (!memcmp("madvise", buf,
          - min(sizeof("madvise")-1, count))) {
+        } else if (sysfs_streq(buf, "madvise")) {
          clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
          clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_OR_MADV_FLAG, &transparent_hugepage_flags);
          clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_REQ_MADV_FLAG, &transparent_hugepage_flags);
          set_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
-} else if (!memcmp("never", buf, 
-   min(sizeof("never")-1, count))) {
+} else if (sysfs_streq(buf, "never")) {
    clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_DIRECT_FLAG, &transparent_hugepage_flags);
    clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_FLAG, &transparent_hugepage_flags);
    clear_bit(TRANSPARENT_HUGEPAGE_DEFRAG_KSWAPD_OR_MADV_FLAG, 
    &transparent_hugepage_flags);
    @@ -501,13 +494,13 @@
    set_compound_page_dtor(page, TRANSHUGE_PAGE_DTOR);
 }

-unsigned long __thp_get_unmapped_area(struct file *filp, unsigned long len,
+static unsigned long __thp_get_unmapped_area(struct file *filp,
   unsigned long addr, unsigned long len,
   loff_t off, unsigned long flags, unsigned long size)
{
    unsigned long len_pad;
    loff_t off_end = off + len;
    loff_t off_align = round_up(off, size);
    -unsigned long len_pad;
    +unsigned long len_pad, ret;

    if (off_end <= off_align || (off_end - off_align) < size)
        return 0;
    @@ -516,30 +509,40 @@
    if (len_pad < len || (off + len_pad) < off)
        return 0;

    -addr = current->mm->get_unmapped_area(filp, 0, len_pad,
    +ret = current->mm->get_unmapped_area(filp, addr, len_pad,
    off >> PAGE_SHIFT, flags);
    -if (IS_ERR_VALUE(addr))
        +
        +/*
        + * The failure might be due to length padding. The caller will retry
        + * without the padding.
        + */
        +if (IS_ERR_VALUE(ret))
            return 0;

        -addr += (off - addr) & (size - 1);
        -return addr;
        +/*
        + * Do not try to align to THP boundary if allocation at the address
        + * hint succeeds.
        + */
        +if (ret == addr)
            +return addr;

Open Source Used In 5GaaS Edge AC-4  33263
unsigned long thp_get_unmapped_area(struct file *filp, unsigned long addr, unsigned long len, unsigned long pgoff, unsigned long flags)
{
+unsigned long ret;
loff_t off = (loff_t)pgoff << PAGE_SHIFT;

-if (addr)
goto out;
if (!IS_DAX(filp->f_mapping->host) || !IS_ENABLED(CONFIG_FS_DAX_PMD))
goto out;

-addr = __thp_get_unmapped_area(filp, len, off, flags, PMD_SIZE);
-if (addr)
-return addr;
-
-out:
+ret = __thp_get_unmapped_area(filp, addr, len, off, flags, PMD_SIZE);
+if (ret)
+return ret;
+out:
return current->mm->get_unmapped_area(filp, addr, len, pgoff, flags);
}
EXPORT_SYMBOL_GPL(thp_get_unmapped_area);
@@ -555,7 +558,8 @@
VM_BUG_ON_PAGE(!PageCompound(page), page);

-if (mem_cgroup_try_charge(page, vma->vm_mm, gfp, &memcg, true)) {
+if (mem_cgroup_try_charge(page, vma->vm_mm, gfp | __GFP_NORETRY, &memcg, 
+true)) {
  put_page(page);
  count_vm_event(THP_FAULT_FALLBACK);
  return VM_FAULT_FALLBACK;
@@ -684,7 +688,25 @@
  transparent_hugepage_use_zero_page()) {
  pgtbl_t pgtbl;
  struct page *zero_page;
-bool set;
-int ret;
  pgtbl = pte_alloc_one(vma->vm_mm, haddr);
  if (unlikely(!pgtbl))
@@ -697,25 +700,25 @@
}
vmf->ptl = pmd_lock(vma->vm_mm, vmf->pmd);
ret = 0;
-set = false;
if (pmd_none(*vmf->pmd)) {
ret = check_stable_address_space(vma->vm_mm);
if (ret) {
spin_unlock(vmf->ptl);
+pte_free(vma->vm_mm, pgtable);
} else if (userfaultfd_missing(vma)) {
spin_unlock(vmf->ptl);
+pte_free(vma->vm_mm, pgtable);
ret = handle_userfault(vmf, VM_UFFD_MISSING);
VM_BUG_ON(ret & VM_FAULT_FALLBACK);
} else {
set_huge_zero_page(pgtable, vma->vm_mm, vma,
    haddr, vmf->pmd, zero_page);
spin_unlock(vmf->ptl);
-set = true;
}
} else
+} else {
spin_unlock(vmf->ptl);
-if (!set)
+pte_free(vma->vm_mm, pgtable);
+
return ret;
}
gfp = alloc_hugepage_direct_gfpmask(vma);
@@ -737,6 +740,21 @@
spinlock_t *ptl;

ptl = pmd_lock(mm, pmd);
+if (!pmd_none(*pmd)) {
+if (write) { 
+if (pmd_pfn(*pmd) != pfn_t_to_pfn(pfn)) {
+WARN_ON_ONCE(!is_huge_zero_pmd(*pmd));
+goto out_unlock;
+
+entry = pmd_mkyoung(*pmd);
+entry = maybe_pmd_mkwrite(pmd_mkdirty(entry), vma);
+if (pmdp_set_access_flags(vma, addr, pmd, entry, 1))
+update_mmu_cache_pmd(vma, addr, pmd);
+
+goto out_unlock;
+
+entry = pmd_mkhuge(pfn_t_pmd(pfn, prot));


if (pfn_t_devmap(pfn))
    entry = pmd_mkdevmap(entry);
@@ -748,18 +766,25 @@
if (pgtable) {
    pgtable_transhuge_deposit(mm, pmd, pgtable);
    mm_inc_nr_ptes(mm);
    +pgtable = NULL;
}

set_pmd_at(mm, addr, pmd, entry);
update_mmu_cache_pmd(vma, addr, pmd);
+
+out_unlock:
spin_unlock(ptl);
+if (pgtable)
+pte_free(mm, pgtable);
}

-int vmf_insert_pfn_pmd(struct vm_area_struct *vma, unsigned long addr,
-pmd_t *pmd, pfn_t pfn, bool write)
+int vmf_insert_pfn_pmd(struct vm_fault *vmf, pfn_t pfn, bool write)
{
+unsigned long addr = vmf->address & PMD_MASK;
+struct vm_area_struct *vma = vmf->vma;
    pgprot_t pgprot = vma->vm_page_prot;
    pgtable_t pgtable = NULL;
    +/*
+ * If we had pmd_special, we could avoid all these restrictions,
+ * but we need to be consistent with PTEs and architectures that
+ * @ @ -782,7 +807,7 @ @
+
    track_pfn_insert(vma, &pgprot, pfn);

-insert_pfn_pmd(vma, addr, pmd, pfn, pgprot, write, pgtable);
+insert_pfn_pmd(vma, addr, vmf->pmd, pfn, pgprot, write, pgtable);
return VM_FAULT_NOPAGE;
}
EXPORT_SYMBOL_GPL(vmf_insert_pfn_pmd);
@@ -803,6 +828,20 @@
spinlock_t *ptl;

ptl = pud_lock(mm, pud);
+if (!pud_none(*pud)) {
+    +if (write) {
+        +if (pud_pfn(*pud) != pfn_t_to_pfn(pfn)) {
+            +WARN_ON_ONCE(!is_huge_zero_pud(*pud));
+            +goto out_unlock;
+        }
+    }
+}

+}  
+entry = pud_mkyoung(*pud);  
+entry = maybe_pud_mkwrite(pud_mkdirty(entry), vma);  
+if (pudp_set_access_flags(vma, addr, pud, entry, 1))  
+update_mmu_cache_pud(vma, addr, pud);  
+}  
+goto out_unlock;  
+}  
+entry = pud_mkhuge(pfn_t_pud(pfn, prot));  
if (pfn_t_devmap(pfn))  
entry = pud_mkdevmap(entry);  
@@ -812,13 +851,17 @@  
}  
set_pud_at(mm, addr, pud, entry);  
update_mmu_cache_pud(vma, addr, pud);  
+  
+out_unlock:  
spin_unlock(ptl);  
}  

-int vmf_insert_pfn_pud(struct vm_area_struct *vma, unsigned long addr,  
-pud_t *pud, pfn_t pfn, bool write)  
+int vmf_insert_pfn_pud(struct vm_fault *vmf, pfn_t pfn, bool write)  
{  
+unsigned long addr = vmf->address & PUD_MASK;  
+struct vm_area_struct *vma = vmf->vma;  
pgprot_t pgprot = vma->vm_page_prot;  
+  
/*  
* If we had pud_special, we could avoid all these restrictions,  
* but we need to be consistent with PTEs and architectures that  
@@ -835,7 +878,7 @@  
track_pfn_insert(vma, &pgprot, pfn);  

-insert_pfn_pud(vma, addr, pud, pfn, pgprot, write);  
+insert_pfn_pud(vma, addr, vmf->pud, pfn, pgprot, write);  
return VM_FAULT_NOPAGE;  
}  
EXPORT_SYMBOL_GPL(vmf_insert_pfn_pud);  
@@ -1316,7 +1359,7 @@  
}  

if (unlikely(mem_cgroup_try_charge(new_page, vma->vm_mm,  
-huge_gfp, &memcg, true))) {  
+huge_gfp | __GFP_NORETRY, &memcg, true))) {  
put_page(new_page);  

split_huge_pmd(vma, vmf->pmd, vmf->address);
if (page)
@@ -1381,13 +1424,12 @@
}
/*
- * FOLL_FORCE can write to even unwritable pmd's, but only
- * after we've gone through a COW cycle and they are dirty.
+ * FOLL_FORCE or a forced COW break can write even to unwritable pmd's,
+ * but only after we've gone through a COW cycle and they are dirty.
 */
static inline bool can_follow_write_pmd(pmd_t pmd, unsigned int flags)
{
    return pmd_write(pmd) || ((flags & FOLL_COW) && pmd_dirty(pmd));
}
struct page *follow_trans_huge_pmd(struct vm_area_struct *vma,
@@ -1639,7 +1681,7 @@
* If other processes are mapping this page, we couldn't discard
* the page unless they all do MADV_FREE so let's skip the page.
 */
    -if (page_mapcount(page) != 1)
    +if (total_mapcount(page) != 1)
        goto out;
    if (!trylock_page(page))
@@ -1781,7 +1823,7 @@
bool move_huge_pmd(struct vm_area_struct *vma, unsigned long old_addr,
    spinlock_t *old_ptl, *new_ptl;
    pmd_t pmd;
@@ -1812,7 +1854,7 @@
if (new_ptl != old_ptl)
    spin_lock_nested(new_ptl, SINGLE_DEPTH_NESTING);
    pmd = pmdp_huge_get_and_clear(mm, old_addr, old_pmd);
    -if (pmd_present(pmd) && pmd_dirty(pmd))
    +if (pmd_present(pmd))
        force_flush = true;
    VM_BUG_ON(!pmd_none(*new_pmd));
    VM_BUG_ON(!pmd_none(*new_pmd));

@@ -1823,12 +1865,10 @@
if (vma_is_dax(vma))
return;
page = pmd_page(pmd);
@if (!PageDirty(page) && pmd_dirty(pmd))
+set_page_dirty(page);
@if (!PageReferenced(page) && pmd_young(pmd))
SetPageReferenced(page);
page_remove_rmap(page, true);
put_page(page);
add_mm_counter(mm, MM_FILEPAGES, -HPAGE_PMD_NR);
return;
} else if (is_huge_zero_pmd(*pmd)) {
+atomic_inc(&page[i]._mapcount);
+pte_unmap(pte);
}
-/*
- * Set PG_double_map before dropping compound_mapcount to avoid
- * false-negative page_mapped().
- */
-if (compound_mapcount(page) > 1 && !TestSetPageDoubleMap(page)) {
-\for (i = 0; i < HPAGE_PMD_NR; i++)
+atomic_inc(&page[i]._mapcount);
+pte_unmap(pte);
}
-if (atomic_add_negative(-1, compound_mapcount_ptr(page))) {
- /* Last compound_mapcount is gone. */
- __dec_node_page_state(page, NR_ANON_THPS);
- if (TestClearPageDoubleMap(page)) {
- /* No need in mapcount reference anymore */
+ if (!pmd_migration) {
+ /* Set PG_double_map before dropping compound_mapcount to avoid
+ false-negative page_mapped().
+ */
+ if (compound_mapcount(page) > 1 &&
+ !TestSetPageDoubleMap(page)) {
+ for (i = 0; i < HPAGE_PMD_NR; i++)
+ atomic_dec(&page[i]._mapcount);
+ atomic_inc(&page[i]._mapcount);
+ }
+ }
+ lock_page_memcg(page);
+ if (atomic_add_negative(-1, compound_mapcount_ptr(page))) {
+ /* Last compound_mapcount is gone. */
+ __dec_lruvec_page_state(page, NR_ANON_THPS);
+ if (TestClearPageDoubleMap(page)) {
+ /* No need in mapcount reference anymore */
+ for (i = 0; i < HPAGE_PMD_NR; i++)
+ atomic_dec(&page[i]._mapcount);
+ }
+ }
+ unlock_page_memcg(page);
}

smp_wmb(); /* make pte visible before pmd */
@@ -2227,6 +2275,8 @@

spinlock_t *ptl;
struct mm_struct *mm = vma->vm_mm;
unsigned long haddr = address & HPAGE_PMD_MASK;
+bool do_unlock_page = false;
+pmd_t _pmd;

mmu_notifier_invalidate_range_start(mm, haddr, haddr + HPAGE_PMD_SIZE);
ptl = pmd_lock(mm, pmd);
@@ -2236,11 +2286,41 @@
 * pmd against. Otherwise we can end up replacing wrong page.
 */
 VM_BUG_ON(freeze && !page);
-if (page &amp; page != pmd_page(*pmd))
- goto out;
+if (page) {

+VM_WARN_ON_ONCE(!PageLocked(page));
+if (page != pmd_page(*pmd))
+goto out;
+
+repeat:
+if (pmd_trans_huge(*pmd)) {
- page = pmd_page(*pmd);
+ page = pmd_page(*pmd);
+ /*
+ * An anonymous page must be locked, to ensure that a
+ * concurrent reuse_swap_page() sees stable mapcount;
+ * but reuse_swap_page() is not used on shmem or file,
+ * and page lock must not be taken when zap_pmd_range()
+ * calls __split_huge_pmd() while i_mmap_lock is held.
+ */
+ if (PageAnon(page)) {
+ if (unlikely(!trylock_page(page))) {
+ get_page(page);
+ _pmd = *pmd;
+ spin_unlock(ptl);
+ lock_page(page);
+ spin_lock(ptl);
+ if (unlikely(!pmd_same(*pmd, _pmd))) {
+ unlock_page(page);
+ put_page(page);
+ page = NULL;
+ goto repeat;
+ }
+ put_page(page);
+ }
+ do_unlock_page = true;
+ }
+}
+
+if (PageMlocked(page))
+ clear_page_mlock(page);
} else if (!mdevmap(*pmd) || is_pmd_migration_entry(*pmd))
@@ -2248,6 +2328,8 @@
 __split_huge_pmd_locked(vma, pmd, haddr, freeze);
 out:
 spin_unlock(ptl);
+if (do_unlock_page)
+unlock_page(page);

/*
 * No need to double call mmu_notifier->invalidate_range() callback.
 * They are 3 cases to consider inside __split_huge_pmd_locked():
@@ -2331,22 +2413,22 @@


- static void freeze_page(struct page *page)
+ static void unmap_page(struct page *page)
{
    enum ttu_flags ttu_flags = TTU_IGNORE_MLOCK | TTU_IGNORE_ACCESS |
- TTU_RMAP_LOCKED | TTU_SPLIT_HUGE_PMD;
- bool unmap_success;
+ TTU_RMAP_LOCKED | TTU_SPLIT_HUGE_PMD | TTU_SYNC;

    VM_BUG_ON_PAGE(!PageHead(page), page);

    if (PageAnon(page))
        ttu_flags |= TTU_SPLIT_FREEZE;

    -unmap_success = try_to_unmap(page, ttu_flags);
    -VM_BUG_ON_PAGE(!unmap_success, page);
+ try_to_unmap(page, ttu_flags);
+
+ VM_WARN_ON_ONCE_PAGE(page_mapped(page), page);
}

- static void unfreeze_page(struct page *page)
+ static void remap_page(struct page *page)
{
    int i;
    if (PageTransHuge(page)) {
@@ -2363,26 +2445,13 @@
        struct page *page_tail = head + tail;

        VM_BUG_ON_PAGE(atomic_read(&page_tail->_mapcount) != -1, page_tail);
-VM_BUG_ON_PAGE(page_ref_count(page_tail) != 0, page_tail);
             
-/*
- * tail_page->_refcount is zero and not changing from under us. But
- * get_page_unless_zero() may be running from under us on the
- * tail_page. If we used atomic_set() below instead of atomic_inc() or
- * atomic_add(), we would then run atomic_set() concurrently with
- * get_page_unless_zero(), and atomic_set() is implemented in C not
- * using locked ops. spin_unlock on x86 sometime uses locked ops
- * because of PPro errata 66, 92, so unless somebody can guarantee
- * atomic_set() here would be safe on all archs (and not only on x86),
- * it's safer to use atomic_inc()/atomic_add().
+ * Clone page flags before unfreezing refcount.
+ *
+ * After successful get_page_unless_zero() might follow flags change,
+ * for example lock_page() which set PG_waiters.
- if (PageAnon(head) && !PageSwapCache(head)) {
  page_ref_inc(page_tail);
} else {
  /* Additional pin to radix tree */
  page_ref_add(page_tail, 2);
}

page_tail->flags &= ~PAGE_FLAGS_CHECK_AT_PREP;
page_tail->flags |= (head->flags &
((1L << PG_referenced) |
  -2395.36 +2464.42 @@
  (1L << PG_unevictable) |
  (1L << PG_dirty)));

/*
 * After clearing PageTail the gup refcount can be released.
 * Page flags also must be visible before we make the page non-compound.
 */
/* ->mapping in first tail page is compound_mapcount */
VM_BUG_ON_PAGE(tail > 2 && page_tail->mapping != TAIL_MAPPING,
  +page_tail);
+page_tail->mapping = head->mapping;
+page_tail->index = head->index + tail;
+
+/* Page flags must be visible before we make the page non-compound. */
smp_wmb();

/+*
 + * Clear PageTail before unfreezing page refcount.
 + *
 + * After successful get_page_unless_zero() might follow put_page()
 + * which needs correct compound_head().
 + */
clear_compound_head(page_tail);

/+*
 + Finally unfreeze refcount. Additional reference from page cache. */
+page_ref_unfreeze(page_tail, 1 + (!PageAnon(head) ||
  + PageSwapCache(head)));
+
if (page_is_young(head))
  set_page_young(page_tail);
if (page_is_idle(head))
  set_page_idle(page_tail);

/* ->mapping in first tail page is compound_mapcount */
-VM_BUG_ON_PAGE(tail > 2 && page_tail->mapping != TAIL_MAPPIN,
- page_tail->mapping = head->mapping;
- page_tail->index = head->index + tail;
page_cpushid_xchg_last(page_tail, page_cpushid_last(head));
lru_add_page_tail(head, page_tail, lruvec, list);
}

static void __split_huge_page(struct page *page, struct list_head *list,
unsigned long flags)
{                                              
struct page *head = compound_head(page);
struct zone *zone = page_zone(head);
struct lruvec *lruvec = mem_cgroup_page_lruvec(head, zone->zone_pgdat);
@@ -2432,14 +2507,11 @@
/* complete memcg works before add pages to LRU */
mem_cgroup_split_huge_fixup(head);

-if (!PageAnon(page))
-end = DIV_ROUND_UP(i_size_read(head->mapping->host), PAGE_SIZE);
-
for (i = HPAGE_PMD_NR - 1; i >= 1; i--) {
  __split_huge_page_tail(head, i, lruvec, list);
/* Some pages can be beyond i_size: drop them from page cache */
  if (head[i].index >= end) {
    __ClearPageDirty(head + i);
    +ClearPageDirty(head + i);
    __delete_from_page_cache(head + i, NULL);
    if (IS_ENABLED(CONFIG_SHMEM) && PageSwapBacked(head))
      +shmem_uncharge(head->mapping->host, 1);
  }
ClearPageCompound(head);
+
+split_page_owner(head, HPAGE_PMD_ORDER);
+
/* See comment in __split_huge_page_tail() */
  if (PageAnon(head)) {
/* Additional pin to radix tree of swap cache */
    @@ -2463,7 +2538,7 @@
      spin_unlock_irqrestore(zone_lru_lock(page_zone(head)), flags);
-unfreeze_page(head);
+remap_page(head);

for (i = 0; i < HPAGE_PMD_NR; i++) {
    struct page *subpage = head + i;
   @@ -2603,11 +2678,12 @@
    struct pglist_data *pgdata = NODE_DATA(page_to_nid(head));
    struct anon_vma *anon_vma = NULL;
    struct address_space *mapping = NULL;
-int count, mapcount, extra_pins, ret;
+int extra_pins, ret;
    bool mlocked;
    unsigned long flags;
+    pgoff_t end;

-    VM_BUG_ON_PAGE(is_huge_zero_page(page), page);
+    VM_BUG_ON_PAGE(is_huge_zero_page(head), head);
    VM_BUG_ON_PAGE(!PageLocked(page), page);
    VM_BUG_ON_PAGE(!PageCompound(page), page);
   @@ -2628,6 +2704,19 @@
        ret = -EBUSY;
        goto out;
    } +end = -1;
-mapping = NULL;
+anon_vma_lock_write(anon_vma);
    } else {
@@ -2641,10 +2718,19 @@
        anon_vma = NULL;
        i_mmap_lock_read(mapping);
        +
        +/*
        + * __split_huge_page() may need to trim off pages beyond EOF:
        + * but on 32-bit, i_size_read() takes an irq-unsafe seqlock,
        + * which cannot be nested inside the page tree lock. So note
        + * end now: i_size itself may be changed at any moment, but
        + * head page lock is good enough to serialize the trimming.
        + */
        +end = DIV_ROUND_UP(i_size_read(mapping->host), PAGE_SIZE);
    }

    /*
    - * Racy check if we can split the page, before freeze_page() will
    + * Racy check if we can split the page, before unmap_page() will
    * split PMDs
    */
if (!can_split_huge_page(head, &extra_pins)) {
    @@ -2653,8 +2739,7 @@
}

mlocked = PageMlocked(page);
-freeze_page(head);
-VM_BUG_ON_PAGE(compound_mapcount(head), head);
+unmap_page(head);

/* Make sure the page is not on per-CPU pagevec as it takes pin */
if (mlocked)
    @@ -2680,9 +2765,7 @@

/* Prevent deferred_split_scan() touching ->_refcount */
spin_lock(&pgdata->split_queue_lock);
-count = page_count(head);
-mapcount = total_mapcount(head);
-if (!mapcount && page_ref_freeze(head, 1 + extra_pins)) {
  +if (page_ref_freeze(head, 1 + extra_pins)) {
    if (!list_empty(page_deferred_list(head))) {
        pgdata->split_queue_len--;
        list_del(page_deferred_list(head));
    @@ -2690,7 +2773,7 @@
        if (mapping)
            __dec_node_page_state(page, NR_SHMEM_THPS);
        spin_unlock(&pgdata->split_queue_lock);
-      __split_huge_page(page, list, flags);
+      __split_huge_page(page, list, end, flags);
        if (PageSwapCache(head))
            swp_entry_t entry = { .val = page_private(head) };

    @@ -2698,19 +2781,12 @@
    ] else
        ret = 0;
    } else {
        -if (IS_ENABLED(CONFIG_DEBUG_VM) && mapcount) {
            -pr_alert("total_mapcount: %u, page_count(): %u\n",
                mapcount, count);
            -if (PageTail(page))
                -dump_page(head, NULL);
            -dump_page(page, "total_mapcount(head) > 0");
            -BUG();
            -}
        spin_unlock(&pgdata->split_queue_lock);
        -fail:if (mapping)
            +fail:
            +if (mapping)
                spin_unlock(&mapping->tree_lock);

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spin_unlock_irqrestore(zone_lru_lock(page_zone(head)), flags);
-unfreeze_page(head);
+remap_page(head);
ret = -EBUSY;
}

@@ -2791,11 +2867,13 @@

list_for_each_safe(pos, next, &list) {
    page = list_entry((void *)pos, struct page, mapping);
-    lock_page(page);
+    if (!trylock_page(page))
        goto next;
/* split_huge_page() removes page from list on success */
    if (!split_huge_page(page))
        split++;
    unlock_page(page);
+    next:
    put_page(page);
}

@@ -2890,9 +2968,6 @@
if (!(pvmw->pmd && !pvmw->pte))
    return;

-mmu_notifier_invalidate_range_start(mm, address,
-    address + HPAGE_PMD_SIZE);
-    flush_cache_range(vma, address, address + HPAGE_PMD_SIZE);
    pmdval = *pvmw->pmd;
    pmdp.invalidate(vma, address, pvmw->pmd);
@@ -2905,9 +2980,6 @@
    set_pmd_at(mm, address, pvmw->pmd, pmde);
    page_remove_rmap(page, true);
    put_page(page);
-    mmu_notifier_invalidate_range_end(mm, address,
-        address + HPAGE_PMD_SIZE);
}

void remove_migration_pmd(struct page_vma_mapped_walk *pvmw, struct page *new)
@@ -2933,7 +3005,7 @@
    flush_cache_range(vma, mmun_start, mmun_start + HPAGE_PMD_SIZE);
    page_add_anon_rmap(new, vma, mmun_start, true);
    set_pmd_at(mm, mmun_start, pvmw->pmd, pmde);
-    if (vma->vm_flags & VM_LOCKED)
+    if ((vma->vm_flags & VM_LOCKED) && !PageDoubleMap(new))
        mlock_vma_page(new);
update_mmu_cache_pmd(vma, address, pvmw->pmd);
}
--- linux-4.15.0.orig/mm/hugetlb.c
+++ linux-4.15.0/mm/hugetlb.c
@@ -18,6 +18,7 @@
#include <linux/bootmem.h>
#include <linux/sysfs.h>
#include <linux/slab.h>
+#include <linux/mmdebug.h>
#include <linux/sched/signal.h>
#include <linux/rmap.h>
#include <linux/string_helpers.h>
@@ -68,6 +69,21 @@
static int num_fault_mutexes;
struct mutex *hugetlb_fault_mutex_table ____cacheline_aligned_in_smp:
+
+static inline bool PageHugeFreed(struct page *head)
+{
+    return page_private(head + 4) == -1UL;
+}
+
+static inline void SetPageHugeFreed(struct page *head)
+{
+    set_page_private(head + 4, -1UL);
+}
+
+static inline void ClearPageHugeFreed(struct page *head)
+{
+    set_page_private(head + 4, 0);
+}
+
+ /* Forward declaration */
static int hugetlb_acct_memory(struct hstate *h, long delta):
@@ -573,13 +589,20 @@
{
    struct hugepage_subpool *spool = subpool_inode(inode);
    long rsv_adjust;
    bool reserved = false;

    rsv_adjust = hugepage_subpool_get_pages(spool, 1);
    -if (rsv_adjust) {
    +if (rsv_adjust) {
        +if (rsv_adjust > 0) {
            struct hstate *h = hstate_inode(inode);

            -hugetlb_acct_memory(h, 1);
            +if (!hugetlb_acct_memory(h, 1))
                reserved = true;
+} else if (!rsv_adjust) {
+reserved = true;
+}
+
+if (!reserved)
+pr_warn("hugetlb: Huge Page Reserved count may go negative.
";}
}

/*
@@ -865,6 +888,7 @@
list_move(&page->lru, &h->hugepage_freelists[nid]);
h->free_huge_pages++;
h->free_huge_pages_node[nid]++;
+SetPageHugeFreed(page);
}

static struct page *dequeue_huge_page_node_exact(struct hstate *h, int nid)
@@ -882,6 +906,7 @@
return NULL;
list_move(&page->lru, &h->hugepage_activelist);
set_page_refcounted(page);
+ClearPageHugeFreed(page);
-h->free_huge_pages--;
-h->free_huge_pages_node[nid]--;
return page;
@@ -1080,11 +1105,10 @@
struct page *page;

for (i = start_pfn; i < end_pfn; i++) {
-\t\tif (!pfn_valid(i))
+\t\tpage = pfn_to_online_page(i);
+\t\tif (!page)
-\t\tpage = pfn_to_page(i);
-\t\tif (page_zone(page) != z)
-\t\treturn false;
-
-\t\t\tpage = pfn_to_page(i);
-\t\n-\t\tif (page_zone(page) != z)
-\t\treturn false;
-
-\n-\t\t\tpage = pfn_to_page(i);
-
\n\n\n@@ -1191,14 +1215,16 @@
static void update_and_free_page(struct hstate *h, struct page *page)
{
\tint i;
+struct page *subpage = page;

\t\tif (hstate_is_gigantic(h) && !gigantic_page_supported())
\t\treturn;
h->nr_huge_pages--;  
h->nr_huge_pages_node[page_to_nid(page)]--;  
-for (i = 0; i < pages_per_huge_page(h); i++) {
    -page[i].flags &= ~(1 << PG_locked | 1 << PG_error |  
    + for (i = 0; i < pages_per_huge_page(h); i++, subpage = mem_map_next(subpage, page, i)) {
        + subpage->flags &= ~(1 << PG_locked | 1 << PG_error |  
            1 << PG_referenced | 1 << PG_dirty |  
            1 << PG_active | 1 << PG_private |  
            1 << PG_writeback);  
@@ -1233,12 +1259,11 @@ */  
bool page_huge_active(struct page *page)  
{  
    -VM_BUG_ON_PAGE(!PageHuge(page), page);  
    -return PageHead(page) && PagePrivate(&page[1]);  
    +return PageHeadHuge(page) && PagePrivate(&page[1]);  
}  
/* never called for tail page */  
-static void set_page_huge_active(struct page *page)  
+void set_page_huge_active(struct page *page)  
{  
    VM_BUG_ON_PAGE(!PageHeadHuge(page), page);  
    SetPagePrivate(&page[1]);  
@@ -1270,12 +1295,23 @@ */  
    ClearPagePrivate(page);  
    
    /* A return code of zero implies that the subpool will be under its  
* minimum size if the reservation is not restored after page is free.  
* Therefore, force restore_reserve operation.  
* If PagePrivate() was set on page, page allocation consumed a  
* reservation. If the page was associated with a subpool, there  
* would have been a page reserved in the subpool before allocation  
* via hugepage_subpool_get_pages(). Since we are 'restoring' the  
* reservation, do not call hugepage_subpool_put_pages() as this will  
* remove the reserved page from the subpool.  
*/  
-if (hugepage_subpool_put_pages(spool, 1) == 0)  
    restore_reserve = true;  
+if (!restore_reserve)  
    */  
+ * A return code of zero implies that the subpool will be  
+ * under its minimum size if the reservation is not restored  
+ * after page is free. Therefore, force restore_reserve  
+ * operation.  
+ */
if (hugepage_subpool_put_pages(spool, 1) == 0)
+restore_reserve = true;
+
spin_lock(&hugetlb_lock);
clear_page_huge_active(page);
@@ -1305,6 +1341,7 @@
set_hugetlb_cgroup(page, NULL);
h->nr_huge_pages++; 
h->nr_huge_pages_node[nid]++;
+ClearPageHugeFreed(page);
spin_unlock(&hugetlb_lock);
put_page(page); /* free it into the hugepage allocator */
}
@@ -1366,15 +1403,12 @@
return get_compound_page_dtor(page_head) == free_huge_page;
}
-pgoff_t __basepage_index(struct page *page)
+pgoff_t hugetlb_basepage_index(struct page *page)
{
struct page *page_head = compound_head(page);
pgoff_t index = page_index(page_head);
unsigned long compound_idx;

-if (!PageHuge(page_head))
-return page_index(page);
-
if (compound_order(page_head) >= MAX_ORDER)
compound_idx = page_to_pfn(page) - page_to_pfn(page_head);
else
@@ -1468,6 +1502,7 @@
{
int rc = 0;

+retry:
spin_lock(&hugetlb_lock);
if (PageHuge(page) && !page_count(page)) {
struct page *head = compound_head(page);
@@ -1477,6 +1512,26 @@
rc = -EBUSY;
goto out;
}
+
+/*
+ * We should make sure that the page is already on the free list
+ * when it is dissolved.
+ */
if (unlikely(!PageHugeFreed(head))) {
  spin_unlock(&hugetlb_lock);
  cond_resched();
  /*
  * Theoretically, we should return -EBUSY when we
  * encounter this race. In fact, we have a chance
  * to successfully dissolve the page if we do a
  * retry. Because the race window is quite small.
  * If we seize this opportunity, it is an optimization
  * for increasing the success rate of dissolving page.
  */
  goto retry;
}

/* Move PageHW Poison flag from head page to the raw error page,
 * which makes any subpages rather than the error page reusable.
 */
if (hstate_is_gigantic(h))
  adjust_managed_page_count(page, 1 << h->order);
  cond_resched();
}

retval = sysfs_create_group(hstate_kobjs[hi], hstate_attr_group);
if (retval)
  kobject_put(hstate_kobjs[hi]);
  hstate_kobjs[hi] = NULL;
return retval;
}

#ifdef CONFIG_SYSCTL
+static int proc_hugetlb_doulongvec_minmax(struct ctl_table *table, int write,
  void *buffer, size_t *length,
  loff_t *ppos, unsigned long *out)
十{
  +struct ctl_table dup_table;
  +
/*
 * In order to avoid races with __do_proc_doulongvec_minmax(), we can duplicate the @table and alter the duplicate of it.
 */
dup_table = *table;
dup_table.data = out;

return proc_doulongvec_minmax(&dup_table, write, buffer, length, ppos);
+
static int hugetlb_sysctl_handler_common(bool obey_mempolicy, struct ctl_table *table, int write, void __user *buffer, size_t *length, loff_t *ppos)
@@ -2910,9 +2984,8 @@
if (!hugepages_supported())
 return -EOPNOTSUPP;
	table->data = &tmp;
	table->maxlen = sizeof(unsigned long);
	ret = proc_doulongvec_minmax(table, write, buffer, length, ppos);
+ ret = proc_hugetlb_doulongvec_minmax(table, write, buffer, length, ppos,
+ &tmp);
if (ret)
goto out;
@@ -2956,9 +3029,8 @@
if (write && hstate_is_gigantic(h))
 return -EINVAL;
	table->data = &tmp;
	table->maxlen = sizeof(unsigned long);
+ ret = proc_hugetlb_doulongvec_minmax(table, write, buffer, length, ppos,
+ &tmp);
if (ret)
goto out;
@@ -3209,7 +3309,30 @@
int copy_hugetlb_page_range(struct mm_struct *dst, struct mm_struct *src,
 struct vm_area_struct *vma)
{
 -pte_t *src_pte, *dst_pte, entry;
 +pte_t *src_pte, *dst_pte, entry;
 struct page *ptepage;
 unsigned long addr;
 int cow;
 @@ -3237,15 +3309,30 @@
 break;
/* If the pagetables are shared don't copy or take references */
-if (dst_pte == src_pte)
+/ *
+ * If the pagetables are shared don't copy or take references.
+ * dst_pte == src_pte is the common case of src/dest sharing.
+ *
+ * However, src could have 'unshared' and dst shares with
+ * another vma. If dst_pte !none, this implies sharing.
+ * Check here before taking page table lock, and once again
+ * after taking the lock below.
+ */
+dst_entry = huge_ptep_get(dst_pte);
+if (((dst_pte == src_pte) || !huge_pte_none(dst_entry))
continue;

dst_ptrl = huge_pte_lock(h, dst, dst_pte);
src_ptrl = huge_pte_lockptr(h, src, src_pte);
spin_lock_nested(src_ptrl, SINGLE_DEPTH_NESTING);
entry = huge_ptep_get(src_pte);
-/* skip none entry */
+if (huge_pte_none(entry) || !huge_pte_none(dst_entry)) {
+/*
+ * Skip if src entry none. Also, skip in the
+ * unlikely case dst entry !none as this implies
+ * sharing with another vma.
+ * /
+
+} else if (unlikely(is_hugetlb_entry_migration(entry)) ||
+is_hugetlb_entry_hwpoisoned(entry))) {
@@ -3304,6 +3391,7 @@
unsigned long sz = huge_page_size(h);
const unsigned long mmun_start = start;/* For mmu_notifiers */
const unsigned long mmun_end   = end;/* For mmu_notifiers */
+bool force_flush = false;

WARN_ON(!is_vm_hugetlb_page(vma));
BUG_ON(start & ~huge_page_mask(h));
@@ -3325,6 +3413,8 @@
ptl = huge_pte_lock(h, mm, ptep);
if (huge_pmd_unshare(mm, &address, ptep)) {
spin_unlock(ptl);
+tlb_flush_pmd_range(tlb, address & PUD_MASK, PUD_SIZE);
+force_flush = true;
continue;
}
@@ -3381,6 +3471,22 @@

{ mmu_notifier_invalidate_range_end(mm, mmun_start, mmun_end);
  tlb_end_vma(tlb, vma);
+
+/*
+ * If we unshared PMDs, the TLB flush was not recorded in mmu_gather. We
+ * could defer the flush until now, since by holding i_mmap_rwsem we
+ * guaranteed that the last reference would not be dropped. But we must
+ * do the flushing before we return, as otherwise i_mmap_rwsem will be
+ * dropped and the last reference to the shared PMDs page might be
+ * dropped as well.
+ *
+ * In theory we could defer the freeing of the PMD pages as well, but
+ * huge_pmd_unshare() relies on the exact page_count for the PMD page to
+ * detect sharing, so we cannot defer the release of the page either.
+ * Instead, do flush now.
+ */
+if (force_flush)
+  tlb_flush_mmu_tlbonly(tlb);
}

void __unmap_hugepage_range_final(struct mmu_gather *tlb,
@@ -3565,7 +3671,6 @@
  copy_user_huge_page(new_page, old_page, address, vma,
    __SetPageUptodate(new_page);
-  set_page_huge_active(new_page);
  mmun_start = address & huge_page_mask(h);
  mmun_end = mmun_start + huge_page_size(h);
@@ -3588,6 +3693,7 @@
    make_huge_pte(vma, new_page, 1));
    page_remove_rmap(old_page, true);
    hugepage_add_new_anon_rmap(new_page, vma, address);
+  set_page_huge_active(new_page);
  /* Make the old page be freed below */
  new_page = old_page;
 }
@@ -3647,6 +3753,12 @@
  return err;
  ClearPagePrivate(page);
+
+/*
+ * set page dirty so that it will not be removed from cache/file
+ * by non-hugetlbfs specific code paths.
+ */
+set_page_dirty(page);
+
spin_lock(&inode->i_lock);
inode->i_blocks += blocks_per_huge_page(h);
spin_unlock(&inode->i_lock);
@@ -3664,6 +3776,7 @@
struct page *page;
pte_t new_pte;
spinlock_t *ptl;
+bool new_page = false;

/*
 * Currently, we are forced to kill the process in the event the
@@ -3710,8 +3823,7 @@
 * handling userfault. Reacquire after handling
 * fault to make calling code simpler.
 */
-hash = hugetlb_fault_mutex_hash(h, mm, vma, mapping,
-idx, address);
+hash = hugetlb_fault_mutex_hash(h, mapping, idx);
mutex_unlock(&hugetlb_fault_mutex_table[hash]);
ret = handle_userfault(&vmf, VM_UFFD_MISSING);
mutex_lock(&hugetlb_fault_mutex_table[hash]);
@@ -3729,7 +3841,7 @@
}
clear_huge_page(page, address, pages_per_huge_page(h));
__SetPageUptodate(page);
-set_page_huge_active(page);
+new_page = true;

if (vma->vm_flags & VM_MAYSHARE) {
int err = huge_add_to_page_cache(page, mapping, idx);
@@ -3754,7 +3866,7 @@
 * So we need to block hugepage fault by PG_hwpinon bit check.
 */
if (unlikely(PageHWPinon(page))) {
-ret = VM_FAULT_HWPINISON |
+ret = VM_FAULT_HWPINISON_LARGE |
VM_FAULT_SET_HINDEX(hstate_index(h));
goto backout_unlocked;
}
@@ -3800,6 +3912,15 @@
}

spin_unlock(ptl);
+
+/*
+ * Only make newly allocated pages active. Existing pages found
+*/
in the pagecache could be !page_huge_active() if they have been
isolated for migration.
*/
if (new_page)
set_page_huge_active(page);
unlock_page(page);
out:
return ret;
@@ -3814,23 +3935,16 @@
}
#endif CONFIG_SMP
-u32 hugetlb_fault_mutex_hash(struct hstate *h, struct mm_struct *mm,
 - struct vm_area_struct *vma,
 - struct address_space *mapping,
 - pgoff_t idx, unsigned long address)
+u32 hugetlb_fault_mutex_hash(struct hstate *h, struct address_space *mapping,
 + pgoff_t idx)
 {
 unsigned long key[2];
 u32 hash;

 -if (vma->vm_flags & VM_SHARED) {
 -key[0] = (unsigned long) mapping;
 -key[1] = idx;
 -} else {
 -key[0] = (unsigned long) mm;
 -key[1] = address >> huge_page_shift(h);
 -}
 +key[0] = (unsigned long) mapping;
 +key[1] = idx;

 -hash = jhash2((u32 *)&key, sizeof(key)/sizeof(u32), 0);
 +hash = jhash2((u32 *)&key, sizeof(key)/(sizeof(u32)), 0);

 return hash & (num_fault_mutexes - 1);
 }
@@ -3839,10 +3953,8 @@
 * For uniprocesor systems we always use a single mutex, so just
 * return 0 and avoid the hashing overhead.
 */
-u32 hugetlb_fault_mutex_hash(struct hstate *h, struct mm_struct *mm,
 - struct vm_area_struct *vma,
 - struct address_space *mapping,
 - pgoff_t idx, unsigned long address)
+u32 hugetlb_fault_mutex_hash(struct hstate *h, struct address_space *mapping,
 + pgoff_t idx)
{  
return 0;  
}
@@ -3887,7 +3999,7 @@
  *
  * get spurious allocation failures if two CPUs race to instantiate
  * the same page in the page cache.
  */
-hash = hugetlb_fault_mutex_hash(h, mm, vma, mapping, idx, address);
+hash = hugetlb_fault_mutex_hash(h, mapping, idx);
mutex_lock(&hugetlb_fault_mutex_table[hash]);

entry = huge_ptep_get(ptep);
@@ -4008,10 +4120,20 @@
struct page *page;

if (!*pagep) {
-  
	ret = -ENOMEM;
+  /* If a page already exists, then it's UFFDIO_COPY for
+   * a non-missing case. Return -EEXIST.
+   */
+  
+if (vm_shared &&
+    hugetlbfs_pagecache_present(h, dst_vma, dst_addr)) {
+    ret = -EEXIST;
+    goto out;
+  }
  
  page = alloc_huge_page(dst_vma, dst_addr, 0);
  #if (IS_ERR(page))
+  
+if (IS_ERR(page)) {
+    ret = -ENOMEM;
+    goto out;
+  }
  
  ret = copy_huge_page_from_user(page,
  (const void __user *) src_addr,
@@ -4019,7 +4141,7 @@/* fallback to copy_from_user outside mmap_sem */
  if (unlikely(ret)) {
-    
    -ret = -EFAULT;
+    -ret = -ENOENT;
    *pagep = page;
    /* don't free the page */
    goto out;
@@ -4035,7 +4157,6 @@
  * the set_pte_at() write.
  */
  __SetPageUptodate(page);
- set_page_huge_active(page);

mapping = dst_vma->vm_file->f_mapping;
idx = vma_hugecache_offset(h, dst_vma, dst_addr);
@@ -4103,6 +4224,7 @@
update_mmu_cache(dst_vma, dst_addr, dst_pte);

spin_unlock(ptl);
+ set_page_huge_active(page);
if (vm_shared)
 unlock_page(page);
ret = 0;
@@ -4208,7 +4330,8 @@
break;
}
if (ret & VM_FAULT_RETRY) {
- if (nonblocking)
+ if (nonblocking &&
+ !(fault_flags & FAULT_FLAG_RETRY_NOWAIT))
*nonblocking = 0;
*nr_pages = 0;
/*
@@ -4227,6 +4350,19 @@
pfn_offset = (vaddr & ~huge_page_mask(h)) >> PAGE_SHIFT;
page = pte_page(huge_ptep_get(pte));
+
+/*
+ * Instead of doing 'try_get_page()' below in the same_page
+ * loop, just check the count once here.
+ */
+if (unlikely(page_count(page) <= 0)) {
+if (pages) {
+spin_unlock(ptl);
+remainder = 0;
+err = -ENOMEM;
+break;
+}
+}
+}
same_page:
if (pages) {
pages[i] = mem_map_offset(page, pfn_offset);
@@ -4354,6 +4490,12 @@
struct resv_map *resv_map;
long gbl_reserve;

+/* This should never happen */
+if (from > to) {
+VM_WARN(1, "%s called with a negative range\n", __func__);  
+return -EINVAL;  
+}  
+  
+/*  
* Only apply hugepage reservation if asked. At fault time, an  
* attempt will be made for VM_NORESERVE to allocate a page  
*/  
+/*  
* check on proper vm_flags and page table alignment  
*/  
-#if (vma->vm_flags & VM_MAYSHARE &&  
-  vma->vm_start <= base && end <= vma->vm_end)  
+if (vma->vm_flags & VM_MAYSHARE && range_in_vma(vma, base, end))  
return true;  
return false;  
}  
+/*  
* Determine if start,end range within vma could be mapped by shared pmd.  
* If yes, adjust start and end to cover range associated with possible  
* shared pmd mappings.  
*/  
+void adjust_range_if_pmd_sharing_possible(struct vm_area_struct *vma,  
+unsigned long *start, unsigned long *end)  
+{  
+unsigned long v_start = ALIGN(vma->vm_start, PUD_SIZE),  
+v_end = ALIGN_DOWN(vma->vm_end, PUD_SIZE);  
+  
+/*  
* vma need span at least one aligned PUD size and the start,end range  
* must at least partialy within it.  
*/  
+/*  
+if (!(vma->vm_flags & VM_MAYSHARE) ||  
+(!((v_end > v_start) ||  
+(*end <= v_start) || (*start >= v_end)))  
+return;  
+  
+/* Extend the range to be PUD aligned for a worst case scenario */  
+if (*start > v_start)  
+*start = ALIGN_DOWN(*start, PUD_SIZE);  
+  
+if (*end < v_end)  
+*end = ALIGN(*end, PUD_SIZE);  
+}  
+  
+/*  
* Search for a shareable pmd page for hugetlb. In any case calls pmd_alloc()  
* and returns the corresponding pte. While this is not necessary for the
* shared pmd case because we can allocate the pmd later as well, it makes the
@@ -4549,7 +4717,7 @@
if (!vma_shareable(vma, addr))
    return (pte_t *)pmd_alloc(mm, pud, addr);

-i_mmap_lock_write(mapping);
+i_mmap_lock_read(mapping);
    vma_interval_tree_foreach(svma, &mapping->i_mmap, idx, idx) {
        if (svma == vma)
            continue;
@@ -4579,7 +4747,7 @@
    spin_unlock(ptl);
    out:
    pte = (pte_t *)pmd_alloc(mm, pud, addr);
-i_mmap_unlock_write(mapping);
+i_mmap_unlock_read(mapping);
    return pte;
    }

@@ -4622,6 +4790,11 @@
{
    return 0;
}
+
+void adjust_range_if_pmd_sharing_possible(struct vm_area_struct *vma,
+unsigned long *start, unsigned long *end)
+{
+    }
#define want_pmd_share() (0)
#endif /* CONFIG_ARCH_WANT_HUGE_PMD_SHARE */

@@ -4669,8 +4842,8 @@
{
    pgd_t *pgd;
    p4d_t *p4d;
-pud_t *pud;
-pmd_t *pmd;
+pud_t *pud, pud_entry;
+pmd_t *pmd, pmd_entry;
    pgd = pgd_offset(mm, addr);
    if (!pgd_present(*pgd))
        @ @ -4680,17 +4853,19 @@
       return NULL;

    pud = pud_offset(p4d, addr);
    -if (sz != PUD_SIZE & & pud_none(*pud))
    +pud_entry = READ_ONCE(*pud);
+if (sz != PUD_SIZE && pud_none(pud_entry))
return NULL;
/* hugepage or swap? */
- if (pud_huge(*pud) || !pud_present(*pud))
+ if (pud_huge(pud_entry) || !pud_present(pud_entry))
return (pte_t *)pud;

pmd = pmd_offset(pud, addr);
- if (sz != PMD_SIZE && pmd_none(*pmd))
+ pmd_entry = READ_ONCE(*pmd);
+ if (sz != PMD_SIZE && pmd_none(pmd_entry))
return NULL;
/* hugepage or swap? */
- if (pmd_huge(*pmd) || !pmd_present(*pmd))
+ if (pmd_huge(pmd_entry) || !pmd_present(pmd_entry))
return (pte_t *)pmd;
return NULL;
@@ -4777,9 +4952,9 @@
{
 bool ret = true;

-VM_BUG_ON_PAGE(!PageHead(page), page);
spin_lock(&hugetlb_lock);
- if (!page_huge_active(page) || !get_page_unless_zero(page)) {
+ if (!PageHeadHuge(page) || !page_huge_active(page) ||
+ !get_page_unless_zero(page)) {
 ret = false;
goto unlock;
} again:
rcu_read_lock();
h_cg = hugetlb_cgroup_from_task(current);
- if (!css_tryget_online(&h_cg->css)) {
+ if (!css_tryget(&h_cg->css)) {
 rcu_read_unlock();
goto again;
} again:
r
--- linux-4.15.0.orig/mm/hugetlb_cgroup.c
+++ linux-4.15.0/mm/hugetlb_cgroup.c
@@ -196,7 +196,7 @@
extern pmd_t maybe_pmd_mkwrite(pmd_t pmd, struct vm_area_struct *vma);

/* At what user virtual address is page expected in @vma?
+ * At what user virtual address is page expected in vma?
+ * Returns -EFAULT if all of the page is outside the range of vma.
+ * If page is a compound head, the entire compound page is considered.
+ */

static inline unsigned long
-vma_address(struct page *page, struct vm_area_struct *vma)
+__vma_address(struct page *page, struct vm_area_struct *vma)
{
-pgoff_t pgoff = page_to_pgoff(page);
-return vma->vm_start + ((pgoff - vma->vm_pgoff) << PAGE_SHIFT);
+pgoff_t pgoff;
+unsigned long address;
+
+VM_BUG_ON_PAGE(PageKsm(page), page); /* KSM page->index unusable */
+pgoff = page_to_pgoff(page);
+if (pgoff >= vma->vm_pgoff) {
+address = vma->vm_start +
+(pgoff - vma->vm_pgoff) << PAGE_SHIFT);
+/* Check for address beyond vma (or wrapped through 0?) */
+if (address < vma->vm_start || address >= vma->vm_end)
+address = -EFAULT;
+} else if (PageHead(page) &&
+ pgoff + (1UL << compound_order(page)) - 1 >= vma->vm_pgoff) {
+/* Test above avoids possibility of wrap to 0 on 32-bit */
+address = vma->vm_start;
+} else {
+address = -EFAULT;
+}
+return address;
}

+/
+ * Then at what user virtual address will none of the page be found in vma?
+ * Assumes that vma_address() already returned a good starting address.
+ * If page is a compound head, the entire compound page is considered.
+ */

static inline unsigned long
-vma_address_end(struct page *page, struct vm_area_struct *vma)
+vma_address_end(struct page *page, struct vm_area_struct *vma)
{
-unsigned long start, end;
-
-start = __vma_address(page, vma);
-end = start + PAGE_SIZE * (hpage_nr_pages(page) - 1);
+pgoff_t pgoff;
+unsigned long address;
-
-/* page should be within @vma mapping range */
VM_BUG_ON_VMA(\(\text{end} < \text{vma}\rightarrow\text{vm_start} \parallel \text{start} > = \text{vma}\rightarrow\text{vm_end}, \text{vma}\));
-
-return max(\(\text{start}, \text{vma}\rightarrow\text{vm_start}\));
+VM_BUG_ON_PAGE(PageKsm(page), page); /* KSM \text{page}\rightarrow\text{index} unusable */
+pgoff = page_to_pgoff(page) + (1UL << compound_order(page));
+address = vma->vm_start + ((pgoff - vma->vm_pgoff) << PAGE_SHIFT);
+/* Check for address beyond vma (or wrapped through 0?) */
+if (address < vma->vm_start || address > vma->vm_end)
+address = vma->vm_end;
+return address;

#else /* !CONFIG_MMU */
@@ -456,6 +481,16 @@
#define NODE_RECLAIM_SOME 0
#define NODE_RECLAIM_SUCCESS 1

+ifdef CONFIG_NUMA
+extern int node_reclaim(struct pglist_data *, gfp_t, unsigned int);
+endif
+static inline int node_reclaim(struct pglist_data *pgdat, gfp_t mask,
+unsigned int order)
+{
+return NODE_RECLAIM_NOSCAN;
+}
+#endif
+
extern int hwpoison_filter(struct page *p);

extern u32 hwpoison_filter_dev_major;
--- linux-4.15.0.orig/mm/kasan/kasan.c
+++ linux-4.15.0/mm/kasan/kasan.c
@@ -613,12 +613,13 @@

int kasan_module_alloc(void *addr, size_t size)
{
 void *ret;
+size_t scaled_size;
 size_t shadow_size;
 unsigned long shadow_start;

 shadow_start = (unsigned long)kasan_mem_to_shadow(addr);
-shadow_size = round_up(size >> KASAN_SHADOW_SCALE_SHIFT,
-PAGE_SIZE);
+scaled_size = (size + KASAN_SHADOW_MASK) >> KASAN_SHADOW_SCALE_SHIFT;
+shadow_size = round_up(scaled_size, PAGE_SIZE);

 if (WARN_ON(!PAGE_ALIGNED(shadow_start)))
 return -EINVAL;
EXPORT_SYMBOL(__asan_unpoison_stack_memory);

#ifdef CONFIG_MEMORY_HOTPLUG
+static bool shadow_mapped(unsigned long addr)
+{
+    pgd_t *pgd = pgd_offset_k(addr);
+    p4d_t *p4d;
+    pud_t *pud;
+    pmd_t *pmd;
+    pte_t *pte;
+    
+    if (pgd_none(*pgd))
+        return false;
+    p4d = p4d_offset(pgd, addr);
+    if (p4d_none(*p4d))
+        return false;
+    pud = pud_offset(p4d, addr);
+    if (pud_none(*pud))
+        return false;
+    pmd = pmd_offset(pud, addr);
+    if (pmd_none(*pmd))
+        return false;
+    pte = pte_offset_kernel(pmd, addr);
+    return !pte_none(*pte);
+}
+
+static int __meminit kasan_mem_notifier(struct notifier_block *nb,
+unsigned long action, void *data)
+{
+    case MEM_GOING_ONLINE: {
+        ret;
+        
+        if (pud_bad(*pud))
+            return true;
+        pmd = pmd_offset(pud, addr);
+        if (pmd_none(*pmd))
+            return false;
+        if (pmd_bad(*pmd))
+            return true;
+        pte = pte_offset_kernel(pmd, addr);
+        return !pte_none(*pte);
+    }
+
    static int __meminit kasan_mem_notifier(struct notifier_block *nb,
    unsigned long action, void *data)
    {
    @ -758.6 +793.14 @
    case MEM_GOING_ONLINE: {
        ret;
        
    */
    + * If shadow is mapped already than it must have been mapped
    + * during the boot. This could happen if we onlining previously
    */
* offlined memory.
+ */
+if (shadow_mapped(shadow_start))
+return NOTIFY_OK;
+
ret = __vmalloc_node_range(shadow_size, PAGE_SIZE, shadow_start,
shadow_end, GFP_KERNEL,
PAGE_KERNEL, VM_NO_GUARD,
@@ -769,8 +812,26 @@
kmemleak_ignore(ret);
return NOTIFY_OK;
}  
-case MEM_OFFLINE:
-vfree((void *)shadow_start);
+case MEM_CANCEL_ONLINE:
+case MEM_OFFLINE: {
+struct vm_struct *vm;
+
+/*
+ * shadow_start was either mapped during boot by kasan_init()
+ * or during memory online by __vmalloc_node_range().
+ * In the latter case we can use vfree() to free shadow.
+ * Non-NULL result of the find_vm_area() will tell us if
+ * that was the second case.
+ *
+ * Currently it’s not possible to free shadow mapped
+ * during boot by kasan_init(). It’s because the code
+ * to do that hasn’t been written yet. So we’ll just
+ * leak the memory.
+ */
+vm = find_vm_area((void *)shadow_start);
+if (vm)
+vfree((void *)shadow_start);
+}
}

return NOTIFY_OK;
@@ -783,5 +844,5 @@
return 0;
module_init(kasan_memhotplug_init);
+core_initcall(kasan_memhotplug_init);
#endif
--- linux-4.15.0.orig/mm/khugepaged.c
+++ linux-4.15.0/mm/khugepaged.c
@@ -53,6 +53,9 @@
#define CREATE_TRACE_POINTS

#include <trace/events/huge_memory.h>

+static struct task_struct *khugepaged_thread __read_mostly;
+static DEFINE_MUTEX(khugepaged_mutex);

/* default scan 8*512 pte (or vmas) every 30 second */
static unsigned int khugepaged_pages_to_scan __read_mostly;
static unsigned int khugepaged_pages_collapsed;
@@ -394,7 +397,7 @@
 static inline int khugepaged_test_exit(struct mm_struct *mm)
 {
 -return atomic_read(&mm->mm_users) == 0;
 +return atomic_read(&mm->mm_users) == 0 || !mmget_still_valid(mm);
 }

 int __khugepaged_enter(struct mm_struct *mm)
 @@ -407,7 +410,7 @@
 return -ENOMEM;
 /* __khugepaged_exit() must not run from under us */
 -VM_BUG_ON_MM(khugepaged_test_exit(mm), mm);
 +VM_BUG_ON_MM(atomic_read(&mm->mm_users) == 0, mm);
 if (unlikely(test_and_set_bit(MMF_VM_HUGEPAGE, &mm->flags))) {
 free_mm_slot(mm_slot);
 return 0;
 @@ -530,7 +533,12 @@
 goto out;
 }

 -VM_BUG_ON_PAGE(PageCompound(page), page);
 +/* TODO: teach khugepaged to collapse THP mapped with pte */
 +if (PageCompound(page)) {
 +result = SCAN_PAGE_COMPOUND;
 +goto out;
 +}+
 +
 VM_BUG_ON_PAGE(!PageAnon(page), page);
 /*
 @@ -589,17 +597,17 @@
  mmu_notifier_test_young(vma->vm_mm, address))
 referenced++;
 } 
 -if (likely(writable)) {
 -if (likely(referenced)) {
 -result = SCAN_SUCCEED;
 -trace_mm_collapse_huge_page_isolate(page, none_or_zero,
- referenced, writable, result);  
- return 1;  
- }  
+ if (unlikely(!writable)) {  
+ result = SCAN_PAGE_RO;  
+ } else if (unlikely(!referenced)) {  
+ result = SCAN_LACK_REFERENCED_PAGE;  
+ } else {  
+ result = SCAN_SUCCEED;  
+ trace_mm_collapse_huge_page_isolate(page, none_or_zero,  
+ referenced, writable, result);  
+ return 1;  
+ }  
- out:  
- release_pte_pages(pte, _pte);  
- trace_mm_collapse_huge_page_isolate(page, none_or_zero,  
@@ -796,6 +804,18 @@  
static bool khugepaged_prealloc_page(struct page **hpage, bool *wait)  
{  
+ /*  
+ * If the hpage allocated earlier was briefly exposed in page cache  
+ * before collapse_file() failed, it is possible that racing lookups  
+ * have not yet completed, and would then be unpleasantly surprised by  
+ * finding the hpage reused for the same mapping at a different offset.  
+ * Just release the previous allocation if there is any danger of that.  
+ */  
+ if (*hpage && page_count(*hpage) > 1) {  
+ put_page(*hpage);  
+ *hpage = NULL;  
+ }  
+ if (!*hpage)  
+ *hpage = khugepaged_alloc_hugepage(wait);  
@@ -960,7 +980,9 @@  
goto out_nolock;  
}  
- if (unlikely(mem_cgroup_try_charge(new_page, mm, gfp, &memcg, true))) {  
+ /* Do not oom kill for khugepaged charges */  
+ if (unlikely(mem_cgroup_try_charge(new_page, mm, gfp | __GFP_NORETRY,  
+ &memcg, true))) {  
result = SCAN_CGROUP_CHARGE_FAIL;  
goto out_nolock;
static void retract_page_tables(struct address_space *mapping, pgoff_t pgoff)
{
    struct vm_area_struct *vma;
    +struct mm_struct *mm;
    unsigned long addr;
    pmd_t *pmd, _pmd;

    continue;
    if (vma->vm_end < addr + HPAGE_PMD_SIZE)
        continue;
    _pmd = mm_find_pmd(vma->vm_mm, addr);
    +mm = vma->vm_mm;
    +pmd = mm_find_pmd(mm, addr);
    if (!pmd)
        continue;
    /* re-fault. Not ideal, but it's more important to not disturb
     * the system too much.
     */
    -if (down_write_trylock(&vma->vm_mm->mmap_sem)) {
        -spinlock_t *ptl = pmd_lock(vma->vm_mm, pmd);
        /* assume page table is clear */
        -_pmd = pmdp_collapse_flush(vma, addr, pmd);
        -spin_unlock(ptl);
        -up_write(&vma->vm_mm->mmap_sem);
        -mm_dec_nr_ptes(vma->vm_mm);
        -pte_free(vma->vm_mm, pmd_pgtable(_pmd));
        +if (down_write_trylock(&mm->mmap_sem)) {
        +spinlock_t *ptl = pmd_lock(mm, pmd);
        +# assume page table is clear */
        +_pmd = pmdp_collapse_flush(vma, addr, pmd);
        +spin_unlock(ptl);
        +mm_dec_nr_ptes(mm);
        +pte_free(mm, pmd_pgtable(_pmd));
    +}
    +up_write(&mm->mmap_sem);
    }
    i_mmap_unlock_write(mapping);
}

/* collapse_shmem - collapse small tmpfs/shmem pages into huge one.
 * Basic scheme is simple, details are more complex:
- * - allocate and freeze a new huge page;
+ * - allocate and lock a new huge page;
* - scan over radix tree replacing old pages the new one
* + swap in pages if necessary;
* + fill in gaps;
@@ -1289,11 +1315,11 @@
* - if replacing succeed:
* + copy data over;
* + free old pages;
- * + unfreeze huge page;
+ * + unlock huge page;
* - if replacing failed;
* + put all pages back and unfreeze them;
* + restore gaps in the radix-tree;
- * + free huge page;
+ * + unlock and free huge page;
*/
static void collapse_shmem(struct mm_struct *mm, struct address_space *mapping, pgoff_t start, 
@@ -1319,23 +1345,22 @@
go to out;
} 

-if (unlikely(mem_cgroup_try_charge(new_page, mm, gfp, &memcg, true))) {
+/* Do not oom kill for khugepaged charges */
+if (unlikely(mem_cgroup_try_charge(new_page, mm, gfp | __GFP_NORETRY, 
+ &memcg, true))) {
result = SCAN_CGROUP_CHARGE_FAIL;
go to out;
}

+__SetPageLocked(new_page);
+__SetPageSwapBacked(new_page);
new_page->index = start;
new_page->mapping = mapping;
-__SetPageSwapBacked(new_page);
-__SetPageLocked(new_page);
-BUG_ON(!page_ref_freeze(new_page, 1));
-
/*
- * At this point the new_page is 'frozen' (page_count() is zero), locked
- * and not up-to-date. It's safe to insert it into radix tree, because
- * nobody would be able to map it or use it in other way until we
- * unfreeze it.
+ * At this point the new_page is locked and not up-to-date.
+ * It's safe to insert it into the page cache, because nobody would
+ * be able to map it or use it in another way until we unlock it.
index = start;
@@ -1344,18 +1369,28 @@
int n = min(iter.index, end) - index;

/*
+ * Stop if extent has been hole-punched, and is now completely
+ * empty (the more obvious i_size_read() check would take an
+ * irq-unsafe seqlock on 32-bit).
+ */
+if (n >= HPAGE_PMD_NR) {
+result = SCAN_TRUNCATED;
+goto tree_locked;
+
+ /*
+ Handle holes in the radix tree: charge it from shmem and
+ insert relevant subpage of new_page into the radix-tree.
+ */
+if (n && !shmem_charge(mapping->host, n)) {
+result = SCAN_FAIL;
+-break;
+goto tree_locked;
+
+nr_none += n;
+for (; index < min(iter.index, end); index++) {
+radix_tree_insert(&mapping->page_tree, index,
+new_page + (index % HPAGE_PMD_NR));
+
+nr_none += n;
+
+ /* We are done. */
+if (index >= end)
@@ -1371,12 +1406,12 @@
+result = SCAN_FAIL;
+goto tree_unlocked;
+}
+-spin_lock_irq(&mapping->tree_lock);
+} else if (trylock_page(page)) {
+get_page(page);
++spin_unlock_irq(&mapping->tree_lock);
+} else {
+result = SCAN_PAGE_LOCK;
+-break;
+goto tree_locked;
+}
VM_BUG_ON_PAGE(!PageLocked(page), page);
VM_BUG_ON_PAGE(!PageUptodate(page), page);
-VM_BUG_ON_PAGE(PageTransCompound(page), page);
+
+/*
+ * If file was truncated then extended, or hole-punched, before
+ * we locked the first page, then a THP might be there already.
+ */
+if (PageTransCompound(page)) {
+  result = SCAN_PAGE_COMPOUND;
+  goto out_unlock;
+
}  
if (page_mapping(page) != mapping) {
  result = SCAN_TRUNCATED;
  goto out_unlock;
}  
-spin_unlock_irq(&mapping->tree_lock);

if (isolate_lru_page(page)) {
  result = SCAN_DEL_PAGE_LRU;
  -goto out_isolate_failed;
  +goto out_unlock;
  }

if (page_mapped(page))
  @@ -1417,7 +1459,9 @@
  */
  if (!page_ref_freeze(page, 3)) {
    result = SCAN_PAGE_COUNT;
    -goto out_lru;
    +spin_unlock_irq(&mapping->tree_lock);
    +putback_lru_page(page);
    +goto out_unlock;
  }

  /*
  @@ -1433,17 +1477,10 @@
  slot = radix_tree_iter_resume(slot, &iter);
  index++;
  continue;
  -out_lru:
  -spin_unlock_irq(&mapping->tree_lock);
  -putback_lru_page(page);
  -out_isolate_failed:

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unlock_page(page);
-put_page(page);
goto tree_unlocked;
out_unlock:
unlock_page(page);
put_page(page);
-break;
+goto tree_unlocked;
}

/*@ -1451,14 +1488,18 @@*/
* This code only triggers if there's nothing in radix tree
* beyond 'end'.
*/
-if (result == SCAN_SUCCEED && index < end) {
+if (index < end) {
  int n = end - index;

+/* Stop if extent has been truncated, and is now empty */
+if (n >= HPAGE_PMD_NR) {
  +result = SCAN_TRUNCATED;
  +goto tree_locked;
  +} 
if (!shmem_charge(mapping->host, n)) {
  result = SCAN_FAIL;
  goto tree_locked;
}
-
  for (; index < end; index++) {
    radix_tree_insert(&mapping->page_tree, index,
        new_page + (index % HPAGE_PMD_NR));
  } 

nr_none += n;
}

+__inc_node_page_state(new_page, NR_SHMEM_THPS);
+if (nr_none) {
  +struct zone *zone = page_zone(new_page);
  +
  +__mod_node_page_state(zone->zone_pgdat, NR_FILE_PAGES, nr_none);
  +
  +__mod_node_page_state(zone->zone_pgdat, NR_SHMEM, nr_none);
  +}
+}
tree_locked:
spin_unlock_irq(&mapping->tree_lock);
tree_unlocked:
if (result == SCAN_SUCCEED) {
    unsigned long flags;
    struct zone *zone = page_zone(new_page);
    /*
     * Replacing old pages with new one has succeed, now we need to
     * copy the content and free old pages.
     */
    +index = start;
    list_for_each_entry_safe(page, tmp, &pagelist, lru) {
        +while (index < page->index) {
            +clear_highpage(new_page + (index % HPAGE_PMD_NR));
            +index++;
        }
        copy_highpage(new_page + (page->index % HPAGE_PMD_NR),
                      page);
        list_del(&page->lru);
        unlock_page(page);
        -page_ref_unfreeze(page, 1);
        page->mapping = NULL;
        +page_ref_unfreeze(page, 1);
        ClearPageActive(page);
        ClearPageUnevictable(page);
        +unlock_page(page);
        put_page(page);
        +index++;
    }
    -local_irq_save(flags);
    -__inc_node_page_state(new_page, NR_SHMEM_THPS);
    -if (nr_none) {
        -__mod_node_page_state(zone->zone_pgdat, NR_FILE_PAGES, nr_none);
        -__mod_node_page_state(zone->zone_pgdat, NR_SHMEM, nr_none);
        +while (index < end) {
            +clear_highpage(new_page + (index % HPAGE_PMD_NR));
            +index++;
        }
    -local_irq_restore(flags);
    */
    - * Remove pte page tables, so we can re-faulti
    - * the page as huge.
    - */
    -retract_page_tables(mapping, start);
    -
    -/* Everything is ready, let's unfreeze the new_page */
    -set_page_dirty(new_page);
    SetPageUptodate(new_page);
-page_ref_unfreeze(new_page, HPAGE_PMD_NR);
+page_ref_add(new_page, HPAGE_PMD_NR - 1);
+set_page_dirty(new_page);
mem_cgroup_commit_charge(new_page, memcg, false, true);
lru_cache_add_anon(new_page);
-unlock_page(new_page);

+/
+ /* Remove pte page tables, so we can re-fault the page as huge.*/
+ */
+retract_page_tables(mapping, start);
*hpage = NULL;
} else {
  /* Something went wrong: rollback changes to the radix-tree */
-only_page_tables(mapping->host, nr_none);
  spin_lock_irq(&mapping->tree_lock);
+mapping->nrpages -= nr_none;
  +shmem_uncharge(mapping->host, nr_none);
  +
  radix_tree_for_each_slot(slot, &mapping->page_tree, &iter,
  start) {
    if (iter.index >= end)
      @@ -1542,19 +1588,18 @@
slot, page);
    slot = radix_tree_iter_resume(slot, &iter);
    spin_unlock_irq(&mapping->tree_lock);
-putback_lru_page(page);
unlock_page(page);
+putback_lru_page(page);
    unlock_page(page);
    spin_lock_irq(&mapping->tree_lock);
    }
VM_BUG_ON(nr_none);
spin_unlock_irq(&mapping->tree_lock);

-/* Unfreeze new_page, caller would take care about freeing it */
-page_ref_unfreeze(new_page, 1);
mem_cgroup_cancel_charge(new_page, memcg, true);
-unlock_page(new_page);
new_page->mapping = NULL;
}
+
+unlock_page(new_page);
out:
VM_BUG_ON(!list_empty(&pagelist));
/* TODO: tracepoints */
@@ -1674,10 +1719,14 @@
spin_unlock(&khugepaged_mm_lock);
mm = mm_slot->mm;
-down_read(&mm->mmap_sem);
-if (unlikely(khugepaged_test_exit(mm)))
- vma = NULL;
-else
+ /*
+ * Don't wait for semaphore (to avoid long wait times). Just move to
+ * the next mm on the list.
+ */
+ vma = NULL;
+if (unlikely(!down_read_trylock(&mm->mmap_sem)))
+goto breakouterloop_mmap_sem;
+if (likely(!khugepaged_test_exit(mm)))
 vma = find_vma(mm, khugepaged_scan.address);

progress++;
@@ -1903,8 +1952,6 @@

int start_stop_khugepaged(void)
{
- static struct task_struct *khugepaged_thread __read_mostly;
- static DEFINE_MUTEX(khugepaged_mutex);
int err = 0;

mutex_lock(&khugepaged_mutex);
@@ -1931,3 +1978,11 @@
mutex_unlock(&khugepaged_mutex);
return err;
}
+
+void khugepaged_min_free_kbytes_update(void)
+{
+ mutex_lock(&khugepaged_mutex);
+ if (khugepaged_enabled() && &khugepaged_thread)
+ set_recommended_min_free_kbytes();
+ mutex_unlock(&khugepaged_mutex);
+}
--- linux-4.15.0.orig/mm/kmemleak.c
+++ linux-4.15.0/mm/kmemleak.c
@@ -127,7 +127,7 @@
/* GFP bitmask for kmemleak internal allocations */
#define gfp_kmemleak_mask(gfp) (((gfp) & (GFP_KERNEL | GFP_ATOMIC)) | 
 \__GFP_NORETRY | __GFP_NOMEMALLOC | 
-\__GFP_NOWARN | __GFP_NOFAIL)
+\__GFP_NOWARN)

/* scanning area inside a memory block */
struct kmemleak_scan_area {
if (in_irq()) {
    object->pid = 0;
    strncpy(object->comm, "hardirq", sizeof(object->comm));
} else if (in_softirq()) {
    object->pid = 0;
    strncpy(object->comm, "softirq", sizeof(object->comm));
} else {
    @@ -1364,6 +1364,7 @@
    /*
     * Scan a large memory block in MAX_SCAN_SIZE chunks to reduce the latency.
     */
    +#ifdef CONFIG_SMP
    static void scan_large_block(void *start, void *end)
    {
        void *next;
        @@ -1375,6 +1376,7 @@
        cond_resched();
    }
    +#endif
    /*
     * Scan a memory block corresponding to a kmemleak_object. A condition is
     */
    -#ifdef CONFIG_SMP
    static void stop_scan_thread(void)
    {
        @@ -1918,15 +1918,15 @@
    }
stop_scan_thread();

+mutex_lock(&scan_mutex);
/*
- * Once the scan thread has stopped, it is safe to no longer track
- * object freeing. Ordering of the scan thread stopping and the memory
- * accesses below is guaranteed by the kthread_stop() function.
+ * Once it is made sure that kmemleak_scan has stopped, it is safe to no
+ * longer track object freeing. Ordering of the scan thread stopping and
+ * the memory accesses below is guaranteed by the kthread_stop()
+ * function.
*/
kmemleak_free_enabled = 0;
+mutex_unlock(&scan_mutex);

if (!kmemleak_found_leaks)
    __kmemleak_do_cleanup();
@@ -2025,6 +2024,17 @@
local_irq_restore(flags);

+/* register the data/bss sections */
+create_object((unsigned long)_sdata, _edata - _sdata,
+    KMEMLEAK_GREY, GFP_ATOMIC);
+create_object((unsigned long)__bss_start, __bss_stop - __bss_start,
+    KMEMLEAK_GREY, GFP_ATOMIC);
+/* only register .data..ro_after_init if not within .data */
+if (&__start_ro_after_init < &_sdata || &__end_ro_after_init > &_edata)
+create_object((unsigned long)__start_ro_after_init,
+    __end_ro_after_init - __start_ro_after_init,
+    KMEMLEAK_GREY, GFP_ATOMIC);
+
/*
 * This is the point where tracking allocations is safe. Automatic
 * scanning is started during the late initcall. Add the early logged
--- linux-4.15.0.orig/mm/ksm.c
+++ linux-4.15.0/mm/ksm.c
@@ -199,6 +199,8 @@
#define SEQNR_MASK	0x0ff	/* low bits of unstable tree seqnr */
#define UNSTABLE_FLAG	0x100	/* is a node of the unstable tree */
#define STABLE_FLAG	0x200	/* is listed from the stable tree */
+#define KSM_FLAG_MASK	(SEQNR_MASK|UNSTABLE_FLAG|STABLE_FLAG)
+/* to mask all the flags */

/* The stable and unstable tree heads */
static struct rb_root one_stable_tree[1] = { RB_ROOT };
@@ -766,6 +768,7 @@


stable_node->rmap_hlist_len--; 

put_anon_vma(rmap_item->anon_vma);
+rmap_item->head = NULL;

rmap_item->address &= PAGE_MASK;

} else if (rmap_item->address & UNSTABLE_FLAG) {
@@ -847,13 +850,13 @@ return 0;
}

@if (WARN_ON_ONCE(page_mapped(page))) {
./*
- * This should not happen: but if it does, just refuse to let
- * merge_across_nodes be switched - there is no need to panic.
- */
-err = -EBUSY;
-} else {
+/*
+ * Page could be still mapped if this races with __mmput() running in
+ * between ksm_exit() and exit_mmap(). Just refuse to let
+ * merge_across_nodes/max_page_sharing be switched.
+ */
+err = -EBUSY;
+if (!page_mapped(page)) {
+/*
+ * The stable node did not yet appear stale to get_ksm_page(),
+ * since that allows for an unmapped ksm page to be recognized
@@ -1138,6 +1141,13 @@
+newpte = pte_mkspecial(pfn_pte(page_to_pfn(kpage),
+ vma->vm_page_prot));
+/*
+ * We're replacing an anonymous page with a zero page, which is
+ * not anonymous. We need to do proper accounting otherwise we
+ * will get wrong values in /proc, and a BUG message in dmesg
+ * when tearing down the mm.
+ */
+dec_mm_counter(mm, MM_ANONPAGES);
} }

flush_cache_page(vma, addr, pte_pfn(*ptep));
@@ -2076,8 +2086,16 @@

down_read(&mm->mmap_sem);
 vma = find_mergeable_vma(mm, rmap_item->address);
-err = try_to_merge_one_page(vma, page,
- ZERO_PAGE(rmap_item->address));
if (vma) {
    err = try_to_merge_one_page(vma, page,
    ZERO_PAGE(rmap_item->address));
} else {
    /*
     * If the vma is out of date, we do not need to
     * continue.
     */
    err = 0;
}
up_read(&mm->mmap_sem);
/*
 * In case of failure, the page was not really empty, so we
@@ -2089,8 +2107,22 @@
 tree_rmap_item = unstable_tree_search_insert(rmap_item, page, &tree_page);
 if (tree_rmap_item) {
    bool split;
+    kpage = try_to_merge_two_pages(rmap_item, page,
     tree_rmap_item, tree_page);
+    /*
+     * If both pages we tried to merge belong to the same compound
+     * page, then we actually ended up increasing the reference
+     * count of the same compound page twice, and split_huge_page
+     * failed.
+     * Here we set a flag if that happened, and we use it later to
+     * try split_huge_page again. Since we call put_page right
+     * afterwards, the reference count will be correct and
+     * split_huge_page should succeed.
+     */
+    split = PageTransCompound(page)
+    &&& compound_head(page) == compound_head(tree_page);
    put_page(tree_page);
    if (kpage) {
    /*
@@ -2117,6 +2149,20 @@
     break_cow(tree_rmap_item);
     break_cow(rmap_item);
    }
+} else if (split) {
+    /*
+     * We are here if we tried to merge two pages and
+     * failed because they both belonged to the same
+     * compound page. We will split the page now, but no
+     * merging will take place.
+     * We do not want to add the cost of a full lock; if
+     * the page is locked, it is better to skip it and
+    */

-* perhaps try again later.
+-*/
+if (!trylock_page(page))
+return;
+split_huge_page(page);
+unlock_page(page);
}
}
}
@
-2346,8 +2392,12 @@
try_to_freeze();

if (ksmd_should_run()) {
-schedule_timeout_interruptible(
-msecs_to_jiffies(ksm_thread_sleep_millisecs));
+if (ksm_thread_sleep_millisecs >= 1000)
+schedule_timeout_interruptible(
+msecs_to_jiffies(round_jiffies_relative(ksm_thread_sleep_millisecs)));
+else
+schedule_timeout_interruptible(
+msecs_to_jiffies(ksm_thread_sleep_millisecs));
} else {
wait_event_freezable(ksm_thread_wait,
ksmd_should_run() || kthread_should_stop());
@@ -2538,10 +2588,15 @@
anon_vma_lock_read(anon_vma);
anon_vma_interval_tree_foreach(vmac, &anon_vma->rb_root,
0, ULONG_MAX) {
+unsigned long addr;
+
+cond_resched();
+cond_resched();
+vma = vmac->vma;
-if (rmap_item->address < vma->vm_start ||
- rmap_item->address >= vma->vm_end)
+
+/* Ignore the stable/unstable/sqnr flags */
+addr = rmap_item->address & ~KSM_FLAG_MASK;
+
+if (addr < vma->vm_start || addr >= vma->vm_end)
+continue;
+/*
 * Initially we examine only the vma which covers this
@@ -2555,8 +2610,7 @@
iffin (rwc->invalid_vma && rwc->invalid_vma(vma, rwc->arg))
     continue;
   -if (!rwc->rmap_one(page, vma,
     -rmap_item->address, rwc->arg)) {
if (!rwc->rmap_one(page, vma, addr, rwc->arg)) {
  anon_vma_unlock_read(anon_vma);
  return;
}
--- linux-4.15.0.orig/mm/list_lru.c
+++ linux-4.15.0/mm/list_lru.c
@@ -42,11 +42,7 @@
#if defined(CONFIG_MEMCG) && !defined(CONFIG_SLOB)
 static inline bool list_lru_memcg_aware(struct list_lru *lru)
 {
- /*
-  * This needs node 0 to be always present, even
-  * in the systems supporting sparse numa ids.
-  */
-  return !!lru->node[0].memcg_lrus;
+  return lru->memcg_aware;
 }

 static inline struct list_lru_one *
 @@ -318,7 +314,7 @@
 return 0;
 fail:
-  __memcg_destroy_list_lru_node(memcg_lrus, begin, i - 1);
+  __memcg_destroy_list_lru_node(memcg_lrus, begin, i);
  return -ENOMEM;
 }
@@ -390,6 +386,8 @@
 { int i;

 +lru->memcg_aware = memcg_aware;
+ if (!memcg_aware)
  return 0;

 --- linux-4.15.0.orig/mm/maccess.c
 +++ linux-4.15.0/mm/maccess.c
 @@ -5,8 +5,32 @@
 #include <linux/mm.h>
 #include <linux/uaccess.h>

 +static __always_inline long
 +probe_read_common(void *dst, const void __user *src, size_t size)
+{
+  long ret;
+  

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+pagefault_disable();
+ret = __copy_from_user_inatomic(dst, src, size);
+pagefault_enable();
+
+return ret ? -EFAULT : 0;
+
+static __always_inline long
+probe_write_common(void __user *dst, const void *src, size_t size)
+{
+long ret;
+
+pagefault_disable();
+ret = __copy_to_user_inatomic(dst, src, size);
+pagefault_enable();
+
+return ret ? -EFAULT : 0;
+
+
/**
 - * probe_kernel_read(): safely attempt to read from a location
 + * probe_kernel_read(): safely attempt to read from a kernel-space location
 + * @dst: pointer to the buffer that shall take the data
 + * @src: address to read from
 + * @size: size of the data chunk
 + * @old_fs: kernel fs before probe
 + *
 + mm_segment_t old_fs = get_fs();
 +
+set_fs(KERNEL_DS);
+-pagefault_disable();
+-ret = __copy_from_user_inatomic(dst,
+-(__force const void __user *)src, size);
+-pagefault_enable();
++ret = probe_read_common(dst, (__force const void __user *)src, size);
+set_fs(old_fs);
+
+-return ret ? -EFAULT : 0;
++return ret;
}
EXPORT_SYMBOL_GPL(probe_kernel_read);

/**
 * probe_user_read(): safely attempt to read from a user-space location
 * @dst: pointer to the buffer that shall take the data
 * @src: address to read from. This must be a user address.
 * @size: size of the data chunk
 *
 * Safely read from user address @src to the buffer at @dst. If a kernel fault

+ * happens, handle that and return -EFAULT.
+ */
+
+long __weak probe_user_read(void *dst, const void __user *src, size_t size)
+ __attribute__((alias("__probe_user_read")));
+
+long __probe_user_read(void *dst, const void __user *src, size_t size)
+{
+ long ret = -EFAULT;
+ mm_segment_t old_fs = get_fs();
+ set_fs(USER_DS);
+ if (access_ok(VERIFY_READ, src, size))
+ ret = probe_read_common(dst, src, size);
+ set_fs(old_fs);
+ return ret;
+}
+EXPORT_SYMBOL_GPL(probe_user_read);
+
+/**
+ * probe_kernel_write(): safely attempt to write to a location
+ * @dst: address to write to
+ * @src: pointer to the data that shall be written
+ * @ -48,6 +96,7 @@
+ * Safely write to address @dst from the buffer at @src. If a kernel fault
+ * happens, handle that and return -EFAULT.
+ */
+
+long __weak probe_kernel_write(void *dst, const void *src, size_t size)
+ __attribute__((alias("__probe_kernel_write")));
+
@@ -48,6 +96,7 @@

 set_fs(KERNEL_DS);
 -pagefault_disable();
 -ret = __copy_to_user_inatomic((__force void __user *)dst, src, size);
 -pagefault_enable();
 +ret = probe_write_common((__force void __user *)dst, src, size);
 set_fs(old_fs);

 -return ret ? -EFAULT : 0;
+return ret;
 }
 EXPORT_SYMBOL_GPL(probe_kernel_write);

 /**
+ * probe_user_write(): safely attempt to write to a user-space location
+ * @dst: address to write to
+ * @src: pointer to the data that shall be written
+ * @size: size of the data chunk
+ *
+ * Safely write to address @dst from the buffer at @src. If a kernel fault
+ * happens, handle that and return -EFAULT.
+ */
+
+long __weak probe_user_write(void __user *dst, const void *src, size_t size)
+    __attribute__((alias("__probe_user_write")));
+
+long __probe_user_write(void __user *dst, const void *src, size_t size)
+{
+    long ret = -EFAULT;
+    mm_segment_t old_fs = get_fs();
+
+    set_fs(USER_DS);
+    if (access_ok(VERIFY_WRITE, dst, size))
+        ret = probe_write_common(dst, src, size);
+    set_fs(old_fs);
+
+    return ret;
+}
+
+EXPORT_SYMBOL_GPL(probe_user_write);
+
/**
 * strncpy_from_unsafe: - Copy a NUL terminated string from unsafe address.
 * @dst:   Destination address, in kernel space. This buffer must be at
 *         least @count bytes long.
 * @unsafe_addr: Unsafe user address.
 * @count: Maximum number of bytes to copy, including the trailing NUL.
 *
 * Copies a NUL-terminated string from unsafe user address to kernel buffer.
 *
 * On success, returns the length of the string INCLUDING the trailing NUL.
 *
 * If access fails, returns -EFAULT (some data may have been copied
+ * and the trailing NUL added).
+ *
+ * If @count is smaller than the length of the string, copies @count-1 bytes,
+ * sets the last byte of @dst buffer to NUL and returns @count.
+ */
+long strncpy_from_unsafe_user(char *dst, const void __user *unsafe_addr,
+   long count)
+{
+  mm_segment_t old_fs = get_fs();
+  long ret;
+  +if (unlikely(count <= 0))
+    return 0;
+  +set_fs(USER_DS);
+  +pagefault_disable();
+  +ret = strncpy_from_user(dst, unsafe_addr, count);
+  +pagefault_enable();
+  +set_fs(old_fs);
+  +
+  +if (ret >= count) {
+    ret = count;
+    dst[ret - 1] = '\0';
+  } else if (ret > 0) {
+    ret++;
+  }
+  +return ret;
+}
+/**
+ * strnlen Unsafe User: - Get the size of a user string INCLUDING final NUL.
+ * @unsafe_addr: The string to measure.
+ * @count: Maximum count (including NUL)
+ *
+ * Get the size of a NUL-terminated string in user space without pagefault.
+ *
+ * Returns the size of the string INCLUDING the terminating NUL.
+ *
+ * If the string is too long, returns a number larger than @count. User
+ * has to check the return value against "> count".
+ * On exception (or invalid count), returns 0.
+ *
+ * Unlike strnlen User, this can be used from IRQ handler etc. because
+ * it disables pagefaults.
+ */
+long strnlen Unsafe User(const void __user *unsafe_addr, long count)
+{


mm_segment_t old_fs = get_fs();
int ret;

set_fs(USER_DS);
pagefault_disable();
ret = strnlen_user(unsafe_addr, count);
pagefault_enable();
set_fs(old_fs);

return ret;
}
--- linux-4.15.0.orig/mm/madvise.c
+++ linux-4.15.0/mm/madvise.c
@@ -24,6 +24,7 @@
#include <linux/swapops.h>
#include <linux/shmem_fs.h>
#include <linux/mmu_notifier.h>
+#include <linux/sched/mm.h>
#include <asm/tlb.h>

@@ -96,7 +97,7 @@
new_flags |= VM_DONTDUMP;
break;
case MADV_DODUMP:
-if (new_flags & VM_SPECIAL) {
+if (!is_vm_hugetlb_page(vma) && new_flags & VM_SPECIAL) {
    error = -EINVAL;
goto out;
} @ @ -826,6 +827,23 @@
if (write) {
    if (down_write_killable(&current->mm->mmap_sem))
        return -EINTR;
        +/
        + * We may have stolen the mm from another process
        + * that is undergoing core dumping.
        + *
        + * Right now that's io_ring, in the future it may
        + * be remote process management and not "current"
        + * at all.
        + *
        + * We need to fix core dumping to not do this,
        + * but for now we have the mmget_still_valid()
        + * model.
        + */
+if (!mmget_still_valid(current->mm)) {

+up_write(&current->mm->mmap_sem);  
+return -EINTR;  
+}  
} else {  
down_read(&current->mm->mmap_sem);  
}  
--- linux-4.15.0.orig/mm/memblock.c  
+++ linux-4.15.0/mm/memblock.c  
@@ -174,14 +174,6 @@  
*/  
* Find @size free area aligned to @align in the specified range and node.  
*  
- * When allocation direction is bottom-up, the @start should be greater  
- * than the end of the kernel image. Otherwise, it will be trimmed. The  
- * reason is that we want the bottom-up allocation just near the kernel  
- * image so it is highly likely that the allocated memory and the kernel  
- * will reside in the same node.  
- *  
- * If bottom-up allocation failed, will try to allocate memory top-down.  
- *  
- * RETURNS:  
- * Found address on success, 0 on failure.  
- */  
@@ -189,8 +181,6 @@  
phys_addr_t align, phys_addr_t start,  
phys_addr_t end, int nid, ulong flags)  
{  
-phys_addr_t kernel_end, ret;  
-  
-/* pump up @end */  
-if (end == MEMBLOCK_ALLOC_ACCESSIBLE)  
end = memblock.current_limit;  
@@ -198,39 +188,12 @@  
/* avoid allocating the first page */  
start = max_t(phys_addr_t, start, PAGE_SIZE);  
end = max(start, end);  
-kernel_end = __pa_symbol(_end);  
-  
-/*  
- * try bottom-up allocation only when bottom-up mode  
- * is set and @end is above the kernel image.  
- */  
-if (memblock_bottom_up() && end > kernel_end) {  
-phys_addr_t bottom_up_start;  
-  
-/* make sure we will allocate above the kernel */  
-bottom_up_start = max(start, kernel_end);  
-
/* ok, try bottom-up allocation first */
ret = __memblock_find_range_bottom_up(bottom_up_start, end,
   size, align, nid, flags);
if (ret)
  return ret;

/*
 * we always limit bottom-up allocation above the kernel,
 * but top-down allocation doesn't have the limit, so
 * retrying top-down allocation may succeed when bottom-up
 * allocation failed.
 *
 * bottom-up allocation is expected to be fail very rarely,
 * so we use WARN_ONCE() here to see the stack trace if
 * fail happens.
 */
WARN_ONCE(1, "memblock: bottom-up allocation failed, memory hotunplug may be affected\n");

return __memblock_find_range_top_down(start, end, size, align, nid,
   flags);
+if (memblock_bottom_up())
+  return __memblock_find_range_bottom_up(start, end, size, align,
+    nid, flags);
+else
+  return __memblock_find_range_top_down(start, end, size, align,
+    nid, flags);
}

/**
@@ -1101,34 +1064,6 @@
*out_nid = r->nid;
}

-unsigned long __init_memblock memblock_next_valid_pfn(unsigned long pfn,
-           unsigned long max_pfn)
-{
-struct memblock_type *type = &memblock.memory;
-unsigned int right = type->cnt;
-unsigned int mid, left = 0;
-phys_addr_t addr = PFN_PHYS(pfn + 1);
-
-do {
-    mid = (right + left) / 2;
-
-if (addr < type->regions[mid].base)
-    right = mid;
-else if (addr >= (type->regions[mid].base +
- type->regions[mid].size))
-left = mid + 1;
-else {
-/* addr is within the region, so pfn + 1 is valid */
-return min(pfn + 1, max_pfn);
-}
-} while (left < right);
-
-if (right == type->cnt)
-return max_pfn;
-else
-return min(PHYS_PFN(type->regions[right].base), max_pfn);
-}
-
/**
 * memblock_set_node - set node ID on memblock regions
 * @base: base of area to set node ID for
 * @ @ -1464,11 +1399,7 @@
 */
void __init __memblock_free_early(phys_addr_t base, phys_addr_t size)
{
-memblock_dbg("%s: [%#016llx-%#016llx] %pF\n",
- __func__, (u64)base, (u64)base + size - 1,
- (void *)_RET_IP_);
-kmemleak_free_part_phys(base, size);
-memblock_remove_range(&memblock.reserved, base, size);
+memblock_free(base, size);
}

/*
--- linux-4.15.0.orig/mm/memcontrol.c
+++ linux-4.15.0/mm/memcontrol.c
@@ -233,6 +233,12 @@
/* Used for OOM nofiier */
#define OOM_CONTROL(0)

+static inline bool should_force_charge(void)
+{
+return tsk_is_oom_victim(current) || fatal_signal_pending(current) ||
+(current->flags & PF_EXITING);
+}
+
+/* Some nice accessors for the vmpressure. */
+struct vmpressure *memcg_to_vmpressure(struct mem_cgroup *memcg)
+{
+return mz;
+}
- * Return page count for single (non recursive) @memcg.
- *
- * Implementation Note: reading percpu statistics for memcg.
- *
- * Both of vmstat[] and percpu_counter has threshold and do periodic
- * synchronization to implement "quick" read. There are trade-off between
- * reading cost and precision of value. Then, we may have a chance to implement
- * a periodic synchronization of counter in memcg's counter.
- *
- * But this _read() function is used for user interface now. The user accounts
- * memory usage by memory cgroup and he _always_ requires exact value because
- * he accounts memory. Even if we provide quick-and-fuzzy read, we always
- * have to visit all online cpus and make sum. So, for now, unnecessary
- * synchronization is not implemented. (just implemented for cpu hotplug)
- *
- * If there are kernel internal actions which can make use of some not-exact
- * value, and reading all cpu value can be performance bottleneck in some
- * common workload, threshold and synchronization as vmstat[] should be
- * implemented.
- *
- * The parameter idx can be of type enum memcg_event_item or vm_event_item.
- */

static unsigned long memcg_sum_events(struct mem_cgroup *memcg, int event)
{
    unsigned long val = 0;
    int cpu;
    
    for_each_possible_cpu(cpu)
    val += per_cpu(memcg->stat->events[event], cpu);
    return val;
}
-__this_cpu_add(memcg->stat->count[NR_SHMEM], nr_pages);
+__mod_memcg_state(memcg, NR_SHMEM, nr_pages);
}

if (compound) {
    VM_BUG_ON_PAGE(!PageTransHuge(page), page);
    __this_cpu_add(memcg->stat->count[MEMCG_RSS_HUGE], nr_pages);
    __mod_memcg_state(memcg, MEMCG_RSS_HUGE, nr_pages);
}
/* pagein of a big page is an event. So, ignore page size */
if (nr_pages > 0)
    __this_cpu_inc(memcg->stat->events[PGPGIN]);
else {
    __this_cpu_inc(memcg->stat->events[PGPGOUT]);
    nr_pages = -nr_pages; /* for event */
}
-__this_cpu_add(memcg->stat->nr_page_events, nr_pages);
+__this_cpu_add(memcg->stat_cpu->nr_page_events, nr_pages);
}

unsigned long mem_cgroup_node_nr_lru_pages(struct mem_cgroup *memcg,
@@ -642,8 +619,8 @@
{
    unsigned long val, next;
    -val = __this_cpu_read(memcg->stat->nr_page_events);
-    next = __this_cpu_read(memcg->stat->targets[target]);
+    val = __this_cpu_read(memcg->stat_cpu->nr_page_events);
+    next = __this_cpu_read(memcg->stat_cpu->targets[target]);
    /* from time_after() in jiffies.h */
    if ((long)(next - val) < 0) {
        switch (target) {
@@ -659,7 +636,7 @@
            default:
            break;
        }
-__this_cpu_write(memcg->stat->targets[target], next);
+__this_cpu_write(memcg->stat_cpu->targets[target], next);
        return true;
    }
    return false;
@@ -725,7 +702,7 @@
    if (unlikely(!memcg))
        memcg = root_mem_cgroup;

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{-
    while (!css_tryget_online(&memcg->css));
+
    while (!css_tryget(&memcg->css));
rcu_read_unlock();
return memcg;
}
@@ -871,26 +848,45 @@
css_put(&prev->css);
}

-static void invalidate_reclaim_iterators(struct mem_cgroup *dead_memcg)
+static void __invalidate_reclaim_iterators(struct mem_cgroup *from,
+struct mem_cgroup *dead_memcg)
{
-    struct mem_cgroup *memcg = dead_memcg;
+    struct mem_cgroup *memcg = dead_memcg;
    struct mem_cgroup_reclaim_iter *iter;
    struct mem_cgroup_per_node *mz;
    int nid;
    int i;

    -while ((memcg = parent_mem_cgroup(memcg))) {
       -for_each_node(nid) {
          -mz = mem_cgroup_nodeinfo(memcg, nid);
          -for (i = 0; i <= DEF_PRIORITY; i++) {
             -iter = &mz->iter[i];
             -cmpxchg(&iter->position,
             -dead_memcg, NULL);
          }-
       -} +for_each_node(nid) {
       +mz = mem_cgroup_nodeinfo(from, nid);
       +for (i = 0; i <= DEF_PRIORITY; i++) {
             +iter = &mz->iter[i];
             +cmpxchg(&iter->position,
             +dead_memcg, NULL);
       }
    }

+static void invalidate_reclaim_iterators(struct mem_cgroup *dead_memcg) +{
+    struct mem_cgroup *memcg = dead_memcg;
+    struct mem_cgroup *last;
+    +do {
+        __invalidate_reclaim_iterators(memcg, dead_memcg);
+        last = memcg;
+    } while ((memcg = parent_mem_cgroup(memcg)));
+    +}
/*
 * When cgroup non-hierarchy mode is used,
 * parent_mem_cgroup() does not walk all the way up to the
 * cgroup root (root_mem_cgroup). So we have to handle
 * dead_memcg from cgroup root separately.
 */
if (last != root_mem_cgroup)
__invalidate_reclaim_iterators(root_mem_cgroup,
dead_memcg);
{

/*
 * Iteration constructs for visiting all cgroups (under a tree). If
 * loops are exited prematurely (break), mem_cgroup_iter_break() must
 * @ @ -1251,8 +1247,13 @@
 *]

bool ret;

mutex_lock(&oom_lock);
ret = out_of_memory(&oc);
if (mutex_lock_killable(&oom_lock))
return true;
/*
 * A few threads which were not waiting at mutex_lock_killable() can
 * fail to bail out. Therefore, check again after holding oom_lock.
 */
ret = should_force_charge() || out_of_memory(&oc);
mutex_unlock(&oom_lock);
return ret;
}@ @ -1707,11 +1708,6 @@
} exporting_symbol(unlock_page_memcg);

/*
 * size of first charge trial. "32" comes from vmscan.c's magic value.
 * TODO: maybe necessary to use big numbers in big irons.
 */
#define CHARGE_BATCH 32U
struct memcg_stock_pcp {
struct mem_cgroup *cached; /* this never be root cgroup */
unsigned int nr_pages;
}@ @ -1739,7 +1735,7 @@
unsigned long flags;
bool ret = false;
-if (nr_pages > CHARGE_BATCH)
+if (nr_pages > MEMCG_CHARGE_BATCH)
return ret;

local_irq_save(flags);
@@ -1808,7 +1804,7 @@
}
stock->nr_pages += nr_pages;

@if (stock->nr_pages > CHARGE_BATCH)
+if (stock->nr_pages > MEMCG_CHARGE_BATCH)
drain_stock(stock);

local_irq_restore(flags);
@@ -1858,9 +1854,44 @@
static int memcg_hotplug_cpu_dead(unsigned int cpu)
{
    struct memcg_stock_pcp *stock;
    +struct mem_cgroup *memcg;

    stock = &per_cpu(memcg_stock, cpu);
    drain_stock(stock);
    +
    +for_each_mem_cgroup(memcg) {
        +int i;
        +
        +for (i = 0; i < MEMCG_NR_STAT; i++) {
            +int nid;
            +long x;
            +
            +x = this_cpu_xchg(memcg->stat_cpu->count[i], 0);
            +if (x)
                +atomic_long_add(x, &memcg->stat[i]);
            +
            +if (i >= NR_VM_NODE_STAT_ITEMS)
                +continue;
            +
            +for_each_node(nid) {
                +struct mem_cgroup_per_node *pn;
                +
                +pn = mem_cgroup_nodeinfo(memcg, nid);
                +x = this_cpu_xchg(pn->lruvec_stat_cpu->count[i], 0);
                +if (x)
                    +atomic_long_add(x, &pn->lruvec_stat[i]);
                +}
            +}
            +
            +for (i = 0; i < NR_VM_EVENT_ITEMS; i++) {
                +long x;
                +
                +
```
x = this_cpu_xchg(memcg->stat_cpu->events[i], 0);
+if (x)
+atomic_long_add(x, &memcg->events[i]);
+
+return 0;
}
@@ -1871,7 +1902,7 @@
do {
    if (page_counter_read(&memcg->memory) <= memcg->high)
    continue;
-      mem_cgroup_event(memcg, MEMCG_HIGH);
+      memcg_memory_event(memcg, MEMCG_HIGH);
    try_to_free_mem_cgroup_pages(memcg, nr_pages, gfp_mask, true);
  } while ((memcg = parent_mem_cgroup(memcg));
}
@@ -1881,7 +1912,7 @@
struct mem_cgroup *memcg;

memcg = container_of(work, struct mem_cgroup, high_work);
-reclaim_high(memcg, CHARGE_BATCH, GFP_KERNEL);
+reclaim_high(memcg, MEMCG_CHARGE_BATCH, GFP_KERNEL);
}
/*
@@ -1905,7 +1936,7 @@
static int try_charge(struct mem_cgroup *memcg, gfp_t gfp_mask,
 unsigned int nr_pages)
 {
-    unsigned int batch = max(CHARGE_BATCH, nr_pages);
+    unsigned int batch = max(MEMCG_CHARGE_BATCH, nr_pages);
    int nr_retries = MEM_CGROUP_RECLAIM_RETRIES;
    struct mem_cgroup *mem_over_limit;
    struct page_counter *counter;
@@ -1937,14 +1968,21 @@
    }
/*
+ * Memcg doesn't have a dedicated reserve for atomic
+ * allocations. But like the global atomic pool, we need to
+ * put the burden of reclaim on regular allocation requests
+ * and let these go through as privileged allocations.
+ */
+if (gfp_mask & __GFP_ATOMIC)
+goto force;
+```
/*
* Unlike in global OOM situations, memcg is not in a physical
* memory shortage. Allow dying and OOM-killed tasks to
* bypass the last charges so that they can exit quickly and
* free their memory.
*/
-if (unlikely(tsk_is_oom_victim(current) ||
-    fatal_signal_pending(current) ||
-    current->flags & PF_EXITING))
+if (unlikely(should_force_charge()))
goto force;

/*
@@ -1962,7 +2000,7 @@
if (!gfpflags_allow_blocking(gfp_mask))
goto nomem;

-mem_cgroup_event(mem_over_limit, MEMCG_MAX);
+memcg_memory_event(mem_over_limit, MEMCG_MAX);

nr_reclaimed = try_to_free_mem_cgroup_pages(mem_over_limit, nr_pages,
-    gfp_mask, may_swap);
+    gfp_mask, GFP_NOWAIT | __GFP_NOWARN);
@@ -2005,7 +2043,7 @@
if (fatal_signal_pending(current))
goto force;

-mem_cgroup_event(mem_over_limit, MEMCG_OOM);
+memcg_memory_event(mem_over_limit, MEMCG_OOM);

mem_cgroup_oom(mem_over_limit, gfp_mask,
    get_order(nr_pages * PAGE_SIZE));
@@ -2205,7 +2243,7 @@
{
 struct memcg_kmem_cache_create_work *cw;

-cw = kmalloc(sizeof(*cw), GFP_NOWAIT);
+ cw = kmalloc(sizeof(*cw), GFP_NOWAIT | __GFP_NOWARN);
if (!cw)
    return;
@@ -2333,6 +2371,16 @@
if (!cgroup_subsys_on_dfl(memory_cgrp_subsys) &&
    !page_counter_try_charge(&memcg->kmem, nr_pages, &counter)) {
+    /* Enforce __GFP_NOFAIL allocation because callers are not
+     * prepared to see failures and likely do not have any failure
+     */
+    /*
+     */
+ * handling code.
+ */
+if (gfp & __GFP_NOFAIL) {
+page_counter_charge(&memcg->kmem, nr_pages);
+return 0;
+}
cancel_charge(memcg, nr_pages);
return -ENOMEM;
}
@@ -2355,7 +2403,7 @@
struct mem_cgroup *memcg;
int ret = 0;

-if (memcg_kmem_bypass())
+if (mem_cgroup_disabled() || memcg_kmem_bypass())
return 0;

memcg = get_mem_cgroup_from_mm(current->mm);
@@ -2415,18 +2463,11 @@
for (i = 1; i < HPAGE_PMD_NR; i++)
head[i].mem_cgroup = head->mem_cgroup;

-__this_cpu_sub(head->mem_cgroup->stat->count[MEMCG_RSS_HUGE],
-HPAGE_PMD_NR);
+_mod_memcg_state(head->mem_cgroup, MEMCG_RSS_HUGE, -HPAGE_PMD_NR);
}
#endif /* CONFIG_TRANSPARENT_HUGEPAGE */

#ifdef CONFIG_MEMCG_SWAP
-static void mem_cgroup_swap_statistics(struct mem_cgroup *memcg,
-    int nr_entries)
-{
-    this_cpu_add(memcg->stat->count[MEMCG_SWAP], nr_entries);
-}
/**
 * mem_cgroup_move_swap_account - move swap charge and swap_cgroup's record.
 * @entry: swap entry to be moved
@@ -2450,8 +2491,8 @@
new_id = mem_cgroup_id(to);

if (swap_cgroup_cmpxchg(entry, old_id, new_id) == old_id) {
    -mem_cgroup_swap_statistics(from, -1);
-    -mem_cgroup_swap_statistics(to, 1);
+mod_memcg_state(from, MEMCG_SWAP, -1);
+mod_memcg_state(to, MEMCG_SWAP, 1);
    return 0;
}
return -EINVAL;
@@ -2767,10 +2808,10 @@
    struct mem_cgroup *iter;
    int i;

    -memset(events, 0, sizeof(*events) * MEMCG_NR_EVENTS);
    +memset(events, 0, sizeof(*events) * NR_VM_EVENT_ITEMS);

    for_each_mem_cgroup_tree(iter, memcg) {
      -for (i = 0; i < MEMCG_NR_EVENTS; i++)
      +for (i = 0; i < NR_VM_EVENT_ITEMS; i++)
        events[i] += memcg_sum_events(iter, i);
    }
    }
@@ -3489,7 +3530,7 @@
    struct mem_cgroup_thresholds *thresholds;
    struct mem_cgroup_threshold_ary *new;
    unsigned long usage;
-
    int i, j, size;
    +int i, j, size, entries;

    mutex_lock(&memcg->thresholds_lock);
    }
@@ -3509,14 +3550,20 @@
    __mem_cgroup_threshold(memcg, type == _MEMSWAP);

    /* Calculate new number of threshold */
    -size = 0;
    +size = entries = 0;
    for (i = 0; i < thresholds->primary->size; i++) {
      if (thresholds->primary->entries[i].eventfd != eventfd)
        size++;
      +else
      +entries++;
    }

    new = thresholds->spare;

    /* If no items related to eventfd have been cleared, nothing to do */
    +if (!entries)
    +goto unlock;
    +
    /* Set thresholds array to NULL if we don't have thresholds */
    if (!size) {
      kfree(new);
      }
@@ -3619,7 +3666,8 @@
      seq_printf(sf, "oom_kill_disable %d\n", memcg->oom_kill_disable);
seq_printf(sf, "under_oom %d\n", (bool)memcg->under_oom);
seq_printf(sf, "oom_kill %lu\n", memcg_sum_events(memcg, OOM_KILL));
+seq_printf(sf, "oom_kill %lu\n",
+atomic_long_read(&memcg->memory_events[MEMCG_OOM_KILL]));
return 0;
}

@@ -3671,6 +3719,22 @@
return &memcg->cgwb_domain;
}

+/*
+ * idx can be of type enum memcg_stat_item or node_stat_item.
+ * Keep in sync with memcg_exact_page().
+ */
+static unsigned long memcg_exact_page_state(struct mem_cgroup *memcg, int idx)
+{
+long x = atomic_long_read(&memcg->stat[idx]);
+int cpu;
+
+for_each_online_cpu(cpu)
+x += per_cpu_ptr(memcg->stat_cpu, cpu)->count[idx];
+if (x < 0)
+x = 0;
+return x;
+}
+*/

/* mem_cgroup_wb_stats - retrieve writeback related stats from its memcg
 * @wb: bdi_writeback in question
 @@ -3696,10 +3760,10 @@
 struct mem_cgroup *memcg = mem_cgroup_from_css(wb->memcg_css);
 struct mem_cgroup *parent;

-*pdirty = memcg_page_state(memcg, NR_FILE_DIRTY);
+*pdirty = memcg_exact_page_state(memcg, NR_FILE_DIRTY);

 /* this should eventually include NR_UNSTABLE_NFS */
-*pwriteback = memcg_page_state(memcg, NR_WRITEBACK);
+*pwriteback = memcg_exact_page_state(memcg, NR_WRITEBACK);
*pfillepages = mem_cgroup_nr_lru_pages(memcg, (1 << LRU_INACTIVE_FILE) |
 (1 << LRU_ACTIVE_FILE));
*pheadroom = PAGE_COUNTER_MAX;
 @@ -4110,6 +4174,14 @@

 static DEFINE_IDR(mem_cgroup_idr);

+static void mem_cgroup_id_remove(struct mem_cgroup *memcg)
static void mem_cgroup_id_get_many(struct mem_cgroup *memcg, unsigned int n) {
    VM_BUG_ON(atomic_read(&memcg->id.ref) <= 0);
    @ @ -4120,8 +4192,7 @@
    {
    VM_BUG_ON(atomic_read(&memcg->id.ref) < n);
    if (atomic_sub_and_test(n, &memcg->id.ref)) {
        -idr_remove(&mem_cgroup_idr, memcg->id.id);
        -memcg->id.id = 0;
        +mem_cgroup_id_remove(memcg);
    }
    /* Memcg ID pins CSS */
    css_put(&memcg->css);
    @ @ -4168,8 +4239,8 @@
    if (!pn)
    return 1;

    -pn->lruvec_stat = alloc_percpu(struct lruvec_stat);
    -if (!pn->lruvec_stat) {
    +pn->lruvec_stat_cpu = alloc_percpu(struct lruvec_stat);
    +if (!pn->lruvec_stat_cpu) {
        kfree(pn);
        return 1;
    }
    @ @ -4187,7 +4258,10 @@
    }
    struct mem_cgroup_per_node *pn = memcg->nodeinfo[node];

    -free_percpu(pn->lruvec_stat);
    +free_percpu(pn->lruvec_stat_cpu);
    kfree(pn);
    }
    @ @ -4197,7 +4271,7 @@

    for_each_node(node)
    free_mem_cgroup_per_node_info(memcg, node);
    -free_percpu(memcg->stat);
free_percpu(memcg->stat_cpu);
kfree(memcg);
}

@@ -4226,8 +4300,8 @@
if (memcg->id.id < 0)
goto fail;

-memcg->stat = alloc_percpu(struct mem_cgroup_stat_cpu);
-!memcg->stat
+memcg->stat_cpu = alloc_percpu(struct mem_cgroup_stat_cpu);
+!memcg->stat_cpu
goto fail;

for_each_node(node)
@@ -4255,8 +4329,7 @@
idr_replace(&mem_cgroup_idr, memcg, memcg->id.id);
return memcg;
fail:
-!memcg->id.id
-idr_remove(&mem_cgroup_idr, memcg->id.id);
+mem_cgroup_id_remove(memcg);
__mem_cgroup_free(memcg);
return NULL;
}
@@ -4315,6 +4388,7 @@
return &memcg->css;
fail:
+mem_cgroup_id_remove(memcg);
mem_cgroup_free(memcg);
return ERR_PTR(-ENOMEM);
}
@@ -4469,7 +4543,7 @@
struct page *page = NULL;
swp_entry_t ent = pte_to_swp_entry(ptent);

-!mc.flags & MOVE_ANON || non_swap_entry(ent)
+!mc.flags & MOVE_ANON
return NULL;

/*
@@ -4488,6 +4562,9 @@
return page;
}

+if (non_swap_entry(ent))
+return NULL;
Because lookup_swap_cache() updates some statistics counter, we call find_get_page() with swapper_space directly.

spin_lock_irqsave(&from->move_lock, flags);

if (!anon && page_mapped(page)) {
    __this_cpu_sub(from->stat->count[NR_FILE_MAPPED], nr_pages);
    __this_cpu_add(to->stat->count[NR_FILE_MAPPED], nr_pages);
    __mod_memcg_state(from, NR_FILE_MAPPED, -nr_pages);
    __mod_memcg_state(to, NR_FILE_MAPPED, nr_pages);
}

struct address_space *mapping = page_mapping(page);

if (mapping_cap_account_dirty(mapping)) {
    __this_cpu_sub(from->stat->count[NR_FILE_DIRTY], nr_pages);
    __this_cpu_add(to->stat->count[NR_FILE_DIRTY], nr_pages);
    __mod_memcg_state(from, NR_FILE_DIRTY, -nr_pages);
    __mod_memcg_state(to, NR_FILE_DIRTY, nr_pages);
}

if (PageWriteback(page)) {
    __this_cpu_sub(from->stat->count[NR_WRITEBACK], nr_pages);
    __this_cpu_add(to->stat->count[NR_WRITEBACK], nr_pages);
    __mod_memcg_state(from, NR_WRITEBACK, -nr_pages);
    __mod_memcg_state(to, NR_WRITEBACK, nr_pages);
}

if (!mem_cgroup_is_root(mc.to))
    page_counter_uncharge(&mc.to->memory, mc.moved_swap);

    -mem_cgroup_id_get_many(mc.to, mc.moved_swap);
    css_put_many(&mc.to->css, mc.moved_swap);
    mc.moved_swap = 0;
    ent = target.ent;
    if (!mem_cgroup_move_swap_account(ent, mc.from, mc.to)) {
        mc.precharge--;
/* we fixup refcnts and charges later. */
+mem_cgroup_id_get_many(mc.to, 1);
+/* we fixup other refcnts and charges later. */
mc.moved_swap++;
}
break;
@@ -5259,7 +5334,7 @@
continue;
}

-mem_cgroup_event(memcg, MEMCG_OOM);
+memcg_memory_event(memcg, MEMCG_OOM);
if (!mem_cgroup_out_of_memory(memcg, GFP_KERNEL, 0))
break;
}
@@ -5272,11 +5347,16 @@
{
struct mem_cgroup *memcg = mem_cgroup_from_css(seq_css(m));

-seq_printf(m, "low %lu\n", memcg_sum_events(memcg, MEMCG_LOW));
-seq_printf(m, "high %lu\n", memcg_sum_events(memcg, MEMCG_HIGH));
-seq_printf(m, "max %lu\n", memcg_sum_events(memcg, MEMCG_MAX));
-seq_printf(m, "oom %lu\n", memcg_sum_events(memcg, MEMCG_OOM));
-seq_printf(m, "oom_kill %lu\n", memcg_sum_events(memcg, OOM_KILL));
+seq_printf(m, "low %lu",
+ atomic_long_read(&memcg->memory_events[MEMCG_LOW]));
+seq_printf(m, "high %lu",
+ atomic_long_read(&memcg->memory_events[MEMCG_HIGH]));
+seq_printf(m, "max %lu",
+ atomic_long_read(&memcg->memory_events[MEMCG_MAX]));
+seq_printf(m, "oom %lu",
+ atomic_long_read(&memcg->memory_events[MEMCG_OOM]));
+seq_printf(m, "oom_kill %lu",
+ atomic_long_read(&memcg->memory_events[MEMCG_OOM_KILL]));
return 0;
}
@@ -5285,7 +5365,7 @@
{
struct mem_cgroup *memcg = mem_cgroup_from_css(seq_css(m));
unsigned long stat[MEMCG_NR_STAT];
-unsigned long events[MEMCG_NR_EVENTS];
+unsigned long events[NR_VM_EVENT_ITEMS];
int i;

/*
@@ -5642,12 +5722,12 @@
}
local_irq_save(flags);
-__this_cpu_sub(ug->memcg->stat->count[MEMCG_RSS], ug->nr_anon);
-__this_cpu_sub(ug->memcg->stat->count[MEMCG_CACHE], ug->nr_file);
-__this_cpu_sub(ug->memcg->stat->count[MEMCG_RSS_HUGE], ug->nr_huge);
-__this_cpu_sub(ug->memcg->stat->count[NR_SHMEM], ug->nr_shmem);
-__this_cpu_add(ug->memcg->stat->events[PGPGOUT], ug->pgpgout);
-__this_cpu_add(ug->memcg->stat->nr_page_events, nr_pages);
+__mod_memcg_state(ug->memcg, MEMCG_RSS, -ug->nr_anon);
+__mod_memcg_state(ug->memcg, MEMCG_CACHE, -ug->nr_file);
+__mod_memcg_state(ug->memcg, MEMCG_RSS_HUGE, -ug->nr_huge);
+__mod_memcg_state(ug->memcg, NR_SHMEM, -ug->nr_shmem);
+__count_memcg_events(ug->memcg, PGPGOUT, ug->pgpgout);
+__this_cpu_add(ug->memcg->stat_cpu->nr_page_events, nr_pages);
memcg_check_events(ug->memcg, ug->dummy_page);
local_irq_restore(flags);

@@ -5828,6 +5908,10 @@
if (!mem_cgroup_sockets_enabled)
return;

+/* Do not associate the sock with unrelated interrupted task's memcg. */
+if (in_interrupt())
+return;
+
rcu_read_lock();
memcg = mem_cgroup_from_task(current);
if (memcg == root_mem_cgroup)
@@ -5874,7 +5958,7 @@
if (in_softirq())
gfp_mask = GFP_NOWAIT;

-__this_cpu_add(memcg->stat->count[MEMCG_SOCK], nr_pages);
+mod_memcg_state(memcg, MEMCG_SOCK, nr_pages);

if (try_charge(memcg, gfp_mask, nr_pages) == 0)
return true;
@@ -5895,7 +5979,7 @@
return;
}

-__this_cpu_sub(memcg->stat->count[MEMCG_SOCK], nr_pages);
+mod_memcg_state(memcg, MEMCG_SOCK, -nr_pages);

refill_stock(memcg, nr_pages);
}
nr_entries);
VM_BUG_ON_PAGE(oldid, page);
-mem_cgroup_swap_statistics(swap_memcg, nr_entries);
+mod_memcg_state(swap_memcg, MEMCG_SWAP, nr_entries);

page->mem_cgroup = NULL;
@@ -6085,7 +6169,7 @@
 mem_cgroup_id_get_many(memcg, nr_pages - 1);
 oldid = swap_cgroup_record(entry, mem_cgroup_id(memcg), nr_pages);
 VM_BUG_ON_PAGE(oldid, page);
@@ -6113,7 +6197,7 @@
 else
 page_counter_uncharge(&memcg->memsw, nr_pages);
 }
@@ -508,6 +509,7 @@
 [MF_MSG_POISONED_HUGE]= "huge page already hardware poisoned",
 [MF_MSG_HUGE]= "huge page",
 [MF_MSG_FREE_HUGE]= "free huge page",
+[MF_MSG_NON_PMD_HUGE]= "non-pmd-sized huge page",
 [MF_MSG_UNMAP_FAILED]= "unmapping failed page",
 [MF_MSG_DIRTY_SWAPCACHE]= "dirty swapcache page",
 [MF_MSG_CLEAN_SWAPCACHE]= "clean swapcache page",
@@ -1090,6 +1092,21 @@
 return 0;
 }
"
/*
 * TODO: hwpoison for pud-sized hugetlb doesn't work right now, so
 * simply disable it. In order to make it work properly, we need
 * make sure that:
 * - conversion of a pud that maps an error hugetlb into hwpoison
 * - entry properly works, and
 * - other mm code walking over page table is aware of pud-aligned
 * hwpoison entries.
 */
if (huge_page_size(page_hstate(head)) > PMD_SIZE) {
    action_result(pfn, MF_MSG_NON_PMD_HUGE, MF_IGNORED);
    res = -EBUSY;
goto out;
}

if (!hwpoison_user_mappings(p, pfn, trapno, flags, &head)) {
    action_result(pfn, MF_MSG_UNMAP_FAILED, MF_IGNORED);
    res = -EBUSY;
    goto out;
}

if (!hwpoison_user_mappings(p, pfn, trapno, flags, &head)) {
    action_result(pfn, MF_MSG_UNMAP_FAILED, MF_IGNORED);
    res = -EBUSY;
    goto out;
}

return 0;

-arch_unmap_kpfn(pfn);
-
orig_head = hpage = compound_head(p);
num_poisoned_pages_inc();

@@ -1252,7 +1267,12 @@
return 0;
}

-arch_unmap_kpfn(pfn);
-
orig_head = hpage = compound_head(p);
num_poisoned_pages_inc();

@@ -1686,19 +1706,17 @@
struct page *hpage = compound_head(page);

if (!PageHuge(page) && PageTransHuge(hpage)) {
    -lock_page(hpage);
    -if (!PageAnon(hpage) || unlikely(split_huge_page(hpage))) {

- unlock_page(hpage);
- if (!PageAnon(hpage))
+ lock_page(page);
+ if (!PageAnon(page) || unlikely(split_huge_page(page))) {
+ unlock_page(page);
+ if (!PageAnon(page))
pr_info("soft offline: %#lx: non anonymous thp\n", page_to_pfn(page));
else
pr_info("soft offline: %#lx: thp split failed\n", page_to_pfn(page));
- put_hwpoison_page(hpage);
+ put_hwpoison_page(page);
return -EBUSY;
}
- unlock_page(hpage);
- get_hwpoison_page(page);
- put_hwpoison_page(hpage);
+ unlock_page(page);
}

if (PageHuge(page))
--- linux-4.15.0.orig/mm/memory.c
+++ linux-4.15.0/mm/memory.c
@@ -81,7 +81,7 @@
#include "internal.h"

-#ifdef LAST_CPUPID_NOT_IN_PAGE_FLAGS
+#if defined(LAST_CPUPID_NOT_IN_PAGE_FLAGS) && !defined(CONFIG_COMPILE_TEST)
 #warning Unfortunate NUMA and NUMA Balancing config, growing page-frame for last_cpupid.
 #endif

@@ -117,6 +117,18 @@
 2;
 #endif

+#ifndef arch_faults_on_old_pte
+static inline bool arch_faults_on_old_pte(void)
+{
+ /*
+ * Those arches which don't have hw access flag feature need to
+ * implement their own helper. By default, "true" means pagefault
+ * will be hit on old pte.
+ */
+ return true;
+ }
+#endif
+
+ static int __init disable_randmaps(char *s)
randomize_va_space = 0;
zero_pfn = page_to_pfn(ZERO_PAGE());
return 0;
}
core_initcall(init_zero_pfn);
early_initcall(init_zero_pfn);

#ifdef SPLIT_RSS_COUNTING
__tlb_reset_range(tlb);
#endif

static void tlb_flush_mmu_only(struct mmu_gather *tlb)
static void tlb_flush_mmu_free(struct mmu_gather *tlb)
{
if (!tlb->end)
return;
struct mmu_gather_batch *batch;

- tlb_flush(tlb);
- mmu_notifier_invalidate_range(tlb->mm, tlb->start, tlb->end);
#ifdef CONFIG_HAVE_RCU_TABLE_FREE
tlb_table_flush(tlb);
#endif
- __tlb_reset_range(tlb);
}

- static void tlb_flush_mmu_free(struct mmu_gather *tlb)
{
- struct mmu_gather_batch *batch;

for (batch = &tlb->local; batch && batch->nr; batch = batch->next) {
free_pages_and_swap_cache(batch->pages, batch->nr);
batch->nr = 0;
@@ -323,6 +325,16 @@
return false;
}

+ void tlb_flush_pmd_range(struct mmu_gather *tlb, unsigned long address,
+ unsigned long size)
+ {
+ if (tlb->page_size !== 0 && tlb->page_size !== PMD_SIZE)
+ tlb_flush_mmu(tlb);
+ tlb->page_size = PMD_SIZE;
+tlb->start = min(tlb->start, address);
+tlb->end = max(tlb->end, address + size);
+
#endif /* HAVE GENERIC_MMU_GATHER */

#ifdef CONFIG_HAVE_RCU_TABLE_FREE
@@ -331,6 +343,21 @@
    * See the comment near struct mmu_table_batch.
    */
+
+/*
+ * If we want tlb_remove_table() to imply TLB invalidates.
+ */
+static inline void tlb_table_invalidate(struct mmu_gather *tlb)
+{
+    /*
+     * Invalidate page-table caches used by hardware walkers. Then we still
+     * need to RCU-sched wait while freeing the pages because software
+     * walkers can still be in-flight.
+     */
+    tlb_flush_mmu_tlbonly(tlb);
+    +#endif
+}  
+
static void tlb_remove_table_smp_sync(void *arg)
{
    /* Simply deliver the interrupt */
@@ -367,6 +394,7 @@
    struct mmu_table_batch **batch = &tlb->batch;
    if (*batch) {
        tlb_table_invalidate(tlb);
+        call_rcu_sched(&(*batch)->rcu, tlb_remove_table_rcu);
    *batch = NULL;
    }
@@ -376,23 +404,16 @@
    struct mmu_table_batch **batch = &tlb->batch;
+
+/*
+ * When there's less then two users of this mm there cannot be a
+ * concurrent page-table walk.
+ */
+if (atomic_read(&tlb->mm->mm_users) < 2) {
+    tlb_remove_table(table);
    return;
+}
if (*batch == NULL) {
*batch = (struct mmu_table_batch *)__get_free_page(GFP_NOWAIT | __GFP_NOWARN);
if (*batch == NULL) {
    tlb_table.invalidate(tlb);
tlb_remove_table_one(table);
return;
}
(*batch)->nr = 0;
}
(*batch)->tables[(*batch)->nr++] = table;
if ((*batch)->nr == MAX_TABLE_BATCH)
tlb_table_flush(tlb);
@@ -1418,11 +1439,9 @@
do {
    next = pmd_addr_end(addr, end);
    if (is_swap_pmd(*pmd) || pmd_trans_huge(*pmd) || pmd_devmap(*pmd)) {
        if (next - addr != HPAGE_PMD_SIZE) {
            VM_BUG_ON_VMA(vma_is_anonymous(vma) &&
            !rwsem_is_locked(&tlb->mm->mmap_sem), vma);
        } else if (zap_huge_pmd(tlb, vma, pmd, addr))
            goto next;
    /* fall through */
    }
@@ -1798,14 +1817,21 @@
    * in may not match the PFN we have mapped if the
    * mapped PFN is a writeable COW page. In the mkwrite
    * case we are creating a writable PTE for a shared
    * mapping and we expect the PFNs to match.
    + * mapping and we expect the PFNs to match. If they
    + * don't match, we are likely racing with block
    + * allocation and mapping invalidation so just skip the
    + * update.
    */
    -if (WARN_ON_ONCE(pte_pfn(*pte) != pfn_t_to_pfn(pfn)))
    +if (pte_pfn(*pte) != pfn_t_to_pfn(pfn)) {
        WARN_ON_ONCE(!is_zero_pfn(pte_pfn(*pte)));
goto out_unlock;
    -} else
    +} else if (zap_huge_pmd(tlb, vma, pmd, addr))
goto out_unlock;
/* fall through */
}
@@ -1798,14 +1817,21 @@
    * in may not match the PFN we have mapped if the
    * mapped PFN is a writeable COW page. In the mkwrite
    * case we are creating a writable PTE for a shared
    * mapping and we expect the PFNs to match.
    + * mapping and we expect the PFNs to match. If they
    + * don't match, we are likely racing with block
    + * allocation and mapping invalidation so just skip the
    + * update.
    */
    -if (WARN_ON_ONCE(pte_pfn(*pte) != pfn_t_to_pfn(pfn)))
    +if (pte_pfn(*pte) != pfn_t_to_pfn(pfn)) {
        WARN_ON_ONCE(!is_zero_pfn(pte_pfn(*pte)));
goto out_unlock;
-entry = *pte;
goto out_mkwrite;
} else
-goto out_unlock;
+
+entry = pte_mkyoung(*pte);
entry = maybe_mkdirty(entry, vma);
+if (ptep_set_access_flags(vma, addr, pte, entry, 1))
+update_mmu_cache(vma, addr, pte);
+
+goto out_unlock;
}

/* Ok, finally just insert the thing.. */
@@ -1814,7 +1840,6 @@
else
entry = pte_mkspecial(pfn_t_pte(pfn, prot));

-out_mkwrite:
if (mkwrite) {
entry = pte_mkyoung(entry);
entry = maybe_mkdirty(entry, vma);
@@ -1888,6 +1913,9 @@
if (addr < vma->vm_start || addr >= vma->vm_end)
return -EFAULT;
+
+if (!pfn_modify_allowed(pfn, pgprot))
+return -EACCES;
+
track_pfn_insert(vma, &pgprot, __pfn_to_pfn_t(pfn, PFN_DEV));

ret = insert_pfn(vma, addr, __pfn_to_pfn_t(pfn, PFN_DEV), pgprot,
@@ -1897,18 +1925,35 @@
}
EXPORT_SYMBOL(vm_insert_pfn_prot);

+static bool vm_mixed_ok(struct vm_area_struct *vma, pfn_t pfn)
+{
+/* these checks mirror the abort conditions in vm_normal_page */
+if (vma->vm_flags & VM_MIXEDMAP)
+return true;
+if (pfn_t_devmap(pfn))
+return true;
+if (pfn_t_special(pfn))
+return true;
+if (is_zero_pfn(pfn_t_to_pfn(pfn)))
+return true;
+return false;
+
+static int __vm_insert_mixed(struct vm_area_struct *vma, unsigned long addr,
pfn_t pfn, bool mkwrite)
{
pgprot_t pgprot = vma->vm_page_prot;
BUG_ON(!(vma->vm_flags & VM_MIXEDMAP));
+BUG_ON(!vm_mixed_ok(vma, pfn));

if (addr < vma->vm_start || addr >= vma->vm_end)
    return -EFAULT;

track_pfn_insert(vma, &pgprot, pfn);

+if (!pfn_modify_allowed(pfn_t_to_pfn(pfn), pgprot))
+    return -EACCES;
+
+/*
   * If we don't have pte special, then we have to use the pfn_valid()
   * based VM_MIXEDMAP scheme (see vm_normal_page), and thus we *must*
   * @@ -1954,21 +1999,26 @@
   * unsigned long addr, unsigned long end,
   * unsigned long pfn, pgprot_t prot)
   {
   -pte_t *pte;
   +pte_t *pte, *mapped_pte;
   spinlock_t *ptl;
   +int err = 0;

   -pte = pte_alloc_map_lock(mm, pmd, addr, &ptl);
   +mapped_pte = pte = pte_alloc_map_lock(mm, pmd, addr, &ptl);
   if (!pte)
       return -ENOMEM;
   arch_enter_lazy_mmu_mode();
   do {
       BUG_ON(!pte_none(*pte));
       +if (!pfn_modify_allowed(pfn, prot)) {
           +err = -EACCES;
           +break;
           +}
       set_pte_at(mm, addr, pte, pte_mkspecial(pfn_pte(pfn, prot)));
       pfn++;
   } while (pte++, addr += PAGE_SIZE, addr != end);
   arch_leave_lazy_mmu_mode();
   -pte_unmap_unlock(pte - 1, ptl);
   -return 0;
   +pte_unmap_unlock(mapped_pte, ptl);
   +return err;
   }

static inline int remap_pmd_range(struct mm_struct *mm, pud_t *pud,
@@ -1977,6 +2027,7 @@
{

pmd_t *pmd;
unsigned long next;
+int err;

PFN = addr >> PAGE_SHIFT;
pmd = pmd_alloc(mm, pud, addr);
@@ -1985,9 +2036,10 @@
VM_BUG_ON(pmd_trans_huge(*pmd));
do {
    next = pmd_addr_end(addr, end);
    if (remap_pte_range(mm, pmd, addr, next,
        -PFN + (addr >> PAGE_SHIFT), prot))
        -return -ENOMEM;
    +err = remap_pte_range(mm, pmd, addr, next,
        +PFN + (addr >> PAGE_SHIFT), prot);
    +if (err)
        +return err;
} while (pmd++, addr = next, addr != end);
return 0;
@@ -1998,6 +2050,7 @@
{
pud_t *pud;
unsigned long next;
+int err;

PFN = addr >> PAGE_SHIFT;
pud = pud_alloc(mm, p4d, addr);
@@ -2005,9 +2058,10 @@
return -ENOMEM;
do {
    next = pud_addr_end(addr, end);
    if (remap_pmd_range(mm, pud, addr, next,
        -PFN + (addr >> PAGE_SHIFT), prot))
        -return -ENOMEM;
    +err = remap_pmd_range(mm, pud, addr, next,
        +PFN + (addr >> PAGE_SHIFT), prot);
    +if (err)
        +return err;
} while (pud++, addr = next, addr != end);
return 0;
@@ -2018,6 +2072,7 @@
{
p4d_t *p4d;
unsigned long next;
+int err;
pfn -= addr >> PAGE_SHIFT;
p4d = p4d_alloc(mm, pgd, addr);
@@ -2025,9 +2080,10 @@
return -ENOMEM;
do {
  next = p4d_addr_end(addr, end);
  -if (remap_pud_range(mm, p4d, addr, next,
   -pfn + (addr >> PAGE_SHIFT), prot))
   +err = remap_pud_range(mm, p4d, addr, next,
   +pfn + (addr >> PAGE_SHIFT), prot);
   +if (err)
   +return err;
  } while (p4d++, addr = next, addr != end);
return 0;
}
@@ -2295,32 +2351,101 @@
return same;
}

static inline void cow_user_page(struct page *dst, struct page *src, unsigned long va, struct vm_area_struct *vma)
+static inline bool cow_user_page(struct page *dst, struct page *src,
+  struct vm_fault *vmf)
{
  bool ret;
  void *kaddr;
  void __user *uaddr;
  bool locked = false;
  struct vm_area_struct *vma = vmf->vma;
  struct mm_struct *mm = vma->vm_mm;
  unsigned long addr = vmf->address;
  debug_dma_assert_idle(src);

  +if (likely(src)) { 
  +copy_user_highpage(dst, src, addr, vma);
  +return true;
  +}
  +
  /*
   * If the source page was a PFN mapping, we don't have
   * a "struct page" for it. We do a best-effort copy by
   * just copying from the original user address. If that
   * fails, we just zero-fill it. Live with it.
   */
  -if (unlikely(!src)) {
  -void *kaddr = kmap_atomic(dst);
  -void __user *uaddr = (void __user *)(va & PAGE_MASK);
+kaddr = kmap_atomic(dst);
+uaddr = (void __user *)(addr & PAGE_MASK);
+
+/*
+ * On architectures with software "accessed" bits, we would
+ * take a double page fault, so mark it accessed here.
+ */
+if (arch_faults_on_old_pte() && !pte_young(vmf->orig_pte)) {
+  pte_t entry;
+
+  vmf->pte = pte_offset_map_lock(mm, vmf->pmd, addr, &vmf->ptl);
+  locked = true;
+  if (!likely(pte_same(*vmf->pte, vmf->orig_pte))) {
+    /* Other thread has already handled the fault
+    * and we don't need to do anything. If it's
+    * not the case, the fault will be triggered
+    * again on the same address.
+    */
+    ret = false;
+    goto pte_unlock;
+  }
+  
+  entry = pte_mkyoung(vmf->orig_pte);
+  if (ptep_set_access_flags(vma, addr, vmf->pte, entry, 0))
+    update_mmu_cache(vma, addr, vmf->pte);
+  }
+  
+/*
+ * This really shouldn't fail, because the page is there
+ * in the page tables. But it might just be unreadable,
+ * in which case we just give up and fill the result with
+ * zeroes.
+ */
+if (__copy_from_user_inatomic(kaddr, uaddr, PAGE_SIZE)) {
+  if (locked)
+    goto warn;
+  
+/* Re-validate under PTL if the page is still mapped */
+vmf->pte = pte_offset_map_lock(mm, vmf->pmd, addr, &vmf->ptl);
+locked = true;
+if (!likely(pte_same(*vmf->pte, vmf->orig_pte))) {
+  /* The PTE changed under us. Retry page fault. */
+  ret = false;
+  goto pte_unlock;
+}
+*/
- * This really shouldn't fail, because the page is there
- * in the page tables. But it might just be unreadable,
- * in which case we just give up and fill the result with
- * zeroes.
+ * The same page can be mapped back since last copy attempt.
+ * Try to copy again under PTL.
*/
-if (__copy_from_user_inatomic(kaddr, uaddr, PAGE_SIZE))
+if (__copy_from_user_inatomic(kaddr, uaddr, PAGE_SIZE)) {
+*/
+ * Give a warn in case there can be some obscure
+ * use-case
+ */
+warn:
+WARN_ON_ONCE(1);
clear_page(kaddr);
kunmap_atomic(kaddr);
flush_dcache_page(dst);
} else
-copy_user_highpage(dst, src, va, vma);
+
+ret = true;
+
+pte_unlock:
+if (locked)
+pte_unmap_unlock(vmf->pte, vmf->ptl);
kunmap_atomic(kaddr);
flush_dcache_page(dst);
+
+return ret;
}

static gfp_t __get_fault_gfp_mask(struct vm_area_struct *vma)
@@ -2474,7 +2599,19 @@
vmf->address);
if (!new_page)
go oom;
cow_user_page(new_page, old_page, vmf->address, vma);
+
+if (!cow_user_page(new_page, old_page, vmf)) {
+*/
+ * COW failed, if the fault was solved by other,
+ * it's fine. If not, userspace would re-fault on
+ * the same address and we will handle the fault
+ * from the second attempt.
+ */
+put_page(new_page);
+if (old_page)
+put_page(old_page);
+return 0;
+
if (mem_cgroup_try_charge(new_page, mm, GFP_KERNEL, &memcg, false))
@@ -3199,6 +3336,29 @@
 struct vm_area_struct *vma = vmf->vma;
 int ret;

+/*
 + * Preallocate pte before we take page_lock because this might lead to
 + * deadlocks for memcg reclaim which waits for pages under writeback:
 + * lock_page(A)
 + * SetPageWriteback(A)
 + * unlock_page(A)
 + * lock_page(B)
 + * lock_page(B)
 + * pte_alloc_pne
 + * shrink_page_list
 + * wait_on_page_writeback(A)
 + * SetPageWriteback(B)
 + * unlock_page(B)
 + *# flush A, B to clear the writeback
 + */
+if (pmd_none(*vmf->pmd) && !vmf->prealloc_pte) {
+vmf->prealloc_pte = pte_alloc_one(vmf->vma->vm_mm,
+ vmf->address);
+if (!vmf->prealloc_pte)
+return VM_FAULT_OOM;
+smp_wmb(); /* See comment in __pte_alloc() */
+
+ret = vma->vm_ops->fault(vmf);
+if (unlikely(ret & (VM_FAULT_ERROR | VM_FAULT_NOPAGE | VM_FAULT_RETRY |
+ VM_FAULT_DONE_COW)))
@@ -3699,16 +3859,45 @@
 /* but allow concurrent faults).
 * The mmap_sem may have been released depending on flags and our
 * return value. See filemap_fault() and __lock_page_or_retry().
+ * If mmap_sem is released, vma may become invalid (for example
+ * by other thread calling munmap()).
+ */
static int do_fault(struct vm_fault *vmf)
{
 struct vm_area_struct *vma = vmf->vma;
struct mm_struct *vm_mm = vma->vm_mm;
int ret;

/* The VMA was not fully populated on mmap() or missing VM_DONTEXPAND */
if (!vma->vm_ops->fault)
    ret = VM_FAULT_SIGBUS;
else if (((vmf->flags & FAULT_FLAG_WRITE))
    /*
     * If we find a migration pmd entry or a none pmd entry, which
     * should never happen, return SIGBUS
     */
    if (unlikely(!pmd_present(*vmf->pmd)))
        ret = VM_FAULT_SIGBUS;
    else {
        vmf->pte = pte_offset_map_lock(vmf->vma->vm_mm,
            vmf->pmd,
            vmf->address,
            &vmf->ptl);
        /* Make sure this is not a temporary clearing of pte
         * by holding ptl and checking again. A R/M/W update
         * of pte involves: take ptl, clearing the pte so that
         * we don’t have concurrent modification by hardware
         * followed by an update.
         */
        if (unlikely(pte_none(*vmf->pte)))
            ret = VM_FAULT_SIGBUS;
        else
            ret = VM_FAULT_NOPAGE;
        pte_unmap_unlock(vmf->pte, vmf->ptl);
        } /* else if (!vmf->flags & FAULT_FLAG_WRITE))
ret = do_read_fault(vmf);
else if (!vma->vm_flags & VM_SHARED)
    ret = do_cow_fault(vmf);
/** preallocated pagetable is unused: free it */
if (vmf->prealloc_pte) {
    pte_free(vma->vm_mm, vmf->prealloc_pte);
    vmf->prealloc_pte = NULL;
}
return ret;
@@ -4368,6 +4557,9 @@
return -EINVAL;

maddr = ioremap_prot(phys_addr, PAGE_ALIGN(len + offset), prot);
+if (!maddr)
+return -ENOMEM;
+
if (write)
memcpy_toio(maddr + offset, buf, len);
else
@@ -4390,7 +4582,9 @@
void *old_buf = buf;
int write = gup_flags & FOLL_WRITE;

-down_read(&mm->mmap_sem);
+if (down_read_killable(&mm->mmap_sem))
+return 0;
+
/* ignore errors, just check how much was successfully transferred */
while (len) {
int bytes, ret, offset;
@@ -4651,17 +4845,19 @@
void *page_kaddr;
unsigned long i, rc = 0;
unsigned long ret_val = pages_per_huge_page * PAGE_SIZE;
+struct page *subpage = dst_page;

-for (i = 0; i < pages_per_huge_page; i++) {
+for (i = 0; i < pages_per_huge_page;
+     i++, subpage = mem_map_next(subpage, dst_page, i)) {
if (allow_pagefault)
-page_kaddr = kmap(dst_page + i);
+page_kaddr = kmap(subpage);
else
-page_kaddr = kmap_atomic(dst_page + i);
+page_kaddr = kmap_atomic(subpage);
rc = copy_from_user(page_kaddr,
(Const void __user *)(src + i * PAGE_SIZE),
PAGE_SIZE);
if (allow_pagefault)
-kunmap(dst_page + i);
+kunmap(subpage);
else
kunmap_atomic(page_kaddr);

--- linux-4.15.0.orig/mm/memory_hotplug.c
+++ linux-4.15.0/mm/memory_hotplug.c
```c
#define include <linux/memblock.h>
#include <linux/compaction.h>
+#include <linux/rmap.h>

#include <asm/tlbflush.h>

#define DEFINE_STATIC_PERCPU_RWSEM(mem_hotplug_lock);

+static int default_kernel_zone = ZONE_NORMAL;
+
+void get_online_mems(void)
+
+{ percpu_down_read(&mem_hotplug_lock);
+  @ @ -342,12 +345,8 @@
+    unsigned long start_pfn,
+    unsigned long end_pfn)
+  { -struct mem_section *ms;
+    for (; start_pfn < end_pfn; start_pfn += PAGES_PER_SECTION) {
+      ms = __pfn_to_section(start_pfn);
+      -if (unlikely(!valid_section(ms)))
+        if (unlikely(!pfn_to_online_page(start_pfn)))
+          continue;
+    if (unlikely(pfn_to_nid(start_pfn) != nid))
+      if (unlikely(pfn_to_nid(start_pfn) != nid))
+        @ @ -367,15 +366,12 @@
+          unsigned long start_pfn,
+          unsigned long end_pfn)
+          -struct mem_section *ms;
+          unsigned long pfn;
+          /* pfn is the end pfn of a memory section. */
+          pfn = end_pfn - 1;
+          for (; pfn >= start_pfn; pfn -= PAGES_PER_SECTION) {
+            ms = __pfn_to_section(pfn);
+            -if (unlikely(!valid_section(ms)))
+              if (unlikely(!pfn_to_online_page(pfn)))
+                continue;
+            if (unlikely(pfn_to_nid(pfn) != nid))
```

unsigned long z = zone_end_pfn(zone); /* zone_end_pfn namespace clash */
unsigned long zone_end_pfn = z;
unsigned long pfn;
-struct mem_section *ms;
int nid = zone_to_nid(zone);
zone_span_writelock(zone);
*pfn = zone_start_pfn;
for (; pfn < zone_end_pfn; pfn += PAGES_PER_SECTION) {
  -ms = __pfn_to_section(pfn);
  -if (unlikely(!valid_section(ms)))
  +if (unlikely(!pfn_to_online_page(pfn)))
    continue;

  if (page_zone(pfn_to_page(pfn)) != zone)
    zone_span_writeunlock(zone);
}

-static void shrink_pgdat_span(struct pglist_data *pgdat, 
  -unsigned long start_pfn, unsigned long end_pfn)
+static void update_pgdat_span(struct pglist_data *pgdat)
{
  -unsigned long pgdat_start_pfn = pgdat->node_start_pfn;
  -unsigned long p = pgdat_end_pfn(pgdat); /* pgdat_end_pfn namespace clash */
  -unsigned long pgdat_end_pfn = p;
  -unsigned long pfn;
  -struct mem_section *ms;
  -int nid = pgdat->node_id;
  -
  -if (pgdat_start_pfn == start_pfn) {
    -*/
    - * If the section is smallest section in the pgdat, it need
    - * shrink pgdat->node_start_pfn and pgdat->node_spanned_pages.
    - * In this case, we find second smallest valid mem_section
    - * for shrinking zone.
    - */
    -pfn = find_smallest_section_pfn(nid, NULL, end_pfn,
      -pgdat_end_pfn);
    -if (pfn) {
      -pgdat->node_start_pfn = pfn;
      -pgdat->node_spanned_pages = pgdat_end_pfn - pfn;
      -}
  }
  }
  } else if (pgdat_end_pfn == end_pfn) {
-*/
- * If the section is biggest section in the pgdat, it need
- * shrink pgdat->node_spanned_pages.
- * In this case, we find second biggest valid mem_section for
- * shrinking zone.
- */
-pfn = find_biggest_section_pfn(nid, NULL, pgdat_start_pfn,
  - start_pfn);
-/*
-if (pfn)
-pgdat->node_spanned_pages = pfn - pgdat_start_pfn + 1;
-}
-*/
- */
- * If the section is not biggest or smallest mem_section in the pgdat,
- * it only creates a hole in the pgdat. So in this case, we need not
- * change the pgdat.
- * But perhaps, the pgdat has only hole data. Thus it check the pgdat
- * has only hole or not.
- */
-pfn = pgdat_start_pfn;
-/*
-for (; pfn < pgdat_end_pfn; pfn += PAGES_PER_SECTION) {
  -ms = __pfn_to_section(pfn);
  +unsigned long node_start_pfn = 0, node_end_pfn = 0;
  +struct zone *zone;
  
  -if (unlikely(!valid_section(ms)))
  -continue;
  +for (zone = pgdat->node_zones;
  +  -zone < pgdat->node_zones + MAX_NR_ZONES; zone++) {
  +  -unsigned long zone_end_pfn = zone->zone_start_pfn +
  +  -zone->spanned_pages;
  
  -if (pfn_to_nid(pfn) != nid)
  +/* No need to lock the zones, they can't change. */
  +if (!zone->spanned_pages)
  continue;
  -
  - /* If the section is current section, it continues the loop */
  -if (start_pfn == pfn)
  +if (!node_end_pfn) {
  +node_start_pfn = zone->zone_start_pfn;
  +node_end_pfn = zone_end_pfn;
  continue;
  +}
  
  /* If we find valid section, we have nothing to do */
  -return;
  +if (zone_end_pfn > node_end_pfn)
node_end_pfn = zone_end_pfn;
+if (zone->zone_start_pfn < node_start_pfn)
+node_start_pfn = zone->zone_start_pfn;
}

-/* The pgdat has no valid section */
+pgdat->node_start_pfn = 0;
+pgdat->node_spanned_pages = 0;
+pgdat->node_start_pfn = node_start_pfn;
+pgdat->node_spanned_pages = node_end_pfn - node_start_pfn;
}

static void __remove_zone(struct zone *zone, unsigned long start_pfn)
@@ -530,9 +486,19 @@
    int nr_pages = PAGES_PER_SECTION;
    unsigned long flags;

+#ifdef CONFIG_ZONE_DEVICE
+/*
+ * Zone shrinking code cannot properly deal with ZONEDEVICE. So
+ * we will not try to shrink the zones - which is okay as
+ * set_zone_contiguous() cannot deal with ZONEDEVICE either way.
+ */
+if (zone_idx(zone) == ZONE_DEVICE)
+    return;
+#endif
+
+pgdat_resize_lock(zone->zone_pgdat, &flags);
+shrink_zone_span(zone, start_pfn, start_pfn + nr_pages);
- shrink_pgdat_span(pgdat, start_pfn, start_pfn + nr_pages);
+ update_pgdat_span(pgdat);
+pgdat_resize_unlock(zone->zone_pgdat, &flags);
}

@@ -833,10 +799,21 @@
    set_zone_contiguous(zone);
 }

+void set_default_mem_hotplug_zone(enum zone_type zone)
+{
+    default_kernel_zone = zone;
+}
+
+#ifdef CONFIG_HIGHMEM
+#define MAX_KERNEL_ZONE ZONE_HIGHMEM
+#else
+#define MAX_KERNEL_ZONE ZONE_NORMAL
+#endif
+/*
 * Returns a default kernel memory zone for the given pfn range.
 * If no kernel zone covers this pfn range it will automatically go
 * to the ZONE_NORMAL.
 * + to the MAX_KERNEL_ZONE.
 */
static struct zone *default_kernel_zone_for_pfn(int nid, unsigned long start_pfn,
unsigned long nr_pages)
@@ -844,14 +821,14 @@
struct pglist_data *pgdat = NODE_DATA(nid);
int zid;

-@ (zid = 0; zid <= ZONE_NORMAL; zid++) {
+@ (zid = 0; zid <= MAX_KERNEL_ZONE; zid++) {
 struct zone *zone = &pgdat->node_zones[zid];

 if (zone_intersects(zone, start_pfn, nr_pages))
 return zone;
 }

 -return &pgdat->node_zones[ZONE_NORMAL];
+return &pgdat->node_zones[default_kernel_zone];
 }

 static inline struct zone *default_zone_for_pfn(int nid, unsigned long start_pfn,
@@ -878,8 +855,8 @@
return movable_node_enabled ? movable_zone : kernel_zone;
 }

 --struct zone * zone_for_pfn_range(int online_type, int nid, unsigned start_pfn,
-unsigned long nr_pages)
+struct zone *zone_for_pfn_range(int online_type, int nid,
+unsigned long start_pfn, unsigned long nr_pages)
 {
 if (online_type == MMOP_ONLINE_KERNEL)
 return default_kernel_zone_for_pfn(nid, start_pfn, nr_pages);
@@ -904,7 +881,6 @@
return zone;
 }

 -/* Must be protected by mem_hotplug_begin() or a device_lock */
+int __ref online_pages(unsigned long pfn, unsigned long nr_pages, int online_type)
 {
 unsigned long flags;
@@ -915,6 +891,8 @@
 int ret;
 struct memory_notify arg;


+mem_hotplug_begin();  
+  
nid = pfn_to_nid(pfn);
/* associate pfn range with the zone */
zone = move_pfn_range(online_type, nid, pfn, nr_pages);
@@ -973,6 +951,7 @@
if (onlined_pages)
memory_notify(MEM_ONLINE, &arg);
+mem_hotplug_done();
return 0;

failed_addition:
@@ -980,6 +959,7 @@
(unsigned long long) pfn << PAGE_SHIFT,
((unsigned long long) pfn + nr_pages) << PAGE_SHIFT) - 1);
memory_notify(MEM_CANCEL_ONLINE, &arg);
+mem_hotplug_done();
return ret;
}
#endif /* CONFIG_MEMORY_HOTPLUG_SPARSE */
@@ -1109,7 +1089,12 @@
return device_online(&mem->dev);
}

-/* we are OK calling __meminit stuff here - we have CONFIG_MEMORY_HOTPLUG */
+/*
+ * NOTE: The caller must call lock_device_hotplug() to serialize hotplug
+ * and online/offline operations (triggered e.g. by sysfs).
+ *
+ * we are OK calling __meminit stuff here - we have CONFIG_MEMORY_HOTPLUG
+ */
int __ref add_memory_resource(int nid, struct resource *res, bool online)
{
  u64 start, size;
@@ -1185,26 +1170,26 @@
/* create new memmap entry */
firmware_map_add_hotplug(start, start + size, "System RAM");

+/* device_online() will take the lock when calling online_pages() */
+mem_hotplug_done();
+
+/* online pages if requested */
if (online)
  walk_memory_range(PFN_DOWN(start), PFN_UP(start + size - 1),
    NULL, online_memory_block);
- goto out;
- 
+ return ret;
error:
    /* rollback pgdat allocation and others */
if (new_pgdat && pgdat)
    rollback_node_hotadd(nid, pgdat);
memblock_remove(start, size);
-
-out:
    mem_hotplug_done();
    return ret;
}
-EXPORT_SYMBOL_GPL(add_memory_resource);

-int __ref add_memory(int nid, u64 start, u64 size)
+ /* requires device_hotplug_lock, see add_memory_resource() */
+ int __ref __add_memory(int nid, u64 start, u64 size)
{ 
    struct resource *res;
    int ret;
    @@ -1218,6 +1203,17 @@
    release_memory_resource(res);
    return ret;
}
+
+int add_memory(int nid, u64 start, u64 size)
+{
+    int rc;
+    
+    lock_device_hotplug();
+    rc = __add_memory(nid, start, size);
+    unlock_device_hotplug();
+    
+    return rc;
+}
EXPORT_SYMBOL_GPL(add_memory);

#ifdef CONFIG_MEMORY_HOTREMOVE
@@ -1255,7 +1251,8 @@
    bool is_mem_section_removable(unsigned long start_pfn, unsigned long nr_pages)
    {
        struct page *page = pfn_to_page(start_pfn);
-        struct page *end_page = page + nr_pages;
+        unsigned long end_pfn = min(start_pfn + nr_pages, zone_end_pfn(page_zone(page)));
+        struct page *end_page = pfn_to_page(end_pfn);

        /* Check the starting page of each pageblock within the range */


for (; page < end_page; page = next_active_pageblock(page)) {
    if (i == MAX_ORDER_NR_PAGES || pfn + i >= end_pfn)
        continue;
    /* Check if we got outside of the zone */
    if (zone && !zone_spans_pfn(zone, pfn + i))
        return 0;
    page = pfn_to_page(pfn + i);
    if (zone && page_zone(page) != zone)
        return 0;
}

static unsigned long scan_movable_pages(unsigned long start, unsigned long end)
{
    unsigned long pfn;
    struct page *page;
    for (pfn = start; pfn < end; pfn++) {
        if (pfn_valid(pfn)) {
            page = pfn_to_page(pfn);
            if (PageLRU(page))
                return pfn;
            if (__PageMovable(page))
                return pfn;
            if (PageHuge(page)) {
                if (page_huge_active(page))
                    return pfn;
                else
                    pfn = round_up(pfn + 1, 1 << compound_order(page)) - 1;
            }
        } else
            continue;
    }
    struct page *page, *head;
    unsigned long skip;
    if (!pfn_valid(pfn))
        continue;
    page = pfn_to_page(pfn);
    if (PageLRU(page))
        return pfn;
    if (__PageMovable(page))
        return pfn;
    if (!PageHuge(page))
        continue;
    head = compound_head(page);
    if (page_huge_active(head))
        return pfn;
+skip = (1 << compound_order(head)) - (page - head);
+pfn += skip - 1;
}
return 0;
}
@@ -1391,6 +1395,21 @@
pfn = page_to_pfn(compound_head(page))
+hpage_nr_pages(page) - 1;

+/*
+ * HWPoison pages have elevated reference counts so the migration would
+ * fail on them. It also doesn't make any sense to migrate them in the
+ * first place. Still try to unmap such a page in case it is still mapped
+ * (e.g. current hwpoison implementation doesn't unmap KSM pages but keep
+ * the unmap as the catch all safety net).
+ */
+if (PageHWPoison(page)) {
+if (WARN_ON(PageLRU(page)))
+isolate_lru_page(page);
+if (page_mapped(page))
+try_to_unmap(page, TTU_IGNORE_MLOCK | TTU_IGNORE_ACCESS);
+continue;
+}
+
+if (!get_page_unless_zero(page))
+continue;
/+*
@@ -1605,10 +1624,16 @@
return -EINVAL;
if (!IS_ALIGNED(end_pfn, pageblock_nr_pages))
return -EINVAL;
+
+mem_hotplug_begin();
+
+/* This makes hotplug much easier...and readable.
 we assume this for now... */
-if (!test_pages_in_a_zone(start_pfn, end_pfn, &valid_start, &valid_end))
+if (!test_pages_in_a_zone(start_pfn, end_pfn, &valid_start,
+ &valid_end)) {
+mem_hotplug_done();
return -EINVAL;
+}

zone = page_zone(pfn_to_page(valid_start));
node = zone_to_nid(zone);
@@ -1617,8 +1642,10 @@
/* set above range as isolated */
ret = start_isolate_page_range(start_pfn, end_pfn,
MIGRATE_MOVABLE, true);
-if (ret)
+if (ret) {
+    mem_hotplug_done();
+    return ret;
+
    arg.start_pfn = start_pfn;
    arg.nr_pages = nr_pages;
    writeback_set_ratelimit();

    memory_notify(MEM_OFFLINE, &arg);
+    mem_hotplug_done();
    return 0;

    failed_removal:
@@ -1689,6 +1716,7 @@
        memory_notify(MEM_CANCEL_OFFLINE, &arg);
        /* pushback to free area */
        undo_isolate_page_range(start_pfn, end_pfn, MIGRATE_MOVABLE);
+        mem_hotplug_done();
        return ret;
    }

-/* Must be protected by mem_hotplug_begin() or a device_lock */
int offline_pages(unsigned long start_pfn, unsigned long nr_pages)
{
    return __offline_pages(start_pfn, start_pfn + nr_pages);

--- linux-4.15.0.orig/mm/mempolicy.c
+++ linux-4.15.0/mm/mempolicy.c
@@ -306,7 +306,7 @@
    else {
        nodes_remap(tmp, pol->v.nodes, pol->w.cpuset_mems_allowed,
                    *nodes);
-        pol->w.cpuset_mems_allowed = tmp;
+        pol->w.cpuset_mems_allowed = *nodes;
    }

    if (nodes_empty(tmp))
@@ -350,7 +350,7 @@
        else {
    if (!pol)
        return;
-        if (!mpol_store_user_nodemask(pol) &&
+        if (!mpol_store_user_nodemask(pol) &&
            !mpol_store_user_nodemask(pol) &&
            !(pol->flags & MPOL_F_LOCAL) &&
            nodes_equal(pol->w.cpuset_mems_allowed, *newmask))
        return;


-static void migrate_page_add(struct page *page, struct list_head *pagelist,
+static int migrate_page_add(struct page *page, struct list_head *pagelist,
unsigned long flags);

struct queue_pages {
@@ -403,7 +403,7 @@
    return node_isset(nid, *qp->nmask) == !(flags & MPOL_MF_INVERT);
 }

+/*
+ * queue_pages_pmd() has four possible return values:
+ * 0 - pages are placed on the right node or queued successfully.
+ * 1 - there is unmovable page, and MPOL_MF_MOVE* & MPOL_MF_STRICT were
+ *     specified.
+ * 2 - THP was split.
+ * -EIO - is migration entry or only MPOL_MF_STRICT was specified and an
+ *     existing page was already on a node that does not follow the
+ *     policy.
+ */
+static int queue_pages_pmd(pmd_t *pmd, spinlock_t *ptl, unsigned long addr,
unsigned long end, struct mm_walk *walk) {
@@ -428,6 +428,16 @@
    unsigned long flags;
    if (unlikely(is_pmd_migration_entry(*pmd))) {
-        ret = 1;
+        ret = -EIO;
            goto unlock;
    }
    page = pmd_page(*pmd);
    if (is_huge_zero_page(page)) {
        spin_unlock(ptl);
@@ -437,13 +447,14 @@
            __split_huge_pmd(walk->vma, pmd, addr, false, NULL);
+            ret = 2;
                goto out;
    } 
    if (!thp_migration_supported()) {
@@ -455,16 +465,19 @@
        thp_migration_supported()) {
            put_page(page);
            goto out;
        }
    -if (!queue_pages_required(page, qp)) {
+    }
ret = 1;
if (!queue_pages_required(page, qp))
goto unlock;
-

ret = 1;
flags = qp->flags;
/* go to thp migration */
-if (flags & (MPOL_MF_MOVE | MPOL_MF_MOVE_ALL))
-migrate_page_add(page, qp->pagelist, flags);
+if (flags & (MPOL_MF_MOVE | MPOL_MF_MOVE_ALL)) {
+    if (!vma_migratable(walk->vma) ||
+        migrate_page_add(page, qp->pagelist, flags)) {
+        ret = 1;
+        goto unlock;
+    }
+} else
+    ret = -EIO;
unlock:
spin_unlock(ptl);
out:
@@ -474,6 +488,13 @@
/*
 * Scan through pages checking if pages follow certain conditions,
 * and move them to the pagelist if they do.
+ *
+ * queue_pages_pte_range() has three possible return values:
+ * 0 - pages are placed on the right node or queued successfully.
+ * 1 - there is unmovable page, and MPOL_MF_MOVE* & MPOL_MF_STRICT were
+ * specified.
+ * -EIO - only MPOL_MF_STRICT was specified and an existing page was already
+ * on a node that does not follow the policy.
+*/
static int queue_pages_pte_range(pmd_t *pmd, unsigned long addr,
unsigned long end, struct mm_walk *walk)
@@ -483,20 +504,22 @@
    ret = queue_pages_pmd(pmd, ptl, addr, end, walk);
@@ -483,20 +504,22 @@
    spin_unlock(ptl);
-return 0;
+if (ret != 2)
+return ret;
}
+/* THP was split, fall through to pte walk */

if (pmd_trans_unstable(pmd))
return 0;
retry:
-pte = pte_offset_map_lock(walk->mm, pmd, addr, &ptl);
+mapped_pte = pte = pte_offset_map_lock(walk->mm, pmd, addr, &ptl);
for (; addr != end; pte++, addr += PAGE_SIZE) {
if (!pte_present(*pte))
continue;
@@ -527,11 +550,30 @@
goto retry;
}
-migrate_page_add(page, qp->pagelist, flags);
+if (flags & (MPOL_MF_MOVE | MPOL_MF_MOVE_ALL)) {
+/* MPOL_MF_STRICT must be specified if we get here */
+if (!vma_migratable(vma)) {
+has_unmovable = true;
+break;
+}
+
+/*
+ * Do not abort immediately since there may be
+ * temporary off LRU pages in the range. Still
+ * need migrate other LRU pages.
+ */
+if (migrate_page_add(page, qp->pagelist, flags))
+has_unmovable = true;
+} else
+break;
}
-pte_unmap_unlock(pte - 1, ptl);
+pte_unmap_unlock(mapped_pte, ptl);
cond_resched();
-return 0;
+
+if (has_unmovable)
+return 1;
+
+return addr != end ? -EIO : 0;
}

static int queue_pages_hugetlb(pte_t *pte, unsigned long hmask,
unsigned long endvma = vma->vm_end;
unsigned long flags = qp->flags;

- if (!vma_migratable(vma))
+ /*
+  * Need check MPOL_MF_STRICT to return -EIO if possible
+  * regardless of vma_migratable
+  */
+ if (!vma_migratable(vma) &&
+     !(flags & MPOL_MF_STRICT))
return 1;

if (endvma > end)
@@ -628,7 +675,7 @@
}
/* queue pages from current vma */
- if (flags & (MPOL_MF_MOVE | MPOL_MF_MOVE_ALL))
+ if (flags & MPOL_MF_VALID)
return 0;
return 1;
]
@@ -638,7 +685,15 @@
* If pages found in a given range are on a set of nodes (determined by
* @nodes and @flags,) it’s isolated and queued to the pagelist which is
- * passed via @private.)
+ * passed via @private.
+ *
+ * queue_pages_range() has three possible return values:
+ * 1 - there is unmovable page, but MPOL_MF_MOVE* & MPOL_MF_STRICT were
+ * specified.
+ * 0 - queue pages successfully or no misplaced page.
+ * errno - i.e. misplaced pages with MPOL_MF_STRICT specified (-EIO) or
+ * memory range specified by nodemask and maxnode points outside
+ * your accessible address space (-EFAULT)
+ */
static int
queue_pages_range(struct mm_struct *mm, unsigned long start, unsigned long end,
@@ -925,7 +980,7 @@
/*
 * page migration, thp tail pages can be passed.
 */
- static void migrate_page_add(struct page *page, struct list_head *pagelist,
+ static int migrate_page_add(struct page *page, struct list_head *pagelist,
 unsigned long flags)
{
struct page *head = compound_head(page);
mod_node_page_state(page_pgdat(head),
NR_ISOLATED_ANON + page_is_file_cache(head),
hpage_nr_pages(head));
} else if (flags & MPOL_MF_STRICT) {
+/*
+ * Non-movable page may reach here. And, there may be
+ * temporary off LRU pages or non-LRU movable pages.
+ * Treat them as unmovable pages since they can't be
+ * isolated, so they can't be moved at the moment. It
+ * should return -EIO for this case too.
+ */
+return -EIO;
}
+
+return 0;
}

static struct page *new_node_page(struct page *page, unsigned long node, int **x)
+
static void migrate_page_add(struct page *page, struct list_head *pagelist,
+static int migrate_page_add(struct page *page, struct list_head *pagelist,
unsigned long flags)
{
+return -EIO;
}

int do_migrate_pages(struct mm_struct *mm, const nodemask_t *from,
+int ret;
LIST_HEAD(pagelist);

if (flags & ~(unsigned long)MPOL_MF_VALID)
+if (err)
goto mpol_out;

-err = queue_pages_range(mm, start, end, nmask,
+ret = queue_pages_range(mm, start, end, nmask,
flags | MPOL_MF_INVERT, &pagelist);
-if (!err)
err = mbind_range(mm, start, end, new);
+
+if (ret < 0) {
+err = ret;
+goto up_out;
+
+err = mbind_range(mm, start, end, new);

if (!err) {
int nr_failed = 0:
@@ -1243,13 +1316,16 @@
putback_movable_pages(&pagelist);
}

-if (nr_failed && (flags & MPOL_MF_STRICT))
+if ((ret > 0) || (nr_failed && (flags & MPOL_MF_STRICT)))
err = -EIO;
-} else
-putback_movable_pages(&pagelist);
+} else {
+up_out:
+if (!list_empty(&pagelist))
+putback_movable_pages(&pagelist);
+

up_write(&mm->mmap_sem);
- mpol_out:
+mpol_out:
mpol_put(new);
return err;
}
@@ -1263,6 +1339,7 @@
unsigned long maxnode
{
unsigned long k;
+unsigned long t;
unsigned long nlongs;
unsigned long endmask;

@@ -1279,13 +1356,19 @@
else
endmask = (1UL << (maxnode % BITS_PER_LONG)) - 1;

-/* When the user specified more nodes than supported just check
- if the non supported part is all zero. */
+/*
When the user specified more nodes than supported just check
if the non supported part is all zero.

If maxnode have more longs than MAX_NUMNODES, check
the bits in that area first. And then go through to
check the rest bits which equal or bigger than MAX_NUMNODES.
Otherwise, just check bits [MAX_NUMNODES, maxnode).

if (nlongs > BITS_TO_LONGS(MAX_NUMNODES)) {
  if (nlongs > PAGE_SIZE/sizeof(long))
    return -EINVAL;
  for (k = BITS_TO_LONGS(MAX_NUMNODES); k < nlongs; k++) {
    unsigned long t;
    if (get_user(t, nmask + k))
      return -EFAULT;
    if (k == nlongs - 1) {
      @ @ -1298,6 +1381,16 @@
      endmask = ~0UL;
    }
  }
  if (maxnode > MAX_NUMNODES && MAX_NUMNODES % BITS_PER_LONG != 0) {
    unsigned long valid_mask = endmask;
    valid_mask &= ~(1UL << (MAX_NUMNODES % BITS_PER_LONG)) - 1);
    if (get_user(t, nmask + nlongs - 1))
      return -EFAULT;
    if (t & valid_mask)
      return -EINVAL;
  }
  if (copy_from_user(nodes_addr(*nodes), nmask, nlongs*sizeof(unsigned long)))
    return -EFAULT;
  nodes_addr(*nodes)[nlongs-1] &= endmask;
  @ @ -1309,7 +1402,7 @@
  nodemask_t *nodes)
  {
    unsigned long copy = ALIGN(maxnode-1, 64) / 8;
    -const int nbytes = BITS_TO_LONGS(MAX_NUMNODES) * sizeof(long);
    +unsigned int nbytes = BITS_TO_LONGS(nr_node_ids) * sizeof(long);
    if (copy > nbytes) {
      if (copy > PAGE_SIZE)
        @ @ -1418,10 +1511,14 @@
        goto out_put;
    }
  -if (!nodes_subset(*new, node_states[N_MEMORY])) { 
    -err = -EINVAL;
+task_nodes = cpuset_mems_allowed(current);
+nodes_and(*new, *new, task_nodes);
+if (nodes_empty(*new))
+goto out_put;
+
+nodes_and(*new, *new, node_states[N_MEMORY]);
+if (nodes_empty(*new))
+goto out_put;
-
+err = security_task_movememory(task);
+if (err)
+@@ -1460,7 +1557,7 @@
+int uninitialized_var(pval);
+nodemask_t nodes;
+
+if (nmask != NULL && maxnode < MAX_NUMNODES)
+if (nmask != NULL && maxnode < nr_node_ids)
+return -EINVAL;
+
+err = do_get_mempolicy(&pval, &nodes, addr, flags);
+@@ -1489,7 +1586,7 @@
+unsigned long nr_bits, alloc_size;
+DECLARE_BITMAP(bm, MAX_NUMNODES);
+
+nr_bits = min_t(unsigned long, maxnode-1, MAX_NUMNODES);
+nr_bits = min_t(unsigned long, maxnode-1, nr_node_ids);
+alloc_size = ALIGN(nr_bits, BITS_PER_LONG) / 8;
+
+if (nmask)
+@@ -1989,8 +2086,36 @@
+if (!nmask || node_isset(hpage_node, *nmask)) {
+mpol_cond_put(pol);
+page = alloc_pages_node(hpage_node,
+gfp | __GFP_THISNODE, order);
+/*
+ * We cannot invoke reclaim if __GFP_THISNODE
+ * is set. Invoking reclaim with
+ * __GFP_THISNODE set, would cause THP
+ * allocations to trigger heavy swapping
+ * despite there may be tons of free memory
+ * (including potentially plenty of THP
+ * already available in the buddy) on all the
+ * other NUMA nodes.
+ *
+ * At most we could invoke compaction when
+ * __GFP_THISNODE is set (but we would need to
+ * refrain from invoking reclaim even if
+ * compaction returned COMPACT_SKIPPED because
+ * there wasn’t not enough memory to succeed
+ * compaction). For now just avoid
+ * __GFP_THISNODE instead of limiting the
+ * allocation path to a strict and single
+ * compaction invocation.
+ *
+ * Supposedly if direct reclaim was enabled by
+ * the caller, the app prefers THP regardless
+ * of the node it comes from so this would be
+ * more desiderable behavior than only
+ * providing THP originated from the local
+ * node in such case.
+ */
+if (!(gfp & __GFP_DIRECT_RECLAIM))
   +gfp |= __GFP_THISNODE;
   +page = __alloc_pages_node(hpage_node, gfp, order);
goto out;
}

case MPOL_INTERLEAVE:
   return !!nodes_equal(a->v.nodes, b->v.nodes);

case MPOL_PREFERRED:
   /* a's ->flags is the same as b's */
   +if (a->flags & MPOL_F_LOCAL)
      return true;
   return a->v.preferred_node == b->v.preferred_node;
default:
   BUG();

char *flags = strchr(str, '=');
int err = 1;

+if (flags)
   +*flags++ = '\0';/* terminate mode string */
+
   if (nodelist) {
      /* NUL-terminate mode or flags string */
      *nodelist++ = '\0';
   } else
      nodes_clear(nodes);

-if (flags)
   -*flags++ = '\0';/* terminate mode string */
-
for (mode = 0; mode < MPOL_MAX; mode++) {
    if (!strcmp(str, policy_modes[mode])) {
        break;
    }
}

switch (mode) {
    case MPOL_PREFERRED:
        /*
         * Insist on a nodelist of one node only
         * Insist on a nodelist of one node only, although later
         * we use first_node(nodes) to grab a single node, so here
         * nodelist (or nodes) cannot be empty.
         */
        if (nodelist) {
            char *rest = nodelist;
            rest++;
            if (!rest)
                goto out;
            else if (nodes_empty(nodes))
                goto out;
            break;
        }
    break;
}

    case MPOL_INTERLEAVE:
        --- linux-4.15.0.orig/mm/migrate.c
        +++ linux-4.15.0/mm/migrate.c
        @ @ -247,10 +247,8 @@
        pte = swp_entry_to_pte(entry);
        } else if (is_device_public_page(new)) {
            pte = pte_mkdevmap(pte);
            -flush_dcache_page(new);
            }
        -} else 
        -flush_dcache_page(new);
        +}

    #ifdef CONFIG_HUGETLB_PAGE
    if (PageHuge(new)) {
        @ @ -274,6 +272,9 @@
        if (vma->vm_flags & VM_LOCKED && !PageTransCompound(new))
            mlock_vma_page(new);

        +if (PageTransHuge(page) && PageMlocked(page))
            +clear_page_mlock(page);
            +
            /* No need to invalidate - it was non-present before */
            update_mmu_cache(vma, pvmw.address, pvmw.pte);
        }
        @ @ -968,6 +969,13 @@
if (!PageMappingFlags(page))
page->mapping = NULL;
+
+if (unlikely(is_zone_device_page(newpage))) {
+if (is_device_public_page(newpage))
+flush_dcache_page(newpage);
+} else
+flush_dcache_page(newpage);
+
out:
return rc;
@@ -1103,10 +1111,13 @@
* If migration is successful, decrease refcount of the newpage
* which will not free the page because new page owner increased
* refcounter. As well, if it is LRU page, add the page to LRU
- * list in here.
+ * list in here. Use the old state of the isolated source page to
+ * determine if we migrated a LRU page. newpage was already unlocked
+ * and possibly modified by its owner - don't rely on the page
+ * state.
+ */
if (rc == MIGRATEPAGE_SUCCESS) {
-+if (unlikely(__PageMovable(newpage)))
++if (unlikely(!is_lru))
+++put_page(newpage);
else
putback_lru_page(newpage);
@@ -1297,6 +1308,16 @@
lock_page(hpage);
}

+/*
+ * Check for pages which are in the process of being freed. Without
+ * page_mapping() set, hugetlbfs specific move page routine will not
+ * be called and we could leak usage counts for subpools.
+ */
+if (page_private(hpage) && !page_mapping(hpage)) {
+rc = -EBUSY;
+goto out_unlock;
+}
+
if (PageAnon(hpage))
anon_vma = page_get_anon_vma(hpage);

@@ -1328,6 +1349,7 @@
set_page_owner_migrate_reason(new_hpage, reason);
unlock_page(hpage);
if (rc != -EAGAIN)
    return;

entry = maybe_pmd_mkwrite(pmd_mkdirty(entry), vma);

/*
 * Clear the old entry under pagetable lock and establish the new PTE.
 * Any parallel GUP will either observe the old page blocking on the
 * page lock, block on the page table lock or observe the new page.
 * Overwrite the old entry under pagetable lock and establish
 * the new PTE. Any parallel GUP will either observe the old
 * page blocking on the page lock, block on the page table
 * new page and page_add_new_anon_rmap guarantee the copy is
 * visible before the pagetable update.
 */
flush_cache_range(vma, mmun_start, mmun_end);
page_add_anon_rmap(new_page, vma, mmun_start, true);

/*
 * At this point the pmd is numa/protnone (i.e. non present) and the TLB
 * has already been flushed globally. So no TLB can be currently
 * caching this non present pmd mapping. There's no need to clear the
 * pmd before doing set_pmd_at(), nor to flush the TLB after
 * set_pmd_at(). Clearing the pmd here would introduce a race
 * condition against MADV_DONTNEED, because MADV_DONTNEED only holds the
 * mmap_sem for reading. If the pmd is set to NULL at any given time,
 * MADV_DONTNEED won't wait on the pmd lock and it'll skip clearing this
 * pmd.
 */
set_pmd_at(mm, mmun_start, pmd, entry);
update_mmu_cache_pmd(vma, address, &entry);

/* No need to double call mmu_notifier->invalidate_range() callback as
 * the above pmdp_huge_clear_flush_notify() did already call it.
 */
-mmu_notifier_invalidate_range_only_end(mm, mmun_start, mmun_end);
+mmu_notifier_invalidate_range_end(mm, mmun_start, mmun_end);

/* Take an "isolate" reference and put new page on the LRU. */
get_page(new_page);
static void migrate_vma_collect(struct migrate_vma *migrate)
{
-struct mm_walk mm_walk;
-
-mm_walk.pmd_entry = migrate_vma_collect_pmd;
-mm_walk.pte_entry = NULL;
-mm_walk.pte_hole = migrate_vma_collect_hole;
-mm_walk.hugetlb_entry = NULL;
-mm_walk.test_walk = NULL;
-mm_walk.vma = migrate->vma;
-mm_walk.mm = migrate->vm_mm;
-mm_walk.private = migrate;
+struct mm_walk mm_walk = {
+.pmd_entry = migrate_vma_collect_pmd,
+.pte_hole = migrate_vma_collect_hole,
+.vma = migrate->vma,
+.mm = migrate->vm_mm,
+.private = migrate,
+};

mmu_notifier_invalidate_range_start(mm_walk.mm,
    migrate->start,
--- linux-4.15.0.orig/mm/mincore.c
+++ linux-4.15.0/mm/mincore.c
@@ -169,6 +169,22 @@
return 0;
}

+static inline bool can_do_mincore(struct vm_area_struct *vma)
+{
+if (vma_is_anonymous(vma))
+return true;
+if (!vma->vm_file)
+return false;
+/*
+ * Reveal pagecache information only for non-anonymous mappings that
+ * correspond to the files the calling process could (if tried) open
+ * for writing; otherwise we'd be including shared non-exclusive
+ * mappings, which opens a side channel.
+ */
+return inode_owner_or_capable(file_inode(vma->vm_file)) ||
+inode_permission(file_inode(vma->vm_file), MAY_WRITE) == 0;
+}
+
/*
 * Do a chunk of "sys_mincore()". We've already checked
* all the arguments, we hold the mmap semaphore: we should
@ @ -189.8 +205.13 @@
 vma = find_vma(current->mm, addr);
if (!vma || addr < vma->vm_start)
 return -ENOMEM;
-mincore_walk.mm = vma->vm_mm;
end = min(vma->vm_end, addr + (pages << PAGE_SHIFT));
+if (!can_do_mincore(vma)) {
+ unsigned long pages = DIV_ROUND_UP(end - addr, PAGE_SIZE);
+ memset(vec, 1, pages);
+ return pages;
+}
+mincore_walk.mm = vma->vm_mm;
err = walk_page_range(addr, end, &mincore_walk);
if (err < 0)
return err;
--- linux-4.15.0.orig/mm/mlock.c
+++ linux-4.15.0/mm/mlock.c
@@ -629,11 +629,11 @@
 struct vm_area_struct *vma;
 int count = 0;
+unsigned long count = 0;
 if (mm == NULL)
 mm = current->mm;
--- linux-4.15.0.orig/mm/mmap.c
+++ linux-4.15.0/mm/mmap.c
@@ -45,6 +45,7 @@
 * MAP_PRIVATE	r: (no) nor: (yes) ysr: (no) ysr: (no) yes
 *w: (no) now: (copy) copyw: (no) no
 *x: (no) nox: (no) yesx: (no) yesx: (yes) yes
+* 
-* On arm64, PROT_EXEC has the following behaviour for both MAP_SHARED and
/* MAP_PRIVATE:
 * r: (no) no
 * w: (no) no
 * x: (yes) yes
 */

pgprot_t protection_map[16] __ro_after_init = {
    __P000, __P001, __P010, __P011, __P100, __P101, __P110, __P111,
    __S000, __S001, __S010, __S011, __S100, __S101, __S110, __S111
};

#ifndef CONFIG_ARCH_HAS_FILTER_PGPRT
+static inline pgprot_t arch_filter_pgprot(pgprot_t prot)
+{
+  return prot;
+}
+#endif

pgprot_t vm_get_page_prot(unsigned long vm_flags)
{
-  return __pgprot(pgprot_val(protection_map[vm_flags &
+  pgprot_t ret = __pgprot(pgprot_val(protection_map[vm_flags &
(VM_READ|VM_WRITE|VM_EXEC|VM_SHARED)]) |
pgprot_val(arch_vm_get_page_prot(vm_flags)));
+
+  return arch_filter_pgprot(ret);
}

EXPORT_SYMBOL(vm_get_page_prot);

@@ -171,14 +175,14 @@}
if (vma->vm_ops && vma->vm_ops->close)
  vma->vm_ops->close(vma);
if (vma->vm_file)
-  fput(vma->vm_file);
+  vma_fput(vma);
  mpol_put(vma_policy(vma));
-  kmem_cache_free(vm_area_cachep, vma);
+  vm_area_free(vma);
  return next;
}

-static int do_brk(unsigned long addr, unsigned long len, struct list_head *uf);
-
+static int do_brk_flags(unsigned long addr, unsigned long request, unsigned long flags,
+    struct list_head *uf);
SYSCALL_DEFINE1(brk, unsigned long, brk)
{
  unsigned long retval;
@@ -236,7 +240,7 @@

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goto out;

/* Ok, looks good - let it rip. */
-if (do_brk(olbrk, newbrk-oldbrk, &uf) < 0)
+if (do_brk_flags(olbrk, newbrk-oldbrk, 0, &uf) < 0)
goto out;

set_brk:
@@ -896,13 +900,13 @@
if (remove_next) {
  if (file) {
    uprobe_munmap(next, next->vm_start, next->vm_end);
-      fput(file);
+      vma_fput(vma);
  }
  if (next->anon_vma)
    anon_vma_merge(vma, next);
  mm->map_count--;
  mpol_put(vma_policy(next));
-    kmem_cache_free(vm_area_cachep, next);
+    vm_area_free(next);
/*
 * In mprotect's case 6 (see comments on vma_merge),
 * we must remove another next too. It would clutter
@@ -1315,6 +1319,35 @@
 return 0;
 }

+static inline u64 file_mmap_size_max(struct file *file, struct inode *inode)
+{
+  if (S_ISREG(inode->i_mode))
+    return MAX_LFS_FILESIZE;
+  if (S_ISBLK(inode->i_mode))
+    return MAX_LFS_FILESIZE;
+  /* Special "we do even unsigned file positions" case */
+  if (file->f_mode & FMODE_UNSIGNED_OFFSET)
+    return 0;
+  /* Yes, random drivers might want more. But I'm tired of buggy drivers */
+  return ULONG_MAX;
+}
+
+static inline bool file_mmap_ok(struct file *file, struct inode *inode,
+                                  unsigned long pgoff, unsigned long len)
+{ u64 maxsize = file_mmap_size_max(file, inode);
+if (maxsize && len > maxsize)
+return false;
+maxsize -= len;
+if (pgoff > maxsize >> PAGE_SHIFT)
+return false;
+return true;
+
/*
 * The caller must hold down_write(&current->mm->mmap_sem).
 */
@@ -1389,6 +1422,9 @@
struct inode *inode = file_inode(file);
unsigned long flags_mask;

+if (!file_mmap_ok(file, inode, pgoff, len))
+return -EOVERFLOW;
+
flags_mask = LEGACY_MAP_MASK | file->f_op->mmap_supported_flags;

switch (flags & MAP_TYPE) {
@@ -1670,19 +1706,17 @@
* specific mapper. the address has already been validated, but
* not unmapped, but the maps are removed from the list.
 */
-vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);
+vma = vm_area_alloc(mm);
if (!vma) {
error = -ENOMEM;
goto unacct_error;
}

-vma->vm_mm = mm;
-vma->vm_start = addr;
-vma->vm_end = addr + len;
-vma->vm_flags = vm_flags;
-vma->vm_page_prot = vm_get_page_prot(vm_flags);
-vma->vm_pgoff = pgoff;
-INIT_LIST_HEAD(&vma->anon_vma_chain);

if (file) {
    if (vm_flags & VM_DENYWRITE) {
@@ -1761,8 +1795,8 @@
return addr;
unmap_and_free_vma:
+    vma_fput(vma);
vma->vm_file = NULL;
-fput(file);

/* Undo any partial mapping done by a device driver. */
unmap_region(mm, vma, prev, vma->vm_start, vma->vm_end);
@@ -1773,7 +1807,7 @@
if (vm_flags & VM_DENYWRITE)
 allow_write_access(file);
free_vma:
-kmem_cache_free(vm_area_cachep, vma);
+vm_area_free(vma);
unacct_error:
if (charged)
vm_unacct_memory(charged);
@@ -2022,6 +2056,7 @@
info.low_limit = mm->mmap_base;
info.high_limit = TASK_SIZE;
info.align_mask = 0;
+info.align_offset = 0;
return vm_unmapped_area(&info);
}
#endif
@@ -2063,6 +2098,7 @@
info.low_limit = max(PAGE_SIZE, mmap_min_addr);
info.high_limit = mm->mmap_base;
info.align_mask = 0;
+info.align_offset = 0;
addr = vm_unmapped_area(&info);

/*@ -2331,12 +2367,11 @@
{ 
struct mm_struct *mm = vma->vm_mm;
struct vm_area_struct *prev;
-int error;
+int error = 0;

address &= PAGE_MASK;
-error = security_mmap_addr(address);
-if (error)
-return error;
+if (address < mmap_min_addr)
+return -EPERM;

/*@ Enforce stack_guard_gap */
prev = vma->vm_prev;
@@ -2432,7 +2467,8 @@
vma = find_vma_prev(mm, addr, &prev);
if (vma &amp; (vma-&gt;vm_start &lt;= addr))
    return vma;
-if (!prev &amp;&amp; expand_stack(prev, addr))
 /* don't alter vm_end if the coredump is running */
+if (!prev &amp;&amp; !mmget_still_valid(mm) &amp;&amp; expand_stack(prev, addr))
    return NULL;
if (prev-&gt;vm_flags &amp; VM_LOCKED)
    populate_vma_page_range(prev, addr, prev-&gt;vm_end, NULL);
@@ -2458,6 +2494,9 @@
    return vma;
if (!vm_area-&gt;vm_flags &amp; VM_GROWSDOWN)
    return NULL;
+/* don't alter vm_start if the coredump is running */
+if (!mmget_still_valid(mm))
    return NULL;
    start = vma-&gt;vm_start;
if (expand_stack(vma, addr))
    return NULL;
@@ -2561,15 +2600,10 @@
    return err;
 }

-new = kmem_cache_alloc(vm_area_cachep, GFP_KERNEL);
+new = vm_area_dup(vma);
if (!new)
    return -ENOMEM;
-*new = *vma;
-
-INIT_LIST_HEAD(&amp;new-&gt;anon_vma_chain);
-
    if (new_below)
        new-&gt;vm_end = addr;
    else {
@@ -2586,7 +2620,7 @@
goto out_free_mpol;

    if (new-&gt;vm_file)
        -get_file(new-&gt;vm_file);
+ vma_get_file(new);

    if (new-&gt;vm_ops &amp;&amp; new-&gt;vm_ops-&gt;open)
        new-&gt;vm_ops-&gt;open(new);
@@ -2605,12 +2639,12 @@
    if (new-&gt;vm_ops &amp;&amp; new-&gt;vm_ops-&gt;close)
        new-&gt;vm_ops-&gt;close(new);
    if (new-&gt;vm_file)
-fput(new->vm_file);
+vma_fput(new);
unlink_anon_vmas(new);
out_free_mpol:
mpol_put(vma_policy(new));
out_free_vma:
-kmem_cache_free(vm_area_cachep, new);
+vm_area_free(new);
return err;
}

@@ -2767,7 +2801,7 @@
(struct vm_area_struct *vma;
unsigned long populate = 0;
unsigned long ret = -EINVAL;
-struct file *file;
+-struct file *file, *prfile;
+struct file *file, *prfile;

 pr_warn_once("%s (%d) uses deprecated remap_file_pages() syscall. See
 Documentation/vm/remap_file_pages.txt.in",
  +current->comm, current->pid);
@@ -2842,10 +2876,27 @@
 }
 }

- file = get_file(vma->vm_file);
 +vma_get_file(vma);
 +file = vma->vm_file;
 +prfile = vma->vm_prfile;
 ret = do_mmap_pgoff(vma->vm_file, start, size,
 prot, flags, pgoff, &populate, NULL);
 +if (!IS_ERR_VALUE(ret) && file && prfile) {
+struct vm_area_struct *new_vma;
+ +new_vma = find_vma(mm, ret);
+ +if (!new_vma->vm_prfile)
+ +new_vma->vm_prfile = prfile;
+ +if (new_vma != vma)
+ +get_file(prfile);
+ +} 
+/*
 + * two fput()s instead of vma_fput(vma),
 + * coz vma may not be available anymore.
 + */
+ fput(file);
+ if (prfile)
+ fput(prfile);
out:
up_write(&mm->mmap_sem);
if (populate)
@@ -2870,21 +2921,14 @@
  anonymous maps. eventually we may be able to do some
  brk-specific accounting here.
 */
-static int do_brk_flags(unsigned long addr, unsigned long request, unsigned long flags, struct list_head *uf)
+static int do_brk_flags(unsigned long addr, unsigned long len, unsigned long flags, struct list_head *uf)
 {
 struct mm_struct *mm = current->mm;
 struct vm_area_struct *vma, *prev;
-unsigned long len;
-if (len < request)
-  return -ENOMEM;
-if (!len)
-  return 0;
-/* Until we need other flags, refuse anything except VM_EXEC. */
 if ((flags & (~VM_EXEC)) != 0)
  return -EINVAL;
@@ -2932,14 +2976,12 @@
-/*
- * create a vma struct for an anonymous mapping
- */
-vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);
+vma = vm_area_alloc(mm);
 if (!vma) {
   vm_unacct_memory(len >> PAGE_SHIFT);
   return -ENOMEM;
 }
-INIT_LIST_HEAD(&vma->anon_vma_chain);
-vma->vm_mm = mm;
 vma->vm_start = addr;
 vma->vm_end = addr + len;
 vma->vm_pgoff = pgoff;
@@ -2956,18 +2998,20 @@ return 0;
 }
-/*
- * do_brk(unsigned long addr, unsigned long len, struct list_head *uf)
- */
-static int do_brk(unsigned long addr, unsigned long len, struct list_head *uf)
-{
-  return do_brk_flags(addr, len, 0, uf);
-}
int vm_brk_flags(unsigned long addr, unsigned long len, unsigned long flags)
{
    struct mm_struct *mm = current->mm;
    unsigned long len;
    int ret;
    bool populate;
    LIST_HEAD(uf);

    len = PAGE_ALIGN(request);
    if (len < request)
        return -ENOMEM;
    if (!len)
        return 0;
    if (down_write_killable(&mm->mmap_sem))
        return -EINTR;

    if (unlikely(mm_is_oom_victim(mm))) {
        /* Manually reap the mm to free as much memory as possible.
         * Then, as the oom reaper does, set MMF_OOM_SKIP to disregard
         * this mm from further consideration. Taking mm->mmap_sem for
         * write after setting MMF_OOM_SKIP will guarantee that the oom
         * reaper will not run on this mm again after mmap_sem is
         * dropped.
         * Nothing can be holding mm->mmap_sem here and the above call
         * to mmu_notifier_release(mm) ensures mmu notifier callbacks in
         * __oom_reap_task_mm() will not block.
         * This needs to be done before calling munlock_vma_pages_all(),
         * which clears VM_LOCKED, otherwise the oom reaper cannot
         * reliably test it.
         */
        mutex_lock(&oom_lock);
        __oom_reap_task_mm(mm);
        mutex_unlock(&oom_lock);
        set_bit(MMF_OOM_SKIP, &mm->flags);
        down_write(&mm->mmap_sem);
        up_write(&mm->mmap_sem);
if (mm->locked_vm) {
  vma = mm->mmap;
  while (vma) {
    /* update_hiwater_rss(mm) here? but nobody should be looking */
    /* Use -1 here to ensure all VMAs in the mm are unmapped */
    unmap_vmas(&tlb, vma, 0, -1);
    -if (unlikely(mm_is_oom_victim(mm))) {
      /*
      * Wait for oom_reap_task() to stop working on this
      * mm. Because MMF_OOM_SKIP is already set before
      * calling down_read(), oom_reap_task() will not run
      * on this "mm" post up_write().
      */
      -set_bit(MMF_OOM_SKIP, &mm->flags);
      -down_write(&mm->mmap_sem);
      -up_write(&mm->mmap_sem);
    }
    free_pgtables(&tlb, vma, FIRST_USER_ADDRESS, USER_PGTABLES_CEILING);
  }
  @@ -3047,6 +3099,7 @@
  if (vma->vm_flags & VM_ACCOUNT)
    nr_accounted += vma_pages(vma);
  vma = remove_vma(vma);
  +cond_resched();
  } else {
    -new_vma = kmem_cache_alloc(vm_area_cachep, GFP_KERNEL);
    +new_vma = vm_area_dup(vma);
    if (!new_vma)
      goto out;
    -new_vma = *vma;
    new_vma->vm_start = addr;
  }
}
new_vma->vm_end = addr + len;
new_vma->vm_pgoff = pgoff;
if (vma_dup_policy(vma, new_vma))
goto out_free_vma;
-INIT_LIST_HEAD(&new_vma->anon_vma_chain);
if (anon_vma_clone(new_vma, vma))
goto out_free_mempol;
if (new_vma->vm_file)
-get_file(new_vma->vm_file);
+vma_get_file(new_vma);
if (new_vma->vm_ops && new_vma->vm_ops->open)
new_vma->vm_ops->open(new_vma);
vma_link(mm, new_vma, prev, rb_link, rb_parent);
@@ -3164,7 +3215,7 @@
out_free_mempol:
mpol_put(vma_policy(new_vma));
out_free_vma:
-kmem_cache_free(vm_area_cachep, new_vma);
+vm_area_free(new_vma);
out:
return NULL;
}
@@ -3286,12 +3337,10 @@
int ret;
struct vm_area_struct *vma;

-vma = kmem_cache_alloc(vm_area_cachep, GFP_KERNEL);
+vma = vm_area_alloc(mm);
if (unlikely(vma == NULL))
return ERR_PTR(-ENOMEM);

-INIT_LIST_HEAD(&vma->anon_vma_chain);
-vma->vm_mm = mm;
vma->vm_start = addr;
vma->vm_end = addr + len;

@@ -3312,7 +3361,7 @@
return vma;
out:
-kmem_cache_free(vm_area_cachep, vma);
+vm_area_free(vma);
return ERR_PTR(ret);
}

--- linux-4.15.0.orig/mm/mmu_notifier.c
+++ linux-4.15.0/mm/mmu_notifier.c
@@ -274,7 -274,7 @@
* thanks to mm_take_all_locks().
 */
spin_lock(&mm->mmu_notifier_mm->lock);
-hlist_add_head(&mn->hlist, &mm->mmu_notifier_mm->list);
+hlist_add_head_rcu(&mn->hlist, &mm->mmu_notifier_mm->list);
spin_unlock(&mm->mmu_notifier_mm->lock);

mm_drop_all_locks(mm);
--- linux-4.15.0.orig/mm/mprotect.c
+++ linux-4.15.0/mm/mprotect.c
@@ -148,6 +148,31 @@
return pages;
}
+/
+ * Used when setting automatic NUMA hinting protection where it is
+ * critical that a numa hinting PMD is not confused with a bad PMD.
+ */
+static inline int pmd_none_or_clear_bad_unless_trans_huge(pmd_t *pmd)
+{
+pmd_t pmdval = pmd_read_atomic(pmd);
+
+/* See pmd_none_or_trans_huge_or_clear_bad for info on barrier */
+#ifdef CONFIG_TRANSPARENT_HUGEPAGE
+barrier();
+#endif
+	if (pmd_none(pmdval))
+    return 1;
+if (pmd_trans_huge(pmdval))
+    return 0;
+if (unlikely(pmd_bad(pmdval)))
+    pmd_clear_bad(pmd);
+    return 1;
+}
+
+static inline unsigned long change_pmd_range(struct vm_area_struct *vma,
pud_t *pud, unsigned long addr, unsigned long end,
pgprot_t newprot, int dirty_accountable, int prot_numa)
@@ -164,8 +189,17 @@
unsigned long this_pages;
next = pmd_addr_end(addr, end);
-if (!is_swap_pmd(*pmd) && !pmd_trans_huge(*pmd) && !pmd_devmap(*pmd)
-&& pmd_none_or_clear_bad(pmd))
Automatic NUMA balancing walks the tables with mmap_sem held for read. It's possible a parallel update to occur between pmd_trans_huge() and a pmd_none_or_clear_bad() check leading to a false positive and clearing. Hence, it's necessary to atomically read the PMD value for all the checks.

```
if (!is_swap_pmd(*pmd) && !pmd_devmap(*pmd) &&
   pmd_none_or_clear_bad_unless_trans_huge(pmd))
goto next;
```

/* invoke the mmu notifier if the pmd is populated */
@@ -292,6 +326,42 @@
return pages;
}

+static int prot_none_pte_entry(pte_t *pte, unsigned long addr,
+                                unsigned long next, struct mm_walk *walk)
+{
+    return pfn_modify_allowed(pte_pfn(*pte), *(pgprot_t *)(walk->private)) ?
+        0 : -EACCES;
+}
+
+static int prot_none_hugetlb_entry(pte_t *pte, unsigned long hmask,
+                                        unsigned long addr, unsigned long next,
+                                        struct mm_walk *walk)
+{
+    return pfn_modify_allowed(pte_pfn(*pte), *(pgprot_t *)(walk->private)) ?
+        0 : -EACCES;
+}
+
+static int prot_none_test(unsigned long addr, unsigned long next,
+                            struct mm_walk *walk)
+{
+    return 0;
+}
+
+static int prot_none_walk(struct vm_area_struct *vma, unsigned long start,
+                           unsigned long end, unsigned long newflags)
+{
+    pgprot_t new_pgprot = vm_get_page_prot(newflags);
+    struct mm_walk prot_none_walk = {
+        .pte_entry = prot_none_pte_entry,
+        .hugetlb_entry = prot_none_hugetlb_entry,
+        .test_walk = prot_none_test,
+        .mm = current->mm,
+.private = &new_pgprot,
+{
+  return walk_page_range(start, end, &prot_none_walk);
+}
+
int

mprotect_fixup(struct vm_area_struct *vma, struct vm_area_struct **pprev,
  unsigned long start, unsigned long end, unsigned long newflags)
@@ -310,6 +380,19 @@
}
/ *
+ * Do PROT_NONE PFN permission checks here when we can still
+ * bail out without undoing a lot of state. This is a rather
+ * uncommon case, so doesn’t need to be very optimized.
+ */
+if (arch_has_pfn_modify_check() &&
+  (vma->vm_flags & (VM_PFNMAP|VM_MIXEDMAP)) &&
+  (newflags & (VM_READ|VM_WRITE|VM_EXEC)) == 0) {
+  error = prot_none_walk(vma, start, end, newflags);
+  if (error)
+    return error;
+}
+
+/*
+ * If we make a private mapping writable we increase our commit;
+ * but (without finer accounting) cannot reduce our commit if we
+ * make it unwritable again. hugetlb mapping were accounted for
--- linux-4.15.0.orig/mm/mremap.c
+++ linux-4.15.0/mm/mremap.c
@@ -115,7 +115,7 @@
static void move_ptes(struct vm_area_struct *vma, pmd_t *old_pmd,
  unsigned long old_addr, unsigned long old_end,
  struct vm_area_struct *new_vma, pmd_t *new_pmd,
-  unsigned long new_addr, bool need_rmap_locks, bool *need_flush)
+  unsigned long new_addr, bool need_rmap_locks)
{
    struct mm_struct *mm = vma->vm_mm;
    pte_t *old_pte, *new_pte, pte;
@@ -163,15 +163,17 @@
    pte = ptep_get_and_clear(mm, old_addr, old_pte);
    /*
    - * If we are remapping a dirty PTE, make sure
    + * If we are remapping a valid PTE, make sure
    * to flush TLB before we drop the PTL for the
    - * old PTE or we may race with page_mkclean().
This check has to be done after we removed the old PTE from page tables or another thread may dirty it after the check and before the removal. NOTE! Both old and new PTL matter: the old one for racing with page_mkclean(), the new one to make sure the physical page stays valid until the TLB entry for the old mapping has been flushed.

```c
if (pte_present(pte) && pte_dirty(pte))
force_flush = true;
pte = move_pte(pte, new_vma->vm_page_prot, old_addr, new_addr);
pte = move_soft_dirty_pte(pte);
@@ -179,13 +181,11 @@
}
arch_leave_lazy_mmu_mode();
+if (force_flush)
+flush_tlb_range(vma, old_end - len, old_end);
if (new_ptl != old_ptl)
spin_unlock(new_ptl);
pte_unmap(new_pte - 1);
-else
-need_flush = true;
-pte_unmap_unlock(old_pte - 1, old_ptl);
if (need_rmap_locks)
drop_rmap_locks(vma);
@@ -200,7 +200,6 @@
{
unsigned long extent, next, old_end;
pmd_t *old_pmd, *new_pmd;
-bool need_flush = false;
unsigned long mmun_start;/* For mmu_notifiers */
unsigned long mmun_end;/* For mmu_notifiers */
@@ -224,15 +223,14 @@
new_pmd = alloc_new_pmd(vma->vm_mm, vma, new_addr);
if (!new_pmd)
break;
-if (is_swap_pmd(*old_pmd) || pmd_trans_huge(*old_pmd)) {
+if (is_swap_pmd(*old_pmd) || pmd_trans_huge(*old_pmd) || pmd_devmap(*old_pmd)) {
  if (extent == HPAGE_PMD_SIZE) {
    bool moved;
```
/* See comment in move_ptes() */
if (need_rmap_locks)
take_rmap_locks(vma);
moved = move_huge_pmd(vma, old_addr, new_addr,
   - old_end, old_pmd, new_pmd,
   - &need_flush);
+ old_end, old_pmd, new_pmd);
if (need_rmap_locks)
drop_rmap_locks(vma);
if (moved)
@@ -250,10 +248,8 @@
if (extent > LATENCY_LIMIT)
extent = LATENCY_LIMIT;
move_ptes(vma, old_pmd, old_addr, old_addr + extent, new_vma,
   - new_pmd, new_addr, need_rmap_locks, &need_flush);
+ new_pmd, new_addr, need_rmap_locks);
}
@if (need_flush)
-flush_tlb_range(vma, old_end-len, old_addr);

mmu_notifier_invalidate_range_end(vma->vm_mm, mmun_start, mmun_end);

--- linux-4.15.0.orig/mm/nommu.c
+++ linux-4.15.0/mm/nommu.c
@@ -450,10 +450,14 @@
EXPORT_SYMBOL_GPL(vm_unmap_aliases);

/ *
- * Implement a stub for vmalloc_sync_all() if the architecture chose not to
- * have one.
+ * Implement a stub for vmalloc_sync_[un]mapping() if the architecture
+ * chose not to have one.
 */
-void __weak vmalloc_sync_all(void)
+void __weak vmalloc_sync_mappings(void)
+{
+}
+
+void __weak vmalloc_sync_unmappings(void)
+{

@@ -641,7 +645,7 @@
up_write(&nommu_region_sem);

if (region->vm_file)
-fput(region->vm_file);
+vmr_fput(region);
/* IO memory and memory shared directly out of the pagecache
* from ramfs/tmpfs mustn't be released here */
@@ -799,9 +803,9 @@
if (vma->vm_ops && vma->vm_ops->close)
  vma->vm_ops->close(vma);
if (vma->vm_file)
  fput(vma->vm_file);
+vm_fput(vma);
  put_nommu_region(vma->vm_region);
  kmem_cache_free(vm_area_cachep, vma);
  +vm_area_free(vma);
}

/*
@@ -1236,7 +1240,7 @@
if (!region)
  goto error_getting_region;

-vma = kmem_cache_zalloc(vm_area_cachep, GFP_KERNEL);
+vma = vm_area_alloc(current->mm);
if (!vma)
  goto error_getting_vma;
@@ -1244,7 +1248,6 @@
region->vm_flags = vm_flags;
region->vm_pgoff = pgoff;

-INIT_LIST_HEAD(&vma->anon_vma_chain);
  vma->vm_flags = vm_flags;
  vma->vm_pgoff = pgoff;
@@ -1321,7 +1324,7 @@
goto error_just_free;
} }
-fput(region->vm_file);
+vmr_fput(region);
  kmem_cache_free(vm_region_jar, region);
  region = pregion;
  result = start;
@@ -1396,11 +1399,11 @@
up_write(&nommu_region_sem);
error:
if (region->vm_file)
-fput(region->vm_file);
+vmr_fput(region);
  kmem_cache_free(vm_region_jar, region);
if (vma->vm_file)  
-fput(vma->vm_file);  
-kmem_cache_free(vm_area_cachep, vma);  
+vma_fput(vma);  
+vm_area_free(vma);  
return ret;  

sharing_violation:  
@@ -1494,14 +1497,13 @@  
if (!region)  
return -ENOMEM;  

-new = kmem_cache_alloc(vm_area_cachep, GFP_KERNEL);  
+new = vm_area_dup(vma);  
if (!new) {  
kmem_cache_free(vm_region_jar, region);  
return -ENOMEM;  
}  
/* most fields are the same, copy all, and then fixup */  
-*new = *vma;  
*region = *vma->vm_region;  
new->vm_region = region;  
@@ -1815,7 +1817,8 @@  
struct vm_area_struct *vma;  
int write = gup_flags & FOLL_WRITE;  

-down_read(&mm->mmap_sem);  
+if (down_read_killable(&mm->mmap_sem))  
+return 0;  
/* the access must start within one of the target process's mappings */  
vma = find_vma(mm, addr);  
--- linux-4.15.0.orig/mm/oom_kill.c  
+++ linux-4.15.0/mm/oom_kill.c  
@@ -54,6 +54,8 @@  
int sysctl_oom_dump_tasks = 1;  

DEFINE_MUTEX(oom_lock);  
+/* Serializes oom_score_adj and oom_score_adj_min updates */  
+DEFINE_MUTEX(oom_adj_mutex);  

#ifdef CONFIG_NUMA  
/**  
@@ -474,7 +476,6 @@  
return false;  
}
#ifndef CONFIG_MMU
/
* OOM Reaper kernel thread which tries to reap the memory used by the OOM
@@ -485,16 +486,51 @@
static struct task_struct *oom_reaper_list;
static DEFINE_SPINLOCK(oom_reaper_lock);

-static bool __oom_reap_task_mm(struct task_struct *tsk, struct mm_struct *mm)
+void __oom_reap_task_mm(struct mm_struct *mm)
{
-struct mmu_gather tlb;
+struct vm_area_struct *vma;
+ *
+/*
+ * Tell all users of get_user/copy_from_user etc... that the content
+ * is no longer stable. No barriers really needed because unmapping
+ * should imply barriers already and the reader would hit a page fault
+ * if it stumbled over a reaped memory.
+ */
+set_bit(MMF_UNSTABLE, &mm->flags);
+ *
+for (vma = mm->mmap ; vma; vma = vma->vm_next) {
+if (!can_madv_dontneed_vma(vma))
+continue;
+ *
+/*
+ * Only anonymous pages have a good chance to be dropped
+ * without additional steps which we cannot afford as we
+ * are OOM already.
+ *
+ * We do not even care about fs backed pages because all
+ * which are reclaimable have already been reclaimed and
+ * we do not want to block exit_mmap by keeping mm ref
+ * count elevated without a good reason.
+ */
+if (vma_is_anonymous(vma) || !(vma->vm_flags & VM_SHARED)) {
+struct mmu_gather tlb;
+ *
+tlb_gather_mmu(&tlb, mm, vma->vm_start, vma->vm_end);
+unmap_page_range(&tlb, vma, vma->vm_start, vma->vm_end,
+ NULL);
+tlb_finish_mmu(&tlb, vma->vm_start, vma->vm_end);
+}
+}
+static bool oom_reap_task_mm(struct task_struct *tsk, struct mm_struct *mm) 
+
bool ret = true;

/*
 * We have to make sure to not race with the victim exit path
 * and cause premature new oom victim selection:
 * __oom_reap_task_mm
 * oom_reap_task_mm
 * mmget_not_zero
 * mmput
 * atomic_dec_and_test
@@ -542,35 +578,8 @@
trace_start_task_reaping(tsk->pid);

-/*
- * Tell all users of get_user/copy_from_user etc... that the content
- * is no longer stable. No barriers really needed because unmapping
- * should imply barriers already and the reader would hit a page fault
- * if it stumbled over a reaped memory.
- */
-set_bit(MMF_UNSTABLE, &mm->flags);
+__oom_reap_task_mm(mm);

-for (vma = mm->mmap ; vma; vma = vma->vm_next) {
-if (!can_madv_dontneed_vma(vma))
-continue;
-
-/*
- * Only anonymous pages have a good chance to be dropped
- * without additional steps which we cannot afford as we
- * are OOM already.
- *
- * We do not even care about fs backed pages because all
- * which are reclaimable have already been reclaimed and
- * we do not want to block exit_mmap by keeping mm ref
- * count elevated without a good reason.
- */
-if (vma_is_anonymous(vma) || !(vma->vm_flags & VM_SHARED)) {
-tlb_gather_mmu(&tlb, mm, vma->vm_start, vma->vm_end);
-unmap_page_range(&tlb, vma, vma->vm_start, vma->vm_end, NULL);
-tlb_finish_mmu(&tlb, vma->vm_start, vma->vm_end);
-}
-}
pr_info("oom_reaper: reaped process %d (%s), now anon-rss:%lukB, file-rss:%lukB, shmem-rss:%lukB\n", task_pid_nr(tsk), tsk->comm,
K(get_mm_counter(mm, MM_ANONPAGES)),
@@ -591,13 +600,12 @@
struct mm_struct *mm = tsk->signal->oom_mm;

/* Retry the down_read_trylock(mmap_sem) a few times */
while (attempts++ < MAX_OOM_REAP_RETRIES && !_oom_reap_task_mm(tsk, mm))
+while (attempts++ < MAX_OOM_REAP_RETRIES && !oom_reap_task_mm(tsk, mm))
schedule_timeout_idle(HZ/10);

if (attempts <= MAX_OOM_REAP_RETRIES)
goto done;

pr_info("oom_reaper: unable to reap pid:%d (%s)n",
task_pid_nr(tsk), tsk->comm);
depth_show_all_locks();
@@ -637,8 +645,8 @@
static void wake_oom_reaper(struct task_struct *tsk)
{
-/* tsk is already queued? */
-if (tsk == oom_reaper_list || tsk->oom_reaper_list)
+/* mm is already queued? */
+if (test_and_set_bit(MMF_OOM_REAP_QUEUED, &tsk->signal->oom_mm->flags))
return;

get_task_struct(tsk);
@@ -874,6 +882,13 @@
* still freeing memory.
*/
read_lock(&tasklist_lock);
+
+/*
+ * The task 'p' might have already exited before reaching here. The
+ * put_task_struct() will free task_struct 'p' while the loop still try
+ * to access the field of 'p', so, get an extra reference.
+ */
+get_task_struct(p);
for_each_thread(p, t) {
    list_for_each_entry(child, &t->children, sibling) {
        unsigned int child_points;
@@ -893,6 +908,7 @@
    }
}
+put_task_struct(p);
read_unlock(&tasklist_lock);
p = find_lock_task_mm(victim);
@@ -911,7 +927,7 @@
/* Raise event before sending signal: task reaper must see this */
count_vm_event(OOM_KILL);
-count_memcg_event_mm(mm, OOM_KILL);
+memcg_memory_event_mm(mm, MEMCG_OOM_KILL);

/*
 * We should send SIGKILL before granting access to memory reserves
 @@ -1046,9 +1062,10 @@
 * The OOM killer does not compensate for IO-less reclaim.
 * pagefault_out_of_memory lost its gfp context so we have to
 * make sure exclude 0 mask - all other users should have at least
- * ___GFP_DIRECT_RECLAIM to get here.
+ * ___GFP_DIRECT_RECLAIM to get here. But mem_cgroup_oom() has to
+ * invoke the OOM killer even if it is a GFP_NOFS allocation.
 */
-if (oc->gfp_mask && !(oc->gfp_mask & __GFP_FS))
+if (oc->gfp_mask && !(oc->gfp_mask & __GFP_FS) && !is_memcg_oom(oc))
 return true;

/*
--- linux-4.15.0.orig/mm/page-writeback.c
+++ linux-4.15.0/mm/page-writeback.c
@@ -201,11 +201,11 @@
 if (this_bw < tot_bw) {
 if (min) {
 min *= this_bw;
- do_div(min, tot_bw);
+ min = div64_ul(min, tot_bw);
 } else
 if (max < 100) {
 max *= this_bw;
- do_div(max, tot_bw);
+ max = div64_ul(max, tot_bw);
 } else
 } }

@@ -2149,6 +2149,13 @@
 /* not miss some pages (e.g., because some other process has cleared TOWRITE
 * tag we set). The rule we follow is that TOWRITE tag can be cleared only
 * by the process clearing the DIRTY tag (and submitting the page for IO).
+ *
+ * To avoid deadlocks between range_cyclic writeback and callers that hold
+ * pages in PageWriteback to aggregate IO until write_cache_pages() returns,
+ * we do not loop back to the start of the file. Doing so causes a page
+ * lock/page writeback access order inversion - we should only ever lock

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int write_cache_pages(struct address_space *mapping, struct writeback_control *wbc, writepage_t writepage, @-2156,13 +2163,13 @-)
{
    int ret = 0;
    int done = 0;
    int error;
    struct pagevec pvec;
    int nr_pages;
    pgoff_t uninitialized_var(writeback_index);
    pgoff_t index;
    pgoff_t end; /* Inclusive */
    pgoff_t done_index;
    -int cycled;
    int range_whole = 0;
    int tag;

    if (wbc->range_cyclic) {
        writeback_index = mapping->writeback_index; /* prev offset */
        index = writeback_index;
        -if (index == 0)
            -cycled = 1;
        -else
            cycled = 0;
        end = -1;
    } else {
        index = wbc->range_start >> PAGE_SHIFT;
        end = wbc->range_end >> PAGE_SHIFT;
        if (wbc->range_start == 0 && wbc->range_end == LLONG_MAX)
            range_whole = 1;
        -cycled = 1; /* ignore range_cyclic tests */
    }
    if (wbc->sync_mode == WB_SYNC_ALL || wbc->tagged_writepages)
        tag = PAGECACHE_TAG_TOWRITE;
    else
        tag = PAGECACHE_TAG_DIRTY;
    -retry:
    if (wbc->sync_mode == WB_SYNC_ALL || wbc->tagged_writepages)
        tag_pages_for_writeback(mapping, index, end);
    done_index = index;
    @-2236,25 +2237,31 @-
    goto continue_unlock;

    trace_wbc_writepage(wbc, inode_to_bdi(mapping->host));
- ret = (*writepage)(page, wbc, data);
- if (unlikely(ret)) {
- if (ret == AOP_WRITEPAGE_ACTIVATE) {
+ error = (*writepage)(page, wbc, data);
+ if (unlikely(error)) {
+ /*
+ * Handle errors according to the type of
+ * writeback. There's no need to continue for
+ * background writeback. Just push done_index
+ * past this page so media errors won't choke
+ * writeout for the entire file. For integrity
+ * writeback, we must process the entire dirty
+ * set regardless of errors because the fs may
+ * still have state to clear for each page. In
+ * that case we continue processing and return
+ * the first error.
+ */
+ } else if (wbc->sync_mode != WB_SYNC_ALL) {
+ ret = error;
+ done_index = page->index + 1;
+ done = 1;
+ break;
+ } else {
+ error = 0;
+ }
+ } else if (wbc->sync_mode != WB_SYNC_ALL) {
+ ret = error;
+ done_index = page->index + 1;
+ done = 1;
+ break;
+ } else if (!ret)
+ ret = error;
+ }
+
+ /*
+ @ @ -2272,17 +2279,14 @@
+ pagevec_release(&pvec);
+ cond_resched();
+ }
+ if (!cycled && !done) {
+ /*
- * range_cyclic:
- * We hit the last page and there is more work to be done: wrap
- * back to the start of the file
- */
cycled = 1;
index = 0;
end = writeback_index - 1;
goto retry;
}
+
+/*
+ * If we hit the last page and there is more work to be done: wrap
+ * back the index back to the start of the file for the next
+ * time we are called.
+ */
+if (wbc->range_cyclic && !done)
done_index = 0;
if (wbc->range_cyclic || (range_whole && wbc->nr_to_write > 0))
mapping->writeback_index = done_index;

@@ -2501,13 +2505,13 @@
if (mapping && mapping_cap_account_dirty(mapping)) {
struct inode *inode = mapping->host;
struct bdi_writeback *wb;
@@ -2501,13 +2505,13 @@
 unlocked_inode_to_wb_end(inode, &cookie);
 struct wb_lock_cookie cookie = {};

-wb = unlocked_inode_to_wb_begin(inode, &locked);
+wb = unlocked_inode_to_wb_begin(inode, &cookie);
current->nr_dirtied--;
dec_node_page_state(page, NR_DIRTIED);
dec_wb_stat(wb, WB_DIRTIED);
-unlocked_inode_to_wb_end(inode, locked);
+unlocked_inode_to_wb_end(inode, &cookie);
}
}
EXPORT_SYMBOL(account_page_redirty);
@@ -2613,15 +2617,15 @@
if (mapping_cap_account(dirty(mapping)) {
struct inode *inode = mapping->host;
struct bdi_writeback *wb;
@@ -2613,15 +2617,15 @@
 unlocked_inode_to_wb_end(inode, locked);
 unlocked_inode_to_wb_end(inode, &cookie);
}

lock_page_memcg(page);
-wb = unlocked_inode_to_wb_begin(inode, &locked);
+wb = unlocked_inode_to_wb_begin(inode, &cookie);
if (TestClearPageDirty(page))
account_page_cleaned(page, mapping, wb);

-unlocked_inode_to_wb_end(inode, locked);
+unlocked_inode_to_wb_end(inode, &cookie);
unlock_page_memcg(page);
} else {
ClearPageDirty(page);
@@ -2653,7 +2657,7 @@
if (mapping && mapping_cap_account_dirty(mapping)) {
 struct inode *inode = mapping->host;
 struct bdi_writeback *wb;
-bool locked;
+struct wb_lock_cookie cookie = {};

/*
 * Yes, Virginia, this is indeed insane.
 * @@ -2690,14 +2694,14 @@
 * always locked coming in here, so we get the desired
 * exclusion.
 * */
-wb = unlocked_inode_to_wb_begin(inode, &locked);
+wb = unlocked_inode_to_wb_begin(inode, &cookie);
if (TestClearPageDirty(page)) {
 dec_lruvec_page_state(page, NR_FILE_DIRTY);
 dec_zone_page_state(page, NR_ZONE_WRITE_PENDING);
 dec_wb_stat(wb, WB_RECLAIMABLE);
 ret = 1;
}
-unlocked_inode_to_wb_end(inode, locked);
+unlocked_inode_to_wb_end(inode, &cookie);
return ret;
}
return TestClearPageDirty(page);
--- linux-4.15.0.orig/mm/page_alloc.c
+++ linux-4.15.0/mm/page_alloc.c
@@ -46,6 +46,7 @@
#include <linux/stop_machine.h>
#include <linux/sort.h>
#include <linux/pfn.h>
+#include <xen/xen.h>
#include <linux/backing-dev.h>
#include <linux/fault-inject.h>
#include <linux/page-isolation.h>
@@ -67,6 +68,7 @@
#include <linux/ftrace.h>
#include <linux/lockdep.h>
#include <linux/nmi.h>
```c
#include <linux/khugepaged.h>
#include <asm/sections.h>
#include <asm/tlbflush.h>

/* Always populate low zones for address-constrained allocations */
if (zone_end < pgdat_end_pfn(pgdat))
    return true;
/* Xen PV domains need page structures early */
+if (xen_pv_domain())
+return true;

(*nr_initialised)++;
if ((*nr_initialised > pgdat->static_init_pgcnt) &&
    (pfn & (PAGES_PER_SECTION - 1)) == 0) {
    struct page *buddy;
    unsigned int max_order;
    -max_order = min_t(unsigned int, MAX_ORDER, pageblock_order + 1);
    +max_order = min_t(unsigned int, MAX_ORDER - 1, pageblock_order);
    VM_BUG_ON(!zone_is_initialized(zone));
    VM_BUG_ON_PAGE(page->flags & PAGE_FLAGS_CHECK_AT_PREP, page);
    VM_BUG_ON_PAGE(bad_range(zone, page), page);
    continue_merging:
    -while (order < max_order - 1) {
        +while (order < max_order) {
            buddy_pfn = __find_buddy_pfn(pfn, order);
            buddy = page + (buddy_pfn - pfn);

            pfn = combined_pfn;
            order++;
        }
    }
    -if (max_order < MAX_ORDER) {
        +if (order < MAX_ORDER - 1) {
            /* If we are here, it means order is >= pageblock_order.
             * We want to prevent merge between freepages on isolate
             * pageblock and normal pageblock. Without this, pageblock
             * is_migrate_isolate(buddy_mt)))
            goto done_merging;
        }
    -max_order++;
    +max_order = order + 1;
    goto continue_merging;
```
spin_lock(&zone->lock);
isolated_pageblocks = has_isolate_pageblock(zone);

+/
+ * Ensure proper count is passed which otherwise would stuck in the
+ * below while (list_empty(list)) loop.
+ */
+ count = min(pcp->count, count);
while (count) {
    struct page *page;
    struct list_head *list;
    spin_lock(&zone->lock);
isolated_pageblocks = has_isolate_pageblock(zone);
+
static void __meminit __init_single_page(struct page *page, unsigned long pfn,
unsigned long zone, int nid)
{
    mm_zero_struct_page(page);
    if (zero)
        mm_zero_struct_page(page);
    set_page_links(page, zone, nid, pfn);
    init_page_count(page);
    page_mapcount_reset(page);
}

static void __meminit __init_single_pfn(unsigned long pfn,
unsigned long zone, int nid, bool zero)
{
    __init_single_page(pfn_to_page(pfn), pfn, zone, nid, zero);
}

#ifdef CONFIG_DEFERRED_STRUCT_PAGE_INIT
    if (pfn >= zone->zone_start_pfn && pfn < zone_end_pfn(zone))
        __init_single_pfn(pfn, zid, nid);
#endif

static inline void init_reserved_page(unsigned long pfn)
{
if (!__pageblock_pfn_to_page(block_start_pfn, block_end_pfn, zone))
    return;
+  cond_resched();
}
/* We confirm that there is no hole */
page++;
else
    page = pfn_to_page(pfn);
-  __init_single_page(page, pfn, zid, nid);
+  __init_single_page(page, pfn, zid, nid, true);
cond_resched();
}
/* Block until all are initialised */
wait_for_completion(&pgdat_init_all_done_comp);
+
+  * The number of managed pages has changed due to the initialisation
+  * so the pcpu batch and high limits needs to be updated or the limits
+  * will be artificially small.
+  */
+  for_each_populated_zone(zone)
+    zone_pcp_update(zone);
+
+ /* Reinit limits that are based on free pages after the kernel is up */
+ files_maxfiles_init();
#endif
arch_alloc_page(page, order);
kernsl_map_pages(page, 1 << order, 1);
- kernel_poison_pages(page, 1 << order, 1);
+ kernel_poison_pages(page, 1 << order, 1);
+ kasan_alloc_pages(page, order);
+ kasan_popoison_pages(page, 1 << order, 1);
set_page_owner(page, order, gfp_flags);
}
/* this guy won’t enter reclaim */
- if ((current->flags & PF_MEMALLOC) && !(gfp_mask & __GFP_NOMEMALLOC))
+ if (current->flags & PF_MEMALLOC)
return false;

/* We're only interested __GFP_FS allocations for now */
@@ -3917,17 +3937,6 @@
int reserve_flags;

/*
 - * In the slowpath, we sanity check order to avoid ever trying to
 - * reclaim >= MAX_ORDER areas which will never succeed. Callers may
 - * be using allocators in order of preference for an area that is
 - * too large.
 - */
- if (order >= MAX_ORDER) {
- WARN_ON_ONCE(!(gfp_mask & __GFP_NOWARN));
- return NULL;
- }
-
- /*
- * We also sanity check to catch abuse of atomic reserves being used by
- * callers that are not in atomic context.
- */
@@ -4030,7 +4039,6 @@
* orientated.
*/

if (!alloc_flags & ALLOC_CPUSSET) || reserve_flags) {
    ac->zonelist = node_zonelist(numa_node_id(), gfp_mask);
    ac->preferred_zoneref = first_zones_zonelist(ac->zonelist,
     ac->high_zoneidx, ac->nodemask);
}
@@ -4221,6 +4229,15 @@
 *
 * There are several places where we assume that the order value is sane
 * so bail out early if the request is out of bound.
 + */
+ if (unlikely(order >= MAX_ORDER)) {
+ WARN_ON_ONCE(!(gfp_mask & __GFP_NOWARN));
+ return NULL;
+ }
+ gfp_mask &= gfp_allowed_mask;
alloc_mask = gfp_mask;
if (!prepare_alloc_pages(gfp_mask, order, preferred_nid, nodemask, &ac, &alloc_mask, &alloc_flags))
@@ -4290,16 +4307,19 @@
}
-void __free_pages(struct page *page, unsigned int order)
+static inline void free_the_page(struct page *page, unsigned int order)
{
 -if (put_page_testzero(page)) {
-    if (order == 0)
-        free_unref_page(page);
-    else
-        __free_pages_ok(page, order); 
-
-    free_unref_page(page);
-    if (order == 0)/* Via pcp? */
-        __free_pages_ok(page, order);
+    else
+        __free_pages_ok(page, order);
    }
+void __free_pages(struct page *page, unsigned int order)
+{
+    if (put_page_testzero(page))
+        __free_pages_ok(page, compound_order(page));
+    }
EXPORT_SYMBOL(__free_pages);

void free_pages(unsigned long addr, unsigned int order)
@@ -4348,14 +4368,8 @@
{
 VM_BUG_ON_PAGE(page_ref_count(page) == 0, page);

-    -if (page_ref_sub_and_test(page, count)) {
-        unsigned int order = compound_order(page);
-
-    -    if (order == 0)
-        free_unref_page(page);
-    -    else
-        __free_pages_ok(page, order);
-    }
+    if (page_ref_sub_and_test(page, count))
+        free_the_page(page, compound_order(page));
+    }
EXPORT_SYMBOL(__page_frag_cache_drain);

@@ -4379,11 +4393,11 @@
/* Even if we own the page, we do not use atomic_set().
 * This would break get_page_unless_zero() users.
 */
-    page_ref_add(page, size - 1);
+    page_ref_add(page, PAGE_FRAG_CACHE_MAX_SIZE);
nc->pfmemalloc = page_is_pfmemalloc(page);
-nc->pagecnt_bias = size;
+nc->pagecnt_bias = PAGE_FRAG_CACHE_MAX_SIZE + 1;
nc->offset = size;
}

if (!page_ref_sub_and_test(page, nc->pagecnt_bias))
goto refill;

+if (unlikely(nc->pfmemalloc)) {
+free_the_page(page, compound_order(page));
+goto refill;
+}

#if (PAGE_SIZE < PAGE_FRAG_CACHE_MAX_SIZE)
/* if size can vary use size else just use PAGE_SIZE */
size = nc->size;
#endif
/* OK, page count is 0, we can safely set it */
-set_page_count(page, size);
+set_page_count(page, PAGE_FRAG_CACHE_MAX_SIZE + 1);

/* reset page count bias and offset to start of new frag */
-nc->pagecnt_bias = size;
+nc->pagecnt_bias = PAGE_FRAG_CACHE_MAX_SIZE + 1;
offset = size - fragsz;
}

struct page *page = virt_to_head_page(addr);

if (unlikely(put_page_testzero(page)))
-__free_pages_ok(page, compound_order(page));
+free_the_page(page, compound_order(page));
}
EXPORT_SYMBOL(page_frag_free);

min(global_node_page_state(NR_SLAB_RECLAIMABLE) / 2,
wmark_low);

*/
+ * Part of the kernel memory, which can be released under memory
+ * pressure.
+ */
+available += global_node_page_state(NR_INDIRECTLY_RECLAIMABLE_BYTES) >>
PAGE_SHIFT;
+
if (available < 0)
available = 0;
return available;
@@ -5343,17 +5369,8 @@
if (context != MEMMAP_EARLY)
goto not_early;

-if (!early_pfn_valid(pfn)) {
-#ifdef CONFIG_HAVE_MEMBLOCK_NODE_MAP
-/*
- * Skip to the pfn preceding the next valid one (or
- * end_pfn), such that we hit a valid pfn (or end_pfn)
- * on our next iteration of the loop.
- */
-pfn = memblock_next_valid_pfn(pfn, end_pfn) - 1;
-#endif
+if (!early_pfn_valid(pfn))
continue;
-}
if (!early_pfn_in_nid(pfn, nid))
continue;
if (!update_defer_init(pgdat, pfn, end_pfn, &nr_initialised))
@@ -5393,15 +5410,20 @@
* can be created for invalid pages (for alignment)
* check here not to call set_pageblock_migratetype() against
* pfn out of zone.
+ *
+ * Please note that MEMMAP_HOTPLUG path doesn't clear memmap
+ * because this is done early in sparse_add_one_section
+ */
if (!(pfn & (pageblock_nr_pages - 1))) {
struct page *page = pfn_to_page(pfn);

-__init_single_page(page, pfn, zone, nid);
+__init_single_page(page, pfn, zone, nid,
+context != MEMMAP_HOTPLUG);
set_pageblock_migratetype(page, MIGRATE_MOVABLE);
cond_resched();
} else {
-__init_single_pfn(pfn, zone, nid);
+__init_single_pfn(pfn, zone, nid,
+context != MEMMAP_HOTPLUG);
}
}
@@ -5600,8 +5622,10 @@
unsigned long size)
{
    struct pglist_data *pgdat = zone->zone_pgdat;
    int zone_idx = zone_idx(zone) + 1;

    pgdat->nr_zones = zone_idx(zone) + 1;
    if (zone_idx > pgdat->nr_zones)
        pgdat->nr_zones = zone_idx;

    zone->zone_start_pfn = zone_start_pfn;

    unsigned long *zone_start_pfn, unsigned long *zone_end_pfn,
    unsigned long *ignored)
{
    unsigned long zone_low = arch_zone_lowest_possible_pfn[zone_type];
    unsigned long zone_high = arch_zone_highest_possible_pfn[zone_type];
    /* When hotadd a new node from cpu_up(), the node should be empty */
    if (!node_start_pfn && !node_end_pfn)
        return 0;

    /* Get the start and end of the zone */
    *zone_start_pfn = arch_zone_lowest_possible_pfn[zone_type];
    *zone_end_pfn = arch_zone_highest_possible_pfn[zone_type];
    *zone_start_pfn = clamp(node_start_pfn, zone_low, zone_high);
    *zone_end_pfn = clamp(node_end_pfn, zone_low, zone_high);
    adjust_zone_range_for_zone_movable(nid, zone_type,
        node_start_pfn, node_end_pfn,
        zone_start_pfn, zone_end_pfn);

    /* Only struct pages that are backed by physical memory are zeroed and */
    /* initialized by going through __init_single_page(). But, there are some
*/
    @ @ -6239,7 +6265,7 @@
    free_area_init_core(pgdat);
}

#endif CONFIG_HAVE_MEMBLOCK
#else if defined(CONFIG_HAVE_MEMBLOCK) && !defined(CONFIG_FLAT_NODE_MEM_MAP)
/*
* Only struct pages that are backed by physical memory are zeroed and
* initialized by going through __init_single_page(). But, there are some
*/
@ @ -6277,7 +6303,7 @@
if (pgcnt)
    pr_info("Reserved but unavailable: %lld pages", pgcnt);
}
#endif /* CONFIG_HAVE_MEMBLOCK */
#endif /* CONFIG_HAVE_MEMBLOCK && !CONFIG_FLAT_NODE_MEM_MAP */

#endif CONFIG_HAVE_MEMBLOCK_NODE_MAP
@ @ -6692,6 +6718,7 @@
/* Initialise every node */
mminit_verify_pageflags_layout();
setup_nr_node_ids();
+zero_resv_unavail();
for_each_online_node(nid) {
    pg_data_t *pgdat = NODE_DATA(nid);
    free_area_init_node(nid, NULL,
@@ -6702,7 +6729,6 @@
        node_set_state(nid, N_MEMORY);
    check_for_memory(pgdat, nid);
}
-zero_resv_unavail();
}

static int __init cmdline_parse_core(char *p, unsigned long *core)
@@ -6770,9 +6796,21 @@
    end = (void *)((unsigned long)end & PAGE_MASK);
    for (pos = start; pos < end; pos += PAGE_SIZE, pages++) {
+        struct page *page = virt_to_page(pos);
+        void *direct_map_addr;
+        
+        /*
+         * 'direct_map_addr' might be different from 'pos'
+         * because some architectures' virt_to_page()
+         * work with aliases. Getting the direct map
+         * address ensures that we get a _writeable_
+         * alias for the memset().
+         */
+        direct_map_addr = page_address(page);
        if ((unsigned int)poison <= 0xFF)
-            memset(pos, poison, PAGE_SIZE);
-            free_reserved_page(virt_to_page(pos));
+            memset(direct_map_addr, poison, PAGE_SIZE);
+            free_reserved_page(page);
    }
    if (pages && s)
@@ -6864,9 +6902,9 @@

    void __init free_area_init(unsigned long *zones_size)
    {
+        zero_resv_unavail();
        free_area_init_node(0, zones_size,
@@ -33408,1 +33408 @@
            __pa(PAGE_OFFSET) >> PAGE_SHIFT, NULL);
-        zero_resv_unavail();
}
static int page_alloc_cpu_dead(unsigned int cpu)
@@ -7109,9 +7147,11 @@
 setup_min_slab_ratio();
 #endif

 +khugepaged_min_free_kbytes_update();
 +
 return 0;
 }
-core_initcall(init_per_zone_wmark_min)
+postcore_initcall(init_per_zone_wmark_min)

 /*
 * min_free_kbytes_sysctl_handler - just a wrapper around proc_dointvec() so
@@ -7762,7 +7802,6 @@
 }
 #endif

-#ifdef CONFIG_MEMORY_HOTPLUG
 /*
 * The zone indicated has a new number of managed_pages; batch sizes and percpu
 * page high values need to be recalculated.
@@ -7776,7 +7815,6 @@
 per_cpu_ptr(zone->pageset, cpu));
 mutex_unlock(&pcp_batch_high_lock);
 }
+#endif

 void zone_pcp_reset(struct zone *zone)
 {
 --- linux-4.15.0.orig/mm/page_ext.c
+++ linux-4.15.0/mm/page_ext.c
@@ -271,6 +271,7 @@
 table_size = get_entry_size() * PAGES_PER_SECTION;

 BUG_ON(PageReserved(page));
+kmemleak_free(addr);
 free_pages_exact(addr, table_size);
 }
@@ -396,10 +397,8 @@
 * We know some arch can have a nodes layout such as
 * -----------pfn-----------
 * N0 | N1 | N2 | N0 | N1 | N2|...
-_ *
- * Take into account DEFERRED_STRUCT_PAGE_INIT.
 */
-if (early_pfn_to_nid(pfn) != nid)
+if (pfn_to_nid(pfn) != nid)
   continue;
if (init_section_page_ext(pfn, nid))
   goto oom;
--- linux-4.15.0.orig/mm/page_idle.c
+++ linux-4.15.0/mm/page_idle.c
@@ -4,6 +4,7 @@
#include <linux/fs.h>
#include <linux/sysfs.h>
#include <linux/kobject.h>
+#include <linux/memory_hotplug.h>
#include <linux/mm.h>
#include <linux/mmzone.h>
#include <linux/pagemap.h>
@@ -30,13 +31,9 @@
 *
 static struct page *page_idle_get_page(unsigned long pfn)
 {
-struct page *page;
+struct page *page = pfn_to_online_page(pfn);
   struct zone *zone;

-if (!fn_valid(pfn))
-   return NULL;
-
-   page = pfn_to_page(pfn);
   if (!page || !PageLRU(page) ||
      !get_page_unless_zero(page))
      return NULL;
@@ -65,11 +62,15 @@
      while (page_vma_mapped_walk(&pvmw)) {
         addr = pvmw.address;
         if (pvmw.pte) {
-            referenced = ptep_clear_young_notify(vma, addr,
-            pvmw.pte);
+            /* For PTE-mapped THP, one sub page is referenced,
+            * the whole THP is referenced.
+            */
+            if (ptep_clear_young_notify(vma, addr, pvmw.pte))
+               referenced = true;
+         } else if (IS_ENABLED(CONFIG_TRANSPARENT_HUGEPAGE)) {
+            referenced = true;
+            pmdp_clear_young_notify(vma, addr, pvmw.pmd);
+            if (pmdp_clear_young_notify(vma, addr, pvmw.pmd))
+               referenced = true;
+         } else {
WARN_ON_ONCE(1);
@@ -132,7 +133,7 @@
end_pfn = pfn + count * BITS_PER_BYTE;
if (end_pfn > max_pfn)
- end_pfn = ALIGN(max_pfn, BITMAP_CHUNK_BITS);
+ end_pfn = max_pfn;

for (; pfn < end_pfn; pfn++) {
bit = pfn % BITMAP_CHUNK_BITS;
@@ -177,7 +178,7 @@
end_pfn = pfn + count * BITS_PER_BYTE;
if (end_pfn > max_pfn)
- end_pfn = ALIGN(max_pfn, BITMAP_CHUNK_BITS);
+ end_pfn = max_pfn;

for (; pfn < end_pfn; pfn++) {
bit = pfn % BITMAP_CHUNK_BITS;
--- linux-4.15.0.orig/mm/page_io.c
+++ linux-4.15.0/mm/page_io.c
@@ -38,7 +38,6 @@
bio->bi_iter.bi_sector = map_swap_page(page, &bdev);
bio_set_dev(bio, bdev);
- bio->bi_iter.bi_sector <<= PAGE_SHIFT - 9;
bio->bi_end_io = end_io;

for (i = 0; i < nr; i++)
@@ -76,6 +75,7 @@
{
 struct swap_info_struct *sis;
 struct gendisk *disk;
+swp_entry_t entry;

/*
 * There is no guarantee that the page is in swap cache - the software
@@ -107,11 +107,11 @@
 * we again wish to reclaim it.
 */
 disk = sis->bdev->bd_disk;
-if (disk->fops->swap_slot_free_notify) {
- swp_entry_t entry;
+entry.val = page_private(page);
+if (disk->fops->swap_slot_free_notify &&
+__swap_count(sis, entry) == 1) {
 unsigned long offset:
entry.val = page_private(page);
offset = swp_offset(entry);

SetPageDirty(page);
@@ -261,11 +261,6 @@ return ret;
 }

-static sector_t swap_page_sector(struct page *page)
-{
-return (sector_t)__page_file_index(page) << (PAGE_SHIFT - 9);
-}

- static inline void count_swpout_vm_event(struct page *page)
-{
- 
- 
- 
- #ifdef CONFIG_TRANSPARENT_HUGEPAGE
- 
- 
- 
- ret = bdev_write_page(sis->bdev, swap_page_sector(page), page, wbc);
+ ret = bdev_write_page(sis->bdev, map_swap_page(page, &sis->bdev),
+             page, wbc);
 if (!ret) {
 count_swpout_vm_event(page);
 return 0;
@@ -374,7 +370,7 @@ return ret;
 }

 -ret = bdev_read_page(sis->bdev, swap_page_sector(page), page);
 +ret = bdev_read_page(sis->bdev, map_swap_page(page, &sis->bdev),
 if (!ret) {
 if (trylock_page(page)) {
 swap_slot_free_notify(page);
--- linux-4.15.0.orig/mm/page_owner.c
+++ linux-4.15.0/mm/page_owner.c
@@ -123,13 +123,13 @@
static inline bool check_recursive_alloc(struct stack_trace *trace,
         unsigned long ip)
 {
-    int i, count;
+    int i;

 if (!trace->nr_entries)
 return false;
for (i = 0, count = 0; i < trace->nr_entries; i++) {
    if (trace->entries[i] == ip && ++count == 2)
+for (i = 0; i < trace->nr_entries; i++) {
+    if (trace->entries[i] == ip)
+    return true;
+}

@@ -273,7 +273,8 @@
+  * not matter as the mixed block count will still be correct
+  */
+for (; pfn < end_pfn; ) {
+    if (!pfn_valid(pfn)) {
+        page = pfn_to_online_page(pfn);
+        if (!page) {
+            pfn = ALIGN(pfn + 1, MAX_ORDER_NR_PAGES);
+            continue;
+        }
+    }
@@ -281,13 +282,13 @@
+    if (!pfn_valid_within(pfn))
+        continue;
+/* The pageblock is online, no need to recheck. */
+    page = pfn_to_page(pfn);
+    pageblock_mt = get_pageblock_migratetype(page);
+
    for (; pfn < block_end_pfn; pfn++) {
        if (!pfn_valid_within(pfn))
            continue;
+
        /* The pageblock is online, no need to recheck. */
        page = pfn_to_page(pfn);
+
        if (page_zone(page) != zone)
            continue;
++ linux-4.15.0.orig/mm/page_poison.c
++ linux-4.15.0/mm/page_poison.c
@@ -6,6 +6,7 @@
 @include <linux/page_ext.h>
 @include <linux/poison.h>
 @include <linux/ratelimit.h>
+@include <linux/kasan.h>

 static bool want_page_poisoning __read_mostly;

@@ -34,7 +35,10 @@
 {    void *addr = kmap_atomic(page);
+ /* KASAN still think the page is in-use, so skip it. */
+ kasan_disable_current();

--- linux-4.15.0.orig/mm/page_poison.c
+++ linux-4.15.0/mm/page_poison.c
@@ -34,7 +35,10 @@
 {    void *addr = kmap_atomic(page);
+ /* KASAN still think the page is in-use, so skip it. */
+ kasan_disable_current();


memset(addr, PAGE_POISON, PAGE_SIZE);
+kasan_enable_current();
kunmap_atomic(addr);
}

--- linux-4.15.0.orig/mm/page_vma_mapped.c
+++ linux-4.15.0/mm/page_vma_mapped.c
@@ -21,7 +21,29 @@
if (!is_swap_pte(*pvmw->pte))
return false;
} else {
-  if (!pte_present(*pvmw->pte))
+  /* We get here when we are trying to unmap a private
+     * device page from the process address space. Such
+     * page is not CPU accessible and thus is mapped as
+     * a special swap entry, nonetheless it still does
+     * count as a valid regular mapping for the page (and
+     * is accounted as such in page maps count).
+     *
+     * So handle this special case as if it was a normal
+     * page mapping ie lock CPU page table and returns
+     * true.
+     *
+     * For more details on device private memory see HMM
+     * (include/linux/hmm.h or mm/hmm.c).
+     */
+  if (is_swap_pte(*pvmw->pte)) {
+    swp_entry_t entry;
+    /* Handle un-addressable ZONE_DEVICE memory */
+    entry = pte_to_swp_entry(*pvmw->pte);
+    if (!is_device_private_entry(entry))
+      return false;
+  } else if (!pte_present(*pvmw->pte))
+    return false;
+} else if (!pte_present(*pvmw->pte))
+    return false;
}

@@ -89,6 +111,13 @@ return pfn_in_hpage(pvmw->page, pfn);
}

+static void step_forward(struct page_vma_mapped_walk *pvmw, unsigned long size)
+{
+  pvmw->address = (pvmw->address + size) & ~(size - 1);
+  if (!pvmw->address)
+    pvmw->address = ULONG_MAX;
+}
/*
 * page_vma_mapped_walk - check if @pvmw->page is mapped in @pvmw->vma at
 * @pvmw->address
 *@ @pvmw->address
@@ -117,6 +146,7 @@}
{
    struct mm_struct *mm = pvmw->vma->vm_mm;
    struct page *page = pvmw->page;
+   unsigned long end;
    pgd_t *pgd;
    p4d_t *p4d;
    pud_t *pud;
@@ -126,10 +156,11 @@
    if (pvmw->pmd && !pvmw->pte)
        return not_found(pvmw);
-
    if (unlikely(PageHuge(page))) {
    +   if (unlikely(PageHuge(page))) {
    +     /* The only possible mapping was handled on last iteration */
        +   if (pvmw->pte)
    +     return not_found(pvmw);
    }
-
    if (unlikely(PageHuge(pvmw->page))) {
    /* when pud is not present, pte will be NULL */
        pvmw->pte = huge_pte_offset(mm, pvmw->address,
            PAGE_SIZE << compound_order(page));
@@ -142,78 +173,108 @@
        return not_found(pvmw);
        return true;
    }
    -restart:
    -pgd = pgd_offset(mm, pvmw->address);
    -if (!pgd_present(*pgd))
    -return false;
    -p4d = p4d_offset(pgd, pvmw->address);
    -if (!p4d_present(*p4d))
    -return false;
    -pud = pud_offset(p4d, pvmw->address);
    -if (!pud_present(*pud))
    -return false;
    -pvmw->pmd = pmd_offset(pud, pvmw->address);
    +
    /*
    - * Make sure the pmd value isn’t cached in a register by the
        - * compiler and used as a stale value after we’ve observed a
        - * subsequent update.
    + * Seek to next pte only makes sense for THP.
*/
But more important than that optimization, is to filter out any PageKsm page: whose page->index misleads vma_address() and vma_address_end() to disaster.

```c
    pmde = READ_ONCE(*pvmw->pmd);
    if (pmd_trans_huge(pmde) || is_pmd_migration_entry(pmde)) {
        pmde = pmde_lock(mm, pvmw->pmd);
        if (likely(pmd_trans_huge(*pvmw->pmd))) {
            if (pvmw->flags & PVMW_MIGRATION)
                return not_found(pvmw);
            if (pmd_page(*pvmw->pmd) != page)
                return not_found(pvmw);
            return true;
        } else if (!pmd_present(*pvmw->pmd)) {
            if (thp_migration_supported()) {
                if (!(pvmw->flags & PVMW_MIGRATION))
                    return not_found(pvmw);
                end = PageTransCompound(page) ?
                    vma_address_end(page, pvmw->vma) :
                    pvmw->address + PAGE_SIZE;
                if (pvmw->pte)
                    goto next_pte;
            }
        } else if (!pmd_present(*pvmw->pmd)) {
            step_forward(pvmw, PGDIR_SIZE);
            continue;
        }
        p4d = p4d_offset(pgd, pvmw->address);
        if (!p4d_present(*p4d)) {
            step_forward(pvmw, P4D_SIZE);
            continue;
        }
        pud = pud_offset(p4d, pvmw->address);
        if (!pud_present(*pud)) {
            step_forward(pvmw, PUD_SIZE);
            continue;
        }
        pvmw->pmd = pmd_offset(pud, pvmw->address);
        if (pmd_trans_huge(pmde) || is_pmd_migration_entry(pmde)) {
```
+pvmw->ptl = pmd_lock(mm, pvmw->pmd);
+pnde = *pvmw->pmd;
+if (likely(pmd_trans_huge(pnde))) {
+if (pvmw->flags & PVMW_MIGRATION)
+return not_found(pvmw);
-if (is_migration_entry(pmd_to_swp_entry(*pvmw->pmd))) {
+swp_entry_t entry = pmd_to_swp_entry(*pvmw->pmd);
+if (pmd_page(pnde) != page)
+return not_found(pvmw);
+return true;
+}
+if (!pmd_present(pnde)) {
+swp_entry_t entry;
-
-if (migration_entry_to_page(entry) != page)
-return not_found(pvmw);
-return true;
-}
+if (!thp_migration_supported() ||
+ !(pvmw->flags & PVMW_MIGRATION))
+return not_found(pvmw);
+entry = pmd_to_swp_entry(pnde);
+if (!is_migration_entry(entry) ||
+ migration_entry_to_page(entry) != page)
+return not_found(pvmw);
+return true;
}
-return not_found(pvmw);
-} else {
/* THP pmd was split under us: handle on pte level */
spin_unlock(pvmw->ptl);
 pvmw->ptl = NULL;
+} else if (!pmd_present(pnde)) {
+/*
+ * If PVMW_SYNC, take and drop THP pmd lock so that we
+ * cannot return prematurely, while zap_huge_pmd() has
+ * cleared *pmd but not decremented compound_mapcount().
+ */
+if ((pvmw->flags & PVMW_SYNC) &&
+ PageTransCompound(page)) {
+spinlock_t *ptl = pmd_lock(mm, pvmw->pmd);
+}
+spin_unlock(ptl);
+}
step_forward(pvmw, PMD_SIZE);
+continue;
} else if (!pmd_present(pnde)) {
-return false;
-
-}  
-if (!map_pte(pvmw))  
-goto next_pte;
-while (1) {
+if (!map_pte(pvmw))
+goto next_pte;
+this_pte:
-if (check_pte(pvmw))
-return true;
-
-next_pte:
-/* Seek to next pte only makes sense for THP */  
-if (!PageTransHuge(pvmw->page) || PageHuge(pvmw->page))
-return not_found(pvmw);
-
-do {
-pvmw->address += PAGE_SIZE;
-if (pvmw->address >= pvmw->vma->vm_end ||
- pvmw->address >=
- __vma_address(pvmw->page, pvmw->vma) +
- hpage_nr_pages(pvmw->page) * PAGE_SIZE)
+if (pvmw->address >= end)
-return not_found(pvmw);
-/* Did we cross page table boundary? */
-if (pvmw->address % PMD_SIZE == 0) {
-ppte_unmap(pvmw->pte);
+if ((pvmw->address & (PMD_SIZE - PAGE_SIZE)) == 0) {
+if (pvmw->ptl) {
+spin_unlock(pvmw->ptl);
-pvmw->ptl = NULL;
+
}  
+pte_unmap(pvmw->pte);
+pvmw->pte = NULL;
-goto restart;
-} else {
-pvmw->pte++;
+}  
+pvmw->pte++;
+if ((pvmw->flags & PVMW_SYNC) && !pvmw->ptl) {
+pvmw->ptl = pte_lockptr(mm, pvmw->pmd);
+spin_lock(pvmw->ptl);
}  
} while (pte_none(*pvmw->pte));

@@ -221,7 +282,10 @@
pvmw->ptl = pte_lockptr(mm, pvmw->pmd);
spin_lock(pvmw->ptl);
}
-

+goto this_pte;
+} while (pvmw->address < end);
+
+return false;
}

/**
@@ -240,14 +304,10 @@
 .vma = vma,
 .flags = PVMW_SYNC,
 ];
-unsigned long start, end;
-
-start = __vma_address(page, vma);
-end = start + PAGE_SIZE * (hpage_nr_pages(page) - 1);

-if (unlikely(end < vma->vm_start || start >= vma->vm_end))
+pvmw.address = vma_address(page, vma);
+if (pvmw.address == -EFAULT)
return 0;
-pvmw.address = max(start, vma->vm_start);
if (!page_vma_mapped_walk(&pvmw))
return 0;
page_vma_mapped_walk_done(&pvmw);
--- linux-4.15.0.orig/mm/pagewalk.c
+++ linux-4.15.0/mm/pagewalk.c
@@ -15,9 +15,9 @@
 err = walk->pte_entry(pte, addr, addr + PAGE_SIZE, walk);
 if (err)
   break;
-addr += PAGE_SIZE;
-if (addr == end)
+if (addr >= end - PAGE_SIZE)
break;
+addr += PAGE_SIZE;
pte++;
}

--- linux-4.15.0.orig/mm/percpu-km.c
+++ linux-4.15.0/mm/percpu-km.c
@@ -34,7 +34,7 @@
 #include <linux/log2.h>

 static int pcpu Populate Chunk (struct pcpu_chunk *chunk,
-    int page_start, int page_end)
+    int page_start, int page_end, gfp_t gfp)
{
  return 0;
}

Open Source Used In 5GaaS Edge AC-4  33419
static struct pcpu_chunk *pcpu_create_chunk(void)
{  
    const int nr_pages = pcpu_group_sizes[0] >> PAGE_SHIFT;
    struct pcpu_chunk *chunk;
    struct page *pages;
    unsigned long flags;
    int i;

    chunk = pcpu_alloc_chunk();
    chunk = pcpu_alloc_chunk(gfp);
    if (!chunk)
        return NULL;

    pages = alloc_pages(GFP_KERNEL, order_base_2(nr_pages));
    pages = alloc_pages(gfp | GFP_KERNEL, order_base_2(nr_pages));
    if (!pages) {
        pcpu_free_chunk(chunk);
        return NULL;
    }

    chunk->data = pages;
    chunk->base_addr = page_address(pages) - pcpu_group_offsets[0];

    spin_lock_irq(&pcpu_lock);
    spin_lock_irqsave(&pcpu_lock, flags);
    pcpu_chunk_populated(chunk, 0, nr_pages, false);
    spin_unlock_irq(&pcpu_lock);
    spin_unlock_irqrestore(&pcpu_lock, flags);

    pcpu_stats_chunk_alloc();
    trace_percpu_create_chunk(chunk->base_addr);
    --- linux-4.15.0.orig/mm/percpu-vm.c
    +++ linux-4.15.0/mm/percpu-vm.c
    @@ -37,7 +37,7 @@
    lockdep_assert_held(&pcpu_alloc_mutex);

    if (!pages)
        pages = pcpu_mem_zalloc(pages_size);
    pages = pcpu_mem_zalloc(pages_size, 0);
    return pages;
}

@@ -73,18 +73,21 @@
static int pcpu_alloc_pages(struct pcpu_chunk *chunk,
    struct page **pages, int page_start, int page_end) {
    unsigned int cpu, tcpu;
    int i;

    for_each_possible_cpu(cpu) {
        for (i = page_start; i < page_end; i++) {
            struct page **pagep = &pages[pcpu_page_idx(cpu, i)];
            *pagep = &pages[pcpu_page_idx(cpu, i)];
            *page_start = chunk;
            *page_end: the start page
            *page_end: the end page
            *gfp: allocation flags passed to the underlying memory allocator
            *
            * For each cpu, populate and map pages [@page_start,@page_end) into
              *chunk.
            @pcpu_alloc_mutex, does GFP_KERNEL allocation.
            */
            static int pcpu_populate_chunk(struct pcpu_chunk *chunk,
                int page_start, int page_end) {
                struct page **pages;
                @pcpu_alloc_pages(chunk, pages, page_start, page_end))
                return -ENOMEM;

                -if (pcpu_alloc_pages(chunk, pages, page_start, page_end))
                +if (pcpu_alloc_pages(chunk, pages, page_start, page_end, gfp))
                return -ENOMEM;
if (pcpu_map_pages(chunk, pages, page_start, page_end)) {
    @ @ .325,12 +329,12 @ @
    pcpu_free_pages(chunk, pages, page_start, page_end);
}

-static struct pcpu_chunk *pcpu_create_chunk(void)
+static struct pcpu_chunk *pcpu_create_chunk(gfp_t gfp)
{
    struct pcpu_chunk *chunk;
    struct vm_struct **vms;

    -chunk = pcpu_alloc_chunk();
+chunk = pcpu_alloc_chunk(gfp);
    if (!chunk)
        return NULL;

--- linux-4.15.0.orig/mm/percpu.c
+++ linux-4.15.0/mm/percpu.c
@@ -80,6 +80,7 @@
#include <linux/vmalloc.h>
#include <linux/workqueue.h>
#include <linux/kmemleak.h>
+include <linux/sched.h>
#include <asm/cacheflush.h>
#include <asm/sections.h>
@@ -447,10 +448,12 @@
/**
 * pcpu_mem_zalloc - allocate memory
 * @size: bytes to allocate
+ * @gfp: allocation flags
 * *
 * Allocate @size bytes. If @size is smaller than PAGE_SIZE,
- * kzalloc() is used; otherwise, vzalloc() is used. The returned
- * memory is always zeroed.
+ * kzalloc() is used; otherwise, the equivalent of vzalloc() is used.
+ * This is to facilitate passing through whitelisted flags. The
+ * returned memory is always zeroed.
 * *
 * CONTEXT:
 * Does GFP_KERNEL allocation.
@@ -458,15 +461,16 @@
 */
-static void *pcpu_mem_zalloc(size_t size)
+static void *pcpu_mem_zalloc(size_t size, gfp_t gfp)
{
if (WARN_ON_ONCE(!slab_is_available()))
    return NULL;

if (size <= PAGE_SIZE)
    -return kzalloc(size, GFP_KERNEL);
-else
    -return vzalloc(size);
+return __vmalloc(size, gfp | GFP_KERNEL | __GFP_ZERO, +PAGE_KERNEL);
+}

/**
 * Search to find a fit.
 */
@end = start + alloc_bits + PCPU_BITMAP_BLOCK_BITS;
@end = min_t(int, start + alloc_bits + PCPU_BITMAP_BLOCK_BITS, +pcpu_chunk_map_bits(chunk));
bit_off = bitmap_find_next_zero_area(chunk->alloc_map, end, start, +alloc_bits, align_mask);
if (bit_off >= end)
    @@ -1094,7 +1099,7 @@
        \@ @ -1094,7 +1099,7 @@

/* allocate chunk */
chunk = memblock_virt_alloc(sizeof(struct pcpu_chunk) +
    -BITS_TO_LONGS(region_size >> PAGE_SHIFT), +BITS_TO_LONGS(region_size >> PAGE_SHIFT) * sizeof(unsigned long),
    0);

INIT_LIST_HEAD(&chunk->list);
@@ -1154,12 +1159,12 @@
    return chunk;
}

-static struct pcpu_chunk *pcpu_alloc_chunk(void) +static struct pcpu_chunk *pcpu_alloc_chunk(gfp_t gfp)
{ +struct pcpu_chunk *chunk;
    int region_bits;

    -chunk = pcpu_mem_zalloc(pcpu_chunk_struct_size);
    +chunk = pcpu_mem_zalloc(pcpu_chunk_struct_size, gfp);
    if (!chunk)
        return NULL;

    @@ -1168,17 +1173,17 @@
region_bits = pcpu_chunk_map_bits(chunk);

chunk->alloc_map = pcpu_mem_zalloc(BITS_TO_LONGS(region_bits) *
    - sizeof(chunk->alloc_map[0]));
+ sizeof(chunk->alloc_map[0]), gfp);
if (!chunk->alloc_map)
goto alloc_map_fail;

chunk->bound_map = pcpu_mem_zalloc(BITS_TO_LONGS(region_bits + 1) *
    - sizeof(chunk->bound_map[0]));
+ sizeof(chunk->bound_map[0]), gfp);
if (!chunk->bound_map)
goto bound_map_fail;

chunk->md_blocks = pcpu_mem_zalloc(pcpu_chunk_nr_blocks(chunk) *
    - sizeof(chunk->md_blocks[0]));
+ sizeof(chunk->md_blocks[0]), gfp);
if (!chunk->md_blocks)
goto md_blocks_fail;

@@ -1204,6 +1209,7 @@
{
    if (!chunk)
        return;
+    pcpu_mem_free(chunk->md_blocks);
    pcpu_mem_free(chunk->bound_map);
    pcpu_mem_free(chunk->alloc_map);
    pcpu_mem_free(chunk);
@@ -1277,9 +1283,10 @@ *
 * pcpu_addr_to_page- translate address to physical address
 * pcpu_verify_alloc_info- check alloc_info is acceptable during init
 */
-static int pcpu_populate_chunk(struct pcpu_chunk *chunk, int off, int size);
+static int pcpu_populate_chunk(struct pcpu_chunk *chunk, int off, int size,
+    gfp_t gfp);
static void pcpu_depopulate_chunk(struct pcpu_chunk *chunk, int off, int size,
    gfp_t gfp);
static void pcpu_destroy_chunk(struct pcpu_chunk *chunk);
static struct page *pcpu_addr_to_page(void *addr);
static int __init pcpu_verify_alloc_info(const struct pcpu_alloc_info *ai);
@@ -1421,7 +1428,7 @@
}

if (list_empty(&pcpu_slot[pcpu_nr_slots - 1])) {
    chunk = pcpu_create_chunk();
+    chunk = pcpu_create_chunk(0);
    if (!chunk) {
err = "failed to allocate new chunk";
goto fail;
@@ -1450,7 +1457,7 @@
     page_start, page_end) {
     WARN_ON(chunk->immutable);

     -ret = pcpu_populate_chunk(chunk, rs, re);
     +ret = pcpu_populate_chunk(chunk, rs, re, 0);

     spin_lock_irqsave(&pcpu_lock, flags);
     if (ret) {
@@ -1561,10 +1568,17 @@
     * pcpu_balance_workfn - manage the amount of free chunks and populated pages
     * @work: unused
     *
     - * Reclaim all fully free chunks except for the first one.
     + * Reclaim all fully free chunks except for the first one. This is also
     + * responsible for maintaining the pool of empty populated pages. However,
     + * it is possible that this is called when physical memory is scarce causing
     + * OOM killer to be triggered. We should avoid doing so until an actual
     + * allocation causes the failure as it is possible that requests can be
     + * serviced from already backed regions.
     */
     static void pcpu_balance_workfn(struct work_struct *work)
     {
          /* gfp flags passed to underlying allocators */
          +const gfp_t gfp = __GFP_NORETRY | __GFP_NOWARN;
          LIST_HEAD(to_free);
          struct list_head *free_head = &pcpu_slot[pcpu_nr_slots - 1];
          struct pcpu_chunk *chunk, *next;
@@ -1645,7 +1659,7 @@
          int nr = min(re - rs, nr_to_pop);

          -ret = pcpu_populate_chunk(chunk, rs, rs + nr);
          +ret = pcpu_populate_chunk(chunk, rs, rs + nr, gfp);
          if (!ret) {
          nr_to_pop -= nr;
          spin_lock_irq(&pcpu_lock);
@@ -1662,7 +1676,7 @@
          if (nr_to_pop) {
               /* ran out of chunks to populate, create a new one and retry */
               -chunk = pcpu_create_chunk();
               +chunk = pcpu_create_chunk(gfp);
               if (chunk) {
               spin_lock_irq(&pcpu_lock);
               pcpu_chunk_relocate(chunk, -1);
struct pcpu_chunk *chunk;
unsigned long flags;
int off;
+bool need_balance = false;

if (!ptr)
return;
@@ -1710,7 +1725,7 @@
list_for_each_entry(pos, &pcpu_slot[pcpu_nr_slots - 1], list)
if (pos != chunk) {
-tpcpu_schedule_balance_work();
+need_balance = true;
break;
}
}
@@ -1718,6 +1733,9 @@
trace_percpu_free_percpu(chunk->base_addr, off, ptr);

spin_unlock_irqrestore(&pcpu_lock, flags);
+
+if (need_balance)
+tpcpu_schedule_balance_work();
}
EXPORT_SYMBOL_GPL(free_percpu);
@@ -2494,8 +2512,8 @@
ai->groups[group].base_offset = areas[group] - base;
}

-pr_info("Embedded %zu pages/cpu @%p s%zu r%zu d%zu u%zu\n",
-PFN_DOWN(size_sum), base, ai->static_size, ai->reserved_size,
+pr_info("Embedded %zu pages/cpu s%zu r%zu d%zu u%zu\n",
+PFN_DOWN(size_sum), ai->static_size, ai->reserved_size,
ai->dyn_size, ai->unit_size);

rc = pcpu_setup_first_chunk(ai, base);
@@ -2616,8 +2634,8 @@
/* we're ready, commit */
-pr_info("%d %s pages/cpu @%p s%zu r%zu d%zu 0\n",
-unit_pages, psize_str, vm.addr, ai->static_size,
+pr_info("%d %s pages/cpu s%zu r%zu d%zu 0\n",
+unit_pages, psize_str, ai->static_size,
ai->reserved_size, ai->dyn_size);
rc = pcpu_setup_first_chunk(ai, vm.addr);
--- linux-4.15.0.orig/mm/prfile.c
+++ linux-4.15.0/mm/prfile.c
@@ -0,0 +1,86 @@
+/*
+ * SPDX-License-Identifier: GPL-2.0
+ * Mainly for aufs which mmap(2) different file and wants to print different
+ * path in /proc/PID/maps.
+ * Call these functions via macros defined in linux/mm.h.
+ *
+ * See Documentation/filesystems/aufs/design/06mmap.txt
+ *
+ * Copyright (c) 2014-2017 Junjro R. Okajima
+ * Copyright (c) 2014 Ian Campbell
+ */
+
+/* #define PRFILE_TRACE */
+static inline void prfile_trace(struct file *f, struct file *pr,
+                                const char func[], int line, const char func2[])
+{
+  #ifdef PRFILE_TRACE
+    if (pr)
+      pr_info("%s:%d: %s, %pD2\n", func, line, func2, f);
+  #endif
+
+void vma_do_file_update_time(struct vm_area_struct *vma, const char func[],
+                              int line)
+{
+  struct file *f = vma->vm_file, *pr = vma->vm_prfile;
+  prfile_trace(f, pr, func, line, __func__);
+  file_update_time(f);
+  if (f && pr)
+    file_update_time(pr);
+}
+
+void vma_do_pr_or_file(struct vm_area_struct *vma, const char func[],
+                        int line)
+{
+  struct file *f = vma->vm_file, *pr = vma->vm_prfile;
+  prfile_trace(f, pr, func, line, __func__);
+  return (f && pr) ? pr : f;
```c
void vma_do_get_file(struct vm_area_struct *vma, const char func[], int line)
{
    struct file *f = vma->vm_file, *pr = vma->vm_prfile;
    prfile_trace(f, pr, func, line, __func__);
    get_file(f);
    if (f && pr) get_file(pr);
}

void vma_do_fput(struct vm_area_struct *vma, const char func[], int line)
{
    struct file *f = vma->vm_file, *pr = vma->vm_prfile;
    prfile_trace(f, pr, func, line, __func__);
    fput(f);
    if (f && pr) fput(pr);
}

#ifndef CONFIG_MMU
struct file *vmr_do_pr_or_file(struct vm_region *region, const char func[],
                                int line)
{
    struct file *f = region->vm_file, *pr = region->vm_prfile;
    prfile_trace(f, pr, func, line, __func__);
    return (f && pr) ? pr : f;
}

void vmr_do_fput(struct vm_region *region, const char func[], int line)
{
    struct file *f = region->vm_file, *pr = region->vm_prfile;
    prfile_trace(f, pr, func, line, __func__);
    fput(f);
    if (f && pr) fput(pr);
}
#endif /* !CONFIG_MMU */
```

```c
struct backing_dev_info *bdi = inode_to_bdi(mapping->host);
unsigned long max_pages = ra->ra_pages;
```
+unsigned long add_pages;
+pgoff_t prev_offset;

/*
@@ -469,10 +470,17 @@
  * Will this read hit the readahead marker made by itself?
  * If so, trigger the readahead marker hit now, and merge
  * the resulted next readahead window into the current one.
+  * Take care of maximum IO pages as above.
  */
  
  if (offset == ra->start && ra->size == ra->async_size) {
-    ra->async_size = get_next_ra_size(ra, max_pages);
-    ra->size += ra->async_size;
+    add_pages = get_next_ra_size(ra, max_pages);
+    if (ra->size + add_pages <= max_pages) {
+      ra->async_size = add_pages;
+      ra->size += add_pages;
+    } else {
+      ra->size = max_pages;
+      ra->async_size = max_pages >> 1;
+    }
  }

  return ra_submit(ra, mapping, filp);
--- linux-4.15.0.orig/mm/rmap.c
+++ linux-4.15.0/mm/rmap.c
@@ -64,6 +64,7 @@
 #include <linux/backing-dev.h>
 #include <linux/page_idle.h>
 #include <linux/memremap.h>
+#include <linux/userfaultfd_k.h>
 #include <asm/tlbflush.h>

 @@ -685,7 +686,6 @@
 */
 unsigned long page_address_in_vma(struct page *page, struct vm_area_struct *vma)
 {
-    unsigned long address;
    if (PageAnon(page)) {
        struct anon_vma *page__anon_vma = page_anon_vma(page);
        /*
@@ -695,15 +695,13 @@
         if (!vma->anon_vma || !page__anon_vma ||
             !page__anon_vma || !vma->anon_vma ||
             vma->anon_vma->root != page__anon_vma->root)
             return -EFAULT;
-    } else if (page->mapping) {
-      if (!vma->vm_file || !vma->vm_file->f_mapping != page->mapping)
-return -EFAULT;
} else
+} else if (!vma->vm_file) {
    return -EFAULT;
    address = __vma_address(page, vma);
-} if (unlikely(address < vma->vm_start || address >= vma->vm_end))
+} else if (vma->vm_file->f_mapping != compound_head(page)->mapping) {
    return -EFAULT;
    -return address;
+}
+return vma_address(page, vma);
}

pmd_t *mm_find_pmd(struct mm_struct *mm, unsigned long address)
@@ -895,7 +893,7 @@
    * We have to assume the worse case ie pmd for invalidation. Note that
    * the page can not be free from this function.
    */
    end = min(vma->vm_end, start + (PAGE_SIZE << compound_order(page)));
@end = vma_address_end(page, vma);
    mmu_notifier_invalidate_range_start(vma->vm_mm, start, end);

while (page_vma_mapped_walk(&pvmw)) {
@@ -1346,6 +1344,15 @@
unsigned long start = address, end;
enum ttu_flags flags = (enum ttu_flags)arg;

+/*
+ * When racing against e.g. zap_pte_range() on another cpu,
+ * in between its ptep_get_and_clear_full() and page_remove_rmap(),
+ * try_to_unmap() may return false when it is about to become true,
+ * if page table locking is skipped: use TTU_SYNC to wait for that.
+ */
+if (flags & TTU_SYNC)
    +pvmw.flags = PVMW_SYNC;
+if (flags & TTU_MUNLOCK)
    /* munlock has nothing to gain from examining un-locked vmas */
    if (!(flags & TTU_MUNLOCK) && !(vma->vm_flags & VM_LOCKED))
        return true;
@@ -1360,11 +1367,22 @@
    }

    /*
    - * We have to assume the worse case ie pmd for invalidation. Note that
    - * the page can not be free in this function as call of try_to_unmap()
    - * must hold a reference on the page.
    * For THP, we have to assume the worse case ie pmd for invalidation.
* For hugetlb, it could be much worse if we need to do pud
* invalidation in the case of pmd sharing.
* Note that the page can not be free in this function as call of
* try_to_unmap() must hold a reference on the page.
*/
@end = min(vma->vm_end, start + (PAGE_SIZE << compound_order(page)));
@end = PageKsm(page) ?
+address + PAGE_SIZE : vma_address_end(page, vma);
+if (PageHuge(page)) {
+/*
+ * If sharing is possible, start and end will be adjusted
+ * accordingly.
+ */
+adjust_range_if_pmd_sharing_possible(vma, &start, &end);
+
+mmu_notifier_invalidate_range_start(vma->vm_mm, start, end);

while (page_vma_mapped_walk(&pvmw)) {
@@ -1410,6 +1428,32 @@
subpage = page - page_to_pfn(page) + pte_pfn(*pvmw.pte);
address = pvmw.address;

+if (PageHuge(page)) {
+if (huge_pmd_unshare(mm, &address, pvmw.pte)) {
+/*
+ * huge_pmd_unshare unmapped an entire PMD
+ * page. There is no way of knowing exactly
+ * which PMDs may be cached for this mm, so
+ * we must flush them all. start/end were
+ * already adjusted above to cover this range.
+ */
+flush_cache_range(vma, start, end);
+flush_tlb_range(vma, start, end);
+mmu_notifier_invalidate_range(mm, start, end);
+
+/*
+ * The ref count of the PMD page was dropped
+ * which is part of the way map counting
+ * is done for shared PMDs. Return 'true'
+ * here. When there is no other sharing,
+ * huge_pmd_unshare returns false and we will
+ * unmap the actual page and drop map count
+ * to zero.
+ */
+page_vma_mapped_walk_done(&pvmw);
+break;
+}
if (IS_ENABLED(CONFIG_MIGRATION) &&
    (flags & TTU_MIGRATION) &&
    @ @ -1432,7 +1476,15 @@
/*
 * No need to invalidate here it will synchronize on
 * against the special swap migration pte.
 + *
 + * The assignment to subpage above was computed from a
 + * swap PTE which results in an invalid pointer.
 + * Since only PAGE_SIZE pages can currently be
 + * migrated, just set it to page. This will need to be
 + * changed when hugepage migrations to device private
 + * memory are supported.
 */
+subpage = page;
goto discard;
}
@@ -1483,11 +1535,16 @@
set_pte_at(mm, address, pvmw.pte, pteval);
}

-} else if (pte_unused(pteval)) {
+} else if (pte_unused(pteval) && !userfaultfd_armed(vma)) {
/*
 * The guest indicated that the page content is of no
 * interest anymore. Simply discard the pte, vmscan
 * will take care of the rest.
 + * A future reference will then fault in a new zero
 + * page. When userfaultfd is active, we must not drop
 + * this page though, as its main user (postcopy
 + * migration) will not expect userfaults on already
 + * copied pages.
 */
dec_mm_counter(mm, mm_counter(page));
/* We have to invalidate as we cleared the pte */
@@ -1627,9 +1684,9 @@
return is_vma_temporary_stack(vma);
}

-static int page_mapcount_is_zero(struct page *page)
+static int page_not_mapped(struct page *page)
{
    -return !total_mapcount(page);
+return !page_mapped(page);
}
/**
 * @ @ -1647,7 +1704,7 @@
 * struct rmap_walk_control rwc = {
 * .rmap_one = try_to_unmap_one,
 * .arg = (void *)flags,
 * -.done = page_mapcount_is_zero,
 * +.done = page_not_mapped,
 * .anon_lock = page_lock_anon_vma_read,
 *};
 *
 * @ @ -1668,14 +1725,15 @@
 * else
 * rmap_walk(page, &rwc);
 *
 * -return !page_mapcount(page) ? true : false;
 */
 *
 * When racing against e.g. zap_pte_range() on another cpu,
 * in between its ptep_get_and_clear_full() and page_remove_rmap(),
 * try_to_unmap() may return false when it is about to become true,
 * if page table locking is skipped: use TTU_SYNC to wait for that.
 *
 * +return !page_mapcount(page);
 }
 *
 * -static int page_not_mapped(struct page *page)
 * -{
 * -return !page_mapped(page);
 * -}
 *
 */
 *
 * try_to_munlock - try to munlock a page
 * @page: the page to be munlocked
 * @ @ -1770,6 +1828,7 @@
 * struct vm_area_struct *vma = avc->vma;
 * unsigned long address = vma_address(page, vma);
 *
 * +VM_BUG_ON_VMA(address == -EFAULT, vma);
 * cond_resched();
 *
 * if (rwc->invalid_vma && rwc->invalid_vma(vma, rwc->arg))
 * @ @ -1824,6 +1883,7 @@
 * pgoff_start, pgoff_end) {
 * unsigned long address = vma_address(page, vma);
 *
 * +VM_BUG_ON_VMA(address == -EFAULT, vma);
 * cond_resched();
if (rwc->invalid_vma && rwc->invalid_vma(vma, rwc->arg))
    return totalram_pages / 2;
}

static unsigned long shmem_default_max_inodes(void)
static int shmem_default_max_inodes(void)
{
    return min(totalram_pages - totalhigh_pages, totalram_pages / 2);
    unsigned long ul;
    ul = INT_MAX;
    ul = min3(ul, totalram_pages - totalhigh_pages, totalram_pages / 2);
    return ul;
}
#endif

if (!shmem_inode_acct_block(inode, pages))
    return false;

/* nrpages adjustment first, then shmem_recalc_inode() when balanced */
inode->i_mapping->nrpages += pages;
+
    spin_lock_irqsave(&info->lock, flags);
    info->allocated += pages;
    inode->i_blocks += pages * BLOCKS_PER_PAGE;
    shmem_recalc_inode(inode);
    spin_unlock_irqrestore(&info->lock, flags);
    -inode->i_mapping->nrpages += pages;

    return true;
}

struct shmem_inode_info *info = SHMEM_I(inode);
unsigned long flags;
    /* nrpages adjustment done by __delete_from_page_cache() or caller */
    +spin_lock_irqsave(&info->lock, flags);
    info->allocated -= pages;
    inode->i_blocks -= pages * BLOCKS_PER_PAGE;
    @ @ -493,36 +501,45 @ @
    info = list_entry(pos, struct shmem_inode_info, shrinklist);
    inode = &info->vfs_inode;
-if (nr_to_split && split >= nr_to_split) {
-put(inode);
-continue;
-}
+if (nr_to_split && split >= nr_to_split)
+goto leave;

-page = find_lock_page(inode->i_mapping,
+page = find_get_page(inode->i_mapping,
(inode->i_size & HPAGE_PMD_MASK) >> PAGE_SHIFT);
if (!page)
+/* No huge page at the end of the file: nothing to split */
if (!PageTransHuge(page)) {
-unlock_page(page);
-put_page(page);
-goto drop;
}

+/* Leave the inode on the list if we failed to lock
+ the page at this time.
+ * Waiting for the lock may lead to deadlock in the
+ * reclaim path.
+ */
+if (!trylock_page(page)) {
+put_page(page);
+goto leave;
+
+ ret = split_huge_page(page);
unlock_page(page);
-put_page(page);

-if (ret) {
-/* split failed: leave it on the list */
-put(inode);
-continue;
-}
+/* If split failed leave the inode on the list */
+if (ret)
+goto leave;

split++;

drop:
list_del_init(&info->shrinklist);
removed++;  
+leave:  
  iput(inode);  
}  

@@ -1082,6 +1099,11 @@
    simple_xattr_free(&info->xattrs);  
 WARN_ON(inode->i_blocks);  
 +if (!sbinfo->idr_nouse && inode->i_ino) {  
 +  mutex_lock(&sbinfo->idr_lock);  
 +  idr_remove(&sbinfo->idr, inode->i_ino);  
 +  mutex_unlock(&sbinfo->idr_lock);  
 +}  
    shmemp_free_inode(inode->i_sb);  
    clear_inode(inode);  
}  
@@ -1519,11 +1541,13 @@
 {
    struct page *oldpage, *newpage;  
    struct address_space *swap_mapping;  
+    swp_entry_t entry;  
    pgoff_t swap_index;  
    int error;  

    oldpage = *pagep;  
-    swap_index = page_private(oldpage);  
+    entry.val = page_private(oldpage);  
+    swap_index = swp_offset(entry);  
    swap_mapping = page_mapping(oldpage);  

/*
  @@ -1542,7 +1566,7 @@
      __SetPageLocked(newpage);  
      __SetPageSwapBacked(newpage);  
      SetPageUptodate(newpage);  
-    set_page_private(newpage, swap_index);  
+    set_page_private(newpage, entry.val);  
      SetPageSwapCache(newpage);  

/*
  @@ -2037,9 +2061,10 @@
 */

/*
  * Our priority is to support MAP_SHARED mapped hugely;  
  * and support MAP_PRIVATE mapped hugely too, until it is COWed.  
  * - But if caller specified an address hint, respect that as before.  
  * + * But if caller specified an address hint and we allocated area there  
  * + successfully, respect that as before.
if (uaddr)
+if (uaddr == addr)
return addr;

if (shmem_huge != SHMEM_HUGE_FORCE) {
@@ -2073,7 +2098,7 @@
if (inflated_len < len)
return addr;

-inflated_addr = get_area(NULL, 0, inflated_len, 0, flags);
+inflated_addr = get_area(NULL, uaddr, inflated_len, 0, flags);
if (IS_ERR_VALUE(inflated_addr))
return addr;
if (inflated_addr & ~PAGE_MASK)
@@ -2113,7 +2138,11 @@
struct shmem_inode_info *info = SHMEM_I(inode);
int retval = -ENOMEM;

-spin_lock_irq(&info->lock);
+/*
+ * What serializes the accesses to info->flags?
+ * ipc_lock_object() when called from shmctl_do_lock(),
+ * no serialization needed when called from shm_destroy().
+ */
if (lock && !(info->flags & VM_LOCKED)) {
if (!user_shm_lock(inode->i_size, user))
goto out_nomem;
@@ -2128,7 +2157,6 @@
retval = 0;

out_nomem:
-spin_unlock_irq(&info->lock);
return retval;
}
@@ -2150,13 +2178,13 @@
struct inode *inode;
struct shmem_inode_info *info;
struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
+int ino;

if (shmem_reserve_inode(sb))
return NULL;

inode = new_inode(sb);
if (inode) {
-inode->i_ino = get_next_ino();
+inode->i_ino = get_next_ino();
inode_init_owner(inode, dir, mode);
inode->i_blocks = 0;
inode->i_atime = inode->i_mtime = inode->i_ctime = current_time(inode);
@@ -2198,6 +2226,27 @@
 mpol_shared_policy_init(&info->policy, NULL);
 break;
 }
+lockdep_annotate_inode_mutex_key(inode);
+
+if (!sbinfo->idr_nouse) {
+/* inum 0 and 1 are unused */
+mutex_lock(&sbinfo->idr_lock);
+ino = idr_alloc(&sbinfo->idr, inode, 2, INT_MAX,
+GFP_NOFS);
+if (ino > 0) {
+inode->i_ino = ino;
+mutex_unlock(&sbinfo->idr_lock);
+__insert_inode_hash(inode, inode->i_ino);
+} else {
+inode->i_ino = 0;
+mutex_unlock(&sbinfo->idr_lock);
+iput(inode);
+/* shmem_free_inode() will be called */
+inode = NULL;
+}
+} else
+inode->i_ino = get_next_ino();
} else
shmem_free_inode(sb);
return inode;
@@ -2227,10 +2276,21 @@
struct page *page;
pte_t _dst_pte, *dst_pte;
ret = -ENOMEM;
@if (!shmem_inode_acct_block(inode, 1))
+if (!shmem_inode_acct_block(inode, 1)) {
+/*
+ * We may have got a page, returned -ENOENT triggering a retry,
+ * and now we find ourselves with -ENOMEM. Release the page, to
+ * avoid a BUG_ON in our caller.
+ */
+if (unlikely(*pagep)) {
+put_page(*pagep);
+*pagep = NULL;
+} else
+page = get_page(*pagep);
+mutex_lock(&page_lock);
+if (unlikely(*pagep = page)) {
+mutex_unlock(&page_lock);
+ret = -ENOMEM;
+if (!shmem_inode_acct_block(inode, 1))
+if (!shmem_inode_acct_block(inode, 1)) {
+/*
+ * We may have got a page, returned -ENOENT triggering a retry,
+ * and now we find ourselves with -ENOMEM. Release the page, to
+ * avoid a BUG_ON in our caller.
+ */
+if (unlikely(*pagep)) {
+put_page(*pagep);
+*pagep = NULL;
if (!*pagep) {
    page = shmem_alloc_page(gfp, info, pgoff);
    *pagep = page;
    shmem_inode_unacct_blocks(inode, 1);
    /* don't free the page */
    -return -EFAULT;
    +return -ENOENT;
}
} else { /* mfill_zeropage_atomic */
clear_highpage(page):
    __SetPageSwapBacked(page);
    __SetPageUptodate(page);

    +ret = -EFAULT;
    +offset = linear_page_index(dst_vma, dst_addr);
    +max_off = DIV_ROUND_UP(i_size_read(inode), PAGE_SIZE);
    +if (unlikely(offset >= max_off))
        +goto out_release;
    +
    ret = mem_cgroup_try_charge(page, dst_mm, gfp, &memcg, false);
    if (ret)
        goto out_release;
    @@ -2281,19 +2347,35 @@
        +set_page_dirty(page);
    +
    dst_pte = pte_offset_map_lock(dst_mm, dst_pmd, dst_addr, &ptl);
    if (dst_vma->vm_flags & VM_WRITE)
        _dst_pte = pte_mkwrite(pte_mkdirty(_dst_pte));
    +else {
        +*/
        + * We don't set the pte dirty if the vma has no
        + * VM_WRITE permission, so mark the page dirty or it
        + * could be freed from under us. We could do it
        + * unconditionally before unlock_page(), but doing it
        + * only if VM_WRITE is not set is faster.
        + */
        +set_page_dirty(page);
    +}
-
    -ret = -EEXIST;
    dst_pte = pte_offset_map_lock(dst_mm, dst_pmd, dst_addr, &ptl);
    +
    +ret = -EFAULT;
    +max_off = DIV_ROUND_UP(i_size_read(inode), PAGE_SIZE);
if (unlikely(offset >= max_off))
goto out_release_uncharge_unlock;

ret = -EEXIST;
if (!pte_none(*dst_pte))
goto out_release_uncharge_unlock;

lru_cache_add_anon(page);

-spin_lock(&info->lock);
+spin_lock_irq(&info->lock);
info->allocated++;
inode->i_blocks += BLOCKS_PER_PAGE;
shmem_recalc_inode(inode);
-spin_unlock(&info->lock);
+spin_unlock_irq(&info->lock);

inc_mm_counter(dst_mm, mm_counter_file(page));
page_add_file_rmap(page, false);
@@ -2301,13 +2383,15 @@
/* No need to invalidate - it was non-present before */
update_mmu_cache(dst_vma, dst_addr, dst_pte);
-unlock_page(page);
+pte_unmap_unlock(dst_pte, ptl);
+unlock_page(page);
ret = 0;
out:
return ret;

out_release_uncharge_unlock:
+ClearPageDirty(page);
+delete_from_page_cache(page);
out_release_uncharge:
mem_cgroup_cancel_charge(page, memcg, false);
out_release:
@@ -2579,9 +2663,7 @@
inode_lock(inode);
/* We're holding i_mutex so we can access i_size directly */

-If (offset < 0)
-offset = -EINVAL;
-else if (offset >= inode->i_size)
+if (offset < 0 || offset >= inode->i_size)
offset = -ENXIO;
else {
start = offset >> PAGE_SHIFT;
@@ -2617,31 +2699,33 @@
void **slot;
pgoff_t start;
struct page *page;
unsigned int tagged = 0;

lru_add_drain();
start = 0;
-rcu_read_lock();

+spin_lock_irq(&mapping->tree_lock);
radix_tree_for_each_slot(slot, &mapping->page_tree, &iter, start) {
- page = radix_tree_deref_slot(slot);
+ page = radix_tree_deref_slot_protected(slot, &mapping->tree_lock);
if (!page || radix_tree_exception(page)) {
if (radix_tree_deref_retry(page)) {
 slot = radix_tree_iter_retry(&iter);
 continue;
}
} else if (page_count(page) - page_mapcount(page) > 1) {
- spin_lock_irq(&mapping->tree_lock);
radix_tree_tag_set(&mapping->page_tree, iter.index,
 SHMEM_TAG_PINNED);
- spin_unlock_irq(&mapping->tree_lock);
}

-if (need_resched()) {
 slot = radix_tree_iter_resume(slot, &iter);
-cond_resched_rcu();
-}
+if (++tagged % 1024)
+continue;
+
+ slot = radix_tree_iter_resume(slot, &iter);
+ spin_unlock_irq(&mapping->tree_lock);
+ cond_resched();
+ spin_lock_irq(&mapping->tree_lock);
}
-rcu_read_unlock();
+spin_unlock_irq(&mapping->tree_lock);
}

/*@ -2853,7 +2937,7 @*/

shmempalloc.waitq = &shmempalloc_waitq;
shmempalloc.start = unmap_start >> PAGE_SHIFT;
+shmempalloc.start = (u64)unmap_start >> PAGE_SHIFT;

/*
shmem_falloc.next = (unmap_end + 1) >> PAGE_SHIFT;
spin_lock(&inode->i_lock);
inode->i_private = &shmem_falloc;

static int shmem_link(struct dentry *old_dentry, struct inode *dir, struct dentry *dentry)
{
    struct inode *inode = d_inode(old_dentry);
    int ret;
    int ret = 0;

    /*
    * No ordinary (disk based) filesystem counts links as inodes;
    * but each new link needs a new dentry, pinning lowmem, and
    * tmpfs dentries cannot be pruned until they are unlinked.
    * But if an O_TMPFILE file is linked into the tmpfs, the
    * first link must skip that, to get the accounting right.
    */
    ret = shmem_reserve_inode(inode->i_sb);
    if (ret)
        goto out;
    if (inode->i_nlink) {
        ret = shmem_reserve_inode(inode->i_sb);
        if (ret)
            goto out;
    }
    dir->i_size += BOGO_DIRENT_SIZE;
inode->i_ctime = dir->i_ctime = dir->i_mtime = current_time(inode);

static int shmem_match(struct inode *ino, void *vfh)
{
    __u32 *fh = vfh;
    __u64 inum = fh[2];
    inum = (inum << 32) | fh[1];
    u64 inum = fh[1];
    return ino->i_ino == inum && fh[0] == ino->i_generation;
}

struct dentry *dentry = NULL;
inum = fid->raw[2];
inum = (inum << 32) | fid->raw[1];
inode = ilookup5(sb, (unsigned long)(inum + fid->raw[0]),
shmem_match, fid->raw);
+inum = fid->raw[1];
+inode = ilookup5(sb, inum, shmem_match, fid->raw);
if (inode) {
  dentry = d_find_alias(inode);
  iput(inode);
  @@ -3428,30 +3512,15 @@
  static int shmem_encode_fh(struct inode *inode, __u32 *fh, int *len,
    struct inode *parent)
  {
    -if (*len < 3) {
    -*len = 3;
    +if (*len < 2) {
    +*len = 2;
    return FILEID_INVALID;
  }

  -if (inode_unhashed(inode)) {
    /* Unfortunately insert_inode_hash is not idempotent,
     * so as we hash inodes here rather than at creation
     * time, we need a lock to ensure we only try
     * to do it once
     */
    -static DEFINE_SPINLOCK(lock);
    -spin_lock(&lock);
    -if (inode_unhashed(inode))
      -__insert_inode_hash(inode,
        -inode->i_ino + inode->i_generation);
    -spin_unlock(&lock);
    -}
    
    -fh[0] = inode->i_generation;
    fh[1] = inode->i_ino;
    -fh[2] = ((__u64)inode->i_ino) >> 32;
    -*len = 3;
    +*len = 2;
    return 1;
  }

@@ -3515,7 +3584,7 @@
goto bad_val;
 } else if (!strcmp(this_char,"nr_inodes")) {
 sbinfo->max_inodes = memparse(value, &rest);
 -if (*rest)
+if (*rest || sbinfo->max_inodes < 2)
goto bad_val;
} else if (!strcmp(this_char,"mode")) {
if (remount)
@@ -3580,7 +3649,7 @@
{
 struct shmem_sb_info *sbinfo = SHMEM_SB(sb);
 struct shmem_sb_info config = *sbinfo;
-unsigned long inodes;
+int inodes;
 int error = -EINVAL;

 config.mpol = NULL;
@@ -3629,7 +3698,7 @@
 seq_printf(seq, ",size=%luk",
 sbinfo->max_blocks << (PAGE_SHIFT - 10));
 if (sbinfo->max_inodes != shmem_default_max_inodes())
-seq_printf(seq, ",nr_inodes=%lu", sbinfo->max_inodes);
+seq_printf(seq, ",nr_inodes=%d", sbinfo->max_inodes);
 +seq_printf(seq, ",mode=%03ho", sbinfo->mode);
 if (!uid_eq(sbinfo->uid, GLOBAL_ROOT_UID))
@@ -3747,6 +3816,8 @@
{
 struct shmem_sb_info *sbinfo = SHMEM_SB(sb);

+if (!sbinfo->idr_nouse)
+idr_destroy(&sbinfo->idr);
 percpu_counter_destroy(&sbinfo->used_blocks);
 mpol_put(sbinfo->mpol);
 kfree(sbinfo);
@@ -3765,6 +3836,8 @@
if (!sbinfo)
return -ENOMEM;
+mutex_init(&sbinfo->idr_lock);
+idr_init(&sbinfo->idr);
 sbinfo->mode = S_IRWXUGO | S_ISVTX;
 sbinfo->uid = current_fsuid();
 sbinfo->gid = current_fsgid();
@@ -3872,6 +3945,15 @@
 kmem_cache_destroy(shmem_inode_cachep);
 }
+static __init void shmem_no_idr(struct super_block *sb)
+{
+struct shmem_sb_info *sbinfo;
+
+sbinfo = SHMEM_SB(sb);
static const struct address_space_operations shmem_aops = {
    .writepage = shmem_writepage,
    .set_page_dirty = __set_page_dirty_no_writeback,
};

static const struct file_operations shm_operations = {
    .open = shm_open,
    .read = shm_read,
    .write = shm_write,
    .release = shm_release,
    .seek = __do_seek,

#ifdef CONFIG_TRANSPARENT_HUGE_PAGECACHE
    if (has_transparent_hugepage() && shmem_huge > SHMEM_HUDGE_DENY)
#endif
    pr_err("Could not kern_mount tmpfs
");
goto out1;
}

static void init_arraycache(struct array_cache *ac, int limit, int batch)
{
    /*
     * The array_cache structures contain pointers to free object.
     * However, when such objects are allocated or transferred to another
     * cache the pointers are not cleared and they could be counted as
     * valid references during a kmemleak scan. Therefore, kmemleak must
     * not scan such objects.
     */
    kmemleak_no_scan(ac);
    if (ac) {
        ac->avail = 0;
        ac->limit = limit;
        struct array_cache *ac = NULL;
        ac = kmalloc_node(memsize, gfp, node);
        /*
         * The array_cache structures contain pointers to free object.
         * However, when such objects are allocated or transferred to another
         * cache the pointers are not cleared and they could be counted as
         * valid references during a kmemleak scan. Therefore, kmemleak must
         * not scan such objects.
         */
        kmemleak_no_scan(ac);
        init_arraycache(ac, entries, batchcount);
        return ac;
    }
}
struct alien_cache *alc = NULL;

alc = kmalloc_node(memsize, gfp, node);
-init_arraycache(&alc->ac, entries, batch);
-spin_lock_init(&alc->lock);
+if (alc) {
+kmemleak_no_scan(alc);
+init_arraycache(&alc->ac, entries, batch);
+spin_lock_init(&alc->lock);
+}
return alc;

@@ -1283,6 +1286,7 @@
 nr_node_ids * sizeof(struct kmem_cache_node *),
 SLAB_HWCACHE_ALIGN);
 list_add(&kmem_cache->list, &slab_caches);
+memcg_link_cache(kmem_cache);
 slab_state = PARTIAL;

/*
@@ -2126,6 +2130,8 @@
cachep->allocflags = __GFP_COMP;
 if (flags & SLAB_CACHE_DMA)
cachep->allocflags |= GFP_DMA;
+if (flags & SLAB_CACHE_DMA32)
+cachep->allocflags |= GFP_DMA32;
 if (flags & SLAB_RECLAIM_ACCOUNT)
cachep->allocflags |= __GFP_RECLAIMABLE;
cachep->size = size;
@@ -3665,6 +3671,8 @@
 struct kmem_cache *cachep;
 void *ret;

+if (unlikely(size > KMALLOC_MAX_CACHE_SIZE))
+return NULL;
cache = kmalloc_slab(size, flags);
if (unlikely(ZERO_OR_NULL_PTR(cachep)))
return cachep;
@@ -3700,6 +3708,8 @@
 struct kmem_cache *cachep;
 void *ret;

+if (unlikely(size > KMALLOC_MAX_CACHE_SIZE))
+return NULL;
cache = kmalloc_slab(size, flags);
if (unlikely(ZERO_OR_NULL_PTR(cachep)))
return cachep;
next_reap_node();

out:
/* Set up the next iteration */
-schedule_delayed_work(work, round_jiffies_relative(REAPTIMEOUT_AC));
+schedule_delayed_work_on(smp_processor_id(), work, 
+round_jiffies_relative(REAPTIMEOUT_AC));
}

void get_slabinfo(struct kmem_cache *cachep, struct slabinfo *sinfo)

static int leaks_show(struct seq_file *m, void *p)
{
-struct kmem_cache *cachep = list_entry(p, struct kmem_cache, list);
+struct kmem_cache *cachep = list_entry(p, struct kmem_cache, 
+ root_caches_node);
struct page *page;
struct kmem_cache_node *n;
const char *name;

/* whole processing. */

do {
-set_store_user_clean(cachep);
-drain_cpu_caches(cachep);
+/*
+ * drain_cpu_caches() could make kmemleak_object and
+ * debug_objects_cache dirty, so reset afterwards.
+ */
+set_store_user_clean(cachep);

x[1] = 0;

/* Legal flag mask for kmem_cache_create(), for various configurations */
#define SLAB_CORE_FLAGS (SLAB_HWCACHE_ALIGN | SLAB_CACHE_DMA | SLAB_PANIC | 
+SLAB_CACHE_DMA32 | SLAB_PANIC | 
+SLAB_TYPESAFE_BY_RCU | SLAB_DEBUG_OBJECTS )

#if defined(CONFIG_DEBUG_SLAB)
SLAB_FAILSLAB | SLAB_KASAN)

#define SLAB_MERGESAME (SLAB_RECLAIMACCOUNT | SLAB_CACHEDMA | 
  - SLABACCOUNT)
+ SLAB_CACHEDMA32 | SLABACCOUNT)

/*
 * Merge control. If this is set then no merging of slab caches will occur.
 * @ @ -546,10 +546,14 @@
 * list_del(&s->list);

 if (s->flags & SLAB_TYPESAFE_BY_RCU) {
+ #ifdef SLAB_SUPPORTS_SYSFS
+ sysfs_slab_unlink(s);
+ #endif
   list_add_tail(&s->list, &slab_caches_to(rcu_destroy);
   schedule_work(&slab_caches_to(rcu_destroy_work);
 } else {
+ #ifdef SLAB_SUPPORTS_SYSFS
+ sysfs_slab_unlink(s);
+ sysfs_slab_release(s);
 #else
 slab_kmem_cache_release(s);
 @ @ -967,18 +971,18 @@
 } int index;

- if (unlikely(size > KMALLOC_MAX_SIZE)) {
- WARN_ON_ONCE(!(flags & __GFP_NOWARN));
- return NULL;
- }
-
- if (size <= 192) {
- if (!size)
- return ZERO_SIZE_PTR;

  index = size_index[size_index_elem(size)];
- } else
+ } else {
+ if (unlikely(size > KMALLOC_MAX_CACHE_SIZE)) {
+ WARN_ON(1);
+ return NULL;
+ }
 index = fls(size - 1);
+ }

#ifdef CONFIG_ZONE_DMA
if (unlikely((flags & GFP_DMA)))
@@ -1478,7 +1482,7 @@
if (unlikely(ZERO_OR_NULL_PTR(mem)))
    return;
ks = ksize(mem);
-memset(mem, 0, ks);
+memzero_explicit(mem, ks);
kfree(mem);
}
EXPORT_SYMBOL(kzfree);
--- linux-4.15.0.orig/mm/slub.c
+++ linux-4.15.0/mm/slub.c
@@ -15,6 +15,7 @@
 #include <linux/module.h>
 #include <linux/bit_spinlock.h>
 #include <linux/interrupt.h>
+#include <linux/swab.h>
 #include <linux/bitops.h>
 #include <linux/slab.h>
 #include "slab.h"
@@ -250,7 +251,7 @@
 unsigned long ptr_addr)
 {
 #ifdef CONFIG_SLAB_FREELIST_HARDENED
@@ -271,8 +272,7 @@
 static void prefetch_freepointer(const struct kmem_cache *s, void *object)
 {
-    if (object)
+    prefetch(freelist_dereference(s, object + s->offset));
+    prefetch(object + s->offset);
 } }

 static inline void *get_freepointer_safe(struct kmem_cache *s, void *object)
@@ -661,6 +661,20 @@
 va_end(args);
 }
+static bool freelist_corrupted(struct kmem_cache *s, struct page *page,
+    void **freelist, void *nextfree)
+{
+    if ((s->flags & SLAB_CONSISTENCY_CHECKS) &&
+        !check_valid_pointer(s, page, nextfree) && freelist) 


+object_err(s, page, *freelist, "Freechain corrupt");
+*freelist = NULL;
+slab_fix(s, "Isolate corrupted freechain");
+return true;
+
+return false;
+
static void print_trailer(struct kmem_cache *s, struct page *page, u8 *p)
{
  unsigned int off; /* Offset of last byte */
  @@ -674,15 +688,15 @@
    p, p - addr, get_freepointer(s, p));

  if (s->flags & SLAB_RED_ZONE)
    -print_section(KERN_ERR, "Redzone ", p - s->red_left_pad,
    -print_section(KERN_ERR, "Redzone ", p - s->red_left_pad,
      s->red_left_pad);
  else if (p > addr + 16)
    print_section(KERN_ERR, "Bytes b4 ", p - 16, 16);

    -print_section(KERN_ERR, "Object ", p,
    -print_section(KERN_ERR, "Object ", p,
      min_t(unsigned long, s->object_size, PAGE_SIZE));
  if (s->flags & SLAB_RED_ZONE)
    -print_section(KERN_ERR, "Redzone ", p + s->object_size,
    +print_section(KERN_ERR, "Redzone ", p + s->object_size,
      s->inuse - s->object_size);

  if (s->offset)
    @@ -697,7 +711,7 @@

  if (off != size_from_object(s))
    /* Beginning of the filler is the free pointer */
    -print_section(KERN_ERR, "Padding ", p + off,
    +print_section(KERN_ERR, "Padding ", p + off,
      size_from_object(s) - off);

dump_stack();
@@ -710,7 +724,7 @@

  print_trailer(s, page, object);
}
va_list args;
@@ -873,11 +887,11 @@
 u8 *endobject = object + s->object_size;

 if (s->flags & SLAB_RED_ZONE) {
-    if (!check_bytes_and_report(s, page, object, "Redzone",
+    if (!check_bytes_and_report(s, page, object, "Left Redzone",
        object - s->red_left_pad, val, s->red_left_pad))
        return 0;

-    if (!check_bytes_and_report(s, page, object, "Redzone",
+    if (!check_bytes_and_report(s, page, object, "Right Redzone",
        endobject, val, s->inuse - s->object_size))
        return 0;
    } else {
@@ -892,7 +906,7 @@
 if (val != SLUB_RED_ACTIVE && (s->flags & __OBJECT_POISON) &&
     (!check_bytes_and_report(s, page, p, "Poison", p,
     POISON_FREE, s->object_size - 1) ||
-    !check_bytes_and_report(s, page, p, "Poison",
+    !check_bytes_and_report(s, page, p, "End Poison",
     p + s->object_size - 1, POISON_END, 1)))
     return 0;
/*
@@ -1342,6 +1356,11 @@
 static inline void dec_slabs_node(struct kmem_cache *s, int node,
 int objects) {}

+static bool freelist_corrupted(struct kmem_cache *s, struct page *page,
+    void **freelist, void *nextfree)
+{
+    *return false;
+}
#endif /* CONFIG_SLUB_DEBUG */

/*
@@ -1360,10 +1379,8 @@
 kasan_kfree_large(x);
 }

-static inline void *slab_free_hook(struct kmem_cache *s, void *x)
+static inline bool slab_free_hook(struct kmem_cache *s, void *x)
{
    -void *freeptr;
    -
    kmemleak_free_recursive(x, s->flags);

/*
if (!(s->flags & SLAB_DEBUG_OBJECTS))
ddebug_check_no_obj_freed(x, s->object_size);

-freeptr = get_freepointer(s, x);

/*
 * kasan_slab_free() may put x into memory quarantine, delaying its
 * reuse. In this case the object's freelist pointer is changed.
 * */
-kasan_slab_free(s, x);
-return freeptr;
+/* KASAN might put x into memory quarantine, delaying its reuse */
+return kasan_slab_free(s, x);
}

static inline void slab_free_freelist_hook(struct kmem_cache *s,
					   void *head, void *tail)
+static inline bool slab_free_freelist_hook(struct kmem_cache *s,
+  void **head, void **tail,
+  int *cnt)
{
/*
 * Compiler cannot detect this function can be removed if slab_free_hook()
 */
defined(CONFIG_DEBUG_OBJECTS_FREE) ||
defined(CONFIG_KASAN)

-void *object = head;
-void *tail_obj = tail ? : head;
-void *freeptr;
+void *object;
+void *next = *head;
+void *old_tail = *tail ? *tail : *head;
+
+/* Head and tail of the reconstructed freelist */
+*head = NULL;
+*tail = NULL;

do {
-freeptr = slab_free_hook(s, object);
-} while ((object != tail_obj) && (object = freeptr));
+object = next;
+next = get_freepointer(s, object);
+/* If object's reuse doesn't have to be delayed */
+if (!slab_free_hook(s, object)) {
+/* Move object to the new freelist */
+set_freepointer(s, object, *head);
+*head = object;
if (!*tail)
*tail = object;
} else {
*/
* Adjust the reconstructed freelist depth
* accordingly if object's reuse is delayed.
*/
--(*cnt);
} while (object != old_tail);

if (*head == *tail)
*tail = NULL;
+
+return *head != NULL;
+#else
+return true;
+#endif

struct page *page, *page2;
void *object = NULL;
unsigned int available = 0;
int objects;

/*
* @ @ -1809,7 +1848,7 @@
{
struct page *page, *page2;
void *object = NULL;
-int available = 0;
+unsigned int available = 0;
int objects;

/*
* @ @ -1925,8 +1964,6 @@

if (node == NUMA_NO_NODE)
searchnode = numa_mem_id();
-else if (!node_present_pages(node))
-searchnode = node_to_mem_node(node);

object = get_partial_node(s, get_node(s, searchnode), c, flags);
if (object || node != NUMA_NO_NODE)
@ @ -2034,6 +2071,14 @@
void *prior;
unsigned long counters;

+/
* If 'nextfree' is invalid, it is possible that the object at
* 'freelist' is already corrupted. So isolate all objects
* starting at 'freelist'.
+*/
+if (freelist_corrupted(s, page, &freelist, nextfree))
break;
+
do {
  prior = page->freelist;
  counters = page->counters;
@@ -2523,17 +2568,27 @@
  struct page *page;

  page = c->page;
-  if (!page)
+  if (!page) {
+    /*
+     * if the node is not online or has no normal memory, just
+     * ignore the node constraint
+     */
+    if (unlikely(node != NUMA_NO_NODE &&
+         !node_state(node, N_NORMAL_MEMORY)))
+      node = NUMA_NO_NODE;
+    goto new_slab;
+  }
  redo:

  if (unlikely(!node_match(page, node))) {
    -int searchnode = node;
-    
-    -if (node != NUMA_NO_NODE && !node_present_pages(node))
-      searchnode = node_to_mem_node(node);
-    
-    -if (unlikely(!node_match(page, searchnode))) {
+    /*
+     * same as above but node_match() being false already
+     * implies node != NUMA_NO_NODE
+     */
+    if (!node_state(node, N_NORMAL_MEMORY)) {
+      node = NUMA_NO_NODE;
+      goto redo;
+    } else {
      stat(s, ALLOC_NODE_MISMATCH);
      deactivate_slab(s, page, c->freelist, c);
      goto new_slab;
@@ -2945,11 +3000,13 @@
      barrier();

      if (likely(page == c->page)) {
-        set_freepointer(s, tail_obj, c->freelist);
+        void **freelist = READ_ONCE(c->freelist);
+        +set_freepointer(s, tail_obj, freelist);

if (unlikely(!this_cpu_cmpxchg_double(s->cpu_slab->freelist, s->cpu_slab->tid, c->freelist, tid, +freelist, tid, head, next_tid(tid)))) {

note_cmpxchg_failure("slab_free", s, tid);
@@ -2965,14 +3022,12 @@
    void *head, void *tail, int cnt,
           unsigned long addr)
{
-    slab_free_freelist_hook(s, head, tail);
    /*
     * slab_free_freelist_hook() could have put the items into quarantine.
     * If so, no need to free them.
     * With KASAN enabled slab_free_freelist_hook modifies the freelist
     * to remove objects, whose reuse must be delayed.
     */
-if (s->flags & SLAB_KASAN && !(s->flags & SLAB_TYPESAFE_BY_RCU))
    return;
-do_slab_free(s, page, head, tail, cnt, addr);
+if (slab_free_freelist_hook(s, &head, &tail, &cnt))
+    do_slab_free(s, page, head, tail, cnt, addr);
}

#endif CONFIG_KASAN
@@ -3125,6 +3180,15 @@
if (unlikely(!object)) {
    /*
     * We may have removed an object from c->freelist using
     * the fastpath in the previous iteration; in that case,
     * c->tid has not been bumped yet.
     * Since __slab_alloc() may reenable interrupts while
     * allocating memory, we should bump c->tid now.
     */
+c->tid = next_tid(c->tid);
+
+/*
     * Invoking slow path likely have side-effect
     * of re-populating per CPU c->freelist
     */
@@ -3558,6 +3622,9 @@
if (s->flags & SLAB_CACHE_DMA)
    s->allocflags |= GFP_DMA;
+if (s->flags & SLAB_CACHE_DMA32)
+s->allocflags |= GFP_DMA32;
+
+if (s->flags & SLAB_RECLAIM_ACCOUNT)
+s->allocflags |= __GFP_RECLAIMABLE;

@@ -4792,7 +4859,17 @@
 }
 }

-get_online_mems();
+/*
 + * It is impossible to take "mem_hotplug_lock" here with "kernfs_mutex"
 + * already held which will conflict with an existing lock order:
 + *
 + * mem_hotplug_lock->slab_mutex->kernfs_mutex
 + *
 + * We don't really need mem_hotplug_lock (to hold off
 + * slab_mem_going_offline_callback) here because slab's memory hot
 + * unplug code doesn't destroy the kmem_cache->node[] data.
 + */
 +
 +#ifdef CONFIG_SLUB_DEBUG
 if (flags & SO_ALL) {
 struct kmem_cache_node *n;
@@ -4833,7 +4910,6 @@
 x += sprintf(buf + x, " N%d=%lu",
 node, nodes[node]);
 #endif
-put_online_mems();
 kfree(nodes);
 return x + sprintf(buf + x, "\n");
 }
@@ -4944,10 +5020,10 @@
 static ssize_t cpu_partial_store(struct kmem_cache *s, const char *buf,
 size_t length)
 {
-unsigned long objects;
+unsigned int objects;

 int err;

-err = kstrtol(buf, 10, &objects);
+err = kstrtouint(buf, 10, &objects);
 if (err)
 return err;
 if (objects && !kmem_cache_has_cpu_partial(s))
@@ -5549,7 +5625,8 @@
 */
 if (buffer)
buf = buffer;
+else if (root_cache->max_attr_size < ARRAY_SIZE(mbuf))
+  !IS_ENABLED(CONFIG_SLUB_STATS))
buf = mbuf;
else {
  buffer = (char *) get_zeroed_page(GFP_KERNEL);
}

if (s->flags & SLAB_CACHE_DMA)
  *p++ = 'd';
+if (s->flags & SLAB_CACHE_DMA32)
  *p++ = 'D';
if (s->flags & SLAB_RECLAIM_ACCOUNT)
  *p++ = 'a';
if (s->flags & SLAB_CONSISTENCY_CHECKS)
  kset_unregister(s->memcg_kset);
#endif
kobject_uevent(&s->kobj, KOBJ_REMOVE);
-kobject_del(&s->kobj);
out:
kobject_put(&s->kobj);
}
}

+void sysfs_slab.unlink(struct kmem_cache *s)
+
+{^}
+if (slab_state >= FULL)
+  kobject_del(&s->kobj);
+}
+
+void sysfs_slab.release(struct kmem_cache *s)
{
if (slab_state >= FULL)
-- linux-4.15.0.orig/mm/sparse.c
+++ linux-4.15.0/mm/sparse.c
@@ -197,7 +197,7 @@
}
#define for_each_present_section_nr(start, section_nr)		/
     ((section_nr >= 0) &&
				(section_nr != -1) &&
--- linux-4.15.0.orig/mm/sparse.c
+++ linux-4.15.0/mm/sparse.c
@@ -197,7 +197,7 @@
}
unsigned long pfn;

for (pfn = start_pfn; pfn < end_pfn; pfn += PAGES_PER_SECTION) {
    unsigned long section_nr = pfn_to_section_nr(pfn);
    struct mem_section *ms;

    /*
    */
    struct mem_section *ms;
    struct page *memmap;
    unsigned long *usemap;
    unsigned long flags;
    int ret;

    /*
    */
    return -ENOMEM;
}

-pgdatsize_lock(pgdat, &flags);

ms = __pfn_to_section(start_pfn);
if (ms->section_mem_map & SECTION_MARKED_PRESENT) {
    ret = -EEXIST;
    ret = sparse_init_one_section(ms, section_nr, memmap, usemap);
out:
    -pgdat_resize_unlock(pgdat, &flags);
    if (ret <= 0) {
        kfree(usemap);
        __kfree_section_memmap(memmap);
        unsigned long map_offset)
        {
            struct page *memmap = NULL;
            unsigned long *usemap = NULL, flags;
            struct pglist_data *pgdat = zone->zone_pgdat;
            unsigned long *usemap = NULL;

            -pgdat_resize_lock(pgdat, &flags);
            if (ms->section_mem_map) {
                usemap = ms->pageblock_flags;
                memmap = sparse_decode_mem_map(ms->section_mem_map,
            }
ms->pageblock_flags = NULL;
}
-pgdat_resize_unlock(pgdat, &flags);

clear_hwpoisoned_pages(memmap + map_offset,
PAGES_PER_SECTION - map_offset);
--- linux-4.15.0.orig/mm/swap.c
+++ linux-4.15.0/mm/swap.c
@@ -320,11 +320,6 @@
{
- static bool need_activate_page_drain(int cpu)
- {  
- return false;
- } 
- 
- void activate_page(struct page *page)
{  
 struct zone *zone = page_zone(page);
@@ -681,12 +676,20 @@
 put_cpu();
 }
+
+ #ifdef CONFIG_SMP
 +
+ static DEFINE_PER_CPU(struct work_struct, lru_add_dRAIN_work);
 +
 static void lru_add_dRAIN_per_cpu(struct work_struct *dummy)
 { 
 lru_add_dRAIN();
 } 
-
- static DEFINE_PER_CPU(struct work_struct, lru_add_dRAIN_work); 
+ #else
+ void lru_add_dRAIN_all(void)
+ { 
+ lru_add_dRAIN();
+ } 
+ #endif

 void lru_add_dRAIN_all_cpuslocked(void)
 { 
 --- linux-4.15.0.orig/mm/swap_state.c
+++ linux-4.15.0/mm/swap_state.c
@@ -23,6 +23,7 @@
 #include <linux/huge_mm.h>
#include <asm/pgtable.h>
+#include "internal.h"

/*
 * swapper_space is a fiction, retained to simplify the path through
@@ -38,7 +39,7 @@
 struct address_space *swapper_spaces[MAX_SWAPFILES] __read_mostly;
 static unsigned int nr_swapper_spaces[MAX_SWAPFILES] __read_mostly;
-bool swap_vma_readahead __read_mostly = true;
+bool swap_vma_readahead __read_mostly = false;

#define SWAP_RA_WIN_SHIFT (PAGE_SHIFT / 2)
#define SWAP_RA_HITS_MASK ((1UL << SWAP_RA_WIN_SHIFT) - 1)
@@ -403,7 +404,7 @@
 /*
 * call radix_tree_preload() while we can wait.
 */
-err = radix_tree_maybe_preload(gfp_mask & GFP_KERNEL);
+err = radix_tree_maybe_preload(gfp_mask & GFP_RECLAIM_MASK);
 if (err)
 break;
@@ -523,10 +524,11 @@
 return 1;

 hits = atomic_xchg(&swapin_readahead_hits, 0);
/pages = __swapin_nr_pages(prev_offset, offset, hits, max_pages,
+pages = __swapin_nr_pages(READ_ONCE(prev_offset), offset, hits, 
+  max_pages,
    atomic_read(&last_readahead_pages));
   if (!hits)
     prev_offset = offset;
    WRITE_ONCE(prev_offset, offset);
    atomic_set(&last_readahead_pages, pages);

 return pages;
--- linux-4.15.0.orig/mm/swapfile.c
+++ linux-4.15.0/mm/swapfile.c
@@ -98,6 +98,15 @@

atomic_t nr_rotate_swap = ATOMIC_INIT(0);

+static struct swap_info_struct *swap_type_to_swap_info(int type)
+{
+  +if (type >= READ_ONCE(nr_swapfiles))
+    return NULL;
+   +

+*smp_rmb();/* Pairs with smp_wmb in alloc_swap_info. */+
+return READ_ONCE(swap_info[type]);
+
static inline unsigned char swap_count(unsigned char ent)
{
    return ent & ~SWAP_HAS_CACHE;/* may include SWAP_HAS_CONT flag */
    goto nextsi;
}
if (cluster) {
    if (!(si->flags & SWP_FILE))
+    if (si->flags & SWP_BLKDEV)
        n_ret = swap_alloc_cluster(si, swp_entries);
    else
        n_ret = scan_swap_map_slots(si, SWAP_HAS_CACHE,
        @ @ -1014,12 +1023,14 @ @
    /* The only caller of this function is now suspend routine */
    swp_entry_t get_swap_page_of_type(int type)
    {
        struct swap_info_struct *si;
        struct swap_info_struct *si = swap_type_to_swap_info(type);
pwoff_t offset;

        -si = swap_info[type];
        +if (!si)
        +goto fail;
        +
spin_lock(&si->lock);
        -if (si && (si->flags & SWP_WRITEOK)) {
        +if (si->flags & SWP_WRITEOK) {
            atomic_long_dec(&nr_swap_pages);
        /* This is called for allocating swap entry, not cache */
            offset = scan_swap_map(si, 1);
            @ @ -1030,6 +1041,7 @ @
            atomic_long_inc(&nr_swap_pages);
        } spin_unlock(&si->lock);
        +fail:
        return (swp_entry_t) {0};
    }

    @ @ -1041,9 +1053,9 @ @
    if (!entry.val)
        goto out;
    type = swp_type(entry);
    -if (type >= nr_swapfiles)
        +p = swap_type_to_swap_info(type);
if (!p)
goto bad_nofile;
-p = swap_info[type];
if (!(!p->flags & SWP_USED))
goto bad_device;
offset = swp_offset(entry);
sector_t swapdev_block(int type, pgoff_t offset)
{
    struct block_device *bdev;
    struct swap_info_struct *si = swap_type_to_swap_info(type);

    if ((unsigned int)type >= nr_swapfiles)
        return 0;
    if (!si || !(si->flags & SWP_WRITEOK))
return 0;
return map_swap_entry(swp_entry(type, offset), &bdev);
}

if (PageSwapCache(page) &&
    likely(page_private(page) == entry.val) &&
    !page_swapped(page))
    (!PageTransCompound(page) ||
    !swap_page_trans_huge_swapped(si, entry))
delete_from_swap_cache(compound_head(page));

/*
@@ -2285,7 +2297,7 @@
struct swap_extent *se;
pgoft_t offset;

-sis = swap_info[swap_type(entry)];
+sis = swap_swap_info(entry);
*bdev = sis->bdev;

offset = swp_offset(entry);
@@ -2310,7 +2322,7 @@
swp_entry_t entry;
    entry.val = page_private(page);
    -return map_swap_entry(entry, bdev);
    +return map_swap_entry(entry, bdev) << (PAGE_SHIFT - 9);
}

/*
@@ -2723,9 +2735,7 @@

if (!l)
return SEQ_START_TOKEN;

- for (type = 0; type < nr_swapfiles; type++) {
- smp_rmb(); /* read nr_swapfiles before swap_info[type] */
- si = swap_info[type];
+ for (type = 0; (si = swap_type_to_swap_info(type)); type++) {
if (!((si->flags & SWP_USED) || !si->swap_map)
continue;
if (!--l)
@@ -2745,12 +2755,10 @@
else
type = si->type + 1;

- for (; type < nr_swapfiles; type++) {
- smp_rmb(); /* read nr_swapfiles before swap_info[type] */
- si = swap_info[type];
+ (*pos);
+ for (; (si = swap_type_to_swap_info(type)); type++) {
if (!((si->flags & SWP_USED) || !si->swap_map)
continue;
+ *pos;
return si;
}

@@ -2834,10 +2842,12 @@
static struct swap_info_struct *alloc_swap_info(void)
{
 struct swap_info_struct *p;
+ struct swap_info_struct *defer = NULL;
 unsigned int type;
 int i;
+ int size = sizeof(*p) + nr_node_ids * sizeof(struct plist_node);

- p = kzalloc(sizeof(*p), GFP_KERNEL);
+ p = kvzalloc(size, GFP_KERNEL);
 if (!p)
 return ERR_PTR(-ENOMEM);

@@ -2848,21 +2858,21 @@
}
if (type >= MAX_SWAPFILES) {
 spin_unlock(&swap_lock);
- kfree(p);
+kvfree(p);
 return ERR_PTR(-EPERM);
}
if (type >= nr_swapfiles) {

p->type = type;
swap_info[type] = p;
+WRITE_ONCE(swap_info[type], p);
/*
 * Write swap_info[type] before nr_swapfiles, in case a
 * racing procfs swap_start() or swap_next() is reading them.
 * (We never shrink nr_swapfiles, we never free this entry.)
 */
smp_wmb();
nr_swapfiles++;
+WRITE_ONCE(nr_swapfiles, nr_swapfiles + 1);
} else {
-kfree(p);
-defer = p;
p = swap_info[type];
/*
 * Do not memset this entry: a racing procfs swap_next()
 @ @ -2875.6 +2885.7 @@
plist_node_init(&p->avail_lists[i], 0);
p->flags = SWP_USED;
spin_unlock(&swap_lock);
+kvfree(defer);
spin_lock_init(&p->lock);
spin_lock_init(&p->cont_lock);

@@ -2909.6 +2920.35 @@
return 0;
}

+/*
+/* Find out how many pages are allowed for a single swap device. There
+/* are two limiting factors:
+/* 1) the number of bits for the swap offset in the swp_entry_t type, and
+/* 2) the number of bits in the swap pte, as defined by the different
+/* architectures.
+*/
+/* In order to find the largest possible bit mask, a swap entry with
+* swap type 0 and swap offset ~0UL is created, encoded to a swap pte,
+* decoded to a swp_entry_t again, and finally the swap offset is
+* extracted.
+*/
+/* This will mask all the bits from the initial ~0UL mask that can't
+* be encoded in either the swp_entry_t or the architecture definition
+* of a swap pte.
+*/
+unsigned long generic_max_swapfile_size(void)
+{
+return swp_offset(pte_to_swp_entry(
    +swp_entry_to_pte(swp_entry(0, ~0UL)))) + 1;
+
+/* Can be overridden by an architecture for additional checks. */
+__weak unsigned long max_swapfile_size(void)
+{
+    return generic_max_swapfile_size();
+}
+
+static unsigned long read_swap_header(struct swap_info_struct *p,
union swap_header *swap_header,
struct inode *inode)
@@ -2944,23 +2984,12 @@
p->cluster_next = 1;
p->cluster_nr = 0;

    /* Find out how many pages are allowed for a single swap
    - device. There are two limiting factors: 1) the number
    - of bits for the swap offset in the swp_entry_t type, and
    - 2) the number of bits in the swap pte as defined by the
    - different architectures. In order to find the
    - largest possible bit mask, a swap entry with swap type 0
    - and swap offset ~0UL is created, encoded to a swap pte,
    - decoded to a swp_entry_t again, and finally the swap
    - offset is extracted. This will mask all the bits from
    - the initial ~0UL mask that can't be encoded in either
    - the swp_entry_t or the architecture definition of a
    - swap pte.
    - */
    -maxpages = swp_offset(pte_to_swp_entry(
        -swp_entry_to_pte(swp_entry(0, ~0UL)))) + 1;
    +maxpages = max_swapfile_size();
    last_page = swap_header->info.last_page;
    if (!last_page) {
        pr_warn("Empty swap-file\n");
        return 0;
    }
    if (last_page > maxpages) {
        pr_warn("Truncating oversized swap area, only using %lu k out of %lu k\n",
        maxpages <<= (PAGE_SHIFT - 10),
        @@ -3356,7 +3385,7 @@
        {
        struct swap_info_struct *p;
        struct swap_cluster_info *ci;
        -unsigned long offset, type;
        +unsigned long offset;
unsigned char count;
unsigned char has_cache;
int err = -EINVAL;
@@ -3364,10 +3393,10 @@
if (non_swap_entry(entry))
    goto out;

-type = swp_type(entry);
-if (type >= nr_swapfiles)
+p = swp_swap_info(entry);
+if (!p)
    goto bad_file;
-p = swap_info[type];
+    offset = swp_offset(entry);
    if (unlikely(offset >= p->max))
        goto out;
@@ -3464,7 +3493,7 @@
struct swap_info_struct *swp_swap_info(swp_entry_t entry)
 {
    -return swap_info[swp_type(entry)];
    +return swap_type_to_swap_info(swp_type(entry));
 }

struct swap_info_struct *page_swap_info(struct page *page)
--- linux-4.15.0.orig/mm/truncate.c
+++ linux-4.15.0/mm/truncate.c
@@ -524,9 +524,13 @@
    */
    spin_lock_irq(&mapping->tree_lock);
    spin_unlock_irq(&mapping->tree_lock);
-    -truncate_inode_pages(mapping, 0);
+    +/*
+    + * Cleancache needs notification even if there are no pages or shadow
+    + * entries.
+    + */
+    +truncate_inode_pages(mapping, 0);
    }
    +
+/#
+ * Cleancache needs notification even if there are no pages or shadow
+ * entries.
+ */
+truncate_inode_pages(mapping, 0);
}
static inline const char *check_bogus_address(const void *ptr, unsigned long n)
{
    /* Reject if object wraps past end of memory. */
    if ((unsigned long)ptr + n < (unsigned long)ptr)
        return "<wrapped address>";

    /* Reject if NULL or ZERO-allocation. */
    if (!virt_addr_valid(ptr))
        return NULL;

    page = virt_to_head_page(ptr);

    /* When CONFIG_HIGHMEM=y, kmap_to_page() will give either the
     * highmem page or fallback to virt_to_page(). The following
     * is effectively a highmem-aware virt_to_head_page().
     */
    +page = compound_head(kmap_to_page((void *)ptr));

    /* Check slab allocator for flags and size. */
    if (PageSlab(page))
        goto report;

    /* Validates that the given object is:
     * - not bogus address
     * - known-safe heap or stack object
     * - fully contained by stack (or stack frame, when available)
     * - fully within SLAB object (or object whitelist area, when available)
     * - not in kernel text
     */
    __check_object_size(const void *ptr, unsigned long n, bool to_user)
        goto report;

    /* Check for bad heap object. */
    -err = check_heap_object(ptr, n, to_user);
    goto report;
}
/* Check for bad stack object. */
switch (check_stack_object(ptr, n)) {
    case NOT_STACK:
        goto report;
}

/* Check for bad heap object. */
check_heap_object(ptr, n, to_user);

/* Check for object in kernel to avoid text exposure. */
err = check_kernel_text_object(ptr, n);
if (!err)
    /* fallback to copy_from_user outside mmap_sem */
    if (!*pagep) {
        ret = -ENOMEM;
    } else {
        ret = -EFAULT;
        *pagep = page;
        goto out;
    }
}

/* fallback to copy_from_user outside mmap_sem */
if (unlikely(ret)) {
    -ret = -EFAULT;
    *pagep = page;
    /* don't free the page */
    goto out;
}

/* the shmem MAP_PRIVATE case requires checking the i_size */
if (dst_vma->vm_file) {
    /* the shmem MAP_PRIVATE case requires checking the i_size */
inode = dst_vma->vm_file->f_inode;
    offset = linear_page_index(dst_vma, dst_addr);
    max_off = DIV_ROUND_UP(i_size_read(inode), PAGE_SIZE);
    ret = -EFAULT;
    if (unlikely(offset >= max_off))
        goto out_release_uncharge_unlock;
}
+ret = -EEXIST;
if (!pte_none(*dst_pte))
goto out_release_uncharge_unlock;

@@ -109,11 +120,22 @@
pte_t _dst_pte, *dst_pte;
spinlock_t *ptl;
int ret;
+pgoff_t offset, max_off;
+struct inode *inode;

_dst_pte = pte_mkspecial(pfn_pte(my_zero_pfn(dst_addr),
   dst_vma->vm_page_prot));
-ret = -EEXIST;
dst_pte = pte_offset_map_lock(dst_mm, dst_pmd, dst_addr, &ptl);
+if (dst_vma->vm_file) {
+    /* the shmem MAP_PRIVATE case requires checking the i_size */
+    inode = dst_vma->vm_file->f_inode;
+    offset = linear_page_index(dst_vma, dst_addr);
+    max_off = DIV_ROUND_UP(i_size_read(inode), PAGE_SIZE);
+    ret = -EFAULT;
+    if (unlikely(offset >= max_off))
+        goto out_unlock;
+}
+ret = -EEXIST;
if (!pte_none(*dst_pte))
goto out_unlock;
set_pte_at(dst_mm, dst_addr, dst_pte, _dst_pte);
@@ -206,8 +228,9 @@
if (!dst_vma || !is_vm_hugetlb_page(dst_vma))
goto out_unlock;
/*
 * Only allow _mcopy_atomic_hugetlb on userfaultfd
 * registered ranges.
 * Check the vma is registered in uffd, this is
 * required to enforce the VM_MAYWRITE check done at
 * uffd registration time.
 */
if (!dst_vma->vm_userfaultfd_ctx.ctx)
goto out_unlock;
@@ -249,8 +272,7 @@
idx = linear_page_index(dst_vma, dst_addr);
mapping = dst_vma->vm_file->f_mapping;
-hash = hugetlb_fault_mutex_hash(h, dst_mm, dst_vma, mapping,
-idx, dst_addr);
+hash = hugetlb_fault_mutex_hash(h, mapping, idx);
mutex_lock(&hugetlb_fault_mutex_table[hash]);
err = -ENOMEM;
@@ -275,7 +297,7 @@
cond_resched();

-if (unlikely(err == -EFAULT)) {
+if (unlikely(err == -ENOENT)) {
    up_read(&dst_mm->mmap_sem);
    BUG_ON(!page);

@@ -381,7 +403,17 @@
    ssize_t err;

-if (vma_is_anonymous(dst_vma)) {
+/*
+ * The normal page fault path for a shmem will invoke the
+ * fault, fill the hole in the file and COW it right away. The
+ * result generates plain anonymous memory. So when we are
+ * asked to fill an hole in a MAP_PRIVATE shmem mapping, we'll
+ * generate anonymous memory directly without actually filling
+ * the hole. For the MAP_PRIVATE case the robustness check
+ * only happens in the pagetable (to verify it's still none)
+ * and not in the radix tree.
+ */
+if (!((dst_vma->vm_flags & VM_SHARED)) {
    if (!zeropage)
        err = mcopy_atomic_pte(dst_mm, dst_pmd, dst_vma,
                        dst_addr, src_addr, page);
@@ -440,13 +472,9 @@
    if (!dst_vma->vm_userfaultfd_ctx.ctx)
        goto out_unlock;

/*
- * Be strict and only allow __mcopy_atomic on userfaultfd
- * registered ranges to prevent userland errors going
- * unnoticed. As far as the VM consistency is concerned, it
- * would be perfectly safe to remove this check, but there's
- * no useful usage for __mcopy_atomic outside of userfaultfd
- * registered ranges. This is after all why these are ioctls
- * belonging to the userfaultfd and not syscalls.
+ * Check the vma is registered in uffd, this is required to
+ * enforce the VM_MAYWRITE check done at uffd registration
+ * time.
+ */
if (!dst_vma->vm_userfaultfd_ctx.ctx)
    goto out_unlock;
@@ -480,7 +508,8 @@
* dst_vma.
*/

err = -ENOMEM;
-#if (vma_is_anonymous(dst_vma) && unlikely(anon_vma_prepare(dst_vma)))
+#if (!(dst_vma->vm_flags & VM_SHARED) &&
+ unlikely(anon_vma_prepare(dst_vma)))

  goto out_unlock;

while (src_addr < src_start + len) {
    src_addr, &page, zeropage);
    cond_resched();

-#if (unlikely(err == -EFAULT)) {
+#if (unlikely(err == -ENOENT)) {

  void *page_kaddr;

  up_read(&dst_mm->mmap_sem);
--- linux-4.15.0.orig/mm/util.c
+++ linux-4.15.0/mm/util.c
@@ -417,6 +417,24 @@
 |
 EXPORT_SYMBOL(kvfree);

+/**
+ * kvfree_sensitive - Free a data object containing sensitive information.
+ * @addr: address of the data object to be freed.
+ * @len: length of the data object.
+ *
+ * Use the special memzero_explicit() function to clear the content of a
+ * kvmalloc'ed object containing sensitive data to make sure that the
+ * compiler won't optimize out the data clearing.
+ */
+void kvfree_sensitive(const void *addr, size_t len)
+{
+  if (likely(!ZERO_OR_NULL_PTR(addr))) {
+    memzero_explicit((void *)addr, len);
+  }
+  kvfree(addr);
+}
+EXPORT_SYMBOL(kvfree_sensitive);
+
+static inline void *__page_rmapping(struct page *page)
+{
  if (PageHuge(page))
return false;
- for (i = 0; i < hpage_nr_pages(page); i++) {
+ for (i = 0; i < (1 << compound_order(page)); i++) {
if (atomic_read(&page[i]._mapcount) >= 0)
return true;
}
@@ -636,6 +654,13 @@
free += global_node_page_state(NR_SLAB_RECLAIMABLE);

/ *
+ * Part of the kernel memory, which can be released
+ * under memory pressure.
+ */
+free += global_node_page_state(
+NR_INDIRECTLY_RECLAIMABLE_BYTES) >> PAGE_SHIFT;
+
+/*
+ * Leave reserved pages. The pages are not for anonymous pages.
+/ *
if (free <= totalreserve_pages)
--- linux-4.15.0.orig/mm/vmacache.c
+++ linux-4.15.0/mm/vmacache.c
@@ -8,44 +8,6 @@
#include <linux/vmacache.h>

/ *
- * Flush vma caches for threads that share a given mm.
- *
- * The operation is safe because the caller holds the mmap_sem
- * exclusively and other threads accessing the vma cache will
- * have mmap_sem held at least for read, so no extra locking
- * is required to maintain the vma cache.
- */
-void vmacache_flush_all(struct mm_struct *mm)
-{  
-struct task_struct *g, *p;
-  
-  count_vm_vmacache_event(VMCACHE_FULL_FLUSHES);
-  
-  /*
-   * Single threaded tasks need not iterate the entire
-   * list of process. We can avoid the flushing as well
-   * since the mm's seqnum was increased and don't have
-   * to worry about other threads' seqnum. Current's
-   * flush will occur upon the next lookup.
-   */
-  -if (atomic_read(&mm->mm_users) == 1)
-    return;
-rcu_read_lock();
-for_each_process_thread(g, p) {
  /*
  * Only flush the vmacache pointers as the
  * mm seqnum is already set and curr's will
  * be set upon invalidation when the next
  * lookup is done.
  */
  -if (mm == p->mm)
    -vmacache_flush(p);
-} 
-rcu_read_unlock();
lockdep_assert_held(&vmap_purge_lock);

valist = llist_del_all(&vmap_purge_list);
+if (unlikely(valist == NULL))
+return false;
+
+/*
+ * First make sure the mappings are removed from all page-tables
+ * before they are freed.
+ */
+vmalloc_sync_unmappings();
+
+/*
+ * TODO: to calculate a flush range without looping.
+ * The list can be up to lazy_max_pages() elements.
+ */
llist_for_each_entry(va, valist, purge_list) {
if (va->va_start < start)
start = va->va_start;
if (va->va_end > end)
end = va->va_end;
-do_free = true;
}

-if (!do_free)
-return false;
-
flush_tlb_kernel_range(start, end);
+resched_threshold = (int) lazy_max_pages() << 1;

spin_lock(&vmap_area_lock);
llist_for_each_entry_safe(va, n_va, valist, purge_list) {
@@ -701,7 +716,9 @@
__free_vmap_area(va);
atomic_sub(nr, &vmap_lazy_nr);
-cond_resched_lock(&vmap_area_lock);
+
+if (atomic_read(&vmap_lazy_nr) < resched_threshold)
+cond_resched_lock(&vmap_area_lock);
}
spin_unlock(&vmap_area_lock);
return true;
@@ -1519,7 +1536,7 @@
addr))
return;
area = remove_vm_area(addr);
+area = find_vm_area(addr);
if (unlikely(!area)) {
    WARN(1, KERN_ERR "Trying to vfree() nonexistent vm area (%p)\n",
        addr);
@@ -1529,6 +1546,7 @@
d debug_check_no_locks_freed(addr, get_vm_area_size(area));
d debug_check_no_obj_freed(addr, get_vm_area_size(area));

+remove_vm_area(addr);
if (dallocate_pages) {
    int i;

@@ -1677,7 +1695,6 @@
    nr_pages = get_vm_area_size(area) >> PAGE_SHIFT;
    array_size = (nr_pages * sizeof(struct page *));

-    -area->nr_pages = nr_pages;
+    /* Please note that the recursion is strictly bounded. */
    if (array_size > PAGE_SIZE) {
        pages = __vmalloc_node(array_size, 1, nested_gfp|highmem_mask,
@@ -1685,13 +1702,16 @@
            else {
                pages = kmalloc_node(array_size, nested_gfp, node);
            }
-    -area->pages = pages;
-    -if (!area->pages) {
+    +if (!pages) {
        remove_vm_area(area->addr);
        kfree(area);
        return NULL;
    }

+    -area->pages = pages;
+    -area->nr_pages = nr_pages;
+    +for (i = 0; i < area->nr_pages; i++) {
+        struct page *page;

@@ -1943,11 +1963,15 @@
    }

#if defined(CONFIG_64BIT) && defined(CONFIG_ZONE_DMA32)
-#define GFP_VMALLOC32 GFP_DMA32 | GFP_KERNEL
+#define GFP_VMALLOC32 (GFP_DMA32 | GFP_KERNEL)
#elif defined(CONFIG_64BIT) && defined(CONFIG_ZONE_DMA)
-#define GFP_VMALLOC32 GFP_DMA | GFP_KERNEL
+#define GFP_VMALLOC32 (GFP_DMA | GFP_KERNEL)
#define GFP_VMALLOC32 (GFP_DMA | GFP_KERNEL)
#else
-#define GFP_VMALLOC32 GFP_KERNEL
+/*
  * 64b systems should always have either DMA or DMA32 zones. For others
  * GFP_DMA32 should do the right thing and use the normal zone.
  */
+#define GFP_VMALLOC32 GFP_DMA32 | GFP_KERNEL
#endif
/**
@@ -2229,6 +2253,7 @@
 *@vma:		vma to cover
 *@uaddr:		target user address to start at
 *@kaddr:		virtual address of vmalloc kernel memory
+ *@pgoff:		offset from @kaddr to start at
 *@size:		size of map area
 *
 *Returns:0 for success, -Exxx on failure
 @@ -2241,9 +2266,15 @@
 */
 int remap_vmalloc_range_partial(struct vm_area_struct *vma, unsigned long uaddr,
-				void *kaddr, unsigned long size)
+void *kaddr, unsigned long pgoff,
+unsigned long size)
 {
 struct vm_struct *area;
 +unsigned long off;
 +unsigned long end_index;
+}
+if (check_shl_overflow(pgoff, PAGE_SHIFT, &off))
+return -EINVAL;

 size = PAGE_ALIGN(size);

 @@ -2257,8 +2288,10 @@
 if (!area->flags & VM_USERMAP))
 return -EINVAL;

 -if (kaddr + size > area->addr + area->size)
 +if (check_add_overflow(size, off, &end_index) ||
 +    end_index > get_vm_area_size(area))
 return -EINVAL;
 +kaddr += off;

do {
   struct page *page = vmalloc_to_page(kaddr);
unsigned long pgoff)
{
    return remap_vmalloc_range_partial(vma, vma->vm_start,
        addr + (pgoff << PAGE_SHIFT),
        addr, pgoff,
        vma->vm_end - vma->vm_start);
}
EXPORT_SYMBOL(remap_vmalloc_range);

/*
 * Implement a stub for vmalloc_sync_all() if the architecture chose not to
 * have one.
 * Implement stubs for vmalloc_sync_[un]mappings() if the architecture chose
 * not to have one.
 *
 * The purpose of this function is to make sure the vmalloc area
 * mappings are identical in all page-tables in the system.
 */
-void __weak vmalloc_sync_all(void)
+void __weak vmalloc_sync_mappings(void)
{

+void __weak vmalloc_sync_unmappings(void)
+
+
static int f(pte_t *pte, pgtable_t table, unsigned long addr, void *data)
{
    /*
     * Add a shrinker callback to be called from the vm.
     */
    -int register_shrinker(struct shrinker *shrinker)
    +int prealloc_shrinker(struct shrinker *shrinker)
    {
        size_t size = sizeof(*shrinker->nr_deferred);

        shrinker->nr_deferred = kzalloc(size, GFP_KERNEL);
        if (!shrinker->nr_deferred)
            return -ENOMEM;
        return 0;
    }
+void free_prealloced_shrinker(struct shrinker *shrinker)
+{
+kfree(shrinker->nr_deferred);
+shrinker->nr_deferred = NULL;
+}
+
+void register_shrinker_prepared(struct shrinker *shrinker)
+{
+down_write(&shrinker_rwsem);
+list_add_tail(&shrinker->list, &shrinker_list);
+up_write(&shrinker_rwsem);
+}
+
+int register_shrinker(struct shrinker *shrinker)
+{
+int err = prealloc_shrinker(shrinker);
+
+if (err)
+return err;
+register_shrinker_prepared(shrinker);
+return 0;
}
EXPORT_SYMBOL(register_shrinker);
@@ -502,6 +521,15 @@
sc.nid = 0;
freed += do_shrink_slab(&sc, shrinker, nr_scanned, nr_eligible);
+/*
+ * Bail out if someone want to register a new shrinker to
+ * prevent the registration from being stalled for long periods
+ * by parallel ongoing shrinking.
+ */
+if (rwsem_is_contended(&shrinker_rwsem)) {
+freed = freed ? : 1;
+break;
+}
+}
+
+up_read(&shrinker_rwsem);
@@ -1384,7 +1412,7 @@
list_for_each_entry_safe(page, next, page_list, lru) {
if (page_is_file_cache(page) && !PageDirty(page) &&
- !__PageMovable(page)) {
+ !__PageMovable(page) && !PageUnevictable(page)) {
ClearPageActive(page);
list_move(&page->lru, &clean_pages);
}
if (PageDirty(page)) {
    struct address_space *mapping;
    bool migrate_dirty;

    /*
    * Only pages without mappings or that have a
    * ->migratepage callback are possible to migrate
    * without blocking
    * without blocking. However, we can be racing with
    * truncation so it's necessary to lock the page
    * to stabilise the mapping as truncation holds
    * the page lock until after the page is removed
    * from the page cache.
    */
    +if (!trylock_page(page))
        +return ret;
    +mapping = page_mapping(page);
    -if (mapping && !mapping->a_ops->migratepage)
        +migrate_dirty = !mapping || mapping->a_ops->migratepage;
    +unlock_page(page);
    +if (!migrate_dirty)
        return ret;
}

set_bit(PGDAT_WRITEBACK, &pgdat->flags);

/*
 * If dirty pages are scanned that are not queued for IO, it
 * implies that flushers are not doing their job. This can
 * happen when memory pressure pushes dirty pages to the end of
 * the LRU before the dirty limits are breached and the dirty
 * data has expired. It can also happen when the proportion of
 * dirty pages grows not through writes but through memory
 * pressure reclaiming all the clean cache. And in some cases,
 * the flushers simply cannot keep up with the allocation
 * rate. Nudge the flusher threads in case they are asleep.
 */
+if (stat.nr_unqueued_dirty == nr_taken)
    +wakeup_flusher_threads(WB_REASON_VMSCAN);
+
+/*
 * Legacy memcg will stall in page writeback so avoid forcibly
 * stalling here.
 */
if (stat.nr_dirty && stat.nr_dirty == stat.nr_congested)
set_bit(PGDAT_CONGESTED, &pgdat->flags);

/*
 * If dirty pages are scanned that are not queued for IO, it
 * implies that flushers are not doing their job. This can
 * happen when memory pressure pushes dirty pages to the end of
 * the LRU before the dirty limits are breached and the dirty
 * data has expired. It can also happen when the proportion of
 * dirty pages grows not through writes but through memory
 * pressure reclaiming all the clean cache. And in some cases,
 * the flushers simply cannot keep up with the allocation
 * rate. Nudge the flusher threads in case they are asleep, but
 * also allow kswapd to start writing pages during reclaim.
 */
-if (stat.nr_unqueued_dirty == nr_taken) {
  wakeup_flusher_threads(WB_REASON_VMSCAN);
} else {
  /* Allow kswapd to start writing pages during reclaim. */
  if (stat.nr_unqueued_dirty == nr_taken)
    set_bit(PGDAT_DIRTY, &pgdat->flags);
-

/*
 * If kswapd scans pages marked for immediate
 */
 static bool inactive_list_is_low(struct lruvec *lruvec, bool file,
                        struct mem_cgroup *memcg,
                        struct scan_control *sc, bool actual_reclaim)
                        struct scan_control *sc, bool trace)
{
enum lru_list active_lru = file * LRU_FILE + LRU_ACTIVE;
struct pglist_data *pgdat = lruvec_pgdat(lruvec);

inactive = lruvec_lru_size(lruvec, inactive_lru, sc->reclaim_idx);
active = lruvec_lru_size(lruvec, active_lru, sc->reclaim_idx);

-if (memcg)
  refaults = memcg_page_state(memcg, WORKINGSET_ACTIVATE);
-else
  refaults = node_page_state(pgdat, WORKINGSET_ACTIVATE);
-
/*
 * When refaults are being observed, it means a new workingset
 * is being established. Disable active list protection to get
 * rid of the stale workingset quickly.
/*
 -if (file && actual_reclaim && lruvec->refaults != refaults) {
 +refaults = lruvec_page_state(lruvec, WORKINGSET_ACTIVATE);
 +if (file && lruvec->refaults != refaults) {
 inactive_ratio = 0;
 } else {
 gb = (inactive + active) >> (30 - PAGE_SHIFT);
 @@ -2141,7 +2175,7 @@
inactive_ratio = 1;
 }

 -if (actual_reclaim)
 +if (trace)
 trace_mm_vmscan_inactive_list_is_low(pgdat->node_id, sc->reclaim_idx,
 lruvec_lru_size(lruvec, inactive_lru, MAX_NR_ZONES), inactive,
 lruvec_lru_size(lruvec, active_lru, MAX_NR_ZONES), active,
 @@ -2151,12 +2185,10 @@
 }

 static unsigned long shrink_list(enum lru_list lru, unsigned long nr_to_scan,
 - struct lruvec *lruvec, struct mem_cgroup *memcg,
 - struct scan_control *sc)
 + struct lruvec *lruvec, struct scan_control *sc)
 { 
 if (is_active_lru(lru)) {
 -if (inactive_list_is_low(lruvec, is_file_lru(lru),
 - memcg, sc, true))
 +if (inactive_list_is_low(lruvec, is_file_lru(lru), sc, true))
 shrink_active_list(nr_to_scan, lruvec, sc, lru);
 return 0;
 }
 @@ -2256,7 +2288,7 @@
 * anonymous pages on the LRU in eligible zones.
 * Otherwise, the small LRU gets thrashed.
 */
 -if (!inactive_list_is_low(lruvec, false, memcg, sc, false) &&
 +if (!inactive_list_is_low(lruvec, false, sc, false) &&
   lruvec_lru_size(lruvec, LRU_INACTIVE_ANON, sc->reclaim_idx) >> sc->priority) {
 scan_balance = SCAN_ANON;
 @@ -2274,7 +2306,7 @@
 * lruvec even if it has plenty of old anonymous pages unless the 
 * system is under heavy pressure.
 */
 -if (!inactive_list_is_low(lruvec, true, memcg, sc, false) &&
 +if (!inactive_list_is_low(lruvec, true, sc, false) &&
   lruvec_lru_size(lruvec, LRU_INACTIVE_FILE, sc->reclaim_idx) >> sc->priority) {
 scan_balance = SCAN_FILE;

goto out;
@@ -2356,9 +2388,14 @@
/*
 * Scan types proportional to swappiness and
 * their relative recent reclaim efficiency.
+ * Make sure we don't miss the last page on
+ * the offlined memory cgroups because of a
+ * round-off error.
 */
-scan = div64_u64(scan * fraction[file],
- denominator);
+scan = mem_cgroup_online(memcg) ?
+ div64_u64(scan * fraction[file], denominator) :
+ DIV64_U64_ROUND_UP(scan * fraction[file],
+ denominator);
break;
case SCAN_FILE:
case SCAN_ANON:
@@ -2425,7 +2462,7 @@
 nr[lru] -= nr_to_scan;
 nr_reclaimed += shrink_list(lru, nr_to_scan,
 - lruvec, memcg, sc);
+ lruvec, sc);
 }
 }

@@ -2492,7 +2529,7 @@
 * Even if we did not try to evict anon pages at all, we want to
 * rebalance the anon lru active/inactive ratio.
 */
-if (inactive_list_is_low(lruvec, false, memcg, sc, true))
+if (inactive_list_is_low(lruvec, false, sc, true))
 shrink_active_list(SWAP_CLUSTER_MAX, lruvec,
 sc, LRU_ACTIVE_ANON);
 }
@@ -2610,7 +2647,7 @@
 sc->memcg_low_skipped = 1;
 continue;
 }
-mem_cgroup_event(memcg, MEMCG_LOW);
+memcg_memory_event(memcg, MEMCG_LOW);
 }

reclaimed = sc->nr_reclaimed;
@@ -2817,12 +2854,8 @@
 unsigned long refaults;
 struct lruvec *lruvec;

---

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- if (memcg)
  refaults = memcg_page_state(memcg, WORKINGSET_ACTIVATE);
- else
  refaults = node_page_state(pgdat, WORKINGSET_ACTIVATE);
-
  lruvec = mem_cgroup_lruvec(pgdat, memcg);
+ refaults = lruvec_page_state(lruvec, WORKINGSET_ACTIVATE);
lruvec->refaults = refaults;
} while ((memcg = mem_cgroup_iter(root_memcg, memcg, NULL)));
}
@@ -2936,8 +2969,9 @@
/* kswapd must be awake if processes are being throttled */
if (!wmark_ok && waitqueue_active(&pgdat->kswapd_wait)) {
-  pgdat->kswapd_classzone_idx = min(pgdat->kswapd_classzone_idx,
-                        (enum zone_type)ZONE_NORMAL);
+  if (READ_ONCE(pgdat->kswapd_classzone_idx) > ZONE_NORMAL)
+    WRITE_ONCE(pgdat->kswapd_classzone_idx, ZONE_NORMAL);
  +
  wake_up_interruptible(&pgdat->kswapd_wait);
}
@@ -3170,7 +3204,7 @@
do {
    struct lruvec *lruvec = mem_cgroup_lruvec(pgdat, memcg);
-
    -if (inactive_list_is_low(lruvec, false, memcg, sc, true))
+    +if (inactive_list_is_low(lruvec, false, sc, true))
      shrink_active_list(SWAP_CLUSTER_MAX, lruvec,
                        sc, LRU_ACTIVE_ANON);

@@ -3428,19 +3462,18 @@
/*
 - * pgdat->kswapd_classzone_idx is the highest zone index that a recent
 - * allocation request woke kswapd for. When kswapd has not woken recently,
 - * the value is MAX_NR_ZONES which is not a valid index. This compares a
 - * given classzone and returns it or the highest classzone index kswapd
 - * was recently woke for.
 + * The pgdat->kswapd_classzone_idx is used to pass the highest zone index to be
 + * reclaimed by kswapd from the waker. If the value is MAX_NR_ZONES which is not
 + * a valid index then either kswapd runs for first time or kswapd couldn't sleep
 + * after previous reclaim attempt (node is still unbalanced). In that case
 + * return the zone index of the previous kswapd reclaim cycle.
 */
static enum zone_type kswapd_classzone_idx(pg_data_t *pgdat,
enum zone_type classzone_idx)
{
    if (pgdat->kswapd_classzone_idx == MAX_NR_ZONES)
        return classzone_idx;
    enum zone_type curr_idx = READ_ONCE(pgdat->kswapd_classzone_idx);
    return max(pgdat->kswapd_classzone_idx, classzone_idx);
    return curr_idx == MAX_NR_ZONES ? prev_classzone_idx : curr_idx;
}

static void kswapd_try_to_sleep(pg_data_t *pgdat, int alloc_order, int reclaim_order,
    * the previous request that slept prematurely.
    */
    if (remaining) {
        pgdat->kswapd_classzone_idx = kswapd_classzone_idx(pgdat, classzone_idx);
        pgdat->kswapd_order = max(pgdat->kswapd_order, reclaim_order);
        WRITE_ONCE(pgdat->kswapd_classzone_idx, kswapd_classzone_idx(pgdat, classzone_idx));
        if (READ_ONCE(pgdat->kswapd_order) < reclaim_order)
            WRITE_ONCE(pgdat->kswapd_order, reclaim_order);
    }

    finish_wait(&pgdat->kswapd_wait, &wait);
    tsk->flags |= PF_MEMALLOC | PF_SWAPWRITE | PF_KSWAPD;
    set_freezable();

    pgdat->kswapd_order = 0;
    pgdat->kswapd_classzone_idx = MAX_NR_ZONES;
    WRITE_ONCE(pgdat->kswapd_order, 0);
    WRITE_ONCE(pgdat->kswapd_classzone_idx, MAX_NR_ZONES);
    for ( ; ; ) {
        bool ret;

        alloc_order = reclaim_order = pgdat->kswapd_order;
        alloc_order = reclaim_order = READ_ONCE(pgdat->kswapd_order);
        classzone_idx = kswapd_classzone_idx(pgdat, classzone_idx);

        kswapd_try_sleep:
        classzone_idx);

        /* Read the new order and classzone_idx */
        alloc_order = reclaim_order = pgdat->kswapd_order;
        classzone_idx = kswapd_classzone_idx(pgdat, 0);
- pgdat->kswapd_order = 0;
- pgdat->kswapd_classzone_idx = MAX_NR_ZONES;
+ alloc_order = reclaim_order = READ_ONCE(pgdat->kswapd_order);
+ classzone_idx = kswapd_classzone_idx(pgdat, classzone_idx);
+ WRITE_ONCE(pgdat->kswapd_order, 0);
+ WRITE_ONCE(pgdat->kswapd_classzone_idx, MAX_NR_ZONES);

ret = try_to_freeze();
if (kthread_should_stop())
    @@ -3625,16 +3661,23 @@
void wakeup_kswapd(struct zone *zone, int order, enum zone_type classzone_idx)
{
    pg_data_t *pgdat;
+    enum zone_type curr_idx;
    if (!managed_zone(zone))
        return;
    if (!cpuset_zone_allowed(zone, GFP_KERNEL | __GFP_HARDWALL))
        return;
+    pgdat = zone->zone_pgdat;
-    pgdat->kswapd_classzone_idx = kswapd_classzone_idx(pgdat,
+    curr_idx = READ_ONCE(pgdat->kswapd_classzone_idx);
+    if (curr_idx == MAX_NR_ZONES || curr_idx < classzone_idx)
+        WRITE_ONCE(pgdat->kswapd_classzone_idx, classzone_idx);
+    if (READ_ONCE(pgdat->kswapd_order) < order)
+        WRITE_ONCE(pgdat->kswapd_order, order);
+    if (!waitqueue_active(&pgdat->kswapd_wait))
        return;
    @@ -3950,7 +3993,13 @@
int page_evictable(struct page *page)
{
    -return !mapping_unevictable(page_mapping(page)) && !PageMlocked(page);
+int ret;
+    /* Prevent address_space of inode and swap cache from being freed */
+    rcu_read_lock();
+    ret = !mapping_unevictable(page_mapping(page)) && !PageMlocked(page);
+    rcu_read_unlock();
+    return ret;
#ifdef CONFIG_SHMEM
--- linux-4.15.0.orig/mm/vmstat.c
+++ linux-4.15.0/mm/vmstat.c
@@ -1161,6 +1161,7 @@
    "nr_vmscan_immediate_reclaim",
    "nr_dirtied",
    "nr_written",
+    "", /* nr_indirectly_reclaimable */

 /* enum writeback_stat_item counters */
    "nr_dirty_threshold",
@@ -1271,10 +1272,8 @@
 #endif
#endif /* CONFIG_MEMORY_BALLOON */
#endif /* CONFIG_DEBUG_TLBFLUSH */
-#ifdef CONFIG_SMP
    "nr_tlb_remote_flush",
    "nr_tlb_remote_flush_received",
-#endif /* CONFIG_SMP */
    "nr_tlb_local_flush_all",
    "nr_tlb_local_flush_one",
#endif /* CONFIG_DEBUG_TLBFLUSH */
@@ -1282,7 +1281,6 @@
 #ifdef CONFIG_DEBUG_VM_VMACACHE
    "vmacache_find_calls",
    "vmacache_find_hits",
-"vmacache_full_flushes",
#endif
#endif
#endif /* CONFIG_SWAP */
    "swap_ra",
@@ -1386,6 +1384,9 @@
 list_for_each(curr, &area->free_list[mtype])
 freecount++;
    seq_printf(m, "%6lu ", freecount);
+spin_unlock_irq(&zone->lock);
+cond_resched();
+spin_lock_irq(&zone->lock);
    }
    seq_putc(m, '\n');
    }
@@ -1568,6 +1569,10 @@
 if (is_zone_first_populated(pgdat, zone)) {
    seq_printf(m, "$n per-node stats$);
    for (i = 0; i < NR_VM_NODE_STAT_ITEMS; i++) {
+/* Skip hidden vmstat items */
+if (*vmstat_text[i + NR_VM_ZONE_STAT_ITEMS +
+ NR_VM_NUMA_STAT_ITEMS] == '\0')
+continue;
+ seq_printf(m, "%n %-12s %lu",
+ vmstat_text[i + NR_VM_ZONE_STAT_ITEMS +
+ NR_VM_NUMA_STAT_ITEMS],
@@ -1739,6 +1744,10 @@
unsigned long *l = arg;
unsigned long off = 1 - (unsigned long *)m->private;
+/* Skip hidden vmstat items. */
+if (*vmstat_text[off] == '\0')
+return 0;
+
+ seq_puts(m, vmstat_text[off]);
+ seq_put_decimal_ull(m, " ", *l);
+ seq_putc(m, '\n');
@@ -1868,12 +1877,13 @@
/*
 * The fast way of checking if there are any vmstat diffs.
- * This works because the diffs are byte sized items.
+ * This works because the diffs are byte sized items.
 */
-if (memchr_inv(p->vm_stat_diff, 0, NR_VM_ZONE_STAT_ITEMS))
+if (memchr_inv(p->vm_stat_diff, 0, NR_VM_ZONE_STAT_ITEMS *
+ sizeof(p->vm_stat_diff[0])))
+ return true;
+#ifdef CONFIG_NUMA
- if (memchr_inv(p->vm_numa_stat_diff, 0, NR_VM_NUMA_STAT_ITEMS))
+ if (memchr_inv(p->vm_numa_stat_diff, 0, NR_VM_NUMA_STAT_ITEMS *
+ sizeof(p->vm_numa_stat_diff[0])))
+ return true;
+#endif
}
@@ -2014,7 +2024,7 @@
 #endif
# ifdef CONFIG_PROC_FS
 proc_create("buddyinfo", 0444, NULL, &buddyinfo_file_operations);
- proc_create("pagetypeinfo", 0444, NULL, &pagetypeinfo_file_operations);
+ proc_create("pagetypeinfo", 0400, NULL, &pagetypeinfo_file_operations);
+ proc_create("vmstat", 0444, NULL, &vmstat_file_operations);
 proc_create("zoneinfo", 0444, NULL, &zoneinfo_file_operations);
 #endif
 --- linux-4.15.0.orig/mm/z3fold.c
+++ linux-4.15.0/mm/z3fold.c
@@ -99,6 +99,7 @@
 #define BUDDY_MASK(0x3)
#define BUDDY_SHIFT2
/**
 * struct z3fold_pool - stores metadata for each z3fold pool
 * @ @ -144,7 +145,8 @ @
 * PAGE_HEADLESS = 0,
 * MIDDLE_CHUNK_MAPPED,
 * NEEDS_COMPACTING,
 * -PAGE_STAILE
 * +PAGE_STAILE,
 * +PAGE_CLAIMED, /* by either reclaim or free */
 * }
/**
***************
* @ @ -173,6 +175,7 @ @
clear_bit(MIDDLE_CHUNK_MAPPED, &page->private);
clear_bit(NEEDS_COMPACTING, &page->private);
clear_bit(PAGE_STAILE, &page->private);
+clear_bit(PAGE_CLAIMED, &page->private);
spin_lock_init(&zhdr->page_lock);
kref_init(&zhdr->refcount);
* @ @ -221,8 +224,11 @ @
unsigned long handle;
handle = (unsigned long)zhdr;
-if (bud != HEADLESS)
- handle += (bud + zhdr->first_num) & BUDDY_MASK;
+if (bud != HEADLESS) {
+ handle |= (bud + zhdr->first_num) & BUDDY_MASK;
+ if (bud == LAST)
+ handle |= (zhdr->last_chunks << BUDDY_SHIFT);
+ }
return handle;
}
@@ -232,6 +238,12 @@
return (struct z3fold_header *) (handle & PAGE_MASK);
}

/* only for LAST bud, returns zero otherwise */
+static unsigned short handle_to_chunks(unsigned long handle)
+{
+ return (handle & ~PAGE_MASK) >> BUDDY_SHIFT;
+}
+
/*
 * (handle & BUDDY_MASK) < zhdr->first_num is possible in encode_handle
* but that doesn't matter. because the masking will result in the

spin_lock_init(&pool->lock);
spin_lock_init(&pool->stale_lock);
pool->unbuddied = __alloc_percpu(sizeof(struct list_head)*NCHUNKS, 2);
+if (!pool->unbuddied)
+goto out_pool;
for_each_possible_cpu(cpu) {
  struct list_head *unbuddied =
  per_cpu_ptr(pool->unbuddied, cpu);
  pool->name = name;
pool->compact_wq = create_singlethread_workqueue(pool->name);
if (!pool->compact_wq)
  goto out;
+goto out_unbuddied;
pool->release_wq = create_singlethread_workqueue(pool->name);
if (!pool->release_wq)
  goto out_wq;
  out_wq:
  destroy_workqueue(pool->compact_wq);
  out:
  +out_unbuddied:
  +free_percpu(pool->unbuddied);
  +out_pool:
  kfree(pool);
  +out:
  return NULL;
}

page = virt_to_page(zhdr);

if (test_bit(PAGE_HEADLESS, &page->private)) {
  /* HEADLESS page stored */
  -bud = HEADLESS;
  -} else {
  -z3fold_page_lock(zhdr);
  -bud = handle_to_buddy(handle);
  -
  -switch (bud) {
  -case FIRST:
  -zhdr->first_chunks = 0;
  -break;
  -case MIDDLE:
  -zhdr->middle_chunks = 0;
zhdr->start_middle = 0;
break;

-case LAST:
-zhdr->last_chunks = 0;
-break;
-default:
-pr_err("%s: unknown bud %d\n", __func__, bud);
-WARN_ON(1);
-z3fold_page_unlock(zhdr);
-return;
+/* if a headless page is under reclaim, just leave.
+ * NB: we use test_and_set_bit for a reason: if the bit
+ * has not been set before, we release this page
+ * immediately so we don't care about its value any more.
+ */
+if (!test_and_set_bit(PAGE_CLAIMED, &page->private)) {
+spin_lock(&pool->lock);
+list_del(&page->lru);
+spin_unlock(&pool->lock);
+free_z3fold_page(page);
+atomic64_dec(&pool->pages_nr);
} 
+return;
}

-if (bud == HEADLESS) {
-spin_lock(&pool->lock);
-list_del(&page->lru);
-spin_unlock(&pool->lock);
-free_z3fold_page(page);
-atomic64_dec(&pool->pages_nr);
+/* Non-headless case */
+z3fold_page_lock(zhdr);
+bud = handle_to_buddy(handle);
+
+switch (bud) {
+case FIRST:
+zhdr->first_chunks = 0;
+break;
+case MIDDLE:
+zhdr->middle_chunks = 0;
+break;
+case LAST:
+zhdr->last_chunks = 0;
+break;
+default:
+pr_err("%s: unknown bud %d\n", __func__, bud);
+WARN_ON(1);
atomic64_dec(&pool->pages_nr);
return;
}

if (test_bit(PAGE_CLAIMED, &page->private)) {
	z3fold_page_unlock(zhdr);
	return;
}
if (test_and_set_bit(NEEDS_COMPACTING, &page->private)) {
    z3fold_page_unlock(zhdr);
    return;
}

++@
++@
atomic64_dec(&pool->pages_nr);
return;
}

list_for_each_prev(pos, &pool->lru) {
    page = list_entry(pos, struct page, lru);
    +/* this bit could have been set by free, in which case  *
    + * we pass over to the next page in the pool.      *
    + */
    +if (test_and_set_bit(PAGE_CLAIMED, &page->private))
    +continue;
    +
    +zhdr = page_address(page);
    if (test_bit(PAGE_HEADLESS, &page->private))
        /* candidate found */
        break;

-@ zhdr = page_address(page);
-@ if (!z3fold_page_trylock(zhdr))
    +if (!z3fold_page_trylock(zhdr)) {
        zhdr = NULL;
        continue; /* can't evict at this point */
    +}
    kref_get(&zhdr->refcount);
    list_del_init(&zhdr->buddy);
    zhdr->cpu = -1;
    +break;
}

+@ zhdr = page_address(page);
+if (!zhdr)
+len break;
+
list_del_init(&page->lru);
spin_unlock(&pool->lock);
goto next;

next:
-spin_lock(&pool->lock);
if (test_bit(PAGE_HEADLESS, &page->private)) {
  if (ret == 0) {
    -spin_unlock(&pool->lock);
    free_z3fold_page(page);
+atomic64_dec(&pool->pages_nr);
    return 0;
  } else if (kref_put(&zhdr->refcount, release_z3fold_page)) {
    -spin_lock(&pool->lock);
    list_add(&page->lru, &pool->lru);
    spin_unlock(&pool->lock);
  } else {
    +z3fold_page_lock(zhdr);
    +clear_bit(PAGE_CLAIMED, &page->private);
    +if (kref_put(&zhdr->refcount, release_z3fold_page_locked)) {
      +atomic64_dec(&pool->pages_nr);
      +return 0;
    +}
  /*
  */
  +/*
  +* if we are here, the page is still not completely
  +* free. Take the global pool lock then to be able
  +* to add it back to the lru list
  +*/
  +spin_lock(&pool->lock);
  +list_add(&page->lru, &pool->lru);
  spin_unlock(&pool->lock);
  -return 0;
  +z3fold_page_unlock(zhdr);
} */

-/*
 - * Add to the beginning of LRU.
 - * Pool lock has to be kept here to ensure the page has
 - * not already been released
 - */
-list_add(&page->lru, &pool->lru);
+/* We started off locked to we need to lock the pool back */
+spin_lock(&pool->lock);
}
spin_unlock(&pool->lock);
return -EAGAIN;
@@ -938,7 +984,7 @@
      set_bit(MIDDLE_CHUNK_MAPPED, &page->private);
break;

case LAST:
-addr += PAGE_SIZE - (zhdr->last_chunks << CHUNK_SHIFT);
+addr += PAGE_SIZE - (handle_to_chunks(handle) << CHUNK_SHIFT);
break;
default:
  pr_err("unknown buddy id %d\n", buddy);
--- linux-4.15.0.orig/mm/zsmalloc.c
+++ linux-4.15.0/mm/zsmalloc.c
@@ -52,6 +52,7 @@
#include <linux/zpool.h>
#include <linux/mount.h>
#include <linux/migrate.h>
+#include <linux/wait.h>
#include <linux/pagemap.h>
#include <linux/fs.h>

@@ -268,6 +269,10 @@
#endif
};

@@ -1879,6 +1884,31 @@
zspage->isolated--;}
}

+static void putback_zspage_deferred(struct zs_pool *pool,
+   struct size_class *class,
+   struct zspage *zspage)
+{
+  enum fullness_group fg;
+  +fg = putback_zspage(class, zspage);
+  +if (fg == ZS_EMPTY)
+    +schedule_work(&pool->free_work);
+  +}
+}
+static inline void zs_pool_dec_isolated(struct zs_pool *pool)
+VM BUG_ON(atomic_long_read(&pool->isolated_pages) <= 0);
+atomic_long_dec(&pool->isolated_pages);
+/
+ * There's no possibility of racing, since wait_for_isolated_drain()
+ * checks the isolated count under &class->lock after enqueuing
+ * on migration_wait.
+ */
+if (atomic_long_read(&pool->isolated_pages) == 0 && pool->destroying)
+wake_up_all(&pool->migration_wait);
+}
+
+static void replace_sub_page(struct size_class *class, struct zspage *zspage,
+struct page *newpage, struct page *oldpage)
+
+static void replace_sub_page(struct size_class *class, struct zspage *zspage,
+struct page *newpage, struct page *oldpage)
+{
+ @@ -1948,6 +1978,7 @@
+ /*
+ if (!list_empty(&zspage->list) && !is_zspage_isolated(zspage)) {
+ get_zspage_mapping(zspage, &class_idx, &fullness);
+atomic_long_inc(&pool->isolated_pages);
+remove_zspage(class, zspage, fullness);
+}
+ @@ -2047,8 +2078,21 @@
+ * Page migration is done so let's putback isolated zspage to
+ * the list if @page is final isolated subpage in the zspage.
+ */
+-if (!is_zspage_isolated(zspage))
-putback_zspage(class, zspage);
+if (!is_zspage_isolated(zspage)) {
+ /*
+ * We cannot race with zs_destroy_pool() here because we wait
+ * for isolation to hit zero before we start destroying.
+ * Also, we ensure that everyone can see pool->destroying before
+ * we start waiting.
+ */
+putback_zspage_deferred(pool, class, zspage);
+zs_pool_dec_isolated(pool);
+}
+
+if (page_zone(newpage) != page_zone(page)) {
+dec_zone_page_state(page, NR_ZSPAGES);
+inc_zone_page_state(newpage, NR_ZSPAGES);
+}
+
+reset_page(page);
+put_page(page);
+ @@ -2094,13 +2138,12 @@
spin_lock(&class->lock);
deck_zspage_isolation(zspage);
if (!is_zspage_isolated(zspage)) {
    fg = putback_zspage(class, zspage);
    /*
     * Due to page_lock, we cannot free zspage immediately
     * so let's defer.
     */
    -if (fg == ZS_EMPTY)
    -schedule_work(&pool->free_work);
+putback_zspage_deferred(pool, class, zspage);
+zs_pool_dec_isolated(pool);
}
spin_unlock(&class->lock);
}
return 0;

+static bool pool_isolated_are_drained(struct zs_pool *pool)
+{
+    return atomic_long_read(&pool->isolated_pages) == 0;
+}
+/* Function for resolving migration */
+static void wait_for_isolated_drain(struct zs_pool *pool)
+{
+    /*
     * We're in the process of destroying the pool, so there are no
     * active allocations. zs_page_isolate() fails for completely free
     * zspages, so we need only wait for the zs_pool's isolated
     * count to hit zero.
     */
+    +wait_event(pool->migration_wait,
+        pool_isolated_are_drained(pool));
+}
+
static void zs_unregister_migration(struct zs_pool *pool)
{
    +pool->destroying = true;
    /*
     * We need a memory barrier here to ensure global visibility of
     * pool->destroying. Thus pool->isolated pages will either be 0 in which
     * case we don't care, or it will be > 0 and pool->destroying will
     * ensure that we wake up once isolation hits 0.
     */
    +smp_mb();
wait_for_isolated_drain(pool); /* This can block */
flush_work(&pool->free_work);
iput(pool->inode);
}
@@ -2211,11 +2282,13 @@
return obj_wasted * class->pages_per_zspage;
}

- static void __zs_compact(struct zs_pool *pool, struct size_class *class)
+ static unsigned long __zs_compact(struct zs_pool *pool, 
+ struct size_class *class)
{
 struct zs_compact_control cc;
 struct zspage *src_zspage;
 struct zspage *dst_zspage = NULL;
+ unsigned long pages_freed = 0;

 spin_lock(&class->lock);
 while ((src_zspage = isolate_zspage(class, true))) {
@@ -2245,7 +2318,7 @@
 putback_zspage(class, dst_zspage);
 if (putback_zspage(class, src_zspage) == ZS_EMPTY) {
 free_zspage(pool, class, src_zspage);
-pool->stats.pages_compacted += class->pages_per_zspage;
+pages_freed += class->pages_per_zspage;
 }
 spin_unlock(&class->lock);
 cond_resched();
@@ -2256,12 +2329,15 @@
 putback_zspage(class, src_zspage);
 spin_unlock(&class->lock);
 +
 + return pages_freed;
 } }

 unsigned long zs_compact(struct zs_pool *pool) 
{
 int i;
 struct size_class *class;
+ unsigned long pages_freed = 0;

 for (i = ZS_SIZE_CLASSES - 1; i >= 0; i--) {
 class = pool->size_class[i];
@@ -2269,10 +2345,11 @@
 continue;
 if (class->index != i)
 continue;

-__zs_compact(pool, class);
+pages_freed += __zs_compact(pool, class);
}
+atomic_long_add(pages_freed, &pool->stats.pages_compacted);

-return pool->stats.pages_compacted;
+return pages_freed;
}
EXPORT_SYMBOL_GPL(zs_compact);

@@ -2289,13 +2366,12 @@
struct zs_pool *pool = container_of(shrinker, struct zs_pool, shrinker);

-pages_freed = pool->stats.pages_compacted;
/*
 * Compact classes and calculate compaction delta.
 * Can run concurrently with a manually triggered
 * (by user) compaction.
 */
-pages_freed = zs_compact(pool) - pages_freed;
+pages_freed = zs_compact(pool);

return pages_freed ? pages_freed : SHRINK_STOP;
}
@@ -2366,6 +2442,10 @@
if (!pool->name)
goto err;
+
+if (create_cache(pool))
goto err;
+
+if (PageTransHuge(page)) {
+    ret = -EINVAL;
+    goto reject;
+}

--- linux-4.15.0.orig/mm/zswap.c
+++ linux-4.15.0/mm/zswap.c
@@ -970,6 +970,12 @@
u8 *src, *dst;
 struct zswap_header *zhdr;

+/* THP isn't supported */
+if (PageTransHuge(page)) {
+    ret = -EINVAL;
+    goto reject;
+}
if (!zswap_enabled || !tree) {
    ret = -ENODEV;
    goto reject;
@@ -983,6 +989,15 @@
    ret = -ENOMEM;
    goto reject;
}
+
+/* A second zswap_is_full() check after
+ * zswap_shrink() to make sure it's now
+ * under the max_pool_percent
+ */
+if (zswap_is_full()) {
+    ret = -ENOMEM;
+    goto reject;
+}
+
/* allocate entry */
--- linux-4.15.0.orig/net/6lowpan/iphc.c
+++ linux-4.15.0/net/6lowpan/iphc.c
@@ -770,6 +770,7 @@
    skb_push(skb, sizeof(hdr));
    skb_reset_mac_header(skb);
    skb_reset_network_header(skb);
    skb_copy_to_linear_data(skb, &hdr, sizeof(hdr));

--- linux-4.15.0.orig/net/6lowpan/nhc.c
+++ linux-4.15.0/net/6lowpan/nhc.c
@@ -18,7 +18,7 @@
#include "nhc.h"

static struct rb_root rb_root = RB_ROOT;
-static struct lowpan_nhc *lowpan_nexthdr_nhcs[NEXTHDR_MAX];
+static struct lowpan_nhc *lowpan_nexthdr_nhcs[NEXTHDR_MAX + 1];
static DEFINE_SPINLOCK(lowpan_nhc_lock);

static int lowpan_nhc_insert(struct lowpan_nhc *nhc)
--- linux-4.15.0.orig/net/802/garp.c
+++ linux-4.15.0/net/802/garp.c
@@ -206,6 +206,19 @@
    kfree(attr);
}
+
+static void garp_attr_destroy_all(struct garp_applicant *app)
+struct rb_node *node, *next;
+struct garp_attr *attr;
+
+for (node = rb_first(&app->gid);
+     next = node ? rb_next(node) : NULL, node != NULL;
+     node = next) {
+attr = rb_entry(node, struct garp_attr, node);
+garp_attr_destroy(app, attr);
+}
+
+static int garp_pdu_init(struct garp_applicant *app)
+{
struct sk_buff *skb;
@@ -612,6 +625,7 @@
spin_lock_bh(&app->lock);
garp_gid_event(app, GARP_EVENT_TRANSMIT_PDU);
+garp_attr_destroy_all(app);
garp_pdu_queue(app);
spin_unlock_bh(&app->lock);

--- linux-4.15.0.orig/net/802/mrp.c
+++ linux-4.15.0/net/802/mrp.c
@@ -295,6 +295,19 @@
kfree(attr);
}

+static void mrp_attr_destroy_all(struct mrp_applicant *app)
+{
+struct rb_node *node, *next;
+struct mrp_attr *attr;
+
+for (node = rb_first(&app->mad);
+     next = node ? rb_next(node) : NULL, node != NULL;
+     node = next) {
+attr = rb_entry(node, struct mrp_attr, node);
+mrp_attr_destroy(app, attr);
+}
+
+static int mrp_pdu_init(struct mrp_applicant *app)
+{
struct sk_buff *skb;
@@ -898,6 +911,7 @@
spin_lock_bh(&app->lock);
mrp_mad_event(app, MRP_EVENT_TX);

+mrp_attr_destroy_all(app);
mrp_pdu_queue(app);
spin_unlock_bh(&app->lock);

--- linux-4.15.0.orig/net/8021q/vlan.c
+++ linux-4.15.0/net/8021q/vlan.c
@@ -272,7 +272,8 @@
 return 0;
 out_free_newdev:
- if (new_dev->reg_state == NETREG_UNINITIALIZED)
+ if (new_dev->reg_state == NETREG_UNINITIALIZED ||
+ new_dev->reg_state == NETREG_UNREGISTERED)
 free_netdev(new_dev);
 return err;
 }
@@ -667,7 +668,7 @@
 out_unlock:
 rcu_read_unlock();
 out:
- skb_gro_flush_final(skb, pp, flush);
+ skb_gro_flush_final(skb, pp, flush);

 return pp;
 }
--- linux-4.15.0.orig/net/8021q/vlan.h
+++ linux-4.15.0/net/8021q/vlan.h
@@ -110,6 +110,7 @@
 void vlan_setup(struct net_device *dev);
 int register_vlan_dev(struct net_device *dev, struct netlink_ext_ack *extack);
 void unregister_vlan_dev(struct net_device *dev, struct list_head *head);
+ void vlan_dev_uninit(struct net_device *dev);
 bool vlan_dev_inherit_address(struct net_device *dev,
 struct net_device *real_dev);

--- linux-4.15.0.orig/net/8021q/vlan_core.c
+++ linux-4.15.0/net/8021q/vlan_core.c
@@ -48,8 +48,8 @@
 /* original position later
 */
 skb_push(skb, offset);
- skb = *skbp = vlan_insert_tag(skb, skb->vlan_proto,
- skb->vlan_tci);
+ skb = *skbp = vlan_insert_inner_tag(skb, skb->vlan_proto,
+ skb->vlan_tci, skb->mac_len);
 if (!skb)
 return false;
 skb_pull(skb, offset + VLAN_HLEN);
--- linux-4.15.0.orig/net/8021q/vlan_dev.c
+++ linux-4.15.0/net/8021q/vlan_dev.c
@@ -29,6 +29,7 @@
    #include <linux/etherdevice.h>
    #include <linux/ethtool.h>
    +#include <linux/phy.h>
    #include <net/arp.h>
    #include <net/switchdev.h>

@@ -365,10 +366,12 @@
    ifrr.ifr_ifru = ifr->ifr_ifru;

    switch (cmd) {
+    case SIOCSHWTSTAMP:
        +if (!net_eq(dev_net(dev), &init_net))
+        break;
    case SIOCGMIIPHY:
    case SIOCGMIIREG:
    case SIOCMIIREG:
-case SIOCSHWTSTAMP:
+    case SIOCSHWTSTAMP:
    case SIOCGHWTSTAMP:
        if (netif_device_present(real_dev) && ops->ndo_do_ioctl)
            err = ops->ndo_do_ioctl(real_dev, &ifrr, cmd);
@@ -569,6 +572,7 @@
    netdev_warn(real_dev, "VLAN features are set incorrectly. Q-in-Q configurations may not work correctly.");

    dev->vlan_features = real_dev->vlan_features & ~NETIF_F_ALL_FCOE;
    +dev->mpls_features = real_dev->mpls_features;

    /* ipv6 shared card related stuff */
    dev->dev_id = real_dev->dev_id;
@@ -607,7 +611,8 @@
    return 0;
}

-static void vlan_dev_uninit(struct net_device *dev)
+/* Note: this function might be called multiple times for the same device. */
+void vlan_dev_uninit(struct net_device *dev)
{
    struct vlan_priority_tci_mapping *pm;
    struct vlan_dev_priv *vlan = vlan_dev_priv(dev);
@@ -665,8 +670,11 @@

    const struct vlan_dev_priv *vlan = vlan_dev_priv(dev);
    const struct ethtool_ops *ops = vlan->real_dev->ethtool_ops;
+    +struct phy_device *phydev = vlan->real_dev->phydev;
-if (ops->get_ts_info) {
+if (phydev && phydev->drv && phydev->drv->ts_info) {
  + return phydev->drv->ts_info(phydev, info);
  +} else if (ops->get_ts_info) {
    return ops->get_ts_info(vlan->real_dev, info);
  } else {
    info->so_timestamping = SOF_TIMESTAMPING_RX_SOFTWARE |
--- linux-4.15.0.orig/net/8021q/vlan_netlink.c
+++ linux-4.15.0/net/8021q/Vlan_netlink.c
@@ -95,11 +95,13 @@
 struct ifla_vlan_flags *flags;
 struct ifla_vlan_qos_mapping *m;
 struct nlattr *attr;
-int rem;
+int rem, err;

 if (data[IFLA_VLAN_FLAGS]) {
  flags = nla_data(data[IFLA_VLAN_FLAGS]);
-  vlan_dev_change_flags(dev, flags->flags, flags->mask);
+  err = vlan_dev_change_flags(dev, flags->flags, flags->mask);
+  if (err)
+    +return err;
  }

 if (data[IFLA_VLAN_INGRESS_QOS]) {
  nla_for_each_nested(attr, data[IFLA_VLAN_INGRESS_QOS], rem) {
@@ -110,7 +112,9 @@
    if (data[IFLA_VLAN_EGRESS_QOS]) {
      m = nla_data(attr);
-     vlan_dev_set_egress_priority(dev, m->from, m->to);
+     err = vlan_dev_set_egress_priority(dev, m->from, m->to);
+     if (err)
+       +return err;
  }
 }

 return 0;
@@ -158,10 +162,11 @@
 return -EINVAL;

 err = vlan_changelink(dev, tb, data, extack);
-  if (err < 0)
-    -return err;
-    -return register_vlan_dev(dev, extack);
+  if (!err)
+    +err = register_vlan_dev(dev, extack);
+  if (err)
+    +vlan_dev_uninit(dev);
+return err;
}

static inline size_t vlan_qos_map_size(unsigned int n)
--- linux-4.15.0.orig/net/9p/client.c
+++ linux-4.15.0/net/9p/client.c
@@ -181,6 +181,12 @@
     ret = r;
     continue;
 }
+if (option < 4096) {
+    +p9_debug(P9_DEBUG_ERROR,
+    +    "msize should be at least 4k\n");
+    +ret = -EINVAL;
+    +continue;
+}
    clnt->msize = option;
 break;
 case Opt_trans:
@@ -955,7 +961,7 @@
     {
       int err = 0;
       struct p9_req_t *req;
-      char *version;
+      char *version = NULL;
       int msize;

       p9_debug(P9_DEBUG_9P, ">>> TVERSION msize %d protocol %d\n",
@@ -996,10 +1002,18 @@
       else if (!strncmp(version, "9P2000", 6))
       c->proto_version = p9_proto_legacy;
       else {
+        +p9_debug(P9_DEBUG_ERROR,
+        +    "server returned an unknown version: %s\n", version);
+        err = -EREMOTEIO;
+        goto error;
       }
+      if (msize < 4096) {
+        +p9_debug(P9_DEBUG_ERROR,
+        +    "server returned a msize < 4096: %d\n", msize);
+        +err = -EREMOTEIO;
+        +goto error;
+      }
      if (msize < c->msize)
      c->msize = msize;

@@ -1064,6 +1078,13 @@
if (clnt->msize > clnt->trans_mod->maxsize)
clnt->msize = clnt->trans_mod->maxsize;

+if (clnt->msize < 4096) {
+p9_debug(P9_DEBUG_ERROR,
+"Please specify a msize of at least 4k\n");
+err = -EINVAL;
+goto close_trans;
+}
+
err = p9_client_version(clnt);
if (err)
goto close_trans;
--- linux-4.15.0.orig/net/9p/protocol.c
+++ linux-4.15.0/net/9p/protocol.c
@@ -46,10 +46,15 @@
void p9stat_free(struct p9_wstat *stbuf)
{
    kfree(stbuf->name);
+    stbuf->name = NULL;
    kfree(stbuf->uid);
+    stbuf->uid = NULL;
    kfree(stbuf->gid);
+    stbuf->gid = NULL;
    kfree(stbuf->muid);
+    stbuf->muid = NULL;
    kfree(stbuf->extension);
+    stbuf->extension = NULL;
}
EXPORT_SYMBOL(p9stat_free);

@@ -565,9 +570,10 @@
if (ret) {
P9_DEBUG_9P, "<<< p9stat_read failed: %d\n", ret);
trace_9p_protocol_dump(clnt, &fake_pdu);
+    return ret;
    }
-
+    return fake_pdu.offset;
}]
EXPORT_SYMBOL(p9stat_read);

@@ -616,13 +622,19 @@
if (ret) {
P9_DEBUG_9P, "<<< p9dirent_read failed: %d\n", ret);
trace_9p_protocol_dump(clnt, &fake_pdu);
+    return ret;
    }

-return ret;
+    return fake_pdu.offset;
}]
EXPORT_SYMBOL(p9stat_read);

@@ -616,13 +622,19 @@
if (ret) {
P9_DEBUG_9P, "<<< p9dirent_read failed: %d\n", ret);
trace_9p_protocol_dump(clnt, &fake_pdu);
-goto out;
return ret;
}

strcpy(dirent->d_name, nameptr);
ret = strscpy(dirent->d_name, nameptr, sizeof(dirent->d_name));
if (ret < 0) {
    p9_debug(P9_DEBUG_ERROR,
            "On the wire dirent name too long: %s\n",
            nameptr);
    kfree(nameptr);
    return ret;
}
kfree(nameptr);

[out:
return fake_pdu.offset;
]
EXPORT_SYMBOL(p9dirent_read);
--- linux-4.15.0.orig/net/9p/trans_common.c
+++ linux-4.15.0/net/9p/trans_common.c
@@ -14,6 +14,7 @@
#include <linux/mm.h>
#include <linux/module.h>
+#include "trans_common.h"

/**
 * p9_release_req_pages - Release pages after the transaction.
--- linux-4.15.0.orig/net/9p/trans_fd.c
+++ linux-4.15.0/net/9p/trans_fd.c
@@ -185,6 +185,8 @@
        spin_lock_irqsave(&p9_poll_lock, flags);
        list_del_init(&m->poll_pending_link);
        spin_unlock_irqrestore(&p9_poll_lock, flags);
+-flush_work(&p9_poll_work);
} }

/**
 @@ -197,15 +199,14 @@
static void p9_conn_cancel(struct p9_conn *m, int err)
 {
    struct p9_req_t *req, *rtmp;
    -unsigned long flags;
    LIST_HEAD(cancel_list);

    p9_debug(P9_DEBUG_ERROR, "mux %p err %d\n", m, err);
-spin_lock_irqsave(&m->client->lock, flags);
+spin_lock(&m->client->lock);

if (m->err) {
-spin_unlock_irqrestore(&m->client->lock, flags);
+spin_unlock(&m->client->lock);
return;
}

@@ -217,7 +218,6 @@
list_for_each_entry_safe(req, rtmp, &m->unsent_req_list, req_list) {
list_move(&req->req_list, &cancel_list);
}
-spin_unlock_irqrestore(&m->client->lock, flags);

list_for_each_entry_safe(req, rtmp, &cancel_list, req_list) {
  p9_debug(P9_DEBUG_ERROR, "call back req %p\n", req);
@@ -226,6 +226,7 @@
  req->t_err = err;
  p9_client_cb(m->client, req, REQ_STATUS_ERROR);
}
+spin_unlock(&m->client->lock);
}

static int
@@ -300,7 +301,6 @@
{
  int n, err;
  struct p9_conn *m;
-int status = REQ_STATUS_ERROR;

  m = container_of(work, struct p9_conn, rq);

@@ -380,11 +380,22 @@
  if ((m->req) && (m->rc.offset == m->rc.capacity)) {
    p9_debug(P9_DEBUG_TRANS, "got new packet\n");
    spin_lock(&m->client->lock);
-  if (m->req->status != REQ_STATUS_ERROR)
-    status = REQ_STATUS_RCVD;
-  list_del(&m->req->req_list);
+  if (m->req->status == REQ_STATUS_SENT) {
+    list_del(&m->req->req_list);
+    p9_client_cb(m->client, m->req, REQ_STATUS_RCVD);
+  } else if (m->req->status == REQ_STATUS_FLSHD) {
+    /* Ignore replies associated with a cancelled request. */
+    p9_debug(P9_DEBUG_TRANS,
+    "Ignore replies associated with a cancelled request\n");
+  } else {
spin_unlock(&m->client->lock);
+spin_unlock(&m->client->lock);
+p9_client_cb(m->client, m->req, status);
m->rc.sdata = NULL;
m->rc.offset = 0;
m->rc.capacity = 0;
{
  p9_debug(P9_DEBUG_TRANS, "client %p req %p\n", client, req);

  spin_lock(&client->lock);
  /* Ignore cancelled request if message has been received
   * before lock.
   */
  if (req->status == REQ_STATUS_RCVD) {
    spin_unlock(&client->lock);
    return 0;
  }
  /* we haven't received a response for oldreq,
   * remove it from the list.
   */
  -spin_lock(&client->lock);
  list_del(&req->req_list);
  req->status = REQ_STATUS_FLSHD;
  spin_unlock(&client->lock);
  return 0;
  }
}
return -ENOMEM;
ts->rd = fget(rfd);
+if (!ts->rd)
  goto out_free_ts;
+if (!(ts->rd->f_mode & FMODE_READ))
  goto out_put_rd;
ts->wr = fget(wfd);
-if (ts->rd || !ts->wr) {
  -if (ts->rd)
    -fput(ts->rd);
  -if (ts->wr)
    -fput(ts->wr);
static int p9_socket_open(struct p9_client *client, struct socket *csocket)
{
    if (err < 0)
        return err;

    if (addr == NULL || valid_ipaddr4(addr) < 0)
        return -EINVAL;

    csocket = NULL;

    if (!addr || !strlen(addr))
        return -EINVAL;

    if (strlen(addr) >= UNIX_PATH_MAX) {
        pr_err("%s (%d): address too long: %s\n",
               __func__, task_pid_nr(current), addr);
        --- linux-4.15.0.orig/net/9p/trans_rdma.c
        +++ linux-4.15.0/net/9p/trans_rdma.c
        @@ -276,7 +276,6 @@
        case RDMA_CM_EVENT_DISCONNECTED:
            if (rdma)
                rdma->state = P9_RDMA_CLOSED;
        }
-if (c)
-c->status = Disconnected;
+c->status = Disconnected;
break;

case RDMA_CM_EVENT_TIMEWAIT_EXIT:
@@ -476,7 +475,7 @@
err = post_recv(client, rpl_context);
if (err) {
-p9_debug(P9_DEBUG_FCALL, "POST RECV failed\n");
+p9_debug(P9_DEBUG_ERROR, "POST RECV failed: %d\n", err);
goto recv_error;
} /* remove posted receive buffer from request structure */
@@ -545,7 +544,7 @@
recv_error:
kfree(rpl_context);
spin_lock_irqsave(&rdma->req_lock, flags);
-if (rdma->state < P9_RDMA_CLOSING) {
+if (err != -EINTR && rdma->state < P9_RDMA_CLOSING) {
rdma->state = P9_RDMA_CLOSING;
spin_unlock_irqstore(&rdma->req_lock, flags);
rdma_disconnect(rdma->cm_id);
@@ -646,6 +645,9 @@
struct rdma_conn_param conn_param;
struct ib_qp_init_attr qp_attr;

+if (addr == NULL)
+return -EINVAL;
+
+ /* Parse the transport specific mount options */
err = parse_opts(args, &opts);
if (err < 0)
--- linux-4.15.0.orig/net/9p/trans_virtio.c
+++ linux-4.15.0/net/9p/trans_virtio.c
@@ @ -160,7 +160,8 @@
spin_unlock_irqrestore(&chan->lock, flags);
/* Wakeup if anyone waiting for VirtIO ring space */
wake_up(chan->vc_wq);
-p9_client_cb(chan->client, req, REQ_STATUS_RCVD);
+if (len)
+p9_client_cb(chan->client, req, REQ_STATUS_RCVD);
}
}

@@ @ -188,7 +189,7 @@
s = rest_of_page(data);
if (s > count)
s = count;
-BUG_ON(index > limit);
+BUG_ON(index >= limit);
/* Make sure we don't terminate early. */
sg_unmark_end(&sg[index]);
sg_set贲(buf(&sg[index++], data, s);
@@ -233,6 +234,7 @@
s = PAGE_SIZE - data_off;
if (s > count)
s = count;
+BUG_ON(index >= limit);
/* Make sure we don't terminate early. */
sg_unmark_end(&sg[index]);
sg_set贲_page(&sg[index++], pdata[i++], s, data_off);
@@ -405,6 +407,7 @@
p9_debug(P9_DEBUG_TRANS, "virtio request\n");

if (uodata) {
  __le32 sz;
  int n = p9_get_mapped_pages(chan, &out_pages, uodata,
      outlen, &offs, &need_drop);
  if (n < 0)
    @ @ -415,6 +418,12 @@
     memcpy(&req->tc->sdata[req->tc->size - 4], &v, 4);
    outlen = n;
  }
  /* The size field of the message must include the length of the
   + header and the length of the data. We didn't actually know
   + the length of the data until this point so add it in now.
   + */
  +sz = cpu_to_le32(req->tc->size + outlen);
  +memcpy(&req->tc->sdata[0], &sz, sizeof(sz));
} else if (uidata) {
  int n = p9_get_mapped_pages(chan, &in_pages, uidata,
      inlen, &offs, &need_drop);
  @ @ -562,7 +571,7 @@
  chan->vq = virtio_find_single_vq(vdev, req_done, "requests");
  if (IS_ERR(chan->vq)) {
    err = PTR_ERR(chan->vq);
    -goto out_free_vq;
    +goto out_free_chan;
  }
  chan->vq->vdev->priv = chan;
  spin_lock_init(&chan->lock);
  @ @ -593,7 +602,7 @@
  chan->vc_wq = kmalloc(sizeof(wait_queue_head_t), GFP_KERNEL);
  if (!chan->vc_wq) {
err = -ENOMEM;
-goto out_free_tag;
+goto out_remove_file;
}
init_waitqueue_head(chan->vc_wq);
chan->ring_bufs_avail = 1;
@@ -611,10 +620,13 @@
return 0;

+out_remove_file:
+sysfs_remove_file(&vdev->dev.kobj, &dev_attr_mount_tag.attr);
out_free_tag:
kfree(tag);
out_free_vq:
vdev->config->del_vqs(vdev);
+out_free_chan:
kfree(chan);
fail:
return err;
@@ -642,6 +654,9 @@

if (devname == NULL)
+return -EINVAL;
+
mutex_lock(&virtio_9p_lock);
list_for_each_entry(chan, &virtio_chan_list, chan_list) {
if (!strncmp(devname, chan->tag, chan->tag_len) &&
@@ -751,10 +766,16 @@
/* The standard init function */
static int __init p9_virtio_init(void)
{
+int rc;
+
INIT_LIST_HEAD(&virtio_chan_list);

v9fs_register_trans(&p9_virtio_trans);
-return register_virtio_driver(&p9_virtio_drv);
+rc = register_virtio_driver(&p9_virtio_drv);
+if (rc)
+v9fs_unregister_trans(&p9_virtio_trans);
+
static void __exit p9_virtio_cleanup(void)
--- linux-4.15.0.orig/net/9p/trans_xen.c
+++ linux-4.15.0/net/9p/trans_xen.c
@@ -95,6 +95,9 @@
{
    struct xen_9pfs_front_priv *priv = NULL;
    +if (addr == NULL)
    +    return -EINVAL;
    +
    read_lock(&xen_9pfs_lock);
    list_for_each_entry(priv, &xen_9pfs_devs, list) {
        if (!strcmp(priv->tag, addr)) {
@@ -136,7 +139,7 @@
static int p9_xen_request(struct p9_client *client, struct p9_req_t *p9_req)
{
    struct xen_9pfs_front_priv *priv = NULL;
    +struct xen_9pfs_front_priv *priv;
    RING_IDX cons, prod, masked_cons, masked_prod;
    unsigned long flags;
    u32 size = p9_req->tc->size;
@@ -149,7 +152,7 @@
        break;
    }
    read_unlock(&xen_9pfs_lock);
    +if (!priv || priv->client != client)
    +    return -EINVAL;
    num = p9_req->tc->tag % priv->num_rings;
    @@ -389,8 +392,8 @@
    unsigned int max_rings, max_ring_order, len = 0;

    versions = xenbus_read(XBT_NIL, dev->otherend, "versions", &len);
    -if (!len)
    -    return -EINVAL;
    +if (IS_ERR(versions))
    +    return PTR_ERR(versions);
    if (strcmp(versions, "1")) {
        kfree(versions);
        return -EINVAL;
@@ -527,13 +530,19 @@
static int p9_trans_xen_init(void)
{
    +int rc;
    +
    if (!xen_domain())

return -ENOMEM;

pr_info("Initialising Xen transport for 9pfs\n");

v9fs_register_trans(&p9_xen_trans);
return xenbus_register_frontend(&xen_9pfs_front_driver);
+rc = xenbus_register_frontend(&xen_9pfs_front_driver);
+if (rc)
+v9fs_unregister_trans(&p9_xen_trans);
+
+return rc;
}

module_init(p9_trans_xen_init);

--- linux-4.15.0.orig/net/Makefile
+++ linux-4.15.0/net/Makefile
@@ -18,7 +18,7 @@
 obj-$(CONFIG_INET) += ipv4/
 obj-$(CONFIG_TLS) += tls/
 obj-$(CONFIG_XFRM) += xfrm/
-obj-$(CONFIG_UNIX) += unix/
+obj-$(CONFIG_UNIX_SCM) += unix/
 obj-$(CONFIG_UNIX) += unix/
 obj-$(CONFIG_NET) += ipv6/
 obj-$(CONFIG_PACKET) += packet/
 obj-$(CONFIG_NET_KEY) += key/
--- linux-4.15.0.orig/net/appletalk/aarp.c
+++ linux-4.15.0/net/appletalk/aarp.c
@@ -879,15 +879,24 @@
 static unsigned char aarp_snap_id[] = { 0x00, 0x00, 0x00, 0x80, 0xF3 }

-void __init aarp_proto_init(void)
+int __init aarp_proto_init(void)
 {
 +int rc;
 +
aarp_dl = register_snap_client(aarp_snap_id, aarp_rcv);
-+if (!aarp_dl)
++if (!aarp_dl) {
+printk(KERN_CRIT "Unable to register AARP with SNAP.\n");
+return -ENOMEM;
+
+}
+timer_setup(&aarp_timer, aarp_expire_timeout, 0);
aarp_timer.expires  = jiffies + sysctl_aarp_expiry_time;
add_timer(&aarp_timer);
-register_netdevice_notifier(&aarp_notifier);
+rc = register_netdevice_notifier(&aarp_notifier);
+if (rc) {
+del_timer_sync(&aarp_timer);
+unregister_snap_client(aarp_dl);
+
+return rc;
}

/* Remove the AARP entries associated with a device. */
--- linux-4.15.0.orig/net/appletalk/atalk_proc.c
+++ linux-4.15.0/net/appletalk/atalk_proc.c
@@ -293,7 +293,7 @@
    goto out;
}

-void __exit atalk_proc_exit(void)
+void atalk_proc_exit(void)
{
    remove_proc_entry("interface", atalk_proc_dir);
    remove_proc_entry("route", atalk_proc_dir);
--- linux-4.15.0.orig/net/appletalk/ddp.c
+++ linux-4.15.0/net/appletalk/ddp.c
@@ -1028,6 +1028,11 @@
    */
    if (sock->type != SOCK_RAW && sock->type != SOCK_DGRAM)
        goto out;
+    +rc = -EPERM;
+    +if (sock->type == SOCK_RAW && !kern && !capable(CAP_NET_RAW))
+        goto out;
+    +
+    rc = -ENOMEM;
    sk = sk_alloc(net, PF_APPLETALK, GFP_KERNEL, &ddp_proto, kern);
    if (!sk)
        @@ -1569,8 +1574,8 @@
            skb);
            struct net_device *dev;
            struct ddpehdr *ddp;
-int size;
-+struct atalk_route *rt;
+int size, hard_header_len;
+struct atalk_route *rt, *rt_lo = NULL;
    int err;

    if (flags & ~(MSG_DONTWAIT|MSG_CMSG_COMPAT))
        @@ -1633,7 +1638,22 @@
            SOCK_DEBUG(skb, "SK %p: Size needed %d, device %s\n", sk, size, dev->name);
-
-size += dev->hard_header_len;
/* Leave room for loopback hardware header if necessary */
+if (usat->sat_addr.s_node == ATADDR_BCAST &&
  (dev->flags & IFF_LOOPBACK || !(rt->flags & RTF_GATEWAY))) {
+struct atalk_addr at_lo;
+
+at_lo.s_node = 0;
+at_lo.s_net  = 0;
+
+rt_lo = atrtr_find(&at_lo);
+
+if (rt_lo && rt_lo->dev->hard_header_len > hard_header_len)
+hard_header_len = rt_lo->dev->hard_header_len;
+
+size += hard_header_len;
release_sock(sk);
skb = sock_alloc_send_skb(sk, size, (flags & MSG_DONTWAIT), &err);
lock_sock(sk);
@@ -1641,7 +1661,7 @@
goto out;

skb_reserve(skb, ddp_dl->header_length);
-skb_reserve(skb, dev->hard_header_len);
+skb_reserve(skb, hard_header_len);
skb->dev = dev;

SOCK_DEBUG(sk, "SK %p: Begin build.\n", sk);
@@ -1692,18 +1712,12 @@
/* loop back */
skb_orphan(skb);
if (ddp->deh_dnode == ATADDR_BCAST) {
-struct atalk_addr at_lo;
-
-at_lo.s_node = 0;
-at_lo.s_net  = 0;
-
-rt = atrtr_find(&at_lo);
-if (!rt) {
+if (!rt) {
+ktfree_skb(skb);
err = -ENETUNREACH;
goto out;
}
-dev = rt->dev;
+dev = rt_lo->dev;
skb->dev = dev;
}
ddp_dl->request(ddp_dl, skb, dev->dev_addr);
@@ 1905,31 +1919,61 @@
EXPORT_SYMBOL(attrr_get_dev);
EXPORT_SYMBOL(atalk_find_dev_addr);

- static const char atalk_err_snap[] __initconst =
- KERN_CTR "Unable to register DDP with SNAP:\n";
- 
/* Called by proto.c on kernel start up */
static int __init atalk_init(void)
{
  int rc = proto_register(&ddp_proto, 0);
  int rc;

  -if (rc != 0)
  +rc = proto_register(&ddp_proto, 0);
  +if (rc)
  goto out;

  -(void)sock_register(&atalk_family_ops);
  +rc = sock_register(&atalk_family_ops);
  +if (rc)
  +goto out_proto;
  +
  ddp_dl = register_snap_client(ddp_snap_id, atalk_rcv);
  -if (!ddp_dl)
  -printk(atalk_err_snap);
  +if (!ddp_dl) {
  +pr_crit("Unable to register DDP with SNAP:\n");
  +rc = -ENOMEM;
  +goto out_sock;
  +}

  dev_add_pack(&ltalk_packet_type);
  dev_add_pack(&ppptalk_packet_type);

  -register_netdevice_notifier(&ddp_notifier);
  -aarp_proto_init();
  -atalk_proc_init();
  -atalk_register_sysctl();
  +rc = register_netdevice_notifier(&ddp_notifier);
  +if (rc)
  +goto out_snap;
  +
  +rc = aarp_proto_init();
  +if (rc)
  +goto out_dev;
  +
+rc = atalk_proc_init();
+if (rc)
+goto out_aarp;
+
+rc = atalk_register_sysctl();
+if (rc)
+goto out_proc;
+out:
+return rc;
+out_proc:
+atalk_proc_exit();
+out_aarp:
+aarp_cleanup_module();
+out_dev:
+unregister_netdevice_notifier(&ddp notifier);
+out_snap:
+dev_remove_pack(&ppptalk_packet_type);
+dev_remove_pack(&ltalk_packet_type);
+unregister_snap_client(ddp dl);
+out_sock:
+sock_unregister(PF_APPLETALK);
+out_proto:
+proto_unregister(&ddp_proto);
+goto out;
}
module_init(atalk_init);

--- linux-4.15.0.orig/net/appletalk/sysctl_net_atalk.c  
+++ linux-4.15.0/net/appletalk/sysctl_net_atalk.c  
@@ -45,9 +45,12 @@  
static struct ctl_table_header *atalk_table_header;

-void atalk_register_sysctl(void)
+int __init atalk_register_sysctl(void)
{  
+atalk_table_header = register_net_sysctl(&init_net, "net/appletalk", atalk_table);
+if (!atalk_table_header)
+return -ENOMEM;
+return 0;
}

void atalk_unregister_sysctl(void)
--- linux-4.15.0.orig/net/atm/br2684.c  
+++ linux-4.15.0/net/atm/br2684.c  
@@ -252,8 +252,7 @@
 ATM_SKB(skb)->vcc = atmvec = brvec->atmvec;
pr_debug("atm_skb(%p)->vcc(%p)->dev(%p)\n", skb, atmvcc, atmvcc->dev);
-refcount_add(skb->truesize, &sk_atm(atmvcc)->sk_wmem_alloc);
-ATM_SKB(skb)->atm_options = atmvcc->atm_options;
+atm_account_tx(atmvcc, skb);
dev->stats.tx_packets++;
dev->stats.tx_bytes += skb->len;

--- linux-4.15.0.orig/net/atm/clip.c
+++ linux-4.15.0/net/atm/clip.c
@@ -381,8 +381,7 @@
 memcpy(here, llc_oui, sizeof(llc_oui));
 ((__be16 *) here)[3] = skb->protocol;
 }
-refcount_add(skb->truesize, &sk_atm(vcc)->sk_wmem_alloc);
-ATM_SKB(skb)->atm_options = vcc->atm_options;
+atm_account_tx(vcc, skb);
entry->vccs->last_use = jiffies;
pr_debug("atm_skb(%p)->vcc(%p)->dev(%p)\n", skb, vcc, vcc->dev);
old = xchg(&entry->vccs->xoff, 1); /* assume XOFF ... */
--- linux-4.15.0.orig/net/atm/common.c
+++ linux-4.15.0/net/atm/common.c
@@ -630,10 +630,9 @@
goto out;
 }
 pr_debug("%d += %d\n", sk_wmem_alloc_get(sk), skb->truesize);
-refcount_add(skb->truesize, &sk->sk_wmem_alloc);
-ATM_SKB(skb)->atm_options = vcc->atm_options;
+atm_account_tx(vcc, skb);
skb->dev = NULL; /* for paths shared with net_device interfaces */
-ATM_SKB(skb)->atm_options = vcc->atm_options;
if (!copy_from_iter_full(skb_put(skb, size), size, &m->msg_iter)) {
    kfree_skb(skb);
    error = -EFAULT;
@@ -668,7 +667,7 @@
    mask |= POLLHUP;
 /* readable? */
 -if (!skb_queue_empty(&sk->sk_receive_queue))
+if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
    mask |= POLLIN | POLLRDNORM;
 /* writable? */
--- linux-4.15.0.orig/net/atm/lec.c
+++ linux-4.15.0/net/atm/lec.c
@@ -41,6 +41,9 @@
#include <linux/module.h>
#include <linux/init.h>

"
+/* Hardening for Spectre-v1 */
+#include <linux/nospec.h>
+
#include "lec.h"
#include "lec_arpc.h"
#include "resources.h"
@@ -179,9 +182,8 @@
struct net_device *dev = skb->dev;

ATM_SKB(skb)->vcc = vcc;
-ATM_SKB(skb)->atm_options = vcc->atm_options;
+atm_account_tx(vcc, skb);

-refcount_add(skb->truesize, &sk_atm(vcc)->sk_wmem_alloc);
if (vcc->send(vcc, skb) < 0) {
    dev->stats.tx_dropped++;
    return;
    @ @ -687.8 +689.10 @@
bytes_left = copy_from_user(&ioc_data, arg, sizeof(struct atmlec_ioc));
if (bytes_left != 0)
    pr_info("copy from user failed for %d bytes\n", bytes_left);
-if (ioc_data.dev_num < 0 || ioc_data.dev_num >= MAX_LEC_ITF ||
 -dev_lec[ioc_data.dev_num])
+if (ioc_data.dev_num < 0 || ioc_data.dev_num >= MAX_LEC_ITF)
    return -EINVAL;
+ioc_data.dev_num = array_index_nospec(ioc_data.dev_num, MAX_LEC_ITF);
+return -EINVAL;
 vpriv = kmalloc(sizeof(struct lec_vcc_priv), GFP_KERNEL);
if (!vpriv)
    @ @ -706.7 +710.10 @@

static int lec_mcast_attach(struct atm_vcc *vcc, int arg)
    {
    -if (arg < 0 || arg >= MAX_LEC_ITF || !dev_lec[arg])
    +if (arg < 0 || arg >= MAX_LEC_ITF)
       +return -EINVAL;
    +arg = array_index_nospec(arg, MAX_LEC_ITF);
    +if (!dev_lec[arg])
       return -EINVAL;
    vcc->proto_data = dev_lec[arg];
    return lec_mcast_make(netdev_priv(dev_lec[arg]), vcc);
    @ @ -724.6 +731.7 @@
    i = arg;
    if (arg >= MAX_LEC_ITF)
       return -EINVAL;
    +i = array_index_nospec(arg, MAX_LEC_ITF);
    if (!dev_lec[i]) {
    

int size;

@@ -1274,6 +1282,12 @@
 entry->recv_vcc = NULL;
 }
 if (entry->recv_vcc) {
+    struct atm_vcc *vcc = entry->recv_vcc;
+    struct lec_vcc_priv *vpriv = LEC_VCC_PRIV(vcc);
+    kfree(vpriv);
+    vcc->user_back = NULL;
+    entry->recv_vcc->push = entry->old_recv_push;
 vcc_release_async(entry->recv_vcc, -EPIPE);
 entry->recv_vcc = NULL;
--- linux-4.15.0.orig/net/atm/mpc.c
+++ linux-4.15.0/net/atm/mpc.c
@@ -555,8 +555,7 @@
sizeof(struct llc_snap_hdr));
} -refcount_add(skb->truesize, &sk_atm(entry->shortcut)->sk_wmem_alloc);
-ATM_SKB(skb)->atm_options = entry->shortcut->atm_options;
+atm_account_tx(entry->shortcut, skb);
entry->shortcut->send(entry->shortcut, skb);
entry->packets_fwded++;
mpc->in_ops->put(entry);
--- linux-4.15.0.orig/net/atm/pppoatm.c
+++ linux-4.15.0/net/atm/pppoatm.c
@@ -350,8 +350,7 @@
return 1;
} -refcount_add(skb->truesize, &sk_atm(ATM_SKB(skb)->vcc)->sk_wmem_alloc);
-ATM_SKB(skb)->atm_options = ATM_SKB(skb)->vcc->atm_options;
+atm_account_tx(vcc, skb);
pr_debug("atm_skb(%p)->vcc(%p)->dev(%p)->vci=%d
skb, ATM_SKB(skb)->vcc, ATM_SKB(skb)->vcc->dev);
ret = ATM_SKB(skb)->vcc->send(ATM_SKB(skb)->vcc, skb)
--- linux-4.15.0.orig/net/atm/raw.c
+++ linux-4.15.0/net/atm/raw.c
@@ -35,8 +35,8 @@
struct sock *sk = sk_atm(vcc);
pr_debug("(%d) %d -= %d
- vcc->vci, sk_wmem_alloc_get(sk), skb->truesize);
-WARN_ON(refcount_sub_and_test(skb->truesize, &sk->sk_wmem_alloc));
+ vcc->vci, sk_wmem_alloc_get(sk), ATM_SKB(skb)->acct_truesize);
WARN_ON(refcount_sub_and_test(ATM_SKB(skb)->acct_truesize, &sk->sk_wmem_alloc));
deck_kfree_skb_any(skb);
sk->sk_write_space(skb);
}
--- linux-4.15.0.orig/net/ax25/af_ax25.c
+++ linux-4.15.0/net/ax25/af_ax25.c
@@ -638,8 +638,10 @@
      break;
  case SO_BINDTODEVICE:
    if (optlen > IFNAMSIZ)
-     optlen = IFNAMSIZ;
+     optlen = IFNAMSIZ - 1;
+     memset(devname, 0, sizeof(devname));

    if (copy_from_user(devname, optval, optlen)) {
      res = -EFAULT;
@@ -653,15 +655,22 @@
      break;
    }
-   dev = dev_get_by_name(&init_net, devname);
+   rtnl_lock();
+   dev = __dev_get_by_name(&init_net, devname);
   if (!dev) {
+     rtnl_unlock();
      res = -ENODEV;
      break;
    }

   ax25->ax25_dev = ax25_dev_ax25dev(dev);
+   if (!ax25->ax25_dev) {
+     rtnl_unlock();
+     res = -ENODEV;
+     break;
+   }
   ax25_fillin_cb(ax25, ax25->ax25_dev);
-   dev_put(dev);
+   rtnl_unlock();
   break;

   default:
@@ -851,6 +860,8 @@
      break;
  case SOCK_RAW:
+if (!capable(CAP_NET_RAW))
+return -EPERM;
break;
default:
return -ESOCKTNOSUPPORT;
@@ -1179,7 +1190,10 @@
if (addr_len > sizeof(struct sockaddr_ax25) &&
    fsa->fsa_ax25.sax25_ndigis != 0) {
    /* Valid number of digipeaters ? */
-    if (fsa->fsa_ax25.sax25_ndigis < 1 || fsa->fsa_ax25.sax25_ndigis > AX25_MAX_DIGIS) {
+    if (fsa->fsa_ax25.sax25_ndigis < 1 ||
+        fsa->fsa_ax25.sax25_ndigis > AX25_MAX_DIGIS ||
+        addr_len < sizeof(struct sockaddr_ax25) +
+        sizeof(ax25_address) * fsa->fsa_ax25.sax25_ndigis) {
err = -EINVAL;
goto out_release;
}
@@ -1499,7 +1513,10 @@
struct full_sockaddr_ax25 *fsa = (struct full_sockaddr_ax25 *)usax;
    /* Valid number of digipeaters ? */
-    if (usax->sax25_ndigis < 1 || usax->sax25_ndigis > AX25_MAX_DIGIS) {
+    if (usax->sax25_ndigis < 1 ||
+        usax->sax25_ndigis > AX25_MAX_DIGIS ||
+        addr_len < sizeof(struct sockaddr_ax25) +
+        sizeof(ax25_address) * usax->sax25_ndigis) {
err = -EINVAL;
goto out;
}
--- linux-4.15.0.orig/net/ax25/ax25_dev.c
+++ linux-4.15.0/net/ax25/ax25_dev.c
@@ -116,6 +116,7 @@
if ((s = ax25_dev_list) == ax25_dev) {
    ax25_dev_list = s->next;
    spin_unlock_bh(&ax25_dev_lock);
+dev->ax25_ptr = NULL;
    dev_put(dev);
    kfree(ax25_dev);
    return;
@@ -125,6 +126,7 @@
if (s->next == ax25_dev) {
    s->next = ax25_dev->next;
    spin_unlock_bh(&ax25_dev_lock);
+dev->ax25_ptr = NULL;
    dev_put(dev);
    kfree(ax25_dev);
    return;
--- linux-4.15.0.orig/net/ax25/ax25_ip.c
+++ linux-4.15.0/net/ax25/ax25_ip.c
@@ -114,6 +114,7 @@
dst = (ax25_address *)(bp + 1);
src = (ax25_address *)(bp + 8);
+ax25_route_lock_use();
route = ax25_get_route(dst, NULL);
if (route) {
digipeat = route->digipeat;
@@ -206,9 +207,8 @@ ax25_queue_xmit(skb, dev);
put:
@if (route)
-ax25_put_route(route);
+ax25_route_lock_unuse();
return NETDEV_TX_OK;
}
--- linux-4.15.0.orig/net/ax25/ax25_route.c
+++ linux-4.15.0/net/ax25/ax25_route.c
@@ -40,7 +40,7 @@
#include <linux/export.h>
static ax25_route *ax25_route_list;
-static DEFINE_RWLOCK(ax25_route_lock);
+DEFINE_RWLOCK(ax25_route_lock);

void ax25_rt_device_down(struct net_device *dev)
{  
@@ -349,6 +349,7 @@
*Find AX.25 route
*
*Only routes with a reference count of zero can be destroyed.
+ *Must be called with ax25_route_lock read locked.
*/
ax25_route *ax25_get_route(ax25_address *addr, struct net_device *dev)
{  
@@ -356,7 +357,6 @
ax25_route *ax25_def_rt = NULL;
ax25_route *ax25_rt;
-read_lock(&ax25_route_lock);
/*
 *Bind to the physical interface we heard them on, or the default
 *route if none is found;
 @@ -379,11 +379,6 @@
if (ax25_spe_rt != NULL)
    ax25_rt = ax25_spe_rt;

    -if (ax25_rt != NULL)
    -ax25_hold_route(ax25_rt);
    -
    -read_unlock(&ax25_route_lock);
    -
    return ax25_rt;

@@ -414,9 +409,12 @@
ax25_route *ax25_rt;
int err = 0;

-if ((ax25_rt = ax25_get_route(addr, NULL)) == NULL)
+ax25_route_lock_use();
+ax25_rt = ax25_get_route(addr, NULL);
+if (!ax25_rt) { 
+    ax25_route_lock_unuse();
    return -EHOSTUNREACH;
    -
    +}
if ((ax25->ax25_dev = ax25_dev_ax25dev(ax25_rt->dev)) == NULL) {
    err = -EHOSTUNREACH;
    goto put;
@@ -445,14 +443,15 @@
}

if (ax25->sk != NULL) {
+    local_bh_disable();
    bh_lock_sock(ax25->sk);
    sock_reset_flag(ax25->sk, SOCK_ZAPPED);
    bh_unlock_sock(ax25->sk);
+    local_bh_enable();
}

put:
    -ax25_put_route(ax25_rt);
    -
    +ax25_route_lock_unuse();
    return err;
}

--- linux-4.15.0.orig/net/batman-adv/bat_iv_ogm.c
+++ linux-4.15.0/net/batman-adv/bat_iv_ogm.c
@@ -34,6 +34,7 @@
#include <linux/kref.h>
static int batadv_iv_ogm_orig_add_if(struct batadv_orig_node *orig_node,
    unsigned int max_if_num)
{
    void *data_ptr;
    size_t old_size;
    /* Return: 0 on success, a negative error code otherwise. */
    static void
    batadv_iv_ogm_drop_bcast_own_entry(struct batadv_orig_node *orig_node,
        unsigned int max_if_num,
        unsigned int del_if_num)
    {
        size_t chunk_size;
        size_t if_offset;
        /* Return: 0 on success, a negative error code otherwise. */
    static void
    batadv_iv_ogm_drop_bcast_own_sum_entry(struct batadv_orig_node *orig_node,
        unsigned int max_if_num,
        unsigned int del_if_num)
    {
        size_t if_offset;
        void *data_ptr;
        /* Return: 0 on success, a negative error code otherwise. */
    static int batadv_iv_ogm_orig_del_if(struct batadv_orig_node *orig_node,
        unsigned int max_if_num,
        unsigned int del_if_num)
    {
        spin_lock_bh(&orig_node->bat_iv.ogm_cnt_lock);
    }
struct batadv_orig_node *orig_node;
-int size, hash_added;
+int hash_added;
+size_t size;

orig_node = batadv_orig_hash_find(bat_priv, addr);
if (orig_node)
@@ -366,14 +371,18 @@
unsigned char *ogm_buff;
u32 random_seqno;

+mutex_lock(&hard_iface->bat_iv.ogm_buff_mutex);
+
/* randomize initial seqno to avoid collision */
get_random_bytes(&random_seqno, sizeof(random_seqno));
atomic_set(&hard_iface->bat_iv.ogm_seqno, random_seqno);

hard_iface->bat_iv.ogm_buff_len = BATADV_OGM_HLEN;
ogm_buff = kmalloc(hard_iface->bat_iv.ogm_buff_len, GFP_ATOMIC);
-if (!ogm_buff)
+if (!ogm_buff) {
+mutex_unlock(&hard_iface->bat_iv.ogm_buff_mutex);
return -ENOMEM;
+
hard_iface->bat_iv.ogm_buff = ogm_buff;

@@ -385,35 +394,59 @@
batadv_ogm_packet->reserved = 0;
batadv_ogm_packet->tq = BATADV_TQ_MAX_VALUE;

+mutex_unlock(&hard_iface->bat_iv.ogm_buff_mutex);
+
return 0;
}

static void batadv_iv_ogm_iface_disable(struct batadv_hard_iface *hard_iface)
{
+mutex_lock(&hard_iface->bat_iv.ogm_buff_mutex);
+
kfree(hard_iface->bat_iv.ogm_buff);
hard_iface->bat_iv.ogm_buff = NULL;
+
+mutex_unlock(&hard_iface->bat_iv.ogm_buff_mutex);
}

static void batadv_iv_ogm_iface_update_mac(struct batadv_hard_iface *hard_iface)
{

struct batadv_ogm_packet *batadv_ogm_packet;

unsigned char *ogm_buff = hard_iface->bat_iv.ogm_buff;
+void *ogm_buff;

-batadv_ogm_packet = (struct batadv_ogm_packet *)ogm_buff;
+mutex_lock(&hard_iface->bat_iv.ogm_buff_mutex);
+
+ogm_buff = hard_iface->bat_iv.ogm_buff;
+if (!ogm_buff)
+goto unlock;
+
+batadv_ogm_packet = ogm_buff;
ether_addr_copy(batadv_ogm_packet->orig,
hard_iface->net_dev->dev_addr);
ether_addr_copy(batadv_ogm_packet->prev_sender,
hard_iface->net_dev->dev_addr);
+
+unlock:
+mutex_unlock(&hard_iface->bat_iv.ogm_buff_mutex);
}

static void
batadv_iv_ogm_primary_iface_set(struct batadv_hard_iface *hard_iface)
{
struct batadv_ogm_packet *batadv_ogm_packet;
-unsigned char *ogm_buff = hard_iface->bat_iv.ogm_buff;
+void *ogm_buff;

-batadv_ogm_packet = (struct batadv_ogm_packet *)ogm_buff;
+mutex_lock(&hard_iface->bat_iv.ogm_buff_mutex);
+
+ogm_buff = hard_iface->bat_iv.ogm_buff;
+if (!ogm_buff)
+goto unlock;
+
+batadv_ogm_packet = ogm_buff;
batadv_ogm_packet->ttl = BATADV_TTL;
+
+unlock:
+mutex_unlock(&hard_iface->bat_iv.ogm_buff_mutex);
}

/* when do we schedule our own ogm to be sent */
@@ -450,17 +483,23 @@
* batadv_iv_ogm_aggr_packet - checks if there is another OGM attached
* @buff_pos: current position in the skb
* @packet_len: total length of the skb
- * @tlv_len: tlv length of the previously considered OGM

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static bool batadv_iv_ogm_aggr_packet(int buff_pos, int packet_len,
  const struct batadv_ogm_packet *ogm_packet)
{

  int next_buff_pos = 0;

  next_buff_pos += buff_pos + BATADV_OGM_HLEN;
  next_buff_pos += ntohs(tvlv_len);
  /* check if there is enough space for the header */
  next_buff_pos += buff_pos + sizeof(*ogm_packet);
  if (next_buff_pos > packet_len)
    return false;
  /* check if there is enough space for the optional TVLV */
  next_buff_pos += ntohs(ogm_packet->tvlv_len);
  return (next_buff_pos <= packet_len) &&
    (next_buff_pos <= BATADV_MAX_AGGREGATION_BYTES);

  /* adjust all flags and log packets */
  while (batadv_iv_ogm_aggr_packet(buff_pos, forw_packet->packet_len,
      batadv_ogm_packet->tvlv_len)) {
    /* we might have aggregated direct link packets with an
     * ordinary base packet
     */
    @ @ -546,8 +585,10 @ @
    if (WARN_ON(!forw_packet->if_outgoing))
      return;

    -if (WARN_ON(forw_packet->if_outgoing->soft_iface != soft_iface))
  +if (forw_packet->if_outgoing->soft_iface != soft_iface) {
    +pr_warn("%s: soft interface switch for queued OGM\n", __func__);
    return;
  }

  if (forw_packet->if_incoming->if_status != BATADV_IF_ACTIVE)
    return;
    @ @ -884,7 +925,7 @ @
  u32 i;
  size_t word_index;

u8 *w;
-int if_num;
+unsigned int if_num;

for (i = 0; i < hash->size; i++) {
    head = &hash->table[i];
    @@ -905,7 +946,11 @@
    }
}

static void batadv_iv_ogm_schedule(struct batadv_hard_iface *hard_iface)
/**
 + * batadv_iv_ogm_schedule() - schedule submission of hardif ogm buffer
 + * @hard_iface: interface whose ogm buffer should be transmitted
 + */
+static void batadv_iv_ogm_schedule_buff(struct batadv_hard_iface *hard_iface)
{| struct batadv_priv *bat_priv = netdev_priv(hard_iface->soft_iface);
unsigned char **ogm_buff = &hard_iface->bat_iv.ogm_buff;
@@ -916,8 +961,10 @@
u16 tvlv_len = 0;
unsigned long send_time;

-if (hard_iface->if_status == BATADV_IF_NOT_IN_USE ||
-    hard_iface->if_status == BATADV_IF_TO_BE_REMOVED)
+lockdep_assert_held(&hard_iface->bat_iv.ogm_buff_mutex);
+/* interface already disabled by batadv_iv_ogm_iface_disable */
+if (!*ogm_buff)
return;

/* the interface gets activated here to avoid race conditions between
@@ -986,6 +1033,17 @@
batadv_hardif_put(primary_if);
 }

+static void batadv_iv_ogm_schedule(struct batadv_hard_iface *hard_iface)
+{
+if (hard_iface->if_status == BATADV_IF_NOT_IN_USE ||
+    hard_iface->if_status == BATADV_IF_TO_BE_REMOVED)
+return;
+ mutex_lock(&hard_iface->bat_iv.ogm_buff_mutex);
+ batadv_iv_ogm_schedule_buff(hard_iface);
+ mutex_unlock(&hard_iface->bat_iv.ogm_buff_mutex);
+}
* batadv_iv_ogm_orig_update - use OGM to update corresponding data in an
  * originator
@@ -1014,7 +1072,7 @@
    struct batadv_neigh_node *tmp_neigh_node = NULL;
    struct batadv_neigh_node *router = NULL;
    struct batadv_orig_node *orig_node_tmp;
-int if_num;
+unsigned int if_num;
    u8 sum_orig, sum_neigh;
    u8 *neigh_addr;
    u8 tq_avg;
@@ -1173,7 +1231,7 @@
    u8 total_count;
    u8 orig_rq_count, neigh_rq_count, neigh_rq_inv, tq_own;
    unsigned int neigh_rq_inv_cube, neigh_rq_max_cube;
-int if_num;
+unsigned int if_num;
    unsigned int tq_asym_penalty, inv_asym_penalty;
    unsigned int combined_tq;
    unsigned int tq_iface_penalty;
@@ -1692,9 +1750,9 @@
    if (is_my_orig) {
        unsigned long *word;
        -int offset;
+size_t offset;
        s32 bit_pos;
        -s16 if_num;
+unsigned int if_num;
        u8 *weight;

        orig_neigh_node = batadv_iv_ogm_orig_get(bat_priv,
@@ -1838,7 +1896,7 @@
    /* unpack the aggregated packets and process them one by one */
    while (batadv_iv_ogm_aggr_packet(ogm_offset, skb_headlen(skb),
        - ogm_packet->tvlv_len)) {
+ ogm_packet)) {
        batadv_iv_ogm_process(skb, ogm_offset, if_incoming);

        ogm_offset += BATADV_OGM_HLEN;
@@ -2471,7 +2529,7 @@
    return ret;
    }
-}
+-static void batadv_iv_iface_activate(struct batadv_hard_iface *hard_iface)
+static void batadv_iv_iface_enabled(struct batadv_hard_iface *hard_iface)
    {
/* begin scheduling originator messages on that interface */
batadv_iv_ogm_schedule(hard_iface);
@@ -2718,8 +2776,8 @@
{
    struct batadv_neigh_ifinfo *router_ifinfo = NULL;
    struct batadv_neigh_node *router;
    -struct batadv_gw_node *curr_gw;
-    int ret = -EINVAL;
+    struct batadv_gw_node *curr_gw = NULL;
+    int ret = 0;
    void *hdr;

    router = batadv_orig_router_get(gw_node->orig_node, BATADV_IF_DEFAULT);
@@ -2766,6 +2824,8 @@
    ret = 0;

    out:
+    if (curr_gw)
+        batadv_gw_node_put(curr_gw);
    if (router_ifinfo)
        batadv_neigh_ifinfo_put(router_ifinfo);
    if (router)
@@ -2809,8 +2869,8 @@
    ret = 0;

static struct batadv_algo_ops batadv_batman_iv __read_mostly = {
    .name = "BATMAN_IV",
    .iface = {
        -.activate = batadv_iv_iface_activate,
        .enable = batadv_iv_ogm_iface_enable,
+        .enabled = batadv_iv_iface_enabled,
        .disable = batadv_iv_ogm_iface_disable,
        .update_mac = batadv_iv_ogm_iface_update_mac,
        .primary_set = batadv_iv_ogm_primary_iface_set,
--- linux-4.15.0.orig/net/batman-adv/bat_v.c
+++ linux-4.15.0/net/batman-adv/bat_v.c
@@ -928,8 +928,8 @@
{
    struct batadv_neigh_ifinfo *router_ifinfo = NULL;
    struct batadv_neigh_node *router;
    -struct batadv_gw_node *curr_gw;
-    int ret = -EINVAL;
+    struct batadv_gw_node *curr_gw = NULL;
+    int ret = 0;
    void *hdr;

    router = batadv_orig_router_get(gw_node->orig_node, BATADV_IF_DEFAULT);
@@ -996,6 +996,8 @@
    ret = 0;
out:
+if (curr_gw)
+batadv_gw_node_put(curr_gw);
if (router_ifinfo)
batadv_neigh_ifinfo_put(router_ifinfo);
if (router)
--- linux-4.15.0.orig/net/batman-adv/bat_v_elp.c
+++ linux-4.15.0/net/batman-adv/bat_v_elp.c
@@ -103,6 +103,11 @@
ret = cfg80211_get_station(real_netdev, neigh->addr, &sinfo);

+if (!ret) {
+ /* free the TID stats immediately */
+cfg80211_sinfo_release_content(&sinfo);
+}
+dev_put(real_netdev);
if (ret == -ENOENT) {
/* Node is not associated anymore! It would be 
@@ -227,7 +232,7 @@
* the packet to be exactly of that size to make the link
* throughput estimation effective.
*/
-skb_put(skb, probe_len - hard_iface->bat_v.elp_skb->len);
+skb_put_zero(skb, probe_len - hard_iface->bat_v.elp_skb->len);
batadv_dbg(BATADV_DBG_BATMAN, bat_priv,
   "Sending unicast (probe) ELP packet on interface %s to %pM
", @ @ -227,7 +232,7 @@
struct batadv_priv *bat_priv;
struct sk_buff *skb;
u32 elp_interval;
+bool ret;

bat_v = container_of(work, struct batadv_hard_iface_bat_v, elp_wq.work);
hard_iface = container_of(bat_v, struct batadv_hard_iface, bat_v);
@@ -315,8 +321,11 @@
* may sleep and that is not allowed in an rcu protected
* context. Therefore schedule a task for that.
*/
-queue_work(batadv_event_workqueue,
- &hardif_neigh->bat_v.metric_work);
+ret = queue_work(batadv_event_workqueue,
+ &hardif_neigh->bat_v.metric_work);
+
+if (!ret)
+batadv_hardif_neigh_put(hardif_neigh);
int batadv_v_elp_iface_enable(struct batadv_hard_iface *hard_iface)
{
    static const size_t tvlv_padding = sizeof(__be32);
    struct batadv_elp_packet *elp_packet;
    unsigned char *elp_buff;
    u32 random_seqno;
    size_t size;
    int res = -ENOMEM;

    size = ETH_HLEN + NET_IP_ALIGN + BATADV_ELP_HLEN;
    hard_iface->bat_v.elp_skb = dev_alloc_skb(size);
    if (!hard_iface->bat_v.elp_skb)
        goto out;
    skb_reserve(hard_iface->bat_v.elp_skb, ETH_HLEN + NET_IP_ALIGN);
    elp_buff = skb_put_zero(hard_iface->bat_v.elp_skb, BATADV_ELP_HLEN);
    elp_packet = (struct batadv_elp_packet *)elp_buff;
    elp_packet->packet_type = BATADV_ELP;

    skb_reserve(hard_iface->bat_v.elp_skb, ETH_HLEN + NET_IP_ALIGN);
    elp_buff = skb_put_zero(hard_iface->bat_v.elp_skb, BATADV_ELP_HLEN);
    elp_packet = (struct batadv_elp_packet *)elp_buff;

    /*
     * batadv_v_ogm_send - periodic worker broadcasting the own OGM
     * @work: work queue item
     * +* batadv_v_ogm_send_workif() - periodic worker broadcasting the own OGM
     * +* @bat_priv: the bat priv with all the soft interface information
     */
    -static void batadv_v_ogm_send(struct work_struct *work)
static void batadv_v_ogm_send_softif(struct batadv_priv *bat_priv) {
    struct batadv_hard_iface *hard_iface;
    struct batadv_priv_bat_v *bat_v;
    struct batadv_priv *bat_priv;
    struct batadv_ogm2_packet *ogm_packet;
    struct sk_buff *skb, *skb_tmp;
    unsigned char *ogm_buff;
    u16 tvlv_len = 0;
    int ret;

    -bat_v = container_of(work, struct batadv_priv_bat_v, ogm_wq.work);
    -bat_priv = container_of(bat_v, struct batadv_priv, bat_v);
    +lockdep_assert_held(&bat_priv->bat_v.ogm_buff_mutex);
    if (atomic_read(&bat_priv->mesh_state) == BATADV_MESH_DEACTIVATING)
        goto out;
    @@ -237,6 +237,23 @@
    }
}

/**
 + * batadv_v_ogm_send() - periodic worker broadcasting the own OGM
 + * @work: work queue item
 + */
+static void batadv_v_ogm_send(struct work_struct *work)
+{
+    struct batadv_priv_bat_v *bat_v;
+    struct batadv_priv *bat_priv;
+    
+    bat_v = container_of(work, struct batadv_priv_bat_v, ogm_wq.work);
+    bat_priv = container_of(bat_v, struct batadv_priv, bat_v);
+    
+    mutex_lock(&bat_priv->bat_v.ogm_buff_mutex);
+    batadv_v_ogm_send_softif(bat_priv);
+    mutex_unlock(&bat_priv->bat_v.ogm_buff_mutex);
+}
+
+/**
 * batadv_v_ogm_iface_enable - prepare an interface for B.A.T.M.A.N. V
 * @hard_iface: the interface to prepare
 * @ @ -260,11 +276,15 @@
 * struct batadv_priv *bat_priv = netdev_priv(primary_iface->soft_iface);
 * struct batadv_ogm2_packet *ogm_packet;
+
+mutex_lock(&bat_priv->bat_v.ogm_buff_mutex);
if (!bat_priv->bat_v.ogm_buff)
ogm_packet = (struct batadv_ogm2_packet *)bat_priv->bat_v.ogm_buff;
ether_addr_copy(ogm_packet->orig, primary_iface->net_dev->dev_addr);
+unlock:
+mutex_unlock(&bat_priv->bat_v.ogm_buff_mutex);
}

/**
 * @buff_pos: current position in the skb
 * @packet_len: total length of the skb
 * @tvlv_len: tvlv length of the previously considered OGM
 * @ogm2_packet: potential OGM2 in buffer
 * @Return: true if there is enough space for another OGM, false otherwise.
 */
static bool batadv_v_ogm_aggr_packet(int buff_pos, int packet_len,
    const struct batadv_ogm2_packet *ogm2_packet)
{
  int next_buff_pos = 0;

  next_buff_pos += buff_pos + BATADV_OGM2_HLEN;
  next_buff_pos += ntohs(ogm2_packet->tvlv_len);
  if (next_buff_pos > packet_len)
    return false;
  /* check if there is enough space for the optional TVLV */
  next_buff_pos += ntohs(ogm2_packet->tvlv_len);
  return (next_buff_pos <= packet_len) &&
         (next_buff_pos <= BATADV_MAX_AGGREGATION_BYTES);

  ntohl(ogm_packet->seqno),
  ntohl(ogm_packet->seqno),
  ntohl(ogm_packet->seqno),
  ntohl(ogm_packet->seqno),
return (next_buff_pos <= packet_len) &&
         (next_buff_pos <= BATADV_MAX_AGGREGATION_BYTES);

  if (batadv_is_my_mac(bat_priv, ogm_packet->orig)) {
+batadv dbg(BATADV_DBG_BATMAN, bat_priv,
+  "Drop packet: originator packet from ourself\n");
+return;
orig_node = batadv_v_ogm_orig_get(bat_priv, ogm_packet->orig);
if (!orig_node)
    return;
    goto out;

neigh_node = batadv_neigh_node_get_or_create(orig_node, if_incoming,
    ethhdr->h_source);
    @ @ -816,11 +848,6 @@
if (batadv_is_my_mac(bat_priv, ethhdr->h_source))
goto free_skb;

    -ogm_packet = (struct batadv_ogm2_packet *)skb->data;
    -
    -if (batadv_is_my_mac(bat_priv, ogm_packet->orig))
    -goto free_skb;
    -
    batadv_inc_counter(bat_priv, BATADV_CNT_MGMT_RX);
    batadv_add_counter(bat_priv, BATADV_CNT_MGMT_RX_BYTES,
        skb->len + ETH_HLEN);
    @ @ -829,7 +856,7 @@
    ogm_packet = (struct batadv_ogm2_packet *)skb->data;

while (batadv_v_ogm_aggr_packet(ogm_offset, skb_headlen(skb),
    -ogm_packet->tvlv_len)) { 
    +ogm_packet))} { 
    batadv_v_ogm_process(skb, ogm_offset, if_incoming);

    ogm_offset += BATADV_OGM2_HLEN;
    @ @ -880,6 +907,8 @@
    atomic_set(&bat_priv->bat_v.ogm_seqno, random_seqno);
    INIT_DELAYED_WORK(&bat_priv->bat_v.ogm_wq, batadv_v_ogm_send);

    +mutex_init(&bat_priv->bat_v.ogm_buff_mutex);
    +
    return 0;
}

    @ @ -891,7 +920,11 @@
    }
cancel_delayed_work_sync(&bat_priv->bat_v.ogm_wq);
mutable_lock(&bat_priv->bat_v.ogm_buff_mutex);
+
+kfree(bat_priv->bat_v.ogm_buff);
+bat_priv->bat_v.ogm_buff = NULL;
+bat_priv->bat_v.ogm_buff_len = 0;
+
+mutable_unlock(&bat_priv->bat_v.ogm_buff_mutex);
}
--- linux-4.15.0.orig/net/batman-adv/bridge_loop_avoidance.c
+++ linux-4.15.0/net/batman-adv/bridge_loop_avoidance.c
@@ -36,6 +36,7 @@
#include <linux/lockdep.h>
#include <linux/netdevice.h>
#include <linux/netlink.h>
+#include <linux/preempt.h>
#include <linux/rculist.h>
#include <linux/rcupdate.h>
#include <linux/seq_file.h>
@@ -95,11 +96,12 @@
*/
static inline u32 batadv_choose_backbone_gw(const void *data, u32 size)
{
-const struct batadv_bla_claim *claim = (struct batadv_bla_claim *)data;
+const struct batadv_bla_backbone_gw *gw;

u32 hash = 0;

-hash = jhash(&claim->addr, sizeof(claim->addr), hash);
-hash = jhash(&claim->vid, sizeof(claim->vid), hash);
+gw = (struct batadv_bla_backbone_gw *)data;
+hash = jhash(&gw->orig, sizeof(gw->orig), hash);
+hash = jhash(&gw->vid, sizeof(gw->vid), hash);

return hash % size;
}
@@ -450,7 +452,10 @@
batadv_add_counter(bat_priv, BATADV_CNT_RX_BYTES,
 skb->len + ETH_HLEN);

-netif_rx(skb);
+if (in_interrupt())
+netif_rx(skb);
+else
+netif_rx_ni(skb);
out:
if (primary_if)
batadv_hardif_put(primary_if);
@@ -803,6 +808,8 @@
const u8 *mac, const unsigned short vid)

struct batadv_bla_claim search_claim, *claim;
+struct batadv_bla_claim *claim_removed_entry;
+struct hlist_node *claim_removed_node;

ether_addr_copy(search_claim.addr, mac);
search_claim.vid = vid;
@@ -813,10 +820,18 @@
batadv_dbg(BATADV_DBG_BLA, bat_priv, "%s(): %pM, vid %d\n", __func__,
    mac, batadv_print_vid(vid));
-	batadv_hash_remove(bat_priv->bla.claim_hash, batadv_compare_claim,
-    batadv_choose_claim, claim);
-    batadv_claim_put(claim); /* reference from the hash is gone */
+    claim_removed_node = batadv_hash_remove(bat_priv->bla.claim_hash,
+        batadv_compare_claim,
+        batadv_choose_claim, claim);
+    if (!claim_removed_node)
+        goto free_claim;
+    /* reference from the hash is gone */
+    claim_removed_entry = hlist_entry(claim_removed_node,
+        struct batadv_bla_claim, hash_entry);
+    batadv_claim_put(claim_removed_entry);

free_claim:
/* don't need the reference from hash_find() anymore */
batadv_claim_put(claim);
}
@@ -1579,13 +1594,16 @@
/* don't need the reference from hash_find() anymore */
batadv_claim_put(claim);
}

/**
 - * batadv_bla_check_bcast_duplist - Check if a frame is in the broadcast dup.
 - * batadv_bla_check_duplist() - Check if a frame is in the broadcast dup.
 - * @bat_priv: the bat priv with all the soft interface information
 - * @skb: contains the bcast_packet to be checked
 - *
 - * check if it is on our broadcast list. Another gateway might
 - * have sent the same packet because it is connected to the same backbone,
 - * so we have to remove this duplicate.
 - * @skb: contains the multicast packet to be checked
 - * @payload_ptr: pointer to position inside the head buffer of the skb
 - * marking the start of the data to be CRC'ed
 - * @orig: originator mac address, NULL if unknown
 - *
 - * Check if it is on our broadcast list. Another gateway might have sent the
 - * same packet because it is connected to the same backbone, so we have to
 */

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* remove this duplicate.
*
* This is performed by checking the CRC, which will tell us
* with a good chance that it is the same packet. If it is furthermore
@@ -1594,19 +1612,17 @@
*
* Return: true if a packet is in the duplicate list, false otherwise.
*/
bool batadv_bla_check_bcast_duplist(struct batadv_priv *bat_priv,
-    struct sk_buff *skb)
+static bool batadv_bla_check_duplist(struct batadv_priv *bat_priv,
+    struct sk_buff *skb, u8 *payload_ptr,
+    const u8 *orig)
{
  int i, curr;
  __be32 crc;
  struct batadv_bcast_packet *bcast_packet;
  struct batadv_bcast_duplist_entry *entry;
  bool ret = false;

  bcast_packet = (struct batadv_bcast_packet *)skb->data;
+  int i, curr;
+  __be32 crc;

  /* calculate the crc ... */
  -crc = batadv_skb_crc32(skb, (u8 *)(bcast_packet + 1));
  +crc = batadv_skb_crc32(skb, payload_ptr);
  spin_lock_bh(&bat_priv->bla.bcast_duplist_lock);

  if (entry->crc != crc)
    continue;

  if (batadv_compare_eth(entry->orig, bcast_packet->orig))
    continue;
+/* are the originators both known and not anonymous? */
+if (orig && !is_zero_ether_addr(orig) &&
+    !is_zero_ether_addr(entry->orig)) {
+  /* If known, check if the new frame came from
+   * the same originator:
+   * We are safe to take identical frames from the
+   * same orig, if known, as multiplications in
+   * the mesh are detected via the (orig, seqno) pair.
+   * So we can be a bit more liberal here and allow
+   * identical frames from the same orig which the source
+   * host might have sent multiple times on purpose.
+ */
+  return true;
+}

  /* ... */

  /* Calculate the CRC... */
  -crc = batadv_skb_crc32(skb, (u8 *)(bcast_packet + 1));
  +crc = batadv_skb_crc32(skb, payload_ptr);
  spin_lock_bh(&bat_priv->bla.bcast_duplist_lock);

  if (entry->crc != crc)
    continue;

  if (batadv_compare_eth(entry->orig, bcast_packet->orig))
    continue;
+/* are the originators both known and not anonymous? */
+if (orig && !is_zero_ether_addr(orig) &&
+    !is_zero_ether_addr(entry->orig)) {
+  /* If known, check if the new frame came from
+   * the same originator:
+   * We are safe to take identical frames from the
+   * same orig, if known, as multiplications in
+   * the mesh are detected via the (orig, seqno) pair.
+   * So we can be a bit more liberal here and allow
+   * identical frames from the same orig which the source
+   * host might have sent multiple times on purpose.
+ */
+  return true;
+}

  /* ... */

  /* Calculate the CRC... */
  -crc = batadv_skb_crc32(skb, (u8 *)(bcast_packet + 1));
  +crc = batadv_skb_crc32(skb, payload_ptr);
  spin_lock_bh(&bat_priv->bla.bcast_duplist_lock);

  if (entry->crc != crc)
    continue;

  if (batadv_compare_eth(entry->orig, bcast_packet->orig))
    continue;
+/* are the originators both known and not anonymous? */
+if (orig && !is_zero_ether_addr(orig) &&
+    !is_zero_ether_addr(entry->orig)) {
+  /* If known, check if the new frame came from
+   * the same originator:
+   * We are safe to take identical frames from the
+   * same orig, if known, as multiplications in
+   * the mesh are detected via the (orig, seqno) pair.
+   * So we can be a bit more liberal here and allow
+   * identical frames from the same orig which the source
+   * host might have sent multiple times on purpose.
+ */
+  return true;
+}
if (batadv_compare_eth(entry->orig, orig))
    continue;
}

/* this entry seems to match: same crc, not too old,
and from another gw. therefore return true to forbid it.
entry = &bat_priv->bla.bcast_duplist[curr];
entry->crc = crc;
entry->entrytime = jiffies;
ether_addr_copy(entry->orig, bcast_packet->orig);
+ */
+ /* known originator */
+ if (orig)
+ ether_addr_copy(entry->orig, orig);
+ /* anonymous originator */
+ else
+ eth_zero_addr(entry->orig);
+ bat_priv->bla.bcast_duplist_curr = curr;

out:
}

/**
 * batadv_bla_check_ucast_duplist() - Check if a frame is in the broadcast dup.
 * @bat_priv: the bat priv with all the soft interface information
 * @skb: contains the multicast packet to be checked, decapsulated from a
 *  unicast_packet
 * *
 * Check if it is on our broadcast list. Another gateway might have sent the
 * same packet because it is connected to the same backbone, so we have to
 * remove this duplicate.
 * *
 * Return: true if a packet is in the duplicate list, false otherwise.
 * */
+static bool batadv_bla_check_ucast_duplist(struct batadv_priv *bat_priv,
+ struct sk_buff *skb)
+{ return batadv_bla_check_duplist(bat_priv, skb, (u8 *)skb->data, NULL);
+}
+/**
 * batadv_bla_check_bcast_duplist() - Check if a frame is in the broadcast dup.
 * @bat_priv: the bat priv with all the soft interface information
 * @skb: contains the bcast_packet to be checked
 * */
bool batadv_bla_check_bcast_duplist(struct batadv_priv *bat_priv, 
    struct sk_buff *skb) {
    struct batadv_bcast_packet *bcast_packet;
    u8 *payload_ptr;

    bcast_packet = (struct batadv_bcast_packet *)skb->data;
    payload_ptr = (u8 *)(bcast_packet + 1);

    return batadv_bla_check_duplist(bat_priv, skb, payload_ptr, 
        bcast_packet->orig);
}

/**
 * batadv_bla_is_backbone_gw_orig - Check if the originator is a gateway for
 * the VLAN identified by vid.
 * @bat_priv: the bat priv with all the soft interface information
 */
{
    struct batadv_bla_backbone_gw *backbone_gw;
    struct ethhdr *ethhdr;
    bool ret;

    ethhdr = eth_hdr(skb);

    if (unlikely(!backbone_gw))
        return true;

    /* backbone_gw is unreferenced in the report work function function */
    ret = queue_work(batadv_event_workqueue, &backbone_gw->report_work);
    /* backbone_gw is unreferenced in the report work function function
     * if queue_work() call was successful
     */
    if (!ret)
        batadv_backbone_gw_put(backbone_gw);

    return true;
}
* @bat_priv: the bat priv with all the soft interface information
* @skb: the frame to be checked
* @vid: the VLAN ID of the frame
- * @is_bcast: the packet came in a broadcast packet type.
+ * @packet_type: the batman packet type this frame came in

* batadv_bla_rx avoidance checks if:
*  * we have to race for a claim
@@ -1818,7 +1902,7 @@
  * further process the skb.
*/
bool batadv_bla_rx(struct batadv_priv *bat_priv, struct sk_buff *skb,
-  unsigned short vid, bool is_bcast)
+  unsigned short vid, int packet_type)
{
  struct batadv_bla_backbone_gw *backbone_gw;
  struct ethhdr *ethhdr;
@@ -1840,9 +1924,32 @@
  goto handled;

  if (unlikely(atomic_read(&bat_priv->bla.num_requests)))
-/* don't allow broadcasts while requests are in flight */
-  if (is_multicast_ether_addr(ethhdr->h_dest) &
-      is_bcast)
-    goto handled;
+/* don't allow multicast packets while requests are in flight */
+  if (is_multicast_ether_addr(ethhdr->h_dest))
+/* Both broadcast flooding or multicast-via-unicasts
+ delivery might send to multiple backbone gateways
+ sharing the same LAN and therefore need to coordinate
+ which backbone gateway forwards into the LAN,
+ by claiming the payload source address.
+ *
+ * Broadcast flooding and multicast-via-unicasts
+ delivery use the following two batman packet types.
+ * Note: explicitly exclude BATADV_UNICAST_4ADDR,
+ as the DHCP gateway feature will send explicitly
+ to only one BLA gateway, so the claiming process
+ should be avoided there.
+ */
+  if (packet_type == BATADV_BCAST ||
+      packet_type == BATADV_UNICAST)
+    goto handled;
+/* potential duplicates from foreign BLA backbone gateways via
+ multicast-in-unicast packets
+ */
+  if (is_multicast_ether_addr(ethhdr->h_dest) &
+      packet_type == BATADV_UNICAST &&

+ batadv_bla_check_ucast_duplist(bat_priv, skb))
+goto handled;

ether_addr_copy(search_claim.addr, ethhdr->h_source);
search_claim.vid = vid;
@@ -1877,13 +1984,14 @@
goto allow;
}

-/* if it is a broadcast ... */
-if (is_multicast_ether_addr(ethhdr->h_dest) && is_bcast) {
+/* if it is a multicast ... */
+if (is_multicast_ether_addr(ethhdr->h_dest) &&
+    (packet_type == BATADV_BCAST || packet_type == BATADV_UNICAST)) {
/* ... drop it. the responsible gateway is in charge.
 *
- * We need to check is_bcast because with the gateway
+ * We need to check packet type because with the gateway
 * feature, broadcasts (like DHCP requests) may be sent
- * using a unicast packet type.
+ * using a unicast 4 address packet type. See comment above.
 */
    goto handled;
} else {
@@ -2161,22 +2269,25 @@
{
    struct batadv_bla_claim *claim;
    int idx = 0;
    +int ret = 0;

    rcu_read_lock();
    hlist_for_each_entry_rcu(claim, head, hash_entry) {
    if (idx++ < *idx_skip)
    continue;
    -if (batadv_bla_claim_dump_entry(msg, portid, seq,
    -primary_if, claim)) {
    +
    +ret = batadv_bla_claim_dump_entry(msg, portid, seq,
    + primary_if, claim);
    +if (ret) {
    -*idx_skip = idx - 1;
    goto unlock;
    }
    }

    -*idx_skip = idx;
    +*idx_skip = 0;
    unlock:
rcu_read_unlock();
- return 0;
+ return ret;
}

/**
@@ -2391,22 +2502,25 @@
{ 
 struct batadv_bla_backbone_gw *backbone_gw;
 int idx = 0;
+ int ret = 0;

 rcu_read_lock();
 hlist_for_each_entry_rcu(backbone_gw, head, hash_entry) {
 if (idx++ < *idx_skip)
 continue;
- if (batadv_bla_backbone_dump_entry(msg, portid, seq,
- primary_if, backbone_gw)) {
+ ret = batadv_bla_backbone_dump_entry(msg, portid, seq,
+ primary_if, backbone_gw);
+ if (ret) {
+ *idx_skip = idx - 1;
 goto unlock;
 }
 }

 -*idx_skip = idx;
+*idx_skip = 0;
 unlock:
 rcu_read_unlock();
- return 0;
+ return ret;
}

 /**
 --- linux-4.15.0.orig/net/batman-adv/bridge_loop_avoidance.h
 +++ linux-4.15.0/net/batman-adv/bridge_loop_avoidance.h
 @@ -47,7 +47,7 @@
 #ifdef CONFIG_BATMAN_ADV_BLA
 bool batadv_bla_rx(struct batadv_priv *bat_priv, struct sk_buff *skb,
- unsigned short vid, bool is_bcast);
+ unsigned short vid, int packet_type);
 bool batadv_bla_tx(struct batadv_priv *bat_priv, struct sk_buff *skb,
 unsigned short vid);
 bool batadv_bla_is_backbone_gw(struct sk_buff *skb,
 @@ -78,7 +78,7 @@

static inline bool batadv_bla_rx(struct batadv_priv *bat_priv, 
struct sk_buff *skb, unsigned short vid, 
  - bool is_bcast) 
  + int packet_type) 
  { 
    return false; 
  }

--- linux-4.15.0.orig/net/batman-adv/debugfs.c
+++ linux-4.15.0/net/batman-adv/debugfs.c
@@ -18,6 +18,7 @@
#include "debugfs.h"
#include "main.h"

+  #include <linux/dcache.h>
+  #include <linux/debugfs.h>
+  #include <linux/err.h>
+  #include <linux/errno.h>
@@ -338,6 +339,45 @@
}

/**
 + * batadv_debugfs_rename_hardif() - Fix debugfs path for renamed hardif
 + * @hard_iface: hard interface which was renamed
 + */
+void batadv_debugfs_rename_hardif(struct batadv_hard_iface *hard_iface)
+{ 
  +const char *name = hard_iface->net_dev->name;
  +struct dentry *dir;
  +struct dentry *d;
  +
  +dir = hard_iface->debug_dir;
  +if (!dir)
  +  return;
  +
  +d = debugfs_rename(dir->d_parent, dir, dir->d_parent, name);
  +if (!d)
  +  pr_err("Can't rename debugfs dir to \%s\n", name);
  +} 
+
+/**
+ * batadv_debugfs_rename_meshif() - Fix debugfs path for renamed softif
+ * @dev: net_device which was renamed
+ */
+void batadv_debugfs_rename_meshif(struct net_device *dev)
+{ 
  +struct batadv_priv *bat_priv = netdev_priv(dev);
  +const char *name = dev->name;
  +
  +
struct dentry *dir;
struct dentry *d;

+dir = bat_priv->debug_dir;
+if (!dir)
+return;
+
d = debugfs_rename(dir->d_parent, dir, dir->d_parent, name);
+if (!d)
+pr_err("Can't rename debugfs dir to \%s\n", name);
+
/**
 * batadv_debugfs_del_hardif - delete the base directory for a hard interface
 * in debugfs.
 * @hard_iface: hard interface which is deleted.
 */
--- linux-4.15.0.orig/net/batman-adv/debugfs.h
+++ linux-4.15.0/net/batman-adv/debugfs.h
@@ -29,8 +29,10 @@
void batadv_debugfs_init(void);
void batadv_debugfs_destroy(void);
int batadv_debugfs_add_meshif(struct net_device *dev);
+void batadv_debugfs_rename_meshif(struct net_device *dev);
void batadv_debugfs_del_meshif(struct net_device *dev);
int batadv_debugfs_add_hardif(struct batadv_hard_iface *hard_iface);
+void batadv_debugfs_rename_hardif(struct batadv_hard_iface *hard_iface);
void batadv_debugfs_del_hardif(struct batadv_hard_iface *hard_iface);

#else
@@ -48,6 +50,10 @@
return 0;
}

+static inline void batadv_debugfs_rename_hardif(struct batadv_hard_iface *hard_iface)
+{
+}
+
static inline void batadv_debugfs_del_hardif(struct net_device *dev)
{
}
@@ -59,6 +65,11 @@
}

static inline
+void batadv_debugfs_rename_hardif(struct batadv_hard_iface *hard_iface)
+{
+}
+
+static inline
void batadv_debugfs_del_hardif(struct batadv_hard_iface *hard_iface)
{
}
--- linux-4.15.0.orig/net/batman-adv/distributed-arp-table.c
+++ linux-4.15.0/net/batman-adv/distributed-arp-table.c
@@ -243,6 +243,7 @@
    u32 hash = 0;
    const struct batadv_dat_entry *dat = data;
    const unsigned char *key;
+  __be16 vid;
    u32 i;

    key = (const unsigned char *)&dat->ip;
@@ -252,7 +253,8 @@
    hash ^= (hash >> 6);
}
-
+    _key = (const unsigned char *)&dat->vid;
+    vid = htons(dat->vid);
+    key = (__force const unsigned char *)&vid;
    for (i = 0; i < sizeof(dat->vid); i++) {
        hash += key[i];
        hash += (hash << 10);
@@ -391,7 +393,7 @@
    batadv_arp_hw_src(skb, hdr_size), &ip_src,
    batadv_arp_hw_dst(skb, hdr_size), &ip_dst);

    -if (hdr_size == 0)
    +if (hdr_size < sizeof(struct batadv_unicast_packet))
        return;

    unicast_4addr_packet = (struct batadv_unicast_4addr_packet *)skb->data;
@@ -1240,7 +1242,6 @@
    hw_src, &ip_src, hw_dst, &ip_dst,
    dat_entry->mac_addr, &dat_entry->ip);
    dropped = true;
-    goto out;
+
/* Update our internal cache with both the IP addresses the node got
@@ -1249,6 +1250,9 @@
batadv_dat_entry_add(bat_priv, ip_src, hw_src, vid);
batadv_dat_entry_add(bat_priv, ip_dst, hw_dst, vid);
+
    +if (dropped)
    +goto out;
+  

/* If BLA is enabled, only forward ARP replies if we have claimed the
 * source of the ARP reply or if no one else of the same backbone has
 * already claimed that client. This prevents that different gateways
--- linux-4.15.0.orig/net/batman-adv/fragmentation.c
+++ linux-4.15.0/net/batman-adv/fragmentation.c
@@ -274,7 +274,7 @@
kfree(entry);

packet = (struct batadv_frag_packet *)skb_out->data;
-size = ntohs(packet->total_size);
+size = ntohs(packet->total_size) + hdr_size;

/* Make room for the rest of the fragments. */
if (pskb_expand_head(skb_out, 0, size - skb_out->len, GFP_ATOMIC) < 0) {
 @ @ -287,7 +287,8 @@
/* Move the existing MAC header to just before the payload. (Override
 * the fragment header.)
 */
-skb_pull_rcsum(skb_out, hdr_size);
+skb_pull(skb_out, hdr_size);
+skb_out->ip_summed = CHECKSUM_NONE;
memmove(skb_out->data - ETH_HLEN, skb_mac_header(skb_out), ETH_HLEN);
skb_set_mac_header(skb_out, -ETH_HLEN);
skb_reset_network_header(skb_out);
--- linux-4.15.0.orig/net/batman-adv/gateway_client.c
+++ linux-4.15.0/net/batman-adv/gateway_client.c
@@ -31,6 +31,7 @@
#include <linux/kernel.h>
#include <linux/kref.h>
#include <linux/list.h>
+#include <linux/lockdep.h>
#include <linux/netdevice.h>
#include <linux/netlink.h>
#include <linux/rculist.h>
@@ -325,6 +326,9 @@
 * @bat_priv: the bat_priv with all the soft interface information
 * @orig_node: originator announcing gateway capabilities
 * @gateway: announced bandwidth information
+ *
+ * Has to be called with the appropriate locks being acquired
+ */
static void batadv_gw_node_add(struct batadv_priv *bat_priv,
    struct batadv_orig_node *orig_node,
@@ -332,6 +336,8 @@
{ struct batadv_gw_node *gw_node;
lockdep_assert_held(&bat_priv->gw.list_lock);
+
if (gateway->bandwidth_down == 0)
return;

@@ -346,10 +352,8 @@
gw_node->bandwidth_down = ntohl(gateway->bandwidth_down);
gw_node->bandwidth_up = ntohl(gateway->bandwidth_up);

+spin_lock_bh(&bat_priv->gw.list_lock);
kref_get(&gw_node->refcount);
hlist_add_head_rcu(&gw_node->list, &bat_priv->gw.gateway_list);
+spin_unlock_bh(&bat_priv->gw.list_lock);

batadv_dbg(BATADV_DBG_BATMAN, bat_priv,
    "Found new gateway %pM -> gw bandwidth: %u.%u/%u.%u MBit\n",
@@ -405,11 +409,14 @@
{  
struct batadv_gw_node *gw_node, *curr_gw = NULL;

+spin_lock_bh(&bat_priv->gw.list_lock);
gw_node = batadv_gw_node_get(bat_priv, orig_node);
if (!gw_node) {
    batadv_gw_node_add(bat_priv, orig_node, gateway);
+spin_unlock_bh(&bat_priv->gw.list_lock);
go to out;
}  
+spin_unlock_bh(&bat_priv->gw.list_lock);

if (gw_node->bandwidth_down == ntohl(gateway->bandwidth_down) &&
    gw_node->bandwidth_up == ntohl(gateway->bandwidth_up))
@@ -667,8 +674,10 @@
chaddr_offset = *header_len + BATADV_DHCP_CHADDR_OFFSET;
/* store the client address if the message is going to a client */
- if (ret == BATADV_DHCP_TO_CLIENT &&
-     skb_may_pull(skb, chaddr_offset + ETH_ALEN)) {
+ if (ret == BATADV_DHCP_TO_CLIENT) {
+     if (!skb_may_pull(skb, chaddr_offset + ETH_ALEN))
+         return BATADV_DHCP_NO;
+ }
/* check if the DHCP packet carries an Ethernet DHCP */
p = skb->data + *header_len + BATADV_DHCP_HTYPE_OFFSET;
if (*p != BATADV_DHCP_HTYPE_ETHERNET)
@@ -705,7 +714,7 @@
{  
struct batadv_neigh_node *neigh_curr = NULL;
struct batadv_neigh_node *neigh_old = NULL;
vid = batadv_get_vid(skb, 0);

@if (is_multicast_ether_addr(ethhdr->h_dest))
@goto out;
+
orig_dst_node = batadv_transtable_search(bat_priv, ethhdr->h_source, ethhdr->h_dest, vid);
if (!orig_dst_node)
--- linux-4.15.0.orig/net/batman-adv/hard-interface.c
+++ linux-4.15.0/net/batman-adv/hard-interface.c
@@ -19,7 +19,6 @@
#include "main.h"

#include <linux/atomic.h>
-#include <linux/bug.h>
#include <linux/byteorder/generic.h>
#include <linux/errno.h>
#include <linux/fs.h>
@@ -29,6 +28,7 @@
#include <linux/kernel.h>
#include <linux/kref.h>
#include <linux/list.h>
+#include <linux/mutex.h>
#include <linux/netdevice.h>
#include <linux/printk.h>
#include <linux/rculist.h>
@@ -172,8 +172,10 @@
parent_dev = __dev_get_by_index((struct net *)parent_net, dev_get_iflink(net_dev));
/* if we got a NULL parent_dev there is something broken. */
-#if (WARN(!parent_dev, "Cannot find parent device"))
+if (!parent_dev) {
+pr_err("Cannot find parent device\n");
return false;
+
if (batadv_mutual_parents(net_dev, net, parent_dev, parent_net))
return false;
@@ -737,6 +739,11 @@
hard_iface->soft_iface = soft_iface;
bat_priv = netdev_priv(hard_iface->soft_iface);
+if (bat_priv->num_ifaces >= UINT_MAX) {
+ret = -ENOSPC;
+goto err_dev;
+}
+ret = netdev_master_upper_dev_link(hard_iface->net_dev,
    soft_iface, NULL, NULL, NULL);
if (ret)
    @ @ -789,6 +796,9 @ @
batadv_hardif_recalc_extra_skbroom(soft_iface);

+if (bat_priv->algo_ops->iface.enabled)
+bat_priv->algo_ops->iface.enabled(hard_iface);
+out:
return 0;

@@ -844,7 +854,7 @@
batadv_hardif_recalc_extra_skbroom(hard_iface->soft_iface);

/* nobody uses this interface anymore */
-!if (!bat_priv->num_ifaces) {
+!if (bat_priv->num_ifaces == 0) {
batadv_gw_check_client_stop(bat_priv);

if (autodel == BATADV_IF_CLEANUP_AUTO)
    @ @ -880,7 +890,7 @ @
if (ret)
goto free_if;

-hard_iface->if_num = -1;
+hard_iface->if_num = 0;
-hard_iface->net_dev = net_dev;
-hard_iface->soft_iface = NULL;
-hard_iface->if_status = BATADV_IF_NOT_IN_USE;
    @ @ -892,6 +902,7 @ @
INIT_LIST_HEAD(&hard_iface->list);
INIT_HLIST_HEAD(&hard_iface->neigh_list);

+mutex_init(&hard_iface->bat_iv.ogm_buff_mutex);
spin_lock_init(&hard_iface->neigh_list_lock);
kref_init(&hard_iface->refcount);
    @ @ -949,6 +960,32 @ @
 rtnl_unlock();
}
/**
 * batadv_hard_if_event_softif() - Handle events for soft interfaces
 * @event: NETDEV_* event to handle
 * @net_dev: net_device which generated an event
 * *
 * @ Return: NOTIFY_* result
 */
static int batadv_hard_if_event_softif(unsigned long event,
				       struct net_device *net_dev)
{
    struct batadv_priv *bat_priv;

    switch (event) {
    case NETDEV_REGISTER:
        batadv_sysfs_add_meshif(net_dev);
        bat_priv = netdev_priv(net_dev);
        batadv_softif_create_vlan(bat_priv, BATADV_NO_FLAGS);
        break;
    case NETDEV_CHANGENAME:
        batadv_debugfs_rename_meshif(net_dev);
        break;
    }

    return NOTIFY_DONE;
}

static int batadv_hard_if_event(struct notifier_block *this,
unsigned long event, void *ptr)
{
    struct batadv_hard_iface *primary_if = NULL;
    struct batadv_priv *bat_priv;

    if (batadv_softif_is_valid(net_dev) && event == NETDEV_REGISTER) {
        batadv_sysfs_add_meshif(net_dev);
        bat_priv = netdev_priv(net_dev);
        batadv_softif_create_vlan(bat_priv, BATADV_NO_FLAGS);
        break;
    }
    if (batadv_softif_is_valid(net_dev))
        return batadv_hard_if_event_softif(event, net_dev);

    hard_iface = batadv_hardif_get_by_netdev(net_dev);
    if (!hard_iface && (event == NETDEV_REGISTER ||
         hard_iface->num_bcasts = BATADV_NUM_BCASTS_WIRELESS;
break;
+case NETDEV_CHANGENAME:
+batadv_debugfs_rename_hardif(hard_iface);
+break;
default:
break;
}
--- linux-4.15.0.orig/net/batman-adv/log.c
+++ linux-4.15.0/net/batman-adv/log.c
@@ -195,6 +195,7 @@
 .read           = batadv_log_read,
 .poll           = batadv_log_poll,
 .llseek         = no_llseek,
+ .owner          = THIS_MODULE,
};

int batadv_debug_log_setup(struct batadv_priv *bat_priv)
--- linux-4.15.0.orig/net/batman-adv/main.c
+++ linux-4.15.0/net/batman-adv/main.c
@@ -153,6 +153,7 @@
 spin_lock_init(&bat_priv->tt.commit_lock);
 spin_lock_init(&bat_priv->gw.list_lock);
 #ifdef CONFIG_BATMAN_ADV_MCAST
+spin_lock_init(&bat_priv->mcast.mla_lock);
 spin_lock_init(&bat_priv->mcast.want_lists_lock);
 #endif
 spin_lock_init(&bat_priv->tvlv.container_list_lock);
--- linux-4.15.0.orig/net/batman-adv/multicast.c
+++ linux-4.15.0/net/batman-adv/multicast.c
@@ -269,8 +269,6 @@
 * translation table except the ones listed in the given mcast_list.
 *
 * If mcast_list is NULL then all are retracted.
- *
- * Do not call outside of the mcast worker! (or cancel mcast worker first)
- */
 static void batadv_mcast_mla_tt_retract(struct batadv_priv *bat_priv,
 struct hlist_head *mcast_list)
@@ -278,8 +276,6 @@
 struct batadv_hw_addr *mcast_entry;
 struct hlist_node *tmp;

-WARN_ON(delayed_work_pending(&bat_priv->mcast.work));
-
 hlist_for_each_entry_safe(mcast_entry, tmp, &bat_priv->mcast.mla_list, 
 list) {
 if (mcast_list &&
@@ -303,8 +299,6 @@

* Adds multicast listener announcements from the given mcast_list to the
* translation table if they have not been added yet.

- * Do not call outside of the mcast worker! (or cancel mcast worker first)
*
static void batadv_mcast_mla_tt_add(struct batadv_priv *bat_priv,
   struct hlist_head *mcast_list)
@@ -312,8 +306,6 @@
struct batadv_hw_addr *mcast_entry;
struct hlist_node *tmp;

-WARN_ON(delayed_work_pending(&bat_priv->mcast.work));
-
if (!mcast_list)
return;
@@ -540,8 +532,8 @@
bat_priv->mcast.enabled = true;
}

-return !(mcast_data.flags &
- (BATADV_MCAST_WANT_ALL_IPV4 | BATADV_MCAST_WANT_ALL_IPV6));
+return !(mcast_data.flags & BATADV_MCAST_WANT_ALL_IPV4 &&
+ mcast_data.flags & BATADV_MCAST_WANT_ALL_IPV6);
}

/**
@@ -600,7 +592,10 @@
priv_mcast = container_of(delayed_work, struct batadv_priv_mcast, work);
bat_priv = container_of(priv_mcast, struct batadv_priv, mcast);

+spin_lock(&bat_priv->mcast.mla_lock);
__batadv_mcast_mla_update(bat_priv);
+spin_unlock(&bat_priv->mcast.mla_lock);
+
batadv_mcast_start_timer(bat_priv);
}

@@ -809,8 +804,8 @@
batadv_mcast_forw_tt_node_get(struct batadv_priv *bat_priv,
 struct ethhdr *ethhdr)
{
-return batadv_transtable_search(bat_priv, ethhdr->h_source,
-ethhdr->h_dest, BATADV_NO_FLAGS);
+return batadv_transtable_search(bat_priv, NULL, ethhdr->h_dest,
+BATADV_NO_FLAGS);
}
/**
--- linux-4.15.0.orig/net/batman-adv/netlink.c
+++ linux-4.15.0/net/batman-adv/netlink.c
@@ -110,7 +110,7 @@
{
 struct nlattr *attr = nlmsg_find_attr(nlh, GENL_HDRLEN, attrtype);

-  return attr ? nla_get_u32(attr) : 0;
+  return (attr && nla_len(attr) == sizeof(u32)) ? nla_get_u32(attr) : 0;
 }

/**
--- linux-4.15.0.orig/net/batman-adv/network-coding.c
+++ linux-4.15.0/net/batman-adv/network-coding.c
@@ -850,16 +850,27 @@
    spinlock_t *lock; /* Used to lock list selected by "int in_coding" */
    struct list_head *list;

+/* Select ingoing or outgoing coding node */
+if (in_coding) {
+    lock = &orig_neigh_node->in_coding_list_lock;
+    list = &orig_neigh_node->in_coding_list;
+} else {
+    lock = &orig_neigh_node->out_coding_list_lock;
+    list = &orig_neigh_node->out_coding_list;
+}
+
+spin_lock_bh(lock);
+
/* Check if nc_node is already added */
nc_node = batadv_nc_find_nc_node(orig_node, orig_neigh_node, in_coding);
/* Node found */
if (nc_node)
-    return nc_node;
+    goto unlock;

nc_node = kzalloc(sizeof(*nc_node), GFP_ATOMIC);
if (!nc_node)
-    return NULL;
+    goto unlock;
/* Initialize nc_node */
INIT_LIST_HEAD(&nc_node->list);
@ @ -868,22 +879,14 @@
kref_get(&orig_neigh_node->refcount);
nc_node->orig_node = orig_neigh_node;
*/
/* Select ingoing or outgoing coding node */
-if (in_coding) {
	lock = &orig_neigh_node->in_coding_list_lock;
	list = &orig_neigh_node->in_coding_list;
} else {
	lock = &orig_neigh_node->out_coding_list_lock;
	list = &orig_neigh_node->out_coding_list;
}
-
batadv_dbg(BATADV_DBG_NC, bat_priv, "Adding nc_node %pM -> %pM\n",
	nc_node->addr, nc_node->orig_node->orig);

/* Add nc_node to orig_node */
-spin_lock_bh(lock);
kref_get(&nc_node->refcount);
list_add_tail_rcu(&nc_node->list, list);
+
+unlock:
spin_unlock_bh(lock);

return nc_node;
@@ -1014,15 +1017,8 @@
*/
static u8 batadv_nc_random_weight_tq(u8 tq)
{
-u8 rand_val, rand_tq;
- get_random_bytes(&rand_val, sizeof(rand_val));
-
/* randomize the estimated packet loss (max TQ - estimated TQ) */
-rand_tq = rand_val * (BATADV_TQ_MAX_VALUE - tq);
-
/* normalize the randomized packet loss */
-rand_tq /= BATADV_TQ_MAX_VALUE;
+u8 rand_tq = prandom_u32_max(BATADV_TQ_MAX_VALUE + 1 - tq);

/* convert to (randomized) estimated tq again */
return BATADV_TQ_MAX_VALUE - rand_tq;
--- linux-4.15.0.orig/net/batman-adv/originator.c
+++ linux-4.15.0/net/batman-adv/originator.c
@@ -1500,7 +1500,7 @@
}
int batadv_orig_hash_add_if(struct batadv_hard_iface *hard_iface,
			    int max_if_num)
+			    unsigned int max_if_num)
{
struct batadv_priv *bat_priv = netdev_priv(hard_iface->soft_iface);
struct batadv_algo_ops *bao = bat.priv->algo_ops;
@@ -1535,7 +1535,7 @@
 }

int batadv_orig_hash_del_if(struct batadv_hard_iface *hard_iface,
    - int max_if_num)
+    unsigned int max_if_num)
{
struct batadv_priv *bat_priv = netdev_priv(hard_iface->soft_iface);
struct batadv_hashtable *hash = bat_priv->orig_hash;
--- linux-4.15.0.orig/net/batman-adv/originator.h
+++ linux-4.15.0/net/batman-adv/originator.h
@@ -78,9 +78,9 @@
 int batadv_orig_hash_add_if(struct batadv_hard_iface *hard_iface,
    - int max_if_num);
+    unsigned int max_if_num);
 int batadv_orig_hash_del_if(struct batadv_hard_iface *hard_iface,
    - int max_if_num);
+    unsigned int max_if_num);
 struct batadv_orig_node_vlan *
 batadv_orig_node_vlan_new(struct batadv_orig_node *orig_node,
    unsigned short vid);
--- linux-4.15.0.orig/net/batman-adv/routing.c
+++ linux-4.15.0/net/batman-adv/routing.c
@@ -743,6 +743,7 @@
/**
 * batadv_reroute_unicast_packet - update the unicast header for re-routing
 * @bat_priv: the bat priv with all the soft interface information
+ * @skb: unicast packet to process
 * @unicast_packet: the unicast header to be updated
 * @dst_addr: the payload destination
 * @vid: VLAN identifier
@@ @ -754,7 +755,7 @@
 * Return: true if the packet header has been updated, false otherwise
 */
static bool
batadv_reroute_unicast_packet(struct batadv_priv *bat_priv,
    @skb unicast packet to process
    @unicast_packet: the unicast header to be updated
    @dst_addr: the payload destination
    @vid: VLAN identifier
@@ @ -754,7 +755,7 @@
 * Return: true if the packet header has been updated, false otherwise
 */
static bool
batadv_reroute_unicast_packet(struct batadv_priv *bat_priv,
    @skb unicast packet to process
    @unicast_packet: the unicast header to be updated
    @dst_addr: the payload destination
    @vid: VLAN identifier
@@ @ -754,7 +755,7 @@
 * Return: true if the packet header has been updated, false otherwise
 */
skb_postpull_rcsum(skb, unicast_packet, sizeof(*unicast_packet));
ether_addr_copy(unicast_packet->dest, orig_addr);
unicast_packet->ttvn = orig_ttvn;
skb_postpush_rcsum(skb, unicast_packet, sizeof(*unicast_packet));

ret = true;
out:
@@ -819,13 +822,17 @@
vid = batadv_get_vid(skb, hdr_len);
ethhdr = (struct ethhdr *)(skb->data + hdr_len);

+/* do not reroute multicast frames in a unicast header */
+if (is_multicast_ether_addr(ethhdr->h_dest))
+return true;
+
/* check if the destination client was served by this node and it is now
* roaming. In this case, it means that the node has got a ROAM_ADV
* message and that it knows the new destination in the mesh to re-route
* the packet to */
+if (batadv_tt_local_client_is_roaming(bat_priv, ethhdr->h_dest, vid)) {
-+if (batadv_reroute_unicast_packet(bat_priv, unicast_packet,
+if (batadv_reroute_unicast_packet(bat_priv, skb, unicast_packet,
    ethhdr->h_dest, vid))
batadv_dbg_ratelimited(BATADV_DBG_TT,
    bat_priv,
@@ -871,7 +878,7 @@
* destination can possibly be updated and forwarded towards the new
* target host */
-+if (batadv_reroute_unicast_packet(bat_priv, unicast_packet,
+if (batadv_reroute_unicast_packet(bat_priv, skb, unicast_packet,
    ethhdr->h_dest, vid))
batadv_dbg_ratelimited(BATADV_DBG_TT, bat_priv,
    "Rerouting unicast packet to %pM (dst=%pM): TTVN mismatch old_ttvn=%u new_ttvn=%u\n",
@@ -894,12 +901,14 @@
    if (!primary_if)
    return false;

+/* update the packet header */
+skb_postpull_rcsum(skb, unicast_packet, sizeof(*unicast_packet));
ether_addr_copy(unicast_packet->dest, primary_if->net_dev->dev_addr);
+unicast_packet->ttvn = curr_ttvn;
+skb_postpush_rcsum(skb, unicast_packet, sizeof(*unicast_packet));

batadv_hardif_put(primary_if);
-unicast_packet->ttvn = curr_ttvn;
return true;
}

@@ -945,14 +954,10 @@
struct batadv_orig_node *orig_node = NULL, *orig_node_gw = NULL;
int check, hdr_size = sizeof(*unicast_packet);
enum batadv_subtype subtype;
-struct ethhdr *ethhdr;
int ret = NET_RX_DROP;
bool is4addr, is_gw;

unicast_packet = (struct batadv_unicast_packet *)skb->data;
-unicast_4addr_packet = (struct batadv_unicast_4addr_packet *)skb->data;
-ethhdr = eth_hdr(skb);
-
- is4addr = unicast_packet->packet_type == BATADV_UNICAST_4ADDR;
-/* the caller function should have already pulled 2 bytes */
if (is4addr)
@@ -972,12 +977,14 @@
if (!batadv_check_unicast_ttvn(bat_priv, skb, hdr_size))
goto free_skb;
+
+unicast_packet = (struct batadv_unicast_packet *)skb->data;
+/* packet for me */
if (batadv_is_my_mac(bat_priv, unicast_packet->dest)) {
    /* If this is a unicast packet from another backbone gw,
     * drop it.
     */
-orig_addr_gw = ethhdr->h_source;
-orig_addr_gw = eth_hdr(skb)->h_source;
orig_node_gw = batadv_orig_hash_find(bat_priv, orig_addr_gw);
    if (orig_node_gw) {
        is_gw = batadv_bla_is_backbone_gw(skb, orig_node_gw,
@@ -992,6 +999,8 @@
    }
}

if (is4addr) {
    +unicast_4addr_packet =
    +(struct batadv_unicast_4addr_packet *)skb->data;
    subtype = unicast_4addr_packet->subtype;
    batadv_dat_inc_counter(bat_priv, subtype);
--- linux-4.15.0.orig/net/batman-adv/soft-interface.c
+++ linux-4.15.0/net/batman-adv/soft-interface.c
@@ -213,10 +213,14 @@
netif_trans_update(soft_iface);
vid = batadv_get_vid(skb, 0);
+ skb_reset_mac_header(skb);
ethhdr = eth_hdr(skb);

switch (ntohs(ethhdr->h_proto)) {
case ETH_P_8021Q:
+ skb_reset_mac_header(skb);
+ skb_may_pull(skb, sizeof(*vhdr))
+ goto dropped;
+ skb_may_pull(skb, sizeof(*vhdr))
+ vhdr = vlan_eth_hdr(skb);

/* drop batman-in-batman packets to prevent loops */
@@ -414,10 +418,10 @@
struct vlan_ethhdr *vhdr;
struct ethhdr *ethhdr;
unsigned short vid;
-bool is_bcast;
+int packet_type;
batadv_bcast_packet = (struct batadv_bcast_packet *)skb->data;
-is_bcast = (batadv_bcast_packet->packet_type == BATADV_BCAST);
+packet_type = batadv_bcast_packet->packet_type;

skb_pull_rcsum(skb, hdr_size);
skb_reset_mac_header(skb);
@@ -451,13 +455,7 @@
/* skb->dev & skb->pkt_type are set here */
skb->protocol = eth_type_trans(skb, soft_iface);
-
-/* should not be necessary anymore as we use skb_pull_rcsum() 
- * TODO: please verify this and remove this TODO 
- * -- Dec 21st 2009, Simon Wunderlich 
- */
-
-/* skb->ip_summed = CHECKSUM_UNNECESSARY; */
+skb_postpull_rcsum(skb, eth_hdr(skb), ETH_HLEN);

batadv_inc_counter(bat_priv, BATADV_CNT_RX);
batadv_add_counter(bat_priv, BATADV_CNT_RX_BYTES,
@@ -466,7 +464,7 @@
/* Let the bridge loop avoidance check the packet. If will 
* not handle it, we can safely push it up. 
*/
- if (batadv_bla_rx(bat_priv, skb, vid, is_bcast))
+ if (batadv_bla_rx(bat_priv, skb, vid, packet_type))
goto out;
if (orig_node)
@@ -572,15 +570,20 @@
struct batadv_softif_vlan *vlan;
int err;

+spin_lock_bh(&bat_priv->softif_vlan_list_lock);
+
+vlan = batadv_softif_vlan_get(bat_priv, vid);
+if (vlan) {
+  batadv_softif_vlan_put(vlan);
+  spin_unlock_bh(&bat_priv->softif_vlan_list_lock);
+  return -EEXIST;
+
}

vlan = kzalloc(sizeof(*vlan), GFP_ATOMIC);
-if (!vlan)
+if (!vlan) {
+  spin_unlock_bh(&bat_priv->softif_vlan_list_lock);
  return -ENOMEM;
+
  vlan->bat_priv = bat_priv;
  vlan->vid = vid;
@@ -588,17 +591,23 @@
  atomic_set(&vlan->ap_isolation, 0);

  +kref_get(&vlan->refcount);
  +hlist_add_head_rcu(&vlan->list, &bat_priv->softif_vlan_list);
  +spin_unlock_bh(&bat_priv->softif_vlan_list_lock);
  +
  /* batadv_sysfs_add_vlan cannot be in the spinlock section due to the
   * sleeping behavior of the sysfs functions and the fs_reclaim lock
   */
  err = batadv_sysfs_add_vlan(bat_priv->soft_iface, vlan);
  if (err) {
    -kfree(vlan);
    /* ref for the function */
    +batadv_softif_vlan_put(vlan);
    +
    /* ref for the list */
    +batadv_softif_vlan_put(vlan);
    return err;
  }

  -spin_lock_bh(&bat_priv->softif_vlan_list_lock);
  -kref_get(&vlan->refcount);
- hlist_add_head_rcu(&vlan->list, &bat_priv->softif_vlan_list);
- spin_unlock_bh(&bat_priv->softif_vlan_list_lock);
-
/* add a new TT local entry. This one will be marked with the NOPURGE */
* flag
*/
--- linux-4.15.0.orig/net/batman-adv/sysfs.c
+++ linux-4.15.0/net/batman-adv/sysfs.c
@@ -186,7 +186,8 @@
\return __batadv_store_uint_attr(buff, count, _min, _max,\
    _post_func, attr,\
    &bat_priv->_var, net_dev);\
+  &bat_priv->_var, net_dev,\
+  NULL);\
}

#define BATADV_ATTR_SIF_SHOW_UINT(_name, _var)
@@ -260,7 +261,9 @@
\length = __batadv_store_uint_attr(buff, count, _min, _max,\
    _post_func, attr,\
    &hard_iface->_var, net_dev);\
+  &hard_iface->_var,\
+  hard_iface->soft_iface,\
+  net_dev);\
\batadv_hardif_put(hard_iface);\
return length;\
@@ -354,10 +357,12 @@
static int batadv_store_uint_attr(const char *buff, size_t count, struct net_device *net_dev,\
+    struct net_device *slave_dev,\
    const char *attr_name,\
    unsigned int min, unsigned int max,\
    atomic_t *attr)\
{\
+char ifname[IFNAMSIZ + 3] = "";\
unsigned long uint_val;
int ret;

@@ -383,8 +388,11 @@
if (atomic_read(attr) == uint_val)
    return count;
-batadv_info(net_dev, "%s: Changing from: %i to: %lu\n",\
-    attr_name, atomic_read(attr), uint_val);
+if (slave_dev)
+snprintf(ifname, sizeof(ifname), "%s: ", slave_dev->name);
+
+batadv_info(net_dev, "%s: %sChanging from: %i to: %lu\n",
+ attr_name, ifname, atomic_read(attr), uint_val);

atomic_set(attr, uint_val);
return count;
@@ -395,12 +403,13 @@
void (*post_func)(struct net_device *),
const struct attribute *attr,
atomic_t *attr_store,
-struct net_device *net_dev)
+struct net_device *net_dev,
+struct net_device *slave_dev)
{
int ret;

-ret = batadv_store_uint_attr(buff, count, net_dev, attr->name, min, max,
-attr_store);
+ret = batadv_store_uint_attr(buff, count, net_dev, slave_dev,
+attr->name, min, max, attr_store);
if (post_func && ret)
post_func(net_dev);

@@ -569,7 +578,7 @@
return __batadv_store_uint_attr(buff, count, 1, BATADV_TQ_MAX_VALUE,
batadv_post_gw_reselect, attr,
&bat_priv->gw.sel_class,
-bat_priv->soft_iface);
+bat_priv->soft_iface, NULL);
}

static ssize_t batadv_show_gw_bwidth(struct kobject *kobj,
@@ -1072,14 +1081,15 @@
ret = batadv_parse_throughput(net_dev, buff, "throughput_override",
    &tp_override);
if (!ret)
    return count;
+goto out;

old_tp_override = atomic_read(&hard_iface->bat_v.throughput_override);
if (old_tp_override == tp_override)
goto out;

-batadv_info(net_dev, "%s: Changing from: %u.%u MBit to: %u.%u MBit\n",
-"throughput_override",
-batadv_info(hard_iface->soft_iface,
+ "%s: %s: Changing from: %u.%u MBit to: %u.%u MBit\n",
+ "throughput_override", net_dev->name,
    old_tp_override / 10, old_tp_override % 10,
    tp_override / 10, tp_override % 10);

@@ -1104,6 +1114,7 @@

    tp_override = atomic_read(&hard_iface->bat_v.throughput_override);

    +batadv_hardif_put(hard iface);
    return sprintf(buff, "%u.%u MBit\n", tp_override / 10, 
        tp_override % 10);
    }
--- linux-4.15.0.orig/net/batman-adv/translation-table.c
+++ linux-4.15.0/net/batman-adv/translation-table.c
@@ -614,14 +614,26 @@
    struct batadv_tt_global_entry *tt_global,
    const char *message)
{
    +struct batadv_tt_global_entry *tt_removed_entry;
    +struct hlist_node *tt_removed_node;

    batadv_dbg(BATADV_DBG_TT, bat_priv,
        "Deleting global tt entry %pM (vid: %d): %s\n",
        tt_global->common.addr,
        batadv_print_vid(tt_global->common.vid), message);

    -batadv_hash_remove(bat_priv->tt.global_hash, batadv_compare_tt,
        -batadv_choose_tt, &tt_global->common);
    -batadv_tt_global_entry_put(tt_global);
    +tt_removed_node = batadv_hash_remove(bat_priv->tt.global_hash,
        +batadv_compare_tt,
        +batadv_choose_tt,
        +&tt_global->common);
    +if (!tt_removed_node)
    +return;

    +/* drop reference of remove hash entry */
    +tt_removed_entry = hlist_entry(tt_removed_node,
        struct batadv_tt_global_entry,
        +batadv_compare_tt,
        +batadv_choose_tt,
        +&tt_global->common);
    +if (!tt_removed_node)
    +return;

    +/* drop reference of remove hash entry */
    +tt_removed_entry = hlist_entry(tt_removed_node,
        struct batadv_tt_global_entry,
        +common.hash_entry);
    +batadv_tt_global_entry_put(tt_removed_entry);
    }

/**
@@ -860,7 +872,7 @@
    struct batadv_orig_node_vlan *vlan;
    u8 *tt_change_ptr;


-rcu_read_lock();
+spin_lock_bh(&orig_node->vlan_list_lock);

hlist_for_each_entry_rcu(vlan, &orig_node->vlan_list, list) {
    num_vlan++;
    num_entries += atomic_read(&vlan->tt.num_entries);
    tt_vlan->vid = htons(vlan->vid);
    tt_vlan->crc = htonl(vlan->tt.crc);
    +tt_vlan->reserved = 0;
}

out:
-rcu_read_unlock();
+spin_unlock_bh(&orig_node->vlan_list_lock);
return tvlv_len;
}

@ @ -929,15 +942,20 @@
struct batadv_tvlv_tt_vlan_data *tt_vlan;
struct batadv_softif_vlan *vlan;

u16 num_vlan = 0;
-u16 num_entries = 0;
+u16 vlan_entries = 0;
+u16 total_entries = 0;
-u16 tvlv_len;

u8 *tt_change_ptr;
int change_offset;

-rcu_read_lock();
+spin_lock_bh(&bat_priv->softif_vlan_list_lock);

hlist_for_each_entry_rcu(vlan, &bat_priv->softif_vlan_list, list) {
    vlan_entries = atomic_read(&vlan->tt.num_entries);
    if (vlan_entries < 1)
        continue;
    num_vlan++;
    num_entries += atomic_read(&vlan->tt.num_entries);
    +total_entries += vlan_entries;
}

change_offset = sizeof(**tt_data);
@@ -945,7 +963,7 @@
if (*tt_len < 0)
    *tt_len = batadv_tt_len(total_entries);

    tvlv_len = *tt_len;
tvlv_len += change_offset;

    tt_vlan = (struct batadv_tvlv_tt_vlan_data *)(*tt_data + 1);
    hlist_for_each_entry_rcu(vlan, &bat_priv->softif_vlan_list, list) {
        +vlan_entries = atomic_read(&vlan->tt.num_entries);
        +if (vlan_entries < 1)
            +continue;
        +
        tt_vlan->vid = htons(vlan->vid);
        tt_vlan->crc = htonl(vlan->tt.crc);
        +tt_vlan->reserved = 0;
        tt_vlan++;
    }
}

unsigned short vid, const char *message,
    bool roaming)
{
    +struct batadv_tt_local_entry *tt_removed_entry;
    struct batadv_tt_local_entry *tt_local_entry;
    u16 flags, curr_flags = BATADV_NO_FLAGS;
    -void *tt_entry_exists;
    +struct hlist_node *tt_removed_node;

    tt_local_entry = batadv_tt_local_hash_find(bat_priv, addr, vid);
    if (!tt_local_entry)
        batadv_tt_local_event(bat_priv, tt_local_entry, BATADV_TT_CLIENT_DEL);
    @ @ -1344,15 +1368,18 @@
    */
    batadv_tt_local_event(bat_priv, tt_local_entry, BATADV_TT_CLIENT_DEL);

    }
+tt_removed_node = batadv_hash_remove(bat_priv->tt.local_hash,
   batadv_compare_tt,
   batadv_choose_tt,
   &tt_local_entry->common);
-if (!tt_entry_exists)
+if (!tt_removed_node)
goto out;

-/* extra call to free the local tt entry */
-batadv_tt_local_entry_put(tt_local_entry);
+/* drop reference of remove hash entry */
+tt_removed_entry = hlist_entry(tt_removed_node,
   +struct batadv_tt_local_entry,
   +common.hash_entry);
+batadv_tt_local_entry_put(tt_removed_entry);

out:
if (tt_local_entry)
@@ -1528,6 +1555,8 @@
  * by a given originator
  * @entry: the TT global entry to check
  * @orig_node: the originator to search in the list
+  * @flags: a pointer to store TT flags for the given @entry received
+  * from @orig_node
  *
  * find out if an orig_node is already in the list of a tt_global_entry.
  *
@@ -1535,7 +1564,8 @@ */
 static bool
 batadv_tt_global_entry_has_orig(const struct batadv_tt_global_entry *entry,
-   -const struct batadv_orig_node *orig_node)
+   -const struct batadv_orig_node *orig_node,
+   u8 *flags)
 {  
   struct batadv_tt_orig_list_entry *orig_entry;
   bool found = false;
@@ -1543,6 +1573,8 @@
   orig_entry = batadv_tt_global_orig_entry_find(entry, orig_node);
   if (orig_entry) {
     found = true;
+    if (flags)
+      *flags = orig_entry->flags;
     +batadv_tt_orig_list_entry_put(orig_entry);
   }
struct batadv_tt_orig_list_entry *orig_entry;

+spin_lock_bh(&tt_global->list_lock);
+orig_entry = batadv_tt_global_orig_entry_find(tt_global, orig_node);
if (orig_entry) {
    /* refresh the ttvn: the current value could be a bogus one that
    ***/
    orig_entry->flags = flags;
    kref_init(&orig_entry->refcount);
    -spin_lock_bh(&tt_global->list_lock);
    kref_get(&orig_entry->refcount);
    hlist_add_head_rcu(&orig_entry->list,
                      &tt_global->orig_list);
    -spin_unlock_bh(&tt_global->list_lock);
    atomic_inc(&tt_global->orig_list_count);

    sync_flags:
    @@ -1621,6 +1655,8 @@
    out:
    if (orig_entry)
        batadv_tt_orig_list_entry_put(orig_entry);
    +
    +spin_unlock_bh(&tt_global->list_lock);
}

/**
@@ -1679,7 +1715,9 @@
ether_addr_copy(common->addr, tt_addr);
common->vid = vid;

    -common->flags = flags;
+if (!lis_multicast_ether_addr(common->addr))
+common->flags = flags & (~BATADV_TT_SYNC_MASK);
+tt_global_entry->roam_at = 0;
/* node must store current time in case of roaming. This is
    * needed to purge this entry out on timeout (if nobody claims
    @@ -1721,7 +1759,7 @@
    if (!((common->flags & BATADV_TT_CLIENT_TEMP))
goto out;
    if (batadv_tt_global_entry_has_orig(tt_global_entry,
                                      -orig_node))
        + orig_node, NULL))
goto out_remove;
batadv_tt_global_del_orig_list(tt_global_entry);
goto add_orig_entry;
@@ -1742,7 +1780,8 @@
 * client entry *
 */
-common->flags |= flags & (~BATADV_TT_SYNC_MASK);
+if (!is_multicast_ether_addr(common->addr))
+common->flags |= flags & (~BATADV_TT_SYNC_MASK);

/* If there is the BATADV_TT_CLIENT_ROAM flag set, there is only
 * one originator left in the list and we previously received a
@@ -2863,23 +2902,46 @@
 *
 /**
 - * batadv_tt_local_valid - verify that given tt entry is a valid one
+ * batadv_tt_local_valid() - verify local tt entry and get flags
 * @entry_ptr: to be checked local tt entry
 * @data_ptr: not used but definition required to satisfy the callback prototype
+ * @flags: a pointer to store TT flags for this client to
+ *
+ * Checks the validity of the given local TT entry. If it is, then the provided
+ * flags pointer is updated.
+ *
+ * Return: true if the entry is a valid, false otherwise.
+ */
+static bool batadv_tt_local_valid(const void *entry_ptr, const void *data_ptr,
+const void *entry_ptr,
+const void *data_ptr,
+u8 *flags)
{ const struct batadv_tt_common_entry *tt_common_entry = entry_ptr;

if (tt_common_entry->flags & BATADV_TT_CLIENT_NEW)
return false;
+
+if (flags)
+*flags = tt_common_entry->flags;
+
return true;
}
+/**
+ * batadv_tt_global_valid() - verify global tt entry and get flags
+ * @entry_ptr: to be checked global tt entry
+ * @data_ptr: an orig_node object (may be NULL)
+ * @flags: a pointer to store TT flags for this client to
Checks the validity of the given global TT entry. If it is, then the provided
flags pointer is updated either with the common (summed) TT flags if data_ptr
is NULL or the specific, per originator TT flags otherwise.

Return: true if the entry is a valid, false otherwise.

static bool batadv_tt_global_valid(const void *entry_ptr,
const void *data_ptr,
const void *data_ptr,
u8 *flags)
{
const struct batadv_tt_common_entry *tt_common_entry = entry_ptr;
const struct batadv_tt_global_entry *tt_global_entry;
struct batadv_tt_global_entry *tt_global_entry = entry_ptr;
const struct batadv_tt_common_entry *tt_common_entry = entry_ptr;
const struct batadv_tt_global_entry *tt_global_entry;

- return batadv_tt_global_entry_has_orig(tt_global_entry, orig_node);

+ return batadv_tt_global_entry_has_orig(tt_global_entry, orig_node,
+ flags);
}

/**
 * @hash: hash table containing the tt entries
 * @tt_len: expected tvlv tt data buffer length in number of bytes
 * @tvlv_buff: pointer to the buffer to fill with the TT data
 * @valid_cb: function to filter tt change entries
 * @cb_data: data passed to the filter function as argument
 * Fills the tvlv buff with the tt entries from the specified hash. If valid_cb
 * is not provided then this becomes a no-op.
 */
static void batadv_tt_tvlv_generate(struct batadv_priv *bat_priv,
struct batadv_hashtable *hash,
void *tvlv_buff, u16 tt_len,
bool (*valid_cb)(const void *,
const void *),
u8 *flags),
void *cb_data)
{
struct batadv_tt_common_entry *tt_common_entry;
struct batadv_tvlv_tt_change *tt_change;
struct hlist_head *head;

u16 tt_tot, tt_num_entries = 0;


```c
+u8 flags;
+bool ret;
u32 i;

tt_tot = batadv_tt_entries(tt_len);

+if (!valid_cb)
+return;
+
rcu_read_lock();
for (i = 0; i < hash->size; i++) {
head = &hash->table[i];
@@ -2931,11 +3003,12 @@
if (tt_tot == tt_num_entries)
break;

-if ((valid_cb) && (!valid_cb(tt_common_entry, cb_data)))
+ret = valid_cb(tt_common_entry, cb_data, &flags);
+if (!ret)
continue;

ether_addr_copy(tt_change->addr, tt_common_entry->addr);
-tt_change->flags = tt_common_entry->flags;
+tt_change->flags = flags;

memset(tt_change->reserved, 0,
@@ -3729,6 +3802,8 @@
    sizeof(tt_change->reserved));
@@ -3729,6 +3802,8 @@

void batadv_tt_free(struct batadv_priv *bat_priv)
{
+batadv_tvlv_handler_unregister(bat_priv, BATADV_TVLV_ROAM, 1);
+batadv_tvlv_container_unregister(bat_priv, BATADV_TVLV_TT, 1);

--- linux-4.15.0.orig/net/batman-adv/tvlv.c
+++ linux-4.15.0/net/batman-adv/tvlv.c
@@ -528,15 +528,20 @@
    struct batadv_tvlv_handler *tvlv_handler;

+spin_lock_bh(&bat_priv->tvlv_handler_list_lock);
+        tvlv_handler = batadv_tvlv_handler_get(bat_priv, type, version);
if (tvlv_handler) {
+spin_unlock_bh(&bat_priv->tvlv_handler_list_lock);
```
batadv_tvlv_handler_put(tvlv_handler);
return;
}

tvlv_handler = kzalloc(sizeof(*tvlv_handler), GFP_ATOMIC);
- if (!tvlv_handler)
+ if (!tvlv_handler) {
+ spin_unlock_bh(&bat_priv->tvlv.handler_list_lock);
return;
+ }}
tvlv_handler->ogm_handler = optr;
tvlv_handler->unicast_handler = uptr;
@@ -546,7 +551,6 @@
kref_init(&tvlv_handler->refcount);
INIT_HLIST_NODE(&tvlv_handler->list);

- spin_lock_bh(&bat_priv->tvlv.handler_list_lock);
kref_get(&tvlv_handler->refcount);
hlist_add_head_rcu(&tvlv_handler->list, &bat_priv->tvlv.handler_list);
spin_unlock_bh(&bat_priv->tvlv.handler_list_lock);
--- linux-4.15.0.orig/net/batman-adv/types.h
+++ linux-4.15.0/net/batman-adv/types.h
@@ -86,6 +87,9 @@
unsigned char *ogm_buff;
int ogm_buff_len;
atomic_t ogm_seqno;
+/** @ogm_buff_mutex: lock protecting ogm_buff and ogm_buff_len */
+struct mutex ogm_buff_mutex;
};

/**
@@ -155,7 +159,7 @@ */

struct batadv_hard_iface {
 struct list_head list;
- s16 if_num;
+unsigned int if_num;
 char if_status;


struct batadv_priv_bat_v {
    unsigned char *ogm_buff;
    int ogm_buff_len;
    atomic_t ogm_seqno;
    +struct mutex ogm_buff_mutex;
    struct delayed_work ogm_wq;
};

atomic_t bcast_seqno;
atomic_t bcast_queue_left;
atomic_t batman_queue_left;
char num_ifaces;
unsigned int num_ifaces;
struct kobject *mesh_obj;
struct dentry *debug_dir;
struct hlist_head forw_bat_list;
* @update_mac: (re-)init mac addresses of the protocol information
* belonging to this hard-interface
@@ -1430,6 +1439,7 @@
struct batadv_algo_iface_ops {
  void (*activate)(struct batadv_hard_iface *hard_iface);
  int (*enable)(struct batadv_hard_iface *hard_iface);
  +void (*enabled)(struct batadv_hard_iface *hard_iface);
  void (*disable)(struct batadv_hard_iface *hard_iface);
  void (*update_mac)(struct batadv_hard_iface *hard_iface);
@@ -1477,9 +1487,10 @@
  */
struct batadv_algo_orig_ops {
  void (*free)(struct batadv_orig_node *orig_node);
-  int (*add_if)(struct batadv_orig_node *orig_node, int max_if_num);
-  int (*del_if)(struct batadv_orig_node *orig_node, int max_if_num,
-      int del_if_num);
+  int (*add_if)(struct batadv_orig_node *orig_node,
+      unsigned int max_if_num);
+  int (*del_if)(struct batadv_orig_node *orig_node,
+      unsigned int max_if_num, unsigned int del_if_num);
#ifdef CONFIG_BATMAN_ADV_DEBUGFS
  void (*print)(struct batadv_priv *priv, struct seq_file *seq,
    struct batadv_hard_iface *hard_iface);
--- linux-4.15.0.orig/net/bluetooth/6lowpan.c
+++ linux-4.15.0/net/bluetooth/6lowpan.c
@@ -57,6 +57,7 @@
/* We are listening incoming connections via this channel */
static struct l2capChan *listenChan;
+static DEFINE_MUTEX(set_lock);

struct lowpan_peer {
  struct listHead list;
@@ -167,10 +168,10 @@
struct in6_addr *daddr,
    struct sk_buff *skb)
{
-  struct lowpan_peer *peer;
-  struct in6_addr *nexthop;
  struct rt6Info *rt = (struct rt6Info *)skb_dst(skb);
  int count = atomic_read(&dev->peer_count);
  +const struct in6_addr *nexthop;
  +struct lowpan_peer *peer;

  BT_DBG("peers %d addr %pF6c rt %p", count, daddr, rt);
@@ -187,10 +188,16 @@
if (!rt) {
    nexthop = &lowpan_cb(skb)->gw;
    -
    -if (ipv6_addr_any(nexthop))
    -return NULL;
    +if (ipv6_addr_any(&lowpan_cb(skb)->gw)) {
    +/* There is neither route nor gateway,
    + * probably the destination is a direct peer.
    + */
    +nexthop = daddr;
    +} else {
    +/* There is a known gateway
    + */
    +nexthop = &lowpan_cb(skb)->gw;
    +}
} else {
    nexthop = rt6_nexthop(rt, daddr);

    @@ -1076,12 +1083,14 @@

    enable_6lowpan = set_enable->flag;
    +mutex_lock(&set_lock);
    if (listen_chan) {
    l2cap_chan_close(listen_chan, 0);
    l2cap_chan_put(listen_chan);
    }

    listen_chan = bt_6lowpan_listen();
    +mutex_unlock(&set_lock);

    kfree(set_enable);
    }
    @@ -1133,11 +1142,13 @@
    if (ret == -EINVAL)
    return ret;
    
    +mutex_lock(&set_lock);
    if (listen_chan) {
    l2cap_chan_close(listen_chan, 0);
    l2cap_chan_put(listen_chan);
    listen_chan = NULL;
    }
    +mutex_unlock(&set_lock);

    if (conn) {
struct lowpan_peer *peer;
--- linux-4.15.0.orig/net/bluetooth/Kconfig
+++ linux-4.15.0/net/bluetooth/Kconfig
@@ -62,7 +62,6 @@
 config BT_HS
 bool "Bluetooth High Speed (HS) features"
depends on BT_BREDR
- default y
 help
 Bluetooth High Speed includes support for off-loading
 Bluetooth connections via 802.11 (wifi) physical layer
--- linux-4.15.0.orig/net/bluetooth/a2mp.c
+++ linux-4.15.0/net/bluetooth/a2mp.c
@@ -233,6 +233,9 @@
 struct a2mp_info_req req;

 found = true;
+ +memset(&req, 0, sizeof(req));
 +
 req.id = cl->id;
 a2mp_send(mgr, A2MP_GETINFO_REQ, __next_ident(mgr),
   sizeof(req), &req);
@@ -312,6 +315,8 @@
  if (!hdev || hdev->dev_type != HCI_AMP) {
 struct a2mp_info_rsp rsp;

+ +memset(&rsp, 0, sizeof(rsp));
 +
 rsp.id = req->id;
 rsp.status = A2MP_STATUS_INVALID_CTRL_ID;
@@ -355,6 +360,8 @@
  if (!ctrl)
   return -ENOMEM;

+ +memset(&req, 0, sizeof(req));
 +
 req.id = rsp->id;
 a2mp_send(mgr, A2MP_GETAMPASSOC_REQ, __next_ident(mgr), sizeof(req),
  &req);
@@ -381,6 +388,8 @@
  hdev =hci_dev_get(req->id);
 if (!hdev || hdev->amp_type == AMP_TYPE_BREDR || tmp) {
 struct a2mp_amp_assoc_rsp rsp;
+ + +memset(&rsp, 0, sizeof(rsp));
  rsp.id = req->id;
if (tmp) {
    struct a2mp_cmd *hdr)
{
    struct a2mp_physlink_req *req = (void *) skb->data;
    struct a2mp_physlink_rsp *hdr = (void *) skb->data;
    struct hci_dev *hdev;
    struct hci_conn *hcon;

    BT_DBG("local_id %d, remote_id %d", req->local_id, req->remote_id);

    memset(&rsp, 0, sizeof(rsp));
    memset(&rej, 0, sizeof(rej));
    rej.reason = cpu_to_le16(0);
    hdr = (void *) skb->data;

    BT_DBG("%s mgr %p", hdev->name, mgr);
}
memset(&rsp, 0, sizeof(rsp));

rsp.id = hdev->id;
rsp.status = A2MP_STATUS_INVALID_CTRL_ID;

if (!mgr)
    return;

memset(&req, 0, sizeof(req));

req.mtu = cpu_to_le16(L2CAP_A2MP_DEFAULT_MTU);
req.ext_feat = 0;
a2mp_send(mgr, A2MP_DISCOVER_REQ, 1, sizeof(req), &req);

export_symbol(bt_sock_unlink);

void bt_accept_enqueue(struct sock *parent, struct sock *sk)
{
    BT_DBG("parent %p, sk %p", parent, sk);
    sock_hold(sk);
    -lock_sock(sk);
    +if (bh)
        bh_lock_sock_nested(sk);
    +else
        lock_sock_nested(sk, SINGLE_DEPTH_NESTING);
    +
    list_add_tail(&bt_sk(sk)->accept_q, &bt_sk(parent)->accept_q);
    bt_sk(sk)->parent = parent;
    -release_sock(sk);
    +
    +if (bh)
bh_unlock_sock(sk);
+else
+release_sock(sk);
+
parent->sk_ack_backlog++;
}
EXPORT_SYMBOL(bt_accept_enqueue);
@@ -450,7 +460,7 @@
if (sk->sk_state == BT_LISTEN)
return bt_accept_poll(skb);
- if (sk->sk_err || !skb_queue_empty(&sk->sk_error_queue))
+ if (sk->sk_err || !skb_queue_empty_lockless(&sk->sk_error_queue))
mask |= POLLERR |
(sock_flag(skb, SOCK_SELECT_ERR_QUEUE) ? POLLPRI : 0);

@@ -460,7 +470,7 @@
if (sk->sk_shutdown == SHUTDOWN_MASK)
mask |= POLLHUP;
- if (!skb_queue_empty(&sk->sk_receive_queue))
+ if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
mask |= POLLIN | POLLRDNDLM;

if (sk->sk_state == BT_CLOSED)
--- linux-4.15.0.orig/net/bluetooth/amp.c
+++ linux-4.15.0/net/bluetooth/amp.c
@@ -305,6 +305,9 @@
struct hci_request req;
int err;

+if (!mgr)
+return;
+
cp.phy_handle = hcon->handle;
cp.len_so_far = cpu_to_le16(0);
cp.max_len = cpu_to_le16(hdev->amp_assoc_size);
--- linux-4.15.0.orig/net/bluetooth/cmtp/cmtp.h
+++ linux-4.15.0/net/bluetooth/cmtp/cmtp.h
@@ -26,7 +26,7 @@
#include <linux/types.h>
#include <net/bluetooth/bluetooth.h>

+defineBTNAMSIZ18
+#defineBTNAMSIZ21

/* CMTP ioctl defines */
#defineCMTPCONNADD_IOW(C,200,int)
if (!(session->flags & BIT(CMTP_LOOPBACK))) {
  err = cmtp_attach_device(session);
  if (err < 0) {
    /* Caller will call fput in case of failure, and so
     * will cmtp_session kthread.
     */
    get_file(session->sock->file);
    atomic_inc(&session->terminate);
    wake_up_interruptible(sk_sleep(session->sock->sk));
  }
}

static void hci_req_add_le_create_conn(struct hci_request *req,
    struct hci_conn *conn)
{
  struct hci_conn *conn,
  struct hci_cp_le_create_conn cp;
  struct hci_dev *hdev = conn->hdev;
  u8 own_addr_type;

  /* If direct address was provided we use it instead of current
   * address.
   */
  if (direct_rpa) {
    if (bacmp(&req->hdev->random_addr, direct_rpa))
      hci_req_add(req, HCI_OP_LE_SET_RANDOM_ADDR, 6, 
          direct_rpa);
    /* direct address is always RPA */
    own_addr_type = ADDR_LE_DEV_RANDOM;
  } else {
    /* Update random address, but set require_privacy to false so
     * that we never connect with an non-resolvable address.
     */
    if (hci_update_random_address(req, false, conn_use_rpa(conn), 
        &own_addr_type))
      return;
    if (direct_rpa) {
      if (bacmp(&req->hdev->random_addr, direct_rpa))
        hci_req_add(req, HCI_OP_LE_SET_RANDOM_ADDR, 6, 
            direct_rpa);
      /* direct address is always RPA */
      own_addr_type = ADDR_LE_DEV_RANDOM;
    } else {
      /* Update random address, but set require_privacy to false so
       * that we never connect with an non-resolvable address.
       */
      if (hci_update_random_address(req, false, conn_use_rpa(conn), 
        &own_addr_type))
        return;
      /* Caller will call fput in case of failure, and so
       * will cmtp_session kthread.
       */
      get_file(session->sock->file);
      atomic_inc(&session->terminate);
      wake_up_interruptible(sk_sleep(session->sock->sk));
    }
  }
}
+    &own_addr_type))
+  return;
+
  memset(&cp, 0, sizeof(cp));
  
@@ -809,6 +822,14 @@  
  return;

  memset(&cp, 0, sizeof(cp));
+
  /* Some controllers might reject command if intervals are not
 * within range for undirected advertising.
 * BCM20702A0 is known to be affected by this.
 * */
  +cp.min_interval = cpu_to_le16(0x0020);
  +cp.max_interval = cpu_to_le16(0x0020);
  +
  cp.type = LE_ADV_DIRECT_IND;
  cp.own_address_type = own_addr_type;
  cp.direct_addr_type = conn->dst_type;
@@ -825,7 +846,7 @@  
 struct hci_conn *hci_connect_le(struct hci_dev *hdev, bdaddr_t *dst,
       u8 dst_type, u8 sec_level, u16 conn_timeout,
       -u8 role)
+u8 role, bdaddr_t *direct_rpa)
  {  
    struct hci_conn_params *params;
    struct hci_conn *conn;
@@ -940,7 +961,7 @@  
    hci_dev_set_flag(hdev, HCI_LE_SCAN_INTERRUPTED);
  }

-hci_req_add_le_create_conn(&req, conn);
+hci_req_add_le_create_conn(&req, conn, direct_rpa);

  create_conn:
  err = hci_req_run(&req, create_le_conn_complete);
@@ -1041,8 +1062,10 @@  
     if (!conn)
     return ERR_PTR(-ENOMEM);
     -if (hci_explicit_conn_params_set(hdev, dst, dst_type) < 0)
+        if (hci_explicit_conn_params_set(hdev, dst, dst_type) < 0) {
+            hci_conn_del(conn);
+        return ERR_PTR(-EBUSY);
+  }

  hci_req_add_le_create_conn(&req, conn);
conn->state = BT_CONNECT;
set_bit(HCI_CONN_SCANNING, &conn->flags);
@@ -1148,6 +1171,23 @@
return 0;
}

+ /* AES encryption is required for Level 4:
+ *
+ * BLUETOOTH CORE SPECIFICATION Version 5.2 | Vol 3, Part C
+ * page 1319:
+ *
+ * 128-bit equivalent strength for link and encryption keys
+ * required using FIPS approved algorithms (E0 not allowed,
+ * SAFER+ not allowed, and P-192 not allowed; encryption key
+ * not shortened)
+ */
+if (conn->sec_level == BT_SECURITY_FIPS &&
+    !test_bit(HCI_CONN_AES_CCM, &conn->flags)) {
+    bt_dev_err(conn->hdev,
+        "Invalid security: Missing AES-CCM usage");
+    return 0;
+}
+
+if (hci_conn_ssp_enabled(conn) &&
    !test_bit(HCI_CONN_ENCRYPT, &conn->flags))
return 0;
@@ -1268,8 +1308,16 @@
return 0;
encrypt:
-if (test_bit(HCI_CONN_ENCRYPT, &conn->flags))
+if (test_bit(HCI_CONN_ENCRYPT, &conn->flags)) {
+    /* Ensure that the encryption key size has been read,
+    * otherwise stall the upper layer responses.
+    */
+    if (conn->enc_key_size)
+        return 0;
+    +/* Nothing else needed, all requirements are met */
+    return 1;
+}

    hci_conn_encrypt(conn);
    return 0;
--- linux-4.15.0.orig/net/bluetooth/hci_core.c
+++ linux-4.15.0/net/bluetooth/hci_core.c
@@ -802,8 +802,8 @@
if (hdev->le_features[0] & HCI_LE_DATA_LEN_EXT) {
struct hci_cp_le_write_def_data_len cp;

-cp.tx_len = hdev->le_max_tx_len;
-cp.tx_time = hdev->le_max_tx_time;
+cp.tx_len = cpu_to_le16(hdev->le_max_tx_len);
+cp.tx_time = cpu_to_le16(hdev->le_max_tx_time);
hci_req_add(req, HCI_OP_LE_WRITE_DEF_DATA_LEN, sizeof(cp), &cp);
}

@@ -1258,6 +1258,12 @@
goto done;
}

+/* Restrict maximum inquiry length to 60 seconds */
+if (ir.length > 60) {
+err = -EINVAL;
+goto done;
+}
+
+hci_dev_lock(hdev);
if (inquiry_cache_age(hdev) > INQUIRY_CACHE_AGE_MAX ||
inquiry_cache_empty(hdev) || ir.flags & IREQ_CACHE_FLUSH) {
@@ -1278,8 +1284,10 @@
	/* cleared). If it is interrupted by a signal, return -EINVAL.
	*/
	if (wait_on_bit(&hdev->flags, HCI_INQUIRY,
-TASK_INTERRUPTIBLE))
		return -EINTR;
+TASK_INTERRUPTIBLE)) { 
+err = -EINTR;
+goto done;
+}
}

;/* for unlimited number of responses we will use buffer with
@@ -1456,8 +1464,13 @@
} else { 
/* Init failed, cleanup */
flush_work(&hdev->tx_work);
-flush_work(&hdev->cmd_work);
+flush_work(&hdev->tx_work);
+flush_work(&hdev->cmd_work);
+/* Since hci_rx_work() is possible to awake new cmd_work
+ * it should be flushed first to avoid unexpected call of
+ * hci_cmd_work()
+ */
flush_work(&hdev->rx_work);
+flush_work(&hdev->cmd_work);
skb_queue_purge(&hdev->cmd_q);
skb_queue_purge(&hdev->rx_q);
@@ -1575,6 +1588,14 @@
hci_request_cancel_all(hdev);
hci_req_sync_lock(hdev);

+if (!hci_dev_test_flag(hdev, HCI_UNREGISTER) &&
+    !hci_dev_test_flag(hdev, HCI_USER_CHANNEL) &&
+    test_bit(HCI_UP, &hdev->flags)) {
+    /* Execute vendor specific shutdown routine */
+    if (hdev->shutdown)
+        hdev->shutdown(hdev);
+}
+
if (!test_and_clear_bit(HCI_UP, &hdev->flags)) {
    cancel_delayed_work_sync(&hdev->cmd_timer);
hci_req_sync_unlock(hdev);
@@ -3008,6 +3029,8 @@
hdev->le_max_tx_time = 0x0148;
hdev->le_max_rx_len = 0x001b;
hdev->le_max_rx_time = 0x0148;
+hdev->le_max_key_size = SMP_MAX_ENC_KEY_SIZE;
+hdev->le_min_key_size = SMP_MIN_ENC_KEY_SIZE;

hdev->rpa_timeout = HCI_DEFAULT_RPA_TIMEOUT;
hdev->discov_interleaved_timeout = DISCOV_INTERLEAVED_TIMEOUT;
@@ -3173,14 +3196,10 @@
/* Unregister HCI device */
void hci_unregister_dev(struct hci_dev *hdev)
{
    -int id;
    -
    BT_DBG("%p name %s bus %d", hdev, hdev->name, hdev->bus);

    hci_dev_set_flag(hdev, HCI_UNREGISTER);

    -id = hdev->id;
    -
    write_lock(&hci_dev_list_lock);
    list_del(&hdev->list);
    write_unlock(&hci_dev_list_lock);
@@ -3209,7 +3228,14 @@
}

device_del(&hdev->dev);
+/* Actual cleanup is deferred until hci_cleanup_dev(). */
+hci_dev_put(hdev);
/* Cleanup HCI device */
+void hci_cleanup_dev(struct hci_dev *hdev)
+
+{
+debugfs_remove_recursive(hdev->debugfs);
kfree_const(hdev->hw_info);
kfree_const(hdev->fw_info);
@@ -3231,11 +3257,8 @@
+hci_discovery_filter_clear(hdev);
hci_dev_unlock(hdev);

-hci_dev_put(hdev);
-
-ida_simple_remove(&hci_index_ida, id);
+ida_simple_remove(&hci_index_ida, hdev->id);
+
-EXPORT_SYMBOL(hci_unregister_dev);
+
/* Suspend HCI device */
+int hci_suspend_dev(struct hci_dev *hdev)
@@ -4161,6 +4184,9 @@
+return;
+
+/* If we reach this point this event matches the last command sent */
+hci_dev_clear_flag(hdev, HCI_CMD_PENDING);
+
+/* If the command succeeded and there's still more commands in
+ * this request the request is not yet complete.
+ */
@@ -4214,7 +4240,14 @@
hci_send_to_sock(hdev, skb);
+
- if (hci_dev_test_flag(hdev, HCI_USER_CHANNEL)) {
-+/* If the device has been opened in HCI_USER_CHANNEL,
-+ * the userspace has exclusive access to device.
-+ * When device is HCI_INIT, we still need to process
-+ * the data packets to the driver in order
-+ * to complete its setup().
-+ */
+ if (hci_dev_test_flag(hdev, HCI_USER_CHANNEL) &&
+ !test_bit(HCI_INIT, &hdev->flags)) {
+kfree_skb(skb);
+continue;
+}
hdev->sent_cmd = skb_clone(skb, GFP_KERNEL);
if (hdev->sent_cmd) {
  if (hci_req_status_pend(hdev))
    hci_dev_set_flag(hdev, HCI_CMD_PENDING);
  atomic_dec(&hdev->cmd_cnt);
  hci_send_frame(hdev, skb);
if (test_bit(HCI_RESET, &hdev->flags))
--- linux-4.15.0.orig/net/bluetooth/hci_event.c
+++ linux-4.15.0/net/bluetooth/hci_event.c
@@ -41,12 +41,27 @@
 /* Handle HCI Event packets */

 -static void hci_cc_inquiry_cancel(struct hci_dev *hdev, struct sk_buff *skb)
+static void hci_cc_inquiry_cancel(struct hci_dev *hdev, struct sk_buff *skb,
+    u8 *new_status)
+{
+    __u8 status = *((__u8 *) skb->data);
+
    BT_DBG("%s status 0x%2.2x", hdev->name, status);

    /* It is possible that we receive Inquiry Complete event right
    + * before we receive Inquiry Cancel Command Complete event, in
    + * which case the latter event should have status of Command
    + * Disallowed (0x0c). This should not be treated as error, since
    + * we actually achieve what Inquiry Cancel wants to achieve,
    + * which is to end the last Inquiry session.
    + */
    +if ((status == 0x0c && !test_bit(HCI_INQUIRY, &hdev->flags)) {
+    bt_dev_warn(hdev, "Ignoring error of Inquiry Cancel command");
+    status = 0x00;
+  }
+  *
+  *new_status = status;
+  *
+  if (status)
+  return;
+}
+if (len > HCI_MAX_AD_LENGTH)
+return;
+bacpy(&d->last_adv_addr, bdaddr);
d->last_adv_addr_type = bdaddr_type;
d->last_adv_rssi = rssi;
@@ -2095,7 +2113,7 @@
 BT_DBG("%s num_rsp %d", hdev->name, num_rsp);

 -if (!num_rsp)
+if (!num_rsp || skb->len < num_rsp * sizeof(*info) + 1)
    return;

 if (hci_dev_test_flag(hdev, HCI_PERIODIC_INQ))
@@ -2476,7 +2494,7 @@
         &cp);
 } else {
   clear_bit(HCI_CONN_ENCRYPT_PEND, &conn->flags);
-  -hci_encrypt_cfm(conn, ev->status, 0x00);
+  -hci_encrypt_cfm(conn, ev->status);
   }
 }

@@ -2561,22 +2579,7 @@
 conn->enc_key_size = rp->key_size;
 }

-If (conn->state == BT_CONFIG) {
-  -conn->state = BT_CONNECTED;
-  -hci_connect_cfm(conn, 0);
-  -hci_conn_drop(conn);
- } else {
-   -u8 encrypt; 
-   
-   -if (!test_bit(HCI_CONN_ENCRYPT, &conn->flags))
-      -encrypt = 0x00;
-   -else if (test_bit(HCI_CONN_AES_CCM, &conn->flags))
-      -encrypt = 0x02;
-   -else 
-      -encrypt = 0x01;
- 
-   -hci_encrypt_cfm(conn, 0, encrypt);
-   -}
+  -hci_encrypt_cfm(conn, 0);
 
 unlock:
 -hci_dev_unlock(hdev);
@@ -2623,27 +2626,23 @@
 clear_bit(HCI_CONN_ENCRYPT_PEND, &conn->flags);
/* Check link security requirements are met */
+if (!hci_conn_check_link_mode(conn))
+ev->status = HCI_ERROR_AUTH_FAILURE;
+
+if (ev->status & conn->state == BT_CONNECTED) {
+if (ev->status == HCI_ERROR_PIN_OR_KEY_MISSING)
+set_bit(HCI_CONN_AUTH_FAILURE, &conn->flags);
+
++++/* Notify upper layers so they can cleanup before
+ * disconnecting.
+ */
++hci_encrypt_cfm(conn, ev->status);
++hci_disconnect(conn, HCI_ERROR_AUTH_FAILURE);
++hci_conn_drop(conn);
+goto unlock;
}

-/* In Secure Connections Only mode, do not allow any connections
- * that are not encrypted with AES-CCM using a P-256 authenticated
- * combination key.
- */
- if (hci_dev_test_flag(hdev, HCI_SC_ONLY) &&
- (test_bit(HCI_CONN_AES_CCM, &conn->flags) ||
- conn->key_type != HCI_LK_AUTH_COMBINATION_P256)) {
- hci_connect_cfm(conn, HCI_ERROR_AUTH_FAILURE);
- hci_conn_drop(conn);
- goto unlock;
- }
-
- /* Try reading the encryption key size for encrypted ACL links */
+ if (!ev->status && ev->encrypt & conn->type == ACL_LINK) {
+ struct hci_cp_read_enc_key_size cp;
+ @ @ -2673,14 +2672,7 @ @
+ }

notify:
- if (conn->state == BT_CONFIG) {
- if (!ev->status)
- conn->state = BT_CONNECTED;
- -
- hci_connect_cfm(conn, ev->status);
- hci_conn_drop(conn);
- }
else
- hci_encrypt_cfm(conn, ev->status, ev->encrypt);
+ hci_encrypt_cfm(conn, ev->status);

unlock:
hci_dev_unlock(hdev);
switch (*opcode) {
    case HCI_OP_INQUIRY_CANCEL:
        -hci_cc_inquiry_cancel(hdev, skb);
        +hci_cc_inquiry_cancel(hdev, skb, status);
        break;

case HCI_OP_PERIODIC_INQ:
    @@ -3053,6 +3045,12 @@
        hci_req_cmd_complete(hdev, *opcode, *status, req_complete,
                           req_complete_skb);

        +if (hci_dev_test_flag(hdev, HCI_CMD_PENDING)) {
            +bt_dev_err(hdev,
            + "unexpected event for opcode 0x%4.4x", *opcode);
            +return;
            +}
            +
            if (atomic_read(&hdev->cmd_cnt) && !skb_queue_empty(&hdev->cmd_q))
                queue_work(hdev->workqueue, &hdev->cmd_work);
        }
@@ -3156,6 +3154,12 @@
        hci_req_cmd_complete(hdev, *opcode, ev->status, req_complete,
                           req_complete_skb);

        +if (hci_dev_test_flag(hdev, HCI_CMD_PENDING)) {
            +bt_dev_err(hdev,
            + "unexpected event for opcode 0x%4.4x", *opcode);
            +return;
            +}
            +
            if (atomic_read(&hdev->cmd_cnt) && !skb_queue_empty(&hdev->cmd_q))
                queue_work(hdev->workqueue, &hdev->cmd_work);
        }
@@ -3625,6 +3629,9 @@
        struct inquiry_info_with_rssi_and_pscan_mode *info;
        info = (void *) (skb->data + 1);

        +if (skb->len < num_rsp * sizeof(*info) + 1)
            goto unlock;
        +
        for (; num_rsp; num_rsp--, info++) {
            u32 flags;

            @@ -3646,6 +3653,9 @@
                }
                else {
                    struct inquiry_info_with_rssi *info = (void *) (skb->data + 1);
+if (skb->len < num_rsp * sizeof(*info) + 1)
+goto unlock;
+
for (; num_rsp; num_rsp--, info++) {
  u32 flags;

@@ -3666,6 +3676,7 @@
 }
 }

+unlock:
+hci_dev_unlock(hdev);
 }

@@ -3764,6 +3775,21 @@

switch (ev->status) {
  case 0x00:
    /* The synchronous connection complete event should only be
    + sent once per new connection. Receiving a successful
    + complete event when the connection status is already
    + BT_CONNECTED means that the device is misbehaving and sent
    + multiple complete event packets for the same new connection.
    +
    + Registering the device more than once can corrupt kernel
    + memory, hence upon detecting this invalid event, we report
    + an error and ignore the packet.
    +*/
  +if (conn->state == BT_CONNECTED) {
    +bt_dev_err(hdev, "Ignoring connect complete event for existing connection");
  +goto unlock;
  +}
  +
    conn->handle = __le16_to_cpu(ev->handle);
    conn->state  = BT_CONNECTED;
    conn->type   = ev->link_type;
@@ -3777,6 +3803,7 @@
    case 0x11:// Supported Feature or Parameter Value */
 case 0x1c:// SCO interval rejected */
 case 0x1a:// Unsupported Remote Feature */
+case 0x1e:// Invalid LMP Parameters */
 case 0x1f:// Unspecified error */
 case 0x20:// Unsupported LMP Parameter value */
    if (conn->out) {
@@ -3827,7 +3854,7 @@
    BT_DBG("%s num_rsp %d", hdev->name, num_rsp);
-if (!num_rsp)
+if (!num_rsp || skb->len < num_rsp * sizeof(*info) + 1)
 return;

 if (hci_dev_test_flag(hdev, HCI_PERIODIC_INQ))
@@ -4352,6 +4379,11 @@
 return;
 }

+if (!hcon->amp_mgr) {
+hci_dev_unlock(hdev);
+return;
+}
+
 if (ev->status) {
 hci_conn_del(hcon);
 hci_dev_unlock(hdev);
@@ -4396,6 +4428,7 @@
 return;

 hchan->handle = le16_to_cpu(ev->handle);
+hchan->amp = true;

 BT_DBG("hcon %p mgr %p hchan %p", hcon, hcon->amp_mgr, hchan);
@@ -4428,7 +4461,7 @@
 hci_dev_lock(hdev);

 hchan = hci_chan_lookup_handle(hdev, le16_to_cpu(ev->handle));
-if (!hchan)
+if (!hchan || !hchan->amp)
 goto unlock;

 amp_destroy_logical_link(hchan, ev->reason);
@@ -4648,7 +4681,8 @@
 /* This function requires the caller holds hdev->lock */
 static struct hci_conn *check_pending_le_conn(struct hci_dev *hdev,
     bdaddr_t *addr,
-   u8 addr_type, u8 adv_type)
 +   u8 addr_type, u8 adv_type,
+   bdaddr_t *direct_rpa)
 { 
 struct hci_conn *conn;
 struct hci_conn_params *params;
@@ -4699,7 +4733,8 @@
 }
conn = hci_connect_le(hdev, addr, addr_type, BT_SECURITY_LOW,
-  HCI_LE_AUTOCONN_TIMEOUT, HCI_ROLE_MASTER);
+  HCI_LE_AUTOCONN_TIMEOUT, HCI_ROLE_MASTER,
+  direct_rpa);
if (!IS_ERR(conn)) {
  /* If HCI_AUTO_CONN_EXPLICIT is set, conn is already owned
   * by higher layer that tried to connect, if no then
   */
  if (len > HCI_MAX_AD_LENGTH) {
    pr_err_ratelimited("legacy adv larger than 31 bytes");
    return;
  }

  /* Find the end of the data in case the report contains padded zero
   * bytes at the end causing an invalid length value.
   */
  pr_err_ratelimited("legacy adv larger than 31 bytes");
  return;
}

if (conn && type == LE_ADV_IND) {
  /* Check if we have been requested to connect to this device.
   * direct_addr is set only for directed advertising reports (it is NULL
   * for advertising reports) and is already verified to be RPA above.
   */
  +conn = check_pending_le_conn(hdev, bdaddr, bdaddr_type, type,
    +direct_addr);
  +if (conn && type == LE_ADV_IND && len <= HCI_MAX_AD_LENGTH) {
    /* Store report for later inclusion by
     * mgmt_device_connected
     */
    rssi = ev->data[ev->length];
    process_adv_report(hdev, ev->evt_type, &ev->bdaddr,
      - ev->bdaddr_type, NULL, 0, rssi,
      - ev->data, ev->length);
    +if (ev->length <= HCI_MAX_AD_LENGTH) {
      +rssi = ev->data[ev->length];
      +process_adv_report(hdev, ev->evt_type, &ev->bdaddr,

&+ ev->bdaddr_type, NULL, 0, rssi,
+ ev->data, ev->length);+
+ } else {
+ bt_dev_err(hdev, "Dropping invalid advertising data");
+ }

ptr += sizeof(*ev) + ev->length + 1;
}
@@ -5126,20 +5175,18 @@

struct sk_buff *skb)
{
 u8 num_reports = skb->data[0];
- void *ptr = &skb->data[1];
+ struct hci_ev_le_direct_adv_info *ev = (void *)&skb->data[1];
 +struct hci_ev_le_direct_adv_info *ev = (void *)&skb->data[1];

-hci_dev_lock(hdev);
+if (!num_reports || skb->len < num_reports * sizeof(*ev) + 1)
+return;

-while (num_reports--) {
-struct hci_ev_le_direct_adv_info *ev = ptr;
+hci_dev_lock(hdev);

+for (; num_reports; num_reports--, ev++)
+process_adv_report(hdev, ev->evt_type, &ev->bdaddr,
+ ev->bdaddr_type, &ev->direct_addr,
+ ev->direct_addr_type, ev->rssi, NULL, 0);

- ptr += sizeof(*ev);
- }
-
- hci_dev_unlock(hdev);
}

@@ -5206,6 +5253,12 @@

return true;
}

+/* Check if request ended in Command Status - no way to retrieve
+ any extra parameters in this case.
+ */
+if (hdr->evt == HCI_EV_CMD_STATUS)
+return false;
+
+ if (hdr->evt != HCI_EV_CMD_COMPLETE) {
+ bt_dev_err(hdev, "last event is not cmd complete (0x%2.2x)",
+ hdr->evt);
+ @@ -5238,6 +5291,11 @@
u8 status = 0, event = hdr->evt, req_evt = 0;
u16 opcode = HCI_OP_NOP;

+if (!event) {
+bt_dev_warn(hdev, "Received unexpected HCI Event 00000000");
+goto done;
+}
+
+if (hdev->sent_cmd && bt_cb(hdev->sent_cmd)->hci.req_event == event) {
+struct hci_command_hdr *cmd_hdr = (void *) hdev->sent_cmd->data;
+opcode = __le16_to_cpu(cmd_hdr->opcode);
+}
+}

{done:
   kfree_skb(orig_skb);
   kfree_skb(skb);
   hdev->stat.evt_rx++;
--- linux-4.15.0.orig/net/bluetooth/hci_request.c
+++ linux-4.15.0/net/bluetooth/hci_request.c
@@ -46,6 +46,11 @@
     skb_queue_purge(&req->cmd_q);
 }

+bool hci_req_status_pend(struct hci_dev *hdev)
+{
+    return hdev->req_status == HCI_REQ_PEND;
+}
+
+static int req_run(struct hci_request *req, hci_req_complete_t complete,
+                    hci_req_complete_skb_t complete_skb)
+{
+    int ret;

-if (!test_bit(HCI_UP, &hdev->flags))
-    return -ENETDOWN;
-
-    /* Serialize all requests */
-    hci_req_sync_lock(hdev);
-    -ret = __hci_req_sync(hdev, req, opt, timeout, hci_status);
-    +/* check the state after obtaing the lock to protect the HCI_UP */
-    +* against any races from hci_dev_do_close when the controller
-    +* gets removed.
-    +*/
-    +if (test_bit(HCI_UP, &hdev->flags))
+ret = __hci_req_sync(hdev, req, opt, timeout, hci_status);
+else
+ret = -ENETDOWN;
hci_req_sync_unlock(hdev);

return ret;
@@ -1100,6 +1109,14 @@
instance_flags = get_adv_instance_flags(hdev, instance);

+/* If instance already has the flags set skip adding it once
+ * again.
+ */
+if (adv_instance && eir_get_data(adv_instance->adv_data,
+ adv_instance->adv_data_len, EIR_FLAGS,
+ NULL))
+goto skip_flags;
+
/* The Add Advertising command allows userspace to set both the general
 * and limited discoverable flags.
 */
@@ -1132,6 +1149,7 @@
{ }

+skip_flags:
if (adv_instance) {
memcpy(ptr, adv_instance->adv_data,
    adv_instance->adv_data_len);
--- linux-4.15.0.orig/net/bluetooth/hci_request.h
+++ linux-4.15.0/net/bluetooth/hci_request.h
@@ -37,6 +37,7 @@
void hci_req_init(struct hci_request *req, struct hci_dev *hdev);
void hci_req_purge(struct hci_request *req);
+bool hci_req_status_pend(struct hci_dev *hdev);
int hci_req_run(struct hci_request *req, hci_req_complete_t complete);
int hci_req_run_skb(struct hci_request *req, hci_req_complete_skb_t complete);
void hci_req_add(struct hci_request *req, u16 opcode, u32 plen,
--- linux-4.15.0.orig/net/bluetooth/hci_sock.c
+++ linux-4.15.0/net/bluetooth/hci_sock.c
@@ -59,6 +59,17 @@
char              comm[TASK_COMM_LEN];
};

+static struct hci_dev *hci_hdev_from_sock(struct sock *sk)
+{
+struct hci_dev *hdev = hci_pi(sk)->hdev;
if (!hdev)
  return ERR_PTR(-EBADFD);
if (hci_dev_test_flag(hdev, HCI_UNREGISTER))
  return ERR_PTR(-EPIPE);
return hdev;
}

void hci_sock_set_flag(struct sock *sk, int nr)
{
  set_bit(nr, &hci_pi(sk)->flags);
  @ @ -752,19 +763,13 @@
  if (event == HCI_DEV_UNREG) {
    struct sock *sk;

    /* Detach sockets from device */
    /* Wake up sockets using this dead device */
    read_lock(&hci_sk_list.lock);
    sk_for_each(sk, &hci_sk_list.head) {
      bh_lock_sock_nested(sk);
      if (hci_pi(sk)->hdev == hdev) {
        -hci_pi(sk)->hdev = NULL;
        sk->sk_err = EPIPE;
        -sk->sk_state = BT_OPEN;
        sk->sk_state_change(sk);
        -
        -hci_dev_put(hdev);
      }
      bh_unlock_sock(sk);
    }
    read_unlock(&hci_sk_list.lock);
    }
    @ @ -831,7 +836,7 @@
    if (!sk)
      return 0;

    -hdev = hci_pi(sk)->hdev;
    +lock_sock(sk);

    switch (hci_pi(sk)->channel) {
    case HCI_CHANNEL_MONITOR:
    @@ -854,6 +859,7 @@
      bt_sock_unlink(&hci_sk_list, sk);

      +hdev = hci_pi(sk)->hdev;
      if (hdev) {
        if (hci_pi(sk)->channel == HCI_CHANNEL_USER) {
          
Open Source Used In 5GaaS Edge AC-4  33596
/* When releasing a user channel exclusive access,
 skb_queue_purge(&sk->sk_receive_queue);
 skb_queue_purge(&sk->sk_write_queue);

 +release_sock(sk);
 sock_put(sk);
 return 0;
 }
@@ -921,10 +928,10 @@
 static int hci_sock_bound_ioctl(struct sock *sk, unsigned int cmd,
 unsigned long arg)
 {
 -struct hci_dev *hdev = hci_pi(sk)->hdev;
 +struct hci_dev *hdev = hci_hdev_from_sock(sk);

 -if (!hdev)
 -return -EBADFD;
 +if (IS_ERR(hdev))
 +return PTR_ERR(hdev);

 if (hci_dev_test_flag(hdev, HCI_USER_CHANNEL))
 return -EBUSY;
 @@ -1078,6 +1085,18 @@
 lock_sock(sk);

 /* Allow detaching from dead device and attaching to alive device, if
+ * the caller wants to re-bind (instead of close) this socket in
+ * response to hci_sock_dev_event(HCI_DEV_UNREG) notification.
+ */
+ if (sk->sk_state == BT_BOUND) {
+ err = -EALREADY;
+ goto done;
+ }

 if (sk->sk_state == BT_BOUND) {
 err = -EALREADY;
 goto done;
 }

 lock_sock(sk);

 -hdev = hci_pi(sk)->hdev;
 -if (!hdev) {
+ /* Allow detaching from dead device and attaching to alive device, if
+ * the caller wants to re-bind (instead of close) this socket in
+ * response to hci_sock_dev_event(HCI_DEV_UNREG) notification.
+ */
+ hdev = hci_pi(sk)->hdev;
+ if (hdev && hci_dev_test_flag(hdev, HCI_UNREGISTER)) {
+ hci_pi(sk)->hdev = NULL;
+ sk->sk_state = BT_OPEN;
+ hci_dev_put(hdev);
+ }
+ hdev = NULL;
+ if (sk->sk_state == BT_BOUND) {
+ err = -EALREADY;
+ goto done;
+ }

 lock_sock(sk);

 -hdev = hci_pi(sk)->hdev;
 -if (!hdev) {  
+ /* Allow detaching from dead device and attaching to alive device, if
+ * the caller wants to re-bind (instead of close) this socket in
+ * response to hci_sock_dev_event(HCI_DEV_UNREG) notification.
+ */
+ hdev = hci_pi(sk)->hdev;
+ if (hdev && hci_dev_test_flag(hdev, HCI_UNREGISTER)) {
+ hci_pi(sk)->hdev = NULL;
+ sk->sk_state = BT_OPEN;
+ hci_dev_put(hdev);
+ }
+ hdev = NULL;
+ if (sk->sk_state == BT_BOUND) {
+ err = -EALREADY;
+ goto done;
+ }

 lock_sock(sk);

err = -EBADFD;
+hdev = hci_hdev_from_sock(sk);
+if (IS_ERR(hdev)) {
+err = PTR_ERR(hdev);
goto done;
}

@@ -1716,9 +1735,9 @@
goto done;
}

-hdev = hci_pi(sk)->hdev;
-if (!hdev) {
-err = -EBADFD;
+hdev = hci_hdev_from_sock(sk);
+if (IS_ERR(hdev)) {
+err = PTR_ERR(hdev);
goto done;
}

--- linux-4.15.0.orig/net/bluetooth/hci_sysfs.c
+++ linux-4.15.0/net/bluetooth/hci_sysfs.c
@@ -83,6 +83,9 @@
static void bt_host_release(struct device *dev)
 {
 struct hci_dev *hdev = to_hci_dev(dev);
+
+if (hci_dev_test_flag(hdev, HCI_UNREGISTER))
+hci_cleanup_dev(hdev);
kfree(hdev);
module_put(THIS_MODULE);
}

--- linux-4.15.0.orig/net/bluetooth/hidp/core.c
+++ linux-4.15.0/net/bluetooth/hidp/core.c
@@ -431,8 +431,8 @@
 del_timer(&session->timer);
 }

-static void hidp_process_report(struct hidp_session *session,
-int type, const u8 *data, int len, int intr)
+static void hidp_process_report(struct hidp_session *session, int type,
+const u8 *data, unsigned int len, int intr)
 {
 if (len > HID_MAX_BUFFER_SIZE)
 len = HID_MAX_BUFFER_SIZE;
@@ -775,7 +775,7 @@
hid->version = req->version;
hid->country = req->country;

- strncpy(hid->name, req->name, sizeof(req->name) - 1);
+ strncpy(hid->name, req->name, sizeof(hid->name));

snprintf(hid->phys, sizeof(hid->phys), "%pMR",
    &l2cap_pi(session->ctrl_sock->sk)->chan->src);
hid->dev.parent = &session->conn->hcon->dev;
hid->ll_driver = &hidp_hid_driver;

/* True if device is blacklisted in drivers/hid/hid-core.c */
+/* True if device is blacklisted in drivers/hid/quirks.c */
if (hid_ignore(hid)) {
    hid_destroy_device(session->hid);
    session->hid = NULL;
    @@ -1282,7 +1282,7 @@

    /* cleanup runtime environment */
    remove_wait_queue(sk_sleep(session->intr_sock->sk), &intr_wait);
    -remove_wait_queue(sk_sleep(session->intr_sock->sk), &ctrl_wait);
    +remove_wait_queue(sk_sleep(session->ctrl_sock->sk), &ctrl_wait);
    wake_up_interruptible(&session->report_queue);
    hidp_del_timer(session);

    sockfd_put(csock);
    return err;
} +ca.name[sizeof(ca.name)-1] = 0;

err = hidp_connection_add(&ca, csock, isock);
if (!err && copy_to_user(argp, &ca, sizeof(ca)))
    BTDBG("chan %p state %s", chan, state_to_string(chan->state));

mutex_lock(&conn->chan_lock);
+/* __set_chan_timer() calls l2cap_chan_hold(chan) while scheduling
    + * this work. No need to call l2cap_chan_hold(chan) here again.
    + */
l2cap_chan_lock(chan);

if (chan->state == BT_CONNECTED || chan->state == BT_CONFIG)
    @@ -426,12 +429,12 @@
struct l2cap_chan *l2cap_chan_create(void)
@@ -442,6 +445,8 @@
   if (!chan)
      return NULL;
+skb_queue_head_init(&chan->tx_q);
+skb_queue_head_init(&chan->srej_q);

mutex_init(&chan->lock);
/* Set default lock nesting level */
@@ -507,7 +512,9 @@
   chan->flush_to = L2CAP_DEFAULT_FLUSH_TO;
   chan->retrans_timeout = L2CAP_DEFAULT_RETRANS_TO;
   chan->monitor_timeout = L2CAP_DEFAULT_MONITOR_TO;
+   chan->conf_state = 0;
+   set_bit(CONF_NOT_COMPLETE, &chan->conf_state);

set_bit(FLAG_FORCE_ACTIVE, &chan->flags);
}
@@ -1340,6 +1347,21 @@
   sizeof(req), &req);
 }

+static bool l2cap_check_enc_key_size(struct hci_conn *hcon)
+{
+  /* The minimum encryption key size needs to be enforced by the
+     * host stack before establishing any L2CAP connections. The
+     * specification in theory allows a minimum of 1, but to align
+     * BR/EDR and LE transports, a minimum of 7 is chosen.
+     * This check might also be called for unencrypted connections
+     * that have no key size requirements. Ensure that the link is
+     * actually encrypted before enforcing a key size.
+     */

l2cap_chan_close(chan, reason);

-l2cap_chan_unlock(chan);
-
-chan->ops->close(chan);
-mutex_unlock(&conn->chan_lock);
+
+l2cap_chan_unlock(chan);
+l2cap_chan_put(chan);
+mutex_unlock(&conn->chan_lock);
}

static bool l2cap_check_enc_key_size(struct hci_conn *hcon)
{
return (!test_bit(HCI_CONN_ENCRYPT, &hcon->flags) ||
    hcon->enc_key_size >= HCI_MIN_ENC_KEY_SIZE);
}

static void l2cap_do_start(struct l2cap_chan *chan)
{
    struct l2cap_conn *conn = chan->conn;
    if (!(conn->info_state & L2CAP_INFO_FEAT_MASK_REQ_DONE))
        return;

    if (!l2cap_chan_check_security(chan, true) ||
        !__l2cap_no_conn_pending(chan))
        return;

    if (l2cap_check_enc_key_size(conn->hcon))
        l2cap_start_connection(chan);
    else
        __set_chan_timer(chan, L2CAP_DISC_TIMEOUT);
}

static inline int l2cap_mode_supported(__u8 mode, __u32 feat_mask)
    continue;
}

-l2cap_start_connection(chan);
+if (l2cap_check_enc_key_size(conn->hcon))
+l2cap_start_connection(chan);
+else
+l2cap_chan_close(chan, ECONNREFUSED);
}

} else if (chan->state == BT_CONNECT2) {
    struct l2cap_conn_rsp rsp;
    @ @ -1702,9 +1732,9 @@

    l2cap_chan_del(chan, err);

    -l2cap_chan_unlock(chan);
    - chan->ops->close(chan);
    +
    +l2cap_chan_unlock(chan);
    l2cap_chan_put(chan);
}
while (len >= L2CAP_CONF_OPT_SIZE) {
len -= l2cap_get_conf_opt(&req, &type, &olen, &val);
+if (len < 0)
+break;

hint  = type & L2CAP_CONF_HINT;
type &= L2CAP_CONF_MASK;

switch (type) {
  case L2CAP_CONF_MTU:
+if (olen != 2)
+break;
  mtu = val;
  break;

  case L2CAP_CONF_FLUSH_TO:
+if (olen != 2)
+break;
  chan->flush_to = val;
  break;

  case L2CAP_CONF_RFC:
+if (olen != sizeof(rfc))
+break;
+memcpy(&rfc, (void *) val, olen);
  break;

  case L2CAP_CONF_FCS:
+if (olen != 1)
+break;
  if (val == L2CAP_FCS_NONE)
    set_bit(CONF_RECV_NO_FCS, &chan->conf_state);
  break;

  case L2CAP_CONF_EFS:
+if (olen != sizeof(efs)) {
+  remote_efs = 1;
+  memcpy(&efs, (void *) val, olen);
+  }
+if (olen != sizeof(efs))
+break;

```
remote_efs = 1;
memcpy(&efs, (void *) val, olen);
break;

case L2CAP_CONF_EWS:
    if (olen != 2)
        break;
if (!(chan->conn->local_fixed_chan & L2CAP_FC_A2MP))
    return -ECONNREFUSED;
    set_bit(FLAG_EXT_CTRL, &chan->flags);
set_bit(CONF_EWS_RECV, &chan->conf_state);
chan->tx_win_max = L2CAP_DEFAULT_EXT_WINDOW;
while (len >= L2CAP_CONF_OPT_SIZE) {
    len -= l2cap_get_conf_opt(&rsp, &type, &olen, &val);
    if (len < 0)
        break;
    switch (type) {
        case L2CAP_CONF_MTU:
            if (olen != 2)
                break;
            if (val < L2CAP_DEFAULT_MIN_MTU) {
                *result = L2CAP_CONF_UNACCEPT;
                chan->imtu = L2CAP_DEFAULT_MIN_MTU;
            } else
                chan->imtu = val;
            l2cap_add_conf_opt(&ptr, L2CAP_CONF_MTU, 2, chan->imtu, endptr - ptr);
            break;
        case L2CAP_CONF_FLUSH_TO:
            if (olen != 2)
                break;
            chan->flush_to = val;
            l2cap_add_conf_opt(&ptr, L2CAP_CONF_FLUSH_TO, 2, chan->flush_to, endptr - ptr);
            break;
    }
}
default:
    if (hint)
        break;
- result = L2CAP_CONF_UNKNOWN;
* ((u8 *) ptr++) = type;
break;
while (len >= L2CAP_CONF_OPT_SIZE) {
    len -= l2cap_get_conf_opt(&rsp, &type, &olen, &val);
    if (len < 0)
        break;
    switch (type) {
        case L2CAP_CONF_MTU:
            if (olen != 2)
                break;
            if (val < L2CAP_DEFAULT_MIN_MTU) {
                *result = L2CAP_CONF_UNACCEPT;
                chan->imtu = L2CAP_DEFAULT_MIN_MTU;
            } else
                chan->imtu = val;
            l2cap_add_conf_opt(&ptr, L2CAP_CONF_MTU, 2, chan->imtu, endptr - ptr);
            break;
        case L2CAP_CONF_FLUSH_TO:
            if (olen != 2)
                break;
            chan->flush_to = val;
            l2cap_add_conf_opt(&ptr, L2CAP_CONF_FLUSH_TO, 2, chan->flush_to, endptr - ptr);
            break;
    }
}
+l2cap_add_conf_opt(&ptr, L2CAP_CONF_FLUSH_TO, 2,
+    chan->flush_to, endptr - ptr);
break;

case L2CAP_CONF_RFC:
    -if (olen == sizeof(rfc))
    -    memcpy(&rfc, (void *)val, olen);
    -break;
    +if (olen != sizeof(rfc))
    +    memcpy(&rfc, (void *)val, olen);
    +break;
    if (test_bit(CONF_STATE2_DEVICE, &chan->conf_state) &&
        rfc.mode != chan->mode)
        return -ECONNREFUSED;
    -chan->fcs = 0;
    -
    -l2cap_add_conf_opt(&ptr, L2CAP_CONF_RFC,
    -    sizeof(rfc), (unsigned long) &rfc, endptr - ptr);
    +l2cap_add_conf_opt(&ptr, L2CAP_CONF_RFC, sizeof(rfc),
    +    (unsigned long) &rfc, endptr - ptr);
    break;

case L2CAP_CONF_EWS:
    +if (olen != 2)
    +    break;
    chan->ack_win = min_t(u16, val, chan->ack_win);
    l2cap_add_conf_opt(&ptr, L2CAP_CONF_EWS, 2,
    -    chan->tx_win, endptr - ptr);
    break;

case L2CAP_CONF_EFS:
    -if (olen == sizeof(efs)) {
    -    memcpy(&efs, (void *)val, olen);
    -    -if (chan->local_stype != L2CAP_SERV_NOTRAFIC &&
    -        efs.stype != L2CAP_SERV_NOTRAFIC &&
    -        efs.stype != chan->local_stype)
    -        return -ECONNREFUSED;
    -    -l2cap_add_conf_opt(&ptr, L2CAP_CONF_EFS, sizeof(efs),
    -        (unsigned long) &efs, endptr - ptr);
    -}
    +if (olen != sizeof(efs))
    +    break;
    +memcpy(&efs, (void *)val, olen);
    +if (chan->local_stype != L2CAP_SERV_NOTRAFIC &&
    +    efs.stype != L2CAP_SERV_NOTRAFIC &&
+ efs.stype != chan->local_stype)
+ return -ECONNREFUSED;
+ l2cap_add_conf_opt(&ptr, L2CAP_CONF_EFS, sizeof(efs),
+ (unsigned long *)&efs, endptr - ptr);
break;

    case L2CAP_CONF_FCS:
+ if (olen != 1)
+ break;
    if (*result == L2CAP_CONF_PENDING)
    if (val == L2CAP_FCS_NONE)
    set_bit(CONF_RECV_NO_FCS,
    @@ -3727,13 +3773,18 @@

while (len >= L2CAP_CONF_OPT_SIZE) {
    len -= l2cap_get_conf_opt(&rsp, &type, &olen, &val);
+ if (len < 0)
+ break;

        switch (type) {
        case L2CAP_CONF_RFC:
-        if (olen == sizeof(rfc))
-        memcpy(&rfc, (void *)val, olen);
+        if (olen != sizeof(rfc))
+        break;
+        memcpy(&rfc, (void *)val, olen);
        break;
        case L2CAP_CONF_EWS:
+        if (olen != 2)
+        break;
        txwin_ext = val;
        break;
    }  
    @@ -4070,7 +4121,8 @@
return 0;
    }

- if (chan->state != BT_CONFIG && chan->state != BT_CONNECT2) {
+ if (chan->state != BT_CONFIG && chan->state != BT_CONNECT2 &&
+    chan->state != BT_CONNECTED) {
    cmd_reject_invalid_cid(conn, cmd->ident, chan->scid,
    chan->dcid);
    goto unlock;
    @@ -4293,6 +4345,7 @@
return 0;
    }

+ l2cap_chan_hold(chan);
l2cap_chan_lock(chan);

rsp.dcid = cpu_to_le16(chan->scid);
@@ -4301,12 +4354,11 @@
chan->ops->set_shutdown(chan);

-l2cap_chan_hold(chan);
l2cap_chan_del(chan, ECONNRESET);

-l2cap_chan_unlock(chan);
-
chan->ops->close(chan);
+
+l2cap_chan_unlock(chan);
l2cap_chan_put(chan);

mutex_unlock(&conn->chan_lock);
@@ -4338,14 +4390,21 @@
return 0;
}

+l2cap_chan_hold(chan);
l2cap_chan_lock(chan);

-l2cap_chan_hold(chan);
-l2cap_chan_del(chan, 0);
+if (chan->state != BT_DISCONNECT) {
+l2cap_chan_unlock(chan);
+l2cap_chan_put(chan);
+mutex_unlock(&conn->chan_lock);
+return 0;
+}

-l2cap_chan_unlock(chan);
+l2cap_chan_del(chan, 0);

chan->ops->close(chan);
+
+l2cap_chan_unlock(chan);
l2cap_chan_put(chan);

mutex_unlock(&conn->chan_lock);
@@ -4868,10 +4927,8 @@
BT_DBG("chan %p, result %d, local_amp_id %d, remote_amp_id %d",
          chan, result, local_amp_id, remote_amp_id);

-if (chan->state == BT_DISCONNECT || chan->state == BT_CLOSED) {

l2cap_chan_unlock(chan);
+if (chan->state == BT_DISCONN || chan->state == BT_CLOSED)
return;
-}

if (chan->state != BT_CONNECTED) {
l2cap_do_create(chan, result, local_amp_id, remote_amp_id);
@@ -6630,9 +6687,10 @@
goto drop;
}

-if ((chan->mode == L2CAP_MODE_ERTM ||
+if (chan->ops->filter) {
	if (chan->ops->filter(chan, skb))
+goto drop;
+}

if (!control->sframe) {
int err;
@@ -6769,6 +6827,16 @@
chan->sdu_len = sdu_len;
chan->sdu_last_frag = skb;

+/* Detect if remote is not able to use the selected MPS */
+if (skb->len + L2CAP_SDULEN_SIZE < chan->mps) {
+u16 mps_len = skb->len + L2CAP_SDULEN_SIZE;
+ /* Adjust the number of credits */
+BT_DBG("chan->mps %u -> %u", chan->mps, mps_len);
+chan->mps = mps_len;
+l2cap_chan_le_send_credits(chan);
+}
+}
return 0;
}

@@ -7156,7 +7224,7 @@
hcon = hci_connect_le(hdev, dst, dst_type,
chan->sec_level,
    HCI_LE_CONN_TIMEOUT,
-    HCI_ROLE_SLAVE);
+    HCI_ROLE_SLAVE, NULL);
else
hcon = hci_connect_le_scan(hdev, dst, dst_type,
chan->sec_level,
@@ -7434,7 +7502,7 @@

```c
if (chan->state == BT_CONNECT) {
    if (!status)
        l2cap_start_connection(chan);
    else
        __set_chan_timer(chan, L2CAP_DISC_TIMEOUT);
    if (!status) {
        if (!status && l2cap_check_enc_key_size(hcon)) {
            if (test_bit(FLAG_DEFER_SETUP, &chan->flags)) {
                res = L2CAP_CR_PEND;
                stat = L2CAP_CS_AUTHOR_PEND;
                struct l2cap_conn_rsp rsp;
                __u16 res, stat;
            }
        }
        else
            __set_chan_timer(chan, L2CAP_DISC_TIMEOUT);
    }
}
```
struct sock *sk = sock->sk;
int err;
+struct l2cap_chan *chan;

BT_DBG("sock %p, sk %p", sock, sk);

@@ -1200,9 +1209,17 @@
broadcast(sock); sk_list, sk);

err = l2cap_sock_shutdown(sock, 2);
+chan = l2cap_pi(sk)->chan;
+
+l2cap_chan_hold(chan);
+l2cap_chan_lock(chan);

sock_orphan(sk);
l2cap_sock_kill(sk);
+
+l2cap_chan_unlock(chan);
+l2cap_chan_put(chan);
+
return err;
}

@@ -1220,12 +1237,15 @@

BT_DBG("child chan %p state %s", chan,
        state_to_string(chan->state));

+l2cap_chan_hold(chan);
+l2cap_chan_lock(chan);
+
+__clear_chan_timer(chan);
l2cap_chan_close(chan, ECONNRESET);
-l2cap_sock_kill(sk);
-
+l2cap_sock_kill(sk);
+
+l2cap_chan_unlock(chan);
+l2cap_chan_put(chan);
}
}

@@ -1253,7 +1273,7 @@
l2cap_sock_init(sk, parent);

-broadcast_enqueue(parent, sk);
+l2cap_sock_init(sk, parent);

-broadcast_enqueue(parent, sk, false);
release_sock(parent);

@@ -1330,8 +1350,6 @@

parent = bt_sk(sk)->parent;

-sock_set_flag(sk, SOCK_ZAPPED);
-
switch (chan->state) {
    case BT_OPEN:
    case BT_BOUND:
@@ -1358,8 +1376,11 @@
        break;
    }
-
release_sock(sk);
+
+/* Only zap after cleanup to avoid use after free race */
+sock_set_flag(sk, SOCK_ZAPPED);
+
}

static void l2cap_sock_state_change_cb(struct l2cap_chan *chan, int state,
@@ -1465,6 +1486,19 @@
        sk->sk_state_change(sk);
    }

+static int l2cap_sock_filter(struct l2cap_chan *chan, struct sk_buff *skb)
+{
+    struct sock *sk = chan->data;
+    
+switch (chan->mode) {
+    case L2CAP_MODE_ERTM:
+    case L2CAP_MODE_STREAMING:
+        return sk_filter(sk, skb);
+    }
+    return 0;
+}
+
static const struct l2cap_ops l2cap_chan_ops = {
    .name = "L2CAP Socket Interface",
    .new_connection = l2cap_sock_new_connection_cb,
@@ -1479,6 +1513,7 @@
    .set_shutdown = l2cap_sock_set_shutdown_cb,
    .get_sndtimeo = l2cap_sock_get_sndtimeo_cb,
.alloc_skb=12cap_sock_alloc_skb_cb,
+filter=12cap_sock_filter,
};

static void l2cap_sock_destruct(struct sock *sk)
--- linux-4.15.0.org/net/bluetooth/mgmt.c
+++ linux-4.15.0/net/bluetooth/mgmt.c
@@ -219,12 +219,15 @@
 MGMT_STATUS_TIMEOUT,/* Instant Passed */
 MGMT_STATUS_NOT_SUPPORTED,/* Pairing Not Supported */
 MGMT_STATUS_FAILED,/* Transaction Collision */
+MGMT_STATUS_FAILED,/* Reserved for future use */
 MGMT_STATUS_INVALID_PARAMS,/* Unacceptable Parameter */
 MGMT_STATUS_REJECTED,/* QoS Rejected */
 MGMT_STATUS_NOT_SUPPORTED,/* Classification Not Supported */
 MGMT_STATUS_REJECTED,/* Insufficient Security */
 MGMT_STATUS_INVALID_PARAMS,/* Parameter Out Of Range */
+MGMT_STATUS_FAILED,/* Reserved for future use */
 MGMT_STATUS_BUSY,/* Role Switch Pending */
+MGMT_STATUS_FAILED,/* Reserved for future use */
 MGMT_STATUS_FAILED,/* Slot Violation */
 MGMT_STATUS_FAILED,/* Role Switch Failed */
 MGMT_STATUS_INVALID_PARAMS,/* EIR Too Large */
@@ -635,7 +638,8 @@
 if (lmp_ssp_capable(hdev)) {
     settings |= MGMT_SETTING_SSP;
     -settings |= MGMT_SETTING_HS;
+if (IS_ENABLED(CONFIG_BT_HS))
+    settings |= MGMT_SETTING_HS;
 }

 if (lmp_sc_capable(hdev))
@@ -1645,6 +1649,10 @@
 BT_DBG("request for %s", hdev->name);

+if (!IS_ENABLED(CONFIG_BT_HS))
+    return mgmt_cmd_status(sk, hdev->id, MGMT_OP_SET_HS,
+                         MGMT_STATUS_NOT_SUPPORTED);
+    status = mgmt_bredr_support(hdev);
 if (status)
     return mgmt_cmd_status(sk, hdev->id, MGMT_OP_SET_HS, status);
@@ -2298,9 +2306,8 @@
 /* LE address type */
 addr_type = le_addr_type(cp->addr.type);
-hci_remove_irk(hdev, &cp->addr.bdaddr, addr_type);
-
-err = hci_removeltk(hdev, &cp->addr.bdaddr, addr_type);
+/* Abort any ongoing SMP pairing. Removesltk and irk if they exist. */
+err = smp_cancel_and_remove_pairing(hdev, &cp->addr.bdaddr, addr_type);
+if (err < 0) {
+    err = mgmt_cmd_complete(sk, hdev->id, MGMT_OP_UNPAIR_DEVICE,
+                           MGMT_STATUS_NOT_PAIRED, &rp,
+                           @ @ -2314,8 +2321,6 @@
+    goto done;
+}

-/* Abort any ongoing SMP pairing */
-smp_cancel_pairing(conn);

/* Defer clearing up the connection parameters until closing to
* give a chance of keeping them if a repairing happens.
@ @ -6089,6 +6094,9 @@
for (i = 0, cur_len = 0; i < len; i += (cur_len + 1)) {
    cur_len = data[i];

+if (!cur_len)
+    continue;
+
    if (data[i + 1] == EIR_FLAGS &&
        (!is_adv_data || flags_managed(adv_flags)))
        return false;
--- linux-4.15.0.orig/net/bluetooth/rfcomm/sock.c
+++ linux-4.15.0/net/bluetooth/rfcomm/sock.c
@@ -988,7 +988,7 @@
    rfcomm_pi(sk)->channel = channel;

    sk->sk_state = BT_CONFIG;
-bt_accept_enqueue(parent, sk);
+b_accept_enqueue(parent, sk, true);

/* Accept connection and return socket DLC */
*d = rfcomm_pi(sk)->dlc;
--- linux-4.15.0.orig/net/bluetooth/rfcomm/tty.c
+++ linux-4.15.0/net/bluetooth/rfcomm/tty.c
@@ -413,10 +413,8 @@
     dlc = rfcomm_dlc_exists(&req.src, &req.dst, req.channel);
     if (IS_ERR(dlc))
         return PTR_ERR(dlc);
-else if (dlc) {
-    rfcomm_dlc_put(dlc);
+if (dlc)
+    return -EBUSY;
dlc = rfcomm_dlc_alloc(GFP_KERNEL);
if (!dlc)
    return -ENOMEM;

sk->sk_state_change(sk);
bh_unlock_sock(sk);

-sco_sock_kill(sk);
sock_put(sk);
}

sco_sock_clear_timer(sk);
sco_chan_del(sk, err);
bh_unlock_sock(sk);
-sco_sock_kill(sk);
sock_put(sk);
}

conn->sk = sk;

if (parent)
    -bt_accept_enqueue(parent, sk);
+bt_accept_enqueue(parent, sk, true);
}

static int sco_chan_add(struct sco_conn *conn, struct sock *sk,
static int sco_connect(struct sock *sk)
+static int sco_connect(struct hci_dev *hdev, struct sock *sk)
{
    struct sco_conn *conn;
    struct hci_conn *hcon;
    -struct hci_dev *hdev;
    int err, type;

    BT_DBG("%pMR -> %pMR", &sco_pi(sk)->src, &sco_pi(sk)->dst);

    -hdev = hci_get_route(&sco_pi(sk)->src, &sco_pi(sk)->dst, BDADDR_BREDR);
    -if (!hdev)
        -return -EHOSTUNREACH;
- 
  -hci_dev_lock(hdev);
  -
  if (lmp_esco_capable(hdev) && !disable_esco)
    type = ESCO_LINK;
  else
    type = SCO_LINK;

  if (sco_pi(sk)->setting == BT_VOICE_TRANSPARENT &&
    (!lmp_transp_capable(hdev) || !lmp_esco_capable(hdev))) {
    -err = -EOPNOTSUPP;
    -goto done;
  -}
  +(!lmp_transp_capable(hdev) || !lmp_esco_capable(hdev)))
  +return -EOPNOTSUPP;

  hcon = hci_connect_sco(hdev, type, &sco_pi(sk)->dst,
    sco_pi(sk)->setting);
  -if (IS_ERR(hcon)) {
  -err = PTR_ERR(hcon);
  -goto done;
  -}
  +if (IS_ERR(hcon))
  +return PTR_ERR(hcon);

  conn = sco_conn_add(hcon);
  if (!conn) {
    hci_conn_drop(hcon);
    -err = -ENOMEM;
    -goto done;
  +return -ENOMEM;
  }

  /* Update source addr of the socket */
  @@ -256,7 +242,7 @@
  err = sco_chan_add(conn, sk, NULL);
  if (err)
    -goto done;
    +return err;

  if (hcon->state == BT_CONNECTED) {
    sco_sock_clear_timer(sk);
    @@ -266,9 +252,6 @@
    sco_sock_set_timer(sk, sk->sk_sndtimeo);
  }

  -done:
-hci_dev_unlock(hdev);
-hci_dev_put(hdev);
return err;
}

@@ -445,7 +428,6 @@
lock_sock(sk);
__sco_sock_close(sk);
release_sock(sk);
-sco_sock_kill(sk);
}

static void sco_sock_init(struct sock *sk, struct sock *parent)
@@ -553,6 +535,7 @@
{
 struct sockaddr_sco *sa = (struct sockaddr_sco *) addr;
 struct sock *sk = sock->sk;
+struct hci_dev *hdev;
 int err;

 BT_DBG("sk %p", sk);
@@ -567,12 +550,19 @@
if (sk->sk_type != SOCK_SEQPACKET)
  return -EINVAL;
+  hdev = hci_get_route(&sa->sco_bdaddr, &sco_pi(sk)->src, BDADDR_BREDR);
+  if (!hdev)
+    return -EHOSTUNREACH;
+  hci_dev_lock(hdev);
+  lock_sock(sk);
/* Set destination address and psm */
bacpy(&sco_pi(sk)->dst, &sa->sco_bdaddr);

-err = sco_connect(sk);
+err = sco_connect(hdev, sk);
+hci_dev_unlock(hdev);
+hci_dev_put(hdev);
if (err)
goto done;

@@ -761,6 +751,11 @@
cp.max_latency = cpu_to_le16(0xffff);
cp.retrans_effort = 0xff;
break;
+default:
+/* use CVSD settings as fallback */


+cp.max_latency = cpu_to_le16(0xffff);
+cp.retrans_effort = 0xff;
+break;
}

hci_send_cmd(hdev, HCI_OP_ACCEPT_SYNC_CONN_REQ,
--- linux-4.15.0.orig/net/bluetooth/smp.c
+++ linux-4.15.0/net/bluetooth/smp.c
@@ -83,13 +83,11 @@
 struct smp_dev {
 /* Secure Connections OOB data */
 +bool local_oob;
+u8 local_pk[64];
+u8 local_rand[16];
 bool debug_key;

 -u8 min_key_size;
 -u8 max_key_size;
-
 struct crypto_cipher* tfm_aes;
 struct crypto_shash* tfm_cmac;
 struct crypto_kpp* tfm_ecdh;
 @@ -599,6 +597,8 @@
 memcpy(rand, smp->local_rand, 16);

+smp->local_oob = true;
+
 return 0;
}

@@ -717,7 +717,7 @@
 if (rsp == NULL) {
 req->io_capability = conn->hcon->io_capability;
 req->oob_flag = oob_flag;
-rsp->max_key_size = SMP_DEV(hdev)->max_key_size;
+rsp->max_key_size = hdev->le_max_key_size;
 req->init_key_dist = local_dist;
 req->resp_key_dist = remote_dist;
 req->auth_req = (authreq & AUTH_REQ_MASK(hdev));
 @@ -728,7 +728,7 @@
 rsp->io_capability = conn->hcon->io_capability;
 rsp->oob_flag = oob_flag;
-rsp->max_key_size = SMP_DEV(hdev)->max_key_size;
+rsp->max_key_size = hdev->le_max_key_size;
 rsp->init_key_dist = req->init_key_dist & remote_dist;

---
rsp->resp_key_dist = req->resp_key_dist & local_dist;
rsp->auth_req = (authreq & AUTH_REQ_MASK(hdev));
@@ -742,7 +742,7 @@
struct hci_dev *hdev = conn->hcon->hdev;
struct smp_chan *smp = chan->data;

- if (max_key_size > SMP_DEV(hdev)->max_key_size ||
+ if (max_key_size > hdev->le_max_key_size ||
    max_key_size < SMP_MIN_ENC_KEY_SIZE)
return SMP_ENC_KEY_SIZE;

@@ -1785,7 +1785,7 @@
    * successfully received our local OOB data - therefore set the
    * flag to indicate that local OOB is in use.
    */
- if (req->oob_flag == SMP_OOB_PRESENT)
+ if (req->oob_flag == SMP_OOB_PRESENT && SMP_DEV(hdev)->local_oob)
    set_bit(SMP_FLAG_LOCAL_OOB, &smp->flags);

/* SMP over BR/EDR requires special treatment */
@@ -1967,7 +1967,7 @@
    * successfully received our local OOB data - therefore set the
    * flag to indicate that local OOB is in use.
    */
- if (rsp->oob_flag == SMP_OOB_PRESENT)
+ if (rsp->oob_flag == SMP_OOB_PRESENT && SMP_DEV(hdev)->local_oob)
    set_bit(SMP_FLAG_LOCAL_OOB, &smp->flags);

smp->prsp[0] = SMP_CMD_PAIRING_RSP;
@@ -2296,8 +2296,14 @@
    else
    sec_level = authreq_to_seclevel(auth);

- if (smp_sufficient_security(hcon, sec_level, SMP_USE_LTK))
+ if (smp_sufficient_security(hcon, sec_level, SMP_USE_LTK)) {
+/* If link is already encrypted with sufficient security we
+ * still need refresh encryption as per Core Spec 5.0 Vol 3,
+ * Part H 2.4.6
+ */
+    smp_ltk_encrypt(conn, hcon->sec_level);
return 0;
+}

if (sec_level > hcon->pending_sec_level)
    hcon->pending_sec_level = sec_level;
@@ -2413,30 +2419,51 @@
    return ret;
}
```c
void smp_cancel_pairing(struct hci_conn *hcon)

int smp_cancel_and_remove_pairing(struct hci_dev *hdev, bdaddr_t *bdaddr,
    u8 addr_type)
{
    struct l2cap_conn *conn = hcon->l2cap_data;
    struct hci_conn *hcon;
    struct l2cap_conn *conn;
    struct l2cap_chan *chan;
    struct smp_chan *smp;
    int err;

    err = hci_remove_ltk(hdev, bdaddr, addr_type);
    hci_remove_irk(hdev, bdaddr, addr_type);
    hcon = hci_conn_hash_lookup_le(hdev, bdaddr, addr_type);
    if (!hcon)
        goto done;
    conn = hcon->l2cap_data;
    if (!conn)
        return;
    chan = conn->smp;
    if (!chan)
        return;
    goto done;

    l2cap_chan_lock(chan);

    smp = chan->data;
    if (smp) {
        /* Set keys to NULL to make sure smp_failure() does not try to
         * remove and free already invalidated rcu list entries. */
        smp->ltk = NULL;
        smp->slaveltk = NULL;
        smp->remote_irk = NULL;
        if (test_bit(SMP_FLAG_COMPLETE, &smp->flags))
            smp_failure(conn, 0);
        else
            smp_failure(conn, SMP_UNSPECIFIED);
        err = 0;
    }

    l2cap_chan_unlock(chan);
    +
```

static int smp_cmd_encrypt_info(struct l2cap_conn *conn, struct sk_buff *skb)
{
    /* Drop IRK if peer is using identity address during pairing but is
     * providing different address as identity information. 
     * Microsoft Surface Precision Mouse is known to have this bug. 
     */
    if (hci_is_identity_address(&hcon->dst, hcon->dst_type) &&
        (bacmp(&info->bdaddr, &hcon->dst) ||
         info->addr_type != hcon->dst_type)) {
        bt_dev_err(hcon->hdev, 
            "ignoring IRK with invalid identity address");
        goto distribute;
    }
    bacpy(&smp->id_addr, &info->bdaddr);
    smp->id_addr_type = info->addr_type;
    if (skb->len < sizeof(*key))
        return SMP_INVALID_PARAMS;
    /* Check if remote and local public keys are the same and debug key is
      * not in use. 
      */
    if (!test_bit(SMP_FLAG_DEBUG_KEY, &smp->flags) &&
        !crypto_memneq(key, smp->local_pk, 64)) {
        bt_dev_err(hdev, "Remote and local public keys are identical");
        return SMP_UNSPECIFIED;
    }
    memcpy(smp->remote_pk, key, 64);
    if (test_bit(SMP_FLAG_REMOTE_OOB, &smp->flags)) {
        * key was set/generated.
    } else {
        struct smp_dev *smp_dev = chan->data;
        struct l2cap_chan *hchan = hdev->smp_data;
        struct smp_dev *smp_dev;
if (!hchan || !hchan->data)
		return SMP_UNSPECIFIED;
+
+smp_dev = hchan->data;

tfm_ecdh = smp_dev->tfm_ecdh;
} else {
@@ -3224,11 +3279,10 @@
    return ERR_CAST(tfm_ecdh);
}
"""""
+smp->local_oob = false;
smp->tfm_aes = tfm_aes;
smp->tfm_cmac = tfm_cmac;
smp->tfm_ecdh = tfm_ecdh;
-smp->min_key_size = SMP_MIN_ENC_KEY_SIZE;
-smp->max_key_size = SMP_MAX_ENC_KEY_SIZE;

create_chan:
chan = l2cap_chan_create();
@@ -3358,7 +3412,7 @@
    char buf[4];

    snprintf(buf, sizeof(buf), "%2u\n", SMP_DEV(hdev)->min_key_size);
+sprintf(buf, "%2u\n", hdev->le_min_key_size);
    return simple_read_from_buffer(user_buf, count, ppos, buf, strlen(buf));
}  
@@ -3379,11 +3433,11 @@
    sscanf(buf, "%hhu", &key_size);
-sif (key_size > SMP_DEV(hdev)->max_key_size ||
+sif (key_size > hdev->le_max_key_size ||
        key_size < SMP_MIN_ENC_KEY_SIZE)
    return -EINVAL;
-sMP_DEV(hdev)->min_key_size = key_size;
+sMP_DEV(hdev)->le_min_key_size = key_size;

return count;
"
@@ -3402,7 +3456,7 @@  
    struct hci_dev *hdev = file->private_data;
    char buf[4];

    snprintf(buf, "%2u\n", SMP_DEV(hdev)->max_key_size);
+sprintf(buf, "%2u\n", hdev->le_max_key_size);
    return simple_read_from_buffer(user_buf, count, ppos, buf, strlen(buf));
}  
@@ -3433,11 +3487,11 @@  
    sscanf(buf, "%hhu", &key_size);
-sif (key_size > SMP_DEV(hdev)->max_key_size ||
+sif (key_size > hdev->le_max_key_size ||
        key_size < SMP_MIN_ENC_KEY_SIZE)
    return -EINVAL;
-SMP_DEV(hdev)->min_key_size = key_size;
+sMP_DEV(hdev)->le_min_key_size = key_size;

return count;
"
@@ -3456,7 +3510,7 @@  
    struct hci_dev *hdev = file->private_data;
    char buf[4];
```c
snprintf(buf, sizeof(buf), "%2u\n", SMP_DEV(hdev)->max_key_size);
+snprintf(buf, sizeof(buf), "%2u\n", hdev->le_max_key_size);
return simple_read_from_buffer(user_buf, count, ppos, buf, strlen(buf));
}
@@ -3424,10 +3478,10 @@
sscanf(buf, "%hhu", &key_size);
if (key_size > SMP_MAX_ENC_KEY_SIZE ||
- key_size < SMP_DEV(hdev)->min_key_size)
+ key_size < hdev->le_min_key_size)
    return -EINVAL;
-SMP_DEV(hdev)->max_key_size = key_size;
+hdev->le_max_key_size = key_size;
return count;
}
--- linux-4.15.0.orig/net/bluetooth/smp.h
+++ linux-4.15.0/net/bluetooth/smp.h
@@ -181,7 +181,8 @@
};
/* SMP Commands */
-void smp_cancel_pairing(struct hci_conn *hcon);
+int smp_cancel_and_remove_pairing(struct hci_dev *hdev, bdaddr_t *bdaddr,
+ u8 addr_type);
bool smp_sufficient_security(struct hci_conn *hcon, u8 sec_level,
    enum smp_key_pref key_pref);
int smp_conn_security(struct hci_conn *hcon, __u8 sec_level);
--- linux-4.15.0.orig/net/bridge/br.c
+++ linux-4.15.0/net/bridge/br.c
@@ -171,6 +171,22 @@
    .notifier_call = br_switchdev_event,
};
+void br_opt_toggle(struct net_bridge *br, enum net_bridge_opts opt, bool on)
+{
+    bool cur = !!br_opt_get(br, opt);
+    +br_debug(br, "toggle option: %d state: %d -> %d\n",
+        opt, cur, on);
+    +if (cur == on)
+        +return;
+    +if (on)
+        +set_bit(opt, &br->options);
```
else
+clear_bit(opt, &br->options);
+
static void __net_exit br_net_exit(struct net *net)
{
struct net_device *dev;
--- linux-4.15.0.orig/net/bridge/br_arp_nd_proxy.c
+++ linux-4.15.0/net/bridge/br_arp_nd_proxy.c
@@ -158,7 +158,9 @@
if (br->neigh_suppress_enabled) {
if (p & & (p->flags & BR_NEIGH_SUPPRESS))
return;
-if (ipv4_is_zeronet(sip) || sip == tip) {
+if (parp->ar_op != htons(ARPOP_RREQUEST) &&
+parp->ar_op != htons(ARPOP_RREPLY) &&
+(ipv4_is_zeronet(sip) || sip == tip)) {
/* prevent flooding to neigh suppress ports */
BR_INPUT_SKB_CB(skb)->proxyarp_replied = true;
return;
@@ -277,6 +279,10 @@
for (i = 0; i < ns_olen - 1; i += (ns->opt[i + 1] << 3)) {
+if (!ns->opt[i + 1]) {
+kfree_skb(reply);
+return;
+
if (ns->opt[i] == ND_OPT_SOURCE_LL_ADDR) {
    daddr = ns->opt + i + sizeof(struct nd_opt_hdr);
    break;
@@ -311,7 +317,7 @@
/* Neighbor Advertisement */
    memset(na, 0, sizeof(*na) + na_olen);
    na->icmph.icmp6_type = NDISC_NEIGHBOUR_ADVERTISEMENT;
    -na->icmph.icmp6_router = 0; /* XXX: should be 1 ? */
+na->icmph.icmp6_router = (n->flags & NTF_ROUTER) ? 1 : 0;
    na->icmph.icmp6_override = 1;
    na->icmph.icmp6_solicited = 1;
    na->target = ns->target;
--- linux-4.15.0.orig/net/bridge/br_device.c
+++ linux-4.15.0/net/bridge/br_device.c
@@ -206,6 +206,7 @@
        sum.rx_packets += tmp.rx_packets;
    }
+netdev_stats_to_stats64(stats, &dev->stats);
    stats->tx_bytes = sum.tx_bytes;
```c
stats->tx_packets = sum.tx_packets;
stats->rx_bytes = sum.rx_bytes;
if (!is_valid_ether_addr(addr->sa_data))
    return -EADDRNOTAVAIL;

/* dev_set_mac_addr() can be called by a master device on bridge's
 * NETDEV_UNREGISTER, but since it's being destroyed do nothing
 */
if (dev->reg_state != NETREG_REGISTERED)
    return -EBUSY;

spin_lock_bh(&br->lock);
if (!ether_addr_equal(dev->dev_addr, addr->sa_data)) {
    /* Mac address will be changed in br_stp_change_bridge_id(). */
    skb_push(skb, ETH_HLEN);
    skb_push(skb, ETH_HLEN);
    br_drop_fake_rtable(skb);
    if (skb->ip_summed == CHECKSUM_PARTIAL &&
        skb_push(skb, ETH_HLEN);
    goto drop;
    skb->tstamp = 0;
    return NF_HOOK(NFPROTO_BRIDGE, NF_BR_POST_ROUTING,
                   skb->tstamp = 0;
    return NF_HOOK(NFPROTO_BRIDGE, NF_BR_POST_ROUTING,
                   br_drop_fake_rtable(skb);
    if (unlikely(netpoll_tx_running(to->br->dev))) {
        -skb_push(skb, ETH_HLEN);
        +if (!is_skb_forwardable(skb->dev, skb))
            kfree_skb(skb);
        else
            skb_push(skb, ETH_HLEN);
        +return -EBUSY;
    } else {
        if (unlikely(Netpoll_tx_running(to->br->dev))) {
            if (!is_skb_forwardable(skb->dev, skb))
                kfree_skb(skb);
            skb_push(skb, ETH_HLEN);
        +if (!is_skb_forwardable(skb->dev, skb))
            return -EBUSY;
    }
```
br_netpoll_send_skb(to, skb);
-
return;
}
br_hook = NF_BR_LOCAL_OUT;
--- linux-4.15.0.orig/net/bridge/br_if.c
+++ linux-4.15.0/net/bridge/br_if.c
@@ -26,6 +26,7 @@
#include <net/sock.h>
#include <linux/if_vlan.h>
#include <net/switchdev.h>
+#include <net/net_namespace.h>
#include "br_private.h"

@@ -199,11 +200,19 @@
kfree(p);
}
+
+static void brport_get_ownership(struct kobject *kobj, kuid_t *uid, kgid_t *gid)
+{
+struct net_bridge_port *p = kobj_to_brport(kobj);
+ +
+net_ns_get_ownership(dev_net(p->dev), uid, gid);
+ +}
+
+ static struct kobj_type brport_ktype = {
+ #ifdef CONFIG_SYSFS
.sysfs_ops = &brport_sysfs_ops,
#endif
.release = release_nbp,
+ .get_ownership = brport_get_ownership,
+};

static void destroy_nbp(struct net_bridge_port *p)
@@ -488,7 +497,7 @@
struct net_bridge_port *p;
int err = 0;
unsigned br_hr, dev_hr;
-bool changed_addr;
+bool changed_addr, fdb_synced = false;

/* Don't allow bridging non-ethernet like devices, or DSA-enabled
 * master network devices since the bridge layer rx_handler prevents
@@ -509,8 +518,8 @@
return -ELOOP;
}
-/* Device is already being bridged */
-if (br_port_exists(dev))
+/* Device has master upper dev */
+if (netdev_master_upper_dev_get(dev))
    return -EBUSY;

  /* No bridging devices that dislike that (e.g. wireless) */
@@ -527,13 +536,16 @@
call_netdevice_notifiers(NETDEV_JOIN, dev);

    err = dev_set_allmulti(dev, 1);
    -if (err) 
    +if (err) {
        +br_multicast_del_port(p);
        +kfree(p); /* kobject not yet init'd, manually free */
        +goto err1;
        +}

    err = kobject_init_and_add(&p->kobj, &brport_ktype, &(dev->dev.kobj),
        SYSFS_BRIDGE_PORT_ATTR);
    if (err)
        -goto err1;
        +goto err2;

    err = br_sysfs_addif(p);
    if (err)
        @@ -562,6 +574,19 @@
        list_add_rcu(&p->list, &br->port_list);

        nbp_update_port_count(br);
        +if (!br_promisc_port(p) && (p->dev->priv_flags & IFF_UNICAST_FLT)) []
+/* When updating the port count we also update all ports' 
+ * promiscuous mode.
+ * A port leaving promiscuous mode normally gets the bridge's
+ * fdb synced to the unicast filter (if supported), however,
+ * `br_port_clear_promisc` does not distinguish between
+ * non-promiscuous ports and *new* ports, so we need to
+ * sync explicitly here.
+ */
+    +fdb_synced = br_fdb_sync_static(br, p) == 0;
+    +if (!fdb_synced)
+        +netdev_err(dev, "failed to sync bridge static fdb addresses to this port\n");
+    +}

    netdev_update_features(br->dev);

    @@ -602,6 +627,8 @@
return 0;

err7:
+if (fdb_synced)
+br_fdb_unsync_static(br, p);
list_del_rcu(&p->list);
br_fdb_delete_by_port(br, p, 0, 1);
nbp_update_port_count(br);
@@ -615,13 +642,11 @@
err3:
sysfs_remove_link(br->ifobj, p->dev->name);
err2:
+br_multicast_del_port(p);
kobject_put(&p->kobj);
-p = NULL; /* kobject_put frees */
-err1:
-dev_set_allmulti(dev, -1);
-put_back:
+err1:
-dev_put(dev);
-kfree(p);
return err;
}

--- linux-4.15.0.orig/net/bridge/br_input.c
+++ linux-4.15.0/net/bridge/br_input.c
@@ -79,7 +79,6 @@
struct net_bridge_fdb_entry *dst = NULL;
struct net_bridge_mdb_entry *mdst;
bool local_rcv, mcast_hit = false;
-const unsigned char *dest;
struct net_bridge *br;
u16 vid = 0;

@@ -97,10 +96,9 @@
br_fdb_update(br, p, eth_hdr(skb)->h_source, vid, false);
local_rcv = !(br->dev->flags & IFF_PROMISC);
-dest = eth_hdr(skb)->h_dest;
-if (is_multicast_ether_addr(dest)) {
+if (is_multicast_ether_addr(eth_hdr(skb)->h_dest)) {
 /* by definition the broadcast is also a multicast address */
-if (is_broadcast_ether_addr(dest)) {
+if (is_broadcast_ether_addr(eth_hdr(skb)->h_dest)) {
 pkt_type = BR_PKT_BROADCAST;
 local_rcv = true;
 } else {
@@ -149,7 +147,7 @@
break;

break;

break;
}

/* note: already called with rcu_read_lock */
static int br_handle_local_finish(struct net *net, struct sock *sk, struct sk_buff *skb)
{
-struct net_bridge_port *p = br_port_get_rcu(skb->dev);
-
-__br_handle_local_finish(skb);

-BR_INPUT_SKB_CB(skb)->brdev = p->br->dev;
-br_pass_frame_up(skb);
-return 0;

+#* return 1 to signal the okfn() was called so it's ok to use the skb */
++return 1;
}

/*
 goto forward;
 }

-/* Deliver packet to local host only */
-NF_HOOK(NFPROTO_BRIDGE, NF_BR_LOCAL_IN, dev_net(skb->dev),
-NULL, skb, skb->dev, NULL, br_handle_local_finish);
-return RX_HANDLER_CONSUMED;

+#* The else clause should be hit when nf_hook():
++ * - returns < 0 (drop/error)
++ * - returns = 0 (stolen/nf_queue)
++ * Thus return 1 from the okfn() to signal the skb is ok to pass
++ */
+if (NF_HOOK(NFPROTO_BRIDGE, NF_BR_LOCAL_IN,
+  dev_net(skb->dev), NULL, skb, skb->dev, NULL,
+  br_handle_local_finish) == 1) {
+return RX_HANDLER_PASS;
+} else {
+return RX_HANDLER_CONSUMED;
+}
}

forward:
--- linux-4.15.0.orig/net/bridge/br_mdb.c
+++/ linux-4.15.0/net/bridge/br_mdb.c
@@ -419,7 +419,7 @@
        nlh = nlmsg_put(skb, pid, seq, type, sizeof(*bpm), NLM_F_MULTI);
    +nlh = nlmsg_put(skb, pid, seq, type, sizeof(*bpm), 0);
    if (!nlh)
        return -EMSGSIZE;
--- linux-4.15.0.orig/net/bridge/br_multicast.c
+++ linux-4.15.0/net/bridge/br_multicast.c
@@ -1147,6 +1147,7 @@
    int type;
    int err = 0;
    __be32 group;
    +u16 nsrsc;

    ih = igmpv3_report_hdr(skb);
    num = ntohs(ih->ngrec);
    @@ -1160,8 +1161,9 @@
    grec = (void *)(skb->data + len - sizeof(*grec));
    group = grec->grec_mca;
    type = grec->grec_type;
    +nsrsc = ntohs(grec->grec_nsrcs);

    -len += ntohs(grec->grec_nsrcs) * 4;
    +len += nsrsc * 4;
    if (!pskb_may_pull(skb, len))
        return -EINVAL;
@@ -1182,7 +1184,7 @@
    src = eth_hdr(skb)->h_source;
    if ((type == IGMPV3_CHANGE_TO_INCLUDE ||
        type == IGMPV3_MODE_IS_INCLUDE) &&
    - ntsrh(grec->grec_nsrcs) == 0) {
    + nsrsc == 0) {
        br_ip4_multicast_leave_group(br, port, group, vid, src);
    } else {
        err = br_ip4_multicast_add_group(br, port, group, vid,
    @@ -1217,23 +1219,26 @@
        for (i = 0; i < num; i++) {
            -__be16 *nsrsc, __nsrsc;
            +__be16 *nsrsc, __nsrsc;
            +u16 nsrsc;

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-nsrcs = skb_header_pointer(skb, 
- len + offsetof(struct mld2_grec, 
- grec_nsrs), 
- sizeof(_nsrcs), &_nsrcs);
- if (!nsrcs)
+ _nsrcs = skb_header_pointer(skb, 
+ len + offsetof(struct mld2_grec, 
+ grec_nsrs),
+ sizeof(_nsrcs), &__nsrcs);
+ if (!_nsrcs)
return -EINVAL;

+nsrcs = ntohs(_nsrcs);
+
+ if (!pskb_may_pull(skb, 
len + sizeof(*grec) +
- sizeof(struct in6_addr) * ntohs(*nsrcs))
+ sizeof(struct in6_addr) * nsrs))
return -EINVAL;

grec = (struct mld2_grec *)(skb->data + len);
len += sizeof(*grec) +
- sizeof(struct in6_addr) * ntohs(*nsrcs);
+ sizeof(struct in6_addr) * nsrs;

/* We treat these as MLDv1 reports for now. */
switch (grec->grec_type) {
@@ -1252,7 +1257,7 @@
src = eth_hdr(skb)->h_source;
if ((grec->grec_type == MLD2_CHANGE_TO_INCLUDE ||
- grec->grec_type == MLD2_MODE_IS_INCLUDE) &&
+ nsrcs == 0) {
    br_ip6_multicast_leave_group(br, port, &grec->grec_mca,
    vid, src);
} else {
@@ -1507,7 +1512,6 @@
struct sk_buff *skb,
    u16 vid)
{
-const struct ipv6hdr *ip6h = ipv6_hdr(skb);
struct mld_msg *mld;
struct net_bridge_mdb_entry *mp;
struct mld2_query *mld2q;
@@ -1551,7 +1555,7 @@
if (is_general_query) {
saddr.proto = htons(ETH_P_IPV6);


- saddr.u.ip6 = ip6h->saddr;
+ saddr.u.ip6 = ipv6_hdr(skb)->saddr;

br_multicast_query_received(br, port, &br->ip6_other_query,
   &saddr, max_delay);
@@ -1619,6 +1623,9 @@
if (!br_port_group_equal(p, port, src))
    continue;
+
+if (p->flags & MDB_PG_FLAGS_PERMANENT)
+break;
+
    rcu_assign_pointer(*pp, p->next);
    hlist_del_init(&p->mglist);
    del_timer(&p->timer);
@@ -1786,7 +1793,9 @@
    pim_hdr_type(pimhdr) != PIM_TYPE_HELLO)
    return;

+spin_lock(&br->multicast_lock);
    br_multicast_mark_router(br, port);
    +spin_unlock(&br->multicast_lock);
    }

static int br_multicast_ipv4_rcv(struct net_bridge *br,
@@ -2154,7 +2163,8 @@
    __br_multicast_open(br, query);

    -list_for_each_entry(port, &br->port_list, list) {
        +rcu_read_lock();
        +list_for_each_entry_rcu(port, &br->port_list, list) {
            if (port->state == BR_STATE_DISABLED ||
                port->state == BR_STATE_BLOCKING)
                continue;
        } +rcu_read_unlock();
    }

    int br_multicast_toggle(struct net_bridge *br, unsigned long val)
    --- linux-4.15.0.orig/net/bridge/br_netfilter_hooks.c
    +++ linux-4.15.0/net/bridge/br_netfilter_hooks.c
    @@ -50,25 +50,22 @@

    struct brnf_net {
bool enabled;
-};

#ifdef CONFIG_SYSCTL
-static struct ctl_table_header *brnf_sysctl_header;
-static int brnf_call_iptables __read_mostly = 1;
-static int brnf_call_ip6tables __read_mostly = 1;
-static int brnf_call_arptables __read_mostly = 1;
-static int brnf_filter_vlan_tagged __read_mostly;
-static int brnf_filter_pppoe_tagged __read_mostly;
-static int brnf_pass_vlan_indev __read_mostly;
#endif

#define brnf_call_iptables 1
#define brnf_call_ip6tables 1
#define brnf_call_arptables 1
#define brnf_filter_vlan_tagged 0
#define brnf_filter_pppoe_tagged 0
#define brnf_pass_vlan_indev 0
+struct ctl_table_header *ctl_hdr;
#endif

+/* default value is 1 */
+int call_iptables;
+int call_ip6tables;
+int call_arptables;
+
+/* default value is 0 */
+int filter_vlan_tagged;
+int filter_pppoe_tagged;
+int pass_vlan_indev;
+};
+
#define IS_IP(skb) 
(!skb_vlan_tag_present(skb) && skb->protocol == htons(ETH_P_IP))

@@ -88,17 +85,28 @@
return 0;
}

-#define IS_VLAN_IP(skb) 
-(vlan_proto(skb) == htons(ETH_P_IP) &&
- brnf_filter_vlan_tagged)
-
-#define IS_VLAN_IPV6(skb) 
-(vlan_proto(skb) == htons(ETH_P_IPV6) &&
- brnf_filter_vlan_tagged)
-
-#define IS_VLAN_ARP(skb) 

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-(vlan_proto(skb) == htons(ETH_P_ARP) &&
  - brnf_filter_vlan_tagged)
+static inline bool is_vlan_ip(const struct sk_buff *skb, const struct net *net)
   +{
   +struct brnf_net *brnet = net_generic(net, brnf_net_id);
   +
   +return vlan_proto(skb) == htons(ETH_P_IP) && brnet->filter_vlan_tagged;
   +}
   +
+static inline bool is_vlan_ipv6(const struct sk_buff *skb,
+const struct net *net)
   +{
   +struct brnf_net *brnet = net_generic(net, brnf_net_id);
   +
   +return vlan_proto(skb) == htons(ETH_P_IPV6) &&
   +    brnet->filter_vlan_tagged;
   +}
   +
+static inline bool is_vlan_arp(const struct sk_buff *skb, const struct net *net)
   +{
   +struct brnf_net *brnet = net_generic(net, brnf_net_id);
   +
   +return vlan_proto(skb) == htons(ETH_P_ARP) && brnet->filter_vlan_tagged;
   +}

static inline __be16 pppoe_proto(const struct sk_buff *skb)
{
   ssizeof(struct pppoe_hdr));
}

-#define IS_PPPOE_IP(skb) 
   - (skb->protocol == htons(ETH_P_PPP_SES) &&
     - pppoe_proto(skb) == htons(PPP_IP) &&
     - brnf_filter_pppoe_tagged)
   -
-#define IS_PPPOE_IPV6(skb) 
   - (skb->protocol == htons(ETH_P_PPP_SES) &&
     - pppoe_proto(skb) == htons(PPP_IPV6) &&
     - brnf_filter_pppoe_tagged)
+static inline bool is_pppoe_ip(const struct sk_buff *skb, const struct net *net)
   +{
   +struct brnf_net *brnet = net_generic(net, brnf_net_id);
   +
   +return skb->protocol == htons(ETH_P_PPP_SES) &&
   +    pppoe_proto(skb) == htons(PPP_IP) && brnet->filter_pppoe_tagged;
   +}
+static inline bool is_pppoe_ipv6(const struct sk_buff *skb,
  + const struct net *net) {
  +struct brnf_net *brnet = net_generic(net, brnf_net_id);
  +return skb->protocol == htons(ETH_P_PPP_SES) &&
  +  pppoe_proto(skb) == htons(PPP_IPV6) &&
  +  brnet->filter_pppoe_tagged;
+

/* largest possible L2 header, see br_nf_dev_queue_xmit() */
#define NF_BRIDGE_MAX_MAC_HEADER_LENGTH (PPPOE_SES_HLEN + ETH_HLEN)
@@ -275,7 +291,7 @@
struct nf_bridge_info *nf_bridge = nf_bridge_info_get(skb);
  int ret;

  -if (neigh->hh.hh_len) {
  +if ((neigh->nud_state & NUD_CONNECTED) && neigh->hh.hh_len) {
   neigh_hh_bridge(&neigh->hh, skb);
   skb->dev = nf_bridge->physindev;
   ret = br_handle_frame_finish(net, sk, skb);
@@ -422,12 +438,16 @@
      return 0;
   }

- static struct net_device *brnf_get_logical_dev(struct sk_buff *skb, const struct net_device *dev)
+static struct net_device *brnf_get_logical_dev(struct sk_buff *skb,
+    +const struct net_device *dev,
+    +const struct net *net)
   { 
   struct net_device *vlan, *br;
   +struct brnf_net *brnet = net_generic(net, brnf_net_id);

   br = bridge_parent(dev);
   -if (brnf_pass_vlan_indev == 0 || !skb_vlan_tag_present(skb))
   +if (brnet->pass_vlan_indev == 0 || !skb_vlan_tag_present(skb))
     return br;

   vlan = __vlan_find_dev_deep_rcu(br, skb->vlan_proto,
@@ -437,7 +457,7 @@
     }

   /* Some common code for IPv4/IPv6 */
   -struct net_device *setup_pre_routing(struct sk_buff *skb)
+struct net_device *setup_pre_routing(struct sk_buff *skb, const struct net *net)
   { 
   struct nf_bridge_info *nf_bridge = nf_bridge_info_get(skb);
nf_bridge->in_prerouting = 1;
nf_bridge->physindev = skb->dev;
-skb->dev = brnf_get_logical_dev(skb, skb->dev);
+skb->dev = brnf_get_logical_dev(skb, skb->dev, net);

if (skb->protocol == htons(ETH_P_8021Q))
nf_bridge->orig_proto = BRNF_PROTO_8021Q;
@@ -474,6 +494,7 @@
struct net_bridge_port *p;
struct net_bridge *br;
__u32 len = nf_bridge_encap_header_len(skb);
+struct brnf_net *brnet;

if (unlikely(!pskb_may_pull(skb, len)))
return NF_DROP;
@@ -483,18 +504,22 @@
br = p->br;

-if (IS_IPV6(skb) || IS_VLAN_IPV6(skb) || IS_PPPOE_IPV6(skb)) {
-    if (!brnf_call_ip6tables && !br->nf_call_ip6tables)
+brnet = net_generic(state->net, brnf_net_id);
    if (IS_IPV6(skb) || is_vlan_ipv6(skb, state->net) ||
+        is_pppoe_ipv6(skb, state->net)) {
+    if (!brnet->call_ip6tables &&
+        !br_opt_get(br, BROPT_NF_CALL_IPV6TABLES))
return NF_ACCEPT;

    nf_bridge_pull_encap_header_rcsum(skb);
    return br_nf_pre_routing_ipv6(priv, skb, state);
  }

-if (!(brnf_call_iptables && !br->nf_call_iptables)
+if (!(brnet->call_iptables && !br_opt_get(br, BROPT_NF_CALL_IPTABLES))
    return NF_ACCEPT;

-if (!IS_IP(skb) && !IS_VLAN_IP(skb) && !IS_PPPOE_IP(skb))
+if (!IS_IP(skb) && !is_vlan_ip(skb, state->net) &&
    !is_pppoe_ip(skb, state->net))
return NF_ACCEPT;

    nf_bridge_pull_encap_header_rcsum(skb);
@@ -505,13 +530,14 @@
f_bridge_put(skb->nf_bridge);
if (!nf_bridge_alloc(skb))
return NF_DROP;
-if (!setup_pre_routing(skb))
+if (!setup_pre_routing(skb, state->net))
    return NF_DROP;

nf_bridge = nf_bridge_info_get(skb);
nf_bridge->ipv4_daddr = ip_hdr(skb)->daddr;

skb->protocol = htons(ETH_P_IP);
+skb->transport_header = skb->network_header + ip_hdr(skb)->ihl * 4;

NF_HOOK(NFPROTO_IPV4, NF_INET_PRE_ROUTING, state->net, state->sk, skb, skb->dev, NULL,
@@ -527,7 +553,7 @@
    struct nf_bridge_info *nf_bridge = nf_bridge_info_get(skb);
    struct net_device *in;

-    if (!IS_ARP(skb) && !IS_VLAN_ARP(skb)) {
+    if (!IS_ARP(skb) && !is_vlan_arp(skb, net)) {

    if (skb->protocol == htons(ETH_P_IP))
        nf_bridge->frag_max_size = IPCB(skb)->frag_max_size;
@@ -581,9 +607,11 @@
        if (!parent)
            return NF_DROP;

        if (desc)
        return NF_DROP;

        -if (IS_IP(skb) || IS_VLAN_IP(skb) || IS_PPPOE_IP(skb))
+    if (IS_IP(skb) || is_vlan_ip(skb, state->net) ||
+        is_pppoe_ip(skb, state->net))
            pf = NFPROTO_IPV4;
-else if (IS_IPV6(skb) || IS_VLAN_IPV6(skb) || IS_PPPOE_IPV6(skb))
+    else if (IS_IPV6(skb) || is_vlan_ipv6(skb, state->net) ||
+        is_pppoe_ipv6(skb, state->net))
            pf = NFPROTO_IPV6;
    else
        return NF_ACCEPT;
@@ -614,7 +642,7 @@
    skb->protocol = htons(ETH_P_IPV6);
    NF_HOOK(pf, NF_INET_FORWARD, state->net, NULL, skb,
-        brnf_get_logical_dev(skb, state->in),
+        brnf_get_logical_dev(skb, state->in, state->net),
        parent, br_nf_forward_finish);

    return NF_STOLEN;
@@ -627,23 +655,28 @@
    struct net_bridge_port *p;
    struct net_bridge *br;
struct net_device **d = (struct net_device **)(skb->cb);
+struct brnf_net *brnet;

p = br_port_get_rcu(state->out);
if (p == NULL)
    return NF_ACCEPT;
br = p->br;

-if (!brnf_call_arptables && !br->nf_call_arptables)
+brnet = net_generic(state->net, brnf_net_id);
+if (!brnet->call_arptables && !br_opt_get(br, BROPT_NF_CALL_ARPTABLES))
    return NF_ACCEPT;

if (!IS_ARP(skb)) {
    -if (!IS_VLAN_ARP(skb))
+if (!is_vlan_arp(skb, state->net))
        return NF_ACCEPT;
    nf_bridge_pull_encap_header(skb);
}

+if (unlikely(!pskb_may_pull(skb, sizeof(struct arphdr))))
    return NF_DROP;
+
    if (arp_hdr(skb)->ar_pln != 4) {
        -if (IS_VLAN_ARP(skb))
+        if (is_vlan_arp(skb, state->net))
            nf_bridge_push_encap_header(skb);
        return NF_ACCEPT;
    }
@@ -712,6 +745,11 @@
    mtu_reserved = nf_bridge_mtu_reduction(skb);
    mtu = skb->dev->mtu;

+if (nf_bridge->pkt_otherhost) {
+    skb->pkt_type = PACKET_OTHERHOST;
+    nf_bridge->pkt_otherhost = false;
+}
+
    if (nf_bridge->frag_max_size && nf_bridge->frag_max_size < mtu)
        mtu = nf_bridge->frag_max_size;
@@ -798,15 +836,15 @@
    if (!realoutdev)
        return NF_DROP;

-if (IS_IP(skb) || IS_VLAN_IP(skb) || IS_PPPOE_IP(skb))
+if (IS_IP(skb) || is_vlan_ip(skb, state->net) ||
    is_pppoe_ip(skb, state->net))
pf = NFPROTO_IPV4;
- else if (IS_IPV6(skb) || IS_VLAN_IPV6(skb) || IS_PPPOE_IPV6(skb))
+ else if (IS_IPV6(skb) || is_vlan_ipv6(skb, state->net) ||
+ is_pppoe_ipv6(skb, state->net))
pf = NFPROTO_IPV6;
else
return NF_ACCEPT;

/* We assume any code from br_dev_queue_push_xmit onwards doesn't care
 * about the value of skb->pkt_type. */
if (skb->pkt_type == PACKET_OTHERHOST) {
    skb->pkt_type = PACKET_HOST;
    nf_bridge->pkt_otherhost = true;
    @ @ -832,7 +870,8 @@
        struct sk_buff *skb,
        const struct nf_hook_state *state)
    {
        -if (skb->nf_bridge && !skb->nf_bridge->in_prerouting) {
+if (skb->nf_bridge && !skb->nf_bridge->in_prerouting &&
 + !netif_is_l3_master(skb->dev)) {
            state->okfn(state->net, state->sk, skb);
            return NF_STOLEN;
        }
    @ @ -880,11 +919,6 @@
    .br_dev_xmit_hook =br_nf_dev_xmit,
    };

    -void br_netfilter_enable(void)
    -{
    -}
    -EXPORT_SYMBOL_GPL(br_netfilter_enable);
    
    /* For br_nf_post_routing, we need (prio = NF_BR_PRI_LAST), because
     * br_dev_queue_push_xmit is called afterwards */
    static const struct nf_hook_ops br_nf_ops[] = {
        @ @ -952,23 +986,6 @@
        return NOTIFY_OK;
    }

    -static void __net_exit brnf_exit_net(struct net *net)
    -{
        struct brnf_net *brnet = net_generic(net, brnf_net_id);
        -
        -if (!brnet->enabled)
        -return;
        -
        -nf_unregister_net_hooks(net, br_nf_ops, ARRAY_SIZE(br_nf_ops));
        -brnet->enabled = false;
static struct pernet_operations brnf_net_ops __read_mostly = {
    .exit = brnf_exit_net,
    .id   = &brnf_net_id,
    .size = sizeof(struct brnf_net),
};

static struct notifier_block brnf_notifier __read_mostly = {
    .notifier_call = brnf_device_event,
};

static struct ctl_table brnf_table[] = {
    {
        .procname = "bridge-nf-call-arptables",
        .data = &brnf_call_arptables,
        .maxlen = sizeof(int),
        .mode = 0644,
        .proc_handler = brnf_sysctl_call_tables,
    },
    {
        .procname = "bridge-nf-call-iptables",
        .data = &brnf_call_iptables,
        .maxlen = sizeof(int),
        .mode = 0644,
        .proc_handler = brnf_sysctl_call_tables,
    },
    {
        .procname = "bridge-nf-call-ip6tables",
        .data = &brnf_call_ip6tables,
        .maxlen = sizeof(int),
        .mode = 0644,
        .proc_handler = brnf_sysctl_call_tables,
    },
    {
        .procname = "bridge-nf-filter-vlan-tagged",
        .data = &brnf_filter_vlan_tagged,
        .maxlen = sizeof(int),
        .mode = 0644,
        .proc_handler = brnf_sysctl_call_tables,
    },
    {
        .procname = "bridge-nf-filter-pppoe-tagged",
        .data = &brnf_filter_pppoe_tagged,
        .maxlen = sizeof(int),
        .mode = 0644,
        .proc_handler = brnf_sysctl_call_tables,
    },
};
{ .procname= "bridge-nf-pass-vlan-input-dev",   .data= &brnf_pass_vlan_indev,   .maxlen= sizeof(int),   .mode= 0644,   .proc_handler= brnf_sysctl_call_tables, },
{ }
{ }
+
+static inline void br_netfilter_sysctl_default(struct brnf_net *brnf)
+{
+brnf->call_iptables = 1;
+brnf->call_ip6tables = 1;
+brnf->call_arptables = 1;
+brnf->filter_vlan_tagged = 0;
+brnf->filter_pppoe_tagged = 0;
+brnf->pass_vlan_indev = 0;
+
+}
+
+static int br_netfilter_sysctl_init_net(struct net *net)
+{
+struct ctl_table *table = brnf_table;
+struct brnf_net *brnet;
+
+if (!net_eq(net, &init_net)) {
+table = kmembdup(table, sizeof(brnf_table), GFP_KERNEL);
+if (!table)
+return -ENOMEM;
+
+br_netfilter_sysctl_default(brnet);
+
+brnet = net_generic(net, brnf_net_id);
+table[0].data = &brnet->call_arptables;
+table[1].data = &brnet->call_iptables;
+table[2].data = &brnet->call_ip6tables;
+table[3].data = &brnet->filter_vlan_tagged;
+table[4].data = &brnet->filter_pppoe_tagged;
+table[5].data = &brnet->pass_vlan_indev;
+
+br_netfilter_sysctl_default(brnet);
+
+brnet->ctl_hdr = register_net_sysctl(net, "net/bridge", table);
+if (!brnet->ctl_hdr) {
+if (!net_eq(net, &init_net))
+kfree(table);
+
+return -ENOMEM;
+}
+return 0;
+
+static void br_netfilter_sysctl_exit_net(struct net *net,
+struct brnf_net *brnet)
+{
+struct ctl_table *table = brnet->ctl_hdr->ctl_table_arg;
+
+unregister_net_sysctl_table(brnet->ctl_hdr);
+if (!net_eq(net, &init_net))
+kfree(table);
+
+
+static int __net_init brnf_init_net(struct net *net)
+{
+return br_netfilter_sysctl_init_net(net);
+
+}
+
+static void __net_exit brnf_exit_net(struct net *net)
+{
+struct brnf_net *brnet;
+
+brnet = net_generic(net, brnf_net_id);
+if (brnet->enabled) {
+nf_unregister_net_hooks(net, br_nf_ops, ARRAY_SIZE(br_nf_ops));
+brnet->enabled = false;
+}
+
+#ifdef CONFIG_SYSCTL
+br_netfilter_sysctl_exit_net(net, brnet);
+#endif
+
+static struct pernet_operations brnf_net_ops __read_mostly = {
+#ifdef CONFIG_SYSCTL
+br_netfilter_sysctl_exit_net(net, brnet);
+#endif
+
+static struct pernet_operations brnf_net_ops __read_mostly = {
+#ifdef CONFIG_SYSCTL
+.init = brnf_init_net,
+#endif
+.exit = brnf_exit_net,
+.id = &brnf_net_id,
+.size = sizeof(struct brnf_net),
+};
+
+static int __init br_netfilter_init(void)
+
+int ret;
+@@ -1085,16 +1177,6 @@
return ret;
}

-#ifdef CONFIG_SYSCTL
-br_netfilter: can't register to sysctl
unregister_netdevice_notifier(&brnf_notifier);
unregister_pernet_subsys(&brnf_net_ops);
return -ENOMEM;
#endif
RCU_INIT_POINTER(nf_br_ops, &br_ops);
printk(KERN_NOTICE "Bridge firewalling registered\n"); return 0;
@@ -1105,9 +1187,6 @@
RCU_INIT_POINTER(nf_br_ops, NULL);
unregister_netdevice_notifier(&brnf_notifier);
unregister_pernet_subsys(&brnf_net_ops);
-#ifdef CONFIG_SYSCTL
-unregister_net_sysctl_table(brnf_sysctl_header);
-#endif}

module_init(br_netfilter_init);
--- linux-4.15.0.orig/net/bridge/br_netfilter_ipv6.c
+++ linux-4.15.0/net/bridge/br_netfilter_ipv6.c
@@ -131,6 +131,7 @@
         IPSTATS_MIB_INDISCARDS);
goto drop;
}
+hdr = ipv6_hdr(skb);
}
if (hdr->nexthdr == NEXTHDR_HOP & br_nf_check_hbh_len(skb))
goto drop;
@@ -227,13 +228,15 @@
         nf_bridge_put(skb->nf_bridge);
 if (!nf_bridge_alloc(skb))
 return NF_DROP;
-#ifdef CONFIG_SYSCTL
-if (!setup_pre_routing(skb))
+if (!setup_pre_routing(skb, state->net))
return NF_DROP;

 nf_bridge = nf_bridge_info_get(skb);
 nf_bridge->ipv6_daddr = ipv6_hdr(skb)->daddr;
 skb->protocol = htons(ETH_P_IPV6);
+skb->transport_header = skb->network_header + sizeof(struct ipv6hdr);
+
NF_HOOK(NFPROTO_IPV6, NF_INET_PRE_ROUTING, state->net, state->sk, skb,
skb->dev, NULL,
br_nf_pre_routing_finish_ipv6);
--- linux-4.15.0.orig/net/bridge/br_netlink.c
+++ linux-4.15.0/net/bridge/br_netlink.c
@@ -1236,19 +1236,19 @@
if (data[IFLA_BR_NF_CALL_IPTABLES]) {
    u8 val = nla_get_u8(data[IFLA_BR_NF_CALL_IPTABLES]);

    -br->nf_call_iptables = val ? true : false;
+    br_opt_toggle(br, BROPT_NF_CALL_IPTABLES, !!val);
}

if (data[IFLA_BR_NF_CALL_IP6TABLES]) {
    u8 val = nla_get_u8(data[IFLA_BR_NF_CALL_IP6TABLES]);

    -br->nf_call_ip6tables = val ? true : false;
+    br_opt_toggle(br, BROPT_NF_CALL_IP6TABLES, !!val);
}

if (data[IFLA_BR_NF_CALL_ARPTABLES]) {
    u8 val = nla_get_u8(data[IFLA_BR_NF_CALL_ARPTABLES]);

    -br->nf_call_arptables = val ? true : false;
+    br_opt_toggle(br, BROPT_NF_CALL_ARPTABLES, !!val);
}
#endif

@@ -1381,7 +1381,8 @@
#ifdef CONFIG_BRIDGE_VLAN_FILTERING
if (nla_put_be16(skb, IFLA_BR_VLAN_PROTOCOL, br->vlan_proto) ||
    nla_put_u16(skb, IFLA_BR_VLAN_DEFAULT_PVID, br->default_pvid) ||
-    nla_put_u8(skb, IFLA_BR_VLAN_STATS_ENABLED, br->vlan_stats_enabled))
+    nla_put_u8(skb, IFLA_BR_VLAN_STATS_ENABLED, br_opt_get(br, BROPT_VLAN_STATS_ENABLED))
return -EMSGSIZE;
#endif
#ifdef CONFIG_BRIDGE_IGMP_SNOOPING
@@ -1434,11 +1435,11 @@
#endif
#ifdef CONFIG_BRIDGE_NETFILTER
if (nla_put_u8(skb, IFLA_BR_NF_CALL_IPTABLES,
    - br->nf_call_iptables ? 1 : 0)) ||
+    br_opt_get(br, BROPT_NF_CALL_IPTABLES) ? 1 : 0)) ||
    nla_put_u8(skb, IFLA_BR_NF_CALL_IP6TABLES,
    - br->nf_call_ip6tables ? 1 : 0) ||
+   br_opt_get(br, BROPT_NF_CALL_IP6TABLES) ? 1 : 0) ||
   nla_put_u8(skb, IFLA_BR_NF_CALL_ARPTABLES,
-   br->nf_call_arptables ? 1 : 0))
+   br_opt_get(br, BROPT_NF_CALL_ARPTABLES) ? 1 : 0))
return -EMSGSIZE;
#endif

@@ -1476,7 +1477,7 @@}
}
return numvls * nla_total_size(sizeof(struct bridge_vlan_xstats)) +
-   nla_total_size(sizeof(struct br_mcast_stats)) +
+   nla_total_size_64bit(sizeof(struct br_mcast_stats)) +
   nla_total_size(0);
}

--- linux-4.15.0.orig/net/bridge/br_nf_core.c
+++ linux-4.15.0/net/bridge/br_nf_core.c
@@ -26,7 +26,8 @@
#endif
static void fake_update_pmtu(struct dst_entry *dst, struct sock *sk,
-   struct sk_buff *skb, u32 mtu)
+   struct sk_buff *skb, u32 mtu,
+   bool confirm_neigh)
{
}

--- linux-4.15.0.orig/net/bridge/br_private.h
+++ linux-4.15.0/net/bridge/br_private.h
@@ -100,8 +100,8 @@
};

struct br_tunnel_info {
-   __be64 tunnel_id;
-   struct metadata_dst*tunnel_dst;
+   __be64 tunnel_id;
+   struct metadata_dst __rcu *tunnel_dst;

/*
 @@ -197,8 +197,8 @@
 struct rcu_headrcu;
 struct timer_listtimer;
 struct br_ipaddr;
+unsigned chareth_addr[ETH_ALEN] __aligned(2);
 unsigned charflags;
-unsigned chareth_addr[ETH_ALEN];
struct net_bridge_mdb_entry
@@ -278,6 +278,8 @@
   u16				group_fwd_mask;
 @

+#define kobj_to_brport(obj) container_of(obj, struct net_bridge_port, kobj)
+
#define br_auto_port(p) ((p)->flags & BR_AUTO_MASK)
#define br_promisc_port(p) ((p)->flags & BR_PROMISC)

@@ -300,16 +302,23 @

rcu_dereference_rtnl(dev->rx_handler_data) : NULL;
 }

+enum net_bridge_opts {
+   BROPT_VLAN_ENABLED,
+   BROPT_VLAN_STATS_ENABLED,
+   BROPT_NF_CALL_IPTABLES,
+   BROPT_NF_CALL_IP6TABLES,
+   BROPT_NF_CALL_ARPTABLES,
+   *};
+
+struct net_bridge {
+   spinlock_t				lock;
+   spinlock					hash_lock;
+   struct list_head			port_list;
+   struct net_device		*dev;
+   struct pcpu_sw_netstats		__percpu *stats;
+   unsigned long			options;
+}

/* These fields are accessed on each packet */
#endif

u8				vlan_enabled;
-u8 vlan_stats_enabled;
__be16				vlan_proto;
   u16 default_pvid;
struct net_bridge_vlan_group	__rcu *vlgrp;
@@ -321,9 +330,6 @@
   struct rtable		fake_rtable;
   struct rt6_info		fake_rt6_info;
 @
};

-bool				nf_call_iptables;
-bool				nf_call_ip6tables;
-bool				nf_call_arptables;
@endef

u16group_fwd_mask;

u16group_fwd_mask_required;
@@ -480,6 +486,14 @@
            return true;
        }

+static inline int br_opt_get(const struct net_bridge *br,
+    enum net_bridge_opts opt)
+{
+    return test_bit(opt, &br->options);
+}
+
+void br_opt_toggle(struct net_bridge *br, enum net_bridge_opts opt, bool on);
+
/* br_device.c */
void br_dev_setup(struct net_device *dev);
void br_dev_delete(struct net_device *dev, struct list_head *list);
--- linux-4.15.0.orig/net/bridge/br_stp_bpdu.c
+++ linux-4.15.0/net/bridge/br_stp_bpdu.c
@@ -147,7 +147,6 @@
void br_stp_rcv(const struct stp_proto *proto, struct sk_buff *skb,
struct net_device *dev)
{
    const unsigned char *dest = eth_hdr(skb)->h_dest;
struct net_bridge_port *p;
struct net_bridge *br;
const unsigned char *buf;
@@ -176,7 +175,7 @@
    if (p->state == BR_STATE_DISABLED)
        goto out;
    
-#if (!ether_addr_equal(dest, br->group_addr))
+if (!ether_addr_equal(eth_hdr(skb)->h_dest, br->group_addr))
    goto out;
    
    if (p->flags & BR_BPDU_GUARD) {
--- linux-4.15.0.orig/net/bridge/br_sysfs_br.c
+++ linux-4.15.0/net/bridge/br_sysfs_br.c
@@ -685,12 +685,12 @@
struct device *d, struct device_attribute *attr, char *buf)
{
    struct net_bridge *br = to_bridge(d);
    struct net_bridge_attribute *attr, char *buf)
{
    struct net_bridge *br = to_bridge(d);
    
-return sprintf(buf, "\n", br->nf_call_iptables);
+return sprintf(buf, "\n", br_opt_get(br, BROPT_NF_CALL_IPTABLES));
    }
    
static int set_nf_call_iptables(struct net_bridge *br, unsigned long val)
{
    -br->nf_call_iptables = val ? true : false;
+br_opt_toggle(br, BROPT_NF_CALL_IPTABLES, !!val);
return 0;
}

@@ -706,12 +706,12 @@
struct device *d, struct device_attribute *attr, char *buf)
{
struct net_bridge *br = to_bridge(d);
-return sprintf(buf, "%u\n", br->nf_call_ip6tables);
+return sprintf(buf, "%u\n", br_opt_get(br, BROPT_NF_CALL_IP6TABLES));
}

static int set_nf_call_ip6tables(struct net_bridge *br, unsigned long val)
{
-br->nf_call_ip6tables = val ? true : false;
+br_opt_toggle(br, BROPT_NF_CALL_IP6TABLES, !!val);
return 0;
}

@@ -727,12 +727,12 @@
struct device *d, struct device_attribute *attr, char *buf)
{
struct net_bridge *br = to_bridge(d);
-return sprintf(buf, "%u\n", br->nf_call_arptables);
+return sprintf(buf, "%u\n", br_opt_get(br, BROPT_NF_CALL_ARPTABLES));
}

static int set_nf_call_arptables(struct net_bridge *br, unsigned long val)
{
-br->nf_call_arptables = val ? true : false;
+br_opt_toggle(br, BROPT_NF_CALL_ARPTABLES, !!val);
return 0;
}

@@ -750,7 +750,7 @@
char *buf)
{
struct net_bridge *br = to_bridge(d);
-return sprintf(buf, "%d\n", br->vlan_enabled);
+return sprintf(buf, "%d\n", br_opt_get(br, BROPT_VLAN_ENABLED));
}

static ssize_t vlan_filtering_store(struct device *d,
@@ -798,7 +798,7 @@
char *buf)
{
struct net_bridge *br = to_bridge(d);
-return sprintf(buf, "%u\n", br->vlan_stats_enabled);
+return sprintf(buf, "%u\n", br_opt_get(br, BROPT_VLAN_STATS_ENABLED));
}
static ssize_t vlan_stats_enabled_store(struct device *d, unsigned long v, unsigned long mask) {
    unsigned long flags;
    flags = d->flags;
    if (v)
        flags |= mask;
    flags &= ~mask;
    if (flags != d->flags) {
        int err;
        err = br_switchdev_set_port_flag(d, flags, mask);
        if (err)
            return err;
        d->flags = flags;
        br_port_flags_change(d, mask);
    }
}

#define to_brport_attr(_at) container_of(_at, struct brport_attribute, attr)
#define to_brport(obj) container_of(obj, struct net_bridge_port, kobj)

static ssize_t brport_show(struct kobject *kobj, struct attribute *attr, char *buf) {
    struct brport_attribute *brport_attr = to_brport_attr(attr);
    if (!brport_attr->show)
        return -EINVAL;
    return brport_attr->show(kobj, buf);
}

const char *buf, size_t count)
struct brport_attribute *brport_attr = to_brport_attr(attr);
-struct net_bridge_port *p = to_brport(kobj);
+struct net_bridge_port *p = kobj_to_brport(kobj);
ssize_t ret = -EINVAL;
char *endp;
unsigned long val;
--- linux-4.15.0.orig/net/bridge/br_vlan.c
+++ linux-4.15.0/net/bridge/br_vlan.c
@@ -168,6 +168,8 @@
masterv = br_vlan_find(vg, vid);
if (WARN_ON(!masterv))
  return NULL;
+refcount_set(&masterv->refcnt, 1);
+return masterv;
}
refcount_inc(&masterv->refcnt);
@@ -253,8 +255,10 @@
masterv = br_vlan_get_master(br, v->vid);
-if (!masterv)
+if (!masterv) {
+err = -ENOMEM;
  goto out_filt;
  +}
  v->brvlan = masterv;
  v->stats = masterv->stats;
} }
@@ -386,7 +390,7 @@
return NULL;
 }
}
-if (br->vlan_stats_enabled) {
+if (br_opt_get(br, BROPT_VLAN_STATS_ENABLED)) {
  stats = this_cpu_ptr(v->stats);
  u64_stats_update_begin(&stats->syncp);
  stats->tx_bytes += skb->len;
@@ -475,14 +479,14 @@
  skb->vlan_tci |= pvid;
 /* if stats are disabled we can avoid the lookup */
-if (!br->vlan_stats_enabled)
+if (!br_opt_get(br, BROPT_VLAN_STATS_ENABLED))
  return true;
} }
n = br_vlan_find(vg, *vid);
if (!v || !br_vlan_should_use(v))
goto drop;

-if (br->vlan_stats_enabled) {
+if (br_opt_get(br, BROPT_VLAN_STATS_ENABLED)) {
    stats = this_cpu_ptr(v->stats);
    u64_stats_update_begin(&stats->syncp);
    stats->rx_bytes += skb->len;
    @ @ -504,7 +508,7 @@
/* If VLAN filtering is disabled on the bridge, all packets are
 * permitted.
 */
-} else { /* vlan_enabled && ETH_P_8021AD */
+if (!br->vlan_enabled) {
+    BR_INPUT_SKB_CB(skb)->vlan_filtered = false;
+    return true;
+}
    struct net_bridge *br = p->br;

/* If filtering was disabled at input, let it pass. */
-} else { /* vlan_enabled && ETH_P_8021AD */
+if (!br_opt_get(br, BROPT_VLAN_ENABLED))
    return true;

    vg = nbp_vlan_group_rcu(p);
    @ @ -655,6 +659,11 @@

ASSERT_RTNL();

/* delete auto-added default pvid local fdb before flushing vlans
 * otherwise it will be leaked on bridge device init failure
 */
+br_fdb_delete_by_port(br, NULL, 0, 1);
+
    vg = br_vlan_group(br);
    __vlan_flush(vg);
    RCU_INIT_POINTER(br->vlgrp, NULL);
    @ @ -677,7 +686,8 @@
    return;

spin_lock_bh(&br->lock);
-} else { /* vlan_enabled && ETH_P_8021AD */
+if (!br->vlan_enabled || br->vlan_proto == htons(ETH_P_8021Q)) {
+    br->group_addr[5] = 0x00;
+} else { /* vlan_enabled && ETH_P_8021AD */

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void br_recalculate_fwd_mask(struct net_bridge *br)
{
    if (!br->vlan_enabled || br->vlan_proto == htons(ETH_P_8021Q))
        br->group_fwd_mask_required = BR_GROUPFWD_DEFAULT;
    else /* vlan_enabled && ETH_P_8021AD */
        br->group_fwd_mask_required = BR_GROUPFWD_8021AD &
             ((br->dev)->vlan_enabled && ETH_P_8021AD &
             0x707,14 +718,14 @ @
     }

    int err;

    if (br->vlan_enabled == val)
        +if (br_opt_get(br, BROPT_VLAN_ENABLED) == !!val)
            return 0;

    err = switchdev_port_attr_set(br->dev, &attr);
    if (err && err != -EOPNOTSUPP)
        return err;

    br->vlan_enabled = val;
    +br_opt_toggle(br, BROPT_VLAN_ENABLED, !!val);
    br->group_fwd_mask_required = BR_GROUPFWD_DEFAULT &
             ((br->dev)->vlan_enabled && ETH_P_8021AD &
             0x731,7 +742,7 @ @
     }

    struct net_bridge *br = netdev_priv(dev);

    -return !!br->vlan_enabled;
    +return br_opt_get(br, BROPT_VLAN_ENABLED);
}
EXPORT_SYMBOL_GPL(br_vlan_enabled);

switch (val) {
    case 0:
    case 1:
        -br->vlan_stats_enabled = val;
        +br_opt_toggle(br, BROPT_VLAN_STATS_ENABLED, !!val);
        break;
    default:
        return -EINVAL;
    }
}
/* Only allow default pvid change when filtering is disabled */
-if (br->vlan_enabled) {
+if (br_opt_get(br, BROPT_VLAN_ENABLED)) {
    pr_info_once("Please disable vlan filtering to change default_pvid\n");
    err = -EPERM;
    goto out;
@@ -997,7 +1008,7 @@
    .orig_dev = p->br->dev,
    .id = SWITCHDEV_ATTR_ID_BRIDGE_VLAN_FILTERING,
    .flags = SWITCHDEV_F_SKIP_EOPNOTSUPP,
-    .u.vlan_filtering = p->br->vlan_enabled,
+    .u.vlan_filtering = br_opt_get(p->br, BROPT_VLAN_ENABLED),
    ];
    struct net_bridge_vlan_group *vg;
    int ret = -ENOMEM;
--- linux-4.15.0.orig/net/bridge/br_vlan_tunnel.c
+++ linux-4.15.0/net/bridge/br_vlan_tunnel.c
@@ -46,26 +46,33 @@
    br_vlan_tunnel_rht_params);
 }
+static void vlan_tunnel_info_release(struct net_bridge_vlan *vlan)
+{
+    struct metadata_dst *tdst = rtnl_dereference(vlan->tinfo.tunnel_dst);
+    +WRITE_ONCE(vlan->tinfo.tunnel_id, 0);
+    +RCU_INIT_POINTER(vlan->tinfo.tunnel_dst, NULL);
+    +dst_release(&tdst->dst);
+    +}
+    +
+    void vlan_tunnel_info_del(struct net_bridge_vlan_group *vg,
+        struct net_bridge_vlan *vlan)
+    {
+        if (!vlan->tinfo.tunnel_dst)
+            if (!rcu_access_pointer(vlan->tinfo.tunnel_dst))
+                return;
+        rhashtable_remove_fast(&vg->tunnel_hash, &vlan->tnode,
+            br_vlan_tunnel_rht_params);
+        -vlan->tinfo.tunnel_id = 0;
+        -dst_release(&vlan->tinfo.tunnel_dst->dst);
+        -vlan->tinfo.tunnel_dst = NULL;
+        +vlan_tunnel_info_release(vlan);
+    }
+}
+
+static int __vlan_tunnel_info_add(struct net_bridge_vlan_group *vg,
+        struct net_bridge_vlan *vlan, u32 tun_id)
+    {
+        struct metadata_dst *metadata = NULL;

+struct metadata_dst *metadata = rtnl_dereference(vlan->tinfo.tunnel_dst);
__be64 key = key32_to_tunnel_id(cpu_to_be32(tun_id));
int err;

-if (vlan->tinfo.tunnel_dst)
+if (metadata)
  return -EEXIST;

  metadata = __ip_tun_set_dst(0, 0, 0, 0, 0, TUNNEL_KEY,
@@ -74,8 +81,8 @@
  return -EINVAL;

  metadata->u.tun_info.mode |= IP_TUNNEL_INFO_TX | IP_TUNNEL_INFO_BRIDGE;
-vlan->tinfo.tunnel_dst = metadata;
-vlan->tinfo.tunnel_id = key;
+rcu_assign_pointer(vlan->tinfo.tunnel_dst, metadata);
+WRITE_ONCE(vlan->tinfo.tunnel_id, key);

  err = rhashtable_lookup_insert_fast(&vg->tunnel_hash, &vlan->tnode,
    br_vlan_tunnel_rht_params);
@@ -84,9 +91,7 @@
  return 0;
 out:
  -dst_release(&vlan->tinfo.tunnel_dst->dst);
-vlan->tinfo.tunnel_dst = NULL;
-vlan->tinfo.tunnel_id = 0;
+vlan_tunnel_info_release(vlan);

  return err;
 }
@@ -186,12 +191,15 @@
 int br_handle_egress_vlan_tunnel(struct sk_buff *skb, 
   struct net_bridge_vlan *vlan)
 { 
+struct metadata_dst *tunnel_dst;
+__be64 tunnel_id;
  int err;

  -if (!vlan || !vlan->tinfo.tunnel_id)
+if (!vlan)
    return 0;

    -if (unlikely(!skb_vlan_tag_present(skb)))
+if (!skb_vlan_tag_present(skb))
      tunnel_id = READ_ONCE(vlan->tinfo.tunnel_id);
    +if (!tunnel_id || unlikely(!skb_vlan_tag_present(skb)))
      return 0;


skb_dst_drop(skb);
@@ -199,7 +207,9 @@
    if (err)
    return err;

-skb_dst_set(skb, dst_clone(&vlan->tinfo.tunnel_dst->dst));
+  tunnel_dst = rcu_dereference(vlan->tinfo.tunnel_dst);
+  if (tunnel_dst && dst_hold_safe(&tunnel_dst->dst))
  skb_dst_set(skb, &tunnel_dst->dst);

return 0;
}
--- linux-4.15.0.orig/net/bridge/netfilter/ebt_among.c
+++ linux-4.15.0/net/bridge/netfilter/ebt_among.c
@@ -172,18 +172,69 @@
    return true;
    }

+static bool poolsize_invalid(const struct ebt_mac_wormhash *w)
+{)
+  return w && w->poolsize >= (INT_MAX / sizeof(struct ebt_mac_wormhash_tuple));
+}
+ +
+static bool wormhash_offset_invalid(int off, unsigned int len)
+{)
+  if (off == 0) /* not present */
+    return false;
+  off += sizeof(struct ebt_mac_wormhash);
+  return off > len;
+}
+ +
+static bool wormhash_sizes_valid(const struct ebt_mac_wormhash *wh, int a, int b)
+{)
+  if (a == 0)
+    a = sizeof(struct ebt_among_info);
+  return ebt_mac_wormhash_size(wh) + a == b;
+}
+ +
+static int ebt_among_mt_check(const struct xt_mtchk_param *par)
+{
+  const struct ebt_among_info *info = par->matchinfo;
+  return true;
+}
const struct ebt_entry_match *em =
container_of(par->matchinfo, const struct ebt_entry_match, data);
- int expected_length = sizeof(struct ebt_among_info);
+ unsigned int expected_length = sizeof(struct ebt_among_info);
const struct ebt_mac_wormhash *wh_dst, *wh_src;
int err;

+ if (expected_length > em->match_size)
  + return -EINVAL;

  - wh_src = ebt_among_wh_src(info);
+  if (poolsize_invalid(wh_dst))
  + return -EINVAL;

  + expected_length += ebt_mac_wormhash_size(wh_dst);
+  if (expected_length > em->match_size)
  + return -EINVAL;

+  wh_src = ebt_among_wh_src(info);
+  if (poolsize_invalid(wh_src))
+    return -EINVAL;

+  if (info->wh_src_ofs < info->wh_dst_ofs) {
+    if (!wormhash_sizes_valid(wh_src, info->wh_src_ofs, info->wh_dst_ofs))
+      return -EINVAL;
+  } else {

+  + expected_length += ebt_mac_wormhash_size(wh_src);

  + if (em->match_size != EBT_ALIGN(expected_length)) {

if (skb_make_writable(skb, 0))
return EBT_DROP;
else
skb->pkt_type = PACKET_MULTICAST;
} else {
-\t	if (xt_hooknum(par) != NF_BR_BROUTING)
-\t\t\tdev = br_port_get_rcu(xt_in(par))->br->dev;
-\t\telse
-\t\t\tconst struct net_device *dev;
-\t\tswitch (xt_hooknum(par)) {
-\t\t\tcase NF_BR_BROUTING:
-\t\t\t\tdev = xt_in(par);
-\t\t\t\tbreak;
-\t\t\tcase NF_BR_PRE_ROUTING:
-\t\t\t\tdev = br_port_get_rcu(xt_in(par))->br->dev;
-\t\t\t\tbreak;
-\t\t\tdefault:
-\t\t\t\tdev = NULL;
-\t\t\t\tbreak;
-\t\t\t}
-\t\tif (!dev) /* NF_BR_LOCAL_OUT */
-\t\t\treturn info->target;
\}
\else
skb->pkt_type = PACKET_HOST;
if (ether_addr_equal(info->mac, dev->dev_addr))
skb->pkt_type = PACKET_HOST;
--- linux-4.15.0.orig/net/bridge/netfilter/ebtables.c
+++ linux-4.15.0/net/bridge/netfilter/ebtables.c
@@ -31,10 +31,6 @@
 /* needed for logical [in,out]-dev filtering */
 #include "../br_private.h"

-\#define BUGPRINT(format, args...) printk("kernel msg: ebtables bug: please \
-\t\t\t\t\treport to author: "format, ## args)
-\t-\#define BUGPRINT(format, args...) */
-"
-/* Each cpu has its own set of counters, so there is no need for write_lock in
* the softirq
* For reading or updating the counters, the user context needs to
@ @ -398,6 +394,12 @@
watcher = xt_request_find_target(NFPROTO_BRIDGE, w->u.name, 0);
if (IS_ERR(watcher))
return PTR_ERR(watcher);
+\t+if (watcher->family != NFPROTO_BRIDGE) {
+\t\tmodule_put(watcher->me);
+\t\treturn -ENOENT;
+\t}
+ w->u.watcher = watcher;

par->target = watcher;
@@ -477,8 +449,6 @@ /* we make userspace set this right,
 * so there is no misunderstanding */
-BUGPRINT("EBT_ENTRY_OR_ENTRIES shouldn't be set 
-"in distinguisher\n");
return -EINVAL;
}
if (i != NF_BR_NUMHOOKS)
@@ -498,18 +466,14 @@ offset += e->next_offset;
}
}
-if (offset != limit) {
-BUGPRINT("entries_size too small\n");
+if (offset != limit)
return -EINVAL;
-}

/* check if all valid hooks have a chain */
for (i = 0; i < NF_BR_NUMHOOKS; i++) {
if (!newinfo->hook_entry[i] &&
- (valid_hooks & (1 << i))) {
-BUGPRINT("Valid hook without chain\n");
+ (valid_hooks & (1 << i)))
return -EINVAL;
-}
}
return 0;
}
@@ -556,26 +500,20 @@ /* this checks if the previous chain has as many entries
* as it said it has */
-if (*n != *cnt) {
-BUGPRINT("nentries does not equal the nr of entries 
-"in the chain\n");
+if (*n != *cnt)
return -EINVAL;
-}
+
if (((struct ebt_entries *)e)->policy != EBT_DROP &&
    ((struct ebt_entries *)e)->policy != EBT_ACCEPT) {
/* only RETURN from udc */
if (i != NF_BR_NUMHOOKS) {
    return -EINVAL;
} else if (i == NF_BR_NUMHOOKS) /* it's a user defined chain */
    (*udc_cnt)++;

/* a plain old entry, heh */
if (sizeof(struct ebt_entry) > e->watchers_offset ||
    e->watchers_offset > e->target_offset ||
    e->target_offset >= e->next_offset) {
    BUGPRINT("entry offsets not in right order\n");
    return -EINVAL;
} else {
    (*cnt)++;
    (*totalcnt)++;
    return 0;

/* this is not checked anywhere else */
if (e->bitmask == 0)
    return 0;

if (e->bitmask & ~EBT_F_MASK) {
    BUGPRINT("Unknown flag for bitmask\n");
    return -EINVAL;
} else if (e->invflags & ~EBT_INV_MASK) {
    BUGPRINT("Unknown flag for inv bitmask\n");
    return -EINVAL;
}
+if (e->invflags & ~EBT_INV_MASK)
    return -EINVAL;
-}
-if ((e->bitmask & EBT_NOPROTO) && (e->bitmask & EBT_802_3)) {
    -BUGPRINT("NOPROTO & 802_3 not allowed\n");
+if ((e->bitmask & EBT_NOPROTO) && (e->bitmask & EBT_802_3))
    return -EINVAL;
-}
+/* what hook do we belong to? */
for (i = 0; i < NF_BR_NUMHOOKS; i++) {
    if (!newinfo->hook_entry[i]) {
      @ -696,6 +681,8 @@
        i = 0;

+memset(&mtpar, 0, sizeof(mtpar));
+memset(&tgpar, 0, sizeof(tgpar));
    mtpar.net = tgpar.net = net;
    mtpar.table = tgpar.table = name;
    mtpar.entryinfo = tgpar.entryinfo = e;
    @ -717,16 +704,21 @@
    goto cleanup_watchers;
  }
+/* Reject UNSPEC, xtables verdicts/return values are incompatible */
+if (target->family != NFPROTO_BRIDGE) {
+    module_put(target->me);
+    ret = -ENOENT;
+    goto cleanup_watchers;
+}
+/* Revert UNSPEC, xtables verdicts/return values are incompatible */
+if ((struct ebt_standard_target *)target->u.target == &ebt_standard_target) {
    if (gap < sizeof(struct ebt_standard_target)) {
      -BUGPRINT("Standard target size too big\n");
      ret = -EFAULT;
      goto cleanup_watchers;
    }
    if (((struct ebt_standard_target *)target->u.target)->verdict <
         -NUM_STANDARD_TARGETS) {
      -BUGPRINT("Invalid standard target\n");
      ret = -EFAULT;
      goto cleanup_watchers;
    }
    @ -786,10 +778,9 @@
if (strcmp(t->u.name, EBT_STANDARD_TARGET))
    goto letscontinue;
if (e->target_offset + sizeof(struct ebt_standard_target) >
    e->next_offset)
    BUGPRINT("Standard target size too big\n");
    e->next_offset)
    return -1;
else
    verdict = ((struct ebt_standard_target *)t)->verdict;
if (verdict >= 0) { /* jump to another chain */
    struct ebt_entries *hlp2 =
    @@ -798,14 +789,12 @@
    if (hlp2 == cl_s[i].cs.chaininfo)
        break;
/* bad destination or loop */
    -if (i == udc_cnt) {
        -BUGPRINT("bad destination\n");
        +if (i == udc_cnt)
            return -1;
    -}
    -if (cl_s[i].cs.n) {
        -BUGPRINT("loop\n");
        +}
    +if (cl_s[i].cs.n)
        return -1;
    -}
    +
    if (cl_s[i].hookmask & (1 << hooknr))
        goto letscontinue;
/* this can't be 0, so the loop test is correct */
    @@ -838,24 +827,21 @@
    i = 0;
    while (i < NF_BR_NUMHOOKS && !newinfo->hook_entry[i])
        i++;
    -if (i == NF_BR_NUMHOOKS) {
        -BUGPRINT("No valid hooks specified\n");
        +if (i == NF_BR_NUMHOOKS)
            return -EINVAL;
    -}
    -if (newinfo->hook_entry[i] != (struct ebt_entries *)newinfo->entries) {
        -BUGPRINT("Chains don't start at beginning\n");
        +}
    +if (newinfo->hook_entry[i] != (struct ebt_entries *)newinfo->entries)
            return -EINVAL;
    -}
/* make sure chains are ordered after each other in same order
for (j = i + 1; j < NF_BR_NUMHOOKS; j++) {
    if (!newinfo->hook_entry[j])
        continue;
    -if (newinfo->hook_entry[j] <= newinfo->hook_entry[i]) {
        -BUGPRINT("Hook order must be followed\n");
        +if (newinfo->hook_entry[j] <= newinfo->hook_entry[i])
            return -EINVAL;
        -
        +
        i = j;
    }
    @@ -873,15 +859,11 @@
    if (ret != 0)
        return ret;
    -if (i != j) {
        -BUGPRINT("nentries does not equal the nr of entries in the "
        -"(last) chain\n");
        +if (i != j)
            return -EINVAL;
        -}
    -if (k != newinfo->nentries) {
        -BUGPRINT("Total nentries is wrong\n");
        +
        +if (k != newinfo->nentries)
            return -EINVAL;
    -}
    /* get the location of the udc, put them in an array
     * while we're at it, allocate the chainstack
    @@ -914,7 +896,6 @@
        ebt_get_udc_positions, newinfo, &i, cl_s);
    /* sanity check */
    if (i != udc_cnt) {
        -BUGPRINT("i != udc_cnt\n");
        vfree(cl_s);
        return -EFAULT;
    }
    @@ -1015,7 +996,6 @@
goto free_unlock;
    if (repl->num_counters && repl->num_counters != t->private->nentries) {
        -BUGPRINT("Wrong nr. of counters requested\n");
        ret = -EINVAL;
        goto free_unlock;


if (copy_from_user(&tmp, user, sizeof(tmp)) != 0)
    return -EFAULT;

    -if (len != sizeof(tmp) + tmp.entries_size) {
        -BUGPRINT("Wrong len argument\n");
        +if (len != sizeof(tmp) + tmp.entries_size)
            return -EINVAL;
    }

    -if (tmp.entries_size == 0) {
        -BUGPRINT("Entries_size never zero\n");
        +if (tmp.entries_size == 0)
            return -EINVAL;
    }

    /* overflow check */
    if (tmp.nentries >= ((INT_MAX - sizeof(struct ebt_table_info)) / NR_CPUS - SMP_CACHE_BYTES) / sizeof(struct ebt_counter))
        @ @ -1119,21 +1096,22 @@
    tmp.name[sizeof(tmp.name) - 1] = 0;

countersize = COUNTER_OFFSET(tmp.nentries) * nr_cpu_ids;
    -newinfo = vmalloc(sizeof(*newinfo) + countersize);
    +newinfo = __vmalloc(sizeof(*newinfo) + countersize, GFP_KERNEL_ACCOUNT,
        + PAGE_KERNEL);
    if (!newinfo)
        return -ENOMEM;
    if (countersize)
        memset(newinfo->counters, 0, countersize);
    -newinfo->entries = vmalloc(tmp.entries_size);
    +newinfo->entries = __vmalloc(tmp.entries_size, GFP_KERNEL_ACCOUNT,
        + PAGE_KERNEL);
    if (!newinfo->entries)
        ret = -ENOMEM;
    goto free_newinfo;
}

if (copy_from_user(
    newinfo->entries, tmp.entries, tmp.entries_size) != 0) {
    -BUGPRINT("Couldn't copy entries from userspace\n");
    ret = -EFAULT;
    goto free_entries;
}
if (input_table == NULL || (repl = input_table->table) == NULL ||
   repl->entries == NULL || repl->entries_size == 0 ||
   repl->counters != NULL || input_table->private != NULL) {
   -BUGPRINT("Bad table data for ebt_register_table!!!\n");
   return -EINVAL;
}

/* Don’t add one table to multiple lists. */
table = kmemdup(input_table, sizeof(struct ebt_table), GFP_KERNEL);
@@ -1221,13 +1197,10 @@
   ((char *)repl->hook_entry[i] - repl->entries);
}
ret = translate_table(net, repl->name, newinfo);
-if (ret != 0) {
   -BUGPRINT("Translate_table failed\n");
   +if (ret != 0)
      goto free_chainstack;
   -}

if (table->check && table->check(newinfo, table->valid_hooks)) {
   -BUGPRINT("The table doesn’t like its own initial data, lol\n");
   ret = -EINVAL;
   goto free_chainstack;
}
@@ -1238,7 +1211,6 @@
   list_for_each_entry(t, &net->xt.tables[NFPROTO_BRIDGE], list) {
      if (strcmp(t->name, table->name) == 0) {
         ret = -EEXIST;
-BUGPRINT("Table name already exists\n");
      goto free_unlock;
      }
   }
@@ -1310,7 +1282,6 @@
goto free_tmp;
if (num_counters != t->private->nentries) {
   -BUGPRINT("Wrong nr of counters\n");
   ret = -EINVAL;
   goto unlock_mutex;
}
@@ -1435,10 +1406,8 @@
   if (num_counters == 0)
      return 0;

   -if (num_counters != nentries) {
      -BUGPRINT("Num_counters wrong\n");
      +if (num_counters != nentries)
return -EINVAL;
-

counterstmp = vmalloc(nentries * sizeof(*counterstmp));
if (!counterstmp)
@@ -1484,15 +1453,11 @@
    (tmp.num_counters ? nentries * sizeof(struct ebt_counter) : 0))
return -EINVAL;
-
-if (tmp.nentries != nentries)
  -BUGPRINT("Nentries wrong\n");
+if (tmp.nentries != nentries)
return -EINVAL;
-
-if (tmp.entries_size != entries_size) {
  -BUGPRINT("Wrong size\n");
+if (tmp.entries_size != entries_size)
return -EINVAL;
-
ret = copy_counters_to_user(t, oldcounters, tmp.counters,
tmp.num_counters, nentries);  
@@ -1564,7 +1529,6 @@
 mutex_unlock(&ebt_mutex);
 if (copy_to_user(user, &tmp, *len) != 0) {
  -BUGPRINT("c2u Didn't work\n");
+ret = -EFAULT;
break;
 }
@@ -1641,7 +1605,8 @@
 int off = ebt_compat_match_offset(match, m->match_size);
 compat_uint_t msize = m->match_size - off;

-BUG_ON(off >= m->match_size);
+if (WARN_ON(off >= m->match_size))
+return -EINVAL;

if (copy_to_user(cm->u.name, match->name,
                strlen(match->name) + 1) || put_user(msize, &cm->match_size))
@@ -1671,7 +1636,8 @@
 int off = xt_compat_target_offset(target);
 compat_uint_t tsize = t->target_size - off;

-BUG_ON(off >= t->target_size);
+if (WARN_ON(off >= t->target_size))
+return -EINVAL;


if (copy_to_user(cm->u.name, target->name, 
    strlen(target->name) + 1) || put_user(tsize, &cm->match_size))
@ @ -1813,16 +1779,29 @@
return 0;
}

+static int ebt_compat_init_offsets(unsigned int number)
+{
+    +if (number > INT_MAX)
+        +return -EINVAL;
+    +/* also count the base chain policies */
+    +number += NF_BR_NUMHOOKS;
+    +return xt_compat_init_offsets(NFPROTO_BRIDGE, number);
+}

static int compat_table_info(const struct ebt_table_info *info, 
    struct compat_ebt_replace *newinfo)
{
    unsigned int size = info->entries_size;
    const void *entries = info->entries;
    int ret;

    newinfo->entries_size = size;
    ret = ebt_compat_init_offsets(info->nentries);
    +if (ret)
        +return ret;

    -xt_compat_init_offsets(NFPROTO_BRIDGE, info->nentries);
    return EBT_ENTRY_ITERATE(entries, size, compat_calc_entry, info, 
        entries, newinfo);
}
@ @ -1897,12 +1876,13 @@
}

static int ebt_buf_add(struct ebt_entries_buf_state *state, 
    -void *data, unsigned int sz)
    +const void *data, unsigned int sz)
{
    if (state->buf_kern_start == NULL)
        goto count_only;

    -BUG_ON(state->buf_kern_offset + sz > state->buf_kern_len);
    +if (WARN_ON(state->buf_kern_offset + sz > state->buf_kern_len))
        +return -EINVAL;

    ...
memcpy(state->buf_kern_start + state->buf_kern_offset, data, sz);

@@ -1915,7 +1895,8 @@
 {
 char *b = state->buf_kern_start;

-BUG_ON(b && state->buf_kern_offset > state->buf_kern_len);
+if (WARN_ON(b && state->buf_kern_offset > state->buf_kern_len))
+return -EINVAL;

if (b != NULL && sz > 0)
memset(b + state->buf_kern_offset, 0, sz);
@@ -1929,7 +1910,7 @@
 EBT_COMPAT_TARGET,
 }

-static int compat_mtw_from_user(struct compat_ebt_entry_mwt *mwt,
+static int compat_mtw_from_user(const struct compat_ebt_entry_mwt *mwt,
 enum compat_mwt compat_mwt,
 struct ebt_entries_buf_state *state,
 const unsigned char *base)
@@ -1941,7 +1922,8 @@
 int off, pad = 0;
 unsigned int size_kern, match_size = mwt->match_size;

-strlcpy(name, mwt->u.name, sizeof(name));
+if (strscpy(name, mwt->u.name, sizeof(name)) < 0)
+return -EINVAL;

if (state->buf_kern_start)
 dst = state->buf_kern_start + state->buf_kern_offset;
@@ -1992,8 +1974,10 @@
 pad = XT_ALIGN(size_kern) - size_kern;

-strlcpy(name, mwt->u.name, sizeof(name));
+if (strscpy(name, mwt->u.name, sizeof(name)) < 0)
+return -EINVAL;

if (pad > 0 && dst) {
 -BUG_ON(state->buf_kern_len <= pad);
-BUG_ON(state->buf_kern_offset + (match_size + off) + size_kern > state->buf_kern_len - pad);
+if (WARN_ON(state->buf_kern_len <= pad))
+return -EINVAL;
+if (WARN_ON(state->buf_kern_offset + (match_size + off) + size_kern > state->buf_kern_len - pad))
+return -EINVAL;
 memset(dst + size_kern, 0, pad);
 }

 return off + match_size;
@@ -2002,22 +1986,23 @@
 /* return size of all matches, watchers or target, including necessary
  * alignment and padding.
  */
static int ebt_size_mwt(struct compat_ebt_entry_mwt *match32,
unsigned int size_left, enum compat_mwt type,
struct ebt_entries_buf_state *state, const void *base)
{
const char *buf = (const char *)match32;
int growth = 0;

if (size_left == 0)
    return 0;

buf = (char *) match32;
-
while (size_left >= sizeof(*match32)) {
+	do {
        struct ebt_entry_match *match_kern;
        int ret;

+if (size_left < sizeof(*match32))
+return -EINVAL;
+
match_kern = (struct ebt_entry_match *) state->buf_kern_start;
if (match_kern) {
    char *tmp;
    @ @ -2043,7 +2028,8 @ @
    if (ret < 0)
        return ret;

-BUG_ON(ret < match32->match_size);
+if (WARN_ON(ret < match32->match_size))
+return -EINVAL;

growth += ret - match32->match_size;
growth += ebt_compat_entry_padsize();

    @ @ -2053,19 +2039,18 @ @
    if (match_kern)
        match_kern->match_size = ret;

-WARN_ON(type == EBT_COMPAT_TARGET && size_left);
match32 = (struct compat_ebt_entry_mwt *) buf;
-
+} while (size_left);

return growth;
}

/* called for all ebt_entry structures. */
static int size_entry_mwt(struct ebt_entry *entry, const unsigned char *base,
unsigned int *total,
struct ebt_entries_buf_state *state)
{
unsigned int i, j, startoff, new_offset = 0;
/* stores match/watchers/targets & offset of next struct ebt_entry: */
unsigned int *offsets_update = NULL;
for (i = 0; i < 4 ; ++i) {
	if (offsets[i] > *total)
		return -EINVAL;
	if (i < 3 && offsets[i] == *total)
		return -EINVAL;
	if (i == 0)
		continue;
	if (offsets[i-1] > offsets[i])
		return -EINVAL;
}
for (i = 0, j = 1 ; j < 4 ; j++, i++) {
struct compat_ebt_entry_mwt *match32;
unsigned int size;
for (i = 0, j = 1 ; j < 4 ; j++, i++) {
struct compat_ebt_entry_mwt *match32;
unsigned int size;
}@ @ -21909,6 +2094,19 @@
* offsets are relative to beginning of struct ebt_entry (i.e., 0).
*/
+for (i = 0; i < 4 ; ++i) {
+if (offsets[i] > *total)
+return -EINVAL;
+
+if (i < 3 &&& offsets[i] == *total)
+return -EINVAL;
+
+if (i == 0)
+continue;
+if (offsets[i-1] > offsets[i])
+return -EINVAL;
+}
+
for (i = 0, j = 1 ; j < 4 ; j++, i++) {
func_input->struct_ebt_entry_mwt *match32;
unsigned int size;
}@ @ -2138,10 +2136,13 @@
return ret;
}

-startoff = state->buf_user_offset - startoff;
+next_expected_off = state->buf_user_offset - startoff;
+if (next_expected_off != entry->next_offset)
+return -EINVAL;

-BUG_ON(*total < startoff);
-*total -= startoff;
+if (*total < entry->next_offset)
+return -EINVAL;
+*total -= entry->next_offset;
return 0;
}

@@ -2162,7 +2163,9 @@
if (ret < 0)
    return ret;
-
-WARN_ON(size_remaining);
+if (size_remaining)
+    return -EINVAL;
+
    return state->buf_kern_offset;
}

//@ -2245,7 +2248,10 @@

xt_compat_lock(NFPROTO_BRIDGE);
-
-xt_compat_init_offsets(NFPROTO_BRIDGE, tmp.nentries);
+ret = ebt_compat_init_offsets(tmp.nentries);
+if (ret < 0)
+    goto out_unlock;
+
    ret = compat_copy_entries(entries_tmp, tmp.entries_size, &state);
    if (ret < 0)
        goto out_unlock;

    state.buf_kern_len = size64;

    ret = compat_copy_entries(entries_tmp, tmp.entries_size, &state);
    -BUG_ON(ret < 0);/* parses same data again */
+if (WARN_ON(ret < 0)) {
+    vfree(entries_tmp);
+    goto out_unlock;
+}

    vfree(entries_tmp);
    tmp.entries_size = size64;
--- linux-4.15.0.orig/net/bridge/netfilter/nft_reject_bridge.c
+++ linux-4.15.0/net/bridge/netfilter/nft_reject_bridge.c
@@ -34,6 +34,12 @@
    ether_addr_copy(eth->h_dest, eth_hdr(oldskb)->h_source);
    eth->h_proto = eth_hdr(oldskb)->h_proto;
    skb_pull(nskb, ETH_HLEN);
+    if (skb_vlan_tag_present(oldskb)) {
+        u16 vid = skb_vlan_tag_get(oldskb);
+        __vlan_hwaccel_put_tag(nskb, oldskb->vlan_proto, vid);
+    }

static int nft_bridge_iphdr_validate(struct sk_buff *skb)
@@ -230,6 +236,7 @@
pskb_trim_rcsum(skb, ntohs(ip6h->payload_len) + sizeof(*ip6h)))
return false;
+ip6h = ipv6_hdr(skb);
thoff = ipv6_skip_exthdr(skb, ((u8*)(ip6h+1) - skb->data), &proto, &fo);
if (thoff < 0 || thoff >= skb->len || (fo & htons(~0x7)) != 0)
return false;
--- linux-4.15.0.orig/net/caif/caif_dev.c
+++ linux-4.15.0/net/caif/caif_dev.c
@@ -131,8 +131,10 @@
caifd = caif_get(skb->dev);
WARN_ON(caifd == NULL);
-if (caifd == NULL)
+if (!caifd) {
+rcu_read_unlock();
return;
+}
caifd_hold(caifd);
rcu_read_unlock();
@@ -301,7 +303,7 @@
caifd_put(caifd);
}
-void caif_enroll_dev(struct net_device *dev, struct caif_dev_common *caifdev,
+int caif_enroll_dev(struct net_device *dev, struct caif_dev_common *caifdev,
struct cflayer *link_support, int head_room,
struct cflayer **layer,
int (**rcv_func)(struct sk_buff *, struct net_device *,
@@ -312,11 +314,12 @@
enum cfcnfg_phy_preference pref;
struct cfcnfg *cfg = get_cfcnfg(dev_net(dev));
struct caif_device_entry_list *caifdevs;
+int res;
caifdevs = caif_device_list(dev_net(dev));
caifd = caif_device_alloc(dev);
if (!caifd)
-return;
+return -ENOMEM;
*layer = &caifd->layer;
spin_lock_init(&caifd->flow_lock);
@@ -337,7 +340,7 @@
strlcpy(caifd->layer.name, dev->name,

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sizeof(caifd->layer.name));
caifd->layer.transmit = transmit;
-cfcnfg_add_phy_layer(cfg,
+res = cfcnfg_add_phy_layer(cfg,
    dev,
    &caifd->layer,
    pref,
   @@ -347,6 +350,7 @@
    mutex_unlock(&caifdevs->lock);
    if (rcv_func)
    *rcv_func = receive;
    +return res;
    }
EXPORT_SYMBOL(caif_enroll_dev);

@@ -361,6 +365,7 @@
    struct cflayer *layer, *link_support;
    int head_room = 0;
    struct caif_device_entry_list *caifdevs;
    +int res;

cfg = get_cfcnfg(dev_net(dev));
caifdevs = caif_device_list(dev_net(dev));
@@ -386,8 +391,10 @@
    break;
    }
    -caif_enroll_dev(dev, caifdev, link_support, head_room,
    +res = caif_enroll_dev(dev, caifdev, link_support, head_room,
    &layer, NULL);
    +if (res)
    +cfserl_release(link_support);
    caifdev->flowctrl = dev_flowctrl;
    break;

--- linux-4.15.0.orig/net/caif/caif_socket.c
+++ linux-4.15.0/net/caif/caif_socket.c
@@ -539,7 +539,8 @@
goto err;
ret = -EINVAL;
-if (unlikely(msg->msg_iter.iov->iov_base == NULL))
+if (unlikely(msg->msg_iter.nr_segs == 0) ||
    unlikely(msg->msg_iter.iov->iov_base == NULL))
goto err;
noblock = msg->msg_flags & MSG_DONTWAIT;

@@ -953,7 +954,7 @@
mask |= POLLRDHUP;

/* readable? */
-if (!skb_queue_empty(&sk->sk_receive_queue) ||
+if (!skb_queue_empty_lockless(&sk->sk_receive_queue) ||
   (sk->sk_shutdown & RCV_SHUTDOWN))
mask |= POLLIN | POLLRDNORM;

--- linux-4.15.0.orig/net/caif/caif_usb.c
+++ linux-4.15.0/net/caif/caif_usb.c
@@ -116,6 +116,11 @@
   return (struct cflayer *) this;
 }

+static void cfusbl_release(struct cflayer *layer)
+{
+  kfree(layer);
+}
+
+static struct packet_type caif_usb_type __read_mostly = {
+.type = cpu_to_be16(ETH_P_802_EX1),
  
@@ -128,6 +133,7 @@
   struct cflayer *layer, *link_support;
   struct usbnet *usbnet;
   struct usb_device *usbdev;
+  int res;

/* Check whether we have a NCM device, and find its VID/PID. */
if (!(dev->dev.parent && dev->dev.parent->driver &&
@@ -170,8 +176,11 @@
   if (dev->num_tx_queues > 1)
     pr_warn("USB device uses more than one tx queue\n
c-af_enroll_dev(dev, &common, link_support, CFUSB_MAX_HEADLEN,
+res = caif_enroll_dev(dev, &common, link_support, CFUSB_MAX_HEADLEN,
   &layer, &caif_usb_type.func);
+  if (res)
+    goto err;
+  
+  if (!pack_added)
+    dev_add_pack(&caif_usb_type);
+  pack_added = true;
@@ -179,6 +188,9 @@
   strlcpy(layer->name, dev->name, sizeof(layer->name));

   return 0;
+err:
+cfusbl_release(link_support);
+return res;
}

static struct notifier_block caif_device_notifier = {
--- linux-4.15.0.orig/net/caif/cfcnfg.c
+++ linux-4.15.0/net/caif/cfcnfg.c
@@ -450,7 +450,7 @@
rcu_read_unlock();
}

-void
+int
cfcnfg_add_phy_layer(struct cfcnfg *cnfg,
  struct net_device *dev, struct cflayer *phy_layer,
  enum cfcnfg_phy_preference pref,
@@ -459,7 +459,7 @@
{
 struct cflayer *frml;
 struct cfcnfg_phyinfo *phyinfo = NULL;
-int i;
+int i, res = 0;
 u8 phyid;

 mutex_lock(&cnfg->lock);
@@ -473,12 +473,15 @@
goto got_phyid;
} pr_warn("Too many CAIF Link Layers (max 6)\n"); +res = -EEXIST;
goto out;

got_phyid:
phyinfo = kzalloc(sizeof(struct cfcnfg_phyinfo), GFP_ATOMIC);
-if (!phyinfo)
+if (!phyinfo) {
 +res = -ENOMEM;
goto out_err;
 +}
phy_layer->id = phyid;
phyinfo->pref = pref;
@@ -492,8 +495,10 @@
frml = cffrml_create(phyid, fcs);

-if (!frml)
+if (!frml) {


+res = -ENOMEM;
goto out_err;
+
phyinfo->frm_layer = frml;
layer_set_up(frml, cnfg->mux);

list_add_rcu(&phyinfo->node, &cnfg->phys);
out:
mutex_unlock(&cnfg->lock);
-return;
+return res;

out_err:
kfree(phyinfo);
mutex_unlock(&cnfg->lock);
+return res;
}
EXPORT_SYMBOL(cfcnfg_add_phy_layer);
--- linux-4.15.0.orig/net/caif/cfctrl.c
+++ linux-4.15.0/net/caif/cfctrl.c
@@ -352,15 +352,14 @@
 u8 cmdrsp;
 u8 cmd;
 int ret = -1;
- u16 tmp16;
 u8 len;
 u8 param[255];
- u8 linkid;
+ u8 linkid = 0;
 struct cfctrl *cfctrl = container_obj(layer);
 struct cfctrl_request_info rsp, *req;

-cfpkt_extr_head(pkt, &cmdrsp, 1);
+cmdrsp = cfpkt_extr_head_u8(pkt);
 cmd = cmdrsp & CFCTRL_CMD_MASK;
 if (cmd != CFCTRL_CMD_LINK_ERR
     && CFCTRL_RSP_BIT != (CFCTRL_RSP_BIT & cmdrsp)
@@ -378,13 +377,12 @@
 u8 physlinkid;
 u8 prio;
 u8 tmp;
- u32 tmp32;
 u8 *cp;
 int i;
 struct cfctrl_link_param linkparam;


memset(&linkparam, 0, sizeof(linkparam));

cfpkt_ext_head(pkt, &tmp, 1);
+tmp = cfpkt_ext_head_u8(pkt);

serv = tmp & CFCTRL_SRV_MASK;
linkparam.linktype = serv;
@@ -392,13 +390,13 @@
servtype = tmp >> 4;
linkparam.ctype = servtype;

cfpkt_ext_head(pkt, &tmp, 1);
+tmp = cfpkt_ext_head_u8(pkt);
physlinkid = tmp & 0x07;
prio = tmp >> 3;

linkparam.priority = prio;
linkparam.phyid = physlinkid;
cfpkt_ext_head(pkt, &endpoint, 1);
+endpoint = cfpkt_ext_head_u8(pkt);
linkparam.endpoint = endpoint & 0x03;

switch (serv) {
@@ -407,45 +405,43 @@
if (CFCTRL_ERR_BIT & cmdrsp)
break;
/* Link ID */
cfpkt_ext_head(pkt, &linkid, 1);
+linkid = cfpkt_ext_head_u8(pkt);
break;
case CFCTRL_SRV_VIDEO:
cfpkt_ext_head(pkt, &tmp, 1);
+tmp = cfpkt_ext_head_u8(pkt);
linkparam.u.video.connid = tmp;
if (CFCTRL_ERR_BIT & cmdrsp)
break;
/* Link ID */
cfpkt_ext_head(pkt, &linkid, 1);
+linkid = cfpkt_ext_head_u8(pkt);
break;
case CFCTRL_SRV_DATAGRAM:
cfpkt_ext_head(pkt, &tmp32, 4);
linkparam.u.datagram.connid =
- le32_to_cpu(tmp32);
+ cfpkt_ext_head_u32(pkt);
if (CFCTRL_ERR_BIT & cmdrsp)
break;
/* Link ID */
-cfpkt_extr_head(pkt, &linkid, 1);
+linkid = cfpkt_extr_head_u8(pkt);
break;
case CFCTRL_SRV_RFM:
/* Construct a frame, convert
 * DatagramConnectionID
 * to network format long and copy it out... */
-cfpkt_extr_head(pkt, &tmp32, 4);
linkparam.u.rfm.connid =
  -le32_to_cpu(tmp32);
+ cfpkt_extr_head_u32(pkt);
  cp = (u8 *) linkparam.u.rfm.volume;
  -for (cfpkt_extr_head(pkt, &tmp, 1);
  +for (tmp = cfpkt_extr_head_u8(pkt);
    cfpkt_more(pkt) && tmp != \"\0\";
  - cfpkt_extr_head(pkt, &tmp, 1))
  + tmp = cfpkt_extr_head_u8(pkt))
  *cp++ = tmp;
  *cp = \"\0\";

  if (CFCTRL_ERR_BIT & cmdrsp)
    break;
/* Link ID */
-cfpkt_extr_head(pkt, &linkid, 1);
+linkid = cfpkt_extr_head_u8(pkt);
break;
case CFCTRL_SRV_UTIL:
@ @ -454,13 +450,11 @@
  * to network format long and copy it out... */
/* Fifosize KB */
-cfpkt_extr_head(pkt, &tmp16, 2);
linkparam.u.utility.fifosize_kb =
  -le16_to_cpu(tmp16);
+ cfpkt_extr_head_u16(pkt);
/* Fifosize bufs */
-cfpkt_extr_head(pkt, &tmp16, 2);
linkparam.u.utility.fifosize_bufs =
  -le16_to_cpu(tmp16);
+ cfpkt_extr_head_u16(pkt);
/* name */
  cp = (u8 *) linkparam.u.utility.name;
  caif_assert(sizeof(linkparam.u.utility.name)
  @@ -468,24 +462,24 @@
  for (i = 0;
i < UTILITY_NAME_LENGTH
     && cfpkt_more(pkt); i++) {
    -cfpkt_extr_head(pkt, &tmp, 1);
    +tmp = cfpkt_extr_head_u8(pkt);
    *cp++ = tmp;
}
/* Length */
-cfpkt_extr_head(pkt, &len, 1);
+len = cfpkt_extr_head_u8(pkt);
linkparam.u.utility.paramlen = len;
/* Param Data */
-    cp = linkparam.u.utility.params;
   +while (cfpkt_more(pkt) && len--) {
    -cfpkt_extr_head(pkt, &tmp, 1);
    +tmp = cfpkt_extr_head_u8(pkt);
    *cp++ = tmp;
   }
if (CFCTRL_ERR_BIT & cmdrsp)
    break;
/* Link ID */
-cfpkt_extr_head(pkt, &linkid, 1);
+linkid = cfpkt_extr_head_u8(pkt);
/* Length */
-cfpkt_extr_head(pkt, &len, 1);
+len = cfpkt_extr_head_u8(pkt);
/* Param Data */
-cfpkt_extr_head(pkt, &param, len);
   +break;
   @ @ -522,7 +516,7 @ @
}
break;
case CFCTRL_CMD_LINK_DESTROY:
    -cfpkt_extr_head(pkt, &linkid, 1);
    +linkid = cfpkt_extr_head_u8(pkt);
    cfctrl->res.linkdestroy_rsp(cfctrl->serv.layer.up, linkid);
    break;
case CFCTRL_CMD_LINK_ERR:
    --- linux-4.15.0.orig/net/caif/cfserl.c
    +++ linux-4.15.0/net/caif/cfserl.c
    @ @ -31,6 +31,11 @ @
    static void cfserl_ctrlcmd(struct cflayer *layr, enum caif_ctrlcmd ctrl,
        int phyid);

    +void cfserl_release(struct cflayer *layer)
    +{
        +kfree(layer);
    +}


struct cflayer *cfserl_create(int instance, bool use_stx)
{
    struct cfserl *this = kzalloc(sizeof(struct cfserl), GFP_ATOMIC);
    --- linux-4.15.0.orig/net/caif/chnl_net.c
    +++ linux-4.15.0/net/caif/chnl_net.c
    @@ -54,20 +54,6 @@
    enum caif_states state;
    }

    -static void robust_list_del(struct list_head *delete_node)
    -{
    -struct list_head *list_node;
    -struct list_head *n;
    -ASSERT_RTNL();
    -list_for_each_safe(list_node, n, &chnl_net_list) {
    -if (list_node == delete_node) {
        -list_del(list_node);
        -return;
    -}
    -}
    -WARN_ON(1);
    -}
    -
    static int chnl_recv_cb(struct cflayer *layr, struct cfpkt *pkt)
    {
    struct sk_buff *skb;
    @@ -369,6 +355,7 @@
    ASSERT_RTNL();
    priv = netdev_priv(dev);
    strncpy(priv->name, dev->name, sizeof(priv->name));
    +INIT_LIST_HEAD(&priv->list_field);
    return 0;
    }

    @@ -377,7 +364,7 @@
    struct chnl_net *priv;
    ASSERT_RTNL();
    priv = netdev_priv(dev);
    -robust_list_del(&priv->list_field);
    +list_del_init(&priv->list_field);
    }

    static const struct net_device_ops netdev_ops = {
    @@ -542,7 +529,7 @@
    rtnl_lock();
    list_for_each_safe(list_node, _tmp, &chnl_net_list) {
    dev = list_entry(list_node, struct chnl_net, list_field);
    -list_del(list_node);
}
+list_del_init(list_node);
delete_device(dev);
}
rtnl_unlock();
--- linux-4.15.0.orig/net/can/af_can.c
+++ linux-4.15.0/net/can/af_can.c
@@ -105,6 +105,7 @@
static void can_sock_destruct(struct sock *sk)
{
    skb_queue_purge(&sk->sk_receive_queue);
+    skb_queue_purge(&sk->sk_error_queue);
    }

static const struct can_proto *can_get_proto(int protocol)
@@ -721,16 +722,25 @@
    /* This check is made separately since cfd->len would be uninitialized if skb->len = 0. */
    +pr_warn_once("PF_CAN: dropped non conform CAN skbuff: dev type %d, len %d, datalen %d\n",
        dev->type, skb->len, cfd->len);
+    goto free_skb;
+
+/* This check is made separately since cfd->len would be uninitialized if skb->len = 0. */
    +if (unlikely(cfd->len > CAN_MAX_DLEN)) {
        -kfree_skb(skb);
        -return NET_RX_DROP;
        +goto free_skb;
    }

can_receive(skb, dev);
return NET_RX_SUCCESS;
+
+free_skb:
+kfree_skb(skb);
+return NET_RX_DROP;
}

static int canfd_rcv(struct sk_buff *skb, struct net_device *dev,
@@ -738,16 +748,25 @@
    }

    canfd_frame *cfd = (struct canfd_frame *)skb->data;

-        if (unlikely(dev->type != ARPHRD_CAN || skb->len != CAN_MTU ||
-        cfd->len > CAN_MAX_DLEN)) { 
+        if (unlikely(dev->type != ARPHRD_CAN || skb->len != CAN_MTU)) {
            +pr_warn_once("PF_CAN: dropped non conform CAN skbuff: dev type %d, len %d, datalen %d\n",
                dev->type, skb->len, cfd->len);
            -kfree_skb(skb);
            -return NET_RX_DROP;
            +goto free_skb;
        }

canfd_rbuf(skb, dev);
return NET_RX_SUCCESS;
+
+free_skb:
+kfree_skb(skb);
+return NET_RX_DROP;
}
-if (unlikely(dev->type != ARPHRD_CAN || skb->len != CANFD_MTU))
-  cfd->len > CANFD_MAX_DLEN)) {  
-pr_warn_once("PF_CAN: dropped non conform CAN FD skbuff: dev type %d, len %d, datalen %d\n",  
  +if (unlikely(dev->type != ARPHRD_CAN || skb->len != CANFD_MTU)) {
  +pr_warn_once("PF_CAN: dropped non conform CAN FD skbuff: dev type %d, len %d\n",  
  +  dev->type, skb->len);
  +goto free_skb;
  +}
  
  /* This check is made separately since cfd->len would be uninitialized if skb->len = 0. */  
  +if (unlikely(cfd->len > CANFD_MAX_DLEN)) {
  +pr_warn_once("PF_CAN: dropped non conform CAN FD skbuff: dev type %d, len %d, datalen %d\n",  
  +  dev->type, skb->len, cfd->len);
  -kfree_skb(skb);
  -return NET_RX_DROP;
  +goto free_skb;
  }

  can_receive(skb, dev);
  return NET_RX_SUCCESS;
  +
  +free_skb:
  +kfree_skb(skb);
  +return NET_RX_DROP;
  }

/*
 @@ -958,6 +977,8 @@
static __init int can_init(void)
{
  +int err;
  +
  /* check for correct padding to be able to use the structs similarly */
  BUILD_BUG_ON(offsetof(struct can_frame, can_dlc) !=
    offsetof(struct canfd_frame, len) ||
 @@ -971,15 +992,31 @@
if (!rcv_cache)
  return -ENOMEM;

-register_pernet_subsys(&can_pernet_ops);
+err = register_pernet_subsys(&can_pernet_ops);
+if (err)
+  goto out_pernet;

/* protocol register */
-sock_register(&can_family_ops);

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-register_netdevice_notifier(&can_netdev_notifier);
+err = sock_register(&can_family_ops);
+if (err)
+    goto out_sock;
+err = register_netdevice_notifier(&can_netdev_notifier);
+if (err)
+    goto out_notifier;
+
+dev_add_pack(&can_packet);
+dev_add_pack(&canfd_packet);

return 0;
+
+out_notifier:
+sock_unregister(PF_CAN);
+out_sock:
+unregister_pernet_subsys(&can_pernet_ops);
+out_pernet:
+kmem_cache_destroy(rcv_cache);
+
+return err;
}

static __exit void can_exit(void)
--- linux-4.15.0.orig/net/can/bcm.c
+++ linux-4.15.0/net/can/bcm.c
@@ -67,6 +67,9 @@
*/
#define MAX_NFRAMES 256

+#define BCM_TIMER_SEC_MAX (400 * 24 * 60 * 60)
+/* use of last_frames[index].flags */
#define RX_RECV    0x40 /* received data for this element */
#define RX_THR     0x80 /* element not been sent due to throttle feature */
@@ -122,7 +125,7 @@
struct sock sk;
int bound;
int ifindex;
-struct notifier_block notifier;
+struct list_head notifier;
struct list_head rx_ops;
struct list_head tx_ops;
unsigned long dropped_usr_msgs;
@@ -130,6 +133,10 @@
char procname [32]; /* inode number in decimal with \0 */
};
/* check limitations for timeval provided by user */
+static bool bcm_is_invalid_tv(struct bcm_msg_head *msg_head)
+{
+    if ((msg_head->ival1.tv_sec < 0) ||
+        (msg_head->ival1.tv_sec > BCM_TIMER_SEC_MAX) ||
+        (msg_head->ival1.tv_usec < 0) ||
+        (msg_head->ival1.tv_usec >= USEC_PER_SEC) ||
+        (msg_head->ival2.tv_sec < 0) ||
+        (msg_head->ival2.tv_sec > BCM_TIMER_SEC_MAX) ||
+        (msg_head->ival2.tv_usec < 0) ||
+        (msg_head->ival2.tv_usec >= USEC_PER_SEC))
+        return true;
+    return false;
+}
+
#define CFSIZ(flags) ((flags & CAN_FD_FRAME) ? CANFD_MTU : CAN_MTU)
#define OPSIZ sizeof(struct bcm_op)
#define MHSIZ sizeof(struct bcm_msg_head)
+static bool bcm_is_invalid_tv(struct bcm_msg_head *msg_head)
+{
+    if ((msg_head->ival1.tv_sec < 0) ||
+        (msg_head->ival1.tv_sec > BCM_TIMER_SEC_MAX) ||
+        (msg_head->ival1.tv_usec < 0) ||
+        (msg_head->ival1.tv_usec >= USEC_PER_SEC) ||
+        (msg_head->ival2.tv_sec < 0) ||
+        (msg_head->ival2.tv_sec > BCM_TIMER_SEC_MAX) ||
+        (msg_head->ival2.tv_usec < 0) ||
+        (msg_head->ival2.tv_usec >= USEC_PER_SEC))
+        return true;
+    return false;
+}
+
/* create notification to user */
+memset(&msg_head, 0, sizeof(msg_head));
+msg_head.opcode = TX_EXPIRED;
+msg_head.flags = op->flags;
+msg_head.count = op->count;
+memset(&head, 0, sizeof(head));
+head.opcode = RX_CHANGED;
+head.flags = op->flags;
+head.count = op->count;
+data->flags &= (BCM_CAN_FLAGS_MASK|RX_RECV);
+
/* this element is not throttled anymore */
+memset(&head, 0, sizeof(head));
+head.opcode = RX_CHANGED;
+head.flags = op->flags;
+head.count = op->count;
+data->flags &= (BCM_CAN_FLAGS_MASK|RX_RECV);
struct bcm_msg_head msg_head;

/* create notification to user */
+memset(&msg_head, 0, sizeof(msg_head));
msg_head.opcode  = RX_TIMEOUT;
msg_head.flags   = op->flags;
msg_head.count   = op->count;
@@ -815,6 +841,7 @@
bcm_rx_handler, op);

list_del(&op->list);
+synchronize_rcu();
bcm_remove_op(op);
return 1; /* done */
}
@@ -886,6 +913,10 @@
if (msg_head->nframes < 1 || msg_head->nframes > MAX_NFRAMES)
return -EINVAL;

+/* check timeval limitations */
+if ((msg_head->flags & SETTIMER) & bcm_is_invalid_tv(msg_head))
+return -EINVAL;
+
/* check the given can_id */
op = bcm_find_op(&bo->tx_ops, msg_head, ifindex);
if (op) {
@@ -1065,6 +1096,10 @@
!(msg_head->can_id & CAN_RTR_FLAG)))
return -EINVAL;

+/* check timeval limitations */
+if ((msg_head->flags & SETTIMER) & bcm_is_invalid_tv(msg_head))
+return -EINVAL;
+
/* check the given can_id */
op = bcm_find_op(&bo->rx_ops, msg_head, ifindex);
if (op) {
@@ -1412,20 +1447,15 @@
/*
 * notification handler for netdevice status changes
 */
-static int bcm_notifier(struct notifier_block *nb, unsigned long msg,
-void *ptr)
+static void bcm_notify(struct bcm_sock *bo, unsigned long msg,
+struct net_device *dev)
{
-struct net_device *dev = netdev_notifier_info_to_dev(ptr);
-struct bcm_sock *bo = container_of(nb, struct bcm_sock, notifier);
struct sock *sk = &bo->sk;
struct bcm_op *op;
int notify_enodev = 0;

if (!net_eq(dev_net(dev), sock_net(sk)))
  return NOTIFY_DONE;

if (dev->type != ARPHRD_CAN)
  return NOTIFY_DONE;
+return;

switch (msg) {

  sk->sk_error_report(sk);
}
+

+static int bcm_notifier(struct notifier_block *nb, unsigned long msg,
+void *ptr)
+{
+  struct net_device *dev = netdev_notifier_info_to_dev(ptr);
+  +if (dev->type != ARPHRD_CAN)
+    return NOTIFY_DONE;
+  +if (msg != NETDEV_UNREGISTER && msg != NETDEV_DOWN)
+    return NOTIFY_DONE;
+  +if (unlikely(bcm_busy_notifier)) /* Check for reentrant bug. */
+    return NOTIFY_DONE;
+  +spin_lock(&bcm_notifier_lock);
+  +list_for_each_entry(bcm_busy_notifier, &bcm_notifier_list, notifier) {
+    +spin_unlock(&bcm_notifier_lock);
+    +bcm_notify(bcm_busy_notifier, msg, dev);
+    +spin_lock(&bcm_notifier_lock);
+  }
+  +bcm_busy_notifier = NULL;
+  +spin_unlock(&bcm_notifier_lock);
+  return NOTIFY_DONE;
}

/* set notifier */
-bo->notifier.notifier_call = bcm_notifier;
-
-register_netdevice_notifier(&bo->notifier);
+spin_lock(&bcm_notifier_lock);
+list_add_tail(&bo->notifier, &bcm_notifier_list);
+spin_unlock(&bcm_notifier_lock);

return 0;
}

/* remove bcm_ops, timer, rx_unregister(), etc. */

-unregister_netdevice_notifier(&bo->notifier);
+spin_lock(&bcm_notifier_lock);
+while (bcm_busy_notifier == bo) {
+spin_unlock(&bcm_notifier_lock);
+schedule_timeout_uninterruptible(1);
+spin_lock(&bcm_notifier_lock);
+}
+list_del(&bo->notifier);
+spin_unlock(&bcm_notifier_lock);

lock_sock(sk);

/* REGMASK(op->can_id), bcm_rx_handler, op; */
+
+synchronize_rcu();
+
+list_for_each_entry_safe(op, next, &bo->rx_ops, list) {
bcm_remove_op(op);
}

@ @ -1720,6 +1783,10 @@
.exit = canbcm_pernet_exit,
};

+static struct notifier_block canbcm_notifier = {
+ .notifier_call = bcm_notifier
+};
+
+static int __init bcm_module_init(void)
{ int err;
@@ -1733,12 +1800,14 @@
register_pernet_subsys(&canbcm_pernet_ops);
+register_netdevice_notifier(&canbcm_notifier);
return 0;
}

static void __exit bcm_module_exit(void)
{
  can_proto_unregister(&bcm_can_proto);
+unregister_netdevice_notifier(&canbcm_notifier);
  unregister_pernet_subsys(&canbcm_pernet_ops);
}

--- linux-4.15.0.orig/net/can/gw.c
+++ linux-4.15.0/net/can/gw.c
@@ -416,13 +416,29 @@
while (modidx < MAX_MODFUNCTIONS && &gwj->mod.modfunc[modidx])
       (*gwj->mod.modfunc[modidx++])(cf, &gwj->mod);

-/* check for checksum updates when the CAN frame has been modified */
+/* Has the CAN frame been modified? */
if (modidx) {
  -if (gwj->mod.csumfunc.crc8)
+/* get available space for the processed CAN frame type */
+int max_len = nskb->len - offsetof(struct can_frame, data);
+/* dlc may have changed, make sure it fits to the CAN frame */
+if (cf->can_dlc > max_len)
+goto out_delete;
+/* check for checksum updates in classic CAN length only */
+if (gwj->mod.csumfunc.crc8) {
+if (cf->can_dlc > 8)
+goto out_delete;
+(*gwj->mod.csumfunc.crc8)(cf, &gwj->mod.csum crc8);
+}
+
+if (gwj->mod.csumfunc.xor) {
+if (cf->can_dlc > 8)
+goto out_delete;
+
(*gwj->mod.csumfunc.xor)(cf, &gwj->mod.csum xor);
+}

/* clear the skb timestamp if not configured the other way */
gwj->dropped_frames++;
else
  gwj->handled_frames++;
  return;
  out_delete:
+  /* delete frame due to misconfiguration */
+  gwj->deleted_frames++;
+  kfree_skb(nskb);
+  return;
}

static inline int cgw_register_filter(struct_net *net, struct cgw_job *gwj)
  gwj->src.dev == dev || gwj->dst.dev == dev) {
    hlist_del(&gwj->list);
    cgw_unregister_filter(net, gwj);
    synchronize_rcu();
    kmem_cache_free(cgw_cache, gwj);
  }
  }
  if (gwj->src.dev == dev || gwj->dst.dev == dev) {
    hlist_del(&gwj->list);
    cgw_unregister_filter(net, gwj);
    synchronize_rcu();
    kmem_cache_free(cgw_cache, gwj);
  }
  }
  if (!net->can.proc_dir)
    return;
  }
  void can_remove_proc(struct_net *net) {
    hlist_del(&gwj->list);
    cgw_unregister_filter(net, gwj);
    synchronize_rcu();
    kmem_cache_free(cgw_cache, gwj);
    err = 0;
    break;
  }
  void can_remove_proc(struct_net *net) {
    hlist_del(&gwj->list);
    cgw_unregister_filter(net, gwj);
    synchronize_rcu();
    kmem_cache_free(cgw_cache, gwj);
    err = 0;
    break;
  }
if (net->can.pde_version)
  remove_proc_entry(CAN_PROC_VERSION, net->can.proc_dir);

@@ -581,6 +584,5 @@
if (net->can.pde_rcvlist_sff)
  remove_proc_entry(CAN_PROC_RCVLIST_SFF, net->can.proc_dir);

-   if (net->can.proc_dir)
-     remove_proc_entry("can", net->proc_net);
+   remove_proc_entry("can", net->proc_net);
 }
--- linux-4.15.0.orig/net/can/raw.c
+++ linux-4.15.0/net/can/raw.c
@@ -84,7 +84,7 @@
 struct sock sk;
 int bound;
 int ifindex;
-struct notifier_block notifier;
+struct list_head notifier;
 struct list_head notifier;
 int loopback;
 int recv_own_msgs;
 int fd_frames;
@@ -266,21 +270,16 @@
 return err;
 }

+static LIST_HEAD(raw_notifier_list);
+static DEFINE_SPINLOCK(raw_notifier_lock);
+static struct raw_sock *raw_busy_notifier;
+
/*
 * Return pointer to store the extra msg flags for raw_recvmsg().
 * We use the space of one unsigned int beyond the 'struct sockaddr_can'
@@ -266,21 +270,16 @@
 return err;
 }

-struct notifier_block raw_notifier(struct notifier_block *nb,
-unsigned long msg, void *ptr)
+static void raw_notify(struct raw_sock *ro, unsigned long msg,
{ 
- struct net_device *dev = netdev_notifier_info_to_dev(ptr);
- struct raw_sock *ro = container_of(nb, struct raw_sock, notifier);
 struct sock *sk = &ro->sk;

 if (!net_eq(dev_net(dev), sock_net(sk)))
  return NOTIFY_DONE;
- if (dev->type != ARPHRD_CAN)
  return NOTIFY_DONE;
+return;

if (ro->ifindex != dev->ifindex)
  return NOTIFY_DONE;
+return;

switch (msg) {

@@ -309,7 +308,28 @@
  sk->sk_error_report(sk);
  break;
  }
+}

+static int raw_notifier(struct notifier_block *nb, unsigned long msg,
+       void *ptr)
+{
+  struct net_device *dev = netdev_notifier_info_to_dev(ptr);
+  
+  if (dev->type != ARPHRD_CAN)
+    return NOTIFY_DONE;
+  if (msg != NETDEV_UNREGISTER && msg != NETDEV_DOWN)
+    return NOTIFYDONE;
+  if (unlikely(raw_busy_notifier)) /* Check for reentrant bug. */
+    return NOTIFY_DONE;
+  
+  spin_lock(&raw_notifier_lock);
+  list_for_each_entry(raw_busy_notifier, &raw_notifier_list, notifier) {
+    spin_unlock(&raw_notifier_lock);
+    raw_notify(raw_busy_notifier, msg, dev);
+    spin_lock(&raw_notifier_lock);
+  }
+  raw_busy_notifier = NULL;
+  spin_unlock(&raw_notifier_lock);
  return NOTIFY_DONE;
}

@@ -338,9 +358,9 @@
  return -ENOMEM;
 /* set notifier */
 -ro->notifier.notifier_call = raw_notifier;
 -
-   -register_netdevice_notifier(&ro->notifier);
+   +spin_lock(&raw_notifier_lock);
list_add_tail(&ro->notifier, &raw_notifier_list);
spin_unlock(&raw_notifier_lock);

return 0;
}
@@ -355,7 +375,14 @@
ro = raw_sk(sk);

-unregister_netdevice_notifier(&ro->notifier);
+spin_lock(&raw_notifier_lock);
+while (raw_busy_notifier == ro) {
+spin_unlock(&raw_notifier_lock);
+schedule_timeout_uninterruptible(1);
+spin_lock(&raw_notifier_lock);
+}
+list_del(&ro->notifier);
+spin_unlock(&raw_notifier_lock);

lock_sock(sk);

@@ -522,10 +549,18 @@

+rtnl_lock();
lock_sock(sk);

-if (ro->bound && ro->ifindex)
+if (ro->bound && ro->ifindex) {
 dev = dev_get_by_index(sock_net(sk), ro->ifindex);
+if (!dev) {
+if (count > 1)
+kfree(filter);
+err = -ENODEV;
+goto out_fil;
+}
+}

if (ro->bound) {
/* (try to) register the new filters */
@@ -564,6 +599,7 @@
 dev_put(dev);

 release_sock(sk);
+rtnl_unlock();

break;
err_mask &= CAN_ERR_MASK;

+rtnl_lock();
lock_sock(sk);

-if (ro->bound && ro->ifindex) {
  dev = dev_get_by_index(sock_net(sk), ro->ifindex);
  +if (!dev) {
    +err = -EDEVICE;
    +goto out_err;
  +}
  +}

/* remove current error mask */
if (ro->bound) {
  dev = dev_get_by_index(sock_net(sk), ro->ifindex);

  release_sock(sk);
  +rtnl_unlock();

  break;
}

-if (ro->fd_frames) {
  dev = dev_get_by_index(sock_net(sk), ifindex);
  +if (!dev)
  +err = -EINVAL;
  +if (ro->fd_frames && dev->mtu == CANFD_MTU) {
    if (unlikely(size != CANFD_MTU && size != CAN_MTU))
      -return -EINVAL;
    +goto put_dev;
  } else {
    if (unlikely(size != CAN_MTU))
      -return -EINVAL;
    +goto put_dev;
  }
}

-dev = dev_get_by_index(sock_net(sk), ifindex);
-if (!dev)
-return -ENXIO;
-
skb = sock_alloc_send_skb(sk, size + sizeof(struct can_skb_priv),
   msg->msg_flags & MSG_DONTWAIT, &err);
if (!skb)
@@ -869,6 +913,10 @@
   .prot       = &raw_proto,
 };

+static struct notifier_block canraw_notifier = {
+   .notifier_call = raw_notifier
+};
+
static __init int raw_module_init(void)
{
    int err;
@@ -878,6 +926,8 @@
    err = can_proto_register(&raw_can_proto);
    if (err < 0)
        printk(KERN_ERR "can: registration of raw protocol failed\n");
+else
    +register_netdevice_notifier(&canraw_notifier);

return err;
}
@@ -885,6 +935,7 @@
static __exit void raw_module_exit(void)
{
    can_proto_unregister(&raw_can_proto);
    unregister_netdevice_notifier(&canraw_notifier);
}

module_init(raw_module_init);
--- linux-4.15.0.orig/net/ceph/auth.c
+++ linux-4.15.0/net/ceph/auth.c
@@ -315,6 +315,22 @@
 }
EXPORT_SYMBOL(ceph_auth_update_authorizer);

+int ceph_auth_add_authorizer_challenge(struct ceph_auth_client *ac,
+    struct ceph_authorizer *a,
+    void *challenge_buf,
+    int challenge_buf_len)
+{
    int ret = 0;
    +mutex_lock(&ac->mutex);
if (ac->ops && ac->ops->add_authorizer_challenge)
+ ret = ac->ops->add_authorizer_challenge(ac, a, challenge_buf,
+ challenge_buf_len);
+ mutex_unlock(&ac->mutex);
+ return ret;
+
+EXPORT_SYMBOL(ceph_auth_add_authorizer_challenge);
+
int ceph_auth_verify_authorizer_reply(struct ceph_auth_client *ac,
         struct ceph_authorizer *a)
{
    --- linux-4.15.0.orig/net/ceph/auth_x.c
    +++ linux-4.15.0/net/ceph/auth_x.c
    @@ -9,6 +9,7 @@

#include <linux/ceph/decode.h>
#include <linux/ceph/auth.h>
+#include <linux/ceph/ceph_features.h>
#include <linux/ceph/libceph.h>
#include <linux/ceph/messenger.h>

    @@ -70,25 +71,40 @@
    return sizeof(u32) + ciphertext_len;
 }

+static int __ceph_x_decrypt(struct ceph_crypto_key *secret, void *p,
+    int ciphertext_len)
+{
+    struct ceph_x_encrypt_header *hdr = p;
+    int plaintext_len;
+    int ret;
+    
+    ret = ceph_crypt(secret, false, p, ciphertext_len, ciphertext_len,
+                      &plaintext_len);
+    if (ret)
+        return ret;
+    
+    if (le64_to_cpu(hdr->magic) != CEPHX_ENC_MAGIC) {
+        pr_err("%s bad magic\n", __func__);
+        return -EINVAL;
+    }
+    
+    return plaintext_len - sizeof(*hdr);
+
+static int ceph_x_decrypt(struct ceph_crypto_key *secret, void **p, void *end)
+{
+    struct ceph_x_encrypt_header *hdr = *p + sizeof(u32);
-int ciphertext_len, plaintext_len;
+int ciphertext_len;

int ret;

ceph_decode_32_safe(p, end, ciphertext_len, E_inval);
ceph_decode_need(p, end, ciphertext_len, E_inval);

- ret = ceph_crypt(secret, false, *p, end - *p, ciphertext_len,
- &plaintext_len);
-if (ret)
+-ret = __ceph_x_decrypt(secret, *p, ciphertext_len);
+if (ret < 0)
return ret;

- if (hdr->struct_v != 1 || le64_to_cpu(hdr->magic) != CEPHX_ENC_MAGIC)
- return -EPERM;
 -
*p += ciphertext_len;
- return plaintext_len - sizeof(struct ceph_x_encrypt_header);
+return ret;

e_inval:
return -EINVAL;
@@ -275,6 +291,51 @@
return -EINVAL;
} 

+/*
+ * Encode and encrypt the second part (ceph_x_authorize_b) of the
+ * authorizer. The first part (ceph_x_authorize_a) should already be
+ * encoded.
+ */
+static int encrypt_authorizer(struct ceph_x_authorizer *au, 
+u64 *server_challenge)
+{
+struct ceph_x_authorize_a *msg_a;
+struct ceph_x_authorize_b *msg_b;
+void *p, *end;
+int ret;
+
+msg_a = au->buf->vec.iov_base;
+WARN_ON(msg_a->ticket_blob.secret_id != cpu_to_le64(au->secret_id));
+p = (void *)(msg_a + 1) + le32_to_cpu(msg_a->ticket_blob.blob_len);
+end = au->buf->vec.iov_base + au->buf->vec.iov_len;
+
+msg_b = p + ceph_x_encrypt_offset();
+msg_b->struct_v = 2;
+msg_b->nonce = cpu_to_le64(au->nonce);
+if (server_challenge) {
+    msg_b->have_challenge = 1;
+    msg_b->server_challenge_plus_one =
+        cpu_to_le64(*server_challenge + 1);
+} else {
+    msg_b->have_challenge = 0;
+    msg_b->server_challenge_plus_one = 0;
+}
+
+ret = ceph_x_encrypt(&au->session_key, p, end - p, sizeof(*msg_b));
+if (ret < 0)
+    return ret;
+
+p += ret;
+
+if (server_challenge) {
+    WARN_ON(p != end);
+} else {
+    WARN_ON(p > end);
+}
+au->buf->vec.iov_len = p - au->buf->vec.iov_base;
+
+return 0;
}

static void ceph_x_authorizer_cleanup(struct ceph_x_authorizer *au)
{
    ceph_crypto_key_destroy(&au->session_key);
    int maxlen;
    struct ceph_x_authorize_a *msg_a;
    struct ceph_x_authorize_b *msg_b;
    void *p, *end;

    int ticket_blob_len =
        (th->ticket_blob ? th->ticket_blob->vec.iov_len : 0);

    dout(" th %p secret_id %lld %lld", th, secret_id,
        th->ticket_blob.secret_id);

    -p = msg_a + 1;
    -p += ticket_blob_len;
    -end = au->buf->vec.iov_base + au->buf->vec.iov_len;

    -msg_b = p + ceph_x_encrypt_offset();
    -msg_b->struct_v = 1;
    get_random_bytes(&au->nonce, sizeof(au->nonce));
    -msg_b->nonce = cpu_to_le64(au->nonce);
    -ret = ceph_x_encrypt(&au->session_key, p, end - p, sizeof(*msg_b));
-if (ret < 0)
+ret = encrypt_authorizer(au, NULL);
+if (ret) {
+pr_err("failed to encrypt authorizer: %d", ret);
+goto out_au;
+}

-p += ret;
-WARN_ON(p > end);
-au->buf->vec.iov_len = p - au->buf->vec.iov_base;
dout(" built authorizer nonce %llx len %d
", au->nonce,
    (int)au->buf->vec.iov_len);
return 0;
@@ -626,6 +678,54 @@
return 0;
}

+static int decrypt_authorize_challenge(struct ceph_x_authorizer *au,
+    void *challenge_buf,
+    int challenge_buf_len,
+    u64 *server_challenge)
+{
+    struct ceph_x_authorize_challenge *ch =
+        challenge_buf + sizeof(struct ceph_x_encrypt_header);
+    int ret;
+    +/* no leading len */
+    +ret = __ceph_x_decrypt(&au->session_key, challenge_buf,
+                        challenge_buf_len);
+    +if (ret < 0)
+        +return ret;
+    +if (ret < sizeof(*ch)) {
+        +pr_err("bad size %d for ceph_x_authorize_challenge\n", ret);
+        +return -EINVAL;
+    +}
+        +*server_challenge = le64_to_cpu(ch->server_challenge);
+return 0;
+}
+
+static int ceph_x_add_authorizer_challenge(struct ceph_auth_client *ac,
+    struct ceph_authorizer *a,
+    void *challenge_buf,
+    int challenge_buf_len)
+{
+    struct ceph_x_authorizer *au = (void *)a;
+    u64 server_challenge;
+    int ret;
+ret = decrypt_authorize_challenge(au, challenge_buf, challenge_buf_len, &server_challenge);
+if (ret) {
+pr_err("failed to decrypt authorize challenge: %d", ret);
+return ret;
+}
+
+ret = encrypt_authorizer(au, &server_challenge);
+if (ret) {
+pr_err("failed to encrypt authorizer w/ challenge: %d", ret);
+return ret;
+}
+
+return 0;
+
static int ceph_x_verify_authorizer_reply(struct ceph_auth_client *ac,
    struct ceph_authorizer *a)
{
    ret = ceph_x_decrypt(&au->session_key, &p, p + CEPHX_AU_ENC_BUF_LEN);
    if (ret < 0)
        return ret;
    if (ret != sizeof(*reply))
        return -EPERM;
    if (ret < sizeof(*reply)) {
        pr_err("bad size %d for ceph_x_authorize_reply
", ret);
        return -EINVAL;
    }
    if (au->nonce + 1 != le64_to_cpu(reply->nonce_plus_one))
        ret = -EPERM;
    void *enc_buf = au->enc_buf;
    struct {
        __le32 len;
        __le32 header_crc;
        __le32 front_crc;
        __le32 middle_crc;
        __le32 data_crc;
    } __packed *sigblock = enc_buf + ceph_x_encrypt_offset();
    int ret;
    __le64 *psig)
    {
        ret = -EPERM;
        @@ -704,26 +806,64 @@
            __le64 *psig)
        {
            void *enc_buf = au->enc_buf;
            -struct {
                __le32 len;
                __le32 header_crc;
                __le32 front_crc;
                __le32 middle_crc;
                __le32 data_crc;
            } __packed *sigblock = enc_buf + ceph_x_encrypt_offset();
            -int ret;
            -
            -sigblock->len = cpu_to_le32(4*sizeof(u32));
            -sigblock->header_crc = msg->hdr.crc;
-sigblock->front_crc = msg->footer.front_crc;
-sigblock->middle_crc = msg->footer.middle_crc;
-sigblock->data_crc = msg->footer.data_crc;
-ret = ceph_x_encrypt(&au->session_key, enc_buf, CEPHX_AU_ENC_BUF_LEN,
   sizeof(*sigblock));
-if (ret < 0)
-return ret;
+int ret;
+
+if (!CEPH_HAVE_FEATURE(msg->con->peer_features, CEPHX_V2)) {
+struct {
   +__le32 len;
   +__le32 header_crc;
   +__le32 front_crc;
   +__le32 middle_crc;
   +__le32 data_crc;
+} __packed *sigblock = enc_buf + ceph_x_encrypt_offset();
+
+sigblock->len = cpu_to_le32(4*sizeof(u32));
+sigblock->header_crc = msg->hdr.crc;
+sigblock->front_crc = msg->footer.front_crc;
+sigblock->middle_crc = msg->footer.middle_crc;
+sigblock->data_crc = msg->footer.data_crc;
+
+ret = ceph_x_encrypt(&au->session_key, enc_buf,
   CEPHX_AU_ENC_BUF_LEN, sizeof(*sigblock));
+if (ret < 0)
+return ret;
+
+*psig = ((__le64 *)(enc_buf + sizeof(u32));
+} else {
+struct {
   +__le32 header_crc;
   +__le32 front_crc;
   +__le32 front_len;
   +__le32 middle_crc;
   +__le32 middle_len;
   +__le32 data_crc;
   +__le32 data_len;
   +__le32 seq_lower_word;
+} __packed *sigblock = enc_buf;
+struct {
   +__le64 a, b, c, d;
+} __packed *penc = enc_buf;
+int ciphertext_len;
+
+sigblock->header_crc = msg->hdr.crc;
+sigblock->front_crc = msg->footer.front_crc;
+sigblock->front_len = msg->hdr.front_len;
+sigblock->middle_crc = msg->footer.middle_crc;
+sigblock->middle_len = msg->hdr.middle_len;
+sigblock->data_crc = msg->footer.data_crc;
+sigblock->data_len = msg->hdr.data_len;
+sigblock->seq_lower_word = *(__le32 *)&msg->hdr.seq;
+
+ /* no leading len, no ceph_x_encrypt_header */
+ret = ceph_crypt(&au->session_key, true, enc_buf,
+ CEPHX_AU_ENC_BUF_LEN, sizeof(*sigblock),
+ &ciphertext_len);
+if (ret)
+return ret;
+
+ *psig = *(__le64 *)(enc_buf + sizeof(u32));
return 0;
}

@@ -778,6 +918,7 @@
.handle_reply = ceph_x_handle_reply,
 .create_authorizer = ceph_x_create_authorizer,
 .update_authorizer = ceph_x_update_authorizer,
+.add_authorizer_challenge = ceph_x_add_authorizer_challenge,
 .verify_authorizer_reply = ceph_x_verify_authorizer_reply,
 .invalidate_authorizer = ceph_x_invalidate_authorizer,
 .reset =  ceph_x_reset,
--- linux-4.15.0.orig/net/ceph/auth_x_protocol.h
+++ linux-4.15.0/net/ceph/auth_x_protocol.h
@@ -70,6 +70,13 @@
struct ceph_x_authorize_b {
 __u8 struct_v;
 __le64 nonce;
+ __u8 have_challenge;
+ __le64 server_challenge_plus_one;
+} __attribute__ ((packed));
+
+struct ceph_x_authorize_challenge {
+ __u8 struct_v;
+ __le64 server_challenge;
} __attribute__ ((packed));

struct ceph_x_authorize_reply {
--- linux-4.15.0.orig/net/ceph/ceph_common.c
+++ linux-4.15.0/net/ceph/ceph_common.c
@@ -79,6 +79,7 @@
case CEPH_MSG_CLIENT_REPLY: return "client_reply";
case CEPH_MSG_CLIENT_CAPS: return "client_caps";
case CEPH_MSG_CLIENT_CAPRELEASE: return "client_cap_release";
+case CEPH_MSG_CLIENT_QUOTA: return "client_quota";
case CEPH_MSG_CLIENT_SNAP: return "client_snap";
case CEPH_MSG_CLIENTLEASE: return "client_lease";
case CEPH_MSG_OSD_MAP: return "osd_map";
@@ -418,11 +419,15 @@
opt->flags |= CEPH_OPT_FSID;
break;
case Opt_name:
+kfree(opt->name);
opt->name = kstrndup(argstr[0].from,
     argstr[0].to-argstr[0].from,
     GFP_KERNEL);
break;
case Opt_secret:
+ceph_crypto_key_destroy(opt->key);
+kfree(opt->key);
+    
+      opt->key = kzalloc(sizeof(*opt->key), GFP_KERNEL);
if (!opt->key) {
  err = -ENOMEM;
@@ -433,6 +438,9 @@
goto out;
break;
case Opt_key:
+ceph_crypto_key_destroy(opt->key);
+kfree(opt->key);
+      
+      opt->key = kzalloc(sizeof(*opt->key), GFP_KERNEL);
if (!opt->key) {
  err = -ENOMEM;
@@ -713,7 +721,6 @@
}
EXPORT_SYMBOL(__ceph_open_session);
-
int ceph_open_session(struct ceph_client *client)
{
  int ret;
@@ -729,6 +736,23 @@
}
EXPORT_SYMBOL(ceph_open_session);
+
+int ceph_wait_for_latest_osdmap(struct ceph_client *client,
+unsigned long timeout)
+{

+u64 newest_epoch;
+int ret;
+
+ret = ceph_monc_get_version(&client->monc, "osdmap", &newest_epoch);
+if (ret)
+return ret;
+
+if (client->osdc.osdmap->epoch >= newest_epoch)
+return 0;
+
+ceph_osdc_maybe_request_map(&client->osdc);
+return ceph_monc_wait_osdmap(&client->monc, newest_epoch, timeout);
+
+}
+EXPORT_SYMBOL(ceph_wait_for_latest_osdmap);

static int __init init_ceph_lib(void)
{
    --- linux-4.15.0.orig/net/ceph/messenger.c
    +++ linux-4.15.0/net/ceph/messenger.c
    @@ -595,9 +595,15 @@
    struct bio_vec bvec;
    int ret;

    /* sendpage cannot properly handle pages with page_count == 0,
    - we need to fallback to sendmsg if that's the case */
    -if (page_count(page) >= 1)
    +/*
    + * sendpage cannot properly handle pages with page_count == 0,
    + * we need to fall back to sendmsg if that's the case.
    + *
    + * Same goes for slab pages: skb_can_coalesce() allows
    + * coalescing neighboring slab objects into a single frag which
    + * triggers one of hardened usercopy checks.
    + */
    +if (page_count(page) >= 1 && !PageSlab(page))
    return __ceph_tcp_sendpage(sock, page, offset, size, more);

    bvec.bv_page = page;
    @@ -1406,24 +1412,26 @@
    * Connection negotiation.
    */

    -static struct ceph_auth_handshake *get_connect_authorizer(struct ceph_connection *con,
    -int *auth_proto)
    +static int get_connect_authorizer(struct ceph_connection *con)
    {
    struct ceph_auth_handshake *auth;
    +int auth_proto;

    return __ceph_tcp_sendpage(sock, page, offset, size, more);
}
if (!con->ops->get_authorizer) {
+con->auth = NULL;
kon->out_connect.authorizer_protocol = CEPH_AUTH_UNKNOWN;
con->out_connect.authorizer_len = 0;
-return NULL;
+return 0;
}

-auth = con->ops->get_authorizer(con, auth_proto, con->auth_retry);
-auth = con->ops->get_authorizer(con, &auth_proto, con->auth_retry);
if (IS_ERR(auth))
-return auth;
+return PTR_ERR(auth);
-con->auth_reply_buf = auth->authorizer_reply_buf;
-con->auth_reply_buf_len = auth->authorizer_reply_buf_len;
-return auth;
+con->auth = auth;
+con->out_connect.authorizer_protocol = cpu_to_le32(auth_proto);
+con->out_connect.authorizer_len = cpu_to_le32(auth->authorizer_buf_len);
+return 0;
}

/*@ -1439,12 +1447,22 @*/
con_flag_set(con, CON_FLAG_WRITE_PENDING);
}

+static void __prepare_write_connect(struct ceph_connection *con)
 +{
 +con_out_kvec_add(con, sizeof(con->out_connect), &con->out_connect);
 +if (con->auth)
 +con_out_kvec_add(con, con->auth->authorizer_buf_len,
 + con->auth->authorizer_buf);
 +}
 +
 static int prepare_write_connect(struct ceph_connection *con)
 {unsigned int global_seq = get_global_seq(con->msgr, 0);
 int proto;
 -int auth_proto;
 -struct ceph_auth_handshake *auth;
 +int ret;
switch (con->peer_name.type) {
  case CEPH_ENTITY_TYPE_MON:
    @@ -1471,24 +1489,11 @@
    con->out_connect.protocol_version = cpu_to_le32(proto);
    con->out_connect.flags = 0;

    -auth_proto = CEPH_AUTH_UNKNOWN;
    -auth = get_connect_authorizer(con, &auth_proto);
    -if (IS_ERR(auth))
      -return PTR_ERR(auth);

    -con->out_connect.authorizer_protocol = cpu_to_le32(auth_proto);
    -con->out_connect.authorizer_len = auth ?
      -cpu_to_le32(auth->authorizer_buf_len) : 0;

    -con_out_kvec_add(con, sizeof (con->out_connect),
      -&con->out_connect);
    -if (auth && auth->authorizer_buf_len)
      -con_out_kvec_add(con, auth->authorizer_buf_len,
        -auth->authorizer_buf);

    -con->out_more = 0;
    -con_flag_set(con, CON_FLAG_WRITE_PENDING);
    +ret = get_connect_authorizer(con);
    +if (ret)
      +return ret;

    +__prepare_write_connect(con);
    return 0;
  }

@@ -1748,11 +1753,21 @@
  if (ret <= 0)
    goto out;

    -size = le32_to_cpu(con->in_reply.authorizer_len);
    -end += size;
    -ret = read_partial(con, end, size, con->auth_reply_buf);
    -if (ret <= 0)
      -goto out;
    +if (con->auth) {
      +size = le32_to_cpu(con->in_reply.authorizer_len);
      +if (size > con->auth->authorizer_reply_buf_len) {
        +pr_err("authorizer reply too big: \%d > \%zu\n", size,
          +con->auth->authorizer_reply_buf_len);
        +ret = -EINVAL;
        +goto out;
      +}

    +if (con->auth) {
      +size = le32_to_cpu(con->in_reply.authorizer_len);
      +if (size > con->auth->authorizer_reply_buf_len) {
        +pr_err("authorizer reply too big: \%d > \%zu\n", size,
          +con->auth->authorizer_reply_buf_len);
        +ret = -EINVAL;
        +goto out;
      +}
+end += size;
+ret = read_partial(con, end, size,
+    con->auth->authorizer_reply_buf);
+if (ret <= 0)
+    goto out;
+
}  

dout("read_partial_connect %p tag %d, con_seq = %u, g_seq = %u
", 
    con, (int)con->in_reply.tag,
    le32_to_cpu(con->in_reply.global_seq));
out:
return ret;
-

/*
@@ -2043,16 +2057,34 @@

dout("process_connect on %p tag %d", con, (int)con->in_tag);

-if (con->auth_reply_buf) {
+if (con->auth) {
+    int len = le32_to_cpu(con->in_reply.authorizer_len);
+    
+    /* Any connection that defines ->get_authorizer() 
+     * should also define ->verify_authorizer_reply(). 
+     * should also define ->add_authorizer_challenge() and 
+     * ->verify_authorizer_reply().
+     */
+    
+    * See get_connect_authorizer().
+    */
+    ret = con->ops->verify_authorizer_reply(con);
+    if (ret < 0) {
+        con->error_msg = "bad authorize reply";
+        return ret;
+    }
+    if (con->in_reply.tag == CEPH_MSGR_TAG_CHALLENGE_AUTHORIZER) {
+        ret = con->ops->add_authorizer_challenge(
+            con, con->auth->authorizer_reply_buf, len);
+        if (ret < 0)
+            return ret;
+        con_out_kvec_reset(con);
+        __prepare_write_connect(con);
+        prepare_read_connect(con);
+        return 0;
if (len) {
    ret = con->ops->verify_authorizer_reply(con);
    if (ret < 0) {
        con->error_msg = "bad authorize reply";
        return ret;
    }
}

int ret = 1;

dout("try_write start %p state %lu\n", con, con->state);
if (con->state != CON_STATE_PREOPEN &&
    con->state != CON_STATE_CONNECTING &&
    con->state != CON_STATE_NEGOTIATING &&
    con->state != CON_STATE_OPEN)
    return 0;

more:
dout("try_write out_kvec_bytes %d\n", con->out_kvec_bytes);
BUG_ON(!con->sock);
/* kvec data queued? */
if (con->out_kvec_left) {
    ret = write_partial_kvec(con);
    ceph_msg_put(con->in_msg);
    con->in_msg = NULL;
}

BUG_ON(con->out_msg != con);
ceph_msg_put(con->out_msg);
con->out_msg = NULL;

BUG_ON(con->out_msg->con != con);
ceph_msg_put(con->out_msg);
con->out_msg = NULL;

/* Requeue anything that hasn't been acked */
list_splice_init(&con->out_sent, &con->out_queue);
con_flag_set(con, CON_FLAG KEEPALIVE_PENDING);
mutex_unlock(&con->mutex);
-if (con_flag_test_and_set(con, CON_FLAG KEEPALIVE_PENDING) == 0 &
- con_flag_test_and_set(con, CON_FLAG_WRITE_PENDING) == 0)
+
+if (con_flag_test_and_set(con, CON_FLAG_WRITE_PENDING) == 0)
queue_con(con);
}
EXPORT_SYMBOL(ceph_con_keepalive);
--- linux-4.15.0.orig/net/ceph/mon_client.c
+++ linux-4.15.0/net/ceph/mon_client.c
@@ -209,6 +209,14 @@
__open_session(monc);
}

+static void un_backoff(struct ceph_mon_client *monc)
+{
+monc->hunt_mult /= 2; /* reduce by 50% */
+if (monc->hunt_mult < 1)
+monc->hunt_mult = 1;
+dout("%s hunt_mult now %d\n", __func__, monc->hunt_mult);
+}
+
+/*
+ * Reschedule delayed work timer.
+ */
@@ -914,6 +922,15 @@
mutex_unlock(&monc->mutex);

ret = wait_generic_request(req);
+if (!ret)
+/*
+ * Make sure we have the osdmap that includes the blacklist
+ * entry. This is needed to ensure that the OSDs pick up the
+ * new blacklist before processing any future requests from
+ * this client.
+ */
+ret = ceph_wait_for_latest_osdmap(monc->client, 0);
+
out:
put_generic_request(req);
return ret;
@@ -963,6 +980,7 @@
if (!monc->hunting) {
    ceph_con_keepalive(&monc->con);
    __validate_auth(monc);
+    un_backoff(monc);
}
if (is_auth &&
    @@ -1123,9 +1141,8 @@
dout("%s found mon%d\n", __func__, monc->cur_mon);
monc->hunting = false;
monc->had_a_connection = true;
- monc->hunt_mult /= 2; /* reduce by 50% */
- if (monc->hunt_mult < 1)
-    monc->hunt_mult = 1;
+ un_backoff(monc);
+ __schedule_delayed(monc);
}
}

--- linux-4.15.0.orig/net/ceph/osd_client.c
+++ linux-4.15.0/net/ceph/osd_client.c
@@ -384,6 +384,7 @@
dest->size = src->size;
dest->min_size = src->min_size;
dest->sort_bitwise = src->sort_bitwise;
+ dest->recovery_deletes = src->recovery_deletes;
dest->flags = src->flags;
dest->paused = src->paused;
@@ -1330,7 +1331,7 @@
struct ceph_osds up, acting;
 bool force_resend = false;
 bool unpaused = false;
- bool legacy_change;
+ bool legacy_change = false;
 bool split = false;
 bool sort_bitwise = ceph_osdmap_flag(osdc, CEPH_OSDMAP_SORTBITWISE);
 bool recovery_deletes = ceph_osdmap_flag(osdc,
@@ -1426,15 +1427,14 @@
t->osd = acting.primary;
}

- if (unpaused || legacy_change || force_resend ||
-    (split && con && CEPH_HAVE_FEATURE(con->peer_features,
-     RESEND_ON_SPLIT)))
+ if (unpaused || legacy_change || force_resend || split)
ct_res = CALC_TARGET_NEED_RESEND;
else
ct_res = CALC_TARGET_NO_ACTION;

out:
-dout("%s t %p -> ct_res %d osd %d\n", __func__, t, ct_res, t->osd);
+ dout("%s t %p -> %d%d%d%d ct_res %d osd%d\n", __func__, t, unpaused,
static int verify_authorizer_reply(struct ceph_connection *con) {
    @@ -5341,6 +5353,7 @@
    .put = put_osd_con,
    .dispatch = dispatch,
    .get_authorizer = get_authorizer,
+    .add_authorizer_challenge = add_authorizer_challenge,
    .verify_authorizer_reply = verify_authorizer_reply,
    .invalidate_authorizer = invalidate_authorizer,
    .alloc_msg = alloc_msg,
    --- linux-4.15.0.orig/net/compat.c
    +++ linux-4.15.0/net/compat.c
    @ @ -158.7 +158.7 @@
    if (kcmlen > stackbuf_size)
    kcmdmsg_base = kcmdmsg = sock_kmalloc(sk, kcmlen, GFP_KERNEL);
    if (kcmdmsg == NULL)
        -return -ENOBUFFS;
+    return -ENOMEM;
    }
/* Now copy them over neatly. */
memset(kcmsg, 0, kcmlen);
@@ -289,6 +289,7 @@
break;
}
/* Bump the usage count and install the file. */
+__receive_sock(fp[i]);
fd_install(new_fd, get_file(fp[i]));
}
@@ -377,7 +378,8 @@
    if (optname == SO_RCVTIMEO || optname == SO_SNDTIMEO)
+    (!COMPAT_USE_64BIT_TIME &&
+     (optname == SO_RCVTIMEO || optname == SO_SNDTIMEO))
return do_set_sock_timeout(sock, level, optname, optval, optlen);

return sock_setsockopt(sock, level, optname, optval, optlen);
@@ -442,7 +444,8 @@
      if (optname == SO_RCVTIMEO || optname == SO_SNDTIMEO)
    (!COMPAT_USE_64BIT_TIME &&
      (optname == SO_RCVTIMEO || optname == SO_SNDTIMEO))
return do_get_sock_timeout(sock, level, optname, optval, optlen);
return sock_getsockopt(sock, level, optname, optval, optlen);
}
@@ -460,12 +463,14 @@
    err = -ENOENT;
    if (!sock_flag(sk, SOCK_TIMESTAMP))
sock_enable_timestamp(sk, SOCK_TIMESTAMP);
-tv = ktime_to_timeval(sk->sk_stamp);
+tv = ktime_to_timeval(sock_read_timestamp(sk));
    if (tv.tv_sec == -1)
        return err;
    if (tv.tv_sec == 0) {
+          ktime_t kt = ktime_get_real();
        +tv = ktime_to_timeval(kt);
    }
    err = 0;
if (put_user(tv.tv_sec, &ctv->tv_sec) ||
@@ -488,12 +493,13 @@
err = -ENOENT;
if (!sock_flag(sk, SOCK_TIMESTAMP))
sock_enable_timestamp(sk, SOCK_TIMESTAMP);
-ts = ktime_to_timespec(sk->sk_stamp);
+ts = ktime_to_timespec(sock_read_timestamp(sk));
if (ts.tv_sec == -1)
return err;
if (ts.tv_sec == 0) {
-sk->sk_stamp = ktime_get_real();
-ts = ktime_to_timespec(sk->sk_stamp);
+kt ime_t kt = ktime_get_real();
+sock_write_timestamp(sk, kt);
+ts = ktime_to_timespec(kt);
}
err = 0;
if (put_user(ts.tv_sec, &ctv->tv_sec) ||
--- linux-4.15.0.orig/net/core/datagram.c
+++ linux-4.15.0/net/core/datagram.c
@@ -97,7 +97,7 @@
if (error)
goto out_err;

-if (sk->sk_receive_queue.prev != skb)
+if (READ_ONCE(sk->sk_receive_queue.prev) != skb)
goto out;
/* Socket shut down? */
@@ -281,7 +281,7 @@
break;

sk_busy_loop(sk, flags & MSG_DONTWAIT);
-} while (!skb_queue_empty(&sk->sk_receive_queue));
+} while (READ_ONCE(sk->sk_receive_queue.prev) != *last);
error = -EAGAIN;

@@ -810,8 +810,9 @@
return -EINVAL;
}

-if (unlikely(skb->ip_summed == CHECKSUM_COMPLETE))
-netdev_rx_csum_fault(skb->dev);
+if (unlikely(skb->ip_summed == CHECKSUM_COMPLETE) &&
+!skb->csum_complete_sw)
+netdev_rx_csum_fault(NULL);
return 0;
fault:
@@ -843,7 +844,7 @@
mask = 0;

/* exceptional events? */
-if (sk->sk_err || skb_queue_empty(&sk->sk_error_queue))
+if (sk->sk_err || skb_queue_empty_lockless(&sk->sk_error_queue))
mask |= POLLERR |
(sock_flag(sk, SOCK_SELECT_ERR_QUEUE) ? POLLPRI : 0);

@@ -853,7 +854,7 @@
mask |= POLLHUP;

/* readable? */
-if (!skb_queue_empty(&sk->sk_receive_queue))
+if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
mask |= POLLIN | POLLRDNORM;

/* Connection-based need to check for termination and startup */
--- linux-4.15.0.orig/net/core/dev.c
+++ linux-4.15.0/net/core/dev.c
@@ -83,6 +83,7 @@
#include <linux/sched.h>
#include <linux/sched/mm.h>
#include <linux/mutex.h>
+#include <linux/rwsem.h>
#include <linux/string.h>
#include <linux/mm.h>
#include <linux/socket.h>
@@ -151,6 +152,7 @@
    /* Instead of increasing this, you should create a hash table. */
    #define MAX_GRO_SKBS 8
    +#define MAX_NEST_DEV 8

    /* This should be increased if a protocol with a bigger head is added. */
    #define GRO_MAX_HEAD (MAX_HEADER + 128)
@@ -196,7 +198,7 @@
    static unsigned int napi_gen_id = NR_CPUS;
    static DEFINE_READ_MOSTLY_HASHTABLE(napi_hash, 8);

    static seqcount_t devnet_rename_seq;
    +static DECLARE_RWSEM(devnet_rename_sem);

    static inline void dev_base_seq_inc(struct net *net)
    {
@@ -900,33 +902,28 @@
*@net: network namespace
*@name: a pointer to the buffer where the name will be stored.
*@ifindex: the ifindex of the interface to get the name from.
-
- *The use of raw_seqcount_begin() and cond_resched() before
- *retrying is required as we want to give the writers a chance
- *to complete when CONFIG_PREEMPT is not set.
 */
int netdev_get_name(struct net *net, char *name, int ifindex)
{
    struct net_device *dev;
    unsigned int seq;
    int ret;

    -retry:
    -seq = raw_seqcount_begin(&devnet_rename_seq);
    +down_read(&devnet_rename_sem);
    rcu_read_lock();
    +
    dev = dev_get_by_index_rcu(net, ifindex);
    if (!dev) {
        -rcu_read_unlock();
        -return -ENODEV;
        +ret = -ENODEV;
        +goto out;
    }
    strcpy(name, dev->name);
    -rcu_read_unlock();
    -if (read_seqcount_retry(&devnet_rename_seq, seq)) {
        -cond_resched();
        -goto retry;
    }
    -return 0;
    +ret = 0;
    +out:
    +rcu_read_unlock();
    +up_read(&devnet_rename_sem);
    +return ret;
}

/**
   @@ -1027,7 +1024,7 @@
   {
   if (*name == '\0')
   return false;
   -if (strlen(name) >= IFNAMSIZ)

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if (strnlen(name, IFNAMSIZ) == IFNAMSIZ)
    return false;
if (!strcmp(name, ".") || !strcmp(name, ".."))
    return false;
if (dev->flags & IFF_UP)
    return -EBUSY;

err = dev_get_valid_name(net, dev, newname);
if (err < 0) {
    -write_seqcount_end(&devnet_rename_seq);
    +up_write(&devnet_rename_sem);
    return err;
}

if (strncmp(newname, dev->name, IFNAMSIZ) == 0) {
    -write_seqcount_end(&devnet_rename_seq);
    +up_write(&devnet_rename_sem);
    return 0;
}

err = dev_get_valid_name(net, dev, newname);
if (err < 0) {
    -write_seqcount_end(&devnet_rename_seq);
    +up_write(&devnet_rename_sem);
    return err;
}

if (ret) {
    memcpy(dev->name, oldname, IFNAMSIZ);
    dev->name_assign_type = old_assign_type;
    -write_seqcount_end(&devnet_rename_seq);
    +up_write(&devnet_rename_sem);
    return ret;
}

-netdev_adjacent_rename_links(dev, oldname);

/* err >= 0 after dev_alloc_name() or stores the first errno */
if (err >= 0) {
    err = ret;
    -write_seqcount_begin(&devnet_rename_seq);
    +down_write(&devnet_rename_sem);
    memcpy(dev->name, oldname, IFNAMSIZ);
    memcpy(oldname, newname, IFNAMSIZ);
    +up_write(&devnet_rename_sem);
}
dev->name_assign_type = old_assign_type;
@@ -1710,6 +1707,28 @@}
EXPORT_SYMBOL(call_netdevice_notifiers);

+/**
+ * call_netdevice_notifiers_mtu - call all network notifier blocks
+ * @val: value passed unmodified to notifier function
+ * @dev: net_device pointer passed unmodified to notifier function
+ * @arg: additional u32 argument passed to the notifier function
+ *
+ * Call all network notifier blocks. Parameters and return value
+ * are as for raw_notifier_call_chain().
+ */
+static int call_netdevice_notifiers_mtu(unsigned long val,
+    struct net_device *dev, u32 arg)
+{
+    struct netdev_notifier_info_ext info = {
+        .info.dev = dev,
+        .ext.mtu = arg,
+    };
+    
+    BUILD_BUG_ON(offsetof(struct netdev_notifier_info_ext, info) != 0);
+    
+    return call_netdevice_notifiers_info(val, &info.info);
+}
+
+#ifdef CONFIG_NET_INGRESS
static struct static_key ingress_needed __read_mostly;

@@ -2081,7 +2100,7 @@
int i, j;

for (i = count, j = offset; i--; j++) {
-    if (!remove_xps_queue(dev_maps, cpu, j))
+    if (!remove_xps_queue(dev_maps, tci, j))
        break;
    }

@@ -2366,8 +2385,11 @@
*/

int netif_set_real_num_tx_queues(struct net_device *dev, unsigned int txq)
{
+bool disabling;
    int rc;

+disabling = txq < dev->real_num_tx_queues;
+}
if (txq < 1 || txq > dev->num_tx_queues)
    return -EINVAL;

@@ -2383,15 +2405,19 @@
    if (dev->num_tc)
        netif_setup_tc(dev, txq);

-    if (txq < dev->real_num_tx_queues) {
-        dev->real_num_tx_queues = txq;
+    +if (disabling) {
+        synchronize_net();
+        qdisc_reset_all_tx_gt(dev, txq);
+    #ifdef CONFIG_XPS
        netif_reset_xps_queues_gt(dev, txq);
+    #endif
    +} else {
+        dev->real_num_tx_queues = txq;
    }

-dev->real_num_tx_queues = txq;
    return 0;
}
EXPORT_SYMBOL(netif_set_real_num_tx_queues);

@@ -2712,7 +2738,7 @@
    skb_may_pull(skb, sizeof(struct ethhdr)))
        return 0;

-segs = skb_mac_gso_segment(skb, features);

-    if (unlikely(skb_needs_check(skb, tx_path)))
+    +if (unlikely(skb_needs_check(skb, tx_path) && !IS_ERR(segs)))
        skb_warn_bad_offload(skb);

    return segs;
@@ -2919,7 +2945,7 @@
EXPORT_SYMBOL(passthru_features_check);

-    static netdev_features_t dflt_features_check(const struct sk_buff *skb,
+static netdev_features_t dflt_features_check(struct sk_buff *skb,
    struct net_device *dev,
    netdev_features_t features)
{
    skb = next;
    -if (netif_xmit_stopped(txq) && skb) {
    +if (netif_tx_queue_stopped(txq) && skb) {
        rc = NETDEV_TX_BUSY;
    break;
    }
    @ @ -3240,15 +3266,23 @ @
    #if IS_ENABLED(CONFIG_CGROUP_NET_PRIO)
    static void skb_update_prio(struct sk_buff *skb)
    {
        -struct netprio_map *map = rcu_dereference_bh(skb->dev->priomap);
        +const struct netprio_map *map;
        +const struct sock *sk;
        +unsigned int prioidx;

        -if (!skb->priority && skb->sk && map) {
            -unsigned int prioidx =
            -sock_cgroup_prioidx(&skb->sk->sk_cgrp_data);
            +if (skb->priority)
            +return;
            +map = rcu_dereference_bh(skb->dev->priomap);
            +if (!map)
            +return;
            +sk = skb_to_full_sk(skb);
            +if (!sk)
            +return;

        -if (prioidx < map->priomap_len)
            -skb->priority = map->priomap[prioidx];
        -}
        +prioidx = sock_cgroup_prioidx(&sk->sk_cgrp_data);
        +if (prioidx < map->priomap_len)
            +skb->priority = map->priomap[prioidx];
    }
    #else
    #define skb_update_prio(skb)
    @ @ -3561,7 +3595,8 @ @

    int netdev_tstamp_prequeue __read_mostly = 1;
    int netdev_budget __read_mostly = 300;
unsigned int __read_mostly netdev_budget_usecs = 2000;
/* Must be at least 2 jiffies to guarantee 1 jiffy timeout */
unsigned int __read_mostly netdev_budget_usecs = 2 * USEC_PER_SEC / HZ;
int weight_p __read_mostly = 64; /* old backlog weight */
int dev_weight_rx_bias __read_mostly = 1; /* bias for backlog weight */
int dev_weight_tx_bias __read_mostly = 1; /* bias for output_queue quota */
@@ -4663,7 +4698,7 @@
skb_queue_walk_safe(&sd->input_pkt_queue, skb, tmp) {
    if (skb->dev->reg_state == NETREG_UNREGISTERING) {
        skb_unlink(skb, &sd->input_pkt_queue);
        kfree_skb(skb);
@@ -4801,7 +4836,8 @@
    skb->pkt_type = PACKET_HOST;
    skb->encapsulation = 0;
    skb_shinfo(skb)->gso_type = 0;
+    skb_reset_mac_header(skb);
+    skb_gro_reset_offset(skb);
    skb->vlan_tci = 0;
    skb->dev = napi->dev;
    skb->skb_iif = 0;
+    skb->pkt_type = PACKET_HOST;
+    skb->encapsulation = 0;
    skb_shinfo(skb)->gso_type = 0;
    skb->truesize = SKB_TRUESIZE(skb_end_offset(skb));
    skb->eth = skb_gro_header_fast(skb, 0);
    if (unlikely(skb_gro_header_hard(skb, hlen))) {
        skb->pkt_type = PACKET_HOST;
        skb->encapsulation = 0;
        skb_shinfo(skb)->gso_type = 0;
        skb->truesize = SKB_TRUESIZE(skb_end_offset(skb));
    }
}
+eth = (const struct ethhdr *)skb->data;
gro_pull_from_frag0(skb, hlen);
NAPI_GRO_CB(skb)->frag0 += hlen;
NAPI_GRO_CB(skb)->frag0_len -= hlen;
@@ -5311,11 +5351,18 @@
* __napi_schedule_irqoff - schedule for receive
* @n: entry to schedule
* 
- * Variant of __napi_schedule() assuming hard irqs are masked
+ * Variant of __napi_schedule() assuming hard irqs are masked.
+ *
+ * On PREEMPT RT enabled kernels this maps to __napi_schedule()
+ * due to force-threaded interrupts and spinlock substitution.
+ */
void __napi_schedule_irqoff(struct napi_struct *n)
{
-____napi_schedule(this_cpu_ptr(&softnet_data), n);
+if (!IS_ENABLED(CONFIG_PREEMPT_RT))
+____napi_schedule(this_cpu_ptr(&softnet_data), n);
+else
+__napi_schedule(n);
}
EXPORT_SYMBOL(__napi_schedule_irqoff);
@@ -5339,11 +5386,14 @@
if (work_done)
timeout = n->dev->gro_flush_timeout;

+/* When the NAPI instance uses a timeout and keeps postponing
+ * it, we need to bound somehow the time packets are kept in
+ * the GRO layer
+ */
+napi_gro_flush(n, !timeout);
if (timeout)
hrtimer_start(&n->timer, ns_to_ktime(timeout),
       HRTIMER_MODE_REL_PINNED);
else
-napi_gro_flush(n, false);
} 
if (unlikely(!list_empty(&n->poll_list))) {
/* If n->poll_list is not empty, we need to mask irqs */
@@ -5563,12 +5613,13 @@
pr_err_once("netif_napi_add() called with weight %d on device %s\n",
 weight, dev->name);
napi->weight = weight;
-list_add(&napi->dev_list, &dev->napi_list);
napi->dev = dev;
ifdef CONFIG_NETPOLL
napi->poll_owner = -1;
#endif
set_bit(NAPI_STATE_SCHED, &napi->state);
set_bit(NAPI_STATE_NPSVC, &napi->state);
list_add_rcu(&napi->dev_list, &dev->napi_list);
napi_hash_add(napi);
}
EXPORT_SYMBOL(netif_napi_add);
@
-5627,7 +5678,9 @@
trace_napi_poll(n, work, weight);
}

-WARN_ON_ONCE(work > weight);
+if (unlikely(work > weight))
+pr_err_once("NAPI poll function %pS returned %d, exceeding its budget of %d\n",
+    n->poll, work, weight);

if (likely(work < weight))
goto out_unlock;
@
-5876,6 +5929,21 @@
}
EXPORT_SYMBOL(netdev_upper_get_next_dev_rcu);

+static struct net_device *netdev_next_upper_dev(struct net_device *dev,
+struct list_head **iter)
+{
+    struct netdev_adjacent *upper;
+    upper = list_entry((*iter)->next, struct netdev_adjacent, list);
+    if (&upper->list == &dev->adj_list.upper)
+        return NULL;
+    *iter = &upper->list;
+    return upper->dev;
+}
+
+static struct net_device *netdev_next_upper_dev_rcu(struct net_device *dev,
+    struct list_head **iter)
+{
+    struct net_device *netdev_next_upper_dev(struct net_device *dev,
+        struct list_head **iter)
+    {
+        struct netdev_adjacent *upper;
+        upper = list_entry((*iter)->next, struct netdev_adjacent, list);
+        if (&upper->list == &dev->adj_list.upper)
+            return NULL;
+        *iter = &upper->list;
+        return upper->dev;
+    }
+    static struct net_device *netdev_next_upper_dev_rcu(struct net_device *dev,
+        struct list_head **iter)
+    {
+        struct netdev_adjacent *upper;
+        upper = list_entry((*iter)->next, struct netdev_adjacent, list);
+        if (&upper->list == &dev->adj_list.upper)
+            return NULL;
+        *iter = &upper->list;
+        return upper->dev;
+    }
+
+static int netdev_walk_all_upper_dev(struct net_device *dev,
+    int (*fn)(struct net_device *dev,
void *data)
+
struct net_device *udev, *next, *now, *dev_stack[MAX_NEST_DEV + 1];
+struct list_head *niter, *iter, *iter_stack[MAX_NEST_DEV + 1];
+int ret, cur = 0;
+
+now = dev;
+iter = &dev->adj_list.upper;
+
+while (1) {
+  if (now != dev) {
+    ret = fn(now, data);
+    if (ret)
+      return ret;
+  }
+
+  next = NULL;
+  while (1) {
+    udev = netdev_next_upper_dev(now, &iter);
+    if (!udev)
+      break;
+    
+    next = udev;
+    niter = &udev->adj_list.upper;
+    dev_stack[cur] = now;
+    iter_stack[cur++] = iter;
+    break;
+  }
+
+  if (!next) {
+    if (!cur)
+      return 0;
+    next = dev_stack[--cur];
+    niter = iter_stack[cur];
+  }
+
+  now = next;
+  iter = niter;
+}
+
+return 0;
+
int netdev_walk_all_upper_dev_rcu(struct net_device *dev,
  int (*fn)(struct net_device *dev,
    void *data),
  void *data)
- struct net_device *udev;
- struct list_head *iter;
- int ret;
+ struct net_device *udev, *next, *now, *dev_stack[MAX_NEST_DEV + 1];
+ struct list_head *niter, *iter, *iter_stack[MAX_NEST_DEV + 1];
+ int ret, cur = 0;

- for (iter = &dev->adj_list.upper,
  - udev = netdev_next_upper_dev_rcu(dev, &iter);
  - udev;
  - udev = netdev_next_upper_dev_rcu(dev, &iter)) {
+ now = dev;
+ iter = &dev->adj_list.upper;

  /* first is the upper device itself */
  - ret = fn(udev, data);
  - if (ret)
  - return ret;
  + niter = &udev->adj_list.upper;
  +
  + next = NULL;
  + while (1) {
  + if (now != dev) {
  + ret = fn(now, data);
  + if (ret)
  + return ret;
  +
  + dev_stack[cur] = now;
  + iter_stack[cur++] = iter;
  + break;
  +
  + next = udev;
  + niter = &udev->adj_list.upper;
  + dev_stack[cur] = now;
  + iter_stack[cur++] = iter;
  + break;
  +}
  + if (!next) {
  + if (!cur)
  + return 0;
  + next = dev_stack[--cur];
  + niter = iter_stack[cur];

  /* then look at all of its upper devices */
  - ret = netdev_walk_all_upper_dev_rcu(udev, fn, data);
  - if (ret)
  - return ret;
  + while (1) {
  + if (now != dev) {
  + ret = fn(now, data);
  + if (ret)
  + return ret;
  +
  + udev = netdev_next_upper_dev_rcu(now, &iter);
  + if (!udev)
  + break;
  +
  + niter = &udev->adj_list.upper;
  + dev_stack[cur] = now;
  + iter_stack[cur++] = iter;
  + break;
  +}
+now = next;
+iter = niter;
}

return 0;
@@ -6022,23 +6155,42 @@
void *data),
    void *data)
{
-struct net_device *ldev;
-struct list_head *iter;
-int ret;
+struct net_device *ldev, *next, *now, *dev_stack[MAX_NEST_DEV + 1];
+struct list_head *niter, *iter, *iter_stack[MAX_NEST_DEV + 1];
+int ret, cur = 0;

    for (iter = &dev->adj_list.lower,
        ldev = netdev_next_lower_dev(dev, &iter);
        ldev;
    ldev = netdev_next_lower_dev(dev, &iter)) {
        /* first is the lower device itself */
        ret = fn(ldev, data);
        if (ret)
            return ret;
    /* then look at all of its lower devices */
    ret = netdev_walk_all_lower_dev(ldev, fn, data);
    if (ret)
        return ret;
    now = dev;
    iter = &dev->adj_list.lower;

    /* then look at all of its lower devices */
    -ret = netdev_walk_all_lower_dev(ldev, fn, data);
    -if (ret)
    -return ret;
    +while (1) {
    +if (now != dev) {
    +ret = fn(now, data);
    +if (ret)
    +return ret;
    +}
    +}
    +
    +next = NULL;
    +while (1) {
    +ldev = netdev_next_lower_dev(now, &iter);
    +if (!ldev)
    +break;
    +
    +next = ldev;
    +niter = &ldev->adj_list.lower;

+dev_stack[cur] = now;
+iter_stack[cur++] = iter;
+break;
+}
+
+if (!next) {
+if (!cur)
+return 0;
+next = dev_stack[--cur];
+niter = iter_stack[cur];
+}
+
+now = next;
+iter = niter;
}

return 0;
@@ -6059,28 +6211,93 @@
return lower->dev;
}

-int netdev_walk_all_lower_dev_rcu(struct net_device *dev,
-    int (*fn)(struct net_device *dev,
-        void *data),
-        void *data)
+static u8 __netdev_upper_depth(struct net_device *dev)
+{
+struct net_device *udev;
+struct list_head *iter;
+u8 max_depth = 0;
+
+for (iter = &dev->adj_list.upper,
+     udev = netdev_next_upper_dev(dev, &iter);
+     udev;
+     udev = netdev_next_upper_dev(dev, &iter)) {
+if (max_depth < udev->upper_level)
+max_depth = udev->upper_level;
+}
+
+return max_depth;
+}
+
+static u8 __netdev_lower_depth(struct net_device *dev)
{  
struct net_device *ldev;
struct list_head *iter;
-int ret;
+u8 max_depth = 0;

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for (iter = &dev->adj_list.lower,
- ldev = netdev_next_lower_dev(dev, iter);
+ ldev = netdev_next_lower_dev(dev, &iter);
ldev;
- ldev = netdev_next_lower_dev_rcu(dev, iter)) {
  /* first is the lower device itself */
  - ret = fn(ldev, data);
  - if (ret)
    - return ret;
  + ldev = netdev_next_lower_dev(dev, &iter)) {
    + if (max_depth < ldev->lower_level)
      + max_depth = ldev->lower_level;
  +}
  */ then look at all of its lower devices */
  - ret = netdev_walk_all_lower_dev_rcu(ldev, fn, data);
  - if (ret)
    - return ret;
  + return max_depth;
  +}
+
+static int __netdev_update_upper_level(struct net_device *dev, void *data)
+{
  +dev->upper_level = __netdev_upper_depth(dev) + 1;
  +return 0;
  +}
+
+static int __netdev_update_lower_level(struct net_device *dev, void *data)
+{
  +dev->lower_level = __netdev_lower_depth(dev) + 1;
  +return 0;
  +}
+
+int netdev_walk_all_lower_dev_rcu(struct net_device *dev,
+  int (*fn)(struct net_device *dev,
+    void *data),
+  void *data)
+{
  +struct net_device *ldev, *next, *now, *dev_stack[MAX_NEST_DEV + 1];
  +struct list_head *niter, *iter, *iter_stack[MAX_NEST_DEV + 1];
  +int ret, cur = 0;
  +now = dev;
  +iter = &dev->adj_list.lower;
  +
  +while (1) {
    +if (now != dev) {

Open Source Used In 5GaaS Edge AC-4  33723
ret = fn(now, data);
+if (ret)
+return ret;
+
+next = NULL;
+while (1) {
+ldev = netdev_next_lower_dev_rcu(now, &iter);
+if (!ldev)
+break;
+
+next = ldev;
+niter = &ldev->adj_list.lower;
+dev_stack[cur] = now;
+iter_stack[cur++] = iter;
+break;
+
+if (!next) {
+if (!cur)
+return 0;
+next = dev_stack[--cur];
+niter = iter_stack[cur];
+
+now = next;
+iter = niter;
+
}
}

return 0;
@@ -6339,6 +6556,9 @@
if (netdev_has_upper_dev(dev, upper_dev))
  return -EEXIST;
+
+if ((dev->lower_level + upper_dev->upper_level) > MAX_NEST_DEV)
+return -EMLINK;
+
+if (master && netdev_master_upper_dev_get(dev))
  return -EBUSY;

@@ -6359,6 +6579,12 @@
if (ret)
  goto rollback;

+__netdev_update_upper_level(dev, NULL);
+netdev_walk_all_lower_dev(dev, __netdev_update_upper_level, NULL);
+
+__netdev_update_lower_level(upper_dev, NULL);
+netdev_walk_all_upper_dev(upper_dev, __netdev_update_lower_level, NULL);
+
return 0;

rollback:
@@ -6439,6 +6665,12 @@
    call_netdevice_notifiers_info(NETDEV_CHANGEUPPER,
        &changeupper_info.info);
    +__netdev_update_upper_level(dev, NULL);
    +netdev_walk_all_lower_dev(dev, __netdev_update_upper_level, NULL);
    +__netdev_update_lower_level(upper_dev, NULL);
    +netdev_walk_all_upper_dev(upper_dev, __netdev_update_lower_level, NULL);
}
EXPORT_SYMBOL(netdev_upper_dev_unlink);
@@ -6923,7 +7155,8 @@
    if (ops->ndo_change_mtu)
        return ops->ndo_change_mtu(dev, new_mtu);
-
-dev->mtu = new_mtu;
+/* Pairs with all the lockless reads of dev->mtu in the stack */
+WRITE_ONCE(dev->mtu, new_mtu);
return 0;
}
EXPORT_SYMBOL(__dev_set_mtu);
@@ -6942,18 +7175,9 @@
    if (new_mtu == dev->mtu)
        return 0;

-/* MTU must be positive, and in range */
-if (new_mtu < 0 || new_mtu < dev->min_mtu) {
-    -net_err_ratelimited("%s: Invalid MTU %d requested, hw min %d\n",
-        -dev->name, new_mtu, dev->min_mtu);
-    -return -EINVAL;
-}
-
-if (dev->max_mtu > 0 && new_mtu > dev->max_mtu) {
-    -net_err_ratelimited("%s: Invalid MTU %d requested, hw max %d\n",
-        -dev->name, new_mtu, dev->max_mtu);
-    -return -EINVAL;
-}
+err = dev_validate_mtu(dev, new_mtu);
+if (err)
+    return err;
if (!netif_device_present(dev))
return -ENODEV;
@@ -6967,14 +7191,16 @@
er = __dev_set_mtu(dev, new_mtu);

if (!err) {
-err = call_netdevice_notifiers(NETDEV_CHANGEMTU, dev);
+err = call_netdevice_notifiers_mtu(NETDEV_CHANGEMTU, dev,
+   orig_mtu);
er = notifier_to_errno(err);
if (err) {
 /* setting mtu back and notifying everyone again,
 * so that they have a chance to revert changes.
 */
-__dev_set_mtu(dev, orig_mtu);
+call_netdevice_notifiers_mtu(NETDEV_CHANGEMTU, dev,
+   orig_mtu);
-call_netdevice_notifiers(NETDEV_CHANGEMTU, dev);
+call_netdevice_notifiers_mtu(NETDEV_CHANGEMTU, dev,
+   new_mtu);
}
}
return err;
@@ -7268,7 +7494,7 @@
if (!dev->rtnl_link_ops ||
   dev->rtnl_link_state == RTNL_LINK_INITIALIZED)
skb = rtmsg_ifinfo_build_skb(RTM_DELLINK, dev, ~0U, 0,
-   GFP_KERNEL, NULL);
+   GFP_KERNEL, NULL, 0);
/*
* Flush the unicast and multicast chains
@@ -7316,7 +7542,7 @@
netdev_features_t feature;
int feature_bit;

-for_each_netdev_feature(&upper_disables, feature_bit) {
+for_each_netdev_feature(upper_disables, feature_bit) {
   feature = __NETIF_F_BIT(feature_bit);
   if (!!(upper->wanted_features & feature)
      && (features & feature)) {
@@ -7336,17 +7562,19 @@
netdev_features_t feature;
int feature_bit;

-for_each_netdev_feature(&upper_disables, feature_bit) {
+for_each_netdev_feature(upper_disables, feature_bit) {
   feature = __NETIF_F_BIT(feature_bit);
   if (!!(features & feature) && (lower->features & feature)) {
   netdev_dbg(upper, "Disabling feature %pNF on lower dev %s\n",}
&feature, lower->name);
lower->wanted_features &= ~feature;
-netdev_update_features(lower);
+__netdev_update_features(lower);

if (unlikely(lower->features & feature))
netdev_WARN(upper, "failed to disable %pNF on %s!\n",
    &feature, lower->name);
+else
+netdev_features_change(lower);
}
}
}
@@ -7719,8 +7947,10 @@
goto err_uninit;

ret = netdev_register_kobject(dev);
-if (ret)
+if (ret) {
+dev->reg_state = NETREG_UNREGISTERED;
+goto err_uninit;
+}
dev->reg_state = NETREG_REGISTERED;

__netdev_update_features(dev);
@@ -7751,7 +7981,16 @@
ret = notifier_to_errno(ret);
if (ret) {
  rollback_registered(dev);
+  rcu_barrier();
+  dev->reg_state = NETREG_UNREGISTERED;
+  /* We should put the kobject that hold in
+     * netdev_unregister_kobject(), otherwise
+     * the net device cannot be freed when
+     * driver calls free_netdev(), because the
+     * kobject is being hold.
+     */
+  kobjett_put(&dev->dev.kobj);
} 
/*
 * Prevent userspace races by waiting until the network
 @@ -7804,6 +8043,9 @@
  set_bit(__LINK_STATE_PRESENT, &dev->state);
  set_bit(__LINK_STATE_START, &dev->state);
+/* napi_busy_loop stats accounting wants this */
+dev_net_set(dev, &init_net);
/* Note : We dont allocate pcpu_refcnt for dummy devices,  
* because users of this 'device' dont need to change  
* its refcount. 
@@ -7814,6 +8056,23 @@ 
EXPORT_SYMBOL_GPL(init_dummy_netdev);

+int dev_validate_mtu(struct net_device *dev, int new_mtu) 
+{ 
+/* MTU must be positive, and in range */ 
+if (new_mtu < 0 || new_mtu < dev->min_mtu) { 
+net_err_ratelimited("%s: Invalid MTU %d requested, hw min %d\n",
+ dev->name, new_mtu, dev->min_mtu); 
+return -EINVAL; 
+} 
+ 
+if (dev->max_mtu > 0 && new_mtu > dev->max_mtu) { 
+net_err_ratelimited("%s: Invalid MTU %d requested, hw max %d\n",
+ dev->name, new_mtu, dev->max_mtu); 
+return -EINVAL; 
+} 
+return 0; 
+} 
+
/** 
* register_netdev- register a network device 
*@dev: device to register 
@@ -7902,7 +8161,7 @@
refcnt = netdev_refcnt_read(dev);

- if (time_after(jiffies, warning_time + 10 * HZ)) { 
+if (refcnt & time_after(jiffies, warning_time + 10 * HZ)) { 
pr_emerg("unregister_netdevice: waiting for %s to become free. Usage count = %d\n", 
 dev->name, refcnt); 
warning_time = jiffies; 
@@ -8152,6 +8411,8 @@

dev->gso_max_size = GSO_MAX_SIZE;
 dev->gso_max_segs = GSO_MAX_SEGS;
 +dev->upper_level = 1;
 +dev->lower_level = 1;

INIT_LIST_HEAD(&dev->napi_list);
 INIT_LIST_HEAD(&dev->unreg_list);
@@ -8355,7 +8616,7 @@
int dev_change_net_namespace(struct net_device *dev, struct net *net, const char *pat)
{
    int err, new_nsid;
+    int err, new_nsid, new_ifindex;

    ASSERT_RTNL();

@@ -8381,7 +8642,8 @@
    /* We get here if we can't use the current device name */
    if (!pat)
        goto out;
-    if (dev_get_valid_name(net, dev, pat) < 0)
+    err = dev_get_valid_name(net, dev, pat);
+    if (err < 0)
        goto out;
    }

@@ -8393,7 +8655,6 @@
    dev_close(dev);

    /* And unlink it from device chain */
    -err = -ENODEV;
    unlist_netdevice(dev);

    synchronize_net();
@@ -8411,11 +8672,16 @@
    call_netdevice_notifiers(NETDEV_UNREGISTER, dev);
    rcu_barrier();
    call_netdevice_notifiers(NETDEV_UNREGISTER_FINAL, dev);
-    if (dev->rtnl_link_ops && dev->rtnl_link_ops->get_link_net)
-        new_nsid = peernet2id_alloc(dev_net(dev), net);
+    new_nsid = peernet2id_alloc(dev_net(dev), net, GFP_KERNEL);
+    /* If there is an ifindex conflict assign a new one */
+    if (__dev_get_by_index(net, dev->ifindex))
+        new_ifindex = dev_new_index(net);
    else
        -new_nsid = peernet2id(dev_net(dev), net);
-        rtmsg_ifinfo_newnet(RTM_DELLINK, dev, ~0U, GFP_KERNEL, &new_nsid);
+        new_ifindex = dev->ifindex;
+        rtmsg_ifinfo_newnet(RTM_DELLINK, dev, ~0U, GFP_KERNEL, &new_nsid,
+                            new_ifindex);

    /* Flush the unicast and multicast chains */
@@ -8429,10 +8695,7 @@
Actually switch the network namespace

/* If there is an ifindex conflict assign a new one */

/* Send a netdev-add uevent to the new namespace */

/* Leave virtual devices for the generic cleanup */

/* Push remaining network devices to init_net */

list_for_each_entry(ha, &list->list, list) {
  if (!memcmp(ha->addr, addr, addr_len) &&
    ha->type == addr_type) {
    if (ha->type == addr_type &&
      !memcmp(ha->addr, addr, addr_len)) {
      if (global) {
        /* check if addr is already used as global */
        if (ha->global_use)
          --- linux-4.15.0.orig/net/core/devlink.c
          +++ linux-4.15.0/net/core/devlink.c
          @@ -1031,7 +1031,7 @@
          err = ops->sb_occ_port_pool_get(devlink_port, devlink_sb->index,
            pool_index, &cur, &max);
          if (err && err != -EOPNOTSUPP)
            -return err;
            +goto sb_occ_get_failure;
          if (err) {
            if (nla_put_u32(msg, DEVLINK_ATTR_SB_OCC_CUR, cur))
              // some code
goto nla_put_failure;
@@ -1044,8 +1044,10 @@
 return 0;

 nla_put_failure:
+err = -EMSGSIZE;
 +sb_occ_get_failure:
 genlmsg_cancel(msg, hdr);
 -return -EMSGSIZE;
 +return err;
 }

 static int devlink_nl_cmd_sb_port_pool_get_doit(struct sk_buff *skb,
 @@ -1776,7 +1778,7 @@
 if (!nlh) {
 err = devlink_dpipe_send_and_alloc_skb(&skb, info);
 if (err)
- goto err_skb_send_alloc;
+ return err;
 goto send_done;
 }

 @@ -1785,7 +1787,6 @@
 nla_put_failure:
 err = -EMSGSIZE;
 err_table_put:
- err_skb_send_alloc:
 genlmsg_cancel(skb, hdr);
 nlmag_free(skb);
 return err;
@@ -2051,7 +2052,7 @@
 if (!nlh) {
 err = devlink_dpipe_send_and_alloc_skb(&skb, info);
 if (err)
 -goto err_skb_send_alloc;
+ return err;
 goto send_done;
 }

 //@ -1785,7 +1787,6 @@
 nla_put_failure:
 err = -EMSGSIZE;
 err_table_put:
- err_skb_send_alloc:
 genlmsg_cancel(skb, hdr);
 nlmag_free(skb);
 return err;
@@ -2051,7 +2052,7 @@
 if (!nlh) {
 err = devlink_dpipe_send_and_alloc_skb(&skb, info);
 if (err)
 -goto err_skb_send_alloc;
+ return err;
 goto send_done;
 }

 return genlmsg_reply(dump_ctx skb, info);
static int devlink_nl_cmd_dpipe_entries_get(struct sk_buff *skb,
@@ -2207,7 +2202,7 @@
            if (!nlh) {
                err = devlink_dpipe_send_and_alloc_skb(&skb, info);
            if (err)
-                goto err_skb_send_alloc;
+                return err;
            goto send_done;
        } return genlmsg_reply(skb, info);
@@ -2215,7 +2210,6 @@
        nla_put_failure:
            err = -EMSGSIZE;
        err_table_put:
-        err_skb_send_alloc:
            genlmsg_cancel(skb, hdr);
            nlmsg_free(skb);
            return err;
--- linux-4.15.0.orig/net/core/drop_monitor.c
+++ linux-4.15.0/net/core/drop_monitor.c
@@ -154,6 +154,7 @@
 static void trace_drop_common(struct sk_buff *skb, void *location)
 {
     struct net_dm_alert_msg *msg;
+    struct net_dm_drop_point *point;
     struct nlmsghdr *nlh;
     struct nlattr *nla;
     int i;
@@ -172,11 +173,13 @@
         nla = genlmsg_data(nlmsg_data(nlh));
         msg = nla_data(nla);
+        point = msg->points;
         for (i = 0; i < msg->entries; i++) {
             if (!memcmp(&location, &msg->points[i].pc, sizeof(void *))) {
                 -msg->points[i].count++;
+                point->count++;
                 goto out;
             }
+point++;
}
if (msg->entries == dm_hit_limit)
goto out;
@@ -185,8 +188,8 @@
/*
   __nla_reserve_nohdr(dskb, sizeof(struct net_dm_drop_point));
   nla->nla_len += NLA_ALIGN(sizeof(struct net_dm_drop_point));
-   memcpy(msg->points[msg->entries].pc, &location, sizeof(void *));
-   msg->points[msg->entries].count = 1;
+   memcpy(point->pc, &location, sizeof(void *));
+   point->count = 1;
   msg->entries++;

   if (!timer_pending(&data->send_timer)) {
      --- linux-4.15.0.orig/net/core/ethtool.c
      +++ linux-4.15.0/net/core/ethtool.c
      @@ -641,7 +641,7 @@
      { struct ethtool_link_usettings link_usettings;

         -memcpy(&link_usettings.base, &from->base, sizeof(link_usettings));
         +memcpy(&link_usettings, from, sizeof(link_usettings));
         bitmap_to_u32array(link_usettings.link_modes.supported,
         __ETHTOOL_LINK_MODE_MASK_NU32,
         from->link_modes.supported,
      @@ -906,8 +906,13 @@
         if (rc >= 0)
         info.n_priv_flags = rc;
         }
         -if (ops->get_regs_len)
         -info.regdump_len = ops->get_regs_len(dev);
         +if (ops->get_regs_len) {
         +int ret = ops->get_regs_len(dev);
         +
         +if (ret > 0)
         +info.regdump_len = ret;
         +}
         +
         if (ops->get_eeprom_len)
         info.eedump_len = ops->get_eeprom_len(dev);
      @@ -1408,6 +1413,9 @@
      return -EFAULT;

      reglen = ops->get_regs_len(dev);
      +if (reglen <= 0)
      +return reglen;
+ if (regs.len > reglen)
  regs.len = reglen;

@@ -1418,13 +1426,16 @@
 return -ENOMEM;
 }
 +if (regs.len < reglen)
+reglen = regs.len;
+ ops->get_regs(dev, &regs, regbuf);

 ret = -EFAULT;
 if (copy_to_user(useraddr, &regs, sizeof(regs)))
 goto out;
 useraddr += offsetof(struct ethtool_regs, data);
 -if (regbuf && copy_to_user(useraddr, regbuf, regs.len))
 +if (copy_to_user(useraddr, regbuf, reglen))
 goto out;
 ret = 0;

@@ -1455,11 +1466,13 @@
 static int ethtool_get_wol(struct net_device *dev, char __user *useraddr)
 {
 -struct ethtool_wolinfo wol = { .cmd = ETHTOOL_GWOL };
 +struct ethtool_wolinfo wol;

 if (!dev->ethtool_ops->get_wol)
 return -EOPNOTSUPP;

+memset(&wol, 0, sizeof(struct ethtool_wolinfo));
 +wol.cmd = ETHTOOL_GWOL;
 dev->ethtool_ops->get_wol(dev, &wol);

 if (copy_to_user(useraddr, &wol, sizeof(wol))
 @@ -1558,7 +1571,7 @@
 if (eeprom.offset + eeprom.len > total_len)
 return -EINVAL;

 -data = kmalloc(PAGE_SIZE, GFP_USER);
 +data = kzalloc(PAGE_SIZE, GFP_USER);
 if (!data)
 return -ENOMEM;

@@ -1623,7 +1636,7 @@
 if (eeprom.offset + eeprom.len > ops->get_eeprom_len(dev))
static int ethtool_set_ringparam(struct net_device *dev, void __user *useraddr)
{
    struct ethtool_ringparam ringparam, max = { .cmd = ETHTOOL_GRINGPARAM };

    if (!dev->ethtool_ops->set_ringparam)
        if (!dev->ethtool_ops->set_ringparam || !dev->ethtool_ops->get_ringparam)
            return -EOPNOTSUPP;

    if (copy_from_user(&ringparam, useraddr, sizeof(ringparam)))
        return -EFAULT;

    dev->ethtool_ops->get_ringparam(dev, &max);
    /* ensure new ring parameters are within the maximums */
    if (ringparam.rx_pending > max.rx_max_pending \\
        || ringparam.rx_mini_pending > max.rx_mini_max_pending \\
        || ringparam.rx_jumbo_pending > max.rx_jumbo_max_pending \\
        || ringparam.tx_pending > max.tx_max_pending)
        return -EINVAL;

    return dev->ethtool_ops->set_ringparam(dev, &ringparam);
}

return -EINVAL;

-data = kmalloc(PAGE_SIZE, GFP_USER);
+data = kzalloc(PAGE_SIZE, GFP_USER);
if (!data)
    return -ENOMEM;

-test.len = test_len;
-data = kmalloc(test_len * sizeof(u64), GFP_USER);
+data = kcalloc(test_len, sizeof(u64), GFP_USER);
if (!data)
    return -ENOMEM;

WARN_ON_ONCE(!ret);

gstrings.len = ret;
-data = vzalloc(gstrings.len * ETH_GSTRING_LEN);
+if (gstrings.len && !data)

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return -EINVAL;

-data = kmalloc(PAGE_SIZE, GFP_USER);
+data = kzalloc(PAGE_SIZE, GFP_USER);
if (!data)
    return -ENOMEM;

@g@  -1692,14 +1705,23 @@

static int ethtool_set_ringparam(struct net_device *dev, void __user *useraddr)
{
    struct ethtool_ringparam ringparam, max = { .cmd = ETHTOOL_GRINGPARAM };

    if (!dev->ethtool_ops->set_ringparam)
        if (!dev->ethtool_ops->set_ringparam || !dev->ethtool_ops->get_ringparam)
            return -EOPNOTSUPP;

    if (copy_from_user(&ringparam, useraddr, sizeof(ringparam)))
        return -EFAULT;

    dev->ethtool_ops->get_ringparam(dev, &max);
    /* ensure new ring parameters are within the maximums */
    if (ringparam.rx_pending > max.rx_max_pending \\
        || ringparam.rx_mini_pending > max.rx_mini_max_pending \\
        || ringparam.rx_jumbo_pending > max.rx_jumbo_max_pending \\
        || ringparam.tx_pending > max.tx_max_pending)
        return -EINVAL;

    return dev->ethtool_ops->set_ringparam(dev, &ringparam);
}

@g@  -1795,7 +1817,7 @@

return -EFAULT;

-test.len = test_len;
-data = kmalloc(test_len * sizeof(u64), GFP_USER);
+data = kcalloc(test_len, sizeof(u64), GFP_USER);
if (!data)
    return -ENOMEM;

@g@  -1831,11 +1853,15 @@

WARN_ON_ONCE(!ret);

-gstrings.len = ret;
-data = vzalloc(gstrings.len * ETH_GSTRING_LEN);
+if (gstrings.len && !data)
-return -ENOMEM;
+if (gstrings.len) {
+  data = vzalloc(gstrings.len * ETH_GSTRING_LEN);
+  if (!data)
+    return -ENOMEM;
+return -ENOMEM;

-__ethtool_get_strings(dev, gstrings.string_set, data);
+__ethtool_get_strings(dev, gstrings.string_set, data);
+} else {
+  data = NULL;
+
}

ret = -EFAULT;
if (copy_to_user(useraddr, &gstrings, sizeof(gstrings)))
  @ @ -1931,11 +1957,14 @@
return -EFAULT;

stats.n_stats = n_stats;
-data = vzalloc(n_stats * sizeof(u64));
-if (n_stats && !data)
-  return -ENOMEM;
-
-ops->get_ethtool_stats(dev, &stats, data);
+if (n_stats) {
+  data = vzalloc(n_stats * sizeof(u64));
+  if (!data)
+    return -ENOMEM;
+  ops->get_ethtool_stats(dev, &stats, data);
+} else {
+  data = NULL;
+
}

ret = -EFAULT;
if (copy_to_user(useraddr, &stats, sizeof(stats)))
  @ @ -1971,13 +2000,17 @@
return -EFAULT;

stats.n_stats = n_stats;
-data = vzalloc(n_stats * sizeof(u64));
-if (n_stats && !data)
-  return -ENOMEM;
-
+mutex_lock(&phydev->lock);
-phydev->drv->get_stats(phydev, &stats, data);
mutex_unlock(&phydev->lock);
+mutex_lock(&phydev->lock);
+phydev->drv->get_stats(phydev, &stats, data);
+mutex_unlock(&phydev->lock);
+} else {
+data = NULL;
+
+}

ret = -EFAULT;
if (copy_to_user(useraddr, &stats, sizeof(stats)))
@@ -2294,7 +2327,7 @@
ret = ethtool_tunable_valid(&tuna);
if (ret)
return ret;
-data = kmalloc(tuna.len, GFP_USER);
+data = kzalloc(tuna.len, GFP_USER);
if (!data)
return -ENOMEM;
ret = ops->get_tunable(dev, &tuna, data);
@@ -2335,9 +2368,10 @@
return ret;
}

-static int ethtool_get_per_queue_coalesce(struct net_device *dev,
-  void __user *useraddr,
-  struct ethtool_per_queue_op *per_queue_opt)
+static noinline_for_stack int
+ethtool_get_per_queue_coalesce(struct net_device *dev,
+    void __user *useraddr,
+    struct ethtool_per_queue_op *per_queue_opt)
{
  u32 bit;
  int ret;
@@ -2367,9 +2401,10 @@
return 0;
}

-static int ethtool_set_per_queue_coalesce(struct net_device *dev,
-  void __user *useraddr,
-  struct ethtool_per_queue_op *per_queue_opt)
+static noinline_for_stack int
+ethtool_set_per_queue_coalesce(struct net_device *dev,
+    void __user *useraddr,
+    struct ethtool_per_queue_op *per_queue_opt)
{
  u32 bit;
  int i, ret = 0;
@@ -2426,13 +2461,17 @@


return ret;
}

+static int noinline_for_stack ethtool_set_per_queue(struct net_device *dev,
+ void __user *useraddr, u32 sub_cmd)
{ structs ethtool_per_queue_op per_queue_opt;

if (copy_from_user(&per_queue_opt, useraddr, sizeof(per_queue_opt)))
return -EFAULT;

+if (per_queue_opt.sub_command != sub_cmd)
+return -EINVAL;
+
s switch (per_queue_opt.sub_command) {
+ case ETHTOOL_GCOALESCE:
+ return ethtool_get_per_queue_coalesce(dev, useraddr, &per_queue_opt);
@@ -2473,7 +2512,7 @@
+ ret = ethtool_phy_tunable_valid(&tuna);
+ if (ret)
+ return ret;
-data = kmalloc(tuna.len, GFP_USER);
-data = kzalloc(tuna.len, GFP_USER);
+ if (!data)
+ return -ENOMEM;
+ mutex_lock(&phydev->lock);
@@ -2521,11 +2560,14 @@
static int ethtool_get_fecparam(struct net_device *dev, void __user *useraddr)
{ struct ethtool_fecparam fecparam = { ETHTOOL_GFECPARAM };
+ int rc;

+ if (!dev->ethtool_ops->get_fecparam)
+ return -EOPNOTSUPP;
-dev->ethtool_ops->get_fecparam(dev, &fecparam);
+rc = dev->ethtool_ops->get_fecparam(dev, &fecparam);
+if (rc)
+ return rc;
+}

if (copy_to_user(useraddr, &fecparam, sizeof(fecparam)))
return -EFAULT;
@@ -2585,6 +2627,7 @@
case ETHTOOL_GPHYSTATS:
case ETHTOOL_GTMS:
case ETHTOOL_GPERMADDR:
case ETHTOOL_GUFO:
case ETHTOOL_GGSO:
    case ETHTOOL_GGRO:
    case ETHTOOL_GFLAGS:
        rc = ethtool_get_phy_stats(dev, useraddr);
        break;
    case ETHTOOL_PERQUEUE:
        rc = ethtool_set_per_queue(dev, useraddr);
        break;
    case ETHTOOL_GLINKSETTINGS:
        rc = ethtool_get_link_ksettings(dev, useraddr);
        --- linux-4.15.0.orig/net/core/fib_rules.c
        +++ linux-4.15.0/net/core/fib_rules.c
        @@ -802,7 +802,7 @@
        frh = nlmsg_data(nlh);
        frh->family = ops->family;
        -frh->table = rule->table;
        +frh->table = rule->table < 256 ? rule->table : RT_TABLE_COMPAT;
        if (nla_put_u32(skb, FRA_TABLE, rule->table))
            goto nla_put_failure;
        if (nla_put_u32(skb, FRA_SUPPRESS_PREFIXLEN, rule->suppress_prefixlen))
            @@ -931,7 +931,7 @@
            }
            struct net *net;
            struct sk_buff *skb;
            -int err = -ENOBUFS;
            +int err = -ENOMEM;
            net = ops->fro_net;
            skb = nlmsg_new(fib_rule_nlmsg_size(ops, rule), GFP_KERNEL);
            --- linux-4.15.0.orig/net/core/filter.c
            +++ linux-4.15.0/net/core/filter.c
            @@ -459,8 +459,15 @@
            if (fp->code == (BPF_ALU | BPF_DIV | BPF_X) ||
                fp->code == (BPF_ALU | BPF_MOD | BPF_X)) {
                *insn++ = BPF_MOV32_REG(BPF_REG_X, BPF_REG_X);
                +/* Error with exception code on div/mod by 0.
                    + * For cBPF programs, this was always return 0.
                    + */
                    +*insn++ = BPF_JMP_IMM(BPF_JNE, BPF_REG_X, 0, 2);
                    +*insn++ = BPF_ALU32_REG(BPF_XOR, BPF_REG_A, BPF_REG_A);
                    +*insn++ = BPF_EXIT_INSN();
                    +}
*insn = BPF_RAW_INSN(fp->code, BPF_REG_A, BPF_REG_X, 0, fp->k);
break;
@@ -473,11 +480,18 @@
#define BPF.Emit_JMP							/
    do { /
+    const s32 off_min = S16_MIN, off_max = S16_MAX; /
+    +s32 off; /
+    +
    if (target >= len || target < 0) /
    goto err; /
    -insn->off = addrs ? addrs[target] - addrs[i] - 1 : 0; /
+    -off = addrs ? addrs[target] - addrs[i] - 1 : 0; /
    /* Adjust pc relative offset for 2nd or 3rd insn. */ /
    -insn->off -= insn - tmp_insns; /
+    +off -= insn - tmp_insns; /
    +/* Reject anything not fitting into insn->off. */ /
    +if (off < off_min || off > off_max) /
    +goto err; /
    +insn->off = off; /
    } while (0)

    case BPF_JMP | BPF_JA:
@@ -1704,6 +1718,7 @@
    skb->dev = dev;
    skb->tstamp = 0;

    __this_cpu_inc(xmit_recursion);
    ret = dev_queue_xmit(skb);
    @@ -1715,18 +1730,19 @@
 static int __bpf_redirect_no_mac(struct sk_buff *skb, struct net_device *dev, u32 flags)
 {
    /* skb->mac_len is not set on normal egress */
    unsigned int mlen = skb->network_header - skb->mac_header;
    +unsigned int mlen = skb_network_offset(skb);
    +if (mlen) {
    +__skb_pull(skb, mlen);
    +if (mlen) {
    +__skb_pull(skb, mlen);
    */ At ingress, the mac header has already been pulled once.
    - * At egress, skb_pospull_rcsum has to be done in case that
    - * the skb is originated from ingress (i.e. a forwarded skb)
    - * to ensure that rcsum starts at net header.
-*/
-if (!skb_at_tc_ingress(skb))
 skb_postpull_rcsum(skb, skb_mac_header(skb), mlen);
+// At ingress, the mac header has already been pulled once.
+ // At egress, skb_pospull_rcsum has to be done in case that
+ // the skb is originated from ingress (i.e. a forwarded skb)
+ // to ensure that rcsum starts at net header.
+ */
+if (!skb_at_tc_ingress(skb))
+skb_postpull_rcsum(skb, skb_mac_header(skb), mlen);
+
 skb_pop_mac_header(skb);
 skb_reset_mac_len(skb);
 return flags & BPF_F_INGRESS ?
@@ -2279,17 +2295,14 @@
 return 0;
 }

-#define BPF_SKB_MAX_LEN SKB_MAX_ALLOC
 static int bpf_skb_adjust_net(struct sk_buff *skb, s32 len_diff)
 {
-bool trans_same = skb->transport_header == skb->network_header;
 u32 len_cur, len_diff_abs = abs(len_diff);
 u32 len_min = bpf_skb_net_base_len(skb);
-+u32 len_max = __bpf_skb_max_len(skb);
+u32 len_max = BPF_SKB_MAX_LEN;
 __be16 proto = skb->protocol;
 bool shrink = len_diff < 0;
 int ret;
@@ -2368,7 +2381,7 @@
 BPF_CALL_3(bpf_skb_change_tail, struct sk_buff *, skb, u32, new_len,
 u64, flags)
 { 
-+u32 max_len = __bpf_skb_max_len(skb);
-+u32 min_len = __bpf_skb_min_len(skb);
 int ret;
@@ -2419,7 +2432,7 @@
 BPF_CALL_3(bpf_skb_change_head, struct sk_buff *, skb, u32, head_room,
 u64, flags)
 { 
-+u32 max_len = __bpf_skb_max_len(skb);
+u32 max_len = BPF_SKB_MAX_LEN;
u32 new_len = skb->len + head_room;
int ret;

@@ -2441,6 +2454,7 @@
          __skb_push(skb, head_room);
          memset(skb->data, 0, head_room);
          skb_reset_mac_header(skb);
+         skb_reset_mac_len(skb);
     }

     bpf_compute_data_pointers(skb);
@@ -3204,10 +3218,12 @@ /* Only some socketops are supported */
     switch (optname) {
         case SO_RCVBUF:  
+            val = min_t(u32, val, sysctl_rmem_max);  
            sk->sk_userlocks |= SOCK_RCVBUF_LOCK;
            sk->sk_rcvbuf = max_t(int, val * 2, SOCK_MIN_RCVBUF);  
            break;
         case SO_SNDBUF:  
+            val = min_t(u32, val, sysctl_wmem_max);  
            sk->sk_userlocks |= SOCK_SNDBUF_LOCK;
            sk->sk_sndbuf = max_t(int, val * 2, SOCK_MIN_SNDBUF);  
            break;
@@ -3225,7 +3241,10 @@  
             sk->sk_rcvlowat = val ? : 1;  
             break;
         case SO_MARK:  
-            sk->sk_mark = val;  
+            if (sk->sk_mark != val) {  
+              sk->sk_mark = val;  
+              sk_dst_reset(sk);  
+            }
             break;
         default:  
             ret = -EINVAL;
@@ -3240,7 +3259,8 @@
             strncpy(name, optval, min_t(long, optlen,
                 TCP_CA_NAME_MAX-1));
             name[TCP_CA_NAME_MAX-1] = 0;
-            ret = tcp_set_congestion_control(sk, name, false, reinit);
+            ret = tcp_set_congestion_control(sk, name, false,
+                                             true);  
             } else {
             struct tcp_sock *tp = tcp_sk(sk);
@@ -3251,7 +3271,7 @@
/* Only some options are supported */
switch (optname) {
    case TCP_BPF_IW:
        -if (val <= 0 || tp->data_segs_out > 0)
        +if (val <= 0 || tp->data_segs_out > tp->syn_data)
            ret = -EINVAL;
        else
            tp->snd_cwnd = val;
        --- linux-4.15.0.orig/net/core/flow_dissector.c
        +++ linux-4.15.0/net/core/flow_dissector.c
@@ -548,9 +548,10 @@
        nhoff = skb_network_offset(skb);
        hlen = skb_headlen(skb);
        #if IS_ENABLED(CONFIG_NET_DSA)
@@ -614,8 +615,10 @@
            key_control->addr_type = FLOW_DISSECTOR_KEY_IPV4_ADDRS;
        } }
@@ -664,8 +667,10 @@
            key_control->addr_type = FLOW_DISSECTOR_KEY_IPV6_ADDRS;
        } }
-if (dissector_uses_key(flow_dissector, FLOW_DISSECTOR_KEY_PORTS)) {
+    if (dissector_uses_key(flow_dissector, FLOW_DISSECTOR_KEY_PORTS) &&
+         !(key_control->flags & FLOW_DIS_IS_FRAGMENT)) {
key_ports = skb_flow_dissector_target(flow_dissector, FLOW_DISSECTOR_KEY_PORTS, target_container);
}

EXPORT_SYMBOL(__skb_flow_dissect);

-static u32 hashrnd __read_mostly;
+static siphash_key_t hashrnd __read_mostly;

static __always_inline void __flow_hash_secret_init(void)
{
    net_get_random_once(&hashrnd, sizeof(hashrnd));
}

-static __always_inline u32 __flow_hash_words(const u32 *words, u32 length,
-        u32 keyval)
+static const void *flow_keys_hash_start(const struct flow_keys *flow)
{
    return jhash2(words, length, keyval);
-}
-
-static inline const u32 *flow_keys_hash_start(const struct flow_keys *flow)
-{
-    const void *p = flow;
-    
-    -BUILD_BUG_ON(FLOW_KEYS_HASH_OFFSET % sizeof(u32));
-    return (const u32 *)(p + FLOW_KEYS_HASH_OFFSET);
+BUILD_BUG_ON(FLOW_KEYS_HASH_OFFSET % SIPHASH_ALIGNMENT);
+    return &flow->FLOW_KEYS_HASH_START_FIELD;
    
}

static inline size_t flow_keys_hash_length(const struct flow_keys *flow)
{
    -size_t diff = FLOW_KEYS_HASH_OFFSET + sizeof(flow->addr);
    -BUILD_BUG_ON(sizeof(*flow) - FLOW_KEYS_HASH_OFFSET) % sizeof(u32));
    -BUILD_BUG_ON(offsetof(typeof(*flow), addr) !=
        - sizeof(*flow) - sizeof(flow->addr));
+size_t len = offsetof(typeof(*flow), addr) - FLOW_KEYS_HASH_OFFSET;


switch (flow->control.addr_type) {
  case FLOW_DISSECTOR_KEY_IPV4_ADDRS:
    -diff -= sizeof(flow->addrs.v4addr);
    +len += sizeof(flow->addrs.v4addr);
    break;
  case FLOW_DISSECTOR_KEY_IPV6_ADDRS:
    -diff -= sizeof(flow->addrs.v6addr);
    +len += sizeof(flow->addrs.v6addr);
    break;
  case FLOW_DISSECTOR_KEY_TIPC:
    -diff -= sizeof(flow->addrs.tipckey);
    +len += sizeof(flow->addrs.tipckey);
    break;
}

- return (sizeof(*flow) - diff) / sizeof(u32);
+ return len;
}

__be32 flow_get_u32_src(const struct flow_keys *flow)
@@ -1093,14 +1087,15 @@
}

- static inline u32 __flow_hash_from_keys(struct flow_keys *keys, u32 keyval)
+ static inline u32 __flow_hash_from_keys(struct flow_keys *keys, 
+ const siphash_key_t *keyval)
{
  u32 hash;

  __flow_hash_consistentify(keys);

  - hash = __flow_hash_words(flow_keys_hash_start(keys),
- flow_keys_hash_length(keys), keyval);
+ hash = siphash(flow_keys_hash_start(keys),
+ flow_keys_hash_length(keys), keyval);
  if (!hash)
    hash = 1;

@@ -1110,12 +1105,13 @@
 u32 flow_hash_from_keys(struct flow_keys *keys)
{
  __flow_hash_secret_init();
- return __flow_hash_from_keys(keys, hashrnd);
+ return __flow_hash_from_keys(keys, &hashrnd);
} 
EXPORT_SYMBOL(flow_hash_from_keys);

 static inline u32 ___skb_get_hash(const struct sk_buff *, struct flow_keys *keys)
- struct flow_keys *keys, u32 keyval)
+ struct flow_keys *keys,
+ const siphash_key_t *keyval)
{
    skb_flow_dissect_flow_keys(skb, keys,
        FLOW_DISSECTOR_F_STOP_AT_FLOW_LABEL);
    skb_flow_dissect_flow_keys(skb, keys,
        FLOW_DISSECTOR_F_STOP_AT_FLOW_LABEL);

    return __flow_hash_from_keys(&keys, hashrnd);
+ return __flow_hash_from_keys(&keys, &hashrnd);
}
EXPORT_SYMBOL_GPL(__skb_get_hash_symmetric);

@@ -1163,7 +1159,7 @@

    return __flow_hash_from_keys(&keys, hashrnd);
+ return __flow_hash_from_keys(&keys, &hashrnd);
}
EXPORT_SYMBOL_GPL(__skb_get_hash_symmetric);

@@ -1183,13 +1179,14 @@

    hash = ___skb_get_hash(skb, &keys, hashrnd);
+ hash = ___skb_get_hash(skb, &keys, &hashrnd);

    __skb_set_sw_hash(skb, hash, flow_keys_have_l4(&keys));
}
EXPORT_SYMBOL(__skb_get_hash);

-__u32 skb_get_hash_perturb(const struct sk_buff *skb, u32 perturb)
+__u32 skb_get_hash_perturb(const struct sk_buff *skb,
+    const siphash_key_t *perturb)
{
    struct flow_keys keys;

    keys->ports.src = fl6->fl6_sport;
    keys->ports.dst = fl6->fl6_dport;
    keys->keyid.keyid = fl6->fl6_gre_key;
-    keys->tags.flow_label = (__force u32)fl6->flowlabel;
+    keys->tags.flow_label = (__force u32)flowi6_get_flowlabel(fl6);
    keys->basic.ip_proto = fl6->flowi6_proto;

    return flow_hash_from_keys(keys);
--- linux-4.15.0.orig/net/core/gen_estimator.c
+++ linux-4.15.0/net/core/gen_estimator.c
@@ -66,6 +66,7 @@

 static void est_fetch_counters(struct net_rate_estimator *e,
    struct gnet_stats_basic_packed *b)
{
+    memset(b, 0, sizeof(*b));
if (e->stats_lock)
spin_lock(e->stats_lock);

@@ -83,11 +84,11 @@

u64 rate, brate;

est_fetch_counters(est, &b);
-brate = (b.bytes - est->last_bytes) << (10 - est->ewma_log - est->intvl_log);
-brate -= (est->avbps >> est->ewma_log);
+brate = (b.bytes - est->last_bytes) << (10 - est->intvl_log);
+brate = (brate >> est->ewma_log) - (est->avbps >> est->ewma_log);

-rate = (u64)(b.packets - est->last_packets) << (10 - est->ewma_log - est->intvl_log);
-rate -= (est->avpps >> est->ewma_log);
+rate = (rate >> est->ewma_log) - (est->avpps >> est->ewma_log);

write_seqcount_begin(&est->seq);
est->avbps += brate;
@@ -146,6 +147,9 @@
if (parm->interval < -2 || parm->interval > 3)
return -EINVAL;

+if (parm->ewma_log == 0 || parm->ewma_log >= 31)
+return -EINVAL;
+
est = kzalloc(sizeof(*est), GFP_KERNEL);
if (!est)
return -ENOBUFS;
@@ -159,7 +163,11 @@
est->intvl_log = intvl_log;
est->cpu_bstats = cpu_bstats;

+if (stats_lock)
+local_bh_disable();
est_fetch_counters(est, &b);
+if (stats_lock)
+local_bh_enable();
est->last_bytes = b.bytes;
est->last_packets = b.packets;
old = rcu_dereference_protected(*rate_est, 1);
--- linux-4.15.0.orig/net/core/gen_stats.c
+++ linux-4.15.0/net/core/gen_stats.c
@@ -77,8 +77,20 @@
d->lock = lock;
spin_lock_bh(lock);
} }
-if (d->tail)
-return gnet_stats_copy(d, type, NULL, 0, padattr);
+if (d->tail) {
+int ret = gnet_stats_copy(d, type, NULL, 0, padattr);
+
+/* The initial attribute added in gnet_stats_copy() may be
+ * preceded by a padding attribute, in which case d->tail will
+ * end up pointing at the padding instead of the real attribute.
+ * Fix this so gnet_stats_finish_copy() adjusts the length of
+ * the right attribute.
+ */
+if (ret == 0 && d->tail->nla_type == padattr)
+d->tail = (struct nlattr*)((char*)d->tail +
+ NLA_ALIGN(d->tail->nla_len));
+return ret;
+
return 0;
}
--- linux-4.15.0.orig/net/core/gro_cells.c
+++ linux-4.15.0/net/core/gro_cells.c
@@ -13,22 +13,36 @@
{
struct net_device *dev = skb->dev;
struct gro_cell *cell;
+int res;

-if (!gcells->cells || skb_cloned(skb) || netif_elide_gro(dev))
-return netif_rx(skb);
+rcu_read_lock();
+if (unlikely(!(dev->flags & IFF_UP)))
+goto drop;
+
+if (!gcells->cells || skb_cloned(skb) || netif_elide_gro(dev)) {
+res = netif_rx(skb);
+goto unlock;
+
+cell = this_cpu_ptr(gcells->cells);

if (skb_queue_len(&cell->napi_skbs) > netdev_max_backlog) {
+drop:
atomic_long_inc(&dev->rx_dropped);
kfree_skb(skb);
-return NET_RX_DROP;
+res = NET_RX_DROP;
+goto unlock;
}
__skb_queue_tail(&cell->napi_skbs, skb);
if (skb_queue_len(&cell->napi_skbs) == 1)
napi_schedule(&cell->napi);
- return NET_RX_SUCCESS;
+ res = NET_RX_SUCCESS;
+ unlock:
+ rcu_read_unlock();
+ return res;
}
break;
}

+local_bh_enable();
preempt_enable();

return ret;
@@ -217,7 +218,7 @@
if (!tb[LWT_BPF_PROG_FD] || !tb[LWT_BPF_PROG_NAME])
return -EINVAL;
-prog->name = nla_memdup(tb[LWT_BPF_PROG_NAME], GFP_KERNEL);
+prog->name = nla_memdup(tb[LWT_BPF_PROG_NAME], GFP_ATOMIC);
if (!prog->name)
return -ENOMEM;

--- linux-4.15.0.orig/net/core/neighbour.c
+++ linux-4.15.0/net/core/neighbour.c
@@ -18,6 +18,7 @@
#define pr_fmt(fmt) KBUILD_MODNAME": " fmt

#include <linux/slab.h>
+#include <linux/kmemleak.h>
#include <linux/types.h>
#include <linux/kernel.h>
#include <linux/module.h>
@@ -30,6 +31,7 @@
#include <linux/times.h>
#include <net/net_namespace.h>
#include <net/neighbour.h>
+#include <net/arp.h>
#include <net/dst.h>
#include <net/sock.h>
#include <net/netevent.h>
@@ -55,7 +57,8 @@
static void __neigh_notify(struct neighbour *n, int type, int flags,
u32 pid);
static void neigh_update_notify(struct neighbour *neigh, u32 nlmsg_pid);
-static int pneigh_ifdown(struct neigh_table *tbl, struct net_device *dev);
+static int pneigh_ifdown_and_unlock(struct neigh_table *tbl,
+ struct net_device *dev);

#ifdef CONFIG_PROC_FS
static const struct file_operations neigh_stat_seq_fops;
@@ -291,8 +294,7 @@
{
write_lock_bh(&tbl->lock);
neigh_flush_dev(tbl, dev);
- pneigh_ifdown(tbl, dev);
- write_unlock_bh(&tbl->lock);
+pneigh_ifdown_and_unlock(tbl, dev);

del_timer_sync(&tbl->proxy_timer);
pneigh_queue_purge(&tbl->proxy_queue);
@@ -360,12 +362,14 @@
ret = kmalloc(sizeof(*ret), GFP_ATOMIC);
if (!ret)
    return NULL;
-if (size <= PAGE_SIZE)
+if (size <= PAGE_SIZE) {
    buckets = kzalloc(size, GFP_ATOMIC);
-else
+} else {
    buckets = (struct neighbour __rcu **)
        __get_free_pages(GFP_ATOMIC | __GFP_ZERO,
            get_order(size));
+kmemleak_alloc(buckets, size, 1, GFP_ATOMIC);
+}
if (!buckets) {
    kfree(ret);
    return NULL;
@@ -385,10 +389,12 @@
    size_t size = (1 << nht->hash_shift) * sizeof(struct neighbour *);
    struct neighbour __rcu **buckets = nht->hash_buckets;

-if (size <= PAGE_SIZE)
+if (size <= PAGE_SIZE) {
    kfree(buckets);
-else
+} else {
    +kmemleak_free(buckets);
    free_pages((unsigned long)buckets, get_order(size));
+}
    kfree(nht);
}

@@ -681,9 +687,10 @@
    return -ENOENT;
    }

-static int pneigh_ifdown(struct neigh_table *tbl, struct net_device *dev)
+static int pneigh_ifdown_and_unlock(struct neigh_table *tbl,
    + struct net_device *dev)
    {
    -struct pneigh_entry *n, **np;
    +struct pneigh_entry *n, **np, *freelist = NULL;
for (h = 0; h <= PNEIGH_HASHMASK; h++) {
    while ((n = *np) != NULL) {
        if (!dev || n->dev == dev) {
            *np = n->next;
            if (tbl->pdestructor)
                tbl->pdestructor(n);
            if (n->dev)
                dev_put(n->dev);
            kfree(n);
            +n->next = freelist;
            +freelist = n;
            continue;
        }
        np = &n->next;
    }
    +write_unlock_bh(&tbl->lock);
    while ((n = freelist)) {
        freelist = n->next;
        +n->next = NULL;
        if (tbl->pdestructor)
            tbl->pdestructor(n);
        if (n->dev)
            dev_put(n->dev);
        kfree(n);
    }
    return -ENOENT;
}

atomic_set(&neigh->probes,
    NEIGH_VAR(neigh->parms, UCAST_PROBES));
+neigh_del_timer(neigh);
neigh->nud_state = NUD_INCOMPLETE;
neigh->updated = now;
nex t = now + max(NEIGH_VAR(neigh->parms, RETRANS_TIME),
    @ @ -1025,6 +1040,7 @ @
} else if (neigh->nud_state & NUD_STALE) {
    neigh_dbg(2, "neigh %p is delayed\n", neigh);
    +neigh_del_timer(neigh);
    neigh->nud_state = NUD_DELAY;
    neigh->updated = jiffies;
    neigh_add_timert(neigh, jiffies +
}
if (update) {
    hh = &neigh->hh;
    if (hh->hh_len) {
        if (READ_ONCE(hh->hh_len)) {
            write_seqlock_bh(&hh->hh_lock);
            update(hh, neigh->dev, neigh->ha);
            write_sequnlock_bh(&hh->hh_lock);
        }
    }
}

/* Update confirmed timestamp for neighbour entry after we
 * received ARP packet even if it doesn't change IP to MAC binding.
 */
+if (new & NUD_CONNECTED)
+    neigh->confirmed = jiffies;
+
/* If entry was valid and address is not changed,
   do not change entry state, if new one is STALE.
 */
@@ -1187,15 +1209,12 @@
}
}

/* Update timestamps only once we know we will make a change to the
 */
/* Update timestamp only once we know we will make a change to the
 * neighbour entry. Otherwise we risk to move the locktime window with
 * noop updates and ignore relevant ARP updates.
 */
-@ -1247,7 +1266,7 @@
-    if (new != old || lladdr != neigh->ha) {
-        neigh->confirmed = jiffies;
+    if (new != old || lladdr != neigh->ha)
+        neigh->updated = jiffies;
-    }
-
    if (new != old) {
        neigh_del_timer(neigh);
        n2 = NULL;
        if (dst) {
            +if (dst && dst->obsolete != DST_OBSOLETE_DEAD) {
                n2 = dst_neigh_lookup_skb(dst, skb);
                if (n2)
n1 = n2;
@@ -1336,7 +1355,7 @@
struct net_device *dev = neigh->dev;
unsigned int seq:

-if (dev->header_ops->cache && !neigh->hh.hh_len)
+if (dev->header_ops->cache && !READ_ONCE(neigh->hh.hh_len))
  neigh_hh_init(neigh);

do {
  goto nla_put_failure;
}
@@ -1858,8 +1877,8 @@
  
  long flush_delta = now - tbl->last_flush;
  long rand_delta = now - tbl->last_rand;
-struct neigh_hash_table *nht;
+struct neigh_hash_table *nht;
 struct ndt_config ndc = {
   .ndtc_key_len = tbl->key_len,
  @@ -2323,12 +2342,16 @@
  err = nlmsg_parse(nlh, sizeof(struct ndmsg), tb, NDA_MAX, NULL, NULL);
  if (!err) {
    if (tb[NDA_IFINDEX])
-      if (tb[NDA_IFINDEX])
+      if (tb[NDA_IFINDEX]) {
+        if (nla_len(tb[NDA_IFINDEX]) != sizeof(u32))
+          return -EINVAL;
+        filter_idx = nla_get_u32(tb[NDA_IFINDEX]);
+      }
    -if (tb[NDA_MASTER])
    +}
+if (tb[NDA_MASTER]) {
+  if (nla_len(tb[NDA_MASTER]) != sizeof(u32))
+    return -EINVAL;
    filter_master_idx = nla_get_u32(tb[NDA_MASTER]);
    +}
    if (filter_idx || filter_master_idx)
      flags |= NLM_F_DUMP_FILTERED;
  }
  @@ -2513,7 +2536,13 @@
  if (!tbl)
    goto out;
  rcu_read_lock_bh();
-  neigh = __neigh_lookup_noref(tbl, addr, dev);
+  if (index == NEIGH_ARP_TABLE) {
+u32 key = *((u32 *)addr);
+
+neigh = __ipv4_neigh_lookup_noref(dev, key);
+} else {
+neigh = __neigh_lookup_noref(tbl, addr, dev);
+}
if (!neigh)
neigh = __neigh_create(tbl, addr, dev, false);
err = PTR_ERR(neigh);
@@ -2721,6 +2750,7 @@
}

void *neigh_seq_start(struct seq_file *seq, loff_t *pos, struct neigh_table *tbl, unsigned int neigh_seq_flags)
+__acquires(tbl->lock)
+__acquires(rcu_bh)
{
  struct neigh_seq_state *state = seq->private;
  @@ -2731,6 +2761,7 @@
        rcu_read_lock_bh();
        state->nht = rcu_dereference_bh(tbl->nht);
        +read_lock(&tbl->lock);

        return *pos ? neigh_get_idx_any(seq, pos) : SEQ_START_TOKEN;
  }
@@ -2764,8 +2795,13 @@
EXPORT_SYMBOL(neigh_seq_next);

void neigh_seq_stop(struct seq_file *seq, void *v)
+__releases(tbl->lock)
+__releases(rcu_bh)
{
+struct neigh_seq_state *state = seq->private;
+struct neigh_table *tbl = state->tbl;
+read_unlock(&tbl->lock);
  rcu_read_unlock_bh();
}
EXPEORT_SYMBOL(neigh_seq_stop);
@@ -2800,6 +2836,7 @@
        *pos = cpu+1;
        return per_cpu_ptr(tbl->stats, cpu);
    }
+(*pos)++;
    return NULL;
}

--- linux-4.15.0.orig/net/core/net-sysfs.c
### linux-4.15.0/net/core/net-sysfs.c

```c
@@ -295,10 +295,31 @@
struct net_device *netdev = to_net_dev(dev);

return sprintf(buf, fmt_dec,
    - atomic_read(&netdev->carrier_changes));
+ atomic_read(&netdev->carrier_up_count) +
+ atomic_read(&netdev->carrier_down_count));
}
static DEVICE_ATTR_RO(carrier_changes);

+static ssize_t carrier_up_count_show(struct device *dev,
+    struct device_attribute *attr,
+    char *buf)
+{
+struct net_device *netdev = to_net_dev(dev);
+ return sprintf(buf, fmt_dec, atomic_read(&netdev->carrier_up_count));
+}
+static DEVICE_ATTR_RO(carrier_up_count);
+
+static ssize_t carrier_down_count_show(struct device *dev,
+    struct device_attribute *attr,
+    char *buf)
+{
+struct net_device *netdev = to_net_dev(dev);
+ return sprintf(buf, fmt_dec, atomic_read(&netdev->carrier_down_count));
+}
+static DEVICE_ATTR_RO(carrier_down_count);
+
/* read-write attributes */

static int change_mtu(struct net_device *dev, unsigned long new_mtu)
@@ -547,6 +568,8 @@
    &dev_attr_phys_port_name.attr,
    &dev_attr_phys_switch_id.attr,
    &dev_attr_proto_down.attr,
+ &dev_attr_carrier_up_count.attr,
+ &dev_attr_carrier_down_count.attr,
NULL,
};
ATTRIBUTE_GROUPS(net_class);
@@ -905,11 +928,20 @@
return ns;
}

+static void rx_queue_get_ownership(struct kobject *kobj,
```
static struct kobj_type rx_queue_ktype __ro_after_init = {
    .sysfs_ops = &rx_queue_sysfs_ops,
    .release = rx_queue_release,
    .default_attrs = rx_queue_default_attrs,
    .namespace = rx_queue_namespace,
    .get_ownership = rx_queue_get_ownership,
};

static int rx_queue_add_kobject(struct net_device *dev, int index)
{
    struct kobject *kobj = &queue->kobj;
    int error = 0;

    /* Kobject_put later will trigger rx_queue_release call which
     * decreases dev refcount: Take that reference here
     */
    +dev_hold(queue->dev);
    +
    kobj->kset = dev->queues_kset;
    error = kobject_init_and_add(kobj, &rx_queue_ktype, NULL,
        "rx-%u", index);
    if (error)
        -return error;
    +goto err;

    if (dev->sysfs_rx_queue_group) {
        error = sysfs_create_group(kobj, dev->sysfs_rx_queue_group);
        -if (error) {
            -kobject_put(kobj);
            -return error;
        -}
        +if (error)
            +goto err;
    }

    kobject_uevent(kobj, KOBJ_ADD);
    -dev_hold(queue->dev);

    return error;
    +
+err:
+kobject_put(kobj);
+return error;
}
#endif /* CONFIG_SYSFS */

@@ -1029,7 +1067,7 @@
     trans_timeout = queue->trans_timeout;
     spin_unlock_irq(&queue->_xmit_lock);
 
 -return sprintf(buf, "%lu", trans_timeout);
 +return sprintf(buf, fmt_ulong, trans_timeout);
 }

 static unsigned int get_netdev_queue_index(struct netdev_queue *queue)
@@ -1070,6 +1108,9 @@
     int err, index = get_netdev_queue_index(queue);
     u32 rate = 0;
     
 +if (!capable(CAP_NET_ADMIN))
 +return -EPERM;
 +
     err = kstrtou32(buf, 10, &rate);
     if (err < 0)
         return err;
@@ -1208,22 +1249,29 @@
     static ssize_t xps_cpus_show(struct netdev_queue *queue,
                     char *buf)
 {
 +int cpu, len, ret, num_tc = 1, tc = 0;
     struct net_device *dev = queue->dev;
     -int cpu, len, num_tc = 1, tc = 0;
     struct xps_dev_maps *dev_maps;
     cpumask_var_t mask;
     unsigned long index;
     
 -if (!zalloc_cpumask_var(&mask, GFP_KERNEL))
 -return -ENOMEM;
 -
 index = get_netdev_queue_index(queue);
 
 +if (!rtnl_trylock())
 +return restart_syscall();
 +
 if (dev->num_tc) {
     num_tc = dev->num_tc;
     tc = netdev_txq_to_tc(dev, index);
 -if (tc < 0)
-return -EINVAL;
+if (tc < 0) {
+ret = -EINVAL;
+goto err_rtnl_unlock;
+}
+
+if (!zalloc_cpumask_var(&mask, GFP_KERNEL)) {
+ret = -ENOMEM;
+goto err_rtnl_unlock;
}

rcu_read_lock();
@@ -1247,9 +1295,15 @@
}
rcu_read_unlock();

+rtnl_unlock();
+
len = snprintf(buf, PAGE_SIZE, "%*pb\n", cpumask_pr_args(mask));
free_cpumask_var(mask);
return len < PAGE_SIZE ? len : -EINVAL;
+
+err_rtnl_unlock:
+rtnl_unlock();
+return ret;
}

static ssize_t xps_cpus_store(struct netdev_queue *queue,
@@ -1274,7 +1328,13 @@
return err;
}

+if (!rtnl_trylock()) {
+free_cpumask_var(mask);
+return restart_syscall();
+}
+
err = netif_set_xps_queue(dev, mask, index);
+rtnl_unlock();

free_cpumask_var(mask);

@@ -1315,11 +1375,20 @@
return ns;
}

+static void netdev_queue_get_ownership(struct kobject *kobj,
kuid_t *uid, kgid_t *gid)
+
+\{  
+const struct net *net = netdev_queue_namespace(kobj);
+
+net_ns_get_ownership(net, uid, gid);
+
+\}
+
+static struct kobj_type netdev_queue_ktype __ro_after_init = {
   .sysfs_ops = &netdev_queue_sysfs_ops,
   .release = netdev_queue_release,
   .default_attrs = netdev_queue_default_attrs,
   .namespace = netdev_queue_namespace,
   .get_ownership = netdev_queue_get_ownership,
};

static int netdev_queue_add_kobject(struct net_device *dev, int index)
@@ -1328,24 +1397,29 @@
struct kobject *kobj = &queue->kobj;
int error = 0;

+/* Kobject_put later will trigger netdev_queue_release call 
+ * which decreases dev refcount: Take that reference here 
+ */
+dev_hold(queue->dev);
+
++kobj->kset = dev->queues_kset;
++error = kobject_init_and_add(kobj, &netdev_queue_ktype, NULL,
++"tx-%u", index);
++if (error)
++-return error;
++goto err;
+
+#ifdef CONFIG_BQL
++error = sysfs_create_group(kobj, &dql_group);
++if (error) {
++-kobject_put(kobj);
++-return error;
++-
+++if (error)
+++-goto err;
++#endif

kobject_uevent(kobj, KOBJ_ADD);
-dev_hold(queue->dev);
-
return 0;
+
+err:
+kobject_put(koh);
+return error;
}
#endif /* CONFIG_SYSFS */

@@ -1409,6 +1483,9 @@
error:
netdev_queue_update_kobjects(dev, txq, 0);
net_rx_queue_update_kobjects(dev, rxq, 0);
+#ifdef CONFIG_SYSFS
+kset_unregister(dev->queues_kset);
+#endif
return error;
}

@@ -1509,6 +1586,14 @@
return dev_net(dev);
}

+static void net_get_ownership(struct device *d, kuid_t *uid, kgid_t *gid)
+{
+struct net_device *dev = to_net_dev(d);
+const struct net *net = dev_net(dev);
++
+net_ns_get_ownership(net, uid, gid);
+
static struct class net_class __ro_after_init = {
 .name = "net",
 .dev_release = netdev_release,
@@ -1516,6 +1601,7 @@
 .dev_uevent = netdev_uevent,
 .ns_type = &net_ns_type_operations,
 .namespace = net_namespace,
+ .get_ownership = net_get_ownership,
};

#ifdef CONFIG_OF_NET
--- linux-4.15.0.orig/net/core/net_namespace.c
+++ linux-4.15.0/net/core/net_namespace.c
@@ -17,6 +17,7 @@
#include <linux/user_namespace.h>
#include <linux/net_namespace.h>
#include <linux/sched/task.h>
+##include <linux/uidgid.h>

##include <net/sock.h>
##include <net/netlink.h>

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@@ -181,9 +182,9 @@
 return 0;
 }

-/* Should be called with nsid_lock held. If a new id is assigned, the bool alloc
- * is set to true, thus the caller knows that the new id must be notified via
- * rtnl.
+/* Must be called from RCU-critical section or with nsid_lock held. If
+ * a new id is assigned, the bool alloc is set to true, thus the
+ * caller knows that the new id must be notified via rtnl.
+*/
 static int __peernet2id_alloc(struct net *net, struct net *peer, bool *alloc)
 {
-@@ -207,7 +208,7 @@
- return NETNSA_NSID_NOT_ASSIGNED;
- }
+/** should be called with nsid_lock held */
+static int __peernet2id(struct net *net, struct net *peer)
+{
 bool no = false;
-@@ -215,11 +216,11 @@
- return __peernet2id_alloc(net, peer, &no);
+/** Must be called from RCU-critical section or with nsid_lock held */
 static int __peernet2id(struct net *net, struct net *peer)
 {
 bool no = false;
@@ -231,7 +232,7 @@
 id = __peernet2id_alloc(net, peer, &alloc);
 spin_unlock_bh(&net->nsid_lock);
 if (alloc && id >= 0)
- rtln_net_notifyid(net, RTM_NEWNSID, id);
+ rtln_net_notifyid(net, RTM_NEWNSID, id, gfp);
 return id;
 }
EXPORT_SYMBOL_GPL(peernet2id_alloc);
@@ -241,9 +242,10 @@
 { int id;
@@ -231,7 +232,7 @@
 id = __peernet2id_alloc(net, peer, &alloc);
 spin_unlock_bh(&net->nsid_lock);
 if (alloc && id >= 0)
- rtln_net_notifyid(net, RTM_NEWNSID, id);
+ rtln_net_notifyid(net, RTM_NEWNSID, id, gfp);
 return id;
 }
EXPORT_SYMBOL_GPL(peernet2id_alloc);
@@ -241,9 +242,10 @@
 { int id;
spin_lock_bh(&net->nsid_lock);
rcu_read_lock();

id = __peernet2id(net, peer);
spin_unlock_bh(&net->nsid_lock);
rcu_read_unlock();
+
return id;
}

EXPORT_SYMBOL(peernet2id);
@@ -286,6 +288,7 @@
atomic_set(&net->count, 1);
refcount_set(&net->passive, 1);
+get_random_bytes(&net->hash_mix, sizeof(u32));
et->dev_base_seq = 1;
et->user_ns = user_ns;
idr_init(&net->netns_ids);
@@ -432,6 +435,33 @@
return net;
}

+/**
 + * net_ns_get_ownership - get sysfs ownership data for @net
 + * @net: network namespace in question (can be NULL)
 + * @uid: kernel user ID for sysfs objects
 + * @gid: kernel group ID for sysfs objects
 + *
 + * Returns the uid/gid pair of root in the user namespace associated with the
 + * given network namespace.
 + */
+void net_ns_get_ownership(const struct net *net, kuid_t *uid, kgid_t *gid)
+{
+if (net) {
+kuid_t ns_root_uid = make_kuid(net->user_ns, 0);
+kgid_t ns_root_gid = make_kgid(net->user_ns, 0);
+
+if (uid_valid(ns_root_uid))
+*uid = ns_root_uid;
+
+if (gid_valid(ns_root_gid))
+*gid = ns_root_gid;
+} else {
+*uid = GLOBAL_ROOT_UID;
+*gid = GLOBAL_ROOT_GID;
+}
+}
+EXPORT_SYMBOL_GPL(net_ns_get_ownership);
static DEFINE_SPINLOCK(cleanup_list_lock);
static LIST_HEAD(cleanup_list); /* Must hold cleanup_list_lock to touch */

static struct cleanup_list_item *cleanup_list_addItem(struct cleanup_item *item)
{
    static DEFINE_SPINLOCK(cleanup_list_lock);
    spin_lock_bh(&cleanup_list_lock);
    cleanup_list_add(&cleanup_list, item);
    spin_unlock_bh(&cleanup_list_lock);
    return item;
}

static struct cleanup_list_item *cleanup_list_removeItem(struct cleanup_list_item *item)
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_list_remove(&cleanup_list, item);
    spin_unlock_bh(&cleanup_list_lock);
    return item;
}

static void cleanup_list_removeAll()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_list_remove(&cleanup_list, NULL);
    spin_unlock_bh(&cleanup_list_lock);
}

int idr_remove(const void *id_expr, const char *id)
{
    struct idr *idr = id_expr;
    idr_remove(idr, id);
    spin_unlock_bh(&idr->lock);
    if (idr->refc == 1)
        idr_destroy(idr);
    return idr->refc;
}

static void cleanup_schedule()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_schedule(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup清洗()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup清洗(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_reschedule()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_reschedule(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_schedule_all()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_schedule_all(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_reschedule_all()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_reschedule_all(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_removeAll()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_removeAll(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_removeItem(struct cleanup_list_item *item)
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_remove(&cleanup_list, item);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_removeAllItem(struct cleanup_list_item *item)
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_remove(&cleanup_list, item);
    spin_unlock_bh(&cleanup_list_lock);
}

static struct cleanup_list_item *cleanup_searchItem(const char *id)
{
    return cleanup_search(&cleanup_list, id);
}

static struct cleanup_list_item *idr_remove(const void *id_expr, const char *id)
{
    struct idr *idr = id_expr;
    idr_remove(idr, id);
    spin_unlock_bh(&idr->lock);
    if (idr->refc == 1)
        idr_destroy(idr);
    return idr->refc;
}

static void cleanup_schedule()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_schedule(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup清洗()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup清洗(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_reschedule()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_reschedule(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_schedule_all()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_schedule_all(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_reschedule_all()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_reschedule_all(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_removeAll()
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_removeAll(&cleanup_list);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_removeItem(struct cleanup_list_item *item)
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_remove(&cleanup_list, item);
    spin_unlock_bh(&cleanup_list_lock);
}

static void cleanup_removeAllItem(struct cleanup_list_item *item)
{
    spin_lock_bh(&cleanup_list_lock);
    cleanup_remove(&cleanup_list, item);
    spin_unlock_bh(&cleanup_list_lock);
}

static struct cleanup_list_item *cleanup_searchItem(const char *id)
{
    return cleanup_search(&cleanup_list, id);
}
struct rtnl_net_dump_cb *net_cb = (struct rtnl_net_dump_cb *)data;

spin_lock_bh(&net->nsid_lock);
rcu_read_lock();
idr_for_each(&net->netns_ids, rtnl_net_dumpid_one, &net_cb);
spin_unlock_bh(&net->nsid_lock);
rcu_read_unlock();

cb->args[0] = net_cb.idx;
return skb->len;

static void rtnl_net_notifyid(struct net *net, int cmd, int id)
static void rtnl_net_notifyid(struct net *net, int cmd, int id, gfp_t gfp)
{
struct sk_buff *msg;
int err = -ENOMEM;

msg = nlmsg_new(rtnl_net_get_size(), gfp);
if (!msg)
goto out;

rtnl_notify(msg, net, 0, RTNLGRP_NSID, NULL, gfp);
return;
err_out:
mutex_unlock(&net_mutex);
-if (register_pernet_subsys(&net_ns_ops))
+panic("Could not register network namespace subsystems");

rtnl_register(PF_UNSPEC, RTM_NEWNSID, rtnl_net_newid, NULL,
RTNL_FLAG_DOIT_UNLOCKED);
--- linux-4.15.0.orig/net/core/netclassid_cgroup.c
+++ linux-4.15.0/net/core/netclassid_cgroup.c
```c
+/*
+ * To avoid freezing of sockets creation for tasks with big number of threads
+ * and opened sockets lets release file_lock every 1000 iterated descriptors.
+ * New sockets will already have been created with new classid.
+ */
+
+struct update_classid_context {
+  u32 classid;
+  unsigned int batch;
+};
+
+#define UPDATE_CLASSID_BATCH 1000
+
static int update_classid_sock(const void *v, struct file *file, unsigned n)
{
  int err;
  struct update_classid_context *ctx = (void *)v;
  struct socket *sock = sock_from_file(file, &err);

  if (sock) {
    spin_lock(&cgroup_sk_update_lock);
    -sock_cgroup_set_classid(&sock->sk->sk_cgrp_data,
      -(unsigned long)v);
    +sock_cgroup_set_classid(&sock->sk->sk_cgrp_data, ctx->classid);
    spin_unlock(&cgroup_sk_update_lock);
  }
  +if (--ctx->batch == 0) {
  +ctx->batch = UPDATE_CLASSID_BATCH;
  +return n + 1;
  +}
  return 0;
}
+
+static void update_classid_task(struct task_struct *p, u32 classid)
+{
+  struct update_classid_context ctx = {
+    .classid = classid,
+    .batch = UPDATE_CLASSID_BATCH
+  };
+  unsigned int fd = 0;
+  +do {
+    +task_lock(p);
+    +fd = iterate_fd(p->files, fd, update_classid_sock, &ctx);
```
static void cgrp_attach(struct cgroup_taskset *tset) {
    struct cgroup_subsys_state *css;
    struct task_struct *p;

    cgroup_taskset_for_each(p, css, tset) {
        -task_lock(p);
        -iterate_fd(p->files, 0, update_classid_sock,
            - (void *) (unsigned long) css_cls_state(css)->classid);
        -task_unlock(p);
        +update_classid_task(p, css_cls_state(css)->classid);
    }
}

@@ -101,12 +131,8 @@
cs->classid = (u32)value;

    css_task_iter_start(css, 0, &it);
    -while ((p = css_task_iter_next(&it))) {
        -task_lock(p);
        -iterate_fd(p->files, 0, update_classid_sock,
            - (void *) (unsigned long) cs->classid);
        -task_unlock(p);
    }
    +while ((p = css_task_iter_next(&it)))
    +update_classid_task(p, cs->classid);
    css_task_iter_end(&it);

    return 0;
--- linux-4.15.0.orig/net/core/netpoll.c
+++ linux-4.15.0/net/core/netpoll.c
@@ -28,6 +28,7 @@
    #include <linux/slab.h>
    #include <linux/export.h>
    #include <linux/if_vlan.h>
+    #include <net/dsa.h>
    #include <net/tcp.h>
    #include <net/udp.h>
    #include <net/addrconf.h>
@@ -122,7 +123,7 @@
txq = netdev_get_tx_queue(dev, q_index);
    HARD_TX_LOCK(dev, txq, smp_processor_id());
    if (netif_xmit_frozen_or_stopped(txq) ||
- netpoll_start_xmit(skb, dev, txq) != NETDEV_TX_OK) {
+ !dev_xmit_complete(netpoll_start_xmit(skb, dev, txq)) { 
skb_queue_head(&npinfo->txq, skb);
HARD_TX_UNLOCK(dev, txq);
local_irq_restore(flags);
@@ -179,7 +180,7 @@
    struct napi_struct *napi;
    int cpu = smp_processor_id();

    list_for_each_entry(napi, &dev->napi_list, dev_list) {
+    list_for_each_entry_rcu(napi, &dev->napi_list, dev_list) {
      if (cmpxchg(&napi->poll_owner, -1, cpu) == -1) {
        poll_one_napi(napi);
        smp_store_release(&napi->poll_owner, -1);
@@ -357,7 +358,7 @@

    HARD_TX_UNLOCK(dev, txq);

    -if (status == NETDEV_TX_OK)
-+if (dev_xmit_complete(status))
   break;

   }
@@ -374,7 +375,7 @@

   }

    -if (status != NETDEV_TX_OK) {
-+if (!dev_xmit_complete(status)) {
      skb_queue_tail(&npinfo->txq, skb);
      schedule_delayed_work(&npinfo->tx_work,0);
    }
@@ -661,15 +662,15 @@

    int netpoll_setup(struct netpoll *np) {
        -struct net_device *ndev = NULL;
-+struct net_device *ndev = NULL, *dev = NULL;
+struct net *net = current->nsproxy->net_ns;
 struct in_device *in_dev;
    int err;

    rtnl_lock();
    -if (np->dev_name[0]) {
-+struct net *net = current->nsproxy->net_ns;
+if (np->dev_name[0])
        ndev = __dev_get_by_name(net, np->dev_name);
    -}

+if (!ndev) {
  np_err(np, "%s doesn't exist, aborting\n", np->dev_name);
  err = -ENODEV;
  @@ -677,6 +678,19 @@
  }
  dev_hold(ndev);

  /* bring up DSA management network devices up first */
+for_each_netdev(net, dev) {
+  if (!netdev_uses_dsa(dev))
+    continue;
+  +err = dev_change_flags(dev, dev->flags | IFF_UP);
+  if (err < 0) {
+    np_err(np, "%s failed to open %s\n",
+      np->dev_name, dev->name);
+    goto put;
+  }
+}
+
+if (netdev_master_upper_dev_get(ndev)) {
  np_err(np, "%s is a slave device, aborting\n", np->dev_name);
  err = -EBUSY;
--- linux-4.15.0.orig/net/core/netprio_cgroup.c
+++ linux-4.15.0/net/core/netprio_cgroup.c
@@ -240,6 +240,8 @@

 struct task_struct *p;
 struct cgroup_subsys_state *css;

+cgroup_sk_alloc_disable();
+
cgroup_tasks_set_for_each(p, css, tset) {
  void *v = (void *) (unsigned long) css->cgroup->id;

--- linux-4.15.0.orig/net/core/pktgen.c
+++ linux-4.15.0/net/core/pktgen.c
@@ -3157,7 +3157,13 @@

 { thread_is_running(t)) {

+  /* note: 't' will still be around even after the unlock/lock
+     * cycle because pktgen_thread threads are only cleared at
+     * net exit
+     */
+  mutex_unlock(&pktgen_thread_lock);
  msleep_interruptible(100);
+  mutex_lock(&pktgen_thread_lock);
if (signal_pending(current))
goto signal;
@@ -3172,6 +3178,10 @@
struct pktgen_thread *t;
int sig = 1;
+
/* prevent from racing with rmmod */
+if (!try_module_get(THIS_MODULE))
+return sig;
+
mutex_lock(&pktgen_thread_lock);

list_for_each_entry(t, &pn->pktgen_threads, th_list) {
@@ -3185,6 +3195,7 @@
t->control |= (T_STOP);
mutexit_unlock(&pktgen_thread_lock);
+module_put(THIS_MODULE);
return sig;
}

@@ -3552,7 +3563,7 @@
struct pktgen_dev *pkt_dev = NULL;
int cpu = t->cpu;

-BUG_ON(smp_processor_id() != cpu);
+WARN_ON(smp_processor_id() != cpu);

init_waitqueue_head(&t->queue);
complete(&t->start_done);
--- linux-4.15.0.orig/net/core/rtnetlink.c
+++ linux-4.15.0/net/core/rtnetlink.c
@@ -920,8 +920,11 @@
rtnl_xdp_size() /* IFLA_XDP */
+ nla_total_size(4) /* IFLA_EVENT */
+ nla_total_size(4) /* IFLA_NEW_NETNSID */
+     + nla_total_size(4) /* IFLA_NEW_IFINDEX */
+ nla_total_size(1) /* IFLA_PROTO_DOWN */
+ nla_total_size(4) /* IFLA_IF_NETNSID */
+     + nla_total_size(4) /* IFLA_CARRIER_UP_COUNT */
+     + nla_total_size(4) /* IFLA_CARRIER_DOWN_COUNT */
0;
}

@@ -1350,14 +1353,15 @@
return ret;
}
static int nla_put_iflink(struct sk_buff *skb, const struct net_device *dev)
{
    int ifindex = dev_get_iflink(dev);

    -if (dev->ifindex == ifindex)
    -return 0;
    +if (force || dev->ifindex != ifindex)
    +return nla_put_u32(skb, IFLA_LINK, ifindex);

    -return nla_put_u32(skb, IFLA_LINK, ifindex);
    +return 0;
}

static noinline_for_stack int nla_put_ifalias(struct sk_buff *skb,
@@ -1372,20 +1376,24 @@
static int rtnl_fill_link_netnsid(struct sk_buff *skb,
const struct net_device *dev,
    struct net *src_net)
    {
    bool put_iflink = false;
    +
    if (dev->rtnl_link_ops && dev->rtnl_link_ops->get_link_net) {
        struct net *link_net = dev->rtnl_link_ops->get_link_net(dev);

        if (!net_eq(dev_net(dev), link_net)) {
            -int id = peernet2id_alloc(src_net, link_net);
            +int id = peernet2id_alloc(src_net, link_net, gfp);
            {
            +put_iflink = false;
            +
            if (dev->rtnl_link_ops && dev->rtnl_link_ops->get_link_net) {
                struct net *link_net = dev->rtnl_link_ops->get_link_net(dev);

                if (!net_eq(dev_net(dev), link_net)) {
                    -int id = peernet2id_alloc(src_net, link_net);
                    +int id = peernet2id_alloc(src_net, link_net, gfp);
                    {
                    +put_iflink = true;
                    }
                    }
                    }
                    -return 0;
                    +return nla_put_iflink(skb, dev, put_iflink);
                    }

    -static int rtnl_fill_link_af(struct sk_buff *skb,
    @@ -1433,7 +1441,8 @@
    struct net_device *dev, struct net *src_net,
    int type, u32 pid, u32 seq, u32 change,
unsigned int flags, u32 ext_filter_mask,
- u32 event, int *new_nsid, int tgt_netnsid)
+ u32 event, int *new_nsid, int new_ifindex,
+ int tgt_netnsid, gfp_t gfp)
{
    struct ifinfomsg *ifm;
    struct nlmsghdr *nlh;
    @@ -1468,15 +1477,19 @@
    nla_put_u32(skb, IFLA_NUM_RX_QUEUES, dev->num_rx_queues) ||
    #ifdef CONFIG_RPS
        nla_put_u32(skb, IFLA_NUM_RX_QUEUES, dev->num_rx_queues) ||
    #endif
    - nla_put_iflink(skb, dev) ||
        put_master_ifindex(skb, dev) ||
        nla_put_u8(skb, IFLA_CARRIER, netif_carrier_ok(dev)) ||
             (dev->qdisc &&
        nla_put_string(skb, IFLA_QDISC, dev->qdisc->ops->id)) ||
        nla_put_ifalias(skb, dev) ||
        nla_put_u32(skb, IFLA_CARRIER_CHANGES,
             atomic_read(&dev->carrier_changes)) ||
    - nla_put_u8(skb, IFLA_PROTO_DOWN, dev->proto_down)) ||
        +atomic_read(&dev->carrier_up_count) +
             atomic_read(&dev->carrier_down_count)) ||
    + nla_put_u8(skb, IFLA_PROTO_DOWN, dev->proto_down)) ||
    + nla_put_u32(skb, IFLA_CARRIER_UP_COUNT,
             +atomic_read(&dev->carrier_up_count)) ||
    + nla_put_u32(skb, IFLA_CARRIER_DOWN_COUNT,
             +atomic_read(&dev->carrier_down_count))
    goto nla_put_failure;

    if (event != IFLA_EVENT_NONE) {
        @@ -1519,12 +1532,16 @@
        goto nla_put_failure;
    }

    -if (rtnl_fill_link_netnsid(skb, dev, src_net))
    +if (rtnl_fill_link_netnsid(skb, dev, src_net, gfp))
        goto nla_put_failure;

    if (new_nsid &&
        nla_put_s32(skb, IFLA_NEW_NETNSID, *new_nsid) < 0)
        goto nla_put_failure;
    +if (new_ifindex &&
        + nla_put_s32(skb, IFLA_NEW_IFINDEX, new_ifindex) < 0)
        +goto nla_put_failure;

    rcu_read_lock();
    if (rtnl_fill_link_af(skb, dev, ext_filter_mask))
static const struct nla_policy ifla_info_policy[IFLA_INFO_MAX+1] = {
    [IFLA_EVENT]= { .type = NLA_U32 },
    [IFLA_GROUP]= { .type = NLA_U32 },
    [IFLA_IF_NETNSID]= { .type = NLA_S32 },
    +[IFLA_CARRIER_UP_COUNT]= { .type = NLA_U32 },
    +[IFLA_CARRIER_DOWN_COUNT] = { .type = NLA_U32 },
};

static struct net *rtnl_link_get_net_by_nlattr(struct net *src_net, struct nlattr *tb) {
    struct net *net;
    ...
    if (err < 0) {
        if (likely(skb->len))
            EXPORT_SYMBOL(rtnl_link_get_net);
    }
    /* Figure out which network namespace we are talking about by
     * examining the link attributes in the following order:
     * +
     * + 1. IFLA_NET_NS_PID
     * + 2. IFLA_NET_NS_FD
     * + 3. IFLA_IF_NETNSID
     * */
    +static struct net *rtnl_link_get_net_by_nlattr(struct net *src_net,
        struct nlattr *tb[])
    +{
        ...
    }
    +struct net *net;
}
+if (tb[IFLA_NET_NS_PID] || tb[IFLA_NET_NS_FD])
+return rtnl_link_get_net(src_net, tb);
+
+if (!tb[IFLA_IF_NETNSID])
+return get_net(src_net);
+
+net = get_net_ns_by_id(src_net, nla_get_u32(tb[IFLA_IF_NETNSID]));
+if (!net)
+return ERR_PTR(-EINVAL);
+
+return net;
+
+
+static struct net *rtnl_link_get_net_capable(const struct sk_buff *skb,
+                                            struct net *src_net,
+                                            struct nlattr *tb[], int cap)
+{
+    struct net *net;
+
+    net = rtnl_link_get_net_by_nlattr(src_net, tb);
+    if (IS_ERR(net))
+        return net;
+
+    if (!netlink_ns_capable(skb, net->user_ns, cap)) {
+        put_net(net);
+        return ERR_PTR(-EPERM);
+    }
+
+    return net;
+}
+
+/* Verify that rtnetlink requests do not pass additional properties
+ * potentially referring to different network namespaces.
+ */
+static int rtnl_ensure_unique_netns(struct nlattr *tb[],
+                                     struct netlink_ext_ack *extack,
+                                     bool netns_id_only)
+{
+    if (netns_id_only) {
+        if (!tb[IFLA_NET_NS_PID] && !tb[IFLA_NET_NS_FD])
+            return 0;
+        NL_SET_ERR_MSG(extack, "specified netns attribute not supported");
+        return -EOPNOTSUPP;
+    }
+
+    return 0;
+}
+if (tb[IFLA_IF_NETNSID] && (tb[IFLA_NET_NS_PID] || tb[IFLA_NET_NS_FD]))
+  goto invalid_attr;
+
+if (tb[IFLA_NET_NS_PID] && (tb[IFLA_IF_NETNSID] || tb[IFLA_NET_NS_FD]))
+  goto invalid_attr;
+
+if (tb[IFLA_NET_NS_FD] && (tb[IFLA_IF_NETNSID] || tb[IFLA_NET_NS_PID]))
+  goto invalid_attr;
+
+return 0;
+
+invalid_attr:
+  NL_SET_ERR_MSG(extack, "multiple netns identifying attributes specified");
+  return -EINVAL;
+
static int validate_linkmsg(struct net_device *dev, struct nlattr *tb[])
{
  if (dev) {
    if (tb[IFLA_VF_MAC]) {
      struct ifla_vf_mac *ivm = nla_data(tb[IFLA_VF_MAC]);
        +if (ivm->vf >= INT_MAX)
          +return -EINVAL;
        if (ops->ndo_set_vf_mac)
          err = ops->ndo_set_vf_mac(dev, ivm->vf,
          @@ -1885,6 +1977,8 @@
            if (tb[IFLA_VF_VLAN]) {
              struct ifla_vf_vlan *ivv = nla_data(tb[IFLA_VF_VLAN]);

                +if (ivv->vf >= INT_MAX)
                  +return -EINVAL;
                if (ops->ndo_set_vf_vlan)
                  err = ops->ndo_set_vf_vlan(dev, ivv->vf, ivv->vlan,

                @@ -1896,6 +1990,8 @@
                  if (tb[IFLA_VF_VLAN]) {
                    struct ifla_vf_vlan *ivv = nla_data(tb[IFLA_VF_VLAN]);

                      +if (ivv->vf >= INT_MAX)
                        +return -EINVAL;
                      if (ops->ndo_set_vf_vlan)
                        err = ops->ndo_set_vf_vlan(dev, ivv->vf, ivv->vlan,

                      @@ -1928,6 +2024,8 @@
                        if (len == 0)
                          return -EINVAL;

                          +if (ivvl[0]->vf >= INT_MAX)
                            +return -EINVAL;
                          if (ops->ndo_set_vf_vlan)
                            err = ops->ndo_set_vf_vlan(dev, ivvl[0]->vf, ivvl[0]->vlan,

                            @@ -1938,6 +2036,8 @@
                            struct ifla_vf_tx_rate *ivt = nla_data(tb[IFLA_VF_TX_RATE]);
struct ifla_vf_info ivf;

+if (ivt->vf >= INT_MAX)
+return -EINVAL;
err = -EOPNOTSUPP;
if (ops->ndo_get_vf_config)
err = ops->ndo_get_vf_config(dev, ivt->vf, &ivf);
@@ -1956,6 +2056,8 @@
if (tb[IFLA_VF_RATE]) {
struct ifla_vf_rate *ivt = nla_data(tb[IFLA_VF_RATE]);
+if (ivt->vf >= INT_MAX)
+return -EINVAL;
err = -EOPNOTSUPP;
if (ops->ndo_set_vf_rate)
err = ops->ndo_set_vf_rate(dev, ivt->vf,
@@ -1968,6 +2070,8 @@
if (tb[IFLA_VF_SPOOFCHK]) {
struct ifla_vf_spoofchk *ivs = nla_data(tb[IFLA_VF_SPOOFCHK]);
+if (ivs->vf >= INT_MAX)
+return -EINVAL;
err = -EOPNOTSUPP;
if (ops->ndo_set_vf_spoofchk)
err = ops->ndo_set_vf_spoofchk(dev, ivs->vf,
@@ -1979,6 +2083,8 @@
if (tb[IFLA_VF_LINK_STATE]) {
struct ifla_vf_link_state *ivl = nla_data(tb[IFLA_VF_LINK_STATE]);
+if (ivl->vf >= INT_MAX)
+return -EINVAL;
err = -EOPNOTSUPP;
if (ops->ndo_set_vf_link_state)
err = ops->ndo_set_vf_link_state(dev, ivl->vf,
@@ -1992,6 +2098,8 @@
err = -EOPNOTSUPP;
ivrssq_en = nla_data(tb[IFLA_VF_RSS_QUERY_EN]);
+if (ivrssq_en->vf >= INT_MAX)
+return -EINVAL;
if (ops->ndo_set_vf_rss_query_en)
err = ops->ndo_set_vf_rss_query_en(dev, ivrssq_en->vf,
ivrssq_en->setting);
@@ -2002,6 +2110,8 @@
if (tb[IFLA_VF_TRUST]) {
struct ifla_vf_trust *ivt = nla_data(tb[IFLA_VF_TRUST]);
+if (ivt->vf >= INT_MAX)

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return -EINVAL;

if (ops->ndo_set_vf_guid)
    return -EOPNOTSUPP;
-
    return handle_vf_guid(dev, ivt, IFLA_VF_IB_NODE_GUID);
} 

if (tb[IFLA_VF_IB_PORT_GUID]) {
    struct ifla_vf_guid *ivt = nla_data(tb[IFLA_VF_IB_PORT_GUID]);

    +if (ivt->vf >= INT_MAX)
    +return -EINVAL;
    +
    if (!ops->ndo_set_vf_guid)
        return -EOPNOTSUPP;
-
    @@ -2077,17 +2190,18 @@
    const struct net_device_ops *ops = dev->netdev_ops;
    int err;

    -if (tb[IFLA_NET_NS_PID] || tb[IFLA_NET_NS_FD]) {
        -struct net *net = rtnl_link_get_net(dev_net(dev), tb);
        +err = validate_linkmsg(dev, tb);
        +if (err < 0)
            +return err;
        +
        +if (tb[IFLA_NET_NS_PID] || tb[IFLA_NET_NS_FD] || tb[IFLA_IF_NETNSID]) {
            +struct net *net = rtnl_link_get_net_capable(skb, dev_net(dev),
                +    tb, CAP_NET_ADMIN);
            if (IS_ERR(net)) {
                err = PTR_ERR(net);
                goto errout;
            }
            -if (!netlink_ns_capable(skb, net->user_ns, CAP_NET_ADMIN)) {
                -put_net(net);
                -err = -EPERM;
                -goto errout;
            -}
            +err = dev_change_net_namespace(dev, net, ifname);
put_net(net);
if (err)
@@ -2400,8 +2514,9 @@
if (err < 0)
goto errout;
-
-if (tb[IFLA_IF_NETNSID])
-return -EOPNOTSUPP;
+err = rtnl_ensure_unique_netns(tb, extack, false);
+if (err < 0)
+goto errout;
-
if (tb[IFLA_IFNAME])
nla_strlcpy(ifname, tb[IFLA_IFNAME], IFNAMSIZ);
@@ -2422,10 +2537,6 @@
goto errout;
}
-
-err = validate_linkmsg(dev, tb);
-if (err < 0)
-goto errout;
-
err = do_setlink(skb, dev, ifm, extack, tb, ifname, 0);
errout:
return err;
@@ -2487,36 +2598,57 @@
struct netlink_ext_ack *extack)
{
 struct net *net = sock_net(skb->sk);
-struct net_device *dev;
+struct net *tgt_net = net;
+struct net_device *dev = NULL;
 struct ifinfomsg *ifm;
 char ifname[IFNAMSIZ];
 struct nlattr *tb[IFLA_MAX+1];
 int err;
+int netnsid = -1;

 err = nlmsg_parse(nlh, sizeof(*ifm), tb, IFLA_MAX, ifla_policy, extack);
 if (err < 0)
 return err;
-
-if (tb[IFLA_IF_NETNSID])
-return -EOPNOTSUPP;
+err = rtnl_ensure_unique_netns(tb, extack, true);
+if (err < 0)
+return err;
if (tb[IFLA_IFNAME])
nla_strlcpy(ifname, tb[IFLA_IFNAME], IFNAMSIZ);

+if (tb[IFLA_IF_NETNSID]) {
+ netnsid = nla_get_s32(tb[IFLA_IF_NETNSID]);
+ tgt_net = get_target_net(NETLINK_CB(skb).sk, netnsid);
+ if (IS_ERR(tgt_net))
+ return PTR_ERR(tgt_net);
+}
+
t= -EINVAL;
ifm = nlmsg_data(nlh);
if (ifm->ifi_index > 0)
-dev = __dev_get_by_index(net, ifm->ifi_index);
+dev = __dev_get_by_index(tgt_net, ifm->ifi_index);
else if (tb[IFLA_IFNAME])
-dev = __dev_get_by_name(net, ifname);
+dev = __dev_get_by_name(tgt_net, ifname);
else if (tb[IFLA_GROUP])
-return rtnl_group_dellink(net, nla_get_u32(tb[IFLA_GROUP]));
+err = rtnl_group_dellink(tgt_net, nla_get_u32(tb[IFLA_GROUP]));
else
-return -EINVAL;
goto out;
+
-if (!dev)
-return -ENODEV;
+if (!dev) {
+ if (tb[IFLA_IFNAME] || ifm->ifi_index > 0)
+ err = -ENODEV;
+ goto out;
+}
+
t = rtnl_delete_link(dev);

-return rtnl_delete_link(dev);
+out:
+if (netnsid >= 0)
+ put_net(tgt_net);
+
+return err;
}

int rtnl_configure_link(struct net_device *dev, const struct ifinfomsg *ifm)
@@ -2531,9 +2663,12 @@
return err;
-dev->rtnl_link_state = RTNL_LINK_INITIALIZED;
-
-__dev_notify_flags(dev, old_flags, ~0U);
+if (dev->rtnl_link_state == RTNL_LINK_INITIALIZED) {
+__dev_notify_flags(dev, old_flags, (old_flags ^ dev->flags));
+} else {
+dev->rtnl_link_state = RTNL_LINK_INITIALIZED;
+__dev_notify_flags(dev, old_flags, -0U);
+
} return 0;
}
EXPORT_SYMBOL(rtnl_configure_link);
@@ -2556,6 +2691,12 @@
else if (ops->get_num_rx_queues)
    num_rx_queues = ops->get_num_rx_queues();

+if (num_tx_queues < 1 || num_tx_queues > 4096)
+return ERR_PTR(-EINVAL);
+
+if (num_rx_queues < 1 || num_rx_queues > 4096)
+return ERR_PTR(-EINVAL);
+
    dev = alloc_netdev_mqs(ops->priv_size, ifname, name_assign_type,
                        ops->setup, num_tx_queues, num_rx_queues);
    if (!dev)
@@ -2565,8 +2706,17 @@
    dev->rtnl_link_ops = ops;
    dev->rtnl_link_state = RTNL_LINK_INITIALIZING;

-    -dev->mtu = nla_get_u32(tb[IFLA_MTU]);
-    +if (tb[IFLA_MTU]) {
-         +u32 mtu = nla_get_u32(tb[IFLA_MTU]);
-         +int err;
-         +
+    err = dev_validate_mtu(dev, mtu);
+    if (err) {
+        +free_netdev(dev);
+        +return ERR_PTR(err);
+    }
+    +dev->mtu = mtu;
+    }
+    if (tb[IFLA_ADDRESS]) {
+        memcpy(dev->dev_addr, nla_data(tb[IFLA_ADDRESS]),
                          nla_len(tb[IFLA_ADDRESS]));
@@ -2631,8 +2781,9 @@
                if (err < 0)
return err;

-if (tb[IFLA_IF_NETNSID])
-return -EOPNOTSUPP;
+err = rtnl Ensure_unique_netns(tb, extack, false);
+if (err < 0)
+return err;

if (tb[IFLA_IFNAME])
  nla_strlcpy(ifname, tb[IFLA_IFNAME], IFNAMSIZ);
@@ -2781,14 +2932,10 @@
  name_assign_type = NET_NAME_ENUM;
}

-dest_net = rtnl_link_get_net(net, tb);
+dest_net = rtnl_link_get_net_capable(skb, net, tb, CAP_NET_ADMIN);
if (IS_ERR(dest_net))
  return PTR_ERR(dest_net);

-err = -EPERM;
-if (!netlink_ns_capable(skb, dest_net->user_ns, CAP_NET_ADMIN))
-goto out;
-
if (tb[IFLA_LINK_NETNSID]) {
  int id = nla_get_s32(tb[IFLA_LINK_NETNSID]);
@@ -2820,7 +2967,8 @@
 */
 if (err < 0) {
  /* If device is not registered at all, free it now */
-  if (dev->reg_state == NETREG_UNINITIALIZED)
+  if (dev->reg_state == NETREG_UNINITIALIZED ||
+      dev->reg_state == NETREG_UNREGISTERED)
    free_netdev(dev);
  goto out;
 }
@@ -2881,6 +3029,10 @@
if (err < 0)
  return err;

+err = rtnl Ensure_unique_netns(tb, extack, true);
+if (err < 0)
+return err;
+
if (tb[IFLA_IF_NETNSID]) {
  netnsid = nla_get_s32(tb[IFLA_IF_NETNSID]);
  tgt_net = get_target_net(NETLINK_CB(skb).sk, netnsid);
@@ -2915,7 +3067,7 @@
err = rtnl_fill_ifinfo(skb, dev, net,
    RTM_NEWLINK, NETLINK_CB(skb).portid,
    nlh->nlmsg_seq, 0, 0, ext_filter_mask,
    0, NULL, netnsid);
+ 0, NULL, 0, netnsid, GFP_KERNEL);
if (err < 0) {
/* -EMSGSIZE implies BUG in if_nlmsg_size */
WARN_ON(err == -EMSGSIZE);
@@ -2968,12 +3120,12 @@
{
    int idx;
    int s_idx = cb->family;
+int type = cb->nlh->nlmsg_type - RTM_BASE;
    if (s_idx == 0)
        s_idx = 1;
    for (idx = 1; idx <= RTNL_FAMILY_MAX; idx++) {
-    int type = cb->nlh->nlmsg_type-RTM_BASE;
        struct rtnl_link *handlers;
        rtnl_dumpit_func dumpit;
@@ -3003,7 +3155,8 @@

    struct sk_buff *rtmsg_ifinfo_build_skb(int type, struct net_device *dev,
        unsigned int change,
-    u32 event, gfp_t flags, int *new_nsid)
+    u32 event, gfp_t flags, int *new_nsid,
+    int new_ifindex)
    {
        struct net *net = dev_net(dev);
        struct sk_buff *skb;
@@ -3016,7 +3169,7 @@

    err = rtnl_fill_ifinfo(skb, dev, dev_net(dev),
        type, 0, 0, change, 0, 0, event,
-    new_nsid, -1);
+    new_nsid, new_ifindex, -1, flags);
    if (err < 0) {
/* -EMSGSIZE implies BUG in if_nlmsg_size */
WARN_ON(err == -EMSGSIZE);
@@ -3039,14 +3192,15 @@

    static void rtmsg_ifinfo_event(int type, struct net_device *dev,
        unsigned int change, u32 event,
-    gfp_t flags, int *new_nsid)
+    gfp_t flags, int *new_nsid, int new_ifindex)
    {
struct sk_buff *skb;

if (dev->reg_state != NETREG_REGISTERED)
    return;

- skb = rtmsg_ifinfo_build_skb(type, dev, change, event, flags, new_nsid);
+ skb = rtmsg_ifinfo_build_skb(type, dev, change, event, flags, new_nsid,
   +     new_ifindex);
if (skb)
    rtmsg_ifinfo_send(skb, dev, flags);
}
@@ -3054,14 +3208,15 @@
void rtmsg_ifinfo(int type, struct net_device *dev, unsigned int change,
    gfp_t flags)
{
- rtmsg_ifinfo_event(type, dev, change, rtnl_get_event(0), flags, NULL);
+ rtmsg_ifinfo_event(type, dev, change, rtnl_get_event(0), flags,
+    new_nsid);
}

void rtmsg_ifinfo_newnet(int type, struct net_device *dev, unsigned int change,
-    gfp_t flags, int *new_nsid)
+    gfp_t flags, int *new_nsid, int new_ifindex)
{
    rtmsg_ifinfo_event(type, dev, change, rtnl_get_event(0), flags,
-        new_nsid);
+        new_nsid, new_ifindex);
}

static int nlmmsg_populate_fdb_fill(struct sk_buff *skb,
@@ -3223,6 +3378,11 @@
    return -EINVAL;
}

+if (dev->type != ARPHRD_ETHER) {
+NL_SET_ERR_MSG(extack, "FDB add only supported for Ethernet devices");
+return -EINVAL;
+}
+
addr = nla_data(tb[NDA_LLADDR]);

er = fdb_vid_parse(tb[NDA_VLAN], &vid, extack);
@@ -3327,6 +3487,11 @@
    return -EINVAL;
}

+if (dev->type != ARPHRD_ETHER) {
+NL_SET_ERR_MSG(extack, "FDB delete only supported for Ethernet devices");
+return -EINVAL;
+}

addr = nla_data(tb[NDA_LLADDR]);

err = fdb_vid_parse(tb[NDA_VLAN], &vid, extack);  
@@ -3413,6 +3578,9 @@
 {  
 int err;

+if (dev->type != ARPHRD_ETHER)  
+return -EINVAL;
+  
+netif_addr_lock_bh(dev);  
err = nlmsg_populate_fdb(skb, cb, dev, idx, &dev->uc);  
if (err)  
@@ -3441,16 +3609,27 @@
 int err = 0;
 int fidx = 0;

-err = nlmsg_parse(cb->nlh, sizeof(struct ifinfomsg), tb,  
- IFLA_MAX, ifla_policy, NULL);  
-if (err < 0) {  
-return -EINVAL;  
-} else if (err == 0) {  
-if (tb[IFLA_MASTER])  
-br_idx = nla_get_u32(tb[IFLA_MASTER]);  
-}  
+/* A hack to preserve kernel<->userspace interface.  
+ * Before Linux v4.12 this code accepted ndmsg since iproute2 v3.3.0.  
+ * However, ndmsg is shorter than ifinfomsg thus nlmsg_parse() bails.  
+ * So, check for ndmsg with an optional u32 attribute (not used here).  
+ * Fortunately these sizes don't conflict with the size of ifinfomsg  
+ * with an optional attribute.  
+ */  
+if (nlmsg_len(cb->nlh) != sizeof(struct ndmsg) &&  
+ (nlmsg_len(cb->nlh) != sizeof(struct ndmsg) +  
+ nla_attr_size(sizeof(u32)))) {  
+err = nlmsg_parse(cb->nlh, sizeof(struct ifinfomsg), tb,  
+ IFLA_MAX, ifla_policy, NULL);  
+if (err < 0) {  
+return -EINVAL;  
+} else if (err == 0) {  
+if (tb[IFLA_MASTER])  
+br_idx = nla_get_u32(tb[IFLA_MASTER]);  
+}  
-brport_idx = ifm->ifi_index;
if (br_idx) {
    br_dev = __dev_get_by_index(net, br_idx);
    if (err < 0)
        goto errout;
}

/* Notification info is only filled for bridge ports, not the bridge
 * device itself. Therefore, a zero notification length is valid and
 * should not result in an error.
 */
if (!skb->len)
    goto errout;

/* @ -4142,7 +4325,7 @@ */
static size_t if_nlmsg_stats_size(const struct net_device *dev,
    u32 filter_mask)
{
    -size_t size = 0;
    +size_t size = NLMSG_ALIGN(sizeof(struct if_stats_msg));
    if (stats_attr_valid(filter_mask, IFLA_STATS_LINK_64, 0))
        size += nla_total_size_64bit(sizeof(struct rtnl_link_stats64));
    case NETDEV_CHANGELOWERSTATE:
    case NETDEV_CHANGE_TX_QUEUE_LEN:
        rtmsg_ifinfo_event(RTM_NEWLINK, dev, 0, rtnl_get_event(event),
            GFP_KERNEL, NULL);
        return __netdev_alloc_frag(fragsz, GFP_ATOMIC);
    return __netdev_alloc_frag(unsigned int fragsz)
    { 
        +fragsz = SKB_DATA_ALIGN(fragsz);
        +return __netdev_alloc_frag(fragsz, GFP_ATOMIC);
    }
```
+fragsz = SKB_DATA_ALIGN(fragsz);
+
+return __napi_alloc_frag(fragsz, GFP_ATOMIC);
}
EXPORT_SYMBOL(napi_alloc_frag);
@@ -394,7 +398,11 @@
  len += NET_SKB_PAD;

-if ((len > SKB_WITH_OVERHEAD(PAGE_SIZE)) ||
+/* If requested length is either too small or too big,
+ * we use kmalloc() for skb->head allocation.
+ */
+if (len <= SKB_WITH_OVERHEAD(1024) ||
    len > SKB_WITH_OVERHEAD(PAGE_SIZE) ||
    (gfp_mask & (__GFP_DIRECT_RECLAIM | GFP_DMA))) {
  skb = __alloc_skb(len, gfp_mask, SKB_ALLOC_RX, NUMA_NO_NODE);
-if (!skb)
  goto skb_success;

+nc = this_cpu_ptr(&napi_alloc_cache);
  len += SKB_DATA_ALIGN(sizeof(struct skb_shared_info));
  len = SKB_DATA_ALIGN(len);

@@ -857,6 +870,8 @@
```

n->hdr_len = skb->nohdr ? skb_headroom(skb) : skb->hdr_len;
n->cloned = 1;
n->nohdr = 0;
+n->peeked = 0;
+C(pfnmalloc);
n->destructor = NULL;
C(tail);
C(end);
@@ -935,9 +950,6 @@
WARN_ON_ONCE(!in_task());

- if (!sock_flag(sk, SOCK_ZEROCOPY))
- return NULL;
-
skb = sock_omalloc(sk, 0, GFP_KERNEL);
if (!skb)
return NULL;
@@ -1836,6 +1848,27 @@
}
EXPORT_SYMBOL(___pskb_trim);

+/* Note : use pskb_trim_rcsum() instead of calling this directly
+ */
+int pskb_trim_rcsum_slow(struct sk_buff *skb, unsigned int len)
+{
+if (skb->ip_summed == CHECKSUM_COMPLETE) {
+int delta = skb->len - len;
+
+skb->csum = csum_block_sub(skb->csum,
+ skb_checksum(skb, len, delta, 0),
+ len);
+} else if (skb->ip_summed == CHECKSUM_PARTIAL) {
+int hdlen = (len > skb_headlen(skb)) ? skb_headlen(skb) : len;
+int offset = skb_checksum_start_offset(skb) + skb->csum_offset;
+
+if (offset + sizeof(__sum16) > hdlen)
+return -EINVAL;
+}
+return __pskb_trim(skb, len);
+
+EXPORT_SYMBOL(pskb_trim_rcsum_slow);
+
/**
* __pskb_pull_tail - advance tail of skb header
* @skb: buffer to reallocate
@@ -2280,6 +2313,7 @@
kv.iov_base = skb->data + offset;
kv.iov_len = slen;
memset(&msg, 0, sizeof(msg));
+msg.msg_flags = MSG_DONTWAIT;

ret = kernel_sendmsg_locked(sk, &msg, &kv, 1, slen);
if (ret <= 0)
@@ -2667,8 +2701,11 @@
@@ -2839,23 +2876,27 @@
/**
 * skb_rbtree_purge - empty a skb rbtree
 *@root: root of the rbtree to empty
 + *Return value: the sum of truesizes of all purged skbs.
 * +
 *Delete all buffers on an &sk_buff rbtree. Each buffer is removed from
 *the list and one reference dropped. This function does not take
 *any lock. Synchronization should be handled by the caller (e.g., TCP
 *out-of-order queue is protected by the socket lock).
 */
-void skb_rbtree_purge(struct rb_root *root)
+unsigned int skb_rbtree_purge(struct rb_root *root)
 {
 struct rb_node *p = rb_first(root);
+unsigned int sum = 0;
 while (p) {
 struct sk_buff *skb = rb_entry(p, struct sk_buff, rbnode);

 p = rb_next(p);
 rb_erase(&skb->rbnode, root);
 +sum += skb->truesize;
 kfree_skb(skb);
 }
+return sum;
 }

/**
static int skb_prepare_for_shift(struct sk_buff *skb)
{
return skb_cloned(skb) && pskb_expand_head(skb, 0, 0, GFP_ATOMIC);
+int ret = 0;
+
+if (skb_cloned(skb)) {
+/* Save and restore truesize: pskb_expand_head() may reallocate
+ * memory where ksize(kmalloc(S)) != ksize(kmalloc(S)), but we
+ * cannot change truesize at this point.
+ */
+unsigned int save_truesize = skb->truesize;
+
+ret = pskb_expand_head(skb, 0, 0, GFP_ATOMIC);
+skb->truesize = save_truesize;
+
+return ret;
}

/**
@@ -3458,6 +3511,19 @@
}
EXPORT_SYMBOL_GPL(skb_pull_rcsum);

+static inline skb_frag_t skb_head_frag_to_page_desc(struct sk_buff *frag_skb)
+{
+skb_frag_t head_frag;
+struct page *page;
+
+page = virt_to_head_page(frag_skb->head);
+head_frag.page.p = page;
+head_frag.page_offset = frag_skb->data -
+(unsigned char *)page_address(page);
+head_frag.size = skb_headlen(frag_skb);
+return head_frag;
+
+/**
*skb_segment - Perform protocol segmentation on skb.
*@head_skb: buffer to segment
@@ -3490,6 +3556,25 @@
int pos;
int dummy;
+
+if (list_skb && !list_skb->head_frag && skb_headlen(list_skb) &&
+ (skb_shinfo(head_skb)->gso_type & SKB_GSO_DODGY)) {
+/* gso_size is untrusted, and we have a frag_list with a linear
+ * non head_frag head.
+ *
+ * (we assume checking the first list_skb member suffices;
+ * i.e if either of the list_skb members have non head_frag
+ * head, then the first one has too).
+ *
+ * If head_skb's headlen does not fit requested gso_size, it
+ * means that the frag_list members do NOT terminate on exact
+ * gso_size boundaries. Hence we cannot perform skb_frag_t page
+ * sharing. Therefore we must fallback to copying the frag_list
+ * skbs; we do so by disabling SG.
+ */
+if (mss != GSO_BY_FRAGS && mss != skb_headlen(head_skb))
+features &= ~NETIF_F_SG;
+
+__skb_push(head_skb, doffset);
proto = skb_network_protocol(head_skb, &dummy);
if (unlikely(!proto))
@@ -3658,14 +3743,19 @@
while (pos < offset + len) {
  if (i >= nfrags) {
-    BUG_ON(skb_headlen(list_skb));
-    i = 0;
    nfrags = skb_shinfo(list_skb)->nr_frags;
    frag = skb_shinfo(list_skb)->frags;
    frag_skb = list_skb;
+    if (!skb_headlen(list_skb)) {
+      BUG_ON(!nfrags);
+      } else {
+        BUG_ON(!list_skb->head_frag);
+      }
+    _skb_push(head_skb, doffset);
    proto = skb_network_protocol(head_skb, &dummy);
    if (unlikely(!proto))
@@ -3675,6 +3765,7 @@
    net_warn_ratelimited(
"skb_segment: too many frags: %u %u\n",
    pos, mss);
+err = -EINVAL;
    goto err;
    }
    
    list_skb = list_skb->next;
    
    net_warn_ratelimited("skb_segment: too many frags: %u %u\n",
    pos, mss);
    err = -EINVAL;
    goto err;

if (skb_zerocopy_clone(nskb, frag_skb, GFP_ATOMIC))
goto err;

-*nskb_frag = *frag;
+*nskb_frag = (i < 0) ? skb_head_frag_to_page_desc(frag_skb) : *frag;
__skb_frag_ref(nskb_frag);
size = skb_frag_size(nskb_frag);

perform_csum_check:
if (!csum) {
-if (skb_has_shared_frag(nskb)) {
-err = __skb_linearize(nskb);
-if (err)
-goto err;
-
+if (skb_has_shared_frag(nskb) &&
+ __skb_linearize(nskb))
+goto err;
+
if (!nskb->remcsum_offload)
nskb->ip_summed = CHECKSUM_NONE;
SKB_GSO_CB(nskb)->csum =

struct sk_buff *lp, *p = *head;
unsigned int delta_truesize;

-if (unlikely(p->len + len >= 65536))
+if (unlikely(p->len + len >= 65536 || NAPI_GRO_CB(skb)->flush))
return -E2BIG;

lp = NAPI_GRO_CB(p)->last;

skb_queue_tail(&sk->sk_error_queue, skb);
if (!sock_flag(sk, SOCK_DEAD))
-sk->sk_data_ready(sk);
+sk->sk_error_report(sk);
return 0;
}
EXPORT_SYMBOL(sock_queue_err_skb);

if (skb && (skb_next = skb_peek(q))) {
icmp_next = is_icmp_err_skb(skb_next);
}
if (icmp_next)
  -sk->sk_err = SKB_EXT_ERR(skb_next)->ee.ee_origin;
+sk->sk_err = SKB_EXT_ERR(skb_next)->ee_errno;
  
spin_unlock_irqrestore(&q->lock, flags);

@@ -4866,6 +4956,10 @@
  nf_reset(skb);
  nf_reset_trace(skb);

+ifdef CONFIG_NET_SWITCHDEV
+skb->offload_fwd_mark = 0;
+endif
+
if (!xnet)
return;

@@ -4910,46 +5004,96 @@
EXPORT_SYMBOL_GPL(skb_gso_transport_seglen);

/**
- * skb_gso_validate_mtu - Return in case such skb fits a given MTU
+ * skb_gso_size_check - check the skb size, considering GSO_BY_FRAGS
 * *
- * @skb: GSO skb
- * @mtu: MTU to validate against
- * There are a couple of instances where we have a GSO skb, and we
- * want to determine what size it would be after it is segmented.
- *
- * skb_gso_validate_mtu validates if a given skb will fit a wanted MTU
- * once split.
- * We might want to check:
- * - L3+L4+payload size (e.g. IP forwarding)
- * - L2+L3+L4+payload size (e.g. sanity check before passing to driver)
- *
+ * This is a helper to do that correctly considering GSO_BY_FRAGS.
+ *
+ * @seg_len: The segmented length (from skb_gso_*_seglen). In the
+ * GSO_BY_FRAGS case this will be [header sizes + GSO_BY_FRAGS].
+ *
+ * @max_len: The maximum permissible length.
+ *
+ * Returns true if the segmented length <= max length.
+ */
bool skb_gso_validate_mtu(const struct sk_buff *skb, unsigned int mtu)
-
+static inline bool skb_gso_size_check(const struct sk_buff *skb,
+      unsigned int seg_len,
unsigned int max_len) {
    const struct skb_shared_info *shinfo = skb_shinfo(skb);
    const struct sk_buff *iter;
    unsigned int hlen;

    hlen = skb_gso_network_seglen(skb);
    if (shinfo->gso_size != GSO_BY_FRAGS)
        return hlen <= mtu;
    return seg_len <= max_len;

    /* Undo this so we can re-use header sizes */
    -hlen -= GSO_BY_FRAGS;
    +seg_len -= GSO_BY_FRAGS;

    skb_walk_frags(skb, iter) {
        -if (hlen + skb_headlen(iter) > mtu)
        +if (seg_len + skb_headlen(iter) > max_len)
            return false;
    }

    return true;
}

/**
 * skb_gso_validate_mtu - Return in case such skb fits a given MTU
 * @skb: GSO skb
 * @mtu: MTU to validate against
 *
 * skb_gso_validate_mtu validates if a given skb will fit a wanted
 * MTU once split.
 * @
 * bool skb_gso_validate_mtu(const struct sk_buff *skb, unsigned int mtu)
 * +{}
 * return skb_gso_size_check(skb, skb_gso_network_seglen(skb), mtu);
 */
EXPORT_SYMBOL_GPL(skb_gso_validate_mtu);

/**
 * skb_gso_validate_mac_len - Will a split GSO skb fit in a given length?
 * @skb: GSO skb
 * @len: length to validate against
 *
 * skb_gso_validate_mac_len validates if a given skb will fit a wanted
 * length once split, including L2, L3 and L4 headers and the payload.
 * @*/
+bool skb_gso_validate_mac_len(const struct sk_buff *skb, unsigned int len)
+{
+return skb_gso_size_check(skb, skb_gso_mac_seglen(skb), len);
+}
+EXPORT_SYMBOL_GPL(skb_gso_validate_mac_len);
+
static struct sk_buff *skb_reorder_vlan_header(struct sk_buff *skb)
{
+int mac_len, meta_len;
+void *meta;
+
if (skb_cow(skb, skb_headroom(skb)) < 0) {
    kfree_skb(skb);
    return NULL;
}

-memmove(skb->data - ETH_HLEN, skb->data - skb->mac_len - VLAN_HLEN,
         skb->data - skb->mac_len - VLAN_HLEN, 2 * ETH_ALEN);
+mac_len = skb->data - skb_mac_header(skb);
+if (likely(mac_len > VLAN_HLEN + ETH_TLEN)) {
    memmove(skb_mac_header(skb) + VLAN_HLEN, skb_mac_header(skb),
             skb_mac_header(skb) + VLAN_HLEN, skb_mac_header(skb),
         skb->mac_header += VLAN_HLEN;
        return skb;
    }
+
+meta_len = skb_metadata_len(skb);
+if (meta_len) {
+mempmove(skb->data - VLAN_HLEN, skb->data - skb->mac_len - VLAN_HLEN,
             skb->data - skb->mac_len - VLAN_HLEN, VLAN_HLEN, skb->data);
+meta = skb_metadata_end(skb) - meta_len;
+memmove(meta + VLAN_HLEN, meta, meta_len);
+}
+
skb->mac_header += VLAN_HLEN;
return skb;
}
@@ -4967,8 +5111,8 @@
skb = skb_share_check(skb, GFP_ATOMIC);
if (unlikely(!skb))
goto err_free;
-
-if (unlikely(!pskb_may_pull(skb, VLAN_HLEN)))
+/* We may access the two bytes after vlan_hdr in vlan_set_encap_proto(). */
+if (unlikely(!pskb_may_pull(skb, VLAN_HLEN + sizeof(unsigned short))))
goto err_free;

vhdr = (struct vlan_hdr *)skb->data;
@@ -5129,7 +5273,6 @@
unsigned long chunk;
struct sk_buff *skb;
struct page *page;
-gfp_t gfp_head;
int i;

*errcode = -EMSGSIZE;
@@ -5139,12 +5282,8 @@
  if (npages > MAX_SKB_FRAGS)
     return NULL;

-gfp_head = gfp_mask;
-if (gfp_head & __GFP_DIRECT_RECLAIM)
-gfp_head |= __GFP_RETRY_MAYFAIL;
-
  *errcode = -ENOBUFS;
-skb = alloc_skb(header_len, gfp_head);
+skb = alloc_skb(header_len, gfp_mask);
  if (!skb)
     return NULL;

@@ -5366,9 +5505,13 @@
  if (skb_has_frag_list(skb))
     skb_clone_fraglist(skb);

  -if (k == 0) {
    /**< split line is in frag list */
    -pskb_carve_frag_list(skb, shinfo, off - pos, gfp_mask);
    /**< split line is in frag list */
    +if (k == 0 && pskb_carve_frag_list(skb, shinfo, off - pos, gfp_mask)) {
    /**< skb_frag_unref() is not needed here as shinfo->nr_frags = 0. */
    +if (skb_has_frag_list(skb))
      kfree_skb_list(skb_shinfo(skb)->frag_list);
      kfree(data);
      +return -ENOMEM;
  }
  skb_release_data(skb);

--- linux-4.15.0.orig/net/core/sock.c
+++ linux-4.15.0/net/core/sock.c
@@ -735,6 +735,7 @@
   break;
 case SO_DONTROUTE:
   sock_valbool_flag(sk, SOCK_LOCALROUTE, valbool);
+    sk_dst_reset(sk);
   break;
 case SO_BROADCAST:
   sock_valbool_flag(sk, SOCK_BROADCAST, valbool);
@@ -1022,7 +1023,7 @@
   if (val < 0)
     ret = -EINVAL;

else
  -sk->sk_ll_usec = val;
  +WRITE_ONCE(sk->sk_ll_usec, val);
}
break;
#endif
@@ -1038,7 +1039,7 @@
break;
case SO_INCOMING_CPU:
  -sk->sk_incoming_cpu = val;
  +WRITE_ONCE(sk->sk_incoming_cpu, val);
break;
case SO_CNX_ADVICE:
@@ -1068,6 +1069,16 @@
} EXPORT_SYMBOL(sock_setsockopt);

+static const struct cred *sk_get_peer_cred(struct sock *sk)
+{
+  const struct cred *cred;
+
+  spin_lock(&sk->sk_peer_lock);
+  cred = get_cred(sk->sk_peer_cred);
+  spin_unlock(&sk->sk_peer_lock);
+
+  return cred;
+}

static void cred_to_ucred(struct pid *pid, const struct cred *cred,
    struct ucred *ucred)
@@ -1241,7 +1252,11 @@
    peercred;
    if (len > sizeof(peercred))
    len = sizeof(peercred);
+
    spin_lock(&sk->sk_peer_lock);
    cred_to_ucred(sk->sk_peer_pid, sk->sk_peer_cred, &peercred);
    spin_unlock(&sk->sk_peer_lock);
+
    if (copy_to_user(optval, &peercred, len))
    return -EFAULT;
    goto lenout;
@@ -1249,20 +1264,23 @@
} case SO_PEERGROUPS:

const struct cred *cred;
int ret, n;

- if (!sk->sk_peer_cred)
+ cred = sk_get_peer_cred(sk);
+ if (!cred)
   return -ENODATA;

- n = sk->sk_peer_cred->group_info->ngroups;
+ n = cred->group_info->ngroups;
if (len < n * sizeof(gid_t)) {
  len = n * sizeof(gid_t);
+ put_cred(cred);
return put_user(len, optlen) ? -EFAULT : -ERANGE;
}

len = n * sizeof(gid_t);

- ret = groups_to_user((gid_t __user *)optval,
-     sk->sk_peer_cred->group_info);
+ ret = groups_to_user((gid_t __user *)optval, cred->group_info);
+ put_cred(cred);
if (ret)
  return ret;
goto lenout;
@@ -1350,16 +1368,13 @@
break;

case SO_INCOMING_CPU:
- v.val = sk->sk_incoming_cpu;
+ v.val = READ_ONCE(sk->sk_incoming_cpu);
break;

case SO_MEMINFO:
{ u32 meminfo[SK_MEMINFO_VARS];

- if (get_user(len, optlen))
-  return -EFAULT;
- sk_get_meminfo(sk, meminfo);

len = min_t(unsigned int, len, sizeof(meminfo));
@@ -1540,6 +1555,7 @@
cgroup_sk_alloc(&sk->sk_cgrp_data);
 sock_update_classid(&sk->sk_cgrp_data);
 sock_update_netprioidx(&sk->sk_cgrp_data);
+ sk_tx_queue_clear(sk);
}
return sk;
@@ -1563,8 +1579,6 @@
sk_filter_uncharge(sk, filter);
RCU_INIT_POINTER(sk->sk_filter, NULL);
}
-if (rcu_access_pointer(sk->sk_reuseport_cb))
-reuseport_detach_sock(sk);

sock_disable_timestamp(sk, SK_FLAGS_TIMESTAMP);

@@ -1577,9 +1591,10 @@
sk->sk_frag.page = NULL;
}

-if (sk->sk_peer_cred)
-put_cred(sk->sk_peer_cred);
+/* We do not need to acquire sk->sk_peer_lock, we are the last user. */
+put_cred(sk->sk_peer_cred);
+put_pid(sk->sk_peer_pid);
+
if (likely(sk->sk_net_refcnt))
put_net(sock_net(sk));
sk_prot_free(skb->sk_prot_creator, sk);
@@ -1587,7 +1602,14 @@

void sk_destruct(struct sock *sk)
{
-if (sock_flag(skb, SOCK_RCU_FREE))
+bool use_call_rcu = sock_flag(skb, SOCK_RCU_FREE);
+
+if (rcu_access_pointer(skb->sk_reuseport_cb)) {
+reuseport_detach_sock(skb);
+use_call_rcu = true;
+}
+
+if (use_call_rcu)
call_rcu(&skb->sk_rcu, __sk_destruct);
else
__sk_destruct(&skb->sk_rcu);
@@ -1595,7 +1617,7 @@

static void __sk_free(struct sock *skb)
{
-if (unlikely(sock_diag_has_destroy_listeners(skb) && skb->sk_net_refcnt))
+if (unlikely(skb->sk_net_refcnt && sock_diag_has_destroy_listeners(skb)))
sock_diag_broadcast_destroy(skb);
else
sk_destruct(sk);
@@ -1675,17 +1697,17 @@
 newsk->sk_dst_pending_confirm = 0;
 newsk->sk_wmem_queued = 0;
 newsk->sk_forward_alloc = 0;
-
-/* sk->sk_memcg will be populated at accept() time */
-newsk->sk_memcg = NULL;
-
-atomic_set(&newsk->sk_drops, 0);
-newsk->sk_send_head = NULL;
-newsk->sk_userlocks = sk->sk_userlocks & ~SOCK_BINDPORT_LOCK;
-atomic_set(&newsk->sk_zckey, 0);

sock_reset_flag(newsk, SOCK_DONE);
cgroup_sk_alloc(&newsk->sk_cgrp_data);
+
+/* sk->sk_memcg will be populated at accept() time */
+newsk->sk_memcg = NULL;
+
+cgroup_sk_clone(&newsk->sk_cgrp_data);

rcu_read_lock();
filter = rcu_dereference(sk->sk_filter);
@@ -1737,6 +1759,7 @@
/*
 sk_refcnt_debug_inc(newsk);
 sk_set_socket(newsk, NULL);
+sk_tx_queue_clear(newsk);
 newsk->sk_wq = NULL;

if (newsk->sk_prot->sockets_allocated)
@@ -2165,8 +2188,8 @@
 } else {
 unsigned long *memory_pressure = sk->sk_prot->memory_pressure;

-if (memory_pressure && *memory_pressure)
-*memory_pressure = 0;
+if (memory_pressure && READ_ONCE(*memory_pressure))
+WRITE_ONCE(*memory_pressure, 0);
 }
 }

@@ -2245,7 +2268,7 @@
 finish_wait(&sk->sk_lock.wq, &wait);
 }

-static void __release_sock(struct sock *sk)
+void __release_sock(struct sock *sk)
__releases(&sk->sk_lock.slock)
__acquires(&sk->sk_lock.slock)
{
@@ -2359,7 +2382,7 @@
}

if (sk_has_memory_pressure(sk)) {
  -int alloc;
  +u64 alloc;

  if (!sk_under_memory_pressure(sk))
    return 1;
@@ -2560,6 +2583,27 @@
}
EXPORT_SYMBOL(sock_no_mmap);

+/*
+ * When a file is received (via SCM_RIGHTS, etc), we must bump the
+ * various sock-based usage counts.
+ */
+void __receive_sock(struct file *file)
+{
+  struct socket *sock;
+  int error;
+  
+  /*
+   * The resulting value of "error" is ignored here since we only
+   * need to take action when the file is a socket and testing
+   * "sock" for NULL is sufficient.
+   */
+   +sock = sock_from_file(file, &error);
+   +if (sock) {
+     +sock_update_netprioidx(&sock->sk->sk_cgrp_data);
+     +sock_update_classid(&sock->sk->sk_cgrp_data);
+   } +}
+
+ssize_t sock_no_sendpage(struct socket *sock, struct page *page, int offset, size_t size, int flags)
{ 
  ssize_t res;
@@ -2729,12 +2773,17 @@
    sk->sk_peer_pid=NULL;
    sk->sk_peer_cred=NULL;
    +spin_lock_init(&sk->sk_peer_lock);
+  }
  sk->sk_write_pending=0;
sk->sk_rcvlowat=1;
sk->sk_rcvtimeo=MAX_SCHEDULE_TIMEOUT;
sk->sk_sndtimeo=MAX_SCHEDULE_TIMEOUT;

sk->sk_stamp = SK_DEFAULT_STAMP;
#if BITS_PER_LONG==32
+seqlock_init(&sk->sk_stamp_seq);
#endif
atomic_set(&sk->sk_zckey, 0);

#ifdef CONFIG_NET_RX_BUSY_POLL
@@ -3359,7 +3408,7 @@
{
    struct sock *sk = p;

    return !skb_queue_empty(&sk->sk_receive_queue) ||
+    !skb_queue_empty_lockless(&sk->sk_receive_queue) ||
        sk_busy_loop_timeout(sk, start_time);
}
EXPORT_SYMBOL(sk_busy_loop_end);
--- linux-4.15.0.orig/net/core/sock_diag.c
+++ linux-4.15.0/net/core/sock_diag.c
@@ -10,6 +10,7 @@
#include <linux/kernel.h>
#include <linux/tcp.h>
#include <linux/workqueue.h>
'+include <linux/nospec.h>
#include <linux/inet_diag.h>
#include <linux/sock_diag.h>
@@ -218,6 +219,7 @@
    if (req->sdiag_family >= AF_MAX)
        return -EINVAL;
    req->sdiag_family = array_index_nospec(req->sdiag_family, AF_MAX);

    if (sock_diag_handlers[req->sdiag_family] == NULL)
        request_module("net-pf-%d-proto-%d-type-%d", PF_NETLINK,
--- linux-4.15.0.orig/net/core/sockreuseport.c
+++ linux-4.15.0/net/core/sockreuseport.c
@@ -94,6 +94,16 @@
    return more_reuse;
}

+static void reuseport_free_rcu(struct rcu_head *head)
+{
+    struct sock_reuseport *reuse;
+    

reuse = container_of(head, struct sock_reuseport, rcu);
if (reuse->prog)
+bpf_prog_destroy(reuse->prog);
kfree(reuse);
+
/**
 * reuseport_add_sock - Add a socket to the reuseport group of another.
 * @sk: New socket to add to the group.
 @@ -102,7 +112,7 @@
 */
int reuseport_add_sock(struct sock *sk, struct sock *sk2)
{
-struct sock_reuseport *reuse;
+struct sock_reuseport *old_reuse, *reuse;

if (!rcu_access_pointer(sk2->sk_reuseport_cb)) {
  int err = reuseport_alloc(sk2);
  @@ -113,10 +123,13 @@
   spin_lock_bh(&reuseport_lock);
   reuse = rcu_dereference_protected(sk2->sk_reuseport_cb,
   - lockdep_is_held(&reuseport_lock)),
   -WARN_ONCE(rcu_dereference_protected(sk->sk_reuseport_cb,
   - lockdep_is_held(&reuseport_lock)),
   - "socket already in reuseport group");
+ lockdep_is_held(&reuseport_lock));
+old_reuse = rcu_dereference_protected(sk->sk_reuseport_cb,
+ lockdep_is_held(&reuseport_lock));
+if (old_reuse & old_reuse->num_socks != 1) {
+  spin_unlock_bh(&reuseport_lock);
+  return -EBUSY;
+}

if (reuse->num_socks == reuse->max_socks) {
  reuse = reuseport_grow(reuse);
  @@ -134,19 +147,11 @@
   spin_unlock_bh(&reuseport_lock);
   +if (old_reuse)
   +call_rcu(&old_reuse->rcu, reuseport_free_rcu);
   return 0;
 }

- static void reuseport_free_rcu(struct rcu_head *head)
-{
- struct sock_reuseport *reuse;

- reuse = container_of(head, struct sock_reuseport, rcu);
- if (reuse->prog)
  - bpf_prog_destroy(reuse->prog);
- kfree(reuse);
- }
-
void reuseport_detach_sock(struct sock *sk)
{
    struct sock_reuseport *reuse;

    int err = 0;
    long vm_wait = 0;
    long current_timeo = *timeo_p;
    bool noblock = (*timeo_p ? false : true);
    DEFINE_WAIT_FUNC(wait, woken_wake_function);

if (sk_stream_memory_free(sk))
    @ @ -133,11 +132,8 @@

    if (sk->sk_err || (sk->sk_shutdown & SEND_SHUTDOWN))
        goto do_error;
    -if (!*timeo_p) {
    -if (noblock)
        -set_bit(SOCK_NOSPACE, &sk->sk_socket->flags);
        -goto do_nonblock;
        -}
    +if (!*timeo_p)
        +goto do_eagain;
    if (signal_pending(current))
        goto do_interrupted;
    sk_clear_bit(SOCKWQ_ASYNC_NOSPACE, sk);
    @@ -169,7 +165,13 @@
    do_error:
        err = -EPIPE;
        goto out;
    -do_nonblock:
    +do_eagain:
        /* Make sure that whenever EAGAIN is returned, EPOLLOUT event can
        * be generated later.
        * When TCP receives ACK packets that make room, tcp_check_space()
        * only calls tcp_new_space() if SOCK_NOSPACE is set.
        */
        +set_bit(SOCK_NOSPACE, &sk->sk_socket->flags);
        err = -EAGAIN;
        goto out;
do_interrupted:
--- linux-4.15.0.orig/net/core/sysctl_net_core.c
+++ linux-4.15.0/net/core/sysctl_net_core.c
@@ -25,9 +25,12 @@
 static int zero = 0;
 static int one = 1;
+static int two __maybe_unused = 2;
 static int min_sndbuf = SOCK_MIN_SNDBUF;
 static int min_rcvbuf = SOCK_MIN_RCVBUF;
 static int max_skb_frags = MAX_SKB_FRAGS;
+static long long_one __maybe_unused = 1;
+static long long_max __maybe_unused = LONG_MAX;

 static int net_msg_warn;/* Unused, but still a sysctl */
@@ -250,6 +253,52 @@
 return proc_dostring(&fake_table, write, buffer, lenp, ppos);
 }

+#ifdef CONFIG_BPF_JIT
+static int proc_dointvec_minmax_bpf_enable(struct ctl_table *table, int write,
+    void __user *buffer, size_t *lenp,
+    loff_t *ppos)
+{
+    int ret, jit_enable = *(int *)table->data;
+    struct ctl_table tmp = *table;
+    if (write && !capable(CAP_SYS_ADMIN))
+        return -EPERM;
+    tmp.data = &jit_enable;
+    ret = proc_dointvec_minmax(&tmp, write, buffer, lenp, ppos);
+    if (write && !ret) {
+        *(int *)table->data = jit_enable;
+        if (jit_enable == 2)
+            pr_warn("bpf_jit_enable = 2 was set! NEVER use this in production, only for JIT debugging!\n");
+    }
+    return ret;
+}
+
+#ifdef CONFIG_HAVE_EBPF_JIT
+static int
+proc_dointvec_minmax_bpf_restricted(struct ctl_table *table, int write,
+    void __user *buffer, size_t *lenp,
+    loff_t *ppos)
+{
+    if (!capable(CAP_SYSADMIN))
+        return -EPERM;
+    tmp.data = &jit_enable;
+    ret = proc_dointvec_minmax(&tmp, write, buffer, lenp, ppos);
+    if (write && !ret) {
+        *(int *)table->data = jit_enable;
+        if (jit_enable == 2)
+            pr_warn("bpf_jit_enable = 2 was set! NEVER use this in production, only for JIT debugging!\n");
+    }
+    return ret;
+}

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+return -EPERM;
+
+return proc_dointvec_minmax(table, write, buffer, lenp, ppos);
+
+# endif /* CONFIG_HAVE_EBPF_JIT */
+
+static int
+proc_dolongvec_minmax_bpf_restricted(struct ctl_table *table, int write,
+    void __user *buffer, size_t *lenp,
+    loff_t *ppos)
+{
+    #if !defined(CONFIG_BPF_JIT_ALWAYS_ON)
+        #ifdef CONFIG_BPF_JIT_ALWAYS_ON
+            .extra1= &one,
+            .extra2= &two,
+        #endif
+    #else
+        .extra1= &zero,
+        .extra2= &two,
+    +# endif
+
+    #endif
+
static struct ctl_table net_core_table[] = {
    #ifdef CONFIG_NET
    {
        .data= &bpf_jit_enable,
        .maxlen= sizeof(int),
        .mode= 0644,
    #ifndef CONFIG_BPF_JIT_ALWAYS_ON
        .proc_handler= proc_dointvec,
    #else
        .proc_handler= proc_dointvec_minmax,
    +# ifdef CONFIG_BPF_JIT_ALWAYS_ON
        .extra1= &one,
        .extra2= &one,
    +# endif
    +# else
        .extra1= &zero,
        .extra2= &two,
    +# endif
    },
    #ifdef CONFIG_HAVE_EBPF_JIT
    {
        .data= &bpf_jit_harden,
        .maxlen= sizeof(int),
        .mode= 0600,
    -proc_handler= proc_dointvec,
    +# ifdef CONFIG_BPF_JIT_ALWAYS_ON
        .extra1= &zero,
    +# endif
    },
    #endif
}
+ .extra2= &two,
},
{
.procname= "bpf_jit_kallsyms",
data= &bpf_jit_kallsyms,
.maxlen= sizeof(int),
.mode= 0600,
.proc_handler= proc_dointvec,
+ .proc_handler= proc_dointvec_minmax_bpf_restricted,
+ .extra1= &zero,
+ .extra2= &one,
},
#endif
+
+ {
+ .procname= "bpf_jit_limit",
data= &bpf_jit_limit,
.maxlen= sizeof(long),
.mode= 0600,
+ .proc_handler= proc_dolongvec_minmax_bpf_restricted,
+ .extra1= &long_one,
+ .extra2= &long_max,
+ },
#endif
{
.procname= "netdev_tstamp_prequeue",
--- linux-4.15.0.orig/net/core/utils.c
+++ linux-4.15.0/net/core/utils.c
@@ -419,6 +419,23 @@
}
EXPORT_SYMBOL(inet_proto_csum_replace4);

+/**
+ * inet_proto_csum_replace16 - update layer 4 header checksum field
+ * @sum: Layer 4 header checksum field
+ * @skb: sk_buff for the packet
+ * @from: old IPv6 address
+ * @to: new IPv6 address
+ * @pseudohdr: True if layer 4 header checksum includes pseudoheader
+ *
+ * Update layer 4 header as per the update in IPv6 src/dst address.
+ *
+ * There is no need to update skb->csum in this function, because update in two
+ * fields a.) IPv6 src/dst address and b.) L4 header checksum cancels each other
+ * for skb->csum calculation. Whereas inet_proto_csum_replace4 function needs to
+ * update skb->csum, because update in 3 fields a.) IPv4 src/dst address,
+ * b.) IPv4 Header checksum and c.) L4 header checksum results in same diff as
+ * L4 Header checksum for skb->csum calculation.
+ */
void inet_proto_csum_replace16(__sum16 *sum, struct sk_buff *skb,
    const __be32 *from, const __be32 *to,
    bool pseudohdr)
@@ -430,9 +447,6 @@
    if (skb->ip_summed != CHECKSUM_PARTIAL) {
        *sum = csum_fold(csum_partial(diff, sizeof(diff),
            ~csum_unfold(*sum)));
    -if (skb->ip_summed == CHECKSUM_COMPLETE && pseudohdr)
    -skb->csum = ~csum_partial(diff, sizeof(diff),
    - skb->csum)
    } else if (pseudohdr)
        *sum = ~csum_fold(csum_partial(diff, sizeof(diff),
            csum_unfold(*sum)));
--- linux-4.15.0.orig/net/dcb/dcbnl.c
+++ linux-4.15.0/net/dcb/dcbnl.c
@@ -1727,6 +1727,8 @@
    fn = &reply_funcs[dcb->cmd];
    if (!fn->cb)
        return -EOPNOTSUPP;
+    if (fn->type == RTM_SETDCB && !netlink_capable(skb, CAP_NET_ADMIN))
+        return -EPERM;

    if (!tb[DCB_ATTR_IFNAME])
        return -EINVAL;
@@ -1765,7 +1767,7 @@
    if (itr->app.selector == app->selector &&
        itr->app.protocol == app->protocol &&
        itr->ifindex == ifindex &&
    -    (!prio || itr->app.priority == prio))
    +    ((prio == -1) || itr->app.priority == prio))
        return itr;
    }
    }
@@ -1800,7 +1802,8 @@

    spin_lock_bh(&dcb_lock);
    if ((itr = dcb_app_lookup(app, dev->ifindex, 0)))
        itr = dcb_app_lookup(app, dev->ifindex, -1);
+    if (itr)
+        prio = itr->app.priority;
        spin_lock_bh(&dcb_lock);

    @ @ -1828,7 +1831,8 @@

    spin_lock_bh(&dcb_lock);
/* Search for existing match and replace */
    -if ((itr = dcb_app_lookup(new, dev->ifindex, 0)))

+itr = dcb_app_lookup(new, dev->ifindex, -1);
+if (itr) {
    if (new->priority)
        itr->app.priority = new->priority;
    else {
        u8 prio = 0;

        spin_lock_bh(&dcb_lock);
        -itr = dcb_app_lookup(app, dev->ifindex, 0))
        +itr = dcb_app_lookup(app, dev->ifindex, -1);
        +if (itr)
            prio |= 1 << itr->app.priority;
        spin_unlock_bh(&dcb_lock);

        --- linux-4.15.0.orig/net/dccp/ccid.h
        +++ linux-4.15.0/net/dccp/ccid.h
        @ @ -202.7 +202.7 @ @
        static inline int ccid_hc_tx_parse_options(struct ccid *ccid, struct sock *sk,
            u8 pkt, u8 opt, u8 *val, u8 len)
        {
            -if (ccid->ccid_ops->ccid_hc_tx_parse_options == NULL)
                +if (!ccid || !ccid->ccid_ops->ccid_hc_tx_parse_options)
                return 0;
        return ccid->ccid_ops->ccid_hc_tx_parse_options(sk, pkt, opt, val, len);
        }
        @ @ -214.7 +214.7 @ @
        static inline int ccid_hc_rx_parse_options(struct ccid *ccid, struct sock *sk,
            u8 pkt, u8 opt, u8 *val, u8 len)
        {
            -if (ccid->ccid_ops->ccid_hc_rx_parse_options == NULL)
                +if (!ccid || !ccid->ccid_ops->ccid_hc_rx_parse_options)
                return 0;
        return ccid->ccid_ops->ccid_hc_rx_parse_options(sk, pkt, opt, val, len);
        }
        --- linux-4.15.0.orig/net/dccp/ccids/ccid2.c
        +++ linux-4.15.0/net/dccp/ccids/ccid2.c
        @ @ -126.6 +126.16 @ @
            DCCPF_SEQ_WMAX));
        }

        +static void dccp_tasklet_schedule(struct sock *sk)
        +{
            +struct tasklet_struct *t = &dccp_sk(sk)->dccps_xmitlet;
                +if (!test_and_set_bit(TASKLET_STATE_SCHED, &t->state)) {
                    +sock_hold(sk);
                    +tasklet_schedule(t);

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static void ccid2_hc_tx_rto_expire(struct timer_list *t)
{
    struct ccid2_hc_tx_sock *hc = from_timer(hc, t, tx_rtotimer);
    @@ -166,7 +176,7 @@
    /* if we were blocked before, we may now send cwnd=1 packet */
    if (sender_was_blocked)
        -tasklet_schedule(&dccp_sk(sk)->dccps_xmitlet);
        +dccp_tasklet_schedule(sk);
    /* restart backed-off timer */
    sk_reset_timer(sk, &hc->tx_rtotimer, jiffies + hc->tx_rto);
    out:
    @@ -218,14 +228,16 @@
    struct ccid2_hc_tx_sock *hc = ccid2_hc_tx_sk(sk);
    u32 cwnd = hc->tx_cwnd, restart_cwnd,
        iwnd = rfc3390_bytes_to_packets(dccp_sk(sk)->dccps_mss_cache);
        +s32 delta = now - hc->tx_lsndtime;
    hc->tx_ssthresh = max(hc->tx_ssthresh, (cwnd >> 1) + (cwnd >> 2));
    /* don't reduce cwnd below the initial window (IW) */
    restart_cwnd = min(cwnd, iwnd);
    -cwnd >>= (now - hc->tx_lsndtime) / hc->tx_rto;
    -hc->tx_cwnd = max(cwnd, restart_cwnd);
    +while ((delta -= hc->tx_rto) >= 0 && cwnd > restart_cwnd)
        +cwnd >>= 1;
    +hc->tx_cwnd = max(cwnd, restart_cwnd);
    hc->tx_cwnd_stamp = now;
    hc->tx_cwnd_used = 0;
    @@ -706,7 +718,7 @@
    done:
    /* check if incoming Acks allow pending packets to be sent */
    if (sender_was_blocked && !ccid2_cwnd_network_limited(hc))
        -tasklet_schedule(&dccp_sk(sk)->dccps_xmitlet);
        +dccp_tasklet_schedule(sk);
    dccp_ackvec_parsed_cleanup(&hc->tx_av_chunks);
}

--- linux-4.15.0.orig/net/dccp/ccids/ccid3.c
+++ linux-4.15.0/net/dccp/ccids/ccid3.c
@@ -600,7 +600,7 @@
{
    struct ccid3_hc_rx_sock *hc = ccid3_hc_rx_sk(sk);
struct dccp_sock *dp = dccp_sk(sk);
-ktime_t now = ktime_get_real();
+kt ime_t now = ktime_get();
s64 delta = 0;

switch (fbtype) {
@@ -625,15 +625,14 @@
case CCID3_FBACK_PERIODIC:
    delta = ktime_us_delta(now, hc->rx_tstamp_last_feedback);
    if (delta <= 0)
-DCCP_BUG("delta (%ld) <= 0", (long)delta);
-else
+      delta = 1;
+      hc->rx_x_recv = scaled_div32(hc->rx_bytes_recv, delta);
    break;
 Default:
    return;
    }

-ccid3_pr_debug("Interval %ldusec, X_recv=%u, 1/p=%u\n", (long)delta,
+ccid3_pr_debug("Interval %lldusec, X_recv=%u, 1/p=%u\n", delta,
    hc->rx_x_recv, hc->rx_pinv);

hc->rx_tstamp_last_feedback = now;
@@ -680,7 +679,8 @@
static u32 ccid3_first_li(struct sock *sk)
{
    struct ccid3_hc_rx_sock *hc = ccid3_hc_rx_sk(sk);
    -u32 x_recv, p, delta;
+u32 x_recv, p;
+   s64 delta;
    u64 fval;

    if (hc->rx_rtt == 0) {
@@ -688,7 +688,9 @@
        hc->rx_rtt = DCCP_FALLBACK_RTT;
    }

-    delta = ktime_to_us(net_timedelta(hc->rx_tstamp_last_feedback));
+    delta = ktime_us_delta(ktime_get(), hc->rx_tstamp_last_feedback);
+    if (delta <= 0)
+        delta = 1;
    x_recv = scaled_div32(hc->rx_bytes_recv, delta);
    if (x_recv == 0) /* would also trigger divide-by-zero */
        DCCP_WARN("X_recv==0\n");
--- linux-4.15.0.orig/net/dccp/dccp.h
+++ linux-4.15.0/net/dccp/dccp.h
@@ -44,9 +44,9 @@
#define dccp_pr_debug_cat(format, a...)   DCCP_PRINTK(dccp_debug, format, ##a)
#define dccp_debug(fmt, a...)		  dccp_pr_debug_cat(KERN_DEBUG fmt, ##a)
#else
-#define dccp_pr_debug(format, a...)  
-#define dccp_pr_debug_cat(format, a...)  
-#define dccp_debug(format, a...)  
+#define dccp_pr_debug(format, a...)  	  do {} while (0)
+#define dccp_pr_debug_cat(format, a...)  	  do {} while (0)
+#define dccp_debug(format, a...)  	  do {} while (0)
#endif
extern struct inet_hashinfo dccp_hashinfo;
--- linux-4.15.0.orig/net/dccp/feat.c
+++ linux-4.15.0/net/dccp/feat.c
@@ -738,7 +738,12 @@
if (dccp_feat_clone_sp_val(&fval, sp_val, sp_len))
return -ENOMEM;

-treturn dccp_feat_push_change(fn, feat, is_local, mandatory, &fval);
+tif (dccp_feat_push_change(fn, feat, is_local, mandatory, &fval)) {
+  kfree(fval.sp.vec);
+  return -ENOMEM;
+}
+return 0;
}

/**
--- linux-4.15.0.orig/net/dccp/input.c
+++ linux-4.15.0/net/dccp/input.c
@@ -606,11 +606,13 @@
if (sk->sk_state == DCCP_LISTEN) {
if (dh->dccph_type == DCCP_PKT_REQUEST) {
/* It is possible that we process SYN packets from backlog,
- * so we need to make sure to disable BH right there.
+ * so we need to make sure to disable BH and RCU right there.
 */
+rcu_read_lock();
local_bh_disable();
acceptable = inet_csk(sk)->icsk_af_ops->conn_request(sk, skb) >= 0;
local_bh_enable();
+rcu_read_unlock();
if (!acceptable)
return 1;
consume_skb(skb);
inet->inet_daddr,
inet->inet_sport,
inet->inet_dport);
-inet->inet_id = dp->dccps_iss ^ jiffies;
+inet->inet_id = prandom_u32();

err = dccp_connect(sk);
rt = NULL;
@@ -121,7 +121,7 @@
inet->inet_id = prandom_u32();
err = dccp_connect(skb);
rt = NULL;
@@ -417,7 +417,7 @@
RCU_INIT_POINTER(newinet->inet_opt, rcu_dereference(ireq->ireq_opt));
newinet->mc_index = inet_iif(skb);
newinet->mc_ttl = ip_hdr(skb)->ttl;
-newinet->inet_id = jiffies;
+newinet->inet_id = prandom_u32();

if (dst == NULL &
+ (dst = inet_csk_route_child_sock(sk, newsk, req)) == NULL)
goto put_and_exit;
@@ -493,9 +493,11 @@
err = ip_build_and_send_pkt(skb, sk, ireq->ir_loc_addr,
-ireq->ir_rmt_addr);
+rcu_read_lock();
err = ip_build_and_send_pkt(skb, sk, ireq->ir_loc_addr,
-ireq->ir_rmt_addr,
+rcu_dereference(ireq->ireq_opt));
+rcu_read_unlock();
err = net_xmit_eval(err);
}
@@ -614,6 +616,7 @@
ireq = inet_rsk(req);
sk_rcv_saddr_set(req_to_sk(req), ip_hdr(skb)->daddr);
sk_daddr_set(req_to_sk(req), ip_hdr(skb)->saddr);
+ireq->ir_mark = inet_request_mark(sk, skb);
ireq->ireq_family = AF_INET;
ireq->ir_iif = sk->sk_bound_dev_if;

--- linux-4.15.0.orig/net/dccp ipv6.c
+++ linux-4.15.0/net/dccp ipv6.c
@@ -211,7 +211,7 @@
final_p = fl6_update_dst(&fl6, rcu_dereference(np->opt), &final);
rcu_read_unlock();
-dst = ip6.dst lookup_flow(sk, &fl6, rcu_dereference(np->opt), &final);
+dst = ip6.dst lookup_flow(sock_net(sk), sk, &fl6, final_p);
if (IS_ERR(dst)) {

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err = PTR_ERR(dst);
dst = NULL;
@@ -282,7 +282,7 @@
security_skb_classify_flow(rxskb, flowi6_to_flowi(&fl6));

/* sk = NULL, but it is safe for now. RST socket required. */
-dst = ip6_dst_lookup_flow(ctl_sk, &fl6, NULL);
+dst = ip6_dst_lookup_flow(sock_net(ctl_sk), ctl_sk, &fl6, NULL);
if (!IS_ERR(dst)) {
    skb_dst_set(skb, dst);
    ip6_xmit(ctl_sk, skb, &fl6, 0, NULL, 0);
    if (!ipv6_unicast_destination(skb))
        return 0;/* discard, don’t send a reset here */
+
    +if (ipv6_addr_v4mapped(&ipv6_hdr(skb)->saddr)) {
        __IP6_INC_STATS(sock_net(sk), NULL, IPSTATS_MIB_INHDRERRORS);
        return 0;
        +}
        +
    +if (dccp_bad_service_code(sk, service)) {
        dcb->dcpd_reset_code = DCCP_RESET_CODE_BAD_SERVICE_CODE;
        goto drop;
        @ @ -351,6 +356,7 @@
        ireq->ir_v6_rmt_addr = ipv6_hdr(skb)->saddr;
        ireq->ir_v6_loc_addr = ipv6_hdr(skb)->daddr;
        ireq->irq_family = AF_INET6;
        +ireq->ir_mark = inet_request_mark(sk, skb);

        if (ipv6_opt_accepted(sk, skb, IP6CB(skb)))
            newnp->ipv6_mc_list = NULL;
            newnp->ipv6_ac_list = NULL;
            newnp->ipv6_fl_list = NULL;
            -newnp->mcast_oif   = inet6_iif(skb);
            -newnp->mcast_hops = ipv6_hdr(skb)->hop_limit;
            +newnp->mcast_oif   = inet_iif(skb);
            +newnp->mcast_hops = ip_hdr(skb)->ttl;

            /*
             * No need to charge this sock to the relevant IPv6 refcnt debug socks count
             @ @ -911,7 +917,7 @@
             opt = rcu_dereference_protected(np->opt, lockdep_sock_is_held(sk));
             final_p = fl6_update_dst(&fl6, opt, &final);
             
             -dst = ip6_dst_lookup_flow(sk, &fl6, final_p);
             +dst = ip6_dst_lookup_flow(sock_net(sk), sk, &fl6, final_p);

             */
if (IS_ERR(dst)) {
    err = PTR_ERR(dst);
    goto failure;
}
--- linux-4.15.0.orig/net/dccp/minisocks.c
+++ linux-4.15.0/net/dccp/minisocks.c
@@ -97,6 +97,8 @@
    newdp->dccps_role = DCCP_ROLE_SERVER;
    newdp->dccps_hc_rx_ackvec = NULL;
+newdp->dccps_hc_rx_ccid = NULL;
+newdp->dccps_hc_tx_ccid = NULL;
    newdp->dccps_service_list = NULL;
    newdp->dccps_service = dreq->dreq_service;
    newdp->dccps_timestamp_echo = dreq->dreq_timestamp_echo;
--- linux-4.15.0.orig/net/dccp/proto.c
+++ linux-4.15.0/net/dccp/proto.c
@@ -280,9 +280,7 @@
    dp->dccps_hc_rx_ccid = NULL;
-    dp->dccps_hc_tx_ccid = NULL;
    __skb_queue_purge(&sk->sk_receive_queue);
    __skb_queue_purge(&sk->sk_write_queue);
@@ -789,6 +787,11 @@
    skb_reserve(skb, sk->sk_prot->max_header);
    rc = memcpy_from_msg(skb_put(skb, len), msg, len);
    if (rc != 0)
--- linux-4.15.0.orig/net/dccp/timer.c
+++ linux-4.15.0/net/dccp/timer.c
@@ -232,6 +232,7 @@
 else
    dccp_write_xmit(sk);
    bh_unlock_sock(sk);
+    sock_put(sk);
}

static void dccp_write_xmit_timer(struct timer_list *t)
struct sock *sk = &dp->dccps_inet_connection.icsk_inet.sk;

dccp_write_xmitlet((unsigned long)sk);
-sock_put(sk);
}

void dccp_init_xmit_timers(struct sock *sk)
--- linux-4.15.0.orig/net/decnet/af_decnet.c
+++ linux-4.15.0/net/decnet/af_decnet.c
@@ -823,7 +823,7 @@
 static int dn_confirm_accept(struct sock *sk, long *timeo, gfp_t allocation)
 {
 struct dn_scp *scp = DN_SK(sk);
  DEFINE_WAIT(wait);
+  DEFINE_WAIT_FUNC(wait, woken_wake_function);
  int err;

   if (scp->state != DN_CR)
   @@ -833,11 +833,11 @@
    scp->segsize_loc = dst_metric_advmss(__sk_dst_get(sk));
   dn_send_conn_conf(sk, allocation);

   -prepare_to_wait(sk_sleep(sk), &wait, TASK_INTERRUPTIBLE);
   +add_wait_queue(sk_sleep(sk), &wait);
    for(;;) {
     release_sock(sk);
     if (scp->state == DN_CC)
-     -*timeo = schedule_timeout(*timeo);
+     -*timeo = wait_woken(&wait, TASK_INTERRUPTIBLE, *timeo);
      lock_sock(sk);
      err = 0;
      if (scp->state == DN_RUN)
-     @@ -851,9 +851,8 @@
       err = -EAGAIN;
      if (!*timeo)
         break;
-    -prepare_to_wait(sk_sleep(sk), &wait, TASK_INTERRUPTIBLE);
- } 
-    -finish_wait(sk_sleep(sk), &wait);
+    +remove_wait_queue(sk_sleep(sk), &wait);
    if (err == 0) {
      sk->sk_socket->state = SS_CONNECTED;
    } else if (scp->state != DN_CC) {
@@ -865,7 +864,7 @@
 static int dn_wait_run(struct sock *sk, long *timeo)
 { 
 struct dn_scp *scp = DN_SK(sk);
if (scp->state == DN_RUN)
@@ -874,11 +873,11 @@
if (!*timeo)
return -EALREADY;

-prepare_to_wait(sk_sleep(sk), &wait, TASK_INTERRUPTIBLE);
+add_wait_queue(sk_sleep(sk), &wait);
for(;;) {
release_sock(sk);
if (scp->state == DN_CI || scp->state == DN_CC)
-  *timeo = schedule_timeout(*timeo);
+  *timeo = wait_woken(&wait, TASK_INTERRUPTIBLE, *timeo);
lock_sock(sk);
err = 0;
if (scp->state == DN_RUN)
@@ -892,9 +891,8 @@
  err = -ETIMEDOUT;
if (!*timeo)
break;
-prepare_to_wait(sk_sleep(sk), &wait, TASK_INTERRUPTIBLE);
}
-finish_wait(sk_sleep(sk), &wait);
+remove_wait_queue(sk_sleep(sk), &wait);
out:
if (err == 0) {
  sk->sk_socket->state = SS_CONNECTED;
@@ -1039,16 +1037,16 @@

static struct sk_buff *dn_wait_for_connect(struct sock *sk, long *timeo)
{
-DEFINITION_WAIT(wait);
+DEFINITION_WAIT_FUNC(wait, woken_wake_function);
struct sk_buff *skb = NULL;
int err = 0;

-prepare_to_wait(sk_sleep(sk), &wait, TASK_INTERRUPTIBLE);
+add_wait_queue(sk_sleep(sk), &wait);
for(;;) {
release_sock(sk);
skb = skb_dequeue(&sk->sk_receive_queue);
if (skb == NULL) {
-  *timeo = schedule_timeout(*timeo);
+  *timeo = wait_woken(&wait, TASK_INTERRUPTIBLE, *timeo);
  skb = skb_dequeue(&sk->sk_receive_queue);
lock_sock(sk);
@@ -1063,9 +1061,8 @@

err = -EAGAIN;
if (!*timeo)
break;
-prepare_to_wait(sk_sleep(sk), &wait, TASK_INTERRUPTIBLE);
}
finish_wait(sk_sleep(sk), &wait);
+remove_wait_queue(sk_sleep(sk), &wait);

return skb == NULL ? ERR_PTR(err) : skb;
}
@@ -1338,6 +1335,12 @@
lock_sock(sk);
err = __dn_setsockopt(sock, level, optname, optval, optlen, 0);
release_sock(sk);
+#ifdef CONFIG_NETFILTER
/* we need to exclude all possible ENOPROTOOPTs except default case */
+if (err == -ENOPROTOOPT && optname != DSO_LINKINFO &&
+    optname != DSO_STREAM && optname != DSO_SEQPACKET)
+err = nf_setsockopt(sk, PF_DECnet, optname, optval, optlen);
+#endif

return err;
}
@@ -1445,15 +1448,6 @@
dn_nsp_send_disc(sk, 0x38, 0, sk->sk_allocation);
break;

-default:
-#ifdef CONFIG_NETFILTER
-return nf_setsockopt(sk, PF_DECnet, optname, optval, optlen);
-#endif
-case DSO_LINKINFO:
-case DSO_STREAM:
-case DSO_SEQPACKET:
-return -ENOPROTOOPT;
-
case DSO_MAXWINDOW:
if (optlen != sizeof(unsigned long))
return -EINVAL;
@@ -1501,6 +1495,12 @@
return -EINVAL;
scp->info_loc = u.info;
break;
+case DSO_LINKINFO:
+case DSO_STREAM:
+case DSO_SEQPACKET:
+default:
+return -ENOPROTOOPT;
}

return 0;
@@ -1514,6 +1514,20 @@
lock_sock(sk);
err = __dn_getsockopt(sock, level, optname, optval, optlen, 0);
release_sock(sk);
+#ifdef CONFIG_NETFILTER
+if (err == -ENOPROTOOPT && optname != DSO_STREAM &&
+    optname != DSO_SEQPACKET && optname != DSO_CONACCEPT &&
+    optname != DSO_CONREJECT) {
+int len;
+
+if (get_user(len, optlen))
+return -EFAULT;
+
+err = nf_getsockopt(sk, PF_DECnet, optname, optval, &len);
+if (err >= 0)
+err = put_user(len, optlen);
+}
+#endif

return err;
}
@@ -1579,26 +1593,6 @@
r_data = &link;
break;

-ifdef CONFIG_NETFILTER
-{    
-int ret, len;
-
-if (get_user(len, optlen))
-return -EFAULT;
-
-ret = nf_getsockopt(sk, PF_DECnet, optname, optval, &len);
-if (ret >= 0)
-ret = put_user(len, optlen);
-}
-ifdef
-case DSO_STREAM:
-case DSO_SEQPACKET:
- case DSO_CONACCEPT:
- case DSO_CONREJECT:
- return -ENOPROTOOPT;
-
case DSO_MAXWINDOW:
if (r_len > sizeof(unsigned long))
r_len = sizeof(unsigned long);
@@ -1630,6 +1624,13 @@
r_len = sizeof(unsigned char);
r_data = &scp->info_rem;
break;
+
case DSO_STREAM:
case DSO_SEQPACKET:
case DSO_CONACCEPT:
case DSO_CONREJECT:
case DSO_SEQPACKET:
case DSO_CONACCEPT:
case DSO_CONREJECT:
case DSO_SEQPACKET:
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case DSO_SEQPACKET:
case DSO_CONACCEPT:
case DSO_CONREJECT:
case DSO_SEQPACKET:
case DSO_CONACCEPT:
case DSO_CONREJECT:
}

if (r_data) {
--- linux-4.15.0.orig/net/decnet/dn_dev.c
+++ linux-4.15.0/net/decnet/dn_dev.c
@@ -56,7 +56,7 @@
 #include <net/dn_neigh.h>
 #include <net/dn_fib.h>

- #define DN_IFREQ_SIZE (sizeof(struct ifreq) - sizeof(struct sockaddr) + sizeof(struct sockaddr_dn))
+ #define DN_IFREQ_SIZE (offsetof(struct ifreq, ifr_ifru) + sizeof(struct sockaddr_dn))

 static char dn_rt_all_end_mcast[ETH_ALEN] = {0xAB,0x00,0x00,0x04,0x00,0x00};
 static char dn_rt_all_rt_mcast[ETH_ALEN]  = {0xAB,0x00,0x00,0x03,0x00,0x00};
--- linux-4.15.0.orig/net/decnet/dn_route.c
+++ linux-4.15.0/net/decnet/dn_route.c
@@ -118,7 +118,8 @@
 static struct dst_entry *dn_dst_negative_advice(struct dst_entry *);
 static void dn_dst_link_failure(struct sk_buff *);
 static void dn_dst_update_pmtu(struct dst_entry *dst, struct sock *sk,
- struct sk_buff *skb , u32 mtu);
+ struct sk_buff *skb , u32 mtu,
+ bool confirm_neigh);
 static void dn_dst_redirect(struct dst_entry *dst, struct sock *sk,
 struct sk_buff *skb);
 static struct neighbour *dn_dst_neigh_lookup(const struct dst_entry *dst,
- @@ -259,7 +260,8 @@
  * advertise to the other end).
+ * advertise to the other end).
+ */
 static void dn_dst_update_pmtu(struct dst_entry *dst, struct sock *sk,
struct sk_buff *skb, u32 mtu)
+
+ struct sk_buff *skb, u32 mtu,
+   bool confirm_neigh)
{
struct dn_route *rt = (struct dn_route *) dst;
struct neighbour *n = rt->n;
...
memcpy(optval, eq, next_opt - eq);
+optval[next_opt - eq] = '\0';
+
=} else {
+opt_nlen = opt_len;
+optval[0] = '\0';
+
+}
+
+kdebug("option '%*.*s' val '\%s'",
  + opt_nlen, opt_nlen, opt, optval);

/* see if it's an error number representing a DNS error
 * that's to be recorded as the result in this key */
if (opt_nlen == sizeof(DNS_ERRORNO_OPTION) - 1 &&
    memcmp(opt, DNS_ERRORNO_OPTION, opt_nlen) == 0) {
    kdebug("dns error number option");
    -if (opt_vlen <= 0)
    -goto bad_option_value;
    
    -ret = kstrtoul(eq, 10, &derrno);
    +ret = kstrtoul(optval, 10, &derrno);
    if (ret < 0)
        goto bad_option_value;

    @@ -127,10 +132,8 @@
}

bad_option_value:
-printk(KERN_WARNING
    -  "Option '%*.*s' to dns_resolver key:
    -    " bad/missing value\n",
    -  opt_nlen, opt_nlen, opt);
+pr_warn_ratelimited("Option '%*.*s' to dns_resolver key: bad/missing value\n",
    + opt_nlen, opt_nlen, opt);
    return -EINVAL;
} while (opt = next_opt + 1, opt < end);

@@ -239,7 +242,7 @@
* - the key's semaphore is read-locked
*/
static long dns_resolver_read(const struct key *key,
    - char __user *buffer, size_t buflen)
    + char *buffer, size_t buflen)
{
    int err = PTR_ERR(key->payload.data[dns_key_error]);

    --- linux-4.15.0.orig/net/dsa/dsa.c
    +++ linux-4.15.0/net/dsa/dsa.c
    @@ -259,15 +259,22 @@


rc = dsa_slave_register_notifier();
if (rc)
    return rc;
+goto register_notifier_fail;
rc = dsa_legacy_register();
if (rc)
    return rc;
+goto legacy_register_fail;
dev_add_pack(&dsa_pack_type);

return 0;
+
+legacy_register_fail:
+dsa_slave_unregister_notifier();
+register_notifier_fail:
+destroy_workqueue(dsa_owq);
+
+return rc;
} 
module_init(dsa_init_module);

--- linux-4.15.0.orig/net/dsa/dsa2.c
+++ linux-4.15.0/net/dsa/dsa2.c
@@ -49,7 +49,7 @@
    dst->index = index;

    INIT_LIST_HEAD(&dst->list);
    -list_add_tail(&dsa_tree_list, &dst->list);
    +list_add_tail(&dst->list, &dsa_tree_list);

    kref_init(&dst->refcount);

@@ -258,11 +258,14 @@
 static int dsa_port_setup(struct dsa_port *dp)
 {
     struct dsa_switch *ds = dp->ds;
    -int err;
    +int err = 0;

     memset(&dp->devlink_port, 0, sizeof(dp->devlink_port));
     +dp->mac = of_get_mac_address(dp->dn);

     -err = devlink_port_register(ds->devlink, &dp->devlink_port, dp->index);
     +if (dp->type != DSA_PORT_TYPE_UNUSED)
         +err = devlink_port_register(ds->devlink, &dp->devlink_port,
static void dsa_port_teardown(struct dsa_port *dp)
{
    devlink_port_unregister(&dp->devlink_port);
    if (dp->type != DSA_PORT_TYPE_UNUSED)
        devlink_port_unregister(&dp->devlink_port);

    switch (dp->type) {
    case DSA_PORT_TYPE_UNUSED:
        break;
    case DSA_PORT_TYPE_USER:
        break;
    case DSA_PORT_TYPE_SLAVE:
        break;
    }
    
    err = dsa_switch_setup(ds);
    if (err)
        return err;
    
    for (port = 0; port < ds->num_ports; port++) {
        dp = &ds->ports[port];
        struct dsa_port *cpu_dp = dev->dsa_ptr;
        struct dsa_switch_tree *dst = cpu_dp->dst;
        struct dsa_switch *ds;
        struct dsa_port *slave_port;

        if (device < 0 || device >= DSA_MAX_SWITCHES)
            return NULL;
        if (port < 0 || port >= ds->num_ports)
            return NULL;

        if (unlikely(slave_port->type != DSA_PORT_TYPE_USER))
            return NULL;
        return slave_port->slave;
    }

    /* port.c */

    -- linux-4.15.0.orig/net/dsa/legacy.c
+++ linux-4.15.0/net/dsa/legacy.c
@@ -194,7 +194,7 @@
    ds->ports[i].dn = cd->port_dn[i];
    ds->ports[i].cpu_dp = dst->cpu_dp;

-if (dsa_is_user_port(ds, i))
+if (!dsa_is_user_port(ds, i))
    continue;

    ret = dsa_slave_create(&ds->ports[i]);
--- linux-4.15.0.orig/net/dsa/master.c
+++ linux-4.15.0/net/dsa/master.c
@@ -55,8 +55,7 @@
    struct dsa_switch *ds = cpu_dp->ds;
    int port = cpu_dp->index;
    int len = ETH_GSTRING_LEN;
-   int mcount = 0, count;
-   unsigned int i;
+   int mcount = 0, count, i;
    uint8_t pfx[4];
    uint8_t *ndata;

@@ -77,6 +76,8 @@
 */
    ds->ops->get_strings(ds, port, ndata);
    count = ds->ops->get_sset_count(ds);
+   if (count < 0)
+      return;
    for (i = 0; i < count; i++) {
        memmove(ndata + (i * len + sizeof(pfx)),
                ndata + i * len, len - sizeof(pfx));
@@ -116,6 +117,8 @@
    cpu_dp->orig_ethtool_ops = NULL;
  }

+static struct lock_class_key dsa_master_addr_list_lock_key;
+
+int dsa_master_setup(struct net_device *dev, struct dsa_port *cpu_dp)
+{
+/* If we use a tagging format that doesn't have an ethertype
@@ -125,6 +128,8 @@
    wmb();

    dev->dsa_ptr = cpu_dp;
+   lockdep_set_class(&dev->addr_list_lock, 
+                     &dsa_master_addr_list_lock_key);

    return dsa_master_ethtool_setup(dev);
int dsa_port_enable(struct dsa_port *dp, struct phy_device *phy) {
    u8 stp_state = dp->bridge_dev ? BR_STATE_BLOCKING : BR_STATE_FORWARDING;
    struct dsa_switch *ds = dp->ds;
    int port = dp->index;
    int err;
    return err;
}

dsa_port_set_state_now(dp, stp_state);
+if (!dp->bridge_dev)
+dsa_port_set_state_now(dp, BR_STATE_FORWARDING);

return 0;
}

dsa_port_set_state_now(dp, BR_STATE_DISABLED);
+if (!dp->bridge_dev)
+dsa_port_set_state_now(dp, BR_STATE_DISABLED);

if (ds->ops->port_disable)
ds->ops->port_disable(ds, port, phy);

if (dev->flags & IFF_UP) {
    if (change & IFF_ALLMULTI)
        dev_set_allmulti(master, dev->flags & IFF_ALLMULTI ? 1 : -1);
    if (change & IFF_PROMISC)
        dev_set_promiscuity(master, dev->flags & IFF_PROMISC ? 1 : -1);
    +if (dev->flags & IFF_UP) {
        +if (change & IFF_ALLMULTI)
            dev_set_allmulti(master,
+    +    dev->flags & IFF_ALLMULTI ? 1 : -1);
        +if (change & IFF_PROMISC)
            dev_set_promiscuity(master,
+    +    dev->flags & IFF_PROMISC ? 1 : -1);
static void dsa_slave_set_rx_mode(struct net_device *dev)
@@ -555,13 +559,15 @@
     {dp->ds};
     struct dsa_switch *ds = dp->ds;
     
     if (sset == ETH_SS_STATS) {
         -int count;
         +int count = 0;
     
         -count = 4;
     -if (ds->ops->get_sset_count)
         -count += ds->ops->get_sset_count(ds);
         +if (ds->ops->get_sset_count) {
             +count = ds->ops->get_sset_count(ds);
             +if (count < 0)
                 +return count;
         +}
     
     -return count;
     +return count + 4;
 }

 return -EOPNOTSUPP;
@@ -1119,6 +1125,9 @@
     {dp->ds};
     struct dsa_slave_priv *p = netdev_priv(slave_dev);

     +if (!netif_running(slave_dev))
         +return 0;
     +
     netif_device_detach(slave_dev);

     if (slave_dev->phydev) {
@@ -1134,7 +1143,10 @@
     int dsa_slave_resume(struct net_device *slave_dev)
         {dp->ds};
         struct dsa_slave_priv *p = netdev_priv(slave_dev);

         if (slave_dev->phydev) {
               +return 0;
     +
     netif_device_attach(slave_dev);

         if (slave_dev->phydev) {
               +slave_dev->features | NETIF_F_HW_TC;
         slave_dev->hw_features |= NETIF_F_HW_TC;
slave_dev->ethtool_ops = &dsa_slave_ethtool_ops;
-eth_hw_addr_inherit(slave_dev, master);
+if (port->mac && is_valid_ether_addr(port->mac))
+ether_addr_copy(slave_dev->dev_addr, port->mac);
+else
+eth_hw_addr_inherit(slave_dev, master);
slave_dev->priv_flags |= IFF_NO_QUEUE;
slave_dev->netdev_ops = &dsa_slave_netdev_ops;
slave_dev->switchdev_ops = &dsa_slave_switchdev_ops;
--- linux-4.15.0.orig/net/dsa/tag_brcm.c
+++ linux-4.15.0/net/dsa/tag_brcm.c
@@ -129,6 +129,8 @@
/* Remove Broadcom tag and update checksum */
skb_pull_rcsum(skb, BRCM_TAG_LEN);

+skb->offload_fwd_mark = 1;
+
+return skb;
}
--- linux-4.15.0.orig/net/dsa/tag_edsa.c
+++ linux-4.15.0/net/dsa/tag_edsa.c
@@ -17,6 +17,16 @@
#define DSA_HLEN	4
#define EDSA_HLEN	8

+#define FRAME_TYPE_TO_CPU	0x00
+#define FRAME_TYPE_FORWARD	0x03
+
+#define TO_CPU_CODE_MGMT_TRAP	0x00
+#define TO_CPU_CODE_FRAME2REG	0x01
+#define TO_CPU_CODE_IGMP_MLD_TRAP	0x02
+#define TO_CPU_CODE_POLICY_TRAP	0x03
+#define TO_CPU_CODE_ARP_MIRROR	0x04
+#define TO_CPU_CODE_POLICY_MIRROR	0x05
+
static struct sk_buff *edsa_xmit(struct sk_buff *skb, struct net_device *dev)
{
 struct dsa_port *dp = dsa_slave_to_port(dev);
 @ @ -81,6 +91,8 @@
 struct packet_type *pt)
 {
 u8 *edsa_header;
+int frame_type;
+int code;
+int source_device;
+int source_port;
/*
 * Check that frame type is either TO_CPU or FORWARD.
 */
-if ((edsa_header[0] & 0xc0) != 0x00 && (edsa_header[0] & 0xc0) != 0xc0)
+frame_type = edsa_header[0] >> 6;
+
+switch (frame_type) {
+  case FRAME_TYPE_TO_CPU:
+    code = (edsa_header[1] & 0x6) | ((edsa_header[2] >> 4) & 1); 
+    /*
+     * Mark the frame to never egress on any port of the same switch
+     * unless it's a trapped IGMP/MLD packet, in which case the
+     * bridge might want to forward it.
+     */
+    +if (code != TO_CPU_CODE_IGMP_MLD_TRAP)
+      skb->offload_fwd_mark = 1;
+      +break;
+      +
+    +case FRAME_TYPE_FORWARD:
+      skb->offload_fwd_mark = 1;
+      +break;
+      +
+    +default:
+      return NULL;
+    +}
+
/*
 * Determine source device and port.
 */
- skb->offload_fwd_mark = 1;
-
return skb;

static struct sk_buff *mtk_tag_xmit(struct sk_buff *skb,  
    struct net_device *dev)  
{  
    struct dsa_port *dp = dsa_slave_to_port(dev);  
    u8 *mtk_tag;  
    unsigned char *dest = eth_hdr(skb)->h_dest;  
    bool is_multicast_skb = is_multicast_ether_addr(dest) &&  
    !is_broadcast_ether_addr(dest);  

    if (skb_cow_head(skb, MTK_HDR_LEN) < 0)  
        return NULL;  
    @ @ -40,6 +44,10 @ @  
    mtk_tag[2] = 0;  
    mtk_tag[3] = 0;  

    /* Disable SA learning for multicast frames */  
    if (unlikely(is_multicast_skb))  
        mtk_tag[1] |= MTK_HDR_XMIT_SA_DIS;  
    return skb;  
}

@@ -48,6 +56,9 @@
{
    int port;  
    __be16 *phdr, hdr;  
    unsigned char *dest = eth_hdr(skb)->h_dest;  
    bool is_multicast_skb = is_multicast_ether_addr(dest) &&  
    !is_broadcast_ether_addr(dest);  

    if (unlikely(!pskb_may_pull(skb, MTK_HDR_LEN)))  
        return NULL;  
    @ @ -73,6 +84,10 @ @  
    if (!skb->dev)  
        return NULL;  

    /* Only unicast or broadcast frames are offloaded */  
    if (likely(!is_multicast_skb))  
        skb->offload_fwd_mark = 1;  
    return skb;  
}

--- linux-4.15.0.orig/net/dsa/tag_qca.c
+++ linux-4.15.0/net/dsa/tag_qca.c
@@ -41,10 +41,7 @@
    struct dsa_port *dp = dsa_slave_to_port(dev);  
    u16 *phdr, hdr;  

-dev->stats.tx_packets++;  
-dev->stats.tx_bytes += skb->len;  
-
-if (skb_cow_head(skb, 0) < 0)  
+if (skb_cow_head(skb, QCA_HDR_LEN) < 0)  
return NULL;

skb_push(skb, QCA_HDR_LEN);
--- linux-4.15.0.orig/net/dsa/tag_trailer.c  
+++ linux-4.15.0/net/dsa/tag_trailer.c  
@@ -75,7 +75,8 @@  
if (!skb->dev)  
return NULL;

-pskb_trim_rcsum(skb, skb->len - 4);  
+if (pskb_trim_rcsum(skb, skb->len - 4))  
+return NULL;

return skb;
}
--- linux-4.15.0.orig/net/ethernet/eth.c  
+++ linux-4.15.0/net/ethernet/eth.c  
@@ -239,7 +239,12 @@  
  hh->hh_len = ETH_HLEN;
 +  
+/* Pairs with READ_ONCE() in neigh_resolve_output(),  
+ * neigh_hh_output() and neigh_update_hhs().  
+ */  
+smp_store_release(&hh->hh_len, ETH_HLEN);
 +  
+return 0;
}  
EXPORT_SYMBOL(eth_header_cache);
--- linux-4.15.0.orig/net/hsr/hsr_device.c  
+++ linux-4.15.0/net/hsr/hsr_device.c  
@@ -94,9 +94,8 @@  
&& (old_operstate != IF_OPER_UP)) {  
/* Went up */  
hsr->announce_count = 0;
-hsr->announce_timer.expires = jiffies +
-msecs_to_jiffies(HSR_ANNOUNCE_INTERVAL);  
+add_timer(&hsr->announce_timer);
+mod_timer(&hsr->announce_timer,  
+         jiffies + msecs_to_jiffies(HSR_ANNOUNCE_INTERVAL));

---
if ((hsr_dev->operstate != IF_OPER_UP) && (old_operstate == IF_OPER_UP))
    skb->dev->dev_addr, skb->len) <= 0)
    goto out;
    skb_reset_mac_header(skb);
    skb_reset_network_header(skb);
    skb_reset_transport_header(skb);

    if (hsrVer > 0) {
        hsr_tag = skb_put(skb, sizeof(struct hsr_tag));
    }
    struct hsr_priv *hsr;
    struct hsr_port *master;
    unsigned long interval;

    hsr = from_timer(hsr, t, announce_timer);

    hsr->protVersion);
    hsr->announce_count++;

    -hsr->announce_timer.expires = jiffies +
    -msecs_to_jiffies(HSR_ANNOUNCE_INTERVAL);
    +interval = msecs_to_jiffies(HSR_ANNOUNCE_INTERVAL);
    } else {
    send_hsr_supervision_frame(master, HSR_TLV_LIFE_CHECK,
    hsr->protVersion);

    -hsr->announce_timer.expires = jiffies +
    -msecs_to_jiffies(HSR_LIFE_CHECK_INTERVAL);
    +interval = msecs_to_jiffies(HSR_LIFE_CHECK_INTERVAL);
    }

    if (is_admin_up(master->dev))
    -add_timer(&hsr->announce_timer);
    +mod_timer(&hsr->announce_timer, jiffies + interval);

    rcu_read_unlock();
}

res = hsr_add_port(hsr, hsr_dev, HSR_FT_MASTER);
    if (res)
    -return res;
    +goto err_add_port;
res = register_netdevice(hsr_dev);
if (res)
@@ -506,6 +506,8 @@
fail:
hsr_for_each_port(hsr, port)
hsr_del_port(port);
+err_add_port:
+hsr_del_node(&hsr->self_node_db);

return res;
}
--- linux-4.15.0.orig/net/hsr/hsr_framereg.c
+++ linux-4.15.0/net/hsr/hsr_framereg.c
@@ -124,6 +124,18 @@
return 0;
}

+void hsr_del_node(struct list_head *self_node_db)
+{
+ struct hsr_node *node;
+ +rcu_read_lock();
+ node = list_first_or_null_rcu(self_node_db, struct hsr_node, mac_list);
+rcu_read_unlock();
+if (node) {
+kfree(node);
+}
+
/* Allocate an hsr_node and add it to node_db. 'addr' is the node's AddressA;
 * seq_out is used to initialize filtering of outgoing duplicate frames
@@ -298,7 +310,8 @@
node_dst = find_node_by_AddrA(&port->hsr->node_db, eth_hdr(skb)->h_dest);
if (node_dst) {
-WARN_ONCE(1, "%s: Unknown node\n", __func__);
+if (net_ratelimit())
+netdev_err(skb->dev, "%s: Unknown node\n", __func__);
return;
}
if (port->type != node_dst->AddrB_port)
@@ -454,13 +467,9 @@
struct hsr_port *port;
unsigned long tdiff;

-
-rcu_read_lock();
node = find_node_by_AddrA(&hsr->node_db, addr);
-if (!node) {
-rcu_read_unlock();
-return -ENOENT;/* No such entry */
-
+if (!node)
+return -ENOENT;

ether_addr_copy(addr_b, node->MacAddressB);

@@ -495,7 +504,5 @@
*addr_b_ifindex = -1;
}

-rcu_read_unlock();
-
return 0;
}
--- linux-4.15.0.orig/net/hsr/hsr_framereg.h
+++ linux-4.15.0/net/hsr/hsr_framereg.h
@@ -16,6 +16,7 @@
struct hsr_node;

+void hsr_del_node(struct list_head *self_node_db);
struct hsr_node *hsr_add_node(struct list_head *node_db, unsigned char addr[],
u16 seq_out);
struct hsr_node *hsr_get_node(struct hsr_port *port, struct sk_buff *skb,
--- linux-4.15.0.orig/net/hsr/hsr_netlink.c
+++ linux-4.15.0/net/hsr/hsr_netlink.c
@@ -64,10 +64,16 @@
else
multicast_spec = nla_get_u8(data[IFLA_HSR_MULTICAST_SPEC]);

-if (!data[IFLA_HSR_VERSION])
+if (!data[IFLA_HSR_VERSION]) {
hsr_version = 0;
-else
+} else {
hsr_version = nla_get_u8(data[IFLA_HSR_VERSION]);
+if (hsr_version > 1) {
+NL_SET_ERR_MSG_MOD(extack,
+"Only versions 0..1 are supported");
+return -EINVAL;
+}
+}
return hsr_dev_finalize(dev, link, multicast_spec, hsr_version);
}
@@ -259,17 +265,16 @@
if (!na)
goto invalid;

-hsr_dev = __dev_get_by_index(genl_info_net(info),
-nla_get_u32(info->attrs[HSR_A_IFINDEX]));
+rcu_read_lock();
+hsr_dev = dev_get_by_index_rcu(genl_info_net(info),
+ nla_get_u32(info->attrs[HSR_A_IFINDEX]));
if (!hsr_dev)
-goto invalid;
+goto rcu_unlock;
if (!is_hsr_master(hsr_dev))
-goto invalid;
-
+goto rcu_unlock;

/* Send reply */
-
-skb_out = genlmsg_new(NLMSG_GOODSIZE, GFP_KERNEL);
+skb_out = genlmsg_new(NLMSG_GOODSIZE, GFP_ATOMIC);
if (!skb_out) {
res = -ENOMEM;
goto fail;
@@ -321,12 +326,10 @@
res = nla_put_u16(skb_out, HSR_A_IF1_SEQ, hsr_node_if1_seq);
if (res < 0)
goto nla_put_failure;

res = nla_put_u32(skb_out, HSR_A_IF1_IFINDEX,
-port->dev->ifindex);
-rcu_read_unlock();
if (res < 0)
goto nla_put_failure;

@@ -336,20 +339,22 @@
res = nla_put_u16(skb_out, HSR_A_IF2_SEQ, hsr_node_if2_seq);
if (res < 0)
goto nla_put_failure;

res = nla_put_u32(skb_out, HSR_A_IF2_IFINDEX,
-port->dev->ifindex);
-rcu_read_unlock();
if (res < 0)
goto nla_put_failure;

@@ -366,20 +369,22 @@
res = nla_put_u16(skb_out, HSR_A_IF2_SEQ, hsr_node_if2_seq);
if (res < 0)
goto nla_put_failure;

rcu_read_lock();
port = hsr_port_get_hsr(hsr, HSR_PT_SLAVE_B);
if (port)
res = nla_put_u32(skb_out, HSR_A_IF2_IFINDEX,
-port->dev->ifindex);
-rcu_read_unlock();
if (res < 0)
goto nla_put_failure;


-rcu_read_unlock();
if (res < 0)
goto nla_put_failure;

+rcu_read_unlock();
+
genlmsg_end(skb_out, msg_head);
genlmsg_unicast(genl_info_net(info), skb_out, info->snd_portid);

return 0;

+rcu_unlock:
+rcu_read_unlock();
invalid:
netlink_ack(skb_in, nlmsg_hdr(skb_in), -EINVAL, NULL);
return 0;
@@ -359,6 +364,7 @@*/
/* Fall through */
fail:
+rcu_read_unlock();
return res;
}

@@ -366,16 +372,14 @@*/
static int hsr_get_node_list(struct sk_buff *skb_in, struct genl_info *info)
{
-/* For receiving */
-struct nlattr *na;
+unsigned char addr[ETH_ALEN];
struct net_device *hsr_dev;
-
-/* For sending */
struct sk_buff *skb_out;
-void *msg_head;
struct hsr_priv *hsr;
-void *pos;
-unsigned char addr[ETH_ALEN];
+bool restart = false;
+struct nlattr *na;
+void *pos = NULL;
+void *msg_head;
int res;

if (!info)
@@ -385,17 +389,17 @@*/
if (!na)
goto invalid;

- hsr_dev = __dev_get_by_index(genl_info_net(info), 
  - nla_get_u32(info->attrs[HSR_A_IFINDEX]));
+rcu_read_lock();
+hsr_dev = dev_get_by_index_rcu(genl_info_net(info),
  + nla_get_u32(info->attrs[HSR_A_IFINDEX]));
if (!hsr_dev)
  -goto invalid;
+goto rcu_unlock;
if (!is_hsr_master(hsr_dev))
  -goto invalid;
-
+goto rcu_unlock;

+restart:
/* Send reply */
-
-skbi_out = genlmsg_new(NLMSG_GOODSIZE, GFP_KERNEL);
+skb_out = genlmsg_new(GENLMSG_DEFAULT_SIZE, GFP_ATOMIC);
if (!skb_out) {
  res = -ENOMEM;
goto fail;
@@ -409,18 +413,26 @@
goto nla_put_failure;
}

-res = nla_put_u32(skb_out, HSR_A_IFINDEX, hsr_dev->ifindex);
-if (res < 0)
  -goto nla_put_failure;
+if (!restart) {
+  res = nla_put_u32(skb_out, HSR_A_IFINDEX, hsr_dev->ifindex);
+  if (res < 0)
+    goto nla_put_failure;
+}

hsr = netdev_priv(hsr_dev);

-rcu_read_lock();
-pos = hsr_get_next_node(hsr, NULL, addr);
+if (!pos)
+  pos = hsr_get_next_node(hsr, NULL, addr);
while (pos) {
  res = nla_put(skb_out, HSR_A_NODE_ADDR, ETH_ALEN, addr);
  if (res < 0) {
    -rcu_read_unlock();
+    if (res == -EMSGSIZE) {
+      genlmsg_end(skb_out, msg_head);
  }}

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+genlmsg_unicast(genl_info_net(info), skb_out,
+info->snd_portid);
+restart = true;
+goto restart;
+}
+goto nla_put_failure;
}

pos = hsr_get_next_node(hsr, pos, addr);
@@ -432,15 +444,18 @@
return 0;

+rcu_unlock:
+rcu_read_unlock();
invalid:
netlink_ack(skb_in, nlmsg_hdr(skb_in), -EINVAL, NULL);
return 0;

nla_put_failure:
-kfree_skb(skb_out);
+nlmsg_free(skb_out);
/* Fall through */

fail:
+rcu_read_unlock();
return res;
}

@@ -467,6 +482,7 @@
   .name = "HSR",
   .version = 1,
   .maxattr = HSR_A_MAX,
+   .netnsok = true,
   .module = THIS_MODULE,
   .ops = hsr_ops,
   .n_ops = ARRAY_SIZE(hsr_ops),
--- linux-4.15.0.orig/net/hsr/hsr_slave.c
+++ linux-4.15.0/net/hsr/hsr_slave.c
@@ -32,6 +32,8 @@
rcu_read_lock(); /* hsr->node_db, hsr->ports */
port = hsr_port_get_rcu(skb->dev);
+if (!port)
+goto finish_pass;
if (hsr_addr_is_self(port->hsr, eth_hdr(skb)->h_source)) { /* Directly kill frames sent by ourselves */
@@ -150,16 +152,16 @@
if (port == NULL)
return -ENOMEM;

+port->hsr = hsr;
+port->dev = dev;
+port->type = type;
+
if (type != HSR_PT_MASTER) {
res = hsr_portdev_setup(dev, port);
if (res)
goto fail_dev_setup;
}

-port->hsr = hsr;
-port->dev = dev;
-port->type = type;
-
list_add_tail_rcu(&port->port_list, &hsr->ports);
synchronize_rcu();

--- linux-4.15.0.orig/net/ieee802154/6lowpan/6lowpan_i.h
+++ linux-4.15.0/net/ieee802154/6lowpan/6lowpan_i.h
@@ -17,37 +17,19 @@
#define LOWPAN_DISPATCH_FRAG1           0xc0
#define LOWPAN_DISPATCH_FRAGN           0xe0

-struct lowpan_create_arg {
+struct frag_lowpan_compare_key {
  u16 tag;
  u16 d_size;
  -const struct ieee802154_addr *src;
  -const struct ieee802154_addr *dst;
  +struct ieee802154_addr src;
  +struct ieee802154_addr dst;
};

-/* Equivalent of ipv4 struct ip
+/* Equivalent of ipv4 struct ipq
 */
 struct lowpan_frag_queue {
 struct inet_frag_queueq;
 -
  -u16 tag;
  -u16 d_size;
  -struct ieee802154_addr addrsrc;
  -struct ieee802154_addrdaddr;
};
-static inline u32 ieee802154_addr_hash(const struct ieee802154_addr *a) 
{-
-switch (a->mode) {
-\case IEEE802154_ADDR_LONG:
-\return (((__force u64)a->extended_addr) >> 32) ^
-\(((__force u64)a->extended_addr) & 0xffffffff);
-\case IEEE802154_ADDR_SHORT:
-\return ((__force u32)(a->short_addr + (a->pan_id << 16));
-\default:
-\return 0;
-}
-}

int lowpan_frag_rcv(struct sk_buff *skb, const u8 frag_type);
void lowpan_net_frag_exit(void);
int lowpan_net_frag_init(void);
--- linux-4.15.0.orig/net/ieee802154/6lowpan/core.c
+++ linux-4.15.0/net/ieee802154/6lowpan/core.c
@@ -90,12 +90,18 @@
return 0;
}
+
static int lowpan_get_iflink(const struct net_device *dev)
+
+return lowpan_802154_dev(dev)->wdev->ifindex;
+}
+
static const struct net_device_ops lowpan_netdev_ops = {
 .ndo_init = lowpan_dev_init,
 .ndo_start_xmit = lowpan_xmit,
 .ndo_open = lowpan_open,
 .ndo_stop = lowpan_stop,
 .ndo_neigh_construct = lowpan_neigh_construct,
 +.ndo_get_iflink = lowpan_get_iflink,
};

static void lowpan_setup(struct net_device *ldev)
@@ -206,9 +212,13 @@
static int lowpan_device_event(struct notifier_block *unused,
 unsigned long event, void *ptr)
 {
 -struct net_device *wdev = netdev_notifier_info_to_dev(ptr);
+struct net_device *wdev = netdev_notifier_info_to_dev(ptr);
+struct net_device *ndev = netdev_notifier_info_to_dev(ptr);
 +struct wpan_dev *wpan_dev;

 -if (wdev->type != ARPHRD_IEEE802154)
+if (ndev->type != ARPHRD_IEEE802154)
 +return NOTIFY_DONE;
+wpan_dev = ndev->ieee802154_ptr;
+if (!wpan_dev)
  return NOTIFY_DONE;

switch (event) {
  @@ -217,8 +227,8 @@
  * also delete possible lowpan interfaces which belongs
  * to the wpan interface.
  */
  -if (wdev->ieee802154_ptr->lowpan_dev)
  -lowpan_dellink(wdev->ieee802154_ptr->lowpan_dev, NULL);
  +if (wpan_dev->lowpan_dev)
  +lowpan_dellink(wpan_dev->lowpan_dev, NULL);
  break;
  default:
  return NOTIFY_DONE;
  --- linux-4.15.0.orig/net/ieee802154/6lowpan/reassembly.c
  +++ linux-4.15.0/net/ieee802154/6lowpan/reassembly.c
  @@ -25,7 +25,7 @@
  #include <net/ieee802154_netdev.h>
  #include <net/6lowpan.h>
 -#include <net/ipv6.h>
 +#include <net/ipv6_frag.h>
  #include <net/inet_frag.h>
  @@@ -37,47 +37,15 @@
  static int lowpan_frag_reasm(struct lowpan_frag_queue *fq,
     struct sk_buff *prev, struct net_device *ldev);

 -static unsigned int lowpan_hash_frag(u16 tag, u16 d_size,
 -  struct ieee802154_addr *saddr,
 -  struct ieee802154_addr *daddr)
 -{
 -  -net_get_random_once(&lowpan_frags.rnd, sizeof(lowpan_frags.rnd));
 -  -return jhash_3words(ieee802154_addr_hash(saddr),
 -  -  ieee802154_addr_hash(daddr),
 -  -  (__force u32)(tag + (d_size << 16)),
 -  -  lowpan_frags.rnd);
 -}
 -
 -static unsigned int lowpan_hashfn(const struct inet_frag_queue *q)
 -{
 -  -const struct lowpan_frag_queue *fq:
 -  -fq = container_of(q, struct lowpan_frag_queue, q);
 -  -return lowpan_hash_frag(fq->tag, fq->d_size, &fq->saddr, &fq->daddr);
static bool lowpan_frag_match(const struct inet_frag_queue *q, const void *a)
{
    const struct lowpan_frag_queue *fq;
    const struct lowpan_create_arg *arg = a;

    fq = container_of(q, struct lowpan_frag_queue, q);
    return fq->tag == arg->tag && fq->d_size == arg->d_size &&
        ieee802154_addr_equal(&fq->saddr, arg->src) &&
        ieee802154_addr_equal(&fq->daddr, arg->dst);
}

static void lowpan_frag_init(struct inet_frag_queue *q, const void *a)
{
    const struct lowpan_create_arg *arg = a;
    const struct frag_lowpan_compare_key *key = a;
    struct lowpan_frag_queue *fq;

    fq = container_of(q, struct lowpan_frag_queue, q);

    fq->tag = arg->tag;
    fq->d_size = arg->d_size;
    fq->saddr = *arg->src;
    fq->daddr = *arg->dst;
    BUILD_BUG_ON(sizeof(*key) > sizeof(q->key));
    memcpy(&q->key, key, sizeof(*key));
}

static void lowpan_frag_expire(struct timer_list *t)
{
    if (fq->q.flags & INET_FRAG_COMPLETE)
        goto out;

    inet_frag_kill(&fq->q, &lowpan_frags);
    out:
    spin_unlock(&fq->q.lock);
}

static inline struct lowpan_frag_queue *
    const struct ieee802154_addr *src,
    const struct ieee802154_addr *dst)
{
    struct inet_frag_queue *q;
struct lowpan_create_arg arg;
unsigned int hash;
struct netns_ieee802154_lowpan *ieee802154_lowpan = net_ieee802154_lowpan(net);
+struct frag_lowpan_compare_key key = {};
+struct inet_frag_queue *q;
+
+key.tag = cb->d_tag;
+key.d_size = cb->d_size;
+key.src = *src;
+key.dst = *dst;
-
-arg.tag = cb->d_tag;
-arg.d_size = cb->d_size;
-arg.src = src;
-arg.dst = dst;
-
-hash = lowpan_hash_frag(cb->d_tag, cb->d_size, src, dst);
-
-q = inet_frag_find(&ieee802154_lowpan->frags,
- &lowpan_frags, &arg, hash);
-}

if (IS_ERR_OR_NULL(q)) {

+q = inet_frag_find(&ieee802154_lowpan->frags, &key);
+if (!q)
return NULL;
+
return container_of(q, struct lowpan_frag_queue, q);
}

struct sk_buff *fp, *head = fq->q.fragments;
int sum_truesize;

-inet_frag_kill(&fq->q, &lowpan_frags);
+inet_frag_kill(&fq->q);

/* Make the one we just received the head. */
if (prev) {
@@ -230,7 +193,7 @@
    struct lowpan_frag_queue *fq;
    struct net *net = dev_net(skb->dev);
    struct ieee802154_hdr hdr;
    int err;
    -struct ieee802154_cb *cb = lowpan_802154_cb(skb);
    -struct ieee802154_hdr hdr = {};
    +struct ieee802154_hdr hdr = {};
if (ieee802154_hdr_peek_addrs(skb, &hdr) < 0)
    @@ -438,7 +401,7 @@
    ret = lowpan_frag_queue(fq, skb, frag_type);
    spin_unlock(&fq->q.lock);

    inet_frag_put(&fq->q, &lowpan_frags);
+inet_frag_put(&fq->q);
    return ret;
}

@@ -448,24 +411,22 @@
}

#ifdef CONFIG_SYSCTL
-static int zero;
 static struct ctl_table lowpan_frags_ns_ctl_table[] = {
 
 .procname= "6lowpanfrag_high_thresh",
 .data= &init_net.ieee802154_lowpan.frags.high_thresh,
 -.maxlen= sizeof(int),
 +.maxlen= sizeof(unsigned long),
 .mode= 0644,
 -.proc_handler= proc_dointvec_minmax,
 +.proc_handler= proc_doulongvec_minmax,
 .extra1= &init_net.ieee802154_lowpan.frags.low_thresh
 },
 
 .procname= "6lowpanfrag_low_thresh",
 .data= &init_net.ieee802154_lowpan.frags.low_thresh,
 -.maxlen= sizeof(int),
 +.maxlen= sizeof(unsigned long),
 .mode= 0644,
 -.proc_handler= proc_dointvec_minmax,
 -.extra1= &zero,
 +.proc_handler= proc_doulongvec_minmax,
 +.extra2= &init_net.ieee802154_lowpan.frags.high_thresh
 },
 
@@ -581,14 +542,20 @@
 {
 struct netns_ieee802154_lowpan *ieee802154_lowpan =
     net_ieee802154_lowpan(net);
+int res;

 ieee802154_lowpan->frags.high_thresh = IPV6_FRAG_HIGH_THRESH;
 ieee802154_lowpan->frags.low_thresh = IPV6_FRAG_LOW_THRESH;
 ieee802154_lowpan->frags.timeout = IPV6_FRAG_TIMEOUT;
+ieee802154_lowpan->frags.f = &lowpan_frags;

-inet_frags_init_net(ieee802154_lowpan->frags);
-
-return lowpan_frags_ns_sysctl_register(net);
+res = inet_frags_init_net(ieee802154_lowpan->frags);
+if (res < 0)
+return res;
+res = lowpan_frags_ns_sysctl_register(net);
+if (res < 0)
+inet_frags_exit_net(ieee802154_lowpan->frags);
+return res;
}

static void __net_exit lowpan_frags_exit_net(struct net *net)
@@ -597,7 +564,7 @@
    net_ieee802154_lowpan(net);

    lowpan_frags_ns_sysctl_unregister(net);
-    inet_frags_exit_net(&ieee802154_lowpan->frags, &lowpan_frags);
+    inet_frags_exit_net(&ieee802154_lowpan->frags);
    }

static struct pernet_operations lowpan_frags_ops = {
@@ -605,38 +572,69 @@
    .exit = lowpan_frags_exit_net,
    };

-int __init lowpan_net_frag_init(void)
+static u32 lowpan_key_hashfn(const void *data, u32 len, u32 seed)
+{
+    int ret;
+    return jhash2(data,
+        sizeof(struct frag_lowpan_compare_key) / sizeof(u32), seed);
+}

-ret = lowpan_frags_sysctl_register();
-    if (ret)
-        return ret;
-    if (lowpan_key_hashfn);
+ret = register_pernet_subsys(&lowpan_frags_ops);
+        if (ret)
+            goto err_pernet;
+        return jhash2((const u32 *)&fq->key,
+                       sizeof(struct frag_lowpan_compare_key) / sizeof(u32), seed);
static int lowpan_obj_cmpfn(struct rhashtable_compare_arg *arg, const void *ptr)
{
    const struct frag_lowpan_compare_key *key = arg->key;
    const struct inet_frag_queue *fq = ptr;
    return !!memcmp(&fq->key, key, sizeof(*key));
}

static const struct rhashtable_params lowpan_rhash_params = {
    .head_offset = offsetof(struct inet_frag_queue, node),
    .hashfn = lowpan_key_hashfn,
    .obj_hashfn = lowpan_obj_hashfn,
    .obj_cmpfn = lowpan_obj_cmpfn,
    .automatic_shrinking = true,
};

int __init lowpan_net_frag_init(void)
{
    int ret;

    lowpan_frags.hashfn = lowpan_hashfn;
    lowpan_frags.constructor = lowpan_frag_init;
    lowpan_frags.destructor = NULL;
    lowpan_frags.qsize = sizeof(struct frag_queue);
    lowpan_frags.match = lowpan_frag_match;
    lowpan_frags.frag_expire = lowpan_frag_expire;
    lowpan_frags.frag_cache_name = lowpan_frags_cache_name;
    ret = inet_frags_init(&lowpan_frags);
    if (ret)
        goto err_pernet;
    ret = lowpan_frags_sysctl_register();
    if (ret)
        goto err_sysctl;
    ret = register_pernet_subsys(&lowpan_frags_ops);
    if (ret)
        goto err_pernet;
    return ret;
err_pernet:
    lowpan_frags_sysctl_unregister();
err_sysctl:
    inet_frags_fini(&lowpan_frags);
return ret;

}

void lowpan_net_frag_exit(void) {
    -inet_frags_fini(&lowpan_frags);
    lowpan_frags_sysctl_unregister();
    unregister_pernet_subsys(&lowpan_frags_ops);
    +inet_frags_fini(&lowpan_frags);
}
--- linux-4.15.0.orig/net/ieee802154/6lowpan/tx.c
+++ linux-4.15.0/net/ieee802154/6lowpan/tx.c
@@ -48,6 +48,9 @@
    const struct ipv6hdr *hdr = ipv6_hdr(skb);
    struct neighbour *n;

    +if (!daddr)
    +return -EINVAL;
    +
    /* TODO:
    * if this package isn't ipv6 one, where should it be routed?
    */
    @@ -265,9 +268,24 @@
    /* We must take a copy of the skb before we modify/replace the ipv6
    * header as the header could be used elsewhere
    */
    -skb = skb_unshare(skb, GFP_ATOMIC);
    -if (!skb)
    -return NET_XMIT_DROP;
    +if (unlikely(skb_headroom(skb) < ldev->needed_headroom ||
    + skb_tailroom(skb) < ldev->needed_tailroom)) {
    +struct sk_buff *nskb;
    +
    +nskb = skb_copy_expand(skb, ldev->needed_headroom,
    + ldev->needed_tailroom, GFP_ATOMIC);
    +if (likely(nskb)) {
    +consume_skb(skb);
    +#skb = nskb;
    +} else {
    +#free_skb(skb);
    +#return NET_XMIT_DROP;
    +#}
    +} else {
    +#skb = skb_unshare(skb, GFP_ATOMIC);
    +if (!skb)
    +#return NET_XMIT_DROP;
    +#}
ret = lowpan_header(skb, ldev, &dgram_size, &dgram_offset);
if (ret < 0) {
    --- linux-4.15.0.orig/net/ieee802154/nl-mac.c
    +++ linux-4.15.0/net/ieee802154/nl-mac.c
    @ @ -559,9 +559,7 @ @
desc->mode = nla_get_u8(info->attrs[IEEE802154_ATTR_LLSEC_KEY_MODE]);

    if (desc->mode == IEEE802154_SCF_KEY_IMPLICIT) {
        if (!info->attrs[IEEE802154_ATTR_PAN_ID] &&
            !info->attrs[IEEE802154_ATTR_SHORT_ADDR] ||
            info->attrs[IEEE802154_ATTR_HW_ADDR])
            return -EINVAL;
        desc->device_addr.pan_id = nla_get_shortaddr(info->attrs[IEEE802154_ATTR_PAN_ID]);
        desc->device_addr.mode = IEEE802154_ADDR_SHORT;
        desc->device_addr.short_addr = nla_get_shortaddr(info->attrs[IEEE802154_ATTR_SHORT_ADDR]);
    } else {
        if (!info->attrs[IEEE802154_ATTR_HW_ADDR])
            return -EINVAL;
    }
    desc->device_addr.mode = IEEE802154_ADDR_LONG;
    desc->device_addr.extended_addr = nla_get_hwaddr(info->attrs[IEEE802154_ATTR_HW_ADDR]);
}

--- linux-4.15.0.orig/net/ieee802154/nl-phy.c
--- linux-4.15.0/net/ieee802154/nl-phy.c
@@ -249,8 +249,10 @@
}
if (nla_put_string(msg, IEEE802154_ATTR_PHY_NAME, wpan_phy_name(phy)) ||
    + nla_put_string(msg, IEEE802154_ATTR_DEV_NAME, dev->name))
+    return -ENOSPC;
    goto nla_put_failure;
+}

dev_put(dev);

--- linux-4.15.0.orig/net/ieee802154/nl-phy.c
+++ linux-4.15.0/net/ieee802154/nl-phy.c
@@ -249,8 +249,10 @@
}
if (nla_put_string(msg, IEEE802154_ATTR_PHY_NAME, wpan_phy_name(phy)) ||
    + nla_put_string(msg, IEEE802154_ATTR_DEV_NAME, dev->name))
+    return -ENOSPC;
    goto nla_put_failure;
+}
dev_put(dev);

wpan_phy_put(phy);
--- linux-4.15.0.orig/net/ieee802154/nl802154.c
+++ linux-4.15.0/net/ieee802154/nl802154.c
@@ -836,8 +836,13 @@
goto nla_put_failure;
#endif /* CONFIG_IEEE802154_NL802154_EXPERIMENTAL */
+if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR)
+    goto out;
+
if (nl802154_get_llsec_params(msg, rdev, wpan_dev) < 0)
    goto nla_put_failure;
+
out:
#endif /* CONFIG_IEEE802154_NL802154_EXPERIMENTAL */
genlmsg_end(msg, hdr);
@@ -1310,19 +1315,20 @@
    return -EINVAL;

 addr->pan_id = nla_get_le16(attrs[NL802154_DEV_ADDR_ATTR_PAN_ID]);
 addr->mode = nla_get_u32(attrs[NL802154_DEV_ADDR_ATTR_MODE]);
 switch (addr->mode) {
 case NL802154_DEV_ADDR_SHORT:
+    if (!attrs[NL802154_DEV_ADDR_ATTR_SHORT])
+        return -EINVAL;
    addr->short_addr = nla_get_le16(attrs[NL802154_DEV_ADDR_ATTR_SHORT]);
    break;
 case NL802154_DEV_ADDR_EXTENDED:
+    if (!attrs[NL802154_DEV_ADDR_ATTR_EXTENDED])
+        return -EINVAL;
    addr->extended_addr = nla_get_le64(attrs[NL802154_DEV_ADDR_ATTR_EXTENDED]);
    break;
 default:
@@ -1402,6 +1408,9 @@
    u32 changed = 0;
    int ret;
+if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR)
+return -EOPNOTSUPP;
+
+if (info->attrs[NL802154_ATTR_SEC_ENABLED]) {
+  u8 enabled;
+
+  if (err)
+    return err;
+
+  if (info->attrs[NL802154_ATTR_SEC_ENABLED]) {
+    u8 enabled;
+
+    if (err)
+      return err;
+
+    if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR) {
+      err = skb->len;
+      goto out_err;
+    }
+    +
+    if (!wpan_dev->netdev) {
+      err = -EINVAL;
+      goto out_err;
+    }
+  }
+  +
+  if (!wpan_dev->netdev) {
+    err = -EINVAL;
+    goto out_err;
+  }
+
- if (nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-     +if (!info->attrs[NL802154_ATTR_SEC_KEY] ||
-     +  nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-       info->attrs[NL802154_ATTR_SEC_KEY],
-       nl802154_key_policy, info->extack))
-      return -EINVAL;
-  }
-  +
-  if (!wpan_dev->netdev) {
-    struct ieee802154_ilsec_key_id = { }; u32 commands[NL802154_CMD_FRAME_NR_IDS / 32] = { };
-  }
-
-  if (nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-     +if (!info->attrs[NL802154_ATTR_SEC_KEY] ||
-     +  nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-       info->attrs[NL802154_ATTR_SEC_KEY],
-       nl802154_key_policy, info->extack))
-      return -EINVAL;
-  }
-  +
-  if (!wpan_dev->netdev) {
-    struct nlattr *attrs[NL802154_KEY_ATTRIB_MAX + 1];
-    struct ieee802154_ilsec_key_id id;
-  }
-
-  if (nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-     +if (!info->attrs[NL802154_ATTR_SEC_KEY] ||
-     +  nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-       info->attrs[NL802154_ATTR_SEC_KEY],
-       nl802154_key_policy, info->extack))
-      return -EINVAL;
-  }
-  +
-  if (!wpan_dev->netdev) {
-    struct nlattr *attrs[NL802154_KEY_ATTRIB_MAX + 1];
-    struct ieee802154_ilsec_key_id id;
-  }
-
-  if (nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-     +if (!info->attrs[NL802154_ATTR_SEC_KEY] ||
-     +  nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-       info->attrs[NL802154_ATTR_SEC_KEY],
-       nl802154_key_policy, info->extack))
-      return -EINVAL;
-  }
-  +
-  if (!wpan_dev->netdev) {
-    struct nlattr *attrs[NL802154_KEY_ATTRIB_MAX + 1];
-    struct ieee802154_ilsec_key_id id;
-  }
-
-  if (nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-     +if (!info->attrs[NL802154_ATTR_SEC_KEY] ||
-     +  nla_parse_nested(attrs, NL802154_KEY_ATTRIB_MAX,
-       info->attrs[NL802154_ATTR_SEC_KEY],
-       nl802154_key_policy, info->extack))
-      return -EINVAL;
-  }
-  +
-  if (!wpan_dev->netdev) {
-    struct nlattr *attrs[NL802154_KEY_ATTRIB_MAX + 1];
-    struct ieee802154_ilsec_key_id id;
-  }
-
err = -EINVAL;
goto out_err;
@@ -1765,6 +1786,9 @@
    struct wpan_dev *wpan_dev = dev->ieee802154_ptr;
    struct ieee802154_llsec_device dev_desc;

+if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR)
+    return -EOPNOTSUPP;
    +
    if (ieee802154_llsec_parse_device(info->attrs[NL802154_ATTR_SEC_DEVICE],
         &dev_desc) < 0)
        return -EINVAL;
@@ -1780,7 +1804,8 @@
    struct nlattr *attrs[NL802154_DEV_ATTR_MAX + 1];
    __le64 extended_addr;

-    if (nla_parse_nested(attrs, NL802154_DEV_ATTR_MAX, 
+    if (!info->attrs[NL802154_ATTR_SEC_DEVICE] ||
      nla_parse_nested(attrs, NL802154_DEV_ATTR_MAX, 
        info->attrs[NL802154_ATTR_SEC_DEVICE],
        nl802154_dev_policy, info->extack))
        return -EINVAL;
@@ -1850,6 +1875,11 @@
    if (err)
        return err;

+if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR) {
+    err = skb->len;
+    goto out_err;
+}
    +
    if (!wpan_dev->netdev) {
        err = -EINVAL;
        goto out_err;
@@ -1907,6 +1937,9 @@
    struct ieee802154_llsec_device_key key;
    __le64 extended_addr;

+if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR) {
+    err = skb->len;
+    goto out_err;
+}
    +
    if (!info->attrs[NL802154_ATTR_SEC_DEVKEY] ||
        nla_parse_nested(atrrs, NL802154_DEVKEY_ATTR_MAX, 
        info->attrs[NL802154_ATTR_SEC_DEVKEY],
        nl802154_dev_policy, info->extack))
        return -EINVAL;
@@ -1940,7 +1973,8 @@
    struct ieee802154_llsec_device_key key;
    __le64 extended_addr;

    +if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR) {
        err = skb->len;
        goto out_err;
    +}
if (nla_parse_nested(attrs, NL802154_DEVKEY_ATTR_MAX, info->attrs[NL802154_ATTR_SEC_DEVKEY]))
    if (!info->attrs[NL802154_ATTR_SEC_DEVKEY] ||
        nla_parse_nested(attrs, NL802154_DEVKEY_ATTR_MAX, info->attrs[NL802154_ATTR_SEC_DEVKEY], nl802154_devkey_policy, info->extack))
    return -EINVAL;

if (err)
    return err;

if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR) {
    skb->len = skb->len;
    goto out_err;
+}
+
if (!wpan_dev->netdev) {
    err = -EINVAL;
    goto out_err;
+}

struct wpan_dev *wpan_dev = dev->ieee802154_ptr;
struct ieee802154_llsec_seclevel sl;

+if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR)
+    return -EOPNOTSUPP;
+
if (llsec_parse_seclevel(info->attrs[NL802154_ATTR_SEC_LEVEL], &sl) < 0)
    return -EINVAL;

+if (wpan_dev->iftype == NL802154_IFTYPE_MONITOR)
+    return -EOPNOTSUPP;
+
+ if (!info->attrs[NL802154_ATTR_SEC_LEVEL] ||
        llsec_parse_seclevel(info->attrs[NL802154_ATTR_SEC_LEVEL], &sl) < 0)
--- linux-4.15.0.orig/net/ieee802154/nl_policy.c
+++ linux-4.15.0/net/ieee802154/nl_policy.c
@@ -30,7 +30,13 @@
 [IEEE802154_ATTR_HW_ADDR] = { .type = NLA_HW_ADDR, },
 [IEEE802154_ATTR_PAN_ID] = { .type = NLA_U16, },
 [IEEE802154_ATTR_CHANNEL] = { .type = NLA_U8, },
+[IEEE802154_ATTR_BCN_ORD] = { .type = NLA_U8, },
+[IEEE802154_ATTR_SF_ORD] = { .type = NLA_U8, },
+[IEEE802154_ATTR_PAN_COORD] = { .type = NLA_U8, },
+[IEEE802154_ATTR_BAT_EXT] = { .type = NLA_U8, },

+[IEEE802154_ATTR_COORD_REALIGN] = { .type = NLA_U8, },
[IEEE802154_ATTR_PAGE] = { .type = NLA_U8, },
+[IEEE802154_ATTR_DEV_TYPE] = { .type = NLA_U8, },
[IEEE802154_ATTR_COORD_SHORT_ADDR] = { .type = NLA_U16, },
[IEEE802154_ATTR_COORD_HW_ADDR] = { .type = NLA_HW_ADDR, },
[IEEE802154_ATTR_COORD_PAN_ID] = { .type = NLA_U16, },
--- linux-4.15.0.orig/net/ieee802154/socket.c
+++ linux-4.15.0/net/ieee802154/socket.c
@@ -985,6 +985,11 @@
 #endif
 
+static void ieee802154_sock_destruct(struct sock *sk)
+{
+skb_queue_purge(&sk->sk_receive_queue);
+
+ /* Create a socket. Initialise the socket, blank the addresses
+ * set the state.
+ */
@@ -991,6 +999,7 @@
 switch (sock->type) {
 case SOCK_RAW:
+rc = -EPERM;
+if (!capable(CAP_NET_RAW))
+goto out;
 proto = &ieee802154_raw_prot;
 ops = &ieee802154_raw_ops;
 break;
@@ -1022,7 +1030,7 @@
 sock->ops = ops;

 sock_init_data(sock, sk);
-/* FIXME: sk->sk_destruct */
+sk->sk_destruct = ieee802154_sock_destruct;
 sk->sk_family = PF_IEEE802154;

 /* Checksums on by default */
--- linux-4.15.0.orig/net/ife/ife.c
+++ linux-4.15.0/net/ife/ife.c
 @@ -69,6 +69,9 @@
 int total_pull;
 u16 ifehdrln;

 +if (!pskb_may_pull(skb, skb->dev->hard_header_len + IFE_METAHDRLEN))
+return NULL;
+}
ifehdr = (struct ifeheadr *) (skb->data + skb->dev->hard_header_len);
ifehdrln = ntohs(ifehdr->metalen);
total_pull = skb->dev->hard_header_len + ifehdrln;
@@ -92,12 +95,43 @@
    __be16 len;
}
+static bool __ife_tlv_meta_valid(const unsigned char *skbdata,
+    const unsigned char *ifehdr_end)
+{
+    const struct meta_tlvhdr *tlv;
+    u16 tlvlen;
+    +if (unlikely(skbdata + sizeof(*tlv) > ifehdr_end))
+        +return false;
+    +tlv = (const struct meta_tlvhdr *)skbdata;
+    +tlvlen = ntohs(tlv->len);
+    +/* tlv length field is inc header, check on minimum */
+    +if (tlvlen < NLA_HDRLEN)
+        +return false;
+    +/* overflow by NLA_ALIGN check */
+    +if (NLA_ALIGN(tlvlen) < tlvlen)
+        +return false;
+    +if (unlikely(skbdata + NLA_ALIGN(tlvlen) > ifehdr_end))
+        +return false;
+    +return true;
+}
+    /* Caller takes care of presenting data in network order */
+    -void *ife_tlv_meta_decode(void *skbdata, u16 *attrtype, u16 *dlen, u16 *totlen)
+void *ife_tlv_meta_decode(void *skbdata, const void *ifehdr_end, u16 *attrtype,
+    + u16 *dlen, u16 *totlen)
+{
+    struct meta_tlvhdr *tlv = (struct meta_tlvhdr *) skbdata;
+    +struct meta_tlvhdr *tlv;
+    +if (!__ife_tlv_meta_valid(skbdata, ifehdr_end))
+        +return NULL;
+    +tlv = (struct meta_tlvhdr *)skbdata;
+    *dlen = ntohs(tlv->len) - NLA_HDRLEN;
+    *attrtype = ntohs(tlv->type);
config NET_IPVTI
tristate "Virtual (secure) IP: tunneling"
+depends on IPV6 || IPV6=n
select INET_TUNNEL
select NET_IP_TUNNEL
depends on INET_XFRM_MODE_TUNNEL

out:
-rt = ip_route_output(net, sip, tip, 0, 0);
+rt = ip_route_output(net, sip, tip, 0, l3mdev_master_ifindex_rcu(dev));
if (IS_ERR(rt))
return 1;
if (rt->dst.dev != dev) {
--- linux-4.15.0.orig/net/ipv4/cipso_ipv4.c
+++ linux-4.15.0/net/ipv4/cipso_ipv4.c
@@ -486,6 +486,7 @@
kfree(doi_def->map.std->lvl.local);
kfree(doi_def->map.std->cat.cipso);
kfree(doi_def->map.std->cat.local);
```c
+kfree(doi_def->map.std);
break;
}
kfree(doi_def);
@@ -533,16 +534,10 @@
ret_val = -ENOENT;
goto doi_remove_return;
}
-if (!refcount_dec_and_test(&doi_def->refcount)) {
-spin_unlock(&cipso_v4_doi_list_lock);
-ret_val = -EBUSY;
-goto doi_remove_return;
-}
list_del_rcu(&doi_def->list);
spin_unlock(&cipso_v4_doi_list_lock);
-cipso_v4_cache_invalidate();
call_rcu(&doi_def->rcu, cipso_v4_doi_free_rcu);
+cipso_v4_doi_putdef(doi_def);
ret_val = 0;

doi_remove_return:
@@ -599,9 +594,6 @@

if (!refcount_dec_and_test(&doi_def->refcount))
return;
-spin_lock(&cipso_v4_doi_list_lock);
-list_del_rcu(&doi_def->list);
-spin_unlock(&cipso_v4_doi_list_lock);

cipso_v4_cache_invalidate();
call_rcu(&doi_def->rcu, cipso_v4_doi_free_rcu);
@@ -667,7 +659,8 @@
case CIPSO_V4_MAP_PASS:
return 0;
case CIPSO_V4_MAP_TRANS:
-    if (doi_def->map.std->lvl.cipso[level] < CIPSO_V4_INV_LVL)
+    if ((level < doi_def->map.std->lvl.cipso_size) &&
+        (doi_def->map.std->lvl.cipso[level] < CIPSO_V4_INV_LVL))
return 0;
break;
}
@@ -1271,7 +1264,8 @@
return ret_val;
}

-secattr->flags |= NETLBL_SECATTR_MLS_CAT;
+if (secattr->attr.mls.cat)
secattr->flags |= NETLBL_SECATTR_MLS_CAT;
}

return 0;
@@ -1452,7 +1446,8 @@
secattr->flags |= NETLBL_SECATTR_MLS_CAT;
+if (secattr->attr.mls.cat)
+secattr->flags |= NETLBL_SECATTR_MLS_CAT;
}

return 0;
@@ -1512,7 +1507,7 @@
*
* Description:
* Parse the packet’s IP header looking for a CIPSO option. Returns a pointer
- * to the start of the CIPSO option on success, NULL if one if not found.
+ * to the start of the CIPSO option on success, NULL if one is not found.
* 
*/
unsigned char *cipso_v4_optptr(const struct sk_buff *skb)
@@ -1522,10 +1517,8 @@
int optlen;
int taglen;

-for (optlen = iph->ihl*4 - sizeof(struct iphdr); optlen > 0; ) {
+for (optlen = iph->ihl*4 - sizeof(struct iphdr); optlen > 1; ) {
    switch (optptr[0]) {
      -case IPOPT_CIPSO:
      -return optptr;
      case IPOPT_END:
      return NULL;
      case IPOPT_NOOP:
@@ -1534,6 +1527,11 @@
      default:
          taglen = optptr[1];
      }
+if (!taglen || taglen > optlen)
+return NULL;
+if (optptr[0] == IPOPT_CIPSO)
+return optptr;
+optlen -= taglen;
+optptr += taglen;
}
void cipso_v4_error(struct sk_buff *skb, int error, u32 gateway)
{
    unsigned char optbuf[sizeof(struct ip_options) + 40];
    struct ip_options *opt = (struct ip_options *)optbuf;
    int res;
    if (ip_hdr(skb)->protocol == IPPROTO_ICMP || error != -EACCES)
        return;
    /*
    * We might be called above the IP layer,
    * so we can not use icmp_send and IPCB here.
    */
    +memset(opt, 0, sizeof(struct ip_options));
    +opt->optlen = ip_hdr(skb)->ihl*4 - sizeof(struct iphdr);
    +rcu_read_lock();
    +res = __ip_options_compile(dev_net(skb->dev), opt, skb, NULL);
    +rcu_read_unlock();
    if (res)
        return;
    if (gateway)
        --icmp_send(skb, ICMP_DEST_UNREACH, ICMP_NET_ANO, 0);
    else
        --icmp_send(skb, ICMP_DEST_UNREACH, ICMP_HOST_ANO, 0);
}
#include <net/addrconf.h>

#define IPV6ONLY_FLAGS 
+ (IFA_F_NODAD | IFA_F_OPTIMISTIC | IFA_F_DADFAILED |
+ IFA_F_HOMEADDRESS | IFA_F_TENTATIVE |
+ IFA_F_MANAGETEMPADDR | IFA_F_STABLE_PRIVACY)

+ static struct ipv4_devconf ipv4_devconf = {
  .data = [
    [IPV4_DEVCONF_ACCEPT_REDIRECTS - 1] = 1,
    @ @ -263,6 +268,7 @@
  err = devinet_sysctl_register(in_dev);
  if (err) {
    in_dev->dead = 1;
    +neigh_parms_release(&arp_tbl, in_dev->arp_parms);
    in_dev_put(in_dev);
    in_dev = NULL;
    goto out;
    @ @ -461,6 +467,9 @@
    ifa->ifa_flags &= ~IFA_F_SECONDARY;
    last_primary = &in_dev->ifa_list;

    /* Don't set IPv6 only flags to IPv4 addresses */
    +ifa->ifa_flags &= ~IPV6ONLY_FLAGS;
    +
    for (ifap = &in_dev->ifa_list; (ifa1 = *ifap) != NULL;
        ifap = &ifa1->ifa_next) {
      if (!ifa1->ifa_flags & IFA_F_SECONDARY) &&
        @ @ -578,12 +587,15 @@
        return NULL;
    }

    static int ip_mc_config(struct sock *sk, bool join, const struct in_ifaddr *ifa)
    +static int ip_mc_autojoin_config(struct net *net, bool join,
    + const struct in_ifaddr *ifa)
    {
    +#if defined(CONFIG_IP_MULTICAST)
      struct ip_mreqn mreq = {
        .imr_multiaddr.s_addr = ifa->ifa_address,
        .imr_ifindex = ifa->ifa_dev->dev->ifindex,
      };
    +struct sock *sk = net->ipv4.mc_autojoin_sk;
    int ret;
    
    ASSERT_RTNL();
    @ @ -596,6 +608,9 @@
    release_sock(sk);
static int inet_rtm_deladdr(struct sk_buff *skb, struct nlmsghdr *nlh,
@@ -637,7 +652,7 @@
 continue;

 if (ipv4_is_multicast(ifa->ifa_address))
- ip_mc_config(net->ipv4.mc_autojoin_sk, false, ifa);
+ ip_mc_autojoin_config(net, false, ifa);
 __inet_del_ifa(in_dev, ifap, 1, nlh, NETLINK_CB(skb).portid);
 return 0;
 }
@@ -895,8 +910,7 @@
 set_ifa_lifetime(ifa, valid_lft, prefered_lft);
 if (ifa->ifa_flags & IFA_F_MCAUTOJOIN) {
- int ret = ip_mc_config(net->ipv4.mc_autojoin_sk,
- true, ifa);
+ int ret = ip_mc_autojoin_config(net, true, ifa);

 if (ret < 0) {
 inet_free_ifa(ifa);
@@ -1426,11 +1440,6 @@
 
- static bool inetdev_valid_mtu(unsigned int mtu)
- {
- return mtu >= IPV4_MIN_MTU;
- } 
- 
- static void inetdev_send_gratuitous_arp(struct net_device *dev, 
 struct in_device *in_dev)

 --- linux-4.15.0.orig/net/ipv4/esp4.c
 +++ linux-4.15.0/net/ipv4/esp4.c
 @@ -205,7 +205,7 @@
 tail[plen - 1] = proto;
 }

- static void esp_output_udp_encap(struct xfrm_state *x, struct sk_buff *skb, struct esp_info *esp)
+ static int esp_output_udp_encap(struct xfrm_state *x, struct sk_buff *skb, struct esp_info *esp)
{ 
 int encap_type;
struct udphdr *uh;
@@ -213,6 +213,7 @@
      __be16 sport, dport;
 struct xfrm_encap_tmpl *encap = x->encap;
 struct ip_esp_hdr *esph = esp->esph;
+unsigned int len;

 spin_lock_bh(&x->lock);
 sport = encaps->encap_sport;
@@ -220,11 +221,14 @@
      encaps_type = encaps->encap_type;
 spin_unlock_bh(&x->lock);
+
      len = skb->len + esp->tailen - skb_transport_offset(skb);
      if (len + sizeof(struct iphdr) >= IP_MAX_MTU)
         return -EMSGSIZE;
      
         uh = (struct udphdr *)esph;
         uh->source = sport;
         uh->dest = dport;
-         uh->len = htons(skb->len + esp->tailen
-            skb_transport_offset(skb));
-         uh->len = htons(len);
         uh->check = 0;

         switch (encap_type) {
@@ -241,12 +245,13 @@
             skb_mac_header(skb) = IPPROTO_UDP;
             esp->esph = esph;
             
            +return 0;
         }

 int esp_output_head(struct xfrm_state *x, struct sk_buff *skb, struct esp_info *esp)
{ }
 u8 *tail;
- u8 *vaddr;
 int nfrags;
 int espqh_offset;
 struct page *page;
@@ -254,8 +259,12 @@
      int tailen = esp->tailen;

      /* this is non-NULL only with UDP Encapsulation */
-      if (x->encap)
-      -esp_output_udp_encap(x, skb, esp);
+      if (x->encap) {

+int err = esp_output_udp_encap(x, skb, esp);
+
+if (err < 0)
+    return err;
+
if (!skb_cloned(skb)) {
    if (tailen <= skb_tailroom(skb)) {
        page = pfrag->page;
        get_page(page);

        vaddr = kmap_atomic(page);

        tail = vaddr + pfrag->offset;
        tail = page_address(page) + pfrag->offset;

        esp_output_fill_trailer(tail, esp->tfclen, esp->plen, esp->proto);

        kunmap_atomic(vaddr);

        nfrags = skb_shinfo(skb)->nr_frags;

        __skb_fill_page_desc(skb, nfrags, page, pfrag->offset,
        struct fib_table *tb;

        hlist_for_each_entry_safe(tb, tmp, head, tb_hlist)
            flushed += fib_table_flush(net, tb);

        } else

        if (flushed)
            return ip_hdr(skb)->daddr;

    }
}

in_dev = __in_dev_get_rcu(dev);
-BUG_ON(!in_dev);

net = dev_net(dev);

scope = RT_SCOPE_UNIVERSE;
if (ipv4_is_zeronet(ip_hdr(skb)->saddr)) {
    bool vmark = in_dev && IN_DEV_SRC_VMARK(in_dev);
    struct flowi4 fl4 = {
        .flowi4_iif = LOOPBACK_IFINDEX,
        .flowi4_oif = l3mdev_master_ifindex_rcu(dev),
        .saddr = ip_hdr(skb)->saddr,
        .tos = IP_TOS(ip_hdr(skb)->tos),
   );
    if (!fib_lookup(net, &fl4, &res, 0))
        return FIB_RES_PREFSRC(net, res);
};

static int rtm_to_fib_config(struct net *net, struct sk_buff *skb,
    struct rtmsg *msg, struct nla *attr)
{
    case RTA_GATEWAY:
        cfg->fc_gw = nla_get_be32(attr);
        break;
    case RTA_VIA:
        NL_SET_ERR_MSG(extack, "IPv4 does not support RTA_VIA attribute");
        err = -EINVAL;
        goto errout;
    case RTA_PRIORITY:
        cfg->fc_priority = nla_get_u32(attr);
        break;
    default:
        break;
}

static int fib_netdev_event(struct notifier_block *this, unsigned long event, void *ptr)
{
    struct net_device *dev = netdev_notifier_info_to_dev(ptr);
    struct netdev_notifier_changeupper_info *info;
    struct netdev_notifier_changeupper_info *upper_info = ptr;
    struct netdev_notifier_info_ext *info_ext = ptr;
    struct in_device *in_dev;
    struct net *net = dev_net(dev);
    unsigned int flags;

    ...
fib_sync_up(dev, RTNH_F_LINKDOWN);
else
fib_sync_down_dev(dev, event, false);
/* fall through */
+rt_cache_flush(net);
+break;
case NETDEV_CHANGEMTU:
+fib_sync_mtu(dev, info_ext->ext.mtu);
rt_cache_flush(net);
break;
case NETDEV_CHANGEUPPER:
-info = ptr;
+upper_info = ptr;
/* flush all routes if dev is linked to or unlinked from
* an L3 master device (e.g., VRF)
*/
-if (info->upper_dev && netif_is_l3_master(info->upper_dev))
+if (upper_info->upper_dev &&
+    netif_is_l3_master(upper_info->upper_dev))
fib_disable_ip(dev, NETDEV_DOWN, true);
break;
}
@@ -1317,7 +1327,7 @@
hlist_for_each_entry_safe(tb, tmp, head, tb_hlist) {
    hlist_del(&tb->tb_hlist);
    -fib_table_flush(net, tb);
    +fib_table_flush(net, tb, true);
    fib_free_table(tb);
}
--- linux-4.15.0.orig/net/ipv4/fib_semantics.c
+++ linux-4.15.0/net/ipv4/fib_semantics.c
@@ -646,6 +646,11 @@
    fi->fib_nh, cfg, extack))
    return 1;
}
+#ifdef CONFIG_IP_ROUTE_CLASSID
    if (cfg->fc_flow &&
+      cfg->fc_flow != fi->fib_nh->nh_tclassid)
    +return 1;
+#endif
if ((!cfg->fc_oif || cfg->fc_oif == fi->fib_nh->nh_oif) &&
    (!cfg->fc_gw || cfg->fc_gw == fi->fib_nh->nh_gw))
    return 0;
@@ -712,6 +717,8 @@
nla_strlcpy(tmp, nla, sizeof(tmp));
val = tcp_ca_get_key_by_name(fi->fib_net, tmp, &ecn_ca);
} else {
+if (nla_len(nla) != sizeof(u32))
+return false;
val = nla_get_u32(nla);
}

@@ -824,7 +831,7 @@
if (fl4.flowi4_scope < RT_SCOPE_LINK)
fl4.flowi4_scope = RT_SCOPE_LINK;

@if (cfg->fc_table)
+if (cfg->fc_table && cfg->fc_table != RT_TABLE_MAIN)
tbl = fib_get_table(net, cfg->fc_table);
if (tbl)
@@ -1038,6 +1045,8 @@
if (val == TCP_CA_UNSPEC)
return -EINVAL;
} else {
+if (nla_len(nla) != sizeof(u32))
+return -EINVAL;
val = nla_get_u32(nla);
}
if (type == RTAX_ADVMSS && val > 65535 - 40)
@@ -1453,8 +1462,8 @@
int ret = 0;
unsigned int hash = fib_laddr_hashfn(local);
struct hlist_head *head = &fib_info_laddrhash[hash];
+int tb_id = l3mdev_fib_table(dev) ? : RT_TABLE_MAIN;
struct net *net = dev_net(dev);
- int tb_id = l3mdev_fib_table(dev);
struct fib_info *fi;

if (!fib_info_laddrhash || local == 0)
@@ -1502,6 +1511,56 @@
return NOTIFY_DONE;
}

+/* Update the PMTU of exceptions when:
+ * - the new MTU of the first hop becomes smaller than the PMTU
+ * - the old MTU was the same as the PMTU, and it limited discovery of
+ *   larger MTUs on the path. With that limit raised, we can now
+ *   discover larger MTUs
+ * A special case is locked exceptions, for which the PMTU is smaller
+ * - if the new MTU is greater than the PMTU, don't make any change
+ * - otherwise, unlock and set PMTU

```c
+ static void nh_update_mtu(struct fib_nh *nh, u32 new, u32 orig)
+ {
+ struct fnhe_hash_bucket *bucket;
+ int i;
+ +bucket = rcu_dereference_protected(nh->nh_exceptions, 1);
+ if (!bucket)
+ return;
+ +for (i = 0; i < FNHE_HASH_SIZE; i++) {
+ struct fib_nh_exception *fnhe;
+ +for (fnhe = rcu_dereference_protected(bucket[i].chain, 1);
+ fnhe;
+ + fnhe = rcu_dereference_protected(fnhe->fnhe_next, 1)) {
+ if (fnhe->fnhe_mtu_locked) {
+ if (new <= fnhe->fnhe_pmtu) {
+ fnhe->fnhe_pmtu = new;
+ fnhe->fnhe_mtu_locked = false;
+ } else if (new < fnhe->fnhe_pmtu ||
+ orig == fnhe->fnhe_pmtu) {
+ fnhe->fnhe_pmtu = new;
+ }
+ }
+ }
+ }
+ }
+ }
+ }
+ }
+ }
+ void fib_sync_mtu(struct net_device *dev, u32 orig_mtu)
+ {
+ unsigned int hash = fib_devindex_hashfn(dev->ifindex);
+ struct hlist_head *head = &fib_info_devhash[hash];
+ struct fib_nh *nh;
+ +hlist_for_each_entry(nh, head, nh_hash) {
+ if (nh->nh_dev == dev)
+ nh_update_mtu(nh, dev->mtu, orig_mtu);
+ }
+ }
+ *
+ /* Event              force Flags           Description
+ * NETDEV_CHANGE      0     LINKDOWN        Carrier OFF, not for scope host
+ * NETDEV_DOWN       0     LINKDOWN|DEAD   Link down, not for scope host
+ */
+ bool first = false;
+ for_nexthops(fi) {
```
if (net->ipv4.sysctl_fib_multipath_use_neigh) {
    +continue;
    +if (!first) {
        res->nh_sel = nhsel;
        +first = true;
        +}
    +}

    if (hash > atomic_read(&nh->nh_upper_bound))
        continue;

    -if (!net->ipv4.sysctl_fib_multipath_use_neigh ||
        -fib_good_nh(nh)) {
        -res->nh_sel = nhsel;
        -return;
        -}
    -if (!first) {
        -res->nh_sel = nhsel;
        -first = true;
        -}
    +res->nh_sel = nhsel;
    +return;
} endfor_nexthops(fi);
#endif
--- linux-4.15.0.orig/net/ipv4/fib_trie.c
+++ linux-4.15.0/net/ipv4/fib_trie.c
@@ -1725,7 +1725,7 @@
    while ((l = leaf_walk_rcu(&tp, key)) != NULL) {
        struct key_vector *local_l = NULL, *local_tp;

        -hlist_for_each_entry_rcu(fa, &l->leaf, fa_list) {
            +hlist_for_each_entry(fa, &l->leaf, fa_list) {
                struct fib_alias *new_fa;

                if (local_tb->tb_id != fa->tb_id)
                    @ @ -1832,7 +1832,7 @@
            }

            /* Caller must hold RTNL. */
            -int fib_table_flush(struct net *net, struct fib_table *tb)
            +int fib_table_flush(struct net *net, struct fib_table *tb, bool flush_all)
                { struct trie *t = (struct trie *)tb->tb_data;
                    struct key_vector *pn = t->kv;
                    @ @ -1880,8 +1880,17 @@
                    hlist_for_each_entry_safe(fa, tmp, &n->leaf, fa_list) {
struct fib_info *fi = fa->fa_info;

- if (fi || !(fi->fib_flags & RTNH_F_DEAD))
-   tb->tb_id != fa->tb_id) {
+ if (fi || tb->tb_id != fa->tb_id)
+   (!fi->fib_flags & RTNH_F_DEAD) &&
+   !fib_props[fa->fa_type].error)) {
  +slen = fa->fa_slen;
  +continue;
+}
+
+/* Do not flush error routes if network namespace is
+ not being dismantled
+ */
+if (!flush_all && fib_props[fa->fa_type].error) {
  slen = fa->fa_slen;
  continue;
}
@@ -2304,6 +2313,7 @@
 "%zd bytes, size of tnode: %zd bytes.\n",
 LEAF_SIZE, TNODE_SIZE(0));

+rcu_read_lock();
for (h = 0; h < FIB_TABLE_HASHSZ; h++) {
  struct hlist_head *head = &net->ipv4.fib_table_hash[h];
  struct fib_table *tb;
@@ -2323,7 +2333,9 @@
 trie_show_usage(seq, t->stats);
 #endif
 } +cond_resched_rcu();
+
+rcu_read_unlock();

 return 0;
}
--- linux-4.15.0.orig/net/ipv4/fou.c
+++ linux-4.15.0/net/ipv4/fou.c
@@ -120,6 +120,7 @@
 struct guehdr *guehdr;
 void *data;
 u16 doffset = 0;
+u8 proto_ctype;

 if (!fou)
 return 1;
@@ -211,13 +212,14 @@
 if (unlikely(guehdr->control))
return gue_control_message(skb, guehdr);

+proto CType = guehdr->proto CType;
__skb_pull(skb, sizeof(struct udphdr) + hdrlen);
skb_reset_transport_header(skb);

if (iptunnel_pull_offloads(skb))
goto drop;

-return -guehdr->proto CType;
+return -proto CType;

drop:
kfree_skb(skb);
@@ -448,9 +450,7 @@
out_unlock:
rcu_read_unlock();
out:
-NAPI_GRO_CB(skb)->flush | flush;
-skb_gro_remcsum_cleanup(skb, &grc);
-skb->remcsum_offload = 0;
+skb_gro_flush_final_remcsum(skb, pp, flush, &grc);

return pp;
}
--- linux-4.15.0.orig/net/ipv4/gre_demux.c
+++ linux-4.15.0/net/ipv4/gre_demux.c
@@ -60,7 +60,9 @@
}
EXPORT_SYMBOL_GPL(gre_del_protocol);

-/* Fills in tpi and returns header length to be pulled. */
+/* Fills in tpi and returns header length to be pulled.
+ * Note that caller must use pskb_may_pull() before pulling GRE header.
+ */
+int gre_parse_header(struct sk_buff *skb, struct tnl_ptk_info *tpi,
+bool *csum_err, __be16 proto, int nhs) {
+options = (__be32 *)(greh + 1);
+if (greh->flags & GRE_CS U M) {
+if (!skb_checksum_simple_validate(skb)) {
+if (!skb_checksum_try_convert(skb, IPPROTO_GRE, 0,
+null_compute_pseudo);
+} else if (csum_err) {
+*csum_err = true;
return -EINVAL;
}

-skb_checksum_try_convert(skb, IPPROTO_GRE, 0,
- null_compute_pseudo);
options++;
}

@@ -113,8 +116,14 @@
 * - When dealing with WCCPv2, Skip extra 4 bytes in GRE header
 */
 if (greh->flags == 0 && tpi->proto == htons(ETH_P_WCCP)) {
 +u8 _val, *val;
 +
 +val = skb_header_pointer(skb, nhs + hdr_len,
 + sizeof(_val), &_val);
 +if (!val)
 +return -EINVAL;
 tpi->proto = proto;
-if (*!(u8 *)options & 0xF0) != 0x40)
 +if (*val & 0xF0) != 0x40)
 hdr_len += 4;
 }
 tpi->hdr_len = hdr_len;
--- linux-4.15.0.orig/net/ipv4/gre_offload.c
+++ linux-4.15.0/net/ipv4/gre_offload.c
@@ -19,12 +19,12 @@
 netdev_features_t features)
 {
 int tnl_hlen = skb_inner_mac_header(skb) - skb_transport_header(skb);
+bool need_csum, need_recompute_csum, gso_partial;
 struct sk_buff *segs = ERR_PTR(-EINVAL);
 u16 mac_offset = skb->mac_header;
 __be16 protocol = skb->protocol;
 u16 mac_len = skb->mac_len;
 int gre_offset, outer_hlen;
-bool need_csum, gso_partial;
+
 if (!skb->encapsulation)
 goto out;
@@ -45,6 +45,7 @@
 skb->protocol = skb->inner_protocol;

 need_csum = !!(skb_shinfo(skb)->gso_type & SKB_GSO_GRE_CSUM);
+need_recompute_csum = skb->csum_not_inet;
 skb->encap_hdr_csum = need_csum;

 features &= skb->dev->hw_enc_features;
*(pcsum + 1) = 0;
- *pcsum = gso_make_checksum(skb, 0);
+ if (need_recompute_csum && skb_is_gso(skb)) {
+ __wsum csum;
+ + csum = skb_checksum(skb, gre_offset,
+ + skb->len - gre_offset, 0);
+ + *pcsum = csum_fold(csum);
+ + } else { 
+ + *pcsum = gso_make_checksum(skb, 0);
+ + }
+ } while ((skb = skb->next));
out:
return segs;
@@ -223,7 +232,7 @@
out_unlock:
rcu_read_unlock();
out:
- NAPI_GRO_CB(skb)->flush |= flush;
+ skb_gro_flush_final(skb, pp, flush);

return pp;
}
--- linux-4.15.0.orig/net/ipv4/icmp.c
+++ linux-4.15.0/net/ipv4/icmp.c
@@ -244,7 +244,7 @@
/**
 * icmp_global_allow - Are we allowed to send one more ICMP message ?
 */
- * Uses a token bucket to limit our ICMP messages to sysctl_icmpmsgs_per_sec.
+ * Uses a token bucket to limit our ICMP messages to ~sysctl_icmpmsgs_per_sec.
* Returns false if we reached the limit and can not send another packet.
* Note: called with BH disabled
*/
@@ -254,10 +254,11 @@
bool rc = false;

/* Check if token bucket is empty and cannot be refilled
 * without taking the spinlock.
+ * without taking the spinlock. The READ_ONCE() are paired
+ * with the following WRITE_ONCE() in this same function.
*/
+if (!icmp_global.credit) {
+delta = min_t(u32, now - icmp_global.stamp, HZ);
+if (!READ_ONCE(icmp_global.credit)) {
delta = min_t(u32, now - READ_ONCE(icmp_global.stamp), HZ);
if (delta < HZ / 50)
    return false;
}
@@ -267,14 +268,17 @@
if (delta >= HZ / 50) {
    incr = sysctl_icmp_msgs_per_sec * delta / HZ ;
    if (incr)
        -icmp_global.stamp = now;
+WRITE_ONCE(icmp_global.stamp, now);
}
credit = min_t(u32, icmp_global.credit + incr, sysctl_icmp_msgs_burst);
if (credit) {
    -credit--;
+/* We want to use a credit of one in average, but need to randomize
+ * it for security reasons.
+ */
+credit = max_t(int, credit - prandom_u32_max(3), 0);
    rc = true;
}
-icmp_global.credit = credit;
+WRITE_ONCE(icmp_global.credit, credit);
spin_unlock(&icmp_global.lock);
return rc;
}
@@ -464,6 +468,23 @@
local_bh_enable();
}

+/*
+ * The device used for looking up which routing table to use for sending an ICMP
+ * error is preferably the source whenever it is set, which should ensure the
+ * icmp error can be sent to the source host, else lookup using the routing
+ * table of the destination device, else use the main routing table (index 0).
+ */
+static struct net_device *icmp_get_route_lookup_dev(struct sk_buff *skb)
+{  
+struct net_device *route_lookup_dev = NULL;
+  +if (skb->dev)
+    route_lookup_dev = skb->dev;
+  +else if (skb_dst(skb))
+    route_lookup_dev = skb_dst(skb)->dev;
+  +return route_lookup_dev;
+}
+static struct rtable *icmp_route_lookup(struct net *net,
struct flowi4 *fl4,
struct sk_buff *skb_in,
int type, int code,
struct icmp_bxm *param)
{
+struct net_device *route_lookup_dev;
struct rtable *rt, *rt2;
struct flowi4 fl4_dec;
int err;
fl4->flowi4_proto = IPPROTO_ICMP;
fl4->flowi4_icmp_type = type;
fl4->flowi4_icmp_code = code;
- fl4->flowi4_oif = l3mdev_master_ifindex(skb_dst(skb_in)->dev);
+ route_lookup_dev = icmp_get_route_lookup_dev(skb_in);
+fl4->flowi4_oif = l3mdev_master_ifindex(route_lookup_dev);

security_skbclassify_flow(skb_in, flowi4_to_flowi(fl4));
rt = ip_route_output_key_hash(net, fl4, skb_in);
if (err)
goto relookup_failed;

- if (inet_addr_type_dev_table(net, skb_dst(skb_in)->dev,
+ if (inet_addr_type_dev_table(net, route_lookup_dev,
    fl4_dec.saddr) == RTN_LOCAL) {
        rt2 = __ip_route_output_key(net, &fl4_dec);
    if (IS_ERR(rt2))
        *MUST reply to only the first fragment.
*/

-void icmp_send(struct sk_buff *skb_in, int type, int code, __be32 info)
+void __icmp_send(struct sk_buff *skb_in, int type, int code, __be32 info,
+ const struct ip_options *opt)
{
    struct iphdr *iph;
    int room;
}

if (!rt)
goto out;
-net = dev_net(rt->dst.dev);
+
+if (rt->dst.dev)
+net = dev_net(rt->dst.dev);
+else if (skb_in->dev)
+net = dev_net(skb_in->dev);
/*
* Find the original header. It is expected to be valid, of course.
@@ -694,7 +724,7 @@
  iph->tos;
 mark = IP4_REPLY_MARK(net, skb_in->mark);

- if (ip_options_echo(net, &icmp_param.replyopts.opt.opt, skb_in))
+ if (__ip_options_echo(net, &icmp_param.replyopts.opt.opt, skb_in, opt))
   goto out_unlock;

@@ -738,6 +768,13 @@
icmp_param.data_len = room;
 icmp_param.head_len = sizeof(struct icmphdr);

+/* if we don't have a source address at this point, fall back to the
+ * dummy address instead of sending out a packet with a source address
+ * of 0.0.0.0
+ */
+ if (!fl4.saddr)
+ fl4.saddr = htonl(INADDR_DUMMY);
+ icmp_push_reply(&icmp_param, &fl4, &ipc, &rt);
ende:
 ip_rt_put(rt);
@@ -747,8 +784,42 @@
 local_bh_enable();
 out:;
}
-EXPORT_SYMBOL(icmp_send);
+EXPORT_SYMBOL(__icmp_send);
+
+ #if IS_ENABLED(CONFIG_NF_NAT)
+ #include <net/conntrack.h>
+ void icmp_ndo_send(struct sk_buff *skb_in, int type, int code, __be32 info)
+ {
+ struct sk_buff *cloned_skb = NULL;
+ struct ip_options opts = { 0 };
+ enum ip_conntrack_info ctinfo;
+ struct nf_conn *ct;
+ __be32 orig_ip;
+ + ct = nf_ct_get(skb_in, &ctinfo);
+ if (!(ct || !(ct->status & IPS_SRC_NAT))) {
+ + __icmp_send(skb_in, type, code, info, &opts);
+return;
+
+if (skb_shared(skb_in))
+skb_in = cloned_skb = skb_clone(skb_in, GFP_ATOMIC);
+
+if (unlikely(skb_in || skb_network_header(skb_in) < skb_in->head ||
+skb_network_header(skb_in) + sizeof(struct iphdr)) >
+skb_tail_pointer(skb_in) || skb_network_offset(skb_in) + sizeof(struct iphdr))))
+goto out;
+
+orig_ip = ip_hdr(skb_in)->saddr;
+ip_hdr(skb_in)->saddr = ct->tuplehash[0].tuple.src.u3.ip;
+__icmp_send(skb_in, type, code, info, &opts);
+out:
+consume_skb(cloned_skb);
+
+EXPORT_SYMBOL(icmp_ndo_send);
+#endif

static void icmp_socket_deliver(struct sk_buff *skb, u32 info)
{
#ifdef CONFIG_IP_MULTICAST
/* Parameter names and values are taken from igmp-v2-06 draft */

-#define IGMP_V1_ROUTER_PRESENT_TIMEOUT(400*HZ)
-#define IGMP_V2_ROUTER_PRESENT_TIMEOUT(400*HZ)
#define IGMP_V2_UNSOLICITED_REPORT_INTERVAL(10*HZ)
#define IGMP_V3_UNSOLICITED_REPORT_INTERVAL(1*HZ)
+#define IGMP_QUERY_INTERVAL(125*HZ)
#define IGMP_QUERY_RESPONSE_INTERVAL(10*HZ)
-#define IGMP_QUERY_ROBUSTNESS_VARIABLE2
-
#define IGMP_INITIAL_REPORT_DELAY(1)

@@ -190,6 +187,17 @@
    pmc = rtnl_dereference(pmc->next_rcu))
+
+static void ip_sf_list_clear_all(struct ip_sf_list *psf)
+{[snip]
+ while (psf) {
+    next = psf->sf_next;
+    kfree(psf);
+    psf = next;
+ } } + #ifdef CONFIG_IP_MULTICAST
/*
@@ -386,7 +394,11 @@
pip->frag_off = htons(IP_DF);
pip->ttl = 1;
pip->daddr = fl4.daddr;
+    rcu_read_lock();
pip->saddr = igmpv3_get_srcaddr(dev, &fl4);
+    rcu_read_unlock();
+    pip->protocol = IPPROTO_IGMP;
pip->tot_len = 0;/* filled in later */
ip_select_ident(net, skb, NULL);
@@ -631,6 +643,13 @@
} }

+static void kfree_pmc(struct ip_mc_list *pmc)
+{
+    ip_sf_list_clear_all(pmc->sources);
+    ip_sf_list_clear_all(pmc->tomb);
+    kfree(pmc);
+} 
+
+static void igmpv3_send_cr(struct in_device *in_dev)
+
+static void igmp_ifc_timer_expire(struct timer_list *t)
struct in_device *in_dev = from_timer(in_dev, t, mr_ifc_timer);
+u8 mr_ifc_count;

igmpv3_send_cr(in_dev);
-if (in_dev->mr_ifc_count) {
-in_dev->mr_ifc_count--;
+restart:
+mr_ifc_count = READ_ONCE(in_dev->mr_ifc_count);
+
+if (mr_ifc_count) {
+if (cmpxchg(&in_dev->mr_ifc_count, mr_ifc_count, mr_ifc_count - 1) != mr_ifc_count)
+goto restart;
+igmp_ifc_start_timer(in_dev,
+        unsolicited_report_interval(in_dev));
+
}
@@ -803,7 +829,7 @@
 struct net *net = dev_net(in_dev->dev);
 if (IGMP_V1_SEEN(in_dev) || IGMP_V2_SEEN(in_dev))
     return;
-in_dev->mr_ifc_count = in_dev->mr_qrv ?: net->ipv4.sysctl_igmp_qrv;
+WRITE_ONCE(in_dev->mr_ifc_count, in_dev->mr_qrv ?: net->ipv4.sysctl_igmp_qrv);
+igmp_ifc_start_timer(in_dev, 1);
}
@@ -932,16 +958,18 @@
 max_delay = IGMP_QUERY_RESPONSE_INTERVAL;
 in_dev->mr_v1_seen = jiffies +
-IGMP_V1_ROUTER_PRESENT_TIMEOUT;
+/* v2 router present */
+max_delay = ih->code*(HZ/IGMP_TIMER_SCALE);
 in_dev->mr_v2_seen = jiffies +
-IGMP_V2_ROUTER_PRESENT_TIMEOUT;
+(in_dev->mr_qrv * in_dev->mr_qi) +
+in_dev->mr_qri;
 group = 0;
 } else {
 /* cancel the interface change timer */
-in_dev->mr_ifc_count = 0;
+WRITE_ONCE(in_dev->mr_ifc_count, 0);
 if (del_timer(&in_dev->mr_ifc_timer))
     __in_dev_put(in_dev);

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/* clear deleted report items */
@@ -978,8 +1006,21 @@
if (!max_delay)
    max_delay = 1; /* can't mod w/ 0 */
in_dev->mr_maxdelay = max_delay;
-if (ih3->qrv)
-    in_dev->mr_qrv = ih3->qrv;
+ /* RFC3376, 4.1.6. QRV and 4.1.7. QQIC, when the most recently
+  * received value was zero, use the default or statically
+  * configured value.
+  */
+in_dev->mr_qrv = ih3->qrv ?: net->ipv4.sysctl_igmp_qrv;
+in_dev->mr_qi = IGMPV3_QQIC(ih3->qqic)*HZ ?: IGMP_QUERY_INTERVAL;
+
+/* RFC3376, 8.3. Query Response Interval:
+  * The number of seconds represented by the [Query Response
+  * Interval] must be less than the [Query Interval].
+  */
+if (in_dev->mr_qri >= in_dev->mr_qi)
+    in_dev->mr_qri = (in_dev->mr_qi/HZ - 1)*HZ;
+
if (!group) { /* general query */
    if (ih3->nsrcs)
        return true; /* no sources allowed */
@@ -1197,15 +1238,14 @@
    nextpmc = pmc->next;
    ip_mc_clear_src(pmc);
in_dev_put(pmc->interface);
-kfree(pmc);
+kfree_pmc(pmc);
}
/* clear dead sources, too */
rcu_read_lock();
for_each_pmc_rcu(in_dev, pmc) {
-struct ip_sf_list *psf, *psf_next;
+struct ip_sf_list *psf;

spin_lock_bh(&pmc->lock);
psf = pmc->tomb;
pmc->tomb = NULL;
spin_unlock_bh(&pmc->lock);
- for (; psf; psf = psf_next) {
+ ip_sf_list_clear_all(psf);
- }
+ip_sf_list_clear_all(psf);
}
rcu_read_unlock();
}
@@ -1700,7 +1737,7 @@
igmp_group_dropped(pmc);

#ifdef CONFIG_IP_MULTICAST
-in_dev->mr_ifc_count = 0;
+WRITE_ONCE(in_dev->mr_ifc_count, 0);
 if (del_timer(&in_dev->mr_ifc_timer))
  __in_dev_put(in_dev);
in_dev->mr_gq_running = 0;
@@ -1711,18 +1748,30 @@
ip_mc_dec_group(in_dev, IGMP_ALL_HOSTS);
}

-void ip_mc_init_dev(struct in_device *in_dev)
-{#ifdef CONFIG_IP_MULTICAST
+static void ip_mc_reset(struct in_device *in_dev)
+{struct net *net = dev_net(in_dev->dev);
+ +in_dev->mr_qi = IGMP_QUERY_INTERVAL;
+ +in_dev->mr_qri = IGMP_QUERY_RESPONSE_INTERVAL;
+ +in_dev->mr_qrv = net->ipv4.sysctl_igmp_qrv;
+ +}
+}#ifdef CONFIG_IP_MULTICAST
+static void ip_mc_reset(struct in_device *in_dev)
#ifdef CONFIG_IP_MULTICAST

timer_setup(&in_dev->mr_gq_timer, igmp_gq_timer_expire, 0);
timer_setup(&in_dev->mr_ifc_timer, igmp_ifc_timer_expire, 0);
-in_dev->mr_qrv = net->ipv4.sysctl_igmp_qrv;
#endif
+ip_mc_reset(in_dev);

spin_lock_init(&in_dev->mc_tomb_lock);
}
#endif

void ip_mc_up(struct in_device *in_dev)
{
struct ip_mc_list *pmc;
-#ifdef CONFIG_IP_MULTICAST
-struct net *net = dev_net(in_dev->dev);
-#endif

ASSERT_RTNL();

-#ifdef CONFIG_IP_MULTICAST
-#endif
-ip_mc_reset(in_dev);

ip_mc_inc_group(in_dev, IGMP_ALL_HOSTS);

for_each_pmc_rtnl(in_dev, pmc) {
@@ -1770,6 +1814,7 @@
    
    in_dev->mr_qrv = net->ipv4.sysctl_igmp_qrv;
    
-pmc->sfmode = MCAST_INCLUDE;
-#ifdef CONFIG_IP_MULTICAST
-pmc->crcount = in_dev->mr_qrv ?: net->ipv4.sysctl_igmp_qrv;
-#endif
+WRITE_ONCE(in_dev->mr_ifc_count, pmc->crcount);
}
}
for (psf = pmc->sources; psf; psf = psf->sf_next)
    psf->sf_crcount = 0;
igmp_ifc_event(pmc->interface);
@@ -2088,7 +2133,7 @@
 /* else no filters; keep old mode for reports */

 pmc->crcount = in_dev->mr_qrv ?: net->ipv4.sysctl_igmp_qrv;
-in_dev->mr_ifc_count = pmc->crcount;
+WRITE_ONCE(in_dev->mr_ifc_count, pmc->crcount);
for (psf = pmc->sources; psf; psf = psf->sf_next)
    psf->sf_crcount = 0;
igmp_ifc_event(in_dev);
@@ -2102,7 +2147,7 @@

 static void ip_mc_clear_src(struct ip_mc_list *pmc)
 {
+struct ip_sf_list *tomb, *sources;

    spin_lock_bh(&pmc->lock);
    tomb = pmc->tomb;
    @@ -2114,14 +2159,8 @@
    pmc->sfcount[MCAST_EXCLUDE] = 1;
    spin_unlock_bh(&pmc->lock);

    -for (psf = tomb; psf; psf = nextpsf) {
    -nextpsf = psf->sf_next;
    -kfree(psf);
    -}
    -for (psf = sources; psf; psf = nextpsf) {
    -nextpsf = psf->sf_next;
    -kfree(psf);
    -}
    +ip_sf_list_clear_all(tomb);
    +ip_sf_list_clear_all(sources);
    }

 /* Join a multicast group
 @@ -2680,6 +2719,7 @@
    rv = 1;
 } else if (im) {
    if (src_addr) {
@@ -2690,6 +2730,7 @@
        im->sfcount[MCAST_EXCLUDE];
else
rv = im->sfcount[MCAST_EXCLUDE] != 0;
+spin_unlock_bh(&im->lock);
} else
rv = 1; /* unspecified source; tentatively allow */
}
--- linux-4.15.0.orig/net/ipv4/inet_connection_sock.c
+++ linux-4.15.0/net/ipv4/inet_connection_sock.c
@@ -33,17 +33,19 @@
#endif
#if IS_ENABLED(CONFIG_IPV6)
-/* match_wildcard == true: IPV6_ADDR_ANY equals to any IPv6 addresses if IPv6
- * only, and any IPv4 addresses if not IPv6 only
- * match_wildcard == false: addresses must be exactly the same, i.e.
- * IPV6_ADDR_ANY only equals to IPV6_ADDR_ANY,
- * and 0.0.0.0 equals to 0.0.0.0 only
+/* match_sk*_wildcard == true: IPV6_ADDR_ANY equals to any IPv6 addresses
+ * match_sk*_wildcard == false: addresses must be exactly the same, i.e.
+ * IPV6_ADDR_ANY only equals to IPV6_ADDR_ANY,
+ * and 0.0.0.0 equals to 0.0.0.0 only
 */
static bool ipv6_rcv_saddr_equal(const struct in6_addr *sk1_rcv_saddr6,
const struct in6_addr *sk2_rcv_saddr6,
__be32 sk1_rcv_saddr, __be32 sk2_rcv_saddr,
bool sk1_ipv6only, bool sk2_ipv6only,
- bool match_wildcard)
+ bool match_sk1_wildcard,
+ bool match_sk2_wildcard)
{ int addr_type = ipv6_addr_type(sk1_rcv_saddr6);
int addr_type2 = sk2_rcv_saddr6 ? ipv6_addr_type(sk2_rcv_saddr6) : IPV6_ADDR_MAPPED;
@@ -53,8 +55,8 @@
if (!sk2_ipv6only) {
if (sk1_rcv_saddr == sk2_rcv_saddr)
return true;
- if (!sk1_rcv_saddr || !sk2_rcv_saddr)
+ if (match_sk1_wildcard) {
+ return (match_sk1_wildcard && !sk1_rcv_saddr) ||
+ (match_sk2_wildcard && !sk2_rcv_saddr);
}
return false;
}
@@ -62,11 +64,11 @@
if (addr_type == IPV6_ADDR_ANY && addr_type2 == IPV6_ADDR_ANY)
return true;

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-if (addr_type2 == IPV6_ADDR_ANY && match_wildcard &&
+if (addr_type2 == IPV6_ADDR_ANY && match_sk2_wildcard &&
   !(sk2_ipv6only && addr_type == IPV6_ADDR_MAPPED))
return true;

-if (addr_type == IPV6_ADDR_ANY && match_wildcard &&
+if (addr_type == IPV6_ADDR_ANY && match_sk1_wildcard &&
   !(sk1_ipv6only && addr_type2 == IPV6_ADDR_MAPPED))
return true;

@@ -78,18 +80,19 @@
}
#endif
/* match_wildcard == true: 0.0.0.0 equals to any IPv4 addresses
- * match_wildcard == false: addresses must be exactly the same, i.e.
- * 0.0.0.0 only equals to 0.0.0.0
+/* match_sk*_wildcard == true: 0.0.0.0 equals to any IPv4 addresses
+ * match_sk*_wildcard == false: addresses must be exactly the same, i.e.
+ * 0.0.0.0 only equals to 0.0.0.0
 */
static bool ipv4_rcv_saddr_equal(__be32 sk1_rcv_saddr, __be32 sk2_rcv_saddr,
- bool sk2_ipv6only, bool match_wildcard)
+ bool sk2_ipv6only, bool match_sk1_wildcard,
+ bool match_sk2_wildcard)
{
if (!sk2_ipv6only) {
  if (sk1_rcv_saddr == sk2_rcv_saddr)
    return true;
  -if (!sk1_rcv_saddr || !sk2_rcv_saddr)
    return match_wildcard;
+  return (match_sk1_wildcard && !sk1_rcv_saddr) ||
+         (match_sk2_wildcard && !sk2_rcv_saddr);
}
return false;
}
@@ -105,10 +108,12 @@
   sk2->sk_rcv_saddr,
   ipv6_only_sock(sk),
   ipv6_only_sock(sk2),
+  match_wildcard,
+  match_wildcard);
#endif
return ipv4_rcv_saddr_equal(sk->sk_rcv_saddr, sk2->sk_rcv_saddr,
- ipv6_only_sock(sk2), match_wildcard);
+ ipv6_only_sock(sk2), match_wildcard,
+ match_wildcard);
EXPORT_SYMBOL(inet_rcv_saddr_equal);

@@ -270,57 +275,18 @@
    tb->fast_rcv_saddr,
    sk->sk_rcv_saddr,
    tb->fast_ipv6_only,
    -  ipv6_only_sock(sk), true);
    +  ipv6_only_sock(sk), true, false);
#endif
return ipv4_rcv_saddr_equal(tb->fast_rcv_saddr, sk->sk_rcv_saddr,
    -  ipv6_only_sock(sk), true);
    +  ipv6_only_sock(sk), true, false);
}

-/* Obtain a reference to a local port for the given sock,
-   * if snum is zero it means select any available local port.
-   * We try to allocate an odd port (and leave even ports for connect())
-   */
-#int inet_csk_get_port(struct sock *sk, unsigned short snum)
+void inet_csk_update_fastreuse(struct inet_bind_bucket *tb,
    +  struct sock *sk)
{
    -bool reuse = sk->sk_reuse && sk->sk_state != TCP_LISTEN;
    -struct inet_hashinfo *hinfo = sk->sk_prot->h.hashinfo;
    -int ret = 1, port = snum;
    -struct inet_bind_hashbucket *head;
    -struct net *net = sock_net(sk);
    -struct inet_bind_bucket *tb = NULL;
    -kuid_t uid = sock_i_uid(sk);
    +bool reuse = sk->sk_reuse && sk->sk_state != TCP_LISTEN;
    -if (!port) {
    -	head = inet_csk_find_open_port(sk, &tb, &port);
    -if (!head)
    -    return ret;
    -if (!tb)
    -    goto tb_not_found;
    -} 
    -head = &hinfo->bhash[inet_bhashfn(net, port,
    -    hinfo->bhash_size)];
    -spin_lock_bh(&head->lock);
    -inet_bind_bucket_for_each(tb, &head->chain)
    -if (net_eq(ib_net(tb), net) && tb->port == port)
    -    goto tb_found;
    -tb_not_found:
    -tb = inet_bind_bucket_create(hinfo->bind_bucket_cachep,
- net, head, port);
-if (!tb)
-goto fail_unlock;
-tb_found:
-if (!hlist_empty(&tb->owners)) {
-if (sk->sk_reuse == SK_FORCE_REUSE)
-goto success;
-
-if ((tb->fastreuse > 0 && reuse)) ||
- sk_reuseport_match(tb, sk))
-goto success;
-if (inet_csk_bind_conflict(sk, tb, true, true))
-goto fail_unlock;
-}
-success:
if (hlist_empty(&tb->owners)) {
 tb->fastreuse = reuse;
if (sk->sk_reuseport) {
@@ -364,6 +330,54 @@
tb->fastreuseport = 0;
 } }
+*/
+/* Obtain a reference to a local port for the given sock,
+ * if snum is zero it means select any available local port.
+ * We try to allocate an odd port (and leave even ports for connect())
+ */
+int inet_csk_get_port(struct sock *sk, unsigned short snum)
 +{
+bool reuse = sk->sk_reuse && sk->sk_state != TCP_LISTEN;
+struct inet_hashinfo *hinfo = sk->sk_prot->h.hashinfo;
+int ret = 1, port = snum;
+struct inet_bind_hashbucket *head;
+struct net *net = sock_net(sk);
+struct inet_bind_bucket *tb = NULL;
+
+if (!port) {
+head = inet_csk_find_open_port(sk, &tb, &port);
+if (!head)
+return ret;
+if (!tb)
+goto tb_not_found;
+goto success;
+}
+head = &hinfo->bhash[inet_bhashfn(net, port,
+ hinfo->bhash_size)];
+spin_lock_bh(&head->lock);
+inet_bind_bucket_for_each(tb, &head->chain)
+if (net_eq(ib_net(tb), net) && tb->port == port)
+goto tb_found;
+tb_not_found:
+tb = inet_bind_bucket_create(hinfo->bind_bucket_cachep,
+    net, head, port);
+if (!tb)
+goto fail_unlock;
+tb_found:
+if (!hlist_empty(&tb->owners)) {
+    if (sk->sk_reuse == SK_FORCE_REUSE)
+    goto success;
+    if ((tb->fastreuse > 0 && reuse) ||
+        sk_reuseport_match(tb, sk))
+    goto success;
+    if (inet_csk_bind_conflict(sk, tb, true, true))
+    goto fail_unlock;
+}
+success:
+inet_csk_update_fastreuse(tb, sk);
+
+ if (!inet_csk(sk)->icsk_bind_hash)
+     inet_bind_hash(sk, tb, port);
+WARN_ON(inet_csk(sk)->icsk_bind_hash != tb);
+} @ @ -475,9 +489,28 @@
spin_unlock_bh(&queue->fastopenq.lock);
} -mem_cgroup_sk_alloc(newsk);
+
out:
release_sock(sk);
+if (newsk && mem_cgroup_sockets_enabled) {
+int amt;
+/* atomically get the memory usage, set and charge the
+ * newsk->sk_memcg.
+ */
+lock_sock(newsk);
+
+ /* The socket has not been accepted yet, no need to look at
+ * newsk->sk_wmem_queued.
+ */
+amt = sk_mem_pages(newsk->sk_forward_alloc +
+    atomic_read(&newsk->sk_rmem_alloc));
+mem_cgroup_sk_alloc(newsk);
+if (newsk->sk_memcg && amt)
+mem_cgroup_charge_skmem(newsk->sk_memcg, amt);
+
+release_sock(newsk);
+
} if (req)
reqsk_put(req);
return newsk;
@@ -541,7 +574,8 @@
    opt = ireq_opt_deref(ireq);
+rcu_read_lock();
+opt = rcu_dereference(ireq->ireq_opt);

flowi4_init_output(fl4, ireq->ir_iif, ireq->ir_mark,
        RT_CONN_FLAGS(sk), RT_SCOPE_UNIVERSE,
@@ -555,11 +589,13 @@
goto no_route;
if (opt && opt->opt.is_strictroute && rt->rt_uses_gateway)
goto route_err;
+rcu_read_unlock();
return &rt->dst;

route_err:
ip_rt_put(rt);
no_route:
+rcu_read_unlock();
__IP_INC_STATS(net, IPSTATS_MIB_OUTNOROUTES);
return NULL;
} 
@@ -931,7 +967,7 @@
req->sk = child;
req->dl_next = NULL;
if (queue->rskq_accept_head == NULL)
@@ -1083,7 +1119,7 @@
    dst = __sk_dst_check(sk, 0);
if (!dst)
--- linux-4.15.0.orig/net/ipv4/inet_diag.c
+++ linux-4.15.0/net/ipv4/inet_diag.c
@@ -105,12 +105,9 @@
aux = handler->idiag_get_aux_size(sk, net_admin);

return nla_total_size(sizeof(struct tcp_info))
- + nla_total_size(1) /* INET_DIAG_SHUTDOWN */
- + nla_total_size(1) /* INET_DIAG_TOS */
- + nla_total_size(1) /* INET_DIAG_TCLASS */
- + nla_total_size(4) /* INET_DIAG_MARK */
- + nla_total_size(sizeof(struct inet_diag_meminfo))
++ inet_diag_msg_attrs_size()
++ nla_total_size(sizeof(struct inet_diag_meminfo))
+ nla_total_size(sizeof(struct inet_diag_msg))
+ nla_total_size(sizeof(struct inet_diag_meminfo))
+ nla_total_size(SK_MEMINFO_VARS * sizeof(u32))
+ nla_total_size(TCP_CA_NAME_MAX)
+ nla_total_size(sizeof(struct tcpvegas_info))
@@ -151,6 +148,24 @@
if (net_admin && nla_put_u32(skb, INET_DIAG_MARK, sk->sk_mark))
goto errout;

@if (ext & (1 << (INET_DIAG_CLASS_ID - 1)) ||
+ ext & (1 << (INET_DIAG_TCLASS - 1))) {
+u32 classid = 0;
+
+#ifdef CONFIG_SOCK_CGROUP_DATA
+classid = sock_cgroup_classid(&sk->sk_cgrp_data);
+#endif
+/* Fallback to socket priority if class id isn't set.
+ * Classful qdiscs use it as direct reference to class.
+ * For cgroup2 classid is always zero.
+ */
+if (!classid)
+classid = sk->sk_priority;
+
+if (nla_put_u32(skb, INET_DIAG_CLASS_ID, classid))
goto errout;
+}

r->idiag_uid = from_kuid_munged(user_ns, sock_i_uid(sk));
r->idiag_inode = sock_i_ino(sk);

@@ -288,17 +303,6 @@
goto errout;
}

-if (ext & (1 << (INET_DIAG_CLASS_ID - 1))){

- u32 classid = 0;
-
- #ifdef CONFIG_SOCK_CGROUP_DATA
- classid = sock_cgroup_classid(sk->sk_cgrp_data);
- #endif
-
- if (nla_put_u32(skb, INET_DIAG_CLASS_ID, classid))
- goto errout;
-
-out:
-nlmsg_end(skb, nlh);
-return 0;
- @ @ -389,8 +393,10 @@
-r->idiag_inode= 0;

-if (net_admin && nla_put_u32(skb, INET_DIAG_MARK,
- inet_rsk(reqsk)->ir_mark)) {
+ inet_rsk(reqsk)->ir_mark)) {
+nmsg_cancel(skb, nlh);
-return -EMSGSIZE;
+}

-nlmsg_end(skb, nlh);
-return 0;
- @ @ -903,11 +909,12 @@

-for (i = s_i; i < INET_LHTABLE_SIZE; i++) {
- struct inet_listen_hashbucket *ilb;
- struct hlist_nulls_node *node;

-num = 0;
-ilb = &hashinfo->listening_hash[i];
-spin_lock(&ilb->lock);
- sk_for_each(sk, &ilb->head) {
-+sk_nulls_for_each(sk, node, &ilb->nulls_head) {
- struct inet_sock *inet = inet_sk(sk);

-if (!inet_eq(sock_net(sk), net))
- @ @ -991,7 +998,9 @@
-if (!inet_diag_bc_sk(bc, sk))
-goto next_normal;

-sock_hold(sk);
+if (!refcount_inc_not_zero(&sk->sk_refcnt))
+goto next_normal;
+
-num_arr[accum] = num;
sk_arr[accum] = sk;
if (++accum == SKARR_SZ)
--- linux-4.15.0.orig/net/ipv4/inet_fragment.c
+++ linux-4.15.0/net/ipv4/inet_fragment.c
@@ -24,12 +24,62 @@
#include <net/sock.h>
#include <net/inet_frag.h>
#include <net/inet_ecn.h>
+include <net/ip.h>
+include <net/ipv6.h>

-#define INETFRAGS_EVICT_BUCKETS 128
-#define INETFRAGS_EVICT_MAX 512
+/# Use skb->cb to track consecutive/adjacent fragments coming at
+ # the end of the queue. Nodes in the rb-tree queue will
+ # contain "runs" of one or more adjacent fragments.
+ # Invariants:
+ # - next_frag is NULL at the tail of a "run";
+ # - the head of a "run" has the sum of all fragment lengths in frag_run_len.
+ */
+struct ipfrag_skb_cb {
+union {
+struct inet_skb_parm h4;
+struct inet6_skb_parm h6;
+};
+struct sk_buff*next_frag;
+int frag_run_len;
+};
+
+#define FRAG_CB(skb)((struct ipfrag_skb_cb *)(skb)->cb))
+
+static void fragcb_clear(struct sk_buff *skb)
+{  
+RB_CLEAR_NODE(&skb->rbnode);
+FRAG_CB(skb)->next_frag = NULL;
+FRAG_CB(skb)->frag_run_len = skb->len;
+}  
+
+ /* Append skb to the last "run". */  
+static void fragrun_append_to_last(struct inet_frag_queue *q,
+ struct sk_buff *skb)
+{  
+fragcb_clear(skb);
+  
+FRAG_CB(q->last_run_head)->frag_run_len += skb->len;
+FRAG_CB(q->fragments_tail)->next_frag = skb;
+q->fragments_tail = skb;
Create a new "run" with the skb. */
+static void fragrun_create(struct inet_frag_queue *q, struct sk_buff *skb)
+{
+BUILD_BUG_ON(sizeof(struct ipfrag_skb_cb) > sizeof(skb->cb));
+fragcb_clear(skb);

-/* don't rebuild inetfrag table with new secret more often than this */
-#define INETFRAGS_MIN_REBUILD_INTERVAL (5 * HZ)
+if (q->last_run_head)
+rb_link_node(&skb->rbnode, &q->last_run_head->rbnode,
+ & &q->last_run_head->rbnode.rb_right);
+else
+rb_link_node(&skb->rbnode, NULL, &q->rb_fragments.rb_node);
+rb_insert_color(&skb->rbnode, &q->rb_fragments);
+
+q->fragments_tail = skb;
+q->last_run_head = skb;
+
/* Given the OR values of all fragments, apply RFC 3168 5.3 requirements
 * Value : 0xff if frame should be dropped.
** @ -52,154 +102,8 @@

EXPORT_SYMBOL(ip_frag_ecn_table);

-static unsigned int
-static bool inet_frag_may_rebuild(struct inet_frags *f)
-static void inet_frag_secret_rebuild(struct inet_frags *f)
get_random_bytes(&f->rnd, sizeof(u32));
-
for (i = 0; i < INETFRAGS_HASHSZ; i++) {
  struct inet_frag_bucket *hb;
  struct inet_frag_queue *q;
  struct hlist_node *n;
-
  hb = &f->hash[i];
  spin_lock(&hb->chain_lock);
-
  hlist_for_each_entry_safe(q, n, &hb->chain, list) {
    unsigned int hval = inet_frag_hashfn(f, q);
    -
    if (hval != i) {
      struct inet_frag_bucket *hb_dest;
      -
      hlist_del(&q->list);
      -
      /* Relink to new hash chain. */
      hb_dest = &f->hash[hval];
      -
      /* This is the only place where we take
       * another chain_lock while already holding
       * one. As this will not run concurrently,
       * we cannot deadlock on hb_dest lock below, if its
       * already locked it will be released soon since
       * other caller cannot be waiting for hb lock
       * that we've taken above.
       */
      spin_lock_nested(&hb_dest->chain_lock,
        SINGLE_DEPTH_NESTING);
      hlist_add_head(&q->list, &hb_dest->chain);
      spin_unlock(&hb_dest->chain_lock);
    }
  }
  spin_unlock(&hb->chain_lock);
-
  f->rebuild = false;
  f->last_rebuild_jiffies = jiffies;
  -out:
  -write_sequnlock_bh(&f->rnd_seqlock);
  -
  -static bool inet_fragq_should_evict(const struct inet_frag_queue *q)
  -{
    return q->net->low_thresh == 0 ||
      frag_mem_limit(q->net) >= q->net->low_thresh;
  -}
static unsigned int
inet_evict_bucket(struct inet_frags *f, struct inet_frag_bucket *hb)
{
    static unsigned int fq;
    static hlist_node *n;
    unsigned int evicted = 0;
    HLIST_HEAD(expired);

    spin_lock(&hb->chain_lock);

    hlist_for_each_entry_safe(fq, n, &hb->chain, list) {
        if (!inet_fragq_should_evict(fq))
            continue;

        if (!del_timer(&fq->timer))
            continue;

        hlist_add_head(&fq->list_evictor, &expired);
        ++evicted;
    }

    spin_unlock(&hb->chain_lock);

    hlist_for_each_entry_safe(fq, n, &expired, list_evictor)
    f->frag_expire(&fq->timer);

    return evicted;
}

static void inet_frag_worker(struct work_struct *work)
{
    unsigned int budget = INETFRAGS_EVICT_BUCKETS;
    unsigned int i, evicted = 0;
    struct inet_frags *f;

    f = container_of(work, struct inet_frags, frags_work);

    BUILD_BUG_ON(INETFRAGS_EVICT_BUCKETS >= INETFRAGS_HASHSZ);

    local_bh_disable();

    for (i = READ_ONCE(f->next_bucket); budget; --budget) {
        evicted += inet_evict_bucket(f, &f->hash[i]);
        i = (i + 1) & (INETFRAGS_HASHSZ - 1);
        if (evicted > INETFRAGS_EVICT_MAX)
            break;
    }
- free_list = __get_free_list(f);
- f->next_bucket = i;
- local_bh_enable();
- if (f->rebuild && inet_frag_may_rebuild(f))
  inet_frag_secret_rebuild(f);
-
- static void inet_frag_schedule_worker(struct inet_frags *f)
- {
-  if (unlikely(!work_pending(&f->frags_work)))
-   schedule_work(&f->frags_work);
- }
-
- int inet_frags_init(struct inet_frags *f)
  {
-  int i;
-  
-  INIT_WORK(&f->frags_work, inet_frag_worker);
-  
-  for (i = 0; i < INETFRAGS_HASHSZ; i++) {
-   struct inet_frag_bucket *hb = &f->hash[i];
-   
-   spin_lock_init(&hb->chain_lock);
-   INIT_HLIST_HEAD(&hb->chain);
-  }
-  
-  seqlock_init(&f->rnd_seqlock);
-  f->last_rebuild_jiffies = 0;
-  f->frags_cachep = kmem_cache_create(f->frags_cache_name, f->qsize, 0, 0,
-          NULL);
-  if (!f->frags_cachep)
-    @ @ -211,83 +115,73 @@

    void inet_frags_fini(struct inet_frags *f)
    {
    -cancel_work_sync(&f->frags_work);
    +/* We must wait that all inet_frag_destroy_rcu() have completed. */
    +rcu_barrier();
    + kmem_cache_destroy(f->frags_cachep);
    +f->frags_cachep = NULL;
    }  
    
    EXPORT_SYMBOL(inet_frags_fini);
    
    -void inet_frags_exit_net(struct netns_frags *nf, struct inet_frags *f)
+static void inet_frags_free_cb(void *ptr, void *arg)
{
    unsigned int seq;
    int i;
    nf->low_thresh = 0;
    -
evict_again:
    -local_bh_disable();
    -seq = read_seqbegin(&f->rnd_seqlock);
    -
    -for (i = 0; i < INETFRAGS_HASHSZ ; i++)
        -inet_evict_bucket(f, &f->hash[i]);
    -
    -local_bh_enable();
    -cond_resched();
    -
    -if (read_seqretry(&f->rnd_seqlock, seq) ||
    sum_frag_mem_limit(nf))
    -goto evict_again;
    -}
    -EXPORT_SYMBOL(inet_frags_exit_net);
+struct inet_frag_queue *fq = ptr;

-static struct inet_frag_bucket *
get_frag_bucket_locked(struct inet_frag_queue *fq, struct inet_frags *f)
    __acquires(hb->chain_lock)
{
    struct inet_frag_bucket *hb;
    unsigned int seq, hash;
    -
    -restart:
    -seq = read_seqbegin(&f->rnd_seqlock);
    -
    -hash = inet_frag_hashfn(f, fq);
    -hb = &f->hash[hash];
    +/* If we can not cancel the timer, it means this frag_queue
    + * is already disappearing, we have nothing to do.
    + * Otherwise, we own a refcount until the end of this function.
    + */
    -spin_lock(&hb->chain_lock);
    -if (read_seqretry(&f->rnd_seqlock, seq)) {
    -spin_unlock(&hb->chain_lock);
    -goto restart;
    +spin_lock_bh(&fq->lock);
    +if (!(fq->flags & INET_FRAG_COMPLETE)) {
    +fq->flags |= INET_FRAG_COMPLETE;
+refcount_dec(&fq->refcnt);
+
spin_unlock_bh(&fq->lock);
+
return hb;
inet_frag_put(fq);
}
-
static inline void fq_unlink(struct inet_frag_queue *fq, struct inet_frags *f)
+
void inet_frags_exit_net(struct netns_frags *nf)
{
-struct inet_frag_bucket *hb;
+nf->low_thresh = 0; /* prevent creation of new frags */

-hb = get_frag_bucket_locked(fq, f);
-hlist_del(&fq->list);
-fq->flags |= INET_FRAG_COMPLETE;
-spin_unlock(&hb->chain_lock);
+rhashtable_free_and_destroy(&nf->rhashtable, inet_frags_free_cb, NULL);
}
+EXPORT_SYMBOL(inet_frags_exit_net);
-
void inet_frag_kill(struct inet_frag_queue *fq, struct inet_frags *f)
+void inet_frag_kill(struct inet_frag_queue *fq)
{
if (del_timer(&fq->timer))
refcount_dec(&fq->refcnt);

if (!fq->flags & INET_FRAG_COMPLETE)) {
-fq_unlink(fq, f);
+struct netns_frags *nf = fq->net;
+
+fq->flags |= INET_FRAG_COMPLETE;
+rhashtable_remove_fast(&nf->rhashtable, &fq->node, nf->f->rhash_params);
refcount_dec(&fq->refcnt);
}
}
+EXPORT_SYMBOL(inet_frag_kill);
-
void inet_frag_destroy(struct inet_frag_queue *q, struct inet_frags *f)
+static void inet_frag_destroy_rcu(struct rcu_head *head)
+{
+struct inet_frag_queue *q = container_of(head, struct inet_frag_queue,
+   rcu);
+struct inet_frags *f = q->net->f;
+
if (f->destructor)
-f->destructor(q);
+}
+kmem_cache_free(f->frags_cachep, q);
+
+void inet_frag_destroy(struct inet_frag_queue *q)
{
    struct sk_buff *fp;
    struct netns_frags *nf;
    unsigned int sum, sum_truesize = 0;
    +struct inet_frags *f;

    WARN_ON(!(q->flags & INET_FRAG_COMPLETE));
    WARN_ON(del_timer(&q->timer) != 0);
    @@ -295,68 +189,34 @@ /* Release all fragment data. */
    fp = q->fragments;
    nf = q->net;
    -while (fp) {
    -    struct sk_buff *xp = fp->next;
    -    sum_truesize += fp->truesize;
    -    kfree_skb(fp);
    -    fp = xp;
    -    if (fp) {
    -        do {
    -            struct sk_buff *xp = fp->next;
    -            sum_truesize += fp->truesize;
    -            kfree_skb(fp);
    -            fp = xp;
    -        } while (fp);
    -    } else {
    -        sum_truesize = inet_frag_rbtree_purge(&q->rb_fragments);
    -    }
    -    sum = sum_truesize + f->qsize;
    -
    -if (f->destructor)
    -f->destructor(q);
    -kmem_cache_free(f->frags_cachep, q);
    +call_rcu(&q->rcu, inet_frag_destroy_rcu);

    sub_frag_mem_limit(nf, sum);
}
EXPORT_SYMBOL(inet_frag_destroy);

-static struct inet_frag_queue *inet_frag_intern(struct netns_frags *nf,
void *arg)
{
    struct inet_frag_bucket *hb = get_frag_bucket_locked(qp_in, f);
    struct inet_frag_queue *qp;

    #ifdef CONFIG_SMP
    /* With SMP race we have to recheck hash table, because
     * such entry could have been created on other cpu before
     * we acquired hash bucket lock.
     */
    hlist_for_each_entry(qp, &hb->chain, list) {
        if (qp->net == nf && f->match(qp, arg)) {
            refcount_inc(&qp->refcnt);
            spin_unlock(&hb->chain_lock);
            qp_in->flags |= INET_FRAG_COMPLETE;
            inet_frag_put(qp_in, f);
            return qp;
        }
    }
    #endif
    qp = qp_in;
    if (!mod_timer(&qp->timer, jiffies + nf->timeout))
        refcount_inc(&qp->refcnt);
    refcount_inc(&qp->refcnt);
    hlist_add_head(&qp->list, &hb->chain);
    spin_unlock(&hb->chain_lock);
    return qp;
}

static struct inet_frag_queue *inet_frag_alloc(struct netns_frags *nf, struct inet_frags *f, void *arg)
{
    struct inet_frag_queue *q;

    if (!nf->high_thresh || frag_mem_limit(nf) > nf->high_thresh) {
        inet_frag_schedule_worker(f);
    } else if (!nf->high_thresh || frag_mem_limit(nf) > nf->high_thresh)
        return NULL;
}

q = kmem_cache_zalloc(f->frags_cachep, GFP_ATOMIC);
if (!q)
    @ @ -368,70 +228,268 @@
timer_setup(&q->timer, f->frag_expire, 0);
spin_lock_init(&q->lock);
-refcount_set(&q->refcnt, 1);
+refcount_set(&q->refcnt, 3);

return q;
}

static struct inet_frag_queue *inet_frag_create(struct netns_frags *nf,
-struct inet_frags *f,
-void *arg)
+void *arg,
+struct inet_frag_queue **prev)
{
+struct inet_frags *f = nf->f;
struct inet_frag_queue *q;

q = inet_frag_alloc(nf, f, arg);
-if (!q)
+if (!q) {
+*prev = ERR_PTR(-ENOMEM);
return NULL;
+
+mod_timer(&q->timer, jiffies + nf->timeout);

-return inet_frag_intern(nf, q, f, arg);
+*prev = rhashtable_lookup_get_insert_key(&nf->rhashtable, &q->key,
+ &q->node, f->rhash_params);
+if (*prev) {
+q->flags |= INET_FRAG_COMPLETE;
+inet_frag_kill(q);
+inet_frag_destroy(q);
+return NULL;
+
+return q;
+
-struct inet_frag_queue *inet_frag_find(struct netns_frags *nf,
- struct inet_frags *f, void *key,
- unsigned int hash)
+/* TODO : call from rcu_read_lock() and no longer use refcount_inc_not_zero() */
+struct inet_frag_queue *inet_frag_find(struct netns_frags *nf, void *key)
{
-struct inet_frag_bucket *hb;
-struct inet_frag_queue *q;
-int depth = 0;
+struct inet_frag_queue *fq = NULL, *prev;
if (frag_mem_limit(nf) > nf->low_thresh)
inet_frag_schedule_worker(f);
rcu_read_lock();

hash &= (INETFRAGS_HASHSZ - 1);
hb = &f->hash[hash];
prev = rhashtable_lookup(&nf->rhashtable, key, nf->f->rhash_params);
if (!prev)
fq = inet_frag_create(nf, key, &prev);
if (prev & !IS_ERR(prev)) {
prev = prev;
if (!refcount_inc_not_zero(&fq->refcnt))
    fq = NULL;
}
rcu_read_unlock();

spin_lock(&hb->chain_lock);
for_each_entry(q, &hb->chain, list) {
    if (q->net == nf && f->match(q, key)) {
        refcount_inc(&q->refcnt);
        spin_unlock(&hb->chain_lock);
        return q;
    }
    depth++;
} return fq;

EXPORT_SYMBOL(inet_frag_find);

int inet_frag_queue_insert(struct inet_frag_queue *q, struct sk_buff *skb,
    int offset, int end)
{
    struct sk_buff *last = q->fragments_tail;

    /* RFC5722, Section 4, amended by Errata ID : 3089
      *                          When reassembling an IPv6 datagram, if
      * one or more its constituent fragments is determined to be an
      * overlapping fragment, the entire datagram (and any constituent
      * fragments) MUST be silently discarded.
      *Duplicates, however, should be ignored (i.e. skb dropped, but the
      * queue/fragments kept for later reassembly).
      */
    if (!last)
        fragrun_create(q, skb); /* First fragment. */
    else if (last->ip_defrag_offset + last->len < end) {
        This is the common case: skb goes to the end.
        /* Detect and discard overlaps. */
        if (offset < last->ip_defrag_offset + last->len)
+return IPFRAG_OVERLAP;
+if (offset == last->ip_defrag_offset + last->len)
+fragrun_append_to_last(q, skb);
+else
+fragrun_create(q, skb);
+} else {
+/* Binary search. Note that skb can become the first fragment,
+ * but not the last (covered above).
+ */
+struct rb_node **rbn, *parent;
+
+rbn = &q->rb_fragments.rb_node;
+do {
+struct sk_buff *curr;
+int curr_run_end;
+
+parent = *rbn;
+
curr = rb_to_skb(parent);
+curr_run_end = curr->ip_defrag_offset +
+FRAG_CB(curr)->frag_run_len;
+if (end <= curr->ip_defrag_offset)
+rbn = &parent->rb_left;
+else if (offset > curr_run_end)
+rbn = &parent->rb_right;
+else if (offset >= curr->ip_defrag_offset &&
+ end <= curr_run_end)
+return IPFRAG_DUP;
+else
+return IPFRAG_OVERLAP;
+} while (*rbn);
+/* Here we have parent properly set, and rbn pointing to
+ * one of its NULL left/right children. Insert skb.
+ */
+fragcb_clear(skb);
+rb_link_node(&skb->rbnode, parent, rbn);
+rb_insert_color(&skb->rbnode, &q->rb_fragments);
+
+skb->ip_defrag_offset = offset;
+
+return IPFRAG_OK;
+}
+EXPORT_SYMBOL(inet_frag_queue_insert);
+
+void *inet_frag_reasm_prepare(struct inet_frag_queue *q, struct sk_buff *skb,
+struct sk_buff *parent)
+{
+struct sk_buff *fp, *head = skb_rb_first(&q->rb_fragments);
+struct sk_buff **nextp;
+int delta;
+
+if (head != skb) {
+fp = skb_clone(skb, GFP_ATOMIC);
+if (!fp)
+return NULL;
+FRAG_CB(fp)->next_frag = FRAG_CB(skb)->next_frag;
+if (RB_EMPTY_NODE(&skb->rbnode))
+FRAG_CB(parent)->next_frag = fp;
+else
+rb_replace_node(&skb->rbnode, &fp->rbnode,
+&q->rb_fragments);
+if (q->fragments_tail == skb)
+q->fragments_tail = fp;
+skb_morph(skb, head);
+FRAG_CB(skb)->next_frag = FRAG_CB(head)->next_frag;
+rb_replace_node(&head->rbnode, &skb->rbnode,
+&q->rb_fragments);
+consume_skb(head);
+head = skb;
}
}
    spin_unlock(&hb->chain_lock);
+WARN_ON(head->ip_defrag_offset != 0);
+
+delta = -head->truesize;

-if (depth <= INETFRAGS_MAXDEPTH)
-return inet_frag_create(nf, f, key);
+/* Head of list must not be cloned. */
+if (skb_unclone(head, GFP_ATOMIC))
+return NULL;
+
+delta += head->truesize;
+if (delta)
+add_frag_mem_limit(q->net, delta);
+
+/* If the first fragment is fragmented itself, we split
+ it to two chunks: the first with data and paged part
+ and the second, holding only fragments.
+ */
+if (skb_has_frag_list(head)) {
+struct sk_buff *clone;
+int i, plen = 0;
+
+clone = alloc_skb(0, GFP_ATOMIC);
+if (!clone)
+return NULL;
+
+skb_shinfo(clone)->frag_list = skb_shinfo(head)->frag_list;
+skb_frag_list_init(head);
+for (i = 0; i < skb_shinfo(head)->nr_frags; i++)
+plen += skb_frag_size(&skb_shinfo(head)->frags[i]);
+clone->data_len = head->data_len - plen;
+clone->len = clone->data_len;
+head->truesize += clone->truesize;
+clone->csum = 0;
+clone->ip_summed = head->ip_summed;
+add_frag_mem_limit(q->net, clone->truesize);
+skb_shinfo(head)->frag_list = clone;
+nextp = &clone->next;
+} else {
+nextp = &skb_shinfo(head)->frag_list;
+
+return nextp;
+}
+
+EXPORT_SYMBOL(inet_frag_reasm_prepare);
+
+void inet_frag_reasm_finish(struct inet_frag_queue *q, struct sk_buff *head,
+  void *reasm_data)
+{
+struct sk_buff **nextp = (struct sk_buff **)reasm_data;
+struct rb_node *rbn;
+struct sk_buff *fp;
-
-if (inet_frag_may_rebuild(f)) {
-  -if (!f->rebuild)
-    f->rebuild = true;
-  inet_frag_schedule_worker(f);
+skb_push(head, head->data - skb_network_header(head));
+
+/* Traverse the tree in order, to build frag_list. */
+fp = FRAG_CB(head)->next_frag;
+rbn = rb_next(&head->rbnode);
+rb_erase(&head->rbnode, &q->rb_fragments);
+while (rbn || fp) {
+    /* fp points to the next sk_buff in the current run; */
+    * nextp = fp;
+    nextp = &fp->next;
+    fp->prev = NULL;
+    memset(&fp->rbnode, 0, sizeof(fp->rbnode));
+    memset(&fp->rbnode, 0, sizeof(fp->rbnode));
+    fp->sk = NULL;
+  } else {
+    nextp = &fst->frag_list;
+    }
+    +
+    +return nextp;
+    +
+    +EXPORT_SYMBOL(inet_frag_reasm_prepare);
+    +
+    +void inet_frag_reasm_finish(struct inet_frag_queue *q, struct sk_buff *head,
+    +  void *reasm_data)
+    +{
+    +struct sk_buff **nextp = (struct sk_buff **)reasm_data;
+    +struct rb_node *rbn;
+    +struct sk_buff *fp;
-
+    -if (inet_frag_may_rebuild(f)) {
+    -  -if (!f->rebuild)
+    -    f->rebuild = true;
+    -  inet_frag_schedule_worker(f);
+    +skb_push(head, head->data - skb_network_header(head));
+    +
+    +/* Traverse the tree in order, to build frag_list. */
+    +fp = FRAG_CB(head)->next_frag;
+    +rbn = rb_next(&head->rbnode);
+    +rb_erase(&head->rbnode, &q->rb_fragments);
+    +while (rbn || fp) {
+    +    /* fp points to the next sk_buff in the current run; */
+    +    * nextp = fp;
+    +    nextp = &fp->next;
+    +    fp->prev = NULL;
+    +    memset(&fp->rbnode, 0, sizeof(fp->rbnode));
+    +    memset(&fp->rbnode, 0, sizeof(fp->rbnode));
+    +    fp->sk = NULL;
+head->data_len += fp->len;
+head->len += fp->len;
+if (head->ip_summed != fp->ip_summed)
+head->ip_summed = CHECKSUM_NONE;
+else if (head->ip_summed == CHECKSUM_COMPLETE)
+head->csum = csum_add(head->csum, fp->csum);
+head->truesize += fp->truesize;
+fp = FRAG_CB(fp)->next_frag;
+
/* Move to the next run. */
+if (rbn) {
+struct rb_node *rbnext = rb_next(rbn);
+fp = rb_to_skb(rbn);
+rb_erase(rbn, &q->rb_fragments);
+rbn = rbnext;
+}
}
+sub_frag_mem_limit(q->net, head->truesize);

-return ERR_PTR(-ENOBUFS);
+*nextp = NULL;
+head->next = NULL;
+head->prev = NULL;
+head->tstamp = q->stamp;
}
-EXPORT_SYMBOL(inet_frag_find);
+EXPORT_SYMBOL(inet_frag_reasm_finish);

-void inet_frag_maybe_warn_overflow(struct inet_frag_queue *q,
- const char *prefix)
+struct sk_buff *inet_frag_pull_head(struct inet_frag_queue *q)
{
- static const char msg[] = "inet_frag_find: Fragment hash bucket"
- " list length grew over limit " __stringify(INETFRAGS_MAXDEPTH)
- ". Dropping fragment:\n"
+struct sk_buff *head;
+
+if (q->fragments) {
+head = q->fragments;
+q->fragments = head->next;
+} else {
+struct sk_buff *skb;
+
+head = skb_rb_first(&q->rb_fragments);
+if (!head)
+return NULL;
+skb = FRAG_CB(head)->next_frag;


+if (skb)
+rb_replace_node(&head->rbnode, &skb->rbnode,
+&q->rb_fragments);
+else
+rb_erase(&head->rbnode, &q->rb_fragments);
+memset(&head->rbnode, 0, sizeof(head->rbnode));
+barrier();
+}
+if (head == q->fragments_tail)
+q->fragments_tail = NULL;
+
+sub_frag_mem_limit(q->net, head->truesize);

-if (PTR_ERR(q) == -ENOBUFS)
-net_dbg_ratelimited("%s%s", prefix, msg);
+return head;
}

-EXPORT_SYMBOL(inet_frag_maybe_warn_overflow);
+EXPORT_SYMBOL(inet_frag_pull_head);
--- linux-4.15.0.orig/net/ipv4/inet_hashtables.c
+++ linux-4.15.0/net/ipv4/inet_hashtables.c
@@ -160,6 +160,7 @@
return -ENOMEM;
}

+inet_csk_update_fastreuse(tb, child);
}

inet_bind_hash(child, tb, port);
spin_unlock(&head->lock);
@@ -188,12 +189,12 @@
bool dev_match = (sk->sk_bound_dev_if == dif ||
    sk->sk_bound_dev_if == sdif);

-if (exact_dif && !dev_match)
+if (!dev_match)
    return -1;
-if (sk->sk_bound_dev_if && dev_match)
+if (sk->sk_bound_dev_if)
    score += 4;
{
    bool exact_dif = inet_exact_dif_match(net, skb);
struct sock *sk, *result = NULL;
+struct hlist_nulls_node *node;

u32 phash = 0;

-sk_for_each_rcu(sk, &ilb->head) {
+sk_nulls_for_each_rcu(sk, node, &ilb->nulls_head) {
    score = compute_score(sk, net, hnum, daddr,
        dif, sdif, exact_dif);
    if (score > hiscore) {
        @@ -442,10 +444,11 @@
            struct inet_listen_hashbucket *ilb)
    {struct inet_bind_bucket *tb = inet_csk(sk)->icsk_bind_hash;
+    const struct hlist_nulls_node *node;
        struct sock *sk2;
        kuid_t uid = sock_i_uid(sk);

            -sk_for_each_rcu(skb2, &ilb->head) {
+            sk_nulls_for_each_rcu(skb2, node, &ilb->nulls_head) {
                if (sk2 != sk &&
                    skb->sk_family == sk->sk_family &&
                    ipv6_only_sock(skb2) == ipv6_only_sock(skb) &&
                    @@ -480,9 +483,9 @@
                    }
        if (IS_ENABLED(CONFIG_IPV6) && skb->sk_reuseport &&
            skb->sk_family == AF_INET6)
            -hlist_add_tail_rcu(skb->sk_node, &ilb->head);
+__sk_nulls_add_node_tail_rcu(skb, &ilb->nulls_head);
        else
            -hlist_add_head_rcu(skb->sk_node, &ilb->head);
+__sk_nulls_add_node_rcu(skb, &ilb->nulls_head);
        sock_set_flag(skb, SOCK_RCU_FREE);
        sock_prot_inuse_add(sock_net(skb), skb->sk_prot, 1);
        unlock:
            @@ -525,10 +528,7 @@
            spin_lock_bh(lock);
        if (rcu_access_pointer(skb->sk_reuseport_cb))
            reuseport_detach_sock(skb);
        -if (listener)
            -done = __sk_del_node_init(skb);
        -else
            -done = __sk_nulls_del_node_init(skb);
+done = __sk_nulls_del_node_init(skb);
        if (done)
            sock_prot_inuse_add(sock_net(skb), skb->sk_prot, -1);
        spin_unlock_bh(lock);
            @@ -664,7 +664,8 @@
for (i = 0; i < INET_LHTABLE_SIZE; i++) {
spin_lock_init(&h->listening_hash[i].lock);
-INIT_HLIST_HEAD(&h->listening_hash[i].head);
+INIT_HLIST_NULLS_HEAD(&h->listening_hash[i].nulls_head,
   i + LISTENING_NULLS_BASE);
}
EXPORT_SYMBOL_GPL(inet_hashinfo_init);
--- linux-4.15.0.orig/net/ipv4/inet_timewait_sock.c
+++ linux-4.15.0/net/ipv4/inet_timewait_sock.c
@@ -179,6 +179,7 @@
tw->tw_dport = inet->inet_dport;
tw->tw_family = sk->sk_family;
tw->tw_reuse = sk->sk_reuse;
+tw->tw_reuseport = sk->sk_reuseport;
tw->tw_hash = sk->sk_hash;
tw->tw_ipv6only = 0;
tw->tw_transparent = inet->transparent;
--- linux-4.15.0.orig/net/ipv4/inetpeer.c
+++ linux-4.15.0/net/ipv4/inetpeer.c
@@ -159,7 +159,12 @@
base->total / inet_peer_threshold * HZ;
for (i = 0; i < gc_cnt; i++) {
  p = gc_stack[i];
-delta = (__u32)jiffies - p->dtime;
+++ The READ_ONCE() pairs with the WRITE_ONCE()
++ in inet_putpeer()
+*/
+delta = (__u32)jiffies - READ_ONCE(p->dtime);
+if (delta < ttl || !refcount_dec_if_one(&p->refcnt))
gc_stack[i] = NULL;
}
@@ -210,10 +215,12 @@
p = kmem_cache_alloc(peer_cachep, GFP_ATOMIC);
if (p) {
  p->daddr = *daddr;
  +p->dtime = (__u32)jiffies;
  refcount_set(&p->refcnt, 2);
  atomic_set(&p->rid, 0);
  p->metrics[RTAX_LOCK-1] = INETPEER_METRICS_NEW;
  p->rate_tokens = 0;
  +p->n_redirects = 0;
  /* 60*HZ is arbitrary, but chosen enough high so that the first
    * calculation of tokens is at its maximum.
  */
  @@ -234,7 +241,10 @@
void inet_putpeer(struct inet_peer *p)
{
    p->dtime = (__u32)jiffies;
    /* The WRITE_ONCE() pairs with itself (we run lockless)
    and the READ_ONCE() in inet_peer_gc()
    */
    WRITE_ONCE(p->dtime, (__u32)jiffies);

    if (refcount_dec_and_test(&p->refcnt))
        call_rcu(&p->rcu, inetpeer_free_rcu);
    --- linux-4.15.0.orig/net/ipv4/ip_forward.c
    +++ linux-4.15.0/net/ipv4/ip_forward.c
    @ @ -72,6 +72,7 @@
    if (unlikely(opt->optlen))
        ip_forward_options(skb);

    skb->tstamp = 0;
    return dst_output(net, sk, skb);
}

--- linux-4.15.0.orig/net/ipv4/ip_fragment.c
+++ linux-4.15.0/net/ipv4/ip_fragment.c
@@ -57,27 +57,64 @@
 /* Use skb->cb to track consecutive/adjacent fragments coming at
  * the end of the queue. Nodes in the rb-tree queue will
  * contain "runs" of one or more adjacent fragments.
  *
  * Invariants:
  * - next_frag is NULL at the tail of a "run";
  * - the head of a "run" has the sum of all fragment lengths in frag_run_len.
  */
+struct ipfrag_skb_cb {
+    struct inet_skb_parmh;
+    int offset;
+    struct sk_buff*next_frag;
+    int frag_run_len;
+};

-#define FRAG_CB(skb)((struct ipfrag_skb_cb *)((skb)->cb))
+static void ip4_frag_init_run(struct sk_buff *skb)
/* Append skb to the last "run". */
static void ip4_frag_append_to_last_run(struct inet_frag_queue *q, struct sk_buff *skb)
{
  RB_CLEAR_NODE(&skb->rbnode);
  FRAG_CB(skb)->next_frag = NULL;
  +
  FRAG_CB(q->last_run_head)->frag_run_len += skb->tot_len;
  FRAG_CB(q->fragments_tail)->next_frag = skb;
  q->fragments_tail = skb;
  +
  +/* Create a new "run" with the skb. */
  static void ip4_frag_create_run(struct inet_frag_queue *q, struct sk_buff *skb)
  {
    if (q->last_run_head)
      rb_link_node(&skb->rbnode, &q->last_run_head->rbnode,
          &q->last_run_head->rbnode.rb_right);
    else
      rb_link_node(&skb->rbnode, NULL, &q->rb_fragments.rb_node);
    +
    ip4_frag_init_run(skb);
    q->fragments_tail = skb;
    q->last_run_head = skb;
    +
  }

  /* Describe an entry in the "incomplete datagrams" queue. */
  struct ipq
  {
    struct inet_frag_queue q;

    u32 user;
    __be32 saddr;
    __be32 daddr;
    __be16 id;
    u8 protocol;
    u8ecn; /* RFC3168 support */
    u16 max_df_size; /* largest frag with DF set seen */
    int iif;
    -int vif; /* L3 master device index */
    unsigned int rid;
  }
struct inet_peer *peer;
};
@@ -89,49 +126,9 @@
static struct inet_frags ip4_frags;

-int ip_frag_mem(struct net *net)
-{  
 -return sum_frag_mem_limit(&net->ipv4.frags);
 -}
-
-
-struct ip4_create_arg {
-  struct iphdr *iph;
-  u32 user;
-  int vif;
- :};
-
-
-struct ip4_create_arg {
-  struct iphdr *iph;
-  u32 user;
-  int vif;
- :};
-
-
-struct ip4_create_arg {
-  struct iphdr *iph;
-  u32 user;
-  int vif;
- :};
-
-
-static unsigned int ipqhashfn(__be16 id, __be32 saddr, __be32 daddr, u8 prot)
-{  
 -net_get_random_once(&ip4_frags.rnd, sizeof(ip4_frags.rnd));
 -return jhash_3words((__force u32)id << 16 | prot,
 -  (__force u32)saddr, (__force u32)daddr,
 -  ip4_frags.rnd);
 -}
-
-struct ipq *qp;
-const struct ip4_create_arg *arg = a;
-
-qp = container_of(q, struct ipq, q);
-return ipqhashfn(ipq->id, ipq->saddr, ipq->daddr, ipq->protocol);
-}
-
-static bool ip4_frag_match(const struct inet_frag_queue *q, const void *a)
-{  
 -const struct ipq *qp;
 -const struct ip4_create_arg *arg = a;
 -
-qp = container_of(q, struct ipq, q);
-return qp->id == arg->iph->id &&
 -qp->saddr == arg->iph->saddr &&
 -qp->daddr == arg->iph->daddr &&
 -qp->protocol == arg->iph->protocol &&

-qp->user == arg->user &&
-qp->vif == arg->vif;
-
}

static void ip4_frag_init(struct inet_frag_queue *q, const void *a)
{
@@ -140,17 +137,12 @@
    frags);
 struct net *net = container_of(ipv4, struct net, ipv4);

-const struct ip4_create_arg *arg = a;
+const struct frag_v4_compare_key *key = a;

-qp->protocol = arg->iph->protocol;
-qp->id = arg->iph->id;
-qp->ecn = ip4_frag_ecn(arg->iph->tos);
-qp->saddr = arg->iph->saddr;
-qp->daddr = arg->iph->daddr;
-qp->vif = arg->vif;
-qp->user = arg->user;
+q->key.v4 = *key;
+qp->ecn = 0;
 qp->peer = q->net->max_dist ?
    inet_getpeer_v4(net->ipv4.peers, arg->iph->saddr, arg->vif, 1) :
    inet_getpeer_v4(net->ipv4.peers, key->saddr, key->vif, 1) :
    NULL;
}
@@ -168,7 +160,7 @@

static void ipq_put(struct ipq *ipq)
{
-    inet_frag_put(&ipq->q, &ip4_frags);
+    inet_frag_put(&ipq->q);
}

/* Kill ipq entry. It is not destroyed immediately,
@@ -176,7 +168,7 @@ */

static void ipq_kill(struct ipq *ipq)
{
-    inet_frag_kill(&ipq->q, &ip4_frags);
+    inet_frag_kill(&ipq->q);
}

static bool frag_expire_skip_icmp(u32 user)
@@ -194,8 +186,11 @@

static void ip_expire(struct timer_list *t)
struct inet_frag_queue *frag = from_timer(frag, t, timer);
-struct ipq *qp;
+const struct iphdr *iph;
+struct sk_buff *head = NULL;
struct net *net;
+struct ipq *qp;
+int err;

qp = container_of(frag, struct ipq, q);
net = container_of(qp->q.net, struct net, ipv4.frags);
@@ -208,51 +203,65 @@
ipq_kill(qp);
    __IP_INC_STATS(net, IPSTATS_MIB_REASMFAILS);
+    __IP_INC_STATS(net, IPSTATS_MIB_REASMTIMEOUT);

-    if (!inet_frag_evicting(&qp->q)) {
-        struct sk_buff *clone, *head = qp->q.fragments;
-        const struct iphdr *iph;
-        int err;
-
-        __IP_INC_STATS(net, IPSTATS_MIB_REASMTIMEOUT);
-    if (!qp->q.flags & INET_FRAG_FIRST_IN)
-        goto out;
-    if (!(qp->q.flags & INET_FRAG_FIRST_IN) || !qp->q.fragments)
-        /* sk_buff::dev and sk_buff::rbnode are unionized. So we
-           pull the head out of the tree in order to be able to
-           deal with head->dev.
-           */
-        +if (qp->q.fragments) {
-            +head = qp->q.fragments;
-            +qp->q.fragments = head->next;
-        +} else {
-            +head = skb_rb_first(&qp->q.rb.fragments);
-            +if (!head)
-                goto out;
-            +if (FRAG_CB(head)->next_frag)
-                +rb_replace_node(&head->rbnode,
-                    +&FRAG_CB(head)->next_frag->rbnode,
-                    +&qp->q.rb_fragment);
-            +else
-                +rb_erase(&head->rbnode, &qp->q.rb_fragment);
-            +memset(&head->rbnode, 0, sizeof(head->rbnode));
-        +} +barrier();
-    +if (head == qp->q.fragments_tail)


qp->q.fragments_tail = NULL;

head->dev = dev_get_by_index_rcu(net, qp->iif);
if (!head->dev)
goto out;
+sub_frag_mem_limit(qp->q.net, head->truesize);
+
+head->dev = dev_get_by_index_rcu(net, qp->iif);
+if (!head->dev)
goto out;

- skb has no dst, perform route lookup again */
ip = ip_hdr(head);
-err = ip_route_input_noref(head, iph->daddr, iph->saddr,
+ skb has no dst, perform route lookup again */
ip = ip_hdr(head);
+err = ip_route_input_noref(head, iph->daddr, iph->saddr,
 iph->tos, head->dev);
-if (err)
goto out;
+if (err)
goto out;

- skb has no dst, perform route lookup again */
- (skb_rtable(head)->rt_type != RTN_LOCAL))
goto out;
+ skb has no dst, perform route lookup again */
+ (skb_rtable(head)->rt_type != RTN_LOCAL))
goto out;

-clone = skb_clone(head, GFP_ATOMIC);
+spin_unlock(&qp->q.lock);
+icmp_send(head, ICMP_TIME_EXCEEDED, ICMP_EXC_FRAGTIME, 0);
+goto out_rcu_unlock;

- Send an ICMP "Fragment Reassembly Timeout" message. */
-if (clone) {
 -spin_unlock(&qp->q.lock);
 -icmp_send(clone, ICMP_TIME_EXCEEDED,
 - ICMP_EXC_FRAGTIME, 0);
 -consume_skb(clone);
goto out_rcu_unlock;
-
-}
-
out:
spin_unlock(&qp->q.lock);
out_rcu_unlock:
rcu_read_unlock();
+if (head)
+kfree_skb(head);
ipq_put(qp);
}

static struct ipq *ip_find(struct net *net, struct iphdr *iph,
   u32 user, int vif)
{
+struct frag_v4_compare_key key = {
  .saddr = iph->saddr,
  .daddr = iph->daddr,
  .user = user,
  .vif = vif,
  .id = iph->id,
  .protocol = iph->protocol,
+};
struct inet_frag_queue *q;
-struct ip4_create_arg arg;
-unsigned int hash;

-arg.iph = iph;
-arg.user = user;
-arg.vif = vif;
-
-hash = ipqhashfn(iph->id, iph->saddr, iph->daddr, iph->protocol);
-
-q = inet_frag_find(&net->ipv4.frags, &ip4_frags, &arg, hash);
-if (IS_ERR_OR_NULL(q)) {
  -inet_frag_maybe_warn_overflow(q, pr_fmt());
  +q = inet_frag_find(&net->ipv4.frags, &key);
  +if (!q)
    return NULL;
  +}
  return container_of(q, struct ipq, q);
}

end = atomic_inc_return(&peer->rid);
qp->rid = end;
if (rc) {
    struct net *net;
    if (!mod_timer(&qp->q.timer, jiffies + qp->q.net->timeout)) {
        return -ETIMEDOUT;
    }
    struct sk_buff *fp;

do {
    struct sk_buff *xp = fp->next;
    sum_truesize += fp->truesize;
    kfree_skb(fp);
    fp = xp;
} while (fp);

+sum_truesize = inet_frag_rbtree_purge(&qp->q.rb_fragments);
sub_frag_mem_limit(qp->q.net, sum_truesize);

qp->q.flags = 0;
qp->q.len = 0;
qp->q.meat = 0;
qp->q.fragments = NULL;
+qp->q.rb.fragments = RB_ROOT;
qp->q.fragments_tail = NULL;
+qp->q.last_run_head = NULL;
qp->iif = 0;
qp->ecn = 0;

/* Add new segment to existing queue. */
static int ip_frag_queue(struct ipq *qp, struct sk_buff *skb)
{
    struct sk_buff *prev, *next;
    struct net *net = container_of(qp->q.net, struct net, ipv4.frags);
    struct rb_node **rbn, *parent;
    struct sk_buff *skb1, *prev_tail;
    struct net_device *dev;
unsigned int fragsize;
int flags, offset;
@@ -405,94 +409,61 @@
if (err)
goto err;

-/* Find out which fragments are in front and at the back of us
- * in the chain of fragments so far. We must know where to put
- * this fragment, right?
- */
-prev = qp->q.fragments_tail;
-if (!prev || FRAG_CB(prev)->offset < offset) {
- next = NULL;
- goto found;
-}
-prev = NULL;
-for (next = qp->q.fragments; next != NULL; next = next->next) {
- if (FRAG_CB(next)->offset >= offset)
- break; /* bingo! */
- prev = next;
- }
-}
-
-found:
-/* We found where to put this one. Check for overlap with
- * preceding fragment, and, if needed, align things so that
- * any overlaps are eliminated.
- */
-if (prev) {
- int i = (FRAG_CB(prev)->offset + prev->len) - offset;
-}
-if (i > 0) {
- offset += i;
- err = -EINVAL;
- if (end <= offset)
- goto err;
- err = -ENOMEM;
- if (!pskb_pull(skb, i))
- goto err;
- if(skb->ip_summed != CHECKSUM_UNNECESSARY)
- skb->ip_summed = CHECKSUM_NONE;
-}
-
-err = -ENOMEM;
+/* Note : skb->rbnode and skb->dev share the same location. */
+dev = skb->dev;
+/* Makes sure compiler won't do silly aliasing games */
+barrier();
-while (next && &FRAG_CB(next)->offset < end) {
    int i = end - FRAG_CB(next)->offset; /* overlap is ‘i’ bytes */
    /* RFC5722, Section 4, amended by Errata ID : 3089
       When reassembling an IPv6 datagram, if
       one or more its constituent fragments is determined to be an
       overlapping fragment, the entire datagram (and any constituent
       fragments) MUST be silently discarded.
    */
    * We do the same here for IPv4 (and increment an snmp counter).
    */

    if (i < next->len) {
        /* Eat head of the next overlapped fragment
           and leave the loop. The next ones cannot overlap.
        */
        if (!pskb_pull(next, i))
            goto err;
        -FRAG_CB(next)->offset += i;
        -qp->q.meat -= i;
        -if (next->ip_summed != CHECKSUM_UNNECESSARY)
            next->ip_summed = CHECKSUM_NONE;
        -break;
    } else {
        struct sk_buff *free_it = next;
        /* Old fragment is completely overridden with
           new one drop it.
        */
        next = next->next;
        if (prev)
            prev->next = next;
        else
            qp->q.fragments = next;
        -qp->q.meat -= free_it->len;
        -sub_frag_mem_limit(qp->q.net, free_it->truesize);
        -kfree_skb(free_it);
    }
    /* Find out where to put this fragment. */
    if (offset < prev_tail->ip_defrag_offset + prev_tail->len)
        ip4_frag_create_run(&qp->q, skb); /* First fragment. */
    else if (prev_tail->ip_defrag_offset + prev_tail->len < end) {
        /* This is the common case: skb goes to the end. */
        /* Detect and discard overlaps. */
        if (offset < prev_tail->ip_defrag_offset + prev_tail->len)
            ip4_frag_create_run(&qp->q, skb); /* First fragment. */
    
    prev_tail = qp->q.fragments_tail;
    if (!prev_tail)
        ip4_frag_create_run(&qp->q, skb); /* First fragment. */
goto discard_qp;
+if (offset == prev_tail->ip_defrag_offset + prev_tail->len)
+ip4_frag_append_to_last_run(&qp->q, skb);
+else
+ip4_frag_create_run(&qp->q, skb);
+} else {
+/* Binary search. Note that skb can become the first fragment,
+ * but not the last (covered above).
+ */
+rbn = &qp->q.rb.fragments.rb_node;
+do {
+parent = *rbn;
+skb1 = rb_to_skb(parent);
+if (end <= skb1->ip_defrag_offset)
+rbn = &parent->rb_left;
+else if (offset >= skb1->ip_defrag_offset +
+FRAG_CB(skb1)->frag_run_len)
+rbn = &parent->rb_right;
+else /* Found an overlap with skb1. */
+goto discard_qp;
+} while (*rbn);
+/* Here we have parent properly set, and rbn pointing to
+/ * one of its NULL left/right children. Insert skb.
+ */
+ip4_frag_init_run(skb);
+rb_link_node(&skb->rbnode, parent, rbn);
+rb_insert_color(&skb->rbnode, &qp->q.rb.fragments);
}

- FRAG_CB(skb)->offset = offset;
-
-/ * Insert this fragment in the chain of fragments. */
-skb->next = next;
-if (!next)
-qp->q.fragments_tail = skb;
-if (prev)
-prev->next = skb;
-else
-qp->q.fragments = skb;
-
-dev = skb->dev;
-if (dev) {
+if (dev) {
+qp->iif = dev->ifindex;
-skb->dev = NULL;
-}
+skb->ip_defrag_offset = offset;
qp->q.stamp = skb->tstamp;
qp->q.meat += skb->len;
qp->ecn |= ecn;
@@ -514,7 +485,7 @@
unsigned long orefdst = skb->_skb_refdst;

skb->_skb_refdst = 0UL;
-err = ip_frag_reasm(qp, prev, dev);
+err = ip Frag Reasm(qp, skb, prev_tail, dev);
 skb->_skb_refdst = orefdst;
 return err;
}
@@ -522,22 +493,27 @@
 skb_dst_drop(skb);
 return -EINPROGRESS;

+discard_qp:
+inet_frag_kill(&qp->q);
+err = -EINVAL;
+__IP_INC_STATS(net, IPSTATS_MIB_REASM_OVERLAPS);
 err:
 kfree_skb(skb);
 return err;
}

/* Build a new IP datagram from all its fragments. */

-struct iphdr *iph;
+struct sk_buff *fp, *head = skb_rb_first(&qp->q.rb_fragments);
  +struct rb_node *rbn;
+int delta;

@@ -549,26 +525,27 @@
goto out_fail;
}

/* Build a new IP datagram from all its fragments. */

-struct iphdr *iph;
+struct sk_buff *fp, *head = qp->q.fragments;
+struct sk_buff *fp, *head = skb_rb_first(&qp->q.rb_fragments);
+struct sk_buff **nextp; /* To build frag_list. */
+struct rb_node *rbn;

int len;
int ihlen;
+int delta;
int err;
u8 ecn;

@@ -549,26 +525,27 @@
goto out_fail;
}
/* Make the one we just received the head. */
-if (prev) {
-head = prev->next;
-fp = skb_clone(head, GFP_ATOMIC);
+if (head != skb) {
  +fp = skb_clone(skb, GFP_ATOMIC);
-if (!fp)
  goto out_nomem;

-if (!(fp->next))
  +FRAG_CB(fp)->next_frag = FRAG_CB(skb)->next_frag;
+if (RB_EMPTY_NODE(&skb->rbnode))
  +FRAG_CB(prev_tail)->next_frag = fp;
+else
  +rb_replace_node(&skb->rbnode, &fp->rbnode,
  +&qp->q.rb_fragments);
+if (qp->q.fragments_tail == skb)
  qp->q.fragments_tail = fp;
-prev->next = fp;
-
-skbo_morph(head, qp->q.fragments);
-head->next = qp->q.fragments->next;
-
-consume_skb(qp->q.fragments);
-qp->q.fragments = head;
+skbo_morph(skb, head);
+FRAG_CB(skb)->next_frag = FRAG_CB(head)->next_frag;
+rb_replace_node(&head->rbnode, &skb->rbnode,
  +&qp->q.rb_fragments);
+consume_skb(head);
+head = skb;
}

-WARN_ON(!head);
-WARN_ON(FRAG_CB(head)->offset != 0);
+WARN_ON(head->ip_defrag_offset != 0);

/* Allocate a new buffer for the datagram. */
-ihlen = ip_hdrlen(head);
@@ -578,10 +555,16 @@
-if (len > 65535)
  goto out_oversize;

  +delta = - head->truesize;
  +
  /* Head of list must not be cloned. */
-if (skb_unclone(head, GFP_ATOMIC))
goto out_nomem;

+delta += head->truesize;
+if (delta)
+add_frag_mem_limit(qp->q.net, delta);
+
/*/ If the first fragment is fragmented itself, we split
* it to two chunks: the first with data and paged part
* and the second, holding only fragments. */
@@ -592,35 +575,61 @@
clone = alloc_skb(0, GFP_ATOMIC);
if (!clone)
  goto out_nomem;
-clone->next = head->next;
-head->next = clone;
skb_shinfo(clone)->frag_list = skb_shinfo(head)->frag_list;
skb_frag_list_init(head);
for (i = 0; i < skb_shinfo(head)->nr_frags; i++)
  plen += skb_frag_size(&skb_shinfo(head)->frags[i]);
clone->len = clone->data_len = head->data_len - plen;
-head->data_len -= clone->len;
-head->len -= clone->len;
+head->truesize += clone->truesize;
clone->csum = 0;
clone->ip_summed = head->ip_summed;
add_frag_mem_limit(qp->q.net, clone->truesize);
+skb_shinfo(head)->frag_list = clone;
+nextp = &clone->next;
+} else {
+nextp = &skb_shinfo(head)->frag_list;
+
-skb_shinfo(head)->frag_list = head->next;
skb_push(head, head->data - skb_network_header(head));

-for (fp=head->next; fp; fp = fp->next) {
-head->data_len += fp->len;
-head->len += fp->len;
-if (head->ip_summed != fp->ip_summed)
-head->ip_summed = CHECKSUM_NONE;
-else if (head->ip_summed == CHECKSUM_COMPLETE)
-head->csum = csum_add(head->csum, fp->csum);
-head->truesize += fp->truesize;
+/* Traverse the tree in order, to build frag_list. */
+fp = FRAG_CB(head)->next_frag;
+rbn = rb_next(&head->rbnode);
+rb_erase(&head->rbnode, &qp->q.rb.fragments);
+while (rbn || fp) {
/* fp points to the next sk_buff in the current run; */
/* rbn points to the next run. */
/* Go through the current run. */
while (fp) {
  /* fp points to the next sk_buff in the current run; */
  nextp = fp;
  nextp = &fp->next;
  fp->prev = NULL;
  memset(&fp->rbnode, 0, sizeof(fp->rbnode));
  fp->sk = NULL;
  head->data_len += fp->len;
  head->len += fp->len;
  if (head->ip_summed != fp->ip_summed)
    head->ip_summed = CHECKSUM_NONE;
  else if (head->ip_summed == CHECKSUM_COMPLETE)
    head->csum = csum_add(head->csum, fp->csum);
  head->truesize += fp->truesize;
  fp = FRAG_CB(fp)->next_frag;
}
/* Move to the next run. */
if (rbn) {
  struct rb_node *rbnext = rb_next(rbn);
  fp = rb_to_skb(rbn);
  rb_erase(rbn, &qp->q.rb_fragments);
  rbn = rbnext;
}
}
sub_frag_mem_limit(qp->q.net, head->truesize);

*nextp = NULL;
head->next = NULL;
head->prev = NULL;
head->dev = dev;
head->tstamp = qp->q.stamp;
IPCB(head)->frag_max_size = max(qp->max_df_size, qp->q.max_size);
__IP_INC_STATS(net, IPSTATS_MIB_REASMOKS);
qp->q.fragments = NULL;
+qp->q.rb_fragments = RB_ROOT;
qp->q.fragments_tail = NULL;
+qp->q.last_run_head = NULL;
return 0;

out_nomem:

err = -ENOMEM;
goto out_fail;
out_oversize:
-net_info_ratelimited("Oversized IP packet from %pI4\n", &qp->saddr);
+net_info_ratelimited("Oversized IP packet from %pI4\n", &qp->q.key.v4.saddr);
out_fail:
__IP_INC_STATS(net, IPSTATS_MIB_REASMFAILS);
return err;
@@ -716,10 +727,14 @@
if (ip_is_fragment(&iph)) {
 skb = skb_share_check(skb, GFP_ATOMIC);
 if (skb) {
-\t\t\tif (!pskb_may_pull(skb, netoff + iph.ihl * 4))
-\t\t\treturn skb;
-\t\t\tif (pskb_trim_rcsum(skb, netoff + len))
-\t\t\treturn skb;
+\t\t\tif (!pskb_may_pull(skb, netoff + iph.ihl * 4)) {
+\t\t\t\tkfree_skb(skb);
+\t\t\treturn NULL;
+\t\t}\n+\t\tif (pskb_trim_rcsum(skb, netoff + len)) {
+\t\t\tkfree_skb(skb);
+\t\treturn NULL;
+\t}\nmemset(IPCB(skb), 0, sizeof(struct inet_skb_parm));
if (ip_defrag(net, skb, user))
return NULL;
@@ -730,25 +745,46 @@
} EXPORT_SYMBOL(ip_check_defrag);

+unsigned int inet_frag_rbtree_purge(struct rb_root *root)
+{
+struct rb_node *p = rb_first(root);
+unsigned int sum = 0;
+while (p) {
+\tstruct sk_buff *skb = rb_entry(p, struct sk_buff, rbnode);
+\t+p = rb_next(p);
+\t+rb_erase(&skb->rbnode, root);
+\t+while (skb) {
+\t\t+struct sk_buff *next = FRAG_CB(skb)->next_frag;
+\t\t\t+sum += skb->truesize;
+\t\t+kfree_skb(skb);
+\t\t+skb = next;
+\t\t}\n+\t}\n+}
+return sum;
+
+EXPORT_SYMBOL(inet_frag_rbtree_purge);
+
+#ifdef CONFIG_SYSCTL
-static int zero;
+static int dist_min;
+
static struct ctl_table ip4_frags_ns_ctl_table[] = {

{ .procname = "ipfrag_high_thresh",
  .data = &init_net.ipv4.frags.high_thresh,
  .maxlen = sizeof(int),
  .mode = 0644,
  .proc_handler = proc_dointvec_minmax,
  .extra1 = &init_net.ipv4.frags.low_thresh
 },

{ .procname = "ipfrag_low_thresh",
  .data = &init_net.ipv4.frags.low_thresh,
  .maxlen = sizeof(int),
  .mode = 0644,
  .proc_handler = proc_dointvec_minmax,
  .extra1 = &zero,
  .extra2 = &init_net.ipv4.frags.high_thresh
 },

@@ -764,7 +800,7 @@
  .maxlen = sizeof(int),
  .mode = 0644,
  .proc_handler = proc_dointvec_minmax,
- extra1 = &zero
+ extra1 = &dist_min,
 },

{ }
};
@@ -846,22 +882,16 @@

static int __net_init ipv4_frags_init_net(struct net *net)
{
  /* Fragment cache limits.
  * The fragment memory accounting code, (tries to) account for
  * the real memory usage, by measuring both the size of frag
  */


- * queue struct (inet_frag_queue (ipv4:ipq/ipv6:frag_queue))
- * and the SKB's truesize.
- *
- * A 64K fragment consumes 129736 bytes (44*2944)+200
- * (1500 truesize == 2944, sizeof(struct ipq) == 200)
- *
- * We will commit 4MB at one time. Should we cross that limit
- * we will prune down to 3MB, making room for approx 8 big 64K
- * fragments 8x128k.
+int res;
+
+/*
+ * Fragment cache limits. We will commit 256K at one time. Should we
+ * cross that limit we will prune down to 192K. This should cope with
+ * even the most extreme cases without allowing an attacker to
+ * measurably harm machine performance.
+ */
-net->ipv4.frags.high_thresh = 4 * 1024 * 1024;
-net->ipv4.frags.low_thresh = 3 * 1024 * 1024;
+net->ipv4.frags.high_thresh = 256 * 1024;
+net->ipv4.frags.low_thresh = 192 * 1024;
/*
 * Important NOTE! Fragment queue must be destroyed before MSL expires.
 * RFC791 is wrong proposing to prolongate timer each fragment arrival
@@ -870,16 +900,21 @@
net->ipv4.frags.timeout = IP_FRAG_TIME;

net->ipv4.frags.max_dist = 64;
+net->ipv4.frags.f = &ip4_frags;

-inet_frags_init_net(&net->ipv4.frags);
-
-return ip4_frags_ns_ctl_register(net);
+res = inet_frags_init_net(&net->ipv4.frags);
+-if (res < 0)
+-return res;
+-res = ip4_frags_ns_ctl_register(net);
+-if (res < 0)
+-inet_frags_exit_net(&net->ipv4.frags);
+-return res;
+
{static void __net_exit ipv4_frags_exit_net(struct net *net)
 { ip4_frags_ns_ctl_unregister(net);
- inet_frags_exit_net(&net->ipv4.frags, &ip4_frags);
+ inet_frags_exit_net(&net->ipv4.frags);
 }}
static struct pernet_operations ip4_frags_ops = {
  .exit = ipv4_frags_exit_net,
};

+static u32 ip4_key_hashfn(const void *data, u32 len, u32 seed)
+{
+  return jhash2(data,
+    sizeof(struct frag_v4_compare_key) / sizeof(u32), seed);
+}
+
+static u32 ip4_obj_hashfn(const void *data, u32 len, u32 seed)
+{
+  const struct inet_frag_queue *fq = data;
+  return jhash2((const u32 *)&fq->key.v4,
+    sizeof(struct frag_v4_compare_key) / sizeof(u32), seed);
+}
+
+static int ip4_obj_cmpfn(struct rhashtable_compare_arg *arg, const void *ptr)
+{
+  const struct frag_v4_compare_key *key = arg->key;
+  const struct inet_frag_queue *fq = ptr;
+  return !!memcmp(&fq->key, key, sizeof(*key));
+}
+
+static const struct rhashtable_params ip4_rhash_params = {
+  .head_offset= offsetof(struct inet_frag_queue, node),
+  .key_offset= offsetof(struct inet_frag_queue, key),
+  .key_len= sizeof(struct frag_v4_compare_key),
+  .hashfn= ip4_key_hashfn,
+  .obj_hashfn= ip4_obj_hashfn,
+  .obj_cmpfn= ip4_obj_cmpfn,
+  .automatic_shrinking= true,
+};
+
void __init ipfrag_init(void)
{
  -ip4_frags_ctl_register();
  -register_pernet_subsys(&ip4_frags_ops);
  -ip4_frags.hashfn = ip4_hashfn;
  ip4_frags.constructor = ip4_frag_init;
  ip4_frags.destructor = ip4_frag_free;
  ip4_frags.qsize = sizeof(struct ipq);
  -ip4_frags.match = ip4_frag_match;
ip4_frags.frag_expire = ip_expire;
ip4_frags.fragments_cache_name = ip_frag_cache_name;
+ip4_frags.rhash_params = ip4_rhash_params;
if (inet_frags_init(&ip4_frags))
    panic("IP: failed to allocate ip4_frags cache\n");
+ip4_frags_ctl_register();
+register_pernet_subsys(&ip4_frags_ops);
}
--- linux-4.15.0.orig/net/ipv4/ip_gre.c
+++ linux-4.15.0/net/ipv4/ip_gre.c
@@ -177,6 +177,8 @@
if (tpi->proto == htons(ETH_P_TEB))
    itn = net_generic(net, gre_tap_net_id);
+else if (tpi->proto == htons(ETH_P_ERSPAN))
+    itn = net_generic(net, erspan_net_id);
else
    itn = net_generic(net, ipgre_net_id);
@@ -228,13 +230,10 @@
const int type = icmp_hdr(skb)->type;
const int code = icmp_hdr(skb)->code;
struct tnl_ptk_info tpi;
-bool csum_err = false;
-if (gre_parse_header(skb, &tpi, &csum_err, htons(ETH_P_IP),
-    iph->ihl * 4) < 0) {
-    if (!csum_err)
-        /* ignore csum errors. */
-        return;
-}
+if (gre_parse_header(skb, &tpi, NULL, htons(ETH_P_IP),
+    iph->ihl * 4) < 0)
+    return;

if (type == ICMP_DEST_UNREACH && code == ICMP_FRAG_NEEDED) {
    ipv4_update_pmtu(skb, dev_net(skb->dev), info,
    @@ -303,8 +302,10 @@
return PACKET_REJECT;

md = ip_tunnel_info_opts(&tun_dst->u.tun_info);
-if (!md)
-    +dst_release((struct dst_entry *)tun_dst);
+    return PACKET_REJECT;
+
md->index = index;
info = &tun_dst->u.tun_info;
ip_tunnel_rcv(tunnel, skb, tpi, tun_dst, log_ecn_error);
return PACKET_RCVD;
}

return PACKET_REJECT;
+
drop:
kfree_skb(skb);
return PACKET_RCVD;
@@ -408,11 +411,13 @@
if (unlikely(tpi.proto == htons(ETH_P_ERSPAN))) {
if (erspan_rcv(skb, &tpi, hdr_len) == PACKET_RCVD)
return 0;
+goto out;
}
if (ipgre_rcv(skb, &tpi, hdr_len) == PACKET_RCVD)
return 0;
+
out:
icmp_send(skb, ICMP_DEST_UNREACH, ICMP_PORT_UNREACH, 0);
drop:
kfree_skb(skb);
@@ -584,6 +589,9 @@
struct ip_tunnel *tunnel = netdev_priv(dev);
const struct iphdr *tnl_params;
+if (!pskb_inet_may_pull(skb))
+goto err_free_rt;
+
md = ip_tunnel_info_opts(tun_info);
if (!md)
goto err_free_rt;
@@ -631,23 +639,29 @@
struct ip_tunnel *tunnel = netdev_priv(dev);
const struct iphdr *tnl_params;
+if (!skb_inet_may_pull(skb))
+goto free_skb;
+
if (tunnel->collect_md) {
gre_fb_xmit(skb, dev, skb->protocol);
return NETDEV_TX_OK;
}

if (dev->header_ops) {
  /* Need space for new headers */
  -if (skb_cow_head(skb, dev->needed_headroom -


(tunnel->hlen + sizeof(struct iphdr)))

+const int pull_len = tunnel->hlen + sizeof(struct iphdr);
+
+if (skb_cow_head(skb, 0))
goto free_skb;

tnl_params = (const struct iphdr *)skb->data;

+if (pull_len > skb_transport_offset(skb))
+goto free_skb;
+
/* Pull skb since ip_tunnel_xmit() needs skb->data pointing
 * to gre header.
 */
-skb_pull(skb, tunnel->hlen + sizeof(struct iphdr));
+skb_pull(skb, pull_len);
 skb_reset_mac_header(skb);
 } else {
 if (skb_cow_head(skb, dev->needed_headroom))
 @ @ -681,7 +695,7 @@
 __be32 id, u32 index, bool truncate)
 {  
 struct iphdr *iphdr = ip_hdr(skb);
 -struct ethhdr *eth = eth_hdr(skb);
 +struct ethhdr *eth = (struct ethhdr *)skb->data;
 enum erspan_encap_type enc_type;
 struct erspanhdr *ershdr;
 struct qtag_prefix {
 @ @ -720,6 +734,9 @@
 struct ip_tunnel *tunnel = netdev_priv(dev);
 bool truncate = false;

+if (!pskb_inet_may_pull(skb))
+goto free_skb;
+
 if (tunnel->collect_md) {
 erspan_fb_xmit(skb, dev, skb->protocol);
 return NETDEV_TX_OK;
 @ @ -753,6 +770,9 @@
 {  
 struct ip_tunnel *tunnel = netdev_priv(dev);

+if (!pskb_inet_may_pull(skb))
+goto free_skb;
+
 if (tunnel->collect_md) {
 gre_fb_xmit(skb, dev, htons(ETH_P_TEB));
 return NETDEV_TX_OK;
len = tunnel->tun_hlen - len;
tunnel->hlen = tunnel->hlen + len;
-dev->needed_headroom = dev->needed_headroom + len;
+if (dev->header_ops)
+dev->hard_header_len += len;
+else
+dev->needed_headroom += len;
+
if (set_mtu)
dev->mtu = max_t(int, dev->mtu - len, 68);

dev->mtu = max_t(int, dev->mtu - len, 68);

tunnel->encap.type == TUNNEL_ENCAP_NONE) {

dev->features |= NETIF_F_GSO_SOFTWARE;
dev->hw_features |= NETIF_F_GSO_SOFTWARE;
+} else {
+dev->features &= ~NETIF_F_GSO_SOFTWARE;
+dev->hw_features &= ~NETIF_F_GSO_SOFTWARE;
}
dev->features |= NETIF_F_LLTX;
+} else {
+dev->hw_features &= ~NETIF_F_GSO_SOFTWARE;
+dev->features &= ~(NETIF_F_LLTX | NETIF_F_GSO_SOFTWARE);
}
}

return -EINVAL;
dev->flags = IFF_BROADCAST;
dev->header_ops = &ipgre_header_ops;
+dev->hard_header_len = tunnel->hlen + sizeof(*iph);
+dev->needed_headroom = 0;
#endif
} else if (!tunnel->collect_md) {
    dev->header_ops = &ipgre_header_ops;
    dev->hard_header_len = tunnel->hlen + sizeof(*iph);
    dev->needed_headroom = 0;
}

return ip_tunnel_init(dev);
@@ -1209,6 +1241,24 @@
    if (data[IFLA_GRE_FWMARK])
        *fwmark = nla_get_u32(data[IFLA_GRE_FWMARK]);

+    return 0;
+} +
+static int erspan_netlink_parms(struct net_device *dev,
+    struct nlattr *data[],
+    struct nlattr *tb[],
+    struct ip_tunnel_parm *parms,
+    __u32 *fwmark)
+{
+    struct ip_tunnel *t = netdev_priv(dev);
+    int err;
+    +
+    err = ipgre_netlink_parms(dev, data, tb, parms, fwmark);
+    +if (err)
+        +return err;
+    +if (!data)
+        +return 0;
+    +
+    if (data[IFLA_GRE_ERSPAN_INDEX]) {
        t->index = nla_get_u32(data[IFLA_GRE_ERSPAN_INDEX]);
    }
    sizeof(struct erspanhdr);
    t_hlen = tunnel->hlen + sizeof(struct iphdr);

-dev->needed_headroom = LL_MAX_HEADER + t_hlen + 4;
-dev->mtu = ETH_DATA_LEN - t_hlen - 4;
    dev->features|= GRE_FEATURES;
    dev->hw_features|= GRE_FEATURES;
    dev->priv_flags|= IFF_LIVE_ADDR_CHANGE;
    @ -1317,45 +1365,70 @@
    ip_tunnel_setup(dev, gre_tap_net_id);
}

-static int ipgre_newlink(struct net *src_net, struct net_device *dev,
static int
ipgre_newlink_encap_setup(struct net_device *dev, struct nlattr *data[]) {
    struct ip_tunnel_parm p;
    struct ip_tunnel_encap ipencap;
    __u32 fwmark = 0;
    int err;

    if (ipgre_netlink_encap_parms(data, &ipencap)) {
        struct ip_tunnel *t = netdev_priv(dev);
        err = ip_tunnel_encap_setup(t, &ipencap);
        if (err < 0)
            return err;
    }

    return 0;
}

static int
ipgre_newlink(struct net *src_net, struct net_device *dev, struct nlattr *tb[], struct nlattr *data[], struct netlink_ext_ack *extack) {
    struct ip_tunnel_parm p;
    __u32 fwmark = 0;
    int err;

    err = ipgre_newlink_encap_setup(dev, data);
    if (err)
        return err;

    err = ipgre_netlink_parms(dev, data, tb, &p, &fwmark);
    if (err < 0)
        return err;
    return ip_tunnel_newlink(dev, tb, &p, fwmark);
}

static int
erspan_newlink(struct net *src_net, struct net_device *dev, struct nlattr *tb[], struct nlattr *data[], struct netlink_ext_ack *extack) {
    struct ip_tunnel_parm p;
    __u32 fwmark = 0;
    int err;

    err = erspan_netlink_parms(dev, data, tb, &p, &fwmark);
    if (err < 0)
        return err;
    return ip_tunnel_newlink(dev, tb, &p, fwmark);
}
err = ipgre_newlink_encap_setup(dev, data);
+if (err)
+return err;
+
+err = erspan_netlink_parms(dev, data, tb, &p, &fwmark);
+if (err)
+return err;
+
+return ip_tunnel_newlink(dev, tb, &p, fwmark);
+
+
static int ipgre_changelink(struct net_device *dev, struct nlattr *tb[],
struct nlattr *data[],
struct netlink_ext_ack *extack)
{
    struct ip_tunnel *t = netdev_priv(dev);
    struct ip_tunnel_encap ipencap;
    __u32 fwmark = t->fwmark;
    struct ip_tunnel_parm p;
    int err;

    -if (ipgre_netlink_encap_parms(data, &ipencap)) {
        -err = ip_tunnel_encap_setup(t, &ipencap);
        -
        -if (err < 0)
        -return err;
        -}
        +err = ipgre_newlink_encap_setup(dev, data);
        +if (err)
        +return err;
        +

        err = ipgre_netlink_parms(dev, data, tb, &p, &fwmark);
        if (err < 0)
            @ @ -1368,8 +1441,34 @@
            t->parms.i_flags = p.i_flags;
            t->parms.o_flags = p.o_flags;

            -if (strcmp(dev->rtnl_link_ops->kind, "erspan"))
            -ipgre_link_update(dev, !tb[IFLA_MTU]);
            +ipgre_link_update(dev, !tb[IFLA_MTU]);
            +
            +return 0;
            +}
            +
            +static int erspan_changelink(struct net_device *dev, struct nlattr *tb[],
            +    struct nlattr *data[],
            +    struct netlink_ext_ack *extack)
            +{
            +    struct ip_tunnel *t = netdev_priv(dev);
+__u32 fwmark = t->fwmark;
+struct ip_tunnel_parm p;
+int err;
+
+err = ipgre_newlink_encap_setup(dev, data);
+if (err)
+return err;
+
+err = erspan_netlinkparms(dev, data, tb, &p, &fwmark);
+if (err < 0)
+return err;
+
+err = ip_tunnel_changelink(dev, tb, &p, fwmark);
+if (err < 0)
+return err;
+
+t->parms.i_flags = p.i_flags;
+t->parms.o_flags = p.o_flags;

return 0;
}
@@ -1468,6 +1567,7 @@
static void erspan_setup(struct net_device *dev)
{
 ether_setup(dev);
+dev->max_mtu = 0;
 dev->netdev_ops = erspan_netdev_ops;
 dev->priv_flags &= ~IFF_TX_SKB_SHARING;
 dev->privflags |= IFF_LIVE_ADDR_CHANGE;
@@ -1532,8 +1632,8 @@
 .priv_size = sizeof(struct ip_tunnel),
 .setup = erspan_setup,
 .validate = erspan_validate,
-.newlink = ipgre_newlink,
-.changelink = ipgre_changelink,
+.newlink = erspan_newlink,
+.changelink = erspan_changelink,
 .dellink = ip_tunnel_dellink,
 .get_size = ipgre_get_size,
 .fill_info = ipgre_fill_info,
--- linux-4.15.0.orig/net/ipv4/ip_input.c
+++ linux-4.15.0/net/ipv4/ip_input.c
@@ -259,11 +259,10 @@
 ip_local_deliver_finish);
 }

-static inline bool ip_rcv_options(struct sk_buff *skb)
+static inline bool ip_rcv_options(struct sk_buff *skb, struct net_device *dev)
struct ip_options *opt;
const struct iphdr *iph;
-struct net_device *dev = skb->dev;

/* It looks as overkill, because not all
   IP options require packet mangling.
   @@ -299,7 +298,7 @@
   }
   }

-if (ip_options_rcv_srr(skb))
+if (ip_options_rcv_srr(skb, dev))
goto drop;

@@ -362,7 +361,7 @@
}
#endif

-if (iph->ihl > 5 && ip_rcv_options(skb))
+if (iph->ihl > 5 && ip_rcv_options(skb, dev))
goto drop;

rt = skb_rtable(skb);
@@ -481,6 +480,7 @@
}
goto drop;
}
+iph = ip_hdr(skb);
skb->transport_header = skb->network_header + iph->ihl*4;

/* Remove any debris in the socket control block */
--- linux-4.15.0.orig/net/ipv4/ip_options.c
+++ linux-4.15.0/net/ipv4/ip_options.c
@@ -251,8 +251,9 @@
   */
-int ip_options_compile(struct net *net,
-    struct ip_options *opt, struct sk_buff *skb)
+int __ip_options_compile(struct net *net,
+    struct ip_options *opt, struct sk_buff *skb,
+    __be32 *info)
{  
    __be32 spec_dst = htonl(INADDR_ANY);
    unsigned char *pp_ptr = NULL;
    @@ -468,11 +469,22 @@

return 0;

error:
- if (skb) {
- icmp_send(skb, ICMP_PARAMETERPROB, 0, htonl((pp_ptr-iph)<<24));
- }
+ if (info)
  + *info = htonl((pp_ptr-iph)<<24);
  return -EINVAL;
}
+
+ int ip_options_compile(struct net *net,
+ struct ip_options *opt, struct sk_buff *skb)
+ {
+ int ret;
+ __be32 info;
+ ret = __ip_options_compile(net, opt, skb, &info);
+ icmp_send(skb, ICMP_PARAMETERPROB, 0, info);
+ return ret;
+ }
EXPORT_SYMBOL(ip_options_compile);
/*
@@ -600,7 +612,7 @@
}
}

-int ip_options_rcv_srr(struct sk_buff *skb)
+int ip_options_rcv_srr(struct sk_buff *skb, struct net_device *dev)
{
 struct ip_options *opt = &(IPCB(skb)->opt);
 int srrspace, srrptr;
@@ -635,7 +647,7 @@
 orefdst = skb->_skb_refdst;
 skb_dst_set(skb, NULL);
-err = ip_route_input(skb, nexthop, iph->saddr, iph->tos, skb->dev);
+err = ip_route_input(skb, nexthop, iph->saddr, iph->tos, dev);
 rt2 = skb_rtable(skb);
 if (err || (rt2->rt_type != RTN_UNICAST && rt2->rt_type != RTN_LOCAL)) {
 skb_dst_drop(skb);
--- linux-4.15.0.orig/net/ipv4/ip_output.c
+++ linux-4.15.0/net/ipv4/ip_output.c
@@ -73,6 +73,7 @@
 #include <net/icmp.h>
 #include <net/checksum.h>
#include <net/inetpeer.h>
+#include <net/inet_ecn.h>
#include <net/lwtunnel.h>
#include <linux/bpf-cgroup.h>
#include <linux/igmp.h>
@@ -311,7 +312,7 @@
    if (skb_is_gso(skb))
    return ip_finish_output_gso(net, sk, skb, mtu);

-    if (skb->len > mtu || (IPCB(skb)->flags & IPSKB_FRAG_PMTU))
+    if (skb->len > mtu || IPCB(skb)->frag_max_size)
    return ip_fragment(net, sk, skb, mtu, ip_finish_output2);

return ip_finish_output2(net, sk, skb);
@@ -418,8 +419,9 @@
{
    BUILD_BUG_ON(offsetof(typeof(*fl4), daddr) !=
            offsetof(typeof(*fl4), saddr) + sizeof(fl4->saddr));
-    memcpy(&iph->saddr, &fl4->saddr,
-           sizeof(fl4->saddr) + sizeof(fl4->daddr));
+    iph->saddr = fl4->saddr;
    iph->daddr = fl4->daddr;
}
/* Note: skb->sk can be different from sk, in case of tunnels */
@@ -518,11 +520,14 @@
    to->pkt_type = from->pkt_type;
    to->priority = from->priority;
    to->protocol = from->protocol;
+    to->skb_iif = from->skb_iif;
    skb_dst_drop(to);
    skb_dst_copy(to, from);
    to->dev = from->dev;
    to->mark = from->mark;

+    skb_copy_hash(to, from);
+    /* Copy the flags to each fragment. */
    IPCB(to)->flags = IPCB(from)->flags;

@@ -1040,7 +1045,8 @@
    if (copy > length)
    copy = length;

-    if (!(rt->dst.dev->features&NETIF_F_SG)) {
+    if (!(rt->dst.dev->features&NETIF_F_SG) &&
+        skb_tailroom(skb) >= copy) {

unsigned int off;

off = skb->len;
@@ -1119,13 +1125,17 @@
rt = *rtp;
if (unlikely(!rt))
return -EFAULT;
-/*
- * We steal reference to this route, caller should not release it
- */
-*rtp = NULL;
+
cork->fragsize = ip_sk_use_pmtu(skb) ?
-dst_mtu(&rt->dst) : rt->dst.dev->mtu;
+dst_mtu(&rt->dst) : READ_ONCE(rt->dst.dev->mtu);
+
+if (!inetdev_valid_mtu(cork->fragsize))
+return -ENETUNREACH;
+
cork->dst = &rt->dst;
+/* We stole this route, caller should not release it. */
+*rtp = NULL;
+
cork->length = 0;
cork->ttl = ipc->ttl;
cork->tos = ipc->tos;
@@ -1554,7 +1564,7 @@
if (IS_ERR(rt))
return;

-inet_sk(skb)->tos = arg->tos;
+inet_sk(skb)->tos = arg->tos & ~INET_ECN_MASK;

sk->sk_priority = skb->priority;
sk->sk_protocol = ip_hdr(skb)->protocol;
--- linux-4.15.0.orig/net/ipv4/ip_sockglue.c
+++ linux-4.15.0/net/ipv4/ip_sockglue.c
@@ -146,20 +146,20 @@
static void ip_cmsg_recv_dstaddr(struct msghdr *msg, struct sk_buff *skb) {
 +__be16 _ports[2], *ports;
 struct sockaddr_in sin;
-const struct iphdr *iph = ip_hdr(skb);
-__be16 *ports = (__be16 *)skb_transport_header(skb);
-}
-
-if (skb_transport_offset(skb) + 4 > (int)skb->len)
-return;

---
/* All current transport protocols have the port numbers in the
 * first four bytes of the transport header and this function is
 * written with this assumption in mind.
 */

ports = skb_header_pointer(skb, skb_transport_offset(skb),
    sizeof(_ports), &_ports);
if (!ports)
    return;

sin.sin_family = AF_INET;
-sin.sin_addr.s_addr = iph->daddr;
+sin.sin_addr.s_addr = ip_hdr(skb)->daddr;
sin.sin_port = ports[1];
memset(sin.sin_zero, 0, sizeof(sin.sin_zero));

@@ -258,7 +258,8 @@
src_info = (struct in6_pktinfo *)CMSG_DATA(cmsg);
if (!ipv6_addr_v4mapped(&src_info->ipi6_addr))
    return -EINVAL;
-ipc->oif = src_info->ipi6_ifindex;
+if (src_info->ipi6_ifindex)
     +ipc->oif = src_info->ipi6_ifindex;
     ipc->addr = src_info->ipi6_addr.s6_addr32[3];
     continue;
 }
@@ -288,7 +289,8 @@
 if (cmsg->cmsg_len != CMSG_LEN(sizeof(struct in_pktinfo)))
     return -EINVAL;
 info = (struct in_pktinfo *)CMSG_DATA(cmsg);
-ipc->oif = info->ipi_ifindex;
+if (info->ipi_ifindex)
     +ipc->oif = info->ipi_ifindex;
     ipc->addr = info->ipi_spec_dst.s_addr;
     break;
 }
@@ -509,8 +511,6 @@
 int err;
 int copied;

-WARN_ON_ONCE(sk->sk_family == AF_INET6);
-
err = -EAGAIN;
skb = sock_dequeue_err_skb(sk);
if (!skb)
@@ -1251,11 +1251,8 @@
 if (err == -ENOPROTOOPT && optname != IP_HDRINCL &&
     optname != IP_IPSEC_POLICY &&

optname != IP_XFRM_POLICY &&
!ip_mroute_opt(optname)) {  
-lock_sock(sk);  
+!ip_mroute_opt(optname))
err = nf_setsockopt(sk, PF_INET, optname, optval, optlen);
-release_sock(sk);
-
}  
#endif  
return err;
}
@@ -1280,12 +1277,9 @@
if (err == -ENOPROTOOPT && optname != IP_HDRINCL &&
optname != IP_IPSEC_POLICY &&
optname != IP_XFRM_POLICY &&
!ip_mroute_opt(optname)) {  
-lock_sock(sk);  
-err = compat_nf_setsockopt(sk, PF_INET, optname, 
- optval, optlen);  
-release_sock(sk);  
-}  
+!ip_mroute_opt(optname))
+err = compat_nf_setsockopt(sk, PF_INET, optname, optval,  
+ optlen);
+#endif  
return err;
}
@@ -1569,10 +1563,7 @@
if (get_user(len, optlen))
return -EFAULT;
-
-lock_sock(sk);  
-err = nf_getsockopt(sk, PF_INET, optname, optval,  
-&len);  
-release_sock(sk);  
+err = nf_getsockopt(sk, PF_INET, optname, optval, &len);
if (err >= 0)
err = put_user(len, optlen);
return err;
@@ -1604,9 +1595,7 @@
if (get_user(len, optlen))
return -EFAULT;
-
-lock_sock(sk);  
-err = compat_nf_getsockopt(sk, PF_INET, optname, optval, &len);
-release_sock(sk);  
+err = compat_nf_getsockopt(sk, PF_INET, optname, optval, &len);
if (err >= 0)
err = put_user(len, optlen);
return err;

--- linux-4.15.0.orig/net/ipv4/ip_tunnel.c
+++ linux-4.15.0/net/ipv4/ip_tunnel.c
@@ -98,9 +98,10 @@
 __be32 remote, __be32 local,
 __be32 key)
 {
-unsigned int hash;
 struct ip_tunnel *t, *cand = NULL;
 struct hlist_head *head;
+struct net_device *ndev;
+unsigned int hash;
 hash = ip_tunnel_hash(key, remote);
 head = &itn->tunnels[hash];
 @@ -155,11 +156,8 @@
cand = t;
 }

-if (flags & TUNNEL_NO_KEY)
-goto skip_key_lookup;
-
 hlist_for_each_entry_rcu(t, head, hash_node) {
- if (t->parms.i_key != key ||
+if (!(flags & TUNNEL_NO_KEY) && t->parms.i_key != key) ||
 t->parms.iph.saddr != 0 ||
t->parms.iph.daddr != 0 ||
!(t->dev->flags & IFF_UP))
@@ -171,7 +169,6 @@
cand = t;
 }

-skip_key_lookup:
 if (cand)
 return cand;

@@ -179,8 +176,9 @@
 if (t && t->dev->flags & IFF_UP)
 return t;

-if (itn->fb_tunnel_dev && itn->fb_tunnel_dev->flags & IFF_UP)
-return netdev_priv(itn->fb_tunnel_dev);
+ndev = READ_ONCE(itn->fb_tunnel_dev);
+if (ndev && ndev->flags & IFF_UP)
+return netdev_priv(ndev);

 return NULL;
 }
@@ -253,15 +251,16 @@
struct net_device *dev;
char name[IFNAMSIZ];

-if (parms->name[0])
+err = -E2BIG;
+if (parms->name[0]) {
+if (!dev_valid_name(parms->name))
+goto failed;
strlcpy(name, parms->name, IFNAMSIZ);
}else {
-strlcpy(name, ops->kind, IFNAMSIZ);
-strcpy(name, ops->kind);
-strncat(name, "%d", 2);
+strcat(name, "%d");
}

ASSERT_RTNL();
@@ -347,7 +346,7 @@
}
dev->needed_headroom = t_hlen + hlen;
-mtu -= (dev->hard_header_len + t_hlen);
+mtu -= t_hlen + (dev->type == ARPHRD_ETHER ? dev->hard_header_len : 0);

if (mtu < IPV4_MIN_MTU)
+mtu = IPV4_MIN_MTU;
@@ -373,7 +372,10 @@
nt = netdev_priv(dev);
t_hlen = nt->hlen + sizeof(struct iphdr);
-dev->min_mtu = ETH_MIN_MTU;
-dev->max_mtu = 0xFFF8 - dev->hard_header_len - t_hlen;
+dev->max_mtu = 0xFFF8 - t_hlen;
+if (dev->type == ARPHRD_ETHER)
+dev->max_mtu -= dev->hard_header_len;
+ip_tunnel_add(itn, nt);
return nt;
}
@@ -511,16 +513,20 @@
const struct iphdr *inner_iph)
{
struct ip_tunnel *tunnel = netdev_priv(dev);
-int pkt_size = skb->len - tunnel->hlen - dev->hard_header_len;
+int pkt_size;
int mtu;

-if (df)
mtu = dst_mtu(&rt->dst) - dev->hard_header_len
-- sizeof(struct iphdr) - tunnel->hlen;
-else
+pkt_size = skb->len - tunnel->hlen;
+pkt_size -= dev->type == ARPHRDETHER ? dev->hard_header_len : 0;
+
+if (df) {
+mtu = dst_mtu(&rt->dst) - (sizeof(struct iphdr) + tunnel->hlen);
+mtu -= dev->type == ARPHRDETHER ? dev->hard_header_len : 0;
+} else {
mtu = skb_dst(skb) ? dst_mtu(skb_dst(skb)) : dev->mtu;
+
-skb_dst_update_pmtu(skb, mtu);
+skb_dst_update_pmtu_no_confirm(skb, mtu);

if (skb->protocol == htons(ETH_P_IP)) {
    if (!skb_is_gso(skb) &&
@@ -651,13 +657,19 @@
dst = tnl_params->daddr;
    if (dst == 0) {
 /* NBMA tunnel */
+struct ip_tunnel_info *tun_info;

    if (!skb_dst(skb)) {
        dev->stats.tx_fifo_errors++;
 goto tx_error;
 }

    -if (skb->protocol == htons(ETH_P_IP)) {
+if (tif->mode & IP_TUNNEL_INFO_TX) &&
+    ip_tunnel_info_af(tun_info) == AF_INET &&
+    tun_info->key.u.ipv4.dst
+    dst = tun_info->key.u.ipv4.dst;
+} else if (skb->protocol == htons(ETH_P_IP)) {
 rt = skb_rtable(skb);
 dst = rt_nexthop(rt, inner_iph->daddr);
}
@@ -738,7 +750,11 @@
 goto tx_error;
}
-if (tnl_update_pmtu(dev, skb, rt, tnl_params->frag_off, inner_iph)) {
+df = tnl_params->frag_off;
+if (skb->protocol == htons(ETH_P_IP) && !tunnel->ignore_df)
+df |= (inner_iph->frag_off & htons(IP_DF));
+}
+if (tnl_update_pmtu(dev, skb, rt, df, inner_iph)) {
 ip_rt_put(rt);
goto tx_error;
}
@@ -766,10 +782,6 @@
ttl = ip4_dst_hoplimit(&rt->dst);
}

-df = tnl_params->frag_off;
-if (skb->protocol == htons(ETH_P_IP) && !tunnel->ignore_df)
-df |= (inner_iph->frag_off&htons(IP_DF));
-
-max_headroom = LL_RESERVED_SPACE(rt->dev) + sizeof(struct iphdr)
+ rt->dev.header_len + ip_encap_hlen(&tunnel->encap);
if (max_headroom > dev->needed_headroom)
@@ -938,7 +950,10 @@
{
struct ip_tunnel *tunnel = netdev_priv(dev);
int t_hlen = tunnel->hlen + sizeof(struct iphdr);
-int max_mtu = 0xFFF8 - dev->hard_header_len - t_hlen;
+int max_mtu = 0xFFF8 - t_hlen;
+
+if (dev->type == ARPHRD_ETHER)
+max_mtu -= dev->hard_header_len;

if (new_mtu < ETH_MIN_MTU)
return -EINVAL;
@@ -1108,8 +1123,16 @@
eth_hw_addr_random(dev);

mtu = ip_tunnel_bind_dev(dev);
-if (!tb[IFLA_MTU])
+if (tb[IFLA_MTU]) {
+unsigned int max = 0xff8 - (nt->hlen + sizeof(struct iphdr));
+}
+if (dev->type == ARPHRD_ETHER)
+max -= dev->hard_header_len;
+dev->mtu = clamp(dev->mtu, (unsigned int)ETH_MIN_MTU, max);
+} else {
 dev->mtu = mtu;
+}
ip_tunnel_add(itn, nt);
out:
@@ -1126,7 +1149,7 @@
struct ip_tunnel_net *itn = net_generic(net, tunnel->ip_tnl_net_id);

if (dev == itn->fb_tunnel_dev)
-        return -EINVAL;
+        return fan_has_map(&tunnel->fan) ? 0 : -EINVAL;

t = ip_tunnel_find(itn, p, dev->type);

@@ -1186,10 +1209,8 @@
iph->ihl= 5;

    -if (tunnel->collect_md) {
        -dev->features |= NETIF_F_NETNS_LOCAL;
        +if (tunnel->collect_md)
            netif_keep_dst(dev);
        -}
        return 0;
    }
    EXPORT_SYMBOL_GPL(ip_tunnel_init);

--- linux-4.15.0.orig/net/ipv4/ip_tunnel_core.c
+++ linux-4.15.0/net/ipv4/ip_tunnel_core.c
@@ -80,7 +80,7 @@
iph->version= 4;
iph->ihl=sizeof(struct iphdr) >> 2;

    -if (itn->fb_tunnel_dev != dev)
    -ip_tunnel_del(itn, netdev_priv(dev));
    +ip_tunnel_del(itn, netdev_priv(dev));
    +if (itn->fb_tunnel_dev == dev)
    +WRITE_ONCE(itn->fb_tunnel_dev, NULL);

dst_cache_reset(&tunnel->dst_cache);
}
--- linux-4.15.0.orig/net/ipv4/ip_tunnel_core.c
+++ linux-4.15.0/net/ipv4/ip_tunnel_core.c
@@ -89,9 +89,12 @@
__ip_select_ident(net, iph, skb_shinfo(skb)->gso_segs ?: 1);

err = ip_local_out(net, sk, skb);
-if (unlikely(net_xmit_eval(err)))
 -pkt_len = 0;
-iptunnel_xmit_stats(dev, pkt_len);
+
+if (dev) {
+if (unlikely(net_xmit_eval(err)))
+pkt_len = 0;
+iptunnel_xmit_stats(dev, pkt_len);
+}
}
EXPORT_SYMBOL_GPL(iptunnel_xmit);

--- linux-4.15.0.orig/net/ipv4/ip_vti.c
+++ linux-4.15.0/net/ipv4/ip_vti.c
@@ -50,7 +50,7 @@
static int vti_tunnel_init(struct net_device *dev);

static int vti_input(struct sk_buff *skb, int nexthdr, __be32 spi,
 - int encap_type)
+ int encap_type, bool update_skb_dev)
{
 struct ip_tunnel *tunnel;
 const struct iphdr *iph = ip_hdr(skb);
@@ -65,6 +65,9 @@
 XFRM_TUNNEL_SKB_CB(skb)->tunnel.ip4 = tunnel;
+
+skb->dev = tunnel->dev;
+return xfrm_input(skb, nexthdr, spi, encap_type);
}
@@ -74,12 +77,49 @@
return 0;
}

-static int vti_rcv(struct sk_buff *skb)
+static int vti_input_proto(struct sk_buff *skb, int nexthdr, __be32 spi,
+ int encap_type)
+{
+return vti_input(skb, nexthdr, spi, encap_type, false);
+}
+
+static int vti_rcv(struct sk_buff *skb, __be32 spi, bool update_skb_dev)
{XFRM_SPI_SKB_CB(skb)->family = AF_INET;
XFRM_SPI_SKB_CB(skb)->daddr off = offsetof(struct iphdr, daddr);

- return vti_input(skb, ip_hdr(skb)->protocol, 0, 0);
+ return vti_input(skb, ip_hdr(skb)->protocol, spi, 0, update_skb_dev);
+ }
+
+ static int vti_rcv_proto(struct sk_buff *skb)
+ {
+ return vti_rcv(skb, 0, false);
+ }
+
+ static int vti_rcv_tunnel(struct sk_buff *skb)
+ {
+ struct ip_tunnel_net *itn = net_generic(dev_net(skb->dev), vti_net_id);
+ const struct iphdr *iph = ip_hdr(skb);
+ struct ip_tunnel *tunnel;
+ 
+ tunnel = ip_tunnel_lookup(itn, skb->dev->ifindex, TUNNEL_NO_KEY,
+ iph->saddr, iph->daddr, 0);
+ if (tunnel) {
+ struct tnl_ptk_info tpi = {
+ .proto = htons(ETH_P_IP),
+ };
+ 
+ if (!xfrm4_policy_check(NULL, XFRM_POLICY_IN, skb))
+ goto drop;
+ if (iptunnel_pull_header(skb, 0, tpi.proto, false))
+ goto drop;
+ return ip_tunnel_rcv(tunnel, skb, &tpi, NULL, false);
+ }
+
+ return -EINVAL;
+ drop:
+ kfree_skb(skb);
+ return 0;
}

static int vti_rcv_cb(struct sk_buff *skb, int err)
@@ -173,8 +213,39 @@
+ int mtu;
+
+ if (!dst) {
+ - dev->stats.tx_carrier_errors++;
+ goto tx_error_icmp;
+ switch (skb->protocol) {
+ case htons(ETH_P_IP): {
struct rtable *rt;

fl->u.ip4.flowi4_oif = dev->ifindex;
fl->u.ip4.flowi4_flags |= FLOWI_FLAG_ANYSRC;
rt = __ip_route_output_key(dev_net(dev), &fl->u.ip4);
if (IS_ERR(rt)) {
    dev->stats.tx_carrier_errors++;
    goto tx_error_icmp;
}

dst = &rt->dst;
skb_dst_set(skb, dst);
break;

#if IS_ENABLED(CONFIG_IPV6)

case htons(ETH_P_IPV6):
    fl->u.ip6.flowi6_oif = dev->ifindex;
    fl->u.ip6.flowi6_flags |= FLOWI_FLAG_ANYSRC;
    dst = ip6_route_output(dev_net(dev), NULL, &fl->u.ip6);
    if (dst->error) {
        dst_release(dst);
        dst = NULL;
        dev->stats.tx_carrier_errors++;
        goto tx_error_icmp;
    }
    skb_dst_set(skb, dst);
    break;
#endif

default:
    dev->stats.tx_carrier_errors++;
    goto tx_error_icmp;
}
}
}

dst_hold(dst);
@@ -200,7 +271,7 @@

mtu = dst_mtu(dst);
if (skb->len > mtu) {
    skb_dst_update_pmtu(skb, mtu);
- skb_dst_update_pmtu_no_confirm(skb, mtu);
    if (skb->protocol == htons(ETH_P_IP)) {
        icmp_send(skb, ICMP_DEST_UNREACH, ICMP_FRAG_NEEDED, htonl(mtu));
        @ @ -241,6 +312,9 @ @
        struct ip_tunnel *tunnel = netdev_priv(dev);
        struct flowi fl;

        +if (!pskb_inet_may_pull(skb))
goto tx_err;
+
memset(&fl, 0, sizeof(fl));

switch (skb->protocol) {
@@ -253,15 +327,18 @@
memset(IP6CB(skb), 0, sizeof(*IP6CB(skb)));
break;
default:
-dev->stats.tx_errors++;
-dev_kfree_skb(skb);
-return NETDEV_TX_OK;
+goto tx_err;
}

/* override mark with tunnel output key */
fl.flowi_mark = be32_to_cpu(tunnel->parms.o_key);

return vti_xmit(skb, dev, &fl);
+
+tx_err:
+dev->stats.tx_errors++;
+kfree_skb(skb);
+return NETDEV_TX_OK;
}

static int vti4_err(struct sk_buff *skb, u32 info)
@@ -387,7 +464,6 @@
memcpy(dev->dev_addr, &iph->saddr, 4);
memcpy(dev->broadcast, &iph->daddr, 4);
-dev->hard_header_len	= LL_MAX_HEADER + sizeof(struct iphdr);
-dev->mtu		= ETH_DATA_LEN;
-dev->flags		= IFF_NOARP;
-dev->addr_len		= 4;
@@ -408,29 +484,35 @@
}

static struct xfrm4_protocol vti_esp4_protocol __read_mostly = {
-handler=vti_rcv,
-input_handler=vti_input,
+handler=vti_rcv_proto,
+input_handler=vti_input_proto,
.cb_handler=vti_rcv_cb,
.err_handler=vti4_err,
.priority=100,
};
static struct xfrm4_protocol vti_ah4_protocol __read_mostly = {
  .handler=vti_rcv,
  .input_handler=vti_input,
  .handler=vti_rcv_proto,
  .input_handler=vti_input_proto,
  .cb_handler=vti_rcv_cb,
  .err_handler=vti4_err,
  .priority=100,
};

static struct xfrm4_protocol vti_ipcomp4_protocol __read_mostly = {
  .handler=vti_rcv,
  .input_handler=vti_input,
  .handler=vti_rcv_proto,
  .input_handler=vti_input_proto,
  .cb_handler=vti_rcv_cb,
  .err_handler=vti4_err,
  .priority=100,
};

+static struct xfrm_tunnel ipip_handler __read_mostly = {
  .handler=vti_rcv_tunnel,
  .err_handler=vti4_err,
  .priority=0,
  +};
+
static int __net_init vti_init_net(struct net *net)
{
  int err;
  @@ -440,7 +522,8 @@
  if (err)
    return err;
  itn = net_generic(net, vti_net_id);
-  vti_fb_tunnel_init(itn->fb_tunnel_dev);
+  if (itn->fb_tunnel_dev)
+    vti_fb_tunnel_init(itn->fb_tunnel_dev);
  return 0;
}

@@ -598,6 +681,11 @@
  if (err < 0)
    goto xfrm_proto_comp_failed;

+  msg = "ipip tunnel";
+  err = xfrm4_tunnel_register(&ipip_handler, AF_INET);
+  if (err < 0)
+    goto xfrm_tunnel_failed;
+  

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msg = "netlink interface";
err = rtnl_link_register(&vti_link_ops);
if (err < 0)
@@ -606,6 +694,8 @@
    return err;

rtnl_link_failed:
+xfrm4_tunnel_deregister(&ipip_handler, AF_INET);
+xfrm_tunnel_failed:
xfrm4_protocol_deregister(&vti_ipcomp4_protocol, IPPROTO_COMP);
xfrm_proto_comp_failed:
xfrm4_protocol_deregister(&vti_ah4_protocol, IPPROTO_AH);
@@ -621,6 +711,7 @@
static void __exit vti_fini(void)
{
    rtnl_link_unregister(&vti_link_ops);
+xfrm4_tunnel_deregister(&ipip_handler, AF_INET);
xfrm4_protocol_deregister(&vti_ipcomp4_protocol, IPPROTO_COMP);
xfrm4_protocol_deregister(&vti_ah4_protocol, IPPROTO_AH);
xfrm4_protocol_deregister(&vti_esp4_protocol, IPPROTO_ESP);
--- linux-4.15.0.orig/net/ipv4/ipconfig.c
+++ linux-4.15.0/net/ipv4/ipconfig.c
@@ -781,6 +781,11 @@
 */
 static inline void __init ic_bootp_init(void)
 {
+/* Re-initialise all name servers to NONE, in case any were set via the
+ * "ip=" or "nfsaddrs=" kernel command line parameters: any IP addresses
+ * specified there will already have been decoded but are no longer
+ * needed
+ */
+ ic_nameservers_predef();

    dev_add_pack(&bootp_packet_type);
@@ -876,7 +881,7 @@

/*
 - * Copy BOOTP-supplied string if not already set.
+ * Copy BOOTP-supplied string
 */
 static int __init ic_bootp_string(char *dest, char *src, int len, int max)
{
@@ -925,12 +930,15 @@
     break;
     case 12:/* Host name */
-ic_bootp_string(utsname()->nodename, ext+1, *ext+

if (!ic_host_name_set) {
    ic_bootp_string(utsname()->nodename, ext+1, *ext,
    __NEW_UTS_LEN);
    ic_host_name_set = 1;
}
break;

+ ic_host_name_set = 1;
++

/* Domain name (DNS) */
-ic_bootp_string(ic_domain, ext+1, *ext, sizeof(ic_domain));
+ if (!ic_domain[0])
+ ic_bootp_string(ic_domain, ext+1, *ext, sizeof(ic_domain));
break;

/* Root path */
if (!root_server_path[0])
@@ -1402,6 +1410,13 @@
        int err;
        unsigned int i;

+ /* Initialise all name servers to NONE (but only if the "ip=" or
+   "nfsaddr=" kernel command line parameters weren't decoded, otherwise
+   we'll overwrite the IP addresses specified there) */
+ */
+ if (ic_set_manually == 0)
+     ic_nameservers_predef();
+
+ ifdef CONFIG_PROC_FS
        proc_create("pnp", S_IRUGO, init_net.proc_net, &pnp_seq_fops);
+ endif /* CONFIG_PROC_FS */
@@ -1622,6 +1637,7 @@
            return 1;
} /* Initialise all name servers to NONE */
ic_nameservers_predef();

/* Parse string for static IP assignment. */
--- linux-4.15.0.orig/net/ipv4/ipip.c
+++ linux-4.15.0/net/ipv4/ipip.c
@@ -106,6 +106,8 @@
 #include <linux/init.h>
 #include <linux/netfilter_ipv4.h>
 #include <linux/ether.h>
+#include <linux/inetdevice.h>
+include <linux/rculist.h>

 #include <net/sock.h>
 #include <net/ip.h>
static struct ip_fan_map *ipip_fan_find_map(struct ip_tunnel *t, __be32 daddr)
{
    struct ip_fan_map *fan_map;

    rcu_read_lock();
    list_for_each_entry_rcu(fan_map, &t->fan.fan_maps, list) {
        if (fan_map->overlay ==
            (daddr & inet_make_mask(fan_map->overlay_prefix))) {
            rcu_read_unlock();
            return fan_map;
        }
    }
    rcu_read_unlock();

    return NULL;
}

/* Determine fan tunnel endpoint to send packet to, based on the inner IP address.
 * Given a /8 overlay and /16 underlay, for an overlay (inner) address Y.A.B.C, the transformation is F.G.A.B, where "F" and "G" are the first two octets of the underlay network (the network portion of a /16), "A" and "B" are the low order two octets of the underlay network host (the host portion of a /16), and "Y" is a configured first octet of the overlay network.
 * E.g., underlay host 10.88.3.4/16 with an overlay of 99.0.0.0/8 would host overlay subnet 99.3.4.0/24. An overlay network datagram from 99.3.4.5 to 99.6.7.8, would be directed to underlay host 10.88.6.7, which hosts overlay network subnet 99.6.7.0/24. This transformation is described in detail further below.
 * Using netmasks for the overlay and underlay other than /8 and /16, as shown above, can yield larger (or smaller) overlay subnets, with the trade-off of allowing fewer (or more) underlay hosts to participate.
 * The size of each overlay network subnet is defined by the total of the network mask of the overlay plus the size of host portion of the underlay network. In the above example, /8 + /16 = /24.
 * E.g., consider underlay host 10.99.238.5/20 and overlay 99.0.0.0/8. In this case, the network portion of the underlay is 10.99.224.0/20, and the host portion is 0.0.14.5 (12 bits). To determine the overlay...
+ network subnet, the 12 bits of host portion are left shifted 12 bits
+ (/20 - /8) and ORed with the overlay subnet prefix. This yields an
+ overlay subnet of 99.224.80/20, composed of 8 bits overlay, followed by
+ 12 bits underlay. This yields 12 bits in the overlay network portion,
+ allowing for 4094 addresses in each overlay network subnet. The
+ trade-off is that fewer hosts may participate in the underlay network,
+ as it's host address size has shrunk from 16 bits (65534 addresses) in
+ the first example to 12 bits (4094 addresses) here.

+ For fewer hosts per overlay subnet (permitting a larger number of
+ underlay hosts to participate), the underlay netmask may be made
+ smaller.

+ E.g., underlay host 10.111.12/12 (network 10.96.0.0/12, host portion
+ is 0.15.1.2, 20 bits) with an overlay of 33.0.0.0/8 would left shift
+ the 20 bits of host by 4 (so that it's highest order bit is adjacent to
+ the lowest order bit of the /8 overlay). This yields an overlay subnet
+ of 33.240.16.32/28 (8 bits overlay, 20 bits from the host portion of
+ the underlay). This provides more addresses for the underlay network
+ (approximately 2^20), but each host's segment of the overlay provides
+ only 4 bits of addresses (14 usable).

+ It is also possible to adjust the overlay subnet.

+ For an overlay of 240.0.0.0/5 and underlay of 10.88.0.0/20, consider
+ underlay host 10.88.129.2; the 12 bits of host, 0.0.1.2, are left
+ shifted 15 bits (/20 - /5), yielding an overlay network of
+ 240.129.0.0/17. An underlay host of 10.88.244.215 would yield an
+ overlay network of 242.107.128.0/17.

+ For an overlay of 100.64.0.0/10 and underlay of 10.224.220.0/24, for
+ underlay host 10.224.220.10, the underlay host portion (.10) is left
+ shifted 14 bits, yielding an overlay network subnet of 100.66.128.0/18.
+ This would permit 254 addresses on the underlay, with each overlay
+ segment providing approximately 2^14 - 2 addresses (16382).

+ For packets being encapsulated, the overlay network destination IP
+ address is deconstructed into its overlay and underlay-derived
+ portions. The underlay portion (determined by the overlay mask and
+ overlay subnet mask) is right shifted according to the size of the
+ underlay network mask. This value is then ORed with the network
+ portion of the underlay network to produce the underlay network
+ destination for the encapsulated datagram.

+ For example, using the initial example of underlay 10.88.3.4/16 and
+ overlay 99.0.0.0/8, with underlay host 10.88.3.4/16 providing overlay
+ subnet 99.3.4.0/24 with specific host 99.3.4.5. A datagram from
+ 99.3.4.5 to 99.6.7.8 would first have the underlay host derived portion
of the address extracted. This is a number of bits equal to underlay
network host portion. In the destination address, the highest order of
these bits is one bit lower than the lowest order bit from the overlay
network mask.

Using the sample value, 99.6.7.8, the overlay mask is /8, and the
underlay mask is /16 (leaving 16 bits for the host portion). The bits
to be shifted are the middle two octets, 0.6.7.0, as this is 99.6.7.8
ANDed with the mask 0x00ffff00 (which is 16 bits, the highest order of
which is 1 bit lower than the lowest order overlay address bit).

These octets, 0.6.7.0, are then right shifted 8 bits, yielding 0.0.6.7.
This value is then ORed with the underlay network portion,
10.88.0.0/16, providing 10.88.6.7 as the final underlay destination for
the encapsulated datagram.

Another transform using the final example: overlay 100.64.0.0/10 and
underlay 10.224.220.0/24. Consider overlay address 100.66.128.1
sending a datagram to 100.66.200.5. In this case, 8 bits (the host
portion size of 10.224.220.0/24) beginning after the 100.64/10 overlay
prefix are masked off, yielding 0.2.192.0. This is right shifted 14
(32 - 10 - (32 - 24), i.e., the number of bits between the overlay
network portion and the underlay host portion) bits, yielding 0.0.0.11.
This is ORed with the underlay network portion, 10.224.220.0/24, giving
the underlay destination of 10.224.220.11 for overlay destination
100.66.200.5.

static int ipip_build_fan_iphdr(struct ip_tunnel *tunnel, struct sk_buff *skb, struct iphdr *iph)
{
    struct ip_fan_map *f_map;
    u32 daddr, underlay;

    f_map = ipip_fan_find_map(tunnel, ip_hdr(skb)->daddr);
    if (!f_map)
        return -ENOENT;

    daddr = ntohl(ip_hdr(skb)->daddr);
    underlay = ntohl(f_map->underlay);
    if (!underlay)
        return -EINVAL;

    *iph = tunnel->parms.iph;
    iph->daddr = htonl(underlay |
                      ((daddr & ~f_map->overlay_mask) >>
                       (32 - f_map->overlay_prefix -
                        (32 - f_map->underlay_prefix))));
    return 0;
}
/*
 * This function assumes it is being called from dev_queue_xmit()
 * and that skb is filled properly by that function.
 */
const struct iphdr *tiph = &tunnel->parms.iph;
static void ipip_tunnel_setup(struct net_device *dev)
{
    struct ip_tunnel *t = netdev_priv(dev);
    dev->netdev_ops = &ipip_netdev_ops;
    dev->type = ARPHRD_TUNNEL;
    dev->features = IPIP_FEATURES;
    dev->hw_features = IPIP_FEATURES;
    ip_tunnel_setup(dev, ipip_net_id);
    INIT_LIST_HEAD(&t->fan.fan_maps);
}

static void ipip_tunnel_setup(struct net_device *dev)
{
    struct ip_tunnel *t = netdev_priv(dev);
    dev->netdev_ops = &ipip_netdev_ops;
    dev->type = ARPHRD_TUNNEL;
    dev->features = IPIP_FEATURES;
    dev->hw_features = IPIP_FEATURES;
    ip_tunnel_setup(dev, ipip_net_id);
    INIT_LIST_HEAD(&t->fan.fan_maps);
}

static int ipip_tunnel_init(struct net_device *dev)
@ @ -494,6 +652,93 @@
return ret;
}

+static void ipip_fan_flush_map(struct ip_tunnel *t)
+{
+    struct ip_fan_map *fan_map;
+    
+    list_for_each_entry_rcu(fan_map, &t->fan.fan_maps, list) {
+        list_del_rcu(&fan_map->list);
+        kfree_rcu(fan_map, rcu);
+    }
+    
+    +static int ipip_fan_del_map(struct ip_tunnel *t, __be32 overlay)
+    +{
+        struct ip_fan_map *fan_map;
+        
+        fan_map = ipip_fan_find_map(t, overlay);
+        
+        +if (!fan_map)
+        +    return -ENOENT;
+        
+        list_del_rcu(&fan_map->list);
+        kfree_rcu(fan_map, rcu);
+        
+        +return 0;
+    }
+    
+    +static int ipip_fan_add_map(struct ip_tunnel *t, struct ifla_fan_map *map)
+    +{
+        __be32 overlay_mask, underlay_mask;
+        struct ip_fan_map *fan_map;
+        
+        overlay_mask = inet_make_mask(map->overlay_prefix);
+        underlay_mask = inet_make_mask(map->underlay_prefix);
+        
+        +if (((map->overlay & ~overlay_mask) || (map->underlay & ~underlay_mask))
+    +    return -EINVAL;
+        
+        +if (!overlay_mask && (map->underlay & underlay_mask))
+    +    return -EINVAL;
+        
+        /* Special case: overlay 0 and underlay 0: flush all mappings */
+        +if (!overlay_mask && !underlay_mask) {
+            ipip_fan_flush_map(t);
+            +return 0;
+        }
+        
+        /* Special case: overlay set and underlay 0: clear map for overlay */
+if (!map->underlay)
+return ipip_fan_del_map(t, map->overlay);
+
+if (ipip_fan_find_map(t, map->overlay))
+return -EEXIST;
+
+fan_map = kmalloc(sizeof(*fan_map), GFP_KERNEL);
+fan_map->underlay = map->underlay;
+fan_map->overlay = map->overlay;
+fan_map->underlay_prefix = map->underlay_prefix;
+fan_map->overlay_mask = htonl(overlay_mask);
+fan_map->overlay_prefix = map->overlay_prefix;
+
+list_add_tail_rcu(&fan_map->list, &t->fan.fan_maps);
+
+return 0;
+
+
+static int ipip_netlink_fan(struct nlattr *data[], struct ip_tunnel *t,
+    struct ip_tunnel_parm *parms)
+{
+    struct ifla_fan_map *map;
+    struct nlattr *attr;
+    int rem, rv;
+
+    if (data == NULL || !data[IFLA_IPTUN_FAN_MAP])
+        return 0;
+
+    if (parms->iph.daddr)
+        return -EINVAL;
+
+    nla_for_each_nested(attr, data[IFLA_IPTUN_FAN_MAP], rem) {
+        map = nla_data(attr);
+        rv = ipip_fan_add_map(t, map);
+        if (rv)
+            return rv;
+    }
+
+    return 0;
+
+}
+
+static int ipip_newlink(struct net *src_net, struct net_device *dev,
+    struct nlattr *tb[], struct nlattr *data[],
+    struct netlink_ext_ack *extack)
+{
+    struct ip_tunnel_parm p;
+    struct ip_tunnel_encap ipencap;
+
    +if (!map->underlay)
    +return ipip_fan_del_map(t, map->overlay);
    +
    +if (ipip_fan_find_map(t, map->overlay))
    +return -EEXIST;
    +
    +fan_map = kmalloc(sizeof(*fan_map), GFP_KERNEL);
    +fan_map->underlay = map->underlay;
    +fan_map->overlay = map->overlay;
    +fan_map->underlay_prefix = map->underlay_prefix;
    +fan_map->overlay_mask = htonl(overlay_mask);
    +fan_map->overlay_prefix = map->overlay_prefix;
    +
    +list_add_tail_rcu(&fan_map->list, &t->fan.fan_maps);
    +
    +return 0;
    +}
__u32 fwmark = 0;
+int err;

if (ipip_netlink_encap_parms(data, &ipencap)) {
 -int err = ip_tunnel_encap_setup(t, &ipencap);
 +err = ip_tunnel_encap_setup(t, &ipencap);

 if (err < 0)
 return err;
}

ipip_netlink_parms(data, &p, &t->collect_md, &fwmark);
+err = ipip_netlink_fan(data, t, &p);
+if (err < 0)
 +return err;
return ip_tunnel_newlink(dev, tb, &p, fwmark);
}

@@ -523,9 +772,10 @@
 struct ip_tunnel_encap ipencap;
 bool collect_md;
 __u32 fwmark = t->fwmark;
+int err;

 if (ipip_netlink_encap_parms(data, &ipencap)) {
 -int err = ip_tunnel_encap_setup(t, &ipencap);
 +err = ip_tunnel_encap_setup(t, &ipencap);

 if (err < 0)
 return err;
 @@ -534,6 +784,9 @@
 ipip_netlink_parms(data, &p, &collect_md, &fwmark);
 if (collect_md)
 return -EINVAL;
+err = ipip_netlink_fan(data, t, &p);
+if (err < 0)
 +return err;

 if (((dev->flags & IFF_POINTOPOINT) && !p.iph.daddr) ||
 !(dev->flags & IFF_POINTOPOINT) && p.iph.daddr))
 @@ -571,6 +824,8 @@
 nla_total_size(0) +
 /* IFLA_IPTUN_FWMARK */
 nla_total_size(4) +
+/* IFLA_IPTUN_FAN_MAP */
+nla_total_size(sizeof(struct ifla_fan_map)) * 256 +
 0;
}
@@ -603,6 +858,26 @@
    if (tunnel->collect_md)
    if (nla_put_flag(skb, IFLA_IPTUN_COLLECT_METADATA))
        goto nla_put_failure;
+    if (fan_has_map(&tunnel->fan)) {
+        struct nlattr *fan_nest;
+        struct ip_fan_map *fan_map;
+        +fan_nest = nla_nest_start(skb, IFLA_IPTUN_FAN_MAP);
+        if (!fan_nest)
+            goto nla_put_failure;
+        list_for_each_entry_rcu(fan_map, &tunnel->fan.fan_maps, list) {
+            struct ifla_fan_map map;
+            map.underlay = fan_map->underlay;
+            map.underlay_prefix = fan_map->underlay_prefix;
+            map.overlay = fan_map->overlay;
+            map.overlay_prefix = fan_map->overlay_prefix;
+            if (nla_put(skb, IFLA_FAN_MAPPING, sizeof(map), &map))
+                goto nla_put_failure;
+        }
+        nla_nest_end(skb, fan_nest);
+    }
    return 0;

nla_put_failure:
@@ -623,6 +898,9 @@
    [IFLA_IPTUN_COLLECT_METADATA]= { .type = NLA_FLAG },
    [IFLA_IPTUN_FWMARK]= { .type = NLA_U32 },
+    [__IFLA_IPTUN_VENDOR_BREAK ... IFLA_IPTUN_MAX]= { .type = NLA_BINARY },
+    [IFLA_IPTUN_FAN_MAP]= { .type = NLA_NESTED },
    ];

static struct rtnl_link_ops ipip_link_ops __read_mostly = {
@@ -671,6 +949,23 @@
    .size = sizeof(struct ip_tunnel_net),
    ];

+ifdef CONFIG_SYSCTL
+static struct ctl_table_header *ipip_fan_header;
+static unsigned int ipip_fan_version = 3;
+ +static struct ctl_table ipip_fan_sysctls[] = {
+    

+ .procname = "version",
+ .data = &ipip_fan_version,
+ .maxlen = sizeof(ipip_fan_version),
+ .mode = 0444,
+ .proc_handler = proc_dointvec,
+ },
+ [];
+ }
+ #endif /* CONFIG_SYSCTL */
+
+ static int __init ipip_init(void)
+ {
+ int err;
+ @@ -696,12 +991,25 @@
+ if (err < 0)
+ goto rtnl_link_failed;
+ #ifdef CONFIG_SYSCTL
+ ipip_fan_header = register_net_sysctl(&init_net, "net/fan",
+ + ipip_fan_sysctls);
+ if (!ipip_fan_header) {
+ + err = -ENOMEM;
+ + goto sysctl_failed;
+ + }
+ #endif /* CONFIG_SYSCTL */
+ 
+ out:
+ return err;
+ #ifdef CONFIG_SYSCTL
+ sysctl_failed:
+ rtnl_link_unregister(&ipip_link_ops);
+ #endif /* CONFIG_SYSCTL */
+ 
+ #ifdef CONFIG_SYSCTL
+ +sysctl_failed:
+ +rtnl_link_unregister(&ipip_link_ops);
+ +#endif /* CONFIG_SYSCTL */
+ 
+ if IS_ENABLED(CONFIG_MPLS)
+ -xfrm4_tunnel_deregister(&mplsip_handler, AF_INET);
+ +xfrm4_tunnel_deregister(&mplsip_handler, AF_MPLS);
+ xfrm_tunnel_mplsip_failed:
+ 
+ #endif
+ @@ -713,6 +1021,9 @@
+
+ static void __exit ipip_fini(void)
+ {
+ #ifdef CONFIG_SYSCTL
+ unregister_net_sysctl_table(ipip_fan_header);
+ +#endif /* CONFIG_SYSCTL */
+ }
rtln_link_unregister(&ipip_link_ops);
if (xfm4_tunnel_deregister(&ipip_handler, AF_INET))
pr_info("%s: can't deregister tunnel\n", __func__);
--- linux-4.15.0.orig/net/ipv4/ipmr.c
+++ linux-4.15.0/net/ipv4/ipmr.c
@@ -69,6 +69,8 @@
#include <net/nexthop.h>
#include <net/switchdev.h>

+#include <linux/nospec.h>
+
struct ipmr_rule {
 struct fib_rule common;
};
@@ -356,6 +358,7 @@
static struct mr_table *ipmr_new_table(struct net *net, u32 id)
{
 struct mr_table *mrt;
+int err;

 /* "pimreg\%u" should not exceed 16 bytes (IFNAMSIZ) */
 if (id != RT_TABLE_DEFAULT && id >= 1000000000)
 @@ -371,7 +374,11 @@
 write_pnet(&mrt->net, net);
mrt->id = id;
-rhltable_init(&mrt->mfc_hash, &ipmr_rht_params);
+err = rhltable_init(&mrt->mfc_hash, &ipmr_rht_params);
+if (err) {
+kfree(mrt);
+return ERR_PTR(err);
+}
INIT_LIST_HEAD(&mrt->mfc_cache_list);
INIT_LIST_HEAD(&mrt->mfc_unres_queue);

 @@ -1676,6 +1683,7 @@
 return -EFAULT;
 if (vr.vifi >= mrt->maxvif)
 return -EINVAL;
+vr.vifi = array_index_nospec(vr.vifi, mrt->maxvif);
 read_lock(&mrt_lock);
vif = &mrt->vif_table[vr.vifi];
 if (VIF_EXISTS(mrt, vr.vifi)) {
 @@ -1750,6 +1758,7 @@
 return -EFAULT;
 if (vr.vifi >= mrt->maxvif)
 return -EINVAL;
+vr.vifi = array_index_nospec(vr.vifi, mrt->maxvif);
read_lock(&mrt_lock);
vif = &mrt->vif_table[vr.vifi];
if (VIF_EXISTS(mrt, vr.vifi)) {
    rcu_read_unlock();
    return -ENODEV;
}
_skb2 = skb_clone(skb, GFP_ATOMIC);
_skb2 = skb_realloc_headroom(skb, sizeof(struct iphdr));
if (!skb2) {
    read_unlock(&mrt_lock);
    rcu_read_unlock();
    next_entry:
    e++;
}
-e = 0;
-s_e = 0;

spin_lock_bh(&mfc_unres_lock);
list_for_each_entry(mfc, &mrt->mfc_unres_queue, list) {
    if (table_base + v
        != arpt_next_entry(e)) {
        verdict = NF_DROP;
        break;
    }
    jumpstack[stackidx++] = e;
}

static bool next_offset_ok(const struct xt_table_info *t, unsigned int newpos)
{
    if (newpos > t->size - sizeof(struct arpt_entry))
        return false;
    if (newpos % __alignof__(struct arpt_entry) != 0)
        return false;
    return true;
/* Figures out from what hook each rule can be called: returns 0 if there are loops. Puts hook bitmask in comefrom. */
@@ -358,6 +373,8 @@
/* Move along one */
size = e->next_offset;
+if (!next_offset_ok(newinfo, pos + size))
+return 0;
  e = entry0 + pos + size;
if (pos + size >= newinfo->size)
  return 0;
@@ -379,6 +396,10 @@
    if (!next_offset_ok(newinfo, newpos))
        return 0;
    +
e = entry0 + newpos;
e->counters.pcnt = pos;
pos = newpos;
@@ -389,10 +410,11 @@
    return 1;
}

+static inline int check_target(struct arpt_entry *e, struct net *net, const char *name)
+static int check_target(struct arpt_entry *e, const char *name)
{
    struct xt_entry_target *t = arpt_get_target(e);
    struct xt_tgchk_param par = {
        .net = net,
        .table = name,
        .entryinfo = e,
        .target = t->u.kernel.target,
@@ -404,8 +426,9 @@
            return xt_check_target(&par, t->u.target_size - sizeof(*t), 0, false);
 }

+static inline int find_check_entry(struct arpt_entry *e, struct net *net, const char *name,
  +unsigned int size,
+struct xt_percpu_counter_alloc_state *alloc_state)
struct xt_entry_target *t;
@@ -424,7 +447,7 @@
t->u.kernel.target = target;

-ret = check_target(e, name);
+ret = check_target(e, net, name);
 if (ret)
 goto err;
 return 0;
@@ -499,12 +522,13 @@
 return 0;
 }

-static inline void cleanup_entry(struct arpt_entry *e)
+static void cleanup_entry(struct arpt_entry *e, struct net *net)
 {
 struct xt_tgdtor_param par;
 struct xt_entry_target *t;

 t = arpt_get_target(e);
+par.net = net;
 par.target = t->u.kernel.target;
 par.targinfo = t->data;
 par.family = NFPROTO_ARP;
@@ -517,7 +541,9 @@
 /* Checks and translates the user-supplied table segment (held in
 * newinfo).
 */
-static int translate_table(struct xt_table_info *newinfo, void *entry0,
+static int translate_table(struct net *net,
+    struct xt_table_info *newinfo,
+    void *entry0,
    const struct arpt_replace *repl)
 {
 struct xt_percpu_counter_alloc_state alloc_state = { 0 };
if (i-- == 0)
break;
-cleanup_entry(iter);
+cleanup_entry(iter, net);
}
return ret;
}
@@ -782,7 +808,9 @@
memcpy(newinfo, info, offsetof(struct xt_table_info, entries));
newinfo->initial_entries = 0;
loc_cpu_entry = info->entries;
-xt_compat_init_offsets(NFPROTO_ARP, info->number);
+ret = xt_compat_init_offsets(NFPROTO_ARP, info->number);
+if (ret)
+return ret;
+return ret;
xt_entry_foreach(iter, loc_cpu_entry, info->size) {
ret = compat_calc_entry(iter, info, loc_cpu_entry, newinfo);
if (ret != 0)
@@ -897,7 +925,7 @@
struct arpt_entry *iter;
ret = 0;
-counters = vzalloc(num_counters * sizeof(struct xt_counters));
+counters = xt_counters_alloc(num_counters);
if (!counters) {
ret = -ENOMEM;
goto out;
@@ -933,7 +961,7 @@
/* Decrease module usage counts and free resource */
loc_cpu_old_entry = oldinfo->entries;
xt_entry_foreach(iter, loc_cpu_old_entry, oldinfo->size)
 -cleanup_entry(iter);
+cleanup_entry(iter, net);

xt_free_table_info(oldinfo);
if (copy_to_user(counters_ptr, counters,
@@ -985,7 +1013,7 @@
goto free_newinfo;
}

-stat = translate_table(newinfo, loc_cpu_entry, &tmp);
+ret = translate_table(net, newinfo, loc_cpu_entry, &tmp);
if (ret != 0)
goto free_newinfo;
@@ -997,7 +1025,7 @@
free_newinfo_untrans:
xt_entry_foreach(iter, loc_cpu_entry, newinfo->size)
-cleanup_entry(iter);
+cleanup_entry(iter, net);
free_newinfo:
xt_free_table_info(newinfo);
return ret;
@@ -1160,7 +1188,8 @@
}
}

-static int translate_compat_table(struct xt_table_info **pinfo,
+static int translate_compat_table(struct net *net,
   struct xt_table_info **pinfo,
   void **pentry0,
   const struct compat_arpt_replace *compatr)
{
@@ -1170,7 +1199,7 @@
   struct arpt_replace repl;
   unsigned int size;
-   int ret = 0;
+   int ret;
   info = *pinfo;
   entry0 = *pentry0;
@@ -1179,7 +1208,9 @@
   j = 0;
   xt_compat_lock(NFPROTO_ARP);
-   xt_compat_init_offsets(NFPROTO_ARP, compatr->num_entries);
+   if (ret)
+      goto out_unlock;
/* Walk through entries, checking offsets. */
   xt_entry_foreach(iter0, entry0, compatr->size) {
   ret = check_compat_entry_size_and_hooks(iter0, info, &size,
@@ -1226,7 +1259,7 @@
   repl.num_counters = 0;
   repl.counters = NULL;
repl.size = newinfo->size;
-ret = translate_table(newinfo, entry1, &repl);
+ret = translate_table(net, newinfo, entry1, &repl);
if (ret)
goto free_newinfo;

@@ -1279,7 +1312,7 @@
goto free_newinfo;
}

-ret = translate_compat_table(&newinfo, &loc_cpu_entry, &tmp);
+ret = translate_compat_table(net, &newinfo, &loc_cpu_entry, &tmp);
if (ret != 0)
goto free_newinfo;

@@ -1291,7 +1324,7 @@
free_newinfo_untrans:
xt_entry_foreach(iter, loc_cpu_entry, newinfo->size)
-cleanup_entry(iter);
+cleanup_entry(iter, net);
free_newinfo:
xt_free_table_info(newinfo);
return ret;
@@ -1518,7 +1551,7 @@
return ret;
}

-static void __arpt_unregister_table(struct xt_table *table)
+static void __arpt_unregister_table(struct net *net, struct xt_table *table)
{
 struct xt_table_info *private;
 void *loc_cpu_entry;
@@ -1530,7 +1563,7 @@
 /* Decrease module usage counts and free resources */
 loc_cpu_entry = private->entries;
 xt_entry_foreach(iter, loc_cpu_entry, private->size)
-cleanup_entry(iter);
+cleanup_entry(iter, net);
 if (private->number > private->initial_entries)
module_put(table_owner);
 xt_free_table_info(private);
@@ -1555,7 +1588,7 @@
loc_cpu_entry = newinfo->entries;
memcpy(loc_cpu_entry, repl->entries, repl->size);

-ret = translate_table(newinfo, loc_cpu_entry, repl);
+ret = translate_table(net, newinfo, loc_cpu_entry, repl);
if (ret != 0)
goto out_free;

@@ -1570,7 +1603,7 @@
ret = nf_register_net_hooks(net, ops, hweight32(table->valid_hooks));
if (ret != 0) {
    __arpt_unregister_table(new_table);
+    __arpt_unregister_table(net, new_table);
    *res = NULL;
}

@@ -1585,7 +1618,7 @@
    const struct nf_hook_ops *ops)
{
    nf_unregister_net_hooks(net, ops, hweight32(table->valid_hooks));
-    __arpt_unregister_table(table);
+    __arpt_unregister_table(net, table);
}

/* The built-in targets: standard (NULL) and error. */
--- linux-4.15.0.orig/net/ipv4/netfilter/ip_tables.c
+++ linux-4.15.0/net/ipv4/netfilter/ip_tables.c
@@ -335,8 +335,13 @@
continue;
}
if (table_base + v != ipt_next_entry(e) &&
    !(e->ip.flags & IPT_F_GOTO))
+    !(e->ip.flags & IPT_F_GOTO)) { 
+if (unlikely(stackidx >= private->stacksize)) {
+    verdict = NF_DROP;
+    break;
+}
+} 
jumpstack[stackidx++] = e;
+
)e = get_entry(table_base, v);
continue;
@@ -364,6 +369,17 @@
else return verdict;
}

+static bool next_offset_ok(const struct xt_table_info *t, unsigned int newpos)
+{
+if (newpos > t->size - sizeof(struct ipt_entry))
+    return false;
+    +
+if (newpos % __alignof__(struct ipt_entry) != 0)
return false;
+
return true;
+
/* Figures out from what hook each rule can be called: returns 0 if
there are loops. Puts hook bitmask in comefrom. */
static int
@@ -424,6 +440,8 @@

/* Move along one */
size = e->next_offset;
+if (!next_offset_ok(newinfo, pos + size))
+return 0;

e = entry0 + pos + size;
if (pos + size >= newinfo->size)
return 0;
@@ -445,6 +463,10 @@
if (newpos >= newinfo->size)
return 0;
}
+
+if (!next_offset_ok(newinfo, newpos))
+return 0;
+
e = entry0 + newpos;
e->counters.pcnt = pos;
pos = newpos;
@@ -535,6 +557,7 @@
return -ENOMEM;

j = 0;
+memcpy(&mtpar, 0, sizeof(mtpar));

mtpar.net= net;
mtpar.table = name;
mtpar.entryinfo = &e->ip;
@@ -945,7 +968,9 @@

memcpy(newinfo, info, offsetof(struct xt_table_info, entries));
newinfo->initial_entries = 0;
loc_cpu_entry = info->entries;
-xt_compat_init_offsets(AF_INET, info->number);
+ret = xt_compat_init_offsets(AF_INET, info->number);
+if (ret)
+return ret;
+xt_entry_foreach(iter, loc_cpu_entry, info->size) {
ret = compat_calc_entry(iter, info, loc_cpu_entry, newinfo);
if (ret != 0)
@@ -1058,7 +1083,7 @@
struct ipt_entry *iter;

ret = 0;
-counters = vzalloc(num_counters * sizeof(struct xt_counters));
+counters = xt_counters_alloc(num_counters);
if (!counters) {
    ret = -ENOMEM;
    goto out;
}
j = 0;
xt_compat_lock(AF_INET);
-counters = xt_compat_init_offsets(AF_INET, compatr->num_entries);
+ret = xt_compat_init_offsets(AF_INET, compatr->num_entries);
+if (ret)
    goto out_unlock;
/* Walk through entries, checking offsets. */
xt_entry_foreach(iter0, entry0, compatr->size) {
    ret = check_compat_entry_size_and_hooks(iter0, info, &size,
        @ @ -1440,6 +1467,8 @@
    if (!newinfo)
        goto out_unlock;

    @ @ -1420,7 +1445,9 @@
        ret = check_compat_entry_size_and_hooks(iter0, info, &size,
            @ @ -1440,6 +1467,8 @@
    if (!newinfo)
        goto out_unlock;
    memset(newinfo->entries, 0, size);
    newinfo->number = compatr->num_entries;
    for (i = 0; i < NF_INET_NUMHOOKS; i++) {
        newinfo->hook_entry[i] = compatr->hook_entry[i];
        @ @ -1902,6 +1931,7 @@
            .checkentry = icmp_checkentry,
            .proto = IPPROTO_ICMP,
            .family = NFPROTO_IPV4,
            .me = THIS_MODULE,
        },
    ];

    --- linux-4.15.0.orig/net/ipv4/netfilter/ipt_CLAMPERIP.c
    +++ linux-4.15.0/net/ipv4/netfilter/ipt_CLAMPERIP.c
    @ @ -56,18 +56,15 @@
    #endif
    enum clusterip_hashmode hash_mode;/* which hashing mode */
    u_int32_t hash_initval;/* hash initialization */
    -struct rcu_head rcu;
    -
    +struct rcu_head rcu;/* for call_rcu_bh */
    +struct net *net;/* netns for pernet list */
    char ifname[IFNAMSIZ];/* device ifname */
    -struct notifier_block notifier;/* refresh c->ifindex in it */
ifdef CONFIG_PROC_FS
static const struct file_operations clusterip_proc_fops;
#endif

-static unsigned int clusterip_net_id __read_mostly;
-
struct clusterip_net {
    struct list_head configs;
    /* lock protects the configs list */
    @ @ -75,19 +72,35 @ @
}

ifdef CONFIG_PROC_FS
struct proc_dir_entry *procdir;
+/* mutex protects the config->pde*/
+struct mutex mutex;
#endif

+static unsigned int clusterip_net_id __read_mostly;
+static inline struct clusterip_net *clusterip_pernet(struct net *net)
+{
+    return net_generic(net, clusterip_net_id);
+
+}

static inline void
clusterip_config_get(struct clusterip_config *c)
{
    refcount_inc(&c->refcount);
}

static void clusterip_config_rcu_free(struct rcu_head *head)
{
    -kfree(container_of(head, struct clusterip_config, rcu));
    +struct clusterip_config *config;
    +struct net_device *dev;
    +
    +config = container_of(head, struct clusterip_config, rcu);
    +dev = dev_get_by_name(config->net, config->ifname);
    +if (dev) {
    +    dev_mc_del(dev, config->clustermac);
    +    dev_put(dev);
    +}
    +kfree(config);
}
static inline void
@@ -101,24 +114,23 @@
    * entry(rule) is removed, remove the config from lists, but don't free it
    * yet, since proc-files could still be holding references */
static inline void
-clusterip_config_entry_put(struct net *net, struct clusterip_config *c)
+clusterip_config_entry_put(struct clusterip_config *c)
{
    struct clusterip_net *cn = net_generic(net, clusterip_net_id);
+    struct clusterip_net *cn = clusterip_pernet(c->net);
    local_bh_disable();
    if (refcount_dec_and_lock(&c->entries, &cn->lock)) {
        list_del_rcu(&c->list);
        spin_unlock(&cn->lock);
        local_bh_enable();
        -
        -unregister_netdevice_notifier(&c->notifier);
        -
        /* In case anyone still accesses the file, the open/close
         * functions are also incrementing the refcount on their own,
         * so it's safe to remove the entry even if it's in use. */
#ifdef CONFIG_PROC_FS
    +    mutex_lock(&cn->mutex);
    if (cn->procdir)
        proc_remove(c->pde);
    +    mutex_unlock(&cn->mutex);
    #endif
    return;
}
@@ -129,7 +141,7 @@
__clusterip_config_find(struct net *net, __be32 clusterip)
{
    struct clusterip_config *c;
    -struct clusterip_net *cn = net_generic(net, clusterip_net_id);
+struct clusterip_net *cn = clusterip_pernet(net);

    list_for_each_entry_rcu(c, &cn->configs, list) {
        if (c->clusterip == clusterip)
@@ -177,32 +189,37 @@
            void *ptr)
        {
            struct net_device *dev = netdev_notifier_info_to_dev(ptr);
+            struct net *net = dev_net(dev);
+            struct clusterip_net *cn = clusterip_pernet(net);
            struct clusterip_config *c;

            -c = container_of(this, struct clusterip_config, notifier);


-switch (event) {
- case NETDEV_REGISTER:
- if (!strcmp(dev->name, c->ifname)) {
- c->ifindex = dev->ifindex;
- dev_mc_add(dev, c->clustermac);
- }
- break;
- case NETDEV_UNREGISTER:
- if (dev->ifindex == c->ifindex) {
- dev_mc_del(dev, c->clustermac);
- c->ifindex = -1;
- }
- break;
- case NETDEV_CHANGENAME:
- if (!strcmp(dev->name, c->ifname)) {
- c->ifindex = dev->ifindex;
- dev_mc_add(dev, c->clustermac);
- } else if (dev->ifindex == c->ifindex) {
- dev_mc_del(dev, c->clustermac);
- c->ifindex = -1;
+ spin_lock_bh(&cn->lock);
+ list_for_each_entry_rcu(c, &cn->configs, list) {
+ switch (event) {
+ case NETDEV_REGISTER:
+ if (!strcmp(dev->name, c->ifname)) {
+ c->ifindex = dev->ifindex;
+ dev_mc_add(dev, c->clustermac);
+ }
+ break;
+ case NETDEV_UNREGISTER:
+ if (dev->ifindex == c->ifindex) {
+ dev_mc_del(dev, c->clustermac);
+ c->ifindex = -1;
+ }
+ break;
+ case NETDEV_CHANGENAME:
+ if (!strcmp(dev->name, c->ifname)) {
+ c->ifindex = dev->ifindex;
+ dev_mc_add(dev, c->clustermac);
+ } else if (dev->ifindex == c->ifindex) {
+ dev_mc_del(dev, c->clustermac);
+ c->ifindex = -1;
+ }
+ break;
+ }
- break;
- }
+ spin_unlock_bh(&cn->lock);
return NOTIFY_DONE;
}
@@ -211,31 +228,44 @@
clusterip_config_init(struct net *net, const struct ipt_clusterip_tgt_info *i,
    __be32 ip, const char *iniface)
{
    struct clusterip_net *cn = net_generic(net, clusterip_net_id);
    +struct clusterip_net *cn = clusterip_pernet(net);
    struct clusterip_config *c;
    +struct net_device *dev;
    int err;

    +if (iniface[0] == '0') {
        +pr_info("Please specify an interface name\n");
        +return ERR_PTR(-EINVAL);
        +}
    +
    c = kzalloc(sizeof(*c), GFP_ATOMIC);
    if (!c)
        return ERR_PTR(-ENOMEM);
    -strncpy(c->ifname, iniface);
    -c->ifindex = -1;
    -c->clusterip = ip;
    +dev = dev_get_by_name(net, iniface);
    +if (!dev) {
        +pr_info("no such interface %s\n", iniface);
        +kfree(c);
        +return ERR_PTR(-ENOENT);
        +}
    +
    c->ifindex = dev->ifindex;
    +strcpy(c->ifname, dev->name);
    memcpy(&c->clustermac, &i->clustermac, ETH_ALEN);
    +dev_mc_add(dev, c->clustermac);
    +dev_put(dev);
    +
    +c->clusterip = ip;
    c->num_total_nodes = i->num_total_nodes;
    clusterip_config_init_nodelist(c, i);
    c->hash_mode = i->hash_mode;
    c->hash_initval = i->hash_initval;
    +c->net = net;
    refcount_set(&c->refcount, 1);
    -refcount_set(&c->entries, 1);

    spin_lock_bh(&cn->lock);
    if (!__clusterip_config_find(net, ip)) {

-spin_unlock_bh(&cn->lock);
-kfree(c);
-
-return ERR_PTR(-EBUSY);
+err = -EBUSY;
+goto out_config_put;
}

list_add_rcu(&c->list, &cn->configs);
@@ -247,9 +277,11 @@
/* create proc dir entry */
sprintf(buffer, "%pI4", &ip);
+mutex_lock(&cn->mutex);
c->pde = proc_create_data(buffer, S_IWUSR|S_IRUSR,
    cn->procdir,
    &clusterip_proc_fops, c);
+mutex_unlock(&cn->mutex);
if (!c->pde) {
err = -ENOMEM;
goto err;
@@ -257,20 +289,17 @@
} #endif

-c->notifier.notifier_call = clusterip_netdev_event;
-err = register_netdevice_notifier(&c->notifier);
-if (!err)
-    return c;
+refcount_set(&c->entries, 1);
+return c;

#ifdef CONFIG_PROC_FS
-proc_remove(c->pde);
err:
# endif
spin_lock_bh(&cn->lock);
list_del_rcu(&c->list);
+out_config_put:
spin_unlock_bh(&cn->lock);
-kfree(c);
-
+clusterip_config_put(c);
return ERR_PTR(err);
}

@@ -431,7 +460,7 @@
struct ipt_clusterip_tgt_info *cipinfo = par->targinfo;
const struct ipt_entry *e = par->entryinfo;
struct clusterip_config *config;
-int ret;
+int ret, i;

if (par->nft_compat) {
    pr_err("cannot use CLUSTERIP target from nftables compat\n");
    pr_info("Please specify destination IP\n");
    return -EINVAL;
}
-/* FIXME: further sanity checks */
+if (cipinfo->num_local_nodes > ARRAY_SIZE(cipinfo->local_nodes)) {
+    pr_info("bad num_local_nodes %u\n", cipinfo->num_local_nodes);
+    return -EINVAL;
+}
+for (i = 0; i < cipinfo->num_local_nodes; i++) {
+    if (cipinfo->local_nodes[i] - 1 >=
+        sizeof(config->local_nodes) * 8) {
+        pr_info("bad local_nodes[%d] %u\n", i, cipinfo->local_nodes[i]);
+        return -EINVAL;
+    }
+
+}

config = clusterip_config_find_get(par->net, e->ip.dst.s_addr, 1);
if (!config) {
    pr_info("Please specify an interface name\n");
    return -EINVAL;
} else {
    struct net_device *dev;

    -if (e->ip.iniface[0] == '\0') {
    +pr_info("no such interface %s\n", e->ip.iniface);
    +return -ENOENT;
    -}

    -dev = dev_get_by_name(par->net, e->ip.iniface);
    -if (!dev) {
    +pr_info("no such interface %s\n", e->ip.iniface);
    +return -ENOENT;
    -}

    -dev_put(dev);

    config = clusterip_config_init(par->net, cipinfo,
e->ip.dst.s_addr,
e->ip.iniface);
if (IS_ERR(config))
  return PTR_ERR(config);
-
  }
-  cipinfo->config = config;
+  } else if (memcmp(&config->clustermac, &cipinfo->clustermac, ETH_ALEN))
+  return -EINVAL;
ret = nf_ct_netns_get(par->net, par->family);
-  if (ret < 0)
+  if (ret < 0) {
    pr_info("cannot load conntrack support for proto=%u\n",
    par->family);
    +clusterip_config_entry_put(config);
    +clusterip_config_put(config);
    +return ret;
    +}
if (!(par->net->xt.clusterip_deprecated_warning)) {
  pr_info("ipt_CLUSTERIP is deprecated and it will removed soon, ",
  par->net->xt.clusterip_deprecated_warning = true;
  }
  cipinfo->config = config;
  return ret;
}
@@ -505,7 +534,7 @@
/* if no more entries are referencing the config, remove it
 * from the list and destroy the proc entry */
 -clusterip_config_entry_put(par->net, cipinfo->config);
+clusterip_config_entry_put(cipinfo->config);

  clusterip_config_put(cipinfo->config);

  @ @ -788,7 +817,7 @@

 static int clusterip_net_init(struct net *net)
 {  
 -struct clusterip_net *cn = net_generic(net, clusterip_net_id);
+struct clusterip_net *cn = clusterip_pernet(net);
  int ret;

 INIT_LIST_HEAD(&cn->configs);


pr_err("Unable to proc dir entry\n");
return -ENOMEM;
}
+mutex_init(&cn->mutex);
#endif /* CONFIG_PROC_FS */

return 0;
@@ -813,13 +843,15 @@
static void clusterip_net_exit(struct net *net)
{
-struct clusterip_net *cn = net_generic(net, clusterip_net_id);
#ifdef CONFIG_PROC_FS
+struct clusterip_net *cn = clusterip_pernet(net);
+mutex_lock(&cn->mutex);
proc_remove(cn->procdir);
    cn->procdir = NULL;
+mutex_unlock(&cn->mutex);
#endif
    nf_unregister_net_hook(net, &cip_arp_ops);
-WARN_ON_ONCE(!list_empty(&cn->configs));
}

static struct pernet_operations clusterip_net_ops = {
    .size = sizeof(struct clusterip_net),
};
+struct notifier_block cip_netdev_notifier = {
+ .notifier_call = clusterip_netdev_event
+};
+
static int __init clusterip_tg_init(void)
{
    int ret;
    @@ -841,11 +877,17 @@
    if (ret < 0)
        goto cleanup_subsys;
    ret = register_netdevice_notifier(&cip_netdev_notifier);
+    if (ret < 0)
+        goto unregister_target;
+    pr_info("ClusterIP Version %s loaded successfully\n", CLUSTERIP_VERSION);
return 0;

+unregister_target:
+xt_unregister_target(&clusterip_tg_reg);
cleanup_subsys:
unregister_pernet_subsys(&clusterip_net_ops);
return ret;
@@ -855,6 +897,7 @@
{
    pr_info("ClusterIP Version \%s unloading\n", CLUSTERIP_VERSION);

+unregister_netdevice_notifier(&cip_netdev_notifier);
xt_unregister_target(&clusterip_tg_reg);
unregister_pernet_subsys(&clusterip_net_ops);

--- linux-4.15.0.orig/net/ipv4/netfilter/ipt_MASQUERADE.c
+++ linux-4.15.0/net/ipv4/netfilter/ipt_MASQUERADE.c
@@ -81,9 +81,12 @@
    int ret;

    ret = xt_register_target(&masquerade_tg_reg);
    +if (ret)
    +return ret;

    -if (ret == 0)
    -        nf_nat_masquerade_ipv4_register_notifier();
    +ret = nf_nat_masquerade_ipv4_register_notifier();
    +if (ret)
    +    xt_unregister_target(&masquerade_tg_reg);

    return ret;
}
--- linux-4.15.0.orig/net/ipv4/netfilter/ipt_rpfilter.c
+++ linux-4.15.0/net/ipv4/netfilter/ipt_rpfilter.c
@@ -94,8 +94,9 @@
    flow.flowi4_oif = 0;
    flow.flowi4_mark = info->flags & XT_RPFILTER_VALID_MARK ? skb->mark : 0;
    -flow.flowi4_tos = RT_TOS(iph->tos);
    +flow.flowi4_tos = iph->tos & IPTOS_RT_MASK;
    flow.flowi4_scope = RT_SCOPE_UNIVERSE;
    +flow.flowi4_oif = l3mdev_master_ifindex_rcu(xt_in(par));

    return rpfiler_lookup_reverse(xt_net(par), &flow, xt_in(par), info->flags) ^ invert;
}
ip_hdrlen(skb) < sizeof(struct iphdr))
return NF_ACCEPT;

- if (ip_is_fragment(ip_hdr(skb))) /* IP_NODEFRAG setsockopt set */
+ if (ip_is_fragment(ip_hdr(skb))) { /* IP_NODEFRAG setsockopt set */
+ enum ip_contrack_info ctinfo;
+ struct nf_conn *tmpl;
+ + tmpl = nf_ct_get(skb, &ctinfo);
+ if (tmpl && nf_ct_is_template(tmpl)) {
+ /* when skipping ct, clear templates to avoid fooling
+ * later targets/matches
+ */
+ skb->_nfct = 0;
+ nf_ct_put(tmpl);
+ }
return NF_ACCEPT;
+

return nf_conntrack_in(state->net, PF_INET, state->hook, skb);
}
@@ -218,15 +230,19 @@
struct nf_conntrack_tuple tuple;
memset(&tuple, 0, sizeof(tuple));
+
+lock_sock(sk);
tuple.src.u3.ip = inet->inet_rcv_saddr;
tuple.src.u.tcp.port = inet->inet_sport;
tuple.dst.u3.ip = inet->inet_daddr;
tuple.dst.u.tcp.port = inet->inet_dport;
tuple.src.l3num = PF_INET;
tuple.dst.protonum = sk->sk_protocol;
+release_sock(sk);

/* We only do TCP and SCTP at the moment: is there a better way? */
- if (sk->sk_protocol != IPPROTO_TCP && sk->sk_protocol != IPPROTO_SCTP) {
+ if (tuple.dst.protonum != IPPROTO_TCP &&
+ tuple.dst.protonum != IPPROTO_SCTP) {
pr_debug("SO_ORIGINAL_DST: Not a TCP/SCTP socket\n");
return -ENOPROTOOPT;
}
--- linux-4.15.0.orig/net/ipv4/netfilter/nf_log_arp.c
+++ linux-4.15.0/net/ipv4/netfilter/nf_log_arp.c
@@ -46,16 +46,31 @@
const struct nf_loginfo *info,
const struct sk_buff *skb, unsigned int nhoff)
{
const struct arphdr *ah;
const struct arphdr _arph;
const struct arppayload *ap;
struct arppayload _arpp;
unsigned int logflags;
const struct arphdr *ah;
unsigned int logflags;
struct arphdr _arph;

ah = skb_header_pointer(skb, 0, sizeof(_arph), &arph);
if (ah == NULL) {
    nf_log_buf_add(m, "TRUNCATED");
    return;
}

if (info->type == NF_LOG_TYPE_LOG)
    logflags = info->u.log.logflags;
else
    logflags = NF_LOG_DEFAULT_MASK;

if (logflags & NF_LOG_MACDECODE) {
    nf_log_buf_add(m, "MACSRC=%pM MACDST=%pM MACPROTO=%04x ",
            eth_hdr(skb)->h_source, eth_hdr(skb)->h_dest,
            ntohs(eth_hdr(skb)->h_proto));
    nf_log_dump_vlan(m, skb);
    nf_log_buf_add(m, "MACSRC=%pM MACDST=%pM MACPROTO=%04x ",
            eth_hdr(skb)->h_source, eth_hdr(skb)->h_dest,
            ntohs(eth_hdr(skb)->h_proto));
}

nf_log_buf_add(m, "ARP HTYPE=%d PTYPE=0x%04x OPCODE=%d",
        ntohs(ar->ar_hrd), ntohs(ar->ar_pro), ntohs(ar->ar_op));

--- linux-4.15.0.orig/net/ipv4/netfilter/nf_log_ipv4.c
+++ linux-4.15.0/net/ipv4/netfilter/nf_log_ipv4.c
@@ -287,8 +287,10 @@
    case ARPHRD_ETHER:
        nf_log_buf_add(m, "MACSRC=%pM MACDST=%pM MACPROTO=%04x ",
            eth_hdr(skb)->h_source, eth_hdr(skb)->h_dest,
            ntohs(eth_hdr(skb)->h_proto));
        nf_log_dump_vlan(m, skb);
        nf_log_buf_add(m, "MACSRC=%pM MACDST=%pM MACPROTO=%04x ",
            eth_hdr(skb)->h_source, eth_hdr(skb)->h_dest,
            ntohs(eth_hdr(skb)->h_proto));
        return;
    default:
        --- linux-4.15.0.orig/net/ipv4/netfilter/nf_nat_masquerade_ipv4.c
+++ linux-4.15.0/net/ipv4/netfilter/nf_nat_masquerade_ipv4.c
@@ -105,12 +105,26 @@


return NOTIFY_DONE;
}

+static int inet_cmp(struct nf_conn *ct, void *ptr)
+{
+  struct in_ifaddr *ifa = (struct in_ifaddr *)ptr;
+  struct net_device *dev = ifa->ifa_dev->dev;
+  struct nf_conntrack_tuple *tuple;
+
+  if (!device_cmp(ct, (void *)(long)dev->ifindex))
+    return 0;
  
  tuple = &ct->tuplehash[IP_CT_DIR_REPLY].tuple;
  
  return ifa->ifa_address == tuple->dst.u3.ip;
  
}

static int masq_inet_event(struct notifier_block *this,
                           unsigned long event,
                           void *ptr)
{
  struct in_device *idev = ((struct in_ifaddr *)ptr)->ifa_dev;
  
  struct netdev_notifier_info info;
  struct net *net = dev_net(idev->dev);
  
  /* The masq_dev_notifier will catch the case of the device going
   * down. So if the inetdev is dead and being destroyed we have
   * @ @ .120.8 +134.10 @ @
   * if (idev->dead)
   * return NOTIFY_DONE;

   -netdev_notifier_info_init(&info, idev->dev);
   -return masq_device_event(this, event, &info);
   +if (event == NETDEV_DOWN)
   +nf_ct_iterate_cleanup_net(net, inet_cmp, ptr, 0, 0);
   +
   +return NOTIFY_DONE;
  }

static struct notifier_block masq_dev_notifier = {
  @ @ .132,29 +148,51 @ @
  .notifier_call= masq_inet_event,
};

-static atomic_t masquerade_notifier_refcount = ATOMIC_INIT(0);
+static int masq_refcnt;
+static DEFINE_MUTEX(masq_mutex);
-void nf_nat_masquerade_ipv4_register_notifier(void)
+int nf_nat_masquerade_ipv4_register_notifier(void)
{
+int ret = 0;
+
+mutex_lock(&masq_mutex);
/* check if the notifier was already set */
-if (atomic_inc_return(&masquerade_notifier_refcount) > 1)
-return;
+if (++masq_refcnt > 1)
+goto out_unlock;

/* Register for device down reports */
-register_netdevice_notifier(&masq_dev_notifier);
+ret = register_netdevice_notifier(&masq_dev_notifier);
+if (ret)
+goto err_dec;

/* Register IP address change reports */
-register_inetaddr_notifier(&masq_inet_notifier);
+ret = register_inetaddr_notifier(&masq_inet_notifier);
+if (ret)
+goto err_unregister;
+
+mutex_unlock(&masq_mutex);
+return ret;
+
+err_unregister:
+unregister_netdevice_notifier(&masq_dev_notifier);
+err_dec:
+masq_refcnt--;
+out_unlock:
+mutex_unlock(&masq_mutex);
+return ret;
}

EXPORT_SYMBOL_GPL(nf_nat_masquerade_ipv4_register_notifier);

void nf_nat_masquerade_ipv4_unregister_notifier(void)
{
+mutex_lock(&masq_mutex);
/* check if the notifier still has clients */
-if (atomic_dec_return(&masquerade_notifier_refcount) > 0)
-return;
+if (--masq_refcnt > 0)
+goto out_unlock;

unregister_netdevice_notifier(&masq_dev_notifier);
unregister_inetaddr_notifier(&masq_inet_notifier);
+out_unlock:

+mutex_unlock(&masq_mutex);
}
EXPORT_SYMBOL_GPL(nf_nat_masquerade_ipv4_unregister_notifier);

--- linux-4.15.0.orig/net/ipv4/netfilter/nf_nat_pptp.c
+++ linux-4.15.0/net/ipv4/netfilter/nf_nat_pptp.c
@@ -165,8 +165,7 @@
   case PPTP_SET_LINK_INFO:
   /* only need to NAT in case PAC is behind NAT box */
   @ @ -267.9 +266.7 @@
   pcid_off = offsetof(union pptp_ctrl_union, setlink.peersCallID);
   break;
   default:
   -pr_debug("unknown outbound packet 0x%04x:%s\n", msg,
-   -msg <= PPTP_MSG_MAX ? pptp_msg_name[msg] :
-   -pptp_msg_name[0]);
+  pr_debug("unknown outbound packet %s\n", pptp_msg_name(msg));
   /* fall through */
   case PPTP_START_SESSION_REQUEST:
   case PPTP_START_SESSION_REPLY:
--- linux-4.15.0.orig/net/ipv4/netfilter/nf_socket_ipv4.c
+++ linux-4.15.0/net/ipv4/netfilter/nf_socket_ipv4.c
@@ -108,10 +108,12 @@
   int doff = 0;
   if (iph->protocol == IPPROTO_UDP || iph->protocol == IPPROTO_TCP) {
     -struct udphdr _hdr, *hp;
+  struct tcphdr _hdr;
+  struct udphdr *hp;
   hp = skb_header_pointer(skb, ip_hdrlen(skb),
   -sizeof(_hdr), &_hdr);
+  struct tcphdr _hdr;
+  struct udphdr *hp;
   hp = skb_header_pointer(skb, ip_hdrlen(skb),
   -sizeof(_hdr), &_hdr);
+  iph->protocol == IPPROTO_UDP ?
+  sizeof(*hp) : sizeof(_hdr), &_hdr);
   if (hp == NULL)
     return NULL;

--- linux-4.15.0.orig/net/ipv4/netfilter/nft_masq_ipv4.c
+++ linux-4.15.0/net/ipv4/netfilter/nft_masq_ipv4.c
@@ -69,7 +69,9 @@
   if (ret < 0)
return ret;

-nf_nat_masquerade_ipv4_register_notifier();
+ret = nf_nat_masquerade_ipv4_register_notifier();
+if (ret)
+nft_unregister_expr(&nft_masq_ipv4_type);

return ret;
}
--- linux-4.15.0.orig/net/ipv4/ping.c
+++ linux-4.15.0/net/ipv4/ping.c
@@ -775,8 +775,10 @@
    ipc.addr = faddr = daddr;
    if (ipc.opt && ipc.opt->opt.srr) {
      -if (!daddr)
-      +if (!daddr) {
+        err = -EINVAL;
+        goto out_free;
+      }
      faddr = ipc.opt->opt.faddr;
    }
    tos = get_rttos(&ipc, inet);
@@ -799,6 +801,9 @@
    fl4.fl4_icmp_type = user_icmph.type;
    fl4.fl4_icmp_code = user_icmph.code;
    +
    security_sk_classify_flow(sk, flowi4_to_flowi(&fl4));
    rt = ip_route_output_flow(net, &fl4, sk);
    if (IS_ERR(rt)) {
@@ -842,6 +847,7 @@
    out:
    ip_rt_put(rt);
    +out_free:
    if (free)
      kfree(ipc.opt);
    if (!err) {
@@ -972,6 +978,7 @@
      struct sock *sk;
      struct net *net = dev_net(skb->dev);
      struct icmphdr *icmph = icmp_hdr(skb);
      +bool rc = false;

/* We assume the packet has already been checked by icmp_rcv */

struct sk_buff *skb2 = skb_clone(skb, GFP_ATOMIC);

pr_debug("rcv on socket %p\n", sk);
-if (skb2)
-ping_queue_rcv_skb(sk, skb2);
+if (skb2 && !ping_queue_rcv_skb(sk, skb2))
+rc = true;
-sock_put(sk);
-return true;
}
-pr_debug("no socket, dropping\n");

-return false;
+if (!rc)
+pr_debug("no socket, dropping\n");
+
+return rc;
}
EXPORT_SYMBOL_GPL(ping_rcv);

--- linux-4.15.0.orig/net/ipv4/proc.c
+++ linux-4.15.0/net/ipv4/proc.c
@@ -54,7 +54,6 @@
 static int sockstat_seq_show(struct seq_file *seq, void *v)
 {
-unsigned int frag_mem;
+struct net *net = seq->private;
 int orphans, sockets;

 orphans = percpu_counter_sum_positive(&tcp_orphan_count);
@@ -72,8 +71,9 @@
 seq_printf(seq, "RAW: inuse %d\n", 
 -sock_prot_inuse_get(net, &udplite_prot));
 seq_printf(seq, "FRAG: inuse %d\n", 
+int frags, sockets);
-seq_printf(seq, "FRAG: inuse %d\n", !frag_mem, frag_mem);
+seq_printf(seq, "FRAG: inuse %d\n", !frag_mem, frag_mem);
+seq_printf(seq, "FRAG: inuse %d\n", 
 atomic_read(&net->ipv4.frags.rhashtable.nelems),
 atomic_read(&net->ipv4.frags.rhashtable.nelems),
 atomic_read(&net->ipv4.frags.rhashtable.nelems),
 return 0;
 }

@@ -132,6 +132,7 @@
 SNMP_MIB_ITEM("InECT1Pkts", IPSTATS_MIB_ECT1PKTS),
 SNMP_MIB_ITEM("InECT0Pkts", IPSTATS_MIB_ECT0PKTS),
SNMP_MIB_ITEM("InCEPkts", IPSTATS_MIB_CEPKTS),
+SNMP_MIB_ITEM("ReasmOverlaps", IPSTATS_MIB_REASM_OVERLAPS),
SNMP_MIB_SENTINEL
};

@@ -297,6 +298,7 @@
SNMP_MIB_ITEM("TCPKeepAlive", LINUX_MIB_TCPKEEPALIVE),
SNMP_MIB_ITEM("TCPMTUPFail", LINUX_MIB_TCPMTUPFAIL),
SNMP_MIB_ITEM("TCPMTUPT успех", LINUX_MIB_TCPMTUPT успех),
+SNMP_MIB_ITEM("TCPWqueueTooBig", LINUX_MIB_TCPWqueueTooBig),
SNMP_MIB_SENTINEL
};

--- linux-4.15.0.orig/net/ipv4/raw.c
+++ linux-4.15.0/net/ipv4/raw.c
@@ -174,6 +174,7 @@
static int raw_v4_input(struct sk_buff *skb, const struct iphdr *iph, int hash)
{
    int sdif = inet_sdif(skb);
+    int dif = inet_if(skb);
    struct sock *sk;
    struct hlist_head *head;
    int delivered = 0;
@@ -186,8 +187,7 @@
net = dev_net(skb->dev);
sk = __raw_v4_lookup(net, __sk_head(head), iph->protocol,
-    skb->dev->ifindex, sdif);
-    skb->dev->ifindex, sdif);
+    skb->dev->ifindex, sdif);  
while (sk) {
    delivered = 1;
@@ -202,7 +202,7 @@
}
}

read_unlock(&raw_v4_hashinfo.lock);
--- linux-4.15.0.orig/net/ipv4/raw_diag.c
+++ linux-4.15.0/net/ipv4/raw_diag.c
@@ -23,9 +23,6 @@
return &raw_v6_hashinfo;
#endif
} else {

pr_warn_once("Unexpected inet family %d\n",
    r->diag_family);
-WARN_ON_ONCE(1);
return ERR_PTR(-EINVAL);
}
}
@@ -102,8 +99,9 @@
if (IS_ERR(sk))
    return PTR_ERR(sk);

-rep = nlmsg_new(sizeof(struct inet_diag_msg) +
-sizeof(struct inet_diag_meminfo) + 64,
+rep = nlmsg_new(nla_total_size(sizeof(struct inet_diag_msg)) +
    +inet_diag_msg_attrs_size() +
    +nla_total_size(sizeof(struct inet_diag_meminfo)) + 64,
GFP_KERNEL);
if (!rep) {
    sock_put(sk);
--- linux-4.15.0.orig/net/ipv4/route.c
+++ linux-4.15.0/net/ipv4/route.c
@@ -70,6 +70,7 @@
#include <linux/types.h>
#include <linux/kernel.h>
#include <linux/mm.h>
+#include <linux/bootmem.h>
#include <linux/string.h>
#include <linux/socket.h>
#include <linux/sockios.h>
@@ -128,10 +129,11 @@
static int ip_rt_error_cost __read_mostly	= HZ;
static int ip_rt_error_burst __read_mostly	= 5 * HZ;
static int ip_rt_mtuExpires __read_mostly
test= 10 * 60 * HZ;
-statstatic int ip_rt_min_pmtu __read_mostly= 512 + 20 + 20;
+static u32 ip_rt_min_pmtu __read_mostly= 512 + 20 + 20;
static int ip_rt_min_advmsg __read_mostly= 256;

static int ip_rt_gc_timeout __read_mostly= RT_GC_TIMEOUT;
+
/*
 * Interface to generic destination cache.
 */
@@ -142,7 +144,8 @@
static struct dst_entry *ipv4_negative_advice(struct dst_entry *dst);
static void ipv4_link_failure(struct sk_buff *skb);
static void ip_rt_update_pmtu(struct dst_entry *dst, struct sock *sk,
    struct sk_buff *skb, u32 mtu);
+    struct sk_buff *skb, u32 mtu,
+    bool confirm_neigh);
static void ip_do_redirect(struct dst_entry *dst, struct sock *sk, struct sk_buff *skb);
static void ipv4_dst_destroy(struct dst_entry *dst);

@@ -274,6 +277,7 @@
     *pos = cpu+1;
     return &per_cpu(rt_cache_stat, cpu);
 }
+(*pos)++;
     return NULL;
 }
@@ -482,8 +486,10 @@
     __ipv4_confirm_neigh(dev, *__force u32 *)pkey);
 }
-
#define IP_IDENTS_SZ 2048u
-
+/* Hash tables of size 2048..262144 depending on RAM size.
+ * Each bucket uses 8 bytes.
+ */
+static u32 ip_idents_mask __read_mostly;
static atomic_t *ip_idents __read_mostly;
static u32 *ip_tstamps __read_mostly;

@@ -493,36 +499,40 @@
 */
 u32 ip_idents_reserve(u32 hash, int segs)
 {
-  u32 *p_tstamp = ip_tstamps + hash % IP_IDENTS_SZ;
-  atomic_t *p_id = ip_idents + hash % IP_IDENTS_SZ;
-  u32 old = READ_ONCE(*p_tstamp);
-  u32 now = (u32)jiffies;
-  u32 new, delta = 0;
-  do {
-        old = cmpxchg(p_tstamp, old, now);
-        if (old != now)
-            delta = prandom_u32_max(now - old);
-        old = READ_ONCE(*p_tstamp);
+  bucket, old, now = (u32)jiffies;
+  atomic_t *p_id;
+  u32 *p_tstamp;
+  u32 delta = 0;
+  bucket = hash & ip_idents_mask;
+  p_tstamp = ip_tstamps + bucket;
+  p_id = ip_idents + bucket;
+  old = READ_ONCE(*p_tstamp);

     if (old != now && cmpxchg(p_tstamp, old, now) == old)
         delta = prandom_u32_max(now - old);
-
-    /* Do not use atomic_add_return() as it makes UBSAN unhappy */
-    -do {
old = (u32)atomic_read(p_id);
new = old + delta + segs;
} while (atomic_cmpxchg(p_id, old, new) != old);

return new - segs;

/* If UBSAN reports an error there, please make sure your compiler
 * supports -fno-strict-overflow before reporting it that was a bug
 * in UBSAN, and it has been fixed in GCC-8.
 */
return atomic_add_return(segs + delta, p_id) - segs;
}
EXPORT_SYMBOL(ip_idents_reserve);

void __ip_select_ident(struct net *net, struct iphdr *iph, int segs)
{
static u32 ip_idents_hashrnd __read_mostly;

u32 hash, id;

-net_get_random_once(&ip_idents_hashrnd, sizeof(ip_idents_hashrnd));
/* Note the following code is not safe, but this is okay. */
+if (unlikely(siphash_key_is_zero(&net->ipv4.ip_id_key)))
+get_random_bytes(&net->ipv4.ip_id_key,
+sizeof(net->ipv4.ip_id_key));

-hash = jhash_3words((__force u32)iph->daddr,
+hash = siphash_3u32((__force u32)iph->daddr,
+    ip_idents_hashrnd);
+ iph->protocol,
+    &net->ipv4.ip_id_key); id = ip_idents_reserve(hash, segs);
iph->id = htons(id);
}
@@ -609,18 +619,25 @@
}

-static struct fib_nh_exception *fnhe_oldest(struct fnhe_hash_bucket *hash)
+static void fnhe_remove_oldest(struct fnhe_hash_bucket *hash)
{
-struct fib_nh_exception *fnhe, *oldest;
+struct fib_nh_exception __rcu **fnhe_p, **oldest_p;
+struct fib_nh_exception *fnhe, *oldest = NULL;

-oldest = rcu_dereference(hash->chain);
- for (fnhe = rcu_dereference(oldest->fnhe_next); fnhe;
- fnhe = rcu_dereference(fnhe->fnhe_next)) {
if (time_before(fnhe->fnhe_stamp, oldest->fnhe_stamp))
for (fnhe_p = &hash->chain; ; fnhe_p = &fnhe->fnhe_next) {
    fnhe = rcu_dereference_protected(*fnhe_p,
      lockdep_is_held(&fnhe_lock));
    if (!fnhe)
        break;
    if (!oldest ||
          time_before(fnhe->fnhe_stamp, oldest->fnhe_stamp)) {
        oldest = fnhe;
    }
    oldest_p = fnhe_p;
}
fnhe_flush_routes(oldest);
return oldest;

static inline u32 fnhe_hashfun(__be32 daddr)
static void fill_route_from_fnhe(struct rtable *rt, struct fib_nh_exception *fnhe)
{
    rt->rt_pmtu = fnhe->fnhe_pmtu;
    rt->rt_mtu_locked = fnhe->fnhe_mtu_locked;
    rt->dst.expires = fnhe->fnhe_expires;
}

if (fnhe->fnhe_gw) {
}

static void update_or_create_fnhe(struct fib_nh *nh, __be32 daddr, __be32 gw,
   u32 pmtu, unsigned long expires)
{
    struct fnhe_hash_bucket *hash;
    struct fib_nh_exception *fnhe;

    fnhe->fnhe_genid = genid;
    if (gw)
        fnhe->fnhe_gw = gw;
    -if (pmtu)
        +if (pmtu) {
            fnhe->fnhe_pmtu = pmtu;
            fnhe->fnhe_mtu_locked = lock;
        }
        fnhe->fnhe_expires = max(1UL, expires);
        /* Update all cached dsts too */
        rt = rcu_dereference(fnhe->fnhe_rth_input);
    }
if (rt)
fill_route_from_fnhe(rt, fnhe);
} else {
- if (depth > FNHE_RECLAIM_DEPTH)
-fnhe = fnhe_oldest(hash);
- else {
-fnhe = kzalloc(sizeof(*fnhe), GFP_ATOMIC);
- if (!fnhe)
- goto out_unlock;
+
+ /* Randomize max depth to avoid some side channels attacks. */
+ int max_depth = FNHE_RECLAIM_DEPTH +
+ prandom_u32_max(FNHE_RECLAIM_DEPTH);
-
-fnhe->fnhe_next = hash->chain;
-rcu_assign_pointer(hash->chain, fnhe);
+ while (depth > max_depth) {
+ fnhe_remove_oldest(hash);
+ depth--;
+
+fnhe = kzalloc(sizeof(*fnhe), GFP_ATOMIC);
+ if (!fnhe)
+ goto out_unlock;
+
+fnhe->fnhe_next = hash->chain;
+
 fnhe->fnhe_genid = genid;
 fnhe->fnhe_daddr = daddr;
 fnhe->fnhe_gw = gw;
 fnhe->fnhe_pmtu = pmtu;
-fnhe->fnhe_expires = expires;
+fnhe->fnhe_mtu_locked = lock;
+fnhe->fnhe_expires = max(1UL, expires);
+
+rcu_assign_pointer(hash->chain, fnhe);

/* Exception created; mark the cached routes for the nexthop
 * stale, so anyone caching it rechecks if this exception
@@ -786,10 +814,13 @@
 neigh_event_send(n, NULL);
 } else {
 if (fib_lookup(net, fl4, &res, 0) == 0) {
-struct fib_nh *nh = &FIB_RES_NH(res);
+struct fib_nh *nh;
+
+fib_select_path(net, &res, fl4, skb);
+nh = &FIB_RES_NH(res);
update_or_create_fnhe(nh, fl4->daddr, new_gw,
-0, jiffies + ip_rt_gc_timeout);
+0, false,
+jiffies + ip_rt_gc_timeout);
}
if (kill_route)
rt->dst.obsolete = DST_OBSOLETE_KILL;
@@ -896,13 +927,15 @@
/* No redirected packets during ip_rt_redirect_silence;
 * reset the algorithm.
 */
- if (time_after(jiffies, peer->rate_last + ip_rt_redirect_silence))
+ if (time_after(jiffies, peer->rate_last + ip_rt_redirect_silence)) {
peer->rate_tokens = 0;
+peer->n_redirects = 0;
+}
/* Too many ignored redirects; do not send anything
 * set dst.rate_last to the last seen redirected packet.
 */
- if (peer->rate_tokens >= ip_rt_redirect_number) {
+ if (peer->n_redirects >= ip_rt_redirect_number) {
peer->rate_last = jiffies;
 goto out_put_peer;
}
@@ -910,18 +943,18 @@
/* Check for load limit; set rate_last to the latest sent
 * redirect.
 */
- if (peer->rate_tokens == 0 ||
+ if (peer->n_redirects == 0 ||
   time_after(jiffies,
   (peer->rate_last +
   -(ip_rt_redirect_load << peer->rate_tokens)))) {
+ (ip_rt_redirect_load << peer->n_redirects)))) {
 __be32 gw = rt_nexthop(rt, ip_hdr(skb)->daddr);

icmp_send(skb, ICMP_REDIRECT, ICMP_REDIR_HOST, gw);
peer->rate_last = jiffies;
+++peer->rate_tokens;
++++peer->n_redirects;
#endif CONFIG_IP_ROUTE_VERBOSE
if (log_martians &&
- peer->rate_tokens == ip_rt_redirect_number)
+ peer->n_redirects == ip_rt_redirect_number)
net_warn_ratelimited("host %pI4/if%d ignores redirects for %pI4 to %pI4\n",
 &ip_hdr(skb)->saddr, inet_iif(skb),
 &ip_hdr(skb)->daddr, &gw);
static void __ip_rt_update_pmtu(struct rtable *rt, struct flowi4 *fl4, u32 mtu) {
    struct dst_entry *dst = &rt->dst;
    +struct net *net = dev_net(dst->dev);
    +u32 old_mtu = ipv4_mtu(dst);
    struct fib_result res;
    +bool lock = false;

    -if (dst_metric_locked(dst, RTAX_MTU))
    +if (ip_mtu_locked(dst))
        return;

    -if (ipv4_mtu(dst) < mtu)
    +if (old_mtu < mtu)
        return;

    -if (mtu < ip_rt_min_pmtu)
    -mtu = ip_rt_min_pmtu;
    +if (mtu < ip_rt_min_pmtu) {
        +lock = true;
        +mtu = min(old_mtu, ip_rt_min_pmtu);
    +}

    -if (rt->rt_pmtu == mtu &&
    +if (rt->rt_pmtu == mtu && !lock &&
        time_before(jiffies, dst->expires - ip_rt_mtu_expires / 2))
        return;

    rcu_read_lock();
    -if (fib_lookup(dev_net(dst->dev), fl4, &res, 0) == 0) {
        -struct fib_nh *nh = &FIB_RES_NH(res);
        +if (fib_lookup(net, fl4, &res, 0) == 0) {
            +struct fib_nh *nh;

            -update_or_create_fnhe(nh, fl4->daddr, 0, mtu,
            +fib_select_path(net, &res, fl4, NULL);
            +nh = &FIB_RES_NH(res);
            +update_or_create_fnhe(nh, fl4->daddr, 0, mtu, lock,
                jiffies + ip_rt_mtu_expires);
        }
    rcu_read_unlock();
    }

static void ip_rt_update_pmtu(struct dst_entry *dst, struct sock *sk,
    - struct sk_buff *skb, u32 mtu)
    + struct sk_buff *skb, u32 mtu,
    + bool confirm_neigh)
```c
static void ipv4_send_dest_unreach(struct sk_buff *skb)
{
+struct ip_options opt;
+int res;
+
+/* Recompile ip options since IPCB may not be valid anymore.
+ * Also check we have a reasonable ipv4 header.
+ */
+if (!pskb_network_may_pull(skb, sizeof(struct iphdr)) ||
+    ip_hdr(skb)->version != 4 || ip_hdr(skb)->ihl < 5)
+return;
+
+memset(&opt, 0, sizeof(opt));
+if (ip_hdr(skb)->ihl > 5) {
+    if (!pskb_network_may_pull(skb, ip_hdr(skb)->ihl * 4))
+        return;
+    opt.optlen = ip_hdr(skb)->ihl * 4 - sizeof(struct iphdr);
+}
+rcu_read_lock();
+res = __ip_options_compile(dev_net(skb->dev), &opt, skb, NULL);
+rcu_read_unlock();
+
+if (res)
+return;
+
+__icmp_send(skb, ICMP_DEST_UNREACH, ICMP_HOST_UNREACH, 0, &opt);
+
+
static void ipv4_link_failure(struct sk_buff *skb)
{
 struct rtable *rt;
-
icmp_send(skb, ICMP_DEST_UNREACH, ICMP_HOST_UNREACH, 0);
+ipv4_send_dest_unreach(skb);

 rt = skb_rtable(skb);
 if (rt)
 @ @ -1273,7 +1342,7 @ @

 mtu = READ_ONCE(dst->dev->mtu);
```
-if (unlikely(dst_metric_locked(dst, RTAX_MTU))) {
+if (unlikely(ip_mtu_locked(dst))) {
  if (rt->rtUses_gateway && mtu > 576)
    mtu = 576;
}
@@ -1283,6 +1352,40 @@
return mtu - lwtunnel_headroom(dst->lwtstate, mtu);
}

+static void ip_del_fnhe(struct fib_nh *nh, __be32 daddr)
+{
+  struct fnhe_hash_bucket *hash;
+  struct fib_nh_exception *fnhe, __rcu **fnhe_p;
+  u32 hval = fnhe_hashfun(daddr);
+  +spin_lock_bh(&fnhe_lock);
+  +
+  +hash = rcu_dereference_protected(nh->nh_exceptions,
+      lockdep_is_held(&fnhe_lock));
+  +hash += hval;
+  +fnhe_p = &hash->chain;
+  +fnhe = rcu_dereference_protected(*fnhe_p, lockdep_is_held(&fnhe_lock));
+  +while (fnhe) {
+    if (fnhe->fnhe_daddr == daddr) {
+      rcu_assign_pointer(*fnhe_p, rcu_dereference_protected(
+          fnhe->fnhe_next, lockdep_is_held(&fnhe_lock)));
+      /* set fnhe_daddr to 0 to ensure it won't bind with
+         * new dsts in rt_bind_exception().
+      */
+      fnhe->fnhe_daddr = 0;
+      fnhe_flush_routes(fnhe);
+      kfree_rcu(fnhe, rcu);
+      break;
+    }
+    fnhe_p = &fnhe->fnhe_next;
+    fnhe = rcu_dereference_protected(fnhe->fnhe_next,
+          lockdep_is_held(&fnhe_lock));
+  +}
+  +spin_unlock_bh(&fnhe_lock);
+}
+
+static struct fib_nh_exception *find_exception(struct fib_nh *nh, __be32 daddr)
+{
  struct fnhe_hash_bucket *hash = rcu_dereference(nh->nh_exceptions);
  @@ -1296,8 +1399,14 @@

for (fnhe = rcu_dereference(hash[hval].chain); fnhe;
    fnhe = rcu_dereference(fnhe->fnhe_next)) {
    if (fnhe->fnhe_daddr == daddr)
        if (fnhe->fnhe_daddr == daddr) {
            if (fnhe->fnhe_expires &&
                time_after(jiffies, fnhe->fnhe_expires)) {
                ip_del_fnhe(nh, daddr);
                break;
            }
        return fnhe;
    }
return NULL;
}
@@ -1368,7 +1477,7 @@
prev = cmpxchg(p, orig, rt);
if (prev == orig) {
    if (orig) {
        dst_dev_put(&orig->dst);
    dst_release(&orig->dst);
    }
} else {
@@ -1386,7 +1495,7 @@
static DEFINE_PER_CPU_ALIGNED(struct uncached_list, rt_uncached_list);

-static void rt_add_uncached_list(struct rtable *rt)
+void rt_add_uncached_list(struct rtable *rt)
{
    struct uncached_list *ul = raw_cpu_ptr(&rt_uncached_list);

    spin_unlock_bh(&ul->lock);
}

-static void ipv4_dst_destroy(struct dst_entry *dst)
+void rt_del_uncached_list(struct rtable *rt)
{
    struct dst_metrics *p = (struct dst_metrics *)DST_METRICS_PTR(dst);
    struct rtable *rt = (struct rtable *) dst;
    -
    -if (p != &dst_default_metrics && refcount_dec_and_test(&p->refcnt))
    -kfree(p);
    -
    if (!list_empty(&rt->rt_uncached)) {
        struct uncached_list *ul = rt->rt_uncached_list;
+static void ipv4_dst_destroy(struct dst_entry *dst)
+{
+struct dst_metrics *p = (struct dst_metrics *)DST_METRICS_PTR(dst);
+struct rtable *rt = (struct rtable *)dst;
+if (p != &dst_default_metrics && refcount_dec_and_test(&p->refcnt))
+kfree(p);
+rt_del_uncached_list(rt);
+
+void rt_flush_dev(struct net_device *dev)
+
+
struct net *net = dev_net(dev);
rt->rt_is_input = 0;
rt->rt_iif = 0;
rt->rt_pmtu = 0;
rt->rt_mtu_locked = 0;
rt->rt_gateway = 0;
rt->rt_uses_gateway = 0;
rt->rt_table_id = 0;
@end

static void ip_del_fnhe(struct fib_nh *nh, __be32 daddr)
-
-
struct fnhe_hash_bucket *hash;
-struct fib_nh_exception *fnhe, __rcu **fnhe_p;
-u32 hval = fnhe_hashfun(daddr);
-
-spin_lock_bh(&fnhe_lock);
-
-hash = rcu_dereference_protected(nh->nh_exceptions,
- lockdep_is_held(&fnhe_lock));
-hash += hval;
-
-fnhe_p = &hash->chain;
-fnhe = rcu_dereference_protected(*fnhe_p, lockdep_is_held(&fnhe_lock));
-while (fnhe) {
-if (fnhe->fnhe_daddr == daddr) {
-rcu_assign_pointer(*fnhe_p, rcu_dereference_protected(}
-fnhe->fnhe_next, lockdep_is_held(&fnhe_lock)));
- fnhe_flush_routes(fnhe);
- kfree_rcu(fnhe, rcu);
- break;
- }
- fnhe_p = &fnhe->fnhe_next;
- fnhe = rcu_dereference_protected(fnhe->fnhe_next,
- lockdep_is_held(&fnhe_lock));
- }
-
- spin_unlock_bh(&fnhe_lock);
- }
-
static void set_lwt_redirect(struct rtable *rth)
{
    if (lwtunnel_output_redirect(rth->dst.lwtstate)) {
        fnhe = find_exception(&FIB_RES_NH(*res), daddr);
        if (do_cache) {
            if (fnhe) {
                rth = rcu_dereference(fnhe->fnhe_rth_input);
                if (rth && rth->dst.expires &&
                    time_after(jiffies, rth->dst.expires)) {
                    ip_del_fnhe(&FIB_RES_NH(*res), daddr);
                    fnhe = NULL;
                } else {
                    goto rt_cache;
                }
            }
            -rth = rcu_dereference(FIB_RES_NH(*res).nh_rth_input);
            -rt_cache:
            +else
            +rth = rcu_dereference(FIB_RES_NH(*res).nh_rth_input);
            if (rt_cache_valid(rth)) {
                skb_dst_set_noref(skb, &rth->dst);
                goto out;
            }
        }

        skb_flow_dissect_flow_keys(skb, &keys, flag);
        +hash_keys.control.addr_type = FLOW_DISSECTOR_KEY_IPV4_ADDRS;
        hash_keys.addrs.v4addrs.src = keys.addrs.v4addrs.src;
        hash_keys.addrs.v4addrs.dst = keys.addrs.v4addrs.dst;
        hash_keys.ports.src = keys.ports.src;
@@ -1869,6 +1946,19 @@
+        return __mkroute_input(skb, res, in_dev, daddr, saddr, tos);
+
+/* get device for dst_alloc with local routes */
+static struct net_device *ip_rt_get_dev(struct net *net,
+                      const struct fib_result *res)
+{
+    struct fib_nh *nh = res->fi ? &FIB_RES_NH(*res) : NULL;
+    struct net_device *dev = NULL;
+    if (nh)
+        dev = l3mdev_master_dev_rcu(nh->nh_dev);
+    return dev ? : net->loopback_dev;
+}
+
/*
* NOTE. We drop all the packets that has local source
* addresses, because every properly looped back packet
@@ -2006,7 +2096,7 @@
}
}

-rth = rt_dst_alloc(l3mdev_master_dev_rcu(dev) ? : net->loopback_dev,
+rth = rt_dst_alloc(ip_rt_get_dev(net, res),
    flags | RTCF_LOCAL, res->type,
    IN_DEV_CONF_GET(in_dev, NOPOLICY), false, do_cache);
if (!rth)
@@ -2110,12 +2200,13 @@
    int our = 0;
    int err = -EINVAL;

-if (in_dev)
-    our = ip_check_mc_rcu(in_dev, daddr, saddr,
-        ip_hdr(skb)->protocol);
+if (!in_dev)
+    return err;
+    our = ip_check_mc_rcu(in_dev, daddr, saddr,
+        ip_hdr(skb)->protocol);

    /* check l3 master if no match yet */
    -if ((!in_dev || !our) && netif_is_l3_slave(dev)) {
+if (!our && netif_is_l3_slave(dev)) {
        struct in_device *l3_in_dev;
        l3_in_dev = __in_dev_get_rcu(skb->dev);
        l3_in_dev = __in_dev_get_rcu(skb->dev);
@@ -2201,39 +2292,31 @@


* the loopback interface and the IP_PKTINFO ipi_ifindex will
* be set to the loopback interface as well.
*/
-fi = NULL;
+do_cache = false;
}

fnhe = NULL;
do_cache &= fi != NULL;
-*fi = NULL;
+fi = NULL;
+do_cache &= fi != NULL;
-if (do_cache) {
+if (fi) {
struct rtable __rcu **prth;
struct fib_nh *nh = &FIB_RES_NH(*res);

fnhe = find_exception(nh, fl4->daddr);
+if (!do_cache)
+goto add;
if (fnhe) {
+prth = &fnhe->fnhe_rth_output;
-prth = rcu_dereference(*prth);
+if (!do_cache)
+goto rt_cache;
-} else {
-} else {
+if (unlikely(fl4->flowi4_flags &
+    FLOWI_FLAG_KNOWN_NH &&
+    !(nh->nh_gw &&
+    nh->nh_scope == RT_SCOPE_LINK))) {
+do_cache = false;
+goto add;
} +prth = raw_cpu_ptr(nh->nh_pcpu_rth_output);
} -
-if (unlikely(fl4->flowi4_flags &
-    FLOWI_FLAG_KNOWN_NH &&
-    !(nh->nh_gw &&
-    nh->nh_scope == RT_SCOPE_LINK))) {
-do_cache = false;
-goto add;
-}
-prth = raw_cpu_ptr(nh->nh_pcpu_rth_output);
+prth = rcu_dereference(*prth);
-rt_cache:
if (rt_cache_valid(rth) && dst_hold_safe(&rth->dst))
    return rth;
}  
@@ -2283,13 +2366,14 @@
    struct sk_buff *skb)
{
    __u8 tos = RT_FL_TOS(fl4);
-   struct fib_result res;
+   struct fib_result res = {
+   .type = RTN_UNSPEC,
+   .fi = NULL,
+   .table = NULL,
+   .tclassid = 0,
+   };
    struct rtable *rth;

    -res.tclassid = 0;
    -res.fi = NULL;
    -res.table = NULL;
    -
    fl4->flowi4_iif = LOOPBACK_IFINDEX;
    fl4->flowi4_tos = tos & IPTOS_RT_MASK;
    fl4->flowi4_scope = ((tos & RTO_ONLINK) ?
@@ -2311,14 +2395,17 @@
    if (fl4->saddr) {
-        rth = ERR_PTR(-EINVAL);
+        int err;
+        if (ipv4_is_multicast(fl4->saddr) ||
+            ipv4_is_lbcast(fl4->saddr) ||
+            ipv4_is_zeronet(fl4->saddr)) {
+        rth = ERR_PTR(-EINVAL);
        goto out;
+        }
+        err = -ENETUNREACH;
    }
    /* I removed check for oif == dev->oif here. It was wrong for two reasons:
    */
    fib_select_path(net, res, fl4, skb);
    dev_out = FIB_RES_DEV(*res);
- fl4->flowi4_oif = dev_out->ifindex;

make_route:
rth = __mkroute_output(res, fl4, orig_oif, dev_out, flags);
@@ -2486,7 +2571,8 @@
}

static void ipv4_rt_blackhole_update_pmtu(struct dst_entry *dst, struct sock *sk,
- struct sk_buff *skb, u32 mtu)
+ struct sk_buff *skb, u32 mtu,
+ bool confirm_neigh)
{
}
@@ -2532,6 +2618,7 @@
rt->rt_is_input = ort->rt_is_input;
rt->rt_iif = ort->rt_iif;
rt->rt_pmtu = ort->rt_pmtu;
+rt->rt_mtu_locked = ort->rt_mtu_locked;

rt->rt_genid = rt_genid_ipv4(net);
rt->rt_flags = ort->rt_flags;
@@ -2555,10 +2642,12 @@
if (IS_ERR(rt))
    return rt;

-if (flp4->flowi4_proto)
+if (flp4->flowi4_proto) {
+flp4->flowi4_oif = rt->dst.dev->ifindex;
    rt = (struct rtable *)xfrm_lookup_route(net, &rt->dst,
        flowi4_to_flowi(flp4),
        sk, 0);
+}

    return rt;
}
@@ -2634,6 +2723,8 @@
memcpy(metrics, dst_metrics_ptr(&rt->dst), sizeof(metrics));
if (rt->rt_pmtu && expires)
    metrics[RTAX_MTU - 1] = rt->rt_pmtu;
+if (rt->rt_mtu_locked && expires)
+    metrics[RTAX_LOCK - 1] |= BIT(RTAX_MTU);
if (rtnetlink_put_metrics(skb, metrics) < 0)
goto nla_put_failure;
@@ -2736,7 +2827,7 @@
memset(&fl4, 0, sizeof(fl4));
fl4.daddr = dst;
fl4.saddr = src;
-fl4.flowi4_tos = rtm->rtm_tos;
+fl4.flowi4_tos = rtm->rtm_tos & IPTOS_RT_MASK;
fl4.flowi4_oif = tb[RTA_OIF] ? nla_get_u32(tb[RTA_OIF]) : 0;
fl4.flowi4_mark = mark;
fl4.flowi4_uid = uid;
@@ -2755,8 +2846,9 @@
skb->protocol= htons(ETH_P_IP);
skb->dev= dev;
skb->mark= mark;
-err = ip_route_input_rcu(skb, dst, src, rtm->rtm_tos,
-dev, &res);
+err = ip_route_input_rcu(skb, dst, src,
+rtm->rtm_tos & IPTOS_RT_MASK, dev,
+&res);

rt = skb_rtable(skb);
if (err == 0 && rt->dst.error)
@@ -2819,6 +2911,7 @@
static int ip_rt_gc_interval __read_mostly  = 60 * HZ;
static int ip_rt_gc_min_interval __read_mostly= HZ / 2;
static int ip_rt_gc_elasticity __read_mostly= 8;
+static int ip_min_valid_pmtu __read_mostly= IPV4_MIN_MTU;

static int ipv4_sysctl_rtcache_flush(struct ctl_table *__ctl, int write,
   void __user *buffer,
@@ -2934,7 +3027,8 @@
   .maxlen= sizeof(int),
   .mode= 0644,
   -.proc_handler= proc_dointvec,
+  .proc_handler= proc_dointvec_minmax,
   +.extra1= &ip_min_valid_pmtu,
   },
   {
   .procname= "min_adv_mss",
@@ -3043,17 +3137,25 @@
int __init ip_rt_init(void)
{
  +void *idents_hash;
  int cpu;

- ip_idents = kmalloc(IP_IDENTS_SZ * sizeof(*ip_idents), GFP_KERNEL);
- if (!ip_idents)
+ if (ip_idents)
-    panic("IP: failed to allocate ip_idents\n");
-
- prandom_bytes(ip_idents, IP_IDENTS_SZ * sizeof(*ip_idents));

- ip_tstamps = kcalloc(IP_IDENTS_SZ, sizeof(*ip_tstamps), GFP_KERNEL);
- if (!ip_tstamps)
  - panic("IP: failed to allocate ip_tstamps\n");

+ /* For modern hosts, this will use 2 MB of memory */
+ idents_hash = alloc_large_system_hash("IP idents",
+   sizeof(*ip_idents) + sizeof(*ip_tstamps),
+   0,
+   16, /* one bucket per 64 KB */
+   HASH ZERO,
+   NULL,
+   &ip_idents_mask,
+   2048,
+   256*1024);
+
+ ip_idents = idents_hash;
+
+ prandom_bytes(ip_idents, (ip_idents_mask + 1) * sizeof(*ip_idents));
+
+ ip_tstamps = idents_hash + (ip_idents_mask + 1) * sizeof(*ip_idents);

for_each_possible_cpu(cpu) {
  struct uncached_list *ul = &per_cpu(rt_uncached_list, cpu);
  inet_csk_reqsk_queue_add(sk, req, child);
  if (!inet_csk_reqsk_queue_add(sk, req, child)) {
    bh_unlock_sock(child);
    sock_put(child);
    child = NULL;
    reqsk_put(req);
  } else {
    reqsk_free(req);
  }
} else {
  reqsk_put(req);
}

int mss;
int full_space, mss;
struct rtable *rt;
__u8 rcv_wscale;
struct flowi4 fl4;
@@ -384,8 +389,13 @@
 /* Try to redo what tcp_v4_send_synack did. */
 req->rsk_window_clamp = tp->window_clamp ?:dst_metric(&rt->dst, RTAX_WINDOW);
 /* limit the window selection if the user enforce a smaller rx buffer */
+full_space = tcp_full_space(sk);
+/* limit the window selection if the user enforce a smaller rx buffer */
+if (sk->sk_userlocks & SOCK_RCVBUF_LOCK &&
+ (req->rsk_window_clamp > full_space || req->rsk_window_clamp == 0))
+req->rsk_window_clamp = full_space;
 -tcp_select_initial_window(sk, tcp_full_space(sk), req->mss,
 +tcp_select_initial_window(sk, full_space, req->mss,
 &req->rsk_rcv_wnd, &req->rsk_window_clamp,
 ireq->wscale_ok, &rcv_wscale,
 dst_metric(&rt->dst, RTAX_INITRWND));
--- linux-4.15.0.orig/net/ipv4/sysctl_net_ipv4.c
+++ linux-4.15.0/net/ipv4/sysctl_net_ipv4.c
@@ -38,6 +38,8 @@
 static int tcp_local_port_range_max[] = { 65535, 65535 }; 
 static int tcp_adv_win_scale_min = -31;
 static int tcp_adv_win_scale_max = 31;
+static int tcp_min_snd_mss_min = TCP_MIN_SND_MSS;
+static int tcp_min_snd_mss_max = 65535;
 static int ip_privileged_port_min;
 static int ip_privileged_port_max = 65535;
 static int ip_ttl_min = 1;
 @@ -46,6 +48,7 @@
 if (write && ret == 0) {
 low = make_kgid(user_ns, urange[0]);
 high = make_kgid(user_ns, urange[1]);
- if (!gid_valid(low) || !gid_valid(high) ||
- (urange[1] < urange[0]) || gid_lt(high, low)) {
+ if (!gid_valid(low) ||!gid_valid(high))
+ return -EINVAL;
+ if (urange[1] < urange[0] || gid_lt(high, low)) {
 low = make_kgid(&init_user_ns, 1);
 high = make_kgid(&init_user_ns, 0);
 }
 @@ -263,8 +267,9 @@
ipv4.sysctl_tcp_fastopen);
struct ctl_table tbl = { .maxlen = (TCP_FASTOPEN_KEY_LENGTH * 2 + 10) };
struct tcp_fastopen_context *ctxt;
-int ret;
u32 user_key[4]; /* 16 bytes, matching TCP_FASTOPEN_KEY_LENGTH */
+__le32 key[4];
+int ret, i;

tbl.data = kmalloc(tbl.maxlen, GFP_KERNEL);
if (!tbl.data)
@@ -273,11 +278,14 @@
rcu_read_lock();
ctxt = rcu_dereference(net->ipv4.tcp_fastopen_ctx);
if (ctxt)
-memcpy(user_key, ctxt->key, TCP_FASTOPEN_KEY_LENGTH);
++memcpy(key, ctxt->key, TCP_FASTOPEN_KEY_LENGTH);
else
-memset(user_key, 0, sizeof(user_key));
++memset(key, 0, sizeof(key));
rcu_read_unlock();

+for (i = 0; i < ARRAY_SIZE(key); i++)
+user_key[i] = le32_to_cpu(key[i]);
+
+snprintf(tbl.data, tbl.maxlen, "%08x-%08x-%08x-%08x",
user_key[0], user_key[1], user_key[2], user_key[3]);
ret = proc_dostring(&tbl, write, buffer, lenp, ppos);
@@ -288,13 +296,17 @@
ret = -EINVAL;
goto bad_key;
}
-tcp_fastopen_reset_cipher(net, NULL, user_key,
+
+tcp_fastopen_reset_cipher(net, NULL, key,
TCP_FASTOPEN_KEY_LENGTH);
}

bad_key:
pr_debug("proc FO key set 0x%x-%x-%x-%x <- 0x%s: %u\n",
-user_key[0], user_key[1], user_key[2], user_key[3],
+user_key[0], user_key[1], user_key[2], user_key[3],
(char *)tbl.data, ret);
kfree(tbl.data);
return ret;
@@ -545,7 +557,9 @@
.data = &init_net.ipv4.sysctl_icmp_echo_ignore_all,
.maxlen = sizeof(int),
.mode = 0644,
.proc_handler = proc_dointvec
+proc_handler = proc_dointvec_minmax,
.extra1 = &zero,
.extra2 = &one_day_secs
},
{
.procname = "icmp_echo_ignore_broadcasts",
.proc_handler = proc_dointvec,
}
{
+procname = "tcp_min_snd_mss",
+data = &init_net.ipv4.sysctl_tcp_min_snd_mss,
.maxlen = sizeof(int),
+mode = 0644,
+proc_handler = proc_dointvec_minmax,
+extra1 = &tcp_min_snd_mss_min,
+extra2 = &tcp_min_snd_mss_max,
+
+
+{
.procname = "tcp_probe_threshold",
.data = &init_net.ipv4.sysctl_tcp_probe_threshold,
.maxlen = sizeof(int),
--- linux-4.15.0.orig/net/ipv4/tcp.c
+++ linux-4.15.0/net/ipv4/tcp.c
@@ -327,7 +327,7 @@
{
unsigned long val;

@if (tcp_memory_pressure)
+if (READ_ONCE(tcp_memory_pressure))
return;
val = jiffies;

@@ -342,7 +342,7 @@
{
unsigned long val;

@if (!tcp_memory_pressure)
+if (!READ_ONCE(tcp_memory_pressure))
return;
val = xchg(&tcp_memory_pressure, 0);
if (val)
@@ -590,7 +590,7 @@
}
/* This barrier is coupled with smp_wmb() in tcp_reset */
smp_rmb();
- if (sk->sk_err || skb_queue_empty(&sk->sk_error_queue))
+ if (sk->sk_err || skb_queue_empty_lockless(&sk->sk_error_queue))
 mask |= POLLERR;

return mask;
@@ -692,7 +692,7 @@
 {
 return skb->len < size_goal &&
     sock_net(sk)->ipv4.sysctl_tcp_autocorking &&
- skb != tcp_write_queue_head(sk) &&
+ !tcp_rtx_queue_empty(sk) &&
     refcount_read(&sk->sk_wmem_alloc) > skb->truesize;
 }
@@ -930,6 +930,22 @@
 return mss_now;
 }

+/* In some cases, both sendpage() and sendmsg() could have added
+ * an skb to the write queue, but failed adding payload on it.
+ * We need to remove it to consume less memory, but more
+ * importantly be able to generate EPOLLOUT for Edge Trigger epoll()
+ * users.
+ */
+static void tcp_remove_empty_skb(struct sock *sk, struct sk_buff *skb)
+{
+ if (skb && !skb->len &&
+ TCP_SKB_CB(skb)->end_seq == TCP_SKB_CB(skb)->seq) {
+ tcp_unlink_write_queue(skb, sk);
+ tcp_check_send_head(sk, skb);
+ sk_wmem_free_skb(sk, skb);
+ }
+}
+
ssize_t do_tcp_sendpages(struct sock *sk, struct page *page, int offset,
 size_t size, int flags)
{
@@ -1050,12 +1066,12 @@
 return copied;

do_error:
+tcp_remove_empty_skb(sk, tcp_write_queue_tail(sk));
 if (copied)
 goto out;
 out_err:
/* make sure we wake any epoll edge trigger waiter */
-if (unlikely(skb_queue_len(&sk->sk_write_queue) == 0 &
-   err == -EAGAIN)) {
+if (unlikely(tcp_rtx_and_write_queues_empty(sk) &
   err == -EAGAIN)) {
   sk->sk_write_space(sk);
tcp_chrono_stop(sk, TCP_CHRONO_SNDBUF_LIMITED);
}
@@ -1193,8 +1209,8 @@
flags = msg->msg_flags;

-     !sk->sk_state) {
+   if (flags & MSG_ZEROCOPY && size) {
+      if (flags & MSG_ZEROCOPY && size && sock_flag(sk, SOCK_ZEROCOPY)) {
         if ((1 << sk->sk_state) & ~(TCPF_ESTABLISHED | TCPF_CLOSE_WAIT)) {
            err = -EINVAL;
goto out_err;
         }
@@ -1210,7 +1226,8 @@
uarg->zerocopy = 0;
       }
}

-   skb = tcp_write_queue_tail(skb);
+skb = tcp_write_queue_tail(skb);
do fault:
-   if (!sk->len) {
-       tcp_unlink_write_queue(skb, sk);
-       /* It is the one place in all of TCP, except connection
-        * reset, where we can be unlinking the send_head.
-        */
-       tcp_check_send_head(skb, sk);
-       sk_wmem_free_skb(skb, sk);
-   }
+do_error:
tcp_remove_empty_skb(sk, skb);

-   do_error:
+   if (copied + copied_syn)
go out;
go out_err:
sock_zerocopy_put_abort(uarg);
err = sk_stream_error(sk, flags, err);
/* make sure we wake any epoll edge trigger waiter */
-if (unlikely(skb_queue_len(&sk->sk_write_queue) == 0 &&
  err == -EAGAIN)) {
+if (unlikely(tcp_rtx_and_write_queues_empty(sk) && err == -EAGAIN)) {
  sk->sk_write_space(sk);
tcp_chrono_stop(sk, TCP_CHRONO_SNDBUF_LIMITED);
}
@@ -1798,7 +1808,7 @@
if (unlikely(flags & MSG_ERRQUEUE))
  return inet_recv_error(sk, msg, len, addr_len);

-if (sk_can_busy_loop(sk) && skb_queue_empty(&sk->sk_receive_queue) &&
+if (sk_can_busy_loop(sk) && skb_queue_empty_lockless(&sk->sk_receive_queue) &&
    (sk->sk_state == TCP_ESTABLISHED))
  sk_busy_loop(sk, nonblock);

@@ -1859,7 +1869,7 @@
* shouldn't happen.
*/
if (WARN(before(*seq, TCP_SKB_CB(skb)->seq),
  "recvmsg bug: copied %X seq %X rcvnxt %X fl %X\n",
+ "TCP recvmsg seq # bug: copied %X, seq %X, rcvnxt %X, fl %X\n",
  *seq, TCP_SKB_CB(skb)->seq, tp->rcv_nxt,
  flags))
  break;
@@ -1874,7 +1884,7 @@
if (TCP_SKB_CB(skb)->tcp_flags & TCPHDR_FIN)
goto found_fin_ok;
WARN(!flags & MSG_PEEK),
  "recvmsg bug 2: copied %X seq %X rcvnxt %X fl %X\n",
+ "TCP recvmsg seq # bug 2: copied %X, seq %X, rcvnxt %X, fl %X\n",
  *seq, TCP_SKB_CB(skb)->seq, tp->rcv_nxt, flags);
}
@@ -1988,13 +1998,15 @@
tp->urg_data = 0;
tcp_fast_path_check(sk);
}
-if (used + offset < skb->len)
-continue;

if (TCP_SKB_CB(skb)->has_rxtstamp) {
  tcp_update_recv_tstamps(skb, &tss);
  has_tss = true;
}
+}
+if (used + offset < skb->len)
+continue;
+
+if (TCP_SKB_CB(skb)->tcp_flags & TCPHDR_FIN)
goto found_fin_ok;
if (!flags & MSG_PEEK)
@@ -2241,16 +2253,10 @@
sock_hold(sk);
sock_orphan(sk);

-/* It is the last release_sock in its life. It will remove backlog. */
-release_sock(sk);
- 
- 
-/* Now socket is owned by kernel and we acquire BH lock 
-* to finish close. No need to check for user refs. 
-* /
local_bh_disable();
bh_lock_sock(sk);
-WARN_ON(sock_owned_by_user(sk));
+/* remove backlog if any, without releasing ownership. */
+__release_sock(sk);

percpu_counter_inc(sk->sk_prot->orphan_count);
@@ -2319,6 +2325,7 @@
out:
bh_unlock_sock(sk);
local_bh_enable();
+release_sock(sk);
sock_put(skb);
} 
EXPORT_SYMBOL(tcp_close);
@@ -2336,6 +2343,7 @@
{
struct rb_node *p = rb_first(&sk->tcp_rtx_queue);
@@ -2361,6 +2369,8 @@
INIT_LIST_HEAD(&tcp_sk(sk)->tsorted_sent_queue);
INIT_LIST_HEAD(&tcp_sk(skb)->tsorted_sent_queue);

int tcp_disconnect(struct sock *sk, int flags)
@@ -2407,16 +2417,19 @@
tp->write_seq += tp->max_window + 2;
if (tp->write_seq == 0)
    tp->write_seq = 1;
-    icsk->icsk_backoff = 0;
    tp->snd_cwnd = 2;
-    tcp->packets_out = 0;
    tp->snd_ssthresh = TCP_INFINITE_SSTHRESH;
    tp->snd_cwnd_cnt = 0;
    tp->window_clamp = 0;
+    tp->delivered = 0;
+    if (icsk->icsk_ca_ops->release)
+        icsk->icsk_ca_ops->release(sk);
+    memset(icsk->icsk_ca_priv, 0, sizeof(icsk->icsk_ca_priv));
    tcp_set_ca_state(sk, TCP_CA_Open);
    tp->is_sack_reneg = 0;
    tcp_clear_retrans(tp);
+    tp->total_retrans = 0;
    inet_csk_delack_init(sk);
/* Initialize rcv_mss to TCP_MIN_MSS to avoid division by 0
   * issue in _tcp_select_window()
@@ -2427,6 +2440,12 @@
dst_release(sk->sk_rx_dst);
    sk->sk_rx_dst = NULL;
    tcp_saved_syn_free(tp);
+    tp->segs_in = 0;
+    tp->segs_out = 0;
+    tp->bytes_acked = 0;
+    tp->bytes_received = 0;
+    tp->data_segs_in = 0;
+    tp->data_segs_out = 0;

/* Clean up fastopen related fields */
tcp_free_fastopen_req(tp);
@@ -2434,6 +2453,12 @@

WARN_ON(inet->inet_num && !icsk->icsk_bind_hash);

+    if (sk->sk_frag.page) {
+        put_page(sk->sk_frag.page);
+        sk->sk_frag.page = NULL;
+        sk->sk_frag.offset = 0;
+    }
+    sk->sk_error_report(sk);
return err;
}
@@ -2553,7 +2578,9 @@
    name[val] = 0;

lock_sock(sk);
-err = tcp_set_congestion_control(sk, name, true, true);
+err = tcp_set_congestion_control(sk, name, true, true,
+    ns_capable(sock_net(sk)->user_ns, CAP_NET_ADMIN));
release_sock(sk);
return err;

@@ -2660,21 +2687,30 @@
case TCP_REPAIR_QUEUE:
    if (!tp->repair)
        err = -EPERM;
-    else if (val < TCP_QUEUES_NR)
-        tp->repair_queue = val;
+    else if ((unsigned int)val < TCP_QUEUES_NR)
        tp->repair_queue = val;
    else
        err = -EINVAL;
    break;

case TCP_QUEUE_SEQ:
    if (sk->sk_state != TCP_CLOSE)
        err = -EPERM;
-    else if (tp->repair_queue == TCP_SEND_QUEUE)
-        tp->write_seq = val;
-    else if (tp->repair_queue == TCP_RECV_QUEUE)
-        tp->rcv_nxt = val;
-    else
+    } else if (tp->repair_queue == TCP_SEND_QUEUE) {
+        if (!tcp_rtx_queue_empty(sk))
+            err = -EPERM;
+        else
+            WRITE_ONCE(tp->write_seq, val);
+    } else if (tp->repair_queue == TCP_RECV_QUEUE) {
+        if (tp->rcv_nxt != tp->copied_seq) {
+            err = -EPERM;
+        } else {
+            WRITE_ONCE(tp->rcv_nxt, val);
+            WRITE_ONCE(tp->copied_seq, val);
+        }
+    } else {
        err = -EINVAL;
    }
break;

case TCP_REPAIR_OPTIONS:
    @@ -2800,7 +2836,6 @@
#ifdef CONFIG_TCP_MD5SIG
    case TCP_MD5SIG:
    case TCP_MD5SIG_EXT:
-/# Read the IP->Key mappings from userspace */
    err = tp->af_specific->md5_parse(sk, optname, optval, optlen);
    break;
#endif
@@ -3466,10 +3501,13 @@
int tcp_md5_hash_key(struct tcp_md5sig_pool *hp, const struct tcp_md5sig_key *key)
{
    +u8 keylen = READ_ONCE(key->keylen); /* paired with WRITE_ONCE() in tcp_md5_do_add */
    struct scatterlist sg;
-	sg_init_one(&sg, key->key, keylen);
-    ahash_request_set_crypt(hp->md5_req, &sg, NULL, keylen);
+    sg_init_one(&sg, keylen);
+    ahash_request_set_crypt(hp->md5_req, &sg, NULL, keylen);
+    /* tcp_md5_do_add() might change key->key under us */
    return crypto_ahash_update(hp->md5_req);
}
EXPORT_SYMBOL(tcp_md5_hash_key);
@@ -3504,8 +3542,7 @@
struct request_sock *req = inet_reqsk(sk);

    bh_unlock_sock(sk);
    local_bh_disable();
    -inet_csk_reqsk_queue_drop_and_put(req->rsk_listener, 
-    - req);
    +inet_csk_reqsk_queue_drop(req->rsk_listener, req);
    local_bh_enable();
    return 0;
    }
@@ -3536,6 +3613,7 @@
unsigned long limit;
unsigned int i;
+BUILD_BUG_ON(TCP_MIN_SND_MSS <= MAX_TCP_OPTION_SPACE);
BUILD_BUG_ON(sizeof(struct tcp_skb_cb) >
    FIELD_SIZEOF(struct sk_buff, cb));

@@ -3637,8 +3676,8 @@
-init_net.ipv4.sysctl_tcp_rmem[2] = max(64*1024, max_wshare);
-init_net.ipv4.sysctl_tcp_rmem[1] = 87380;
-init_net.ipv4.sysctl_tcp_rmem[2] = max(87380, max_rshare);
+init_net.ipv4.sysctl_tcp_rmem[1] = 131072;
+init_net.ipv4.sysctl_tcp_rmem[2] = max(131072, max_rshare);

pr_info("Hash tables configured (established %u bind %u)\n",
    tcp_hashinfo.ehash_mask + 1, tcp_hashinfo.bhash_size);
--- linux-4.15.0.orig/net/ipv4/tcp_bbr.c
+++ linux-4.15.0/net/ipv4/tcp_bbr.c
@@ -95,12 +95,11 @@
 u32     mode:3, /* current bbr_mode in state machine */
 prev_ca_state:3, /* CA state on previous ACK */
 packet_conservation:1, /* use packet conservation? */
-restore_cwnd:1, /* decided to revert cwnd to old value */
 round_start:1, /* start of packet-timed tx->ack round? */
 tso_segs_goal:7, /* segments we want in each skb we send */
 idle_restart:1, /* restarting after idle? */
 probe_rtt_round_done:1, /* a BBR_PROBE_RTT round at 4 pkts? */
-unused:5,
+unused:6,
 lt_is_sampling:1, /* taking long-term ("LT") samples now? */
 lt_rtt_cnt:7, /* round trips in long-term interval */
 lt_use_bw:1; /* use lt_bw as our bw estimate? */
@@ -117,6 +116,14 @@
 unused_b:5;
 u32prior_cwnd;/* prior cwnd upon entering loss recovery */
 u32full_bw;/* recent bw, to estimate if pipe is full */
+
 /* For tracking ACK aggregation: */
+u64ack_epoch_mstamp;/* start of ACK sampling epoch */
+u16extra_acked[2]:/* max excess data ACKed in epoch */
+u32ack_epoch_acked:20;/* packets (S)ACKed in sampling epoch */
+extra_acked_win_rtt:5;/* age of extra_acked, in round trips */
+extra_acked_win_idx:1;/* current index in extra_acked array */
+unused_c:6;
};

#define CYCLE_LEN 8/* number of phases in a pacing gain cycle */
@@ -176,6 +183,17 @@
static const u32 bbr_lt_bw_max_rtts = 48;

/* Gain factor for adding extra_acked to target cwnd: */
static const int bbr_extra_acked_gain = BBR_UNIT;

/* Window length of extra_acked window. */
static const u32 bbr_extra_acked_win_rtts = 5;

/* Max allowed val for ack_epoch_acked, after which sampling epoch is reset */
static const u32 bbr_ack_epoch_acked_reset_thresh = 1U << 20;

/* Time period for clamping cwnd increment due to ack aggregation */
static const u32 bbr_extra_acked_max_us = 100 * 1000;

static void bbr_check_probe_rtt_done(struct sock *sk);

/* Do we estimate that STARTUP filled the pipe? */
static bool bbr_full_bw_reached(const struct sock *sk)
{
    return bbr->lt_use_bw ? bbr->lt_bw : bbr_max_bw(sk);
}

/* Return maximum extra acked in past k-2k round trips, */
/* where k = bbr_extra_acked_win_rtts. */
static u16 bbr_extra_acked(const struct sock *sk)
{
    struct bbr *bbr = inet_csk_ca(sk);
    return max(bbr->extra_acked[0], bbr->extra_acked[1]);
}

/* Return rate in bytes per second, optionally with a gain. */
/* The order here is chosen carefully to avoid overflow of u64. This should */
/* work for input rates of up to 2.9Tbit/sec and gain of 2.89x. */

if (event == CA_EVENT_TX_START && tp->app_limited) {
    bbr->idle_restart = 1;
    bbr->ack_epoch_mstamp = tp->tcp_mstamp;
    bbr->ack_epoch_acked = 0;
    /* Avoid pointless buffer overflows: pace at est. bw if we don't */
    /* need more speed (we're restarting from idle and app-limited). */
    if (bbr->mode == BBR_PROBE_BW)
        bbr_set_pacing_rate(sk, bbr_bw(sk), BBR_UNIT);
    else if (bbr->mode == BBR_PROBE_RTT)
        bbr_check_probe_rtt_done(sk);
}
/* Find target cwnd. Right-size the cwnd based on min RTT and the estimated bottleneck bandwidth: */

/* Calculate bdp based on min RTT and the estimated bottleneck bandwidth: */

/* cwnd = bw * min_rtt * gain = BDP * gain */
/* bdp = bw * min_rtt * gain */

/* The key factor, gain, controls the amount of queue. While a small gain builds a smaller queue, it becomes more vulnerable to noise in RTT measurements (e.g., delayed ACKs or other ACK compression effects). This noise may cause BBR to under-estimate the rate. */

/* To achieve full performance in high-speed paths, we budget enough cwnd to fit full-sized skbs in-flight on both end hosts to fully utilize the path: */
/* - one skb in sending host Qdisc, */
/* - one skb in sending host TSO/GSO engine */
/* - one skb being received by receiver host LRO/GRO/delayed-ACK engine */
/* Don’t worry, at low rates (bbr_min_tso_rate) this won’t bloat cwnd because in such cases iso.segs_goal is 1. The minimum cwnd is 4 packets, */
/* which allows 2 outstanding 2-packet sequences, to try to keep pipe full even with ACK-every-other-packet delayed ACKs. */

static u32 bbr_target_cwnd(struct sock *sk, u32 bw, int gain)
{
    struct bbr *bbr = inet_csk_ca(sk);
    u32 cwnd;
    u32 bdp;
    u64 w;

    /* If we've never had a valid RTT sample, cap cwnd at the initial value. */
    w = (u64)bw * bbr->min_rtt_us;

    /* Apply a gain to the given value, then remove the BW_SCALE shift. */
    cwnd = (((w * gain) >> BBR_SCALE) + BW_UNIT - 1) / BW_UNIT;
    bdp = (((w * gain) >> BBR_SCALE) + BW_UNIT - 1) / BW_UNIT;
    return bdp;
}

/* To achieve full performance in high-speed paths, we budget enough cwnd to fit full-sized skbs in-flight on both end hosts to fully utilize the path: */
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/* which allows 2 outstanding 2-packet sequences, to try to keep pipe full even with ACK-every-other-packet delayed ACKs. */
+ * Don't worry, at low rates (bbr_min_tso_rate) this won't bloat cwnd because
+ * in such cases tso_segs_goal is 1. The minimum cwnd is 4 packets,
+ * which allows 2 outstanding 2-packet sequences, to try to keep pipe
+ * full even with ACK-every-other-packet delayed ACKs.
+ */
+static u32 bbr_quantization_budget(struct sock *sk, u32 cwnd, int gain)
+{
+struct bbr *bbr = inet_csk_ca(sk);

/* Allow enough full-sizedskb in flight to utilize end systems. */
cwnd += 3 * bbr->tso_segs_goal;
@ @ .353,9 +391,40 @@
/* Reduce delayed ACKs by rounding up cwnd to the next even number. */
cwnd = (cwnd + 1) & ~1U;

+ /* Ensure gain cycling gets inflight above BDP even for small BDPs. */
+if (bbr->mode == BBR_PROBE_BW && gain > BBR_UNIT)
+cwnd += 2;
+
return cwnd;
}

+/* Find inflight based on min RTT and the estimated bottleneck bandwidth. */
+static u32 bbr_inflight(struct sock *sk, u32 bw, int gain)
+{
+u32 inflight;
+
inflight = bbr_bdp(sk, bw, gain);
+inflight = bbr_quantization_budget(sk, inflight, gain);
+
+return inflight;
+}
+
+/* Find the cwnd increment based on estimate of ack aggregation */
+static u32 bbr_ack_aggregation_cwnd(struct sock *sk)
+{
+u32 max_aggr_cwnd, aggr_cwnd = 0;
+
+if (bbr_extra_acked_gain && bbr_full_bw_reached(sk)) {
+max_aggr_cwnd = ((u64)bbr_bw(sk) * bbr_extra_acked_max_us)
+BW_UNIT;
+aggr_cwnd = (bbr_extra_acked_gain * bbr_extra_acked(sk))
+BW_SCALE;
+aggr_cwnd = min(aggr_cwnd, max_aggr_cwnd);
+
+return aggr_cwnd;
+}
/* An optimization in BBR to reduce losses: On the first round of recovery, we
* follow the packet conservation principle: send P packets per P packets acked.
* After that, we slow-start and send at most 2*P packets per P packets acked.
@@ -387,17 +456,11 @@
cwnd = tcp_packets_in_flight(tp) + acked;
} else if (prev_state >= TCP_CA_Recovery && state < TCP_CA_Recovery) {
/* Exiting loss recovery; restore cwnd saved before recovery. */
-bbr->restore_cwnd = 1;
+cwnd = max(cwnd, bbr->prior_cwnd);
bbr->packet_conservation = 0;
}
bbr->prev_ca_state = state;

@if (bbr->restore_cwnd) {
-/* Restore cwnd after exiting loss recovery or PROBE_RTT. */
-cwnd = max(cwnd, bbr->prior_cwnd);
-bbr->restore_cwnd = 0;
-}
-
if (bbr->packet_conservation) {
/*new_cwnd = max(cwnd, tcp_packets_in_flight(tp) + acked);
return true;/* yes, using packet conservation */
@@ -422,8 +485,15 @@
if (bbr_set_cwnd_to_recover_or_restore(sk, rs, acked, &cwnd))
goto done;
+target_cwnd = bbr_bdp(sk, bw, gain);
+
+/* Increment the cwnd to account for excess ACKed data that seems
+ due to aggregation (of data and/or ACKs) visible in the ACK stream.
+ */
+target_cwnd += bbr_ack_aggregation_cwnd(sk);
+target_cwnd = bbr_quantization_budget(sk, target_cwnd, gain);
+
/* If we're below target cwnd, slow start cwnd toward target cwnd. */
-target_cwnd = bbr_target_cwnd(sk, bw, gain);
if (bbr_full_bw_reached(sk)) /* only cut cwnd if we filled the pipe */
cwnd = min(cwnd + acked, target_cwnd);
else if (cwnd < target_cwnd || tp->delivered < TCP_INIT_CWND)
@@ -464,14 +534,14 @@
if (bbr->pacing_gain > BBR_UNIT)
return is_full_length &&
(rs->losses || /* perhaps pacing_gain*BDP won't fit */
- inflight >= bbr_target_cwnd(sk, bw, bbr->pacing_gain));
+ inflight >= bbr_inflight(sk, bw, bbr->pacing_gain));

/* A pacing_gain < 1.0 tries to drain extra queue we added if bw
* probing didn't find more bw. If inflight falls to match BDP then we
* estimate queue is drained; persisting would underutilize the pipe.
* 
*/
return is_full_length ||
-inflight <= bbr_target_cwnd(sk, bw, BBR_UNIT);
+inflight <= bbr_inflight(sk, bw, BBR_UNIT);
}

static void bbr_advance_cycle_phase(struct sock *sk)
@@ -481,7 +551,8 @@
    bbr->pacing_gain = bbr->lt_use_bw ? BBR_UNIT :
    + bbr_pacing_gain[bbr->cycle_idx];
}

/* Gain cycling: cycle pacing gain to converge to fair share of available bw. */
@@ -490,8 +561,7 @@
    }
    struct bbr *bbr = inet_csk_ca(sk);
    
-    if ((bbr->mode == BBR_PROBE_BW) && !bbr->lt_use_bw &&
    -      bbr_is_next_cycle_phase(sk, rs))
+    if (bbr->mode == BBR_PROBE_BW && bbr_is_next_cycle_phase(sk, rs))
        bbr_advance_cycle_phase(sk);
    }

@@ -674,8 +744,7 @@
    /* bandwidth sample. Delivered is in packets and interval_us in uS and
    * ratio will be <<1 for most connections. So delivered is first scaled.
    */
    -bw = (u64)rs->delivered * BW_UNIT;
    -do_div(bw, rs->interval_us);
    +bw = div64_long((u64)rs->delivered * BW_UNIT, rs->interval_us);

    /* If this sample is application-limited, it is likely to have a very
    * low delivered count that represents application behavior rather than
    @ @ -694.6 +763.67 @@
    }
    }

    /* Estimates the windowed max degree of ack aggregation.
    * This is used to provision extra in-flight data to keep sending during
    * inter-ACK silences.
    * 
    * Degree of ack aggregation is estimated as extra data acked beyond expected.
max_extra_acked = "maximum recent excess data ACKed beyond max_bw * interval"
cwnd += max_extra_acked
Max extra_acked is clamped by cwnd and bw * bbr_extra_acked_max_us (100 ms).
Max filter is an approximate sliding window of 5-10 (packet timed) round trips.

static void bbr_update_ack_aggregation(struct sock *sk,
const struct rate_sample *rs) {
    u32 epoch_us, expected_acked, extra_acked;
    struct bbr *bbr = inet_csk_ca(sk);
    struct tcp_sock *tp = tcp_sk(sk);

    if (!bbr_extra_acked_gain || rs->acked_sacked <= 0 ||
    rs->delivered < 0 || rs->interval_us <= 0)
        return;

    if (bbr->round_start) {
        bbr->extra_acked_win_rtts = min(0x1F,
        bbr->extra_acked_win_rtts + 1);
        if (bbr->extra_acked_win_rtts >= bbr_extra_acked_win_rtts) {
            bbr->extra_acked_win_rtts = 0;
            bbr->extra_acked_win_idx = bbr->extra_acked_win_idx ?
                    0 : 1;
            bbr->extra_acked[bbr->extra_acked_win_idx] = 0;
        }
    }

    /* Compute how many packets we expected to be delivered over epoch. */
    epoch_us = tcp_stamp_us_delta(tp->delivered_mstamp,
        bbr->ack_epoch_mstamp);
    expected_acked = ((u64)bbr_bw(sk) * epoch_us) / BW_UNIT;
    /* Reset the aggregation epoch if ACK rate is below expected rate or 
    * significantly large no. of ack received since epoch (potentially 
    * quite old epoch). */
    if (bbr->ack_epoch_acked <= expected_acked ||
        (bbr->ack_epoch_acked + rs->acked_sacked >=
        bbr_ack_epoch_acked_reset_thresh)) {
        bbr->ack_epoch_acked = 0;
        bbr->ack_epoch_mstamp = tp->delivered_mstamp;
        expected_acked = 0;
    }
    /* Compute excess data delivered, beyond what was expected. */

+bbr->ack_epoch_acked = min_t(u32, 0xFFFFF,
  +    bbr->ack_epoch_acked + rs->acked_sacked);
+extra_acked = bbr->ack_epoch_acked - expected_acked;
+extra_acked = min(extra_acked, tp->snd_cwnd);
+if (extra_acked > bbr->extra_acked[bbr->extra_acked_win_idx])
  +bbr->extra_acked[bbr->extra_acked_win_idx] = extra_acked;
+
  /* Estimate when the pipe is full, using the change in delivery rate: BBR*
  * estimates that STARTUP filled the pipe if the estimated bw hasn't changed by
  * at least bbr_full_bw_thres (25%) after bbr_full_bw_cnt (3) non-app-limited
  * @ @ .733,10 +863,24 @@
  */ /* fall through to check if in-flight is already small: */
if (bbr->mode == BBR_DRAIN &&
  tcp_packets_in_flight(tcp_sk(sk)) <=
  -    bbr_target_cwnd(sk, bbr_max_bw(sk), BBR_UNIT))
  +    bbr_inflight(sk, bbr_max_bw(sk), BBR_UNIT))
  bbr_reset_probe_bw_mode(sk);  /* we estimate queue is drained */
}

+static void bbr_check_probe_rtt_done(struct sock *sk)
+{
+  struct tcp_sock *tp = tcp_sk(sk);
+  struct bbr *bbr = inet_csk_ca(sk);
+
+  if (!(bbr->probe_rtt_done_stamp &&
+       after(tcp_jiffies32, bbr->probe_rtt_done_stamp)))
+    return;
+
+  bbr->min_rtt_stamp = tcp_jiffies32;  /* wait a while until PROBE_RTT */
+  +tp->snd_cwnd = max(tp->snd_cwnd, bbr->prior_cwnd);
+  +bbr_reset_mode(sk);
+}

  /* The goal of PROBE_RTT mode is to have BBR flows cooperatively and
  * periodically drain the bottleneck queue, to converge to measure the true
  * min_rtt (unloaded propagation delay). This allows the flows to keep queues
  * @ @ .766,7 +910,7 @@
  filter_expired = after(tcp_jiffies32,
  -    bbr->min_rtt_stamp + bbr->min_rtt_win_sec * HZ);
  if (rs->rtt_us >= 0 &&
  -    (rs->rtt_us <= bbr->min_rtt_us || filter_expired)) {
  +    (rs->rtt_us < bbr->min_rtt_us || filter_expired)) {
  bbr->min_rtt_us = rs->rtt_us;
  bbr->min_rtt_stamp = tcp_jiffies32;
  }
  @@ -794,20 +938,19 @@
  else if (bbr->probe_rtt_done_stamp) {
if (bbr->round_start)
    bbr->probe_rtt_round_done = 1;
-if (bbr->probe_rtt_round_done &&
    after(tcp_jiffies32, bbr->probe_rtt_done_stamp)) {
    bbr->min_rtt_stamp = tcp_jiffies32;
    bbr->restore_cwnd = 1; /* snap to prior_cwnd */
    bbr_reset_mode(sk);
  }
  +if (bbr->probe_rtt_round_done)
    bbr_check_probe_rtt_done(sk);
}

static void bbr_update_model(struct sock *sk, const struct rate_sample *rs)
{
  bbr_update_bw(sk, rs);
  +bbr_update_ack_aggregation(sk, rs);
  bbr_update_cycle_phase(sk, rs);
  bbr_check_full_bw_reached(sk, rs);
  bbr_check_drain(sk, rs);
  bbr->has_seen_rtt = 0;
  bbr->has_seen_rtt = 0;
  bbr_init_pacing_rate_from_rtt(sk);

  bbr->restore_cwnd = 0;
  bbr->round_start = 0;
  bbr->idle_restart = 0;
  bbr->full_bw_reached = 0;
  bbr->ack_epoch_acked = 0;
cmpxchg(&sk->sk_pacing_status, SK_PACING_NONE, SK_PACING_NEEDED);
}

- if (sk->sk_state != TCP_CLOSE)
+ if (ca->flags & TCP_CONG_NEEDS_ECN)
+ INET_ECN_xmit(sk);
+ else
+ INET_ECN_dontxmit(sk);
+
+ if (!(1 << sk->sk_state) & (TCPF_CLOSE | TCPF_LISTEN))
tcp_init_congestion_control(sk);
}

@@ -223,6 +228,10 @@
ret = -ENOENT;
 } else if (!try_module_get(ca->owner)) {
 ret = -EBUSY;
+ } else if (!net_eq(net, &init_net) &&
+ !(ca->flags & TCP_CONG_NON_RESTRICTED)) {
+ /* Only init netns can set default to a restricted algorithm */
+ ret = -EPERM;
+ } else {
 prev = xchg(&net->ipv4.tcp_congestion_control, ca);
 if (prev)
@@ -332,7 +341,8 @@
 * tcp_reinit_congestion_control (if the current congestion control was
 * already initialized.
 * /
-int tcp_set_congestion_control(struct sock *sk, const char *name, bool load, bool reinit)
+int tcp_set_congestion_control(struct sock *sk, const char *name, bool load, bool reinit,
+ bool reinit, bool cap_net_admin)
{ }
 struct inet_connection_sock *icsk = inet_csk(sk);
 const struct tcp_congestion_ops *ca;
@@ -368,8 +378,7 @@
 } else {
 err = -EBUSY;


```c
} else if (!((ca->flags & TCP_CONG_NON_RESTRICTED) ||
             ns_capable(sock_net(sk)->user_ns, CAP_NET_ADMIN))) {
    } else if (!try_module_get(ca->owner)) {
        err = -EPERM;
    } else if (!try_module_get(ca->owner)) {
        err = -EBUSY;

--- linux-4.15.0.orig/net/ipv4/tcp_cubic.c
+++ linux-4.15.0/net/ipv4/tcp_cubic.c
@@ -403,6 +403,8 @@
if (hystart_detect & HYSTART_DELAY) {
    /* obtain the minimum delay of more than sampling packets */
    +ca->curr_rtt = delay;
    if (ca->sample_cnt < HYSTART_MIN_SAMPLES) {
        if (ca->curr_rtt == 0 || ca->curr_rtt > delay)
            ca->curr_rtt = delay;
--- linux-4.15.0.orig/net/ipv4/tcp_dctcp.c
+++ linux-4.15.0/net/ipv4/tcp_dctcp.c
@@ -55,7 +55,6 @@
    u32 dctcp_alpha;
    u32 next_seq;
    u32 ce_state;
-u32 delayed_ack_reserved;
    u32 loss_cwnd;
}

@@ -67,11 +66,6 @@
    module_param(dctcp_alpha_on_init, uint, 0644);
 MODULE_PARM_DESC(dctcp_alpha_on_init, "parameter for initial alpha value");

-STATIC unsigned int dctcp_clamp_alpha_on_loss __read_mostly;
-STATIC MODULE_PARAM_DESC(dctcp_clamp_alpha_on_loss, uint, 0644);
-STATIC MODULE_PARM_DESC(dctcp_clamp_alpha_on_loss,
-    "parameter for clamping alpha on loss");
-
static struct tcp_congestion_ops dctcp_reno;

static void dctcp_reset(const struct tcp_sock *tp, struct dctcp *ca)
@@ -96,7 +90,6 @@
    ca->dctcp_alpha = min(dctcp_alpha_on_init, DCTCP_MAX_ALPHA);

    -ca->delayed_ack_reserved = 0;
    ca->loss_cwnd = 0;
    ca->ce_state = 0;
```

struct dctcp *ca = inet_csk_ca(sk);
struct tcp_sock *tp = tcp_sk(sk);

/* State has changed from CE=0 to CE=1 and delayed
 * ACK has not sent yet. */
@if (!ca->ce_state && ca->delayed_ack_reserved) {
  u32 tmp_rcv_nxt;
  /* Save current rcv_nxt. */
  tmp_rcv_nxt = tp->rcv_nxt;
  /* Generate previous ack with CE=0. */
  tp->ecn_flags &= ~TCP_ECN_DEMAND_CWR;
  tp->rcv_nxt = ca->prior_rcv_nxt;
  tcp_send_ack(sk);
  /* Recover current rcv_nxt. */
  tp->rcv_nxt = tmp_rcv_nxt;
}@

/* State has changed from CE=1 to CE=0 and delayed
 * ACK has not sent yet. */
@if (ca->ce_state && ca->delayed_ack_reserved) {
  u32 tmp_rcv_nxt;
  /* Save current rcv_nxt. */
  tmp_rcv_nxt = tp->rcv_nxt;
  /* Generate previous ack with CE=1. */
  tp->ecn_flags |= TCP_ECN_DEMAND_CWR;
  tp->rcv_nxt = ca->prior_rcv_nxt;
}@
- tcp_send_ack(sk);

  /* Recover current rcv_nxt. */
  -tp->rcv_nxt = tmp_rcv_nxt;
  +if (ca->ce_state) {
    +/* State has changed from CE=1 to CE=0, force an immediate
    + * ACK to reflect the new CE state. If an ACK was delayed,
    + * send that first to reflect the prior CE state.
    + */
    +if (inet_csk(sk)->icsk_ack.pending & ICSK_ACK_TIMER)
    +  __tcp_send_ack(sk, ca->prior_rcv_nxt);
    +tcp_enter_quickack_mode(sk, 1);
  }

  ca->prior_rcv_nxt = tp->rcv_nxt;
@@ -231,40 +206,23 @@
}
}

-static void dctcp_state(struct sock *sk, u8 new_state)
+static void dctcp_react_to_loss(struct sock *sk)
{
  -if (dctcp_clamp_alpha_on_loss && new_state == TCP_CA_Loss) {
    -struct dctcp *ca = inet_csk_ca(sk);
    +struct dctcp *ca = inet_csk_ca(sk);
    +struct tcp_sock *tp = tcp_sk(sk);
    +struct tcp_sock *tp = tcp_sk(sk);

    -/* If this extension is enabled, we clamp dctcp_alpha to
    - * max on packet loss; the motivation is that dctcp_alpha
    - * is an indicator to the extend of congestion and packet
    - * loss is an indicator of extreme congestion; setting
    - * this in practice turned out to be beneficial, and
    - * effectively assumes total congestion which reduces the
    - * window by half.
    - */
    -ca->dctcp_alpha = DCTCP_MAX_ALPHA;
    -}
    +ca->loss_cwnd = tp->snd_cwnd;
    +tp->snd_ssthresh = max(tp->snd_cwnd >> 1U, 2U);
  }

-static void dctcp_update_ack_reserved(struct sock *sk, enum tcp_ca_event ev)
+static void dctcp_state(struct sock *sk, u8 new_state)
{
  -struct dctcp *ca = inet_csk_ca(sk);
  -
  -switch (ev) {
case CA_EVENT_DELAYED_ACK:
    if (!ca->delayed_ack_reserved)
        ca->delayed_ack_reserved = 1;
    break;
    case CA_EVENT_NON_DELAYED_ACK:
        if (ca->delayed_ack_reserved)
            ca->delayed_ack_reserved = 0;
        break;
        default:
            /* Don't care for the rest. */
            break;
    }
    if (new_state == TCP_CA_Recovery &&
        new_state != inet_csk(sk)->icsk_ca_state)
        dctcp_react_to_loss(sk);
    /* We handle RTO in dctcp_cwnd_event to ensure that we perform only
     * one loss-adjustment per RTT.
     */
    /*
    static void dctcp_cwnd_event(struct sock *sk, enum tcp_ca_event ev)
    *
    case CA_EVENT_ECN_NO_CE:
        dctcp_ce_state_1_to_0(sk);
        break;
    case CA_EVENT_DELAYED_ACK:
        case CA_EVENT_NON_DELAYED_ACK:
            dctcp_update_ack_reserved(sk, ev);
        case CA_EVENT_LOSS:
            dctcp_react_to_loss(sk);
        break;
        default:
            /* Don't care for the rest. */
            
static void dctcp_cwnd_event(struct sock *sk, enum tcp_ca_event ev)
    *
    case CA_EVENT_ECN_NO_CE:
        dctcp_ce_state_1_to_0(sk);
        break;
    case CA_EVENT_DELAYED_ACK:
    case CA_EVENT_NON_DELAYED_ACK:
        dctcp_update_ack_reserved(sk, ev);
    case CA_EVENT_LOSS:
        dctcp_react_to_loss(sk);
        break;
    default:
        /* Don't care for the rest. */
        
    @ -276.9 +234.8 @
    case CA_EVENT_ECN_NO_CE:
        dctcp_ce_state_1_to_0(sk);
        break;
    case CA_EVENT_DELAYED_ACK:
    case CA_EVENT_NON_DELAYED_ACK:
        dctcp_update_ack_reserved(sk, ev);
    case CA_EVENT_LOSS:
        dctcp_react_to_loss(sk);
        break;
    default:
        /* Don't care for the rest. */
        
--- linux-4.15.0.orig/net/ipv4/tcp_fastopen.c
+++ linux-4.15.0/net/ipv4/tcp_fastopen.c
@@ -461,8 +461,15 @@
    }
    struct net *net = sock_net(sk);
    /* Paired with READ_ONCE() in tcp_fastopen_active_should_disable() */
    +WRITE_ONCE(net->ipv4.tfo_active_disable_stamp, jiffies);
    +
    /* Paired with smp_rmb() in tcp_fastopen_active_should_disable().
     * We want net->ipv4.tfo_active_disable_stamp to be updated first.
     */
    +atomic_inc(&net->ipv4.tfo_active_disable_times);
    +net->ipv4.tfo_active_disable_stamp = jiffies;
NET_INC_STATS(net, LINUX_MIB_TCPFASTOPENBLACKHOLE);
}

@@ -480,10 +487,16 @@
if (!tfo_da_times)
    return false;

/* Paired with smp_mb__before_atomic() in tcpopen_active_disable() */
+smp_rmb();
+
+ /* Limit timeout to max: 2^6 * initial timeout */
+ multiplier = 1 << min(tfo_da_times - 1, 6);
+ -timeout = multiplier * tfo_bh_timeout * HZ;
+ -if (time_before(jiffies, sock_net(sk)->ipv4.tfo_active_disable_stamp + timeout))
+ +
+ /* Paired with the WRITE_ONCE() in tcp_fastopen_active_disable(). */
+ +timeout = READ_ONCE(sock_net(sk)->ipv4.tfo_active_disable_stamp) +
+ + multiplier * tfo_bh_timeout * HZ;
+ +if (time_before(jiffies, timeout))
+ return true;
+
/* Mark check bit so we can check for successful active TFO
--- linux-4.15.0.orig/net/ipv4/tcp_illinois.c
+++ linux-4.15.0/net/ipv4/tcp_illinois.c
@@ -6,7 +6,7 @@
 * The algorithm is described in:
 * "TCP-Illinois: A Loss and Delay-Based Congestion Control Algorithm
 * for High-Speed Networks"
- * http://www.ifp.illinois.edu/~srikant/Papers/liubassri06perf.pdf
 *
 * Implemented from description in paper and ns-2 simulation.
 * Copyright (C) 2007 Stephen Hemminger <shemminger@linux-foundation.org>
--- linux-4.15.0.orig/net/ipv4/tcp_input.c
+++ linux-4.15.0/net/ipv4/tcp_input.c
@@ -183,24 +183,27 @@
}
}

-static void tcp_incr_quickack(struct sock *sk)
+static void tcp_incr_quickack(struct sock *sk, unsigned int max_quickacks)
{
    struct inet_connection_sock *icsk = inet_csk(sk);
    unsigned int quickacks = tcp_sk(sk)->rcv_wnd / (2 * icsk->icsk_ack.rcv_mss);

    if (quickacks == 0)
        quickacks = 2;
+quickacks = min(quickacks, max_quickacks);
if (quickacks > icsk->icsk_ack.quick)
-icsk->icsk_ack.quick = min(quickacks, TCP_MAX_QUICKACKS);
+icsk->icsk_ack.quick = quickacks;
}

-static void tcp_enter_quickack_mode(struct sock *sk)
+void tcp_enter_quickack_mode(struct sock *sk, unsigned int max_quickacks)
{
 struct inet_connection_sock *icsk = inet_csk(sk);
-tcp_incr_quickack(sk);
+
+tcp_incr_quickack(sk, max_quickacks);
icsk->icsk_ack.pingpong = 0;
icsk->icsk_ack.ato = TCP_ATO_MIN;
}
+EXPORT_SYMBOL(tcp_enter_quickack_mode);

/* Send ACKs quickly, if "quick" count is not exhausted
 * and the session is not interactive.
@@ -223,17 +226,26 @@
static void tcp_ecn_accept_cwr(struct tcp_sock *tp, const struct sk_buff *skb)
{
- if (tcp_hdr(skb)->cwr)
+ if (tcp_hdr(skb)->cwr) {
 tp->ecn_flags &= ~TCP_ECN_DEMAND_CWR;
+ /* If the sender is telling us it has entered CWR, then its
+ * cwnd may be very low (even just 1 packet), so we should ACK
+ * immediately.
+ */
+ tcp_enter_quickack_mode((struct sock *)tp, 2);
+ }
}

static void tcp_ecn_withdraw_cwr(struct tcp_sock *tp)
{
 tp->ecn_flags &= ~TCP_ECN_DEMAND_CWR;
+tp->ecn_flags &= ~TCP_ECN_QUEUE_CWR;
}

-static void __tcp_ecn_check_ce(struct tcp_sock *tp, const struct sk_buff *skb)
+static void __tcp_ecn_check_ce(struct sock *sk, const struct sk_buff *skb)
{
+struct tcp_sock *tp = tcp_sk(sk);
+ switch (TCP_SKB_CB(skb)->ip_dsfield & INET_ECN_MASK) {

case INET_ECN_NOT_ECT:
    /* Funny extension: if ECT is not set on a segment,
       @ @ -241,31 +253,31 @@
       * it is probably a retransmit.
       */
    if (tp->ecn_flags & TCP_ECN_SEEN)
        -tcp_enter_quickack_mode((struct sock *)tp);
        +tcp_enter_quickack_mode(sk, 2);
    break;
    case INET_ECN_CE:
        -if (tcp_ca_needs_ecn((struct sock *)tp))
            -tcp_ca_event((struct sock *)tp, CA_EVENT_ECN_IS_CE);
            +if (tcp_ca_needs_ecn(sk))
            +tcp_ca_event(sk, CA_EVENT_ECN_IS_CE);
        if (!(tp->ecn_flags & TCP_ECN_DEMAND_CWR)) {
            /* Better not delay acks, sender can have a very low cwnd */
            -tcp_enter_quickack_mode((struct sock *)tp);
            +tcp_enter_quickack_mode(sk, 2);
            tp->ecn_flags |= TCP_ECN_DEMAND_CWR;
        }
        tp->ecn_flags |= TCP_ECN_SEEN;
        break;
        default:
        -if (tcp_ca_needs_ecn((struct sock *)tp))
            -tcp_ca_event((struct sock *)tp, CA_EVENT_ECN_NO_CE);
            +if (tcp_ca_needs_ecn(sk))
            +tcp_ca_event(sk, CA_EVENT_ECN_NO_CE);
            tp->ecn_flags |= TCP_ECN_SEEN;
            break;
    }
    -static void tcp_ecn_check_ce(struct tcp_sock *tp, const struct sk_buff *skb)
        +static void tcp_ecn_check_ce(struct sock *sk, const struct sk_buff *skb)
    {
        -if (tp->ecn_flags & TCP_ECN_OK)
            __tcp_ecn_check_ce(tp, skb);
            +if (tcp_sk(sk)->ecn_flags & TCP_ECN_OK)
            __tcp_ecn_check_ce(sk, skb);
    }
    static void tcp_ecn_rcv_synack(struct tcp_sock *tp, const struct tcphdr *th)
        @@ -369,11 +381,12 @@
        static void tcp_grow_window(struct sock *sk, const struct sk_buff *skb)
        {
            struct sock *tp = tcp_sk(sk);
            +int room;
+room = min_t(int, tp->window_clamp, tcp_space(sk)) - tp->rcv_ssthresh;

/* Check #1 */
-if (tp->rcv_ssthresh < tp->window_clamp &&
- (int)tp->rcv_ssthresh < tcp_space(sk) &&
- !tcp_under_memory_pressure(sk)) {
+if (room > 0 && !tcp_under_memory_pressure(sk)) {
  int incr;

  /* Check #2. Increase window, if skb with such overhead
@@ -386,33 +399,13 @@ */
  if (incr) {
    incr = max_t(int, incr, 2 * skb->len);
    -tp->rcv_ssthresh = min(tp->rcv_ssthresh + incr,
-      tp->window_clamp);
    +tp->rcv_ssthresh += min(room, incr);
    inet_csk(sk)->icsk_ack.quick |= 1;
  }
}

-/* 3. Tuning rcvbuf, when connection enters established state. */
-static void tcp_fixup_rcvbuf(struct sock *sk)
-{
-  u32 mss = tcp_sk(sk)->advmss;
-  int rcvmem;
-  -
-    rcvmem = 2 * SKB_TRUESIZE(mss + MAX_TCP_HEADER) *
-      tcp_default_init_rwnd(mss);
-    -
-      /* Dynamic Right Sizing (DRS) has 2 to 3 RTT latency
-         * Allow enough cushion so that sender is not limited by our window
-         */
-      -if (sock_net(sk)->ipv4.sysctl_tcp_moderate_rcvbuf)
-        rcvmem <<= 2;
-      -
-      -if (sk->sk_rcvbuf < rcvmem)
-        sk->sk_rcvbuf = min(rcvmem, sock_net(sk)->ipv4.sysctl_tcp_rmem[2]);
-    -
-    -/* 4. Try to fixup all. It is made immediately after connection enters
+/* 3. Try to fixup all. It is made immediately after connection enters
+   * established state.
+*/
+void tcp_init_buffer_space(struct sock *sk)
@@ -421,12 +414,9 @@
struct tcp_sock *tp = tcp_sk(sk);

int maxwin;

- if (!((sk->sk_userlocks & SOCK_RCVBUF_LOCK)))
  - tcp_fixup_rcvbuf(sk);
if (!((sk->sk_userlocks & SOCK_SNDBUF_LOCK))
tcp_sndbuf_expand(sk);

- tp->rcvq_space.space = tp->rcv_wnd;
tcp_mstamp_refresh(tp);
tp->rcvq_space.time = tp->tcp_mstamp;
tp->rcvq_space.seq = tp->copied_seq;
@@ -450,9 +440,11 @@

tp->rcv_ssthresh = min(tp->rcv_ssthresh, tp->window_clamp);
tp->snd_cwnd_stamp = tcp_jiffies32;
+tp->rcvq_space.space = min3(tp->rcv_ssthresh, tp->rcv_wnd,
+ (u32)TCP_INIT_CWND * tp->advmss);
}

/* 5. Recalculate window clamp after socket hit its memory bounds. */
/+/* 4. Recalculate window clamp after socket hit its memory bounds. */
static void tcp_clamp_window(struct sock *sk)
{
 struct tcp_sock *tp = tcp_sk(sk);
@@ -578,8 +570,8 @@
 void tcp_rcv_space_adjust(struct sock *sk)
{
 struct tcp_sock *tp = tcp_sk(sk);
+u32 copied;
 int time;
 -int copied;

tcp_mstamp_refresh(tp);
time = tcp_stamp_us_delta(tp->tcp_mstamp, tp->rcvq_space.time);
@@ -602,12 +594,13 @@

 if (sock_net(sk)->ipv4.sysctl_tcp_moderate_rcvbuf &&
  !((sk->sk_userlocks & SOCK_RCVBUF_LOCK)) { /*
  -int rcvwin, rcvmem, rcvbuf;
  +int rcvmem, rcvbuf;
  +u64 rcvwin;
  
  /* minimal window to cope with packet losses, assuming
   * steady state. Add some cushion because of small variations.
   */
  -rcvwin = (copied << 1) + 16 * tp->advmss;
  +rcvwin = ((u64)copied << 1) + 16 * tp->advmss;
/* If rate increased by 25%,
* assume slow start, rcvwin = 3 * copied
@@ -627,13 +620,14 @@
while (tcp_win_from_space(sk, rcvmem) < tp->advmss)
    rcvmem += 128;

    rcvbuf = min(rcvwin / tp->advmss * rcvmem,
+    do_div(rcvwin, tp->advmss);
+    rcvbuf = min_t(u64, rcvwin * rcvmem,
        sock_net(sk)->ipv4.sysctl_tcp_rmem[2]);
    if (rcvbuf > sk->sk_rcvbuf) {
        sk->sk_rcvbuf = rcvbuf;
    }
}

tp->rcvq_space.space = copied;
/* The _first_ data packet received, initialize
 * delayed ACK engine.
 */
-tcp_incr_quickack(sk);
+tcp_incr Quickack(sk, TCP_MAX QUICKACKS);
icsk->icsk_ack.at0 = TCP_ATO_MIN;
} else {
    int m = now - icsk->icsk_ack.lrcvtime;
+    tcp_incr_quickack(sk, TCP_MAX QUICKACKS);
    sk_mem_reclaim(sk);
}
icsk->icsk_ack.lrcvtime = now;

-tcp_ecn_check_ce(tp, skb);
+tcp_ecn_check_ce(sk, skb);
if (skb->len >= 128)
tcp_grow_window(sk, skb);
/* This must be called before lost_out is incremented */
static void tcp_verify_retransmit_hint(struct tcp_sock *tp, struct sk_buff *skb)
{  
  -if (!tp->retransmit_skb_hint ||
    before(TCP_SKB_CB(skb)->seq,
    TCP_SKB_CB(tp->retransmit_skb_hint)->seq))
+    if ((!tp->retransmit_skb_hint && tp->retrans_out >= tp->lost_out) ||
        (tp->retransmit_skb_hint &&
         before(TCP_SKB_CB(skb)->seq,
         TCP_SKB_CB(tp->retransmit_skb_hint)->seq))
  tp->retransmit_skb_hint = skb;
}

@@ -1181,7 +1176,7 @@
@@ -1283,7 +1278,7 @@
    TCP_SKB_CB(skb)->seq += shifted;

tcp_skb_pcount_add(prev, pcount);
-BUG_ON(tcp_skb_pcount(skb) < pcount);
+WARN_ON_ONCE(tcp_skb_pcount(skb) < pcount);
tcp_skb_pcount_add(skb, -pcount);

/* When we're adding to gso_segs == 1, gso_size will be zero,
@@ -1349,6 +1344,21 @@
    skb_headlen(skb) && skb_is_nonlinear(skb);
  }

+int tcp_skb_shift(struct sk_buff *to, struct sk_buff *from,
+    int pcount, int shiftlen)
+{  
+    /* TCP min gso_size is 8 bytes (TCP_MIN_GSO_SIZE)
+     * Since TCP_SKB_CB(skb)->tcp_gso_segs is 16 bits, we need
+     * to make sure not storing more than 65535 * 8 bytes per skb,
+     * even if current MSS is bigger.
+     */
+    if (unlikely(to->len + shiftlen >= 65535 * TCP_MIN_GSO_SIZE))
+        return 0;
+    if (unlikely(tcp_skb_pcount(to) + pcount > 65535))
+        return 0;
+    return skb_shift(to, from, shiftlen);
+}
/* Try collapsing SACK blocks spanning across multiple skb to a single skb. */
@@ -1457,7 +1467,7 @@
if (!after(TCP_SKB_CB(skb)->seq + len, tp->snd_una))
goto fallback;

-if (!skb_shift(prev, skb, len))
+if (!tcp_skb_shift(prev, skb, pcount, len))
goto fallback;
if (!tcp_shifted_skb(sk, prev, skb, state, pcount, len, mss, dup_sack))
goto out;
@@ -1475,11 +1485,10 @@
goto out;

len = skb->len;
-if (skb_shift(prev, skb, len)) {
- pcount += tcp_skb_pcount(skb);
- tcp_shifted_skb(sk, prev, skb, state, tcp_skb_pcount(skb),
+ pcount = tcp_skb_pcount(skb);  
+ if (tcp_skb_shift(prev, skb, pcount, len))
+ tcp_shifted_skb(sk, prev, skb, state, pcount,
len, mss, 0);
-}

out:
return prev;
@@ -1694,8 +1703,11 @@
}

/* Ignore very old stuff early */
-if (!after(sp[used_sacks].end_seq, prior_snd_una))
+if (!after(sp[used_sacks].end_seq, prior_snd_una)) {
+ if (i == 0)
+ first_sack_index = -1;
 continue;
+}

used_sacks++; 
@@ -1977,11 +1989,6 @@
/* F-RTO RFC5682 sec 3.1 step 1: retransmit SND.UNA if no previous loss recovery is underway except recurring timeout(s) on the same SND.UNA (sec 3.2). Disable F-RTO on path MTU probing
 - *
 - In theory F-RTO can be used repeatedly during loss recovery.
 - In practice this interacts badly with broken middle-boxes that falsely raise the receive window, which results in repeated
- * timeouts and stop-and-go behavior.
	*/

    tp->frto = net->ipv4.sysctl_tcp_frto &
    (new_recovery || icsk->icsk_retransmits) &
    tcp_try_undo_loss(sk, false))

return;

-/*! The ACK (s)acks some never-retransmitted data meaning not all
- * the data packets before the timeout were lost. Therefore we
- * undo the congestion window and state. This is essentially
- * the operation in F-RTO (RFC5682 section 3.1 step 3.b). Since
- * a retransmitted skb is permantly marked, we can apply such an
- * operation even if F-RTO was not used.
- */

    -if ((flag & FLAG_ORIG_SACK_ACKED) &&
        tcp_try_undo_loss(sk, tp->undo_marker))
    -return;
    -
    if (tp->frto) { /* F-RTO RFC5682 sec 3.1 (sack enhanced version). */
        +/* Step 3.b. A timeout is spurious if not all data are
        + * lost, i.e., never-retransmitted data are (s)acked.
        + */
        +if ((flag & FLAG_ORIG_SACK_ACKED) &&
            tcp_try_undo_loss(sk, true))
        +return;
        +
        if (after(tp->snd_nxt, tp->high_seq)) {
            if (flag & FLAG_DATA_SACKED || is_dupack)
                tp->frto = 0; /* Step 3.a. loss was real */
                tcp_rack_mark_lost(sk);
                if (tcp_rack_mark_lost(sk))
                    *ack_flag &= ~FLAG_SET_XMIT_TIMER;
                    if (prior_retrans > tp->retrans_out)
                        *ack_flag |= FLAG_LOST_RETRANS;
                    }
                @ @ -3117,6 +3121,7 @@
                tp->retransmit_skb_hint = NULL;
                if (unlikely(skb == tp->lost_skb_hint))
                    tp->lost_skb_hint = NULL;
                    +tcp_highest_sack_replace(skb, skb, next);
                    tcp_rtx_queue_unlink_and_free(skb, sk);
            }
        }
if (tcp_is_reno(tp)) {
    tcp_remove_reno_sacks(sk, pkts_acked);
    +
    +/* If any of the cumulatively ACKed segments was
    + * retransmitted, non-SACK case cannot confirm that
    + * progress was due to original transmission due to
    + * lack of TCPCB_SACKED_ACKED bits even if some of
    + * the packets may have been never retransmitted.
    + */
    +if (flag & FLAG_RETRANS_DATA_ACKED)
    +flag &= ~FLAG_ORIG_SACK_ACKED;
} else {
    int delta;

    @@ -3435,10 +3449,8 @@
}

/* This routine deals with acks during a TLP episode.
 * We mark the end of a TLP episode on receiving TLP dupack or when
 * ack is after tlp_high_seq.
 */
static void tcp_process_tlp_ack(struct sock *sk, u32 ack, int flag)
{
    @@ -3447,7 +3459,10 @@
            return;

            -if (flag & FLAG_DSACKING_ACK) {
            +if (!tp->tlp_retrans) {
                +/* TLP of new data has been acknowledged */
                +tp->tlp_high_seq = 0;
                +} else if (flag & FLAG_DSACKING_ACK) {
                    /* This DSACK means original and TLP probe arrived; no loss */
                    +tp->tlp_high_seq = 0;
                } else if (after(ack, tp->tlp_high_seq)) {
                      @@ -3606,9 +3621,6 @@

                      if (tp->tlp_high_seq)
                          tcp_process_tlp_ack(sk, ack, flag);
                      -/* If needed, reset TLP/RTO timer; RACK may later override this. */
                      +if (flag & FLAG_SET_XMIT_TIMER)
                          -tcp_set_xmit_timer(sk);
                      }
if (tcp_ack_is_dubious(sk, flag)) {
  is_dupack = !(flag & (FLAG_SND_UNA_ADVANCED | FLAG_NOT_DUP));
  @@ .3616,6 +3628,10 @@
      &rexmit);
}

/* If needed, reset TLP/RTO timer when RACK doesn't set. */
+if (flag & FLAG_SET_XMIT_TIMER)
+tcp_set_xmit_timer(sk);
+
if ((flag & FLAG_FORWARD_PROGRESS) || !(flag & FLAG_NOT_DUP))
  sk_dst_confirm(sk);

@@ -3867,11 +3883,8 @@
  int length = (th->doff << 2) - sizeof(*th);
  const u8 *ptr = (const u8 *)(th + 1);

-/* If the TCP option is too short, we can short cut */
  -if (length < TCPOLEN_MD5SIG)
  -return NULL;
  -
  -while (length > 0) {
-/* If not enough data remaining, we can short cut */
-while (length >= TCPOLEN_MD5SIG) {
  int opcode = *ptr++;
  int opsize;

@@ -3988,6 +4001,7 @@
 /* This barrier is coupled with smp_rmb() in tcp_poll() */
 smp_wmb();

+tcp_write_queue_purge(sk);
 tcp_done(sk);

if (!sock_flag(sk, SOCK_DEAD))
@@ .4127,7 +4141,7 @@
if (TCP_SKB_CB(skb)->end_seq != TCP_SKB_CB(skb)->seq &&
      before(TCP_SKB_CB(skb)->seq, tp->rcv_nxt)) {
 NET_INC_STATS(sock_net(sk), LINUX_MIB_DELAYEDACKLOST);
-tcp_enter_quickack_mode(sk);
+tcp_enter_quickack_mode(sk, TCP_MAX_QUICKACKS);

if (tcp_is_sack(tp) && sock_net(skb)->ipv4.sysctl_tcp_dsack) {
  u32 end_seq = TCP_SKB_CB(skb)->end_seq;
@@ .4285,11 +4299,29 @@
  if (TCP_SKB_CB(skb)->has_rxtstamp) {
    TCP_SKB_CB(skb)->has_rxtstamp = true;
    TCP_SKB_CB(skb)->has_rxtstamp = true;

---
to->tstamp = from->tstamp;
+skb_hwtstamps(to)->hwtstamp = skb_hwtstamps(from)->hwtstamp;
}

return true;
}

+static bool tcp_ooo_try_coalesce(struct sock *sk,
+ struct sk_buff *to,
+ struct sk_buff *from,
+ bool *fragstolen)
+{
+bool res = tcp_try_coalesce(sk, to, from, fragstolen);
+
+/** In case tcp_drop() is called later, update to->gso_segs */
+if (res) {
+u32 gso_segs = max_t(u16, 1, skb_shinfo(to)->gso_segs) +
+    max_t(u16, 1, skb_shinfo(from)->gso_segs);
+    skb_shinfo(to)->gso_segs = min_t(u32, gso_segs, 0xFFFF);
+}
+return res;
+}
+
static void tcp_drop(struct sock *sk, struct sk_buff *skb)
{
    sk_drops_add(sk, skb);
    u32 seq, end_seq;
    bool fragstolen;

    -tcp_ecn_check_ce(tp, skb);
+tcp_ecn_check_ce(sk, skb);

    if (unlikely(tcp_try_rmem_schedule(sk, skb, skb->truesize))) {
        NET_INC_STATS(sock_net(skb), LINUX_MIB_TCPOFODROP);
    }

    /* In the typical case, we are adding an skb to the end of the list.
    * Use of ooo_last_skb avoids the O(Log(N)) rbtree lookup.
    */
    -if (tcp_try_coalesce(skb, skb->ooo_last_skb,
        skb, &fragstolen)) {
        +if (tcp_ooo_try_coalesce(skb, skb->ooo_last_skb,
            skb, &fragstolen)) {
            coalesce_done:
                -tcp_grow_window(skb, skb);
                +/* For non sack flows, do not grow window to force DUPACK
                * and trigger fast retransmit.
/* if (tcp_is_sack(tp)) */
tcp_grow_window(sk, skb);
kfree_skb_partial(skb, fragstolen);
skb = NULL;
goto add_sack;

/* All the bits are present. Drop. */
NET_INC_STATS(sock_net(sk), LINUX_MIB_TCPOFOMERGE);
__kfree_skb(skb);
tcp_drop(sk, skb);
skb = NULL;
tcp_dsack_set(sk, seq, end_seq);
goto add_sack;
TCP_SKB_CB(skb1)->end_seq);
NET_INC_STATS(sock_net(sk), LINUX_MIB_TCPOFOMERGE);
__kfree_skb(skb1);
tcp_drop(sk, skb1);
goto merge_right;
}
-} else if (tcp_try_coalesce(skb, skb1, skb, &fragstolen)) {
+} else if (tcp_ooo_try_coalesce(skb, skb1, skb, &fragstolen)) {

goto coalesce_done;
}
p = &parent->rb_right;
TCP_SKB_CB(skb1)->end_seq);
et:
if (skb) {
tcp_grow_window(skb);
#if For non sack flows, do not grow window to force DUPACK
+ * and trigger fast retransmit.
+ */
+if (tcp_is_sack(tp))
tcp_grow_window(skb, skb);
skb_condense(skb);
skb_set_owner_r(skb, sk);
}
TCP_SKB_CB(skb1)->end_seq);
tcp_dsack_set(skb, TCP_SKB_CB(skb)->seq, TCP_SKB_CB(skb)->end_seq);

out_of_window:
tcp_enter_quickack_mode(skb);
+tcp_enter_quickack_mode(sk, TCP_MAX_QUICKACKS);
inet_csk_schedule_ack(sk);
drop:
tcp_drop(sk, skb);
@@ -4652,8 +4692,6 @@
if (!before(TCP_SKB_CB(skb)->seq, tp->rcv_nxt + tcp_receive_window(tp)))
goto out_of_window;
-tcp_enter_quickack_mode(sk);
-
if (before(TCP_SKB_CB(skb)->seq, tp->rcv_nxt)) {
/* Partial packet, seq < rcv_next < end_seq */
SOCK_DEBUG(sk, "partial packet: rcv_next %X seq %X - %X\n",
@@ -4825,6 +4863,7 @@
static void tcp_collapse_ofo_queue(struct sock *sk)
{
struct tcp_sock *tp = tcp_sk(sk);
+u32 range_truesize, sum_tiny = 0;
struct sk_buff *skb, *head;
 u32 start, end;

@@ -4836,6 +4875,7 @@
} start = TCP_SKB_CB(skb)->seq:
end = TCP_SKB_CB(skb)->end_seq;
+range_truesize = skb->truesize;
for (head = skb;;) {
 skb = skb_rb_next(skb);
@@ -4846,11 +4886,20 @@
 if (!skb ||
 after(TCP_SKB_CB(skb)->seq, end) ||
 before(TCP_SKB_CB(skb)->end_seq, start)) {
-tcp_collapse(sk, NULL, &tp->out_of_order_queue,
-     head, skb, start, end);
+/* Do not attempt collapsing tiny skbs */
+if (range_truesize != head->truesize ||
+    end - start >= SKB_WITH_OVERHEAD(SK_MEM_QUANTUM)) {
+    tcp_collapse(sk, NULL, &tp->out_of_order_queue,
+        head, skb, start, end);
+} else {
+    sum_tiny += range_truesize;
+    if (sum_tiny > sk->sk_rcvbuf >> 3)
+        return;
+} goto new_range;
}
+range_truesize += skb->truesize;
if (unlikely(before(TCP_SKB_CB(skb)->seq, start)))
start = TCP_SKB_CB(skb)->seq;
if (after(TCP_SKB_CB(skb)->end_seq, end))
@@ -4865,6 +4914,7 @@
    * 2) not add too big latencies if thousands of packets sit there.
    * (But if application shrinks SO_RCVBUF, we could still end up
    * freeing whole queue here)
+ * 3) Drop at least 12.5 % of sk_rcvbuf to avoid malicious attacks.
    *
    * Return true if queue has shrunk.
    */
@@ -4872,20 +4922,26 @@
{
    struct tcp_sock *tp = tcp_sk(sk);
    struct rb_node *node, *prev;
+int goal;

    if (RB_EMPTY_ROOT(&tp->out_of_order_queue))
        return false;

    NET_INC_STATS(sock_net(sk), LINUX_MIB_OFOPRUNED);
+goal = sk->sk_rcvbuf >> 3;
    node = &tp->ooo_last_skb->rbnode;
    do {
        prev = rb_prev(node);
        rb_erase(node, &tp->out_of_order_queue);
+goal -= rb_to_skb(node)->truesize;
        tcp_drop(sk, rb_to_skb(node));
        -sk_mem_reclaim(sk);
-        if (atomic_read(&sk->sk_rmem_alloc) <= sk->sk_rcvbuf &&
-            !tcp_under_memory_pressure(sk))
-            break;
+        if ('prev || goal <= 0) {
+            sk_mem_reclaim(sk);
+        if (atomic_read(&sk->sk_rmem_alloc) <= sk->sk_rcvbuf &&
+            !tcp_under_memory_pressure(sk))
+            break;
+        goal = sk->sk_rcvbuf >> 3;
+    };
    node = prev;
    } while (node);
    tp->ooo_last_skb = rb_to_skb(prev);
@@ -4920,6 +4976,9 @@
else if (tcp_under_memory_pressure(sk))
    tp->rcv_ssthresh = min(tp->rcv_ssthresh, 4U * tp->advmss);

+if (atomic_read(&sk->sk_rmem_alloc) <= sk->sk_rcvbuf)

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+return 0;
+
tcp_collapse_ofo_queue(sk);
if (!skb_queue_empty(&sk->sk_receive_queue))
tcp_collapse(sk, &sk->sk_receive_queue, NULL,
@@ -5420,6 +5479,8 @@
tcp_data_snd_check(sk);
if (!inet_csk_ack_scheduled(sk))
goto no_ack;
+} else {
+tcp_update_wl(tp, TCP_SKB_CB(skb)->seq);
}

__tcp_ack_snd_check(sk, 0);
@ @ -5696,7 +5757,7 @@
* to stand against the temptation 8)     --ANK
*/
inet_csk_schedule_ack(sk);
-tcp_enter_quickack_mode(sk);
+tcp_enter_quickack_mode(sk, TCP_MAX_QUICKACKS);
inet_csk_reset_xmit_timer(sk, ICSK_TIME_DACK,
TCP_DELACK_MAX, TCP_RTO_MAX);

@ @ -5823,11 +5884,13 @@
if (th->fin)
goto discard;
/* It is possible that we process SYN packets from backlog,
- * so we need to make sure to disable BH right there.
- * so we need to make sure to disable BH and RCU right there.
 */
+rcu_read_lock();
local_bh_disable();
acceptable = icsk->icsk_af_ops->conn_request(sk, skb) >= 0;
local_bh_enable();
+rcu_read_unlock();

if (!acceptable)
return 1;
@ @ -6308,7 +6371,13 @@
af_ops->send_synack(fastopen_sk, dst, &fl, req,
       &foc, TCP_SYNACK_FASTOPEN);
/* Add the child socket directly into the accept queue */
+inet_csk_reqsk_queue_add(sk, req, fastopen_sk);
+if (!inet_csk_reqsk_queue_add(sk, req, fastopen_sk)) {
+reqsk_fastopen_remove(fastopen_sk, req, false);
+bh_unlock_sock(fastopen_sk);
+sock_put(fastopen_sk);
+reqsk_put(req);
goto drop;
+
sk->sk_data_ready(sk);
bh_unlock_sock(fastopen_sk);
sock_put(fastopen_sk);
--- linux-4.15.0.orig/net/ipv4/tcp_ipv4.c
+++ linux-4.15.0/net/ipv4/tcp_ipv4.c
@@ -247,7 +247,7 @@
     inet->inet_daddr);
 }

-inet->inet_id = tp->write_seq ^ jiffies;
+inet->inet_id = prandom_u32();

if (tcp_fastopen_defer_connect(sk, &err))
    return err;
@@ -287,7 +287,7 @@
     dst = inet_csk_update_pmtu(sk, mtu);
     if (!dst)
         return;
@@ -455,7 +455,7 @@
     if (sk->sk_state == TCP_LISTEN)
         goto out;

     -tp->mtu_info = info;
     +WRITE_ONCE(tp->mtu_info, info);
     if (!sock_owned_by_user(sk)) {
         tcp_v4_mtu_reduced(sk);
     } else {
@@ -477,14 +477,15 @@
     if (sock_owned_by_user(sk))
         break;

     skb = tcp_rtx_queue_head(sk);
     +if (WARN_ON_ONCE(!skb))
     +break;
     +
     icsk->icsk_backoff--;
     icsk->icsk_rto = tp->srtt_us ? __tcp_set_rto(tp) :
TCP_TIMEOUT_INIT;
     icsk->icsk_rto = inet_csk_rto_backoff(icsk, TCP_RTO_MAX);

     skb = tcp_rtx_queue_head(sk);

BUG_ON(!skb);
-
tcp_mstamp_refresh(tp);
delta_us = (u32)(tp->tcp_mstamp - skb->skb_mstamp);
remaining = icsk->icsk_rto -
@@ -705,7 +706,8 @@
 */
 if (sk) {
 arg.bound_dev_if = sk->sk_bound_dev_if;
- trace_tcp_send_reset(sk, skb);
+ if (sk_fullsock(sk))
+ trace_tcp_send_reset(skb, skb);
 }

BUILD_BUG_ON(offsetof(struct sock, sk_bound_dev_if) !=
@@ -879,9 +881,11 @@
 if (skb) {
 __tcp_v4_send_check(skb, ireq->ir_loc_addr, ireq->ir_rmt_addr);
+ rcu_read_lock();
 err = ip_build_and_send_pkt(skb, sk, ireq->ir_loc_addr,
- ireq->ir_rmt_addr,
- ireq_opt_deref(ireq));
+ rcu_dereference(ireq->ireq_opt));
+rcu_read_unlock();
 err = net_xmit_eval(err);
 }
@@ -996,9 +1000,18 @@
 key = tcp_md5_do_lookup_exact(sk, addr, family, prefixlen);
 if (key) {
- /* Pre-existing entry - just update that one. */
+ /* Pre-existing entry - just update that one.
+ Note that the key might be used concurrently.
+ */
 memcpy(key->key, newkey, newkeylen);
- key->keylen = newkeylen;
+ /* Pairs with READ_ONCE() in tcp_md5_hash_key().
+ Also note that a reader could catch new key->keylen value
+ but old key->key[], this is the reason we use __GFP_ZERO
+ at sock_kmalloc() time below these lines.
+ */
+WRITE_ONCE(key->keylen, newkeylen);
+ return 0;
 }
rcu_assign_pointer(tp->md5sig_info, md5sig);
}

-key = sock_kmalloc(sk, sizeof(*key), gfp);  
+key = sock_kmalloc(sk, sizeof(*key), gfp | __GFP_ZERO);
if (!key)
    return -ENOMEM;
if (!tcp_alloc_md5sig_pool()) {
    @ @ -1369,7 +1382,7 @@
    inet_csk(newsk)->icsk_ext_hdr_len = 0;
    if (inet_opt)
        inet_csk(newsk)->icsk_ext_hdr_len = inet_opt->opt.optlen;
    -newinet->inet_id = newtp->write_seq ^ jiffies;
    +newinet->inet_id = prandom_u32();
}
if (dst) {
    dst = inet_csk_route_childSock(sk, newsk, req);
    int tcp_filter(struct sock *sk, struct sk_buff *skb)
    {
        struct tcphdr *th = (struct tcphdr *)skb->data;
        -unsigned int eaten = skb->len;
        -int err;
        -err = sk_filter_trim_cap(sk, skb, th->doff * 4);
        -if (!err) {
            -eaten -= skb->len;
            -TCP_SKB_CB(skb)->end_seq -= eaten;
        -}
        -return err;
        +return sk_filter_trim_cap(sk, skb, th->doff * 4);
    }
    EXPORT_SYMBOL(tcp_filter);
}

 requsk_put(req);
 goto discard_it;
}  
+if (tcp_checksum_complete(skb)) {
   +requsk_put(req);
   +goto csum_error;
+}
if (unlikely(sk->sk_state != TCP_LISTEN)) {
    inet_csk_reqsk_queue_drop_and_put(sk, req);
    goto lookup;
    @ @ -1944,13 +1954,14 @@
struct tcp_iter_state *st = seq->private;
struct net *net = seq_file_net(seq);
struct inet_listen_hashbucket *ilb;
+struct hlist_nulls_node *node;
struct sock *sk = cur;

if (!sk) {
  get_head:
  ilb = &tcp_hashinfo.listening_hash[st->bucket];
  spin_lock(&ilb->lock);
  -sk = sk_head(&ilb->head);
  +sk = sk_nulls_head(&ilb->nulls_head);
  st->offset = 0;
  goto get_sk;
}
@@ -1958,9 +1969,9 @@
  ++st->num;
  ++st->offset;

  -sk = sk_next(sk);
  +sk = sk_nulls_next(sk);
  get_sk:
  -sk_for_each_from(sk) {
  +sk_nulls_for_each_from(sk, node) {
    if (!net_eq(sock_net(sk), net))
      continue;
    if (sk->sk_family == st->family)
      @ @ -2085.6 +2096.7 @ @
  static void *tcp_seek_last_pos(struct seq_file *seq)
  {
    struct tcp_iter_state *st = seq->private;
    +int bucket = st->bucket;
    int offset = st->offset;
    int orig_num = st->num;
    void *rc = NULL;
    @ @ -2095.7 +2107.7 @ @
    break;
    st->state = TCP_SEQ_STATE_LISTENING;
    rc = listening_get_next(seq, NULL);
    -while (offset-- && rc)
    +while (offset-- && rc && bucket == st->bucket)
      rc = listening_get_next(seq, rc);
    if (rc)
      break;
    @ @ -2106.7 +2118.7 @ @
    if (st->bucket > tcp_hashinfo.ehash_mask)
      break;
    rc = established_get_first(seq);
-while (offset-- && rc)
+while (offset-- && rc && bucket == st->bucket)
rc = established_get_next(seq, rc);
}

@@ -2451,7 +2463,8 @@
{
int cpu;
-module_put(net->ipv4.tcp_congestion_control->owner);
+if (net->ipv4.tcp_congestion_control)
+module_put(net->ipv4.tcp_congestion_control->owner);

for_each_possible_cpu(cpu)
inet_ctl_sock_destroy(*per_cpu_ptr(net->ipv4.tcp_sk, cpu));
@@ -2474,6 +2487,12 @@
if (res)
goto fail;
sock_set_flag(sk, SOCK_USE_WRITE_QUEUE);
+
+/* Please enforce IP_DF and IPID==0 for RST and
+ * ACK sent in SYN-RECV and TIME-WAIT state.
+ */
+inet_sk(sk)->pmtudisc = IP_PMTUDISC_DO;
+*per_cpu_ptr(net->ipv4.tcp_sk, cpu) = sk;
}
@@ -2481,6 +2500,7 @@
net->ipv4.sysctl_tcp_ecn_fallback = 1;

net->ipv4.sysctl_tcp_base_mss = TCP_BASE_MSS;
-net->ipv4.sysctl_tcp_min_snd_mss = TCP_MIN_SND_MSS;
-net->ipv4.sysctl_tcp_probe_threshold = TCP_PROBE_THRESHOLD;
-net->ipv4.sysctl_tcp_probe_interval = TCP_PROBE_INTERVAL;

--- linux-4.15.0.orig/net/ipv4/tcp_minisocks.c
+++ linux-4.15.0/net/ipv4/tcp_minisocks.c
@@ -184,8 +184,9 @@
inet_twsk_deschedule_put(tw);
return TCP_TW_SUCCESS;
}
+} else {
+inet_twsk_reschedule(tw, TCP_TIMEWAIT_LEN);
+}
-inet_twsk_reschedule(tw, TCP_TIMEWAIT_LEN);

if (tmp_opt.saw_tstamp) {

tcptw->tw_ts_recent = tmp_opt.rcv_tsval;
--- linux-4.15.0.orig/net/ipv4/tcp_nv.c
+++ linux-4.15.0/net/ipv4/tcp_nv.c
@ @ -364,7 +364,7 @@
 /*
 cwnd_by_slope = (u32)
 div64_u64(((u64)ca->nv_rtt_max_rate) * ca->nv_min_rtt,
- (u64)(80000 * tp->mss_cache));
+ 80000ULL * tp->mss_cache);
 max_win = cwnd_by_slope + nv_pad;

 /* If cwnd > max_win, decrease cwnd
--- linux-4.15.0.orig/net/ipv4/tcp_output.c
+++ linux-4.15.0/net/ipv4/tcp_output.c
@ @ -60,6 +60,9 @@
 skb_unlink(skb, &sk->sk_write_queue);
tcp_rbtree_insert(&sk->tcp_rtx_queue, skb);
+if (tp->highest_sack == NULL)
+tp->highest_sack = skb;
+
tp->packets_out += tcp_skb_pcount(skb);
if (!prior_packets || icsk->icsk_pending == ICSK_TIME_LOSS_PROBE)
tcp_rearm_rto(sk);
@ @ -160,27 +163,17 @@
}

/* Account for an ACK we sent. */
-staticmethod void tcp_event_ack_sent(struct sock *sk, unsigned int pkts)
+static inline void tcp_event_ack_sent(struct sock *sk, unsigned int pkts,
+ u32 rcv_nxt)
{
+struct tcp_sock *tp = tcp_sk(sk);
+
+if (unlikely(rcv_nxt != tp->rcv_nxt))
+return; /* Special ACK sent by DCTCP to reflect ECN */
tcp_dec_quickack_mode(sk, pkts);
inet_csk_clear_xmit_timer(sk, ICSK_TIME_DACK);
}

-u32 tcp_default_init_rwnd(u32 mss)
{
 /* Initial receive window should be twice of TCP_INIT_CWND to
  * enable proper sending of new unsent data during fast recovery
  * (RFC 3517, Section 4, NextSeg() rule (2)). Further place a
  * limit when mss is larger than 1460.
  */

- u32 init_rwnd = TCP_INIT_CWND * 2;
-
- if (mss > 1460)
- init_rwnd = max((1460 * init_rwnd) / mss, 2U);
- return init_rwnd;
- }
-
/* Determine a window scaling and initial window to offer.
 * Based on the assumption that the given amount of space
 * will be offered. Store the results in the tp structure.
@@ -215,7 +208,10 @@*/
if (sock_net(sk)->ipv4.sysctl_tcp_workaround_signed_windows)
(*rcv_wnd) = min(space, MAX_TCP_WINDOW);
else
-(*rcv_wnd) = space;
+(*rcv_wnd) = min_t(u32, space, U16_MAX);
+
+if (init_rcv_wnd)
+*rcv_wnd = min(*rcv_wnd, init_rcv_wnd * mss);

>(*rcv_wscale) = 0;
if (wscale_ok) {
 @@ -229,12 +225,6 @@
}
}
-
- if (mss > (1 << *rcv_wscale)) {
- if (!init_rcv_wnd) /* Use default unless specified otherwise */
- init_rcv_wnd = tcp_default_init_rwnd(mss);
- *rcv_wnd = min(*rcv_wnd, init_rcv_wnd * mss);
- }
-
/* Set the clamp no higher than max representable value */
(*window_clamp) = min_t(__u32, U16_MAX << (*rcv_wscale), *window_clamp);
}
@@ -650,7 +640,8 @@
unsigned int mss, struct sk_buff *skb,
 struct tcp_out_options *opts,
 const struct tcp_md5sig_key *md5,
- struct tcp_fastopen_cookie *foc)
+ struct tcp_fastopen_cookie *foc,
+ enum tcp_synack_type synack_type)
{
 struct inet_request_sock *ireq = inet_rsk(req);
 unsigned int remaining = MAX_TCP_OPTION_SPACE;
@@ -665,7 +656,8 @@
 * rather than TS in order to fit in better with old,
 * buggy kernels, but that was deemed to be unnecessary.
ireq->tstamp_ok &= !ireq->sack_ok;
+if (synack_type != TCP_SYNACK_COOKIE)
+ireq->tstamp_ok &= !ireq->sack_ok;
}
#endif

@@ -744,8 +736,9 @@
      (remaining - TCPOLEN_SACK_BASE_ALIGNED) / TCPOLEN_SACK_PERBLOCK);
    -size += TCPOLEN_SACK_BASE_ALIGNED +
    -opts->num_sack_blocks * TCPOLEN_SACK_PERBLOCK;
    +if (likely(opts->num_sack_blocks))
    +size += TCPOLEN_SACK_BASE_ALIGNED +
    +opts->num_sack_blocks * TCPOLEN_SACK_PERBLOCK;
    }

return size;
@@ -1031,8 +1024,8 @@
* We are working here with either a clone of the original
* SKB, or a fresh unique copy made by the retransmit engine.
*/
-static int tcp_transmit_skb(struct sock *sk, struct sk_buff *skb, int clone_it,
- gfp_t gfp_mask)
+static int __tcp_transmit_skb(struct sock *sk, struct sk_buff *skb,
+    int clone_it, gfp_t gfp_mask, u32 rcv_nxt)
{
    const struct inet_connection_sock *icsk = inet_csk(sk);
    struct inet_sock *inet;
    @@ -1108,7 +1101,7 @@
        th->source = inet->inet_sport;
        th->dest = inet->inet_dport;
        th->seq = htonl(tcb->seq);
    -th->ack_seq = htonl(tp->rcv_nxt);
    +th->ack_seq = htonl(rcv_nxt);
    /*(((__be16 *)th) + 6)=htons(((tcp_header_size >> 2) << 12) |
        tcb->tcp_flags);
    
    @@ -1149,7 +1142,7 @@
        icsk->icsk_af_ops->send_check(sk, skb);

        if (likely(tcb->tcp_flags & TCPHDR_ACK))
            -tcp_event_ack_sent(sk, tcp_skb_pcount(skb));
            +tcp_event_ack_sent(sk, tcp_skb_pcount(skb), rcv_nxt);

        if (skb->len != tcp_header_size) {
            tcp_event_data_sent(tp, sk);
@@ -1186,6 +1179,13 @@
    return err;
 }

+static int tcp_transmit_skb(struct sock *sk, struct sk_buff *skb, int clone_it,
+    gfp_t gfp_mask)
+{
+    return __tcp_transmit_skb(sk, skb, clone_it, gfp_mask,
+        tcp_sk(sk)->rcv_nxt);
+}
+
+/* This routine just queues the buffer for sending.
+ * NOTE: probe0 timer is not checked, do not forget tcp_push_pending_frames,
+ @ @ -1299,6 +1299,7 @@
    struct tcp_sock *tp = tcp_sk(sk);
    struct sk_buff *buff;
    int nsize, old_factor;
+    long limit;
    int nlen;
    u8 flags;

@@ -1299,6 +1299,7 @@
    if (nsize < 0)
        nsize = 0;

+/* tcp_sendmsg() can overshoot sk_wmem_queued by one full size skb.
+ * We need some allowance to not penalize applications setting small
+ * SO_SNDBUF values.
+ * Also allow first and last skb in retransmit queue to be split.
+ */
+    limit = sk->sk_sndbuf + 2 * SKB_TRUESIZE(GSO_MAX_SIZE);
+    if (unlikely((sk->sk_wmem_queued >> 1) > limit &&
+        tcp_queue != TCP_FRAG_IN_WRITE_QUEUE &&
+        skb != tcp_rtx_queue_head(sk) &&
+        skb != tcp_rtx_queue_tail(sk))) {
+        NET_INC_STATS(sock_net(sk), LINUX_MIB_TCPWQUEUETOOBIG);
+        return -ENOMEM;
+    }
+    if (skb_unclone(skb, gfp))
        return -ENOMEM;

@@ -1479,8 +1494,7 @@
    mss_now -= icsk->icsk_ext_hdr_len;
    /* Then reserve room for full set of TCP options and 8 bytes of data */
    -if (mss_now < 48)
- mss_now = 48;
+ mss_now = max(mss_now, sock_net(sk)->ipv4.sysctl_tcp_min_snd_mss);
return mss_now;
}

@@ -1491,6 +1505,7 @@
return __tcp_mtu_to_mss(sk, pmtu) -
    (tcp_sk(sk)->tcp_header_len - sizeof(struct tcphdr));
}  
+EXPORT_SYMBOL(tcp_mtu_to_mss);

/* Inverse of above */
int tcp_mss_to_mtu(struct sock *sk, int mss)
@@ -1641,7 +1656,8 @@
    tp->packets_out > tp->max_packets_out ||
    is_cwnd_limited) {
        tp->max_packets_out = tp->packets_out;
-    tp->max_packets_seq = tp->snd_nxt;
-    tp->is_cwnd_limited = is_cwnd_limited;
+    tp->max_packets_seq = tp->snd_nxt;
+    tp->is_cwnd_limited = is_cwnd_limited;
@@ -1730,7 +1746,7 @@
    */
    segs = max_t(u32, bytes / mss_now, min_tso_segs);

-    return min_t(u32, segs, sk->sk_gso_max_segs);
+    return min_t(u32, segs, sk->sk_gso_max_segs);
+return segs;
}  
EXPERIMENTAL_SYMBOL(tcp_tso_autosize);

@@ -1742,9 +1758,10 @@
    const struct tcp_congestion_ops *ca_ops = inet_csk(sk)->icsk_ca_ops;
    u32 tso_segs = ca_ops->tso_segs_goal ? ca_ops->tso_segs_goal : 0;

-    return tso_segs ? :
-    tcp_tso_autosize(sk, mss_now,  
-    sock_net(sk)->ipv4.sysctl_tcp_min_tso_segs);
+    if (!tso_segs)
+    tso_segs = tcp_tso_autosize(sk, mss_now,  
+    sock_net(sk)->ipv4.sysctl_tcp_min_tso_segs);
+    return min_t(u32, tso_segs, sk->sk_gso_max_segs);
    }

    /* Returns the portion of skb which can be sent right away */
@@ -1922,7 +1939,9 @@
    * This algorithm is from John Heffner.
static bool tcp_tso_should_defer(struct sock *sk, struct sk_buff *skb,
- bool *is_cwnd_limited, u32 max_segs)
+ bool *is_cwnd_limited,
+ bool *is_rwnd_limited,
+ u32 max_segs)
{
    const struct inet_connection_sock *icsk = inet_csk(sk);
    u32 age, send_win, cong_win, limit, in_flight;
    @@ -1930,9 +1949,6 @@
    struct sk_buff *head;
    int win_divisor;

    -if (TCP_SKB_CB(skb)->tcp_flags & TCPHDR_FIN)
    -goto send_now;
    -
    if (icsk->icsk_ca_state >= TCP_CA_Recovery)
    goto send_now;

@@ -1990,10 +2006,27 @@
    if (age < (tp->srtt_us >> 4))
    goto send_now;

    /* Ok, it looks like it is advisable to defer. */
    +/- Ok, it looks like it is advisable to defer.
    +/- Three cases are tracked:
    +/- 1) We are cwnd-limited
    +/- 2) We are rwnd-limited
    +/- 3) We are application limited.
    +/-
    +if (cong_win < send_win) {
        +if (cong_win <= skb->len) {
            +*is_cwnd_limited = true;
            +return true;
        +}
        +} else {
            +if (send_win <= skb->len) {
                +*is_rwnd_limited = true;
                +return true;
            +}
        +}
    -if (cong_win < send_win && cong_win <= skb->len)
        -*is_cwnd_limited = true;
    +/* If this packet won’t get more data, do not wait. */
    +if (TCP_SKB_CB(skb)->tcp_flags & TCPPH_HDR_FIN)
        +goto send_now;
return true;

@@ -2026,6 +2059,24 @@
 }
 }

+static bool tcp_can_coalesce_send_queue_head(struct sock *sk, int len)
+{
+    struct sk_buff *skb, *next;
+    skb = tcp_send_head(sk);
+    tcp_for_write_queue_from_safe(skb, next) {
+        if (len <= skb->len)
+            break;
+        if (unlikely(TCP_SKB_CB(skb)->eor) || tcp_has_tx_tstamp(skb))
+            return false;
+        len -= skb->len;
+    }
+    return true;
+}
+
/* Create a new MTU probe if we are ready.
 * MTU probe is regularly attempting to increase the path MTU by
 * deliberately sending larger packets. This discovers routing
@@ -2098,6 +2149,9 @@
 return 0;
 }

+if (!tcp_can_coalesce_send_queue_head(sk, probe_size))
+    return -1;
+
/* We're allowed to probe. Build it now. */
nskb = sk_stream_alloc_skb(sk, probe_size, GFP_ATOMIC, false);
if (!nskb)
@@ -2133,6 +2187,11 @@
 /* We've eaten all the data from this skb.
 * Throw it away. */
 TCP_SKB_CB(nskb)->tcp_flags |= TCP_SKB_CB(skb)->tcp_flags;
+/* If this is the last SKB we copy and eor is set
+ * we need to propagate it to the new skb.
+ */
+TCP_SKB_CB(nskb)->eor = TCP_SKB_CB(skb)->eor;
+tcp_skb_collapse_tstamp(nskb, skb);
+tcp_unlink_write_queue(skb, sk);
sk_wmem_free_skb(sk, skb);
if (!push_one &&
    tcp_tso_should_defer(sk, skb, &is_cwnd_limited,
    - max_segs))
+ &is_rwnd_limited, max_segs))
break;
}

if (tcp_small_queue_check(sk, skb, 0))
break;

/* Argh, we hit an empty skb(), presumably a thread
 + * is sleeping in sendmsg()/sk_stream_wait_memory().
 + * We do not want to send a pure-ack packet and have
 + * a strange looking rtx queue with empty packet(s).
 + */
+if (TCP_SKB_CB(skb)->end_seq == TCP_SKB_CB(skb)->seq)
+break;
+
if (unlikely(tcp_transmit_skb(sk, skb, 1, gfp)))
break;

/* Send one loss probe per tail loss episode. */
if (push_one != 2)
tcp_schedule_loss_probe(sk, false);

/* is_cwnd_limited |= (tcp_packets_in_flight(tp) >= tp->snd_cwnd);
 + if (likely(sent_pkts || is_cwnd_limited))
 + tcp_cwnd_validate(sk, is_cwnd_limited);
 +
 if (likely(sent_pkts)) {
 if (tcp_in_cwnd_reduction(sk))
 tp->prr_out += sent_pkts;
 @@ -2392,8 +2463,6 @@
 /* Send one loss probe per tail loss episode. */
 if (push_one != 2)
tcp_schedule_loss_probe(sk, false);
-is_cwnd_limited |= (tcp_packets_in_flight(tp) >= tp->snd_cwnd);
-tcp_cwnd_validate(sk, is_cwnd_limited);
return false;
}
return !tp->packets_out && !tcp_write_queue_empty(sk);
@@ -2414,15 +2483,12 @@

early_retrans = sock_net(sk)->ipv4.sysctl_tcp_early_retrans;


/* Schedule a loss probe in 2*RTT for SACK capable connections
 * in Open state, that are either limited by cwnd or application.
 * not in loss recovery, that are either limited by cwnd or application.
 */
if ((early_retrans != 3 && early_retrans != 4) ||
    !tp->packets_out || !tcp_is_sack(tp) ||
    !icsk->icsk_ca_state != TCP_CA_Open)
  return false;
-
-if ((tp->snd_cwnd > tcp_packets_in_flight(tp)) &&
    tcp_write_queue_empty(sk))
+  (icsk->icsk_ca_state != TCP_CA_Open &&
+    icsk->icsk_ca_state != TCP_CA_CWR))
return false;

/* Probe timeout is 2*rtt. Add minimum RTO to account
@@ -2476,6 +2542,11 @@

int pcount;
int mss = tcp_current_mss(sk);

+/* At most one outstanding TLP */
+if (tp->tlp_high_seq)
+  goto rearm_timer;
+
+tp->tlp_retrans = 0;
skb = tcp_send_head(sk);
if (skb && tcp_snd wnd_test(tp, skb, mss)) {
  pcount = tp->packets_out;
 adopting rebate on sk_rtx_queue;

 // At most one outstanding TLP retransmission. */
-if (tp->tlp_high_seq)
  goto rearm_timer;
-
-/* Retransmit last segment. */
-if (WARN_ON(!skb))
  goto rearm_timer;
+if (unlikely(!skb)) {
+  WARN_ONCE(tp->packets_out,
+    "invalid inflight: %u state %u cwnd %u mss %d\n",
+    tp->packets_out, sk->sk_state, tp->snd_cwnd, mss);
+  inet_csk(sk)->icsk_pending = 0;
+  return;
+}

if (skb_still_in_host_queue(sk, skb))
goto rearm_timer;
@@ -2515,10 +2586,12 @@
if (__tcp_retransmit_skb(sk, skb, 1))
goto rearm_timer;

+tp->tlp_retrans = 1;
+
+probe_sent:
/* Record snd_nxt for loss detection. */
tp->tlp_high_seq = tp->snd_nxt;

-probe_sent:
NET_INC_STATS(sock_net(sk), LINUX_MIB_TCPLOSSPROBES);
/* Reset s.t. tcp_rearm_rto will restart timer from now */
inet_csk(skb)->icsk_pending = 0;
@@ -2718,7 +2791,7 @@
if (next_skb_size <= skb_availroom(skb))
 skb_copy_bits(next_skb, 0, skb_put(skb, next_skb_size),
  next_skb_size);
-else if (!skb_shift(skb, next_skb, next_skb_size))
+else if (!tcp_skb_shift(skb, next_skb, 1, next_skb_size))
 return false;
 }
tcp_highest_sack_replace(sk, next_skb, skb);
@@ -2836,8 +2909,10 @@
return -EBUSY;

if (before(TCP_SKB_CB(skb)->seq, tp->snd_una)) {
- if (before(TCP_SKB_CB(skb)->end_seq, tp->snd_una))
- BUG();
+ if (unlikely(before(TCP_SKB_CB(skb)->end_seq, tp->snd_una))) {
  +WARN_ON_ONCE(1);
  +return -EINVAL;
  +}
if (tcp_trim_head(sk, skb, tp->snd_una - TCP_SKB_CB(skb)->seq))
 return -ENOMEM;
}
@@ -2911,7 +2986,7 @@
TCP_SKB_CB(skb)->sacked |= TCPCB_EVER_RETRANS;
 trace_tcp_retransmit_skb(sk, skb);
} else if (err != -EBUSY) {
- NET_INC_STATS(sock_net(sk), LINUX_MIB_TCPRETRANSFAIL);
+ NET_ADD_STATS(sock_net(sk), LINUX_MIB_TCPRETRANSFAIL, segs);
}
return err;
}
@@ -3145,6 +3220,7 @@
if (!nskb)
return -ENOMEM;
INIT_LIST_HEAD(&nskb->tcp_tsorted_anchor);
+tcp_highest_sack_replace(sk, skb, nskb);
tcp_rtx_queue_unlink_and_free(skb, sk);
_skb_header_release(nskb);
tcp_rbtree_insert(&sk->tcp_rtx_queue, nskb);
@@ -3225,7 +3301,7 @@
#endif
skb_set_hash(skb, tcp_rsk(req)->txhash, PKT_HASH_TYPE_L4);
tcp_header_size = tcp_synack_options(sk, req, mss, skb, &opts, md5,
-    foc) + sizeof(*th);
+    foc, synack_type) + sizeof(*th);

skb_push(skb, tcp_header_size);
skb_reset_transport_header(skb);
@@ -3341,6 +3417,7 @@
sock_reset_flag(sk, SOCK_DONE);
tp->snd_wnd = 0;
tcp_init_wl(tp, 0);
+tcp_write_queue_purge(sk);
tp->snd_una = tp->write_seq;
tp->snd_sml = tp->write_seq;
tp->snd_up = tp->write_seq;
@@ -3529,8 +3606,6 @@
int ato = icsk->icsk_ack.ato;
unsigned long timeout;
-tcp_ca_event(sk, CA_EVENT_DELAYED_ACK);
-
if (ato > TCP_DELACK_MIN) {
    const struct tcp_sock *tp = tcp_sk(sk);
    int max_ato = HZ / 2;
    @@ -3579,7 +3654,7 @@
}
/* This routine sends an ack and also updates the window. */
-void tcp_send_ack(struct sock *sk)
+void __tcp_send_ack(struct sock *sk, u32 rcv_nxt)
{
    struct sk_buff *buff;

    @@ -3587,8 +3662,6 @@
if (sk->sk_state == TCP_CLOSE)
return;
-tcp_ca_event(sk, CA_EVENT_NON_DELAYED_ACK);
-
/* We are not putting this on the write queue, so
* tcp_transmit_skb() will set the ownership to this
* sock.
@@ -3614,9 +3687,14 @@
skb_set_tcp_pure_ack(buff);
/* Send it off, this clears delayed acks for us. */
- tcp_transmit_skb(sk, buff, 0, (__force gfp_t)0);
+ __tcp_transmit_skb(sk, buff, 0, (__force gfp_t)0, rcv_nxt);
+}
+EXPORT_SYMBOL_GPL(__tcp_send_ack);
+
+void tcp_send_ack(struct sock *sk)
+{
+ __tcp_send_ack(sk, tcp_sk(sk)->rcv_nxt);
+}
+EXPORT_SYMBOL_GPL(tcp_send_ack);

/* This routine sends a packet with an out of date sequence
 * number. It assumes the other end will try to ack it.
--- linux-4.15.0.orig/net/ipv4/tcp_recovery.c
+++ linux-4.15.0/net/ipv4/tcp_recovery.c
@@ -90,13 +90,13 @@
}
- void tcp_rack_mark_lost(struct sock *sk)
+ bool tcp_rack_mark_lost(struct sock *sk)
+ {
 struct tcp_sock *tp = tcp_sk(sk);
 u32 timeout;

 if (!tp->rack.advanced)
- return;
+ return false;

 /* Reset the advanced flag to avoid unnecessary queue scanning */
 tp->rack.advanced = 0;
@@ -106,6 +106,7 @@
 inet_csk_reset_xmit_timer(sk, ICSK_TIME_REO_TIMEOUT,
- timeout, inet_csk(sk)->icsk_rto);
+ } 
+ return !!timeout;
+ }

 /* Record the most recently (re)sent time among the (s)acked packets
--- linux-4.15.0.orig/net/ipv4/tcp_timer.c
+++ linux-4.15.0/net/ipv4/tcp_timer.c
@@ -34,6 +34,7 @@
sk->sk_err = sk->sk_err_soft ? ETIMEDOUT;
sk->sk_error_report(sk);

+tcp_write_queue_purge(sk);
tcp_done(sk);
__NET_INC_STATS(sock_net(sk), LINUX_MIB_TCPABORTONTIMEOUT);
}
@@ -136,6 +137,7 @@
mss = tcp_mtu_to_mss(sk, icsk->icsk_ntup.search_low) >> 1;
mss = min(net->ipv4.sysctl_tcp_base_mss, mss);
mss = max(mss, 68 - tcp_sk(sk)->tcp_header_len);
+mss = max(mss, net->ipv4.sysctl_tcp_min_snd_mss);
icsk->icsk_ntup.search_low = tcp_mss_to_mtu(sk, mss);
}
tcp_sync_mss(sk, icsk->icsk_pmtu_cookie);
@@ -359,7 +361,7 @@
return;
}

-if (icsk->icsk_probes_out > max_probes) {
+if (icsk->icsk_probes_out >= max_probes) {
abort: tcp_write_err(sk);
} else {
/* Only send another probe if we didn’t close things up. */
@@ -424,10 +426,8 @@
/*
return;
}
-if (!tp->packets_out)
-goto out;
-
-WARN_ON(tcp_rtx_queue_empty(sk));
+if (!tp->packets_out || WARN_ON_ONCE(tcp_rtx_queue_empty(sk)))
+return;

tp->tlp_high_seq = 0;
@@ -465,11 +465,12 @@
goto out_reset_timer;
}

+__NET_INC_STATS(sock_net(sk), LINUX_MIB_TCPTIMEOUTS);
if (tcp_write_timeout(sk))
goto out;

if (icsk->icsk_retransmits == 0) {
-int mib_idx;
+int mib_idx = 0;

if (icsk->icsk_ca_state == TCP_CA_Recovery) {
  if (tcp_is_sack(tp))
@@ -484,10 +485,9 @@
    mib_idx = LINUX_MIB_TCPSACKFAILURES;
  else
    mib_idx = LINUX_MIB_TCPRENOFAILURES;
-}  else {
-    mib_idx = LINUX_MIB_TCPTIMEOUTS;
}  
-__NET_INC_STATS(sock_net(sk), mib_idx);
+if (mib_idx)
+  __NET_INC_STATS(sock_net(sk), mib_idx);
}

tcp_enter_loss(sk);
--- linux-4.15.0.orig/net/ipv4/tcp_ulp.c
+++ linux-4.15.0/net/ipv4/tcp_ulp.c
@@ -39,7 +39,7 @@
#ifdef CONFIG_MODULES
if (!ulp && &capable(CAP_NET_ADMIN)) {
  rcu_read_unlock();
-    request_module("%s", name);
+    request_module("tcp-ulp-%s", name);
  rcu_read_lock();
  ulp = tcp_ulp_find(name);
}  
@@ -108,6 +108,8 @@
if (icsk->icsk_ulp_ops->release)
  icsk->icsk_ulp_ops->release(sk);
  module_put(icsk->icsk_ulp_ops->owner);
+
  icsk->icsk_ulp_ops = NULL;
}

/* Change upper layer protocol for socket */
--- linux-4.15.0.orig/net/ipv4/udp.c
+++ linux-4.15.0/net/ipv4/udp.c
@@ -413,13 +413,13 @@
  bool dev_match = (sk->sk_bound_dev_if == dif ||
    sk->sk_bound_dev_if == sdif);

-  if (exact_dif & & !dev_match)
+  if (!dev_match)
    return -1;
-  if (sk->sk_bound_dev_if & & dev_match)
+  if (sk->sk_bound_dev_if)
    score += 4;
if (sk->sk_incoming_cpu == raw_smp_processor_id())
+if (READ_ONCE(sk->sk_incoming_cpu) == raw_smp_processor_id())
  score++;
  return score;
}
@@ -563,7 +563,11 @@
 struct sock *udp4_lib_lookup_skb(struct sk_buff *skb,
    __be16 sport, __be16 dport)
 {
-  return __udp4_lib_lookup_skb(skb, sport, dport, &udp_table);
+  const struct iphdr *iph = ip_hdr(skb);
+  return __udp4_lib_lookup(dev_net(skb->dev), iph->saddr, sport,
+    iph->daddr, dport, inet_iif(skb),
+    inet_sdif(skb), &udp_table, NULL);
 }}
EXPORT_SYMBOL_GPL(udp4_lib_lookup_skb);
@@ -878,7 +882,7 @@
 __be16 dport;
 u8  tos;
 int err, is_udplite = IS_UDPLITE(skb);
-  int corkreq = up->corkflag || msg->msg_flags&MSG_MORE;
+  int corkreq = READ_ONCE(up->corkflag) || msg->msg_flags&MSG_MORE;
  int (*getfrag)(void *, char *, int, int, int, struct sk_buff *);
  struct sk_buff *skb;
  struct ip_options_data opt_copy;
@@ -978,8 +982,10 @@
 sock_tx_timestamp(sk, ipc.sockc.tsflags, &ipc.tx_flags);
 if (ipc.opt && ipc.opt->opt.srr) {
-  if (!daddr)
-    -EINVAL;
+  if (!daddr) {
+    err = -EINVAL;
+    goto out_free;
+  }
  faddr = ipc.opt->opt.faddr;
  connected = 0;
  }
@@ -1087,6 +1093,7 @@
 out:
  ip_rt_put(rt);
  out_free:
  if (free)
kfree(ipc.opt);
if (!err)
@@ -1158,7 +1165,7 @@
}

up->len += size;
-if (!(up->corkflag || (flags&MSG_MORE)))
+if (!(READ_ONCE(up->corkflag) || (flags&MSG_MORE)))
ret = udp_push_pending_frames(sk);
if (!ret)
ret = size;
@@ -1188,6 +1195,20 @@
scratch->_tsize_state |= UDP_SKB_IS_STATELESS;
}

+static void udp_skb_csumunnecessary_set(struct sk_buff *skb)
+{
+ /* We come here after udp_lib_checksum_complete() returned 0.
+ * This means that skb_checksum_complete() might have
+ * set skb->csum_valid to 1.
+ * On 64bit platforms, we can set csum_unnecessary
+ * to true, but only if the skb is not shared.
+ */
+ +#if BITS_PER_LONG == 64
+if (!skb_shared(skb))
+udp_skb_scratch(skb)->csum_unnecessary = true;
+ +#endif
+
+
+static int udp_skb_truesize(struct sk_buff *skb)
+{
return udp_skb_scratch(skb)->_tsize_state & ~UDP_SKB_IS_STATELESS;
@@ -1209,7 +1338,7 @@
if (likely(partial)) {
up->forward_deficit += size;
size = up->forward_deficit;
- if (size < (sk->sk_rcvbuf >> 2))
+ if (size < (unsigned int)(sk->sk_rcvbuf) >> 2) &&
 + skb_queue_empty(&up->reader_queue))
return;
} else {
size += up->forward_deficit;
@@ -1316,7 +1338,7 @@
 * queue contains some other skb
 */
 rmem = atomic_add_return(size, &sk->sk_rmem_alloc);
- if (rmem > (size + sk->sk_rcvbuf))
+ if (rmem > (size + unsigned int)(sk->sk_rcvbuf))
goto uncharge_drop;

spin_lock(&list->lock);
@@ -1422,10 +1444,7 @@
    *total += skb->truesize;
    kfree_skb(skb);
  } else {
    /* the csum related bits could be changed, refresh
    * the scratch area
    */
-    udp_set_dev_scratch(skb);
+    udp_skb_csum_unnecessary_set(skb);
    break;
  }
@@ -1449,7 +1468,7 @@
    spin_lock_bh(&rcvq->lock);
    skb = __first_packet_length(sk, rcvq, &total);
    -if (!skb && !skb_queue_empty(sk_queue)) {
+    if (!skb && !skb_queue_empty_lockless(sk_queue)) {
      spin_lock(&sk_queue->lock);
      skb_queue_splice_tail_init(sk_queue, rcvq);
      spin_unlock(&sk_queue->lock);
-    @@ -1524,7 +1543,7 @@
      return skb;
    }
    -if (skb_queue_empty(sk_queue)) {
+    if (skb_queue_empty_lockless(sk_queue)) {
      spin_unlock_bh(&queue->lock);
      goto busy_check;
    }
    @@ -1551,7 +1570,7 @@
    break;

    sk_busy_loop(sk, flags & MSG_DONTWAIT);
-} while (!skb_queue_empty(sk_queue));
+} while (!skb_queue_empty_lockless(sk_queue));

    /* skb_queue is empty, reader_queue may contain peeked packets */
    @@ -1561,7 +1580,7 @@
    *err = error;
    return NULL;
  }
-EXPORT_SYMBOL_GPL(__skb_recv_udp);
+EXPORT_SYMBOL(__skb_recv_udp);
/*
 * This should be easy, if there is something there we
 * @ @ -1875,7 +1894,7 @@
 /*
 * UDP-Lite specific tests, ignored on UDP sockets
 */
-if ((is_udplite & UDPLITE_RECV_CC) && UDP_SKB_CB(skb)->partial_cov) {
+if ((up->pcflag & UDPLITE_RECV_CC) && UDP_SKB_CB(skb)->partial_cov) {

/*
 * MIB statistics other than incrementing the error count are
 * @ @ -2031,13 +2050,56 @@
 err = udplite_checksum_init(skb, uh);
 if (err)
 return err;
 +
+if (UDP_SKB_CB(skb)->partial_cov) {
+skb->csum = inet_compute_pseudo(skb, proto);
+return 0;
+}
 }
 */

/* Note, we are only interested in != 0 or == 0, thus the
 * force to int.
 */
-return (__force int)skb_checksum_init_zero_check(skb, proto, uh->check,
 -inet_compute_pseudo);
+err = (__force int)skb_checksum_init_zero_check(skb, proto, uh->check,
 +inet_compute_pseudo);
+if (err)
+return err;
 +
+if (skb->ip_summed == CHECKSUM_COMPLETE && !skb->csum_valid) {
+/* If SW calculated the value, we know it's bad */
+if (skb->csum_complete_sw)
+return 1;
+
+/* HW says the value is bad. Let's validate that.
 + * skb->csum is no longer the full packet checksum,
 + * so don't treat it as such.
 + */
+skb_checksum_complete_unset(skb);
+}
 +
+return 0;
+}
/** wrapper for udp_queue_rcv_skb tacking care of csum conversion and
+ * return code conversion for ip layer consumption
+ */
+static int udp_unicast_rcv_skb(struct sock *sk, struct sk_buff *skb,
+   struct udphdr *uh)
+{
+  int ret;
+  
+  if (inet_get_convert_csum(sk) && uh->check && !IS_UDPLITE(sk))
+    skb_checksum_try_convert(skb, IPPROTO_UDP, uh->check,
+                  inet_compute_pseudo);
+  
+  ret = udp_queue_rcv_skb(sk, skb);
+  
+  /* a return value > 0 means to resubmit the input, but
+     * it wants the return to be -protocol, or 0
+     */
+  if (ret > 0)
+    return -ret;
+  return 0;
+}

// -2086,14 +2148,9 @@
if (unlikely(sk->sk_rx_dst != dst))
  udp_sk_rx_dst_set(skb, dst);

-ret = udp_queue_rcv_skb(sk, skb);
+ret = udp_unicast_rcv_skb(sk, skb, uh);
sock_put(skb);
  
  /* a return value > 0 means to resubmit the input, but
  * it wants the return to be -protocol, or 0
  */
  -if (ret > 0)
  -return -ret;
  -return 0;
  +return ret;
}

if (rt->rt_flags & (RTCF_BROADCAST|RTCF_MULTICAST))
  @@ -2101,22 +2158,8 @@
saddr, daddr, udptable, proto);

  sk = __udp4_lib_lookup_skb(skb, uh->source, uh->dest, udptable);
  
  -if (sk) {
  -  int ret;
  -  
  -  -if (inet_get_convert_csum(sk) && uh->check && !IS_UDPLITE(sk))
- skb_checksum_try_convert(skb, IPPROTO_UDP, uh->check,
  - inet_compute_pseudo);
-
- ret = udp_queue_rcv_skb(sk, skb);
-
- /* a return value > 0 means to resubmit the input, but
-  * it wants the return to be -protocol, or 0
-  */
- if (ret > 0)
-  return -ret;
- return 0;
-
+ if (sk)
+ return udp_unicast_rcv_skb(sk, skb, uh);

if (!xfrm4_policy_check(NULL, XFRM_POLICY_IN, skb))
goto drop;
@@ -2278,7 +2321,8 @@
*/
if (!inet_sk(sk)->inet_daddr && in_dev)
return ip_mc_validate_source(skb, iph->daddr,
  - iph->saddr, iph->tos,
  + iph->saddr,
  + iph->tos & IPTOS_RT_MASK,
    skb->dev, in_dev, &itag);
}
return 0;
@@ -2293,6 +2337,9 @@
{
  struct udp_sock *up = udp_sk(sk);
  bool slow = lock_sock_fast(sk);
  + /* protects from races with udp_abort() */
  + sock_set_flag(sk, SOCK_DEAD);
  udp_flush_pending_frames(sk);
  unlock_sock_fast(sk, slow);
  if (static_key_false(&udp_encap_needed) && up->encap_type) {
    switch (optname) {
      case UDP_CORK:
        if (val != 0) {
          -up->corkflag = 1;
          +WRITE_ONCE(up->corkflag, 1);
        } else {
          -up->corkflag = 0;
          +WRITE_ONCE(up->corkflag, 0);
          lock_sock(sk);
          push_pending_frames(sk);
release_sock(sk);
@@ -2435,7 +2482,7 @@

switch (optname) {
  case UDP_CORK:
-    val = up->corkflag;
+    val = READ_ONCE(up->corkflag);
    break;

  case UDP_ENCAP:
-    @ @ -2507,7 +2554,7 @ @
+    unsigned int mask = datagram_poll(file, sock, wait);
  struct sock *sk = sock->sk;

-    if (!skb_queue_empty(&udp_sk(sk)->reader_queue))
+    if (!skb_queue_empty_lockless(&udp_sk(sk)->reader_queue))
      mask |= POLLIN | POLLRDNORM;

  sock_rps_record_flow(sk);
@@ -2526,10 +2573,17 @@
  { }
  lock_sock(sk);

+/* udp{v6}._destroy_sock() sets it under the sk lock, avoid racing
+ * with close()
+ */
+if (sock_flag(sk, SOCK_DEAD))
+  goto out;
+
sk->sk_err = err;
sk->sk_error_report(sk);
__udp_disconnect(sk, 0);

+out:
  release_sock(sk);

return 0;
@@ -2711,7 +2765,7 @@
  " %02X %08X:%08X %02X:%08X %08X %08X %5u %8d %lu %d %pK %d",
  bucket, src, srcp, dest, destp, sp->sk_state,
  sk_wmem_alloc_get(sp),
-skip rmem_alloc_get(sp),
+udp_rqueue_get(sp),
0, 0L, 0,
  from_kuid_munged(seq_user_ns(f), sock_i_uid(sp)),
0, sock_i_ino(sp),
--- linux-4.15.0.orig/net/ipv4/udp_diag.c
+++ linux-4.15.0/net/ipv4/udp_diag.c

err = -ENOMEM;
-rep = nlmsg_new(sizeof(struct inet_diag_msg) +
-sizeof(struct inet_diag_meminfo) + 64,
+rep = nlmsg_new(nla_total_size(sizeof(struct inet_diag_msg)) +
+inet_diag_msg_attr_size() +
+nla_total_size(sizeof(struct inet_diag_meminfo)) + 64,
GFP_KERNEL);
if (!rep)
goto out;

static void udp_diag_get_info(struct sock *sk, struct inet_diag_msg *r,
void *info)
{
    -r->idiag_rqueue = sk_rmem_alloc_get(skb);
    +r->idiag_rqueue = udp_rqueue_get(skb);
    r->idiag_wqueue = sk_wmem_alloc_get(skb);
}

if (NAPI_GRO_CB(skb)->encap_mark ||
    skb->ip_summed != CHECKSUM_PARTIAL &&
    (uh->check && skb->ip_summed != CHECKSUM_PARTIAL &&
    NAPI_GRO_CB(skb)->csum_cnt == 0 &&
    !NAPI_GRO_CB(skb)->csum_valid))
goto out;

++- linux-4.15.0.orig/net/ipv4/udp_offload.c
+++ linux-4.15.0/net/ipv4/udp_offload.c
@@ -254,7 +254,7 @@
    skb_gro_flush_final(skb, pp, flush);
    return pp;
}
EXPORT_SYMBOL(udp_gro_receive);

if (xo && (xo->flags & XFRM_GRO)) {
    skb_mac_header_rebuild(skb);
    skb_reset_transport_header(skb);
}
return 0;
}

--- linux-4.15.0.orig/net/ipv4/xfrm4_mode_transport.c
+++ linux-4.15.0/net/ipv4/xfrm4_mode_transport.c
@@ -46,7 +46,6 @@
static int xfrm4_transport_input(struct xfrm_state *x, struct sk_buff *skb) {
int ihl = skb->data - skb_transport_header(skb);
-struct xfrm_offload *xo = xfrm_offload(skb);

if (skb->transport_header != skb->network_header) {
memmove(skb_transport_header(skb),
@@ -54,8 +53,7 @@
skb->network_header = skb->transport_header;
}

--- linux-4.15.0.orig/net/ipv4/xfrm4_mode_tunnel.c
+++ linux-4.15.0/net/ipv4/xfrm4_mode_tunnel.c
@@ -92,7 +92,8 @@
 skb_reset_network_header(skb);
 skb_mac_header_rebuild(skb);
-eth_hdr(skb)->h_proto = skb->protocol;
+if (skb->mac_len)
+eth_hdr(skb)->h_proto = skb->protocol;

err = 0;

--- linux-4.15.0.orig/net/ipv4/xfrm4_output.c
+++ linux-4.15.0/net/ipv4/xfrm4_output.c
@@ -76,9 +76,7 @@
{
memset(IPCB(skb), 0, sizeof(*IPCB(skb)));

-#ifdef CONFIG_NETFILTER
IPCB(skb)->flags |= IPSKB_XFRM_TRANSFORMED;
-#endif

return xfrm_output(sk, skb);
}
--- linux-4.15.0.orig/net/ipv4/xfrm4_policy.c
xdst->u.rt.rt_gateway = rt->rt_gateway;
xdst->u.rt.rt_uses_gateway = rt->rt_uses_gateway;
xdst->u.rt.rt_pmtu = rt->rt_pmtu;
+xdst->u.rt.rt_mtu_locked = rt->rt_mtu_locked;
xdst->u.rt.rt_table_id = rt->rt_table_id;
INIT_LIST_HEAD(&xdst->u.rt.rt_uncached);
+rt_add_uncached_list(&xdst->u.rt);

return 0;
}
@@ -110,7 +112,8 @@

_decode_session4(struct sk_buff *skb, struct flowi *fl, int reverse)
{
    const struct iphdr *iph = ip_hdr(skb);
-    u8 *xprth = skb_network_header(skb) + iph->ihl * 4;
+    int ihl = iph->ihl;
+    u8 *xprth = skb_network_header(skb) + ihl * 4;
    struct flowi4 *fl4 = &fl->u.ip4;
    int oif = 0;

    @@ -121,6 +124,11 @@
    fl4->flowi4_mark = skb->mark;
    fl4->flowi4_oif = reverse ? skb->skb_iif : oif;

    +fl4->flowi4_proto = iph->protocol;
    +fl4->daddr = reverse ? iph->saddr : iph->daddr;
    +fl4->saddr = reverse ? iph->daddr : iph->saddr;
    +fl4->flowi4_tos = iph->tos;
    +
    if (!ip_is_fragment(iph)) {
        switch (iph->protocol) {
        case IPPROTO_UDP:
@@ -132,7 +140,7 @@
            __be16 *ports;

            -xprth = skb_network_header(skb) + iph->ihl * 4;
-            xprth = skb_network_header(skb) + ihl * 4;
            ports = (__be16 *)xprth;

            fl4->fl4_sport = ports[!!reverse];
@@ -145,7 +153,7 @@
            u8 *icmp;

            -xprth = skb_network_header(skb) + iph->ihl * 4;
            +xprth = skb_network_header(skb) + ihl * 4;
+xprth = skb_network_header(skb) + ihl * 4;
icmp = xprth;

fl4->fl4_icmp_type = icmp[0];
@@ -158,7 +166,7 @@
pskb_may_pull(skb, xprth + 4 - skb->data)) {
    __be32 *ehdr;

-xprth = skb_network_header(skb) + iph->ihl * 4;
+xprth = skb_network_header(skb) + ihl * 4;
    ehdr = (__be32 *)xprth;

-fl4->fl4_ipsec_spi = ehdr[0];
+fl4->fl4_ipsec_spi = ehdr[0];
@@ -170,7 +178,7 @@
pskb_may_pull(skb, xprth + 8 - skb->data)) {
    __be32 *ah_hdr;

-xprth = skb_network_header(skb) + iph->ihl * 4;
+xprth = skb_network_header(skb) + ihl * 4;
    ah_hdr = (__be32 *)xprth;

-fl4->fl4_ipsec_spi = ah_hdr[1];
+fl4->fl4_ipsec_spi = ah_hdr[1];
@@ -182,7 +190,7 @@
pskb_may_pull(skb, xprth + 4 - skb->data)) {
    __be16 *ipcomp_hdr;

-xprth = skb_network_header(skb) + iph->ihl * 4;
+xprth = skb_network_header(skb) + ihl * 4;
    ipcomp_hdr = (__be16 *)xprth;

-fl4->fl4_ipsec_spi = htonl(ntohs(ipcomp_hdr[1]));
+fl4->fl4_ipsec_spi = htonl(ntohs(ipcomp_hdr[1]));
@@ -195,7 +203,7 @@
greflags = (__be16 *)xprth;
    __be32 *gre_hdr;

-xprth = skb_network_header(skb) + iph->ihl * 4;
+xprth = skb_network_header(skb) + ihl * 4;
    gre_hdr = (__be32 *)xprth;

@@ -212,19 +220,16 @@
break;
}
}

-fl4->flowi4_proto = iph->protocol;
-fl4->daddr = reverse ? iph->saddr : iph->daddr;
-fl4->saddr = reverse ? iph->daddr : iph->saddr;
-fl4->flowi4_tos = iph->tos;

@@ -253,7 +261,7 @@

pskb_may_pull(skb, xprth + 4 - skb->data)) {
    __be16 *ipcomp_hdr;

-xprth = skb_network_header(skb) + iph->ihl * 4;
+xprth = skb_network_header(skb) + ihl * 4;
    ipcomp_hdr = (__be16 *)xprth;

-fl4->fl4_ipsec_spi = htonl(ntohs(ipcomp_hdr[1]));
+fl4->fl4_ipsec_spi = htonl(ntohs(ipcomp_hdr[1]));
@@ -266,7 +274,7 @@
greflags = (__be16 *)xprth;
    __be32 *gre_hdr;

-xprth = skb_network_header(skb) + iph->ihl * 4;
+xprth = skb_network_header(skb) + ihl * 4;
    gre_hdr = (__be32 *)xprth;

@@ -283,19 +291,16 @@
break;
}
}

-fl4->flowi4_proto = iph->protocol;
-fl4->daddr = reverse ? iph->saddr : iph->daddr;
-fl4->saddr = reverse ? iph->daddr : iph->saddr;
-fl4->flowi4_tos = iph->tos;

@  

static void xfrm4_update_pmtu(struct dst_entry *dst, struct sock *sk,
    struct sk_buff *skb, u32 mtu,
    bool confirm_neigh)
{
    struct xfrm_dst *xdst = (struct xfrm_dst *)dst;
    struct dst_entry *path = xdst->route;

    if (xdst->u.rt.rt_uncached_list)
        rt_del_uncached_list(&xdst->u.rt);
    xfrm_dst_destroy(xdst);
}

static void xfrm4_redirect(struct dst_entry *dst, struct sock *sk,
@@ -241,7 +246,8 @@
    struct xfrm_dst *xdst = (struct xfrm_dst *)dst;

    dst_destroy_metrics_generic(dst);
    
    +if (xdst->u.rt.rt_uncached_list)
    +rt_del_uncached_list(&xdst->u.rt);
    xfrm_dst_destroy(xdst);

--- linux-4.15.0.orig/net/ipv6/Kconfig
+++ linux-4.15.0/net/ipv6/Kconfig
@@ -109,6 +109,7 @@
 config IPV6_ILA
     tristate "IPv6: Identifier Locator Addressing (ILA)"
     depends on NETFILTER
+select DST_CACHE
 select LWTUNNEL
---help---
 Support for IPv6 Identifier Locator Addressing (ILA).
@@ -320,6 +321,7 @@
 config IPV6_SEG6_HMAC
     bool "IPv6: Segment Routing HMAC support"
     depends on IPV6
+select CRYPTO
 select CRYPTO_HMAC
 select CRYPTO_SHA1
 select CRYPTO_SHA256
--- linux-4.15.0.orig/net/ipv6/addrconf.c
+++ linux-4.15.0/net/ipv6/addrconf.c
@@ -186,8 +186,9 @@
 static void addrconf_dad_start(struct inet6_ifaddr *ifp);

    static void addrconf_dad_start(struct inet6_ifaddr *ifp);
static void addrconf_dad_work(struct work_struct *w);
- static void addrconf_dad_completed(struct inet6_ifaddr *ifp, bool bump_id);
- static void addrconf_dad_run(struct inet6_dev *idev);
+ static void addrconf_dad_completed(struct inet6_ifaddr *ifp, bool bump_id,
+   bool send_na);
+ static void addrconf_dad_run(struct inet6_dev *idev, bool restart);
static void addrconf_rs_timer(struct timer_list *t);
static void __ipv6_ifa_notify(int event, struct inet6_ifaddr *ifa);
static void ipv6_ifa_notify(int event, struct inet6_ifaddr *ifa);
@@ -1163,7 +1164,8 @@
    list_for_each_entry(ifa, &idev->addr_list, if_list) {
        if (ifa == ifp)
            continue;
-       if (!ipv6_prefix_equal(&ifa->addr, &ifp->addr,
+       if (ifa->prefix_len != ifp->prefix_len ||
+          !ipv6_prefix_equal(&ifa->addr, &ifp->addr,
              ifp->prefix_len))
        continue;
        if (ifa->flags & (IFA_F_PERMANENT | IFA_F_NOPREFIXROUTE))
@@ -2369,6 +2371,7 @@
       .fc_dst_len = 8,
       .fc_flags = RTF_UP,
       .fc_nlinfo.nl_net = dev_net(dev),
+       .fc_protocol = RTPROT_KERNEL,
    };

    ipv6_addr_set(&cfg.fc_dst, htonl(0xFF000000), 0, 0, 0);
@@ -3190,6 +3193,10 @@
    if (netif_is_l3_master(idev->dev))
        return;

+ /* no link local addresses on devices flagged as slaves */
+ if (idev->dev->flags & IFF_SLAVE)
+     return;
+ ipv6_addr_set(&addr, htonl(0xFE800000), 0, 0, 0);

    switch (idev->cnf.addr_gen_mode) {
@@ -3238,6 +3245,10 @@
       /* Alas, we support only Ethernet autoconfiguration. */
       +idev = __in6_dev_get(dev);
       +ipv6_mc_up(idev);
+ return;
     }


void *ptr)
{
struct net_device *dev = netdev_notifier_info_to_dev(ptr);
+struct netdev_notifier_change_info *change_info;
struct netdev_notifier_changecaller_info *info;
struct inet6_dev *idev = __in6_dev_get(dev);
struct net *net = dev_net(dev);
@@ -3441,7 +3453,7 @@
break;
}

-if (idev) {
+if (!IS_ERR_OR_NULL(idev)) {
    if (idev->if_flags & IF_READY) {
    /* device is already configured -
     * but resend MLD reports, we might
@@ -3449,6 +3461,9 @@
     * multicast snooping switches
     */
     ipv6_mc_up(idev);
     +change_info = ptr;
     +if (change_info->flags_changed & IFF_NOARP)
     +addrconf_dad_run(idev, true);
     break;
    }
    idev->if_flags |= IF_READY;
@@ -3482,7 +3497,7 @@

if (!IS_ERR_OR_NULL(idev)) {
    if (run_pending)
-addrconf_dad_run(idev);
+addrconf_dad_run(idev, false);

/*
 * If the MTU changed during the interface down,
@@ -3833,12 +3848,17 @@
     idev->cnf.accept_dad < 1) ||
     !(ifp->flags&IFA_F_TENTATIVE)) ||
     ifp->flags & IFA_F_NODAD) {
+bool send_na = false;
+if (ifp->flags & IFA_F_TENTATIVE &&
+   !(ifp->flags & IFA_F_OPTIMISTIC))
+send_na = true;
+bump_id = ifp->flags & IFA_F_TENTATIVE;
+ifp->flags &= ~(IFA_F_TENTATIVE|IFA_F_OPTIMISTIC|IFA_F_DADFAILED);
spin_unlock(&ifp->lock);
read_unlock_bh(&idev->lock);

-addrcconf_dad_completed(ifp, bump_id);
+addrconf_dad_completed(ifp, bump_id, send_na);
return;
}
@@ -3967,16 +3987,21 @@
}
if (ifp->dad_probes == 0) {
+bool send_na = false;
+
/*
 * DAD was successful
 */
+if (ifp->flags & IFA_F_TENTATIVE &&
+    !(ifp->flags & IFA_F_OPTIMISTIC))
+send_na = true;

bump_id = ifp->flags & IFA_F_TENTATIVE;
ifp->flags &= ~(IFA_F_TENTATIVE|IFA_F_OPTIMISTIC|IFA_F_DADFAILED);
spin_unlock(&ifp->lock);
write_unlock_bh(&idev->lock);

-addrcconf_dad_completed(ifp, bump_id);
+addrconf_dad_completed(ifp, bump_id, send_na);

goto out;
}
@@ -4014,7 +4039,8 @@
return true;
}

-static void addrconf_dad_completed(struct inet6_ifaddr *ifp, bool bump_id)
+static void addrconf_dad_completed(struct inet6_ifaddr *ifp, bool bump_id,
+   bool send_na)
{
 struct net_device *dev = ifp->idev->dev;
 struct in6_addr lladdr;
@@ -4046,6 +4072,16 @@
 if (send_mld)
 ipv6_mc_dad_complete(ifp->idev);

+/* send unsolicited NA if enabled */
+if (send_na &&
+   (ifp->idev->cnf.ndisc_notify ||
dev_net(dev)->ipv6.devconf_all->ndisc_notify)) {  
+ ndisc_send_na(dev, &in6addr_linklocal_allnodes, &ifp->addr,  
+ */router=*/ !!ifp->idev->cnf.forwarding,  
+ */solicited=*/ false, /*override=*/ true,  
+ */inc_opt=*/ true);  
+}  
+}  
+}  
+}

if (send_rs) {
/*
 *If a host as already performed a random delay
@@ -4077,16 +4113,19 @@
 addrconf_verify_rtnl();
 */
}

+static void addrconf_dad_run(struct inet6_dev *idev, bool restart) {
+ struct inet6_ifaddr *ifp;

read_lock_bh(&idev->lock);
list_for_each_entry(ifp, &idev->addr_list, if_list) {
spin_lock(&ifp->lock);
-if (ifp->flags & IFA_F_TENTATIVE &&
 - ifp->state == INET6_IFADDR_STATE_DAD)
+if ((ifp->flags & IFA_F_TENTATIVE &&
 + ifp->state == INET6_IFADDR_STATE_DAD) || restart) {
+if (restart)
+ ifp->state = INET6_IFADDR_STATE_PREDAD;
addrconf_dad_kick(ifp);
+}
spin_unlock(&ifp->lock);
}
read_unlock_bh(&idev->lock);
@@ -4122,7 +4161,6 @@
p++;
continue;
}
-state->offset++;
return ifa;
}

@@ -4146,13 +4184,12 @@
 return ifa;
}

+state->offset = 0;
while (++state->bucket < IN6_ADDR_HSIZE) {
-state->offset = 0;

Open Source Used In 5GaaS Edge AC-4 34080
hlist_for_each_entry_rcu(ifa,
    &inet6_addr_lst[state->bucket], addr_lst) {
    if (!net_eq(dev_net(ifa->idev->dev), net))
        continue;
    state->offset++;
    return ifa;
}

@@ -4352,9 +4389,11 @@
    spin_lock(&ifpub->lock);
    ifpub->regen_count = 0;
    spin_unlock(&ifpub->lock);
    +rcu_read_unlock_bh();
    ipv6_create_tempaddr(ifpub, ifp, true);
    in6_ifa_put(ifpub);
    in6_ifa_put(ifp);
    +rcu_read_lock_bh();
    goto restart;
}  
} else if (time_before(ifp->tstamp + ifp->prefered_lft * HZ - regen_advance * HZ, next))
@@ -4781,8 +4820,8 @@
    /* unicast address incl. temp addr */
    list_for_each_entry(ifa, &idev->addr_list, if_list) {
        if (++ip_idx < s_ip_idx)
            continue;
        +if (ip_idx < s_ip_idx)
            goto next;
        err = inet6_fill_ifaddr(skb, ifa,
            NETLINK_CB(cb->skb).portid,
            cb->nlh->nlmsg_seq,
        @@ -4791,6 +4830,8 @@
            if (err < 0)
                break;
            nl_dump_check_consistent(cb, nlmsg_hdr(skb));
            +next:
            +ip_idx++;
        }  
        break;
    }
   @@ -5533,13 +5574,20 @@
    switch (event) {
    case RTM_NEWADDR:
        /*
        - * If the address was optimistic
        - * we inserted the route at the start of
        - * our DAD process, so we don't need
        - * to do it again
        */
+ * If the address was optimistic we inserted the route at the
+ * start of our DAD process, so we don't need to do it again.
+ * If the device was taken down in the middle of the DAD
+ * cycle there is a race where we could get here without a
+ * host route, so nothing to insert. That will be fixed when
+ * the device is brought up.
+ */
-if (!rcu_access_pointer(ifp->rt->rt6i_node))
+if (ifp->rt && !rcu_access_pointer(ifp->rt->rt6i_node)) {
    ip6_ins_rt(ifp->rt);
+} else if (!ifp->rt && (ifp->idev->dev->flags & IFF_UP)) {
    pr_warn("BUG: Address %pI6c on device %s is missing its host route.\n",
+&ifp->addr, ifp->idev->dev->name);
    +}
+}

if (ifp->idev->cnf.forwarding)
    addrconf_join_anycast(ifp);
if (!ipv6_addr_any(&ifp->peer_addr))
--- linux-4.15.0.orig/net/ipv6/addrconf_core.c
+++ linux-4.15.0/net/ipv6/addrconf_core.c
@@ -127,15 +127,16 @@
}
EXPORT_SYMBOL(inet6addr_validator_notifier_call_chain);

-static int eafnosupport_ipv6_dst_lookup(struct net *net, struct sock *u1,
-static dst_entry **u2,
-static struct flowi6 *u3)
-static struct dst_entry *eafnosupport_ipv6_dst_lookup_flow(struct net *net,
+static struct dst_entry *eafnosupport_ipv6_dst_lookup_flow(struct net *net,
   + const struct sock *sk,
   + struct flowi6 *fl6,
   + const struct in6_addr *final_dst)
{ 
   -return -EAFNOSUPPORT;
   +return ERR_PTR(-EAFNOSUPPORT);
 }

const struct ipv6_stub *ipv6_stub __read_mostly = &(struct ipv6_stub) {
-ipv6_dst_lookup = eafnosupport_ipv6_dst_lookup,
+ipv6_dst_lookup_flow = eafnosupport_ipv6_dst_lookup_flow,
};
EXPORT_SYMBOL_GPL(ipv6_stub);

--- linux-4.15.0.orig/net/ipv6/addrlabel.c
+++ linux-4.15.0/net/ipv6/addrlabel.c
@@ -306,7 +306,9 @@
/* add default label */
static int __net_init ip6addrlbl_net_init(struct net *net) {

--- linux-4.15.0.orig/net/ipv6/addrlabel.c
+++ linux-4.15.0/net/ipv6/addrlabel.c
@ @ -306.7 +306.9 @@
/* add default label */
static int __net_init ip6addrlbl_net_init(struct net *net) {
int err = 0;
+struct ip6addrlbl_entry *p = NULL;
+struct hlist_node *n;
+int err;
int i;

ADDRLABEL(KERN_DEBUG "\%s\n", __func__);
@@ -315,14 +317,20 @@
INIT_HLIST_HEAD(&net->ipv6.ip6addrlbl_table.head);

for (i = 0; i < ARRAY_SIZE(ip6addrlbl_init_table); i++) {
-  int ret = ip6addrlbl_add(net, 
-    ip6addrlbl_init_table[i].prefix, 
-    ip6addrlbl_init_table[i].prefixlen, 
-    0, 
-    ip6addrlbl_init_table[i].label, 0); 
-  /* XXX: should we free all rules when we catch an error? */
-  if (ret && (!err || err != -ENOMEM))
-    err = ret;
-  +err = ip6addrlbl_add(net, 
-    + ip6addrlbl_init_table[i].prefix, 
-    + ip6addrlbl_init_table[i].prefixlen, 
-    + 0, 
-    + ip6addrlbl_init_table[i].label, 0);
+  if (err)
  +    goto err_ip6addrlbl_add;
  +} 
  +return 0;
  +
  +err_ip6addrlbl_add:
  +hlist_for_each_entry_safe(p, n, &net->ipv6.ip6addrlbl_table.head, list) {
  +    hlist_del_rcu(&p->list);
  +    kfree_rcu(p, rcu);
  +} 
  return err;
} 
--- linux-4.15.0.orig/net/ipv6/af_inet6.c
+++ linux-4.15.0/net/ipv6/af_inet6.c
@@ -284,6 +284,7 @@
 struct net *net = sock_net(sk);
 __be32 v4addr = 0;
 unsigned short snum;
+bool saved_ipv6only;
 int addr_type = 0;
 int err = 0;

 @@ -316,6 +317,7 @@
/* Check if the address belongs to the host. */
if (addr_type == IPV6_ADDR_MAPPED) {
    +struct net_device *dev = NULL;
    int chk_addr_ret;

    /* Binding to v4-mapped address on a v6-only socket */
    goto out;
}

+rcu_read_lock();
+if (sk->sk_bound_dev_if) {
    +dev = dev_get_by_index_rcu(net, sk->sk_bound_dev_if);
    +if (!dev) {
      +err = -ENODEV;
        goto out_unlock;
    +}
    +}
    +
    /* Reproduce AF_INET checks to make the bindings consistent */
    v4addr = addr->sin6_addr.s6_addr32[3];
    -chk_addr_ret = inet_addr_type(net, v4addr);
    +chk_addr_ret = inet_addr_type_dev_table(net, dev, v4addr);
    +rcu_read_unlock();
    +
    if (!(addr_type & IPV6_ADDR_MULTICAST))
      np->saddr = addr->sin6_addr;
      +saved_ipv6only = sk->sk_ipv6only;
      +if (addr_type != IPV6_ADDR_ANY && addr_type != IPV6_ADDR_MAPPED)
        +sk->sk_ipv6only = 1;
      +
      /* Make sure we are allowed to bind here. */
      if ((snum || !inet->bind_address_no_port) &&

sk->sk_prot->get_port(sk, snum)) {
+sk->sk_ipv6only = saved_ipv6only;
inet_reset_saddr(sk);
err = -EADDRINUSE;
goto out;
}

@if (addr_type != IPV6_ADDR_ANY) {
+if (addr_type != IPV6_ADDR_ANY)
sk->sk_userlocks |= SOCK_BINDADDR_LOCK;
-if (addr_type != IPV6_ADDR_MAPPED)
+sk->sk_ipv6only = 1;
-
} 
if (snum)
sk->sk_userlocks |= SOCK_BINDPORT_LOCK;
inet->inet_sport = htons(inet->inet_num);
@@ -698,7 +716,7 @@
&final);
rcu_read_unlock();

-dst = ip6_dst_lookup_flow(sk, &fl6, final_p);
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, &fl6, final_p);
if (IS_ERR(dst)) {
 sk->sk_route_caps = 0;
 sk->sk_err_soft = -PTR_ERR(dst);
@@ -860,7 +878,7 @@
 static const struct ipv6_stub ipv6_stub_impl = {
 +ipv6_dst_lookup_flow = ip6_dst_lookup_flow,
 .udpv6_encap_enable = udpv6_encap_enable,
@@ -1074,11 +1092,11 @@
 igmp_fail:
 ndisc_cleanup();
 ndisc_fail:
-ipv6_mr_cleanup();
+icmpv6_cleanup();
icmp_fail:
-unregister_pernet_subsys(&inet6_net_ops);
+ip6_mr_cleanup();
ipmr_fail:
-icmpv6_cleanup();
+unregister_pernet_subsys(&inet6_net_ops);
register_pernet.fail:
sock_unregister(PF_INET6);
rtwl_unregister_all(PF_INET6);
--- linux-4.15.0.orig/net/ipv6/ah6.c
+++ linux-4.15.0/net/ipv6/ah6.c
@@ -600,7 +600,8 @@
    memcpy(auth_data, ah->auth_data, ahp->icv_trunc_len);
    memset(ah->auth_data, 0, ahp->icv_trunc_len);

-if (ipv6_clear_mutable_options(ip6h, hdr_len, XFRM_POLICY_IN))
+err = ipv6_clear_mutable_options(ip6h, hdr_len, XFRM_POLICY_IN);
+if (err)
    goto out_free;

    ip6h->priority = 0;
--- linux-4.15.0.orig/net/ipv6/anycast.c
+++ linux-4.15.0/net/ipv6/anycast.c
@@ -170,7 -170,7 @@
    return 0;
 }

-void ipv6_sock_ac_close(struct sock *sk)
+void __ipv6_sock_ac_close(struct sock *sk)
{
    struct ipv6_pinfo *np = inet6_sk(sk);
    struct net_device *dev = NULL;
@@ -178,10 +178,7 @@
    struct net *net = sock_net(sk);
    int prev_index;

    -if (!np->ipv6_ac_list)
    -return;
    -
    -rtwl_lock();
+ASSERT_RTNL();
    pac = np->ipv6_ac_list;
    np->ipv6_ac_list = NULL;

    @@ -198,6 +195,16 @@
    sock_kfree_s(sk, pac, sizeof(*pac));
    pac = next;
    }
+}
+
+void ipv6_sock_ac_close(struct sock *sk)
+{
+    struct ipv6_pinfo *np = inet6_sk(sk);
+    
+    if (!np->ipv6_ac_list)
+        return;
+    
+    rtwl_lock();
+    ASSERT_RTNL();
+    pac = np->ipv6_ac_list;
+    np->ipv6_ac_list = NULL;

    @@ -198,6 +195,16 @@
    sock_kfree_s(sk, pac, sizeof(*pac));
    pac = next;
    }
+}


+rtnl_lock();
+__ipv6_sock_ac_close(sk);
  rtnl_unlock();
}

--- linux-4.15.0.orig/net/ipv6/calipso.c
+++ linux-4.15.0/net/ipv6/calipso.c
@@ -97,6 +97,9 @@
static struct calipso_map_cache_bkt *calipso_cache;
+
static void calipso_cache_invalidate(void);
static void calipso_doi_putdef(struct calipso_doi *doi_def);
+
/* Label Mapping Cache Functions */

@@ -458,15 +461,10 @@
ret_val = -ENOENT;
goto doi_remove_return;
}
-if (!refcount_dec_and_test(&doi_def->refcount)) {
-  spin_unlock(&calipso_doi_list_lock);
-  ret_val = -EBUSY;
-  goto doi_remove_return;
-}
-list_del_rcu(&doi_def->list);
-spin_unlock(&calipso_doi_list_lock);
-
call_rcu(&doi_def->rcu, calipso_doi_free_rcu);
+calipso_doi_putdef(doi_def);
 ret_val = 0;

doi_remove_return:
@@ -522,10 +520,8 @@
if (!refcount_dec_and_test(&doi_def->refcount))
  return;
-  spin_lock(&calipso_doi_list_lock);
-  list_del_rcu(&doi_def->list);
-  spin_unlock(&calipso_doi_list_lock);
+
calipso_cache_invalidate();
call_rcu(&doi_def->rcu, calipso_doi_free_rcu);
}

@@ -799,8 +795,7 @@

struct ipv6_txoptions *old = txopt_get(inet6_sk(sk)), *txopts;

- txopts = ipv6_renew_options_kern(sk, old, IPV6_HOPOPTS,
  - hop, hop ? ipv6_optlen(hop) : 0);
+ txopts = ipv6_renew_options(sk, old, IPV6_HOPOPTS, hop);

if (IS_ERR(txopts))
  return PTR_ERR(txopts);
@@ -1062,7 +1057,8 @@
    goto getattr_return;
  }

- secattr->flags |= NETLBL_SECATTR_MLS_CAT;
+ if (secattr->attr.mls.cat)
+   secattr->flags |= NETLBL_SECATTR_MLS_CAT;

secattr->type = NETLBL_NLTYPE_CALIPSO;
@@ -1222,8 +1218,7 @@
    if (IS_ERR(new))
      return PTR_ERR(new);

- txopts = ipv6_renew_options_kern(sk, req_inet->ipv6_opt, IPV6_HOPOPTS,
-    new, new ? ipv6_optlen(new) : 0);
+ txopts = ipv6_renew_options(sk, req_inet->ipv6_opt, IPV6_HOPOPTS, new);

kfree(new);

@@ -1260,8 +1255,7 @@
    if (calipso_opt_del(req_inet->ipv6_opt->hopopt, &new))
      return; /* Nothing to do */

- txopts = ipv6_renew_options_kern(sk, req_inet->ipv6_opt, IPV6_HOPOPTS,
-    new, new ? ipv6_optlen(new) : 0);
+ txopts = ipv6_renew_options(sk, req_inet->ipv6_opt, IPV6_HOPOPTS, new);

if (!IS_ERR(txopts)) {
  txopts = xchg(&req_inet->ipv6_opt, txopts);
  --- linux-4.15.0.orig/net/ipv6/datagram.c
  +++ linux-4.15.0/net/ipv6/datagram.c
    @ @ -88,7 +88,7 @ @
    final_p = fl6_update_dst(&fl6, opt, &final);
    rcu_read_unlock();

    - dst = ip6_dst_lookup_flow(sk, &fl6, final_p);
    + dst = ip6_dst_lookup_flow(sock_net(sk), sk, &fl6, final_p);
    if (IS_ERR(dst)) {
      err = PTR_ERR(dst);
goto out;
@@ -146,10 +146,12 @@
 struct sockaddr_in6 *usin = (struct sockaddr_in6 *) uaddr;
 struct inet_sock *inet = inet_sk(sk);
 struct ipv6_pinfo *np = inet6_sk(sk);
-struct in6_addr *daddr;
+
+struct in6_addr *daddr, old_daddr;
+__be32 fl6_flowlabel = 0;
+__be32 old_fl6_flowlabel;
+__be16 old_dport;
 int addr_type;
 int err;
-__be32 fl6_flowlabel = 0;

 if (usin->sin6_family == AF_INET) {
 if (__ipv6_only_sock(sk))
@@ -239,9 +241,13 @@
 } }

 /* save the current peer information before updating it */
+old_daddr = sk->sk_v6_daddr;
+old_fl6_flowlabel = np->flow_label;
+old_dport = inet->inet_dport;
+sk->sk_v6_daddr = *daddr;
+np->flow_label = fl6_flowlabel;
-inet->inet_dport = usin->sin6_port;
/*
@@ -251,11 +257,12 @@
 err = ip6_datagram_dst_update(sk, true);
 if (err) {
-/* Reset daddr and dport so that udp_v6_early_demux()
-* fails to find this socket
+/* Restore the socket peer info, to keep it consistent with
+* the old socket state
 */
 -memset(&sk->sk_v6_daddr, 0, sizeof(sk->sk_v6_daddr));
-inet->inet_dport = 0;
+sk->sk_v6_daddr = old_daddr;
+np->flow_label = old_fl6_flowlabel;
+inet->inet_dport = old_dport;
goto out;
}
skb_reset_network_header(skb);
iph = ipv6_hdr(skb);
iph->daddr = fl6->daddr;
+ip6_flow_hdr(iph, 0, 0);

serr = SKB_EXT_ERR(skb);
serr->ee.ee_errno = err;

if (np->rxopt.bits.rxorigdstaddr) {
    struct sockaddr_in6 sin6;
    _be16 *ports = skb_transport_header(skb);
    +ports = skb_header_pointer(skb, skb_transport_offset(skb),
        sizeof(_ports), &ports);
    +if (ports) {
        /* All current transport protocols have the port numbers in the
         * first four bytes of the transport header and this function is
         * written with this assumption in mind.
         */
        sin6.sin6_family = AF_INET6;
        sin6.sin6_addr = ipv6_hdr(skb)->daddr;
        sin6.sin6_port = ports[1];
        }
    }

EXPORT_SYMBOL_GPL(ip6_datagram_send_ctl);

-vvoid ip6_dgram_sock_seq_show(struct seq_file *seq, struct sock *sp,
    +__u16 srcp, __u16 destp, int bucket)
    +__u16 srcp, __u16 destp, int rqueue, int bucket)
    +const struct in6_addr *dest, *src;

    +dest->s6_addr32[2], dest->s6_addr32[3], destp,
        sp->sk_state,
        sp->sk_wmem_alloc_get(sp),
        +sk_rmem_alloc_get(sp),
    +rqueue,
    +0, 0L, 0,
    +from_kuid_munged(seq_user_ns(seq), sock_i_uid(sp)),
    0,
--- linux-4.15.0.orig/net/ipv6/esp6.c
+++ linux-4.15.0/net/ipv6/esp6.c
@@ -219,7 +219,6 @@
    int esp6_output_head(struct xfrm_state *x, struct sk_buff *skb, struct esp_info *esp)
    {
        u8 *tail;
-       u8 *vaddr;
        int nfrags;
        struct page *page;
    struct sk_buff *trailer;
@@ -252,14 +251,10 @@
          page = pfrag->page;
          get_page(page);

-        vaddr = kmap_atomic(page);
-         -
          -tail = vaddr + pfrag->offset;
          +tail = page_address(page) + pfrag->offset;

          esp_output_fill_trailer(tail, esp->tfclen, esp->plen, esp->proto);

-        kunmap_atomic(vaddr);
-        -
          nfrags = skb_shinfo(skb)->nr_frags;

          __skb_fill_page_desc(skb, nfrags, page, pfrag->offset,
@@ -275,7 +270,7 @@
              skb->len += tailen;
              skb->data_len += tailen;
              skb->truesize += tailen;
        -if (sk)
            +if (sk && sk_fullsock(sk))
                refcount_add(tailen, &sk->sk_wmem_alloc);

        goto out;
@@ -651,8 +646,10 @@
          skb_init_table(sg, nfrags);
          ret = skb_to_sgvec(skb, sg, 0, skb->len);
        -if (unlikely(ret < 0))
        +if (unlikely(ret < 0)) {
            +kfree(tmp);
            goto out;
          +}

          skb->ip_summed = CHECKSUM_NONE;

--- linux-4.15.0.orig/net/ipv6/esp6_offload.c
+++ linux-4.15.0/net/ipv6/esp6_offload.c
struct ip_esp_hdr *esph;
struct ipv6hdr *iph = ipv6_hdr(skb);
struct xfrm_offload *xo = xfrm_offload(skb);
-int proto = iph->nexthdr;
+u8 proto = iph->nexthdr;

skb_push(skb, skb_network_offset(skb));
+
+if (x->outer_mode->encap == XFRM_MODE_TRANSPORT) {
+__be16 frag;
+
+ipv6_skip_exthdr(skb, sizeof(struct ipv6hdr), &proto, &frag);
+}
+
esph = ip_esp_hdr(skb);
*skb_mac_header(skb) = IPPROTO_ESP;

--- linux-4.15.0.orig/net/ipv6/exthdrs.c
+++ linux-4.15.0/net/ipv6/exthdrs.c
@@ -138,18 +138,23 @@
    len -= 2;
    while (len > 0) {
        int optlen = nh[off + 1] + 2;
        int i;
        +int optlen, i;

        switch (nh[off]) {
            -case IPV6_TLV_PAD1:
            -optlen = 1;
            +if (nh[off] == IPV6_TLV_PAD1) {
                padlen++;
                if (padlen > 7)
                    goto bad;
            -break;
            +off++;
            +len--;
            +continue;
            +}
            +if (len < 2)
                goto bad;
            +optlen = nh[off + 1] + 2;
            +if (optlen > len)
                goto bad;

            -case IPV6_TLV_PADN:
            +if (nh[off] == IPV6_TLV_PADN) {


/* RFC 2460 states that the purpose of PadN is
* to align the containing header to multiples
* of 8. 7 is therefore the highest valid value.
@@ -166,12 +171,7 @@
if (nh[off + i] != 0)
goto bad;
}
-break;
-default: /* Other TLV code so scan list */
-if (optlen > len)
-goto bad;
+} else {
tlv_count++;
if (tlv_count > max_count)
goto bad;
@@ -191,7 +191,6 @@
return false;
padlen = 0;
-break;
}
off += optlen;
len -= optlen;
@@ -308,7 +307,7 @@
#endif
if (ip6_parse_tlv(tlvprocdestopt_lst, skb,
- init_net.ipv6.sysctl.max_dst_opts_cnt)) {
+ net->ipv6.sysctl.max_dst_opts_cnt)) {
skb->transport_header += extlen;
opt = IP6CB(skb);
#if IS_ENABLED(CONFIG_IPV6_MIP6)
@@ -861,7 +860,7 @@
opt->flags |= IP6SKB_HOPBYHOP;
if (ip6_parse_tlv(tlvprochopopt_lst, skb,
- init_net.ipv6.sysctl.max_hbh_opts_cnt)) {
+ net->ipv6.sysctl.max_hbh_opts_cnt)) {
skb->transport_header += extlen;
opt = IP6CB(skb);
opt->nhoff = sizeof(struct ipv6hdr);
@@ -1028,29 +1027,21 @@
}
EXPORT_SYMBOL_GPL(ipv6_dup_options);
-static int ipv6_renew_option(void *ohdr,

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- struct ipv6_opt_hdr __user *newopt, int newoptlen,
- int inherit,
- struct ipv6_opt hdr **hdr,
- char **p)
-
-if (inherit) {
  -if (ohdr) {
    -memcpy(*p, ohdr, ipv6_optlen((struct ipv6_opt_hdr *)ohdr));
    -*hdr = (struct ipv6_opt_hdr *)*p;
    -*p += CMSG_ALIGN(ipv6_optlen(*hdr));
  }
  -} else {
  -if (newopt) {
    -if (copy_from_user(*p, newopt, newoptlen))
      -return -EFAULT;
    -*hdr = (struct ipv6_opt_hdr *)*p;
    -*ip = ipv6_optlen(*hdr) > newoptlen
      -return -EINVAL;
    -*p += CMSG_ALIGN(newoptlen);
  }
  -}
  -}
  -return 0;
+static void ipv6_renew_option(int renewtype,
   + struct ipv6_opt_hdr **dest,
   + struct ipv6_opt_hdr *old,
   + struct ipv6_opt_hdr *new,
   + int newtype, char **p)
  +{
  +struct ipv6_opt hdr *src;
  +
  +src = (renewtype == newtype ? new : old);
  +if (!src)
    +return;
  +}
  +memcpy(*p, src, ipv6_optlen(src));
  +*dest = (struct ipv6_opt hdr *)*p;
  +*p += CMSG_ALIGN(ipv6_optlen(*dest));
}
int tot_len = 0;
char *p;
struct ipv6_txoptions *opt2;
int err;

if (opt) {
if (newtype != IPV6_HOPOPTS && opt->hopopt)
@@ -1095,8 +1084,8 @@
tot_len += CMSG_ALIGN(ipv6_optlen(opt->dst1opt));
}

-if (newopt && newoptlen)
-tot_len += CMSG_ALIGN(newoptlen);
+if (newopt)
+tot_len += CMSG_ALIGN(ipv6_optlen(newopt));

if (!tot_len)
return NULL;
@@ -1111,29 +1100,19 @@
opt2->tot_len = tot_len;
p = (char *)(opt2 + 1);

-err = ipv6_renew_option(opt ? opt->hopopt : NULL, newopt, newoptlen,
-    newtype != IPV6_HOPOPTS, 
-    &opt2->hopopt, &p);
-if (err)
-goto out;
-
-err = ipv6_renew_option(opt ? opt->dst0opt : NULL, newopt, newoptlen,
-    newtype != IPV6_RTHDRDSTOPTS, 
-    &opt2->dst0opt, &p);
-if (err)
-goto out;
-
-err = ipv6_renew_option(opt ? opt->srcrt : NULL, newopt, newoptlen,
-    newtype != IPV6_RTHDR, 
-    (struct ipv6_opt_hdr **)&opt2->srcrt, &p);
-if (err)
-goto out;
-
-err = ipv6_renew_option(opt ? opt->dst1opt : NULL, newopt, newoptlen,
-    newtype != IPV6_DSTOPTS, 
-    &opt2->dst1opt, &p);
-if (err)
-goto out;
+
ipv6_renew_option(IPV6_HOPOPTS, &opt2->hopopt,
+    (opt ? opt->hopopt : NULL),
+    newopt, newtype, &p);
ipv6_renew_option(IPV6_RTHDRDSTOPTS, &opt2->dst0opt, 
+ (opt ? opt->dst0opt : NULL), 
+ newopt, newtype, &p);
+ipv6_renew_option(IPV6_RTHDR, 
+ (struct ipv6_opt_hdr **)&opt2->srcrt, 
+ (opt ? (struct ipv6_opt_hdr *)opt->srcrt : NULL), 
+ newopt, newtype, &p);
+ipv6_renew_option(IPV6_DSTOPTS, &opt2->dst1opt, 
+ (opt ? opt->dst1opt : NULL), 
+ newopt, newtype, &p);

opt2->opt_nflen = (opt2->hopopt ? ipv6_optlen(opt2->hopopt) : 0) + 
   (opt2->dst0opt ? ipv6_optlen(opt2->dst0opt) : 0) + 
@ @ -1141.37 +1120.6 @@
opt2->opt_flen = (opt2->dst1opt ? ipv6_optlen(opt2->dst1opt) : 0);

return opt2;
-out:
-sock_kfree_s(sk, opt2, opt2->tot_len);
-return ERR_PTR(err);
-
-/**
-* ipv6_renew_options_kern - replace a specific ext hdr with a new one.
-*
-* @sk: sock from which to allocate memory
-* @opt: original options
-* @newtype: option type to replace in @opt
-* @newopt: new option of type @newtype to replace (kernel-mem)
-* @newoptlen: length of @newopt
-*
-* @ See ipv6_renew_options().  The difference is that @newopt is
-* kernel memory, rather than user memory.
-* /
-struct ipv6_txoptions *
-ipv6_renew_options_kern(struct *sk, struct ipv6_txoptions *opt,
-int newtype, struct ipv6_opt_hdr *newopt,
-int newoptlen)
-{ 
-const mm_segment_t old_fs = get_fs(); 
-
-set_fs(KERNEL_DS);
-ret_val = ipv6_renew_options(sk, opt, newtype,
- (struct ipv6_opt_hdr __user *)newopt,
- newoptlen); 
-set_fs(old_fs);
-return ret_val;
struct ipv6_txoptions *ipv6_fixup_options(struct ipv6_txoptions *opt_space,
--- linux-4.15.0.orig/net/ipv6/icmp.c
+++ linux-4.15.0/net/ipv6/icmp.c
@@ -309,10 +309,9 @@
}

#if IS_ENABLED(CONFIG_IPV6_MIP6)
-static void mip6_addr_swap(struct sk_buff *skb)
+static void mip6_addr_swap(struct sk_buff *skb, const struct inet6_skb_parm *opt)
 {
 struct ipv6hdr *iph = ipv6_hdr(skb);
-struct inet6_skb_parm *opt = IP6CB(skb);
 struct ipv6_destopt_hao *hao;
 struct in6_addr tmp;
 int off;
@@ -329,7 +328,7 @@
 }
 }
#else
-#endif
+static inline void mip6_addr_swap(struct sk_buff *skb) {}
+static inline void mip6_addr_swap(struct sk_buff *skb, const struct inet6_skb_parm *opt) {}
#endif

static struct dst_entry *icmpv6_route_lookup(struct net *net,
@@ -402,9 +401,10 @@
/* for local traffic to local address, skb dev is the loopback
 * device. Check if there is a dst attached to the skb and if so
- * get the real device index.
- * get the real device index. Same is needed for replies to a link
+ * local address on a device enslaved to an L3 master device
+ */
-if (unlikely(iif == LOOPBACK_IFINDEX)) {
+if (unlikely(iif == LOOPBACK_IFINDEX || netif_is_l3_master(skb->dev))) {
 const struct rt6_info *rt6 = skb.rt6_info(skb);

 if (rt6)
@@ -417,13 +417,14 @@
 /*
 *Send an ICMP message in response to a packet in error
 */
-#static void icmp6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info,
-const struct inet6_addr *force_saddr)
+void icmp6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info,
+const struct inet6_addr *force_saddr,
+const struct inet6_skb_parm *parm)
{struct net *net = dev_net(skb->dev);
struct inet6_dev *idev = NULL;
struct ipv6hdr *hdr = ipv6_hdr(skb);
struct sock *sk;
+struct net *net;
struct ipv6_pinfo *np;
const struct in6_addr *saddr = NULL;
struct dst_entry *dst;
@@ -435,12 +436,16 @@
int iif = 0;
int addr_type = 0;
int len;
-u32 mark = IP6_REPLY_MARK(net, skb->mark);
+u32 mark;

if ((u8 *)hdr < skb->head ||
    (skb_network_header(skb) + sizeof(*hdr)) > skb_tail_pointer(skb))
return;

+if (!skb->dev)
+return;
+net = dev_net(skb->dev);
+mark = IP6_REPLY_MARK(net, skb->mark);
/*
 * Make sure we respect the rules
 * i.e. RFC 1885 2.4(e)
 @@ -508,7 +513,7 @@
 if (!(skb->dev->flags&IFF_LOOPBACK) && !icmpv6_global_allow(type))
goto out_bh_enable;

-mip6_addr_swap(skb);
+mip6_addr_swap(skb, parm);

memset(&fl6, 0, sizeof(fl6));
fl6.flowi6_proto = IPPROTO_ICMPV6;
@@ -590,12 +595,13 @@
 out_bh_enable:
 local_bh_enable();
 }
+EXPORT_SYMBOL(icmp6_send);

/* Slightly more convenient version of icmp6_send.
 */
void icmpv6_param_prob(struct sk_buff *skb, u8 code, int pos)
{
-icmp6_send(skb, ICMPV6_PARAMPROB, code, pos, NULL);
+icmp6_send(skb, ICMPV6_PARAMPROB, code, pos, NULL, IP6CB(skb));
kfree_skb(skb);
}

@@ -651,10 +657,10 @@
if (type == ICMP_TIME_EXCEEDED)
    icmp6_send(skb2, ICMPV6_TIME_EXCEED, ICMPV6_EXC_HOPLIMIT,
        - info, &temp_saddr);
    + info, &temp_saddr, IP6CB(skb2));
else
    icmp6_send(skb2, ICMPV6_DEST_UNREACH, ICMPV6_ADDR_UNREACH,
        - info, &temp_saddr);
    + info, &temp_saddr, IP6CB(skb2));
if (rt)
    ip6_rt_put(rt);

--- linux-4.15.0.orig/net/ipv6/inet6_connection_sock.c
+++ linux-4.15.0/net/ipv6/inet6_connection_sock.c
@@ -52,7 +52,7 @@
    fl6->flowi6_uid = sk->sk_uid;
    security_req_classify_flow(req, flowi6_to_flowi(fl6));

-dst = ip6_dst_lookup_flow(sk, fl6, final_p);
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, fl6, final_p);
if (IS_ERR(dst))
    return NULL;

@@ -107,7 +107,7 @@
    dst = __inet6_csk_dst_check(sk, np->dst_cookie);
    if (!dst) {
        -dst = ip6_dst_lookup_flow(sk, fl6, final_p);
        +dst = ip6_dst_lookup_flow(sock_net(sk), sk, fl6, final_p);

        if (!IS_ERR(dst))
            ip6_dst_store(sk, dst, NULL, NULL);
@@ -150,7 +150,7 @@
    if (IS_ERR(dst))
        return NULL;
    -dst->ops->update_pmtu(dst, sk, NULL, mtu);
    +dst->ops->update_pmtu(dst, sk, NULL, mtu, true);

    dst = inet6_csk_route_socket(sk, &fl6);
    return IS_ERR(dst) ? NULL : dst;
--- linux-4.15.0.orig/net/ipv6/inet6_hashtables.c
+++ linux-4.15.0/net/ipv6/inet6_hashtables.c
@@ -113,12 +113,12 @@


bool dev_match = (sk->sk_bound_dev_if == dif || sk->sk_bound_dev_if == sdif);

- if (exact_dif && !dev_match)
+ if (!dev_match)
   return -1;
- if (sk->sk_bound_dev_if && dev_match)
+ if (sk->sk_bound_dev_if)
   score++;
}
- if (sk->sk_incoming_cpu == raw_smp_processor_id())
+ if (READ_ONCE(sk->sk_incoming_cpu) == raw_smp_processor_id())
   score++;
}
return score;

int score, hiscore = 0, matches = 0, reuseport = 0;
bool exact_dif = inet6_exact_dif_match(net, skb);
struct sock *sk, *result = NULL;
+	struct hlist_nulls_node *node;

u32 phash = 0;

- sk_for_each(sk, &ilb->head) {
+ sk_nulls_for_each(sk, node, &ilb->nulls_head) {
 score = compute_score(sk, net, hnum, daddr, dif, sdif, exact_dif);
     if (score > hiscore) {
         reuseport = sk->sk_reuseport;
--- linux-4.15.0.orig/net/ipv6/ip6_checksum.c
+++ linux-4.15.0/net/ipv6/ip6_checksum.c
@@ -73,6 +73,11 @@
err = udplite_checksum_init(skb, uh);
     if (err)
         return err;
+     if (UDP_SKB_CB(skb)->partial_cov) {
+         skb->csum = ip6_compute_pseudo(skb, proto);
+         return 0;
+     }
+ }

/* To support RFC 6936 (allow zero checksum in UDP/IPV6 for tunnels)
@@ -83,8 +88,24 @@
* Note, we are only interested in != 0 or == 0, thus the
* force to int.
*/
-return (__force int)skb_checksum_init_zero_check(skb, proto, uh->check,
-    ip6_compute_pseudo);
+err = (__force int)skb_checksum_init_zero_check(skb, proto, uh->check,
+ip6_compute_pseudo);
+if (err)
+return err;
+
+if (skb->ip_summed == CHECKSUM_COMPLETE && !skb->csum_valid) {
+  /* If SW calculated the value, we know it's bad */
+  if (skb->csum_complete_sw)
+    return 1;
+  /* HW says the value is bad. Let's validate that.
+   * skb->csum is no longer the full packet checksum,
+   * so don't treat is as such.
+   */
+  skb_checksum_complete_unset(skb);
+}
+
+return 0;
}
EXPORT_SYMBOL(udp6_csum_init);

--- linux-4.15.0.orig/net/ipv6/ip6_fib.c
+++ linux-4.15.0/net/ipv6/ip6_fib.c
@@ -847,6 +847,8 @@
 {
 struct fib6_table *table = rt->rt6i_table;

+  /* Flush all cached dst in exception table */
+  rt6i_flush_exceptions(rt);
  if (atomic_read(&rt->rt6i_ref) != 1) {
    /* This route is used as dummy address holder in some split
     * nodes. It is not leaked, but it still holds other resources,
@@ -918,8 +920,7 @@
    found++;
    break;
  }
-  if (rt_can_ecmp)
-    fallback_ins = fallback_ins ?: ins;
+  fallback_ins = fallback_ins ?: ins;
  goto next_iter;
 }

@@ -959,7 +960,9 @@

 if (fallback_ins && !found) {
-    /* No ECMP-able route found, replace first non-ECMP one */
+    /* No matching route with same ecmp-able-ness found, replace
+     * first matching route
@@ -990,9 +992,11 @@

if (err) { // This is a catch-all error
  printk(KERN_DEBUG "Error in ip6_fib.c: line %d: %s
     " "\n", line, printk_pathprefix(), exc)
  return 0;
}

+/* flush used dst */
+rt6i_flush_used(dst);
+}
+
+/* Calculate the next dst for an incoming packet */
+struct fib6_entry *fib6_find_next(struct fib6_table *table, struct

ins = fallback_ins;
iter = rcu_dereference_protected(*ins,
           lockdep_is_held(&rt->rt6i_table->tb6_lock));
@@ -1448,7 +1451,8 @@
if (plen == fn->fn_bit)
return fn;

-prev = fn;
+if (fn->fn_flags & RTN_RTINFO)
+prev = fn;

next:
/*
@@ -1675,9 +1679,6 @@
net->ipv6.rt6_stats->fib_rt_entries--;
net->ipv6.rt6_stats->fib_discardedRoutes++;

-r6_flush_exceptions(rt);
-/* Reset round-robin state, if necessary */
if (rcu_access_pointer(fn->rr_ptr) == rt)
    fn->rr_ptr = NULL;
@@ -2302,14 +2303,13 @@
struct net *net = seq_file_net(seq);
struct ipv6_route_iter *iter = seq->private;

+++(*pos);
if (!v)
    goto iter_table;

n = rcu_dereference_bh(((struct rt6_info *)v)->dst.rt6_next);
-if (n) {
-+++pos;
+if (n)
return n;
-}

iter_table:
ipv6_route_check_sernum(iter);
@@ -2317,8 +2317,6 @@
r = fib6_walk_continue(&iter->w);
spin_unlock_bh(&iter->tbl->tb6_lock);
if (r > 0) {
-    if (v)
-+++pos;
return iter->w.leaf;
} else if (r < 0) {
fib6_walker_unlink(net, &iter->w);
@@ -2345,8 +2343,10 @@
 iter->skip = *pos;

 if (iter->tbl) {
+loff_t p = 0;
 +
 ipv6_route_seq_setup_walk(iter, net);
-@ -2345,8 +2343,10 @@
+@ -2345,8 +2343,10 @@
 -return ipv6_route_seq_next(seq, NULL, pos);
+return ipv6_route_seq_next(seq, NULL, &p);
 } else {
 return NULL;
 }
--- linux-4.15.0.orig/net/ipv6/ip6_flowlabel.c
+++ linux-4.15.0/net/ipv6/ip6_flowlabel.c
@@ -94,15 +94,21 @@
 return fl;
 }

+static void fl_free_rcu(struct rcu_head *head)
+{ 
+struct ip6_flowlabel *fl = container_of(head, struct ip6_flowlabel, rcu);
+ 
+if (fl->share == IPV6_FL_S_PROCESS)
+put_pid(fl->owner.pid);
+kfree(fl->opt);
+kfree(fl);
+}
+
static void fl_free(struct ip6_flowlabel *fl)
{ 
-if (fl) {
-if (fl->share == IPV6_FL_S_PROCESS)
-put_pid(fl->owner.pid);
-kfree(fl->opt);
-kfree_rcu(fl, rcu);
-}
+if (fl)
+call_rcu(&fl->rcu, fl_free_rcu);
 }

 static void fl_release(struct ip6_flowlabel *fl)
 @ @ -248,9 +254,9 @@
 rcu_read_lock_bh();
 for_each_sk_fl_rcu(np, sfl) {
 struct ip6_flowlabel *fl = sfl->fl;


-if (fl->label == label) {
+if (fl->label == label && atomic_inc_not_zero(&fl->users)) {
    fl->lastuse = jiffies;
-atomic_inc(&fl->users);
  rcu_read_unlock_bh();
  return fl;
}
@@ -617,7 +623,8 @@
goto done;
}
fl1 = sfl->fl;
-atomic_inc(&fl1->users);
+if (!atomic_inc_not_zero(&fl1->users))
+fl1 = NULL;
break;
}
}
@@ -634,9 +641,9 @@
if (fl1->share == IPV6_FL_S_EXCL ||
    fl1->share != fl->share ||
    ((fl1->share == IPV6_FL_S_PROCESS) &&
-     (fl1->owner.pid == fl->owner.pid)) ||
+     (fl1->owner.pid != fl->owner.pid)) ||
    ((fl1->share == IPV6_FL_S_USER) &&
-     uid_eq(fl1->owner.uid, fl->owner.uid)) ||
+     !uid_eq(fl1->owner.uid, fl->owner.uid)))
  goto release;
err = -ENOMEM;
--- linux-4.15.0.orig/net/ipv6/ip6_gre.c
+++ linux-4.15.0/net/ipv6/ip6_gre.c
@@ -124,6 +124,7 @@
     int dev_type = (gre_proto == htons(ETH_P_TEB)) ?
     ARPHRD_ETHER : ARPHRD_IP6GRE;
     int score, cand_score = 4;
+struct net_device *ndev;
     for_each_ip_tunnel_rcu(t, ign->tunnels_r_l[h0 ^ h1]) {
     if (!ipv6_addr_equal(local, &t->parms.laddr))
@@ -226,9 +227,9 @@
        if (cand)
           return cand;
        -dev = ign->fb_tunnel_dev;
-        -if (dev->flags & IFF_UP)
-            return netdev_priv(dev);
+        ndev = READ_ONCE(ign->fb_tunnel_dev);
+if (ndev && ndev->flags & IFF_UP)
+return netdev_priv(ndev);

return NULL;
}
@@ -319,11 +320,13 @@
if (t || !create)
    return t;

-if (parms->name[0])
+if (parms->name[0]) {
+    if (!dev_valid_name(parms->name))
+        return NULL;
    strlcpy(name, parms->name, IFNAMSIZ);
-else
+} else {
    strcpy(name, "ip6gre%d");
-
+}
    dev = alloc_netdev(sizeof(*t), name, NET_NAME_UNKNOWN,
        ip6gre_tunnel_setup);
    if (!dev)
@@ -347,7 +350,6 @@
        if (!(nt->parms.o_flags & TUNNEL_SEQ))
            dev->features |= NETIF_F_LLTX;

-dev->hold(dev);
    ip6gre_tunnel_link(ign, nt);
    return nt;
@@ -516,6 +520,9 @@
    if (tunnel->parms.o_flags & TUNNEL_SEQ)
        tunnel->o_seqno++;

        if (skb_cow_head(skb, dev->needed_headroom ?: tunnel->hlen))
        +return -ENOMEM;
        +
        /* Push GRE header. */
        protocol = (dev->type == ARPHRD_ETHER) ? htons(ETH_P_TEB) : proto;
gre_build_header(skb, tunnel->tun_hlen, tunnel->parms.o_flags,
@@ -679,6 +686,9 @@
struct net_device_stats *stats = &t->dev->stats;
int ret;
+
+if (!pskb_inet_may_pull(skb))
+goto tx_err;
+
if (!ip6_tnl_xmit_ctl(t, &t->parms.laddr, &t->parms.raddr))
goto tx_err;

@@ -706,12 +716,11 @@
return NETDEV_TX_OK;
}

-static void ip6gre_tnl_link_config(struct ip6_tnl *t, int set_mtu)
+static void ip6gre_tnl_link_config_common(struct ip6_tnl *t)
{
struct net_device *dev = t->dev;
struct __ip6_tnl_parm *p = &t->parms;
struct flowi6 *fl6 = &t->fl.u.ip6;
-int t_hlen;

if (dev->type != ARPHRD_ETHER) {
	memcpy(dev->dev_addr, &p->laddr, sizeof(struct in6_addr));
@@ -738,12 +747,13 @@
	dev->flags |= IFF_POINTOPOINT;
-else
-dev->flags &= ~IFF_POINTOPOINT;
+
}

-t->tun_hlen = gre_calc_hlen(t->parms.o_flags);
- -
-t->hlen = t->encap_hlen + t->tun_hlen;
- -
-t_hlen = t->hlen + sizeof(struct ipv6hdr);
+static void ip6gre_tnl_link_config_route(struct ip6_tnl *t, int set_mtu,
+ + +
+
+{ +
+const struct __ip6_tnl_parm *p = &t->parms;
+struct net_device *dev = t->dev;
+
+if (p->flags & IP6_TNL_F_CAP_XMIT) {
++int strict = (ipv6_addr_type(&p->raddr) &
+ @@ -775,8 +785,26 @@
+    }
+    }
+}
-static int ip6gre_tnl_change(struct ip6_tnl *t,
-const struct __ip6_tnl_parm *p, int set_mtu)
+static int ip6gre_calc_hlen(struct ip6_tnl *tunnel)
+{
+    int t_hlen;
+    +tunnel->tun_hlen = gre_calc_hlen(tunnel->parms.o_flags);
+    +tunnel->hlen = tunnel->tun_hlen + tunnel->encap_hlen;
+    +t_hlen = tunnel->hlen + sizeof(struct ipv6hdr);
+    +tunnel->dev->hard_header_len = LL_MAX_HEADER + t_hlen;
+    +return t_hlen;
+}
+
+static void ip6gre_tnl_link_config(struct ip6_tnl *t, int set_mtu)
+{
+    +ip6gre_tnl_link_config_common(t);
+    +ip6gre_tnl_link_config_route(t, set_mtu, ip6gre_calc_hlen(t));
+}
+
+static void ip6gre_tnl_copy_tnl_parm(struct ip6_tnl *t,
+    const struct __ip6_tnl_parm *p)
+    {t->parms.laddr = p->laddr;
+     t->parms.raddr = p->raddr;
+     t->parms.o_flags = p->o_flags;
+     t->parms.fwmark = p->fwmark;
+     dst_cache_reset(&t->dst_cache);
+    }
+
+static int ip6gre_tnl_change(struct ip6_tnl *t, const struct __ip6_tnl_parm *p,
+    int set_mtu)
+{
+    +ip6gre_tnl_copy_tnl_parm(t, p);
+    ip6gre_tnl_link_config(t, set_mtu);
+    return 0;
+}
@@ -1068,11 +1102,7 @@
+return ret;
+
-tunnel->tun_hlen = gre_calc_hlen(tunnel->parms.o_flags);
-tunnel->hlen = tunnel->tun_hlen + tunnel->encap_hlen;
-t_hlen = tunnel->hlen + sizeof(struct ipv6hdr);
-
-dev->hard_header_len = LL_MAX_HEADER + t_hlen;
+t_hlen = ip6gre_calc_hlen(tunnel);
dev->mtu = ETH_DATA_LEN - t_hlen;
if (dev->type == ARPHRD_ETHER)
  dev->mtu -= ETH_HLEN;
@@ -1113,8 +1143,6 @@
  strcpy(tunnel->parms.name, dev->name);

  tunnel->hlen = sizeof(struct ipv6hdr) + 4;
-  -dev_hold(dev);
  }

@@ -1158,15 +1186,16 @@
 static int __net_init ip6gre_init_net(struct net *net)
 {
   struct ip6gre_net *ign = net_generic(net, ip6gre_net_id);
+  struct net_device *ndev;
   int err;

   -ign->fb_tunnel_dev = alloc_netdev(sizeof(struct ip6_tnl), "ip6gre0",
-     - NET_NAME_UNKNOWN,
-     - ip6gre_tunnel_setup);
-    if (!ign->fb_tunnel_dev) {
+  ndev = alloc_netdev(sizeof(struct ip6_tnl), "ip6gre0",
+     + NET_NAME_UNKNOWN, ip6gre_tunnel_setup);
+    if (!ndev) {
       err = -ENOMEM;
      goto err_alloc_dev;
    }

+  ign->fb_tunnel_dev = ndev;
    dev_net_set(ign->fb_tunnel_dev, net);
/* FB netdevice is special: we have one, and only one per netns.
 * Allowing to move it to another netns is clearly unsafe.
@@ -1186,7 +1215,7 @@
   return 0;
err_reg_dev:
-    free_netdev(ign->fb_tunnel_dev);
+    free_netdev(ndev);
    err_alloc_dev:
   return err;
  }
@@ -1375,13 +1404,12 @@
   return ret;
  }

-static int ip6gre_newlink(struct net *src_net, struct net_device *dev,
  - struct nlattr *tb[], struct nlattr *data[],
  struct nlattr *tb[], struct nlattr *data[],
static int ip6gre_newlink(struct net *src_net, struct net_device *dev,
                      struct nlattr *tb[], struct nlattr *data[],
                      struct netlink_ext_ack *extack)
{
    struct ip6_tnl *nt;
    struct net *net = dev_net(dev);
    struct ip_tunnel_encap ipencap;
    int err;

    if (err)
        goto out;

    if (tb[IFLA_MTU])
        ip6_tnl_change_mtu(dev, nla_get_u32(tb[IFLA_MTU]));

    out:
    return err;
}

static int ip6gre_changelink_common(struct net_device *dev, struct nlattr *tb[],
                              struct nlattr *data[], struct __ip6_tnl_parm *p_p,
+ struct netlink_ext_ack *extack)
{
    struct ip6_tnl *t, *nt = netdev_priv(dev);
    struct net *net = nt->net;
    struct ip6gre_net *ign = net_generic(net, ip6gre_net_id);
    -struct __ip6_tnl_parm p;
    struct ip_tunnel_encap ipencap;

    if (dev == ign->fb_tunnel_dev)
-        return -EINVAL;
+        return ERR_PTR(-EINVAL);

    if (ip6gre_netlink_encap_parms(data, &ipencap)) {
        int err = ip6_tnl_encap_setup(nt, &ipencap);

        if (err < 0)
            -return err;
+            return ERR_PTR(err);
    }

-    ip6gre_netlinkparms(data, &p);
+    ip6gre_netlink_parms(data, p_p);

    -t = ip6gre_tunnel_locate(net, &p, 0);
    +t = ip6gre_tunnel_locate(net, p_p, 0);

    if (t) {
        if (t->dev != dev)
            -return -EEXIST;
            return ERR_PTR(-EEXIST);
    } else {
        t = nt;
    }

+    return t;
+}
+
+static int ip6gre_changelink(struct net_device *dev, struct nlattr *tb[],
+    struct nlattr *data[],
+    struct netlink_ext_ack *extack)
+{
    +struct ip6_tnl *t = netdev_priv(dev);
    +struct ip6gre_net *ign = net_generic(t->net, ip6gre_net_id);
    +struct __ip6_tnl_parm p;
    +
    +t = ip6gre_changelink_common(dev, tb, data, &p, extack);
    +if (IS_ERR(t))
        +return PTR_ERR(t);
ip6gre_tunnel_unlink(ign, t);
ip6gre_tnl_change(t, &p, !b[IFLA_MTU]);
ip6gre_tunnel_link(ign, t);
--- linux-4.15.0.orig/net/ipv6/ip6_icmp.c
+++ linux-4.15.0/net/ipv6/ip6_icmp.c
@@ -9,6 +9,8 @@
 #if IS_ENABLED(CONFIG_IPV6)
 +#if !IS_BUILTIN(CONFIG_IPV6)
 +
 static ip6_icmp_send_t __rcu *ip6_icmp_send;

 int inet6_register_icmp_sender(ip6_icmp_send_t *fn)
@@ -31,18 +33,52 @@
 }
 EXPORT_SYMBOL(inet6_unregister_icmp_sender);

-void icmpv6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info)
+void __icmpv6_send(struct sk_buff *skb, u8 type, u8 code, __u32 info, 
+const struct inet6_skb_parm *parm)
{| 
 ip6_icmp_send_t *send;

 rcu_read_lock();
 send = rcu_dereference(ip6_icmp_send);
+if (send)
+send(skb, type, code, info, NULL, parm);
+rcu_read_unlock();
+}
+EXPORT_SYMBOL(__icmpv6_send);
+#endif

-#if IS_ENABLED(CONFIG_NF_NAT)
+#ifndef CONFIG_NF_NAT
+### include <net/netfilter/nf_conntrack.h>
+void icmpv6_ndo_send(struct sk_buff *skb, u8 type, u8 code, __u32 info)
+{
+struct inet6_skb_parm parm = { 0 }; 
+struct sk_buff *cloned_skb = NULL;
+enum ip_conntrack_info ctinfo;
+struct in6_addr orig_ip;
+struct nf_conn *ct;
+ 
+ct = nf_ct_get(skb, &ctinfo);
+if (!ct || !(ct->status & IPS_SRC_NAT)) {
+ __icmpv6_send(skb, type, code, info, &parm);
+return;
+
+if (skb_shared(skb_in))
+skb_in = cloned_skb = skb_clone(skb_in, GFP_ATOMIC);
+
+if (unlikely(!skb_in || skb_network_header(skb_in) < skb_in->head ||
+ skb_network_offset(skb_in) + sizeof(struct ipv6hdr)) >
+ skb_network_offset(skb_in) + sizeof(struct ipv6hdr))))
+goto out;
-	send(skb, type, code, info, NULL);
+
+orig_ip = ipv6_hdr(skb_in)->saddr;
+ipv6_hdr(skb_in)->saddr = ct->tuplehash[0].tuple.src.u3.in6;
+__icmpv6_send(skb_in, type, code, info, &parm);
+ipv6_hdr(skb_in)->saddr = orig_ip;
+out:
+-rcu_read_unlock();
+consume_skb(cloned_skb);
+
+EXPORT_SYMBOL(icmpv6_send);
+#endif

--- linux-4.15.0.orig/net/ipv6/ip6_offload.c
+++ linux-4.15.0/net/ipv6/ip6_offload.c
@@ -113,6 +113,7 @@

payload_len = skb->len - nhoff - sizeof(*ipv6h);
ipv6h->payload_len = htons(payload_len);
skb->network_header = (u8 *)ipv6h - skb->head;
+skb_reset_mac_len(skb);

if (udpfrag) {
int err = ip6_find_1stfragopt(skb, &prevhdr);
--- linux-4.15.0.orig/net/ipv6/ip6_output.c
+++ linux-4.15.0/net/ipv6/ip6_output.c
@@ -63,8 +63,8 @@
{
struct dst_entry *dst = skb_dst(skb);
struct net_device *dev = dst->dev;
+const struct in6_addr *nexthop;
struct neighbour *neigh;
skb->network_header = (u8 *)ipv6h - skb->head;
+skb_reset_mac_len(skb);

if (ipv6_addr_is_multicast(&ipv6_hdr(skb)->daddr)) {
return ret;
}

#ifdef CONFIG_NETFILTER && defined(CONFIG_XFRM)
+/* Policy lookup after SNAT yielded a new policy */
+if (skb_dst(skb)->xfrm) {
+IPC(skb)->flags |= IPSKB_REROUTED;
+return dst_output(net, sk, skb);
+}
+#endif
+
if ((skb->len > ip6_skb_dst_mtu(skb) && !skb_is_gso(skb)) ||
dst_allfrag(skb_dst(skb)) ||
(IP6CB(skb)->frag_max_size && skb->len > IP6CB(skb)->frag_max_size))
@ @ -187,39 +195,37 @@
const struct ipv6_pinfo *np = inet6_sk(sk);
struct in6_addr *first_hop = &fl6->daddr;
struct dst_entry *dst = skb_dst(skb);
+unsigned int head_room;
struct ipv6hdr *hdr;
u8  proto = fl6->flowi6_proto;
int seg_len = skb->len;
int hlimit = -1;
m32 mtu;

+head_room = sizeof(struct ipv6hdr) + LL_RESERVED_SPACE(dst->dev);
+if (opt)
+head_room += opt->opt_nflen + opt->opt_flen;
+
+if (unlikely(skb_headroom(skb) < head_room)) {
+struct sk_buff *skb2 = skb_realloc_headroom(skb, head_room);
+if (!skb2) {
+IP6_INC_STATS(net, ip6_dst_idev(skb_dst(skb)),
+IPSTATS_MIB_OUTDISCARDS);
+kfree_skb(skb);
+return -ENOBUFS;
+}
+if (skb->sk)
+skb_set_owner_w(skb2, skb->sk);
+consume_skb(skb);
+skb = skb2;
+}
+
if (opt) {
-seg_len += opt->opt_nflen + opt->opt_flen;
-/* First: exthdrs may take lots of space (~8K for now)
- MAX_HEADER is not enough.
  /*
  -head_room = opt->opt_nflen + opt->opt_flen;
  -seg_len += head_room;
  -head_room += sizeof(struct ipv6hdr) + LL_RESERVED_SPACE(dst->dev);
  -
  -if (skb_headroom(skb) < head_room) {
    struct sk_buff *skb2 = skb_realloc_headroom(skb, head_room);
    -if (!skb2) {
      -IP6_INC_STATS(net, ip6_dst_idev(skb_dst(skb)),
      -IPSTATS_MIB_OUTDISCARDSDS);
      -kfree_skb(skb);
      return -ENOBUFS;
    }
    -consume_skb(skb);
    -skb = skb2;
    /* skb_set_owner_w() changes sk->sk_wmem_alloc atomically,
    - * it is safe to call in our context (socket lock not held)
    - */
    skb_set_owner_w(skb, (struct sock *)sk);
    -}
  }
  -consume_skb(skb);
  -skb = skb2;
  -/"*/
  -skb_set_owner_w(skb, (struct sock *)sk);
  -}
  if (opt->opt_flen)
  ipv6_push_frag_opts(skb, opt, &proto);
  +
  if (opt->opt_nflen)
  ipv6_push_nfrag_opts(skb, opt, &proto, &first_hop,
    &fl6->saddr);
  @ @ -367.6 +373.12 @@
static inline int ip6_forward_finish(struct net *net, struct sock *sk,
  struct sk_buff *skb)
{
  +struct dst_entry *dst = skb_dst(skb);
  +
  +_IP6_INC_STATS(net, ip6_dst_idev(dst), IPSTATS_MIB_OUTFORWDATAGRAMS);
  +_IP6_ADD_STATS(net, ip6_dst_idev(dst), IPSTATS_MIB_OUTOCTETS, skb->len);
  +
  +skb->tstamp = 0;
  return dst_output(net, sk, skb);
}
@@ -493,7 +505,8 @@
send redirects to source routed frames.
  We don’t send redirects to frames decapsulated from IPsec.
  */
  -if (skb->dev == dst->dev && opt->srcrt == 0 && skb_sec_path(skb)) {
    +if (IP6CB(skb)->iif == dst->dev->iifindex &&
      +opt->srcrt == 0 && skb_sec_path(skb)) {
      struct in6_addr *target = NULL;

struct inet_peer *peer;
struct rt6_info *rt;
@@ -560,8 +573,6 @@
    hdr->hop_limit--;

-__IP6_INC_STATS(net, ip6_dst_idev(dst), IPSTATS_MIB_OUTFORWDATAGRAMS);
-__IP6_ADD_STATS(net, ip6_dst_idev(dst), IPSTATS_MIB_OUTOCTETS, skb->len);
return NF_HOOK(NFPROTO_IPV6, NF_INET_FORWARD,
    net, NULL, skb, skb->dev, dst->dev,
    ip6_forward_finish);
@@ -583,6 +594,8 @@
to->dev = from->dev;
to->mark = from->mark;

+skb_copy_hash(to, from);
+
#ifndef CONFIG_NET_SCHED
    to->tc_index = from->tc_index;
@endif
@@ -599,7 +612,7 @@
inet6_sk(skb->sk) : NULL;
struct ipv6hdr *tmp_hdr;
struct frag_hdr *fh;
unsigned int mtu, hlen, left, len;
+unsigned int mtu, hlen, left, len, nexthdr_offset;
int hroom, troom;
__be32 frag_id;
int ptr, offset = 0, err = 0;
@@ -610,6 +623,7 @@
goto fail;
hlen = err;
nexthdr = *prevhdr;
+nexthdr_offset = prevhdr - skb_network_header(skb);

mtu = ip6_skb_dst_mtu(skb);

@@ -644,6 +658,7 @@
(err = skb_checksum_help(skb)))
goto fail;

+prevhdr = skb_network_header(skb) + nexthdr_offset;
hroom = LL_RESERVED_SPACE(rt->dst.dev);
if (skb_has_frag_list(skb)) {
    unsigned int first_len = skb_pagelen(skb);
    @@ -1075,19 +1090,19 @@
        *It returns a valid dst pointer on success, or a pointer encoded
        *error code.
-struct dst_entry *ip6_dst_lookup_flow(const struct sock *sk, struct flowi6 *fl6, const struct in6_addr *final_dst) {
  struct dst_entry *dst = NULL;
  int err;

  -err = ip6_dst_lookup_tail(sock_net(sk), sk, &dst, fl6);
  +err = ip6_dst_lookup_tail(net, sk, &dst, fl6);
  if (err)
    return ERR_PTR(err);
  if (final_dst)
    fl6->daddr = *final_dst;

  -return xfrm_lookup_route(sock_net(sk), dst, flowi6_to_flowi(fl6), sk, 0);
  +return xfrm_lookup_route(net, dst, flowi6_to_flowi(fl6), sk, 0);
}
EXPORT_SYMBOL_GPL(ip6_dst_lookup_flow);
@@ -1112,7 +1127,7 @@
dst = ip6_sk_dst_check(sk, dst, fl6);
  if (!dst)
    -dst = ip6_dst_lookup_flow(sk, fl6, final_dst);
    +dst = ip6_dst_lookup_flow(sock_net(sk), sk, fl6, final_dst);

  return dst;
}
@@ -1237,7 +1252,7 @@
const struct sockcm_cookie *sockc) {
  struct sk_buff *skb, *skb_prev = NULL;
  unsigned int maxfraglen, fragheaderlen, mtu, orig_mtu;
-unsigned int maxfraglen, fragheaderlen, mtu, orig_mtu;
+unsigned int max fraglen, fragheaderlen, mtu, orig_mtu, pmtu;
  int exthdrlen = 0;
  int dst_exthdrlen = 0;
  int hh_len;
@@ -1273,6 +1288,12 @@
    sizeof(struct frag_hdr) : 0) +
    rt->rt6i_nfheader_len;

+/* as per RFC 7112 section 5, the entire IPv6 Header Chain must fit
+ * the first fragment
+ */
+if (headersize + transhdrlen > mtu)
  +goto emsgsize;
+
if (cork->length + length > mtu - headersize &&
    (sk->sk_protocol == IPPROTO_UDP || sk->sk_protocol == IPPROTO_RAW)) {

    if (cork->length + length > maxnonfragsize - headersize) {
        emsgsize:
        -ipv6_local_error(sk, EMSGSIZE, fl6,
        - mtu - headersize +
        - sizeof(struct ipv6hdr));
        +pmtu = max_t(int, mtu - headersize + sizeof(struct ipv6hdr), 0);
        +ipv6_local_error(sk, EMSGSIZE, fl6, pmtu);
        return -EMSGSIZE;
    }

    off = skb->len;
    --- linux-4.15.0.orig/net/ipv6/ip6_tunnel.c
    +++ linux-4.15.0/net/ipv6/ip6_tunnel.c
    @@ -272,7 +272,6 @@
    strcpy(t->parms.name, dev->name);

    -dev_hold(dev);
    ip6_tnl_link(ip6n, t);
    return 0;

    @@ -297,13 +296,16 @@
    struct net_device *dev;
    struct ip6_tnl *t;
    char name[IFNAMSIZ];
    -int err = -ENOMEM;
    +int err = -E2BIG;

    -if (p->name[0])
    +if (p->name[0]) {
    +if (!dev_valid_name(p->name))
    +goto failed;
    strcpy(name, p->name, IFNAMSIZ);
    -else


+} else {
    sprintf(name, "ip6tnl%%d");
    -}
+err = -ENOMEM;
    dev = alloc_netdev(sizeof(*t), name, NET_NAME_UNKNOWN,
    ip6_tnl_dev_setup);
if (!dev)
@@ -624,7 +626,7 @@
    rt = ip_route_output_ports(dev_net(skb->dev), &fl4, NULL,
      eiph->daddr, eiph->saddr, 0, 0,
      IPPROTO_IP, RT_TOS(eiph->tos), 0);
-    if (IS_ERR(rt) || rt->dst.dev->type != ARPHRD_TUNNEL) {
+    if (IS_ERR(rt) || rt->dst.dev->type != ARPHRD_TUNNEL6) {
      if (!IS_ERR(rt))
        ip_rt_put(rt);
      goto out;
@@ -633,7 +635,7 @@
           skb_dst(skb2)->dev->type != ARPHRD_TUNNEL6)
       goto out;
    } else {
    if (ip_route_input(skb2, eiph->daddr, eiph->saddr, eiph->tos,
      skb2->dev) ||
-      skb_dst(skb2)->dev->type != ARPHRD_TUNNEL)
+      skb_dst(skb2)->dev->type != ARPHRD_TUNNEL6)
       goto out;
    }
@@ -642,7 +644,7 @@
    if (rel_info > dst_mtu(skb_dst(skb2)))
      goto out;

- skb_dst_update_pmtu(skb2, rel_info);
+ skb_dst_update_pmtu_no_confirm(skb2, rel_info);
    }

   icmp_send(skb2, rel_type, rel_code, htonl(rel_info));
@@ -860,7 +862,15 @@
       struct metadata_dst *tun_dst,
       bool log_ecn_err)
    {
-    return __ip6_tnl_rcv(t, skb, tpi, NULL, ip6ip6_dscp_ecn_decapsulate,
+    int (*dscp_ecn_decapsulate)(const struct ip6_tnl *t,
+       const struct ipv6hdr *ipv6h,
+       struct sk_buff *skb);
+    +dscp_ecn_decapsulate = ip6ip6_dscp_ecn_decapsulate;
+    +if (tpi->proto == htons(ETH_P_IP))
+    +dscp_ecn_decapsulate = ip4ip6_dscp_ecn_decapsulate;
+return __ip6_tnl_rcv(t, skb, tpi, NULL, dscp_ecn_decapsulate, 
    log_ecn_err);
}
EXPORT_SYMBOL(ip6_tnl_rcv);
@@ -896,6 +906,7 @@
goto drop;
if (!xfrm6_policy_check(NULL, XFRM_POLICY_IN, skb))
goto drop;
+ipv6h = ipv6_hdr(skb);
if (!ip6_tnl_rcv_ctl(t, &ipv6h->daddr, &ipv6h->saddr))
goto drop;
if (iptunnel_pull_header(skb, 0, tpi->proto, false))
@@ -1123,14 +1134,10 @@
max_headroom += 8;
mtu -= 8;
} -
@if (skb->protocol == htons(ETH_P_IPV6)) {
-    if (mtu < IPV6_MIN_MTU)
-        mtu = IPV6_MIN_MTU;
-} else if (mtu < 576) {
-    mtu = 576;
-} +mtu = max(mtu, skb->protocol == htons(ETH_P_IPV6) ?
+        IPV6_MIN_MTU : IPV4_MIN_MTU);

-skb_dst_update_pmtu(skb, mtu);
+skb_dst_update_pmtu_no_confirm(skb, mtu);
if (skb->len - t->tun_hlen - eth_hlen > mtu && !skb_is_gso(skb)) {
    *pmtu = mtu;
    err = -EMSGSIZE;
@@ -1178,10 +1185,6 @@
} 
skb_dst_set(skb, dst);
@if (encap_limit >= 0) {
-    init_tel_txopt(&opt, encap_limit);
-    ipv6_push_frag_opts(skb, &opt.ops, &proto);
-} 
hop_limit = hop_limit ? : ip6_dst_hoplimit(dst);

/* Calculate max headroom for all the headers and adjust 
@@ -1196,6 +1199,11 @@
if (err)
    return err;
+if (encap_limit >= 0) {
    +init_tel_txopt(&opt, encap_limit);
    +ipv6_push_frag_opts(skb, &opt.ops, &proto);
skb_push(skb, sizeof(struct ipv6hdr));
skb_reset_network_header(skb);
ipv6h = ipv6_hdr(skb);
@@ -1220,7 +1228,7 @@
ip4ip6_tnl_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct ip6_tnl *t = netdev_priv(dev);
    const struct iphdr  *iph = ip_hdr(skb);
+    const struct iphdr  *iph;
    int encap_limit = -1;
    struct flowi6 fl6;
    __u8 dsfield;
@@ -1228,6 +1236,7 @@
    u8 tproto;
    int err;
    +iph = ip_hdr(skb);
    memset(&(IPCB(skb)->opt), 0, sizeof(IPCB(skb)->opt));
    tproto = READ_ONCE(t->parms.proto);
    @@ -1266,12 +1275,11 @@
    }\n    fl6.flowi6_uid = sock_net_uid(dev_net(dev), NULL);
    +dsfield = INET_ECN_encapsulate(dsfield, ipv4_get_dsfield(iph));
    if (iptunnel_handle_offloads(skb, SKB_GSO_IPXIP6))
    return -1;

    -dsfield = INET_ECN_encapsulate(dsfield, ipv4_get_dsfield(iph));
    skb_set_inner_ipproto(skb, IPPROTO_IPIP);
    err = ip6_tnl_xmit(skb, dev, dsfield, &fl6, encap_limit, &mtu,
    @@ -1291,7 +1299,7 @@
ip6ip6_tnl_xmit(struct sk_buff *skb, struct net_device *dev)
{
    struct ip6_tnl *t = netdev_priv(dev);
    -struct ipv6hdr *ipv6h = ipv6_hdr(skb);
+    struct ipv6hdr *ipv6h;
    int encap_limit = -1;
    __u16 offset;
    struct flowi6 fl6;
    @@ -1300,6 +1308,7 @@
    u8 tproto;
    int err;
ipv6h = ipv6_hdr(skb);
tproto = READ_ONCE(t->parms.proto);
if ((tproto != IPPROTO_IPV6 && tproto != 0) ||
    ip6_tnl_addr_conflict(t, ipv6h))
    @@ -1353,12 +1362,11 @@
}

fl6.flowi6_uid = sock_net_uid(dev_net(dev), NULL);
+dsfield = INET_ECN_encapsulate(dsfield, ipv6_get_dsfield(ipv6h));

if (iptunnel_handle_offloads(skb, SKB_GSO_IPXIP6))
    return -1;
-
dsfield = INET_ECN_encapsulate(dsfield, ipv6_get_dsfield(ipv6h));
-
skb_set_inner_ipproto(skb, IPPROTO_IPV6);

err = ip6_tnl_xmit(skb, dev, dsfield, &fl6, encap_limit, &mtu,
    @@ -1379,6 +1387,9 @@
struct net_device_stats *stats = &t->dev->stats;
    int ret;

+if (!pskb_inet_may_pull(skb))
+    goto tx_err;
+
+switch (skb->protocol) {
+    case htons(ETH_P_IP):
+        ret = ip4ip6_tnl_xmit(skb, dev);
+    @@ -1682,8 +1693,13 @@
+        if (new_mtu < ETH_MIN_MTU)
+            return -EINVAL;
+        }
+        
+        if (tnl->parms.proto == IPPROTO_IPV6 || tnl->parms.proto == 0) {
+            +if (new_mtu > IP6_MAX_MTU - dev->hard_header_len)
+                +return -EINVAL;
+            +} else {
+                +if (new_mtu > IP_MAX_MTU - dev->hard_header_len)
+                    +return -EINVAL;
+            +}
+        dev->mtu = new_mtu;
+        return 0;
+    }
@@ -1831,8 +1847,9 @@
        if (!(t->parms.flags & IP6_TNL_F_IGN_ENCAP_LIMIT))
            dev->mtu -= 8;
dev->min_mtu = ETH_MIN_MTU;
-dev->max_mtu = 0xFFF8 - dev->hard_header_len;
+dev->max_mtu = IP6_MAX_MTU - dev->hard_header_len;

+dev_hold(dev);
return 0;

destroy_dst:
@@ -1857,10 +1874,8 @@
if (err)
    return err;
ip6_tnl_link_config(t);
-if (t->parms.collect_md) {
-    dev->features |= NETIF_F_NETNS_LOCAL;
+    if (t->parms.collect_md)
        netif_keep_dst(dev);
    -}
    return 0;
}

@@ -1878,7 +1893,6 @@
    struct ip6_tnl_net *ip6n = net_generic(net, ip6_tnl_net_id);

    t->parms.proto = IPPROTO_IPV6;
    -dev_hold(dev);
    rcu_assign_pointer(ip6n->tnls_wc[0], t);
    return 0;
@@ -1979,14 +1993,14 @@
    struct net *net = dev_net(dev);
    struct ip6_tnl_net *ip6n = net_generic(net, ip6_tnl_net_id);
    -struct ip6_tnl *nt, *t;
-    int err;
+    struct ip6_tnl *nt, *t;
+    int err;

    nt = netdev_priv(dev);

    if (ip6_tnl_netlink_encap_parms(data, &ipencap)) {
        -int err = ip6_tnl_encap_setup(nt, &ipencap);
        +err = ip6_tnl_encap_setup(nt, &ipencap);
        if (err < 0)
            return err;
    }
@@ -2002,7 +2016,11 @@
    return -EEXIST;
return ip6_tnl_create2(dev);
+err = ip6_tnl_create2(dev);
+if (!err && tb[IFLA_MTU])
+ip6_tnl_change_mtu(dev, nla_get_u32(tb[IFLA_MTU]));
+
+return err;
}

static int ip6_tnl_changelink(struct net_device *dev, struct nlattr *tb[],
@@ -2187,6 +2205,16 @@
t = rtnl_dereference(t->next);
}
}
+
+t = rtnl_dereference(ip6n->tnls_wc[0]);
+while (t) {
+/* If dev is in the same netns, it has already
+ * been added to the list by the previous loop.
+ */
+if (!net_eq(dev_net(t->dev), net))
+unregister_netdevice_queue(t->dev, list);
+t = rtnl_dereference(t->next);
+}
}

static int __net_init ip6_tnl_init_net(struct net *net)
--- linux-4.15.0.orig/net/ipv6/ip6_udp_tunnel.c
+++ linux-4.15.0/net/ipv6/ip6_udp_tunnel.c
@@ -15,7 +15,7 @@
int udp_sock_create6(struct net *net, struct udp_port_cfg *cfg,
struct socket **sockp)
{
-struct sockaddr_in6 udp6_addr;
+struct sockaddr_in6 udp6_addr = {};
int err;
struct socket *sock = NULL;

@@ -42,6 +42,7 @@
goto error;

if (cfg->peer_udp_port) {
+memset(&udp6_addr, 0, sizeof(udp6_addr));
udp6_addr.sin6_family = AF_INET6;
memcpy(&udp6_addr.sin6_addr, &cfg->peer_ip6,
+ sizeof(udp6_addr.sin6_addr));
--- linux-4.15.0.orig/net/ipv6/ip6_vti.c
strcpy(t->parms.name, dev->name);
-dev_hold(dev);
vti6_tnl_link(ip6n, t);
return 0;
char name[IFNAMSIZ];
int err;

-if (p->name[0])
+if (p->name[0]) {
+if (!dev_valid_name(p->name))
+goto failed;
strlcpy(name, p->name, IFNAMSIZ);
-else
+-} else {
-sprintf(name, "ip6_vti%%d");
+} }

dev = alloc_netdev(sizeof(*t), name, NET_NAME_UNKNOWN, vti6_dev_setup);
if (!dev)
@@ -312,9 +314,10 @@

if (!xfrm6_policy_check(NULL, XFRM_POLICY_IN, skb)) {
rcu_read_unlock();
-return 0;
+goto discard;
}

+ipv6h = ipv6_hdr(skb);
if (!ip6_tnl_rcv_ctl(t, &ipv6h->daddr, &ipv6h->saddr)) {
t->dev->stats.rx_dropped++;
rcu_read_unlock();
@@ -449,8 +452,35 @@
int err = -1;
int mtu;

-if (!dst)
-goto tx_err_link_failure;
+if (!dst) {
+switch (skb->protocol) {
+case htons(ETH_P_IP): {
+struct rtable *rt;
+}
+fl->u.ip4.flowi4_oif = dev->ifindex;
+fl->u.ip4.flowi4_flags |= FLOWI_FLAG_ANYSRC;
+rt = __ip_route_output_key(dev_net(dev), &fl->u.ip4);
+if (IS_ERR(rt))
+goto tx_err_link_failure;
+dst = &rt->dst;
+skb_dst_set(skb, dst);
+break;
+
+case htons(ETH_P_IPV6):
+fl->u.ip6.flowi6_oif = dev->ifindex;
+fl->u.ip6.flowi6_flags |= FLOWI_FLAG_ANYSRC;
+dst = ip6_route_output(dev_net(dev), NULL, &fl->u.ip6);
+if (dst->error) {
+dst_release(dst);
+dst = NULL;
+goto tx_err_link_failure;
+}
+skb_dst_set(skb, dst);
+break;
+default:
+goto tx_err_link_failure;
+
+dst_hold(dst);
dst = xfrm_lookup(t->net, dst, fl, NULL, 0);
@@ -477,13 +507,9 @@
goto tx_err_dst_release;
}

-skb_scrub_packet(skb, !net_eq(t->net, dev_net(dev)));
-skb_dst_set(skb, dst);
-skb->dev = skb_dst(skb)->dev;
-
- mtu = dst_mtu(dst);
- if (!skb->ignore_df && skb->len > mtu) {
- skb_dst_update_pmtu(skb, mtu);
- if (skb->len > mtu) {
- skb_dst_update_pmtu_no_confirm(skb, mtu);
-
- if (skb->protocol == htons(ETH_P_IPV6)) {
- if (mtu < IP6_MIN_MTU)
- @@ -495,9 +521,14 @@
- htonl(mtu));
-
- return -EMSGSIZE;
-
err = -EMSGSIZE;
goto tx_err_dst_release;
}

skb_scrub_packet(skb, !net_eq(t->net, dev_net(dev)));  
skb_dst_set(skb, dst);
skb->dev = skb_dst(skb)->dev;
err = dst_output(t->net, skb->sk, skb);
if (net_xmit_eval(err) == 0) {
    struct pcpu_sw_netstats *tstats = this_cpu_ptr(dev->tstats);
    @ @  -525,18  +556,18  @@
    {
struct ip6_tnl *t = netdev_priv(dev);
struct net_device_stats *stats = &t->dev->stats;
-struct ipv6hdr *ipv6h;
struct flowi fl;
int ret;

+if (!pskb_inet_may_pull(skb))
+goto tx_err;
+
memset(&fl, 0, sizeof(fl));

switch (skb->protocol) {
case htons(ETH_P_IPV6):
   -ipv6h = ipv6_hdr(skb);
- if ((t->parms.proto != IPPROTO_IPV6 && t->parms.proto != 0) ||
   -  vti6_addr_conflict(t, ipv6h))
+   vti6_addr_conflict(t, ipv6_hdr(skb)))
goto tx_err;

xfrm_decode_session(skb, &fl, AF_INET6);
@@ -849,7 +880,7 @@
dev->hard_header_len = LL_MAX_HEADER + sizeof(struct ipv6hdr);
dev->mtu = ETH_DATA_LEN;
dev->min_mtu = IPv6_MIN_MTU;
-dev->max_mtu = IP_MAX_MTU;
+dev->max_mtu = IP_MAX_MTU - sizeof(struct ipv6hdr);
dev->flags |= IFF_NOARP;
dev->addr_len = sizeof(struct in6_addr);
netif_keep_dst(dev);
@@ -871,6 +902,7 @@
dev->tstats = netdev_alloc_pcpu_stats(struct pcpu_sw_netstats);
if (!dev->tstats)
    return -ENOMEM;
+dev_hold(dev);
return 0;

@@ -902,7 +934,6 @@
    struct vti6_net *ip6n = net_generic(net, vti6_net_id);

t->parms.proto = IPPROTO_IPV6;
-dev_hold(dev);

    rcu_assign_pointer(ip6n->tnls_wc[0], t);
    return 0;
@@ -1068,7 +1099,8 @@
    t = rtnl_dereference(ip6n->tnls_wc[0]);
    -unregister_netdevice_queue(t->dev, list);
    +if (t)
    +unregister_netdevice_queue(t->dev, list);
}

static int __net_init vti6_init_net(struct net *net)
--- linux-4.15.0.orig/net/ipv6/ip6mr.c
+++ linux-4.15.0/net/ipv6/ip6mr.c
@@ -53,6 +53,9 @@
    #include <linux/export.h>
    #include <net/ip6_checksum.h>
    #include <linux/netconf.h>
+    +#include <net/ip_tunnels.h>
+    +
+    +#include <linux/nospec.h>

    struct mr6_table {
    struct list_head list;
@@ -495,6 +498,7 @@
    return ERR_PTR(-ENOENT);
    
    it->mrt = mrt;
    +it->cache = NULL;
    return *pos ? ipmr_mfc_seq_idx(net, seq->private, *pos - 1)
    : SEQ_START_TOKEN;
}
-if (err < 0) {
-kfree_skb(skb);
-return err;
-
+if (!pskb_inet_may_pull(skb))
+goto tx_err;
+
+if (ip6mr_fib_lookup(net, &fl6, &mrt) < 0)
+goto tx_err;

read_lock(&mrt_lock);
dev->stats.tx_bytes += skb->len;
@@ -715,6 +718,11 @@
read_unlock(&mrt_lock);
kfree_skb(skb);
return NETDEV_TX_OK;
+
+tx_err:
+dev->stats.tx_errors++;
+kfree_skb(skb);
+return NETDEV_TX_OK;
}

static int reg_vif_get_iflink(const struct net_device *dev)
@@ -1798,7 +1806,8 @@
ret = 0;
if (!ip6mr_new_table(net, v))
ret = -ENOMEM;
-raw6_sk(sk)->ip6mr_table = v;
+else
+raw6_sk(sk)->ip6mr_table = v;
rtnl_unlock();
return ret;
}
@@ -1885,6 +1894,7 @@
return -EFAULT;
if (vr.mifi >= mrt->maxvif)
return -EINVAL;
+vr.mifi = array_index_nospec(vr.mifi, mrt->maxvif);
read_lock(&mrt_lock);
vif = &mrt->vif6_table[vr.mifi];
if (MIF_EXISTS(mrt, vr.mifi)) {
@@ -1959,6 +1969,7 @@
return -EFAULT;
if (vr.mifi >= mrt->maxvif)
return -EINVAL;
+vr.mifi = array_index_nospec(vr.mifi, mrt->maxvif);
read_lock(&mrt_lock);
static inline int ip6mr_forward2_finish(struct net *net, struct sock *sk, struct sk_buff *skb)
{
    -__IP6_INC_STATS(net, ip6_dst_iodev(skb_dst(skb)),
    -IPSTATS_MIB_OUTFORWDATAGRAMS);
    -__IP6_ADD_STATS(net, ip6_dst_iodev(skb_dst(skb)),
    -IPSTATS_MIB_OUTOCTETS, skb->len);
    +IP6_INC_STATS(net, ip6_dst_iodev(skb_dst(skb)),
    +IPSTATS_MIB_OUTFORWDATAGRAMS);
    +IP6_ADD_STATS(net, ip6_dst_iodev(skb_dst(skb)),
    +IPSTATS_MIB_OUTOCTETS, skb->len);
    return dst_output(net, sk, skb);
}

--- linux-4.15.0.orig/net/ipv6/ipv6_sockglue.c
+++ linux-4.15.0/net/ipv6/ipv6_sockglue.c
@@ -185,8 +185,14 @@
    rv = -EBUSY;
    break;
 }
-} else if (sk->sk_protocol != IPPROTO_TCP)
+} else if (sk->sk_protocol == IPPROTO_TCP) {
+    +if (sk->sk_prot != &tcpv6_prot) {
+        retv = -EBUSY;
+        break;
+    +}
+    +} else {
+        break;
+    +}
+
    if (sk->sk_state != TCP_ESTABLISHED) {
        retv = -ENOTCONN;
        @@ -201,6 +207,7 @@
    fl6_free_socklist(sk);
    __ipv6_sock_mc_close(sk);
    +__ipv6_sock_ac_close(sk);

    /*
     * Sock is moving from IPv6 to IPv4 (sk_prot), so
     @@ -398,6 +405,12 @@
     case IPV6_DSTOPTS:
        {
            struct ipv6_txoptions *opt;
            +struct ipv6_opt_hdr *new = NULL;
            
            vif = &mrt->vif6_table[vr.mifi];
            if (MIF_EXISTS(mrt, vr.mifi)) {
                @@ -2000,10 +2011,10 @@
            }
+/* hop-by-hop / destination options are privileged option */
+retv = -EPERM;
+if (optname != IPV6_RTHDR &
+!ns_capable(net->user_ns, CAP_NET_RAW))
+break;

/* remove any sticky options header with a zero length, per RFC3542.
else if (optlen < sizeof(struct ipv6_opt_hdr) ||
  optlen & 0x7 || optlen > 8 * 255)
goto e_inval;
-/* hop-by-hop / destination options are privileged option */
-retv = -EPERM;
-if (optname != IPV6_RTHDR &
!ns_capable(net->user_ns, CAP_NET_RAW))
-break;
+else {
+new = memdup_user(optval, optlen);
+if (IS_ERR(new)) {
+retv = PTR_ERR(new);
+break;
+}
+if (unlikely(ipv6_optlen(new) > optlen)) {
+kfree(new);
+goto e_inval;
+}
+
+}
+}

opt = rcu_dereference_protected(np->opt,
lockdep_sock_is_held(sk));
-opt = ipv6_renew_options(sk, opt, optname,
- (struct ipv6_opt_hdr __user *)optval,
- optlen);
+opt = ipv6_renew_options(sk, opt, optname, new);
+kfree(new);
if (IS_ERR(opt)) {
retv = PTR_ERR(opt);
break;
}@ @ -923,12 +941,8 @@
#endif CONFIG_NETFILTER
/* we need to exclude all possible ENOPROTOOPTs except default case */
if (err == -ENOPROTOOPT &
-optname != IPV6_IPSEC_POLICY &
-optname != IPV6_XFRM_POLICY) {
-lock_sock(sk);
-err = nf_setsockopt(sk, PF_INET6, optname, optval,
-optlen);
-release_sock(sk);
-} 
+optname != IPV6_XFRM_POLICY)
+err = nf_setsockopt(sk, PF_INET6, optname, optval, optlen);
+endif
return err;
}
@@ -958,12 +972,9 @@
#ifdef CONFIG_NETFILTER
/* we need to exclude all possible ENOPROTOOPTs except default case */
if (err == -ENOPROTOOPT && optname != IPV6_IPSEC_POLICY &&
-    optname != IPV6_XFRM_POLICY) {
-    lock_sock(skb);
-err = compat_nf_setsockopt(skb, PF_INET6, optname,
-    optval, optlen);
-    release_sock(skb);
-}
+    optname != IPV6_XFRM_POLICY)
+err = compat_nf_setsockopt(skb, PF_INET6, optname, optval,
+    optlen);
+endif
return err;
}
@@ -1374,10 +1385,7 @@
if (get_user(len, optlen))
return -EFAULT;

-lock_sock(skb);
-err = nf_getsockopt(skb, PF_INET6, optname, optval,
-    &len);
-release_sock(skb);
+err = compat_nf_getsockopt(skb, PF_INET6, optname, optval, &len);
if (err >= 0)
err = put_user(len, optlen);
}
@@ -1416,10 +1424,7 @@
if (get_user(len, optlen))
return -EFAULT;

-lock_sock(skb);
-err = compat_nf_getsockopt(skb, PF_INET6, optname, optval,
-    &len);
-release_sock(skb);
+err = compat_nf_getsockopt(skb, PF_INET6, optname, optval, &len);
if (err >= 0)
err = put_user(len, optlen);
}
--- linux-4.15.0.orig/net/ipv6/mcast.c
+++ linux-4.15.0/net/ipv6/mcast.c
if (pmc) {
    im->idev = pmc->idev;
    im->mca_crcount = idev->mc_qrv;
    im->mca_sfmode = pmc->mca_sfmode;
    if (pmc->mca_sfmode == MCAST_INCLUDE) {
        im->mca_tomb = pmc->mca_tomb;
        im->mca_sources = pmc->mca_sources;
        if (im->mca_sfmode == MCAST_INCLUDE) {
            swap(im->mca_tomb, pmc->mca_tomb);
            swap(im->mca_sources, pmc->mca_sources);
            for (psf = im->mca_sources; psf; psf = psf->sf_next)
                psf->sf_crcount = im->mca_crcount;
        }
        in6_dev_put(pmc->idev);
        ip6_mc_clear_src(pmc);
        kfree(pmc);
    }
    spin_unlock_bh(&im->mca_lock);
}

skb = sock_alloc_send_skb(sk, size, 1, &err);
if (!skb)
    return NULL;

mld_send_initial_cr(idev);
idev->mc_dad_count--;
if (idev->mc_dad_count)
    mld_dad_start_timer(idev, idev->mc_maxdelay);
    mld_dad_start_timer(idev,
        unsolicited_report_interval(idev));
}

if (idev->mc_dad_count) {
    idev->mc_dad_count--;
    if (idev->mc_dad_count)
        mld_dad_start_timer(idev, idev->mc_maxdelay);
        mld_dad_start_timer(idev,
            unsolicited_report_interval(idev));
    }

mld_send_initial_cr(idev);
idev->mc_dad_count--;
if (idev->mc_dad_count)
    mld_dad_start_timer(idev, idev->mc_maxdelay);
    mld_dad_start_timer(idev,
        unsolicited_report_interval(idev));
}
inf6_dev_put(idev);

if (!idev->mc_ifc_count) {
    idev->mc_ifc_count--;
    if (idev->mc_ifc_count)
        mld_ifc_start_timer(idev, idev->mc_maxdelay);
    +unsolicited_report_interval(idev));
} inf6_dev_put(idev);

write_unlock_bh(&idev->lock);

ip6_mc_clear_src(i);
ma_put(i);
write_lock_bh(&idev->lock);
}

--- linux-4.15.0.orig/net/ipv6/ndisc.c
+++ linux-4.15.0/net/ipv6/ndisc.c
@@ -566,6 +566,11 @@
read_lock_bh(&idev->lock);
list_for_each_entry(ifa, &idev->addr_list, if_list) {
+  /* skip tentative addresses until dad completes */
+  if (ifa->flags & IFA_F_TENTATIVE &&
+      !(ifa->flags & IFA_F_OPTIMISTIC))
+    continue;
+  ndisc_send_na(dev, &in6addr_linklocal_allnodes, &ifa->addr,
+    /*router=*/ !!idev->cnf.forwarding,
+    /*solicited=*/ false, /*override=*/ true,
@@ -806,7 +811,7 @@
return;
}

@if (ndopts.nd_opts_nonce)
+if (ndopts.nd_opts_nonce && ndopts.nd_opts_nonce->nd_opt_len == 1)
memcpy(&nonce, (u8 *)(ndopts.nd_opts_nonce + 1), 6);

inc = ipv6_addr_is_multicast(daddr);
@@ -1549,7 +1554,8 @@
*(opt++) = (rd_len >> 3);
opt += 6;

-memcpy(opt, ipv6_hdr(orig_skb), rd_len - 8);
+skb_copy_bits(orig_skb, skb_network_offset(orig_skb), opt,
+    rd_len - 8);
}

void ndisc_send_redirect(struct sk_buff *skb, const struct in6_addr *target)
@@ -1570,6 +1576,12 @@
ops_data_buf[NDISC_OPS_REDIRECT_DATA_SPACE], *ops_data = NULL;
bool ret;
+if (netif_is_l3_master(skb->dev)) {
+  dev = __dev_get_by_index(dev_net(skb->dev), IPCB(skb)->iif);
+  if (!dev)
+    return;
+}
++
+if (ipv6_get_lladdr(dev, &saddr_buf, IFA_F_TENTATIVE)) {
ND_PRINTK(2, warn, "Redirect: no link-local address on %s\n",
  dev->name);
@@ -1718,10 +1730,9 @@
return 0;
}
memset(NEIGH_CB(skb), 0, sizeof(struct neighbour_cb));

switch (msg->icmph.icmp6_type) {
case NDISC_NEIGHBOUR_SOLICITATION:
+    memset(NEIGH_CB(skb), 0, sizeof(struct neighbour_cb));
    ndisc_recv_ns(skb);
    break;

--- linux-4.15.0.orig/net/ipv6/netfilter.c
+++ linux-4.15.0/net/ipv6/netfilter.c
@@ -21,18 +21,22 @@
int ip6_route_me_harder(struct net *net, struct sk_buff *skb)
 {
     const struct ipv6hdr *iph = ipv6_hdr(skb);
     +struct sock *sk = sk_to_full_sk(skb->sk);
     unsigned int hh_len;
     struct dst_entry *dst;
     +int strict = (ipv6_addr_type(&iph->daddr) &
     +   (IPV6_ADDR_MULTICAST | IPV6_ADDR_LINKLOCAL));
     struct flowi6 fl6 = {
-    .flowi6_oif = skb->sk ? skb->sk->sk_bound_dev_if : 0,
+    .flowi6_oif = sk && sk->sk_bound_dev_if ? sk->sk_bound_dev_if :
        strict ? skb_dst(skb)->dev->ifindex : 0,
        .flowi6_mark = skb->mark,
-    .flowi6_uid = sock_net_uid(net, skb->sk),
+    .flowi6_uid = sock_net_uid(net, sk),
        .daddr = iph->daddr,
        .saddr = iph->saddr,
    };

    int err;

-    dst = ip6_route_output(net, skb->sk, &fl6);
+    dst = ip6_route_output(net, sk, &fl6);
    err = dst->error;
    if (err) {
        IP6_INC_STATS(net, ip6_dst_idev(dst), IPSTATS_MIB_OUTNOROUTES);
        @@ -50,7 +54,7 @@
        if (!(IP6CB(skb)->flags & IP6SKB_XFRM_TRANSFORMED) &&
            xfrm_decode_session(skb, flowi6_to_flowi(&fl6), AF_INET6) == 0) {
            skb_dst_set(skb, NULL);
-            dst = xfrm_lookup(net, dst, flowi6_to_flowi(&fl6), skb->sk, 0);
+            dst = xfrm_lookup(net, dst, flowi6_to_flowi(&fl6), sk, 0);
            if (IS_ERR(dst))
                return PTR_ERR(dst);
            skb_dst_set(skb, dst);
--- linux-4.15.0.orig/net/ipv6/netfilter/Kconfig
+++ linux-4.15.0/net/ipv6/netfilter/Kconfig
@@ -48,6 +48,34 @@
fields such as the source, destination, flowlabel, hop-limit and the packet mark.

+if NF_NAT_IPV6
+
+config NFT_CHAIN_NAT_IPV6
+tristate "IPv6 nf_tables nat chain support"
+help
+ This option enables the "nat" chain for IPv6 in nf_tables. This
+ chain type is used to perform Network Address Translation (NAT)
+ packet transformations such as the source, destination address and
+ source and destination ports.
+
+config NFT_MASQ_IPV6
+tristate "IPv6 masquerade support for nf_tables"
+depends on NFT_MASQ
+select NF_NAT_MASQUERADE_IPV6
+help
+ This is the expression that provides IPv4 masquerading support for
+ nf_tables.
+
+config NFT_REDIR_IPV6
+tristate "IPv6 redirect support for nf_tables"
+depends on NFT_REDIR
+select NF_NAT_REDIRECT
+help
+ This is the expression that provides IPv4 redirect support for
+ nf_tables.
+
+endif # NF_NAT_IPV6
+
config NFT_REJECT_IPV6
select NF_REJECT_IPV6
default NF_REJECT
@@ -99,39 +127,12 @@
if NF_NAT_IPV6

-config NFT_CHAIN_NAT_IPV6
-depends on NF_TABLES_IPV6
-tristate "IPv6 nf_tables nat chain support"
-help
- This option enables the "nat" chain for IPv6 in nf_tables. This
- chain type is used to perform Network Address Translation (NAT)
- packet transformations such as the source, destination address and
- source and destination ports.
-
-config NF_NAT_MASQUERADE_IPV6
tristate "IPv6 masquerade support"
help
   This is the kernel functionality to provide NAT in the masquerade
   flavour (automatic source address selection) for IPv6.

-config NFT_MASQ_IPV6
-tristate "IPv6 masquerade support for nf_tables"
-depends on NF_TABLES_IPV6
-depends on NFT_MASQ
-select NF_NAT_MASQUERADE_IPV6
-help
   - This is the expression that provides IPv4 masquerading support for
   - nf_tables.
-
-config NFT_REDIR_IPV6
-tristate "IPv6 redirect support for nf_tables"
-depends on NF_TABLES_IPV6
-depends on NFT_REDIR
-select NF_NAT_REDIRECT
-help
   - This is the expression that provides IPv4 redirect support for
   - nf_tables.
-
endif # NF_NAT_IPV6

config IP6_NF_IPTABLES
--- linux-4.15.0.orig/net/ipv6/netfilter/ip6_tables.c
+++ linux-4.15.0/net/ipv6/netfilter/ip6_tables.c
@@ -275,6 +275,7 @@
    * things we don't know, ie. tcp syn flag or ports). If the
    * rule is also a fragment-specific rule, non-fragments won't
    * match it. */
+acpar.fragoff = 0;
acpar.hotdrop = false;
acpar.state   = state;

@@ -357,6 +358,10 @@
}
if (table_base + v != ip6t_next_entry(e) &&
      !(e->ipv6.flags & IP6T_F_GOTO)) {
+    if (unlikely(stackidx >= private->stacksize)) {
+        verdict = NF_DROP;
+        break;
+    }
    jumpstack[stackidx++] = e;
}

@@ -383,6 +388,17 @@
else return verdict;
}

+static bool next_offset_ok(const struct xt_table_info *t, unsigned int newpos)
+{
+    if (newpos > t->size - sizeof(struct ip6t_entry))
+        return false;
+    if (newpos % __alignof__(struct ip6t_entry) != 0)
+        return false;
+    return true;
+}

/* Figures out from what hook each rule can be called: returns 0 if
there are loops. Puts hook bitmask in comefrom. */
static int
@@ -443,6 +459,8 @@
/* Move along one */
size = e->next_offset;
+if (!next_offset_ok(newinfo, pos + size))
+    return 0;
    e = entry0 + pos + size;
if (pos + size >= newinfo->size)
    return 0;
@@ -464,6 +482,10 @@
    if (newpos >= newinfo->size)
        return 0;
    }
    +
+    if (!next_offset_ok(newinfo, newpos))
+        return 0;
+    e = entry0 + newpos;
e->counters.pcnt = pos;
pos = newpos;
@@ -556,6 +578,7 @@
    return -ENOMEM;
    j = 0;
+    memset(&mtpar, 0, sizeof(mtpar));
    mtpar.net = net;
    mtpar.table = name;
    mtpar.entryinfo = &e->ipv6;
    @@ -963,7 +986,9 @@
    memcpy(newinfo, info, offsetof(struct xt_table_info, entries));
    newinfo->initial_entries = 0;
loc_cpu_entry = info->entries;
-xt_compat_init_offsets(AF_INET6, info->number);
+ret = xt_compat_init_offsets(AF_INET6, info->number);
+if (ret)
+return ret;
xt_entry_foreach(iter, loc_cpu_entry, info->size) {
ret = compat_calc_entry(iter, info, loc_cpu_entry, newinfo);
if (ret != 0)
@@ -1077,7 +1102,7 @@
struct ip6t_entry *iter;

ret = 0;
-counters = vzalloc(num_counters * sizeof(struct xt_counters));
+counters = xt_counters_alloc(num_counters);
if (!counters) {
ret = -ENOMEM;
goto out;
@@ -1428,7 +1453,7 @@
struct compat_ip6t_entry *iter0;
struct ip6t_replace repl;
unsigned int size;
-int ret = 0;
+int ret;

info = *pinfo;
entry0 = *pentry0;
@@ -1437,7 +1462,9 @@
j = 0;
xt_compat_lock(AF_INET6);
-counters = vzalloc(num_counters * sizeof(struct xt_counters));
+ret = xt_compat_init_offsets(AF_INET6, compatr->num_entries);
+if (ret)
+goto out_unlock;
/* Walk through entries, checking offsets. */
xt_entry_foreach(iter0, entry0, compatr->size) {
ret = check_compat_entry_size_and_hooks(iter0, info, &size,
@@ -1457,6 +1484,8 @@
if (!newinfo)
goto out_unlock;
+memset(newinfo->entries, 0, size);
+newinfo->number = compatr->num_entries;
for (i = 0; i < NF_INET_NUMHOOKS; i++) {
newinfo->hook_entry[i] = compatr->hook_entry[i];
@@ -1915,6 +1944,7 @@
.checkentry = icmp6_checkentry,
int err;

err = xt_register_target(&masquerade_tg6_reg);
@if (err == 0)
- nf_nat_masquerade_ipv6_register_notifier();
+ if (err)
+ return err;
+
+ err = nf_nat_masquerade_ipv6_register_notifier();
+ if (err)
+ xt_unregister_target(&masquerade_tg6_reg);

return err;
}
--- linux-4.15.0.orig/net/ipv6/netfilter/ip6t_rpfilter.c
+++ linux-4.15.0/net/ipv6/netfilter/ip6t_rpfilter.c
@@ -26,6 +26,12 @@
 return addr_type & IPV6_ADDR_UNICAST;
 }

static bool rpfilter_addr_linklocal(const struct in6_addr *addr)
+{
+ int addr_type = ipv6_addr_type(addr);
+ return addr_type & IPV6_ADDR_LINKLOCAL;
+}
+
 static bool rpfilter_lookup_reverse6(struct net *net, const struct sk_buff *skb,
 const struct net_device *dev, u8 flags)
 {
@@ -48,10 +54,14 @@
 fl6.flowi6_mark = flags & XT_RPFILTER_VALID_MARK ? skb->mark : 0;
- if ((flags & XT_RPFILTER_LOOSE) == 0) {
- fl6.flowi6_oif = dev->ifindex;
+ + if (rpfilter_addr_linklocal(&iph->saddr)) {
 lookup_flags |= RT6_LOOKUP_F_IFACE;
 -}
+fl6.flowi6_oif = dev->ifindex;
+/* Set flowi6_oif for vrf devices to lookup route in l3mdev domain. */
+} else if (netif_is_l3_master(dev) || netif_is_l3_slave(dev) ||
+    (flags & XT_RPFILTER_LOOSE) == 0)
+fl6.flowi6_oif = dev->ifindex;

rt = (void *) ip6_route_lookup(net, &fl6, lookup_flags);
if (rt->dst.error)
@@ -65,7 +75,9 @@
    if (rt->rt6i_idev->dev == dev || (flags & XT_RPFILTER_LOOSE))
    if (rt->rt6i_idev->dev == dev ||
@@ -226,20 +226,28 @@
       if (sk->sk_protocol != IPPROTO_TCP && sk->sk_protocol != IPPROTO_SCTP)
       if (tuple.dst.protonum != IPPROTO_TCP &&
--- linux-4.15.0.orig/net/ipv6/netfilter/nf_conntrack_l3proto_ipv6.c
+++ linux-4.15.0/net/ipv6/netfilter/nf_conntrack_l3proto_ipv6.c
@@ -226,20 +226,28 @@
       static int
       ipv6_getorigdst(struct sock *sk, int optval, void __user *user, int *len)
       {
-    const struct inet_sock *inet = inet_sk(sk);
    struct nf_conntrack_tuple tuple = { .src.l3num = NFPROTO_IPV6 };
-    const struct ipv6_pinfo *inet6 = inet6_sk(sk);
    const struct nf_conntrack_tuple_hash *h;
    struct sockaddr_in6 sin6;
-    struct nf_conntrack_tuple tuple = { .src.l3num = NFPROTO_IPV6 };
    struct nf_conn *ct;
    __be32 flow_label;
+    int bound_dev_if;
+    lock_sock(sk);
    tuple.src.u3.in6 = sk->sk_v6_rcv_saddr;
    tuple.src.u.tcp.port = inet->inet_sport;
    tuple.dst.u3.in6 = sk->sk_v6_daddr;
    tuple.dst.u.tcp.port = inet->inet_dport;
    tuple.dst.protonum = sk->sk_protocol;
+    bound_dev_if = sk->sk_bound_dev_if;
+    flow_label = inet6->flow_label;
+    release_sock(sk);

-    if (sk->sk_protocol != IPPROTO_TCP &&& sk->sk_protocol != IPPROTO_SCTP)
+    if (tuple.dst.protonum != IPPROTO_TCP &&&
+ tuple.dst.protonum != IPPROTO_SCTP)
return -ENOPROTOOPT;

if (*len < 0 || (unsigned int) *len < sizeof(sin6))
@ @ -257,14 +264,13 @@

sin6.sin6_family = AF_INET6;
sin6.sin6_port = ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple.dst.u.tcp.port;
-sin6.sin6_flowinfo = inet6->flow_label & IPv6_FLOWINFO_MASK;
+sin6.sin6_flowinfo = flow_label & IPv6_FLOWINFO_MASK;
memcpy(&sin6.sin6_addr, &ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple.dst.u3.in6,
sizeof(sin6.sin6_addr));

nf_ct_put(ct);
-sin6.sin6_scope_id = ipv6_iface_scope_id(&sin6.sin6_addr,
- sk->sk_bound_dev_if);
+sin6.sin6_scope_id = ipv6_iface_scope_id(&sin6.sin6_addr, bound_dev_if);
return copy_to_user(user, &sin6, sizeof(sin6)) ? -EFAULT : 0;
}

--- linux-4.15.0.orig/net/ipv6/netfilter/nf_conntrack_reasm.c
+++ linux-4.15.0/net/ipv6/netfilter/nf_conntrack_reasm.c
@@ -33,9 +33,8 @@
#include <net/sock.h>
#include <net/snmp.h>
-#include <net/inet_frag.h>
+include <net/ipv6_frag.h>

-#include <net/ipv6.h>
#include <net/protocol.h>
#include <net/transp_v6.h>
#include <net/rawv6.h>
@@ -52,18 +51,9 @@
static const char nf_frags_cache_name[] = "nf-frags";

-struct nf_ct_frag6_skb_cb
-{
- struct inet6_skb_parmh;
- int offset;
-};
-
-#define NFCT_FRAG6_CB(skb)((struct nf_ct_frag6_skb(cb)*)((skb)->cb))
-
 static struct inet_frags nf_frags;
#ifdef CONFIG_SYSCTL

-static int zero;

static struct ctl_table nf_ct_frag6_sysctl_table[] = {
    {
        .procname= "nf_conntrack_frag6_low_thresh",
        .data= &init_net.nf_frag.frags.low_thresh,
        -.maxlen= sizeof(unsigned int),
        +.maxlen= sizeof(unsigned long),
        .mode= 0644,
        -.proc_handler= proc_dointvec_minmax,
        +.proc_handler= proc_doulongvec_minmax,
        .extra1= &init_net.nf_frag.frags.low_thresh
    },
    {
        .procname= "nf_conntrack_frag6_high_thresh",
        .data= &init_net.nf_frag.frags.high_thresh,
        -.maxlen= sizeof(unsigned int),
        +.maxlen= sizeof(unsigned long),
        .mode= 0644,
        -.proc_handler= proc_dointvec_minmax,
        +.proc_handler= proc_doulongvec_minmax,
        .extra1= &init_net.nf_frag.frags.high_thresh
    },
    { }
    @ @ -76,18 +66,17 @ @
    if (hdr == NULL)
    goto err_reg;

    -net->nf_frag.sysctl.frags_hdr = hdr;
    +net->nf_frag_frags_hdr = hdr;
    return 0;

err_reg:
    @ @ -131,8 +120,8 @ @
    { }
    struct ctl_table *table;

    -table = net->nf_frag.sysctl.frags_hdr->ctl_table_arg;
    -unregister_net_sysctl_table(net->nf_frag.sysctl.frags_hdr);
    +table = net->nf_frag_frags_hdr->ctl_table_arg;
    +unregister_net_sysctl_table(net->nf_frag_frags_hdr);
    if (!net_eq(net, &init_net))
    kfree(table);
+  .id = id,
+  .saddr = hdr->saddr,
+  .daddr = hdr->daddr,
+  .user = user,
+  .iif = iif,
+};
struct inet_frag_queue *q;
-struct ip6_create_arg arg;
-unsigned int hash;
-arg.id = id;
-arg.user = user;
-arg.src = src;
-arg.dst = dst;
-arg.iif = iif;
-arg.ecn = ecn;
-
-local_bh_disable();
-hash = nf_hash_frag(id, src, dst);
-
-q = inet_frag_find(&net->nf_frag.frags, &nf_frags, &arg, hash);
-local_bh_enable();
-if (IS_ERR_OR_NULL(q)) {
-inet_frag_maybe_warn_overflow(q, pr_fmt());
+q = inet_frag_find(&net->nf_frag.frags, &key);
+if (!q)
+return NULL;
+}
+
return container_of(q, struct frag_queue, q);
}

static int nf_ct_frag6_queue(struct frag_queue *fq, struct sk_buff *skb,
const struct frag_hdr *fhdr, int nhoff)
{
-struct sk_buff *prev, *next;
unsigned int payload_len;
-int offset, end;
+struct net_device *dev;
+struct sk_buff *prev;
+int offset, end, err;
u8 ecn;

if (fq->q.flags & INET_FRAG_COMPLETE) {
@@ -231,7 +199,7 @@

if ((unsigned int)end > IPV6_MAXPLEN) {
@@ -213,9 +180,10 @@

pr_debug("offset is too large.
");
-return -1;
+return -EINVAL;
}

ecn = ip6_frag_ecn(ipv6_hdr(skb));
@@ -264,7 +232,8 @@
 /* this case. -DaveM */
 pr_debug("end of fragment not rounded to 8 bytes.
");
-return -1;
+inet_frag_kill(&fq->q);
+return -EPROTO;
}
if (end > fq->q.len) {
 /* Some bits beyond end -> corruption. */
 @ @ -289,55 +258,25 @@
goto err;
}

-/* Find out which fragments are in front and at the back of us
- * in the chain of fragments so far. We must know where to put
- * this fragment, right?
- */
-prev = fq->q.fragments_tail;
-if (!prev || NFCT_FRAG6_CB(prev)->offset < offset) {
- next = NULL;
- goto found;
- }
- prev = NULL;
- for (next = fq->q.fragments; next != NULL; next = next->next) {
- if (NFCT_FRAG6_CB(next)->offset >= offset)
- break; /* bingo! */
- prev = next;
- }
-}
- found:
-/* RFC5722, Section 4:
- * When reassembling an IPv6 datagram, if
- * one or more its constituent fragments is determined to be an
- * overlapping fragment, the entire datagram (and any constituent
- * fragments, including those not yet received) MUST be silently
- * discarded.
- */
+/* Note : skb->rbnode and skb->dev share the same location. */
+dev = skb->dev;
+/* Makes sure compiler wont do silly aliasing games */
+barrier();


/* Check for overlap with preceding fragment. */
-if (prev &&
   (NFCT_FRAG6_CB(prev)->offset + prev->len) > offset)
   goto discard_fq;

/* Look for overlap with succeeding segment. */
-if (next && NFCT_FRAG6_CB(next)->offset < end)
   goto discard_fq;

-NFCT_FRAG6_CB(skb)->offset = offset;

/* Insert this fragment in the chain of fragments. */
-skb->next = next;
-if (!next)
   -fq->q.fragments_tail = skb;
-if (prev)
   -prev->next = skb;
-else
   -fq->q.fragments = skb;

-if (skb->dev) {
   -fq->iif = skb->dev->ifindex;
   -skb->dev = NULL;
   +prev = fq->q.fragments_tail;
   +err = inet_frag_queue_insert(&fq->q, skb, offset, end);
   +if (err) {
      +if (err == IPFRAG_DUP) {
      +/* No error for duplicates, pretend they got queued. */
      +kfree_skb(skb);
      +return -EINPROGRESS;
      +}
      +goto insert_error;
   }
   +if (dev)
   +fq->iif = dev->ifindex;
   +
   +fq->stamp = skb->tstamp;
   +
   +fq->meat = skb->len;
   +fq->ecn |= ecn;
   @@ -353,12 +292,28 @@
   +fq->q.flags |= INET_FRAG_FIRST_IN;
 }

-return 0;
+if (fq->q.flags == (INET_FRAG_FIRST_IN | INET_FRAG_LAST_IN) &&
 + fq->q.meat == fq->q.len) {

unsigned long orefdst = skb->_skb_refdst;
+
+skb->_skb_refdst = 0UL;
+err = nf_ct_frag6_reasm(fq, skb, prev, dev);
+skb->_skb_refdst = orefdst;

-discardfq:
- inet_frag_kill(&fq->q, &nf_frags);
+ /* After queue has assumed skb ownership, only 0 or
+ * -EINPROGRESS must be returned.
+ */
+return err ? -EINPROGRESS : 0;
+
+skb_dst_drop(skb);
+return -EINPROGRESS;
+
+insert_error:
+inet_frag_kill(&fq->q);
+err:
- return -1;
+skb_dst_drop(skb);
+return -EINVAL;
}

static bool
static int nf_ct_frag6_reasm(struct frag_queue *fq, struct sk_buff *prev, struct net_device *dev)
- static int nf_ct_frag6_reasm(struct frag_queue *fq, struct sk_buff *skb,
- struct sk_buff *prev_tail, struct net_device *dev)
{
- struct sk_buff *fp, *head = fq->q.fragments;
- int payload_len;
- void *reasm_data;
- int payload_len;
- u8 ecn;

- inet_frag_kill(&fq->q, &nf_frags);
- WARN_ON(head == NULL);
WARN_ON(NFCT_FRAG6_CB(head)->offset != 0);
+inet_frag_kill(&fq->q);

ecn = ip_frag_ecn_table[fq->ecn];
if (unlikely(ecn == 0xff))
-  return false;
+  goto err;

/* Unfragmented part is taken from the first segment. */
*paypayloadlen = ((head->data - skb_network_header(head)) -
+reasem_data = inet_frag_reasm_prepare(&fq->q, skb, prev_tail);
+if (!reasem_data)
+  goto err;
+
+payload_len = ((skb->data - skb_network_header(skb)) -
   sizeof(struct ipv6hdr) + fq->q.len -
   sizeof(struct frag_hdr));
if (payload_len > IPV6_MAXPLEN) {
 net_dbg_ratelimited("nf_ct_frag6_reasm: payload len = %d\n",
   payload_len);
- return false;
-}
-
*/ Head of list must not be cloned. */
-if (skb_unclone(head, GFP_ATOMIC))
-  return false;
-
/* If the first fragment is fragmented itself, we split
 * it to two chunks: the first with data and paged part
 * and the second, holding only fragments. */
-if (skb_has_frag_list(head)) {
    struct sk_buff *clone;
    int i, plen = 0;

    clone = alloc_skb(0, GFP_ATOMIC);
    -if (clone == NULL)
    -  return false;
    -
    clone->next = head->next;
    head->next = clone;
    skb_shinfo(clone)->frag_list = skb_shinfo(head)->frag_list;
    skb_frag_list_init(head);
    for (i = 0; i < skb_shinfo(head)->nr_frags; i++)
      plen += skb_frag_size(&skb_shinfo(head)->frags[i]);
    clone->len = clone->data_len = head->data_len - plen;
    head->data_len -= clone->len;
    head->len -= clone->len;
    clone->csum = 0;
-clone->ip_summed = head->ip_summed;
-
-@/ add_frag_mem_limit(fq->q.net, clone->truesize);
-
-/* morph head into last received skb: prev. */
-/*
 * This allows callers of ipv6 conntrack defrag to continue
 * to use the last skb(frag) passed into the reasm engine.
 * The last skb frag 'silently' turns into the full reassembled skb.
 * Since prev is also part of q->fragments we have to clone it first.
 */
-if (head != prev) {
-struct sk_buff *iter;
-
-fp = skb_clone(prev, GFP_ATOMIC);
-if (!fp)
-return false;
-
-fp->next = prev->next;
-
-iter = head;
-while (iter) {
-if (iter->next == prev) {
-iter->next = fp;
-break;
-}
-iter = iter->next;
-}
-
-skb_morph(prev, head);
-prev->next = head->next;
-consume_skb(head);
-head = prev;
+goto err;
}

/* We have to remove fragment header from datagram and to relocate
 * header in order to calculate ICV correctly. */
-skb_network_header(head)[fq->nhoffset] = skb_transport_header(head)[0];
-memmove(head->head + sizeof(struct frag_hdr), head->head,
-(head->data - head->head) - sizeof(struct frag_hdr));
-head->mac_header += sizeof(struct frag_hdr);
-head->network_header += sizeof(struct frag_hdr);
-
-skb_shinfo(head)->frag_list = head->next;
-skb_reset_transport_header(head);
- skb_push(head, head->data - skb_network_header(head));
-
- for (fp = head->next; fp; fp = fp->next) {
-   head->data_len += fp->len;
-   head->len += fp->len;
-   if (head->ip_summed != fp->ip_summed)
-     head->ip_summed = CHECKSUM_NONE;
-   else if (head->ip_summed == CHECKSUM_COMPLETE)
-     head->csum = csum_add(head->csum, fp->csum);
-   head->truesize += fp->truesize;
- }
- sub_frag_mem_limit(fq->q.net, head->truesize);
-
- head->ignore_df = 1;
- head->next = NULL;
- head->dev = dev;
- head->tstamp = fq->q.stamp;
- ipv6_hdr(head)->payload_len = htons(payload_len);
- ipv6_change_dsfield(ipv6_hdr(head), 0xff, ecn);
- IP6CB(head)->frag_max_size = sizeof(struct ipv6_hdr) + fq->q.max_size;
+ skb_network_header(skb)[fq->nhoffset] = skb_transport_header(skb)[0];
+ memmove(skb->head + sizeof(struct frag_hdr), skb->head,
+          (skb->data - skb->head) - sizeof(struct frag_hdr));
+ skb->mac_header += sizeof(struct frag_hdr);
+ skb->network_header += sizeof(struct frag_hdr);
+ skb_reset_transport_header(skb);
+ + inet_frag_reasm_finish(&fq->q, skb, reasm_data);
+ + skb->ignore_df = 1;
+ skb->dev = dev;
+ ipv6_hdr(skb)->payload_len = htons(payload_len);
+ ipv6_change_dsfield(ipv6_hdr(skb), 0xff, ecn);
+ IP6CB(skb)->frag_max_size = sizeof(struct ipv6_hdr) + fq->q.max_size;

/* Yes, and fold redundant checksum back. 8) */
- if (head->ip_summed == CHECKSUM_COMPLETE)
-   head->csum = csum_partial(skb_network_header(head),
-                      skb_network_header_len(head),
-                       head->csum);
-   skb_network_header_len(skb),
+ if (skb->ip_summed == CHECKSUM_COMPLETE)
+   skb->csum = csum_partial(skb_network_header(skb),
+               skb_network_header_len(skb),
+               skb->csum);

fq->q.fragments = NULL;
+fq->q.rb_fragments = RB_ROOT;
fq->q.fragments_tail = NULL;
fq->q.last_run_head = NULL;

- return true;
+ return 0;
+
+ err:
+ inet_frag_kill(&fq->q);
+ return -EINVAL;
}
/
@@ -567,7 +450,7 @@

int nf_ct_frag6_gather(struct net *net, struct sk_buff *skb, u32 user)
{
- struct net_device *dev = skb->dev;
+ u16 savethdr = skb->transport_header;
  int fhoff, nhoff, ret;
  struct frag_hdr *fhdr;
  struct frag_queue *fq;
@@ -591,8 +474,8 @@
  fhdr = (struct frag_hdr *)skb_transport_header(skb);

  skb_orphan(skb);
- fq = fq_find(net, fhdr->identification, user, &hdr->saddr, &hdr->daddr,
+ fq = fq_find(net, fhdr->identification, user, hdr,
      skb->dev ? skb->dev->ifindex : 0, ip6_frag_ecn(hdr));
  +fq = fq_find(net, fhdr->identification, user, hdr,
+   skb->dev ? skb->dev->ifindex : 0);
  if (fq == NULL) {
    pr_debug("Can't find and can't create new queue\n");
    return -ENOMEM;
@@ -600,41 +483,40 @@
    spin_lock_bh(&fq->q.lock);

    -if (nf_ct_frag6_queue(fq, skb, fhdr, nhoff) < 0) {
- ret = -EINVAL;
- goto out_unlock;
- }
- */
- */ after queue has assumed skb ownership, only 0 or -EINPROGRESS
- * must be returned.
- */
- ret = -EINPROGRESS;
- if (fq->q.flags == (INET_FRAG_FIRST_IN | INET_FRAG_LAST_IN) &&
-   fhdr->flags == INET_CSتهمFIRST_IN | INET_CSتهمLAST_IN) &
-   fhdr->flags == fhdr->flags &
-   nf_ct_frag6_reasm(fq, skb, dev))
+ret = nf_ct_frag6_queue(fq, skb, fhdr, nhoff);
+if (ret == -EPROTO) {
+skb->transport_header = savethdr;
ret = 0;
+}

-out_unlock:
spin_unlock_bh(&fq->q.lock);
-inet_frag_put(&fq->q, &nf_frags);
+inet_frag_put(&fq->q);
return ret;
}
EXPORT_SYMBOL_GPL(nf_ct_frag6_gather);

static int nf_ct_net_init(struct net *net)
{
+int res;
+
-net->nf_frag.frags.high_thresh = IPV6_FRAG_HIGH_THRESH;
-net->nf_frag.frags.low_thresh = IPV6_FRAG_LOW_THRESH;
-net->nf_frag.frags.timeout = IPV6_FRAG_TIMEOUT;
-inet_frags_init_net(&net->nf_frag.frags);
+net->nf_frag.frags.f = &nf_frags;

-net->nf_frag6_sysctl_register(net);
+res = inet_frags_init_net(&net->nf_frag.frags);
+if (res < 0)
+return res;
+inet frags6_sysctl_register(net);
+if (res < 0)
+inet frags6_exit_net(&net->nf_frag.frags);
+return res;
}

static void nf_ct_net_exit(struct net *net)
{

nf_ct frags6_sysctl_unregister(net);
-inet frags6_exit_net(&net->nf_frag.frags, &nf_frags);
+inet frags6_exit_net(&net->nf_frag.frags);
}

static struct pernet_operations nf_ct_net_ops = {
@@ -642,17 +524,24 @@
.exit = nf_ct_net_exit,
};

+static const struct rhashtable params nfct_rhash_params = {
+ .head_offset= offsetof(struct inet_frag_queue, node),

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+hashfn = ip6frag_key_hashfn,
+obj_hashfn = ip6frag_obj_hashfn,
+obj_cmpfn = ip6frag_obj_cmpfn,
+automatic_shrinking = true,
+
+
int nf_ct_frag6_init(void)
{
    int ret = 0;

    -nf_frags.hashfn = nf_hashfn;
    -nf_frags.constructor = ip6_frag_init;
    +nf_frags.constructor = ip6frag_init;
    nf_frags.destructor = NULL;
    nf_frags.qsize = sizeof(struct frag_queue);
    -nf_frags.match = ip6_frag_match;
    nf_frags.frag_expire = nf_ct_frag6_expire;
    nf_frags.fragments_cache_name = nf_frags_cache_name;
    +nf_frags.rhash_params = nfct_rhash_params;
    ret = inet_frags_init(&nf_frags);
    if (ret)
        goto out;

    --- linux-4.15.0.orig/net/ipv6/netfilter/nf_defrag_ipv6_hooks.c
    +++ linux-4.15.0/net/ipv6/netfilter/nf_defrag_ipv6_hooks.c
    @@ -14,8 +14,7 @@
    #include <linux/skbuff.h>
    #include <linux/icmp.h>
    #include <linux/sysctl.h>
    -#include <net/ipv6.h>
    +#include <net/ipv6.h>
    +#include <net/inet_frag.h>
    +#include <net/ip6.h>
    #include <linux/netfilter_ipv6.h>
    #include <linux/netfilter_bridge.h>
    --- linux-4.15.0.orig/net/ipv6/netfilter/nf_log_ipv6.c
    +++ linux-4.15.0/net/ipv6/netfilter/nf_log_ipv6.c
    @@ -300,9 +300,11 @@
    switch (dev->type) {
    case ARPHRD_ETHER:
        -nf_log_buf_add(m, "MACSRC=%pM MACDST=%pM MACPROTO=%04x ",
            - eth_hdr(skb)->h_source, eth_hdr(skb)->h_dest,
            - ntohs(eth_hdr(skb)->h_proto));
        +nf_log_buf_add(m, "MACSRC=%pM MACDST=%pM ",
            + eth_hdr(skb)->h_source, eth_hdr(skb)->h_dest);
        +nf_log_dump_vlan(m, skb);
        +nf_log_buf_add(m, "MACPROTO=%04x ",
            + ntohs(eth_hdr(skb)->h_proto));
return;
default:
brack;
--- linux-4.15.0.orig/net/ipv6/netfilter/nf_nat_l3proto_ipv6.c
+++ linux-4.15.0/net/ipv6/netfilter/nf_nat_l3proto_ipv6.c
@@ -99,6 +99,10 @@
  !l4proto->manip_pkt(skb, &nf_nat_l3proto_ipv6, iphdroff, hdroff,
target, maniptype))
return false;
+
+/* must reload, offset might have changed */
+ipv6h = (void *)skb->data + iphdroff;
+
+manip_addr:
if (maniptype == NF_NAT_MANIP_SRC)
ipv6h->saddr = target->src.u3.in6;
--- linux-4.15.0.orig/net/ipv6/netfilter/nf_nat_masquerade_ipv6.c
+++ linux-4.15.0/net/ipv6/netfilter/nf_nat_masquerade_ipv6.c
@@ -88,18 +88,30 @@
struct masq_dev_work {
 struct work_struct work;
 struct net *net;
 +struct in6_addr addr;
 int ifindex;
};

+static int inet_cmp(struct nf_conn *ct, void *work)
+{
+struct masq_dev_work *w = (struct masq_dev_work *)work;
+struct nf_connttrack_tuple *tuple;
+  
+  if (!device_cmp(ct, (void *)(long)w->ifindex))
+    return 0;
+  
+  tuple = &ct->tuplehash[IP_CT_DIR_REPLY].tuple;
+  
+  return ipv6_addr_equal(&w->addr, &tuple->dst.u3.in6);
+}

static void iterate_cleanup_work(struct work_struct *work)
{
 struct masq_dev_work *w;
 -long index;

 w = container_of(work, struct masq_dev_work, work);
 -index = w->ifindex;
 -nf_ct_iterate_cleanup_net(w->net, device_cmp, (void *)index, 0, 0);
nf_ct_iterate_cleanup_net(w->net, inet_cmp, (void *)w, 0, 0);

put_net(w->net);
kfree(w);
@@ -121,8 +133,8 @@
  * of ipv6 addresses being deleted), we also need to add an upper
  * limit to the number of queued work items.
 */
-static int masq_inet_event(struct notifier_block *this,
-    unsigned long event, void *ptr)
+static int masq_inet6_event(struct notifier_block *this,
+    unsigned long event, void *ptr)
{
  struct inet6_ifaddr *ifa = ptr;
  const struct net_device *dev;
-@@ -148,6 +160,7 @@
 INIT_WORK(&w->work, iterate_cleanup_work);
  w->ifindex = dev->ifindex;
  w->net = net;
  +w->addr = ifa->addr;
  schedule_work(&w->work);

  return NOTIFY_DONE;
-@@ -159,31 +172,54 @@
 return NOTIFY_DONE;
}
-static struct notifier_block masq_inet_notifier = {
+static struct notifier_block masq_inet6_notifier = {
   .notifier_call = masq_inet_event,
-+static struct notifier_block masq_inet6_notifier = {
+   .notifier_call = masq_inet6_event,
};

-static atomic_t masquerade_notifier_refcount = ATOMIC_INIT(0);
+static int masq_refcnt;
+static DEFINE_MUTEX(masq_mutex);

-void nf_nat_masquerade_ipv6_register_notifier(void)
+int nf_nat_masquerade_ipv6_register_notifier(void)
{
  int ret = 0;
  +mutex_lock(&masq_mutex);
  /* check if the notifier is already set */
  -if (atomic_inc_return(&masquerade_notifier_refcount) > 1)
  -return;
  +if (++masq_refcnt > 1)
  +goto out_unlock;
+ret = register_netdevice_notifier(&masq_dev_notifier);
+if (ret)
+    goto err_dec;
+
+ret = register_inet6addr_notifier(&masq_inet6_notifier);
+if (ret)
+    goto err_unregister;

-register_netdevice_notifier(&masq_dev_notifier);
-register_inet6addr_notifier(&masq_inet_notifier);
+mutex_unlock(&masq_mutex);
+return ret;
+
+err_unregister:
+unregister_netdevice_notifier(&masq_dev_notifier);
+err_dec:
+masq_refcnt--;
+out_unlock:
+mutex_unlock(&masq_mutex);
+return ret;
}          

EXPORT_SYMBOL_GPL(nf_nat_masquerade_ipv6_register_notifier);

void nf_nat_masquerade_ipv6_unregister_notifier(void)
{   
+mutex_lock(&masq_mutex);
/* check if the notifier still has clients */
-if (atomic_dec_return(&masquerade_notifier_refcount) > 0)
-    return;
-if (--masq_refcnt > 0)
+    goto out_unlock;

-unregister_inet6addr_notifier(&masq_inet_notifier);
+unregister_inet6addr_notifier(&masq_inet6_notifier);
+mutex_unlock(&masq_mutex);
}          

EXPORT_SYMBOL_GPL(nf_nat_masquerade_ipv6_unregister_notifier);
struct ipv6hdr *iph = ipv6_hdr(skb), ipv6_var;
struct sk_buff *data_skb = NULL;
int doff = 0;
int thoff = 0, tproto;
@@ -116,9 +116,11 @@
}
if (tproto == IPPROTO_UDP || tproto == IPPROTO_TCP) {
-struct udphdr _hdr, *hp;
+struct tcphdr _hdr;
+struct udphdr *hp;

- hp = skb_header_pointer(skb, thoff, sizeof(_hdr), &_hdr);
+ hp = skb_header_pointer(skb, thoff, tproto == IPPROTO_UDP ?
+ sizeof(*hp) : sizeof(_hdr), &_hdr);
if (hp == NULL)
return NULL;
@@ -132,8 +134,6 @@
thoff + sizeof(*hp);
}
else if (tproto == IPPROTO_ICMPV6) {
-struct ipv6hdr ipv6_var;
-
if (extract_icmp6_fields(skb, thoff, &tproto, &saddr, &daddr,
 &sport, &dport, &ipv6_var))
return NULL;
--- linux-4.15.0.orig/net/ipv6/netfilter/nft_fib_ipv6.c
+++ linux-4.15.0/net/ipv6/netfilter/nft_fib_ipv6.c
@@ -182,7 +182,6 @@
}
*dest = 0;
- again:
rt = (void *)ip6_route_lookup(nft_net(pkt), &fl6, lookup_flags);
if (rt->dst.error)
goto put_rt_err;
@@ -191,15 +190,8 @@
if (rt->rt6i_flags & (RTF_REJECT | RTF_ANYCAST | RTF_LOCAL))
goto put_rt_err;
-if (oif && oif != rt->rt6i_idev->dev) {
-/* multipath route? Try again with F_IFACE */
-if (((lookup_flags & RT6_LOOKUP_F_IFACE) == 0) {
-lookup_flags |= RT6_LOOKUP_F_IFACE;
-fl6.flowi6_oif = oif->ifindex;
-ip6_rt_put(rt);
-goto again;

+if (oif && oif != rt->rt6i_idev->dev)
+goto put_rt_err;

switch (priv->result) {
    case NFT_FIB_RESULT_OIF:
        return ret;

    -nf_nat_masquerade_ipv6_register_notifier();
    +ret = nf_nat_masquerade_ipv6_register_notifier();
    +if (ret)
    +nft_unregister_expr(&nft_masq_ipv6_type);

    return ret;
}

-include <net/secureseq.h>
-include <linux/netfilter.h>

-static u32 __ipv6_select_ident(struct net *net, u32 hashrnd,
+static u32 __ipv6_select_ident(struct net *net,
    const struct in6_addr *dst,
    const struct in6_addr *src)
{
    u32 hash, id;

    -hash = __ipv6_addr_jhash(dst, hashrnd);
    -hash = __ipv6_addr_jhash(src, hash);
    -hash ^= net_hash_mix(net);
    -
    /* Treat id of 0 as unset and if we get 0 back from ip_idents_reserve,
    - set the high order instead thus minimizing possible future
    - collisions.
    - */
    -id = ip_idents_reserve(hash, 1);
    -if (unlikely(!id))
    -id = 1 << 31;
    +do {
    +id = prandom_u32();
    +} while (!id);
return id;
}
@@ -41,7 +33,6 @@
*/
__be32 ipv6_proxy_select_ident(struct net *net, struct sk_buff *skb)
{
- static u32 ip6_proxy_idents_hashrnd __read_mostly;
 struct in6_addr buf[2];
 struct in6_addr *addrs;
 u32 id;
-@@ -53,11 +44,7 @@
 if (!addrs)
 return 0;

 -net_get_random_once(&ip6_proxy_idents_hashrnd,
- sizeof(ip6_proxy_idents_hashrnd));
 -
- id = __ipv6_select_ident(net, ip6_proxy_idents_hashrnd,
- &addrs[1], &addrs[0]);
+ id = __ipv6_select_ident(net, &addrs[1], &addrs[0]);
 return htonl(id);
 }
EXPORT_SYMBOL_GPL(ipv6_proxy_select_ident);
@@ -66,12 +53,9 @@
 const struct in6_addr *daddr,
 const struct in6_addr *saddr)
 {
- static u32 ip6_idents_hashrnd __read_mostly;
 u32 id;

 -net_get_random_once(&ip6_idents_hashrnd,
- sizeof(ip6_idents_hashrnd));
 -
- id = __ipv6_select_ident(net, ip6_idents_hashrnd,
- daddr, saddr);
+ id = __ipv6_select_ident(net, daddr, saddr);
 return htonl(id);
 }
EXPORT_SYMBOL(ipv6_select_ident);
--- linux-4.15.0.orig/net/ipv6/ping.c
+++ linux-4.15.0/net/ipv6/ping.c
@@ -232,7 +232,7 @@
 return ping_proc_register(net, &ping_v6_seq_afinfo);
 }

-static void __net_init ping_v6_proc_exit_net(struct net *net)
+static void __net_exit ping_v6_proc_exit_net(struct net *net)
{
 return ping_proc_unregister(net, &ping_v6_seq_afinfo);

---
static int sockstat6_seq_show(struct seq_file *seq, void *v)
{
    struct net *net = seq->private;
    unsigned int frag_mem = ip6_frag_mem(net);

    seq_printf(seq, "TCP6: inuse %d\n",
               sock_prot_inuse_get(net, &tcpv6_prot));
    seq_printf(seq, "UDPLITE6: inuse %d\n",
               sock_prot_inuse_get(net, &udplitev6_prot));
    seq_printf(seq, "RAW6: inuse %d\n",
               sock_prot_inuse_get(net, &rawv6_prot));

    seq_printf(seq, "FRAG6: inuse %u memory %lu\n", !!frag_mem, frag_mem);
    atomic_read(&net->ipv6.frags.rhashtable.nelems),
    frag_mem_limit(&net->ipv6.frags));
    return 0;
}

/* Binding to link-local address requires an interface */
if (!sk->sk_bound_dev_if)
    goto out_unlock;

+ if (sk->sk_bound_dev_if) {
    err = -ENODEV;
    dev = dev_get_by_index_rcu(sock_net(sk),
        sk->sk_bound_dev_if);
    skb->protocol = htons(ETH_P_IPV6);
    skb->priority = sk->sk_priority;
    skb->mark = sk->sk_mark;
    skb->dst_set(skb, &rt->dst);
    skb_put(skb, length);
    skb_reset_network_header(skb);
    skb_transport_header = skb->network_header;
    err = memcpy_from_msg(iph, msg, length);
    -if (err)
goto error_fault;
+if (err) {
+err = -EFAULT;
+kfree_skb(skb);
+goto error;
+
+skb_dst_set(skb, &rt->dst);
+*dstp = NULL;
+
/* if egress device is enslaved to an L3 master device pass the
 * skb to its handler for processing
 @@ -674,21 +680,28 @@
 if (unlikely(!skb))
 return 0;
 
+/* Acquire rcu_read_lock() in case we need to use rt->rt6i_iodev
 + * in the error path. Since skb has been freed, the dst could
 + * have been queued for deletion.
 + */
+rcu_read_lock();
+IP6_UPD_PO_STATS(net, rt->rt6i_iodev, IPSTATS_MIB_OUT, skb->len);
+err = NF_HOOK(NFPROTO_IPV6, NF_INET_LOCAL_OUT, net, sk, skb,
+ NULL, rt->dst.dev, dst_output);
+if (err > 0)
+err = net_xmit_errno(err);
+-if (err)
+-goto error;
+-if (err) {
+F6_INC_STATS(net, rt->rt6i_iodev, IPSTATS_MIB_OUTDISCARDS);
+rcu_read_unlock();
+goto error_check;
+}
+rcu_read_unlock();
+out:
+return 0;
+
-error_fault:
-error = -EFAULT;
-kfree_skb(skb);
-error:
-IP6_INC_STATS(net, rt->rt6i_iodev, IPSTATS_MIBUTDISCARDS);
+error_check:
-if (err == -ENOBUFS && !np->recverr)
-err = 0;
-return err;
@@ -769,6 +782,7 @@
 struct sockcm_cookie sockc;
struct ipcm6_cookie ipc6;
int addr_len = msg->msg_namelen;
+int hdrincl;
uint16_t proto;
int err;

/*
 * Get and verify the address.
 */
@@ -782,6 +796,13 @@
if (msg->msg_flags & MSG_OOB)
    return -EOPNOTSUPP;

/* hdrincl should be READ_ONCE(inet->hdrincl)
 + * but READ_ONCE() doesn't work with bit fields.
 + * Doing this indirectly yields the same result.
 + */
+hdrincl = inet->hdrincl;
+hdrincl = READ_ONCE(hdrincl);
+
/*
 */
@@ -876,11 +897,14 @@
    opt = ipv6_fixup_options(&opt_space, opt);

fl6.flowi6_proto = proto;
-rfv.msg = msg;
-rfv.hlen = 0;
-err = rawv6_probe_proto_opt(&rfv, &fl6);
-if (err)
    goto out;
+if (!hdrincl) {
+    rfv.msg = msg;
+    rfv.hlen = 0;
+    err = rawv6_probe_proto_opt(&rfv, &fl6);
+    if (err)
+        goto out;
+}

if (!ipv6_addr_any(daddr))
    fl6.daddr = *daddr;
@@ -897,7 +921,7 @@
    fl6.flowi6_oif = np->ucast_oif;
    security_sk_classify_flow(sk, flowi6_to_flowi(&fl6));
    -if (inet->hdrincl)
+    if (hdrincl)
        fl6.flowi6_flags |= FLOWI_FLAG_KNOWN_NH;
if (ipc6.tclass < 0)
@@ -905,7 +929,7 @@
fl6.flowlabel = ip6_make_flowinfo(ipc6.tclass, fl6.flowlabel);

-dst = ip6_dst_lookup_flow(sk, &fl6, final_p);
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, &fl6, final_p);
if (IS_ERR(dst)) {
  err = PTR_ERR(dst);
  goto out;
@@ -920,7 +944,7 @@
goto do_confirm;

back_from_confirm:
-if (inet->hdrincl)
+if (hdrincl)
err = rawv6_send_hdrinc(sk, msg, len, &fl6, &dst, msg->msg_flags);
  else {
    ipc6.opt = opt;
--- linux-4.15.0.orig/net/ipv6/reassembly.c
+++ linux-4.15.0/net/ipv6/reassembly.c
@@ -57,18 +57,11 @@
#include <net/rawv6.h>
#include <net/ndisc.h>
#include <net/addrconf.h>
-#include <net/inet_frag.h>
+#include <net/ipv6_frag.h>
-#include <net/inet_frag.h>
+#include <net/inet_ecn.h>

static const char ip6_frag_cache_name[] = "ip6-frags";

-struct ip6frag_skb_cb {
 struct inet6_skb_parmh;
-intoffset;
-};
-
-#define FRAG6_CB(skb)((struct ip6frag_skb_cb *)(skb)->cb))

-static u8 ip6_frag_ecn(const struct ipv6hdr *ipv6h)
{ return 1 << (ipv6_get_dsfield(ipv6h) & INET_ECN_MASK);
@@ -76,99 +69,8 @@

static struct inet_frags ip6_frags;

-static int ip6_frag_reasm(struct frag_queue *fq, struct sk_buff *prev,
- struct net_device *dev);
-
- static unsigned int inet6_hash_frag(__be32 id, const struct in6_addr *saddr,
  const struct in6_addr *daddr)
{
  net_get_random_once(&ip6_frags.rnd, sizeof(ip6_frags.rnd));
  return jhash_3words(ipv6_addr_hash(saddr), ipv6_addr_hash(daddr),
    ((__force u32)id, ip6_frags.rnd);
}

- static unsigned int ip6_hashfn(const struct inet_frag_queue *q)
{
  const struct frag_queue *fq;
  fq = container_of(q, struct frag_queue, q);
  return inet6_hash_frag(fq->id, &fq->saddr, &fq->daddr);
}

- bool ip6_frag_match(const struct inet_frag_queue *q, const void *a)
{
  const struct frag_queue *fq;
  const struct ip6_create_arg *arg = a;
  fq = container_of(q, struct frag_queue, q);
  return fq->id == arg->id &&
         fq->user == arg->user &&
         ipv6_addr_equal(&fq->saddr, arg->src) &&
         ipv6_addr_equal(&fq->daddr, arg->dst) &&
         (arg->iif == fq->iif ||
          !(ipv6_addr_type(arg->dst) & (IPV6_ADDR_MULTICAST |
            IPV6_ADDR_LINKLOCAL)));
}

-EXPORT_SYMBOL(ip6_frag_match);

- void ip6_frag_init(struct inet_frag_queue *q, const void *a)
{
  struct frag_queue *fq = container_of(q, struct frag_queue, q);
  return fq->id == arg->id &&
         fq->user == arg->user &&
         ipv6_addr_equal(&fq->saddr, arg->src) &&
         ipv6_addr_equal(&fq->daddr, arg->dst) &&
         (arg->iif == fq->iif ||
          !(ipv6_addr_type(arg->dst) & (IPV6_ADDR_MULTICAST |
            IPV6_ADDR_LINKLOCAL)));
}

-EXPORT_SYMBOL(ip6_frag_init);
-void ip6_expire_frag_queue(struct net *net, struct frag_queue *fq, 
-struct inet frags *frags)
{
   struct net_device *dev = NULL;

   spin_lock(&fq->q.lock);

   if (fq->q.flags & INET_FRAG_COMPLETE)
      goto out;

   inet_frag_kill(&fq->q, frags);

   rcu_read_lock();
   dev = dev_get_by_index_rcu(net, fq->iif);
   if (!dev)
      goto out_rcu_unlock;

   __IP6_INC_STATS(net, __in6_dev_get(dev), IPSTATS_MIB_REASMFAILS);

   if (inet_frag_evicting(&fq->q))
      goto out_rcu_unlock;

   __IP6_INC_STATS(net, __in6_dev_get(dev), IPSTATS_MIB_REASMTIMEOUT);

   /* Don't send error if the first segment did not arrive. */
   if (!(fq->q.flags & INET_FRAG_FIRST_IN) || !fq->q.fragments)
      goto out_rcu_unlock;

   /* But use as source device on which LAST ARRIVED
   * segment was received. And do not use fq->dev
   * pointer directly, device might already disappeared.
   */
   fq->q.fragments->dev = dev;
   icmpv6_send(fq->q.fragments, ICMPV6_TIME_EXCEED, ICMPV6_EXC_FRAGTIME, 0);
   out_rcu_unlock:
   rcu_read_unlock();
   out:
   spin_unlock(&fq->q.lock);
   inet_frag_put(&fq->q, frags);
}

EXPORT_SYMBOL(ip6_expire_frag_queue);

+static int ip6_frag_reasm(struct frag_queue *fq, struct sk_buff *skb,
+ struct sk_buff *prev_tail, struct net_device *dev);

static void ip6_frag_expire(struct timer_list *t)
{
}
fq = container_of(frag, struct frag_queue, q);
net = container_of(fq->q.net, struct net, ipv6.frags);

-ip6_expire_frag_queue(net, fq, &ip6_frags);
+ip6frag_expire_frag_queue(net, fq);
}

static struct frag_queue *
-fq_find(struct net *net, __be32 id, const struct in6_addr *src,
-const struct in6_addr *dst, int iif, u8 ecn)
+fq_find(struct net *net, __be32 id, const struct ipv6hdr *hdr, int iif)
{
+struct frag_v6_compare_key key = {
+.id = id,
+.saddr = hdr->saddr,
+.daddr = hdr->daddr,
+.user = IP6_DEFRAG_LOCAL_DELIVER,
+.iif = iif,
+};
struct inet_frag_queue *q;
-struct ip6_create_arg arg;
-unsigned int hash;
-
-arg.id = id;
-arg.user = IP6_DEFRAG_LOCAL_DELIVER;
-arg.src = src;
-arg.dst = dst;
-arg.iif = iif;
-arg.ecn = ecn;
-
-hash = inet6_hash_frag(id, src, dst);
-
-q = inet_frag_find(&net->ipv6.frags, &ip6_frags, &arg, hash);
-if (IS_ERR_OR_NULL(q)) {
-inet_frag_maybe_warn_overflow(q, pr_fmt());
+if (!(ipv6_addr_type(&hdr->daddr) & (IPV6_ADDR_MULTICAST |
+ IPV6_ADDR_LINKLOCAL)))
+key.iif = 0;
+
+q = inet_frag_find(&net->ipv6.frags, &key);
+if (!q)
+return NULL;
-}
+
+return container_of(q, struct frag_queue, q);
}

static int ip6_frag_queue(struct frag_queue *fq, struct sk_buff *skb,
- struct frag_hdr *fhdr, int nhoff)
+ struct frag_hdr *fhdr, int nhoff,
+ u32 *prob_offset)
{
-struct sk_buff *prev, *next;
-struct net_device *dev;
-int offset, end, fragsize;
struct net *net = dev_net(skb_dst(skb)->dev);
+int offset, end, fragsize;
+struct sk_buff *prev_tail;
+struct net_device *dev;
+int err = -ENOENT;
    u8 ecn;

    if (fq->q.flags & INET_FRAG_COMPLETE)
        goto err;

    +err = -EINVAL;
    offset = ntohs(fhdr->frag_off) & ~0x7;
    end = offset + (ntohs(ipv6_hdr(skb)->payload_len) -
        ((u8 *)(fhdr + 1) - (u8 *)(ipv6_hdr(skb) + 1)));

    if ((unsigned int)end > IPV6_MAXPLEN) {
        __IP6_INC_STATS(net, ip6_dst_idev(skb_dst(skb)),
            -IPSTATS_MIB_INHDRERRORS);
        -icmpv6_param_prob(skb, ICMPV6_HDR_FIELD,
            -((u8 *)&fhdr->frag_off - skb_network_header(skb)));
        +prob_offset = (u8 *)&fhdr->frag_off - skb_network_header(skb);
        /* note that if prob_offset is set, the skb is freed elsewhere,
         * we do not free it here.
         */
        +*/
        return -1;
    } }

    @ @ -248,7 +150,7 @ @
    */
    if (end < fq->q.len ||
        ((fq->q.flags & INET_FRAG_LAST_IN) &&& end != fq->q.len))
        -goto err;
        +goto discard_fq;
    fq->q.flags |= INET_FRAG_LAST_IN;
    fq->q.len = end;
} else {
    @ @ -259,79 +161,42 @ @
    /* RFC2460 says always send parameter problem in
     * this case. -DaveM
     */
if (end > fq->q.len) {
    /* Some bits beyond end -> corruption. */
    if (fq->q.flags & INET_FRAG_LAST_IN)
        goto err;
    goto discard_fq;
    fq->q.len = end;
}

if (end == offset)
    goto err;
+goto discard_fq;

+err = -ENOMEM;
/* Point into the IP datagram 'data' part. */
+if (!pskb_pull(skb, (u8 *) (fhdr + 1) - skb->data))
    goto err;
-
    if (pskb_trim_rcsum(skb, end - offset))
    goto err;
-

    /* Find out which fragments are in front and at the back of us
    - * in the chain of fragments so far. We must know where to put
    - * this fragment, right?
    - */
    -prev = fq->q.fragments_tail;
    -if (!prev || FRAG6_CB(prev)->offset < offset) {
    -next = NULL;
    -goto found;
    -}
    -prev = NULL;
    -for (next = fq->q.fragments; next != NULL; next = next->next) {
    -if (FRAG6_CB(next)->offset >= offset)
    -break;/* bingo! */
    -prev = next;
    -}
    -found:
    -/* RFC5722, Section 4, amended by Errata ID : 3089
    - * When reassembling an IPv6 datagram, if
    - * one or more its constituent fragments is determined to be an
- * overlapping fragment, the entire datagram (and any constituent
- * fragments) MUST be silently discarded.
- */
-
/* Check for overlap with preceding fragment. */
-if (prev &&
-    (FRAG6_CB(prev)->offset + prev->len) > offset)
goto discard_fq;

/* Look for overlap with succeeding segment. */
-if (next && FRAG6_CB(next)->offset < end)
+err = pskb_trim_rcsum(skb, end - offset);
+if (err)
goto discard_fq;

-FRAG6_CB(skb)->offset = offset;
+/* Note : skb->rbnode and skb->dev share the same location. */
+dev = skb->dev;
+/* Makes sure compiler wont do silly aliasing games */
+barrier();

/* Insert this fragment in the chain of fragments. */
-skb->next = next;
-if (!next)
-fq->q.fragments_tail = skb;
-if (prev)
-prev->next = skb;
-else
-fq->q.fragments = skb;
+prev_tail = fq->q.fragments_tail;
+err = inet_frag_queue_insert(&fq->q, skb, offset, end);
+if (err)
+goto insert_error;

-dev = skb->dev;
-if (dev) {
+if (dev)
-fq->iif = dev->ifindex;
-skbb->dev = NULL;
-
+fq->q.stamp = skb->tstamp;
-fq->q.meat += skb->len;
-fq->ecn |= ecn;

if (fq->q.flags == (INET_FRAG_FIRST_IN | INET_FRAG_LAST_IN) &&
     fq->q.meat == fq->q.len) {

int res;
unsigned long orefdst = skb->_skb_refdst;

skb->_skb_refdst = 0UL;
res = ip6_frag_reasm(fq, prev, dev);
+err = ip6_frag_reasm(fq, skb, prev_tail, dev);
skb->_skb_refdst = orefdst;
-return res;
+return err;
}

skb_dst_drop(skb);
-return -1;
+return -EINPROGRESS;

+insert_error:
+if (err == IPFRAG_DUP) {
+kfree_skb(skb);
+return -EINVAL;
+}
+err = -EINVAL;
+__IP6_INC_STATS(net, ip6_dst_idev(skb_dst(skb)),
+IPSTATS_MIB_REASM_OVERLAPS);
discard_fq:
-inet_frag_kill(&fq->q, &ip6_frags);
-err:
+inet_frag_kill(&fq->q);
+__IP6_INC_STATS(net, ip6_dst_idev(skb_dst(skb)),
IPSTATS_MIB_REASMFAILS);
+err:
kfree_skb(skb);
-return -1;
+return err;
}

/*
 * Check if this packet is complete.
- * Returns NULL on failure by any reason, and pointer
- * to current nexthdr field in reassembled frame.
 *
 * It is called with locked fq, and caller must check that
 * queue is eligible for reassembly i.e. it is not COMPLETE,
 * the last and the first frames arrived and all the bits are here.
 */
-static int ip6_frag_reasm(struct frag_queue *fq, struct sk_buff *prev,
- struct net_device *dev)
+static int ip6_frag_reasm(struct frag_queue *fq, struct sk_buff *skb,
+ struct sk_buff *prev_tail, struct net_device *dev)
{ 
struct net *net = container_of(fq->q.net, struct net, ipv6.frags);
-struct sk_buff *fp, *head = fq->q.fragments;
-int payload_len;
unsigned int nhoff;
-int sum_truesize;
+void *reasn_data;
+int payload_len;
-ecn = ip_frag_ecn_table[fq->ecn];
if (unlikely(ecn == 0xff))
goto out_fail;

-/* Make the one we just received the head. */ 
-if (prev) {
- head = prev->next;
- fp = skb_clone(head, GFP_ATOMIC);
 -
- if (!fp)
- goto out_oom;
- 
- fp->next = head->next;
- if (!fp->next)
- fq->q.fragments_tail = fp;
- prev->next = fp;
 -
- skb_morph(head, fq->q.fragments);
- head->next = fq->q.fragments->next;
 -
- consume_skb(fq->q.fragments);
- fq->q.fragments = head;
- }
 -
- WARN_ON(head == NULL);
- WARN_ON(FRAG6_CB(head)->offset != 0);
+ reasm_data = inet_frag_reasm_prepare(&fq->q, skb, prev_tail);
+ if (!reasn_data)
+ goto out_oom;

-/* Unfragmented part is taken from the first segment. */ 
-payload_len = ((head->data - skb_network_header(head)) - 
+payload_len = ((skb->data - skb_network_header(skb)) - 
sizeof(struct ipv6hdr) + fq->q.len - 
sizeof(struct frag_hdr));
if (payload_len > IPV6_MAXPLEN)
goto out_oversize;

/* Head of list must not be cloned. */
-if (skb_unclone(head, GFP_ATOMIC))
goto out_oom;
-
/* If the first fragment is fragmented itself, we split
 * it to two chunks: the first with data and paged part
 * and the second, holding only fragments. */
-if (skb_has_frag_list(head)) {
-struct sk_buff *clone;
-int i, plen = 0;
-
-clone = alloc_skb(0, GFP_ATOMIC);
-if (!clone)
-goto out_oom;
-clone->next = head->next;
-head->next = clone;
-skb_shinfo(clone)->frag_list = skb_shinfo(head)->frag_list;
-skb_frag_list_init(head);
-for (i = 0; i < skb_shinfo(head)->nr_frags; i++)
-plen += skb_frag_size(skb_shinfo(head)->frags[i]);
-clone->len = clone->data_len = head->data_len - plen;
-head->data_len -= clone->len;
-head->len -= clone->len;
-clone->csum = 0;
-clone->ip_summed = head->ip_summed;
-add_frag_mem_limit(fq->q.net, clone->truesize);
-}
-
/* We have to remove fragment header from datagram and to relocate
 * header in order to calculate ICV correctly. */
-nhoff = fq->nhoffset;
-skb_network_header(head)[nhoff] = skb_transport_header(head)[0];
-memmove(head->head + sizeof(struct frag_hdr), head->head,
-(head->data - head->head) - sizeof(struct frag_hdr));
-if (skb_mac_header_was_set(head))
-head->mac_header += sizeof(struct frag_hdr);
-head->network_header += sizeof(struct frag_hdr);
-
-skb_reset_transport_header(head);
-skb_push(head, head->data - skb_network_header(head));
-
-sum_truesize = head->truesize;
-for (fp = head->next; fp;) {
-bool headstolen;
-int delta;
struct sk_buff *next = fp->next;

- sum_truesize += fp->truesize;
if (head->ip_summed != fp->ip_summed)
- head->ip_summed = CHECKSUM_NONE;
else if (head->ip_summed == CHECKSUM_COMPLETE)
- head->csum = csum_add(head->csum, fp->csum);

- if (skb_try_coalesce(head, fp, &headstolen, &delta)) {
- kfree_skb_partial(fp, headstolen);
} else {
- if (!skb_shinfo(head)->frag_list)
- skb_shinfo(head)->frag_list = fp;
- head->data_len += fp->len;
- head->len += fp->len;
- head->truesize += fp->truesize;
}
- fp = next;
-
- skb_network_header(skb)[nhoff] = skb_transport_header(skb)[0];
+ memmove(skb->head + sizeof(struct frag_hdr), skb->head,
+ skb->data - skb->head) - sizeof(struct frag_hdr));
+ if (skb_mac_header_was_set(skb))
+ skb->mac_header += sizeof(struct frag_hdr);
+ skb->network_header += sizeof(struct frag_hdr);
+ skb_transport_header(skb);
+ inet_frag_reasm_finish(&fq->q, skb, reasm_data);
+ skb->dev = dev;
+ ipv6_hdr(skb)->payload_len = htons(payload_len);
+ ipv6_change_dsfield(ipv6_hdr(skb), 0xff, ecn);
+ IP6CB(skb)->nhoff = nhoff;
+ IP6CB(skb)->flags |= IP6SKB_FRAGMENTED;
+ IP6CB(skb)->frag_max_size = fq->q.max_size;
+ skb_network_header(skb)[nhoff] = skb_transport_header(skb)[0];
+ memmove(skb->head + sizeof(struct frag_hdr), skb->head,
+ skb->data - skb->head) - sizeof(struct frag_hdr));
+ if (skb_mac_header_was_set(skb))
+ skb->mac_header += sizeof(struct frag_hdr);
+ skb->network_header += sizeof(struct frag_hdr);
+ skb->transport_header(skb);
+ inet_frag_reasm_finish(&fq->q, skb, reasm_data);
+ skb->dev = dev;
+ ipv6_hdr(skb)->payload_len = htons(payload_len);
+ ipv6_change_dsfield(ipv6_hdr(skb), 0xff, ecn);
+ IP6CB(skb)->nhoff = nhoff;
+ IP6CB(skb)->flags |= IP6SKB_FRAGMENTED;
+ IP6CB(skb)->frag_max_size = fq->q.max_size;

/* Yes, and fold redundant checksum back. 8) */
skb_postpush_rsum(head, skb_network_header(head),
- skb_network_header_len(head));
+ skb_postpush_rsum(skb, skb_network_header(skb),
+ skb_network_header_len(skb));

rcu_read_lock();
__IP6_INC_STATS(net, __in6_dev_get(dev), IPSTATS_MIB_REASMOKS);
rcu_read_unlock();
fq->q.fragments = NULL;
+fq->q.rb_fragments = RB_ROOT;
fq->q.fragments_tail = NULL;
+fq->q.last_run_head = NULL;
return 1;

out_oversize:
@@ -522,6 +319,7 @@
rcu_read_lock();
__IP6_INC_STATS(net, __in6_dev_get(dev), IPSTATS_MIB_REASMFAILS);
rcu_read_unlock();
+inet_frag_kill(&fq->q);
return -1;
}

@@ -531,6 +329,7 @@
struct frag_queue *fq;
const struct ipv6hdr *hdr = ipv6_hdr(skb);
struct net *net = dev_net(skb_dst(skb)->dev);
+int iif;

if (IP6CB(skb)->flags & IP6SKB_FRAGMENTED)
goto fail_hdr;
@@ -548,7 +347,7 @@
hdr = ipv6_hdr(skb);
fhdr = (struct frag_hdr *)skb_transport_header(skb);

-if (!(fhdr->frag_off & htons(0xFFF9))) {
+if (!(fhdr->frag_off & htons(IP6_OFFSET | IP6_MF))) {
/* It is not a fragmented frame */
skb->transport_header += sizeof(struct frag_hdr);
__IP6_INC_STATS(net,
@@ -556,20 +355,31 @@
IP6CB(skb)->nhoff = (u8 *)fhdr - skb_network_header(skb);
IP6CB(skb)->flags |= IP6SKB_FRAGMENTED;
+IP6CB(skb)->frag_max_size = ntohs(hdr->payload_len) +
+ sizeof(struct ipv6hdr);
return 1;
}
- fq = fq_find(net, fhdr->identification, &hdr->saddr, &hdr->daddr, skb->dev ? skb->dev->ifindex : 0, ip6_frag_ecn(hdr));
  + iif = skb->dev ? skb->dev->ifindex : 0;
  + fq = fq_find(net, fhdr->identification, hdr, iif);
  if (fq) {
    u32 prob_offset = 0;
    int ret;

    spin_lock(&fq->q.lock);

    - ret = ip6_frag_queue(fq, skb, fhdr, IP6CB(skb)->nhoff);
    + ret = ip6_frag_queue(fq, skb, fhdr, IP6CB(skb)->nhoff,
      &prob_offset);

    spin_unlock(&fq->q.lock);

    - inet_frag_put(&fq->q, &ip6_frags);
    + inet_frag_put(&fq->q);

    if (prob_offset) {
      __IP6_INC_STATS(net, ip6_dst_idev(skb_dst(skb)),
      IPSTATS_MIB_INHDRERRORS);
      /* icmpv6_param_prob() calls kfree_skb(skb) */
      + icmpv6_param_prob(skb, ICMPV6_HDR_FIELD, prob_offset);
    }
    return ret;
  }

@@ -590,24 +400,22 @@
};

#ifdef CONFIG_SYSCTL
- static int zero;
  static struct ctl_table ip6_frags_ns_ctl_table[] = {
  
+static struct ctl_table ip6_frags_ns_ctl_table[] = {
    
  .procname= "ip6frag_high_thresh",
  .data= &init_net.ipv6.frags.high_thresh,
  .maxlen= sizeof(int),
  +.maxlen= sizeof(unsigned long),
  .mode= 0644,
  -.proc_handler= proc_dointvec_minmax,
  +.proc_handler= proc_doulongvec_minmax,
  .extra1= &init_net.ipv6.frags.low_thresh
  },
  
  .procname= "ip6frag_low_thresh",
  .data= &init_net.ipv6.frags.low_thresh,

Open Source Used In 5GaaS Edge AC-4 34176
- maxlen = sizeof(int),
+ maxlen = sizeof(unsigned long),
.mode = 0644,
- proc_handler = proc_dointvec_minmax,
- extra1 = &zero,
+ proc_handler = proc_doulongvec_minmax,
+ extra2 = &init_net.ipv6.frags.high_thresh
},
{
@ @ -650,10 +458,6 @@
table[1].data = &net->ipv6.frags.low_thresh;
table[1].extra2 = &net->ipv6.frags.high_thresh;
table[2].data = &net->ipv6.frags.timeout;
-
-/* Don't export sysctls to unprivileged users */
- if (net->user_ns != &init_user_ns)
- table[0].procname = NULL;
}

hdr = register_net_sysctl(net, "net/ipv6", table);
@ @ -715,19 +519,27 @@

static int __net_init ipv6_frags_init_net(struct net *net)
{
+ int res;
+
+ net->ipv6.frags.high_thresh = IPV6_FRAG_HIGH_THRESH;
+ net->ipv6.frags.low_thresh = IPV6_FRAG_LOW_THRESH;
+ net->ipv6.frags.timeout = IPV6_FRAG_TIMEOUT;
+ net->ipv6.frags.f = &ip6_frags;
-
inet_frags_init_net(&net->ipv6.frags);
+ res = inet_frags_init_net(&net->ipv6.frags);
+ if (res < 0)
+ return res;
-
-return ip6_frags_ns_sysctl_register(net);
+ return res; 
+
inet_frags_exit_net(&net->ipv6.frags);
+
static void __net_exit ipv6_frags_exit_net(struct net *net)
{
 ip6_frags_ns_sysctl_unregister(net);
- inet_frags_exit_net(&net->ipv6.frags, &ip6_frags);
+ inet_frags_exit_net(&net->ipv6.frags);
static struct pernet_operations ip6_frags_ops = {
    .exit = ipv6_frags_exit_net,
};

static const struct rhashtable_params ip6_rhash_params = {
    .head_offset= offsetof(struct inet_frag_queue, node),
    .hashfn= ip6frag_key_hashfn,
    .obj_hashfn= ip6frag_obj_hashfn,
    .obj_cmpfn= ip6frag_obj_cmpfn,
    .automatic_shrinking= true,
};

int __init ipv6_frag_init(void)
{
    int ret;

    ret = inet6_add_protocol(&frag_protocol, IPPROTO_FRAGMENT);
    ip6_frags.constructor = ip6frag_init;
    ip6_frags.destructor = NULL;
    ip6_frags.qsize = sizeof(struct frag_queue);
    ip6_frags.frag_expire = ip6_frag_expire;
    ip6_frags.frags_cache_name = ip6_frag_cache_name;
    ip6_frags.rhash_params = ip6_rhash_params;
    ret = inet_frags_init(&ip6_frags);
    if (ret)
        goto out;

    ret = inet6_add_protocol(&frag_protocol, IPPROTO_FRAGMENT);
    if (ret)
        goto err_protocol;

    ret = ip6_frags_sysctl_register();
    if (ret)
        goto err_sysctl;

    if (ret)
        goto err_pernet;

    ip6_frags.hashfn = ip6_hashfn;
    ip6_frags.constructor = ip6_frag_init;
    ip6_frags.destructor = NULL;
    ip6_frags.qsize = sizeof(struct frag_queue);
    ip6_frags.match = ip6_frag_match;
    ip6_frags.frag_expire = ip6_frag_expire;
    ip6_frags.frags_cache_name = ip6_frag_cache_name;

out:
    return ret;

erp_err:
    return ret;

erp_sysctl:
    return ret;

erp_pernet:
    return ret;
- ret = inet_frags_init(&ip6_frags);
- if (ret)
- goto err_pernet;
- out:
- return ret;

@@ -768,13 +588,15 @@
   inet6_del_protocol(&frag_protocol, IPPROTO_FRAGMENT);
+err_protocol:
   +inet_frags_fini(&ip6_frags);
   goto out;
 }

void ipv6_frag_exit(void)
{
- inet_frags_fini(&ip6_frags);
  ip6_frags_sysctl_unregister();
  unregister_pernet_subsys(&ip6_frags_ops);
  inet6_del_protocol(&frag_protocol, IPPROTO_FRAGMENT);
+ inet_frags_fini(&ip6_frags);
}

--- linux-4.15.0.orig/net/ipv6/route.c
+++ linux-4.15.0/net/ipv6/route.c
@@ -94,7 +94,8 @@
 static int ip6_pkt_prohibit_out(struct net *net, struct sock *sk, struct sk_buff *skb);
 static void ip6_link_failure(struct sk_buff *skb);
 static void ip6_rt_update_pmtu(struct dst_entry *dst, struct sock *sk,
-    struct sk_buff *skb, u32 mtu);
+    struct sk_buff *skb, u32 mtu,
+    bool confirm_neigh);
 static void rt6_do_redirect(struct dst_entry *dst, struct sock *sk,
    struct sk_buff *skb);
 static void rt6_dst_from_metrics_check(struct rt6_info *rt);
@@ -128,7 +129,7 @@
 static DEFINE_PER_CPU_ALIGNED(struct uncached_list, rt6_uncached_list);

- static void rt6_uncached_list_add(struct rt6_info *rt)
+ static void rt6_uncached_list_add(struct rt6_info *rt)
 { 
 struct uncached_list *ul = raw_cpu_ptr(&rt6_uncached_list);

@@ -139,7 +140,7 @@
   spin_unlock_bh(&ul->lock);
 }
static void rt6_uncached_list_del(struct rt6_info *rt)
+void rt6_uncached_list_del(struct rt6_info *rt)
{
  if (!list_empty(&rt->rt6i_uncached)) {
    struct uncached_list *ul = rt->rt6i_uncached_list;
    return dst_cow_metrics_generic(dst, old);
  }

-static inline const void *choose_neigh_daddr(struct rt6_info *rt,
+static inline const void *choose_neigh_daddr(const struct in6_addr *p,
    struct sk_buff *skb,
    const void *daddr)
{
-  struct in6_addr *p = &rt->rt6i_gateway;
-
    if (!ipv6_addr_any(p))
      return (const void *) p;
    else if (skb)
      @ @ -221,7 +220,7 @ @
      struct rt6_info *rt = (struct rt6_info *) dst;
      struct neighbour *n;

-    daddr = choose_neigh_daddr(rt, skb, daddr);
+    daddr = choose_neigh_daddr(rt6_nexthop(rt, &in6addr_any), skb, daddr);
    n = __ipv6_neigh_lookup(dst->dev, daddr);
    if (n)
      return n;
    @ @ -233,7 +232,7 @ @
    struct net_device *dev = dst->dev;
    struct rt6_info *rt = (struct rt6_info *)dst;

-    daddr = choose_neigh_daddr(rt, NULL, daddr);
+    daddr = choose_neigh_daddr(&rt->rt6i_gateway, NULL, daddr);
    if (!daddr)
      return;
    if (dev->flags & (IFF_NOARP | IFF_LOOPBACK))
      @ @ -270,7 +269,8 @ @
  }
}

static void ip6_rt_blackhole_update_pmtu(struct dst_entry *dst, struct sock *sk,
- struct sk_buff *skb, u32 mtu)
+ struct sk_buff *skb, u32 mtu,
+ bool confirm_neigh)
{
}

@ @ -922,6 +922,9 @ @
struct rt6_info *rt, *rt_cache;
struct fib6_node *fn;

+if (fl6->flowi6_flags & FLOWI_FLAG_SKIP_NH_OIF)
+flags &= ~RT6_LOOKUP_F_IFACE;
+
rcu_read_lock();
fn = fib6_lookup(&table->tb6_root, &fl6->daddr, &fl6->saddr);
restart:

static void rt6_update_exception_stamp_rt(struct rt6_info *rt)
{
    struct rt6_info *from = (struct rt6_info *)rt->dst.from;
    struct rt6_exception_bucket *bucket;
    struct in6_addr *src_key = NULL;
    struct rt6_exception *rt6_ex;

    -if (!from ||
    !(rt->rt6i_flags & RTF_CACHE))
    return;
+
rcu_read_lock();
+from = (struct rt6_info *)rcu_dereference(rt->dst.from);
+if (!from || !(rt->rt6i_flags & RTF_CACHE))
+    goto unlock;
+
    bucket = rcu_dereference(from->rt6i_exception_bucket);
    
#ifdef CONFIG_IPV6_SUBTREES
    @@ -1488,6 +1491,7 @@
    if (rt6_ex)
        rt6_ex->stamp = jiffies;
    +unlock:
    rcu_read_unlock();
    
#else
    @@ -1510,7 +1514,30 @@
    }

    static void rt6 Exceptions_update_pmtu(struct rt6_info *rt, int mtu)
    +static bool rt6 mtu_change_route_allowed(struct inet6_dev *idev,
    + struct rt6_info *rt, int mtu)
    +{ /* If the new MTU is lower than the route PMTU, this new MTU will be the
lowest MTU in the path: always allow updating the route PMTU to
* reflect PMTU decreases.
* If the new MTU is higher, and the route PMTU is equal to the local
  MTU, this means the old MTU is the lowest in the path, so allow
  updating it: if other nodes now have lower MTUs, PMTU discovery will
  handle this.
*/
if (dst_mtu(&rt->dst) >= mtu)
  return true;
if (dst_mtu(&rt->dst) == idev->cnf.mtu6)
  return true;
return false;
}

static void rt6_exceptions_update_pmtu(struct inet6_dev *idev,
				       struct rt6_info *rt, int mtu)
{
    struct rt6_exception_bucket *bucket;
    struct rt6_exception *rt6_ex;
    bucket = rcu_dereference_protected(rt->rt6i_exception_bucket,
                                       lockdep_is_held(&rt6_exception_lock));

    -if (bucket) {
      -for (i = 0; i < FIB6_EXCEPTION_BUCKET_SIZE; i++) {
        -hlist_for_each_entry(rt6_ex, &bucket->chain, hlist) {
          -struct rt6_info *entry = rt6_ex->rt6i;
          -/* For RTF_CACHE with rt6i_pmtu == 0
          -i.e. a redirected route,
          -the metrics of its rt->dst.from has already
          -been updated.
          -*/
          -if (entry->rt6i_pmtu && entry->rt6i_pmtu > mtu)
            -entry->rt6i_pmtu = mtu;
        -}
        -bucket++;
        +if (!bucket)
          +return;
          +
    }
    -for (i = 0; i < FIB6_EXCEPTION_BUCKET_SIZE; i++) {
      +hlist_for_each_entry(rt6_ex, &bucket->chain, hlist) {
        +struct rt6_info *entry = rt6_ex->rt6i;
        +
      }
      +/* For RTF_CACHE with rt6i_pmtu == 0 (i.e. a redirected
+ * route), the metrics of its rt->dst.from have already
+ * been updated.
+ */
+ if (entry->rt6i_pmtu &&
+     rt6_mtu_change_route_allowed(idev, entry, mtu))
+entry->rt6i_pmtu = mtu;
} 
bucket++;
}

@@ -1586,31 +1615,34 @@
* EXPIRES exceptions - e.g. pmtu-generated ones are pruned when
* expired, independently from their aging, as per RFC 8201 section 4
*/
-if (!(rt->rt6i_flags & RTF_EXPIRES) &&
-    time_after_eq(now, rt->dst.lastuse + gc_args->timeout)) {
-RT6_TRACE("aging clone %p"n", rt);
+if (!(rt->rt6i_flags & RTF_EXPIRES)) {
+    if (time_after_eq(now, rt->dst.lastuse + gc_args->timeout)) {
+RT6_TRACE("aging clone %p"n", rt);
+rt6_remove_exception(bucket, rt6_ex);
+return;
+}
+} else if (time_after(jiffies, rt->dst.expires)) {
+RT6_TRACE("purging expired route %p"n", rt);
rt6_remove_exception(bucket, rt6_ex);
return;
-} else if (rt->rt6i_flags & RTF_GATEWAY) {
+}
+
+if (rt->rt6i_flags & RTF_GATEWAY) {
struct neighbour *neigh;
__u8 neigh_flags = 0;

-neigh = dst_neigh_lookup(&rt->dst, &rt->rt6i_gateway);
-if (neigh) {
+neigh = __ipv6_neigh_lookup_noref(rt->dst.dev, &rt->rt6i_gateway);
+if (neigh)
neigh_flags = neigh->flags;
-neigh_release(neigh);
-}
+
+if (!(neigh_flags & NTF_ROUTER)) {
RT6_TRACE("purging route %p via non-router but gateway\n", rt);
rt6_remove_exception(bucket, rt6_ex);
return;


} else if (__rt6_check_expired(rt)) {
    RT6_TRACE("purging expired route %p
", rt);
    rtt6_remove_exception(bucket, rt6_ex);
    return;
}
+ gc_args->more++;
}

@@ -1626,7 +1658,8 @@
if (!rcu_access_pointer(rt->rt6i_exception_bucket))
    return;

- spin_lock_bh(&rt6_exception_lock);
+ rcu_read_lock_bh();
+ spin_lock(&rt6_exception_lock);
    bucket = rcu_dereference_protected(rt->rt6i_exception_bucket,
+ lockdep_is_held(&rt6_exception_lock));

@@ -1640,7 +1673,8 @@
    bucket++;
 }
 }
- spin_unlock_bh(&rt6_exception_lock);
+ spin_unlock(&rt6_exception_lock);
+ rcu_read_unlock_bh();
 }

struct rt6_info *ip6_pol_route(struct net *net, struct fib6_table *table,
@@ -1790,11 +1824,16 @@
    const struct ipv6hdr *inner_iph;
    const struct icmp6hdr *icmph;
    struct ipv6hdr _inner_iph;
+    struct icmp6hdr _icmph;
    if (likely(outer_iph->nexthdr != IPPROTO_ICMPV6))
        goto out;

- icmph = icmp6_hdr(skb);
+ icmph = skb_header_pointer(skb, skb_transport_offset(skb),
+ sizeof(_icmph), &_icmph);
+ if (!icmph)
+     goto out;
+ if (icmp6_type != ICMPV6_DEST_UNREACH &&
     icmph->icmp6_type != ICMPV6_PKT_TOOBIG &&
     icmph->icmp6_type != ICMPV6_TIME_EXCEED &&
keys->control.addr_type = FLOW_DISSECTOR_KEY_IPV6_ADDRS;
keys->addrs.v6addrs.src = key_iph->saddr;
keys->addrs.v6addrs.dst = key_iph->daddr;
-keys->tags.flow_label = ip6_flowinfo(key_iph);
+keys->tags.flow_label = ip6_flowlabel(key_iph);
keys->basic.ip_proto = key_iph->nexthdr;
}

static void __ip6_rt_update_pmtu(struct dst_entry *dst, const struct sock *sk,
- const struct ipv6hdr *iph, u32 mtu)
+ const struct ipv6hdr *iph, u32 mtu,
+ bool confirm_neigh)
{
    const struct in6_addr *daddr, *saddr;
    struct rt6_info *rt6 = (struct rt6_info *)dst;

    -if (rt6->rt6i_flags & RTF_LOCAL)
    -return;
    -
    -if (dst_metric_locked(dst, RTAX_MTU))
    -return;
    +/* Note: do *NOT* check dst_metric_locked(dst, RTAX_MTU)
    + * IPv6 pmtu discovery isn't optional, so 'mtu lock' cannot disable it.
    + * [see also comment in rt6_mtu_change_route()]
    + */

    if (iph) {
        daddr = &iph->daddr;
@@ -2056,7 +2095,10 @@
        daddr = NULL;
        saddr = NULL;
    }
@@ -2056,7 +2095,10 @@
    -dst_confirm_neigh(dst, daddr);
    +
    +if (confirm_neigh)
    +dst_confirm_neigh(dst, daddr);
    +
    mtu = max_t(u32, mtu, IPV6_MIN_MTU);
    if (mtu >= dst_mtu(dst))
    return;
@@ -2079,9 +2121,11 @@
    }

static void ip6_rt_update_pmtu(struct dst_entry *dst, struct sock *sk,
- struct sk_buff *skb, u32 mtu)
+ struct sk_buff *skb, u32 mtu,
+ bool confirm_neigh)
{
  __ip6_rt_update_pmtu(dst, sk, skb ? ipv6_hdr(skb) : NULL, mtu);
+__ip6_rt_update_pmtu(dst, sk, skb ? ipv6_hdr(skb) : NULL, mtu,
+  confirm_neigh);
}

void ip6_update_pmtu(struct sk_buff *skb, struct net *net, __be32 mtu,
@@ -2101,17 +2145,20 @@
  dst = ip6_route_output(net, NULL, &fl6);
  if (!dst->error)
    __ip6_rt_update_pmtu(dst, NULL, iph, ntohl(mtu));
+__ip6_rt_update_pmtu(dst, NULL, iph, ntohl(mtu), true);
  dst_release(dst);
}
EXPORT_SYMBOL_GPL(ip6_update_pmtu);

void ip6_sk_update_pmtu(struct sk_buff *skb, struct sock *sk, __be32 mtu)
{
+int oif = sk->sk_bound_dev_if;
  struct dst_entry *dst;

- ip6_update_pmtu(skb, sock_net(sk), mtu,
- sk->sk_bound_dev_if, sk->sk_mark, sk->sk_uid);
+if (!oif && skb->dev)
+  oif = l3mdev_master_ifindex(skb->dev);
+  ip6_update_pmtu(skb, sock_net(sk), mtu, oif, sk->sk_mark, sk->sk_uid);
+  dst = __sk_dst_get(skb);
  if (!dst || !dst->obsolete ||
@@ -3517,25 +3564,13 @@
     Since RFC 1981 doesn't include administrative MTU increase
     update PMTU increase is a MUST. (i.e. jumbo frame)
 */
 */
-  if new MTU is less than route PMTU, this new MTU will be the
-  lowest MTU in the path, update the route PMTU to reflect PMTU
-  decreases; if new MTU is greater than route PMTU, and the
-  old MTU is the lowest MTU in the path, update the route PMTU
-  to reflect the increase. In this case if the other nodes’ MTU
-  also have the lowest MTU, TOO BIG MESSAGE will be lead to
-  PMTU discovery.
-  */
  if (rt->dst.dev == arg->dev &&

---

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static const struct nla_policy rtm_ipv6_policy[RTA_MAX+1] = {
    [RTA_GATEWAY] = { .len = sizeof(struct in6_addr) },
    [RTA_PREFSRC] = { .len = sizeof(struct in6_addr) },
    [RTA_OIF] = { .type = NLA_U32 },
    [RTA_IIF] = { .type = NLA_U32 },
    [RTA_PRIORITY] = { .type = NLA_U32 },
    [RTA_TABLE] = { .type = NLA_U32 },
    [RTA_EXPIRES] = { .type = NLA_U32 },
    [RTA_UID] = { .type = NLA_U32 },
    [RTA_MARK] = { .type = NLA_U32 },

    static int rtm_to_fib6_config(struct sk_buff *skb, struct nlmsghdr *nlh,
    static int plen = (rtm->rtm_dst_len + 7) >> 3;
    err_nh = NULL;
    list_for_each_entry(nh, &rt6_nh_list, next) {
/* save reference to first route for notification */
-if (!rt_notif && !err)
-rt_notif = nh->rt6_info;
+
+if (!err) {
+/* save reference to last route successfully inserted */
+rt_last = nh->rt6_info;
+ 
+/* save reference to first route for notification */
+if (!rt_notif)
+rt_notif = nh->rt6_info;
+

/* nh->rt6_info is used or freed at this point, reset to NULL*/
nh->rt6_info = NULL;
@@ -3851,8 +3897,11 @@
 * nexthops have been replaced by first new, the rest should
 * be added to it.
 */
-cfg->fc_nlinfo.nlh->nlmsg_flags &= ~(NLM_F_EXCL |
-    NLM_F_REPLACE);
+
+if (cfg->fc_nlinfo.nlh) {
+    cfg->fc_nlinfo.nlh->nlmsg_flags &= ~(NLM_F_EXCL |
+        NLM_F_REPLACE);
+    cfg->fc_nlinfo.nlh->nlmsg_flags |= NLM_F_CREATE;
+}
nhn++;

@@ -4073,7 +4122,7 @@
 table = rt->rt6i_table->tb6_id;
 else
 table = RT6_TABLE_UNSPEC;
-rtm->rtm_table = table;
+rtm->rtm_table = table < 256 ? table : RT_TABLE_COMPAT;
if (nla_put_u32(skb, RTA_TABLE, table))
goto nla_put_failure;
if (rt->rt6i_flags & RTF_REJECT) {
--- linux-4.15.0.orig/net/ipv6/seg6.c
+++ linux-4.15.0/net/ipv6/seg6.c
@@ -220,9 +220,7 @@
 rcu_read_unlock();

genlmsg_end(msg, hdr);
-genlmsg_reply(msg, info);
-
-return 0;
+return genlmsg_reply(msg, info);
nla_put_failure;
rcu_read_unlock();
--- linux-4.15.0.orig/net/ipv6/seg6_hmac.c
+++ linux-4.15.0/net/ipv6/seg6_hmac.c
@@ -373,7 +373,7 @@
 return -ENOMEM;
 for_each_possible_cpu(cpu) {
  -tfm = crypto_alloc_shash(algo->name, 0, GFP_KERNEL);
+ tfm = crypto_alloc_shash(algo->name, 0, 0);
  if (IS_ERR(tfm))
    return PTR_ERR(tfm);
  p_tfm = per_cpu_ptr(algo->tfms, cpu);
--- linux-4.15.0.orig/net/ipv6/seg6_iptunnel.c
+++ linux-4.15.0/net/ipv6/seg6_iptunnel.c
@@ -16,6 +16,7 @@
 #include <net/ip.h>
 #include <net/lwtunnel.h>
 #include <net/netns/generic.h>
@@ -93,7 +94,8 @@
 /* encapsulate an IPv6 packet within an outer IPv6 header with a given SRH */
 int seg6_do_srh_encap(struct sk_buff *skb, struct ipv6_sr_hdr *osrh, int proto)
  {
- struct net *net = dev_net(skb_dst(skb)->dev);
+ struct dst_entry *dst = skb_dst(skb);
+ struct net *net = dev_net(dst->dev);
   struct ipv6hdr *hdr, *inner_hdr;
   struct ipv6_sr_hdr *isrh;
   int hdrlen, tot_len, err;
@@ -101,7 +103,7 @@
   err = skb_cow_head(skb, tot_len);
   if (unlikely(err))
     return err;
@@ -124,6 +126,8 @@
  } else {
    ip6_flow_hdr(hdr, 0, 0);
    hdr->hop_limit = ip6_dst_hoplimit(skb_dst(skb));
+    /* encapsulate an IPv6 packet within an outer IPv6 header with a given SRH */
+    int seg6_do_srh_encap(struct sk_buff *skb, struct ipv6_sr_hdr *osrh, int proto)
+      {
memset(IP6CB(skb), 0, sizeof(*IP6CB(skb)));  

hdr->nexthdr = NEXTHDR_ROUTING;  
@@ -134,7 +138,7 @@
    isrh->nexthdr = proto;

hdr->daddr = isrh->segments[isrh->first_segment];
-set_tun_src(net, skb->dev, &hdr->daddr, &hdr->saddr);
+set_tun_src(net, dst->dev, &hdr->daddr, &hdr->saddr);

#ifdef CONFIG_IPV6_SEG6_HMAC
    if (sr_has_hmac(isrh)) {
@@ -159,7 +163,7 @@
        hdrlen = (osrh->hdrlen + 1) << 3;

        -err = skb_cow_head(skb, hdrlen);
        +err = skb_cow_head(skb, hdrlen + skb->mac_len);
        if (unlikely(err))
            return err;

@@ -210,11 +214,6 @@

    tinfo = seg6_encap_lwtunnel(dst->lwtstate);

    -if (likely(!skb->encapsulation)) {
    -    skb_reset_inner_headers(skb);
    -    skb->encapsulation = 1;
    -}
    -
    switch (tinfo->mode) {
    case SEG6_IPTUN_MODE_INLINE:
        if (skb->protocol != htons(ETH_P_IPV6))
@@ -223,10 +222,12 @@
            if (err)
                return err;

            skb_reset_inner_headers(skb);
        break;
    case SEG6_IPTUN_MODE_ENCAP:
        +err = iptunnel_handle_offloads(skb, SKB_GSO_IPXIP6);
        +if (err)
            +return err;
        +
        if (skb->protocol == htons(ETH_P_IPV6))
            proto = IPPROTO_IPV6;
else if (skb->protocol == htons(ETH_P_IP))
@@ -238,6 +239,8 @@
if (err)
    return err;

+skb_set_inner_transport_header(skb, skb_transport_offset(skb));
+skb_set_inner_protocol(skb, skb->protocol);
skb->protocol = htons(ETH_P_IPV6);
break;
case SEG6_IPTUN_MODE_L2ENCAP:
@@ -261,8 +264,6 @@
ipv6_hdr(skb)->payload_len = htons(skb->len - sizeof(struct ipv6hdr));
skb_set_transport_header(skb, sizeof(struct ipv6hdr));

-skb_set_inner_protocol(skb, skb->protocol);
-
return 0;
}

@@ -328,6 +329,7 @@
struct ipv6hdr *hdr = ipv6_hdr(skb);
struct flowi6 fl6;

+memset(&fl6, 0, sizeof(fl6));
fl6.daddr = hdr->daddr;
fl6.saddr = hdr->saddr;
fl6.flowlabel = ip6_flowinfo(hdr);
@@ -418,7 +420,7 @@
slwt = seg6_lwt_lwtunnel(newts);

-err = dst_cache_init(&slwt->cache, GFP_KERNEL);
+err = dst_cache_init(&slwt->cache, GFP_ATOMIC);
if (err) {
kfree(newts);
return err;
--- linux-4.15.0.orig/net/ipv6/seg6_local.c
+++ linux-4.15.0/net/ipv6/seg6_local.c
@@ -27,6 +27,7 @@
#include <net/addrconf.h>
#include <net/ip6_route.h>
#include <net/dst_cache.h>
+##include <net/ip_tunnels.h>
 ifdef CONFIG_IPV6_SEG6_HMAC
#include <net/seg6_hmac.h>
#endif
@@ -126,7 +127,8 @@
skb_reset_network_header(skb);
skb_reset_transport_header(skb);
-skb->encapsulation = 0;
+if (iptunnel_pull_offloads(skb))
+return false;

return true;
}
--- linux-4.15.0.orig/net/ipv6/sit.c
+++ linux-4.15.0/net/ipv6/sit.c
@@ -182,7 +182,7 @@
#ifdef CONFIG_IPV6_SIT_6RD
 struct ip_tunnel *t = netdev_priv(dev);

-if (t->dev == sitn->fb_tunnel_dev) {
+if (dev == sitn->fb_tunnel_dev) {
     ipv6_addr_set(&t->ip6rd.prefix, htonl(0x20020000), 0, 0, 0);
     t->ip6rd.relay_prefix = 0;
     t->ip6rd.prefixlen = 16;
@@ -215,8 +215,6 @@
     dev_hold(dev);
     dev = alloc_netdev(sizeof(*t), name, NET_NAME_UNKNOWN,
                         ipip6_tunnel_setup);
@@ -544,7 +544,8 @@
     dev = alloc_netdev(sizeof(*t), name, NET_NAME_UNKNOWN,
                         ipip6_tunnel_setup);
     if (!dev)
@@ -544,7 +544,8 @@
     dev = alloc_netdev(sizeof(*t), name, NET_NAME_UNKNOWN,
                         ipip6_tunnel_setup);
     if (!dev)
@@ -544,7 +544,8 @@
     dev = alloc_netdev(sizeof(*t), name, NET_NAME_UNKNOWN,
                         ipip6_tunnel_setup);
     if (!dev)
err = 0;
- if (!ip6_err_gen_icmpv6_unreach(skb, iph->ihl * 4, type, data_len))
+ if (__in6_dev_get(skb->dev) &&
    !ip6_err_gen_icmpv6_unreach(skb, iph->ihl * 4, type, data_len))
    goto out;

if (t->parms.iph.daddr == 0)
    @ @ -666,6 +667,10 @@
        !net_eq(tunnel->net, dev_net(tunnel->dev)))
    goto out;

+ /* skb can be uncloned in iptunnel_pull_header, so
+ * old iph is no longer valid
+ */
+ iph = (const struct iphdr *)skb_mac_header(skb);
err = IP_ECN_decapsulate(iph, skb);
if (unlikely(err)) {
    if (log_ecn_error)
        @@ -775,8 +780,9 @@
        pbw0 = tunnel->ip6rd.prefixlen >> 5;
        pbi0 = tunnel->ip6rd.prefixlen & 0x1f;

        - d = (ntohl(v6dst->s6_addr32[pbw0] << pbi0) >>
          - tunnel->ip6rd.relay_prefixlen;
          + d = tunnel->ip6rd.relay_prefixlen < 32 ?
          + (ntohl(v6dst->s6_addr32[pbw0] << pbi0) >>
          + tunnel->ip6rd.relay_prefixlen : 0;

        pbi1 = pbi0 - tunnel->ip6rd.relay_prefixlen;
        if (pbi1 > 0)
            @@ -935,7 +941,7 @@
        }

if (tunnel->parms.iph.daddr)
- skb_dst_update_pmtu(skb, mtu);
+ skb_dst_update_pmtu_no_confirm(skb, mtu);

if (skb->len > mtu && !skb_is_gso(skb)) {
    icmpv6_send(skb, ICMPV6_PKT_TOOBIG, 0, mtu);
    @ @ -1019,6 +1025,9 @@
    static netdev_tx_t sit_tunnel_xmit(struct sk_buff *skb,
        struct net_device *dev)
    {
        if (!pskb_inet_may_pull(skb))
            +goto tx_err;
        +switch(skb->protocol) {
            case htons(ETH_P_IP):
sit_tunnel_xmit__(skb, dev, IPPROTO_IPIP);
@@ -1073,10 +1082,9 @@
if (!tdev && tunnel->parms.link)
tdev = __dev_get_by_index(tunnel->net, tunnel->parms.link);

-if (tdev) {
+if (tdev && !netif_is_l3_master(tdev)) {
int t_hlen = tunnel->hlen + sizeof(struct iphdr);

-dev->hard_header_len = tdev->hard_header_len + sizeof(struct iphdr);
dev->mtu = tdev->mtu - t_hlen;
if (dev->mtu < IPV6_MIN_MTU)
dev->mtu = IPV6_MIN_MTU;
@@ -1366,10 +1374,9 @@
dev->priv_destructor= ipip6_dev_free;

dev->type= ARPHRD_SIT;
-dev->hard_header_len= LL_MAX_HEADER + t_hlen;
dev->mtu= ETH_DATA_LEN - t_hlen;
dev->min_mtu= IPV6_MIN_MTU;
-dev->max_mtu= 0xFFF8 - t_hlen;
+dev->max_mtu= IP6_MAX_MTU - t_hlen;
dev->flags= IFF_NOARP;
netif_keep_dst(dev);
dev->addr_len= 4;
@@ -1398,7 +1405,7 @@
dev->tstats = NULL;
return err;
} 
-
+dev_hold(dev);
return 0;
}

@@ -1414,7 +1421,6 @@
iph->ihl= 5;
iph->ttl= 64;
-dev_hold(dev);
rcu_assign_pointer(sitn->tunnels_wc[0], tunnel);
}

@@ -1578,9 +1584,20 @@
if (err < 0)
return err;
+if (tb[IFLA_MTU]) {
+u32 mtu = nla_get_u32(tb[IFLA_MTU]);
+ if (mtu >= IPV6_MIN_MTU &&
+     mtu <= IP6_MAX_MTU - dev->hard_header_len)
+     dev->mtu = mtu;
+
+#ifdef CONFIG_IPV6_SIT_6RD
+    if (ipip6_netlink_6rd_parms(data, &ip6rd))
+    {
+        err = ipip6_tunnel_update_6rd(nt, &ip6rd);
+        if (err < 0)
+            unregister_netdevice_queue(dev, NULL);
+    }
+#endif
+
return err;
@@ -1798,9 +1815,9 @@
if (dev->rtnl_link_ops == &sit_link_ops)
    unregister_netdevice_queue(dev, head);

    for (prio = 1; prio < 4; prio++) {
+    for (prio = 0; prio < 4; prio++) {
        int h;
        -for (h = 0; h < IP6_SIT_HASH_SIZE; h++) {
+        for (h = 0; h < (prio ? IP6_SIT_HASH_SIZE : 1); h++) {
            struct ip_tunnel *t;

            t = rtnl_dereference(sitn->tunnels[prio][h]);
@@ -1856,6 +1873,7 @@
        if (err_reg_dev) {
            ipip6_dev_free(sitn->fb_tunnel_dev);
+            free_netdev(sitn->fb_tunnel_dev);
            err_alloc_dev:
            return err;
        }
--- linux-4.15.0.orig/net/ipv6/syncookies.c
+++ linux-4.15.0/net/ipv6/syncookies.c
@@ -141,7 +141,7 @@
      
      __u32 cookie = ntohl(th->ack_seq) - 1;
      struct sock *ret = sk;
-struct request_sock *req;
+struct request_sock *req;
    -int mss;
    +int full_space, mss;
      struct dst_entry *dst;
      __u8 rcv_wscale;
      u32 tsoff = 0;
@@ -238,13 +238,19 @@

fl6.flowi6_uid = sk->sk_uid;
security_req_classify_flow(req, flow6_to_flowii(&fl6));

-dst = ip6_dst_lookup_flow(sk, &fl6, final_p);
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, &fl6, final_p);
if (IS_ERR(dst))
goto out_free;
}

req->rsk_window_clamp = tp->window_clamp ? dst_metric(dst, RTAX_WINDOW);
-tcp_select_initial_window(sk, tcp_full_space(sk), req->mss,
+/* limit the window selection if the user enforce a smaller rx buffer */
+full_space = tcp_full_space(sk);
+if (sk->sk_userlocks & SOCK_RCVBUF_LOCK &&
   + (req->rsk_window_clamp > full_space || req->rsk_window_clamp == 0))
+req->rsk_window_clamp = full_space;
+
+tcp_select_initial_window(sk, full_space, req->mss,
   &req->rsk_rcv_wnd, &req->rsk_window_clamp,
   ireq->wscale_ok, &rcv_wscale,
   dst_metric(dst, RTAX_INITRWND));
--- linux-4.15.0.orig/net/ipv6/tcp_ipv6.c
+++ linux-4.15.0/net/ipv6/tcp_ipv6.c
@@ -254,7 +254,7 @@
security_sk_classify_flow(sk, flowi6_to_flowii(&fl6));

-dst = ip6_dst_lookup_flow(sk, &fl6, final_p);
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, &fl6, final_p);
if (IS_ERR(dst)) {
    err = PTR_ERR(dst);
goto failure;
@@ -321,11 +321,20 @@
static void tcp_v6_mtu_reduced(struct sock *sk)
 {
 struct dst_entry *dst;
+u32 mtu;

    if ((1 << sk->sk_state) & (TCPF_LISTEN | TCPF_CLOSE))
        return;

-dst = inet6_csk_update_pmtu(skb, tcp_skb(skb)->mtu_info);
+mtu = READ_ONCE(tcp_skb(skb)->mtu_info);
+
+/* Drop requests trying to increase our current mss.
+ * Check done in __ip6_rt_update_pmtu() is too late.
+ */
+if (tcp_mtu_to_mss(skb, mtu) >= tcp_skb(skb)->mss_cache)


+return;
+
+dst = inet6_csk_update_pmtu(sk, mtu);
+if (!dst)
+return;
+
@@ -404,6 +413,8 @@
+
if (type == ICMPV6_PKT_TOOBIG) {
+u32 mtu = ntohl(info);
+
/* We are not interested in TCP_LISTEN and open_requests
 * (SYN-ACKs send out by Linux are always <576bytes so
 * they should go through unfragmented).
@@ -414,7 +425,11 @@
if (!ip6_sk_accept_pmtu(sk))
goto out;

+tp->mtu_info = ntohl(info);
+if (mtu < IPV6_MIN_MTU)
+goto out;
+
+WRITE_ONCE(tp->mtu_info, mtu);
+
if (!sock_owned_by_user(sk))
tcp_v6_mtu_reduced(sk);
else if (!test_and_set_bit(TCP_MTU_REduced_DEFERRED,
@@ -488,7 +503,8 @@
opt = ireq->ipv6_opt;
+if (!opt)
+opt = rcu_dereference(np->opt);
+err = ip6_xmit(skb, skb, fl6, sk->sk_mark, opt, np->tclass);
  
err = net_xmit_eval(err);
}
@@ -867,7 +883,7 @@
/* Underlying function will use this to retrieve the network
 /* namespace
 */
-dst = ip6_dst_lookup_flow(ctl_sk, &fl6, NULL);
+dst = ip6_dst_lookup_flow(sock_net(ctl_sk), ctl_sk, &fl6, NULL);
if (!IS_ERR(dst)) {
  skb_dst_set(buff, dst);
  ip6_xmit(ctl_sk, buff, &fl6, fl6.flowi6_mark, NULL, tclass);
@@ -920,7 +936,8 @@
&tcp_hashinfo, NULL, 0,
&ipv6h->saddr,
 th->source, &ipv6h->daddr,
- ntohs(th->source), tcp_v6_iif(skb),
+ ntohs(th->source),
+ tcp_v6_iif_l3_slave(skb),
tcp_v6_sdif(skb));
if (!sk1)
goto out;
@@ -943,7 +960,8 @@
if (sk) {
oif = sk->sk_bound_dev_if;
-trace_tcp_send_reset(sk, skb);
+if (sk_fullsock(sk))
+trace_tcp_send_reset(sk, skb);
}
tcp_v6_send_response(sk, skb, seq, ack_seq, 0, 0, 0, oif, key, 1, 0, 0);
@@ -1018,6 +1036,11 @@
if (!ipv6_unicast_destination(skb))
goto drop;
+if (ipv6_addr_v4mapped(&ipv6_hdr(skb)->saddr)) {
+__IP6_INC_STATS(sock_net(sk), NULL, IPSTATS_MIB_INHDRERRORS);
+return 0;
+}
+
return tcp_conn_request(&tcp6_request_sock_ops,
&tcp_request_sock_ipv6_ops, sk, skb);
@@ -1459,6 +1482,10 @@
newnp->ipv6_fl_list = NULL;
newnp->pktoptions = NULL;
newnp->opt = NULL;
-newnp->mcast_oif = tcp_v6_iif(skb);
-newnp->mcast_hops = ipv6_hdr(skb)->hop_limit;
-newnp->rcv_flowinfo = ip6_flowinfo(ipv6_hdr(skb));
+newnp->mcast_oif = inet_iif(skb);
+newnp->mcast_hops = ip_hdr(skb)->ttl;
+newnp->rcv_flowinfo = 0;
if (np->repflow)
-newnp->flow_label = ip6_flowlabel(ipv6_hdr(skb));
+newnp->flow_label = 0;
/
* No need to charge this sock to the relevant IPv6 refcnt debug socks count
@@ -1459,6 +1482,10 @@
reqsk_put(req);
goto discard_it;
}
+if (tcp_checksum_complete(skb)) {
+reqsk_put(req);
+goto csum_error;
+}
if (unlikely(sk->sk_state != TCP_LISTEN)) {
inet_csk_reqsk_queue_drop_and_put(sk, req);
goto lookup;
@@ -1575,7 +1602,8 @@
skb, __tcp_hdrlen(th),
   &ipv6_hdr(skb)->saddr, th->source,
   &ipv6_hdr(skb)->daddr,
- ntohs(th->dest), tcp_v6_iif(skb),
+ ntohs(th->dest),
+ tcp_v6_iif_l3_slave(skb),
   sdif);
if (sk2) {
   struct inet_timewait_sock *tw = inet_twsk(sk);
--- linux-4.15.0.orig/net/ipv6/udp.c
+++ linux-4.15.0/net/ipv6/udp.c
@@ -164,13 +164,13 @@
   bool dev_match = (sk->sk_bound_dev_if == dif ||
     sk->sk_bound_dev_if == sdif);
   if (exact_dif && !dev_match)
-   if (sk->sk_bound_dev_if && dev_match)
+   if (sk->sk_bound_dev_if)
     score++;
   }

   -if (sk->sk_incoming_cpu == raw_smp_processor_id())
   +if (READ_ONCE(sk->sk_incoming_cpu) == raw_smp_processor_id())
     score++;

   return score;
@@ -308,7 +308,7 @@

   return __udp6_lib_lookup(dev_net(skb->dev), &iph->saddr, sport,
   &iph->daddr, dport, inet6_iif(skb),
- inet6_sdif(skb), &udp_table, skb);
+ inet6_sdif(skb), &udp_table, NULL);
  }
EXPORT_SYMBOL_GPL(udp6_lib_lookup_skb);
@@ -506,7 +506,7 @@
struct net *net = dev_net(skb->dev);

sk = __udp6_lib_lookup(net, daddr, uh->dest, saddr, uh->source,
-    inet6_iif(skb), 0, udptable, skb);
+    inet6_iif(skb), 0, udptable, NULL);
if (!sk) {
    __ICMP6_INC_STATS(net, __in6_dev_get(skb->dev),
    ICMP6_MIB_INERRORS);
@@ -629,7 +629,7 @@
/*
 * UDP-Lite specific tests, ignored on UDP sockets (see net/ipv4/udp.c).
 */
-   if ((is_udplite & UDPLITE_RECV_CC) && UDP_SKB_CB(skb)->partial_cov) {
+   if ((up->pcflag & UDPLITE_RECV_CC) && UDP_SKB_CB(skb)->partial_cov) {

   if (up->pcrlen == 0) {          /* full coverage was set */
   net_dbg_ratelimited("UDPLITE6: partial coverage %d while full coverage %d requested\n",
@@ -780,6 +780,26 @@
}
}

+/* wrapper for udp_queue_rcv_skb tacking care of csum conversion and
+ * return code conversion for ip layer consumption
+ */
+static int udp6_unicast_rcv_skb(struct sock *sk, struct sk_buff *skb,
+struct udphdr *uh) {
+    int ret;
+    +if (inet_get_convert_csum(sk) && uh->check && !IS_UDPLITE(sk))
+skb_checksum_try_convert(skb, IPPROTO_UDP, uh->check,
+    +    +ip6_compute_pseudo);
+    +ret = udpv6_queue_rcv_skb(sk, skb);
+    +/* a return value > 0 means to resubmit the input */
+    +if (ret > 0)
+    +return ret;
+    +return 0;
+}
+int __udp6_lib_rcv(struct sk_buff *skb, struct udp_table *udptable,
int proto) {
    @@ -831,13 +851,14 @@
    if (unlikely(skb->sk_rx_dst != dst))
    udp6_sk_rx_dst_set(skb, dst);
- ret = udpv6_queue_rcv_skb(sk, skb);
- sock_put(sk);
+ if (!uh->check && !udp_sk(sk)->no_check6_rx) {
+ sock_put(sk);
+ goto report_csum_error;
+ }

- /* a return value > 0 means to resubmit the input */
- if (ret > 0)
- return ret;
- return 0;
+ ret = udp6_unicast_rcv_skb(sk, skb, uh);
+ sock_put(sk);
+ return ret;
}

/*
@@ -850,30 +871,13 @@
/* Unicast */
 sk = __udp6_lib_lookup_skb(skb, uh->source, uh->dest, udptable);
 if (sk) {
     int ret;
     -
     - if (!uh->check && !udp_sk(sk)->no_check6_rx) {
     - udp6_csum_zero_error(skb);
     - goto csum_error;
     - }
     -
     - if (inet_get_convert_csum(sk) && uh->check && !IS_UDPLITE(sk))
     - skb_checksum_try_convert(skb, IPPROTO_UDP, uh->check,
     - ip6_compute_pseudo);
     -
     - ret = udpv6_queue_rcv_skb(sk, skb);
-    -
+ /* a return value > 0 means to resubmit the input */
+ if (ret > 0)
+ return ret;
+    -
+ return 0;
+ if (!uh->check && !udp_sk(sk)->no_check6_rx)
+ goto report_csum_error;
+ return udp6_unicast_rcv_skb(sk, skb, uh);
}
if (!xfrm6_policy_check(NULL, XFRM_POLICY_IN, skb))
go to discard;
@@ -894,6 +898,9 @@
ulen, skb->len,
daddr, ntohs(uh->dest));
go to discard;
+
+report_csum_error:
+udp6_csum_zero_error(skb);
csum_error:
__UDP6_INC_STATS(net, UDP_MIB_CSUMERRORS, proto == IPPROTO_UDPLITE);
discard:
@@ -1128,7 +1135,7 @@
struct ipcm6_cookie ipc6;
int addr_len = msg->msg_name len;
int ulen = len;
-int corkreq = up->corkflag || msg->msg_flags&MSG_MORE;
+int corkreq = READ_ONCE(up->corkflag) || msg->msg_flags&MSG_MORE;
int err;
int connected = 0;
int is_udplite = IS_UDPLITE(sk);
@@ -1294,14 +1301,14 @@
ipc6.opt = opt;

fl6.flowi6_proto = sk->sk_protocol;
-if (!ipv6_addr_any(daddr))
- fl6.daddr = *daddr;
-else
- fl6.daddr.s6_addr[15] = 0x1; /* :: means loopback (BSD'ism) */
+fl6.daddr = *daddr;
if (ipv6_addr_any(&fl6.saddr) && !ipv6_addr_any(&np->saddr))
fl6.saddr = np->saddr;
fl6.fl6_sport = inet->inet_sport;
+if (ipv6_addr_any(&fl6.daddr))
+ fl6.daddr.s6_addr[15] = 0x1; /* :: means loopback (BSD'ism) */
+ final_p = fl6_update_dst(&fl6, opt, &final);
if (final_p)
connected = 0;
@@ -1427,6 +1434,9 @@
{
 struct udp_sock *up = udp_sk(sk);
 lock_sock(sk);
+ /* protects from races with udp_abort() */
+ sock_set_flag(sk, SOCK_DEAD);
+ udp_v6_flush_pending_frames(sk);
+ release_sock(sk);

@@ -1503,7 +1513,8 @@
struct inet_sock *inet = inet_sk(v);
 __u16 srcp = ntohs(inet->inet_sport);
 __u16 destp = ntohs(inet->inet_dport);
-ip6_dgram_sock_seq_show(seq, v, srcp, destp, bucket);
+ __ip6_dgram_sock_seq_show(seq, v, srcp, destp,
+   udp_rqueue_get(v), bucket);
} return 0;
}

--- linux-4.15.0.orig/net/ipv6/xfrm6_input.c
+++ linux-4.15.0/net/ipv6/xfrm6_input.c
@@ -59,6 +59,7 @@
if (xo && (xo->flags & XFRM_GRO)) {
 skb_mac_header_rebuild(skb);
 +skb_reset_transport_header(skb);
 return -1;
}

--- linux-4.15.0.orig/net/ipv6/xfrm6_mode_transport.c
+++ linux-4.15.0/net/ipv6/xfrm6_mode_transport.c
@@ -51,7 +51,6 @@
static int xfrm6_transport_input(struct xfrm_state *x, struct sk_buff *skb)
{
 int ihl = skb->data - skb_transport_header(skb);
 -struct xfrm_offload *xo = xfrm_offload(skb);
+if (skb->transport_header != skb->network_header) {
 memmove(skb_transport_header(skb),
 skb->transport_header(skb),
 sizeof(struct ipv6hdr));
- if (!xo || !(xo->flags & XFRM_GRO))
+ skb->transport_header(skb);
 +skb_reset_transport_header(skb);
 return 0;
 }

--- linux-4.15.0.orig/net/ipv6/xfrm6_mode_tunnel.c
+++ linux-4.15.0/net/ipv6/xfrm6_mode_tunnel.c
skb_reset_network_header(skb);
skb_mac_header_rebuild(skb);
-eth_hdr(skb)->h_proto = skb->protocol;
+if (skb->mac_len)
+eth_hdr(skb)->h_proto = skb->protocol;

err = 0;

--- linux-4.15.0.orig/net/ipv6/xfrm6_output.c
+++ linux-4.15.0/net/ipv6/xfrm6_output.c
@@ -130,9 +130,7 @@
{
    memset(IP6CB(skb), 0, sizeof(*IP6CB(skb)));

-#ifdef CONFIG_NETFILTER
IP6CB(skb)->flags |= IP6SKB_XFRM_TRANSFORMED;
+#endif

return xfrm_output(sk, skb);
}  
@@ -148,7 +146,7 @@
{
    struct dst_entry *dst = skb_dst(skb);
    struct xfrm_state *x = dst->xfrm;
-int mtu;
+unsigned int mtu;
    bool toobig;

-#ifdef CONFIG_NETFILTER
@@ -170,9 +168,11 @@
    if (toobig && xfrm6_local_dontfrag(skb)) {
        xfrm6_local_rxpmtu(skb, mtu);
        +kfree_skb(skb);
        return -EMSGSIZE;
    } else if (!skb->ignore_df && toobig && skb->sk) {
        xfrm_local_error(skb, mtu);
        +kfree_skb(skb);
        return -EMSGSIZE;
    }

--- linux-4.15.0.orig/net/ipv6/xfrm6_policy.c
+++ linux-4.15.0/net/ipv6/xfrm6_policy.c
@@ -113,6 +113,9 @@
    xdst->u.rt6i_gateway = rt->rt6i_gateway;
    xdst->u.rt6i_dst = rt->rt6i_dst;
xdst->u.rt6i_src = rt->rt6i_src;
+INIT_LIST_HEAD(&xdst->u.rt6i_uncached);
+rt6_uncached_list_add(&xdst->u.rt6);
+atomic_inc(&dev_net(dev)->ipv6.rt6_stats->fib_rt_uncache);

return 0;
}
@@ -123,7 +126,7 @@
 struct flowi6 *fl6 = &fl->u.ip6;
 int onlyproto = 0;
 const struct ipv6hdr *hdr = ipv6_hdr(skb);
-"u16 offset = sizeof(*hdr);
+"u32 offset = sizeof(*hdr);
 struct ipv6_opt_hdr *exthdr;
 const unsigned char *nh = skb_network_header(skb);
 u16 nhoff = IP6CB(skb)->nhoff;
@@ -220,12 +223,13 @@
}
static void xfrm6_update_pmtu(struct dst_entry *dst, struct sock *sk,
-"struct sk_buff *skb, u32 mtu)"
+"struct sk_buff *skb, u32 mtu, bool confirm_neigh)"
{"
 struct xfrm_dst *xdst = (struct xfrm_dst *)dst;
 struct dst_entry *path = xdst->route;
-"path->ops->update_pmtu(path, sk, skb, mtu);"
+"path->ops->update_pmtu(path, sk, skb, mtu, confirm_neigh);"
}
static void xfrm6_redirect(struct dst_entry *dst, struct sock *sk,
@@ -244,6 +248,8 @@
 if (likely(xdst->u.rt6i_idev))
 in6_dev_put(xdst->u.rt6i_idev);
 dst_destroy_metrics_generic(dst);
+"if (xdst->u.rt6i_uncached_list)"
+"rt6_uncached_list_del(&xdst->u.rt6);
 xfrm_dst_destroy(xdst);"
}

--- linux-4.15.0.orig/net/ipv6/xfrm6_tunnel.c
+++ linux-4.15.0/net/ipv6/xfrm6_tunnel.c
@@ -144,6 +144,9 @@
 index = __xfrm6_tunnel_spi_check(net, spi);
 if (index >= 0)
     goto alloc_spi;
+""
if (spi == XFRM6_TUNNEL_SPI_MAX)
+break;
}
for (spi = XFRM6_TUNNEL_SPI_MIN; spi < xfrm6_tn->spi; spi++) {
index = __xfrm6_tunnel_spi_check(net, spi);
@@ -396,6 +399,10 @@
xfrm6_tunnel_deregister(&xfrm6_tunnel_handler, AF_INET6);
xfrm_unregister_type(&xfrm6_tunnel_type, AF_INET6);
unregister_pernet_subsys(&xfrm6_tunnel_net_ops);
+/* Someone maybe has gotten the xfrm6_tunnel_spi.
+ * So need to wait it.
+ */
+rcu_barrier();
kmem_cache_destroy(xfrm6_tunnel_spi_kmem);
}

--- linux-4.15.0.orig/net/iucv/af_iucv.c
+++ linux-4.15.0/net/iucv/af_iucv.c
@@ -13,6 +13,7 @@
#define pr_fmt(fmt) KMSG_COMPONENT ": " fmt

#include <linux/module.h>
+#include <linux/netdevice.h>
#include <linux/types.h>
#include <linux/list.h>
#include <linux/errno.h>
@@ -352,20 +353,33 @@
memcpy(&phs_hdr->iucv_hdr, imsg, sizeof(struct iucv_message));

skb->dev = iucv->hs_dev;
-if (!skb->dev)
-+dev_hard_header(skb, skb->dev, ETH_P_AF_IUCV, NULL, NULL, skb->len);
-if (!(skb->dev->flags & IFF_UP) || !netif_carrier_ok(skb->dev))
-+err = -ENETDOWN;
+goto err_free;
+
+if (!(skb->dev->flags & IFF_UP) || !netif_carrier_ok(skb->dev))
+err = -ENETDOWN;
+goto err_free;
+
+if (skb->len > skb->dev->mtu) {
+err = -EMSGSIZE;
+goto err_free;
+
+if (skb->len > skb->dev->mtu) {
+err = -EMSGSIZE;
+goto err_free;
+
+if (sock->sk_type == SOCK_SEQPACKET)
-+return -ENODEV;
-+return -ENETDOWN;
-+return -ENETDOWN;
-+return -EMSGSIZE;
-else
 skb_trim(skb, skb->dev->mtu);
+if (sock->sk_type == SOCK_SEQPACKET) {
+err = -EMSGSIZE;
+goto err_free;
+}
+skb_trim(skb, skb->dev->mtu);
}
skb->protocol = cpu_to_be16(ETH_P_AF_IUCV);
+
 skb_queue_tail(&iucv->send_skb_q, nskb);
err = dev_queue_xmit(skb);
if (net_xmit_eval(err)) {
 @@ -376,6 +390,10 @@
 WARN_ON(atomic_read(&iucv->msg_recv) < 0);
 } return net_xmit_eval(err);
+
+err_free:
+kfree_skb(skb);
+return err;
}

static struct sock *__iucv_get_sock_by_name(char *nm)
 @@ -455,12 +473,14 @@
 /* Send controlling flags through an IUCV socket for HIPER transport */
 static int iucv_send_ctrl(struct sock *sk, u8 flags)
 { struct iucv_sock *iucv = iucv_sk(sk);
 int err = 0;
 int blen;
 struct sk_buff *skb;
 u8 shutdown = 0;

 -blen = sizeof(struct af_iucv_trans_hdr) + ETH_HLEN;
 +blen = sizeof(struct af_iucv_trans_hdr) +
+ LL_RESERVED_SPACE(iucv->hs_dev);
 if (sk->sk_shutdown & SEND_SHUTDOWN) {
 /* controlling flags should be sent anyway */
}
shutdown = sk->sk_shutdown;
@@ -1121,7 +1141,8 @@
 * segmented records using the MSG_EOR flag), but
 * for SOCK_STREAM we might want to improve it in future */
 if (iucv->transport == AF_IUCV_TRANS_HIPER) {
-    headroom = sizeof(struct af_iucv_trans_hdr) + ETH_HLEN;
+    headroom = sizeof(struct af_iucv_trans_hdr) +
+    LL_RESERVED_SPACE(iucv->hs_dev);
    linear = len;
 } else {
 if (len < PAGE_SIZE) {
-    @ @ -1169,7 +1190,7 @@
+    @ @ -1552,7 +1573,8 @@
    err = afiucv_hs_send(&txmsg, sk, skb, 0);
    if (err) {
        atomic_dec(&iucv->msg_sent);
    -goto fail;
        +goto out;
    } else /* Classic VM IUCV transport */
    skb_queue_tail(&iucv->send_skb_q, skb);
-    @ @ -1572,7 +1784,7 @@
    break;
    }
 }

-if (how == SEND_SHUTDOWN || how == SHUTDOWN_MASK) {
+if ((how == SEND_SHUTDOWN || how == SHUTDOWN_MASK) &&
  + sk->sk_state == IUCV_CONNECTED) {
    if (iucv->transport == AF_IUCV_TRANS_IUCV) {
        txmsg.class = 0;
        txmsg.tag = 0;
-    @ @ -1762,7 +1784,7 @@
    }

    /* Create the new socket */
-    nsk = iucv_sock_alloc(NULL, sk->sk_type, GFP_ATOMIC, 0);
+    nsk = iucv_sock_alloc(NULL, sk->sk_protocol, GFP_ATOMIC, 0);
    if (!nsk) {
        err = pr_iucv->path_sever(path, user_data);
        iucv_path_free(path);
-    @ @ -1972,7 +1994,7 @@
        goto out;
    }

    -nsk = iucv_sock_alloc(NULL, sk->sk_type, GFP_ATOMIC, 0);
+    nsk = iucv_sock_alloc(NULL, sk->sk_protocol, GFP_ATOMIC, 0);
    bh_lock_sock(sk);
    if ((sk->sk_state != IUCV_LISTEN) ||
        sk_acceptq_is_full(sk)) ||
struct sock *sk;
struct iucv_sock *iucv;
struct af_iucv_trans_hdr *trans_hdr;

int err = NET_RX_SUCCESS;
char nullstring[8];

if (skb->len < (ETH_HLEN + sizeof(struct af_iucv_trans_hdr))) {
    WARN_ONCE(1, "AF_IUCV too short skb, len=%d, min=%d",
            skb->len, ETH_HLEN + sizeof(struct af_iucv_trans_hdr));
    err = afiucv_hs_callback_rx(sk, skb);
    break;
} else {
    kfree_skb(skb);
}

return err;

afiucv_dev->driver = &af_iucv_driver;
err = device_register(afiucv_dev);
if (err)
    goto out_driver;
+goto out_iucv_dev;
return 0;

+out_iucv_dev:
+put_device(afiucv_dev);
out_driver:
    driver_unregister(&af_iucv_driver);
out_iucv:
    af_iucv_dev->driver = &af_iucv_driver;
    err = afiucv_iucv_init();
    return err;

static void afiucv_iucv_exit(void)
+
+device_unregister(afiucv_dev);
+driver_unregister(&af_iucv_driver);
+pr_iucv->iucv_unregister(&af_iucv_handler, 0);
+}
+
static int __init afiucv_init(void)
{
    int err;
    err = afiucv_iucv_init();
}
if (err)
goto out_sock;
else
+register_netdevice_notifier(&afiucv_netdev_notifier);
+
+err = register_netdevice_notifier(&afiucv_netdev_notifier);
+if (err)
+goto out_notifier;
+
dev_add_pack(&iucv_packet_type);
return 0;
+
+out_notifier:
+if (pr_iucv)
+afluvc_iucv_exit();
out_sock:
sock_unregister(PF_IUCV);
out_proto:
@@ -2495,12 +2533,11 @@
static void __exit afiucv_exit(void)
{
 if (pr_iucv) {
 -device_unregister(af_iucv_dev);
 -driver_unregister(&af_iucv_driver);
 -pr_iucv->iucv_unregister(&af_iucv_handler, 0);
 +afluvc_iucv_exit();
 symbol_put(iucv_if);
 -} else
 -unregister_netdevice_notifier(&afiucv_netdev_notifier);
+}
+
+unregister_netdevice_notifier(&afiucv_netdev_notifier);
+dev_remove_pack(&iucv_packet_type);
+sock_unregister(PF_IUCV);
+proto_unregister(&iucv_proto);
--- linux-4.15.0.orig/net/kcm/kcmsock.c
+++ linux-4.15.0/net/kcm/kcmsock.c
@@ -1381,24 +1381,32 @@
 .parse_msg = kcm_parse_func_strparser,
 .read_sock_done = kcm_read_sock_done,
 };
-int err;
+int err = 0;

csk = csock->sk;
if (!csk)
return -EINVAL;
lock_sock(csk);

/* Only allow TCP sockets to be attached for now */
if ((csk->sk_family != AF_INET && csk->sk_family != AF_INET6) ||
    csk->sk_protocol != IPPROTO_TCP)
    return -EOPNOTSUPP;
    csk->sk_protocol != IPPROTO_TCP) {
    err = -EOPNOTSUPP;
    goto out;
}

/* Don't allow listeners or closed sockets */
if (csk->sk_state == TCP_LISTEN || csk->sk_state == TCP_CLOSE)
    return -EOPNOTSUPP;
if (csk->sk_state == TCP_LISTEN || csk->sk_state == TCP_CLOSE) {
    err = -EOPNOTSUPP;
    goto out;
}

psock = kmem_cache_zalloc(kcm_psockp, GFP_KERNEL);
if (!psock)
    return -ENOMEM;
if (!psock) {
    err = -ENOMEM;
    goto out;
}
psock->mux = mux;
psock->sk = csk;
err = strp_init(&psock->strp, csk, &cb);
if (err) {
    kmem_cache_free(kcm_psockp, psock);
    return err;
}

write_lock_bh(&csk->sk_callback_lock);
write_unlock_bh(&csk->sk_callback_lock);
*@
@ -1407,7 +1415,7 @@
err = strp_init(&psock->strp, csk, &cb);
if (err) {
    kmem_cache_free(kcm_psockp, psock);
    return err;
    goto out;
}
write_lock_bh(&csk->sk_callback_lock);
@ -1417,9 +1425,11 @@
*/
if (csk->sk_user_data) {
    write_unlock_bh(&csk->sk_callback_lock);
    +strp_stop(&psock->strp);
    strip_done(&psock->strp);
    kmem_cache_free(kcm_psockp, psock);
    -return -EALREADY;
    +err = -EALREADY;

goto out;
}

psock->save_data_ready = csk->sk_data_ready;
@@ -1455,7 +1465,10 @@
/* Schedule RX work in case there are already bytes queued */
strp_check_rcv(&psock->strp);

return 0;
+out:
+release_sock(csk);
+
+return err;
}

static int kcm_attach_ioctl(struct socket *sock, struct kcm_attach *info)
@@ -1507,6 +1520,7 @@
if (WARN_ON(psock->rx_kcm)) {
write_unlock_bh(&csk->sk_callback_lock);
+release_sock(csk);
return;
}

@@ -1657,7 +1671,7 @@
__module_get(newsock->ops->owner);

newsk = sk_alloc(sock_net(osock->sk), PF_KCM, GFP_KERNEL,
- &kcm_proto, true);
+ &kcm_proto, false);
if (!newsk) {
sock_release(newsock);
return ERR_PTR(-ENOMEM);
@@ -2040,14 +2054,14 @@
if (err) goto fail;

-err = sock_register(&kcm_family_ops);
-if (err)
-sock_register_fail;
-
err = register_pernet_device(&kcm_net_ops);
if (err) goto net_ops_fail;

+err = sock_register(&kcm_family_ops);
+if (err)
+sock_register_fail;
+ err = kcm_proc_init();
if (err)
goto proc_init_fail;
@@ -2055,12 +2069,12 @@
return 0;

proc_init_fail:
-unregister_pernet_device(&kcm_net_ops);
-
-net_ops_fail:
sock_unregister(PF_KCM);

sock_register_fail:
+unregister_pernet_device(&kcm_net_ops);
+
+net_ops_fail:
proto_unregister(&kcm_proto);

fail:
@@ -2076,8 +2090,8 @@
static void __exit kcm_exit(void)
 {
 kcm_proc_exit();
-unregister_pernet_device(&kcm_net_ops);
 sock_unregister(PF_KCM);
+unregister_pernet_device(&kcm_net_ops);
 proto_unregister(&kcm_proto);
 destroy_workqueue(kcm_wq);

--- linux-4.15.0.orig/net/key/af_key.c
+++ linux-4.15.0/net/key/af_key.c
@@ -196,30 +196,22 @@
return 0;
}

-static int pfkey_broadcast_one(struct sk_buff *skb, struct sk_buff **skb2,
-    gfp_t allocation, struct sock *sk)
-    { err = -ENOBUFS;
+static int pfkey_broadcast_one(struct sk_buff *skb, gfp_t allocation,
+    struct sock *sk)
+    { int err = -ENOBUFS;

-sock_hold(sk);
-if (*skb2 == NULL) {
-   if (refcount_read(&skb->users) != 1) {
-     *skb2 = skb_clone(skb, allocation);
- } else {
-
- skb2 = skb;
- reffcount_inc(&skb->users);
-
-}
-
-if (*skb2 != NULL) {
-if (atomic_read(&sk->sk_rmem_alloc) <= sk->sk_rcvbuf) {
- skb_set_owner_r(*skb2, sk);
- skb_queue_tail(&sk->sk_receive_queue, skb);
- sk->sk_data_ready(sk);
- *skb2 = NULL;
- err = 0;
- }
+ if (atomic_read(&sk->sk_rmem_alloc) <= sk->sk_rcvbuf) {
+ skb2 = skb_clone(skb, allocation);
+ }
+ }
+
+ skb2 = skb_clone(skb, allocation);
+ }

@@ -234,7 +226,6 @@}
{
 struct netns_pfkey *net_pfkey = net_generic(net, pfkey_net_id);
 struct sock *sk;
- struct sk_buff *skb2 = NULL;
+ struct sk_buff *skb2 = NULL;
 int err = -ESRCH;

 /* XXX Do we need something like netlink_overrun? I think 
 @@ -253,7 +244,7 @@
 * socket.
 */
 if (pfk->promisc)
- pfkey_broadcast_one(skb, &skb2, GFP_ATOMIC, sk);
+ pfkey_broadcast_one(skb, GFP_ATOMIC, sk);

 /* the exact target will be processed later */
 if (sk == one_sk)
 @@ -268,7 +259,7 @@
 continue;
 }
err2 = pfkey_broadcast_one(skb, &skb2, GFP_ATOMIC, sk);
+err2 = pfkey_broadcast_one(skb, GFP_ATOMIC, sk);

/* Error is cleared after successful sending to at least one
 * registered KM */ @ @ -278,9 +269,8 @@
rcu_read_unlock();

if (one_sk != NULL)
-err = pfkey_broadcast_one(skb, &skb2, allocation, one_sk);
+err = pfkey_broadcast_one(skb, allocation, one_sk);

-kfree_skb(skb2);
kfree_skb(skb);
return err;
}
@@ -437,6 +427,24 @@ return 0;
}

+static inline int sadb_key_len(const struct sadb_key *key)
+{
+int key_bytes = DIV_ROUND_UP(key->sadb_key_bits, 8);
+return DIV_ROUND_UP(sizeof(struct sadb_key) + key_bytes,
+sizeof(uint64_t));
+}
+
+static int verify_key_len(const void *p)
+{
+const struct sadb_key *key = p;
+
+if (sadb_key_len(key) > key->sadb_key_len)
+return -EINVAL;
+
+return 0;
+}
+
static inline int pfkey_sec_ctx_len(const struct sadb_x_sec_ctx *sec_ctx)
{
return DIV_ROUND_UP(sizeof(struct sadb_x_sec_ctx) +
@@ -533,16 +541,25 @@ return -EINVAL;
if (ext_hdrs[ext_type-1] != NULL)
return -EINVAL;
-if (ext_type == SADB_EXT_ADDRESS_SRC ||
- ext_type == SADB_EXT_ADDRESS_DST ||
- ext_type == SADB_EXT_ADDRESS_PROXY ||
- ext_type == SADB_X_EXT_NAT_T_OA) {
+switch (ext_type) {
+case SADB_EXT_ADDRESS_SRC:
+case SADB_EXT_ADDRESS_DST:
+case SADB_EXT_ADDRESS_PROXY:
+case SADB_X_EXT_NAT_T_OA:
if (verify_address_len(p))
return -EINVAL;
-}
-if (ext_type == SADB_X_EXT_SEC_CTX) {
+break;
+case SADB_X_EXT_SEC_CTX:
if (verify_sec_ctx_len(p))
return -EINVAL;
+break;
+case SADB_EXT_KEY_AUTH:
+case SADB_EXT_KEY_ENCRYPT:
+if (verify_key_len(p))
+return -EINVAL;
+break;
+default:
+break;
}
ext_hdrs[ext_type-1] = (void *) p;
}
@@ -1104,14 +1121,12 @@
key = ext_hdrs[SADB_EXT_KEY_AUTH - 1];
if (key != NULL &
    sa->sadb_sa_auth != SADB_X_AALG_NULL &
- ((key->sadb_key_bits+7) / 8 == 0 ||
- (key->sadb_key_bits+7) / 8 > key->sadb_key_len * sizeof(uint64_t)))
+ key->sadb_key_bits == 0)
return ERR_PTR(-EINVAL);
key = ext_hdrs[SADB_EXT_KEY_ENCRYPT-1];
if (key != NULL &
    sa->sadb_sa_encrypt != SADB_EALG_NULL &
- ((key->sadb_key_bits+7) / 8 == 0 ||
- (key->sadb_key_bits+7) / 8 > key->sadb_key_len * sizeof(uint64_t)))
+ key->sadb_key_bits == 0)
return ERR_PTR(-EINVAL);
x = xfrm_state_alloc(net);
@@ -1840,6 +1855,13 @@
if (ext_hdrs[SADB_X_EXT_FILTER - 1]) {
struct sadb_x_filter *xfilter = ext_hdrs[SADB_X_EXT_FILTER - 1];

+if ((xfilter->sadb_x_filter_splen >=
+ (sizeof(xfrm_address_t) << 3)) ||

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+ (xfilter->sadb_x_filter_dplen >=
+(sizeof(xfrm_address_t) << 3))) {
+mutex_unlock(&pfk->dump_lock);
+return -EINVAL;
+}
filter = kmalloc(sizeof(*filter), GFP_KERNEL);
if (filter == NULL) {
mutex_unlock(&pfk->dump_lock);
@@ -1936,8 +1958,10 @@
if (rq->sadb_x_ipsecrequest_mode == 0)
return -EINVAL;
+if (!xfrm_id_proto_valid(rq->sadb_x_ipsecrequest_proto))
+return -EINVAL;
-t->id.proto = rq->sadb_x_ipsecrequest_proto; /* XXX check proto */
+t->id.proto = rq->sadb_x_ipsecrequest_proto;
if ((mode = pfkey_mode_to_xfrm(rq->sadb_x_ipsecrequest_mode)) < 0)
return -EINVAL;
*t->mode = mode;
@@ -2389,7 +2413,7 @@
return err;
}

-xp = xfrm_policy_bysel_ctx(net, DUMMY_MARK, XFRM_POLICY_TYPE_MAIN,
+xp = xfrm_policy_bysel_ctx(net, &dummy_mark, XFRM_POLICY_TYPE_MAIN,
pol->sadb_x_policy_dir - 1, &sel, pol_ctx,
 1, &err);
security_xfrm_policy_free(pol_ctx);
@@ -2425,8 +2449,10 @@
goto out;
} err = pfkey_xfrm_policy2msg(out_skb, xp, dir);
-if (err < 0)
-+if (err < 0) {
+kfree_skb(out_skb);
goto out;
+}
out_hdr = (struct sadb_msg *) out_skb->data;
out_hdr->sadb_msg_version = hdr->sadb_msg_version;
@@ -2638,7 +2664,7 @@
return -EINVAL;
delete = (hdr->sadb_msg_type == SADB_X_SPDDELETE2);
-xp = xfrm_policy_byid(net, DUMMY_MARK, XFRM_POLICY_TYPE_MAIN,
+xp = xfrm_policy_byid(net, &dummy_mark, XFRM_POLICY_TYPE_MAIN,
  dir, pol->sadb_x_policy_id, delete, &err);
if (xp == NULL)
return -ENOENT;
@@ -2677,8 +2703,10 @@
return PTR_ERR(out_skb);
@@ -2880,7 +2908,7 @@
break;
if (!aalg->pfkey_supported)
continue;
@if (aalg_tmpl_set(t, aalg) && aalg->available)
+ if (aalg_tmpl_set(t, aalg))
sz += sizeof(struct sadb_comb);
} 
return sz + sizeof(struct sadb_prop);
@@ -2909,7 +2937,7 @@
for (k = 1; ; k++) {
@@ -2909,7 +2937,7 @@
for (k = 1; ; k++) {
if (!aalg->pfkey_supported)
continue;
-if (aalg_tmpl_set(t, aalg) && aalg->available)
+ if (aalg_tmpl_set(t, aalg))
  sz += sizeof(struct sadb_comb);
} 
-define L2TP_SLFLAG_S 0x40000000
+define L2TP_SL_SEQ_MASK 0x00ffffff
/* Default trace flags */
#define L2TP_DEFAULT_DEBUG_FLAGS0

spinlock_t l2tp_session_hlist_lock;

#if IS_ENABLED(CONFIG_IPV6)
static bool l2tp_sk_is_v6(struct sock *sk)
{
  return sk->sk_family == PF_INET6 &&
  !ipv6_addr_v4mapped(&sk->sk_v6_daddr);
}
#endif

static inline struct l2tp_tunnel *l2tp_tunnel(struct sock *sk)
{
  @ @ -136,51 +142,6 @ @
}

- /* Lookup the tunnel socket, possibly involving the fs code if the socket is
- * owned by userspace. A struct sock returned from this function must be
- * released using l2tp_tunnel_sock_put once you're done with it.
- */
- static struct sock *l2tp_tunnel_sock_lookup(struct l2tp_tunnel *tunnel)
- {
-     -int err = 0;
-     -struct sock *sock = NULL;
-     -struct sock *sk = NULL;
-     -
-     -if (!tunnel)
-     -goto out;
-     -
-     -if (tunnel->fd >= 0) {
-       -/* Socket is owned by userspace, who might be in the process
-       -* of closing it. Look the socket up using the fd to ensure
-       -* consistency.
-       -*/
-       -sock = sockfd_lookup(tunnel->fd, &err);
-       -if (sock)
-         -sk = sock->sk;
-       -} else {
-         -/* Socket is owned by kernelspace */
-         -sk = tunnel->sock;
-         -sock_hold(sk);
-     -}
- }
-
static void l2tp_tunnel_sock_put(struct sock *sk) {
    struct l2tp_tunnel *tunnel = l2tp_sock_to_tunnel(sk);
    if (tunnel) {
        if (tunnel->fd >= 0) {
            /* Socket is owned by userspace */
            sockfd_put(sk->sk_socket);
        }
    }
    sock_put(skb);
}

/* Lookup a tunnel. A new reference is held on the returned tunnel. */
struct l2tp_tunnel *l2tp_tunnel_get(const struct net *net, u32 tunnel_id) {
    rcu_read_lock_bh();
    list_for_each_entry_rcu(tunnel, &pn->l2tp_tunnel_list, list) {
        if (tunnel->tunnel_id == tunnel_id) {
            l2tp_tunnel_inc_refcount(tunnel);
            /* the tunnel is freed in the socket destructor */
        }
    }
    rcu_read_unlock_bh();
    return tunnel;
@@ -214,6 +182,26 @@
EXPORT_SYMBOL_GPL(l2tp_tunnel_get);

+struct l2tp_tunnel *l2tp_tunnel_get_nth(const struct net *net, int nth)
+{
+const struct l2tp_net *pn = l2tp_pernet(net);
+struct l2tp_tunnel *tunnel;
+int count = 0;
+
+rcu_read_lock_bh();
+list_for_each_entry_rcu(tunnel, &pn->l2tp_tunnel_list, list) {
+if (++count > nth &&
+    refcount_inc_not_zero(&tunnel->ref_count)) {
+rcu_read_unlock_bh();
+return tunnel;
+}
+}
+rcu_read_unlock_bh();
+
+return NULL;
+}
+EXPORT_SYMBOL_GPL(l2tp_tunnel_get_nth);
+
/* Lookup a session. A new reference is held on the returned session. */
struct l2tp_session *l2tp_session_get(const struct net *net,
struct l2tp_tunnel *tunnel,
@@ -338,20 +326,23 @@
spin_lock_bh(&pn->l2tp_session_hlist_lock);

+/* IP encap expects session IDs to be globally unique, while
+ * UDP encap doesn’t.
+ */
+hlist_for_each_entry(session_walk, g_head, global_hlist)
- if (session_walk->session_id == session->session_id) {
+ if (session_walk->session_id == session->session_id &&
+     (session_walk->tunnel->encap == L2TP_ENCAPTYPE_IP ||
+      tunnel->encap == L2TP_ENCAPTYPE_IP)) {
err = -EEXIST;
goto err_tlock_pnlock;
}

l2tp_tunnel_inc_refcount(tunnel);
-sock_hold(tunnel->sock);
hlist_add_head_rcu(&session->global_hlist, g_head);

spin_unlock_bh(&pn->l2tp_session_hlist_lock);
} else {
    l2tp_tunnel_inc_refcount(tunnel);
    -sock_hold(tunnel->sock);
}

hlist_add_head(&session->hlist, head);
@@ -368,46 +359,6 @@
}  
EXPORT_SYMBOL_GPL(l2tp_session_register);

-/* Lookup a tunnel by id */
-  */
-struct l2tp_tunnel *l2tp_tunnel_find(const struct net *net, u32 tunnel_id)
-{  
    struct l2tp_tunnel *tunnel;
    struct l2tp_net *pn = l2tp_pernet(net);
    -
    rcu_read_lock_bh();
    -list_for_each_entry_rcu(tunnel, &pn->l2tp_tunnel_list, list) {
    -if (tunnel->tunnel_id == tunnel_id) {
        -rcu_read_unlock_bh();
        -return tunnel;
    -}
    -}
    -rcu_read_unlock_bh();
    -
    -return NULL;
    -}
-EXPORT_SYMBOL_GPL(l2tp_tunnel_find);
-  
-struct l2tp_tunnel *l2tp_tunnel_find_nth(const struct net *net, int nth)
-{  
    struct l2tp_net *pn = l2tp_pernet(net);
    struct l2tp_tunnel *tunnel;
    -int count = 0;
    -
    -rcu_read_lock_bh();
    -list_for_each_entry_rcu(tunnel, &pn->l2tp_tunnel_list, list) {
    -if (++count > nth) {
        -rcu_read_unlock_bh();
        -return tunnel;
    -}
    -}
    -
    -rcu_read_unlock_bh();
    -
    -return NULL;
-}
-EXPORT_SYMBOL_GPL(l2tp_tunnel_find_nth);
/*****************************************************************************
* Receive data handling
*****************************************************************************/
@@ -731,11 +682,9 @@
"%s: recv data ns=%u, session nr=%u\n",
session->name, ns, session->nr);
}
+ptr += 4;
}
-/* Advance past L2-specific header, if present */
-ptr += session->l2specific_len;
if (L2TP_SKB_CB(skb)->has_seq) {
/* Received a packet with sequence numbers. If we're the LNS,
* check if we sre sending sequence numbers and if not,
@@ -780,10 +729,8 @@
}
}
-/* Session data offset is handled differently for L2TPv2 and
- * L2TPv3. For L2TPv2, there is an optional 16-bit value in
- * the header. For L2TPv3, the offset is negotiated using AVPs
- * in the session setup control protocol.
+/* Session data offset is defined only for L2TPv2 and is
+ * indicated by an optional 16-bit value in the header.
*/
if (tunnel->version == L2TP_HDR_VER_2) {
/* If offset bit set, skip it. */
@@ -791,8 +738,7 @@
offset = ntohs(*(__be16 *)ptr);
ptr += 2 + offset;
}
-} else
-ptr += session->offset;
+}
offset = ptr - optr;
if (!pskb_may_pull(skb, offset))
@@ -877,7 +823,7 @@
__skb_pull(skb, sizeof(struct udphdr));
/* Short packet? */
-if (!pskb_may_pull(skb, L2TP_HDR_SIZE_SEQ)) {
+if (!pskb_may_pull(skb, L2TP_HDR_SIZE_MAX)) {
l2tp_info(tunnel, L2TP_MSG_DATA,

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"%s: recv short packet (len=%d)/n",
    tunnel->name, skb->len);
@@ -953,6 +899,12 @@
goto error;
}
+	if (tunnel->version == L2TP_HDR_VER_3 &&
    l2tp_v3_ensure_opt_in_linear(session, skb, &ptr, &optr)) {
    l2tp_session_dec_refcount(session);
+    goto error;
+}
    l2tp_recv_common(session, skb, ptr, optr, hdrflags, length, payload_hook);
    l2tp_session_dec_refcount(session);
@@ -975,7 +927,7 @@
{
struct l2tp_tunnel *tunnel;

-tunnel = l2tp_sock_to_tunnel(sk);
+    tunnel = rcu_dereference_sk_user_data(sk);
    if (tunnel == NULL)
        goto pass_up;
@@ -983,13 +935,10 @@
    tunnel->name, skb->len);

    if (l2tp_udp_recv_core(tunnel, skb, tunnel->recv_payload_hook))
        goto pass_up_put;
    goto pass_up;
-
-sock_put(sk);
return 0;
-
-pass_up_put:
-sock_put(skb);
pass_up:
return 1;
}
@@ -1052,24 +1001,21 @@
memcpy(bufp, &session->cookie[0], session->cookie_len);
    bufp += session->cookie_len;
}

-if (session->l2specific_len) {
    if (session->l2specific_type == L2TP_L2SPECTYPE_DEFAULT) {
        u32 l2h = 0;
    -if (session->send_seq) {
    -l2h = 0x40000000 | session->ns;
- session->ns++;  
- session->ns &= 0xffffffff;
- l2tp_dbg(session, L2TP_MSG_SEQ,  
  - "%s: updated ns to %u\n",  
  - session->name, session->ns);
-
+ if (session->l2specific_type == L2TP_L2SPECTYPE_DEFAULT) {
+ u32 l2h = 0;

- *((__be32 *) bufp) = htonl(l2h);
+ if (session->send_seq) {
+ l2h = 0x40000000 | session->ns;
+ session->ns++;
+ session->ns &= 0xffffffff;
+ l2tp_dbg(session, L2TP_MSG_SEQ,  
  + "%s: updated ns to %u\n",  
  + session->name, session->ns);
} }

- bufp += session->l2specific_len;
+ *((__be32 *)bufp) = htonl(l2h);
+ bufp += 4;
} 
- if (session->offset)  
- bufp += session->offset;

return bufp - optr;
}
@@ -1100,8 +1046,9 @@

/* Queue the packet to IP for output */
skb->ignore_df = 1;
+ skb_dst_drop(skb);
#if IS_ENABLED(CONFIG_IPV6)
- if (tunnel->sock->sk_family == PF_INET6 && !tunnel->v4mapped)  
- if (l2tp_sk_is_v6(tunnel->sock))  
  error = inet6_csk_xmit(tunnel->sock, skb, NULL);
else
#endif
@@ -1164,9 +1111,14 @@
goto out_unlock;
}

 /* Get routing info from the tunnel socket */
- skb_dst_drop(skb);
- skb_dst_set(skb, dst_clone(__sk_dst_check(sk, 0)));
+/* The user-space may change the connection status for the user-space
+ * provided socket at run time: we must check it under the socket lock

+ *
+if (tunnel->fd >= 0 && sk->sk_state != TCP_ESTABLISHED) {
+kfree_skb(skb);
+ret = NET_XMIT_DROP;
+goto out_unlock;
+}

inet = inet_sk(sk);
fl = &inet->cork.fl;
@@ -1183,7 +1135,7 @@
/* Calculate UDP checksum if configured to do so */
#if IS_ENABLED(CONFIG_IPV6)
-  if (sk->sk_family == PF_INET6 && !tunnel->v4mapped)
+  if (l2tp_sk_is_v6(sk))
    udp6_set_csum(udp_get_no_check6_tx(sk),
      skb, &inet6_sk(sk)->saddr,
      &sk->sk_v6_daddr, udp_len);
@@ -1216,14 +1168,12 @@
static void l2tp_tunnel_destruct(struct sock *sk)
{
  struct l2tp_tunnel *tunnel = l2tp_tunnel(sk);
  struct l2tp_net *pn;

  if (tunnel == NULL)
    goto end;

  l2tp_info(tunnel, L2TP_MSG_CONTROL, "%s: closing...

(*sk->sk_destruct)(sk);
+
+kfree_rcu(tunnel, rcu);
end:
return;
}
@@ -1312,49 +1255,43 @@
/* Tunnel socket destroy hook for UDP encapsulation */
static void l2tp_udp_encap_destroy(struct sock *sk)
{
-struct l2tp_tunnel *tunnel = l2tp_sock_to_tunnel(sk);
-if (tunnel) {
-l2tp_tunnel_closeall(tunnel);
-sock_put(sk);
-}
+struct l2tp_tunnel *tunnel = l2tp_tunnel(sk);
+
+if (tunnel)
+l2tp_tunnel_delete(tunnel);
}

/* Workqueue tunnel deletion function */
static void l2tp_tunnel_del_work(struct work_struct *work)
{
-struct l2tp_tunnel *tunnel = NULL;
-struct socket *sock = NULL;
-struct sock *sk = NULL;
-
-tunnel = container_of(work, struct l2tp_tunnel, del_work);
+struct l2tp_tunnel *tunnel = container_of(work, struct l2tp_tunnel, del_work);
+struct sock *sk = tunnel->sock;
+struct socket *sock = sk->sk_socket;
+struct l2tp_net *pn;

l2tp_tunnel_closeall(tunnel);

-sk = l2tp_tunnel_sock_lookup(tunnel);
-if (!sk)
-goto out;
-
-sk = sk->sk_socket;
-
-/* If the tunnel socket was created by userspace, then go through the
- * inet layer to shut the socket down, and let userspace close it.
- * Otherwise, if we created the socket directly within the kernel, use
+/* If the tunnel socket was created within the kernel, use
 * the sk API to release it here.
- * In either case the tunnel resources are freed in the socket
- * destructor when the tunnel socket goes away.
 */
- if (tunnel->fd >= 0) {
- if (sock)
- inet_shutdown(sock, 2);
- } else {
- if (tunnel->fd < 0) {
- if (sock) {
kernel_sock_shutdown(sock, SHUT_RDWR);
sock_release(sock);
}
}
}

- l2tp_tunnel_sock_put(sk);
- out:
+/* Remove the tunnel struct from the tunnel list */
+pn = l2tp_pernet(tunnel->l2tp_net);
+spin_lock_bh(&pn->l2tp_tunnel_list_lock);
+list_del_rcu(&tunnel->list);
+spin_unlock_bh(&pn->l2tp_tunnel_list_lock);
+
+/* drop initial ref */
+l2tp_tunnel_dec_refcount(tunnel);
+
+/* drop workqueue ref */
l2tp_tunnel_dec_refcount(tunnel);
}

@@ -1487,70 +1424,11 @@
{
struct l2tp_tunnel *tunnel = NULL;
int err;
-struct socket *sock = NULL;
-struct sock *sk = NULL;
-struct l2tp_net *pn;
enum l2tp_encap_type encap = L2TP_ENCAPTYPE_UDP;

-/* Get the tunnel socket from the fd, which was opened by
- * the userspace L2TP daemon. If not specified, create a
- * kernel socket.
- */
- if (fd < 0) {
- err = l2tp_tunnel_sock_create(net, tunnel_id, peer_tunnel_id,
- cfg, &sock);
- if (err < 0)
- goto err;
- } else {

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-sock = sockfd_lookup(fd, &err);
-if (!sock) {
-pr_err("tunl %u: sockfd_lookup(fd=%d) returned %d\n",
			 tunnel_id, fd, err);
-err = -EBADF;
-goto err;
-}
-
-/* Reject namespace mismatches */
-if (!net_eq(sock_net(sock->sk), net)) {
-pr_err("tunl %u: netns mismatch\n", tunnel_id);
-err = -EINVAL;
-goto err;
-}
-
-sk = sock->sk;
-
-if (cfg != NULL)
encap = cfg->encap;

-/* Quick sanity checks */
-switch (encap) {
-case L2TP_ENCAPTYPE_UDP:
-err = -EPROTONOSUPPORT;
-if (sk->sk_protocol != IPPROTO_UDP) {
-pr_err("tunl %hu: fd %d wrong protocol, got %d, expected %d\n",
			 tunnel_id, fd, sk->sk_protocol, IPPROTO_UDP);
-goto err;
-}
-break;
-case L2TP_ENCAPTYPE_IP:
-err = -EPROTONOSUPPORT;
-if (sk->sk_protocol != IPPROTO_L2TP) {
-pr_err("tunl %hu: fd %d wrong protocol, got %d, expected %d\n",
			 tunnel_id, fd, sk->sk_protocol, IPPROTO_L2TP);
-goto err;
-}
-break;
-}
-
-/* Check if this socket has already been prepped */
-tunnel = l2tp_tunnel(sk);
-if (tunnel != NULL) {
-/* This socket has already been prepped */
-err = -EBUSY;
-goto err;
-}
tunnel = kzalloc(sizeof(struct l2tp_tunnel), GFP_KERNEL);
if (tunnel == NULL) {
    err = -ENOMEM;
}
if (cfg != NULL) {
    tunnel->debug = cfg->debug;
}
#if IS_ENABLED(CONFIG_IPV6)
    if (sk->family == PF_INET6) {
        struct ipv6_pinfo *np = inet6_sk(sk);
        tunnel->encap = encap;
    }
#endif
    if (ipv6_addr_v4mapped(&np->saddr) &&
        ipv6_addr_v4mapped(&sk->v6_daddr)) {
        struct inet_sock *inet = inet_sk(sk);
    }
    tunnel->v4mapped = true;
    inet->inet_saddr = np->saddr.s6_addr32[3];
    inet->inet_rcv_saddr = sk->v6_rcv_saddr.s6_addr32[3];
    inet->inet_daddr = sk->v6_daddr.s6_addr32[3];
} else {
    tunnel->v4mapped = false;
    refcount_set(&tunnel->ref_count, 1);
    tunnel->fd = fd;
    INIT_DELETE_WORK(&tunnel->del_work, l2tp_tunnel_del_work);
    INIT_LIST_HEAD(&tunnel->list);
    err = 0;
    if (tunnelp)
        *tunnelp = tunnel;
    return err;
}
EXPORT_SYMBOL_GPL(l2tp_tunnel_create);

+static int l2tp_validate_socket(const struct sock *sk, const struct net *net,
enum l2tp_encap_type encap
+
+if (!net_eq(sock_net(sk), net))
+return -EINVAL;
+
+if (sk->sk_type != SOCK_DGRAM)
+return -EPROTONOSUPPORT;
+
+if (sk->sk_family != PF_INET && sk->sk_family != PF_INET6)
+return -EPROTONOSUPPORT;
+
+if ((encap == L2TP_ENCAPTYPE_UDP && sk->sk_protocol != IPPROTO_UDP) ||
+ (encap == L2TP_ENCAPTYPE_IP && sk->sk_protocol != IPPROTO_L2TP))
+return -EPROTONOSUPPORT;
+
+if (sk->sk_user_data)
+return -EBUSY;
+
+return 0;
+
+
+int l2tp_tunnel_register(struct l2tp_tunnel *tunnel, struct net *net,
+ struct l2tp_tunnel_cfg *cfg)
+
+    struct l2tp_tunnel *tunnel_walk;
+    struct l2tp_net *pn;
+    struct socket *sock;
+    struct sock *sk;
+    int ret;
+
+    if (tunnel->fd < 0) {
+        ret = l2tp_tunnel_sock_create(net, tunnel->tunnel_id,
+            tunnel->peer_tunnel_id, cfg,
+            &sock);
+        if (ret < 0)
+            goto err;
+    } else {
+        sock = sockfd_lookup(tunnel->fd, &ret);
+        if (!sock)
+            goto err;
+    }
+
+    ret = l2tp_validate_socket(sock->sk, net, tunnel->encap);
+    if (ret < 0)
+        goto err_sock;
+
+    tunnel->l2tp_net = net;
+    pn = l2tp_pernet(net);
spin_lock_bh(&pn->l2tp_tunnel_list_lock);
+list_for_each_entry(tunnel_walk, &pn->l2tp_tunnel_list, list) {
+if (tunnel_walk->tunnel_id == tunnel->tunnel_id) {
+spin_unlock_bh(&pn->l2tp_tunnel_list_lock);
+
+ret = -EEXIST;
+goto err_sock;
}
}
#endif
+list_add_rcu(&tunnel->list, &pn->l2tp_tunnel_list);
+spin_unlock_bh(&pn->l2tp_tunnel_list_lock);

-/* Mark socket as an encapsulation socket. See net/ipv4/udp.c */
-tunnel->encap = encap;
-if (encap == L2TP_ENCAPTYPE_UDP) {
-struct udp_tunnel_sock_cfg udp_cfg = { };
+sk = sock->sk;
+ssock_hold(sk);
+tunnel->sock = sk;

-udp_cfg.sk_user_data = tunnel;
-udp_cfg.encap_type = UDP_ENCAP_L2TPINUDP;
-udp_cfg.encap_rcv = l2tp_udp_encap_recv;
-udp_cfg.encap_destroy = l2tp_udp_encap_destroy;
+if (tunnel->encap == L2TP_ENCAPTYPE_UDP) {
+struct udp_tunnel_sock_cfg udp_cfg = {
+s.sk_user_data = tunnel,
+s.encap_type = UDP_ENCAP_L2TPINUDP,
+s.encap_rcv = l2tp_udp_encap_recv,
+s.encap_destroy = l2tp_udp_encap_destroy,
+};

setup_udp_tunnel_sock(net, sock, &udp_cfg);
} else {
sk->sk_user_data = tunnel;
}

-/* Hook on the tunnel socket destructor so that we can cleanup
- * if the tunnel socket goes away.
- */
tunnel->old_sk_destruct = sk->sk_destruct;
sk->sk_destruct = &l2tp_tunnel_destruct;
-tunnel->sock = sk;
-tunnel->fd = fd;
-lockdep_set_class_and_name(&sk->sk_lock.slock, &l2tp_socket_class, "l2tp_sock");
-
lockdep_set_class_and_name(&sk->sk_lock.slock, &l2tp_socket_class, "l2tp_sock");
sk->sk_allocation = GFP_ATOMIC;

/* Init delete workqueue struct */
INIT_WORK(&tunnel->del_work, l2tp_tunnel_del_work);

/* Add tunnel to our list */
INIT_LIST_HEAD(&tunnel->list);

/* Bump the reference count. The tunnel context is deleted */
* only when this drops to zero. Must be done before list insertion
- *
-refcount_set(&tunnel->ref_count, 1);
.spin_lock_bh(&pn->l2tp_tunnel_list_lock);
-list_add_rcu(&tunnel->list, &pn->l2tp_tunnel_list);
-spin_unlock_bh(&pn->l2tp_tunnel_list_lock);
+if (tunnel->fd >= 0)
+sockfd_put(sock);

-err = 0;
-err:
-if (tunnelp)
-*tunnelp = tunnel;
+return 0;

-/* If tunnel’s socket was created by the kernel, it doesn’t
- * have a file.
- */
- if (sock &&& sock->file)
+err_sock:
+if (tunnel->fd < 0)
+sock_release(sock);
+else
sockfd_put(sock);
-
-return err;
+err:
+return ret;
}

EXPORT_SYMBOL_GPL(l2tp_tunnel_create);
+EXPORT_SYMBOL_GPL(l2tp_tunnel_register);

/* This function is used by the netlink TUNNEL_DELETE command. */
stitialk -1668,8 +1588,6 @@

if (tunnel) {
BUG_ON(tunnel->magic != L2TP_TUNNEL_MAGIC);
-sock_put(tunnel->sock);
-session->tunnel = NULL;
l2tp_tunnel_decRefCount(tunnel);
}

@@ -1725,7 +1643,7 @@
EXPORT_SYMBOL_GPL(l2tp_session_delete);

/* We come here whenever a session's send_seq, cookie_len or
   * l2specific_len parameters are set.
   + * l2specific_type parameters are set.
   */
void l2tp_session_set_header_len(struct l2tp_session *session, int version)
{
@@ -1734,7 +1652,7 @@
if (session->send_seq)
    session->hdr_len += 4;
} else {
-    session->hdr_len = 4 + session->cookie_len + session->l2specific_len + session->offset;
+    session->hdr_len = 4 + session->cookie_len;
+    session->hdr_len += l2tp_get_l2specific_len(session);
    if (session->tunnel->encap == L2TP_ENCAPTYPE_UDP)
        session->hdr_len += 4;
}
@@ -1784,7 +1703,6 @@
    session->recv_seq = cfg->recv_seq;
    session->ins_mode = cfg->ins_mode;
    session->reorder_timeout = cfg->reorder_timeout;
-    session->offset = cfg->offset;
+    session->l2specific_type = cfg->l2specific_type;
    session->l2specific_len = cfg->l2specific_len;
    session->cookie_len = cfg->cookie_len;
@@ -1841,7 +1759,8 @@
rcu_read_unlock_bh();

-flush_workqueue(l2tp_wq);
+if (l2tp_wq)
+    flush_workqueue(l2tp_wq);
rcu_barrier();

for (hash = 0; hash < L2TP_HASH_SIZE_2; hash++)
--- linux-4.15.0.orig/net/l2tp/l2tp_core.h
+++ linux-4.15.0/net/l2tp/l2tp_core.h
@@ @ -59,7 +59,6 @@
int debug;/* bitmask of debug message
 * categories */
u16 vlan_id;/* VLAN pseudowire only */
- u16 offset;/* offset to payload */
u16 l2specific_len;/* Layer 2 specific length */
u16 l2specific_type;/* Layer 2 specific type */
u8 cookie[8];/* optional cookie */
@@ -86,8 +85,6 @@
incookie_len;
 u8 peer_cookie[8];
in peer_cookie_len;
- u16 offset;/* offset from end of L2TP header
- to beginning of data */
 u16 l2specific_len;
u16 l2specific_type;
 u16 hdr_len;
@@ -193,9 +190,6 @@
 struct sock* sock;/* Parent socket */
 int fd;/* Parent fd, if tunnel socket
  * was created by userspace */
- #if IS_ENABLED(CONFIG_IPV6)
- bool v4mapped;
- #endif

 struct work_struct del_work;
@@ -219,27 +213,10 @@
 return &session->priv[0];
 }

 - static inline struct l2tp_tunnel * l2tp_sock_to_tunnel(struct sock * sk)
  - {
   - struct l2tp_tunnel * tunnel;
   -
   - if (sk == NULL)
     - return NULL;
   -
   - sock_hold(sk);
   - tunnel = (struct l2tp_tunnel *) (sk->sk_user_data);
   - if (tunnel == NULL) {
     - sock_put(sk);
     - goto out;
    - }
   -
   - BUG_ON(tunnel->magic != L2TP_TUNNEL_MAGIC);
  -
   - out:
    - return tunnel;
  - }
  -
struct l2tp_tunnel *l2tp_tunnel_get(const struct net *net, u32 tunnel_id);
+struct l2tp_tunnel *l2tp_tunnel_get_nth(const struct net *net, int nth);
+
+void l2tp_tunnel_free(struct l2tp_tunnel *tunnel);

struct l2tp_session *l2tp_session_get(const struct net *net, 
struct l2tp_tunnel *tunnel,
@@ -247,12 +224,13 @@
struct l2tp_session *l2tp_session_get_nth(struct l2tp_tunnel *tunnel, int nth);
struct l2tp_session *l2tp_session_get_by_ifname(const struct net *net, 
const char *ifname);
-struct l2tp_tunnel *l2tp_tunnel_find(const struct net *net, u32 tunnel_id);
-struct l2tp_tunnel *l2tp_tunnel_find_nth(const struct net *net, int nth);

int l2tp_tunnel_create(struct net *net, int fd, int version, u32 tunnel_id, 
    u32 peer_tunnel_id, struct l2tp_tunnel_cfg *cfg, 
    struct l2tp_tunnel **tunnelp);
+int l2tp_tunnel_register(struct l2tp_tunnel *tunnel, struct net *net, 
+    struct l2tp_tunnel_cfg *cfg);
+
+void l2tp_tunnel_closeall(struct l2tp_tunnel *tunnel);
void l2tp_tunnel_delete(struct l2tp_tunnel *tunnel);
struct l2tp_session *l2tp_session_create(int priv_size, 
@@ -288,7 +266,7 @@
  
static inline void l2tp_tunnel_dec_refcount(struct l2tp_tunnel *tunnel)
  {
if (refcount_dec_and_test(&tunnel->ref_count))
-  kfree_rcu(tunnel, rcu);
+  l2tp_tunnel_free(tunnel);
  }

/* Session reference counts. Incremented when code obtains a reference 
@@ -305,6 +283,37 @@
l2tp_session_free(session);
  }
+
+static inline int l2tp_get_l2specific_len(struct l2tp_session *session)
+{
+  switch (session->l2specific_type) {
+    case L2TP_L2SPECTYPE_DEFAULT:
+      return 4;
+    case L2TP_L2SPECTYPE_NONE:
+      default:
+        return 0;
+  }
+}
+
+static inline int l2tp_v3_ensure_opt_in_linear(struct l2tp_session *session, struct sk_buff *skb,
unsigned char **ptr, unsigned char **optr)
+
+int opt_len = session->peer_cookie_len + l2tp_get_l2specific_len(session);
+
+if (opt_len > 0) {
+int off = *ptr - *optr;
+
+if (!pskb_may_pull(skb, off + opt_len))
+return -1;
+
+if (skb->data != *optr) {
+*optr = skb->data;
+*ptr = skb->data + off;
+
+}
+
+
+return 0;
+
+#define l2tp_printk(ptr, type, func, fmt, ...)
+do {
+if (((ptr)->debug) & (type))
+--- linux-4.15.0.orig/net/l2tp/l2tp_debugfs.c
+++ linux-4.15.0/net/l2tp/l2tp_debugfs.c
@@ -47,7 +47,11 @@
static void l2tp_dfs_next_tunnel(struct l2tp_dfs_seq_data *pd)
{
    -pd->tunnel = l2tp_tunnel_find_nth(pd->net, pd->tunnel_idx);
    +/* Drop reference taken during previous invocation */
    +if (pd->tunnel)
    +l2tp_tunnel_dec_refcount(pd->tunnel);
    +
    +pd->tunnel = l2tp_tunnel_get_nth(pd->net, pd->tunnel_idx);
    pd->tunnel_idx++;
}
@@ -96,7 +100,17 @@
static void l2tp_dfs_seq_stop(struct seq_file *p, void *v)
{
    -/* nothing to do */
    +struct l2tp_dfs_seq_data *pd = v;
    +
    +if (!pd || pd == SEQ_START_TOKEN)
    +return;
    +
    +/* Drop reference taken by last invocation of l2tp_dfs_next_tunnel() */


+if (pd->tunnel) {
+l2tp_tunnel_dec_refcount(pd->tunnel);
+pd->tunnel = NULL;
+pd->session = NULL;
+}
}

static void l2tp_dfs_seq_tunnel_show(struct seq_file *m, void *v)
{
    session->lns_mode ? "LNS" : "LAC",
    session->debug,
    jiffies_to_msecs(session->reorder_timeout));
-    seq_printf(m, "   offset %hu l2specific %hu/%hu\n",
-        session->offset, session->l2specific_type, session->l2specific_len);
+    seq_printf(m, "   offset 0 l2specific %hu/%hu\n",
+        session->l2specific_type, session->l2specific_len);
    if (session->cookie_len) {
        seq_printf(m, "   cookie %02x%02x%02x%02x",
            session->cookie[0], session->cookie[1],
        --- linux-4.15.0.orig/net/l2tp/l2tp_ip.c
+++ linux-4.15.0/net/l2tp/l2tp_ip.c
@@ -24,7 +24,6 @@
#include <net/inet_hashtables.h>
#include <net/tcp_states.h>
#include <net/protocol.h>
@@ -165,6 +164,9 @@
print_hex_dump_bytes("", DUMP_PREFIX_OFFSET, ptr, length);
}

+if (l2tp_v3_ensure_opt_in_linear(session, skb, &ptr, &optr))
+goto discard_sess;
+l2tp_recv_common(session, skb, ptr, optr, 0, skb->len, tunnel->recv_payload_hook);
l2tp_session_dec_refcount(session);

@@ -210,15 +212,31 @@
return 0;
}

-static int l2tp_ip_open(struct sock *sk)
+static int l2tp_ip_hash(struct sock *sk)
{
-/* Prevent autobind. We don't have ports. */
-inet_sk(sk)->inet_num = IPPROTO_L2TP;
+if (sk_unhashed(sk)) {
+write_lock_bh(&l2tp_ip_lock);
+sk_add_node(sk, &l2tp_ip_table);
+write_unlock_bh(&l2tp_ip_lock);
+}
+return 0;
+
+
+static void l2tp_ip_unhash(struct sock *sk)
+{
+if (sk_unhashed(sk))
+return;
+write_lock_bh(&l2tp_ip_lock);
-sk_add_node(sk, &l2tp_ip_table);
+sk_del_node_init(sk);
+write_unlock_bh(&l2tp_ip_lock);
+}
+
+static int l2tp_ip_open(struct sock *sk)
+{
+/* Prevent autobind. We don’t have ports. */
+inet_sk(sk)->inet_num = IPPROTO_L2TP;
+
+l2tp_ip_hash(sk);
return 0;
}

@@ -234,17 +252,13 @@
static void l2tp_ip_destroy_sock(struct sock *sk)
{
 struct sk_buff *skb;
-struct l2tp_tunnel *tunnel = l2tp_sock_to_tunnel(sk);
+struct l2tp_tunnel *tunnel = sk->sk_user_data;

 while ((skb = __skb_dequeue_tail(&sk->sk_write_queue)) != NULL)
 kfree_skb(skb);
-
-if (tunnel) {
-l2tp_tunnel_closeall(tunnel);
-sock_put(sk);
-}
-
- -sk_refcnt_debug_dec(sk);
+if (tunnel)
+l2tp_tunnel_delete(tunnel);
}

 static int l2tp_ip_bind(struct sock *sk, struct sockaddr *uaddr, int addr_len)
@@ -600,8 +614,8 @@
       .sendmsg = l2tp_ip_sendmsg,
       .recvmsg = l2tp_ip_recvmsg,
       .backlog_rcv = l2tp_ip_backlog_recv,
-      .hash = inet_hash,
-      .unhash = inet_unhash,
+      .hash = l2tp_ip_hash,
+      .unhash = l2tp_ip_unhash,
       .obj_size = sizeof(struct l2tp_ip_sock),
#ifdef CONFIG_COMPAT
       .compat_setsockopt = compat_ip_setsockopt,
--- linux-4.15.0.orig/net/l2tp/l2tp_ip6.c
+++ linux-4.15.0/net/l2tp/l2tp_ip6.c
@@ -24,8 +24,6 @@
       #include <net/inet_common.h>
       -#include <net/inet_hashtables.h>
       -#include <net/inet6_hashtables.h>
       #include <net/tcp_states.h>
       #include <net/protocol.h>
       #include <net/xfrm.h>
@@ -178,6 +176,9 @@
       print_hex_dump_bytes("", DUMP_PREFIX_OFFSET, ptr, length);
    }

+if (l2tp_v3_ensure_opt_in_linear(session, skb, &ptr, &optr))
+    goto discard_sess;
+
+    l2tp_recv_common(session, skb, ptr, optr, 0, skb->len,
        tunnel->recv_payload_hook);
    l2tp_session_dec_refcount(session);
@@ -224,15 +225,31 @@
    return 0;
 }

-static int l2tp_ip6_open(struct sock *sk)
+static int l2tp_ip6_hash(struct sock *sk)
{
    /* Prevent autobind. We don’t have ports. */
    -inet_sk(sk)->inet_num = IPPROTO_L2TP;
+    if (sk_unhashed(sk)) {
+        write_lock_bh(&l2tp_ip6_lock);
+        sk_add_node(sk, &l2tp_ip6_table);
+        write_unlock_bh(&l2tp_ip6_lock);
+    }
+    return 0;
+}

-#ifdef CONFIG_COMPAT
-    .compat_setsockopt = compat_ip_setsockopt,
--- linux-4.15.0.orig/net/l2tp/l2tp_ip6.c
+++ linux-4.15.0/net/l2tp/l2tp_ip6.c
@@ -24,8 +24,6 @@
       #include <net/inet_common.h>
       -#include <net/inet_hashtables.h>
       -#include <net/inet6_hashtables.h>
       #include <net/tcp_states.h>
       #include <net/protocol.h>
       #include <net/xfrm.h>
@@ -178,6 +176,9 @@
       print_hex_dump_bytes("", DUMP_PREFIX_OFFSET, ptr, length);
    }

+if (l2tp_v3_ensure_opt_in_linear(session, skb, &ptr, &optr))
+    goto discard_sess;
+
+    l2tp_recv_common(session, skb, ptr, optr, 0, skb->len,
        tunnel->recv_payload_hook);
    l2tp_session_dec_refcount(session);
@@ -224,15 +225,31 @@
    return 0;
 }

-static int l2tp_ip6_open(struct sock *sk)
+static int l2tp_ip6_hash(struct sock *sk)
{
    /* Prevent autobind. We don’t have ports. */
    -inet_sk(sk)->inet_num = IPPROTO_L2TP;
+    if (sk_unhashed(sk)) {
+        write_lock_bh(&l2tp_ip6_lock);
+        sk_add_node(sk, &l2tp_ip6_table);
+        write_unlock_bh(&l2tp_ip6_lock);
+    }
+    return 0;
+}

-#ifdef CONFIG_COMPAT
-    .compat_setsockopt = compat_ip_setsockopt,
+static void l2tp_ip6_unhash(struct sock *sk)
+
+if (sk_unhashed(sk))
+return;

write_lock_bh(&l2tp_ip6_lock);
-sk_add_node(sk, &l2tp_ip6_table);
+sk_del_node_init(sk);
write_unlock_bh(&l2tp_ip6_lock);
+
+static int l2tp_ip6_open(struct sock *sk)
+
+/* Prevent autobind. We don't have ports. */
+inet_sk(sk)->inet_num = IPPROTO_L2TP;

+l2tp_ip6_hash(sk);
return 0;
}

static void l2tp_ip6_destroy_sock(struct sock *sk)
{
-struct l2tp_tunnel *tunnel = l2tp_sock_to_tunnel(sk);
+struct l2tp_tunnel *tunnel = sk->sk_user_data;

lock_sock(sk);
ip6_flush_pending_frames(sk);
release_sock(sk);

-if (tunnel) {
-l2tp_tunnel_closeall(tunnel);
-sock_put(sk);
-}
+if (tunnel)
+l2tp_tunnel_delete(tunnel);

inet6_destroy_sock(sk);
}

fl6.flowlabel = ip6_make_flowinfo(ipc6.tclass, fl6.flowlabel);

dst = ip6_dst_lookup_flow(sk, &fl6, final_p);
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, &fl6, final_p);
if (IS_ERR(dst)) {
err = PTR_ERR(dst);
goto out;
@@ -679,9 +694,6 @@
    if (flags & MSG_OOB)
    goto out;

    -if (addr_len)
    -*addr_len = sizeof(*lsa);
    -
    if (flags & MSG_ERRQUEUE)
    return ipv6_recv_error(sk, msg, len, addr_len);

@@ -711,6 +723,7 @@
    lsa->l2tp_conn_id = 0;
    if (ipv6_addr_type(&lsa->l2tp_addr) & IPV6_ADDR_LINKLOCAL)
    lsa->l2tp_scope_id = inet6_iif(skb);
    +*addr_len = sizeof(*lsa);
    }

if (np->rxopt.all)
@@ -739,8 +752,8 @@
    .sendmsg   = l2tp_ip6_sendmsg,
    .recvmsg   = l2tp_ip6_recvmsg,
    .backlog_rcv = l2tp_ip6_backlog_recv,
    -.hash    = inet6_hash,
    -.unhash  = inet_unhash,
    +.hash    = l2tp_ip6_hash,
    +.unhash  = l2tp_ip6_unhash,
    .obj_size = sizeof(struct l2tp_ip6_sock),
#ifdef CONFIG_COMPAT
    .compat_setsockopt = compat_ipv6_setsockopt,
--- linux-4.15.0.orig/net/l2tp/l2tp_netlink.c
+++ linux-4.15.0/net/l2tp/l2tp_netlink.c
@@ -236,12 +236,6 @@
    if (info->attrs[L2TP_ATTR_DEBUG])
    cfg.debug = nla_get_u32(info->attrs[L2TP_ATTR_DEBUG]);

    -tunnel = l2tp_tunnel_find(net, tunnel_id);
    -if (tunnel != NULL) {
    -ret = -EEXIST;
    -goto out;
    -}
    -
    ret = -EINVAL;
    switch (cfg.encap) {
    case L2TP_ENCAPTYPE_UDP:
    @@ -251,9 +245,19 @@
    break;
    }
-if (ret >= 0)
-ret = l2tp_tunnel_notify(&l2tp_nl_family, info,
-  tunnel, L2TP_CMD_TUNNEL_CREATE);
+if (ret < 0)
+goto out;
+
+l2tp_tunnel_inc_refcount(tunnel);
+ret = l2tp_tunnel_register(tunnel, net, &cfg);
+if (ret < 0) {
+kfree(tunnel);
+goto out;
+}
+ret = l2tp_tunnel_notify(&l2tp_nl_family, info, tunnel,
+  L2TP_CMD_TUNNEL_CREATE);
+l2tp_tunnel_dec_refcount(tunnel);
+
out:
return ret;
}
@@ -483,14 +487,17 @@
struct net *net = sock_net(skb->sk);

for (;;) {
-tunnel = l2tp_tunnel_find_nth(net, ti);
+
tunnel = l2tp_tunnel_get_nth(net, ti);
if (tunnel == NULL)
go out;
if (l2tp_nl_tunnel_send(skb, NETLINK_CB(cb->skb).portid,
  cb->nlh->nlmsg_seq, NLM_F_MULTI,
-tunnel, L2TP_CMD_TUNNEL_GET) < 0)
+
tunnel, L2TP_CMD_TUNNEL_GET) < 0) {
+  l2tp_tunnel_dec_refcount(tunnel);
  goto out;
+}
+l2tp_tunnel_dec_refcount(tunnel);
-
  ti++;
 }
@@ -547,9 +554,6 @@
}

if (tunnel->version > 2) {
-if (info->attrs[L2TP_ATTR_OFFSET])
-  cfg.offset = nla_get_u16(info->attrs[L2TP_ATTR_OFFSET]);
-
  if (info->attrs[L2TP_ATTR_DATA_SEQ])
cfg.data_seq = nla_get_u8(info->attrs[L2TP_ATTR_DATA_SEQ]);

@@ -865,7 +869,7 @@
 for (;;) {
 if (tunnel == NULL) {
 -tunnel = l2tp_tunnel_find_nth(net, ti);
+_tunnel = l2tp_tunnel_get_nth(net, ti);
     if (tunnel == NULL)
         goto out;
 }
@@ -873,6 +877,7 @@
     session = l2tp_session_get_nth(tunnel, si);
     if (session == NULL) {
         ti++;
+     l2tp_tunnel_dec_refcount(tunnel);
         tunnel = NULL;
         si = 0;
         continue;
@@ -882,6 +887,7 @@
     } else if (l2tp_session_dec_refcount(session) < 0) {
         l2tp_session_dec_refcount(session);
         +l2tp_tunnel_dec_refcount(tunnel);
@@ -416,20 +416,18 @@
 /* Session (and tunnel control) socket create/destroy. */
 +static void pppol2tp_put_sk(struct rcu_head *head)
 +{
+     struct pppol2tp_session *ps;
+     +ps = container_of(head, typeof(*ps), rcu);
+     sock_put(ps->__sk);
+ } +
 /* Called by l2tp_core when a session socket is being closed. */
 static void pppol2tp_session_close(struct l2tp_session *session)
 { -struct sock *sk;
    -BUG_ON(session->magic != L2TP_SESSION_MAGIC);
-sk = pppol2tp_session_get_sock(session);
-if (sk) {
- if (sk->sk_socket)
- inet_shutdown(sk->sk_socket, SEND_SHUTDOWN);
- sock_put(sk);
-}
}

/* Really kill the session socket. (Called from sock_put() if */
@@ -449,14 +447,6 @@
}
}

static void pppol2tp_put_sk(struct rcu_head *head)
-{
- struct pppol2tp_session *ps;
- -ps = container_of(head, typeof(*ps), rcu);
- sock_put(ps->__sk);
- }
-
- /* Called when the PPPoX socket (session) is closed. */
- static int pppol2tp_release(struct socket *sock)
- @@ -481,8 +471,7 @@
- sock->sk = NULL;
-
- session = pppol2tp_sock_to_session(sk);
- -if (session != NULL) {
- +if (session) {
- struct pppol2tp_session *ps;
-
- l2tp_session_delete(session);
- @@ -500,6 +489,7 @@
- * The last reference will be dropped by pppol2tp_put_sk(). */
- }
- +
- release_sock(sk);
-
- /* This will delete the session context via */
- @@ -628,6 +618,13 @@
- lock_sock(sk);
-
- error = -EINVAL;
- +
if (sockaddr_len != sizeof(struct sockaddr_pppol2tp) &&
    sockaddr_len != sizeof(struct sockaddr_pppol2tpv3) &&
    sockaddr_len != sizeof(struct sockaddr_pppol2tpin6) &&
    sockaddr_len != sizeof(struct sockaddr_pppol2tpv3in6))
goto end;
+
if (sp->sa_protocol != PX_PROTO_OL2TP)
goto end;

error = l2tp_tunnel_create(sock_net(sk), fd, ver, tunnel_id, peer_tunnel_id, &tcfg, &tunnel);
if (error < 0)
goto end;
+
  l2tp_tunnel_inc_refcount(tunnel);
+error = l2tp_tunnel_register(tunnel, sock_net(sk),
  &tcfg);
+if (error < 0) {
  kfree(tunnel);
  goto end;
  }
+drop_tunnel = true;

} else {
  /* Error if we can't find the tunnel */

mutex_lock(&ps->sk_lock);
if (rcu_dereference_protected(ps->sk,
       lockdep_is_held(&ps->sk_lock))) {
  lockdep_is_held(&ps->sk_lock)) ||
      ps->__sk) {
    mutex_unlock(&ps->sk_lock);
    error = -EEXIST;
    goto end;

static void pppol2tp_next_tunnel(struct net *net, struct pppol2tp_seq_data *pd)
{  /* Drop reference taken during previous invocation */
  if (pd->tunnel)
    l2tp_tunnel_dec_refcount(pd->tunnel);
  +for (;;)
    -pd->tunnel = l2tp_tunnel_find_nth(net, pd->tunnel_idx);
      +pd->tunnel = l2tp_tunnel_get_nth(net, pd->tunnel_idx);
    pd->tunnel_idx++;
-if (pd->tunnel == NULL)  
-break;
+/* Only accept L2TPv2 tunnels */
+if (!pd->tunnel || pd->tunnel->version == 2)  
+return;

-/* Ignore L2TPv3 tunnels */
-if (pd->tunnel->version < 3)  
-break;
+l2tp_tunnel_dec_refcount(pd->tunnel);
}
}

static void pppol2tp_seq_stop(struct seq_file *p, void *v)  
{
-/* nothing to do */
+struct pppol2tp_seq_data *pd = v;
+  
+if (!pd || pd == SEQ_START_TOKEN)  
+return;
+  
+/* Drop reference taken by last invocation of pppol2tp_next_tunnel() */
+if (pd->tunnel) {
+l2tp_tunnel_dec_refcount(pd->tunnel);
+pd->tunnel = NULL;
+pd->session = NULL;
+}
}

static void pppol2tp_seq_tunnel_show(struct seq_file *m, void *v)  
@@ -1796,6 +1816,9 @@
 .recvmsg = pppol2tp_recvmsg,
 .mmap = sock_no_mmap,
 .ioctl = pppox_ioctl,
+#ifdef CONFIG_COMPAT
+.compat_ioctl = pppox_compat_ioctl,
+#endif
+.compat_ioctl = pppox_compat_ioctl,
+#endif
};

static const struct pppox_proto pppol2tp_proto = {
--- linux-4.15.0.orig/net/lapb/lapb_iface.c
+++ linux-4.15.0/net/lapb/lapb_iface.c
@@ -182,6 +182,7 @@
lapb = __lapb_devtostruct(dev);
if (!lapb)
go to out;
+lapb_put(lapb);

lapb_stop_t1timer(lapb);
lapb_stop_t2timer(lapb);
--- linux-4.15.0.orig/net/lapb/lapb_out.c
+++ linux-4.15.0/net/lapb/lapb_out.c
@@ -87,7 +87,8 @@
skb = skb_dequeue(&lapb->write_queue);
do {
    -if ((skbn = skb_clone(skb, GFP_ATOMIC)) == NULL) {
    +skbn = skb_copy(skb, GFP_ATOMIC);
    +if (!skbn) {
        skb_queue_head(&lapb->write_queue, skb);
        break;
    }
--- linux-4.15.0.orig/net/llc/af_llc.c
+++ linux-4.15.0/net/llc/af_llc.c
@@ -98,8 +98,16 @@
{
    u8 rc = LLC_PDU_LEN_U;
    -if (addr->sllc_test || addr->sllc_xid)
    +if (addr->sllc_test)
        rc = LLC_PDU_LEN_U;
    +else if (addr->sllc_xid)
        rc = LLC_PDU_LEN_U_XID;
    +/* We need to expand header to sizeof(struct llc_xid_info)
    + * since llc_pdu_init_as_xid_cmd() sets 4,5,6 bytes of LLC header
    + * as XID PDU. In llc_ui_sendmsg() we reserved header size and then
    + * filled all other space with user data. If we won't reserve this
    + * bytes, llc_pdu_init_as_xid_cmd() will overwrite user data
    + */
    +rc = LLC_PDU_LEN_U_XID;
    else if (sk->sk_type == SOCK_STREAM)
        rc = LLC_PDU_LEN_I;
    return rc;
@@ -113,22 +121,26 @@
*    +This function always consumes a reference to the skb.
*/
static int llc_ui_send_data(struct sock* sk, struct sk_buff *skb, int noblock)
{
    struct llc_sock* llc = llc_sk(sk);
    -int rc = 0;
    *
    *Send data via reliable llc2 connection.
    *Returns 0 upon success, non-zero if action did not succeed.
    + *
    +This function always consumes a reference to the skb.
    */

if (unlikely(llc_data_accept_state(llc->state) ||
lkc->remote_busy_flag ||
lkc->p_flag)) {
    long timeout = sock_sndtimeo(sk, noblock);
    +int rc;

    rc = llc_ui_wait_for_busy_core(sk, timeout);
    +if (rc) {
        +kfree_skb(skb);
        +return rc;
    +}
    }
    -if (unlikely(!rc))
    -rc = llc_build_and_send_pkt(sk, skb);
    -return rc;
    +return llc_build_and_send_pkt(sk, skb);
}

static void llc_ui_sk_init(struct socket *sock, struct sock *sk)
@@ -199,9 +211,19 @@
    llc->laddr.lsap, llc->daddr.lsap);
    if (!llc_send_disc(sk))
        llc_ui_wait_for_disc(sk, sk->sk_rcvtimeo);
    -if (!sock_flag(sk, SOCK_ZAPPED))
    +if (!sock_flag(sk, SOCK_ZAPPED)) {
        +struct llc_sap *sap = llc->sap;
        +
        +/* Hold this for release_sock(), so that llc_backlog_recv()
        + * could still use it.
        + */
        +llc_sap_hold(sap);
        llc_sap_remove_socket(llc->sap, sk);
        -release_sock(sk);
        +release_sock(sk);
        +llc_sap_put(sap);
        +} else {
        +release_sock(sk);
        +}
    if (llc->dev)
        dev_put(llc->dev);
    sock_put(sk);
@@ -259,6 +281,10 @@
    if (!sock_flag(sk, SOCK_ZAPPED))
goto out;
    +if (!addr->sllc_arphrd)
    +addr->sllc_arphrd = ARPHRD_ETHER;
    +if (addr->sllc_arphrd != ARPHRD_ETHER)
+goto out;
rc = -ENODEV;
if (sk->sk_bound_dev_if) {
  llc->dev = dev_get_by_index(&init_net, sk->sk_bound_dev_if);
  if (unlikely(!sock_flag(sk, SOCK_ZAPPED) || addrlen != sizeof(*addr)))
    goto out;
rc = -EAFNOSUPPORT;
- if (unlikely(addr->sllc_family != AF_LLC))
+ if (!addr->sllc_arphrd)
  +addr->sllc_arphrd = ARPHRD_ETHER;
+ if (unlikely(addr->sllc_family != AF_LLC || addr->sllc_arphrd != ARPHRD_ETHER))
  goto out;
rc = -ENODEV;
rcu_read_lock();
if (sk->sk_bound_dev_if) {
  llc->dev = dev_get_by_index_rcu(&init_net, sk->sk_bound_dev_if);
  if (llc->dev) {
    -if (!addr->sllc_arphrd)
      addr->sllc_arphrd = llc->dev->type;
  if (is_zero_ether_addr(addr->sllc_mac))
    memcpy(addr->sllc_mac, llc->dev->dev_addr,
      IFHWADDRLEN);
    struct sk_buff *skb = NULL;
    struct sock *sk = sock->sk;
    struct llc_sock *llc = llc_sk(sk);
    unsigned long cpu_flags;
    size_t copied = 0;
    u32 peek_seq = 0;
    u32 *seq, skb_len;
    if (!(flags & MSG_PEEK)) {
      -spin_lock_irqsave(&sk->sk_receive_queue.lock, cpu_flags);
      -sk_eat_skb(skb, skb);
      -spin_unlock_irqrestore(&sk->sk_receive_queue.lock, cpu_flags);
      +skb_unlink(skb, &sk->sk_receive_queue);
      +kfree_skb(skb);
      *seq = 0;
    }
    copy_uaddr;
if (!(flags & MSG_PEEK)) {
  -spin_lock_irqsave(&sk->sk_receive_queue.lock, cpu_flags);
  -sk_eat_skb(skb, skb);
  -spin_unlock_irqrestore(&sk->sk_receive_queue.lock, cpu_flags);
  +skb_unlink(skb, &sk->sk_receive_queue);
  +kfree_skb(skb);
  *seq = 0;
}
sk_eat_skb(skb, skb);
spin_unlock_irqrestore(&sk->sk_receive_queue.lock, cpu_flags);
skb_unlink(skb, &sk->sk_receive_queue);
kfree_skb(skb);
*seq = 0;
}

DECLARE_SOCKADDR(struct sockaddr_llc *, addr, msg->msg_name);
int flags = msg->msg_flags;
int noblock = flags & MSG_DONTWAIT;
struct sk_buff *skb;
struct sk_buff *skb = NULL;
size_t size = 0;
int rc = -EINVAL, copied = 0, hdrlen;

lock_sock(sk);
if (addr) {
if (msg->msg_namelen < sizeof(*addr))
goto release;
} else {
if (llc_ui_addr_null(&llc->addr))
goto release;
}
addr = &llc->addr;

/* must bind connection to sap if user hasn't done it. */
lock_sock(sk);
if (addr) {
if (msg->msg_namelen < sizeof(*addr))
goto release;
} else {
if (llc_ui_addr_null(&llc->addr))
goto release;
}
addr = &llc->addr;
} /* bind to sap with null dev, exclusive. */
rc = llc_ui_autobind(sock, addr);
if (rc)
goto release;
}
hdrlen = llc->dev->hard_header_len + llc_ui_header_len(sk, addr);
size = hdrlen + len;
if (size > llc->dev->mtu)
size = llc->dev->mtu;
if (size > llc->dev->mtu)
copied = size - hdrlen;
+rc = -EINVAL;
+if (copied < 0)
goto out;
release_sock(skb);
skb = sock_alloc_send_skb(sk, size, noblock, &rc);
lock_sock(sk);
if (!skb)
goto release;
+goto out;
skb->dev = llc->dev;
skb->protocol = llc_proto_type(addr->sllc_arphrd);
skb_reserve(skb, hdrlen);
@@ -934,29 +960,31 @@
if (sk->sk_type == SOCK_DGRAM || addr->sllc_ua) {
    llc_build_and_send_ui_pkt(llc->sap, skb, addr->sllc_mac,
                                addr->sllc_sap);
    skb = NULL;
    goto out;
} 
if (addr->sllc_test) {
    llc_build_and_send_test_pkt(llc->sap, skb, addr->sllc_mac,
                                 addr->sllc_sap);
    skb = NULL;
    goto out;
} 
if (addr->sllc_xid) {
    llc_build_and_send_xid_pkt(llc->sap, skb, addr->sllc_mac,
                                addr->sllc_sap);
    skb = NULL;
    goto out;
} 
rc = -ENOPROTOOPT;
if (!sk->sk_type == SOCK_STREAM && !addr->sllc_ua) 
    goto out;
rc = llc_ui_send_data(sk, skb, noblock);
+skb = NULL;
out:
-if (rc) {
-kfree_skb(skb);
-release:
+kfree_skb(skb);
+if (rc)
dprintk("%s: failed sending from %02X to %02X: %d\n", 
     __func__, llc->laddr.lsap, llc->daddr.lsap, rc);
-}
-release_sock(sk);
return rc ? : copied;
}
--- linux-4.15.0.orig/net/llc/llc_c_ac.c
+++ linux-4.15.0/net/llc/llc_c_ac.c
@@ -372,6 +372,7 @@
    llc_pdu_init_as_i_cmd(skb, 1, llc->vS, llc->vR);
    rc = llc_mac_hdr_init(skb, llc->dev->dev_addr, llc->daddr.mac);
    if (likely(!rc)) {
+skb_get(skb);
llc_conn_send_pdu(skb, skb);
llc_conn_ac_inc_vs_by_1(skb, skb);
}
@@ -389,6 +390,7 @@
llc_pdu_init_as_i_cmd(skb, 0, llc->vS, llc->vR);
rc = llc_mac_hdr_init(skb, llc->dev->dev_addr, llc->daddr.mac);
if (likely(!rc)) {
+skb_get(skb);
llc_conn_send_pdu(skb, skb);
llc_conn_ac_inc_vs_by_1(skb, skb);
}
@@ -406,6 +408,7 @@
llc_pdu_init_as_i_cmd(skb, 0, llc->vS, llc->vR);
rc = llc_mac_hdr_init(skb, llc->dev->dev_addr, llc->daddr.mac);
if (likely(!rc)) {
+skb_get(skb);
llc_conn_send_pdu(skb, skb);
llc_conn_ac_inc_vs_by_1(skb, skb);
}
@@ -916,6 +919,7 @@
llc_pdu_init_as_i_cmd(skb, llc->ack_pf, llc->vS, llc->vR);
rc = llc_mac_hdr_init(skb, llc->dev->dev_addr, llc->daddr.mac);
if (likely(!rc)) {
+skb_get(skb);
llc_conn_send_pdu(skb, skb);
llc_conn_ac_inc_vs_by_1(skb, skb);
}
@@ -935,14 +939,17 @@
int llc_conn_ac_send_i_as_ack(struct sock *sk, struct sk_buff *skb)
{
 struct llc_sock *llc = llc_sk(skb);
+int ret;

 if (llc->ack_must_be_send) {
-llc_conn_ac_send_i_rsp_f_set_ackpf(skb, skb);
+ret = llc_conn_ac_send_i_rsp_f_set_ackpf(skb, skb);
 llc->ack_must_be_send = 0;
 llc->ack_pf = 0;
-} else
-llc_conn_ac_send_i_cmd_p_set_0(skb, skb);
-} return 0;
+} else {
+ret = llc_conn_ac_send_i_cmd_p_set_0(skb, skb);
+}
+return ret;
}
int llc_conn_ac_stop_all_timers(struct sock *sk, struct sk_buff *skb) {
    struct llc_sock *llc = llc_sk(sk);
    -del_timer(&llc->pf_cycle_timer.timer);
    -del_timer(&llc->ack_timer.timer);
    -del_timer(&llc->rej_sent_timer.timer);
    -del_timer(&llc->busy_state_timer.timer);
    -llc->ack_must_be_send = 0;
    -llc->ack_pf = 0;
    +llc_sk_stop_all_timers(sk, false);
    return 0;
}

--- linux-4.15.0.orig/net/llc/llc_conn.c
+++ linux-4.15.0/net/llc/llc_conn.c
@@ -55,6 +55,8 @@
 * (executing it's actions and changing state), upper layer will be
 * indicated or confirmed, if needed. Returns 0 for success, 1 for
 * failure. The socket lock has to be held before calling this function.
+ *
+ * This function always consumes a reference to the skb.
+ */
int llc_conn_state_process(struct sock *sk, struct sk_buff *skb) {
    @@ -62,12 +64,6 @@
    struct llc_sock *llc = llc_sk(skb->sk);
    struct llc_conn_state_ev *ev = llc_conn_ev(skb);
    -skb_get(skb);
    ev->ind_prim = ev->cfm_prim = 0;
    /*
    * We have to hold the skb, because llc_conn_service will kfree it in
    * the sending path and we need to look at the skb->cb, where we encode
    * llc_conn_state_ev.
    */
    -skb_get(skb);
    ev->ind_prim = ev->cfm_prim = 0;
    /*
    * Send event to state machine
    @@ -75,21 +71,12 @@
    rc = llc_conn_service(skb->sk, skb);
    if (unlikely(rc != 0)) {
        printk(KERN_ERR "%s: llc_conn_service failed\n", __func__);
        -goto out_kfree_skb;
    -}
-if (unlikely((ev->ind_prim && !ev->cfm_prim))) {
    /* indicate or confirm not required */
    -if (!skb->next)
        -goto out_kfree_skb;
    goto out_skb_put;
}

-if (unlikely((ev->ind_prim && ev->cfm_prim)) /* Paranoia */)  
-skb_get(skb);

    switch (ev->ind_prim) {
        case LLC_DATA_PRIM:
            skb_get(skb);
            llc_save_primitive(sk, skb, LLC_DATA_PRIM);
            if (unlikely(sock_queue_rcv_skb(sk, skb))) {
                /* skb->sk pointing to the newly created struct sock in
                 * llc_conn_handler. -acme
                */
                skb_get(skb);
                skb_queue_tail(&sk->sk_receive_queue, skb);
                sk->sk_state_change(sk);
                break;
            }
            -kfree_skb(skb);
            sock_put(sk);
            break;
        case LLC_RESET_PRIM:
            /* RESET is not being notified to upper layers for now */
            printk(KERN_INFO "%s: received a reset ind!\n", __func__);
            -kfree_skb(skb);
            break;
            break;
            default:
                -if (ev->ind_prim) {
                    +if (ev->ind_prim)
                        printk(KERN_INFO "%s: received unknown %d prim!\n", __func__, ev->ind_prim);
                        -kfree_skb(skb);
                        
                        /* No indication */
            break;
        }
    }
@@ -179,15 +163,12 @@
    printk(KERN_INFO "%s: received a reset conf!\n", __func__);  
    break;
    default:
   -if (ev->cfm_prim) {
   +if (ev->cfm_prim)
    printk(KERN_INFO "%s: received unknown %d prim!\n",  
         __func__, ev->cfm_prim);
    -break;
    -}
   -goto out_skb_put; /* No confirmation */
   +/* No confirmation */
   +break;
   }
   -out_kfree_skb:
   -kfree_skb(skb);
   out_skb_put:
   kfree_skb(skb);
   return rc;
@@ -720,6 +701,7 @@
    llc_sk(sk)->sap = sap;

    spin_lock_bh(&sap->sk_lock);
    +sock_set_flag(sk, SOCK_RCU_FREE);
    sap->sk_count++;
    skb->skap = sap;
    sk_nulls_add_node_rcu(sk, laddr_hb);
    hlist_add_head(&llc->dev_hash_node, dev_hb);
@@ -947,6 +929,26 @@
    return sk;
   }
   +void llc_sk_stop_all_timers(struct sock *sk, bool sync)  
   +{
   +struct llc_sock *llc = llc_sk(sk);
   +
   +if (sync) {
   +del_timer_sync(&llc->pf_cycle_timer.timer);
   +del_timer_sync(&llc->ack_timer.timer);
   +del_timer_sync(&llc->rej_sent_timer.timer);
   +del_timer_sync(&llc->busy_state_timer.timer);
   +} else {
   +del_timer(&llc->pf_cycle_timer.timer);
   +del_timer(&llc->ack_timer.timer);
   +del_timer(&llc->rej_sent_timer.timer);
   +del_timer(&llc->busy_state_timer.timer);
   +}  
   +llc->ack_must_be_send = 0;
llc->state = LLC_CONN_OUT_OF_SVC;
/* Stop all (possibly) running timers */
-llc_conn_ac_stop_all_timers(sk, NULL);
+llc_sk_stop_all_timers(sk, true);
#endif DEBUG_LLC_CONN_ALLOC
printk(KERN_INFO "@sk = %p, unackq=%d, txq=%d\n", __func__, skb_queue_len(&llc->pdu_unack_q),
--- linux-4.15.0.orig/net/llc/llc_core.c
+++ linux-4.15.0/net/llc/llc_core.c
@@ -127,9 +127,7 @@
    list_del_rcu(&sap->node);
    spin_unlock_bh(&llc_sap_list_lock);

-synchronize_rcu();
-
-kfree(sap);
+kfree_rcu(sap, rcu);

static struct packet_type llc_packet_type __read_mostly = {
--- linux-4.15.0.orig/net/llc/llc_if.c
+++ linux-4.15.0/net/llc/llc_if.c
@@ -38,6 +38,8 @@
    *closed and -EBUSY when sending data is not permitted in this state or
    *LLC has send an I pdu with p bit set to 1 and is waiting for it's
    *response.
+ *
+ *This function always consumes a reference to the skb.
+ */
```c
int llc_build_and_send_pkt(struct sock *sk, struct sk_buff *skb)
{
    struct llc_sock *llc = llc_sk(sk);

    if (unlikely(llc->state == LLC_CONN_STATE_ADM))
        goto out;
    goto out_free;
    rc = -EBUSY;
    if (unlikely(llc_data_accept_state(llc->state) || /* data_conn_refuse */
             llc->p_flag)) {
        llc->failed_data_req = 1;
        goto out;
    }
    goto out_free;
}
```
```c
+skb_get(skb);
rc = dev_queue_xmit(skb);
+
return rc;
}

@@ -77,12 +79,14 @@
struct llc_sap_state_ev *ev = llc_sap_ev(skb);
int rc;

-llc_pdu_header_init(skb, LLC_PDU_TYPE_U, ev->saddr.lsap,
+llc_pdu_header_init(skb, LLC_PDU_TYPE_U_XID, ev->saddr.lsap,
    ev->daddr.lsap, LLC_PDU_CMD);
llc_pdu_init_as_xid_cmd(skb, LLC_XID_NULL_CLASS_2, 0);
rc = llc_mac_hdr_init(skb, ev->saddr.mac, ev->daddr.mac);
-If (likely(!rc))
+If (likely(!rc)) {
+skb_get(skb);
rc = dev_queue_xmit(skb);
+
return rc;
}

@@ -135,8 +139,10 @@
        ev->daddr.lsap, LLC_PDU_CMD);
llc_pdu_init_as_test_cmd(skb);
rc = llc_mac_hdr_init(skb, ev->saddr.mac, ev->daddr.mac);
-If (likely(!rc))
+If (likely(!rc)) {
+skb_get(skb);
rc = dev_queue_xmit(skb);
+
return rc;
}

--- linux-4.15.0.orig/net/llc/llc_sap.c
+++ linux-4.15.0/net/llc/llc_sap.c
@@ -197,29 +197,22 @@
    *After executing actions of the event, upper layer will be indicated
    *if needed(on receiving an UI frame). skb can be null for the
    *datalink_proto case.
+ *
+ *This function always consumes a reference to the skb.
+ */
static void llc_sap_state_process(struct llc_sap *sap, struct sk_buff *skb) {
    struct llc_sap_state_ev *ev = llc_sap_ev(skb);
```

---
- skb_get(skb);
ev->ind_cfm_flag = 0;
llc_sap_next_state(sap, skb);
-if (ev->ind_cfm_flag == LLC_IND) {
- skb->sk->sk_state == TCP_LISTEN
-kfree_skb(skb);
-} else {
- llc_save_primitive(skb->sk, skb, ev->prim);

- /* queue skb to the user. */
- if (sock_queue_rcv_skb(skb->sk, skb))
- kfree_skb(skb);
- }
+ if (ev->ind_cfm_flag == LLC_IND && skb->sk->sk_state != TCP_LISTEN) {
+ llc_save_primitive(skb->sk, skb, ev->prim);
+ }
+ /* queue skb to the user. */
+ if (sock_queue_rcv_skb(skb->sk, skb) == 0)
+ return;
}
kfree_skb(skb);
}
--- linux-4.15.0.orig.net/llc_station.c
+++ linux-4.15.0/net/llc_station.c
@@ -32,7 +32,7 @@
return LLC_PDU_IS_CMD(pdu) &&			/* command PDU */
 LLC_PDU_TYPE_IS_U(pdu) &&		/* U type PDU */
 LLC_U_PDU_CMD(pdu) == LLC_1_PDU_CMD_TEST &&
 - !pdu->dsap ? 0 : 1;/* NULL DSAP value */
+ !pdu->dsap;/* NULL DSAP value */
}

static int llc_stat_ev_rx_null_dsap_test_c(struct sk_buff *skb)
@@ @ -42,7 +42,7 @@
return LLC_PDU_IS_CMD(pdu) &&		/* command PDU */
 LLC_PDU_TYPE_IS_U(pdu) &&		/* U type PDU */
 LLC_U_PDU_CMD(pdu) == LLC_1_PDU_CMD_TEST &&
 - !pdu->dsap ? 0 : 1;/* NULL DSAP */
+ !pdu->dsap;/* NULL DSAP */
}

static int llc_station_ac_send_xid_r(struct sk_buff *skb)
--- linux-4.15.0.orig.net/mac80211/agg-rx.c
+++ linux-4.15.0/net/mac80211/agg-rx.c
@@ -8,6 +8,7 @@
    * Copyright 2007, Michael Wu <flamingice@sourmilk.net>
    * Copyright 2007-2010, Intel Corporation
    * Copyright(c) 2015-2017 Intel Deutschland GmbH
  + * Copyright (C) 2018        Intel Corporation
    *
    * This program is free software; you can redistribute it and/or modify
    * it under the terms of the GNU General Public License version 2 as
@@ -315,9 +316,6 @@
    */
    status = WLAN_STATUS_REQUEST_DECLINED;
    -ieee80211_send_addba_resp(sta->sdata, sta->sta.addr,
    -    tid, dialog_token, status,
    -    1, buf_size, timeout);
  goto end;
}

--- linux-4.15.0.orig/net/mac80211/agg-tx.c
+++ linux-4.15.0/net/mac80211/agg-tx.c
@@ -8,6 +8,7 @@
    * Copyright 2007, Michael Wu <flamingice@sourmilk.net>
    * Copyright 2007-2010, Intel Corporation
    * Copyright(c) 2015-2017 Intel Deutschland GmbH
  + * Copyright (C) 2018 - 2019 Intel Corporation
    *
    * This program is free software; you can redistribute it and/or modify
    * it under the terms of the GNU General Public License version 2 as
@@ -984,6 +987,9 @@
    sta->ampdu_mlme.addba_req_num[tid] = 0;

    +tid_tx->timeout =
    +le16_to_cpu(mgmt->u.action.u.addba_resp.timeout);
    +
    if (tid_tx->timeout) {
        mod_timer(&tid_tx->session_timer,
                        TU_TO_EXP_TIME(tid_tx->timeout));

--- linux-4.15.0.orig/net/mac80211/agg-tx.c
+++ linux-4.15.0/net/mac80211/agg-tx.c
@@ -8,6 +8,7 @@
    * Copyright 2007, Michael Wu <flamingice@sourmilk.net>
    * Copyright 2007-2010, Intel Corporation
    * Copyright(c) 2015-2017 Intel Deutschland GmbH
  + * Copyright (C) 2018 - 2019 Intel Corporation
    *
    * This program is free software; you can redistribute it and/or modify
    * it under the terms of the GNU General Public License version 2 as
@@ -365,6 +366,8 @@
    set_bit(HT_AGG_STATE_STOPPING, &tid_tx->state);

    +ieee80211_agg_stop_txq(sta, tid);
    +
    spin_unlock_bh(&sta->lock);

    ht_dbg(sta->sdata, “Tx BA session stop requested for %pM tid %u\n”,
@@ -984,6 +987,9 @@
    sta->ampdu_mlme.addba_req_num[tid] = 0;

    +tid_tx->timeout =
    +le16_to_cpu(mgmt->u.action.u.addba_resp.timeout);
    +
    if (tid_tx->timeout) {
        mod_timer(&tid_tx->session_timer,
                        TU_TO_EXP_TIME(tid_tx->timeout));
case NL80211_IFTYPE_AP:
    case NL80211_IFTYPE_AP_VLAN:
        /* Keys without a station are used for TX only */
        -if (key->sta && test_sta_flag(key->sta, WLAN_STA_MFP))
        +if (sta && test_sta_flag(sta, WLAN_STA_MFP))
            key->conf.flags |= IEEE80211_KEY_FLAG_RX_MGMT;
            break;
    case NL80211_IFTYPE_ADHOC:
        @ @ -494,7 +494,7 @@
        goto out_unlock;
    }

    -ieee80211_key_free(key, true);
    +ieee80211_key_free(key, sdata->vif.type == NL80211_IFTYPE_STATION);

    ret = 0;
    out_unlock:
    @ @ -661,7 +661,8 @@
    u16 brate;

    sband = ieee80211_get_sband(sta->sdata);
    -if (sband) {
    +WARN_ON_ONCE(sband && !sband->bitrates);
        +if (sband && sband->bitrates) {
            brate = sband->bitrates[rate->idx].bitrate;
            rinfo->legacy = DIV_ROUND_UP(brate, 1 << shift);
        }
        @ @ -884,6 +885,7 @@
            BSS_CHANGED_P2P_PS |
            BSS_CHANGED_TXPOWER;
    int err;
    +int prev_beacon_int;

    old = sdata_dereference(sdata->u.ap.beacon, sdata);
    if (old)
        @ @ -906,6 +908,7 @@

    sdata->needed_rx_chains = sdata->local->rx_chains;

    +prev_beacon_int = sdata->vif.bss_conf.beacon_int;
    sdata->vif.bss_conf.beacon_int = params->beacon_interval;

    mutex_lock(&local->mtx);
    @ @ -914,8 +917,10 @@
    if (!err)
ieee80211_vif_copy_chanctx_to_vlans(sdata, false);
mutex_unlock(&local->mtx);
-if (err)
+if (err) {
+sdata->vif.bss_conf.beacon_int = prev_beacon_int;
return err;
+}

/*
 * Apply control port protocol, this allows us to
@@ -1085,50 +1090,6 @@
 return 0;
 */

-/* Layer 2 Update frame (802.2 Type 1 LLC XID Update response) */
-struct iapp_layer2_update {
- u8 da[ETH_ALEN]; /* broadcast */
- u8 sa[ETH_ALEN]; /* STA addr */
- __be16 len; /* 6 */
- u8 dsap; /* 0 */
- u8 ssap; /* 0 */
- u8 control;
- u8 xid_info[3];
- } __packed;
-
-static void ieee80211_send_layer2_update(struct sta_info *sta)
-{
- struct iapp_layer2_update *msg;
- struct sk_buff *skb;
-
- /* Send Level 2 Update Frame to update forwarding tables in layer 2
- * bridge devices */
- skb = dev_alloc_skb(sizeof(*msg));
- if (!skb)
- return;
- msg = skb_put(skb, sizeof(*msg));
-
- /* 802.2 Type 1 Logical Link Control (LLC) Exchange Identifier (XID)
- * Update response frame; IEEE Std 802.2-1998, 5.4.1.2.1 */
- eth_broadcast_addr(msg->da);
- memcpy(msg->sa, sta->sta.addr, ETH_ALEN);
- msg->len = htons(6);
- msg->dsap = 0;
- msg->ssap = 0x01; /* NULL LSAP, CR Bit: Response */
- msg->control = 0xaf; /* XID response lsb.1111F101. */
- * F=0 (no poll command; unsolicited frame) */
- skb->dev = sta->sdata->dev;
- skb->protocol = eth_type_trans(skb, sta->sdata->dev);
- memset(skb->cb, 0, sizeof(skb->cb));
- netif_rx(skb);
-
- static int sta_apply_auth_flags(struct ieee80211_local *local,
   struct sta_info *sta,
   u32 mask, u32 set)
   @@ -1438,7 +1399,6 @@
   sdata = IEEE80211_DEV_TO_SUB_IF(params->vlan);
   @@ -1455,6 +1415,11 @@
   sta = sta_info_alloc(sdata, mac, GFP_KERNEL);
   if (!sta)
     return -ENOMEM;
+if (params->sta_flags_set & BIT(NL80211_STA_FLAG_TDLS_PEER) &&
+    sdata->vif.type == NL80211_IFTYPE_STATION &&
+    !sdata->u.mgd.associated)
+  return -EINVAL;
+sta = sta_info_alloc(sdata, mac, GFP_KERNEL);
if (sta)
  return -ENOMEM;
  @@ -1477,18 +1442,12 @@
  test_sta_flag(sta, WLAN_STA_ASSOC))
  rate_control_rate_init(sta);
-
- if (layer2_update = sdata->vif.type == NL80211_IFTYPE_AP_VLAN ||
-    sdata->vif.type == NL80211_IFTYPE_AP;
- err = sta_info_insert_rcu(sta);
- if (err) {
-    rcu_read_unlock();
-    return err;
-  }

- if (layer2_update)
- iee80211_send_layer2_update(sta);
rcu_read_unlock();
return 0;
@@ -1577,8 +1536,10 @@
}
if (sta->sdata->vif.type == NL80211_IFTYPE_AP_VLAN &&
- sta->sdata->u.vlan.sta)
+ sta->sdata->u.vlan.sta) {
+iieee80211_clear_fast_rx(sta);
RCU_INIT_POINTER(sta->sdata->u.vlan.sta, NULL);
+
}
if (test_sta_flag(sta, WLAN_STA_AUTHORIZED))
ieee80211_vif_dec_num_mcast(sta->sdata);  
@@ -1586,10 +1547,11 @@
sta->sdata = vlansdata;
ieee80211_check_fast_xmit(sta);
-ieee80211_send_layer2_update(sta);  
+cfg80211_send_layer2_update(sta->sdata->dev,  
+ sta->sta.addr);
+
}
err = sta_apply_parameters(local, sta, params);
@@ -2038,6 +2000,7 @@
ieee80211_stop_mesh(sdata);
mutex_lock(&sdata->local->mtx);
ieee80211_vif_release_channel(sdata);
+kfree(sdata->u.mesh.ie);
mutex_unlock(&sdata->local->mtx);
return 0;
@@ -2373,10 +2336,17 @@
struct ieee80211_sub_if_data *sdata;
enum nl80211_tx_power_setting txp_type = type;
bool update_txp_type = false;
+bool has_monitor = false;

if (wdev) {
sdata = IEEE80211_WDEV_TO_SUB_IF(wdev);
+if (sdata->vif.type == NL80211_IFTYPE_MONITOR) { 
  sdata = rtnl_dereference(local->monitor_sdata); 
  +if (!sdata) 
  +return -EOPNOTSUPP; 
  +} 
+
+switch (type) {
+  
+  case NL80211_TX_POWER_AUTOMATIC: 
  sdata->user_power_level = IEEE80211_UNSET_POWER_LEVEL; 
@@ -2415,15 +2385,34 @@ 
  mutex_lock(&local->iflist_mtx); 
  list_for_each_entry(sdata, &local->interfaces, list) {
  +if (sdata->vif.type == NL80211_IFTYPE_MONITOR) {
  +has_monitor = true; 
  +continue; 
  +} 
  sdata->user_power_level = local->user_power_level; 
  if (txp_type != sdata->vif.bss_conf.txpower_type)
  +update_txp_type = true; 
  sdata->vif.bss_conf.txpower_type = txp_type; 
  } 
-  list_for_each_entry(sdata, &local->interfaces, list) 
-  list_for_each_entry(sdata, &local->interfaces, list) {
-  +if (sdata->vif.type == NL80211_IFTYPE_MONITOR) 
-    +continue; 
-  } 
  ieee80211_recalc_txpower(sdata, update_txp_type); 
+} 
  mutex_unlock(&local->iflist_mtx); 
+}
+
+if (has_monitor) {
+  sdata = rtnl_dereference(local->monitor_sdata); 
+  +if (sdata) 
+    +sdata->user_power_level = local->user_power_level; 
+  +if (txp_type != sdata->vif.bss_conf.txpower_type)
+    +update_txp_type = true; 
+  +sdata->vif.bss_conf.txpower_type = txp_type; 
+  +
+  +ieee80211_recalc_txpower(sdata, update_txp_type); 
+} 
+}
+}
+
+return 0;
+} 
@@ -2765,14 +2754,14 @@
 continue;
for (j = 0; j < IEEE80211_HT_MCS_MASK_LEN; j++) {
  if (~sdata->rc_rateidx_mcs_mask[i][j]) {
    if (sdata->rc_rateidx_mcs_mask[i][j] != 0xff) {
      sdata->rc_has_mcs_mask[i] = true;
      break;
    }
  }
}

for (j = 0; j < NL80211_VHT_NSS_MAX; j++) {
  if (~sdata->rc_rateidx_vht_mcs_mask[i][j]) {
    if (sdata->rc_rateidx_vht_mcs_mask[i][j] != 0xffff) {
      sdata->rc_has_vht_mcs_mask[i] = true;
      break;
    }
  }
}

return err;

+static void ieee80211_end_cac(struct wiphy *wiphy, 
+  struct net_device *dev)
+{
+  struct ieee80211_sub_if_data *sdata = IEEE80211_DEV_TO_SUB_IF(dev);
+  struct ieee80211_local *local = sdata->local;
+
+  mutex_lock(&local->mtx);
+  list_for_each_entry(sdata, &local->interfaces, list) {
+    /* it might be waiting for the local->mtx, but then
+     * by the time it gets it, sdata->wdev.cac_started
+     * will no longer be true
+     */
+    cancel_delayed_work(&sdata->dfs_cac_timer_work);
+    +if (sdata->wdev.cac_started) {
+      ieee80211_vif_release_channel(sdata);
+      sdata->wdev.cac_started = false;
+    }
+  }
+  mutex_unlock(&local->mtx);
+
+  static struct cfg80211_beacon_data *
+  cfg80211_beacon_dup(struct cfg80211_beacon_data *beacon)
+  {
+    @ @ -2863,7 +2874,7 @@
+    if (beacon->probe_resp_len) {
+      new_beacon->probe_resp_len = beacon->probe_resp_len;
+      -beacon->probe_resp = pos;
+    }
new beacon->probe_resp = pos;
memcpy(pos, beacon->probe_resp, beacon->probe_resp_len);
pos += beacon->probe_resp_len;
}
@
@@ -3745,6 +3756,7 @@
#endif
.get_channel = ieee80211_cfg_get_channel,
.start_radar_detection = ieee80211_start_radar_detection,
+end_cac = ieee80211_end_cac,
.channel_switch = ieee80211_channel_switch,
.set_qos_map = ieee80211_set_qos_map,
.set_ap_chanwidth = ieee80211_set_ap_chanwidth,
--- linux-4.15.0.orig/net/mac80211/debugfs_netdev.c
+++ linux-4.15.0/net/mac80211/debugfs_netdev.c
@@ -490,9 +490,14 @@

const struct ieee80211_sub_if_data *sdata, char *buf, int buflen)
{
 struct ieee80211_local *local = sdata->local;
-struct txq_info *txqi = to_txq_info(sdata->vif.txq);
+struct txq_info *txqi;

int len;
+if (!sdata->vif.txq)
+return 0;
+
+txqi = to_txq_info(sdata->vif.txq);
+
spin_lock_bh(&local->fq.lock);
rcu_read_lock();

@@ -659,7 +664,9 @@
DEBUGFS_ADD(rc_rateidx_vht_mcs_mask_5ghz);
DEBUGFS_ADD(hw_queues);

-if (sdata->local->ops->wake_tx_queue)
+if (sdata->local->ops->wake_tx_queue &&
+ sdata->vif.type != NL80211_IFTYPE_P2P_DEVICE &&
+ sdata->vif.type != NL80211_IFTYPE_NAN)
DEBUGFS>Add(aqm);
}
@@ -838,7 +845,7 @@

dir = sdata->vif.debugfs_dir;

-if (!dir)
+if (IS_ERR_OR_NULL(dir))
  return;
sprintf(buf, "netdev:%s", sdata->name);
--- linux-4.15.0.orig/net/mac80211/debugfs_sta.c
+++ linux-4.15.0/net/mac80211/debugfs_sta.c
@@ -80,6 +80,7 @@
    FLAG(MPSP_OWNER),
    FLAG(MPSP_RECIPIENT),
    FLAG(PS_DELIVER),
+    FLAG(USES_ENCRYPTION),
    #undef FLAG
    }
};

--- linux-4.15.0.orig/net/mac80211/driver-ops.c
+++ linux-4.15.0/net/mac80211/driver-ops.c
@@ -128,8 +128,11 @@
 } else if (old_state == IEEE80211_STA_AUTH &&
     new_state == IEEE80211_STA_ASSOC) {
     ret = drv_sta_add(local, sdata, &sta->sta);
-    if (ret == 0)
+    if (ret == 0) {
        sta->uploaded = true;
+        if (rcu_access_pointer(sta->sta.rates))
+            drv_sta_rate_tbl_update(local, sdata, &sta->sta);
+    }
 } else if (old_state == IEEE80211_STA_ASSOC &&
     new_state == IEEE80211_STA_AUTH) {
     drv_sta_remove(local, sdata, &sta->sta);
@@ -169,11 +172,16 @@
 if (!check_sdata_in_driver(sdata))
 return -EIO;

-    if (WARN_ONCE(params->cw_min == 0 ||
-        params->cw_min > params->cw_max,
-        "%s: invalid CW_min/CW_max: %d/%d\n",
-        sdata->name, params->cw_min, params->cw_max))
+    if (params->cw_min == 0 || params->cw_min > params->cw_max) {
+        /* If we can't configure hardware anyway, don't warn. We may
+         * never have initialized the CW parameters.
+         */
+        WARN_ONCE(local->ops->conf_tx,
+            "%s: invalid CW_min/CW_max: %d/%d\n",
+            sdata->name, params->cw_min, params->cw_max);
+        return -EINVAL;
+    }

     trace_drv_conf_tx(local, sdata, ac, params);
     if (local->ops->conf_tx)
--- linux-4.15.0.orig/net/mac80211/driver-ops.h
+++ linux-4.15.0/net/mac80211/driver-ops.h
@@ -165,7 +165,8 @@
if (WARN_ON_ONCE(sdata->vif.type == NL80211_IFTYPE_P2P_DEVICE ||
sdata->vif.type == NL80211_IFTYPE_NAN ||
   sdata->vif.type == NL80211_IFTYPE_MONITOR &&
-   !sdata->vif.mu_mimo_owner))
+   !sdata->vif.mu_mimo_owner &&
+   !(changed & BSS_CHANGED_TXPOWER)))
return;

if (!check_sdata_in_driver(sdata))
@@ -1163,6 +1164,9 @@
{
   struct ieee80211_sub_if_data *sdata = vif_to_sdata(txq->txq.vif);

   +if (local->in_reconfig)
   +return;
   +
   if (!check_sdata_in_driver(sdata))
   return;

--- linux-4.15.0.orig/net/mac80211/ibss.c
+++ linux-4.15.0/net/mac80211/ibss.c
@@ -947,8 +947,8 @@
if (len < IEEE80211_DEAUTH_FRAME_LEN)
    return;
    -ibss_dbg(sdata, "RX DeAuth SA=%pM DA=%pM BSSID=%pM (reason: %d)\n",
        - mgmt->sa, mgmt->da, mgmt->bssid, reason);
+ibss_dbg(sdata, "RX DeAuth SA=%pM DA=%pM\n", mgmt->sa, mgmt->da);
+ibss_dbg(sdata, "tBSSID=%pM (reason: %d)\n", mgmt->bssid, reason);
    sta_info_destroy_addr(sdata, mgmt->sa);
 }

 @ @ -966,9 +966,9 @@
 auth_alg = le16_to_cpu(mgmt->u.auth.auth_alg);
 auth_transaction = le16_to_cpu(mgmt->u.auth.auth_transaction);

 -ibss_dbg(sdata, "RX Auth SA=%pM DA=%pM BSSID=%pM (auth_transaction=%d)\n",
-      mgmt->sa, mgmt->da, mgmt->bssid, auth_transaction);
+ibss_dbg(sdata, "RX Auth SA=%pM DA=%pM\n", mgmt->sa, mgmt->da);
+ibss_dbg(sdata, "tBSSID=%pM (auth_transaction=%d)\n",
+      mgmt->bssid, auth_transaction);

if (auth_alg != WLAN_AUTH_OPEN || auth_transaction != 1) return;
rx_timestamp = drv_get_tsf(local, sdata);
}

-ibss_dbg(sdata,
  - "RX beacon SA=%pM BSSID=%pM TSF=0x%llx BCN=0x%llx diff=%lld @%lu\n",
  +ibss_dbg(sdata, "RX beacon SA=%pM BSSID=%pM TSF=0x%llx\n",
  mgmt->sa, mgmt->bssid,
  - (unsigned long long)rx_timestamp,
  + (unsigned long long)rx_timestamp);
+ibss_dbg(sdata, "tBCN=0x%llx diff=%lld @%lu\n",
  (unsigned long long)beacon_timestamp,
  (unsigned long long)(rx_timestamp - beacon_timestamp),
  jiffies);
@@ -1537,9 +1537,9 @@
  tx_last_beacon = drv_tx_last_beacon(local);

-ibss_dbg(sdata,
  - "RX ProbeReq SA=%pM DA=%pM BSSID=%pM (tx_last_beacon=%d)\n",
  - mgmt->sa, mgmt->da, mgmt->bssid, tx_last_beacon);
+ibss_dbg(sdata, "RX ProbeReq SA=%pM DA=%pM\n",
  + mgmt->bssid, tx_last_beacon);
  if (!tx_last_beacon && is_multicast_ether_addr(mgmt->da))
    return;
@@ -1860,6 +1860,8 @@
/* remove beacon */
kfree(sdata->u.ibss.ie);
+sdata->u.ibss.ie = NULL;
+sdata->u.ibss.ie_len = 0;
/* on the next join, re-program HT parameters */
memset(&ifibss->ht_capa, 0, sizeof(ifibss->ht_capa));
--- linux-4.15.0.orig/net/mac80211/ieee80211_i.h
+++ linux-4.15.0/net/mac80211/ieee80211_i.h
@@ -52,12 +52,6 @@
#define IEEE80211_ENCRYPT_HEADROOM 8
#define IEEE80211_ENCRYPT_TAILROOM 18
/* IEEE 802.11 (Ch. 9.5 Defragmentation) requires support for concurrent
  * reception of at least three fragmented frames. This limit can be increased
  * by changing this define, at the cost of slower frame reassembly and
  * increased memory use (about 2 kB of RAM per entry). */
#define IEEE80211_FRAGMENT_MAX 4

-/* IEEE 802.11 (Ch. 9.5 Defragmentation) requires support for concurrent
  * reception of at least three fragmented frames. This limit can be increased
  * by changing this define, at the cost of slower frame reassembly and
  * increased memory use (about 2 kB of RAM per entry). */
/* power level hasn't been configured (or set to automatic) */
#define IEEE80211_UNSET_POWER_LEVEL INT_MIN

@@ -90,18 +84,6 @@
#define IEEE80211_MAX_NAN_INSTANCE_ID 255

-struct ieee80211_fragment_entry {
-struct sk_buff_head skb_list;
-unsigned long first_frag_time;
-u16 seq;
-u16 extra_len;
-u16 last_frag;
-u8 rx_queue;
-bool check_sequential_pn; /* needed for CCMP/GCMP */
-u8 last_pn[6]; /* PN of the last fragment if CCMP was used */
-};
-
-struct ieee80211_bss {
 u32 device_ts_beacon, device_ts_presp;

@@ -241,8 +223,15 @@
 */
 int security_idx;

-u32 tkip_iv32;
-u16 tkip_iv16;
+union {
+ struct {
+ u32 iv32;
+ u16 iv16;
+ } tkip;
+ struct {
+ u8 pn[IEEE80211_CCMP_PN_LEN];
+ } ccm_gcm;
+ };
+
 struct ieee80211_csa_settings {
@@ -881,9 +870,7 @@
 char name[IFNAMSIZ];

-/* Fragment table for host-based reassembly */
-struct ieee80211_fragment_entry fragments[IEEE80211_FRAGMENT_MAX];
-unsigned int fragment_next;
+struct ieee80211_fragment_cache frags;
/* TID bitmap for NoAck policy */

u16 noack_map;
@@ -1047,6 +1034,7 @@
IEEE80211_QUEUE_STOP_REASON_FLUSH,
IEEE80211_QUEUE_STOP_REASON_TDLS_TEARDOWN,
IEEE80211_QUEUE_STOP_REASON_RESERVE_TID,
+IEEE80211_QUEUE_STOP_REASON_IFTYPE_CHANGE,

IEEE80211_QUEUE_STOP_REASONS,
};
@@ -1406,7 +1394,7 @@
rcu_read_lock();
chanctx_conf = rcu_dereference(sdata->vif.chanctx_conf);

- if (WARN_ON(!chanctx_conf)) {
+ if (!chanctx_conf) {
     rcu_read_unlock();
     return NULL;
 }
const u8 *peer, u16 reason);
const char *ieee80211_get_reason_code_string(u16 reason_code);

extern const struct ethtool_ops ieee80211_ethtool_ops;

#define debug_noinline
#endif

void ieee80211_init_frag_cache(struct ieee80211_fragment_cache *cache);
void ieee80211_destroy_frag_cache(struct ieee80211_fragment_cache *cache);

#define IEEE80211_I_H */
--- linux-4.15.0.orig/net/mac80211/iface.c
+++ linux-4.15.0/net/mac80211/iface.c
@@ -1013,6 +1013,8 @@
    ieee80211_clear_tx_pending(local);

    sdata->vif.bss_conf.beacon_int = 0;
+    /*
    * If the interface goes down while suspended, presumably because
    * the device was unplugged and that happens before our resume,
    @@ -1106,16 +1108,12 @@
    */
    static void ieee80211_teardown_sdata(struct ieee80211_sub_if_data *sdata)
    {
        -int i;
        -
        /* free extra data */
        ieee80211_free_keys(sdata, false);

       ieee80211_debugfs_remove_netdev(sdata);

        -for (i = 0; i < IEEE80211_FRAGMENT_MAX; i++)
          -__skb_queue_purge(&sdata->fragments[i].skb_list);
        -sdata->fragment_next = 0;
        +ieee80211_destroy_frag_cache(&sdata->frags);

        if (ieee80211_vif_is_mesh(&sdata->vif))
          ieee80211_mesh_teardown_sdata(sdata);
    @ @ -1474,7 +1472,7 @@
        break;
    case NL80211_IFTYPE_UNSPECIFIED:
    case NUM_NL80211_IFTYPES:
      -BUG();
      +WARN_ON(1);
break;
}

@@ -1538,6 +1536,10 @@
if (ret)
    return ret;

+ieee80211_stop_vif_queues(local, sdata,
+  IEEE80211_QUEUE_STOP_REASON_IFTYPE_CHANGE);
+synchronize_net();
+
    ieee80211_do_stop(sdata, false);

    ieee80211_teardown_sdata(sdata);
@@ -1558,6 +1560,8 @@
    err = ieee80211_do_open(&sdata->wdev, false);
    WARN(err, "type change: do_open returned %d", err);

+ieee80211_wake_vif_queues(local, sdata,
+  IEEE80211_QUEUE_STOP_REASON_IFTYPE_CHANGE);
return ret;
}

@@ -1755,7 +1759,8 @@
if (local->ops->wake_tx_queue &&
    type != NL80211_IFTYPE_AP_VLAN &&
-   type != NL80211_IFTYPE_MONITOR)
+   (type != NL80211_IFTYPE_MONITOR ||
+    (params->flags & MONITOR_FLAG_ACTIVE))
    txq_size += sizeof(struct txq_info) +
        local->hw.txq_data_size;
@@ -1821,8 +1826,7 @@
    sdata->wdev.wiphy = local->hw.wiphy;
    sdata->local = local;

    -for (i = 0; i < IEEE80211_FRAGMENT_MAX; i++)
+for (i = 0; i < IEEE80211_FRAGMENT_MAX; i++)
    -skb_queue_head_init(&sdata->fragments[i].skb_list);
    +ieee80211_init_frag_cache(&sdata->frags);

    INIT_LIST_HEAD(&sdata->key_list);
@@ -1905,6 +1909,9 @@
    list_del_rcu(&sdata->list);
    mutex_unlock(&sdata->local->iflist_mtx);

    +if (sdata->vif.txq)
+ieee80211_txq_purge(sdata->local, to_txq_info(sdata->vif.txq));
+
synchronize_rcu();

if (sdata->dev) {
--- linux-4.15.0.orig/net/mac80211/key.c
+++ linux-4.15.0/net/mac80211/key.c
@@ -335,6 +335,7 @@
if (sta) {
	static atomic_t key_color = ATOMIC_INIT(0);
struct ieee80211_key *old_key;

 @@ -648,12 +649,23 @@
 struct sta_info *sta)
 }

 struct ieee80211_local *local = sdata->local;
+static atomic_t key_color = ATOMIC_INIT(0);
 struct ieee80211_key *old_key;
-int idx, ret;
-bool pairwise;
+int idx = key->conf.keyidx;
+bool pairwise = key->conf.flags & IEEE80211_KEY_FLAG_PAIRWISE;
+/*
 + * We want to delay tailroom updates only for station - in that
 + * case it helps roaming speed, but in other cases it hurts and
 + * can cause warnings to appear.
 + */
+bool delay_tailroom = sdata->vif.type == NL80211_IFTYPE_STATION;
+int ret;

-pairwise = key->conf.flags & IEEE80211_KEY_FLAG_PAIRWISE;
-idx = key->conf.keyidx;
+/*
 + * Assign a unique ID to every key so we can easily prevent mixed
 + * key and fragment cache attacks.
 + */
+key->color = atomic_inc_return(&key_color);

 mutex_lock(&sdata->local->key_mtx);

 @@ -681,14 +693,14 @@
 increment_tailroom_need_count(sdata);

 ieee80211_key_replace(sdata, sta, pairwise, old_key, key);
-ieee80211_key_destroy(old_key, true);
+ieee80211_key_destroy(old_key, delay_tailroom);

ieee80211_debugfs_key_add(key);

if (!local->wowlan) {
    ret = ieee80211_key_enable_hw_accel(key);
    if (ret)
        ieee80211_key_free(key, true);
    else {
        ret = 0;
    }
   @@ -923,7 +935,8 @@
    ieee80211_key_replace(key->sdata, key->sta,
        key->conf.flags & IEEE80211_KEY_FLAG_PAIRWISE, key, NULL);
    -__ieee80211_key_destroy(key, true);
    +__ieee80211_key_destroy(key, key->sdata->vif.type ==
    +NL80211_IFTYPE_STATION);
    }

    for (i = 0; i < NUM_DEFAULT_KEYS; i++) {
    @@ -933,7 +946,8 @@
    ieee80211_key_replace(key->sdata, key->sta,
        key->conf.flags & IEEE80211_KEY_FLAG_PAIRWISE, key, NULL);
    -__ieee80211_key_destroy(key, true);
    +__ieee80211_key_destroy(key, key->sdata->vif.type ==
    +NL80211_IFTYPE_STATION);
    }

    mutex_unlock(&local->key_mtx);
    --- linux-4.15.0.orig/net/mac80211/key.h
    +++ linux-4.15.0/net/mac80211/key.h
    @@ -127,6 +127,8 @@
    } debugfs;
    #endif

    +unsigned int color;
    +
    /*
     * key config, must be last because it contains key
     * material as variable length member
     --- linux-4.15.0.orig/net/mac80211/main.c
     +++ linux-4.15.0/net/mac80211/main.c
     @@ -255,8 +255,27 @@

     flush_work(&local->radar_detected_work);
rtln_lock();

- list_for_each_entry(sdata, &local->interfaces, list)
+ list_for_each_entry(sdata, &local->interfaces, list) { 
  /*
  + XXX: there may be more work for other vif types and even
  + for station mode: a good thing would be to run most of
  + the iface type's dependent_stop (ieee80211_mg_stop,
  + ieee80211_ibss_stop) etc...
  + For now, fix only the specific bug that was seen: race
  + between csa_connection_drop_work and us.
  + */
  + if (sdata->vif.type == NL80211_IFTYPE_STATION) {
  +/
  + This worker is scheduled from the iface worker that
  + runs on mac80211's workqueue, so we can't be
  + scheduling this worker after the cancel right here.
  + The exception is ieee80211_chswitch_done.
  + Then we can have a race...
  + /
  + cancel_work_sync(&sdata->u.mgd.csa_connection_drop_work);
  +}
  flush_delayed_work(&sdata->dec_tailroom_needed_wk);
+
  ieee80211_scan_cancel(local);

  /* make sure any new ROC will consider local->in_reconfig */
  @ @ -467,10 +486,7 @ @
cpu_to_le32(IEEE80211_VHT_CAP_RXLDPC |
    IEEE80211_VHT_CAP_SHORT_GI_80 |
    IEEE80211_VHT_CAP_SHORT_GI_160 |
- IEEE80211_VHT_CAP_RXSTBC_1 |
- IEEE80211_VHT_CAP_RXSTBC_2 |
- IEEE80211_VHT_CAP_RXSTBC_3 |
- IEEE80211_VHT_CAP_RXSTBC_4 |
+ IEEE80211_VHT_CAP_RXSTBC_MASK |
  IEEE80211_VHT_CAP_TXSTBC |
  IEEE80211_VHT_CAP_SU_BEAMFORMER_CAPABLE |
  IEEE80211_VHT_CAP_SU_BEAMFORMEREE_CAPABLE |
  @ @ -896,8 +912,19 @ @
continue;

  if (!dflt_chandef.chan) {
  +/*
  + Assign the first enabled channel to dflt_chandef
  + from the list of channels
  + */
  +for (i = 0; i < sband->n_channels; i++)
  +if (!(sband->channels[i].flags &
IEEE80211_CHAN_DISABLED))
+ break;
+ /* if none found then use the first anyway */
+ if (i == sband->n_channels)
+ i = 0;
+ 
+ cfg80211_chandef_create(&dflt_chandef,
- &sband->channels[0],
+ &sband->channels[i],
NL80211_CHAN_NO_HT);
+ /* init channel we’re on */
+ if (!local->use_chanctx && !local->_oper_chandef.chan) {
+ @ @ -1015.8 +1042.11 @@
+ if (local->hw.wiphy->max_scan_ie_len)
+ local->hw.wiphy->max_scan_ie_len -= local->scan_ies_len;
+ -WARN_ON(!ieee80211_cs_list_valid(local->hw.cipher_schemes,
- local->hw.n_cipher_schemes));
+ +if (WARN_ON(!ieee80211_cs_list_valid(local->hw.cipher_schemes,
+ local->hw.n_cipher_schemes))) {
+ +result = -EINVAL;
+ +goto fail_workqueue;
+ +}
+ result = ieee80211_init_cipher_suites(local);
+ if (result < 0)
+ @ @ -1170.6 +1200.7 @@
+ #if IS_ENABLED(CONFIG_IPV6)
+ unregister_inet6addr_notifier(&local->ifa6_notifier);
+ #endif
+ +ieee80211_txq_teardown_flows(local);
+ }
+ rtwl_lock();
+ @ @ -1198.7 +1229.6 @@
+ skb_queue_purge(&local->skb_queue);
+ skb_queue_purge(&local->skb_queue_unreliable);
+ skb_queue_purge(&local->skb_queue_mods);
+ ieee80211_txq_teardown_flows(local);
+ destroy_workqueue(local->workqueue);
+ wiphy_unregister(local->hw.wiphy);
+ #endif
+ #ifdef CONFIG_NUMA
+ /* flush STAs and mpaths on this iface */
+ sta_info_flush(sdata);
+ +ieee80211_free_keys(sdata, true);
+ @ @ -922.6 +922.7 @@
mesh_path_flush_by_iface(sdata);

/* stop the beacon */
@@ -1209,7 +1210,8 @@
ifmsh->chsw_ttl = 0;

/* Remove the CSA and MCSP elements from the beacon */
-tmp_csa_settings = rcu_dereference(ifmsh->csa);
+tmp_csa_settings = rcu_dereference_protected(ifmsh->csa,
+    lockdep_is_held(&sdata->wdev.mtx));
RCU_INIT_POINTER(ifmsh->csa, NULL);
if (tmp_csa_settings)
kfree_rcu(tmp_csa_settings, rcu_head);
@@ -1231,6 +1233,8 @@
struct mesh_csa_settings *tmp_csa_settings;
int ret = 0;

+lockdep_assert_held(&sdata->wdev.mtx);
+
tmp_csa_settings = kmalloc(sizeof(*tmp_csa_settings),
    GFP_ATOMIC);
if (!tmp_csa_settings)
@@ -1253,13 +1257,12 @@
}

static int mesh_fwd_csa_frame(struct ieee80211_sub_if_data *sdata,
-    struct ieee80211_mgmt *mgmt, size_t len)
+    struct ieee80211_mgmt *mgmt, size_t len,
+    struct ieee802_11_elems *elems)
{
    struct ieee80211_mgmt *mgmt_fwd;
    struct sk_buff *skb;
    struct ieee80211_local *local = sdata->local;
-    u8 *pos = mgmt->u.action.u.chan_switch.variable;
-    size_t offset_ttl;
+
    skb = dev_alloc_skb(local->tx_headroom + len);
    if (!skb)
@@ -1267,13 +1270,9 @@
    skb_reserve(skb, local->tx_headroom);
    mgmt_fwd = skb_put(skb, len);

    /* offset_ttl is based on whether the secondary channel
    * offset is available or not. Subtract 1 from the mesh TTL
    * and disable the initiator flag before forwarding.
    */
    -offset_ttl = (len < 42) ? 7 : 10;
    *(pos + offset_ttl) -= 1;
memcpy(mgmt_fwd, mgmt, len);
eth_broadcast_addr(mgmt_fwd->da);
@@ -1321,7 +1320,7 @@
/* forward or re-broadcast the CSA frame */
if (fwd_csa) {
  if (mesh_fwd_csa_frame(sdata, mgmt, len) < 0)
+    if (mesh_fwd_csa_frame(sdata, mgmt, len, &elems) < 0)
    mcsa_dbg(sdata, "Failed to forward the CSA frame");
}
--- linux-4.15.0.orig/net/mac80211/mesh.h
+++ linux-4.15.0/net/mac80211/mesh.h
@@ -217,7 +217,8 @@
int mesh_rmc_init(struct ieee80211_sub_if_data *sdata);
void ieee80211s_init(void);
void ieee80211s_update_metric(struct ieee80211_sub_if_data *sdata, *local,
-  struct sta_info *sta, struct sk_buff *skb);
+  struct sta_info *sta,
+  struct ieee80211_tx_status *st);
void ieee80211_mesh_init_sdata(struct ieee80211_sub_if_data *sdata);
void ieee80211_mesh_teardown_sdata(struct ieee80211_sub_if_data *sdata);
int ieee80211_start_mesh(struct ieee80211_sub_if_data *sdata);
--- linux-4.15.0.orig/net/mac80211/mesh_hwmp.c
+++ linux-4.15.0/net/mac80211/mesh_hwmp.c
@@ -295,15 +295,12 @@
}
void ieee80211s_update_metric(struct ieee80211_sub_if_data *sdata, *local,
-  struct sta_info *sta, struct sk_buff *skb)
+  struct sta_info *sta,
+  struct ieee80211_tx_status *st)
{
  -struct ieee80211_tx_info *txinfo = IEEE80211_SKB_CB(skb);
  -struct ieee80211_hdr *hdr = (struct ieee80211_hdr *) skb->data;
  +struct ieee80211_tx_info *txinfo = st->info;
  int failed;

  -if (!ieee80211_is_data(hdr->frame_control))
    return;
  -
  failed = !(txinfo->flags & IEEE80211 TX_STAT_ACK);
/* moving average, scaled to 100. */
unsigned long fail_avg =
    ewma_mesh_fail_avg_read(&sta->mesh->fail_avg);

@if (sta->mesh->plink_state != NL80211_PLINK_ESTAB)
+return MAX_METRIC;
+
/* Try to get rate based on HW/SW RC algorithm.
 * Rate is returned in units of Kbps, correct this
 * to comply with airtime calculation units
 @ @ -355.7 +355.7 @ @
 */

    tx_time = (device_constant + 10 * test_frame_len / rate);
    estimated_retx = ((1 << (2 * ARITH_SHIFT)) / (s_unit - err));
    result = (tx_time * estimated_retx) >> (2 * ARITH_SHIFT);
    return (u32)result;

forward = false;
reply = true;
target_metric = 0;
+
@if (SN_GT(target_sn, ifmsh->sn))
+ifmsh->sn = target_sn;
+
if (time_after(jiffies, ifmsh->last_sn_update +
    net_traversal_jiffies(sdata)) ||
    time_before(jiffies, ifmsh->last_sn_update)) {
    @ @ -1084.7 +1088.14 @ @
    mesh_path_sel_frame_tx(MPATH_PREQ, 0, sdata->vif.addr, ifmsh->sn,
        target_flags, mpath->dst, mpath->sn, da, 0,
        ttl, lifetime, 0, ifmsh->preq_id++, sdata);
+
+spin_lock_bh(&mpath->state_lock);
+if (mpath->flags & MESH_PATH_DELETED) {
+spin_unlock_bh(&mpath->state_lock);
+goto enddiscovery;
+
mod_timer(&mpath->timer, jiffies + mpath->discovery_timeout);
+spin_unlock_bh(&mpath->state_lock);
+
enddiscovery:
rcu_read_unlock();
@ @ -1133.7 +1144.8 @ @
}
if (!(mpath->flags & MESH_PATH_RESOLVING))
    + if (!(mpath->flags & MESH_PATH_RESOLVING) &&
          mesh_path_sel_is_hwmp(sdata))
mesh_queue_preq(mpath, PREQ_Q_F_START);

if (skb_queue_len(&mpath->frame_queue) >= MESH_FRAME_QUEUE_LEN)
++ linux-4.15.0.orig/net/mac80211/mesh_pathtbl.c
+++ linux-4.15.0/net/mac80211/mesh_pathtbl.c
@@ -23,7 +23,7 @@
static u32 mesh_table_hash(const void *addr, u32 len, u32 seed)
{
    /* Use last four bytes of hw addr as hash index */
    -return jhash_1word(*(u32 *)(addr+2), seed);
    +return jhash_1word(__get_unaligned_cpu32((u8 *)addr + 2), seed);
}

static const struct rhashtable_params mesh_rht_params = {
    INIT_HLIST_HEAD(&newtbl->known_gates);
    atomic_set(&newtbl->entries, 0);
    spin_lock_init(&newtbl->gates_lock);
    +if (rhashtable_init(&newtbl->rhead, &mesh_rht_params)) {
        +kfree(newtbl);
        +return NULL;
    +}

    return newtbl;
}
}

} while (unlikely(ret == -EEXIST && !mpath));

-if (ret && ret !:-EEXIST)
    -return ERR_PTR(ret);
-
-/* At this point either new_mpath was added, or we found a
- * matching entry already in the table; in the latter case
- * free the unnecessary new entry.
- */
-if (ret == -EEXIST) {
    +if (ret) {
        kfree(new_mpath);
        +if (ret !:-EEXIST)
            +return ERR_PTR(ret);
    +}
new_mpath = mpath;
}
+
if (ret)
+kfree(new_mpath);
+
sdata->u.mesh.mpp_paths_generation++;
return ret;
}
@@ -487,6 +489,9 @@
	&new_mpath->rhash,
mesh_rht_params);
+	if (ret)
+		kfree(new_mpath);
+
sdata->u.mesh.mpp_paths_generation++;
return ret;
}
@@ -552,6 +557,7 @@
del_timer_sync(&mpath->timer);
atomic_dec(&sdata->u.mesh.mpaths);
atomic_dec(&tbl->entries);
+mesh_path_flush_pending(mpath);
kfree_rcu(mpath, rcu);
}
@@ -848,9 +854,6 @@
goto free_path;
}

-rhashtable_init(&tbl_path->rhead, &mesh_rht_params);
-rhashtable_init(&tbl_mpp->rhead, &mesh_rht_params);
-
sdata->u.mesh.mesh_paths = tbl_path;
sdata->u.mesh.mpp_paths = tbl_mpp;

--- linux-4.15.0.orig/net/mac80211/mlme.c
+++ linux-4.15.0/net/mac80211/mlme.c
@@ -35,6 +35,7 @@
#define IEEE80211_AUTH_TIMEOUT(HZ / 5)
#define IEEE80211_AUTH_TIMEOUT_LONG(HZ / 2)
#define IEEE80211_AUTH_TIMEOUT_SHORT(HZ / 10)
+#define IEEE80211_AUTH_TIMEOUT_SAE(HZ * 2)
#define IEEE80211_AUTH_MAX_TRIES3
#define IEEE80211_AUTH_WAIT_ASSOC(HZ * 5)
#define IEEE80211_ASSOC_TIMEOUT(HZ / 5)
@@ -974,6 +975,10 @@
*/

if (sdata->reserved_chanctx) {


# Open Source Used In 5GaaS Edge AC-4

```c
+struct ieee80211_supported_band *sband = NULL;
+struct sta_info *mgd_sta = NULL;
+enum ieee80211_sta_rx_bandwidth bw = IEEE80211_STA_RX_BW_20;
+
/*
 * with multi-vif csa driver may call ieee80211_csa_finish()
 * many times while waiting for other interfaces to use their
@@ -982,6 +987,48 @@
if (sdata->reserved_ready)
    goto out;

+if (sdata->vif.bss_conf.chandef.width !=
 +   sdata->csa_chandef.width) {
+  /*
+  * For managed interface, we need to also update the AP
+  * station bandwidth and align the rate scale algorithm
+  * on the bandwidth change. Here we only consider the
+  * bandwidth of the new channel definition (as channel
+  * switch flow does not have the full HT/VHT/HE
+  * information), assuming that if additional changes are
+  * required they would be done as part of the processing
+  * of the next beacon from the AP.
+  */
+  switch (sdata->csa_chandef.width) {
+    case NL80211_CHAN_WIDTH_20_NOHT:
+    case NL80211_CHAN_WIDTH_20:
+    default:
+      bw = IEEE80211_STA_RX_BW_20;
+      break;
+    case NL80211_CHAN_WIDTH_40:
+      bw = IEEE80211_STA_RX_BW_40;
+      break;
+    case NL80211_CHAN_WIDTH_80:
+      bw = IEEE80211_STA_RX_BW_80;
+      break;
+    case NL80211_CHAN_WIDTH_80P80:
+    case NL80211_CHAN_WIDTH_160:
+      bw = IEEE80211_STA_RX_BW_160;
+      break;
+  }
+  mgd_sta = sta_info_get(sdata, ifmgd->bssid);
+  sband =
+    local->hw.wiphy->bands[sdata->csa_chandef.chan->band];
+  +
+  if (sdata->vif.bss_conf.chandef.width >
+      sdata->csa_chandef.width) {
```

---

**Open Source Used In 5GaaS Edge AC-4 34285**
mgd_sta->sta.bandwidth = bw;
+rate_control_rate_update(local, sband, mgd_sta,
+ IEEE80211_RC_BW_CHANGED);
+
ret = ieee80211_vif_use_reserved_context(sdata);
if (ret) {
sdata_info(sdata,
@@ -992,6 +1039,13 @@
goto out;
}

@if (sdata->vif.bss_conf.chandef.width <
 + sdata->csa_chandef.width) {
+mgd_sta->sta.bandwidth = bw;
+rate_control_rate_update(local, sband, mgd_sta,
+ IEEE80211_RC_BW_CHANGED);
+
+goto out;
}

@@ -1004,9 +1058,6 @@
goto out;
}

-* XXX: shouldn't really modify cfg80211-owned data! */
-ifmgd->associated->channel = sdata->csa_chandef.chan;
-
-ifmgd->csa_waiting_bcn = true;

ieee80211_sta_reset_beacon_monitor(sdata);
@@ -1036,6 +1087,11 @@
sdata->vif.csa_active = false;
ifmgd->csa_waiting_bcn = false;
+/*
 + * If the CSA IE is still present on the beacon after the switch,
 + * we need to consider it as a new CSA (possibly to self).
 + */
+ifmgd->beacon_crc_valid = false;

ret = drv_post_channel_switch(sdata);
if (ret) {
@@ -1213,6 +1269,16 @@
 cbss->beacon_interval));
return;
 drop_connection:
+ /*
+ * This is just so that the disconnect flow will know that
+ * we were trying to switch channel and failed. In case the
+ * mode is 1 (we are not allowed to Tx), we will know not to
+ * send a deauthentication frame. Those two fields will be
+ * reset when the disconnection worker runs.
+ */
+ sdata->vif.csa_active = true;
+ sdata->csa_block_tx = csa_ie.mode;
+
+ ieee80211_queue_work(&local->hw, &ifmgd->csa_connection_drop_work);
+ mutex_unlock(&local->chanctx_mtx);
+ mutex_unlock(&local->mtx);
+
+- params[ac].acm = acm;
+ params[ac].uapsd = uapsd;
+
- if (params[ac].cw_min > params[ac].cw_max) {
+ if (params[ac].cw_min == 0 ||
+ params[ac].cw_min > params[ac].cw_max) {
+ sdata_info(sdata,
+ "AP has invalid WMM params (CWmin/max=%d/%d for ACI %d), using defaults
",
+ params[ac].cw_min, params[ac].cw_max, aci);
+ return false;
+ }
+
+ /* WMM specification requires all 4 ACIs. */
+ for (ac = 0; ac < IEEE80211_NUM_ACS; ac++) {
+ if (params[ac].cw_min == 0) {
+ sdata_info(sdata,
+ "AP has invalid WMM params (missing AC %d), using defaults
",
+ ac);
+ return false;
+ }
+ }
+
+ if (!ieee80211_is_data(hdr->frame_control))
+ return;
+
- if (ieee80211_is_nullfunc(hdr->frame_control) &&
+ if (ieee80211_is_any_nullfunc(hdr->frame_control) &&
+ sdata->u.mgd.probe_send_count > 0) {
+ if (ack)
ieee80211_sta_reset_conn_monitor(sdata);
@@ -2345,7 +2422,8 @@
rcu_read_lock();
ssid = ieee80211_bss_get_ie(cbss, WLAN_EID_SSID);
-if (WARN_ON_ONCE(ssid == NULL))
+if (WARN_ONCE(!ssid || ssid[1] > IEEE80211_MAX_SSID_LEN,
    +  "invalid SSID element (len=%d)", ssid ? ssid[1] : -1))
ssid_len = 0;
else
  ssid_len = ssid[1];
@@ -2383,6 +2461,7 @@
struct ieee80211_local *local = sdata->local;
struct ieee80211_if_managed *ifmgd = &sdata->u.mgd;
u8 frame_buf[IEEE80211_DEAUTH_FRAME_LEN];
+bool tx;

sdata_lock(sdata);
if (!ifmgd->associated) {
@@ -2390,6 +2469,8 @@
    +  "invalid SSID element (len=%d)", ssid ? ssid[1] : -1))
    ssid_len = ssid[1];
@@ -2397,7 +2478,7 @@
    }
case WLAN_REASON_##type: return #type

-static const char *ieee80211_get_reason_code_string(u16 reason_code)
+const char *ieee80211_get_reason_code_string(u16 reason_code)
{
    switch (reason_code) {
    case WLAN(UNSPECIFIED);
    // -2731,6 +2812,11 @@ 
    if (len < 24 + 2)
    return;

    +if (!ether_addr_equal(mgmt->bssid, mgmt->sa)) {
+ieee80211_tdlss_handle_disconnect(sdata, mgmt->sa, reason_code);
+return;
    } +
    +
    if (ifmgd->associated &&
        ether_addr_equal(mgmt->bssid, ifmgd->associated->bssid)) {
    const u8 *bssid = ifmgd->associated->bssid;
    // -2780,6 +2866,11 @@
    reason_code = le16_to_cpu(mgmt->u.disassoc.reason_code);

    +if (!ether_addr_equal(mgmt->bssid, mgmt->sa)) {
+ieee80211_tdlss_handle_disconnect(sdata, mgmt->sa, reason_code);
+return;
    } +
    +
    sdata_info(sdata, "disassociated from %pM (Reason: %u=%s)\n",
               mgmt->sa, reason_code,
               ieee80211_get_reason_code_string(reason_code));
    // -3785,16 +3876,19 @@
    tx_flags);

    if (tx_flags == 0) {
-auth_data->timeout = jiffies + IEEE80211_AUTH_TIMEOUT;
-auth_data->timeout_started = true;
-run_again(sdata, auth_data->timeout);
+if (auth_data->algorithm == WLAN_AUTH_SAE)
+auth_data->timeout = jiffies +
+IEEE80211_AUTH_TIMEOUT_SAE;
+else
-auth_data->timeout = jiffies + IEEE80211_AUTH_TIMEOUT;
} else {
-auth_data->timeout =
    round_jiffies_up(jiffies + IEEE80211_AUTH_TIMEOUT_LONG);
-auth_data->timeout_started = true;
-run_again(sdata, auth_data->timeout);
auth_data->timeout_started = true;
run_again(sdata, auth_data->timeout);
return 0;
}

@@ -3865,8 +3959,15 @@
ifmgd->status_received = false;
if (ifmgd->auth_data && ieee80211_is_auth(fc)) {
if (status_acked) {
-ifmgd->auth_data->timeout =
-jiffies + IEEE80211_AUTH_TIMEOUT_SHORT;
+if (ifmgd->auth_data->algorithm ==
+WLAN_AUTH_SAE)
+ifmgd->auth_data->timeout =
+jiffies +
+IEEE80211_AUTH_TIMEOUT_SAE;
+else
+ifmgd->auth_data->timeout =
+jiffies +
+IEEE80211_AUTH_TIMEOUT_Short;
run_again(sdata, ifmgd->auth_data->timeout);
} else {
ifmgd->auth_data->timeout = jiffies - 1;
@@ -4644,7 +4745,7 @@
rcu_read_lock();
ssidie = ieee80211_bss_get_ie(req->bss, WLAN_EID_SSID);
-if (!ssidie) {
+if (!ssidie || ssidie[1] > sizeof(assoc_data->ssid)) {
rcu_read_unlock();
kfree(assoc_data);
return -EINVAL;
--- linux-4.15.0.orig/net/mac80211/rate.c
+++ linux-4.15.0/net/mac80211/rate.c
@@ -941,7 +941,8 @@
if (old)
kfree_rcu(old, rcu_head);
-drv_sta_rate_tbl_update(hw_to_local(hw), sta->sdata, pubsta);
+if (sta->uploaded)
+drv_sta_rate_tbl_update(hw_to_local(hw), sta->sdata, pubsta);
ieee80211_sta_set_expected_throughput(pubsta, sta_get_expected_throughput(sta));

--- linux-4.15.0.orig/net/mac80211/rc80211_minstrel.c
success = !(info->flags & IEEE80211_TX_STAT_ACK);

for (i = 0; i < IEEE80211_TX_MAX_RATES; i++) {
    if (ar[i].idx < 0 || !ar[i].count)
        break;

    ndx = rix_to_ndx(mi, ar[i].idx);
    if ((info->flags & IEEE80211_TX_CTL_RATE_CTRL_PROBE) && (i >= 0))
        mi->sample_packets++;
    if (mi->sample_defered > 0)
        mi->sample_defered--;
    if (time_after(jiffies, mi->last_stats_update +
        (mp->update_interval * HZ) / 1000))
        minstrel_update_stats(mp, mi);
    return;

    delta = (mi->total_packets * sampling_ratio / 100) -
        (mi->sample_packets + mi->sample_defered / 2) + mi->sample_packets;

    /* delta < 0: no sampling required */
    prev_sample = mi->prev_sample;
    return;

    if (mi->total_packets >= 10000) {
        mi->sample_defered = 0;
        mi->sample_packets = 0;
        mi->total_packets = 0;
    } else if (delta > mi->n_rates * 2) {
        @ @ -407.19 +400.8 @ @
        * rate sampling method should be used.
        * Respect such rates that are not sampled for 20 interations.
        */
        -if (mrr_capable &&
            -msr->perfect_tx_time > mr->perfect_tx_time &&
            -msr->stats.sample_skipped < 20) {
            @ @ -276.7 +276.7 @@
            /* Only use IEEE80211_TX_CTL_RATE_CTRL_PROBE to mark
- * packets that have the sampling rate deferred to the
- * second MRR stage. Increase the sample counter only
- * if the deferred sample rate was actually used.
- * Use the sample_deferred counter to make sure that
- * the sampling is not done in large bursts */
-info->flags |= IEEE80211_TX_CTL_RATE_CTRL_PROBE;
-rate++;
-mi->sample_deferred++;
} else {
+if (msr->perfect_tx_time < mr->perfect_tx_time ||
+    msr->stats.sample_skipped >= 20) {
if (!msr->sample_limit)
return;
@@ -439,6 +421,7 @@
rate->idx = mi->r[ndx].rix;
rate->count = minstrel_get_retry_count(&mi->r[ndx], info);
+info->flags |= IEEE80211_TX_CTL_RATE_CTRL_PROBE;
} }
--- linux-4.15.0.orig/net/mac80211/rc80211_minstrel.h
+++ linux-4.15.0/net/mac80211/rc80211_minstrel.h
@@ -98,7 +98,6 @@
 u8 max_prob_rate;
 unsigned int total_packets;
 unsigned int sample_packets;
-unsigned int sample_deferred;

 unsigned int sample_row;
 unsigned int sample_column;
--- linux-4.15.0.orig/net/mac80211/rc80211_minstrel_ht.c
+++ linux-4.15.0/net/mac80211/rc80211_minstrel_ht.c
@@ -129,7 +129,8 @@
 #define CCK_GROUP
 [MINSTREL_CCK_GROUP] = {
-.streams = 0,
+.streams = 1,
.flags = 0,
 .duration = {
 CCK_DURATION_LIST(false),
 @@ -282,7 +282,8 @@
 break;
/* short preamble */
-if (!(mi->supported[group] & BIT(idx)))

if ((mi->supported[group] & BIT(idx + 4)) &&
    (rate->flags & IEEE80211_TX_RC_USE_SHORT_PREAMBLE))
idx += 4;
}
return &mi->groups[group].rates[idx];

/* (re)Initialize group rate indexes */
for(j = 0; j < MAX_THR_RATES; j++)
- tmp_group_tp_rate[j] = group;
+ tmp_group_tp_rate[j] = MCS_GROUP_RATES * group;
for (i = 0; i < MCS_GROUP_RATES; i++) {
if (!(mi->supported[group] & BIT(i)))
    return;
}
sample_group = &minstrel_mcs_groups[sample_idx / MCS_GROUP_RATES];
+ sample_idx %= MCS_GROUP_RATES;
+ if (sample_group == &minstrel_mcs_groups[MINSTREL_CCK_GROUP] &&
    (sample_idx >= 4) != txrc->short_preamble)
    return;
+ info->flags |= IEEE80211_TX_CTL_RATE_CTRL_PROBE;
rate->count = 1;

-if (sample_idx / MCS_GROUP_RATES == MINSTREL_CCK_GROUP) {
+int idx = sample_idx % ARRAY_SIZE(mp->cck_rates);
+rate->idx = mp->cck_rates[idx];
} else if (sample_group->flags & IEEE80211_TX_RC_VHT_MCS) {
ieee80211_rate_set_vht(rate, sample_idx % MCS_GROUP_RATES,
    sample_group->streams);
} else {
-rate->idx = sample_idx % MCS_GROUP_RATES +
- (sample_group->streams - 1) * 8;
+rate->idx = sample_idx + (sample_group->streams - 1) * 8;
}
rate->flags = sample_group->flags;
struct ieee80211_mcs_info *mcs = &sta->ht_cap.mcs;
u16 sta_cap = sta->ht_cap.cap;
struct ieee80211_sta_vht_cap *vht_cap = &sta->vht_cap;
-struct sta_info *sinfo = container_of(sta, struct sta_info, sta);
int use_vht;
int n_supported = 0;
int ack_dur;
@@ -1258,8 +1263,7 @@
 if (!n_supported)
goto use_legacy;

-if (test_sta_flag(sinfo, WLAN_STA_SHORT_PREAMBLE))
-mi->cck_supported_short |= mi->cck_supported_short << 4;
+mi->supported[MINSTREL_CCK_GROUP] |= mi->cck_supported_short << 4;

/* create an initial rate table with the lowest supported rates */
minstrel_ht_update_stats(mp, mi);
--- linux-4.15.0.orig/net/mac80211/rx.c
+++ linux-4.15.0/net/mac80211/rx.c
@@ -141,6 +141,9 @@
 /* allocate extra bitmaps */
 if (status->chains)
 len += 4 * hweight8(status->chains);
+/* vendor presence bitmap */
+if (status->flag & RX_FLAG_RADIOTAP_VENDOR_DATA)
+len += 4;

if (ieee80211_have_rx_timestamp(status)) {
    len = ALIGN(len, 8);
@@ -182,8 +185,6 @@
 if (status->flag & RX_FLAG_RADIOTAP_VENDOR_DATA) {
 struct ieee80211_vendor_radiotap *rtap = (void *)skb->data;

-/* vendor presence bitmap */
-len += 4;
/* alignment for fixed 6-byte vendor data header */
len = ALIGN(len, 2);
/* vendor data header */
@@ -205,7 +206,7 @@
 struct ieee80211_hdr_3addr hdr;
 u8 category;
 u8 action_code;
-} __packed action;
+} __packed __aligned(2) action;

if (!sdata)
return;
@@ -1254,7 +1255,7 @@
return RX_CONTINUE;

if (ieee80211_is_ctl(hdr->frame_control) ||
- ieee80211_is_qos_nullfunc(hdr->frame_control) ||
+ ieee80211_is_any_nullfunc(hdr->frame_control) ||
is_multicast_ether_addr(hdr->addr1))
return RX_CONTINUE;

@@ -1641,8 +1642,7 @@
 * Drop (qos-)data::nullfunc frames silently, since they
 * are used only to control station power saving mode.
 */
-    if (ieee80211_is_nullfunc(hdr->frame_control) ||
-        ieee80211_is_qos_nullfunc(hdr->frame_control)) {
+    if (ieee80211_is_any_nullfunc(hdr->frame_control)) {
        I802_DEBUG_INC(rx->local->rx_handlers_drop_nullfunc);
    }

/*
@@ -1899,19 +1899,34 @@
    return result;
 }

+void ieee80211_init_frag_cache(struct ieee80211_fragment_cache *cache)
+{
+    int i;
+    
+    for (i = 0; i < ARRAY_SIZE(cache->entries); i++)
+        skb_queue_head_init(&cache->entries[i].skb_list);
+}
+
+void ieee80211_destroy_frag_cache(struct ieee80211_fragment_cache *cache)
+{
+    int i;
+    
+    for (i = 0; i < ARRAY_SIZE(cache->entries); i++)
+        __skb_queue_purge(&cache->entries[i].skb_list);
+}
+
+static inline struct ieee80211_fragment_entry *
+    ieee80211_reassemble_add(struct ieee80211_sub_if_data *sdata,
+    struct ieee80211_fragment_cache *cache,
    unsigned int frag, unsigned int seq, int rx_queue,
    struct sk_buff **skb)
+    {
+        struct ieee80211_fragment_entry *entry;
+        
+        entry = &sdata->fragments[sdata->fragment_next++];
+        if (sdata->fragment_next >= IEEE80211_FRAGMENT_MAX)
+            sdata->fragment_next = 0;
+        entry = &cache->entries[cache->next++];
+        if (cache->next >= IEEE80211_FRAGMENT_MAX)
+            cache->next = 0;
+        
+        if (!skb_queue_empty(&entry->skb_list))
- skb_queue_purge(&entry->skb_list);
+ skb_queue_purge(&entry->skb_list);

skb_queue_tail(&entry->skb_list, *skb); /* no need for locking */
*skb = NULL;
@@ -1926,14 +1941,14 @@
}

static inline struct ieee80211_fragment_entry *
-ieee80211_reassemble_find(struct ieee80211_sub_if_data *sdata,
+ieee80211_reassemble_find(struct ieee80211_fragment_cache *cache,
 unsigned int frag, unsigned int seq,
 int rx_queue, struct ieee80211_hdr *hdr)
{
 struct ieee80211_fragment_entry *entry;
 int i, idx;

-idx = sdata->fragment_next;
+idx = cache->next;
 for (i = 0; i < IEEE80211_FRAGMENT_MAX; i++) {
 struct ieee80211_hdr *f_hdr;
@@ -1941,7 +1956,7 @@
 if (idx < 0)
 idx = IEEE80211_FRAGMENT_MAX - 1;

-entry = &sdata->fragments[idx];
+entry = &cache->entries[idx];
 if (skb_queue_empty(&entry->skb_list) || entry->seq != seq ||
 entry->rx_queue != rx_queue || entry->last_frag + 1 != frag)
@@ -1968,15 +1983,27 @@
 return NULL;
 }

+static bool requires_sequential_bn(struct ieee80211_rx_data *rx, __le16 fc)
+{
+return rx->key &&
+(rx->key->conf.cipher == WLAN_CIPHER_SUITE_CCMP ||
+rx->key->conf.cipher == WLAN_CIPHER_SUITE_CCMP_256 ||
+rx->key->conf.cipher == WLAN_CIPHER_SUITE_GCMP ||
+rx->key->conf.cipher == WLAN_CIPHER_SUITE_GCMP_256) &&
+ieee80211_has_protected(fc);
+}
+
 static ieee80211_rx_result debug_noinline
 ieee80211_rx_h_defragment(struct ieee80211_rx_data *rx)
 {
struct ieee80211_fragment_cache *cache = &rx->sdata->frags;
struct ieee80211_hdr *hdr;
unsigned int frag, seq;
struct ieee80211_fragment_entry *entry;
struct sk_buff *skb;
+struct ieee80211_rx_status *status = IEEE80211_SKB_RXCB(rx->skb);

hdr = (struct ieee80211_hdr *)rx->skb->data;
fcs = hdr->frame_control;
sc = le16_to_cpu(hdr->seq_ctrl);
frag = sc & IEEE80211_SCTL_FRAG;

-if (is_multicast_ether_addr(hdr->addr1)) {
    I802_DEBUG_INC(rx->local->dot11MulticastReceivedFrameCount);
    goto out_no_led;
}
+if (rx->sta)
    cache = &rx->sta->frags;

if (likely(!ieee80211_has_morefrags(fc) && frag == 0))
goto out;

+if (is_multicast_ether_addr(hdr->addr1))
+return RX_DROP_MONITOR;
+
I802_DEBUG_INC(rx->local->rx_handlers_fragments);

if (skb_linearize(rx->skb))
    @@ -2010,20 +2038,17 @@

if (frag == 0) {
    /* This is the first fragment of a new frame. */
    -entry = ieee80211_reassemble_add(rx->sdata, frag, seq,
    +entry = ieee80211_reassemble_add(cache, frag, seq,
        rx->seqno_idx, &(rx->skb));
    -if (rx->key &&
        (rx->key->conf.cipher == WLAN_CIPHER_SUITE_CCMP ||
        (rx->key->conf.cipher == WLAN_CIPHER_SUITE_CCMP_256 ||
        (rx->key->conf.cipher == WLAN_CIPHER_SUITE_GCMP ||
        (rx->key->conf.cipher == WLAN_CIPHER_SUITE_GCMP_256) &&
        -ieee80211_has_protected(fc)) {
            +if (requires_sequential_pn(rx, fc)) {
                int queue = rx->security_idx;
                /* Store CCMP/GCMP PN so that we can verify that the
/* next fragment has a sequential PN value. */
entry->check_sequential_pn = true;
+entry->is_protected = true;
+entry->key_color = rx->key->color;
memcpy(entry->last_pn,
    rx->key->u.ccmp.rx_pn[queue],
    IEEE80211_CCMP_PN_LEN);
@@ -2035,6 +2060,11 @@
    sizeof(rx->key->u.gcmp.rx_pn[queue]));
BUILD_BUG_ON(IEEE80211_CCMP_PN_LEN !=
    IEEE80211_GCMP_PN_LEN);
+} else if (rx->key &&
+    (ieee80211_has_protected(fc) ||
+    (status->flag & RX_FLAG_DECRYPTED))) {
+    entry->is_protected = true;
+    entry->key_color = rx->key->color;
} return RX_QUEUED;
}@@ -2042,7 +2072,7 @@
/* This is a fragment for a frame that should already be pending in
* fragment cache. Add this fragment to the end of the pending entry.
*/
-entry = ieee80211_reassemble_find(rx->sdata, frag, seq,
+entry = ieee80211_reassemble_find(cache, frag, seq,
    rx->seqno_idx, hdr);
if (!entry) {
    I802_DEBUG_INC(rx->local->rx_handlers_drop_defrag);
@@ -2057,25 +2087,39 @@
    if (entry->check_sequential_pn) {
        int i;
        u8 pn[IEEE80211_CCMP_PN_LEN], *rpn;
-int queue;
-    - (rx->key->conf.cipher != WLAN_CIPHER_SUITE_CCMP &&
-        rx->key->conf.cipher != WLAN_CIPHER_SUITE_CCMP_256 &&
-        rx->key->conf.cipher != WLAN_CIPHER_SUITE_GCMP &&
-        rx->key->conf.cipher != WLAN_CIPHER_SUITE_GCMP_256))
+    if (!requires_sequential_pn(rx, fc))
+        return RX_DROP_UNUSABLE;
+    +/* Prevent mixed key and fragment cache attacks */
+    +if (entry->key_color != rx->key->color)
+        return RX_DROP_UNUSABLE;
+    +memcpy(pn, entry->last_pn, IEEE80211_CCMP_PN_LEN);
for (i = IEEE80211_CCMP_PN_LEN - 1; i >= 0; i--) {
    pn[i]++;
    if (pn[i])
        break;
}
-queue = rx->security_idx;
-rpn = rx->key->u.ccmp.rx_pn[queue];
+
+rpn = rx->ccm_gcm.pn;
if (memcmp(pn, rpn, IEEE80211_CCMP_PN_LEN))
    return RX_DROP_UNUSABLE;
memcpy(entry->last_pn, pn, IEEE80211_CCMP_PN_LEN);
+} else if (entry->is_protected &&
+  (!rx->key ||
+   (!ieee80211_has_protected(fc) &&
+   !(status->flag & RX_FLAG_DECrypted)) ||
+   rx->key->color != entry->key_color)) {
+/* Drop this as a mixed key or fragment cache attack, even
+ * if for TKIP Michael MIC should protect us, and WEP is a
+ * lost cause anyway.
+ */
+return RX_DROP_UNUSABLE;
+} else if (entry->is_protected && rx->key &&
+ entry->key_color != rx->key->color &&
+ (status->flag & RX_FLAG_DECrypted)) {
+return RX_DROP_UNUSABLE;
}
skb_pull(rx->skb, ieee80211_hdrlen(fc));
@@ -2104,7 +2148,6 @@
    out: ieee80211_led_rx(rx->local);
    - out_no_led: if (rx->sta)
        rx->sta->rx_stats.packets++;
    return RX_CONTINUE;
    @@ -2120,6 +2163,7 @@
 static int ieee80211_drop_unencrypted(struct ieee80211_rx_data *rx, __le16 fc)
 {
     +struct ieee80211_hdr *hdr = (void *)rx->skb->data;
     struct sk_buff *skb = rx->skb;
     struct ieee80211_rx_status *status = IEEE80211_SKB_RXCB(skb);
     @@ -2130,9 +2174,34 @@
         if (status->flag & RX_FLAG_DECrypted)
             return 0;
/* check mesh EAPOL frames first */
+if (unlikely(rx->sta && ieee80211_vif_is_mesh(&rx->sdata->vif) &&
    ieee80211_is_data(fc))) {
+struc ieee80211s_hdr *mesh_hdr;
+u16 hdr_len = ieee80211_hdrlen(fc);
+u16 ethertype_offset;
+__be16 ethertype;
+
+if (!ether_addr_equal(hdr->addr1, rx->sdata->vif.addr))
+goto drop_check;
+
+/* make sure fixed part of mesh header is there, also checks skb len */
+if (!pskb_may_pull(rx->skb, hdr_len + 6))
+goto drop_check;
+
+mesh_hdr = (struct ieee80211s_hdr *)(skb->data + hdr_len);
+ethertype_offset = hdr_len + ieee80211_get_mesh_hdrlen(mesh_hdr) +
+    sizeof(rfc1042_header);
+
+if (skb_copy_bits(rx->skb, ethertype_offset, &ethertype, 2) == 0 &&
    ethertype == rx->sdata->control_port_protocol)
+return 0;
+
+drop_check:
/* Drop unencrypted frames if key is set. */
if (unlikely(!ieee80211_has_protected(fc) &&
    !ieee80211_is_nullfunc(fc) &&
    !ieee80211_is_any_nullfunc(fc) &&
    ieee80211_is_data(fc) && rx->key))
return -EACCES;

@@ -2235,13 +2304,13 @@
struct ethhdr *ehdr = (struct ethhdr *) rx->skb->data;

/*
 - * Allow EAPOL frames to us/the PAE group address regardless
 - * of whether the frame was encrypted or not.
 - */
-if (ehdr->h_proto == rx->sdata->control_port_protocol &&
-    ether_addr_equal(ehdr->h_dest, rx->sdata->vif.addr) ||
-    ether_addr_equal(ehdr->h_dest, pae_group_addr))
+ if (ether_addr_equal(ehdr->h_dest, rx->sdata->vif.addr) ||
+    ether_addr_equal(ehdr->h_dest, pae_group_addr))
+return true;
+ * Allow EAPOL frames to us/the PAE group address regardless of
+ * whether the frame was encrypted or not, and always disallow
+ * all other destination addresses for them.
+ */
+if (unlikely(ehdr->h_proto == rx->sdata->control_port_protocol))
+return ether_addr_equal(ehdr->h_dest, rx->sdata->vif.addr) ||
  + ether_addr_equal(ehdr->h_dest, pae_group_addr);

if (ieee80211_802_1x_port_control(rx) ||
    ieee80211_drop_unencrypted(rx, fc))
@@ -2281,6 +2350,7 @@
if ((sdata->vif.type == NL80211_IFTYPE_AP ||
    sdata->vif.type == NL80211_IFTYPE_AP_VLAN) &&
  !(sdata->flags & IEEE80211_SDATA_DONT_BRIDGE_PACKETS) &&
+  ehdr->h_proto != rx->sdata->control_port_protocol &&
  (sdata->vif.type != NL80211_IFTYPE_AP_VLAN || !sdata->u.vlan.sta)) {  
if (is_multicast_ether_addr(ehdr->h_dest) &&
    ieee80211_vif_get_num_mcast_if(sdata) != 0) {
@@ -2334,9 +2404,30 @@
#ifdef

if (skb) {
+struct ethhdr *ehdr = (struct ethhdr *)skb->data;
+ /* deliver to local stack */
  skb->protocol = eth_type_trans(skb, dev);
  memset(skb->cb, 0, sizeof(skb->cb));
  + */
  + /* 802.1X over 802.11 requires that the authenticator address
  + be used for EAPOL frames. However, 802.1X allows the use of
  + a bridge and we pass the frame with the PAE group address,
  + then the bridge will forward it to the network (even if the
  + client was not associated yet), which isn't supposed to
  + happen.
  + To avoid that, rewrite the destination address to our own
  + address, so that the authenticator (e.g. hostapd) will see
  + the frame, but bridge won't forward it anywhere else. Note
  + that due to earlier filtering, the only other address can
  + be the PAE group address.
  */
+if (unlikely(skb->protocol == sdata->control_port_protocol &&
+  !ether_addr_equal(ehdr->h_dest, sdata->vif.addr)))
+ether_addr_copy(ehdr->h_dest, sdata->vif.addr);
+ if (rx->napi)
  napi_gro_receive(rx->napi, skb);
else
@@ -2418,9 +2509,27 @@
if (ieee80211_data_to_8023_exthdr(skb, &ethhdr,
rx->sdata->vif.addr,
- rx->sdata->vif.type))
+ rx->sdata->vif.type,
+ true))
return RX_DROP_UNUSABLE;

+if (rx->key) {
+/**
+ * We should not receive A-MSDUs on pre-HT connections,
+ * and HT connections cannot use old ciphers. Thus drop
+ * them, as in those cases we couldn't even have SPP
+ * A-MSDUs or such.
+ */
+switch (rx->key->conf.cipher) {
+case WLAN_CIPHER_SUITE_WEP40:
+case WLAN_CIPHER_SUITE_WEP104:
+case WLAN_CIPHER_SUITE_TKIP:
+return RX_DROP_UNUSABLE;
+default:
+break;
+}
+
+ieee80211_amsdu_to_8023s(skb, &frame_list, dev->dev_addr,
+ rx->sdata->vif.type,
+ rx->local->hw.extra_tx_headroom,
+ struct ieee80211_sub_if_data *sdata = rx->sdata;
+ struct ieee80211_if_ifmsg *ifmsh = &sdata->u.mesh;
+ u16 ac, q, hdrlen;
+int tailroom = 0;

hdr = (struct ieee80211_hdr *) skb->data;
hdrlen = ieee80211_hdrlen(hdr->frame_control);
skb_set_queue_mapping(skb, q);
if (!--mesh_hdr->ttl) {
-IEEE80211_IFSTA_MESH_CTR_INC(ifmsh, dropped_frames_ttl);
+if (!is_multicast_ether_addr(hdr->addr1))
+IEEE80211_IFSTA_MESH_CTR_INC(ifmsh,
+ dropped_frames_ttl);
goto out;
}

if (!ifmsh->mshcfg.dot11MeshForwarding)
goto out;
if (sdata->crypto_tx_tailroom_needed_cnt)
  tailroom = IEEE80211_ENCRYPT_TAILROOM;
+
if (fwd_skb) {
  fwd_skb = skb_copy_expand(skb, local->tx_headroom + sdata->encrypt_headroom, tailroom, GFP_ATOMIC);
}

if (!fwd_skb) {
  net_info_ratelimited("%s: failed to clone mesh frame\n", sdata->name);
  return RX_DROP_MONITOR;
}

case cpu_to_le16(IEEE80211_STYPE_PROBE_RESP):
  /* process for all: mesh, mlme, ibss */
  break;
+
  case cpu_to_le16(IEEE80211_STYPE_DEAUTH):
    if (is_multicast_ether_addr(mgmt->da) && !is_broadcast_ether_addr(mgmt->da))
      return RX_DROP_MONITOR;
+
  /* process only for station/IBSS */
  +
  if (sdata->vif.type != NL80211_IFTYPE_STATION && sdata->vif.type != NL80211_IFTYPE_ADHOC)
    return RX_DROP_MONITOR;
  +
  break;
+
  case cpu_to_le16(IEEE80211_STYPE_ASSOC_RESP):
  case cpu_to_le16(IEEE80211_STYPE_REASSOC_RESP):
  -case cpu_to_le16(IEEE80211_STYPE_DISASSOC):
  if (is_multicast_ether_addr(mgmt->da) && !is_broadcast_ether_addr(mgmt->da))
    return false;
  +
  if ( ieee80211_is_robust_mgmt_frame(skb) && ! is_valid_ether_addr(hdr->addr2))
    return false;
  +
  if (multicast)
    return true;
  +
  return ether_addr_equal(sdata->vif.addr, hdr->addr1);
  @ @ -3592.7 +3719,8 @@
  return false;
+
  if (ieee80211_is_beacon(hdr->frame_control))
    return false;
    ether_addr_equal(sdata->vif.addr, hdr->addr1));
  @ @ -3585.6 +3710,8 @@
  if (bssid && !sdata->u.mgd.use_4addr)
    return false;
  +
  if (multicast)
    return true;
  +
  return ether_addr_equal(sdata->vif.addr, hdr->addr1));
  @ @ -3592.7 +3719,8 @@
  return false;
    ether_addr_equal(sdata->u.ibss.bssid, hdr->addr2))
  +
  ether_addr_equal(sdata->u.ibss.bssid, hdr->addr2));
  +
  ether_addr_equal(sdata->u.ibss.bssid, hdr->addr2));
  +
  !is_valid_ether_addr(hdr->addr2))
    return false;
  return false;
  if (ieee80211_is_beacon(hdr->frame_control))
    return false;
    ether_addr_equal(sdata->vif.addr, hdr->addr1));
  @ @ -3592.7 +3719,8 @@
rcu_read_lock();
key = rcu_dereference(sta->ptk[sta->ptk_idx]);
+if (!key)
+key = rcu_dereference(sdata->default_unicast_key);
if (key) {
  switch (key->conf.cipher) {
  case WLAN_CIPHER_SUITE_TKIP:
    @ @ -3847,7 +3977,7 @@
  lockdep_assert_held(&local->sta_mtx);

  -list_for_each_entry_rcu(sta, &local->sta_list, list) { 
  +list_for_each_entry(sta, &local->sta_list, list) {
  if (sdata != sta->sdata &&
    (sta->sdata->bss || sta->sdata->bss != sdata->bss))
    continue;
  @ @ -3928,7 +4058,7 @@
  if ((hdr->frame_control & cpu_to_le16(IEEE80211_FCTL_FROMDS | IEEE80211_FCTL_TODS)) !=
    fast_rx->expected_ds_bits)
    goto drop;
  +return false;

  /* assign the key to drop unencrypted frames (later)
   * and strip the IV/MIC if necessary
   --- linux-4.15.0.org/net/mac80211/spectmgmt.c
   +++ linux-4.15.0/net/mac80211/spectmgmt.c
   @ @ -8,6 +8,7 @@
   * Copyright 2007, Michael Wu <flamingice@sourmilk.net>
   * Copyright 2007-2008, Intel Corporation
   * Copyright 2008, Johannes Berg <johannes@sipsolutions.net>
   + * Copyright (C) 2018 Intel Corporation
   *
   * This program is free software; you can redistribute it and/or modify
   * it under the terms of the GNU General Public License version 2 as
   @ @ -27,7 +28,7 @@
   u32 sta_flags, u8 *bssid,
   struct ieee80211_csa_ie *csa_ie)
   {
   -enum nl80211_band new_band;
   +enum nl80211_band new_band = current_band;
   int new_freq;
   u8 new_chan_no;
   struct ieee80211_channel *new_chan;
   @ @ -55,15 +56,13 @@

elems->ext_chansw_ie->new_operating_class, &new_band)) {
    sdata_info(sdata,
      "cannot understand ECSA IE operating class %d, disconnecting\n",
      "cannot understand ECSA IE operating class, %d, ignoring\n",
      elems->ext_chansw_ie->new_operating_class);
    return -EINVAL;
  }

  new_chan_no = elems->ext_chansw_ie->new_ch_num;
  csa_ie->count = elems->ext_chansw_ie->count;
  csa_ie->mode = elems->ext_chansw_ie->mode;
}

else if (elems->ch_switch_ie) {
  -new_band = current_band;
  new_chan_no = elems->ch_switch_ie->new_ch_num;
  csa_ie->count = elems->ch_switch_ie->count;
  csa_ie->mode = elems->ch_switch_ie->mode;

--- linux-4.15.0.orig/net/mac80211/sta_info.c
+++ linux-4.15.0/net/mac80211/sta_info.c
@@ -3,6 +3,7 @@
 *
 * Copyright 2006-2007 Jiri Benc <jbenc@suse.cz>
 * Copyright 2013-2014 Intel Mobile Communications GmbH
 * Copyright (C) 2015 - 2017 Intel Deutschland GmbH
+ * Copyright (C) 2018-2020 Intel Corporation
 *
 * This program is free software; you can redistribute it and/or modify
 * it under the terms of the GNU General Public License version 2 as
 @@ -243,6 +244,24 @@
 */
 void sta_info_free(struct ieee80211_local *local, struct sta_info *sta) {
+/*
 + * If we had used sta_info_pre_move_state() then we might not
 + * have gone through the state transitions down again, so do
 + * it here now (and warn if it's inserted).
 + *
 + * This will clear state such as fast TX/RX that may have been
 + * allocated during state transitions.
 + */
 +while (sta->sta_state > IEEE80211_STA_NONE) {
+  int ret;
+  +WARN_ON_ONCE(test_sta_flag(sta, WLAN_STA_INSERTED));
+  +ret = sta_info_move_state(sta, sta->sta_state - 1);
+  +if (WARN_ONCE(ret, "sta_info_move_state() returned %d\n", ret))
+    break;
+}
if (sta->rate_ctrl)
rate_control_free_sta(sta);

@@ -314,7 +333,7 @@
if (ieee80211_hw_check(hw, USES_RSS)) {
sta->pcpu_rx_stats =
 alloc_percpu(struct ieee80211_sta_rx_stats);
+ alloc_percpu_gfp(struct ieee80211_sta_rx_stats, gfp);
if (!sta->pcpuRx_stats)
goto free;
}
@@ -350,6 +369,8 @@
u64_stats_init(&sta->rx_stats.syncp);

+ieee80211_init_frag_cache(&sta->frags);
+sta->sta_state = IEEE80211_STA_NONE;

/* Mark TID as unreserved */
@@ -433,6 +454,7 @@
if (sta->sta.txq[0])
kfree(to_txq_info(sta->sta.txq[0]));
free:
+free_percpu(sta->pcpu_rx_stats);
#endif CONFIG_MAC80211_MESH
kfree(sta->mesh);
#endif CONFIG_MAC80211_MESH
out_drop_sta:
local->num_sta--;
synchronize_net();
- cleanup_single_sta(sta);
+cleanup_single_sta(sta);
out_err:
mutex_unlock(&local->sta_mtx);
kfree(sinfo);
@@ -632,19 +654,13 @@
err = sta_info_insert_check(sta);
if (err) {
+sta_info_free(local, sta);
mutex_unlock(&local->sta_mtx);
rcu_read_lock();
-goto out_free;
+return err;
}
err = sta_info_insert_finish(sta);
if (err)
  goto out_free;
-
  return 0;
- out_free:
  sta_info_free(local, sta);
  return err;
+ return sta_info_insert_finish(sta);
}

int sta_info_insert(struct sta_info *sta)
@@ -976,6 +992,11 @@
    might_sleep();
    lockdep_assert_held(&local->sta_mtx);

+    if (sta->sta_state == IEEE80211_STA_AUTHORIZED) {
+        ret = sta_info_move_state(sta, IEEE80211_STA_ASSOC);
+        WARN_ON_ONCE(ret);
+    } +
+ /* now keys can no longer be reached */
    ieee80211_free_sta_keys(local, sta);

@@ -1012,6 +1033,8 @@
    ieee80211_free_sta_keys(local, sta);

@@ -1898,6 +2020,10 @@
    ieee80211_check_fast_xmit(sta);
    ieee80211_check_fast_rx(sta);
}

+    if (sta->sdata->vif.type == NL80211_IFTYPE_AP_VLAN ||
+        sta->sdata->vif.type == NL80211_IFTYPE_AP)
+        cfg80211_send_layer2_update(sta->sdata->dev,
+          sta->sta.addr);
    break;
  default:
    break;
@@ -1993,6 +2020,10 @@
    rinfo->flags = 0;
sband = local->hw.wiphy->bands[band];
+
+if (WARN_ON_ONCE(!sband->bitrates))
+break;
+
+brate = sband->bitrates[rate_idx].bitrate;
if (rinfo->bw == RATE_INFO_BW_5)
shift = 2;
@@ -2312,7 +2343,8 @@
{
  struct ieee80211_sta_rx_stats *stats = sta_get_last_rx_stats(sta);

-  if (time_after(stats->last_rx, sta->status_stats.last_ack))
+  if (!sta->status_stats.last_ack ||
+      time_after(stats->last_rx, sta->status_stats.last_ack))
return stats->last_rx;
return sta->status_stats.last_ack;
}
--- linux-4.15.0.orig/net/mac80211/sta_info.h
+++ linux-4.15.0/net/mac80211/sta_info.h
@@ -101,6 +101,7 @@
  WLAN_STA_MPSP_OWNER,
  WLAN_STA_MPSP_RECIPIENT,
  WLAN_STA_PS_DELIVER,
+WLAN_STA_USES_ENCRYPTION,
  NUM_WLAN_STA_FLAGS,
  };
@@ -418,6 +419,34 @@
/*
#define STA_SLOW_THRESHOLD 6000 /* 6 Mbps */

+/*
+ * IEEE 802.11-2016 (10.6 "Defragmentation") recommends support for "concurrent
+ * reception of at least one MSDU per access category per associated STA"
+ * on APs, or "at least one MSDU per access category" on other interface types.
+ *
+ * This limit can be increased by changing this define, at the cost of slower
+ * frame reassembly and increased memory use while fragments are pending.
+ */
+#{define IEEE80211_FRAGMENT_MAX 4
+
+"struct ieee80211_fragment_entry {
+  struct sk_buff_head skb_list;
+  unsigned long first_frag_time;
+  u16 seq;
+  u16 extra_len;
+  u16 last_frag;
+  }"}
+u8 rx_queue;
+u8 check_sequential_pn:1, /* needed for CCMP/GCMP */
+is_protected:1;
+u8 last_pn[6]; /* PN of the last fragment if CCMP was used */
+unsigned int key_color;
+}
+
+struct ieee80211_fragment_cache {
+struct ieee80211_fragment_entry	entries[IEEE80211_FRAGMENT_MAX];
+unsigned int next;
+}
+
/*
 * struct sta_info - STA information
 *
* @pcpu_rx_stats: per-CPU RX statistics, assigned only if the driver needs
* this (by advertising the USES_RSS hw flag)
* @status_stats: TX status statistics
+ * @frags: fragment cache
 */
struct sta_info {
/* General information, mostly static */
@@ -579,6 +609,8 @@
struct cfg80211_chan_def tdls_chandef;

+struct ieee80211_fragment_cache frags;
+
/* keep last! */
struct ieee80211_sta sta;
};
--- linux-4.15.0.orig/net/mac80211/status.c
+++ linux-4.15.0/net/mac80211/status.c
@@ -470,11 +470,6 @@
if (!skb)
    return;
-    if (dropped) {
-        dev_kfree_skb_any(skb);
-        return;
-    }
-
-    if (info->flags & IEEE80211_TX_INTFL_NL80211_FRAME_TX) {
    u64 cookie = IEEE80211_SKB_CB(skb)->ack.cookie;
    struct ieee80211_sub_if_data *sdata;
    @@ -483,8 +478,7 @@
    rcu_read_lock();
sdata = ieee80211_sdata_from_skb(local, skb);
if (sdata) {
    if (ieee80211_is_nullfunc(hdr->frame_control) ||
        ieee80211_is_qos_nullfunc(hdr->frame_control))
        if (ieee80211_is_any_nullfunc(hdr->frame_control))
            cfg80211_probe_status(sdata->dev, hdr->addr1,
                cookie, acked,
                GFP_ATOMIC);
    else if (dropped) {
        dev_kfree_skb_any(skb);
    } else {
        /* consumes skb */
        skb_complete_wifi_ack(skb, acked);
        rcu_read_unlock();
    }
}

/*
@@ -496,6 +490,8 @@
    rcu_read_unlock();

    dev_kfree_skb_any(skb);
    +} else if (dropped) {
    +dev_kfree_skb_any(skb);
    } else {
        /* consumes skb */
        skb_complete_wifi_ack(skb, acked);
        @ @ -548,6 +544,11 @@
    }

    ieee80211LedTx(local);
    +
    +if (skb_has_frag_list(skb)) {
        kfree_skb_list(skb_shinfo(skb)->frag_list);
        skb_shinfo(skb)->frag_list = NULL;
        +}
    }

    /*
    @@ -800,7 +801,7 @@

    rateControlTxStatus(local, sband, status);
    if (ieee80211_vif_is_mesh(&sta->sdata->vif))
        ieee80211s_update_metric(local, sta, skb);
    +ieee80211s_update_metric(local, sta, status);

    if (!(info->flags & IEEE80211_TX_CTL_INJECTED) && acked)
        ieee80211_frame_acked(sta, skb);
    @ @ -854,7 +855,8 @@
    IEEE802_DEBUG_INC(local->dot11FailedCount);
}

    -if (ieee80211_is_nullfunc(fc) && ieee80211_has_pm(fc) &&
        +if (ieee80211_is_any_nullfunc(fc) &&
            +ieee80211_has_pm(fc) &&
                ieee80211_hw_check(&local->hw, REPORTS_TX_ACK_STATUS) &&
                !info->flags & IEEE80211_TX_CTL_INJECTED) &&
                local->ps_sdata && !(local->scanning)) {

/* Track when last TDLS packet was ACKed */
if (test_sta_flag(sta, WLAN_STA_TDLS_PEER_AUTH))
sta->status_stats.last_tdls_pkt_time = jiffies;
} else if (test_sta_flag(sta, WLAN_STA_PS_STA)) {
	return;
} else {
ieee80211_lost_packet(sta, info);
}

rate_control_tx_status(local, sband, status);
+if (ieee80211_vif_is_mesh(&sta->sdata->vif))
+ieee80211s_update_metric(local, sta, status);
}

if (acked || noack_success) {
--- linux-4.15.0.orig/net/mac80211/tdls.c
+++ linux-4.15.0/net/mac80211/tdls.c
@@ -16,6 +16,7 @@
#include "ieee80211_i.h"
#include "driver-ops.h"
#include "rate.h"
+#include "wme.h"

/* give usermode some time for retries in setting up the TDLS session */
#define TDLS_PEER_SETUP_TIMEOUT (15 * HZ)
@@ -1006,14 +1007,13 @@
switch (action_code) {
    case WLAN_TDLS_SETUP_REQUEST:
    case WLAN_TDLS_SETUP_RESPONSE:
-      skb_set_queue_mapping(skb, IEEE80211_AC_BK);
-      skb->priority = 2;
+      skb->priority = 256 + 2;
      break;
    default:
-      skb_set_queue_mapping(skb, IEEE80211_AC_VI);
-      skb->priority = 5;
+      skb->priority = 256 + 5;
      break;
    }
+      skb_set_queue_mapping(skb, ieee80211_select_queue(sdata, skb));

/*
* Set the WLAN_TDLS_TEARDOWN flag to indicate a teardown in progress.
@@ -1988,3 +1988,26 @@
}
rtnl_unlock();
}
+void ieee80211_ttls_handle_disconnect(struct ieee80211_sub_if_data *sdata,
+    const u8 *peer, u16 reason)
+{
+    struct ieee80211_sta *sta;
+
+rcu_read_lock();
+    sta = ieee80211_find_sta(&sdata->vif, peer);
+    if (!sta || !sta->tdls) {
+rcu_read_unlock();
+        return;
+    }
+rcu_read_unlock();
+
+tdls_dbg(sdata, "disconnected from TDLS peer %pM (Reason: %u=%s)\n",
+    peer, reason,
+    ieee80211_get_reason_code_string(reason));
+
+ieee80211_ttls_oper_request(&sdata->vif, peer,
+    NL80211_TTLS_TEARDOWN,
+    WLAN_REASON_TTLS_TEARDOWN_UNREACHABLE,
+    GFP_ATOMIC);
+}
--- linux-4.15.0.orig/net/mac80211/tkip.c
+++ linux-4.15.0/net/mac80211/tkip.c
@@ -266,9 +266,21 @@
if ((keyid >> 6) != key->conf.keyidx)
    return TKIP_DECRYPT_INVALID_KEYIDX;

-    if (rx_ctx->ctx.state != TKIP_STATE_NOT_INIT &&
-        (iv32 < rx_ctx->iv32 ||
-         (iv32 == rx_ctx->iv32 && iv16 < rx_ctx->iv16)))
+    /* Reject replays if the received TSC is smaller than or equal to the
+       last received value in a valid message, but with an exception for
+       the case where a new key has been set and no valid frame using that
+       key has yet received and the local RSC was initialized to 0. This
+       exception allows the very first frame sent by the transmitter to be
+       accepted even if that transmitter were to use TSC 0 (IEEE 802.11
+       described TSC to be initialized to 1 whenever a new key is taken into
+       use).
+    */
+    if (iv32 < rx_ctx->iv32 ||
+        (iv32 == rx_ctx->iv32 &&
+         (iv16 < rx_ctx->iv16 ||
+          (iv16 == rx_ctx->iv16 &&
+           (rx_ctx->iv32 || rx_ctx->iv16 ||
+            rx_ctx->ctx.state != TKIP_STATE_NOT_INIT))))
    return TKIP_DECRYPT_REPLAY;
if (only_iv) {
    --- linux-4.15.0.orig/net/mac80211/trace_msg.h
    +++ linux-4.15.0/net/mac80211/trace_msg.h
    @@ -1,4 +1,9 @@
    /* SPDX-License-Identifier: GPL-2.0 */
    +/
    + * Portions of this file
    + * Copyright (C) 2019 Intel Corporation
    + */
    
    #ifdef CONFIG_MAC80211_MESSAGE_TRACING

    #if !defined(__MAC80211 MSG_DRIVER_TRACE) || defined(TRACE_HEADER_MULTI_READ)
    @@ -11,7 +16,7 @@
    #undef TRACE_SYSTEM
    #define TRACE_SYSTEM mac80211_msg
    
    -#define MAX_MSG_LEN100
    +#define MAX_MSG_LEN120

    DECLARE_EVENT_CLASS(mac80211_msg_event,
    TP_PROTO(struct va_format *vaf),
    --- linux-4.15.0.orig/net/mac80211/tx.c
    +++ linux-4.15.0/net/mac80211/tx.c
    @@ -4,6 +4,7 @@
    * Copyright 2006-2007 Jiri Benc <jbenc@suse.cz>
    * Copyright 2007 Johannes Berg <johannes@sipsolutions.net>
    * Copyright 2013-2014 Intel Mobile Communications GmbH
    + * Copyright (C) 2018 Intel Corporation
    *
    * This program is free software; you can redistribute it and/or modify
    * it under the terms of the GNU General Public License version 2 as
    @@ -295,7 +296,7 @@
    if (unlikely(test_bit(SCAN_SW_SCANNING, &tx->local->scanning)) &&
        test_bit(SDATA_STATE_OFFCHANNEL, &tx->sdata->state) &&
        !ieee80211_is_probe_req(hdr->frame_control) &&
    - !ieee80211_is_nullfunc(hdr->frame_control))
    + !ieee80211_is_any_nullfunc(hdr->frame_control))
    /*
    * When software scanning only nullfunc frames (to notify
    * the sleep state to the AP) and probe requests (for the
    @@ -434,8 +435,8 @@
    if (ieee80211_hw_check(&tx->local->hw, QUEUE_CONTROL))
        info->hw_queue = tx->sdata->vif.cab_queue;

    -/* no stations in PS mode */
    -if (!atomic_read(&ps->num_sta_ps))

/* no stations in PS mode and no buffered packets */
if (!atomic_read(&ps->num_sta_ps) && skb_queue_empty(&ps->bc_buf))
return TX_CONTINUE;

info->flags |= IEEE80211_TX_CTL_SEND_AFTER_DTIM;
@@ -588,10 +589,13 @@
struct ieee80211_tx_info *info = IEEE80211_SKB_CB(tx->skb);
struct ieee80211_hdr *hdr = (struct ieee80211_hdr *)tx->skb->data;

-  (unlikely(info->flags & IEEE80211_TX_INTFL_DONT_ENCRYPT))
+  (unlikely(info->flags & IEEE80211_TX_INTFL_DONT_ENCRYPT)) { 
  tx->key = NULL;
-  else if (tx->sta &&
-    (key = rcu_dereference(tx->sta->ptk[tx->sta->ptk_idx])))
+  else if (tx->sta &&
          (key = rcu_dereference(tx->sta->ptk[tx->sta->ptk_idx])))
    return TX_CONTINUE;
    }
    +
    +  if (tx->sta &&
    +    (key = rcu_dereference(tx->sta->ptk[tx->sta->ptk_idx])))
    tx->key = key;
else if (ieee80211_is_group_privacy_action(tx->skb) &&
    (key = rcu_dereference(tx->sdata->default_multicast_key)))
@@ -652,6 +656,9 @@
    if (!skip_hw && tx->key &&
        tx->key->flags & KEY_FLAG_UPLOADED_TO_HARDWARE)
        info->control.hw_key = &tx->key->conf;
+    else if (!ieee80211_is_mgmt(hdr->frame_control) && tx->sta &&
+        test_sta_flag(tx->sta, WLAN_STA_USES_ENCRYPTION)) { 
+    return TX_DROP;
    }

    return TX_CONTINUE;
@@ -1138,7 +1145,7 @@
}

/* reset session timer */
-  if (reset_agg_timer && tid_tx->timeout)
+  if (reset_agg_timer)
    tid_tx->last_tx = jiffies;

return queued;
@@ -1870,7 +1877,7 @@
sdata->vif.hw_queue[skb_get_queue_mapping(skb)];

if (invoke_tx_handlers_early(&tx))
    return false;
+    return true;
if (ieee80211_queue_skb(local, sdata, tx.sta, tx(skb))
return true;
@@ -1884,14 +1891,26 @@

/* device xmit handlers */

+enum ieee80211_encrypt {
+  ENCRYPT_NONE,
+  ENCRYPT_MGMT,
+  ENCRYPT_DATA,
+};
+
+static int ieee80211_skb_resize(struct ieee80211_sub_if_data *sdata,
struct sk_buff *skb,
-    int head_need, bool may_encrypt)
+    int head_need,
+    enum ieee80211_encrypt encrypt)
{
    struct ieee80211_local *local = sdata->local;
    bool enc_tailroom;
    int tail_need = 0;

    -if (may_encrypt && sdata->crypto_tx_tailroom_needed_cnt) {
      +enc_tailroom = encrypt == ENCRYPT_MGMT ||
      +  (encrypt == ENCRYPT_DATA &&
      +   sdata->crypto_tx_tailroom_needed_cnt);
    +
    +if (enc_tailroom) {
      +  tail_need = IEEE80211_ENCRYPT_TAILROOM;
      +  tail_need -= skb_tailroom(skb);
      +  tail_need = max_t(int, tail_need, 0);
      @@ -1899,8 +1918,7 @@

    if (skb_cloned(skb) &&
        (!ieee80211_hw_check(&local->hw, SUPPORTS_CLONED_SKBS)) ||
        -!skb_clone_writable(skb, ETH_HLEN)) ||
        +!skb_clone_writable(skb, ETH_HLEN) || enc_tailroom))
I802_DEBUG_INC(local->tx_expand_skb_head_cloned);
else if (head_need || tail_need)
I802_DEBUG_INC(local->tx_expand_skb_head);
@@ -1923,21 +1941,27 @@
    struct ieee80211_tx_info *info = IEEE80211_SKB_CB(skb);
    struct ieee80211_hdr *hdr = (struct ieee80211_hdr *) skb->data;
    int headroom;
    -bool may_encrypt;
+enum ieee80211_encrypt encrypt;
- may_encrypt = !(info->flags & IEEE80211_TX_INTFL_DONT_ENCRYPT);
+ if (info->flags & IEEE80211_TX_INTFL_DONT_ENCRYPT)
+ encrypt = ENCRYPT_NO;
+ else if (ieee80211_is_mgmt(hdr->frame_control))
+ encrypt = ENCRYPT_MGMT;
+ else
+ encrypt = ENCRYPT_DATA;

headroom = local->tx_headroom;
- if (may_encrypt)
+ if (encrypt != ENCRYPT_NO)
headroom += sdata->encrypt_headroom;
headroom -= skb_headroom(skb);
headroom = max_t(int, 0, headroom);

- if (ieee80211_skb_resize(sdata, skb, headroom, may_encrypt)) {
+ if (ieee80211_skb_resize(sdata, skb, headroom, encrypt)) {
    ieee80211_free_txskb(&local->hw, skb);
    return;
}

/* reload after potential resize */
hdr = (struct ieee80211_hdr *) skb->data;
info->control.vif = &sdata->vif;

@@ -2078,7 +2102,11 @@
vht_mcs = iterator.this_arg[4] >> 4;
+ if (vht_mcs > 11)
+ vht_mcs = 0;
vht_nss = iterator.this_arg[4] & 0xF;
+ if (!vht_nss || vht_nss > 8)
+ vht_nss = 1;
break;

/*
@@ -2719,7 +2747,7 @@
head_need += sdata->encrypt_headroom;
head_need += local->tx_headroom;
head_need = max_t(int, 0, head_need);
- if (ieee80211_skb_resize(sdata, skb, head_need, true)) {
+ if (ieee80211_skb_resize(sdata, skb, head_need, ENCRYPT_DATA)) {
    ieee80211_free_txskb(&local->hw, skb);
    skb = NULL;
    return ERR_PTR(-ENOMEM);
@@ -3055,27 +3083,18 @@

static bool ieee80211_amsdu_realloc_pad(struct ieee80211_local *local,
-struct sk_buff *skb, int headroom,
-int *subframe_len)
+struct sk_buff *skb, int headroom)
{
-int amsdu_len = *subframe_len + sizeof(struct ethhdr);
-int padding = (4 - amsdu_len) & 3;
-
-if (skb_headroom(skb) < headroom || skb_tailroom(skb) < padding) {
+if (skb_headroom(skb) < headroom) {
I802_DEBUG_INC(local->tx_expand_skb_head);

-if (pskb_expand_head(skb, headroom, padding, GFP_ATOMIC)) {
+if (pskb_expand_head(skb, headroom, 0, GFP_ATOMIC)) {
    wiphy_debug(local->hw.wiphy,
        "failed to reallocate TX buffer\n");
    return false;
}
}

-if (padding) {
-    *subframe_len += padding;
-    skb_put_zero(skb, padding);
-}
-
    return true;
}

@@ -3099,8 +3118,9 @@
    if (info->control.flags & IEEE80211_TX_CTRL_AMSDU)
        return true;

-if (!ieee80211_amsdu_realloc_pad(local, skb, sizeof(*amsdu_hdr),
-    &subframe_len))
+if (!ieee80211_amsdu_realloc_pad(local, skb,
+    sizeof(*amsdu_hdr) +
+    local->hw.extra_tx_headroom))
    return false;

    data = skb_push(skb, sizeof(*amsdu_hdr));
@@ -3162,11 +3182,13 @@
    u8 max_subframes = sta->sta.max_amsdu_subframes;
    int max_frags = local->hw.max_tx_fragments;
    int max_amsdu_len = sta->sta.max_amsdu_len;
+    int orig_truesize;
    __be16 len;
    void *data;
bool ret = false;
unsigned int orig_len;
-int n = 1, nfrags;
+int n = 2, nfrags, pad = 0;
+u16 hdrlen;

if (!ieee80211_hw_check(&local->hw, TX_AMSDU))
return false;
@@ -3194,14 +3216,12 @@
if (!head)
goto out;

+orig_truesize = head->truesize;
orig_len = head->len;

if (skb->len + head->len > max_amsdu_len)
goto out;

-if (!ieee80211_amsdu_prepare_head(sdata, fast_tx, head))
-goto out;
-
  nfrags = 1 + skb_shinfo(skb)->nr_frags;
  nfrags += 1 + skb_shinfo(head)->nr_frags;
  frag_tail = &skb_shinfo(head)->frag_list;
@@ -3217,10 +3237,32 @@
if (max_frags && nfrags > max_frags)
goto out;

-if (!ieee80211_amsdu_realloc_pad(local, skb, sizeof(rfc1042_header) + 2,
-    &subframe_len))
+if (!ieee80211_amsdu_prepare_head(sdata, fast_tx, head))
  goto out;

+/* If n == 2, the "while (*frag_tail)" loop above didn't execute
+ * and *frag_tail should be &skb_shinfo(head)->frag_list.
+ * However, ieee80211_amsdu_prepare_head() can reallocate it.
+ * Reload frag_tail to have it pointing to the correct place.
+ */
+if (n == 2)
+frag_tail = &skb_shinfo(head)->frag_list;
+
+/*
+ * Pad out the previous subframe to a multiple of 4 by adding the
+ * padding to the next one, that's being added. Note that head->len
+ * is the length of the full A-MSDU, but that works since each time
+ * we add a new subframe we pad out the previous one to a multiple
+ * of 4 and thus it no longer matters in the next round.
+ */
+hdrlen = fast_tx->hdr_len - sizeof(rfc1042_header);
+if ((head->len - hdrlen) & 3)
+pad = 4 - ((head->len - hdrlen) & 3);
+
+if (!ieee80211_amsdu_realloc_pad(local, skb, sizeof(rfc1042_header) +
+ 2 + pad))
+goto out_recalc;
+
ret = true;

data = skb_push(skb, ETH_ALEN + 2);
memmove(data, data + ETH_ALEN + 2, 2 * ETH_ALEN);
@@ -3230,15 +3272,20 @@
memcpy(data, &len, 2);
memcpyp(data + 2, rfc1042_header, sizeof(rfc1042_header));
+
+memset(skb_push(skb, pad), 0, pad);
+
head->len += skb->len;
head->data_len += skb->len;
*frag_tail = skb;
-
-flow->backlog += head->len - orig_len;
-tin->backlog_bytes += head->len - orig_len;
-
-fq_recalc_backlog(fq, tin, flow);
+out_recalc:
+fq->memory_usage += head->truesize - orig_truesize;
+if (head->len != orig_len) {
+flow->backlog += head->len - orig_len;
+tin->backlog_bytes += head->len - orig_len;

+fq_recalc_backlog(fq, tin, flow);
+
out:
spin_unlock_bh(&fq->lock);

@@ -3370,7 +3417,7 @@
if (unlikely(ieee80211_skb_resize(sdata, skb,
max_t(int, extra_head + hw_headroom -
skb_headroom(skb), 0),
- false))) {
+ ENCRYPT_NO))) {
 kfree_skb(skb);
return true;
} 
@@ -3469,8 +3516,26 @@
tx skb = skb;
tx sdata = vif_to sdata(info->control.vif);
if (txq->sta)
+ if (txq->sta) {
  tx.sta = container_of(txq->sta, struct sta_info, sta);
+ /*
+ * Drop unicast frames to unauthorised stations unless they are
+ * EAPOL frames from the local station.
+ */
+ if (unlikely(ieee80211_is_data(hdr->frame_control) &&
  !ieee80211_vif_is_mesh(&tx.sdata->vif) &&
  tx.sdata->vif.type != NL80211_IFTYPE_OCB &&
  !is_multicast_ether_addr(hdr->addr1) &&
  !test_sta_flag(tx.sta, WLAN_STA_AUTHORIZED) &&
  (!info->control.flags &
  IEEE80211_TX_CTRL_PORT_CTRL_PROTO) ||
  !ether_addr_equal(tx.sdata->vif.addr,
  +hdr->addr2)))
    +I802_DEBUG_INC(local->tx_handlers_drop_unauth_port);
  ieee80211_free_txskb(&local->hw, skb);
  goto begin;
+ }
+ }

/*
 * The key can be removed while the packet was queued, so need to call
--- linux-4.15.0.orig/net/mac80211/util.c
+++ linux-4.15.0/net/mac80211/util.c
@@ -5,6 +5,7 @@
 * Copyright 2007 Johannes Berg <johannes@sipsolutions.net>
 * Copyright 2013-2014 Intel Mobile Communications GmbH
 * Copyright (C) 2015-2017 Intel Deutschland GmbH
+ * Copyright (C) 2018-2019 Intel Corporation
 *
 * This program is free software; you can redistribute it and/or modify
 * it under the terms of the GNU General Public License version 2 as
@@ -944,16 +945,22 @@
elem_parse_failed = true;
 break;
case WLAN_EID_VHT_OPERATION:
- if (elen >= sizeof(struct ieee80211_vht_operation))
+ if (elen >= sizeof(struct ieee80211_vht_operation)) {
    elems->vht_operation = (void *)pos;
  else
    -elem_parse_failed = true;
+ if (calc_crc)
+   +crc = crc32_be(crc, pos - 2, elen + 2);
+ break;
+ }
+elem_parse_failed = true;
break;
case WLAN_EID_OPCODE_NOTIF:
  -if (elen > 0)
+if (elen > 0) {
    elems->opmode_notif = pos;
  } else
  -elem_parse_failed = true;
+if (calc_crc)
  +crc = crc32_be(crc, pos - 2, elen + 2);
+break;
+}
+elem_parse_failed = true;
break;
case WLAN_EID_MESH_ID:
  elems->mesh_id = pos;
  @ @ -1947,6 +1954,10 @ @
case NL80211_IFTYPE_AP_VLAN:
case NL80211_IFTYPE_MONITOR:
broadcast;
case NL80211_IFTYPE_ADHOC:
+if (sdata->vif.bss_conf.ibss_joined)
+WARN_ON(drv_join_ibss(local, sdata));
+/* fall through */
default:
  ieee80211_reconfig_stations(sdata);
  /* fall through */
  @ @ -2065,7 +2076,8 @ @
  if (!sta->uploaded)
  continue;

  -if (sta->sdata->vif.type != NL80211_IFTYPE_AP)
+if (sta->sdata->vif.type != NL80211_IFTYPE_AP &&
+  sta->sdata->vif.type != NL80211_IFTYPE_AP_VLAN)
  continue;

  for (state = IEEE80211_STA_NOTEXIST;
       @ @ -2118,6 +2130,10 @ @
       mutex_lock(&local->mtx);
       ieee80211_start_next_roc(local);
       mutex_unlock(&local->mtx);
  +/* Requeue all works */
  +list_for_each_entry(sdata, &local->interfaces, list)
  +ieee80211_queue_work(&local->hw, &sdata->work);
  }

  if (local->monitors == local->open_count && local->monitors > 0)
/* Always allow software iftypes */
-if (local->hw.wiphy->software_iftypes & BIT(iftype)) {
+if (cfg80211_iftype_allowed(local->hw.wiphy, iftype, 0, 1)) {
  if (radar_detect)
    return -EINVAL;
  return 0;
}

if (sdata_iter == sdata ||
    !ieee80211_sdata_running(sdata_iter) ||
-  local->hw.wiphy->software_iftypes & BIT(wdev_iter->iftype))
+  cfg80211_iftype_allowed(local->hw.wiphy,
+    wdev_iter->iftype, 0, 1))
  continue;

params.iftype_num[wdev_iter->iftype]++;
--- linux-4.15.0.orig/net/mac80211/vht.c
+++ linux-4.15.0/net/mac80211/vht.c
@@ -170,10 +170,7 @@
 /* take some capabilities as-is */
cap_info = le32_to_cpu(vht_cap_ie->vht_cap_info);
vht_cap->cap = cap_info:
-    vht_cap->cap &= IEEE80211_VHT_CAP_MAX_MPDU_LENGTH_3895 |
-    IEEE80211_VHT_CAP_MAX_MPDU_LENGTH_7991 |
-    IEEE80211_VHT_CAP_MAX_MPDU_LENGTH_11454 |
-    IEEE80211_VHT_CAP_RXLDPC |
+    vht_cap->cap &= IEEE80211_VHT_CAP_RXLDPC |
    IEEE80211_VHT_CAP_VHT_TXOP_PS |
    IEEE80211_VHT_CAP_HTC_VHT |
    IEEE80211_VHT_CAP_MAX_A_MPDU_LENGTH_EXPONENT_MASK |
@@ -182,6 +179,9 @@
    IEEE80211_VHT_CAP_RX_ANTENNA_PATTERN |
    IEEE80211_VHT_CAP_TX_ANTENNA_PATTERN;

+    vht_cap->cap |= min_t(u32, cap_info & IEEE80211_VHT_CAP_MAX_MPDU_MASK,
+        own_cap.cap & IEEE80211_VHT_CAP_MAX_MPDU_MASK);
+
/* and some based on our own capabilities */
switch (own_cap.cap & IEEE80211_VHT_CAP_SUPP_CHAN_WIDTH_MASK) {
  case IEEE80211_VHT_CAP_SUPP_CHAN_WIDTH_160MHZ:
@@ -391,12 +391,18 @@
* IEEE80211-2016 specification makes higher bandwidth operation
* possible on the TDLS link if the peers have wider bandwidth
* capability.
+ *
# Open Source Used In 5GaaS Edge AC-4 34323

+ * However, in this case, and only if the TDLS peer is authorized,
+ * limit to the tdls_chandef so that the configuration here isn't
+ * wider than what's actually requested on the channel context.
+ */
if (test_sta_flag(sta, WLAN_STA_TDLS_PEER) &&
- test_sta_flag(sta, WLAN_STA_TDLS_WIDER_BW))
- return bw;
-
- bw = min(bw, ieee80211_chan_width_to_rx_bw(bss_width));
+ test_sta_flag(sta, WLAN_STA_TDLS_WIDER_BW) &&
+ test_sta_flag(sta, WLAN_STA_AUTHORIZED) &&
+ sta->tdls_chandef.chan)
+ bw = min(bw, ieee80211_chan_width_to_rx_bw(sta->tdls_chandef.width));
+ else
+ bw = min(bw, ieee80211_chan_width_to_rx_bw(bss_width));

return bw;
}
--- linux-4.15.0.orig/net/mac80211/wpa.c
+++ linux-4.15.0/net/mac80211/wpa.c
@@ -162,8 +162,8 @@
 update_iv:
 /* update IV in key information to be able to detect replays */
- rx->key->u.tkip.rx[rx->security_idx].iv32 = rx->tkip_iv32;
- rx->key->u.tkip.rx[rx->security_idx].iv16 = rx->tkip_iv16;
+ rx->key->u.tkip.rx[rx->security_idx].iv32 = rx->tkip.iv32;
+ rx->key->u.tkip.rx[rx->security_idx].iv16 = rx->tkip.iv16;

return RX_CONTINUE;
@@ -289,8 +289,8 @@
    &rx->tkip_iv32,
    &rx->tkip.iv32,
    &rx->tkip.iv32;
+    &rx->tkip.iv16;
+    &rx->tkip.iv16);
if (res != TKIP_DECRYPT_OK)
return RX_DROP_UNUSABLE;
@@ -514,6 +514,9 @@
    &rx->tkip.iv32,
    &rx->tkip.iv16);
    &rx->tkip.iv32,
+    &rx->tkip.iv16);
if (res != TKIP_DECRYPT_OK)
return RX_DROP_UNUSABLE;

/* reload hdr - skb might have been reallocated */
+hdr = (void *)rx->skb->data;
data_len = skb->len - hdrlen - IEEE80211_CCMP_HDR_LEN - mic_len;
if (!rx->sta || data_len < 0)
return RX_DROP_UNUSABLE;
@@ -548,6 +551,8 @@
}
memcp(key->u.ccmp.rx_pn[queue], pn, IEEE80211_CCMP_PN_LEN);
+if (unlikely(ieee80211_is_frag(hdr))
+memp(key->u.ccm_gcm.pn, pn, IEEE80211_CCMP_PN_LEN);
}
/* Remove CCMP header and MIC */
@@ -742,6 +747,9 @@
return RX_DROP_UNUSABLE;
}
+/* reload hdr - skb might have been reallocated */
+hdr = (void *)rx->skb->data;
+data_len = skb->len - hdrlen - IEEE80211_GCMP_HDR_LEN - mic_len;
if (!rx->sta || data_len < 0)
return RX_DROP_UNUSABLE;
@@ -777,6 +785,8 @@
memcpy(key->u.gcmp.rx_pn[queue], pn, IEEE80211_GCMP_PN_LEN);
+if (unlikely(ieee80211_is_frag(hdr))
+memp(key->u.ccm_gcm.pn, pn, IEEE80211_CCMP_PN_LEN);
}
/* Remove GCMP header and MIC */
@@ -1169,7 +1179,7 @@
struct ieee80211_rx_status *status = IEEE80211_SKB_RXCB(skb);
struct ieee80211_key *key = rx->key;
struct ieee80211_mmie_16 *mmie;
-u8 aad[GMAC_AAD_LEN], mic[GMAC_MIC_LEN], ipn[6], nonce[GMAC_NONCE_LEN];
+u8 aad[GMAC_AAD_LEN], *mic, ipn[6], nonce[GMAC_NONCE_LEN];
struct ieee80211_hdr *hdr = (struct ieee80211_hdr *)skb->data;
if (!ieee80211_is_mgmt(hdr->frame_control))
@@ -1200,13 +1210,18 @@
memcpy(nonce, hdr->addr2, ETH_ALEN);
memcp(nonce + ETH_ALEN, ipn, 6);

+mic = kmalloc(GMAC_MIC_LEN, GFP_ATOMIC);
+if (!mic)
+return RX_DROP_UNUSABLE;
if (ieee80211_aes_gmac(key->u.aes_gmac.tfm, aad, nonce,
         skb->data + 24, skb->len - 24,
         mic) < 0 ||
     crypto_memneq(mic, mmie->mic, sizeof(mmie->mic))) {
    key->u.aes_gmac.icverrors++;
    +kfree(mic);
    return RX_DROP_UNUSABLE;
}
    +kfree(mic);
}

memcpy(key->u.aes_gmac.rx_pn, ipn, 6);

--- linux-4.15.0.orig/net/mac802154/llsec.c
+++ linux-4.15.0/net/mac802154/llsec.c
@@ -160,7 +160,7 @@
crypto_free_skcipher(key->tfm0);
 err_tfm:
 for (i = 0; i < ARRAY_SIZE(key->tfm); i++)
-  if (key->tfm[i])
+  if (!IS_ERR_OR_NULL(key->tfm[i]))
    crypto_free_aead(key->tfm[i]);

kzfree(key);
--- linux-4.15.0.orig/net/mac802154/tx.c
+++ linux-4.15.0/net/mac802154/tx.c
@@ -42,11 +42,11 @@
if (res)
goto err_tx;
-ieee802154_xmit_complete(&local->hw, skb, false);
-
  dev->stats.tx_packets++;
  dev->stats.tx_bytes += skb->len;
+
+ieee802154_xmit_complete(&local->hw, skb, false);
+
  return;

err_tx:
@@ -63,8 +63,21 @@
int ret;

if (!(local->hw.flags & IEEE802154_HW_TX_OMIT_CKSUM)) {
-  u16 crc = crc_ccitt(0, skb->data, skb->len);
+  struct sk_buff *skb;
+  u16 crc;
+
+  if (unlikely(skb_tailroom(skb) < IEEE802154_FCS_LEN)) {
+nskb = skb_copy_expand(skb, 0, IEEE802154_FCS_LEN,
+                        GFP_ATOMIC);
+if (likely(nskb)) {
  +consume_skb(skb);
  +skb = nskb;
+} else {
  +goto err_tx;
+}
+
+crc = crc_ccitt(0, skb->data, skb->len);
put_unaligned_le16(crc, skb_put(skb, 2));
}

@ @ -73,6 +86,8 @@

/* async is priority, otherwise sync is fallback */
if (local->ops->xmit_async) {
  +unsigned int len = skb->len;
  +
  ret = drv_xmit_async(local, skb);
  if (ret) {
    ieee802154_wake_queue(&local->hw);
    @ @ -80,7 +95,7 @@
  }
}

dev->stats.tx_packets++;
-dev->stats.tx_bytes += skb->len;
+dev->stats.tx_bytes += len;
} else {
  local->tx_skb = skb;
queue_work(local->workqueue, &local->tx_work);
--- linux-4.15.0.orig/net/mpls/af_mpls.c
+++ linux-4.15.0/net/mpls/af_mpls.c
@@ -8,6 +8,7 @@
#include <linux/ipv6.h>
#include <linux/mls.h>
#include <linux/netconf.h>
+#include <linux/nospec.h>
#include <linux/vmalloc.h>
#include <linux/percpu.h>
#include <net/ip.h>
@@ -617,16 +618,15 @@
struct net_device *dev;
struct dst_entry *dst;
struct flowi6 fl6;
-int err;
if (!ipv6_stub)
    return ERR_PTR(-EAFNOSUPPORT);

memset(&fl6, 0, sizeof(fl6));
memcpy(&fl6.daddr, addr, sizeof(struct in6_addr));
-err = ipv6_stub->ipv6_dst_lookup(net, NULL, &dst, &fl6);
-if (err)
    -return ERR_PTR(err);
+dst = ipv6_stub->ipv6_dst_lookup_flow(net, NULL, &fl6, NULL);
+if (IS_ERR(dst))
+    return ERR_CAST(dst);

dev = dst->dev;
dev_hold(dev);
@@ -935,24 +935,27 @@
    return err;
 }

-static bool mpls_label_ok(struct net *net, unsigned int index,
+static bool mpls_label_ok(struct net *net, unsigned int *index,
    struct netlink_ext_ack *extack)
{
    bool is_ok = true;
    +
    /* Reserved labels may not be set */
    -if (index < MPLS_LABEL_FIRST_UNRESERVED) {
    +if (*index < MPLS_LABEL_FIRST_UNRESERVED) {
        NL_SET_ERR_MSG(extack,
            "Invalid label - must be MPLS_LABEL_FIRST_UNRESERVED or higher");
        -return false;
    +is_ok = false;
    }

    /* The full 20 bit range may not be supported. */
    -if (index >= net->mpls.platform_labels) {
    +if (is_ok && *index >= net->mpls.platform_labels) {
        NL_SET_ERR_MSG(extack,
            "Label >= configured maximum in platform_labels");
        -return false;
    +is_ok = false;
    }

    -return true;
    +*index = array_index_nospec(*index, net->mpls.platform_labels);
    +return is_ok;
}

static int mpls_route_add(struct mpls_route_config *cfg,
index = find_free_label(net);

- if (!mpls_label_ok(net, index, extack))
+ if (!mpls_label_ok(net, &index, extack))
  goto errout;

/* Append makes no sense with mpls */
index = cfg->rc_label;

- if (!mpls_label_ok(net, index, extack))
+ if (!mpls_label_ok(net, &index, extack))
  goto errout;

mpls_route_update(net, index, NULL, &cfg->rc_nlinfo);

if (!mpls_label_ok(cfg->rc_nlinfo.nl_net,
  - cfg->rc_label, extack))
+ &cfg->rc_label, extack))
  goto errout;
break;
}
+case RTA_GATEWAY:
+  NL_SET_ERR_MSG(extack, "MPLS does not support RTA_GATEWAY attribute");
+  goto errout;
    case RTA_VIA:
  { 
    if (nla_get_via(nla, &cfg->rc_via_alen,
      -   &cfg->rc_label, extack))
        goto errout;
  }
- if (!mpls_label_ok(net, in_label, extack)) {
+ if (!mpls_label_ok(net, &in_label, extack)) {
    err = -EINVAL;
    goto errout;
  }

--- linux-4.15.0.orig/net/mpls/mpls_gso.c
+++ linux-4.15.0/net/mpls/mpls_gso.c
@@ -18,6 +18,7 @@
#include <linux/netdev_features.h>
#include <linux/netdevice.h>
#include <linux/skbuff.h>
+ include <net/mpls.h>

static struct sk_buff *mpls_gso_segment(struct sk_buff *skb,  
    netdev_features_t_features)  
@@ -31,6 +32,8 @@

skb_reset_network_header(skb);  
  mpls_hlen = skb_inner_network_header(skb) - skb_network_header(skb);  
+if (unlikely(!mpls_hlen || mpls_hlen % MPLS_HLEN))  
+goto out;
if (unlikely(!pskb_may_pull(skb, mpls_hlen)))  
goto out;

--- linux-4.15.0.orig/net/mpls/mpls_iptunnel.c  
+++ linux-4.15.0/net/mpls/mpls_iptunnel.c  
@@ -28,7 +28,7 @@

#include "internal.h"

static const struct nla_policy mpls_iptunnel_policy[MPLS_IPTUNNEL_MAX + 1] = {
    [MPLS_IPTUNNEL_DST] = { .type = NLA_U32 },
    [MPLS_IPTUNNEL_DST] = { .len = sizeof(u32) },
    [MPLS_IPTUNNEL_TTL] = { .type = NLA_U8 },
};

--- linux-4.15.0.orig/net/ncsi/Makefile  
+++ linux-4.15.0/net/ncsi/Makefile  
@@ -1,4 +1,4 @@

# Makefile for NCSI API
#
-obj-$(CONFIG_NET_NCSI) += ncsi-cmd.o ncsi-rsp.o ncsi-aen.o ncsi-manage.o
+obj-$(CONFIG_NET_NCSI) += ncsi-cmd.o ncsi-rsp.o ncsi-aen.o ncsi-manage.o ncsi-netlink.o
--- linux-4.15.0.orig/net/ncsi/internal.h  
+++ linux-4.15.0/net/ncsi/internal.h  
@@ -68,15 -68,6 @@

NCSI_MODE_MAX
};

-enum {
-    NCSI_FILTER_BASE= 0,
-    NCSI_FILTER_VLAN= 0,
-    NCSI_FILTER_UC,
-    NCSI_FILTER_MC,
-    NCSI_FILTER_MIXED,
-    NCSI_FILTER_MAX
-};
-
-struct ncsi_channel_version {
struct ncsi_channel_filter {
  u32 index; /* Index of channel filters */
  u32 total; /* Total entries in the filter table */
  u64 bitmap; /* Bitmap of valid entries */
  u32 data[]; /* Data for the valid entries */
}

struct ncsi_channel_mac_filter {
  u8 n_uc;
  u8 n_mc;
  u8 n_mixed;
  u64 bitmap;
  unsigned char* addrs;
};

struct ncsi_channel_vlan_filter {
  u8 n_vids;
  u64 bitmap;
  u16* vids;
};

struct ncsi_channel_stats {
  u32 version; /* Supported BCD encoded NCSI version */
  u32 alpha2; /* Supported BCD encoded NCSI version */
  u32 data[8]; /* Data entries */
};

struct ncsi_channel_filter {
  u32 index; /* Index of channel filters */
  u32 total; /* Total entries in the filter table */
  u64 bitmap; /* Bitmap of valid entries */
  u32 data[]; /* Data for the valid entries */
}

struct ncsi_channel_mac_filter {
  u8 n_uc;
  u8 n_mc;
  u8 n_mixed;
  u64 bitmap;
  unsigned char* addrs;
};

struct ncsi_channel_vlan_filter {
  u8 n_vids;
  u64 bitmap;
  u16* vids;
};

struct ncsi_channel_stats {
  u32 version; /* Supported BCD encoded NCSI version */
  u32 alpha2; /* Supported BCD encoded NCSI version */
  u32 data[8]; /* Data entries */
};
/* Resources */
-int ncsi_find_filter(struct ncsi_channel *nc, int table, void *data);
-int ncsi_add_filter(struct ncsi_channel *nc, int table, void *data);
-int ncsi_remove_filter(struct ncsi_channel *nc, int table, int index);
void ncsi_start_channel_monitor(struct ncsi_channel *nc);
void ncsi_stop_channel_monitor(struct ncsi_channel *nc);
struct ncsi_channel *ncsi_find_channel(struct ncsi_package *np,
--- linux-4.15.0.orig/net/ncsi/ncsi-manage.c
+++ linux-4.15.0/net/ncsi/ncsi-manage.c
@@ -12,7 +12,6 @@
#include <linux/init.h>
#include <linux/netdevice.h>
#include <linux/skbuff.h>
-#include <linux/netlink.h>
#include <net/ncsi.h>
#include <net/net_namespace.h>
@@ -23,129 +22,11 @@
#include "internal.h"
#include "ncsi-pkt.h"
+#include "ncsi-netlink.h"

LIST_HEAD(ncsi_dev_list);
DEFINE_SPINLOCK(ncsi_dev_lock);

-static inline int ncsi_filter_size(int table)
-{
-    int sizes[] = { 2, 6, 6, 6 };
-    -BUILD_BUG_ON(ARRAY_SIZE(sizes) != NCSI_FILTER_MAX);
-    if (table < NCSI_FILTER_BASE || table >= NCSI_FILTER_MAX)
-        return -EINVAL;
-    return sizes[table];
-}
-
-static u32 *ncsi_get_filter(struct ncsi_channel *nc, int table, int index)
-{
-    struct ncsi_channel_filter *ncf;
-    int size;
-    -ncf = nc->filters[table];
-    if (!ncf)
-        return NULL;
-    -size = ncsi_filter_size(table);
if (size < 0)
return NULL;
-
return ncf->data + size * index;
-
/* Find the first active filter in a filter table that matches the given
 * data parameter. If data is NULL, this returns the first active filter.
 */
int ncsi_find_filter(struct ncsi_channel *nc, int table, void *data)
{
struct ncsi_channel_filter *ncf;
-void *bitmap;
-int index, size;
-unsigned long flags;
-
ncf = nc->filters[table];
-if (!ncf)
return -ENXIO;
-
-size = ncsi_filter_size(table);
-if (size < 0)
return size;
-
-spin_lock_irqsave(&nc->lock, flags);
-bitmap = (void *)&ncf->bitmap;
-index = -1;
-while ((index = find_next_bit(bitmap, ncf->total, index + 1))
       < ncf->total) {
-if (!data || !memcmp(ncf->data + size * index, data, size)) {
-spin_unlock_irqrestore(&nc->lock, flags);
-return index;
-
-spin_unlock_irqrestore(&nc->lock, flags);
-
-return -ENOENT;
-
-
int ncsi_add_filter(struct ncsi_channel *nc, int table, void *data)
{
-stuct ncsi_channel_filter *ncf;
-int index, size;
-void *bitmap;
-unsigned long flags;
-
-size = ncsi_filter_size(table);
-if (size < 0)
- return size;
-
- index = ncsi_find_filter(nc, table, data);
- if (index >= 0)
- return index;
-
- ncf = nc->filters[table];
- if (!ncf)
- return -ENODEV;
-
- spin_lock_irqsave(&nc->lock, flags);
- bitmap = (void *)&ncf->bitmap;
- do {
- index = find_next_zero_bit(bitmap, ncf->total, 0);
- if (index >= ncf->total) {
- spin_unlock_irqrestore(&nc->lock, flags);
- return -ENOSPC;
- }
- } while (test_and_set_bit(index, bitmap));
-
- memcpy(ncf->data + size * index, data, size);
- spin_unlock_irqrestore(&nc->lock, flags);
-
- return index;
-
-
- int ncsi_remove_filter(struct ncsi_channel *nc, int table, int index)
-
- {
- struct ncsi_channel_filter *ncf;
- int size;
- void *bitmap;
- unsigned long flags;
-
- size = ncsi_filter_size(table);
- if (size < 0)
- return size;
-
- ncf = nc->filters[table];
- if (!ncf || index >= ncf->total)
- return -ENODEV;
-
- spin_lock_irqsave(&nc->lock, flags);
- bitmap = (void *)&ncf->bitmap;
- if (test_and_clear_bit(index, bitmap))
- memset(ncf->data + size * index, 0, size);
- spin_unlock_irqrestore(&nc->lock, flags);
-
- return 0;
static void ncsi_report_link(struct ncsi_dev_priv *ndp, bool force_down)
{
    struct ncsi_dev *nd = &ndp->ndev;
    monitor_state = nc->monitor.state;
    spin_unlock_irqrestore(&nc->lock, flags);

    -if (!enabled || chained) {
    -ncsi_stop_channel_monitor(nc);
    -return;
    -}
    +if (!enabled)
    +return;/* expected race disabling timer */
    +if (WARN_ON_ONCE(chained))
    +goto bad_state;
    +
    if (state != NCSI_CHANNEL_INACTIVE &&
        state != NCSI_CHANNEL_ACTIVE) {
    -ncsi_stop_channel_monitor(nc);
    +bad_state:
    +netdev_warn(ndp->ndev.dev,
        +"Bad NCSI monitor state channel %d 0x%x %s queue\n",
        +nc->id, state, chained ? "on" : "off");
    +spin_lock_irqsave(&nc->lock, flags);
    +nc->monitor.enabled = false;
    +spin_unlock_irqrestore(&nc->lock, flags);
    return;
    }

    ndp->flags |= NCSI_DEV_RESHUFFLE;
    
    ncm = &nc->modes[NCSI_MODE_LINK];
    spin_lock_irqsave(&nc->lock, flags);
    +nc->monitor.enabled = false;
    nc->state = NCSI_CHANNEL_INVISIBLE;
    ncm->data[2] &= ~0x1;
    spin_unlock_irqrestore(&nc->lock, flags);
    
    static void ncsi_remove_channel(struct ncsi_channel *nc)
    {
        struct ncsi_package *np = nc->package;
        
        ncsi_stop_channel_monitor(nc);
        
        ncm = &nc->modes[NCSI_MODE_LINK];
        spin_lock_irqsave(&nc->lock, flags);
        +nc->monitor.enabled = false;
        nc->state = NCSI_CHANNEL_INVISIBLE;
        ncm->data[2] &= ~0x1;
        spin_unlock_irqrestore(&nc->lock, flags);
    }
}
unsigned long flags;
-int i;

-/* Release filters */
spin_lock_irqsave(&nc->lock, flags);
-for (i = 0; i < NCSI_FILTER_MAX; i++) {
-ncf = nc->filters[i];
-if (!ncf)
-continue;

-nc->filters[i] = NULL;
-kfree(ncf);
-}
+/* Release filters */
+kfree(nc->mac_filter.addrs);
+kfree(nc->vlan_filter.vids);

nc->state = NCSI_CHANNEL_INACTIVE;
spin_unlock_irqrestore(&nc->lock, flags);

static int clear_one_vid(struct ncsi_dev_priv *ndp, struct ncsi_channel *nc,
 struct ncsi_cmd_arg *nca)
{
+struct ncsi_channel_vlan_filter *ncf;
+unsigned long flags;
+void *bitmap;
-int index;
-u32 *data;
-u16 vid;

-index = ncsi_find_filter(nc, NCSI_FILTER_VLAN, NULL);
-if (index < 0) {
-/* Filter table empty */
-return -1;
-}
+ncf = &nc->vlan_filter;
+bitmap = &ncf->bitmap;

-data = ncsi_get_filter(nc, NCSI_FILTER_VLAN, index);
-if (!data) {
-netdev_err(ndp->ndev.dev,
- "NCSI: failed to retrieve filter %\d\n", index);
-/* Set the VLAN id to 0 - this will still disable the entry in
- * the filter table, but we won't know what it was.
- */
-vid = 0;
-} else {
-vid = *(u16 *)data;
+spin_lock_irqsave(&nc->lock, flags);
+index = find_next_bit(bitmap, ncf->n_vids, 0);
+if (index >= ncf->n_vids) {
+spin_unlock_irqrestore(&nc->lock, flags);
+return -1;
}
+vid = ncf->vids[index];

-netdev_printk(KERN_DEBUG, ndp->ndev.dev,
- "NCSI: removed vlan tag %u at index %d\n",
- vid, index + 1);
-ncsi_remove_filter(nc, NCSI_FILTER_VLAN, index);
+clear_bit(index, bitmap);
+ncf->vids[index] = 0;
+spin_unlock_irqrestore(&nc->lock, flags);

nca->type = NCSI_PKT_CMD_SVF;
nca->words[1] = vid;
@@ -711,45 +585,55 @@
static int set_one_vid(struct ncsi_dev_priv *ndp, struct ncsi_channel *nc,
struct ncsi_cmd_arg *nca)
{
+struct ncsi_channel_vlan_filter *ncf;
struct vlan_vid *vlan = NULL;
-int index = 0;
+unsigned long flags;
+int i, index;
+void *bitmap;
+u16 vid;
+
+if (list_empty(&ndp->vlan_vids))
+return -1;
+
+ncf = &nc->vlan_filter;
+bitmap = &ncf->bitmap;

+spin_lock_irqsave(&nc->lock, flags);
+
+rcu_read_lock();
list_for_each_entry_rcu(vlan, &ndp->vlan_vids, list) {
-index = ncsi_find_filter(nc, NCSI_FILTER_VLAN, &vlan->vid);
-if (index < 0) {
-/* New tag to add */
-netdev_printk(KERN_DEBUG, ndp->ndev.dev,
- "NCSI: new vlan id to set: %u\n",
- vlan->vid);
+vid = vlan->vid;
+for (i = 0; i < ncf->n_vids; i++)
if (ncf->vids[i] == vid) {
+vid = 0;
+break;
+}
+if (vid)
break;
-
-netdev_printk(KERN_DEBUG, ndp->ndev.dev,
-"vid %u already at filter pos %d\n",
-vlan->vid, index);
}
+rcu_read_unlock();

-if (!vlan || index >= 0) {
-netdev_printk(KERN_DEBUG, ndp->ndev.dev,
-"no vlan ids left to set\n");
+if (!vid) {
+/* No VLAN ID is not set */
+spin_unlock_irqrestore(&nc->lock, flags);
return -1;
}

-index = ncsi_add_filter(nc, NCSI_FILTER_VLAN, &vlan->vid);
-if (index < 0) {
+index = find_next_zero_bit(bitmap, ncf->n_vids, 0);
+if (index < 0 || index >= ncf->n_vids) {
netdev_err(ndp->ndev.dev,
-"Failed to add new VLAN tag, error %d\n", index);
-if (index == -ENOSPC)
-netdev_err(ndp->ndev.dev,
-"Channel %u already has all VLAN filters set\n",
-nc->id);
+ "Channel %u already has all VLAN filters set\n",
+nc->id);
+spin_unlock_irqrestore(&nc->lock, flags);
return -1;
}

-netdev_printk(KERN_DEBUG, ndp->ndev.dev,
-"NCSI: set vid %u in packet, index %u\n",
-vlan->vid, index + 1);
+ncf->vids[index] = vid;
+set_bit(index, bitmap);
+spin_unlock_irqrestore(&nc->lock, flags);
+nca->type = NCSI_PKT_CMD_SVF;
-nca->words[1] = vlan->vid;
+nca->words[1] = vid;
static int ncsi_choose_active_channel(struct ncsi_dev_priv *ndp)
{
-struct ncsi_package *np;
-struct ncsi_channel *nc, *found, *hot_nc;
+struct ncsi_package *np, *force_package;
+struct ncsi_channel *nc, *found, *hot_nc, *force_channel;
struct ncsi_channel_mode *ncm;

spin_lock_irqsave(&ndp->lock, flags);
hot_nc = ndp->hot_channel;
+force_channel = ndp->force_channel;
+force_package = ndp->force_package;
spin_unlock_irqrestore(&ndp->lock, flags);

+/* Force a specific channel whether or not it has link if we have been
+ configured to do so
+ */
+if (force_package && force_channel) {
+found = force_channel;
+ncm = &found->modes[NCSI_MODE_LINK];
+if (!(ncm->data[2] & 0x1))
+netdev_info(ndp->ndev.dev, 
+ "NCSI: Channel %u forced, but it is link down\n",
+ found->id);
+goto out;
+}
+
+/* The search is done once an inactive channel with up
* link is found.
*/
found = NULL;
NCSI_FOR_EACH_PACKAGE(ndp, np) {
+if (ndp->force_package && np != ndp->force_package)
+continue;
NCSI_FOR_EACH_CHANNEL(np, nc) {
spin_lock_irqsave(&nc->lock, flags);

ndp->ptype.dev = dev;
dev_add_pack(&ndp->ptype);

+/* Set up generic netlink interface */

/ * HW filter index starts at 1 */
nca->bytes[6] = index + 1;
nca->bytes[7] = 0x01;
@@ -965,20 +849,37 @@
/* HW filter index starts at 1 */
nca->bytes[6] = index + 1;
nca->bytes[7] = 0x01;
@@ -965,20 +849,37 @@
/* HW filter index starts at 1 */
nca->bytes[6] = index + 1;
nca->bytes[7] = 0x01;
@@ -965,20 +849,37 @@
ncsi_init_netlink(dev);
+
return nd;
}
EXPORT_SYMBOL_GPL(ncsi_register_dev);
@@ -1673,6 +1577,8 @@
#endif
spin_unlock_irqrestore(&ncsi_dev_lock, flags);

+ncsi_unregister_netlink(nd->dev);
+
kfree(ndp);
}
EXPORT_SYMBOL_GPL(ncsi_unregister_dev);
--- linux-4.15.0.orig/net/ncsi/ncsi-netlink.c
+++ linux-4.15.0/net/ncsi/ncsi-netlink.c
@@ -0,0 +1,415 @@
+
+/*
+ * Copyright Samuel Mendoza-Jonas, IBM Corporation 2018.
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
+
+#include <linux/module.h>
+#include <linux/kernel.h>
+#include <linux/if_arp.h>
+#include <linux/rtnetlink.h>
+#include <linux/etherdevice.h>
+#include <linux/module.h>
+#include <net/genetlink.h>
+#include <net/ncsi.h>
+#include <linux/skbuff.h>
+#include <net/sock.h>
+#include <uapi/linux/ncsi.h>
+
+#+#+include "internal.h"
+#+#+include "ncsi-netlink.h"
+
+static struct genl_family ncsi_genl_family;
+
+static const struct nla_policy ncsi_genl_policy[NCSI_ATTR_MAX + 1] = {
+[NCSI_ATTR_IFINDEX] = { .type = NLA_U32 },
+[NCSI_ATTR_PACKAGE_LIST] = { .type = NLA_NESTED },
+[NCSI_ATTR_PACKAGE_ID] = { .type = NLA_U32 },
+[NCSI_ATTR_CHANNEL_ID] = { .type = NLA_U32 },
static struct ncsi_dev_priv *ndp_from_ifindex(struct net *net, u32 ifindex)
{
    struct ncsi_dev_priv *ndp;
    struct net_device *dev;
    struct ncsi_dev *nd;
    
    if (!net)
        return NULL;
    
    dev = dev_get_by_index(net, ifindex);
    if (!dev) {
        pr_err("NCSI netlink: No device for ifindex %u\n", ifindex);
        return NULL;
    }
    
    nd = ncsi_find_dev(dev);
    ndp = nd ? TO_NCSI_DEV_PRIV(nd) : NULL;
    
    dev_put(dev);
    return ndp;
}

static int ncsi_write_channel_info(struct sk_buff *skb,
    struct ncsi_dev_priv *ndp,
    struct ncsi_channel *nc)
{
    struct ncsi_channel_vlan_filter *ncf;
    struct ncsi_channel_mode *m;
    struct nlattr *vid_nest;
    int i;
    
    nla_put_u32(skb, NCSI_CHANNEL_ATTR_ID, nc->id);
    m = &nc->modes[NCSI_MODE_LINK];
    nla_put_u32(skb, NCSI_CHANNEL_ATTR_LINK_STATE, m->data[2]);
    if (nc->state == NCSI_CHANNELACTIVE)
        nla_put_flag(skb, NCSI_CHANNEL_ATTR_ACTIVE);
    if (ndp->force_channel == nc)
        nla_put_flag(skb, NCSI_CHANNEL_ATTR_FORCED);
    nla_put_u32(skb, NCSI_CHANNEL_ATTR_VERSION_MAJOR, nc->version.version);
    nla_put_u32(skb, NCSI_CHANNEL_ATTR_VERSION_MINOR, nc->version.alpha2);
    nla_put_string(skb, NCSI_CHANNEL_ATTR_VERSION_STR, nc->version.fw_name);
    
    vid_nest = nla_nest_start(skb, NCSI_CHANNEL_ATTR_VLAN_LIST);
    if (!vid_nest)
return -ENOMEM;
+ncf = &nc->vlan_filter;
+i = -1;
+while ((i = find_next_bit((void *)&ncf->bitmap, ncf->n_vids,
+ i + 1)) < ncf->n_vids) {
+if (ncf->vids[i])
+nla_put_u16(skb, NCSI_CHANNEL_ATTR_VLAN_ID,
+ ncf->vids[i]);
+
+nla_nest_end(skb, vid_nest);
+
+return 0;
+
+static int ncsi_write_package_info(struct sk_buff *skb,
+ struct ncsi_dev_priv *ndp, unsigned int id)
+{
+struct nlattr *pnest, *cnest, *nest;
+struct ncsi_package *np;
+struct ncsi_channel *nc;
+bool found;
+int rc;
+
+if (id > ndp->package_num) {
+netdev_info(ndp->ndev.dev, "NCSI: No package with id %u\n", id);
+nreturn -ENODEV;
+}
+
+found = false;
+NCSI_FOR_EACH_PACKAGE(ndp, np) {
+if (np->id != id)
+continue;
+pnest = nla_nest_start(skb, NCSI_PKG_ATTR);
+nla_put_u32(skb, NCSI_PKG_ATTR_ID, np->id);
+ncontinue;
+nfound = true;
+nNCSI_FOR_EACH_CHANNEL(np, nc) {
+nnest = nla_nest_start(skb, NCSI_CHANNEL_ATTR);
+ncontinue;
+nnest_cancel(skb, nest);
+nreturn -ENOMEM;
+nNCSI_FOR_EACH_CHANNEL(np, nc) {
+nnest = nla_nest_start(skb, NCSI_CHANNEL_ATTR);
+ncontinue;
+return -ENOMEM;
+
+rc = ncsi_write_channel_info(skb, ndp, nc);
+if (rc) {
+nla_nest_cancel(skb, nest);
+nla_nest_cancel(skb, cnest);
+nla_nest_cancel(skb, pnest);
+return rc;
+
+nla_nest_end(skb, nest);
+
+nla_nest_end(skb, cnest);
+nla_nest_end(skb, pnest);
+found = true;
+
+if (!found)
+return -ENODEV;
+
+return 0;
+
+
+static int ncsi_pkg_info_nl(struct sk_buff *msg, struct genl_info *info)
+{
+struct ncsi_dev_priv *ndp;
+unsigned int package_id;
+struct sk_buff *skb;
+struct nlattr *attr;
+void *hdr;
+int rc;
+
+if (!info || !info->attrs)
+return -EINVAL;
+
+if (!info->attrs[NCSI_ATTR_IFINDEX])
+return -EINVAL;
+
+if (!info->attrs[NCSI_ATTR_PACKAGE_ID])
+return -EINVAL;
+
+ndp = ndp_from_ifindex(genl_info_net(info),
+            nla_get_u32(info->attrs[NCSI_ATTR_IFINDEX]));
+
+if (!ndp)
+return -ENODEV;
+
+skb = genlmsg_new(NLMSG_DEFAULT_SIZE, GFP_KERNEL);
+if (!skb)
+return -ENOMEM;
+hdr = genlmsg_put(skb, info->snd_portid, info->snd_seq, &ncsi_genl_family, 0, NCSI_CMD_PKG_INFO);
+if (!hdr) {
+kfree(skb);
+return -EMSGSIZE;
+
+package_id = nla_get_u32(info->attrs[NCSI_ATTR_PACKAGE_ID]);
+
+attr = nla_nest_start(skb, NCSI_ATTR_PACKAGE_LIST);
+rc = ncsi_write_package_info(skb, ndp, package_id);
+
+if (rc) {
+nla_nest_cancel(skb, attr);
+goto err;
+
+nla_nest_end(skb, attr);
+
+genlmsg_end(skb, hdr);
+return genlmsg_reply(skb, info);
+
+err:
+genlmsg_cancel(skb, hdr);
+kfree(skb);
+return rc;
+
+static int ncsi_pkg_info_all_nl(struct sk_buff *skb, struct netlink_callback *cb) {
+struct nlattr *attrs[NCSI_ATTR_MAX];
+struct ncsi_package *np, *package;
+struct ncsi_dev_priv *ndp;
+unsigned int package_id;
+struct nlattr *attr;
+void *hdr;
+int rc;
+
+rc = genlmsg_parse(cb->nlh, &ncsi_genl_family, attrs, NCSI_ATTR_MAX, ncsi_genl_policy, NULL);
+if (rc)
+return rc;
+
+if (!attrs[NCSI_ATTR_IFINDEX])
+return -EINVAL;
+}
+ndp = ndp_from_ifindex(get_net(sock_net(skb->sk)),
+    nla_get_u32(attrs[NCSI_ATTR_IFINDEX]));
+
+if (!ndp)
+    return -ENODEV;
+
+package_id = cb->args[0];
+package = NULL;
+NCSI_FOREACHPACKAGE(ndp, np)
+    if (np->id == package_id)
+        package = np;
+
+if (!package)
+    return 0; /* done */
+
+hdr = genlmsg_put(skb, NETLINK_CB(cb->skb).portid, cb->nlh->nlmsg_seq,
+    &ncsi_genl_family, 0, NCSI_CMD_PKG_INFO);
+if (!hdr) {
+    rc = -EMSGSIZE;
+    goto err;
+} /* err */
+
+attr = nla_nest_start(skb, NCSI_ATTR_PACKAGE_LIST);
+rc = ncsi_write_package_info(skb, ndp, package->id);
+if (rc) {
+    nla_nest_cancel(skb, attr);
+    goto err;
+}
+
+nla_nest_end(skb, attr);
+genlmsg_end(skb, hdr);
+
+cb->args[0] = package_id + 1;
+
+return skb->len;
+err:
+    genlmsg_cancel(skb, hdr);
+    return rc;
+
+}
+
+static int ncsi_set_interface_nl(struct sk_buff *msg, struct genl_info *info)
+{
+    struct ncsi_package *np, *package;
+    struct ncsi_channel *nc, *channel;
+    unsigned long flags;
+    +static int ncsi_set_interface_nl(struct sk_buff *msg, struct genl_info *info)
+    +{ 
+        struct ncsi_package *np, *package;
+        struct ncsi_channel *nc, *channel;
+        u32 package_id, channel_id;
+        struct ncsi_dev_priv *ndp;
+        unsigned long flags;
+        +


+if (!info || !info->attrs)
+return -EINVAL;
+
+if (!info->attrs[NCSI_ATTR_IFINDEX])
+return -EINVAL;
+
+if (!info->attrs[NCSI_ATTR_PACKAGE_ID])
+return -EINVAL;
+
+ndp = ndp_from_ifindex(get_net(sock_net(msg->sk)),
+ nla_get_u32(info->attrs[NCSI_ATTR_IFINDEX]));
+if (!ndp)
+return -ENODEV;
+
+package_id = nla_get_u32(info->attrs[NCSI_ATTR_PACKAGE_ID]);
+package = NULL;
+
+spin_lock_irqsave(&ndp->lock, flags);
+
+NCSI_FOR_EACH_PACKAGE(ndp, np)
+if (np->id == package_id)
+package = np;
+if (!package) {
+ /* The user has set a package that does not exist */
+ return -ERANGE;
+}
+
+channel = NULL;
+if (!info->attrs[NCSI_ATTR_CHANNEL_ID]) {
+ /* Allow any channel */
+channel_id = NCSI_RESERVED_CHANNEL;
+} else {
+channel_id = nla_get_u32(info->attrs[NCSI_ATTR_CHANNEL_ID]);
+NCSI_FOR_EACH_CHANNEL(package, nc)
+if (nc->id == channel_id)
+channel = nc;
+}
+
+if (channel_id != NCSI_RESERVED_CHANNEL && !channel) {
+ /* The user has set a channel that does not exist on this
+ package */
+ netdev_info(ndp->ndev.dev, "NCSI: Channel %u does not exist!",
+ channel_id);
+return -ERANGE;
+}
+
+ndp->force_package = package;
+ndp->force_channel = channel;
+spin_unlock_irqrestore(&ndp->lock, flags);
+
+netdev_info(ndp->ndev.dev, "Set package 0x%x, channel 0x%x%s as preferred\n",
+    package_id, channel_id,
+    channel_id == NCSI_RESERVED_CHANNEL ? " (any)" : "");
+
+/* Bounce the NCSI channel to set changes */
+ncsi_stop_dev(&ndp->ndev);
+ncsi_start_dev(&ndp->ndev);
+
+return 0;
+
+
+static int ncsi_clear_interface_nl(struct sk_buff *msg, struct genl_info *info)
+{
+    struct ncsi_dev_priv *ndp;
+    unsigned long flags;
+
+    if (!info || !info->attrs)
+        return -EINVAL;
+
+    if (!info->attrs[NCSI_ATTR_IFINDEX])
+        return -EINVAL;
+
+    ndp = ndp_from_ifindex(get_net(sock_net(msg->sk)),
+        nla_get_u32(info->attrs[NCSI_ATTR_IFINDEX]));
+    if (!ndp)
+        return -ENODEV;
+
+    /* Clear any override */
+    spin_lock_irqsave(&ndp->lock, flags);
+    ndp->force_package = NULL;
+    ndp->force_channel = NULL;
+    spin_unlock_irqrestore(&ndp->lock, flags);
+    netdev_info(ndp->ndev.dev, "NCSI: Cleared preferred package/channel\n");
+
+    /* Bounce the NCSI channel to set changes */
+    ncsi_stop_dev(&ndp->ndev);
+    ncsi_start_dev(&ndp->ndev);
+
+    return 0;
+}

+static const struct genl_ops ncsi_ops[] = {
+    {
+        .cmd = NCSI_CMD_PKG_INFO,
+        .policy = ncsi_genl_policy,
+    }
+};
+.doit = ncsi_pkg_info_nl,
+.dumpit = ncsi_pkg_info_all_nl,
+.flags = 0,
+},
+
+.cmd = NCSI_CMD_SET_INTERFACE,
+.policy = ncsi_genl_policy,
+.doit = ncsi_set_interface_nl,
+.flags = GENL_ADMIN_PERM,
+},
+
+.cmd = NCSI_CMD_CLEAR_INTERFACE,
+.policy = ncsi_genl_policy,
+.doit = ncsi_clear_interface_nl,
+.flags = GENL_ADMIN_PERM,
+}.
+
+static struct genl_family ncsi_genl_family __ro_after_init = {
+.name = "NCSI",
+.version = 0,
+.maxattr = NCSI_ATTR_MAX,
+.module = THIS_MODULE,
+.ops = ncsi_ops,
+.n_ops = ARRAY_SIZE(ncsi_ops),
+};
+
+int ncsi_init_netlink(struct net_device *dev)
+{
+int rc;
+
+rc = genl_register_family(&ncsi_genl_family);
+if (rc)
+netdev_err(dev, "ncsi: failed to register netlink family\n");
+
+return rc;
+}
+
+int ncsi_unregister_netlink(struct net_device *dev)
+{
+int rc;
+
+rc = genl_unregister_family(&ncsi_genl_family);
+if (rc)
+netdev_err(dev, "ncsi: failed to unregister netlink family\n");
+
+return rc;
+}
--- linux-4.15.0.orig/net/ncsi/ncsi-netlink.h
+++ linux-4.15.0/net/ncsi/ncsi-netlink.h
@@ -0,0 +1,20 @@
+/*
+ * Copyright Samuel Mendoza-Jonas, IBM Corporation 2018.
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ */
+
+#ifndef __NCSI_NETLINK_H__
+#define __NCSI_NETLINK_H__
+#include <linux/netdevice.h>
+#include "internal.h"
+
+int ncsi_init_netlink(struct net_device *dev);
+int ncsi_unregister_netlink(struct net_device *dev);
+
+#endif /* __NCSI_NETLINK_H__ */
--- linux-4.15.0.orig/net/ncsi/ncsi-rsp.c
+++ linux-4.15.0/net/ncsi/ncsi-rsp.c
@@ -334,9 +334,9 @@
 struct ncsi_rsp_pkt *rsp;
 struct ncsi_dev_priv *ndp = nr->ndp;
 struct ncsi_channel *nc;
-struct ncsi_channel_filter *ncf;
-unsigned short vlan;
-int ret;
+
+struct ncsi_channel_vlan_filter *ncf;
+unsigned long flags;
+void *bitmap;

 /* Find the package and channel */
 rsp = (struct ncsi_rsp_pkt *)skb_network_header(nr->rsp);
@@ -346,22 +346,23 @@
 struct ncsi_rsp_pkt *rsp;
 struct ncsi_dev_priv *ndp = nr->ndp;
 struct ncsi_channel *nc;
-struct ncsi_channel_filter *ncf;
-unsigned short vlan;
-int ret;
+struct ncsi_channel_vlan_filter *ncf;
+unsigned long flags;
+void *bitmap;

 /* Find the package and channel */
 r庆幸 = (struct ncsi_rsp_pkt *)skb_network_header(nr->r庆幸);
@@ -364,22 +364,23 @@
 return -ENODEV;

 cmd = (struct ncsi_cmd_svf_pkt *)skb_network_header(nr->cmd);
-ncf = nr->filters[NCSI_FILTER_VLAN];
-if (!ncf)
-    return -ENOENT;
-if (cmd->index > ncf->total)
+ncf = &nc->vlan_filter;
+if (cmd->index > ncf->n_vids)
/* Add or remove the VLAN filter. Remember HW indexes from 1 */
+spin_lock_irqsave(&nc->lock, flags);
+bitmap = &ncf->bitmap;
if (!(cmd->enable & 0x1)) {
-/* HW indexes from 1 */
-re = ncsi_remove_filter(nc, NCSI_FILTER_VLAN, cmd->index - 1);
+if (test_and_clear_bit(cmd->index - 1, bitmap))
+n = vid[cmd->index - 1] = 0;
} else {
-vlan = ntohs(cmd->vlan);
-re = ncsi_add_filter(nc, NCSI_FILTER_VLAN, &vlan);
+set_bit(cmd->index - 1, bitmap);
+n = vid[cmd->index - 1] = ntohs(cmd->vlan);
}
+spin_unlock_irqrestore(&nc->lock, flags);

-return ret;
+return 0;
}

static int ncsi_rsp_handler_ev(struct ncsi_request *nr)
@@ -422,8 +423,12 @@
struct ncsi_rsp_pkt *rsp;
struct ncsi_dev_priv *ndp = nr->ndp;
struct ncsi_channel *nc;
-struct ncsi_channel_filter *ncf;
+struct ncsi_channel_mac_filter *ncf;
+unsigned long flags;
+bool enabled;
+int index;
+
/* Find the package and channel */
rsp = (struct ncsi_rsp_pkt *)skb_network_header(nr->rsp);
@@ -436,31 +441,23 @@
* isn't supported yet.
*/
cmd = (struct ncsi_cmd_sma_pkt *)skb_network_header(nr->cmd);
-switch (cmd->at_e >> 5) {
-case 0x0;/* UC address */
-nc = nc->filters[NCSI_FILTER_UC];
-break;
-case 0x1;/* MC address */
-nc = nc->filters[NCSI_FILTER_MC];


-break;
-default:
-return -EINVAL;
-
+enabled = cmd->at_e & 0x1;
+ncf = &nc->mac_filter;
+bitmap = &ncf->bitmap;

-/* Sanity check on the filter */
-if (!ncf)
-return -ENOENT;
-else if (cmd->index >= ncf->total)
+if (cmd->index > ncf->n_uc + ncf->n_mc + ncf->n_mixed)
-return -ERANGE;

-bitmap = &ncf->bitmap;
-if (cmd->at_e & 0x1) {
-set_bit(cmd->index, bitmap);
-memcpy(ncf->data + 6 * cmd->index, cmd->mac, 6);
+index = (cmd->index - 1) * ETH_ALEN;
+spin_lock_irqsave(&nc->lock, flags);
+if (enabled) {
+set_bit(cmd->index - 1, bitmap);
+memcpy(&ncf->addrs[index], cmd->mac, ETH_ALEN);
} else {
-clear_bit(cmd->index, bitmap);
-memset(nmc->data + 6 * cmd->index, 0, 6);
+clear_bit(cmd->index - 1, bitmap);
+memset(&ncf->addrs[index], 0, ETH_ALEN);
}
+spin_unlock_irqrestore(&nc->lock, flags);

return 0;
}
@@ -631,9 +628,7 @@
 struct ncsi_rsp_gc_pkt *rsp;
 struct ncsi_dev_priv *ndp = nr->ndp;
 struct ncsi_channel *nc;
-struct ncsi_channel_filter *ncf;
-size_t size, entry_size;
-int cnt, i;
+size_t size;

/* Find the channel */
 rsp = (struct ncsi_rsp_gc_pkt *)skb_network_header(nr->rsp);
-@ @ -655,64 +650,40 @@
 nc->caps[NCSI_CAP_VLAN].cap = rsp->vlan_mode &
 NCSI_CAP_VLAN_MASK;
/* Build filters */
-for (i = 0; i < NCSI_FILTER_MAX; i++) {
-switch (i) {
-case NCSI_FILTER_VLAN:
	cnt = rsp->vlan_cnt;
-entry_size = 2;
-break;
-case NCSI_FILTER_MIXED:
	cnt = rsp->mixed_cnt;
-entry_size = 6;
-break;
-case NCSI_FILTER_MC:
	cnt = rsp->mc_cnt;
-entry_size = 6;
-break;
-case NCSI_FILTER_UC:
	cnt = rsp->uc_cnt;
-entry_size = 6;
-break;
-default:
-continue;
-
-if (!cnt || nc->filters[i])
-continue;
-
-size = sizeof(*ncf) + cnt * entry_size;
-ncf = kzalloc(size, GFP_ATOMIC);
-if (!ncf) {
-pr_warn("%s: Cannot alloc filter table (%d)\n",
-__func__, i);
-return -ENOMEM;
-
-ncf->index = i;
-ncf->total = cnt;
-if (i == NCSI_FILTER_VLAN) {
-/* Set VLAN filters active so they are cleared in
-* first configuration state
-*/
-ncf->bitmap = U64_MAX;
-} else {
-ncf->bitmap = 0x0ul;
-}
-nc->filters[i] = ncf;
-}
+size = (rsp->uc_cnt + rsp->mc_cnt + rsp->mixed_cnt) * ETH_ALEN;
nc->mac_filter.addrs = kzalloc(size, GFP_ATOMIC);
if (!nc->mac_filter.addrs)
    return -ENOMEM;
nc->mac_filter.n_uc = rsp->uc_cnt;
nc->mac_filter.n_mc = rsp->mc_cnt;
nc->mac_filter.n_mixed = rsp->mixed_cnt;
++nc->mac_filter.addrs = kcalloc(rsp->vlan_cnt,
    sizeof(*nc->mac_filter.addrs),
    GFP_ATOMIC);
if (!nc->vlan_filter.vids)
    return -ENOMEM;
/* Set VLAN filters active so they are cleared in the first
   * configuration state
   */
nc->vlan_filter.bitmap = U64_MAX;
nc->vlan_filter.n_vids = rsp->vlan_cnt;
return 0;
}

static int ncsi_rsp_handler_gp(struct ncsi_request *nr)
{
    struct ncsi_rsp_gp_pkt *rsp;
    struct ncsi_channel_vlan_filter *ncvf;
    struct ncsi_channel_mac_filter *ncmf;
    struct ncsi_dev_priv *ndp = nr->ndp;
    struct ncsi_rsp_gp_pkt *rsp;
    struct ncsi_channel *nc;
    unsigned short enable, vlan;
    unsigned long flags;
    void *bitmap;
    int i;
/* Find the channel */
    rsp = (struct ncsi_rsp_gp_pkt *)skb_network_header(nr->rsp);
    @ @ -746,36 +717,33 @ @
/* MAC addresses filter table */
pdata = (unsigned char *)rsp + 48;
    enable = rsp->mac_enable;
    ncmf = &nc->mac_filter;
    spin_lock_irqsave(&nc->lock, flags);
    bitmap = &ncmf->bitmap;
    for (i = 0; i < rsp->mac_cnt; i++, pdata += 6) {
        if (i >= (nc->filters[NCSI_FILTER_UC]->total +
nc->filters[NCSI_FILTER_MC]->total))
-table = NCSI_FILTER_MIXED;
-else if (i >= nc->filters[NCSI_FILTER_UC]->total)
-table = NCSI_FILTER_MC;
-else
-table = NCSI_FILTER_UC;
-
if (!(enable & (0x1 << i)))
-continue;
-
-if (ncsi_find_filter(nc, table, pdata) >= 0)
-continue;
+clear_bit(i, bitmap);
+else
+set_bit(i, bitmap);

-ncsi_add_filter(nc, table, pdata);
+memcpy(&ncmf->addrs[i * ETH_ALEN], pdata, ETH_ALEN);
}  
+spin_unlock_irqrestore(&nc->lock, flags);

/* VLAN filter table */
enable = ntohs(rsp->vlan_enable);
+ncvf = &nc->vlan_filter;
+bitmap = &ncvf->bitmap;
+spin_lock_irqsave(&nc->lock, flags);
for (i = 0; i < rsp->vlan_cnt; i++, pdata += 2) {
  if (!(enable & (0x1 << i)))
    -continue;
    
  -vlan = ntohs(*(__be16 *)pdata);
  -if (ncsi_find_filter(nc, NCSI_FILTER_VLAN, &vlan) >= 0)
    -continue;
    +clear_bit(i, bitmap);
    +else
    +set_bit(i, bitmap);

  -ncsi_add_filter(nc, NCSI_FILTER_VLAN, &vlan);
  +ncvf->vids[i] = ntohs(*(__be16 *)pdata);
}  
+spin_unlock_irqrestore(&nc->lock, flags);

return 0;
}  
@ @ -980,7 +948,7 @@
int payload, i, ret;

/* Find the NCSI device */
-nd = ncsi_find_dev(dev);
+nd = ncsi_find_dev(orig_dev);
ndp = nd ? TO_NCSI_DEV_PRIV(nd) : NULL;
if (!ndp)
    return -ENOMEM;
--- linux-4.15.0.orig/net/netfilter/Kconfig
+++ linux-4.15.0/net/netfilter/Kconfig
@@ -75,7 +75,7 @@
config NF_CONNTRACK_SECMARK
    bool 'Connection tracking security mark support'
    depends on NETWORK_SECMARK
    -default m if NETFILTER_ADVANCED=n
+    default y if NETFILTER_ADVANCED=n
    help
        This option enables security markings to be applied to
        connections. Typically they are copied to connections from
@@ -718,13 +718,13 @@
    depends on NETFILTER_ADVANCED
    ---help---
    This option adds a 'CHECKSUM' target, which can be used in the iptables mangle
-    table.
+    table to work around buggy DHCP clients in virtualized environments.

-    You can use this target to compute and fill in the checksum in
-    a packet that lacks a checksum. This is particularly useful,
-    if you need to work around old applications such as dhcp clients,
-    that do not work well with checksum offloads, but don't want to disable
-    checksum offload in your device.
+    Some old DHCP clients drop packets because they are not aware
+    that the checksum would normally be offloaded to hardware and
+    thus should be considered valid.
+    This target can be used to fill in the checksum using iptables
+    when such packets are sent via a virtual network device.

    To compile it as a module, choose M here. If unsure, say N.
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_bitmap_gen.h
+++ linux-4.15.0/net/netfilter/ipset/ip_set_bitmap_gen.h
@@ -64,9 +64,9 @@
if (SET_WITH_TIMEOUT(set))
    del_timer_sync(&map->gc);
-ip_set_free(map->members);
if (set->dsize && set->extensions & IPSET_EXT_DESTROY)
    mtype_ext_cleanup(set);
+ip_set_free(map->members);
ip_set_free(map);
if (set->extensions & IPSET_EXT_DESTROY)
    mtype_ext_cleanup(set);
-memset(map->members, 0, map->memsize);
+bitmap_zero(map->members, map->elements);
    set->elements = 0;
    set->ext_size = 0;
}
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_bitmap_ip.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_bitmap_ip.c
@@ -40,7 +40,7 @@
 /* Type structure */
 struct bitmap_ip {
     void *members; /* the set members */
+    unsigned long *members; /* the set members */
     u32 first_ip; /* host byte order, included in range */
     u32 last_ip; /* host byte order, included in range */
     u32 elements; /* number of max elements in the set */
@@ -223,7 +223,7 @@
     if (!map->members)
         return false;
     map->first_ip = first_ip;
@@ -317,7 +317,7 @@
     if (!map)
         return -ENOMEM;
     map->memsize = bitmap_bytes(0, elements - 1);
+     map->memsize = BITS_TO_LONGS(elements) * sizeof(unsigned long);
     if (!init_map_ip(set, map, first_ip, last_ip,
         elements, hosts, netmask)) {
         -map->members = ip_set_alloc(map->memsize);
+        map->members = bitmap_zalloc(elements, GFP_KERNEL | __GFP_NOWARN);
         if (!map->members)
             return false;
         map->first_ip = first_ip;
@@ -317,7 +317,7 @@
     if (!map)
         return -ENOMEM;
     map->memsize = bitmap_bytes(0, elements - 1);
+     map->memsize = BITS_TO_LONGS(elements) * sizeof(unsigned long);
     if (!init_map_ip(set, map, first_ip, last_ip,
         elements, hosts, netmask)) {
         -- linux-4.15.0.orig/net/netfilter/ipset/ip_set_bitmap_ipmac.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_bitmap_ipmac.c
@@ -46,7 +46,7 @@
 /* Type structure */
 struct bitmap_ipmac {
     void *members; /* the set members */
+    unsigned long *members; /* the set members */
     u32 first_ip; /* host byte order, included in range */

u32 last_ip;/* host byte order, included in range */
u32 elements;/* number of max elements in the set */
@@ -219,10 +219,6 @@
struct ip_set_ext ext = IP_SET_INIT_KEXT(skb, opt, set);

-/* MAC can be src only */
-if (!(opt->flags & IPSET_DIM_TWO_SRC))
-    return 0;
-
ip = ntohl(ip4addr(skb, opt->flags & IPSET_DIM_ONE_SRC));
if (ip < map->first_ip || ip > map->last_ip)
    return -IPSET_ERR_BITMAP_RANGE;
@@ -233,7 +229,14 @@
    return -EINVAL;
e.id = ip_to_id(map, ip);
-memcpy(e.ether, eth_hdr(skb)->h_source, ETH_ALEN);
+
+if (opt->flags & IPSET_DIM_TWO_SRC)
+    ether_addr_copy(e.ether, eth_hdr(skb)->h_source);
+else
+    ether_addr_copy(e.ether, eth_hdr(skb)->h_dest);
+
+if (is_zero_ether_addr(e.ether))
+    return -EINVAL;

return adtfn(set, &e, &ext, &opt->ext, opt->cmdflags);
}
@@ -300,7 +303,7 @@
init_map_ipmac(struct ip_set *set, struct bitmap_ipmac *map,
         u32 first_ip, u32 last_ip, u32 elements)
{
-    map->members = ip_set_alloc(map->memsize);
+    map->members = bitmap_zalloc(elements, GFP_KERNEL | __GFP_NOWARN);
    if (!map->members)
        return false;
    map->first_ip = first_ip;
@@ -365,7 +368,7 @@
    if (!map)
        return -ENOMEM;

-    map->memsize = bitmap_bytes(0, elements - 1);
+    map->memsize = BITS_TO_LONGS(elements) * sizeof(unsigned long);
    set->variant = &bitmap_ipmac;
    if (!init_map_ipmac(set, map, first_ip, last_ip, elements)) {
        kfree(map);
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_bitmap_port.c
/* Type structure */
struct bitmap_port {
    void *members; /* the set members */
    unsigned long *members; /* the set members */
    u16 first_port; /* host byte order, included in range */
    u16 last_port; /* host byte order, included in range */
    u32 elements; /* number of max elements in the set */
}

init_map_port(struct ip_set *set, struct bitmap_port *map,
              u16 first_port, u16 last_port)
{
    map->members = ip_set_alloc(map->memsize);
    map->members = bitmap_zalloc(map->elements, GFP_KERNEL | __GFP_NOWARN);
    if (!map->members)
        return false;
    map->first_port = first_port;
    map->elements = elements;
    map->memsize = bitmap_bytes(0, map->elements);
    if (!init_map_port(set, map, first_port, last_port)) {
        kfree(map);
    }
}

for (id = 0; id < IPSET_EXT_ID_MAX; id++) {
    if (!add_extension(id, cadt_flags, tb))
        continue;
    if (align < ip_set_extensions[id].align)
        align = ip_set_extensions[id].align;
    len = ALIGN(len, ip_set_extensions[id].align);
    set->offset[id] = len;
    set->extensions |= ip_set_extensions[id].type;
}

/* Get the name of a set behind a set index.
 * We assume the set is referenced, so it does exist and
 * can't be destroyed. The set cannot be renamed due to
 * the referencing either.
 * Set itself is protected by RCU, but its name isn't: to protect against
+ * renaming, grab ip_set_ref_lock as reader (see ip_set_rename()) and copy the
+ * name.
+ */
-const char *
-ip_set_name_byindex(struct net *net, ip_set_id_t index)
+void
+ip_set_name_byindex(struct net *net, ip_set_id_t index, char *name)
{  
-const struct ip_set *set = ip_set_rcu_get(net, index);
+struct ip_set *set = ip_set_rcu_get(net, index);
  BUG_ON(!set);
-  BUG_ON(set->ref == 0);
+  read_lock_bh(&ip_set_ref_lock);
+  strncpy(name, set->name, IPSET_MAXNAMELEN);
+  read_unlock_bh(&ip_set_ref_lock);
  return set->name;
}
EXPORT_SYMBOL_GPL(ip_set_name_byindex);

@@ -1128,8 +1129,8 @@
 if (!set)
  return -ENOENT;
-read_lock_bh(&ip_set_ref_lock);
+write_lock_bh(&ip_set_ref_lock);
 if (set->ref != 0) {
  ret = -IPSET_ERR_REFERENCED;
  goto out;
@@ -1145,7 +1146,7 @@
  strncpy(set->name, name2, IPSET_MAXNAMELEN);
 out:
-read_unlock_bh(&ip_set_ref_lock);
+write_unlock_bh(&ip_set_ref_lock);
 return ret;
}
@@ -1640,6 +1641,7 @@
 struct ip_set *set;
 struct nlattr *tb[IPSET_ATTR_ADT_MAX + 1] = {};
 int ret = 0;
+u32 lineno;
if (unlikely(protocol_failed(attr) ||
   !attr[IPSET_ATTR_SETNAME]) ||
 @@ -1656,7 +1658,7 @@
 return -IPSET_ERR_PROTOCOL;

 rcu_read_lock_bh();
 -ret = set->variant->uadt(set, tb, IPSET_TEST, NULL, 0, 0);
 +ret = set->variant->uadt(set, tb, IPSET_TEST, &lineno, 0, 0);
 rcu_read_unlock_bh();
 /* Userspace can't trigger element to be re-added */
 if (ret == -EAGAIN)
 @@ -1951,8 +1953,9 @@
 }

 req_version->version = IPSET_PROTOCOL;
 -ret = copy_to_user(user, req_version,
 - sizeof(struct ip_set_req_version));
 +if (copy_to_user(user, req_version,
 + sizeof(struct ip_set_req_version)))
 +ret = -EFAULT;
 goto done;
 }
 case IP_SET_OP_GET_BYNAME: {
 @@ -2009,7 +2012,8 @@
 }/* end of switch(op) */

 copy:
 -ret = copy_to_user(user, data, copylen);
 +if (copy_to_user(user, data, copylen))
 +ret = -EFAULT;

 done:
 vfree(data);
 @@ -2055,6 +2059,7 @@
 inst->is_deleted = true; /* flag for ip_set_nfnl_put */

 +nfnl_lock(NFNL_SUBSYS_IPSET);
 for (i = 0; i < inst->ip_set_max; i++) {
 set = ip_set(inst, i);
 if (set) {
 @@ -2062,6 +2067,7 @@
 ip_set_destroy_set(set);
 }
 }
 +nfnl_unlock(NFNL_SUBSYS_IPSET);
 kfree(rcu_dereference_protected(inst->ip_set_list, 1));
}
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_gen.h
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_gen.h
@@ -104,31 +104,17 @@
{
  size_t hsize;

-/* We must fit both into u32 in jhash and size_t */
+/* We must fit both into u32 in jhash and INT_MAX in kvmalloc_node() */
  if (hbits > 31)
    return 0;
  hsize = jhash_size(hbits);
-  if (((size_t)-1) - sizeof(struct htable)) / sizeof(struct hbucket *)
+  if ((INT_MAX - sizeof(struct htable)) / sizeof(struct hbucket *)
< hsize)
    return 0;

  return hsize * sizeof(struct hbucket *) + sizeof(struct htable);
}

-/* Compute htable_bits from the user input parameter hashsize */
-static u8
-htable_bits(u32 hashsize)
-{
-  /* Assume that hashsize == 2^htable_bits */
-  u8 bits = fls(hashsize - 1);
-  -
-  -if (jhash_size(bits) != hashsize)
-    /* Round up to the first 2^n value */
-    bits = fls(hashsize);
-  -
-  -return bits;
-  -}
-  -
-  #ifdef IP_SET_HASH_WITH_NETS
-  #if IPSET_NET_COUNT > 1
-  #define __CIDR(cidr, i)		(cidr[i])
-  @ @ -625,7 +611,7 @ @
-goto cleanup;
-}
-}
-
-#ifdef IP_SET_HASH_WITH_NETS
-#if IPSET_NET_COUNT > 1
-#define __CIDR(cidr, i)(cidr[i])
-@ @ -1242,7 +1228,10 @ @
-pr_debug("Create set %s with family %s\n", 

set->name, set->family == NFPROTO_IPV4 ? "inet" : "inet6”):

-#ifndef IP_SETPROTO_UNDEF
+#ifdef IP_SETPROTO_UNDEF
+if (set->family != NFPROTO_UNSPEC)
+return -IPSET_ERR_INVALID_FAMILY;
+#else
+if (!set->family == NFPROTO_IPV4 || set->family == NFPROTO_IPV6)
return -IPSET_ERR_INVALID_FAMILY;
#endif
@@ -1292,7 +1281,11 @@
if (!h)
return -ENOMEM;

-hbits = htable_bits(hashsize);
+/* Compute htable_bits from the user input parameter hashsize.
+ * Assume that hashsize == 2^htable_bits,
+ * otherwise round up to the first 2^n value.
+ */
+hbits = fls(hashsize - 1);

if (hsize == 0) {
    return -ENOMEM;
    kfree(h);
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_ipmac.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_ipmac.c
@@ @ -36,9 +36,6 @@
/* Type specific function prefix */
#define HTYPE hash_ipmac

-/* Zero valued element is not supported */
-static const unsigned char invalid_ether[ETH_ALEN] = { 0);
-
-/* IPv4 variant */

/* Member elements */
@@ @ -95,16 +92,16 @@
struct hash_ipmac4_elem e = { .ip = 0, {.foo[0] = 0, .foo[1] = 0 } }; 
struct ip_set_ext ext = IP_SET_INIT_KEXT(skb, opt, set);

- /* MAC can be src only */
-if (!(opt->flags & IPSET_DIM_TWO_SRC))
-return 0;
-
if (skb_mac_header(skb) < skb->head ||
    (skb_mac_header(skb) + ETH_HLEN) > skb->data)
    return -EINVAL;

-memcpy(e.ether, eth_hdr(skb)->h_source, ETH_ALEN);
if (ether_addr_equal(e.ether, invalid_ether))
+ if (opt->flags & IPSET_DIM_TWO_SRC)
+ ether_addr_copy(e.ether, eth_hdr(skb)->h_source);
+ else
+ ether_addr_copy(e.ether, eth_hdr(skb)->h_dest);
+ 
+ if (is_zero_ether_addr(e.ether))
return -EINVAL;

ip4addrptr(skb, opt->flags & IPSET_DIM_ONE_SRC, &e.ip);
@@ -140,7 +137,7 @@
if (ret)
return ret;
memcpy(e.ether, nla_data(tb[IPSET_ATTR_ETHER]), ETH_ALEN);
- if (ether_addr_equal(e.ether, invalid_ether))
+ if (is_zero_ether_addr(e.ether))
return -IPSET_ERR_HASH_ELEM;

return adtfn(set, &e, &ext, &ext, flags);
@@ -211,16 +208,16 @@
    
    /* MAC can be src only */
- if (!(opt->flags & IPSET_DIM_TWO_SRC))
- return 0;
- 
- if (skb_mac_header(skb) < skb->head ||
- (skb_mac_header(skb) + ETH_HLEN) > skb->data)
- return -EINVAL;
- 
- memcpy(e.ether, eth_hdr(skb)->h_source, ETH_ALEN);
- if (ether_addr_equal(e.ether, invalid_ether))
+ if (opt->flags & IPSET_DIM_TWO_SRC)
+ ether_addr_copy(e.ether, eth_hdr(skb)->h_source);
+ else
+ ether_addr_copy(e.ether, eth_hdr(skb)->h_dest);
+
+ if (is_zero_ether_addr(e.ether))
return -EINVAL;

ip6addrptr(skb, opt->flags & IPSET_DIM_ONE_SRC, &e.ip6);
@@ -260,7 +257,7 @@
return ret;
memcpy(e.ether, nla_data(tb[IPSET_ATTR_ETHER]), ETH_ALEN);
- if (ether_addr_equal(e.ether, invalid_ether))
+ if (is_zero_ether_addr(e.ether))
return -IPSET_ERR_HASH_ELEM;

return adtfn(set, &e, &ext, &ext, flags);
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_ipportnet.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_ipportnet.c
@@ -168,7 +168,7 @@
 struct hash_ipportnet4_elem e = { .cidr = HOST_MASK - 1 };
 struct ip_set_ext ext = IP_SET_INIT_UEXT(set);
 u32 ip = 0, ip_to = 0, p = 0, port, port_to;
-u32 ip2_from = 0, ip2_to = 0, ip2_last, ip2;
+u32 ip2_from = 0, ip2_to = 0, ip2;
 bool with_ports = false;
 u8 cidr;
 int ret;
@@ -269,22 +269,21 @@
 for (; ip <= ip_to; ip++) {
 e.ip = htonl(ip);
 -p = ntohs(h->next.port);
-+ip2 = ntohl(h->next.ip2);
 +} else {
 +p = port;
 +ip2 = ip2_from;
 +}
 for (; ip <= ip_to; ip++) {
 e.ip = htonl(ip);
 -p = retried && ip == ntohl(h->next.ip) ? ntohs(h->next.port)
-      : port;
+      : do {
 for (; p <= port_to; p++) {
 e.port = htons(p);
 -ip2 = retried &&
-  ip == ntohl(h->next.ip) &&
-  p == ntohs(h->next.port)
-? ntohl(h->next.ip2) : ip2_from;
-while (ip2 <= ip2_to) {
+do {
 e.ip2 = htonl(ip2);
 -ip2_last = ip_set_range_to_cidr(ip2, ip2_to,
-  &&cidr);
+ip2 = ip_set_range_to_cidr(ip2, ip2_to, &cidr);
 e.cidr = cidr - 1;
 ret = adtfn(set, &e, &ext, &ext, flags);
@@ -292,9 +291,10 @@
 return ret;
ret = 0;
-ip2 = ip2_last + 1;
-
+} while (ip2++ < ip2_to);
+ip2 = ip2_from;
+
+p = port;
+
} return ret;
+

--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_mac.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_mac.c
@@ -34,9 +34,9 @@
 struct hash_mac4_elem e = { .foo[0] = 0, .foo[1] = 0 };
 struct ip_set_ext ext = IP_SET_INIT_KEXT(skb, opt, set);

-/* MAC can be src only */
-#if (!(opt->flags & IPSET_DIM_ONE_SRC))
-#return 0;
-
-if (skb_mac_header(skb) < skb->head ||
-(skb_mac_header(skb) + ETH_HLEN) > skb->data)
-return -EINVAL;
-
-ether_addr_copy(e.ether, eth_hdr(skb)->h_source);
+if (opt->flags & IPSET_DIM_ONE_SRC)
+ ether_addr_copy(e.ether, eth_hdr(skb)->h_source);
+else
+ ether_addr_copy(e.ether, eth_hdr(skb)->h_dest);
+
+ if (memcmp(e.ether, invalid_ether, ETH_ALEN) == 0)
+ return -EINVAL;
+ return adtfn(set, &e, &ext, &opt->ext, opt->cmdflags);
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_net.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_net.c
@@ -14,12 +14,12 @@
 struct hash_net4_elem e = { .cidr = HOST_MASK };
 struct ip_set_ext ext = IP_SET_INIT_UEXT(set);

-ip = 0, ip_to = 0, last;
+u32 ip = 0, ip_to = 0, last;
+u32 ip = 0, ip_to = 0;

 int ret;

 if (tb[IPSET_ATTR_LINENO])
@@ -193,16 +193,16 @@
 }
 if (retried)
ip = ntohl(h->next.ip);
-while (ip <= ip_to) {
    +do {
        e.ip = htonl(ip);
        -last = ip_set_range_to_cidr(ip, ip_to, &e.cidr);
        +ip = ip_set_range_to_cidr(ip, ip_to, &e.cidr);
        ret = adtfn(set, &e, &ext, &ext, flags);
        if (ret && !ip_set_eexist(ret, flags))
            return ret;

        ret = 0;
        -ip = last + 1;
    -}
    +} while (ip++ < ip_to);
    return ret;
}

--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_netiface.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_netiface.c
@@ -200,7 +200,7 @@
     ipset_adtfn adtfn = set->variant->adt[adt];
     struct hash_netiface4_elem e = { .cidr = HOST_MASK, .elem = 1 };
     struct ip_set_ext ext = IP_SET_INIT_UEXT(set);
    -u32 ip = 0, ip_to = 0, last;
    +u32 ip = 0, ip_to = 0;
    int ret;

    if (tb[IPSET_ATTR_LINENO])
@@ -255,17 +255,16 @@

    if (retried)
        ip = ntohl(h->next.ip);
    -while (ip <= ip_to) {
    +do {
        e.ip = htonl(ip);
        -last = ip_set_range_to_cidr(ip, ip_to, &e.cidr);
        +ip = ip_set_range_to_cidr(ip, ip_to, &e.cidr);
        ret = adtfn(set, &e, &ext, &ext, flags);

        if (ret && !ip_set_eexist(ret, flags))
            return ret;

        ret = 0;
        -ip = last + 1;
    -}
    +} while (ip++ < ip_to);
    return ret;
}
--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_netnet.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_netnet.c
@@ -169,8 +169,8 @@
     adtfn = set->variant->adt[adt];
 struct hash_netnet4_elem e = { };  
 struct ip_set_ext ext = IP_SET_INIT_UEXT(set);
-  u32 ip = 0, ip_to = 0, last;
-  u32 ip2 = 0, ip2_from = 0, ip2_to = 0, last2;
+  u32 ip = 0, ip_to = 0;
+  u32 ip2 = 0, ip2_from = 0, ip2_to = 0;
 int ret;

 if (tb[IPSET_ATTR_LINENO])
@@ -247,27 +247,27 @@
     ip_set_mask_from_to(ip2_from, ip2_to, e.cidr[1]);
 }

-  if (retried)  
+  if (retried) {
+    ip = ntohl(h->next.ip[0]);
+    ip2 = ntohs(h->next.ip[1]);
+  } else {
+    ip2 = ip2_from;
+  }
+
+  while (ip <= ip_to) {
+    do {
+      e.ip[0] = htonl(ip);
+      last = ip_set_range_to_cidr(ip, ip_to, &e.cidr[0]);
+      ip2 = (retried &&
+       ip == ntohs(h->next.ip[0])) ? ntohs(h->next.ip[1])
+       : ip2_from;
+      while (ip2 <= ip2_to) {
+        ip = ip_set_range_to_cidr(ip, ip_to, &e.cidr[0]);
+        do {
+          e.ip[1] = htonl(ip2);
+          last2 = ip_set_range_to_cidr(ip2, ip2_to, &e.cidr[1]);
+          ip2 = ip_set_range_to_cidr(ip2, ip2_to, &e.cidr[1]);
+          ret = adtfn(set, &e, &ext, &ext, flags);
+          if (ret && !ip_set_eexist(ret, flags))
+            return ret;
+        } while (ip2 <= ip2_to);
+        ip = last + 1;
+      }
+    }
  
  ret = 0;
  -ip2 = last2 + 1;
  -}
-  -ip = last + 1;
-}
while (ip2++ < ip2_to);
+ip2 = ip2_from;
+
} while (ip++ < ip_to);
return ret;
}

--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_netport.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_netport.c
@@ -161,7 +161,7 @@
ipset_adtfn adtfn = set->variant->adt[adt];
struct hash_netport4_elem e = { .cidr = HOST_MASK - 1);
struct ip_set_ext ext = IP_SET_INIT_UEXT(set);
-u32 port, port_to, p = 0, ip = 0, ip_to = 0, last;
+u32 port, port_to, p = 0, ip = 0, ip_to = 0;
bool with_ports = false;

u8 cidr;
int ret;
@@ -239,25 +239,26 @@
ip = ntohl(h->next.ip);
-while (ip <= ip_to) {
-+p = ntohs(h->next.port);
+-} else {
++p = port;
++}
+do {
+e.ip = htonl(ip);
-last = ip_set_range_to_cidr(ip, ip_to, &cidr);
+ip = ip_set_range_to_cidr(ip, ip_to, &cidr);
+e.cidr = cidr - 1;
-p = retried && ip == ntohs(h->next.ip) ? ntohs(h->next.port)
- : port;
+for (; p <= port_to; p++) {
+e.port = htons(p);
+ret = adtfn(set, &e, &ext, &ext, flags);
-
+if (ret && !ip_set_eexist(ret, flags))
+return ret;
ret = 0;
}
-ip = last + 1;
-}
+p = port;
+} while (ip++ < ip_to);
return ret;
}

--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_hash_netportnet.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_hash_netportnet.c
@@ -184,8 +184,8 @@
ipset_adtfn adtfn = set->variant->adt[adt];
struct hash_netportnet4_elem e = { };
struct ip_set_ext ext = IP_SET_INIT_UEXT(set);
-u32 ip = 0, ip_to = 0, ip_last, p = 0, port, port_to;
-u32 ip2_from = 0, ip2_to = 0, ip2_last, ip2;
+u32 ip = 0, ip_to = 0, p = 0, port, port_to;
+u32 ip2_from = 0, ip2_to = 0, ip2;
bool with_ports = false;
int ret;

@@ -213,13 +213,13 @@
if (tb[IPSET_ATTR_CIDR]) {
    e.cidr[0] = nla_get_u8(tb[IPSET_ATTR_CIDR]);
-    if (!e.cidr[0] || e.cidr[0] > HOST_MASK)
+    if (e.cidr[0] > HOST_MASK)
        return -IPSET_ERR_INVALID_CIDR;
    }

if (tb[IPSET_ATTR_CIDR2]) {
    e.cidr[1] = nla_get_u8(tb[IPSET_ATTR_CIDR2]);
-    if (!e.cidr[1] || e.cidr[1] > HOST_MASK)
+    if (e.cidr[1] > HOST_MASK)
        return -IPSET_ERR_INVALID_CIDR;
    }

@@ -288,33 +288,34 @@
ip_set_mask_from_to(ip2_from, ip2_to, e.cidr[1]);
    }

-    if (retried)
-        if (retried) {
-            ip = ntohs(h->next.ip[0]);
-            +p = ntohs(h->next.port);
-            +ip2 = ntohs(h->next.ip[1]);
-            +} else {
-                +p = port;
-                +ip2 = ip2_from;
-            +}
-        }
-    }
-while (ip <= ip_to) {
# Open Source Used In 5GaaS Edge AC-4 34369

```c
+do {
  e.ip[0] = htonl(ip);
- ip_last = ip_set_range_to_cidr(ip, ip_to, &e.cidr[0]);
- p = retried && ip == htonl(h->next.ip[0]) ? ntohs(h->next.port)
- : port;
+ip = ip_set_range_to_cidr(ip, ip_to, &e.cidr[0]);
  for (; p <= port_to; p++) {
    e.port = htons(p);
- ip2 = (retried && ip == ntohl(h->next.ip[0]) &&
- p == ntohs(h->next.port)) ? ntohl(h->next.ip[1])
- : ip2_from;
- while (ip2 <= ip2_to) {
- +do {
    e.ip[1] = htonl(ip2);
- ip2_last = ip_set_range_to_cidr(ip2, ip2_to,
- &e.cidr[1]);
+ip2 = ip_set_range_to_cidr(ip2, ip2_to,
+ &e.cidr[1]);
  ret = adtfn(set, &e, &ext, &ext, flags);
  if (ret && !ip_set_eexist(ret, flags))
    return ret;
    ret = 0;
- ip2 = ip2_last + 1;
- }
+} while (ip2++ < ip2_to);
+ip2 = ip2_from;
} }
- ip = ip_last + 1;
- }
+} while (ip++ < ip_to);
return ret;
}

@@ -492,13 +493,13 @@

if (tb[IPSET_ATTR_CIDR]) {
  e.cidr[0] = nla_get_u8(tb[IPSET_ATTR_CIDR]);
- if (!e.cidr[0] || e.cidr[0] > HOST_MASK)
- return -IPSET_ERR_INVALID_CIDR;
} +if (e.cidr[0] > HOST_MASK)

if (tb[IPSET_ATTR_CIDR2]) {
  e.cidr[1] = nla_get_u8(tb[IPSET_ATTR_CIDR2]);
- if (!e.cidr[1] || e.cidr[1] > HOST_MASK)
+if (e.cidr[1] > HOST_MASK)
```
return -IPSET_ERR_INVALID_CIDR;
}

--- linux-4.15.0.orig/net/netfilter/ipset/ip_set_list_set.c
+++ linux-4.15.0/net/netfilter/ipset/ip_set_list_set.c
@@ -62,7 +62,7 @@
 /* Don't lookup sub-counters at all */
opt->cmdflags &= ~IPSET_FLAG_MATCH_COUNTERS;
if (opt->cmdflags & IPSET_FLAG_SKIP_SUBCOUNTER_UPDATE)
-  opt->cmdflags &= ~IPSET_FLAG_SKIP_COUNTER_UPDATE;
+  opt->cmdflags |= IPSET_FLAG_SKIP_COUNTER_UPDATE;
list_for_each_entry_rcu(e, &map->members, list) {
if (SET_WITH_TIMEOUT(set) &&
    ip_set_timeout_expired(ext_timeout(e, set)))
@@ -157,9 +157,7 @@
}{
  struct set_elem *e = container_of(rcu, struct set_elem, rcu);
  struct ip_set *set = e->set;
-  struct list_set *map = set->data;
-ip_set_put_byindex(map->net, e->id);
ip_set_ext_destroy(set, e);
kfree(e);
}
@@ -167,15 +165,21 @@
static inline void
list_set_del(struct ip_set *set, struct set_elem *e)
{
+  struct list_set *map = set->data;
  +list_del_rcu(&e->list);
+  ip_set_put_byindex(map->net, e->id);
call_rcu(&e->rcu, __list_set_del_rcu);
}

static inline void
- list_set_replace(struct set_elem *e, struct set_elem *old)
+ list_set_replace(struct ip_set *set, struct set_elem *e, struct set_elem *old)
{
  +struct list_set *map = set->data;
  +list_replace_rcu(&old->list, &e->list);
  +ip_set_put_byindex(map->net, old->id);
call_rcu(&old->rcu, __list_set_del_rcu);
}
@@ -307,7 +311,7 @@
INIT_LIST_HEAD(&e->list);
list_set_init_extensions(set, ext, e);
if (n)
- list_set_replace(e, n);
+ list_set_replace(set, e, n);
else if (next)
list_add_tail_rcu(&e->list, &next->list);
else if (prev)
@@ -495,6 +499,7 @@
    const struct list_set *map = set->data;
    struct nlattr *atd, *nested;
    u32 i = 0, first = cb->args[IPSET_CB_ARG0];
+char name[IPSET_MAXNAMELEN];
    struct set_elem *e;
    int ret = 0;

@@ -513,8 +518,8 @@
    nested = ipset_nest_start(skb, IPSET_ATTR_DATA);
    if (!nested)
        goto nla_put_failure;
    - if (nla_put_string(skb, IPSET_ATTR_NAME,
    + if (nla_put_string(skb, IPSET_ATTR_NAME, name))
    + if (nla_put_string(skb, IPSET_ATTR_NAME, name))
        goto nla_put_failure;
    if (ip_set_put_extensions(skb, set, e, true))
        goto nla_put_failure;
@@ -535,8 +540,8 @@
    ret = -EMSGSIZE;
 } else {
    cb->args[IPSET_CB_ARG0] = i;
+ipset_nest_end(skb, atd);
    }
- ipset_nest_end(skb, atd);
out:
rcu_read_unlock();
return ret;
--- linux-4.15.0.orig/net/netfilter/ipvs/Kconfig
+++ linux-4.15.0/net/netfilter/ipvs/Kconfig
@@ -29,6 +29,7 @@
    bool "IPv6 support for IPVS"
    depends on IPV6 = y || IP_VS = IPV6
    select IP6_NF_IPTABLES
+select NF_DEFRAG_IPV6
    ---help---
        Add IPv6 support to IPVS.

--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_app.c
mutex_lock(&__ip_vs_app_mutex);

/+* increase the module use count */
+if (!ip_vs_use_count_inc()) {
+err = -ENOENT;
+goto out_unlock;
+
+list_for_each_entry(a, &ipvs->app_list, a_list) {
+if (!strcmp(app->name, a->name)) {
+    err = -EEXIST;
+    /* decrease the module use count */
+    ip_vs_use_count_dec();
+    goto out_unlock;
+}
+}
+a = kmemdup(app, sizeof(*app), GFP_KERNEL);
+if (!a) {
+    err = -ENOMEM;
+    /* decrease the module use count */
+    ip_vs_use_count_dec();
+    goto out_unlock;
+}
+INIT_LIST_HEAD(&a->incs_list);
+list_add(&a->a_list, &ipvs->app_list);
+    /* increase the module use count */
+    ip_vs_use_count_inc();
+
+out_unlock:
mutex_unlock(&__ip_vs_app_mutex);
--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_conn.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_conn.c
@@ -232,7 +232,10 @@
 static inline bool ip_vs_conn_unlink(struct ip_vs_conn *cp)
 {
     unsigned int hash;
-    bool ret;
-    bool ret = false;
+    bool ret = false;
+    if (cp->flags & IP_VS_CONN_F_ONE_PACKET)
+        return refcount_dec_if_one(&cp->refcnt);

     hash = ip_vs_conn_hashkey_conn(cp);

@@ -240,15 +243,13 @@

spin_lock(&cp->lock);

if (cp->flags & IP_VS_CONN_F_HASHED) {
    ret = false;
    /* Decrease refcnt and unlink conn only if we are last user */
    if (refcount_dec_if_one(&cp->refcnt)) {
        hlist_del_rcu(&cp->c_list);
        cp->flags &= ~IP_VS_CONN_F_HASHED;
        ret = true;
    } else
    ret = refcount_read(&cp->refcnt) ? false : true;
}
spin_unlock(&cp->lock);
ct_write_unlock_bh(hash);
EXPORT_SYMBOL_GPL(ip_vs_conn_out_get_proto);

static void __ip_vs_conn_put_notimer(struct ip_vs_conn *cp)
{
    __ip_vs_conn_put(cp);
    ip_vs_conn_expire(&cp->timer);
}
/*
 *      Put back the conn and restart its timer with its timeout
 */
@@ -478,7 +473,7 @@
    (refcount_read(&cp->refcnt) == 1) &&
    !timer_pending(&cp->timer))
/* expire connection immediately */
-__ip_vs_conn_put_notimer(cp);
+ip_vs_conn_expire(&cp->timer);
else
    __ip_vs_conn_put_timer(cp);
}
@@ -1406,6 +1401,10 @@
        int idx;

/* Compute size and mask */
+if (ip_vs_conn_tab_bits < 8 || ip_vs_conn_tab_bits > 20) {
+    pr_info("conn_tab_bits not in [8, 20]. Using default value\n");
+    ip_vs_conn_tab_bits = CONFIG_IP_VS_TAB_BITS;
+}
    ip_vs_conn_tab_size = 1 << ip_vs_conn_tab_bits;
    ip_vs_conn_tab_mask = ip_vs_conn_tab_size - 1;
/* sorry, all this trouble for a no-hit :) */
IP_VS_DBG_PKT(12, af, pp, skb, iph->off,
    "ip_vs_in: packet continues traversal as normal");
-if (iph->fragoffs) {
  /* Fragment that couldn't be mapped to a conn entry
   * is missing module nf_defrag_ipv6
   */
  -IP_VS_DBG_RL("Unhandled frag, load nf_defrag_ipv6\n");
  +/+ Fragment couldn't be mapped to a conn entry */
  +if (iph->fragoffs)
  IP_VS_DBG_PKT(7, af, pp, skb, iph->off,
    "unhandled fragment");
-
  *verdict = NF_ACCEPT;
  return 0;
} @@ -1637,7 +1635,7 @@
if (!cp) {
  int v;

  -if (!sysctl_schedule_icmp(ipvs))
  +if (ipip || !sysctl_schedule_icmp(ipvs))
    return NF_ACCEPT;
    
    conn_reuse_mode = sysctl_conn_reuse_mode(ipvs);
    if (conn_reuse_mode &amp; !iph.fragoffs &amp; & is_new_conn(skb, &iph) &amp; & cp) {
      -bool uses_ct = false, resched = false;
      +bool old_ct = false, resched = false;

      if (unlikely(sysctl_expire_nodest_conn(ipvs)) &amp; & cp-&gt;dest &amp; &
        unlikely(!atomic_read(&amp;cp-&gt;dest-&gt;weight))) {
        resched = true;
        -uses_ct = ip_vs_conn_uses_conntrack(cp, skb);
        +old_ct = ip_vs_conn_uses_old_conntrack(cp, skb);
      } else if (is_new_conn_expected(cp, conn_reuse_mode)) {
        -uses_ct = ip_vs_conn_uses_conntrack(cp, skb);
        +old_ct = ip_vs_conn_uses_old_conntrack(cp, skb);
        if (!atomic_read(&amp;cp-&gt;n_control)) {
          resched = true;
if (resched) {
    if (!old_ct)
        cp->flags &= ~IP_VS_CONN_F_NFCT;
    if (!atomic_read(&cp->n_control))
        ip_vs_conn_expire_now(cp);
    __ip_vs_conn_put(cp);
    if (uses_ct)
        return NF_DROP;
    cp = NULL;
}

if (cp->dest && !(cp->dest->flags & IP_VS_DEST_F_AVAILABLE)) {
    /* the destination server is not available */

    if (sysctl_expire_nodest_conn(ipvs)) {
        __u32 flags = cp->flags;
        +/* when timer already started, silently drop the packet. */
        +if (timer_pending(&cp->timer))
            +__ip_vs_conn_put(cp);
        +else
            +ip_vs_conn_put(cp);
        +if (sysctl_expire_nodest_conn(ipvs) &&
            +!(flags & IP_VS_CONN_F_ONE_PACKET)) {
            /* try to expire the connection immediately */
            ip_vs_conn_expire_now(cp);
        }
        /* don't restart its timer, and silently drop the packet. */
        __ip_vs_conn_put(cp);
    +return NF_DROP;
}

static int __net_init __ip_vs_init(struct net *net)
struct netns_ipvs *ipvs;
-int ret;

ipvs = net_generic(net, ip_vs_net_id);
if (ipvs == NULL)
@@ -2233,17 +2239,11 @@
if (ip_vs_sync_net_init(ipvs) < 0)
goto sync_fail;

-ret = nf_register_net_hooks(net, ip_vs_ops, ARRAY_SIZE(ip_vs_ops));
-if (ret < 0)
-goto hook_fail;
-
return 0;
/*
 * Error handling
 */

-hook_fail:
-ip_vs_sync_net_cleanup(ipvs);
sync_fail:
ip_vs_conn_net_cleanup(ipvs);
conn_fail:
@@ -2263,7 +2263,6 @@
{
 struct netns_ipvs *ipvs = net_ipvs(net);

-nf_unregister_net_hooks(net, ip_vs_ops, ARRAY_SIZE(ip_vs_ops));
ip_vs_service_net_cleanup(ipvs);/* ip_vs_flush() with locks */
ip_vs_conn_net_cleanup(ipvs);
ip_vs_app_net_cleanup(ipvs);
@@ -2274,10 +2273,24 @@
net->ipvs = NULL;
}

+static int __net_init __ip_vs_dev_init(struct net *net)
+{
+int ret;
+
+ret = nf_register_net_hooks(net, ip_vs_ops, ARRAY_SIZE(ip_vs_ops));
+if (ret < 0)
+goto hook_fail;
+return 0;
+
+hook_fail:
+return ret;
+}
static void __net_exit __ip_vs_dev_cleanup(struct net *net)
{
    struct netns_ipvs *ipvs = net_ipvs(net);
    EnterFunction(2);
+    nf_unregister_net_hooks(net, ip_vs_ops, ARRAY_SIZE(ip_vs_ops));
    ipvs->enable = 0;/* Disable packet reception */
    smp_wmb();
    ip_vs_sync_net_cleanup(ipvs);
    @@ -2292,6 +2305,7 @@
};

static struct pernet_operations ipvs_core_dev_ops = {
    .init = __ip_vs_dev_init,
    .exit = __ip_vs_dev_cleanup,
};

--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_ctl.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_ctl.c
@@ -43,6 +43,7 @@
 #ifdef CONFIG_IP_VS_IPV6
 #include <net/ipv6.h>
 #include <net/ip6_route.h>
+    #include <net/netfilter/ipv6/nf_defrag_ipv6.h>
 #endif
 #include <net/route.h>
 #include <net/sock.h>
@@ -97,7 +98,6 @@
 static void update_defense_level(struct netns_ipvs *ipvs)
 {
     struct sysinfo i;
-static int old_secure_tcp = 0;
    int availmem;
    int nomem;
    int to_change = -1;
    @@ -178,35 +178,35 @@
    spin_lock(&ipvs->securetcp_lock);
    switch (ipvs->sysctl_secure_tcp) {
        case 0:
-            if (old_secure_tcp >= 2)
+            if (ipvs->old_secure_tcp >= 2)
                to_change = 0;
            break;
        case 1:
            if (nomem) {
                -if (old_secure_tcp < 2)
+                if (ipvs->old_secure_tcp < 2)
                    to_change = 1;
ipvs->sysctl_secure_tcp = 2;
} else {
    -if (old_secure_tcp >= 2)
    +if (ipvs->old_secure_tcp >= 2)
        to_change = 0;
    }
break;
  case 2:
    if (nomem) {
        -if (old_secure_tcp < 2)
        +if (ipvs->old_secure_tcp < 2)
            to_change = 1;
    } else {
        -if (old_secure_tcp >= 2)
        +if (ipvs->old_secure_tcp >= 2)
            to_change = 0;
        ipvs->sysctl_secure_tcp = 1;
    }
break;
  case 3:
    -old_secure_tcp = ipvs->sysctl_secure_tcp;
    +ipvs->old_secure_tcp = ipvs->sysctl_secure_tcp;
    if (to_change >= 0)
        ip_vs_protocol_timeout_change(ipvs,
            ipvs->sysctl_secure_tcp > 1);
@@ -893,11 +893,17 @@
#ifdef CONFIG_IP_VS_IPV6
if (udest->af == AF_INET6) {
    +int ret;
    +
atype = ipv6_addr_type(&udest->addr.in6);
    if (!(atype & IPV6_ADDR_UNICAST) ||
        atype & IPV6_ADDR_LINKLOCAL) &&
    !--ip_vs_addr_is_local_v6(svc->ipvs->net, &udest->addr.in6))
        return -EINVAL;
    +
    +ret = nf_defrag_ipv6_enable(svc->ipvs->net);
    +if (ret)
        +return ret;
    } else
    #endif
    {
struct ip_vs_service *svc = NULL;

/* increase the module use count */
ip_vs_use_count_inc();
+if (!ip_vs_use_count_inc())
+return -ENOPROTOOPT;

/* Lookup the scheduler by 'u->sched_name' */
if (strcmp(u->sched_name, "none")) {
@ @ -1221,6 +1228,10 @@
    ret = -EINVAL;
    goto out_err;
}
+
+ret = nf_defrag_ipv6_enable(ipvs->net);
+if (ret)
+goto out_err;
}
#endif

ip_vs_addr_copy(svc->af, &svc->addr, &u->addr);
svc->port = u->port;
svc->fwmark = u->fwmark;
-svc->flags = u->flags;
+svc->flags = u->flags & ~IP_VS_SVC_F_HASHED;
svc->timeout = u->timeout * HZ;
svc->netmask = u->netmask;
svc->ipvs = ipvs;
@ @ -2253,6 +2264,18 @@
    u->udp_timeout);

#ifdef CONFIG_IP_VS_PROTO_TCP
+if (u->tcp_timeout < 0 || u->tcp_timeout > (INT_MAX / HZ))
+    u->tcp_fin_timeout < 0 || u->tcp_fin_timeout > (INT_MAX / HZ))} {
+    return -EINVAL;
+}
+#endif
+
+if (u->tcp_timeout) {
    pd = ip_vs_proto_data_get(ipvs, IPPROTO_TCP);
if (copy_from_user(arg, user, len) != 0)
return -EFAULT;

/* increase the module use count */
ip_vs_use_count_inc();
-
/* Handle daemons since they have another lock */
if (cmd == IP_VS_SO_SET_STARTDAEMON ||
    cmd == IP_VS_SO_SET_STOPDAEMON) {
    struct ipvs_sync_daemon_cfg cfg;

    memset(&cfg, 0, sizeof(cfg));
    if (strlcpy(cfg.mcast_ifn, dm->mcast_ifn,
              sizeof(cfg.mcast_ifn)))
        goto out_dec;
    cfg.syncid = dm->syncid;
    rtnl_lock();
    mutex_lock(&ipvs->sync_mutex);
    ret = start_sync_thread(ipvs, &cfg, dm->state);
    mutex_unlock(&ipvs->sync_mutex);
    rtnl_unlock();
} else {
    mutex_lock(&ipvs->sync_mutex);
    ret = stop_sync_thread(ipvs, dm->state);
    mutex_unlock(&ipvs->sync_mutex);
}
    goto out_dec;
return ret;
}

mutex_lock(&__ip_vs_mutex);
/*/ Set timeout values for (tcp tcpfin udp) */
ret = ip_vs_set_timeout(ipvs, (struct ip_vs_timeout_user *)arg);
goto out_unlock;
} else if (!len) {
    /* No more commands with len == 0 below */
    ret = -EINVAL;
    goto out_unlock;
}

usvc_compat = (struct ip_vs_service_user *)arg;
if ((cmd == IP_VS_SO_SET_ADD || cmd == IP_VS_SO_SET_EDIT) &&
    strnlen(usvc.sched_name, IP_VS_SCHEDNAME_MAXLEN) ==
    IP_VS_SCHEDNAME_MAXLEN) {
    ret = -EINVAL;
    goto out_unlock;
+}
+
/* Check for valid protocol: TCP or UDP or SCTP, even for fwmark! = 0 */
if (usvc.protocol != IPPROTO_TCP && usvc.protocol != IPPROTO_UDP &&
    usvc.protocol != IPPROTO_SCTP) {
    pr_err("set_ctl: invalid protocol: %d %pI4:%d %s\n",
            usvc.protocol, &usvc.addr.ip,
            ntohs(usvc.port), usvc.sched_name);
    ret = -EFAULT;
    goto out_unlock;
}

break;
case IP_VS_SO_SET_DELDEST:
ret = ip_vs_del_dest(svc, &udest);
  -break;
  -default:
  -ret = -EINVAL;
}

out_unlock:
mutex_unlock(&__ip_vs_mutex);
  -out_dec:
  -/* decrease the module use count */
  -ip_vs_use_count_dec();
  -
  return ret;
}

static const struct nla_policy ip_vs_daemon_policy[IPVS_DAEMON_ATTR_MAX + 1] = {
[IPVS_DAEMON_ATTR_STATE]= { .type = NLA_U32 },
[IPVS_DAEMON_ATTR_MCAST_IFN]= { .type = NLA_NUL_STRING,
    - .len = IP_VS_IFNAME_MAXLEN },
+ [IPVS_DAEMON_ATTR_SYNC_ID]= { .type = NLA_U32 },
+ [IPVS_DAEMON_ATTR_SYNC_MAXLEN]= { .type = NLA_U16 },
[IPVS_DAEMON_ATTR_MCAST_GROUP]= { .type = NLA_U32 },
@@ -2872,7 +2892,7 @@
[IPVS_SVC_ATTR_PORT]= { .type = NLA_U16 },
[IPVS_SVC_ATTR_FWMARK]= { .type = NLA_U32 },
[IPVS_SVC_ATTR_SCHED_NAME]= { .type = NLA_NUL_STRING,
- .len = IP_VS_SCHEDNAME_MAXLEN },
+ .len = IP_VS_SCHEDNAME_MAXLEN - 1 },
[IPVS_SVC_ATTR_PE_NAME]= { .type = NLA_NUL_STRING,
- .len = IP_VS_PENAME_MAXLEN },
 [IPVS_SVC_ATTR_FLAGS]= { .type = NLA_BINARY,
@@ -3484,12 +3504,8 @@
if (ipvs->mixed_address_family_dests > 0)
return -EINVAL;

-rtnl_lock();
-mutex_lock(&ipvs->sync_mutex);
ret = start_sync_thread(ipvs, &c,
 nla_get_u32(attrs[IPVS_DAEMON_ATTR_STATE]));
-mutex_unlock(&ipvs->sync_mutex);
-rtnl_unlock();
return ret;
}
@@ -3500,10 +3516,8 @@
if (!attrs[IPVS_DAEMON_ATTR_STATE])
return -EINVAL;

-mutex_lock(&ipvs->sync_mutex);
ret = stop_sync_thread(ipvs,
- nla_get_u32(attrs[IPVS_DAEMON_ATTR_STATE]));
-mutex_unlock(&ipvs->sync_mutex);
return ret;
}
@@ -3973,6 +3987,11 @@
tbl[idx++].data = &ipvs->sysctl_conn_reuse_mode;
tbl[idx++].data = &ipvs->sysctl_schedule.icmp;
tbl[idx++].data = &ipvs->sysctl_ignore.tunneled;
+#ifdef CONFIG_IP_VS_DEBUG
+*/ Global sysctls must be ro in non-init netns */
+if (!net_eq(net, &init_net))
+tbl[idx++].mode = 0444;
+#endif

ipvs->sysctl_hdr = register_net_sysctl(net, "net/ipv4/vs", tbl);
if (ipvs->sysctl_hdr == NULL) {
@@ -4011,6 +4030,9 @@
static struct notifier_block ip_vs_dst_notifier = {
    .notifier_call = ip_vs_dst_event,
+  #ifdef CONFIG_IP_VS_IPV6
+    .priority = ADDRCONF_NOTIFY_PRIORITY + 5,
+  #endif
};

int __net_init ip_vs_control_net_init(struct netns_ipvs *ipvs)
--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_ftp.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_ftp.c
@@ -260,7 +260,7 @@
    buf_len = strlen(buf);
    ct = nf_ct_get(skb, &ctinfo);
-    if (ct && (ct->status & IPS_NAT_MASK)) {
+    if (ct) {
        bool mangled;

        /* If mangling fails this function will return 0
--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_lblc.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_lblc.c
@@ -371,6 +371,7 @@
          tbl->counter = 1;
          tbl->dead = 0;
          tbl->svc = svc;
+          atomic_set(&tbl->entries, 0);
*/

        /* Hook periodic timer for garbage collection
--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_lblcr.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_lblcr.c
@@ -534,6 +534,7 @@
           tbl->counter = 1;
           tbl->dead = 0;
           tbl->svc = svc;
+           atomic_set(&tbl->entries, 0);
*/

        /* Hook periodic timer for garbage collection
--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_pe.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_pe.c
@@ -67,7 +67,8 @@
            struct ip_vs_pe *tmp;
 */

        /* increase the module use count */
-        ip_vs_use_count_inc();
+        if (!ip_vs_use_count_inc())
+            return -ENOENT;
mutex_lock(&ip_vs_pe_mutex);
/* Make sure that the pe with this name doesn't exist
--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_sched.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_sched.c
@@ -184,7 +184,8 @@
 {}
 /* increase the module use count */
-ip_vs_use_count_inc();
+if (!ip_vs_use_count_inc())
+return -ENOENT;

mutex_lock(&ip_vs_sched_mutex);

--- linux-4.15.0.orig/net/netfilter/ipvs/ip_vs_sync.c
+++ linux-4.15.0/net/netfilter/ipvs/ip_vs_sync.c
@@ -49,6 +49,7 @@
 #include <linux/kthread.h>
 #include <linux/wait.h>
 #include <linux/kernel.h>
+#include <linux/sched/signal.h>
 #include <asm/unaligned.h> /* Used for ntoh_seq and hton_seq */

@@ -194,6 +195,7 @@
#define IPVS_OPT_F_PARAM (1 << (IPVS_OPT_PARAM-1))

struct ip_vs_sync_thread_data {
+struct task_struct *task;
 struct netns_ipvs *ipvs;
 struct socket *sock;
 char *buf;
@@ -373,8 +375,11 @@
 ms->sync_queue_len++;
 list_add_tail(&sb->list, &ms->sync_queue);
-if ((++ms->sync_queue_delay) == IPVS_SYNC_WAKEUP_RATE)
-wake_up_process(ms->master_thread);
+if ((++ms->sync_queue_delay) == IPVS_SYNC_WAKEUP_RATE) {
 +int id = (int)(ms - ipvs->ms);
 +
+wake_up_process(ipvs->master_tinfo[id].task);
 +}
 } else
 ip_vs_sync_buff_release(sb);
 spin_unlock(&ipvs->sync_lock);
@@ -1360,15 +1365,9 @@
/*
 * Specify default interface for outgoing multicasts
 */
-static int set_mcast_if(struct sock *sk, char *ifname)
+static int set_mcast_if(struct sock *sk, struct net_device *dev)
 {
  struct net_device *dev;
  struct inet_sock *inet = inet_sk(sk);
  struct net *net = sock_net(sk);
  
  dev = __dev_get_by_name(net, ifname);
  if (!dev)
    return -ENODEV;
  
  if (sk->sk_bound_dev_if && dev->ifindex != sk->sk_bound_dev_if)
    return -EINVAL;
  
  * in the in_addr structure passed in as a parameter.
 */
 static int
-join_mcast_group(struct sock *sk, struct in_addr *addr, char *ifname)
+join_mcast_group(struct sock *sk, struct in_addr *addr, struct net_device *dev)
 {
  struct net *net = sock_net(sk);
  struct ip_mreqn mreq;
  struct net_device *dev;
  int ret;

  memset(&mreq, 0, sizeof(mreq));
  memcpy(&mreq.imr_multiaddr, addr, sizeof(struct in_addr));

  dev = __dev_get_by_name(net, ifname);
  if (!dev)
    return -ENODEV;

  if (sk->sk_bound_dev_if && dev->ifindex != sk->sk_bound_dev_if)
    return -EINVAL;

  @ @ -1396,19 +1395,14 @ @
  #ifdef CONFIG_IP_VS_IPV6
  static int join_mcast_group6(struct sock *sk, struct in6_addr *addr,
-     char *ifname)
+     struct net_device *dev)
  {
   struct net *net = sock_net(sk);
   struct net_device *dev;
   int ret;

   memset(&mreq, 0, sizeof(mreq));
   memcpy(&mreq.imal_addr, addr, sizeof(struct in6_addr));

   dev = __dev_get_by_name(net, ifname);
   if (!dev)
     return -ENODEV;

   if (sk->sk_bound_dev_if && dev->ifindex != sk->sk_bound_dev_if)
     return -EINVAL;

   @@ -1423,15 +1417,10 @@

   #ifdef CONFIG_IP_VS_IPV6
   static int join_mcast_group6(struct sock *sk, struct in6_addr *addr,
-      char *ifname)
+      struct net_device *dev)
   {
    struct net *net = sock_net(sk);
    struct net_device *dev;
    int ret;
-dev = __dev_get_by_name(net, ifname);
-if (!dev)
-return -ENODEV;

if (sk->sk_bound_dev_if && dev->ifindex != sk->sk_bound_dev_if)
return -EINVAL;

@@ -1443,24 +1432,18 @@
}
#endif

-static int bind_mcastif_addr(struct socket *sock, char *ifname)
+static int bind_mcastif_addr(struct socket *sock, struct net_device *dev)
{
-struct net *net = sock_net(sock->sk);
-struct net_device *dev;
-__be32 addr;
-struct sockaddr_in sin;

-dev = __dev_get_by_name(net, ifname);
-if (!dev)
-return -ENODEV;

 addr = inet_select_addr(dev, 0, RT_SCOPE_UNIVERSE);
if (!addr)
pr_err("You probably need to specify IP address on 
" 
"multicast interface.\n");

IP_VS_DBG(7, "binding socket with (%s) %pI4\n",
- ifname, &addr);
+ dev->name, &addr);

/* Now bind the socket with the address of multicast interface */
sin.sin_family = AF_INET;
@@ -1493,7 +1476,8 @@
/*
 *      Set up sending multicast socket over UDP
 */
-static struct socket *make_send_sock(struct netns_ipvs *ipvs, int id)
+static int make_send_sock(struct netns_ipvs *ipvs, int id,
 + struct net_device *dev, struct socket **sock_ret)
{
 /* multicast addr */
 union ipvs_sockaddr mcast_addr;
@@ -1505,9 +1489,10 @@
 if (result < 0) {
 pr_err("Error during creation of socket; terminating\n");
 -return ERR_PTR(result);

+goto error;
}  
-result = set_mcast_if(sock->sk, ipvs->mcfg.mcast_ifn);
+*sock_ret = sock;
+result = set_mcast_if(sock->sk, dev);
if (result < 0) {
  pr_err("Error setting outbound mcast interface\n");
goto error;
@@ -1522,7 +1507,7 @@
  set_sock_size(sock->sk, 1, result);

  if (AF_INET == ipvs->mcfg.mcast_af)
-    result = bind_mcastif_addr(sock, ipvs->mcfg.mcast_ifn);
+    result = bind_mcastif_addr(sock, dev);
  else
    result = 0;
  if (result < 0) {
@@ -1538,19 +1523,18 @@
goto error;
  }

  return sock;
+return 0;

error:
  -sock_release(sock);
  -return ERR_PTR(result);
+return result;
}

/*
 *      Set up receiving multicast socket over UDP
 */
-static struct socket *make_receive_sock(struct netns_ipvs *ipvs, int id,
-      int ifindex)
+static int make_receive_sock(struct netns_ipvs *ipvs, int id,
+     struct net_device *dev, struct socket **sock_ret)
{
  /* multicast addr */
  union ipvs_sockaddr mcast_addr;
@@ -1562,8 +1546,9 @@
    IPPROTO_UDP, &sock);
  if (result < 0) {
    pr_err("Error during creation of socket; terminating\n");
-      return ERR_PTR(result);
+    goto error;
  }

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+*sock_ret = sock;
/* it is equivalent to the REUSEADDR option in user-space */
sock->sk->sk_reuse = SK_CAN_REUSE;
result = sysctl_sync_sock_size(ipvs);
@@ -1571,7 +1556,7 @@
    set_sock_size(sock->sk, 0, result);

get_mcast_sockaddr(&mcast_addr, &salen, &ipvs->bcfg, id);
-sock->sk->sk_bound_dev_if = ifindex;
+sock->sk->sk_bound_dev_if = dev->ifindex;
result = sock->ops->bind(sock, (struct sockaddr *)&mcast_addr, salen);
if (result < 0) {
    pr_err("Error binding to the multicast addr\n");
@@ -1582,21 +1567,20 @@
#ifdef CONFIG_IP_VS_IPV6
if (ipvs->bcfg.mcast_af == AF_INET6)
    result = join_mcast_group6(sock->sk, &mcast_addr.in6.sin6_addr,
-    dev->bcfg_mcast_ifn);
+    dev);
else
    #endif
result = join_mcast_group(sock->sk, &mcast_addr.in.sin_addr,
-    dev->bcfg_mcast_ifn);
+    dev);
if (result < 0) {
    pr_err("Error joining to the multicast group\n");
goto error;
}

-return sock;
+return 0;

error:
-sock_release(sock);
-return ERR_PTR(result);
+return result;
}

@@ -1665,8 +1649,10 @@
spin_lock_bh(&ipvs->sync_lock);
if (ms->sync_queue_len &&
    ms->sync_queue_delay < IPVS_SYNC_WAKEUP_RATE) {
+    int id = (int)(ms - ipvs->ms);
+    ms->sync_queue_delay = IPVS_SYNC_WAKEUP_RATE;
    -wake_up_process(ms->master_thread);
    +wake_up_process(ipvs->master_tinfo[id].task);

---
Open Source Used In 5GasS Edge AC-4 34388
spin_unlock_bh(&ipvs->sync_lock);
}
@@ -1732,10 +1718,6 @@ if (sb)
ip_vs_sync_buff_release(sb);

-/* release the sending multicast socket */
-sock_release(tinfo->sock);
-kfree(tinfo);
-
return 0;
}
@@ -1744,6 +1726,8 @@
{
 struct ip_vs_sync_thread_data *tinfo = data;
 struct netns_ipvs *ipvs = tinfo->ipvs;
+struct sock *sk = tinfo->sock->sk;
+struct udp_sock *up = udp_sk(sk);
 int len;

 pr_info("sync thread started: state = BACKUP, mcast_ifn = %s, 
@@ -1751,12 +1735,14 @@
ipvs->bcfg.mcast_ifn, ipvs->bcfg.syncid, tinfo->id);

 while (!kthread_should_stop()) {
-wait_event_interruptible(*sk_sleep(tinfo->sock->sk),
-!skb_queue_empty(&tinfo->sock->sk->sk_receive_queue)
-|| kthread_should_stop());
+wait_event_interruptible(*sk_sleep(sk),
+!skb_queue_empty_lockless(&sk->sk_receive_queue) ||
+!skb_queue_empty_lockless(&up->reader_queue) ||
+kthread_should_stop());

 /* do we have data now? */
-while (!skb_queue_empty(&tinfo->sock->sk->sk_receive_queue)) {
+while (!skb_queue_empty_lockless(&tinfo->sock->sk->sk_receive_queue)) {
  len = ip_vs_receive(tinfo->sock, tinfo->buf,
ipvs->bcfg.sync_maxlen);
  if (len <= 0) {
    @ @ -1769,11 +1755,6 @@
  }

-/* release the sending multicast socket */
-sock_release(tinfo->sock);
- kfree(tinfo->buf);
- kfree(tinfo);
-
return 0;
}

@@ -1781,13 +1762,12 @@
int start_sync_thread(struct netns_ipvs *ipvs, struct ipvs_sync_daemon_cfg *c,
                     int state)
{
-    struct ip_vs_sync_thread_data *tinfo;
-    struct task_struct **array = NULL, *task;
-    struct socket *sock;
+    struct ip_vs_sync_thread_data *ti = NULL, *tinfo;
+    struct task_struct *task;
    struct net_device *dev;
    char *name;
    int (*threadfn)(void *data);
    -int id, count, hlen;
    +int id = 0, count, hlen;
    int result = -ENOMEM;
    u16 mtu, min_mtu;

@@ -1795,6 +1775,22 @@
   IP_VS_DBG(7, "Each ip_vs_sync_conn entry needs %zd bytes\n",
              sizeof(struct ip_vs_sync_conn_v0));

+/* increase the module use count */
+if (!ip_vs_use_count_inc())
+    return -ENOPROTOOPT;
+
+/* Do not hold one mutex and then to block on another */
+for (;;) {
+    rtnl_lock();
+    if (mutex_trylock(&ipvs->sync_mutex))
+        break;
+    rtnl_unlock();
+    mutex_lock(&ipvs->sync_mutex);
+    if (rtnl_trylock())
+        break;
+    mutex_unlock(&ipvs->sync_mutex);
+}
+
if (!ipvs->sync_state) {
    count = clamp(sysctl_sync_ports(ipvs), 1, IPVS_SYNC_PORTS_MAX);
    ipvs->threads_mask = count - 1;
@@ -1813,7 +1809,8 @@
 dev = __dev_get_by_name(ipvs->net, c->mcast_ifn);
if (!dev) {
    pr_err("Unknown mcast interface: %s", c->mcast_ifn);
    return -ENODEV;
    +result = -ENODEV;
    +goto out_early;
}

hlen = (AF_INET6 == c->mcast_af) ?
    sizeof(struct ipv6hdr) + sizeof(struct udphdr) :
@@ -1830,26 +1827,30 @@
c->sync_maxlen = mtu - hlen;

if (state == IP_VS_STATE_MASTER) {
    +result = -EEXIST;
    if (ipvs->ms)
        -return -EEXIST;
    +return -EEXIST;
    +goto out_early;

    ipvs->mcfg = *c;
    name = "ipvs-m:%d:%d";
    threadfn = sync_thread_master;
    } else if (state == IP_VS_STATE_BACKUP) {
    -if (ipvs->backup_threads)
        -return -EEXIST;
    +result = -EEXIST;
    +if (ipvs->backup_tinfo)
        +goto out_early;

    ipvs->bcfg = *c;
    name = "ipvs-b:%d:%d";
    threadfn = sync_thread_backup;
    } else {
        -return -EINVAL;
        +result = -EINVAL;
        +goto out_early;
    }

    if (state == IP_VS_STATE_MASTER) {
        struct ipvs_master_sync_state *ms;

        +result = -ENOMEM;
        ipvs->ms = kcalloc(count, sizeof(ipvs->ms[0]), GFP_KERNEL);
        if (!ipvs->ms)
            goto out;
@@ -1862,101 +1863,110 @@
            master_wakeup_work_handler);
        ms->ipvs = ipvs;
    }
    -} else {

array = kcalloc(count, sizeof(struct task_struct *), GFP_KERNEL);
if (!array)
    goto out;

result = -ENOMEM;
ti = kcalloc(count, sizeof(struct ip_vs_sync_thread_data), GFP_KERNEL);
if (!ti)
    goto out;

tinfo = NULL;
for (id = 0; id < count; id++) {
    if (state == IP_VS_STATE_MASTER)
        sock = make_send_sock(ipvs, id);
    else
        sock = make_receive_sock(ipvs, id, dev->ifindex);

    if (IS_ERR(sock)) {
        result = PTR_ERR(sock);
        goto outtinfo;
    }

    tinfo = kmalloc(sizeof(*tinfo), GFP_KERNEL);
    if (!tinfo)
        goto outsocket;
    tinfo = &ti[id];
tinfo->ipvs = ipvs;
tinfo->sock = sock;
    if (state == IP_VS_STATE_BACKUP) {
        result = -ENOMEM;
        tinfo->buf = kmalloc(ipvs->bcfg.sync_maxlen, GFP_KERNEL);
        if (!tinfo->buf)
            goto outtinfo;
    } else {
        tinfo->buf = NULL;
        goto out;
    }
    tinfo->id = id;
    if (state == IP_VS_STATE_MASTER)
        result = make_send_sock(ipvs, id, dev, &tinfo->sock);
    else
        result = make_receive_sock(ipvs, id, dev, &tinfo->sock);
    if (result < 0)
        goto out;

    task = kthread_run(threadfn, tinfo, name, ipvs->gen, id);
    if (IS_ERR(task)) {
        result = PTR_ERR(task);
        goto out;
    }
}
-goto outtinfo;
+goto out;
}
-tinfo = NULL;
-if (state == IP_VS_STATE_MASTER)
-ipvs->ms[id].master_thread = task;
-else
-array[id] = task;
+tinfo->task = task;
}

/* mark as active */

-if (state == IP_VS_STATE_BACKUP)
-ipvs->backup_threads = array;
+if (state == IP_VS_STATE_MASTER)
+ipvs->master_tinfo = ti;
+else
+ipvs->backup_tinfo = ti;
spin_lock_bh(&ipvs->sync_buff_lock);
ipvs->sync_state |= state;
spin_unlock_bh(&ipvs->sync_buff_lock);

-/* increase the module use count */
-ip_vs_use_count_inc();
+mutex_unlock(&ipvs->sync_mutex);
+rtnl_unlock();

return 0;

-outsocket:
-sock_release(sock);
-
-outtinfo:
-if (tinfo) {
-sock_release(tinfo->sock);
-kfree(tinfo->buf);
-kfree(tinfo);
-}
-count = id;
-while (count-- > 0) {
-if (state == IP_VS_STATE_MASTER)
-kthread_stop(ipvs->ms[count].master_thread);
-else
-kthread_stop(array[count]);
-}
-kfree(array);
-
out:
+/* We do not need RTNL lock anymore, release it here so that
+ * sock_release below can use rtnl_lock to leave the mcast group.
+ */
+rtwl_unlock();
+id = min(id, count - 1);
+if (ti) {
+for (tinfo = t + id; tinfo >= t; tinfo--) {
+if (tinfo->task)
+kthread_stop(tinfo->task);
+}
+}
+}
if (!(ipvs->sync_state & IP_VS_STATE_MASTER)) {
kfree(ipvs->ms);
ipvs->ms = NULL;
}
+mutex_unlock(&ipvs->sync_mutex);
+
+/* No more mutexes, release socks */
+if (ti) {
+for (tinfo = ti + id; tinfo >= ti; tinfo--) {
+if (tinfo->sock)
+sock_release(tinfo->sock);
+kfree(tinfo->buf);
+}
+kfree(ti);
+}
+
+/* decrease the module use count */
+ip_vs_use_count_dec();
+return result;
+
+out_early:
+mutex_unlock(&ipvs->sync_mutex);
+rtwl_unlock();
+
+/* decrease the module use count */
+ip_vs_use_count_dec();
return result;
}

int stop_sync_thread(struct netns_ipvs *ipvs, int state)
{
-struct task_struct **array;
+struct ip_vs_sync_thread_data *ti, *tinfo;
int id;
int rete = -EINVAL;

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IP_VS_DBG(7, "%s(): pid %d\n", __func__, task_pid_nr(current));

+mutex_lock(&ipvs->sync_mutex);
if (state == IP_VS_STATE_MASTER) {
  +retc = -ESRCH;
  if (!ipvs->ms)
    +return -ESRCH;
  +goto err;
  +ti = ipvs->master_tinfo;

  /*
   * The lock synchronizes with sb_queue_tail(), so that we don't
   * stp this lock synchronizes with sb_queue_tail(), so that we don't
   */
  -struct ipvs_master_sync_state *ms = &ipvs->ms[id];
  int ret;

  +tinfo = &t[i];
  pr_info("stopping master sync thread %d ...\n",
  -task_pid_nr(ms->master_thread));
  +task_pid_nr(tinfo->task));
  cancel_delayed_work_sync(&ms->master_wakeup_work);
  -ret = kthread_stop(ms->master_thread);
  +ret = kthread_stop(tinfo->task);
  if (retc >= 0)
    retc = ret;
}
  kfree(ipvs->ms);
  ipvs->ms = NULL;
  +ipvs->master_tinfo = NULL;
} else if (state == IP_VS_STATE_BACKUP) {
  -array = ipvs->backup_threads;
  retc = 0;
  for (id = ipvs->threads_mask; id >= 0; id--) {
    int ret;

    +tinfo = &t[i];
    pr_info("stopping backup sync thread %d ...\n",
    -task_pid_nr(array[id]));
    +ret = kthread_stop(array[id]);
+task_pid_nr(tinfo->task));
+ret = kthread_stop(tinfo->task);
if (retc >= 0)
retc = ret;
}
-kfree(array);
-ipvs->backup_threads = NULL;
+ipvs->backup_tinfo = NULL;
+} else {
+goto err;
+}
+id = ipvs->threads_mask;
+mutex_unlock(&ipvs->sync_mutex);
+
+/* No more mutexes, release socks */
+for (tinfo = ti + id; tinfo >= ti; tinfo--) {
+if (tinfo->sock)
+sock_release(tinfo->sock);
+kfree(tinfo->buf);
}
+kfree(ti);

/* decrease the module use count */
ip_vs_use_count_dec();
+return retc;
+
+err:
+mutex_unlock(&ipvs->sync_mutex);
return retc;
}

@@ -2025,7 +2053,6 @@
{
int retc;

-mutex_lock(&ipvs->sync_mutex);
retc = stop_sync_thread(ipvs, IP_VS_STATE_MASTER);
if (retc && retc != -ESRCH)
pr_err("Failed to stop Master Daemon\n");
@@ -2033,5 +2060,4 @@
retc = stop_sync_thread(ipvs, IP_VS_STATE_BACKUP);
if (retc && retc != -ESRCH)
pr_err("Failed to stop Backup Daemon\n");
-mutex_unlock(&ipvs->sync_mutex);
}
struct rtable *ort = skb_rtable(skb);

if (!skb->dev && sk && sk_fullsock(sk))
- ort->dst.ops->update_pmtu(&ort->dst, sk, NULL, mtu);
+ ort->dst.ops->update_pmtu(&ort->dst, sk, NULL, mtu, true);
}

static inline bool ensure_mtu_is_adequate(struct netns_ipvs *ipvs, int skb_af,
@@ -585,6 +585,8 @@
    if (ret == NF_ACCEPT) {
        nf_reset(skb);
        skb_forward_csum(skb);
-       if (skb->dev)
+       if (skb->dev)
+          skb->tstamp = 0;
    }
    return ret;
}
@@ -625,6 +627,8 @@

if (!local) {
    skb_forward_csum(skb);
+   if (skb->dev)
+      skb->tstamp = 0;
    NF_HOOK(pf, NF_INET_LOCAL_OUT, cp->ipvs->net, NULL, skb,
    NULL, skb_dst(skb)->dev, dst_output);
} else
@@ -645,6 +649,8 @@

if (!local) {
    ip_vs_drop_early_demux_sk(skb);
    skb_forward_csum(skb);
+   if (skb->dev)
+      skb->tstamp = 0;
    NF_HOOK(pf, NF_INET_LOCAL_OUT, cp->ipvs->net, NULL, skb,
    NULL, skb_dst(skb)->dev, dst_output);
} else

--- linux-4.15.0.orig/net/netfilter/nf_conntrack_core.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_core.c
@@ -25,6 +25,7 @@
#include <linux/slab.h>
#include <linux/random.h>
#include <linux/jhash.h>
+include <linux/siphash.h>
#include <linux/err.h>
#include <linux/percpu.h>
#include <linux/moduleparam.h>
@@ -300,6 +301,40 @@

EXPORT_SYMBOL_GPL(nf_ct_invert_tuple);
/* Generate a almost-unique pseudo-id for a given conntrack.
 * intentionally doesn't re-use any of the seeds used for hash
 * table location, we assume id gets exposed to userspace.
 *
 * Following nf_conn items do not change throughout lifetime
 * of the nf_conn:
 *
 * 1. nf_conn address
 * 2. nf_conn->master address (normally NULL)
 * 3. the associated net namespace
 * 4. the original direction tuple
 */

u32 nf_ct_get_id(const struct nf_conn *ct)
{
  static __read_mostly siphash_key_t ct_id_seed;
  unsigned long a, b, c, d;

  net_get_random_once(&ct_id_seed, sizeof(ct_id_seed));
  +a = (unsigned long)ct;
  +b = (unsigned long)ct->master;
  +c = (unsigned long)nf_ct_net(ct);
  +d = (unsigned long)siphash(&ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple,
   +sizeof(ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple),
   +&ct_id_seed);
  +#ifdef CONFIG_64BIT
  +return siphash_4u64((u64)a, (u64)b, (u64)c, (u64)d, &ct_id_seed);
  +#else
  +return siphash_4u32((u32)a, (u32)b, (u32)c, (u32)d, &ct_id_seed);
  +#endif
  +}
+EXPORT_SYMBOL_GPL(nf_ct_get_id);
+
static void
clean_from_lists(struct nf_conn *ct)
{
  tstamp = nf_conn_tstamp_find(ct);
  -if (tstamp && tstamp->stop == 0)
  +if (tstamp) {
  +s32 timeout = ct->timeout - nfct_time_stamp;
  +
  +tstamp->stop = ktime_get_real_ns();
  +if (timeout < 0)
+tstamp->stop -= jiffies_to_nsecs(-timeout);
+
+static inline bool
+nf_ct_match(const struct nf_conn *ct1, const struct nf_conn *ct2)
+{
+    return nf_ct_tuple_equal(&ct1->tuplehash[IP_CT_DIR_ORIGINAL].tuple, &ct2->tuplehash[IP_CT_DIR_ORIGINAL].tuple) &&
+           nf_ct_tuple_equal(&ct1->tuplehash[IP_CT_DIR_REPLY].tuple, &ct2->tuplehash[IP_CT_DIR_REPLY].tuple) &&
+           nf_ct_zone_equal(ct1, nf_ct_zone(ct2), IP_CT_DIR_ORIGINAL) &&
+           nf_ct_zone_equal(ct1, nf_ct_zone(ct2), IP_CT_DIR_REPLY) &&
+           net_eq(nf_ct_net(ct1), nf_ct_net(ct2));
+}
+
/* caller must hold rcu readlock and none of the nf_conntrack_locks */
static void nf_ct_gc_expired(struct nf_conn *ct)
{
    /* This is the conntrack entry already in hashes that won race. */
    struct nf_conn *lost_ct = nf_ct_tuplehash_to_ctrack(h);
    const struct nf_conntrack_l4proto *l4proto = __nf_ct_l4proto_find(nf_ct_l3num(ct), nf_ct_protonum(ct));
    enum ip_conntrack_info oldinfo;
    struct nf_conn *loser_ct = nf_ct_get(skb, &oldinfo);

    if (l4proto->allow_clash && ((ct->status & IPS_NAT_DONE_MASK) == 0) &&
        !nf_ct_is_dying(ct) &&
        atomic_inc_not_zero(&ct->ct_general.use)) {
        if (l4proto->allow_clash &&
            nf_ct_acct_merge(lost_ct, ctinfo, loser_ct) &&
            nf_conntrack_put(&loser_ct->ct_general) &&
            nf_ct_set(skb, ct, oldinfo);
        return NF_ACCEPT;
    }

    if (((ct->status & IPS_NAT_DONE_MASK) == 0) ||
        nf_ct_match(ct, loser_ct)) {
        nf_ct_acct_merge(lost_ct, ctinfo, loser_ct);
        nf_conntrack_put(&loser_ct->ct_general);
        nf_ct_set(skb, ct, oldinfo);
    }
return NF_ACCEPT;
+
+nf_ct_put(ct);
}
NF_CT_STAT_INC(net, drop);
return NF_DROP;

/* REJECT will give spurious warnings here. */

/* No external references means no one else could have confirmed us. */
/* Another skb with the same unconfirmed conntrack may win the race. This may happen for bridge(br_flood)
or broadcast/multicast packets do skb_clone with unconfirmed conntrack. */

-WARN_ON(nf_ct_is_confirmed(ct));
+if (unlikely(nf_ct_is_confirmed(ct))) {
+WARN_ON_ONCE(1);
+nf_conntrack_double_unlock(hash, reply_hash);
+local_bh_enable();
+return NF_DROP;
+}

pr_debug("Confirming conntrack %p\n", ct);

/* We have to check the DYING flag after unlink to prevent a race against nf_ct_get_next_corpse() possibly called from
*/

if (nf_ct_key_equal(h, tuple, zone, net)) {
+/* Tuple is taken already, so caller will need to find a new source port to use. */
+/* Only exception:
+ * If the *original tuples* are identical, then both conntracks refer to the same flow.
+ * This is a rare situation, it can occur e.g. when more than one UDP packet is sent from same socket
+ * in different threads.
+ */
+/* Let nf_et_resolve_clash() deal with this later. */
+if (nf_ct_tuple_equal(&ignored_conntrack->tuplehash[IP_CT_DIR_ORIGINAL].tuple, &ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple) &&
+nf_ct_zone_equal(ct, zone, IP_CT_DIR_ORIGINAL))
+continue;
NF_CT_STAT_INC_ATOMIC(net, found);
rcu_read_unlock();
return 1;
@@ -932,19 +1011,22 @@
return drops;
}

-static noinline int early_drop(struct net *net, unsigned int _hash)
+static noinline int early_drop(struct net *net, unsigned int hash)
{
-unsigned int i;
+unsigned int i, bucket;

for (i = 0; i < NF_CT_EVICTION_RANGE; i++) {
    struct hlist_nulls_head *ct_hash;
-    unsigned int hash, hsize, drops;
+    unsigned int hsize, drops;
    rcu_read_lock();
    nf_conntrack_get_ht(&ct_hash, &hsize);
-    hash = reciprocal_scale(_hash++, hsize);
+    if (!i)
+        bucket = reciprocal_scale(hash, hsize);
+    else
+        bucket = (bucket + 1) % hsize;

-    drops = early_drop_list(net, &ct_hash[hash]);
+    drops = early_drop_list(net, &ct_hash[bucket]);
    rcu_read_unlock();

    if (drops) {
@@ -1132,9 +1214,9 @@
*(unsigned long *)(ct->tuplehash[IP_CT_DIR_REPLY].hnnode.pprev) = hash;
    ct->status = 0;
    write_pnet(&ct->ct_net, net);
-    memset(&ct->__nfct_init_offset[0], 0,
+    memset(&ct->__nfct_init_offset, 0,
        offsetof(struct nf_conn, proto) -
        offsetof(struct nf_conn, __nfct_init_offset[0]));
+        offsetof(struct nf_conn, __nfct_init_offset));

    nf_ct_zone_add(ct, zone);
@@ -1954,7 +2036,7 @@
return -EOPNOTSUPP;

/* On boot, we can set this without any fancy locking. */
if (!nf_conntrack_htable_size)
+if (!nf_conntrack_hash)
    return param_set_uint(val, kp);

rc = kstrtouint(val, 0, &hashsize);
--- linux-4.15.0.orig/net/netfilter/nf_conntrack_ftp.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_ftp.c
@@ -323,7 +323,7 @@
i++;
}
-pr_debug("Skipped up to \`%c\'\n", skip);
+pr_debug("Skipped up to 0x%hhx delimiter!\n", skip);

*numoff = i;
*numlen = getnum(data + i, dlen - i, cmd, term, numoff);
--- linux-4.15.0.orig/net/netfilter/nf_conntrack_h323_asn1.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_h323_asn1.c
@@ -171,7 +171,7 @@
    bytes++;

-if (*bs->cur + bytes > *bs->end)
+if (bs->cur + bytes > bs->end)
    return 1;

return 0;
--- linux-4.15.0.orig/net/netfilter/nf_conntrack_helper.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_helper.c
@@ -465,6 +465,11 @@
    nf_ct_expect_iterate_destroy(expect_iter_me, NULL);
    nf_ct_iterate_destroy(unhelp, me);
    +
    +/* Maybe someone has gotten the helper already when unhelp above.
    + * So need to wait it.
    + */
    +synchronize_rcu();
    }
EXPORT_SYMBOL_GPL(nf_conntrack_helper_unregister);

--- linux-4.15.0.orig/net/netfilter/nf_conntrack_netlink.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_netlink.c
@@ -29,6 +29,7 @@
 #include <linux/siphash.h>
 #include <linux/interrupt.h>
 #include <linux/slab.h>
+#include <linux/siphash.h>

 Open Source Used In 5GaaS Edge AC-4 34402
#include <linux/netfilter.h>
#include <net/netlink.h>
@@ -194,6 +195,7 @@
    if (!help)
        return 0;
+
    rcu_read_lock();
    helper = rcu_dereference(help->helper);
    if (!helper)
        goto out;
@@ -209,9 +211,11 @@
    nla_nest_end(skb, nest_helper);
    out:
    +rcu_read_unlock();
    return 0;
    @@ -444,7 +448,9 @@
    static int ctnetlink_dump_id(struct sk_buff *skb, const struct nf_conn *ct) {
        -if (nla_put_be32(skb, CTA_ID, htonl((unsigned long)ct)))
        +__be32 id = (__force __be32)nf_ct_get_id(ct);
        +
        +if (nla_put_be32(skb, CTA_ID, id))
            goto nla_put_failure;
        return 0;
    @@ -793,6 +799,21 @@
    endif
    }

    +static int ctnetlink_start(struct netlink_callback *cb) {
        +const struct nlattr * const *cda = cb->data;
        +struct ctnetlink_filter *filter = NULL;
        +
        +if (cda[CTA_MARK] && cda[CTA_MARK_MASK]) {
            +filter = ctnetlink_alloc_filter(cda);
            +if (IS_ERR(filter))
                +return PTR_ERR(filter);
            +}
    }

Open Source Used In 5GaaS Edge AC-4 34403
static int ctnetlink_filter_match(struct nf_conn *ct, void *data)
{
struct ctnetlink_filter *filter = data;

if (!tb[CTA_TUPLE_IP])
    return -EINVAL;

if (l3num != NFPROTO_IPV4 && l3num != NFPROTO_IPV6)
    return -EOPNOTSUPP;
tuple->src.l3num = l3num;

tuple = ctnetlink_parse_tuple_ip(tb[CTA_TUPLE_IP], tuple);

tuple->src.l3num = l3num;
	nf_ct_put(ct);
return -ENOENT;

if (ct[CTA_ID]) {
    u_int32_t id = ntohl(nla_get_be32(cda[CTA_ID]));
    if (id != (__force __be32)nf_ct_get_id(ct)) {
        nf_ct_put(ct);
        return -ENOENT;
    }
}

if (nlh->nlmsg_flags & NLM_F_DUMP) {
    struct netlink_dump_control c = {
        .start = ctnetlink_start,
        .dump = ctnetlink_dump_table,
        .done = ctnetlink_done,
        .data = (void *)cda,
    };

    -if (cda[CTA_MARK] & cda[CTA_MARK_MASK]) {
        struct ctnetlink_filter *filter;
        -filter = ctnetlink_alloc_filter(cda);
        -if (IS_ERR(filter))
            -return PTR_ERR(filter);
        -filter = filter;
    -}
}
return netlink_dump_start(ctnl, skb, nlh, &c);
}

@@ -2524,6 +2541,25 @@
static const union nf_inet_addr any_addr;

+static __be32 nf_expect_get_id(const struct nf_conntrack_expect *exp)
+{
+    static __read_mostly siphash_key_t exp_id_seed;
+    unsigned long a, b, c, d;
+    +net_get_random_once(&exp_id_seed, sizeof(exp_id_seed));
+    +a = (unsigned long)exp;
+    +b = (unsigned long)exp->helper;
+    +c = (unsigned long)exp->master;
+    +d = (unsigned long)siphash(&exp->tuple, sizeof(exp->tuple), &exp_id_seed);
+    +#ifdef CONFIG_64BIT
+    +return (__force __be32)siphash_4u64((u64)a, (u64)b, (u64)c, (u64)d, &exp_id_seed);
+    +#else
+    +return (__force __be32)siphash_4u32((u32)a, (u32)b, (u32)c, (u32)d, &exp_id_seed);
+    +#endif
+}
+
+static int
+ctnetlink_exp_dump_expect(struct sk_buff *skb,
+const struct nf_conntrack_expect *exp)
+{
+    if (nla_put_be32(skb, CTA_EXPECT_TIMEOUT, htonl(timeout)) ||
+    -    nla_put_be32(skb, CTA_EXPECT_ID, htonl((unsigned long)exp)) ||
+    +    nla_put_be32(skb, CTA_EXPECT_ID, nf_expect_get_id(exp)) ||
+    nla_put_be32(skb, CTA_EXPECT_FLAGS, htonl(exp->flags)) ||
+    nla_put_be32(skb, CTA_EXPECT_CLASS, htonl(exp->class)))
+    goto nla_put_failure;
+    
+    if (cda[CTA_EXPECT_ID]) {
+        __be32 id = nla_get_be32(cda[CTA_EXPECT_ID]);
+        -if (ntohl(id) != (u32)(unsigned long)exp) {
+            +if (id != nf_expect_get_id(exp)) {
+                nf_ct_expect_put(exp);
+                return -ENOENT;
+            }
+        }
+    }
list_for_each_entry(net, net_exit_list, exit_list)
ctnetlink_net_exit(net);
+
+/* wait for other cpus until they are done with ctnl_notifiers */
+synchronize_rcu();
}

static struct pernet_operations ctnetlink_net_ops = {
--- linux-4.15.0.orig/net/netfilter/nf_conntrack_pptp.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_pptp.c
@@ -71,24 +71,32 @@
#if defined(DEBUG) || defined(CONFIG_DYNAMIC_DEBUG)
/* PptpControlMessageType names */
-const char *const pptp_msg_name[] = {
- "UNKNOWN_MESSAGE",
- "START_SESSION_REQUEST",
- "START_SESSION_REPLY",
- "STOP_SESSION_REQUEST",
- "STOP_SESSION_REPLY",
- "ECHO_REQUEST",
- "ECHO_REPLY",
- "OUT_CALL_REQUEST",
- "OUT_CALL_REPLY",
- "IN_CALL_REQUEST",
- "IN_CALL_REPLY",
- "IN_CALL_CONNECT",
- "CALL_CLEAR_REQUEST",
- "CALL_DISCONNECT_NOTIFY",
- "WAN_ERROR_NOTIFY",
- "SET_LINK_INFO"
+static const char *const pptp_msg_name_array[PPTP_MSG_MAX + 1] = {
+ [0] = "UNKNOWN_MESSAGE",
+ [PPTP_START_SESSION_REQUEST] = "START_SESSION_REQUEST",
+ [PPTP_START_SESSION_REPLY] = "START_SESSION_REPLY",
+ [PPTP_STOP_SESSION_REQUEST] = "STOP_SESSION_REQUEST",
+ [PPTP_STOP_SESSION_REPLY] = "STOP_SESSION_REPLY",
+ [PPTP_ECHO_REQUEST] = "ECHO_REQUEST",
+ [PPTP_ECHO_REPLY] = "ECHO_REPLY",
+ [PPTP_OUT_CALL_REQUEST] = "OUT_CALL_REQUEST",
+ [PPTP_OUT_CALL_REPLY] = "OUT_CALL_REPLY",
+ [PPTP_IN_CALL_REQUEST] = "IN_CALL_REQUEST",
+ [PPTP_IN_CALL_REPLY] = "IN_CALL_REPLY",
+ [PPTP_IN_CALL_CONNECT] = "IN_CALL_CONNECT",
+ [PPTP_CALL_CLEAR_REQUEST] = "CALL_CLEAR_REQUEST",
+ [PPTP_CALL_DISCONNECT_NOTIFY] = "CALL_DISCONNECT_NOTIFY",
const char *pptp_msg_name(u_int16_t msg)
{
    if (msg > PPTP_MSG_MAX)
        return pptp_msg_name_array[0];
    return pptp_msg_name_array[msg];
}

EXPORT_SYMBOL(pptp_msg_name);

switch (msg) {  
    case PPTP_START_SESSION_REPLY:
        pcid = pptpReq->ocack.peersCallID;
        if (info->pns_call_id != pcid)
            goto invalid;
        pr_debug("inbound control message %s\n", pptp_msg_name[msg]);
        switch (msg) {
            case PPTP拨号成功回应:
                if (info->pns_call_id != pcid)
                    goto invalid;
                if (pptpReq->ocack.resultCode == PPTP拨号建立成功)
                    goto invalid;
                cid = pptpReq->icreq.callID;
                pr_debug("inbound control message %s\n", pptp_msg_name[msg]);
                if (info->pns_call_id != pcid)
                    goto invalid;
                info->cstate = PPTP拨号建立中;
                info->pns_call_id = cid;
                break;
        }
        pr_debug("inbound control message %s\n", pptp_msg_name[msg]);
        if (info->pns_call_id != pcid)
            goto invalid;
        info->cstate = PPTP拨号建立成功;
/* we expect a GRE connection from PAC to PNS */ @ @ -356,7 +364,7 @@
case PPTP_CALL_DISCONNECT_NOTIFY:
/* server confirms disconnect */
cid = pptpReq->disc.callID;
-pr_debug("%s, CID=%X\n", pptp_msg_name[msg], ntohs(cid));
+pr_debug("%s, CID=%X\n", pptp_msg_name(msg), ntohs(cid));
info->cstate = PPTP_CALL_NONE;

/* untrack this call id, unexpect GRE packets */
@ @ -383,7 +391,7 @@
invalid:
pr_debug("invalid %s: type=%d cid=%u pcid=%u "
"cstate=%d sstate=%d pns_cid=%u pac_cid=%u\n",
- msg <= PPTP_MSG_MAX ? pptp_msg_name[msg] : pptp_msg_name[0],
+ pptp_msg_name(msg),
msg, ntohs(cid), ntohs(pcid), info->cstate, info->sstate,
ntohs(info->pns_call_id), ntohs(info->pac_call_id));
return NF_ACCEPT;
@ @ -403,7 +411,7 @@
typedef(nf_nat_pptp_hook_outbound) nf_nat_pptp_outbound;

msg = ntohs(ctlh->messageType);
-pr_debug("outbound control message %s\n", pptp_msg_name[msg]);
+pr_debug("outbound control message %s\n", pptp_msg_name[msg]);

switch (msg) {
    case PPTP_START_SESSION_REQUEST:
    @ @ -425,7 +433,7 @@
        info->cstate = PPTP_CALL_OUT_REQ;
/* track PNS call id */
cid = pptpReq->ocreq.callID;
-pr_debug("%s, CID=%X\n", pptp_msg_name[msg], ntohs(cid));
+pr_debug("%s, CID=%X\n", pptp_msg_name(msg), ntohs(cid));
info->pns_call_id = cid;
break;

    @ @ -439,7 +447,7 @@
    pcid = pptpReq->icack.peersCallID;
    if (info->pac_call_id != pcid)
        goto invalid;
-pr_debug("%s, CID=%X PCID=%X\n", pptp_msg_name[msg],
+pr_debug("%s, CID=%X PCID=%X\n", pptp_msg_name(msg),
    ntohs(cid), ntohs(pcid));

if (pptpReq->icack.resultCode == PPTP_INCALL_ACCEPT) {
    @ @ -479,7 +487,7 @@
invalid:
pr_debug("invalid %s: type=%d cid=%u pcid=%u ",
"cstate=%d sstate=%d pns_cid=%u pac_cid=%u\n",
- msg <= PPTP_MSG_MAX ? pptp_msg_name[msg] : pptp_msg_name[0],
+ pptp_msg_name(msg),
msg, ntohs(cid), ntohs(pcid), info->cstate, info->sstate,
ntohs(info->pns_call_id), ntohs(info->pac_call_id));
return NF_ACCEPT;
--- linux-4.15.0.orig/net/netfilter/nf_conntrack_proto.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_proto.c
@@ -74,7 +74,7 @@
struct va_format vaf;
va_list args;

-if (net->ct.sysctl_log_invalid != protonum ||
+if (net->ct.sysctl_log_invalid != protonum &&
    net->ct.sysctl_log_invalid != IPPROTO_RAW)
return;

--- linux-4.15.0.orig/net/netfilter/nf_conntrack_proto_dccp.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_proto_dccp.c
@@ -243,14 +243,14 @@
* We currently ignore Sync packets
* 
*sNO, sRQ, sRS, sPO, sOP, sCR, sCG, sTW */
-sIG, sIG, sIG, sIG, sIG, sIG, sIG,
+sIV, sIG, sIG, sIG, sIG, sIG, sIG,
},
[DCCP_PKT_SYNCACK] = {
/*
 * We currently ignore SyncAck packets
 *
*sNO, sRQ, sRS, sPO, sOP, sCR, sCG, sTW */
-sIG, sIG, sIG, sIG, sIG, sIG, sIG,
+sIV, sIG, sIG, sIG, sIG, sIG, sIG,
},
[CT_DCCP_ROLE_SERVER] = {
@@ -371,14 +371,14 @@
* We currently ignore Sync packets
* 
*sNO, sRQ, sRS, sPO, sOP, sCR, sCG, sTW */
-sIG, sIG, sIG, sIG, sIG, sIG, sIG,
+sIV, sIG, sIG, sIG, sIG, sIG, sIG,
},
[DCCP_PKT_SYNCACK] = {
/*
 * We currently ignore SyncAck packets
 */

* *NO, sRQ, sRS, sPO, sOP, sCR, sCG, sTW */
- sIG, sIG, sIG, sIG, sIG, sIG, sIG, sIG,
+ sIV, sIG, sIG, sIG, sIG, sIG, sIG, sIG,
 }
},
};
@@ -712,6 +712,9 @@
unsigned int *timeouts = data;
int i;

+if (!timeouts)
+  timeouts = dn->dccp_timeout;
+
/* set default DCCP timeouts. */
for (i=0; i<CT_DCCP_MAX; i++)
timeouts[i] = dn->dccp_timeout[i];
--- linux-4.15.0.orig/net/netfilter/nf_conntrack_proto_sctp.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_proto_sctp.c
@@ -64,6 +64,8 @@
[SCTP_CONNTRACK_HEARTBEAT_ACKED]= 210 SECS,
};

+#define SCTP_FLAG_HEARTBEAT_VTAG_FAILED 1
+
#define sNO SCTP_CONNTRACK_NONE
#define sCL SCTP_CONNTRACK_CLOSED
#define sCW SCTP_CONNTRACK_COOKIE_WAIT
@@ -316,6 +318,7 @@
struct sctp_chunkhdr _sch;
unsigned long map[256 / sizeof(unsigned long)] = { 0 };
+bool ignore = false;

sh = skb_header_pointer(skb, dataoff, sizeof(_sctph), &_sctph);
if (sh == NULL)
  @ @ -360.15 +363.39 @ @
/* Sec 8.5.1 (D) */
if (sh->vtag != ct->proto.sctp.vtag[dir])
goto out_unlock;
-} else if (sch->type == SCTP_CID_HEARTBEAT ||
-  sch->type == SCTP_CID_HEARTBEAT_ACK) {
+} else if (sch->type == SCTP_CID_HEARTBEAT) {
+if (ct->proto.sctp.vtag[dir] == 0) {
+  pr_debug("Setting %d vtag %x for dir %d\n", sch->type, sh->vtag, dir);
+  ct->proto.sctp.vtag[dir] = sh->vtag;
+} else if (sh->vtag != ct->proto.sctp.vtag[dir]) {
+  if (test_bit(SCTP_CID_DATA, map) || ignore)
goto out_unlock;
+
+ct->proto.sctp.flags |= SCTP_FLAG_HEARTBEAT_VTAG_FAILED;
+ct->proto.sctp.last_dir = dir;
+ignore = true;
+continue;
+} else if (ct->proto.sctp.flags & SCTP_FLAG_HEARTBEAT_VTAG_FAILED) {
+ct->proto.sctp.flags &= ~SCTP_FLAG_HEARTBEAT_VTAG_FAILED;
+}
+} else if (sch->type == SCTP_CID_HEARTBEAT_ACK) {
if (ct->proto.sctp.vtag[dir] == 0) {
pr_debug("Setting vtag %x for dir %d\n", sh->vtag, dir);
ct->proto.sctp.vtag[dir] = sh->vtag;
} else if (sh->vtag != ct->proto.sctp.vtag[dir]) {
-pr_debug("Verification tag check failed\n");
goto out_unlock;
+if (test_bit(SCTP_CID_DATA, map) || ignore)
+goto out_unlock;
+
+if ((ct->proto.sctp.flags & SCTP_FLAG_HEARTBEAT_VTAG_FAILED) == 0 ||
+ ct->proto.sctp.last_dir == dir)
+goto out_unlock;
+
+ct->proto.sctp.flags &= ~SCTP_FLAG_HEARTBEAT_VTAG_FAILED;
+ct->proto.sctp.vtag[dir] = sh->vtag;
+ct->proto.sctp.vtag[!dir] = 0;
+} else if (ct->proto.sctp.flags & SCTP_FLAG_HEARTBEAT_VTAG_FAILED) {
+ct->proto.sctp.flags &= ~SCTP_FLAG_HEARTBEAT_VTAG_FAILED;
+
}

@@ -403,6 +430,10 @@
}
spin_unlock_bh(&ct->lock);

 теле allow but do not refresh timeout */
+if (ignore)
+return NF_ACCEPT;
+
+nf_ct_refresh_acct(ct, ctinfo, skb, timeouts[new_state]);

if (old_state == SCTP_CONNTRACK_COOKIE_ECHOED &&
@@ -628,6 +659,9 @@
struct nf_sctp_net *sn = sctp_pernet(net);
int i;

+if (!timeouts)
+timeouts = sn->timeouts;
+
+ /* set default SCTP timeouts. */
+ for (i=0; i<SCTP_CONNTRACK_MAX; i++)
+ timeouts[i] = sn->timeouts[i];

--- linux-4.15.0.org/net/netfilter/nf_conntrack_proto_tcp.c
+++ linux-4.15.0/net/netfilter/nf_conntrack_proto_tcp.c
@@ -501,6 +501,7 @@
 struct ip_ct_tcp_state *receiver = &state->seen[!dir];
 const struct nf_conntrack_tuple *tuple = &ct->tuplehash[dir].tuple;
 __u32 seq, ack, sack, end, win, swin;
+u16 win_raw;
 s32 receiver_offset;
 bool res, in_recv_win;

@@ -509,7 +510,8 @@
 */
 seq = ntohl(tcph->seq);
 ack = sack = ntohl(tcph->ack_seq);
- win = ntohs(tcph->window);
+ win = win_raw;
+ win = win_raw;
 end = segment_seq_plus_len(seq, skb->len, dataoff, tcph);

if (receiver->flags & IP_CT_TCP_FLAG_SACK_PERM)
@@ -568,13 +570,20 @@
 swin = win << sender->td_scale;
 sender->td_maxwin = (swin == 0 ? 1 : swin);
 sender->td_maxend = end + sender->td_maxwin;
-/*
- * We haven't seen traffic in the other direction yet
- * but we have to tweak window tracking to pass III
- * and IV until that happens.
- */
- if (receiver->td_maxwin == 0)
+ if (receiver->td_maxwin == 0) {
+ /* We haven't seen traffic in the other
+ * direction yet but we have to tweak window
+ * tracking to pass III and IV until that
+ * happens.
+ */
+ receiver->td_end = receiver->td_maxend = sack;
+ } else if (sack == receiver->td_end + 1) {
+ /* Likely a reply to a keepalive.
+ * Needed for III.
+ */
+ receiver->td_end++;
+}
else if ((state->state == TCP_CONNTRACK_SYN_SENT
    && dir == IP_CT_DIR_ORIGINAL)
@@ -684,14 +693,14 @@
    && state->last_seq == seq
    && state->last_ack == ack
-    && state->last_end == end
+    && state->last_end == end
    && state->last_win == win)
+    && state->last_win == win_raw)
state->retrans++;
else {
    state->last_dir = dir;
state->last_seq = seq;
state->last_ack = ack;
state->last_end = end;
-state->last_win = win;
+state->last_win = win_raw;
state->retrans = 0;
}
}
@@ -795,6 +804,12 @@
return tcp_pernet(net)->timeouts;
}

+static bool nf_conntrack_tcp_established(const struct nf_conn *ct)
+{
+    return ct->proto.tcp.state == TCP_CONNTRACK_ESTABLISHED &&
+        test_bit(IPS_ASSURED_BIT, &ct->status);
+}
+
+/* Returns verdict for packet, or -1 for invalid. */
static int tcp_packet(struct nf_conn *ct,
@@ -979,16 +994,38 @@
            const struct sk_buff *skb,
@@ -979,16 +994,38 @@
            break;
    case TCP_CONNTRACK_CLOSE:
        if (index == TCP_RST_SET
-            && (ct->proto.tcp.seen[!dir].flags & IP_CT_TCP_FLAG_MAXACK_SET)
-            && before(ntohl(th->seq), ct->proto.tcp.seen[!dir].td_maxack)) {
-            /* Invalid RST */
-            spin_unlock_bh(&ct->lock);
-            nf_ct_l4proto_log_invalid(skb, ct, "invalid rst");
-            return -NF_ACCEPT;
+            break;
+            if (index != TCP_RST_SET)
+            break;
+        

if (ct->proto.tcp.seen[!dir].flags & IP_CT_TCP_FLAG_MAXACK_SET) {
  u32 seq = ntohl(th->seq);
  if (before(seq, ct->proto.tcp.seen[!dir].td_maxack)) {
    /* Invalid RST */
    spin_unlock_bh(&ct->lock);
    nf_ct_l4proto_log_invalid(skb, ct, "invalid rst");
    return -NF_ACCEPT;
  }
  /* Check if rst is part of train, such as
   *   foo:80 > bar:4379: P, 235946583:235946602(19) ack 42
   *   foo:80 > bar:4379: R, 235946602:235946602(0)  ack 42
   */
  if (ct->proto.tcp.last_index == TCP_ACK_SET &&
      ct->proto.tcp.last_dir == dir &&
      seq == ct->proto.tcp.last_end)
    break;
  /* ... RST sequence number doesn't match exactly, keep
     established state to allow a possible challenge ACK.
   */
  new_state = old_state;
}
- if (index == TCP_RST_SET
-   && ((test_bit(IPS_SEEN_REPLY_BIT, &ct->status)
-     && ct->proto.tcp.last_index == TCP_SYN_SET)
-     || (!test_bit(IPS_ASSURED_BIT, &ct->status)
-       && ct->proto.tcp.last_index == TCP_ACK_SET))
  goto in_window;
/* segments we ignored. */
/* Just fall through */
break;
default:
/* Keep compilers happy. */
break;
if (ct->proto.tcp.retrans >= tn->tcp_max_retrans &&
    timeouts[new_state] > timeouts[TCP_CONNTRACK_RETRANS])
timeout = timeouts[TCP_CONNTRACK_RETRANS];
else if (unlikely(index == TCP_RST_SET))
timeout = timeouts[TCP_CONNTRACK_CLOSE];
else if ((ct->proto.tcp.seen[0].flags | ct->proto.tcp.seen[1].flags) &
    IP_CT_TCP_FLAG_DATA_UNACKNOWLEDGED &&
    timeouts[new_state] > timeouts[TCP_CONNTRACK_UNACK])
/* TCP SACK sequence number adjustment */
static unsigned int nf_ct_sack_adjust(struct sk_buff *skb,
    unsigned int protoff,
    struct tcphdr *tcph,
    struct nf_conn *ct,
    enum ip_conntrack_info ctinfo)
{
    unsigned int dir, optoff, optend;
    struct tcphdr *tcph = (void *)skb->data + protoff;
    struct nf_conn_seqadj *seqadj = nfct_seqadj(ct);
    unsigned int dir, optoff, optend;
    optoff = protoff + sizeof(struct tcphdr);
    optend = protoff + tcph->doff * 4;
    if (!skb_make_writable(skb, optend))
        return 0;
    optoff = protoff + sizeof(struct tcphdr);
    optend = protoff + tcph->doff * 4;
    if (!skb_make_writable(skb, optend))
        return 0;
    tcph = (void *)skb->data + protoff;
    dir = CTINFO2DIR(ctinfo);
    while (optoff < optend) {
        ntohl(newack));
        tcph->ack_seq = newack;
        -res = nf_ct_sack_adjust(skb, protoff, tcph, ct, ctinfo);
        +res = nf_ct_sack_adjust(skb, protoff, ct, ctinfo);
        out:
        spin_unlock_bh(&ct->lock);
    }

    return "unknown";
@@ -399,7 +400,7 @@
    *pos = cpu + 1;
    return per_cpu_ptr(net->ct.stat, cpu);
 }
-    +(*pos)++;
    return NULL;
 }

@@ -537,6 +538,9 @@
 {  
     int ret;

+    /* module_param hashsize could have changed value */
+    nf_conntrack_h table_size_user = nf_conntrack_h table_size;
+    ret = proc_dointvec(table, write, buffer, lenp, ppos);
    if (ret < 0 || !write)
        return ret;
@@ -627,8 +631,11 @@
     if (net->user_ns != &init_user_ns)
         table[0].procname = NULL;
     if (!net_eq(&init_net, net)) {
+         table[0].mode = 0444;
+         table[2].mode = 0444;
+         table[5].mode = 0444;
+     }
     net->ct.sysctl_header = register_net_sysctl(net, "net/netfilter", table);
     if (!net->ct.sysctl_header)
         --- linux-4.15.0.orig/net/netfilter/nf_dup_netdev.c
     +++ linux-4.15.0/net/netfilter/nf_dup_netdev.c
@@ -21,6 +21,7 @@
     skb_push(skb, skb->mac_len);
     skb->dev = dev;
+     skb->tstamp = 0;
     dev_queue_xmit(skb);
 }

--- linux-4.15.0.orig/net/netfilter/nf_log.c
+++ linux-4.15.0/net/netfilter/nf_log.c
@@ -440,6 +440,10 @@
     if (write) {
         struct ctl_table tmp = *table;

@@ -399,7 +400,7 @@
    *pos = cpu + 1;
    return per_cpu_ptr(net->ct.stat, cpu);
 }
-    +(*pos)++;
    return NULL;
 }

@@ -537,6 +538,9 @@
 {  
     int ret;

+    /* module_param hashsize could have changed value */
+    nf_conntrack_h table_size_user = nf_conntrack_h table_size;
+    ret = proc_dointvec(table, write, buffer, lenp, ppos);
    if (ret < 0 || !write)
        return ret;
@@ -627,8 +631,11 @@
     if (net->user_ns != &init_user_ns)
         table[0].procname = NULL;
     if (!net_eq(&init_net, net)) {
+         table[0].mode = 0444;
+         table[2].mode = 0444;
+         table[5].mode = 0444;
+     }
     net->ct.sysctl_header = register_net_sysctl(net, "net/netfilter", table);
     if (!net->ct.sysctl_header)
         --- linux-4.15.0.orig/net/netfilter/nf_dup_netdev.c
     +++ linux-4.15.0/net/netfilter/nf_dup_netdev.c
@@ -21,6 +21,7 @@
     skb_push(skb, skb->mac_len);
     skb->dev = dev;
+     skb->tstamp = 0;
     dev_queue_xmit(skb);
 }

--- linux-4.15.0.orig/net/netfilter/nf_log.c
+++ linux-4.15.0/net/netfilter/nf_log.c
@@ -440,6 +440,10 @@
     if (write) {
         struct ctl_table tmp = *table;
+/* proc_dostring() can append to existing strings, so we need to
+ * initialize it as an empty string.
+ */
+buf[0] = '\0';
tmp.data = buf;
r = proc_dostring(&tmp, write, buffer, lenp, ppos);
if (r)
@@ -458,14 +462,17 @@
rcu_assign_pointer(net->nf.nf_loggers[tindex], logger);
mutex_unlock(&nf_log_mutex);
} else {
+struct ctl_table tmp = *table;
+
+tmp.data = buf;
mutex_lock(&nf_log_mutex);
logger = nft_log_dereference(net->nf.nf_loggers[tindex]);
if (!logger)
-table->data = "NONE";
+strlcpy(buf, "NONE", sizeof(buf));
else
-table->data = logger->name;
-r = proc_dostring(table, write, buffer, lenp, ppos);
+strlcpy(buf, logger->name, sizeof(buf));
mutex_unlock(&nf_log_mutex);
+r = proc_dostring(&tmp, write, buffer, lenp, ppos);
}
return r;
--- linux-4.15.0.orig/net/netfilter/nf_log_common.c
+++ linux-4.15.0/net/netfilter/nf_log_common.c
@@ -175,6 +175,18 @@
}
EXPORT_SYMBOL_GPL(nf_log_dump_packet_common);
+void nf_log_dump_vlan(struct nf_log_buf *m, const struct sk_buff *skb)
+{
+u16 vid;
+
+if (!skb_vlan_tag_present(skb))
+return;
+
+vid = skb_vlan_tag_get(skb);
+nf_log_buf_add(m, "VPROTO=%04x VID=%u ", ntohs(skb->vlan_proto), vid);
+}
+EXPORT_SYMBOL_GPL(nf_log_dump_vlan);
+
/* bridge and netdev logging families share this code. */
void nf_log_l2packet(struct net *net, u_int8_t pf,

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__be16 protocol,
--- linux-4.15.0.orig/net/netfilter/nf_nat_core.c
+++ linux-4.15.0/net/netfilter/nf_nat_core.c
@@ -97,7 +97,8 @@
dst = skb_dst(skb);
if (dst->xfrm)
    dst = ((struct xfrm_dst *)dst)->route;
-dst_hold(dst);
+if (!dst_hold_safe(dst))
+    return -EHOSTUNREACH;
    dst = xfrm_lookup(net, dst, &fl, skb->sk, 0);
if (IS_ERR(dst))
--- linux-4.15.0.orig/net/netfilter/nf_nat_proto_common.c
+++ linux-4.15.0/net/netfilter/nf_nat_proto_common.c
@@ -41,7 +41,7 @@
    u16 *rover)
{
    -unsigned int range_size, min, i;
    +unsigned int range_size, min, max, i;
    __be16 *portptr;
    u_int16_t off;

@@ -71,7 +71,10 @@
} else {
    min = ntohs(range->min_proto.all);
    -range_size = ntohs(range->max_proto.all) - min + 1;
    +max = ntohs(range->max_proto.all);
    +if (unlikely(max < min))
    +swap(max, min);
    +range_size = max - min + 1;
    }

if (range->flags & NF_NAT_RANGE_PROTO_RANDOM) {
--- linux-4.15.0.orig/net/netfilter/nf_nat_proto_udp.c
+++ linux-4.15.0/net/netfilter/nf_nat_proto_udp.c
@@ -66,15 +66,14 @@
    enum nf_nat_manip_type maniptype)
{
    struct udphdr *hdr;
    -bool do_csum;

    if (!skb_make_writable(skb, hdroff + sizeof(*hdr)))
        return false;

    hdr = (struct udphdr *)(skb->data + hdroff);
- do_csum = hdr->check || skb->ip_summed == CHECKSUM_PARTIAL;
+ __udp_manip_pkt(skb, l3proto, iphdroff, hdr, tuple, maniptype, 
+ !!hdr->check);

- __udp_manip_pkt(skb, l3proto, iphdroff, hdr, tuple, maniptype, do_csum);
return true;
}

--- linux-4.15.0.orig/net/netfilter/nf_nat_sip.c
+++ linux-4.15.0/net/netfilter/nf_nat_sip.c
@@ -18,6 +18,7 @@
#include <net/netfilter/nf_nat.h>
#include <net/netfilter/nf_nat_helper.h>
+ #include <net/netfilter/nf_conntrack_core.h>
#include <net/netfilter/nf_conntrack_helper.h>
#include <net/netfilter/nf_conntrack_expect.h>
#include <net/netfilter/nf_conntrack_seqadj.h>
@@ -316,6 +317,9 @@
static void nf_nat_sip_expected(struct nf_conn *ct, 
struct nf_conntrack_expect *exp) 
{
+ struct nf_conn_help *help = nfct_help(ct->master);
+ struct nf_conntrack_expect *pair_exp;
+ int range_set_for_snat = 0;
+ struct nf_nat_range range;

/* This must be a fresh one. */
@@ -327,15 +331,42 @@
range.min_addr = range.max_addr = exp->saved_addr;
nf_nat_setup_info(ct, &range, NF_NAT_MANIP_DST);
-/* Change src to where master sends to, but only if the connection
- * actually came from the same source. */
- if (nf_inet_addr_cmp(&ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple.src.u3, 
+/* Do media streams SRC manip according with the parameters
+ * found in the paired expectation.
+ * found in the paired expectation.
+ */
+ if (exp->class != SIP_EXPECT_SIGNALLING) 
+ spin_lock_bh(&nf_conntack_expect_lock);
+ hlist_for_each_entry(pair_exp, &help->expectations, lnode) 
+ if (pair_exp->tuple.src.l3num == nf_ct_l3num(ct) &&
+ + pair_exp->tuple.dst.protonum == ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple.dst.protonum &&
+ + nf_inet_addr_cmp(&ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple.src.u3, &pair_exp->saved_addr) &&
+ + ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple.src.u.all == pair_exp->saved_proto.all) 
+ +range.flags = (NF_NAT_RANGE_MAP_IPS | NF_NAT_RANGE_PROTO_SPECIFIED);
+range.min_proto.all = range.max_proto.all = pair_exp->saved_proto.all; 
+range.min_addr = range.max_addr = pair_exp->tuple.dst.u3;
/* When no paired expectation has been found, change src to
+ * where master sends to, but only if the connection actually came
+ * from the same source.
+ */
+ if (!range_set_for_snat &&
+     nf_inet_addr_cmp(&ct->tuplehash[IP_CT_DIR_ORIGINAL].tuple.src.u3,
+                    &ct->master->tuplehash[exp->dir].tuple.src.u3)) {
range.flags = NF_NAT_RANGE_MAP_IPS;
range.min_addr = range.max_addr
    = ct->master->tuplehash[exp->dir].tuple.dst.u3;
-     nf_nat_setup_info(ct, &range, NF_NAT_MANIP_SRC);
+     range_set_for_snat = 1;
}
+
+/* Perform SRC manip. */
+ if (range_set_for_snat)
+     nf_nat_setup_info(ct, &range, NF_NAT_MANIP_SRC);
}

static unsigned int nf_nat_sip_expect(struct sk_buff *skb, unsigned int protoff,
--- linux-4.15.0.orig/net/netfilter/nf_queue.c
+++ linux-4.15.0/net/netfilter/nf_queue.c
@@ -138,6 +138,11 @@
goto err;
}
+    if (skb_dst(skb) && !skb_dst_force(skb)) {
+        status = -ENETDOWN;
+        goto err;
+    }
+    *entry = (struct nf_queue_entry) {
+        .skb = skb,
+        .state = *state,
+        @@ -146,7 +151,6 @@
+    afinfo->saveroute(skb, entry);
status = qh->outfn(entry, queuenum);
repeat:
verdict = nf_hook_entry_hookfn(hook, skb, state);
if (verdict != NF_ACCEPT) {
    *index = i;
if (verdict != NF_REPEAT)
    return verdict;
goto repeat;
--- linux-4.15.0.orig/net/netfilter/nf_synproxy_core.c
+++ linux-4.15.0/net/netfilter/nf_synproxy_core.c
@@ -34,6 +34,9 @@
    int length = (th->doff * 4) - sizeof(*th);
u8 buf[40], *ptr;
    if (unlikely(length < 0))
    return false;
+    ptr = skb_header_pointer(skb, doff + sizeof(*th), length, buf);
if (ptr == NULL)
    return false;
@@ -50,6 +53,8 @@
    length--;
    continue;
default:
    if (length < 2)
    return true;
    opsize = *ptr++;
if (opsize < 2)
    return true;
@@ -273,7 +278,7 @@
    *pos = cpu + 1;
    return per_cpu_ptr(snet->stats, cpu);
}
+(*pos)+=1;
    return NULL;
}

--- linux-4.15.0.orig/net/netfilter/nf_tables_api.c
+++ linux-4.15.0/net/netfilter/nf_tables_api.c
@@ -220,6 +220,46 @@
    return err;
}
/* either expr ops provide both activate/deactivate, or neither */
+static bool nft_expr_check_ops(const struct nft_expr_ops *ops)
+{
+    repeat:
verdict = nf_hook_entry_hookfn(hook, skb, state);
if (verdict != NF_ACCEPT) {
    *index = i;
if (verdict != NF_REPEAT)
    return verdict;
goto repeat;
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if (ptr == NULL)
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if (ptr == NULL)
    return false;
@@ -50,6 +53,8 @@
    length--;
    continue;
default:
    if (length < 2)
    return true;
    opsize = *ptr++;
if (opsize < 2)
    return true;
@@ -273,7 +278,7 @@
    *pos = cpu + 1;
    return per_cpu_ptr(snet->stats, cpu);
}
+(*pos)+=1;
    return NULL;
}

--- linux-4.15.0.orig/net/netfilter/nf_tables_api.c
+++ linux-4.15.0/net/netfilter/nf_tables_api.c
@@ -220,6 +220,46 @@
    return err;
}
/* either expr ops provide both activate/deactivate, or neither */
+static bool nft_expr_check_ops(const struct nft_expr_ops *ops)
+{
+    repeat:
verdict = nf_hook_entry_hookfn(hook, skb, state);
if (verdict != NF_ACCEPT) {
    *index = i;
if (verdict != NF_REPEAT)
    return verdict;
goto repeat;
+if (!ops)
+return true;
+
+if (WARN_ON_ONCE((!ops->activate ^ !ops->deactivate)))
+return false;
+
+return true;
+
+static void nft_rule_expr_activate(const struct nft_ctx *ctx,
+    struct nft_rule *rule)
+{
+    struct nft_expr *expr;
+    expr = nft_expr_first(rule);
+    while (expr != nft_expr_last(rule) && expr->ops) {
+        if (expr->ops->activate)
+            expr->ops->activate(ctx, expr);
+        expr = nft_expr_next(expr);
+    }
+
+    static void nft_rule_expr_deactivate(const struct nft_ctx *ctx,
+        struct nft_rule *rule)
+    {
+        struct nft_expr *expr;
+        expr = nft_expr_first(rule);
+        while (expr != nft_expr_last(rule) && expr->ops) {
+            if (expr->ops->deactivate)
+                expr->ops->deactivate(ctx, expr);
+            expr = nft_expr_next(expr);
+        }
+
static int
    nf_tables_delrule_deactivate(struct nft_ctx *ctx, struct nft_rule *rule)
    {
        nft_trans_destroy(trans);
        return err;
    }

    return 0;
}
int err;

list_for_each_entry(rule, &ctx->chain->rules, list) {
    if (!nft_is_active_next(ctx->net, rule))
        continue;
    err = nft_delrule(ctx, rule);
    if (err < 0)
        return err;
}

static void nf_tables_table_destroy(struct nft_ctx *ctx)
{
    if (WARN_ON(ctx->table->use > 0))
        return;
    kfree(ctx->table->name);
    kfree(ctx->table);
}

static void nf_tables_chain_destroy(struct nft_ctx *ctx)
{
    BUG_ON(ctx->chain->use > 0);
    if (WARN_ON(ctx->chain->use > 0))
        return;
    kfree(ctx->chain->name);
    kfree(ctx->chain);
}
return err;
}
@@ -1237,13 +1282,16 @@
rcu_assign_pointer(chain->stats, newstats);
synchronize_rcu();
free_percpu(oldstats);
-} else
+} else {
rcu_assign_pointer(chain->stats, newstats);
+static_branch_inc(&nft_counters_enabled);
+
}
}

static void nf_tables_chain_destroy(struct nft_chain *chain)
{
-BUG_ON(chain->use > 0);
+if (WARN_ON(chain->use > 0))
+return;

if (nft_is_base_chain(chain)) {
 struct nft_base_chain *basechain = nft_base_chain(chain);
-@@ -1449,7 +1497,6 @@
 struct nft_base_chain *basechain;
 struct nft_stats *stats = NULL;
 struct nft_chain_hook hook;
-const struct nlattr *name;
 struct nf_hook_ops *ops;
 struct nft_trans *trans;
 int err, i;
-@@ -1500,12 +1547,11 @@
 return PTR_ERR(stats);
 }

+err = -ENOMEM;
trans = nft_trans_alloc(ctx, NFT_MSG_NEWCHAIN,
sizeof(struct nft_trans_chain));
-if (trans == NULL) {
- free_percpu(stats);
- return -ENOMEM;
-}
+if (trans == NULL)
+goto err;

nft_trans_chain_stats(trans) = stats;
nft_trans_chain_update(trans) = true;
-@@ -1515,19 +1561,37 @@
else
 nft_trans_chain_policy(trans) = -1;


-name = nla[NFTA_CHAIN_NAME];

-if (nla[NFTA_CHAIN_HANDLE] && name) {
-   -nft_trans_chain_name(trans) =
-   -nla_strdup(name, GFP_KERNEL);
-   -if (!nft_trans_chain_name(trans)) {
-       -kfree(trans);
-       -free_percpu(stats);
-       -return -ENOMEM;
+   +if (nla[NFTA_CHAIN_HANDLE] &&
+       +nla[NFTA_CHAIN_NAME]) {
+       +struct nft_trans *tmp;
+       +char *name;
+       +
+       +err = -ENOMEM;
+       +name = nla_strdup(nla[NFTA_CHAIN_NAME], GFP_KERNEL);
+       +if (!name)
+           +goto err;
+       +
+       +err = -EEXIST;
+       +list_for_each_entry(tmp, &ctx->net->nft.commit_list, list) {
+           +if (tmp->msg_type == NFT_MSG_NEWCHAIN &&
+               +tmp->ctx.table == table &&
+               +nft_trans_chain_update(tmp) &&
+               +nft_trans_chain_name(tmp) &&
+               +strcmp(name, nft_trans_chain_name(tmp)) == 0) {
+               +kfree(name);
+               +goto err;
+           +}
+       }
+   +nft_trans_chain_name(trans) = name;
+} list_add_tail(&trans->list, &ctx->net->nft.commit_list);

   return 0;
+err:
+   +free_percpu(stats);
+   +kfree(trans);
+   +return err;
}

static int nf_tables_newchain(struct net *net, struct sock *nlsk,
@@ -1674,6 +1738,9 @@

int nft_register_expr(struct nft_expr_type *type)
{
     +if (!nft_expr_check_ops(type->ops))
nfnl_lock(NFNL_SUBSYS_NFTABLES);
if (type->family == NFPROTO_UNSPEC)
list_add_tail_rcu(&type->list, &nf_tables_expressions);
err = PTR_ERR(ops);
goto err1;
}
if (!nft_expr_check_ops(ops)) {
err = -EINVAL;
goto err1;
}
} else
ops = type->ops;
static void nf_tables_expr_destroy(const struct nft_ctx *ctx,
struct nft_expr *expr)
{
const struct nft_expr_type *type = expr->ops->type;
if (expr->ops->destroy)
expr->ops->destroy(ctx, expr);
-module_put(expr->ops->type->owner);
+module_put(type->owner);
}
struct nft_expr *nft_expr_init(const struct nft_ctx *ctx,
[@ -1940,11 +2020,7 @@
]NFTA_RULE_POSITION= { .type = NLA_U64 },
]NFTA_RULE_USERDATA= { .type = NLA_BINARY,
.len = NFT_USERDATA_MAXLEN },
+[NFTA_RULE_ID]= { .type = NLA_U32 },
};
static int nf_tables_fill_rule_info(struct sk_buff *skb, struct net *net,
[@ -2266,11 +2366,11 @@
nlh->nlmsg_seq, NFT_MSG_NEWRULE, 0,
.family, table, chain, rule);
if (err < 0)
-goto err;
+goto err_fill_rule_info;
-return nlmsg_unicast(nlsk, skb2, NETLINK_CB(skb).portid);
+return nfnetlink_unicast(skb2, net, NETLINK_CB(skb).portid);
-err:
+err_fill_rule_info:
  kfree_skb(skb2);
  return err;
}
@@ -2204,7 +2278,7 @@
static void nf_tables_rule_destroy(const struct nft_ctx *ctx,
    struct nft_rule *rule)
{
  struct nft_expr *expr;
  +struct nft_expr *expr, *next;

  /*
   * Careful: some expressions might not be initialized in case this
   @ @ -2212,12 +2286,20 @@ */
   expr = nft_expr_first(rule);
   while (expr != nft_expr_last(rule) && expr->ops) {
     +next = nft_expr_next(expr);
     nf_tables_expr_destroy(ctx, expr);
     -expr = nft_expr_next(expr);
     +expr = next;
   }
   kfree(rule);
}

+static void nf_tables_rule_release(const struct nft_ctx *ctx,
+    struct nft_rule *rule)
+{
+  +nft_rule_expr_deactivate(ctx, rule);
+  +nf_tables_rule_destroy(ctx, rule);
+}
+
+  #define NFT_RULE_MAXEXPRS128

static struct nft_expr_info *info;
@@ -2276,16 +2358,13 @@
if (chain->use == UINT_MAX)
  return -EOVERFLOW;
-}

-#if (nl[nFTA_RULE_POSITION]) {
-  -if (!((nlh->nlmsg_flags & NLM_F_CREATE))
-    -return -EOPNOTSUPP;
-  -pos_handle = be64_to_cpu(nla_get_be64(nla[nFTA_RULE_POSITION]));
-  -old_rule = __nf_tables_rule_lookup(chain, pos_handle);
-  -if (IS_ERR(old_rule))
-    -kfree_skb(skb);
-    -return err;
return PTR_ERR(old_rule);
+
if (nla[NFTA_RULE_POSITION]) {
+	pos_handle = be64_to_cpu(nla_get_be64(nla[NFTA_RULE_POSITION]));
+
old_rule = __nf_tables_rule_lookup(chain, pos_handle);
+
if (IS_ERR(old_rule))
+
return PTR_ERR(old_rule);
+
}
}

nft_ctx_init(&ctx, net, skb, nlh, afi, table, chain, nla);
@@ -2344,43 +2423,41 @@
}
if (nlh->nlmsg_flags & NLM_F_REPLACE) {
-
-if (nft_is_active_next(net, old_rule)) {
-
-trans = nft_trans_rule_add(&ctx, NFT_MSG_DELRULE,
-   - old_rule);
-
-if (trans == NULL) {
-
-err = -ENOMEM;
-
goto err2;
-
}
-
-nft_deactivate_next(net, old_rule);

-chain->use--;
-
-list_add_tail_rcu(&rule->list, &old_rule->list);
-
} else {
-
-err = -ENOENT;
+
-trans = nft_trans_rule_add(&ctx, NFT_MSG_NEWRULE, rule);
+
-if (trans == NULL) {
+
-err = -ENOMEM;
+
goto err2;
+
}
+
+err = nft_delrule(&ctx, old_rule);
+
-if (err < 0) {
+
+nft_trans_destroy(trans);

goto err2;
+
}
-
} else if (nlh->nlmsg_flags & NLM_F_APPEND)
-
-if (old_rule)
-
-list_add_rcu(&rule->list, &old_rule->list);

-else
-
-list_add_tail_rcu(&rule->list, &chain->rules);
-else {
-
-if (old_rule)
-
-list_add_tail_rcu(&rule->list, &old_rule->list);

-else
-
-list_add_rcu(&rule->list, &chain->rules);
-
}
if (nft_trans_rule_add(&ctx, NFT_MSG_NEWRULE, rule) == NULL) {
    err = -ENOMEM;
    goto err3;
+    list_add_tail_rcu(&rule->list, &old_rule->list);
} else {
+        if (nft_trans_rule_add(&ctx, NFT_MSG_NEWRULE, rule) == NULL) {
+            err = -ENOMEM;
+            goto err2;
        }
        +
        +        if (nlh->nlmsg_flags & NLM_F_APPEND) {
+            if (old_rule)
+                list_add_rcu(&rule->list, &old_rule->list);
+        else
+            list_add_tail_rcu(&rule->list, &chain->rules);
+    } else {
+        if (old_rule)
+            list_add_tail_rcu(&rule->list, &old_rule->list);
+        else
+            list_add_rcu(&rule->list, &chain->rules);
+    }
}  
chain->use++;
return 0;

err3:
-list_del_rcu(&rule->list);
err2:
-nf_tables_rule_destroy(&ctx, rule);
+nf_tables_rule_release(&ctx, rule);
err1:
    for (i = 0; i < n; i++) {
        if (info[i].ops != NULL)
@@ -2661,12 +2738,13 @@
            u32 id = ntohl(nla_get_be32(nla));

            list_for_each_entry(trans, &net->nft.commit_list, list) {
                struct nft_set *set = nft_trans_set(trans);
                +if (trans->msg_type == NFT_MSG_NEWSET) {
                +    struct nft_set *set = nft_trans_set(trans);
                +    if (trans->msg_type == NFT_MSG_NEWSET &&
                +        id == nft_trans_set_id(trans) &&
                +        nft_active_genmask(set, genmask))
                -        return set;
                +        return set;
            }
        }
    }get_be32(nla));

    list_for_each_entry(trans, &net->nft.commit_list, list) {
        struct nft_set *set = nft_trans_set(trans);
        +if (trans->msg_type == NFT_MSG_NEWSET) {
        +    struct nft_set *set = nft_trans_set(trans);
        +    if (trans->msg_type == NFT_MSG_NEWSSETT &&
        +        id == nft_trans_set_id(trans) &&
        +        nft_active_genmask(set, genmask))
        -        return set;
        +        return set;
+\}
+return ERR_PTR(-ENOENT);
+\}
@@ -2800,7 +2878,8 @@
goto nla_put_failure;
+\}

-if (nla_put(skb, NFTA_SET_USERDATA, set->udlen, set->udata))
+if (set->udata &&
+    nla_put(skb, NFTA_SET_USERDATA, set->udlen, set->udata))
goto nla_put_failure;

desc = nla_nest_start(skb, NFTA_SET_DESC);
@@ -2972,11 +3051,11 @@
ero = nf_tables_fill_set(skb2, &ctx, set, NFT_MSG_NEWSET, 0);
+    goto err_fill_set_info;
-if (err < 0)
-goto err;
+return nfnetlink_unicast(skb2, net, NETLINK_CB(skb).portid);

-err:
+return err_fill_set_info:
-kfree_skb(skb2);
+return err;
    }
@@ -3047,10 +3126,13 @@
+NFT_SET_INTERVAL | NFT_SET_TIMEOUT |
+NFT_SET_MAP | NFT_SET_EVAL |
+NFT_SET_OBJECT))
-return -EINVAL;
+return -EOPNOTSUPP;
/* Only one of these operations is supported */
-if ((flags & (NFT_SET_MAP | NFT_SET_EVAL | NFT_SET_OBJECT)) ==
-se (NFT_SET_MAP | NFT_SET_EVAL | NFT_SET_OBJECT))
+if ((flags & (NFT_SET_MAP | NFT_SET_EVAL | NFT_SET_OBJECT)) ==
+    (NFT_SET_MAP | NFT_SET_EVAL | NFT_SET_OBJECT))
+return -EOPNOTSUPP;
+if ((flags & (NFT_SET_EVAL | NFT_SET_OBJECT)) ==
+    (NFT_SET_EVAL | NFT_SET_OBJECT))
return -EOPNOTSUPP;
+}

@@ -3082,7 +3164,7 @@
objtype = ntohl(nla_get_be32(nla[NFTA_SET_OBJ_TYPE]));
if (objtype == NFT_OBJECT_UNSPEC ||
    objtype > NFT_OBJECT_MAX)
    return -EINVAL;
+    return -EOPNOTSUPP;
} else if (flags & NFT_SET_OBJECT)
    return -EINVAL;
else
@@ -3191,18 +3273,20 @@
    err = ops->init(set, &desc, nla);
    if (err < 0)
        -goto err2;
        +goto err3;
    err = nft_trans_set_add(&ctx, NFT_MSG_NEWSET, set);
    if (err < 0)
        -goto err3;
        +goto err4;
    list_add_tail_rcu(&set->list, &table->sets);
    table->use++;
    return 0;

-err3:
+err4:
    ops->destroy(set);
+err3:
    +kfree(set->name);
    err2:
    kvfree(set);
err1:
@@ -3362,6 +3446,8 @@
[NFTA_SET_ELEM_TIMEOUT] = { .type = NLA_U64 },
[NFTA_SET_ELEM_USERDATA] = { .type = NLA_BINARY,
    .len = NFT_USERDATA_MAXLEN },
+[NFTA_SET_ELEM_EXPR] = { .type = NLA_NESTED },
+[NFTA_SET_ELEM_OBJREF] = { .type = NLA_STRING },
];

static const struct nla_policy nft_set_elem_list_policy[NFTA_SET_ELEM_LIST_MAX + 1] = {
@@ -3679,8 +3765,10 @@
    return err;

    err = -EINVAL;
-    if (desc.type != NFT_DATA_VALUE || desc.len != set->klen)
+    if (desc.type != NFT_DATA_VALUE || desc.len != set->klen) {
+        nft_data_release(&elem.key.val, desc.type);
        return err;
+    }

priv = set->ops->get(ctx->net, set, &elem, flags);
if (IS_ERR(priv))
    return -ENOMEM;
skb = nlmsg_new(NLMSG_GOODSIZE, GFP_KERNEL);
if (skb == NULL)
    return err;
err = nf_tables_fill_setelem_info(skb, ctx, ctx->seq, ctx->portid,
    NFT_MSG_NEWSETELEM, 0, set, &elem);
if (err < 0)
    return err2;
err_fill_setelem:
kfree_skb(skb);
err1:
    return err == -EAGAIN ? -ENOBUFS : err;
}

static int nf_tables_getsetelem(struct net *net, struct sock *nlsk,
@@ -3902,14 +3984,20 @@
    )
    return -EINVAL;
} else {
    if (nla[NFTA_SET_ELEM_DATA] != NULL)
        return -EINVAL;
    }
+if ((flags & NFT_SET_ELEM_INTERVAL_END) &&
+    (nla[NFTA_SET_ELEM_DATA] ||

timeout = 0;
if (nla[NFTA_SET_ELEM_TIMEOUT] != NULL) {
    if (!(set->flags & NFT_SET_TIMEOUT))
        timeout = 0;
if (nft_set_ext_exists(ext, NFT_SET_EXT_DATA) ^
    nft_set_ext_exists(ext2, NFT_SET_EXT_DATA) ||
    nft_set_ext_exists(ext, NFT_SET_EXT_OBJREF) ^
    nft_set_ext_exists(ext2, NFT_SET_EXT_OBJREF)) {
    err = -EBUSY;
    goto err5;
} 
if ((nft_set_ext_exists(ext, NFT_SET_EXT_DATA) &&
    nft_set_ext_exists(ext2, NFT_SET_EXT_DATA) &&
    memcmp(nft_set_ext_data(ext),
    nft_set_ext_data(ext2), NFTA_SET_ELEM_DATA)) == 0) {
    kfree(trans);
    err4: +if (obj)
    +obj->use--;
    kfree(elem.priv);
    err3:
    if (nla[NFTA_SET_ELEM_DATA] != NULL)
        goto err3; /*NFT_GOTO verdicts. This function must be called on active data objects
    *from the second phase of the commit protocol.
    */
    -static void nft_data_hold(const struct nft_data *data, enum nft_data_types type)
    +void nft_data_hold(const struct nft_data *data, enum nft_data_types type)
    { if (type == NFT_DATA_VERDICT) {
        switch (data->verdict.code) {
            @ @ -4252,6 +4344,7 @@
        }
    } set->ndeact++;

    +nft_set_elem_deactivate(ctx->net, set, elem);
    nft_trans_elem_set(trans) = set;
    nft_trans_elem(trans) = *elem;
list_add_tail(&trans->list, &ctx->net->nft.commit_list);
@@ -4633,7 +4726,7 @@
     if (idx > s_idx)
     memset(&cb->args[1], 0,
             sizeof(cb->args) - sizeof(cb->args[0]));
-    if (filter && filter->table[0] &&
+    if (filter && filter->table &&
         strcmp(filter->table, table->name))
        goto cont;
    if (filter &
@@ -4758,10 +4851,11 @@
         family, table, obj, reset);
     if (err < 0)
        goto err;
     goto err_fill_obj_info;
 
 return nlmsg_unicast(nlsk, skb2, NETLINK_CB(skb).portid);
-err:
+err_fill_obj_info:
    kfree_skb(skb2);
    return err;
 }
@@ -4925,10 +5019,11 @@
 err = nf_tables_fill_gen_info(skb2, net, NETLINK_CB(skb).portid,
         nlh->nlmsg_seq);
     if (err < 0)
-    goto err;
+    goto err_fill_gen_info;
 
 return nlmsg_unicast(nlsk, skb2, NETLINK_CB(skb).portid);
-err:
+err_fill_gen_info:
    kfree_skb(skb2);
    return err;
 }
@@ -5039,7 +5134,7 @@
 struct nft_base_chain *basechain;

 if (nft_trans_chain_name(trans))
-    strcpy(trans->ctx.chain->name, nft_trans_chain_name(trans));
+    swap(trans->ctx.chain->name, nft_trans_chain_name(trans));
 
 if (!nft_is_base_chain(trans->ctx.chain)
return;
@@ -5061,6 +5156,9 @@
case NFT_MSG_DELTABLE:
fći_tables_table_destroy(&trans->ctx);
break;
+case NFT_MSG_NEWCHAIN:
+kfree(nft_trans_chain_name(trans));
+break;
case NFT_MSG_DELCHAIN:
fći_tables_chain_destroy(trans->ctx.chain);
break;
@@ -5118,13 +5216,15 @@
fći_tables_table_notify(&trans->ctx, NFT_MSG_DELTABLE);
break;
case NFT_MSG_NEWCHAIN:
-if (nft_trans_chain_update(trans))
+if (nft_trans_chain_update(trans)) {
  nft_chain_commit_update(trans);
-else
-+nft_tables_chain_notify(&trans->ctx, NFT_MSG_NEWCHAIN);
-/* trans destroyed after rcu grace period */
+} else {
  nft_clear(net, trans->ctx.chain);
-  -nft_tables_chain_notify(&trans->ctx, NFT_MSG_NEWCHAIN);
-  -nft_trans_destroy(trans);
  +nft_tables_chain_notify(&trans->ctx, NFT_MSG_NEWCHAIN);
  +nft_trans_destroy(trans);
+}
break;
case NFT_MSG_DELCHAIN:
list_del_rcu(&trans->ctx.chain->list);
@@ -5264,7 +5364,7 @@
case NFT_MSG_NEWCHAIN:
-if (nft_trans_chain_update(trans)) {
  free_percpu(nft_trans_chain_stats(trans));
-  +kfree(nft_trans_chain_name(trans));
  nft_trans_destroy(trans);
 } else {
trans->ctx.table->use--;
@@ -5283,10 +5383,12 @@
case NFT_MSG_NEWRULE:
trans->ctx.chain->use--;
list_del_rcu(&nft_trans_rule(trans)->list);
+nft_rule_expr_deactivate(&trans->ctx, nft_trans_rule(trans));
break;
case NFT_MSG_DELRULE:

trans->ctx.chain->use++;
nft_clear(trans->ctx.net, nft_trans_rule(trans));
+nft_rule_expr_activate(&trans->ctx, nft_trans_rule(trans));
nft_trans_destroy(trans);
break;
case NFT_MSG_NEWSET:
@@ -5859,14 +5961,15 @@
 {
 struct nft_rule *rule, *nr;

-BUG_ON(!nft_is_base_chain(ctx->chain));
+nft_clear(trans->ctx.net, nft_trans_rule(trans));
+*nft_rule_expr_activate(&trans->ctx, nft_trans_rule(trans));
+nft_trans_destroy(trans);
+break;

 nf_tables_unregister_hooks(ctx->net, ctx->chain->table, ctx->chain,
 ctx->afi->nops);
list_for_each_entry_safe(rule, nr, &ctx->chain->rules, list) {
    list_del(&rule->list);
    ctx->chain->use--;
-    nf_tables_rule_destroy(ctx, rule);
+    nf_tables_rule_release(ctx, rule);
    list_del(&ctx->chain->list);
    ctx->table->use--;
    &@ -5900,7 +6003,7 @@
list_for_each_entry_safe(rule, nr, &chain->rules, list) {
    list_del(&rule->list);
    chain->use--;
-    nf_tables_rule_destroy(&ctx, rule);
+    nf_tables_rule_release(&ctx, rule);
}
list_for_each_entry_safe(set, ns, &table->sets, list) {
    --- linux-4.15.0.orig/net/netfilter/nf_tables_core.c
    +++ linux-4.15.0/net/netfilter/nf_tables_core.c
    @ & -119,15 +119,24 @@
    static noinline void nft_update_chain_stats(const struct nft_chain *chain,
        const struct nft_pktinfo *pkt)
    {
+    struct nft_base_chain *base_chain;
+    struct nft_stats __percpu *pstats;
+    struct nft_stats *stats;

-local_bh_disable();
-    stats = this_cpu_ptr(rcu_dereference(nft_base_chain(chain)->stats));
-    u64_stats_update_begin(&stats->syncp);
-    stats->pkts++;
-    stats->bytes += skb->len;


- u64_stats_update_end(&stats->syncp);
  - local_bh_enable();
  + base_chain = nft_base_chain(chain);
  +
  + rcu_read_lock();
  + pstats = READ_ONCE(base_chain->stats);
  + if (pstats) {
    + local_bh_disable();
    + stats = this_cpu_ptr(pstats);
    + u64_stats_update_begin(&stats->syncp);
    + stats->pkts++;
    + stats->bytes += pkt->skb->len;
    + u64_stats_update_end(&stats->syncp);
    + local_bh_enable();
    +
  +
  + rcu_read_unlock();
  }

struct nft_jumpstack {
  @ @ -201,7 +210,8 @ @

switch (regs.verdict.code) {
  case NFT_JUMP:
    - BUG_ON(stackptr >= NFT_JUMP_STACK_SIZE);
    + if (WARN_ON_ONCE(stackptr >= NFT_JUMP_STACK_SIZE))
    + return NF_DROP;
    jumpstack[stackptr].chain = chain;
    jumpstack[stackptr].rule = rule;
    jumpstack[stackptr].rulenum = rulenum;
    --- linux-4.15.0.orig/net/netfilter/nfnetlink.c
    +++ linux-4.15.0/net/netfilter/nfnetlink.c
    @ @ -140,10 +140,15 @ @
  }
EXPORT_SYMBOL_GPL(nfnetlink_set_err);

-int nfnetlink_unicast(struct sk_buff *skb, struct net *net, u32 portid,
  - int flags)
+int nfnetlink_unicast(struct sk_buff *skb, struct net *net, u32 portid)
  { return netlink_unicast(net->nfnl, skb, portid, flags); 
+int err;
+  + err = nlmsg_unicast(net->nfnl, skb, portid);
+  + if (err == -EAGAIN)
+  + err = -ENOBUFS;
+  + return err;
  +}
EXPORT_SYMBOL_GPL(nfnetlink_unicast);

@@ -530,7 +535,7 @@
     ss = nfnetlink_get_subsys(type << 8);
     rcu_read_unlock();
     if (!ss)
-     request_module("nfnetlink-subsys-%d", type);
+     request_module_nowait("nfnetlink-subsys-%d", type);
     return 0;
 }
#endif

--- linux-4.15.0.orig/net/netfilter/nfnetlink_acct.c
+++ linux-4.15.0/net/netfilter/nfnetlink_acct.c
@@ -238,29 +238,33 @@
             [NFACCT_FILTER_VALUE] = [ .type = NLA_U32 ],
         ];

         -static struct nfacct_filter *
-         nfacct_filter_alloc(const struct nlattr * const attr)
+static int nfnl_acct_start(struct netlink_callback *cb)
{
-     struct nfacct_filter *filter;
+     const struct nlattr *const attr = cb->data;
     struct nlattr *tb[NFACCT_FILTER_MAX + 1];
+     struct nfacct_filter *filter;
     int err;

     +if (!attr)
         +return 0;
     +if (!attr)
         +return 0;
     +
     err = nla_parse_nested(tb, NFACCT_FILTER_MAX, attr, filter_policy,
             NULL);
     if (err < 0)
         -return ERR_PTR(err);
+         return err;

     if (!tb[NFACCT_FILTER_MASK] || !tb[NFACCT_FILTER_VALUE])
         -return ERR_PTR(-EINVAL);
+         return -EINVAL;

     filter = kzalloc(sizeof(struct nfacct_filter), GFP_KERNEL);
     if (!filter)
         -return ERR_PTR(-ENOMEM);
+         return -ENOMEM;

     filter->mask = ntohl(nla_get_be32(tb[NFACCT_FILTER_MASK]));
     filter->value = ntohl(nla_get_be32(tb[NFACCT_FILTER_VALUE]));
     cb->data = filter;
static int nfnl_acct_get(struct net *net, struct sock *nfnl,  
@@ -275,18 +279,11 @@  
if (nlh->nlmsg_flags & NLM_F_DUMP) {  
struct netlink_dump_control c = {  
  .dump = nfnl_acct_dump,  
  .start = nfnl_acct_start,  
  .done = nfnl_acct_done,  
  .data = (void *)tb[NFACCT_FILTER],  
};  

-if (tb[NFACCT_FILTER]) {  
  struct nfacct_filter *filter;  
  -filter = nfacct_filter_alloc(tb[NFACCT_FILTER]);  
  -if (IS_ERR(filter))  
  -return PTR_ERR(filter);  
  -c.data = filter;  
  -}  
  return netlink_dump_start(nfnl, skb, nlh, &c);  
}  
--- linux-4.15.0.orig/net/netfilter/nfnetlink_cthelper.c  
+++ linux-4.15.0/net/netfilter/nfnetlink_cthelper.c  
@@ -106,7 +106,7 @@  
if (help->helper->data_len == 0)  
  return -EINVAL;  

-nla_memcpy(help->data, nla_data(attr), sizeof(help->data));  
+nla_memcpy(help->data, attr, sizeof(help->data));  
  return 0;  
}  

@@ -240,6 +240,7 @@  
  ret = -ENOMEM;  
goto err2;  
}  
+helper->data_len = size;  

helper->flags |= NF_CT_HELPER_F_USERSPACE;  
memcpy(&helper->tuple, tuple, sizeof(struct nf_conntrack_tuple));  
@@ -369,10 +370,14 @@  
nfnl_cethelper_update(const struct nlattr * const tb[],

struct nf_conntrack_helper *helper)
{
  +u32 size;
  int ret;

  -if (tb[NFCTH_PRIV_DATA_LEN])
    -return -EBUSY;
  +if (tb[NFCTH_PRIV_DATA_LEN]) {
    +size = ntohl(nla_get_be32(tb[NFCTH_PRIV_DATA_LEN]));
    +if (size != helper->data_len)
      +return -EBUSY;
  +}

  if (tb[NFCTH_POLICY]) {
    ret = nfnl_cthelper_update_policy(helper, tb[NFCTH_POLICY]);
    @ @ -733,6 +738,8 @@
    [NFCTH_NAME] = { .type = NLA_NUL_STRING,
      .len = NF_CT_HELPER_NAME_LEN-1 },
    [NFCTH_QUEUE_NUM] = { .type = NLA_U32, },
    +[NFCTH_PRIV_DATA_LEN] = { .type = NLA_U32, },
    +[NFCTH_STATUS] = { .type = NLA_U32, },
  };

  static const struct nfnl_callback nfnl_cthelper_cb[NFNL_MSG_CTHELPER_MAX] = {
    --- linux-4.15.0.orig/net/netfilter/nfnetlink_log.c
    +++ linux-4.15.0/net/netfilter/nfnetlink_log.c
    @ @ .359,8 +359,7 @@
    goto out;
  }
}

-nfnetlink_unicast(inst->skb, inst->net, inst->peer_portid,
  - MSG_DONTWAIT);
+nfnetlink_unicast(inst->skb, inst->net, inst->peer_portid);
out:
  inst->qlen = 0;
  inst->skb = NULL;
  --- linux-4.15.0.orig/net/netfilter/nfnetlink_queue.c
  +++ linux-4.15.0/net/netfilter/nfnetlink_queue.c
  @ @ -662,7 +662,7 @@
  *packet_id_ptr = htonl(entry->id);

  /* nfnetlink_unicast will either free the skb or add it to a socket */
  -err = nfnetlink_unicast(skb, net, queue->peer_portid, MSG_DONTWAIT);
  +err = nfnetlink_unicast(skb, net, queue->peer_portid);
  if (err < 0) {
    if (queue->flags & NFQA_CFG_F_FAIL_OPEN) {
      failopen = 1;
      @ @ -1228,6 +1228,9 @@
static const struct nla_policy nfqa_cfg_policy[NFQA_CFG_MAX+1] = {
[NFQA_CFG_CMD] = { .len = sizeof(struct nfql_msg_config_cmd) },
[NFQA_CFG_PARAMS] = { .len = sizeof(struct nfql_msg_config_params) },
+[NFQA_CFG_QUEUE_MAXLEN] = { .type = NLA_U32 },
+[NFQA_CFG_MASK] = { .type = NLA_U32 },
+[NFQA_CFG_FLAGS] = { .type = NLA_U32 },
};

static const struct nf_queue_handler nfqh = {
--- linux-4.15.0.orig/net/netfilter/nft_bitwise.c
+++ linux-4.15.0/net/netfilter/nft_bitwise.c
@@ -83,7 +83,7 @@
tb[NFTA_BITWISE_MASK]);
if (err < 0)
    return err;
-if (d1.len != priv->len) {
+if (d1.type != NFT_DATA_VALUE || d1.len != priv->len) {
    err = -EINVAL;
    goto err1;
} 
@@ -92,7 +92,7 @@
tb[NFTA_BITWISE_XOR]);
if (err < 0)
    goto err1;
-if (d2.len != priv->len) {
+if (d2.type != NFT_DATA_VALUE || d2.len != priv->len) {
    err = -EINVAL;
    goto err2;
} 
--- linux-4.15.0.orig/net/netfilter/nft_cmp.c
+++ linux-4.15.0/net/netfilter/nft_cmp.c
@@ -77,7 +77,14 @@
err = nft_data_init(NULL, &priv->data, sizeof(priv->data), &desc,
    tb[NFTA_CMP_DATA]);
-BUG_ON(err < 0);
+if (err < 0)
+    return err;
+    return err;
+    return err;
+    return err;
+}
priv->sreg = nft_parse_register(tb[NFTA_CMP_SREG]);
err = nft_validate_register_load(priv->sreg, desc.len);
@@ -127,7 +134,8 @@
err = nft_data_init(NULL, &data, sizeof(data), &desc,
    tb[NFTA_CMP_DATA]);
-BUG_ON(err < 0);
+if (err < 0)
+return err;

priv->sreg = nft_parse_register(tb[NFTA_CMP_SREG]);
err = nft_validate_register_load(priv->sreg, desc.len);
--- linux-4.15.0.orig/net/netfilter/nft_compat.c
+++ linux-4.15.0/net/netfilter/nft_compat.c
@@ -27,14 +27,31 @@
 struct list_head head;
 struct nft_expr_ops ops;
 unsigned int refcnt;
+/* Unlike other expressions, ops doesn’t have static storage duration.
+ * nft core assumes they do. We use kfree_rcu so that nft core can
+ * can check expr->ops->size even after nft_compat->destroy() frees
+ * the nft_xt struct that holds the ops structure.
+ */
+struct rcu_head rcu_head;
+};
+
+/* Used for matches where *info is larger than X byte */
+#define NFT_MATCH_LARGE_THRESH 192
+
+struct nft_xt_match_priv {
+    void *info;
+};
-
-static void nft_xt_put(struct nft_xt *xt)
+static bool nft_xt_put(struct nft_xt *xt)
{
    if (--xt->refcnt == 0) {
        list_del(&xt->head);
-        kfree(xt);
+        kfree_rcu(xt, rcu_head);
+        return true;
    }
+    return false;
}

static int nft_compat_chain_validate_dependency(const char *tablename,
@@ -226,6 +243,7 @@
 struct xt_target *target = expr->ops->data;
 struct xt_tgchk_param par;
size_t size = XT_ALIGN(nla_len(tb[NFTA_TARGET_INFO]));
+struct nft_xt *nft_xt;
u16 proto = 0;
bool inv = false;
union nft_entry e = {};
@@ -236,25 +254,22 @@
if (ctx->nla[NFTA_RULE_COMPAT]) {
ret = nft_parse_compat(ctx->nla[NFTA_RULE_COMPAT], &proto, &inv);
if (ret < 0)
-goto err;
+return ret;
}

nft_target_set_tgchk_param(&par, ctx, target, info, &e, proto, inv);

ret = xt_check_target(&par, size, proto, inv);
if (ret < 0)
-goto err;
+return ret;

/* The standard target cannot be used */
-if (target->target == NULL) {
-ret = -EINVAL;
-goto err;
-}
+if (!target->target)
+return -EINVAL;
+nft_xt = container_of(expr->ops, struct nft_xt, ops);
+nft_xt->refcnt++;
return 0;
-err:
-module_put(target->me);
-return ret;
}

static void
@@ -262,6 +277,7 @@
{
struct xt_target *target = expr->ops->data;
void *info = nft_expr_priv(expr);
+struct module *me = target->me;
struct xt_tgdtor_param par;

par.net = ctx->net;
@@ -262,6 +277,7 @@
{
struct xt_target *target = expr->ops->data;
void *info = nft_expr_priv(expr);
+struct module *me = target->me;
struct xt_tgdtor_param par;

par.net = ctx->net;
@@ -262,6 +277,7 @@
{
struct xt_target *target = expr->ops->data;
void *info = nft_expr_priv(expr);
+struct module *me = target->me;
struct xt_tgdtor_param par;

par.net = ctx->net;
nft_xt_put(container_of(expr->ops, struct nft_xt, ops));
-module_put(target->me);
+if (nft_xt_put(container_of(expr->ops, struct nft_xt, ops)))
+module_put(me);
+
+static int nft_extension_dump_info(struct sk_buff *skb, int attr,
+    const void *info,
+    unsigned int size, unsigned int user_size)
+
+unsigned int info_size, aligned_size = XT_ALIGN(size);
+struct nlattr *nla;
+
+nla = nla_reserve(skb, attr, aligned_size);
+if (!nla)
+    return -1;
+
in_size = user_size ? : size;
+memcpy(nla_data(nla), info, info_size);
+memset(nla_data(nla) + info_size, 0, aligned_size - info_size);
+
+return 0;
}

static int nft_target_dump(struct sk_buff *skb, const struct nft_expr *expr)
{
    if (nla_put_string(skb, NFTA_TARGET_NAME, target->name) ||
        nla_put_be32(skb, NFTA_TARGET_REV, htonl(target->revision)) ||
        nft_extension_dump_info(skb, NFTA_TARGET_INFO, info, target->targetsize, target->usersize))
    goto nla_put_failure;

    return 0;
}

-void nft_match_eval(const struct nft_expr *expr, const struct nft_regs *regs, const struct nft_pktinfo *pkt)
+static void __nft_match_eval(const struct nft_expr *expr, const struct nft_regs *regs,
+    const struct nft_pktinfo *pkt,
+    void *info)
void *info = nft_expr_priv(expr);
struct xt_match *match = expr->ops->data;
struct sk_buff *skb = pkt->skb;
bool ret;
@@ -344,6 +379,22 @@
 }
 }

+static void nft_match_large_eval(const struct nft_expr *expr,
       struct nft_regs *regs,
       const struct nft_pktinfo *pkt)
+
+struct nft_xt_match_priv *priv = nft_expr_priv(expr);
+__nft_match_eval(expr, regs, pkt, priv->info);
+
+static void nft_match_eval(const struct nft_expr *expr,
       struct nft_regs *regs,
       const struct nft_pktinfo *pkt)
+
+__nft_match_eval(expr, regs, pkt, nft_expr_priv(expr));
+
+static const struct nla_policy nft_match_policy[NFTA_MATCH_MAX + 1] = {
+NFTA_MATCH_NAME	= { .type = NLA_NUL_STRING },
+NFTA_MATCH_REV	= { .type = NLA_U32 },
@@ -404,13 +455,14 @@
}

static int
-nft_match_init(const struct nft_ctx *ctx, const struct nft_expr *expr,
       const struct nlattr * const tb[])
+
+__nft_match_init(const struct nft_ctx *ctx, const struct nft_expr *expr,
+       const struct nlattr * const tb[],
+       void *info)
+
+static const struct nla_policy nft_match_policy[NFTA_MATCH_MAX + 1] = {
+NFTA_MATCH_NAME	= { .type = NLA_NUL_STRING },
+NFTA_MATCH_REV	= { .type = NLA_U32 },
@@ -421,26 +473,51 @@
    if (ctx->nla[NFTA_RULE_COMPAT]) {
        ret = nft_parse_compat(ctx->nla[NFTA_RULE_COMPAT], &proto, &inv);
    }

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if (ret < 0)
    -goto err;
+return ret;
 }

nft_match_set_mchk_param(&par, ctx, match, info, &e, proto, inv);

ret = xt_check_match(&par, size, proto, inv);
if (ret < 0)
    -goto err;
+return ret;

+nft_xt = container_of(expr->ops, struct nft_xt, ops);
+nft_xt->refcnt++;
return 0;
-err:
-module_put(match->me);
+}
+
+static int
+nft_match_init(const struct nft_ctx *ctx, const struct nft_expr *expr,
+    const struct nla * const tb[])
+{
+    return __nft_match_init(ctx, expr, tb, nft_expr_priv(expr));
+}
+
+static int
+nft_match_large_init(const struct nft_ctx *ctx, const struct nft_expr *expr,
+    const struct nla * const tb[])
+{
+    struct nft_xt_match_priv *priv = nft_expr_priv(expr);
+    struct xt_match *m = expr->ops->data;
+    int ret;
+    +priv->info = kmalloc(XT_ALIGN(m->matchsize), GFP_KERNEL);
+    +if (!priv->info)
+        +return -ENOMEM;
+    +ret = __nft_match_init(ctx, expr, tb, priv->info);
+    +if (ret)
+        +kfree(priv->info);
+    return ret;
+
+static void
-nft_match_destroy(const struct nft_ctx *ctx, const struct nft_expr *expr)
+__nft_match_destroy(const struct nft_ctx *ctx, const struct nft_expr *expr,
+    void *info)
\{
  struct xt_match *match = expr->ops->data;
  void *info = nft_expr_priv(expr);
  struct module *me = match->me;
  struct xt_mtdtor_param par;

  par.net = ctx->net;
  if (par.match->destroy != NULL)
    par.match->destroy(&par);

  -nft_xt_put(container_of(expr->ops, struct nft_xt, ops));
  -module_put(match->me);
  +if (nft_xt_put(container_of(expr->ops, struct nft_xt, ops)))
    +module_put(me);
\
-static int nft_match_dump(struct sk_buff *skb, const struct nft_expr *expr)
+static void
+nft_match_destroy(const struct nft_ctx *ctx, const struct nft_expr *expr)
+{
  +__nft_match_destroy(ctx, expr, nft_expr_priv(expr));
  +}
+static void
+nft_match_large_destroy(const struct nft_ctx *ctx, const struct nft_expr *expr)
+{
  struct nft_xt_match_priv *priv = nft_expr_priv(expr);
  +__nft_match_destroy(ctx, expr, priv->info);
  +kfree(priv->info);
  +}
+static int __nft_match_dump(struct sk_buff *skb, const struct nft_expr *expr,
  void *info)
  { -void *info = nft_expr_priv(expr);
    struct xt_match *match = expr->ops->data;

    if (nla_put_string(skb, NFTA_MATCH_NAME, match->name) ||
        nla_put_be32(skb, NFTA_MATCH_REV, htonl(match->revision)) ||
        -nla_put(skb, NFTA_MATCH_INFO, XT_ALIGN(match->matchsize), info))
      +nft_extension_dump_info(skb, NFTA_MATCH_INFO, info,
      +match->matchsize, match->usersize)
    goto nla_put_failure;

    return 0;
  }
\}

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return -1;
}

+static int nft_match_dump(struct sk_buff *skb, const struct nft_expr *expr)
+{
+return __nft_match_dump(skb, expr, nft_expr_priv(expr));
+
+}
+
+static int nft_match_large_dump(struct sk_buff *skb, const struct nft_expr *e)
+{
+struct nft_xt_match_priv *priv = nft_expr_priv(e);
+
+return __nft_match_dump(skb, e, priv->info);
+}
+
static int nft_match_validate(const struct nft_ctx *ctx,
const struct nft_expr *expr,
const struct nft_data **data)
@@ -637,6 +742,7 @@
{
struct nft_xt *nft_match;
struct xt_match *match;
+unsigned int matchsize;
char *mt_name;
u32 rev, family;
int err;
@@ -654,13 +760,8 @@
list_for_each_entry(nft_match, &nft_match_list, head) {
struct xt_match *match = nft_match->ops.data;

-if (nft_match_cmp(match, mt_name, rev, family)) {
-if (!try_module_get(match->me))
-return ERR_PTR(-ENOENT);
-
-nft_match->refcnt++;
+if (nft_match_cmp(match, mt_name, rev, family))
return &nft_match->ops;
-}
}

match = xt_request_find_match(family, mt_name, rev);
@@ -679,9 +780,8 @@
goto err;
}

-nft_match->refcnt = 1;
+nft_match->refcnt = 0;
nft_match->ops.type = &nft_match_type;
nft_match->ops.size = nft_expr_size(XT_ALIGN(match->matchsize));
nft_match->ops.eval = nft_match_eval;
nft_match->ops.init = nft_match_init;
nft_match->ops.destroy = nft_match_destroy;
@@ -689,6 +789,18 @@
nft_match->ops.validate = nft_match_validate;
nft_match->ops.data = match;

+matchsize = nft_expr_size(XT_ALIGN(match->matchsize));
+if (matchsize > NFT_MATCH_LARGE_THRESH) {
+matchsize = nft_expr_size(sizeof(struct nft_xt_match_priv));
+
+nft_match->ops.eval = nft_match_large_eval;
+nft_match->ops.init = nft_match_large_init;
+nft_match->ops.destroy = nft_match_large_destroy;
+nft_match->ops.dump = nft_match_large_dump;
+}
+
+nft_match->ops.size = matchsize;
+
list_add(&nft_match->head, &nft_match_list);

return &nft_match->ops;
@@ -735,23 +847,31 @@
rev = ntohl(nla_get_be32(tb[NFTA_TARGET_REV]));
family = ctx->afi->family;

+if (strcmp(tg_name, XT_ERROR_TARGET) == 0 ||
+ strcmp(tg_name, XT_STANDARD_TARGET) == 0 ||
+ strcmp(tg_name, "standard") == 0)
+return ERR_PTR(-EINVAL);
+
/* Re-use the existing target if it's already loaded. */
list_for_each_entry(nft_target, &nft_target_list, head) {
struct xt_target *target = nft_target->ops.data;

-if (nft_target_cmp(target, tg_name, rev, family)) {
-continue;

+nft_target->refcnt++;
+if (nft_target_cmp(target, tg_name, rev, family))
return &nft_target->ops;
-}
target = xt_request_find_target(family, tg_name, rev);
if (IS_ERR(target))
    return ERR_PTR(-ENOENT);

@if (!target->target) {
    err = -EINVAL;
    goto err;
} +

if (target->targetsize > nla_len(tb[NFTA_TARGET_INFO])) {
    err = -EINVAL;
    goto err;
} @@ -764,7 +884,7 @@
    goto err;
}

-nft_target->refcnt = 1;
+nft_target->refcnt = 0;

nft_target->ops.type = &nft_target_type;
nft_target->ops.size = NFT_EXPR_SIZE(XT_ALIGN(target->targetsize));
nft_target->ops.init = nft_target_init;
@@ -825,6 +945,32 @@

static void __exit nft_compat_module_exit(void)
{
    struct nft_xt *xt, *next;
    +
    +/* list should be empty here, it can be non-empty only in case there
    + * was an error that caused nft_xt expr to not be initialized fully
    + * and noone else requested the same expression later.
    + *
    + * In this case, the lists contain 0-refcount entries that still
    + * hold module reference.
    + */
    +list_for_each_entry_safe(xt, next, &nft_target_list, head) {
    +struct xt_target *target = xt->ops.data;
    +
    +if (WARN_ON_ONCE(xt->refcnt))
    +continue;
    +module_put(target->me);
    +kfree(xt);
    +}
+
    +list_for_each_entry_safe(xt, next, &nft_match_list, head) {
    +struct xt_match *match = xt->ops.data;
    +
    +if (WARN_ON_ONCE(xt->refcnt))
    +continue;
+module_put(match->me);
+kfree(x);
+
} nfnetlink_subsys_unregister(&nfnl_compat_subsys);
nft_unregister_expr(&nft_target_type);
nft_unregister_expr(&nft_match_type);
--- linux-4.15.0.orig/net/netfilter/nft.c
+++ linux-4.15.0/net/netfilter/nft.c
@@ -842,22 +842,26 @@
   struct nft_object *obj, bool reset)
 {
   const struct nft_ct_helper_obj *priv = nft_obj_data(obj);
-  const struct nf_conntrack_helper *helper = priv->helper4;
+  const struct nf_conntrack_helper *helper;
   u16 family;
+  if (priv->helper4 && priv->helper6) {
+    family = NFPROTO_INET;
+    helper = priv->helper4;
+  } else if (priv->helper6) {
+    family = NFPROTO_IPV6;
+    helper = priv->helper6;
+  } else {
+    family = NFPROTO_IPV4;
+    helper = priv->helper4;
+  }
+
  if (nla_put_string(skb, NFTA_CT_HELPER_NAME, helper->name))
    return -1;

  if (nla_put_u8(skb, NFTA_CT_HELPER_L4PROTO, priv->l4proto))
    return -1;
-
-if (priv->helper4 && priv->helper6)
-  family = NFPROTO_INET;
-else if (priv->helper6)
-  family = NFPROTO_IPV6;
-else
-  family = NFPROTO_IPV4;
-
  if (nla_put_be16(skb, NFTA_CT_HELPER_L3PROTO, htons(family)))
    return -1;

--- linux-4.15.0.orig/net/netfilter/nft_dynset.c
+++ linux-4.15.0/net/netfilter/nft_dynset.c
@@ -205,8 +205,10 @@
   nft_set_ext_add_length(&priv->tmpl, NFT_SET_EXT_EXPR,
                        priv->expr->ops->size);
if (set->flags & NFT_SET_TIMEOUT) {
    if (timeout || set->timeout) {
        nft_set_ext_add(&priv->tmpl, NFT_SET_EXT_TIMEOUT);
        nft_set_ext_add(&priv->tmpl, NFT_SET_EXT_EXPIRATION);
    }
}

priv->timeout = timeout;
--- linux-4.15.0.orig/net/netfilter/nft_exthdr.c
+++ linux-4.15.0/net/netfilter/nft_exthdr.c
@@ -46,6 +46,9 @@
    unsigned int offset = 0;
    int err;

+if (pkt->skb->protocol != htons(ETH_P_IPV6))
+    goto err;
+    err = ipv6_find_hdr(pkt->skb, &offset, priv->type, NULL, NULL);
if (priv->flags & NFT_EXTHDR_F_PRESENT) {
    *dest = (err >= 0);
    unsigned int i, optl, tcphdr_len, offset;
    struct tcphdr *tcph;
    u8 *opt;
    -u32 src;

    tcph = nft_tcp_header_pointer(pkt, sizeof(buff), buff, &tcph_len);
    if (!tcph)
        @@ -144,7 +146,6 @@
            for (i = sizeof(*tcph); i < tcph_len - 1; i += optl) {
                union {
                    __be16 v16;
                    __be32 v32;
                } old, new;
                @@ -165,13 +166,13 @@
                    if (!tcph)
                        return;

                    -src = regs->data[priv->sreg];
                    offset = i + priv->offset;

                    switch (priv->len) {
                        case 2:
                            old.v16 = get_unaligned((u16 *)(opt + offset));
                            -new.v16 = src;
                            break;
new.v16 = (__force __be16)nft_reg_load16(
+&regs->data[priv->sreg]);

switch (priv->type) {
  case TCPOPT_MSS:
@@ -189,7 +190,7 @@
    old.v16, new.v16, false);
  break;
  case 4:
-    new.v32 = src;
+    new.v32 = regs->data[priv->sreg];
    old.v32 = get_unaligned((u32 *)(opt + offset));

  if (old.v32 == new.v32)
--- linux-4.15.0.orig/net/netfilter/nft_fwd_netdev.c
+++ linux-4.15.0/net/netfilter/nft_fwd_netdev.c
@@ -62,6 +62,13 @@
    return -1;
 }

+static int nft_fwd_validate(const struct nft_ctx *ctx,
+    const struct nft_expr *expr,
+    const struct nft_data **data)
+{
+  return nft_chain_validate_hooks(ctx->chain, (1 << NF_NETDEV_INGRESS));
+}
+static struct nft_expr_type nft_fwd_netdev_type __read_mostly = {
static struct nft_expr_type nft_fwd_netdev_type;
static const struct nft_expr_ops nft_fwd_netdev_ops = {
  .type= &nft_fwd_netdev_type,
@@ -69,6 +76,7 @@
  .validation= nft_fwd_netdev_validate,
  .init= nft_fwd_netdev_init,
  .dump= nft_fwd_netdev_dump,
+  .validate= nft_fwd_validate,
};

static struct nft_expr_type nft_fwd_netdev_type __read_mostly = {
--- linux-4.15.0.orig/net/netfilter/nft_hash.c
+++ linux-4.15.0/net/netfilter/nft_hash.c
@@ -131,7 +131,7 @@
    priv->dreg = nft_parse_register(tb[NFTA_HASH_DREG]);

    priv->modulus = ntohl(nla_get_be32(tb[NFTA_HASH_MODULUS]));
-  if (priv->modulus <= 1)
+  if (priv->modulus < 1)
    return -ERANGE;
if (priv->offset + priv->modulus - 1 < priv->offset)
--- linux-4.15.0.orig/net/netfilter/nft_immediate.c
+++ linux-4.15.0/net/netfilter/nft_immediate.c
@@ -69,8 +69,16 @@
 return err;
 }

-static void nft_immediate_destroy(const struct nft_ctx *ctx,
-                                 const struct nft_expr *expr)
+static void nft_immediate_destroy(const struct nft_ctx *ctx,
+                                 const struct nft_expr *expr)
+{
+  const struct nft_immediate_expr *priv = nft_expr_priv(expr);
+  return nft_data_hold(&priv->data, nft_dreg_to_type(priv->dreg));
+}
+
+static void nft_immediate_activate(const struct nft_ctx *ctx,
+                                   const struct nft_expr *expr)
+{
+  const struct nft_immediate_expr *priv = nft_expr_priv(expr);
+  return nft_data_hold(&priv->data, nft_dreg_to_type(priv->dreg));
+}
+
+static void nft_immediate_deactivate(const struct nft_ctx *ctx,
+                                      const struct nft_expr *expr)
{
  const struct nft_immediate_expr *priv = nft_expr_priv(expr);

@@ -108,7 +116,8 @@
 .size = NFT_EXPR_SIZE(sizeof(struct nft_immediate_expr)),
 .eval = nft_immediate_eval,
 .init = nft_immediate_init,
-  .destroy = nft_immediate_destroy,
+  .destroy = nft_immediate_destroy,
+.activate = nft_immediate_activate,
+.deactivate = nft_immediate_deactivate,
 .dump = nft_immediate_dump,
 .validate = nft_immediate_validate,
};
--- linux-4.15.0.orig/net/netfilter/nft_limit.c
+++ linux-4.15.0/net/netfilter/nft_limit.c
@@ -51,10 +51,13 @@
 return !limit->invert;
 }

+/* Use same default as in iptables. */
+#define NFT_LIMIT_PKT_BURST_DEFAULT 5

 static int nft_limit_init(struct nft_limit *limit,
-                          const struct nlattr * const tb[])
+                          const struct nlattr * const tb[], bool pkts)
{
-  u64 unit;
-  +u64 unit, tokens;
+  +u64 unit, tokens;
 return !limit->invert;
}
if (tb[NFTA_LIMIT_RATE] == NULL ||
    tb[NFTA_LIMIT_UNIT] == NULL)
  return -68,18 +71,25 @@

if (tb[NFTA_LIMIT_BURST])
  limit->burst = ntohl(nla_get_be32(tb[NFTA_LIMIT_BURST]));
-else
  limit->burst = 0;
+if (pkts && limit->burst == 0)
  +limit->burst = NFT_LIMIT_PKT_BURST_DEFAULT;

if (limit->rate + limit->burst < limit->rate)
  return -EOVERFLOW;

/* The token bucket size limits the number of tokens can be
 * accumulated. tokens_max specifies the bucket size.
 * tokens_max = unit * (rate + burst) / rate.
 */
-limit->tokens = div_u64(limit->nsecs * (limit->rate + limit->burst),
  limit->rate);
+if (pkts) {
  tokens = div64_u64(limit->nsecs, limit->rate) * limit->burst;
  } else {
  /* The token bucket size limits the number of tokens can be
   * accumulated. tokens_max specifies the bucket size.
   * tokens_max = unit * (rate + burst) / rate.
   */
  tokens = div64_u64(limit->nsecs * (limit->rate + limit->burst),
    limit->rate);
  +limit->tokens = tokens;
  limit->tokens_max = limit->tokens;

if (tb[NFTA_LIMIT_FLAGS])
  struct nft_limit_pkts *priv = nft_expr_priv(expr);
  int err;

-err = nft_limit_init(&priv->limit, tb);
+err = nft_limit_init(&priv->limit, tb, true);
  if (err < 0)
    return err;

  @ @ -185,7 +195,7 @@
  { struct nft_limit *priv = nft_expr_priv(expr);
return nft_limit_init(priv, tb);
+return nft_limit_init(priv, tb, false);
}

static int nft_limit_bytes_dump(struct sk_buff *skb, err = nft_limit_init(&priv->limit, tb);
+err = nft_limit_init(&priv->limit, tb, true);
if (err < 0)
return err;

struct nft_limit *priv = nft_obj_data(obj);
-err = nft_limit_init(priv, tb);
+err = nft_limit_init(priv, tb, false);
}

static int nft_limit_obj_bytes_dump(struct sk_buff *skb, --- linux-4.15.0.orig/net/netfilter/nft_lookup.c
+++ linux-4.15.0/net/netfilter/nft_lookup.c
priv->sreg = nft_parse_register(tb[NFTA_LOOKUP_SREG]);
err = nft_validate_register_load(priv->sreg, set->klen);
if (err < 0)
--- linux-4.15.0.orig/net/netfilter/nft_meta.c
+++ linux-4.15.0/net/netfilter/nft_meta.c
struct sk_buff *skb = pkt->skb;
u32 *sreg = &regs->data[meta->sreg];
u32 value = *sreg;
-u8 pkt_type;
+u8 value8;

switch (meta->key) {
case NFT_META_MARK:

skb->priority = value;
break;
case NFT_META_PKTTYPE:
    -pkt_type = nft_reg_load8(sreg);
    +value8 = nft_reg_load8(sreg);

    -if (skb->pkt_type != pkt_type &&
        skb_pkt_type_ok(pkt_type) &&
    +if (skb->pkt_type != value8 &&
        skb_pkt_type_ok(value8) &&
        skb_pkt_type_ok(skb->pkt_type))
    -skb->pkt_type = pkt_type;
    +skb->pkt_type = value8;
break;
case NFT_META_NFTRACE:
    -skb->nf_trace = !!value;
    +value8 = nft_reg_load8(sreg);
    +
    +skb->nf_trace = !!value8;
break;
default:
    WARN_ON(1);
--- linux-4.15.0.orig/net/netfilter/nft_nat.c
+++ linux-4.15.0/net/netfilter/nft_nat.c
@@ -135,7 +135,7 @@
    priv->type = NF_NAT_MANIP_DST;
break;
default:
    -return -EINVAL;
    +return -EOPNOTSUPP;
}

if (tb[NFTA_NAT_FAMILY] == NULL)
@@ -153,7 +153,9 @@
    alen = FIELD_SIZEOF(struct nf_nat_range, min_addr.ip6);
break;
default:
    -return -EAFNOSUPPORT;
    +if (tb[NFTA_NAT_REG_ADDR_MIN])
    +return -EAFNOSUPPORT;
    +break;
}
priv->family = family;

@@ -202,7 +204,7 @@
    if (tb[NFTA_NAT_FLAGS]) {
        priv->flags = ntohl(nla_get_be32(tb[NFTA_NAT_FLAGS]));
    if (priv->flags & ~NF_NAT_RANGE_MASK)
-return -EINVAL;
+return -EOPNOTSUPP;
}

return nf_ct_netns_get(ctx->net, family);
--- linux-4.15.0.orig/net/netfilter/nft_payload.c
+++ linux-4.15.0/net/netfilter/nft_payload.c
@@ -79,7 +79,9 @@
     u32 *dest = &regs->data[priv->dreg];
     int offset;

-dest[priv->len / NFT_REG32_SIZE] = 0;
+if (priv->len % NFT_REG32_SIZE)
+    dest[priv->len / NFT_REG32_SIZE] = 0;
+
switch (priv->base) {
    case NFT_PAYLOAD_LL_HEADER:
        if (!skb_mac_header_was_set(skb))
@@ -121,6 +123,7 @@
          [NFTA_PAYLOAD_LEN]= { .type = NLA_U32 },
          [NFTA_PAYLOAD_CSUM_TYPE]= { .type = NLA_U32 },
          [NFTA_PAYLOAD_CSUM_OFFSET]= { .type = NLA_U32 },
+         [NFTA_PAYLOAD_CSUM_FLAGS]= { .type = NLA_U32 },
    ];

static int nft_payload_init(const struct nft_ctx *ctx,
--- linux-4.15.0.orig/net/netfilter/nft_range.c
+++ linux-4.15.0/net/netfilter/nft_range.c
@@ -70,11 +70,21 @@
     if (desc_from.type != NFT_DATA_VALUE) {
         err = -EINVAL;
         goto err1;
+    }
+    err = nft_data_init(NULL, &priv->data_to, sizeof(priv->data_to),
+        &desc_to, tb[NFTA_RANGE_TO_DATA]);
     if (err < 0)
         goto err1;

+if (desc_from.type != NFT_DATA_VALUE) {
    +err = -EINVAL;
    +goto err1;
    +}
    +
    err = nft_data_init(NULL, &priv->data_to, sizeof(priv->data_to),
        &desc_to, tb[NFTA_RANGE_TO_DATA]);
    if (err < 0)
        goto err1;

+if (desc_to.type != NFT_DATA_VALUE) {
    +err = -EINVAL;
    +goto err2;
    +}
    +
    if (desc_from.len != desc_to.len) {
err = -EINVAL;
goto err2;
--- linux-4.15.0.orig/net/netfilter/nft_reject.c
+++ linux-4.15.0/net/netfilter/nft_reject.c
@@ -94,7 +94,8 @@
 int nft_reject_icmp_code(u8 code)
 {
- BUG_ON(code > NFT_REJECT_ICMPX_MAX);
+ if (WARN_ON_ONCE(code > NFT_REJECT_ICMPX_MAX))
+ return ICMP_NET_UNREACH;

 return icmp_code_v4[code];
 }
@@ -111,7 +112,8 @@
 int nft_reject_icmpv6_code(u8 code)
 {
- BUG_ON(code > NFT_REJECT_ICMPX_MAX);
+ if (WARN_ON_ONCE(code > NFT_REJECT_ICMPX_MAX))
+ return ICMPV6_NOROUTE;

 return icmp_code_v6[code];
 }
--- linux-4.15.0.orig/net/netfilter/nft_set_hash.c
+++ linux-4.15.0/net/netfilter/nft_set_hash.c
@@ -377,13 +377,22 @@
 struct nft_rhash *priv = nft_set_priv(set);
 cancel_delayed_work_sync(&priv->ge_work);
+rcu_barrier();
 rhashtable_free_and_destroy(&priv->ht, nft_rhash_elem_destroy,
- (void *)set);
+/* Number of buckets is stored in u32, so cap our result to 1U<<31 */
+ #define NFT_MAX_BUCKETS (1U << 31)
+ static u32 nft_hash_buckets(u32 size)
+ {
- return roundup_pow_of_two(size * 4 / 3);
+ u64 val = div_u64((u64)size * 4, 3);
+ if (val >= NFT_MAX_BUCKETS)
+ return NFT_MAX_BUCKETS;
+ return roundup_pow_of_two(val);
static bool nft_rhash_estimate(const struct nft_set_desc *desc, u32 features,
@@ -477,6 +486,23 @@
     return false;
 }

+static u32 nft_jhash(const struct nft_set *set, const struct nft_hash *priv,
+    const struct nft_set_ext *ext)
+{
+    const struct nft_data *key = nft_set_ext_key(ext);
+    u32 hash, k1;
+    
+    if (set->klen == 4) {
+        k1 = *(u32 *)key;
+        hash = jhash_1word(k1, priv->seed);
+    } else {
+        hash = jhash(key, set->klen, priv->seed);
+    }
+    hash = reciprocal_scale(hash, priv->buckets);
+    return hash;
+}

static int nft_hash_insert(const struct net *net, const struct nft_set *set,
@@ -486,8 +512,7 @@
 u8 genmask = nft_genmask_next(net);
 u32 hash;

-    hash = jhash(nft_set_ext_key(&this->ext), set->klen, priv->seed);
-    hash = reciprocal_scale(hash, priv->buckets);
-    hash = nft_jhash(set, priv, &this->ext);
-    hlist_for_each_entry(he, &priv->table[hash], node) {
+    if (!memcmp(nft_set_ext_key(&he->ext), &elem->key.val,
    nft_set_elem_active(&he->ext, genmask)) {
nft_set_elem_change_active(net, set, &he->ext);
--- linux-4.15.0.orig/net/netfilter/nft_set_rbtree.c
+++ linux-4.15.0/net/netfilter/nft_set_rbtree.c
@@ -35,6 +35,11 @@
 (*nft_set_ext_flags(&rbe->ext) & NFT_SET_ELEM_INTERVAL_END);
 }

+static bool nft_rbtree_interval_start(const struct nft_rbtree_elem *rbe)
+{
+  return !nft_rbtree_interval_end(rbe);
+}
+
static bool nft_rbtree_equal(const struct nft_set *set, const void *this,
const struct nft_rbtree_elem *interval)
{
  @@ -66,7 +71,7 @@
    nft_rbtree_equal(set, this, interval) &&
    nft_rbtree_interval_end(this) &&
-   !nft_rbtree_interval_end(interval))
+   nft_rbtree_interval_start(interval))
    continue;
    interval = rbe;
  } else if (d > 0)
@@ -86,7 +91,7 @@
    if (set->flags & NFT_SET_INTERVAL && interval != NULL &&
        nft_set_elem_active(&interval->ext, genmask) &&
-     !nft_rbtree_interval_end(interval)) {
+    nft_rbtree_interval_start(interval)) {
        *ext = &interval->ext;
        return true;
    }
@@ -209,9 +214,9 @@
    p = &parent->rb_right;
    else {
        if (nft_rbtree_interval_end(rbe) &&
-        !nft_rbtree_interval_end(new)) {
+        nft_rbtree_interval_start(new)) {
            p = &parent->rb_left;
        } else if (!nft_rbtree_interval_end(rbe) &&
-        nft_rbtree_interval_start(rbe) &&
+        nft_rbtree_interval_end(new)) {
        p = &parent->rb_right;
        } else if (nft_set_elem_active(&rbe->ext, genmask)) {
@@ -296,18 +301,17 @@
            else if (d > 0)
                parent = parent->rb_right;

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else {
- if (!nft_set_elem_active(&rbe->ext, genmask)) {
- parent = parent->rb_left;
- continue;
- }
- if (nft_rbtree_interval_end(rbe) &&
- !nft_rbtree_interval_end(this)) {
+ nft_rbtree_interval_start(this)) {
- parent = parent->rb_left;
- continue;
- } else if (!nft_rbtree_interval_end(rbe) &&
+ !nft_rbtree_interval_start(rbe) &&
- nft_rbtree_interval_end(this)) {
- parent = parent->rb_right;
- continue;
+ } else if (!nft_set_elem_active(&rbe->ext, genmask)) {
+ parent = parent->rb_left;
+ continue;
} }

nft_rbtree_flush(net, set, rbe);
return rbe;

--- linux-4.15.0.orig/net/netfilter/x_tables.c
+++ linux-4.15.0/net/netfilter/x_tables.c
@@ -39,8 +39,8 @@
 MODULE_AUTHOR("Harald Welte <laforge@netfilter.org>");
 MODULE_DESCRIPTION("{ip,ip6,arp,eb}_tables backend module");

-#define SMP_ALIGN(x) (((x) + SMP_CACHE_BYTES-1) & ~(SMP_CACHE_BYTES-1))
+#define XT_MAX_TABLE_SIZE (512 * 1024 * 1024)
#define XT_PCPU_BLOCK_SIZE 4096
+#define XT_MAX_TABLE_SIZE(512 * 1024 * 1024)

struct compat_delta {
  unsigned int offset; /* offset in kernel */
  @ @ -210,6 +210,9 @@
}

struct xt_match *match;

+if (strnlen(name, XT_EXTENSION_MAXNAMELEN) == XT_EXTENSION_MAXNAMELEN)
+return ERR_PTR(-EINVAL);
+
+match = xt_find_match(nfproto, name, revision);
+if (IS_ERR(match)) {
+  request_module("%st %s", xt_prefix[nfproto], name);
+  @ @ -252,6 +255,9 @@
+  }
+struct xt_target *target;
+
+if (strnlen(name, XT_EXTENSION_MAXNAMELEN) == XT_EXTENSION_MAXNAMELEN)
return ERR_PTR(-EINVAL);
+
target = xt_find_target(af, name, revision);
if (IS_ERR(target)) {
request_module("%st_%s", xt_prefix[af], name);
@@ -323,6 +329,7 @@
const struct xt_match *m;
int have_rev = 0;
+
mutex_lock(&xt[af].mutex);
list_for_each_entry(m, &xt[af].match, list) {
if (strcmp(m->name, name) == 0) {
if (m->revision > *bestp)
@@ -331,6 +338,7 @@
have_rev = 1;
}
}
+mutex_unlock(&xt[af].mutex);

if (af != NFPROTO_UNSPEC && !have_rev)
return match_revfn(NFPROTO_UNSPEC, name, revision, bestp);
@@ -343,6 +351,7 @@
const struct xt_target *t;
int have_rev = 0;
+
mutex_lock(&xt[af].mutex);
list_for_each_entry(t, &xt[af].target, list) {
if (strcmp(t->name, name) == 0) {
if (t->revision > *bestp)
@@ -351,6 +360,7 @@
have_rev = 1;
}
}
+mutex_unlock(&xt[af].mutex);

if (af != NFPROTO_UNSPEC && !have_rev)
return target_revfn(af, name, revision, bestp);
@@ -364,12 +374,10 @@
{
int have_rev, best = -1;

-mutex_lock(&xt[af].mutex);
if (target == 1)
have_rev = target_revfn(af, name, revision, &best);
else
have_rev = match_revfn(af, name, revision, &best);
-mutex_unlock(&xt[af].mutex);
if (best == -1) {
  return buf;
}

int xt_check_match(struct xt_mtcchk_param *par,
                  unsigned int size, u_int8_t proto, bool inv_proto)
{
  struct xt_af *xp = &xt[af];

  if (!xp->compat_tab) {
    if (!xp->number)
      return -EINVAL;
    xp->compat_tab = vmalloc(sizeof(struct compat_delta) * xp->number);
    if (!xp->compat_tab)
      return -ENOMEM;
    return -EINVAL;
  }
  return 0;
}

EXPORT_SYMBOL(xt_check_match);

int xt_check_match(struct xt_mtcchk_param *par,
                   unsigned int size, u_int8_t proto, bool inv_proto)
{
  struct xt_af *xp = &xt[af];

  if (!xp->compat_tab) {
    if (!xp->number)
      return -EINVAL;
    xp->compat_tab = vmalloc(sizeof(struct compat_delta) * xp->number);
    if (!xp->compat_tab)
      return -ENOMEM;
    return -EINVAL;
  }
  return 0;
}

EXPORT_SYMBOL(xt_check_match);

int xt_check_match(struct xt_mtcchk_param *par,
                   unsigned int size, u_int8_t proto, bool inv_proto)
{
  struct xt_af *xp = &xt[af];

  if (!xp->compat_tab) {
    if (!xp->number)
      return -EINVAL;
    xp->compat_tab = vmalloc(sizeof(struct compat_delta) * xp->number);
    if (!xp->compat_tab)
      return -ENOMEM;
    return -EINVAL;
  }
  return 0;
}

EXPORT_SYMBOL(xt_check_match);
return -ENOMEM;
xp->cur = 0;
}
+if (WARN_ON(!xp->compat_tab))
+return -ENOMEM;

if (xp->cur >= xp->number)
return -EINVAL;
@@ -569,10 +601,28 @@
}
EXPORT_SYMBOL_GPL(xt_compat_calc_jump);

+void xt_compat_init_offsets(u_int8_t af, unsigned int number)
+int xt_compat_init_offsets(u8 af, unsigned int number)
{
+size_t mem;
+
+if (!number || number > (INT_MAX / sizeof(struct compat_delta)))
+return -EINVAL;
+
+if (WARN_ON(xt[af].compat_tab))
+return -EINVAL;
+
+mem = sizeof(struct compat_delta) * number;
+if (mem > XT_MAX_TABLE_SIZE)
+return -ENOMEM;
+
+xt[af].compat_tab = vmalloc(mem);
+if (!xt[af].compat_tab)
+return -ENOMEM;

xt[af].number = number;
xt[af].cur = 0;
+
return 0;
}
EXPORT_SYMBOL(xt_compat_init_offsets);

@@ -588,7 +638,7 @@
{
 const struct xt_match *match = m->u.kernel.match;
 struct compat_xt_entry_match *cm = (struct compat_xt_entry_match *)m;
-+int pad, off = xt_compat_match_offset(match);
+int off = xt_compat_match_offset(match);
 u_int16_t msize = cm->u.user.match_size;
 char name[sizeof(m->u.user.name)];

@@ -598,9 +648,6 @@
match->compat_from_user(m->data, cm->data);

else
memcpy(m->data, cm->data, msize - sizeof(*cm));
-pad = XT_ALIGN(match->matchsize) - match->matchsize;
-if (pad > 0)
-memset(m->data + match->matchsize, 0, pad);

msize += off;
m->u.user.match_size = msize;
@@ -771,6 +818,9 @@
*/
unsigned int *xt_alloc_entry_offsets(unsigned int size)
{
+if (size > XT_MAX_TABLE_SIZE / sizeof(unsigned int))
+return NULL;
+
return kvmalloc_array(size, sizeof(unsigned int), GFP_KERNEL | __GFP_ZERO);
}
@@ -940,7 +990,7 @@
{
const struct xt_target *target = t->u.kernel.target;
struct compat_xt_entry_target *ct = (struct compat_xt_entry_target *)t;
-int pad, off = xt_compat_target_offset(target);
+int off = xt_compat_target_offset(target);
u_int16_t tsize = ct->u.user.target_size;
char name[sizeof(t->u.user.name)];

@@ -950,9 +1000,6 @@
target->compat_from_user(t->data, ct->data);
else
memcpy(t->data, ct->data, tsize - sizeof(*ct));
-pad = XT_ALIGN(target->targetsize) - target->targetsize;
-if (pad > 0)
-memset(t->data + target->targetsize, 0, pad);

tsize += off;
t->u.user.target_size = tsize;
@@ -996,14 +1043,14 @@
struct xt_table_info *info = NULL;
size_t sz = sizeof(*info) + size;

-if (sz < sizeof(*info))
+if (sz < sizeof(*info)) || sz >= XT_MAX_TABLE_SIZE)
return NULL;

/* Pedantry: prevent them from hitting BUG() in vmalloc.c --RR */
-if ((SMP_ALIGN(size) >> PAGE_SHIFT) + 2 > totalram_pages)
```c
+if ((size >> PAGE_SHIFT) + 2 > totalram_pages)
return NULL;

-info = kvmalloc(sz, GFP_KERNEL);
+info = kvmalloc(sz, GFP_KERNEL_ACCOUNT);
if (!info)
return NULL;

@@ -1146,6 +1193,21 @@
return 0;
 }

+struct xt_counters *xt_counters_alloc(unsigned int counters)
+{
+struct xt_counters *mem;
+
+if (counters == 0 || counters > INT_MAX / sizeof(*mem))
+return NULL;
+
+counters *= sizeof(*mem);
+if (counters > XT_MAX_TABLE_SIZE)
+return NULL;
+
+return vzalloc(counters);
+}
+EXPORT_SYMBOL(xt_counters_alloc);
+
struct xt_table_info *
xt_replace_table(struct xt_table *table,
 unsigned int num_counters,
@@ -1184,7 +1246,7 @@
table->private = newinfo;
/* make sure all cpus see new ->private value */
-smp_wmb();
+smp_mb();
/
/*
 * Even though table entries have now been swapped, other CPU's
 @@ -1751,7 +1813,7 @@
 seqcount_init(&per_cpu(xt_recseq, i));
 }

-xt = kmalloc(sizeof(struct xt_af) * NFPROTO_NUMPROTO, GFP_KERNEL);
+xt = kcalloc(NFPROTO_NUMPROTO, sizeof(struct xt_af), GFP_KERNEL);
if (!xt)
return -ENOMEM;
```
static unsigned int checksum_tg(struct sk_buff *skb, const struct xt_action_param *par)
{
    if (skb->ip_summed == CHECKSUM_PARTIAL)
        skb_checksum_help(skb);
    return XT_CONTINUE;
}

static int checksum_tg_check(const struct xt_tgchk_param *par)
{
    const struct xt_CHECKSUM_info *einfo = par->targinfo;
    const struct ip6t_ip6 *i6 = par->entryinfo;
    const struct ipt_ip *i4 = par->entryinfo;
    if (einfo->operation & ~XT_CHECKSUM_OP_FILL) {
        pr_info("unsupported CHECKSUM operation \%x\n", einfo->operation);
        return -EINVAL;
    }

    switch (par->family) {
    case NFPROTO_IPV4:
        if (i4->proto == IPPROTO_UDP &&
            (i4->invflags & XT_INV_PROTO) == 0)
            return 0;
        break;
    case NFPROTO_IPV6:
        if ((i6->flags & IP6T_F_PROTO) &&
            i6->proto == IPPROTO_UDP &&
            (i6->invflags & XT_INV_PROTO) == 0)
            return 0;
        break;
    }
}
+pr_warn_once("CHECKSUM should be avoided. If really needed, restrict with \"-p udp\" and only use in OUTPUT\");
return 0;
}

--- linux-4.15.0.orig/net/netfilter/xt_IDLETIMER.c
+++ linux-4.15.0/net/netfilter/xt_IDLETIMER.c
@@ -116,6 +116,22 @@
schedule_work(&timer->work);
}

+static int idletimer_check_sysfs_name(const char *name, unsigned int size)
+{
+ int ret;
+ +ret = xt_check_proc_name(name, size);
+ if (ret < 0)
+ return ret;
+ +if (!strcmp(name, "power") ||
+ !strcmp(name, "subsystem") ||
+ !strcmp(name, "uevent"))
+ return -EINVAL;
+ +return 0;
+}
+
+static int idletimer_tg_create(struct idletimer_tg_info *info)
+{
+ int ret;
+ @@ -125,9 +141,10 @@
+ goto out_free_timer;
+ }
+ static int idletimer_check_sysfs_name(const char *name, unsigned int size)
+ {
+ int ret;
+ if (ret < 0)
+ goto out_free_timer;
+ sysfs_attr_init(&info->timer->attr.attr);
+ info->timer->attr.attr.name = kstrdup(name, GFP_KERNEL);
+ if (!info->timer->attr.attr.name) {
+ @@ -145,11 +161,11 @@
+ timer_setup(&info->timer->timer, idletimer_tg_expired, 0);
+ info->timer->refcnt = 1;
+ }
+ }
mod_timer(&info->timer->timer,
    msecs_to_jiffies(info->timeout * 1000) + jiffies);

-INIT_WORK(&info->timer->work, idletimer_tg_work);
-
    return 0;

out_free_attr:
    @@ -191,7 +211,10 @@
        pr_debug("timeout value is zero\n");
        return -EINVAL;
    }
-
    +if (info->timeout >= INT_MAX / 1000) {
    +    pr_debug("timeout value is too big\n");
    +    return -EINVAL;
    +}
    
    if (info->label[0] == '\0' ||
        strlen(info->label,
          MAX_IDLETIMER_LABEL_SIZE) == MAX_IDLETIMER_LABEL_SIZE) {
        @@ -252,6 +275,7 @@
            .family= NFPROTO_UNSPEC,
            .target= idletimer_tg_target,
            .targetsize  = sizeof(struct idletimer_tg_info),
        +    .usersize= offsetof(struct idletimer_tg_info, timer),
            .checkentry= idletimer_tg_checkentry,
            .destroy    = idletimer_tg_destroy,
            .me= THIS_MODULE,
    --- linux-4.15.0.orig/net/netfilter/xt_LED.c
    +++ linux-4.15.0/net/netfilter/xt_LED.c
        @@ -142,9 +142,10 @@
            goto exit_alloc;
        }

    /* See if we need to set up a timer */
    -if (ledinfo->delay > 0)
    -timer_setup(&ledinternal->timer, led_timeout_callback, 0);
    +/* Since the letinternal timer can be shared between multiple targets,
    + * always set it up, even if the current target does not need it
    + */
    +timer_setup(&ledinternal->timer, led_timeout_callback, 0);

    list_add_tail(&ledinternal->list, &xt_led_triggers);
    
    @@ -181,8 +182,7 @@
        list_del(&ledinternal->list);
-if (ledinfo->delay > 0)
-del_timer_sync(&ledinternal->timer);
+del_timer_sync(&ledinternal->timer);

led_trigger_unregister(&ledinternal->netfilter_led_trigger);

@@ -198,6 +198,7 @@
    .family = NFPROTO_UNSPEC,
    .target = led_tg,
    .targetsize = sizeof(struct xt_led_info),
+   .usersize = offsetof(struct xt_led_info, internal_data),
    .checkentry = led_tg_check,
    .destroy = led_tg_destroy,
    .me = THIS_MODULE,
--- linux-4.15.0.orig/net/netfilter/xt_RATEEST.c
+++ linux-4.15.0/net/netfilter/xt_RATEEST.c
@@ -39,23 +39,31 @@
     hlist_add_head(&est->list, &rateest_hash[h]);
 }

-struct xt_rateest *xt_rateest_lookup(const char *name)
+static struct xt_rateest *__xt_rateest_lookup(const char *name)
{
    struct xt_rateest *est;
    unsigned int h;

    h = xt_rateest_hash(name);
-    mutex_lock(&xt_rateest_mutex);
-    hlist_for_each_entry(est, &rateest_hash[h], list) {
-        if (strcmp(est->name, name) == 0) {
-            est->refcnt++;
-        }
-    }
-    mutex_unlock(&xt_rateest_mutex);
+    mutex_lock(&xt_rateest_mutex);
+    est = __xt_rateest_lookup(name);
+    mutex_unlock(&xt_rateest_mutex);
    return est;

+struct xt_rateest *xt_rateest_lookup(const char *name)
+{
+    struct xt_rateest *est;
+    +mutex_lock(&xt_rateest_mutex);
+    est = __xt_rateest_lookup(name);
+    mutex_unlock(&xt_rateest_mutex);
+    return est;
void xt_rateest_put(struct xt_rateest *est)
{
    struct xt_rateest *cfg;
    int ret;

    if (strnlen(info->name, sizeof(est->name)) >= sizeof(est->name))
        return -ENOMEM;

    int jhash_rnd[sizeof(jhash_rnd)];
    net_get_random_once(&jhash_rnd, sizeof(jhash_rnd));

    est = __xt_rateest_lookup(info->name);
    if (est) {
        est = xt_rateest_lookup(info->name);
        mutex_lock(&xt_rateest_mutex);
        mutex_unlock(&xt_rateest_mutex);
    } /*
     * If estimator parameters are specified, they must match the
     * existing estimator.
    */
    info->est = est;
    xt_rateest_hash_insert(est);
    mutex_unlock(&xt_rateest_mutex);
    return 0;

err2:
    kfree(est);
err1:
    mutex_unlock(&xt_rateest_mutex);
    return ret;
}
@@ -49,7 +48,7 @@
    return XT_CONTINUE;
 }

-static int checkentry_lsm(struct xt_secmark_target_info *info)
+static int checkentry_lsm(struct xt_secmark_target_info_v1 *info)
{
    int err;

@@ -79,15 +78,15 @@
    return 0;
 }

-static int secmark_tg_check(const struct xt_tgchk_param *par)
+static int secmark_tg_check(const char *table, struct xt_secmark_target_info_v1 *info)
{
    struct xt_secmark_target_info_v1 *info = par->targinfo;
    int err;

-    if (strcmp(par->table, "mangle") != 0 &&
-        strcmp(par->table, "security") != 0) {
+    if (strcmp(table, "mangle") != 0 &&
+        strcmp(table, "security") != 0) {
        pr_info("target only valid in the \mangle\ or \security\ tables, not \"%s\".\n", par->table);
        return -EINVAL;
    }

@@ -122,25 +121,76 @@
 }

-    static struct xt_target secmark_tg_reg __read_mostly = {
-        .name       = "SECMARK",
-        .revision   = 0,
-        .family     = NFPROTO_UNSPEC,
-        .checkentry = secmark_tg_check,
-        .destroy    = secmark_tg_destroy,
-        .target     = secmark_tg,
-        .targetsize = sizeof(struct xt_secmark_target_info),
-        .me         = THIS_MODULE,
-    };
+    static struct xt_target secmark_tg_reg __read_mostly = {
+        .name       = "SECMARK",
+        .revision   = 0,
+        .family     = NFPROTO_UNSPEC,
+        .checkentry = secmark_tg_check_v0(const struct xt_tgchk_param *par)
+{
+    
+    +struct xt_secmark_target_info *info = par->targinfo;
+    +struct xt_secmark_target_info_v1 newinfo = {

+ .mode= info->mode,
+ int ret;
+ 
mempy(newinfo.sectx, info->sectx, SECMARK_SECTX_MAX);
+ 
+ ret = secmark_tg_check(par->table, &newinfo);
+ info->secid = newinfo.secid;
+ 
+ return ret;
+ }
+
+static unsigned int
+ secmark_tg_v0(struct sk_buff *skb, const struct xt_action_param *par)
+ {
+ const struct xt_secmark_target_info *info = par->targinfo;
+ struct xt_secmark_target_info_v1 newinfo = {
+ .secid= info->secid,
+ };
+ 
+ return secmark_tg(skb, &newinfo);
+ }
+
+static int secmark_tg_check_v1(const struct xt_tgchk_param *par)
+ {
+ return secmark_tg_check(par->table, par->targinfo);
+ }
+
+static unsigned int
+ secmark_tg_v1(struct sk_buff *skb, const struct xt_action_param *par)
+ {
+ return secmark_tg(skb, par->targinfo);
+ }
+
+static struct xt_target secmark_tg_reg[] __read_mostly = {
+ {
+ .name= "SECMARK",
+ .revision= 0,
+ .family= NFPROTO_UNSPEC,
+ .checkentry= secmark_tg_check_v0,
+ .destroy= secmark_tg_destroy,
+ .target= secmark_tg_v0,
+ .targetsize= sizeof(struct xt_secmark_target_info),
+ .me= THIS_MODULE,
+ },
+ {
+ .name= "SECMARK",
+ .revision= 1,
family = NFPROTO_UNSPEC,
.checkentry = secmark_tg_check_v1,
.destroy = secmark_tg_destroy,
.target = secmark_tg_v1,
.targetsize = sizeof(struct xt_secmark_target_info_v1),
.usersize = offsetof(struct xt_secmark_target_info_v1, secid),
.me = THIS_MODULE,

};

static int __init secmark_tg_init(void)
{
- return xt_register_target(&secmark_tg_reg);
+ return xt_register_targets(secmark_tg_reg, ARRAY_SIZE(secmark_tg_reg));
}

static void __exit secmark_tg_exit(void)
{
- xt_unregister_target(&secmark_tg_reg);
+ xt_unregister_targets(secmark_tg_reg, ARRAY_SIZE(secmark_tg_reg));
}

module_init(secmark_tg_init);
--- linux-4.15.0.orig/net/netfilter/xt_cgroup.c
+++ linux-4.15.0/net/netfilter/xt_cgroup.c
@@ -52,6 +52,7 @@
 return -EINVAL;
 }
/info->priv = NULL;
 if (info->has_path) {
 cgrp = cgroup_get_from_path(info->path);
 if (!cgrp) }
@@ -65,6 +66,38 @@
 return 0;
 }
+static int cgroup_mt_check_v2(const struct xt_mtchk_param *par)
+{
+ struct xt_cgroup_info_v2 *info = par->matchinfo;
+ struct cgroup *cgrp;
+ if ((info->invert_path & ~1) || (info->invert_classid & ~1))
+ return -EINVAL;
+ if (!info->has_path && !info->has_classid) {
+ pr_info("xt_cgroup: no path or classid specified\n");
+ return -EINVAL;
+ }
if (info->has_path && info->has_classid) {
  pr_info_ratelimited("path and classid specified\n");
  return -EINVAL;
}
+
info->priv = NULL;
+ if (info->has_path) {
  cgrp = cgroup_get_from_path(info->path);
  if (IS_ERR(cgrp)) {
  pr_info_ratelimited("invalid path, errno=%ld\n",
+    PTR_ERR(cgrp));
  return -EINVAL;
  }
  info->priv = cgrp;
  +
  return 0;
  +}
  +
static bool cgroup_mt_v0(const struct sk_buff *skb, struct xt_action_param *par)
{
  if (!sk || !sk_fullsock(sk) || !net_eq(xt_net(par), sock_net(sk)))
    return false;
    +
  if (ancestor)
    return cgroup_is_descendant(sock_cgroup_ptr(skcd), ancestor) ^
  info->invert_path;
  else
    return (info->classid == sock_cgroup_classid(skcd)) ^
  info->invert_classid;
  +
}
+
static bool cgroup_mt_v2(const struct sk_buff *skb, struct xt_action_param *par)
+
const struct xt_cgroup_info_v2 *info = par->matchinfo;
+ struct sock_cgroup_data *skcd = &skb->sk->sk_cgrp_data;
+ struct cgroup *ancestor = info->priv;
+ struct sock *sk = skb->sk;
+
++ if (!sk || !sk_fullsock(sk) || !net_eq(xt_net(par), sock_net(sk)))
++ return false;
++
++ if (ancestor)
++ return cgroup_is_descendant(sock_cgroup_ptr(skcd), ancestor) ^
++ info->invert_path;
++ else
++ return (info->classid == sock_cgroup_classid(skcd)) ^
++ info->invert_classid;
++
+
static void cgroup_mt_destroy_v1(const struct xt_mtdtor_param *par)
{
struct xt_cgroup_info_v1 *info = par->matchinfo;
@@ -102,6 +153,14 @@
cgroup_put(info->priv);
}

+static void cgroup_mt_destroy_v2(const struct xt_mtdtor_param *par)
+{
+struct xt_cgroup_info_v2 *info = par->matchinfo;
+    
+    +if (info->priv)
+    cgroup_put(info->priv);
+}
+
+static struct xt_match cgroup_mt_reg[] __read_mostly = {
+
+    .name = "cgroup",
+    .me = THIS_MODULE,
+    .hooks = (1 << NF_INET_LOCAL_OUT) |
+            (1 << NF_INET_POST_ROUTING) |
+            (1 << NF_INET_LOCAL_IN),
+    },
+
+    +.name = "cgroup",
+    +.revision = 2,
+    +.family = NFPROTO_UNSPEC,
+    +.checkentry = cgroup_mt_check_v2,
+    +.match = cgroup_mt_v2,
+    +.matchsize = sizeof(struct xt_cgroup_info_v2),
+    +.usersize = offsetof(struct xt_cgroup_info_v2, priv),
+    +.destroy = cgroup_mt_destroy_v2,
+    +.me = THIS_MODULE,
+    +.hooks = (1 << NF_INET_LOCAL_OUT) |
+            (1 << NF_INET_POST_ROUTING) |
+            (1 << NF_INET_LOCAL_IN),
+    },
+};
--- linux-4.15.0.orig/net/netfilter/xt_cluster.c
+++ linux-4.15.0/net/netfilter/xt_cluster.c
@@ -133,6 +133,7 @@
 static int xt_cluster_mt_checkentry(const struct xt_mtchk_param *par)
 {    
 struct xt_cluster_match_info *info = par->matchinfo;
+    }

    if (info->total_nodes > XT_CLUSTER_NODES_MAX) {
        pr_info("you have exceeded the maximum ")
@@ -145,7 +146,17 @@

"higher than the total number of nodes\n"
return -EDOM;
}
-\treturn 0;
+
+ret = nf_ct_netns_get(par->net, par->family);
+if (ret < 0)
+pr_info_ratelimited("cannot load conntrack support for proto=%u\n",
+ par->family);
+return ret;
+
+static void xt_cluster_mt_destroy(const struct xt_mtdtor_param *par)
+{
+nf_ct_netns_put(par->net, par->family);
}

static struct xt_match xt_cluster_match __read_mostly = {
@@ -154,6 +165,7 @@
 .match		= xt_cluster_mt,
 .checkentry	= xt_cluster_mt_checkentry,
 .matchsize	= sizeof(struct xt_cluster_match_info),
+destroy	= xt_cluster_mt_destroy,
 .me		= THIS_MODULE,
};

--- linux-4.15.0.orig/net/netfilter/xt_connlimit.c
+++ linux-4.15.0/net/netfilter/xt_connlimit.c
@@ -46,6 +46,9 @@
 struct xt_connlimit_conn {
 struct hlist_node		node;
 struct nf_conntrack_tuple	tuple;
+struct nf_conntrack_zone	zone;
 	u32				jiffies32;

 struct xt_connlimit_rb {
@@ -96,9 +99,9 @@
 return memcmp(addr->ip6, u3->ip6, sizeof(addr->ip6));
 }

_Static bool add_hlist(struct hlist_head *head,
+bool nf_conncount_add(struct hlist_head *head,
 const struct nf_conntrack_tuple *tuple,
 const union nf_inet_addr *addr)
+const struct nf_conntrack_zone *zone)
struct xt_connlimit_conn *conn;

@@ -106,36 +109,78 @@
 if (conn == NULL)
 return false;
 conn->tuple = *tuple;
+conn->zone = *zone;
+conn->cpu = raw_smp_processor_id();
+conn->jiffies32 = (u32)jiffies;
 hlist_add_head(&conn->node, head);
 return true;
 }
 EXPORT_SYMBOL_GPL(nf_conncount_add);

-static unsigned int check_hlist(struct net *net,
 -struct hlist_head *head,
 -const struct nf_conntrack_tuple *tuple,
 -const struct nf_conntrack_zone *zone,
 -bool *addit)
 +static const struct nf_conntrack_tuple_hash *find_or_evict(struct net *net, struct xt_connlimit_conn *conn)
 +{
 +const struct nf_conntrack_tuple_hash *found;
 +unsigned long a, b;
 +int cpu = raw_smp_processor_id();
 +u32 age;
 +
 +found = nf_conntrack_find_get(net, &conn->zone, &conn->tuple);
 +if (found)
 +return found;
 +b = conn->jiffies32;
 +a = (u32)jiffies;
 +
 /* conn might have been added just before by another cpu and
 + * might still be unconfirmed. In this case, nf_conntrack_find()
 + * returns no result. Thus only evict if this cpu added the
 + * stale entry or if the entry is older than two jiffies.
 + */
 +age = a - b;
 +if (conn->cpu == cpu || age >= 2) {
 +hlist_del(&conn->node);
 +kmem_cache_free(connlimit_conn_cachep, conn);
 +return ERR_PTR(-ENOENT);
 +}
 +
 +return ERR_PTR(-EAGAIN);
+}

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+unsigned int nf_conncount_lookup(struct net *net, struct hlist_head *head,
+ const struct nf_conntrack_tuple *tuple,
+ const struct nf_conntrack_zone *zone,
+ bool *addit)
+ {
+ const struct nf_conntrack_tuple_hash *found;
+ struct xt_connlimit_conn *conn;
- struct hlist_node *n;
+ struct hlist_node *n;
+ unsigned int length = 0;
+ *addit = true;

/* check the saved connections */
+ hlist_for_each_entry_safe(conn, n, head, node) {
+ -found = nf_conntrack_find_get(net, zone, &conn->tuple);
+ -if (found == NULL) {
+ -hlist_del(&conn->node);
+ -kmem_cache_free(connlimit_conn_cachep, conn);
+ +found = find_or_evict(net, conn);
+ +if (IS_ERR(found)) {
+ +/* Not found, but might be about to be confirmed */
+ +if (PTR_ERR(found) == -EAGAIN) {
+ +length++;  
+ +if (!tuple)
+ +continue;
+ +
+ +if (nf_ct_tuple_equal(&conn->tuple, tuple) &&
+ + nf_ct_zone_equal(found_ct, zone, zone->dir))
+ + *addit = false;
+ +}  
+ +continue;
+ }
+ 
+ found_ct = nf_ct_tuplehash_to_ctrack(found);
+ 
+ -if (nf_ct_tuple_equal(&conn->tuple)) {
+ +if (nf_ct_tuple_equal(&conn->tuple, tuple) &&
+ + nf_ct_zone_equal(found_ct, zone, zone->dir)) {
+ /*
+ * Just to be sure we have it only once in the list.
+ * We should not see tuples twice unless someone hooks
+ @ @ -159,6 +204,7 @ @
+ 
+ return length;
+ }
EXPORT_SYMBOL_GPL(nf_conncount_lookup);

static void tree_nodes_free(struct rb_root *root,
    struct xt_connlimit_rb *gc_nodes[],
    unsigned int count;
} else {
    /* same source network -> be counted! */
    unsigned int count;
    count = check_hlist(net, &rbconn->hhead, tuple, zone, &addit);
    count = nf_conncount_lookup(net, &rbconn->hhead, tuple,
        zone, &addit);
    tree_nodes_free(root, gc_nodes, gc_count);
    if (!addit)
        return count;
    -if (!add_hlist(&rbconn->hhead, tuple, addr))
+if (!nf_conncount_add(&rbconn->hhead, tuple, zone))
        return 0; /* hotdrop */
    return count + 1;
    continue;

/* only used for GC on hhead, retval and 'addit' ignored */
-check_hlist(net, &rbconn->hhead, tuple, zone, &addit);
+nf_conncount_lookup(net, &rbconn->hhead, tuple, zone, &addit);
    if (hlist_empty(&rbconn->hhead))
        gc_nodes[gc_count++] = rbconn;
    }
    continue;
    while (rbconn) {
        conn->tuple = *tuple;
        conn->zone = *zone;
        rbconn->addr = *addr;

        INIT_HLIST_HEAD(&rbconn->hhead);
        return 0;
    }
}

-void nf_conncount_cache_free(struct hlist_head *hhead)
}{
    struct xt_connlimit_conn *conn;
    struct xt_connlimit_rb *rbconn;

    /* only used for GC on hhead, retval and 'addit' ignored */
    -check_hlist(net, &rbconn->hhead, tuple, zone, &addit);
    +nf_conncount_lookup(net, &rbconn->hhead, tuple, zone, &addit);
    if (hlist_empty(&rbconn->hhead))
        gc_nodes[gc_count++] = rbconn;
    }
    continue;
    while (rbconn) {
        conn->tuple = *tuple;
        conn->zone = *zone;
        rbconn->addr = *addr;

        INIT_HLIST_HEAD(&rbconn->hhead);
        return 0;
    }
}
struct hlist_node *n;
+
+hlist_for_each_entry_safe(conn, n, hhead, node)
+kmem_cache_free(connnlimit_conn_cachep, conn);
+}
+EXPORT_SYMBOL_GPL(nf_conncount_cache_free);
+
+static void destroy_tree(struct rb_root *r)
+{
+struct xt_connnlimit_rb *rbconn;
+struct rb_node *node;
+
+while ((node = rb_first(r)) != NULL) {
+  @@ -379,8 +436,7 @@
+    hlist_for_each_entry_safe(conn, n, &rbconn->hhead, node)
+    kmem_cache_free(connnlimit_conn_cachep, conn);
+  }
+  nf_conncount_cache_free(&rbconn->hhead);
+
+kmem_cache_free(connnlimit_rb_cachep, rbconn);
+}
+--- linux-4.15.0.orig/net/netfilter/xt_hashlimit.c
+++ linux-4.15.0/net/netfilter/xt_hashlimit.c
@@ -295,9 +295,10 @@
 /* copy match config into hashtable config */
 ret = cfg_copy(&hinfo->cfg, (void *)cfg, 3);
 -
-+if (ret) {
+if (ret) {
+vfree(hinfo);
+return ret;
+}
+
+hinfo->cfg.size = size;
+if (hinfo->cfg.max == 0)
+  @@ -774,7 +775,7 @@
if (!dh->rateinfo.prev_window &&
      (dh->rateinfo.current_rate <= dh->rateinfo.burst)) {
    spin_unlock(&dh->lock);
-rcu_read_unlock_bh();
+local_bh_enable();
return !(cfg->mode & XT_HASHLIMIT_INVERT);
} else {
  goto overlimit;
@@ -814,7 +815,6 @@

int ret;

ret = cfg_copy(&cfg, (void *)&info->cfg, 1);
-
if (ret)
return ret;

@@ -830,7 +830,6 @@
int ret;

ret = cfg_copy(&cfg, (void *)&info->cfg, 2);
-
if (ret)
return ret;

@@ -846,6 +845,8 @@
return hashlimit_mt_common(skb, par, hinfo, &info->cfg, 3);
}

#define HASHLIMIT_MAX_SIZE 1048576
+
static int hashlimit_mt_check_common(const struct xt_mtchk_param *par,
    struct xt_hashlimit_htable **hinfo,
    struct hashlimit_cfg3 *cfg,
@@ -856,6 +857,14 @@
if (cfg->gc_interval == 0 || cfg->expire == 0)
    return -EINVAL;
+if (cfg->size > HASHLIMIT_MAX_SIZE) {
+    cfg->size = HASHLIMIT_MAX_SIZE;
+    pr_info_ratelimited("size too large, truncated to %u\n", cfg->size);
+    }
+if (cfg->max > HASHLIMIT_MAX_SIZE) {
+    cfg->max = HASHLIMIT_MAX_SIZE;
+    pr_info_ratelimited("max too large, truncated to %u\n", cfg->max);
+    }
if (par->family == NFPROTO_IPV4) {
if (cfg->srcmask > 32 || cfg->dstmask > 32)
    return -EINVAL;
@@ -915,11 +924,11 @@
struct hashlimit_cfg3 cfg = {};
int ret;

-if (info->name[sizeof(info->name) - 1] != '\0')
-    return -EINVAL;
+ret = xt_check_proc_name(info->name, sizeof(info->name));
+if (ret)
+    return ret;
ret = cfg_copy(&cfg, (void *)&info->cfg, 1);
-
if (ret)
return ret;

@@ -933,11 +942,11 @@
struct hashlimit_cfg3 cfg = {};
int ret;
-
-if (info->name[sizeof(info->name) - 1] != '0')
-return -EINVAL;
+ret = xt_check_proc_name(info->name, sizeof(info->name));
+if (ret)
+return ret;
+
ret = cfg_copy(&cfg, (void *)&info->cfg, 2);
-
if (ret)
return ret;

@@ -948,9 +957,11 @@
static int hashlimit_mt_check(const struct xt_mtchk_param *par)
{
    struct xt_hashlimit_mtinfo3 *info = par->matchinfo;
    +int ret;
-
-if (info->name[sizeof(info->name) - 1] != '0')
-return -EINVAL;
+ret = xt_check_proc_name(info->name, sizeof(info->name));
+if (ret)
+return ret;
+
return hashlimit_mt_check_common(par, &info->hinfo, &info->cfg,
        info->name, 3);
--- linux-4.15.0.orig/net/netfilter/xt_limit.c
+++ linux-4.15.0/net/netfilter/xt_limit.c
@@ -193,9 +193,8 @@
    .compatsize       = sizeof(struct compat_xt_rateinfo),
    .compat_from_user = limit_mt_compat_from_user,
    .compat_to_user   = limit_mt_compat_to_user,
-#else
-    .usersize         = offsetof(struct xt_rateinfo, prev),
+    .usersize         = offsetof(struct xt_rateinfo, prev),
    #endif
    .me               = THIS_MODULE,
};
--- linux-4.15.0.orig/net/netfilter/xt_nfacct.c
+++ linux-4.15.0/net/netfilter/xt_nfacct.c
@@ -55,24 +55,39 @@
   nfnl_acct_put(info->nfacct);
 }

-static struct xt_match nfacct_mt_reg __read_mostly = {
-  .name       = "nfacct",
-  .family     = NFPROTO_UNSPEC,
-  .checkentry = nfacct_mt_checkentry,
-  .match      = nfacct_mt,
-  .destroy    = nfacct_mt_destroy,
-  .matchsize  = sizeof(struct xt_nfacct_match_info),
-  .me         = THIS_MODULE,
+static struct xt_match nfacct_mt_reg[] __read_mostly = {
+  {
+    .name       = "nfacct",
+    .revision   = 0,
+    .family     = NFPROTO_UNSPEC,
+    .checkentry = nfacct_mt_checkentry,
+    .match      = nfacct_mt,
+    .destroy    = nfacct_mt_destroy,
+    .matchsize  = sizeof(struct xt_nfacct_match_info),
+    .usersize   = offsetof(struct xt_nfacct_match_info, nfacct),
+    .me         = THIS_MODULE,
+  },
+  {
+    .name       = "nfacct",
+    .revision   = 1,
+    .family     = NFPROTO_UNSPEC,
+    .checkentry = nfacct_mt_checkentry,
+    .match      = nfacct_mt,
+    .destroy    = nfacct_mt_destroy,
+    .matchsize  = sizeof(struct xt_nfacct_match_info_v1),
+    .usersize   = offsetof(struct xt_nfacct_match_info_v1, nfacct),
+    .me         = THIS_MODULE,
+  },
};

static int __init nfacct_mt_init(void)
{
-  return xt_register_match(&nfacct_mt_reg);
+  return xt_register_matches(nfacct_mt_reg, ARRAY_SIZE(nfacct_mt_reg));
}

static void __exit nfacct_mt_exit(void)
{
-  xt_unregister_match(&nfacct_mt_reg);

xt_unregister_matches(nfacct_mt_reg, ARRAY_SIZE(nfacct_mt_reg));
}

module_init(nfacct_mt_init);
--- linux-4.15.0.orig/net/netfilter/xt_physdev.c
+++ linux-4.15.0/net/netfilter/xt_physdev.c
@@ -96,8 +96,7 @@
static int physdev_mt_check(const struct xt_mtchk_param *par)
{
    const struct xt_physdev_info *info = par->matchinfo;
-
    -br_netfilter_enable();
    +static bool brnf_probed __read_mostly;
    +static bool brnf_probed __read_mostly;

    if (!info->bitmask & XT_PHYSDEV_OP_MASK) ||
    info->bitmask & ~XT_PHYSDEV_OP_MASK)
@@ -105,14 +104,18 @@
    if (info->bitmask & (XT_PHYSDEV_OP_OUT | XT_PHYSDEV_OP_ISOUT) &&
            (!info->bitmask & XT_PHYSDEV_OP_BRIDGED) &&
            -par->hook_mask & ((1 << NF_INET_LOCAL_OUT) |
            -par->hook_mask & ((1 << NF_INET_FORWARD) | (1 << NF_INET_POST_ROUTING)))) {
        pr_info("using --physdev-out and --physdev-is-out are only 
        "supported in the FORWARD and POSTROUTING chains with 
        "bridged traffic.
"");
        -if (par->hook_mask & (1 << NF_INET_LOCAL_OUT))
            +return -EINVAL;
        +return -EINVAL;
    }
    +
    +if (!brnf_probed) {
        +brnf_probed = true;
        +request_module("br_netfilter");
    +}
    +
    return 0;
}

--- linux-4.15.0.orig/net/netfilter/xt_recent.c
+++ linux-4.15.0/net/netfilter/xt_recent.c
@@ -155,7 +155,8 @@
static void recent_entry_reap(struct recent_table *t, unsigned long time,
/*
* Drop entries with timestamps older then 'time'.
*/
-static void recent_entry_reap(struct recent_table *t, unsigned long time)
+static void recent_entry_reap(struct recent_table *t, unsigned long time,
    +struct recent_entry *working, bool update)
struct recent_entry *e;

e = list_entry(t->lru_list.next, struct recent_entry, lru_list);

/*
 + * Do not reap the entry which are going to be updated.
 + */
+if (e == working && update)
+return;
+
+/*
 * The last time stamp is the most recent.
 */
if (time_after(time, e->stamps[e->index-1]))

/* info->seconds must be non-zero */
if (info->check_set & XT_RECENT_REAP)
-recent_entry_reap(t, time);
+recent_entry_reap(t, time, e,
+info->check_set & XT_RECENT_UPDATE && ret);
}

if (info->check_set & XT_RECENT_SET |
    info->check_set & XT_RECENT_MAX_NSTAMPS - 1);
return -EINVAL;
-} -if (info->name[0] == '0' ||
 - strnlen(info->name, XT_RECENT_NAME_LEN) == XT_RECENT_NAME_LEN)
- return -EINVAL;
+ret = xt_check_proc_name(info->name, sizeof(info->name));
+if (ret) 
+return ret;

if (ip_pkt_list_tot && info->hit_count < ip_pkt_list_tot)
nstamp_mask = roundup_pow_of_two(ip_pkt_list_tot) - 1;
const struct recent_entry *e = v;
const struct list_head *head = e->list.next;

(*pos)+=;
while (head == &t->iphash[st->bucket]) {
  if (++st->bucket >= ip_list_hash_size)
    return NULL;
  head = t->iphash[st->bucket].next;


--- linux-4.15.0.orig/net/netfilter/xt_statistic.c
+++ linux-4.15.0/net/netfilter/xt_statistic.c
@@ -84,6 +84,7 @@
 .checkentry = statistic_mt_check,
 .destroy = statistic_mt_destroy,
 .matchsize = sizeof(struct xt_statistic_info),
+ .usersize = offsetof(struct xt_statistic_info, master),
 .me = THIS_MODULE,
};

--- linux-4.15.0.orig/net/netlabel/netlabel_cipso_v4.c
+++ linux-4.15.0/net/netlabel/netlabel_cipso_v4.c
@@ -156,8 +156,8 @@
 return -ENOMEM;
 doi_def->map.std = kzalloc(sizeof(*doi_def->map.std), GFP_KERNEL);
 if (doi_def->map.std == NULL) {
-\t ret_val = -ENOMEM;
-\t goto add_std_failure;
+\t kfree(doi_def);
+\t return -ENOMEM;
 } 
 doi_def->type = CIPSO_V4_MAP_TRANS;

@@ -198,14 +198,14 @@
 doi_def->map.std->lvl.local = kcalloc(doi_def->map.std->lvl.local_size, 
 \t sizeof(u32),
 \t - GFP_KERNEL);
+ \t GFP_KERNEL | __GFP_NOWARN);
 if (doi_def->map.std->lvl.local == NULL) {
 ret_val = -ENOMEM;
 goto add_std_failure;
 } 
 doi_def->map.std->lvl.cipso = kcalloc(doi_def->map.std->lvl.cipso_size, 
 \t sizeof(u32),
 \t - GFP_KERNEL);
+ \t GFP_KERNEL | __GFP_NOWARN);
 if (doi_def->map.std->lvl.cipso == NULL) {
 ret_val = -ENOMEM;
 goto add_std_failure;
 \t @@ -273.7 +273.7 @@
 doi_def->map.std->cat.local = kcalloc(
 doi_def->map.std->cat.local_size,
sizeof(u32),
- GFP_KERNEL);
+ GFP_KERNEL | __GFP_NOWARN);
if (doi_def->map.std->cat.local == NULL) {
  ret_val = -ENOMEM;
  goto add_std_failure;
@@ -281,7 +281,7 @@
  doi_def->map.std->cat.cipso = kcalloc(
      doi_def->map.std->cat.cipso_size,
      sizeof(u32),
- GFP_KERNEL);
+ GFP_KERNEL | __GFP_NOWARN);
if (doi_def->map.std->cat.cipso == NULL) {
  ret_val = -ENOMEM;
  goto add_std_failure;
@@ -581,6 +581,7 @@
  break;
  }
+cipso_v4_doi_putdef(doi_def);
  rcu_read_unlock();

genlmsg_end(ans_skb, data);
@@ -589,12 +590,14 @@
  list_retry:
  /* XXX - this limit is a guesstimate */
  if (nlsze_mult < 4) {
      +cipso_v4_doi_putdef(doi_def);
      rcu_read_unlock();
      kfree_skb(ans_skb);
      nlsze_mult *= 2;
      goto list_start;
  }
  list_failure_lock:
  +cipso_v4_doi_putdef(doi_def);
  rcu_read_unlock();
  list_failure:
  kfree_skb(ans_skb);
  --- linux-4.15.0.orig/net/netlabel/netlabel_domainhash.c
  +++ linux-4.15.0/net/netlabel/netlabel_domainhash.c
  @@ -99,6 +99,7 @@
  kfree(netlbl_domhsh_addr6_entry(iter6));
  }
#endif /* IPv6 */
+kfree(ptr->def.addrsel);
  }
kfree(ptr->domain);
kfree(ptr);
goto add_return;
}
#endif /* IPv6 */
+/* cleanup the new entry since we've moved everything over */
+netlbl_domhsh_free_entry(&entry->rcu);
} else
ret_val = -EINVAL;

int ret_val = 0;
struct audit_buffer *audit_buf;
+struct netlbl_af4list *iter4;
+struct netlbl_domaddr4_map *map4;
+#if IS_ENABLED(CONFIG_IPV6)
+struct netlbl_af6list *iter6;
+struct netlbl_domaddr6_map *map6;
+#endif /* IPv6 */

if (entry == NULL)
return -ENOENT;
#endif -610.6 +619.9 @@
ret_val = -ENOENT;
spin_unlock(&netlbl_domhsh_lock);

+if (ret_val)
+return ret_val;
+
audit_buf = netlbl_audit_start_common(AUDIT_MAC_MAP_DEL, audit_info);
if (audit_buf != NULL) {
audit_log_format(audit_buf,
#endif -619.40 +631.29 @@
audit_log_end(audit_buf);
}

-else if (ret_val == 0) {
-struct netlbl_af4list *iter4;
-struct netlbl_domaddr4_map *map4;
-#if IS_ENABLED(CONFIG_IPV6)
-struct netlbl_af6list *iter6;
-struct netlbl_domaddr6_map *map6;
-#endif /* IPv6 */
-
-else
-
-switch (entry->def.type) {
- case NETLBL_NLTYPE_ADDRSELECT:
- netlbl_af4list_foreach_rcu(iter4,
- &entry->def.addrsel->list4) {

+switch (entry->def.type) {
+  case NETLBL_NLTYPE_ADDRSELECT:
+    netlbl_af4list_foreach_rcu(iter4, &entry->def.addrsel->list4) {
+      map4 = netlbl_domhsh_addr4_entry(iter4);
+      cipso_v4_doi_putdef(map4->def.cipso);
+    }
+
+    case NETLBL_NLTYPE_CIPSOV4:
+      cipso_v4_doi_putdef(entry->def.cipso);
+      break;
+
+    case NETLBL_NLTYPE_CALIPSO:
+      calipso_doi_putdef(entry->def.calipso);
+      break;
+
+  }  
+
+  if (entry->def.type == NETLBL_NLTYPE_ADDRSELECT) {
+    netlbl_af6list_foreach_rcu(iter6, &entry->def.addrsel->list6) {
+      map6 = netlbl_domhsh_addr6_entry(iter6);
+      calipso_doi_putdef(map6->def.calipso);
+    }
+    case NETLBL_NLTYPE_CIPSOV4:
+      cipso_v4_doi_putdef(entry->def.cipso);
+      break;
+    case NETLBL_NLTYPE_CALIPSO:
+      calipso_doi_putdef(entry->def.calipso);
+      break;
+  }  
+
+  if (off & (BITS_PER_LONG - 1)) != 0)
+    return -EINVAL;
+
+  if (entry->rcu) rcu_fast_path(entry->rcu, netlbl_domhsh_free_entry);
+  else
+    call_rcu(&entry->rcu, netlbl_domhsh_free_entry);
+
+  return ret_val;
+
+}
/* a null catmap is equivalent to an empty one */
+if (!catmap) {
+  *offset = (u32)-1;
+  return 0;
+}
+
+if (off < catmap->startbit) {
  off = catmap->startbit;
  *offset = off;
  @@ -903,7 +909,8 @@
      (state == 0 && (byte & bitmask) == 0))
  return bit_spot;

  -bit_spot++;
  +if (++bit_spot >= bitmap_len)
  +return -1;
  bitmask >>= 1;
  if (bitmask == 0) {
    byte = bitmap[++byte_offset];

--- linux-4.15.0.orig/net/netlabel/netlabel_mgmt.c
+++ linux-4.15.0/net/netlabel/netlabel_mgmt.c
@@ -90,6 +90,7 @@
 static int netlbl_mgmt_add_common(struct genl_info *info,
     struct netlbl_audit *audit_info)
 {
   +void *pmap = NULL;
   int ret_val = -EINVAL;
   struct netlbl_domaddr_map *addrmap = NULL;
   struct cipso_v4_doi *cipsov4 = NULL;
@@ -189,6 +190,7 @@
       ret_val = netlbl_af4list_add(&map->list, &addrmap->list4);
       -if (ret_val != 0) {
       -kfree(map);
       -goto add_free_addrmap;
       +if (ret_val != 0)
         goto add_free_map;
entry->family = AF_INET;
entry->def.type = NETLBL_NLTYPE_ADDRSELECT;
@@ -237,6 +237,7 @@
    ret_val = -ENOMEM;
goto add_free_addrmapper;
}
+pmap = map;
map->list.addr = *addr;
map->list.addr.s6_addr32[0] &= mask->s6_addr32[0];
map->list.addr.s6_addr32[1] &= mask->s6_addr32[1];
@@ -249,10 +250,8 @@
    map->def.calipso = calipso;
    ret_val = netlbl_af6list_add(&map->list, &addrmap->list6);
    -if (ret_val != 0) {
    -kfree(map);
    -goto add_free_addrmapper;
    -}
    +if (ret_val != 0)
    +goto add_free_map;
    
    entry->family = AF_INET6;
    entry->def.type = NETLBL_NLTYPE_ADDRSELECT;
@@ -262,10 +261,12 @@
    ret_val = netlbl_domhsh_add(entry, audit_info);
    if (ret_val != 0)
    -goto add_free_addrmapper;
    +goto add_free_map;
    
    return 0;
    
    +add_free_map:
    +kfree(pmap);
    add_free_addrmapper:
    kfree(addrmap);
    add_doi_put_def:
    --- linux-4.15.0.orig/net/netlabel/netlabel_unlabeled.c
    +++ linux-4.15.0/net/netlabel/netlabel_unlabeled.c
    @@ -781,7 +781,8 @@
    
    u32 addr_len;
    -if (info->attrs[NLBL_UNLABEL_A_IPV4ADDR]) {
    +if (info->attrs[NLBL_UNLABEL_A_IPV4ADDR] &&
    +  info->attrs[NLBL_UNLABEL_A_IPV4MASK]) {
      addr_len = nla_len(info->attrs[NLBL_UNLABEL_A_IPV4ADDR]);
if (addr_len != sizeof(struct in_addr) &&
    addr_len != nla_len(info->attrs[NLBL_UNLABEL_A_IPV4MASK]))
@@ -1178,12 +1179,13 @@
    struct netlbl_unlhsh_walk_arg cb_arg;
    u32 skip_bkt = cb->args[0];
    u32 skip_chain = cb->args[1];
    -u32 iter_bkt;
    -u32 iter_chain = 0, iter_addr4 = 0, iter_addr6 = 0;
    +u32 skip_addr4 = cb->args[2];
    +u32 iter_bkt, iter_chain = 0, iter_addr4 = 0, iter_addr6 = 0;
    struct netlbl_unlhsh_iface *iface;
    struct list_head *iter_list;
    struct netlbl_af4list *addr4;
    #if IS_ENABLED(CONFIG_IPV6)
    +u32 skip_addr6 = cb->args[3];
    struct netlbl_af6list *addr6;
    #endif
@@ -1194,7 +1196,7 @@
    rcu_read_lock();
    for (iter_bkt = skip_bkt;
         iter_bkt < rcu_dereference(netlbl_unlhsh)->size;
    -     iter_bkt++, iter_chain = 0, iter_addr4 = 0, iter_addr6 = 0) {
    +     iter_bkt++) {
        iter_list = &rcu_dereference(netlbl_unlhsh)->tbl[iter_bkt];
        list_for_each_entry_rcu(iface, iter_list, list) {
            if (!iface->valid ||
@@ -1202,7 +1204,7 @@
             continue;
        netlbl_af4list_foreach_rcu(addr4,
             &iface->addr4_list) {
             -if (iter_addr4++ < cb->args[2])
             +if (iter_addr4++ < skip_addr4)
                 continue;
        if (netlbl_unlabel_staticlist_gen(
             NLBL_UNLABEL_C_STATICLIST,
@@ -1215,10 +1217,12 @@
             goto unlabel_staticlist_return;
        }
        }
        +iter_addr4 = 0;
        +skip_addr4 = 0;
        #if IS_ENABLED(CONFIG_IPV6)
        netlbl_af6list_foreach_rcu(addr6,
             &iface->addr6_list) {
             -if (iter_addr6++ < cb->args[3])
             +if (iter_addr6++ < skip_addr6)
                 continue;
if (netlbl_unlabel_staticlist_gen(NLBL_UNLABEL_C_STATICLIST, @-1231,8 +1235,12 @)
goto unlabel_staticlist_return;
}

iter_addr6 = 0;
+skip_addr6 = 0;
@end interface /* IPv6 */
}
+iter_chain = 0;
+skip_chain = 0;
}

unlabel_staticlist_return:
@-1472,6 +1480,16 @
iface = rcu_dereference(netlbl_unlhsh_def);
if (iface == NULL || iface->valid)
goto unlabel_getattr_nolabel;
+
+if IS_ENABLED(CONFIG_IPV6)
/* When resolving a fallback label, check the sk_buff version as
 * it is possible (e.g. SCTP) to have family = PF_INET6 while
 * receiving ip_hdr(skb)->version = 4.
 */
+if (family == PF_INET6 && ip_hdr(skb)->version == 4)
+family = PF_INET;
+endif /* IPv6 */
+
switch (family) {
  case PF_INET:
struct iphdr *hdr4;
  --- linux-4.15.0 orig/net/netlink/af_netlink.c
  +++ linux-4.15.0/net/netlink/af_netlink.c
  @-63,6 +63,7 @
#include <linux/hash.h>
#include <linux/genetlink.h>
#include <linux/net_namespace.h>
+include <linux/nospec.h>

#include <net/net_namespace.h>
#include <net/sock.h>
@-427,11 +428,13 @
static inline void
netlink_lock_table(void)
{
  +unsigned long flags;
  +
/* read_lock() synchronizes us to netlink_table_grab */

-read_lock(&nl_table_lock);
+read_lock_irqsave(&nl_table_lock, flags);
atomic_inc(&nl_table_users);
-read_unlock(&nl_table_lock);
+read_unlock_irqrestore(&nl_table_lock, flags);
}

static inline void
@@ -563,7 +566,10 @@
    /* We need to ensure that the socket is hashed and visible. */
    smp_wmb();
    -nlk_sk(sk)->bound = portid;
+/* Paired with lockless reads from netlink_bind(),
+ * netlink_connect() and netlink_sendmsg().
+ */
+WRITE_ONCE(nlk_sk(sk)->bound, portid);

err:
    release_sock(sk);
@@ -646,6 +652,7 @@
    if (protocol < 0 || protocol >= MAX_LINKS)
        return -EPROTONOSUPPORT;
    +protocol = array_index_nospec(protocol, MAX_LINKS);

    netlink_lock_table();
    #ifdef CONFIG_MODULES
    @@ -976,7 +983,13 @@
        return err;
    }

    -bound = nlk->bound;
    +if (nlk->ngroups == 0)
    +groups = 0;
    +else if (nlk->ngroups < 8*sizeof(groups))
    +groups &= (1UL << nlk->ngroups) - 1;
    +
    +/* Paired with WRITE_ONCE() in netlink_insert() */
    +bound = READ_ONCE(nlk->bound);
    if (bound) {
        /* Ensure nlk->portid is up-to-date. */
        smp_rmb();
        @@ -989,7 +1002,8 @@
        if (nlk->netlink_bind &&& groups) {
            int group;

for (group = 0; group < nlk->ngroups; group++) {
    /* nl_groups is a u32, so cap the maximum groups we can bind */
    for (group = 0; group < BITS_PER_TYPE(u32); group++) {
        if (!test_bit(group, &groups))
            continue;
        err = nlk->netlink_bind(net, group + 1);
        netlink_insert(sk, nladdr->nl_pid);
        netlink_autobind(sock);
        if (err) {
            netlink_undo_bind(nlk->ngroups, groups, sk);
        } else {
            netlink_undo_bind(BITS_PER_TYPE(u32), groups, sk);
        }
    }
    goto unlock;
}
if (addr->sa_family != AF_NETLINK)
    return -EINVAL;
if (alen < sizeof(struct sockaddr_nl))
    return -EINVAL;
if ((nladdr->nl_groups || nladdr->nl_pid) &&
    !netlink_allowed(sock, NL_CFG_F_NONROOT_SEND))
    return -EPERM;
/* No need for barriers here as we return to user-space without
 * using any of the bound attributes.
 * * Paired with WRITE_ONCE() in netlink_insert().
 */
@if (!nlk->bound)
+if (!READ_ONCE(nlk->bound))
    err = netlink_autobind(sock);
if (err == 0) {
    if (msg->msg_namelen < sizeof(struct sockaddr_nl))
        goto out;
    if (addr->nl_family != AF_NETLINK)
        goto out;
dst_portid = addr->nl_pid;
    dst_group = nlk->dst_group;
    }

-if (!nlk->bound) {
    /* Paired with WRITE_ONCE() in netlink_insert() */
+if (!READ_ONCE(nlk->bound)) {
    err = netlink_autobind(sock);
    if (err)
        goto out;
    @ @ -2275,7 +2296,7 @ @
    if (cb->start) {
        ret = cb->start(cb);
        if (ret)
            -goto error_unlock;
            +goto error_put;
    }
}

nlk->cb_running = true;
@@ -2295,6 +2316,8 @@
*/
return -EINTR;

+error_put:
+module_put(control->module);
error_unlock:
sock_put(sk);
mutex_unlock(nlk->cb_mutex);
@@ -2365,7 +2388,7 @@
in_skb->len))
WARN_ON(nla_put_u32(skb, NLMSGERR_ATTR_OFFS,
    (u8 *)extack->bad_attr -
    in_skb->data));
+    (u8 *)nlh));
} else {
    if (extack->cookie_len)
        WARN_ON(nla_put(skb, NLMSGERR_ATTR_COOKIE,
            @ @ -2450,13 +2473,15 @@
/* errors reported via destination sk->sk_err, but propagate
 * delivery errors if NETLINK_BROADCAST_ERROR flag is set */
err = nlmsg_multicast(sk, skb, exclude_portid, group, flags);
+if (err == -ESRCH)
+err = 0;
}

if (report) {
    int err2;

    err2 = nlmsg_unicast(sk, skb, portid);
-    if (!err || err == -ESRCH)
+    if (!err)
err = err2;
}

--- linux-4.15.0.orig/net/netlink/genetlink.c
+++ linux-4.15.0/net/netlink/genetlink.c
@@ -365,7 +365,7 @@
 start, end + 1, GFP_KERNEL);
 if (family->id < 0) {
   err = family->id;
-  goto errout_locked;
+  goto errout_free;
  +goto errout_free;
 }

 err = genl_validate_assign_mc_groups(family);
@@ -384,6 +384,7 @@
 errout_remove:
 idr_remove(&genl_fam_idr, family->id);
 +errout_free:
 kfree(family->attrbuf);
 errout_locked:
 genl_unlock_all();
@@ -958,60 +959,11 @@
 .netnsok = true,
);

- static int genl_bind(struct net *net, int group)
- {
-   struct genl_family *f;
-   int err = -ENOENT;
-   unsigned int id;
-   -down_read(&cb_lock);
-   -
-   -idr_for_each_entry(&genl_fam_idr, f, id) {
-     -if (group >= f->mcgrp_offset &&
-       group < f->mcgrp_offset + f->n_mcgrps) {
-       int famGRP = group - f->mcgrp_offset;
-     -
-       -if (!netnsok && net != &init_net)
-         err = -ENOENT;
-       else if (f->mcast_bind)
-         err = f->mcast_bind(net, famGRP);
-       else
-         err = 0;
-       -break;
-     -}
-   -}
-   -
-   -

---
-up_read(&cb_lock);
-
-return err;
-
-
-static void genl_unbind(struct net *net, int group)
-
{
-struct genl_family *f;
-unsigned int id;
-
-down_read(&cb_lock);
-
-
idr_for_each_entry(&genl_fam_idr, f, id) {
-if (group >= f->mcgrp_offset &&
- group < f->mcgrp_offset + f->n_mcgrps) {
- int fam_grp = group - f->mcgrp_offset;
-
-if (f->mcast_unbind)
-f->mcast_unbind(net, fam_grp);
-break;
-
-
-up_read(&cb_lock);
-
-
-
-static int __net_init genl_pernet_init(struct net *net)
{
 struct netlink_kernel_cfg cfg = {
 .input= genl_rcv,
 .flags= NL_CFG_F_NONROOT_RECV,
 .bind= genl_bind,
 .unbind= genl_unbind,
 };

/* we’ll bump the group number right afterwards */
@@ -1081,6 +1033,7 @@
{
 struct sk_buff *tmp;
 struct net *net, *prev = NULL;
+bool delivered = false;
 int err;

 for_each_net_rcu(net) {
-@@ -1092,14 +1045,21 @@
 }

 err = nlmsg_multicast(prev->genl_sock, tmp,
- portid, group, flags);
+if (err)
+  err = nlmsg_multicast(prev->genl_sock, tmp,
+                        portid, group, flags);
+    break;
+}
-
if (!err)
    delivered = true;
else if (err != -ESRCH)
goto error;
}

prev = net;
}

return nlmsg_multicast(prev->genl_sock, skb, portid, group, flags);
+err = nlmsg_multicast(prev->genl_sock, skb, portid, group, flags);
+if (!err)
++delivered = true;
+else if (err != -ESRCH)
++return err;
++return delivered ? 0 : -ESRCH;

error:
kfree_skb(skb);
return err;

--- linux-4.15.0.orig/net/netrom/af_netrom.c
+++ linux-4.15.0/net/netrom/af_netrom.c
@@ -153,7 +153,7 @@
sk_for_each(s, &nr_list)
       if (!ax25cmp(&nr_sk(s)->source_addr, addr) &&
           s->sk_state == TCP_LISTEN) {
-bh_lock_sock(s);
+sock_hold(s);
          goto found;
       }

@@ -174,7 +174,7 @@
       struct nr_sock *nr = nr_sk(s);
       if (nr->my_index == index && nr->my_id == id) {
-bh_lock_sock(s);
+sock_hold(s);
          goto found;
       }

@@ -198,7 +198,7 @@
           if (nr->your_index == index && nr->your_id == id &&
               !ax25cmp(&nr->dest_addr, dest)) {
-bh_lock_sock(s);
+sock_hold(s);
          goto found;
       }

@@ -222,7 +222,7 @@
           if (nr->local_index == index && nr->local_id == id &&
               !ax25cmp(&nr->local_addr, local)) {
-bh_lock_sock(s);
+sock_hold(s);
          goto found;
       }

@@ -261,7 +261,7 @@
       if (nr->my_src == src)
           if (nr->my_index == index && nr->my_id == id) {
-bh_lock_sock(s);
+sock_hold(s);
              goto found;
           }
@@ -224,7 +224,7 @@
     if (i != 0 && j != 0) {
         if ((sk = nr_find_socket(i, j)) == NULL)
             break;
-        bh_unlock_sock(sk);
+        sock_put(sk);
     }

     id++;
@@ -871,7 +871,7 @@
     unsigned short frametype, flags, window, timeout;
     int ret;

-    skb->sk = NULL; /* Initially we don't know who it's for */
+    skb_orphan(skb);

    /*
     * skb->data points to the netrom frame start
@@ -919,6 +919,7 @@
     if (sk != NULL) {
         bh_lock_sock(sk);
         skb_reset_transport_header(skb);
@@ -928,6 +929,7 @@
             ret = nr_process_rx_frame(sk, skb);
         bh_unlock_sock(sk);
         +sock_put(skb);
             return ret;
         }
@@ -959,13 +961,17 @@
             (make = nr_make_new(skb)) == NULL) {
                 nr_transmit_refusal(skb, 0);
             if (sk)
-            bh_unlock_sock(skb);
+            sock_put(skb);
                 return 0;
             }
+
+            bh_lock_sock(skb);
+            window = skb->data[20];

+            sock_hold(make);
skb->sk = make;
+skb->destructor = sock_efree;
make->sk_state = TCP_ESTABLISHED;

/* Fill in his circuit details */
@@ -1015,6 +1021,7 @@
sk->sk_data_ready(sk);

bh_unlockSock(sk);
+sock_put(sk);

nr_insert_socket(make);

--- linux-4.15.0.orig/net/netrom/nr_route.c
+++ linux-4.15.0/net/netrom/nr_route.c
@@ -211,6 +211,7 @@
/* refcount initialized at 1 */
spin_unlock_bh(&nr_node_list_lock);

+nr_neigh_put(nr_neigh);
return 0;
}
nr_node_lock(nr_node);

--- linux-4.15.0.orig/net/netrom/nr_timer.c
+++ linux-4.15.0/net/netrom/nr_timer.c
@@ -52,21 +52,21 @@
{
struct nr_sock *nr = nr_sk(sk);

-mod_timer(&nr->t1timer, jiffies + nr->t1);
+sk_reset_timer(sk, &nr->t1timer, jiffies + nr->t1);
}

void nr_start_t2timer(struct sock *sk)
{
struct nr_sock *nr = nr_sk(sk);

-mod_timer(&nr->t2timer, jiffies + nr->t2);
+sk_reset_timer(sk, &nr->t2timer, jiffies + nr->t2);
}

void nr_start_t4timer(struct sock *sk)
{
struct nr_sock *nr = nr_sk(sk);

-mod_timer(&nr->t4timer, jiffies + nr->t4);
+sk_reset_timer(sk, &nr->t4timer, jiffies + nr->t4);
void nr_start_idletimer(struct sock *sk)
@@ -74,37 +74,37 @@
    struct nr_sock *nr = nr_sk(sk);

    if (nr->idle > 0)
-        mod_timer(&nr->idletimer, jiffies + nr->idle);
+        sk_reset_timer(sk, &nr->idletimer, jiffies + nr->idle);
    }

void nr_start_heartbeat(struct sock *sk)
{
-    mod_timer(&sk->sk_timer, jiffies + 5 * HZ);
+    sk_reset_timer(sk, &sk->sk_timer, jiffies + 5 * HZ);
}

void nr_stop_t1timer(struct sock *sk)
{
-    del_timer(&nr_sk(sk)->t1timer);
+    sk_stop_timer(sk, &nr_sk(sk)->t1timer);
}

void nr_stop_t2timer(struct sock *sk)
{
-    del_timer(&nr_sk(sk)->t2timer);
+    sk_stop_timer(sk, &nr_sk(sk)->t2timer);
}

void nr_stop_t4timer(struct sock *sk)
{
-    del_timer(&nr_sk(sk)->t4timer);
+    sk_stop_timer(sk, &nr_sk(sk)->t4timer);
}

void nr_stop_idletimer(struct sock *sk)
{
-    del_timer(&nr_sk(sk)->idletimer);
+    sk_stop_timer(sk, &nr_sk(sk)->idletimer);
}

void nr_stop_heartbeat(struct sock *sk)
{
-    del_timer(&sk->sk_timer);
+    sk_stop_timer(sk, &sk->sk_timer);
}

int nr_t1timer_running(struct sock *sk)
@@ -124,11 +124,9 @@

is accepted() it isn't 'dead' so doesn't get removed. */
if (sock_flag(sk, SOCK_DESTROY) ||
    (sk->sk_state == TCP_LISTEN && sock_flag(sk, SOCK_DEAD))) {
    sock_hold(sk);
bh_unlock_sock(sk);
nr_destroy_socket(sk);
    return;
    goto out;
+
+    sock_put(sk);
} 
break;

@@ -149,6 +147,8 @@
nr_start_heartbeat(sk);
bh_unlock_sock(sk);
+out:
+    sock_put(sk);
} 

static void nr_t2timer_expiry(struct timer_list *t)
@@ -162,6 +162,7 @@
nr_enquiry_response(sk);
} 
bh_unlock_sock(sk);
+    sock_put(sk);
}

static void nr_t4timer_expiry(struct timer_list *t)
@@ -172,6 +173,7 @@
bh_lock_sock(sk);
nr_sk(sk)->condition &= ~NR_COND_PEER_RX_BUSY;
bh_unlock_sock(sk);
+    sock_put(sk);
}

static void nr_idletimer_expiry(struct timer_list *t)
@@ -200,6 +202,7 @@
sock_set_flag(sk, SOCK_DEAD);
} 
bh_unlock_sock(sk);
+    sock_put(sk);
}

static void nr_t1timer_expiry(struct timer_list *t)
@@ -212,8 +215,7 @@
case NR_STATE_1:
if (nr->n2count == nr->n2) {
nr_disconnect(sk, ETIMEDOUT);
-bh_unlock_sock(sk);
-return;
+goto out;
} else {
 nr->n2count++;
 nr_write_internal(sk, NR_CONNREQ);
 @@ -223,8 +225,7 @@
case NR_STATE_2:
 if (nr->n2count == nr->n2) {
 nr_disconnect(sk, ETIMEDOUT);
-bh_unlock_sock(sk);
-return;
+goto out;
} else {
 nr->n2count++;
 nr_write_internal(sk, NR_DISCREQ);
 @@ -234,8 +235,7 @@
case NR_STATE_3:
 if (nr->n2count == nr->n2) {
 nr_disconnect(sk, ETIMEDOUT);
-bh_unlock_sock(sk);
-return;
+goto out;
} else {
 nr->n2count++;
 nr_requeue_frames(sk);
 @@ -244,5 +244,7 @@
}

nr_start_t1timer(sk);
+out:
 bh_unlock_sock(sk);
+sock_put(sk);
}
--- linux-4.15.0.orig/net/nfc/af_nfc.c
+++ linux-4.15.0/net/nfc/af_nfc.c
@@ -72,6 +72,9 @@
 proto_tab[nfc_proto->id] = nfc_proto;
 write_unlock(&proto_tab_lock);

+if (rc)
+proto_unregister(nfc_proto->proto);
+
+return rc;
}

EXPORT_SYMBOL(nfc_proto_register);
--- linux-4.15.0.orig/net/nfc/digital_core.c
+++ linux-4.15.0/net/nfc/digital_core.c
@@ -286,6 +286,15 @@
int digital_tg_listen_mdaa(struct nfc_digital_dev *ddev, u8 rf_tech)
{
    struct digital_tg_mdaa_params *params;
+    int rc;

    params = kzalloc(sizeof(*params), GFP_KERNEL);
    if (!params)
@@ -300,8 +301,12 @@
            get_random_bytes(params->nfcid2 + 2, NFC_NFCID2_MAXSIZE - 2);
    params->sc = DIGITAL_SENSF_FELICA_SC;

    return digital_send_cmd(ddev, DIGITAL_CMD_TG_LISTEN_MDAA, NULL, params,
-                           500, digital_tg_recv_atr_req, NULL);
+                           500, digital_tg_recv_atr_req, NULL);
+    if (rc)
+        kfree(params);
+    return rc;
}

static int digital_tg_listen_md(struct nfc_digital_dev *ddev, u8 rf_tech)
--- linux-4.15.0.orig/net/nfc/digital_dep.c
+++ linux-4.15.0/net/nfc/digital_dep.c
@@ -1285,6 +1285,8 @@
}

rc = nfc_tm_data_received(ddev->nfc_dev, resp);
+if (rc)
+    resp = NULL;

exit:
kfree_skb(ddev->chaining_skb);
--- linux-4.15.0.orig/net/nfc/digital_technology.c
+++ linux-4.15.0/net/nfc/digital_technology.c
@@ -474,8 +474,12 @@
        skb_put_u8(skb, sel_cmd);
        skb_put_u8(skb, DIGITAL_SDD_REQ_SEL_PAR);

-    return digital_in_send_cmd(ddev, skb, 30, digital_in_recv_sdd_res,
-                               - target);
+    rc = digital_in_send_cmd(ddev, skb, 30, digital_in_recv_sdd_res,
+                             + target);
+    if (rc)
+        kfree_skb(skb);
+    }
static void digital_in_recv_sens_res(struct nfc_digital_dev *ddev, void *arg,
--- linux-4.15.0.orig/net/nfc/hci/core.c
+++ linux-4.15.0/net/nfc/hci/core.c
@@ -193,13 +193,20 @@
 void nfc_hci_cmd_received(struct nfc_hci_dev *hdev, u8 pipe, u8 cmd,
     struct sk_buff *skb)
 {
-u8 gate = hdev->pipes[pipe].gate;
-u8 status = NFC_HCI_ANY_OK;
 struct hci_create_pipe_resp *create_info;
 struct hci_delete_pipe_noti *delete_info;
 struct hci_all_pipe_cleared_noti *cleared_info;
+u8 gate;

 -pr_debug("from gate %x pipe %x cmd %x\n", gate, pipe, cmd);
 +pr_debug("from pipe %x cmd %x\n", pipe, cmd);
 +
 +if (pipe >= NFC_HCI_MAX_PIPES) {
 +status = NFC_HCI_ANY_E_NOK;
 +goto exit;
 +}
 +
 +gate = hdev->pipes[pipe].gate;

 switch (cmd) {
 case NFC_HCI_ADM_NOTIFY_PIPE_CREATED:
@@ -209,6 +216,11 @@
 create_info = (struct hci_create_pipe_resp *)skb->data;

 +if (create_info->pipe >= NFC_HCI_MAX_PIPES) {
 +status = NFC_HCI_ANY_E_NOK;
 +goto exit;
 +}
 +
 +/* Save the new created pipe and bind with local gate,
 * the description for skb->data[3] is destination gate id
 * but since we received this cmd from host controller, we
@@ -232,6 +244,11 @@
 delete_info = (struct hci_delete_pipe_noti *)skb->data;

 +if (delete_info->pipe >= NFC_HCI_MAX_PIPES) {
 +status = NFC_HCI_ANY_E_NOK;
 +goto exit;
 +}
 +

hdev->pipes[delete_info->pipe].gate = NFC_HCI_INVALID_GATE;
hdev->pipes[delete_info->pipe].dest_host = NFC_HCI_INVALID_HOST;
break;
@@ -377,8 +394,14 @@
	struct sk_buff *skb)
{
    int r = 0;
-u8 gate = hdev->pipes[pipe].gate;
+u8 gate;
+
+if (pipe >= NFC_HCI_MAX_PIPES) {
+    pr_err("Discarded event %x to invalid pipe %x\n", event, pipe);
+    goto exit;
+}
+
+gate = hdev->pipes[pipe].gate;
if (gate == NFC_HCI_INVALID_GATE) {
    pr_err("Discarded event %x to unopened pipe %x\n", event, pipe);
    goto exit;
--- linux-4.15.0.orig/net/nfc/llcp_commands.c
+++ linux-4.15.0/net/nfc/llcp_commands.c
@@ -149,6 +149,10 @@
    pr_debug("uri: %s, len: %zu\n", uri, uri_len);

+/* sdreq->tlv_len is u8, takes uri_len, + 3 for header, + 1 for NULL */
+if (WARN_ON_ONCE(uri_len > U8_MAX - 4))
+    return NULL;
+
+sdreq = kzalloc(sizeof(struct nfc_llcp_sdp_tlv), GFP_KERNEL);
if (sdreq == NULL)
    return NULL;
@@ -415,6 +419,10 @@
    &service_name_tlv_length);
+if (!service_name_tlv) {
+    err = -ENOMEM;
+    goto error_tlv;
+}
size += service_name_tlv_length;
}
@@ -425,9 +433,17 @@

miux_tlv = nfc_llcp_build_tlv(LLCP_TLV_MIUX, (u8 *)&miux, 0,
&miux_tlv_length);
+if (!miux_tlv) {
  +err = -ENOMEM;
  +goto error_tlv;
  +}
  
size += miux_tlv_length;

  rw_tlv = nfc_llcp_build_tlv(LLCP_TLV_RW, &rw, 0, &rw_tlv_length);
+if (!rw_tlv) {
  +err = -ENOMEM;
  +goto error_tlv;
  +}
  
size += rw_tlv_length;

  pr_debug("SKB size %d SN length %zu\n", size, sock->service_name_len);
@@ -480,9 +496,17 @@

  miux_tlv = nfc_llcp_build_tlv(LLCP_TLV_MIUX, (u8 *)&miux, 0,
&miux_tlv_length);
+if (!miux_tlv) {
  +err = -ENOMEM;
  +goto error_tlv;
  +}
  
size += miux_tlv_length;

  rw_tlv = nfc_llcp_build_tlv(LLCP_TLV_RW, &rw, 0, &rw_tlv_length);
+if (!rw_tlv) {
  +err = -ENOMEM;
  +goto error_tlv;
  +}
  
size += rw_tlv_length;

  skb = llcp_allocate_pdu(sock, LLCP_PDU_CC, size);
@@ -748,11 +772,14 @@

  pr_debug("Fragment %zd bytes remaining %zd",
  frag_len, remaining_len);

-pdu = nfc_alloc_send_skb(sock->dev, &sock->sk, MSG_DONTWAIT,
+ pdu = nfc_alloc_send_skb(sock->dev, &sock->sk, 0,
  frag_len + LLCP_HEADER_SIZE, &err);
if (pdu == NULL) {
  -pr_err("Could not allocate PDU\n");
  -continue;
  +pr_err("Could not allocate PDU (error=%d)\n", err);
  +len = remaining_len;
  +if (len == 0)
  +len = err;
  +break;
static int nfc_llcp_build_gb(struct nfc_llcp_local *local)
{
    u8 *gb_cur, *version_tlv, version, version_length;
    u8 *lto_tlv, lto_length;
    u8 *wks_tlv, wks_length;
    u8 *miux_tlv, miux_length;
    u8 gb_len = 0;
    int ret = 0;

    version = LLCP_VERSION_11;

    version_tlv = nfc_llcp_build_tlv(LLCP_TLV_VERSION, &version, 1, &version_length);
    if (!version_tlv) {
        ret = -ENOMEM;
        goto out;
    }
    gb_len += version_length;

    lto_tlv = nfc_llcp_build_tlv(LLCP_TLV_LTO, &local->lto, 1, &lto_length);
    if (!lto_tlv) {
        ret = -ENOMEM;
        goto out;
    }
    gb_len += lto_length;

    pr_debug("Local wks 0x%lx\n", local->local_wks);
    wks_tlv = nfc_llcp_build_tlv(LLCP_TLV_WKS, (u8 *)&wks, 2, &wks_length);
    if (!wks_tlv) {
        ret = -ENOMEM;
        goto out;
    }
    gb_len += wks_length;

    miux_tlv = nfc_llcp_build_tlv(LLCP_TLV_MIUX, (u8 *)&local->miux, &miux_length);
    if (!miux_tlv) {
        ret = -ENOMEM;
        goto out;
    }
    gb_len += miux_length;

out:

    return ret;
}
```c
ret = -ENOMEM;
goto out;
}
gb_len += miux_length;

gb_len += ARRAY_SIZE(llcp_magic);
--- linux-4.15.0.orig/net/nfc/llcp_sock.c
+++ linux-4.15.0/net/nfc/llcp_sock.c
@@ -119,9 +119,20 @@
    llcp_sock->service_name = kmemdup(llcp_addr.service_name,
    llcp_sock->service_name_len,
    GFP_KERNEL);
-
+if (!llcp_sock->service_name) {
    nfc_llcp_local_put(llcp_sock->local);
    llcp_sock->local = NULL;
    llcp_sock->dev = NULL;
+    ret = -ENOMEM;
+    goto put_dev;
+}
llcp_sock->ssap = nfc_llcp_get_sdp_ssap(local, llcp_sock);
if (llcp_sock->ssap == LLCP_SAP_MAX) {
    nfc_llcp_local_put(llcp_sock->local);
    llcp_sock->local = NULL;
    kfree(llcp_sock->service_name);
    llcp_sock->service_name = NULL;
    llcp_sock->dev = NULL;
    ret = -EADDRINUSE;
    goto put_dev;
}
@@ -562,11 +573,11 @@
    if (sk->sk_state == LLCP_LISTEN)
        return llcp_accept_poll(sk);

-    if (!sk->sk_err || !skb_queue_empty(&sk->sk_error_queue))
+    if (!sk->sk_err || !skb_queue_empty_lockless(&sk->sk_error_queue))
        mask |= POLLERR |
        (sock_flag(sk, SOCK_SELECT_ERR_QUEUE) ? POLLPRI : 0);

-    if (!skb_queue_empty(&sk->receive_queue))
+    if (!skb_queue_empty_lockless(&sk->receive_queue))
        mask |= POLLIN | POLLRDNORM;

    if (sk->sk_state == LLCP_CLOSED)
        ret = -EISCONN;
        goto error;
```

+if (sk->sk_state == LLCP_CONNECTING) {
+    ret = -EINPROGRESS;
+    goto error;
+}

dev = nfc_get_device(addr->dev_idx);
if (dev == NULL) {
    goto error;
}
sock_unlink:
nfc_llcp_put_ssap(local, llcp_sock->ssap);
+nfc_llcp_local_put(llcp_sock->local);
+llcp_sock->local = NULL;
ret = -ENOMEM;
goto put_dev;
}

-if (sock->type == SOCK_RAW) {
    if (!capable(CAP_NET_RAW))
        return -EPERM;
    sock->ops = &llcp_rawsock_ops;
} else {
    sock->ops = &llcp_sock_ops;
}

sk = nfc_llcp_sock_alloc(sock, sock->type, GFP_ATOMIC, kern);
if (sk == NULL)
    return -ENOMEM;
void nci_free_device(struct nci_dev *ndev)
{
    nfc_free_device(ndev->nfc_dev);
    +nci_hci_deallocate(ndev);
kfree(ndev);
}
EXPORT_SYMBOL(nci_free_device);
--- linux-4.15.0.orig/net/nfc/nci/data.c
+++ linux-4.15.0/net/nfc/nci/data.c
@@ -119,7 +119,7 @@
    conn_info = nci_get_conn_info_by_conn_id(ndev, conn_id);
    if (!conn_info) {
        rc = -EPROTO;
-    goto free_exit;
+    goto exit;
    }
__skb_queue_head_init(&frags_q);
--- linux-4.15.0.orig/net/nfc/hci.c
+++ linux-4.15.0/net/nfc/hci.c
@@ -312,6 +312,10 @@
        dest_gate = create_info->dest_gate;
        new_pipe = create_info->pipe;
        +if (new_pipe >= NCI_HCI_MAX_PIPES) {
+        +status = NCI_HCI_ANY_E_NOK;
+        +goto exit;
+    }
*/
/* Save the new created pipe and bind with local gate,
   * the description for skb->data[3] is destination gate id
@@ -336,6 +340,10 @@
    delete_info = (struct nci_hci_delete_pipe_noti *)skb->data;
    new_pipe = delete_info->pipe;
    +if (delete_info->pipe >= NCI_HCI_MAX_PIPES) {
+    +status = NCI_HCI_ANY_E_NOK;
+    +goto exit;
+}
    ndev->hci_dev->pipes[delete_info->pipe].gate =
    NCI_HCI_INVALID_GATE;
@@ -799,3 +807,8 @@
    return hdev;
}
+ void nci_hci_deallocate(struct nci_dev *ndev)
+
+kfree(ndev->hci_dev);
+
--- linux-4.15.0.orig/net/nfc/nci/rsp.c
+++ linux-4.15.0/net/nfc/nci/rsp.c
@@ -289,6 +289,8 @@
               ndev->cur_conn_id);
   if (conn_info) {
       list_del(&conn_info->list);
+			if (conn_info == ndev->rf_conn_info)
+				ndev->rf_conn_info = NULL;
   devm_kfree(&ndev->nfc_dev->dev, conn_info);
 }
}
--- linux-4.15.0.orig/net/nfc/nci/uart.c
+++ linux-4.15.0/net/nfc/nci/uart.c
@@ -348,7 +348,7 @@
   nu->rx_skb = nci_skb_alloc(nu->ndev,
       NCI_MAX_PACKET_SIZE,
   -      GFP_KERNEL);
+			+        GFP_ATOMIC);
   if (!nu->rx_skb)
       return -ENOMEM;
 }
--- linux-4.15.0.orig/net/nfc/netlink.c
+++ linux-4.15.0/net/nfc/netlink.c
@@ -44,6 +44,7 @@
 [NFC_ATTR_DEVICE_NAME] = { .type = NLA_STRING,
               .len = NFC_DEVICE_NAME_MAXSIZE },
 [NFC_ATTR_PROTOCOLS] = { .type = NLA_U32 },
+	[NFC_ATTR_TARGET_INDEX] = { .type = NLA_U32 },
 [NFC_ATTR_COMM_MODE] = { .type = NLA_U8 },
 [NFC_ATTR_RF_MODE] = { .type = NLA_U8 },
 [NFC_ATTRDEVICEPOWERED] = { .type = NLA_U8 },
@@ -55,13 +56,17 @@
 [NFC_ATTR_LLC_SDP] = { .type = NLA_NESTED },
 [NFC_ATTR_FIRMWARE_NAME] = { .type = NLA_STRING,
       .len = NFC_FIRMWARE_NAME_MAXSIZE },
+	[NFC_ATTR_SE_INDEX] = { .type = NLA_U32 },
 [NFC_ATTR_SE_APDU] = { .type = NLA_BINARY },
+	[NFC_ATTR_VENDOR_ID] = { .type = NLA_U32 },
+	[NFC_ATTR_VENDOR_SUBCMD] = { .type = NLA_U32 },
 [NFC_ATTR_VENDOR_DATA] = { .type = NLA_BINARY },
 ];

static const struct nla_policy nfc_sdp_genl_policy[NFC_SDP_ATTR_MAX + 1] = {
-[NFC_SDP_ATTR_URI] = { .type = NLA_STRING },
+[NFC_SDP_ATTR_URI] = { .type = NLA_STRING,
+    .len = U8_MAX - 4 },
[NFC_SDP_ATTR_SAP] = { .type = NLA_U8 },
];

@@ -880,6 +885,7 @@
if (!dev->polling) {
    device_unlock(&dev->dev);
    +nfc_put_device(dev);
    return -EINVAL;
}
@@ -935,7 +941,8 @@
    u32 device_idx, target_idx;
    int rc;
    -if (!info->attrs[NFC_ATTR_DEVICE_INDEX])
    +if (!info->attrs[NFC_ATTR_DEVICE_INDEX] ||
    +    !info->attrs[NFC_ATTR_TARGET_INDEX])
    return -EINVAL;
    device_idx = nla_get_u32(info->attrs[NFC_ATTR_DEVICE_INDEX]);
    @@ -993,7 +1000,8 @@
    int rc;
    u32 idx;
    -if (!info->attrs[NFC_ATTR_DEVICE_INDEX])
    +if (!info->attrs[NFC_ATTR_DEVICE_INDEX] ||
    +    !info->attrs[NFC_ATTR_TARGET_INDEX])
    return -EINVAL;
    idx = nla_get_u32(info->attrs[NFC_ATTR_DEVICE_INDEX]);
    @@ -1042,7 +1050,8 @@
    struct sk_buff *msg = NULL;
    u32 idx;
    -if (!info->attrs[NFC_ATTR_DEVICE_INDEX])
    +if (!info->attrs[NFC_ATTR_DEVICE_INDEX] ||
    +    !info->attrs[NFC_ATTR_FIRMWARE_NAME])
    return -EINVAL;
    idx = nla_get_u32(info->attrs[NFC_ATTR_DEVICE_INDEX]);
    @@ -1121,7 +1130,6 @@
    local = nfc_llcp_find_local(dev);
    if (!local) {

local = nfc_llcp_find_local(dev);
if (!local) {
    nfc_put_device(dev);
    rc = -ENODEV;
    goto exit;
}
@@ -1181,7 +1189,6 @@
local = nfc_llcp_find_local(dev);
if (!local) {
    nfc_put_device(dev);
    rc = -ENODEV;
    goto exit;
}
@@ -1244,7 +1251,7 @@
u32 idx;
char firmware_name[NFC_FIRMWARE_NAME_MAXSIZE + 1];

-if (!info->attrs[NFC_ATTR_DEVICE_INDEX])
+if (!info->attrs[NFC_ATTR_DEVICE_INDEX] || !info->attrs[NFC_ATTR_FIRMWARE_NAME])
    return -EINVAL;

    rc = nla_get_u32(info->attrs[NFC_ATTR_DEVICE_INDEX]);
    --- linux-4.15.0.orig/net/nfc/rawsock.c
    +++ linux-4.15.0/net/nfc/rawsock.c
    @@ -117,7 +117,6 @@
    if (addr->target_idx > dev->target_next_idx - 1 ||
         addr->target_idx < dev->target_next_idx - dev->n_targets) {
        rc = -EINVAL;
        -goto error;
        +goto put_dev;
    }
rc = nfc_activate_target(dev, addr->target_idx, addr->nfc_protocol);
    --- linux-4.15.0.orig/net/nfc/rawsock.c
    +++ linux-4.15.0/net/nfc/rawsock.c
    @@ -344,10 +344,13 @@
    if ((sock->type != SOCK_SEQPACKET) && (sock->type != SOCK_RAW))
        return -ESOCKTNOSUPPORT;
    -if (sock->type == SOCK_RAW)
    +if (sock->type == SOCK_RAW) {
      +if (!ns_capable(net->user_ns, CAP_NET_RAW))
      +return -EPERM;
      sock->ops = &rawsock_raw_ops;
      -else
      +} else {
      sock->ops = &rawsock_ops;
      +}
    sk = sk_alloc(net, PF_NFC, GFP_ATOMIC, nfc_proto->proto, kern);
    if (!sk)
--- linux-4.15.0.orig/net/nsh/nsh.c
+++ linux-4.15.0/net/nsh/nsh.c
@@ -90,6 +90,8 @@
       if (unlikely(!pskb_may_pull(skb, NSH_BASE_HDR_LEN)))
           goto out;
       nsh_len = nsh_hdr_len(nsh_hdr(skb));
+      if (nsh_len < NSH_BASE_HDR_LEN)
+          goto out;
       if (unlikely(!pskb_may_pull(skb, nsh_len)))
           goto out;

@@ -100,7 +102,7 @@
 __skb_pull(skb, nsh_len);

 skb_reset_mac_header(skb);
-skb_reset_mac_len(skb);
+skb->mac_len = proto == htons(ETH_P_TEB) ? ETH_HLEN : 0;
 skb->protocol = proto;

 features &= NETIF_F_SG;
--- linux-4.15.0.orig/net/openvswitch/actions.c
+++ linux-4.15.0/net/openvswitch/actions.c
@@ -175,8 +175,7 @@
       if (skb->ip_summed == CHECKSUM_COMPLETE) {
           __be16 diff[] = { ~(hdr->h_proto), ethertype };

-          skb->csum = ~csum_partial((char *)diff, sizeof(diff),
-                                ~skb->csum);
+          skb->csum = csum_partial((char *)diff, sizeof(diff), skb->csum);

       }

       hdr->h_proto = ethertype;
@@ -268,8 +267,7 @@
       if (skb->ip_summed == CHECKSUM_COMPLETE) {
           __be32 diff[] = { ~(stack->label_stack_entry), lse };

-          skb->csum = ~csum_partial((char *)diff, sizeof(diff),
-                          ~skb->csum);
+          skb->csum = csum_partial((char *)diff, sizeof(diff), skb->csum);

       }

       stack->label_stack_entry = lse;
@@ -894,17 +892,17 @@

       if (key->eth.type == htons(ETH_P_IP)) {
           struct dst_entry ovs_dst;
-          struct rtable ovs_rt = { 0 };
+          struct rtable ovs_rt = { 0 };


unsigned long orig_dst;

prepare_frag(vport, skb, orig_network_offset,
    ovs_key_mac_proto(key));
-dst_init(&ovs_dst, &ovs_dst_ops, NULL, 1,
+dst_init(&ovs_rt.dst, &ovs_dst_ops, NULL, 1,
    DST_OBSOLETE_NONE, DST_NOCOUNT);  
-ovs_dst.dev = vport->dev;
+ovs_rt.dst.dev = vport->dev;

orig_dst = skb->_skb_refdst;
-skbb_dst_set_noref(skb, &ovs_dst);
+skbb_dst_set_noref(skb, &ovs_rt.dst);
IPCB(skb)->frag_max_size = mru;

ip_do_fragment(net, skb->sk, skb, ovs_vport_output);
--- linux-4.15.0.orig/net/openvswitch/conntrack.c
+++ linux-4.15.0/net/openvswitch/conntrack.c
@@ -23,6 +23,7 @@
#include <net/netfilter/nf_conntrack_seqadj.h>
#include <net/netfilter/nf_conntrack_zones.h>
#include <net/netfilter/ipv6/nf_defrag_ipv6.h>
+include <net/ipv6_frag.h>
#ifdef CONFIG_NF_NAT_NEEDED
#include <linux/netfilter/nf_nat.h>
@@ -254,10 +255,6 @@
ovs_ct_update_key(skb, NULL, key, false, false);
}

-#define IN6_ADDR_INITIALIZER(ADDR)\
-    { (ADDR).s6_addr32[0], (ADDR).s6_addr32[1],\
-
int ovs_ct_put_key(const struct sw_flow_key *swkey,
    const struct sw_flow_key *output, struct sk_buff *skb)
{
@@ -279,24 +276,30 @@
if (swkey->ct_orig_proto) {
    if (swkey->eth.type == htons(ETH_P_IP)) {
        struct ovs_key_ct_tuple_ipv4 orig = {
            -output->ipv4.ct_orig.src,
            -output->ipv4.ct_orig.dst,
            -output->ct.orig_tp.src,
            -output->ct.orig_tp.dst,
            -output->ct_orig_proto,
        -};


+struct ovs_key_ct_tuple_ipv4 orig;
+
+memset(&orig, 0, sizeof(orig));
+orig.ipv4_src = output->ipv4.ct_orig.src;
+orig.ipv4_dst = output->ipv4.ct_orig.dst;
+orig.src_port = output->ct.orig_tp.src;
+orig.dst_port = output->ct.orig_tp.dst;
+orig.ipv4_proto = output->ct_orig_proto;
+
+if (nla_put(skb, OVS_KEY_ATTR_CT_ORIG_TUPLE_IPV4,
       sizeof(orig), &orig))
    return -EMSGSIZE;
} else if (swkey->eth.type == htons(ETH_P_IPV6)) {
    struct ovs_key_ct_tuple_ipv6 orig = {
        IN6_ADDR_INITIALIZER(output->ipv6.ct_orig.src),
        IN6_ADDR_INITIALIZER(output->ipv6.ct_orig.dst),
        -output->ct.orig_tp.src,
        -output->ct.orig_tp.dst,
        -output->ct_orig_proto,
    };
    +struct ovs_key_ct_tuple_ipv6 orig;
    +memset(&orig, 0, sizeof(orig));
    +memcpy(orig.ipv6_src, output->ipv6.ct_orig.src.s6_addr32,
            sizeof(orig.ipv6_src));
    +memcpy(orig.ipv6_dst, output->ipv6.ct_orig.dst.s6_addr32,
            sizeof(orig.ipv6_dst));
    +orig.src_port = output->ct.orig_tp.src;
    +orig.dst_port = output->ct.orig_tp.dst;
    +orig.ipv6_proto = output->ct_orig_proto;
    +
    if (nla_put(skb, OVS_KEY_ATTR_CT_ORIG_TUPLE_IPV6,
               sizeof(orig), &orig))
        return -EMSGSIZE;
}@@ -879,6 +882,21 @@
err = ovs_ct_nat_execute(skb, ct, ctinfo, &info->range, maniptype);

+if (err == NF_ACCEPT && ct->status & IPS_DST_NAT) {
+    +if (ct->status & IPS_SRC_NAT) {
+        +if (maniptype == NF_NAT_MANIP_SRC)
+            maniptype = NF_NAT_MANIP_DST;
+        +else
+            maniptype = NF_NAT_MANIP_SRC;
+        +
+        +err = ovs_ct_nat_execute(skb, ct, ctinfo, &info->range,
+                                  +maniptype);
+    } else if (CTINFO2DIR(ctinfo) == IP_CT_DIR_ORIGINAL) {
```c
+err = ovs_ct_nat_execute(skb, ct, cinfo, NULL,
+ NF_NAT_MANIP_SRC);
+
+ /* Mark NAT done if successful and update the flow key. */
if (err == NF_ACCEPT)
    ovs_n3t_update_key(key, skb, maniptype);
@ @ -1083,7 +1101,8 @@
    &info->labels.mask);
if (err)
    return err;
-} else if (labels_nonzero(&info->labels.mask)) {
+} else if (IS_ENABLED(CONFIG_NF_CONNTRACK_LABELS) &&
    + labels_nonzero(&info->labels.mask)) {
err = ovs_ct_set_labels(ct, key, &info->labels.value,
    &info->labels.mask);
if (err)
    @ @ -1098,6 +1117,36 @@
    return 0;
}

+/* Trim the skb to the length specified by the IP/IPv6 header,
+ * removing any trailing lower-layer padding. This prepares the skb
+ * for higher-layer processing that assumes skb->len excludes padding
+ * (such as nf_ip_checksum). The caller needs to pull the skb to the
+ * network header, and ensure ip_hdr/ipv6_hdr points to valid data.
+ */
+static int ovs_skb_network_trim(struct sk_buff *skb)
+{
+    unsigned int len;
+    int err;
+    
+    switch (skb->protocol) {
+    case htons(ETH_P_IP):
+        len = ntohs(ip_hdr(skb)->tot_len);
+        break;
+    case htons(ETH_P_IPV6):
+        len = sizeof(struct ipv6hdr) + ntohs(ipv6_hdr(skb)->payload_len);
+        break;
+    default:
+        len = skb->len;
+        break;
+    }
+    
+    err = pskb_trim(skb, len);
+    if (err)
+        kfree_skb(skb);
```

+ return err;
+}
+
/* Returns 0 on success, -EINPROGRESS if 'skb' is stolen, or other nonzero
 * value if 'skb' is freed.
 * */
@@ -1112,6 +1161,10 @@
 nh_ofs = skb_network_offset(skb);
 skb_pull_rcsum(skb, nh_ofs);

+err = ovs_skb_network_trim(skb);
+if (err)
+return err;
+
if (key->ip.frag != OVS_FRAG_TYPE_NONE) {
 err = handle_fragments(net, key, info->zone.id, skb);
 if (err)
--- linux-4.15.0.orig/net/openvswitch/datapath.c
+++ linux-4.15.0/net/openvswitch/datapath.c
@@ -697,9 +697,13 @@
{
 size_t len = NLMSG_ALIGN(sizeof(struct ovs_header));

-/* OVS_FLOW_ATTR_UFID */
+/* OVS_FLOW_ATTR_UFID, or unmasked flow key as fallback
 + * see ovs_nla_put_identifier()
 + */
+if (sfid && ovs_identifier_is_ufid(sfid))
+  len += nla_total_size(sfid->ufid_len);
+else
+  len += nla_total_size(ovs_key_attr_size());

/* OVS_FLOW_ATTR_KEY */
if (!sfid || should_fill_key(sfid, ufid_flags))
@@ -875,7 +879,10 @@
 retval = ovs_flow_cmd_fill_info(flow, dp_ifindex, skb,
 info->snd_portid, info->snd_seq, 0,
 cmd, ufid_flags);
-BUG_ON(retval < 0);
+if (WARN_ON_ONCE(retval < 0)) {
+kfree_skb(skb);
+skb = ERR_PTR(retval);
+}
return skb;
}

@@ -1338,7 +1345,10 @@
OVS_FLOW_CMD_DEL,
    ufid_flags);
rcu_read_unlock();
-BUG_ON(err < 0);
+if (WARN_ON_ONCE(err < 0)) {
    +kfree_skb(reply);
    +goto out_free;
    +}

    ovs_notify(&dp_flow_genl_family, reply, info);
} else {
@@ -1346,6 +1356,7 @@
    }
}
}

+out_free:
    ovs_flow_free(flow, true);
    return 0;
unlock:
@@ -1842,7 +1853,7 @@ /* Called with ovs_mutex or RCU read lock. */
    static int ovs_vport_cmd_fill_info(struct vport *vport, struct sk_buff *skb,
                 struct net *net, u32 portid, u32 seq,
                 u32 flags, u8 cmd)
           u32 flags, u8 cmd, gfp_t gfp)
    {
    struct ovs_header *ovs_header;
    struct ovs_vport_stats vport_stats;
@@ -1863,7 +1874,7 @@
    goto nla_put_failure;

    if (!net_eq(net, dev_net(vport->dev))) {
        -int id = peernet2id_alloc(net, dev_net(vport->dev));
+int id = peernet2id_alloc(net, dev_net(vport->dev), gfp);

    if (nla_put_s32(skb, OVS_VPORT_ATTR_NETNSID, id))
        goto nla_put_failure;
@@ -1904,11 +1915,12 @@
    struct sk_buff *skb;
    int retval;

    -skb = nlmsg_new(NLMSG_DEFAULT_SIZE, GFP_ATOMIC);
    +skb = nlmsg_new(NLMSG_DEFAULT_SIZE, GFP_KERNEL);
    if (!skb)
        return ERR_PTR(-ENOMEM);

    if (!net_eq(net, dev_net(vport->dev))) {
        -int id = peernet2id_alloc(net, dev_net(vport->dev));
+int id = peernet2id_alloc(net, dev_net(vport->dev), gfp);

    if (nla_put_s32(skb, OVS_VPORT_ATTR_NETNSID, id))
        goto nla_put_failure;
@@ -1904,11 +1915,12 @@
    struct sk_buff *skb;
    int retval;

    -skb = nlmsg_new(NLMSG_DEFAULT_SIZE, GFP_ATOMIC);
    +skb = nlmsg_new(NLMSG_DEFAULT_SIZE, GFP_KERNEL);
    if (!skb)
        return ERR_PTR(-ENOMEM);

    if (!net_eq(net, dev_net(vport->dev))) {
        -int id = peernet2id_alloc(net, dev_net(vport->dev));
+int id = peernet2id_alloc(net, dev_net(vport->dev), gfp);

    if (nla_put_s32(skb, OVS_VPORT_ATTR_NETNSID, id))
        goto nla_put_failure;
@@ -1904,11 +1915,12 @@
    struct sk_buff *skb;
    int retval;

    -skb = nlmsg_new(NLMSG_DEFAULT_SIZE, GFP_ATOMIC);
    +skb = nlmsg_new(NLMSG_DEFAULT_SIZE, GFP_KERNEL);
    if (!skb)
        return ERR_PTR(-ENOMEM);

    if (!net_eq(net, dev_net(vport->dev))) {
        -int id = peernet2id_alloc(net, dev_net(vport->dev));
+int id = peernet2id_alloc(net, dev_net(vport->dev), gfp);

    if (nla_put_s32(skb, OVS_VPORT_ATTR_NETNSID, id))
        goto nla_put_failure;
+ GFP_KERNEL);
BUG_ON(retval < 0);

return skb;
@@ -2041,7 +2053,7 @@

err = ovs_vport_cmd_fill_info(vport, reply, genl_info_net(info),
    info->snd_portid, info->snd_seq, 0,
-    OVS_VPORT_CMD_NEW);
+    OVS_VPORT_CMD_NEW, GFP_KERNEL);

if (netdev_get_fwd_headroom(vport->dev) > dp->max_headroom)
update_headroom(dp);
@@ -2100,7 +2112,7 @@

err = ovs_vport_cmd_fill_info(vport, reply, genl_info_net(info),
    info->snd_portid, info->snd_seq, 0,
-    OVS_VPORT_CMD_NEW);
+    OVS_VPORT_CMD_NEW, GFP_ATOMIC);
BUG_ON(err < 0);

ovs_unlock();
@@ -2139,7 +2151,7 @@

err = ovs_vport_cmd_fill_info(vport, reply, genl_info_net(info),
    info->snd_portid, info->snd_seq, 0,
-    OVS_VPORT_CMD_DEL);
+    OVS_VPORT_CMD_DEL, GFP_KERNEL);
BUG_ON(err < 0);

/* the vport deletion may trigger dp headroom update */
@@ -2181,7 +2193,7 @@
goto exit_unlock_free;

err = ovs_vport_cmd_fill_info(vport, reply, genl_info_net(info),
    info->snd_portid, info->snd_seq, 0,
-    OVS_VPORT_CMD_NEW);
+    OVS_VPORT_CMD_DEL, GFP_ATOMIC);
BUG_ON(err < 0);

rcu_read_unlock();
@@ -2217,7 +2229,8 @@

    NLM_F_MULTI,
-    OVS_VPORT_CMD_NEW) < 0)
+    OVS_VPORT_CMD_NEW,
+    GFP_ATOMIC) < 0)
goto out;
j++;  
@@ -2238,7 +2251,7 @@
    
    [OVS_VPORT_ATTR_STATS] = { .len = sizeof(struct ovs_vport_stats) },
    [OVS_VPORT_ATTR_PORT_NO] = { .type = NLA_U32 },
-    [OVS_VPORT_ATTR_UPCALL_PID] = { .type = NLA_U32 },
+    [OVS_VPORT_ATTR_UPCALL_PID] = { .type = NLA_UNSPEC },
    [OVS_VPORT_ATTR_TYPE] = { .type = NLA_U32 },
    -[OVS_VPORT_ATTR_UPCALL_PID] = { .type = NLA_U32 },
    +[OVS_VPORT_ATTR_UPCALL_PID] = { .type = NLA_UNSPEC },
    [OVS_VPORT_ATTR_OPTIONS] = { .type = NLA_NESTED },
    [OVS_VPORT_ATTR_IFINDEX] = { .type = NLA_U32 },
    [OVS_VPORT_ATTR_NETNSID] = { .type = NLA_S32 },
--- linux-4.15.0.orig/net/openvswitch/flow_netlink.c
+++ linux-4.15.0/net/openvswitch/flow_netlink.c
@@ -497,7 +497,7 @@
        return -EINVAL;
    }

-    -if (!nz || !is_all_zero(nla_data(nla), expected_len)) {
-        +if (!nz || !is_all_zero(nla_data(nla), nla_len(nla))) {
    attrs |= 1 << type;
    a[type] = nla;
     }
@@ -1664,13 +1664,10 @@
     */ The nlattr stream should already have been validated */
     nla_for_each_nested(nla, attr, rem) {
        -if (tbl[nla_type(nla)].len == OVS_ATTR_NESTED) {
          -if (tbl[nla_type(nla)].next)
          -tbl = tbl[nla_type(nla)].next;
          -nlattr_set(nla, val, tbl);
          -} else {
            +if (tbl[nla_type(nla)].len == OVS_ATTR_NESTED)
            +nlattr_set(nla, val, tbl[nla_type(nla)].next ? : tbl);
            +else
            memset(nla_data(nla), val, nla_len(nla));
          -}  
     if (nla_type(nla) == OVS_KEY_ATTR_CT_STATE)
*(u32 *)nla_data(nla) &= CT_SUPPORTED_MASK;
@@ -2261,14 +2258,14 @@
     struct sw_flow_actions *acts;
     int newActsSize;
    -int req_size = NLA_ALIGN(attr_len);
        +size_t req_size = NLA_ALIGN(attr_len);
    int next_offset = offsetof(struct sw_flow_actions, actions) +
    (*sfa)->actions_len;
if (req_size <= (ksize(*sfa) - next_offset))
goto out;

-new_acts_size = ksize(*sfa) * 2;
+new_acts_size = max(next_offset + req_size, ksize(*sfa) * 2);

if (new_acts_size > MAX_ACTIONS_BUFSIZE) {
    if ((MAX_ACTIONS_BUFSIZE - next_offset) < req_size) {
        * is already present */
        if (mac_proto != MAC_PROTO_NONE)
            return -EINVAL;
    -mac_proto = MAC_PROTO_NONE;
+mac_proto = MAC_PROTO_ETHERNET;
    break;
}

case OVS_ACTION_ATTR_POP_ETH:
@@ -2943,7 +2940,7 @@
    if (vlan_tci & htons(VLAN_TAG_PRESENT))
        return -EINVAL;
+mac_proto = MAC_PROTO_ETHERNET;
    break;

--- linux-4.15.0.orig/net/openvswitch/meter.c
+++ linux-4.15.0/net/openvswitch/meter.c
@@ -242,14 +242,20 @@
    band->type = nla_get_u32(attr[OVS_BAND_ATTR_TYPE]);
    band->rate = nla_get_u32(attr[OVS_BAND_ATTR_RATE]);
+if (band->rate == 0) {
+    err = -EINVAL;
+    goto exit_free_meter;
+}
+    band->burst_size = nla_get_u32(attr[OVS_BAND_ATTR_BURST]);
/* Figure out max delta_t that is enough to fill any bucket.
 * Keep max_delta_t size to the bucket units:
 * pkts => 1/1000 packets, kilobits => bits.
 */
+    * Start with a full bucket.
+    /*
-    band_max_delta_t = (band->burst_size + band->rate) * 1000;
-    
-    band->bucket = band_max_delta_t;
+    band->bucket = (band->burst_size + band->rate) * 1000ULL;
band_max_delta_t = div_u64(band->bucket, band->rate);
if (band_max_delta_t > meter->max_delta_t)
meter->max_delta_t = band_max_delta_t;
band++;
@
-458,6 +464,14 @
spin_lock(&meter->lock);

long_delta_ms = (now_ms - meter->used); /* ms */
+if (long_delta_ms < 0) {
+/* This condition means that we have several threads fighting
+ * for a meter lock, and the one who received the packets a
+ * bit later wins. Assuming that all racing threads received
+ * packets at the same time to avoid overflow.
+ */
+long_delta_ms = 0;
+
} /* Make sure delta_ms will not be too large, so that bucket will not
 * wrap around below.
--- linux-4.15.0.orig/net/openvswitch/meter.h
+++ linux-4.15.0/net/openvswitch/meter.h
@@ -26,7 +26,7 @@
    u32 bucket; /* 1/1000 packets, or in bits */
    u32 burst_size;
    -u32 bucket; /* 1/1000 packets, or in bits */
+u64 bucket; /* 1/1000 packets, or in bits */
    struct ovs_flow_stats stats;
    }

--- linux-4.15.0.orig/net/openvswitch/vport-internal_dev.c
+++ linux-4.15.0/net/openvswitch/vport-internal_dev.c
@@ -44,7 +44,8 @@
}
/* Called with rcu_read_lock_bh. */
-static int internal_dev_xmit(struct sk_buff *skb, struct net_device *netdev)
+static netdev_tx_t
+internal_dev_xmit(struct sk_buff *skb, struct net_device *netdev)
{
    int len, err;

    @
-63,7 +64,7 @
} else {
    netdev->stats.tx_errors++;
}
-return 0;
+return NETDEV_TX_OK;

---
static int internal_dev_open(struct net_device *netdev)
@@ -156,7 +157,7 @@
    netdev->priv_flags |= IFF_LIVE_ADDR_CHANGE | IFF_OPENVSWITCH |
                        IFF_PHYON_NATURAL | IFF_NO_QUEUE;
    netdev->needs_free_netdev = true;
netdev->priv_destructor = internal_dev_destructor;
+    netdev->priv_destructor = NULL;
    netdev->ethtool_ops = &internal_dev_ethtool_ops;
    netdev->rtnl_link_ops = &internal_dev_link_ops;

@@ -176,6 +177,7 @@
{
    struct vport *vport;
    struct internal_dev *internal_dev;
+    struct net_device *dev;
    int err;

    vport = ovs_vport_alloc(0, &ovs_internal_vport_ops, parms);
@@ -184,8 +186,9 @@
    goto error;
}
	dev = alloc_netdev(sizeof(struct internal_dev),
@@ -192,9 +195,9 @
    dev->tstats);    free_netdev(vport->dev);

-vport->dev = alloc_netdev(sizeof(struct internal_dev),
- parms->name, NET_NAME_USER, do_setup);
+dev = alloc_netdev(sizeof(struct internal_dev),
+ parms->name, NET_NAME_USER, do_setup);
+vport->dev = dev;
    if (!vport->dev) {
        err = -ENOMEM;
        goto error_free_vport;
@@ -209,6 +212,7 @@
        err = register_netdevice(vport->dev);
        if (err)
            goto error_unlock;
+vport->dev->priv_destructor = internal_dev_destructor;

    dev_set_promiscuity(vport->dev, 1);
    rtnl_unlock();
@@ -218,9 +222,9 @@
    error_unlock:
    rtnl_unlock();
    -free_percpu(vport->dev->tstats);
+free_percpu(dev->tstats);
    error_free_netdev;
    -free_netdev(vport->dev);
+free_netdev(dev);
error_free_vport:
ovs_vport_free(vport);
error:
--- linux-4.15.0.orig/net/packet/af_packet.c
+++ linux-4.15.0/net/packet/af_packet.c
@@ -328,11 +328,11 @@
skb_set_queue_mapping(skb, queue_index);
}

-/* register_prot_hook must be invoked with the po->bind_lock held,
+/* __register_prot_hook must be invoked through register_prot_hook
 * or from a context in which asynchronous accesses to the packet
 * socket is not possible (packet_create()).
+*/
-static void register_prot_hook(struct sock *sk)
+static void __register_prot_hook(struct sock *sk)
{]
 struct packet_sock *po = pkt_sk(sk);

@@ -347,8 +347,13 @@
}
}

-/* {,__}unregister_prot_hook() must be invoked with the po->bind_lock
-* held. If the sync parameter is true, we will temporarily drop
+static void register_prot_hook(struct sock *sk)
+{]
+lockdep_assert_held_once(&pkt_sk(sk)->bind_lock);
+__register_prot_hook(sk);
+}
+
 +/* If the sync parameter is true, we will temporarily drop
 * the po->bind_lock and do a synchronize_net to make sure no
 * asynchronous packet processing paths still refer to the elements
@@ -358,6 +363,8 @@
 struct packet_sock *po = pkt_sk(sk);

+lockdep_assert_held_once(&po->bind_lock);
+po->running = 0;

 if (po->fanout)
@@ -575,7 +582,8 @@
msec = 1;
div = ecmd.base.speed / 1000;
mbits = (blk_size_in_bytes * 8) / (1024 * 1024);

@@ -971,6 +979,7 @@
static void prb_clear_blk_fill_status(struct packet_ring_buffer *rb)
+__releases(&pkc->blk_fill_in_prog_lock)
{
    struct tpacket_kbdq_core *pkc = GET_PBDQC_FROM_RB(rb);
    atomic_dec(&pkc->blk_fill_in_prog);
@@ -1018,6 +1027,7 @@
    struct tpacket_kbdq_core *pkc,
    struct tpacket_block_desc *pbd,
    unsigned int len)
+__acquires(&pkc->blk_fill_in_prog_lock)
    {
        struct tpacket3_hdr *ppd;
@@ -1319,15 +1329,21 @@
     
     static bool fanout_flow_is_huge(struct packet_sock *po, struct sk_buff *skb)
     {
-        u32 rxhash;
+        u32 *history = po->rollover->history;
+        u32 victim, rxhash;
        int i, count = 0;

        rxhash = skb_get_hash(skb);
        for (i = 0; i < ROLLOVER_HLEN; i++)
-            if (po->rollover->history[i] == rxhash)
+            if (READ_ONCE(history[i]) == rxhash)
+                count++;
+            /
-            if (prandom_u32() % ROLLOVER_HLEN = rxhash;
+            if (prandom_u32() % ROLLOVER_HLEN;
              +
+              /* Avoid dirtying the cache line if possible */
+              +if (READ_ONCE(history[victim]) != rxhash)
+              +WRITE_ONCE(history[victim], rxhash);

            return count > (ROLLOVER_HLEN >> 1);
@@ -2029,7 +2045,7 @@
 return -EINVAL;
 *len -= sizeof(vnet_hdr);

-if (virtio_net_hdr_from_skb(skb, &vnet_hdr, vio_le(), true))
+if (virtio_net_hdr_from_skb(skb, &vnet_hdr, vio_le(), true, 0))
 return -EINVAL;

 return memcpy_to_msg(msg, (void *)&vnet_hdr, sizeof(vnet_hdr));
@@ -2175,11 +2191,13 @@
 int skb_len = skb->len;
 unsigned int snaplen, res;
 unsigned long status = TP_STATUS_USER;
-unsigned short macoff, netoff, hdrlen;
+unsigned short macoff, hdrlen;
+unsigned int netoff;
 struct sk_buff *copy_skb = NULL;
 struct timespec ts;
 __u32 ts_status;
 bool is_drop_n_account = false;
+unsigned int slot_id = 0;
 bool do_vnet = false;

 /* struct tpacket{2,3}_hdr is aligned to a multiple of TPACKET_ALIGNMENT. 
@@ -2237,6 +2255,12 @@
 macoff = netoff - maclen;
 }
+if (netoff > USHRT_MAX) {
+spin_lock(&sk->sk_receive_queue.lock);
+po->stats.stats1.tp_drops++;
+spin_unlock(&sk->sk_receive_queue.lock);
+goto drop_n_restore;
+}
 if (po->tp_version <= TPACKET_V2) {
 if (macoff + snaplen > po->rx_ring.frame_size) {
 if (po->copy_thresh &&
@@ -2275,6 +2299,23 @@
 TP_STATUS_KERNEL, (macoff+snaplen));
 if (!h.raw)
 goto drop_n_account;
+    +if (po->tp_version <= TPACKET_V2) {
+        +slot_id = po->rx_ring.head;
+        +if (test_bit(slot_id, po->rx_ring.rx_owner_map))
+            goto drop_n_account;
+        ++_set_bit(slot_id, po->rx_ring.rx_owner_map);
+    }
+if (do_vnet &&
+    virtio_net_hdr_from_skb(skb, h.raw + macoff -
+    sizeof(struct virtio_net_hdr),
+   vio_le(), true, 0)) {
+if (po->tp_version == TPACKET_V3)
+    prb_clear_blk_fill_status(&po->rx_ring);
+    goto drop_n_account;
+}
+
if (po->tp_version <= TPACKET_V2) {
    packet_increment_rx_head(po, &po->rx_ring);
/*
@@ -2286,6 +2327,7 @@
    if (po->stats.stats1.tp_drops)
    status |= TP_STATUS_LOSING;
 }
+
    po->stats.stats1.tp_packets++;
    if (copy_skb) {
        status |= TP_STATUS_COPY;
@@ -2293,15 +2335,6 @@
        } 
        spin_unlock(&sk->sk_receive_queue.lock);

        -if (do_vnet) {
            -if (virtio_net_hdr_from_skb(skb, h.raw + macoff -
                -sizeof(struct virtio_net_hdr),
                -vio_le(), true)) {
                -spin_lock(&sk->sk_receive_queue.lock);
                -goto drop_n_account;
            -}
            -}
            -
            -
            skb_copy_bits(skb, 0, h.raw + macoff, snaplen);

        if (!ts_status = tpacket_get_timestamp(skb, &ts, po->tp_tstamp))
@@ -2382,9 +2415,12 @@
        #endif

        if (po->tp_version <= TPACKET_V2) {
            +spin_lock(&sk->sk_receive_queue.lock);
            +packet_set_status(po, h.raw, status);
            +__clear_bit(slot_id, po->rx_ring.rx_owner_map);
            +spin_unlock(&sk->sk_receive_queue.lock);
            sk->sk_data_ready(sk);
        } else {
+            +} else if (po->tp_version == TPACKET_V3) {

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prb_clear_blk_fill_status(&po->rx_ring);
}

@@ -2418,11 +2454,14 @@
void *ph;
__u32 ts;

-ph = skb_shinfo(skb)->destructor_arg;
+ph = skb_zcopy_get_nouarg(skb);
packet_dec_pending(&po->tx_ring);

ts = __packet_set_timestamp(po, ph, skb);
__packet_set_status(po, ph, TP_STATUS_AVAILABLE | ts);
+
+if (!packet_read_pending(&po->tx_ring))
+complete(&po->skb_completion);
}

sock_wfree(skb);
@@ -2484,7 +2523,7 @@
skb->priority = po->sk.sk_priority;
skb->mark = po->sk.sk_mark;
sock_tx_timestamp(&po->sk, sockc->tsflags, &skb_shinfo(skb)->tx_flags);
-skb_shinfo(skb)->destructor_arg = ph.raw;
+skb_zcopy_set_nouarg(skb, ph.raw);

skb_reserve(skb, hlen);
skb_reset_network_header(skb);
@@ -2617,7 +2656,7 @@

static int tpacket_snd(struct packet_sock *po, struct msghdr *msg)
{
-struct sk_buff *skb;
+struct sk_buff *skb = NULL;
struct net_device *dev;
struct virtio_net_hdr *vnet_hdr = NULL;
struct sockcm_cookie sockc;
@@ -2626,19 +2665,26 @@
void *ph;
DECLARE_SOCKADDR(struct sockaddr_ll *, saddr, msg->msg_name);
bool need_wait = !(msg->msg_flags & MSG_DONTWAIT);
+unsigned char *addr = NULL;
int tp_len, size_max;
-unsigned char *addr;
void *data;
int len_sum = 0;
int status = TP_STATUS_AVAILABLE;
int hlen, tlen, copylen = 0;
long timeo = 0;

mutex_lock(&po->pg_vec_lock);

/* packet_sendmsg() check on tx_ring.pg_vec was lockless,
+ * we need to confirm it under protection of pg_vec_lock.
+ */
+if (unlikely(!po->tx_ring.pg_vec)) {
err = -EBUSY;
+goto out;
+}
if (likely(saddr == NULL)) {
dev= packet_cached_dev_get(po);
-proto= po->num;
-addr= NULL;
+proto= READ_ONCE(po->num);
} else {
err = -EINVAL;
if (msg->msg_namelen < sizeof(struct sockaddr_ll))
@@ -2648,8 +2694,13 @@
sll_addr)))
goto out;
proto= saddr->sll_protocol;
-addr= saddr->sll_addr;
-dev = dev_get_by_index(sock_net(&po->sk), saddr->sll_ifindex);
+if (po->sk.sk_socket->type == SOCK_DGRAM) {
+if (dev && msg->msg_namelen < dev->addr_len +
+ offsetof(struct sockaddr_ll, sll_addr))
+goto out_put;
+addr = saddr->sll_addr;
+}
}
}

err = -ENXIO;
@@ -2674,12 +2725,21 @@
if ((size_max > dev->mtu + reserve + VLAN_HLEN) && !po->has_vnet_hdr)
size_max = dev->mtu + reserve + VLAN_HLEN;
+reinit_completion(&po->skb_completion);
+
+do { 
ph = packet_current_frame(po, &po->tx_ring,
-TP_STATUS_SEND_REQUEST);
+if (unlikely(ph == NULL)) {
+if (need_wait && need_resched())
+schedule();
+if (need_wait && skb) {
+timeo = sock_sndtimeo(&po->sk, msg->msg_flags & MSG_DONTWAIT);
+timeo = wait_for_completion_interruptible_timeout(&po->skb_completion, timeo);
+if (timeo <= 0) {
+err = !timeo ? -ETIMEDOUT : -ERESTARTSYS;
+goto out_put;
+}
+
+/* check for additional frames */
continue;
}

@@ -2738,10 +2798,12 @@
}
}

@if (po->has_vnet_hdr && virtio_net_hdr_to_skb(skb, vnet_hdr,
   vio_le())) {
-tp_len = -EINVAL;
goto tpacket_error;
+if (po->has_vnet_hdr) {
+if (virtio_net_hdr_to_skb(skb, vnet_hdr, vio_le())) {
+tp_len = -EINVAL;
goto tpacket_error;
+}
+virtio_net_hdr_set_proto(skb, vnet_hdr);
}

skb->destructor = tpacket_destruct_skb;
@@ -2819,7 +2881,7 @@
struct sk_buff *skb;
struct net_device *dev;
__be16 proto;
-unsigned char *addr;
+unsigned char *addr = NULL;
int err, reserve = 0;
struct sockcm_cookie sockc;
struct virtio_net_hdr vnet_hdr = { 0 };
@@ -2835,8 +2905,13 @@
if (likely(saddr == NULL)) {
dev= packet_cached_dev_get(po);
-proto= po->num;
-addr= NULL;
+proto= READ_ONCE(po->num);
} else {
err = -EINVAL;
if (msg->msg_namelen < sizeof(struct sockaddr_ll))
@@ -2844,8 +2905,13 @@
if (msg->msg_namelen < (saddr->sll_halen + offsetof(struct sockaddr_ll, sll_addr)))
goto out;
proto= saddr->sll_protocol;
-addr= saddr->sll_addr;
development = dev_get_by_index(sock_net(sk), saddr->sll_ifindex);
+if (sock->type == SOCK_DGRAM) {
+if (dev && msg->msg_namelen < dev->addr_len +
+ offsetof(struct sockaddr_ll, sll_addr))
+goto out_unlock;
+addr = saddr->sll_addr;
+
}

err = -ENXIO;
@@ -2895,13 +2961,18 @@
if (skb == NULL)
goto out_unlock;

-skb_set_network_header(skb, reserve);
+skb_reset_network_header(skb);

err = -EINVAL;
if (sock->type == SOCK_DGRAM) {
offset = dev_hard_header(skb, dev, ntohs(proto), addr, NULL, len);
if (unlikely(offset < 0))
goto out_free;
+} else if (reserve) {
+skb_reserve(skb, -reserve);
+if (len < reserve + sizeof(struct ipv6hdr) &&
+dev->min_header_len != dev->hard_header_len)
+skb_reset_network_header(skb);
+
} /* Returns -EFAULT on error */
@@ -2933,6 +3004,7 @@
if (err)
goto out_free;
len += sizeof(vnet_hdr);
+virtio_net_hdr_set_proto(skb, &vnet_hdr);
}

skb_probe_transport_header(skb, reserve);
@@ -3007,6 +3079,7 @@
packet_flush_mclist(sk);

+lock_sock(sk);
if (po->rx_ring.pg_vec) {
memset(&req_u, 0, sizeof(req_u));
packet_set_ring(sk, &req_u, 1, 0);
memset(&req_u, 0, sizeof(req_u));
packet_set_ring(sk, &req_u, 1, 1);
+release_sock(sk);

f = fanout_release(sk);

synchronize_net();

+kfree(po->rollover);
if (f) {
-kfree(po->rollover);
fanon_release_data(f);
kfree(f);
}
/* prevents packet_notifier() from calling
 * register_prot_hook()
 */
-po->num = 0;
+WRITE_ONCE(po->num, 0);
__unregister_prot_hook(sk, true);
rcu_read_lock();
dev_curr = po->prot_hook.dev;
//@ -3104,17 +3178,17 @@
}

BUG_ON(po->running);
-po->num = proto;
+WRITE_ONCE(po->num, proto);
po->prot_hook.type = proto;

if (unlikely(unlisted)) {
 dev_put(dev);
 po->prot_hook.dev = NULL;
-po->ifindex = -1;
+WRITE_ONCE(po->ifindex, -1);
packet_cached_dev_reset(po);
} else {
 po->prot_hook.dev = dev;
-po->ifindex = dev ? dev->ifindex : 0;
+WRITE_ONCE(po->ifindex, dev ? dev->ifindex : 0);
packet_cached_dev_assign(po, dev);
}
//@ -3220,6 +3294,7 @@
sock_init_data(sock, sk);

po = pkt_sk(sk);
+init_completion(&po->skb_completion);
sk->sk_family = PF_PACKET;
po->num = proto;
po->xmit = dev_queue_xmit;
@@ -3249,11 +3324,11 @@
    if (proto) {
        po->prot_hook.type = proto;
        -register_prot_hook(skb);
+__register_prot_hook(skb);
    }

mutex_lock(&net->packet.sklist_lock);
-sk_add_node_rcu(skb, &net->packet.sklist);
+sk_add_node_tail_rcu(skb, &net->packet.sklist);
mutex_unlock(&net->packet.sklist_lock);

preempt_disable();
@@ -3353,20 +3428,29 @@
sock_recv_ts_and_drops(msg, sk, skb);

if (msg->msg_name) {
    +int copy_len;
    +/* If the address length field is there to be filled
       * in, we fill it in now.
       */
    if (sock->type == SOCK_PACKET) {
        __sockaddr_check_size(sizeof(struct sockaddr_pkt));
        msg->msg_namelen = sizeof(struct sockaddr_pkt);
        +copy_len = msg->msg_namelen;
    } else {
        struct sockaddr_ll *sll = &PACKET_SKB_CB(skb)->sa.ll;

        msg->msg_namelen = sll->sll_halen +
        offsetof(struct sockaddr_ll, sll_addr);
        +copy_len = msg->msg_namelen;
        +if (msg->msg_namelen < sizeof(struct sockaddr_ll)) {
            +memset(msg->msg_name +
            +offsetof(struct sockaddr_ll, sll_addr),
            +0, sizeof(sll->sll_addr));
            +msg->msg_namelen = sizeof(struct sockaddr_ll);
            +}
        }
    }
    -memcpy(msg->msg_name, &PACKET_SKB_CB(skb)->sa,
if (pkt_sk(sk)->auxdata) {
    uaddr->sa_family = AF_PACKET;
    memset(uaddr->sa_data, 0, sizeof(uaddr->sa_data));
    rcu_read_lock();
    -dev = dev_get_by_index_rcu(sock_net(sk), pkt_sk(sk)->ifindex);
    +dev = dev_get_by_index_rcu(sock_net(sk), READ_ONCE(pkt_sk(sk)->ifindex));
    if (dev)
        strcpy(uaddr->sa_data, dev->name, sizeof(uaddr->sa_data));
    rcu_read_unlock();
    @ @ -3435,16 +3519,18 @@
    struct sock *sk = sock->sk;
    struct packet_sock *po = pkt_sk(sk);
    DECLARE_SOCKADDR(struct sockaddr_ll *, sll, uaddr);
    +int ifindex;

    if (peer)
        return -EOPNOTSUPP;

    +ifindex = READ_ONCE(po->ifindex);
    sll->sll_family = AF_PACKET;
    -sll->sll_ifindex = po->ifindex;
    -sll->sll_protocol = po->num;
    +sll->sll_ifindex = ifindex;
    +sll->sll_protocol = READ_ONCE(po->num);
    sll->sll_pkttype = 0;
    rcu_read_lock();
    -dev = dev_get_by_index_rcu(sock_net(sk), po->ifindex);
    +dev = dev_get_by_index_rcu(sock_net(sk), ifindex);
    if (dev) {
        sll->sll_hatype = dev->type;
        sll->sll_halen = dev->addr_len;
        @ @ -3644,6 +3730,7 @@
        union tpacket_req_u req_u req_u;
        int len;

        +lock_sock(sk);
        switch (po->tp_version) {
        case TPACKET_V1:
        case TPACKET_V2:
        @ @ -3654,12 +3741,17 @@
            len = sizeof(req_u.req3);
            break;
        }
if (optlen < len) {
    return -EINVAL;
} else if (copy_from_user(&req_u.req, optval, len)) {
    return -EFAULT;
} else if (optname == PACKET_TX_RING) {
    lock_sock(sk);
    ret = packet_set_ring(sk, &req_u, 0, &optname);
    release_sock(sk);
    return ret;
}
case PACKET_COPY_THRESH:
{
    @ -3725,12 +3817,18 @
}
    if (optlen != sizeof(val))
    return -EINVAL;
    if (po->rx_ring.pg_vec || po->tx_ring.pg_vec)
    return -EBUSY;
    if (copy_from_user(&val, optval, sizeof(val)))
    return -EFAULT;
    po->tp_loss = !!val;
    lock_sock(sk);
    if (po->rx_ring.pg_vec || po->tx_ring.pg_vec) {
        ret = -EBUSY;
    } else {
        po->tp_loss = !!val;
        ret = 0;
    }
    release_sock(sk);
    return ret;
}
case PACKET_AUXDATA:
{
    @ -3741,7 +3839,9 @
    if (copy_from_user(&val, optval, sizeof(val)))
    return -EFAULT;
    lock_sock(sk);
po->auxdata = !!val;
+release_sock(sk);
return 0;
}
case PACKET_ORIGDEV:
@@ -3753,7 +3853,9 @@
if (copy_from_user(&val, optval, sizeof(val)))
 return -EFAULT;
 +lock_sock(sk);
 po->origdev = !!val;
+release_sock(sk);
return 0;
}
case PACKET_VNET_HDR:
@@ -3762,15 +3864,20 @@
if (sock->type != SOCK_RAW)
 return -EINVAL;
-if (po->rx_ring.pg_vec || po->tx_ring.pg_vec)
 -return -EBUSY;
 if (optlen < sizeof(val))
 return -EINVAL;
 if (copy_from_user(&val, optval, sizeof(val)))
 return -EFAULT;

-po->has_vnet_hdr = !!val;
-return 0;
+lock_sock(sk);
+if (po->rx_ring.pg_vec || po->tx_ring.pg_vec) {
+ ret = -EBUSY;
+ } else {
+ po->has_vnet_hdr = !!val;
+ ret = 0;
+ }
+release_sock(sk);
+return ret;
}
case PACKET_TIMESTAMP:
{
@@ -3808,11 +3915,17 @@
if (optlen != sizeof(val))
 return -EINVAL;
-if (po->rx_ring.pg_vec || po->tx_ring.pg_vec)
 -return -EBUSY;
 if (copy_from_user(&val, optval, sizeof(val)))
 return -EFAULT;

struct packet_sock *po = pkt_sk(sk);
unsigned long *rx_owner_map = NULL;
int was_running, order = 0;
struct packet_ring_buffer *rb;
struct sk_buff_head *rb_queue;
/* Added to avoid minimal code churn */
struct tpacket_req *req = &req_u->req;

-po->tp_tx_has_off = !!val;
+lock_sock(sk);
+if (po->rx_ring.pg_vec || po->tx_ring.pg_vec) {
  +ret = -EBUSY;
+} else {
  +po->tp_tx_has_off = !!val;
  +ret = 0;
+}
+release_sock(sk);
return 0;
}
case PACKET_QDISC_BYPASS:
@@ -3997,7 +4110,7 @@
              }
            }
            if (kubelet_util::kubelet_ip_links onView) {
@@ -4177,7 +4290,7 @@
            }
            struct pgv *pg_vec;
            int i;

            -pg_vec = kcalloc(block_nr, sizeof(struct pgv), GFP_KERNEL);
            +pg_vec = kcalloc(block_nr, sizeof(struct pgv), GFP_KERNEL | __GFP_NOWARN);
            if (unlikely(!pg_vec))
                goto out;

            @@ -4201,6 +4314,7 @@
            {
                struct pgv *pg_vec = NULL;
                struct packet_sock *po = pkt_sk(sk);
                +unsigned long *rx_owner_map = NULL;
                int was_running, order = 0;
                struct packet_ring_buffer *rb;
                struct sk_buff_head *rb_queue;
                @@ -4209,8 +4323,6 @@
                /* Added to avoid minimal code churn */
                struct tpacket_req *req = &req_u->req;

                -lock_sock(skb);
                -
                rb = tx_ring ? &po->tx_ring : &po->rx_ring;
                rb_queue = tx_ring ? &sk->tx_queue : &sk->rx_queue;
                +release_sock(skb);
                return 0;
            
            case PACKET_QDISC_BYPASS:
            if (msg == NETDEV_UNREGISTER) {
                packet_cached_dev_reset(po);
                -po->ifindex = -1;
                +WRITE_ONCE(po->ifindex, -1);
                if (po->prot_hook.dev)
                    dev_put(po->prot_hook.dev);
                po->prot_hook.dev = NULL;
                @@ -4177,7 +4290,7 @@
                struct pgv *pg_vec;
                int i;

                -pg_vec = kcalloc(block_nr, sizeof(struct pgv), GFP_KERNEL);
                +pg_vec = kcalloc(block_nr, sizeof(struct pgv), GFP_KERNEL | __GFP_NOWARN);
                if (unlikely(!pg_vec))
                    goto out;

                @@ -4201,6 +4314,7 @@
                {
                    struct pgv *pg_vec = NULL;
                    struct packet_sock *po = pkt_sk(skb);
                    +unsigned long *rx_owner_map = NULL;
                    int was_running, order = 0;
                    struct packet_ring_buffer *rb;
                    struct sk_buff_head *rb_queue;
                    @@ -4209,8 +4323,6 @@
                    /* Added to avoid minimal code churn */
                    struct tpacket_req *req = &req_u->req;

                    -lock_sock(skb);
                    -
                    rb = tx_ring ? &po->tx_ring : &po->rx_ring;
                    rb_queue = tx_ring ? &sk->tx_queue : &sk->rx_queue;
                    +release_sock(skb);
                    return 0;
                

if (req->tp_block_nr) {
+unsigned int min_frame_size;
+
/* Sanity tests and some calculations */
err = -EBUSY;
if (unlikely(rb->pg_vec))
    goto out;
if (unlikely(!PAGE_ALIGNED(req->tp_block_size)))
    goto out;
+min_frame_size = po->tp_hdrlen + po->tp_reserve;
if (po->tp_version >= TPACKET_V3 &&
    req->tp_block_size <=
    BLK_PLUS_PRIV((u64)req_u->req3.tp_sizeof_priv))
    req->tp_block_size <
    + BLK_PLUS_PRIV((u64)req_u->req3.tp_sizeof_priv) + min_frame_size)
    goto out;
-if (unlikely(req->tp_frame_size < po->tp_hdrlen +
    -po->tp_reserve))
+if (unlikely(req->tp_frame_size < min_frame_size))
    goto out;
if (unlikely(req->tp_frame_size & (TPACKET_ALIGNMENT - 1)))
    goto out;
@@ -4258,7 +4372,7 @@
    if (unlikely(rb->frames_per_block == 0))
    goto out;
    -if (unlikely(req->tp_block_size > UINT_MAX / req->tp_block_nr))
+if (unlikely(rb->frames_per_block > UINT_MAX / req->tp_block_nr))
    goto out;
    if (unlikely((rb->frames_per_block * req->tp_block_nr) !=
        req->tp_frame_nr))
@@ -4281,11 +4395,17 @@
        req3->tp_sizeof_priv ||
        req3->tp_feature_req_word) {
    err = -EINVAL;
    -goto out;
+goto out_free_pg_vec;
    }
}
break;
default:
+if (!tx_ring) {
+rx_owner_map = bitmap_alloc(req->tp_frame_nr,
+GFP_KERNEL | __GFP_NOWARN | __GFP_ZERO);
if (!rx_owner_map)
    goto out_free_pg_vec;
}
break;
}
}

if (was_running) {
    po->num = 0;
    WRITE_ONCE(po->num, 0);
    unregister_prot_hook(sk, false);
}
spin_unlock(&po->bind_lock);

err = 0;
spin_lock_bh(&rb_queue->lock);
swap(rb->pg_vec, pg_vec);
+if (po->tp_version <= TPACKET_V2)
    swap(rb->rx_owner_map, rx_owner_map);
rb->frame_max = (req->tp_frame_nr - 1);
rb->head = 0;
rb->frame_size = req->tp_frame_size;

spin_lock(&po->bind_lock);
if (was_running) {
    -po->num = num;
    WRITE_ONCE(po->num, num);
    register_prot_hook(sk);
}
spin_unlock(&po->bind_lock);

prb_shutdown_retire_blk_timer(po, rb_queue);

+out_free_pg_vec:
+bitmap_free(rx_owner_map);
if (pg_vec)
    free_pg_vec(pg_vec, order, req->tp_block_nr);
out:
-release_sock(sk);
return err;
}


static int __init packet_init(void)
{
    int rc = proto_register(&packet_proto, 0);
    int rc;

    if (rc != 0)
        rc = proto_register(&packet_proto, 0);
    if (rc)
        goto out;
    rc = sock_register(&packet_family_ops);
    if (rc)
        goto out_proto;
    rc = register_pernet_subsys(&packet_net_ops);
    if (rc)
        goto out_sock;
    rc = register_netdevice_notifier(&packet_netdev_notifier);
    if (rc)
        goto out_pernet;
    return 0;
}

--- linux-4.15.0.orig/net/packet/internal.h
+++ linux-4.15.0/net/packet/internal.h
@@ -70,7 +70,10 @@

         refcount_read(&s->sk_refcnt),
         s->sk_type,
         ntohs(po->num),
--- linux-4.15.0.orig/net/packet/internal.h
+++ linux-4.15.0/net/packet/internal.h
@@ -4572,14 +4695,29 @@

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}

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+++ linux-4.15.0/net/packet/internal.h
@@ -70,7 +70,10 @@

         refcount_read(&s->sk_refcnt),
         s->sk_type,
unsigned int __percpu*pending_refcnt;

-struct tpacket_kbdq_corepktb_dqc;
+union {
+unsigned long*rx_owner_map;
+struct tpacket_kbdq_corepktb_dqc;
+};
}

extern struct mutex fanout_mutex;
@@ -112,10 +115,12 @@
 int copy_thresh;
 spinlock_t bind_lock;
 struct mutexpg_vec_lock;
-unsigned int running:1, /* prot_hook is attached*/
-_auxdata:1,
+unsigned int running;	/* bind_lock must be held */
+unsigned int auxdata:1, /* writer must hold sock lock */
 origdev:1,
-has_vnet_hdr:1;
+has_vnet_hdr:1;
+tp_loss:1,
+tp_tx_has_off:1;
 int pressure;
 intfindex;/* bound device*/
 __be16num;
@@ -125,9 +130,8 @@
 enum tpacket_versionstp_version;
 unsigned inttp_hdrlen;
 unsigned inttp_reserve;
-unsigned inttp_loss:1;
-unsigned inttp_tx_has_off:1;
 unsigned inttp_tstamp;
+struct completionskb_completion;
 struct net_device __rcu*cached_dev;
 int(*xmit)(struct sk_buff *skb);
 struct packet_typeprot_hook _____cacheline_aligned_in_smp;
--- linux-4.15.0.orig/net/phonet/pep.c
+++ linux-4.15.0/net/phonet/pep.c
@@ -132,7 +132,7 @@
 ph->utid = 0;
 ph->message_id = id;
 ph->pipe_handle = pn->pipe_handle;
- ph->data[0] = code;
+ ph->error_code = code;
 return pn_skb_send(sk, skb, NULL);
}
ph->utid = id; /* whatever */
ph->message_id = id;
ph->pipe_handle = pn->pipe_handle;
ph->data[0] = code;
+ph->error_code = code;
return pn_skb_send(sk, skb, NULL);
}

structpnpipehdr *ph;
struct sockaddr_pn dst;
u8 data[4] = {
-oph->data[0]. /* PEP type */
+oph->pep_type. /* PEP type */
 code. /* error code, at an unusual offset */
 PAD, PAD,
};

ph->utid = oph->utid;
ph->message_id = PNS_PEP_CTRL_RESP;
ph->pipe_handle = oph->pipe_handle;
ph->data[0] = oph->data[1]; /* CTRL id */
+ph->data0 = oph->data[0]; /* CTRL id */

pn_skb_get_src_sockaddr(oskb, &dst);
return pn_skb_send(sk, skb, &dst);

hdr = pnp_hdr(skb);
-if (hdr->data[0] != PN_PEP_TYPE_COMMON) {
+if (hdr->pep_type != PN_PEP_TYPE_COMMON) {
 net_dbg_ratelimited("Phonet unknown PEP type: %u\n",
- (unsigned int)hdr->data[0]);
+ (unsigned int)hdr->pep_type);
return -EOPNOTSUPP;
}

-switch (hdr->data[1]) {
+switch (hdr->data[0]) {
 case PN_PEP_IND_FLOW_CONTROL:
 switch (pn->tx_fc) {
 case PN_LEGACY_FLOW_CONTROL:
-switch (hdr->data[4]) {
+switch (hdr->data[3]) {
 case PEP_IND_BUSY:
 atomic_set(&pn->tx_credits, 0);
case PN_ONE_CREDIT_FLOW_CONTROL:
- if (hdr->data[4] == PEP_IND_READY)
+ if (hdr->data[3] == PEP_IND_READY)
    atomic_set(&pn->tx_credits, wake = 1);
    break;
}

case PN_PEP_IND_ID_MCFC_GRANT_CREDITS:
    if (pn->tx_fc != PN_MULTI_CREDIT_FLOW_CONTROL)
        break;
- atomic_add(wake = hdr->data[4], &pn->tx_credits);
+ atomic_add(wake = hdr->data[3], &pn->tx_credits);
    break;

default:
    net_dbg_ratelimited("Phonet unknown PEP indication: %u\n",
    - (unsigned int)hdr->data[1]);
+ (unsigned int)hdr->data[0]);
    return -EOPNOTSUPP;
}

if (wake)
{
    struct pep_sock *pn = pep_sk(sk);
    struct pnpipehdr *hdr = pnp_hdr(skb);
    u8 n_sb = hdr->data[0];
+ u8 n_sb = hdr->data0;

    pn->rx_fc = pn->tx_fc = PN_LEGACY_FLOW_CONTROL;
    skb_pull(skb, sizeof(*hdr));
    return -ECONNREFUSED;

/* Parse sub-blocks */
- n_sb = hdr->data[4];
+ n_sb = hdr->data[3];
    while (n_sb > 0) {
        u8 type, buf[6], len = sizeof(buf);
        const u8 *data = pep_get_sb(skb, &type, &len, buf);
        ph->utid = 0;
        ph->message_id = PNS_PIPE_REMOVE_REQ;
        ph->pipe_handle = pn->pipe_handle;
        - ph->data[0] = PAD;
+ph->data0 = PAD;
return pn_skb_send(sk, skb, NULL);
}

@@ -817,7 +817,7 @@
peer_type = hdr->other_pep_type << 8;

/* Parse sub-blocks (options) */
-n_sb = hdr->data[4];
+n_sb = hdr->data[3];
while (n_sb > 0) {
    u8 type, buf[1], len = sizeof(buf);
    const u8 *data = pep_get_sb(skb, &type, &len, buf);
@@ -1109,7 +1109,7 @@
ph->utid = 0;
if (pn->aligned) {
    ph->message_id = PNS_PIPE_ALIGNED_DATA;
@@ -352,9 +352,9 @@
if (sk->sk_state == TCP_CLOSE)
    return POLLERR;
    -if (!skb_queue_empty(&sk->sk_receive_queue))
    +if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
    mask |= POLLIN | POLLRDNORM;
    -if (!skb_queue_empty(&pn->ctrlreq_queue))
    +if (!skb_queue_empty_lockless(&pn->ctrlreq_queue))
    mask |= POLLPRI;
    if (!mask && sk->sk_state == TCP_CLOSE_WAIT)
    return POLLHUP;
    --- linux-4.15.0.orig/net/psample/psample.c
    +++ linux-4.15.0/net/psample/psample.c
@@ -156,7 +156,7 @@
{psample_group_notify(group, PSAMPLE_CMD_DEL_GROUP);
    list_del(&group->list);
    -kfree(group);
    +kfree_rcu(group, rcu);
    }

static struct psample_group *
@@ -223,7 +223,7 @@
data_len = PSAMPLE_MAX_PACKET_SIZE - meta_len - NLA_HDRLEN
- NLA_ALIGNTO;

-nl_skb = genlmsg_new(meta_len + data_len, GFP_ATOMIC);
+nl_skb = genlmsg_new(meta_len + nla_total_size(data_len), GFP_ATOMIC);
if (unlikely(!nl_skb))
    return;

--- linux-4.15.0.orig/net/qrtr/qrtr.c
+++ linux-4.15.0/net/qrtr/qrtr.c
@@ -157,6 +157,7 @@
    list_del(&node->item);
    mutex_unlock(&qrtr_node_lock);
    cancel_work_sync(&node->work);
    skb_queue_purse(&node->rx_queue);
    kfree(node);
}
@@ -184,28 +185,35 @@
        struct qrtr_hdr_v1 *hdr;
        size_t len = skb->len;
        -int rc = -ENODEV;
        +int rc;
        
        hdr = skb_push(skb, sizeof(*hdr));
        hdr->version = cpu_to_le32(QRTR_PROTO_VER_1);
        hdr->type = cpu_to_le32(type);
        hdr->src_node_id = cpu_to_le32(from->sq_node);
        hdr->src_port_id = cpu_to_le32(from->sq_port);
        -hdr->dst_node_id = cpu_to_le32(to->sq_node);
        -hdr->dst_port_id = cpu_to_le32(to->sq_port);
        +if (to->sq_port == QRTR_PORT_CTRL) {
        +    hdr->dst_node_id = cpu_to_le32(node->nid);
        +    hdr->dst_port_id = cpu_to_le32(QRTR_PORT_CTRL);
        +} else {
        +    hdr->dst_node_id = cpu_to_le32(to->sq_node);
        +    hdr->dst_port_id = cpu_to_le32(to->sq_port);
        +}
        
        hdr->size = cpu_to_le32(len);
        hdr->confirm_rx = 0;

        -skb_put_pado(skb, ALIGN(len, 4));
        -mutex_lock(&node->ep_lock);
        -if (node->ep)
        -rc = node->ep->xmit(node->ep, skb);
- else
- kfree_skb(skb);
- mutex_unlock(&node->ep_lock);
+ rc = skb_put_padto(skb, ALIGN(len, 4) + sizeof(*hdr));

+ if (!rc) {
  + mutex_lock(&node->ep_lock);
  + rc = -ENODEV;
  + if (node->ep)
  + rc = node->ep->xmit(node->ep, skb);
  + else
  + kfree_skb(skb);
  + mutex_unlock(&node->ep_lock);
  +}
  return rc;
}

@@ -256,14 +264,14 @@
const struct qrtr_hdr_v2 *v2;
struct sk_buff *skb;
struct qrtr_cb *cb;
- unsigned int size;
+ size_t size;
unsigned int ver;
size_t hdrlen;

- if (len & 3)
+ if (len == 0 || len & 3)
  return -EINVAL;

- skb = netdev_alloc_skb(NULL, len);
+ skb = __netdev_alloc_skb(NULL, len, GFP_ATOMIC | __GFP_NOWARN);
if (!skb)
  return -ENOMEM;
@@ -274,6 +282,8 @@

 switch (ver) {
  case QRTR_PROTO_VER_1:
    + if (len < sizeof(*v1))
    + goto err;
    v1 = data;
    hdrlen = sizeof(*v1);

    @@ -287,6 +297,8 @@
    size = le32_to_cpu(v1->size);
    break;
  case QRTR_PROTO_VER_2:
+if (len < sizeof(*v2))
+goto err;
v2 = data;
hdrlen = sizeof(*v2) + v2->optlen;

@@ -309,7 +321,7 @@
goto err;
}

-if (len != ALIGN(size, 4) + hdrlen)
+if (!size || len != ALIGN(size, 4) + hdrlen)
goto err;

if (cb->dst_port != QRTR_PORT_CTRL && cb->type != QRTR_TYPE_DATA)
@@ -712,7 +724,7 @@
 } mutex_unlock(&qrtr_node_lock);

-qrtr_local_enqueue(node, skb, type, from, to);
+qrtr_local_enqueue(NULL, skb, type, from, to);

return 0;
}
@@ -763,23 +775,30 @@

node = NULL;
if (addr->sq_node == QRTR_NODE_BCAST) {
+if (addr->sq_port != QRTR_PORT_CTRL &&
+ qrtr_local_nid != QRTR_NODE_BCAST) {
+release_sock(sk);
+return -ENOTCONN;
+}
enqueue_fn = qrtr_bcast_enqueue;
} else if (addr->sq_node == ipc->us.sq_node) {
enqueue_fn = qrtr_local_enqueue;
} else {
-enqueue_fn = qrtr_node_enqueue;
+enqueue_fn = qrtr_node_enqueue;
node = qrtr_node_lookup(addr->sq_node);
if (!node) {
release_sock(sk);
return -ECONNRESET;
}
+enqueue_fn = qrtr_node_enqueue;
}

plen = (len + 3) & ~3;
skb = sock_alloc_send_skb(sk, plen + QRTR_HDR_MAX_SIZE,
msg->msg_flags & MSG_DONTWAIT, &rc);
-if (!skb)
+if (!skb) {
+rc = -ENOMEM;
goto out_node;
+

skb_reserve(skb, QRTR_HDR_MAX_SIZE);

rc = copied;

if (addr) {
+"There is an anonymous 2-byte hole after sq_family,
+ * make sure to clear it.
+ */
+memset(addr, 0, sizeof(*addr));
+
+cb = (struct qrtr_cb *)skb->cb;
addr->sq_family = AF_QIPCRTR;
addr->sq_node = cb->src_node;

sock_set_flag(sk, SOCK_DEAD);
+sock_orphan(sk);
sock->sk = NULL;

if (!sock_flag(sk, SOCK_ZAPPED))
--- linux-4.15.0.orig/net/qrtr/smd.c
+++ linux-4.15.0/net/qrtr/smd.c
@@ -114,5 +114,6 @@
module_rpmsg_driver(qcom_smd_qrtr_driver);

+MODULE_ALIAS("rpmsg:IPCRTR");
MODULE_DESCRIPTION("Qualcomm IPC-Router SMD interface driver");
MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/net/rds/bind.c
+++ linux-4.15.0/net/rds/bind.c
@@ -60,12 +60,14 @@
u64 key = ((u64)addr << 32) | port;
struct rds_sock *rs;

-rhasshtable_lookup_fast(&bind_hash_table, &key, ht_parms);
-if (rs & !sock_flag(rds_rs_to_sk(rs), SOCK_DEAD))
-rds_sock_addref(rs);
-else
+rcu_read_lock();
rs = rhashtable_lookup(&bind_hash_table, &key, ht_parms);
+if (rs && sock_flag(rds_rs_to_sk(rs), SOCK_DEAD) ||
+ !refcount_inc_not_zero(&rds_rs_to_sk(rs)->sk_refcnt))
rs = NULL;

+rcu_read_unlock();
+
rdssdebug("returning rs %p for %pH:%u\n", rs, &addr,
ntohs(port));
@@ -114,6 +116,7 @@
rs, &addr, (int)ntohs(*port));
break;
} else {
+rs->rs_bound_addr = 0;
rcs_sock_put(rs);
ret = -ENOMEM;
break;
@@ -156,6 +159,7 @@
goto out;
}

+sock_set_flag(sk, SOCK_RCU_FREE);
ret = rds_add_bound(rs, sin->sin_addr.s_addr, &sin->sin_port);
if (ret)
goto out;
--- linux-4.15.0.orig/net/rds/connection.c
+++ linux-4.15.0/net/rds/connection.c
@@ -366,6 +366,8 @@
* to the conn hash, so we never trigger a reconnect on this
* conn - the reconnect is always triggered by the active peer. */
cancel_delayed_work_sync(&cp->cp_conn_w);
+if (conn->c_destroy_in_prog)
+return;
rcu_read_lock();
if (!hlist_unhashed(&conn->c_hash_node)) {
rcu_read_unlock();
@@ -445,7 +447,6 @@
*/
rcs_cong_remove_conn(conn);

-put_net(conn->c_net);
kfree(conn->c_path);
kmem_cache_free(rds_conn_slab, conn);

--- linux-4.15.0.orig/net/rds/ib.c
+++ linux-4.15.0/net/rds/ib.c
@@ -141,6 +141,9 @@
refcount_set(&rds_ibdev->refcount, 1);
INIT_WORK(&rds_ibdev->free_work, rds_ib_dev_free);

+INIT_LIST_HEAD(&rds_ibdev->ipaddr_list);
+INIT_LIST_HEAD(&rds_ibdev->conn_list);
+
+ rds_ibdev->max_wrs = device->attrs.max_qp_wr;
+ rds_ibdev->max_sge = min(device->attrs.max_sge, RDS_IB_MAX_SGE);

@@ -200,9 +203,6 @@
device->name,
 rds_ibdev->use_fastreg ? "FRMR" : "FMR");

-INIT_LIST_HEAD(&rds_ibdev->ipaddr_list);
-INIT_LIST_HEAD(&rds_ibdev->conn_list);
-
down_write(&rds_ib_devices_lock);
list_add_tail_rcu(&rds_ibdev->list, &rds_ib_devices);
up_write(&rds_ib_devices_lock);
@@ -347,7 +347,8 @@
/* Create a CMA ID and try to bind it. This catches both
 * IB and iWARP capable NICs.
 */
-cm_id = rdma_create_id(&init_net, NULL, NULL, RDMA_PS_TCP, IB_QPT_RC);
+cm_id = rdma_create_id(&init_net, rds_rdma_cm_event_handler,
+NULL, RDMA_PS_TCP, IB_QPT_RC);
if (IS_ERR(cm_id))
return PTR_ERR(cm_id);

--- linux-4.15.0.orig/net/rds/ib.h
+++ linux-4.15.0/net/rds/ib.h
@@ -371,7 +371,7 @@
int rds_ib_recv_init(void);
void rds_ib_recv_exit(void);
int rds_ib_recv_path(struct rds_conn_path *conn);
-int rds_ib_recv_alloc_caches(struct rds_ib_connection *ic);
+int rds_ib_recv_alloc_caches(struct rds_ib_connection *ic, gfp_t gfp);
void rds_ib_recv_free_caches(struct rds_ib_connection *ic);
void rds_ib_recv_refill(struct rds_connection *conn, int prefill, gfp_t gfp);
void rds_ib_inc_free(struct rds_incoming *inc);
--- linux-4.15.0.orig/net/rds/ib_cm.c
+++ linux-4.15.0/net/rds/ib_cm.c
@@ -546,7 +546,7 @@
rdsdebug("conn %p pd %p cq %p %p\n", conn, ic->i_pd,
 ic->i_send_cq, ic->i_recv_cq);

-return ret;
+goto out;
sends_out:
vfree(ic->i_sends);
@@ -571,6 +571,7 @@
ic->i_send_cq = NULL;
rcs_ibdev_out:
rcs_ib_remove_conn(rcs_ibdev, conn);
+out:
rds_ib_dev_put(rcs_ibdev);

return ret;
@@ -945,7 +946,7 @@
if (!ic)
return -ENOMEM;

-ret = rds_ib_recv_alloc_caches(ic);
+ret = rds_ib_recv_alloc_caches(ic, gfp);
if (ret) {
 kfree(ic);
 return ret;
--- linux-4.15.0.orig/net/rds/ib_fmr.c
+++ linux-4.15.0/net/rds/ib_fmr.c
@@ -44,6 +44,17 @@
else
 pool = rds_ibdev->mr_1m_pool;

+if (atomic_read(&pool->dirty_count) >= pool->max_items / 10)
+queue_delayed_work(rds_ib_mr_wq, &pool->flush_worker, 10);
 +/
+/* Switch pools if one of the pool is reaching upper limit */
+if (atomic_read(&pool->dirty_count) >= pool->max_items * 9 / 10) {
+if (pool->pool_type == RDS_IB_MR_8K_POOL)
+pool = rds_ibdev->mr_1m_pool;
+else
+pool = rds_ibdev->mr_8k_pool;
+}
+ibmr = rds_ib_try_reuse_ibmr(pool);
if (ibmr)
return ibmr;
--- linux-4.15.0.orig/net/rds/ib_fmr.c
+++ linux-4.15.0/net/rds/ib_fmr.c
@@ -61,6 +61,7 @@
frmr->mr_attr.max_pages);
if (IS_ERR(frmr->mr)) {
 pr_warn("RDS/IB: %s failed to allocate MR", __func__); 
+err = PTR_ERR(frmr->mr);
goto out_no_cigar;
cpu_relax();

-ret = ib_map_mr_sg_zbva(frmr->mr, ibmr->sg, ibmr->sg_len, 
+ret = ib_map_mr_sg_zbva(frmr->mr, ibmr->sg, ibmr->sg_dma_len, 
&off, PAGE_SIZE);
-if (unlikely(ret != ibmr->sg_len))
+if (unlikely(ret != ibmr->sg_dma_len))
return ret < 0 ? ret : -EINVAL;

/* Perform a WR for the fast_reg_mr. Each individual page
--- linux-4.15.0.orig/net/rds/ib_rdma.c
+++ linux-4.15.0/net/rds/ib_rdma.c
@@ -111,9 +112,9 @@

list_to_llist_nodes(pool, &unmap_list, &clean_nodes, &clean_tail);
-if (ibmr_ret)
+if (ibmr_ret) {
 *ibmr_ret = llist_entry(clean_nodes, struct rds_ib_mr, llnode);
-
+clean_nodes = clean_nodes->next;
 +}
/* more than one entry in llist nodes */
-if (clean_nodes->next)
-llist_add_batch(clean_nodes->next, clean_tail, &pool->clean_list);
+if (clean_nodes)
+llist_add_batch(clean_nodes, clean_tail, 
+&pool->clean_list);

}

struct rds_ib_mr *ibmr = NULL;
int iter = 0;

-if (atomic_read(&pool->dirty_count) >= pool->max_items_soft / 10)
-queue_delayed_work(rds_ib_mr_wq, &pool->flush_worker, 10);
-
-while (1) {
-ibmr = rds_ib_reuse_mr(pool);
-if (ibmr)
--- linux-4.15.0.orig/net/rds/ib_recv.c
+++ linux-4.15.0/net/rds/ib_recv.c
@@ -98,12 +98,12 @@
static int rds_ib_recv_alloc_cache(struct rds_ib_refill_cache *cache)
{
    struct rds_ib_cache_head *head;
    int cpu;

    cache->percpu = alloc_percpu(struct rds_ib_cache_head);
    if (!cache->percpu)
        return -ENOMEM;

    return 0;
}

int rds_ib_recv_alloc_caches(struct rds_ib_connection *ic)
{
    int ret;

    ret = rds_ib_recv_alloc_cache(&ic->i_cache_incs);
    if (!ret) {
        ret = rds_ib_recv_alloc_cache(&ic->i_cache_frags);
        if (ret)
            free_percpu(ic->i_cache_incs.percpu);
    }

    return ret;
}

/* Do not send cong updates to IB loopback */

static const char *const rds_ib_stat_names[] = {
    "ib_connect_raced",
    "ib_listen_closed_stale",
    NULL
};
"s_ib_evt_handler_call",
"ib_evt_handler_call",
"ib_tasklet_call",
"ib_tx_cq_event",
"ib_tx_ring_full",
--- linux-4.15.0.orig/net/rds/loop.c
+++ linux-4.15.0/net/rds/loop.c
@@ -193,4 +193,5 @@
      .inc_copy_to_user = rds_message_inc_copy_to_user,
      .inc_free = rds_loop_inc_free,
      .t_name = "loopback",
+    .t_type = RDS_TRANS_LOOP,
    };
--- linux-4.15.0.orig/net/rds/rdma.c
+++ linux-4.15.0/net/rds/rdma.c
@@ -515,9 +515,10 @@
    return tot_pages;
 }

-int rds_rdma_extra_size(struct rds_rdma_args *args)
+int rds_rdma_extra_size(struct rds_rdma_args *args,
+                        struct rds_iov_vector *iov)
{
-struct rds_iovec vec;
+struct rds_iovec *vec;
 struct rds_iovec __user *local_vec;
 int tot_pages = 0;
 unsigned int nr_pages;
@@ -528,13 +529,26 @@
 if (args->nr_local == 0)
 return -EINVAL;

+if (args->nr_local > UIO_MAXIOV)
+return -EMSGSIZE;
+iov->iov = kcalloc(args->nr_local,
+sizeof(struct rds_iovec),
+GFP_KERNEL);
+if (!iov->iov)
+return -ENOMEM;
+vec = &iov->iov[0];
+if (copy_from_user(vec, local_vec, args->nr_local *
+sizeof(struct rds_iovec)))
+return -EFAULT;
+iov->len = args->nr_local;
+return tot_pages;


/* figure out the number of pages in the vector */
-for (i = 0; i < args->nr_local; i++) {
-if (copy_from_user(&vec, &local_vec[i],
-   sizeof(struct rds_iovec)))
-return -EFAULT;
+for (i = 0; i < args->nr_local; i++, vec++) {

-nr_pages = rds_pages_in_vec(&vec);
+nr_pages = rds_pages_in_vec(vec);
if (nr_pages == 0)
return -EINVAL;

@@ -556,15 +570,15 @@
 * Extract all arguments and set up the rdma_op
 */
int rds_cmsg_rdma_args(struct rds_sock *rs, struct rds_message *rm,
-    struct cmsghdr *cmsg)
-    struct cmsghdr *cmsg,
+    struct cmsghdr *cmsg,
+    struct rds_iov_vector *vec)
{
struct rds_rdma_args *args;
struct rm_rdma_op *op = &rm->rdma;
int nr_pages;
unsigned int nr_bytes;
struct page **pages = NULL;
-struct rds_iovec iovstack[UIO_FASTIOV], *iovs = iovstack;
-    int iov_size;
+    struct rds_iovec *iovs;
unsigned int i, j;
int ret = 0;

@@ -584,31 +598,23 @@
goto out_ret;
}

-/* Check whether to allocate the iovec area */
-    iov_size = args->nr_local * sizeof(struct rds_iovec);
-    if (args->nr_local > UIO_FASTIOV) {
-        iovs = sock_kmalloc(rds_rs_to_sk(rs), iov_size, GFP_KERNEL);
-        if (!iovs) {
-            -ret = -ENOMEM;
-            goto out_ret;
-        }
+    if (vec->len != args->nr_local) {
+        ret = -EINVAL;
+        goto out_ret;
+    }

/* Extract all arguments and set up the rdma_op */
int rds_cmsg_rdma_args(struct rds_sock *rs, struct rds_message *rm,
-if (copy_from_user(iovs, (struct rds_iovec __user *)(unsigned long) args->local_vec_addr, iov_size)) { 
  ret = -EFAULT;
  goto out;
-}
+iovs = vec->iov;

  nr_pages = rds_rdma_pages(iovs, args->nr_local);
  if (nr_pages < 0) {
    ret = -EINVAL;
    goto out;
    +goto out_ret;
  }

  pages = kcalloc(nr_pages, sizeof(struct page *), GFP_KERNEL);
  if (!pages) {
    ret = -ENOMEM;
    goto out;
    +goto out_ret;
  }

  op->op_write = !!((args->flags & RDS_RDMA_READWRITE);
  @@ -621,7 +627,7 @@
  op->op_sg = rds_message_alloc_sgs(rm, nr_pages);
  if (!op->op_sg) {
    ret = -ENOMEM;
    goto out;
    +goto out_pages;
  }

  if (op->op_notify || op->op_recverr) {
    @@ -633,7 +639,7 @@
    op->op_notifier = kmalloc(sizeof(struct rds_notifier), GFP_KERNEL);
    if (!op->op_notifier) {
      ret = -ENOMEM;
      goto out;
      +goto out_pages;
    }

    op->op_notifier->n_user_token = args->user_token;
    op->op_notifier->n_status = RDS_RDMA_SUCCESS;
    @@ -679,7 +685,7 @@
    /*
    ret = rds_pin_pages(iov->addr, nr, pages, !op->op_write);
    if (ret < 0)
    -goto out;
    +goto out_pages;
    else
    ret = 0;
  \@endverbatim

  /*
  ret = rds_pin_pages(iov->addr, nr, pages, !op->op_write);
  if (ret < 0)
  -goto out;
  +goto out_pages;
  else
  ret = 0;
}
nr_bytes,
(unsigned int) args->remote_vec.bytes);
ret = -EINVAL;
-goto out;
+goto out_pages;
}
op->op_bytes = nr_bytes;

-out:
-if (iovs != iovstack)
-sock_kfree_s(rds_rs_to_sk(rs), iovs, iov_size);
+out_pages:
kfree(pages);
out_ret:
if (ret)
--- linux-4.15.0.orig/net/rds/rds.h
+++ linux-4.15.0/net/rds/rds.h
@@ -150,7 +150,7 @@
/* Protocol version */
unsigned int c_version;
-struct net *c_net;
+possible_net tc_net;

struct list_head c_map_item;
unsigned long c_map_queued;
@@ -165,13 +165,13 @@
static inline
struct net *rds_conn_net(struct rds_connection *conn)
{
- return conn->c_net;
+return read_pnet(&conn->c_net);
}

static inline
void rds_conn_net_set(struct rds_connection *conn, struct net *net)
{ 
-conn->c_net = get_net(net); 
+write_pnet(&conn->c_net, net);
}

#define RDS_FLAG_CONG_BITMAP 0x01
@@ -356,6 +356,18 @@
#define RDS_MSG_PAGEVEC 7
#define RDS_MSG_FLUSH 8
+struct rds_iov_vector {
+struct rds_iovec *iov;
+int len;
+};
+
+struct rds_iov_vector_arr {
+struct rds_iov_vector *vec;
+int len;
+int indx;
+int incr;
+};
+
+struct rds_message {
+refcount_t m_refcount;
+struct list_head m_sock_item;
+int m_status;
+};

/* Available as part of RDS core, so doesn't need to participate
 * in get_preferred transport etc
 */
#define RDS_TRANS_LOOP 3

/**
 * struct rds_transport - transport specific behavioural hooks
 *
 @@ -839,13 +856,13 @@
 int rds_get_mr_for_dest(struct rds_sock *rs, char __user *optval, int optlen);
 int rds_free_mr(struct rds_sock *rs, char __user *optval, int optlen);
 void rds_rdma_drop_keys(struct rds_sock *rs);
-int rds_rdma_extra_size(struct rds_rdma_args *args);
-int rds_cmsg_rdma_args(struct rds_sock *rs, struct rds_message *rm,
-    struct cmsghdr *cmsg);
+int rds_rdma_extra_size(struct rds_rdma_args *args,
+    struct rds_iov_vector *iov);
 int rds_cmsg_rdma_dest(struct rds_sock *rs, struct rds_message *rm,
    struct cmsghdr *cmsg);
-int rds_cmsg_rdma_args(struct rds_sock *rs, struct rds_message *rm,
-    struct cmsghdr *cmsg);
+int rds_cmsg_rdma_args(struct rds_sock *rs, struct rds_message *rm,
+    struct cmsghdr *cmsg,
+    struct rds_iov_vector *vec);
 int rds_cmsg_rdma_map(struct rds_sock *rs, struct rds_message *rm,
    struct cmsghdr *cmsg);
 void rds_rdma_free_op(struct rm_rdma_op *ro);
--- linux-4.15.0.orig/net/rds/recv.c
+++ linux-4.15.0/net/rds/recv.c
@@ -103,6 +103,11 @@
 rds_stats_add(s_recv_bytes_added_to_socket, delta);
else
rds_stats_add(s_recv_bytes_removed_from_socket, -delta);
+
+ /* loop transport doesn't send/recv congestion updates */
+ if (rs->rs_transport->t_type == RDS_TRANS_LOOP)
+ return;
+
now_congested = rs->rs_rcv_bytes > rds_sk_rcvbuf(rs);

rdsdebug("rs %p (%pI4:%u) recv bytes %d buf %d ")
@@ -448,12 +453,13 @@
int rds_notify_queue_get(struct rds_sock *rs, struct msghdr *msghdr)
{
  struct rds_notifier *notifier;
  -struct rds_rdma_notify cmsg = { 0 }; /* fill holes with zero */
  +struct rds_rdma_notify cmsg;
  unsigned int count = 0, max_messages = ~0U;
  unsigned long flags;
  LIST_HEAD(copy);
  int err = 0;

  +memset(&cmsg, 0, sizeof(cmsg));/* fill holes with zero */

  /* put_cmsg copies to user space and thus may sleep. We can't do this
   * with rs_lock held, so first grab as many notifications as we can stuff
@@ -558,6 +564,7 @@
             struct rds_cmsg_rx_trace t;
  int i, j;

  +memset(&t, 0, sizeof(t));
  inc->i_rx_lat_trace[RDS_MSG_RX_CMSG] = local_clock();
  t.rx_traces = rs->rs_rx_traces;
  for (i = 0; i < rs->rs_rx_traces; i++) {
@@ -656,7 +663,7 @@
               if (rds_cmsg_recv(inc, msg, rs)) {
                    ret = -EFAULT;
                    goto out;
++ break;
               }

  rds_stats_inc(s_recv_delivered);
--- linux-4.15.0.orig/net/rds/send.c
+++ linux-4.15.0/net/rds/send.c
@@ -1,5 +1,5 @@
*/
- * Copyright (c) 2006 Oracle. All rights reserved.
+ * Copyright (c) 2006, 2018 Oracle and/or its affiliates. All rights reserved.

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This software is available to you under a choice of one of two licenses. You may choose to be licensed under the terms of the GNU @ @ -869,12 +869,14 @@
*rds_message is getting to be quite complicated, and we'd like to allocate *it all in one go. This figures out how big it needs to be up front. */
-static int rds_rm_size(struct msghdr *msg, int data_len)
+static int rds_rm_size(struct msghdr *msg, int data_len,
+ struct rds_iov_vector_arr *vct)
{
 struct cmsghdr *cmsg;
 int size = 0;
 int cmgs_groups = 0;
 int retv;
+struct rds_iov_vector *iov, *tmp_iov;

 for_each_cmsghdr(cmsg, msg) {
  if (!CMSG_OK(msg, cmsg))
@@ -885,8 +887,24 @@
   case RDS_CMSG_RDMA_ARGS:
+    if (vct->indx >= vct->len) {
+      vct->len += vct->incr;
+      tmp_iov =
+        krealloc(vct->vec,
+      vct->len *
+ sizeof(struct rds_iov_vector),
+ GFP_KERNEL);
+    if (!tmp_iov) {
+      vct->len -= vct->incr;
+      return -ENOMEM;
+    }
+    iov = &vct->vec[vct->indx];
+    memset(iov, 0, sizeof(struct rds_iov_vector));
+    vct->indx++;;
   cmgs_groups |= 1;
-    retval = rds_rdma_extra_size(CMSG_DATA(cmsg));
+    retval = rds_rdma_extra_size(CMSG_DATA(cmsg), iov);
  if (retval < 0)
    return retval;
  size += retval;
@@ -923,10 +941,11 @@
  }
}
static int rds_cmsg_send(struct rds_sock *rs, struct rds_message *rm,
- struct msghdr *msg, int *allocated_mr)
+ struct msghdr *msg, int *allocated_mr,
+ struct rds_iov_vector_arr *vct)
{
    struct cmsghdr *cmsg;
    int ret = 0;
    +int ret = 0, ind = 0;

    for_each_cmsghdr(cmsg, msg) {
        if (!CMSG_OK(msg, cmsg))
            switch (cmsg->cmsg_type) {
            case RDS_CMSG_RDMA_ARGS:
                ret = rds_cmsg_rdma_args(rs, rm, cmsg);
                if (ind >= vct->indx)
                    return -ENOMEM;
                ret = rds_cmsg_rdma_args(rs, rm, cmsg, &vct->vec[ind]);
                ind++;
                break;
            case RDS_CMSG_RDMA_DEST:
                return ret;
            }

    -static int rds_send_mprds_hash(struct rds_sock *rs, struct rds_connection *conn)
    +static int rds_send_mprds_hash(struct rds_sock *rs,
        struct rds_connection *conn, int nonblock)
    {
        int hash;

        if (conn->c_npaths == 0 && hash != 0) {
            rds_send_ping(conn, 0);

            /* The underlying connection is not up yet. Need to wait
             * until it is up to be sure that the non-zero c_path can be
             * used. But if we are interrupted, we have to use the zero
             * c_path in case the connection ends up being non-MP capable.
             */
            if (conn->c_npaths == 0) {
                -wait_event_interruptible(conn->c_hs_waitq,
                - (conn->c_npaths != 0));
            */
            cannot wait for the connection be made, so just use
                + * the base c_path.
                */
ACTION

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+if (nonblock)
+return 0;
+if (wait_event_interruptible(conn->c_hs_waitq,
+ conn->c_npaths != 0))
+hash = 0;
}
if (conn->c_npaths == 1)
hash = 0;
@@ -1034,6 +1068,13 @@
long timeo = sock_sndtimeo(sk, nonblock);
struct rds_conn_path *cpath;
size_t total_payload_len = payload_len, rdma_payload_len = 0;
+struct rds_iov_vector_arr vct;
+int ind;
+
+memset(&vct, 0, sizeof(vct));
+
+/* expect 1 RDMA CMSG per rds_sendmsg. can still grow if more needed. */
+vct.incr = 1;

/* Mirror Linux UDP mirror of BSD error message compatibility */
/* XXX: Perhaps MSG_MORE someday */
@@ -1082,7 +1123,7 @@
}
/* size of rm including all sgs */
-ret = rds_rm_size(msg, payload_len);
+ret = rds_rm_size(msg, payload_len, &vct);
if (ret < 0)
goto out;
@@ -1124,7 +1165,7 @@
}
/* Parse any control messages the user may have included. */
-ret = rds_cmsg_send(rs, rm, msg, &allocated_mr);
+ret = rds_cmsg_send(rs, rm, msg, &allocated_mr, &vct);
if (ret) {
/* Trigger connection so that its ready for the next retry */
if (ret == -EAGAIN)
@@ -1147,7 +1188,7 @@
}
if (conn->c_trans->t_mp_capable)
-cpath = &conn->c_path[rds_send_mprds_hash(rs, conn)];
+cpath = &conn->c_path[rds_send_mprds_hash(rs, conn, nonblock)];
else
cpath = &conn->c_path[0];
queue_delayed_work(rds_wq, &cpath->cp_send_w, 1);

rds_message_put(rm);
+
+for (ind = 0; ind < vct.indx; ind++)
+kfree(vct.vec[ind].iov);
+kfree(vct.vec);
+
return payload_len;

out:
+for (ind = 0; ind < vct.indx; ind++)
+kfree(vct.vec[ind].iov);
+kfree(vct.vec);
+
/* If the user included a RDMA_MAP cmsg, we allocated a MR on the fly.
 * If the sendmsg goes through, we keep the MR. If it fails with EAGAIN
 * or in any other way, we need to destroy the MR again */
--- linux-4.15.0.orig/net/rds/stats.c
+++ linux-4.15.0/net/rds/stats.c
@@ -76,6 +76,8 @@
	"cong_update_received",
	"cong_send_error",
	"cong_send_blocked",
+"recv_bytes_added_to_sock",
+"recv_bytes_freed_fromsock",
};

void rds_stats_info_copy(struct rds_info_iterator *iter,
--- linux-4.15.0.orig/net/rds/tcp.c
+++ linux-4.15.0/net/rds/tcp.c
@@ -307,7 +307,8 @@
 rdsdebug("freeing tc %p\n", tc);

 spin_lock_irqsave(&rds_tcp_conn_lock, flags);
-list_del(&tc->t_tcp_node);
+if (!tc->t_tcp_node_detached)
+list_del(&tc->t_tcp_node);
 spin_unlock_irqrestore(&rds_tcp_conn_lock, flags);

 kmem_cache_free(rds_tcp_conn_slab, tc);
@@ -528,12 +529,16 @@
 rds_tcp_listen_stop(lsock, &rtn->rds_tcp_accept_w);
 spin_lock_irq(&rds_tcp_conn_lock);
 list_for_each_entry_safe(tc, _tc, &rds_tcp_conn_list, t_tcp_node) {
-struct net *c_net = tc->t_epath->ep_conn->c_net;

+struct net *c_net = read_pnet(&tc->t_cpath->cp_conn->c_net);

-if (net != c_net || !tc->t_sock)
+if (net != c_net)
  continue;
-if (!list_has_conn(&tmp_list, tc->t_cpath->cp_conn))
+if (!list_has_conn(&tmp_list, tc->t_cpath->cp_conn)) {
  list_move_tail(&tc->t_tcp_node, &tmp_list);
  } else {
    list_del(&tc->t_tcp_node);
    tc->t_tcp_node_detached = true;
  }
}

spin_unlock_irq(&rds_tcp_conn_lock);
list_for_each_entry_safe(tc, _tc, &tmp_list, t_tcp_node) {
@@ -587,7 +592,7 @@
spin_lock_irq(&rds_tcp_conn_lock);
list_for_each_entry_safe(tc, _tc, &rds_tcp_conn_list, t_tcp_node) {
-struct net *c_net = tc->t_cpath->cp_conn->c_net;
+struct net *c_net = read_pnet(&tc->t_cpath->cp_conn->c_net);

if (net != c_net || !tc->t_sock)
  continue;
--- linux-4.15.0.orig/net/rds/tcp.h
+++ linux-4.15.0/net/rds/tcp.h
@@ -12,6 +12,7 @@
struct rds_tcp_connection {
 struct list_head	t_tcp_node;
+bool			t_tcp_node_detached;
 struct rds_conn_path	*t_cpath;
/* t_conn_path_lock synchronizes the connection establishment between
 * rds_tcp_accept_one and rds_tcp_conn_path_connect
--- linux-4.15.0.orig/net/rds/tcp_listen.c
+++ linux-4.15.0/net/rds/tcp_listen.c
@@ -1,5 +1,5 @@
/*
-* Copyright (c) 2006 Oracle. All rights reserved.
+* Copyright (c) 2006, 2018 Oracle. All rights reserved.
 *
 * This software is available to you under a choice of one of two
 * licenses. You may choose to be licensed under the terms of the GNU
@@ -142,12 +142,20 @@
if (ret)
  goto out;

-new_sock->type = sock->type;
new_sock->ops = sock->ops;
ret = sock->ops->accept(sock, new_sock, O_NONBLOCK, true);
if (ret < 0)
goto out;

/** sock_create_lite() does not get a hold on the owner module so we
+ * need to do it here. Note that sock_release() uses sock->ops to
+ * determine if it needs to decrement the reference count. So set
+ * sock->ops after calling accept() in case that fails. And there's
+ * no need to do try_module_get() as the listener should have a hold
+ * already.
+ **/
+new_sock->ops = sock->ops;
+_module_get(new_sock->ops->owner);
+
ret = rds_tcp_keepalive(new_sock);
if (ret < 0)
goto out;

--- linux-4.15.0.orig/net/rfkill/core.c
+++ linux-4.15.0/net/rfkill/core.c
@@ -998,10 +998,13 @@
int __must_check rfkill_register(struct rfkill *rfkill)
 {
 static unsigned long rfkill_no;
-struct device *dev = &rfkill->dev;
+struct device *dev;

if (!rfkill)
	return -EINVAL;
+
	dev = &rfkill->dev;

mutex_lock(&rfkill_global_mutex);

@@ -1312,10 +1315,12 @@
.lseek= no_llseek,
 ];

+#define RFKILL_NAME "rfkill"
+
static struct miscdevice rfkill_miscdev = {
- .name= "rfkill",
- .fops= &rfkill_fops,
- .minor= MISC_DYNAMIC_MINOR,
+ .name= RFKILL_NAME,
+ .minor= RFKILL_MINOR,
static int __init rfkill_init(void)
@@ -1367,3 +1372,6 @@
class_unregister(&rfkill_class);
}
module_exit(rfkill_exit);
+
+MODULE_ALIAS_MISCDEV(RFKILL_MINOR);
+MODULE_ALIAS("devname:" RFKILL_NAME);
--- linux-4.15.0.orig/net/rfkill/rfkill-gpio.c
+++ linux-4.15.0/net/rfkill/rfkill-gpio.c
@@ -137,13 +137,18 @@
ret = rfkill_register(rfkill->rfkill_dev);
if (ret < 0)
	return ret;
+goto err_destroy;

platform_set_drvdata(pdev, rfkill);

device_info(&pdev->dev, "%s device registered\n", rfkill->name);

return 0;
+
+err_destroy:
+rfkill_destroy(rfkill->rfkill_dev);
+
+return ret;

static int rfkill_gpio_remove(struct platform_device *pdev)
--- linux-4.15.0.orig/net/rose/rose_loopback.c
+++ linux-4.15.0/net/rose/rose_loopback.c
@@ -16,6 +16,7 @@
#include <linux/init.h>

int rose_loopback_queue(struct sk_buff *skb, struct rose_neigh *neigh)
{
-struct sk_buff *skbn;
+struct sk_buff *skbn = NULL;

-struct sk_buff_head loopback_queue;
+#define ROSE_LOOPBACK_LIMIT 1000
static struct timer_list loopback_timer;

static void rose_set_loopback_timer(void);
@@ -35,29 +36,27 @@
#include <linux/init.h>

static struct sk_buff_head loopback_queue;
+#define ROSE_LOOPBACK_LIMIT 1000
static struct timer_list loopback_timer;

static void rose_set_loopback_timer(void);
@@ -35,29 +36,27 @@
#include <linux/init.h>

int rose_loopback_queue(struct sk_buff *skb, struct rose_neigh *neigh)
{
-struct sk_buff *skbn;
+struct sk_buff *skbn = NULL;
-skbn = skb_clone(skb, GFP_ATOMIC);
+if (skb_queue_len(&loopback_queue) < ROSE_LOOPBACK_LIMIT)
+skbn = skb_clone(skb, GFP_ATOMIC);

-kfree_skb(skb);
-
-if (skbn != NULL) {
+if (skbn) {
+consume_skb(skb);
skb_queue_tail(&loopback_queue, skbn);

if (!rose_loopback_running())
rose_set_loopback_timer();
+} else {
+kfree_skb(skb);
}

return 1;
}
-

static void rose_set_loopback_timer(void)
{
-del_timer(&loopback_timer);
-
-loopback_timer.expires = jiffies + 10;
-add_timer(&loopback_timer);
+mod_timer(&loopback_timer, jiffies + 10);
}

static void rose_loopback_timer(struct timer_list *unused)
@@ -68,8 +67,12 @@
struct sock *sk;
unsigned short frametype;
unsigned int lci_i, lci_o;
+int count;

-while ((skb = skb_dequeue(&loopback_queue)) != NULL) {
+for (count = 0; count < ROSE_LOOPBACK_LIMIT; count++) {
+skb = skb_dequeue(&loopback_queue);
+if (!skb)
+return;
if (skb->len < ROSE_MIN_LEN) {
kfree_skb(skb);
continue;
@@ -96,16 +99,27 @@
if (frametype == ROSE_CALL_REQUEST) {
    if ((dev = rose_dev_get(dest)) != NULL) {
        if (rose_rx_call_request(skb, dev, rose_loopback_neigh, lci_o) == 0)
            kfree_skb(skb);
    } else {
        if (!rose_loopback_neigh->dev) {
            kfree_skb(skb);
            continue;
        }
        dev = rose_dev_get(dest);
        if (!dev) {
            kfree_skb(skb);
            continue;
        }
        if (rose_rx_call_request(skb, dev, rose_loopback_neigh, lci_o) == 0) {
            dev_put(dev);
            kfree_skb(skb);
        }
    } else {
        kfree_skb(skb);
    }
}
if (!skb_queue_empty(&loopback_queue))
    mod_timer(&loopback_timer, jiffies + 1);
}

void __exit rose_loopback_clear(void)
--- linux-4.15.0.orig.net/rose/rose_route.c
+++ linux-4.15.0.net/rose/rose_route.c
@@ -850,6 +850,7 @@
@@ -867,6 +868,10 @@
 if (skb->len < ROSE_MIN_LEN)
     return res;
 +
 if (!ax25)
 +    return rose_loopback_queue(skb, NULL);
 +
frametype = skb->data[2];
lci = ((skb->data[0] << 8) & 0xF00) + ((skb->data[1] << 0) & 0x0FF);
if (frametype == ROSE_CALL_REQUEST &&
--- linux-4.15.0.orig/net/rose/rose_subr.c
+++ linux-4.15.0/net/rose/rose_subr.c
@@ -105,16 +105,17 @@
struct sk_buff *skb;
unsigned char  *dptr;
unsigned char  lci1, lci2;
-char buffer[100];
-int len, faclen = 0;
+int maxfaclen = 0;
+int len, faclen;
+int reserve;

-len = AX25_BPQ_HEADER_LEN + AX25_MAX_HEADER_LEN + ROSE_MIN_LEN + 1;
+reserve = AX25_BPQ_HEADER_LEN + AX25_MAX_HEADER_LEN + 1;
+len = ROSE_MIN_LEN;

switch (frametype) {
    case ROSE_CALL_REQUEST:
        len  += 1 + ROSE_ADDR_LEN + ROSE_ADDR_LEN;
-faclen = rose_create_facilities(buffer, rose);
+faclen = 256;
        len  += faclen;
+maxfaclen = 256;
        break;
    case ROSE_CALL_ACCEPTED:
    case ROSE_CLEAR_REQUEST:
@@ -123,15 +124,16 @@
    break;
}

-if ((skb = alloc_skb(len, GFP_ATOMIC)) == NULL)
+skb = alloc_skb(reserve + len + maxfaclen, GFP_ATOMIC);
+if (!skb)
    return;

/*
  *Space for AX.25 header and PID.
  */
-skb_reserve(skb, AX25_BPQ_HEADER_LEN + AX25_MAX_HEADER_LEN + 1);
+skb_reserve(skb, reserve);

-dptr = skb_put(skb, skb_tailroom(skb));
+dpdr = skb_put(skb, len);

lci1 = (rose->lci >> 8) & 0x0F;
lci2 = (rose->lci >> 0) & 0xFF;
dptr += ROSE_ADDR_LEN;
memcpy(dptr, &rose->source_addr, ROSE_ADDR_LEN);
dptr += ROSE_ADDR_LEN;
memcpy(dptr, buffer, faclen);

+faclen = rose_create_facilities(dptr, rose);
+skb_put(skb, faclen);
dptr += faclen;
break;

memset(&cp, 0, sizeof(cp));
cp.local	= rx->local;
cp.key= key;
-cp.security_level= 0;
+cp.security_level= rx->min_sec_level;
cp.exclusive= false;
cp.upgrade= upgrade;
cp.service_id= srx->srx_service;

switch (rx->sk.sk_state) {
case RXRPC_UNBOUND:
+case RXRPC_CLIENT_UNBOUND:	rx->srx.srx_family = AF_RXRPC;	rx->srx.srx_service = 0;	rx->srx.transport_type = SOCK_DGRAM;
}@ @ -547,6 +547,7 @@

rx->local = local;
-rx->sk.sk_state = RXRPC_CLIENT_UNBOUND;
+rx->sk.sk_state = RXRPC_CLIENT_BOUND;
/* Fall through */

-case RXRPC_CLIENT_UNBOUND:
case RXRPC_CLIENT_BOUND:
if (!m->msg_name &&
   test_bit(RXRPC_SOCK_CONNECTED, &rx->flags)) {
}@ @ -860,7 +860,6 @@
static int rxrpc_release_sock(struct sock *sk)
{
 struct rxrpc_sock *rx = rxrpc_sk(sk);
-struct rxrpc_net *rxnet = rxrpc_net(sock_net(&rx->sk));

  _enter("%p[%.d,%.d]", sk, sk->sk_state, refcount_read(&sk->sk_refcnt));
rxrpc_release_calls_on_socket(rx);
flush_workqueue(rxrpc_workqueue);
rxrpc_purge_queue(&sk->sk_receive_queue);
-rxrpc_queue_work(&rxnet->service_conn_reaper);
-rxrpc_queue_work(&rxnet->client_conn_reaper);

rxrpc_put_local(rx->local);
rx->local = NULL;
--- linux-4.15.0.orig/net/rxrpc/ar-internal.h
+++ linux-4.15.0/net/rxrpc/ar-internal.h
@@ -437,8 +437,7 @@
 enum rxrpc_conn_cache_state cache_state;
 enum rxrpc_conn_proto_state state; /* current state of connection */
 -u32local_abort; /* local abort code */
- u32remote_abort; /* remote abort code */
 +u32abort_code; /* Abort code of connection abort */
 intdebug_id; /* debug ID for printk */
 atomic_tserial; /* packet serial number counter */
 unsigned inthi_serial; /* highest serial number received */
-@@ -448,8 +447,19 @@
 u8security_size; /* security header size */
 u8security_ix; /* security type */
 u8out_clientflag; /* RXRPC_CLIENT_INITIATED if we are client */
+shorterror; /* Local error code */
;

+static inline bool rxrpc_to_server(const struct rxrpc_skb *sp)
+{
+ return sp->hdr.flags & RXRPC_CLIENT_INITIATED;
+}
+
+static inline bool rxrpc_to_client(const struct rxrpc_skb *sp)
+{
+ return !rxrpc_to_server(sp);
+}
+
/*
 * Flags in call->flags.
 */
@@ -464,6 +474,8 @@
 RXRPC_CALL_SEND_PING, /* A ping will need to be sent */
 RXRPC_CALL_PINGING, /* Ping in process */
 RXRPC_CALL_RETRANS_TIMEOUT, /* Retransmission due to timeout occurred */
+RXRPC_CALL_BEGAN_RX_TIMER, /* We began the expect_rx_by timer */
+RXRPC_CALL_DISCONNECTED, /* The call has been disconnected */
/**
@@ -591,6 +603,7 @@
  * not hard-ACK'd packet follows this.
 */
rxrpc_seq_t	tx_top;/* Highest Tx slot allocated. */
+u16	tx_backoff;/* Delay to insert due to Tx failure */

/* TCP-style slow-start congestion control [RFC5681]. Since the SMSS
  * is fixed, we keep these numbers in terms of segments (ie. DATA
@@ -875,6 +888,7 @@
void rxrpc_put_client_conn(struct rxrpc_connection *);
void rxrpc_discard_expired_client_conns(struct work_struct *);
void rxrpc_destroy_all_client_connections(struct rxrpc_net *);
+void rxrpc_clean_up_local_conns(struct rxrpc_local *);

/*
 * conn_event.c
--- linux-4.15.0.orig/net/rxrpc/call_accept.c
+++ linux-4.15.0/net/rxrpc/call_accept.c
@@ -26,6 +26,11 @@
 #include <net/ip.h>
 #include "ar-internal.h"

+static void rxrpc_dummy_notify(struct sock *sk, struct rxrpc_call *call,
+       unsigned long user_call_ID)
+{
+}
+
/*
 * Preallocate a single service call, connection and peer and, if possible,
 * give them a user ID and attach the user's side of the ID to them.
@@ -115,9 +120,9 @@
while (*pp) {
    parent = *pp;
    xcall = rb_entry(parent, struct rxrpc_call, sock_node);
-if (user_call_ID < call->user_call_ID)
+if (user_call_ID < xcall->user_call_ID)
    pp = &("pp")->rb_left;
-else if (user_call_ID > call->user_call_ID)
+else if (user_call_ID > xcall->user_call_ID)
    pp = &("pp")->rb_right;
else
    goto id_in_use;
@@ -203,6 +208,7 @@
tail = b->peer_backlog_tail;
while (CIRC_CNT(head, tail, size) > 0) {

struct rxrpc_peer *peer = b->peer_backlog[tail];
+rxrpc_put_local(peer->local);
kfree(peer);
tail = (tail + 1) & (size - 1);
}
@@ -227,6 +233,8 @@
if (rx->discard_new_call) {
    _debug("discard %lx", call->user_call_ID);
    rx->discard_new_call(call, call->user_call_ID);
    +if (call->notify_rx)
    +call->notify_rx = rxrpc_dummy_notify;
    rxrpc_put_call(call, rxrpc_call_put_kernel);
}
rxrpc_call_completed(call);
@@ -418,11 +426,11 @@
case RXRPC_CONN_REMOTELY_ABORTED:
    rxrpc_set_call_completion(call, RXRPC_CALL_REMOTELY_ABORTED,
        - conn->remote_abort, -ECONNABORTED);
        + conn->abort_code, conn->error);
    break;
    case RXRPC_CONN_LOCALLY_ABORTED:
    rxrpc_abort_call("CON", call, sp->hdr.seq,
        - conn->local_abort, -ECONNABORTED);
        + conn->abort_code, conn->error);
    break;
    default:
    BUG();
--- linux-4.15.0.orig/net/rxrpc/call_event.c
+++ linux-4.15.0/net/rxrpc/call_event.c
@@ -123,6 +123,7 @@
else
    ack_at = expiry;

    +ack_at += READ_ONCE(call->tx_backoff);
    ack_at += now;
    if (time_before(ack_at, call->ack_at)) {
        WRITE_ONCE(call->ack_at, ack_at);
@@ -225,7 +226,7 @@
            ktime_to_ns(ktime_sub(skb->tstamp, max_age)));
    }

            resend_at = nsecs_to_jiffies(ktime_to_ns(ktime_sub(oldest, now)));
            +resend_at = nsecs_to_jiffies(ktime_to_ns(ktime_sub(now, oldest)));
            resend_at += jiffies + rxrpc_resend_timeout;
            WRITE_ONCE(call->resend_at, resend_at);

            @@ -312,6 +313,7 @@

container_of(work, struct rxrpc_call, processor);
rxrpc_serial_t *send_ack;
unsigned long now, next, t;
unsigned int iterations = 0;

rxrpc_see_call(call);

call->debug_id, rxrpc_call_states[call->state], call->events);

recheck_state:
+/* Limit the number of times we do this before returning to the manager */
+iterations++;
+if (iterations > 5)
+goto requeue;
+
if (test_and_clear_bit(RXRPC_CALL_EV_ABORT, &call->events)) {
    rxrpc_send_abort_packet(call);
goto recheck_state;
@@ -442,13 +449,16 @@
rxrpc_reduce_call_timer(call, next, now, rxrpc_timer_restart);
/* other events may have been raised since we started checking */
-if (call->events && call->state < RXRPC_CALL_COMPLETE) {
-__rxrpc_queue_call(call);
-goto out;
-}
+if (call->events && call->state < RXRPC_CALL_COMPLETE)
+goto requeue;

out_put:
rxrpc_put_call(call, rxrpc_call_put);
out:
_leave("");
+return;
+
+requeue:
+__rxrpc_queue_call(call);
+goto out;
}
--- linux-4.15.0.orig/net/rxrpc/call_object.c
+++ linux-4.15.0/net/rxrpc/call_object.c
@@ -280,7 +280,7 @@
*/
ret = rxrpc_connect_call(call, cp, srx, gfp);
if (ret < 0)
-goto error;
+goto error_attached_to_socket;
trace_rxrpc_call(call, rxrpc_call_connected, atomic_read(&call->usage),
here, NULL);
@@ -300,18 +300,29 @@
error_dup_user_ID:
write_unlock(&rx->call_lock);
release_sock(&rx->sk);
-ret = -EEXIST;
-
-error:
@@ -510,7 +521,7 @@
*_debug("RELEASE CALL %p (%d CONN %p)", call, call->debug_id, conn);
-if (conn)
+if (conn && !test_bit(RXRPC_CALL_DISCONNECTED, &call->flags))
rxrpc_disconnect_call(call);
for (i = 0; i < RXRPC_RXTX_BUFF_SIZE; i++) {
  @@ -638,12 +649,13 @@ }
}

/*
 * Final call destruction under RCU.
 * + Final call destruction - but must be done in process context.
 */
-static void rxrpc_rcu_destroy_call(struct rcu_head *rcu)
+static void rxrpc_destroy_call(struct work_struct *work)
{
+  struct rxrpc_call *call = container_of(work, struct rxrpc_call, processor);
+  rxrpc_put_connection(call->conn);
  rxrpc_put_peer(call->peer);
  kfree(call->rxtx_buffer);
  kfree(call->rxtx_annotations);
  @@ -651,6 +663,22 @@
}

/ *
 * Final call destruction under RCU.
 + */
+static void rxrpc_rcu_destroy_call(struct rcu_head *rcu)
+{
+  struct rxrpc_call *call = container_of(rcu, struct rxrpc_call, rcu);
+  +
+  +if (in_softirq()) {
+    INIT_WORK(&call->processor, rxrpc_destroy_call);
+  +if (!rxrpc_queue_work(&call->processor))
+    BUG();
+  +} else {
+    rxrpc_destroy_call(&call->processor);
+  +}
+}
+
+/*
 * clean up a call
 */
 void rxrpc_cleanup_call(struct rxrpc_call *call) {
  @@ -665,7 +693,6 @@
    ASSERTCMP(call->state, ==, RXRPC_CALL_COMPLETE);
    ASSERT(test_bit(RXRPC_CALL_RELEASED, &call->flags));
    -ASSERTCMP(call->conn, ==, NULL);
    
    /* Clean up the Rx/Tx buffer */
for (i = 0; i < RXRPC_RXTX_BUFF_SIZE; i++)
@@ -689,27 +716,27 @@
    _enter(""");

    -if (list_empty(&rxnet->calls))
    -return;
    +if (!list_empty(&rxnet->calls)) {
    +write_lock(&rxnet->call_lock);

    -write_lock(&rxnet->call_lock);
    +while (!list_empty(&rxnet->calls)) {
    +call = list_entry(rxnet->calls.next,
    + struct rxrpc_call, link);
    +_debug("Zapping call %p", call);

    -while (!list_empty(&rxnet->calls)) {
    -call = list_entry(rxnet->calls.next, struct rxrpc_call, link);
    -_debug("Zapping call %p", call);
    -
    -rxrpc_see_call(call);
    -list_del_init(&call->link);
    -
    -pr_err("Call %p still in use (%d,%s,%lx,%lx)!\n",
    -    call, atomic_read(&call->usage),
    -    rxrpc_call_states[call->state],
    -    call->flags, call->events);
    +rxrpc_see_call(call);
    +list_del_init(&call->link);
    +
    +pr_err("Call %p still in use (%d,%s,%lx,%lx)!\n",
    +    call, atomic_read(&call->usage),
    +    rxrpc_call_states[call->state],
    +    call->flags, call->events);
    +
    +write_unlock(&rxnet->call_lock);
    +cond_resched();
    +write_lock(&rxnet->call_lock);
    +}

    write_unlock(&rxnet->call_lock);
    -cond_resched();
    -write_lock(&rxnet->call_lock);
    }
    -
    -write_unlock(&rxnet->call_lock);
    }
--- linux-4.15.0.orig/net/rxrpc/conn_client.c
+++ linux-4.15.0/net/rxrpc/conn_client.c
@@ -351,7 +351,7 @@
     * normally have to take channel_lock but we do this before anyone else
     * can see the connection.
     */
-    list_add_tail(&call->chan_wait_link, &candidate->waiting_calls);
+    list_add(&call->chan_wait_link, &candidate->waiting_calls);

    if (cp->exclusive) {
        call->conn = candidate;
@@ -430,7 +430,7 @@
            call->conn = candidate;
        call->security_ix = conn->security_ix;
        call->service_id = conn->service_id;
-        list_add(&call->chan_wait_link, &conn->waiting_calls);
+        list_add_tail(&call->chan_wait_link, &conn->waiting_calls);
        spin_unlock(&conn->channel_lock);
        _leave(" = 0 [extant %d", conn->debug_id);
        return 0;
@@ -703,6 +703,7 @@
            ret = rxrpc_wait_for_channel(call, gfp);
        if (ret < 0) {
            +trace_rxrpc_client(call->conn, ret, rxrpc_client_chan_wait_failed);
        rxrpc_disconnect_client_call(call);
            goto out;
        }
@@ -773,15 +774,21 @@
     */
     void rxrpc_disconnect_client_call(struct rxrpc_call *call)
     {
-        unsigned int channel = call->cid & RXRPC_CHANNELMASK;
+        unsigned int channel = -1;
    struct rxrpc_connection *conn = call->conn;
-        struct rxrpc_channel *chan = &conn->channels[channel];
+        struct rxrpc_channel *chan = NULL;
        struct rxrpc_net *rxnet = rxrpc_net(sock_net(&call->socket->sk));
            -trace_rxrpc_client(conn, channel, rxrpc_client_chan_disconnect);
-        call->conn = NULL;
+        unsigned int channel = -1;
+        u32 cid;
+        spin_lock(&conn->channel_lock);
+        set_bit(RXRPC_CALL_DISCONNECTED, &call->flags);
+        +cid = call->cid;
+        if (cid) {
+            +channel = cid & RXRPC_CHANNELMASK;


chan = &conn->channels[channel];
+
+trace_rxrpc_client(conn, channel, rxrpc_client_chan_disconnect);

/* Calls that have never actually been assigned a channel can simply be
 * discarded. If the conn didn't get used either, it will follow
 @@ -806,7 +813,10 @@
goto out;
 }

-ASSERTCMP(rcu_access_pointer(chan->call), ==, call);
+if (rcu_access_pointer(chan->call) != call) {
+spin_unlock(&conn->channel_lock);
+BUG();
+

/* If a client call was exposed to the world, we save the result for
 * retransmission.
 @@ -893,7 +903,6 @@
 spin_unlock(&rxnet->client_conn_cache_lock);
 out_2:
 spin_unlock(&conn->channel_lock);
-rxrpc_put_connection(conn);
 _leave("");
 return;

@@ -1153,3 +1162,47 @@
 _leave("");
 }
 +
+/*
+ * Clean up the client connections on a local endpoint.
+ */
+void r xrpc_clean_up_local_conns(struct rxrpc_local *local)
+{
+struct rxrpc_connection *conn, *tmp;
+struct rxrpc_net *rxnet = local->rxnet;
+unsigned int nr_active;
+LIST_HEAD(graveyard);
+
+_enter("");
+
+spin_lock(&rxnet->client_conn_cache_lock);
+nr_active = rxnet->nr_active_client_conns;
+
+list_for_each_entry_safe(conn, tmp, &rxnet->idle_client_conns,
+ cache_link) {
if (conn->params.local == local) {
    ASSERTCMP(conn->cache_state, ==, RXRPC_CONN_CLIENT_IDLE);
    trace_rxrpc_client(conn, -1, rxrpc_client_discard);
    if (!test_and_clear_bit(RXRPC_CONN_EXPOSED, &conn->flags))
        BUG();
    conn->cache_state = RXRPC_CONN_CLIENT_INACTIVE;
    list_move(&conn->cache_link, &graveyard);
    nr_active--;
}

rxnet->nr_active_client_conns = nr_active;
spin_unlock(&rxnet->client_conn_cache_lock);
ASSERTCMP(nr_active, >=, 0);

while (!list_empty(&graveyard)) {
    conn = list_entry(graveyard.next, struct rxrpc_connection, cache_link);
    list_del_init(&conn->cache_link);
    rxrpc_put_connection(conn);
}

_leave(" [culled]);

--- linux-4.15.0.orig/net/rxrpc/conn_event.c
+++ linux-4.15.0/net/rxrpc/conn_event.c
@@ -70,7 +70,7 @
   iov[2].iov_len= sizeof(ack_info);
 pkt.whdr.epoch= htonl(conn->proto.epoch);
 -pkt.whdr.cid= htonl(conn->proto.cid);
+pkt.whdr.cid= htonl(conn->proto.cid | channel);
 pkt.whdr.callNumber= htonl(call_id);
 pkt.whdr.seq= 0;
 pkt.whdr.type= chan->last_type;
@@ -126,7 +126,7 @@
 switch (chan->last_type) {
 case RXRPC_PACKET_TYPE_ABORT:
   _proto("Tx ABORT %%%u { %d } [re]", serial, conn->local_abort);
+   _proto("Tx ABORT %%%u { %d } [re]", serial, conn->abort_code);
   break;
 case RXRPC_PACKET_TYPE_ACK:
    trace_rxrpc_tx_ack(NULL, serial, chan->last_seq, 0,
@@ -144,13 +144,12 @@
   * pass a connection-level abort onto all calls on that connection

Open Source Used In 5GaaS Edge AC-4 34585
static void rxrpc_abort_calls(struct rxrpc_connection *conn,
   enum rxrpc_call_completion compl,
   u32 abort_code, int error)
{
    struct rxrpc_call *call;
    int i;

    _enter("[%d],%x", conn->debug_id, abort_code);
+_enter("[%d],%x", conn->debug_id, conn->abort_code);

    spin_lock(&conn->channel_lock);

    @@ -162,9 +161,11 @@
    if (compl == RXRPC_CALL_LOCALLY_ABORTED)
        trace_rxrpc_abort("CON", call->cid,
            call->call_id, 0,
-       abort_code, error);
+       conn->abort_code,
+       conn->error);
    if (rxrpc_set_call_completion(call, compl,
        -       abort_code, error))
+       conn->abort_code,
+       conn->error))
        rxrpc_notify_socket(call);
    }
    @@ -197,10 +198,12 @@
    return 0;
    }

+conn->error = error;
+conn->abort_code = abort_code;
    conn->state = RXRPC_CONN_LOCALLY_ABORTED;
    spin_unlock_bh(&conn->state_lock);

-rxrpc_abort_calls(conn, RXRPC_CALL_LOCALLY_ABORTED, abort_code, error);
+rxrpc_abort_calls(conn, RXRPC_CALL_LOCALLY_ABORTED);

    msg.msg_name= &conn->params.peer->srx.transport;
    msg.msg_name= conn->params.peer->srx.transport_len;
@@ -219,7 +222,7 @@
    whdr._rsvd= 0;
    whdr.serviceId= htons(conn->service_id);

-    word= htonl(conn->local_abort);
+    word= htonl(conn->abort_code);
serial = atomic_inc_return(&conn->serial);
whdr.serial = htonl(serial);
_proto("Tx CONN ABORT %%u { %d }", serial, conn->local_abort);
_proto("Tx CONN ABORT %%u { %d }", serial, conn->abort_code);

ret = kernel_sendmsg(conn->params.local->socket, &msg, iov, 2, len);
if (ret < 0) {
    abort_code = ntohl(wtmp);
    _proto("Rx ABORT %%u { ac=%d }", sp->hdr.serial, abort_code);
    +conn->error = -ECONNABORTED;
    +conn->abort_code = abort_code;
    conn->state = RXRPC_CONN_REMOTELY_ABORTED;
    -rxrpc_abort_calls(conn, RXRPC_CALL_REMOTELY_ABORTED,
        -abort_code, -ECONNABORTED);
    +rxrpc_abort_calls(conn, RXRPC_CALL_REMOTELY_ABORTED);
    return -ECONNABORTED;
}

spin_lock(&conn->channel_lock);
-spin_lock(&conn->state_lock);
+spin_lock_bh(&conn->state_lock);

if (conn->state == RXRPC_CONN_SERVICE_CHALLENGING) {
    conn->state = RXRPC_CONN_SERVICE;
    -spin_unlock(&conn->state_lock);
    +spin_unlock_bh(&conn->state_lock);
    for (loop = 0; loop < RXRPC_MAXCALLS; loop++)
        rxrpc_call_is_secure(
            rcu_dereference_protected(
                conn->channels[loop].call,
                lockdep_is_held(&conn->channel_lock)));
} else {
    -spin_unlock(&conn->state_lock);
    +spin_unlock_bh(&conn->state_lock);
}

spin_unlock(&conn->channel_lock);

Open Source Used In 5GaaS Edge AC-4 34587
case -EKEYEXPIRED:
case -EKEYREJECTED:
goto protocol_error;
+case -ENOMEM:
case -EAGAIN:
goto requeue_and_leave;
case -ECONNABORTED:
--- linux-4.15.0.orig/net/rxrpc/conn_object.c
+++ linux-4.15.0/net/rxrpc/conn_object.c
@@ -99,7 +99,7 @@
k.epoch = sp->hdr.epoch;
k.cid = sp->hdr.cid & RXRPC_CIDMASK;

@if (sp->hdr.flags & RXRPC_CLIENT_INITIATED) {
+if (rxrpc_to_server(sp)) {
 /* We need to look up service connections by the full protocol
  * parameter set. We look up the peer first as an intermediate
  * step and then the connection from the peer's tree.
@@ -205,9 +205,11 @@
call->peer->cong_cwnd = call->cong_cwnd;

-spin_lock_bh(&conn->params.peer->lock);
-hlist_del_init(&call->error_link);
-spin_unlock_bh(&conn->params.peer->lock);
+if (!hlist_unhashed(&call->error_link)) {
+spin_lock_bh(&conn->params.peer->lock);
+hlist_del_init(&call->error_link);
+spin_unlock_bh(&conn->params.peer->lock);
+
if (rxrpc_is_client_call(call))
return rxrpc_disconnect_client_call(call);
@@ -216,9 +218,8 @@
__rxrpc_disconnect_call(conn, call);
spin_unlock(&conn->channel_lock);

-call->conn = NULL;
+set_bit(RXRPC_CALL_DISCONNECTED, &call->flags);
conn->idle_timestamp = jiffies;
-rxrpc_put_connection(conn);
}

/*
@@ -388,7 +389,7 @@
if (conn->state == RXRPC_CONN_SERVICE_PREALLOC)
 continue;
if (rxnet->live) {
  if (rxnet->live && !conn->params.local->dead) {
    idle_timestamp = READ_ONCE(conn->idle_timestamp);
    expire_at = idle_timestamp + rxrpc_connection_expiry * HZ;
  }
}

/*
 * Apply a hard ACK by advancing the Tx window.
 */
static void rxrpc_rotate_tx_window(struct rxrpc_call *call, rxrpc_seq_t to,
struct rxrpc_ack_summary *summary)
{
  struct sk_buff *skb, *list = NULL;
  bool rot_last = false;
  int ix;
  u8 annotation;

  skb->next = list;
  list = skb;

  if (annotation & RXRPC_TX_ANNO_LAST)
    if (annotation & RXRPC_TX_ANNO_LAST) {
      set_bit(RXRPC_CALL_TX_LAST, &call->flags);
      rot_last = true;
    }
  if ((annotation & RXRPC_TX_ANNO_MASK) != RXRPC_TX_ANNO_ACK)
    summary->nr_rot_new_acks++;
}

spin_unlock(&call->lock);

trace_rxrpc_transmit(call, (test_bit(RXRPC_CALL_TX_LAST, &call->flags) ?
  trace_rxrpc_transmit(call, (rot_last ?
    rxrpc_transmit_rotate_last :
    rxrpc_transmit_rotate));
  wake_up(&call->waitq);
  skb->next = NULL;
  rxrpc_free_skb(skb, rxrpc_skb_tx_freed);
}
+
+return rot_last;
}
/*  @ @ -273.23 +278.26 @@  static bool rxrpc_end_tx_phase(struct rxrpc_call *call, bool reply_begun,  const char *abort_why)  {  +unsigned int state;  

ASSERT(test_bit(RXRPC_CALL_TX_LAST, &call->flags));  

write_lock(&call->state_lock);  

-switch (call->state) {  +state = call->state;  +switch (state) {  case RXRPC_CALL_CLIENT_SEND_REQUEST:  case RXRPC_CALL_CLIENT_AWAIT_REPLY:  if (reply_begun)  -call->state = RXRPC_CALL_CLIENT_RECV_REPLY;  +call->state = state = RXRPC_CALL_CLIENT_RECV_REPLY;  else  -call->state = RXRPC_CALL_CLIENT_AWAIT_REPLY;  +call->state = state = RXRPC_CALL_CLIENT_AWAIT_REPLY;  break;  

case RXRPC_CALL_SERVER_AWAIT_ACK:  __rxrpc_call_completed(call);  rxrpc_notify_socket(call);  +state = call->state;  break;  

default:  @ @ -297.11 +305.10 @@  }  

write_unlock(&call->state_lock);  -if (call->state == RXRPC_CALL_CLIENT_AWAIT_REPLY) {  +if (state == RXRPC_CALL_CLIENT_AWAIT_REPLY)  trace_rxrpc_transmit(call, rxrpc_transmit_await_reply);  -} else {  +else  trace_rxrpc_transmit(call, rxrpc_transmit_end);  -}  _leave(" = ok");  return true;  

@ @ -332.11 +339.11 @@  trace_rxrpc_timer(call, rxrpc_timer_init_for_reply, now);  
}
-if (!test_bit(RXRPC_CALL_TX_LAST, &call->flags))
-rxrpc_rotate_tx_window(call, top, &summary);
if (!test_bit(RXRPC_CALL_TX_LAST, &call->flags)) {
    -rxrpc_proto_abort("TXL", call, top);
    -return false;
+if (!rxrpc_rotate_tx_window(call, top, &summary)) {
+    +rxrpc_proto_abort("TXL", call, top);
+    +return false;
+}
}
if (!rxrpc_end_tx_phase(call, true, "ETD"))
return false;
@@ -439,7 +446,7 @@
if (state >= RXRPC_CALL_COMPLETE)
return;

-if (call->state == RXRPC_CALL_SERVER_RECV_REQUEST) {
+if (state == RXRPC_CALL_SERVER_RECV_REQUEST) {
    unsigned long timo = READ_ONCE(call->next_req_timo);
    unsigned long now, expect_req_by;

@@ -593,8 +600,7 @@
    immediate_ack, true,
    rxrpc_propose_ack_input_data);

-if (sp->hdr.seq == READ_ONCE(call->rx_hard_ack) + 1)
-rxrpc_notify_socket(call);
+rxrpc_notify_socket(call);
+_leave(" [queued]");
}
@@ -713,13 +719,12 @@
    ntohl(ackinfo->rxMTU), ntohl(ackinfo->maxMTU),
    rwind, ntohl(ackinfo->jumbo_max));

+if (rwind > RXRPC_RXTX_BUFF_SIZE - 1)
+rwind = RXRPC_RXTX_BUFF_SIZE - 1;
if (call->tx_winsize != rwind) {
    -if (rwind > RXRPC_RXTX_BUFF_SIZE - 1)
    -rwind = RXRPC_RXTX_BUFF_SIZE - 1;
    if (rwind > call->tx_winsize)
        wake = true;
    -trace_rxrpc_rx_rwind_change(call, sp->hdr.serial,
      -ntohl(ackinfo->rwind), wake);
+trace_rxrpc_rx_rwind_change(call, sp->hdr.serial, rwind, wake);
    call->tx_winsize = rwind;
}
/* Discard any out-of-order or duplicate ACKs. */
if (before_eq(sp->hdr.serial, call->acks_latest)) {
    _debug("discard ACK %d <= %d",
            sp->hdr.serial, call->acks_latest);
    return;
}

call->acks_latest_ts = skb->tstamp;
call->acks_latest = sp->hdr.serial;

/* Parse rwind and mtu sizes if provided. */
ioffset = offset + nr_acks + 3;
if (skb->len >= ioffset + sizeof(buf.info)) {
    if (skb_copy_bits(skb, ioffset, &buf.info, sizeof(buf.info)) < 0)
        return;
}

/* Discard any out-of-order or duplicate ACKs. */
-if (before_eq(sp->hdr.serial, call->acks_latest)) {
    _debug("discard ACK %d <= %d",
            sp->hdr.serial, call->acks_latest);
    return;
}

call->acks_latest_ts = skb->tstamp;
call->acks_latest = sp->hdr.serial;

- if (before(hard_ack, call->tx_hard_ack) ||
      after(hard_ack, call->tx_top))
    return rxrpc_proto_abort("AKW", call, 0);

if (nr_acks > call->tx_top - hard_ack)
    return rxrpc_proto_abort("AKN", call, 0);

-if (after(hard_ack, call->tx_hard_ack))
    -rxrpc_rotate_tx_window(call, hard_ack, &summary);
+if (after(hard_ack, call->tx_hard_ack)) {
+    if (rxrpc_rotate_tx_window(call, hard_ack, &summary)) {
+        rxrpc_end_tx_phase(call, false, "ETA");
+        return;
+    }
+}

if (nr_acks > 0) {
    if (skb_copy_bits(skb, offset, buf.acks, nr_acks) < 0)
        return;
}
if (test_bit(RXRPC_CALL_TX_LAST, &call->flags)) {
  rxrpc_end_tx_phase(call, false, "ETA");
  return;
}

if (call->rxtx_annotations[call->tx_top & RXRPC_RXTX_BUFF_MASK] & RXRPC_TX_ANNO_LAST && summary.nr_acks == call->tx_top - hard_ack &&
    rxrpc_rotate_tx_window(call, call->tx_top, &summary))
  rxrpc_end_tx_phase(call, false, "ETL");
}

expect_rx_by = now + timo;
WRITE_ONCE(call->expect_rx_by, expect_rx_by);

trace_rxrpc_rx_packet(sp);
rxrpc_post_packet_to_local(local, skb);
goto out;

case RXRPC_PACKET_TYPE_BUSY:
  -if (sp->hdr.flags & RXRPC_CLIENT_INITIATED)
  +if (rxrpc_to_server(sp))
    goto discard;
  /* Fall through */

@@ -1240,16 +1242,19 @@
  goto discard_unlock;

if (sp->hdr.callNumber == chan->last_call) {
  /* For the previous service call, if completed successfully, we
   * discard all further packets.
   +if (chan->call ||
   +  sp->hdr.type == RXRPC_PACKET_TYPE_ABORT)
   +goto discard_unlock;
   +
   +/* For the previous service call, if completed
   + * successfully, we discard all further packets.
   */
  if (rxrpc_conn_is_service(conn) &&
-    (chan->last_type == RXRPC_PACKET_TYPE_ACK ||
-     sp->hdr.type == RXRPC_PACKET_TYPE_ABORT))
+    chan->last_type == RXRPC_PACKET_TYPE_ACK)
    goto discard_unlock;

-/* But otherwise we need to retransmit the final packet from
- * data cached in the connection record.
-+/* But otherwise we need to retransmit the final packet
-+ * from data cached in the connection record.
-*/
  rxrpc_post_packet_to_conn(conn, skb);
goto out_unlock;
@@ -1258,7 +1263,7 @@
call = rcu_dereference(chan->call);

if (sp->hdr.callNumber > chan->call_id) {
  -if (!((sp->hdr.flags & RXRPC_CLIENT_INITIATED)) { 
  +if (rxrpc_to_client(sp)) {
    rcu_read_unlock();
    goto reject_packet;
  }
@@ -1275,7 +1280,7 @@
}

if (!call || atomic_read(&call->usage) == 0) {

-if(!(sp->hdr.type & RXRPC_CLIENT_INITIATED) ||
+if(rxrpc_to_client(sp) ||
sp->hdr.callNumber == 0 ||
sp->hdr.type != RXRPC_PACKET_TYPE_DATA)
    goto bad_message_unlock;
--- linux-4.15.0.orig/net/rxrpc/key.c
+++ linux-4.15.0/net/rxrpc/key.c
@@ -35,7 +35,7 @@
 static void rxrpc_destroy(struct key *);
 static void rxrpc_destroy_s(struct key *);
 static void rxrpc_describe(const struct key *, struct seq_file *);
 static long rxrpc_read(const struct key *, char __user *, size_t);
+static long rxrpc_read(const struct key *, char *, size_t);

 /*
 * rxrpc defined keys take an arbitrary string as the description and an
 @@ -905,7 +905,7 @@
 _enter("");

 -if (optlen <= 0 || optlen > PAGE_SIZE - 1)
+if (optlen <= 0 || optlen > PAGE_SIZE - 1 || rx->securities)
    return -EINVAL;
    description = memdup_user_nul(optval, optlen);
@@ -1044,12 +1044,12 @@*/
 static long rxrpc_read(const struct key *key,
-    char __user *buffer, size_t buflen)
+    char *buffer, size_t buflen)
 {
    const struct rxrpc_key_token *token;
    const struct krb5_principal *princ;
    size_t size;
-   __be32 __user *xdr, *oldxdr;
+   __be32 *xdr, *oldxdr;
    u32 cnlen, toksize, ntoks, tok, zero;
    u16 toksizes[AFSTOKEN_MAX];
    int loop;
@@ -1075,7 +1075,7 @@
    switch (token->security_index) {
        case RXRPC_SECURITY_RXKAD:
            toksize += 9 * 4; /* viceid, kvno, key*2 + len, begin,
@@ -1079,7 +1079,7 @@
            toksize += RND(token->kad->ticket_len);
break;
@@ -1110,8 +1110,9 @@
break;

default: /* we have a ticket we can’t encode */
-BUG();
-continue;
+pr_err("Unsupported key token type (%u)\n",
+ token->security_index);
+return -ENOPKG;
}

_debug("token[%u]: toksize=%u", ntoks, toksize);
@@ -1126,30 +1127,33 @@
if (!buffer || buflen < size)
return size;

-xdr = (__be32 __user *) buffer;
+xdr = (__be32 *)buffer;
zero = 0;
#define ENCODE(x)\
do {\
-__be32 y = htonl(x);\
-if (put_user(y, xdr++) < 0)\
-goto fault;\
+*xdr++ = htonl(x);\
} while(0)
#define ENCODE_DATA(l, s)\
do {\
-u32 _l = (l);\
ENCODE(l);\
-if (copy_to_user(xdr, (s), _l) != 0)\
-goto fault;\
-if (_l & 3 &&\
- copy_to_user((u8 __user *)xdr + _l, &zero, 4 - (_l & 3)) != 0)\
-goto fault;\
+memcpy(xdr, (s), _l);\
+if (_l & 3)\
+memcpy((u8 *)xdr + _l, &zero, 4 - (_l & 3));\
+xdr += (_l + 3) >> 2;\
} while(0)
#define ENCODE_BYTES(l, s)\
do {\
+u32 _l = (l);\
+memcpy(xdr, (s), _l);\
+if (_l & 3)\
+memcpy((u8 *)xdr + _l, &zero, 4 - (_l & 3));\
xdr += (_l + 3) >> 2;\n
while(0)
#define ENCODE64(x) \
  do { \
    __be64 y = cpu_to_be64(x); \
    -if (copy_to_user(xdr, &y, 8) != 0) \
    -goto fault; \
    +memcpy(xdr, &y, 8); \
    xdr += 8 >> 2; \
  } while(0)
#define ENCODE_STR(s) \
case RXRPC_SECURITY_RXKAD: \
  ENCODE(token->kad->vice_id); \
  ENCODE(token->kad->kvno); \
  -ENCODE_DATA(8, token->kad->session_key); \
  +ENCODE_BYTES(8, token->kad->session_key); \
  ENCODE(token->kad->start); \
  ENCODE(token->kad->expiry); \
  ENCODE(token->kad->primary_flag); \
default: \
  BUG(); \
  break;
  +pr_err("Unsupported key token type (%u)\n", \
    + token->security_index); \
  +return -ENOPKG;
} \
ASSERTCMP((unsigned long)xdr - (unsigned long)oldxdr, ==, \
            -1240,8 +1245,4 @@ \
            ASSERTCMP((char __user *) xdr - buffer, ==, size); \
            _leave(" = %zu", size); \
            return size; \
          -fault: \
            _leave(" = -EFAULT"); \
            -return -EFAULT;
} \
--- linux-4.15.0.orig/net/rxrpc/local_object.c 
+++ linux-4.15.0/net/rxrpc/local_object.c 
@@ -133,22 +133,43 @@
} 
/* we want to receive ICMP errors */ 
-opt = 1;
-ret = kernel_setsockopt(local->socket, SOL_IP, IP_RECVERR,
-(char *) &opt, sizeof(opt));
-if (ret < 0) {
-_debug("setsockopt failed");
-goto error;
-}
+switch (local->srx.transport.family) {
+case AF_INET6:
+/* we want to receive ICMPv6 errors */
+opt = 1;
+ret = kernel_setsockopt(local->socket, SOL_IPV6, IPV6_RECVERR,
+(char *) &opt, sizeof(opt));
+if (ret < 0) {
+_debug("setsockopt failed");
+goto error;
+}
+
+/* Fall through and set IPv4 options too otherwise we don't get
+ * errors from IPv4 packets sent through the IPv6 socket.
+ */
+
+case AF_INET:
+/* we want to receive ICMP errors */
+opt = 1;
+ret = kernel_setsockopt(local->socket, SOL_IP, IP_RECVERR,
+(char *) &opt, sizeof(opt));
+if (ret < 0) {
+_debug("setsockopt failed");
+goto error;
+}
+
+/* we want to set the don't fragment bit */
+opt = IP_PMTUDISC_DO;
+ret = kernel_setsockopt(local->socket, SOL_IP, IP_MTU_DISCOVER,
+(char *) &opt, sizeof(opt));
+if (ret < 0) {
+_debug("setsockopt failed");
+goto error;
+}
+break;

/* we want to set the don't fragment bit */
-opt = IP_PMTUDISC_DO;
-ret = kernel_setsockopt(local->socket, SOL_IP, IP_MTU_DISCOVER,
-(char *) &opt, sizeof(opt));
-if (ret < 0) {
-_debug("setsockopt failed");
-goto error;
+default:
+BUG();
}

/* set the socket up */
@@ -289,11 +310,14 @@
 {}
 local->dead = true;

+local->dead = true;
+
mutex_lock(&rxnet->local_mutex);
list_del_init(&local->link);
mutex_unlock(&rxnet->local_mutex);

-ASSERT(RB_EMPTY_ROOT(&local->client_conns));
+rtrxpc_clean_up_local_conns(local);
+rtrxpc_service_connection_reaper(&rxnet->service_conn_reaper);
ASSERT(!local->service);

if (socket) {
--- linux-4.15.0.orig/net/rxrpc/output.c
+++ linux-4.15.0/net/rxrpc/output.c
@@ -33,6 +33,21 @@
};

/*
 + * Increase Tx backoff on transmission failure and clear it on success.
 + */
+static void rtrxpc_tx_backoff(struct rtrxpc_call *call, int ret)
+{
+    if (ret < 0) {
+        u16 tx_backoff = READ_ONCE(call->tx_backoff);
+        if (tx_backoff < HZ)
+            WRITE_ONCE(call->tx_backoff, tx_backoff + 1);
+    } else {
+        WRITE_ONCE(call->tx_backoff, 0);
+    }
+    
+    /*
 * Arrange for a keepalive ping a certain time after we last transmitted. This
 * lets the far side know we're still interested in this call and helps keep
 * the route through any intervening firewall open.
 @ @ -116,7 +131,7 @@
 int rtrxpc_send_ack_packet(struct rtrxpc_call *call, bool ping,
 rtrxpc_serial_t *_serial)
struct rxrpc_connection *conn = NULL;
++
struct rxrpc_connection *conn;
struct rxcspi_ack_buffer *pkt;
struct msghdr msg;
struct kvec iov[2];
@@ -126,18 +141,14 @@
int ret;
u8 reason;

-spin_lock_bh(&call->lock);
-if (call->conn)
-conn = rxrpc_get_connection_maybe(call->conn);
-spin_unlock_bh(&call->lock);
-if (!conn)
+if (test_bit(RXRPC_CALL_DISCONNECTED, &call->flags))
ret = -ECONNRESET;

pkt = kzalloc(sizeof(*pkt), GFP_KERNEL);
-if (!pkt) {
-rxrpc_put_connection(conn);
+if (!pkt)
return -ENOMEM;
+
+conn = call->conn;

msg.msg_name = &call->peer->srx.transport;
msg.msg_namelen = call->peer->srx.transport_len;
@@ -206,6 +217,8 @@
if (ping)
call->ping_time = ktime_get_real();

+rxrpc_tx_backoff(call, ret);
+
+if (call->state < RXRPC_CALL_COMPLETE) {
+if (ret < 0) {
+if (ping)
@@ -213,7 +226,7 @@
rxrpc_propose_ACK(call, pkt->ack.reason,
    ntohs(pkt->ack.maxSkew),
    ntohl(pkt->ack.serial),
    true, true,
+false, true,
    rxrpc_propose_ack_retry_tx);
    } else {
spin_lock_bh(&call->lock);
@@ -228,7 +241,6 @@
out:
-rxrpc_put_connection(conn);
kfree(pkt);
return ret;
}
@@ -238,7 +250,7 @@ */
int rxrpc_send_abort_packet(struct rxrpc_call *call)
{
-struct rxrpc_connection *conn = NULL;
+struct rxrpc_connection *conn;
struct rxrpc_abort_buffer pkt;
struct msghdr msg;
struct kvec iov[1];
@@ -255,13 +267,11 @@
test_bit(RXRPC_CALL_TX_LAST, &call->flags))
return 0;

-spin_lock_bh(&call->lock);
-if (call->conn)
-conn = rxrpc_get_connection_maybe(call->conn);
-spin_unlock_bh(&call->lock);
-if (!conn)
+if (test_bit(RXRPC_CALL_DISCONNECTED, &call->flags))
return -ECONNRESET;

+conn = call->conn;
+
msg.msg_name= &call->peer->srx.transport;
msg.msg_name_len= call->peer->srx.transport_len;
msg.msg_control= NULL;
@@ -289,7 +299,7 @@
ret = kernel_sendmsg(conn->params.local->socket,
 &msg, iov, 1, sizeof(pkt));

-rxrpc_put_connection(conn);
+rxrpc_tx_backoff(call, ret);
return ret;
}
@@ -380,6 +390,8 @@
ret = kernel_sendmsg(conn->params.local->socket, &msg, iov, 2, len);

up_read(&conn->params.local->defrag_sem);
+
+rxrpc_tx_backoff(call, ret);
if (ret == -EMSGSIZE)
goto send_fragmentable;

@@ -407,9 +419,29 @@
rxrpc_timer_set_for_lost_ack);

- 
-
- } 

- ]

-rxrpc_set_keepalive(call);
+if (sp->hdr.seq == 1 &&
+ !test_and_set_bit(RXRPC_CALL_BEGAN_RX_TIMER,
+ &call->flags)) {
+unsigned long nowj = jiffies, expect_rx_by;
+ +
+expect_rx_by = nowj + call->next_rx_timo;
+WRITE_ONCE(call->expect_rx_by, expect_rx_by);
+rxrpc_reduce_call_timer(call, expect_rx_by, nowj,
+rxrpc_timer_set_for_normal);
+} 
+
+rxrpc_set_keepalive(call);
+} else { 
+/* Cancel the call if the initial transmission fails,
+ particularly if that's due to network routing issues that
+ aren't going away anytime soon. The layer above can arrange
+ the retransmission.
+ */
+if (!test_and_set_bit(RXRPC_CALL_BEGAN_RX_TIMER, &call->flags))
+rxrpc_set_call_completion(call, RXRPC_CALL_LOCAL_ERROR,
+ RX_USER_ABORT, ret);
+}

_leave(" = %d [%u]", ret, call->peer->maxdata);
return ret;

@@ -421,41 +453,27 @@
down_write(&conn->params.local->defrag_sem);

switch (conn->params.local->srx.transport.family) {
+case AF_INET6:
    case AF_INET:
        opt = IP_PMTUDISC_DONT;
    -ret = kernel_setsockopt(conn->params.local->socket,
    -SOL_IP, IP_MTU_DISCOVER,
    -(char *)&opt, sizeof(opt));
    -if (ret == 0) {
    -ret = kernel_sendmsg(conn->params.local->socket, &msg,
    - iov, 2, len);
- opt = IP_PMTUDISC_DO;
- kernel_setsockopt(conn->params.local->socket, SOL_IP,
  - IP_MTU_DISCOVER,
  - (char *)&opt, sizeof(opt));
- }
  + kernel_setsockopt(conn->params.local->socket,
  + SOL_IP, IP_MTU_DISCOVER,
  + (char *)&opt, sizeof(opt));
  + ret = kernel_sendmsg(conn->params.local->socket, &msg,
  + iov, 2, len);
  +
  + opt = IP_PMTUDISC_DO;
  + kernel_setsockopt(conn->params.local->socket,
  + SOL_IP, IP_MTU_DISCOVER,
  + (char *)&opt, sizeof(opt));
  break;

#elif CONFIG_AF_RXRPC_IPV6
  - case AF_INET6:
  - opt = IPV6_PMTUDISC_DONT;
  - ret = kernel_setsockopt(conn->params.local->socket,
  - SOL_IPV6, IPV6_MTU_DISCOVER,
  - (char *)&opt, sizeof(opt));
  - if (ret == 0) {
  - ret = kernel_sendmsg(conn->params.local->socket, &msg,
  - iov, 1, iov[0].iov_len);
  -
  - opt = IPV6_PMTUDISC_DO;
  - kernel_setsockopt(conn->params.local->socket,
  - SOL_IPV6, IPV6_MTU_DISCOVER,
  - (char *)&opt, sizeof(opt));
  - }
  - break;
  - #endif
  - #default:
  - #BUG();
  - }

+ rxrpc_tx_backoff(call, ret);
+
+ up_write(&conn->params.local->defrag_sem);
+ goto done;
}
struct sk_buff *skb;

+if (unlikely(!local))
+return;
+
+ _enter("%p[%d]", sk, local->debug_id);

skb = sock_dequeue_err_skb(sk);
--- linux-4.15.0.orig/net/rxrpc/recvmsg.c
+++ linux-4.15.0/net/rxrpc/recvmsg.c
@@ -449,7 +449,7 @@
 list_empty(&rx->recvmsg_q) &&
    rx->sk.sk_state != RXRPC_SERVER_LISTENING) {
 release_sock(&rx->sk);
-    return -ENODATA;
+    return -EAGAIN;
 }

if (list_empty(&rx->recvmsg_q)) {
@@ -517,15 +517,16 @@
     ret = put_cmsg(msg, SOL_RXRPC, RXRPC_USER_CALL_ID,
                      sizeof(unsigned int), &id32);
 } else {
-       unsigned long idl = call->user_call_ID;
+       unsigned long idl = call->user_call_ID;

 ret = put_cmsg(msg, SOL_RXRPC, RXRPC_USER_CALL_ID,
                  sizeof(unsigned long), &idl);
 }
if (ret < 0)
  goto error_unlock_call;
}

-if (msg->msg_name) {
+if (msg->msg_name && call->peer) {
   struct sockaddr_rxrpc *srx = msg->msg_name;
   size_t len = sizeof(call->peer->srx);
@@ -591,7 +592,7 @@
 }
 error_no_call:
 release_sock(&rx->sk);
+error_trace:
 trace_rxrpc_recvmsg(call, rxrpc_recvmsg_return, 0, 0, ret);
 return ret;
@@ -599,7 +601,7 @@
wait_error:
finish_wait(sk_sleep(&rx->sk), &wait);
call = NULL;
-goto error_no_call;
+goto error_trace;
}

/**
--- linux-4.15.0.orig/net/rxrpc/rxkad.c
+++ linux-4.15.0/net/rxrpc/rxkad.c
@@ -773,8 +773,7 @@
{
    const struct rxrpc_key_token *token;
    struct rxkad_challenge challenge;
    -struct rxkad_response resp
+    struct rxkad_response *resp
    -__attribute__((aligned(8))); /* must be aligned for crypto */
    +struct rxkad_response *resp;
    struct rxrpc_skb_priv *sp = rxrpc_skb(skb);
    const char *eproto;
    u32 version, nonce, min_level, abort_code;
@@ -818,26 +817,29 @@
        token = conn->params.key->payload.data[0];

        /* build the response packet */
        -memset(&resp, 0, sizeof(resp));
        -resp.version			= htonl(RXKAD_VERSION);
        -resp.encrypted.epoch		= htonl(conn->proto.epoch);
        -resp.encrypted.cid		= htonl(conn->proto.cid);
        -resp.encrypted.securityIndex	= htonl(conn->security_ix);
        -resp.encrypted.inc_nonce	= htonl(nonce + 1);
        -resp.kvno			= htonl(token->kad->kvno);
        -resp.ticket_len			= htonl(token->kad->ticket_len);
        -
        -resp.encrypted.call_id[0] = htonl(conn->channels[0].call_counter);
        -resp.encrypted.call_id[1] = htonl(conn->channels[1].call_counter);
        -resp.encrypted.call_id[2] = htonl(conn->channels[2].call_counter);
        -resp.encrypted.call_id[3] = htonl(conn->channels[3].call_counter);
        
        resp = kzalloc(sizeof(struct rxkad_response), GFP_NOFS);
        if (!resp)
            return -ENOMEM;
        
        resp->version			= htonl(RXKAD_VERSION);
        resp->encrypted.epoch		= htonl(conn->proto.epoch);
        resp->encrypted.cid		= htonl(conn->proto.cid);
        resp->encrypted.securityIndex	= htonl(conn->security_ix);
        resp->encrypted.inc_nonce	= htonl(nonce + 1);
+resp->encrypted.level= htonl(conn->params.security_level);
+resp->kvno= htonl(token->kad->kvno);
+resp->ticket_len= htonl(token->kad->ticket_len);
+resp->encrypted.call_id[0]= htonl(conn->channels[0].call_counter);
+resp->encrypted.call_id[1]= htonl(conn->channels[1].call_counter);
+resp->encrypted.call_id[2]= htonl(conn->channels[2].call_counter);
+resp->encrypted.call_id[3]= htonl(conn->channels[3].call_counter);

/* calculate the response checksum and then do the encryption */
-trxkad_calc_response_checksum(&resp);
-trxkad_encrypt_response(conn, &resp, token->kad);
-return rxkad_send_response(conn, &sp->hdr, &resp, token->kad);
+trxkad_calc_response_checksum(resp);
+trxkad_encrypt_response(conn, resp, token->kad);
+ret = rxkad_send_response(conn, &sp->hdr, resp, token->kad);
+kfree(resp);
+return ret;

protocol_error:
trace_rxrpc_rx_eproto(NULL, sp->hdr.serial, eproto);
@@ -1048,8 +1050,7 @@
 struct sk_buff *skb,
 u32 *_abort_code)
 {
-struct rxkad_response response
-__attribute__((aligned(8))); /* must be aligned for crypto */
+struct rxkad_response *response;
 struct rxrpc_skb_priv *sp = rxrpc_skb(skb);
 struct rxrpc_crypt session_key;
 const char *eproto;
@@ -1061,17 +1062,22 @@
 _enter("{%d,%x}", conn->debug_id, key_serial(conn->server_key));

 +ret = -ENOMEM;
 +response = kzalloc(sizeof(struct rxkad_response), GFP_NOFS);
 +if (!response)
 +goto temporary_error;
 +
 eproto = tracepoint_string("rxkad_rsp_short");
 abort_code = RXKADPACKETSHORT;
 if (skb_copy_bits(skb, sizeof(struct rxrpc_wire_header),
- &response, sizeof(response)) < 0)
- + response, sizeof(*response)) < 0)
 goto protocol_error;
 -if (!pskb_pull(skb, sizeof(response)))
 +if (!pskb_pull(skb, sizeof(*response)))
 BUG();
-version = ntohl(response.version);
ticket_len = ntohl(response.ticket_len);
-kvno = ntohl(response.kvno);
+version = ntohl(response->version);
+ticket_len = ntohl(response->ticket_len);
+kvno = ntohl(response->kvno);
_proto("Rx RESPONSE %%%u { v=%u kv=%u tl=%u }",
        sp->hdr.serial, version, kvno, ticket_len);

ret = rxkad_decrypt_ticket(conn, skb, ticket, ticket_len, &session_key,
        &expiry, _abort_code);
if (ret < 0)
goto temporary_error_free;
+goto temporary_error_free_ticket;

/* use the session key from inside the ticket to decrypt the
 * response */
-rxkad_decrypt_response(conn, &response, &session_key);
+rxkad_decrypt_response(conn, response, &session_key);

eproto = tracepoint_string("rxkad_rsp_param");
abort_code = RXKADSEALEDINCON;
-if (ntohl(response.encrypted.epoch) != conn->proto.epoch)
+if (ntohl(response->encrypted.epoch) != conn->proto.epoch)
goto protocol_error_free;
-if (ntohl(response.encrypted.cid) != conn->proto.cid)
+if (ntohl(response->encrypted.cid) != conn->proto.cid)
goto protocol_error_free;
-if (ntohl(response.encrypted.securityIndex) != conn->security_ix)
+if (ntohl(response->encrypted.securityIndex) != conn->security_ix)
goto protocol_error_free;
-csum = response.encrypted.checksum;
-response.encrypted.checksum = 0;
-rxkad_calc_response_checksum(&response);
+response->encrypted.checksum = 0;
+rxkad_calc_response_checksum(response);
eproto = tracepoint_string("rxkad_rsp_csum");
-if (response.encrypted.checksum != csum)
+if (response->encrypted.checksum != csum)
goto protocol_error_free;

spin_lock(&conn->channel_lock);
for (i = 0; i < RXRPC_MAXCALLS; i++) {
    struct rxrpc_call *call;
    -u32 call_id = ntohl(response.encrypted.call_id[i]);
+u32 call_id = ntohl(response->encrypted.call_id[i]);

eproto = tracepoint_string("rxkad_rsp_callid");
if (call_id > INT_MAX)
   @@ -1153,12 +1159,12 @@
       eproto = tracepoint_string("rxkad_rsp_seq");
       abort_code = RXKADOUTOFSEQUENCE;
       -if (ntohl(response.encrypted.inc_nonce) != conn->security_nonce + 1)
       +if (ntohl(response->encrypted.inc_nonce) != conn->security_nonce + 1)
           goto protocol_error_free;
       eproto = tracepoint_string("rxkad_rsp_level");
       abort_code = RXKADLEVELFAIL;
       -level = ntohl(response.encrypted.level);
       +level = ntohl(response->encrypted.level);
       if (level > RXRPC_SECURITY_ENCRYPT)
           goto protocol_error_free;
       conn->params.security_level = level;
   @ @ -1168,9 +1174,10 @@
       * as for a client connection */
   ret = rxrpc_get_server_data_key(conn, &session_key, expiry, kvno);
   if (ret < 0)
      -goto temporary_error_free;
      +goto temporary_error_free_ticket;
   kfree(ticket);
   +kfree(response);
   _leave(" = 0");
   return 0;

   @ @ -1179,12 +1186,14 @@
   protocol_error_free:
   kfree(ticket);
   protocol_error:
   +kfree(response);
   trace_rxrpc_rx_eproto(NULL, sp->hdr.serial, eproto);
   * _abort_code = abort_code;
   return -EPROTO;

   -temporary_error_free:
   +temporary_error_free_ticket:
   kfree(ticket);
   +kfree(response);
   temporary_error:
   /* Ignore the response packet if we got a temporary error such as
   * ENOMEM. We just want to send the challenge again. Note that we
--- linux-4.15.0.orig/net/rxrpc/sendmsg.c
+++ linux-4.15.0/net/rxrpc/sendmsg.c
@@ -62,8 +62,8 @@
    rtt = READ_ONCE(call->peer->rtt);
    rtt2 = nsecs_to_jiffies64(rtt) * 2;
    if (rtt2 < 1)
-       rtt2 = 1;
-    if (rtt2 < 2)
+       rtt2 = 2;
+    if (rtt2 < 2)
+       rtt2 = 2;

    timeout = rtt2;
    tx_start = READ_ONCE(call->tx_hard_ack);
@@ -130,7 +130,9 @@
 spin_lock_bh(&call->lock);

    if (call->state < RXRPC_CALL_COMPLETE) {
-       call->rxtx_annotations[ix] = RXRPC_TX_ANNO_RETRANS;
+       call->rxtx_annotations[ix] =
+          (call->rxtx_annotations[ix] & RXRPC_TX_ANNO_LAST) |
+          RXRPC_TX_ANNO_RETRANS;
    if (!test_and_set_bit(RXRPC_CALL_EV_RESEND, &call->events))
        rxrpc_queue_call(call);
    }
@@ -221,6 +223,16 @@
 ret = rxrpc_send_data_packet(call, skb, false);
 if (ret < 0) {
    switch (ret) {
+    case -ENETUNREACH:
+    case -EHOSTUNREACH:
+    case -ECONNREFUSED:
+        rxrpc_set_call_completion(call,
+            RXRPC_CALL_LOCAL_ERROR, 0, ret);
+        rxrpc_notify_socket(call);
+        goto out;
+    }
    __debug("need instant resend %d", ret);
    rxrpc_instant_resend(call, ix);
    } else {
@@ -239,6 +251,7 @@
 out:
    rxrpc_free_skb(skb, rxrpc_skb_tx_freed);
 _leave("");
/* this should be in poll */
sk_clear_bit(SOCKWQ_ASYNC_NOSPACE, sk);

@if (sk->sk_err || (sk->sk_shutdown & SEND_SHUTDOWN))
+if (sk->sk_shutdown & SEND_SHUTDOWN)
return -EPIPE;

more = msg->msg_flags & MSG_MORE;
@@ -637,6 +650,9 @@
if (IS_ERR(call))
return PTR_ERR(call);
/* ... and we have the call lock. */
+ret = 0;
+if (READ_ONCE(call->state) == RXRPC_CALL_COMPLETE)
+goto out_put_unlock;
} else {
switch (READ_ONCE(call->state)) {
case RXRPC_CALL_UNINITIALISED:
@@ -644,6 +660,7 @@
case RXRPC_CALL_SERVER_PREALLOC:
 case RXRPC_CALL_SERVER_SECURING:
 case RXRPC_CALL_SERVER_ACCEPTING:
+trxrpc_put_call(call, rxrpc_call_put);
 ret = -EBUSY;
 goto error_release_sock;
default:
--- linux-4.15.0.orig/net/sched/act_api.c
+++ linux-4.15.0/net/sched/act_api.c
@@ -135,8 +135,10 @@
continue;

nest = nla_nest_start(skb, n_i);
-@ -265,7 +278,7 @@
+if (!nest) {
+index--;
 goto nla_put_failure;
+
 err = tcf_action_dump_1(skb, p, 0, 0);
 if (err < 0) {
 index--;
@@ -1072,10 +1074,16 @@
 static int tcf_action_add(struct net *net, struct nla *nla,
 struct nlmsghdr *n, u32 portid, int ovr)
 { 
-@ -1072,10 +1074,16 @@
+int loop, ret;
 LIST_HEAD(actions);
- ret = tcf_action_init(net, NULL, nla, NULL, NULL, ovr, 0, &actions);
+ for (loop = 0; loop < 10; loop++) {
+ ret = tcf_action_init(net, NULL, nla, NULL, NULL, ovr, 0,
+ &actions);
+ if (ret != -EAGAIN)
+ break;
+ }
+ 
+ if (ret)
return ret;

@@ -1122,10 +1130,7 @@
*/
if (n->nlmsg_flags & NLM_F_REPLACE)
ovr = 1;
-replay:
ret = tcf_action_add(net, tca[TCA_ACT_TAB], n, portid, ovr);
-if (ret == -EAGAIN)
-goto replay;
break;
case RTM_DELACTION:
ret = tca_action_gd(net, tca[TCA_ACT_TAB], n,
--- linux-4.15.0.orig/net/sched/act_bpf.c
+++ linux-4.15.0/net/sched/act_bpf.c
@@ -248,10 +248,14 @@
static void tcf_bpf_cfg_cleanup(const struct tcf_bpf_cfg *cfg)
{
- if (cfg->is_ebpf)
- bpf_prog_put(cfg->filter);
- else
- bpf_prog_destroy(cfg->filter);
+ struct bpf_prog *filter = cfg->filter;
+ if (filter) {
+ if (cfg->is_ebpf)
+ bpf_prog_put(filter);
+ else
+ bpf_prog_destroy(filter);
+ }

kfree(cfg->bpf_ops);
kfree(cfg->bpf_name);
@@ -352,7 +356,7 @@
return res;
out:
if (res == ACT_P_CREATED)
- tcf_idr_cleanup(*act, est);
+ tcf_idr_release(*act, bind);

    return ret;
    }
@@ -398,7 +402,7 @@
    }
    struct tc_action_net *tn = net_generic(net, bpf_net_id);

    - return tc_action_net_init(tn, &act_bpf_ops);
    + return tc_action_net_init(net, tn, &act_bpf_ops);
    }

    static void __net_exit bpf_exit_net(struct net *net)
    --- linux-4.15.0.orig/net/sched/act_connmark.c
    +++ linux-4.15.0/net/sched/act_connmark.c
    @@ -206,7 +206,7 @@
    }
    struct tc_action_net *tn = net_generic(net, connmark_net_id);

    - return tc_action_net_init(tn, &act_connmark_ops);
    + return tc_action_net_init(net, tn, &act_connmark_ops);
    }

    static void __net_exit connmark_exit_net(struct net *net)
    --- linux-4.15.0.orig/net/sched/act_csum.c
    +++ linux-4.15.0/net/sched/act_csum.c
    @@ -632,7 +632,7 @@
    }
    struct tc_action_net *tn = net_generic(net, csum_net_id);

    - return tc_action_net_init(tn, &act_csum_ops);
    + return tc_action_net_init(net, tn, &act_csum_ops);
    }

    static void __net_exit csum_exit_net(struct net *net)
    --- linux-4.15.0.orig/net/sched/act_gact.c
    +++ linux-4.15.0/net/sched/act_gact.c
    @@ -232,7 +232,7 @@
    }
    struct tc_action_net *tn = net_generic(net, gact_net_id);

    - return tc_action_net_init(tn, &act_gact_ops);
    + return tc_action_net_init(net, tn, &act_gact_ops);
    }

    static void __net_exit gact_exit_net(struct net *net)
    --- linux-4.15.0.orig/net/sched/act_ife.c
static int load_metaops_and_vet(struct tcf_ife_info *ife, u32 metaid, void *val, int len, bool exists)
{
    struct tcf_meta_ops *ops = find_ife_oplist(metaid);
    int ret = 0;

    if (!ops) {
        ret = -ENOENT;
        #ifdef CONFIG_MODULES
        -spin_unlock_bh(&ife->tcf_lock);
        rtnl_unlock();
        request_module("ife-meta-%s", ife_meta_id2name(metaid));
        rtnl_lock();
        -spin_lock_bh(&ife->tcf_lock);
        ops = find_ife_oplist(metaid);
        #endif
    }

    @ @ -276,13 +274,9 @ @
    if (!ops) {
        ret = -ENOENT;
        #ifdef CONFIG_MODULES
        -spin_unlock_bh(&ife->tcf_lock);
        rtnl_unlock();
        request_module("ife-meta-%s", ife_meta_id2name(metaid));
        rtnl_lock();
        -spin_lock_bh(&ife->tcf_lock);
        ops = find_ife_oplist(metaid);
        #endif
    }

    @ @ -299,24 +293,17 @ @
}

static int add_metainfo(struct tcf_ife_info *ife, u32 metaid, void *metaval, int len, bool atomic)
{
    struct tcf_meta_info *mi = NULL;
    struct tcf_meta_ops *ops = find_ife_oplist(metaid);
    int ret = 0;

    if (!ops)
        return -ENOENT;

    mi = kzalloc(sizeof(*mi), atomic ? GFP_ATOMIC : GFP_KERNEL);
    if (!mi)
/*put back what find_ife_oplist took */
-module_put(ops->owner);
+if (!mi)
    return -ENOMEM;
-
    mi->metaid = metaid;
    mi->ops = ops;
    ret = ops->alloc(mi, metaval, atomic ? GFP_ATOMIC : GFP_KERNEL);
    if (ret != 0) {
        kfree(mi);
        -module_put(ops->owner);
        return ret;
    }
+
    if (exists)
        spin_lock_bh(&ife->tcf_lock);
    list_add_tail(&mi->metalist, &ife->metalist);
    +if (exists)
        spin_unlock_bh(&ife->tcf_lock);
    +
    +return ret;
    +}

+static int add_metainfo_and_get_ops(const struct tcf_meta_ops *ops,
    struct tcf_ife_info *ife, u32 metaid,
    bool exists)
    +{
        +int ret;
        +
        +if (!try_module_get(ops->owner))
            +return -ENOENT;
        +ret = __add_metainfo(ops, ife, metaid, NULL, 0, true, exists);
        +if (ret)
            +module_put(ops->owner);
        return ret;
    }

-static int use_all_metadata(struct tcf_ife_info *ife)
+static int add_metainfo(struct tcf_ife_info *ife, u32 metaid, void *metaval,
    +int len, bool exists)
    +{
        +const struct tcf_meta_ops *ops = find_ife_oplist(metaid);
        +int ret;
        +
        +if (!ops)
return -ENOENT;
ret = __add_metainfo(ops, ife, metaid, metaval, len, false, exists);
if (ret)
    /*put back what find_ife_oplist took */
    module_put(ops->owner);
    return ret;
}

static int use_all_metadata(struct tcf_ife_info *ife, bool exists)
{
    struct tcf_meta_ops *o;
    int rc = 0;
    read_lock(&ife_mod_lock);
    list_for_each_entry(o, &ifeoplist, list) {
        rc = add_metainfo(ife, o->metaid, NULL, 0, true);
        if (rc == 0)
            installed += 1;
    }
    list_for_each_entry_safe(e, n, &ife->metalist, metalist) {
        module_put(e->ops->owner);
        list_del(&e->metalist);
        if (e->metaval) {
            if (e->ops->release)
                kfree(e->metaval);
            else
                kfree(e->metaval);
        }
        module_put(e->ops->owner);
        kfree(e);
    }
    spin_unlock_bh(&ife->tcf_lock);
    p = rcu_dereference_protected(ife->params, 1);
    kfree_rcu(p, rcu);
    if (p)
        kfree_rcu(p, rcu);
}

/* under ife->tcf_lock for existing action */
static int populate_metalist(struct tcf_ife_info *ife, struct nlattr **tb,
bool exists)
{
    val = nla_data(tb[i]);
    len = nla_len(tb[i]);

    -rc = load_metaops_and_vet(ife, i, val, len, exists);
    +rc = load_metaops_and_vet(i, val, len);
    if (rc != 0)
        return rc;

    int ret = 0;
    int err;

    +if (!nla)
        +return -EINVAL;
    +
    err = nla_parse_nested(tb, TCA_IFE_MAX, nla, ife_policy, NULL);
    if (err < 0)
        return err;

    saddr = nla_data(tb[TCA_IFE_SMAC]);
}

-if (exists)
    -spin_lock_bh(&ife->tcf_lock);

if (ret == ACT_P_CREATED)
    INIT_LIST_HEAD(&ife->metalist);

-if (exists)
    _tcf_ife_cleanup(*a, bind);

metadata_parse_err:
    _tcf_ife_cleanup(*a, bind);
    -
if (exists)
- spin_unlock_bh(&ife->tcf_lock);
+ tcf_idr_release(*a, bind);
kfree(p);
return err;
}
@@ -564,19 +577,19 @@
* as we can. You better have at least one else we are
* going to bail out
*/
-err = use_all_metadata(ife);
+err = use_all_metadata(ife, exists);
if (err) {
if (ret == ACT_P_CREATED)
- _tcf_ife_cleanup(*a, bind);
-
-if (exists)
- spin_unlock_bh(&ife->tcf_lock);
+ tcf_idr_release(*a, bind);
kfree(p);
return err;
}

if (exists)
+ spin_lock_bh(&ife->tcf_lock);
+ ife->tcf_action = parm->action;
+ if (exists)
spin_unlock_bh(&ife->tcf_lock);

p_old = rtnl_dereference(ife->params);
@@ -652,7 +665,7 @@
}
}

- return 0;
+ return -ENOENT;
}

static int tcf_ife_decode(struct sk_buff *skb, const struct tc_action *a,
@@ -682,7 +695,12 @@
 u16 mtype;
 u16 dlen;
- curr_data = ife_tlv_meta_decode(tlv_data, &mtype, &dlen, NULL);
+curr_data = ife_tlv_meta_decode(tlv_data, ifehdr_end, &mtype,
+&dlen, NULL);
+if (!curr_data) {
+qstats_drop_inc(this_cpu_ptr(ife->common.cpu_qstats));
+return TC_ACT_SHOT;
+
if (find_decode_metaid(skb, ife, mtype, dlen, curr_data)) {
    /* abuse overlimits to count when we receive metadata */
    @ @ -855,7 +873,7 @@
    {
    struct tc_action_net *tn = net_generic(net, ife_net_id);

    -return tc_action_net_init(tn, &act_ife_ops);
    +return tc_action_net_init(net, tn, &act_ife_ops);
    }

    static void __net_exit ife_exit_net(struct net *net)
    --- linux-4.15.0.orig/net/sched/act_ipt.c
    +++ linux-4.15.0/net/sched/act_ipt.c
    @ @ -65,12 +65,13 @@
    return 0;
    }

    -static void ipt_destroy_target(struct xt_entry_target *t)
    +static void ipt_destroy_target(struct xt_entry_target *t, struct net *net)
    {
    struct xt_tgdtor_param par = {
        .target   = t->u.kernel.target,
        .targinfo = t->data,
        .family   = NFPROTO_IPV4,
        .net      = net,
    };  
    if (par.target->destroy != NULL)
        par.target->destroy(&par);
    @ @ -80,9 +81,12 @@
    static void tcf_ipt_release(struct tc_action *a, int bind)
    {
    struct tcf_ipt *ipt = to_ipt(a);
    -ipt_destroy_target(ipt->tcfi_t);
    +
    +if (ipt->tcfi_t) {
    +ipt_destroy_target(ipt->tcfi_t, a->idrinfo->net);
    +kfree(ipt->tcfi_t);
    +}
    kfree(ipt->tcfi_tname);
    -kfree(ipt->tcfi_t);
    }

    static const struct nla_policy ipt_policy[TCA_IPT_MAX + 1] = {
        @ @ -169,7 +173,7 @@
spin_lock_bh(&ipt->tcf_lock);
if (ret != ACT_P_CREATED) {
    -ipt_destroy_target(ipt->tcf_i);
    +ipt_destroy_target(ipt->tcf_i, net);
kfree(ipt->tcf_i_t);
kfree(ipt->tcf_i_tname);
}
@ @ -186,8 +190,7 @@
err2:
kfree(tname);
err1:
-if (ret == ACT_P_CREATED)
-tcf_idr_cleanup("a, est);
+tcf_idr_release("a, bind);
return err;
}
@
}
struct tc_action_net *tn = net_generic(net, ipt_net_id);

-return tc_action_net_init(tn, &act_ipt_ops);
+return tc_action_net_init(net, tn, &act_ipt_ops);
}
static void __net_exit ipt_exit_net(struct net *net)
@
{
struct tc_action_net *tn = net_generic(net, xt_net_id);

-return tc_action_net_init(tn, &act_xt_ops);
+return tc_action_net_init(net, tn, &act_xt_ops);
}
static void __net_exit xt_exit_net(struct net *net)
@
{
struct tc_action_net *tn = net_generic(net, mirred_net_id);

-return tc_action_net_init(tn, &act_mirred_ops);
+return tc_action_net_init(net, tn, &act_mirred_ops);
}
static void __net_exit mirred_exit_net(struct net *net)
@
{
return err;

pr_info("Mirror/redirect action on\n");
-
+err = tcf_register_action(&act_mirred_ops, &mirred_net_ops);
+if (err)
+unregister_netdevice_notifier(&mirred_device_notifier);
+
+return err;
}

static void __exit mirred_cleanup_module(void)
--- linux-4.15.0.orig/net/sched/act_nat.c
+++ linux-4.15.0/net/sched/act_nat.c
@@ -307,7 +307,7 @@
{
 struct tc_action_net *tn = net_generic(net, nat_net_id);

-\treturn tc_action_net_init(tn, &act_nat_ops);
+\treturn tc_action_net_init(net, tn, &act_nat_ops);
}

static void __net_exit nat_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_pedit.c
+++ linux-4.15.0/net/sched/act_pedit.c
@@ -46,7 +46,7 @@
int err = -EINVAL;
int rem;

-\tif (!nla || !n)
+\tif (!nla)
return NULL;

keys_ex = kcalloc(n, sizeof(*k), GFP_KERNEL);
@@ -109,16 +109,18 @@
{
 struct nlattr *keys_start = nla_nest_start(skb, TCA_PEDIT_KEYS_EX);

+\tif (!keys_start)
+\tgoto nla_failure;
+for (; n > 0; n--) {
+struct nlattr *key_start;
+
+key_start = nla_nest_start(skb, TCA_PEDIT_KEY_EX);
+\tif (!key_start)
+\tgoto nla_failure;
+
+if (nla_put_u16(skb, TCA_PEDIT_KEY_EX_HTYPE, keys_ex->htype) ||

---
- nla_put_u16(skb, TCA_PEDIT_KEY_EX_CMD, keys_ex->cmd)) {
    -nlmsg_trim(skb, keys_start);
    -return -EINVAL;
    -}
+    nla_put_u16(skb, TCA_PEDIT_KEY_EX_CMD, keys_ex->cmd))
+goto nla_failure;
}

nla_nest_end(skb, key_start);

@@ -128,6 +130,9 @@
@@ -158,6 +163,9 @@
  return 0;
  +nla_failure:
  +nla_nest_cancel(skb, keys_start);
  +return -EINVAL;
 }

static int tcf_pedit_init(struct net *net, struct nlattr *nla,
@@ -167,7 +175,6 @@
  return PTR_ERR(keys_ex);
  if (!tcf_idr_check(tn, parm->index, a, bind)) {
    if (!parm->nkeys)
@@ -395,7 +401,10 @@
  if (!tcf_idr_check(tn, parm->index, a, bind)) {
    -if (!parm->nkeys)
    -return -EINVAL;
    ret = tcf_idr_create(tn, parm->index, est, a,
    &act_pedit_ops, bind, false);
    if (ret)
    @@ -176,7 +182,7 @@
p = to_pedit(*a);
  keys = kmalloc(ksize, GFP_KERNEL);
  if (keys == NULL) {
    -tcf_idr_cleanup(*a, est);
    +tcf_idr_release(*a, bind);
    kfree(keys_ex);
    return -ENOMEM;
  }
opt->bindcnt = p->tcf_bindcnt - bind;

if (p->tcfp_keys_ex) {
- tfc_pedit_key_ex_dump(skb, p->tcfp_ex, p->tcfp_nkeys);
+ if (tcf_pedit_key_ex_dump(skb,
+ p->tcfp_keys_ex,
+ p->tcfp_nkeys))
+ goto nla_put_failure;

if (nla_put(skb, TCA_PEDIT_PARMS_EX, s, opt))
goto nla_put_failure;
@@ -450,7 +459,7 @@
{
    struct tc_action_net *tn = net_generic(net, pedit_net_id);

    -return tc_action_net_init(tn, &act_pedit_ops);
+return tc_action_net_init(net, tn, &act_pedit_ops);
}

static void __net_exit pedit_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_police.c
+++ linux-4.15.0/net/sched/act_police.c
@@ -194,7 +194,7 @@
    qdisc_put_rtab(P_tab);
    qdisc_put_rtab(R_tab);
    if (ret == ACT_P_CREATED)
-        tcf_idr_cleanup(*a, est);
+        tcf_idr_release(*a, bind);
        return err;
    }

@@ -331,7 +331,7 @@
{
    struct tc_action_net *tn = net_generic(net, police_net_id);

    -return tc_action_net_init(tn, &act_police_ops);
+return tc_action_net_init(net, tn, &act_police_ops);
}

static void __net_exit police_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_sample.c
+++ linux-4.15.0/net/sched/act_sample.c
@@ -45,6 +45,7 @@
    struct tc_sample *parm;
    struct tcf_sample *s;
    bool exists = false;
+u32 rate;
    int ret;
if (!nla)
@@ -64,7 +65,7 @@
if (!exists) {
    ret = tcf_idr_create(tn, parm->index, est, a,
    &act_sample_ops, bind, false);
+    &act_sample_ops, bind, true);
    if (ret)
        return ret;
    ret = ACT_P_CREATED;
@@ -73,10 +74,17 @@
    if (!ovr)
        return -EEXIST;
    }
-s = to_sample(*a);
+
+rate = nla_get_u32(tb[TCA_SAMPLE_RATE]);
+if (!rate) {
+    tcf_idr_release(*a, bind);
+    return -EINVAL;
+}
+    s = to_sample(*a);
    s->tcf_action = parm->action;
    s->rate = nla_get_u32(tb[TCA_SAMPLE_RATE]);
+    s->rate = rate;
    s->psample_group_num = nla_get_u32(tb[TCA_SAMPLE_PSAMPLE_GROUP]);
    psample_group = psample_group_get(net, s->psample_group_num);
    if (!psample_group) {
@@ -84,13 +92,16 @@
        tcf_idr_release(*a, bind);
        return -ENOMEM;
    -RCU_INIT_POINTER(s->psample_group, psample_group);
+rcu_swap_protected(s->psample_group, psample_group,
+    lockdep_is_held(&s->tcf_lock));

    if (tb[TCA_SAMPLE_TRUNC_SIZE]) {
        truncate = true;
        s->trunc_size = nla_get_u32(tb[TCA_SAMPLE_TRUNC_SIZE]);
    }
+
+if (psample_group)
+    psample_group_put(psample_group);
if (ret == ACT_P_CREATED)
    tcf_idr_insert(tn, *a);
    return ret;
@@ -103,7 +114,8 @@
   -psample_group_put(psample_group);
   +if (psample_group)
   +psample_group_put(psample_group);
 }

static bool tcf_sample_dev_ok_push(struct net_device *dev)
@@ -113,6 +125,7 @@
case ARPHRD_TUNNEL6:
case ARPHRD_SIT:
case ARPHRD_IPGRE:
+case ARPHRD_IP6GRE:
case ARPHRD_VOID:
case ARPHRD_NONE:
   return false;
@@ -233,7 +246,7 @@
{
   struct tc_action_net *tn = net_generic(net, sample_net_id);

   -return tc_action_net_init(tn, &act_sample_ops);
   +return tc_action_net_init(net, tn, &act_sample_ops);
 }

static void __net_exit sample_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_simple.c
+++ linux-4.15.0/net/sched/act_simple.c
@@ -53,22 +53,22 @@
   kfree(d->tcfd_defdata);
 }

-static int alloc_defdata(struct tcf_defact *d, char *defdata)
+static int alloc_defdata(struct tcf_defact *d, const struct nlattr *defdata)
{
   d->tcfd_defdata = kzalloc(SIMP_MAX_DATA, GFP_KERNEL);
   if (unlikely(!d->tcfd_defdata))
      return -ENOMEM;
-   strlcpy(d->tcfd_defdata, defdata, SIMP_MAX_DATA);
+   nla_strlcpy(d->tcfd_defdata, defdata, SIMP_MAX_DATA);
   return 0;
 }

-static void reset_policy(struct tcf_defact *d, char *defdata,
+static void reset_policy(struct tcf_defact *d, const struct nlattr *defdata,
   struct tc_defact *p)

spin_lock_bh(&d->tcf_lock);
d->tcf_action = p->action;
memset(d->tcfd_defdata, 0, SIMP_MAX_DATA);
strlcpy(d->tcfd_defdata, defdata, SIMP_MAX_DATA);
+strlcpy(d->tcfd_defdata, defdata, SIMP_MAX_DATA);
spin_unlock_bh(&d->tcf_lock);

@@ -87,7 +87,6 @@
struct tcf_defact *d;
bool exists = false;
int ret = 0, err;
-char *defdata;

if (nla == NULL)
  return -EINVAL;
@@ -110,8 +109,6 @@
return -EINVAL;
}
-defdata = nla_data(tb[TCA_DEF_DATA]);
  
  if (!exists) {
    ret = tcf_idr_create(tn, parm->index, est, a,
      &act_simp_ops, bind, false);
    @@ -119,9 +116,9 @@
      return ret;
    d = to_defact(*a);
    -ret = alloc_defdata(d, defdata);
    +ret = alloc_defdata(d, tb[TCA_DEF_DATA]);
    if (ret < 0) {
      -tcf_idr_cleanup(*a, est);
      +tcf_idr_release(*a, bind);
      return ret;
    }
    d->tcf_action = parm->action;
  }@@ -133,7 +130,7 @@
    if (!ovr)
      return -EEXIST;
    -reset_policy(d, defdata, parm);
    +reset_policy(d, tb[TCA_DEF_DATA], parm);
  }

if (ret == ACT_P_CREATED)
  @@ -201,7 +198,7 @@
  
  if (nla == NULL)
    return -EINVAL;
  @@
struct tc_action_net *tn = net_generic(net, simp_net_id);

-return tc_action_net_init(tn, &act_simp_ops);
+return tc_action_net_init(net, tn, &act_simp_ops);
 }

static void __net_exit simp_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_skbedit.c
+++ linux-4.15.0/net/sched/act_skbedit.c
@@ -121,7 +121,8 @@
 return 0;
 if (!flags)
- 		tcf_idr_release(*a, bind);
+ 	if (exists)
+ 		tcf_idr_release(*a, bind);
 return -EINVAL;
 }

@@ -238,7 +239,7 @@
 {
 struct tc_action_net *tn = net_generic(net, skbedit_net_id);

-return tc_action_net_init(tn, &act_skbedit_ops);
+return tc_action_net_init(net, tn, &act_skbedit_ops);
 }

static void __net_exit skbedit_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_skbmod.c
+++ linux-4.15.0/net/sched/act_skbmod.c
@@ -131,8 +131,11 @@
 if (exists && bind)
 return 0;

-if (!flags) {
- 	-tcf_idr_release(*a, bind);
+if (!flags) {
+ 	if (exists)
+ 		tcf_idr_release(*a, bind);
 return -EINVAL;
 }

@@ -238,7 +239,7 @@
 {
 struct tc_action_net *tn = net_generic(net, skbedit_net_id);

-return tc_action_net_init(tn, &act_skbedit_ops);
+return tc_action_net_init(net, tn, &act_skbedit_ops);
 }

static void __net_exit skbedit_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_skbmod.c
+++ linux-4.15.0/net/sched/act_skbmod.c
@@ -152,7 +155,7 @@
 ASSERT_RTNL();
p = kzalloc(sizeof(struct tcf_skbmod_params), GFP_KERNEL);
 if (unlikely(!p))
- 	-if (ovr)
+if (ret == ACT_P_CREATED)
tcf_idr_release(*a, bind);
return -ENOMEM;
}
@@ -190,7 +193,8 @@
struct tcf_skbmod_params *p;

p = rcu_dereference_protected(d->skbmod_p, 1);
-kfree_rcu(p, rcu);
+if (p)
+kfree_rcu(p, rcu);
}

static int tcf_skbmod_dump(struct sk_buff *skb, struct tc_action *a,
@@ -263,7 +267,7 @@
{
struct tc_action_net *tn = net_generic(net, skbmod_net_id);

-return tc_action_net_init(tn, &act_skbmod_ops);
+return tc_action_net_init(net, tn, &act_skbmod_ops);
}

static void __net_exit skbmod_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_tunnel_key.c
+++ linux-4.15.0/net/sched/act_tunnel_key.c
@@ -36,7 +36,7 @@
metadata->u.tun_info.mode |= IP_TUNNEL_INFO_TX;
 break;
 default:
         +ret = -EINVAL;
@@ -181,7 +182,7 @@
 params_old = rtnl_dereference(t->params);

-params_new->action = parm->action;
+t->tcf_action = parm->action;

params_new->tcft_action = parm->t_action;
params_new->tcft_enc_metadata = metadata;

@@ -207,11 +208,12 @@
struct tcf_tunnel_key_params *params;

params = rcu_dereference_protected(t->params, 1);
+if (params) {
+if (params->tcft_action == TCA_TUNNEL_KEY_ACT_SET)
+dst_release(&params->tcft_enc_metadata->dst);
+
-if (params->tcft_action == TCA_TUNNEL_KEY_ACT_SET)
-dst_release(&params->tcft_enc_metadata->dst);
-
-kfree_rcu(params, rcu);
+kfree_rcu(params, rcu);
+}
}

static int tunnel_key_dump_addresses(struct sk_buff *skb,
@@ -252,13 +254,13 @@
	.action   = t->tcf_action,
};
struct tcf_t tm;
params = rtnl_dereference(t->params);

opt.t_action = params->tcft_action;
-opt.action = params->action;
+opt.action = params->tcf_action;

if (nla_put(skb, TCA_TUNNEL_KEY_PARMS, sizeof(opt), &opt))
goto nla_put_failure;
@@ -322,7 +324,7 @@
{
struct tc_action_net *tn = net_generic(net, tunnel_key_net_id);

-return tc_action_net_init(tn, &act_tunnel_key_ops);
+return tc_action_net_init(net, tn, &act_tunnel_key_ops);
}

static void __net_exit tunnel_key_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/act_vlan.c
+++ linux-4.15.0/net/sched/act_vlan.c
@@ -161,6 +161,8 @@

 case htons(ETH_P_8021AD):

break;
default:
+if (exists)
+  tcf_idr_release(*a, bind);
return -EPROTONOSUPPORT;
}
} else {
@@ -225,7 +227,8 @@
struct tcf_vlan_params *p;

    p = rcu_dereference_protected(v->vlan_p, 1);
    -kfree_rcu(p, rcu);
    +if (p)
    +  kfree_rcu(p, rcu);
}

static int tcf_vlan_dump(struct sk_buff *skb, struct tc_action *a,
@@ -298,7 +301,7 @@
{
    struct tc_action_net *tn = net_generic(net, vlan_net_id);

    -return tc_action_net_init(tn, &act_vlan_ops);
    +return tc_action_net_init(net, tn, &act_vlan_ops);
}

static void __net_exit vlan_exit_net(struct net *net)
--- linux-4.15.0.orig/net/sched/cls_api.c
+++ linux-4.15.0/net/sched/cls_api.c
@@ -30,6 +30,8 @@

 #include <net/pkt_sched.h>
 #include <net/pkt_cls.h>

+extern const struct nla_policy rtm_tca_policy[TCA_MAX + 1];
+
/* The list of all installed classifier types */
static LIST_HEAD(tcf_proto_base);

@@ -102,9 +104,10 @@
}
EXPORT_SYMBOL(unregister_tcf_proto_ops);

-bool tcf_queue_work(struct work_struct *work)
+bool tcf_queue_work(struct rcu_work *rwork, work_func_t func)
{
    -return queue_work(tc_filter_wq, work);
    +INIT_RCU_WORK(rwork, func);
    +return queue_rcu_work(tc_filter_wq, rwork);
}
EXPORT_SYMBOL(tcf_queue_work);

@@ -150,8 +153,8 @@
} else {
    err = -ENOENT;
}
-goto errout;
@endif
+goto errout;
}

static void tcf_chain_destroy(struct tcf_chain *chain)
{
+struct tcf_block *block = chain->block;
+list_del(&chain->list);
kfree(chain);
+if (list_empty(&block->chain_list))
+kfree(block);
}

static void tcf_chain_hold(struct tcf_chain *chain)
@@ -329,49 +336,34 @@
EXPORT_SYMBOL(tcf_block_get);

-void tcf_block_put_ext(struct tcf_block *block, struct Qdisc *q,
 struct tcf_block_ext_info *ei)

/* XXX: Standalone actions are not allowed to jump to any chain, and bound
 * actions should be all removed after flushing.
 */

{ 
  struct tcf_chain *chain;
  struct tcf_chain *chain, *tmp;

  if (!block)
    return;
  /* Hold a refcnt for all chains, except 0, so that they don't disappear
   * while we are iterating.
   */
  list_for_each_entry(chain, &block->chain_list, list)
    if (chain->index)
      tcf_chain_hold(chain);
  list_for_each_entry(chain, &block->chain_list, list)
    tcf_chain_flush(chain);
  tcf_block_offload_unbind(block, q, ei);
  -INIT_WORK(&block->work, tcf_block_put_final);
  /* Wait for existing RCU callbacks to cool down, make sure their works
   * have been queued before this. We can not flush pending works here
   * because we are holding the RTNL lock.
   */
  -rcu_barrier();
  -tcf_queue_work(&block->work);
  /* At this point, all the chains should have refcnt >= 1. */
  +list_for_each_entry_safe(chain, tmp, &block->chain_list, list)
    +tcf_chain_put(chain);
  +
  /* Finally, put chain 0 and allow block to be freed. */
  +chain = list_first_entry(&block->chain_list, struct tcf_chain, list);
  +tcf_chain_put(chain);
} 
EXPORT_SYMBOL(tcf_block_put_ext);

int tcf_classify(struct sk_buff *skb, const struct tcf_proto *tp,
    struct tcf_result *res, bool compat_mode)
{
  __be16 protocol = tc_skb_protocol(skb);
  #ifdef CONFIG_NET_CLS_ACT
  const int max_reclassify_loop = 4;
  const struct tcf_proto *orig_tp = tp;
  @ @ -506,6 +497,7 @ @
  reclassify:
  #endif

for (tp; tp = rcu_dereference_bh(tp->next)) {
+    __be16 protocol = tc_skb_protocol(skb);
int err;

    if (tp->protocol != protocol &&
@@ -537,7 +529,6 @@
            }

    tp = first_tp;
-    protocol = tc_skb_protocol(skb);
    goto reclassify;
@endif

@@ -741,7 +732,7 @@
    replay:
    tp_created = 0;

-err = nlmsg_parse(n, sizeof(*t), tca, TCA_MAX, NULL, extack);
+err = nlmsg_parse(n, sizeof(*t), tca, TCA_MAX, rtm_tca_policy, extack);
    if (err < 0)
        return err;

@@ -924,6 +915,9 @@
    tcf_chain_tp_insert(chain, &chain_info, tp);
    tfilter_notify(net, skb, n, tp, q, parent, fh,
            RTM_NEWTFILTER, false);
+    /* q pointer is NULL for shared blocks */
+if (q)
+    q->flags &= ~TCQ_F_CAN_BYPASS;
} else {
    if (tp_created)
        tcf_proto_destroy(tp);
@@ -1026,7 +1020,8 @@
    if (nlmsg_len(cb->nlh) < sizeof(*tcm))
        return skb->len;

-err = nlmsg_parse(cb->nlh, sizeof(*tcm), tca, TCA_MAX, NULL, NULL);
+err = nlmsg_parse(cb->nlh, sizeof(*tcm), tca, TCA_MAX, rtm_tca_policy, + NULL);
    if (err)
        return err;

@@ -1065,13 +1060,18 @@
        continue;
    if (!tcf_chain_dump(chain, q, skb, cb,
            -    index_start, &index))
+    +    index_start, &index))
{  
  
  nla_get_u32(tca[TCA_CHAIN]) != chain->index
  continue;
  
  if (!tcf_chain_dump(chain, q, skb, cb,
  -    index_start, &index))
  +    index_start, &index))
  {  
  

err = -EMSGSIZE;
break;
}

cb->args[0] = index;

out:
/* If we did no progress, the error (EMSGSIZE) is real */
+if (skb->len == 0 && err)
+return err;
return skb->len;
}

@@ -1119,7 +1119,6 @@
exts->actions[i++] = act;
exts->nr_actions = i;
}
exts->net = net;
}
#else
if ((exts->action && tb[exts->action]) ||
@@ -1247,7 +1246,7 @@
return ret;
ok_count = ret;

-if (!exts)
+if (!exts || ok_count)
return ok_count;
ret = tc_exts_setup_cb_egdev_call(exts, type, type_data, err_stop);
if (ret < 0)
--- linux-4.15.0.orig/net/sched/cls_basic.c
+++ linux-4.15.0/net/sched/cls_basic.c
@@ -35,10 +35,7 @@
struct tcf_result res;
struct tcf_proto *tp;
struct list_head link;
-union {
-struct work_struct work;
-struct rcu_head rcu;
+-struct rcu_work rwork;
};
struct tcf_resultres;
struct tcf_proto*tp;
struct list_headlink;
-union {
-struct work_struct work;
-struct rcu_headrcu;
-};
+struct rcu_workrwork;
};

static int basic_classify(struct sk_buff *skb, const struct tcf_proto *tp,
@@ -97,21 +94,14 @@
static void basic_delete_filter_work(struct work_struct *work)
struct basic_filter *f = container_of(work, struct basic_filter, work);

struct basic_filter *f = container_of(to_rcu_work(work), struct basic_filter, rwork);

rtnl_lock();
__basic_delete_filter(f);
rtnl_unlock();

static void basic_delete_filter(struct rcu_head *head)
{
    struct basic_filter *f = container_of(head, struct basic_filter, rcu);

    INIT_WORK(&f->work, basic_delete_filter_work);
tcf_queue_work(&f->work);
}

static void basic_destroy(struct tcf_proto *tp)
{
    struct basic_head *head = rtnl_dereference(tp->root);
    tcf_unbind_filter(tp, &f->res);
    idr_remove_ext(&head->handle_idr, f->handle);
    if (tcf_exts_get_net(&f->exts))
        call_rcu(&f->rcu, basic_delete_filter);
    tcf_queue_work(&f->rwork, basic_delete_filter_work);
    __basic_delete_filter(f);
}

    tcf_unbind_filter(tp, &f->res);
    idr_remove_ext(&head->handle_idr, f->handle);
    tcf_exts_get_net(&f->exts);
    call_rcu(&f->rcu, basic_delete_filter);
    tcf_queue_work(&f->rwork, basic_delete_filter_work);*
*last = list_empty(&head->flist);
return 0;
}

if (!fnew)
return -ENOBUFS;

err = tcf_exts_init(&fnew->exts, TCA_BASIC_ACT, TCA_BASIC_POLICE);
+err = tcf_exts_init(&fnew->exts, net, TCA_BASIC_ACT, TCA_BASIC_POLICE);
if (err < 0)
goto errout;

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list_replace_rcu(&fold->link, &fnew->link);
tcf_unbind_filter(tp, &fold->res);
tcf_exts_get_net(&fold->exts);
-call_rcu(&fold->rcu, basic_delete_filter);
+ tcf_queue_work(&fold->rwork, basic_delete_filter_work);
} else {
 list_add_rcu(&fnew->link, &head->flist);
}

static void basic_bind_class(void *fh, u32 classid, unsigned long cl, void *q, unsigned long base)
{
 struct basic_filter *f = fh;

-if (f && f->res.classid == classid)
-f->res.class = cl;
+if (f && f->res.classid == classid) {
+ if (cl)
+__tcf_bind_filter(q, &f->res, base);
+else
+__tcf_unbind_filter(q, &f->res);
+}
}

static int basic_dump(struct net *net, struct tcf_proto *tp, void *fh,
--- linux-4.15.0.orig/net/sched/cls_bpf.c
+++ linux-4.15.0/net/sched/cls_bpf.c
@@ -49,10 +49,7 @@
 struct sock_filter *bpf_ops;
 const char *bpf_name;
 struct tcf_proto *tp;
-union {
-struct work_struct work;
-struct rcu_head rcu;
-};
+struct rcu_work rwork;
};

-static const struct nla_policy bpf_policy[TCA_BPF_MAX + 1] = {
+static void cls_bpf_delete_prog_work(struct work_struct *work)
struct cls_bpf_prog *prog = container_of(work, struct cls_bpf_prog, work);

+struct cls_bpf_prog *prog = container_of(to_rcu_work(work),
+    struct cls_bpf_prog,
+    rwork);
rtnl_lock();
__cls_bpf_delete_prog(prog);
rtnl_unlock();

static void cls_bpf_delete_prog_rcu(struct rcu_head *rcu)
{
-struct cls_bpf_prog *prog = container_of(rcu, struct cls_bpf_prog, rcu);

-INIT_WORK(&prog->work, cls_bpf_delete_prog_work);
-tcf_queue_work(&prog->work);
-
-
static void __cls_bpf_delete(struct tcf_proto *tp, struct cls_bpf_prog *prog)
{
struct cls_bpf_head *head = rtnl_dereference(tp->root);
@@ -294,7 +284,7 @@
list_del_rcu(&prog->link);
tcf_unbind_filter(tp, &prog->res);
if (tcf_exts_get_net(&prog->exts))
    -call_rcu(&prog->rcu, cls_bpf_delete_prog_rcu);
+    tcf_queue_work(&prog->rwork, cls_bpf_delete_prog_work);
else
    __cls_bpf_delete_prog(prog);
}
@@ -477,7 +467,7 @@
if (!prog)
    return -ENOBUFS;

-ret = tcf_exts_init(&prog->exts, TCA_BPF_ACT, TCA_BPF_POLICE);
+ret = tcf_exts_init(&prog->exts, net, TCA_BPF_ACT, TCA_BPF_POLICE);
if (ret < 0)
goto errout;

@@ -520,7 +510,7 @@
list_replace_rcu(&oldprog->link, &prog->link);
tcf_unbind_filter(tp, &oldprog->res);
tcf_exts_get_net(&oldprog->exts);
-    -call_rcu(&oldprog->rcu, cls_bpf_delete_prog_rcu);
+    tcf_queue_work(&oldprog->rwork, cls_bpf_delete_prog_work);
} else {
    list_add_rcu(&prog->link, &head->plist);
static void cls_bpf_bind_class(void *fh, u32 classid, unsigned long cl, 
+    void *q, unsigned long base)
{
    struct cls_bpf_prog *prog = fh;

-    if (prog && prog->res.classid == classid)
-        prog->res.class = cl;
+    if (prog && prog->res.classid == classid) {
+        if (cl)
+            __tcf_bind_filter(q, &prog->res, base);
+        else
+            __tcf_unbind_filter(q, &prog->res);
+    }
}

static void cls_bpf_walk(struct tcf_proto *tp, struct tcf_walker *arg)
--- linux-4.15.0.orig/net/sched/cls_cgroup.c
+++ linux-4.15.0/net/sched/cls_cgroup.c
@@ -23,10 +23,7 @@
        struct tcf_exts texts;
        struct tcf_ematch_tree ematches;
        struct tcf_proto *tp;
-    union {
-        struct work_struct work;
-        struct rcu_head rcu;
-    };
+    struct rcu_work rwork;

    static int cls_cgroup_classify(struct sk_buff *skb, const struct tcf_proto *tp,
@@ -70,24 +67,14 @@

    static void cls_cgroup_destroy_work(struct work_struct *work)
    {
-        struct cls_cgroup_head *head = container_of(work,
+        struct cls_cgroup_head *head = container_of(to_rcu_work(work),
+            cls_cgroup_head,
+            rwork);
            struct cls_cgroup_head,
            work);
+        rwork);
        rtnl_lock();
        __cls_cgroup_destroy(head);
        rtnl_unlock();


-static void cls_cgroup_destroy_rcu(struct rcu_head *root)
{

-struct cls_cgroup_head *head = container_of(root,
- struct cls_cgroup_head,
- rcu);

-INIT_WORK(&head->work, cls_cgroup_destroy_work);
-tcf_queue_work(&head->work);
-

static int cls_cgroup_change(struct net *net, struct sk_buff *skb, struct tcf_proto *tp, unsigned long base, u32 handle, struct nlattr **tca, @@ -111,7 +98,7 @@ if (!new)
return -ENOBUS;

-err = tcf_exts_init(&new->exts, TCA_CGROUP_ACT, TCA_CGROUP_POLICE);
+err = tcf_exts_init(&new->exts, net, TCA_CGROUP_ACT, TCA_CGROUP_POLICE);
if (err < 0)
goto errout;
new->handle = handle;
@@ -132,7 +119,7 @@
tcf_exts_get_net(&head->exts);
-call_rcu(&head->rcu, cls_cgroup_destroy_rcu);
+call_rcu(&head->rcu, cls_cgroup_destroy_rcu);
/* Head can still be NULL due to cls_cgroup_init(). */
if (head) {

tcf_exts_get_net(&head->exts);
-call_rcu(&head->rcu, cls_cgroup_destroy_rcu);
+tcf_queue_work(&head->rwork, cls_cgroup_destroy_work);
} return 0;
errout:
@@ -148,7 +135,7 @@
/* Head can still be NULL due to cls_cgroup_init(). */
if (head) {

if (tcf_exts_get_net(&head->exts))
-call_rcu(&head->rcu, cls_cgroup_destroy_rcu);
+tcf_queue_work(&head->rwork, cls_cgroup_destroy_work);
else
__cls_cgroup_destroy(head);
}
--- linux-4.15.0.orig/net/sched/cls_flow.c
+++ linux-4.15.0/net/sched/cls_flow.c
@@ -57,10 +57,7 @@
 u32 divisor;
 u32 baseclass;
 u32 hashrnd;
union {
    struct work_struct work;
    struct rcu_head rcu;
    
    struct rcu_work rwork;
};

static inline u32 addr_fold(void *addr)
@@ -383,21 +380,14 @@
static void flow_destroy_filter_work(struct work_struct *work)
{
    struct flow_filter *f = container_of(work, struct flow_filter, work);
    
    struct flow_filter *f = container_of(to_rcu_work(work),
+        struct flow_filter,
+        rwork);
    rtnl_lock();
    __flow_destroy_filter(f);
    rtnl_unlock();
}

-static void flow_destroy_filter(struct rcu_head *head)
-{
-    struct flow_filter *f = container_of(head, struct flow_filter, rcu);
-    
-    INIT_WORK(&f->work, flow_destroy_filter_work);
-    tcf_queue_work(&f->work);
-}
-
-static int flow_change(struct net *net, struct sk_buff *in_skb,
 struct tcf_proto *tp, unsigned long base,
 u32 handle, struct nlattr **tca,
@@ -450,7 +440,7 @@
    if (err < 0)
        goto err1;

-err = tcf_exts_init(&fnew->exts, TCA_FLOW_ACT, TCA_FLOW_POLICE);
+err = tcf_exts_init(&fnew->exts, net, TCA_FLOW_ACT, TCA_FLOW_POLICE);
    if (err < 0)
        goto err2;

@@ -562,7 +552,7 @@
    if (fold) {
        tcf_exts_get_net(&fold->exts);
        -call_rcu(&fold->rcu, flow_destroy_filter);
+call_rcu(&fold->rcu, flow_destroy_filter);
        tcf_queue_work(&fold->rwork, flow_destroy_filter_work);
        

list_del_rcu(&f->list);
tcf_exts_get_net(&f->exts);
-call_rcu(&f->rcu, flow_destroy_filter);
+tcf_queue_work(&f->rwork, flow_destroy_filter_work);
*last = list_empty(&head->filters);
return 0;
}
@@ -581,7 +571,7 @@
list_for_each_entry_safe(f, next, &head->filters, list) {
list_del_rcu(&f->list);
if (tcf_exts_get_net(&f->exts))
-call_rcu(&f->rcu, flow_destroy_filter);
+tcf_queue_work(&f->rwork, flow_destroy_filter_work);
else
__flow_destroy_filter(f);
}
--- linux-4.15.0.orig/net/sched/cls_flower.c
+++ linux-4.15.0/net/sched/cls_flower.c
@@ -71,10 +71,7 @@
bool mask_assigned;
struct list_head filters;
struct rhashtable_params ht_params;
-union {
-struct work_struct work;
-struct rcu_head	rcu;
-};
+struct rcu_work rwork;
struct idr handle_idr;
};

@@ -87,10 +84,7 @@
struct list_head list;
u32 handle;
u32 flags;
-union {
-struct work_struct work;
-struct rcu_headrcu;
-};
+struct rcu_work rwork;
struct net_device *hw_dev;
};

@@ -159,6 +153,7 @@
if (!atomic_read(&head->ht.nelems))
    return -1;

+flow_dissector_init_keys(&skb_key.control, &skb_key.basic);
fl_clear_masked_range(&skb_key, &head->mask);

skb_key.indev_ifindex = skb->skb_iif;
@@ -202,21 +197,14 @@
static void fl_destroy_filter_work(struct work_struct *work)
{
-struct cls_fl_filter *f = container_of(work, struct cls_fl_filter, work);
+struct cls_fl_filter *f = container_of(to_rcu_work(work),
+struct cls_fl_filter, rwork);

  rtwl_lock();
  fl_destroy_filter(f);
  rtwl_unlock();
}

-static void fl_destroy_filter(struct rcu_head *head)
{-
  struct cls_fl_filter *f = container_of(head, struct cls_fl_filter, rcu);
  -
  INIT_WORK(&f->work, fl_destroy_filter_work);
  -tcf_queue_work(&f->work);
  -}
  -
  static void fl_hw_destroy_filter(struct tcf_proto *tp, struct cls_fl_filter *f)
  {
    struct tc_cls_flower_offload cls_flower = {};
    @@ -289,29 +277,22 @@
    fl_hw_destroy_filter(tp, f);
    tcf_unbind_filter(tp, &f->res);
    if (tcf_exts_get_net(&f->exts))
      -call_rcu(&f->rcu, fl_destroy_filter);
    +tcf_queue_work(&f->rwork, fl_destroy_filter_work);
    else
      __fl_destroy_filter(f);
  }

  static void fl_destroy_sleepable(struct work_struct *work)
  {
    -struct cls_fl_head *head = container_of(work, struct cls_fl_head,
    -work);
  +struct cls_fl_head *head = container_of(to_rcu_work(work),
  +struct cls_fl_head,
  +rwork);
if (head->mask_assigned)
rhashtable_destroy(&head->ht);
kfree(head);
module_put(TTHIS_MODULE);
}

- static void fl_destroy_rcu(struct rcu_head *rcu)
- {
- struct cls_fl_head *head = container_of(rcu, struct cls_fl_head, rcu);
- 
- INIT_WORK(&head->work, fl_destroy_sleepable);
- schedule_work(&head->work);
- }

static void fl_destroy(struct tcf_proto *tp)
{
 struct cls_fl_head *head = rtnl_dereference(tp->root);
 idr_destroy(&head->handle_idr);

 module_get(TTHIS_MODULE);
 call_rcu(&head->rcu, fl_destroy_rcu);

 __module_put(TTHIS_MODULE);
 call_rcu(&head->rcu, fl_destroy_rcu);
 +tcf_queue_work(&head->rwork, fl_destroy_sleepable);
}

static void *fl_get(struct tcf_proto *tp, u32 handle)
{
 [TCA_FLOWER_KEY_IP_TOS_MASK]= { .type = NLA_U8 },
 [TCA_FLOWER_KEY_IP_TTL]= { .type = NLA_U8 },
 [TCA_FLOWER_KEY_IP_TTL_MASK]= { .type = NLA_U8 },
 +[TCA_FLOWER_FLAGS]= { .type = NLA_U32 },
};

static void fl_set_key_val(struct nlattr **tb,
 goto errout_tb;
}

- err = tcf_exts_init(&fnew->exts, TCA_FLOWER_ACT, 0);
+ err = tcf_exts_init(&fnew->exts, net, TCA_FLOWER_ACT, 0);
if (err < 0)
goto errout;

 list_replace_rcu(&fold->list, &fnew->list);
tcf_unbind_filter(tp, &fold->res);
tcf_exts_get_net(&fold->exts);
- call_rcu(&fold->rcu, fl_destroy_filter);
+tcf_queue_work(&fold->rwork, fl_destroy_filter_work);
} else {
list_add_tail_rcu(&fnew->list, &head->filters);
}
@@ -971,7 +953,7 @@
return 0;

errout_idr:
- if (fnew->handle)
+ if (!fold)
 idr_remove_ext(&head->handle_idr, fnew->handle);
errout:
tcf_exts_destroy(&fnew->exts);
@@ -1343,12 +1325,17 @@
return -1;
}

static void fl_bind_class(void *fh, u32 classid, unsigned long cl)
+static void fl_bind_class(void *fh, u32 classid, unsigned long cl, void *q,
+                         unsigned long base)
{
struct cls_fl_filter *f = fh;

- if (f && f->res.classid == classid)
- f->res.class = cl;
+ if (f && f->res.classid == classid) {
+ if (cl)
+ _tcf_bind_filter(q, &f->res, base);
+ else
+ _tcf_unbind_filter(q, &f->res);
+}
}

static struct tcf_proto_ops cls_fl_ops __read_mostly = {
--- linux-4.15.0.orig/net/sched/cls_fw.c
+++ linux-4.15.0/net/sched/cls_fw.c
@@ -47,10 +47,7 @@
 #endif /* CONFIG_NET_CLS_IND */
 struct tcf_exts exts;
 struct tcf_proto*tp;
-union {
-struct work_struct work;
+struct rcu_work rwork;
-struct rcu_head rcu;
-};
+struct rcu_workrcu;
struct rcu_headrcu;
-}
+}

static u32 fw_hash(u32 handle)
static void fw_delete_filter_work(struct work_struct *work)
{
    struct fw_filter *f = container_of(work, struct fw_filter, work);
    struct fw_filter *f = container_of(to_rcu_work(work),
        struct fw_filter, rwork);
    rtnl_lock();
    __fw_delete_filter(f);
    rtnl_unlock();
}

static void fw_delete_filter(struct rcu_head *head)
{
    struct fw_filter *f = container_of(head, struct fw_filter, rcu);

    INIT_WORK(&f->work, fw_delete_filter_work);
    tcf_queue_work(&f->work);
}

static void fw_destroy(struct tcf_proto *tp)
{
    struct fw_head *head = rtnl_dereference(tp->root);
    __ -164,7 +154,7 __
    rtnl_dereference(f->next));
    tcf_unbind_filter(tp, &f->res);
    if (tcf_exts_get_net(&f->exts))
        -call_rcu(&f->rcu, fw_delete_filter);
    +tcf_queue_work(&f->rwork, fw_delete_filter_work);
    else
        __fw_delete_filter(f);
}

RCU_INIT_POINTER(*fp, rtnl_dereference(f->next));
tcf_unbind_filter(tp, &f->res);
tcf_exts_get_net(&f->exts);
-call_rcu(&f->rcu, fw_delete_filter);
+tcf_queue_work(&f->rwork, fw_delete_filter_work);
ret = 0;
break;
}

@end -290,7 +280,8 @
#endif /* CONFIG_NET_CLS_IND */
fnew->tp = f->tp;

-err = tcf_exts_init(&fnew->exts, TCA_FW_ACT, TCA_FW_POLICE);
err = tcf_exts_init(&fnew->exts, net, TCA_FW_ACT, TCA_FW_POLICE);
if (err < 0) {
    kfree(fnew);
    return err;
}
rcu_assign_pointer(*fp, fnew);
tcf_unbind_filter(tp, &f->res);
tcf_exts_get_net(&f->exts);
-call_rcu(&f->rcu, fw_delete_filter);
+call_rcu(&f->rcu, fw_delete_filter);
*targ = fnew;
return err;
}

-ferr = tcf_exts_init(&f->exts, TCA_FW_ACT, TCA_FW_POLICE);
+err = tcf_exts_init(&f->exts, net, TCA_FW_ACT, TCA_FW_POLICE);
if (err < 0)
    goto errout;
f->id = handle;
}

-void fw_bind_class(void *fh, u32 classid, unsigned long cl)
+void fw_bind_class(void *fh, u32 classid, unsigned long cl, void *q,
		   unsigned long base)
{
    struct fw_filter *f = fh;

    -if (f && f->res.classid == classid)
    -f->res.class = cl;
+if (f && f->res.classid == classid) {
    +if (cl)
    +__tcf_bind_filter(q, &f->res, base);
+else
    +__tcf_unbind_filter(q, &f->res);
    +}
}

static struct tcf_proto_ops cls_fw_ops __read_mostly = {
    --- linux-4.15.0.orig/net/sched/cls_matchall.c
    +++ linux-4.15.0/net/sched/cls_matchall.c
    @@ -21,10 +21,7 @@
    struct tcf_result res;

u32 handle;

u32 flags;

-union {
  -struct work_struct work;
  -struct rcu_head*rcu;
-};
+struct rcu_work rwork;
};

static void mall_destroy_work(struct work_struct *work)
{
  -struct cls_mall_head *head = container_of(work, struct cls_mall_head,
    - work);
+struct cls_mall_head *head = container_of(to_rcu_work(work),
  + struct cls_mall_head,
  + rwork);
  rtnl_lock();
  __mall_destroy(head);
  rtnl_unlock();
}

- static void mall_destroy_rcu(struct rcu_head *rcu)
- {
  -struct cls_mall_head *head = container_of(rcu, struct cls_mall_head,
    - rcu);
  -
  - INIT_WORK(&head->work, mall_destroy_work);
  -tcf_queue_work(&head->work);
- }
-

static void mall_destroy_hw_filter(struct tcf_proto *tp,
struct cls_mall_head *head,
unsigned long cookie)
{ if (!head)
  return;

  +tcf_unbind_filter(tp, &head->res);
+
  if (!tc_skip_hw(head->flags))
mall_destroy_hw_filter(tp, head, (unsigned long) head);

  if (tcf_exts_get_net(&head->exts))
    -call_rcu(&head->rcu, mall_destroy_rcu);
    +tcf_queue_work(&head->rwork, mall_destroy_work);
else
__mall_destroy(head);
}

static void *mall_get(struct tcf_proto *tp, u32 handle)
{
+struct cls_mall_head *head = rtnl_dereference(tp->root);
+if (head && head->handle == handle)
+return head;
+
return NULL;
}

static const struct nla_policy mall_policy[TCA_MATCHALL_MAX + 1] = {
[TCA_MATCHALL_UNSPEC] = { .type = NLA_UNSPEC },
[TCA_MATCHALL_CLASSID] = { .type = NLA_U32 },
+[TCA_MATCHALL_FLAGS] = { .type = NLA_U32 },
};

static int mall_set_parms(struct net *net, struct tcf_proto *tp,
@@ -188,7 +185,7 @@
if (!new)
return -ENOBUFS;
-	err = tcf_exts_init(&new->exts, TCA_MATCHALL_ACT, 0);
+err = tcf_exts_init(&new->exts, net, TCA_MATCHALL_ACT, 0);
if (err)
goto err_exts_init;
@@ -276,12 +273,17 @@
return -1;
}

-static void mall_bind_class(void *fh, u32 classid, unsigned long cl)
+static void mall_bind_class(void *fh, u32 classid, unsigned long cl, void *q,
+    unsigned long base)
{
 struct cls_mall_head *head = fh;

-    if (head && head->res.classid == classid)
-        head->res.class = cl;
-    if (head && head->res.classid == classid) {
-        if (cl)
-            __tcf_bind_filter(q, &head->res, base);
-        else
-            __tcf_unbind_filter(q, &head->res);
-    }
+    if (head)
+        head->res.class = cl;
+    if (head) {
+        if (head->res.classid == classid)
+            __tcf_bind_filter(q, &head->res, base);
+        else
+            __tcf_unbind_filter(q, &head->res);
+    }
static struct tcf_proto_ops cls_mall_ops __read_mostly = {
--- linux-4.15.0.orig/net/sched/cls_route.c
+++ linux-4.15.0/net/sched/cls_route.c
@@ -57,10 +57,7 @@
    u32 handle;
 struct route4_bucket *bkt;
 struct tcf_proto *tp;
-union {
-    struct work_struct work;
-    struct rcu_head rcu;
-};
+    struct rcu_work rwork;
};

#define ROUTE4_FAILURE ((struct route4_filter *)(-1L))
@@ -266,19 +263,17 @@
 static void route4_delete_filter_work(struct work_struct *work)
 { 
    struct route4_filter *f = container_of(work, struct route4_filter, work);
-   + struct route4_filter *f = container_of(to_rcu_work(work),
-      + struct route4_filter,
-      + rwork);
    rtnl_lock();
    __route4_delete_filter(f);
    rtnl_unlock();
 }

-static void route4_delete_filter(struct rcu_head *head)
+static void route4_queue_work(struct route4_filter *f)
 { 
    struct route4_filter *f = container_of(head, struct route4_filter, rcu);
-   + INIT_WORK(&f->work, route4_delete_filter_work);
-   + tcf_queue_work(&f->rwork, route4_delete_filter_work);
+    tcf_queue_work(&f->rwork, route4_delete_filter_work);
 }

 static void route4_destroy(struct tcf_proto *tp)
@@ -304,7 +299,7 @@
 RCU_INIT_POINTER(b->ht[h2], next);
 tcf_unbind_filter(tp, &f->res);
 if (tcf_exts_get_net(&f->exts))
-   -call_rcu(&f->rcu, route4_delete_filter);
+   +route4_queue_work(f);
else
    _route4_delete_filter(f);
}
@@ -348,7 +343,7 @@ /* Delete it */
tcf_unbind_filter(tp, &f->res);
tcf_exts_get_net(&f->exts);
- call_rcu(&f->rcu, route4_delete_filter);
+ tcf_queue_work(&f->rwork, route4_delete_filter_work);

 /* Strip RTNL protected tree */
 for (i = 0; i <= 32; i++) {
@@ -499,7 +494,7 @@ if (!f)
        goto errout;

-err = tcf_exts_init(&f->exts, TCA_ROUTE4_ACT, TCA_ROUTE4_POLICE);
+err = tcf_exts_init(&f->exts, net, TCA_ROUTE4_ACT, TCA_ROUTE4_POLICE);
 if (err < 0)
        goto errout;

@@ -539,8 +534,8 @@
 fp = &b->ht[h];
 for (pfp = rtnl_dereference(*fp); pfp;
     fp = &pfp->next, pfp = rtnl_dereference(*fp)) {
- if (pfp == f) {
-     *fp = f->next;
+ if (pfp == fold) {
+     rcu_assign_pointer(*fp, fold->next);
         break;
     }
 }}
@@ -552,7 +547,7 @@
 if (fold) {
 tcf_unbind_filter(tp, &fold->res);
tcf_exts_get_net(&fold->exts);
- call_rcu(&fold->rcu, route4_delete_filter);
+ tcf_queue_work(&fold->rwork, route4_delete_filter_work);
 }
 return 0;

@@ -648,12 +643,17 @@
 return -1;
}
}

- static void route4_bind_class(void *fh, u32 classid, unsigned long cl)
+ static void route4_bind_class(void *fh, u32 classid, unsigned long cl, void *q, 
+     unsigned long base)
struct route4_filter *f = fh;

- if (f && f->res.classid == classid)
  - f->res.class = cl;
+ if (f && f->res.classid == classid) {
+   if (cl)
+     __tcf_bind_filter(q, &f->res, base);
+   else
+     __tcf_unbind_filter(q, &f->res);
+ }

static struct tcf_proto_ops cls_route4_ops __read_mostly = {
--- linux-4.15.0.orig/net/sched/cls_rsvp.h
+++ linux-4.15.0/net/sched/cls_rsvp.h
@@ -97,10 +97,7 @@
  u32						handle;
  struct rsvp_session*sess;
  -union {
  -struct work_struct		work;
  -struct rcu_head			rcu;
  }
  +struct rcu_work			rwork;
};

static inline unsigned int hash_dst(__be32 *dst, u8 protocol, u8 tunnelid)
@@ -294,21 +291,14 @@
static void rsvp_delete_filter_work(struct work_struct *work)
{
  -struct rsvp_filter *f = container_of(work, struct rsvp_filter, work);
  -
  +struct rsvp_filter *f = container_of(to_rcu_work(work),
  +    struct rsvp_filter,
  +    rwork);
  rtnl_lock();
  __rsvp_delete_filter(f);
  rtnl_unlock();
}

- static void rsvp_delete_filter_rcu(struct rcu_head *head)
-{
-  -struct rsvp_filter *f = container_of(head, struct rsvp_filter, rcu);
-  -
-  -INIT_WORK(&f->work, rsvp_delete_filter_work);
-  -tcf_queue_work(&f->work);
static void rsvp_delete_filter(struct tcf_proto *tp, struct rsvp_filter *f)
{
    tcf_unbind_filter(tp, &f->res);
    if (tcf_exts_get_net(&f->exts))
        call_rcu(&f->rcu, rsvp_delete_filter_rcu);
    else
        __rsvp_delete_filter(f);
}

static const struct nla_policy rsvp_policy[TCA_RSVP_MAX + 1] = {
    [TCA_RSVP_CLASSID] = { .type = NLA_U32 },
    [TCA_RSVP_DST] = { .type = NLA_BINARY,
        .len = RSVP_DST_LEN * sizeof(u32) },
    [TCA_RSVP_SRC] = { .type = NLA_BINARY,
        .len = RSVP_DST_LEN * sizeof(u32) },
    [TCA_RSVP_PINFO] = { .len = sizeof(struct tc_rsvp_pinfo) },
};

if (err < 0)
    return err;

err = tcf_exts_init(&e, TCA_RSVP_ACT, TCA_RSVP_POLICE);
if (err < 0)
    return err;
err = tcf_exts_validate(net, tp, tb, tca[TCA_RATE], &e, ovr);
goto errout2;
}

-err = tcf_exts_init(&n->exts, TCA_RSVP_ACT, TCA_RSVP_POLICE);
+err = tcf_exts_init(&n->exts, net, TCA_RSVP_ACT, TCA_RSVP_POLICE);
if (err < 0)
    return err;
err = tcf_exts_validate(net, tp, tb, tca[TCA_RATE], &e, ovr);
goto errout2;
}

if (f == NULL)
goto errout2;

-err = tcf_exts_init(&f->exts, TCA_RSVP_ACT, TCA_RSVP_POLICE);
+err = tcf_exts_init(&f->exts, net, TCA_RSVP_ACT, TCA_RSVP_POLICE);
if (err < 0)
goto errout;

h2 = 16;
@@ -745,12 +734,17 @@
return -1;
}

-static void rsvp_bind_class(void *fh, u32 classid, unsigned long cl)
+static void rsvp_bind_class(void *fh, u32 classid, unsigned long cl, void *q,
  + unsigned long base)
{
  struct rsvp_filter *f = fh;

  -if (f && f->res.classid == classid)
  -f->res.class = cl;
  +if (f && f->res.classid == classid) {
  +if (cl)
  +__tcf_bind_filter(q, &f->res, base);
  +else
  +__tcf_unbind_filter(q, &f->res);
  +}

static struct tcf_proto_ops RSVP_OPS __read_mostly = {
  --- linux-4.15.0.orig/net/sched/cls_tcindex.c
  +++ linux-4.15.0/net/sched/cls_tcindex.c
  @ @ .28,20 +28,14 @ @
  struct tcindex_filter_result {
    struct tcf_extsexts;
    struct tcf_resultres;
    -union {
    -struct work_struct work;
    -struct rcu_headrcu;
    -};
    +struct rcu_workwork;
    };

    struct tcindex_filter {
      u16 key;
      struct tcindex_filter_result result;
      struct tcindex_filter __rcu *next;
      -union {
      -struct work_struct work;
      -struct rcu_head rcu;

struct tcindex_filter {
    u32 hash; /* hash table size; 0 if undefined */
    u32 alloc_hash; /* allocated size */
    u32 fall_through; /* 0: only classify if explicit match */
    struct rcu_head rcu;
    struct rcu_work rwork;
};

static inline int tcindex_filter_is_set(struct tcindex_filter_result *r) {
    struct tcindex_filter_result *r;

    -r = container_of(work, struct tcindex_filter_result, work);
    +r = container_of(to_rcu_work(work),
                     struct tcindex_filter_result,
                     +rwork);
    rtnl_lock();
    __tcindex_destroy_rexts(r);
    rtnl_unlock();
}

static void tcindex_destroy_rexts(struct rcu_head *head) {
    struct tcindex_filter_result *r;

    -r = container_of(head, struct tcindex_filter_result, rcu);
    -INIT_WORK(&r->work, tcindex_destroy_rexts_work);
    -tcf_queue_work(&r->work);
    -}

    -

    static void __tcindex_destroy_fexts(struct tcindex_filter *f) {
        tcf_exts_destroy(&f->result.exts);
    }

static void tcindex_destroy_fexts_work(struct work_struct *work) {
    struct tcindex_filter *f = container_of(work, struct tcindex_filter,
                                            -work);
    +struct tcindex_filter *f = container_of(to_rcu_work(work),
                                            +struct tcindex_filter,
                                            +rwork);
rtwl_lock();
__tcindex_destroy_fexts(f);
rtwl_unlock();
}

-static void tcindex_destroy_fexts(struct rcu_head *head)
-{  
  struct tcindex_filter *f = container_of(head, struct tcindex_filter,
    -rcu);
  -
  -INIT_WORK(&f->work, tcindex_destroy_fexts_work);
  -tcf_queue_work(&f->work);
  -}
-
static int tcindex_delete(struct tcf_proto *tp, void *arg, bool *last)
{
  struct tcindex_data *p = rtnl_dereference(tp->root);
  /* @ @ -227.12+206.12 @ @ */
  *%
  if (f) {
    if (tcf_exts_get_net(&f->result.exts))
      -call_rcu(&f->rcu, tcindex_destroy_fexts);
      +tcf_queue_work(&f->rwork, tcindex_destroy_fexts_work);
    else
      __tcindex_destroy_fexts(f);
  } else {
    if (tcf_exts_get_net(&r->exts))
      -call_rcu(&r->rcu, tcindex_destroy_rexts);
      +tcf_queue_work(&r->rwork, tcindex_destroy_rexts_work);
    else
      __tcindex_destroy_rexts(r);
  }
  @ @ -241.17+220.11 @ @
  return 0;
}

-static int tcindex_destroy_element(struct tcf_proto *tp,
  - void *arg, struct tcf_walker *walker)
  +static void tcindex_destroy_work(struct work_struct *work)
  {
    -bool last;
    -
    -return tcindex_delete(tp, arg, &last);
  -}
  -
  -static void __tcindex_destroy(struct rcu_head *head)
  -{
-struct tcindex_data *p = container_of(head, struct tcindex_data, rcu);
+struct tcindex_data *p = container_of(to_rcu_work(work),
+    struct tcindex_data,
+    rwork);

kfree(p->perfect);
kfree(p->h);
@@ -272,15 +245,19 @@
[TCA_TCINDEX_CLASSID]= [ .type = NLA_U32 ],
];

 static int tcindex_filter_result_init(struct tcindex_filter_result *r)
+static int tcindex_filter_result_init(struct tcindex_filter_result *r,
+    struct net *net)
{
    memset(r, 0, sizeof(*r));
-    return tcf_exts_init(&r->exts, TCA_TCINDEX_ACT, TCA_TCINDEX_POLICE);
+    return tcf_exts_init(&r->exts, net, TCA_TCINDEX_ACT,
+        TCA_TCINDEX_POLICE);
    }

 static void __tcindex_partial_destroy(struct rcu_head *head)
+static void tcindex_partial_destroy_work(struct work_struct *work)
{
    struct tcindex_data *p = container_of(head, struct tcindex_data, rcu);
+    struct tcindex_data *p = container_of(to_rcu_work(work),
+        struct tcindex_data,
+        rwork);

    kfree(p->perfect);
kfree(p);
@@ -295,17 +272,17 @@
kfree(cp->perfect);
}

 static int tcindex_alloc_perfect_hash(struct tcindex_data *cp)
+static int tcindex_alloc_perfect_hash(struct net *net, struct tcindex_data *cp)
{
    int i, err = 0;

    cp->perfect = kcalloc(cp->hash, sizeof(struct tcindex_filter_result),
        GFP_KERNEL);
+    GFP_KERNEL | __GFP_NOWARN);
    if (!cp->perfect)
        return -ENOMEM;
    for (i = 0; i < cp->hash; i++) {
        -err = tcf_exts_init(&cp->perfect[i].exts,
err = tcf_exts_init(&cp->perfect[i].exts, net, TCA_TCINDEX_ACT, TCA_TCINDEX_POLICE);
if (err < 0)
goto errout;
@@ -325,13 +302,13 @@
struct nlattr *est, bool ovr)
{
 struct tcindex_filter_result new_filter_result, *old_r = r;
-struct tcindex_filter_result cr;
 struct tcindex_data *cp = NULL, *oldp;
 struct tcindex_filter *f = NULL; /* make gcc behave */
+struct tcf_result cr = {};
 int err, balloc = 0;
 struct tcf_exts e;

-err = tcf_exts_init(&e, TCA_TCINDEX_ACT, TCA_TCINDEX_POLICE);
+err = tcf_exts_init(&e, net, TCA_TCINDEX_ACT, TCA_TCINDEX_POLICE);
if (err < 0)
return err;
err = tcf_exts_validate(net, tp, tb, est, &e, ovr);
@@ -354,34 +331,46 @@
cp->fall_through = p->fall_through;
cp->tp = tp;

+if (tb[TCA_TCINDEX_HASH])
+cp->hash = nla_get_u32(tb[TCA_TCINDEX_HASH]);
+    +
+if (tb[TCA_TCINDEX_MASK])
+cp->mask = nla_get_u16(tb[TCA_TCINDEX_MASK]);
+    +
+if (tb[TCA_TCINDEX_SHIFT]) {
+    +cp->shift = nla_get_u32(tb[TCA_TCINDEX_SHIFT]);
+    +if (cp->shift > 16) {
+    +err = -EINVAL;
+    +goto errout;
+    +}
    +}
+    +}
+if (!cp->hash) {
+    /* Hash not specified, use perfect hash if the upper limit
+     * of the hashing index is below the threshold.
+     */
+    +if ((cp->mask >> cp->shift) < PERFECT_HASH_THRESHOLD)
+    +cp->hash = (cp->mask >> cp->shift) + 1;
+else
+    +cp->hash = DEFAULT_HASH_SIZE;
+    +}
+    +}
+if (p->perfect) {

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int i;

-\textbf{if} (tcindex\_alloc\_perfect\_hash(cp) < 0)
+\textbf{if} (tcindex\_alloc\_perfect\_hash(net, cp) < 0)
  goto errout;
-\textbf{for} (i = 0; i < cp->hash; i++)
+\textbf{cp->alloc\_hash} = cp->hash;
+\textbf{for} (i = 0; i < min(cp->hash, p->hash); i++)
  cp->perfect[i].res = p->perfect[i].res;

balloc = 1;
}

\textbf{cp->h} = p->h;

-err = tcindex\_filter\_result\_init(&new\_filter\_result);
-\textbf{if} (err < 0)
-  goto errout1;
-err = tcindex\_filter\_result\_init(&cr);
+err = tcindex\_filter\_result\_init(&new\_filter\_result, net);
\textbf{if} (err < 0)
-  goto errout1;
+  goto errout_alloc;
\textbf{if} (old_r)
-  cr.res = r->res;
-  
-\textbf{if} (tb[TCA\_TCINDEX\_HASH])
-  \textbf{cp->hash} = nla\_get\_u32(tb[TCA\_TCINDEX\_HASH]);
-  
-\textbf{if} (tb[TCA\_TCINDEX\_MASK])
-  \textbf{cp->mask} = nla\_get\_u16(tb[TCA\_TCINDEX\_MASK]);
-  
-\textbf{if} (tb[TCA\_TCINDEX\_SHIFT])
-  \textbf{cp->shift} = nla\_get\_u32(tb[TCA\_TCINDEX\_SHIFT]);
+cr = r->res;

err = -EBUSY;

@@ -400,16 +389,6 @@
if (tb[TCA\_TCINDEX\_FALL\_THROUGH])
  cp->fall\_through = nla\_get\_u32(tb[TCA\_TCINDEX\_FALL\_THROUGH]);

-\textbf{if} (!\textbf{cp->hash}) {
-/* Hash not specified, use perfect hash if the upper limit
- * of the hashing index is below the threshold.
- */
-\textbf{if} ((\textbf{cp->mask} >> \textbf{cp->shift}) < PERFECT\_HASH\_THRESHOLD)
-  \textbf{cp->hash} = (\textbf{cp->mask} >> \textbf{cp->shift}) + 1;
-\textbf{else}
-  \textbf{cp->hash} = DEFAULT\_HASH\_SIZE;
if (!cp->perfect && !cp->h) {  
    if (valid_perfect_hash(cp)) {  
        if (tcindex_alloc_perfect_hash(cp) < 0)  
            goto errout_alloc;  
        balloc = 1;  
    } else {  
        goto errout_alloc;  
    }  
} else {  
    goto errout_alloc;  
}

f->next = NULL;  
-err = tcindex_filter_result_init(&f->result);  
+err = tcindex_filter_result_init(&f->result, net);  
if (err < 0) {  
    kfree(f);  
    goto errout_alloc;  
}  
if (tb[TCA_TCINDEX_CLASSID]) {  
    cr.res.classid = nla_get_u32(tb[TCA_TCINDEX_CLASSID]);  
    tcf_bind_filter(tp, &cr.res, base);  
    cr.classid = nla_get_u32(tb[TCA_TCINDEX_CLASSID]);  
    +tcf_bind_filter(tp, &cr, base);  
}

-err = tcindex_filter_result_init(&f->result, net);  
+err = tcindex_filter_result_init(&f->result, net);  
if (err < 0) {  
    kfree(f);  
    goto errout_alloc;  
}  
oldp = p;
-r->res = cr.res;
+r->res = cr;
+tcf_exts_change(&r->exts, &e);
rcu_assign_pointer(tp->root, cp);

if (r == &new_filter_result) {
struct tcindex_filter *nfp;
struct tcindex_filter __rcu **fp;
+f->result.res = r->res;
tcf_exts_change(&f->result.exts, &r->exts);

fp = cp->h + (handle % cp->hash);
@@ -497,10 +474,12 @@
; /* nothing */
rcu_assign_pointer(*fp, f);
} else {
+tcf_exts_destroy(&new_filter_result.exts);
}

if (oldp)
-call_rcu(&oldp->rcu, __tcindex_partial_destroy);
+tcf_queue_work(&oldp->rwork, tcindex_partial_destroy_work);
return 0;

errout_alloc:
@@ -508,8 +487,6 @@
tcindex_free_perfect_hash(cp);
else if (balloc == 2)
kfree(cp->h);
-errout1:
-tcf_exts_destroy(&cr.exts);
tcf_exts_destroy(&new_filter_result.exts);
errout:
kfree(cp);
@@ -582,15 +559,34 @@
static void tcindex_destroy(struct tcf_proto *tp)
{
struct tcindex_data *p = rtnl_dereference(tp->root);
-struct tcf_walker walker;
+int i;

pr_debug("tcindex_destroy(tp %p,p %p\n", tp, p);
-walker.count = 0;
-walker.skip = 0;
-walker.fn = tcindex_destroy_element;


tcindex_walk(tp, &walker);

-call_rcu(&p->rcu, __tcindex_destroy);
+if (p->perfect) {
+    for (i = 0; i < p->hash; i++) {
+        struct tcindex_filter_result *r = p->perfect + i;
+        tcf_unbind_filter(tp, &r->res);
+        if (tcf_exts_get_net(&r->exts))
+            tcf_queue_work(&r->rwork,
+                tcindex_destroy_rexts_work);
+        else
+            __tcindex_destroy_rexts(r);
+    }
+}
+for (i = 0; p->h && i < p->hash; i++) {
+    struct tcindex_filter *f, *next;
+    bool last;
+    for (f = rtnl_dereference(p->h[i]); f; f = next) {
+        next = rtnl_dereference(f->next);
+        tcindex_delete(tp, &f->result, &last);
+    }
+    tcf_queue_work(&p->rwork, tcindex_destroy_work);
}

return -1;

static void tcindex_bind_class(void *fh, u32 classid, unsigned long cl)
+static void tcindex_bind_class(void *fh, u32 classid, unsigned long cl,
+    void *q, unsigned long base)
{
    struct tcindex_filter_result *r = fh;
+if (r && r->res.classid == classid)
    r->res.class = cl;
+if (r && r->res.classid == classid) {
    if (cl)
        __tcf_bind_filter(q, &r->res, base);
    else
        __tcf_unbind_filter(q, &r->res);
+}
static struct tcf_proto_ops cls_tcindex_ops __read_mostly = {
    --- linux-4.15.0.orig/net/sched/cls_u32.c
    +++ linux-4.15.0/net/sched/cls_u32.c
    @@ -68,10 +68,7 @@
    #endif
    struct tcf_proto*tp;
    -union {
    -    struct work_struct	work;
    -    struct rcu_head		rcu;
    -};
    +struct rcu_work		rwork;
    /* The 'sel' field MUST be the last field in structure to allow for
     * tc_u32_keys allocated at end of structure.
     */
    @@ -389,6 +386,7 @@
    root_ht->tp_c = tp_c;
    +root_ht->refcnt++;
    rcu_assign_pointer(tp_c->hlist, root_ht);
    root_ht->refcnt++;
    tp->data = tp_c;
    return 0;
    @@ -397,10 +395,12 @@
    static int u32_destroy_key(struct tcf_proto *tp, struct tc_u_knode *n,
    +struct tc_u_hnode *ht = rtnl_dereference(n->ht_down);
    tcf_exts_destroy(&n->exts);
    tcf_exts_put_net(&n->exts);
    -n->ht_down->refcnt--;
    +if (ht && --ht->refcnt == 0)
    +kfree(ht);
    +#ifdef CONFIG_CLS_U32_PERF
    if (free_pf)
    free_percpu(n->pf);
    @@ -423,21 +423,14 @@
    */
    static void u32_delete_key_work(struct work_struct *work)
    {
    +struct tc_u_knode *ht = rtl_dereference(n->ht_down);
    +tcf_exts_destroy(&n->exts);
    tcf_exts_put_net(&n->exts);
    #if defined CONFIG_CLS_U32_PERF
    if (free_pf)
    free_percpu(n->pf);
    #endif
+ rwork);
rtwl_lock();
u32_destroy_key(key->tp, key, false);
rtwl_unlock();
}

static void u32_delete_key_rcu(struct rcu_head *rcu)
-
+ struct tc_u_knode *key = container_of(rcu, struct tc_u_knode, rcu);
-
-INIT_WORK(&key->work, u32_delete_key_work);
tcf_queue_work(&key->work);
-
-
/* u32_delete_key_freepf_rcu is the rcu callback variant
 * that free's the entire structure including the statistics
 * percpu variables. Only use this if the key is not a copy
 @@ -447,21 +440,14 @@
 */
static void u32_delete_key_freepf_work(struct work_struct *work)
{
+struct tc_u_knode *key = container_of(to_rcu_work(work),
+    struct tc_u_knode,
+    rwork);
+rtwl_lock();
u32_destroy_key(key->tp, key, true);
+rtwl_unlock();

}

static void u32_delete_key_freepf_rcu(struct rcu_head *rcu)
-
+ struct tc_u_knode *key = container_of(rcu, struct tc_u_knode, rcu);
-
-INIT_WORK(&key->work, u32_delete_key_freepf_work);
tcf_queue_work(&key->work);
-
-
static int u32_delete_key(struct tcf_proto *tp, struct tc_u_knode *key)
{
    struct tc_u_knode __rcu **kp;
    @@ -476,8 +462,9 @@
     RCU_INIT_POINTER(*kp, key->next);

     tcf_unbind_filter(tp, &key->res);
+    idr_remove(&ht->handle_idr, key->handle);
     tcf_exts_get_net(&key->exts);
call_rcu(&key->rcu, u32_delete_key_freepf_rcu);
tcf_queue_work(&key->rwork, u32_delete_key_freepf_work);
return 0;
}
}
@@ -544,6 +531,7 @@
static int u32_replace_hw_knode(struct tcf_proto *tp, struct tc_u_knode *n, u32 flags)
{
+struct tc_u_hnode *ht = rtnl_dereference(n->ht_down);
struct tcf_block *block = tp->chain->block;
struct cls_u32_offload cls_u32 = { };
bool skip_sw = tc_skip_sw(flags);
@@ -563,7 +551,7 @@
cls_u32.knode.sel = &n->sel;
cls_u32.knode.exts = &n->exts;
if (n->ht_down)
-calls_u32.knode.link_handle = n->ht_down->handle;
+cls_u32.knode.link_handle = ht->handle;
}

err = tc_setuup_cb_call(block, NULL, TC_SETUP_CLSU32, &cls_u32, skip_sw);
if (err < 0) {
@@ -592,7 +580,7 @@
u32_remove_hw_knode(tp, n->handle);
idr_remove_ext(&ht->handle_idr, n->handle);
if (tcf_exts_get_net(&n->exts))
-calls_u32.remove_key_freepf_rcu);
+calls_u32.delete_key_freepf_work);
else
u32_destroy_key(n->tp, n, true);
}
@@ -605,7 +593,7 @@
struct tc_u_hnode __rcu **hn;
struct tc_u_hnode *phn;

-WARN_ON(ht->refcnt);
+WARN_ON(--ht->refcnt);

u32_clear_hnode(tp, ht);

@@ -644,7 +632,7 @@
WARN_ON(root_ht == NULL);

-if (root_ht && --root_ht->refcnt == 0)
+if (root_ht && --root_ht->refcnt == 1)
    u32_destroy_hnode(tp, root_ht);
if (--tp_c->refcnt == 0) {
    hlist_del(&tp_c->hnode);
}

_hlist_del(ht);
-ht->refcnt--;
-u32_clear_hnode(tp, ht);
-
-while ((ht = rtnl_dereference(tp_c->hlist)) != NULL) {
    _u32_clear_hnode(tp, ht);
    RCU_INIT_POINTER(tp_c->hlist, ht->next);
    -kfree_rcu(ht, rcu);
    +
    +/* u32_destroy_key() will later free ht for us, if it's
    + * still referenced by some knode
    + */
    +if (--ht->refcnt == 0)
    +kfree_rcu(ht, rcu);
    }

    idr_destroy(&tp_c->handle_idr);
} else {
    return -EINVAL;
}

if (ht->refcnt == 1) {
    -ht->refcnt--;
    u32_destroy_hnode(tp, ht);
} else {
    return -EBUSY;
}

*out:
*last = true;
if (root_ht) {
    -if (root_ht->refcnt > 1) {
    +if (root_ht->refcnt > 2) {
    *last = false;
    goto ret;
    }
    -if (root_ht->refcnt == 1) {
    +if (root_ht->refcnt == 2) {
    if (!ht_empty(root_ht)) {
    *last = false;
    goto ret;
    }
    -if (root_ht->refcnt == 1) {
    +if (root_ht->refcnt == 2) {
    if (!ht_empty(root_ht)) {
    *last = false;
    goto ret;
    }
rcu_assign_pointer(*ins, n);
}

static struct tc_u_knode *u32_init_knode(struct tcf_proto *tp,
static struct tc_u_knode *u32_init_knode(struct net *net, struct tcf_proto *tp,
struct tc_u_knode *n)
{
    static struct tc_u_knode *new;
    static struct tc_u_knode *ht = rtnl_dereference(n->ht_down);
    struct tc_u32_sel *s = &n->sel;
    new = u32_init_knode(tp, n);

    new = kzalloc(sizeof(*n) + s->nkeys*sizeof(struct tc_u32_key), GFP_KERNEL);
    new->fshift = n->fshift;
    new->res = n->res;
    new->flags = n->flags;
    if (new->ht_down)
        RCU_INIT_POINTER(new->ht_down, n->ht_down);
    if (ht)
        RCU_INIT_POINTER(new->ht_down, ht);

    new = u32_init_knode(tp, n);
    new->fshift = n->fshift;
    new->res = n->res;
    new->flags = n->flags;
    RCU_INIT_POINTER(new->ht_down, n->ht_down);
    new = u32_init_knode(tp, n);

    /* bump reference count as long as we hold pointer to structure */
    if (new->ht_down)
        new->ht_down->refcnt++;
    if (ht)
        ht->refcnt++;

#ifdef CONFIG_CLS_U32_PERF
    /* Statistics may be incremented by readers during update */
#endif
    new->tp = tp;
    memcpy(&new->sel, s, sizeof(*s) + s->nkeys*sizeof(struct tc_u32_key));

    if (tcf_exts_init(&new->exts, TCA_U32_ACT, TCA_U32_POLICE)) {
        if (tcf_exts_init(&new->exts, net, TCA_U32_ACT, TCA_U32_POLICE)) {
            kfree(new);
            return NULL;
        }
    }
    if (TC_U32_KEY(n->handle) == 0)
        return -EINVAL;
    if ((n->flags ^ flags) &
        ~((TCA_CLS_FLAGS_IN_HW | TCA_CLS_FLAGS_NOT_IN_HW))
        return -EINVAL;

    new = u32_init_knode(tp, n);
+new = u32_init_knode(net, tp, n);
if (!new)
return -ENOMEM;

@@ -954,7 +942,7 @@
    u32_replace_knode(tp, tp_c, new);
tcf_unbind_filter(tp, &n->res);
tcf_exts_get_net(&n->exts);
-call_rcu(&n->rcu, u32_delete_key_rcu);
+    tcf_queue_work(&n->rwork, u32_delete_key_work);
    return 0;
}

@@ -1062,7 +1050,7 @@
n->flags = flags;
n->tp = tp;

-err = tcf_exts_init(&n->exts, TCA_U32_ACT, TCA_U32_POLICE);
+err = tcf_exts_init(&n->exts, net, TCA_U32_ACT, TCA_U32_POLICE);
if (err < 0)
goto errout;

@@ -1163,12 +1151,17 @@
}
}

-static void u32_bind_class(void *fh, u32 classid, unsigned long cl)
+static void u32_bind_class(void *fh, u32 classid, unsigned long cl, void *q,
 +    unsigned long base)
  {
    struct tc_u_knode *n = fh;

-    if (n && n->res.classid == classid)
-        n->res.class = cl;
+    if (n && n->res.classid == classid) {
+        if (cl)
+            __tcf_bind_filter(q, &n->res, base);
+        else
+            __tcf_unbind_filter(q, &n->res);
+    }
}

static int u32_dump(struct net *net, struct tcf_proto *tp, void *fh,
--- linux-4.15.0.orig/net/sched/ematch.c
+++ linux-4.15.0/net/sched/ematch.c
@@ -242,6 +242,9 @@
goto errout;
if (em->ops->change) {
    +err = -EINVAL;
    +if (em_hdr->flags & TCF_EM_SIMPLE)
    +goto errout;
    err = em->ops->change(net, data, data_len, em);
    if (err < 0)
        goto errout;
    @ @ -267,12 +270,12 @@
    }
    em->data = (unsigned long) v;
    }
+em->datalen = data_len;
    }
}

em->matchid = em_hdr->matchid;
em->flags = em_hdr->flags;
-em->datalen = data_len;
em->net = net;
err = 0;
--- linux-4.15.0.orig/net/sched/sch_api.c
+++ linux-4.15.0/net/sched/sch_api.c
@@ -397,7 +397,8 @@
{
    struct qdisc_rate_table *tab;

    -if (tab == NULL || r->rate == 0 || r->cell_log == 0 ||
    +if (tab == NULL || r->rate == 0 ||
    +r->cell_log == 0 || r->cell_log >= 32 ||
        nla_len(tab) != TC_RTAB_SIZE)
    return NULL;

    @@ -1205,6 +1206,16 @@
    * Delete/get qdisc.
    */

    +const struct nla_policy rtm_tca_policy[TCA_MAX + 1] = {
    +[TCA_KIND]= { .type = NLA_NUL_STRING,
    +.len = IFNAMSIZ - 1 },
    +[TCA_RATE]= { .type = NLA_BINARY,
    +.len = sizeof(struct tc_estimator) },
    +[TCA_STAB]= { .type = NLA_NESTED },
    +[TCA_DUMP_INVISIBLE]= { .type = NLA_FLAG },
    +[TCA_CHAIN]= { .type = NLA_U32 },
    +};
    
static int tc_get_qdisc(struct sk_buff *skb, struct nlmsghdr *n,
struct netlink_ext_ack *extack)
{
    !netlink_ns_capable(skb, net->user_ns, CAP_NET_ADMIN))
    return -EPERM;

    -err = nlmsg_parse(n, sizeof(*tcm), tca, TCA_MAX, NULL, extack);
    +err = nlmsg_parse(n, sizeof(*tcm), tca, TCA_MAX, rtm_tca_policy,
                        + extack);
    if (err < 0)
        return err;

    replay:
    /* Reinit, just in case something touches this. */
    -err = nlmsg_parse(n, sizeof(*tcm), tca, TCA_MAX, NULL, extack);
    +err = nlmsg_parse(n, sizeof(*tcm), tca, TCA_MAX, rtm_tca_policy,
                        + extack);
    if (err < 0)
        return err;

    idx = 0;
    ASSERT_RTNL();

    -err = nlmsg_parse(nlh, sizeof(struct tcmsg), tca, TCA_MAX, NULL, NULL);
    +err = nlmsg_parse(nlh, sizeof(struct tcmsg), tca, TCA_MAX,
                        + rtm_tca_policy, NULL);
    if (err < 0)
        return err;

    struct tcf_bind_args {
        struct tcf_walker w;
        -u32 classid;
        +unsigned long base;
        unsigned long cl;
        +u32 classid;
    };

    static int tcf_node_bind(struct tcf_proto *tp, void *n, struct tcf_walker *arg)
    @@ -1655,7 +1670,7 @@
        struct Qdisc *q = tcf_block_q(tp->chain->block);

        sch_tree_lock(q);
        -tp->ops->bind_class(n, a->classid, a->cl);

+tp->ops->bind_class(n, a->classid, a->cl, q, a->base);
sch_tree_unlock(q);
}
return 0;
@@ -1672,6 +1687,8 @@
c1 = cops->find(q, portid);
if (!cl)
return;
+%if (!cops->tcf_block)
+return;
block = cops->tcf_block(q, cl);
if (!block)
return;
@@ -1684,6 +1701,7 @@
arg.w.fn = tcf_node_bind;
arg.classid = clid;
+arg.base = cl;
arg.cl = new_cl;
+tp->ops->walk(tp, &arg.w);
}
@@ -1719,7 +1737,8 @@
if (!netlink_ns_capable(skb, net->user_ns, CAP_NET_ADMIN))
return -EPERM;

-err = nlmsg_parse(n, sizeof(*tcm), tca, TCA_MAX, NULL, extack);
+err = nlmsg_parse(n, sizeof(*tcm), tca, TCA_MAX, rtm_tca_policy,
+extack);
if (err < 0)
return err;
@@ -1877,7 +1896,7 @@
static int tc_dump_tclass_root(struct Qdisc *root, struct sk_buff *skb,
+struct tcmsg *tcm, struct netlink_callback *cb,
-    int *t_p, int s_t)
+    int *t_p, int s_t, bool recur)
{
struct Qdisc *q;
int b;
@@ -1888,12 +1907,13 @@
if (tc_dump_tclass_qdisc(root, skb, tcm, cb, t_p, s_t) < 0)
return -1;

-if (!qdisc_dev(root))
+if (!qdisc_dev(root) || !recur)
return 0;
if (tcm->tcm_parent) {
    q = qdisc_match_from_root(root, TC_H_MAJ(tcm->tcm_parent));
    if (q && tc_dump_tclass_qdisc(q, skb, tcm, cb, t_p, s_t) < 0)
        return -1;
    return 0;
}
@@ -1922,13 +1942,13 @@
s_t = cb->args[0];
t = 0;

-if (tc_dump_tclass_root(dev->qdisc, skb, tcm, cb, &t, s_t) < 0)
+if (tc_dump_tclass_root(dev->qdisc, skb, tcm, cb, &t, s_t, true) < 0)
goto done;

dev_queue = dev_ingress_queue(dev);
if (dev_queue &&
    tc_dump_tclass_root(dev_queue->qdisc_sleeping, skb, tcm, cb,
-    &t, s_t) < 0)
+    &t, s_t, false) < 0)
goto done;

done:
--- linux-4.15.0.orig/net/sched/sch_atm.c
+++ linux-4.15.0/net/sched/sch_atm.c
@@ -545,15 +545,15 @@
if (!p->link.q)
    p->link.q = &noop_qdisc;
pr_debug("atm_tc_init: link (%p) qdisc %p\n", &p->link, p->link.q);
+p->link.vcc = NULL;
+p->link.sock = NULL;
+p->link.common.classid = sch->handle;
+p->link.ref = 1;
err = tcf_block_get(&p->link.block, &p->link.filter_list, sch);
if (err)
    return err;

-p->link.vcc = NULL;
-p->link.sock = NULL;
-p->link.common.classid = sch->handle;
-p->link.ref = 1;
tasklet_init(&p->task, sch_atm_dequeue, (unsigned long)sch);
return 0;
}
struct sk_buff **to_free)
{
    qdisc_drop(skb, sch, to_free);
    return NET_XMIT_SUCCESS;
    return NET_XMIT_SUCCESS | __NET_XMIT_BYPASS;
}

static struct sk_buff *blackhole_dequeue(struct Qdisc *sch)
--- linux-4.15.0.orig/net/sched/sch_cbq.c
+++ linux-4.15.0/net/sched/sch_cbq.c
@@ -1132,6 +1132,26 @@
    [TCA_CBQ_MAXPRIORITIES]
    = { .len = sizeof(struct tc_cbq_police) },
}

+static int cbq_opt_parse(struct nlattr *tb[TCA_CBQ_MAX + 1], struct nlattr *opt)
+{
+    int err;
+    +if (!opt)
+        return -EINVAL;
+    err = nla_parse_nested(tb, TCA_CBQ_MAX, opt, cbq_policy, NULL);
+    +if (err < 0)
+        return err;
+    +if (tb[TCA_CBQ_WRROPT]) {
+        const struct tc_cbq_wropt *wrw = nla_data(tb[TCA_CBQ_WRROPT]);
+        +if (wrw->priority > TC_CBQ_MAXPRIORITIES)
+            err = -EINVAL;
+    } +return err;
+}
+static int cbq_init(struct Qdisc *sch, struct nlattr *opt)
+{
    struct cbq_sched_data *q = qdisc_priv(sch);
    +if (!opt)
        return -EINVAL;
    -err = nla_parse_nested(tb, TCA_CBQ_MAX, opt, cbq_policy, NULL);
    +err = cbq_opt_parse(tb, opt);
    if (err < 0)
return err;

@@ -1460,10 +1477,7 @@
     struct cbq_class *parent;
     struct qdisc_rate_table *rtab = NULL;

-    if (opt == NULL)
-        return -EINVAL;
-    
-    err = nla_parse_nested(tb, TCA_CBQ_MAX, opt, cbq_policy, NULL);
+    err = cbq_opt_parse(tb, opt);

    if (err < 0)
        return err;

@@ -1577,7 +1591,7 @@
     err = tcf_block_get(&cl->block, &cl->filter_list, sch);
     if (err) {
         kfree(cl);
-        return err;
+        goto failure;
     }

     if (tca[TCA_RATE]) {
         --- linux-4.15.0.orig/net/sched/sch_choke.c
+++ linux-4.15.0/net/sched/sch_choke.c
@@ -327,7 +327,8 @@
         sch->q.qlen = 0;
         sch->qstats.backlog = 0;
-        memset(q->tab, 0, (q->tab_mask + 1) * sizeof(struct sk_buff *));
+        if (q->tab)
+            memset(q->tab, 0, (q->tab_mask + 1) * sizeof(struct sk_buff *));
         q->head = q->tail = 0;
         red_restart(&q->vars);
     }
@@ -353,6 +354,7 @@
     struct sk_buff **old = NULL;
     unsigned int mask;
     u32 max_P;
+    u8 *stab;

     if (opt == NULL)
         return -EINVAL;
@@ -368,8 +370,8 @@
     max_P = tb[TCA_CHOKE_MAX_P] ? nla_get_u32(tb[TCA_CHOKE_MAX_P]) : 0;

     ctrl = nla_data(tb[TCA_CHOKE_PARMS]);

if (!red_check_params(ctl->qth_min, ctl->qth_max, ctl->Wlog))
+stab = nla_data(tb[TCA_CHOKE_STAB]);
+if (!red_check_params(ctl->qth_min, ctl->qth_max, ctl->Wlog, ctl->Scell_log, stab))
return -EINVAL;

if (ctl->limit > CHOKE_MAX_QUEUE)
@@ -419,7 +421,7 @@

red_set_parms(&q->parms, ctl->qth_min, ctl->qth_max, ctl->Wlog,
    ctl->Plog, ctl->Scell_log,
-    nla_data(tb[TCA_CHOKE_STAB]),
+    stab,
    max_P);
red_set_vars(&q->vars);

--- linux-4.15.0.orig/net/sched/sch_codel.c
+++ linux-4.15.0/net/sched/sch_codel.c
@@ -71,10 +71,10 @@
struct Qdisc *sch = ctx;
struct sk_buff *skb = __qdisc_dequeue_head(&sch->q);

- if (skb)
+ if (skb) {
    sch->qstats.backlog -= qdisc_pkt_len(skb);
-    prefetch(&skb->end); /* we'll need skb_shinfo() */
+    prefetch(&skb->end); /* we'll need skb_shinfo() */
+}
    return skb;
 }

--- linux-4.15.0.orig/net/sched/sch_dsmark.c
+++ linux-4.15.0/net/sched/sch_dsmark.c
@@ -353,6 +353,8 @@
goto errout;
err = -EINVAL;
+if (!tb[TCA_DSMARK_INDICES])
    goto errout;
indices = nla_get_u16(tb[TCA_DSMARK_INDICES]);

if (hweight32(indices) != 1)
@@ -395,7 +397,8 @@
struct dsmark_qdisc_data *p = qdisc_priv(sch);
pr_debug("%s(sch %p,[qdisc %p])
     _func__, sch, p);
-qdisc_reset(p->q);
+if (p->q)
+qdisc_reset(p->q);
sch->qstats.backlog = 0;
sch->q.qlen = 0;
}
--- linux-4.15.0.orig/net/sched/sch_fifo.c
+++ linux-4.15.0/net/sched/sch_fifo.c
@@ -151,6 +151,9 @@
      if (strncmp(q->ops->id + 1, "fifo", 4) != 0)
       return 0;

+if (!q->ops->change)
+  return 0;
+
 nla = kmalloc(nla_attr_size(sizeof(struct tc_fifo_qopt)), GFP_KERNEL);
if (nla) {
 nla->nla_type = RTM_NEWQDISC;
--- linux-4.15.0.orig/net/sched/sch_fq.c
+++ linux-4.15.0/net/sched/sch_fq.c
@@ -128,6 +128,28 @@
 return f->next == &detached;
 }

+static bool fq_flow_is_throttled(const struct fq_flow *f)
+{
+  return f->next == &throttled;
+}
+
+static void fq_flow_add_tail(struct fq_flow_head *head, struct fq_flow *flow)
+{
+  if (head->first)
+    head->last->next = flow;
+  else
+    head->first = flow;
+  head->last = flow;
+  flow->next = NULL;
+}
+
+static void fq_flow_unset_throttled(struct fq_sched_data *q, struct fq_flow *f)
+{
+  rb_erase(&f->rate_node, &q->delayed);
+  q->throttled_flows--;
+  fq_flow_add_tail(&q->old_flows, f);
+}
+
+static void fq_flow_set_throttled(struct fq_sched_data *q, struct fq_flow *f)
+{
  struct rb_node **p = &q->delayed.rb_node, *parent = NULL;
@@ -155,15 +177,6 @@
static struct kmem_cache *fq_flow_cachep __read_mostly;

-static void fq_flow_add_tail(struct fq_flow_head *head, struct fq_flow *flow)
-{  
-if (head->first)
-head->last->next = flow;
-else
-head->first = flow;
-head->last = flow;
-flow->next = NULL;
-}

/* limit number of collected flows per round */
#define FQ_GC_MAX 8
@@ -267,6 +280,8 @@  
    if (fq_flow_is_throttled(f))
    +fq_flow_unset_throttled(q, f);
    f->time_next_packet = 0ULL;
 }

@@ -438,9 +453,7 @@
  q->time_next_delayed_flow = f->time_next_packet;
  break;
 }
-rb_erase(p, &q->delayed);
-q->throttled_flows--;  
-fq_flow_add_tail(&q->old_flows, f);
+fq_flow_unset_throttled(q, f);
 }
 }

@@ -682,6 +695,7 @@
[TCA_FQ_FLOW_MAX_RATE]= { .type = NLA_U32 },
[TCA_FQ_BUCKETS_LOG]= { .type = NLA_U32 },
[TCA_FQ_FLOW_REFILL_DELAY]= { .type = NLA_U32 },
+[TCA_FQ_ORPHAN_MASK]= { .type = NLA_U32 },
[TCA_FQ_LOW_RATE_THRESHOLD]= { .type = NLA_U32 },
];

@@ -721,7 +735,7 @@
  if (tb[TCA_FQ_QUANTUM]) {
  u32 quantum = nla_get_u32(tb[TCA_FQ_QUANTUM]);
   
-if (quantum > 0)
if (quantum > 0 && quantum <= (1 << 20))
q->quantum = quantum;
else
err = -EINVAL;
--- linux-4.15.0.orig/net/sched/sch_fq_codel.c
+++ linux-4.15.0/net/sched/sch_fq_codel.c
@@ -428,7 +428,7 @@
q->quantum = max(256U, nla_get_u32(tb[TCA_FQ_CODEL_QUANTUM]));

if (tb[TCA_FQ_CODEL_DROP_BATCH_SIZE])
-q->drop_batch_size = min(1U, nla_get_u32(tb[TCA_FQ_CODEL_DROP_BATCH_SIZE]));
+q->drop_batch_size = max(1U, nla_get_u32(tb[TCA_FQ_CODEL_DROP_BATCH_SIZE]));

if (tb[TCA_FQ_CODEL_MEMORY_LIMIT])
q->memory_limit = min(1U << 31, nla_get_u32(tb[TCA_FQ_CODEL_MEMORY_LIMIT]));
@@ -477,23 +477,27 @@
if (opt) {
-+err = fq_codel_change(sch, opt);
+err = fq_codel_change(sch, opt);
 if (err)
-+return err;
+ goto init_failure;
 } 

 err = tcf_block_get(&q->block, &q->filter_list, sch);
if (err)
-+return err;
+ goto init_failure;

 if (!q->flows) {
-+q->flows = kvzalloc(q->flows_cnt *
-+ sizeof(struct fq_codel_flow), GFP_KERNEL);
-+if (!q->flows)
-+ return -ENOMEM;
+q->flows = kvzalloc(q->flows_cnt * sizeof(struct fq_codel_flow), GFP_KERNEL);
+if (!q->flows) {
+ err = -ENOMEM;
+ goto init_failure;
+ }
q->backlogs = kvzalloc(q->flows_cnt * sizeof(u32), GFP_KERNEL);
-+if (!q->backlogs)
-+ return -ENOMEM;
+q->backlogs = kvzalloc(q->flows_cnt * sizeof(u32), GFP_KERNEL);
+if (!q->backlogs) {
+ err = -ENOMEM;
+ goto alloc_failure;
+ }
for (i = 0; i < q->flows_cnt; i++) {
struct fq_codel_flow *flow = q->flows + i;

else
    sch->flags &= ~TCQ_F_CAN_BYPASS;
    return 0;
+
    alloc_failure:
    kvfree(q->flows);
    q->flows = NULL;
    init_failure:
    q->flows_cnt = 0;
    return err;
}

static int fq_codel_dump(struct Qdisc *sch, struct sk_buff *skb)
static unsigned long fq_codel_bind(struct Qdisc *sch, unsigned long parent,
    u32 classid)
{
    /* we cannot bypass queue discipline anymore */
    sch->flags &= ~TCQ_F_CAN_BYPASS;
    return 0;
}

--- linux-4.15.0.orig/net/sched/sch_generic.c
+++ linux-4.15.0/net/sched/sch_generic.c
@@ -344,6 +344,7 @@
    dev_hold(dev);
 }

+EXPORT_SYMBOL_GPL(__netdev_watchdog_up);

static void dev_watchdog_up(struct net_device *dev)
{
    @ @ -369,7 +370,7 @@
    if (test_and_clear_bit(__LINK_STATE_NOCARRIER, &dev->state)) {
        if (dev->reg_state == NETREG_UNINITIALIZED)
            return;
-atomic_inc(&dev->carrier_changes);
    +atomic_inc(&dev->carrier_up_count);
        linkwatch_fire_event(dev);
        if (netif_running(dev))
            __netdev_watchdog_up(dev);
    @ @ -388,7 +389,7 @@
    if (!test_and_set_bit(__LINK_STATE_NOCARRIER, &dev->state)) {
        if (dev->reg_state == NETREG_UNINITIALIZED)
            return;
atomic_inc(&dev->carrier_changes);
atomic_inc(&dev->carrier_down_count);
linkwatch_fire_event(dev);
}
}
@@ -726,7 +727,11 @@

void qdisc_destroy(struct Qdisc *qdisc)
{
-const struct Qdisc_ops  *ops = qdisc->ops;
+const struct Qdisc_ops *ops;
+
+if (!qdisc)
+    return;
+ops = qdisc->ops;

if (qdisc->flags & TCQ_F_BUILTIN ||
    !refcount_dec_and_test(&qdisc->refcnt))
@@ -762,10 +767,6 @@
    root_lock = qdisc_lock(oqdisc);
    spin_lock_bh(root_lock);

-/* Prune old scheduler */
-if (oqdisc && refcount_read(&oqdisc->refcnt) <= 1)
-qdisc_reset(oqdisc);
-
-/* ... and graft new one */
if (qdisc == NULL)
    qdisc = &noop_qdisc;
@@ -916,6 +917,16 @@
    return false;
}

+static void dev_qdisc_reset(struct net_device *dev,
+    struct netdev_queue *dev_queue,
+    void *none)
+{
+    struct Qdisc *qdisc = dev_queue->qdisc_sleeping;
+    +if (qdisc)
+        qdisc_reset(qdisc);
+    +}
+}

/**
 * dev_deactivate_many - deactivate transmissions on several devices
 * @head: list of devices to deactivate
@@ -926,7 +937,6 @@
 void dev_deactivate_many(struct list_head *head)
struct net_device *dev;
bool sync_needed = false;

list_for_each_entry(dev, head, close_list) {
    netdev_for_each_tx_queue(dev, dev_deactivate_queue,
        &noop_qdisc);
    dev_watchdog_down(dev);
    -sync_needed |= !dev->dismantle;
}

/* Wait for outstanding qdisc-less dev_queue_xmit calls.
   * This is avoided if all devices are in dismantle phase :
   * Caller will call synchronize_net() for us
   */
-if (sync_needed)
    -synchronize_net();
+ synchronize_net();

/* Wait for outstanding qdisc_run calls. */
-list_for_each_entry(dev, head, close_list)
+list_for_each_entry(dev, head, close_list) {
    while (some_qdisc_is_busy(dev))
        yield();
    /* The new qdisc is assigned at this point so we can safely
        * unwind stale skb lists and qdisc statistics
    */
+ netdev_for_each_tx_queue(dev, dev_qdisc_reset, NULL);
+if (dev_ingress_queue(dev))
+    dev_qdisc_reset(dev, dev_ingress_queue(dev), NULL);
}

void dev_deactivate(struct net_device *dev)
--- linux-4.15.0.orig/net/sched/sch_gred.c
+++ linux-4.15.0/net/sched/sch_gred.c
@@ -356,7 +356,7 @@
    struct gred_sched *table = qdisc_priv(sch);
    struct gred_sched_data *q = table->tab[dp];

-    if (!red_check_params(ctl->qth_min, ctl->qth_max, ctl->Wlog))
+    if (!red_check_params(ctl->qth_min, ctl->qth_max, ctl->Wlog, ctl->Scell_log, stab))
        return -EINVAL;
    if (!q) {
        -EINVAL;
@@ -411,7 +411,7 @@
if (tb[TCA_GRED_PARMS] == NULL && tk[TCA_GRED_STAB] == NULL) {
  if (tk[TCA_GRED_LIMIT] != NULL)
    sch->limit = nla_get_u32(tk[TCA_GRED_LIMIT]);
  return gred_change_table_def(sch, opt);
  return gred_change_table_def(sch, tk[TCA_GRED_DPS]);
}

if (tk[TCA_GRED_PARMS] == NULL || 
--- linux-4.15.0.orig/net/sched/sch_hhf.c
+++ linux-4.15.0/net/sched/sch_hhf.c
@@ -4,11 +4,11 @@
    u32 perturbation; /* hash perturbation */
    +siphash_key_t perturbation; /* hash perturbation */
    u32 quantum; /* psched_mtu(qdisc_dev(sch)); */
@@ -125,7 +125,7 @@
    hash = skb_get_hash_perturb(skb, q->perturbation);
    /* Check if this packet belongs to an already established HH flow. */
    flow_pos = hash & HHF_BIT_MASK;
    @ @ -263,7 +263,7 @@
    /* Get hashed flow-id of the skb. */
    -hash = skb_get_hash_perturb(skb, q->perturbation);
    +hash = skb_get_hash_perturb(skb, &q->perturbation);
    /* Check if this packet belongs to an already established HH flow. */
    flow_pos = hash & HHF_BIT_MASK;
    @ @ -528,7 +528,7 @@
    new_hhf_non_hh_weight = nla_get_u32(tk[TCA_HHF_NON_HH_WEIGHT]);
    non_hh_quantum = (u64)new_quantum * new_hhf_non_hh_weight;
    -if (non_hh_quantum > INT_MAX)
    +if (non_hh_quantum == 0 || non_hh_quantum > INT_MAX)
      return -EINVAL;

sch_tree_lock(sch);
@@ -578,7 +578,7 @@
sch->limit = 1000;
q->quantum = psched_mtu(qdisc_dev(sch));
-q->perturbation = prandom_u32();
+get_random_bytes(&q->perturbation, sizeof(q->perturbation));
INIT_LIST_HEAD(&q->new_buckets);
INIT_LIST_HEAD(&q->old_buckets);

--- linux-4.15.0.orig/net/sched/sch_mq.c
+++ linux-4.15.0/net/sched/sch_mq.c
@@ -183,7 +183,8 @@
 struct netdev_queue *dev_queue = mq_queue_get(sch, cl);

 sch = dev_queue->qdisc_sleeping;
-if (gnet_stats_copy_basic(&sch->running, d, NULL, &sch->bstats) < 0 ||
+if (gnet_stats_copy_basic(&sch->running, d, sch->cpu_bstats,
 + &sch->bstats) < 0 ||
       gnet_stats_copy_queue(d, NULL, &sch->qstats, sch->q.qlen) < 0)
 return -1;
 return 0;
--- linux-4.15.0.orig/net/sched/sch_mqprio.c
+++ linux-4.15.0/net/sched/sch_mqprio.c
@@ -416,7 +416,7 @@
 opt.offset[i] = dev->tc_to_txq[i].offset;
 }

-if (nla_put(skb, TCA_OPTIONS, NLA_ALIGN(sizeof(opt)), &opt))
+if (nla_put(skb, TCA_OPTIONS, sizeof(opt), &opt))
goto nla_put_failure;

if ((priv->flags & TC_MQPRIO_F_MODE) &&
@@ -533,8 +533,8 @@
 struct netdev_queue *dev_queue = mqprio_queue_get(sch, cl);

 sch = dev_queue->qdisc_sleeping;
-if (gnet_stats_copy_basic(qdisc_root_sleeping_running(sch),
- d, NULL, &sch->bstats) < 0 ||
+if (gnet_stats_copy_basic(qdisc_root_sleeping_running(sch), d, 
+ sch->cpu_bstats, &sch->bstats) < 0 ||
       gnet_stats_copy_queue(d, NULL, 
       &sch->qstats, sch->q.qlen) < 0)
 return -1;
--- linux-4.15.0.orig/net/sched/sch_multiq.c
+++ linux-4.15.0/net/sched/sch_multiq.c
@@ -341,7 +341,7 @@
cl_q = q->queues[cl - 1];
if (gnet_stats_copy_basic(qdisc_root_sleeping_running(sch),
- d, NULL, &cl_q->bstats) < 0 ||
+ d, cl_q->cpu_bstats, &cl_q->bstats) < 0 ||
    gnet_stats_copy_queue(d, NULL, &cl_q->qstats, cl_q->q.qlen) < 0)
return -1;

--- linux-4.15.0.orig/net/sched/sch_netem.c
+++ linux-4.15.0/net/sched/sch_netem.c
@@ -433,10 +433,13 @@
struct netem_skb_cb *cb;
struct sk_buff *skb2;
struct sk_buff *segs = NULL;
-unsigned int len = 0, last_len, prev_len = qdisc_pkt_len(skb);
-int nb = 0;
+unsigned int prev_len = qdisc_pkt_len(skb);
int count = 1;
int rc = NET_XMIT_SUCCESS;
+int rc_drop = NET_XMIT_DROP;
+
+/* Do not fool qdisc_drop_all() */
+skb->prev = NULL;

/* Random duplication */
if (q->duplicate && q->duplicate >= get_crandom(&q->dup_cor))
@@ -467,12 +470,13 @@
        skb will be queued.
        */
    if (count > 1 && (skb2 = skb_clone(skb, GFP_ATOMIC)) != NULL) {
-        struct Qdisc *rootq = qdisc_root(sch);
+        struct Qdisc *rootq = qdisc_root_bh(sch);
            u32 dupsave = q->duplicate; /* prevent duplicating a dup... */
            q->duplicate = 0;
            rootq->enqueue(skb2, rootq, to_free);
            q->duplicate = dupsave;
+            rc_drop = NET_XMIT_SUCCESS;
        }
    }

/*
@@ -485,7 +489,8 @@
        if (skb_is_gso(skb)) {
            segs = netem_segment(skb, sch, to_free);
            if (!segs)
-                return NET_XMIT_DROP;
+                return rc_drop;
+                qdisc_skb_cb(segs)->pkt_len = segs->len;
+        }
 */

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if (skb->ip_summed == CHECKSUM_PARTIAL &&
     skb_checksum_help(skb)) {
    qdisc_drop(skb, sch, to_free);
    skb = NULL;
    goto finish_segs;
}

if (unlikely(skb->ip_summed == CHECKSUM_CLIENT))
    goto finish_segs;

while (segs) {
    skb2 = segs->next;
    segs->next = NULL;
    skb->ip_summed = skb->ip_summed;
    skb = skb2;
    skb->ip_summed += skb->len;
    skb = skb->next;
}

while (segs) {
    skb2 = segs->next;
    segs->next = NULL;
    skb->ip_summed += skb->len;
    skb = skb->next;
}

qdisc_qstats_backlog_inc(sch, skb);

finish_segs:
if (segs) {
    unsigned int len, last_len;
    int nb;
    len = skb ? skb->len : 0;
    nb = skb ? 1 : 0;
    while (segs) {
        skb2 = segs->next;
        segs->next = NULL;
        skb->ip_summed += skb->len;
        skb = skb->next;
    }
    skb = skb2;
}

qdisc_tree_reduce_backlog(sch, 1 - nb, prev_len - len);
/* Parent qdiscs accounted for 1 skb of size @prev_len */
qdisc_tree_reduce_backlog(sch, -(nb - 1), -(len - prev_len));
}
else if (!skb) {  
    return NET_XMIT_DROP;
return NET_XMIT_SUCCESS;
}
@@ -730,7 +745,7 @@
struct disttable *d;
int i;

-if (n > NETEM_DIST_MAX)
+if (!n || n > NETEM_DIST_MAX)
return -EINVAL;

d = kvmalloc(sizeof(struct disttable) + n * sizeof(s16), GFP_KERNEL);
--- linux-4.15.0.orig/net/sched/sch_prio.c
+++ linux-4.15.0/net/sched/sch_prio.c
@@ -245,8 +245,14 @@
struct prio_sched_data *q = qdisc_priv(sch);
unsigned long band = arg - 1;

-if (new == NULL)
-new = &noop_qdisc;
+if (!new) {
  +new = qdisc_create_dflt(sch->dev_queue, &pfifo_qdisc_ops,
   +TC_H_MAKE(sch->handle, arg));
  +if (!new)
    +new = &noop_qdisc;
  +else
    +qdisc_hash_add(new, true);
  +}

*old = qdisc_replace(sch, new, &q->queues[band]);
return 0;
@@ -299,7 +305,7 @@
  if (gnet_stats_copy_basic(qdisc_root_sleeping_running(sch),
   - d, NULL, &cl_q->bstats) < 0 ||
   + d, cl_q->cpu_bstats, &cl_q->bstats) < 0 ||
      gnet_stats_copy_queue(d, NULL, &cl_q->qstats, cl_q->q.qlen) < 0)
 return -1;

--- linux-4.15.0.orig/net/sched/sch_qfq.c
+++ linux-4.15.0/net/sched/sch_qfq.c
@@ -496,11 +496,6 @@
  if (cl->qdisc != &noop_qdisc)
    qdisc_hash_add(cl->qdisc, true);
  -sch_tree_lock(sch);
  -qdisc_class_hash_insert(&q->clhash, &cl->common);
set_change_agg:
sch_tree_lock(sch);
@@ -518,8 +513,11 @@
} if (existing)
qfq_deact_rm_from_agg(q, cl);
+else
+qdisc_class_hash_insert(&q->clhash, &cl->common);
qfq_add_to_agg(q, new_agg, cl);
sch_tree_unlock(sch);
+qdisc_class_hash_grow(sch, &q->clhash);

*arg = (unsigned long)cl;
return 0;
--- linux-4.15.0.orig/net/sched/sch_red.c
+++ linux-4.15.0/net/sched/sch_red.c
@@ -157,7 +157,6 @@
 .parent = sch->parent,
 ];
-int err;

if (!tc_can_offload(dev) || !dev->netdev_ops->ndo_setup_tc)
return -EOPNOTSUPP;
@@ -172,14 +171,7 @@
opt.command = TC_RED_DESTROY;
}
-exc = dev->netdev_ops->ndo_setup_tc(dev, TC_SETUP_QDISC_RED, &opt);
- if (!err && enable)
- sch->flags |= TCQ_F_OFFLOADED;
- else
- sch->flags &= ~TCQ_F_OFFLOADED;
- return err;
+return dev->netdev_ops->ndo_setup_tc(dev, TC_SETUP_QDISC_RED, &opt);
}

static void red_destroy(struct Qdisc *sch)
@@ -205,6 +197,7 @@
 struct Qdisc *child = NULL;
 int err;
 u32 max_P;

+u8 *stab;

if (opt == NULL)
    return -EINVAL;
@@ -220,17 +213,20 @@

cnt = nla_data(tb[TCA_RED_PARMS]);
-if (!red_check_params(cnt->qth_min, cnt->qth_max, cnt->Wlog))
+stab = nla_data(tb[TCA_RED_STAB]);
+if (!red_check_params(cnt->qth_min, cnt->qth_max, cnt->Wlog,
+    cnt->Scell_log, stab))
    return -EINVAL;

if (ctl->limit > 0) {
    child = fifo_create_dflt(sch, &bfifo_qdisc_ops, ctl->limit);
    if (IS_ERR(child))
        return PTR_ERR(child);
-}
-     /* child is fifo, no need to check for noop_qdisc */
+     qdisc_hash_add(child, true);
+
+    sch_tree_lock(sch);
+    q->flags = cnt->flags;
+    q->limit = cnt->limit;
@@ -244,7 +240,7 @@
    red_set_parms(&q->parms,
        cnt->qth_min, cnt->qth_max, cnt->Wlog,
        cnt->Plog, cnt->Scell_log,
-        nla_data(tb[TCA_RED_STAB]),
+        stab,
        cnt->max_P);
    red_set_vars(&q->vars);

@@ -294,12 +290,22 @@
    .stats.qstats = &sch->qstats,
    },
    ];
+    int err;
+    +sch->flags &= ~TCQ_F_OFFLOADED;
+    +if (!tc_can_offload(dev) || !dev->netdev_ops->ndo_setup_tc)
+    +return 0;
-if (!(sch->flags & TCQ_F_OFFLOADED))
+err = dev->netdev_ops->ndo_setup_tc(dev, TC_SETUP_QDISC_RED,
+&hw_stats);
+if (err == -EOPNOTSUPP)
return 0;

-return dev->netdev_ops->ndo_setup_tc(dev, TC_SETUP_QDISC_RED,
-    &hw_stats);
+if (!err)
+sch->flags |= TCQ_F_OFFLOADED;
+
+return err;
}

static int red_dump(struct Qdisc *sch, struct sk_buff *skb)
--- linux-4.15.0.orig/net/sched/sch_sfb.c
+++ linux-4.15.0/net/sched/sch_sfb.c
@@ -22,7 +22,7 @@
 #include <linux/errno.h>
 #include <linux/skbuff.h>
 #include <linux/random.h>
-#include <linux/jhash.h>
+#include <linux/siphash.h>
 #include <net/ip.h>
 #include <net/pkt_sched.h>
 #include <net/pkt_cls.h>
 @ @ -49,7 +49,7 @@
 * (Section 4.4 of SFB reference : moving hash functions)
 */
 struct sfb_bins {
-  u32 perturbation; /* jhash perturbation */
+  siphash_key_t perturbation; /* siphash key */
  struct sfb_bucket bins[SFB_LEVELS][SFB_NUMBUCKETS];
};

@@ -221,7 +221,8 @@
 static void sfb_init_perturbation(u32 slot, struct sfb_sched_data *q)
 { 
-  q->bins[slot].perturbation = prandom_u32();
+  get_random_bytes(&q->bins[slot].perturbation,
+                    sizeof(q->bins[slot].perturbation));
  }

 static void sfb_swap_slot(struct sfb_sched_data *q)
@@ -318,9 +319,9 @@
/* If using external classifiers, get result and record it. */
if (!sfb_classify(skb, fl, &ret, &salt))
goto other_drop;
-sfbhash = jhash_1word(salt, q->bins[slot].perturbation);
+sfbhash = siphash_1u32(salt, &q->bins[slot].perturbation);
} else {
-sfbhash = skb_get_hash_perturb(skb, q->bins[slot].perturbation);
+sfbhash = skb_get_hash_perturb(skb, &q->bins[slot].perturbation);
}

@@ -356,7 +357,7 @@
/* Inelastic flow */
if (q->double_buffering) {
    sfbhash = skb_get_hash_perturb(skb, q->bins[slot].perturbation);
    &q->bins[slot].perturbation);
    if (!sfbhash)
        sfb_skb_cb(skb)->hashes[slot] = sfbhash;
--- linux-4.15.0.orig/net/sched/sch_sfq.c
+++ linux-4.15.0/net/sched/sch_sfq.c
@@ -18,7 +18,7 @@
#include <linux/errno.h>
#include <linux/init.h>
#include <linux/skbuff.h>
-#include <linux/jhash.h>
+#include <linux/siphash.h>
#include <linux/slab.h>
#include <linux/vmalloc.h>
#include <net/netlink.h>
@@ -121,7 +121,7 @@
u8		headdrop;
-u32		perturbation;
+siphash_key_t 	perturbation;
u8		maxdepth;/* limit of packets per flow */
  u8flags;
  unsigned short  scaled_quantum; /* SFQ_ALLOT_SIZE(quantum) */
@@ -161,7 +161,7 @@
static unsigned int sfq_hash(const struct sfq_sched_data *q,
    { sfq_classify(struct sk_buff *skb, struct Qdisc *sch,}
        const struct sk_buff *skb)
struct sfq_sched_data *q = from_timer(q, t, perturb_timer);
struct Qdisc *sch = q->sch;
spinlock_t *root_lock = qdisc_lock(qdisc_root_sleeping(sch));
+ siphash_key_t nkey;
+ get_random_bytes(&nkey, sizeof(nkey));
spin_lock(root_lock);
-q->perturbation = prandom_u32();
+q->perturbation = nkey;
if (!q->filter_list && q->tail)
sfq_rehash(sch);
spin_unlock(root_lock);
@@ -639,8 +641,17 @@
if (ctl->divisor &&
    (is_power_of_2(ctl->divisor) || ctl->divisor > 65536))
return -EINVAL;
+
/* slot->allot is a short, make sure quantum is not too big. */
+if (ctl->quantum) {
+    unsigned int scaled = SFQ_ALLOT_SIZE(ctl->quantum);
+    if (scaled <= 0 || scaled > SHRT_MAX)
+        return -EINVAL;
+}
+
if (ctl_v1 && !red_check_params(ctl_v1->qth_min, ctl_v1->qth_max,
    -ctl_v1->Wlog))
+ctl_v1->Wlog, ctl_v1->Scell_log, NULL))
return -EINVAL;
if (ctl_v1 && ctl_v1->qth_min) {
p = kmalloc(sizeof(*p), GFP_KERNEL);
@@ -692,7 +703,7 @@
del_timer(&q->perturb_timer);
if (q->perturb_period) {
    mod_timer(&q->perturb_timer, jiffies + q->perturb_period);
    -q->perturbation = prandom_u32();
+get_random_bytes(&q->perturbation, sizeof(q->perturbation));
}
sch_tree_unlock(sch);
kfree(p);
@@ -748,7 +759,7 @@
q->quantum = psched_mtu(qdisc_dev(sch));
q->scaled_quantum = SFQ_ALLOT_SIZE(q->quantum);
q->perturb_period = 0;
- q->perturbation = prandom_u32();
+get_random_bytes(&q->perturbation, sizeof(q->perturbation));

if (opt) {

int err = sfq_change(sch, opt);
@ @ -827.8 +838.6 @@
static unsigned long sfq_bind(struct Qdisc *sch, unsigned long parent,
       u32 classid)
{
    /* we cannot bypass queue discipline anymore */
    sch->flags &= ~TCQ_F_CAN_BYPASS;
    return 0;
}

--- linux-4.15.0.orig/net/sched/sch_tbf.c
+++ linux-4.15.0/net/sched/sch_tbf.c
@@ -142,16 +142,6 @@
     return len;
 }

-/*
- * Return length of individual segments of a gso packet,
- * including all headers (MAC, IP, TCP/UDP)
- */
- static unsigned int skb_gso_mac_seglen(const struct sk_buff *skb)
-{
- unsigned int hdr_len = skb_transport_header(skb) - skb_mac_header(skb);
- return hdr_len + skb_gso_transport_seglen(skb);
- }
- 
- /* GSO packet is too big, segment it so that tbf can transmit
- * each segment in time
- */
- @ @ -388.6 +378.9 @@
- err = PTR_ERR(child);
- goto done;
- }
+ /* child is fifo, no need to check for noop_qdisc */
+ qdisc_hash_add(child, true);
}

sch_tree_lock(sch);
@ @ -396.8 +389.6 @@
q->qdisc->qstats.backlog);
qdisc_destroy(q->qdisc);
q->qdisc = child;
-if (child != &noop_qdisc)
-qdisc_hash_add(child, true);
}
q->limit = qopt->limit;
if (tb[TCA_TBF_PBURST])
--- linux-4.15.0.orig/net/sched/sch_teql.c
+++ linux-4.15.0/net/sched/sch_teql.c
@@ -138,6 +138,9 @@
 struct teql_sched_data *dat = qdisc_priv(sch);
 struct teql_master *master = dat->m;
+
 +if (!master)
 +return;
 +
 prev = master->slaves;
 if (prev) {
 do {
--- linux-4.15.0.orig/net/sctp/associola.c
+++ linux-4.15.0/net/sctp/associola.c
@@ -80,6 +80,7 @@
 /* Discarding const is appropriate here. */
 asoc->ep = (struct sctp_endpoint *)ep;
 asoc->base.sk = (struct sock *)sk;
+asoc->base.net = sock_net(sk);

 sctp_endpoint_hold(asoc->ep);
 sock_hold(asoc->base.sk);
@@ -431,7 +432,7 @@
 WARN_ON(atomic_read(&asoc->rmem_alloc));

 -kfree(asoc);
+ kfree_rcu(asoc, rcu);
 SCTP_DBG_OBJCNT_DEC(asoc);
 }

@@ -496,8 +497,9 @@
 void sctp_assoc_rm_peer(struct sctp_association *asoc,
 struct sctp_transport *peer)
 {
-struct list_head *pos;
-struct sctp_transport *transport;
+struct sctp_transport *transport;
+struct list_head *pos;
+struct sctp_chunk *ch;

 pr_debug("%s: association:%p addr:%pISpc\n",
 __func__, asoc, &peer->ipaddr.sa);
@@ -561,7 +563,6 @@
/*
void reset_transport_on_list(struct sctp_transport *peer)
{
    list_for_each_entry(ch, &peer->transmitted, list)
    sctp_transport_hold(active);
}

/* Reset the transport of each chunk on this list */
list_for_each_entry(ch, &asoc->outqueue.out_chunk_list, list)
@if (ch->transport == peer)
ch->transport = NULL;
+
asoc->peer.transport_count--;

sctp_transport_free(peer);

struct sctp_endpoint *ep;
struct sctp_chunk *chunk;
struct sctp_inq *inqueue;
-int state;
+int first_time = 1; /* is this the first time through the loop */
int error = 0;
+int state;

/* The association should be held so we should be safe. */
ep = asoc->ep;

int state = asoc->state;
subtype = SCTP_ST_CHUNK(chunk->chunk_hdr->type);

/* If the first chunk in the packet is AUTH, do special
   processing specified in Section 6.3 of SCTP-AUTH spec */
+if (first_time && subtype.chunk == SCTP_CID_AUTH) {
+struct sctp_chunkhdr *next_hdr;
+
+next_hdr = sctp_inq_peek(inqueue);
+if (!next_hdr)
++goto normal;
+
+if (next_hdr->type == SCTP_CID_COOKIE_ECHO) {
+chunk->auth_chunk = skb_clone(chunk->skb,
+GFP_ATOMIC);
+chunk->auth = 1;
+continue;
+
+}
+
+}
+
+normal:
+/* SCTP-AUTH, Section 6.3:
 * The receiver has a list of chunk types which it expects
 * to be received only after an AUTH-chunk. This list has
@@ -1074,6 +1104,9 @@
 /* If there is an error on chunk, discard this packet. */
 if (error && chunk)
   chunk->pdiscard = 1;
+
 +if (first_time)
 +first_time = 0;
 }
 sctp_association_put(asoc);
 }
@@ -1418,11 +1451,9 @@
 return;

 /* Get the lowest pmtu of all the transports. */
-list_for_each_entry(t, &asoc->peer.transport_addr_list,
-transports) {
+list_for_each_entry(t, &asoc->peer.transport_addr_list, transports) {
 if (t->pmtu_pending && t->dst) {
   sctp_transport_update_pmtu(t, sctp_dst_mtu(t->dst));
   sctp_transport_update_pmtu(t, scpt_dst_mtu(t->dst));
@@ -1564,12 +1595,15 @@
 int sctp_assoc_set_bind_addr_from_ep(struct sctp_association *asoc,
   enum scpt_scope scope, gfp_t gfp)
 {
+struct sock *sk = asoc->base.sk;

 int flags;

 /* Use scoping rules to determine the subset of addresses from
 * the endpoint.
/*/ 
-flags = (PF_INET6 == asoc->base.sk->sk_family) ? SCTP_ADDR6_ALLOWED : 0;
+flags = (PF_INET6 == sk->sk_family) ? SCTP_ADDR6_ALLOWED : 0;
 +if (!inet_v6_ipv6only(sk))
 +flags |= SCTP_ADDR4_ALLOWED;
 if (asoc->peer.ipv4_address)
   flags |= SCTP_ADDR4_PEER Supp;
if (asoc->peer.ipv6_address)
--- linux-4.15.0.orig/net/sctp/auth.c
+++ linux-4.15.0/net/sctp/auth.c
@@ -493,6 +493,7 @@
 out_err:
 /* Clean up any successful allocations */
 sctp_auth_destroy_hmacs(ep->auth_hmacs);
+ep->auth_hmacs = NULL;
 return -ENOMEM;
 }

--- linux-4.15.0.orig/net/sctp/bind_addr.c
+++ linux-4.15.0/net/sctp/bind_addr.c
@@ -285,22 +285,19 @@
 rawaddr = (union sctp_addr_param *)raw_addr_list;

 af = sctp_get_af_specific(param_type2af(param->type));
-if (unlikely(!af)) {
+if (unlikely(!af) ||
 + !af->from_addr_param(&addr, rawaddr, htons(port), 0)) {
 retval = -EINVAL;
 -sctp_bind_addr_clean(bp);
 -break;
+-goto out_err;
 }

 -af->from_addr_param(&addr, rawaddr, htons(port), 0);
 if (sctp_bind_addr_state(bp, &addr) != -1)
 goto next;
 retval = sctp_add_bind_addr(bp, &addr, sizeof(addr),
 SCTP_ADDR_SRC, gfp);
-if (retval) {
+if (retval)
 /* Can't finish building the list, clean up. */
 -sctp_bind_addr_clean(bp);
 -break;
 -}
+-goto out_err;
 }

 next:
 len = ntohs(param->length);
@@ -309,6 +306,12 @@
sctp_bind_addr_clean(bp);
+
+return retval;
}

/********************************************************************
@@ -453,6 +456,7 @@
* well as the remote peer.
*/
if (((AF_INET == addr->sa.sa_family) &&
+
+ (flags & SCTP_ADDR4_ALLOWED) &&
+ (flags & SCTP_ADDR4_PEERSUPP)) ||
++ ((AF_INET6 == addr->sa.sa_family) &&
++ (flags & SCTP_ADDR6_ALLOWED) &&
--- linux-4.15.0.orig/net/sctp/chunk.c
+++ linux-4.15.0/net/sctp/chunk.c
@@ -231,7 +231,9 @@
/* Account for a different sized first fragment */
if (msg_len >= first_len) {
  msg->can_delay = 0;
-SCTP_INC_STATS(sock_net(asoc->base.sk), SCTP_MIB_FRAGUSRMSGS);
+if (msg_len > first_len)
+SCTP_INC_STATS(sock_net(asoc->base.sk),
+    SCTP_MIB_FRAGUSRMSGS);
} else {
/* Which may be the only one... */
  first_len = msg_len;
--- linux-4.15.0.orig/net/sctp/endpointola.c
+++ linux-4.15.0/net/sctp/endpointola.c
@@ -126,10 +126,6 @@
/* Initialize the bind addr area */
scctp_bind_addr_init(&ep->base.bind_addr, 0);

-/* Remember who we are attached to. */
-ep->base.sk = sk;
-sock_hold(ep->base.sk);
-
-/* Create the lists of associations. */
INIT_LIST_HEAD(&ep->asocs);

-/* Remember who we are attached to. */
+ep->base.sk = sk;
+ep->base.net = sock_net(sk);
+sock_hold(ep->base.sk);
+ return ep;

nomem_hmacs:
--- linux-4.15.0.orig/net/sctp/input.c
+++ linux-4.15.0/net/sctp/input.c
@@ -453,7 +453,7 @@
     else {
         if (!mod_timer(&t->proto_unreach_timer,
                        jiffies + (HZ/20)))
-            sctp_association_hold(asoc);
+            sctp_transport_hold(t);
     }
     } else {
     struct net *net = sock_net(sk);
@@ -462,7 +462,7 @@
         "encountered\n", __func__);  
     if (del_timer(&t->proto_unreach_timer))
         sctp_association_put(asoc);
+        sctp_transport_put(t);

     sctp_do_sm(net, SCTP_EVENT_T_OTHER,
                 SCTP_ST_OTHER(SCTP_EVENT_ICMP_PROTO_UNREACH),
@@ -679,7 +679,7 @@
     ch = skb_header_pointer(skb, offset, sizeof(*ch), &_ch);
 
        /* Break out if chunk length is less then minimal. */
-       if (ntohs(ch->length) < sizeof(_ch))
+       if (!ch || ntohs(ch->length) < sizeof(_ch))
           break;

     ch_end = offset + SCTP_PAD4(ntohs(ch->length));
@@ -813,7 +813,7 @@
     if (!sctp_transport_hold(t))
         return err;

     -if (!net_eq(sock_net(t->asoc->base.sk), x->net))
+     if (!net_eq(t->asoc->base.net, x->net))
         goto out;
     if (x->lport != htons(t->asoc->base.bind_addr.port))
         goto out;
@@ -828,7 +828,7 @@
     {  
         const struct sctp_transport *t = data;
         const union sctp_addr *paddr = &t->ipaddr;
-        const struct net *net = sock_net(t->asoc->base.sk);
+        const struct net *net = t->asoc->base.net;
__be16 lport = htons(t->asoc->base.bind_addr.port);
__u32 addr;

@@ -897,15 +897,12 @@
 rhl_for_each_entry_rcu(transport, tmp, list, node)
 if (transport->asoc->ep == t->asoc->ep) {
  rcu_read_unlock();
  -err = -EEXIST;
  -goto out;
+  return -EEXIST;
  }
  rcu_read_unlock();

 err = rhtable_insert_key(&sctp_transport_hashtable, &arg,
   &t->node, sctp_hash_params);
- out:
  if (err)
   pr_err_once("insert transport fail, errno %d\n", err);
@@ -1084,7 +1081,8 @@
 if (!af)
  continue;
 -af->from_addr_param(paddr, params.addr, sh->source, 0);
+ if (!af->from_addr_param(paddr, params.addr, sh->source, 0))
+  continue;

 asoc = __sctp_lookup_association(net, laddr, paddr, transportp);
 if (asoc)
@@ -1120,6 +1118,9 @@
 union scpt_addr_param *param;
 union scpt_addr paddr;

+if (ntohs(ch->length) < sizeof(*asconf) + sizeof(struct sctp_paramhdr))
+return NULL;
+ /* Skip over the ADDIP header and find the Address parameter */
 param = (union scpt_addr_param *)(asconf + 1);
@@ -1127,7 +1128,8 @@
 if (unlikely(!af))
  return NULL;

 -af->from_addr_param(&paddr, param, peer_port, 0);
+ if (!af->from_addr_param(&paddr, param, peer_port, 0))
+  return NULL;
return __sctp_lookup_association(net, laddr, &paddr, transportp);
}
@@ -1198,7 +1200,7 @@

-	} while (ch_end < skb_tail_pointer(skb));
+	} while (ch_end + sizeof(*ch) < skb_tail_pointer(skb));

return asoc;
}
--- linux-4.15.0.orig/net/sctp/inqueue.c
+++ linux-4.15.0/net/sctp/inqueue.c
@@ -217,7 +217,7 @@
 skb_pull(chunk->skb, offsetof(*ch));
 chunk->subh.v = NULL; /* Subheader is no longer valid. */

- if (chunk->chunk_end + sizeof(*ch) < skb_tail_pointer(chunk->skb)) {
+ if (chunk->chunk_end + sizeof(*ch) <= skb_tail_pointer(chunk->skb)) {
    /* This is not a singleton */
    chunk->singleton = 0;
 } else if (chunk->chunk_end > skb_tail_pointer(chunk->skb)) {
--- linux-4.15.0.orig/net/sctp/ipv6.c
+++ linux-4.15.0/net/sctp/ipv6.c
@@ -97,10 +97,9 @@
     switch (ev) {
     case NETDEV_UP:
     -addr = kmalloc(sizeof(struct sctp_sockaddr_entry), GFP_ATOMIC);
-+addr = kzalloc(sizeof(*addr), GFP_ATOMIC);
     if (addr) {
         addr->a.v6.sin6_family = AF_INET6;
         -addr->a.v6.sin6_port = 0;
+addr->a.v6.sin6_port = fl6->u.ip6.port;
         addr->a.v6.sin6_addr = ifa->addr;
         addr->a.v6.sin6_scope_id = ifa->idev->dev->ifindex;
         addr->valid = 1;
@@ -236,7 +235,8 @@
             }
             struct sctp_association *asoc = t->asoc;
             struct dst_entry *dst = NULL;
-         struct flowi6 *fl6 = &fl->u.ip6;
+         struct flowi6 *fl6 = &fl->u.ip6;
+         struct flowi6 *fl6 = &fl->u.ip6;
             struct sctp_bind_addr *bp;
             struct ipv6_pinfo *np = inet6_sk(sk);
             struct sctp_sockaddr_entry *laddr;
@@ -246,7 +246,7 @@
             enum sctp_scope scope;
memset(fl6, 0, sizeof(struct flowi6));
	memset(&_fl, 0, sizeof(_fl));
fl6->daddr = daddr->v6.sin6_addr;
fl6->fl6_dport = daddr->v6.sin6_port;
fl6->flowi6_proto = IPPROTO_SCTP;
@@ -262,7 +262,8 @@
if (saddr) {
    fl6->saddr = saddr->v6.sin6_addr;
    -fl6->fl6_sport = saddr->v6.sin6_port;
    +if (!fl6->fl6_sport)
    +fl6->fl6_sport = saddr->v6.sin6_port;

    pr_debug("src=%pI6 - ", &fl6->saddr);
}@@ -271,9 +272,12 @@
final_p = fl6_update_dst(fl6, rcu_dereference(np->opt), &final);
rcu_read_unlock();

-dst = ip6_dst_lookup_flow(sk, fl6, final_p);
-if (!asoc || saddr)
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, fl6, final_p);
+if (!asoc || saddr) {
    +t->dst = dst;
    +memcpy(fl, &_fl, sizeof(_fl));
goto out;
    +}

bp = &asoc->base.bind_addr;
scope = sctp_scope(daddr);
@@ -296,6 +300,8 @@
if ((laddr->a.sa.sa_family == AF_INET6) &&
    (sctp_v6_cmp_addr(&dst_saddr, &laddr->a))) {
rcu_read_unlock();
    +t->dst = dst;
    +memcpy(fl, &_fl, sizeof(_fl));
goto out;
    +}

if (saddr) {
    fl6->saddr = saddr->v6.sin6_addr;
    -fl6->fl6_sport = saddr->v6.sin6_port;
    +if (!fl6->fl6_sport)
    +fl6->fl6_sport = saddr->v6.sin6_port;

    pr_debug("src=%pI6 - ", &fl6->saddr);
}@@ -271,9 +272,12 @@
final_p = fl6_update_dst(fl6, rcu_dereference(np->opt), &final);
rcu_read_unlock();

-dst = ip6_dst_lookup_flow(sk, fl6, final_p);
-if (!asoc || saddr)
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, fl6, final_p);
+if (!asoc || saddr) {
    +t->dst = dst;
    +memcpy(fl, &_fl, sizeof(_fl));
goto out;
    +}

bp = &asoc->base.bind_addr;
scope = sctp_scope(daddr);
@@ -296,6 +300,8 @@
if ((laddr->a.sa.sa_family == AF_INET6) &&
    (sctp_v6_cmp_addr(&dst_saddr, &laddr->a))) {
rcu_read_unlock();
    +t->dst = dst;
    +memcpy(fl, &_fl, sizeof(_fl));
goto out;
    +}

if (saddr) {
    fl6->saddr = saddr->v6.sin6_addr;
    -fl6->fl6_sport = saddr->v6.sin6_port;
    +if (!fl6->fl6_sport)
    +fl6->fl6_sport = saddr->v6.sin6_port;

    pr_debug("src=%pI6 - ", &fl6->saddr);
}@@ -271,9 +272,12 @@
final_p = fl6_update_dst(fl6, rcu_dereference(np->opt), &final);
rcu_read_unlock();

-dst = ip6_dst_lookup_flow(sk, fl6, final_p);
-if (!asoc || saddr)
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, fl6, final_p);
+if (!asoc || saddr) {
    +t->dst = dst;
    +memcpy(fl, &_fl, sizeof(_fl));
goto out;
    +}

bp = &asoc->base.bind_addr;
scope = sctp_scope(daddr);
@@ -296,6 +300,8 @@
if ((laddr->a.sa.sa_family == AF_INET6) &&
    (sctp_v6_cmp_addr(&dst_saddr, &laddr->a))) {
rcu_read_unlock();
    +t->dst = dst;
    +memcpy(fl, &_fl, sizeof(_fl));
goto out;
    +}

if (saddr) {
    fl6->saddr = saddr->v6.sin6_addr;
    -fl6->fl6_sport = saddr->v6.sin6_port;
    +if (!fl6->fl6_sport)
    +fl6->fl6_sport = saddr->v6.sin6_port;

    pr_debug("src=%pI6 - ", &fl6->saddr);
}@@ -271,9 +272,12 @@
final_p = fl6_update_dst(fl6, rcu_dereference(np->opt), &final);
rcu_read_unlock();

-dst = ip6_dst_lookup_flow(sk, fl6, final_p);
-if (!asoc || saddr)
+dst = ip6_dst_lookup_flow(sock_net(sk), sk, fl6, final_p);
+if (!asoc || saddr) {
    +t->dst = dst;
    +memcpy(fl, &_fl, sizeof(_fl));
goto out;
    +}
+if (IS_ERR(bdst))
+continue;

-if (!IS_ERR(bdst) &&
- ipv6_chk_addr(dev_net(bdst->dev),
+ if (ipv6_chk_addr(dev_net(bdst->dev),
    &laddr->a.v6.sin6_addr, bdst->dev, 1)) {
if (!IS_ERR_OR_NULL(dst))
dst_release(dst);
dst = bdst;
+t->dst = dst;
+memcpy(fl, &_fl, sizeof(_fl));
break;
}

bmatchlen = sctp_v6_addr_match_len(daddr, &laddr->a);
-if (matchlen > bmatchlen)
+if (matchlen > bmatchlen) {
+dst_release(bdst);
continue;
+
}

if (!IS_ERR_OR_NULL(dst))
dst_release(dst);
dst = bdst;
matchlen = bmatchlen;
+t->dst = dst;
+memcpy(fl, &_fl, sizeof(_fl));
}
rcu_read_unlock();

@@ -351,14 +365,12 @@
struct rt6_info *rt;

rt = (struct rt6_info *)dst;
-t->dst = dst;
-t->dst_cookie = rt6_get_cookie(rt);
pr_debug("rt6_dst:%pI6/%d rt6_src:%pI6\n",
    &rt->rt6i_dst.addr, rt->rt6i_dst.plen,
    &fl->u.ip6.saddr);
} else {
    t->dst = NULL;
-
    pr_debug("no route\n");
}
}
@@ -410,7 +422,6 @@
addr = kzalloc(sizeof(*addr), GFP_ATOMIC);
if (addr) {
    addr->a.v6.sin6_family = AF_INET6;
    -addr->a.v6.sin6_port = 0;
    addr->a.v6.sin6_addr = ifp->addr;
    addr->a.v6.sin6_scope_id = dev->ifindex;
    addr->valid = 1;
    @ @ -480,15 +491,20 @@
}

/* Initialize a sctp_addr from an address parameter. */
-static void sctp_v6_from_addr_param(union sctp_addr *addr,
+static bool sctp_v6_from_addr_param(union sctp_addr *addr,
    union sctp_addr_param *param,
    __be16 port, int iif)
{
    +if (ntohs(param->v6.param_hdr.length) < sizeof(struct sctp_ipv6addr_param))
        +return false;
    +
    addr->v6.sin6_family = AF_INET6;
    addr->v6.sin6_port = port;
    addr->v6.sin6_flowinfo = 0; /* BUG */
    addr->v6.sin6_addr = param->v6.addr;
    addr->v6.sin6_scope_id = iif;
    +
    +return true;
}

/* Initialize an address parameter from a sctp_addr and return the length
 @ @ -517,46 +533,49 @@
addr->v6.sin6_scope_id = 0;
}

-* Compare addresses exactly.
  - * v4-mapped-v6 is also in consideration.
  - */
- static int sctp_v6_cmp_addr(const union sctp_addr *addr1,
+ static int __sctp_v6_cmp_addr(const union sctp_addr *addr1,
    const union sctp_addr *addr2)
+ static int __sctp_v6_cmp_addr(const union sctp_addr *addr1,
+    const union sctp_addr *addr2)
{
    if (addr1->sa.sa_family != addr2->sa.sa_family) {
        if (addr1->sa.sa_family == AF_INET &&
            addr2->sa.sa_family == AF_INET6 &&
            addr2->v6.sin6_addr.s6_addr32[3] ==
            addr1->v4.sin_addr.s_addr)
            -ipv4_addr_v4mapped(&addr2->v6.sin6_addr))
            -if (addr2->v6.sin6_port == addr1->v4.sin_port &&
                addr2->v6.sin6_addr.s6_addr32[3] ==
                addr1->v4.sin_addr.s_addr)
-return 1;
-
+    ipv6_addr_v4mapped(&addr2->v6.sin6_addr) &&
+    addr2->v6.sin6_addr.s6_addr32[3] ==
+    addr1->v4.sin_addr.s_addr)
+return 1;
+
+if (addr2->sa.sa_family == AF_INET &&
    addr1->sa.sa_family == AF_INET6 &&
    ipv6_addr_v4mapped(&addr1->v6.sin6_addr)) {
-    if (addr1->v6.sin6_port == addr2->v4.sin_port &&
        addr1->v6.sin6_addr.s6_addr32[3] ==
        addr2->v4.sin_addr.s_addr)
        -return 1;
    -}
+    ipv6_addr_v4mapped(&addr1->v6.sin6_addr) &&
        addr1->v6.sin6_addr.s6_addr32[3] ==
        addr2->v4.sin_addr.s_addr)
            +return 1;
        +
        return 0;
    }
    -if (addr1->v6.sin6_port != addr2->v6.sin6_port)
        -return 0;
    +
        if (!ipv6_addr_equal(&addr1->v6.sin6_addr, &addr2->v6.sin6_addr))
            return 0;
        +
/* If this is a linklocal address, compare the scope_id. */
-    if (ipv6_addr_type(&addr1->v6.sin6_addr) & IPV6_ADDR_LINKLOCAL) {
-        if (addr1->v6.sin6_scope_id && addr2->v6.sin6_scope_id &&
-            (addr1->v6.sin6_scope_id != addr2->v6.sin6_scope_id)) {
            -return 0;
        -}
    -}
    +if ((ipv6_addr_type(&addr1->v6.sin6_addr) & IPV6_ADDR_LINKLOCAL) &&
        addr1->v6.sin6_scope_id && addr2->v6.sin6_scope_id &&
        addr1->v6.sin6_scope_id != addr2->v6.sin6_scope_id)
        +return 0;
    
    return 1;
}

+/* Compare addresses exactly.
+ * v4-mapped-v6 is also in consideration.
+ */
+static int sctp_v6_cmp_addr(const union sctp_addr *addr1,
    +    const union sctp_addr *addr2)
static void sctp_v6_inaddr_any(union sctp_addr *addr, __be16 port) {
    if (addr->sa.sa_family == AF_INET) {
        memset(addr->v4.sin_zero, 0, sizeof(addr->v4.sin_zero));
        return sizeof(struct sockaddr_in);
    }
    return sizeof(struct sockaddr_in6);
}
- connect = inet_dgram_connect,
+ connect = sctp_inet_connect,
.socketpair = sock_no_socketpair,
.accept = inet_accept,
.getname = sctp_getname,
--- linux-4.15.0.orig/net/sctp/offload.c
+++ linux-4.15.0/net/sctp/offload.c
@@ -36,6 +36,7 @@
 {
 skb->ip_summed = CHECKSUM_NONE;
 skb->csum_not_inet = 0;
+ gso_reset_checksum(skb, ~0);
 return sctp_compute_cksum(skb, skb_transport_offset(skb));
 }

--- linux-4.15.0.orig/net/sctp/output.c
+++ linux-4.15.0/net/sctp/output.c
@@ -386,25 +386,6 @@
 return retval;
 }

 static void sctp_packet_release_owner(struct sk_buff *skb)
-{
- skb_free(skb->sk);
-}
-
- static void sctp_packet_set_owner_w(struct sk_buff *skb, struct sock *sk)
-{
- skb_orphan(skb);
- skb->sk = sk;
- skb->destructor = sctp_packet_release_owner;
-
- /*
- * The data chunks have already been accounted for in sctp_sendmsg(),
- * therefore only reserve a single byte to keep socket around until
- * the packet has been transmitted.
- */
- refcount_inc(&sk->sk_wmem_alloc);
- }
-
- static int sctp_packet_pack(struct sctp_packet *packet,
- struct sk_buff *head, int gso, gfp_t gfp)
-{
- skb_reserve(head, packet->overhead + MAX_HEADER);
- if (!head)
- goto out;
- sctp_packet_set_owner_w(head, sk);
-}
+skb_set_owner_w(head, sk);

/* set sctp header */
sh = skb_push(head, sizeof(struct sctphdr));
--- linux-4.15.0.orig/net/sctp/outqueue.c
+++ linux-4.15.0/net/sctp/outqueue.c
@@ -214,7 +214,7 @@
INIT_LIST_HEAD(&q->retransmit);
INIT_LIST_HEAD(&q->sacked);
INIT_LIST_HEAD(&q->abandoned);
-sctp_sched_set_sched(asoc, SCTP_SS_FCFS);
+sctp_sched_set_sched(asoc, SCTP_SS_DEFAULT);
}

/* Free the outqueue structure and any related pending chunks.
--- linux-4.15.0.orig/net/sctp/proc.c
+++ linux-4.15.0/net/sctp/proc.c
@@ -335,8 +335,6 @@
transport = (struct sctp_transport *)v;
-if (!sctp_transport_hold(transport))
-return 0;
-assoc = transport->asoc;
-epb = &assoc->base;
-sk = epb->sk;
-@@ -426,8 +424,6 @@
}

transport = (struct sctp_transport *)v;
-if (!sctp_transport_hold(transport))
-return 0;
-assoc = transport->asoc;
-list_for_each_entry_rcu(tsp, &assoc->peer.transport_addr_list,
--- linux-4.15.0.orig/net/sctp/protocol.c
+++ linux-4.15.0/net/sctp/protocol.c
@@ -214,7 +213,8 @@
addr = kzalloc(sizeof(*addr), GFP_ATOMIC);
if (addr) {
-addr->a.v4.sin_family = AF_INET;
-addr->a.v4.sin_port = 0;
-addr->a.v4.sin_addr.s_addr = ifa->ifa_local;
-init_list_head(&addr->list);  @ @ -214,7 +213,8 @@
-* sock as well as the remote peer.
*/
if (addr->sa_family == AF_INET &&
    !(copy_flags & SCTP_ADDR4_PEERSUPP))
+    !(copy_flags & SCTP_ADDR4_ALLOWED) ||
+    !(copy_flags & SCTP_ADDR4_PEERSUPP))
continue;
if (addr->sa_family == AF_INET6 &&
    !(copy_flags & SCTP_ADDR6_ALLOWED) ||
@@ -254,6 +254,7 @@
    sa->sin_port = sh->dest;
    sa->sin_addr.s_addr = ip_hdr(skb)->daddr;
 } +memset(sa->sin_zero, 0, sizeof(sa->sin_zero));
 }
/* Initialize an sctp_addr from a socket. */
@@ -262,6 +263,7 @@
 addr->v4.sin_family = AF_INET;
 addr->v4.sin_port = 0;
 addr->v4.sin_addr.s_addr = inet_sk(sk)->inet_rcv_saddr;
+memset(addr->v4.sin_zero, 0, sizeof(addr->v4.sin_zero));
 }
/* Initialize sk->sk_rcv_saddr from sctp_addr. */
@@ -277,13 +279,19 @@
 }
/* Initialize a sctp_addr from an address parameter. */
 static void sctp_v4_from_addr_param(union sctp_addr *addr,
-union sctp_addr_param *param,
+union sctp_addr_param *param,
    __be16 port, int iif)
{
+if (ntohs(param->v4.param_hdr.length) < sizeof(struct sctp_ipv4addr_param))
+return false;
+addr->v4.sin_family = AF_INET;
 addr->v4.sin_port = port;
 addr->v4.sin_addr.s_addr = param->v4.addr.s_addr;
+memset(addr->v4.sin_zero, 0, sizeof(addr->v4.sin_zero));
+ return true;
 }
/* Initialize an address parameter from a sctp_addr and return the length
 @@ -308,6 +316,7 @@
 saddr->v4.sin_family = AF_INET;
 saddr->v4.sin_port = port;
 saddr->v4.sin_addr.s_addr = fl4->saddr;

/* Compare two addresses exactly. */
addr->v4.sin_family = AF_INET;
addr->v4.sin_addr.s_addr = htonl(INADDR_ANY);
addr->v4.sin_port = port;
+memset(addr->v4.sin_zero, 0, sizeof(addr->v4.sin_zero));
}

/* Is this a wildcard address? */
retval = SCTP_SCOPE_LINK;
} else if (ipv4_is_private_10(addr->v4.sin_addr.s_addr) ||
    ipv4_is_private_172(addr->v4.sin_addr.s_addr) ||
-    ipv4_is_private_192(addr->v4.sin_addr.s_addr)) {
+    ipv4_is_private_192(addr->v4.sin_addr.s_addr) ||
+    ipv4_is_test_198(addr->v4.sin_addr.s_addr)) {
retval = SCTP_SCOPE_PRIVATE;
} else {
retval = SCTP_SCOPE_GLOBAL;
}

struct sctp_association *asoc = t->asoc;
struct rtable *rt;
-struct flowi4 *fl4 = &fl->u.ip4;
+struct flowi _fl;
+struct flowi4 *fl4 = &_fl.u.ip4;
struct sctp_bind_addr *bp;
struct sctp_sockaddr_entry *laddr;
struct dst_entry *dst = NULL;
union sctp_addr *daddr = &t->ipaddr;
union sctp_addr dst_saddr;

-memset(fl4, 0x0, sizeof(struct flowi4));
+memset(&_fl, 0x0, sizeof(_fl));
fl4->daddr = daddr->v4.sin_addr.s_addr;
fl4->fl4_dport = daddr->v4.sin_port;
fl4->flowi4_proto = IPPROTO_SCTP;
@@ -449,15 +461,19 @@
}
if (saddr) {
fl4->saddr = saddr->v4.sin_addr.s_addr;
-fl4->fl4_sport = saddr->v4.sin_port;
+if (!fl4->fl4_sport)
+fl4->fl4_sport = saddr->v4.sin_port;
}
pr_debug("%s: dst:%pI4, src:%pI4 - ", __func__, &fl4->daddr, &fl4->saddr);

rt = ip_route_output_key(sock_net(sk), fl4);
-if (!IS_ERR(rt))
+if (!IS_ERR(rt)) {
    dst = &rt->dst;
+    t->dst = dst;
+    memcpy(fl, &_fl, sizeof(_fl));
+}

/* If there is no association or if a source address is passed, no
 * more validation is required.
@@ -514,35 +530,39 @@
 if (!IS_ERR(rt))
     continue;

-if (!dst)
-    dst = &rt->dst;
-    /* Ensure the src address belongs to the output
-     * interface.
-     */
-     odev = __ip_dev_find(sock_net(sk), laddr->a.v4.sin_addr.s_addr,
-                          false);
-if (!odev || odev->ifindex != fl4->flowi4_oif) {
-    -if (!dst) {
-        dst = &rt->dst;
-        t->dst = dst;
-        +memcpy(fl, &_fl, sizeof(_fl));
-        +} else {
-            dst_release(&rt->dst);
-            +}
-        continue;
-    }

-if (dst != &rt->dst)
-    dst_release(dst);
+    dst_release(dst);
    dst = &rt->dst;
+    t->dst = dst;
+    memcpy(fl, &_fl, sizeof(_fl));
+    break;
+}

out_unlock:
rcu_read_unlock();
out:
-t->dst = dst;
-if (dst)
-+if (dst) {
+pr_debug("rt_dst:%pI4, rt_src:%pI4\n",
- &fl4->daddr, &fl4->saddr);
-else
+ &fl->u.ip4.daddr, &fl->u.ip4.saddr);
+} else {
+t->dst = NULL;
+pr_debug("no route\n");
+}
+
/* For v4, the source address is cached in the route entry(dst). So no need
@@ -608,6 +628,7 @@*/
static int sctp_v4_addr_to_user(struct sctp_sock *sp, union sctp_addr *addr)
{
/* No address mapping for V4 sockets */
+memset(addr->v4.sin_zero, 0, sizeof(addr->v4.sin_zero));
return sizeof(struct sockaddr_in);
}
@@ -784,10 +805,9 @@
switch (ev) {
case NETDEV_UP:
-addr = kmalloc(sizeof(struct sctp_sockaddr_entry), GFP_ATOMIC);
+-addr = kzalloc(sizeof(*addr), GFP_ATOMIC);
if (addr) {
 addr->a.v4.sin_family = AF_INET;
-addr->a.v4.sin_port = 0;
+addr->a.v4.sin_addr.s_addr = ifa->ifa_local;
 addr->valid = 1;
 spin_lock_bh(&net->sctp.local_addr_lock);
@@ -1022,7 +1042,7 @@
.owner		   = THIS_MODULE,
.release	   = inet_release,/* Needs to be wrapped... */
.bind		   = inet_bind,
-+connect	   = inet_dgram_connect,
+.connect	   = sctp_inet_connect,
.socketpair	   = sock_no_socketpair,
+accept	   = inet_accept,
+getname	   = inet_getname,/* Semantics are different. */
@@ -1346,7 +1366,7 @@
return status;
}
-static void __net_init sctp_ctrlsock_exit(struct net *net)
+static void __net_exit sctp_ctrlsock_exit(struct net *net)
{
/* Free the control endpoint. */
et各界_sock_destroy(net->sctp.ctl_sock);
--- linux-4.15.0.orig/net/sctp/sctp_diag.c
+++ linux-4.15.0/net/sctp/sctp_diag.c
@@ -221,14 +221,11 @@
addrcnt++;

    return nla_total_size(sizeof(struct sctp_info))
-+ nla_total_size(1)/* INET_DIAG_SHUTDOWN */
-+ nla_total_size(1)/* INET_DIAG_TOS */
-+ nla_total_size(1)/* INET_DIAG_TCLASS */
-+ nla_total_size(4)/* INET_DIAG_MARK */
+ nla_total_size(addrlen * asoc->peer.transport_count)
+ nla_total_size(addrlen * addrcnt)
-+ nla_total_size(sizeof(struct inet_diag_meminfo))
+ nla_total_size(sizeof(struct inet_diag_msg))
++ inet_diag_msg_attrs_size()
++ nla_total_size(sizeof(struct inet_diag_meminfo))
+ 64;
}
return retval;
}
@@ -858,7 +863,11 @@
  struct sctp_chunk *retval;
  __u32 ctsn;

-  ctsn = sctp_tsnmap_get_ctsn(&asoc->peer.tsn_map);
+  if (chunk && chunk->asoc)
+     ctsn = sctp_tsnmap_get_ctsn(&chunk->asoc->peer.tsn_map);
+  else
+     ctsn = sctp_tsnmap_get_ctsn(&asoc->peer.tsn_map);
  +
  shut.cum_tsn_ack = htonl(ctsn);

  retval = sctp_make_control(asoc, SCTP_CID_SHUTDOWN, 0,
@@ -1378,9 +1387,14 @@
  struct sk_buff *skb;
  struct sock *sk;
  +int chunklen;
  +
  +chunklen = SCTP_PAD4(sizeof(*chunk_hdr) + paylen);
  +if (chunklen > SCTP_MAX_CHUNK_LEN)
  +    goto nodata;
  /* No need to allocate LL here, as this is only a chunk. */
-  skb = alloc_skb(SCTP_PAD4(sizeof(*chunk_hdr) + paylen), gfp);
+  skb = alloc_skb(chunklen, gfp);
 if (!skb)
    goto nodata;
@@ -2152,9 +2166,16 @@
    break;
  case SCTP_PARAM_SET_PRIMARY:
    -if (net->sctp.addip_enable)
-       break;
-    goto fallthrough;
+    if (!net->sctp.addip_enable)
+       goto fallthrough;
+  +    if (ntohs(param.p->length) < sizeof(struct sctp_addip_param) +
+       sizeof(struct sctp_paramhdr)) {
+      sctp_process_inv_paramlength(asoc, param.p,
+         chunk, err_chunk);
+      retval = SCTP_IERROR_ABORT;


case SCTP_PARAM_HOST_NAME_ADDRESS:
    /* Tell the peer, we won't support this param. */
    @ @ -2313,7 +2334,6 @@
    union scap_addr addr;
    struct scap_af *af;
    int src_match = 0;
    -char *cookie;

    /* We must include the address that the INIT packet came from.
     * This is the only address that matters for an INIT packet.
    @ @ -2333,11 +2353,13 @@

    /* Process the initialization parameters. */
    sctp_walk_params(param, peer_init, init_hdr.params) {
        -if (!src_match && (param.p->type == SCTP_PARAM_IPV4_ADDRESS ||
        -param.p->type == SCTP_PARAM_IPV6_ADDRESS)) {
        +if (!src_match &&
        +    (param.p->type == SCTP_PARAM_IPV4_ADDRESS ||
        +     param.p->type == SCTP_PARAM_IPV6_ADDRESS)) {
            af = scap_get_af_specific(param_type2af(param.p->type));
            -af->from_addr_param(&addr, param.addr,
            +af->from_addr_param(&addr, param.addr,
                chunk->sctp_hdr->source, 0);
            +if (!af->from_addr_param(&addr, param.addr,
                +chunk->sctp_hdr->source, 0))
                +continue;
                src_match = 1;
        }
    } @ @ -2417,14 +2439,6 @@
    /* Peer Rwnd : Current calculated value of the peer's rwnd. */
    asoc->peer.rwnd = asoc->peer.i.a_rwnd;

    /* Copy cookie in case we need to resend COOKIE-ECHO. */
    -cookie = asoc->peer.cookie;
    -if (cookie) {
        -asoc->peer.cookie = kmemdup(cookie, asoc->peer.cookie_len, gfp);
        -if (!asoc->peer.cookie)
            -goto clean_up;
    -}

    /* RFC 2960 7.2.1 The initial value of ssthresh MAY be arbitrarily
     * high (for example, implementations MAY use the size of the receiver
     * advertised window).
    @ @ -2523,7 +2537,8 @@
    break;
do_addr_param:
af = sctp_get_af_specific(param_type2af(param.p->type));
-af->from_addr_param(&addr, param.addr, htons(asoc->peer.port), 0);
+if (!af->from_addr_param(&addr, param.addr, htons(asoc->peer.port), 0))
  +break;
scope = sctp_scope(peer_addr);
if (sctp_in_scope(net, &addr, scope))
if (!sctp_assoc_add_peer(asoc, &addr, gfp, SCTP_UNCONFIRMED))
  @ @ -2590.7 +2605.11 @@
case SCTP_PARAM_STATE_COOKIE:
asoc->peer.cookie_len =
  ntohs(param.p->length) - sizeof(struct sctp_paramhdr);
-asoc->peer.cookie = param.cookie->body;
+if (asoc->peer.cookie)
  +kfree(asoc->peer.cookie);
+asoc->peer.cookie = kmemdup(param.cookie->body, asoc->peer.cookie_len, gfp);
+if (!asoc->peer.cookie)
  +retval = 0;
break;

case SCTP_PARAM_HEARTBEAT_INFO:
  @ @ -2616.15 +2635.13 @@
addr_param = param.v + sizeof(struct sctp_addip_param);

  af = sctp_get_af_specific(param_type2af(addr_param->p.type));
  -if (af == NULL)
  +if (!af)
  break;

  -af->from_addr_param(&addr, addr_param,
    -  htons(asoc->peer.port), 0);
  +if (!af->from_addr_param(&addr, addr_param,
      +  htons(asoc->peer.port), 0))
  +break;

  /* if the address is invalid, we can't process it.
   * XXX: see spec for what to do.
   */
  if (!af->addr_valid(&addr, NULL, NULL))
    break;

  @ @ -2652.6 +2669.8 @@
goto fall_through;

  /* Save peer's random parameter */
  +if (asoc->peer.peer_random)
    +kfree(asoc->peer.peer_random);
asoc->peer.peer_random = kmemdup(param.p,
ntohs(param.p->length), gfp);  
if (!asoc->peer.peer_random) {
    goto fall_through;
}
/* Save peer's HMAC list */
+if (asoc->peer.peer_hmacs)  
+kfree(asoc->peer.peer_hmacs);  
asoc->peer.peer_hmacs = kmemdup(param.p,
    ntohs(param.p->length), gfp);  
if (!asoc->peer.peer_hmacs) {
    goto fall_through;
+
+if (asoc->peer.peer_chunks)  
+kfree(asoc->peer.peer_chunks);  
asoc->peer.peer_chunks = kmemdup(param.p,
    ntohs(param.p->length), gfp);  
if (!asoc->peer.peer_chunks) {
    goto fall_through;
+
/* ADDIP 4.2.1  This parameter MUST NOT contain a broadcast
   * or multicast address.
   */
    if (af->is_any(&addr))  
-memcpy(&addr.v4, sctp_source(asconf), sizeof(addr));  
+memcpy(&addr, sctp_source(asconf), sizeof(addr));

    peer = sctp_assoc_lookup_paddr(asoc, &addr);
    if (!peer)  
        goto fall_through;
/* We have checked the packet before, so we do not check again.*/
af = sctp_get_af_specific(param_type2af(addr_param->p.type));
-af->from_addr_param(&addr, addr_param, htons(bp->port), 0);  
+if (!af->from_addr_param(&addr, addr_param, htons(bp->port), 0))
    +return;

switch (asconf_param->param_hdr.type) {
case SCTP_PARAM_ADD_IP:
   outlen = (sizeof(outreq) + stream_len) * out;
inlen = (sizeof(inreq) + stream_len) * in;

   -retval = sctp_make_reconf(asoc, outlen + inlen);
   +retval = sctp_make_reconf(asoc, SCTP_PAD4(outlen) + SCTP_PAD4(inlen));
   if (!retval)
      return NULL;

--- linux-4.15.0.orig/net/sctp/sm_sideffect.c
+++ linux-4.15.0/net/sctp/sm_sideffect.c
@@ -3603,7 +3628,7 @@
    outlen = (sizeof(outreq) + stream_len) * out;
inlen = (sizeof(inreq) + stream_len) * in;
    -retval = sctp_make_reconf(asoc, outlen + inlen);
    +retval = sctp_make_reconf(asoc, SCTP_PAD4(outlen) + SCTP_PAD4(inlen));
    if (!retval)
       return NULL;

/* Try again later. */
if (!mod_timer(&transport->proto_unreach_timer, jiffies + (HZ/20)))
    -sctp_association_hold(asoc);
    +sctp_transport_hold(transport);
    goto out_unlock;

out_unlock:
bh_unlock_sock(sk);
    -sctp_association_put(asoc);
    +sctp_transport_put(transport);
    }

/* Handle the timeout of the RE-CONFIG timer. */
@@ -561,8 +561,8 @@
    */
    if (net->sctp.pf_enable &&
        (transport->state == SCTP_ACTIVE) &&
        (transport->error_count < transport->pathmaxrxt) &&
        (transport->error_count > transport->pf_retrans)) {
            +transport->error_count < transport->pathmaxrxt) &&
            +transport->error_count > transport->pf_retrans)) {

sctp_assoc_control_transport(asoc, transport,
    SCTP_TRANSPORT_PF,
    asoc->rto_initial;
    }

    +if (sctp_state(asoc, ESTABLISHED)) {
        kfree(asoc->peer.cookie);
        +asoc->peer.cookie = NULL;
if (sctp_state(asoc, ESTABLISHED) ||
    sctp_state(asoc, CLOSED) ||
    sctp_state(asoc, SHUTDOWN_RECEIVED)) {
@@ -1114,32 +1119,6 @@
}

-/* Sent the next ASCONF packet currently stored in the association.
- * This happens after the ASCONF_ACK was successfully processed.
- */
-static void sctp_cmd_send_asconf(struct sctp_association *asoc)
-{  
-struct net *net = sock_net(asoc->base.sk);
-  
-/* Send the next asconf chunk from the addip chunk
- * queue.
- */
-  if (!list_empty(&asoc->addip_chunk_list)) {
-    struct list_head *entry = asoc->addip_chunk_list.next;
-    struct sctp_chunk *asconf = list_entry(entry,
-      struct sctp_chunk, list);
-    list_del_init(entry);
-    /* Hold the chunk until an ASCONF_ACK is received. */
-    sctp_chunk_hold(asconf);
-    if (sctp_primitive_ASCONF(net, asoc, asconf))
-      sctp_chunk_free(asconf);
-    else
-      asoc->addip_last_asconf = asconf;
-  }
-  }
-}
-
-/* These three macros allow us to pull the debugging code out of the
- * main flow of sctp_do_sm() to keep attention focused on the real
- * functionality there.
-*/
-#ifdef DEBUG_SCTP
-#define SctpPackaged_InitAck
-#define SctpPackaged_InitAckAreFreed
-#define SctpPackaged_InitAckFreed
-#else
-#define SctpPackaged_InitAck
-#define SctpPackaged_InitAckAreFreed
-#define SctpPackaged_InitAckFreed
-#endif
-/* Generate an INIT ACK chunk. */
-new_obj = sctp_make_init_ack(asoc, chunk, GFP_ATOMIC, 0);
-#ifdef DEBUG_SCTP
-  if (!new_obj)
-    goto nomem;
-  if (!new_obj) {
-    error = -ENOMEM;
-    break;
-  }
sctp_add_cmd_sf(commands, SCTP_CMD_REPLY, SCTP CHUNK(new_obj));
@@ -1425,7 +1406,8 @@
if (!new_obj) {
    if (cmd->obj.chunk)
        sctp_chunk_free(cmd->obj.chunk);
-        goto nomem;
+        error = -ENOMEM;
+        break;
}
sctp_add_cmd_sf(commands, SCTP_CMD_REPLY, SCTP CHUNK(new_obj));
@@ -1472,8 +1454,10 @@
/* Generate a SHUTDOWN chunk. */
new_obj = sctp_make_shutdown(asoc, chunk);
-if (!new_obj)
-    goto nomem;
+if (!new_obj) {
+    error = -ENOMEM;
+    break;
+}
sctp_add_cmd_sf(commands, SCTP_CMD_REPLY, SCTP CHUNK(new_obj));
break;
@@ -1559,9 +1543,17 @@
timeout = asoc->timeouts[cmd->obj.to];
BUG_ON(!timeout);

-timer->expires = jiffies + timeout;
-sctp_association_hold(asoc);
-add_timer(timer);
+/*
+ * SCTP has a hard time with timer starts. Because we process
+ * timer starts as side effects, it can be hard to tell if we
+ * have already started a timer or not, which leads to BUG
+ * halts when we call add timer. So here, instead of just starting
+ * a timer, if the timer is already started, and just mod
+ * the timer with the shorter of the two expiration times
+ */
+if (!timer_pending(timer))
+    sctp_association_hold(asoc);
+    timer_reduce(timer, jiffies + timeout);
break;

case SCTP_CMD_TIMER_RESTART:
@@ -1629,12 +1621,12 @@
break;

case SCTP_CMD_INIT_FAILED:
    -sctp_cmd_init_failed(commands, asoc, cmd->obj.u32);
    +sctp_cmd_init_failed(commands, asoc, cmd->obj.u16);
    break;

case SCTP_CMD_ASSOC_FAILED:
    sctp_cmd_assoc_failed(commands, asoc, event_type,
    -    subtype, chunk, cmd->obj.u32);
    +    subtype, chunk, cmd->obj.u16);
    break;

case SCTP_CMD_INIT_COUNTER_INC:
    @ @ -1785,9 +1777,6 @ @
    }
    sctp_cmd_send_msg(asoc, cmd->obj.msg, gfp);
    break;
    -case SCTP_CMD_SEND_NEXT_ACONF:
    -sctp_cmd_send_asconf(asoc);
    -break;
    case SCTP_CMD_PURGE_ACONF_QUEUE:
    sctp_asconf_queue_teardown(asoc);
    break;
    @ @ -1806,11 +1795,17 @ @
    break;
    }
    -if (error)
    +if (error) {
    +cmd = sctp_next_cmd(commands);
    +while (cmd) {
    +if (cmd->verb == SCTP_CMD_REPLY)
    +sctp_chunk_free(cmd->obj.chunk);
    +cmd = sctp_next_cmd(commands);
    +}
    break;
    +}
    +}
    }

    -out:
    /* If this is in response to a received chunk, wait until
     * we are done with the packet to open the queue so that we don't
     * send multiple packets in response to a single request.
    @ @ -1825,8 +1820,5 @ @
    sp->data_ready_signalled = 0;

    return error;
-nomem:
-error = -ENOMEM;
-goto out;
}

--- linux-4.15.0.orig/net/sctp/sm_statefuns.c
+++ linux-4.15.0/net/sctp/sm_statefuns.c
@@ -150,10 +150,7 @@
 struct sctp_cmd_seq *commands);

 static enum sctp_ierror sctp_sf_authenticate(
-struct net *net,
-const struct sctp_endpoint *ep,
-const struct sctp_association *asoc,
-const union sctp_subtype type,
-struct sctp_chunk *chunk);

 static enum sctpDisposition __sctp_sf_do_9_1_abort(
@@ -185,6 +182,16 @@
 return true;
 }

 /* Check for format error in an ABORT chunk */
+static inline bool sctpErr_chunk_valid(struct sctp_chunk *chunk)
+{
+struct sctp_errhdr *err;
+
+sctp_walk_errors(err, chunk->chunk_hdr);
+
+return (void *)err == (void *)chunk->chunk_end;
+}
+
+/**********************************************************
* These are the state functions for handling chunk events.
**********************************************************/
@@ -618,6 +625,38 @@
 return SCTP_DISPOSITION_CONSUME;
 }

+static bool sctp_auth_chunk_verify(struct net *net, struct sctp_chunk *chunk,
+   const struct sctp_association *asoc)
+{
+struct sctp_chunk auth;
+
+if (!chunk->auth_chunk)
+return true;
+
+/* SCTP-AUTH: auth_chunk pointer is only set when the cookie-echo
/* Make sure that we and the peer are AUTH capable */
if (!net->sctp.auth_enable || !asoc->peer.auth_capable)
    return false;

/* set-up our fake chunk so that we can process it */
auth.skb = chunk->auth_chunk;
auth.asoc = chunk->asoc;
auth.sctp_hdr = chunk->sctp_hdr;
auth.chunk_hdr = (struct sctp_chunkhdr *)
    skb_push(chunk->auth_chunk, sizeof(struct sctp_chunkhdr));
    skb_pull(chunk->auth_chunk, sizeof(struct sctp_chunkhdr));
auth.transport = chunk->transport;

return sctp_sf_authenticate(asoc, &auth) == SCTP_IERROR_NO_ERROR;
}

/* Respond to a normal COOKIE ECHO chunk.  
* We are the side that is being asked for an association. 
*/
if (error)
    goto nomem_init;

/* SCTP-AUTH: auth_chunk pointer is only set when the cookie-echo 
- * is supposed to be authenticated and we have to do delayed 
- * authentication. We've just recreated the association using 
- * the information in the cookie and now it's much easier to 
- * do the authentication. 
- */
-if (chunk->auth_chunk) {
    struct sctp_chunk auth;
    enum sctp_ierror ret;

    /* Make sure that we and the peer are AUTH capable */
    -if (!net->sctp.auth_enable || !new_asoc->peer.auth_capable) {
        -sctp_association_free(new_asoc);
        -return sctp_sf_pdiscard(net, ep, asoc, type, arg, commands);
    }

    /* set-up our fake chunk so that we can process it */
    -auth.skb = chunk->auth_chunk;
-auth.asoc = chunk->asoc;
-auth.sctp_hdr = chunk->sctp_hdr;
-auth.chunk_hdr = (struct sctp_chunkhdr *)
-skb_push(chunk->auth_chunk,
- sizeof(struct sctp_chunkhdr));
-skb_pull(chunk->auth_chunk, sizeof(struct sctp_chunkhdr));
-auth.transport = chunk->transport;
-
-ret = sctp_sf_authenticate(net, ep, new_asoc, type, &auth);
-if (ret != SCTP_IERROR_NO_ERROR) {
-sctp_association_free(new_asoc);
-return sctp_sf_pdiscard(net, ep, asoc, type, arg, commands);
-}
+if (!sctp_auth_chunk_verify(net, chunk, new_asoc)) {
+sctp_association_free(new_asoc);
+return sctp_sf_pdiscard(net, ep, asoc, type, arg, commands);
+
repl = sctp_make_cookie_ack(new_asoc, chunk);
@@ -1755,13 +1766,15 @@
GFP_ATOMIC)
goto nomem;
+
+if (!sctp_auth_chunk_verify(net, chunk, new_asoc))
+return SCTP_DISPOSITION_DISCARD;
+
/* Make sure no new addresses are being added during the
 * restart. Though this is a pretty complicated attack
 * since you'd have to get inside the cookie.
 */
-if (!sctp_sf_check_restart_addrs(new_asoc, asoc, chunk, commands)) {
+if (!sctp_sf_check_restart_addrs(new_asoc, asoc, chunk, commands))
return SCTP_DISPOSITION_CONSUME;
-
/* If the endpoint is in the SHUTDOWN-ACK-SENT state and recognizes
 * the peer has restarted (Action A), it MUST NOT setup a new
 @@ -1801,31 +1814,47 @@
SCTP_TO(SCTP_EVENT_TIMEOUT_T4_RTO));
sctp_add_cmd_sf(commands, SCTP_CMD_PURGE_ASCONF_QUEUE, SCTP_NULL());

-repl = sctp_make_cookie_ack(new_asoc, chunk);
+/* Update the content of current association. */
+if (sctp_assoc_update((struct sctp_association *)asoc, new_asoc)) {
+struct sctp_chunk *abort;
+
+abort = sctp_make_abort(asoc, NULL, sizeof(struct sctp_errhdr));
+if (abort) {
+sctp_init_cause(abort, SCTP_ERROR_RSRC_LOW, 0);
+sctp_add_cmd_sf(commands, SCTP_CMD_REPLY, SCTP_CHUNK(abort));
+
+sctp_add_cmd_sf(commands, SCTP_CMD_SET_SK_ERR, SCTP_ERROR(ECONNABORTED));
+sctp_add_cmd_sf(commands, SCTP_CMD_ASSOC_FAILED,
    +SCTP_PERR(SCTP_ERROR_RSRC_LOW));
+SCTP_INC_STATS(net, SCTP_MIB_ABORTEDS);
+SCTP_DEC_STATS(net, SCTP_MIB_CURRESTAB);
+goto nomem;
+
+repl = sctp_make_cookie_ack(asoc, chunk);
if (!repl)
goto nomem;

/* Report association restart to upper layer. */
ev = sctp_ulpevent_make_assoc_change(asoc, 0, SCTP_RESTART, 0,
    - new_asoc->c.sinit_num_ostreams,
    - new_asoc->c.sinit_max_instreams,
    + asoc->c.sinit_num_ostreams,
    + asoc->c.sinit_max_instreams,
    NULL, GFP_ATOMIC);
if (!ev)
goto nomem_ev;

/* Update the content of current association. */
-sctp_add_cmd_sf(commands, SCTP_CMD_UPDATE_ASSOC, SCTP_ASOC(new_asoc));
sctp_add_cmd_sf(commands, SCTP_CMD_EVENT_ULP, SCTP_ULPEVENT(ev));
-if (sctp_state(asoc, SHUTDOWN_PENDING) &&
+if ((sctp_state(asoc, SHUTDOWN_PENDING) ||
    + sctp_state(asoc, SHUTDOWN_SENT)) &&
        (sctp_sstate(asoc->base.sk, CLOSING) ||
        sock_flag(asoc->base.sk, SOCK_DEAD))) {
    /* if we're currently in SHUTDOWN_PENDING, but the socket
    - has been closed by user, don't transition to ESTABLISHED.
    - Instead trigger SHUTDOWN bundled with COOKIE_ACK.
    */
    +* If the socket has been closed by user, don't
    + transition to ESTABLISHED. Instead trigger SHUTDOWN
    + bundled with COOKIE_ACK.
    */
    sctp_add_cmd_sf(commands, SCTP_CMD_REPLY, SCTP_CHUNK(repl));
    return sctp_sf_do_9_2_start_shutdown(net, ep, asoc,
        - SCTP_ST_CHUNK(0), NULL,
        + SCTP_ST_CHUNK(0), repl,
            commands);
    } else {
    sctp_add_cmd_sf(commands, SCTP_CMD_NEW_STATE,

@@ -1867,11 +1896,15 @@
GFP_ATOMIC))
go to nomem;

+if (!sctp_auth_chunk_verify(net, chunk, new_asoc))
+return SCTP_DISPOSITION_DISCARD;
+
/* Update the content of current association. */
sctp_add_cmd_sf(commands, SCTP_CMD_UPDATE_ASSOC, SCTP_ASOC(new_asoc));
sctp_add_cmd_sf(commands, SCTP_CMD_NEW_STATE, SCTP_STATE(SCTP_STATE_ESTABLISHED));
-sctp_inc_stats(net, SCTP_MIB_CURRESTAB);
+if (asoc->state < SCTP_STATE_ESTABLISHED)
+sctp_inc_stats(net, SCTP_MIB_CURRESTAB);
sctp_add_cmd_sf(commands, SCTP_CMD_HB_TIMERS_START, SCTP_NULL());

repl = sctp_make_cookie_ack(new_asoc, chunk);
@@ -1961,6 +1994,9 @@
    * a COOKIE ACK, */
+if (!sctp_auth_chunk_verify(net, chunk, asoc))
+return SCTP_DISPOSITION_DISCARD;
+
/* Don't accidentally move back into established state. */
if (asoc->state < SCTP_STATE_ESTABLISHED) {
    sctp_add_cmd_sf(commands, SCTP_CMD_TIMER_STOP,
@@ -2000,7 +2036,7 @@
    }
    }

-repl = sctp_make_cookie_ack(new_asoc, chunk);
+repl = sctp_make_cookie_ack(asoc, chunk);
if (!repl)
go to nomem;
@@ -2193,6 +2229,9 @@
    scpt_bind_addr_state(&asoc->base.bind_addr, &chunk->dest))
return scpt_sf_discard_chunk(net, ep, asoc, type, arg, commands);

+if (!sctp_err_chunk_valid(chunk))
+return scpt_sf_pdiscard(net, ep, asoc, type, arg, commands);
+
return __sctp_sf_do_9_1_abort(net, ep, asoc, type, arg, commands);
}
@@ -2236,6 +2275,9 @@
    scpt_bind_addr_state(&asoc->base.bind_addr, &chunk->dest))
return scpt_sf_discard_chunk(net, ep, asoc, type, arg, commands);
if (!sctp_err_chunk_valid(chunk))
return sctp_sf_pdiscard(net, ep, asoc, type, arg, commands);
+
/* Stop the T2-shutdown timer. */
sctp_add_cmd_sf(commands, SCTP_CMD_TIMER_STOP,
SCTP_TO(SCTP_EVENT_TIMEOUT_T2_SHUTDOWN));
@@ -2503,6 +2545,9 @@
sctp_bind_addr_state(&asoc->base.bind_addr, &chunk->dest)
return sctp_sf_discard_chunk(net, ep, asoc, type, arg, commands);
+
if (!sctp_err_chunk_valid(chunk))
return sctp_sf_discard(net, ep, asoc, type, arg, commands);
+
return __sctp_sf_do_9_1_abort(net, ep, asoc, type, arg, commands);
}
@@ -2520,16 +2565,8 @@
/* See if we have an error cause code in the chunk. */
len = ntohs(chunk->chunk_hdr->length);
-if (len >= sizeof(struct sctp_chunkhdr) + sizeof(struct sctp_errhdr)) {
-struct sctp_errhdr *err;
- -sctp_walk_errors(err, chunk->chunk_hdr);
- -if (((void *)err != (void *)chunk->chunk_end)
- -return sctp_sf_pdiscard(net, ep, asoc, type, arg,
- -commands);
- -
- +if (len >= sizeof(struct sctp_chunkhdr) + sizeof(struct sctp_errhdr))
error = ((struct sctp_errhdr *)chunk->skb->data)->cause;
- }

sctp_add_cmd_sf(commands, SCTP_CMD_SET_SK_ERR, SCTP_ERROR(ECONNRESET));
/* ASSOC_FAILED will DELETE_TCB. */
@@ -3747,6 +3784,29 @@
return SCTP_DISPOSITION_CONSUME;
}
+
+static enum sctp_disposition sctp_send_next_asconf(
+struct net *net,
+const struct sctp_endpoint *ep,
+struct sctp_association *asoc,
+const union sctp_subtype type,
+struct sctp_cmd_seq *commands)
+{
+    struct sctp_chunk *asconf;
+    struct list_head *entry;

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+if (list_empty(&asoc->addip_chunk_list))
+return SCTP_DISPOSITION_CONSUME;
+
+entry = asoc->addip_chunk_list.next;
+asconf = list_entry(entry, struct sctp_chunk, list);
+
+list_del_init(entry);
+sctp_chunk_hold(asconf);
+asoc->addip_last_asconf = asconf;
+
+return sctp_sf_do_prm_asconf(net, ep, asoc, type, asconf, commands);
+
+
/*
 * ADDIP Section 4.3 General rules for address manipulation
 * When building TLV parameters for the ASCONF Chunk that will add or
 * replace address:
 */
if (!sctp_process_asconf_ack((struct sctp_association *)asoc,
    asconf_ack)) {
  /* Successfully processed ASCONF_ACK. We can
   * release the next asconf if we have one.
   */
  sctp_add_cmd_sf(commands, SCTP_CMD_SEND_NEXT_ASCONF,
      SCTP_NULL());
  return Sctp_DISPOSITION_CONSUME;
}
+
abort = sctp_make_abort(asoc, asconf_ack,
sizeof(struct sctp_errhdr));
*@ -4111,10 +4167,7 @@
 * The return value is the disposition of the chunk.
 */
static enum sctp_ierror sctp_sf_authenticate(
    struct net *net,
    const struct sctp_endpoint *ep,
    const struct sctp_association *asoc,
    const sctp_subtype type,
    sctp_chunk *chunk)
{
    struct sctp_authhdr *auth_hdr;
    @@ -4212,7 +4265,7 @@

auth_hdr = (struct sctp_authhdr *)chunk->skb->data;
-error = sctp_sf_authenticate(net, ep, asoc, type, chunk);
+error = sctp_sf_authenticate(asoc, chunk);
switch (error) {
    case SCTP_IERROR_AUTH_BAD_HMAC:
/* Generate the ERROR chunk and discard the rest
@@ -5382,7 +5435,7 @@
* in the Cumulative TSN Ack field the last sequential TSN it
* has received from the peer.
 */
-reply = sctp_make_shutdown(asoc, NULL);
+reply = sctp_make_shutdown(asoc, arg);
if (!reply)
goto nomem;
@@ -5980,7 +6033,7 @@
disposition = SCTP_DISPOSITION_CONSUME;
    if (sctp_outq_is_empty(&asoc->outqueue)) {
        disposition = sctp_sf_do_9_2_start_shutdown(net, ep, asoc, type,
            -arg, commands);
+            NULL, commands);
        + NULL, commands);
    }

    return disposition;
@@ -6345,13 +6398,15 @@
/* in sctp_ulpevent_make_rcvmsg will drop the frame if we grow our
* memory usage too much
 */
-    if (*sk->sk_prot_creator->memory_pressure) {
+    if (sk_under_memory_pressure(sk)) {
        if (sctp_tsnmap_has_gap(map) &&
            (sctp_tsnmap_get_ctsn(map) + 1) == tsn) {
            pr_debug("%s: under pressure, reneging for tsn:%u\n",
                __func__, tsn);
            deliver = SCTP_CMD_RENEGE;
        } else {
            +sk_mem_reclaim(sk);
        }
    }
/*
--- linux-4.15.0.orig/net/sctp/socket.c
+++ linux-4.15.0/net/sctp/socket.c
@@ -82,7 +82,7 @@
#include <net/sctp/stream_sched.h>
/* Forward declarations for internal helper functions. */
static int sctp_writeable(struct sock *sk);
+static bool sctp_writeable(struct sock *sk);
static void sctp_wfree(struct sk_buff *skb);
static int sctp_wait_for_sndbuf(struct sctp_association *asoc, long *timeo_p,
        size_t msg_len);

/* Get the sndbuf space available at the time on the association. */
static inline int sctp_wspace(struct sctp_association *asoc)
{
    int amt;
    -if (asoc->ep->sndbuf_policy)
        -amt = asoc->sndbuf_used;
    -else
        -amt = sk_wmem_alloc_get(asoc->base.sk);
    +struct sock *sk = asoc->base.sk;
    -if (amt >= asoc->base.sk->sk_sndbuf) {
        -if (asoc->base.sk->sk_userlocks & SOCK_SNDBUF_LOCK)
            -amt = 0;
        -else {
            -amt = sk_stream_wspace(asoc->base.sk);
            -if (amt < 0)
                -amt = 0;
            -}
        -} else {
            -amt = asoc->base.sk->sk_sndbuf - amt;
        -}
    -return amt;
    +return asoc->ep->sndbuf_policy ? sk->sk_sndbuf - asoc->sndbuf_used
        + : sk_stream_wspace(sk);
}

/* Increment the used sndbuf space count of the corresponding association by */
	@ @ -176,29 +161,44 @ @
	skb_orphan(chunk->skb);
}

+newline
+traverse_and_process() \n+do \n+msg = chunk->msg; \n+if (msg == prev_msg) \n+continue; \n+list_for_each_entry(c, &msg->chunks, frag_list) \n+if ((clear && asoc->base.sk == c->skb->sk) ||
+    (!clear && asoc->base.sk != c->skb->sk)) \n+    (!clear && asoc->base.sk != c->skb->sk))
static void sctp_for_each_tx_datachunk(struct sctp_association *asoc,
   bool clear,
   void (*cb)(struct sctp_chunk *))
{
    struct sctp_datamsg *msg, *prev_msg = NULL;
    struct sctp_outq *q = &asoc->outqueue;
    struct sctp_chunk *chunk, *c;
    struct sctp_transport *t;
    struct sctp_chunk *chunk;

    list_for_each_entry(t, &asoc->peer.transport_addr_list, transports)
      list_for_each_entry(chunk, &t->transmitted, transmitted_list)
        cb(chunk);
      traverse_and_process();
    list_for_each_entry(chunk, &q->retransmit, transmitted_list)
      cb(chunk);
      traverse_and_process();
    list_for_each_entry(chunk, &q->sacked, transmitted_list)
      cb(chunk);
      traverse_and_process();
    list_for_each_entry(chunk, &q->abandoned, transmitted_list)
      cb(chunk);
      traverse_and_process();
    list_for_each_entry(chunk, &q->out_chunk_list, list)
      cb(chunk);
      traverse_and_process();
}

/* Verify that this is a valid address. */
@@ -251,11 +251,10 @@
    spin_lock_bh(&sctp_assocs_id_lock);
    asoc = (struct sctp_association *)idr_find(&sctp_assocs_id, (int)id);
    if (asoc && (asoc->base.sk != sk || asoc->base.dead))
      asoc = NULL;
    spin_unlock_bh(&sctp_assocs_id_lock);

    -if (!asoc || (asoc->base.sk != sk) || asoc->base.dead)
-return NULL;
-
return asoc;
}

@@ -338,11 +337,14 @@
if (!opt->pf->af_supported(addr->sa.sa_family, opt))
    return NULL;

/* V4 mapped address are really of AF_INET family */
-if (addr->sa.sa_family == AF_INET6 &&
 -ipv6_addr_v4mapped(&addr->v6.sin6_addr) &&
 -!opt->pf->af_supported(AF_INET, opt))
 -return NULL;
+if (addr->sa.sa_family == AF_INET6) {
+    if (len < SIN6_LEN_RFC2133)
+        return NULL;
+/* V4 mapped address are really of AF_INET family */
+if (ipv6_addr_v4mapped(&addr->v6.sin6_addr) &&
+    !opt->pf->af_supported(AF_INET, opt))
+    return NULL;
+
/* If we get this far, af is valid. */
af = sctp_get_af_specific(addr->sa.sa_family);
@@ -353,6 +355,18 @@
    return af;
}

+static void sctp_auto_asconf_init(struct sctp_sock *sp)
+{*
+    struct net *net = sock_net(&sp->inet.sk);
+    +if (net->sctp.default_auto_asconf) {
+        spin_lock(&net->sctp.addr_wq_lock);
+        +list_add_tail(&sp->auto_asconf_list, &net->sctp.auto_asconf_splist);
+        spin_unlock(&net->sctp.addr_wq_lock);
+    +sp->do_auto_asconf = 1;
+    +}
+    +}
+
/* Bind a local address either to an endpoint or to an association. */
static int sctp_do_bind(struct sock *sk, union sctp_addr *addr, int len)
{*
@@ -415,8 +429,10 @@

/* Refresh ephemeral port. */
-if (!bp->port)
+if (!bp->port) {
    bp->port = inet_sk(sk)->inet_num;
+    scpt_auto_asconf_init(sp);
+}

/* Add the address to the bind address list.
 * Use GFP_ATOMIC since BHs will be disabled.
@@ -1075,7 +1091,7 @@*/
static int __sctp_connect(struct sock *sk,
-                    struct sockaddr *kaddrs,
-                    int addrs_size,
+                    int addrs_size, int flags,
    sctp_assoc_t *assoc_id)
{
    struct net *net = sock_net(sk);
@@ -1093,7 +1109,6 @@
        union sctp_addr *sa_addr = NULL;
        void *addr_buf;
        unsigned short port;
-unsigned int f_flags = 0;
    sp = sctp_sk(sk);
    ep = sp->ep;
    @@ -1243,13 +1258,7 @@
            if (sk->sk_socket->file)
        -f_flags = sk->sk_socket->file->f_flags;
        -timeo = sock_sndtimeo(sk, f_flags & O_NONBLOCK);
    if (assoc_id)
        *assoc_id = asoc->assoc_id;
@@ -1344,7 +1353,7 @@
{
    struct sockaddr *kaddrs;
    gfp_t gfp = GFP_KERNEL;
-unsigned int err = 0;
+int err = 0;
    pr_debug("%s: sk:%p addrs:%p addrs_size:%d\n",
__func__, sk, addrs, addr_size);
return -ENOMEM;

if (__copy_from_user(kaddrs, addr, addr_size)) {
    err = -EFAULT;
} else {
    err = __sctp_connect(sk, kaddrs, addr_size, assoc_id);
    kfree(kaddrs);
    return -EFAULT;
}

/* in-kernel sockets don't generally have a file allocated to them
+ * if all they do is call sock_create_kern().
+ */
+if (sk->sk_socket->file)
+flags = sk->sk_socket->file->f_flags;
+
+err = __sctp_connect(sk, kaddrs, addr_size, flags, assoc_id);
+
    kfree(kaddrs);

    return err;
@got -1969,11 +1985,14 @
goto out_free;
}

@if (sctp_wspace(asoc) < msg_len)
+if (sctp_wspace(asoc) < (int)msg_len)
sctp_prsctp_prune(asoc, sinfo, msg_len - sctp_wspace(asoc));

timeo = sock_sndtimeo(sk, msg->msg_flags & MSG_DONTWAIT);
@if (!sctp_wspace(asoc)) {
+if (sk_under_memory_pressure(sk))
+sk_mem_reclaim(sk);
+
+if (sctp_wspace(asoc) <= 0 || !sk_wmem_schedule(sk, msg_len)) {
/* sk can be changed by peel off when waiting for buf. */
    err = sctp_wait_for_sndbuf(asoc, &timeo, msg_len);
    if (err) {
    @ -3756,32 +3775,16 @@
        unsigned int optlen)
    {
        struct sctp_assoc_value params;
        -struct sctp_association *asoc;
        -int retval = -EINVAL;

        if (optlen != sizeof(params))


-goto out;
-
-if (copy_from_user(&params, optval, optlen)) {
-retval = -EFAULT;
-goto out;
-}
-
-asoc = sctp_id2assoc(sk, params.assoc_id);
-if (asoc) {
-asoc->prsctp_enable = !!params.assoc_value;
-} else if (!params.assoc_id) {
-struct sctp_sock *sp = sctp_sk(sk);
+return -EINVAL;

-sp->ep->prsctp_enable = !!params.assoc_value;
-} else {
-goto out;
-}
+
+if (copy_from_user(&params, optval, optlen))
+return -EFAULT;

-retval = 0;
+sctp_sk(sk)->ep->prsctp_enable = !!params.assoc_value;

-out:
-return retval;
+return 0;
}

static int sctp_setsockopt_default_prinfo(struct sock *sk,
@@ -4252,31 +4255,36 @@

*/
static int sctp_connect(struct sock *sk, struct sockaddr *addr,
-int addr_len)
+int addr_len, int flags)
{
-int err = 0;
-struct sctp_af *af;
+int err = -EINVAL;

-lock_sock(sk);
-
-pr_debug("%s: sk:%p, sockaddr:%p, addr_len:%d\n", __func__, sk,
-addr, addr_len);

/* Validate addr_len before calling common connect/connectx routine. */
af = sctp_get_af_specific(addr->sa_family);
-if (!af || addr_len < af->sockaddr_len) {
-err = -EINVAL;
-} else {
  /* Pass correct addr len to common routine (so it knows there
   * is only one address being passed.
   */
  -err = __sctp_connect(sk, addr, af->sockaddr_len, NULL);
-}
+if (af && addr_len >= af->sockaddr_len)
+err = __sctp_connect(sk, addr, af->sockaddr_len, flags, NULL);

release_sock(sk);
return err;
}

+int sctp_inet_connect(struct socket *sock, struct sockaddr *uaddr,
  int addr_len, int flags)
+{
+  if (addr_len < sizeof(uaddr->sa_family))
+    return -EINVAL;
+  if (uaddr->sa_family == AF_UNSPEC)
+    return -EOPNOTSUPP;
+  return sctp_connect(sock->sk, uaddr, addr_len, flags);
+}

/* FIXME: Write comments. */
static int sctp_disconnect(struct sock *sk, int flags)
{
    sk_socket_allocated_inc(sk);
    sock_prot_inuse_add(net, sk->sk_prot, 1);

    /* Nothing can fail after this block, otherwise
     * sctp_destroy_sock() will be called without addr_wq_lock held
     */
    -if (net->sctp.default_auto_asconf) {
        -spinlock(&sock_net(sk)->sctp.addr_wq_lock);
        -list_add_tail(&sp->auto_asconf_list,
            -&net->sctp.auto_asconf_splist);
        -sp->do_auto_asconf = 1;
        -spinUnlock(&sock_net(sk)->sctp.addr_wq_lock);
    -} else {
        -sp->do_auto_asconf = 0;
    -}

    local_bh_enable();
}
return 0;
@@ -4729,9 +4724,14 @@
 break;
 }

+if (!sctp_transport_hold(t))
+continue;
+
 if (net_eq(sock_net(t->asoc->base.sk), net) &&
     t->asoc->peer.primary_path == t)
 break;
+
+sctp_transport_put(t);
}

return t;
@@ -4741,13 +4741,18 @@
 struct rhashtable_iter *iter,
         int pos)
 {
-void *obj = SEQ_START_TOKEN;
+struct sctp_transport *t;

-while (pos && (obj = sctp_transport_get_next(net, iter)) &&
-       !IS_ERR(obj))
-    pos--;
+if (!pos)
+    return SEQ_START_TOKEN;
+
+return obj;
+while ((t = sctp_transport_get_next(net, iter)) && !IS_ERR(t)) {
+    if (!--pos)
+        break;
+sctp_transport_put(t);
+}
+}
+return t;

int sctp_for_each_endpoint(int (*cb)(struct sctp_endpoint *, void *),
@@ -4807,8 +4812,6 @@
 tsp = sctp_transport_get_idx(net, &hti, *pos + 1);
 for (; !IS_ERR_OR_NULL(tsp); tsp = sctp_transport_get_next(net, &hti)) {
-    if (!sctp_transport_hold(tsp))
-        continue;
 ret = cb(tsp, p);
if (ret)
break;
@@ -7238,8 +7241,6 @@
pr_debug("%s: begins, snum:%d\n", __func__, snum);

-local_bh_disable();
-
if (snum == 0) {
/* Search for an available port. */
int low, high, remaining, index;
@@ -7258,20 +7259,21 @@
continue;
index = sctp_phashfn(sock_net(sk), rover);
head = &sctp_port_hashtable[index];
-spin_lock(&head->lock);
+spin_lock_bh(&head->lock);
sctp_for_each_hentry(pp, &head->chain)
if ((pp->port == rover) &&
    net_eq(sock_net(sk), pp->net))
goto next;
b overrides the existing port iterator, pp being NULL. 
}
/* Exhausted local port range during search? */
ret = 1;
if (remaining <= 0)
-goto fail;
+return ret;

/* OK, here is the one we will use. HEAD (the port
 * hash table list entry) is non-NULL and we hold it's
@@ -7286,7 +7288,7 @@
 /* port iterator, pp being NULL.
 */
head = &sctp_port_hashtable[sctp_phashfn(sock_net(sk), snum)];
-spin_lock(&head->lock);
+spin_lock_bh(&head->lock);
sctp_for_each_hentry(pp, &head->chain) {
if ((pp->port == snum) && net_eq(pp->net, sock_net(sk)))
goto pp_found;
@@ -7370,10 +7372,7 @@
ret = 0;
fail_unlock:
- spin_unlock(&head->lock);
-
-fail:
- local_bh_enable();
+ spin_unlock_bh(&head->lock);
 return ret;

@@ -7538,7 +7537,7 @@
 mask = 0;

 /* Is there any exceptional events? */
- if (sk->sk_err || !skb_queue_empty(&sk->sk_error_queue))
+ if (sk->sk_err || !skb_queue_empty_lockless(&sk->sk_error_queue))
  mask |= POLLERR |
 (sock_flag(sk, SOCK_SELECT_ERR_QUEUE) ? POLLPRI : 0);
 if (sk->sk_shutdown & RCV_SHUTDOWN)
@@ -7547,7 +7546,7 @@
 mask |= POLLHUP;

 /* Is it readable? Reconsider this code with TCP-style support. */
- if (!skb_queue_empty(&sk->sk_receive_queue))
+ if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
  mask |= POLLIN | POLLRDNORM;

 /* The association is either gone or not ready. */
@@ -7883,7 +7882,7 @@
 if (sk_can_busy_loop(sk)) {
   sk_busy_loop(sk, noblock);

- if (!skb_queue_empty(&sk->sk_receive_queue))
+ if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
   continue;
 }

@@ -8045,7 +8044,10 @@
 goto do_error;
 if (signal_pending(current))
 goto do_interrupted;
- if (msg_len <= sctp_wspace(asoc))
+ if (sk_under_memory_pressure(sk))
+ sk_mem_reclaim(sk);
+ if ((int)msg_len <= sctp_wspace(asoc) &&
+ sk_wmem_schedule(sk, msg_len))
 break;

 /* Let another process have a go. Since we are going
static int sctp_writeable(struct sock *sk)
{
    int amt = 0;
    amt = sk->sk_sndbuf - sk_wmem_alloc_get(sk);
    if (amt < 0)
        amt = 0;
    return amt;
}

/* Wait for an association to go into ESTABLISHED state. If timeout is 0,
   newinet->inet_rcv_saddr = inet->inet_rcv_saddr;
   newinet->inet_dport = htons(asoc->peer.port);
   newinet->pmtudisc = inet->pmtudisc;
   newinet->inet_id = asoc->next_tsn ^ jiffies;
   newinet->inet_id = prandom_u32();
   newinet->uc_ttl = inet->uc_ttl;
   newinet->mc_loop = 1;
   sctp_bind_addr_dup(&newsp->ep->base.bind_addr,
                      &oldsp->ep->base.bind_addr, GFP_KERNEL);

   sctp_auto_asconf_init(newsp);
   
   /* Move any messages in the old socket's receive queue that are for the
      * peeled off association to the new socket's receive queue.
   */
   @ @ -8447,9 +8446,9 @@
   lock_sock_nested(newsk, SINGLE_DEPTH_NESTING);
   //sctp_for_each_tx_datachunk(assoc, sctp_clear_owner_w);
   //sctp_for_each_tx_datachunk(assoc, true, sctp_clear_owner_w);
   sctp_assoc_migrate(assoc, newsk);
   //sctp_for_each_tx_datachunk(assoc, sctp_set_owner_w);
   //sctp_for_each_tx_datachunk(assoc, false, sctp_set_owner_w);

   /* If the association on the newsk is already closed before accept()
      * is called, set RCV_SHUTDOWN flag.
   */
   @ @ -8470,7 +8469,6 @@
.name = "SCTP",
.OWNER = THIS_MODULE,
.close = sctp_close,
.connect = sctp_connect,
.disconnect = sctp_disconnect,
.accept = sctp_accept,
.ioctl = sctp_ioctl,
@@ -8485,7 +8483,7 @@
.backlog_rcv = sctp_backlog_rcv,
.hash = sctp_hash,
.unhash = sctp_unhash,
.get_port = sctp_get_port,
+no_autobind = true,
.obj_size = sizeof(struct sctp_sock),
.sysctl_mem = sysctl_sctp_mem,
.sysctl_rmem = sysctl_sctp_rmem,
@@ -8509,7 +8507,6 @@
.name = "SCTPv6",
.owner = THIS_MODULE,
.close = sctp_close,
.connect = sctp_connect,
.disconnect = sctp_disconnect,
.accept = sctp_accept,
.ioctl = sctp_ioctl,
@@ -8524,7 +8521,7 @@
.backlog_rcv = sctp_backlog_rcv,
.hash = sctp_hash,
.unhash = sctp_unhash,
-get_port = sctp_get_port,
+no_autobind = true,
.obj_size = sizeof(struct sctp6_sock),
.sysctl_mem = sysctl_sctp_mem,
.sysctl_rmem = sysctl_sctp_rmem,
--- linux-4.15.0.orig/net/sctp/stream.c
+++ linux-4.15.0/net/sctp/stream.c
@@ -37,17 +37,11 @@
#include <net/sctp/stream.h>
#include <net/sctp/stream_sched.h>

 /* Migrates chunks from stream queues to new stream queues if needed,
 - * but not across associations. Also, removes those chunks to streams
 - * higher than the new max.
 - */
-static void sctp_stream_outq_migrate(struct sctp_stream *stream,
-  struct sctp_stream *new, __u16 outcnt)
+static void sctp_stream_shrink_out(struct sctp_stream *stream, __u16 outcnt)
{
 struct sctp_association *asoc;
struct sctp_chunk *ch, *temp;
struct sctp_outq *outq;
-int i;

asoc = container_of(stream, struct sctp_association, stream);
outq = &asoc->outqueue;
@@ -71,6 +65,19 @@
sctp_chunk_free(ch);
 }
+
+/* Migrates chunks from stream queues to new stream queues if needed,
+ * but not across associations. Also, removes those chunks to streams
+ * higher than the new max.
+ */
+static void sctp_stream_outq_migrate(struct sctp_stream *stream,
+    struct sctp_stream *new, __u16 outcnt)
+{
+  int i;
+  +
+  +if (stream->outcnt > outcnt)
+    +sctp_stream_shrink_out(stream, outcnt);
+
  if (new) {
    /* Here we actually move the old ext stuff into the new
@@ -84,8 +91,10 @@
      }
    }

    -for (i = outcnt; i < stream->outcnt; i++)
    +for (i = outcnt; i < stream->outcnt; i++) {
      kfree(stream->out[i].ext);
      +stream->out[i].ext = NULL;
      +}
    }

  static int sctp_stream_alloc_out(struct sctp_stream *stream, __u16 outcnt,
@@ -164,8 +173,6 @@
    }
    }

    -sched->init(stream);
    -
    in:
    if (!incnt)
goto out;
@@ -237,6 +244,8 @@


new->out = NULL;
new->in  = NULL;
+new->outcnt = 0;
+new->incnt  = 0;
}

static int sctp_send_reconf(struct sctp_association *asoc,
@@ -340,6 +349,7 @@
str_list[i] = htons(str_list[i]);
if (out && !sctp_stream_outq_is_empty(stream, str_nums, nstr_list)) {
+ kfree(nstr_list);
    retval = -EAGAIN;
    goto out;
}@@ -486,7 +496,6 @@
    stream->incnt = incnt;
    stream->outcnt = outcnt;

    asoc->strreset_outstanding = !!out + !!in;
@@ -537,9 +546,9 @@
    struct sctp_strreset_outreq *outreq = param.v;
    struct sctp_stream *stream = &asoc->stream;
    __u32 result = SCTP_STRRESET_DENIED;
    __u16 i, nums, flags = 0;
    __be16 *str_p = NULL;
    __u32 request_seq;
    __u16 i, nums;

    request_seq = ntohl(outreq->request_seq);
@@ -567,6 +576,15 @@
    if (!(!asoc->strreset_enable & SCTP_ENABLE_RESET_STREAM_REQ))
        goto out;

    +nums = (ntohs(param.p->length) - sizeof(*outreq)) / sizeof(__u16);
    +str_p = outreq->list_of_streams;
    +for (i = 0; i < nums; i++) {
        +if (ntohs(str_p[i]) >= stream->incnt) {
            +result = SCTP_STRRESET_ERR_WRONG_SSN;
            +goto out;
        +}
    +}
    +}
if (asoc->strreset_chunk) {
    if (!sctp_chunk_lookup_strreset_param(asoc, outreq->response_seq)) {
        sctp_chunk_put(asoc->strreset_chunk);
        asoc->strreset_chunk = NULL;
    }
    else {
        flags = SCTP_STREAM_RESET_INCOMING_SSN;
    }
    -nums = (ntohs(param.p->length) - sizeof(*outreq)) / sizeof(__u16);
    -if (nums) {
        -str_p = outreq->list_of_streams;
        -for (i = 0; i < nums; i++) {
            if (ntohs(str_p[i]) >= stream->incnt) {
                result = SCTP_STRRESET_ERR_WRONG_SSN;
                goto out;
            }
        }
        +if (nums)
        for (i = 0; i < nums; i++)
            stream->in[ntohs(str_p[i])].ssn = 0;
    -} else {
        +else
        for (i = 0; i < stream->incnt; i++)
            stream->in[i].ssn = 0;
    -}

    result = SCTP_STRRESET_PERFORMED;

    *evp = sctp_ulpevent_make_stream_reset_event(asoc,
    -flags | SCTP_STREAM_RESET_OUTGOING_SSN, nums, str_p,
    +SCTP_STREAM_RESET_INCOMING_SSN, nums, str_p, GFP_ATOMIC);

out:
sctp_update_strreset_result(asoc, result);
@ @ -690,9 +695,6 @ @

result = SCTP_STRRESET_PERFORMED;

-*evp = sctp_ulpevent_make_stream_reset_event(asoc,
    -SCTP_STREAM_RESET_INCOMING_SSN, nums, str_p, GFP_ATOMIC);
    -
out:
sctp_update_strreset_result(asoc, result);
if (!(asoc->strreset_enable & SCTP_ENABLE_CHANGE_ASSOC_REQ))
goto out;

+in = ntohs(addstrm->number_of_streams);
+incnt = stream->incnt + in;
+if (!(in || incnt > SCTP_MAX_STREAM))
goto out;
+
+if (sctp_stream_alloc_in(stream, incnt, GFP_ATOMIC))
goto out;
+
if (asoc->strreset_chunk) {
  if (!sctp_chunk_lookup_strreset_param(
      asoc, 0, SCTP_PARAM_RESET_ADD_IN_STREAMS)) {
    goto out;
  }
}

-in = ntohs(addstrm->number_of_streams);
-incnt = stream->incnt + in;
-if (!(in || incnt > SCTP_MAX_STREAM))
goto out;
-
-if (sctp_stream_alloc_in(stream, incnt, GFP_ATOMIC))
goto out;
-
stream->incnt = incnt;

result = SCTP_STRRESET_PERFORMED;

result = SCTP_STRRESET_PERFORMED;

-*evp = sctp_ulpevent_make_stream_change_event(asoc,
  -0, 0, ntohs(addstrm->number_of_streams), GFP_ATOMIC);
-
out:
scpt_update_strreset_result(asoc, result);
err:
@@ -980,10 +979,10 @@
for (i = 0; i < stream->outcnt; i++)
    stream->out[i].ssn = 0;
}
-
-flags = SCTP_STREAM_RESET_OUTGOING_SSN;
flags |= SCTP_STREAM_RESET_OUTGOING_SSN;
+ for (i = 0; i < stream->outcnt; i++)
    stream->out[i].state = SCTP_STREAM_OPEN;

@@ -1002,6 +1001,8 @@
nums = (ntohs(inreq->param_hdr.length) - sizeof(*inreq)) /
    sizeof(__u16);
+
+flags |= SCTP_STREAM_RESET_INCOMING_SSN;
+ *evp = sctp_ulpevent_make_stream_reset_event(asoc, flags,
nums, str_p, GFP_ATOMIC);
} else if (req->type == SCTP_PARAM_RESET_TSN_REQUEST) {
@@ -1059,11 +1060,13 @@
    number = stream->outcnt - nums;

    -if (result == SCTP_STRRESET_PERFORMED)
    +if (result == SCTP_STRRESET_PERFORMED) {
        for (i = number; i < stream->outcnt; i++)
            stream->out[i].state = SCTP_STREAM_OPEN;
        -} else
        +} else {
            sctp_stream_shrink_out(stream, number);
            stream->outcnt = number;
            +}

    *evp = sctp_ulpevent_make_stream_change_event(asoc, flags,
        0, nums, GFP_ATOMIC);
--- linux-4.15.0.orig/net/sctp/transport.c
+++ linux-4.15.0/net/sctp/transport.c
@@ -148,7 +148,7 @@
    /* Delete the ICMP proto unreachable timer if it's active. */
    if (del_timer(&transport->proto_unreach_timer))
    -sctp_association_put(transport->asoc);
    +sctp_transport_put(transport);

    sctp_transport_put(transport);
} |
@@ -207,7 +207,8 @@
    /* When a data chunk is sent, reset the heartbeat interval. */
    expires = jiffies + sctp_transport_timeout(transport);
    -if (time_before(transport->hb_timer.expires, expires) &&
    +if ((time_before(transport->hb_timer.expires, expires) ||


+ !timer_pending(&transport->hb_timer)) &&
  !mod_timer(&transport->hb_timer,
    expires + prandom_u32_max(transport->rto)))
sctp_transport_hold(transport);
@ @ .242.15 +243.16 @@
&transport->fl, sk);
}
-
-if (transport->dst) {
-transport->pathmtu = SCTP_TRUNC4(dst_mtu(transport->dst));
-} else
+if (transport->dst)
+transport->pathmtu = sctp_dst_mtu(transport->dst);
+else
transport->pathmtu = SCTP_DEFAULT_MAXSEGMENT;
}

bool sctp_transport_update_pmtu(struct sctp_transport *t, u32 pmtu)
{
  struct dst_entry *dst = sctp_transport_dst_check(t);
+struct sock *sk = t->asoc->base.sk;
  bool change = true;

  if (unlikely(pmtu < SCTP_DEFAULT_MINSEGMENT)) {
    @@ .262.18 +264.25 @@
    pmtu = SCTP_TRUNC4(pmtu);
  }

  if (dst) {
-  dst->ops->update_pmtu(dst, t->asoc->base.sk, NULL, pmtu);
+  struct sctp_pf *pf = sctp_get_pf_specific(dst->ops->family);
+  union sctp_addr addr;
+  +pf->af->from_sk(&addr, sk);
+  +pf->to_sk_daddr(&t->ipaddr, sk);
+  dst->ops->update_pmtu(dst, sk, NULL, pmtu, true);
+  +pf->to_sk_daddr(&addr, sk);
+  dst = sctp_transport_dst_check(t);
  }

  if (!dst) {
-  t->af_specific->get_dst(t, &t->saddr, &t->fl, t->asoc->base.sk);
+  t->af_specific->get_dst(t, &t->saddr, &t->fl, sk);
  dst = t->dst;
  }

  if (dst) {
   /* Re-fetch, as under layers may have a higher minimum size */
}
- pmtu = SCTP_TRUNC4(dst_mtu(dst));
+ pmtu = sctp_dst_mtu(dst);
change = t->pathmtu != pmtu;
}
t->pathmtu = pmtu;
@@ -634,7 +643,7 @@ trans->state := SCTP_PF)
timeout += trans->hbinterval;

-return timeout;
+return max_t(unsigned long, timeout, HZ / 5);
}

/* Reset transport variables to their initial values */
--- linux-4.15.0.orig/net/sctp/ulpevent.c
+++ linux-4.15.0/net/sctp/ulpevent.c
@@ -634,8 +634,9 @@
gfp_t gfp)
{
 struct sctp_ulpevent *event = NULL;
-struct sk_buff *skb;
-size_t padding, len;
+struct sk_buff *skb = chunk->skb;
+struct sock *sk = asoc->base.sk;
+size_t padding, datalen;
 int rx_count;

 @@ -646,15 +647,12 @@
 if (asoc->ep->rcvbuf_policy)
  rx_count = atomic_read(&asoc->rmem_alloc);
 else
- rx_count = atomic_read(&asoc->base.sk->sk_rmem_alloc);
+ rx_count = atomic_read(&sk->sk_rmem_alloc);
 if (rx_count >= asoc->base.sk->sk_rcvbuf) {
+ datalen = ntohs(chunk->chunk_hdr->length);
  /* Clone the original skb, sharing the data. */
  skb = skb_clone(chunk->skb, gfp);
  -if ((asoc->base.sk->sk_userlocks & SOCK_RCVBUF_LOCK) ||
  - (sk_rmem_schedule(asoc->base.sk, chunk->skb,
  - chunk->skb->truesize)))
  -goto fail;
  -}
+if (rx_count >= sk->sk_rcvbuf || !sk_rmem_schedule(sk, skb, datalen))
+goto fail;

 /* Clone the original skb, sharing the data. */
 skb = skb_clone(chunk->skb, gfp);
* The sender should never pad with more than 3 bytes. The receiver
* MUST ignore the padding bytes.
*/
-len = ntohs(chunk->chunk_hdr->length);
-padding = SCTP_PAD4(len) - len;
+padding = SCTP_PAD4(datalen) - datalen;

/* Fixup cloned skb with just this chunks data. */
skb_trim(skb, chunk->chunk_end - padding - skb->data);

fail_mark:
-sctp_chunk_put(chunk);
kfree_skb(skb);
fail:
return NULL;
--- linux-4.15.0.orig/net/sctp/ulpqueue.c
+++ linux-4.15.0/net/sctp/ulpqueue.c
@@ -1097,7 +1097,8 @@
freed += sctp_ulpq_renege_frags(ulpq, needed - freed);
 }
/* If able to free enough room, accept this chunk. */
-if (freed >= needed) {
+if (sk_rmem_schedule(asoc->base.sk, chunk->skb, needed) &&
+    freed >= needed) {
int retval = sctp_ulpq_tail_data(ulpq, chunk, gfp);
/*
 * Enter partial delivery if chunk has not been
--- linux-4.15.0.orig/net/smc/af_smc.c
+++ linux-4.15.0/net/smc/af_smc.c
@@ -133,8 +133,14 @@
sk->sk_shutdown |= SHUTDOWN_MASK;
 }
if (smc->clcsock) {
+if (smc->use_fallback && sk->sk_state == SMC_LISTEN) {
+/* wake up clcsock accept */
+rc = kernel_sock_shutdown(smc->clcsock, SHUT_RDWR);
+}
+mutex_lock(&smc->clcsock_release_lock);
sock_release(smc->clcsock);
smc->clcsock = NULL;
+mutex_unlock(&smc->clcsock_release_lock);
}
return sk;
}

init_delayed_work(&smc->sock_put_work, smc_close_sock_put_work);

int rc = -EINVAL;

init_rc = -EINVAL;

release_sock(&lsmc->sk);
new_sk = smc_sock_alloc(sock_net(sk), NULL);

rc = kernel_accept(lsmc->clcsock, &new_clcsock, 0);

mutex_lock(&lsmc->clcsock_release_lock);
if (lsmc->clcsock)
    rc = kernel_accept(lsmc->clcsock, &new_clcsock, 0);
mutex_unlock(&lsmc->clcsock_release_lock);
lock_sock(&lsmc->sk);
if (rc < 0) {
    lsmc->sk.sk_err = -rc;
    if ((sk->sk_state == SMC_INIT) || smc->use_fallback) {
        /* delegate to CLC child sock */
        mask = smc->clcsock->ops->poll(file, smc->clcsock, wait);
        /* if non-blocking connect finished ... */
        lock_sock(sk);
        -if ((sk->sk_state == SMC_INIT) && (mask & POLLOUT)) {
            -sk->sk_err = smc->clcsock->sk->sk_err;
            -if (sk->sk_err) {
                -mask |= POLLERR;
            -} else {
                +sk->sk_err = smc->clcsock->sk->sk_err;
                +if (sk->sk_err) {
                    +mask |= POLLERR;
                } else {
                    /* if non-blocking connect finished ... */
                    +if (sk->sk_state == SMC_INIT &&
                        +mask & POLLOUT &&
                        +smc->clcsock->sk->sk_state != TCP_CLOSE) {
                        rc = smc_connect_rdma(smc);
if (rc < 0)
  mask |= POLLERR;
@@ -1198,8 +1210,7 @@
lock_sock(sk);

rc = -ENOTCONN;
-if ((sk->sk_state != SMC_LISTEN) &&
-  (sk->sk_state != SMC_ACTIVE) &&
+if ((sk->sk_state != SMC_ACTIVE) &&
    (sk->sk_state != SMC_PEERCLOSEWAIT1) &&
    (sk->sk_state != SMC_PEERCLOSEWAIT2) &&
    (sk->sk_state != SMC_APPCLOSEWAIT1) &&
@@ -1221,14 +1232,12 @@
rc = smc_close_shutdown_write(smc);
break;
case SHUT_RD:
-if (sk->sk_state == SMC_LISTEN)
-  rc = smc_close_active(smc);
-else
-  rc = 0;
+  rc = 0;
+  /* nothing more to do because peer is not involved */
break;
}
-rc1 = kernel_sock_shutdown(smc->clcsock, how);
+if (smc->clcsock)
+  rc1 = kernel_sock_shutdown(smc->clcsock, how);
/* map sock_shutdown_cmd constants to sk_shutdown value range */
sk->sk_shutdown |= how + 1;
@@ -1284,8 +1305,6 @@

smc = smc_sk(sk);
lock_sock(sk);
-if (sk->sk_state != SMC_ACTIVE)
+if (sk->sk_state != SMC_ACTIVE) {
  +release_sock(sk);
  goto out;
+}
+release_sock(sk);
if (smc->use_fallback)
  rc = kernel_sendpage(smc->clcsock, page, offset,
    size, flags);
@@ -1293,7 +1305,6 @@
rc = sock_no_sendpage(sock, page, offset, size, flags);

out:
-release_sock(sk);
return rc;
}

@@ -1369,8 +1380,10 @@
smc->use_fallback = false; /* assume rdma capability first */
rc = sock_create_kern(net, PF_INET, SOCK_STREAM,
IPPROTO_TCP, &smc->clcsock);
-if (rc)
+if (rc) {
sk_common_release(sk);
+goto out;
+}
smc->sk.sk_sndbuf = max(smc->clcsock->sk->sk_sndbuf, SMC_BUF_MIN_SIZE);
smc->sk.sk_rcvbuf = max(smc->clcsock->sk->sk_rcvbuf, SMC_BUF_MIN_SIZE);

--- linux-4.15.0.orig/net/smc/smc.h
+++ linux-4.15.0/net/smc/smc.h
@@ -185,6 +185,10 @@
*/
+struct mutex            clcsock_release_lock;
+/* protects clcsock of a listen
+ * socket
+ */
+}
static inline struct smc_sock *smc_sk(const struct sock *sk)

--- linux-4.15.0.orig/net/smc/smc_clc.c
+++ linux-4.15.0/net/smc/smc_clc.c
@@ -31,6 +31,7 @@
int smc_clc_wait_msg(struct smc_sock *smc, void *buf, int buflen,
int expected_type)
{
+long rcvtimeo = smc->clcsock->sk->sk_rcvtimeo;
struct sock *clc_sk = smc->clcsock->sk;
struct smc_clc_msg_hdr *clcm = buf;
struct msghdr msg = {NULL, 0};
@@ -87,7 +88,6 @@
vec.iov_len = buflen;
memset(&msg, 0, sizeof(struct msghdr));
krflags = MSG_WAITALL;
-smc->clcsock->sk->sk_rcvtimeo = CLC_WAIT_TIME;
len = kernel_recvmsg(smc->clcsock, &msg, &vec, 1, datlen, krflags);
if (len < datlen) {
smc->sk.sk_err = EPROTO;
@@ -103,6 +103,7 @@
out:
+smc->clcsock->sk->sk_rcvtimeo = rcvtimeo;
return reason_code;
}

@@ -168,14 +169,12 @@
vec.iov_len = sizeof(pclc);
/* due to the few bytes needed for clc-handshake this cannot block */
len = kernel_sendmsg(smc->clcsock, &msg, &vec, 1, sizeof(pclc));
-if (len < sizeof(pclc)) {
- if (len >= 0) {
- reason_code = -ENETUNREACH;
- smc->sk.sk_err = -reason_code;
- } else {
- smc->sk.sk_err = smc->clcsock->sk->sk_err;
- reason_code = -smc->sk.sk_err;
- }
+if (len < 0) {
+ smc->sk.sk_err = smc->clcsock->sk->sk_err;
+ reason_code = -smc->sk.sk_err;
+ } else if (len < (int)sizeof(pclc)) {
+ reason_code = -ENETUNREACH;
+ smc->sk.sk_err = -reason_code;
+ }

return reason_code;
--- linux-4.15.0.orig/net/smc/smc_core.c
+++ linux-4.15.0/net/smc/smc_core.c
@@ -103,6 +103,8 @@
 struct smc_link_group *lgr = conn->lgr;
 int reduced = 0;
+
 +if (!lgr)
 +return;
 +write_lock_bh(&lgr->conns_lock);
 if (conn->alert_token_local) {
 reduced = 1;
@@ -174,6 +176,7 @@
 lnk = &lgr->lnk[SMC_SINGLE_LINK];
 /* initialize link */
 +lnk->link_id = SMC_SINGLE_LINK;
 lnk->smcibdev = smcibdev;
 lnk->ibport = ibport;
 lnk->path_mtu = smcibdev->pattr[ibport - 1].active_mtu;
@@ -434,6 +437,8 @@
local_contact = SMC_REUSE_CONTACT;
conn->lgr = lgr;
smc_lgr_register_conn(conn); /* add smc conn to lgr */
+if (delayed_work_pending(&lgr->free_work))
+cancel_delayed_work(&lgr->free_work);
write_unlock_bh(&lgr->conns_lock);
break;
}
--- linux-4.15.0.orig/net/smc/smc_diag.c
+++ linux-4.15.0/net/smc/smc_diag.c
@@ -38,15 +38,14 @@
{
struct smc_sock *smc = smc_sk(sk);

+memset(r, 0, sizeof(*r));
r->diag_family = sk->sk_family;
+sock_diag_save_cookie(sk, r->id.idiag_cookie);
if (!smc->clcsock)
return;
r->id.idiag_sport = htons(smc->clcsock->sk->sk_num);
r->id.idiag_dport = smc->clcsock->sk->sk_dport;
r->id.idiag_if = smc->clcsock->sk->sk_bound_dev_if;
+sock_diag_save_cookie(sk, r->id.idiag_cookie);
+memset(&r->id.idiag_src, 0, sizeof(r->id.idiag_src));
+memset(&r->id.idiag_dst, 0, sizeof(r->id.idiag_dst));
r->id.idiag_src[0] = smc->clcsock->sk->sk_rcv_saddr;
r->id.idiag_dst[0] = smc->clcsock->sk->sk_daddr;
}
--- linux-4.15.0.orig/net/smc/smc_ib.c
+++ linux-4.15.0/net/smc/smc_ib.c
@@ -23,6 +23,8 @@
#define SMC_MAX_CQE 32766/* max. # of completion queue elements */
+
#define SMC_QP_MIN_RNR_TIMER 5
#define SMC_QP_TIMEOUT 15 /* 4096 * 2 ** timeout usec */
#define SMC_QP_RETRY_CNT 7 /* 7: infinite */
@@ -427,9 +429,15 @@
  +
  int cqe_size_order, smc_order;
long smc_ib_setup_per_ibdev(struct smc_ib_device *smcibdev)
{
  struct ib_cq_init_attr cqattr ={
    .cqe = SMC_WR_MAX_CQE, .comp_vector = 0 };
+  .cqe = SMC_MAX_CQE, .comp_vector = 0 };
+int cqe_size_order, smc_order;
long rc;
/* the calculated number of cq entries fits to mlx5 cq allocation */
cqe_size_order = cache_line_size() == 128 ? 7 : 6;
smc_order = MAX_ORDER - cqe_size_order - 1;
if (SMC_MAX_CQE + 2 > (0x00000001 << smc_order) * PAGE_SIZE)
cqattr.cqe = (0x00000001 << smc_order) * PAGE_SIZE - 2;
smcibdev->roce_cq_send = ib_create_cq(smcibdev->ibdev,
    smc_wr_tx_cq_handler, NULL,
    smcibdev, &cqattr);

struct smc_ib_device *smcibdev = ib_get_client_data(ibdev, &smc_ib_client);
if (!smcibdev || smcibdev->ibdev != ibdev)
    return;
ib_set_client_data(ibdev, &smc_ib_client, NULL);
spin_lock(&smc_ib_devices.lock);
list_del_init(&smcibdev->list); /* remove from smc_ib_devices */
spin_unlock(&smc_ib_devices.lock);
smc_pnet_remove_by_ibdev(smcibdev);
smc_ib_cleanup_per_ibdev(smcibdev);
cancel_work_sync(&smcibdev->port_event_work);
kfree(smcibdev);

memcpy(confllc->sender_mac, mac, ETH_ALEN);
memcpy(confllc->sender_gid, gid, SMC_GID_SIZE);
hton24(confllc->sender_qp_num, link->roce_qp->qp_num);
confllc->link_num = link->link_id;
memcpy(confllc->link_uid, lgr->id, SMC_LGR_ID_SIZE);
confllc->max_links = SMC_LINKS_PER_LGR_MAX;
/* send llc message */

static int smc_pnet_fill_entry(struct net *net, struct smc_pnetentry *pnetelem,
    struct nlattr *tb[])
{
    char *string, *ibname = NULL;
    int rc = 0;
    char *string, *ibname;
    +int rc;

    memset(pnetelem, 0, sizeof(*pnetelem));
    INIT_LIST_HEAD(&pnetelem->list);
-if (tb[SMC_PNETID_NAME]) {
-string = (char *)nla_data(tb[SMC_PNETID_NAME]);
-if (!smc_pnetid_valid(string, pnetelem->pnet_name)) {
-rc = -EINVAL;
-goto error;
-}
-
-if (tb[SMC_PNETID_ETHNAME]) {
-string = (char *)nla_data(tb[SMC_PNETID_ETHNAME]);
-pnetelem->ndev = dev_get_by_name(net, string);
-if (!pnetelem->ndev)
-return -ENOENT;
-
-if (tb[SMC_PNETID_IBNAME]) {
-ibname = (char *)nla_data(tb[SMC_PNETID_IBNAME]);
-ibname = strim(ibname);
-pnetelem->smcibdev = smc_pnet_find_ib(ibname);
-if (!pnetelem->smcibdev) {
-rc = -ENOENT;
-goto error;
-}
-
-if (tb[SMC_PNETID_IBPORT]) {
-pnetelem->ib_port = nla_get_u8(tb[SMC_PNETID_IBPORT]);
-if (pnetelem->ib_port > SMC_MAX_PORTS) {
-rc = -EINVAL;
-goto error;
-}
+
+rc = -EINVAL;
+if (!tb[SMC_PNETID_NAME])
+goto error;
+string = (char *)nla_data(tb[SMC_PNETID_NAME]);
+if (!smc_pnetid_valid(string, pnetelem->pnet_name))
+goto error;
+
+rc = -EINVAL;
+if (!tb[SMC_PNETID_ETHNAME])
+goto error;
+rc = -ENOENT;
+string = (char *)nla_data(tb[SMC_PNETID_ETHNAME]);
+pnetelem->ndev = dev_get_by_name(net, string);
+if (!pnetelem->ndev)
+goto error;
+
+rc = -EINVAL;
+if (!tb[SMC_PNETID_IBNAME])

goto error;
+rc = -ENOENT;
+ibname = (char *)nla_data(tb[SMC_PNETID_IBNAME]);
+ibname = strim(ibname);
+pnetelem->smcibdev = smc_pnet_find_ib(ibname);
+if (!pnetelem->smcibdev)
+goto error;
+
+rc = -EINVAL;
+if (!tb[SMC_PNETID_IBPORT])
+goto error;
+pnetelem->ib_port = nla_get_u8(tb[SMC_PNETID_IBPORT]);
+if (pnetelem->ib_port < 1 || pnetelem->ib_port > SMC_MAX_PORTS)
+goto error;
+
return 0;

error:
@@ -307,6 +312,8 @@
void *hdr;
int rc;

+if (!info->attrs[SMC_PNETID_NAME])
+return -EINVAL;
 pnetelem = smc_pnet_find_pnetid((char *)nla_data(info->attrs[SMC_PNETID_NAME]));
if (!pnetelem)
@@ -359,6 +366,8 @@
static int smc_pnet_del(struct sk_buff *skb, struct genl_info *info)
{
+if (!info->attrs[SMC_PNETID_NAME])
+return -EINVAL;
 return smc_pnet_remove_by_pnetid((char *)nla_data(info->attrs[SMC_PNETID_NAME]));
}
--- linux-4.15.0.orig/net/smc/smc_tx.c
+++ linux-4.15.0/net/smc/smc_tx.c
@@ -70,13 +70,11 @@
 DEFINE_WAIT_FUNC(wait, woken_wake_function);
 struct smc_connection *conn = &smc->conn;
 struct sock *sk = &smc->sk;
-bool noblock;
-long timeo;
-int rc = 0;

 /* similar to sk_stream_wait_memory */
timeo = sock_sndtimeo(sk, flags & MSG_DONTWAIT);
- noblock = timeo ? false : true;
add_wait_queue(sk_sleep(sk), &wait);
while (1) {
    sk_set_bit(SOCKWQ_ASYNC_NOSPACE, sk);
    break;
} if (!timeo) {
    if (noblock) {
        set_bit(SOCK_NOSPACE, &sk->sk_socket->flags);
    }
    /* ensure EPOLLOUT is subsequently generated */
    set_bit(SOCK_NOSPACE, &sk->sk_socket->flags);
    rc = -EAGAIN;
    break;
}@ -151,12 +149,11 @@
return send_done ?: -ECONNRESET;

if (!atomic_read(&conn->sndbuf_space)) {
    if (send_done)
        return send_done;
    rc = smc_tx_wait_memory(smc, msg->msg_flags);
    if (rc) {
        if (send_done)
            return send_done;
    }
    goto out_err;
    if (rc)
        continue;
} --- linux-4.15.0.orig/net/smc/smc_wr.c
+++ linux-4.15.0/net/smc/smc_wr.c
@@ -223,12 +223,14 @@
      if (pend->idx < link->wr_tx_cnt) {
          u32 idx = pend->idx;
          memset(&link->wr_tx_pends[idx], 0,
              sizeof(link->wr_tx_pends[idx]));
          memset(&link->wr_tx_bufs[idx], 0,
              sizeof(link->wr_tx_bufs[idx]));
          -test_and_clear_bit(pend->idx, link->wr_tx_mask);
+test_and_clear_bit(idx, link->wr_tx_mask);
          return 1;
      }
--- linux-4.15.0.orig/net/smc/smc_wr.h
+++ linux-4.15.0/net/smc/smc_wr.h
@@ -19,7 +19,6 @@
 #include "smc.h"
 #include "smc_core.h"

#define SMC_WR_MAX_CQE 32768 /* max. # of completion queue elements */
#define SMC_WR_BUF_CNT 16 /* # of ctrl buffers per link */

#define SMC_WR_TX_WAIT_FREE_SLOT_TIME (10 * HZ)
--- linux-4.15.0.orig/net/socket.c
+++ linux-4.15.0/net/socket.c
@@ -89,6 +89,7 @@
 #include <linux/magic.h>
 #include <linux/slab.h>
 #include <linux/xattr.h>
+#include <linux/nospec.h>
 #include <linux/uaccess.h>
 #include <asm/unistd.h>
 @@ -392,6 +393,18 @@
 */

+/**
+ * sock_alloc_file - Bind a &socket to a &file
+ * @sock: socket
+ * @flags: file status flags
+ * @dname: protocol name
+ *
+ * Returns the &file bound with @sock, implicitly storing it
+ * in sock->file. If dname is %NULL, sets to "".
+ * On failure the return is a ERR pointer (see linux/err.h).
+ * This function uses GFP_KERNEL internally.
+ */
+
+struct file *sock_alloc_file(struct socket *sock, int flags, const char *dname)
{| start-line=461 |
 struct qstr name = { .name = "" };
 @@ -451,6 +464,14 @@
 return PTR_ERR(newfile);
 |
+/**
+ * sock_from_file - Return the &socket bounded to @file.
+ * @file: file
+ * @err: pointer to an error code return

+ *
+ *On failure returns %NULL and assigns -ENOTSOCK to @err.
+ */
+
struct socket *sock_from_file(struct file *file, int *err)
{
    if (file->f_op == &socket_file_ops)
    {
        sock = sock_from_file(f.file, err);
        if (likely(sock)) {
            *fput_needed = f.flags & FDPUT_FPUT;
            return sock;
        }
        fdput(f);
    }
    if (!err && (iattr->ia_valid & ATTR_UID)) {
        struct socket *sock = SOCKET_I(d_inode(dentry));
        sock->sk->sk_uid = iattr->ia_uid;
        if (sock->sk)
            sock->sk->sk_uid = iattr->ia_uid;
        else
            err = -ENOENT;
    }
    return err;
}/*
 *sock_alloc-allocate a socket
 + *sock_alloc - allocate a socket
 *
 *Allocate a new inode and socket object. The two are bound together
 *and initialised. The socket is then returned. If we are out of inodes
 *-NULL is returned.
 + *NULL is returned. This functions uses GFP_KERNEL internally.
 */
struct socket *sock_alloc(void)
{
    EXPORT_SYMBOL(sock_alloc);
}/*
 *sock_release-close a socket
 + *sock_release - close a socket
 */
@sock: socket to close
*
*The socket is released from the protocol stack if it has a release
@@ -594,12 +618,17 @@
*an inode not a file.
*/

-void sock_release(struct socket *sock)
+static void __sock_release(struct socket *sock, struct inode *inode)
{
  if (sock->ops) {
    struct module *owner = sock->ops->owner;

    if (inode)
      inode_lock(inode);
  sock->ops->release(sock);
    if (inode)
      node_unlock(inode);
    sock->sk = NULL;
    if (inode)
      inode_unlock(inode);
    sock->ops = NULL;
    module_put(owner);
  }
@@ -614,6 +643,11 @@
sock->file = NULL;
}
+
+void sock_release(struct socket *sock)
+{
  +__sock_release(sock, NULL);
+
} Export_SYMBOL(sock_release);

void __sock_tx_timestamp(__u16 tsflags, __u8 *tx_flags)
@@ -633,6 +667,15 @@
}
EXPORT_SYMBOL(__sock_tx_timestamp);

+/**
+ * sock_sendmsg - send a message through @sock
+ */
+ * @sock: socket
+ * @msg: message to send
+ *
+ * Sends @msg through @sock, passing through LSM.
+ * Returns the number of bytes sent, or an error code.
+ */
+
+ static inline int sock_sendmsg_nosec(struct socket *sock, struct msghdr *msg)
int ret = sock->ops->sendmsg(sock, msg, msg_data_left(msg));
@ @ -649,6 +692,18 @ @
}
EXPORT_SYMBOL(sock_sendmsg);

/**
 * kernel_sendmsg - send a message through @sock (kernel-space)
 * @sock: socket
 * @msg: message header
 * @vec: kernel vec
 * @num: vec array length
 * @size: total message data size
 * *
 * Builds the message data with @vec and sends it through @sock.
 * Returns the number of bytes sent, or an error code.
 */

int kernel_sendmsg(struct socket *sock, struct msghdr *msg,
                   struct kvec *vec, size_t num, size_t size)
{
@ @ -657,6 +712,19 @ @
}
EXPORT_SYMBOL(kernel_sendmsg);

/**
 * kernel_sendmsg_locked - send a message through @sock (kernel-space)
 * @sk: sock
 * @msg: message header
 * @vec: output s/g array
 * @num: output s/g array length
 * @size: total message data size
 * *
 * Builds the message data with @vec and sends it through @sock.
 * Returns the number of bytes sent, or an error code.
 * Caller must hold @sk.
 */

int kernel_sendmsg_locked(struct sock *sk, struct msghdr *msg,
                          struct kvec *vec, size_t num, size_t size)
{
@ @ -805,6 +873,16 @ @
}
EXPORT_SYMBOL_GPL(__sock_recv_ts_and_drops);

/**
 * sock_recvmsg - receive a message from @sock
 * @sock: socket
 */
static inline int sock_recvmsg_nosec(struct socket *sock, struct msghdr *msg, int flags)
{
    @msg: message to receive
    + *
    + *Receives @msg from @sock, passing through LSM. Returns the total number
    + *of bytes received, or an error.
    + */
    +

EXPORT_SYMBOL(sock_recvmsg);

int kernel_recvmsg(struct socket *sock, struct msghdr *msg, struct kvec *vec, size_t num, size_t size, int flags)
{
    @msg: message to receive
    + *
    + *Receives @msg from @sock, passing through LSM. Returns the total number
    + *of bytes received, or an error.
    + */
    +
int kernel_recvmsg(struct socket *sock, struct msghdr *msg,
    struct kvec *vec, size_t num, size_t size, int flags)
{
    @msg: message to receive
    + *
    + *Receives @msg from @sock, passing through LSM. Returns the total number
    + *of bytes received, or an error.
    + */
    +
    ssize_t res;

if (file->f_flags & O_NONBLOCK)
+if (file->f_flags & O_NONBLOCK || (iocb->ki_flags & IOCB_NOWAIT))
msg.msg_flags = MSG_DONTWAIT;

if (iocb->ki_pos != 0)
@@ -908,7 +987,7 @@
return -ESPIPE;

-if (file->f_flags & O_NONBLOCK)
+if (file->f_flags & O_NONBLOCK || (iocb->ki_flags & IOCB_NOWAIT))
msg.msg_flags = MSG_DONTWAIT;

if (sock->type == SOCK_SEQPACKET)
@@ -980,11 +1059,6 @@
*what to do with it - that's up to the protocol still.
*/

-static struct ns_common *get_net_ns(struct ns_common *ns)
-{*
-return &get_net(container_of(ns, struct net, ns))->ns;
-}
-
-static long sock_ioctl(struct file *file, unsigned cmd, unsigned long arg)
{
 struct socket *sock;
 @@ -1066,6 +1140,19 @@
 return err;
 }

+/**
+ *sock_create_lite - creates a socket
+ *@family: protocol family (AF_INET, ...)
+ *@type: communication type (SOCK_STREAM, ...)
+ *@protocol: protocol (0, ...)
+ *@res: new socket
+ *
+ *Creates a new socket and assigns it to @res, passing through LSM.
+ *The new socket initialization is not complete, see kernel_accept().
+ *Returns 0 or an error. On failure @res is set to %NULL.
+ *This function internally uses GFP_KERNEL.
+ */
+ *
+ int sock_create_lite(int family, int type, int protocol, struct socket **res)
{*
 int err;
 @@ -1128,7 +1215,7 @@
static int sock_close(struct inode *inode, struct file *filp)
{
    -sock_release(SOCKET_I(inode));
    +__sock_release(SOCKET_I(inode), inode);
    return 0;
}

@@ -1193,6 +1280,21 @@
 }
 EXPORT_SYMBOL(sock_wake_async);

+/**
+ * __sock_create - creates a socket
+ * @net: net namespace
+ * @family: protocol family (AF_INET, ...)
+ * @type: communication type (SOCK_STREAM, ...)
+ * @protocol: protocol (0, ...)
+ * @res: new socket
+ * @kern: boolean for kernel space sockets
+ *
+ * Creates a new socket and assigns it to @res, passing through LSM.
+ * Returns 0 or an error. On failure @res is set to %NULL. @kern must
+ * be set to true if the socket resides in kernel space.
+ * This function internally uses GFP_KERNEL.
+ */
+ +
+ int __sock_create(struct net *net, int family, int type, int protocol,
+ struct socket **res, int kern)
+ {
+ @ @ -1302,12 +1404,35 @@
+ }
+ EXPORT_SYMBOL(__sock_create);

+/**
+ * sock_create - creates a socket
+ * @family: protocol family (AF_INET, ...)
+ * @type: communication type (SOCK_STREAM, ...)
+ * @protocol: protocol (0, ...)
+ * @res: new socket
+ *
+ * A wrapper around __sock_create().
+ * Returns 0 or an error. This function internally uses GFP_KERNEL.
+ */
+ +
+ int sock_create(int family, int type, int protocol, struct socket **res)
+ {
+ return __sock_create(current->nsproxy->net_ns, family, type, protocol, res, 0);
+ }
EXPORT_SYMBOL(sock_create);

+/**
+ * sock_create_kern - creates a socket (kernel space)
+ * @net: net namespace
+ * @family: protocol family (AF_INET, ...)
+ * @type: communication type (SOCK_STREAM, ...)
+ * @protocol: protocol (0, ...)
+ * @res: new socket
+ *
+ * A wrapper around __sock_create().
+ * Returns 0 or an error. This function internally uses GFP_KERNEL.
+ */
+
+ int sock_create_kern(struct net *net, int family, int type, int protocol, struct socket **res)
{  
    return __sock_create(net, family, type, protocol, res, 1);

    if (call < 1 || call > SYS_SENDMMSG)
        return -EINVAL;
    call = array_index_nospec(call, SYS_SENDMMSG + 1);

    len = nargs[call];
    if (len > sizeof(a))
        @ @ -2621,15 +2747,6 @@

        core_initcall(sock_init); /* early initcall */
-
-    -static int __init jit_init(void)
-    -{
-        -#ifdef CONFIG_BPF_JIT_ALWAYS_ON
-            bpf_jit_enable = 1;
-        -#endif
-            -return 0;
-        -}
-        -pure_initcall(jit_init);
-        -
-        -#ifdef CONFIG_PROC_FS
-        void socket_seq_show(struct seq_file *seq)
-        {  
-            @ @ -2845,9 +2962,14 @@
-            copy_in_user(&rxnfc->fs.ring_cookie, &compat_rxnfc->fs.ring_cookie,
-                    (void __user *)&rxnfc->fs.location - 1 -
-                    (void __user *)&rxnfc->fs.ring_cookie) ||
-                    copy_in_user(&rxnfc->rule_cnt, &compat_rxnfc->rule_cnt,
-                            - sizeof(rxnfc->rule_cnt)))

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+ (void __user *)&rxnfc->fs.ring_cookie)
+return -EFAULT;
+if (ethcmd == ETHTOOL_GRXCLSRLALL) {
+if (put_user(rule_cnt, &rxnfc->rule_cnt))
+return -EFAULT;
+} else if (copy_in_user(&rxnfc->rule_cnt,
+&compat_rxnfc->rule_cnt,
+sizeof(rxnfc->rule_cnt)))
+return -EFAULT;
+
+
++ @ @ -3236,6 +3358,7 @@
+case SIOCSARP:
+case SIOCGARP:
+case SIOCDARP:
+case SIOCOUTQNSD:
+case SIOCATMARK:
+return sock_do_ioctl(net, sock, cmd, arg);
+
++ @ @ -3268,18 +3391,46 @@
+
+###
+
+ *kernel_bind - bind an address to a socket (kernel space)
+ *@sock: socket
+ *@addr: address
+ *@addrlen: length of address
+ *
+ *Returns 0 or an error.
+ */
+ +
+ int kernel_bind(struct socket *sock, struct sockaddr *addr, int addrlen)
+ {
+ return sock->ops->bind(sock, addr, addrlen);
+ }
+ EXPORT_SYMBOL(kernel_bind);
+
+###
+ *kernel_listen - move socket to listening state (kernel space)
+ *@sock: socket
+ *@backlog: pending connections queue size
+ *
+ *Returns 0 or an error.
+ */
+ +
+ int kernel_listen(struct socket *sock, int backlog)
+ {
+}
return sock->ops->listen(sock, backlog);
}
EXPORT_SYMBOL(kernel_listen);

+/**
 + *kernel_accept - accept a connection (kernel space)
 + * @sock: listening socket
 + * @newsock: new connected socket
 + * @flags: flags
 + *
 + * @flags must be SOCK_CLOEXEC, SOCK_NONBLOCK or 0.
 + * If it fails, @newsock is guaranteed to be NULL.
 + * Returns 0 or an error.
 + */
 +
 + int kernel_accept(struct socket *sock, struct socket **newsock, int flags)
 {
 struct sock *sk = sock->sk;
 @@ -3305,6 +3456,19 @@
 }
 EXPORT_SYMBOL(kernel_accept);

+/**
 + *kernel_connect - connect a socket (kernel space)
 + * @sock: socket
 + * @addr: address
 + * @addrlen: address length
 + * @flags: flags (O_NONBLOCK, ...)
 + *
 + * For datagram sockets, @addr is the address to which datagrams are sent
 + * by default, and the only address from which datagrams are received.
 + * For stream sockets, attempts to connect to @addr.
 + * Returns 0 or an error code.
 + */
 +
 + int kernel_connect(struct socket *sock, struct sockaddr *addr, int addrlen,
     int flags)
 {
 @@ -3319,6 +3483,15 @@
 }
 EXPORT_SYMBOL(kernel_getsockname);

+/**
 + *kernel_peername - get the address which the socket is connected (kernel space)
 + * @sock: socket
 + * @addr: address holder
 + *
 + * Fills the @addr pointer with the address which the socket is connected.
int kernel_getpeername(struct socket *sock, struct sockaddr *addr, int *addrlen)
{
    @@ -3326,6 +3499,18 @@
}
EXPORT_SYMBOL(kernel_getpeername);

/**
 * kernel_getsockopt - get a socket option (kernel space)
 * @sock: socket
 * @level: API level (SOL_SOCKET, ...)
 * @optname: option tag
 * @optval: option value
 * @optlen: option length
 * 
 * Assigns the option length to @optlen.
 * Returns 0 or an error.
 * 
 */

int kernel_getsockopt(struct socket *sock, int level, int optname, char *optval, int *optlen)
{
    @@ -3348,6 +3533,17 @@
}
EXPORT_SYMBOL(kernel_getsockopt);

/**
 * kernel_setsockopt - set a socket option (kernel space)
 * @sock: socket
 * @level: API level (SOL_SOCKET, ...)
 * @optname: option tag
 * @optval: option value
 * @optlen: option length
 * 
 * Returns 0 or an error.
 * 
 */

int kernel_setsockopt(struct socket *sock, int level, int optname, char *optval, unsigned int optlen)
{
    @@ -3368,6 +3564,17 @@
}
EXPORT_SYMBOL(kernel_setsockopt);
kernel_sendpage: Send a page through a socket.

- sock: Socket
- page: Page
- offset: Page offset
- size: Total size in bytes
- flags: Flags

Retrieves the total amount sent in bytes or an error.

```c
int kernel_sendpage(struct socket *sock, struct page *page, int offset,
                    size_t size, int flags)
```

kernel_sendpage_locked: Send a page through a locked socket.

- sk: Socket
- page: Page
- offset: Page offset
- size: Total size in bytes
- flags: Flags

Retrieves the total amount sent in bytes or an error. Caller must hold @sk.

```c
int kernel_sendpage_locked(struct sock *sk, struct page *page, int offset,
                           size_t size, int flags)
```

kernel_sock_shutdown: Shut down part of a full-duplex connection.

- sock: Socket
- how: Connection part

Returns 0 or an error.

```c
int kernel_sock_shutdown(struct socket *sock, enum sock_shutdown_cmd how)
```

---

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EXPORT_SYMBOL(kernel_sock_shutdown);

-/* This routine returns the IP overhead imposed by a socket i.e. the length of the underlying IP header, depending on whether this is an IPv4 or IPv6 socket and the length from IP options turned on at the socket. Assumes that the caller has a lock on the socket. */

+/**
+ * kernel_sock_ip_overhead - returns the IP overhead imposed by a socket
+ * @sk: socket
+ *
+ * This routine returns the IP overhead imposed by a socket i.e. the length of the underlying IP header, depending on whether this is an IPv4 or IPv6 socket and the length from IP options turned on at the socket. Assumes that the caller has a lock on the socket.
+ */
+
+u32 kernel_sock_ip_overhead(struct sock *sk)
{
    struct inet_sock *inet;
    --- linux-4.15.0.orig/net/strparser/strparser.c
    +++ linux-4.15.0/net/strparser/strparser.c
    @@ -35,7 +35,6 @@
    */
    struct strp_msg strp;
    int accum_len;
    -int early_eaten;
    }

    static inline struct _strp_msg *-_strp_msg(struct sk_buff *skb)
    @@ -60,14 +59,14 @@
    struct sock *sk = strp->sk;

    /* Report an error on the lower socket */
    -sk->sk_err = err;
    +sk->sk_err = -err;
    sk->sk_error_report(sk);
    }
}

static void strp_start_timer(struct strparser *strp, long timeo)
{
    -if (timeo)
    +if (timeo && timeo != LONG_MAX)
    mod_delayed_work(strp_wq, &strp->msg_timer_work, timeo);
    }

    @@ -115,20 +114,6 @@
    head = strp->skb_head;
    
    Open Source Used In 5GaaS Edge AC-4 34768
if (head) {
    /* Message already in progress */
    -
    -stm = _strp_msg(head);
    -if (unlikely(stm->early_eaten)) { 
    /* Already some number of bytes on the receive sock 
    - * data saved in skb_head, just indicate they 
    - * are consumed. 
    - */
    -eaten = orig_len <= stm->early_eaten ?
    -orig_len : stm->early_eaten;
    -stm->early_eaten -= eaten;
    -
    -return eaten;
    -
    }
    -
    if (unlikely(orig_offset)) {
    /* Getting data with a non-zero offset when a message is 
    * in progress is not expected. If it does happen, we 
    @@ -296,10 +281,10 @@
    strp_start_timer(strp, timeo);
    }
    +stm->accum_len += cand_len;
    +eaten += cand_len;
    strp->need_bytes = stm->strp.full_len -
    -stm->accum_len;
    -stm->accum_len += cand_len;
    -stm->early_eaten = cand_len;
    STRP_STATS_ADD(strp->stats.bytes, cand_len);
    desc->count = 0; /* Stop reading socket */
    break;
    @@ -321,6 +306,7 @@
    /* Hurray, we have a new message! */
    cancel_delayed_work(&strp->msg_timer_work);
    strp->skb_head = NULL;
    +strp->need_bytes = 0;
    STRP_STATS_INCR(strp->stats.msgs);
    
    /* Give skb to upper layer */
    @@ -410,9 +396,7 @@
    return;
    
    if (strp->need_bytes) {
    -if (strp_peek_len(strp) >= strp->need_bytes)
    -strp->need_bytes = 0;
    -else
    +if (strp_peek_len(strp) < strp->need_bytes)
    ...
return;
}

@@ -458,7 +442,7 @@
 /* Message assembly timed out */
 STRP_STATS_INCR(strp->stats.msg_timeouts);
 strp->cb.lock(strp);
-strp->cb.abort_parser(strp, ETIMEDOUT);
+strp->cb.abort_parser(strp, -ETIMEDOUT);
 strp->cb.unlock(strp);
 }

--- linux-4.15.0.orig/net/sunrpc/addr.c
+++ linux-4.15.0/net/sunrpc/addr.c
@@ -81,11 +81,11 @@
 rc = snprintf(scopebuf, sizeof(scopebuf), "%c%u",
 IPV6_SCOPE_DELIMITER, sin6->sin6_scope_id);
 -if (unlikely((size_t)rc > sizeof(scopebuf)))
+if (unlikely((size_t)rc >= sizeof(scopebuf)))
 return 0;
 len += rc;
 -if (unlikely(len > buflen))
+if (unlikely(len >= buflen))
 return 0;
 strcat(buf, scopebuf);
@@ -184,7 +184,7 @@
 scope_id = dev->ifindex;
 dev_put(dev);
 } else {
-+if (unlikely((size_t)rc >= sizeof(scopebuf)))
 return 0;

--- linux-4.15.0.orig/net/sunrpc/auth_generic.c
+++ linux-4.15.0/net/sunrpc/auth_generic.c
@@ -281,13 +281,7 @@
{
 struct auth_cred *acred = &container_of(cred, struct generic_cred,
 gc_base)->acred;
-bool ret;
-
-get_rpccred(cred);
+ret = test_bit(RPC_CRED_KEY_EXPIRE_SOON, &acred->ac_flags);
+put_rpccred(cred);
-return ret;
+return test_bit(RPC_CRED_KEY_EXPIRE_SOON, &acred->ac_flags);
}

static const struct rpc_credops generic_credops = {
--- linux-4.15.0.orig/net/sunrpc/auth_gss/auth_gss.c
+++ linux-4.15.0/net/sunrpc/auth_gss/auth_gss.c
@@ -53,6 +53,7 @@
 #include <linux/uaccess.h>
 #include <linux/hashtable.h>

+#include "auth_gss_internal.h"
#include ".../netns.h"

static const struct rpc_authops authgss_ops;
@@ -147,35 +148,6 @@
clear_bit(RPCAUTH_CRED_NEW, &cred->cr_flags);
}

-static const void *
-skip_get_bytes(const void *p, const void *end, void *res, size_t len)
-{ 
-const void *q = (const void *)((const char *)p + len);
-if (unlikely(q > end || q < p))
-return ERR_PTR(-EFAULT);
-memcpy(res, p, len);
-return q;
-}
-
-static inline const void *
-skip_get_netobj(const void *p, const void *end, struct xdr_netobj *dest)
-{ 
-const void *q;
-unsigned int len;
-
-p = simple_get_bytes(p, end, &len, sizeof(len));
-if (IS_ERR(p))
-return p;
-q = (const void *)((const char *)p + len);
-if (unlikely(q > end || q < p))
-return ERR_PTR(-EFAULT);
-dest->data = kmemdup(p, len, GFP_NOFS);
-if (unlikely(dest->data == NULL))
-return ERR_PTR(-ENOMEM);
-dest->len = len;
-return q;
-}
static struct gss_cl_ctx *
  gss_cred_get_ctx(struct rpc_cred *cred)
{
  for (i=0; i < rqstp->rq_enc_pages_num; i++)
    __free_page(rqstp->rq_enc_pages[i]);
kfree(rqstp->rq_enc_pages);
  +rqstp->rq_release_snd_buf = NULL;
}

static int
  if (rqstp->rq_release_snd_buf) 
    +rqstp->rq_release_snd_buf(rqstp);
  +
  if (snd_buf->page_len == 0) {
    rqstp->rq_enc_pages_num = 0;
    return 0;
  
--- linux-4.15.0.orig/net/sunrpc/auth_gss/auth_gss_internal.h
+++ linux-4.15.0/net/sunrpc/auth_gss/auth_gss_internal.h
@@ -0,0 +1,45 @@
+// SPDX-License-Identifier: BSD-3-Clause
+/
+ * linux/net/sunrpc/auth_gss/auth_gss_internal.h
+ * + * Internal definitions for RPCSEC_GSS client authentication
+ * + * Copyright (c) 2000 The Regents of the University of Michigan.
+ * + * All rights reserved.
+ * + * + */
+#include <linux/err.h>
+##include <linux/string.h>
+##include <linux/sunrpc/xdr.h>
+ +
+static inline const void *
+  simple_get_bytes(const void *p, const void *end, void *res, size_t len)
+{
+  const void *q = (const void *)((const char *)p + len);
+  if (unlikely(q > end || q < p))
+    return ERR_PTR(-EFAULT);
+  memcpy(res, p, len);
+  return q;
static inline const void *
simple_get_netobj(const void *p, const void *end, struct xdr_netobj *dest)
{
    const void *q;
    unsigned int len;

    p = simple_get_bytes(p, end, &len, sizeof(len));
    if (IS_ERR(p))
        return p;

    q = (const void *)((const char *)p + len);
    if (unlikely(q > end || q < p))
        return ERR_PTR(-EFAULT);
    if (len) {
        dest->data = kmemdup(p, len, GFP_NOFS);
        if (unlikely(dest->data == NULL))
            return ERR_PTR(-ENOMEM);
    } else
    dest->data = NULL;
    dest->len = len;
    return q;
}

--- linux-4.15.0.orig/net/sunrpc/auth_gss/gss_krb5_crypto.c
+++ linux-4.15.0/net/sunrpc/auth_gss/gss_krb5_crypto.c
@@ -169,7 +169,7 @@
    /*
    * SG returns 4 bytes of salt, which is larger than the
    * 4 bytes we can use.
    */
    struct scatterlist              sg[1];
    int err = -1;
    u8 *checksumdata;
-u8 rc4salt[4];
+u8 *rc4salt;
    struct crypto_aahash *md5;
    struct crypto_aahash *hmac_md5;
    struct ahash_request *req;
@@ -183,14 +183,18 @@
    return GSS_S_FAILURE;
 }
+rc4salt = kmalloc_array(4, sizeof(*rc4salt), GFP_NOFS);
+if (!rc4salt)
+    return GSS_S_FAILURE;
+if (arcfour_hmac_md5_usage_to_salt(usage, rc4salt)) {
+    printk("%s: invalid usage value %u
", __func__, usage);
+    return GSS_S_FAILURE;
+    goto out_free_rc4salt;
+}

    checksumdata = kmalloc(GSS_KRB5_MAX_CKSUM_LEN, GFP_NOFS);
if (!checksumdata)
    return GSS_S_FAILURE;
+    goto out_free_rc4salt;

md5 = crypto_alloc_aahash("md5", 0, CRYPTO_ALG_ASYNC);
if (IS_ERR(md5))
    @@ -237,9 +241,6 @@
    goto out_free_rc4salt;

ahash_request_set_callback(req, CRYPTO_TFM_REQ_MAY_SLEEP, NULL, NULL);

    -err = crypto_aahash_init(req);
    -if (err)
    -goto out;
    err = crypto_aahash_setkey(hmac_md5, cksumkey, kctx->gk5e->keylength);
    if (err)
        goto out;
@@ -261,6 +262,8 @@
    crypto_free_aahash(md5);
    out_free_cksum:
    kfree(checksumdata);
+    out_free_rc4salt:
+    kfree(rc4salt);
    return err ? GSS_S_FAILURE : 0;
}

--- linux-4.15.0.orig/net/sunrpc/auth_gss/gss_krb5_mech.c
+++ linux-4.15.0/net/sunrpc/auth_gss/gss_krb5_mech.c
@@ -46,6 +46,8 @@
#include <linux/sunrpc/xdr.h>
 #include <linux/sunrpc/gss_krb5_enctypes.h>

+##include "auth_gss_internal.h"
+
#if IS_ENABLED(CONFIG_SUNRPC_DEBUG)
 # define RPCDBG_FACILITYRPCDBG_AUTH
 #endif
@@ -187,35 +189,6 @@
 return NULL;
}

-static const void *
-static_get_bytes(const void *p, const void *end, void *res, int len)
-{
-    const void *q = (const void *)((const char *)p + len);
-    if (unlikely(q > end || q < p))
-        return ERR_PTR(-EFAULT);
-    memcpy(res, p, len);
-    return q;
static const void *
simple_get_netobj(const void *p, const void *end, struct xdr_netobj *res)
{
    const void *q;
    unsigned int len;

    p = simple_get_bytes(p, end, &len, sizeof(len));
    if (IS_ERR(p))
        return p;
    q = (const void *)((const char *)p + len);
    if (unlikely(q > end || q < p))
        return ERR_PTR(-EFAULT);
    res->data = kmemdup(p, len, GFP_NOFS);
    if (unlikely(res->data == NULL))
        return ERR_PTR(-ENOMEM);
    res->len = len;
    return q;
}

static inline const void *get_key(const void *p, const void *end,
structural krb5_ctx *ctx, struct crypto_skcipher **res)
{
    unsigned char plain[8];
    s32 code;

    printk("RPC: %s\n", __func__);
plain = kmalloc(8, GFP_NOFS);
if (!plain)
+return -ENOMEM;
+
plain[0] = (unsigned char) ((seqnum >> 24) & 0xff);
plain[1] = (unsigned char) ((seqnum >> 16) & 0xff);
plain[2] = (unsigned char) ((seqnum >> 8) & 0xff);
@@ -69,6 +73,7 @@
code = krb5_encrypt(cipher, cksum, plain, buf, 8);
out:
crypto_free_skcipher(cipher);
+kfree(plain);
return code;
}

s32
@@ -78,12 +83,17 @@
seqnum,
unsigned char *cksum, unsigned char *buf)
{
-unsigned char plain[8];
+unsigned char *plain;
+s32 code;

if (kctx->enctype == ENCTYPE_ARCFOUR_HMAC)
return krb5_make_rc4_seq_num(kctx, direction, seqnum,
cksum, buf);

plain = kmalloc(8, GFP_NOFS);
if (!plain)
+return -ENOMEM;
+
plain[0] = (unsigned char) (seqnum & 0xff);
plain[1] = (unsigned char) ((seqnum >> 8) & 0xff);
@@ -94,7 +104,9 @@
plain[6] = direction;
plain[7] = direction;

-return krb5_encrypt(key, cksum, plain, buf, 8);
+code = krb5_encrypt(key, cksum, plain, buf, 8);
+kfree(plain);
+return code;
}

static s32
@@ -102,7 +114,7 @@
unsigned char *buf, int *direction, s32 *seqnum)

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struct crypto_skcipher *cipher;
unsigned char plain[8];
unsigned char *plain;
s32 code;

```c

dprintk("RPC:   %s\n", __func__);
@@ -115,20 +127,28 @@
if (code)
    goto out;

+    plain = kmalloc(8, GFP_NOFS);
+    if (!plain) {
+        code = -ENOMEM;
+        goto out;
+    }
+    code = krb5_decrypt(cipher, cksum, buf, plain, 8);
    if (code)
        goto out;
+    goto out_plain;

        || (plain[4] != plain[7])) {
        code = (s32)KG_BAD_SEQ;
        -    goto out;
    }
    *direction = plain[4];
    *seqnum = ((plain[0] << 24) | (plain[1] << 16) |
                (plain[2] << 8) | (plain[3]));
+    out_plain:
+    kfree(plain);
    out:
    crypto_free_skcipher(cipher);
    return code;
@@ -141,26 +161,33 @@
    }
    s32 code;
    -unsigned char plain[8];
    struct crypto_skcipher *key = kctx->seq;
+unsigned char *plain;

    dprintk("RPC:   krb5_get_seq_num:\n");
```
if (kctx->enctype == ENCTYPE_ARCFOUR_HMAC)
return krb5_get_re4_seq_num(kctx, cksum, buf,
    direction, seqnum);
+plain = kmalloc(8, GFP_NOFS);
+if (!plain)
+return -ENOMEM;
if ((code = krb5_decrypt(key, cksum, buf, plain, 8)))
  -return code;
+goto out;
    (plain[4] != plain[7]))) {
  code = (s32)KG_BAD_SEQ;
  +goto out;
}
*direction = plain[4];
*seqnum = ((plain[0]) |
  -return 0;
+out:
+kfree(plain);
+return code;
}
--- linux-4.15.0.orig/net/sunrpc/auth_gss/gss_mech_switch.c
+++ linux-4.15.0/net/sunrpc/auth_gss/gss_mech_switch.c
@@ -61,6 +61,8 @@
for (i = 0; i < gm->gm_pf_num; i++) {
  pf = &gm->gm_pfs[i];
  +if (pf->domain)
  +auth_domain_put(pf->domain);
  kfree(pf->auth_domain_name);
  pf->auth_domain_name = NULL;
}
@@ -83,6 +85,7 @@
static int
gss_mech_svc_setup(struct gss_api_mech *gm)
{
 +struct auth_domain *dom;
 struct pf_desc *pf;
 int i, status;
status = -ENOMEM;
if (pf->auth_domain_name == NULL)
goto out;
status = svcauth_gss_register_pseudoflavor(pf->pseudoflavor,
-pf->auth_domain_name);
if (status)
+dom = svcauth_gss_register_pseudoflavor(
+pf->pseudoflavor, pf->auth_domain_name);
+if (IS_ERR(dom)) {
+status = PTR_ERR(dom);
goto out;
+
+pf->domain = dom;
}
return 0;
out:
--- linux-4.15.0.orig/net/sunrpc/auth_gss/svcauth_gss.c
+++ linux-4.15.0/net/sunrpc/auth_gss/svcauth_gss.c
@@ -779,7 +779,7 @@

EXPORT_SYMBOL_GPL(svcauth_gss_flavor);

-int
+struct auth_domain *
svcauth_gss_register_pseudoflavor(u32 pseudoflavor, char * name)
{
 struct gss_domain*new;
@@ -796,21 +796,23 @@
 new->h.flavour = &svcauthops_gss;
 new->pseudoflavor = pseudoflavor;

 -stat = 0;
 test = auth_domain_lookup(name, &new->h);
 -if (test != &new->h) /* Duplicate registration */
 +if (test != &new->h) {
 +pr_warn("svc: duplicate registration of gss pseudo flavour %s,\n",
 +name);
 +stat = -EADDRINUSE;
 auth_domain_put(test);
 -kfree(new->h.name);
 -goto out_free_dom;
 +goto out_free_name;
 }
 -return 0;
 +return test;
 
 +out_free_name:
+kfree(new->h.name);
out_free_dom:
kfree(new);
out:
-return stat;
+return ERR_PTR(stat);
}
-
EXPORT_SYMBOL_GPL(svcauth_gss_register_pseudoflavor);

static inline int @@ -1054,24 +1056,32 @@
return 0;
}

-/* Ok this is really heavily depending on a set of semantics in 
-* how rqstp is set up by svc_recv and pages laid down by the 
-* server when reading a request. We are basically guaranteed that 
-* the token lays all down linearly across a set of pages, starting 
-* at iov_base in rq_arg.head[0] which happens to be the first of a 
-* set of pages stored in rq_pages[]. 
-* rq_arg.head[0].iov_base will provide us the page_base to pass 
-* to the upcall. 
-* */
-static inline int -gss_read_proxy_verf(struct svc_rqst *rqstp,
-    struct rpc_gss_wire_cred *gc, __be32 *authp,
-    struct xdr_netobj *in_handle,
-    struct gssp_in_token *in_token)
+static void gss_free_in_token_pages(struct gssp_in_token *in_token)
{
    struct kvec *argv = &rqstp->rq_arg.head[0];
u32 inlen;
    -int res;
+int i;
    +
+    +i = 0;
    +inlen = in_token->page_len;
+while (inlen) {
+    +if (in_token->pages[i])
+        +put_page(in_token->pages[i]);
+    +inlen -= inlen > PAGE_SIZE ? PAGE_SIZE : inlen;
+} 
+    +
+    +kfree(in_token->pages);
+    +in_token->pages = NULL;
+}
+    +
+static int gss_read_proxy_verf(struct svc_rqst *rqstp,
+    struct rpc_gss_wire_cred *gc, __be32 *authp,
+    struct xdr_netobj *in_handle,
+    struct gssp_in_token *in_token)
+{
+struct kvec *argv = &rqstp->rq_arg.head[0];
+unsigned int length, pgto_offs, pgfrom_offs;
+int pages, i, res, pgto, pgfrom;
+size_t inlen, to_offs, from_offs;

res = gss_read_common_verf(gc, argv, authp, in_handle);
if (res)
@@ -1081,10 +1091,43 @@
    if (inlen > (argv->iov_len + rqstp->rq_arg.page_len))
        return SVC_DENIED;

-in_token->pages = rqstp->rq_pages;
-in_token->page_base = (ulong)argv->iov_base & ~PAGE_MASK;
+pages = DIV_ROUND_UP(inlen, PAGE_SIZE);
+in_token->pages = kcalloc(pages, sizeof(struct page *), GFP_KERNEL);
+if (!in_token->pages)
+    return SVC_DENIED;
+in_token->page_base = 0;
+in_token->page_len = inlen;
+for (i = 0; i < pages; i++) {
+    in_token->pages[i] = alloc_page(GFP_KERNEL);
+    if (!in_token->pages[i]) {
+        gss_free_in_token_pages(in_token);
+        return SVC_DENIED;
+    }
+
+    length = min_t(unsigned int, inlen, argv->iov_len);
+    memcpy(page_address(in_token->pages[0]), argv->iov_base, length);
+    inlen -= length;
+    for (to_offs = length;
+        from_offs = rqstp->rq_arg.page_base;
+        while (inlen) {
+            pgto = to_offs >> PAGE_SHIFT;
+            pgfrom = from_offs >> PAGE_SHIFT;
+            pgto_offs = to_offs & ~PAGE_MASK;
+            pgfrom_offs = from_offs & ~PAGE_MASK;
+            length = min_t(unsigned int, inlen,
+                min_t(unsigned int, PAGE_SIZE - pgto_offs,
+                    PAGE_SIZE - pgfrom_offs));
+            memcpy(page_address(in_token->pages[pgto]) + pgto_offs,
+ page_address(rqstp->rq_arg.pages[pgfrom]) + pgfrom_offs,
+ length);
+
+to_offs += length;
+from_offs += length;
+inlen -= length;
+
} return 0;
}

@@ -1122,7 +1165,7 @@
struct kvec *resv = &rqstp->rq_res.head[0];
struct rsi *rsip, rsikey;
int ret;
-struct sunrpc_net *sn = net_generic(rqstp->rq_xprt->xpt_net, sunrpc_net_id);
+struct sunrpc_net *sn = net_generic(SVC_NET(rqstp), sunrpc_net_id);

memset(&rsikey, 0, sizeof(rsikey));
ret = gss_read_verf(gc, argv, authp,
@@ -1190,6 +1233,7 @@
dprintk("RPC: No creds found!
");
goto out;
} else {
+struct timespec64 boot;

/* steal creds */
rsci.cred = ud->creds;
@@ -1210,6 +1254,9 @@
&expiry, GFP_KERNEL);
if (status)
goto out;
+
+getboottime64(&boot);
+expiry -= boot.tv_sec;
}

rsci.h.expiry_time = expiry;
@@ -1233,7 +1306,11 @@
uint64_t handle;
int status;
int ret;
-struct net *net = rqstp->rq_xprt->xpt_net;
+struct net *net = SVC_NET(rqstp);
struct sunrpc_net *sn = net_generic(net, sunrpc_net_id);

memset(&ud, 0, sizeof(ud));
@@ -1259,8 +1306,11 @@
break;
case GSS_S_COMPLETE:
    status = gss_proxy_save_rsc(sn->rsc_cache, &ud, &handle);
    if (status)
        pr_info("%s: gss_proxy_save_rsc failed (%d)\n", __func__, status);
    goto out;

    cli_handle.data = (u8 *)&handle;
    cli_handle.len = sizeof(handle);
    break;

/* Got an answer to the upcall; use it: */
if (gss_write_init_verf(sn->rsc_cache, rqstp,
    &cli_handle, &ud.major_status))
    pr_info("%s: gss_write_init_verf failed\n", __func__);
    goto out;

    if (gss_write_resv(resv, PAGE_SIZE,
        &cli_handle, &ud.out_token,
        - ud.major_status, ud.minor_status))
    pr_info("%s: gss_write_resv failed\n", __func__);
    goto out;

    ret = SVC_COMPLETE;
out:
    gss_free_in_token_pages(&ud.in_token);
    gssp_free_upcall_data(&ud);
    return ret;

    @@ -1424,7 +1479,7 @@
    __be32*rpcstart;
    __be32*reject_stat = resv->iov_base + resv->iov_len;
    intret;
    -struct sunrpc_net *sn = net_generic(rqstp->rq_xprt->xpt_net, sunrpc_net_id);
    +struct sunrpc_net *sn = net_generic(SVC_NET(rqstp), sunrpc_net_id);

dprintk("RPC: svcauth_gss: argv->iov_len = %zd\n",
    argv->iov_len);
    @@ -1711,11 +1766,14 @@
    svcauth_gss_release(struct svc_rqst *rqstp)
    { struct gss_svc_data *gsd = (struct gss_svc_data *)rqstp->rq_auth_data;
    -struct rpc_gss_wire_cred *gc = &gsd->clcred;
    +struct rpc_gss_wire_cred *gc = &gsd->clcred;
+struct rpc_gss_wire_cred *gc;
struct xdr_buf *resbuf = &rqstp->rq_res;
int stat = -EINVAL;
-struct sunrpc_net *sn = net_generic(rqstp->rq_xprt->xpt_net, sunrpc_net_id);
+struct sunrpc_net *sn = net_generic(SVC_NET(rqstp), sunrpc_net_id);

+if (!gsd)
+goto out;
+gc = &gsd->clcred;
if (gc->gc_proc != RPC_GSS_PROC_DATA)
goto out;
/* Release can be called twice, but we only wrap once. */
@@ -1756,10 +1814,10 @@
if (rqstp->rq_cred.cr_group_info)
    put_group_info(rqstp->rq_cred.cr_group_info);
rqstp->rq_cred.cr_group_info = NULL;
- if (gsd->rsci)
+ if (gsd && gsd->rsci) {
    cache_put(&gsd->rsci->h, sn->rsc_cache);
- gsd->rsci = NULL;
+ gsd->rsci = NULL;
    }
    return stat;
}

@@ -1856,7 +1914,7 @@
goto out2;
 return 0;
out2:
-destroy_use_gss_proxy_proc_entry(net);
+rsi_cache_destroy_net(net);
out1:
 rsc_cache_destroy_net(net);
return rv;
--- linux-4.15.0.orig/net/sunrpc/cache.c
+++ linux-4.15.0/net/sunrpc/cache.c
@@ -54,6 +54,9 @@
h->last_refresh = now;
}
+static void cache_fresh_unlocked(struct cache_head *head,
+struct cache_detail *detail);
+
struct cache_head *sunrpc_cache_lookup(struct cache_detail *detail,
    struct cache_head *key, int hash)
{ }
@@ -110,8 +113,10 @@
cache_get(new);
write_unlock(&detail->hash_lock);

-if (freeme)
+if (freeme) {
+    cache_fresh_unlocked(freeme, detail);
    cache_put(freeme, detail);
+
    return new;
}
EXPORT_SYMBOL_GPL(sunrpc_cache_lookup);
--- linux-4.15.0.orig/net/sunrpc/clnt.c
+++ linux-4.15.0/net/sunrpc/clnt.c
@@ -965,10 +965,20 @@
 }
 EXPORT_SYMBOL_GPL(rpc_bind_new_program);

+void rpc_task_release_transport(struct rpc_task *task)
+{
+    struct rpc_xprt *xprt = task->tk_xprt;
+    
+    +if (xprt) {
+        task->tk_xprt = NULL;
+        xprt_put(xprt);
+    }
+    +}
+    
+    EXPORT_SYMBOL_GPL(rpc_task_release_transport);
    
    void rpc_task_release_client(struct rpc_task *task)
    {
        struct rpc_clnt *clnt = task->tk_client;
        -struct rpc_xprt *xprt = task->tk_xprt;

        if (clnt != NULL) {
            /* Remove from client task list */
            @@ -979,12 +989,14 @@
            rpc_release_client(clnt);
            }
            +rpc_task_release_transport(task);
            +}

            -if (xprt != NULL) {
            -task->tk_xprt = NULL;
            -xprt_put(xprt);
            -}
            +static
+void rpc_task_set_transport(struct rpc_task *task, struct rpc_clnt *clnt)
+{
+    if (!task->tk_xprt)
+        task->tk_xprt = xprt_iter_get_next(&clnt->cl_xpi);
+
+static
+    @ @ -992.8 +1004.7 @@
+    {
+        if (clnt != NULL) {
+            if (task->tk_xprt == NULL)
+                task->tk_xprt = xprt_iter_get_next(&clnt->cl_xpi);
+            rpc_task_set_transport(task, clnt);
+            atomic_inc(&clnt->cl_count);
+            if (clnt->cl_softrtry)
+                @ @ -1528.6 +1539.7 @@
+                clnt->cl_program->version[clnt->cl_vers]->counts[idx]++;  
+                clnt->cl_stats->rpccnt++;
+                task->tk_action = call_reserve;
+                rpc_task_set_transport(task, clnt);
+        } 
+    */
+    @ @ -1995.13 +2007.15 @@
+    static void
+    call_transmit_status(struct rpc_task *task)
+    { 
+        struct rpc_xprt *xprt = task->tk_rqstp->rq_xprt;
+        task->tk_action = call_status;
+    */
+        * Common case: success. Force the compiler to put this
+        * test first.
+        * or test first. Or, if any error and xprt_close_wait,
+        * release the xprt lock so the socket can close.
+        */
+        -if (task->tk_status == 0) {
+            +if (task->tk_status == 0 || xprt_close_wait(xprt)) {
+                xprt_end_transmit(task);
+                rpc_task_force_reencode(task);
+                return;
+            } @ @ -2709.6 +2723.7 @@
+            xprt = xprt_iter_xprt(&clnt->cl_xpi);
+            if (xprt == NULL || xprt == NULL) {
+                rcu_read_unlock();
+                xprt_switch_put(xps);
return -EAGAIN;
}
resvport = xprt->resvport;
--- linux-4.15.0.orig/net/sunrpc/rpc_pipe.c
+++ linux-4.15.0/net/sunrpc/rpc_pipe.c
@@ -1347,6 +1347,7 @@
q.len = strlen(gssd_dummy_clnt_dir[0].name);
clnt_dentry = d_hash_and_lookup(gssd_dentry, &q);
if (!clnt_dentry) {
+    __rpc_depopulate(gssd_dentry, gssd_dummy_clnt_dir, 0, 1);
pipe_dentry = ERR_PTR(-ENOENT);
goto out;
}
@@ -1375,6 +1376,7 @@
struct dentry *clnt_dir = pipe_dentry->d_parent;
struct dentry *gssd_dir = clnt_dir->d_parent;

+dget(pipe_dentry);
+__rpc_rmpipe(d_inode(clnt_dir), pipe_dentry);
+__rpc_depopulate(clnt_dir, gssd_dummy_info_file, 0, 1);
+__rpc_depopulate(gssd_dir, gssd_dummy_clnt_dir, 0, 1);
--- linux-4.15.0.orig/net/sunrpc/rpcb_clnt.c
+++ linux-4.15.0/net/sunrpc/rpcb_clnt.c
@@ -771,6 +771,12 @@
case RPCBVERS_3:
    map->r_netid = xprt->address_strings[RPC_DISPLAY_NETID];
    map->r_addr = rpc_sockaddr2uaddr(sap, GFP_ATOMIC);
+    if (!map->r_addr) {
+        status = -ENOMEM;
+        dprintk("RPC: %5u %s: no memory available\n",
+            task->tk_pid, __func__);
+        goto bailout_free_args;
+    }
    map->r_owner = "";
    break;
case RPCBVERS_2:
@@ -793,6 +799,8 @@
rpc_put_task(child);
return;
+bailout_free_args:
+kfree(map);
bailout_release_client;
rpc_release_client(rpcb_clnt);
bailout_nofree:
@@ -973,8 +981,8 @@
p = xdr_inline_decode(xdr, len);
if (unlikely(p == NULL))
goto out_fail;
-dprintf("RPC: %5u RPCB_%s reply: %s\n", req->rq_task->tk_pid,
  req->rq_task->tk_msg.rpc_proc->p_name, (char *)p);
+dprintf("RPC: %5u RPCB_%s reply: %*pE\n", req->rq_task->tk_pid,
  +req->rq_task->tk_msg.rpc_proc->p_name, len, (char *)p);

if (rpc_uaddr2sockaddr(req->rq_xprt->xprt_net, (char *)p, len,
  sap, sizeof(address)) == 0)
--- linux-4.15.0.orig/net/sunrpc/sched.c
+++ linux-4.15.0/net/sunrpc/sched.c
@@ -99,65 +99,79 @@
  list_add(&task->u.tk_wait.timer_list, &queue->timer_list.list);
 }

-static void rpc_rotate_queue_owner(struct rpc_wait_queue *queue)
-{  
-struct list_head *q = &queue->tasks[queue->priority];
-struct rpc_task *task;
-
-if (!list_empty(q)) {
-  task = list_first_entry(q, struct rpc_task, u.tk_wait.list);
-  if (task->tk_owner == queue->owner)
-    list_move_tail(&task->u.tk_wait.list, q);
-}
-
-static void rpc_set_waitqueue_priority(struct rpc_wait_queue *queue, int priority)
{  
  if (queue->priority != priority) {
    /* Fairness: rotate the list when changing priority */
    -rpc_rotate_queue_owner(queue);
    queue->priority = priority;
    +queue->nr = 1U << priority;
  }
}

-static void rpc_set_waitqueue_owner(struct rpc_wait_queue *queue, pid_t pid)
-{  
  queue->owner = pid;
  queue->nr = RPC_BATCH_COUNT;
-
-  
-static void rpc_reset_waitqueue_priority(struct rpc_wait_queue *queue)
{  
  rpc_set_waitqueue_priority(queue, queue->maxpriority);
  -rpc_set_waitqueue_owner(queue, 0);
}
static void __rpc_add_wait_queue_priority(struct rpc_wait_queue *queue,
		struct rpc_task *task,
		unsigned char queue_priority)
{
	if (unlikely(queue_priority > queue->maxpriority))
		queue_priority = queue->maxpriority;
	if (queue_priority > queue->priority)
		rpc_set_waitqueue_priority(queue, queue_priority);
	q = &queue->tasks[queue_priority];
	list_for_each_entry(t, q, u.tk_wait.list) {
		if (t->tk_owner == task->tk_owner) {
			list_add_tail(&task->u.tk_wait.list, &t->u.tk_wait.links);
			/* Cache the queue head in task->u.tk_wait.list */
			task->u.tk_wait.list.next = q;
			task->u.tk_wait.list.prev = NULL;
			return;
		}
	}
	INIT_LIST_HEAD(&task->u.tk_wait.links);
	list_del(&task->u.tk_wait.list);
	return;
}

static void __rpc_list_enqueue_task(struct list_head *q, struct rpc_task *task)
{
-struct list_head *q;
struct rpc_task *t;

-INIT_LIST_HEAD(&task->u.tk_wait.links);
-INIT_LIST_HEAD(&task->u.tk_wait.links);
	if (!list_empty(&task->u.tk_wait.links)) {
+if (task->u.tk_wait.list.prev == NULL) {
+list_del(&task->u.tk_wait.list);
+return;
+}
+if (!list_empty(&task->u.tk_wait.list)) {

t = list_first_entry(&task->u.tk_wait.links,
+struct rpc_task,
+u.tk_wait.links);

/* Assume __rpc_list_enqueue_task() cached the queue head */
q = t->u.tk_wait.list.next;
list_add_tail(&t->u.tk_wait.list, q);
list_del(&task->u.tk_wait.links);
}
list_del(&task->u.tk_wait.list);
+
+
/*
 * Add new request to a priority queue.
 */
+
static void __rpc_add_wait_queue_priority(struct rpc_wait_queue *queue,
+struct rpc_task *task,
+unsigned char queue_priority)
+
{
+if (unlikely(queue_priority > queue->maxpriority))
+queue_priority = queue->maxpriority;
+__rpc_list_enqueue_task(&queue->tasks[queue_priority], task);
+
+
/*
 * Add new request to wait queue.
 * 
 * Swapper tasks always get inserted at the head of the queue.
 */
static void __rpc_remove_wait_queue_priority(struct rpc_task *task)
{
-struct rpc_task *t;
-
-if (!list_empty(&task->u.tk_wait.links)) {
-t = list_entry(task->u.tk_wait.links.next, struct rpc_task, u.tk_wait.list);
-list_move(&t->u.tk_wait.list, &task->u.tk_wait.list);
-list_splice_init(&task->u.tk_wait.links, &t->u.tk_wait.links);
-}
+__rpc_list_dequeue_task(task);
 }

/*
 @@ -194,13 +208,7 @@
 __rpc_disable_timer(queue, task);
 if (RPC_IS_PRIORITY(queue))
-__rpc_remove_wait_queue_priority(task);
-}
+}
+list_del(&task->u.tk_wait.list);
+list_del(&task->u.tk_wait.list);  
queue->qlen--;  
dprintk("RPC: %5u removed from queue %p\"%s\"%u",  
task->tk_pid, queue, rpc_qname(queue));  
@@ -478,20 +487,22 @@  
struct rpc_task *task;  

/*  
+ * Service the privileged queue.  
+ */  
+q = &queue->tasks[RPC_NR_PRIORITY - 1];  
+if (queue->maxpriority > RPC_PRIORITY_PRIVILEGED && !list_empty(q)) {  
+task = list_first_entry(q, struct rpc_task, u.tk_wait.list);  
+goto out;  
+}  
+  
+/*  
* Service a batch of tasks from a single owner.  
*/  
q = &queue->tasks[queue->priority];  
-if (!list_empty(q)) {  
-task = list_entry(q->next, struct rpc_task, u.tk_wait.list);  
-if (queue->owner == task->tk_owner) {  
-if (--queue->nr)  
-goto out;  
-list_move_tail(&task->u.tk_wait.list, q);  
-}  
-/*  
- * Check if we need to switch queues.  
- */  
-goto new_owner;  
+if (!list_empty(q) && queue->nr) {  
+queue->nr--;  
+task = list_first_entry(q, struct rpc_task, u.tk_wait.list);  
+goto out;  
}  
/*  
@@ -503,7 +514,7 @@  
else  
q = q - 1;  
if (!list_empty(q)) {  
-task = list_entry(q->next, struct rpc_task, u.tk_wait.list);  
+task = list_first_entry(q, struct rpc_task, u.tk_wait.list);  
goto new_queue;  
}  
} while (q != &queue->tasks[queue->priority]);  
@@ -513,8 +524,6 @@
new_queue:
rpc_set_waitqueue_priority(queue, (unsigned int)(q - &queue->tasks[0]));
- new_owner:
  - rpc_set_waitqueue_owner(queue, task->tk_owner);
out:
return task;
}
--- linux-4.15.0.orig/net/sunrpc/svc.c
+++ linux-4.15.0/net/sunrpc/svc.c
@@ -34,6 +34,8 @@
static void svc_unregister(const struct svc_serv *serv, struct net *net);

+void svc_tcp_prep_reply_hdr(struct svc_rqst *rqstp);
+
#define svc_serv_is_pooled(serv) ((serv)->sv_ops->svo_function)

#define SVC_POOL_DEFAULT	SVC_POOL_GLOBAL
@@ -1144,6 +1146,22 @@
static __printf(2,3) void svc_printk(struct svc_rqst *rqstp, const char *fmt, ...) {}
#endif
+__be32
+svc_return_autherr(struct svc_rqst *rqstp, __be32 auth_err)
+{
+set_bit(RQ_AUTHERR, &rqstp->rq_flags);
+return auth_err;
+}
+EXPORT_SYMBOL_GPL(svc_return_autherr);
+
+static __be32
+svc_get_autherr(struct svc_rqst *rqstp, __be32 *statp)
+{
+if (test_and_clear_bit(RQ_AUTHERR, &rqstp->rq_flags))
+return *statp;
+return rpc_auth_ok;
+}
+
/*
 * Common routine for processing the RPC request.
 */
@@ -1172,7 +1190,8 @@
clear_bit(RQ_DROPME, &rqstp->rq_flags);

/* Setup reply header */
-rqstp->rq_xprt->xpt_ops->xpo_prep_reply_hdr(rqstp);
+if (rqstp->rq_prot == IPPROTO_TCP)
+svc_tcp_prep_reply_hdr(rqstp);

csvc_putu32(resv, rqstp->rq_xid);

@@ -1244,7 +1263,7 @@
 * for lower versions. RPC_PROG_MISMATCH seems to be the closest
 * fit.
 */
-    if (versp->vs_need_cong_ctrl &&
+    if (versp->vs_need_cong_ctrl && rqstp->rq_xprt &&
      !test_bit(XPT_CONG_CTRL, &rqstp->rq_xprt->xpt_flags))
goto err_bad_vers;

@@ -1292,11 +1311,9 @@
procp->pc_release(rqstp);
goto dropit;
}
    -if (*statp == rpc_autherr_badcred) {
-      if (procp->pc_release)
-        procp->pc_release(rqstp);
-      goto err_bad_auth;
-    }
+    auth_stat = svc_get_autherr(rqstp, statp);
+    if (auth_stat != rpc_auth_ok)
+      goto err_release_bad_auth;
    if (*statp == rpc_success && procp->pc_encode &&
      !procp->pc_encode(rqstp, resv->iov_base + resv->iov_len)) {
      dprintk("svc: failed to encode reply\n");
@@ -1326,7 +1343,7 @@
  
    sendit:
    if (svc_authorise(rqstp))
-      goto close;
+      goto close_xprt;
    return 1; /* Caller can now send it */

  dropit:
@@ -1335,7 +1352,9 @@
    return 0;

  close:
-    if (test_bit(XPT_TEMP, &rqstp->rq_xprt->xpt_flags))
+    svc_authorise(rqstp);
+    close_xprt:
+      if (rqstp->rq_xprt && test_bit(XPT_TEMP, &rqstp->rq_xprt->xpt_flags))
      svc_close_xprt(rqstp->rq_xprt);
      dprintk("svc: svc_process close\n");
      return 0;

err_short_len:
svc_printk(rqstp, "short len %zd, dropping request\n",
argv->iov_len);
-goto close_xprt;
+goto close_xprt;

err_bad_rpc:
+err_release_bad_auth:
+if (procp->pc_release)
+procp->pc_release(rqstp);
+err_bad_auth:
dprintf("svc: authentication failed (%d)\n", ntohl(auth_stat));
+err_release_bad_auth:
+if (procp->pc_release)
+procp->pc_release(rqstp);
+err_bad_auth:
dprintf("svc: authentication failed (%d)\n", ntohs(auth_stat));
+err_bad_auth:
dprintf("svc: authentication failed (%d)\n", ntohs(auth_stat));
+err_bad_auth:
dprintf("svc: authentication failed (%d)\n", ntohs(auth_stat));
+err_bad_auth:
dprintf("svc: authentication failed (%d)\n", ntohs(auth_stat));
+
/* Build the svc_rqst used by the common processing routine */
-rqstp->rq_xprt = serv->sv_bc_xprt;
+rqstp->rq_xprt = serv->sv_bc_xprt;
+rqstp->rq_xid = req->rq_xid;
+rqstp->rq_prot = req->rq_xprt->prot;
+rqstp->rq_server = serv;
+rqstp->rq_addrlen = sizeof(req->rq_xprt->addr);
+memcpy(&rqstp->rq_addr, &req->rq_xprt->addr, rqstp->rq_addrlen);
-rqstp->rq_addrlen = sizeof(req->rq_xprt->addr);
-memcpy(&rqstp->rq_addr, &req->rq_xprt->addr, rqstp->rq_addrlen);
--- linux-4.15.0.orig/net/sunrpc/svc_xprt.c
+++ linux-4.15.0/net/sunrpc/svc_xprt.c
@@ -103,8 +103,17 @@}
 EXPORT_SYMBOL_GPL(svc_unreg_xprt_class);
 /*
 -* Format the transport list for printing
 +/**
 + * svc_print_xprts - Format the transport list for printing
 + * @buf: target buffer for formatted address
 + * @maxlen: length of target buffer
 + *
 + * Fills in @buf with a string containing a list of transport names, each name
 + * terminated with '\n'. If the buffer is too small, some entries may be
 + * missing, but it is guaranteed that all lines in the output buffer are
 + * complete.
+ *+ * Returns positive length of the filled-in string.+ */int svc_print_xprts(char *buf, int maxlen){@@ -117,9 +126,9 @@list_for_each_entry(xcl, &svc_xprt_class_list, xcl_list) {int slen;-
		sprintf(tmpstr, "%s %d\n", xcl->xcl_name, xcl->xcl_max_payload);
-		slen = strlen(tmpstr);
-\t\tif (len + slen > maxlen)
+\t\tslen = snprintf(tmpstr, sizeof(tmpstr), "%s %d\n",
+\t\t\txcl->xcl_name, xcl->xcl_max_payload);
+\t\tif (slen >= sizeof(tmpstr) || len + slen >= maxlen)
break;
    len += slen;
    strcat(buf, tmpstr);
@@ -476,10 +485,11 @@*/void svc_reserve(struct svc_rqst *rqstp, int space){+struct svc_xprt *xprt = rqstp->rq_xprt;
+space += rqstp->rq_res.head[0].iov_len;
-\tif (space < rqstp->rq_reserved) {
-\t\tstruct svc_xprt *xprt = rqstp->rq_xprt;
-\t\tif (xprt && space < rqstp->rq_reserved) {
-\t\t\tatomic_sub((rqstp->rq_reserved - space), &xprt->xpt_reserved);
-\t\t\trqstp->rq_reserved = space;
-\t\t}
\t\tdel(&u->list);
\t\tu->callback(u);
\t}\nspin_unlock(&xprt->xpt_lock);
while (!list_empty(&xprt->xpt_users)) {
    u = list_first_entry(&xprt->xpt_users, struct svc_xpt_user, list);
-\t\tlist_del_init(&u->list);
-\t\tu->callback(u);
\t}
spin_unlock(&xprt->xpt_lock);
@@ -1055,7 +1065,7 @@struct svc_xprt *xprt;
\t\tint ret = 0;
-\tspin_lock(&serv->sv_lock);
+\tspin_lock_bh(&serv->sv_lock);
list_for_each_entry(xprt, xprt_list, xpt_list) {
if (xprt->xpt_net != net)
continue;
@@ -1063,7 +1073,7 @@
set_bit(XPT_CLOSE, &xprt->xpt_flags);
svc_xprt_enqueue(xprt);
}
-spun_unlock(&serv->sv_lock);
+spin_unlock_bh(&serv->sv_lock);
return ret;
}

--- linux-4.15.0.orig/net/sunrpc/svcsock.c
+++ linux-4.15.0/net/sunrpc/svcsock.c
@@ -381,9 +381,13 @@
static void svc_sock_setbuFSIZE(struct socket *sock, unsigned int snd,
-unsigned int rcv)
+static void svc_sock_setbuFSIZE(struct svc_sock *svsk, unsigned int nreqs)
{
+unsigned int max_mesg = svsk->sk_xprt.xpt_server->sv_max_mesg;
+struct socket *sock = svsk->sk_sock;
+
+nreqs = min(nreqs, INT_MAX / 2 / max_mesg);
+
#if 0
    mm_segment_t oldfs;
    oldfs = get_fs(); set_fs(KERN_DS);
@@ -398,8 +402,8 @@
        * DaveM said I could!
    */
lock_sock(sock->sk);
-sock->sk->sk_sndbuf = snd * 2;
-sock->sk->sk_rcvbuf = rcv * 2;
+sock->sk->sk_sndbuf = nreqs * max_mesg * 2;
+sock->sk->sk_rcvbuf = nreqs * max_mesg * 2;
sock->sk->sk_write_space(sock->sk);
release_sock(sock->sk);
#endif
@@ -559,9 +563,7 @@
    svc_sock_setbuFSIZE(svsk->sk_sock,
-(serv->sv_nrthreads+3) * serv->sv_max_mesg,
-(serv->sv_nrthreads+3) * serv->sv_max_mesg);
+    svc_sock_setbuFSIZE(svsk, serv->sv_nrthreads + 3);
clear_bit(XPT_DATA, &svsk->sk_xprt.xpt_flags);
skb = NULL;
@@ -585,7 +587,7 @@
 */ Don't enable netstamp, sunrpc doesn't
 need that much accuracy */
 }
-svsk->sk_sk->sk_stamp = skb->tstamp;
+sock_write_timestamp(svsk->sk_sk, skb->tstamp);
set_bit(XPT_DATA, &svsk->sk_xprt.xpt_flags); /* there may be more data... */

len  = skb->len;
@@ -729,9 +731,7 @@
* receive and respond to one request.
* svc_udp_recvfrom will re-adjust if necessary
*/
-svc_sock_setbufsize(svsk->sk_sock,
-    3 * svsk->sk_xprt.xpt_server->sv_max_mesg,
-    3 * svsk->sk_xprt.xpt_server->sv_max_mesg);
+svc_sock_setbufsize(svsk, 3);

/* data might have come in before data_ready set up */
set_bit(XPT_DATA, &svsk->sk_xprt.xpt_flags);
@@ -1207,7 +1207,7 @@
 /* Setup response header. TCP has a 4B record length field.
 */
-static void svc_tcp_prep_reply_hdr(struct svc_rqst *rqstp)
+void svc_tcp_prep_reply_hdr(struct svc_rqst *rqstp)
{
    struct kvec *resv = &rqstp->rq_res.head[0];

--- linux-4.15.0.orig/net/sunrpc/xdr.c
+++ linux-4.15.0/net/sunrpc/xdr.c
@@ -512,7 +512,7 @@
 static __be32 *xdr_get_next_encode_buffer(struct xdr_stream *xdr,
 size_t nbytes)
 {
-    static __be32 *p;
+    __be32 *p;
    int space_left;
    int frag1bytes, frag2bytes;

@@ -639,11 +639,10 @@
 WARN_ON_ONCE(xdr->iov);
 return;
 }
-if (fraglen) {

+if (fraglen)
xdr->end = head->iov_base + head->iov_len;
-xdr->page_ptr--; 
-}
/* (otherwise assume xdr->end is already set) */
+xdr->page_ptr--; 
head->iov_len = len;
buf->len = len;
xdr->p = head->iov_base + head->iov_len;
@@ -1037,6 +1036,7 @@
 base = 0;
 } else {
 base -= buf->head[0].iov_len;
+subbuf->head[0].iov_base = buf->head[0].iov_base;
 subbuf->head[0].iov_len = 0;
 }
@@ -1049,6 +1049,8 @@
 base = 0;
 } else {
 base -= buf->page_len;
+subbuf->pages = buf->pages;
+subbuf->page_base = 0;
 subbuf->page_len = 0;
 }
@@ -1060,6 +1062,7 @@
 base = 0;
 } else {
 base -= buf->tail[0].iov_len;
+subbuf->tail[0].iov_base = buf->tail[0].iov_base;
 subbuf->tail[0].iov_len = 0;
 }

--- linux-4.15.0.orig/net/sunrpc/xprt.c
+++ linux-4.15.0/net/sunrpc/xprt.c
@@ -143,31 +143,64 @@
}
EXPORT_SYMBOL_GPL(xprt_unregister_transport);

+static void
+xprt_class_release(const struct xprt_class *t)
+{
+module_put(t->owner);
+}
+static const struct xprt_class *
+xprt_class_find_by_netid_locked(const char *netid)
+
+const struct xprt_class *t;
+unsigned int i;
+
+list_for_each_entry(t, &xprt_list, list) {
+for (i = 0; t->netid[i][0] != '\0'; i++) {
+if (strcmp(t->netid[i], netid) != 0)
+continue;
+if (!try_module_get(t->owner))
+continue;
+return t;
+
+}
+
+return NULL;
+
+
+xprt_class_find_by_netid(const char *netid)
+
+{
+const struct xprt_class *t;
+
+spin_lock(&xprt_list_lock);
+t = xprt_class_find_by_netid_locked(netid);
+if (!t) {
+spin_unlock(&xprt_list_lock);
+request_module("rpc%s", netid);
+spin_lock(&xprt_list_lock);
+t = xprt_class_find_by_netid_locked(netid);
+
+spin_unlock(&xprt_list_lock);
+return t;
+
+
/**
 * xprt_load_transport - load a transport implementation
- * @transport_name: transport to load
+ * @netid: transport to load
*
* Returns:
* 0:transport successfully loaded
* -ENOENT:transport module not available
*/
-int xprt_load_transport(const char *transport_name)
+int xprt_load_transport(const char *netid)
{
-struct xprt_class *t;
-int result;
+const struct xprt_class *t;
result = 0;
spin_lock(&xprt_list_lock);
list_for_each_entry(t, &xprt_list, list) {
if (strcmp(t->name, transport_name) == 0) {
spin_unlock(&xprt_list_lock);
goto out;
}
spin_unlock(&xprt_list_lock);
result = request_module("xprt%s", transport_name);
out:
return result;
t = xprt_class_find_by_netid(netid);
if (!t)
return -ENOENT;
xprt_class_release(t);
return 0;
} 
EXPORT_SYMBOL_GPL(xprt_load_transport);

@@ -780,25 +813,26 @@
return;
if (xprt_test_and_set_connecting(xprt))
return;
xprt->stat.connect_start = jiffies;
xprt->ops->connect(xprt, task);
/* Race breaker */
if (!xprt_connected(xprt)) {
xprt->stat.connect_start = jiffies;
xprt->ops->connect(xprt, task);
} else {
xprt_clear_connecting(xprt);
task->tk_status = 0;
rpc_wake_up_queued_task(&xprt->pending, task);
}
}
xprt_release_write(xprt, task);

static void xprt_connect_status(struct rpc_task *task)
{
struct rpc_xprt*xprt = task->tk_rqstp->rq_xprt;

if (task->tk_status == 0) {
xprt->stat.connect_count++;
xprt->stat.connect_time += (long)jiffies - xprt->stat.connect_start;
switch (task->tk_status) {
+case 0:
dprintf("RPC: %5u xprt_connect_status: connection established\n", 
task->tk_pid);
-return;
-
-switch (task->tk_status) {
+break;
 case -ECONNREFUSED:  
case -ECONNRESET: 
case -ECONNABORTED: 
@@ -815,7 +849,7 @@
default: 
dprintf("RPC: %5u xprt_connect_status: error %d connecting to " 
"server %s\n", task->tk_pid, -task->tk_status, 
-xprt->servername);
+task->tk_rqstp->rq_xprt->servername);
task->tk_status = -EIO;
}
}
--- linux-4.15.0.orig/net/sunrpc/xprtrdma/backchannel.c 
+++ linux-4.15.0/net/sunrpc/xprtrdma/backchannel.c 
@@ -74,21 +74,13 @@
static int rpcrdma_bc_setup_reps(struct rpcrdma_xprt *r_xprt, 
unsigned int count)
{
-struct rpcrdma_rep *rep;
+int rc = 0;

while (count--)
{
	-rep = rpcrdma_create_rep(r_xprt);
-+if (IS_ERR(rep)) {
-+pr_err("RPC: %5s: reply buffer alloc failed\n", 
-+__func__); 
-+rc = PTR_ERR(rep);
-+break;
-+}
-
-+rc = rpcrdma_create_rep(r_xprt);
+break;
-
-rpcrdma_recv_buffer_put(rep);
}

return rc;
}

--- linux-4.15.0.orig/net/sunrpc/xprtrdma/module.c 
+++ linux-4.15.0/net/sunrpc/xprtrdma/module.c
MODULE_LICENSE("Dual BSD/GPL");
MODULE_ALIAS("svcrdma");
MODULE_ALIAS("xprtrdma");
+MODULE_ALIAS("rpcrdma6");

static void __exit rpc_rdma_cleanup(void)
{
    --- linux-4.15.0.orig/net/sunrpc/xprtrdma/rpc_rdma.c
    +++ linux-4.15.0/net/sunrpc/xprtrdma/rpc_rdma.c
    @@ -143,7 +143,7 @@
    if (xdr->page_len) {
        remaining = xdr->page_len;
        offset = offset_in_page(xdr->page_base);
-    count = 0;
+    count = RPCRDMA_MIN_SEND_SGES;
        while (remaining) {
            remaining -= min_t(unsigned int,
                PAGE_SIZE - offset, remaining);
        }
    *
    *ppages = alloc_page(GFP_ATOMIC);
    if (!*ppages)
-        return -EAGAIN;
+        return -ENOBUFS;
}
    }
    seg->mr_page = *ppages;
    seg->mr_offset = (char *)page_base;
    @ @ -1408,7 +1408,7 @@
    dprintk("RPC: reply %p completes request %p (xid 0x%08x)\n", __func__, rep, req, be32_to_cpu(rep->rr_xid));
    }
    -queue_work_on(req->rl_cpu, rpcrdma_receive_wq, &rep->rr_work);
    +queue_work(rpcrdma_receive_wq, &rep->rr_work);
    return;

    out_badstatus:
    --- linux-4.15.0.orig/net/sunrpc/xprtrdma/svc_rdma_backchannel.c
    +++ linux-4.15.0/net/sunrpc/xprtrdma/svc_rdma_backchannel.c
    @@ -263,6 +263,7 @@
    xprt_rdma_bc_close(struct rpc_xprt *xprt)
    {
        dprintk("svcrdma: %s: xprt %p\n", __func__, xprt);
+        xprt->cwnd = RPC_CWNDSHIFT;
        }
    static void
    @ @ -270,6 +271,7 @@

{ 
dprintf("svcrdma: %s: xprt %p\n", __func__, xprt);

+xprt_rdma_free_addresses(xprt);
  xprt_free(xprt);
  module_put(TTHIS_MODULE);
}
@ @ -320.9 +322.9 @ @
xprt->timeout = &xprt_rdma_bc_timeout;
xprt_set_bound(xprt);
xprt_set_connected(xprt);
-xprt->bind_timeout = RPCRDMA_BIND_TO;
-xprt->reestablish_timeout = RPCRDMA_INIT_REEST_TO;
-xprt->idle_timeout = RPCRDMA_IDLE_DISC_TO;
+xprt->bind_timeout = 0;
+xprt->reestablish_timeout = 0;
+xprt->idle_timeout = 0;
xprt->prot = XPRT_TRANSPORT_BC_RDMA;
xprt->tsh_size = RPCRDMA_HDRLEN_MIN / sizeof(__be32);
--- linux-4.15.0.orig/net/sunrpc/xprtrdma/svc_rdma_rw.c
+++ linux-4.15.0/net/sunrpc/xprtrdma/svc_rdma_rw.c
@@ -727,12 +727,16 @@
  head->arg.head[0].iov_len - info->ri_position;
  head->arg.head[0].iov_len = info->ri_position;

-/* Read chunk may need XDR roundup (see RFC 5666, s. 3.7).
+/* Read chunk may need XDR roundup (see RFC 8166, s. 3.4.5.2).
 * 
 - * NFSv2/3 write decoders need the length of the tail to
 - * contain the size of the roundup padding.
+ * If the client already rounded up the chunk length, the
+ * length does not change. Otherwise, the length of the page
+ * list is increased to include XDR round-up.
+ *
+ * Currently these chunks always start at page offset 0,
+ * thus the rounded-up length never crosses a page boundary.
+ */
-head->arg.tail[0].iov_len += 4 - (info->ri_chunklen & 3);
+info->ri_chunklen = XDR_QUADLEN(info->ri_chunklen) << 2;

  head->arg.page_len = info->ri_chunklen;
  head->arg.len += info->ri_chunklen;
  --- linux-4.15.0.orig/net/sunrpc/xprtrdma/svc_rdma_transport.c
+++ linux-4.15.0/net/sunrpc/xprtrdma/svc_rdma_transport.c
@@ @ -527,9 +527,14 @@
 /* Save client advertised inbound read limit for use later in accept. */
 newxprt->sc_ord = param->initiator_depth;

/* Set the local and remote addresses in the transport */
sa = (struct sockaddr *)&newxprt->sc_cm_id->route.addr.dst_addr;
svc_xprt_set_remote(&newxprt->sc_xprt, sa, svc_addr_len(sa));
+
/* The remote port is arbitrary and not under the control of the
+ * client ULP. Set it to a fixed value so that the DRC continues
+ * to be effective after a reconnect.
+ */
+rpc_set_port((struct sockaddr *)&newxprt->sc_xprt.xpt_remote, 0);
+
sa = (struct sockaddr *)&newxprt->sc_cm_id->route.addr.src_addr;
svc_xprt_set_local(&newxprt->sc_xprt, sa, svc_addr_len(sa));

--- linux-4.15.0.orig/net/sunrpc/xprtrdma/transport.c
+++ linux-4.15.0/net/sunrpc/xprtrdma/transport.c
@@ -52,7 +52,6 @@
#include <linux/slab.h>
#include <linux/seq_file.h>
#include <linux/sunrpc/addr.h>
-#include <linux/smp.h>
#include "xprt_rdma.h"

@@ -240,8 +239,12 @@
if (++xprt->connect_cookie == 0) /* maintain a reserved value */
 ++xprt->connect_cookie;
 if (ep->rep_connected > 0) {
- if (!xprt_test_and_set_connected(xprt))
+ if (!xprt_test_and_set_connected(xprt)) {
+xprt->stat.connect_count++;
+xprt->stat.connect_time += (long)jiffies -
+ xprt->stat.connect_start;
+ xprt_wake_pending_tasks(xprt, 0);
+ }
 } else {
 if (xprt_test_and_clear_connected(xprt))
 xprt_wake_pending_tasks(xprt, -ENOTCONN);
@@ -486,6 +489,12 @@
xprt->reestablish_timeout = 0;
xprt_disconnect_done(xprt);
rpcrdma_ep_disconnect(ep, ia);
+
+/* Prepare @xprt for the next connection by reinitializing
+ * its credit grant to one (see RFC 8166, Section 3.3.3).
+ */
+r_xprt->rx_buf.rb_credits = 1;
xprt->cwnd = RPC_CWNDSHIFT;
}
static void
@@ -657,7 +666,6 @@
    task->tk_pid, __func__, rqst->rq_callsize, 
    rqst->rq_rcvsize, req);

    -req->rl_cpu = smp_processor_id();
    req->rl_connect_cookie = 0;/* our reserved value */
    rpcrdma_set_xprtdata(rqst, req);
    rqst->rq_buffer = req->rl_sendbuf->rg_base;
@@ -850,6 +858,7 @@
    .owner= THIS_MODULE,
    .ident= XPRT_TRANSPORT_RDMA,
    .setup= xprt_setup_rdma,
    +.netid= { "rdma", "rdma6", "" },
    
    void xprt_rdma_cleanup(void)
--- linux-4.15.0.orig/net/sunrpc/xprtrdma/verbs.c
+++ linux-4.15.0/net/sunrpc/xprtrdma/verbs.c
@@ -250,13 +250,13 @@
    ia->ri_device->name,
    sap, rpc_get_port(sap));
    #endif
    +init_completion(&ia->ri_remove_done);
    set_bit(RPCRDMA_IAF_REMOVING, &ia->ri_flags);
    ep->rep_connected = -ENODEV;
    xprt_force_disconnect(&xprt->rx_xprt);
    wait_for_completion(&ia->ri_remove_done);

    ia->ri_id = NULL;
    -ia->ri_pd = NULL;
    ia->ri_device = NULL;
    /* Return 1 to ensure the core destroys the id. */
    return 1;
@@ -306,7 +306,6 @@
    int rc;

    init_completion(&ia->ri_done);
    -init_completion(&ia->ri_remove_done);

    id = rdma_create_id(&init_net, rpcrdma_conn_upcall, xprt, RDMA_PS_TCP,
    IB_QPT_RC);
@@ -450,7 +449,9 @@
    ia->ri_id->qp = NULL;
    }
    ib_free_cq(ep->rep_attr.recv_cq);
    +ep->rep_attr.recv_cq = NULL;
ib_free_cq(ep->rep_attr.send_cq);
+ep->rep_attr.send_cq = NULL;

/* The ULP is responsible for ensuring all DMA
 * mappings and MRs are gone.
@@ -463,6 +464,8 @@
rpcrdma_dma_unmap_regbuf(req->rl_recvbuf);
 } rpcrdma_destroy_mrs(buf);
 +ib_dealloc_pd(ia->ri_pd);
 +ia->ri_pd = NULL;

 /* Allow waiters to continue */
 complete(&ia->ri_remove_done);
@@ -509,7 +512,7 @@
 pr_warn("rpcrdma: HCA provides only \%d send SGEs\n", max_sge);
 return -ENOMEM;
 -ia->ri_max_send_sges = max_sge - RPCRDMA_MIN_SEND_SGES;
 +ia->ri_max_send_sges = max_sge;

 if (ia->ri_device->attrs.max_qp_wr <= RPCRDMA_BACKWARD_WRS) {
   dprintk("RPC: \%s: insufficient wqe's available\n",
@@ -558,7 +561,8 @@
   sendcq = ib_alloc_cq(ia->ri_device, NULL,
     ep->rep_attr.cap.max_send_wr + 1,
     1, IB_POLL_WORKQUEUE);
 + ia->ri_device->num_comp_vectors ? 1 : 0,
 + IB_POLL_WORKQUEUE);
 if (IS_ERR(sendcq)) {
   rc = PTR_ERR(sendcq);
   dprintk("RPC: \%s: failed to create send CQ: %i\n",
@@ -635,14 +639,16 @@
 cancel_delayed_work_sync(&ep->rep_connect_worker);;
 -if (ia->ri_id->qp) {
 -+if (ia->ri_id && ia->ri_id->qp) {
 rrpcrdma_ep_disconnect(ep, ia);
 rDMA_destroy_qp(ia->ri_id);
 ia->ri_id->qp = NULL;
 +ib_free_cq(ep->rep_attr.recv_cq);
 -ib_free_cq(ep->rep_attr.send_cq);
 +if (ep->rep_attr.recv_cq)
 +ib_free_cq(ep->rep_attr.recv_cq);
+if (ep->rep_attr.send_cq)
+ib_free_cq(ep->rep_attr.send_cq);
+
+/* Re-establish a connection after a device removal event. *
+@@ -895,17 +901,13 @@
+for (i = 0; i <= buf->rb_sc_last; i++) {
+sc = rpcrdma_sendctx_create(&r_xprt->rx_ia);
+if (!sc)
+    goto out_destroy;
+return -ENOMEM;
+
+sc->sc_xprt = r_xprt;
+buf->rb_sc_ctxs[i] = sc;
+
+} return 0;
+
+out_destroy:
-rpcrdma_sendctxs_destroy(buf);
+    return -ENOMEM;
+
+} /* The sendctx queue is not guaranteed to have a size that is a *
+@@ -1093,10 +1095,17 @@
+return req;
+
+struct rpcrdma_rep *
+/**
+ * rpcrdma_create_rep - Allocate an rpcrdma_rep object
+ * @r_xprt: controlling transport
+ * + + Returns 0 on success or a negative errno on failure.
+ * + */
+int
+rpcrdma_create_rep(struct rpcrdma_xprt *r_xprt)
+{
+struct rpcrdma_create_data_internal *cdata = &r_xprt->rx_data;
+struct rpcrdma_buffer *buf = &r_xprt->rx_buf;
+struct rpcrdma_rep *rep;
+int rc;
+
+    @ @ -1121,12 +1130,18 @ @
+    rep->rr_recv_wr.wr_cqe = &rep->rr_cqe;
+    rep->rr_recv_wr.sg_list = &rep->rr_rdmabuf->rg_iov;
+    rep->rr_recv_wr.num_sge = 1;
+    return rep;
+spin_lock(&buf->rb_lock);
+list_add(&rep->rr_list, &buf->rb_recv_bufs);
+spin_unlock(&buf->rb_lock);
+return 0;

out_free:
kfree(rep);
out:
-return ERR_PTR(rc);
+dprintk("RPC:       %s: reply buffer %d alloc failed\n", 
+__func__, rc);
+return rc;
}

int
@@ -1167,17 +1182,10 @@
}

INIT_LIST_HEAD(&buf->rb_recv_bufs);
-for (i = 0; i < buf->rb_max_requests + RPCRDMA_MAX_BC_REQUESTS; i++) {
-struct rpcrdma_rep *rep;
-
-rep = rpcrdma_create_rep(r_xprt);
-if (IS_ERR(rep)) {
-dprintk("RPC:       %s: reply buffer %d alloc failed\n", 
-__func__, i);
-rc = PTR_ERR(rep);
+for (i = 0; i <= buf->rb_max_requests; i++) {
+rc = rpcrdma_create_rep(r_xprt);
+if (rc)
goto out;
-}
-list_add(&rep->rr_list, &buf->rb_recv_bufs);
}

rc = rpcrdma_sendctxs_create(r_xprt);
@@ -1476,6 +1484,9 @@
static void
rpcrdma_dma_unmap_regbuf(struct rpcrdma_regbuf *rb)
{
+if (!rb)
+return;
+
if (!rpcrdma_regbuf_is_mapped(rb))
return;

@@ -1491,9 +1502,6 @@
void
rpcrdma_free_regbuf(struct rpcrdma_regbuf *rb)
{
    if (!rb)
        return;
    rpcrdma_dma_unmap_regbuf(rb);
    kfree(rb);
}

--- linux-4.15.0.orig/net/sunrpc/xprtrdma/xprt_rdma.h
+++ linux-4.15.0/net/sunrpc/xprtrdma/xprt_rdma.h
@@ -342,7 +342,6 @@
    struct rpcrdma_buffer;
    struct rpcrdma_req {
        struct list_head rll_list;
-       int rl_cpu;
        unsigned int rll_connect_cookie;
        struct rpcrdma_buffer *rl_buffer;
        struct rpcrdma_rep *rl_reply;
@@ -564,8 +563,8 @@
 * Buffer calls - xprtrdma/verbs.c */
    struct rpcrdma_req *rpcrdma_create_req(struct rpcrdma_xprt *);
    struct rpcrdma_rep *rpcrdma_create_rep(struct rpcrdma_xprt *);
    void rpcrdma_destroy_req(struct rpcrdma_req *);
    int rpcrdma_create_rep(struct rpcrdma_xprt *);
    void rpcrdma_buffer_create(struct rpcrdma_xprt *);
    void rpcrdma_buffer_destroy(struct rpcrdma_buffer *);
    struct rpcrdma_sendctx *rpcrdma_sendctx_get_locked(struct rpcrdma_buffer *buf);
--- linux-4.15.0.orig/net/sunrpc/xprtsock.c
+++ linux-4.15.0/net/sunrpc/xprtsock.c
@@ -127,7 +127,7 @@
         .mode = 0644,
         .proc_handler= proc_dointvec_minmax,
         .extra1= &xprt_min_resvport_limit,
-        .extra2= &xprt_max_resvport
+        .extra2= &xprt_max_resvport_limit
    },
    {  
        .procname= "max_resvport",
-       .maxlen = sizeof(unsigned int),
        .mode= 0644,
        .proc_handler= proc_dointvec_minmax,
-        .extra1= &xprt_min_resvport,
+        .extra1= &xprt_min_resvport_limit,
        .extra2= &xprt_max_resvport_limit
    },
}
/* Suck it into the iovec, verify checksum if not done by hw. */
if (csum_partial_copy_to_xdr(&rovr->rq_private_buf, skb)) {
    __UDPX_INC_STATS(sk, UDP_MIB_INERRORS);
    spin_lock(&xprt->recv_lock);
    +__UDPX_INC_STATS(sk, UDP_MIB_INERRORS);
goto out_unpin;
}

-__UDPX_INC_STATS(sk, UDP_MIB_INDATAGRAMS);

spin_lock_bh(&xprt->transport_lock);
xprt_adjust_cwnd(xprt, task, copied);
spin_unlock_bh(&xprt->transport_lock);
spin_lock(&xprt->recv_lock);
xprt_complete_rqst(task, copied);
+__UDPX_INC_STATS(sk, UDP_MIB_INDATAGRAMS);
out_unpin:
xprt_unpin_rqst(rovr);
out_unlock:

static unsigned short xs_get_random_port(void)
+static int xs_get_random_port(void)
{
    unsigned short range = xprt_max_resvport - xprt_min_resvport + 1;
    unsigned short rand = (unsigned short) prandom_u32() % range;
    +return rand + xprt_min_resvport;
    +unsigned short min = xprt_min_resvport, max = xprt_max_resvport;
    +unsigned short range;
    +unsigned short rand;
    +
    +if (max < min)
    +return -EADDRINUSE;

    clear_bit(XPRT_SOCK_CONNECTING, &transport->sock_state);
xprt_clear_connecting(xprt);
}

spin_unlock(&xprt->transport_lock);

spin_unlock_bh(&xprt->transport_lock);
range = max - min + 1;
rand = (unsigned short) prandom_u32() % range;
return rand + min;
}

/**
@@ -1814,9 +1823,9 @@
transport->srcport = xs_sock_getport(sock);
}

-static unsigned short xs_get_srcport(struct sock_xprt *transport)
+static int xs_get_srcport(struct sock_xprt *transport)
{
-unsigned short port = transport->srcport;
+int port = transport->srcport;

if (port == 0 && transport->xprt.resvport)
port = xs_get_random_port();
@@ -1837,7 +1846,7 @@
{ struct sockaddr_storage myaddr;
int err, nloop = 0;
-unsigned short port = xs_get_srcport(transport);
+int port = xs_get_srcport(transport);
unsigned short last;

/*
@@ -1855,8 +1864,8 @@
 * transport->xprt.resvport == 1) xs_get_srcport above will
 * ensure that port is non-zero and we will bind as needed.
 */
-if (port == 0)
-return 0;
+if (port <= 0)
+return port;

memcpy(&myaddr, &transport->srcaddr, transport->xprt.addrlen);
do {
@@ -2010,8 +2019,6 @@
}

/* Tell the socket layer to start connecting... */
-xprt->stat.connect_count++;
-xprt->stat.connect_start = jiffies;
return kernel_connect(sock, xs_addr(xprt), xprt->addrlen, 0);
}
@@ -2043,6 +2050,9 @@
case 0:
dprintf("RPC: xprt %p connected to %s\n",
    xprt, xprt->address_strings[RPC_DISPLAY_ADDR]);
    +xprt->stat.connect_count++;
    +xprt->stat.connect_time += (long)jiffies -
      + xprt->stat.connect_start;
xprt_set_connected(xprt);
    case -ENOBUFFS:
     break;
    @@ -2225,8 +2235,8 @@
     trace_rpc_socket_connect(xprt, sock, 0);
     status = 0;
 out:
    -xprt_unlock_connect(xprt, transport);
    xprt_clear_connecting(xprt);
    +xprt_unlock_connect(xprt, transport);
    xprt_wake_pending_tasks(xprt, status);
 }

 @@ -2363,8 +2373,6 @@
 xs_set_memalloc(xprt);

 /* Tell the socket layer to start connecting... */
    -xprt->stat.connect_count++;
    -xprt->stat.connect_start = jiffies;
 set_bit(XPRT_SOCK_CONNECTING, &transport->sock_state);
 ret = kernel_connect(sock, xs_addr(xprt), xprt->addrlen, O_NONBLOCK);
 switch (ret) {
    @@ -2456,8 +2464,8 @@
 }
 status = -EAGAIN;
 out:
    -xprt_unlock_connect(xprt, transport);
    xprt_clear_connecting(xprt);
    +xprt_unlock_connect(xprt, transport);
    xprt_wake_pending_tasks(xprt, status);
 }

 @@ -3205,6 +3213,7 @@
   .owner = THIS_MODULE,
   .ident = XPRT_TRANSPORT_LOCAL,
   .setup = xs_setup_local,
 +.netid = { "" },
 };

 static struct xprt_class xs_udp_transport = {
    @@ -3213,6 +3222,7 @@
   .owner = THIS_MODULE,
.ident = XPRT_TRANSPORT_UDP,
.setup = xs_setup_udp,
+.netid = [ "udp", "udp6", "" ],
};

static struct xprt_class txs_tcp_transport = {
@@ -3221,6 +3231,7 @@
.owner = THIS_MODULE,
.ident = XPRT_TRANSPORT_TCP,
.setup = xs_setup_tcp,
+.netid = [ "tcp", "tcp6", "" ],
};

static struct xprt_class txs_bc_tcp_transport = {
@@ -3229,6 +3240,7 @@
.owner = THIS_MODULE,
.ident = XPRT_TRANSPORT_BC_TCP,
.setup = xs_setup_bc_tcp,
+.netid = [ "" ],
};

/**
@@ -3289,12 +3301,8 @@
static int param_set_portnr(const char *val, const struct kernel_param *kp)
{
- if (kp->arg == &xprt_min_resvport)
- return param_set_uint_minmax(val, kp,
- RPC_MIN_RESVPORT,
- xprt_max_resvport);
 return param_set_uint_minmax(val, kp,
- xprt_min_resvport,
+RPC_MIN_RESVPORT,
 RPC_MAX_RESVPORT);
}

--- linux-4.15.0.orig/net/tipc/core.c
+++ linux-4.15.0/net/tipc/core.c
@@ -71,9 +71,6 @@
goto out_nametbl;

INIT_LIST_HEAD(&tn->dist_queue);
-err = tipc_topsrv_start(net);
-if (err)
-goto out_subscr;

err = tipc_bcast_init(net);
if (err)
@@ -82,8 +79,6 @@
return 0;
out_bclink:
-tipc_bcast_stop(net);
-out_subscr:
-tipc_nametbl_stop(net);
out_nametbl:
-tipc_sk_rht_destroy(net);
@@ -93,8 +88,12 @@
static void __net_exit tipc_exit_net(struct net *net)
{
-tipc_topsrv_stop(net);
tipc_net_stop(net);
+
+/* Make sure the tipc_net_finalize_work stopped
+ * before releasing the resources.
+ */
+flush_scheduled_work();
tipc_bcast_stop(net);
tipc_nametbl_stop(net);
tipc_sk_rht_destroy(net);
@@ -107,6 +106,11 @@
.size = sizeof(struct tipc_net),
};

+static struct pernet_operations tipc_topsrv_net_ops = {
+ .init = tipc_topsrv_init_net,
+ .exit = tipc_topsrv_exit_net,
+};
+
static int __init tipc_init(void)
{
int err;
@@ -117,54 +121,62 @@
sysctl_tipc_rmem[1] = RCVBUF_DEF;
sysctl_tipc_rmem[2] = RCVBUF_MAX;

-err = tipc_netlink_start();
+err = tipc_register_sysctl();
if (err)
-goto out_netlink;
+goto out_sysctl;

-err = tipc_netlink_compat_start();
+err = register_pernet_device(&tipc_net_ops);
if (err)
err = tipc_socket_init();
if (err)
goto out_socket;

-err = tipc_register_sysctl();
-if (err)
-goto out_sysctl;
-
-err = register_pernet_subsys(&tipc_net_ops);
+err = register_pernet_device(&tipc_topsrv_net_ops);
if (err)
-goto out_pernet;
+goto out_pernet_topsrv;

err = tipc_bearer_setup();
if (err)
goto out_bearer;

+err = tipc_netlink_start();
+if (err)
+goto out_netlink;
+
+err = tipc_netlink_compat_start();
+if (err)
+goto out_netlink_compat;
+
pr_info("Started in single node mode\n");
return 0;
+
+out_netlink_compat:
+tipc_netlink_stop();
+out_netlink:
+tipc_bearer_cleanup();
out_bearer:
-unregister_pernet_subsys(&tipc_net_ops);
+unregister_pernet_device(&tipc_topsrv_net_ops);
+out_pernet_topsrv:
+tipc_socket_stop();
+out_socket:
+unregister_pernet_device(&tipc_net_ops);
out_pernet:
tipc_unregister_sysctl();
out_sysctl:
-tipc_socket_stop();
-out_socket:
static void __exit tipc_exit(void)
{
    -tipc_bearer_cleanup();
    -unregister_pernet_subsys(&tipc_net_ops);
    -tipc_netlink_stop();
    tipc_netlink_compat_stop();
    +tipc_netlink_stop();
    +tipc_bearer_cleanup();
    +unregister_pernet_device(&tipc_topsrv_net_ops);
    tipc_socket_stop();
    +unregister_pernet_device(&tipc_net_ops);
    tipc_unregister_sysctl();

    pr_info("Deactivated\n");
    --- linux-4.15.0.orig/net/tipc/group.c
    +++ linux-4.15.0/net/tipc/group.c
    @@ -198,6 +198,7 @@
    rbtree_postorder_for_each_entry_safe(m, tmp, tree, tree_node) {
        tipc_group_proto_xmit(grp, m, GRP_LEAVE_MSG, &xmitq);
        +__skb_queue_purge(&m->deferredq);
        list_del(&m->list);
        kfree(m);
    }
    @@ -252,8 +253,8 @@
    return NULL;
}

-struct rbtree_postorder_for_each_entry_safe(m, tmp, tree, tree_node) { 
  tipc_group_proto_xmit(grp, m, GRP_LEAVE_MSG, &xmitq);
  +__skb_queue_purge(&m->deferredq);
  list_del(&m->list);
  kfree(m);
}

-static void tipc_group_add_to_tree(struct tipc_group *grp,
  - struct tipc_member *m)
+static int tipc_group_add_to_tree(struct tipc_group *grp,
+  + struct tipc_member *m)
{
  u64 nkey, key = (u64)m->node << 32 | m->port;
  struct rb_node **n, *parent = NULL;
  @@ -270,10 +271,11 @@
  else if (key > nkey)
    n = &(*n)->rb_right;
  else
    -return;
    +return 0;
    }

--- linux-4.15.0.orig/net/tipc/group.c
+++ linux-4.15.0/net/tipc/group.c
@@ -198,6 +198,7 @@
rbtree_postorder_for_each_entry_safe(m, tmp, tree, tree_node) {
    tipc_group_proto_xmit(grp, m, GRP_LEAVE_MSG, &xmitq);
    +__skb_queue_purge(&m->deferredq);
    list_del(&m->list);
    kfree(m);
}
+return -EEXIST;
}
rb_link_node(&m->tree_node, parent, n);
rbiinsert_color(&m->tree_node, &grp->members);
+return 0;
}

static struct tipc_member *tipc_group_create_member(struct tipc_group *grp, @ @ -281,6 +283,7 @@
    int state)
{
    struct tipc_member *m;
    +int ret;

    m = kzalloc(sizeof(*m), GFP_ATOMIC);
    if (!m) @ @ -292,8 +295,12 @@
        m->node = node;
        m->port = port;
        m->bc_acked = grp->bc_snd_nxt - 1;
        +ret = tipc_group_add_to_tree(grp, m);
        +if (ret < 0) {
            +kfree(m);
            +return NULL;
        +}
    grp->member_cnt++;
    -tipc_group_add_to_tree(grp, m);
    tipc_nlist_add(&grp->dests, m->node);
    m->state = state;
    return m;
    --- linux-4.15.0.orig/net/tipc/link.c
    +++ linux-4.15.0/net/tipc/link.c
    @ @ -157,6 +157,7 @@
    struct {
        u16 len;
        u16 limit;
        +struct sk_buff *target_bskb;
    } backlog[5];
    u16 snd_nxt;
    u16 last_retransm;
    @ @ -811,22 +812,37 @@
    /*
    void link_prepare_wakeup(struct tipc_link *l)
    {
        +struct sk_buff_head *wakeupq = &l->wakeupq;
        +struct sk_buff_head *inputq = l->inputq;
        struct sk_buff *skb, *tmp;
        -int imp, i = 0;
struct sk_buff_head tmpq;
int avail[5] = {0,};
int imp = 0;

__skb_queue_head_init(&tmpq);

for (; imp <= TIPC_SYSTEM_IMPORTANCE; imp++)
	avail[imp] = l->backlog[imp].limit - l->backlog[imp].len;

skb_queue_walk_safe(l->wakeupq, skb, tmp) {
	nskb_unlink(skb, l->wakeupq);
	__skb_queue_tail(&tmpq, skb);
} else if (i++ > 10) {
	break;
}

if (avail[imp] <= 0)
	continue;

skb_queue_walk_safe(wakeupq, skb, tmp) {
	imp = TIPC_SKB_CB(skb)->chain_imp;
	if (l->backlog[imp].len < l->backlog[imp].limit) {
		skb_unlink(skb, l->wakeupq);
		__skb_queue_tail(l->inputq, skb);
	} else if (i++ > 10) {
		break;
	}
	continue;
	 avail[imp]--;

skb_unlink(skb, wakeupq);
__skb_queue_tail(&tmpq, skb);
}

spin_lock_bh(&inputq->lock);
skb_queue_splice_tail(&tmpq, inputq);
spin_unlock_bh(&inputq->lock);

}

void tipc_link_reset(struct tipc_link *l)
{
	u32 imp;

	l->peer_session = ANY_SESSION;
	l->session++;
	l->mtu = l->advertised_mtu;
	@ @ -834,11 +850,10 @@
	__skb_queue_purge(&l->deferdq);
	skb_queue_splice_init(&l->wakeupq, l->inputq);
	__skb_queue_purge(&l->backlogq);
	-l->backlog[TIPC_LOW_IMPORTANCE].len = 0;
	-l->backlog[TIPC_MEDIUM_IMPORTANCE].len = 0;
	-l->backlog[TIPC_HIGH_IMPORTANCE].len = 0;
	-l->backlog[TIPC_CRITICAL_IMPORTANCE].len = 0;
	-l->backlog[TIPC_SYSTEM_IMPORTANCE].len = 0;
	for (imp = 0; imp <= TIPC_SYSTEM_IMPORTANCE; imp++) {

int tipc_link_xmit(struct tipc_link *l, struct sk_buff_head *list, struct sk_buff_head *xmitq) {
    struct tipc_msg *hdr = buf_msg(skb_peek(list));
    unsigned int maxwin = l->window;
    unsigned int mtu = l->mtu;
    u16 ack = l->rcv_nxt - 1;
    u16 seqno = l->snd_nxt;
    u16 bc_ack = l->bc_rcvlink->rcv_nxt - 1;
    struct sk_buff_head *transmq = &l->transmq;
    struct sk_buff_head *backlogq = &l->backlogq;
    struct sk_buff *skb, *_skb, *bskb;
    int pkt_cnt = skb_queue_len(list);
    int rc = 0;
    int imp;
    if (pkt_cnt <= 0)
        return 0;

    skb_queue_purge(list);
    if (unlikely(msg_size(hdr) > mtu)) {
        kfree_skb(__skb_dequeue(list));
        l->stats.sent_bundled++;
        return -EMSGSIZE;
    }

    hdr = buf_msg(skb_peek(list));
    if (unlikely(msg_size(hdr) > mtu)) {
        skb_queue_purge(list);
        return -EMSGSIZE;
    }

    imp = msg_importance(hdr);
    /* Allow oversubscription of one data msg per source at congestion */
    if (unlikely(l->backlog[imp].len >= l->backlog[imp].limit)) {
        if (imp == TIPC_SYSTEM_IMPORTANCE) {
            seqno++;
            continue;
        }
    }

    if (tipc_msg_bundle(skb_dequeue(list), hdr, mtu)) {
        tskb = &l->backlog[imp].target_bskb;
        if (tipc_msg_bundle(*tskb, hdr, mtu)) {
            kfree_skb(skb_dequeue(list));
            l->stats.sent_bundled++;
        }
    }
    ...
continue;

- if (tipc_msg_make_bundle(&bskb, hdr, mtu, l->addr)) {
+ if (tipc_msg_make_bundle(tskb, hdr, mtu, l->addr)) {
    kfree_skb(__skb_dequeue(list));
    __skb_queue_tail(backlogq, bskb);
    l->backlog[msg_importance(buf_msg(bskb))].len++;
+    __skb_queue_tail(backlogq, *tskb);
+    l->backlog[imp].len++;
    l->stats.sent_bundled++;
    l->stats.sent_bundles++;
    continue;
}
+    l->backlog[imp].target_bskb = NULL;
    l->backlog[imp].len += skb_queue_len(list);
    skb_queue_splice_tail_init(list, backlogq);
}
@@ -950,6 +972,7 @@
    u16 seqno = l->snd_nxt;
    u16 ack = l->rcv_nxt - 1;
    u16 bc_ack = l->bc_rcvlink->rcv_nxt - 1;
+    u32 imp;

    while (skb_queue_len(&l->transmq) < l->window) {
        skb = skb_peek(&l->backlogq);
@@ -960,7 +983,10 @@
        break;
+    __skb_dequeue(&l->backlogq);
        hdr = buf_msg(skb);
        -l->backlog[msg_importance(hdr)].len--;
+        imp = msg_importance(hdr);
+        l->backlog[imp].len--;
+        if (unlikely(skb == l->backlog[imp].target_bskb))
+            l->backlog[imp].target_bskb = NULL;
        __skb_queue_tail(&l->transmq, skb);
        __skb_queue_tail(xmitq, skb);
        TIPC_SKB_CB(skb)->ackers = l->ackers;
@@ -1070,7 +1096,7 @@
        default:
            pr_warn("Dropping received illegal msg type\n");
            kfree_skb(skb);
        - return false;
+        return true;
    }

@@ -1487,14 +1513,17 @@
    if (in_range(peers_prio, l->priority + 1, TIPC_MAX_LINK_PRI))

l->priority = peers_prio;

/* ACTIVATE_MSG serves as PEER_RESET if link is already down */
-if (msg_peer_stopping(hdr))

/* If peer is going down we want full re-establish cycle */
+if (msg_peer_stopping(hdr)) {
    rc = tipc_link_fsm_evt(l, LINK_FAILURE_EVT);
-else if ((mtyp == RESET_MSG) || !link_is_up(l))
+    if (msg_peer_stopping(hdr)) {
        break;
    +}

/* ACTIVATE_MSG serves as PEER_RESET if link is already down */
+if ((mtyp == RESET_MSG) || !link_is_up(l))
   rc = tipc_link_fsm_evt(l, LINK_PEER_RESET_EVT);

/* ACTIVATE_MSG takes up link if it was already locally reset */
-if (((mtyp == ACTIVATE_MSG) && (l->state == LINK_ESTABLISHING))
+if (mtyp == ACTIVATE_MSG && l->state == LINK_ESTABLISHING)
   rc = TIPC_LINK_UP_EVT;

l->peer_session = msg_session(hdr);
--- linux-4.15.0.orig/net/tipc/monitor.c
+++ linux-4.15.0/net/tipc/monitor.c
@@ -777,7 +777,7 @@
     ret = tipc_bearer_get_name(net, bearer_name, bearer_id);
     if (ret || !mon)
         return -EINVAL;
     *buf = NULL;
   +if (skb_has_frag_list(frag) && __skb_linearize(frag))
   +      goto err;
   +    frag = skb_unshare(frag, GFP_ATOMIC); 
   +    if (unlikely(!frag))
   +        goto err;
   +    head = *headbuf = frag;
   -if (skb_is_nonlinear(head)) {
skb_walk_frags(head, tail) {
-TIPC_SKB_CB(head)->tail = tail;
-
-} else {
-skb_frag_list_init(head);
-
} return 0;
}

@@ -466,10 +462,7 @@
bmsg = buf_msg(_skb);
tipc_msg_init(msg_prevnode(msg), bmsg, MSG_Bundler, 0,
       INT_H_SIZE, dnode);
-if (msg_isdata(msg))
-msg_set_importance(bmsg, TIPC_CRITICAL_IMPORTANCE);
-else
-msg_set_importance(bmsg, TIPC_SYSTEM_IMPORTANCE);
+msg_set_importance(bmsg, msg_importance(msg));
 msg_set_seqno(bmsg, msg_seqno(msg));
 msg_set_ack(bmsg, msg_ack(msg));
 msg_set_bcast_ack(bmsg, msg_bcast_ack(msg));
--- linux-4.15.0.orig/net/tipc/name_distr.c
+++ linux-4.15.0/net/tipc/name_distr.c
@@ -224,7 +224,8 @@
publ->key);
}
-kfree_rcu(p, rcu);
+if (p) +kfree_rcu(p, rcu);
}

/**
--- linux-4.15.0.orig/net/tipc/name_table.c
+++ linux-4.15.0/net/tipc/name_table.c
@@ -1120,20 +1120,17 @@
 struct tipc_dest *tipc_dest_find(struct list_head *l, u32 node, u32 port)
 {
  -u64 value = (u64)node << 32 | port;
 struct tipc_dest *dst;

 list_for_each_entry(dst, l, list) {
  -if (dst->value != value)
  -continue;
  -return dst;
  +if (dst->node == node && dst->port == port)
   +return dst;
  

bool tipc_dest_push(struct list_head *l, u32 node, u32 port)
{
    u64 value = (u64)node << 32 | port;
    struct tipc_dest *dst;

    if (tipc_dest_find(l, node, port))
        return false;
    dst = kmalloc(sizeof(*dst), GFP_ATOMIC);
    if (unlikely(!dst))
        return false;
    dst->value = value;
    dst->node = node;
    dst->port = port;
    list_add(&dst->list, l);
    return true;
}

struct tipc_dest {
    struct list_head list;
    union {
        struct {
            u32 port;
            u32 node;
        };
        u64 value;
    };
    u32 port;
    u32 node;
};

const struct nla_policy tipc_nl_net_policy[TIPC_NLA_NET_MAX + 1] = {
    [TIPC_NLA_NET_UNSPEC] = { .type = NLA_UNSPEC },
    [TIPC_NLA_NET_ID] = { .type = NLA_U32 },
    [TIPC_NLA_NET_ADDR] = { .type = NLA_U32 },
};
const struct nla_policy tipc_nl_link_policy[TIPC_NLA_LINK_MAX + 1] = {
    {  
        .cmd= TIPC_NL_SOCK_GET,
        .start = tipc_dump_start,
        .dumpit = tipc_nl_sk_dump,
        .done = tipc_dump_done,
        .policy = tipc_nl_policy,
    },

    --- linux-4.15.0.orig/net/tipc/netlink_compat.c
    +++ linux-4.15.0/net/tipc/netlink_compat.c
    @ @ -55,6 +55,7 @@
    int rep_type;
    int rep_size;
    int req_type;
    +int req_size;
    struct net *net;
    struct sk_buff *rep;
    struct tlv_desc *req;
    @@ -87,6 +88,11 @@
    return limit;
}

+static inline int TLV_GET_DATA_LEN(struct tlv_desc *tlv)
+{
+    +return TLV_GET_LEN(tlv) - TLV_SPACE(0);
+}
+
+static int tipc_add_tlv(struct sk_buff *skb, u16 type, void *data, u16 len)
+{
    struct tlv_desc *tlv = (struct tlv_desc *)skb_tail_pointer(skb);
    @@ -166,6 +172,11 @@
    return buf;
}

+static inline bool string_is_valid(char *s, int len)
+{
+    +return memchr(s, '\0', len) ? true : false;
+}
+
+static int __tipc_nl_compat_dumpit(struct tipc_nl_compat_cmd_dump *cmd,
    struct tipc_nl_compat_msg *msg,
    struct sk_buff *arg)
    @@ -185,6 +196,7 @@
    return -ENOMEM;
buf->sk = msg->dst_sk;
+__tipc_dump_start(&cb, msg->net);

do {
    int rem;
    @@ -216,6 +228,7 @@
    err = 0;

    err_out:
+__tipc_dump_done(&cb);
    kfree_skb(buf);

    if (err == -EMSGSIZE) {
        @@ -239,10 +252,12 @@
        static int tipc_nl_compat_dumpit(struct tipc_nl_compat_cmd_dump *cmd,
            struct tipc_nl_compat_msg *msg)
        {
            int err;
+        struct nlmsghdr *nlh;
            struct sk_buff *arg;
            int err;

            -if (msg->req_type && !TLV_CHECK_TYPE(msg->req, msg->req_type))
+        if (msg->req_type && (!msg->req_size ||
+          !TLV_CHECK_TYPE(msg->req, msg->req_type)))
                return -EINVAL;

            msg->rep = tipc_tlv_alloc(msg->rep_size);
        @@ -252,8 +267,14 @@
                if (message_type) {
                    tipc_tlv_init(msg->rep, message_type);

                    if (cmd->header)
                        (*cmd->header)(msg);
                    +err = (*cmd->header)(msg);
                    +if (err) {
                        kfree_skb(msg->rep);
                        msg->rep = NULL;
                        return err;
                    +}
                +}

            arg = nlmsg_new(0, GFP_KERNEL);
        @@ -262,6 +283,15 @@
                if (!arg) {
                    return -ENOMEM;
                }

                -if (cmd->header)
+                (*cmd->header)(msg);
                +if (cmd->header) {
                    +err = (*cmd->header)(msg);
                    +if (err) {
                        +kfree_skb(msg->rep);
                        +msg->rep = NULL;
                        +return err;
                    +}
                +}

                return -ENOMEM;

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nlh = nlmsg_put(arg, 0, 0, tipc_genl_family.id, 0, NLM_F_MULTI);
if (!nlh) {
    kfree_skb(arg);
kfree_skb(msg->rep);
    msg->rep = NULL;
    return -EMSGSIZE;
}

nlmsg_end(arg, nlh);

err = __tipc_nl_compat_dumpit(cmd, msg, arg);
if (err) {
kfree_skb(msg->rep);
    return -EINVAL;
}

struct nlattr *prop;
struct nlattr *bearer;
struct tipc_bearer_config *b;

int len;
b = (struct tipc_bearer_config *)TLV_DATA(msg->req);

if (!bearer)
    return -EMSGSIZE;

len = TLV_GET_DATA_LEN(msg->req);
len -= offsetof(struct tipc_bearer_config, name);
if (len <= 0)
    return -EINVAL;

len = min_t(int, len, TIPC_MAX_BEARER_NAME);
if (!string_is_valid(b->name, len))
    return -EINVAL;

if (nla_put_string(skb, TIPC_NLA_BEARER_NAME, b->name))
    return -EMSGSIZE;
```c
\@\@ -402,6 +443,7 @@
{
    char *name;
    struct nlattr *bearer;
    +int len;

    name = (char *)TLV_DATA(msg->req);

    \@\@ -409,6 +451,14 @@
    if (!bearer)
        return -EMSGSIZE;

    +len = TLV_GET_DATA_LEN(msg->req);
    +if (len <= 0)
        +return -EINVAL;
    +
    +len = min_t(int, len, TIPC_MAX_BEARER_NAME);
    +if (!string_is_valid(name, len))
        +return -EINVAL;
    +
    if (nla_put_string(skb, TIPC_NLA_BEARER_NAME, name))
        return -EMSGSIZE;

    \@\@ -469,6 +519,7 @@
    struct nlattr *prop[TIPC_NLA_PROP_MAX + 1];
    struct nlattr *stats[TIPC_NLA_STATS_MAX + 1];
    int err;
    +int len;

    if (!attrs[TIPC_NLA_LINK])
        return -EINVAL;
    \@\@ -495,6 +546,15 @@
    return err;

    name = (char *)TLV_DATA(msg->req);

    +len = TLV_GET_DATA_LEN(msg->req);
    +if (len <= 0)
        +return -EINVAL;
    +
    +len = min_t(int, len, TIPC_MAX_LINK_NAME);
    +if (!string_is_valid(name, len))
        +return -EINVAL;
    +
    if (strcmp(name, nla_data(link[TIPC_NLA_LINK_NAME])) != 0)
        return 0;

    \@\@ -604,7 +664,7 @@
```
if (err)
    return err;

- link_info.dest = nla_get_flag(link[TIPC_NLA_LINK_DEST]);
+ link_info.dest = htonl(nla_get_flag(link[TIPC_NLA_LINK_DEST]));
link_info.up = htonl(nla_get_flag(link[TIPC_NLA_LINK_UP]));
nla_strlcpy(link_info.str, link[TIPC_NLA_LINK_NAME],
    TIPC_MAX_LINK_NAME);
@@ -635,6 +695,7 @@
struct nlattr *prop;
struct nlattr *media;
struct tipc_link_config *lc;
+int len;

lc = (struct tipc_link_config *)TLV_DATA(msg->req);
@@ -642,6 +703,10 @@
if (!media)
    return -EMSGSIZE;

+ len = min_t(int, TLV_GET_DATA_LEN(msg->req), TIPC_MAX_MEDIA_NAME);
+ if (!string_is_valid(lc->name, len))
    + return -EINVAL;
+ if (nla_put_string(skb, TIPC_NLA_MEDIA_NAME, lc->name))
    return -EMSGSIZE;
@@ -662,6 +735,10 @@
struct nlattr *prop;
struct nlattr *bearer;
struct tipc_link_config *lc;
+int len;

lc = (struct tipc_link_config *)TLV_DATA(msg->req);
@@ -669,6 +735,10 @@
if (!bearer)
    return -EMSGSIZE;

+ len = min_t(int, TLV_GET_DATA_LEN(msg->req), TIPC_MAX_MEDIA_NAME);
+ if (!string_is_valid(lc->name, len))
    + return -EINVAL;
+ if (nla_put_string(skb, TIPC_NLA_BEARER_NAME, lc->name))
    return -EMSGSIZE;
@@ -717,9 +787,19 @@
struct tipc_link_config *lc;
struct tipc_bearer *bearer;
struct tipc_media *media;
+int len;

lc = (struct tipc_link_config *)TLV_DATA(msg->req);

+len = TLV_GET_DATA_LEN(msg->req);
+len -= offsetof(struct tipc_link_config, name);
+if (len <= 0)
+return -EINVAL;
+
+len = min_t(int, len, TIPC_MAX_LINK_NAME);
+if (!string_is_valid(lc->name, len))
+return -EINVAL;
+
media = tipc_media_find(lc->name);
if (media) {
	cmd->doit = &tipc_nl_media_set;
@@ -741,6 +821,7 @@
{
	char *name;
	struct nlattr *link;
	+int len;

name = (char *)TLV_DATA(msg->req);

@@ -748,6 +829,14 @@
if (!link)
return -EMSGSIZE;

+len = TLV_GET_DATA_LEN(msg->req);
+if (len <= 0)
+return -EINVAL;
+
+len = min_t(int, len, TIPC_MAX_LINK_NAME);
+if (!string_is_valid(name, len))
+return -EINVAL;
+
if (nla_put_string(skb, TIPC_NLA_LINK_NAME, name))
return -EMSGSIZE;

@@ -769,6 +858,8 @@
};

ntq = (struct tipc_name_table_query *)TLV_DATA(msg->req);
+if (TLV_GET_DATA_LEN(msg->req) < sizeof(struct tipc_name_table_query))
+return -EINVAL;
depth = ntohl(ntq->depth);

hdr = genlmsg_put(args, 0, 0, &tipc_genl_family, NLM_F_MULTI,
     TIPC_NL_PUBL_GET);
+if (!hdr) {
+kfree_skb(args);
+return -EMSGSIZE;
+}

nest = nla_nest_start(args, TIPC_NLA.SOCK);
if (!nest) {
@@ -942,8 +1037,11 @@
  u32 node;
  struct nlattr *con[TIPC_NLA_CON_MAX + 1];

  nla_parse_nested(con, TIPC_NLA_CON_MAX,
   -sock[TIPC_NLA.SOCK_CON], NULL, NULL);
  +err = nla_parse_nested(con, TIPC_NLA_CON_MAX,
  +sock[TIPC_NLA.SOCK_CON], NULL, NULL);
  +
  +if (err)
  +return err;

  node = nla_get_u32(con[TIPC_NLA_CON_NODE]);
  tipc_tlv_sprintf(msg->rep, " connected to <%u.%u.%u:%u >", 
@@ -1191,8 +1289,8 @@
goto send;
}

-len = nlmsg_attrlen(req_nlh, GENL_HDRLEN + TIPC_GENL_HDRLEN);
-if (len && !TLV_OK(msg.req, len)) {
  +msg.req_size = nlmsg_attrlen(req_nlh, GENL_HDRLEN + TIPC_GENL_HDRLEN);
  +if (msg.req_size && !TLV_OK(msg.req, msg.req_size)) {
    msg.rep = tipc_get_err_tlv(TIPC_CFG_NOT_SUPPORTED);
  err = -EOPNOTSUPP;
  goto send;
  --- linux-4.15.0.orig/net/tipc/node.c
+++ linux-4.15.0/net/tipc/node.c
@@ -510,6 +510,12 @@
__skb_queue_head_init(&xmitq);

/* Initial node interval to value larger (10 seconds), then it will be 
   * recalculated with link lowest tolerance 
   */
+tipc_node_read_lock(n);
+n->keepalive_intv = 10000;
+tipc_node_read_unlock(n);
for (bearer_id = 0; bearer_id < MAX_BEARERS; bearer_id++) {
    tipc_node_read_lock(n);
    le = &n->links[bearer_id];
    @@ -688,10 +694,10 @@
static void tipc_node_link_down(struct tipc_node *n, int bearer_id, bool delete)
    {
        struct tipc_link_entry *le = &n->links[bearer_id];
+        struct tipc_media_addr *maddr = NULL;
        struct tipc_link *l = le->link;
-        struct tipc_media_addr *maddr;
-        struct sk_buff_head xmitq;
        int old_bearer_id = bearer_id;
        +        struct sk_buff_head xmitq;

        if (!l)
            return;
        @@ -713,7 +719,8 @@
        tipc_node_write_unlock(n);
        if (delete)
            tipc_mon_remove_peer(n->net, n->addr, old_bearer_id);
-        tipc_bearer_xmit(n->net, bearer_id, &xmitq, maddr);
+        if (!skb_queue_empty(&xmitq))
+            tipc_bearer_xmit(n->net, bearer_id, &xmitq, maddr);
        tipc_sk_rcv(n->net, &le->inputq);
    }

@@ -1863,6 +1870,7 @@
int tipc_nl_node_get_link(struct sk_buff *skb, struct genl_info *info)
    {
        struct net *net = genl_info_net(info);
+        struct nlattr *attrs[TIPC_NLA_LINK_MAX + 1];
        struct tipc_nl_msg msg;
        char *name;
        int err;
@@ -1870,9 +1878,19 @@
            msg.portid = info->snd_portid;
            msg.seq = info->snd_seq;
            -if (!info->attrs[TIPC_NLA_LINK_NAME])
+            if (!info->attrs[TIPC_NLA_LINK])
                return -EINVAL;
            name = nla_data(info->attrs[TIPC_NLA_LINK_NAME]);
+            +err = nla_parse_nested(attrs, TIPC_NLA_LINK_MAX,
+                info->attrs[TIPC_NLA_LINK],
+                tipc_nl_link_policy, info->extack);
if (err)
+return err;
+
+if (!attrs[TIPC_NLA_LINK_NAME])
+return -EINVAL;
+
+name = nla_data(attrs[TIPC_NLA_LINK_NAME]);

msg skb = nlmsg new(NLMSG_GOODSIZE, GFP_KERNEL);
if (!msg skb)
@@ -2145,8 +2163,8 @@
struct net *net = sock_net(skb->sk);
u32 prev bearer = cb->args[0];
struct tipc nl_msg msg;
+int bearer id;
int err;
-int i;

if (prev bearer == MAX_BEARERS)
return 0;
@@ -2156,16 +2174,13 @@
msg seq = cb->nlh->nlmsg seq;

rtnl lock();
-for (i = prev bearer; i < MAX_BEARERS; i++) {
 -prev bearer = i;
 -err = __tipc_nl_add_monitor(net, &msg, prev bearer);
+for (bearer id = prev bearer; bearer id < MAX_BEARERS; bearer id++) {
+err = __tipc_nl_add_monitor(net, &msg, bearer id);
if (err)
-goto out;
+break;
}
-
-out:
rtnl unlock();
-cb->args[0] = prev bearer;
+cb->args[0] = bearer id;

return skb->len;
}
--- linux-4.15.0.orig/net/tipc/socket.c
+++ linux-4.15.0/net/tipc/socket.c
@@ -377,11 +377,13 @@
#define tipc_wait_for_cond(sock_, timeo_, condition_)
       \ 
       (|
+DEFINE_WAIT_FUNC(wait_, woken_wake_function);  \\
struct sock *sk_;
int rc_;  
while ((rc_ = !(condition_))) {
-DEFINE_WAIT_FUNC(wait_, woken_wake_function);  
+/* coupled with smp_wmb() in tipc_sk_proto_rcv() */  
+smp_rmb();  
sk_ = (sock_)->sk;  
rc_ = tipc_sk_sock_err((sock_), timeo_);  
if (rc_)  
@@ -500,7 +502,7 @@  
struct sock *sk = sock->sk;  
struct tipc_sock *tsk = tipc_sk(sk);  
struct net *net = sock_net(sk);  
-long timeout = CONN_TIMEOUT_DEFAULT;  
+long timeout = msecs_to_jiffies(CONN_TIMEOUT_DEFAULT);  
u32 dnode = tsk_peer_node(tsk);  
struct sk_buff *skb;  
@@ -577,6 +579,7 @@  
sk_stop_timer(sk, &sk->sk_timer);  
tipc_sk_remove(tsk);  
+sock_orphan(sk);  
/* Reject any messages that accumulated in backlog queue */  
release_sock(sk);  
tipc_dest_list_purge(&tsk->cong_links);  
@@ -727,12 +730,12 @@  
switch (sk->sk_state) {  
    case TIPC_ESTABLISHED:  
-    case TIPC_CONNECTING:  
if (!tsk->cong_link_cnt && !tsk_conn_cong(tsk))  
    revents |= POLLOUT;  
/* fall thru */  
+    case TIPC_CONNECTING:  
+if (!skb_queue_empty_lockless(&sk->sk_receive_queue))  
+    revents |= POLLIN | POLLRDNORM;  
break;  
    case TIPC_OPEN:  
@@ -741,7 +744,7 @@  
revents |= POLLOUT;  
if (!tipc_sk_type_connectionless(sk))  
    break;  
-    if (skb_queue_empty(&sk->sk_receive_queue))  
+    if (skb_queue_empty_lockless(&sk->sk_receive_queue))  
        break;  
}  

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break;
revents |= POLLIN | POLLRDNDORM;
break;
@@ -883,7 +886,6 @@
DECLARE_SOCKADDR(struct sockaddr_tipc *, dest, m->msg_name);
int blks = tsk_blocks(GROUP_H_SIZE + dlen);
struct tipc_sock *tsk = tipc_sk(sk);
-struct tipc_group *grp = tsk->group;
struct net *net = sock_net(sk);
struct tipc_member *mb = NULL;
u32 node, port;
@@ -897,7 +899,9 @@
/* Block or return if destination link or member is congested */
rc = tipc_wait_for_cond(sock, &timeout, 
!tipc_dest_find(&tsk->cong_links, node, 0) &&
-!tipc_group_cong(grp, node, port, blks, &mb));
+tsk->group &&
+!tipc_group_cong(tsk->group, node, port, blks, 
+ &mb));
if (unlikely(rc))
return rc;

@@ -927,7 +931,6 @@
struct tipc_sock *tsk = tipc_sk(sk);
struct list_head *cong_links = &tsk->cong_links;
int blks = tsk_blocks(GROUP_H_SIZE + dlen);
-struct tipc_group *grp = tsk->group;
struct tipc_member *first = NULL;
struct tipc_member *mbr = NULL;
struct net *net = sock_net(sk);
@@ -943,9 +946,10 @@
type = dest->addr.name.name.type;
inst = dest->addr.name.name.instance;
domain = addr_domain(net, dest->scope);
-exclude = tipc_group_exclude(grp);
+exclude = tipc_group_exclude(tsk->group);
while (++lookups < 4) {
+exclude = tipc_group_exclude(tsk->group);
+first = NULL;

/* Look for a non-congested destination member, if any */
@@ -954,7 +958,8 @@
&dstcnt, exclude, false))
return -EHOSTUNREACH;
tipc_dest_pop(&dsts, &node, &port);
-cong = tipc_group_cong(grp, node, port, blks, &mbr);
+cong = tipc_group_cong(tsk->group, node, port, blks,
if (!cong)
    break;
if (mbr == first)
    @ @ -973,7 +978,8 @@
/* Block or return if destination link or member is congested */
rc = tipc_wait_for_cond(sock, &timeout,
    !tipc_dest_find(cong_links, node, 0) &&
    -!tipc_group_cong(grp, node, port,
    +tsk->group &&
    +!tipc_group_cong(tsk->group, node, port,
    blks, &mbr));
if (unlikely(rc))
    return rc;
@ @ -1008,8 +1014,7 @@
struct sock *sk = sock->sk;
struct net *net = sock_net(sk);
struct tipc_sock *tsk = tipc_sk(sk);
-struct tipc_group *grp = tsk->group;
-struct tipc_nlist *dsts = tipc_group_dests(grp);
+struct tipc_nlist *dsts;
struct tipc_mc_method *method = &tsk->mc_method;
bool ack = method->mandatory && method->rcast;
int blks = tsk_blocks(MCAST_H_SIZE + dlen);
@@ -1018,15 +1023,17 @@
struct sk_buff_head pkts;
int rc = -EHOSTUNREACH;

-if (!dsts->local && !dsts->remote)
  -return -EHOSTUNREACH;
-
/* Block or return if any destination link or member is congested */
-rc = tipc_wait_for_cond(sock, &timeout,!tsk->cong_link_cnt &&
-!tipc_group_bc_cong(grp, blks));
+rc = tipc_wait_for_cond(sock, &timeout,
+!tsk->cong_link_cnt && tsk->group &&
+!tipc_group_bc_cong(tsk->group, blks));
if (unlikely(rc))
    return rc;
+dsts = tipc_group_dests(tsk->group);
+if (!dsts->local && !dsts->remote)
    +return -EHOSTUNREACH;
+
/* Complete message header */
if (dest) {
  msg_set_type(hdr, TIPC_GRP_MCAST_MSG);
  @@ -1038,7 +1045,7 @@
msg_set_hdr_sz(hdr, GROUP_H_SIZE);
msg_set_destport(hdr, 0);
msg_set_destnode(hdr, 0);
-msg_set_grp_bc_seqno(hdr, tipc_group_bc_snd_nxt(grp));
+msg_set_grp_bc_seqno(hdr, tipc_group_bc_snd_nxt(tsk->group));

/* Avoid getting stuck with repeated forced replicasts */
msg_set_grp_bc_ack_req(hdr, ack);
@@ -1170,6 +1177,9 @@
spin_lock_bh(&inputq->lock);
if (skb_peek(arrvq) == skb) {
    skb_queue_splice_tail_init(&tmpq, inputq);
+/* Decrease the skb's refcnt as increasing in the
+ * function tipc_skb_peek
+ */
kfree_skb(__skb_dequeue(arrvq));
} spin_unlock_bh(&inputq->lock);
@@ -1293,7 +1303,7 @@

if (unlikely(!dest)) {
    dest = &tsk->peer;
-if (!(syn || dest->family != AF_TIPC)
+if (!(syn && dest->family != AF_TIPC)
        return -EDESTADDRREQ;
    }
@@ -1407,8 +1417,10 @@
/* Handle implicit connection setup */
if (unlikely(dest)) {
    rc = __tipc_sendmsg(sock, m, dlen);
-if (dlen && (dlen == rc))
+if (dlen && dlen == rc) {
+    tsk->peer_caps = tipc_node_get_capabilities(net, dnode);
    tsk->snt_unacked = tsk_inc(tsk, dlen + msg_hdr_sz(hdr));
+}
    return rc;
} 
@@ -1502,10 +1514,10 @@
srcaddr->sock.family = AF_TIPC;
srcaddr->sock.addrtype = TIPC_ADDR_ID;
+srcaddr->sock.scope = 0;
srcaddr->sock.addr.id.ref = msg_origport(hdr);
srcaddr->sock.addr.id.node = msg_orignode(hdr);
srcaddr->sock.addr.name.domain = 0;
-srcaddr->sock.scope = 0;

m->msg_namelen = sizeof(struct sockaddr_tipc);

if (!msg_in_group(hdr))
@@ -1514,6 +1526,7 @@
/* Group message users may also want to know sending member's id */
    srcaddr->member.family = AF_TIPC;
    srcaddr->member.addrtype = TIPC_ADDR_NAME;
    srcaddr->member.scope = 0;
+   srcaddr->member.addr.name.name.type = msg_nametype(hdr);
    srcaddr->member.addr.name.name.instance = TIPC_SKB_CB(skb)->orig_member;
    srcaddr->member.addr.name.domain = 0;
@@ -1523,16 +1536,17 @@
/**
 * tipc_sk_anc_data_recv - optionally capture ancillary data for received message
 * @m: descriptor for message info
- * @msg: received message header
+ * @skb: received message buffer
 * @tsk: TIPC port associated with message
 *
 * Note: Ancillary data is not captured if not requested by receiver.
 *
 * Returns 0 if successful, otherwise errno
 */
-static int tipc_sk_anc_data_recv(struct msghdr *m, struct tipc_msg *msg,
+static int tipc_sk_anc_data_recv(struct msghdr *m, struct sk_buff *skb,
    struct tipc_sock *tsk)
{
    struct tipc_msg *msg;
    u32 anc_data[3];
    u32 err;
    u32 dest_type;
@@ -1541,6 +1555,7 @@
    if (likely(m->msg_controllen == 0))
        return 0;
    + msg = buf_msg(skb);

    /* Optionally capture errored message object(s) */
    err = msg ? msg_errcode(msg) : 0;
@@ -1551,6 +1566,9 @@
    if (res)
        return res;
    if (anc_data[1]) {
+      if (skb_linearize(skb))
+          return -ENOMEM;
+      msg = buf_msg(skb);
        res = put_cmsg(m, SOL_TIPC, TIPC_RETDATA, anc_data[1],
                        msg_data(msg));
if (res)
@@ -1712,9 +1730,10 @@
      /* Collect msg meta data, including error code and rejected data */
      tipc_sk_set_orig_addr(m, skb);
      -rc = tipc_sk_anc_data_recv(m, hdr, tsk);
      +rc = tipc_sk_anc_data_recv(m, skb, tsk);
      if (unlikely(rc))
        goto exit;
      +hdr = buf_msg(skb);

      /* Capture data if non-error msg, otherwise just set return value */
      if (likely(!err)) {
          @ @ -1824,9 +1843,10 @@
        /* Collect msg meta data, incl. error code and rejected data */
        if (!copied) {
          tipc_sk_set_orig_addr(m, skb);
          -rc = tipc_sk_anc_data_recv(m, hdr, tsk);
          +rc = tipc_sk_anc_data_recv(m, skb, tsk);
          if (rc)
            break;
          +hdr = buf_msg(skb);
        }

      /* Copy data if msg ok, otherwise return error/partial data */
      @@ -1925,6 +1945,8 @@
      return;
      case SOCK_WAKEUP:
        tipc_dest_del(&tsk->cong_links, msg_orignode(hdr), 0);
      +/* coupled with smp_rmb() in tipc_wait_for_cond() */
      +smp_wmb();
        tsk->cong_link_cnt--;
        wakeup = true;
        break;
        @ @ -2000,7 +2022,7 @@
      return true;

      /* If empty 'ACK-' message, wake up sleeping connect() */
      -sk->sk_data_ready(sk);
      +sk->sk_state_change(sk);

      /* 'ACK-' message is neither accepted nor rejected: */
      msg_set_dest_droppable(hdr, 1);
      @@ -2159,7 +2181,7 @@
      static void tipc_sk_enqueue(struct sk_buff_head *inputq, struct sock *sk,
          u32 dport, struct sk_buff_head *xmitq)
      {
          -unsigned long time_limit = jiffies + 2;

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unsigned long time_limit = jiffies + usecs_to_jiffies(20000);
struct sk_buff *skb;
unsigned int lim;
atomic_t *dcnt;

static int tipc_wait_for_accept(struct socket *sock, long timeo)
{
    struct sock *sk = sock->sk;
    DEFINE_WAIT(wait);
    +DEFINE_WAIT_FUNC(wait, woken_wake_function);
    int err;

    /* True wake-one mechanism for incoming connections: only
     * anymore, the common case will execute the loop only once.
     */
    for (;;) {
        -prepare_to_wait exclusive(sk_sleep(sk), &wait,
        - TASK_INTERRUPTIBLE);
        if (timeo && skb_queue_empty(&sk->sk_receive_queue)) {
            +add_wait_queue(sk_sleep(sk), &wait);
            release_sock(sk);
            -timeo = schedule_timeout(timeo);
            +timeo = wait_woken(&wait, TASK_INTERRUPTIBLE, timeo);
            lock_sock(sk);
            +remove_wait_queue(sk_sleep(sk), &wait);
            }
            err = 0;
            if (!skb_queue_empty(&sk->sk_receive_queue))
                @ -2411,7 +2433,6 @
                if (signal_pending(current))
                    break;
                }
                -finish_wait(sk_sleep(sk), &wait);
                return err;
            }
            @ -2513,18 +2534,18 @
            lock_sock(sk);

            __tipc_shutdown(sock, TIPC_CONN_SHUTDOWN);
            -sk->sk_shutdown = SEND_SHUTDOWN;
            +sk->sk_shutdown = SHUTDOWN_MASK;

            if (sk->sk_state == TIPC_DISCONNECTING) {
                /* Discard any unreceived messages */
                __skb_queue_purge(&sk->sk_receive_queue);
/* Wake up anyone sleeping in poll */
sk->sk_state_change(sk);
res = 0;
} else {
res = -ENOTCONN;
}

/* Wake up anyone sleeping in poll. */
+sk->sk_state_change(sk);

release_sock(sk);
return res;
@@ -2645,15 +2666,21 @@
goto walk_stop;

while ((tsk = rhashtable_walk_next(&iter)) && !IS_ERR(tsk)) {
- spin_lock_bh(&tsk->sk.sk_lock.slock);
+ sock_hold(&tsk->sk);
+ rhashtable_walk_stop(&iter);
+ lock_sock(&tsk->sk);
 msg = &tsk->phdr;
 msg_set_prevnode(msg, tn->own_addr);
 msg_set_orignode(msg, tn->own_addr);
- spin_unlock_bh(&tsk->sk.sk_lock.slock);
+ release_sock(&tsk->sk);
+ rhashtable_walk_start(&iter);
+ sock_put(&tsk->sk);
 }
 walk_stop:
 rhashtable_walk_stop(&iter);
} while (tsk == ERR_PTR(-EAGAIN));
+
+ rhashtable_walk_exit(&iter);

static struct tipc_sock *tipc_sk_lookup(struct net *net, u32 portid)
@@ -3186,6 +3213,40 @@
return -EMSGSIZE;
}

+int tipc_dump_start(struct netlink_callback *cb)
+{
+return __tipc_dump_start(cb, sock_net(cb->sk));
+}
+EXPORT_SYMBOL(tipc_dump_start);
+
+int __tipc_dump_start(struct netlink_callback *cb, struct net *net)
+{
+/* tipc_nl_name_table_dump() uses cb->args[0...3]. */
struct rhashtable_iter *iter = (void *)cb->args[4];
struct tipc_net *tn = tipc_net(net);

if (!iter) {
    iter = kmalloc(sizeof(*iter), GFP_KERNEL);
    if (!iter)
        return -ENOMEM;
    cb->args[4] = (long)iter;
}

rhashtable_walk_enter(&tn->sk_rht, iter);
return 0;

int tipc_dump_done(struct netlink_callback *cb)
{
    struct rhashtable_iter *hti = (void *)cb->args[4];

    rhashtable_walk_exit(hti);
    kfree(hti);
    return 0;
}

EXPORT_SYMBOL(tipc_dump_done);

int tipc_nl_sk_dump(struct sk_buff *skb, struct netlink_callback *cb)
{
    int err;

    int tipc_nl_sk_dump(struct sk_buff *skb, struct netlink_callback *cb);
    int tipc_nl_publ_dump(struct sk_buff *skb, struct netlink_callback *cb);

    int tipc_dump_start(struct netlink_callback *cb);
    int tipc_dump_done(struct netlink_callback *cb);
    #endif

    int tipc_topsrv_start(struct net *net)
    int tipc_topsrv_start(struct net *net)
    static int tipc_topsrv_start(struct net *net)
    { struct tipc_net *tn = net_generic(net, tipc_net_id);
const char name[] = "topology_server";
@@ -375,14 +375,14 @@
topsrv->tipc_conn_new = tipc_subscr_connect_cb;
topsrv->tipc_conn_release = tipc_subscr_release_cb;
-strncpy(topsrv->name, name, strlen(name) + 1);
+strncpy(topsrv->name, name, sizeof(topsrv->name));
 tn->topsrv = topsrv;
 atomic_set(&tn->subscription_count, 0);

 return tipc_server_start(topsrv);
}

-void tipc_topsrv_stop(struct net *net)
+-static void tipc_topsrv_stop(struct net *net)
 {    
 struct tipc_net *tn = net_generic(net, tipc_net_id);
 struct tipc_server *topsrv = tn->topsrv;
-@@ -391,3 +391,13 @@
 kfree(topsrv->saddr);
 kfree(topsrv);
 }
+
 +int __net_init tipc_topsrv_init_net(struct net *net)
 +{
 +return tipc_topsrv_start(net);
 +}
 +
 +void __net_exit tipc_topsrv_exit_net(struct net *net)
 +{
 +tipc_topsrv_stop(net);
 +}
 --- linux-4.15.0.orig/net/tipc/subscr.h
 +++ linux-4.15.0/net/tipc/subscr.h
 @@ -75,8 +75,9 @@
 void tipc_subscr_convert_seq(struct tipc_name_seq *in, int swap,
 struct tipc_name_seq *out);
 u32 tipc_subscr_convert_seq_type(u32 type, int swap);
-int tipc_topsrv_start(struct net *net);
-void tipc_topsrv_stop(struct net *net);
+
 +int __net_init tipc_topsrv_init_net(struct net *net);
 +void __net_exit tipc_topsrv_exit_net(struct net *net);

 void tipc_subscr_put(struct tipcSubscription *subscription);
 void tipc_subscr_get(struct tipcSubscription *subscription);
 --- linux-4.15.0.orig/net/tipc/sysctl.c
 +++ linux-4.15.0/net/tipc/sysctl.c
#include <linux/sysctl.h>

+static int zero;
+static int one = 1;
static struct ctl_table_header *tipc_ctl_hdr;

static struct ctl_table tipc_table[] = {
    
    .data= &sysctl_tipc_rmem,
    .maxlen= sizeof(sysctl_tipc_rmem),
    .mode= 0644,
    -.proc_handler= proc_dointvec,
    +.proc_handler= proc_dointvec_minmax,
    +.extra1 = &one,
},
{
    .procname= "named_timeout",
    .data= &sysctl_tipc_named_timeout,
    .maxlen= sizeof(sysctl_tipc_named_timeout),
    .mode= 0644,
    -.proc_handler= proc_dointvec,
    +.proc_handler= proc_dointvec_minmax,
    +.extra1 = &zero,
},
};
--- linux-4.15.0.orig/net/tipc/udp_media.c
+++ linux-4.15.0/net/tipc/udp_media.c
@@ -174,7 +174,6 @@
goto tx_error;
}

_skb->dev = rt->dst.dev;
ttl = ip4_dst_hoplimit(&rt->dst);
udp_tunnel_xmit_skb(rt, ub->ubsock->sk, skb, src->ipv4.s_addr, 
    dst->ipv4.s_addr, 0, ttl, 0, src->port,
@@ -188,15 +187,17 @@
 .saddr = src->ipv6,
 .flowi6_proto = IPPROTO_UDP
};
-err = ipv6_stub->ipv6_dst_lookup(net, ub->ubsock->sk, &ndst,
-    &ff6);
-if (err)
+ndst = ipv6_stub->ipv6_dst_lookup_flow(net,
+    ub->ubsock->sk,
+    &ff6, NULL);
+if (IS_ERR(ndst)) {
+err = PTR_ERR(ndst);
+goto tx_error;
+}

ttl = ip6_dsthoplimit(ndst);
-err = udp_tunnel6_xmit_skb(ndst, ub->ubsock->sk, skb,
-    ndst->dev, &src->ipv6,
-    &dst->ipv6, 0, ttl, 0, src->port,
-    dst->port, false);
+err = udp_tunnel6_xmit_skb(ndst, ub->ubsock->sk, skb, NULL,
+    &src->ipv6, &dst->ipv6, 0, ttl, 0,
+    src->port, dst->port, false);
#endif
}
return err;
@@ -243,10 +244,8 @@
}
err = tipc_udp_xmit(net, _skb, ub, src, &rcast->addr);
-if (err) {
-kfree_skb(_skb);
+if (err)
+goto out;
-}
}
err = 0;
out:
@@ -677,6 +676,11 @@
if (err)
goto err;

+if (remote.proto != local.proto) {
+err = -EINVAL;
+goto err;
+}
+b->bcast_addr.media_id = TIPC_MEDIA_TYPE_UDP;
b->bcast_addr.broadcast = TIPC_BROADCAST_SUPPORT;
rcu_assign_pointer(b->media_ptr, ub);
--- linux-4.15.0.orig/net/tls/tls_main.c
+++ linux-4.15.0/net/tls/tls_main.c
@@ -44,6 +44,13 @@
MODULE_AUTHOR("Mellanox Technologies");
MODULE_DESCRIPTION("Transport Layer Security Support");
MODULE_LICENSE("Dual BSD/GPL");
+MODULE_ALIAS_TCP_ULP("tls");
+enum {
+TLSV4,
+TLSV6,
+TLS_NUM_PROTS,
+};

enum {
    TLS_BASE_TX,
    @@ -51,11 +58,15 @@
    TLS_NUM_CONFIG,
    };

-static struct proto tls_prots[TLS_NUM_CONFIG];
+static struct proto *saved_tcpv6_prot;
+static DEFINE_MUTEX(tcpv6_prot_mutex);
+static struct proto tls_prots[TLS_NUM_PROTS][TLS_NUM_CONFIG];

static inline void update_sk_prot(struct sock *sk, struct tls_context *ctx)
{
    -sk->sk_prot = &tls_prots[ctx->tx_conf];
+int ip_ver = sk->sk_family == AF_INET6 ? TLSV6 : TLSV4;
    +
    +sk->sk_prot = &tls_prots[ip_ver][ctx->tx_conf];
}

int wait_on_pending_writer(struct sock *sk, long *timeo)
@@ -97,6 +108,7 @@
    size = sg->length - offset;
    offset += sg->offset;

+ctx->in_tcp_sendpages = true;
    while (1) {
        if (sg_is_last(sg))
            sendpage_flags = flags;
        @@ -117,6 +129,7 @@
            offset -= sg->offset;
            ctx->partially_sent_offset = offset;
            ctx->partially_sent_record = (void *)sg;
            +ctx->in_tcp_sendpages = false;
            return ret;
    }

@@ -131,6 +144,8 @@
 clear_bit(TLS_PENDING_CLOSED_RECORD, &ctx->flags);
+ctx->in_tcp_sendpages = false;
+ctx->sk_write_space(sk);
return 0;
}
@@ -200,6 +215,15 @@
{
    struct tls_context *ctx = tls_get_ctx(sk);

    /* If in_tcp_sendpages call lower protocol write space handler
    * to ensure we wake up any waiting operations there. For example
    * if do_tcp_sendpages where to call sk_wait_event.
    */
    +if (ctx->in_tcp_sendpages) {
    +ctx->sk_write_space(sk);
    +return;
    +}
    +
    if (!sk->sk_write_pending && tls_is_pending_closed_record(ctx)) {
        gfp_t sk_allocation = sk->sk_allocation;
        int rc;
        @@ -219,6 +243,15 @@
        ctx->sk_write_space(sk);
    }

    +static void tls_ctx_free(struct tls_context *ctx)
    +{
    +if (!ctx)
    +return;
    +
    +memzero_explicit(&ctx->crypto_send, sizeof(ctx->crypto_send));
    +kfree(ctx);
    +}
    +
    static void tls_sk_proto_close(struct sock *sk, long timeout)
    {
        struct tls_context *ctx = tls_get_ctx(sk);
        @@ -229,7 +262,7 @@
        sk_proto_close = ctx->sk_proto_close;

        if (ctx->tx_conf == TLS_BASE_TX) {
        +kfree(ctx);
        +tls_ctx_free(ctx);
        goto skip_tx_cleanup;
        }
        @@ -282,7 +315,7 @@
    }

    /* get user crypto info */
    -crypto_info = &ctx->crypto_send;
    +crypto_info = &ctx->crypto_send;

if (!TLS_CRYPTO_INFO_READY(crypto_info)) {
    rc = -EBUSY;
    goto out;
}
lock_sock(sk);
-memcpy(crypto_info_aes_gcm_128->iv, ctx->iv,
+copy_to_user(optval,
    @@ -308,7 +341,8 @@
    goto out;
} lock_sock(sk);
-memcpy(crypto_info_aes_gcm_128->iv, ctx->iv,
+copy_to_user(optval,
    @@ -365,7 +399,9 @@
    goto out;
} lock_sock(sk);
if (copy_to_user(optval,
    @@ -416,7 +452,7 @@
    goto out;
} err_crypto_info:
-memset(crypto_info, 0, sizeof(*crypto_info));
+memzero_explicit(crypto_info, sizeof(union tls_crypto_context));
out:
    return rc;
} @@ -450,8 +486,21 @@
    return do_tls_setsockopt(sk, optname, optval, optlen);
}

+static void build_protos(struct proto *prot, struct proto *base)
+{
+    +prot[TLS_BASE_TX] = *base;
+    +prot[TLS_BASE_TX].setsockopt = tls_setsockopt;
+    +prot[TLS_BASE_TX].getsockopt = tls_getsockopt;
+    +prot[TLS_BASE_TX].close = tls_sk_proto_close;
+    +prot[TLS_SW_TX] = prot[TLS_BASE_TX];
+    +prot[TLS_SW_TX].sendmsg = tls_sw_sendmsg;
+    +prot[TLS_SW_TX].sendpage = tls_sw_sendpage;


static int tls_init(struct sock *sk)
{
    int ip_ver = sk->sk_family == AF_INET6 ? TLSV6 : TLSV4;
    struct inet_connection_sock *icsk = inet_csk(sk);
    struct tls_context *ctx;
    int rc = 0;
    @ @ -476,6 +525,17 @@
    ctx->getsockopt = sk->sk_prot->getsockopt;
    ctx->sk_proto_close = sk->sk_prot->close;

    /* Build IPv6 TLS whenever the address of tcpv6_prot changes */
    +if (ip_ver == TLSV6 &&
       unlikely(sk->sk_prot != smp_load_acquire(&saved_tcpv6_prot))) {
        +mutex_lock(&tcpv6_prot_mutex);
        +if (likely(sk->sk_prot != saved_tcpv6_prot)) {
            +build_protos(tls_prots[TLSV6], sk->sk_prot);
            +smp_store_release(&saved_tcpv6_prot, sk->sk_prot);
            +}
        +mutex_unlock(&tcpv6_prot_mutex);
        +}
    ctx->tx_conf = TLS_BASE_TX;
    update_sk_prot(sk, ctx);
    out:
    @ @ -488,21 +548,9 @@
    .init = tls_init,
    }

    static void build_protos(struct proto *prot, struct proto *base)
    -{
        -prot[TLS_BASE_TX] = *base;
        -prot[TLS_BASE_TX].setsockopt = tls_setsockopt;
        -prot[TLS_BASE_TX].getsockopt = tls_getsockopt;
        -prot[TLS_BASE_TX].close = tls_sk_proto_close;
        -
        -prot[TLS_SW_TX] = prot[TLS_BASE_TX];
        -prot[TLS_SW_TX].sendmsg = tls_sw_sendmsg;
        -prot[TLS_SW_TX].sendpage = tls_sw_sendpage;
        -}
    -
    static int __init tls_register(void)
    {
        -build_protos(tls_prots, &tcp_prot);
        +build_protos(tls_prots[TLSV4], &tcp_prot);

        tcp_register_ulp(&tcp_tls_ulp_ops);
--- linux-4.15.0.orig/net/tls/tls_sw.c
+++ linux-4.15.0/net/tls/tls_sw.c
@@ -119,9 +119,10 @@
pfrag->offset += use;

 sge = sg + num_elem - 1;
-if (num_elem > first_coalesce && sg_page(sg) == pfrag->page &&
- sg->offset + sg->length == orig_offset) {
- sg->length += use;
+ if (num_elem > first_coalesce && sg_page(sge) == pfrag->page &&
+ sge->offset + sge->length == orig_offset) {
+ sge->length += use;
 } else {
 sge++;
 sg_unmark_end(sge);
@@ -153,6 +154,9 @@
 rc = alloc_sg(sk, len, ctx->sg_encrypted_data,
&ctx->sg_plaintext_num_elem, &ctx->sg_plaintext_size,
&ctx->sg_encrypted_num_elem, &ctx->sg_encrypted_size, 0);

+if (rc == -ENOSPC)
+ctx->sg_encrypted_num_elem = ARRAY_SIZE(ctx->sg_encrypted_data);
+ return rc;
 }

@@ -166,18 +170,9 @@
 &ctx->sg_plaintext_num_elem, &ctx->sg_plaintext_size,
 tls_ctx->pending_open_record_frags);

+if (rc == -ENOSPC)
+ctx->sg_plaintext_num_elem = ARRAY_SIZE(ctx->sg_plaintext_data);
+ return rc;
 }

@@ -195,18 +202,12 @@
}

static int tls_do_encryption(struct tls_context *tls_ctx,
 - struct tls_sw_context *ctx, size_t data_len,
 - gfp_t flags)
 + struct tls_sw_context *ctx,
 + struct aead_request *aead_req,
 + size_t data_len)
 {  
-unsigned int req_size = sizeof(struct aead_request) +
+unsigned int req_size = sizeof(struct aead_request) +

---
crypto_aead_reqsize(ctx->aead_send);
struct aead_request *aead_req;

int rc;

aead_req = kzalloc(req_size, flags);
if (!aead_req)
    return -ENOMEM;
ctx->sg_encrypted_data[0].offset += tls_ctx->prepend_size;
ctx->sg_encrypted_data[0].length -= tls_ctx->prepend_size;

++ctx->sg_encrypted_data[0].offset -= tls_ctx->prepend_size;
ctx->sg_encrypted_data[0].length += tls_ctx->prepend_size;

kfree(aead_req);
return rc;

struct tls_context *tls_ctx = tls_get_ctx(sk);
struct tls_sw_context *ctx = tls_sw_ctx(tls_ctx);
+struct aead_request *req;
int rc;
+req = kzalloc(sizeof(struct aead_request) +
    crypto_aead_reqsize(ctx->aead_send), sk->sk_allocation);
+if (!req)
    +return -ENOMEM;
+sg_mark_end(ctx->sg_plaintext_data + ctx->sg_plaintext_num_elem - 1);
sg_mark_end(ctx->sg_encrypted_data + ctx->sg_encrypted_numElem - 1);

tls_ctx->pending_open_record_frags = 0;
set_bit(TLS_PENDING_CLOSED_RECORD, &tls_ctx->flags);

-rc = tls_do_encryption(tls_ctx, ctx, ctx->sg_plaintext_size,
    -sk->sk_allocation);
+rc = tls_do_encryption(tls_ctx, ctx, req, ctx->sg_plaintext_size);
if (rc < 0) {
    /* If we are called from write_space and
 * we fail, we need to set this SOCK_NOSPACE
 * to trigger another write_space in the future.
 */
    set_bit(SOCK_NOSPACE, &sk->sk_socket->flags);
    -return rc;
}
+goto out_req;
}

free_sg(sk, ctx->sg_plaintext_data, &ctx->sg_plaintext_num_elem,
@@ -268,6 +273,8 @@
tls_err_abort(sk);

tls_advance_record_sn(sk, tls_ctx);
+out_req:
+kfree(req);
return rc;
}

@@ -365,7 +372,7 @@
{
    struct tls_context *tls_ctx = tls_get_ctx(sk);
    struct tls_sw_context *ctx = tls_sw_ctx(tls_ctx);
-    int ret = 0;
+    int ret;
    int required_size;
    long timeo = sock_sndtimeo(sk, msg->msg_flags & MSG_DONTWAIT);
    bool eor = !(msg->msg_flags & MSG_MORE);
@@ -380,7 +387,8 @@
    lock_sock(sk);

-    if (tls_complete_pending_work(sk, tls_ctx, msg->msg_flags, &timeo))
+    ret = tls_complete_pending_work(sk, tls_ctx, msg->msg_flags, &timeo);
+    if (ret)
        goto send_end;

    if (unlikely(msg->msg_controllen)) {
@@ -433,7 +441,7 @@
ret = tls_push_record(sk, msg->msg_flags, record_type);
    if (!ret)
        continue;
-    if (ret == -EAGAIN)
+    if (ret < 0)
        goto send_end;

    copied -= try_to_copy;
@@ -516,7 +524,7 @@
{
    struct tls_context *tls_ctx = tls_get_ctx(sk);
    struct tls_sw_context *ctx = tls_sw_ctx(tls_ctx);
-    int ret = 0;
+    int ret;
    long timeo = sock_sndtimeo(sk, flags & MSG_DONTWAIT);
bool eor;
size_t orig_size = size;
@@ -536,7 +544,8 @@
sk_clear_bit(SOCKWQ_ASYNC_NOSPACE, sk);

-if (tls_complete_pending_work(sk, tls_ctx, flags, &timeo))
+ret = tls_complete_pending_work(sk, tls_ctx, flags, &timeo);
+if (ret)
goto sendpage_end;

/* Call the sk_stream functions to manage the sndbuf mem. */
@@ -641,7 +650,6 @@
int tls_set_sw_offload(struct sock *sk, struct tls_context *ctx)
{
-    char keyval[TLS_CIPHER_AES_GCM_128_KEY_SIZE];
    struct tls_crypto_info *crypto_info;
    struct tls12_crypto_info_aes_gcm_128 *gcm_128_info;
    struct tls_sw_context *sw_ctx;
@@ -667,7 +675,7 @@
        ctx->priv_ctx = (struct tls_offload_context *)sw_ctx;

        crypto_info = &ctx->crypto_send;
-    +crypto_info = &ctx->crypto_send.info;
        switch (crypto_info->cipher_type) {
            case TLS_CIPHER_AES_GCM_128: {
                nonce_size = TLS_CIPHER_AES_GCM_128_IV_SIZE;
@@ -732,9 +740,7 @@
                ctx->push_pending_record = tls_sw_push_pending_record;

                -memcpy(keyval, gcm_128_info->key, TLS_CIPHER_AES_GCM_128_KEY_SIZE); 
-    -rc = crypto_aead_setkey(sw_ctx->aead_send, keyval, 
-+rc = crypto_aead_setkey(sw_ctx->aead_send, gcm_128_info->key, 
                    TLS_CIPHER_AES_GCM_128_KEY_SIZE);
            if (rc)
goto free_aead;
--- linux-4.15.0.orig/net/unix/Kconfig
+++ linux-4.15.0/net/unix/Kconfig
@@ -19,6 +19,11 @@
        Say Y unless you know what you are doing.

        +config UNIX_SCM
        +bool
depends on UNIX
+default y
+
config UNIX_DIAG
tristate "UNIX: socket monitoring interface"
depends on UNIX
--- linux-4.15.0.orig/net/unix/Makefile
+++ linux-4.15.0/net/unix/Makefile
@@ -10,3 +10,5 @@
obj-$(CONFIG_UNIX_DIAG)+= unix_diag.o
unix_diag-y:= diag.o
+
+obj-$(CONFIG_UNIX_SCM)+= scm.o
--- linux-4.15.0.orig/net/unix/af_unix.c
+++ linux-4.15.0/net/unix/af_unix.c
@@ -119,6 +119,8 @@
#include <linux/freezer.h>
#include "scm.h"

struct hlist_head unix_socket_table[2 * UNIX_HASH_SIZE];
EXPORT_SYMBOL_GPL(unix_socket_table);
DEFINE_SPINLOCK(unix_table_lock);
@@ -192,11 +194,17 @@
return unix_peer(osk) == NULL || unix_our_peer(sk, osk);
}

-static inline int unix_recvq_full(struct sock const *sk)
+static inline int unix_recvq_full(const struct sock *sk)
{
  return skb_queue_len(&sk->sk_receive_queue) > sk->sk_max_ack_backlog;
}

+static inline int unix_recvq_full_lockless(const struct sock *sk)
++return skb_queue_len_lockless(&sk->sk_receive_queue) >
+READ_ONCE(sk->sk_max_ack_backlog);
++
++struct sock *unix_peer_get(struct sock *s)
++{
struct sock *peer;
@@ -225,6 +233,8 @@
static int unix_mkname(struct sockaddr_un *sunaddr, int len, unsigned int *hashp)
{
+hashp = 0;
+
if (len <= sizeof(short) || len > sizeof(*sunaddr))
return -EINVAL;
if (!sunaddr || sunaddr->sun_family != AF_UNIX)
    return -EINVAL;
u->path.mnt = NULL;
state = sk->sk_state;
sk->sk_state = TCP_CLOSE;
+
+skpair = unix_peer(sk);
+unix_peer(sk) = NULL;
+
unix_state_unlock(sk);

wake_up_interruptible_all(&u->peer_wait);
-
-
if (skpair != NULL) {
    if (sk->sk_type == SOCK_STREAM || sk->sk_type == SOCK_SEQPACKET) {
        unix_state_lock(skpair);
        unix_dgram_peer_wake_disconnect(sk, skpair);
        sock_put(skpair); /* It may now die */
        unix_peer(sk) = NULL;
    }
}

/* Try to flush out this socket. Throw out buffers at least */
@@ -584,20 +589,42 @@

static void init_peercred(struct sock *sk)
{
    -put_pid(sk->sk_peer_pid);
    -if (sk->sk_peer_cred)
    -put_cred(skb->sk_peer_cred);
    +const struct cred *old_cred;
    +struct pid *old_pid;
    +
    +spin_lock(&sk->sk_peer_lock);
    +old_pid = skb->sk_peer_pid;
    +old_cred = skb->sk_peer_cred;
    skb->sk_peer_pid = get_pid(task_tgid(current));
    skb->sk_peer_cred = get_current_cred();
    +spin_unlock(skb->sk_peer_lock);
    +
    +put_pid(old_pid);
static void copy_peercred(struct sock *sk, struct sock *peersk)
{
	put_pid(sk->sk_peer_pid);
	if (sk->sk_peer_cred)
		put_cred(sk->sk_peer_cred);
+const struct cred *old_cred;
+struct pid *old_pid;
+
+if (sk < peersk) {
+spin_lock(&sk->sk_peer_lock);
+spin_lock_nested(&peersk->sk_peer_lock, SINGLE_DEPTH_NESTING);
+} else {
+spin_lock(&peersk->sk_peer_lock);
+spin_lock_nested(&sk->sk_peer_lock, SINGLE_DEPTH_NESTING);
+}
+old_pid = sk->sk_peer_pid;
+old_cred = sk->sk_peer_cred;
+sk->sk_peer_pid = get_pid(peersk->sk_peer_pid);
+sk->sk_peer_cred = get_cred(peersk->sk_peer_cred);
+
+spin_unlock(&sk->sk_peer_lock);
+spin_unlock(&peersk->sk_peer_lock);
+
+put_pid(old_pid);
+put_cred(old_cred);
}

static int unix_listen(struct socket *sock, int backlog)
{
	@ @ -642,6 +675,9 @ @

test unsigned int unix_dgram_poll(struct file *, struct socket *,
																							poll_table *);

test int unix_ioctl(struct socket *, unsigned int, unsigned long);
+if ifdef CONFIG_COMPAT
+static int unix_compat_ioctl(struct socket *, unsigned int cmd, unsigned long arg);
+endif

test int unix_shutdown(struct socket *, int);

test int unix_stream_sendmsg(struct socket *, struct msghdr *, size_t);

test int unix_stream_recvmsg(struct socket *, struct msghdr *, size_t, int);
	@ @ -683,6 +719,9 @ @
	.getname =unix_getname,
	.poll =unix_poll,
	.ioctl =unix_ioctl,
+ if ifdef CONFIG_COMPAT
+.compat_ioctl =unix_compat_ioctl,
+ endif
.listen =unix_listen,
.shutdown =unix_shutdown,
.setsockopt =sock_no_setsockopt,
@@ -706,6 +745,9 @@
      .getname =unix_getname,
      .poll =unix_dgram_poll,
      .ioctl =unix_ioctl,
+  #ifdef CONFIG_COMPAT
+      .compat_ioctl =unix_compat_ioctl,
+  #endif
      .listen =sock_no_listen,
      .shutdown =unix_shutdown,
      .setsockopt =sock_no_setsockopt,
@@ -728,6 +770,9 @@
      .getname =unix_getname,
      .poll =unix_dgram_poll,
      .ioctl =unix_ioctl,
+  #ifdef CONFIG_COMPAT
+      .compat_ioctl =unix_compat_ioctl,
+  #endif
      .listen =unix_listen,
      .shutdown =unix_shutdown,
      .setsockopt =sock_no_setsockopt,
@@ -893,7 +938,7 @@
      addr->hash ^= sk->sk_type;

      __unix_remove_socket(sk);
-    u->addr = addr;
+    smp_store_release(&u->addr, addr);
      __unix_insert_socket(&unix_socket_table[addr->hash], sk);
      spin_unlock(&unix_table_lock);
      err = 0;
@@ -1063,7 +1108,7 @@
      __unix_remove_socket(sk);
-    u->addr = addr;
+    smp_store_release(&u->addr, addr);
      __unix_insert_socket(list, sk);

    out_unlock:
@@ -1334,15 +1379,29 @@
      RCU_INIT_POINTER(newsk->sk_wq, &newu->peer_wq);
      otheru = unix_sk(other);

      /* copy address information from listening to new sock*/
--/if (otheru->addr) {
-      refcount_inc(&otheru->addr->refcnt);


newu->addr = otheru->addr;
-
+/* copy address information from listening to new sock
+ *
+ * The contents of *(otheru->addr) and otheru->path
+ * are seen fully set up here, since we have found
+ * otheru in hash under unix_table_lock. Insertion
+ * into the hash chain we'd found it in had been done
+ * in an earlier critical area protected by unix_table_lock,
+ * the same one where we'd set *(otheru->addr) contents,
+ * as well as otheru->path and otheru->addr itself.
+ *
+ */
if (otheru->path.dentry) {
    path_get(&otheru->path);
    newu->path = otheru->path;
}
+refcount_inc(&otheru->addr->refcnt);
+smp_store_release(&newu->addr, otheru->addr);

/* Set credentials */
copy_peercred(sk, other);
@@ -1456,7 +1515,7 @@
static int unix_getname(struct socket *sock, struct sockaddr *uaddr, int *uaddr_len, int peer)
{
    struct sock *sk = sock->sk;
-    struct unix_sock *u;
+    struct unix_address *addr;
    DECLARE_SOCKADDR(struct sockaddr_un *, sunaddr, uaddr);
    int err = 0;

    @@ -1471,83 +1530,65 @@
    sock_hold(sk);
    }

    -u = unix_sk(sk);
-    unix_state_lock(sk);
-    if (!u->addr) {
-        +addr = smp_load_acquire(unix_sk(sk)->addr);
-        if (!addr) {
-            sunaddr->sun_family = AF_UNIX;
-            sunaddr->sun_path[0] = 0;


*uaddr_len = sizeof(short);
} else {
    struct unix_address *addr = u->addr;
    *
    *uaddr_len = addr->len;
    memcpy(sunaddr, addr->name, *uaddr_len);
}
unix_state_unlock(sk);
sock_put(sk);
out:
return err;
}

static void unix_detach_fds(struct scm_cookie *scm, struct sk_buff *skb)
+static void unix_peek_fds(struct scm_cookie *scm, struct sk_buff *skb)
{
    int i;

    scm->fp = UNIXCB(skb).fp;
    UNIXCB(skb).fp = NULL;

    for (i = scm->fp->count-1; i >= 0; i--)
        unix_notinflight(scm->fp->user, scm->fp->fp[i]);
}

static void unix_destruct_scm(struct sk_buff *skb)
{
    struct scm_cookie scm;
    memset(&scm, 0, sizeof(scm));
    scm.pid  = UNIXCB(skb).pid;
    if (UNIXCB(skb).fp)
        unix_detach_fds(&scm, skb);
    /* Alas, it calls VFS */
    /* So fscking what? fput() had been SMP-safe since the last Summer */
    scm_destroy(&scm);
    sock_wfree(skb);
}

/* Alas, it calls VFS */
/* So fscking what? fput() had been SMP-safe since the last Summer */

static inline bool too_many_unix_fds(struct task_struct *p)
{
    struct user_struct *user = current_user();
    /* The "user->unix_inflight" variable is protected by the garbage
    * collection lock, and we just read it locklessly here. If you go
    * over the limit, there might be a tiny race in actually noticing
    * it across threads. Tough.
    */
    -static inline bool too_many_unix_fds(struct task_struct *p)
    {
        struct user_struct *user = current_user();

-if (unlikely(user->unix_inflight > task_rlimit(p, RLIMIT_NOFILE)))
  return !capable(CAP_SYSRESOURCE) && !capable(CAP_SYSADMIN);
  return false;
-
-
-static int unix_attach_fds(struct scm_cookie *scm, struct sk_buff *skb)
  {-
  -
  -if (too_many_unix_fds(current))
  -return -ETOOMANYREFS;
  +scm->fp = scm_fp_dup(UNIXCB(skb).fp);
  */
  /* Need to duplicate file references for the sake of garbage
  /* collection. Otherwise a socket in the fps might become a
  /* candidate for GC while the skb is not yet queued.
  */
  +* Garbage collection of unix sockets starts by selecting a set of
  +* candidate sockets which have reference only from being in flight
  +* (total_refs == inflight_refs). This condition is checked once during
  +* the candidate collection phase, and candidates are marked as such, so
  +* that non-candidates can later be ignored. While inflight_refs is
  +* protected by unix_gc_lock, total_refs (file count) is not, hence this
  +* is an instantaneous decision.
  +*
  +* Once a candidate, however, the socket must not be reinstalled into a
  +* file descriptor while the garbage collection is in progress.
  +*
  +* If the above conditions are met, then the directed graph of
  +* candidates (*) does not change while unix_gc_lock is held.
  +*
  +* Any operations that changes the file count through file descriptors
  +* (dup, close, sendmsg) does not change the graph since candidates are
  +* not installed in fds.
  +*
  +* Dequeing a candidate via recvmsg would install it into an fd, but
  +* that takes unix_gc_lock to decrement the inflight count, so it's
  +* serialized with garbage collection.
  +*
  +* MSG_PEEK is special in that it does not change the inflight count,
  +* yet does install the socket into an fd. The following lock/unlock
  +* pair is to ensure serialization with garbage collection. It must be
  +* done between incrementing the file count and installing the file into
  +* an fd.
  +*
  +* If garbage collection starts after the barrier provided by the
  +* lock/unlock, then it will see the elevated refcount and not mark this
* as a candidate. If a garbage collection is already in progress
* before the file count was incremented, then the lock/unlock pair will
* ensure that garbage collection is finished before progressing to
* installing the fd.
* (*) A -> B where B is on the queue of A or B is on the queue of C
* + which is on the queue of listening socket A.
*/
-UNIXCB(skb).fp = scm_fp_dup(scm->fp);
-if (!UNIXCB(skb).fp)
-return -ENOMEM;
-
-for (i = scm->fp->count - 1; i >= 0; i--)
-unix_inflight(scm->fp->user, scm->fp->fp[i]);
-return 0;
+spin_lock(&unix_gc_lock);
+spin_unlock(&unix_gc_lock);
}

static int unix_scm_to_skb(struct scm_cookie *scm, struct sk_buff *skb, bool send_fds)
@@ -1769,7 +1810,8 @@
/* - unix_peer(sk) == sk by time of get but disconnected before lock
/*/
 if (other != sk &&
- unlikely(unix_peer(other) != sk && unix_recvq_full(other))) {
+ unlikely(unix_peer(other) != sk &&
+ unix_recvq_full_lockless(other))) {
 if (timeo) {
timeo = unix_wait_for_peer(other, timeo);
@@ -2076,11 +2118,11 @@
 static void unix_copy_addr(struct msghdr *msg, struct sock *sk)
 {
-struct unix_sock *u = unix_sk(sk);
-struct unix_address *addr = smp_load_acquire(&unix_sk(sk)->addr);
+struct unix_address *addr = smp_load_acquire(&unix_sk(sk)->addr);

-if (u->addr) {
-msg->msg_name = u->addr->len;
-memcpy(msg->msg_name, u->addr->name, u->addr->len);
+if (addr) {
+msg->msg_name = addr->len;
+memcpy(msg->msg_name, addr->name, addr->len);
 } 
}
@@ -2174,7 +2216,7 @@
 sk_peek_offset_fwd(sk, size);
if (UNIXCB(skb).fp)
-  scm.fp = scm_fp_dup(UNIXCB(skb).fp);
+  unix_peek_fds(&scm, skb);
}  
err = (flags & MSG_TRUNC) ? skb->len - skip : size;

@@ -2415,7 +2457,7 @@
 /* It is questionable, see note in unix_dgram_recvmsg.
 */
 if (UNIXCB(skb).fp)
-  scm.fp = scm_fp_dup(UNIXCB(skb).fp);
+  unix_peek_fds(&scm, skb);

 sk_peek_offset_fwd(sk, chunk);

@@ -2584,15 +2626,14 @@
 if (!ns_capable(sock_net(sk)->user_ns, CAP_NET_ADMIN))
 return -EPERM;

-unix_state_lock(sk);
+if (!smp_load_acquire(&unix_sk(sk)->addr))
+return -ENOENT;
 +
 path = unix_sk(sk)->path;
- if (!path.dentry) {
- unix_state_unlock(sk);
+ if (!path.dentry) {
+unix_state_unlock(sk);
- }

 path_get(&path);
-unix_state_unlock(sk);

 fd = get_unused_fd_flags(O_CLOEXEC);
 if (fd < 0)
 @@ -2640,6 +2681,13 @@
 return err;
 }

+#ifdef CONFIG_COMPAT
+  static int unix_compat_ioctl(struct socket *sock, unsigned int cmd, unsigned long arg)
+  {
+   return unix_ioctl(sock, cmd, (unsigned long)compat_ptr(arg));
+  }
+  
 static unsigned int unix_poll(struct file *file, struct socket *sock, poll_table *wait)
struct sock *sk = sock->sk;
mask |= POLLRDHUP | POLLIN | POLLRDNORM;

/* readable? */
@if (!skb_queue_empty(&sk->sk_receive_queue))
+if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
mask |= POLLIN | POLLRDNORM;
/* Connection-based need to check for termination and startup */
@ @ -2657,7 +2705,7 @@
mask = 0;

/* exceptional events? */
-if (sk->sk_err || !skb_queue_empty(&sk->sk_error_queue))
+if (sk->sk_err || !skb_queue_empty_lockless(&sk->sk_error_queue))
mask |= POLLERR |
(sock_flag(sk, SOCK_SELECT_ERR_QUEUE) ? POLLPRI : 0);

@ @ -2695,7 +2743,7 @@
mask |= POLLHUP;

/* readable? */
-if (!skb_queue_empty(&sk->sk_receive_queue))
+if (!skb_queue_empty_lockless(&sk->sk_receive_queue))
mask |= POLLIN | POLLRDNORM;
/* Connection-based need to check for termination and startup */
@ @ -2717,7 +2765,7 @@
other = unix_peer(sk);
if (other & unix_peer(other) != sk &&
- unix_recvq_full(other) &&
+ unix_recvq_full_lockless(other) &&
  unix_dgram_peer_wake_me(sk, other))
writeable = 0;

@ @ -2832,7 +2880,7 @@
(s->sk_state == TCP_ESTABLISHED ? SS_CONNECTING : SS_DISCONNECTING),
sock_i_ino(s));

-if (u->addr) {
+if (u->addr) {// under unix_table_lock here
  int i, len;
  seq_putchar(seq, ' ');

--- linux-4.15.0.orig/net/unix.diag.c

static int sk_diag_dump_name(struct sock *sk, struct sk_buff *nlskb)
{
    struct unix_address *addr = unix_sk(sk)->addr;
    /* might or might not have unix_table_lock */
    struct unix_address *addr = smp_load_acquire(&unix_sk(sk)->addr);

    if (!addr)
        return 0;

    unsigned int unix_tot_inflight;

    struct sock *unix_get_socket(struct file *filp)
    {
        struct sock *u_sock = NULL;
        struct inode *inode = file_inode(filp);

        /* Socket ? */
        if (S_ISSOCK(inode->i_mode) && !(filp->f_mode & FMODE_PATH)) {
            struct socket *sock = SOCKET_I(inode);
            struct sock *s = sock->sk;

            /* PF_UNIX ? */
            if (S_ISSOCK(inode->i_mode) && !(filp->f_mode & FMODE_PATH)) {
                struct socket *sock = SOCKET_I(inode);
                struct sock *s = sock->sk;

                /* Keep the number of times in flight count for the file
                 * descriptor if it is for an AF_UNIX socket.
                 */
                } /* /* Internal data structures and random procedures: */ */

                -static LIST_HEAD(gc_inflight_list);
                static LIST_HEAD(gc_candidates);
                static DEFINE_SPINLOCK(unix_gc_lock);
                static DECLARE_WAIT_QUEUE_HEAD(unix_gc_wait);

                -unsigned int unix_tot_inflight;
                -
                -static LIST_HEAD(gc_inflight_list);
                static LIST_HEAD(gc_candidates);
                -static DEFINE_SPINLOCK(unix_gc_lock);
                static DECLARE_WAIT_QUEUE_HEAD(unix_gc_wait);
-void unix_inflight(struct user_struct *user, struct file *fp)
-{  
-struct sock *s = unix_get_socket(fp);
-  
-spin_lock(&unix_gc_lock);
-
-if (s) {
-struct unix_sock *u = unix_sk(s);
-  
-if (atomic_long_inc_return(&u->inflight) == 1) {
-BUG_ON(!list_empty(&u->link));
-list_add_tail(&u->link, &gc_inflight_list);
-} else {
-BUG_ON(list_empty(&u->link));
-}
-unix_tot_inflight++;
-
-user->unix_inflight++;
-spin_unlock(&unix_ge_lock);
-}
-
-void unix_notinflight(struct user_struct *user, struct file *fp)
-{  
-struct sock *s = unix_get_socket(fp);
-  
-spin_lock(&unix_ge_lock);
-
-if (s) {
-struct unix_sock *u = unix_sk(s);
-  
-BUG_ON(!atomic_long_read(&u->inflight));
-BUG_ON(list_empty(&u->link));
-  
-if (atomic_long_dec_and_test(&u->inflight))
-list_del_init(&u->link);
-unix_tot_inflight--;
-}
-user->unix_inflight--;
-spin_unlock(&unix_ge_lock);
-}
-
static void scan_inflight(struct sock *x, void (*func)(struct unix_sock *),
 struct sk_buff_head *hitlist)
{
--- linux-4.15.0.orig/net/unix/scm.c
+++ linux-4.15.0/net/unix/scm.c
@@ -0,0 +1,149 @@
/// SPDX-License-Identifier: GPL-2.0
#include <linux/module.h>
#include <linux/kernel.h>
#include <linux/string.h>
#include <linux/socket.h>
#include <linux/net.h>
#include <linux/fs.h>
#include <net/af_unix.h>
#include <net/scm.h>
#include <linux/init.h>
#include <linux/sched/signal.h>
+
#include "scm.h"
+
unsigned int unix_tot_inflight;
EXPORT_SYMBOL(unix_tot_inflight);
+
LIST_HEAD(gc_inflight_list);
EXPORT_SYMBOL(gc_inflight_list);
+
DEFINE_SPINLOCK(unix_gc_lock);
EXPORT_SYMBOL(unix_gc_lock);
+
struct sock *unix_get_socket(struct file *filp)
+
{
+struct sock *u_sock = NULL;
+struct inode *inode = file_inode(filp);
+
+/* Socket ? */
+if (S_ISSOCK(inode->i_mode) && !(filp->f_mode & FMODE_PATH)) {
+struct socket *sock = SOCKET_I(inode);
+struct sock *s = sock->sk;
+
+/* PF_UNIX ? */
+if (s && sock->ops && sock->ops->family == PF_UNIX)
++u_sock = s;
+
+} return u_sock;
+
EXPORT_SYMBOL(unix_get_socket);
+
/* Keep the number of times in flight count for the file
 * descriptor if it is for an AF_UNIX socket.
 */
void unix_inflight(struct user_struct *user, struct file *fp)
+
{+struct sock *s = unix_get_socket(fp);
++}
spin_lock(&unix_gc_lock);
+
+if (s) {
+struct unix_sock *u = unix_sk(s);
+
+if (atomic_long_inc_return(&u->inflight) == 1) {
++BUG_ON(!list_empty(&u->link));
+list_add_tail(&u->link, &gc_inflight_list);
+} else {
+BUG_ON(list_empty(&u->link));
+
+unix_tot_inflight++;
+}
+user->unix_inflight++;
+spin_unlock(&unix_gc_lock);
+}
+
+void unix_notinflight(struct user_struct *user, struct file *fp)
+{
+struct sock *s = unix_get_socket(fp);
+
+spin_lock(&unix_gc_lock);
+
+if (s) {
+struct unix_sock *u = unix_sk(s);
+
+BUG_ON(!atomic_long_read(&u->inflight));
+BUG_ON(list_empty(&u->link));
+
+if (atomic_long_dec_and_test(&u->inflight))
+list_del_init(&u->link);
+unix_tot_inflight--;
+}
+user->unix_inflight--;
+spin_unlock(&unix_gc_lock);
+}
+
+/
+ * The "user->unix_inflight" variable is protected by the garbage
+ * collection lock, and we just read it locklessly here. If you go
+ * over the limit, there might be a tiny race in actually noticing
+ * it across threads. Tough.
+ */
+static inline bool too_many_unix_fds(struct task_struct *p)
+{
+struct user_struct *user = current_user();
+
+if (unlikely(user->unix_inflight > task_rlimit(p, RLIMIT_NOFILE)))
+return !capable(CAP_SYS_RESOURCE) && !capable(CAP_SYS_ADMIN);
+
+int unix_attach_fds(struct scm_cookie *scm, struct sk_buff *skb)
+{
+    int i;
+    
+    if (too_many_unix_fds(current))
+        return -ETOOMANYREFS;
+    
+    /*
+     * Need to duplicate file references for the sake of garbage
+     * collection. Otherwise a socket in the fps might become a
+     * candidate for GC while the skb is not yet queued.
+     */
+    UNIXCB(skb).fp = scm_fp_dup(scm->fp);
+    if (!UNIXCB(skb).fp)
+        return -ENOMEM;
+    
+    for (i = scm->fp->count - 1; i >= 0; i--)
+        unix_inflight(scm->fp->user, scm->fp->fp[i]);
+    return 0;
+}
+
+EXPORT_SYMBOL(unix_attach_fds);
+
+void unix_detach_fds(struct scm_cookie *scm, struct sk_buff *skb)
+{
+    int i;
+    
+    scm->fp = UNIXCB(skb).fp;
+    UNIXCB(skb).fp = NULL;
+    
+    for (i = scm->fp->count-1; i >= 0; i--)
+        unix_notinflight(scm->fp->user, scm->fp->fp[i]);
+}
+
+EXPORT_SYMBOL(unix_detach_fds);
+
+void unix_destruct_scm(struct sk_buff *skb)
+{
+    struct scm_cookie scm;
+    
+    memset(&scm, 0, sizeof(scm));
+    scm.pid = UNIXCB(skb).pid;
+    if (UNIXCB(skb).fp)
+        unix_detach_fds(&scm, skb);
+    
+    /* Alas, it calls VFS */
}
/* So fscking what? fput() had been SMP-safe since the last Summer */
+scm_destroy(&scm);
+sock_wfree(skb);
+
+EXPORT_SYMBOL(unix_destruct_scm);

--- linux-4.15.0.orig/net/unix/scm.h
+++ linux-4.15.0/net/unix/scm.h
@@ -0,0 +1,10 @@
+#ifndef NET_UNIX_SCM_H
+#define NET_UNIX_SCM_H
+
+extern struct list_head gc_inflight_list;
+extern spinlock_t unix_gc_lock;
+
+int unix_attach_fds(struct scm_cookie *scm, struct sk_buff *skb);
+void unix_detach_fds(struct scm_cookie *scm, struct sk_buff *skb);
+
+#endif

--- linux-4.15.0.orig/net/vmw_vsock/af_vsock.c
+++ linux-4.15.0/net/vmw_vsock/af_vsock.c
@@ -107,6 +107,7 @@
 #include <linux/poll.h>
 #include <linux/socket.h>
+#include <linux/random.h>
 #include <linux/smp.h>
 #include <linux/socket.h>
@@ -281,7 +282,8 @@
 void vsock_remove_bound(struct vsock_sock *vsk)
 {
     spin_lock_bh(&vsock_table_lock);
-     __vsock_remove_bound(vsk);
+     if (__vsock_in_bound_table(vsk))
+         __vsock_remove_bound(vsk);
     spin_unlock_bh(&vsock_table_lock);
 }
 EXPORT_SYMBOL_GPL(vsock_remove_bound);
@@ -289,7 +291,8 @@
 void vsock_remove_connected(struct vsock_sock *vsk)
 {
     spin_lock_bh(&vsock_table_lock);
-     __vsock_remove_connected(vsk);
+     if (__vsock_in_connected_table(vsk))
+         __vsock_remove_connected(vsk);
     spin_unlock_bh(&vsock_table_lock);
 }
 EXPORT_SYMBOL_GPL(vsock_remove_connected);
-static bool vsock_in_bound_table(struct vsock_sock *vsk)
{
bool ret;

spin_lock_bh(&vsock_table_lock);
ret = __vsock_in_bound_table(vsk);
spin_unlock_bh(&vsock_table_lock);

return ret;
}

- static bool vsock_in_connected_table(struct vsock_sock *vsk)
{
bool ret;

spin_lock_bh(&vsock_table_lock);
ret = __vsock_in_connected_table(vsk);
spin_unlock_bh(&vsock_table_lock);

return ret;
}

void vsock_remove_sock(struct vsock_sock *vsk)
{
if (vsock_in_bound_table(vsk))
  vsock_remove_bound(vsk);

if (vsock_in_connected_table(vsk))
  vsock_remove_connected(vsk);
  vsock_remove_connected(vsk);
}
EXPORT_SYMBOL_GPL(vsock_remove_sock);

@@ -451,14 +429,14 @@
return transport->shutdown(vsock_sk(sk), mode);
}

-void vsock_pending_work(struct work_struct *work)
+static void vsock_pending_work(struct work_struct *work)
{
struct sock *sk;
struct sock *listener;
struct vsock_sock *vsk;
bool cleanup;

-vsk = container_of(work, struct vsock_sock, dwork.work);
+vsk = container_of(work, struct vsock_sock, pending_work.work);
sk = sk_vsock(vsk);
listener = vsk->listener;
cleanup = true;
@@ -484,8 +462,7 @@
 * incoming packets can't find this socket, and to reduce the reference
 * count.
 */
-if (vsock_in_connected_table(vsk))
-vsock_remove_connected(vsk);
+vsock_remove_connected(vsk);

sk->sk_state = TCP_CLOSE;
@@ -498,16 +475,19 @@
sock_put(sk);
sock_put(listener);
}
-EXPORT_SYMBOL_GPL(vsock_pending_work);

/**** SOCKET OPERATIONS ****/

static int __vsock_bind_stream(struct vsock_sock *vsk,
    struct sockaddr_vm *addr)
{
    -static u32 port = LAST_RESERVED_PORT + 1;
    +static u32 port = 0;
    struct sockaddr_vm new_addr;
    
    +if (!port)
    +port = LAST_RESERVED_PORT + 1 +
    +prandom_u32_max(U32_MAX - LAST_RESERVED_PORT);
    +vsock_addr_init(&new_addr, addr->svm_cid, addr->svm_port);

    if (addr->svm_port == VMADDR_PORT_ANY) {
        @@ -597,6 +577,8 @@
        return retval;
    }
    
    +static void vsock_connect_timeout(struct work_struct *work);
    +
    struct sock *__vsock_create(struct net *net,
        struct socket *sock,
        struct sock *parent,
vsk->sent_request = false;
vsk->ignore_connecting_rst = false;
vsk->peer_shutdown = 0;

+INIT_DELAYED_WORK(&vsk->connect_work, vsock_connect_timeout);
+INIT_DELAYED_WORK(&vsk->pending_work, vsock_pending_work);

psk = parent ? vsock_sk(parent) : NULL;
if (parent) {
    vsk->trusted = psk->trusted;
    vsk->owner = get_cred(psk->owner);
    vsk->connect_timeout = psk->connect_timeout;
+security_sk_clone(parent, sk);
} else {
    -vsk->trusted = capable(CAP_NET_ADMIN);
+vsk->trusted = ns_capable_noaudit(&init_user_ns, CAP_NET_ADMIN);
    vsk->owner = get_current_cred();
    vsk->connect_timeout = VSOCK_DEFAULT_CONNECT_TIMEOUT;
}
EXPORT_SYMBOL_GPL(__vsock_create);

-static void __vsock_release(struct sock *sk)
+static void __vsock_release(struct sock *sk, int level)
{
    if (sk) {
        struct sk_buff *skb;
        @@ -672,9 +657,17 @@
            vsk = vsock_sk(sk);
            pending = NULL; /*!< Compiler warning. */

+/* The release call is supposed to use lock_sock_nested()
+ * rather than lock_sock(), if a sock lock should be acquired.
+ */
+transport->release(vsk);

-lock_sock(sk);
+/* When "level" is SINGLE_DEPTH_NESTING, use the nested
+ * version to avoid the warning "possible recursive locking
+ * detected". When "level" is 0, lock_sock_nested(sk, level)
+ * is the same as lock_sock(sk).
+ */
+lock_sock_nested(sk, level);
sock_orphan(sk);
sk->sk_shutdown = SHUTDOWN_MASK;

@@ -683,7 +676,7 @@
/* Clean up any sockets that never were accepted. */
while ((pending = vsock_dequeue_accept(sk)) != NULL) {
    __vsock_release(pending);
    __vsock_release(pending, SINGLE_DEPTH_NESTING);
sock_put(pending);
}

static int vsock_release(struct socket *sock)
{
    __vsock_release(sock->sk);
    __vsock_release(sock->sk, 0);
    sock->sk = NULL;
    sock->state = SS_FREE;

    sk = sock->sk;
    +lock_sock(sk);
    if (sock->state == SS_UNCONNECTED) {
        err = -ENOTCONN;
        if (sk->sk_type == SOCK_STREAM)
            return err;
        goto out;
    } else {
        sock->state = SS_DISCONNECTING;
        err = 0;
    }

    /* Receive and send shutdowns are treated alike. */
    mode = mode & (RCV_SHUTDOWN | SEND_SHUTDOWN);
    if (mode) {
        -lock_sock(sk);
        sk->sk_shutdown |= mode;
        sk->sk_state_change(sk);
        -release_sock(sk);

        if (sk->sk_type == SOCK_STREAM) {
            sock_reset_flag(sk, SOCK_DONE);
            return err;
        }
    } else {
        sock->state = SS_DISCONNECTING;
        err = 0;
    }

out:
    release_sock(sk);
return err;
}

@@ -886,7 +881,7 @@
* the queue and write as long as the socket isn't shutdown for
* sending.
*/
-if (!skb_queue_empty(&sk->sk_receive_queue) ||
+if (!skb_queue_empty_lockless(&sk->sk_receive_queue) ||
    (sk->sk_shutdown & RCV_SHUTDOWN)) {
    mask |= POLLIN | POLLRDNORM;
}
@@ -1115,9 +1110,8 @@
{
struct sock *sk;
struct vsock_sock *vsk;
-int cancel = 0;

-vsk = container_of(work, struct vsock_sock, dwork.work);
+vsched = container_of(work, struct vsock_sock, connect_work_work);
    sk = sk_vsock(vsk);

    lock_sock(sk);
    @ @ -1126,11 +1120,9 @@
    sk->sk_state = TCP_CLOSE;
    sk->sk_err = ETIMEDOUT;
    sk->sk_error_report(sk);
    -cancel = 1;
    +vsched_transport_cancel_pkt(vsk);
    }
    release_sock(sk);
    -if (cancel)
    -vsched_transport_cancel_pkt(vsk);

    sock_put(sk);
    }
    @ @ -1221,9 +1213,7 @@
    * timeout fires.
    */
    sock_hold(sk);
    -INIT_DELAYED_WORK(&vsk->dwork,
    - vsched_connect_timeout);
    -schedule_delayed_work(&vsk->dwork, timeout);
    +schedule_delayed_work(&vsk->connect_work, timeout);

    /* Skip ahead to preserve error code set above. */
    goto out_wait;
    @ @ -1235,7 +1225,7 @@
if (signal_pending(current)) {
err = sock_intr_errno(timeout);
-sk->sk_state = TCP_CLOSE;
+sk->sk_state = sk->sk_state == TCP_ESTABLISHED ? TCP_CLOSING : TCP_CLOSE;
sock->state = SS_UNCONNECTED;
vsoc_original:transport_cancel_pkt(vsk);
goto out_wait;
@@ -1293,7 +1283,7 @@
/* Wait for children sockets to appear; these are the new sockets
 * created upon connection establishment.
 */
+timeout = sock_sndtimeo(listener, flags & O_NONBLOCK);
+timeout = sock_rcvtimeo(listener, flags & O_NONBLOCK);
prepare_to_wait(sk_sleep(listener), &wait, TASK_INTERRUPTIBLE);

while ((connected = vsock_dequeue_accept(listener)) == NULL &&
@@ -2018,7 +2008,13 @@}
} EXPORT_SYMBOL_GPL(vsock_core_get_transport);

+static void __exit vsock_exit(void)
+{ /* Do nothing. This function makes this module removable. */
+ +
+ +module_init(vsock_init_tables);
+module_exit(vsock_exit);

MODULE_AUTHOR("VMware, Inc.");
MODULE_DESCRIPTION("VMware Virtual Socket Family");
--- linux-4.15.0.orig/net/vmw_vsock/hyperv_transport.c
+++ linux-4.15.0/net/vmw_vsock/hyperv_transport.c
@@ -35,6 +35,9 @@
/* The MTU is 16KB per the host side's design */
#define HVS_MTU_SIZE (1024 * 16)

+/* How long to wait for graceful shutdown of a connection */
+#define HVS_CLOSE_TIMEOUT (8 * HZ)
+
+struct vmpipe_proto_header {
 u32 pkt_type;
 u32 data_size;
@@ -141,28 +144,15 @@
****************************************************************************
* The only valid Service GUIDs, from the perspectives of both the host and *
* Linux VM, that can be connected by the other end, must conform to this *
- * format: <port>-facb-11e6-bd58-64006a7986d3, and the "port" must be in *

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When we write apps on the host to connect(), the GUID ServiceID is used.
When we write apps in Linux VM to connect(), we only need to specify the
port and the driver will form the GUID and use that to request the host.

- From the perspective of Linux VM:
  - 1. the local ephemeral port (i.e. the local auto-bound port when we call
  connect() without explicit bind()) is generated by __vsock_bind_stream(),
  - and the range is [1024, 0xFFFFFFFF).
  - 2. the remote ephemeral port (i.e. the auto-generated remote port for
  a connect request initiated by the host's connect()) is generated by
  hvs_remote_addr_init() and the range is [0x80000000, 0xFFFFFFFF).

-define MAX_LISTEN_PORT (u32)0x7FFFFFFF
-define MAX_VM_LISTEN_PORT_MAX_LISTEN_PORT
-define MAX_HOST_LISTEN_PORT_MAX_LISTEN_PORT
-define MIN_HOST_EPHEMERAL_PORT (MAX_HOST_LISTEN_PORT + 1)

-define MAX_VM_LISTEN_PORT_MAX_LISTEN_PORT
-define MIN_HOST_EPHEMERAL_PORT (MAX_HOST_LISTEN_PORT + 1)

/* 00000000-facb-11e6-bd58-64006a7986d3 */
static const uuid_le srv_id_template =
  UUID_LE(0x00000000, 0xfacb, 0x11e6, 0xbd, 0x58,
  @ @ -185.50 +175.11 @@
vsock_addr_init(addr, VMADDR_CID_ANY, port);
}

static void hvs_remote_addr_init(struct sockaddr_vm *remote,
  struct sockaddr_vm *local)
{
- static u32 host_ephemeral_port = MIN_HOST_EPHEMERAL_PORT;
- struct sock *sk;

- vsock_addr_init(remote, VMADDR_CID_ANY, VMADDR_PORT_ANY);

- while (1) {
-/* Wrap around? */
- if (host_ephemeral_port < MIN_HOST_EPHEMERAL_PORT ||
  host_ephemeral_port == VMADDR_PORT_ANY)
    host_ephemeral_port = MIN_HOST_EPHEMERAL_PORT;

- remote->svm_port = host_ephemeral_port++;

- sk = vsock_find_connected_socket(remote, local);
- if (!sk) {
-/* Found an available ephemeral port */
-return;
-
-/* Release refcnt got in vsock_find_connected_socket */
-sock_put(sk);
-}
-}
-
static void hvs_set_channel_pending_send_size(struct vmbus_channel *chan)
{
    set_channel_pending_send_size(chan,
        HVS_PKT_LEN(HVS_SEND_BUF_SIZE));

-/* See hvs_stream_has_space(): we must make sure the host has seen
- * the new pending send size, before we can re-check the writable
- * bytes.
- */
-virt_mb();
-}
-
-static void hvs_clear_channel_pending_send_size(struct vmbus_channel *chan)
-{
    set_channel_pending_send_size(chan, 0);
    -
-/* Ditto */
-virt_mb();
}

@@ -298,27 +249,42 @@
if (hvs_channel_readable(chan))
    sk->sk_data_ready(sk);

-/* See hvs_stream_has_space(): when we reach here, the writable bytes
- * may be already less than HVS_PKT_LEN(HVS_SEND_BUF_SIZE).
- */
    if (hv_get_bytes_to_write(&chan->outbound) > 0)
        sk->sk_write_space(sk);
    }

-static void hvs_close_connection(struct vmbus_channel *chan)
+static void hvs_do_close_lock_held(struct vsock_sock *vsk,
+    bool cancel_timeout)
+{
+    struct sock *sk = get_per_channel_state(chan);
+    struct vsock_sock *vsk = vsock_sk(sk);
+    -
+    lock_sock(sk);
+    struct sock *sk = sk_vsock(vsk);
sk->sk_state = TCP_CLOSE;
sock_set_flag(sk, SOCK_DONE);
-vsk->peer_shutdown |= SEND_SHUTDOWN | RCV_SHUTDOWN;
-
+vsk->peer_shutdown = SHUTDOWN_MASK;
+if (vsock_stream_has_data(vsk) <= 0)
+sk->sk_state = TCP_CLOSING;
sk->sk_state_change(skb);
+if (vsk->close_work_scheduled &&
+  (!cancel_timeout || cancel_delayed_work(&vsk->close_work))) {
+vsk->close_work_scheduled = false;
vsock_remove_sock(vsk);
+
+static void hvs_close_connection(struct vmbus_channel *chan)
+
+{ struct sock *sk = get_per_channel_state(chan);

+lock_sock(sk);
+hvs_do_close_lock_held(vsock_sk(sk), true);
+release_sock(sk);
+
+static void hvs_open_connection(struct vmbus_channel *chan)
@@ -328,19 +294,15 @@

        if_type = &chan->offermsg.offer.if_type;
        if_instance = &chan->offermsg.offer.if_instance;
        conn_from_host = chan->offermsg.offer.u.pipe.user_def[0];
- /* The host or the VM should only listen on a port in
- * [0, MAX_LISTEN_PORT]
- */
- if (!is_valid_srv_id(if_type) ||
-    get_port_by_srv_id(if_type) > MAX_LISTEN_PORT)
+if (!is_valid_srv_id(if_type))
    return;

    hvs_addr_init(&addr, conn_from_host ? if_type : if_instance);
@@ -364,6 +326,13 @@
new->sk_state = TCP_SYN_SENT;
vnew = vsock_sk(new);
+
+hvs_addr_init(&vnew->local_addr, if_type);
+
+/* Remote peer is always the host */
+vsock_addr_init(&vnew->remote_addr,
+VMADDR_CID_HOST, VMADDR_PORT_ANY);
+vnew->remote_addr.svm_port = get_port_by_srv_id(if_instance);

hvs_new = vnew->trans;
hvs_new->chan = chan;
} else {
@@ -386,15 +355,23 @@
    set_per_channel_state(chan, conn_from_host ? new : sk);
+
+/* This reference will be dropped by hvs_close_connection(). */
+sock_hold(conn_from_host ? new : sk);
+vmbus_set_chn_rescind_callback(chan, hvs_close_connection);

+/* Set the pending send size to max packet size to always get
+ * notifications from the host when there is enough writable space.
+ * The host is optimized to send notifications only when the pending
+ * size boundary is crossed, and not always.
+ */
+hvs_set_channel_pending_send_size(chan);
+
    if (conn_from_host) {
    new->sk_state = TCP_ESTABLISHED;
    sk->sk_ack_backlog++;

    hvs_addr_init(&vnew->local_addr, if_type);
    -hvs_remote_addr_init(&vnew->remote_addr, &vnew->local_addr);

-    hvs_new->vm_srv_id = *if_type;
hvs_new->host_srv_id = *if_instance;

return vmbus_send_tl_connect_request(&h->vm_srv_id, &h->host_srv_id);
}

-static int hvs_shutdown(struct vsock_sock *vsk, int mode)
+static void hvs_shutdown_lock_held(struct hvsock *hvs, int mode)
{
    struct sock *sk = sk_vsock(vsk);
    struct vmpipe_proto_header hdr;
    -struct hvs_send_buf *send_buf;
    -struct hvsock *hvs;

    +if (hvs->fin_sent || !hvs->chan)
    +return;
    +
    +/* It can't fail: see hvs_channel_writable_bytes(). */
    +(void)hvs_send_data(hvs->chan, (struct hvs_send_buf *)&hdr, 0);
    +hvs->fin_sent = true;
    +}
    +
    +static int hvs_shutdown(struct vsock_sock *vsk, int mode)
    +{
        if (!mode & SEND_SHUTDOWN)
            return 0;

        -lock_sock(sk);
        -
        -hvs = vsk->trans;
        -if (hvs->fin_sent)
            goto out;
        +hvs_shutdown_lock_held(vsk->trans, mode);
        +return 0;
        +}

        -send_buf = (struct hvs_send_buf *)&hdr;
        +static void hvs_close_timeout(struct work_struct *work)
        +{
            +struct vsock_sock *vsk =
            +container_of(work, struct vsock_sock, close_work.work);
            +struct sock *sk = sk_vsock(vsk);

            /* It can't fail: see hvs_channel_writable_bytes(). */
        +(void)hvs_send_data(hvs->chan, send_buf, 0);
            +lock_sock(sk);
            +if (!sock_flag(sk, SOCK_DONE))


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static void hvs_release(struct vsock_sock *vsk)
{
    struct sock *sk = sk_vsock(vsk);
    struct hvsock *hvs = vsk->trans;
    struct vmbus_channel *chan;

    lock_sock(sk);
    if (!(sk->sk_state == TCP_ESTABLISHED ||
        sk->sk_state == TCP_CLOSING))
        return true;

    sk->sk_state = TCP_CLOSING;
    vsock_remove_sock(vsk);
    if ((sk->sk_shutdown & SHUTDOWN_MASK) != SHUTDOWN_MASK)
        hvs_shutdown_lock_held(vsk->trans, SHUTDOWN_MASK);

    release_sock(sk);
    if (sock_flag(sk, SOCK_DONE))
        return true;

    chan = hvs->chan;
    if (chan)
        hvs_shutdown(vsk, RCV_SHUTDOWN | SEND_SHUTDOWN);
    /* This reference will be dropped by the delayed close routine */
    sock_hold(sk);
    INIT_DELAYED_WORK(&vsk->close_work, hvs_close_timeout);
    vsk->close_workScheduled = true;
    schedule_delayed_work(&vsk->close_work, HVS_CLOSE_TIMEOUT);
    return false;
}

static bool hvs_close_lock_held(struct vsock_sock *vsk)
{
    struct sock *sk = sk_vsock(vsk);
    if (!(sk->sk_state == TCP_ESTABLISHED ||
        sk->sk_state == TCP_CLOSING))
        return true;

    sk->sk_state = TCP_CLOSING;
    vsock_remove_sock(vsk);
    if ((sk->sk_shutdown & SHUTDOWN_MASK) != SHUTDOWN_MASK)
        hvs_shutdown_lock_held(vsk->trans, SHUTDOWN_MASK);

    release_sock(sk);
    if (sock_flag(sk, SOCK_DONE))
        return true;

    chan = hvs->chan;
    if (chan)
        hvs_shutdown(vsk, RCV_SHUTDOWN | SEND_SHUTDOWN);
    /* This reference will be dropped by the delayed close routine */
    sock_hold(sk);
    INIT_DELAYED_WORK(&vsk->close_work, hvs_close_timeout);
    vsk->close_workScheduled = true;
    schedule_delayed_work(&vsk->close_work, HVS_CLOSE_TIMEOUT);
    return false;
}
+lock_sock_nested(sk, SINGLE_DEPTH_NESTING);
+remove_sock = hvs_close_lock_held(vsk);
+release_sock(sk);
+if (remove_sock)
+vsock_remove_sock(vsk);
}

static void hvs_destruct(struct vsock_sock *vsk)
@@ -651,23 +654,8 @@
static s64 hvs_stream_has_space(struct vsock_sock *vsk)
{
 struct hvsock *hvs = vsk->trans;
-struct vmbus_channel *chan = hvs->chan;
-64 ret;
-
- ret = hvs_channel_writable_bytes(chan);
-if (ret > 0) {
- hvs_clear_channel_pending_send_size(chan);
-} else {
-/* See hvs_channel_cb() */
- hvs_set_channel_pending_send_size(chan);
-
-/* Re-check the writable bytes to avoid race */
- ret = hvs_channel_writable_bytes(chan);
-if (ret > 0)
- hvs_clear_channel_pending_send_size(chan);
-}
-
-return ret;
+return hvs_channel_writable_bytes(hvs->chan);
}

static u64 hvs_stream_rcvhiwat(struct vsock_sock *vsk)
@@ -684,16 +672,6 @@
static bool hvs_stream_allow(u32 cid, u32 port)
{
-/* The host's port range [MIN_HOST_EPHEMERAL_PORT, 0xffffffff) is
- * reserved as ephemeral ports, which are used as the host's ports
- * when the host initiates connections.
- * 
- * Perform this check in the guest so an immediate error is produced
- * instead of a timeout.
- */
-if (port > MAX_HOST_LISTEN_PORT)
- return false;
- if (cid == VMADDR_CID_HOST)
return true;

--- linux-4.15.0.orig/net/vmw_vsock/virtio_transport.c
+++ linux-4.15.0/net/vmw_vsock/virtio_transport.c
@@ -39,6 +39,7 @@
     * must be accessed with tx_lock held.
     */
 struct mutex tx_lock;
+bool tx_run;

 struct work_struct send_pkt_work;
 spinlock_t send_pkt_list_lock;
@@ -54,6 +55,7 @@
     * must be accessed with rx_lock held.
     */
 struct mutex rx_lock;
+bool rx_run;
 int rx_buf_nr;
 int rx_buf_max_nr;

@@ -61,43 +63,28 @@
     * vqs[VSOCK_VQ_EVENT] must be accessed with event_lock held.
     */
 struct mutex event_lock;
+bool event_run;
 struct virtio_vsock_event event_list[8];

 u32 guest_cid;
}

- static struct virtio_vsock *virtio_vsock_get(void)
-{
- return the_virtio_vsock;
-}
-
 static u32 virtio_transport_get_local_cid(void)
 {
- struct virtio_vsock *vsock = virtio_vsock_get();
- guest_cid = vsock->guest_cid;
- }
-
- static void virtio_transport_loopback_work(struct work_struct *work)
-{
- struct virtio_vsock *vsock =
- container_of(work, struct virtio_vsock, loopback_work);
- LIST_HEAD(pkts);
-
- spin_lock_bh(&vsock->loopback_list_lock);
- list_splice_init(&vsock->loopback_list, &pkts);
- spin_unlock_bh(&vsock->loopback_list_lock);
-
- mutex_lock(&vsock->rx_lock);
- while (!list_empty(&pkts)) {
  struct virtio_vsock_pkt *pkt;
-
  pkt = list_first_entry(&pkts, struct virtio_vsock_pkt, list);
  list_del_init(&pkt->list);
+
  struct virtio_vsock *vsock;
  u32 ret;

  virtio_transport_recv_pkt(pkt);
  +rcu_read_lock();
  +vsock = rcu_dereference(the_virtio_vsock);
  +if (!vsock) {
    +ret = VMADDR_CID_ANY;
    +goto out_rcu;
  }
  - mutex_unlock(&vsock->rx_lock);
  +
  +ret = vsock->guest_cid;
  +out_rcu:
  +rcu_read_unlock();
  +return ret;
}

static int virtio_transport_send_pkt_loopback(struct virtio_vsock *vsock,
@@ -125,6 +112,9 @@

 mutex_lock(&vsock->tx_lock);
+
+if (!vsock->tx_run)
+ goto out;
+
 vq = vsock->vqs[VSOCK_VQ_TX];

 for (;;) {
@@ -183,6 +173,7 @@

 if (added)
  virtqueue_kick(vq);
+
+out:
 mutex_unlock(&vsock->tx_lock);

 if (restart_rx)
@@ -195,14 +186,18 @@
struct virtio_vsock *vsock;
int len = pkt->len;

-vsock = virtio_vsock_get();
+rcu_read_lock();
+vsock = rcu_dereference(the_virtio_vsock);
if (!vsock) {
virtio_transport_free_pkt(pkt);
-return -ENODEV;
+len = -ENODEV;
+goto out_rcu;
}

-if (le32_to_cpu(pkt->hdr.dst_cid) == vsock->guest_cid)
-return virtio_transport_send_pkt_loopback(vsock, pkt);
+if (le64_to_cpu(pkt->hdr.dst_cid) == vsock->guest_cid) {
+len = virtio_transport_send_pkt_loopback(vsock, pkt);
+goto out_rcu;
+}

if (pkt->reply)
atomic_inc(&vsock->queued_replies);
@@ -212,6 +207,9 @@
spin_unlock_bh(&vsock->send_pkt_list_lock);

queue_work(virtio_vsock_workqueue, &vsock->send_pkt_work);
+
+out_rcu:
+rcu_read_unlock();
return len;
}

@@ -220,12 +218,14 @@
{
struct virtio_vsock *vsock;
struct virtio_vsock_pkt *pkt, *n;
-+int cnt = 0;
+int cnt = 0, ret;
LIST_HEAD(freeme);

-vsock = virtio_vsock_get();
+rcu_read_lock();
+vsock = rcu_dereference(the_virtio_vsock);
if (!vsock) {
-return -ENODEV;
+ret = -ENODEV;
+goto out_rcu;
}
spin_lock_bh(&vsock->send_pkt_list_lock);
@@ -253,7 +253,11 @@
 queue_work(virtio_vsock_workqueue, &vsock->rx_work);
 }

 -return 0;
 +ret = 0;
 +
 +out_rcu:
 +rcu_read_unlock();
 +return ret;
 }

 static void virtio_vsock_rx_fill(struct virtio_vsock *vsock)
 @@ -305,6 +309,10 @@
 vq = vsock->vqs[VSOCK_VQ_TX];
 mutex_lock(&vsock->tx_lock);
 +
 +if (!vsock->tx_run)
 +goto out;
 +
 do {
 struct virtio_vsock_pkt *pkt;
 unsigned int len;
 @@ -315,6 +323,8 @@
 added = true;
 }
 } while (!virtqueue_enable_cb(vq));
 +
 +out:
 mutex_unlock(&vsock->tx_lock);

 if (added)
 @@ -333,56 +343,6 @@
 return val < virtqueue_get_vring_size(vq);
 }

-static void virtio_transport_rx_work(struct work_struct *work)
-{struct virtio_vsock *vsock =
- container_of(work, struct virtio_vsock, rx_work);
- struct virtqueue *vq;
- -
- vq = vsock->vqs[VSOCK_VQ_RX];
- - mutex_lock(&vsock->rx_lock);
do {
    virtqueue_disable_cb(vq);
    for (;;) {
        struct virtio_vsock_pkt *pkt;
        unsigned int len;
        -
        -if (!virtio_transport_more_replies(vsock)) {
            /* Stop rx until the device processes already
             * pending replies. Leave rx virtqueue
             * callbacks disabled.
             */
            goto out;
        -}
        pkt = virtqueue_get_buf(vq, &len);
        if (!pkt) {
            break;
        -}
        -
        -vsock->rx_buf_nr--;
        -*/ Drop short/long packets */
    if (unlikely(len < sizeof(pkt->hdr) ||
             len > sizeof(pkt->hdr) + pkt->len)) {
        virtio_transport_free_pkt(pkt);
        continue;
    -}
    -
    pkt->len = len - sizeof(pkt->hdr);
    virtio_transport_deliver_tap_pkt(pkt);
    virtio_transport_recv_pkt(pkt);
    -} while (!virtqueue_enable_cb(vq));
    -
    -out:
    -if (vsock->rx_buf_nr < vsock->rx_buf_max_nr / 2)
        virtio_vsock_rx_fill(vsock);
    -mutex_unlock(&vsock->rx_lock);
    -}
    */ event_lock must be held */
static int virtio_vsock_event_fill_one(struct virtio_vsock *vsock,
    struct virtio_vsock_event *event)
    @ @ -413,11 +373,14 @ @

static void virtio_vsock_reset_sock(struct sock *sk)
-lock_sock(sk);
+/* vmci_transport.c doesn't take sk_lock here either. At least we're
+ * under vsoc_table_lock so the sock cannot disappear while we're
+ * executing.
+ */
+ sk->sk_state = TCP_CLOSE;
- sk->sk_err = ECONNRESET;
+ sk->sk_error_report(sk);
- release_sock(sk);
}

static void virtio_vsock_update_guest_cid(struct virtio_vsock *vsock)
@@ -452,6 +415,9 @@

mutex_lock(&vsock->event_lock);

+if (!vsock->event_run)
+ goto out;
+
+do {
+ struct virtio_vsock_event *event;
+ unsigned int len;
+ @@ -466,7 +432,7 @@
+ } while (!virtqueue_enable_cb(vq));
+
 virtqueue_kick(vsock->vqs[VSOCK_VQ_EVENT]);
-
+out:
+ mutex_unlock(&vsock->event_lock);
 }

@@ -543,6 +509,86 @@
 .send_pkt = virtio_transport_send_pkt,
 ];

+static void virtio_transport_loopback_work(struct work_struct *work)
+{ }
+struct virtio_vsock *vsock =
+container_of(work, struct virtio_vsock, loopback_work);
+LIST_HEAD(pkts);
+ spin_lock_bh(&vsock->loopback_list_lock);
+list_splice_init(&vsock->loopback_list, &pkts);
+ spin_unlock_bh(&vsock->loopback_list_lock);
+ mutex_lock(&vsock->rx_lock);
+


```c
+if (!vsock->rx_run)
+goto out;
+
+while (!list_empty(&pkts)) {
+struct virtio_vsock_pkt *pkt;
+
+pkt = list_first_entry(&pkts, struct virtio_vsock_pkt, list);
+list_del_init(&pkt->list);
+
+virtio_transport_recv_pkt(&virtio_transport, pkt);
+}

+out:
+mutex_unlock(&vsock->rx_lock);
+}
+
+static void virtio_transport_rx_work(struct work_struct *work)
+{
+struct virtio_vsock *vsock =
+container_of(work, struct virtio_vsock, rx_work);
+
+struct virtqueue *vq;
+
+vq = vsock->vqs[VSOCK_VQ_RX];
+
+mutex_lock(&vsock->rx_lock);
+
+if (!vsock->rx_run)
+goto out;
+
+do {
+virtqueue_disable_cb(vq);
+for (;;) {
+struct virtio_vsock_pkt *pkt;
+unsigned int len;
+
+if (!virtio_transport_more_replies(vsock)) {
+/* Stop rx until the device processes already
+ * pending replies. Leave rx virtqueue
+ * callbacks disabled.
+ */
+goto out;
+}
+
pkt = virtqueue_get_buf(vq, &len);
+if (!pkt) {
+break;
+}
+
+vsock->rx_buf_nr--;
```
/* Drop short/long packets */
+if (unlikely((len < sizeof(pkt->hdr)) || (len > sizeof(pkt->hdr) + pkt->len))) {
+virtio_transport_free_pkt(pkt);
+continue;
+
+pkt->len = len - sizeof(pkt->hdr);
+virtio_transport_deliver_tap_pkt(pkt);
+virtio_transport_recv_pkt(&virtio_transport, pkt);
+
} while (!virtqueue_enable_cb(vq));
+
+out:
+if (vsock->rx_buf_nr < vsock->rx_buf_max_nr / 2)
+virtio_vsock_rx_fill(vsock);
+mutex_unlock(&vsock->rx_lock);
+
+static int virtio_vsock_probe(struct virtio_device *vdev)
+{
+vq_callback_t *callbacks[] = {
@@ -563,7 +609,8 @@
return ret;

/* Only one virtio-vsock device per guest is supported */
- if (the_virtio_vsock) {
+if (rcu_dereference_protected(the_virtio_vsock,
+lockdep_is_held(&the_virtio_vsock_mutex))) {
ret = -EBUSY;
  goto out;
}
@@ -584,16 +631,10 @@

virtio_vsock_update_guest_cid(vsock);

-ret = vsock_core_init(&virtio_transport.transport);
- if (ret < 0)
-  goto out_vqs;
-
  vsock->rx_buf_nr = 0;
  vsock->rx_buf_max_nr = 0;
  atomic_set(&vsock->queued_replies, 0);

-vdev->priv = vsock;
- the_virtio_vsock = vsock;
 mutex_init(&vsock->tx_lock);
mutex_init(&vsock->rx_lock);
mutex_init(&vsock->event_lock);
INIT_WORK(&vsock->send_pkt_work, virtio_transport_send_pkt_work);
INIT_WORK(&vsock->loopback_work, virtio_transport_loopback_work);

+mutex_lock(&vsock->tx_lock);
+vsock->tx_run = true;
+mutex_unlock(&vsock->tx_lock);
+
mutex_lock(&vsock->rx_lock);
virtio_vsock_rx_fill(vsock);
+vsock->rx_run = true;
mutex_unlock(&vsock->rx_lock);

mutex_lock(&vsock->event_lock);
virtio_vsock_event_fill(vsock);
+vsock->event_run = true;
mutex_unlock(&vsock->event_lock);

+vdev->priv = vsock;
+rcu_assign_pointer(the_virtio_vsock, vsock);
+
mutex_unlock(&the_virtio_vsock_mutex);
return 0;

-out_vqs:
-vsock->vdev->config->del_vqs(vsock->vdev);
out:
kfree(vsock);
mutex_unlock(&the_virtio_vsock_mutex);
@@ -631,12 +679,39 @@
struct virtio_vsock *vsock = vdev->priv;
struct virtio_vsock_pkt *pkt;

+mutex_lock(&the_virtio_vsock_mutex);
+
+vdev->priv = NULL;
+rcu_assign_pointer(the_virtio_vsock, NULL);
+synchronize_rcu();
+
flush_work(&vsock->loopback_work);
flush_work(&vsock->rx_work);
flush_work(&vsock->tx_work);
flush_work(&vsock->event_work);
flush_work(&vsock->send_pkt_work);
+
/* Reset all connected sockets when the device disappear */
+vssock_for_each_connected_socket(virtio_vssock_reset_sock);
+
+/* Stop all work handlers to make sure no one is accessing the device,
+ * so we can safely call vdev->config->reset().
+ */
+mutex_lock(&vssock->rx_lock);
+vssock->rx_run = false;
+mutex_unlock(&vssock->rx_lock);
+
+mutex_lock(&vssock->tx_lock);
+vssock->tx_run = false;
+mutex_unlock(&vssock->tx_lock);
+
+mutex_lock(&vssock->event_lock);
+vssock->event_run = false;
+mutex_unlock(&vssock->event_lock);
+
+/* Flush all device writes and interrupts, device will not use any
+ * more buffers.
+ */
+vdev->config->reset(vdev);
+
+mutex_lock(&vssock->rx_lock);
@@ -667,13 +742,11 @@
spin_unlock_bh(&vssock->loopback_list_lock);
-
-mutex_lock(&the_virtio_vssock_mutex);
-the_virtio_vssock = NULL;
-vsock_core_exit();
-mutex_unlock(&the_virtio_vssock_mutex);
-
+/* Delete virtqueues and flush outstanding callbacks if any */
+vdev->config->del_vqs(vdev);
+
+mutex_unlock(&the_virtio_vssock_mutex);
+
kfree(vsock);
}

@@ -702,15 +775,28 @@

virtio_vssock_workqueue = alloc_workqueue("virtio_vssock", 0, 0);
    if (!virtio_vssock_workqueue)
        return -ENOMEM;
+
+    ret = vsock_core_init(&virtio_transport.transport);
+    if (ret)
+        goto out_wq;
+ ret = register_virtio_driver(&virtio_vsock_driver);
+ if (ret)
++destroy_workqueue(virtio_vsock_workqueue);
++goto out_vci;
++
++return 0;
++
++out_vci:
++virtio_vsock_core_exit();
++out_wq:
++destroy_workqueue(virtio_vsock_workqueue);
return ret;
}

static void __exit virtio_vsock_exit(void)
{
 unregister_virtio_driver(&virtio_vsock_driver);
+virtio_vsock_core_exit();
 destroy_workqueue(virtio_vsock_workqueue);
}

--- linux-4.15.0.orig/net/vmw_vsock/virtio_transport_common.c
+++ linux-4.15.0/net/vmw_vsock/virtio_transport_common.c
@@ -92,8 +92,17 @@
 struct virtio_vsock_pkt *pkt = opaque;
 struct af_vsockmon_hdr *hdr;
 struct sk_buff *skb;
+size_t payload_len;
+void *payload_buf;
-
-skb = alloc_skb(sizeof(*hdr) + sizeof(pkt->hdr) + pkt->len, 
+/* A packet could be split to fit the RX buffer, so we can retrieve 
+ * the payload length from the header and the buffer pointer taking 
+ * care of the offset in the original packet. 
+ */
+payload_len = le32_to_cpu(pkt->hdr.len);
+payload_buf = pkt->buf + pkt->off;
+skb = alloc_skb(sizeof(*hdr) + sizeof(pkt->hdr) + payload_len, 
GFP_ATOMIC);
 if (!skb)
 return NULL;
@@ -133,8 +142,8 @@
 skb_put_data(skb, &pkt->hdr, sizeof(pkt->hdr));
-
-if (pkt->len) {

---
skb_put_data(skb, pkt->buf, pkt->len);
+if (payload_len) {
+ skb_put_data(skb, payload_buf, payload_len);
}

return skb;

static int virtio_transport_reset_no_sock(const struct virtio_transport *t,
					struct virtio_vsock_pkt *pkt)
{
+struct virtio_vsock_pkt *reply;
struct virtio_vsock_pkt_info info = {
 .op = VIRTIO_VSOCK_OP_RST,
 .type = le16_to_cpu(pkt->hdr.type),
@@ -672,15 +683,20 @@
if (le16_to_cpu(pkt->hdr.op) == VIRTIO_VSOCK_OP_RST) return 0;

-pkt = virtio_transport_alloc_pkt(&info, 0,
- le64_to_cpu(pkt->hdr.dst_cid),
- le32_to_cpu(pkt->hdr.dst_port),
- le64_to_cpu(pkt->hdr.src_cid),
- le32_to_cpu(pkt->hdr.src_port));
-if (!pkt)
+reply = virtio_transport_alloc_pkt(&info, 0,
+ le64_to_cpu(pkt->hdr.dst_cid),
+ le32_to_cpu(pkt->hdr.dst_port),
+ le64_to_cpu(pkt->hdr.src_cid),
+ le32_to_cpu(pkt->hdr.src_port));
+if (!reply)
return -ENOMEM;

-virtio_transport_get_ops())->send_pkt(pkt);
+virtio_transport_free_pkt(reply);
+return -ENOTCONN;
+
+return t->send_pkt(reply);
}

static void virtio_transport_wait_close(struct sock *sk, long timeout)
@@ -778,12 +794,19 @@
void virtio_transport_release(struct vsock_sock *vsk)
{
  struct virtio_vsock_sock *vvs = vsk->trans;
  struct virtio_vsock_pkt *pkt, *tmp;
  struct sock *sk = &vsk->sk;
  bool remove_sock = true;

  lock_sock(sk);
  lock_sock_nested(sk, SINGLE_DEPTH_NESTING);
  if (sk->sk_type == SOCK_STREAM)
    remove_sock = virtio_transport_close(vsk);
  else
    list_for_each_entry_safe(pkt, tmp, &vvs->rx_queue, list) {
      list_del(&pkt->list);
      virtio_transport_free_pkt(pkt);
    }
  release_sock(sk);

  if (remove_sock)
    @@ -856,8 +879,12 @@
    if (le32_to_cpu(pkt->hdr.flags) & VIRTIO_VSOCK_SHUTDOWN_SEND)
      vsk->peer_shutdown |= SEND_SHUTDOWN;
    if (vsk->peer_shutdown == SHUTDOWN_MASK &&
        sock_stream_has_data(vsk) <= 0)
      -sk->sk_state = TCP_CLOSING;
      + vsock_stream_has_data(vsk) <= 0 &&
      + sock_flag(sk, SOCK_DONE)) {
        (void)virtio_transport_reset(vsk, NULL);
        +
        virtio_transport_do_close(vsk, true);
      }
    if (le32_to_cpu(pkt->hdr.flags))
      sk->sk_state_change(sk);
    break;
    @@ -965,7 +992,8 @@
    /* We are under the virtio-vsock's vsock->rx_lock or vhost-vsock's vq->mutex
       * lock.
       */
    -void virtio_transport_recv_pkt(struct virtio_vsock_pkt *pkt)
    +void virtio_transport_recv_pkt(struct virtio_transport *t,
        + struct virtio_vsock_pkt *pkt)
    {
      struct sockaddr_vm src, dst;
      struct vsock_sock *vsk;
      @@ -987,7 +1015,7 @@
        le32_to_cpu(pkt->hdr.fwd_cnt));

      if (le16_to_cpu(pkt->hdr.type) != VIRTIO_VSOCK_TYPE_STREAM) {
+{
+struct vmci_transport_packet *pkt;
+int err;
+
+pkt = kmalloc(sizeof(*pkt), GFP_KERNEL);
+if (!pkt)
+return -ENOMEM;
+
+err = __vmci_transport_send_control_pkt(pkt, src, dst, type, size,
+mode, wait, proto, handle,
+true);
+kfree(pkt);
+
+return err;
+
}

+static int
vmci_transport_send_control_pkt(struct sock *sk,
enum vmci_transport_packet_type type,
u64 size,
@@ -272,9 +297,7 @@
u16 proto,
struct vmci_handle handle)
{
-struct vmci_transport_packet *pkt;
 struct vsock_sock *vsk;
-int err;

 vsk = vsock_sk(sk);
@@ -284,17 +307,10 @@
if (!vsock_addr_bound(&vsk->remote_addr))
 return -EINVAL;

-pkt = kmalloc(sizeof(*pkt), GFP_KERNEL);
-if (!pkt)
-return -ENOMEM;
-
-err = __vmci_transport_send_control_pkt(pkt, &vsk->local_addr,
-&vsk->remote_addr, type, size,
-mode, wait, proto, handle,
-true);
-kfree(pkt);
-
-return err;
+vmci_transport_alloc_send_control_pkt(&vsk->local_addr,
+&vsk->remote_addr,
+type, size, mode,
static int vmci_transport_send_reset_bh(struct sockaddr_vm *dst, @ @ -312,12 +328,29 @@)
static int vmci_transport_send_reset(struct sock *sk, @ @
    struct vmci_transport_packet *pkt)
{
    struct sockaddr_vm *dst_ptr;
    struct sockaddr_vm dst;
    struct vsock_sock *vsk;

    if (pkt->type == VMCI_TRANSPORT_PACKET_TYPE_RST)
        return 0;
-        return vmci_transport_send_control_pkt(sk,
-            VMCI_TRANSPORT_PACKET_TYPE_RST,
-            0, 0, NULL, VSOCK_PROTO_INVALID,
-            VMCI_INVALID_HANDLE);
+        vsk = vsock_sk(sk);
+        if (!vsock_addr_bound(&vsk->local_addr))
+            return -EINVAL;
+        if (vsock_addr_bound(&vsk->remote_addr)) {
+            dst_ptr = &vsk->remote_addr;
+        } else {
+            vsock_addr_init(&dst, pkt->dg.src.context,
+                &pkt->dg.src_port);
+            dst_ptr = &dst;
+        }
+        return vmci_transport_alloc_send_control_pkt(&vsk->local_addr, dst_ptr,
+            VMCI_TRANSPORT_PACKET_TYPE_RST,
+            0, 0, NULL, VSOCK_PROTO_INVALID,
+            VMCI_INVALID_HANDLE);
}

static int vmci_transport_send_negotiate(struct sock *sk, size_t size) @ @ -551,8 +584,7 @@
    peer, flags, VMCI_NO_PRIVILEGE_FLAGS);
    out:
    if (err < 0) {
        -pr_err("Could not attach to queue pair with %d\n", -
            err);
+        pr_err_once("Could not attach to queue pair with %d\n", err);
        err = vmci_transport_error_to_vsock_error(err);
    }
vpending->listener = sk;
sock_hold(sk);
sock_hold(pending);

-INIT_DELAYED_WORK(&vpending->dwork, vsock_pending_work);
schedule_delayed_work(&vpending->dwork, HZ);
+schedule_delayed_work(&vpending->pending_work, HZ);

out:
return err;

static void vmci_transport_destruct(struct vsock_sock *vsk)
{
+/* transport can be NULL if we hit a failure at init() time */
+if (!vmci_trans(vsk))
+return;
+
+/* Ensure that the detach callback doesn't use the sk/vsk
* we are about to destruct.
*/
--- linux-4.15.0.orig/net/wireless/Makefile
+++ linux-4.15.0/net/wireless/Makefile
@@ -27,7 +27,7 @@
@$(kecho) "  GEN     $@
@(echo '#include "reg.h"'; 
    echo 'const u8 shipped_regdb_certs[] = {'; 
-    cat $^ ; 
+    echo | cat - $^ ; 
    echo '};'; 
    echo 'unsigned int shipped_regdb_certs_len = sizeof(shipped_regdb_certs);'; 
    echo '}'; 
    echo ') > $@
@@ -38,6 +38,7 @@
@(set -e: \n    allf=""; \n    for f in $^ ; do \n+    test -f $$f || continue;\n        # similar to hexdump -v -e '1/1 "0x%:2x," "\n    thisif=$$(od -An -v -tx1 < $$f | \n        sed -e 's/ /\n    --- linux-4.15.0.orig/net/wireless_ap.c
+++ linux-4.15.0/net/wireless_ap.c
@@ -40,6 +40,8 @@
cfg80211_sched_dfs_chan_update(rdev);
)
+schedule_work(&cfg80211_disconnect_work); +
return err;

--- linux-4.15.0.orig/net/wireless/core.c
+++ linux-4.15.0/net/wireless/core.c
@@ -95,6 +95,9 @@
     int "phy%\d when \%d is not its number */
     sscanf(newname, PHY_NAME "%d\n", &wiphy_idx, &taken);
     if (taken == strlen(newname) && wiphy_idx != rdev->wiphy_idx) {
@@ -495,7 +498,7 @@
         &rdev->rfkill_ops, rdev);
     }

     if (!cfg80211_valid_key_idx(rdev, key_idx, pairwise))
@@ -1308,8 +1311,10 @@
     if (rfkill_blocked(rdev))
         return notifier_from_errno(-ERFKILL);
     break;
--- linux-4.15.0.orig/net/wireless/core.h
+++ linux-4.15.0/net/wireless/core.h
@@ -408,6 +408,8 @@

 /* internal helpers */
 bool cfg80211_supported_cipher_suite(struct wiphy *wiphy, u32 cipher);
+bool cfg80211_valid_key_idx(struct cfg80211_registered_device *rdev,
       int key_idx, bool pairwise);
 int cfg80211_validate_key_settings(struct cfg80211_registered_device *rdev,
       struct key_params *params, int key_idx,
       bool pairwise, const u8 *mac_addr);
@@ -434,6 +436,8 @@
bool cfg80211_does_bw_fit_range(const struct ieee80211_freq_range *freq_range, u32 center_freq_khz, u32 bw_khz);

+extern struct work_struct cfg80211_disconnect_work;
+
/**
 * cfg80211_chandef_dfs_usable - checks if chandef is DFS usable
 * @wiphy: the wiphy to validate against
 ... linux-4.15.0.orig/net/wireless/ethtool.c
+++ linux-4.15.0/net/wireless/ethtool.c
@@ -7,9 +7,13 @@
 void cfg80211_get_drvdata(struct net_device *dev, struct ethtool_drvdata *info)
 {
 struct wireless_dev *pdev = wiphy_dev(wdev->wiphy);
-+strlcpy(info->driver, wiphy_dev(wdev->wiphy)->driver->name, sizeof(info->driver));
+-if (pdev->driver)
+-strlcpy(info->driver, pdev->driver->name, sizeof(info->driver));
+else
+-strlcpy(info->driver, "N/A", sizeof(info->driver));

strlcpy(info->version, init_utsname()->release, sizeof(info->version));

--- linux-4.15.0.orig/net/wireless/nl80211.c
+++ linux-4.15.0/net/wireless/nl80211.c
@@ -16,6 +16,7 @@
#include <linux/nl80211.h>
#include <linux/rtnetlink.h>
#include <linux/netlink.h>
+#include <linux/nospec.h>
#include <linux/etherdevice.h>
#include <net/net_namespace.h>
#include <net/genetlink.h>
@@ -198,6 +199,38 @@
return __cfg80211_rdev_from_attrs(netns, info->attrs);
 }

+static int validate_beacon_head(const struct nlattr *attr, +struct netlink_ext_ack *extack) +{
+const u8 *data = nla_data(attr);
+unsigned int len = nla_len(attr);
+const struct element *elem;
+const struct ieee80211_mgmt *mgmt = (void *)data;
+unsigned int fixedlen = offsetof(struct ieee80211_mgmt,

---
+ u.beacon.variable);
+ 
+ if (len < fixedlen)
+ goto err;
+ 
+ if (ieee80211_hdrlen(mgmt->frame_control) !=
+     offsetof(struct ieee80211_mgmt, u.beacon))
+ goto err;
+ 
+ data += fixedlen;
+ len -= fixedlen;
+ 
+ for_each_element(elem, data, len) {
+ /* nothing */
+ }
+ 
+ if (for_each_element_completed(elem, data, len))
+ return 0;
+ 
+ err:
+ NL_SET_ERR_MSG_ATTR(extack, attr, "malformed beacon head");
+ return -EINVAL;
+ }
+ 
+ /* policy for the attributes */
+ static const struct nla_policy nl80211_policy[NUM_NL80211_ATTR] = {
+ [NL80211_ATTR_WIPHY] = { .type = NLA_U32 },
+ @ @ -250,7 +283,8 @@
+ [NL80211_ATTR_MNTR_FLAGS] = { /* NLA_NESTED can't be empty */ },
+ [NL80211_ATTR_MESH_ID] = { .type = NLA_BINARY,
+   .len = IEEE80211_MAX_MESH_ID_LEN },
+ [NL80211_ATTR_MPATH_NEXT_HOP] = { .type = NLA_U32 },
+ [NL80211_ATTR_REG_ALPHA2] = { .type = NLA_STRING, .len = 2 },
+ [NL80211_ATTR_REG_RULES] = { .type = NLA_NESTED },
+ @ @ -287,6 +321,7 @@
+ [NL80211_ATTR_CONTROL_PORT_ETHETYPE] = { .type = NLA_U16 },
+ [NL80211_ATTR_CONTROL_PORT_NO_ENCRYPT] = { .type = NLA_FLAG },
+ [NL80211_ATTR_PRIVACY] = { .type = NLA_FLAG },
+ [NL80211_ATTR_STATUS_CODE] = { .type = NLA_U16 },
+ [NL80211_ATTR_CIPHER_SUITE_GROUP] = { .type = NLA_U32 },
+ [NL80211_ATTR_WPA_VERSIONS] = { .type = NLA_U32 },
+ [NL80211_ATTR_PID] = { .type = NLA_U32 },
+ @ @ -312,6 +347,8 @@
+ [NL80211_ATTR_KEY_DEFAULT_TYPES] = { .type = NLA_NESTED },
+ [NL80211_ATTR_WOWLAN_TRIGGERS] = { .type = NLA_NESTED },
+ 
+ Open Source Used In 5GaaS Edge AC-4 34901
[NL80211_ATTR_STA_PLINK_STATE] = { .type = NLA_U8 },
+[NL80211_ATTR_MEASUREMENT_DURATION] = { .type = NLA_U16 },
+[NL80211_ATTR_MEASUREMENT_DURATION_MANDATORY] = { .type = NLA_FLAG },
[NL80211_ATTR_SCHED_SCAN_INTERVAL] = { .type = NLA_U32 },
[NL80211_ATTR_REKEY_DATA] = { .type = NLA_NESTED },
[NL80211_ATTR_SCAN_SUPP_RATES] = { .type = NLA_NESTED },
@@ -360,6 +397,8 @@
[NL80211_ATTR_MDID] = { .type = NLA_U16 },
[NL80211_ATTR_IE_RIC] = { .type = NLA_BINARY,
 .len = IEEE80211_MAX_DATA_LEN },
+[NL80211_ATTR_CRIT_PROT_ID] = { .type = NLA_U16 },
+[NL80211_ATTR_MAX_CRIT_PROT_DURATION] = { .type = NLA_U16 },
[NL80211_ATTR_PEER_AID] = { .type = NLA_U16 },
[NL80211_ATTR_CH_SWITCH_COUNT] = { .type = NLA_U32 },
[NL80211_ATTR_CH_SWITCH_BLOCK_TX] = { .type = NLA_FLAG },
@@ -385,6 +424,7 @@
[NL80211_ATTR_USER_PRIO] = { .type = NLA_U8 },
[NL80211_ATTR_ADMITTED_TIME] = { .type = NLA_U16 },
[NL80211_ATTR_SMP_MODE] = { .type = NLA_U8 },
+[NL80211_ATTR_OPER_CLASS] = { .type = NLA_U8 },
[NL80211_ATTR_MAC_MASK] = { .len = ETH_ALEN },
[NL80211_ATTR_WIPHY_SELF_MANAGED_REG] = { .type = NLA_FLAG },
[NL80211_ATTR_NETNS_FD] = { .type = NLA_U32 },
@@ -1744,7 +1784,10 @@
/* case we'll continue with more data in the next round,
 * but break unconditionally so unsplit data stops here.
 * */
-state->split_start++;
+if (state->split)
+state->split_start++;
+else
+state->split_start = 0;
break;

 case 9:
 if (rdev->wiphy.extended_capabilities &&
@@ -2056,20 +2099,22 @@
 static int parse_txq_params(struct nlattr *tb[],
      struct ieee80211_txq_params *txq_params)
 {
+u8 ac;
 +
 if (!tb[NL80211_TXQ_ATTR_AC] || !tb[NL80211_TXQ_ATTR_TXOP] ||
    !tb[NL80211_TXQ_ATTR_CWMIN] || !tb[NL80211_TXQ_ATTR_CWMAX] ||
    !tb[NL80211_TXQ_ATTR_AIFS])
 return -EINVAL;

-txq_params->ac = nla_get_u8(tb[NL80211_TXQ_ATTR_AC]);
+ac = nla_get_u8(tb[NL80211_TXQ_ATTR_AC]);
txq_params->txop = nla_get_u16(tb[NL80211_TXQ_ATTR_TXOP]);
txq_params->cwmin = nla_get_u16(tb[NL80211_TXQ_ATTR_CWMIN]);
txq_params->cwmax = nla_get_u16(tb[NL80211_TXQ_ATTR_CWMAX]);
txq_params->aifs = nla_get_u8(tb[NL80211_TXQ_ATTR_AIFS]);

- if (txq_params->ac >= NL80211_NUM_ACS)
  + if (ac >= NL80211_NUM_ACS)
    return -EINVAL;
  -
  + txq_params->ac = array_index_nospec(ac, NL80211_NUM_ACS);
  return 0;
}

@@ -2108,6 +2153,8 @@
control_freq = nla_get_u32(info->attrs[NL80211_ATTR_WIPHY_FREQ]);

+memset(chandef, 0, sizeof(*chandef));
+
chandef->chan = ieee80211_get_channel(&rdev->wiphy, control_freq);
chandef->width = NL80211_CHAN_WIDTH_20_NOHT;
chandef->center_freq1 = control_freq;
@@ -2586,7 +2633,7 @@
if (rdev->ops->get_channel) {
  int ret;
  - struct cfg80211_chan_def chandef;
  + struct cfg80211_chan_def chandef = {};

  ret = rdev_get_channel(rdev, wdev, &chandef);
  if (ret == 0) {
    @@ -2948,8 +2995,7 @@
      return -EINVAL;
    }

    -if (!rdev->ops->add_virtual_intf ||
    -  !(rdev->wiphy.interface_modes & (1 << type)))
    +if (!rdev->ops->add_virtual_intf)
      return -EOPNOTSUPP;

    if ((type == NL80211_IFTYPE_P2P_DEVICE || type == NL80211_IFTYPE_NAN ||
@@ -2968,6 +3014,9 @@
      return err;
    }

    +if (!cfg80211_iftype_allowed(&rdev->wiphy, type, params.use_4addr, 0))
      +return -EOPNOTSUPP;
    +
err = nl80211_parse_mon_options(rdev, type, info, &params);
if (err < 0)
    return err;
@@ -3116,7 +3165,7 @@
    nla_put_failure;

@if (nla_put_u8(cookie->msg, NL80211_ATTR_KEY_IDX, cookie->idx))
+if (nla_put_u8(cookie->msg, NL80211_KEY_IDX, cookie->idx))
    goto nla_put_failure;

nla_nest_end(cookie->msg, key);
@@ -3350,6 +3399,10 @@
    key.type != NL80211_KEYTYPE_GROUP)
    return -EINVAL;

+if (!cfg80211_valid_key_idx(rdev, key.idx, +key.type == NL80211_KEYTYPEPAIRWISE))
+    return -EINVAL;
+
    if (!rdev->ops->del_key)
        return -EOPNOTSUPP;

@@ -3513,6 +3566,7 @@
    return false;
    /* check availability */
    +ridx = array_index_nospec(ridx, IEEE80211_HT_MCS_MASK_LEN);
    if (sband->ht_cap.mcs.rx_mask[ridx] & rbit)
        mcs[ridx] |= rbit;
    else
@@ -3768,6 +3822,12 @@
        memset(bcn, 0, sizeof(*bcn));

        if (attrs[NL80211_ATTR_Beacon HEAD]) {
            +int ret = validate Beacon_head(attrs[NL80211_ATTR_Beacon HEAD], +NULL);
            +
            +if (ret)
                +return ret;
            +
            bcn->head = nla_data(attrs[NL80211_ATTR_Beacon HEAD]);
            bcn->head_len = nla_len(attrs[NL80211_ATTR_Beacon HEAD]);
            if (!bcn->head_len)
@@ -4219,6 +4279,7 @@
                params->sta_flags_mask = BIT(NL80211_STA_FLAG_AUTHENTICATED) | +BIT(NL80211_STA_FLAG_MFP) | +BIT(NL80211_STA_FLAG_AUTHORIZED);
+break;
default:
return -EINVAL;
}
@@ -5495,6 +5556,9 @@
if (!rdev->ops->del_mpath)
return -EOPNOTSUPP;
+if (dev->ieee80211_ptr->iftype != NL80211_IFTYPE_MESH_POINT)
+return -EOPNOTSUPP;
+return rdev_del_mpath(rdev, dev, dst);
}

@@ -6028,7 +6092,7 @@
*/
/*
 * Check HT operation mode based on
- * IEEE 802.11 2012 8.4.2.59 HT Operation element.
+ * IEEE 802.11-2016 9.4.2.57 HT Operation element.
 */
if (tb[NL80211_MESHCONF_HT_OPMODE]) {
    ht_opmode = nla_get_u16(tb[NL80211_MESHCONF_HT_OPMODE]);
@@ -6038,22 +6102,9 @@
            IEEE80211_HT_OP_MODE_NON_HT_STA_PRSNT))
        return -EINVAL;
-        if ((ht_opmode & IEEE80211_HT_OP_MODE_NON_GF_STA_PRSNT) &&
-            (ht_opmode & IEEE80211_HT_OP_MODE_NON_HT_STA_PRSNT))
-        return -EINVAL;
+        /* NON_HT_STA bit is reserved, but some programs set it */
+        ht_opmode &= ~IEEE80211_HT_OP_MODE_NON_HT_STA_PRSNT;

-        switch (ht_opmode & IEEE80211_HT_OP_MODE_PROTECTION) {
-            case IEEE80211_HT_OP_MODE_PROTECTION_NONE:
-                break;
-            case IEEE80211_HT_OP_MODE_PROTECTION_20MHZ:
-                if (ht_opmode & IEEE80211_HT_OP_MODE_NON_HT_STA_PRSNT)
-                    return -EINVAL;
-                break;
-            case IEEE80211_HT_OP_MODE_PROTECTION_NONMEMBER:
-                break;
-            case IEEE80211_HT_OP_MODE_PROTECTION_NONHT_MIXED:
-                if (!(ht_opmode & IEEE80211_HT_OP_MODE_NON_HT_STA_PRSNT))
-                    return -EINVAL;
-                break;
-        }
    cfg->ht_opmode = ht_opmode;
    mask |= (1 << (NL80211_MESHCONF_HT_OPMODE - 1));
}
struct wireless_dev *wdev = dev->ieee80211_ptr;
s32 last, low, high;
u32 hyst;
-int i, n;
+int i, n, low_index;
int err;

/* RSSI reporting disabled? */
int i, n;
+int i, n, low_index;

-if (last < wdev->cqm_config->rssi_thresholds[i])
break;
+
-low = i > 0 ?
-(wdev->cqm_config->rssi_thresholds[i - 1] - hyst) : S32_MIN;
-high = i < n ?
-(wdev->cqm_config->rssi_thresholds[i] + hyst - 1) : S32_MAX;
+low_index = i - 1;
+if (low_index >= 0) {
+low_index = array_index_nospec(low_index, n);
+low = wdev->cqm_config->rssi_thresholds[low_index] - hyst;
+} else {
+low = S32_MIN;
+
+if (i < n) {
+i = array_index_nospec(i, n);
+high = wdev->cqm_config->rssi_thresholds[i] + hyst - 1;
+} else {
+high = S32_MAX;
+
return rdev_set_cqm_rssi_range_config(rdev, dev, low, high);
}

u8 *mask_pat;

-nla_parse_nested(pat_tb, MAX_NL80211_PKTPAT, pat,
- nl80211_packet_pattern_policy,
- info->extack);
+err = nla_parse_nested(pat_tb, MAX_NL80211_PKTPAT, pat,
+...
nl80211_packet_pattern_policy,
info->extack);
+if (err)
+goto error;
+
err = -EINVAL;
if (!pat_tb[NL80211_PKTPAT_MASK] ||
!pat_tb[NL80211_PKTPAT_PATTERN])
@@ -10856,8 +10921,11 @@
rem) {
    u8 *mask_pat;

- nla_parse_nested(pat_tb, MAX_NL80211_PKTPAT, pat,
- nl80211_packet_pattern_policy, NULL);
+err = nla_parse_nested(pat_tb, MAX_NL80211_PKTPAT, pat,
+ nl80211_packet_pattern_policy, NULL);
+if (err)
+return err;
+
if (!pat_tb[NL80211_PKTPAT_MASK] ||
!pat_tb[NL80211_PKTPAT_PATTERN])
return -EINVAL;
@@ -10970,7 +11038,7 @@
struct net_device *dev = info->user_ptr[1];
struct wireless_dev *wdev = dev->ieee80211_ptr;
struct nlattr *tb[NUM_NL80211_REKEY_DATA];
-struct cfg80211_gtk_rekey_data rekey_data;
+struct cfg80211_gtk_rekey_data rekey_data = {};
int err;

if (!info->attrs[NL80211_ATTR_REKEY_DATA])
@@ -11748,6 +11816,7 @@
return -EOPNOTSUPP;

if (!info->attrs[NL80211_ATTR_MDID] ||
+ !info->attrs[NL80211_ATTR_IE] ||
!is_valid_ie_attr(info->attrs[NL80211_ATTR_IE]))
return -EINVAL;
@@ -11865,13 +11934,13 @@
if (!wdev_running(wdev))
return -ENETDOWN;
}
-
-else {
-wdev = NULL;
if (!vcmd->doit)
    return -EOPNOTSUPP;
+
if (info->attrs[NL80211_ATTR_VENDOR_DATA]) {
    data = nla_data(info->attrs[NL80211_ATTR_VENDOR_DATA]);
    len = nla_len(info->attrs[NL80211_ATTR_VENDOR_DATA]);
    
    .policy = nl80211_policy,
    .flags = GENL_UNS_ADMIN_PERM,
    .internal_flags = NL80211_FLAG_NEED_NETDEV_UP |
        NL80211_FLAG_NEED_RTNL,
    + NL80211_FLAG_NEED_RTNL |
    + NL80211_FLAG_CLEAR_SKB,
},
{
    .cmd = NL80211_CMD_DEAUTHENTICATE,
    
    .policy = nl80211_policy,
    .flags = GENL_UNS_ADMIN_PERM,
    .internal_flags = NL80211_FLAG_NEED_NETDEV_UP |
        NL80211_FLAG_NEED_RTNL,
    + NL80211_FLAG_NEED_RTNL |
    + NL80211_FLAG_CLEAR_SKB,
},
{
    .cmd = NL80211_CMD_UPDATE_CONNECT_PARAMS,
    
    .policy = nl80211_policy,
    .flags = GENL_ADMIN_PERM,
    .internal_flags = NL80211_FLAG_NEED_NETDEV_UP |
        NL80211_FLAG_NEED_RTNL,
    + NL80211_FLAG_NEED_RTNL |
    + NL80211_FLAG_CLEAR_SKB,
},
{
    .cmd = NL80211_CMD_DISCONNECT,
    
    .policy = nl80211_policy,
    .flags = GENL_UNS_ADMIN_PERM,
    .internal_flags = NL80211_FLAG_NEED_NETDEV_UP |
        NL80211_FLAG_NEED_RTNL,
    + NL80211_FLAG_NEED_RTNL |
    + NL80211_FLAG_CLEAR_SKB,
},
{  
    .cmd = NL80211_CMD_DEL_PMKSA,
.policy = nl80211_policy,
.flags = GENL_UNS_ADMIN_PERM,
.internal_flags = NL80211_FLAG_NEED_WIPHY |
- NL80211_FLAG_NEED_RTNL,
+ NL80211_FLAG_NEED_RTNL |
+ NL80211_FLAG_CLEAR_SKB,
},
{
.cmd = NL80211_CMD_SET_QOS_MAP,
.doit = nl80211_set_pmk,
.policy = nl80211_policy,
.internal_flags = NL80211_FLAG_NEED_NETDEV_UP |
- NL80211_FLAG_NEED_RTNL,
+ NL80211_FLAG_NEED_RTNL |
+ NL80211_FLAG_CLEAR_SKB,
},
{
.cmd = NL80211_CMD_DEL_PMK,
.wdev->chandef = *chandef;
wdev->preset_chandef = *chandef;
+
+if (wdev->iftype == NL80211_IFTYPE_STATION &&
+ !WARN_ON(!wdev->current_bss))
+wdev->current_bss->pub.channel = chandef->chan;
+
nl80211_ch_switch_notify(rdev, dev, chandef, GFP_KERNEL,
NL80211_CMD_CH_SWITCH_NOTIFY, 0);
}
--- linux-4.15.0.orig/net/wireless/rdev-ops.h
+++ linux-4.15.0/net/wireless/rdev-ops.h
@@ -537,6 +537,10 @@
rdev_set_wiphy_params(struct cfg80211_registered_device *rdev, u32 changed)
{
int ret;
+
+if (!rdev->ops->set_wiphy_params)
+return -EOPNOTSUPP;
+
trace_rdev_set_wiphy_params(&rdev->wiphy, changed);
ret = rdev->ops->set_wiphy_params(&rdev->wiphy, changed);
trace_rdev_return_int(&rdev->wiphy, ret);
@@ -1139,6 +1143,16 @@
return ret;
}
+static inline void
+rdev_end_cac(struct cfg80211_registered_device *rdev,
+    struct net_device *dev)
+{
+    trace_rdev_end_cac(&rdev->wiphy, dev);
+    if (rdev->ops->end_cac)
+        rdev->ops->end_cac(&rdev->wiphy, dev);
+    trace_rdev_return_void(&rdev->wiphy);
+
+}

static inline int
rdev_set_mcast_rate(struct cfg80211_registered_device *rdev,
    struct net_device *dev,
--- linux-4.15.0.orig/net/wireless/reg.c
+++ linux-4.15.0/net/wireless/reg.c
@@ -1122,7 +1122,7 @@
 * definitions (the "2.4 GHz band", the "5 GHz band" and the "60GHz band"),
 * however it is safe for now to assume that a frequency rule should not be
 * part of a frequency's band if the start freq or end freq are off by more
- * than 2 GHz for the 2.4 and 5 GHz bands, and by more than 10 GHz for the
+ * than 2 GHz for the 2.4 and 5 GHz bands, and by more than 20 GHz for the
 * 60 GHz band.
 * This resolution can be lowered and should be considered as we add
 * regulatory rule support for other "bands".
@@ -1137,7 +1137,7 @@
 */
 u32 limit = freq_khz > 45 * ONE_GHZ_IN_KHZ ?
    -10 * ONE_GHZ_IN_KHZ : 2 * ONE_GHZ_IN_KHZ;
+20 * ONE_GHZ_IN_KHZ : 2 * ONE_GHZ_IN_KHZ;
 if (abs(freq_khz - freq_range->start_freq_khz) <= limit)
     return true;
 if (abs(freq_khz - freq_range->end_freq_khz) <= limit)
@@ -1929,7 +1929,7 @@
 static bool reg_wdev_chan_valid(struct wiphy *wiphy, struct wireless_dev *wdev)
 {
  -struct cfg80211_chan_def chandef;
  +struct cfg80211_chan_def chandef = {}; 
  struct cfg80211_registered_device *rdev = wiphy_to_rdev(wiphy);
  enum nl80211_iftype iftype;

@@ -2080,21 +2080,22 @@

 static void handle_channel_custom(struct wiphy *wiphy,
     struct ieee80211_channel *chan,
-    const struct ieee80211_regdomain *regd)
const struct ieee80211_regdomain *regd,
+ u32 min_bw)
{
    u32 bw_flags = 0;
    const struct ieee80211_reg_rule *reg_rule = NULL;
    const struct ieee80211_power_rule *power_rule = NULL;
    u32 bw;

    for (bw = MHZ_TO_KHZ(20); bw >= MHZ_TO_KHZ(5); bw = bw / 2) {
        for (bw = MHZ_TO_KHZ(20); bw >= min_bw; bw = bw / 2) {
            reg_rule = freq_reg_info_regd(MHZ_TO_KHZ(chan->center_freq),
                                          regd, bw);
            if (!IS_ERR(reg_rule))
                break;
        }

    }
    if (IS_ERR(reg_rule)) {
        if (IS_ERR_OR_NULL(reg_rule)) {
            pr_debug("Disabling freq %d MHz as custom regd has no rule that fits it\n",
                      chan->center_freq);
            if (wiphy->regulatory_flags & REGULATORY_WIPHY_SELF_MANAGED) {
                @ @ -2143,8 +2144,14 @ @
                if (!sband)
                    return;
            }
        }
    }

    /* We currently assume that you always want at least 20 MHz,
     * otherwise channel 12 might get enabled if this rule is
     * compatible to US, which permits 2402 - 2472 MHz.
     */
    for (i = 0; i < sband->n_channels; i++)
        handle_channel_custom(wiphy, &sband->channels[i], regd);
    /* Used by drivers prior to wiphy registration */
    @ @ -2532,11 +2539,12 @ @
{  
    struct wiphy *wiphy = NULL;
    enum reg_request_treatment treatment;
    @ +enum nl80211_reg_initiator initiator = reg_request->initiator;

    if (reg_request->wiphy_idx != WIPHY_IDX_INVALID)
            wiphy = wiphy_idx_to_wiphy(reg_request->wiphy_idx);

    @ -switch (reg_request->initiator) {
    +switch (initiator) {

case NL80211_REGDOM_SET_BY_CORE:
treatment = reg_process_hint_core(reg_request);
break;
@@ -2554,7 +2562,7 @@
treatment = reg_process_hint_country_ie(wiphy, reg_request);
break;
default:
-WARN(1, "invalid initiator %d\n", reg_request->initiator);
+WARN(1, "invalid initiator %d\n", initiator);
goto out_free;
}
@@ -2569,7 +2577,7 @@ *
if (treatment == REG_REQ_ALREADY_SET && wiphy &&
    wiphy->regulatory_flags & REGULATORY_STRICT_REG) {
    -wiphy_update_regulatory(wiphy, reg_request->initiator);
    +wiphy_update_regulatory(wiphy, initiator);
    wiphy_all_share_dfs_chan_state(wiphy);
    reg_check_channels();
} @ @ -2613,7 +2621,7 @@
/* When last_request->processed becomes true this will be rescheduled */
if (lr && !lr->processed) {
    -reg_process_hint(lr);
    +pr_debug("Pending regulatory request, waiting for it to be processed...
\n");
    return;
}
@@ -2746,6 +2754,7 @@
request->alpha2[0] = alpha2[0];
request->alpha2[1] = alpha2[1];
request->initiator = NL80211_REGDOM_SET_BY_CORE;
+request->wiphy_idx = WIPHY_IDX_INVALID;
queue_regulatory_request(request);
@@ -2761,6 +2770,9 @@
if (WARN_ON(!alpha2))
    return -EINVAL;
+if (!is_world_regdom(alpha2) && !is_an_alpha2(alpha2))
+    return -EINVAL;
+    request = kzalloc(sizeof(struct regulatory_request), GFP_KERNEL);
if (!request)
    return -ENOMEM;
@@ -3063,8 +3075,54 @@
schedule_work(&reg_work);
}

+static bool is_wiphy_all_set_reg_flag(enum ieee80211_regulatory_flags flag)
+{
+  struct cfg80211_registered_device *rdev;
+  struct wireless_dev *wdev;
+  
+  list_for_each_entry(rdev, &cfg80211_rdev_list, list) {
+    list_for_each_entry(wdev, &rdev->wiphy.wdev_list, list) {
+      wdev_lock(wdev);
+      if (!(wdev->wiphy->regulatory_flags & flag)) {
+        wdev_unlock(wdev);
+        return false;
+      }
+      wdev_unlock(wdev);
+    }
+  }
+  
+  return true;
+}
+void regulatory_hint_disconnect(void)
+{
+  /* Restore of regulatory settings is not required when wiphy(s)
+   * ignore IE from connected access point but clearance of beacon hints
+   * is required when wiphy(s) supports beacon hints.
+   */
+  if (is_wiphy_all_set_reg_flag(REGULATORY_COUNTRY_IE_IGNORE)) {
+    struct reg_beacon *reg_beacon, *btmp;
+    
+    if (is_wiphy_all_set_reg_flag(REGULATORY_DISABLE_BEACON_HINTS))
+      return;
+    spin_lock_bh(&reg_pending_beacons_lock);
+    list_for_each_entry_safe(reg_beacon, btmp, &reg_pending_beacons, list) {
+      list_del(&reg_beacon->list);
+      kfree(reg_beacon);
+    }
+    spin_unlock_bh(&reg_pending_beacons_lock);
+    
+    list_for_each_entry_safe(reg_beacon, btmp, &reg_beacon_list, list) {
+      list_del(&reg_beacon->list);
+      kfree(reg_beacon);
+    }
+  }
pr_debug("All devices are disconnected, going to restore regulatory settings\n");
restore_regulatory_settings(false);
}
@@ -3150,7 +3208,7 @@
power_rule = &reg_rule->power_rule;

if (reg_rule->flags & NL80211_RRF_AUTO_BW)
    snprintf(bw, sizeof(bw), "%d KHz, %d KHz AUTO",
+snprintf(bw, sizeof(bw), "%d KHz, %u KHz AUTO",
    freq_range->max_bandwidth_khz,
    reg_get_max_bandwidth(rd, reg_rule));
else
@@ -3610,6 +3668,25 @@
    return pre_cac_allowed;
}

static void cfg80211_check_and_end_cac(struct cfg80211_registered_device *rdev)
+{
+struct wireless_dev *wdev;
+/* If we finished CAC or received radar, we should end any
+ * CAC running on the same channels.
+ * the check !cfg80211_chandef_dfs_usable contain 2 options:
+ * either all channels are available - those the CAC_FINISHED
+ * event has effected another wdev state, or there is a channel
+ * in unavailable state in wdev chandef - those the RADAR_DETECTED
+ * event has effected another wdev state.
+ * In both cases we should end the CAC on the wdev.
+ */
+list_for_each_entry(wdev, &rdev->wiphy.wdev_list, list) {
+    if (wdev->cac_started &&
+        !cfg80211_chandef_dfs_usable(&rdev->wiphy, &wdev->chandef))
+        rdev_end_cac(rdev, wdev->netdev);
+}
+}
+}

void regulatory_propagate_dfs_state(struct wiphy *wiphy, enum nl80211_dfs_state dfs_state,
    struct cfg80211_channel *chandef,
    enum nl80211_dfs_state dfs_state,
@@ -3636,8 +3713,10 @@
    cfg80211_set_dfs_state(&rdev->wiphy, chandef, dfs_state);

    if (event == NL80211_RADAR_DETECTED ||
-       event == NL80211_RADAR_CAC_FINISHED)
+       event == NL80211_RADAR_CAC_FINISHED) {
cfg80211_sched_dfs_chan_update(rdev);
+cfg80211_check_and_end_cac(rdev);
+
nl80211_radars_notify(rdev, chandef, event, NULL, GFP_KERNEL);
}
@@ -3647,6 +3726,15 @@
{
    int err;

+/*
+ * It's possible that - due to other bugs/issues - cfg80211
+ * never called regulatory_init() below, or that it failed;
+ * in that case, don't try to do any further work here as
+ * it's doomed to lead to crashes.
+ */
+if (IS_ERR_OR_NULL(reg_pdev))
+    return -EINVAL;
+
err = load_builtin_regdb_keys();
if (err)
    return err;
--- linux-4.15.0.orig/net/wireless/scan.c
+++ linux-4.15.0/net/wireless/scan.c
@@ -484,6 +484,8 @@
    const u8 *match, int match_len,
           int match_offset)
{
+    const struct element *elem;
+
    /* match_offset can't be smaller than 2, unless match_len is
     * zero, in which case match_offset must be zero as well.
     */
@@ -491,14 +493,10 @@
         (!match_len &&& match_offset))
     return NULL;

-while (len >= 2 && len >= ies[1] + 2) {
-    if (ies[0] == eid) &&
-        (ies[1] + 2 >= match_offset + match_len) &&
-        !memcmp(ies + match_offset, match, match_len))
-        return ies;
-
-    for_each_element_id(elem, eid, ies, len) {
-        if (elem->datalen >= match_offset - 2 + match_len &&
-            !memcmp(elem->data + match_offset - 2, match, match_len))
-            return ies;
return (void *)elem;
}

return NULL;
@@ -1028,14 +1026,14 @@
* be grouped with this beacon for updates ...
*/
if (!cfg80211_combine_bsses(rdev, new)) {
-kfree(new);
+bss_ref_put(rdev, new);
goto drop;
}
}

if (rdev->bss_entries >= bss_entries_limit &&
   !cfg80211_bss_expire_oldest(rdev)) {
-kfree(new);
+bss_ref_put(rdev, new);
goto drop;
}

@@ -1055,13 +1053,23 @@
return NULL;
}

+/*
 + * Update RX channel information based on the available frame payload
 + * information. This is mainly for the 2.4 GHz band where frames can be received
 + * from neighboring channels and the Beacon frames use the DSSS Parameter Set
 + * element to indicate the current (transmitting) channel, but this might also
 + * be needed on other bands if RX frequency does not match with the actual
 + * operating channel of a BSS.
 + */
    static struct ieee80211_channel *
    cfg80211_get_bss_channel(struct wiphy *wiphy, const u8 *ie, size_t ielen,
                        struct ieee80211_channel *channel,
    + enum nl80211_bss_scan_width scan_width)
    {
    const u8 *tmp;
    u32 freq;
    int channel_number = -1;
    +struct ieee80211_channel *alt_channel;

    tmp = cfg80211_find_ie(WLAN_EID_DS_PARAMS, ie, ielen);
    if (tmp && tmp[1] == 1) {
 @@ -1075,16 +1083,45 @@

if (channel_number < 0) {
    /* No channel information in frame payload */
    return channel;
}

freq = IEEE80211_channel_to_frequency(channel_number, channel->band);
channel = IEEE80211_get_channel(wiphy, freq);
if (!channel)
    return NULL;
if (channel->flags & IEEE80211_CHAN_DISABLED)
    return NULL;

alt_channel = IEEE80211_get_channel(wiphy, freq);
if (!alt_channel) {
    if (channel->band == NL80211_BAND_2GHZ) {
        /* Better not allow unexpected channels when that could
         * be going beyond the 1-11 range (e.g., discovering
         * BSS on channel 12 when radio is configured for
         * channel 11.
         * */
        return NULL;
    }
    /* No match for the payload channel number - ignore it */
    return channel;
}

/* No match for the payload channel number - ignore it */
return channel;

if (scan_width == NL80211_BSS_CHAN_WIDTH_10 ||
    scan_width == NL80211_BSS_CHAN_WIDTH_5) {
    /* Ignore channel number in 5 and 10 MHz channels where there
     * may not be an n:1 or 1:n mapping between frequencies and
     * channel numbers.
     * */
    return channel;
}

/* Use the channel determined through the payload channel number
 * instead of the RX channel reported by the driver.
 * */
if (alt_channel->flags & IEEE80211_CHAN_DISABLED)
    return NULL;
return alt_channel;
}
/* Returned bss is reference counted and must be cleaned up appropriately. */
@@ -1109,7 +1146,8 @@
    (data->signal < 0 || data->signal > 100))
  return NULL;

-channel = cfg80211_get_bss_channel(wiphy, ie, ielen, data->chan);
+channel = cfg80211_get_bss_channel(wiphy, ie, ielen, data->chan,
+    data->scan_width);
    if (!channel)
      return NULL;

@@ -1207,7 +1245,7 @@
  return NULL;

-channel = cfg80211_get_bss_channel(wiphy, mgmt->u.beacon.variable,
-    ielen, data->chan);
+channel = cfg80211_get_bss_channel(wiphy, mgmt->u.beacon.variable,
+    ielen, data->chan, data->scan_width);
    if (!channel)
      return NULL;

--- linux-4.15.0.orig/net/wireless/sme.c
+++ linux-4.15.0/net/wireless/sme.c
@@ -530,7 +530,7 @@
    cfg80211_sme_free(wdev);
 }

-if (WARN_ON(wdev->conn))
+if (wdev->conn)
    return -EINPROGRESS;

wdev->conn = kzalloc(sizeof(*wdev->conn), GFP_KERNEL);
@@ -642,11 +642,15 @@
 * All devices must be idle as otherwise if you are actively
 * scanning some new beacon hints could be learned and would
 * count as new regulatory hints.
+ * Also if there is any other active beaconing interface we
+ * need not issue a disconnect hint and reset any info such
+ * as chan dfs state, etc.
 */
list_for_each_entry(rdev, &cfg80211_rdev_list, list) {
  list_for_each_entry(wdev, &rdev->wiphy.wdev_list, list) {
    wdev_lock(wdev);
    -if (wdev->conn || wdev->current_bss)
    +if (wdev->conn || wdev->current_bss ||
      +  cfg80211_beaconing_iface_active(wdev))
      is_all_idle = false;
    wdev_unlock(wdev);
/**
 * @ -1032,6 +1036,8 @@
 * wdev->current_bss = NULL;
 * wdev->ssid_len = 0;
 * wdev->conn_owner_nlportid = 0;
 * +kzfree(wdev->connect_keys);
 * +wdev->connect_keys = NULL;
 *
 * nl80211_send_disconnected(rdev, dev, reason, ie, ie_len, from_ap);
 *
 * --- linux-4.15.0.orig/net/wireless/trace.h
 * +++ linux-4.15.0/net/wireless/trace.h
 * @@ -607,6 +607,11 @@
 * TP_ARGS(wiphy, netdev)
 * );
 *
 * +DEFINE_EVENT(wiphy_netdev_evt, rdev_end_cac,
 * + TP_PROTO(struct wiphy *wiphy, struct net_device *netdev),
 * + TP_ARGS(wiphy, netdev)
 * +);
 * +
 * DECLARE_EVENT_CLASS(station_add_change,
 * TP_PROTO(struct wiphy *wiphy, struct net_device *netdev, u8 *mac,
 * struct station_parameters *params),
 * --- linux-4.15.0.orig/net/wireless/util.c
 * +++ linux-4.15.0/net/wireless/util.c
 * @@ -4,6 +4,7 @@
 * *
 * * Copyright 2007-2009 Johannes Berg <johannes@sipsolutions.net>
 * * Copyright 2013-2014 Intel Mobile Communications GmbH
 * + * Copyright (C) 2018-2019 Intel Corporation
 */

#include <linux/export.h>
#include <linux/bitops.h>
@@ -15,6 +16,7 @@
 #include <linux/if_vlan.h>
 #include <linux/mls.h>
 #include <linux/gcd.h>
+#include <linux/nospec.h>

#include "core.h"
#include "rdev-ops.h"

return false;
}

static bool
cfg80211_igtk_cipher_supported(struct cfg80211_registered_device *rdev)
{
    struct wiphy *wiphy = &rdev->wiphy;
    int i;
    
    for (i = 0; i < wiphy->n_cipher_suites; i++) {
        switch (wiphy->cipher_suites[i]) {
        case WLAN_CIPHER_SUITE_AES_CMAC:
        case WLAN_CIPHER_SUITE_BIP_CMAC_256:
        case WLAN_CIPHER_SUITE_BIP_GMAC_128:
        case WLAN_CIPHER_SUITE_BIP_GMAC_256:
            return true;
        }
    }
    
    return false;
}

bool cfg80211_valid_key_idx(struct cfg80211_registered_device *rdev, int key_idx, bool pairwise)
{
    int max_key_idx;
    
    if (pairwise)
        max_key_idx = 3;
    else if (cfg80211_igtk_cipher_supported(rdev))
        max_key_idx = 5;
    else
        max_key_idx = 3;
    
    if (key_idx < 0 || key_idx > max_key_idx)
        return false;
    
    return true;
}

int cfg80211_validate_key_settings(struct cfg80211_registered_device *rdev,
    struct key_params *params, int key_idx,
    bool pairwise, const u8 *mac_addr)
{
if (key_idx < 0 || key_idx > 5)
+if (!cfg80211_valid_key_idx(rdev, key_idx, pairwise))
return -EINVAL;

if (!pairwise && mac_addr && !(rdev->wiphy.flags & WIPHY_FLAG_IBSS_RSN))
@@ -420,7 +459,8 @@
EXPORT_SYMBOL(ieee80211_get_mesh_hdrlen);

int ieee80211_data_to_8023_exthdr(struct sk_buff *skb, struct ethhdr *ehdr,
- const u8 *addr, enum nl80211_iftype iftype)
+ const u8 *addr, enum nl80211_iftype iftype,
+ bool is_amsdu)
{
 struct ieee80211_hdr *hdr = (struct ieee80211_hdr *) skb->data;
 struct {
@@ -508,7 +548,7 @@
 skb_copy_bits(skb, hdrlen, &payload, sizeof(payload));
 tmp.h_proto = payload.proto;

-if (likely((ether_addr_equal(payload.hdr, rfc1042_header) &&
+if (likely((!is_amsdu && ether_addr_equal(payload.hdr, rfc1042_header) &&
   tmp.h_proto != htons(ETH_P_AARP) &&
   tmp.h_proto != htons(ETH_P_IPX)) ||
   ether_addr_equal(payload.hdr, bridge_tunnel_header)))
@@ -535,7 +575,7 @@
 struct skb_shared_info *sh = skb_shinfo(skb);
 int page_offset;

 -page_ref_inc(page);
+get_page(page);
 page_offset = ptr - page_address(page);
 skb_add_rx_frag(skb, sh->nr_frags, page, page_offset, len, size);
 }
@@ -650,6 +690,9 @@
 remaining = skb->len - offset;
 if (subframe_len > remaining)
 goto purge;
+/* mitigate A-MSDU aggregation injection attacks */
+if (ether_addr_equal(eth.h_dest, rfc1042_header))
+goto purge;

 offset += sizeof(struct ethhdr);
 last = remaining <= subframe_len + padding;
@@ -710,20 +753,25 @@
 }
 unsigned int dscp;
 unsigned char vlan_priority;
+unsigned int ret;

/* skb->priority values from 256->263 are magic values to
 * directly indicate a specific 802.1d priority. This is used
 * to allow 802.1d priority to be passed directly in from VLAN
 * tags, etc.
 */

-if (skb->priority >= 256 && skb->priority <= 263)
	return skb->priority - 256;
+if (skb->priority >= 256 && skb->priority <= 263) {
		ret = skb->priority - 256;
	
goto out;
+
} else {

if (skb_vlan_tag_present(skb)) {
 vlan_priority = (skb_vlan_tag_get(skb) & VLAN_PRIO_MASK)
>> VLAN_PRIO_SHIFT;
-if (vlan_priority > 0)
	-return vlan_priority;
+if (vlan_priority > 0) {
		ret = vlan_priority;
	
goto out;
+
} else {

switch (skb->protocol) {

@@ -742,8 +790,9 @@
 if (!mpls)
 return 0;

-return (ntohl(mpls->entry) & MPLS_LS_TC_MASK)
 +ret = (ntohl(mpls->entry) & MPLS_LS_TC_MASK)
 >> MPLS_LS_TC_SHIFT;
 +goto out;
+
} else {

unsigned int i, tmp_dscp = dscp >> 2;

for (i = 0; i < qos_map->num_des; i++) {
-if (tmp_dscp == qos_map->dscp_exception[i].dscp)
 -return qos_map->dscp_exception[i].up;
+if (tmp_dscp == qos_map->dscp_exception[i].dscp) {
 +ret = qos_map->dscp_exception[i].up;
 +goto out;
+
} else {

/* 802.21 is always network control traffic */
 @@ -756,18 +805,24 @@
 unsigned int i, tmp_dscp = dscp >> 2;

for (i = 0; i < qos_map->num_des; i++) {
-if (tmp_dscp == qos_map->dscp_exception[i].dscp)
 -return qos_map->dscp_exception[i].up;
+if (tmp_dscp == qos_map->dscp_exception[i].dscp) {
 +ret = qos_map->dscp_exception[i].up;
 +goto out;
+
} else {

/* 802.21 is always network control traffic */
 @@ -756,18 +805,24 @@
 unsigned int i, tmp_dscp = dscp >> 2;
for (i = 0; i < 8; i++) {
    if (tmp_dscp >= qos_map->up[i].low &&
        tmp_dscp <= qos_map->up[i].high) {
        ret = i;
        goto out;
    } else {
        tmp_dscp <= qos_map->up[i].high) {
        ret = i;
        goto out;
    }
}

return dscp >> 5;
+ret = dscp >> 5;
+out:
+return array_index_nospec(ret, IEEE80211_NUM_TIDS);
}
EXPORT_SYMBOL(cfg80211_classify8021d);

@@ -923,11 +978,15 @@
case NL80211_IFTYPE_MESH_POINT:
    /* mesh should be handled? */
    break;
+case NL80211_IFTYPE_OCB:
+    cfg80211_leave_ocb(rdev, dev);
+    break;
    default:
    break;
}

cfg80211_process_rdev_events(rdev);
+cfg80211_mlme_purgeRegistrations(dev->ieee80211_ptr);
}

err = rdev_change_virtual_intf(rdev, dev, ntype, params);
@@ -1335,6 +1394,8 @@
    ies[pos + ext],
    ext == 2))
    pos = skip_ie(ies, ielen, pos);
+else
+    break;
} else {
    pos = skip_ie(ies, ielen, pos);
@@ -1373,7 +1434,7 @@
    u8 *op_class)
    {
        u8 vht_opclass;
-        u16 freq = chandef->center_freq1;
+u32 freq = chandef->center_freq1;

if (freq >= 2412 && freq <= 2472) {
    if (chandef->width > NL80211_CHAN_WIDTH_40)
        @ -1585.7 +1646.7 @@
    for (iftype = 0; iftype < NUM_NL80211_IFTYPES; iftype++) {
        num_interfaces += params->iftype_num[iftype];
        if (params->iftype_num[iftype] > 0 &&
            (!(wiphy->software_iftypes & BIT(iftype)))
            + !cfg80211_iftype_allowed(wiphy, iftype, 0, 1))
            used_iftypes |= BIT(iftype);
    }

    @ -1607.7 +1668.7 @@
    return -ENOMEM;
}

for (iftype = 0; iftype < NUM_NL80211_IFTYPES; iftype++) {
    -if (wiphy->software_iftypes & BIT(iftype))
    +if (cfg80211_iftype_allowed(wiphy, iftype, 0, 1))
        continue;
    for (j = 0; j < c->n_limits; j++) {
        all_iftypes |= limits[j].types;
        @ -1796.3 +1857.71 @@
        const unsigned char bridge_tunnel_header[] __aligned(2) =
            { 0xaa, 0xaa, 0x03, 0x00, 0x00, 0xf8 };
        EXPORT_SYMBOL(bridge_tunnel_header);
        + /* Layer 2 Update frame (802.2 Type 1 LLC XID Update response) */
        +struct iapp_layer2_update {
        +u8 da[ETH_ALEN];/* broadcast */
        +u8 sa[ETH_ALEN];/* STA addr */
        +__be16 len;/* 6 */
        +u8 dsap;/* 0 */
        +u8 ssap;/* 0 */
        +u8 control;
        +u8 xid_info[3];
        +} __packed;
        +
        +void cfg80211_send_layer2_update(struct net_device *dev, const u8 *addr)
        +{
        +struct iapp_layer2_update *msg;
        +struct sk_buff *skb;
        +
        + /* Send Level 2 Update Frame to update forwarding tables in layer 2
        + * bridge devices */
        +
        +skb = dev_alloc_skb(sizeof(*msg));
        +if (!skb)
+return;
+msg = skb_put(skb, sizeof(*msg));
+
+/* 802.2 Type 1 Logical Link Control (LLC) Exchange Identifier (XID)
+ * Update response frame; IEEE Std 802.2-1998, 5.4.1.2.1 */
+
+eth_broadcast_addr(msg->da);
+ether_addr_copy(msg->sa, addr);
+msg->len = htons(6);
+msg->dsap = 0;
+msg->ssap = 0x01;/* NULL LSAP, CR Bit: Response */
+msg->control = 0xaf;/* XID response lsb.1111F101.
+ * F=0 (no poll command; unsolicited frame) */
+msg->xid_info[0] = 0x81;/* XID format identifier */
+msg->xid_info[1] = 1;/* LLC types/classes: Type 1 LLC */
+msg->xid_info[2] = 0;/* XID sender's receive window size (RW) */
+
+skb->dev = dev;
+skb->protocol = eth_type_trans(skb, dev);
+memset(skb->cb, 0, sizeof(skb->cb));
+netif_rx(skb);
+
+} /* EXPORT_SYMBOL(cfg80211_send_layer2_update); */
+
+bool cfg80211_iftype_allowed(struct wiphy *wiphy, enum nl80211_iftype iftype, u8 check_swif, u8 check_swif)
+
+{
+bool is_vlan = iftype == NL80211_IFTYPE_AP_VLAN;
+
+switch (check_swif) {
+case 0:
+if (is_vlan && is_4addr)
+return wiphy->flags & WIPHY_FLAG_4ADDR_AP;
+return wiphy->interface_modes & BIT(iftype);
+case 1:
+if (!wiphy->software_iftypes & BIT(iftype)) && is_vlan)
+return wiphy->flags & WIPHY_FLAG_4ADDR_AP;
+return wiphy->software_iftypes & BIT(iftype);
+default:
+break;
+}
+
+return false;
+} /* EXPORT_SYMBOL(cfg80211_iftype_allowed); */
--- linux-4.15.0.orig/net/wireless/wext-compat.c
+++ linux-4.15.0/net/wireless/wext-compat.c
struct wireless_dev *wdev = dev->ieee80211_ptr;
struct cfg80211_registered_device *rdev = wiphy_to_rdev(wdev->wiphy);
struct cfg80211_chan_def chandef = {};
int ret;

switch (wdev->iftype) {
    --- linux-4.15.0.orig/net/wireless/wext-core.c
    +++ linux-4.15.0/net/wireless/wext-core.c
    @@ -659,7 +659,8 @@
    return NULL;
}

static int iw_handler_get_iwstats(struct net_device *dev,
    /* noinline to avoid a bogus warning with -O3 */
    static noinline int iw_handler_get_iwstats(struct net_device *dev,
        struct iw_request_info *info,
        union iwreq_data *wrqu,
        char *extra)
    @@ -897,8 +898,9 @@
    int call_commit_handler(struct net_device *dev)
    {
        #ifdef CONFIG_WIRELESS_EXT
        -if ((netif_running(dev)) &&
        -  (dev->wireless_handlers->standard[0] != NULL))
        +if (netif_running(dev) &&
        +   dev->wireless_handlers &&
        +   dev->wireless_handlers->standard[0])
        /* Call the commit handler on the driver */
        return dev->wireless_handlers->standard[0](dev, NULL,
            NULL, NULL);
    
    --- linux-4.15.0.orig/net/wireless/wext-sme.c
    +++ linux-4.15.0/net/wireless/wext-sme.c
    @@ -202,6 +202,7 @@
    struct iw_point *data, char *ssid)
    {
        struct wireless_dev *wdev = dev->ieee80211_ptr;
        int ret = 0;

        /* call only for station! */
        if (WARN_ON(wdev->iftype != NL80211_IFTYPE_STATION))
        @@ -219,7 +220,10 @@
            if (ie) {
                data->flags = 1;
                data->length = ie[1];
                memcpy(ssid, ie + 2, data->length);
            
            ...
+if (data->length > IW_ESSID_MAX_SIZE)
+    ret = -EINVAL;
+else
+    memcpy(ssid, ie + 2, data->length);
+
+rcu_read_unlock();
} else if (wdev->wext.connect.ssid && wdev->wext.connect.ssid_len) {
    wdev_unlock(wdev);

    return 0;
} 

int cfg80211_mgd_wext_siwap(struct net_device *dev, 
--- linux-4.15.0.orig/net/wireless/wext-spy.c
+++ linux-4.15.0/net/wireless/wext-spy.c
@@ -120,8 +120,8 @@
     return -EOPNOTSUPP;
 /* Just do it */
 -memcpy(&(spydata->spy_thr_low), &(threshold->low),
-       2 * sizeof(struct iw_quality));
+spydata->spy_thr_low = threshold->low;
+spydata->spy_thr_high = threshold->high;

 /* Clear flag */
 memset(spydata->spy_thr_under, '0', sizeof(spydata->spy_thr_under));
@@ -147,8 +147,8 @@
     return -EOPNOTSUPP;
 /* Just do it */
 -memcpy(&(threshold->low), &(spydata->spy_thr_low),
-       2 * sizeof(struct iw_quality));
+threshold->low = spydata->spy_thr_low;
+threshold->high = spydata->spy_thr_high;

     return 0;
 }
@@ -173,10 +173,10 @@
     memset(threshold.addr.sa_data, address, ETH_ALEN);
     threshold.addr.sa_family = ARPHRD_ETHER;
 /* Copy stats */
-    memcpy((threshold.qual), wstats, sizeof(struct iw_quality));
+    threshold.qual = *wstats;
 /* Copy also thresholds */
 -    memcpy((threshold.low), &(spydata->spy_thr_low),
-           sizeof(struct iw_quality));
+    threshold.low = spydata->spy_thr_low;
2 * sizeof(struct iw_quality));
+threshold.low = spydata->spy_thr_low;
+threshold.high = spydata->spy_thr_high;

/* Send event to user space */
wireless_send_event(dev, SIOCGIWTHRSPY, &wrqu, (char *) &threshold);
--- linux-4.15.0.orig/net/x25/af_x25.c
+++ linux-4.15.0/net/x25/af_x25.c
@@ -100,7 +100,7 @@
}

len = skb->data;
-needed = 1 + (len >> 4) + (len & 0x0f);
+needed = 1 + ((len >> 4) + (len & 0x0f) + 1) / 2;

if (!pskb_may_pull(skb, needed)) {
/* packet is too short to hold the addresses it claims
 @ @ -288,7 +288,7 @@
 sk_for_each(s, &x25_list)
 if (!strcmp(addr->x25_addr,
 x25_sk(s)->source_addr.x25_addr) ||
-!strcmp(addr->x25_addr,
+!strcmp(x25_sk(s)->source_addr.x25_addr,
 null_x25_address.x25_addr) &&
 s->sk_state == TCP_LISTEN) {
 /*
 @@ -352,17 +352,15 @@
 unsigned int lci = 1;
 struct sock *sk;

-read_lock_bh(&x25_list_lock);
-
 -while ((sk = __x25_find_socket(lci, nb)) != NULL) {
 +while ((sk = x25_find_socket(lci, nb)) != NULL) {
 sock_put(sk);
 if (++lci == 4096) {
 lci = 0;
 break;
 }
 +cond_resched();
 }

-read_unlock_bh(&x25_list_lock);
 return lci;
 }

@@ -553,7 +551,7 @@
 if (protocol)
goto out;

-rc = -ENOBUFFS;
+rc = -ENOMEM;
if ((sk = x25_alloc_socket(net, kern)) == NULL)
goto out;

@@ -681,25 +679,33 @@
struct sockaddr_x25 *addr = (struct sockaddr_x25 *)uaddr;
int len, i, rc = 0;

-if (!sock_flag(sk, SOCK_ZAPPED) ||
-    addr_len != sizeof(struct sockaddr_x25) ||
-    addr->sx25_family != AF_X25) {
+if (addr_len != sizeof(struct sockaddr_x25) ||
+    addr->sx25_family != AF_X25 ||
+    strnlen(addr->sx25_addr.x25_addr, X25_ADDR_LEN) == X25_ADDR_LEN) {
  rc = -EINVAL;
  goto out;
}

-len = strlen(addr->sx25_addr.x25_addr);
-for (i = 0; i < len; i++) {
-  if (!isdigit(addr->sx25_addr.x25_addr[i])) {
-    rc = -EINVAL;
-    goto out;
+/* check for the null_x25_address */
+  if (strcmp(addr->sx25_addr.x25_addr, null_x25_address.x25_addr)) {
+    len = strlen(addr->sx25_addr.x25_addr);
+    for (i = 0; i < len; i++) {
+      if (!isdigit(addr->sx25_addr.x25_addr[i])) {
+        rc = -EINVAL;
+        goto out;
+      }
+    }

lock_sock(sk);
-x25_sk(sk)->source_addr = addr->sx25_addr;
-x25_insert_socket(sk);
-sock_reset_flag(sk, SOCK_ZAPPED);
+if (sock_flag(sk, SOCK_ZAPPED)) {
+x25_sk(sk)->source_addr = addr->sx25_addr;
+x25_insert_socket(sk);
+sock_reset_flag(sk, SOCK_ZAPPED);
+} else {
+  rc = -EINVAL;
}
release_sock(sk);
SOCK_DEBUG(sk, "x25_bind: socket is bound\n");
out:
@@ -760,12 +766,17 @@
if (sk->sk_state == TCP_ESTABLISHED)
goto out;
+rc = -EALREADY; /* Do nothing if call is already in progress */
+if (sk->sk_state == TCP_SYN_SENT)
+goto out;
+sk->sk_state = TCP_CLOSE;
sock->state = SS_UNCONNECTED;

rc = -EINVAL;
if (addr_len != sizeof(struct sockaddr_x25) ||
- addr->sx25_family != AF_X25)
+ addr->sx25_family != AF_X25 ||
+ strnlen(addr->sx25_addr.x25_addr, X25_ADDR_LEN) == X25_ADDR_LEN)
goto out;

rc = -ENETUNREACH;
@@ -806,7 +817,7 @@
/* Now the loop */
rc = -EINPROGRESS;
if (sk->sk_state != TCP_ESTABLISHED && (flags & O_NONBLOCK))
  goto out_put_neigh;
+goto out;

rc = x25_wait_for_connection_establishment(sk);
if (rc)
@@ -815,8 +826,13 @@
sock->state = SS_CONNECTED;
rc = 0;
out_put_neigh:
- if (rc)
+ if (rc && x25->neighbour) {
+read_lock_bh(&x25_list_lock);
x25_neigh_put(x25->neighbour);
+x25->neighbour = NULL;
+read_unlock_bh(&x25_list_lock);
+x25->state = X25_STATE_0;
+}
out_put_route:
x25_route_put(rt);
out:
@@ -1035,6 +1051,7 @@
makex25->lci = lci;
makex25->dest_addr = dest_addr;
makex25->source_addr = source_addr;
+x25_neigh_hold(nb);
makex25->neighbour = nb;
makex25->facilities = facilities;
makex25->dte_facilities = dte_facilities;
--- linux-4.15.0.orig/net/x25/x25_dev.c
+++ linux-4.15.0/net/x25/x25_dev.c
@@ -120,8 +120,10 @@
goto drop;

-if (!pskb_may_pull(skb, 1))
+if (!pskb_may_pull(skb, 1)) {
+x25_neigh_put(nb);
+return 0;
+
} 
switch (skb->data[0]) {

--- linux-4.15.0.orig/net/x25/x25_subr.c
+++ linux-4.15.0/net/x25/x25_subr.c
@@ -363,6 +363,12 @@
 sk->sk_state_change(sk);
 sock_set_flag(sk, SOCK_DEAD);
 }
+if (x25->neighbour) {
+read_lock_bh(&x25_list_lock);
+x25_neigh_put(x25->neighbour);
+x25->neighbour = NULL;
+read_unlock_bh(&x25_list_lock);
+}

/*
--- linux-4.15.0.orig/net/xfrm/Kconfig
+++ linux-4.15.0/net/xfrm/Kconfig
@@ -14,6 +14,8 @@
 tristate
 select XFRM
 select CRYPTO
+select CRYPTO_HASH
+select CRYPTO_BLKCIIPHER

 config XFRM_USER
 tristate "Transformation user configuration interface"
--- linux-4.15.0.orig/net/xfrm/xfrm_device.c
+++ linux-4.15.0/net/xfrm/xfrm_device.c
@@ -154,12 +154,6 @@
  return NOTIFY_DONE;
 }

-static int xfrm_dev_unregister(struct net_device *dev)
-{
-  xfrm_policy_cache_flush();
-  return NOTIFY_DONE;
-}
-
-static int xfrm_dev_feat_change(struct net_device *dev)
{
  if ((dev->features & NETIF_F_HW_ESP) && !dev->xfrmdev_ops)
@@ -179,7 +173,6 @@
    xfrm_policy_cache_flush();
  return NOTIFY_DONE;
 }

@@ -191,13 +184,11 @@
case NETDEV_REGISTER:
  return xfrm_dev_register(dev);

-case NETDEV_UNREGISTER:
-  return xfrm_dev_unregister(dev);
-}
-
  case NETDEV_FEAT_CHANGE:
  return xfrm_dev_feat_change(dev);
-
  case NETDEV_DOWN:
+case NETDEV_UNREGISTER:
  return xfrm_dev_down(dev);

 return NOTIFY_DONE;
--- linux-4.15.0.orig/net/xfrm/xfrm_input.c
+++ linux-4.15.0/net/xfrm/xfrm_input.c
@@ -26,6 +26,12 @@
  }

 struct xfrm_trans_cb {
  +union {
    +struct inet_skb_parm h4;
  +#if IS_ENABLED(CONFIG_IPV6)
    +struct inet6_skb_parm h6;
  +#endif
    +struct inet_skb_parm h4;
    +struct inet6_skb_parm h6;
  +#endif
  ];


+} header;
int (*finish)(struct *net, struct *sk, struct *sk_buff *skb);
};

@@ -124,7 +130,7 @@
sp->len = 0;
sp->olen = 0;

-memset(sp->ovec, 0, sizeof(sp->ovec[XFRM_MAX_OFFLOAD_DEPTH]));
+memset(sp->ovec, 0, sizeof(sp->ovec));

if (src) {
int i;
@@ -239,6 +245,9 @@
else
XFRM_INC_STATS(net,
       LINUX_MIB_XFRMINSTATEINVALID);
+
+if (encap_type == -1)
+dev_put(skb->dev);
+goto drop;
}

@@ -335,6 +344,12 @@
skb->sp->xvec(skb->sp->len++) = x;

+skb_dst_force(skb);
+if (!skb_dst(skb)) {
+XFRM_INC_STATS(net, LINUX_MIB_XFRMINERROR);
+goto drop;
+}
+
lock:
spin_lock(&x->lock);

@@ -374,7 +389,6 @@
XFRM_SKB_CB(skb)->seq.input.low = seq;
XFRM_SKB_CB(skb)->seq.input.hi = seq_hi;

-skb_dst_force(skb);
dev_hold(skb->dev);

if (crypto_done)
@@ -388,7 +402,7 @@
dev_put(skb->dev);

spin_lock(&x->lock);
if (nexthdr <= 0) {
  if (nexthdr < 0) {
    if (nexthdr == -EBADMSG) {
      xfrm_audit_state_icvfail(x, skb,
        x->type->proto);
      @ @ -401,7 +415,7 @@
      /* only the first xfrm gets the encap type */
      encap_type = 0;
    }
    -if (async && x->repl->recheck(x, skb, seq)) {
+    if (x->repl->recheck(x, skb, seq)) {
       XFRM_INC_STATS(net, LINUX_MIB_XFRMINSTATESEQERROR);
      goto drop_unlock;
    }
  }
  @ @ -447,6 +461,7 @@
  XFRM_INC_STATS(net, LINUX_MIB_XFRMINHDRERROR);
  goto drop;
}
+  crypto_done = false;
} while (!err);

err = xfrm_rcv_cb(skb, family, x->type->proto, 0);
--- linux-4.15.0.orig/net/xfrm/xfrm_ipcomp.c
+++ linux-4.15.0/net/xfrm/xfrm_ipcomp.c
@@ -283,7 +283,7 @@
    struct crypto_comp *tfm;

    /* This can be any valid CPU ID so we don't need locking. */
    -tfm = __this_cpu_read(*pos->tfms);
+    tfm = this_cpu_read(*pos->tfms);

    if (!strcmp(crypto_comp_name(tfm), alg_name)) {
      pos->users++;
    }
    --- linux-4.15.0.orig/net/xfrm/xfrm_output.c
+++ linux-4.15.0/net/xfrm/xfrm_output.c
@@ -101,6 +101,11 @@
    skb_dst_force(skb);
    if (!skb_dst(skb)) {
+      XFRM_INC_STATS(net, LINUX_MIB_XFRMOUTERROR);
+      err = -EHOSTUNREACH;
+      goto error_nolock;
+    }
    if (xfrm_offload(skb)) {
      x->type_offload->encap(x, skb);
      @@ -231,18 +236,20 @@
if (skb_is_gso(skb)) {
  skb_shinfo(skb)->gso_type |= SKB_GSO_ESP;
  if (skb->inner_protocol)
    return xfrm_output_gso(net, sk, skb);
  return xfrm_output2(net, sk, skb);
  skb_shinfo(skb)->gso_type |= SKB_GSO_ESP;
  goto out;
}

if (x->xso.dev && x->xso.dev->features & NETIF_F_HW_ESP_TX_CSUM)
  goto out;
+} else {
  if (skb_is_gso(skb))
    return xfrm_output_gso(net, sk, skb);
}

  -if (skb_is_gso(skb))
  -return xfrm_output_gso(net, sk, skb);
  -
  if (skb->ip_summed == CHECKSUM_PARTIAL) {
    err = skb_checksum_help(skb);
    if (err) {
      @ @ -279,14 +286,16 @@
    }

    if (skb->protocol == htons(ETH_P_IP))
      proto = AF_INET;
  -else if (skb->protocol == htons(ETH_P_IPV6))
  +else if (skb->protocol == htons(ETH_P_IPV6) &&
    skb->sk->sk_family == AF_INET6)
      proto = AF_INET6;
  else
    return;

  afinfo = xfrm_state_get_afinfo(proto);
  -if (afinfo)
  +if (afinfo) {
    afinfo->local_error(skb, mtu);
    -rcu_read_unlock();
    +rcu_read_unlock();
    +}
  }
EXPORT_SYMBOL_GPL(xfrm_local_error);
--- linux-4.15.0.orig/net/xfrm/xfrm_policy.c
+++ linux-4.15.0/net/xfrm/xfrm_policy.c
@@ -279,14 +286,16 @@
u8 flags;
;
-static DEFINE_PER_CPU(struct xfrm_dst *, xfrm_last_dst);
-static struct work_struct *xfrm_pcpu_work __read_mostly;
static DEFINE_SPINLOCK(xfrm_policy_afinfo_lock);
static struct xfrm_policy_afinfo const __rcu *xfrm_policy_afinfo[AF_INET6 + 1] __read_mostly;
@@ -302,7 +300,9 @@
 static void xfrm_policy_kill(struct xfrm_policy *policy)
 {
+ write_lock_bh(&policy->lock);
 policy->walk.dead = 1;
+ write_unlock_bh(&policy->lock);

 atomic_inc(&policy->genid);

 @@ -625,9 +625,9 @@
 break;
 }
 if (newpos)
- hlist_add_behind(&policy->bydst, newpos);
+ hlist_add_behind_rcu(&policy->bydst, newpos); 
 else
- hlist_add_head(&policy->bydst, chain);
+ hlist_add_head_rcu(&policy->bydst, chain );
 }

 spin_unlock_bh(&net->xfrm.xfrm_policy_lock);
@@ -718,19 +718,10 @@
 spin_unlock_bh(&pq->hold_queue.lock);
 }

- static bool xfrm_policy_mark_match(struct xfrm_policy *policy,
- struct xfrm_policy *pol)
+ static inline bool xfrm_policy_mark_match(const struct xfrm_mark *mark,
+ struct xfrm_policy *pol)
 { 
- u32 mark = policy->mark.v & policy->mark.m;
- 
- if (policy->mark.v == pol->mark.v & policy->mark.m == pol->mark.m)
- return true;
- 
- if ((mark & pol->mark.m) == pol->mark.v &
-     policy->priority == pol->priority)
- return true;
- 
-
int xfrm_policy_insert(int dir, struct xfrm_policy *policy, int excl)
@@ -748,7 +739,7 @@
hlist_for_each_entry(pol, chain, bydst) {
if (pol->type == policy->type &&
  !selector_cmp(&pol->selector, &policy->selector) &&
-  xfrm_policy_mark_match(policy, pol) &&
+  xfrm_policy_mark_match(&policy->mark, pol) &&
  xfrm_sec_ctx_match(pol->security, policy->security) &&
  !WARN_ON(delpol)) {
if (excl) {
@@ -766,9 +757,9 @@
break;
}
if (newpos)
-  hlist_add_behind(&policy->bydst, newpos);
+  hlist_add_behind_rcu(&policy->bydst, newpos);
else
-  hlist_add_head(&policy->bydst, chain);
+  hlist_add_head_rcu(&policy->bydst, chain);
__xfrm_policy_link(policy, dir);

/* After previous checking, family can either be AF_INET or AF_INET6 */
@@ -798,10 +789,10 @@
}
EXPORT_SYMBOL(xfrm_policy_insert);

-struct xfrm_policy *xfrm_policy_bysel_ctx(struct net *net, u32 mark, u8 type,
-    int dir, struct xfrm_selector *sel,
-    struct xfrm_sec_ctx *ctx, int delete,
-    int *err)
+struct xfrm_policy *
+xfrm_policy_bysel_ctx(struct net *net, const struct xfrm_mark *mark, u8 type,
+    int dir, struct xfrm_selector *sel,
+    struct xfrm_sec_ctx *ctx, int delete, int *err)
{
  struct xfrm_policy *pol, *ret;
  struct hlist_head *chain;
@@ -812,7 +803,7 @@
ret = NULL;
  hlist_for_each_entry(pol, chain, bydst) {
if (pol->type == type &&
-  (mark & pol->mark.m) == pol->mark.v &&
+  xfrm_policy_mark_match(mark, pol) &&
    !selector_cmp(sel, &pol->selector) &&
    }
xfrm_sec_ctx_match(ctx, pol->security) {
    xfrm_pol_hold(pol);
    @@ -837,8 +828,9 @@
}  
EXPORT_SYMBOL(xfrm_policy_bysel_ctx);

-struct xfrm_policy *xfrm_policy_byid(struct net *net, u32 mark, u8 type,
-    int dir, u32 id, int delete, int *err)
+struct xfrm_policy *
+xfrm_policy_byid(struct net *net, const struct xfrm_mark *mark, u8 type,
+    int dir, u32 id, int delete, int *err)
{
    struct xfrm_policy *pol, *ret;
    struct hlist_head *chain;
    @@ -853,7 +845,7 @@
    ret = NULL;
    hlist_for_each_entry(pol, chain, byidx) {
        if (pol->type == type && pol->index == id &&
-            (mark & pol->mark.m) == pol->mark.v) {
+            xfrm_policy_mark_match(mark, pol)) {
            xfrm_pol_hold(pol);
            if (delete) {
                *err = security_xfrm_policy_delete(
                    @@ -1256,7 +1248,7 @@
                int xfrm_sk_policy_insert(struct sock *sk, int dir, struct xfrm_policy *pol)
                {
                    struct net *net = xp_net(pol);
                    +struct net *net = sock_net(sk);
                    struct xfrm_policy *old_pol;

                    #ifdef CONFIG_XFRM_SUB_POLICY
                    @@ -1458,10 +1450,13 @@
                    static int xfrm_get_tos(const struct flowi *fl, int family)
                    {
                        const struct xfrm_policy_afinfo *afinfo;
                        -int tos = 0;
                        +int tos;
                        afinfo = xfrm_policy_get_afinfo(family);
                        -tos = afinfo ? afinfo->get_tos(fl) : 0;
                        +if (!afinfo)
                        +return 0;
                        +
                        +tos = afinfo->get_tos(fl);

                        rcu_read_unlock();

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-static void xfrm_last_dst_update(struct xfrm_dst *xdst, struct xfrm_dst *old)
  -
  -this_cpu_write(xfrm_last_dst, xdst);
  -if (old)
  -dst_release(&old->u.dst);
  -}
-
-static void __xfrm_pcpu_work_fn(void)
  -
  -struct xfrm_dst *old;
  -
  -old = this_cpu_read(xfrm_last_dst);
  -if (old && !xfrm_bundle_ok(old))
  -xfrm_last_dst_update(NULL, old);
  -}
-
-void xfrm_policy_cache_flush(void)
  -
  -struct xfrm_dst *old;
  -bool found = 0;
  -int cpu;
  -
  -might_sleep();
  -
  -local_bh_disable();
  -rcu_read_lock();
  -__xfrm_pcpu_work_fn();
  -rcu_read_unlock();
  -local_bh_enable();
  -}
-
-void xfrm_policy_cache_flush(void)
  -
  -struct xfrm_dst *old;
  -bool found = 0;
  -int cpu;
  -
  -might_sleep();
  -
  -local_bh_disable();
  -rcu_read_lock();
  -for_each_possible_cpu(cpu) {
  -old = per_cpu(xfrm_last_dst, cpu);
  -if (old && !xfrm_bundle_ok(old)) {
  -if (smp_processor_id() == cpu) {
  -__xfrm_pcpu_work_fn();
  -continue;
  -}
  -found = true;
  -break;
-rcu_read_unlock();
-local_bh_enable();
-
-if (!found)
-return;
-
-get_online_cpus();
-
-for_each_possible_cpu(cpu) {
-bool bundle_release;
-
-rcu_read_lock();
-old = per_cpu(xfrm_last_dst, cpu);
-bundle_release = old && !xfrm_bundle_ok(old);
-rcu_read_unlock();
-
-if (!bundle_release)
-continue;
-
-if (cpu_online(cpu)) {
-schedule_work_on(cpu, &xfrm_pcpu_work[cpu]);
-continue;
-}
-
-rcu_read_lock();
-old = per_cpu(xfrm_last_dst, cpu);
-if (old && !xfrm_bundle_ok(old)) {
-per_cpu(xfrm_last_dst, cpu) = NULL;
-dst_release(&old->u.dst);
-}
-rcu_read_unlock();
-
-put_online_cpus();
-
-
-static bool xfrm_xdst_can_reuse(struct xfrm_dst *xdst,
-struct xfrm_state * const xfrm[],
-int num)
-{
-const struct dst_entry *dst = &xdst->u.dst;
-int i;
-
-if (xdst->num_xfrms != num)
-return false;
-
for (i = 0; i < num; i++) {
    if (!dst || dst->xfrm != xfrm[i])
        return false;
    dst = dst->child;
}

return xfrm_bundle_ok(xdst);

static struct xfrm_dst *
xfrm_resolve_and_create_bundle(struct xfrm_policy **pols, int num_pols,
                                const struct flowi *fl, u16 family,
                                struct net *net = xp_net(pols[0]);
struct xfrm_state *xfrm[XFRM_MAX_DEPTH];
-struct xfrm_dst *xdst, *old;
+struct xfrm_dst *xdst;
struct dst_entry *dst;
int err;

/* Try to instantiate a bundle */
err = xfrm_tmpl_resolve(pols, num_pols, fl, xfrm, family);
if (err <= 0) {
    -if (err != 0 && err != -EAGAIN)
+if (err == 0)
        return NULL;
+if (err != -EAGAIN)
        XFRM_INC_STATS(net, LINUX_MIB_XFRMOUTPOLERROR);
    return ERR_PTR(err);
}

-xdst = this_cpu_read(xfrm_last_dst);
-if (xdst &&
    xdst->u.dst.dev == dst_orig->dev &&
    xdst->num_pols == num_pols &&
    memcmp(xdst->pols, pols,
    sizeof(struct xfrm_policy *) * num_pols) == 0 &&
    xfrm_xdst_can_reuse(xdst, xfrm, err)) {
    dst_hold(&xdst->u.dst);
    xfrm_pols_put(pols, num_pols);
    while (err > 0)
        xfrm_state_put(xfrm[--err]);
    return xdst;
}
dst = xfrm_bundle_create(pols[0], xfrm, err, fl, dst_orig);
if (IS_ERR(dst)) {
    XFRM_INC_STATS(net, LINUX_MIB_XFRMOUTBUNDLEGENERERROR);
    @ @ -1860,9 +1740,6 @@
    memcpy(xdst->pols, pols, sizeof(struct xfrm_policy *) * num_pols);
    xdst->policy_genid = atomic_read(&pols[0]->genid);
    @ @ -1861,9 +1740,6 @@
    atomic_set(&xdst->u.dst.__refcnt, 2);
    xfrm_last_dst_update(xdst, old);
-    return xdst;
    }
    @ @ -2063,11 +1940,8 @@
    if (num_xfrms <= 0)
    goto make_dummy_bundle;
    -local_bh_disable();
    xdst = xfrm_resolve_and_create_bundle(pols, num_pols, fl, family,
        xflo->dst_orig);
    -local_bh_enable();
    -
    if (IS_ERR(xdst)) {
        err = PTR_ERR(xdst);
        if (err != -EAGAIN)
            @ @ -2154,11 +2028,9 @@
            goto no_transform;
    }
    -local_bh_disable();
    xdst = xfrm_resolve_and_create_bundle(
        pols, num_pols, fl,
        family, dst_orig);
    -local_bh_enable();
    if (IS_ERR(xdst)) {
        xfrm_pols_put(pols, num_pols);
        @ @ -2282,6 +2154,9 @@
        if (IS_ERR(dst) && PTR_ERR(dst) == -EREMOTE)
            return make_blackhole(net, dst_orig->ops->family, dst_orig);
        +if (IS_ERR(dst))
        +dst_release(dst_orig);
        +
        return dst;
    }
EXPORT_SYMBOL(xfrm_lookup_route);
@@ -2541,6 +2416,10 @@
 }
skb_dst_force(skb);
+if (!skb_dst(skb)) {
+XFRM_INC_STATS(net, LINUX_MIB_XFRMFWDHDRERROR);
+return 0;
+}
dst = xfrm_lookup(net, skb_dst(skb), &fl, NULL, XFRM_LOOKUP_QUEUE);
if (IS_ERR(dst)) {
@@ -2979,15 +2858,6 @@
 void __init xfrm_init(void)
 {
- int i;
- -xfrm_pcpu_work = kmalloc_array(NR_CPUS, sizeof(*xfrm_pcpu_work),
- - GFP_KERNEL);
- -BUG_ON(!xfrm_pcpu_work);
- -for (i = 0; i < NR_CPUS; i++)
- -INIT_WORK(&xfrm_pcpu_work[i], xfrm_pcpu_work_fn);
- -register_pernet_subsys(&xfrm_net_ops);
- seqcount_init(&xfrm_policy_hash_generation);
- xfrm_input_init();
--- linux-4.15.0.orig/net/xfrm/xfrm_replay.c
+++ linux-4.15.0/net/xfrm/xfrm_replay.c
@@ -658,7 +658,7 @@
 } else {
 XFRM_SKB_CB(skb)->seq.output.low = oseq + 1;
 XFRM_SKB_CB(skb)->seq.output.hi = oseq_hi;
- xo->seq.low = oseq = oseq + 1;
+ xo->seq.low = oseq + 1;
 xo->seq.hi = oseq_hi;
 oseq += skb_shinfo(skb)->gso_segs;
 }
@@ -666,7 +666,7 @@
 if (unlikely(oseq < replay_esn->oseq)) {
 XFRM_SKB_CB(skb)->seq.output.hi = ++oseq_hi;
 xo->seq.hi = oseq_hi;
- +replay_esn->oseq_hi = oseq_hi;
 if (replay_esn->oseq_hi == 0) {
 replay_esn->oseq--;
 replay_esn->oseq_hi--;
replay_esn->oseq = oseq;
-replay_esn->oseq_hi = oseq_hi;

if (xfrm_aevent_is_on(net))
x->repl->notify(x, XFRM_REPLAY_UPDATE);
--- linux-4.15.0.orig/net/xfrm/xfrm_state.c
+++ linux-4.15.0/net/xfrm/xfrm_state.c
@@ -678,7 +678,6 @@
replay_esn->oseq = oseq;
-replay_esn->oseq_hi = oseq_hi;
if (xfrm_aevent_is_on(net))
x->repl->notify(x, XFRM_REPLAY_UPDATE);
static unsigned int xfrm_state_hashmax __read_mostly = 1 * 1024 * 1024;
-static __read_mostly seqcount_t xfrm_state_hash_generation = SEQCNT_ZERO(xfrm_state_hash_generation);

counter="xfrm_state_hashmax";
static DECLARE_WORK(xfrm_state_gc_work, xfrm_state_gc_task);
static HLIST_HEAD(xfrm_state_gc_list);
@@ -136,7 +135,7 @@
spin_lock_bh(&net->xfrm.xfrm_state_lock);
-repeat_seqcount_begin(&xfrm_state_hash_generation);
+write_seqcount_begin(&net->xfrm.xfrm_state_hash_generation);

x->type->destructor(x);
xfrm_put_type(x->type);
if (x->xfrag.page)
+put_page(x->xfrag.page);
xfrm_dev_state_free(x);
security_xfrm_state_free(x);
kfree(x);
@@ -734,10 +735,9 @@
}
out:
spin_unlock_bh(&net->xfrm.xfrm_state_lock);
- if (cnt) {
+ if (cnt)
  err = 0;
- xfrm_policy_cache_flush();
- }
+ return err;
}
EXPORT_SYMBOL(xfrm_state_flush);
@@ -788,7 +788,7 @@
{
 spin_lock_bh(&net->xfrm.xfrm_state_lock);
 si->sadcnt = net->xfrm.state_num;
- si->sadhcnt = net->xfrm.state_hmask;
+ si->sadhcnt = net->xfrm.state_hmask + 1;
 si->sadhmcnt = xfrm_state_hashmax;
 spin_unlock_bh(&net->xfrm.xfrm_state_lock);
}
@@ -907,7 +907,8 @@
 */
 if (x->km.state == XFRM_STATE_VALID) {
 if ((x->sel.family &&
- !xfrm_selector_match(&x->sel, fl, x->sel.family)) ||
+ (!x->sel.family ||
+ (x->sel.family != family ||
+ !xfrm_selector_match(&x->sel, fl, family))) ||
  !security_xfrm_state_pol_flow_match(x, pol, fl))
 return;

@@ -920,7 +921,9 @@
 *acq_in_progress = 1;
 } else if (x->km.state == XFRM_STATE_ERROR ||
 x->km.state == XFRM_STATE_EXPIRED) {
- if (xfrm_selector_match(&x->sel, fl, x->sel.family) &&
+ if (((!x->sel.family ||
+ (x->sel.family == family &&
+ xfrm_selector_match(&x->sel, fl, family))) &&
 security_xfrm_state_pol_flow_match(x, pol, fl))
*error = -ESRCH;
}
@@ -946,7 +949,7 @@
 to_put = NULL;

- sequence = read_seqcount_begin(&xfrm_state_hash_generation);
+sequence = read_seqcount_begin(&net->xfrm.xfrm_state_hash_generation);

rcu_read_lock();
h = xfrm_dst_hash(net, daddr, saddr, tmpl->reqid, encap_family);
@@ -959,7 +962,7 @@
     tmpl->mode == x->props.mode &
     tmpl->id.proto == x->id.proto &
     (tmpl->id.spi == x->id.spi || !tmpl->id.spi))
-xfrm_state_look_at(pol, x, fl, encap_family,
+xfrm_state_look_at(pol, x, fl, family,
     &best, &acquire_in_progress, &error);
}

if (best || acquire_in_progress)
@@ -975,7 +978,7 @@
     tmpl->mode == x->props.mode &
     tmpl->id.proto == x->id.proto &
     (tmpl->id.spi == x->id.spi || !tmpl->id.spi))
-xfrm_state_look_at(pol, x, fl, encap_family,
+xfrm_state_look_at(pol, x, fl, family,
     &best, &acquire_in_progress, &error);
}

@@ -1054,7 +1057,7 @@
 if (to_put)
 xfrm_state_put(to_put);

@if (read_seqcount_retry(&xfrm_state_hash_generation, sequence)) {
+if (read_seqcount_retry(&net->xfrm.xfrm_state_hash_generation, sequence)) {
    *err = -EAGAIN;
    if (x)
        xfrm_state_put(x);
@@ -1318,6 +1321,30 @@
 EXPORT_SYMBOL(xfrm_state_add);

#ifndef CONFIG_XFRM_MIGRATE
+static inline int clone_security(struct xfrm_state *x, struct xfrm_sec_ctx *security)
+{
+    struct xfrm_user_sec_ctx *uctx;
+    int size = sizeof(*uctx) + security->ctx_len;
+    int err;
+    
+    uctx = kmalloc(size, GFP_KERNEL);
+    if (!uctx)
+        return -ENOMEM;
+    
+    uctx->exttype = XFRMA_SEC_CTX;
+    uctx->len = size;
+    uctx->ctx_doi = security->ctx_doi;
+    uctx->ctx_alg = security->ctx_alg;
+    uctx->ctx_len = security->ctx_len;
+    memcpy(uctx + 1, security->ctx_str, security->ctx_len);
err = security_xfrm_state_alloc(x, uctx);
kfree(uctx);
if (err)
+return err;
+
return 0;
+
static struct xfrm_state *xfrm_state_clone(struct xfrm_state *orig,
   struct xfrm_encap_tmpl *encap)
{
    if (orig->security)
      if (clone_security(x, orig->security))
        goto error;

    if (orig->coaddr) {
        x->coaddr = kmemdup(orig->coaddr, sizeof(*x->coaddr),
            GFP_KERNEL);
    }
    memcpy(&x->mark, &orig->mark, sizeof(x->mark));
    memcpy(&x->props.smark, &orig->props.smark, sizeof(x->props.smark));

    if (xfrm_init_state(x) < 0)
      goto error;
    x->tfcpad = orig->tfcpad;
    x->replay_maxdiff = orig->replay_maxdiff;
    x->replay_maxage = orig->replay_maxage;
    x->curlft.add_time = orig->curlft.add_time;
    memcpy(&x->curlft, &orig->curlft, sizeof(x->curlft));
    x->km.state = orig->km.state;
    x->km.seq = orig->km.seq;
    x->replay = orig->replay;

    int err = -ENOENT;
    __be32 minspi = htonl(low);
    __be32 maxspi = htonl(high);
    __be32 newspi = 0;
    u32 mark = x->mark.v & x->mark.m;

    spin_lock_bh(&x->lock);
}
xfrm_state_put(x0);
goto unlock;
}
-x->id.spi = minspi;
+newspi = minspi;
} else {
 u32 spi = 0;
 for (h = 0; h < high-low+1; h++) {
  spi = low + prandom_u32()% (high-low+1);
  x0 = xfrm_state_lookup(net, mark, &x->id.daddr, htonl(spi), x->id.proto, x->props.family);
  if (x0 == NULL) {
-x->id.spi = htonl(spi);
+newspi = htonl(spi);
  break;
  }
  xfrm_state_put(x0);
  }
-} if (x->id.spi) {
+} if (newspi) {
  spin_lock_bh(&net->xfrm.xfrm_state_lock);
  -x->id.spi = newspi;
  +x->id.spi = newspi;
  h = xfrm_spi_hash(net, &x->id.daddr, x->id.spi, x->id.proto, x->props.family);
  hlist_add_head_rcu(&x->byspi, net->xfrm.state_byspi + h);
  spin_unlock_bh(&net->xfrm.xfrm_state_lock);
  @ @ -2056,6 +2090,18 @@
  struct xfrm_mgr *km;
  struct xfrm_policy *pol = NULL;
  
ifdef CONFIG_COMPAT
if (in_compat_syscall())
return -EOPNOTSUPP;
@endif
+
+if (!optval && !optlen) {
  +xfrm_sk_policy_insert(sk, XFRM_POLICY_IN, NULL);
  +xfrm_sk_policy_insert(sk, XFRM_POLICY_OUT, NULL);
  +__sk_dst_reset(sk);
  +return 0;
  +}
+
if (optlen <= 0 || optlen > PAGE_SIZE)
return -EMSGSIZE;
@@ -2313,6 +2359,7 @@
 net->xfrm.state_num = 0;
 INIT_WORK(&net->xfrm.state_hash_work, xfrm_hash_resize);
 spin_lock_init(&net->xfrm.xfrm_state_lock);
+seqcount_init(&net->xfrm.xfrm_state_hash_generation);
return 0;

out_byspi:
@@ -2328,7 +2375,7 @@
unsigned int sz;

flush_work(&net->xfrm.state_hash_work);
-xfrm_state_flush(net, IPSEC_PROTO_ANY, false);
+xfrm_state_flush(net, 0, false);
flush_work(&xfrm_state_gc_work);

WARN_ON(!list_empty(&net->xfrm.state_all));
--- linux-4.15.0.orig/net/xfrm/xfrm_user.c
+++ linux-4.15.0/net/xfrm/xfrm_user.c
@@ -109,7 +109,8 @@
return 0;
uctx = nla_data(rt);
-if (uctx->len != (sizeof(struct xfrm_user_sec_ctx) + uctx->ctx_len))
+if (uctx->len > nla_len(rt) ||
   uctx->len != (sizeof(struct xfrm_user_sec_ctx) + uctx->ctx_len))
return -EINVAL;

return 0;
@@ -121,22 +122,17 @@
struct nlattr *rt = attrs[XFRMA_REPLAY_ESN_VAL];
struct xfrm_replay_state_esn *rs;

-if (p->flags & XFRM_STATE_ESN) {
- if (!rt)
- return -EINVAL;
- rs = nla_data(rt);
+ if (!rt)
+ return (p->flags & XFRM_STATE_ESN) ? -EINVAL : 0;

-if (rs->bmp_len > XFRMA_REPLAY_ESN_MAX / sizeof(rs->bmp[0]) / 8)
- return -EINVAL;
+rs = nla_data(rt);

-if (nla_len(rt) < (int)xfrm_replay_state_esn_len(rs) &&
- nla_len(rt) != sizeof(*rs))
- return -EINVAL;
-}
+if (rs->bmp_len > XFRMA_REPLAY_ESN_MAX / sizeof(rs->bmp[0]) / 8)
+ return -EINVAL;
-if (!rt)
-    return 0;
+if (nla_len(rt) < (int)xfrm_replay_state_esn_len(rs) &&
  nla_len(rt) != sizeof(*rs))
+    return -EINVAL;

/* As only ESP and AH support ESN feature. */
if ((p->id.proto != IPPROTO_ESP) && (p->id.proto != IPPROTO_AH))
  goto out;
}

+switch (p->sel.family) {
+    case AF_UNSPEC:
+        break;
+
+    case AF_INET:
+        if (p->sel.prefixlen_d > 32 || p->sel.prefixlen_s > 32)
+            goto out;
+        break;
+
+    case AF_INET6:
+        #if IS_ENABLED(CONFIG_IPV6)
+            if (p->sel.prefixlen_d > 128 || p->sel.prefixlen_s > 128)
+                goto out;
+        #else
+            err = -EAFNOSUPPORT;
+        #endif
+        break;
+        #else
+        err = -EAFNOSUPPORT;
+        goto out;
+        #endif
+    default:
+        goto out;
+    }
+
err = -EINVAL;
switch (p->id.proto) {
    case IPPROTO_AH:
+        copy_from_user_state(x, p);
+
+        if (attrs[XFRMA_ENCAP]) {
+            x->encap = kmemdup(nla_data(attrs[XFRMA_ENCAP]),
+                sizeof(*x->encap), GFP_KERNEL);
+            if (x->encap == NULL)
goto error;
+
+if (attrs[XFRMA_COADDR]) {
+    x->coaddr = kmemdup(nla_data(attrs[XFRMA_COADDR]),
+    sizeof(*x->coaddr), GFP_KERNEL);
+    if (x->coaddr == NULL)
+        goto error;
+}
+
if (attrs[XFRMA_SA_EXTRA_FLAGS])
    x->props.extra_flags = nla_get_u32(attrs[XFRMA_SA_EXTRA_FLAGS]);

@@ -565,23 +600,9 @@
    attrs[XFRMA_ALG_COMP]])
goto error;

-if (attrs[XFRMA_ENCAP]) {
-    x->encap = kmemdup(nla_data(attrs[XFRMA_ENCAP]),
-    sizeof(*x->encap), GFP_KERNEL);
-    if (x->encap == NULL)
-        goto error;
-}
-
if (attrs[XFRMA_TFCPAD])
    x->tfcpad = nla_get_u32(attrs[XFRMA_TFCPAD]);

-if (attrs[XFRMA_COADDR]) {
-    x->coaddr = kmemdup(nla_data(attrs[XFRMA_COADDR]),
-    sizeof(*x->coaddr), GFP_KERNEL);
-    if (x->coaddr == NULL)
-        goto error;
-}
-
    xfrm_mark_get(attrs, &x->mark);

if (attrs[XFRMA_OUTPUT_MARK])
@@ -1030,10 +1051,12 @@
    {
        struct sock *nlsk = rcu_dereference(net->xfrm.nlsk);

-        if (nlsk)
-            return nlmsg_multicast(nlsk, skb, pid, group, GFP_ATOMIC);
-        else
-            return -1;
+        if (!nlsk) {
+            kfree_skb(skb);
+            return -EPIPE;
+        }
+        return nlmsg_multicast(nlsk, skb, pid, group, GFP_ATOMIC);
+        else
+            return -1;
+    }
+
        return nlmsg_multicast(nlsk, skb, pid, group, GFP_ATOMIC);
    else
        return -1;
+    if (!nlsk) {
+        kfree_skb(skb);
+        return -EPIPE;
+    }
+
        return nlmsg_multicast(nlsk, skb, pid, group, GFP_ATOMIC);
    else
        return -1;
+    if (!nlsk) {
+        kfree_skb(skb);
+        return -EPIPE;
+    }
+
        return nlmsg_multicast(nlsk, skb, pid, group, GFP_ATOMIC);
static inline unsigned int xfrm_spdinfo_msgsize(void)
@@ -1362,10 +1385,16 @@
        switch (p->sel.family) {
            case AF_INET:
                +if (p->sel.prefixlen_d > 32 || p->sel.prefixlen_s > 32)
                +return -EINVAL;
                +
                break;

            case AF_INET6:
                #if IS_ENABLED(CONFIG_IPV6)
                +if (p->sel.prefixlen_d > 128 || p->sel.prefixlen_s > 128)
                +return -EINVAL;
                +
                break;
            #else
                return  -EAFNOSUPPORT;
            #endif
        }  
        ret = verify_policy_dir(p->dir);
        if (ret)
            return ret;
        -if (p->index && ((p->index & XFRM_POLICY_MAX) != p->dir))
        +if (p->index && (xfrm_policy_id2dir(p->index) != p->dir))
            return -EINVAL;
        return 0;
@@ -1442,8 +1471,16 @@
            if (!ut[i].family)
                ut[i].family = family;

            -if ((ut[i].mode == XFRM_MODE_TRANSPORT) &&
                -  (ut[i].family != prev_family))
                +switch (ut[i].mode) {
                +case XFRM_MODE_TUNNEL:
                +case XFRM_MODE_BEET:
                +break;
                +default:
                +if (ut[i].family != prev_family)
                +return -EINVAL;
                +break;
                +}
                +if (ut[i].mode >= XFRM_MODE_MAX)
return -EINVAL;

dev:family = ut[i].family;
@@ -1459,20 +1496,8 @@
    return -EINVAL;
 }

-switch (ut[i].id.proto) {
-case IPPROTO_AH:
-case IPPROTO_ESP:
-case IPPROTO_COMP:
-#if IS_ENABLED(CONFIG_IPV6)
-case IPPROTO_ROUTING:
-case IPPROTO_DSTOPTS:
-#endif
-case IPSEC_PROTO_ANY:
-break;
-default:
+if (!xfrm_id_proto_valid(ut[i].id.proto))
    return -EINVAL;
 }

return 0;
@@ -1676,9 +1701,11 @@
 #ifdef CONFIG_XFRM_SUB_POLICY
 static int copy_to_user_policy_type(u8 type, struct sk_buff *skb)
 {  
-    struct xfrm_userpolicy_type upt = {
-        .type = type,
-    };
+    struct xfrm_userpolicy_type upt;
+    /* Sadly there are two holes in struct xfrm_userpolicy_type */
+    memset(&upt, 0, sizeof(upt));
+    upt.type = type;

    return nla_put(skb, XFRMA_POLICY_TYPE, sizeof(upt), &upt);
 }
@@ -1793,7 +1820,6 @@
 struct km_event c;
 int delete;
 struct xfrm_mark m;
-    u32 mark = xfrm_mark_get(attrs, &m);
+p = nlmsg_data(nlh);
    delete = nlh->nlmsg_type == XFRM_MSG_DELPOLICY;


if (err)
    return err;

+xfmm_mark_get(attrs, &m);
+
if (p->index)
-xp = xfrm_policy_byid(net, mark, type, p->dir, p->index, delete, &err);
+xp = xfrm_policy_byid(net, &m, type, p->dir, p->index,
    + delete, &err);
else {
    struct nlattr *rt = attrs[XFRMA_SEC_CTX];
    struct xfrm_sec_ctx *ctx;
    @@ -1824,7 +1853,7 @@
        if (err) return err;
    }
-xp = xfrm_policy_byse1_ctx(net, mark, type, p->dir, &p->sel,
+xp = xfrm_policy_byse1_ctx(net, &m, type, p->dir, &p->sel,
        ctx, delete, &err);
    security_xfrm_policy_free(ctx);
    }
@@ -2088,7 +2117,6 @@
    u8 type = XFRM_POLICY_TYPE_MAIN;
    int err = -ENOENT;
    struct xfrm_mark m;
-    u32 mark = xfrm_mark_get(attrs, &m);
    
    err = copy_from_user_policy_type(&type, attrs);
    if (err)
        @@ -2098,8 +2126,11 @@
            if (err) return err;
        }
-xfmm_mark_get(attrs, &m);
-
+if (p->index)
    -xp = xfrm_policy_byid(net, mark, type, p->dir, p->index, 0, &err);
+xp = xfrm_policy_byid(net, &m, type, p->dir, p->index, 0,
    +    &err);
else {
    struct nlattr *rt = attrs[XFRMA_SEC_CTX];
    struct xfrm_sec_ctx *ctx;
    @@ -2116,7 +2147,7 @@
        if (err) return err;
    }
-xp = xfrm_policy_byse1_ctx(net, mark, type, p->dir,
xp = xfrm_policy_bysel_ctx(net, &m, type, p->dir, &p->sel, ctx, 0, &err);
security_xfrm_policy_free(ctx);
}
@@ -2194,6 +2225,9 @@
err = verify_newpolicy_info(&ua->policy);
if (err)
goto free_state;
+err = verify_sec_ctx_len(attrs);
+if (err)
+goto free_state;

/* Build an XP */
xp = xfrm_policy_construct(net, &ua->policy, attrs, &err);
--- linux-4.15.0.orig/samples/bpf/Makefile
+++ linux-4.15.0/samples/bpf/Makefile
@@ -143,6 +143,7 @@
HOSTCFLAGS += -I$(srctree)/tools/testing/selftests/bpf/
HOSTCFLAGS += -I$(srctree)/tools/lib/ -I$(srctree)/tools/include
HOSTCFLAGS += -I$(srctree)/tools/perf
+HOSTCFLAGS += -DHAVE_ATTR_TEST=0

HOSTCFLAGS_bpf_load.o += -I$(objtree)/usr/include -Wno-unused-variable
HOSTLOADLIBES_fds_example += -lelf
@@ -192,12 +193,15 @@
endif

# Trick to allow make to be run from this directory
-all: +all: $(LIBBPF)
$(MAKE) -C ./../ $(CURDIR)/

 clean:
$(MAKE) -C ./../ M=$(CURDIR) clean
-@rm -f *~
+@find $(CURDIR) -type f -name "*~" -delete
 +
+$ (LIBBPF): FORCE
+$ (MAKE) -C $(dir @) $(notdir @)

$(obj)/syscall_nrs.s:$ (src)/syscall_nrs.c
$(call if_changed_dep,cc_s_c)
--- linux-4.15.0.orig/samples/bpf/bpf_load.c
+++ linux-4.15.0/samples/bpf/bpf_load.c
@@ -625,7 +625,7 @@
static char buf[4096];
sz;
-sz = read(trace_fd, buf, sizeof(buf));
+sz = read(trace_fd, buf, sizeof(buf) - 1);
if (sz > 0) {
  buf[sz] = 0;
  puts(buf);
  --- linux-4.15.0.orig/samples/bpf/lwt_len_hist.sh
  +++ linux-4.15.0/samples/bpf/lwt_len_hist.sh
  @ @ -8.6 +8.8 @@
  TRACE_ROOT=/sys/kernel/debug/tracing

  function cleanup {
  +# To reset saved histogram, remove pinned map
  +rm /sys/fs/bpf/tc/globals/lwt_len_hist_map
  ip route del 192.168.253.2/32 dev $VETH0 2> /dev/null
  ip link del $VETH0 2> /dev/null
  ip link del $VETH1 2> /dev/null
  --- linux-4.15.0.orig/samples/bpf/lwt_len_hist_user.c
  +++ linux-4.15.0/samples/bpf/lwt_len_hist_user.c
  @ @ -15.8 +15.6 @@
  #define MAX_INDEX 64
  #define MAX_STARS 38

  -char bpf_log_buf[BPF_LOG_BUF_SIZE];
  -
  static void stars(char *str, long val, long max, int width)
  {
    int i;
    --- linux-4.15.0.orig/samples/bpf/parse_varlen.c
    +++ linux-4.15.0/samples/bpf/parse_varlen.c
    @ @ -6.6 +6.7 @@
    */
    #define KBUILD_MODNAME "foo"
    #include <linux/if_ether.h>
    +#include <linux/if_vlan.h>
    #include <linux/ip.h>
    #include <linux/ipv6.h>
    #include <linux/in.h>
    @ @ -108,11 +109,6 @@
    return 0;
  }

  -struct vlan_hdr {
  -
  -};
  - SEC("varlen")
  int handle_ingress(struct __sk_buff *skb)
struct bpf_flow_keys {
  struct flow_key_record {
    __be32 src;
    __be32 dst;
  } union {
    @ -59,7 +59,7 @@
  }

  static inline __u64 parse_ip(struct __sk_buff *skb, __u64 nhoff, __u64 *ip_proto,
    struct bpf_flow_keys *flow)
  {
    __u64 verlen;
    @ -83,7 +83,7 @@
  }

  static inline __u64 parse_ipv6(struct __sk_buff *skb, __u64 nhoff, __u64 *ip_proto,
    struct bpf_flow_keys *flow)
  {
    __u64 nhoff = ETH_HLEN;
    __u64 ip_proto;
    @ -198,7 +199,7 @@
    SEC("socket2")
    int bpf_prog2(struct __sk_buff *skb)
    {
      -struct bpf_flow_keys flow = {};
      +struct flow_key_record flow = {};
      struct pair *value;
      u32 key;
--- linux-4.15.0.orig/samples/bpf/sockex3_kern.c
+++ linux-4.15.0/samples/bpf/sockex3_kern.c
@@ -61,7 +61,7 @@
 __be16 h_vlan_encapsulated_proto;
 
-struct bpf_flow_keys {
+struct flow_key_record {
     __be32 src;
     __be32 dst;
     union {
@@ -88,7 +88,7 @@
 }

 struct globals {
-struct bpf_flow_keys flow;
+struct flow_key_record flow;
 }; 

 struct bpf_map_def SEC("maps") percpu_map = {
@@ -114,14 +114,14 @@
 
 struct bpf_map_def SEC("maps") hash_map = {
     .type = BPF_MAP_TYPE_HASH,
-    .key_size = sizeof(struct bpf_flow_keys),
+    .key_size = sizeof(struct flow_key_record),
     .value_size = sizeof(struct pair),
     .max_entries = 1024,
 }; 

 static void update_stats(struct __sk_buff *skb, struct globals *g)
 { 
-struct bpf_flow_keys key = g->flow;
+struct flow_key_record key = g->flow;
 struct pair *value;
 value = bpf_map_lookup_elem(&hash_map, &key);
 --- linux-4.15.0.orig/samples/bpf/sockex3_user.c
+++ linux-4.15.0/samples/bpf/sockex3_user.c
@@ -13,7 +13,7 @@
 #define PARSE_IP_PROG_FD (prog_fd[0])
 #define PROG_ARRAY_FD (map_fd[0])

-struct bpf_flow_keys {
+struct flow_key_record {
     __be32 src;
     __be32 dst;


union {
@@ -64,7 +64,7 @@
(void) f;
for (i = 0; i < 5; i++) {
-struct bpf_flow_keys key = {}, next_key;
+struct flow_key_record key = {}, next_key;
struct pair value;
sleep(1);
--- linux-4.15.0.orig/samples/bpf/syscall_tp_kern.c
+++ linux-4.15.0/samples/bpf/syscall_tp_kern.c
@@ -50,13 +50,27 @@
SEC("tracepoint/syscalls/sys_enter_open")
int trace_enter_open(struct syscalls_enter_open_args *ctx)
{
- count((void *)&enter_open_map);
+count(&enter_open_map);
+return 0;
+}
+SEC("tracepoint/syscalls/sys_enter_openat")
+int trace_enter_open_at(struct syscalls_enter_open_args *ctx)
+{
+count(&enter_open_map);
return 0;
}
SEC("tracepoint/syscalls/sys_exit_open")
int trace_enter_exit(struct syscalls_exit_open_args *ctx)
{
- count((void *)&exit_open_map);
+count(&exit_open_map);
+return 0;
+}
+SEC("tracepoint/syscalls/sys_exit_openat")
+int trace_enter_exit_at(struct syscalls_exit_open_args *ctx)
+{
+count(&exit_open_map);
return 0;
}
+include <errno.h>
#include <stdio.h>
#include <sys/types.h>
#include <asm/unistd.h>
@@ -44,8 +45,13 @@
    exit(1);
}
start_time = time_get_ns();
-    for (i = 0; i < MAX_CNT; i++)
-        write(fd, buf, sizeof(buf));
+    for (i = 0; i < MAX_CNT; i++) {
+        if (write(fd, buf, sizeof(buf)) < 0) {
+            printf("task rename failed: %s\n", strerror(errno));
+            close(fd);
+            return;
+        }
+    }
    printf("task_rename:%d: %lld events per sec\n",
.cpu, MAX_CNT * 1000000000ll / (time_get_ns() - start_time));
close(fd);
@@ -63,8 +69,13 @@
    exit(1);
}
start_time = time_get_ns();
-    for (i = 0; i < MAX_CNT; i++)
-        read(fd, buf, sizeof(buf));
+    for (i = 0; i < MAX_CNT; i++) {
+        if (read(fd, buf, sizeof(buf)) < 0) {
+            printf("failed to read from /dev/urandom: %s\n", strerror(errno));
+            close(fd);
+            return;
+        }
+    }
    printf("urandom_read:%d: %lld events per sec\n",
.cpu, MAX_CNT * 1000000000ll / (time_get_ns() - start_time));
close(fd);
--- linux-4.15.0.orig/samples/bpf/trace_event_user.c
+++ linux-4.15.0/samples/bpf/trace_event_user.c
@@ -34,9 +34,9 @@
            return;
sym = ksym_search(addr);
printf("%s;", sym->name);
-    if (!strcmp(sym->name, "sys_read"))
+    if (!strstr(sym->name, "sys_read"))
        sys_read_seen = true;
-    else if (!strcmp(sym->name, "sys_write"))
+    else if (!strstr(sym->name, "sys_write"))
        sys_write_seen = true;
static inline int generate_load(void)
+
+if (system("dd if=/dev/zero of=/dev/null count=5000k status=none") < 0) {
+printf("failed to generate some load with dd: %s\n", strerror(errno));
+return -1;
+}
+
+return 0;
+
static void test_perf_event_all_cpu(struct perf_event_attr *attr)
{
  int nr_cpus = sysconf(_SC_NPROCESSORS_CONF);
  assert(ioctl(pmu_fd[i], PERF_EVENT_IOC_SET_BPF, prog_fd[0]) == 0);
  assert(ioctl(pmu_fd[i], PERF_EVENT_IOC_ENABLE) == 0);
}
-system("dd if=/dev/zero of=/dev/null count=5000k status=none");
+
+if (generate_load() < 0) {
+error = 1;
+goto all_cpu_err;
+}
+print_stacks();
+all_cpu_err:
  for (i--; i >= 0; i--) {
  @ @ -155,7 +169,7 @@

static void test_perf_event_task(struct perf_event_attr *attr)
{
  int pmu_fd;
  int pmu_fd, error = 0;

  /* per task perf event, enable inherit so the "dd ..." command can be traced properly.
   * Enabling inherit will cause bpf_perf_prog_read_time helper failure.
  @ @ -170,10 +184,17 @@
  */
  assert(ioctl(pmu_fd, PERF_EVENT_IOC_SET_BPF, prog_fd[0]) == 0);
  assert(ioctl(pmu_fd, PERF_EVENT_IOC_ENABLE) == 0);
  -system("dd if=/dev/zero of=/dev/null count=5000k status=none");
  + if (generate_load() < 0) {

+error = 1;
+goto err;
+
print_stacks();
+err:
ioctl(pmu_fd, PERF_EVENT_IOC_DISABLE);
close(pmu_fd);
+if (error)
+int_exit(0);
}

static void test_bpf_perf_event(void)
--- linux-4.15.0.orig/samples/bpf/tracex1_kern.c
+++ linux-4.15.0/samples/bpf/tracex1_kern.c
@@ -20,7 +20,7 @@
SEC("kprobe/__netif_receive_skb_core")
int bpf_prog1(struct pt_regs *ctx)
{
-/* attaches to kprobe netif_receive_skb,
+/* attaches to kprobe __netif_receive_skb_core,
* looks for packets on loobpack device and prints them
 */
char devname[IFNAMSIZ];
@@ -29,7 +29,7 @@
int len;

/* non-portable! works for the given kernel only */
-skb = (struct sk_buff *) PT_REGS_PARM1(ctx);
+bpf_probe_read_kernel(&skb, sizeof(skb), (void *)PT_REGS_PARM1(ctx));
dev = _(skb->dev);
len = _(skb->len);

--- linux-4.15.0.orig/samples/bpf/xdp_redirect_user.c
+++ linux-4.15.0/samples/bpf/xdp_redirect_user.c
@@ -139,5 +139,5 @@
poll_stats(2, ifindex_out);

out:
-return 0;
+return ret;
}
--- linux-4.15.0.orig/samples/kfifo/bytestream-example.c
+++ linux-4.15.0/samples/kfifo/bytestream-example.c
@@ -124,8 +124,10 @@
mutex_unlock(&write_lock);
+if (ret)
static ssize_t fifo_read(struct file *file, char __user *buf, count, &copied);
mutex_unlock(&read_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static ssize_t fifo_read(struct file *file, char __user *buf, count, &copied);
mutex_unlock(&write_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static ssize_t fifo_read(struct file *file, char __user *buf, count, &copied);
mutex_unlock(&read_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static const struct file_operations fifo_fops = {
--- linux-4.15.0.orig/samples/kfifo/inttype-example.c
+++ linux-4.15.0/samples/kfifo/inttype-example.c
@@ -117,8 +117,10 @@
ret = kfifo_from_user(&test, buf, count, &copied);
mutex_unlock(&write_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static ssize_t fifo_read(struct file *file, char __user *buf, count, &copied);
mutex_unlock(&read_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static ssize_t fifo_read(struct file *file, char __user *buf, count, &copied);
mutex_unlock(&read_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static const struct file_operations fifo_fops = {
--- linux-4.15.0.orig/samples/kfifo/record-example.c
+++ linux-4.15.0/samples/kfifo/record-example.c
@@ -131,8 +131,10 @@
ret = kfifo_to_user(&test, buf, count, &copied);
mutex_unlock(&read_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static ssize_t fifo_read(struct file *file, char __user *buf, count, &copied);
mutex_unlock(&read_lock);
+if (ret)
+return ret;
-return ret ? ret : copied;
+return copied;
}

static const struct file_operations fifo_fops = {
--- linux-4.15.0.orig/samples/kfifo/record-example.c
+++ linux-4.15.0/samples/kfifo/record-example.c
@@ -131,8 +131,10 @@
ret = kfifo_from_user(&test, buf, count, &copied);

mutex_unlock(&write_lock);
+if (ret)
+return ret;
-
-return ret ? ret : copied;
+return copied;
}

static ssize_t fifo_read(struct file *file, char __user *buf,
@@ -147,8 +149,10 @@
ret = kfifo_to_user(&test, buf, count, &copied);

mutex_unlock(&read_lock);
+if (ret)
+return ret;
-
-return ret ? ret : copied;
+return copied;
}

static const struct file_operations fifo_fops = {
--- linux-4.15.0.orig/samples/livepatch/livepatch-shadow-fix1.c
+++ linux-4.15.0/samples/livepatch/livepatch-shadow-fix1.c
@@ -74,6 +74,11 @@
/* pointer to handle resource release.
 */
leak = kzalloc(sizeof(int), GFP_KERNEL);
+if (!leak) {
+kfree(d);
+return NULL;
+}
+
klp_shadow_alloc(d, SV_LEAK, &leak, sizeof(leak), GFP_KERNEL);

pr_info("%s: dummy @ %p, expires @ %lx\n",
--- linux-4.15.0.orig/samples/livepatch/livepatch-shadow-mod.c
+++ linux-4.15.0/samples/livepatch/livepatch-shadow-mod.c
@@ -118,6 +118,10 @@
/* Oops, forgot to save leak! */
leak = kzalloc(sizeof(int), GFP_KERNEL);
+if (!leak) {
+kfree(d);
+return NULL;
+}
pr_info("%s: dummy @ %p, expires @ %lx\n", __func__, d, d->jiffies_expire);

--- linux-4.15.0.orig/samples/mei/mei-amt-version.c
+++ linux-4.15.0/samples/mei/mei-amt-version.c
@@ -117,7 +117,7 @@
     me->verbose = verbose;

-me->fd = open("/dev/mei", O_RDWR);
+me->fd = open("/dev/mei0", O_RDWR);
     if (me->fd == -1) {
         mei_err(me, "Cannot establish a handle to the Intel MEI driver\n");
         goto err;
@@ -370,7 +370,7 @@
     unsigned int expected_sz)
 {
     uint32_t in_buf_sz;
-    uint32_t out_buf_sz;
+    ssize_t out_buf_sz;
     ssize_t written;
     uint32_t status;
     struct amt_host_if_resp_header *msg_hdr;
--- linux-4.15.0.orig/samples/mic/mpssd/mpssd.c
+++ linux-4.15.0/samples/mic/mpssd/mpssd.c
@@ -414,9 +414,9 @@
 static inline unsigned vring_size(unsigned int num, unsigned long align)
 {
     -return ((sizeof(struct vring_desc) * num + sizeof(__u16) * (3 + num)
-        +align - 1) & ~(align - 1))
-        + sizeof(__u16) * 3 + sizeof(struct vring_used_elem) * num;
+    return _vring_size(num, align, 4);
+} /*
--- linux-4.15.0.orig/samples/pktgen/functions.sh
+++ linux-4.15.0/samples/pktgen/functions.sh
@@ -5,6 +5,8 @@
     set -o errexit
+
     # Author: Jesper Dangaaard Brouer
     # License: GPL
+
     set -o errexit
     +
     ## -- General shell logging cmds --
     function err() {
         local exitcode=$1
@@ -58,6 +60,7 @@


function proc_cmd() {
    local result
    local proc_file=$1
    local status=0
    shift
    local proc_ctrl=${PROC_DIR}/$proc_file
    echo "cmd: $@ > $proc_ctrl"
    fi
    # Quoting of "$@" is important for space expansion
    echo "$@" > "$proc_ctrl"
    local status=$?
    echo "$@" > "$proc_ctrl"
    local status=$?
    result=$(grep "Result: OK:" $proc_ctrl)
    if [[ "$result" == "" ]]; then
        grep "Result:" $proc_ctrl >&2
        if [[ "$proc_file" != "pgctrl" ]]; then
            result=$(grep "Result: OK:" $proc_ctrl) || true
            if [[ "$result" == "" ]]; then
                grep "Result:" $proc_ctrl >&2
            fi
        fi
    fi
    if (( $status != 0 )); then
        err 5 "Write error($status) occurred cmd: "$@ > $proc_ctrl"
    fi
}

[[ $EUID -eq 0 ]] && trap 'pg_ctrl "reset"' EXIT
## -- General shell tricks --

function root_check_run_with_sudo() {
    --- linux-4.15.0.orig/samples/vfio-mdev/mtty.c
    +++ linux-4.15.0/samples/vfio-mdev/mtty.c
    @ @ -171,7 +171,7 @@
    return NULL;
}

-void dump_buffer(char *buf, uint32_t count)
+void dump_buffer(u8 *buf, uint32_t count)
{
    #if defined(DEBUG)
    int i;
    @ @ -250,7 +250,7 @@
static void handle_pci_cfg_write(struct mdev_state *mdev_state, u16 offset, u8 *buf, u32 count) {
    u32 cfg_addr, bar_mask, bar_index = 0;
    ...
}

static void handle_bar_write(unsigned int index, struct mdev_state *mdev_state, u16 offset, u8 *buf, u32 count) {
    u8 data = *buf;
    ...
}

static void handle_bar_read(unsigned int index, struct mdev_state *mdev_state, u16 offset, u8 *buf, u32 count) {
    /* Handle read requests by guest */
    switch (offset) {
    ...
}

static ssize_t mdev_access(struct mdev_device *mdev, u8 *buf, size_t count, loff_t pos, bool is_write) {
    struct mdev_state *mdev_state;
    ...
    #if defined(DEBUG_REGS)
    pr_info("%s: BAR%d WR @0x%llx %s val:0x%02x dlab:%d\n",
            __func__, index, offset, wr_reg[offset],
            (u8)*buf, mdev_state->s[index].dlab);
    #endif
    handle_bar_write(index, mdev_state, offset, buf, count);
    ...
    #endif
    return;
}

else {
    ...
    #if defined(DEBUG_REGS)
    pr_info("%s: BAR%d RD @0x%llx %s val:0x%02x dlab:%d\n",
            __func__, index, offset, rd_reg[offset],
            (u8)*buf, mdev_state->s[index].dlab);
    #endif
    handle_bar_read(index, mdev_state, offset, buf, count);
    ...
    #endif
}
-(u8)*buf, mdev_state->s[index].dlab);
+*buf, mdev_state->s[index].dlab);
#endif
}
break;
@@ -827,7 +827,7 @@
if (count >= 4 && !(*ppos % 4)) {
  u32 val;

  -ret = mdev_access(mdev, (char *)&val, sizeof(val),
  +ret = mdev_access(mdev, (u8 *)&val, sizeof(val),
  *ppos, false);
  if (ret <= 0)
    goto read_err;
  @ @ -839,7 +839,7 @@
} else if (count >= 2 && !(*ppos % 2)) {
  u16 val;

  -ret = mdev_access(mdev, (char *)&val, sizeof(val),
  +ret = mdev_access(mdev, (u8 *)&val, sizeof(val),
  *ppos, false);
  if (ret <= 0)
    goto read_err;
  @ @ -851,7 +851,7 @@
} else {
  u8 val;

  -ret = mdev_access(mdev, (char *)&val, sizeof(val),
  +ret = mdev_access(mdev, (u8 *)&val, sizeof(val),
  *ppos, false);
  if (ret <= 0)
    goto read_err;
  @ @ -889,7 +889,7 @@
  if (copy_from_user(&val, buf, sizeof(val)))
    goto write_err;

  -ret = mdev_access(mdev, (char *)&val, sizeof(val),
  +ret = mdev_access(mdev, (u8 *)&val, sizeof(val),
  *ppos, true);
  if (ret <= 0)
    goto write_err;
  @ @ -901,7 +901,7 @@
  if (copy_from_user(&val, buf, sizeof(val)))
    goto write_err;

  -ret = mdev_access(mdev, (char *)&val, sizeof(val),
  +ret = mdev_access(mdev, (u8 *)&val, sizeof(val),
  *ppos, true);
if (ret <= 0)
goto write_err;
@@ -913,7 +913,7 @@
if (copy_from_user(&val, buf, sizeof(val)))
goto write_err;

-ret = mdev_access(mdev, (char *)&val, sizeof(val),
+ret = mdev_access(mdev, (u8 *)&val, sizeof(val),
 *ppos, true);
if (ret <= 0)
goto write_err;
--- linux-4.15.0.orig/scripts/Kbuild.include
+++ linux-4.15.0/scripts/Kbuild.include
@@ -8,6 +8,7 @@
empty   :=
space   := $(empty) $(empty)
space_escape := _-_SPACE_-_
+pound := \#
right_paren := )
left_paren := ( 
@@ -148,20 +149,21 @@
shell-cached = $(call __shell-cached,__cached_$(call __sanitize-opt,$(1)),$(1))

# output directory for tests below
-TMPOUT := $(if $(KBUILD_EXTMOD),$(firstword $(KBUILD_EXTMOD))/)
+TMPOUT = $(if $(KBUILD_EXTMOD),$(firstword $(KBUILD_EXTMOD))/).tmp_$$$$

# try-run
# Usage: option = $(call try-run, $(CC)...-o "$TMP",option-ok,otherwise)
# Exit code chooses option. "$TMP" serves as a temporary file and is
# automatically cleaned up.
__try-run = set -e;			\n-TMP="$(TMPOUT).$$$$_.tmp"
-TMPO="$(TMPOUT).$$$$_.o"
+TMP=$(TMPOUT)/tmp\n+TMPO=$(TMPOUT)/tmp.o\n+mkdir -p $(TMPOUT)\n+trap "rm -rf $(TMPOUT)" EXIT;\nif ($(1)) >/dev/null 2>&1;\nthen echo "$(2)";\nelse echo "$(3)";\n-fi;\n-rm -f "$TMP" "$TMPO"
+fi

try-run = $(shell $(__try-run))
# ld-option
# Usage: LDFLAGS += $(call ld-option, -X)
 ld-option = $(call try-run-cached,
     $(CC) $(KBUILD_CPPFLAGS) $(CC_OPTION_CFLAGS) -x c /dev/null -c -o "$$TMPO";
     $(LD) $(LDFLAGS) $(1) "$STMPO" -o "$TMP",$(1),$(2))
    
# ar-option
# Usage: KBUILD_ARFLAGS := $(call ar-option,D)
 ar-option = $(call try-run-cached, $(LD) $(LDFLAGS) $(1) -v,$(1),$(2))

# Replace >$$< with >$$< to preserve $ when reloading the .cmd file
# (needed for make)
-# Replace >\#< with >\#< to avoid starting a comment in the .cmd file
+# Replace >\#< with >$(pound)< to avoid starting a comment in the .cmd file
# (needed for make)
# Replace >"< with >""< to be able to enclose the whole string in '...'
# (needed for the shell)
-make-cmd = $(call escsq,$(subst \#,\$(pound),$(subst $$,$$$$,$(cmd_$(1)))))
+make-cmd = $(call escsq,$(subst $(pound),$(pound),$(subst $$,$$$$,$(cmd_$(1)))))

# Find any prerequisites that is newer than target or that does not exist.
# PHONY targets skipped in both cases.
@@ -475,3 +475,6 @@
 endef
 #
 #*******************************************************************************
+ # delete partially updated (i.e. corrupted) files on error
 +.DELETE_ON_ERROR:
     --- linux-4.15.0.orig/scripts/Makefile
     +++ linux-4.15.0/scripts/Makefile
 @ @ -10.6 +10.9 @ @

 HOST_EXTRACFLAGS += -IS$(srctree)/tools/include

+CPTO_LIBS = $(shell pkg-config --libs libcrypto 2>/dev/null || echo -lcrypto)
+CPTO_CFLAGS = $(shell pkg-config --cflags libcrypto 2>/dev/null)
 +
+hostprogs-S(CONFIG_KALLSYMS) += kallsyms
+hostprogs-S(CONFIG_LOGO) += pnmtologo
+hostprogs-S(CONFIG_VT) += conmakehash
@@ -19,11 +22,14 @@
+ hostprogs-S(CONFIG_MODULE_SIG) += sign-file
+ hostprogs-S(CONFIG_SYSTEM_TRUSTED_KEYRING) += extract-cert
+ hostprogs-S(CONFIG_SYSTEM_EXTRA_CERTIFICATE) += insert-sys-cert

+hostprogs-$(CONFIG_SYSTEM_REVOCATION_LIST) += extract-cert

HOSTCFLAGS_sortextable.o = -I$(srctree)/tools/include
HOSTCFLAGS_asnl_compiler.o = -I$(srctree)/include
-HOSTLOADLIBES_sign-file = -lcrypto
-HOSTLOADLIBES_extract-cert = -lcrypto
+HOSTCFLAGS_sign-file.o = $(CRYPTO_CFLAGS)
+HOSTLOADLIBES_sign-file = $(CRYPTO_LIBS)
+HOSTCFLAGS_extract-cert.o = $(CRYPTO_CFLAGS)
+HOSTLOADLIBES_extract-cert = $(CRYPTO_LIBS)

always:= $(hostprogs-y) $(hostprogs-m)

--- linux-4.15.0.orig/scripts/Makefile.build
+++ linux-4.15.0/scripts/Makefile.build
@@ -219,6 +219,8 @@
endif
ifdef CONFIG_FTRACE_MCOUNT_RECORD
+ifndef CC_USING_RECORD_MCOUNT
+# compiler will not generate __mcount_loc use recordmcount or recordmcount.pl
 ifdef BUILD_C_RECORDMCOUNT
 ifdef BUILD_C_RECORDMCOUNT
 ifeq ("$(origin RECORDMCOUNT_WARN)", "command line")
-RECORDMCOUNT_FLAGS = -w
@@ -237,7 +239,7 @@
-sub_cmd_record_mcount = set -e ; perl $(srctree)/scripts/recordmcount.pl "$(ARCH)" \\
-"$(if $(CONFIG_CPU_BIG_ENDIAN),big,little)" \\
-"$(OBJDUMP)" $(OBJCOPY) $(CC) $(KBUILD_CFLAGS)" \\
+"$(OBJDUMP)" $(OBJCOPY) $(CC) $(KBUILD_CPPFLAGS) $(KBUILD_CFLAGS)" \\
-"$(LD)" "$(NM)" "$(RM)" "$(MV)" \\
-"$(if $(part-of-module),1,0)" "$(@)";
-recordmcount_source := $(srctree)/scripts/recordmcount.pl
@@ -247,6 +249,7 @@
-"$(CC_FLAGS_FTRACE)" ]; then\n\n$(sub_cmd_record_mcount)\nfi;
+endif # CC_USING_RECORD_MCOUNT
endif # CONFIG_FTRACE_MCOUNT_RECORD

ifdef CONFIG_STACK_VALIDATION
+objtool_args =$(if $(CONFIG_UNWINDER_ORC),orc generate,check)
+objtool_args +=$(if $(part-of-module), --module,)
+ifdef CONFIG_FRAME_POINTER

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objtool_args += --no-fp
endif
@@ -264,6 +269,10 @@
else
    objtool_args += $(call cc-ifversion, -lt, 0405, --no-unreachable)
endif
+ifdef CONFIG_RETPOLINE
+    objtool_args += --retpoline
+endif
+
ifdef CONFIG_MODVERSIONS
    objtool_o = $(@D)/.tmp_$(@F)
@@ -289,19 +298,27 @@
    $(wildcard include/config/orc/unwinder.h \  
         include/config/stack/validation.h)
+ifdef CONFIG_RETPOLINE
+    cmd_ubuntu_retpoline = $(CONFIG_SHELL) $(srctree)/scripts/ubuntu-retpoline-extract-one $(@) $(<) "$filter -m16 %code16gcc.h,$(a_flags))"; 
+else
+    cmd_ubuntu_retpoline =  
+endif
+
define rule_cc_o_c
    $(call echo-cmd,checksrc) $(cmd_checksrc) \  
    $(call cmd_and_fixdep,cc_o_c) \  
    $(cmd_checkdoc) \  
    $(call echo-cmd,objtool) $(cmd_objtool) \  
    $(cmd_modversions_c) \  
    +$(call echo-cmd,ubuntu-retpoline) $(cmd_ubuntu_retpoline) \  
    $(call echo-cmd,record_mcount) $(cmd_record_mcount)
endef

define rule_as_o_S
    $(call cmd_and_fixdep,as_o_S) \  
    $(call echo-cmd,objtool) $(cmd_objtool) \  
    -$(cmd_modversions_S) \  
    +$(cmd_modversions_S) \  
    +$(call echo-cmd,ubuntu-retpoline) $(cmd_ubuntu_retpoline)
endef

# List module undefined symbols (or empty line if not enabled)
@@ -314,12 +331,14 @@
# Built-in and composite module parts
    $(obj)/%.o: $(src)/%.c $(recordmcount_source) $(objtool_dep) FORCE
    $(call cmd,force_checksrc)
    +$(call cmd,force_check_kmsg)

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# Single-part modules are special since we need to mark them in $(MODVERDIR)

$(single-used-m): $(obj)/%.o: $(src)/%.c $(recordmcount_source) $(objtool_dep) FORCE $(call cmd,force_checksrc) 
+$(call cmd,force_check_kmsg) $(call if_changed_rule,cc_o_c) 
@ { echo $(@:.o=.ko); echo $@; \ 
    $(cmd_undef_syms); } > $(MODVERDIR)/$(@F:.o=.mod) @ @ -567.6 +586.19 @@
@ ifneq ($(KBUILD_KMSG_CHECK),0) @ ifeq ($(KBUILD_KMSG_CHECK),2) + kmsg_cmd := print 
+ quiet_cmd_force_check_kmsg = KMSG_PRINT $< + $(shell [-d $(objtree)/man ] || mkdir -p $(objtree)/man) else + kmsg_cmd := check + quiet_cmd_force_check_kmsg = KMSG_CHECK $< endif + cmd_force_check_kmsg = $(KMSG_CHECK) $(kmsg_cmd) $(CC) $(c_flags) $< ; +endif + 
# Descending
# ---------------------------------------------------------------------------

--- linux-4.15.0.orig/scripts/Makefile.extrawarn
+++ linux-4.15.0/scripts/Makefile.extrawarn
@@ -11,6 +11,8 @@
# are not supported by all versions of the compiler
# =============================================================================
+KBUILD_CFLAGS += $(call cc-disable-warning, packed-not-aligned) 
+ ifeq ("$(origin W)", "command line")
+ export KBUILD_ENABLE_EXTRA_GCC_CHECKS := $(W) endif @ @ -26.6 +28.7 @@
warning-1 += $(call cc-option, -Wmissing-include-dirs)
warning-1 += $(call cc-option, -Wunused-but-set-variable)
warning-1 += $(call cc-option, -Wunused-const-variable) +warning-1 += $(call cc-option, -Wpacked-not-aligned)
warning-1 += $(call cc-disable-warning, missing-field-initializers)
warning-1 += $(call cc-disable-warning, sign-compare)
KBUILD_CFLAGS += $(call cc-disable-warning, sign-compare)
KBUILD_CFLAGS += $(call cc-disable-warning, format-zero-length)
KBUILD_CFLAGS += $(call cc-disable-warning, uninitialized)
KBUILD_CFLAGS += $(call cc-disable-warning, pointer-to-enum-cast)
endif
endif
--- linux-4.15.0.orig/scripts/Makefile.gcc-plugins
+++ linux-4.15.0/scripts/Makefile.gcc-plugins
@@ -14,7 +14,7 @@
endif
ifdef CONFIG_GCC_PLUGIN_SANCOV
-    ifeq ($(CFLAGS_KCOV),)
+    ifeq ($(strip $(CFLAGS_KCOV)),)
# It is needed because of the gcc-plugin.sh and gcc version checks.
gcc-plugin-$(CONFIG_GCC_PLUGIN_SANCOV) += sancov_plugin.so
@@ -29,6 +29,10 @@
gcc-plugin-$(CONFIG_GCC_PLUGIN_STRUCTLEAK)	+= structleak_plugin.so
gcc-plugin-cflags-$(CONFIG_GCC_PLUGIN_STRUCTLEAK_VERBOSE)	+= -fplugin-arg-structleak_plugin_verbose
+ifdef CONFIG_GCC_PLUGIN_STRUCTLEAK
+    DISABLE_STRUCTLEAK_PLUGIN += -fplugin-arg-structleak_plugin-disable
+endif
+export DISABLE_STRUCTLEAK_PLUGIN
gcc-plugin-cflags-$(CONFIG_GCC_PLUGIN_STRUCTLEAK)	+= -DSTRUCTLEAK_PLUGIN
----- linux-4.15.0.orig/scripts/Makefile.kasan
+++ linux-4.15.0/scripts/Makefile.kasan
@@ -30,5 +30,10 @@
disableﭑtsanitizer
endif
endif
+ifdef CONFIG_KASAN_EXTRA
CFLAGS_KASAN_EXTRA += $(call cc-option, -fsanitize-address-use-after-scope)
endif
+ +CFLAGS_KASAN_NOSANITIZE := -fno-builtin
+endif
--- linux-4.15.0.orig/scripts/Makefile.lib
+++ linux-4.15.0/scripts/Makefile.lib
@@ -121,7 +121,7 @@
ifeq ($(CONFIG_KASAN),y)
    _c_flags += $(if $(patsubst n%,,
        $(KASAN_SANITIZE_$(basetarget).o)$(KASAN_SANITIZE)y), 
        -	        $(CFLAGS_KASAN), $(CFLAGS_KASAN_NOSANITIZE))
endif
ifeq ($(CONFIG_UBSAN),y)
    echo '"include <asm-generic/vmlinux.lds.h>";
    echo '.section .dtb.init.rodata,"a";
    echo '.align STRUCT_ALIGNMENT';
    -echo '.global __dtb_$(*F)_begin';
    -echo '__dtb_$(*F)_begin:';
    -echo '__dtb_$(*F)_end:';
    -echo '.global __dtb_$(*F)_end';
    echo '.balign STRUCT_ALIGNMENT';
    ) > $@

--- linux-4.15.0.orig/scripts/Makefile.modinst
+++ linux-4.15.0/scripts/Makefile.modinst
@@ -23,8 +23,12 @@
    if (echo "$(2)/$(notdir $@)" | egrep -q "/drivers/staging") && 
        ![ -f $(srctree)/drivers/staging/signature-inclusion ] && 
        then echo Not signing "$(2)/$(notdir $@)"; fi
+$(mod_compress_cmd) $(2)/$(notdir $@) $(notdir $@) $(patsubst %, $(patsubst %, -e %,$(KBUILD_EXTRA_SYMBOLS))) \\
# Modules built outside the kernel source tree go into extra by default
INSTALL_MOD_DIR ?= extra
--- linux-4.15.0.orig/scripts/Makefile.modpost
+++ linux-4.15.0/scripts/Makefile.modpost
@@ -75,7 +75,7 @@
    $(if $(CONFIG_MODULE_SRCVERSION_ALL),-a,)       
    $(if $(KBUILD_EXTMOD),-i,-o) $(kernelsymfile)   
    $(if $(KBUILD_EXTMOD),-I $(modulesymfile))      
- $(if $(KBUILD_EXTRA_SYMBOLS), $(patsubst %, || true,$(KBUILD_EXTRA_SYMBOLS))) \\
-
+ $(if $(KBUILD_EXTMOD),$(addprefix -e ,$(KBUILD_EXTRA_SYMBOLS))) \
$(if $(KBUILD_EXTMOD),-o $(modulesymfile))
\
$(if $(CONFIG_DEBUG_SECTION_MISMATCH),,-S)
\
$(if $(CONFIG_SECTION_MISMATCH_WARN_ONLY),,-E) \
--- linux-4.15.0.orig/scripts/adjust_autoksyms.sh
+++ linux-4.15.0/scripts/adjust_autoksyms.sh
@@ -84,6 +84,13 @@
depfile="include/config/ksym/${sympath}.h"
mkdir -p "$(dirname "$depfile")"
touch "$depfile"
+# Filesystems with coarse time precision may create timestamps
+# equal to the one from a file that was very recently built and that
+# needs to be rebuild. Let's guard against that by making sure our
+# dep files are always newer than the first file we created here.
+while [ ! "$depfile" -nt "$new_ksyms_file" ]; do
+touch "$depfile"
+done
echo $((count += 1))
done | tail -1 )
changed=${changed:-0}
--- linux-4.15.0.orig/scripts/bloat-o-meter
+++ linux-4.15.0/scripts/bloat-o-meter
@@ -1,4 +1,4 @@
-#!/usr/bin/python
+#!/usr/bin/env python3
#
# Copyright 2004 Matt Mackall <mpm@selenic.com>
#
--- linux-4.15.0.orig/scripts/checkpatch.pl
+++ linux-4.15.0/scripts/checkpatch.pl
@@ -2429,8 +2429,8 @@
# Check if the commit log has what seems like a diff which can confuse patch
if ($in_commit_log && !$commit_log_has_diff &&
- (($line =~ m@^\s+diff\b.*a/[\w/]+@ &&
$line =~ m@^\s+diff\b.*a/([\w/]+)\s+b/$1\b@) ||
+ (($line =~ m@^\s+diff\b.*a/([\w/]+)@ &&
+
$line =~ m@^\s+diff\b.*a/[\w/]+\s+b/$1\b@) ||
$line =~ m@^\s*(?:\-\-\-\s+a/|\+\+\+\s+b/)@ ||
$line =~ m/^\s*\@\@ \-\d+,\d+ \+\d+,\d+ \@\@/)) {
ERROR("DIFF_IN_COMMIT_MSG",
@@ -3889,7 +3889,7 @@
$fix) {
fix_delete_line($fixlinenr, $rawline);
my $fixed_line = $rawline;
-$fixed_line =~ /(^..*$Type\s*$Ident\(.*\)\s*){(.*)$/;
+$fixed_line =~ /(^..*$Type\s*$Ident\(.*\)\s*)\{(.*)$/;
my $line1 = $1;

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my $line2 = $2;
fix_insert_line($fixlinenr, ltrim($line1));
--- linux-4.15.0.orig/scripts/checkstack.pl
+++ linux-4.15.0/scripts/checkstack.pl
@@ -45,9 +45,9 @@
$xxt = "[0-9a-f]"; # hex character
$xxs = "[0-9a-f ]"; # hex character or space
$funcre = qr/^$xx* <(.*)>:$/;
- if ($arch eq 'aarch64') {
-     $re = qr/^.*stp.*sp,\#[0-9]{1,8}$/o;
+ if ($arch =~ '^(aarch|arm)64$') {
+     $re = qr/^.*stp.*sp,\#[0-9]{1,8}$/o;
     #ffffffc0006325cc:   a9bb7bfd       stp     x29, x30, [sp,\#-80]!
-     elsif ($arch eq 'arm') {
-     #ffffffc0006325cc:   a9bb7bfd       stp     x29, x30, [sp,\#-80]!
+     else if ($arch =~ 'arm') {
+     #ffffffc0006325cc:   a9bb7bfd       stp     x29, x30, [sp,\#-80]!
+     $re = qr/^.*sub.*sp,\#[0-9]{2}[/][0-9]{2}$/o;
     #ffffffc0006325cc:   a9bb7bfd       stp     x29, x30, [sp,\#-80]!
     $re = qr/^.*sub.*sp,\#[0-9]{2}[/][0-9]{2}$/o;
     } elsif ($arch eq 'arm') {
#c0008ffc:e24dd064subsp, sp, #100; 0x64
Sre = qr/.*/sub.*sp, \#-([0-9][1-8])\]/o;
--- linux-4.15.0.orig/scripts/coccicheck
+++ linux-4.15.0/scripts/coccicheck
@@ -128,9 +128,10 @@
    fi
    echo $@ >>$DEBUG_FILE
    $@ 2>&3$DEBUG_FILE
-    if [[ $? -ne 0 ]]; then
-        err=$?
+    if [[ $err -ne 0 ]]; then
+        err=$err
        echo "coccicheck failed"
-        exit $?
-    exit $err
+    fi
    fi
    fi

--- linux-4.15.0.orig/scripts/coccinelle/api/stream_open.cocci
+++ linux-4.15.0/scripts/coccinelle/api/stream_open.cocci
@@ -0,0 +1,363 @@
+// SPDX-License-Identifier: GPL-2.0
+// Author: Kirill Smelkov (krr@nexedi.com)
+//
+// Search for stream-like files that are using nonseekable_open and convert
+// them to stream_open. A stream-like file is a file that does not use ppos in
+// its read and write. Rationale for the conversion is to avoid deadlock in
+// between read and write.
+//
+// virtual report
+virtual patch
+virtual explain // explain decisions in the patch (SPFLAGS="-D explain")
+// stream-like reader & writer - ones that do not depend on f_pos.
+@ stream_reader @
+identifier readstream, ppos;
+identifier f, buf, len;
+type loff_t;
+@
+ ssize_t readstream(struct file *f, char *buf, size_t len, loff_t *ppos)
+  {n
+    ... when != ppos
+  }
+
+@ stream_writer@
+identifier writestream, ppos;
+identifier f, buf, len;
+type loff_t;
+@
+ ssize_t writestream(struct file *f, const char *buf, size_t len, loff_t *ppos)
+  {n
+    ... when != ppos
+  }
+
+// a function that blocks
+@ blocks @
+identifier block_f;
+identifier wait_event =~ "^wait_event_.*":
+@
+  block_f(...) {
+    ... when exists
+    wait_event(...)
+    ... when exists
+  }
+
+// stream_reader that can block inside.
+//
+// XXX wait_* can be called not directly from current function (e.g. func -> f -> g -> wait())
+// XXX currently reader_blocks supports only direct and 1-level indirect cases.
+@ reader_blocks_direct @
+identifier stream_reader.readstream;
+identifier wait_event =~ "^wait_event_.*":
+@
+  readstream(...) {
+    ... when exists
+    wait_event(...)
+    ... when exists
+  }
+
+@ reader_blocks_1 @
+identifier stream_reader.readstream;
+identifier blocks.block_f;
+@@
+ readstream(...)
+ { 
+ ... when exists
+ block_f(...)
+ ... when exists
+ }
+
+ reader_blocks depends on reader_blocks_direct || reader_blocks_1 @
+identifier stream_reader.readstream;
+@@
+ readstream(...) {
+ ...
+
+} 
+
+// file_operations + whether they have _any_ .read, .write, .llseek ... at all.
+// XXX add support for file_operations xxx[N] = ...(sound/core/pcm_native.c)
+@ fops0 @
+identifier fops;
+@@
+ struct file_operations fops = { 
+ ...
+ };
+
+ has_read @
+identifier fops0.fops;
+identifier read_f;
+@@
+ struct file_operations fops = { 
+ .read = read_f,
+ };
+
+ has_read_iter @
+identifier fops0.fops;
+identifier read_iter_f;
+@@
+ struct file_operations fops = { 
+ .read_iter = read_iter_f,
+ };
+
+ has_write @
+identifier fops0.fops;
+identifier write_f;
+@@
+ struct file_operations fops = {
+   .write = write_f,
+   
+ @ has_write_iter @
+   identifier fops0.fops;
+   identifier write_iter_f;
+ @@
+   struct file_operations fops = {
+     .write_iter = write_iter_f,
+   
+ @ has_llseek @
+   identifier fops0.fops;
+   identifier llseek_f;
+ @@
+   struct file_operations fops = {
+     .llseek = llseek_f,
+   
+ @ has_no_llseek @
+   identifier fops0.fops;
+ @@
+   struct file_operations fops = {
+     .llseek = no_llseek,
+   
+ @ has_mmap @
+   identifier fops0.fops;
+   identifier mmap_f;
+ @@
+   struct file_operations fops = {
+     .mmap = mmap_f,
+   
+ @ has_copy_file_range @
+   identifier fops0.fops;
+   identifier copy_file_range_f;
+ @@
+   struct file_operations fops = {
+     .copy_file_range = copy_file_range_f,
+   
+ @ has_remap_file_range @
+   identifier fops0.fops;
+   identifier remap_file_range_f;
+ @@
+   struct file_operations fops = {

---
+  .remap_file_range = remap_file_range_f,
+  };
+
+@ has_splice_read @
+identifier fops0.fops;
+identifier splice_read_f;
+@@
+ struct file_operations fops = {
+  .splice_read = splice_read_f,
+  };
+
+@ has_splice_write @
+identifier fops0.fops;
+identifier splice_write_f;
+@@
+ struct file_operations fops = {
+  .splice_write = splice_write_f,
+  };
+
+// file_operations that is candidate for stream_open conversion - it does not
+// use mmap and other methods that assume @offset access to file.
+// XXX for simplicity require no .{read/write}_iter and no .splice_{read/write} for now.
+// XXX maybe_stream.fops cannot be used in other rules - it gives "bad rule maybe_stream or bad variable fops".
+@ maybe_stream depends on (!has_llseek || has_no_llseek) && !has_mmap && !has_copy_file_range && !has_remap_file_range && !has_read_iter && !has_write_iter && !has_splice_read && !has_splice_write @
+identifier fops0.fops;
+@@
+ struct file_operations fops = {
+  };
+
+// ---- conversions ----
+
+// XXX .open = nonseekable_open -> .open = stream_open
+// XXX .open = func -> openfunc -> nonseekable_open
+
+// read & write
+// if both are used in the same file_operations together with an opener -
+// under that conditions we can use stream_open instead of nonseekable_open.
+@ fops_rw depends on maybe_stream @
+identifier fops0.fops, openfunc;
+identifier stream_reader.readstream;
+identifier stream_writer.writestream;
+@@
+ struct file_operations fops = {

---
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+ .open = openfunc,
+ .read = readstream,
+ .write = writestream,
+ );
+
+ @ report_rw depends on report @
+ identifier fops_rw.openfunc;
+ position p1;
+ @ @
+ openfunc(...) {
+ <...
+ nonseekable_open@p1
+ ...
+ }
+
+ @ script:python depends on report && reader_blocks @
+ fops << fops0.fops;
+ p << report_rw.p1;
+ @ @
+ coccilib.report.print_report(p[0],
+ "ERROR: %s: .read() can deadlock .write(); change nonseekable_open -> stream_open to fix." % (fops,))
+
+ @ script:python depends on report && !reader_blocks @
+ fops << fops0.fops;
+ p << report_rw.p1;
+ @ @
+ coccilib.report.print_report(p[0],
+ "WARNING: %s: .read() and .write() have stream semantic; safe to change nonseekable_open -> stream_open." % (fops,))
+
+
+ @ explain_rw_deadlocked depends on explain && reader_blocks @
+ identifier fops_rw.openfunc;
+ @ @
+ openfunc(...) {
+ <...
+ nonseekable_open
++ nonseekable_open /* read & write (was deadlock) */
+ ...
+ }
+
+ @ explain_rw_nodeadlock depends on explain && !reader_blocks @
+ identifier fops_rw.openfunc;
+ @ @
+ openfunc(...) {
+ <...
+ nonseekable_open
++ nonseekable_open /* read & write (no direct deadlock) */
+ ...
+
+ @ patch_rw depends on patch @
+ identifier fops_rw.openfunc;
+ @@
+ openfunc(...) {
+ ...
+ nonseekable_open
++ stream_open
+ ...
+
+// read, but not write
+ @ fops_r depends on maybe_stream && !has_write @
+ identifier fops0.fops, openfunc;
+ identifier stream_reader.readstream;
+ @@
+ struct file_operations fops = {
+ .open = openfunc,
+ .read = readstream,
+ };
+
+ @ report_r depends on report @
+ identifier fops_r.openfunc;
+ position p1;
+ @@
+ openfunc(...) {
+ ...
+ nonseekable_open@p1
+ ...
+
+ @ script:python depends on report @
+ fops << fops0.fops;
+ p << report_r.p1;
+ @@
+coccilib.report.print_report(p[0],
+ "WARNING: %s: .read() has stream semantic; safe to change nonseekable_open -> stream_open." % (fops,))
+
+ @ explain_r depends on explain @
+ identifier fops_r.openfunc;
+ @@
+ openfunc(...) {
+ ...
+ nonseekable_open
++ nonseekable_open /* read only */
+ ...
+ }
+
+@ patch_r depends on patch @
+identifier fops_r.openfunc;
+@@
+ openfunc(...) {
+ <...
+  nonseekable_open
++ stream_open
+ ...
+ }
+
+// write, but not read
+@ fops_w depends on maybe_stream && !has_read @
+identifier fops0.fops, openfunc;
+identifier stream_writer.writestream;
+@@
+  struct file_operations fops = {
+    .open = openfunc,
+    .write = writestream,
+  };
+
+@ report_w depends on report @
+identifier fops_w.openfunc;
+position p1;
+@@
+  openfunc(...) {
+    <...
+  nonseekable_open@p1
+  ...
+ }
+
+@ script:python depends on report @
+fops << fops0.fops;
+p << report_w.p1;
+@@
+cooccilib.report.print_report(p[0],
+  "WARNING: %s: .write() has stream semantic; safe to change nonseekable_open -> stream_open." % (fops,))
+
+@ explain_w depends on explain @
+identifier fops_w.openfunc;
+@@
+ openfunc(...) {
+ <...
+  nonseekable_open
++ nonseekable_open /* write only */
+ ...
+ }
+
+@ patch_w depends on patch @
+identifier fops_w.openfunc;
+@@
+ openfunc(...) {
+ <...
+- nonseekable_open
++ stream_open
+ ...
+ }
+
+// no read, no write - don't change anything
--- linux-4.15.0.orig/scripts/config
+++ linux-4.15.0/scripts/config
@@ -1,4 +1,4 @@
-#!/bin/bash
+#!/usr/bin/env bash
# SPDX-License-Identifier: GPL-2.0
# Manipulate options in a .config file from the command line
@@ -7,6 +7,9 @@
# If no prefix forced, use the default CONFIG_
 CONFIG_="${CONFIG_-CONFIG_}"

+# We use an uncommon delimiter for sed substitutions
+SED_DELIM=$(echo -en \"\001\")
+
 usage() {
 cat >&2 <<EOL
Manipulate options in a .config file from the command line.
@@ -83,7 +86,7 @@
local infile="$3"
llocal tmpfile="$infile.swp"
-sed -e "s:$before:$after:" "$infile" >"$tmpfile"
+sed -e "s$SED_DELIM$before$SED_DELIM$after$SED_DELIM" "$infile" >"$tmpfile"
# replace original file with the edited one
mv "$tmpfile" "$infile"
}
--- linux-4.15.0.orig/scripts/decode_stacktrace.sh
+++ linux-4.15.0/scripts/decode_stacktrace.sh
@@ -66,7 +66,7 @@
if [ "$(cache[$module,$address]+isset)" == "isset" ]; then
local code="$(cache[$module,$address])"
else
-local code=$(addr2line -i -e "$objfile" "$address")
+local code=$(${CROSS_COMPILE}addr2line -i -e "$objfile" "$address")
cache[$module,$address]=$code
fi
@@ -77,8 +77,8 @@
return
fi
-# Strip out the base of the path
-code=${code//$basepath/""}
+# Strip out the base of the path on each line
+code=$(while read -r line; do echo "${line#$basepath/}"; done <<< "$code")
# In the case of inlines, move everything to same line
code=${code//$'\n'/' '}
--- linux-4.15.0.orig/scripts/decodecode
+++ linux-4.15.0/scripts/decodecode
@@ -107,7 +107,7 @@
faultline=`cat $T.dis | head -1 | cut -d":" -f2-`
faultline=`echo "$faultline" | sed -e 's/\[/\\\[/g; s/\]/\\\]/g'`
-cat $T.oo | sed -e "${faultlinenum}s/^\(.*:\)\(.*\)/\1\*\2\t\t<-- trapping instruction/"
+cat $T.oo | sed -e "${faultlinenum}s/^\([^:]*:\)\(.*\)/\1\*\2\t\t<-- trapping instruction/"
echo
cat $T.aa
cleanup
--- linux-4.15.0.orig/scripts/depmod.sh
+++ linux-4.15.0/scripts/depmod.sh
@@ -11,7 +11,15 @@
KERNELRELEASE=$2
SYMBOL_PREFIX=$3
-if ! test -r System.map -a -x "$DEPMOD"; then
+if ! test -r System.map ; then
+exit 0
+fi
+
+# legacy behavior: "depmod" in /sbin, no /sbin in PATH
+PATH="$PATH:/sbin"
+if [ -z $(command -v $DEPMOD) ]; then
+echo "Warning: 'make modules_install' requires $DEPMOD. Please install it." >&2
+echo "This is probably in the kmod package." >&2
exit 0
fi
--- linux-4.15.0.orig/scripts/diffconfig

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+++ linux-4.15.0/scripts/diffconfig
@@ -1,4 +1,4 @@
-#!/usr/bin/python
+#!/usr/bin/env python3
# SPDX-License-Identifier: GPL-2.0
#
# diffconfig - a tool to compare .config files.
--- linux-4.15.0.orig/scripts/dtc/dtc-lexer.l
+++ linux-4.15.0/scripts/dtc/dtc-lexer.l
@@ -38,7 +38,6 @@
#include "srcpos.h"
#include "dtc-parser.tab.h"

-YYLTYPE yylloc;
extern bool treesource_error;

/* CAUTION: this will stop working if we ever use yyless() or yyunput() */
--- linux-4.15.0.orig/scripts/dtc/dtc-lexer.lex.c_shipped
+++ linux-4.15.0/scripts/dtc/dtc-lexer.lex.c_shipped
@@ -631,7 +631,6 @@
#include "srcpos.h"
#include "dtc-parser.tab.h"

-YYLTYPE yylloc;
extern bool treesource_error;

/* CAUTION: this will stop working if we ever use yyless() or yyunput() */
--- linux-4.15.0.orig/scripts/find-unused-docs.sh
+++ linux-4.15.0/scripts/find-unused-docs.sh
@@ -54,7 +54,7 @@
if [${FILES_INCLUDED[$file]+_}]; then
 continue;
 fi
-str=$(scripts/kernel-doc -text -export "$file" 2>/dev/null)
+str=$(scripts/kernel-doc -export "$file" 2>/dev/null)
 if [! -n "$str" ]; then
 echo "$file"
 fi
--- linux-4.15.0.orig/scripts/gcc-plugins/Makefile
+++ linux-4.15.0/scripts/gcc-plugins/Makefile
@@ -10,6 +10,7 @@
 HOST_EXTRACXXFLAGS += -I$(GCC_PLUGINS_DIR)/include -I$(src) -std=gnu++98 -fno-rtti
 HOST_EXTRACXXFLAGS += -fno-exceptions -fasynchronous-unwind-tables -ggdb
 HOST_EXTRACXXFLAGS += -Wno-narrowing -Wno-unused-variable
+ HOST_EXTRACXXFLAGS += -Wno-unused-variable
 export HOST_EXTRACXXFLAGS
 endif

--- linux-4.15.0.orig/scripts/gcc-plugins/Makefile
+++ linux-4.15.0/scripts/gcc-plugins/Makefile
@@ -10,6 +10,7 @@
 HOST_EXTRACXXFLAGS += -I$(GCC_PLUGINS_DIR)/include -I$(src) -std=gnu++98 -fno-rtti
 HOST_EXTRACXXFLAGS += -fno-exceptions -fasynchronous-unwind-tables -ggdb
 HOST_EXTRACXXFLAGS += -Wno-narrowing -Wno-unused-variable
+ HOST_EXTRACXXFLAGS += -Wno-unused-variable
 export HOST_EXTRACXXFLAGS
 endif
--- linux-4.15.0.orig/scripts/gcc-plugins/gcc-common.h
+++ linux-4.15.0/scripts/gcc-plugins/gcc-common.h
@@ -35,7 +35,9 @@
 #include "ggc.h"
 #include "timevar.h"

 +#if BUILDING_GCC_VERSION < 10000
 #include "params.h"
 +#endif

 +#if BUILDING_GCC_VERSION <= 4009
 #include "pointer-set.h"
 @@ -97,6 +99,10 @@
 #include "predict.h"
 #include "ipa-utils.h"

 +#if BUILDING_GCC_VERSION >= 8000
 +#include "stringpool.h"
 +#endif
 +
 +#if BUILDING_GCC_VERSION >= 4009
 #include "attrs.h"
 #include "varasm.h"
 @@ -146,8 +152,10 @@
 void dump_gimple_stmt(pretty_printer *, gimple, int, int);
 #endif

 +#ifndef __unused
 #define __unused __attribute__((__unused__))
 +#endif

 +#ifndef __visible
 #define __visible __attribute__((visibility("default")))
 +#endif

 #define DECL_NAME_POINTER(node) IDENTIFIER_POINTER(DECL_NAME(node))
 #define DECL_NAME_LENGTH(node) IDENTIFIER_LENGTH(DECL_NAME(node))
 @@ -833,6 +843,7 @@
 return gimple_build_assign(lhs, subcode, op1, op2 PASS_MEM_STAT);
 }

 +#if BUILDING_GCC_VERSION < 10000
 template <>
 template <>
 inline bool is_a_helper<const ggoto *>::test(const_gimple gs)
 @@ -846,6 +857,7 @@
 { return gs->code == GIMPLE_RETURN;
 }
static inline gasm *as_a_gasm(gimple stmt)
{
--- linux-4.15.0.orig/scripts/gcc-plugins/latent_entropy_plugin.c
+++ linux-4.15.0/scripts/gcc-plugins/latent_entropy_plugin.c
@@ -255,21 +255,14 @@
return NULL_TREE;
}

-static struct attribute_spec latent_entropy_attr = {
   .name= "latent_entropy",
   .min_length= 0,
   .max_length= 0,
   .decl_required= true,
   .type_required= false,
   .function_type_required= false,
   .handler= handle_latent_entropy_attribute,
-#if BUILDING_GCC_VERSION >= 4007
   .affects_type_identity= false
-#endif
-};
+static struct attribute_spec latent_entropy_attr = { };

static void register_attributes(void *event_data __unused, void *data __unused)
{
   +latent_entropy_attr.name= "latent_entropy";
   +latent_entropy_attr.decl_required= true;
   +latent_entropy_attr.handler= handle_latent_entropy_attribute;
   +
   register_attribute(&latent_entropy_attr);
}

--- linux-4.15.0.orig/scripts/gcc-plugins/randomize_layout_plugin.c
+++ linux-4.15.0/scripts/gcc-plugins/randomize_layout_plugin.c
@@ -443,13 +443,13 @@
if (node == fieldtype)
continue;

-#if (!is_fptr(fieldtype))
-  return 0;
-#
-#if (code != RECORD_TYPE && code != UNION_TYPE)
+if (code == RECORD_TYPE || code == UNION_TYPE) {
  +if (!is_pure_ops_struct(fieldtype))
    +return 0;
  continue;
  +}

---
if (!is_fptr(fieldtype))
    return 0;
}

@@ -580,68 +580,35 @@
    return;
}

- static struct attribute_spec randomize_layout_attr = {
-     .name = "randomize_layout",
-     .min_length = 0,
-     .max_length = 0,
-     .decl_required = false,
-     .type_required = true,
-     .function_type_required = false,
-     .handler = handle_randomize_layout_attr,
-     #if BUILDING_GCC_VERSION >= 4007
-         .affects_type_identity = true
-     #endif
- }
+
- static struct attribute_spec randomize_layout_attr = {
-     .name = "randomize_layout",
-     .min_length = 0,
-     .max_length = 0,
-     .decl_required = false,
-     .type_required = true,
-     .function_type_required = false,
-     .handler = handle_randomize_layout_attr,
-     #if BUILDING_GCC_VERSION >= 4007
-         .affects_type_identity = true
-     #endif
+
+ static void register_attributes(void *event_data, void *data)
+ {
+     randomize_layout_attr.name = "randomize_layout";
+     randomize_layout_attr.type_required = true;
+     randomize_layout_attr.handler = handle_randomize_layout_attr;
+     #if BUILDING_GCC_VERSION >= 4007
+         .affects_type_identity = true
+     #endif
+     randomize_layout_attr.affects_type_identity = true;
+ }
-static struct attribute_spec randomize_considered_attr = {
    .name = "randomize_considered",
    .min_length = 0,
    .max_length = 0,
    .decl_required = false,
    .type_required = true,
    .function_type_required = false,
    .handler = handle_randomize_considered_attr,
+    .no_randomize_layout_attr.name = "no_randomize_layout";
+    .no_randomize_layout_attr.type_required = true;
+    .no_randomize_layout_attr.handler = handle_randomize_layout_attr;
#if BUILDING_GCC_VERSION >= 4007
    .affects_type_identity = false
+    .no_randomize-layout_attr.affects_type_identity = true;
#endif
-};

-static struct attribute_spec randomize_performed_attr = {
    .name = "randomize_performed",
    .min_length = 0,
    .max_length = 0,
    .decl_required = false,
    .type_required = true,
    .function_type_required = false,
    .handler = handle_randomize_performed_attr,
+    .randomize_considered_attr.name = "randomize_considered";
+    .randomize_considered_attr.type_required = true;
+    .randomize_considered_attr.handler = handle_randomize_considered_attr;
+    .randomize_performed_attr.name = "randomize_performed";
+    .randomize_performed_attr.type_required = true;
+    .randomize_performed_attr.handler = handle_randomize_performed_attr;
-};

#if BUILDING_GCC_VERSION >= 4007
-void register_attributes(void *event_data, void *data)
-{
    register_attribute(&randomize_layout_attr);
    register_attribute(&no_randomize_layout_attr);
    register_attribute(&randomize_considered_attr);
+    register_attribute(&randomize_performed_attr);
#endif
--- linux-4.15.0.orig/scripts/gcc-plugins/structleak_plugin.c
+++ linux-4.15.0/scripts/gcc-plugins/structleak_plugin.c
@@ -57,21 +57,15 @@
    return NULL_TREE;
 }

-static struct attribute_spec user_attr = {
- .name = "user",
- .min_length = 0,
- .max_length = 0,
- .decl_required = false,
- .type_required = false,
- .function_type_required = false,
- .handler = handle_user_attribute,
- #if BUILDING_GCC_VERSION >= 4007
- .affects_type_identity = true
- #endif
- };
+static struct attribute_spec user_attr = { };

 static void register_attributes(void *event_data, void *data)
 {
+ user_attr.name = "user";
+ user_attr.handler = handle_user_attribute;
+ #if BUILDING_GCC_VERSION >= 4007
+ user_attr.affects_type_identity = true;
+ #endif
+ register_attribute(&user_attr);
 } 

--- linux-4.15.0.orig/scripts/gdb/linux/proc.py
+++ linux-4.15.0/scripts/gdb/linux/proc.py
@@ -41,7 +41,7 @@
     # linux_banner should contain a newline
     - gdb.write(gdb.parse_and_eval("linux_banner").string())
     + gdb.write(gdb.parse_and_eval("(char *)linux_banner").string())
 
 LxVersion()

--- linux-4.15.0.orig/scripts/gdb/linux/symbols.py
+++ linux-4.15.0/scripts/gdb/linux/symbols.py
@@ -96,10 +96,11 @@
 
     return ""
+     attrs = sect_attrs['attrs']
+     section_name_to_address = {

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attrs[n]['name'].string(): attrs[n]['address']
+ attrs[n]['battr']['attr']['name'].string(): attrs[n]['address']

for n in range(int(sect attrs['nsections']))}

args = []
- for section_name in [".data", ".data..read_mostly", ".rodata", ".bss"]:+
+ for section_name in [".data", ".data..read_mostly", ".rodata", ".bss", 
  ".text", ".text.hot", ".text.unlikely"]:+
+ address = section_name_to_address.get(section_name)
  if address:
    args.append("-s {name} {addr}".format(
--- linux-4.15.0.orig/scripts/insert-sys-cert.c
+++ linux-4.15.0/scripts/insert-sys-cert.c
@@ -7,7 +7,8 @@
* This software may be used and distributed according to the terms
* of the GNU General Public License, incorporated herein by reference.
*
- * Usage: insert-sys-cert [-s <System.map> -b <vmlinux> -c <certfile>
+ * Usage: insert-sys-cert [-s <System.map>] -b <vmlinux> -c <certfile>
+ *                        [-z <bzImage> -c <certfile>
+ *
"/

#define _GNU_SOURCE
@@ -257,6 +258,169 @@
return buf;
}

+static void get_payload_info(char *bzimage, int *offset, int *size)
+{
+  unsigned int system_offset;
+  unsigned char setup_sectors;
+  
+  setup_sectors = bzimage[0x1f1] + 1;
+  system_offset = setup_sectors * 512;
+  *offset = system_offset + *((int*)&bzimage[0x248]);
+  *size = *((int*)&bzimage[0x24c]);
+}
+
+static void update_payload_info(char* bzimage, int new_size)
+{
+  int offset, size;
+  get_payload_info(bzimage, &offset, &size);
+  *((int*)&bzimage[0x24c]) = new_size;
+  if (new_size < size)
+    memset(bzimage + offset + new_size, 0, size - new_size);
+}
+
+struct zipper {
+  unsigned char pattern[10];
int length;
char *command;
char *compress;
}
+
+struct zipper zippers[] = {
+ {0x7F,'E','L','F'}, 4, "cat", "cat"},
+ {0x1F,0x8B}, 2, "gunzip", "gzip -n -f -9"},
+ {0xFD,'x','Z','X','Z',0}, 6, "unxz", "xz"},
+ {'B','Z','h'},3, "bunzip2", "bzip2 -9"},
+ {0xFF,'L','Z','M','A',0}, 6, "unlzma", "lzma -9"},
+ {0xD3,'L','Z','M','A',0,'','
'}, 9, "lzop -d", "lzop -9"}
+);
+
+static struct zipper* get_zipper(char *p) {
+ int i;
+ for (i = 0; i < sizeof(zippers)/sizeof(struct zipper); i++) {
+ if (memcmp(p, zippers[i].pattern, zippers[i].length) == 0)
+ return &zippers[i];
+ }
+ return NULL;
+ }
+
+/*
+ * This only works for x86 bzImage
+ */
+static void extract_vmlinux(char *bzimage, int bzimage_size,
+ char **file, struct zipper **zipper)
+ {
+ int r;
+ char src[15] = "vmlinux-XXXXXX";
+ char dest[15] = "vmlinux-XXXXXX";
+ char cmd[100];
+ int src_fd, dest_fd;
+ int offset, size;
+ struct zipper *z;
+ /* TODO: verify that bzImage is supported */
+ +
+ get_payload_info(bzimage, &offset, &size);
+ z = get_zipper(bzimage + offset);
+ if (z == NULL) {
+ err("Unable to determine the compression of vmlinux\n");
+ return;
+ }
+ +
+ src_fd = mkstemp(src);
+ if (src_fd == -1) {
+ /*
perror("Could not write vmlinux");
+return;
+
+r = write(src_fd, bzimage + offset, size);
+if (r != size) {
+perror("Could not write vmlinux");
+return;
+}
+dest_fd = mkstemp(dest);
+if (dest_fd == -1) {
+perror("Could not create temp file");
+return;
+}
+
+snprintf(cmd, sizeof(cmd), "%s < %s > %s", z->command, src, dest);
+info("Executing: %s\n", cmd);
+r = system(cmd);
+if (r! = 0)
+warn("Possible errors when extracting\n");
+
+r = remove(src);
+if (r! = 0)
+perror(src);
+
+*file = strdup(dest);
+*zipper = z;
+
+static void repack_image(char *bzimage, int bzimage_size,
+char *vmlinux_file, struct zipper *z)
+{
+char tmp[15] = "vmlinux-XXXXXX";
+char cmd[100];
+int fd;
+struct stat st;
+int new_size;
+int r;
+int offset, size;
+
+get_payload_info(bzimage, &offset, &size);
+
+fd = mkstemp(tmp);
+if (fd == -1) {
+perror("Could not create temp file");
+return;
+}
+
+snprintf(cmd, sizeof(cmd), "%s < %s > %s",
+"zip -d0 %s %s", tmp, vmlinux_file, tmp);
++r = system(cmd);
+if (r! = 0)
+warn("Possible errors when extracting\n");
+
+*zipper = z;
+*file = strdup(tmp);
+*file = free(tmp);

+}
+z->compress, vmlinux_file, tmp);
+
+info("Executing: %s
", cmd);
+r = system(cmd);
+if (r!=0)
+warn("Possible errors when compressing\n");
+
+r = remove(vmlinux_file);
+if (r!=0)
+perror(vmlinux_file);
+
+if (fstat(fd, &st)) {
+perror("Could not determine file size");
+close(fd);
+
+}
+new_size = st.st_size;
+if (new_size > size) {
+err("Increase in compressed size is not supported.\n");
+err("Old size was %d, new size is %d\n", size, new_size);
+exit(EXIT_FAILURE);
+
+
+r = read(fd, bzimage + offset, new_size);
+if (r != new_size)
+perror(tmp);
+
+r = remove(tmp);
+if (r!=0)
+perror(tmp);
+
+/* x86 specific patching of bzimage */
+update_payload_info(bzimage, new_size);
+
+/* TODO: update CRC */
+
+
+static void fill_random(unsigned char *p, int n) {
+srand(0);
+int i;
+for (i = 0; i < n; i++)
+p[i] = rand();
+
+
+static void print_sym(Elf_Ehdr *hdr, struct sym *s)
{|
info("sym: %s
", s->name);
static void print_usage(char *e)
{
  printf("Usage %s [-s <System.map>] -b <vmlinux> -c <certfile>\n", e);
  printf("Usage: %s [-s <System.map>] -b <vmlinux> -c <certfile>\n", e);
  printf(" %s [-s <System.map>] -z <bzImage> -c <certfile>\n", e);
}

int main(int argc, char **argv)
{
  char *system_map_file = NULL;
  char *vmlinux_file = NULL;
  char *bzimage_file = NULL;
  char *cert_file = NULL;
  int vmlinux_size;
  int bzimage_size;
  int cert_size;
  Elf_Ehdr *hdr;
  char *cert;
  char *bzimage = NULL;
  struct zipper *z = NULL;
  FILE *system_map;
  unsigned long *lsize;
  int *used;

  while ((opt = getopt(argc, argv, "b:c:s:")) != -1) {
    switch (opt) {
      case 's':
        system_map_file = optarg;
        break;
      case 'b':
        vmlinux_file = optarg;
        break;
      case 'z':
        bzimage_file = optarg;
        break;
      case 'c':
        cert_file = optarg;
        break;
    }
  }
}
-if (!vmlinux_file || !cert_file) {
+if (!cert_file ||
+(!vmlinux_file && !bzimage_file) ||
+(vmlinux_file && bzimage_file)) {
  print_usage(argv[0]);
  exit(EXIT_FAILURE);
}
@@ -311,6 +485,16 @@
  if (!cert)
  exit(EXIT_FAILURE);
+
+if (bzimage_file) {
+bzimage = map_file(bzimage_file, &bzimage_size);
+if (!bzimage)
+  exit(EXIT_FAILURE);
+
+  extract_vmlinux(bzimage, bzimage_size, &vmlinux_file, &z);
+if (!vmlinux_file)
+  exit(EXIT_FAILURE);
+}
+
+hdr = map_file(vmlinux_file, &vmlinux_size);
  if (!hdr)
  exit(EXIT_FAILURE);
@@ -386,7 +570,7 @@
  }
  /* If the existing cert is the same, don't overwrite */
-  if (cert_size == *used &&
+  if (cert_size > 0 && cert_size == *used &&
      strncmp(cert_sym.content, cert, cert_size) == 0) {
    warn("Certificate was already inserted.
);  
    exit(EXIT_SUCCESS);
  @ @ -396,9 +580,11 @@
    warn("Replacing previously inserted certificate.
);

    memcpy(cert_sym.content, cert, cert_size);
+    if (memsym(cert_sym.content, cert, cert_size, -0, cert_sym.size - cert_size);)
+    /* This makes the reserved space incompressable */
+      fill_random(cert_sym.content + cert_size,
+      cert_sym.size - cert_size);

    *lsize = *lsize + cert_size - *used;
    *used = cert_size;
  @ @ -406,5 +592,15 @@
cert_sym.address);
info("Used \%d bytes out of \%d bytes reserved.\n", *used,
cert_sym.size);
+
+if (munmap(hdr, vmlinux_size) == -1) {
  perror(vmlinux_file);
+exit(EXIT_FAILURE);
+}
+
+if (bzimage) {
+repack_image(bzimage, bzimage_size, vmlinux_file, z);
+}
+
exit(EXIT_SUCCESS);
}
--- linux-4.15.0.orig/scripts/kallsyms.c
+++ linux-4.15.0/scripts/kallsyms.c
@@ -123,8 +123,8 @@
 fprintf(stderr, "Read error or end of file.\n");
 return -1;
 }
-if (strlen(str) > KSYM_NAME_LEN) {
-fprintf(stderr, "Symbol \%s too long for kallsyms (\%zu vs \%d).\n"
+if (strlen(str) >= KSYM_NAME_LEN) {
+fprintf(stderr, "Symbol \%s too long for kallsyms (\%zu >= \%d).\n"
"Please increase KSYM_NAME_LEN both in kernel and kallsyms.c\n",
str, strlen(str), KSYM_NAME_LEN);
 return -1;
 @@ -160,6 +160,9 @@
 /* exclude debugging symbols */
 else if (stype == 'N' || stype == 'n')
 return -1;
+/* exclude s390 kasan local symbols */
+else if (!strncmp(sym, ".LASANPC", 8))
+return -1;

 /* include the type field in the symbol name, so that it gets
 * compressed together */
@@ -506,6 +510,8 @@
 table[pos] = table[i];

 static char *special_prefixes[] = {
-"__crc_", /* modversions */
+"__efistub_", /* arm64 EFI stub namespace */
  NULL ];

 static char *special_suffixes[] = {
 @@ -506,6 +510,8 @@
 table[pos] = table[i];

 static char *special_prefixes[] = {
-"__crc_", /* modversions */
+"__efistub_", /* arm64 EFI stub namespace */
  NULL ];

 static char *special_suffixes[] = {
 @ @ -506,6 +510,8 @@
table[pos] = table[i];
learn_symbol(table[pos].sym, table[pos].len);
pos++;
}
/* else */
+free(table[i].sym);
}

/*

 struct menu *menu;
 const char *basename;
 const char *str;
 -char dirname[PATH_MAX+1], tmpname[PATH_MAX+1], newname[PATH_MAX+1];
 +char dirname[PATH_MAX+1], tmpname[PATH_MAX+22], newname[PATH_MAX+8];
 char *env;

dirname[0] = 0;
*/
@@ -1238,7 +1238,7 @@
sym_calc_value(csym);
 if (mode == def_random)
 -has_changed = randomize_choice_values(csym);
 +has_changed |= randomize_choice_values(csym);
 else {
 set_all_choice_values(csym);
 has_changed = true;
--- linux-4.15.0.orig/scripts/kconfig/expr.c
+++ linux-4.15.0/scripts/kconfig/expr.c
@@ -113,7 +113,7 @@
 break;
 case E_NOT:
 expr_free(e->left.expr);
-+return;
+break;
 case E_EQUAL:
 case E_GEQ:
 case E_GTH:
@@ -201,6 +201,13 @@
 int res, old_count;

 */
+ * A NULL expr is taken to be yes, but there's also a different way to
+ * represent yes. expr_is_yes() checks for either representation.
+ */
+if (!e1 || !e2)
+return expr_is_yes(e1) && expr_is_yes(e2);
if (e1->type != e2->type)
return 0;
switch (e1->type) {
--- linux-4.15.0.orig/scripts/kconfig/lkc.h
+++ linux-4.15.0/scripts/kconfig/lkc.h
@@ -88,7 +88,9 @@
 /* confdata.c and expr.c */
 static inline void xfwrite(const void *str, size_t len, size_t count, FILE *out)
 {
-assert(len != 0);
+//assert(len != 0);
+if (len == 0)
+return;

if (fwrite(str, len, count, out) != count)
fprintf(stderr, "Error in writing or end of file\n");
--- linux-4.15.0.orig/scripts/kconfig/lxdialog/inputbox.c
+++ linux-4.15.0/scripts/kconfig/lxdialog/inputbox.c
@@ -126,7 +126,8 @@
case KEY_DOWN:
break;
case KEY_BACKSPACE:
-case 127:
+case 8: /* ^H */
+case 127: /* ^? */
if (pos) {
    wattrset(dialog, dlg.inputbox.atr);
    if (input_x == 0) {
--- linux-4.15.0.orig/scripts/kconfig/menu.c
+++ linux-4.15.0/scripts/kconfig/menu.c
@@ -372,6 +372,7 @@
menu->parent = parent;
last_menu = menu;
}
+expr_free(basedep);
if (last_menu) {
    parent->list = parent->next;
    parent->next = last_menu->next;
--- linux-4.15.0.orig/scripts/kconfig/nconf.c
+++ linux-4.15.0/scripts/kconfig/nconf.c
@@ -504,8 +504,8 @@
index = match_start;
-else if (flag == FIND_NEXT_MATCH_UP)
--match_start;

+match_start = (match_start + items_num) % items_num;
index = match_start;
-index = (index + items_num) % items_num;
while (true) {
  char *str = k_menu_items[index].str;
  if (strcasestr(str, match_str) != NULL)
    state->match_direction = FIND_NEXT_MATCH_UP;
  *ans = get_mext_match(state->pattern,
    state->match_direction);
} else if (key == KEY_BACKSPACE || key == 8 || key == 127) {
  state->pattern[strlen(state->pattern)-1] = '0';
  adj_match_dir(&state->match_direction);
} else
  break;

--- linux-4.15.0.orig/scripts/kconfig/qconf.cc
+++ linux-4.15.0/scripts/kconfig/qconf.cc
@@ -636,7 +636,7 @@
      continue;
 }
hide:
if (item && item->menu == child) {
  last = item;
  continue;
}
hide:
if (item && item->menu == child) {
  last = (ConfigItem*)parent->topLevelItem(0);
  if (last == item)
    continue;
}
hide:
if (item && item->menu == child) {
  last = (ConfigItem*)parent->topLevelItem(0);
  if (last == item)
    continue;
}
- action->setCheckable(true);
- connect(action, SIGNAL(toggled(bool)), SLOT(setShowDebug(bool)));
- connect(this, SIGNAL(showDebugChanged(bool)), action, SLOT(setOn(bool)));
- action->setChecked(showDebug());
+
+action->setCheckable(true);
+connect(action, SIGNAL(toggled(bool)), SLOT(setShowDebug(bool)));
+connect(this, SIGNAL(showDebugChanged(bool)), action, SLOT(setOn(bool)));
+action->setChecked(showDebug());
popup->addSeparator();
popup->addAction(action);
return popup;

--- linux-4.15.0.orig/scripts/kconfig/zconf.l
+++ linux-4.15.0/scripts/kconfig/zconf.l
@@ -71,7 +71,7 @@
{
fprintf(stderr,
    "%s:%d:warning: ignoring unsupported character '%c\n",
-        zconf_curname(), zconf_lineno(), chr);
+        current_file->name, yylineno, chr);
} %

@@ -191,6 +191,8 @@
}}
BEGIN(INITIAL);
+yylval.string = text;
+return T_WORD_QUOTE;
}
%

@@ -108,7 +108,27 @@
input: nl start | start;

-start: mainmenu_stmt stmt_list | stmt_list;

--- linux-4.15.0.orig/scripts/kconfig/zconf.y
+++ linux-4.15.0/scripts/kconfig/zconf.y
@@ -31,7 +31,7 @@
static struct menu *current_menu, *current_entry;
%
-%%expect 32
+%expect 30

%%
input: nl start | start;

-start: mainmenu_stmt stmt_list | stmt_list;
+start: mainmenu_stmt stmt_list | no_mainmenu_stmt stmt_list;
+
+/* mainmenu entry */
+
+mainmenu_stmt: T_MAINMENU prompt T_EOL
+{
+menu_add_prompt(P_MENU, "$2", NULL);
+};
+
+/* Default main menu, if there's no mainmenu entry */
+
+no_mainmenu_stmt: /* empty */
+{
+/*
+ * Hack: Keep the main menu title on the heap so we can safely free it
+ * later regardless of whether it comes from the 'prompt' in
+ * mainmenu_stmt or here
+ */
+menu_add_prompt(P_MENU, strdup("Linux Kernel Configuration"), NULL);
+};
+
+stmt_list:
+/* empty */
@@ -325,7 +345,7 @@
/* if entry */
-if_entry: T_IF expr nl
+if_entry: T_IF expr T_EOL
{
printd(DEBUG_PARSE, "%s:%d:if\n", zconf_curname(), zconf_lineno());
menu_add_entry(NULL);
@@ -351,13 +371,6 @@
| if_block choice_stmt
 ;

-/* mainmenu entry */
-
-MAINMENU stmt: T_MAINMENU prompt nl
-{   
-menu_add_prompt(P_MENU, "$2", NULL);
-};
-
-/* menu entry */

menu: T_MENU prompt T_EOL
@@ -502,6 +515,7 @@
void conf_parse(const char *name) {
    const char *tmp;
    struct symbol *sym;
    int i;

    sym_init();
    _menu_init();
    -rootmenu.prompt = menu_add_prompt(P_MENU, "Linux Kernel Configuration", NULL);

    if (getenv("ZCONF_DEBUG"))
        zconfdebug = 1;
    if (!modules_sym)
        modules_sym = sym_find("n");

    tmp = rootmenu.prompt->text;
    rootmenu.prompt->text = _(rootmenu.prompt->text);
    rootmenu.prompt->text = sym_expand_string_value(rootmenu.prompt->text);
    +free((char*)tmp);

    menu_finalize(&rootmenu);
    for_all_symbols(i, sym) {
        --- linux-4.15.0.orig/scripts/kmsg-doc
        +++ linux-4.15.0/scripts/kmsg-doc
        @ @ -0,0 +1,478 @@
        +#!/usr/bin/perl -w
        +#
        +# kmsg kernel messages check and print tool.
        +#
        +# To check the source code for missing messages the script is called
        +# with check, the name compiler and the compile parameters
        +#kmsg-doc check $(CC) $(c_flags) $<
        +# To create man pages for the messages the script is called with
        +#kmsg-doc print $(CC) $(c_flags) $<
        +#
        +# Copyright IBM Corp. 2008
        +# Author(s):  Martin Schwidiefsky <schwidefsky@de.ibm.com>
        +# Michael Holzheu <holzheu@linux.vnet.ibm.com>
        +
        +use Cwd;
        +use bigint;
        +
        +my $errors = 0;
+my $warnings = 0;
+my $srctree = "";
+my $objtree = "";
+my $kmsg_count = 0;
+
+sub remove_quotes($)
+
+{ my ($string) = @_; my $inside = 0; my $slash = 0; my $result = "";
+
+    foreach my $str (split(/\["\]/, $string)) {
+        if ($inside && ($str ne "" || $slash)) {
+            $result .= $str;
+        }
+        # Check for backslash before quote
+        if ($str eq "") {
+            if (!$slash) {
+                $inside = !$inside;
+            }
+            $result .= $str;
+        } elsif ($str eq \") {
+            $result = $str;
+        } elsif ($str ne "") {
+            $result = $str;
+        }
+    }
+    return $result;
+
+sub string_to_bytes($)
+
+{ my ($string) = @_; my %is_escape = ('"', 0x22, '\', 0x5c, 'n', 0x0a, 'r', 0x0d, 'b', 0x08,
+    't', 0x09, 'f', 0x0c, 'a', 0x07, 'v', 0x0b, '?', 0x3f);
+    my (@ar, $slash, $len);
+
+    # scan string, interpret backslash escapes and write bytes to @ar
+    $len = 0;
+    foreach my $ch (split(/\/, $string)) {
+        if ($ch eq '\') {
+            $result = $str;
+        } elsif ($slash && defined $is_escape{$ch}) {
+            
+        } elsif ($ch eq '\') {
+            $result = $str;
+        } elsif ($ch ne '') {
+            $result = $str;
+        }
+    }
+    return $result;
+}
+
+sub string_to_bytes($)
+
+{ my ($string) = @_; my %is_escape = ('"', 0x22, '\', 0x5c, 'n', 0x0a, 'r', 0x0d, 'b', 0x08,
+    't', 0x09, 'f', 0x0c, 'a', 0x07, 'v', 0x0b, '?', 0x3f);
+    my (@ar, $slash, $len);
+
+    # scan string, interpret backslash escapes and write bytes to @ar
+    $len = 0;
+    foreach my $ch (split(/\/, $string)) {
+        if ($ch eq '\') {
+            $result = $str;
+        } elsif ($slash && defined $is_escape{$ch}) {
+            
+        } elsif ($ch eq '\') {
+            $result = $str;
+        } elsif ($ch ne '') {
+            $result = $str;
+        }
+    }
+    return $result;
+}

sub calc_jhash($) {
    my ($string) = @_; 
    my @ar; 
    my ($a, $b, $c, $i, $length, $len); 
    @ar = string_to_bytes($string); 
    $length = @ar; 
    # add dummy elements to @ar to avoid if then else hell 
    push @ar, (0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0); 
    $a = 0x9e3779b9;  
    $b = 0x9e3779b9;    
    $c = 0;    
    $i = 0; 
    for ($len = $length + 12; $len >= 12; $len -= 12) { 
        if ($len < 24) { 
            $c += $length; 
        } else { 
            $c += ($ar[$i+8] << 8) + ($ar[$i+9] << 16) + ($ar[$i+10] << 24); 
        } 
        $a += $ar[$i] + ($ar[$i+1] << 8) + ($ar[$i+2] << 16) + ($ar[$i+3] << 24); 
        $a &= 0xffffffff; $b &= 0xffffffff; $c &= 0xffffffff; 
    } 
    $a ^= $b; $a &= $c; $a ^= ($c >> 13); $a &= 0xffffffff; 
    $a ^= $b; $a &= $c; $a ^= ($c >> 13); $a &= 0xffffffff; 
    $a ^= $b; $a &= $c; $a ^= ($c >> 13); $a &= 0xffffffff; 
    $a ^= $b; $a &= $c; $a ^= ($c >> 13); $a &= 0xffffffff; 
    $a ^= $b; $a &= $c; $a ^= ($c >> 13); $a &= 0xffffffff; 
}
$c -= $a; $c -= $b; $c ^= ($b >> 5); $c &= 0xffffffff;
+$a -= $b; $a -= $c; $a ^= ($c >> 3); $a &= 0xffffffff;
+$b -= $c; $b -= $a; $b ^= ($a << 10); $b &= 0xffffffff;
+$c -= $a; $c -= $b; $c ^= ($b >> 15); $c &= 0xffffffff;
$1 += 12;
+
+ }     
+ return $c;     
+}     
+
+sub add_kmsg_desc($$$$$$)
+{
+   my ($component, $text, $sev, $argv, $desc, $user) = @_;     
+   my ($hash, $tag);
+
+   $text = remove_quotes($text);
+   $hash = substr(sprintf("%08x", calc_jhash($text)), 2, 6);
+   $tag = $component . "." . $hash;
+
+   if ($kmsg_desc{$tag}) {
+     if ($text ne $kmsg_desc{$tag}->{'TEXT'}) {
+       warn "Duplicate message with tag $tag"
+       warn "  --- $kmsg_desc{$tag}->{'TEXT'}"
+       warn "  +++ $text"
+       } else {
+         warn "Duplicate message description for "$text"
+       }   
+   } else {
+     warn "Duplicate message with tag $tag"
+     warn "  --- $kmsg_desc{$tag}->{'TEXT'}"
+     warn "  +++ $text"
+   }     
+   $errors++;
+   return;
+ }     
+
+sub add_kmsg_print($$$$)
+{
+   my ($component, $sev, $text, $argv) = @_;     
+   my ($hash, $tag, $count, $parm);
+
+   $text = remove_quotes($text);
+   $hash = substr(sprintf("%08x", calc_jhash($text)), 2, 6);
+   $tag = $component . "." . $hash;
+
+   # Pretty print severity
+   $sev =~ s/"0"/Emerg/;
+   $sev =~ s/"1"/Alert/;

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+ $sev =~ s/"2"/Critical/;
+ $sev =~ s/"3"/Error/;
+ $sev =~ s/"4"/Warning/;
+ $sev =~ s/"5"/Notice/;
+ $sev =~ s/"6"/Informational/;
+ $sev =~ s/"7"/Debug/;
+ $kmsg_print{$kmsg_count}->{'TAG'} = $tag;
+ $kmsg_print{$kmsg_count}->{'TEXT'} = $text;
+ $kmsg_print{$kmsg_count}->{'SEV'} = $sev;
+ $kmsg_print{$kmsg_count}->{'ARGV'} = $argv;
+ $kmsg_count += 1;
+}
+
+sub process_source_file($$)
+{
+ my ($component, $file) = @_;
+ my $state;
+ my ($text, $sev, $argv, $desc, $user);
+
+ if (!open(FD, "$file")) {
+return "";
+ }
+
+ $state = 0;
+ while (<FD>) {
+chomp;
+# kmsg message component: #define KMSG_COMPONENT "<component>"
+if (/^#define\s+KMSG_COMPONENT\s+\"(.*)\"[^\"]*$/o) {
+ $component = $1;
+}
+if ($state == 0) {
+ # single line kmsg for undocumented messages, format:
+ # /*? Text: "<message>" */
+ if (/^\s*\/\*\?\s*Text:\s*(\".*\")\s*\*\/\s*$/o) {
+add_kmsg_desc($component, $1, "", "", "", "");
+ }
+ # kmsg message start: '/*?'
+ if (/^\s*\/\*\?\s*$/o) {
+$state = 1;
+($text, $sev, $argv, $desc, $user) = ( "", "", "", "", "" );
+ }
+} elsif ($state == 1) {
+ # kmsg message end: ' */'
+ if (/^\s*\*\/\s*/o) {
+add_kmsg_desc($component, $text, $sev, $argv, $desc, $user);
+$state = 0;
+ }
+ # kmsg message text: ' * Text: "<message>"'

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elsif (/^\s*\*\s*Text:.*$/o) {
    $text = $1;
    }
    # kmsg message severity: ' * Severity: <sev>'
    elsif (/^\s*\*\s*Severity:.*$/o) {
        $sev = $1;
    }
    # kmsg message parameter: ' * Parameter: <argv>'
    elsif (/^\s*\*\s*Parameter:.*$/o) {
        if (!defined($1)) {
            $argv = "";
        } else {
            $argv = $1;
        }
        $state = 2;
    }
    # kmsg message description start: ' * Description:'
    elsif (/^\s*\*\s*Description:.*$/o) {
        if (!defined($1)) {
            $desc = "";
        } else {
            $desc = $1;
        }
        $state = 3;
    }
    # kmsg has unrecognizable lines
    else {
        warn "Warning(${file}:$.): Cannot understand $_";
        $warnings++;
        $state = 0;
    }
} elsif ($state == 2) {
    # kmsg message end: ' */'
    if (/^\s*\*/o) {
        warn "Warning(${file}:$.): Missing description, skipping message";
        $warnings++;
        $state = 0;
    }
    # kmsg message description start: ' * Description:'
    elsif (/^\s*\*\s*Description:.*$/o) {
        $desc = $1;
        $state = 3;
    }
    # kmsg message parameter line: ' * <argv>'
    elsif (/^\s*\*(.*)$/o) {
        $argv .= "\n" . $1;
    } else {
        warn "Warning(${file}:$.): Cannot understand $._";
+$warnings++;  
+$state = 0; 
+} elsif ($state == 3) {  
+  # kmsg message end: ' */'  
+  if (/^\s*\*/\s*/o) {  
+add_kmsg_desc($component, $text, $sev, $argv, $desc, $user);  
+$state = 0;  
+}  
+  # kmsg message description start: ' * User action:'  
+  elsif (/^\s*\*\s*User action:\s*$/o) {  
+$user = $1;  
+$state = 4;  
+}  
+  # kmsg message description line: ' * <text>'  
+  elsif (/^\s*\*\s*(.*)$/o) {  
+$desc .= "$n" . $1;  
+  } else {  
+warn "Warning($file:$.): Cannot understand $._";  
+$warnings++;  
+$state = 0;  
+} elsif ($state == 4) {  
+  # kmsg message end: ' */'  
+  if (/^\s*\*/\s*/o) {  
+add_kmsg_desc($component, $text, $sev, $argv, $desc, $user);  
+$state = 0;  
+}  
+  # kmsg message user action line: ' * <text>'  
+  elsif (/^\s*\*\s*(.*)$/o) {  
+$user .= "$n" . $1;  
+  } else {  
+warn "Warning($file:$.): Cannot understand $._";  
+$warnings++;  
+$state = 0;  
+} return $component;  
+}  
+
+sub process_cpp_file($$$)  
+{  
+  my ($cc, $options, $file, $scomponent) = @_;  
+  open(FD, "$cc $gcc_options|") or die("Preprocessing failed.");  
+  while (<FD>) {
chomp;
+if (/.*__KMSG_PRINT\(\s*\(\S*\)\s*\(\S*\)\s*FMT_.\_ARGS_\s*\(\_\)\_END_\s*\)/o) { 
  +  if ($component ne "") { 
    +    add_kmsg_print($component, $2, $3, $4);
    +  } else {
    +    warn "Error($file:$).: kmsg without component\n";
    +    $errors++;
    +  }
  +} elsif (/.*__KMSG_DEV\(\s*\(\S*\)\s*\(\S*\)\s*FMT_.\_ARGS_\s*\(\_\)\_END_\s*\)/o) {
    +  if ($component ne "") { 
    +    add_kmsg_print($component, $2, "\"%s: \" . $3, $4);
    +  } else {
    +    warn "Error($file:$).: kmsg without component\n";
    +    $errors++;
    +  }
  +}
+}
+
+sub check_messages($) {
  +
  +  my $component = "@_";
  +  my $failed = 0;
  +
  +  for ($i = 0; $i < $kmsg_count; $i++) {
  +  $tag = $kmsg_print{$i}->{'TAG'};
  +  if (!defined($kmsg_desc{$tag})) {
  +      add_kmsg_desc($component,
  +        "\" . $kmsg_print{$i}->{'TEXT'} . \\
  +        $kmsg_print{$i}->{'SEV'},
  +        $kmsg_print{$i}->{'ARGV'},
  +        "Please insert description here",
  +        "What is the user supposed to do");
  +      $kmsg_desc{$tag}->{'CHECK'} = 1;
  +      $failed = 1;
  +      warn "$component: Missing description for: ".
  +      $kmsg_print{$i}->{'TEXT'} . \\
  +      $errors++;
  +    next;
  +  }
  +  if ($kmsg_desc{$tag}->{'SEV'} ne " \\
  +    $kmsg_print{$i}->{'SEV'}) {
  +    warn "Message severity mismatch for "$kmsg_print{$i}->{'TEXT'}"
  +      "\" . $kmsg_print{$i}->{'SEV'} . \\
  +      $warn " \--- $kmsg_desc{$tag}->{'SEV'}\n";
  +    warn " +++ $kmsg_print{$i}->{'SEV'}\n";
  +  }
  +}
+}
+return $failed;
+}  
+  
+sub print_templates()  
+{  
+    print "Templates for missing messages:\n";  
+    foreach $tag ( sort { $kmsg_desc{$a} <=> $kmsg_desc{$b} } keys %kmsg_desc ) {  
+        next;  
+    }  
+  
+  
+  
+    print "\n";  
+    print " * Text: "$kmsg_desc{$tag}->{'TEXT'}\\n\n";  
+    print " * Severity: $kmsg_desc{$tag}->{'SEV'}\\n\n";  
+    $argv = $kmsg_desc{$tag}->{'ARGV'};  
+    if ($argv ne "") {  
+        print " * Parameter:\n\n";  
+        @parms = split(/s*/,$argv,$kmsg_desc{$tag}->{'ARGV'});  
+        $count = 0;  
+        foreach $parm (@parms) {  
+            count += 1;  
+            if (!($parm eq "")) {  
+                print " *   @$count: $parm\\n\n";  
+            }  
+        }  
+    }  
+    print " * Description:\n\n";  
+    print " * $kmsg_desc{$tag}->{'DESC'}\\n\n";  
+    print " * User action:\n\n";  
+    print " * $kmsg_desc{$tag}->{'USER'}\\n\n";  
+  }  
+}  
+  
+sub write_man_pages()  
+{  
+    my ($i, $file);  
+    for ($i = 0; $i < $kmsg_count; $i++) {  
+        $tag = $kmsg_print{$i}->{'TAG'};  
+        if (!defined($kmsg_desc{$tag}) ||  
+            defined($kmsg_desc{$tag}->{'CHECK'}) ||  
+            $kmsg_desc{$tag}->{'DESC'} eq "") {  
+            next;  
+        }  
+        $file = $objtree . "man/" . $tag . ".9";  
+        if (!$open(WR, "$file")) {  
+            warn "Error: Cannot open file $file\n";  
+            $errors++;  
+            return;  
+        }  
+        print "$file = Sobjtree . "man/" . $tag . ".9";  
+        if (!$open(WR, "$file")) {  
+            warn "Error: Cannot open file $file\n";  
+            $errors++;  
+            return;  
+        }  
+    }  
+  
+}  
+  
+
+} print WR ";TH "$tag" 9 "Linux Messages" LINUX\n";
+print WR ".SH Message\n";
+print WR "$tag . " . $kmsg_desc{$tag}->{'TEXT'} . ".n";
+print WR ".SH Severity\n";
+print WR "$kmsg_desc{$tag}->{'SEV'}\n";
+$argv = $kmsg_desc{$tag}->{'ARGV'};
+if ($argv ne "") {
    + print WR ".SH Parameters\n";
    + @parms = split(/\s*\n\s*/,$kmsg_desc{$tag}->{'ARGV'});
    + foreach $parm (@parms) {
        +$parm =~ s/\S*\s*(.*)\s*$/$1/;
        +if (!($parm eq "")) {
            + print WR "$parm\n\n";
        +}
    +}
    + print WR ".SH Description\n";
    +print WR "$kmsg_desc{$tag}->{'DESC'}\n";
    +$user = $kmsg_desc{$tag}->{'USER'};
    +if ($user ne "") {
        + print WR ".SH User action\n";
        + print WR "$user\n";
    +}
+}
+
+if (defined($ENV{'srctree'})) {
 + $srctree = "$ENV{'srctree'}" . "/";
 +} else {
 + $srctree = getcwd;
 +}
+
+if (defined($ENV{'objtree'})) {
 + $objtree = "$ENV{'objtree'}" . "/";
 +} else {
 + $objtree = getcwd;
 +}
+
+if (defined($ENV{'SRCARCH'})) {
 + $srcarch = "$ENV{'SRCARCH'}" . "/";
 +} else {
 + print "kmsg-doc called without a valid \$SRCARCH\n";
 + exit 1;
 +}
+
+$option = shift;
+$cc = shift;
+$gcc_options = "-E -D __KMSG_CHECKER ";
+foreach $tmp (@ARGV) {
+  $tmp =~ s/\(\)/\\(/;
+  $tmp =~ s/\)/\\)/;
+  $gcc_options .= " $tmp";
+  $filename = $tmp;
+}
+
+$component = process_source_file("", $filename);
+if ($component ne "") {
+  process_source_file($component, $srctree . "Documentation/kmsg/" .
+  $srctree . $component);
+  process_source_file($component, $srctree . "Documentation/kmsg/" .
+  $component);
+}
+
+process_cpp_file($cc, $gcc_options, $filename, $component);
+if ($option eq "check") {
+  if (check_messages($component)) {
+    print_templates();
+  }
+} elsif ($option eq "print") {
+  write_man_pages();
+}
+
+exit($errors);

--- linux-4.15.0.orig/scripts/mkcompile_h
+++ linux-4.15.0/scripts/mkcompile_h
@@ -78,15 +78,23 @@
  # Only replace the real compile.h if the new one is different,
  # in order to preserve the timestamp and avoid unnecessary
  # recompliations.
-# We don't consider the file changed if only the date/time changed.
+if [ -z "$KBUILD_BUILD_TIMESTAMP" ]; then
  + IGNORE_PATTERN="UTS_VERSION"
+else
  + IGNORE_PATTERN="NOT_A_PATTERN_TO_BE.MATCHED"
+fi


if [ -r $TARGET ] && \
-   grep -v 'UTS_VERSION' $TARGET > .tmpver.1 && \
-   grep -v 'UTS_VERSION' .tmpcompile > .tmpver.2 && \
+   grep -v $IGNORE_PATTERN $TARGET > .tmpver.1 && \
+   grep -v $IGNORE_PATTERN .tmpcompile > .tmpver.2 && \
   cmp -s .tmpver.1 .tmpver.2; then \
   rm -f .tmpcompile \
else \
   --- linux-4.15.0.orig/scripts/mksysmap \
+++ linux-4.15.0/scripts/mksysmap \
@@ -41,4 +41,4 @@ \
# so we just ignore them to let readprofile continue to work. 
# (At least sparc64 has __crc__ in the middle). 
-$NM -n $1 | grep -v '(^[aNUw] )|(\[aNUw\])|(\[adt\])|(\.[L])' > $2 
+$NM -n $1 | grep -v '(^[aNUw] )|(\[aNUw\])|(\[adt\])|(\.[L])' > $2 
--- linux-4.15.0.orig/scripts/mod/file2alias.c 
+++ linux-4.15.0/scripts/mod/file2alias.c 
@@ -47,49 +47,9 @@ 
structure devtable { 
  const char *device_id; /* name of table, __mod_<name>__device_table. */ 
  unsigned long id_size; 
  -void *function; 
  +int (*do_entry)(const char *filename, void *symval, char *alias); 
}; 

-#define __cat(a,b) a ## b 
-#define __cat(a,b) __cat(a,b) 
-
-/ * we need some special handling for this tool running eventually on 
- * Darwin. The Mach-O section handling is a bit different than ELF section 
- * handling. The differences in detail are: 
- * a) we have segments which have sections 
- * b) we need a API call to get the respective section symbols */ 
-#if defined(__MACH__) 
-#include <mach-o/getsect.h> 
-
-#define INIT_SECTION(name) do { 
-unsigned long #_len;
-    char * __cat(pstart_,name) = getsectdata("__TEXT",\ 
-    #name, &__cat(name, #_len));\ 
-    char * __cat(pstop_,name) = __cat(pstart_,name) +\ 
-       __cat(name, #_len));\ 
-    __cat(__start_,name) = (void *) __cat(pstart_,name);\ 
-    __cat(__stop_,name) = (void *) __cat(pstop_,name);\ 
-    while (0) 
-    +#define SECTION(name) __attribute__((section("__TEXT, " #name))) 
-); 

---
-struct devtable **__start___devtable, **__stop___devtable;
-#else
-#define INIT_SECTION(name) /* no-op for ELF */
-#define SECTION(name)   __attribute__((section(#name)))
-
-/* We construct a table of pointers in an ELF section (pointers generally
-* go unpadded by gcc). ld creates boundary syms for us. */
-extern struct devtable *__start___devtable[], *__stop___devtable[];
-#endif /* __MACH__ */
-
-#if !defined(__used)
-# if __GNUC__ == 3 && __GNUC_MINOR__ < 3
-#  define __used		__attribute__((__unused__))
-# else
-#  define __used	__attribute__((__used__))
-# endif
-#endif
-
/* Define a variable f that holds the value of field f of struct devid
* based at address m.
*/
*/
@@ -102,16 +62,6 @@
#define DEF_FIELD_ADDR(m, devid, f) 
typeof(((struct devid *)0)->f) *f = ((m) + OFF_##devid##_##f)
-/* Add a table entry. We test function type matches while we're here. */
-#define ADD_TO_DEVTABLE(device_id, type, function) 
-\tstatic struct devtable __cat(devtable,__LINE__) = {
-\t	device_id + 0*sizeof((function)((const char *)NULL,
-\t					(void *)NULL,
-\t					(char *)NULL)),
-\t	SIZE_##type, (function) };
-\tstatic struct devtable *SECTION(__devtable) __used 
-\t	__cat(devtable_ptr,__LINE__) = &__cat(devtable,__LINE__)
-
#define ADD(str, sep, cond, field)                              
\do {                                                            
strcat(str, sep);                                       
@@ -431,7 +381,6 @@
return 1;
}
-ADD_TO_DEVTABLE("hid", hid_device_id, do_hid_entry);

/* Looks like: ieee1394:venNmoNspNverN */
static int do_ieee1394_entry(const char *filename,
@@ -456,7 +405,6 @@
add_wildcard(alias);
return 1;
}
-ADD_TO_DEVTABLE("ieee1394", ieee1394_device_id, do_ieee1394_entry);

/* Looks like: pci:vNdNsvNsNdNscNsNiN. */
static int do_pci_entry(const char *filename,
@@ -500,7 +448,6 @@
add_wildcard(alias);
return 1;
}
-ADD_TO_DEVTABLE("pci", pci_device_id, do_pci_entry);

/* looks like: "ccw:tNmNdtNdmN" */
static int do_ccw_entry(const char *filename,
@@ -524,7 +471,6 @@
sprintf(alias, "ap:t%02X\", dev_type);
return 1;
}
-ADD_TO_DEVTABLE("ccw", ccw_device_id, do_ccw_entry);

/* looks like: "css:tN" */
static int do_css_entry(const char *filename,
@@ -535,7 +481,6 @@
sprintf(alias, "css:t%01X", type);
return 1;
}
-ADD_TO_DEVTABLE("css", css_device_id, do_css_entry);

/* Looks like: "serio:tyNprNidNexN" */
static int do_serio_entry(const char *filename,
@@ -566,7 +510,6 @@
add_wildcard(alias);
return 1;
}
-ADD_TO_DEVTABLE("serio", serio_device_id, do_serio_entry);

/* looks like: "acpi:ACPI0003" or "acpi:PNP0C0B" or "acpi:LNXVIDEO" or */
/*   "acpi:bbsspp" (bb=base-class, ss=sub-class, pp=prog-if) */
@@ -604,7 +547,6 @@
}
return 1;
}
-ADD_TO_DEVTABLE(“acpi”, acpi_device_id, do_acpi_entry);

/* looks like: "pnp:dD" */
static void do_pnp_device_entry(void *symval, unsigned long size,
   @@ -725,7 +667,6 @@
   add_wildcard(alias);
   return 1;
}
-ADD_TO_DEVTABLE(“pcmcia”, pcmcia_device_id, do_pcmcia_entry);

static int do_vio_entry(const char *filename, void *symval,
   char *alias)
   @@ -745,7 +686,6 @@
   add_wildcard(alias);
   return 1;
}
-ADD_TO_DEVTABLE(“vio”, vio_device_id, do_vio_entry);

#define ARRAY_SIZE(x) (sizeof(x) / sizeof((x)[0]))

   @@ -818,7 +758,6 @@
   do_input(alias, *swbit, 0, INPUT_DEVICE_ID_SW_MAX);
   return 1;
}
-ADD_TO_DEVTABLE(“input”, input_device_id, do_input_entry);

static int do_eisa_entry(const char *filename, void *symval,
   char *alias)
   @@ -830,7 +769,6 @@
   strcat(alias, “*”);
   return 1;
}
-ADD_TO_DEVTABLE(“eisa”, eisa_device_id, do_eisa_entry);

/* Looks like: parisc:tNhvNrevNsvN */
static int do_parisc_entry(const char *filename, void *symval,
   @@ -850,7 +788,6 @@
   add_wildcard(alias);
   return 1;
}
-ADD_TO_DEVTABLE(“parisc”, parisc_device_id, do_parisc_entry);

/* Looks like: sdio:cNvNdN. */
static int do_sdio_entry(const char *filename,
   @@ -867,7 +804,6 @@
   add_wildcard(alias);
return 1;
);

-ADD_TO_DEVTABLE("sdio", sdio_device_id, do_sdio_entry);

/* Looks like: ssb:vNidNrevN. */
static int do_ssb_entry(const char *filename,
@@ -884,7 +820,6 @@
add_wildcard(alias);
return 1;
)
-ADD_TO_DEVTABLE("ssb", ssb_device_id, do_ssb_entry);

/* Looks like: bcma:mNidNrevNclN. */
static int do_bcma_entry(const char *filename,
@@ -903,7 +838,6 @@
add_wildcard(alias);
return 1;
)
-ADD_TO_DEVTABLE("bcma", bcma_device_id, do_bcma_entry);

/* Looks like: virtio:dNvN */
static int do_virtio_entry(const char *filename, void *symval,
@@ -919,7 +853,6 @@
add_wildcard(alias);
return 1;
)
-ADD_TO_DEVTABLE("virtio", virtio_device_id, do_virtio_entry);

/*
 * Looks like: vmbus:guid
@@ -942,7 +875,6 @@
return 1;
)
-ADD_TO_DEVTABLE("vmbus", hv_vmbus_device_id, do_vmbus_entry);

/* Looks like: i2c:S */
static int do_i2c_entry(const char *filename, void *symval,
@@ -953,7 +895,6 @@
return 1;
)
-ADD_TO_DEVTABLE("i2c", i2c_device_id, do_i2c_entry);

/* Looks like: spi:S */
static int do_spi_entry(const char *filename, void *symval,
@@ -964,7 +906,6 @@
return 1;
}
-ADD_TO_DEVTABLE("spi", spi_device_id, do_spi_entry);

static const struct dmifield {
    const char *prefix;
    @ @ -1019,7 +949,6 @ @
    strcat(alias, ":");
    return 1;
}
-ADD_TO_DEVTABLE("dmi", dmi_system_id, do_dmi_entry);

static int do_platform_entry(const char *filename,
    void *symval, char *alias)
    @ @ -1028,7 +957,6 @ @
    sprintf(alias, PLATFORM_MODULE_PREFIX "%s", *name);
    return 1;
}
-ADD_TO_DEVTABLE("platform", platform_device_id, do_platform_entry);

static int do_mdio_entry(const char *filename,
    void *symval, char *alias)
    @ @ -1053,7 +981,6 @ @
    return 1;
}
-ADD_TO_DEVTABLE("mdio", mdio_device_id, do_mdio_entry);

/* Looks like: zorro:iN. */
static int do_zorro_entry(const char *filename, void *symval,
    @ @ -1064,7 +991,6 @ @
    ADD(alias, "i", id != ZORRO_WILDCARD, id);
    return 1;
}
-ADD_TO_DEVTABLE("zorro", zorro_device_id, do_zorro_entry);

/* looks like: "pnp:dD" */
static int do_isapnp_entry(const char *filename,
    @ @ -1080,7 +1006,6 @ @
    (function >> 12) & 0x0f, (function >> 8) & 0x0f);
    return 1;
}
-ADD_TO_DEVTABLE("isapnp", isapnp_device_id, do_isapnp_entry);

/* Looks like: "ipack:fNvNdN". */
static int do_ipack_entry(const char *filename,
    @ @ -1096,7 +1021,6 @ @
    add_wildcard(alias);
return 1;
}
-ADD_TO_DEVTABLE("ipack", ipack_device_id, do_ipack_entry);

/*
 * Append a match expression for a single masked hex digit.
@@ -1167,7 +1091,6 @@
 return 1;
 }
-ADD_TO_DEVTABLE("amba", amba_id, do_amba_entry);

/*
 * looks like: "mipscdmm:tN"
@@ -1183,7 +1106,6 @@
sprintf(alias, "mipscdmm:t%02X\", type);
 return 1;
 }
-ADD_TO_DEVTABLE("mipscdmm", mips_cdmm_device_id, do_mips_cdmm_entry);

/* LOOKS like cpu:type:x86,venVVVVfamFFFFmodMMMM:feature:*FEAT,*
 * All fields are numbers. It would be nicer to use strings for vendor
@@ -1208,7 +1130,6 @@
sprintf(alias + strlen(alias), "%04X\", feature);
 return 1;
 }
-ADD_TO_DEVTABLE("x86cpu", x86_cpu_id, do_x86cpu_entry);

/* LOOKS like cpu:type::*:feature:*FEAT* */
static int do_cpu_entry(const char *filename, void *symval, char *alias)
@@ -1218,7 +1139,6 @@
sprintf(alias, "cpu:type::*:feature:*%04X\", feature);
 return 1;
 }
-ADD_TO_DEVTABLE("cpu", cpu_feature, do_cpu_entry);

/* Looks like: mei:S:uuid:N:* */
static int do_mei_entry(const char *filename, void *symval,
@@ -1237,7 +1157,6 @@
 add_wildcard(alias);
/* Looks like: ulpi:vNpN */
static int do_ulpi_entry(const char *filename, void *symval,
@@ -1270,7 +1188,6 @@
return 1;
}
-ADD_TO_DEVTABLE("ulpi", ulpi_device_id, do_ulpi_entry);

/* Looks like: hdaudio:vNrNaN */
static int do_hda_entry(const char *filename, void *symval, char *alias)
@@ -1287,7 +1204,6 @@
add_wildcard(alias);
return 1;
}
-ADD_TO_DEVTABLE("hdaudio", hda_device_id, do_hda_entry);

/* Looks like: fsl-mc:vNdN */
static int do_fsl_mc_entry(const char *filename, void *symval,
@@ -1299,7 +1215,6 @@
sprintf(alias, "fsl-mc:v%08Xd%s", vendor, *obj_type);
return 1;
}
-ADD_TO_DEVTABLE("fslmc", fsl_mc_device_id, do_fsl_mc_entry);

/* Looks like: tbsvc:kSpNvNrN */
static int do_tbsvc_entry(const char *filename, void *symval, char *alias)
@@ -1324,7 +1239,6 @@
add_wildcard(alias);
return 1;
}
-ADD_TO_DEVTABLE("tbsvc", tb_service_id, do_tbsvc_entry);

/* Does namelen bytes of name exactly match the symbol? */
static bool sym_is(const char *name, unsigned namelen, const char *symbol)
@@ -1338,12 +1252,11 @@
static void do_table(void *symval, unsigned long size,
    unsigned long id_size,
    const char *device_id,
    - void *function,
+    int (*do_entry)(const char *filename, void *symval, char *alias),
       struct module *mod)
{
    unsigned int i;
    char alias[500];

return 1;
}
# Open Source Used In 5GasS Edge AC-4 35024

```c
int (*do_entry)(const char *, void *entry, char *alias) = function;

device_id_check(mod->name, device_id, size, id_size, symval);
/* Leave last one: it's the terminator. */
@@ -1357,6 +1270,45 @@
}
}

+static const struct devtable devtable[] = {
+  "hid", SIZE_hid_device_id, do_hid_entry,
+  "iae1394", SIZE_ieee1394_device_id, do_ieee1394_entry,
+  "pci", SIZE_pci_device_id, do_pci_entry,
+  "ccw", SIZE_ccw_device_id, do_ccw_entry,
+  "ap", SIZE_ap_device_id, do_ap_entry,
+  "css", SIZE_css_device_id, do_css_entry,
+  "serio", SIZE_serio_device_id, do_serio_entry,
+  "acpi", SIZE_acpi_device_id, do_acpi_entry,
+  "pcmcia", SIZE_pcmcia_device_id, do_pcmcia_entry,
+  "vio", SIZE_vio_device_id, do_vio_entry,
+  "input", SIZE_input_device_id, do_input_entry,
+  "eisa", SIZE_eisa_device_id, do_eisa_entry,
+  "parisc", SIZE_parisc_device_id, do_parisc_entry,
+  "sdio", SIZE_sdio_device_id, do_sdio_entry,
+  "ssb", SIZE_ss_build_device_id, do_ssb_entry,
+  "bcma", SIZE_bcma_device_id, do_bcma_entry,
+  "virtio", SIZE_virtio_device_id, do_virtio_entry,
+  "vmbus", SIZE_hv_vmbus_device_id, do_vmbus_entry,
+  "i2c", SIZE_i2c_device_id, do_i2c_entry,
+  "spi", SIZE_spi_device_id, do_spi_entry,
+  "mii", SIZE_mii_device_id, do_mii_entry,
+  "platform", SIZE_platform_device_id, do_platform_entry,
+  "mdio", SIZE_mdio_device_id, do_mdio_entry,
+  "zorro", SIZE_zorro_device_id, do_zorro_entry,
+  "isp”, SIZE_isapnp_device_id, do_isapnp_entry,
+  "ipack", SIZE_ipack_device_id, do_ipack_entry,
+  "amba", SIZE_amba_device_id, do_amba_entry,
+  "mipsdmm", SIZE_mips_cdmm_device_id, do_mips_cdmm_entry,
+  "x86cpu", SIZE_x86_cpu_device_id, do_x86cpu_entry,
+  "cpu", SIZE_cpu_feature, do_cpu_entry,
+  "mei", SIZE_mei_device_id, do_mei_entry,
+  "rapido", SIZE_rapido_device_id, do_rapido_entry,
+  "ulpi", SIZE_ulpi_device_id, do_ulpi_entry,
+  "hdauio", SIZE_hda_device_id, do_hda_entry,
+  "fslmc", SIZE_fsl_mc_device_id, do_fsl_mc_entry,
+  "tbsvc", SIZE_tb_service_id, do_tbsvc_entry,
+};

/* Create MODULE_ALIAS() statements.
 */
```
At this time, we cannot write the actual output C source yet, so we write into the mod->dev_table_buf buffer. */
@@ -1411,13 +1363,14 @@
  else if (sym_is(name, namelen, "pnp_card"))
    do_pnp_card_entries(symval, sym->st_size, mod);
  else {
-    struct devtable **p;
-    INIT_SECTION(__devtable);
+    int i;
+    for (i = 0; i < ARRAY_SIZE(devtable); i++) {
+      const struct devtable *p = &devtable[i];

    -for (p = __start___devtable; p < __stop___devtable; p++) {
    -  if (sym_is(name, namelen, (*p)->device_id)) {
-    -    do_table(symval, sym->st_size, (*p)->id_size,
-    -      (*p)->device_id, (*p)->function, mod);
+    -    if (sym_is(name, namelen, p->device_id)) {
+      do_table(symval, sym->st_size, p->id_size,
+          p->device_id, p->do_entry, mod);
+    break;
   }
  }
--- linux-4.15.0.orig/scripts/mod/modpost.c
+++ linux-4.15.0/scripts/mod/modpost.c
@@ -645,7 +645,7 @@
  info->sechdrs[sym->st_shndx].sh_offset -
  (info->hdr->e_type != ET_REL ?
  info->sechdrs[sym->st_shndx].sh_addr : 0);
-crc = *crcp;
+crc = TO_NATIVE(*crcp);
}  
sym_update_crc(symname + strlen(CRC_PFX), mod, crc,
  export);
@@ -677,7 +677,7 @@
  if (ELF_ST_TYPE(sym->st_info) == STT_SPARC_REGISTER)
    break;
  if (symname[0] == '.') {
-    char *munged = strdup(symname);
+    char *munged = NOFAIL(strdup(symname));
      munged[0] = '_';
      munged[1] = toupper(munged[1]);
      symname = munged;
@@ -1174,6 +1174,14 @@
  * fromsec = text section
  * refsymname = *.constprop.*
  *
  + * Pattern 6:
+ * Hide section mismatch warnings for ELF local symbols. The goal
+ * is to eliminate false positive modpost warnings caused by
+ * compiler-generated ELF local symbol names such as ".LANCHOR1".
+ * Autogenerated symbol names bypass modpost's "Pattern 2"
+ * whitelisting, which relies on pattern-matching against symbol
+ * names to work. (One situation where gcc can autogenerate ELF
+ * local symbols is when "-fsection-anchors" is used.)
+ */
static int secref_whitelist(const struct sectioncheck *mismatch,
    const char *fromsec, const char *fromsym,
@@ -1212,9 +1220,37 @@
    match(fromsym, optim_symbols))
    return 0;

+/* Check for pattern 6 */
+if (strstarts(fromsym, ",.L")
+return 0;
+
+ return 1;
+
+static inline int is_arm_mapping_symbol(const char *str)
+{
+ return str[0] == '$' && strchr("axtd", str[1])
+}
+
+ /* If there's no name there, ignore it; likewise, ignore it if it's
+  one of the magic symbols emitted used by current ARM tools.
+ */
+ /* Otherwise if find_symbols_between() returns those symbols, they'll
+ fail the whitelist tests and cause lots of false alarms ... fixable
+ only by merging __exit and __init sections into __text, bloating
+ the kernel (which is especially evil on embedded platforms).
+ */
+static inline int is_valid_name(struct elf_info *elf, Elf_Sym *sym)
+{
+ const char *name = elf->strtab + sym->st_name;
+  
+ if (!name || !strlen(name))
+ return 0;
+ return !is_arm_mapping_symbol(name);
+}
+/**
+ * Find symbol based on relocation record info.
+ * In some cases the symbol supplied is a valid symbol so
continue;
if (ELF_ST_TYPE(sym->st_info) == STT_SECTION)
continue;
+if (!is_valid_name(elf, sym))
+continue;
if (sym->st_value == addr)
return sym;
/* Find a symbol nearby - addr are maybe negative */
continue;
if (ELF_ST_TYPE(sym->st_info) == STT_SECTION)
continue;
+if (!is_valid_name(elf, sym))
+continue;
return NULL;
}

- static inline int is_arm_mapping_symbol(const char *str)
- {
- return str[0] == '$' && strchr("axtd", str[1])
- }
- /*
- * If there's no name there, ignore it; likewise, ignore it if it's
- * one of the magic symbols emitted used by current ARM tools.
- *
- * Otherwise if find_symbols_between() returns those symbols, they'll
- * fail the whitelist tests and cause lots of false alarms ... fixable
- * only by merging __exit and __init sections into __text, bloating
- * the kernel (which is especially evil on embedded platforms).
- */
- static inline int is_valid_name(struct elf_info *elf, Elf_Sym *sym)
- {
- const char *name = elf->strtab + sym->st_name;
- -
- if (!name || !strlen(name))
- return 0;
- return !is_arm_mapping_symbol(name);
- }
- /*
- * Find symbols before or equal addr and after addr - in the section sec.
- * If we find two symbols with equal offset prefer one with a valid name.
- */
static char *sec2annotation(const char *s)
{
if (match(s, init_exit_sections)) {
- char *p = malloc(20);
+ char *p = NOFAIL(malloc(20));
char *r = p;
*p++ = '_';
@@ -1349,7 +1363,7 @@
    strcat(p, " ");
    return r;
} else {
    return strdup(""");
+    return NOFAIL(strdup(""));
}

@@ -2050,7 +2064,7 @@
{
    if (buf->size - buf->pos < len) {
    buf->size += len + SZ;
    -buf->p = realloc(buf->p, buf->size);
+    buf->p = NOFAIL(realloc(buf->p, buf->size));
    }
    strncpy(buf->p + buf->pos, s, len);
    buf->pos += len;
    @ @ -2165,6 +2179,14 @@
    buf_print(b, "\nMODULE_INFO(intree, "Y")\n\n");
}

+/* Cannot check for assembler */
+static void add_retpoline(struct buffer *b)
+{
+    buf_printf(b, "\n#ifdef CONFIG_RETPOLINE\n");
+    buf_printf(b, "MODULE_INFO(retpoline, \"Y\")\n\n");
+    buf_printf(b, "\n#endif\n");
+}
+
+static void add_staging_flag(struct buffer *b, const char *name)
+
static const char *staging_dir = "drivers/staging";
@@ -2506,6 +2528,7 @@
    add_header(&buf, mod);
    add_intree_flag(&buf, !external_module);
+    add_retpoline(&buf);
    add_staging_flag(&buf, mod->name);
    err |= add_versions(&buf, mod);
    add_depends(&buf, mod, modules);
    --- linux-4.15.0.orig/scripts/namespae.pl
    +++ linux-4.15.0/scripts/namespae.pl
    @ @ -65,13 +65,14 @@
use strict;
use File::Find;
+use File::Spec;
my $nm = ($ENV{'NM'} || "nm") . " -p";
my $objdump = ($ENV{'OBJDUMP'} || "objdump") . " -s -j .comment";
-my $srctree = "";
-my $objtree = "";
-$srctree = "$ENV{'srctree'}/" if (exists($ENV{'srctree'}));
-$objtree = "$ENV{'objtree'}/" if (exists($ENV{'objtree'}));
+my $srctree = File::Spec->curdir();
+my $objtree = File::Spec->curdir();
+$srctree = File::Spec->rel2abs($ENV{'srctree'}) if (exists($ENV{'srctree'}));
+$objtree = File::Spec->rel2abs($ENV{'objtree'}) if (exists($ENV{'objtree'}));
if ($#ARGV != -1) {
print STDERR "usage: $0 takes no parameters\n";
@@ -231,9 +232,9 @@
}
($source = $basename) =~ s/\.o$//;
if (-e "$source.c" || -e "$source.S") {
-$source = "$objtree$File::Find::dir/$source";
+$source = File::Spec->catfile($objtree, $File::Find::dir, $source)
} else {
-$source = "$srctree$File::Find::dir/$source";
+$source = File::Spec->catfile($srctree, $File::Find::dir, $source)
}
if (! -e "$source.c" && ! -e "$source.S") {
# No obvious source, exclude the object if it is conglomerate
--- linux-4.15.0.orig/scripts/package/Makefile
+++ linux-4.15.0/scripts/package/Makefile
@@ -94,6 +94,19 @@
clean-dirs += $(objtree)/debian/
+# snap-pkg
+# --------------------------------------------------------------------------+snap-pkg: FORCE
+rm -rf $(objtree)/snap
+mkdir $(objtree)/snap
+sed "s@KERNELRELEASE@$(KERNELRELEASE)@; \
+s@SRCTREE@$(shell realpath $(srctree))@" \
+$(srctree)/scripts/package/snapcraft.template > \
+$(objtree)/snap/snapcraft.yaml
+cd $(objtree)/snap && \
+snapcraft --target-arch=$(UTS_MACHINE)
+
+clean-dirs += $(objtree)/snap/
# tarball targets

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--- linux-4.15.0.orig/scripts/package/builddeb
+++ linux-4.15.0/scripts/package/builddeb
@@ -140,7 +140,7 @@
cp System.map "$tmpdir/boot/System.map-$version"
cp $KCONFIG_CONFIG "$tmpdir/boot/config-$version"
fi
-cp "$($MAKE -s image_name)" "$tmpdir/$installed_image_path"
+cp "$($MAKE -s -f $srctree/Makefile image_name)" "$tmpdir/$installed_image_path"

if grep -q "^CONFIG_OF=y" $KCONFIG_CONFIG ; then
# Only some architectures with OF support have this target
@@ -313,7 +313,7 @@
/(cd $srctree; find . -name Makefile\* -o -name Kconfig\* -o -name \*.pl) > "$objtree/debian/hdrsrcfiles"
-(cd $srctree; find arch/*/include include scripts -type f) >> "$objtree/debian/hdrsrcfiles"
+(cd $srctree; find arch/*/include include scripts -type f -o -type l) >> "$objtree/debian/hdrsrcfiles"
/(cd $srctree; find arch/$SRCARCH -name module.lds -o -name Kbuild.platforms -o -name Platform) >>
"$objtree/debian/debian/hsrsrcfiles"
/(cd $srctree; find $(find arch/$SRCARCH -name include -o -name scripts -type d) -type f) >>
"$objtree/debian/debian/hsrsrcfiles"
if grep -q "^CONFIG_STACK_VALIDATION=y" $KCONFIG_CONFIG ; then
--- linux-4.15.0.orig/scripts/package/snapcraft.template
+++ linux-4.15.0/scripts/package/snapcraft.template
@@ -0,0 +1,14 @@
+name: kernel
+version: KERNELRELEASE
+summary: Linux kernel
+description: The upstream Linux kernel
+grade: stable
+confinement: strict
+type: kernel
+
+parts:
++ kernel:
++ plugin: kernel
++ source: SRCTREE
++ source-type: git
++ kconfigfile: SRCTREE/config
--- linux-4.15.0.orig/scripts/recordmcount.c
+++ linux-4.15.0/scripts/package/recordmcount.c
@@ -53,6 +53,10 @@
#define R_AARCH64_ABS64	257
#endif
+#define R_ARM_PC24		1
+#define R_ARM_THM_CALL		10

#define R_AARCH64_ABS64	257
#endif
+#define R_ARM_PC24		1
+#define R_ARM_THM_CALL10

---
static int is_mcounted_section_name(char const *const txtname)
{
    return strncmp(".text", txtname, 5) == 0 ||
           strcmp(".init.text", txtname) == 0 ||
           strcmp(".ref.text", txtname) == 0 ||
           strcmp(".sched.text", txtname) == 0;
}

+static int arm_is_fake_mcount(Elf32_Rel const *rp)
+{ +
+    switch (ELF32_R_TYPE(w(rp->r_info))) {
+        case R_ARM_THM_CALL:
+        case R_ARM_CALL:
+        case R_ARM_PC24:
+            return 0;
+        +
+    }
+}

/* 64-bit EM_MIPS has weird ELF64_Rel.r_info. */
* We interpret Table 29 Relocation Operation (Elf64_Rel, Elf64_Rela) [p.40]
*/

+static int arm_is_fake_mcount32(Elf32_Rel const *rp)
+{ +
+    switch (w(rp->r_info)) {
+        case R_ARM_THM_CALL:
+        case R_ARM_CALL:
+        case R_ARM_PC24:
+            return 0;
+        +
+    }
+}

altmcount = "__gnu_mcount_nc";
make_nop = make_nop_arm;
reltype = R_AARCH64_ABS64;
if (!mcountsym)
mcountsym = get_mcountsym(sym0, relp, str0);

-if (!mcountsym == Elf_r_sym(relp) && !is_fake_mcount(relp)) {
if (mcountsym && mcountsym == Elf_r_sym(relp) &&
!is_fake_mcount(relp)) {
    uint_t const addend =
            _w(_w(relp->r_offset) - recval + mcount_adjust);
    mrelp->r_offset = _w(offbase - linux-4.15.0.orig/scripts/recordmcount.pl
+++ linux-4.15.0/scripts/recordmcount.pl
@@ -142,6 +142,11 @@
        ".text.unlikely" => 1,
    );

+# Acceptable section-prefixes to record.
+my %text_section_prefixes = (
+    ".text." => 1,
+    ");
+
+# Note: we are nice to C-programmers here, thus we skip the "||"-idiom.
$objc= 'objc' if (!$objc);
$objc= 'objcopy' if (!$objc);
@@ -263,7 +268,11 @@
# force flags for this arch
    $ld .= " -m shelf_linux";
-    $objcopy .= " -O elf32-sh-linux";
+    if ($endian eq "big") {
+        $objcopy .= " -O elf32-shbig-linux";
+    } else {
+        $objcopy .= " -O elf32-sh-linux";
+    }
} elsif ($arch eq "powerpc") {
    $local_regex = "^[0-9a-fA-F]+ t (\.?\S+)";
@@ -472,7 +481,7 @@
# Step 2: find the sections and mcount call sites
#
-open(IN, "$objc -hdr $inputfile") || die "error running $objc";
+open(IN, "LANG=C $objc -hdr $inputfile") || die "error running $objc";

my $text;
@@ -503,6 +512,14 @@
# Only record text sections that we know are safe
$read_function = defined($text_sections{$1});
+if (!$read_function) {
+    foreach my $prefix (keys %text_section_prefixes) {
+        if (substr($1, 0, length $prefix) eq $prefix) {
read_function = 1;
last;
}
}

# print out any recorded offsets
update_funcs();

--- linux-4.15.0.orig/scripts/selinux/genheaders/genheaders.c
+++ linux-4.15.0/scripts/selinux/genheaders/genheaders.c
@@ -9,7 +9,6 @@

-#include <sys/socket.h>

-#include <ctype.h>

+#include <sys/socket.h>

struct security_class_mapping {
    const char *name;

--- linux-4.15.0.orig/scripts/selinux/mdp/mdp.c
+++ linux-4.15.0/scripts/selinux/mdp/mdp.c
@@ -32,7 +32,6 @@

-#include <stdlib.h>

-#include <unistd.h>

-#include <sys/socket.h>

static void usage(char *name)
{
--- linux-4.15.0.orig/scripts/setlocalversion
+++ linux-4.15.0/scripts/setlocalversion
@@ -45,7 +45,7 @@

# Check for git and a git repo.
if test -z "$git rev-parse --show-cdup 2>/dev/null" &&
-   head=`git rev-parse --verify --short HEAD 2>/dev/null`; then
+   head=$(git rev-parse --verify HEAD 2>/dev/null); then

# If we are at a tagged commit (like "v2.6.30-rc6"), we ignore
# it, because this version is defined in the top level Makefile.
@@ -59,11 +59,22 @@

# If we are past a tagged commit (like
# "v2.6.30-rc5-302-g72357d5"), we pretty print it.
+ fi
"atag="git describe 2>/dev/null" ; then
-echo "$atag" | awk -F- '{printf("-%05d-%s", $(NF-1),$(NF))}'
+
++# Ensure the abbreviated sha1 has exactly 12
++# hex characters, to make the output
```
+## independent of git version, local
+## core.abbrev settings and/or total number of
+## objects in the current repository - passing
+## --abbrev=12 ensures a minimum of 12, and the
+## awk substr() then picks the 'g' and first 12
+## hex chars.
+if atag="$(git describe --abbrev=12 2>/dev/null)"; then
+echo "$atag" | awk -F- '{printf("-%05d-%s", $(NF-1),substr($NF,0,13))}'
-
+## If we don't have a tag at all we print -g{commitish},
+## again using exactly 12 hex chars.
+else
+head="$(echo $head | cut -c1-12)"
+printf '%s%s' -g $head
+fi
+fi
@@ -73,8 +84,16 @@
+printf -- '-svn%s' `"git svn find-rev $head"`
+fi
-
+## Check for uncommitted changes.
+## First, with git-status, but --no-optional-locks is only
+## supported in git >= 2.14, so fall back to git-diff-index if
+## it fails. Note that git-diff-index does not refresh the
+## index, so it may give misleading results. See
+## git-update-index(1), git-diff-index(1), and git-status(1).
+if {
+git --no-optional-locks status -uno --porcelain 2>/dev/null ||
+git diff-index --name-only HEAD
+} | grep -qE '^(.. )?scripts/package'; then
+printf '%s' -dirty
+fi

--- linux-4.15.0.orig/scripts/sphinx-pre-install
+++ linux-4.15.0/scripts/sphinx-pre-install
@@ -301,7 +301,7 @@
+
-# Checks valid for RHEL/CentOS version 7.x.
-#
-if (! $system_release =~ /Fedora/) {
+if (!($system_release =~ /Fedora/)) {
 $map{"virtualenv"} = "python-virtualenv";
 }

--- linux-4.15.0.orig/scripts/subarch.include
```

SUBARCH := $(shell uname -m | sed -e s/i.86/x86/ -e s/x86_64/x86/\ 				  -e s/sun4u/sparc64/ \
+ -e s/arm.*/arm/ -e s/sa110/arm/\ 
+ -e s/390x/s390/ -e s/parisc64/parisc/\ 
+ -e s/ppc.*/powerpc/ -e s/mips.*/mips/\ 
+ -e s/sh[234].*/sh/ -e s/aarch64.*/arm64/\ 
+ -e s/riscv.*/riscv/)
# Form an associative lookup for the symbol numbers in the ELF symbol table.
#+ Form an associative lookup for the symbol numbers in the ELF symbol table.
++__symbolmap_init()
++{
++    readelf -W --syms "$1" |
++    awk '{$4 == "SECTION" && $1 ~ /^\[0-9\]*:/} { printf("%08x %08x\n", int($1), int($7)); }' |
++    while read symbol_num section_num
++    do
++      echo "symbolmap_$symbol_num='$section_num'"
++    done
++}
++symbolmap_init()
++{
++    eval $(__symbolmap_init "$1")
++}
++symbolmap()
++{
++    eval RET="\$symbolmap_$1"
++    if [ "SRET" = " " ]; then
++      echo "symbolmap: $1: invalid section" 1>&2
++      exit 1
++    fi
++}
++
++# Form an associative lookup for the section numbers in the ELF symbol table.
++# Form an associative lookup for the section numbers in the ELF symbol table.
++__sectionmap_init()
++{
++    readelf -W --headers "$1" |
++    awk '{ sub("\[", ","); sub("]", ","); }
++    { ($1 ~ /^\[0-9\][0-9]*/) { printf("%08x %s %s %s\n", int($1), $2, $3, $4); } }
++    +}' |
++    while read section_num section_name section_type section_vma
++    do
++      echo "sectionmap_$section_num='$section_name"
++      echo "sectionvma_$section_num='$section_vma"
++      case "$section_type" in
++      REL|RELA) section_relocation="$section_type"
++      esac
++      done
++      echo "section_relocation='$section_relocation"
++    +}
The record says to take the value of <symbol> add <symbol offset> and shove that into <write offset> in the segment of the <symbol>.

Format:
<write offset> 64 bits
<symbol number> 32 bits
<relocation type> 32 bits
<symbol offset> 64 bits

raw32 "$1" ".rela$SECTION" { 
+ a1=":"; a2="; a3="; a4="; a5="
+while read a6 
+do 
+ [ "$a1" = "" ] && { a1="$a6"; continue; }
+ [ "$a2" = "" ] && { a2="$a6"; continue; }
+ [ "$a3" = "" ] && { a3="$a6"; continue; }
+ [ "$a4" = "" ] && { a4="$a6"; continue; }
+ [ "$a5" = "" ] && { a5="$a6"; continue; }
+ 
+ raw32 "$1" ".rela$SECTION" { 
  +a1="": a2="; a3="; a4="; a5="
  +while read a6 
  +do 
  +[ "$a1" = "" ] && { a1="$a6"; continue; }
  +[ "$a2" = "" ] && { a2="$a6"; continue; }
  +[ "$a3" = "" ] && { a3="$a6"; continue; }
  +[ "$a4" = "" ] && { a4="$a6"; continue; }
  +[ "$a5" = "" ] && { a5="$a6"; continue; }
  +
  +#echo "$a1" >"a2" >"a3" >"a4" >"a5" >"a6" 1>&2
  +#echo "type<a3> symbol<a4> offset<a2$a1> addr<a6$a6>" 1>&2
  +
  +symbolmap "$a4"; section_num="$RET"
  +#echo "section_num"<$a2$a1> 1>&2
  +
  +sectionmap "$section_num"; section="$RET"
  +sectionvma "$section_num"; vma="$RET"
  +#echo "section"<$section> vma<$vma>" 1>&2
  +
  +# Adjust the segment addressing by the segment offset.
  +printf -v addr "%u" "0x$a6$a6$a6"
  +printf -v vma "%u" "0x$vma"
  +let offset="$addr + $vma"
  +printf -v offset "%x" "$offset"
  +
  +#echo "$file-$section-$offset"
  +
  +done 
+} 
+}
+}
+}
+}
+sed -e 's/-00*/-\1/'}
+
+
+# Form an associative lookup for the raw contents for an ELF section.
+## Uses 8 character 0 expanded hexadecimal key for ease of consumption.
+contentmap_init()
+{ 
+raw32 "$1" "$2" >"Stmp"
+let offset=0
while read value
do
printf -v offset_hex "%08x" $offset
eval contentmap_${offset_hex}=\"value\"
let offset="offset + 4"
done <"Stmp"
rm -f "Stmp"
}
contentmap()
{
eval RET="\$contentmap_$1"
if [ "\$RET" = " " ]; then
echo "contentmap: $1: invalid offset" 1>&2
exit 1
fi
}

rel()
{
# Load up the current contents of the $SECTION segment
# as the offsets (see below) are recorded there and we will need
# those to calculate the actual address.
contentmap_init "$1" "$SECTION"

#file="$(basename "$1")"
file="$1"

# Read relocation information for a 32bit binary. Each relocation entry
# is 3 longs so we collect 3 quads here. Note that the dump is in
# listed in increasing byte order not withstanding the quad split.
#
# The record says to take the value of <symbol> and add that to the
# existing contents of <write offset> in the segment of the <symbol>.
#
# Format:
# <write offset> 32 bits
# <symbol number> 24 bits
# <relocation type> 8 bits
raw32 "$1" ".rel$SECTION" | 
{| 
a1=""
while read a2
do
[ "$a1" = " " ] && { a1="a2"; continue; }
+
echo "$a1$" "$a2$"
contentmap "$a1"; offset="$RET"
+symbolmap "00${a2%??}"; section_num="$RET"
+
+sectionmap "$section_num"; section="$RET"
+sectionvma "$section_num"; vma="$RET"
+#echo "$a1 < >$a2 < > $offset < > $section <"
+
+echo "$file-$section-$offset"
+
+a1=""
+done
+
+tmp=$(mktemp --tmpdir "retpoline-extract-XXXXXX")
+
+disassemble()
+
+local object="$1"
+local src="$2"
+local options="$3"
+local selector="$4"
+
+objdump $options --disassemble --no-show-raw-instr "$object" | \
+awk -F' ' '{ file=""$object""; src=""$src""; }
+/Disassembly of section/ { segment=$4; sub("\n", "", segment); }
+/[0-9a-f][0-9a-f]* <.*>:/ { tag=$0; sub(".*<", "", tag); sub(">.*", "", tag); }
+$0 ~ /(call|jmp)q? \*0x[0-9a-f]*\(%rip\)/ { 
+next
+}
+$0 ~ /(call|jmp)q? \*\*0x[0-9a-f]*\(%rip\)/ { 
+sub("\n", "", $1);
+if (""$selector""") {
+offset=$1
+$1=tag
+print(file "." segment "." offset " " src " " segment " " $0);
+
+
+# Accumulate potentially vulnerable indirect call/jmp sequences. We do this
+# by examining the raw disassembly for affected forms, recording the location
+# of each.
+case "$bit16" in
="") disassemble "$object" "$src" segment !=".init.text" ;;
+="") disassemble "$object" "$src" --disassembler-options=i8086 segment !=".init.text" && segment != ".text32" && segment != ".text64"
+disassemble "$object" "$src" '--disassembler-options=i386' 'segment == ".text32"'
+disassemble "$object" "$src" '--disassembler-options=x86-64' 'segment == ".text64"
+;
+esac | sort -k 1b,1 >"$object.ur-detected"
+[ ! -s "$object.ur-detected" ] && rm -f "$object.ur-detected"
+
+## Load up the symbol table and section mappings.
+symbolmap_init "$object"
+sectionmap_init "$object"
+
+## Accumulate annotated safe indirect call/jmp sequences. We do this by examining
+the $SECTION sections (and their associated relocation information),
+## each entry represents the address of an instruction which has been marked
+## as ok.
+case "$section_relocation" in
+REL)rel "$object" ;;
+RELA)rela "$object" ;;
+esac | sort -k 1b,1 >"$object.ur-safe"
+[ ! -s "$object.ur-safe" ] && rm -f "$object.ur-safe"
+
+## We will perform the below join on the summarised and sorted fragments
+## formed above. This is performed in retpoline-check.
+##join -v 1 -j 1 "$tmp.extracted" "$tmp.safe" | sed -s 's/[^ ]*/ */' 
+
+rm -f "$tmp"
--- linux-4.15.0.orig/scripts/unifdef.c
+++ linux-4.15.0/scripts/unifdef.c
@@ -395,7 +395,7 @@
* When we have processed a group that starts off with a known-false
* #if/#elif sequence (which has therefore been deleted) followed by a
* #elif that we don't understand and therefore must keep, we edit the
- * latter into a #if to keep the nesting correct. We use strncpy() to
+ * latter into a #if to keep the nesting correct. We use memcpy() to
* overwrite the 4 byte token "elif" with "if  " without a '0' byte.
*
* When we find a true #elif in a group, the following block will
@@ -450,7 +450,7 @@
static void Mpass (void) { strncpy(keyword, "if  ", 4); Pelif(); }
static void Mtrue (void) { keywordedit("else"); state(IS_TRUE_MIDDLE); }
static void Meelif (void) { keywordedit("endif"); state(IS_FALSE_TRAILER); }
static void Melse (void) { keywordedit("endif"); state(IS_FALSE_ELSE); }
--- linux-4.15.0.orig/security/Kconfig
+++ linux-4.15.0/security/Kconfig
@@ -18,6 +18,15 @@

If you are unsure how to answer this question, answer N.

+config SECURITY_PERF_EVENTS_RESTRICT
+bool "Restrict unprivileged use of performance events"
+depends on PERF_EVENTS
+help
+ If you say Y here, the kernel.perf_event_paranoid sysctl
+ will be set to 3 by default, and no unprivileged use of the
+ perf_event_open syscall will be permitted unless it is
+ changed.
+
+config SECURITY
bool "Enable different security models"
depends on SYSFS
@@ -36,6 +45,39 @@
bool
default n

+config SECURITY_STACKING
+bool "Security module stacking"
+depends on SECURITY
+help
+ Allows multiple major security modules to be stacked.
+ Modules are invoked in the order registered with a
+ "bail on fail" policy, in which the infrastructure
+ will stop processing once a denial is detected. Not
+ all modules can be stacked. SELinux and Smack are
+ known to be incompatible. User space components may
+ have trouble identifying the security module providing
+ data in some cases.
+
+ If you select this option you will have to select which
+ of the stackable modules you wish to be active. The
+ "Default security module" will be ignored. The boot line
+ "security=" option can be used to specify that one of
+ the modules identified for stacking should be used instead
+ of the entire stack.
+
+ If you are unsure how to answer this question, answer N.
+
+config SECURITY_LSM_DEBUG
+bool "Enable debugging of the LSM infrastructure"
+depends on SECURITY
+help
+ This allows you to choose debug messages related to
+ security modules configured into your kernel. These
+ messages may be helpful in determining how a security
+ module is using security blobs.
+
+ If you are unsure how to answer this question, answer N.
+
config SECURITYFS
bool "Enable the securityfs filesystem"
help
@@ -57,7 +99,7 @@
config PAGE_TABLE_ISOLATION
bool "Remove the kernel mapping in user mode"
default y
-depends on X86_64 && !UML
+depends on (X86_64 || X86_PAE) && !UML
help
This feature reduces the number of hardware side channels by
ensuring that the majority of kernel addresses are not mapped
@@ -154,6 +196,7 @@
bool "Harden memory copies between kernel and userspace"
depends on HAVE_HARDENED_USERCOPY_ALLOCATOR
select BUG
+imply STRICT_DEVMEM
help
This option checks for obviously wrong memory regions when
copying memory to/from the kernel (via copy_to_user() and
@@ -216,6 +259,29 @@
If you wish for all usermode helper programs to be disabled,
specify an empty string here (i.e. "").

+config LOCK_DOWN_KERNEL
+bool "Allow the kernel to be 'locked down'"
+help
+ Allow the kernel to be locked down under certain circumstances, for
+ instance if UEFI secure boot is enabled. Locking down the kernel
+ turns off various features that might otherwise allow access to the
+ kernel image (eg. setting MSR registers).
+
+config LOCK_DOWN_IN_EFI_SECURE_BOOT
+bool "Lock down the kernel in EFI Secure Boot mode"
+default n
+select LOCK_DOWN_KERNEL
+depends on EFI
+help
+ UEFI Secure Boot provides a mechanism for ensuring that the firmware
+ will only load signed bootloaders and kernels. Secure boot mode may
+ be determined from EFI variables provided by the system firmware if
+ not indicated by the boot parameters.
+
+ Enabling this option turns on results in kernel lockdown being
triggered if EFI Secure Boot is set.
+

source security/selinux/Kconfig
source security/smack/Kconfig
source security/tomoyo/Kconfig
@@ -225,6 +291,9 @@
source security/integrity/Kconfig

+menu "Security Module Selection"
+visible if !SECURITY_STACKING
+
choice
prompt "Default security module"
default DEFAULT_SECURITY_SELINUX if SECURITY_SELINUX
@@ -253,14 +322,139 @@
      help
      Add the SELinux security module to the stack.
      Please be sure your user space code is accommodating of
      this security module.
      Ensure that your network configuration is compatible
      with your combination of security modules.
+
      Incompatible with Smack being stacked.
+
      If you are unsure how to answer this question, answer N
+
+config SECURITY_SELINUX_STACKED
+bool "SELinux" if SECURITY_SELINUX && !SECURITY_SMACK_STACKED
+help
+  Add the SELinux security module to the stack.
+  Please be sure your user space code is accommodating of
+  this security module.
+  Ensure that your network configuration is compatible
+  with your combination of security modules.
+
+  Incompatible with Smack being stacked.
+
+If you are unsure how to answer this question, answer N
+
+config SECURITY_SMACK_STACKED
+bool "Simplified Mandatory Access Control" if SECURITY_SMACK
+help
+  Add the Smack security module to the stack.
+  Please be sure your user space code is accommodating of
+  this security module.
+  Ensure that your network configuration is compatible
+  with your combination of security modules.
+
+  Incompatible with SeLinux being stacked.
+ If you are unsure how to answer this question, answer
+
+config SECURITY_TOMOYO_STACKED
+bool "TOMOYO support is enabled by default" if SECURITY_TOMOYO
+default n
+help
+ This option instructs the system to use the TOMOYO checks.
+ If not selected the module will not be invoked.
+ Stacked security modules may interact in unexpected ways.
+ If you are unsure how to answer this question, answer N.
+
+config SECURITY_APPARMOR_STACKED
+bool "AppArmor" if SECURITY_APPARMOR
+help
+ This option instructs the system to use the AppArmor checks.
+ If you are unsure how to answer this question, answer N.
+
+config SECURITY_DAC_STACKED
+bool "Unix Discretionary Access Controls" if !SECURITY_SELINUX_STACKED &&
!SECURITY_SMACK_STACKED && !SECURITY_TOMOYO_STACKED &&
!SECURITY_APPARMOR_STACKED
+default y if !SECURITY_SELINUX_STACKED && !SECURITY_SMACK_STACKED &&
!SECURITY_TOMOYO_STACKED && !SECURITY_APPARMOR_STACKED
+help
+ This option instructs the system to not use security modules
+ by default. This choice can be over ridden by specifying
+ the desired module using the security= parameter.
+ This option is incompatible with selecting selinux, smack,
+ tomoyo, or apparmor.
+
+config DEFAULT_SECURITY_SELINUX
+ bool
+ default y if SECURITY_SELINUX_STACKED
+
+config DEFAULT_SECURITY_SMACK
+ bool
+ default y if SECURITY_SMACK_STACKED
+
+config DEFAULT_SECURITY_TOMOYO
+ bool
+ default y if SECURITY_TOMOYO_STACKED
+
+config DEFAULT_SECURITY_APPARMOR
+ bool
+       default y if SECURITY_APPARMOR_STACKED
+
+       config DEFAULT_SECURITY_DAC
+       bool
+       default y if SECURITY_DAC_STACKED
+
+       choice
+       depends on SECURITY_STACKING & & !SECURITY_DAC_STACKED
+       prompt "Default LSM for legacy interfaces"
+       default SECURITY_DEFAULT_DISPLAY_SELINUX if SECURITY_SELINUX_STACKED
+       default SECURITY_DEFAULT_DISPLAY_SMACK if SECURITY_SMACK_STACKED
+       default SECURITY_DEFAULT_DISPLAY_TOMOYO if SECURITY_TOMOYO_STACKED
+       default SECURITY_DEFAULT_DISPLAY_APPARMOR if SECURITY_APPARMOR_STACKED
+       default SECURITY_DEFAULT_DISPLAY_FIRST
+
+       help
+       Select the security module context that will be displayed by
+       default on legacy interfaces if the kernel parameter
+       security.display= is not specified.
+
+       config SECURITY_DEFAULT_DISPLAY_SELINUX
+       bool "SELinux" if SECURITY_SELINUX_STACKED=y
+
+       config SECURITY_DEFAULT_DISPLAY_SMACK
+       bool "Simplified Mandatory Access Control" if SECURITY_SMACK_STACKED
+
+       config SECURITY_DEFAULT_DISPLAY_TOMOYO
+       bool "TOMOYO" if SECURITY_TOMOYO_STACKED
+
+       config SECURITY_DEFAULT_DISPLAY_APPARMOR
+       bool "AppArmor" if SECURITY_APPARMOR_STACKED
+
+       endchoice
+
+       config SECURITY_DEFAULT_DISPLAY_NAME
+       string
+       default "selinux" if SECURITY_DEFAULT_DISPLAY_SELINUX
+       default "smack" if SECURITY_DEFAULT_DISPLAY_SMACK
+       default "tomoyo" if SECURITY_DEFAULT_DISPLAY_TOMOYO
+       default "apparmor" if SECURITY_DEFAULT_DISPLAY_APPARMOR
+       default "" if DEFAULT_SECURITY_DAC
+
+       endmenu

config DEFAULT_SECURITY
string
+default "selinux,smack,tomoyo,apparmor" if DEFAULT_SECURITY_SELINUX & &
DEFAULT_SECURITY_SMACK & & DEFAULT_SECURITY_TOMOYO & &
DEFAULT_SECURITY_APPARMOR
+default "selinux,smack,tomoyo" if DEFAULT_SECURITY_SELINUX && DEFAULT_SECURITY_SMACK 
&& DEFAULT_SECURITY_TOMOYO
+default "selinux,smack,apparmor" if DEFAULT_SECURITY_SELINUX && DEFAULT_SECURITY_SMACK 
&& DEFAULT_SECURITY_APPARMOR
+default "selinux,tomoyo,apparmor" if DEFAULT_SECURITY_SELINUX &&
DEFAULT_SECURITY_TOMOYO && DEFAULT_SECURITY_APPARMOR
+default "smack,tomoyo,apparmor" if DEFAULT_SECURITY_SMACK &&
DEFAULT_SECURITY_TOMOYO && DEFAULT_SECURITY_APPARMOR
+default "selinux,smack" if DEFAULT_SECURITY_SELINUX &&
DEFAULT_SECURITY_SMACK
+default "selinux,tomoyo" if DEFAULT_SECURITY_SELINUX &&
DEFAULT_SECURITY_TOMOYO
+default "selinux,apparmor" if DEFAULT_SECURITY_SELINUX &&
DEFAULT_SECURITY_APPARMOR
+default "smack,tomoyo" if DEFAULT_SECURITY_SMACK &&
DEFAULT_SECURITY_TOMOYO
+default "smack,apparmor" if DEFAULT_SECURITY_SMACK &&
DEFAULT_SECURITY_APPARMOR
+default "tomoyo,apparmor" if DEFAULT_SECURITY_TOMOYO &&
DEFAULT_SECURITY_APPARMOR
+default "selinux" if DEFAULT_SECURITY_SELINUX
+default "smack" if DEFAULT_SECURITY_SMACK
+default "tomoyo" if DEFAULT_SECURITY_TOMOYO
+default "apparmor" if DEFAULT_SECURITY_APPARMOR
+default "" if DEFAULT_SECURITY_DAC

endmenu

--- linux-4.15.0.orig/security/Makefile
+++ linux-4.15.0/security/Makefile
@@ -30,3 +30,6 @@
# Object integrity file lists
subdir-$(CONFIG_INTEGRITY) += integrity
obj-$(CONFIG_INTEGRITY) += integrity/
+ +# Allow the kernel to be locked down
+obj-$(CONFIG_LOCK_DOWN_KERNEL) += lock_down.o
--- linux-4.15.0.orig/security/apparmor/Makefile
+++ linux-4.15.0/security/apparmor/Makefile
@@ -5,11 +5,45 @@
apparmor-y := apparmorfs.o audit.o capability.o context.o ipc.o lib.o match.o 
    path.o domain.o policy.o policy_unpack.o procattr.o lsm.o 
-    resource.o secid.o file.o policy_ns.o label.o mount.o 
+    resource.o secid.o file.o policy_ns.o label.o mount.o net.o 
+    af_unix.o
apparmor-$(CONFIG_SECURITY_APPARMOR_HASH) += crypto.o

-clean-files := capability_names.h rlim_names.h
+clean-files := capability_names.h rlim_names.h net_names.h

+# Build a lower case string table of address family names
+# Transform lines from
```c
#define AF_LOCAL		1	/* POSIX name for AF_UNIX */
#define AF_INET		2	/* Internet IP Protocol */

and build the securityfs entries for the mapping.
Transforms lines from
#define AF_INET		2	/* Internet IP Protocol */
to
#define AA_SFS_AF_MASK "local inet"

Build a lower case string table of sock type names
Transforms lines from
SOCK_STREAM	= 1,
to
[1] = "stream",

Build a lower case string table of capability names
Transforms lines from

Build a lower case string table of socket type names
Build a lower case string table of capability names
```
/* AppArmor security module
 * This file contains AppArmor af_unix fine grained mediation
 * Copyright 2014 Canonical Ltd.
 */

#include <net/tcp_states.h>

#include "include/af_unix.h"
#include "include/apparmor.h"
#include "include/context.h"
#include "include/file.h"
#include "include/label.h"
#include "include/path.h"
#include "include/policy.h"

+static inline struct sock *aa_sock(struct unix_sock *u)
+{
+return &u->sk;
+}
+
+static inline int unix_fs_perm(const char *op, u32 mask, struct aa_label *label,
+struct unix_sock *u, int flags)
+{
+AA_BUG(!label);
+AA_BUG(!u);
+AA_BUG(!UNIX_FS(aa_sock(u)));
+
+if (unconfined(label) || !LABEL_MEDIATES(label, AA_CLASS_FILE))
+return 0;
+
+mask &= NET_FS_PERMS;
+if (!u->path.dentry) {
+struct path_cond cond = { };
+struct aa_perms perms = { };
+}
struct aa_profile *profile;
+
+/* socket path has been cleared because it is being shutdown
+ * can only fall back to original sun_path request
+ */
+struct aa_sk_ctx *ctx = SK_CTX(&u->sk);
+if (ctx->path.dentry)
+return aa_path_perm(op, label, &ctx->path, flags, mask,
+    &cond);
+return fn_for_each_confined(label, profile,
+(flags | profile->path_flags) & PATH_MEDIATE_DELETED) ?
+    aa_path_perm(op, profile,
+    u->addr->name->sun_path, mask,
+    &cond, flags, &perms) :
+aa_audit_file(profile, &nullperms, op, mask,
+    u->addr->name->sun_path, NULL,
+    NULL, cond.uid,
+    "Failed name lookup - ",
+    "deleted entry", -EACCES);
+} else {
+    /* the sunpath may not be valid for this ns so use the path */
+struct path_cond cond = { u->path.dentry->d_inode->i_uid,
+    u->path.dentry->d_inode->i_mode
+};
+return aa_path_perm(op, label, &u->path, flags, mask, &cond);
+
+return 0;
+}
+
+/* passing in state returned by PROFILE_MEDIATES_AF */
+static unsigned int match_to_prot(struct aa_profile *profile,
+    unsigned int state, int type, int protocol,
+    const char **info)
+{
+    __be16 buffer[2];
+    buffer[0] = cpu_to_be16(type);
+    buffer[1] = cpu_to_be16(protocol);
+    state = aa_dfa_match_len(profile->policy.dfa, state, (char *) &buffer,
+        4);
+    if (!state)
+        *info = "failed type and protocol match";
+    return state;
+}
+
+static unsigned int match_addr(struct aa_profile *profile, unsigned int state,
+    struct sockaddr_un *addr, int addrlen)
+{  
+  if (addr)  
+  /* include leading \0 */  
+  state = aa_dfa_match_len(profile->policy.dfa, state,  
+        addr->sun_path,  
+        unix_addr_len(addrlen));  
+  else  
+  /* anonymous end point */  
+  state = aa_dfa_match_len(profile->policy.dfa, state, "\x01",  
+      1);  
+  /* todo change to out of band */  
+  state = aa_dfa_null_transition(profile->policy.dfa, state);  
+  return state;  
+}  
+  
+static unsigned int match_to_local(struct aa_profile *profile,  
+    unsigned int state, int type, int protocol,  
+    struct sockaddr_un *addr, int addrlen,  
+    const char **info)  
+{  
+  state = match_to_prot(profile, state, type, protocol, info);  
+  if (state) {  
+    state = match_addr(profile, state, addr, addrlen);  
+    if (state) {  
+      /* todo: local label matching */  
+      state = aa_dfa_null_transition(profile->policy.dfa,  
+          state);  
+      if (!state)  
+        *info = "failed local label match";  
+    } else  
+      *info = "failed local address match";  
+  }  
+  return state;  
+}  
+  
+static unsigned int match_to_sk(struct aa_profile *profile,  
+    unsigned int state, struct unix_sock *u,  
+    const char **info)  
+{  
+  struct sockaddr_un *addr = NULL;  
+  int addrlen = 0;  
+  if (u->addr) {  
+    addr = u->addr->name;  
+    addrlen = u->addr->len;  
+  }  
+  
+}
+return match_to_local(profile, state, u->sk.sk_type, u->sk.sk_protocol,
+    addr, addrlen, info);
+
+}
+
+#define CMD_ADDR 1
+#define CMD_LISTEN 2
+#define CMD_OPT 4
+
+static inline unsigned int match_to_cmd(struct aa_profile *profile,
+    unsigned int state, struct unix_sock *u,
+    char cmd, const char **info)
+{
+    state = match_to_sk(profile, state, u, info);
+    if (state) {
+        state = aa_dfa_match_len(profile->policy.dfa, state, &cmd, 1);
+        if (!state)
+            *info = "failed cmd selection match";
+    }
+    return state;
+}
+
+static inline unsigned int match_to_peer(struct aa_profile *profile,
+    unsigned int state,
+    struct unix_sock *u,
+    struct sockaddr_un *peer_addr,
+    int peer_addrlen,
+    const char **info)
+{
+    state = match_to_cmd(profile, state, u, CMD_ADDR, info);
+    if (state) {
+        state = match_addr(profile, state, peer_addr, peer_addrlen);
+        if (!state)
+            *info = "failed peer address match";
+    }
+    return state;
+}
+
+static int do_perms(struct aa_profile *profile, unsigned int state, u32 request,
+    struct common_audit_data *sa)
+{
+    struct aa_perms perms;
+    AA_BUG(!profile);
+    aa_compute_perms(profile->policy.dfa, state, &perms);
+    aa_apply_modes_to_perms(profile, &perms);
+    return aa_check_perms(profile, &perms, request, sa,
static int match_label(struct aa_profile *profile, struct aa_profile *peer,
    unsigned int state, u32 request,
    struct common_audit_data *sa)
{
    AA_BUG(!profile);
    AA_BUG(!peer);
    +aad(sa)->peer = &peer->label;
    +
    +if (state) {
        state = aa_dfa_match(profile->policy.dfa, state,
            peer->base.hname);
        +if (!state)
            +aad(sa)->info = "failed peer label match";
    }
    +return do_perms(profile, state, request, sa);
    +
    +
    +/ * unix sock creation comes before we know if the socket will be an fs
    +/ socket
    +/ v6 - semantics are handled by mapping in profile load
    +/ v7 - semantics require sock create for tasks creating an fs socket.
    +*/
    +static int profile_create_perm(struct aa_profile *profile, int family,
        int type, int protocol)
    +{
        unsigned int state;
        +DEFINE_AUDIT_NET(sa, OP_CREATE, NULL, family, type, protocol);
        +
        +AA_BUG(!profile);
        +AA_BUG(profile_unconfined(profile));
        +
        +if ((state = PROFILE_MEDIATES_AF(profile, AF_UNIX))) {
            state = match_to_prot(profile, state, type, protocol,
                &aad(&sa)->info);
            +return do_perms(profile, state, AA_MAY_CREATE, &sa);
        }
        +
        +return aa_profile_af_perm(profile, &sa, AA_MAY_CREATE, family, type);
        +
        +int aa_unix_create_perm(struct aa_label *label, int family, int type,
            int protocol)
        +{
            +audit_net_cb);
            +
            +static int match_label(struct aa_profile *profile, struct aa_profile *peer,
                unsigned int state, u32 request,
                struct common_audit_data *sa)
        +{
            +AA_BUG(!profile);
            +AA_BUG(!peer);
            +
            +aad(sa)->peer = &peer->label;
            +
            +if (state) {
                state = aa_dfa_match(profile->policy.dfa, state,
                    peer->base.hname);
                +if (!state)
                    +aad(sa)->info = "failed peer label match";
                }
                +return do_perms(profile, state, request, sa);
                +
                +
                +
                */ unix sock creation comes before we know if the socket will be an fs
                */ socket
                */ v6 - semantics are handled by mapping in profile load
                */ v7 - semantics require sock create for tasks creating an fs socket.
                */
                +static int profile_create_perm(struct aa_profile *profile, int family,
                    int type, int protocol)
                +{
                    unsigned int state;
                    +DEFINE_AUDIT_NET(sa, OP_CREATE, NULL, family, type, protocol);
                    +
                    +AA_BUG(!profile);
                    +AA_BUG(profile_unconfined(profile));
                    +
                    +if ((state = PROFILE_MEDIATES_AF(profile, AF_UNIX))) {
                        state = match_to_prot(profile, state, type, protocol,
                            &aad(&sa)->info);
                        +return do_perms(profile, state, AA_MAY_CREATE, &sa);
                    }
                    +
                    +return aa_profile_af_perm(profile, &sa, AA_MAY_CREATE, family, type);
                    +
                    +int aa_unix_create_perm(struct aa_label *label, int family, int type,
                        int protocol)
                    +{
+struct aa_profile *profile;
+
+if (unconfined(label))
+return 0;
+
+return fn_for_each_confined(label, profile,
+profile_create_perm(profile, family, type, protocol));
+
+
+static inline int profile_sk_perm(struct aa_profile *profile, const char *op,
+u32 request, struct sock *sk)
+{
+unsigned int state;
+DEFINE_AUDIT_SK(sa, op, sk);
+
+AA_BUG(!profile);
+AA_BUG(!sk);
+AA_BUG(UNIX_FS(sk));
+AA_BUG(profile_unconfined(profile));
+
+state = PROFILE_MEDIATES_AF(profile, AF_UNIX);
+if (state) {
+state = match_to_sk(profile, state, unix_sk(sk),
+ &aad(&sa)->info);
+return do_perms(profile, state, request, &sa);
+}
+
+return aa_profile_af_sk_perm(profile, &sa, request, sk);
+}
+
+-int aa_unix_label_sk_perm(struct aa_label *label, const char *op, u32 request,
+struct sock *sk)
+{
+struct aa_profile *profile;
+
+return fn_for_each_confined(label, profile,
+profile_sk_perm(profile, op, request, sk));
+}
+
+static int unix_label_sock_perm(struct aa_label *label, const char *op, u32 request,
+struct socket *sock)
+{
+if (unconfined(label))
+return 0;
+if (UNIX_FS(sock->sk))
+return unix_fs_perm(op, request, label, unix_sk(sock->sk), 0);
+}
+return aa_unix_label_sk_perm(label, op, request, sock->sk);
+
+/* revalidation, get/set attr */
+int aa_unix_sock_perm(const char *op, u32 request, struct socket *sock)
+{
+struct aa_label *label;
+int error;
+
+label = begin_current_label_crit_section();
+error = unix_label_sock_perm(label, op, request, sock);
+end_current_label_crit_section(label);
+
+return error;
+}
+
+static int profile_bind_perm(struct aa_profile *profile, struct sock *sk,
+     struct sockaddr *addr, int addrlen)
+{
+    unsigned int state;
+    DEFINE_AUDIT_SK(sa, OP_BIND, sk);
+
+    AA_BUG(!profile);
+    AA_BUG(!sk);
+    AA_BUG(addr->sa_family != AF_UNIX);
+    AA_BUG(profile_unconfined(profile));
+    AA_BUG(unix_addr_fs(addr, addrlen));
+
+    state = PROFILE_MEDIATES_AF(profile, AF_UNIX);
+    if (state) {
+        /* bind for abstract socket */
+        aad(&sa)->net.addr = unix_addr(addr);
+        aad(&sa)->net.addrlen = addrlen;
+
+        state = match_to_local(profile, state,
+            sk->sk_type, sk->sk_protocol,
+            unix_addr(addr), addrlen,
+            &aad(&sa)->info);
+        return do_perms(profile, state, AA_MAY_BIND, &sa);
+    }
+
+    return aa_profile_af_sk_perm(profile, &sa, AA_MAY_BIND, sk);
+}
+
+int aa_unix_bind_perm(struct socket *sock, struct sockaddr *address,
+    int addrlen)
+{
+    struct aa_profile *profile;
struct aa_label *label;
int error = 0;

label = begin_current_label_crit_section();
/* fs bind is handled by mknod */
if (!unconfined(label) || unix_addr_fs(address, addrlen))
    error = fn_for_each_confined(label, profile,
        profile_bind_perm(profile, sock->sk, address,
            addrlen));
end_current_label_crit_section(label);

return error;

int aa_unix_connect_perm(struct socket *sock, struct sockaddr *address,
            int addrlen)
{
    /* unix connections are covered by the
      * - unix_stream_connect (stream) and unix_may_send hooks (dgram)
      * - fs connect is handled by open
      */
    return 0;
}

static int profile_listen_perm(struct aa_profile *profile, struct sock *sk,
                int backlog)
{
    unsigned int state;
    DEFINE_AUDIT_SK(sa, OP_LISTEN, sk);

    AA_BUG(!profile);
    AA_BUG(!sk);
    AA_BUG(UNIX_FS(sk));
    AA_BUG(profile_unconfined(profile));

    state = PROFILE_MEDIATES_AF(profile, AF_UNIX);
    if (state) {
        __be16 b = cpu_to_be16(backlog);

        state = match_to_cmd(profile, state, unix_sk(sk), CMD_LISTEN,
            &aad(&sa)->info);
        if (state) {
            state = aa_dfa_match_len(profile->policy.dfa, state,
                (char *) &b, 2);
            if (!state)
                aad(&sa)->info = "failed listen backlog match";
        }
        return do_perms(profile, state, AA_MAY_LISTEN, &sa);
return aa_profile_af_sk_perm(profile, &sa, AA_MAY_LISTEN, sk);
+
int aa_unix_listen_perm(struct socket *sock, int backlog)
+
static inline int profile_accept_perm(struct aa_profile *profile,
    struct sock *sk,
    struct sock *newsk)
+
static inline int profile_accept_perm(struct aa_profile *profile,
    struct sock *sk,
    struct sock *newsk)
+
/* ability of sock to connect, not peer address binding */
int aa_unix_accept_perm(struct socket *sock, struct socket *newsock)
struct aa_label *label;
int error = 0;

label = begin_current_label_crit_section();
if (!(unconfined(label) || UNIX_FS(sock->sk)))
    error = fn_for_each_confined(label, profile,
        profile_accept_perm(profile, sock->sk,
            newsock->sk));
end_current_label_crit_section(label);

return error;

/* dgram handled by unix_may_sendmsg, right to send on stream done at connect
 * could do per msg unix_stream here
 */
/* sendmsg, recvmsg */
int aa_unix_msg_perm(const char *op, u32 request, struct socket *sock,
    struct msghdr *msg, int size)
{
    return 0;
}

static int profile_opt_perm(struct aa_profile *profile, const char *op, u32 request,
    struct sock *sk, int level, int optname)
{
    unsigned int state;
    DEFINE_AUDIT_SK(sa, op, sk);

    AA_BUG(!profile);
    AA_BUG(!sk);
    AA_BUG(UNIX_FS(sk));
    AA_BUG(profile_unconfined(profile));

    state = PROFILE_MEDIATES_AF(profile, AF_UNIX);
    if (state) {
        __be16 b = cpu_to_be16(optname);
        state = match_to_cmd(profile, state, unix_sk(sk), CMD_OPT,
            &aad(&sa)->info);
        if (state) {
            state = aa_dfa_match_len(profile->policy.dfa, state,
                (char *) &b, 2);
            if (!state)
                aad(&sa)->info = "failed sockopt match";
        }
    }
+return do_perms(profile, state, request, &sa);
+
+return aa_profile_af_sk_perm(profile, &sa, request, sk);
+
+int aa_unix_opt_perm(const char *op, u32 request, struct socket *sock, int level,
+     int optname)
+{
+  struct aa_profile *profile;
+  struct aa_label *label;
+  int error = 0;
+
+  label = begin_current_label_crit_section();
+  if (!(unconfined(label) || UNIX_FS(sock->sk)))
+    error = fn_for_each_confined(label, profile,
+        profile_opt_perm(profile, op, request,
+            sock->sk, level, optname));
+  end_current_label_crit_section(label);
+
+  return error;
+
+/* null peer_label is allowed, in which case the peer_sk label is used */
+static int profile_peer_perm(struct aa_profile *profile, const char *op, u32 request,
+    struct sock *sk, struct sock *peer_sk,
+    struct aa_label *peer_label,
+    struct common_audit_data *sa)
+{
+  unsigned int state;
+
+  AA_BUG(!profile);
+  AA_BUG(profile_unconfined(profile));
+  AA_BUG(!sk);
+  AA_BUG(!peer_sk);
+  AA_BUG(UNIX_FS(peer_sk));
+  AA_BUG(UNIX_FS(peer_sk));
+  state = PROFILE_MEDIATES_AF(profile, AF_UNIX);
+  if (state) {
+    struct aa_sk_ctx *peer_ctx = SK_CTX(peer_sk);
+    struct aa_profile *peerp;
+    struct sockaddr_un *addr = NULL;
+    int len = 0;
+    if (unix_sk(peer_sk)->addr) {
+      addr = unix_sk(peer_sk)->addr->name;
+      len = unix_sk(peer_sk)->addr->len;
+    }
+    state = match_to_peer(profile, state, unix_sk(sk),
+        sk, peer_ctx, peerp, addr, len,
+        profile_opt_perm(profile, op, request,
+            sk, level, optname));
+  }
+  
+  return state;
+}
+addr, len, &aad(sa)->info);
+if (!peer_label)
+peer_label = peer_ctx->label;
+return fn_for_each_in_ns(peer_label, peerp,
+    match_label(profile, peerp, state, request,
+    sa));
+
+return aa_profile_af_sk_perm(profile, sa, request, sk);
+
+/*
 + * Requires: lock held on both @sk and @peer_sk
 + */
+int aa_unix_peer_perm(struct aa_label *label, const char *op, u32 request,
+    struct sock *sk, struct sock *peer_sk,
+    struct aa_label *peer_label)
+{
+    struct unix_sock *peeru = unix_sk(peer_sk);
+    struct unix_sock *u = unix_sk(sk);
+
+    AA_BUG(!label);
+    AA_BUG(!sk);
+    AA_BUG(!peer_sk);
+
+    if (UNIX_FS(aa_sock(peeru)))
+        return unix_fs_perm(op, request, label, peeru, 0);
+    else if (UNIX_FS(aa_sock(u)))
+        return unix_fs_perm(op, request, label, u, 0);
+    else {
+        struct aa_profile *profile;
+        DEFINE_AUDIT_SK(sa, op, sk);
+        aad(&sa)->net.peer_sk = peer_sk;
+        /* TODO: ns!!! */
+        if (!net_eq(sock_net(sk), sock_net(peer_sk))) {  
+            ;
+        }
+        if (unconfined(label))
+            return 0;
+        
+        return fn_for_each_confined(label, profile,
+            profile_peer_perm(profile, op, request, sk,
+            peer_sk, peer_label, &sa));
+    }
+}
static void unix_state_double_lock(struct sock *sk1, struct sock *sk2) {
    if (unlikely(sk1 == sk2) || !sk2) {
        unix_state_lock(sk1);
        return;
    }
    if (sk1 < sk2) {
        unix_state_lock(sk1);
        unix_state_lock_nested(sk2);
    } else {
        unix_state_lock(sk2);
        unix_state_lock_nested(sk1);
    }
}

static void unix_state_double_unlock(struct sock *sk1, struct sock *sk2) {
    if (unlikely(sk1 == sk2) || !sk2) {
        unix_state_unlock(sk1);
        return;
    }
    unix_state_unlock(sk1);
    unix_state_unlock(sk2);
}

int aa_unix_file_perm(struct aa_label *label, const char *op, u32 request,
    struct socket *sock)
{
    struct sock *peer_sk = NULL;
    u32 sk_req = request & ~NET_PEER_MASK;
    int error = 0;
    
    AA_BUG(!label);
    AA_BUG(!sock);
    AA_BUG(!sock->sk);
    AA_BUG(sock->sk->sk_family != AF_UNIX);
    /* TODO: update sock label with new task label */
    unix_state_lock(sock->sk);
    peer_sk = unix_peer(sock->sk);
    if (peer_sk)
        sock_hold(peer_sk);
    if (!unix_connected(sock) && sk_req) {
        error = unix_label_sock_perm(label, op, sk_req, sock);
        if (!error) {
            /* Mutex lock code */
        
            // Mutex unlock code
        }
    }
}

/* from net/unix/af_unix.c */
// update label
+
+
+unix_state_unlock(sock->sk);
+if (!peer_sk)
+return error;
+
+unix_state_double_lock(sock->sk, peer_sk);
+if (!UNIX_FS(sock->sk)) {
+error = unix_fs_perm(op, request, label, unix_sk(sock->sk),
+ PATH_SOCK_COND);
+} else if (UNIX_FS(peer_sk)) {
+error = unix_fs_perm(op, request, label, unix_sk(peer_sk),
+ PATH_SOCK_COND);
+} else {
+struct aa_sk_ctx *pctx = SK_CTX(peer_sk);
+if (sk_req)
+error = aa_unix_label_sk_perm(label, op, sk_req,
+ sock->sk);
+last_error(error,
+xcheck(aa_unix_peer_perm(label, op,
+MAY_READ | MAY_WRITE,
+sock->sk, peer_sk, NULL),
+ aa_unix_peer_perm(pctx->label, op,
+MAY_READ | MAY_WRITE,
+ peer_sk, sock->sk, label)));
+}
+
+unix_state_double_unlock(sock->sk, peer_sk);
+sock_put(peer_sk);
+
+return error;
+
--- linux-4.15.0.orig/security/apparmor/apparmorfs.c
+++ linux-4.15.0/security/apparmor/apparmorfs.c
@@ -126,17 +126,22 @@
return 0;
}

-static void aafs_evict_inode(struct inode *inode)
+static void aafs_i_callback(struct rcu_head *head)
{
-truncate_inode_pages_final(&inode->i_data);
-clear_inode(inode);
+struct inode *inode = container_of(head, struct inode, i_rcu);
if (S_ISLNK(inode->i_mode))
kfree(inode->i_link);
+free_inode_nonrcu(inode);
static void aafs_destroy_inode(struct inode *inode)
{
    call_rcu(&inode->i_rcu, aafs_i_callback);
}

static const struct super_operations aafs_super_ops = {
    .statfs = simple_statfs,
    .evict_inode = aafs_evict_inode,
    .destroy_inode = aafs_destroy_inode,
    .show_path = aafs_show_path,
};

static struct dentry *aafs_create_symlink(const char *name, struct dentry *parent, const char *target, void *private, const struct inode_operations *iops)
{
    struct dentry *dent;
    char *link = NULL;
    if (target) {
        link = kstrdup(target, GFP_KERNEL);
        if (!link)
            return ERR_PTR(-ENOMEM);
    }
    dent = aafs_create(name, S_IFLNK | 0444, parent, private, link, NULL, iops);
    if (IS_ERR(dent))
        kfree(link);
    return ERR_PTR(-ENOMEM);
}

if (target) {
    -link = kstrdup(target, GFP_KERNEL);
    if (!link)
        return ERR_PTR(-ENOMEM);
}
-dent = aafs_create(name, S_IFLNK | 0444, parent, NULL, link, NULL,
+dent = aafs_create(name, S_IFLNK | 0444, parent, private, link, NULL,
    iops);
    if (IS_ERR(dent))
        kfree(link);
    @ @ -358,6 +364,7 @@
    simple_rmdir(dir, dentry);
    else
    simple_unlink(dir, dentry);
    +d_delete(dentry);
    dput(dentry);
inode_unlock(dir);
@@ -420,7 +427,7 @@
 /*
 error = aa_may_manage_policy(label, ns, mask);
 if (error)
+ goto end_section;
+ return error;
 } }

 data = aa_simple_write_to_buffer(buf, size, size, pos);
 error = PTR_ERR(data);
@@ -428,6 +435,7 @@
 error = aa_replace_profiles(ns, label, mask, data);
 aa_put_loaddata(data);
 } }
+end_section:
+ end_current_label_crit_section(label);

 return error;
@@ -1189,9 +1197,7 @@
 static int seq_ns_name_show(struct seq_file *seq, void *v)
 { }
 struct aa_label *label = begin_current_label_crit_section();
- seq_printf(seq, "%s
", aa_ns_name(labels_ns(label),
- labels_ns(label), true));
+ seq_printf(seq, "%s
", labels_ns(label)->base.name);
 end_current_label_crit_section(label);

 return 0;
@@ -1484,26 +1490,97 @@
 return depth;
 }
- static int gen_symlink_name(char *buffer, size_t bsize, int depth,
- const char *dirname, const char *fname)
+ static char *gen_symlink_name(int depth, const char *dirname, const char *fname)
 { }
+ char *buffer, *s;
 int error;
+ int size = depth * 6 + strlen(dirname) + strlen(fname) + 11;
+ s = buffer = kmalloc(size, GFP_KERNEL);
+ if (!buffer)
+ return ERR_PTR(-ENOMEM);
 for (; depth > 0; depth--)
 { }
- if (bsize < 7)
-return -ENAMETOOLONG;
-strcpy(buffer, "././");
-buffer += 6;
-bsize -= 6;
+strcpy(s, "././");
+s += 6;
+size -= 6;
}

-error = snprintf(buffer, bsize, "raw_data/%s/%s", dirname, fname);
-if (error >= bsize || error < 0)
-return -ENAMETOOLONG;
+error = snprintf(s, size, "raw_data/%s/%s", dirname, fname);
+if (error >= size || error < 0) {
+kfree(buffer);
+return ERR_PTR(-ENAMETOOLONG);
+
-return 0;
+return buffer;
+
+static void rawdata_link_cb(void *arg)
+{
+kfree(arg);
}

+static const char *rawdata_get_link_base(struct dentry *dentry, 
+struct inode *inode,
+struct delayed_call *done,
+const char *name)
+{
+struct aa_proxy *proxy = inode->i_private;
+struct aa_label *label;
+struct aa_profile *profile;
+char *target;
+int depth;
+
+if (!dentry)
+return ERR_PTR(-ECHILD);
+return ERR_PTR(-ECHILD);
+
+label = aa_get_label_rcu(&proxy->label);
+profile = labels_profile(label);
+depth = profile_depth(profile);
+target = gen_symlink_name(depth, profile->rawdata->name, name);
+aa_put_label(label);
+
+if (IS_ERR(target))
+return target;
+
+set_delayed_call(done, rawdata_link_cb, target);
+
+return target;
+
+
+static const char *rawdata_get_link_sha1(struct dentry *dentry,
+struct inode *inode,
+struct delayed_call *done)
+{
+return rawdata_get_link_base(dentry, inode, done, "sha1");
+
+
+static const char *rawdata_get_link_abi(struct dentry *dentry,
+struct inode *inode,
+struct delayed_call *done)
+{
+return rawdata_get_link_base(dentry, inode, done, "abi");
+
+
+static const char *rawdata_get_link_data(struct dentry *dentry,
+struct inode *inode,
+struct delayed_call *done)
+{
+return rawdata_get_link_base(dentry, inode, done, "raw_data");
+
+
+static const struct inode_operations rawdata_link_sha1_iops = {
+get_link= rawdata_get_link_sha1,
+};
+
+static const struct inode_operations rawdata_link_abi_iops = {
+get_link= rawdata_get_link_abi,
+};
+static const struct inode_operations rawdata_link_data_iops = {
+get_link= rawdata_get_link_data,
+};
+
+
/*
 * Requires: @profile->ns->lock held
*/
@@ -1574,34 +1651,28 @@

if (profile->rawdata) {
+char target[64];
int depth = profile_depth(profile);
-
error = gen_symlink_name(target, sizeof(target), depth,
- profile->rawdata->name, "sha1");
-if (error < 0)
-goto fail2;
-dent = aafs_create_symlink("raw_sha1", dir, target, NULL);
+dent = aafs_create_symlink("raw_sha1", dir, NULL,
+ profile->label.proxy,
+ &rawdata_link_sha1_iops);
if (IS_ERR(dent))
go to fail;
+aa_get_proxy(profile->label.proxy);
profile->dents[AAFS_PROF_RAW_HASH] = dent;

-error = gen_symlink_name(target, sizeof(target), depth,
- profile->rawdata->name, "abi");
-if (error < 0)
-goto fail2;
-dent = aafs_create_symlink("raw_abi", dir, target, NULL);
+dent = aafs_create_symlink("raw_abi", dir, NULL,
+ profile->label.proxy,
+ &rawdata_link_abi_iops);
if (IS_ERR(dent))
go to fail;
+aa_get_proxy(profile->label.proxy);
profile->dents[AAFS_PROF_RAW_ABI] = dent;

-error = gen_symlink_name(target, sizeof(target), depth,
- profile->rawdata->name, "raw_data");
-if (error < 0)
-goto fail2;
-dent = aafs_create_symlink("raw_data", dir, target, NULL);
+dent = aafs_create_symlink("raw_data", dir, NULL,
+ profile->label.proxy,
+ &rawdata_link_data_iops);
if (IS_ERR(dent))
go to fail;
+aa_get_proxy(profile->label.proxy);
profile->dents[AAFS_PROF_RAW_DATA] = dent;
}

@@ -1895,9 +1966,6 @@
return error;
}

#define list_entry_is_head(pos, head, member) (&pos->member == (head))
/**
 * __next_ns - find the next namespace to list
 * @root: root namespace to stop search at (NOT NULL)
 */
@@ -2187,6 +2255,11 @@
 { }
];

+static struct aa_sfs_entry aa_sfs_entry_dbus[] = {
+ AA_SFS_FILE_STRING("mask", "acquire send receive"),
+ { } }
+);
+
+ static struct aa_sfs_entry aa_sfs_entry_query_label[] = {
+ AA_SFS_FILE_STRING("perms", "allow deny audit quiet"),
+ AA_SFS_FILE_BOOLEAN("data",1),
+ AA_SFS_DIR("policy",aa_sfs_entry_policy),
+ AA_SFS_DIR("domain",aa_sfs_entry_domain),
+ AA_SFS_DIR("file",aa_sfs_entry_file),
+ AA_SFS_DIR("network",aa_sfs_entry_network),
+ AA_SFS_DIR("mount",aa_sfs_entry_mount),
+ AA_SFS_DIR("namespaces",aa_sfs_entry_ns),
+ AA_SFS_FILE_U64("capability",VFS_CAP_FLAGS_MASK),
+ AA_SFS_DIR("caps",aa_sfs_entry_caps),
+ AA_SFS_DIR("ptrace",aa_sfs_entry_ptrace),
+ AA_SFS_DIR("signal",aa_sfs_entry_signal),
+ AA_SFS_DIR("dbus",aa_sfs_entry_dbus),
+ AA_SFS_DIR("query",aa_sfs_entry_query),
+ { } }
+);
--- linux-4.15.0.orig/security/apparmor/capability.c
+++ linux-4.15.0/security/apparmor/capability.c
@@ -110,13 +110,13 @@
 * profile_capable - test if profile allows use of capability @cap
 * @profile: profile being enforced (NOT NULL, NOT unconfined)
 * @cap: capability to test if allowed
- * @audit: whether an audit record should be generated
+ * @opts: CAP_OPT_NOAUDIT bit determines whether audit record is generated
 * @sa: audit data (MAY BE NULL indicating no auditing)
 *
 * Returns: 0 if allowed else -EPERM
 */
-static int profile_capable(struct aa_profile *profile, int cap, int audit,
- struct common_audit_data *sa)
+static int profile_capable(struct aa_profile *profile, int cap,
+ unsigned int opts, struct common_audit_data *sa)
int error;

else
error = -EPERM;

-if (audit == SECURITY_CAP_NOAUDIT) {
+if (opts & CAP_OPT_NOAUDIT) {
if (!COMPLAIN_MODE(profile))
return error;
/* audit the cap request in complain mode but note that it
* aa_capable - test permission to use capability
* @label: label being tested for capability (NOT NULL)
* @cap: capability to be tested
- * @audit: whether an audit record should be generated
+ * @opts: CAP_OPT_NOAUDIT bit determines whether audit record is generated
* *
* Look up capability in profile capability set.
*
* Returns: 0 on success, or else an error code.
*/
-int aa_capable(struct aa_label *label, int cap, int audit)
+int aa_capable(struct aa_label *label, int cap, unsigned int opts)
{
struct aa_profile *profile;
int error = 0;

sa.u.cap = cap;
error = fn_for_each_confined(label, profile,
-profile_capable(profile, cap, audit, &sa));
+profile_capable(profile, cap, opts, &sa));

return error;
}
struct aa_task_ctx *aa_alloc_task_context(gfp_t flags)
{
    return kzalloc(sizeof(struct aa_task_ctx), flags);
}

/**
 * aa_free_task_context - free a task_ctx
@@ -50,8 +40,6 @@
aa_put_label(ctx->label);
aa_put_label(ctx->previous);
aa_put_label(ctx->onexec);
-
-kzfree(ctx);
} }

--- linux-4.15.0.orig/security/apparmor/crypto.c
+++ linux-4.15.0/security/apparmor/crypto.c
@@ -29,6 +29,25 @@
return apparmor_hash_size;
 }

+void aa_snprint_hashstr(char *out, unsigned char *hash, unsigned int hsize)
+{
+    unsigned int i;
+    for (i = 0; i < hsize; i++)
+        sprintf(out + i*2, "%.2x", hash[i]);
+    out[hsize*2] = 0;
+}
+
+char *aa_asprint_hashstr(unsigned char *hash, unsigned int hsize, gfp_t gfp)
+{
+    char *buffer = kmalloc(hsize*2 + 1, gfp);
+    if (!buffer)
+        return NULL;
+    aa_snprint_hashstr(buffer, hash, hsize);
+    return buffer;
+}
+
+char *aa_calc_hash(void *data, size_t len)
{  
    SHASH_DESC_ON_STACK(desc, apparmor_tfm);
--- linux-4.15.0.orig/security/apparmor/domain.c
+++ linux-4.15.0/security/apparmor/domain.c
@@ -592,22 +592,6 @@

if (!new)
goto audit;

-/* Policy has specified a domain transitions. if no_new_privs and
- * confined and not transitioning to the current domain fail.
- *
- * NOTE: Domain transitions from unconfined and to strictly stacked
- * subsets are allowed even when no_new_privs is set because this
- * aways results in a further reduction of permissions.
- */
-if ((bprm->unsafe & LSM_UNSAFE_NO_NEW_PRIVS) &&
-    !profile_unconfined(profile) &&
-    !aa_label_is_subset(new, &profile->label)) {
-error = -EPERM;
-info = "no new privs";
nonewprivs = true;
-perms.allow &= ~MAY_EXEC;
goto audit;
-
}

if (!(perms.xindex & AA_X_UNSAFE)) {
    if (DEBUG_ON) {
@@ -684,21 +668,6 @@
perms.allow &= ~AA_MAY_ONEXEC;
goto audit;
    }
-/* Policy has specified a domain transitions. if no_new_privs and
- * confined and not transitioning to the current domain fail.
- *
- * NOTE: Domain transitions from unconfined and to strictly stacked
- * subsets are allowed even when no_new_privs is set because this
- * aways results in a further reduction of permissions.
- */
-if ((bprm->unsafe & LSM_UNSAFE_NO_NEW_PRIVS) &&
-    !profile_unconfined(profile) &&
-    !aa_label_is_subset(onexec, &profile->label)) {
-error = -EPERM;
-info = "no new privs";
-perms.allow &= ~AA_MAY_ONEXEC;
goto audit;
-
}

if (!(perms.xindex & AA_X_UNSAFE)) {
    if (DEBUG_ON) {
@@ -819,7 +788,20 @@
goto done;
    }


-/* TODO: Add ns level no_new_privs subset test */
+/* Policy has specified a domain transitions. If no_new_privs and
+ * confined ensure the transition is to confinement that is subset
+ * of the confinement when the task entered no new privs.
+ *
+ * NOTE: Domain transitions from unconfined and to stacked
+ * subsets are allowed even when no_new_privs is set because this
+ * always results in a further reduction of permissions.
+ */
+if ((bprm->unsafe & LSM_UNSAFE_NO_NEW_PRIVS) &&
+    !unconfined(label) && !aa_label_is_subset(new, label)) {
+    error = -EPERM;
+    info = "no new privs";
+    goto audit;
+
}

if (bprm->unsafe & LSM_UNSAFE_SHARE) {
    /* FIXME: currently don't mediate shared state */
    @@ -1293,7 +1275,10 @@
    aa_get_label(&profile->label);
    if (IS_ERR_OR_NULL(new)) {
        info = "failed to build target label";
-        error = PTR_ERR(new);
+        if (!new)
+            error = -ENOMEM;
+        else
+            error = PTR_ERR(new);
    new = NULL;
    perms.allow = 0;
    goto audit;
--- linux-4.15.0.orig/security/apparmor/file.c
+++ linux-4.15.0/security/apparmor/file.c
@@ -16,11 +16,13 @@
 #include <linux/fdtable.h>
 #include <linux/file.h>
 #include "include/net.h"
-+#include "include/af_unix.h"
 #include "include/apparmor.h"
 #include "include/audit.h"
 #include "include/context.h"
-+#include "include/file.h"
 #include "include/match.h"
 +#include "include/net.h"
 #include "include/path.h"
 #include "include/policy.h"
 #include "include/label.h"
@@ -282,7 +284,8 @@
int e = 0;

- if (profile_unconfined(profile))
+ if (profile_unconfined(profile) ||
+     ((flags & PATH_SOCK_COND) && !PROFILE_MEDIATES_AF(profile, AF_UNIX)))
  return 0;
  aa_str_perms(profile->file.dfa, profile->file.start, name, cond, perms);
if (request & ~perms->allow)
  return error;
}

+static int __file_sock_perm(const char *op, struct aa_label *label,
  struct aa_label *flabel, struct file *file,
  u32 request, u32 denied)
+
+ struct socket *sock = (struct socket *) file->private_data;
+ int error;
+ +AA_BUG(!sock);
+ /* revalidation due to label out of date. No revocation at this time */
+ if (!denied && aa_label_is_subset(flabel, label))
+   return 0;
+ /* TODO: improve to skip profiles cached in flabel */
+ if (!error)
+   update_file_ctx(file_ctx(file), label, request);
+ return error;
+
+ /* TODO: improve to skip profiles checked above */
+ /* check every profile in file label to is cached */
+ last_error(error, aa_sock_file_perm(flabel, op, request, sock));
+ if (!error)
+   update_file_ctx(file_ctx(file), label, request);
+ return error;
+
/**
 * aa_file_perm - do permission revalidation check & audit for @file
 * @op: operation being checked
 @@ -604,6 +633,9 @@
 error = __file_path_perm(op, label, flabel, file, request,
 denied);
+else if (S_ISSOCK(file_inode(file)->i_mode))
+error = __file_sock_perm(op, label, flabel, file, request,
+    denied);
done:
rcu_read_unlock();

--- linux-4.15.0.orig/security/apparmor/include/af_unix.h
+++ linux-4.15.0/security/apparmor/include/af_unix.h
@@ -0,0 +1,114 @@
+/*
+ * AppArmor security module
+ *
+ * This file contains AppArmor af_unix fine grained mediation
+ *
+ * Copyright 2014 Canonical Ltd.
+ *
+ * This program is free software; you can redistribute it and/or
+ * modify it under the terms of the GNU General Public License as
+ * published by the Free Software Foundation, version 2 of the
+ * License.
+ */
+*/
+ifndef __AA_AF_UNIX_H
+
+include <net/af_unix.h>
+
+include "label.h"
+//include "include/net.h"
+
+#define unix_addr_len(L) ((L) - sizeof(sa_family_t))
+#define unix_abstract_name_len(L) (unix_addr_len(L) - 1)
+#define unix_abstract_len(U) (unix_abstract_name_len((U)->addr->len))
+#define addr_unix_abstract_name(B) ((B)[0] == 0)
+#define addr_unix_anonymous(U) (addr_unix_len(U) <= 0)
+#define addr_unix_abstract(U) (!addr_unix_anonymous(U) && addr_unix_abstract_name((U)->addr))
+//define unix_addr_fs(U) (!unix_addr_anonymous(U) && addr_unix_abstract_name((U)->addr))
+
+#define unix_addr(A) ((struct sockaddr_un *)(A))
+#define unix_addr_anon(A, L) ((A) && unix_addr_len(L) <= 0)
+#define unix_addr_fs(A, L) (!unix_addr_anon(A, L) && !addr_unix_abstract_name(unix_addr(A)->sun_path))
+
+#define UNIX_ANONYMOUS(U) (!unix_sk(U)->addr)
+/* from net/unix/af_unix.c */
+#define UNIX_ABSTRACT(U) (!UNIX_ANONYMOUS(U) &&
+  unix_sk(U)->addr->hash < UNIX_HASH_SIZE)
+#define UNIX_FS(U) (!UNIX_ANONYMOUS(U) && unix_sk(U)->addr->name->sun_path[0])
+#define unix_peer(sk) (unix_sk(sk)->peer)
+#define unix_connected(S) ((S)->state == SS_CONNECTED)
+
+static inline void print_unix_addr(struct sockaddr_un *A, int L)
+{char *buf = (A) ? (char *) &A->sun_path : NULL;
+int len = unix_addr_len(L);
+if (!buf || len <= 0)
+printk(" <anonymous>");
+else if (buf[0])
+printk(" %s", buf);
+else
+/* abstract name len includes leading \0 */
+printk(" %d @%.s", len - 1, len - 1, buf+1);
+};
+
+/*
+printk("%s: %s: f %d, t %d, p %d", __FUNCTION__,
+       #SK ,
+*/
+#define print_unix_sk(SK)
+do {
+struct unix_sock *u = unix_sk(SK);
+printk("%s: f %d, t %d, p %d",#SK ,
+       (SK)->sk_family, (SK)->sk_type, (SK)->sk_protocol);
+if (u->addr)
+print_unix_addr(u->addr->name, u->addr->len);
+else
+print_unix_addr(NULL, sizeof(sa_family_t));
+/* printk("
+} while (0)
+
+#define print_sk(SK)
+do {
+if (!(SK)) {
+printk("%s: %s is null
", __FUNCTION__, #SK);
+} else if ((SK)->sk_family == PF_UNIX) {
+print_unix_sk(SK);
+printk("\n");
+} else {
+print("%s: %s: family %d\n", __FUNCTION__, #SK ,
+       (SK)->sk_family);
+}\\
+} while (0)
+
+#define print_sock_addr(U) \
+do { \
+printk("%s:
", __FUNCTION__); \
+print(" sock %s:", sock_ctx && sock_ctx->label ? aa_label_printk(sock_ctx->label, GFP_ATOMIC); : ">
+<null>\n" ); print_sk(sock); \
+print(" other %s:", other_ctx && other_ctx->label ? aa_label_printk(other_ctx->label, GFP_ATOMI
+ch); : ">
+<null>\n" ); print_sk(other); \
+print(" new %s", new_ctx && new_ctx->label ? aa_label_printk(new_ctx->label, GFP_ATOMI
+ch); : "<null>"); print_sk(newsk); \

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while (0)
+
+
+
+
+ int aa_unix_peer_perm(struct aa_label *label, const char *op, u32 request,
+ struct sock *sk, struct sock *peer_sk,
+ struct aa_label *peer_label);
+ int aa_unix_label_sk_perm(struct aa_label *label, const char *op, u32 request,
+ struct sock *sk);
+ int aa_unix_sock_perm(const char *op, u32 request, struct socket *sock);
+ int aa_unix_create_perm(struct aa_label *label, int family, int type,
+ int protocol);
+ int aa_unix_bind_perm(struct socket *sock, struct sockaddr *address,
+ int addrlen);
+ int aa_unix_connect_perm(struct socket *sock, struct sockaddr *address,
+ int addrlen);
+ int aa_unix_listen_perm(struct socket *sock, int backlog);
+ int aa_unix_accept_perm(struct socket *sock, struct socket *newsock);
+ int aa_unix_msg_perm(const char *op, u32 request, struct socket *sock,
+ struct msghdr *msg, int size);
+ int aa_unix_opt_perm(const char *op, u32 request, struct socket *sock, int level,
+ int optname);
+ int aa_unix_file_perm(struct aa_label *label, const char *op, u32 request,
+ struct socket *sock);
+
+ #endif /* __AA_AF_UNIX_H */
--- linux-4.15.0.orig/security/apparmor/include/audit.h
+++ linux-4.15.0/security/apparmor/include/audit.h
@@ -126,7 +126,20 @@
     kuid_t ouid;
     FS;
   -int signal;
+struct {
+  int type, protocol;
+  struct sock *peer_sk;
+  void *addr;
+  int addrlen;
+} net;
+struct {
+  int rlim;
+  unsigned long max;
+} rlim;
+struct {
+  int signal;
+  int unmappedsig;
+};

 const char *target;
 kuid_t ouid;
 } fs;
-int signal;
+struct {
 +int type, protocol;
 +struct sock *peer_sk;
 +void *addr;
 +int addrlen;
 +} net;
+struct {
 +int rlim;
 +unsigned long max;
 +} rlim;
+struct {
 +int signal;
 +int unmappedsig;
 +}:
struct {
    long pos;
} iface;
struct {
    int rlim;
    unsigned long max;
} rlim;
struct {
    const char *src_name;
    const char *type;
    const char *trans;
}

extern struct aa_sfs_entry aa_sfs_entry_caps[];

-int aa_capable(struct aa_label *label, int cap, int audit);
+int aa_capable(struct aa_label *label, int cap, unsigned int opts);

static inline void aa_free_cap_rules(struct aa_caps *caps)
{
    --- linux-4.15.0.orig/security/apparmor/include/context.h
    +++ linux-4.15.0/security/apparmor/include/context.h
    @ @ -48,11 +48,12 @@
    #include <linux/cred.h>
    #include <linux/slab.h>
    #include <linux/sched.h>
    +#include <linux/lsm_hooks.h>

    #include "label.h"
    #include "policy_ns.h"

    #-define cred_ctx(X) ((X)->security)
    +#define cred_ctx(X) apparmor_cred(X)
    #define current_ctx() cred_ctx(current_cred())

    /**
     @@ -44,7 +45,6 @@
     u64 token;
     }:

     -struct aa_task_ctx *aa_alloc_task_context(gfp_t flags);
     void aa_free_task_context(struct aa_task_ctx *ctx);
     void aa_dup_task_context(struct aa_task_ctx *new,
const struct aa_task_ctx *old);
int aa_restore_previous_label(u64 cookie);
struct aa_label *aa_get_task_label(struct task_struct *task);

+extern struct lsm_blob_sizes apparmor_blob_sizes;
+
+static inline struct aa_task_ctx *apparmor_cred(const struct cred *cred)
+-
+{
+ +#ifdef CONFIG_SECURITY_STACKING
+  +return cred->security + apparmor_blob_sizes.lbs_cred;
+  +#else
+  +return cred->security;
+  +#endif
+  +}

/**
 * aa_cred_raw_label - obtain cred's label
 */
static inline struct aa_label *aa_cred_raw_label(const struct cred *cred)
{  
-struct aa_task_ctx *ctx = cred_ctx(cred);
+struct aa_task_ctx *ctx = apparmor_cred(cred);
AA_BUG(!ctx || !ctx->label);
return ctx->label;
}

+static inline struct aa_file_ctx *apparmor_file(const struct file *file)
+
+{  
+  +#ifdef CONFIG_SECURITY_STACKING
+  +return file->f_security + apparmor_blob_sizes.lbs_file;
+  +#else
+  +return file->f_security;
+  +#endif
+  +}
+
/**
 * __aa_task_raw_label - retrieve another task's label
 * @task: task to query (NOT NULL)
 */
--- linux-4.15.0.orig/security/apparmor/include/crypto.h
+++ linux-4.15.0/security/apparmor/include/crypto.h
@@ -18,6 +18,8 @@
#ifdef CONFIG_SECURITY_APPARMOR_HASH

#ifdef CONFIG_SECURITY_APPARMOR_HASH
unsigned int aa_hash_size(void);
+void aa_snprintf_hashstr(char *out, unsigned char *hash, unsigned int hsize);
+char *aa_asprintf_hashstr(unsigned char *hash, unsigned int hsize, gfp_t gfp);
char *aa_calc_hash(void *data, size_t len);
int aa_calc_profile_hash(struct aa_profile *profile, u32 version, void *start,
size_t len);
@@ -36,6 +38,15 @@
{
    return 0;
}
+
+void aa_snprintf_hashstr(char *out, unsigned char *hash, unsigned int hsize)
+{
+}
+
+char *aa_asprintf_hashstr(unsigned char *hash, unsigned int hsize, gfp_t gfp);
+{
+return NULL;
+}
@endif

#endif /* __APPARMOR_CRYPTO_H */
--- linux-4.15.0.orig/security/apparmor/include/file.h
+++ linux-4.15.0/security/apparmor/include/file.h
@@ -32,7 +32,7 @@
    AA_EXEC_MMAP | AA_MAY_LINK)

-#define file_ctx(X) ((struct aa_file_ctx *)(X)->f_security)
+#define file_ctx(X) apparmor_file(X)

/* struct aa_file_ctx - the AppArmor context the file was opened in
 * @lock: lock to update the ctx
 --- linux-4.15.0.orig/security/apparmor/include/label.h
 +++ linux-4.15.0/security/apparmor/include/label.h
 @@ -279,6 +279,7 @@
 void aa_labelset_init(struct aa_labelset *ls);
 void __aa_labelset_update_subtree(struct aa_ns *ns);

+void aa_label_destroy(struct aa_label *label);
 void aa_label_free(struct aa_label *label);
 void aa_label_kref(struct kref *kref);
 bool aa_label_init(struct aa_label *label, int size);
--- linux-4.15.0.orig/security/apparmor/include/net.h
 +++ linux-4.15.0/security/apparmor/include/net.h
 @@ -0,0 +1,134 @@
+/*
+ * AppArmor security module
+ */
This file contains AppArmor network mediation definitions.

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#ifndef __AA_NET_H
#define __AA_NET_H

#include <net/sock.h>
#include <linux/path.h>
#include <linux/lsm_hooks.h>

#include "apparmorfs.h"
#include "label.h"
#include "perms.h"
#include "policy.h"

#define AA_MAY_SEND		AA_MAY_WRITE
#define AA_MAY_RECEIVE		AA_MAY_READ

#define AA_MAY_SHUTDOWN		AA_MAY_DELETE
#define AA_MAY_CONNECT		AA_MAY_OPEN
#define AA_MAY_ACCEPT		0x00100000

#define AA_MAY_BIND		0x00200000
#define AA_MAY_LISTEN		0x00400000

#define AA_MAY_SETOPT		0x01000000
#define AA_MAY_GETOPT		0x02000000

#define NET_PERMS_MASK (AA_MAY_SEND | AA_MAY_RECEIVE | AA_MAY_CREATE | \
AA_MAY_SHUTDOWN | AA_MAY_BIND | AA_MAY_LISTEN | \ 
AA_MAY_CONNECT | AA_MAY_ACCEPT | AA_MAY_SETATTR | \ 
AA_MAY_GETATTR | AA_MAY_SETOPT | AA_MAY_GETOPT)

#define NET_FS_PERMS (AA_MAY_SEND | AA_MAY_RECEIVE | AA_MAY_CREATE | \
AA_MAY_SHUTDOWN | AA_MAY_CONNECT | AA_MAY_RENAME | \
AA_MAY_SETATTR | AA_MAY_GETATTR | AA_MAY_CHMOD | \
AA_MAY_CHOWN | AA_MAY_CHGRP | AA_MAY_LOCK | \
AA_MAY_MPROT)

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+ #define NET_PEER_MASK (AA_MAY_SEND | AA_MAY_RECEIVE | AA_MAY_CONNECT | AA_MAY_ACCEPT)
+ struct aa_sk_ctx {
+ struct aa_label *label;
+ struct aa_label *peer;
+ struct path path;
+ }
+
+ extern struct lsm_blob_sizes apparmor_blob_sizes;
+ static inline struct aa_sk_ctx *apparmor_sock(const struct sock *sk)
+ {
+ #ifdef CONFIG_SECURITY_STACKING
+ return sk->sk_security + apparmor_blob_sizes.lbs_sock;
+ #else
+ return sk->sk_security;
+ #endif
+ }
+ static inline struct aa_sk_ctx *sk_ctx(X) { return apparmor_sock(X); }
+ #define SOCKET_CTX(X) (sk_ctx(X))->i_security
+ #define DEFINE_AUDIT_NET(NAME, OP, SK, F, T, P) { struct lsm_network_audit NAME ## _net = { .sk = (SK), .family = (F) };
+ DEFINE_AUDIT_DATA(NAME, (SK) && (F) != AF_UNIX) ? LSM_AUDIT_DATA_NET : LSM_AUDIT_DATA_NONE, (SK)->sk_type, (SK)->sk_protocol)
+ NAME.u.net = &(NAME ## _net);
+ aad(&NAME)->net.type = (T);
+ aad(&NAME)->net.protocol = (P)
+ }
+ #define DEFINE_AUDIT_SK(NAME, OP, SK) DEFINE_AUDIT_NET(NAME, OP, SK, (SK)->sk_family, (SK)->sk_type)
+
+ /* struct aa_net - network confinement data */
+ /* @allow: basic network families permissions */
+ /* @audit: which network permissions to force audit */
+ /* @quiet: which network permissions to quiet rejects */
+ struct aa_net {
+ u16 allow[AF_MAX];
+ u16 audit[AF_MAX];
+ u16 quiet[AF_MAX];
+ }
+ extern struct aa_sfs_entry aa_sfs_entry_network[];
+void audit_net_cb(struct audit_buffer *ab, void *va);
+int aa_profile_af_perm(struct aa_profile *profile, struct common_audit_data *sa,
+    u32 request, u16 family, int type);
+static inline int aa_profile_af_sk_perm(struct aa_profile *profile,
+    struct common_audit_data *sa,
+    u32 request,
+    struct sock *sk)
+{
+    return aa_profile_af_perm(profile, sa, request, sk->sk_family,
+        sk->sk_type);
+}
+
+int aa_sock_perm(const char *op, u32 request, struct socket *sock);
+int aa_sock_create_perm(struct aa_label *label, int family, int type,
+    int protocol);
+int aa_sock_bind_perm(struct socket *sock, struct sockaddr *address,
+    int addrlen);
+int aa_sock_connect_perm(struct socket *sock, struct sockaddr *address,
+    int addrlen);
+int aa_sock_listen_perm(struct socket *sock, int backlog);
+int aa_sock_accept_perm(struct socket *sock, struct socket *newsock);
+int aa_sock_msg_perm(const char *op, u32 request, struct socket *sock,
+    struct msghdr *msg, int size);
+int aa_sock_opt_perm(const char *op, u32 request, struct socket *sock, int level,
+    int optname);
+int aa_sock_file_perm(struct aa_label *label, const char *op, u32 request,
+    struct socket *sock);
+
+static inline void aa_free_net_rules(struct aa_net *new)
+{
+    /* NOP */
+}
+
+#endif /* __AA_NET_H */

enum path_flags {
    PATH_IS_DIR = 0x1, /* path is a directory */
    PATH_SOCKET_COND = 0x2,
    PATH_CONNECT_PATH = 0x4, /* connect disconnected paths to / */
    PATH_CHROOT_REL = 0x8, /* do path lookup relative to chroot */
    PATH_CHROOT_NSCONNECT = 0x10, /* connect paths that are at ns root */

    --- linux-4.15.0.orig/security/apparmor/include/path.h
    +++ linux-4.15.0/security/apparmor/include/path.h
    @ @ -18,6 +18,7 @ @
void aa_perm_mask_to_str(char *str, const char *chrs, u32 mask);
-void aa_audit_perm_names(struct audit_buffer *ab, const char **names, u32 mask);
+void aa_audit_perm_names(struct audit_buffer *ab, const char * const *names,
+ u32 mask);
void aa_audit_perm_mask(struct audit_buffer *ab, u32 mask, const char *chrs,
- u32 chrsmask, const char **names, u32 namesmask);
+ u32 chrsmask, const char * const *names, u32 namesmask);
void aa_apply_modes_to_perms(struct aa_profile *profile,
 struct aa_perms *perms);
void aa_compute_perms(struct aa_dfa *dfa, unsigned int state,
 --- linux-4.15.0.orig/security/apparmor/include/policy.h
+++ linux-4.15.0/security/apparmor/include/policy.h
@@ -30,6 +30,7 @@
#include "file.h"
 #include "lib.h"
 #include "label.h"
+ #include "net.h"
 #include "perms.h"
 #include "resource.h"
@@ -111,6 +112,7 @@
 * @policy: general match rules governing policy
 * @file: The set of rules governing basic file access and domain transitions
 * @caps: capabilities for the profile
+ * @net: network controls for the profile
 * @rlimits: rlimits for the profile
 * *
 * @dents: dentries for the profiles file entries in apparmorfs
@@ -148,6 +150,7 @@
 struct aa_policydb policy;
 struct aa_file_rules file;
 struct aa_caps caps;
+struct aa_net net;
 struct aa_rlimit rlimits;

 struct aa_loaddata *rawdata;
@@ -220,6 +223,16 @@
 return 0;
 }

+static inline unsigned int PROFILE_MEDIATES_AF(struct aa_profile *profile,
+ u16 AF) {
+ unsigned int state = PROFILE_MEDIATES(profile, AA_CLASS_NET);
+ _be16 be_af = cpu_to_be16(AF);
+if (!state)
+return 0;
+return aa_dfa_match_len(profile->policy.dfa, state, (char *) &be_af, 2);
+
/**
 * aa_get_profile - increment refcount on profile @p
 * @p: profile (MAYBE NULL)
--- linux-4.15.0.orig/security/apparmor/include/sig_names.h
+++ linux-4.15.0/security/apparmor/include/sig_names.h
@@ -2,6 +2,9 @@
#define SIGUNKNOWN 0
#define MAXMAPPED_SIG 35
+#define MAXMAPPED_SIGNAME (MAXMAPPED_SIG + 1)
+#define SIGRT_BASE 128
+
/* provide a mapping of arch signal to internal signal # for mediation
 * those that are always an alias SIGCLD for SIGCLHD and SIGPOLL for SIGIO
 * map to the same entry those that may/or may not get a separate entry
@@ -56,7 +59,7 @@
};
/* this table is ordered post sig_map[sig] mapping */
-static const char *const sig_names[MAXMAPPED_SIG + 1] = {
+static const char *const sig_names[MAXMAPPED_SIGNAME] = {
 "unknown",
 "hup",
 "int",
--- linux-4.15.0.orig/security/apparmor/ipc.c
+++ linux-4.15.0/security/apparmor/ipc.c
@@ -107,7 +107,8 @@
aad(sa)->error = aa_capable(&tracer->label, CAP_SYS_PTRACE, 1);
 return aa_audit(AUDIT_APPARMOR_AUTO, tracer, sa, audit_ptrace_cb);
 }@
@@ -138,7 +139,7 @@
 if (sig > SIGRTMAX)
 return SIGUNKNOWN;
 else if (sig >= SIGRTMIN)
- return sig - SIGRTMIN + 128; /* rt sigs mapped to 128 */
+ return sig - SIGRTMIN + SIGRT_BASE;
 else if (sig < MAXMAPPED_SIG)
return sig_map[sig];
return SIGUNKNOWN;
@@ -174,60 +175,48 @@
audit_signal_mask(ab, aad(sa)->denied);
}
-	if (aad(sa)->signal < MAXMAPPED_SIG)
+if (aad(sa)->signal == SIGUNKNOWN)
+audit_log_format(ab, "signal=unknown(%d)",
+ aad(sa)->unmappedsig);
+else if (aad(sa)->signal < MAXMAPPED_SIGNAME)
audit_log_format(ab, " signal=%s", sig_names[aad(sa)->signal]);
else
audit_log_format(ab, " signal=rtmin+%d",
- aad(sa)->signal - 128);
+ aad(sa)->signal - SIGRT_BASE);
audit_log_format(ab, " peer=");
aa_label_xaudit(ab, labels_ns(aad(sa)->label), aad(sa)->peer,
FLAGS_NONE, GFP_ATOMIC);
}
/* TODO: update to handle compound name&name2, conditionals */
static void profile_match_signal(struct aa_profile *profile, const char *label,
- int signal, struct aa_perms *perms)
+- unsigned int state;
-
-/* TODO: secondary cache check <profile, profile, perm> */
- state = aa_dfa_next(profile->policy.dfa,
- profile->policy.start[AA_CLASS_SIGNAL],
- signal);
- state = aa_dfa_match(profile->policy.dfa, state, label);
- aa_compute_perms(profile->policy.dfa, state, perms);
-

static int profile_signal_perm(struct aa_profile *profile,
- struct aa_profile *peer, u32 request,
+ struct aa_profile *peer, u32 request,
 struct common_audit_data *sa)
{
 struct aa_perms perms;
 unsigned int state;

 if (profile_unconfined(profile) ||
 !PROFILE_MEDIATES(profile, AA_CLASS_SIGNAL))
 return 0;
-
-aad(sa)->peer = &peer->label;
static int aa_signal_cross_perm(struct aa_profile *sender,
    struct aa_profile *target,
    struct common_audit_data *sa)
{
    return xcheck(profile_signal_perm(sender, target, MAY_WRITE, sa),
                   profile_signal_perm(target, sender, MAY_READ, sa));
}

int aa_may_signal(struct aa_label *sender, struct aa_label *target, int sig)
{
    struct aa_profile *profile;
    DEFINE_AUDIT_DATA(sa, LSM_AUDIT_DATA_NONE, OP_SIGNAL);

    aad(&sa)->signal = map_signal_num(sig);
    return xcheck_labels_profiles(sender, target, aa_signal_cross_perm,
                                  &sa);
    aad((&sa)->unmappedsig = sig;
    return xcheck_labels(sender, target, profile,
                          profile_signal_perm(profile, target, MAY_WRITE, &sa),
                          profile_signal_perm(profile, sender, MAY_READ, &sa));
}
--- linux-4.15.0.orig/security/apparmor/label.c
+++ linux-4.15.0/security/apparmor/label.c
@@ -313,10 +313,8 @@

-static void label_destroy(struct aa_label *label)
+void aa_label_destroy(struct aa_label *label)
{
-    struct aa_label *tmp;
-    AA_BUG(!label);
+
    if (!label_isprofile(label)) {
@@ -332,16 +330,13 @@

if (rcu_dereference_protected(label->proxy->label, true) == label)
-rcu_assign_pointer(label->proxy->label, NULL);

+if (label->proxy) {
+if (rcu_dereference_protected(label->proxy->label, true) == label)
+rcu_assign_pointer(label->proxy->label, NULL);
+aa_put_proxy(label->proxy);
+
} aa_free_secid(label->secid);

tmp = rcu_dereference_protected(label->proxy->label, true);
-if (tmp == label)
-rcu_assign_pointer(label->proxy->label, NULL);
-
-aa_put_proxy(label->proxy);
label->proxy = (struct aa_proxy *) PROXY_POISON + 1;
}

@@ -350,7 +345,7 @@
if (!label)
return;

-label_destroy(label);
+aa_label_destroy(label);
kfree(label);
}

@@ -1463,11 +1458,13 @@
/* helper macro for snprint routines */
define update_for_len(total, len, size, str))
do {
+size_t ulen = len;\
+\AA_BUG(len < 0);\n-
total += len;\n-
-len = min(len, size);\n-
-size -= len;\n-
-str += len;\n+total += ulen;\n+ulen = min(ulen, size);\n+size -= ulen;\n+str += ulen;\n} while (0)

/**
label_for_each(i, label, profile) {
if (aa_ns_visible(ns, profile->ns, flags & FLAG_VIEW_SUBNS)) {
    if (profile->mode == APPARMOR_UNCONFINED)
        count++;
    if (profile == profile->ns->unconfined)
        /* special case unconfined so stacks with
         * unconfined don't report as mixed. ie.
         * profile_foo//&:ns1:unconfined (mixed)
         */
        continue;
    count++;
    if (mode == -1)
        mode = profile->mode;
else if (mode != profile->mode)
    @ @ -1602,7 +1599,7 @@
struct aa_ns *prev_ns = NULL;
struct label_it i;
int count = 0, total = 0;
ssize_t len;
AA_BUG(!str && size != 0);
AA_BUG(!label);
--- linux-4.15.0.orig/security/apparmor/lib.c
+++ linux-4.15.0/security/apparmor/lib.c
@@ -90,10 +90,12 @@
const char *name = skipn_spaces(fqname, n);
const char *name = skipn_spaces(fqname, n);

-@ @ -211,7 +213,8 @@
-\texttt{\textbackslash \textbackslash 0};
+
-\texttt{\textbackslash 0};

-void aa_audit_perm_names(struct audit_buffer *ab, const char **names, u32 mask)
+void aa_audit_perm_names(struct audit_buffer *ab, const char * const *names,
void aa_audit_perm_mask(struct audit_buffer *ab, u32 mask, const char *chrs, 
-u32 chrsmask, const char **names, u32 namesmask)
+u32 chrsmask, const char * const *names, u32 namesmask)
{
    char str[33];

    /* for v5 perm mapping in the policydb, the other set is used
    * to extend the general perm set
    */
    -perms->allow |= map_other(dfa_other_allow(dfa, state));
+perms->allow |= map_other(dfa_other_allow(dfa, state)) | AA_MAY_LOCK;
    perms->audit |= map_other(dfa_other_audit(dfa, state));
    perms->quiet |= map_other(dfa_other_quiet(dfa, state));
    //perms->xindex = dfa_user_xindex(dfa, state);

#include <linux/security/apparmor/lsm.h>
#include <net/sock.h>

#include "include/af_unix.h"
#include "include/apparmor.h"
#include "include/apparmorfs.h"
#include "include/audit.h"
#include "include/context.h"
#include "include/file.h"
#include "include/ipc.h"
+#include "include/net.h"
#include "include/path.h"
#include "include/label.h"
#include "include/policy.h"
static void apparmor_cred_free(struct cred *cred)
{
    aa_free_task_context(cred_ctx(cred));
    -cred_ctx(cred) = NULL;
-}
-*/

- * allocate the apparmor part of blank credentials
- */
/static int apparmor_cred_alloc_blank(struct cred *cred, gfp_t gfp)
{
    /* freed by apparmor_cred_free */
-struct aa_task_ctx *ctx = aa_alloc_task_context(gfp);
-
-if (!ctx)
-return -ENOMEM;
-
-cred_ctx(cred) = ctx;
-return 0;
}

/*@ -80,14 +66,7 @@
static int apparmor_cred_prepare(struct cred *new, const struct cred *old, gfp_t gfp)
{
    /* freed by apparmor_cred_free */
-struct aa_task_ctx *ctx = aa_alloc_task_context(gfp);
-
-if (!ctx)
-return -ENOMEM;
-
-aa_dup_task_context(ctx, cred_ctx(old));
-cred_ctx(new) = ctx;
+aa_dup_task_context(cred_ctx(new), cred_ctx(old));
-return 0;
}

/*@ -111,7 +90,8 @@
tracer = begin_current_label_crit_section();
tracee = aa_get_task_label(child);
error = aa_may_ptrace(tracer, tracee,
    - mode == PTRACE_MODE_READ ? AA_PTRACE_READ : AA_PTRACE_TRACE);
+(mode & PTRACE_MODE_READ) ? AA_PTRACE_READ
+ : AA_PTRACE_TRACE);
aa_put_label(tracee);
end_current_label_crit_section(tracer);

/*@ -123,11 +103,11 @@
struct aa_label *tracer, *tracee;
int error;

-tracee = begin_current_label_crit_section();
+tracee = __begin_current_label_crit_section();
tracer = aa_get_task_label(parent);
error = aa_may_ptrace(tracer, tracee, AA_PTRACE_TRACE);
aa_put_label(tracer);
@end_current_label_crit_section(tracee);
@end_current_label_crit_section(tracee);

return error;
}
@@ -167,14 +147,14 @@
}

static int apparmor_capable(const struct cred *cred, struct user_namespace *ns,
-    int cap, int audit)
+    int cap, unsigned int opts)
{
  struct aa_label *label;
  int error = 0;

  label = aa_get_newest_cred_label(cred);
  if (!unconfined(label))
-    error = aa_capable(label, cap, audit);
+    error = aa_capable(label, cap, opts);
  aa_put_label(label);

  return error;
@@ -424,21 +404,21 @@

  static int apparmor_file_alloc_security(struct file *file)
  {
    -int error = 0;
-  
-  /* freed by apparmor_file_free_security */
+  struct aa_file_ctx *ctx = file_ctx(file);
    struct aa_label *label = begin_current_label_crit_section();
    -file->f_security = aa_alloc_file_ctx(label, GFP_KERNEL);
    -if (!file_ctx(file))
-      error = -ENOMEM;
    +spin_lock_init(&ctx->lock);
+    +rcu_assign_pointer(ctx->label, aa_get_label(label));
+    +end_current_label_crit_section(label);
    +return 0;
  }

  static void apparmor_file_free_security(struct file *file)
  {
    -aa_free_file_ctx(file_ctx(file));
+struct aa_file_ctx *ctx = file_ctx(file);
+
+if (ctx)
+aa_put_label(rcu_access_pointer(ctx->label));
}

static int common_file_perm(const char *op, struct file *file, u32 mask)
@@ -736,6 +716,418 @@
return error;
}

+/**
+ * apparmor_sk_alloc_security - allocate and attach the sk_security field
+ */
+static int apparmor_sk_alloc_security(struct sock *sk, int family, gfp_t flags)
+{
+ /* allocated and cleared by LSM */
+ +
+return 0;
+
+/**
+ * apparmor_sk_free_security - free the sk_security field
+ */
+static void apparmor_sk_free_security(struct sock *sk)
+{
+struct aa_sk_ctx *ctx = SK_CTX(sk);
+
+aa_put_label(ctx->label);
+ctx->label = NULL;
+aa_put_label(ctx->peer);
+ctx->peer = NULL;
+path_put(&ctx->path);
+ctx->path.dentry = NULL;
+ctx->path.mnt = NULL;
+
+
+/**
+ * apparmor_clone_security - clone the sk_security field
+ */
+static void apparmor_clone_security(const struct sock *sk,
+ struct sock *newsk)
+{
+struct aa_sk_ctx *ctx = SK_CTX(sk);
+struct aa_sk_ctx *new = SK_CTX(newsk);
+
+if (new->label)
+aa_put_label(new->label);
+new->label = aa_get_label(ctx->label);
+
+if (new->peer)
+aa_put_label(new->peer);
+new->peer = aa_get_label(ctx->peer);
+new->path = ctx->path;
+path_get(&new->path);
+}
+
+static struct path *UNIX_FS_CONN_PATH(struct sock *sk, struct sock *newsk)
+{
+if (sk->sk_family == PF_UNIX && UNIX_FS(sk))
+return &unix_sk(sk)->path;
+else if (newsk->sk_family == PF_UNIX && UNIX_FS(newsk))
+return &unix_sk(newsk)->path;
+return NULL;
+}
+
+/**
+ * apparmor_unix_stream_connect - check perms before making unix domain conn
+ *
+ * peer is locked when this hook is called
+ */
+static int apparmor_unix_stream_connect(struct sock *sk, struct sock *peer_sk,
+struct sock *newsk)
+{
+struct aa_sk_ctx *sk_ctx = SK_CTX(sk);
+struct aa_sk_ctx *peer_ctx = SK_CTX(peer_sk);
+struct aa_sk_ctx *new_ctx = SK_CTX(newsk);
+struct aa_label *label;
+struct path *path;
+int error;
+
+label = __begin_current_label_crit_section();
+error = aa_unix_peer_perm(label, OP_CONNECT,
+ (AA_MAY_CONNECT | AA_MAY_SEND | AA_MAY_RECEIVE),
+ sk, peer_sk, NULL);
+if (!UNIX_FS(peer_sk)) {
+last_error(error,
+ aa_unix_peer_perm(peer_ctx->label, OP_CONNECT,
+ (AA_MAY_ACCEPT | AA_MAY_SEND | AA_MAY_RECEIVE),
+ peer_sk, sk, label));
+}
+__end_current_label_crit_section(label);
+
+if (error)
+return error;
+return error;
+
/*
label newsk if it wasn't labeled in post_create. Normally this
would be done in sock_graft, but because we are directly looking
at the peer_sk to obtain peer_labeling for unix socks this
does not work
*/
if (!new_ctx->label)
   new_ctx->label = aa_get_label(peer_ctx->label);

/* Cross reference the peer labels for SO_PEERSEC */
if (new_ctx->peer)
   aa_put_label(new_ctx->peer);
if (sk_ctx->peer)
   aa_put_label(sk_ctx->peer);
new_ctx->peer = aa_get_label(sk_ctx->label);
sk_ctx->peer = aa_get_label(peer_ctx->label);

path = UNIX_FS_CONN_PATH(sk, peer_sk);
if (path) {
   new_ctx->path = *path;
   sk_ctx->path = *path;
   path_get(path);
   path_get(path);
}
return 0;
}

/**
apparmor_unix_may_send - check perms before conn or sending unix dgrams

other is locked when this hook is called
dgram connect calls may_send, peer setup but path not copied??????
*/
static int apparmor_unix_may_send(struct socket *sock, struct socket *peer)
{
   struct aa_sk_ctx *peer_ctx = SK_CTX(peer->sk);
   struct aa_label *label;
   int error;

   label = __begin_current_label_crit_section();
   error = xchech(aa_unix_peer_perm(label, OP_SENDMSG, AA_MAY_SEND,
      sock->sk, peer->sk, NULL),
      aa_unix_peer_perm(peer_ctx->label, OP_SENDMSG, AA_MAY_RECEIVE,
      peer->sk, sock->sk, label));
   __end_current_label_crit_section(label);
+ return error;
+
+/**
+ * apparmor_socket_create - check perms before creating a new socket
+ */
+static int apparmor_socket_create(int family, int type, int protocol, int kern)
+{
+    struct aa_label *label;
+    int error = 0;
+
+    label = begin_current_label_crit_section();
+    if (!(kern || unconfined(label)))
+        error = aa_sock_create_perm(label, family, type, protocol);
+    end_current_label_crit_section(label);
+    return error;
+}
+
+/**
+ * apparmor_socket_post_create - setup the per-socket security struct
+ *
+ * Note:
+ * - kernel sockets currently labeled unconfined but we may want to
+ *   move to a special kernel label
+ * - socket may not have sk here if created with sock_create_lite or
+ *   sock_alloc. These should be accept cases which will be handled in
+ *   sock_graft.
+ */
+static int apparmor_socket_post_create(struct socket *sock, int family,
+                                        int type, int protocol, int kern)
+{
+    struct aa_label *label;
+
+    if (kern) {
+        struct aa_ns *ns = aa_get_current_ns();
+        label = aa_get_label(ns_unconfined(ns));
+        aa_put_ns(ns);
+    } else {
+        label = aa_get_current_label();
+    }
+
+    if (sock->sk) {
+        struct aa_sk_ctx *ctx = SK_CTX(sock->sk);
+        label = aa_get_label(ctx->label);
+        ctx->label = aa_get_label(label);
+        aa_put_label(ctx->label);
+    } else {
+        label = aa_get_current_label();
+        aa_put_label(label);
+    }
+
+    if (sk && sk->sk_path) {
+        struct aa_path *path = sk->sk_path;
+        if (path) {
+            struct aa_ft_ctx *ft = aa_ft_ctx_get(label);
+            if (ft) {
+                aa_ft_ctx_put(ft);
+            } else {
+                aa_ft_ctx_put(NULL);
+            }
+        } else {
+            aa_ft_all_label(label);
+        }
+    }
+
+    return error;
+}
aaa_put_label(label);
+
+ return 0;
+
+/**
+ * apparmor_socket_bind - check perms before bind addr to socket
+ */
+static int apparmor_socket_bind(struct socket *sock,
+ struct sockaddr *address, int addrlen)
+{
+ return aa_sock_bind_perm(sock, address, addrlen);
+
+/**
+ * apparmor_socket_connect - check perms before connecting @sock to @address
+ */
+static int apparmor_socket_connect(struct socket *sock,
+ struct sockaddr *address, int addrlen)
+{
+ return aa_sock_connect_perm(sock, address, addrlen);
+
+/**
+ * apparmor_socket_list - check perms before allowing listen
+ */
+static int apparmor_socket_list(struct socket *sock, int backlog)
+{
+ return aa_sock_listen_perm(sock, backlog);
+
+/**
+ * apparmor_socket_accept - check perms before accepting a new connection.
+ *
+ * Note: while @newsock is created and has some information, the accept
+ *       has not been done.
+ */
+static int apparmor_socket_accept(struct socket *sock, struct socket *newsock)
+{
+ return aa_sock_accept_perm(sock, newsock);
+
+/**
+ * apparmor_socket_sendmsg - check perms before sending msg to another socket
+ */
+static int apparmor_socket_sendmsg(struct socket *sock,
+ struct msghdr *msg, int size)
+{ return aa_sock_msg_perm(OP_SENDMSG, AA_MAY_SEND, sock, msg, size); +}
+
+/**
+ * apparmor_socket_recvmsg - check perms before receiving a message
+ */
+static int apparmor_socket_recvmsg(struct socket *sock,
+   struct msghdr *msg, int size, int flags)
+{ return aa_sock_msg_perm(OP_RECVMSG, AA_MAY_RECEIVE, sock, msg, size); +}
+
+/**
+ * apparmor_socket_getsockname - check perms before getting the local address
+ */
+static int apparmor_socket_getsockname(struct socket *sock)
+{ return aa_sock_perm(OP_GETSOCKNAME, AA_MAY_GETATTR, sock); +}
+
+/**
+ * apparmor_socket_getpeername - check perms before getting remote address
+ */
+static int apparmor_socket_getpeername(struct socket *sock)
+{ return aa_sock_perm(OP_GETPEERNAME, AA_MAY_GETATTR, sock); +}
+
+/**
+ * apparmor_getsockopt - check perms before getting socket options
+ */
+static int apparmor_socket_getsockopt(struct socket *sock, int level,
+   int optname)
+{ return aa_sock_opt_perm(OP_GETSOCKOPT, AA_MAY_GETOPT, sock,
+   level, optname); +}
+
+/**
+ * apparmor_setsockopt - check perms before setting socket options
+ */
+static int apparmor_socket_setsockopt(struct socket *sock, int level,
+   int optname)
+{ return aa_sock_opt_perm(OP_SETSOCKOPT, AA_MAY_SETOPT, sock,
+   level, optname); +}
+/**
+ * apparmor_socket_shutdown - check perms before shutting down @sock conn
+ */
+static int apparmor_socket_shutdown(struct socket *sock, int how)
+{
+ return aa_sock_perm(OP_SHUTDOWN, AA_MAY_SHUTDOWN, sock);
+}
+
+/**
+ * apparmor_socket_sock_recv_skb - check perms before associating skb to sk
+ *
+ * Note: can not sleep may be called with locks held
+ *
+ * dont want protocol specific in __skb_recv_datagram()
+ * to deny an incoming connection  socket_sock_rcv_skb()
+ */
+static int apparmor_socket_sock_recv_skb(struct sock *sk, struct sk_buff *skb)
+{
+ return 0;
+}
+
+
+static struct aa_label *sk_peer_label(struct sock *sk)
+{
+ struct sock *peer_sk;
+ struct aa_sk_ctx *ctx = SK_CTX(sk);
+
+ if (ctx->peer)
+ return ctx->peer;
+ if (sk->sk_family != PF_UNIX)
+ return ERR_PTR(-ENOPROTOOPT);
+ /* check for sockpair peering which does not go through
+ * security_unix_stream_connect
+ */
+ peer_sk = unix_peer(sk);
+ if (peer_sk) {
+ ctx = SK_CTX(peer_sk);
+ if (ctx->label)
+ return ctx->label;
+ }
+ return ERR_PTR(-ENOPROTOOPT);
+}
+
+/**
+ * apparmor_socket_getpeersec_stream - get security context of peer
+ *
+ * Note: for tcp only valid if using ipsec or cipso on lan
+ */
+static int apparmor_socket_getpeersec_stream(struct socket *sock,
+    char __user *optval,
+    int __user *optlen,
+    unsigned int len)
+
+    char *name;
+    int slen, error = 0;
+    struct aa_label *label;
+    struct aa_label *peer;
+    
+    label = begin_current_label_crit_section();
+    peer = sk_peer_label(sock->sk);
+    if (IS_ERR(peer)) {
+      error = PTR_ERR(peer);
+      goto done;
+    }
+    slen = aa_label_asxprint(&name, labels_ns(label), peer,
+                FLAG_SHOW_MODE | FLAG_VIEW_SUBNS |
+                FLAG_HIDDEN_UNCONFINED, GFP_KERNEL);
+    /* don't include terminating \0 in slen, it breaks some apps */
+    if (slen < 0) {
+      error = -ENOMEM;
+    } else {
+      if (slen > len) {
+        error = -ERANGE;
+      } else if (copy_to_user(optval, name, slen)) {
+        error = -EFAULT;
+        goto out;
+      }
+      if (put_user(slen, optlen))
+        error = -EFAULT;
+      out:
+        kfree(name);
+        
+    }
+    }
+    
+    done:
+    end_current_label_crit_section(label);
+    
+    return error;
+    
+/**
+   * apparmor_socket_getpeersec_dgram - get security label of packet
+ * @sock: the peer socket
+ * @skb: packet data
+ * @secid: pointer to where to put the secid of the packet
+ *
+ * Sets the netlabel socket state on sk from parent
+ */
+static int apparmor_socket_getpeersec_dgram(struct socket *sock,
+    struct sk_buff *skb, u32 *secid)
+
+{
+/* TODO: requires secid support */
+return -ENOPROTOOPT;
+
+/* apparmor_sock_graft - Initialize newly created socket
+ * @sk: child sock
+ * @parent: parent socket
+ */
+ Note: could set off of SOCK_CTX(parent) but need to track inode and we can
+ just set sk security information off of current creating process label
+ * Labeling of sk for accept case - probably should be sock based
+ * instead of task, because of the case where an implicitly labeled
+ * socket is shared by different tasks.
+ */
+static void apparmor_sock_graft(struct sock *sk, struct socket *parent)
+
+struct aa_sk_ctx *ctx = SK_CTX(sk);
+
+if (!ctx->label)
+    ctx->label = aa_get_current_label();
+
+struct lsm_blob_sizes apparmor_blob_sizes = {
+.lbs_cred = sizeof(struct aa_task_ctx),
+.lbs_file = sizeof(struct aa_file_ctx),
+.lbs_sock = sizeof(struct aa_sk_ctx),
+};
+
+static struct security_hook_list apparmor_hooks[] __lsm_ro_after_init = {
+LSM_HOOK_INIT(ptrace_access_check, apparmor_ptrace_access_check),
+LSM_HOOK_INIT(ptrace_traceme, apparmor_ptrace_traceme),
+LSM_HOOK_INIT(getprocattr, apparmor_getprocattr),
+LSM_HOOK_INIT(setprocattr, apparmor_setprocattr),
+LSM_HOOK_INIT(cred_alloc_blank, apparmor_cred_alloc_blank),
+LSM_HOOK_INIT(sk_alloc_security, apparmor_sk_alloc_security),
+LSM_HOOK_INIT(sk_free_security, apparmor_sk_free_security),
+LSM_HOOK_INIT(sk_clone_security, apparmor_sk_clone_security),
+LSM_HOOK_INIT(unix_stream_connect, apparmor_unix_stream_connect),
+LSM_HOOK_INIT(unix_may_send, apparmor_unix_may_send),
+LSM_HOOK_INIT(socket_create, apparmor_socket_create),
+LSM_HOOK_INIT(socket_post_create, apparmor_socket_post_create),
+LSM_HOOK_INIT(socket_bind, apparmor_socket_bind),
+LSM_HOOK_INIT(socket_connect, apparmor_socket_connect),
+LSM_HOOK_INIT(socket_listen, apparmor_socket_listen),
+LSM_HOOK_INIT(socket_accept, apparmor_socket_accept),
+LSM_HOOK_INIT(socket_sendmsg, apparmor_socket_sendmsg),
+LSM_HOOK_INIT(socket_recvmsg, apparmor_socket_recvmsg),
+LSM_HOOK_INIT(socket_getsockname, apparmor_socket_getsockname),
+LSM_HOOK_INIT(socket_getpeername, apparmor_socket_getpeername),
+LSM_HOOK_INIT(socket_getsockopt, apparmor_socket_getsockopt),
+LSM_HOOK_INIT(socket_setsockopt, apparmor_socket_setsockopt),
+LSM_HOOK_INIT(socket_shutdown, apparmor_socket_shutdown),
+LSM_HOOK_INIT(socket_sock_rcv_skb, apparmor_socket_sock_rcv_skb),
+LSM_HOOK_INIT(socket_getpeersec_stream, apparmor_socket_getpeersec_stream),
+LSM_HOOK_INIT(socket_getpeersec_dgram, apparmor_socket_getpeersec_dgram),
+LSM_HOOK_INIT(sock_graft, apparmor_sock_graft),
+LSM_HOOK_INIT(cred_free, apparmor_cred_free),
+LSM_HOOK_INIT(cred_prepare, apparmor_cred_prepare),
+LSM_HOOK_INIT(cred_transfer, apparmor_cred_transfer),
@@ -1026,12 +1444,10 @@
     struct cred *cred = (struct cred *)current->real_cred;
     struct aa_task_ctx *ctx;
     -ctx = aa_alloc_task_context(GFP_KERNEL);
-    if (!ctx)
-        return -ENOMEM;
+    lsm_early_cred(cred);
+    ctx = apparmor_cred(cred);
     ctx->label = aa_get_label(ns_unconfined(root_ns));
     -cred_ctx(cred) = ctx;
     return 0;
 }@@ -1115,9 +1531,21 @@
 static int __init apparmor_init(void) {

-ctx = aa_alloc_task_context(GFP_KERNEL);
-    if (!ctx)
-        return -ENOMEM;
+    lsm_early_cred(cred);
+    ctx = apparmor_cred(cred);

     ctx->label = aa_get_label(ns_unconfined(root_ns));
     -cred_ctx(cred) = ctx;

     return 0;
 }@@ -1115,9 +1531,21 @@
 static int __init apparmor_init(void) {


static int finish;
int error;

if (!apparmor_enabled || !security_module_enable("apparmor")) {
  if (!finish) {
    if (apparmor_enabled &&
        IS_ENABLED(CONFIG_SECURITY_APPARMOR_STACKED))
      security_add_blobs(&apparmor_blob_sizes);
    else
      apparmor_enabled = false;
    finish = 1;
    return 0;
  }
}

if (!apparmor_enabled) {
  aa_info_message("AppArmor disabled by boot time parameter");
  apparmor_enabled = false;
  return 0;
}

/*
 * AppArmor security module
 *
 * This file contains AppArmor network mediation
 *
 * Copyright (C) 1998-2008 Novell/SUSE
 * Copyright 2009-2017 Canonical Ltd.
 *
 * This program is free software; you can redistribute it and/or
 * modify it under the terms of the GNU General Public License as
 * published by the Free Software Foundation, version 2 of the
 * License.
 *
 * include "include/af_unix.h"
 *include "include/apparmor.h"
 *include "include/audit.h"
 *include "include/context.h"
 *include "include/label.h"
 *include "include/net.h"
 *include "include/policy.h"
 *
 *struct aa_sfs_entry aa_sfs_entry_network[

static const char * const net_mask_names[] = {
  "unknown",
  "send",
  "receive",
  "unknown",
  +
  "create",
  "shutdown",
  "connect",
  "unknown",
  +
  "setattr",
  "getattr",
  "setcred",
  "getcred",
  +
  "chmod",
  "chown",
  "chgrp",
  "lock",
  +
  "mmap",
  "mprot",
  "unknown",
  "unknown",
  +
  "accept",
  "bind",
  "listen",
  "unknown",
  +
  "setopt",
  "getopt",
  "unknown",
  "unknown",
  +
  "unknown",
  "unknown",
  +
  "unknown",
  "unknown",
  +
  "unknown",
  "unknown",
  +
  "unknown",
  "unknown",
  +
  "unknown",
  +
};
+ struct sockaddr_un *addr, int addrlen)
+
+int len = unix_addr_len(addrlen);
+
+if (!addr || len <= 0) {
    audit_log_format(ab, " %s=none", str);
+} else if (addr-&gt;sun_path[0]) {
    audit_log_format(ab, " %s="str);
    audit_log_untrustedstring(ab, addr-&gt;sun_path);
+} else {
    audit_log_format(ab, " %s="@", str);
    if (audit_string_contains_control(&amp;addr-&gt;sun_path[1], len - 1))
        audit_log_n_hex(ab, &amp;addr-&gt;sun_path[1], len - 1);
    else
        audit_log_format(ab, "%.*s", len - 1,
            &amp;addr-&gt;sun_path[1]);
    audit_log_format(ab, ");
+}
+
+static void audit_unix_sk_addr(struct audit_buffer *ab, const char *str,
+    struct sock *sk)
+{
+struct unix_sock *u = unix_sk(sk);
+if (u &amp;&amp; u-&gt;addr)
    audit_unix_addr(ab, str, u-&gt;addr-&gt;name, u-&gt;addr-&gt;len);
+else
    audit_unix_addr(ab, str, NULL, 0);
+
/** audit callback for net specific fields */
+void audit_net_cb(struct audit_buffer *ab, void *va)
+{
+struct common_audit_data *sa = va;
+
    audit_log_format(ab, " family=");
+if (address_family_names[sa-&gt;u.net-&gt;family])
        audit_log_string(ab, address_family_names[sa-&gt;u.net-&gt;family]);
+else
    audit_log_format(ab, \"unknown(%d)\", sa-&gt;u.net-&gt;family);
    audit_log_format(ab, " sock_type=");
+if (sock_type_names[aad(sa)-&gt;net.type])
        audit_log_string(ab, sock_type_names[aad(sa)-&gt;net.type]);
+else
    audit_log_format(ab, \"unknown(%d)\", aad(sa)-&gt;net.type);
    audit_log_format(ab, " protocol=%d", aad(sa)-&gt;net.protocol);
+
+if (aad(sa)-&gt;request &amp; NET_PERMS_MASK) {
+audit_log_format(ab, " requested_mask=");
+aa_audit_perm_mask(ab, aad(sa)->request, NULL, 0,
+    net_mask_names, NET_PERMS_MASK);
+
+if (aad(sa)->denied & NET_PERMS_MASK) {
+audit_log_format(ab, " denied_mask=");
+aa_audit_perm_mask(ab, aad(sa)->denied, NULL, 0,
+    net_mask_names, NET_PERMS_MASK);
+}
+
+if (sa->u.net->family == AF_UNIX) {
+if (((aad(sa)->request & ~NET_PEER_MASK) && aad(sa)->net.addr)
+    audit_unix_addr(ab, "addr",
+    unix_addr(aad(sa)->net.addr),
+    aad(sa)->net.addrlen);
+else
+    audit_unix_sk_addr(ab, "addr", sa->u.net->sk);
+}
+if (aad(sa)->request & NET_PEER_MASK) {
+    if (aad(sa)->net.addr)
+        audit_unix_addr(ab, "peer_addr",
+            unix_addr(aad(sa)->net.addr),
+            aad(sa)->net.addrlen);
+    else
+        audit_unix_sk_addr(ab, "peer_addr",
+            aad(sa)->net.peer_sk);
+}
+if (aad(sa)->peer) {
+    audit_log_format(ab, " peer=");
+    aa_label_xaudit(ab, labels_ns(aad(sa)->label), aad(sa)->peer,
+        FLAGS_NONE, GFP_ATOMIC);
+}
+
+/* Generic af perm */
+int aa_profile_af_perm(struct aa_profile *profile, struct common_audit_data *sa,
+    u32 request, u16 family, int type)
+{
+    struct aa_perms perms = { };
+
+    AA_BUG(family >= AF_MAX);
+    AA_BUG(type < 0 || type >= SOCK_MAX);
+
+    if (profile_unconfined(profile))
+        return 0;
+
+    perms.allow = (profile->net.allow[family] & (1 << type)) ?
ALL_PERMS_MASK = 0;
perms.audit = (profile->net.audit[family] & (1 << type)) ?
    ALL_PERMS_MASK : 0;
perms.quiet = (profile->net.quiet[family] & (1 << type)) ?
    ALL_PERMS_MASK : 0;
aa_apply_modes_to_perms(profile, &perms);
+
return aa_check_perms(profile, &perms, request, sa, audit_net_cb);
+
int aa_af_perm(struct aa_label *label, const char *op, u32 request, u16 family,
    int type, int protocol)
+
struct aa_profile *profile;
DEFINE_AUDIT_NET(sa, op, NULL, family, type, protocol);
+
return fn_for_each_confined(label, profile,
    aa_profile_af_perm(profile, &sa, request, family,
        type));
+
int aa_label_sk_perm(struct aa_label *label, const char *op, u32 request,
    struct sock *sk)
+
int error = 0;
+
AA_BUG(!label);
AA_BUG(!sk);
+
if (!unconfined(label)) {
    struct aa_profile *profile;
    DEFINE_AUDIT_SK(sa, op, sk);
+
error = fn_for_each_confined(label, profile,
    aa_profile_af_sk_perm(profile, &sa, request, sk));
+
return error;
+
int aa_sk_perm(const char *op, u32 request, struct sock *sk)
+
struct aa_label *label;
int error;
+
AA_BUG(!sk);
AA_BUG(in_interrupt());
+
/* TODO: switch to begin_current_label ????? */
+label = begin_current_label_crit_section();
+error = aa_label_sk_perm(label, op, request, sk);
+end_current_label_crit_section(label);
+
+return error;
+
+#define af_select(FAMILY, FN, DEF_FN)
+/
+int __e;\}
+switch ((FAMILY)) {\}
+case AF_UNIX:\
+__e = aa_unix_##FN;\}
+break;\}
+default:\
+__e = DEF_FN;\}
+\}
+__e;\}
+
+/* TODO: push into lsm.c ????? */
+
+/* revalidation, get/set attr, shutdown */
+int aa_sock_perm(const char *op, u32 request, struct socket *sock)
+{
+AA_BUG(!sock);
+AA_BUG(!sock->sk);
+AA_BUG(!sock->sk);
+
+return af_select(sock->sk->sk_family,
+sock_perm(op, request, sock),
+aa_sk_perm(op, request, sock->sk));
+}
+
+int aa_sock_create_perm(struct aa_label *label, int family, int type,
+int protocol)
+{
+AA_BUG(!label);
+/* TODO: .... */
+AA_BUG(!label);
+
+return af_select(family,
+create_perm(label, family, type, protocol),
+aa_af_perm(label, OP_CREATE, AA_MAY_CREATE, family,
+type, protocol));
+}
+
+int aa_sock_bind_perm(struct socket *sock, struct sockaddr *address, int addrlen)
+
+AA_BUG(!sock);
+AA_BUG(!sock->sk);
+AA_BUG(!address);
+/* TODO: .... */
+AA_BUG(in_interrupt());
+
+return af_select(sock->sk->sk_family, bind_perm(sock, address, addrlen),
+ aa_sk_perm(OP_BIND, AA_MAY_BIND, sock->sk));
+
+
+int aa_sock_connect_perm(struct socket *sock, struct sockaddr *address, int addrlen)
+
+AA_BUG(!sock);
+AA_BUG(!sock->sk);
+AA_BUG(!address);
+/* TODO: .... */
+AA_BUG(in_interrupt());
+
+return af_select(sock->sk->sk_family, connect_perm(sock, address, addrlen),
+ aa_sk_perm(OP_CONNECT, AA_MAY_CONNECT, sock->sk));
+
+
+int aa_sock_listen_perm(struct socket *sock, int backlog)
+
+AA_BUG(!sock);
+AA_BUG(!sock->sk);
+/* TODO: .... */
+AA_BUG(in_interrupt());
+
+return af_select(sock->sk->sk_family, listen_perm(sock, backlog),
+ aa_sk_perm(OP_LISTEN, AA_MAY_LISTEN, sock->sk));
+
+
+/* ability of sock to connect, not peer address binding */
+int aa_sock_accept_perm(struct socket *sock, struct socket *newsock)
+
+AA_BUG(!sock);
+AA_BUG(!sock->sk);
+AA_BUG(!newsock);
+/* TODO: .... */
+AA_BUG(in_interrupt());
+ return af_select(sock->sk->sk_family, 
+ accept_perm(sock, newsock),
+ aa_sk_perm(OP_ACCEPT, AA_MAY_ACCEPT, sock->sk));
+ }
+
+ /* sendmsg, recvmsg */
+ int aa_sock_msg_perm(const char *op, u32 request, struct socket *sock,
+ struct msghdr *msg, int size)
+ {
+ AA_BUG(!sock);
+ AA_BUG(!sock->sk);
+ AA_BUG(!msg);
+ /* TODO: .... */
+ AA_BUG(in_interrupt());
+ + return af_select(sock->sk->sk_family,
+ msg_perm(op, request, sock, msg, size),
+ aa_sk_perm(op, request, sock->sk));
+ }
+
+ /* revalidation, get/set attr, opt */
+ int aa_sock_opt_perm(const char *op, u32 request, struct socket *sock, int level,
+ int optname)
+ {
+ AA_BUG(!sock);
+ AA_BUG(!sock->sk);
+ AA_BUG(in_interrupt());
+ + return af_select(sock->sk->sk_family,
+ opt_perm(op, request, sock, level, optname),
+ aa_sk_perm(op, request, sock->sk));
+ }
+
+ int aa_sock_file_perm(struct aa_label *label, const char *op, u32 request,
+ struct socket *sock)
+ {
+ AA_BUG(!label);
+ AA_BUG(!sock);
+ AA_BUG(!sock->sk);
+ + return af_select(sock->sk->sk_family,
+ file_perm(label, op, request, sock),
+ aa_label_sk_perm(label, op, request, sock->sk));
+ }
--- linux-4.15.0.orig/security/apparmor/policy.c
+++ linux-4.15.0/security/apparmor/policy.c
@@ -240,6 +240,7 @@
kzfree(profile->hash);
aa_put_loaddata(profile->rawdata);
+aa_label_destroy(&profile->label);

kzfree(profile);
}
@@ -1003,6 +1004,9 @@
audit_policy(label, op, ns_name, ent->new->base.hname,
   "same as current profile, skipping",
   error);
+ /* break refcount cycle with proxy. */
+ aa_put_proxy(ent->new->label.proxy);
+ ent->new->label.proxy = NULL;
goto skip;
}

--- linux-4.15.0.orig/security/apparmor/policy_ns.c
+++ linux-4.15.0/security/apparmor/policy_ns.c
@@ -255,7 +255,7 @@
 ns = alloc_ns(parent->base.hname, name);
 if (!ns)
 -return NULL;
+return ERR_PTR(-ENOMEM);
 ns->level = parent->level + 1;
 mutex_lock_nested(&ns->lock, ns->level);
 error = __aafs_ns_mkdir(ns, ns_subns_dir(parent), name, dir);
--- linux-4.15.0.orig/security/apparmor/policy_unpack.c
+++ linux-4.15.0/security/apparmor/policy_unpack.c
@@ -206,16 +206,21 @@
 static size_t unpack_u16_chunk(struct aa_ext *e, char **chunk)
 {
 size_t size = 0;
+void *pos = e->pos;

 if (!inbounds(e, sizeof(u16)))
 -return 0;
+goto fail;
 size = le16_to_cpu(get_unaligned((__le16 *) e->pos));
 e->pos += sizeof(__le16);
 if (!inbounds(e, size))
 -return 0;
+goto fail;
 *chunk = e->pos;
 e->pos += size;
 return size;
 +
+fail:
++e->pos = pos;
++return 0;
}

/* unpack control byte */
@@ -259,7 +264,7 @@
char *tag = NULL;
size_t size = unpack_u16_chunk(e, &tag);
/* if a name is specified it must match. otherwise skip tag */
-@if (name && (!size || strcmp(name, tag)))
+if (name && (!size || tag[size - 1] != '\0' || strcmp(name, tag)))
goto fail;
} else if (name) {
/* if a name is specified and there is no name tag fail */
@@ -275,51 +280,81 @@
return 0;
}

+static bool unpack_u16(struct aa_ext *e, u16 *data, const char *name)
++{
+if (unpack_nameX(e, AA_U16, name)) {
+if (!inbounds(e, sizeof(u16)))
+return 0;
+if (data)
+*data = le16_to_cpu(get_unaligned((__le16 *) e->pos));
+e->pos += sizeof(u16);
+return 1;
++}
+}
+
+static bool unpack_u32(struct aa_ext *e, u32 *data, const char *name)
{
+void *pos = e->pos;
+
if (unpack_nameX(e, AA_U32, name)) {
if (!inbounds(e, sizeof(u32)))
-return 0;
+goto fail;
if (data)
*data = le32_to_cpu(get_unaligned((__le32 *) e->pos));
e->pos += sizeof(u32);
return 1;
}
+
+fail:
++e->pos = pos;
return 0;
}

static bool unpack_u64(struct aa_ext *e, u64 *data, const char *name)
{
    void *pos = e->pos;
    if (unpack_nameX(e, AA_U64, name)) {
        if (!inbounds(e, sizeof(u64))) {
            goto fail;
        }
        if (data)
            *data = le64_to_cpu(get_unaligned((__le64 *) e->pos));
        e->pos += sizeof(u64);
        return 1;
    }
    fail:
    e->pos = pos;
    return 0;
}

static size_t unpack_array(struct aa_ext *e, const char *name)
{
    void *pos = e->pos;
    if (unpack_nameX(e, AA_ARRAY, name)) {
        int size;
        if (!inbounds(e, sizeof(u16))) {
            goto fail;
        }
        size = (int)le16_to_cpu(get_unaligned((__le16 *) e->pos));
        e->pos += sizeof(u16);
        return size;
    }
    fail:
    e->pos = pos;
    return 0;
}

static size_t unpack_blob(struct aa_ext *e, char **blob, const char *name)
{
    void *pos = e->pos;
    if (unpack_nameX(e, AA_BLOB, name)) {
        u32 size;
        if (!inbounds(e, sizeof(u32)))
            return 0;
        *blob = (char *) get_unaligned((__le32 *) e->pos);
        e->pos += sizeof(u32);
        return 1;
    }
    fail:
    e->pos = pos;
    return 0;
}
size = le32_to_cpu(get_unaligned((__le32 *) e->pos));
e->pos += sizeof(u32);
if (inbounds(e, (size_t) size)) {
    return size;
}
+
+fail:
+e->pos = pos;
return 0;
}

if (src_str[size - 1] != 0)
go to fail;
*string = src_str;
+
+return size;
}
}

fail:
e->pos = pos;
+size = unpack_array(e, "net_allowed_af");
+if (size) {
    +for (i = 0; i < size; i++) {
        /* discard extraneous rules that this kernel will
         * never request
        */
        +if (i >= AF_MAX) {
+u16 tmp;
+
+if (!unpack_u16(e, &tmp, NULL) ||
+    !unpack_u16(e, &tmp, NULL) ||
+    !unpack_u16(e, &tmp, NULL))
goto fail;
+continue;
+
+if (!unpack_u16(e, &profile->net.allow[i], NULL))
goto fail;
+if (!unpack_u16(e, &profile->net.audit[i], NULL))
goto fail;
+if (!unpack_u16(e, &profile->net.quiet[i], NULL))
goto fail;
+
+if (!unpack_nameX(e, AA_ARRAYEND, NULL))
goto fail;
+
+if (VERSION_LT(e->version, v7)) {
+    /* pre v7 policy always allowed these */
+    profile->net.allow[AF_UNIX] = 0xffff;
+    profile->net.allow[AF_NETLINK] = 0xffff;
+}
+if (unpack_nameX(e, AA_STRUCT, "policydb")) {
+    /* generic policy dfa - optional and may be NULL */
+    info = "failed to unpack policydb";
+    /* generic policy dfa - optional and may be NULL */
+    info = "failed to unpack policydb";
    --- linux-4.15.0.orig/security/apparmor/resource.c
    +++ linux-4.15.0/security/apparmor/resource.c
    @@ -124,7 +124,7 @@
    */

    if (label != peer &&
        !aa_capable(label, CAP_SYS_RESOURCE, SECURITY_CAP_NOAUDIT))
        aa_capable(label, CAP_SYS_RESOURCE, CAP_OPT_NOAUDIT) != 0)
    } else {
        error = fn_for_each(label, profile,
            audit_resource(profile, resource,
                new_rlim->rlim_max, peer,
                --- linux-4.15.0.orig/security/commoncap.c
                +++ linux-4.15.0/security/commoncap.c
                @@ -69,7 +69,7 @@
                * kernel's capable() and has_capability() returns 1 for this case.
                */
                int cap_capable(const struct cred *cred, struct user_namespace *targ_ns,
                    -int cap, int audit)
                    +int cap, unsigned int opts)
                {
                    struct user_namespace *ns = targ_ns;
static inline int cap_inh_is_capped(void)
{
    /* they are so limited unless the current task has the CAP_SETPCAP
     * capability */
    if (cap_capable(current_cred(), current_cred()->user_ns,
                    CAP_SETPCAP, SECURITY_CAP_AUDIT) == 0)
        return 0;
    return 1;
}

int size, ret;
uid_t root, mappedroot;
unsigned nsmagic, magic;
struct vfs_cap_data *cap;
struct vfs_ns_cap_data *nscap = NULL;
struct dentry *dentry;
struct user_namespace *fs_ns;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_alias(inode);

char *tmpbuf = NULL;
struct vfs_cap_data *cap;
struct vfs_ns_cap_data *nscap = NULL;
struct dentry *dentry;
struct user_namespace *fs_ns;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

size = dgetsize(inode);
if (size < 0)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

if (strcmp(name, "capability") != 0)
    return -EOPNOTSUPP;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

size = dgetsize(inode);
if (size < 0)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;

size = dgetsize(inode);
if (size < 0)
    return -EINVAL;

struct dentry = d_find_alias(inode);
++dentry = d_find_any_alias(inode);
if (!dentry)
    return -EINVAL;
- * on-disk value, so return that. */
- if (alloc)
- buffer = tmpbuf;
- else
- kfree(tmpbuf);
- return ret;
- } else if (!is_v3header((size_t) ret, cap)) {
- kfree(tmpbuf);
- return -EINVAL;
+ root = 0;
+ } else if (is_v3header((size_t) ret, cap)) {
+ nsnap = (struct vfs_ns_cap_data *) tmpbuf;
+ root = le32_to_cpu(nsnap->rootid);
+ } else {
+ size = -EINVAL;
+ goto out_free;
}

- nsnap = (struct vfs_ns_cap_data *) tmpbuf;
- root = le32_to_cpu(nsnap->rootid);
kroot = make_kuid(fs_ns, root);

/* If the root kuid maps to a valid uid in current ns, then return
 * this as a nsnap. */
mappedroot = from_kuid(current_user_ns(), kroot);
if (mappedroot != (uid_t)-1 && mappedroot != (uid_t)0) {
+ size = sizeof(struct vfs_ns_cap_data);
if (alloc) {
+ buffer = tmpbuf;
+ if (!nsnap) {
+ */ v2 -> v3 conversion */
+ nsnap = kzalloc(size, GFP_ATOMIC);
+ if (!nsnap) {
+ size = -ENOMEM;
+ goto out_free;
+ }
+ nsmagic = VFS_CAP_REVISION_3;
+ magic = le32_to_cpu(cap->magic_etc);
+ if (magic & VFS_CAP_FLAGS_EFFECTIVE)
+ nsmagic |= VFS_CAP_FLAGS_EFFECTIVE;
+ memcpy(&nsnap->data, &cap->data, sizeof(__le32) * 2 * VFS_CAP_U32);
+ nsnap->magic_etc = cpu_to_le32(nsmagic);
+ } else {
+ */ use allocated v3 buffer */
+ tmpbuf = NULL;
+ }
nsnap->rootid = cpu_to_le32(mappedroot);
- } else
-kfree(tmpbuf);
-return size;
+*buffer = nscap;
+
+goto out_free;
}

if (!rootid_owns_currentns(kroot)) {
-kfree(tmpbuf);
-return -EOPNOTSUPP;
+size = -EOVERFLOW;
+goto out_free;
}

/* This comes from a parent namespace. Return as a v2 capability */
size = sizeof(struct vfs_cap_data);
if (alloc) {
-*buffer = kmalloc(size, GFP_ATOMIC);
-if (*buffer) {
-struct vfs_cap_data *cap = *buffer;
-__le32 nsmagic, magic;
+if (nscap) {
+/* v3 -> v2 conversion */
+cap = kzalloc(size, GFP_ATOMIC);
+if (!cap) {
+size = -ENOMEM;
+goto out_free;
+}
+magic = VFS_CAP_REVISION_2;
+nsmagic = le32_to_cpu(nscap->magic_etc);
+if (nsmagic & VFS_CAP_FLAGS_EFFECTIVE)
+magic |= VFS_CAP_FLAGS_EFFECTIVE;
+memcpy(&cap->data, &nscap->data, sizeof(__le32) * 2 * VFS_CAP_U32);
+cap->magic_etc = cpu_to_le32(magic);
+} else {
+/* use unconverted v2 */
+tmpbuf = NULL;
+}
+*buffer = cap;
+
+out_free:
+kfree(tmpbuf);
+}
+return size;
}@ @ -478,7 +498,7 @@
*  
* If all is ok, we return the new size, on error return < 0.
*/
int cap_convert_nscap(struct dentry *dentry, void **ivalue, size_t size) {
    struct vfs_ns_cap_data *nscap;
    uid_t nsrootid;
    /* ...
    nscap->magic_etc = cpu_to_le32(nsmagic);
    memcpy(&nscap->data, &cap->data, sizeof(__le32) * 2 * VFS_CAP_U32);

    kvfree(*ivalue);
    *ivalue = nscap;
    return newsize;

    /* ...
    if (!file_caps_enabled)
        return 0;

    /* ...
    if (!mnt_may_suid(bprm->file->f_path.mnt))
        if (path_nosuid(&bprm->file->f_path))
            return 0;

    /* ...
    if (WARN_ON(!cap_ambient_invariant_ok(old)))
        return -EPERM;

    if (!ns_capable(dentry->d_sb->s_user_ns, CAP_SYS_ADMIN))
        return -EPERM;

    /* ...
    if (!capable(CAP_SYS_ADMIN))
        if (!ns_capable(dentry->d_sb->s_user_ns, CAP_SYS_ADMIN))
            return -EPERM;
        return 0;
    }
}
@@ -1206,8 +1226,9 @@
 || ((old->securebits & SECURE_ALL_LOCKS & ~arg2))/*[2]*/
 || (arg2 & ~(SECURE_ALL_LOCKS | SECURE_ALL_BITS))/*[3]*/
 || (cap_capable(current_cred(),
-    current_cred()->user_ns, CAP_SETPCAP,
-    SECURITY_CAP_AUDIT) != 0)/*[4]*/
+    current_cred()->user_ns,
+    CAP_SETPCAP,
+    CAP_OPT_NONE) != 0)/*[4]*/
/<*
  * [1] no changing of bits that are locked
  * [2] no unlocking of locks
@@ -1302,9 +1323,10 @@
{
    int cap_sys_admin = 0;

-if (cap_capable(current_cred(), &init_user_ns, CAP_SYS_ADMIN,
-    SECURITY_CAP_NOAUDIT) == 0)
+if (cap_capable(current_cred(), &init_user_ns,
+    CAP_SYS_ADMIN, CAP_OPT_NOAUDIT) == 0)
    cap_sys_admin = 1;
    return cap_sys_admin;
 }
@@ -1323,19 +1345,21 @@

 if (addr < dac_mmap_min_addr) {
    ret = cap_capable(current_cred(), &init_user_ns, CAP_SYS_RAWIO,
-    SECURITY_CAP_AUDIT);
+    SECURITY_CAP_AUDIT);
    + CAP_OPT_NONE);
 /* set PF_SUPERPRIV if it turns out we allow the low mmap */
 if (ret == 0)
    current->flags |= PF_SUPERPRIV;
 } return ret;
 }
+EXPORT_SYMBOL_GPL(cap_mmap_file);

 int cap_mmap_file(struct file *file, unsigned long reqprot,
   unsigned long prot, unsigned long flags)
 { return 0;
 } +EXPORT_SYMBOL_GPL(cap_mmap_file);

 #ifdef CONFIG_SECURITY
--- linux-4.15.0.orig/security/device_cgroup.c
+++ linux-4.15.0/security/device_cgroup.c
@@ -8,6 +8,7 @@
 #include <linux/device_cgroup.h>
 #include <linux/cgroup.h>
 #include <linux/ctype.h>
+#include <linux/export.h>
 #include <linux/list.h>
 #include <linux/uaccess.h>
 #include <linux/seq_file.h>
@@ -560,7 +561,7 @@
   devcg->behavior == DEVCG_DEFAULT_ALLOW) {
 rc = dev_exception_add(devcg, ex);
 if (rc)
-   break;
+   return rc;
   } else {
/*
   * in the other possible cases:
@@ -824,3 +825,4 @@
 return 0;
 }
+EXPORT_SYMBOL_GPL(__devcgroup_check_permission);
--- linux-4.15.0.orig/security/inode.c
+++ linux-4.15.0/security/inode.c
@@ -26,17 +26,22 @@
 static struct vfsmount *mount;
 static int mount_count;
-static void securityfs_evict_inode(struct inode *inode)
+static void securityfs_i_callback(struct rcu_head *head)
{ 
-   truncate_inode_pages_final(&inode->i_data);
-   clear_inode(inode);
+   struct inode *inode = container_of(head, struct inode, i_rcu);
   if (S_ISLNK(inode->i_mode))
     kfree(inode->i_link);
   +free_inode_nonrcu(inode);
+} 
+ 
+static void securityfs_destroy_inode(struct inode *inode)
+{
+   call_rcu(&inode->i_rcu, securityfs_i_callback);
+}
 
 static const struct super_operations securityfs_super_operations = {
   .statfs= simple_statfs,
- evict_inode = securityfs_evict_inode,
+ destroy_inode = securityfs_destroy_inode,
};

static int fill_super(struct super_block *sb, void *data, int silent)
--- linux-4.15.0.orig/security/integrity/digsig.c
+++ linux-4.15.0/security/integrity/digsig.c
@@ -18,6 +18,7 @@
#include <linux/cred.h>
#include <linux/key-type.h>
#include <linux/digsig.h>
+#include <linux/vmalloc.h>
#include <crypto/public_key.h>
#include <keys/system_keyring.h>

@@ -122,7 +123,7 @@
rc = kernel_read_file_from_path(path, &data, &size, 0,
READING_X509_CERTIFICATE);
if (rc < 0) {
- pr_err("Unable to open file: %s (%d)", path, rc);
+ pr_warn("Unable to open file: %s (%d)", path, rc);
return rc;
}

--- linux-4.15.0.orig/security/integrity/evm/evm.h
+++ linux-4.15.0/security/integrity/evm/evm.h
@@ -51,7 +51,7 @@
 size_t req_xattr_value_len, char *digest);
 int evm_calc_hash(struct dentry *dentry, const char *req_xattr_name,
 const char *req_xattr_value,
- size_t req_xattr_value_len, char *digest);
+ size_t req_xattr_value_len, char type, char *digest);
 int evm_init_hmac(struct inode *inode, const struct xattr *xattr,
 char *hmac_val);
 int evm_init_secsfs(void);
--- linux-4.15.0.orig/security/integrity/evm_crypto.c
+++ linux-4.15.0/security/integrity/evm_crypto.c
@@ -90,11 +90,12 @@
 algo = evm_hash;
 }

- if (*tfm == NULL) {
-+ if (IS_ERR_OR_NULL(*tfm)) {
 mutex_lock(&mutex);
 if (*tfm)
 goto out;
-*tfm = crypto_alloc_shash(algo, 0, CRYPTO_ALG_ASYNC);
+*tfm = crypto_alloc_shash(algo, 0, CRYPTO_ALG_ASYNC);
static void hmac_add_misc(struct shash_desc *desc, struct inode *inode, char *type, char *digest) {
    struct h_misc {
        unsigned long ino;
    } hmac_misc;
    memset(&hmac_misc, 0, sizeof(hmac_misc));
    hmac_misc.ino = inode->i_ino;
    hmac_misc.generation = inode->i_generation;
    /* Don't include the inode or generation number in portable
     * signatures
     */
    if (type != EVM_XATTR_PORTABLE_DIGEST) {
        hmac_misc.ino = inode->i_ino;
        hmac_misc.generation = inode->i_generation;
    }
    /* The hmac uid and gid must be encoded in the initial user
       namespace (not the filesystems user namespace) as encoding
       them in the filesystems user namespace allows an attack
    */
    hmac_misc.gid = from_kgid(&init_user_ns, inode->i_gid);
    hmac_misc.mode = inode->i_mode;
    crypto_shash_update(desc, (const u8 *)&hmac_misc, sizeof(hmac_misc));
    if (evm_hmac_attrs & EVM_ATTR_FSUID)
        crypto_shash_update(desc, &inode->i_sb->s_uuid.b[0],
                             sizeof(inode->i_sb->s_uuid));
    crypto_shash_final(desc, digest);
    char *xattr_value = NULL;
    int error;
    int size;
    bool ima_present = false;
    if (!(inode->i_opflags & IOP_XATTR))
        if (!(inode->i_opflags & IOP_XATTR) ||
            inode->i_sb->s_user_ns != &init_user_ns)
return -EOPNOTSUPP;

desc = init_desc(type);
@@ -199,11 +208,18 @@
    error = -ENODATA;
    for (xattrname = evm_config_xattrnames; *xattrname != NULL; xattrname++) {
        bool is_ima = false;
+        if (strcmp(*xattrname, XATTR_NAME_IMA) == 0)
+            is_ima = true;
+        if ((req_xattr_name && req_xattr_value)
+            && !strcmp(*xattrname, req_xattr_name)) {
            error = 0;
            crypto_shash_update(desc, (const u8 *)req_xattr_value,
                req_xattr_value_len);
+                if (is_ima)
+                    ima_present = true;
            continue;
        }
    size = vfs_getxattr_alloc(dentry, *xattrname,
@@ -218,9 +234,14 @@
            crypto_shash_update(desc, (const u8 *)xattr_value, xattr_size);
            if (is_ima)
                ima_present = true;
            continue;
    }
-hmac_add_misc(desc, inode, digest);
+    hmac_add_misc(desc, inode, type, digest);
+/* Portable EVM signatures must include an IMA hash */
+    if (type == EVM_XATTR_PORTABLE_DIGSIG && !ima_present)
+        error = -EPERM;
out:
    kfree(xattr_value);
    kfree(desc);
@@ -232,17 +253,45 @@
        char *digest)
    }
    return evm_calc_hmac_or_hash(dentry, req_xattr_name, req_xattr_value,
            -req_xattr_value_len, EVM_XATTR_HMAC, digest);
            +    req_xattr_value_len, EVM_XATTR_HMAC, digest);
        }
    int evm_calc_hash(struct dentry *dentry, const char *req_xattr_name,
                const char *req_xattr_value, size_t req_xattr_value_len,

- char *digest) 
+ char type, char *digest) 
{
  return evm_calc_hmac_or_hash(dentry, req_xattr_name, req_xattr_value, 
  -req_xattr_value_len, IMA_XATTR_DIGEST, digest); 
+  req_xattr_value_len, type, digest); 
+} 
+
+static int evm_is_immutable(struct dentry *dentry, struct inode *inode) 
+{
+  const struct evm_ima_xattr_data *xattr_data = NULL; 
+  struct integrity_iint_cache *iint; 
+  int rc = 0; 
+  
+  iint = integrity_iint_find(inode); 
+  if (iint && (iint->flags & EVM_IMMUTABLE_DIGSIG)) 
+    return 1; 
+  /* Do this the hard way */ 
+  rc = vfs_getxattr_alloc(dentry, XATTR_NAME_EVM, (char **)xattr_data, 0, 
+    +GFP_NOFS); 
+  if (rc <= 0) { 
+    if (rc == -ENODATA) 
+      return 0; 
+    return rc; 
+  } 
+  if (xattr_data->type == EVM_XATTR_PORTABLE_DIGSIG) 
+    rc = 1; 
+  else 
+    rc = 0; 
+  kfree(xattr_data); 
+  return rc; 
+} 
+
+ /* 
+ * Calculate the hmac and update security.evm xattr 
+ * @ @ -255,6 +304,16 @ @ 
+ struct evm_ima_xattr_data xattr_data; 
+ int rc = 0; 
+ */ 
+ 
+ /* 
+ * Don't permit any transformation of the EVM xattr if the signature 
+ * is of an immutable type 
+ */ 
+ rc = evm_is_immutable(dentry, inode);
+if (rc < 0)
+return rc;
+if (rc)
+return -EPERM;
+
+rc = evm_calc_hmac(dentry, xattr_name, xattr_value,
+xattr_value_len, xattr_data.digest);
+if (rc == 0) {
+ @ @ -280,7 +339,7 @@
+
+crypto_shash_update(desc, lsm_xattr->value, lsm_xattr->value_len);
-hmac_add_misc(desc, inode, hmac_val);
+hmac_add_misc(desc, inode, EVM_XATTR_HMAC, hmac_val);
+kfree(desc);
+return 0;
+}
+
--- linux-4.15.0.orig/security/integrity/evm/evm_main.c
+++ linux-4.15.0/security/integrity/evm/evm_main.c
@@ -31,7 +31,7 @@
    enum integrity_status evm_status = INTEGRITY_PASS;
    int rc, xattr_len;

    -if (iint && iint->evm_status == INTEGRITY_PASS)
    +if (iint && (iint->evm_status == INTEGRITY_PASS ||
    + iint->evm_status == INTEGRITY_PASS_IMMUTABLE))
    return iint->evm_status;

/* if status is not PASS, try to check again - against -ENOMEM */
@@ -164,22 +165,26 @@
    rc = -EINVAL;
    break;
    case EVM_IAMA_XATTR_DIGSIG:
    +case EVM_XATTR_PORTABLE_DIGSIG:
    rc = evm_calc_hash(dentry, xattr_name, xattr_value,
    -xattr_value_len, calc.digest);
    + xattr_value_len, xattr_data->type,
    + calc.digest);
+if (rc)
break;
rc = integrity_digsig_verify(INTEGRITY_KEYRING_EVM,
(const char *)xattr_data, xattr_len,
calc.digest, sizeof(calc.digest));
if (!rc) {
 /* Replace RSA with HMAC if not mounted readonly and
 - * not immutable
 - */
-if (!IS_RDONLY(d_backing_inode(dentry)) &&
 - !IS_IMMUTABLE(d_backing_inode(dentry)))
+if (xattr_data->type == EVM_XATTR_PORTABLE_DIGSIG) {
+if (iint)
+if (xattr_value->flags != EVM_IMMUTABLE_DIGSIG)
+else if (!IS_RDONLY(d_backing_inode(dentry)) &&
+ !IS_IMMUTABLE(d_backing_inode(dentry))) {
 evm_update_evmxattr(dentry, xattr_name,
 xattr_value,
 xattr_value_len);
+}
} else if (!IS_RDONLY(d_backing_inode(dentry)) &&
+ !IS_IMMUTABLE(d_backing_inode(dentry))) {
 evm_update_evmxattr(dentry, xattr_name,
 xattr_value,
 xattr_value_len);
+}
break;
default:
@@ -280,7 +285,7 @@
* affect security.evm. An interesting side affect of writing posix xattr
* acls is there modifying of the i_mode, which is included in security.evm.
* For posix xattr acls only, permit security.evm, even if it currently
- * doesn't exist, to be updated.
+ * doesn't exist, to be updated unless the EVM signature is immutable.
 */
static int evm_protect_xattr(struct dentry *dentry, const char *xattr_name,
 const void *xattr_value, size_t xattr_value_len)
@@ -348,7 +353,8 @@
 if (strcmp(xattr_name, XATTR_NAME_EVM) == 0) {
 if (!xattr_value_len)
 return -EINVAL;
-if (xattr_data->type != EVM_IMA_XATTR_DIGSIG)
+if (xattr_data->type != EVM_IMA_XATTR_DIGSIG &&
 + xattr_data->type != EVM_XATTR_PORTABLE_DIGSIG)
 return -EPERM;
 }
return evm_protect_xattr(dentry, xattr_name, xattr_value,
@@ -425,6 +431,9 @@
/**
 * evm_inode_setattr - prevent updating an invalid EVM extended attribute
 * @dentry: pointer to the affected dentry
+ * Permit update of file attributes when files have a valid EVM signature,
* except in the case of them having an immutable portable signature.

```c
int evm_inode_setattr(struct dentry *dentry, struct iattr *attr)
{
  @@ -464,7 +473,7 @@
}

/*
- * evm_inode_init_security - initializes security.evm
+ * evm_inode_init_security - initializes security.evm HMAC value
*/
int evm_inode_init_security(struct inode *inode,
  const struct xattr *lsm_xattr,
  @@ -473,7 +482,8 @@
    struct evm_ima_xattr_data *xattr_data;
    int rc;
    -if (!evm_initialized || !evm_protected_xattr(lsm_xattr->name))
    +if (!(evm_initialized & EVM_INIT_HMAC) ||
        !evm_protected_xattr(lsm_xattr->name))
      return 0;
    xattr_data = kzalloc(sizeof(*xattr_data), GFP_NOFS);
```

--- linux-4.15.0.orig/security/integrity/evm/evm_secfs.c
+++ linux-4.15.0/security/integrity/evm/evm_secfs.c
@@ -61,12 +61,13 @@
    static ssize_t evm_write_key(struct file *file, const char __user *buf,
        size_t count, loff_t *ppos)
    {
-      int i, ret;
+      unsigned int i;
+      int ret;
        if (!capable(CAP_SYS_ADMIN) || (evm_initialized & EVM_SETUP))
          return -EPERM;
```
iint->ima_file_status = INTEGRITY_UNKNOWN;
iint->ima_mmap_status = INTEGRITY_UNKNOWN;
iint->ima_bprm_status = INTEGRITY_UNKNOWN;
@@ -155,12 +156,14 @@
    memset(iint, 0, sizeof(*iint));
iint->version = 0;
iint->flags = 0UL;
+iint->atomic_flags = 0;
iint->ima_file_status = INTEGRITY_UNKNOWN;
iint->ima_mmap_status = INTEGRITY_UNKNOWN;
iint->ima_bprm_status = INTEGRITY_UNKNOWN;
iint->ima_read_status = INTEGRITY_UNKNOWN;
iint->evm_status = INTEGRITY_UNKNOWN;
iint->measured_pcrs = 0;
+mutex_init(&iint->mutex);
}

static int __init integrity_iintcache_init(void)
--- linux-4.15.0.orig/security/integrity/ima/Kconfig
+++ linux-4.15.0/security/integrity/ima/Kconfig
@@ -10,6 +10,7 @@
 select CRYPTO_HASH_INFO
 select TCG_TPM if HAS_IOMEM && !UML
 select TCG_TIS if TCG_TPM && X86
+select TCG_CRB if TCG_TPM && ACPI
 select TCG_IBMVTPM if TCG_TPM && PPC_PSERIES
 help
 The Trusted Computing Group(TCG) runtime Integrity
--- linux-4.15.0.orig/security/integrity/ima/ima.h
+++ linux-4.15.0/security/integrity/ima/ima.h
@@ -40,7 +40,7 @@
 #define IMA_DIGEST_SIZE SHA1_DIGEST_SIZE
 #define IMA_EVENT_NAME_LEN_MAX 255
-#define IMA_HASH_BITS 9
+#define IMA_HASH_BITS 10
 #define IMA_MEASURE_HTABLE_SIZE (1 << IMA_HASH_BITS)

 #define IMA_TEMPLATE_FIELD_ID_MAX_LEN 16
-@ @ -167.9 +167.10 @@
+@ @ -167.9 +167.10 @@
};
extern struct ima_h_table ima_htable;

-#static inline unsigned long ima_hash_key(u8 *digest)
+#static inline unsigned int ima_hash_key(u8 *digest) 
{ 
-#return hash_long(*digest, IMA_HASH_BITS);
+/* there is no point in taking a hash of part of a digest */
+return (digest[0] | digest[1] << 8) % IMA_MEASURE_HTABLE_SIZE;
}

#define __ima_hooks(hook)
--- linux-4.15.0.orig/security/integrity/ima/ima_appraise.c
+++ linux-4.15.0/security/integrity/ima/ima_appraise.c
@@ -223,13 +223,16 @@
    if (opened & FILE_CREATED)
    iint->flags |= IMA_NEW_FILE;
    if (((iint->flags & IMA_NEW_FILE) &&
@@ -248,6 +251,7 @@
    status = INTEGRITY_FAIL;
    break;
}
+clear_bit(IMA_DIGSIG, &iint->atomic_flags);
    if (xattr_len - sizeof(xattr_value->type) - hash_start >=
      iint->ima_hash->length)
/* xattr length may be longer. md5 hash in previous
@@ -266,7 +270,7 @@
    status = INTEGRITY_PASS;
    break;
    case EVM_IMA_XATTR_DIGSIG:
-    iint->flags |= IMA_DIGSIG;
+    set_bit(IMA_DIGSIG, &iint->atomic_flags);
    rc = integrity_digsig_verify(INTEGRITY_KEYRING_IMA,
       (const char *)xattr_value, rc,
      iint->ima_hash->digest,
@@ -317,7 +321,7 @@
      int rc = 0;
/* do not collect and update hash for digital signatures */
    -if (iint->flags & IMA_DIGSIG)
+    if (test_bit(IMA_DIGSIG, &iint->atomic_flags))
if (iint->ima_file_status != INTEGRITY_PASS)
@@ -327,7 +331,9 @@
if (rc < 0)
return;

+inode_lock(file_inode(file));
ima_fix_xattr(dentry, iint);
+inode_unlock(file_inode(file));
}
/*
@@ -350,16 +356,14 @@
return;

must_appraise = ima_must_appraise(inode, MAY_ACCESS, POST_SETATTR);
+if (!must_appraise)
+__vfs_removexattr(dentry, XATTR_NAME_IMA);
iint = integrity_iint_find(inode);
if (iint) {
-iint->flags &= ~(IMA_APPRAISE | IMA_APPRAISED |
-IMA_APPRAISE_SUBMASK | IMA_APPRAISED_SUBMASK |
-IMA_ACTION_RULE_FLAGS);
-if (must_appraise)
-iint->flags |= IMA_APPRAISE;
+set_bit(IMA_CHANGE_ATTR, &iint->atomic_flags);
+if (!must_appraise)
+clear_bit(IMA_UPDATE_XATTR, &iint->atomic_flags);
} 
-__vfs_removexattr(dentry, XATTR_NAME_IMA);
}
/*
@@ -388,12 +392,12 @@
iint = integrity_iint_find(inode);
if (!iint)
return;
-
-iint->flags &= ~IMA_DONE_MASK;
iint->measured_pcrs = 0;
+set_bit(IMA_CHANGE_XATTR, &iint->atomic_flags);
+if (digsig)
-iint->flags |= IMA_DIGSIG;
-return;
+set_bit(IMA_DIGSIG, &iint->atomic_flags);
+else
clear_bit(IMA_DIGSIG, &iint->atomic_flags);
}

int ima_inode_setxattr(struct dentry *dentry, const char *xattr_name,
--- linux-4.15.0.orig/security/integrity/ima/ima_crypto.c
+++ linux-4.15.0/security/integrity/ima/ima_crypto.c
@@ -73,6 +73,8 @@
    hash_algo_name[ima_hash_algo], rc);
 return rc;
 }
+pr_info("Allocated hash algorithm: %s\n",
+hash_algo_name[ima_hash_algo]);
return 0;
}

@@ -208,7 +210,7 @@
{
    loff_t i_size, offset;
    char *rbuf[2] = { NULL, };
-    int rc, read = 0, rbuf_len, active = 0, ahash_rc = 0;
+    int rc, rbuf_len, active = 0, ahash_rc = 0;
    struct ahash_request *req;
    struct scatterlist sg[1];
    struct crypto_wait wait;
@@ -255,11 +257,6 @@
    &rbuf_size[1], 0);
}

-if (!(file->f_mode & FMODE_READ)) {
-    file->f_mode |= FMODE_READ;
-    read = 1;
-}
-
    for (offset = 0; offset < i_size; offset += rbuf_len) {
      if (!rbuf[1] && offset) {
        /* Not using two buffers, and it is not the first
           @ @ -274.8 +271.16 @@
          rbuf_len = min_t(loff_t, i_size - offset, rbuf_size[active]);
          rc = integrity_kernel_read(file, offset, rbuf[active],
          rbuf_len);
          if (rc != rbuf_len)
            /* Forward current rc, do not overwrite with return value
               + * from ahash_wait()
               + */
            +rc = -EINVAL;
            +/
if (rbuf[1] && offset) {
    /* Using two buffers, and it is not the first */
    rc = ahash_wait(ahash_rc, &wait);
    /* wait for the last update request to complete */
    out3:
    -if (read)
    -file->f_mode &= ~FMODE_READ;
    ima_free_pages(rbuf[0], rbuf_size[0]);
    ima_free_pages(rbuf[1], rbuf_size[1]);
    out2:
    @ @ -334,7 +337,7 @@
    {loff_t i_size, offset = 0;
     char *rbuf;
     -int rc, read = 0;
     +int rc;
    SHASH_DESC_ON_STACK(shash, tfm);

    shash->tfm = tfm;
    @ @ -355,11 +358,6 @@
    if (!rbuf)
    return -ENOMEM;
    -if (!(file->f_mode & FMODE_READ)) {
    ima_free_pages(rbuf[0], rbuf_size[0]);
    ima_free_pages(rbuf[1], rbuf_size[1]);
    out2:
    @ @ -376,8 +374,6 @@
    if (rc)
    break;
    }
    -if (read)
    -file->f_mode &= ~FMODE_READ;
    kfree(rbuf);
    out:
    if (!rc)
    @ @ -418,6 +414,8 @@
    {loff_t i_size;
int rc;
+struct file *f = file;
+bool new_file_instance = false;

/*
 * For consistency, fail file's opened with the O_DIRECT flag on
 */
@@ -429,15 +427,31 @@
 return -EINVAL;
 }

-i_size = i_size_read(file_inode(file));
+/* Open a new file instance in O_RDONLY if we cannot read */
+if (!(!file->f_mode & FMODE_READ)) {
+int flags = file->f_flags & ~(O_WRONLY | O_APPEND |
+O_TRUNC | O_CREAT | O_NOCTTY | O_EXCL);
+flags |= O_RDONLY;
+f = dentry_open(&file->f_path, flags, file->f_cred);
+if (IS_ERR(f))
+return PTR_ERR(f);
+
+new_file_instance = true;
+
+i_size = i_size_read(file_inode(f));

if (ima_ahash_minsize && i_size >= ima_ahash_minsize) {
-rc = ima_calc_file_ahash(file, hash);
+rc = ima_calc_file_ahash(f, hash);
if (!rc)
-return 0;
+goto out;
}

-rc = ima_calc_file_shash(file, hash);
+rc = ima_calc_file_shash(f, hash);
+out:
+if (new_file_instance)
+fput(f);
+return rc;

/*
 @@ -658,6 +672,8 @@
 ima_pcrread(i, pcr_i);
 /* now accumulate with current aggregate */
 rc = crypto_shash_update(shash, pcr_i, TPM_DIGEST_SIZE);
+if (rc != 0)
+return rc;
if (!rc)
    crypto_shash_final(shash, digest);
--- linux-4.15.0.orig/security/integrity/ima/ima_fs.c
+++ linux-4.15.0/security/integrity/ima/ima_fs.c
@@ -39,14 +39,14 @@

define TMPBUFSIZE 12
+
 static ssize_t ima_show_hhtable_value(char __user *buf, size_t count,
    loff_t *ppos, atomic_long_t *val)
{
-  char tmpbuf[TMPBUFSIZE];
+  char tmpbuf[32];/* greater than largest 'long' string value */
  ssize_t len;
-  len = scnprintf(tmpbuf, TMPBUFSIZE, "%li\n", atomic_long_read(val));
+  len = scnprintf(tmpbuf, sizeof(tmpbuf), "%li\n", atomic_long_read(val));
  return simple_read_from_buffer(buf, count, ppos, tmpbuf, len);
}
@@ -287,7 +287,7 @@
    if (ima_appraise & IMA_APPRAISE_ENFORCE)
      result = -EACCES;
  } else {
-    pr_err("Unable to open file: %s (%d)", path, rc);
+    pr_warn("Unable to open file: %s (%d)", path, rc);
    return rc;
  }
@@ -340,8 +340,7 @@
    integrity_audit_msg(AUDIT_INTEGRITY_STATUS, NULL, NULL,
        "policy_update", "signed policy required",
        1, 0);
-  if (ima_appraise & IMA_APPRAISE_ENFORCE)
+  result = -EACCES;
    result = ima_parse_add_rule(data);
  } else {
    result = ima_parse_add_rule(data);
}
+vfree(kexec_buffer);
return;
}

@@ -131,6 +132,8 @@
return;
}

+image->ima_buffer = kexec_buffer;
+
pr_debug("kexec measurement buffer for the loaded kernel at 0x%lx,\n
kbuf.mem);
}
--- linux-4.15.0.orig/security/integrity/ima/ima_main.c
+++ linux-4.15.0/security/integrity/ima/ima_main.c
@@ -16,6 +16,9 @@
*	implements the IMA hooks: ima_bprm_check, ima_file_mmap,
*and ima_file_check.
*/
+
+#define pr_fmt(fmt) KBUILD_MODNAME ": " fmt
+
#include <linux/module.h>
#include <linux/file.h>
#include <linux/binfmts.h>
@@ -96,10 +99,13 @@
if (!iint)
iint = integrity_iint_find(inode);
/* IMA_MEASURE is set from reader side */
-if (iint && (iint->flags & IMA_MEASURE))
+if (iint && test_bit(IMA_MUST_MEASURE,
+&iint->atomic_flags))
send_tomtou = true;
}
} else {
+if (must_measure)
+set_bit(IMA_MUST_MEASURE, &iint->atomic_flags);
if ((atomic_read(&inode->i_writecount) > 0) && must_measure)
send_writers = true;
}
@@ -121,21 +127,24 @@
struct inode *inode, struct file *file)
{
 mode = file->f_mode;
+bool update;

if (!(mode & FMODE_WRITE))
return;


inode_lock(inode);
+mutex_lock(&iint->mutex);
if (atomic_read(&inode->i_writecount) == 1) {
+update = test_and_clear_bit(IMA_UPDATE_XATTR,
  +&iint->atomic_flags);
if ((iint->version != inode->i_version) ||
  (iint->flags & IMA_NEW_FILE)) {
  iint->flags &= ~(IMA_DONE_MASK | IMA_NEW_FILE);
-iint->measured_pcrs = 0;
-if (iint->flags & IMA_APPRAISE)
+if (update)
  ima_update_xattr(iint, file);
}
}
 inode_unlock(inode);
+mutex_unlock(&iint->mutex);
}
/**
 @@ -168,7 +177,7 @@
 char *pathbuf = NULL;
 char filename[NAME_MAX];
 const char *pathname = NULL;
-int rc = -ENOMEM, action, must_appraise;
+int rc = 0, action, must_appraise = 0;
 int pcr = CONFIG_IMA_MEASURE_PCR_IDX;
 struct evm_ima_xattr_data *xattr_value = NULL;
 int xattr_len = 0;
@@ -199,17 +208,31 @@
 if (action) {
  iint = integrity_inode_get(inode);
  if (!iint)
    goto out;
+rc = -ENOMEM;
 }
-}
-if (violation_check) {
+if (!rc && violation_check)
  ima_rdwr_violation_check(file, iint, action & IMA_MEASURE,
    &pathbuf, &pathname);
-if (!action) {
   -rc = 0;
   goto out_free;
-}
-}
+inode_unlock(inode);
+  +if (rc)
+  +goto out;
+  +if (!action)
+  +goto out;
+  +mutex_lock(&iint->mutex);
+  +
+  +if (test_and_clear_bit(IMA_CHANGE_ATTR, &iint->atomic_flags))
+  +/* reset appraisal flags if ima_inode_post_setattr was called */
+  +iint->flags &= ~IMA_APPRAISE | IMA_APPRAISED | IMA_APPRAISE_SUBMASK | IMA_APPRAISED_SUBMASK | IMA_ACTION_FLAGS);
+  +
+  +if (test_and_clear_bit(IMA_CHANGE_XATTR, &iint->atomic_flags))
+  +/* reset all flags if ima_inode_setxattr was called */
+  +iint->flags &= ~IMA_DONE_MASK;
+  +
+  /* Determine if already appraised/measured based on bitmask
+   * (IMA_MEASURE, IMA_MEASURED, IMA_XXXX_APPRAISE, IMA_XXXX_APPRAISED,
+   *  @ @ -227,7 +250,7 @@
+   * if (!action) {
+   * if (must_appraise)
+   * rc = ima_get_cache_status(iint, func);
+   * goto out_digsig;
+   * +goto out_locked;
+   * }

  template_desc = ima_template_desc_current();
  @@ -240,7 +263,7 @@

  rc = ima_collect_measurement(iint, file, buf, size, hash_algo);
  if (rc != 0 && rc != -EBADF && rc != -EINVAL)
  -goto out_digsig;
  +goto out_locked;
  if (!pathbuf)
  /* ima_rdwr_violation possibly pre-fetched */
  pathname = ima_d_path(&file->f_path, &pathbuf, filename);
  @@ -248,26 +271,32 @@
  if (action & IMA_MEASURE)
  ima_store_measurement(iint, file, pathname,
  xattr_value, xattr_len, pcr);
  -if (rc == 0 & & (action & IMA_APPRAISE_SUBMASK))
  +if (rc == 0 & & (action & IMA_APPRAISE_SUBMASK)) {
  +inode_lock(inode);
  rc = ima_appraise_measurement(func, iint, file, pathname,
  xattr_value, xattr_len, opened);
  +inode_unlock(inode);
if (action & IMA_AUDIT)
        ima_audit_measurement(iint, pathname);

if (((file->f_flags & O_DIRECT) && (iint->flags & IMA_PERMIT_DIRECTIO))
    rc = 0;
  -out_digsig:
  -if ((mask & MAY_WRITE) && (iint->flags & IMA_DIGSIG) &&
      out_locked:
    -out:
      if (pathbuf)
        __putname(pathbuf);
      -out:
      -inode_unlock(inode);
      -if (rc && may_appraise) & (ima_appraise & IMA_APPRAISE_ENFORCE))
    return -EACCES;
    +if (must_appraise) {
    +if (rc && (ima_appraise & IMA_APPRAISE_ENFORCE))
      +return -EACCES;
    +if (file->f_mode & FMODE_WRITE)
      +set_bit(IMA_UPDATE_XATTR, &iint->atomic_flags);
    +}
    return 0;
}

static int read_idmap[READING_MAX_ID] = {
    [READING_FIRMWARE] = FIRMWARE_CHECK,
    +[READING_FIRMWARE_PREALLOC_BUFFER] = FIRMWARE_CHECK,
    [READING_MODULE] = MODULE_CHECK,
    [READING_KEXEC_IMAGE] = KEXEC_KERNEL_CHECK,
    [READING_KEXEC_INITRAMFS] = KEXEC_INITRAMFS_CHECK,
    @@ -430,6 +460,16 @@
    ima_init_template_list();
    hash_setup(CONFIG_IMA_DEFAULT_HASH);
    error = ima_init();
    +
    +if (error && strcmp(hash_algo_name[ima_hash_algo],
        +CONFIG_IMA_DEFAULT_HASH) != 0) {
      +pr_info("Allocating %s failed, going to use default hash algorithm %s\n",
        +hash_algo_name[ima_hash_algo], CONFIG_IMA_DEFAULT_HASH);
+hash_setup_done = 0;
+hash_setup(CONFIG_I MA_DEFAULT_HASH);
+error = ima_init();
+
+ if (!error) {
+ ima_initialized = 1;
+ ima_update_policy_flag();
--- linux-4.15.0.orig/security/integrity/ima/ima_mok.c
+++ linux-4.15.0/security/integrity/ima/ima_mok.c
@@ -26,7 +26,7 @@
  
  * Allocate the IMA blacklist keyring
  */
-__init int ima_mok_init(void)
+static __init int ima_mok_init(void)
{
  struct key_restriction *restriction;
@@ -43,13 +43,12 @@
    KEY_USR_WRITE | KEY_USR_SEARCH,
    -KEY_ALLOC_NOT_IN_QUOTA,
    +KEY_ALLOC_NOT_IN_QUOTA |
    +KEY_ALLOC_SET_KEEP,
    restriction, NULL);

  if (IS_ERR(ima_blacklist_keyring))
    panic("Can't allocate IMA blacklist keyring.");
-  -set_bit(KEY_FLAG_KEEP, &ima_blacklist_keyring->flags);
+  return 0;
} 
device_initcall(ima_mok_init);
--- linux-4.15.0.orig/security/integrity/ima/ima_policy.c
+++ linux-4.15.0/security/integrity/ima/ima_policy.c
@@ -170,7 +170,6 @@
    static struct list_head *ima_rules = &ima_default_rules;
  static int ima_policy __initdata;
@@ -468,7 +468,6 @@
               temp_ima_appraise |= IMA_APPRAISE_POLICY;
-ima_rules = &ima_default_rules;
ima_update_policy_flag();
}

case Opt_fsuuid:
ima_log_string(ab, "fsuuid", args[0].from);

-if (uuid_is_null(entry->fsuuid)) {
+if (!uuid_is_null(entry->fsuuid)) {
result = -EINVAL;
break;
}
@@ -742,7 +742,7 @@
result = -EINVAL;
break;
}
@@ -963,10 +963,10 @@
}

static const char *const mask_tokens[] = {
-"MAY_EXEC",
-"MAY_WRITE",
-"MAY_READ",
-"MAY_APPEND"
+"^MAY_EXEC",
+"^MAY_WRITE",
+"^MAY_READ",
+"^MAY_APPEND"
};

#define __ima_hook_stringify(str)(#str),
@@ -1026,6 +1026,7 @@
struct ima_rule_entry *entry = v;
int i;
char tbuf[64] = {0,};
+int offset = 0;

rcu_read_lock();
@@ -1045,15 +1045,15 @@
    if (entry->flags & IMA_FUNC)
policy_func_show(m, entry->func);

-if (entry->flags & IMA_MASK) {
+if ((entry->flags & IMA_MASK) || (entry->flags & IMA_INMASK)) {
+    if (entry->flags & IMA_MASK)
+        offset = 1;
    if (entry->mask & MAY_EXEC)
-seq_printf(m, pt(Opt_mask), mt(mask_exec));
+seq_printf(m, pt(Opt_mask), mt(mask_exec));
+seq_printf(m, pt(Opt_mask), mt(mask_exec) + offset);
if (entry->mask & MAY_WRITE)
- seq_printf(m, pt(Opt_mask), mt(mask_write));
+ seq_printf(m, pt(Opt_mask), mt(mask_write) + offset);
if (entry->mask & MAY_READ)
- seq_printf(m, pt(Opt_mask), mt(mask_read));
+ seq_printf(m, pt(Opt_mask), mt(mask_read) + offset);
if (entry->mask & MAY_APPEND)
- seq_printf(m, pt(Opt_mask), mt(mask_append));
+ seq_printf(m, pt(Opt_mask), mt(mask_append) + offset);
seq_puts(m, " ");
}

--- linux-4.15.0.orig/security/integrity/integrity.h
+++ linux-4.15.0/security/integrity/integrity.h
@@ -29,10 +29,10 @@
 /* iint cache flags */
 #define IMA_ACTION_FLAGS 0xff000000
 #define IMA_ACTION_RULE_FLAGS 0x06000000
-#define IMA_DIGSIG 0x01000000
-#define IMA_DIGSIG_REQUIRED 0x02000000
-#define IMA_PERMIT_DIRECTIO 0x04000000
-#define IMA_NEW_FILE 0x08000000
+#define IMA_DIGSIG_REQUIRED 0x01000000
+#define IMA_PERMIT_DIRECTIO 0x02000000
+#define IMA_NEW_FILE 0x04000000
+#define EVM_IMMUTABLE_DIGSIG 0x08000000

 #define IMA_DO_MASK (IMA_MEASURE | IMA_APPRAISE | IMA_AUDIT | \
 IMA_APPRAISE_SUBMASK)
@@ -53,11 +53,19 @@
 #define IMA_APPRAISED_SUBMASK (IMA_FILE_APPRAISED | IMA_MMAP_APPRAISED | \
 IMA_BPRM_APPRAISED | IMA_READ_APPRAISED)

+/* iint cache atomic_flags */
+#define IMA_CHANGE_XATTR 0
+#define IMA_UPDATE_XATTR 1
+#define IMA_CHANGE_ATTR 2
+#define IMA_DIGSIG 3
+#define IMA_MUST_MEASURE 4
+
 enum evm_ima_xattr_type {
 IMA_XATTR_DIGEST = 0x01,
 EVM_XATTR_HMAC,
 EVM_IMA_XATTR_DIGSIG,
 IMA_XATTR_DIGEST_NG,
 +EVM_XATTR_PORTABLE_DIGSIG,
 IMA_XATTR_LAST

/* integrity data associated with an inode */
struct integrity_iint_cache {
    struct rb_node rb_node; /* rooted in integrity_iint_tree */
    +struct mutex mutex; /* protects: version, flags, digest */
    struct inode *inode; /* back pointer to inode in question */
    u64 version; /* track inode changes */
    unsigned long flags;
    unsigned long measured_pcrs;
    unsigned long atomic_flags;
    enum integrity_status ima_file_status:4;
    enum integrity_status ima_mmap_status:4;
    enum integrity_status ima_bprm_status:4;
}

--- linux-4.15.0.orig/security/keys/big_key.c
+++ linux-4.15.0/security/keys/big_key.c
@@ -22,6 +22,13 @@
#include <keys/big_key-type.h>
#include <crypto/aead.h>
+struct big_key_buf {
+    unsigned int nr_pages;
+    void *virt;
+    struct scatterlist *sg;
+    struct page *pages[];
+};
+
/*
 * Layout of key payload words.
 * /
@@ -91,10 +98,9 @@

 /* Encrypt/decrypt big_key data */
-static int big_key_crypt(enum big_key_op op, u8 *data, size_t datalen, u8 *key)
+static int big_key_crypt(enum big_key_op op, struct big_key_buf *buf, size_t datalen, u8 *key)
{
    int ret;
-    struct scatterlist sgio;
+    struct aead_request *aead_req;
    /* We always use a zero nonce. The reason we can get away with this is
        * because we're using a different randomly generated key for every
@@ -109,8 +115,7 @@
    return -ENOMEM;
    memset(zero_nonce, 0, sizeof(zero_nonce));
-    sg_init_one(&sgio, data, datalen + (op == BIG_KEY_ENC ? ENC_AUTHTAG_SIZE : 0));
- aead_request_set_crypt(aead_req, &sgio, &sgio, datalen, zero_nonce);
+ aead_request_set_crypt(aead_req, buf->sg, buf->sg, datalen, zero_nonce);
aead_request_set_callback(aead_req, CRYPTO_TFM_REQ_MAY_SLEEP, NULL, NULL);
aead_request_set_ad(aead_req, 0);

@@ -130,21 +135,81 @@
}

/*
 * Free up the buffer.
 * *
+static void big_key_free_buffer(struct big_key_buf *buf)
+{
+unsigned int i;
+
+if (buf->virt) {
+memset(buf->virt, 0, buf->nr_pages * PAGE_SIZE);
+vunmap(buf->virt);
+}
+
+for (i = 0; i < buf->nr_pages; i++)
+if (buf->pages[i])
+__free_page(buf->pages[i]);
+
+kfree(buf);
+}
+
+/*
 * Allocate a buffer consisting of a set of pages with a virtual mapping
 * applied over them.
 * *
+static void *big_key_alloc_buffer(size_t len)
+{
+struct big_key_buf *buf;
+unsigned int npg = (len + PAGE_SIZE - 1) >> PAGE_SHIFT;
+unsigned int i, l;
+
+buf = kzalloc(sizeof(struct big_key_buf) +
+ sizeof(struct page) * npg +
+ sizeof(struct scatterlist) * npg,
+ GFP_KERNEL);
+if (!buf)
+return NULL;
+
+buf->nr_pages = npg;
+buf->sg = (void *)(buf->pages + npg);
+sg_init_table(buf->sg, npg);
+ /*
for (i = 0; i < buf->nr_pages; i++) {
    buf->pages[i] = alloc_page(GFP_KERNEL);
    if (!buf->pages[i])
        goto nomem;

    l = min_t(size_t, len, PAGE_SIZE);
    sg_set_page(&buf->sg[i], buf->pages[i], l, 0);
    len -= l;
}

buf->virt = vmap(buf->pages, buf->nr_pages, VM_MAP, PAGE_KERNEL);
if (!buf->virt)
    goto nomem;

return buf;

nomem:
big_key_free_buffer(buf);
return NULL;

/*
 * Preparse a big key
 */

int big_key_preparse(struct key_preparsed_payload *prep)
{
    struct big_key_buf *buf;
    struct path *path = (struct path *)&prep->payload.data[big_key_path];
    struct file *file;
    u8 *enckey;
    u8 *data = NULL;
    ssize_t written;
    size_t datalen = prep->datalen, enclen = datalen + ENC_AUTHTAG_SIZE;
    int ret;

    ret = -EINVAL;
    if (datalen <= 0 || datalen > 1024 * 1024 || !prep->data)
        goto error;
    return -EINVAL;

    /* Set an arbitrary quota */
    prep->quotalen = 16;
    // -157,13 +222,12 @@ *
    * File content is stored encrypted with randomly generated key.
    */
    -size_t enclen = datalen + ENC_AUTHTAG_SIZE;
loff_t pos = 0;

-data = kmalloc(enclen, GFP_KERNEL);
-if (!data)
+buf = big_key_alloc_buffer(enclen);
+if (!buf)
    return -ENOMEM;
-memcpy(data, prep->data, datalen);
+memcpy(buf->virt, prep->data, datalen);

    /* generate random key */
    enckey = kmalloc(ENC_KEY_SIZE, GFP_KERNEL);
    goto err_enckey;

    /* encrypt aligned data */
    -ret = big_key_crypt(BIG_KEY_ENC, data, datalen, enckey);
    +ret = big_key_crypt(BIG_KEY_ENC, buf, datalen, enckey);
    if (ret)
        goto err_enckey;

    goto err_enckey;

    *path = file->f_path;
    path_get(path);
    fput(file);
-kzfree(data);
+big_key_free_buffer(buf);
} else {
    /* Just store the data in a buffer */
    void *data = kmalloc(datalen, GFP_KERNEL);
    @ @ -220,7 +284,7 @@
    err_enckey:
    kzfree(enckey);
    error:
-kzfree(data);
+big_key_free_buffer(buf);
    return ret;
}
@@ -289,7 +353,7 @@
               read the key data
 * - the key's semaphore is read-locked
 */
- long big_key_read(const struct key *key, char __user *buffer, size_t buflen)
+ long big_key_read(const struct key *key, char *buffer, size_t buflen)
 {
     size_t datalen = (size_t)key->payload.data[big_key_len];
     long ret;
@@ -298,15 +362,15 @@
 return datalen;

 if (datalen > BIG_KEY_FILE_THRESHOLD) {
     +struct big_key_buf *buf;
     struct path *path = (struct path *)&key->payload.data[big_key_path];
     struct file *file;
     -u8 *data;
     u8 *enckey = (u8 *)key->payload.data[big_key_data];
     size_t enclen = datalen + ENC_AUTHTAG_SIZE;
     loff_t pos = 0;

     -data = kmalloc(enclen, GFP_KERNEL);
     -if (!data)
     +buf = big_key_alloc_buffer(enclen);
     +if (!buf)
         return -ENOMEM;
     file = dentry_open(path, O_RDONLY, current_cred());
@@ -316,31 +380,28 @@
     /* read file to kernel and decrypt */
     -ret = kernel_read(file, data, enclen, &pos);
     +ret = kernel_read(file, buf->virt, enclen, &pos);
     if (ret >= 0 &
         -if (copy_to_user(buffer, data, datalen) != 0)
         +if (copy_to_user(buffer, data, datalen) != 0)
 }
-ret = -EFAULT;
+ /* copy out decrypted data */
+memcpy(buffer, buf->virt, datalen);

err_fput:
fput(file);
error:
-kzfree(data);
+big_key_free_buffer(buf);
} else {
ret = datalen;
-if (copy_to_user(buffer, key->payload.data[big_key_data],
- datalen) != 0)
- ret = -EFAULT;
+memcpy(buffer, key->payload.data[big_key_data], datalen);
}

return ret;

--- linux-4.15.0.orig/security/keys/encrypted-keys/encrypted.c
+++ linux-4.15.0/security/keys/encrypted-keys/encrypted.c
@@ -895,14 +895,14 @@
}

/*
- * encrypted_read - format and copy the encrypted data to userspace
+ * encrypted_read - format and copy out the encrypted data

 * The resulting datablob format is:
 * <master-key name> <decrypted data length> <encrypted iv> <encrypted data>
 *
 * On success, return to userspace the encrypted key datablob size.
 */
-static long encrypted_read(const struct key *key, char __user *buffer,
+static long encrypted_read(const struct key *key, char *buffer,
+ size_t buflen)
{
 struct encrypted_key_payload *epayload;
 @@ -950,8 +950,7 @@
 key_put(mkey);
 memzero_explicit(derived_key, sizeof(derived_key));

 -if (copy_to_user(buffer, ascii_buf, asciiblob_len) != 0)
- ret = -EFAULT;
+memcpy(buffer, ascii_buf, asciiblob_len);
 kzfree(ascii_buf);

 return asciiblob_len;
--- linux-4.15.0.orig/security/keys/internal.h
+++ linux-4.15.0/security/keys/internal.h
@@ -20,6 +20,8 @@
#include <linux/keyctl.h>
#include <linux/refcount.h>
#include <linux/compat.h>
+#include <linux/mm.h>
+#include <linux/vmalloc.h>

struct iovec;

@@ -188,20 +190,9 @@
return key_task_permission(key_ref, current_cred(), perm);
}

-/*
- * Authorisation record for request_key().
- */
-struct request_key_auth {
-struct key *target_key;
-struct key *dest_keyring;
-const struct cred *cred;
-void *callout_info;
-size_t callout_len;
-pid_t tid;
-} __randomize_layout;
-
extern struct key_type key_type_request_key_auth;
extern struct key *request_key_auth_new(struct key *target,
+const char *op,
+const void *callout_info,
+size_t callout_len,
+struct key *dest_keyring);
@@ -315,5 +306,4 @@
#define key_check(key) do {} while(0)

#endif

-#endif /* _INTERNAL_H */
--- linux-4.15.0.orig/security/keys/key.c
+++ linux-4.15.0/security/keys/key.c
@@ -265,8 +265,8 @@
spin_lock(&user->lock);
if (!flags & KEY_ALLOC_QUOTA_OVERRUN)) {
 -if (user->qnkeys + 1 >= maxkeys ||
- user->qnbytes + quotalen >= maxbytes ||
+if (user->qnkeys + 1 > maxkeys ||
+ user->qnbytes + quotalen > maxbytes ||

user->qnbytes + quotalen < user->qnbytes)
goto no_quota;
}
@@ -297,6 +297,7 @@
key->gid = gid;
key->perm = perm;
key->restrict_link = restrict_link;
+key->last_used_at = ktime_get_real_seconds();

if (!(flags & KEY_ALLOC_NOT_IN_QUOTA))
key->flags |= 1 << KEY_FLAG_IN_QUOTA;
@@ -304,6 +305,8 @@
key->flags |= 1 << KEY_FLAG_BUILTIN;
if (flags & KEY_ALLOC_UID_KEYRING)
key->flags |= 1 << KEY_FLAG_UID_KEYRING;
+if (flags & KEY_ALLOC_SET_KEEP)
+key->flags |= 1 << KEY_FLAG_KEEP;

#ifdef KEY_DEBUGGING
key->magic = KEY_DEBUG_MAGIC;
@@ -382,7 +385,7 @@
spin_lock(&key->user->lock);

if (delta > 0 &&
- (key->user->qnbytes + delta >= maxbytes ||
+ (key->user->qnbytes + delta > maxbytes ||
 key->user->qnbytes + delta < key->user->qnbytes)) {
ret = -EDQUOT;
}
--- linux-4.15.0.orig/security/keys/keyctl.c
+++ linux-4.15.0/security/keys/keyctl.c
@@ -26,6 +26,7 @@
#include <linux/security.h>
#include <linux/uio.h>
#include <linux/uaccess.h>
+#include <keys/request_key_auth-type.h>
#include "internal.h"

#define KEY_MAX_DESC_SIZE 4096
@@ -132,10 +133,7 @@
key_ref_put(keyring_ref);
 error3:
-if (payload) {
- memzero_explicit(payload, plen);
-kvfree(payload);
-}
+kvfree_sensitive(payload, plen);
error2:
kfree(description);
error:
@@ -329,7 +327,7 @@
payload = NULL;
if (plen) {
    ret = -ENOMEM;
    -payload = kmalloc(plen, GFP_KERNEL);
    +payload = kvmalloc(plen, GFP_KERNEL);
    if (!payload)
        goto error;
@@ -350,7 +348,7 @@

    key_ref_put(key_ref);
error2:
    -kzfree(payload);
    +kvfree_sensitive(payload, plen);
error:
    return ret;
}
@@ -742,6 +740,21 @@
}

/*
 + * Call the read method
 + */
+static long __keyctl_read_key(struct key *key, char *buffer, size_t buflen)
+{
+    long ret;
+    down_read(&key->sem);
+    ret = key_validate(key);
+    if (ret == 0)
+        ret = key->type->read(key, buffer, buflen);
+    up_read(&key->sem);
+    return ret;
+}
+
+/*
 + * Read a key's payload.
 + *
 + * The key must either grant the caller Read permission, or it must grant the
@@ -756,26 +769,28 @@
 struct key *key;
 key_ref_t key_ref;
 long ret;
+char *key_data = NULL;
size_t key_data_len;

/* find the key first */
key_ref = lookup_user_key(keyid, 0, 0);
if (IS_ERR(key_ref)) {
    ret = -ENOKEY;
    -goto error;
    +goto out;
}

key = key_ref_to_ptr(key_ref);

ret = key_read_state(key);
if (ret < 0)
    -goto error2; /* Negatively instantiated */
+goto key_put_out; /* Negatively instantiated */

/* see if we can read it directly */
ret = key_permission(key_ref, KEY_NEED_READ);
if (ret == 0)
    goto can_read_key;
if (ret != -EACCES)
    -goto error2;
+goto key_put_out;

/* we can't; see if it's searchable from this process's keyrings */
/* we automatically take account of the fact that it may be
   @@ -783,26 +798,78 @@
   */
if (!is_key_possessed(key_ref)) {
    ret = -EACCES;
    -goto error2;
    +goto key_put_out;
}

/* the key is probably readable - now try to read it */
can_read_key:
    -ret = -EOPNOTSUPP;
    -if (key->type->read) {
        /* Read the data with the semaphore held (since we might sleep)
           * to protect against the key being updated or revoked.
           */
        +if (!key->type->read) {
            +ret = -EOPNOTSUPP;
            +goto key_put_out;
            +}
        +if (!buffer || !buflen) {
            /* Get the key length from the read method */
            +*/

"
ret = __keyctl_read_key(key, NULL, 0);
goto key_put_out;
}
+
+/*
+ * Read the data with the semaphore held (since we might sleep)
+ * to protect against the key being updated or revoked.
+ *
+ * Allocating a temporary buffer to hold the keys before
+ * transferring them to user buffer to avoid potential
+ * deadlock involving page fault and mmap_sem.
+ *
+ * key_data_len = (buflen <= PAGE_SIZE)
+ *? buflen : actual length of key data
+ *
+ * This prevents allocating arbitrary large buffer which can
+ * be much larger than the actual key length. In the latter case,
+ * at least 2 passes of this loop is required.
+ */
+key_data_len = (buflen <= PAGE_SIZE) ? buflen : 0;
+for (;;) {
+if (key_data_len) {
+key_data = kvmalloc(key_data_len, GFP_KERNEL);
+if (!key_data) {
+ret = -ENOMEM;
+goto key_put_out;
+}
+}
+ret = __keyctl_read_key(key, key_data, key_data_len);
+/*
+ * Read methods will just return the required length without
+ * any copying if the provided length isn't large enough.
+ */
+if (ret <= 0 || ret > buflen)
+break;
+
+/*
+ * The key may change (unlikely) in between 2 consecutive
+ * __keyctl_read_key() calls. In this case, we reallocate
+ * a larger buffer and redo the key read when
+ * key_data_len < ret <= buflen.
+ */
down_read(&key->sem);
ret = key_validate(key);
if (ret == 0)
ret = key->type->read(key, buffer, buflen);
-up_read(&key->sem);
+if (ret > key_data_len) {
+if (unlikely(key_data))
+kvfree_sensitive(key_data, key_data_len);
+key_data_len = ret;
+continue; /* Allocate buffer */
+}
+
+if (copy_to_user(buffer, key_data, ret))
+ret = -EFAULT;
+break;
}
+kvfree_sensitive(key_data, key_data_len);

-error2:
+key_put_out:
key_put(key);
-error:
+out:
return ret;
}

@@ -881,8 +948,8 @@
key_quota_root_maxbytes : key_quota_maxbytes;

spin_lock(&newowner->lock);
- if (newowner->qnkeys + 1 >= maxkeys ||
- newowner->qnbytes + key->quotalen >= maxbytes ||
+ if (newowner->qnkeys + 1 > maxkeys ||
+ newowner->qnbytes + key->quotalen > maxbytes ||
+ newowner->qnbytes + key->quotalen > maxbytes ||
+ newowner->qnbytes + key->quotalen <
+ newowner->qnbytes)
goto quota_overrun;
@@ -1100,10 +1167,7 @@
keyctl_change_reqkey_auth(NULL);

error2:
- if (payload) {
- memzero_explicit(payload, plen);
- kvfree(payload);
- }
+kvfree_sensitive(payload, plen);
error:
return ret;
}
struct keyring_read_iterator_context *ctx = data;
const struct key *key = keyring_ptr_to_key(object);
-int ret;

kenter("[%s,%d],{%zu/%zu}",
    key->type->name, key->serial, ctx->count, ctx->buflen);
@@ -440,10 +439,7 @@
if (ctx->count >= ctx->buflen)
    return 1;

-ret = put_user(key->serial, ctx->buffer);
-if (ret < 0)
    return ret;
-ctx->buffer++;
+*ctx->buffer++ = key->serial;
    ctx->count += sizeof(key->serial);
    return 0;
}
@@ -661,9 +657,6 @@
BUG_ON((ctx->flags & STATE_CHECKS) == 0 ||
    (ctx->flags & STATE_CHECKS) == STATE_CHECKS);

-if (ctx->index_key.description)
-ctx->index_key.desc_len = strlen(ctx->index_key.description);
-
/* Check to see if this top-level keyring is what we are looking for
 * and whether it is valid or not.
 */
@@ -921,6 +914,7 @@
struct keyring_search_context ctx = {
   .index_key.type = type,
   .index_key.description = description,
+   .index_key.desc_len = strlen(description),
   .cred = current_cred(),
   .match_data.cmp = key_default_cmp,
   .match_data.raw_data = description,
--- linux-4.15.0.orig/security/keys/proc.c
+++ linux-4.15.0/security/keys/proc.c
@@ -165,6 +165,8 @@
n = key_serial_next(p, v);
    if (n)
        *_pos = key_node_serial(n);
+    else
+        (*_pos)++;
    return n;
}
@@ -187,8 +189,7 @@

text = {[
  .index_key.type = key->type,
+  .index_key = key->index_key,
  .cred = m->file->f_cred,
  .match_data.cmp = lookup_user_key_possessed,
  .match_data.raw_data = key,
--- linux-4.15.0.orig/security/keys/process_keys.c
+++ linux-4.15.0/security/keys/process_keys.c
@@ -20,6 +20,7 @@
#include <linux/security.h>
#include <linux/user_namespace.h>
#include <linux/uaccess.h>
  +#include <keys/request_key_auth-type.h>
  #include "internal.h"

/* Session keyring create vs join semaphore */
--- linux-4.15.0.orig/security/keys/request_key.c
+++ linux-4.15.0/security/keys/request_key.c
@@ -18,31 +18,30 @@
#include <linux/keyctl.h>
#include <linux/slab.h>
  +#include <keys/request_key_auth-type.h>
  #include "internal.h"

#define key_negative_timeout 60 /* default timeout on a negative key's existence */

 /**<
 * complete_request_key - Complete the construction of a key.
- * @cons: The key construction record.
+ * @auth_key: The authorisation key.
 * @error: The success or failute of the construction.
 */
-void complete_request_key(struct key_construction *cons, int error)
+void complete_request_key(struct key *authkey, int error)
{
  kenter("{%d,%d},%d", cons->key->serial, cons->authkey->serial, error);
  struct request_key_auth *rka = get_request_key_auth(authkey);
+  struct key *key = rka->target_key;
+  kenter("%d{%d},%d", authkey->serial, key->serial, error);
if (error < 0)
- key_negate_and_link(cons->key, key_negative_timeout, NULL,
- cons->authkey);
+ key_negate_and_link(key, key_negative_timeout, NULL, authkey);
else
- key_revoke(cons->authkey);
- key_put(cons->key);
- key_put(cons->authkey);
- kfree(cons);
+ key_revoke(authkey);
}
EXPORT_SYMBOL(complete_request_key);

@@ -91,21 +90,19 @@
 * Request userspace finish the construction of a key
 * - execute "/sbin/request-key <op> <key> <uid> <gid> <keyring> <keyring> <keyring>"
 */
-static int call_sbin_request_key(struct key_construction *cons,
- const char *op,
- void *aux)
+static int call_sbin_request_key(struct key *authkey, void *aux)
 { static char const request_key[] = "/sbin/request-key";
+ struct request_key_auth *rka = get_request_key_auth(authkey);
 const struct cred *cred = current_cred();
 key_serial_t prkey, sskey;
- struct key *key = cons->key, *authkey = cons->authkey, *keyring,
- *session;
+ struct key *key = rka->target_key, *keyring, *session;
 char *argv[9], *envp[3], uid_str[12], gid_str[12];
 char key_str[12], keyring_str[3][12];
 char desc[20];
 int ret, i;

- kenter("[%d],[%d],%s", key->serial, authkey->serial, op);
+ kenter("[%d],[%d],%s", key->serial, authkey->serial, rka->op);

 ret = install_user_keyrings();
 if (ret < 0)
@@ -163,7 +160,7 @@
 /* set up the argument list */
 i = 0;
 argv[i++] = (char *)request_key;
- argv[i++] = (char *)op;
+ argv[i++] = (char *)rka->op;
 argv[i++] = key_str;
argv[i++] = uid_str;
argv[i++] = gid_str;
key_put(keyring);

eroowr_alloc:
-complete_request_key(cons, ret);
+complete_request_key(authkey, ret);
kleave(" = %d", ret);
return ret;
}
@@ -205,42 +202,31 @@
size_t callout_len, void *aux,
struct key *dest_keyring)
{
-struct key_construction *cons;
request_key_actor_t actor;
struct key *authkey;
int ret;

kenter("%d,%p,%zu,%p", key->serial, callout_info, callout_len, aux);

-cons = kmalloc(sizeof(*cons), GFP_KERNEL);
-if (!cons)
-return -ENOMEM;
-
/* allocate an authorisation key */
-authkey = request_key_auth_new(key, callout_info, callout_len,
+authkey = request_key_auth_new(key, "create", callout_info, callout_len,
    dest_keyring);
-if (IS_ERR(authkey)) {
-kfree(cons);
-ret = PTR_ERR(authkey);
-authkey = NULL;
-} else {
-cons->authkey = key_get(authkey);
-cons->key = key_get(key);
+if (IS_ERR(authkey))
+return PTR_ERR(authkey);

/+* make the call */
-actor = call_sbin_request_key;
-if (key->type->request_key)
-actor = key->type->request_key;
-
-ret = actor(cons, "create", aux);
-
-/* check that the actor called complete_request_key() prior to
WARN_ON(ret < 0 && !test_bit(KEY_FLAG_REVOKED, &authkey->flags));
key_put(authkey);
}

/* Make the call */
actor = call_sbin_request_key;
if (key->type->request_key)
actor = key->type->request_key;
+
ret = actor(authkey, aux);
+
/* check that the actor called complete_request_key() prior to 
 * returning an error */
WARN_ON(ret < 0 && !test_bit(KEY_FLAG_REVOKED, &authkey->flags));

key_put(authkey);
kleave(" = %d", ret);
return ret;
}
@@ -275,7 +261,7 @@
if (cred->request_key_auth) {
authkey = cred->request_key_auth;
down_read(&authkey->sem);
-rka = authkey->payload.data[0];
+rka = get_request_key_auth(authkey);
if (!test_bit(KEY_FLAG_REVOKED, &authkey->flags))
dest_keyring =
@@ -545,6 +531,7 @@
struct keyring_search_context ctx = {
 .index_key.type = type,
 .index_key.description = description,
+.index_key.desc_len = strlen(description),
 .cred = current_cred(),
 .match_data.cmp = key_default_cmp,
 .match_data.raw_data = description,
--- linux-4.15.0.orig/security/keys/request_key_auth.c
+++ linux-4.15.0/security/keys/request_key_auth.c
@@ -18,7 +18,7 @@
#include <linux/slab.h>
#include <linux/uaccess.h>
#include "internal.h"
-#include <keys/user-type.h>
+#include <keys/request_key_auth-type.h>

static int request_key_auth_preparse(struct key_preparsed_payload *);
static void request_key_auth_free_preparse(struct key_preparsed_payload *);
static void request_key_auth_describe(const struct key *, struct seq_file *);
static void request_key_auth_revoke(struct key *);
static void request_key_auth_destroy(struct key *);
static long request_key_auth_read(const struct key *, char __user *, size_t);
static long request_key_auth_read(const struct key *, char *, size_t);

/*
 * The request-key authorisation key type definition.
*/
static void request_key_auth_describe(const struct key *key,
        struct seq_file *m)
{
    struct request_key_auth *rka = key->payload.data[0];
    struct request_key_auth *rka = get_request_key_auth(key);
    if (!rka)
        return;
    seq_puts(m, "key:");
    seq_puts(m, key->description);
    seq_puts(m, key->description);
    @ @ -82.12 +85.15 @@
    * - the key's semaphore is read-locked
*/
static long request_key_auth_read(const struct key *key,
    char __user *buffer, size_t buflen)
    char *buffer, size_t buflen)
{
    struct request_key_auth *rka = key->payload.data[0];
    struct request_key_auth *rka = get_request_key_auth(key);
    size_t datalen;
    long ret;
    if (!rka)
        return -EKEYREVOKED;
    datalen = rka->callout_len;
    ret = datalen;
    if (buflen > datalen)
        buflen = datalen;
    -if (copy_to_user(buffer, rka->callout_info, buflen) != 0)
        ret = -EFAULT;
    +memcpy(buffer, rka->callout_info, buflen);
    }


struct request_key_auth_revoke(struct key *key)
{
    struct request_key_auth *rka = key->payload.data[0];
    struct request_key_auth *rka = get_request_key_auth(key);

    kenter("[%d]", key->serial);
}

struct request_key_auth_destroy(struct key *key)
{
    struct request_key_auth *rka = key->payload.data[0];
    struct request_key_auth *rka = get_request_key_auth(key);

    kenter("[%d]", key->serial);
}

struct key *request_key_auth_new(struct key *target, const void *callout_info,
    size_t callout_len, struct key *dest_keyring)
{
    struct request_key_auth *rka, *irka;
    const struct cred *cred = current->cred;

    if (!rka->callout_info)
        goto error_free_rka;
    rka->callout_len = callout_len;
    strlcpy(rka->op, op, sizeof(rka->op));

    /* see if the calling process is already servicing the key request of
     * another process */
    struct key *request_key_auth_new(struct key *target, const char *op,
        const void *callout_info, struct key *dest_keyring)
    {
        struct request_key_auth *rka, *irka;
    const struct cred *cred = current->cred;
    strlcpy(rka->callout_info, sizeof(rka->callout_info);
    if (!rka->callout_info)
        goto error_free_rka;
    rka->callout_len = callout_len;
    strlcpy(rka->op, op, sizeof(rka->op));

    /* see if the calling process is already servicing the key request of
     * another process */
    struct key *authkey;
    key_ref_t authkey_ref;

    sprintf(description, "%x", target_id);
    ctx.index_key.desc_len = sprintf(description, "%x", target_id);

    authkey_ref = search_process_keyrings(&ctx);
--- linux-4.15.0.orig/security/keys/trusted.c
+++ linux-4.15.0/security/keys/trusted.c
@@ -797,7 +797,7 @@
case Opt_migratable:
  if (*args[0].from == '0')
  pay->migratable = 0;
 else
-+else if (*args[0].from != '1')
+else if (*args[0].from != '1')
  return -EINVAL;
 break;
 case Opt_pcrlock:
@@ -1136,11 +1136,10 @@
 * trusted_read - copy the sealed blob data to userspace in hex.
 * On success, return to userspace the trusted key datablob size.
 */
- static long trusted_read(const struct key *key, char __user *buffer,
+static long trusted_read(const struct key *key, char *buffer,
   size_t buflen)
{
  struct trusted_key_payload *p;
  char *ascii_buf;
  char *bufp;
  int i;
@@ -1149,18 +1148,9 @@
 return -EINVAL;

 if (buffer && buflen >= 2 * p->blob_len) {
  ascii_buf = kmalloc(2 * p->blob_len, GFP_KERNEL);
  if (!ascii_buf)
-+if (!ascii_buf)
-+return -ENOMEM;
  bufp = ascii_buf;
  for (i = 0; i < p->blob_len; i++)
    bufp = hex_byte_pack(bufp, p->blob[i]);
-+if (copy_to_user(buffer, ascii_buf, 2 * p->blob_len) != 0) {
-+kzfree(ascii_buf);
-+return -EFAULT;
-+}
-+kzfree(ascii_buf);
  return 2 * p->blob_len;
+}
--- linux-4.15.0.orig/security/keys/user_defined.c
+++ linux-4.15.0/security/keys/user_defined.c
@@ -172,7 +172,7 @@

 Open Source Used In 5GaaS Edge AC-4  35161
* read the key data
* - the key's semaphore is read-locked
*/

-long user_read(const struct key *key, char __user *buffer, size_t buflen)
+long user_read(const struct key *key, char *buffer, size_t buflen)
{
    const struct user_key_payload *upayload;
    long ret;
    if (buflen > upayload->datalen)
        buflen = upayload->datalen;

    if (copy_to_user(buffer, upayload->data, buflen) != 0)
        ret = -EFAULT;
    memcpy(buffer, upayload->data, buflen);
}

return ret;
--- linux-4.15.0.orig/security/lock_down.c
+++ linux-4.15.0/security/lock_down.c
@@ -0,0 +1,61 @@
+/* Lock down the kernel
+ *
+ * Copyright (C) 2016 Red Hat, Inc. All Rights Reserved.
+ * Written by David Howells (dhowells@redhat.com)
+ *
+ * This program is free software; you can redistribute it and/or
+ * modify it under the terms of the GNU General Public Licence
+ * as published by the Free Software Foundation; either version
+ * 2 of the Licence, or (at your option) any later version.
+ */
+ *
+ #include <linux/security.h>
+ #include <linux/export.h>
+ #include <linux/efi.h>
+
+static __ro_after_init bool kernel_locked_down;
+
+/*
+ * Put the kernel into lock-down mode.
+ */
+static void __init lock_kernel_down(const char *where)
+{
+    if (!kernel_locked_down) {
+        kernel_locked_down = true;
+        pr_notice("Kernel is locked down from %s; see man kernel_lockdown.7\n", where);
+    }

Open Source Used In 5GaaS Edge AC-4 35162
static int __init lockdown_param(char *ignored)
{
l lock_kernel_down("command line");
return 0;
}

early_param("lockdown", lockdown_param);

/**
 * Lock the kernel down from very early in the arch setup. This must happen
 * prior to things like ACPI being initialised.
 */
void __init init_lockdown(void)
{
#ifdef CONFIG_LOCK_DOWN_IN_EFI_SECURE_BOOT
if (efi_enabled(EFI_SECURE_BOOT))
lock_kernel_down("EFI secure boot");
#endif
}

/**
 * kernel_is_locked_down - Find out if the kernel is locked down
 * @what: Tag to use in notice generated if lockdown is in effect
 */
bool __kernel_is_locked_down(const char *what, bool first)
{
if (what && first && kernel_locked_down)
pr_notice("Lockdown: %s is restricted; see man kernel_lockdown.7\n", what);
return kernel_locked_down;
}

EXPORT_SYMBOL(__kernel_is_locked_down);

--- linux-4.15.0.orig/security/lsm_audit.c
+++ linux-4.15.0/security/lsm_audit.c
@@ -277,7 +277,9 @@
        spin_lock(&a->u.dentry->d_lock);
        audit_log_untrustedstring(ab, a->u.dentry->d_name.name);
        spin_unlock(&a->u.dentry->d_lock);

inode = d_backing_inode(a->u.dentry);
if (inode) {
    audit_log_format(ab, " name=");
+spin_lock(&a->u.dentry->d_lock);
    audit_log_untrustedstring(ab, a->u.dentry->d_name.name);
+spin_unlock(&a->u.dentry->d_lock);

    inode = d_backing_inode(a->u.dentry);
}
if (dentry) {
    audit_log_format(ab, " name=");
    -audit_log_untrustedstring(ab,
        - dentry->d_name.name);
    +spin_lock(&dentry->d_lock);
    +audit_log_untrustedstring(ab, dentry->d_name.name);
    +spin_unlock(&dentry->d_lock);
    dput(dentry);
}
audit_log_format(ab, " dev=");
@@ -321,6 +324,7 @@
    if (a->u.net->sk) {
        struct sock *sk = a->u.net->sk;
        struct unix_sock *u;
    +struct unix_address *addr;
        int len = 0;
        char *p = NULL;

    +--- linux-4.15.0.orig/security/security.c
    +--- 28,20 +28,50 @@
    +#include <linux/personality.h>
    +#include <linux/backing-dev.h>
    +#include <linux/string.h>
    +#include <linux/msg.h>
    +#include <linux/prctl.h>
    +#include <net/flow.h>
    +#include <net/sock.h>

    @@ -351,14 +355,15 @@
    #endif
    case AF_UNIX:
        u = unix_sk(sk);
    +addr = smp_load_acquire(&u->addr);
    +if (!addr)
    +break;
    if (u->path.dentry) {
        audit_log_d_path(ab, " path=", &u->path);
        break;
    }
    -if (!u->addr)
    -break;
    -len = u->addr->len-sizeof(short);
    -p = &u->addr->name->sun_path[0];
    +len = addr->len-sizeof(short);
    +p = &addr->name->sun_path[0];
    audit_log_format(ab, " path=");
    if (*p)
        audit_log_untrustedstring(ab, p);
    --- linux-4.15.0.org/security/security.c
    +++ linux-4.15.0/security/security.c
    @@ -351,14 +355,15 @@
    #include <linux/personality.h>
    #include <linux/backing-dev.h>
    #include <linux/string.h>
    +#include <linux/msg.h>
    +#include <linux/prctl.h>
    +#include <net/flow.h>
    +#include <net/sock.h>
#define MAX_LSM_EVM_XATTR2

/* Maximum number of letters for an LSM name string */
#define SECURITY_NAME_MAX
+#define SECURITY_CHOSEN_NAMES_MAX (SECURITY_NAME_MAX * LSM_MAX_MAJOR)
+#define MODULE_STACK"(stacking)"

struct security_hook_heads security_hook_heads __lsm_ro_after_init;
static ATOMIC_NOTIFIER_HEAD(lsm_notifier_chain);

+static struct kmem_cache *lsm_file_cache;
+static struct kmem_cache *lsm_inode_cache;
+
char *lsm_names;
+
+ /*
+ * If stacking is enabled the task blob will always
+ * include an indicator of what security module data
+ * should be displayed. This is set with PR_SET_DISPLAY_LSM.
+ */
+static struct lsm_blob_sizes blob_sizes = {
+ifdef CONFIG_SECURITY_STACKING
+.lbs_task = SECURITY_NAME_MAX + 6,
+endif
+};
+
/* Boot-time LSM user choice */
-static __initdata char chosen_lsm[SECURITY_NAME_MAX + 1] =
+static __initdata char chosen_lsms[SECURITY_CHOSEN_NAMES_MAX + 1] =
+ifdef CONFIG_SECURITY_STACKING
+MODULE_STACK;
+else
CONFIG_DEFAULT_SECURITY;
+endif
+static __initdata char chosen_display_lsm[SECURITY_NAME_MAX + 1]
+ifdef CONFIG_SECURITY_STACKING
+CONFIG_SECURITY_DEFAULT_DISPLAY_NAME
+endif
+
static void __init do_security_initcalls(void)
{
@@ -76,21 +106,65 @@
loadpin_add_hooks();

/*
- * Load all the remaining security modules.
+ * The first call to a module specific init function
+ * updates the blob size requirements.
+ */
+do_security_initcalls();
+
+/*
+ * Create any kmem_caches needed for blobs
+ */
+if (blob_sizes.lbs_file)
+lsm_file_cache = kmem_cache_create("lsm_file_cache",
+ blob_sizes.lbs_file, 0,
+ SLAB_PANIC, NULL);
+if (blob_sizes.lbs_inode)
+lsm_inode_cache = kmem_cache_create("lsm_inode_cache",
+ blob_sizes.lbs_inode, 0,
+ SLAB_PANIC, NULL);
+/*
+ * The second call to a module specific init function
+ * adds hooks to the hook lists and does any other early
+ * initializations required.
+ */
do_security_initcalls();

+ifdef CONFIG_SECURITY_LSM_DEBUG
+pr_info("LSM: cred blob size       = %d\n", blob_sizes.lbs_cred);
+pr_info("LSM: file blob size       = %d\n", blob_sizes.lbs_file);
+pr_info("LSM: inode blob size      = %d\n", blob_sizes.lbs_inode);
+pr_info("LSM: ipc blob size        = %d\n", blob_sizes.lbs_ipc);
+ifdef CONFIG_KEYS
+pr_info("LSM: key blob size        = %d\n", blob_sizes.lbs_key);
+endif /* CONFIG_KEYS */
+pr_info("LSM: msg_msg blob size    = %d\n", blob_sizes.lbs_msg_msg);
+pr_info("LSM: sock blob size       = %d\n", blob_sizes.lbs_sock);
+pr_info("LSM: superblock blob size = %d\n", blob_sizes.lbs_superblock);
+pr_info("LSM: task blob size       = %d\n", blob_sizes.lbs_task);
+endif /* CONFIG_SECURITY_LSM_DEBUG */
+
return 0;
}

/* Save user chosen LSM */
static int __init choose_lsm(char *str)
{
- strncpy(chosen_lsm, str, SECURITY_NAME_MAX);
+ strncpy(chosen_lsms, str, SECURITY_CHOSEN_NAMES_MAX);
+pr_info("LSM: command line set '%s' security module(s).\n",
+ chosen_lsms);
return 1;
}
__setup("security=", choose_lsm);

+static int __init choose_display_lsm(char *str)
+{
+strncpy(chosen_display_lsm, str, SECURITY_NAME_MAX);
+pr_info("LSM: command line set default display lsm %s\n", chosen_display_lsm);
+return 1;
+}
__setup("security.display=", choose_display_lsm);
+
static bool match_last_lsm(const char *list, const char *lsm)
{
const char *last;
if (*result == NULL) {
*result = kstrdup(new, GFP_KERNEL);
+if (*result == NULL)
+return -ENOMEM;
} else {
/* Check if it is the last registered name */
if (match_last_lsm(*result, new))
@@ -128,6 +204,7 @@
/**
 * security_module_enable - Load given security module on boot ?
 * @module: the name of the module
+ * @stacked: indicates that the module wants to be stacked
 *
 * Each LSM must pass this method before registering its own operations
 * to avoid security registration races. This method may also be used
@@ -143,11 +220,72 @@
 *
 * Otherwise, return false.
 */
-int __init security_module_enable(const char *module)
+#ifdef CONFIG_SECURITY_STACKING
+static bool __init cmp_lsms(const char *lsm)
+{
+const char *str = chosen_lsms;
+const char *split;
+int len = strlen(lsm);
+if (len > SECURITY_NAME_MAX) {
+pr_info("LSM: security module name \"%s\" exceeds limit\n", lsm);
+return false;
+}
+const char *str = chosen_lsms;
+const char *split;
+int len = strlen(lsm);
+if (len > SECURITY_NAME_MAX) {
+pr_info("LSM: security module name \"%s\" exceeds limit\n", lsm);
+return false;
+}
for (split = strchr(str, ','); split; split = strchr(str, ',)) {
    if ((len == split - str) && strncmp(lsm, str, split - str))
        return true;
    str = split + 1;
}
if ((len == strlen(str)) && strncmp(lsm, str, strlen(str)))
    return true;
return false;
}

bool __init security_module_enable(const char *lsm, const bool stacked) {
    return !strcmp(module, chosen_lsm);
#endif

/*
 * Module defined on the command line security=XXXX
 */
if (strcmp(chosen_lsms, MODULE_STACK)) {
    if (cmp_lsms(lsm)) {
        /* set to first LSM registered and then override */
        if (!*default_display_lsm)
            strcpy(default_display_lsm, lsm);
        else if (*chosen_display_lsm && !strcmp(chosen_display_lsm, lsm)) {
            strcpy(default_display_lsm, lsm);
            pr_info("LSM: default display lsm '%s\n', default_display_lsm);
        }
    }
    return true;
}
return false;
#endif

/*
 * Module configured as stacked.
 */
if (stacked && !*default_display_lsm)
    strcpy(default_display_lsm, lsm);
else if (stacked && *chosen_display_lsm && !strcmp(chosen_display_lsm, lsm)) {
    strcpy(default_display_lsm, lsm);
    pr_info("LSM: default display lsm '%s\n', default_display_lsm);
}

return stacked;
#else
    if (strcmp(lsm, chosen_lsms) == 0) {
        strcpy(default_display_lsm, lsm);
        return true;
    }
#endif
return false;
#endif

/*
 * Keep the order of major modules for mapping secids.
 */
static int lsm_next_major;

/**
 * security_add_hooks - Add a modules hooks to the hook lists.
 * @hooks: the hooks to add
 * char *lsm)
 {
 int i;
 int lsm_index = lsm_next_major++;

#ifdef CONFIG_SECURITY_LSM_DEBUG
 pr_info("LSM: Security module %s gets index %d\n", lsm, lsm_index);
#endif
 for (i = 0; i < count; i++) {
 hooks[i].lsm = lsm;
 hooks[i].lsm_index = lsm_index;
 list_add_tail_rcu(&hooks[i].list, hooks[i].head);
 }
 if (lsm_append(lsm, &lsm_names) < 0)
 EXPORT_SYMBOL(unregister_lsm_notifier);

/**
 * lsm_cred_alloc - allocate a composite cred blob
 * @cred: the cred that needs a blob
 * @gfp: allocation type
 *
 * Allocate the cred blob for all the modules
 *
 * Returns 0, or -ENOMEM if memory can't be allocated.
 */
int lsm_cred_alloc(struct cred *cred, gfp_t gfp)
{
 if (blob_sizes.lbs_cred == 0) {
 cred->security = NULL;
 return 0;
 }

 cred->security = kzalloc(blob_sizes.lbs_cred, gfp);
+if (cred->security == NULL)
+return -ENOMEM;
+return 0;
+
+/**
+ * lsm_early_cred - during initialization allocate a composite cred blob
+ * @cred: the cred that needs a blob
+ *
+ * Allocate the cred blob for all the modules if it's not already there
+ */
+void lsm_early_cred(struct cred *cred)
+{
+int rc;
+
+if (cred == NULL)
+panic("%s: NULL cred\n", __func__);
+if (cred->security != NULL)
+return;
+rc = lsm_cred_alloc(cred, GFP_KERNEL);
+if (rc)
+panic("%s: Early cred alloc failed\n", __func__);
+}
+
+static void __init lsm_set_size(int *need, int *lbs)
+{
+int offset;
+
+if (*need > 0) {
+offset = *lbs;
+*lbs += *need;
+*need = offset;
+
+
+/**
+ * security_add_blobs - Report blob sizes
+ * @needed: the size of blobs needed by the module
+ *
+ * Each LSM has to register its blobs with the infrastructure.
+ * The "needed" data tells the infrastructure how much memory
+ * the module requires for each of its blobs. On return the
+ * structure is filled with the offset that module should use
+ * from the blob pointer.
+ */
+void __init security_add_blobs(struct lsm_blob_sizes *needed)
+{
+lsm_set_size(&needed->lbs_cred, &blob_sizes.lbs_cred);
```c
+lsml_set_size(&needed->lbs_file, &blob_sizes.lbs_file);
+lsml_set_size(&needed->lbs_ipc, &blob_sizes.lbs_ipc);
+lsml_set_size(&needed->lbs_key, &blob_sizes.lbs_key);
+lsml_set_size(&needed->lbs_msg_msg, &blob_sizes.lbs_msg_msg);
+lsml_set_size(&needed->lbs_sock, &blob_sizes.lbs_sock);
+lsml_set_size(&needed->lbs_superblock, &blob_sizes.lbs_superblock);
+lsml_set_size(&needed->lbs_task, &blob_sizes.lbs_task);
+/
+ * The inode blob gets an rcu_head in addition to
+ * what the modules might need.
+ */
+if (needed->lbs_inode && & blob_sizes.lbs_inode == 0)
+blob_sizes.lbs_inode = sizeof(struct rcu_head);
+lsml_set_size(&needed->lbs_inode, &blob_sizes.lbs_inode);
+
+/**
+ * lsml_file_alloc - allocate a composite file blob
+ * @file: the file that needs a blob
+ *+
+ * Allocate the file blob for all the modules
+ *+
+ * Returns 0, or -ENOMEM if memory can't be allocated.
+ */
+int lsml_file_alloc(struct file *file)
+{
+   if (!lsml_file_cache) {
+    file->f_security = NULL;
+    return 0;
+   }
+
+   file->f_security = kmem_cache_zalloc(lsm_file_cache, GFP_KERNEL);
+   if (file->f_security == NULL)
+      return -ENOMEM;
+   return 0;
+}
+
+#ifdef CONFIG_SECURITY_STACKING
+static inline char *lsml_of_task(struct task_struct *task)
+{
+#ifdef CONFIG_SECURITY_LSM_DEBUG
+   if (task->security == NULL)
+      pr_info("%s: task has no lsm name.\n", __func__);
+#endif
+   return task->security;
+}
+#endif
+
+```
+/**
+ * lsm_task_alloc - allocate a composite task blob
+ * @task: the task that needs a blob
+ *
+ * Allocate the task blob for all the modules
+ *
+ * Returns 0, or -ENOMEM if memory can't be allocated.
+ */
+int lsm_task_alloc(struct task_struct *task)
+{
+if (blob_sizes.lbs_task == 0) {
+task->security = NULL;
+return 0;
+}
+
task->security = kzalloc(blob_sizes.lbs_task, GFP_KERNEL);
+if (task->security == NULL)
+return -ENOMEM;
+	/* inherit current display lsm */
+#ifdef CONFIG_SECURITY_STACKING
+if (current->security)
+strcpy(task->security, lsm_of_task(current));
+else
+strcpy(task->security, default_display_lsm);
+#endif
+return 0;
+}
+
+/**
+ * lsm_inode_alloc - allocate a composite inode blob
+ * @inode: the inode that needs a blob
+ *
+ * Allocate the inode blob for all the modules
+ *
+ * Returns 0, or -ENOMEM if memory can't be allocated.
+ */
+int lsm_inode_alloc(struct inode *inode)
+{
+if (!lsm_inode_cache) {
+inode->i_security = NULL;
+return 0;
+}
+
+inode->i_security = kmem_cache_zalloc(lsm_inode_cache, GFP_KERNEL);
+if (inode->i_security == NULL)
+return -ENOMEM;
+return 0;
lsm_early_inode - during initialization allocate a composite inode blob

 Allocate the inode blob for all the modules if it's not already there

lsm_ipc_alloc - allocate a composite ipc blob

 Allocate the ipc blob for all the modules

lsm_key_alloc - allocate a composite key blob

 Allocate the key blob for all the modules
int lsm_key_alloc(struct key *key)
{
    if (blob_sizes.lbs_key == 0) {
        key->security = NULL;
        return 0;
    }
    key->security = kzalloc(blob_sizes.lbs_key, GFP_KERNEL);
    if (key->security == NULL)
        return -ENOMEM;
    return 0;
}

int lsm_msg_msg_alloc(struct msg_msg *mp)
{
    if (blob_sizes.lbs_msg_msg == 0) {
        mp->security = NULL;
        return 0;
    }
    mp->security = kzalloc(blob_sizes.lbs_msg_msg, GFP_KERNEL);
    if (mp->security == NULL)
        return -ENOMEM;
    return 0;
}

int lsm_sock_alloc(struct sock *sock, gfp_t priority)
{
+{  
+  if (blob_sizes.lbs_sock == 0) {  
+    sock->sk_security = NULL;  
+    return 0;  
+  }  
+  
+  sock->sk_security = kzalloc(blob_sizes.lbs_sock, priority);  
+  if (sock->sk_security == NULL)  
+    return -ENOMEM;  
+  return 0;  
+}  
+
+/**  
+ * lsm_superblock_alloc - allocate a composite superblock blob  
+ * @sb: the superblock that needs a blob  
+ *  
+ * Allocate the superblock blob for all the modules  
+ *  
+ * Returns 0, or -ENOMEM if memory can't be allocated.  
+ */  
+int lsm_superblock_alloc(struct super_block *sb)  
+{  
+  if (blob_sizes.lbs_superblock == 0) {  
+    sb->s_security = NULL;  
+    return 0;  
+  }  
+  
+  sb->s_security = kzalloc(blob_sizes.lbs_superblock, GFP_KERNEL);  
+  if (sb->s_security == NULL)  
+    return -ENOMEM;  
+  return 0;  
+}
+
+/*  
+ * Hook list operation macros.  
+ *  
+ * @@ -272,16 +705,12 @@  
+ * effective, inheritable, permitted);  
+ */  

-int security_capable(const struct cred *cred, struct user_namespace *ns,  
-  int cap)  
-{  
-  return call_int_hook(capable, 0, cred, ns, cap, SECURITY_CAP_AUDIT);  
-}  
-
-int security_capable_noaudit(const struct cred *cred, struct user_namespace *ns,  
-  int cap)
int security_capable(const struct cred *cred,
    struct user_namespace *ns,
    int cap,
    unsigned int opts)
{
    return call_int_hook(capable, 0, cred, ns, cap, SECURITY_CAP_NOAUDIT);
    return call_int_hook(capable, 0, cred, ns, cap, opts);
}

int security_quotactl(int cmds, int type, int id, struct super_block *sb)
@@ -354,12 +783,21 @@

int security_sb_alloc(struct super_block *sb)
{
    return call_int_hook(sb_alloc_security, 0, sb);
    int rc = lsm_superblock_alloc(sb);
+    if (unlikely(rc))
+        return rc;
+    rc = call_int_hook(sb_alloc_security, 0, sb);
+    if (unlikely(rc))
+        security_sb_free(sb);
+    return rc;
}

void security_sb_free(struct super_block *sb)
{
    call_void_hook(sb_free_security, sb);
    kfree(sb->s_security);
    sb->s_security = NULL;
}

int security_sb_copy_data(char *orig, char *copy)
@@ -433,14 +871,40 @@

int security_inode_alloc(struct inode *inode)
{
    inode->i_security = NULL;
    return call_int_hook(inode_alloc_security, 0, inode);
    int rc = lsm_inode_alloc(inode);
+    if (unlikely(rc))
+        return rc;
+    rc = call_int_hook(inode_alloc_security, 0, inode);
+    if (unlikely(rc))
+        security_inode_free(inode);
+    return rc;
+}
+static void inode_free_by_rcu(struct rcu_head *head)
+{
+  /*
+   * The rcu head is at the start of the inode blob
+   */
+  kmem_cache_free(lsm_inode_cache, head);
+

void security_inode_free(struct inode *inode)
{
  integrity_inode_free(inode);
  call_void_hook(inode_free_security, inode);
  /*
   * The inode may still be referenced in a path walk and
   * a call to security_inode_permission() can be made
   * after inode_free_security() is called. Ideally, the VFS
   * wouldn't do this, but fixing that is a much harder
   * job. For now, simply free the i_security via RCU, and
   * leave the current inode->i_security pointer intact.
   * The inode will be freed after the RCU grace period too.
   */
  if (inode->i_security)
    call_rcu((struct rcu_head *)inode->i_security,
    inode_free_by_rcu);
}

int security_dentry_init_security(struct dentry *dentry, int mode,
@@ -531,6 +995,7 @@
return 0;
return call_int_hook(path_rmdir, 0, dir, dentry);
}
+EXPORT_SYMBOL_GPL(security_path_rmdir);

int security_path_unlink(const struct path *dir, struct dentry *dentry)
{
@@ -547,6 +1012,7 @@
return 0;
return call_int_hook(path_symlink, 0, dir, dentry, old_name);
}
+EXPORT_SYMBOL_GPL(security_path_symlink);

int security_path_link(struct dentry *old_dentry, const struct path *new_dir,
@@ -555,6 +1021,7 @@
return 0;
return call_int_hook(path_link, 0, old_dentry, new_dir, new_dentry);
}
+EXPORT_SYMBOL_GPL(security_path_link);

int security_path_rename(const struct path *old_dir, struct dentry *old_dentry,
const struct path *new_dir, struct dentry *new_dentry,
@@ -582,6 +1049,7 @@
return 0;
return call_int_hook(path_truncate, 0, path);
}
+EXPORT_SYMBOL_GPL(security_path_truncate);

int security_path_chmod(const struct path *path, umode_t mode)
{
@@ -589,6 +1057,7 @@
return 0;
return call_int_hook(path_chmod, 0, path, mode);
}
+EXPORT_SYMBOL_GPL(security_path_chmod);

int security_path_chown(const struct path *path, kuid_t uid, kgid_t gid)
{
@@ -596,6 +1065,7 @@
return 0;
return call_int_hook(path_chown, 0, path, uid, gid);
}
+EXPORT_SYMBOL_GPL(security_path_chown);

int security_path_chroot(const struct path *path)
{
@@ -681,6 +1151,7 @@
return 0;
return call_int_hook(inode_readlink, 0, dentry);
}
+EXPORT_SYMBOL_GPL(security_inode_readlink);

int security_inode_follow_link(struct dentry *dentry, struct inode *inode,
bool rcu)
@@ -696,6 +1167,7 @@
return 0;
return call_int_hook(inode_permission, 0, inode, mask);
}
+EXPORT_SYMBOL_GPL(security_inode_permission);

int security_inode_setattr(struct dentry *dentry, struct iattr *attr)
{
@@ -867,15 +1339,32 @@
return fsnotify_perm(file, mask);
}
int security_file_alloc(struct file *file)
{
- return call_int_hook(file_alloc_security, 0, file);
+ int rc = lsm_file_alloc(file);
+ if (unlikely(rc))
+ return rc;
+ rc = call_int_hook(file_alloc_security, 0, file);
+ if (unlikely(rc))
+ security_file_free(file);
+ return rc;
}

void security_file_free(struct file *file)
{
+ void *blob;
+
+ if (!lsm_file_cache)
+ return;
+ call_void_hook(file_free_security, file);
+ blob = file->f_security;
+ file->f_security = NULL;
+ kmem_cache_free(lsm_file_cache, blob);
}

int security_file_ioctl(struct file *file, unsigned int cmd, unsigned long arg)

int security_task_alloc(struct task_struct *task, unsigned long clone_flags)
{
- return call_int_hook(task_alloc, 0, task, clone_flags);
+ int rc = lsm_task_alloc(task);
+ if (unlikely(rc))
+ return rc;
+ rc = call_int_hook(task_alloc, 0, task, clone_flags);
}
```c
+	if (unlikely(rc))
+security_task_free(task);
+return rc;
+
void security_task_free(struct task_struct *task)
{
    call_void_hook(task_free, task);
+
    kfree(task->security);
+task->security = NULL;
}

int security_cred_alloc_blank(struct cred *cred, gfp_t gfp)
{
    -return call_int_hook(cred_alloc_blank, 0, cred, gfp);
+int rc = lsm_cred_alloc(cred, gfp);
+
    +if (unlikely(rc))
    +return rc;
+
    +rc = call_int_hook(cred_alloc_blank, 0, cred, gfp);
    +if (unlikely(rc))
    +security_cred_free(cred);
    +return rc;
}

void security_cred_free(struct cred *cred)
{
    /*
    * There is a failure case in prepare_creds() that
    * may result in a call here with ->security being NULL.
    */
    +if (unlikely(cred->security == NULL))
    +return;
+
    call_void_hook(cred_free, cred);
+
    +kfree(cred->security);
    +cred->security = NULL;
}

int security_prepare_creds(struct cred *new, const struct cred *old, gfp_t gfp)
{
    -return call_int_hook(cred_prepare, 0, new, old, gfp);
+int rc = lsm_cred_alloc(new, gfp);
+
    +if (unlikely(rc))
    ```
+return rc;
+
+rc = call_int_hook(cred_prepare, 0, new, old, gfp);
+if (unlikely(rc))
+security_cred_free(new);
+return rc;
+
void security_transfer_creds(struct *new, const struct *old)
@@ -1119,6 +1645,80 @@
return call_int_hook(task_kill, 0, p, info, sig, secid);
}

+#ifdef CONFIG_SECURITY_STACKING
+static char *nolsm = "-default";
+#define NOLSMLEN 9
+
+static bool is_registered_lsm(const char *str, size_t size)
+{
+struct security_hook_list *hp;
+
+list_for_each_entry(hp, &security_hook_heads.getprocattr, list) {
+if (size == strlen(hp->lsm) && !strncmp(str, hp->lsm, size))
+return true;
+}
+
+return false;
+}
+
+static bool set_lsm_of_current(const char *str, size_t size)
+{
+char *lsm = lsm_of_task(current);
+
+if (is_registered_lsm(str, size)) {
+strncpy(lsm, str, size);
+lsm[size] = '\0';
+} else if (size == NOLSMLEN && !strncmp(str, nolsm, size)) {
+lsm[0] = '\0';
+} else {
+return false;
+}
+return true;
+}
+
+static int lsm_task_prctl(int option, unsigned long arg2, unsigned long arg3,
+unsigned long arg4, unsigned long arg5)
+{
+char *lsm = lsm_of_task(current);
char buffer[SECURITY_NAME_MAX + 1];
__user char *optval = (__user char *)arg2;
__user int *optlen = (__user int *)arg3;
int dlen;
int len;

switch (option) {
  case PR_GETDISPLAY_LSM:
    len = arg4;
    if (lsm[0] == '\0') {
      lsm = nolsm;
      dlen = NOLSMLEN;
    } else
      dlen = strlen(lsm) + 1;
    if (dlen > len)
      return -ERANGE;
    if (copy_to_user(optval, lsm, dlen))
      return -EFAULT;
    if (put_user(dlen, optlen))
      return -EFAULT;
    break;
  case PR_SETDISPLAY_LSM:
    len = arg3;
    if (len > SECURITY_NAME_MAX)
      return -EINVAL;
    if (copy_from_user(buffer, optval, len))
      return -EFAULT;
    buffer[len] = '\0';
    /* verify the requested LSM is registered */
    if (!set_lsm_of_current(buffer, len))
      return -ENOENT;
    break;
  default:
    return -ENOSYS;
} return 0;
#endif

int security_task_prctl(int option, unsigned long arg2, unsigned long arg3,
unsigned long arg4, unsigned long arg5)
{
  @ @ -1126,6 +1726,12 @ @
  int rc = -ENOSYS;
  struct security_hook_list *hp;

#ifdef CONFIG_SECURITY_STACKING
  rc = lsm_task_prctl(option, arg2, arg3, arg4, arg5);
  return rc;
#endif

+if (rc != -ENOSYS)
+return rc;
+#endif
+
+list_for_each_entry(hp, &security_hook_heads.task_prctl, list) {
+thisrc = hp->hook.task_prctl(option, arg2, arg3, arg4, arg5);
+if (thisrc != -ENOSYS) {
+ @ @ -1155,22 +1761,42 @ @
+
+int security_msg_msg_alloc(struct msg_msg *msg)
+{
+-return call_int_hook(msg_msg_alloc_security, 0, msg);
+int rc = lsm_msg_msg_alloc(msg);
+ +
+if (unlikely(rc))
+return rc;
+rc = call_int_hook(msg_msg_alloc_security, 0, msg);
+if (unlikely(rc))
+security_msg_msg_free(msg);
+return rc;
+}

void security_msg_msg_free(struct msg_msg *msg)
{
+call_void_hook(msg_msg_free_security, msg);
+kfree(msg->security);
+msg->security = NULL;
+}

int security_msg_queue_alloc(struct msg_queue *msq)
{
+-return call_int_hook(msg_queue_alloc_security, 0, msq);
+int rc = lsm_ipc_alloc(&msq->q_perm);
+ +
+if (unlikely(rc))
+return rc;
+rc = call_int_hook(msg_queue_alloc_security, 0, msq);
+if (unlikely(rc))
+security_msg_queue_free(msq);
+return rc;
+}

void security_msg_queue_free(struct msg_queue *msq)
{
+struct kern_ipc_perm *kip = &msq->q_perm;
+ 
+call_void_hook(msg_queue_free_security, msq);
+kfree(kip->security);
int security_msg_queue_associate(struct msg_queue *msq, int msqflg)
{
    if (unlikely(msqflg))
        return -1;
    int rc = call_int_hook(msg_queue_associate, 0, msq);
    if (unlikely(rc))
        return rc;
    return rc;
}

int security shm_alloc(struct shmid_kernel *shp)
{
    -return call_int_hook(shm_alloc_security, 0, shp);
    +int rc = lsm_ipc_alloc(&shp->shm_perm);
    +
    +if (unlikely(rc))
    +return rc;
    +rc = call_int_hook(shm_alloc_security, 0, shp);
    +if (unlikely(rc))
    +security shm_free(shp);
    +return rc;
}

void security shm_free(struct shmid_kernel *shp)
{
    +struct kern_ipc_perm *kip = &shp->shm_perm;
    +
    call void hook(shm_free_s		security = NULL;
}

int security shm_associate(struct shmid_kernel *shp, int shmflg)
{
    -return call_int_hook(shm_associate, 0, shp);
    +int rc = lsm_ipc_alloc(&shp->shm_perm);
    +
    +if (unlikely(rc))
    +return rc;
    +rc = call_int_hook(shm_associate, 0, shp);
    +if (unlikely(rc))
    +security shm_free(shp);
    +return rc;
}

int security sem_alloc(struct sem_array *sma)
{
    -return call_int_hook(sem_alloc_security, 0, sma);
    +int rc = lsm_ipc_alloc(&sma->sem_perm);
    +
    +if (unlikely(rc))
    +return rc;
    +rc = call_int_hook(sem_alloc_security, 0, sma);
    +if (unlikely(rc))
    +security sem_free(sma);
    +return rc;
}

void security sem_free(struct sem_array *sma)
{
    +struct kern_ipc_perm *kip = &sma->sem_perm;
    +
call_void_hook(sem_free_security, sma);
+kfree(kip->security);
+kip->security = NULL;
}

int security_sem_associate(struct sem_array *sma, int semflg)
@@ -1254,14 +1902,68 @@
}
EXPORT_SYMBOL(security_d_instantiate);

-int security_getprocattr(struct task_struct *p, char *name, char **value)
+int security_getprocattr(struct task_struct *p, const char *lsm, char *name,
+char **value)
{
-    return call_int_hook(getprocattr, -EINVAL, p, name, value);
+#ifdef CONFIG_SECURITY_STACKING
+char *speclsm = lsm_of_task(p);
+#endif
+struct security_hook_list *hp;
+int rc;
+
+if (strcmp(name, "display_lsm") == 0) {
+    *value = kstrdup(current->security, GFP_KERNEL);
+    if (*value == NULL)
+        return -ENOMEM;
+    return strlen(*value);
+}
+
+list_for_each_entry(hp, &security_hook_heads.getprocattr, list) {
+    if (lsm != NULL && strcmp(lsm, hp->lsm))
+        continue;
+#ifdef CONFIG_SECURITY_STACKING
+    if (!lsm && speclsm && speclsm[0] && strcmp(speclsm, hp->lsm))
+        continue;
+#endif
+    rc = hp->hook.getprocattr(p, name, value);
+    if (rc != -ENOSYS)
+        return rc;
+}
+return -EINVAL;
}

-int security_setprocattr(const char *name, void *value, size_t size)
+int security_setprocattr(const char *lsm, const char *name, void *value,
+size_t size)
{
-    return call_int_hook(setprocattr, -EINVAL, name, value, size);
+#ifdef CONFIG_SECURITY_STACKING
char *speclsm = lsm_of_task(current);
#else
char *tvalue;
#endif
struct security_hook_list *hp;
int rc;

if (!size)
	return -EINVAL;

if (strcmp(name, "display_lsm") == 0) {
#ifdef CONFIG_SECURITY_STACKING
	if (set_lsm_of_current(value, size))
		return size;
#endif
	return -EINVAL;
}

list_for_each_entry(hp, &security_hook_heads.setprocattr, list) {
#ifdef CONFIG_SECURITY_STACKING
	if (!lsm && speclsm && speclsm[0] && strcmp(speclsm, hp->lsm))
		continue;
#endif
	rc = hp->hook.setprocattr(name, value, size);
	if (rc)
		return rc;
}
	return -EINVAL;
}

int security_netlink_send(struct sock *sk, struct sk_buff *skb)
@@ -1291,7 +1993,19 @@

void security_release_secctx(char *secdata, u32 seclen)
{
	-call_void_hook(release_secctx, secdata, seclen);
#ifdef CONFIG_SECURITY_STACKING
+char *speclsm = lsm_of_task(current);
+#endif
+struct security_hook_list *hp;
+
+list_for_each_entry(hp, &security_hook_heads.release_secctx, list) {
+#ifdef CONFIG_SECURITY_STACKING
+if (!lsm && & speclsm[0] && strcmp(speclsm, hp->lsm))
+continue;
+#endif
+hp->hook.release_secctx(secdata, seclen);
+break;
EXPORT_SYMBOL(security_release_secctx);

int security_socket_getpeersec_stream(struct socket *sock, char __user *optval,
    int __user *optlen, unsigned len)
{
    +#ifdef CONFIG_SECURITY_STACKING
    +struct security_hook_list *hp;
    +char *lsm = lsm_of_task(current);
    +
    +list_for_each_entry(hp, &security_hook_heads.socket_getpeersec_stream,
    +list) {  
        +if (!lsm || !lsm[0] || !strcmp(lsm, hp->lsm))
        +return hp->hook.socket_getpeersec_stream(sock, optval,
        +optlen, len);
    +}
    +return -ENOPROTOOPT;
    +#else
    return call_int_hook(socket_getpeersec_stream, -ENOPROTOOPT, sock,
    optval, optlen, len);
    +#endif
}

int security_socket_getpeersec_dgram(struct socket *sock, struct sk_buff *skb, u32 *secid)
{
    int rc = lsm_sock_alloc(sock, priority);
    if (unlikely(rc))
        return rc;
    rc = call_int_hook(sk_alloc_security, 0, sk, family, priority);
    if (unlikely(rc))
        security_sk_free(sk);
    return rc;
}

void security_sk_free(struct sock *sk)
{
    call_void_hook(sk_free_security, sk);
    kfree(sk->sk_security);
    sk->sk_security = NULL;
}

int security_sk_alloc(struct sock *sk, int family, gfp_t priority)
{
    return call_int_hook(sk_alloc_security, 0, sk, family, priority);
}

void security_sk_free(struct sock *sk)
{
    call_void_hook(sk_free_security, sk);
    kfree(sk->sk_security);
    sk->sk_security = NULL;
}
void security_sk_clone(const struct sock *sk, struct sock *newsk)
@@ -1658,12 +2394,21 @@
    int security_key_alloc(struct key *key, const struct cred *cred,
                         unsigned long flags)
    {
-    return call_int_hook(key_alloc, 0, key, cred, flags);
+    int rc = lsm_key_alloc(key);
+    if (unlikely(rc))
+    return rc;
+    rc = call_int_hook(key_alloc, 0, key, cred, flags);
+    if (unlikely(rc))
+    security_key_free(key);
+    return rc;
    }

    void security_key_free(struct key *key)
    {
-    call_void_hook(key_free, key);
+    kfree(key->security);
+    key->security = NULL;
    }

    int security_key_permission(key_ref_t key_ref,
-$xpd_node = kmem_cache_zalloc(avc_xperms_decision_cachep, GFP_NOWAIT);
+$xpd_node = kmem_cache_zalloc(avc_xperms_decision_cachep, GFP_NOWAIT | __GFP_NOWARN);
     if (!xpd_node)
         return NULL;
     xpd = &xpd_node->xpd;
     if (which & XPERMS_ALLOWED) {  
xpd->allowed = kmem_cache_zalloc(avc_xperms_data_cachep,
         -GFP_NOWAIT);
+         GFP_NOWAIT | __GFP_NOWARN);
     if (!xpd->allowed)
         goto error;
     goto error;
     }
     if (which & XPERMS_AUDITALLOW) {  
xpd->auditallow = kmem_cache_zalloc(avc_xperms_data_cachep,
         -GFP_NOWAIT);
+         GFP_NOWAIT | __GFP_NOWARN);
     if (xpd->auditallow)
         goto error;
     goto error;
     }

if (!xpd->auditallow)
    goto error;
}
if (which & XPERMS_DONTAUDIT) {
    xpd->dontaudit = kmem_cache_zalloc(avc_xperms_data_cachep,
-GFP_NOWAIT);
    +GFP_NOWAIT | __GFP_NOWARN);
    if (!xpd->dontaudit)
        goto error;
}
@@ -393,7 +394,7 @@
{
    struct avc_xperms_node *xp_node;

    -xp_node = kmem_cache_zalloc(avc_xperms_cachep, GFP_NOWAIT);
    +xp_node = kmem_cache_zalloc(avc_xperms_cachep, GFP_NOWAIT | __GFP_NOWARN);
    if (!xp_node)
        return xp_node;
    INIT_LIST_HEAD(&xp_node->xpd_head);
@@ -546,7 +547,7 @@
{
    struct avc_node *node;

    -node = kmem_cache_zalloc(avc_node_cachep, GFP_NOWAIT);
    +node = kmem_cache_zalloc(avc_node_cachep, GFP_NOWAIT | __GFP_NOWARN);
    if (!node)
        goto out;
@@ -863,7 +864,7 @@
if (orig->ae.xp_node) {
        rc = avc_xperms_populate(node, orig->ae.xp_node);
        if (rc) {
            -kmem_cache_free(avc_node_cachep, node);
            +avc_node_kill(node);
            goto out_unlock;
        }
    }
--- linux-4.15.0.orig/security/selinux/hooks.c
+++ linux-4.15.0/security/selinux/hooks.c
@@ -129,9 +129,6 @@

 int selinux_enabled = 1;
#endif

-static struct kmem_cache *sel_inode_cache;
-static struct kmem_cache *file_security_cache;
-
/**
 * selinux_secmark_enabled - Check to see if SECMARK is currently enabled

struct cred *cred = (struct cred *) current->real_cred;
struct task_security_struct *tsec;

-tsec = kzalloc(sizeof(struct task_security_struct), GFP_KERNEL);
-if (!tsec)
-panic("SELinux: Failed to initialize initial task.
");
-
+lsm_early_cred(cred);
+tsec = selinux_cred(cred);
tsec->osid = tsec->sid = SECINITSID_KERNEL;
-cred->security = tsec;
}  
*/

const struct task_security_struct *tsec;

-tsec = cred->security;
+tsec = selinux_cred(cred);
return tsec->sid;
}

static int inode_alloc_security(struct inode *inode)
{
-struct inode_security_struct *isec;
+struct inode_security_struct *isec = selinux_inode(inode);

u32 sid = current_sid();

-isec = kmem_cache_zalloc(sel_inode_cache, GFP_NOFS);
-if (!isec)
-return -ENOMEM;
-
+spin_lock_init(&isec->lock);
INIT_LIST_HEAD(&isec->list);
isec->inode = inode;
-@@ -242,7 +232,6 @@
+isec->sclass = SECCLASS_FILE;
isec->task_sid = sid;
isec->initialized = LABEL_INVALID;
-inode->i_security = isec;

return 0;
}
struct dentry *opt_dentry, bool may_sleep) {
-struct inode_security_struct *isec = inode->i_security;
+struct inode_security_struct *isec = selinux_inode(inode);

    might_sleep_if(may_sleep);

static struct inode_security_struct *inode_security_novalidate(struct inode *inode) {
-    return inode->i_security;
+    return selinux_inode(inode);
}

static struct inode_security_struct *inode_security_rcu(struct inode *inode, bool rcu) {
    error = __inode_security_revalidate(inode, NULL, !rcu);
    if (error)
        return ERR_PTR(error);
-    return inode->i_security;
+    return selinux_inode(inode);
}

/*
 @ @ -299,14 +288,14 @@
 static struct inode_security_struct *inode_security(struct inode *inode) {
     __inode_security_revalidate(inode, NULL, true);
-    return inode->i_security;
+    return selinux_inode(inode);
 }

 static struct inode_security_struct *backing_inode_security_novalidate(struct dentry *dentry) {
     struct inode *inode = d_backing_inode(dentry);

-    return inode->i_security;
+    return selinux_inode(inode);
 }

 /*
 @ @ -317,21 +306,14 @@
 struct inode *inode = d_backing_inode(dentry);

     __inode_security_revalidate(inode, dentry, true);
-return inode->i_security;
-
-}
-
-struct inode_security_struct *isec;
-
-isec = container_of(head, struct inode_security_struct, rcu);
-kmem_cache_free(sel_inode_cache, isec);
+return selinux_inode(inode);
} }

static void inode_free_security(struct inode *inode)
{
-struct inode_security_struct *isec = inode->i_security;
-struct superblock_security_struct *sbsec = inode->i_sb->s_security;
+struct inode_security_struct *isec = selinux_inode(inode);
+struct superblock_security_struct *sbsec =
+selinux_superblock(inode->i_sb);

/*
 * As not all inode security structures are in a list, we check for
@@ -348,49 +330,22 @@
list_del_init(&isec->list);
spin_unlock(&sbsec->isec_lock);
} -
-/*
- * The inode may still be referenced in a path walk and
- * a call to selinux_inode_permission() can be made
- * after inode_free_security() is called. Ideally, the VFS
- * wouldn't do this, but fixing that is a much harder
- * job. For now, simply free the i_security via RCU, and
- * leave the current inode->i_security pointer intact.
- * The inode will be freed after the RCU grace period too.
- */
-call_rcu(&isec->rcu, inode_free_rcu);
} }

static int file_alloc_security(struct file *file)
{
-struct file_security_struct *fsec;
+struct file_security_struct *fsec = selinux_file(file);
 u32 sid = current_sid();

-fsec = kmem_cache_zalloc(file_security_cache, GFP_KERNEL);
-if (!fsec)
-return -ENOMEM;

-fsec = kmem_cache_zalloc(file_security_cache, GFP_KERNEL);
-if (!fsec)
-return -ENOMEM;
fsec->sid = sid;
fsec->fown_sid = sid;
file->f_security = fsec;

return 0;
}

-static void file_free_security(struct file *file)
{
 struct file_security_struct *fsec = file->f_security;
 file->f_security = NULL;
kmem_cache_free(file_security_cache, fsec);
}

-static void file_free_security(struct file *file)
{
 struct file_security_struct *fsec = file->f_security;
 file->f_security = NULL;
kmem_cache_free(file_security_cache, fsec);
}

static int superblock_alloc_security(struct super_block *sb)
{
 struct superblock_security_struct *sbsec;

 sbsec = kzalloc(sizeof(struct superblock_security_struct), GFP_KERNEL);
 if (!sbsec)
 return -ENOMEM;

 mutex_init(&sbsec->lock);
 INIT_LIST_HEAD(&sbsec->isec_head);
 sbsec->sid = SECINITSID_UNLABELED;
 sbsec->def_sid = SECINITSID_FILE;
 sbsec->mntpoint_sid = SECINITSID_UNLABELED;
 sb->s_security = sbsec;

 return 0;
}

-static void superblock_free_security(struct super_block *sb)
{
 struct superblock_security_struct *sbsec = sb->s_security;
 sb->s_security = NULL;
kfree(sbsec);
}

-static inline int inode_doinit(struct inode *inode)
{
 return inode_doinit_with_dentry(inode, NULL);
}

struct superblock_security_struct *sbsec,
const struct cred *cred)
const struct task_security_struct *tsec = cred->security;
+const struct task_security_struct *tsec = selinux_cred(cred);
int rc;

rc = avc_has_perm(tsec->sid, sbsec->sid, SECCLASS_FILESYSTEM,
@@ -460,7 +407,7 @@
struct superblock_security_struct *sbsec,
 const struct cred *cred)
 {
-const struct task_security_struct *tsec = cred->security;
+const struct task_security_struct *tsec = selinux_cred(cred);
 int rc;
 rc = avc_has_perm(tsec->sid, sbsec->sid, SECCLASS_FILESYSTEM,
 FILESYSTEM__RELABELFROM, NULL);
@@ -472,16 +419,10 @@
 return rc;
 }

-static int selinux_is_sblabel_mnt(struct super_block *sb)
+static int selinux_is_genfs_special_handling(struct super_block *sb)
 { 
-struct superblock_security_struct *sbsec = sb->s_security;
-  
-  return sbsec->behavior == SECURITY_FS_USE_XATTR ||
-    sbsec->behavior == SECURITY_FS_USE_TRANS ||
-    sbsec->behavior == SECURITY_FS_USE_TASK ||
-    sbsec->behavior == SECURITY_FS_USE_NATIVE ||
-    /* Special handling. Genfs but also in-core setxattr handler */
-    !strcmp(sb->s_type->name, "sysfs") ||
+  /* Special handling. Genfs but also in-core setxattr handler */
+  !strcmp(sb->s_type->name, "sysfs") ||
+    !strcmp(sb->s_type->name, "pstore") ||
+    !strcmp(sb->s_type->name, "debugfs") ||
+    !strcmp(sb->s_type->name, "tracefs") ||
@@ -491,9 +432,37 @@
    !strcmp(sb->s_type->name, "cgroup2"));
 }

-static int selinux_is_sblabel_mnt(struct super_block *sb)
+static int selinux_is_genfs_special_handling(struct super_block *sb)
 { 
 struct superblock_security_struct *sbsec = sb->s_security;
 +
+/*
+ * IMPORTANT: Double-check logic in this function when adding a new
+ * SECURITY_FS_USE_* definition!
+ */

+BUILD_BUG_ON(SECURITY_FS_USE_MAX != 7);
+
+switch (sbsec->behavior) {
+case SECURITY_FS_USE_XATTR:
+case SECURITY_FS_USE_TRANS:
+case SECURITY_FS_USE_TASK:
+case SECURITY_FS_USE_NATIVE:
+return 1;
+
+case SECURITY_FS_USE_GENFS:
+return selinux_is_genfs_special_handling(sb);
+
+/* Never allow relabeling on context mounts */
+case SECURITY_FS_USE_MNTPOINT:
+case SECURITY_FS_USE_NONE:
+default:
+return 0;
+
+}
+
+static int sb_finish_set_opts(struct super_block *sb)
+
+
+struct superblock_security_struct *sbsec = selinux_superblock(sb);
+struct dentry *root = sb->s_root;
+struct inode *root_inode = d_backing_inode(root);
+int rc = 0;
@@ -576,7 +545,7 @@
+struct security_mnt_opts *opts)
+
+int rc = 0, i;
+struct superblock_security_struct *sbsec = selinux_superblock(sb);
+struct dentry *root = sb->s_root;
+struct inode *root_inode = d_backing_inode(root);
+int rc = 0;
@@ -576,7 +545,7 @@
    struct security_mnt_opts *opts)
    {
    int rc = 0, i;
-    struct superblock_security_struct *sbsec = sb->s_security;
+    struct superblock_security_struct *sbsec = selinux_superblock(sb);
    char *context = NULL;
    u32 len;
    char tmp;
@@ -639,7 +608,7 @@
    }
    if (sbsec->flags & ROOTCONTEXT_MNT) {
    struct dentry *root = sbsec->sb->s_root;
-    struct inode_security_struct *isec = backing_inode_security(root);
+    struct inode_security_struct *isec =
+    backing_inode_security(root);
    char *context = NULL;
    u32 len;
    char tmp;
@@ -639,7 +608,7 @@
    }
    if (sbsec->flags & ROOTCONTEXT_MNT) {
    struct dentry *root = sbsec->sb->s_root;
-    struct inode_security_struct *isec = backing_inode_security(root);
+    struct inode_security_struct *isec =
+    backing_inode_security(root);

    rc = security_sid_to_context(isec->sid, &context, &len);
    if (rc)
@@ -692,7 +662,7 @@
    }
    const struct cred *cred = current_cred();


int rc = 0, i;
-struct superblock_security_struct *sbsec = sb->s_security;
+struct superblock_security_struct *sbsec = selinux_superblock(sb);
const char *name = sb->s_type->name;
struct dentry *root = sbsec->sb->s_root;
struct inode_security_struct *root_isec;
@@ -943,8 +913,8 @@
static int selinux_cmp_sb_context(const struct super_block *oldsb,
    const struct super_block *newsb)
{
-struct superblock_security_struct *old = oldsb->s_security;
-struct superblock_security_struct *new = newsb->s_security;
+struct superblock_security_struct *old = selinux_superblock(oldsb);
+struct superblock_security_struct *new = selinux_superblock(newsb);
char oldflags = old->flags & SE_MNTMASK;
char newflags = new->flags & SE_MNTMASK;
@@ -976,8 +946,9 @@
unsigned long *set_kern_flags)
{
int rc = 0;
-const struct superblock_security_struct *oldsbsec = oldsb->s_security;
-struct superblock_security_struct *newsbsec = newsb->s_security;
+const struct superblock_security_struct *oldsbsec =
+    selinux_superblock(oldsb);
+struct superblock_security_struct *newsbsec = selinux_superblock(newsb);

int set_fscontext = (oldsbsec->flags & FSCONTEXT_MNT);
int set_context = (oldsbsec->flags & CONTEXT_MNT);
@@ -1001,8 +972,11 @@
BUG_ON(!(oldsbsec->flags & SE_SBINITIALIZED));

/* if fs is reusing a sb, make sure that the contexts match */
-if (newsbsec->flags & SE_SBINITIALIZED) {
+if (newsbsec->flags & SE_SBINITIALIZED) {
+    if ((kern_flags & SECURITY_LSM_NATIVE_LABELS) && !set_context)
+        *set_kern_flags |= SECURITY_LSM_NATIVE_LABELS;
+    return selinux_cmp_sb_context(oldsb, newsb);
+}

mutex_lock(&newsbsec->lock);
@@ -1030,14 +1004,17 @@
if (!set_fscontext)
    newsbsec->sid = sid;
if (!set_rootcontext) {
    -struct inode_security_struct *newisec = backing_inode_security(newsb->s_root);
+struct inode_security_struct *newisec =

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+backing_inode_security(newsb->s_root);
newisec->sid = sid;
}
newsbsec->mntpoint_sid = sid;
}
if (set_rootcontext) {
  const struct inode_security_struct *oldisec = backing_inode_security(oldsb->s_root);
  struct inode_security_struct *newisec = backing_inode_security(newsb->s_root);
  const struct inode_security_struct *oldisec =
    backing_inode_security(oldsb->s_root);
  struct inode_security_struct *newisec =
    backing_inode_security(newsb->s_root);

  newisec->sid = oldisec->sid;
}
@@ -1472,6 +1449,11 @@
}
rc = security_genfs_sid(sb->s_type->name, path, tclass, sid);
+if (rc == -ENOENT) {
+  /* No match in policy, mark as unlabeled. */
+  *sid = SECINITSID_UNLABELED;
+  rc = 0;
+}
}
free_page((unsigned long)buffer);
return rc;
@@ -1481,7 +1463,7 @@
static int inode_doinit_with_dentry(struct inode *inode, struct dentry *opt_dentry)
{
  struct superblock_security_struct *sbsec = NULL;
  struct inode_security_struct *isec = inode->i_security;
  u32 task_sid, sid = 0;
  u16 sclass;
  struct dentry *dentry;
  @@ -1500,7 +1482,7 @@
   if (isec->sclass == SECCLASS_FILE)
    isec->sclass = inode_mode_to_security_class(inode->i_mode);

   -sbsec = inode->i_sb->s_security;
   +sbsec = selinux_superblock(inode->i_sb);
   if (!isec->flags & SE_SBINITIALIZED) {
     /* Defer initialization until selinux_complete_init,
        after the initial policy is loaded and the security
     @@ -1532,8 +1514,15 @@
      /* Called from d_instantiate or d_splice_alias. */
      dentry = dget(opt_dentry);
} else {
  /* Called from selinux_complete_init, try to find a dentry. */
  +/*
  + * Called from selinux_complete_init, try to find a dentry.
  + * Some filesystems really want a connected one, so try
  + * that first. We could split SECURITY_FS_USE_XATTR in
  + * two, depending upon that...
  + */
  dentry = d_find_alias(inode);
  +if (!dentry)
  +dentry = d_find_any_alias(inode);
  }
  if (!dentry) {
  /*
@@ -1545,7 +1534,7 @@
  * inode_doinit with a dentry, before these inodes could
  * be used again by userspace.
  */
-  goto out;
+  goto out_invalid;
  }

  len = INITCONTEXTLEN;
  @@ -1636,14 +1625,19 @@
  if ((sbsec->flags & SE_SBGENFS) && !S_ISLNK(inode->i_mode)) {
    /* We must have a dentry to determine the label on
     * procfs inodes */
    -if (opt_dentry)
    +if (opt_dentry) {
    /* Called from d_instantiate or
     * d_splice_alias. */
    dentry = dget(opt_dentry);
    +else {
    +/* Called from selinux_complete_init, try to find a dentry. */
    + * find a dentry. Some filesystems really want
    + * a connected one, so try that first.
    + */
    +dentry = d_find_alias(inode);
    +if (!dentry)
    +dentry = d_find_any_alias(inode);
    +}
    /*
    * This can be hit on boot when a file is accessed
    * before the policy is loaded.  When we load policy we
    @@ -1654,7 +1648,7 @@
    * could be used again by userspace.

/*
if (!dentry)
+goto out_invalid;
rc = selinux_genfs_get_sid(dentry, sclass,
    sbsec->flags, &sid);
dput(dentry);
@@ -1667,11 +1661,10 @@
out:
spin_lock(&isec->lock);
if (isec->initialized == LABEL_PENDING) {  
    -if (!sid || rc) {
        isec->initialized = LABEL_INVALID;
goto out_unlock;
    }
    isec->initialized = LABEL_INITIALIZED;
    isec->sid = sid;
}  
@@ -1679,6 +1672,15 @@
out_unlock:
spin_unlock(&isec->lock);
return rc;
+
+out_invalid:
+spin_lock(&isec->lock);
+if (isec->initialized == LABEL_PENDING) {  
+    isec->initialized = LABEL_INVALID;
+    isec->sid = sid;
+}  
+spin_unlock(&isec->lock);
+return 0;
}

/* Convert a Linux signal to an access vector. */
@@ -1714,7 +1716,7 @@
/* Check whether a task is allowed to use a capability. */
static int cred_has_capability(const struct cred *cred,
    - int cap, int audit, bool initns)
    + int cap, unsigned int opts, bool initns)
{
    struct common_audit_data ad;
    struct av_decision avd;
    @@ -1741,7 +1743,7 @@

rc = avc_has_perm_noaudit(sid, sid, sclass, av, 0, &avd);
-if (audit == SECURITY_CAP_AUDIT) {
+if (!(opts & CAP_OPT_NOAUDIT)) {
    int rc2 = avc_audit(sid, sid, sclass, av, &avd, rc, &ad, 0);
    if (rc2)
        return rc2;
@@ -1766,7 +1768,7 @@
    return 0;

    sid = cred_sid(cred);
    -isec = inode->i_security;
-+isec = selinux_inode(inode);

    return avc_has_perm(sid, isec->sid, isec->sclass, perms, adp);
 }
@@ -1831,7 +1833,7 @@
 struct file *file,
     u32 av)
 {
-struct file_security_struct *fsec = file->f_security;
+struct file_security_struct *fsec = selinux_file(file);
    struct inode *inode = file_inode(file);
    struct common_audit_data ad;
    u32 sid = cred_sid(cred);
@@ -1873,7 +1875,8 @@
 const struct qstr *name, u16 tclass,
     u32 *_new_isid)
 {
-const struct superblock_security_struct *sbsec = dir->i_sb->s_security;
+const struct superblock_security_struct *sbsec =
+        selinux_superblock(dir->i_sb);

    if ((sbsec->flags & SE_SBINITIALIZED) &&
        (sbsec->behavior == SECURITY_FS_USE_MNTPOINT)) {
@@ -1895,7 +1898,7 @@
              struct dentry *dentry,
                 u16 tclass)
 {
-const struct task_security_struct *tsec = current_security();
+const struct task_security_struct *tsec = selinux_cred(current_cred());
    struct inode_security_struct *dsec;
    struct superblock_security_struct *sbsec;
    u32 sid, newsid;
@@ -1903,7 +1906,7 @@
        int rc;

        dsec = inode_security(dir);
-+sbsec = dir->i_sb->s_security;
+sbsec = selinux_superblock(dir->i_sb);

sid = tsec->sid;

@@ -1916,7 +1919,7 @@
    if (rc)
    return rc;

-rc = selinux_determine_inode_label(current_security(), dir,
+rc = selinux_determine_inode_label(selinux_cred(current_cred()), dir,
    &dentry->d_name, tclass, &newsid);
    if (rc)
    return rc;
@@ -2042,7 +2045,7 @@
 struct superblock_security_struct *sbsec;
 u32 sid = cred_sid(cred);

-sbsec = sb->s_security;
+sbsec = selinux_superblock(sb);
 return avc_has_perm(sid, sbsec->sid, SECCLASS_FILESYSTEM, perms, ad);
 }

@@ -2157,7 +2160,7 @@
 struct file *file)
 {
    u32 sid = task_sid(to);
-struct file_security_struct *fsec = file->f_security;
+struct file_security_struct *fsec = selinux_file(file);
    struct dentry *dentry = file->f_path.dentry;
    struct inode_security_struct *isec;
    struct common_audit_data ad;
@@ -2234,9 +2237,9 @@
 */

static int selinux_capable(const struct cred *cred, struct user_namespace *ns,
    - int cap, int audit)
    + int cap, unsigned int opts)
 {
    -return cred_has_capability(cred, cap, audit, ns == &init_user_ns);
    +return cred_has_capability(cred, cap, opts, ns == &init_user_ns);
 }

static int selinux_quotactl(int cmds, int type, int id, struct super_block *sb)
@@ -2307,7 +2310,7 @@
    int rc, cap_sys_admin = 0;

    rc = cred_has_capability(current_cred(), CAP_SYS_ADMIN,
- SECURITY_CAP_NOAUDIT, true);
+ CAP_OPT_NOAUDIT, true);
if (rc == 0)
cap_sys_admin = 1;

@@ -2335,7 +2338,7 @@
    const struct task_security_struct *new_tsec)
{
    int npn = (bprm->unsafe & LSM_UNSAFE_NO_NEW_PRIVS);
-   int nosuid = !mnt_may_suid(bprm->file->f_path.mnt);
+   int nosuid = path_nosuid(&bprm->file->f_path);
    int rc;
    u32 av;

@@ -2396,8 +2399,8 @@
if (bprm->called_set_creds)
    return 0;

-   old_tsec = current_security();
-   new_tsec = bprm->cred->security;
+   old_tsec = selinux_cred(current_cred());
+   new_tsec = selinux_cred(bprm->cred);
    isec = inode_security(inode);

    /* Default to the current task SID. */
@@ -2555,7 +2558,7 @@
    struct rlimit *rlim, *initrlim;
    int rc, i;

-   new_tsec = bprm->cred->security;
+   new_tsec = selinux_cred(bprm->cred);
    if (new_tsec->sid == new_tsec->osid)
        return;

@@ -2597,7 +2600,7 @@
    /*
     static void selinux_bprm_committed_creds(struct linux_binprm *bprm)
     {
-    const struct task_security_struct *tsec = current_security();
+    const struct task_security_struct *tsec = selinux_cred(current_cred());
        struct itimerval itimer;
        u32 osid, sid;
        int rc, i;
@@ -2647,11 +2650,6 @@
            return superblock_alloc_security(sb);
        }

        -static void selinux_sb_free_security(struct super_block *sb)
        -{

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- superblock_free_security(sb);
-
-
static inline int match_prefix(char *prefix, int plen, char *option, int olen)
{
    if (plen > olen)
        return -EINVAL;
    int rc, i, *flags;
    struct security_mnt_opts opts;
    char *secdata, **mount_options;
    - struct superblock_security_struct *sbsec = sb->s_security;
    + struct superblock_security_struct *sbsec = selinux_superblock(sb);
    if (!(sbsec->flags & SE_SBINITIALIZED))
        return 0;

    /* Allow all mounts performed by the kernel */
    - if (flags & MS_KERNMOUNT)
      + if (flags & (MS_KERNMOUNT | MS_SUBMOUNT))
        return 0;

    ad.type = LSM_AUDIT_DATA_DENTRY;
    u32 newsid;
    int rc;
    - rc = selinux_determine_inode_label(current_security(),
      + rc = selinux_determine_inode_label(selinux_cred(current_cred()),
          d_inode(dentry->d_parent), name,
          inode_mode_to_security_class(mode),
          &newsid);
    @ @ -2916,14 +2914,14 @ @
    int rc;
    struct task_security_struct *tsec;
    
    - rc = selinux_determine_inode_label(old->security,
      + rc = selinux_determine_inode_label(selinux_cred(old),
          d_inode(dentry->d_parent), name,
          inode_mode_to_security_class(mode),
          &newsid);
    if (rc)
        return rc;

    - tsec = new->security;
    + tsec = selinux_cred(new);
    tsec->create_sid = newsid;
return 0;
}
@@ -2933,17 +2931,17 @@
    const char **name,
    void **value, size_t *len)
{
-    const struct task_security_struct *tsec = current_security();
+    const struct task_security_struct *tsec = selinux_cred(current_cred());
    struct superblock_security_struct *sbsec;
    u32 newsid, clen;
    int rc;
    char *context;

    -sbsec = dir->i_sb->s_security;
+sbsec = selinux_superblock(dir->i_sb);

    newsid = tsec->create_sid;

    -rc = selinux_determine_inode_label(current_security(),
+rc = selinux_determine_inode_label(selinux_cred(current_cred()),
       dir, qstr,
       inode_mode_to_security_class(inode->i_mode),
       &newsid);
    @@ -2952,7 +2950,7 @@
       /* Possibly defer initialization to selinux_complete_init. */
       if (sbsec->flags & SE_SBINITIALIZED) {
       -struct inode_security_struct *isec = inode->i_security;
+struct inode_security_struct *isec = selinux_inode(inode);
         int rc;
         ad.type = LSM_AUDIT_DATA_INODE;
         @@ -3143,11 +3141,11 @@
             unsigned flags)
         }
         struct common_audit_data ad;
-struct inode_security_struct *isec = inode->i_security;
+struct inode_security_struct *isec = selinux_inode(inode);
         int rc;

         ad.type = LSM_AUDIT_DATA_INODE;
         @@ -3143,11 +3141,11 @@
         static bool has_cap_mac_admin(bool audit)
         {
             const struct cred *cred = current_cred();
-            int cap_audit = audit ? SECURITY_CAP_AUDIT : SECURITY_CAP_NOAUDIT;
+            unsigned int opts = audit ? CAP_OPT_NONE : CAP_OPT_NOAUDIT;
             ...
-if (cap_capable(cred, &init_user_ns, CAP_MAC_ADMIN, cap_audit))
+if (cap_capable(cred, &init_user_ns, CAP_MAC_ADMIN, opts))
    return false;
-if (cred_has_capability(cred, CAP_MAC_ADMIN, cap_audit, true))
+if (cred_has_capability(cred, CAP_MAC_ADMIN, opts, true))
    return false;
    return true;
}
@@ -3172,7 +3170,7 @@
return dentry_has_perm(current_cred(), dentry, FILE__SETATTR);
}

-sbsec = inode->i_sb->s_security;
+sbsec = selinux_superblock(inode->i_sb);
if (!(sbsec->flags & SBLABEL_MNT))
return -EOPNOTSUPP;
@@ -3344,12 +3342,16 @@
    const void *value, size_t size, int flags)
{
    struct inode_security_struct *isec = inode_security_novalidate(inode);
+    struct superblock_security_struct *sbsec = inode->i_sb->s_security;
    u32 newsid;
    int rc;

    if (strcmp(name, XATTR_SELINUX_SUFFIX))
    return -EOPNOTSUPP;
@@ -3391,7 +3393,7 @@
        +if (!(sbsec->flags & SBLABEL_MNT))
        +return -EOPNOTSUPP;
        +if (!value || !size)
        return -EACCES;

@@ -3432,7 +3434,7 @@
static int selinux_file_permission(struct file *file, int mask)
{
    struct inode *inode = file_inode(file);
-sfsec = new_creds->security;
+ssec = selinux_creds(new_creds);
    /* Get label from overlay inode and set it in create_sid */
    selinux_inode_getsecid(d_inode(src), &sid);
    ssec->create_sid = sid;
@@ -3432,7 +3434,7 @@
        struct inode *inode = file_inode(file);
        -struct file_security_struct *fsec = file->f_security;
        +struct file_security_struct *fsec = file->f_security;


struct file_security_struct *fsec = selinux_file(file);
struct inode_security_struct *isec;

u32 sid = current_sid();

@@ -3454,11 +3456,6 @@
 return file_alloc_security(file);
 }

- static void selinux_file_free_security(struct file *file)
- {
- file_free_security(file);
- }
- 
- /*
- * Check whether a task has the ioctl permission and cmd
- * operation to an inode.
- @@ -3467,7 +3464,7 @@
- u32 requested, u16 cmd)
- {
- struct common_audit_data ad;
- 
- struct file_security_struct *fsec = file->f_security;
+ struct file_security_struct *fsec = selinux_file(file);
- struct inode *inode = file_inode(file);
- struct inode_security_struct *isec;
- struct lsm_ioctlop_audit ioctl;
- @@ -3535,7 +3532,7 @@
- case KDSKBENT:
- case KDSKBSENT:
- error = cred_has_capability(cred, CAP_SYS_TTY_CONFIG,
- 
- SECURITY_CAP_AUDIT, true);
+ CAP_OPT_NONE, true);
 break;
 
 /* default case assumes that the command will go
 @@ -3713,7 +3710,7 @@
 { 
 struct file_security_struct *fsec;
 
-fsec = file->f_security;
+ fsec = selinux_file(file);
 fsec->fown_sid = current_sid();
 }

 @@ -3728,7 +3725,7 @@
 /* struct fown_struct is never outside the context of a struct file */
 file = container_of(fown, struct file, f_owner);

-fsec = file->f_security;

+fsec = selinux_file(file);

if (!signum)
    perm = signal_to_av(SIGIO); /* as per send_sigio_to_task */
@@ -3751,7 +3748,7 @@
struct file_security_struct *fsec;
struct inode_security_struct *isec;

-fsec = file->f_security;
+fsec = selinux_file(file);
isec = inode_security(file_inode(file));

/*
 * Save inode label and policy sequence number
 @@ -3784,52 +3781,16 @@
 }

 /*
 - * allocate the SELinux part of blank credentials
 - */
-static int selinux_cred_alloc_blank(struct cred *cred, gfp_t gfp)
-{  
-struct task_security_struct *tsec;
-
-tsec = kzalloc(sizeof(struct task_security_struct), gfp);
-if (!tsec)
-    return -ENOMEM;
-
-cred->security = tsec;
-return 0;
-}
-
-/*
 - * detach and free the LSM part of a set of credentials
 - */
-static void selinux_cred_free(struct cred *cred)
-{  
-struct task_security_struct *tsec = cred->security;
-
-/*
 - * cred->security == NULL if security_cred_alloc_blank() or
 - * security_prepare_creds() returned an error.
 - */
-BUG_ON(cred->security && (unsigned long) cred->security < PAGE_SIZE);
-cred->security = (void *) 0x7UL;
-kfree(tsec);
-}
-/*
* prepare a new set of credentials for modification
*/
static int selinux_cred_prepare(struct cred *new, const struct cred *old, gfp_t gfp)
{
    const struct task_security_struct *old_tsec;
    struct task_security_struct *tsec;
+
    const struct task_security_struct *old_tsec = selinux_cred(old);
    struct task_security_struct *tsec = selinux_cred(new);

    old_tsec = old->security;
    -
    -tsec = kmemdup(old_tsec, sizeof(struct task_security_struct), gfp);
    -if (!tsec)
    -return -ENOMEM;
    -*tsec = *old_tsec;

    -new->security = tsec;
    return 0;
}

@@ -3838,8 +3799,8 @@
*/
static void selinux_cred_transfer(struct cred *new, const struct cred *old)
{
    const struct task_security_struct *old_tsec = old->security;
    -struct task_security_struct *tsec = new->security;
    +const struct task_security_struct *old_tsec = selinux_cred(old);
    +struct task_security_struct *tsec = selinux_cred(new);

    -*tsec = *old_tsec;
}
@ @ -3850,7 +3811,7 @@
*/
static int selinux_kernel_act_as(struct cred *new, u32 secid)
{
    struct task_security_struct *tsec = new->security;
    +struct task_security_struct *tsec = selinux_cred(new);
    u32 sid = current_sid();
    int ret;

    @@ -3874,7 +3835,7 @@
static int selinux_kernel_create_files_as(struct cred *new, struct inode *inode)
{
    struct inode_security_struct *isec = inode_security(inode);
    -struct task_security_struct *tsec = new->security;
    +struct task_security_struct *tsec = selinux_cred(new);
    u32 sid = current_sid();

int ret;

@@ -3917,7 +3878,7 @@
    ad.type = LSM_AUDIT_DATA_FILE;
    ad.u.file = file;

    -fsec = file->f_security;
    +fsec = selinux_file(file);
    if (sid != fsec->sid) {
      rc = avc_has_perm(sid, fsec->sid, SECCLASS_FD, FD__USE, &ad);
    if (rc)
    @@ -4052,7 +4013,7 @@
      static void selinux_task_to_inode(struct task_struct *p,
        struct inode *inode)
        {
        -struct inode_security_struct *isec = inode->i_security;
        +struct inode_security_struct *isec = selinux_inode(inode);
        u32 sid = task_sid(p);

        spin_lock(&isec->lock);
        @@ -4338,7 +4299,7 @@
      static int sock_has_perm(struct sock *sk, u32 perms)
        {
        -struct sk_security_struct *sksec = sk->sk_security;
        +struct sk_security_struct *sksec = selinux_sock(sk);
        struct common_audit_data ad;
        struct lsm_network_audit net = {0,};

        @@ -4356,7 +4317,7 @@
      static int selinux_socket_create(int family, int type,
        int protocol, int kern)
        {
        -const struct task_security_struct *tsec = current_security();
        +const struct task_security_struct *tsec = selinux_cred(current_cred());
        u32 newsid;
        u16 secclass;
        int rc;
        @@ -4375,7 +4336,7 @@
      static int selinux_socket_post_create(struct socket *sock, int family,
        int type, int protocol, int kern)
        {
        -const struct task_security_struct *tsec = current_security();
        +const struct task_security_struct *tsec = selinux_cred(current_cred());
        struct inode_security_struct *iseq = inode_security_novalidate(SOCK_INODE(sock));
        struct sk_security_struct *sksec;
        u16 sclass = socket_type_to_security_class(family, type, protocol);
        @@ -4393,7 +4354,7 @@
isec->initialized = LABEL_INITIALIZED;

if (sock->sk) {
    sksec = sock->sk->sk_security;
    +sksec = selinux_sock(sock->sk);
    sksec->sclass = sclass;
    sksec->sid = sid;
    err = selinux_netlbl_socket_post_create(sock->sk, family);
    @@ -4424,7 +4385,7 @@
        family = sk->sk_family;
    if (family == PF_INET || family == PF_INET6) {
        char *addrp;
    -struct sk_security_struct *sksec = sk->sk_security;
    +struct sk_security_struct *sksec = selinux_sock(sk);
        struct common_audit_data ad;
        struct lsm_network_audit net = {0,};
        struct sockaddr_in *addr4 = NULL;
    @@ -4517,7 +4478,7 @@
      static int selinux_socket_connect(struct socket *sock, struct sockaddr *address, int addrlen)
    {
        struct sock *sk = sock->sk;
    -struct sk_security_struct *sksec = sk->sk_security;
    +struct sk_security_struct *sksec = selinux_sock(sk);
        int err;

        err = sock_has_perm(sk, SOCKET__CONNECT);
    @@ -4649,9 +4610,9 @@
    static int selinux_socket_unix_may_send(struct socket *sock, struct socket *other)
    {
        struct sk_security_struct *sksec_sock = sock->sk->sk_security;
    -struct sk_security_struct *sksec_other = other->sk_security;
    -struct sk_security_struct *sksec_new = newsk->sk_security;
    +struct sk_security_struct *sksec_sock = selinux_sock(sock);
    +struct sk_security_struct *sksec_other = selinux_sock(other);
    +struct sk_security_struct *sksec_new = selinux_sock(newsk);
        struct common_audit_data ad;
        struct lsm_network_audit net = {0,};
        int err;
    @@ -4682,8 +4643,8 @@
    static int selinux_socket_unix_may_send(struct socket *sock, struct socket *other)
    {
        struct sk_security_struct *ssec = sock->sk->sk_security;
    -struct sk_security_struct *osec = other->sk->sk_security;
    -struct sk_security_struct *ssec_new = newsk->sk->sk_security;
    +struct sk_security_struct *ssec_sock = selinux_sock(sock);
    +struct sk_security_struct *osec = selinux_sock(other);
        struct common_audit_data ad;
        struct lsm_network_audit net = {0,};
        int err;
    @@ -4682,8 +4643,8 @@

struct lsm_network_audit net = {0,};

@@ -4722,7 +4683,7 @@
     u16 family)
 {
     int err = 0;
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
 u32 sk_sid = sksec->sid;
 struct common_audit_data ad;
 struct lsm_network_audit net = {0,};
@@ -4754,7 +4715,7 @@
 static int selinux_socket_sock_rcv_skb(struct sock *sk, struct sk_buff *skb)
 {
     int err;
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
 u16 family = sk->sk_family;
 u32 sk_sid = sksec->sid;
 struct common_audit_data ad;
@@ -4820,13 +4781,15 @@
     return err;
 }

-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
 u16 family = sk->sk_family;
 u32 sk_sid = sksec->sid;
 struct common_audit_data ad;
@@ -4884,34 +4847,27 @@
 static int selinux_socket_getpeersec_stream(struct socket *sock, char __user *optval,
   - int __user *optlen, unsigned len)
+static int selinux_socket_getpeersec_stream(struct socket *sock,
+   + __user char *optval,
+   + __user int *optlen,
+   + unsigned int len)
 {
     int err = 0;
     char *scontext;
 u32 scontext_len;
-struct sk_security_struct *sksec = sock->sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sock->sk);
 u32 peer_sid = SECSID_NULL;

     if (sksec->sclass == SECCLASS_UNIX_STREAM_SOCKET ||
@@ -4884,34 +4847,27 @@
 static int selinux_sk_alloc_security(struct sock *sk, int family, gfp_t priority)
 {
     struct sk_security_struct *sksec;
     -
     -sksec = kzalloc(sizeof(*sksec), priority);
     -if (!sksec)
     -return -ENOMEM;

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struct sk_security_struct *sksec = selinux_sock(sk);

sksec->peer_sid = SECINITSID_UNLABELED;
sksec->sid = SECINITSID_UNLABELED;
sksec->sclass = SECCLASS_SOCKET;
selinux_netlbl_sk_security_reset(sksec);

return 0;
}

static void selinux_sk_free_security(struct sock *sk)
{
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);

-sk->sk_security = NULL;
selinux_netlbl_sk_security_free(sksec);
-kfree(sksec);
}

static void selinux_sk_clone_security(const struct sock *sk, struct sock *newsk)
{
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
+struct sk_security_struct *newsksec = selinux_sock(newsk);

newsksec->sid = sksec->sid;
newsksec->peer_sid = sksec->peer_sid;
@@ -4925,7 +4881,7 @@
if (!sk)
  *secid = SECINITSID_ANY_SOCKET;
else {
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);

  *secid = sksec->sid;
}
@@ -4935,7 +4891,7 @@

  struct inode_security_struct *isec =
    inode_security_novalidate(SOCK_INODE(parent));
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);

  if (sk->sk_family == PF_INET || sk->sk_family == PF_INET6 ||
    sk->sk_family == PF_UNIX)
static int selinux_inet_conn_request(struct sock *sk, struct sk_buff *skb, struct request_sock *req)
{
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
  int err;
  u16 family = req->rsk_ops->family;
  u32 connsid;
@@ -4967,7 +4923,7 @@
static void selinux_inet_csk_clone(struct sock *newsk, const struct request_sock *req)
{
-struct sk_security_struct *newsksec = newsk->sk_security;
+struct sk_security_struct *newsksec = selinux_sock(newsk);
  newsksec->sid = req->secid;
  newsksec->peer_sid = req->peer_secid;
@@ -4984,7 +4940,7 @@
static void selinux_inet_conn_established(struct sock *sk, struct sk_buff *skb)
{
  u16 family = sk->sk_family;
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
  /* handle mapped IPv4 packets arriving via IPv6 sockets */
  if (family == PF_INET6 && skb->protocol == htons(ETH_P_IP))
    {}
@@ -5064,7 +5020,7 @@
static int selinux_tun_dev_attach(struct sock *sk, void *security)
{
  struct tun_security_struct *tunsec = security;
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
  /* we don't currently perform any NetLabel based labeling here and it */
  /* isn't clear that we would want to do so anyway; while we could apply */
@@ -5100,39 +5056,59 @@
static int selinux_nlmsg_perm(struct sock *sk, struct sk_buff *skb)
{ int err = 0; u32 perm; +int rc = 0; +unsigned int msg_len; +unsigned int data_len = skb->len; +unsigned char *data = skb->data; struct nlmsghdr *nlh; -struct sk_security_struct *sksec = sk->sk_security; +struct sk_security_struct *sksec = selinux_sock(sk); +u16 sclass = sksec->sclass; +u32 perm;

-if (skb->len < NLMSG_HDRLEN) {
  -err = -EINVAL;
  -goto out;
  -}
  -nlh = nlmsg_hdr(skb);
  +while (data_len >= nlmsg_total_size(0)) {
    +nlh = (struct nlmsghdr *)data;
    -err = selinux_nlmsg_lookup(sksec->sclass, nlh->nlmsg_type, &perm);
    +if (err) {
      +if (err == -EINVAL) {
        +/* NOTE: the nlmsg_len field isn’t reliably set by some netlink
        + * users which means we can’t reject skb’s with bogus
        + * length fields; our solution is to follow what
        + * netlink_rcv_skb() does and simply skip processing at
        + * messages with length fields that are clearly junk
        + */
        +if (nlh->nlmsg_len < NLMSG_HDRLEN || nlh->nlmsg_len > data_len)
          +return 0;
          +
          +rc = selinux_nlmsg_lookup(sclass, nlh->nlmsg_type, &perm);
          +if (rc == 0) {
            +rc = sock_has_perm(sk, perm);
            +if (rc)
              +return rc;
          } else if (rc == -EINVAL) {
            +/* -EINVAL is a missing msg/perm mapping */
            +pr_warn_ratelimited("SELinux: unrecognized netlink"
              +" message: protocol=%hu nlmsg_type=%hu sclass=%s"
              +" pig=%d comm=%s\n",
              +sk->sk_protocol, nlh->nlmsg_type,
              +secclass_map[sksec->sclass - 1].name,
              +task_pid_nr(current), current->comm);
            -if (!selinux_enforcing || security_get_allow_unknown())
              -err = 0;
+" message: protocol=%hu nlmsg_type=%hu sclass=%s"
+		+" pid=%d comm=%s"
+		+secclass_map[sclass - 1].name,
+		+task_pid_nr(current), current->comm);
+if (selinux_enforcing && !security_get_allow_unknown())
+return rc;
+rc = 0;
+} else if (rc == -ENOENT) {
+/* -ENOENT is a missing socket/class mapping, ignore */
+rc = 0;
+} else {
+return rc;
}

-/* Ignore */
-if (err == -ENOENT)
-err = 0;
-goto out;
+/* move to the next message after applying netlink padding */
+msg_len = NLMSG_ALIGN(nlh->nlmsg_len);
+if (msg_len >= data_len)
+return 0;
+data_len -= msg_len;
+data += msg_len;
}

-err = sock_has_perm(sk, perm);
-out:
-return err;
+return rc;
}

#ifdef CONFIG_NETFILTER
@@ -5242,7 +5218,7 @@
return NF_ACCEPT;

/* standard practice, label using the parent socket */
-sksec = sk->sk_security;
+sksec = selinux_sock(sk);
-sid = sksec->sid;
 } else
 sid = SECINITSID_KERNEL;
@@ -5281,7 +5257,7 @@
if (sk == NULL)
 return NF_ACCEPT;
-sksec = sk->sk_security;
+sksec = selinux_sock(sk);

ad.type = LSM_AUDIT_DATA_NET;
ad.u.net = &net;
@ @ -5372,7 +5348,7 @@
u32 skb_sid;
struct sk_security_struct *sksec;

-sksec = sk->sk_security;
+sksec = selinux_sock(sk);
if (selinux_skb_peerlbl_sid(skb, family, &skb_sid))
return NF_DROP;
/* At this point, if the returned skb peerlbl is SECSID_NULL
@ @ -5401,7 +5377,7 @@
} else {
/* Locally generated packet, fetch the security label from the
 * associated socket. */
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
peer_sid = sksec->sid;
secmark_perm = PACKET__SEND;
}
@ @ -5461,51 +5437,22 @@
return selinux_nlmsg_perm(sk, skb);
}

-static int ipc_alloc_security(struct kern_ipc_perm *perm,
-    u16 sclass)
+static void ipc_init_security(struct ipc_security_struct *isec, u16 sclass)
{ }
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
peer_sid = sksec->sid;
secmark_perm = PACKET__SEND;
}
@ @ -5461,51 +5437,22 @@
return selinux_nlmsg_perm(sk, skb);
}

-static int ipc_alloc_security(struct kern_ipc_perm *perm,
-    u16 sclass)
+static void ipc_init_security(struct ipc_security_struct *isec, u16 sclass)
{ }
-struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
peer_sid = sksec->sid;
secmark_perm = PACKET__SEND;
}
@ @ -5461,51 +5437,22 @@
return selinux_nlmsg_perm(sk, skb);
}

-static int ipc_alloc_security(struct kern_ipc_perm *perm,
static int msg_msg_alloc_security(struct msg_msg *msg)
{
struct msg_security_struct *msec;

- msec = kzalloc(sizeof(struct msg_security_struct), GFP_KERNEL);
- if (!msec)
- return -ENOMEM;
-
+ msec = selinux_msg_msg(msg);
msec->sid = SECINITSID_UNLABELED;
- msg->security = msec;

return 0;
}

-static void msg_msg_free_security(struct msg_msg *msg)
-{
-struct msg_security_struct *msec = msg->security;
-
- msg->security = NULL;
-kfree(msec);
-}
-
static int ipc_has_perm(struct kern_ipc_perm *ipc_perms,
u32 perms)
{
@@ -5513,7 +5460,7 @@
struct common_audit_data ad;
u32 sid = current_sid();

- isec = ipc_perms->security;
+ isec = selinux_ipc(ipc_perms);

ad.type = LSM_AUDIT_DATA_IPC;
ad.u.ipc_id = ipc_perms->key;
@@ -5526,11 +5473,6 @@
return msg_msg_alloc_security(msg);
}

-static void selinux_msg_msg_free_security(struct msg_msg *msg)
-{
- msg_msg_free_security(msg);
-}
-
- /* message queue security operations */
static int selinux_msg_queue_alloc_security(struct msg_queue *msq)
```c
// Side effects to be handled by system administrator.

int
rc = ipc_alloc_security(&msq->q_perm, SECCLASS_MSGQ);
if (rc)
    return rc;

isec = msq->q_perm.security;
+isec = selinux_ipc(&msq->q_perm);
+ipc_init_security(isec, SECCLASS_MSGQ);

ad.type = LSM_AUDIT_DATA_IPC;
ad.u.ipc_id = msq->q_perm.key;

rc = avc_has_perm(sid, isec->sid, SECCLASS_MSGQ, 
                     MSGQ__CREATE, &ad);
    if (rc) {
        ipc_free_security(&msq->q_perm);
        return rc;
    }
    return 0;

static void
selinux_msg_queue_free_security(struct msg_queue *msq)
{
    ipc_free_security(&msq->q_perm);
}

static int
selinux_msg_queue_associate(struct msg_queue *msq, int msqflg)
{
    u32 sid = current_sid();

    isec = msq->q_perm.security;
    +isec = selinux_ipc(&msq->q_perm);

    ad.type = LSM_AUDIT_DATA_IPC;
ad.u.ipc_id = msq->q_perm.key;
    @ @ -5614,8 +5544,8 @@
    u32 sid = current_sid();
    int rc;

    -isec = msq->q_perm.security;
    -msec = msg->security;
    +isec = selinux_ipc(&msq->q_perm);
```
+msec = selinux_msg_msg(msg);

/*
 * First time through, need to assign label to the message
@@ -5659,8 +5589,8 @@
    u32 sid = task_sid(target);
    int rc;

    -isec = msq->q_perm.security;
-    msec = msg->security;
+    isec = selinux_ipc(&msq->q_perm);
+    msec = selinux_msg_msg(msg);

    ad.type = LSM_AUDIT_DATA_IPC;
    ad.u.ipc_id = msq->q_perm.key;
@@ -5681,27 +5611,15 @@
    u32 sid = current_sid();
    int rc;

    -rc = ipc_alloc_security(&shp->shm_perm, SECCLASS_SHM);
-    if (rc)
-        -return rc;
-    -isec = shp->shm_perm.security;
+    isec = selinux_ipc(&shp->shm_perm);
+    ipc_init_security(isec, SECCLASS_SHM);

    ad.type = LSM_AUDIT_DATA_IPC;
    ad.u.ipc_id = shp->shm_perm.key;

    rc = avc_has_perm(sid, isec->sid, SECCLASS_SHM,
        SHM__CREATE, &ad);
-    if (rc) {
-        ipc_free_security(&shp->shm_perm);
-        return rc;
-    }
-    return 0;
-
-    static void selinux_shm_free_security(struct shmid_kernel *shp)
-    {
-        ipc_free_security(&shp->shm_perm);
+        +return rc;
    }

static int selinux_shm_associate(struct shmid_kernel *shp, int shmflg)
@@ -5710,7 +5628,7 @@
    struct common_audit_data ad;
u32 sid = current_sid();

 -isec = shp->shm_perm.security;
 +isec = selinux_ipc(&shp->shm_perm);

ad.type = LSM_AUDIT_DATA_IPC;
ad.u.ipc_id = shp->shm_perm.key;
@@ -5774,27 +5692,15 @@
 u32 sid = current_sid();
 int rc;

 -rc = ipc_alloc_security(&sma->sem_perm, SECCLASS_SEM);
-if (rc)
 -return rc;
-
 -isec = sma->sem_perm.security;
 +isec = selinux_ipc(&sma->sem_perm);
 +ipc_init_security(isec, SECCLASS_SEM);

ad.type = LSM_AUDIT_DATA_IPC;
ad.u.ipc_id = sma->sem_perm.key;

rc = avc_has_perm(sid, isec->sid, SECCLASS_SEM,
        SEM__CREATE, &ad);
-if (rc) {
 -ipc_free_security(&sma->sem_perm);
 -return rc;
 -}
 -return 0;
-
-
-static void selinux_sem_free_security(struct sem_array *sma)
 -{
 -ipc_free_security(&sma->sem_perm);
 +return rc;
 }

static int selinux_sem_associate(struct sem_array *sma, int semflg)
@@ -5803,7 +5792,7 @@
 struct common_audit_data ad;
 u32 sid = current_sid();

 -isec = sma->sem_perm.security;
 +isec = selinux_ipc(&sma->sem_perm);

ad.type = LSM_AUDIT_DATA_IPC;
ad.u.ipc_id = sma->sem_perm.key;
@@ -5886,7 +5792,7 @@
static void selinux_ipc_getsecid(struct kern_ipc_perm *ipcp, u32 *secid) {
    struct ipc_security_struct *isec = ipcp->security;
    struct ipc_security_struct *isec = selinux_ipc(ipcp);
    *secid = isec->sid;
}

unsigned len;
rcu_read_lock();
__tsec = __task_cred(p)->security;
__tsec = selinux_cred(__task_cred(p));

if (current != p) {
    error = avc_has_perm(current_sid(), __tsec->sid,
                          -tsec = new->security;
    if (!strcmp(name, "exec")) {
        tsec->exec_sid = sid;
    } else if (!strcmp(name, "fscreate")) {

static void selinux_inode_invalidate_secctx(struct inode *inode) {
    struct inode_security_struct *isec = inode->i_security;
    struct inode_security_struct *isec = selinux_inode(inode);

    spin_lock(&isec->lock);
    isec->initialized = LABEL_INVALID;
    /*
      static int selinux_inode_notifysecctx(struct inode *inode, void *ctx, u32 ctxlen)
      {
        return selinux_inode_setsecurity(inode, XATTR_SELINUX_SUFFIX, ctx, ctxlen, 0);
        int rc = selinux_inode_setsecurity(inode, XATTR_SELINUX_SUFFIX, ctx, ctxlen, 0);
        */
        /* Do not return error when suppressing label (SBLABEL_MNT not set). */
        +return rc == -EOPNOTSUPP ? 0 : rc;
    }
/*
    @@ -6135,30 +6044,17 @@
*/
unsigned long flags)
{
    const struct task_security_struct *tsec;
    struct key_security_struct *ksec;

    ksec = kzalloc(sizeof(struct key_security_struct), GFP_KERNEL);
    if (!ksec)
        return -ENOMEM;
    struct key_security_struct *ksec = selinux_key(k);

    tsec = cred->security;
    +tsec = selinux_cred(cred);
    if (tsec->keycreate_sid)
        ksec->sid = tsec->keycreate_sid;
    else
        ksec->sid = tsec->sid;

    -k->security = ksec;
    return 0;
}

-static void selinux_key_free(struct key *k)
-{  
    struct key_security_struct *ksec = k->security;
    
    -k->security = NULL;
    -kfree(ksec);
    -}

static int selinux_key_permission(key_ref_t key_ref,  
    const struct cred *cred,  
    unsigned perm)
@@ -6176,14 +6072,14 @@
    sid = cred_sid(cred);

    key = key_ref_to_ptr(key_ref);
    -ksec = key->security;
    +ksec = selinux_key(key);

    return avc_has_perm(sid, ksec->sid, SECCLASS_KEY, perm, NULL);
}

static int selinux_key_getsecurity(struct key *key, char **_buffer)
{
    struct key_security_struct *ksec = key->security;
    +struct key_security_struct *ksec = selinux_key(key);
    char *context = NULL;
    unsigned len;
int rc;
@@ -6393,6 +6289,19 @@
} #endif

+struct lsm_blob_sizes selinux_blob_sizes = {
+ .lbs_cred = sizeof(struct task_security_struct),
+ .lbs_file = sizeof(struct file_security_struct),
+ .lbs_inode = sizeof(struct inode_security_struct),
+ .lbs_ipc = sizeof(struct ipc_security_struct),
+ #ifdef CONFIG_KEYS
+ .lbs_key = sizeof(struct key_security_struct),
+ #endif /* CONFIG_KEYS */
+ .lbs_msg_msg = sizeof(struct msg_security_struct),
+ .lbs_sock = sizeof(struct sk_security_struct),
+ .lbs_superblock = sizeof(struct superblock_security_struct),
+);
+
static struct security_hook_list selinux_hooks[] __lsm_ro_after_init = {
   LSM_HOOK_INIT(binder_set_context_mgr, selinux_binder_set_context_mgr),
   LSM_HOOK_INIT(binder_transaction, selinux_binder_transaction),
@@ -6416,7 +6325,6 @@
   LSM_HOOK_INIT(bprm_committed_creds, selinux_bprm_committed_creds),
   LSM_HOOK_INIT(sb_alloc_security, selinux_sb_alloc_security),
   -LSM_HOOK_INIT(sb_free_security, selinux_sb_free_security),
   LSM_HOOK_INIT(sb_copy_data, selinux_sb_copy_data),
   LSM_HOOK_INIT(sb_remount, selinux_sb_remount),
   LSM_HOOK_INIT(sb_kern_mount, selinux_sb_kern_mount),
@@ -6461,7 +6369,6 @@
   LSM_HOOK_INIT(file_permission, selinux_file_permission),
   LSM_HOOK_INIT(file_alloc_security, selinux_file_alloc_security),
   -LSM_HOOK_INIT(file_free_security, selinux_file_free_security),
   LSM_HOOK_INIT(file_ioctl, selinux_file_ioctl),
   LSM_HOOK_INIT(mmap_file, selinux_mmap_file),
   LSM_HOOK_INIT(mmap_addr, selinux_mmap_addr),
@@ -6475,8 +6382,6 @@
   LSM_HOOK_INIT(file_open, selinux_file_open),
   LSM_HOOK_INIT(task_alloc, selinux_task_alloc),
   -LSM_HOOK_INIT(cred_alloc_blank, selinux_cred_alloc_blank),
   -LSM_HOOK_INIT(cred_free, selinux_cred_free),
   LSM_HOOK_INIT(cred_prepare, selinux_cred_prepare),
   LSM_HOOK_INIT(cred_transfer, selinux_cred_transfer),
   LSM_HOOK_INIT(kernel_act_as, selinux_kernel_act_as),
@@ -6502,24 +6407,20 @@
   LSM_HOOK_INIT(ipc_getsecid, selinux_ipc_getsecid),

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LSM_HOOK_INIT(msg_msg_alloc_security, selinux_msg_msg_alloc_security),
-LSM_HOOK_INIT(msg_msg_free_security, selinux_msg_msg_free_security),
LSM_HOOK_INIT(msg_queue_alloc_security,
    selinux_msg_queue_alloc_security),
-LSM_HOOK_INIT(msg_queue_free_security, selinux_msg_queue_free_security),
LSM_HOOK_INIT(msg_queue_associate, selinux_msg_queue_associate),
LSM_HOOK_INIT(msg_queue_msgctl, selinux_msg_queue_msgctl),
LSM_HOOK_INIT(msg_queue_msgsnd, selinux_msg_queue_msgsnd),
LSM_HOOK_INIT(msg_queue_msgrcv, selinux_msg_queue_msgrcv),

LSM_HOOK_INIT(shm_alloc_security, selinux_shm_alloc_security),
-LSM_HOOK_INIT(shm_free_security, selinux_shm_free_security),
LSM_HOOK_INIT(shm_associate, selinux_shm_associate),
LSM_HOOK_INIT(shm_shmctl, selinux_shm_shmctl),
LSM_HOOK_INIT(shm_shmat, selinux_shm_shmat),

LSM_HOOK_INIT(sem_alloc_security, selinux_sem_alloc_security),
-LSM_HOOK_INIT(sem_free_security, selinux_sem_free_security),
LSM_HOOK_INIT(sem_associate, selinux_sem_associate),
LSM_HOOK_INIT(sem_shmctl, selinux_sem_shmctl),
LSM_HOOK_INIT(sem_shmat, selinux-sem_shmat),

#ifdef CONFIG_KEYS
LSM_HOOK_INIT(key_alloc, selinux_key_alloc),
-LSM_HOOK_INIT(key_free, selinux_key_free),
LSM_HOOK_INIT(key_permission, selinux_key_permission),
LSM_HOOK_INIT(key_getsecurity, selinux_key_getsecurity),
#endif

static __init int selinux_init(void)
{
    if (!security_module_enable("selinux")) {
        static int finish;
        +
        +if (!security_module_enable("selinux",
            +IS_ENABLED(CONFIG_SECURITY_SELINUX.Stacked))) {
            selinux_enabled = 0;
            return 0;
        }
    }

    +if (!finish) {
        +security_add_blobs(&selinux_blob_sizes);
        +finish = 1;
        +return 0;
    }
if (!selinux_enabled) {
    printk(KERN_INFO "SELinux: Disabled at boot.\n");
    return 0;
}

default_noexec = !(VM_DATA_DEFAULT_FLAGS & VM_EXEC);

-sel_inode_cache = kmem_cache_create("selinux_inode_security",
    sizeof(struct inode_security_struct),
    0, SLAB_PANIC, NULL);
-file_security_cache = kmem_cache_create("selinux_file_security",
    sizeof(struct file_security_struct),
    0, SLAB_PANIC, NULL);

security_add_hooks(selinux_hooks, ARRAY_SIZE(selinux_hooks), "selinux");

new = kzalloc(sizeof(*new), GFP_ATOMIC);
@if (!new) {
    ret = -ENOMEM;
go to out;
+
} new->psec.subnet_prefix = subnet_prefix;
new->psec.pkey = pkey_num;

#define COMMON_FILE_SOCK_PERMS "ioctl", "read", "write", "create", "getattr", "setattr", "lock", "relabelfrom", "relabelto", "append", "map"
include <linux/msg.h>
#include <net/sock.h>
#include <net/net_namespace.h>
#include "flask.h"
#include "avc.h"
@@ -56,10 +59,7 @@
  struct inode_security_struct {
    struct inode *inode;/* back pointer to inode object */
    -union {
    -  struct list_head list;/* list of inode_security_struct */
    -  struct rcu_head rcu;/* for freeing the inode_security_struct */
    -};
    + struct list_head list;/* list of inode_security_struct */
    u32 task_sid;/* SID of creating task */
    u32 sid;/* SID of this object */
    u16 sclass;/* security class of this object */
@@ -155,5 +155,84 @@
  }
  }
  }
extern unsigned int selinux_checkreqprot;
+extern struct lsm_blob_sizes selinux_blob_sizes;
  +
  +static inline struct task_security_struct *selinux_cred(const struct cred *cred)
  +{
  +#ifdef CONFIG_SECURITY_STACKING
  +return cred->security + selinux_blob_sizes.lbs_cred;
  +#else
  +return cred->security;
  +#endif
  +}
  +
  +static inline struct file_security_struct *selinux_file(const struct file *file)
  +{
  +#ifdef CONFIG_SECURITY_STACKING
  +return file->f_security + selinux_blob_sizes.lbs_file;
  +#else
  +return file->f_security;
  +#endif
  +}
  +
  +static inline struct inode_security_struct *selinux_inode(const struct inode *inode)
  +{
  +#ifdef CONFIG_SECURITY_STACKING
  +return inode->i_security + selinux_blob_sizes.lbs_inode;
  +#else
  +return inode->i_security;
static inline struct superblock_security_struct *selinux_superblock(const struct super_block *superblock)
{
#ifdef CONFIG_SECURITY_STACKING
    return superblock->s_security + selinux_blob_sizes.lbs_superblock;
#else
    return superblock->s_security;
#endif
}

static inline struct msg_security_struct *selinux_msg_msg(const struct msg_msg *msg_msg)
{
#ifdef CONFIG_SECURITY_STACKING
    return msg_msg->security + selinux_blob_sizes.lbs_msg_msg;
#else
    return msg_msg->security;
#endif
}

static inline struct ipc_security_struct *selinux_ipc(const struct kern_ipc_perm *ipc)
{
#ifdef CONFIG_SECURITY_STACKING
    return ipc->security + selinux_blob_sizes.lbs_ipc;
#else
    return ipc->security;
#endif
}

#ifdef CONFIG_KEYS
static inline struct key_security_struct *selinux_key(const struct key *key)
{
#ifdef CONFIG_SECURITY_STACKING
    return key->security + selinux_blob_sizes.lbs_key;
#else
    return key->security;
#endif
}
#endif /* CONFIG_KEYS */

static inline struct sk_security_struct *selinux_sock(const struct sock *sock)
{
#ifdef CONFIG_SECURITY_STACKING
    return sock->sk_security + selinux_blob_sizes.lbs_sock;
#else
    return sock->sk_security;
#endif
}

/* CONFIG_KEYS */

+static inline struct superblock_security_struct *selinux_superblock(const struct super_block *superblock)
+{  
+   +#ifdef CONFIG_SECURITY_STACKING
+   return superblock->s_security + selinux_blob_sizes.lbs_superblock;
+>#else
+   return superblock->s_security;
+>#endif
+}
+
+static inline struct msg_security_struct *selinux_msg_msg(const struct msg_msg *msg_msg)
+{  
+   +#ifdef CONFIG_SECURITY_STACKING
+   return msg_msg->security + selinux_blob_sizes.lbs_msg_msg;
+#else
+   return msg_msg->security;
+>#endif
+}
+
+static inline struct ipc_security_struct *selinux_ipc(const struct kern_ipc_perm *ipc)
+{  
+   +#ifdef CONFIG_SECURITY_STACKING
+   return ipc->security + selinux_blob_sizes.lbs_ipc;
+#else
+   return ipc->security;
+>#endif
+}
+
+/* CONFIG_KEYS */
+
+static inline struct superblock_security_struct *selinux_superblock(const struct super_block *superblock)
+{  
+   +#ifdef CONFIG_SECURITY_STACKING
+   return superblock->s_security + selinux_blob_sizes.lbs_superblock;
+#else
+   return superblock->s_security;
+>#endif
+}
+
+static inline struct msg_security_struct *selinux_msg_msg(const struct msg_msg *msg_msg)
+{  
+   +#ifdef CONFIG_SECURITY_STACKING
+   return msg_msg->security + selinux_blob_sizes.lbs_msg_msg;
+#else
+   return msg_msg->security;
+>#endif
+}

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+}  #endif /* _SELINUX_OBJSEC_H_ */
--- linux-4.15.0.orig/security/selinux/netlabel.c
+++ linux-4.15.0/security/selinux/netlabel.c
@@ -32,6 +32,7 @@
 #include <linux/gfp.h>
 #include <linux/ip.h>
 #include <linux/ipv6.h>
+  #include <linux/lsm_hooks.h>
 #include <net/sock.h>
 #include <net/netlabel.h>
 #include <net/ip.h>
@@ -82,7 +83,7 @@
 static struct netlbl_lsm_secattr *selinux_netlbl_sock_genattr(struct sock *sk)
 {
   int rc;
-  struct sk_security_struct *sksec = sk->sk_security;
+  struct sk_security_struct *sksec = selinux_sock(sk);
   struct netlbl_lsm_secattr *secattr;
   if (sksec->nlbl_secattr != NULL)
     return sock->sk_security;
+}  #endif

static struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
struct netlbl_lsm_secattr *secattr = sksec->nlbl_secattr;
if (secattr == NULL)

static struct netlbl_lsm_secattr *selinux_netlbl_sock_getattr(struct sock *sk, u32 sid)
{
  -struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
  struct netlbl_lsm_secattr *secattr = sksec->nlbl_secattr;

  if (secattr == NULL)
    return 0;
  sk = skb_to_full_sk(skb);
  if (sk != NULL) {
    -struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
    struct netlbl_lsm_secattr *secattr = sksec->nlbl_secattr;

    if (secattr == NULL)
      return 0;
    secattr = selinux_netlbl_sock_getattr(sk, sid);
  }

 void selinux_netlbl_inet_csk_clone(struct sock *sk, u16 family)
{
  -struct sk_security_struct *sksec = sk->sk_security;

  /* being labeled by it's parent socket, if it is just exit */
  sk = skb_to_full_sk(skb);
  if (sk != NULL) {
    -struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
    struct netlbl_lsm_secattr *secattr = sksec->nlbl_secattr;

    if (secattr == NULL)
      return 0;
    secattr = selinux_netlbl_sock_getattr(sk, sid);
  }

}
+struct sk_security_struct *sksec = selinux_sock(sk);

if (family == PF_INET)
    sksec->nlbl_state = NLBL_LABELED;

int selinux_netlbl_socket_post_create(struct sock *sk, u16 family)
{
    int rc;
    -struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
    struct netlbl_lsm_secattr *secattr;

    if (family != PF_INET && family != PF_INET6)
    {
        int rc = 0;
        struct sock *sk = sock->sk;
        -struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
        struct netlbl_lsm_secattr secattr;

        if (selinux_netlbl_option(level, optname) &&
            @ -482,7 +483,7 @@
        int selinux_netlbl_socket_connect(struct sock *sk, struct sockaddr *addr)
        {
            int rc;
            -struct sk_security_struct *sksec = sk->sk_security;
+struct sk_security_struct *sksec = selinux_sock(sk);
            struct netlbl_lsm_secattr *secattr;

        if (sksec->nlbl_state != NLBL_REQSKB &&
        --- linux-4.15.0.orig/security/selinux/selinuxfs.c
        +++ linux-4.15.0/security/selinux/selinuxfs.c
        @ -30,6 +30,7 @@
        #include <linux/uaccess.h>
        #include <linux/kobject.h>
        #include <linux/ctype.h>
        +#include <linux/lsm_hooks.h>

        /* selinuxfs pseudo filesystem for exporting the security policy API.
         * Based on the proc code and the fs/nfsd/nfsctl.c code. */
        @ -1291,15 +1292,20 @@

        ret = -ENOMEM;
        inode = sel_make_inode(dir->d_sb, S_IFREG | S_IRUGO | S_IWUSR);
        -if (!inode)
+if (!inode) {
            dput(dentry);
goto out;
+
}

ret = -ENAMETOOLONG;
len = snprintf(page, PAGE_SIZE, "/%s/%s", BOOL_DIR_NAME, names[i]);
-if (len >= PAGE_SIZE)
+if (len >= PAGE_SIZE) {
+dput(dentry);
+iput(inode);
goto out;
+
}

-sec = (struct inode_security_struct *)inode->i_security;
+sec = (struct inode_security_struct *)selinux_inode(inode);
ret = security_genfs_sid("selinuxfs", page, SECLASS_FILE, &sid);
if (ret) {
pr_warn_ratelimited("SELinux: no sid found, defaulting to security isid for %s\n",
@@ -1425,6 +1431,7 @@ @
*idx = cpu + 1;
return &per_cpu(avc_cache_stats, cpu);
}
+(*idx)++;
return NULL;
}

@@ -1505,8 +1512,10 @@ @
return -ENOMEM;

inode = sel_make_inode(dir->d_sb, S_IFREG|files[i].mode);
-if (!inode)
+if (!inode) {
+dput(dentry);
return -ENOMEM;
+
}

inode->i_fop = files[i].ops;
inode->i_ino = ++sel_last_ino;
@@ -1550,8 +1559,10 @@ @
return -ENOMEM;

inode = sel_make_inode(dir->d_sb, S_IFREG|S_IRUGO);
-if (!inode)
+if (!inode) {
+dput(dentry);
return -ENOMEM;
+
}

inode->i_fop = &sel_initcon_ops;
inode->i_ino = i|SEL_INITCON_INO_OFFSET;
@@ -1649,8 +1660,10 @@
 rc = -ENOMEM;
inode = sel_make_inode(dir->d_sb, S_IFREG|S_IRUGO);
-    if (!inode)
-        dput(dentry);
+    if (!inode) {
+        dput(dentry);
        goto out;
+    }

    inode->i_fop = &sel_perm_ops;
    /* i+1 since perm values are 1-indexed */
@@ -1677,8 +1690,10 @@
 return -ENOMEM;
 inode = sel_make_inode(dir->d_sb, S_IFREG|S_IRUGO);
-    if (!inode)
-        dput(dentry);
+    if (!inode) {
+        dput(dentry);
        return -ENOMEM;
+    }

    inode->i_fop = &sel_class_ops;
    inode->i_ino = sel_class_to_ino(index);
@@ -1751,8 +1766,10 @@
 return -ENOMEM;
 inode = sel_make_inode(policycap_dir->d_sb, S_IFREG | S_IRUGO);
-    if (inode == NULL)
-        dput(dentry);
+    if (inode == NULL) {
+        dput(dentry);
        return -ENOMEM;
+    }

    inode->i_fop = &sel_policycap_ops;
    inode->i_ino = iter | SEL_POLICYCAP_INO_OFFSET;
@@ -1836,11 +1853,13 @@
 ret = -ENOMEM;
 inode = sel_make_inode(sb, S_IFCHR | S_IRUGO | S_IWUGO);
-    if (!inode)
-        dput(dentry);
+    if (!inode) {
+        dput(dentry);
        goto err;
+    }

    inode->i_ino = ++sel_last_ino;
isec = (struct inode_security_struct *)inode->i_security;
+isec = (struct inode_security_struct *)selinux_inode(inode);
isec->sid = SECINITSID_DEVNULL;
isecl->sclass = SECCLASS_CHR_FILE;
isec->initialized = LABEL_INITIALIZED;
--- linux-4.15.0.orig/security/selinux/ss/policydb.c
+++ linux-4.15.0/security/selinux/ss/policydb.c
@@ -275,6 +275,8 @@
 return v;
 }
+static int (*destroy_f[SYM_NUM]) (void *key, void *datum, void *datap);
+
+/*
 * Initialize a policy database structure.
 */
@@ -322,8 +324,10 @@
 out:
 hashtab_destroy(p->filename_trans);
 hashtab_destroy(p->range_tr);
-  for (i = 0; i < SYM_NUM; i++)
+  for (i = 0; i < SYM_NUM; i++) {
+    hashtab_map(p->symtab[i].table, destroy_f[i], NULL);
 hashtab_destroy(p->symtab[i].table);
+  }
 return rc;
 }
@@ -730,7 +734,8 @@
 kfree(key);
 if (datum) {
   levdatum = datum;
-   ebimap_destroy(&levdatum->level->cat);
+   if (levdatum->level)
+     ebimap_destroy(&levdatum->level->cat);
 kfree(levdatum->level);
 }}
 kfree(datum);
@@ -1099,7 +1104,7 @@
 if ((len == 0) || (len == (u32)-1))
 return -EINVAL;

-str = kmalloc(len + 1, flags);
+str = kmalloc(len + 1, flags | __GFP_NOWARN);
 if (!str)
 return -ENOMEM;
@@ -2107,6 +2112,7 @@
int i, j, rc;

u32 nel, len;

__be64 prefixbuf[1];
__le32 buf[3];

struct ocontext *l, *c;

u32 nodebuf[8];

@@ -2216,21 +2222,30 @@
go to out;
break;
}

-case OCON_IBPKEY:
-rc = next_entry(nodebuf, fp, sizeof(u32) * 4);
+case OCON_IBPKEY: {
+u32 pkey_lo, pkey_hi;
+
+rc = next_entry(prefixbuf, fp, sizeof(u64));
+if (rc)
+goto out;
+
-c->u.ibpkey.subnet_prefix = be64_to_cpu(*((__be64 *)nodebuf));
+/* we need to have subnet_prefix in CPU order */
+c->u.ibpkey.subnet_prefix = be64_to_cpu(prefixbuf[0]);
+
-if (nodebuf[2] > 0xffff ||
- nodebuf[3] > 0xffff) {
+rc = next_entry(buf, fp, sizeof(u32) * 2);
+if (rc)
+goto out;
+
+pkey_lo = le32_to_cpu(buf[0]);
+pkey_hi = le32_to_cpu(buf[1]);
+
+if (pkey_lo > U16_MAX || pkey_hi > U16_MAX) {
+rc = -EINVAL;
+goto out;
+}
+
-c->u.ibpkey.low_pkey = le32_to_cpu(nodebuf[2]);
-c->u.ibpkey.high_pkey = le32_to_cpu(nodebuf[3]);
+c->u.ibpkey.low_pkey = pkey_lo;
+c->u.ibpkey.high_pkey = pkey_hi;

rc = context_read_and_validate(&c->context[0],
p,
@@ -2238,7 +2253,10 @@
if (rc)
go to out;
break;
-\case OCON_IBENDPORT:
+} +
+\case OCON_IBENDPORT: {
+\ u32 port;
+ rc = next_entry(buf, fp, sizeof(u32) * 2);
+ if (rc)
+ goto out;
@@ -2248,12 +2266,13 @@
@@ -2261,7 +2280,8 @@
@@ -3104,6 +3124,7 @@
 unsigned int i, j, rc;
 size_t nel, len;
 + __be64 prefixbuf[1];
 + __le32 buf[3];
 + u32 nodebuf[8];
 + struct ocontext *c;
@@ -3191,12 +3212,17 @@
 return rc;
 break;
 case OCON_IBPKEY:
-*(__be64 *)nodebuf = cpu_to_be64(c->ibpkey.subnet_prefix);
+/* subnet_prefix is in CPU order */
+prefixbuf[0] = cpu_to_be64(c->u.ibpkey.subnet_prefix);

-nodebuf[2] = cpu_to_le32(c->u.ibpkey.low_pkey);
-nodebuf[3] = cpu_to_le32(c->u.ibpkey.high_pkey);
+rc = put_entry(prefixbuf, sizeof(u64), 1, fp);
+if (rc)
+return rc;

-rc = put_entry(nodebuf, sizeof(u32), 4, fp);
+buf[0] = cpu_to_le32(c->u.ibpkey.low_pkey);
+buf[1] = cpu_to_le32(c->u.ibpkey.high_pkey);
+rc = put_entry(buf, sizeof(u32), 2, fp);
+if (rc)
+return rc;

+rc = context_write(p, &c->context[0], fp);
--- linux-4.15.0.orig/security/selinux/ss/services.c
+++ linux-4.15.0/security/selinux/ss/services.c
@@ -52,6 +52,7 @@
#include <linux/selinux.h>
#include <linux/flex_array.h>
#include <linux/vmalloc.h>
+#include <linux/lsm_hooks.h>
#include <net/netlabel.h>

#include "flask.h"
@@ -867,6 +868,9 @@
int index;
int rc;

+if (!ss_initialized)
+return 0;
+
read_lock(&policy_rwlock);

rc = -EINVAL;
@@ -1413,27 +1417,25 @@
if (!scontext_len)
return -EINVAL;

+/* Copy the string to allow changes and ensure a NUL terminator */
+scontext2 = kmemdup_nul(scontext, scontext_len, gfp_flags);
+if (!scontext2)
+return -ENOMEM;
+
+if (!ss_initialized) {
   int i;


for (i = 1; i < SECINITSID_NUM; i++) {
    - if (!strcmp(initial_sid_to_string[i], scontext)) {
    + if (!strcmp(initial_sid_to_string[i], scontext2)) {
        *sid = i;
        - return 0;
        + goto out;
    }
    }
    *sid = SECINITSID_KERNEL;
    - return 0;
    + goto out;
}
*sid = SECSID_NULL;

/* Copy the string so that we can modify the copy as we parse it. */
-scontext2 = kmalloc(scontext_len + 1, gfp_flags);
- if (!scontext2)
-    return -ENOMEM;
- memcpy(scontext2, scontext, scontext_len);
- scontext2[scontext_len] = 0;
-
- if (force) {
-   /* Save another copy for storing in uninterpreted form */
-   rc = -ENOMEM;
-   @@ -1447,7 +1449,7 @@
-     scontext_len, &context, def_sid);
-   if (rc == -EINVAL & & force) {
-      context.str = str;
-      -context.len = scontext_len;
-      +context.len = strlen(str) + 1;
-      str = NULL;
-   } else if (rc)
-     goto out_unlock;
-@@ -2663,7 +2665,7 @@
-{
- int rc = 0;
- struct ocontext *c;
- -struct superblock_security_struct *sbsec = sb->s_security;
- + struct superblock_security_struct *sbsec = selinux_superblock(sb);
- const char *fstype = sb->s_type->name;
-
- read_lock(&policy_rwlock);
- @@ -2739,8 +2741,12 @@
- if (*names) {
-    for (i = 0; i < *len; i++)
- kfree(*names)[i]);
- + kfree(*names);
kfree(*values);
+*len = 0;
+*names = NULL;
+*values = NULL;
goto out;
}

--- linux-4.15.0.orig/security/selinux/xfrm.c
+++ linux-4.15.0/security/selinux/xfrm.c
@@ -79,7 +79,7 @@
 gfp_t gfp)
 {
 int rc;
-const struct task_security_struct *tsec = current_security();
+const struct task_security_struct *tsec = selinux_cred(current_cred());
 struct xfrm_sec_ctx *ctx = NULL;
 u32 str_len;

 @@ -136,7 +136,7 @@
 */
 static int selinux_xfrm_delete(struct xfrm_sec_ctx *ctx)
 {
-const struct task_security_struct *tsec = current_security();
+const struct task_security_struct *tsec = selinux_cred(current_cred());

 if (!ctx)
 return 0;

 --- linux-4.15.0.orig/security/smack/smack.h
+++ linux-4.15.0/security/smack/smack.h
@@ -24,6 +24,7 @@
 #include <linux/list.h>
 #include <linux/rculist.h>
 #include <linux/lsm_audit.h>
+#include <linux/msg.h>

 /*
 * Use IPv6 port labeling if IPv6 is enabled and secmarks
 @@ -335,6 +336,7 @@
 extern struct smack_known *smack_unconfined;
 #endif
 extern int smack_ptrace_rule;
+extern struct lsm_blob_sizes smack_blob_sizes;

 extern struct smack_known smack_known_floor;
 extern struct smack_known smack_known_hat;
@@ -355,12 +357,87 @@
 #define SMACK_HASH_SLOTS 16

 /*
 */

/*
extern struct hlist_head smack_known_hash[SMACK_HASH_SLOTS];

static inline struct task_smack *smack_cred(const struct cred *cred)
{
#ifdef CONFIG_SECURITY_STACKING
    return cred->security + smack_blob_sizes.lbs_cred;
#else
    return cred->security;
#endif
}

static inline struct smack_known **smack_file(const struct file *file)
{
#ifdef CONFIG_SECURITY_STACKING
    return file->f_security + smack_blob_sizes.lbs_file;
#else
    return file->f_security;
#endif
}

static inline struct inode_smack *smack_inode(const struct inode *inode)
{
#ifdef CONFIG_SECURITY_STACKING
    return inode->i_security + smack_blob_sizes.lbs_inode;
#else
    return inode->i_security;
#endif
}

static inline struct socket_smack *smack_sock(const struct sock *sock)
{
#ifdef CONFIG_SECURITY_STACKING
    return sock->sk_security + smack_blob_sizes.lbs_sock;
#else
    return sock->sk_security;
#endif
}

static inline struct superblock_smack *smack_superblock(const struct super_block *superblock)
{
#ifdef CONFIG_SECURITY_STACKING
    return superblock->s_security + smack_blob_sizes.lbs_superblock;
#else
    return superblock->s_security;
#endif
}
+static inline struct smack_known **smack_msg_msg(const struct msg_msg *msg)
+{
+#ifdef CONFIG_SECURITY_STACKING
+return msg->security + smack_blob_sizes.lbs_msg_msg;
+#endif
+return msg->security;
+}
+
+static inline struct smack_known **smack_ipc(const struct kern_ipc_perm *ipc)
+{
+#ifdef CONFIG_SECURITY_STACKING
+return ipc->security + smack_blob_sizes.lbs_ipc;
+#else
+return ipc->security;
+#endif
+}
+
+/* CONFIG_KEYS */
+static inline struct smack_known **smack_key(const struct key *key)
+{
+#ifdef CONFIG_SECURITY_STACKING
+return key->security + smack_blob_sizes.lbs_key;
+#else
+return key->security;
+#endif
+}
+
+static inline int smk_inode_transmutable(const struct inode *isp)
+{
+struct inode_smack *sip = isp->i_security;
+return (sip->smk_flags & SMK_INODE_TRANSMUTE) != 0;
+}
+
+static inline struct smack_known *smk_of_inode(const struct inode *isp)
+{
+struct inode_smack *sip = isp->i_security;
+return sip->smk_inode;
static inline struct smack_known *smk_of_task_struct(const struct task_struct *t)
{
    struct smack_known *skp;
    const struct cred *cred;

    rcu_read_lock();
    -skp = smk_of_task(__task_cred(t)->security);
    +cred = __task_cred(t);
    rcu_read_unlock();
    +skp = smk_of_task(smack_cred(cred));
    return skp;
}

static inline struct smack_known *smk_of_task(struct task_struct *t)
{
    struct smack_known *skp;
    const struct cred *cred;

    rcu_read_lock();
    -skp = smk_of_task(__task_cred(t)->security);
    +cred = __task_cred(t);
    rcu_read_unlock();
    +skp = smk_of_task(smack_cred(cred));
    return skp;
}

int smk_access_entry(char *subject_label, char *object_label, struct list_head *rule_list)
{
    int may = -ENOENT;
    struct smack_rule *srp;

    list_for_each_entry_rcu(srp, rule_list, list) {
        if (srp->smk_object->smk_known == object_label &&
            srp->smk_subject->smk_known == subject_label) {
            -may = srp->smk_access;
            -break;
            +int may = srp->smk_access;
            +/*
             + * MAY_WRITE implies MAY_LOCK.
             + */
            +if ((may & MAY_WRITE) == MAY_WRITE)
                +may |= MAY_LOCK;
        }
return may;
}

/*
 * MAY_WRITE implies MAY_LOCK.
 * */
if ((may & MAY_WRITE) == MAY_WRITE)
    may |= MAY_LOCK;
return may;

/**
 @@ -275,7 +274,7 @@
 int smk_curacc(struct smack_known *obj_known,
         u32 mode, struct smk_audit_info *a)
 {
 -struct task_smack *tsp = current_security();
 +struct task_smack *tsp = smack_cred(current_cred());

     return smk_tskacc(tsp, obj_known, mode, a);
 } @@ -469,7 +468,7 @@
 if (i == 0 || i >= SMK_LONGLABEL)
 return ERR_PTR(-EINVAL);

 -smack = kzalloc(i + 1, GFP_KERNEL);
 +smack = kzalloc(i + 1, GFP_NOFS);
 if (smack == NULL)
 return ERR_PTR(-ENOMEM);

 @@ -504,7 +503,7 @@
 if ((m & *cp) == 0)
 continue;
 rc = netlbl_catmap_setbit(&sap->attr.mls.cat,
 - cat, GFP_KERNEL);
 + cat, GFP_NOFS);
 if (rc < 0) {
     netlbl_catmap_free(sap->attr.mls.cat);
     return rc;
 } @@ -540,7 +539,7 @@
 if (skp != NULL)
 goto freeout;

 -skp = kzalloc(sizeof(*skp), GFP_KERNEL);
 +skp = kzalloc(sizeof(*skp), GFP_NOFS);
 if (skp == NULL) {
skp = ERR_PTR(-ENOMEM);
goto freeout;
@@ -642,7 +641,7 @@
return true;
rc = cap_capable(current_cred(), &init_user_ns, cap,
-SECURITY_CAP_AUDIT);
+CAP_OPT_NONE);
if (rc)
return false;

--- linux-4.15.0.orig/security/smack/smack_lsm.c
+++ linux-4.15.0/security/smack/smack_lsm.c
@@ -121,7 +121,7 @@
static int smk_bu_current(char *note, struct smack_known *oskp,
    int mode, int rc)
{
    -struct task_smack *tsp = current_security();
+struct task_smack *tsp = smack_cred(current_cred());
    char acc[SMK_NUM_ACCESS_TYPE + 1];

    if (rc <= 0)
@@ -142,7 +142,7 @@
#ifdef CONFIG_SECURITY_SMACK_BRINGUP
static int smk_bu_task(struct task_struct *otp, int mode, int rc)
{
    -struct task_smack *tsp = current_security();
+struct task_smack *tsp = smack_cred(current_cred());
    struct smack_known *smk_task = smk_of_task_struct(otp);
    char acc[SMK_NUM_ACCESS_TYPE + 1];

    @@ -164,8 +164,8 @@
#ifdef CONFIG_SECURITY_SMACK_BRINGUP
static int smk_bu_inode(struct inode *inode, int mode, int rc)
{
    -struct task_smack *tsp = current_security();
-struct inode_smack *isp = inode->i_security;
+struct task_smack *tsp = smack_cred(current_cred());
+struct inode_smack *isp = smack_inode(inode);
    char acc[SMK_NUM_ACCESS_TYPE + 1];

    if (isp->smk_flags & SMK_INODE_IMPURE)
@@ -194,10 +194,10 @@
#ifdef CONFIG_SECURITY_SMACK_BRINGUP
static int smk_bu_file(struct file *file, int mode, int rc)
{
    -struct task_smack *tsp = current_security();
    -struct inode_smack *isp = inode->i_security;
+struct task_smack *tsp = smack_cred(current_cred());
+struct inode_smack *isp = smack_inode(inode);
    char acc[SMK_NUM_ACCESS_TYPE + 1];

    if (isp->smk_flags & SMK_INODE_IMPURE)
struct smack_known *sskp = tsp->smk_task;
struct inode *inode = file_inode(file);
-struct inode_smack *isp = inode->i_security;
+struct inode_smack *isp = smack_inode(inode);
char acc[SMK_NUM_ACCESS_TYPE + 1];

if (isp->smk_flags & SMK_INODE_IMPURE)
@@ -224,10 +224,10 @@
static int smk_bu_credfile(const struct cred *cred, struct file *file,
int mode, int rc)
{
-struct task_smack *tsp = cred->security;
+struct task_smack *tsp = smack_cred(cred);
struct smack_known *sskp = tsp->smk_task;
struct inode *inode = file_inode(file);
-struct inode_smack *isp = inode->i_security;
+struct inode_smack *isp = smack_inode(inode);
char acc[SMK_NUM_ACCESS_TYPE + 1];

if (isp->smk_flags & SMK_INODE_IMPURE)
@@ -269,7 +269,7 @@
if (!(ip->i_opflags & IOP_XATTR))
return ERR_PTR(-EOPNOTSUPP);
-buffer = kzalloc(SMK_LONGLABEL, GFP_KERNEL);
+buffer = kzalloc(SMK_LONGLABEL, GFP_NOFS);
if (buffer == NULL)
return ERR_PTR(-ENOMEM);
@@ -287,50 +287,35 @@
}

/**
- * new_inode_smack - allocate an inode security blob
+ * init_inode_smack - initialize an inode security blob
+ * @isp: the blob to initialize
+ * @skp: a pointer to the Smack label entry to use in the blob
+ *
- * Returns the new blob or NULL if there's no memory available
+ */
-static struct inode_smack *new_inode_smack(struct smack_known *skp)
+static void init_inode_smack(struct inode *inode, struct smack_known *skp)
{
-struct inode_smack *isp;
-isp = kmem_cache_zalloc(smack_inode_cache, GFP_NOFS);
-if (isp == NULL)
-return NULL;
}
struct inode_smack *isp = smack_inode(inode);
isp->smk_inode = skp;
isp->smk_flags = 0;
mutex_init(&isp->smk_lock);
-
-return isp;
}

/**
- * new_task_smack - allocate a task security blob
+ * init_task_smack - initialize a task security blob
+ * @tsp: blob to initialize
* @task: a pointer to the Smack label for the running task
* @forked: a pointer to the Smack label for the forked task
- * @gfp: type of the memory for the allocation
*
- * Returns the new blob or NULL if there's no memory available
*/
static struct task_smack *new_task_smack(struct smack_known *task,
-struct smack_known *forked, gfp_t gfp)
+static void init_task_smack(struct task_smack *tsp, struct smack_known *task,
+struct smack_known *forked)
{
-struct task_smack *tsp;
-
-tsp = kzalloc(sizeof(struct task_smack), gfp);
-if (tsp == NULL)
-return NULL;
-
tsp->smk_task = task;
tsp->smk_forked = forked;
INIT_LIST_HEAD(&tsp->smk_rules);
INIT_LIST_HEAD(&tsp->smk_relabel);
mutex_init(&tsp->smk_rules_lock);
-
-return tsp;
}

/**
* @ -428,7 +413,7 *
}

rcu_read_lock();
-tsp = __task_cred(tracer)->security;
+tsp = smack_cred(__task_cred(tracer));
tracer_known = smk_of_task(tsp);
if ((mode & PTRACE_MODE_ATTACH) &&
    int rc;
    struct smack_known *skp;

    -skp = smk_of_task(current_security());
    +skp = smk_of_task(smack_cred(current_cred()));

    rc = smk_ptrace_rule_check(ptp, skp, PTRACE_MODE_ATTACH, __func__);
    return rc;
    @@ -534,12 +519,7 @@ */
    static int smack_sb_alloc_security(struct super_block *sb)
    {
      -struct superblock_smack *sbsp;
      -
      -sbsp = kzalloc(sizeof(struct superblock_smack), GFP_KERNEL);
      -
      -if (sbsp == NULL)
      -return -ENOMEM;
      +struct superblock_smack *sbsp = smack_superblock(sb);

      sbsp->smk_root = &smack_known_floor;
      sbsp->smk_default = &smack_known_floor;
      @@ -548,23 +528,11 @@ /*
        * SMK_SB_INITIALIZED will be zero from kzalloc.
        */
      -sb->s_security = sbsp;

      return 0;
    }

    /**
      - * smack_sb_free_security - free a superblock blob
      - * @sb: the superblock getting the blob
      - *
      - */
      -static void smack_sb_free_security(struct super_block *sb)
      -{
      -kfree(sb->s_security);
      -sb->s_security = NULL;
      -}
      -
      -/**
      * smack_sb_copy_data - copy mount options data for processing
      * @orig: where to start
      * @smackopts: mount options string

      */
struct dentry *root = sb->s_root;
struct inode *inode = d_backing_inode(root);
struct superblock_smack *sp = sb->s_security;
struct superblock_smack *sp = smack_superblock(sb);
struct inode_smack *isp;
struct smack_known *skp;
int i;

struct superblock_smack *sbp = dentry->d_sb->s_security;
struct superblock_smack *sbp = smack_superblock(dentry->d_sb);
int rc;
struct smk_audit_info ad;

static int smack_sb_statfs(struct dentry *dentry)
{
    struct superblock_smack *sbp = dentry->d_sb->s_security;
    struct superblock_smack *sbp = smack_superblock(dentry->d_sb);
    int rc;
    struct smk_audit_info ad;

    struct inode *inode = file_inode(bprm->file);
    struct task_smack *bsp = bprm->cred->security;
    struct task_smack *bsp = smack_cred(bprm->cred);
    struct inode_smack *isp;

    return 0;
}

static int smack_bprm_set_creds(struct linux_binprm *bprm)
{
    struct inode *inode = file_inode(bprm->file);
    struct task_smack *bsp = bprm->cred->security;
    struct task_smack *bsp = smack_cred(bprm->cred);
    struct inode_smack *isp;

    return 0;
}
struct superblock_smack *sbsp;
int rc;
@@ -920,11 +884,11 @@
if (bprm->called_set_creds)
    return 0;

-isp = inode->i_security;
+isp = smack_inode(inode);
if (isp->smk_task == NULL || isp->smk_task == bsp->smk_task)
    return 0;

-sbsp = inode->i_sb->s_security;
+sbsp = smack_superblock(inode->i_sb);
if ((sbsp->smk_flags & SMK_SB_UNTRUSTED) &&
    isp->smk_task != sbsp->smk_root)
    return 0;
@@ -944,7 +908,8 @@

if (rc != 0)
    return rc;
-} else if (bprm->unsafe)
+} else if (bprm->unsafe & ~LSM_UNSAFE_PTRACE)
+    return -EPERM;

bsp->smk_task = isp->smk_task;
@@ -971,49 +936,11 @@
{
    struct smack_known *skp = smk_of_current();

-inode->i_security = new_inode_smack(skp);
-if (inode->i_security == NULL)
-    return -ENOMEM;
+    init_inode_smack(inode, skp);
    return 0;
}

/**
- * smack_inode_free_rcu - Free inode_smack blob from cache
- * @head: the rcu_head for getting inode_smack pointer
- *
- * Call back function called from call_rcu() to free
- * the i_security blob pointer in inode
- */
-static void smack_inode_free_rcu(struct rcu_head *head)
-{*
-struct inode_smack *issp;
- issp = container_of(head, struct inode_smack, smk_rcu);
- kmem_cache_free(smack_inode_cache, issp);
-
-/**
- * smack_inode_free_security - free an inode blob using call_rcu()
- * @inode: the inode with a blob
- *
- * Clears the blob pointer in inode using RCU
- */
- static void smack_inode_free_security(struct inode *inode)
- {
- struct inode_smack *issp = inode->i_security;
-
- /**
- * The inode may still be referenced in a path walk and
- * a call to smack_inode_permission() can be made
- * after smack_inode_free_security() is called.
- * To avoid race condition free the i_security via RCU
- * and leave the current inode->i_security pointer intact.
- * The inode will be freed after the RCU grace period too.
- */
- call_rcu(&issp->smk_rcu, smack_inode_free_rcu);
- }
-
-/**
* smack_inode_init_security - copy out the smack from an inode
* @inode: the newly created inode
* @dir: containing directory object
@@ -1028,7 +955,7 @@
const struct qstr *qstr, const char **name,
void **value, size_t *len)
{
- struct inode_smack *issp = inode->i_security;
+ struct inode_smack *issp = smack_inode(inode);
 struct smack_known *skp = smk_of_current();
 struct smack_known *isp = smk_of_inode(inode);
 struct smack_known *dsp = smk_of_inode(dir);
@@ -1213,7 +1140,7 @@

 static int smack_inode_permission(struct inode *inode, int mask)
 {
- struct superblock_smack *sbsp = inode->i_sb->s_security;
+ struct superblock_smack *sbsp = smack_superblock(inode->i_sb);
 struct smk_audit_info ad;
 int no_block = mask & MAY_NOT_BLOCK;
 int rc;
@@ -1366,7 +1293,7 @@
const void *value, size_t size, int flags)
{
    struct smack_known *skp;
    struct inode_smack *isp = d_backing_inode(dentry)->i_security;
    struct inode_smack *isp = smack_inode(d_backing_inode(dentry));

    if (strcmp(name, XATTR_NAME_SMACKTRANSMUTE) == 0) {
        isp->smk_flags |= SMK_INODE_TRANSMUTE;
        if (rc != 0)
            return rc;
    }

    isp = d_backing_inode(dentry)->i_security;
    isp = smack_inode(d_backing_inode(dentry));
/*
* Don't do anything special for these.
*XATTR_NAME_SMACKIPIN
@@ -1455,7 +1382,7 @@
*/
    if (strcmp(name, XATTR_NAME_SMACK) == 0) {
        struct super_block *sbp = dentry->d_sb;
        struct superblock_smack *sbsp = sbp->s_security;
        struct superblock_smack *sbsp = smack_superblock(sbp);

        isp->smk_inode = sbsp->smk_default;
    } else if (strcmp(name, XATTR_NAME_SMACKEXEC) == 0)
@@ -1501,7 +1428,7 @@
    */
    if (sock == NULL || sock->sk == NULL)
        return -EOPNOTSUPP;

    ssp = sock->sk->sk_security;
    ssp = smack_sock(sock->sk);

    if (strcmp(name, XATTR_SMACK_IPIN) == 0)
        isp = ssp->smk_in;
@@ -1545,7 +1472,7 @@
*/
    static void smack_inode_getsecid(struct inode *inode, u32 *secid)
    {
        struct inode_smack *isp = inode->i_security;
        struct inode_smack *isp = smack_inode(inode);

        *secid = isp->smk_inode->smk_secid;
    }
@@ -1579,25 +1506,13 @@
*/
    static int smack_file_alloc_security(struct file *file)
    {
        struct superblock_smack *sbsp = sbp->s_security;
        struct superblock_smack *sbsp = smack_superblock(sbp);

        isp->smk_inode = sbsp->smk_default;
    } else if (strcmp(name, XATTR_NAME_SMACKEXEC) == 0)
@@ -1501,7 +1428,7 @@
    */
    if (sock == NULL || sock->sk == NULL)
        return -EOPNOTSUPP;

    ssp = sock->sk->sk_security;
    ssp = smack_sock(sock->sk);

    if (strcmp(name, XATTR_SMACK_IPIN) == 0)
        isp = ssp->smk_in;
@@ -1545,7 +1472,7 @@
*/
    static void smack_inode_getsecid(struct inode *inode, u32 *secid)
    {
        struct inode_smack *isp = inode->i_security;
        struct inode_smack *isp = smack_inode(inode);

        *secid = isp->smk_inode->smk_secid;
    }
@@ -1579,25 +1506,13 @@
*/
    static int smack_file_alloc_security(struct file *file)
    {
struct smack_known *skp = smk_of_current();
+struct smack_known **blob = smack_file(file);

-file->f_security = skp;
+*blob = smk_of_current();
return 0;
}

/**
 * smack_file_free_security - clear a file security blob
 * @file: the object
 * *
 * The security blob for a file is a pointer to the master
 * label list, so no memory is freed.
 * */
-static void smack_file_free_security(struct file *file)
-{
-file->f_security = NULL;
}
-
-/**
 * smack_file_ioctl - Smack check on ioctls
 * @file: the object
 * @cmd: what to do
 @@ -1734,16 +1649,16 @@
 if (unlikely(IS_PRIVATE(file_inode(file))))
 return 0;

 -isp = file_inode(file)->i_security;
 +isp = smack_inode(file_inode(file));
 if (isp->smk_mmap == NULL)
 return 0;
-ssbp = file_inode(file)->i_sb->s_security;
 +ssbp = smack_superblock(file_inode(file)->i_sb);
 if (ssbp->smk_flags & SMK_SB_UNTRUSTED &&
     isp->smk_mmap != ssbp->smk_root)
 return -EACCES;
 mkp = isp->smk_mmap;

 -tsp = current_security();
 +tsp = smack_cred(current_cred());
 skp = smk_of_current();
 rc = 0;

 @@ -1821,7 +1736,9 @@
 */
 static void smack_file_set_fowner(struct file *file)
 {
file->f_security = smk_of_current();
+struct smack_known **blob = smack_file(file);
+
+*blob = smk_of_current();

}/**
 @@ -1838,8 +1755,9 @@
 static int smack_file_send_sigiotask(struct task_struct *tsk,
     struct fown_struct *fown, int signum)
 {
+struct smack_known **blob;
 struct smack_known *skp;
-struct smack_known *tkp = smk_of_task(tsk->cred->security);
+struct smack_known *tkp = smk_of_task(smack_cred(tsk->cred));
 struct file *file;
 int rc;
 struct smk_audit_info ad;
 @@ -1850,7 +1768,8 @@
 file = container_of(fown, struct file, f_owner);

 /* we don't log here as rc can be overriden */
-  skp = file->f_security;
+  blob = smack_file(file);
+  skp = *blob;
  rc = smk_access(skp, tkp, MAY_DELIVER, NULL);
  rc = smk_bu_note("sigiotask", skp, tkp, MAY_DELIVER, rc);
  if (rc != 0 && has_capability(tsk, CAP_MAC_OVERRIDE))
@@ -1886,8 +1805,8 @@
 if (inode->i_sb->s_magic == SOCKFS_MAGIC) {
 sock = SOCKET_I(inode);
-   ssp = sock->sk->sk_security;
-   tsp = current_security();
+   ssp = smack_sock(sock->sk);
+   tsp = smack_cred(current_cred());
/*
 * If the receiving process can't write to the
 * passed socket or if the passed socket can't
@@ -1929,7 +1848,7 @@
 */
 static int smack_file_open(struct file *file, const struct cred *cred)
 {
-struct task_smack *tsp = cred->security;
+struct task_smack *tsp = smack_cred(cred);
 struct inode *inode = file_inode(file);
 struct smk_audit_info ad;
 int rc;
static int smack_cred_alloc_blank(struct cred *cred, gfp_t gfp)
{
    struct task_smack *tsp;
    -tsp = new_task_smack(NULL, NULL, gfp);
    -if (tsp == NULL)
        -return -ENOMEM;
    -cred->security = tsp;
    +init_task_smack(smack_cred(cred), NULL, NULL);
    return 0;
}

static void smack_cred_free(struct cred *cred)
{
    struct task_smack *tsp = cred->security;
    +struct task_smack *tsp = smack_cred(cred);
    struct smack_rule *rp;
    struct list_head *l;
    struct list_head *n;
    -if (tsp == NULL)
        return;
    -cred->security = NULL;
    -smk_destroy_label_list(&tsp->smk_relabel);
    list_for_each_safe(l, n, &tsp->smk_rules) {
        @ @ -1992,7 +1900,6 @ @
        list_del(&rp->list);
        kfree(rp);
    }
    -kfree(tsp);
}

static int smack_cred_prepare(struct cred *new, const struct cred *old, gfp_t gfp)
{
    struct task_smack *old_tsp = old->security;
    -struct task_smack *new_tsp = new->security;
    +struct task_smack *old_tsp = smack_cred(old);
    struct task_smack *new_tsp;
    /*
```c
+struct task_smack *new_tsp = smack_cred(new);

int rc;

-new_tsp = new_task_smack(old_tsp->smk_task, old_tsp->smk_task, gfp);
-if (new_tsp == NULL)
-return -ENOMEM;
-
-new->security = new_tsp;
+init_task_smack(new_tsp, old_tsp->smk_task, old_tsp->smk_task);

rc = smk_copy_rules(&new_tsp->smk_rules, &old_tsp->smk_rules, gfp);
if (rc != 0)
@@ -2022,10 +1925,7 @@
@@ -2037,15 +1937,14 @@
 */
 static void smack_cred_transfer(struct cred *new, const struct cred *old)
 {
-struct task_smack *old_tsp = old->security;
-struct task_smack *new_tsp = new->security;
+struct task_smack *old_tsp = smack_cred(old);
+struct task_smack *new_tsp = smack_cred(new);

 new_tsp->smk_task = old_tsp->smk_task;
 new_tsp->smk_forked = old_tsp->smk_task;
 mutex_init(&new_tsp->smk_rules_lock);
 INIT_LIST_HEAD(&new_tsp->smk_rules);
-
 /* cbs copy rule list */
 }

@@ -2058,7 +1957,7 @@
 */
 static int smack_kernel_act_as(struct cred *new, u32 secid)
 {
-struct task_smack *new_tsp = new->security;
+struct task_smack *new_tsp = smack_cred(new);
```
new_tsp->smk_task = smack_from_secid(secid);
return 0;
@@ -2075,8 +1974,8 @@
static int smack_kernel_create_files_as(struct cred *new,
     struct inode *inode)
 {
     -struct inode_smack *isp = inode->i_security;
-struct task_smack *tsp = new->security;
+struct inode_smack *isp = smack_inode(inode);
+struct task_smack *tsp = smack_cred(new);

tsp->smk_forked = isp->smk_inode;
tsp->smk_task = tsp->smk_forked;
@@ -2277,10 +2176,11 @@ /
 static void smack_task_to_inode(struct task_struct *p, struct inode *inode)
 {
     -struct inode_smack *isp = inode->i_security;
+struct inode_smack *isp = smack_inode(inode);
     +struct task_smack *tsp = smack_inode(inode);
     struct smack_known *skp = smk_of_task_struct(p);

     isp->smk_inode = skp;
     +isp->smk_flags |= SMK_INODE_INSTANT;
 } 

 /*
 @@ -2300,11 +2214,10 @@
 static int smack_sk_alloc_security(struct sock *sk, int family, gfp_t gfp_flags)
 { 
     struct smack_known *skp = smk_of_current();
-struct socket_smack *ssp;
-ssp = kzalloc(sizeof(struct socket_smack), gfp_flags);
-if (ssp == NULL)
 -return -ENOMEM;
+struct socket_smack *ssp = smack_sock(sk);

 /*
 * Sockets created by kernel threads receive web label.
 @@ -2318,11 +2214,10 @@
 } 
 ssp->smk_packet = NULL;

 -sk->sk_security = ssp;
 -
 return 0;
 }
+ifdef SMACK_IPV6_PORT_LABELING
/**
 * smack_sk_free_security - Free a socket blob
 * @sk: the socket
 @@ -2331,7 +2226,6 @@
 */
static void smack_sk_free_security(struct sock *sk)
{
-#ifdef SMACK_IPV6_PORT_LABELING
struct smk_port_label *spp;

if (sk->sk_family == PF_INET6) {
 @ @ -2344,9 +2238,8 @@
} rcu_read_unlock();
}
-#endif
-kfree(sk->sk_security);
}
+#endif

/**
 * smack_ipv4host_label - check host based restrictions
 @@ -2464,7 +2357,7 @@
static int smack_netlabel(struct sock *sk, int labeled)
{
 struct smack_known *skp;
-struct socket_smack *ssp = sk->sk_security;
+struct socket_smack *ssp = smack_sock(sk);
 if (labeled)
 { int rc = 0;

 @ @ -2509,7 +2402,7 @@
 int rc;
 int skLbl;
 struct smack_known *hkp;
-struct socket_smack *ssp = sk->sk_security;
+struct socket_smack *ssp = smack_sock(sk);
 struct smk_audit_info ad;

 rcu_read_lock();
 @ @ -2585,7 +2478,7 @@
 { struct sock *sk = sock->sk;
 struct sockaddr_in6 *addr6;
-struct socket_smack *ssp = sock->sk->sk_security;
+struct socket_smack *ssp = smack_sock(sock->sk);
struct smk_port_label *spp;
unsigned short port = 0;

@@ -2672,7 +2565,7 @@
 int act)
 {
 struct smk_port_label *spp;
-struct socket_smack *ssp = sk->sk_security;
+struct socket_smack *ssp = smack_sock(sk);
 struct smack_known *skp = NULL;
 unsigned short port;
 struct smack_known *object;
@@ -2739,7 +2632,7 @@
 const void *value, size_t size, int flags)
 {
 struct smack_known *skp;
-struct inode_smack *nsp = inode->i_security;
+struct inode_smack *nsp = smack_inode(inode);
 struct socket_smack *ssp;
 struct socket *sock;
 int rc = 0;
@@ -2766,7 +2659,7 @@
 if (sock == NULL || sock->sk == NULL)
 return -EOPNOTSUPPP;

-ssp = sock->sk->sk_security;
+ssp = smack_sock(sock->sk);

 if (strcmp(name, XATTR_SMACK_IPIN) == 0)
 ssp->smk_in = skp;
@@ -2814,7 +2707,7 @@
 * Sockets created by kernel threads receive web label.
 */
 if (unlikely(current->flags & PF_KTHREAD)) {
-ssp = sock->sk->sk_security;
+ssp = smack_sock(sock->sk);
 ssp->smk_in = &smack_known_web;
 ssp->smk_out = &smack_known_web;
 }
@@ -2923,35 +2816,13 @@
 */
 static int smack_msg_msg_alloc_security(struct msg_msg *msg)
 {
-struct smack_known *skp = smk_of_current();
+struct smack_known **blob = smack_msg_msg(msg);

-msg->security = skp;
+*blob = smk_of_current();
return 0;
}

/**
 * smack_msg_msg_free_security - Clear the security blob for msg_msg
 * @msg: the object
 * *
 * Clears the blob pointer
 * */
static void smack_msg_msg_free_security(struct msg_msg *msg)
{
    msg->security = NULL;
}

/**
 * smack_of_shm - the smack pointer for the shm
 * @shp: the object
 * *
 * Returns a pointer to the smack value
 * */
static struct smack_known *smack_of_shm(struct shmid_kernel *shp)
{
    return (struct smack_known *)shp->shm_perm.security;
}

/**
 * smack_shm_alloc_security - Set the security blob for shm
 * @shp: the object
 * *
 * @ @ -2959,27 +2830,13 @@ */
static int smack_shm_alloc_security(struct shmid_kernel *shp)
{
    struct kern_ipc_perm *isp = &shp->shm_perm;
    struct smack_known *skp = smk_of_current();
    struct smack_known **blob = smack_ipc(&shp->shm_perm);

    -isp->security = skp;
    +*blob = smk_of_current();
    return 0;
}

/**
 * smack_shm_free_security - Clear the security blob for shm
 * @shp: the object
 * *
 * Clears the blob pointer
 * */
static void smack_shm_free_security(struct shmid_kernel *shp)
{
    struct kern_ipc_perm *isp = &shp->shm_perm;
    -
    -isp->security = NULL;
    -}
    -
    -/**
    * smack_shm : check if current has access on shm
    * @shp : the object
    * @access : access requested
    * @ @ -2988,7 +2845,8 @@
    */
    static int smk_curacc_shm(struct shmid_kernel *shp, int access)
    {
        struct smack_known *ssp = smack_of_shm(shp);
        +struct smack_known **blob = smack_ipc(&shp->shm_perm);
        +struct smack_known *ssp = *blob;
        struct smk_audit_info ad;
        int rc;

        @@ -3068,17 +2926,6 @@
    }
    /**
    * smack_of_sem - the smack pointer for the sem
    * @sma: the object
    * *
    * Returns a pointer to the smack value
    */
    -static struct smack_known *smack_of_sem(struct sem_array *sma)
    -{
    -return (struct smack_known *)sma->sem_perm.security;
    -}
    -
    -/**
    * smack_sem_alloc_security - Set the security blob for sem
    * @sma: the object
    * *
    * @ @ -3086,27 +2933,13 @@
    */
    static int smack_sem_alloc_security(struct sem_array *sma)
    {
        struct kern_ipc_perm *isp = &sma->sem_perm;
        -struct smack_known *skp = smk_of_current();
        +struct smack_known **blob = smack_ipc(&sma->sem_perm);

        -isp->security = skp;
/* blob = smk_of_current();
return 0;
}

/**
 * smack_sem_free_security - Clear the security blob for sem
 * @sma: the object
 * *
 * Clears the blob pointer
 * */
-static void smack_sem_free_security(struct sem_array *sma)
{-
-struct kern_ipc_perm *isp = &sma->sem_perm;
-
-isp->security = NULL;
-}
-
-/**
 * smk_curacc_sem : check if current has access on sem
 * @sma : the object
 * @access : access requested
 * @@ -3115,7 +2948,8 @@
 * /
static int smk_curacc_sem(struct sem_array *sma, int access)
{
-struct smack_known *ssp = smack_of_sem(sma);
+struct smack_known **blob = smack_ipc(&sma->sem_perm);
+struct smack_known *ssp = *blob;
struct smk_audit_info ad;
int rc;

@@ -3201,45 +3035,20 @@
}

/**
 * smack_msg_alloc_security - Set the security blob for msg
 * @msq: the object
 * *
 * Returns 0
 * */
static int smack_msg_queue_alloc_security(struct msg_queue *msq)
{
-struct kern_ipc_perm *kisp = &msq->q_perm;
-struct smack_known *skp = smk_of_current();
+struct smack_known **blob = smack_ipc(&msq->q_perm);
+struct smack_known *skp = *blob;

-kisp->security = skp;
/**
 * smack_msg_free_security - Clear the security blob for msg
 * @msg: the object
 * *
 * Clears the blob pointer
 */
 static void smack_msg_queue_free_security(struct msg_queue *msgq)
 {
     struct kern_ipc_perm *kisp = &msgq->q_perm;
     kisp->security = NULL;
 }

 /**
 * smack_of_msq - the smack pointer for the msg
 * @msg: the object
 * *
 * Returns a pointer to the smack label entry
 */
 static struct smack_known *smack_of_msq(struct msg_queue *msgq)
 {
     return (struct smack_known *)msgq->q_perm.security;
 }

 /**
 * smk_curacc_msq : helper to check if current has access on msgq
 * @msgq : the msgq
 * @access : access requested
 */
 static int smk_curacc_msq(struct msg_queue *msgq, int access)
 {
     struct smack_known *msp = smack_of_msq(msgq);
     struct smack_known **blob = smack_ipc(&msgq->q_perm);
     struct smack_known *msp = *blob;
     struct smk_audit_info ad;
     int rc;

     @ @ -3351,7 +3161,8 @@
     */
 static int smack_ipc_permission(struct kern_ipc_perm *ipp, short flag)
 {
     struct smack_known *iskp = ipp->security;
     +struct smack_known **blob = smack_ipc(ipp);
     +struct smack_known *msp = *blob;
     struct smk_audit_info ad;
     int rc;

     @ @ -3248,7 +3057,8 @@
     */

+struct smack_known *iskp = *blob;
int may = smack_flags_to_may(flag);
struct smk_audit_info ad;
int rc;
@@ -3372,7 +3183,8 @@ */
static void smack_ipc_getsecid(struct kern_ipc_perm *ipp, u32 *secid)
{
-struct smack_known *iskp = ipp->security;
+struct smack_known **blob = smack_ipc(ipp);
+struct smack_known *iskp = *blob;

*secid = iskp->smk_secid;
}
@@ -3400,7 +3212,7 @@ if (inode == NULL)
 return;

-isp = inode->i_security;
+isp = smack_inode(inode);

mutex_lock(&isp->smk_lock);
/*
@@ -3411,7 +3223,7 @@ goto unlockandout;
 sbp = inode->i_sb;
-sbsp = sbp->s_security;
+sbsp = smack_superblock(sbp);
/*
 * We're going to use the superblock default label
 * if there's no label on the file.
@@ -3612,18 +3424,16 @@
{
 struct smack_known *skp = smk_of_task_struct(p);
 char *cp;
-int slen;

-if (strcmp(name, "current") != 0)
+if (strcmp(name, "current") == 0) {
+cp = kstrdup(skp->smk_known, GFP_KERNEL);
+if (cp == NULL)
+return -ENOMEM;
+} else
{return -EINVAL;
-cp = kstrdup(skp->smk_known, GFP_KERNEL);
-if (cp == NULL)
```

-return -ENOMEM;
-
-slen = strlen(cp);
*value = cp;
-return slen;
+return strlen(cp);
}

/**
@@ -3639,7 +3449,7 @@
*/
static int smack_setprocattr(const char *name, void *value, size_t size)
{
-struct task_smack *tsp = current_security();
+struct task_smack *tsp = smack_cred(current_cred());
 struct cred *new;
 struct smack_known *skp;
 struct smack_known_list_elem *sklep;
@@ -3680,7 +3490,7 @@
if (new == NULL)
 return -ENOMEM;

-tsp = new->security;
+tsp = smack_cred(new);
 tsp->smk_task = skp;
 /*
 * process can change its label only once
@@ -3705,9 +3515,9 @@
{
 struct smack_known *skp;
 struct smack_known *okp;
-struct socket_smack *ssp = sock->sk_security;
-struct socket_smack *osp = other->sk_security;
-struct socket_smack *nsp = newsk->sk_security;
+struct socket_smack *ssp = smack_sock(sock);
+struct socket_smack *osp = smack_sock(other);
+struct socket_smack *nsp = smack_sock(newsk);
 struct smk_audit_info ad;
 int rc = 0;
 #ifdef CONFIG_AUDIT
@@ -3753,8 +3563,8 @@
*/
static int smack_unix_may_send(struct socket *sock, struct socket *other)
{
-struct socket_smack *ssp = sock->sk->sk_security;
-struct socket_smack *osp = other->sk->sk_security;
+struct socket_smack *ssp = smack_sock(sock->sk);
+struct socket_smack *osp = smack_sock(other->sk);
```

Open Source Used In 5GaaS Edge AC-4 35262
struct smk_audit_info ad;
int rc;

#ifdef SMACK_IPV6_SECMARK_LABELING
-struct socket_smack *ssp = sock->sk->sk_security;
+struct socket_smack *ssp = smack_sock(sock->sk);
struct smack_known *rsp;
#endif
int rc = 0;
#endif
static int smack_socket_sock_rcv_skb(struct sock *sk, struct sk_buff *skb)
{
struct netlbl_lsm_secattr secattr;
-struct socket_smack *ssp = sk->sk_security;
+struct socket_smack *ssp = smack_sock(sk);
struct smack_known *skp = NULL;
int rc = 0;
struct smk_audit_info ad;
+u16 family = sk->sk_family;
#ifdef CONFIG_AUDIT
struct lsm_network_audit net;
#endif
#if IS_ENABLED(CONFIG_IPV6)
struct sockaddr_in6 sadd;
int proto;
+
+if (family == PF_INET6 && skb->protocol == htons(ETH_P_IP))
+family = PF_INET;
#endif /* CONFIG_IPV6 */

-switch (sk->sk_family) {
+switch (family) {
  case PF_INET:
#ifdef CONFIG_SECURITY_SMACK_NETFILTER
/*
@@ -3985,7 +3799,7 @@
 */
  netlbl_secattr_init(&secattr);

  -rc = netlbl_skbuff_getattr(skb, sk->sk_family, &secattr);
  +rc = netlbl_skbuff_getattr(skb, family, &secattr);
  if (rc == 0)
    skp = smack_from_secattr(&secattr, ssp);
  else
@@ -3998,7 +3812,7 @@
```c
#ifndef CONFIG_AUDIT
        smk_ad_init_net(&ad, __func__, LSM_AUDIT_DATA_NET, &net);
        ad.a.u.net->family = sk->sk_family;
        ad.a.u.net->family = family;
        ad.a.u.net->netif = skb->skb_if;
        ipv4_skb_to_auditdata(skb, &ad.a, NULL);
    #endif
    @ @ -4012,7 +3826,7 @@
    rc = smk_bu_note("IPv4 delivery", skp, ssp->smk_in,
        MAY_WRITE, rc);
    if (rc != 0)
        -netlbl_skbuff_err(skb, sk->sk_family, rc, 0);
        +netlbl_skbuff_err(skb, family, rc, 0);
        break;
    #if IS_ENABLED(CONFIG_IPV6)
    case PF_INET6:
        @ @ -4026,9 +3840,11 @@
        skp = smack_ipv6host_label(&sadd);
        if (skp == NULL)
            skp = smack_net_ambient;
        +if (skb == NULL)
            +break;
    #ifdef CONFIG_AUDIT
        smk_ad_init_net(&ad, __func__, LSM_AUDIT_DATA_NET, &net);
        ad.a.u.net->family = sk->sk_family;
        ad.a.u.net->family = family;
        ad.a.u.net->netif = skb->skb_if;
        ipv6_skb_to_auditdata(skb, &ad.a, NULL);
    #endif /* CONFIG_AUDIT */
    @ @ -4064,7 +3880,7 @@
    int slen = 1;
    int rc = 0;

    -ssp = sock->sk->sk_security;
    +ssp = smack_sock(sock->sk);
    if (ssp->smk_packet != NULL) {
        rcp = ssp->smk_packet->smk_known;
        slen = strlen(rcp) + 1;
        @ @ -4114,7 +3930,7 @@

        switch (family) {
            case PF_UNIX:
                -ssp = sock->sk->sk_security;
                +ssp = smack_sock(sock->sk);
                s = ssp->smk_out->smk_secid;
                break;
            case PF_INET:
```

---

**Open Source Used In 5GaaS Edge AC-4 35264**
* Translate what netlabel gave us. */
if (sock != NULL && sock->sk != NULL)
-ssp = sock->sk->sk_security;
+ssp = smack_sock(sock->sk);
netlbl_secattr_init(&secattr);
rc = netlbl_skbuff_getattr(skb, family, &secattr);
if (rc == 0) {
@@ -4165,7 +3981,7 @@
    (sk->sk_family != PF_INET && sk->sk_family != PF_INET6))
    return;
-ssp = sk->sk_security;
+ssp = smack_sock(sk);
ssp->smk_in = skp;
ssp->smk_out = skp;
/* cssp->smk_packet is already set in smack_inet_csk_clone() */
@@ -4185,7 +4001,7 @@
    }
    u16 family = sk->sk_family;
struct smack_known *skp;
-struct socket_smack *ssp = sk->sk_security;
+struct socket_smack *ssp = smack_sock(sk);
struct netlbl_lsm_secattr secattr;
struct sockaddr_in addr;
struct iphdr *hdr;
@@ -4284,7 +4100,7 @@
static void smack_inet_csk_clone(struct sock *sk,
    const struct request_sock *req)
    {
    -struct socket_smack *ssp = sk->sk_security;
+struct socket_smack *ssp = smack_sock(sk);
    struct smack_known *skp;

    if (req->peer_secid != 0) {
@@ -4316,24 +4132,14 @@
        static int smack_key_alloc(struct key *key, const struct cred *cred,
            unsigned long flags)
        {
        -struct smack_known *skp = smk_of_task(cred->security);
+struct smack_known **blob = smack_key(key);
+struct smack_known *skp = smk_of_task(smack_cred(cred));

        -key->security = skp;
+*blob = skp;
        return 0;
+*
/**
 * smack_key_free - Clear the key security blob
 * @key: the object
 */
- static void smack_key_free(struct key *key)
- {
-  key->security = NULL;
- }
- */

/**
 * smack_key_permission - Smack access on a key
 * @key_ref: gets to the object
 * @cred: the credentials to use
 */
static int smack_key_permission(key_ref_t key_ref, const struct cred *cred, unsigned perm)
{
+ struct smack_known **blob;
+ struct smack_known *skp;
 struct key *keyp;
 struct smk_audit_info ad;
 - struct smack_known *tkp = smk_of_task(cred->security);
 + struct smack_known *tkp = smk_of_task(smack_cred(cred));
 int request = 0;
 int rc;

+ /* Validate requested permissions
 + */
+ if (perm & ~KEY_NEED_ALL)
+ return -EINVAL;
 +
 keyp = key_ref_to_ptr(key_ref);
 if (keyp == NULL)
 return -EINVAL;
 @ @ -4358,7 +4172,9 @@
 * If the key hasn't been initialized give it access so that
 * it may do so.
 * /
- if (keyp->security == NULL)
+ blob = smack_key(keyp);
+ skp = *blob;
+ if (skp == NULL)
 return 0;
 /*
* This should not occur
@@ -4370,12 +4186,12 @@
ad.a.u.key_struct.key = keyp->serial;
ad.a.u.key_struct.key_desc = keyp->description;
#endif
-if (perm & KEY_NEED_READ)
-request = MAY_READ;
+if (perm & (KEY_NEED_READ | KEY_NEED_SEARCH | KEY_NEED_VIEW))
+request |= MAY_READ;
if (perm & (KEY_NEED_WRITE | KEY_NEED_LINK | KEY_NEED_SETATTR))
-request = MAY_WRITE;
-rc = smk_access(tkp, keyp->security, request, &ad);
-rc = smk_bu_note("key access", tkp, keyp->security, request, rc);
+request |= MAY_WRITE;
+rc = smk_access(tkp, skp, request, &ad);
+rc = smk_bu_note("key access", tkp, skp, request, rc);
return rc;
}

static int smack_key_getsecurity(struct key *key, char **_buffer)
{
-struct smack_known *skp = key->security;
+struct smack_known **blob = smack_key(key);
+struct smack_known *skp = *blob;

size_t length;
char *copy;

-if (key->security == NULL) {
+if (skp == NULL) {
 *_buffer = NULL;
 return 0;
 }
@@ -4614,12 +4431,12 @@
 return -ENOMEM;
}

-tsp = new_creds->security;
+tsp = smack_cred(new_creds);

/*
 * Get label from overlay inode and set it in create_sid
 */
-isp = d_inode(dentry->d_parent)->i_security;
+isp = smack_inode(d_inode(d_inode(dentry->d_parent)));
 skp = isp->smk_inode;
 tsp->smk_task = skp;

Open Source Used In 5GaaS Edge AC-4 35267
*new = new_creds;
@@ -4642,8 +4459,8 @@
const struct cred *old,
struct cred *new)
{
-struct task_smack *otsp = old->security;
-struct task_smack *ntsp = new->security;
+struct task_smack *otsp = smack_cred(old);
+struct task_smack *ntsp = smack_cred(new);
struct inode_smack *isp;
int may;

@@ -4656,7 +4473,7 @@
/*
 * the attribute of the containing directory
 */
-isp = d_inode(dentry->d_parent)->i_security;
+isp = smack_inode(d_inode(dentry->d_parent));

if (isp->smk_flags & SMK_INODE_TRANSMUTE) {
    rcu_read_lock();
@@ -4676,13 +4493,25 @@
return 0;
}

+struct lsm_blob_sizes smack_blob_sizes = {
+  .lbs_cred = sizeof(struct task_smack),
+  .lbs_file = sizeof(struct smack_known *),
+  .lbs_inode = sizeof(struct inode_smack),
+  .lbs_ipc = sizeof(struct smack_known *),
+  #ifdef CONFIG_KEYS
+    .lbs_key = sizeof(struct smack_known *),
+  #endif /* CONFIG_KEYS */
+  .lbs_msg_msg = sizeof(struct smack_known *),
+  .lbs_sock = sizeof(struct socket_smack),
+  .lbs_superblock = sizeof(struct superblock_smack),
+};
+
static struct security_hook_list smack_hooks[] __lsm_ro_after_init = {
   LSM_HOOK_INIT(ptrace_access_check, smack_ptrace_access_check),
   LSM_HOOK_INIT(ptrace_traceme, smack_ptrace_traceme),
   LSM_HOOK_INIT(syslog, smack_syslog),
   LSM_HOOK_INIT(sb_alloc_security, smack_sb_alloc_security),
   -LSM_HOOK_INIT(sb_free_security, smack_sb_free_security),
   LSM_HOOK_INIT(sb_copy_data, smack_sb_copy_data),
   LSM_HOOK_INIT(sb_kern_mount, smack_sb_kern_mount),
   LSM_HOOK_INIT(sb_stats, smack_sb_stats),
LSM_HOOK_INIT(bprm_set_creds, smack_bprm_set_creds),

LSM_HOOK_INIT(inode_alloc_security, smack_inode_alloc_security),
-LSM_HOOK_INIT(inode_free_security, smack_inode_free_security),
LSM_HOOK_INIT(inode_init_security, smack_inode_init_security),
LSM_HOOK_INIT(inode_link, smack_inode_link),
LSM_HOOK_INIT(inode_unlink, smack_inode_unlink),
@@ -4711,7 +4539,6 @@
LSM_HOOK_INIT(inode_getsecid, smack_inode_getsecid),

LSM_HOOK_INIT(file_alloc_security, smack_file_alloc_security),
-LSM_HOOK_INIT(file_free_security, smack_file_free_security),
LSM_HOOK_INIT(file_ioctl, smack_file_ioctl),
LSM_HOOK_INIT(file_lock, smack_file_lock),
LSM_HOOK_INIT(file_fcntl, smack_file_fcntl),
@@ -4746,23 +4573,19 @@
LSM_HOOK_INIT(ipc_getsecid, smack_ipc_getsecid),

LSM_HOOK_INIT(msg_msg_alloc_security, smack_msg_msg_alloc_security),
-LSM_HOOK_INIT(msg_msg_free_security, smack_msg_msg_free_security),
LSM_HOOK_INIT(msg_msg_alloc_security, smack_msg_msg_alloc_security),
-LSM_HOOK_INIT(msg_msg_free_security, smack_msg_msg_free_security),
LSM_HOOK_INIT(msg_queue_alloc_security, smack_msg_queue_alloc_security),
-LSM_HOOK_INIT(msg_queue_free_security, smack_msg_queue_free_security),
LSM_HOOK_INIT(msg_queue_associate, smack_msg_queue_associate),
LSM_HOOK_INIT(msg_queue_msgctl, smack_msg_queue_msgctl),
LSM_HOOK_INIT(msg_queue_msgsnd, smack_msg_queue_msgsnd),
LSM_HOOK_INIT(msg_queue_msgrcv, smack_msg_queue_msgrcv),

LSM_HOOK_INIT(shm_alloc_security, smack_shm_alloc_security),
-LSM_HOOK_INIT(shm_free_security, smack_shm_free_security),
LSM_HOOK_INIT(shm_associate, smack_shm_associate),
LSM_HOOK_INIT(shm_shmctl, smash_shm_shmctl),
LSM_HOOK_INIT(shm_shmat, smash_shm_shmat),

LSM_HOOK_INIT(sem_alloc_security, smack_sem_alloc_security),
-LSM_HOOK_INIT(sem_free_security, smack_sem_free_security),
LSM_HOOK_INIT(sem_associate, smack_sem_associate),
LSM_HOOK_INIT(sem_shmctl, smash_sem_shmctl),
LSM_HOOK_INIT(sem_shmat, smash_sem_shmat),
@@ -4785,7 +4608,9 @@
LSM_HOOK_INIT(socket_getpeersec_stream, smack_socket_getpeersec_stream),
LSM_HOOK_INIT(socket_getpeersec_dgram, smack_socket_getpeersec_dgram),
LSM_HOOK_INIT(sk_alloc_security, smack_sk_alloc_security),
+#ifdef SMACK_IPV6_PORT_LABELING
LSM_HOOK_INIT(sk_free_security, smack_sk_free_security),
+#endif
LSM_HOOK_INIT(sock_graft, smash_sock_graft),
LSM_HOOK_INIT(inet_conn_request, smack_inet_conn_request),
LSM_HOOK_INIT(inet_csk_clone, smack_inet_csk_clone),
@@ -4793,7 +4618,6 @@
 /* key management security hooks */
 #ifdef CONFIG_KEYS
 LSM_HOOK_INIT(key_alloc, smack_key_alloc),
-LSM_HOOK_INIT(key_free, smack_key_free),
 LSM_HOOK_INIT(key_permission, smack_key_permission),
 LSM_HOOK_INIT(key_getsecurity, smack_key_getsecurity),
#endif /* CONFIG_KEYS */
@@ -4852,23 +4676,36 @@
 /*
static __init int smack_init(void)
 {
-struct cred *cred;
+static int finish;
+struct cred *cred = (struct cred *) current->cred;
 struct task_smack *tsp;

-if (!security_module_enable("smack"))
+if (!security_module_enable("smack",
 +IS_ENABLED(CONFIG_SECURITY_SMACK_STACKED)))
+return 0;
 +
+if (!finish) {
+security_add_blobs(&smack_blob_sizes);
+finish = 1;
+return 0;
+
smack_inode_cache = KMEM_CACHE(inode_smack, 0);
if (!smack_inode_cache)
 return -ENOMEM;
-tsp = new_task_smack(&smack_known_floor, &smack_known_floor,
-GFP_KERNEL);
-if (tsp == NULL) {
-kmem_cache_destroy(smack_inode_cache);
-return -ENOMEM;
-
+lsm_early_cred(cred);

+/*
+ * Set the security state for the initial task.
+ */
+tspt = smack_cred(cred);
+init_task_smack(tsp, &smack_known_floor, &smack_known_floor);
+

/*
 + * Register with LSM
 + */
+security_add_hooks(smack_hooks, ARRAY_SIZE(smack_hooks), "smack");
smack_enabled = 1;

pr_info("Smack: Initializing.
");
@@ -4882,20 +4719,9 @@
pr_info("Smack: IPv6 Netfilter enabled.

#endif
-/*
- * Set the security state for the initial task.
- */
-cred = (struct cred *) current->cred;
-cred->security = tsp;
-
/* initialize the smack_known_list */
init_smack_known_list();

-/*
- * Register with LSM
- */
-security_add_hooks(smack_hooks, ARRAY_SIZE(smack_hooks), "smack");
-
return 0;
}
--- linux-4.15.0.orig/security/smack/smack_netfilter.c
+++ linux-4.15.0/security/smack/smack_netfilter.c
@@ -31,8 +31,8 @@
struct socket_smack *ssp;
struct smack_known *skp;

-if (sk && sk->sk_security) {
-ssp = sk->sk_security;
+if (sk && smack_sock(sk)) {
+ssp = smack_sock(sk);
  skp = ssp->smk_out;
  skb->secmark = skp->smk_secid;
 }@@ -49,8 +49,8 @@
struct socket_smack *ssp;
struct smack_known *skp;

-if (sk && sk->sk_security) {
-ssp = sk->sk_security;
+if (sk && smack_sock(sk)) {

ssp = smack_sock(sk);
skp = ssp->smk_out;
skb->secmark = skp->smk_secid;
}
--- linux-4.15.0.orig/security/smack/smackfs.c
+++ linux-4.15.0/security/smack/smackfs.c
@@ -883,6 +883,8 @@
  if (format == SMK_FIXED24_FMT &&
      (count < SMK_CIPSOMIN || count > SMK_CIPSOMAX))
    return -EINVAL;
+  if (count > PAGE_SIZE)
+    return -EINVAL;

    data = memdup_user_nul(buf, count);
    if (IS_ERR(data))
@@ -906,11 +908,21 @@
      else
        rule += strlen(skp->smk_known) + 1;

      +if (rule > data + count) {
+        rc = -EOVERFLOW;
+        goto out;
+      }
+      ret = sscanf(rule, "%d", &maplevel);
-    -if (ret != 1 || maplevel > SMACK_CIPSO_MAXLEVEL)
+    -if (ret != 1 || maplevel < 0 || maplevel > SMACK_CIPSO_MAXLEVEL)
        goto out;
    rule += SMK_DIGITLEN;
    +if (rule > data + count) {
    +  rc = -EOVERFLOW;
    +  goto out;
    +}  
    +ret = sscanf(rule, "%d", &maplevel);
    -if (ret != 1 || maplevel > SMACK_CIPSO_MAXLEVEL)
    +if (ret != 1 || maplevel < 0 || maplevel > SMACK_CIPSO_MAXLEVEL)
      goto out;
    rule += SMK_DIGITLEN;
    +if (rule > data + count) {
    +  rc = -EOVERFLOW;
    +  goto out;
    +}  
    +ret = sscanf(rule, "%d", &catlen);
    if (ret != 1 || catlen > SMACK_CIPSO_MAXCATNUM)
      goto out;
@@ -923,6 +935,10 @@
      for (i = 0; i < catlen; i++) {
        rule += SMK_DIGITLEN;
        +if (rule > data + count) {
        +  rc = -EOVERFLOW;
        +  goto out;
        +}  
        ret = sscanf(rule, "%u", &cat);
        if (ret != 1 || cat > SMACK_CIPSO_MAXCATNUM)
goto out;
@@ -1177,7 +1193,7 @@
    return -EPERM;
    if (*ppos != 0)
    return -EINVAL;
-   if (count < SMK_NETLBLADDRMIN)
+   if (count < SMK_NETLBLADDRMIN || count > PAGE_SIZE - 1)
    return -EINVAL;

data = memdup_user_nul(buf, count);
@@ -1437,7 +1453,7 @@
    return -EPERM;
    if (*ppos != 0)
    return -EINVAL;
-   if (count < SMK_NETLBLADDRMIN)
+   if (count < SMK_NETLBLADDRMIN || count > PAGE_SIZE - 1)
    return -EINVAL;

data = memdup_user_nul(buf, count);
@@ -2015,6 +2035,9 @@
    if (!smack_privileged(CAP_MAC_ADMIN))
    return -EPERM;
"
+/* Enough data must be present */
+if (count == 0 || count > PAGE_SIZE)
+    return -EINVAL;
+    data = memdup_user_nul(buf, count);
if (IS_ERR(data))
    return PTR_ERR(data);
@@ -2102,6 +2125,9 @@
    if (!smack_privileged(CAP_MAC_ADMIN))
    return -EPERM;
"
+if (count > PAGE_SIZE)
+    return -EINVAL;
+    data = memdup_user_nul(buf, count);
if (IS_ERR(data))
    return PTR_ERR(data);
@@ -2102,6 +2125,9 @@
    if (!smack_privileged(CAP_MAC_ADMIN))
    return -EPERM;
"
+if (count > PAGE_SIZE)
+    return -EINVAL;
+    data = memdup_user_nul(buf, count);
if (IS_ERR(data))
    return PTR_ERR(data);
@@ -2208,14 +2234,14 @@
static void *load_self_seq_start(struct seq_file *s, loff_t *pos)
{
    struct task_smack *tsp = current_security();
    return smk_seq_start(s, pos, &tsp->smk_rules);
}
@@ -2262,7 +2288,7 @@
static ssize_t smk_write_load_self(struct file *file, const char __user *buf,        
    size_t count, loff_t *ppos)
{
    struct task_smack *tsp = current_security();
    return smk_write_rules_list(file, buf, count, ppos, &tsp->smk_rules, &tsp->smk_rules_lock, SMK_FIXED24_FMT);
@@ -2414,14 +2440,14 @@
static void *load_self2_seq_start(struct seq_file *s, loff_t *pos)
{
    struct task_smack *tsp = current_security();
    return smk_seq_start(s, pos, &tsp->smk_rules);
}
@@ -2467,7 +2493,7 @@
static ssize_t smk_write_load_self2(struct file *file, const char __user *buf,        
    size_t count, loff_t *ppos)
struct task_smack *tsp = current_security();
+struct task_smack *tsp = smack_cred(current_cred());

return smk_write_rules_list(file, buf, count, ppos, &tsp->smk_rules,
    &tsp->smk_rules_lock, SMK_LONG_FMT);
@@ -2655,6 +2681,10 @@
    if (!smack_privileged(CAP_MAC_ADMIN))
        return -EPERM;

+/* Enough data must be present */
+if (count == 0 || count > PAGE_SIZE)
+return -EINVAL;
+
    data = memdup_user_nul(buf, count);
    if (IS_ERR(data))
        return PTR_ERR(data);
@@ -2681,14 +2711,14 @@
static void *relabel_self_seq_start(struct seq_file *s, loff_t *pos)
{  
    -struct task_smack *tsp = current_security();
    +struct task_smack *tsp = smack_cred(current_cred());

    return smk_seq_start(s, pos, &tsp->smk_relabel);
}
static void *relabel_self_seq_next(struct seq_file *s, void *v, loff_t *pos)
{  
    -struct task_smack *tsp = current_security();
    +struct task_smack *tsp = smack_cred(current_cred());

    return smk_seq_next(s, v, pos, &tsp->smk_relabel);
}
@@ -2736,7 +2766,6 @@
static ssize_t smk_write_relabel_self(struct file *file, const char __user *buf,
size_t count, loff_t *ppos)
{  
    -struct task_smack *tsp = current_security();
    char *data;
    int rc;
LIST_HEAD(list_tmp);
@@ -2748,10 +2777,13 @@
return -EPERM;
/*
+ * No partial write.
+ * Enough data must be present.
if (!ppos != 0)
    return -EINVAL;
+if (count == 0 || count > PAGE_SIZE)
    return -EINVAL;

data = memdup_user_nul(buf, count);
if (IS_ERR(data))
    @ @ -2761,11 +2793,21 @ @
kfree(data);

if (!rc || (rc == -EINVAL && list_empty(&list_tmp))) {
    +struct cred *new;
    +struct task_smack *tsp;
    +
    +new = prepare_creds();
    +if (!new) {
    +rc = -ENOMEM;
    +goto out;
    +}
    +tsp = new->security;
    smk_destroy_label_list(&tsp->smk_relabel);
    list_splice(&list_tmp, &tsp->smk_relabel);
    +commit_creds(new);
    return count;
}

+out:
    smk_destroy_label_list(&list_tmp);
    return rc;

--- linux-4.15.0.orig/security/tomoyo/common.c
+++ linux-4.15.0/security/tomoyo/common.c
@@ -2254,9 +2254,9 @@
     [TOMOYO_MEMORY_QUERY]  = "query message:",
     ];

-/* Timestamp counter for last updated. */
-static unsigned int tomoyo_stat_updated[TOMOYO_MAX_POLICY_STAT];
-/* Counter for number of updates. */
+static atomic_t tomoyo_stat_updated[TOMOYO_MAX_POLICY_STAT];
+/* Timestamp counter for last updated. */
 static time64_t tomoyo_stat_modified[TOMOYO_MAX_POLICY_STAT];

-/**
- @ @ -2268,10 +2268,7 @ @
- */
 void tomoyo_update_stat(const u8 index)
{ 
  /*
   * I don't use atomic operations because race condition is not fatal.
   */
  -tomyo_stat_updated[index]++;
  +atomic_inc(&tomyo_stat_updated[index]);
  tomyo_stat_modified[index] = ktime_get_real_seconds();
}

for (i = 0; i < TOMOYO_MAX_POLICY_STAT; i++) {
    tomyo_io_printf(head, "Policy %-30s %10u",
                   tomyo_policy_headers[i],
                   tomyo_stat_updated[i]);
    + atomic_read(&tomyo_stat_updated[i]);
    if (tomyo_stat_modified[i]) {
        struct tomyo_time stamp;
        tomyo_convert_time(tomyo_stat_modified[i], &stamp);
    --- linux-4.15.0.orig/security/tomoyo/common.h
    +++ linux-4.15.0/security/tomoyo/common.h
    @@ -29,6 +29,7 @@
        include <linux/inet.h>
        include <linux/inet6.h>
        include <linux/un.h>
        +include <linux/lsm_hooks.h>
        include <net/sock.h>
        include <net/af_unix.h>
        include <net/ip.h>
    @@ -1062,6 +1063,7 @@
        extern bool tomyo_policy_loaded;
        +extern bool tomyo_enabled;
        extern const char * const tomyo_condition_keyword
            [TOMOYO_MAX_CONDITION_KEYWORD];
        extern const char * const tomyo_dif[TOMOYO_MAX_DOMAIN_INFO_FLAGS];
        @@ -1085,6 +1087,7 @@
        extern struct tomyo_policy_namespace tomyo_kernel_namespace;
        extern unsigned int tomyo_memory_quota[TOMOYO_MAX_MEMORY_STAT];
        extern unsigned int tomyo_memory_used[TOMOYO_MAX_MEMORY_STAT];
        +extern struct lsm_blob_sizes tomyo_blob_sizes;

        ******* Inlined functions. *******

    @@ -1197,13 +1200,35 @@
  }
}

/****
+ * tomoyo_cred - Get a pointer to the tomoyo cred security blob
+ * @cred - the relevant cred
+ *
+ * Returns pointer to the tomoyo cred blob.
+ */
+static inline struct tomoyo_domain_info **tomoyo_cred(const struct cred *cred)
+{
+#ifdef CONFIG_SECURITY_STACKING
+return cred->security + tomoyo_blob_sizes.lbs_cred;
+#else
+return cred->security;
+#endif
+
+/**
+ * tomoyo_domain - Get "struct tomoyo_domain_info" for current thread.
+ *
+ * Returns pointer to "struct tomoyo_domain_info" for current thread.
+ */
+static inline struct tomoyo_domain_info *tomoyo_domain(void)
+{
+  return current_cred()->security;
+  const struct cred *cred = current_cred();
+  struct tomoyo_domain_info **blob;
+
+  if (cred->security == NULL)
+    return NULL;
+
+  blob = tomoyo_cred(cred);
+  return *blob;
+}

/**
@@ -1216,7 +1241,9 @@
static inline struct tomoyo_domain_info *tomoyo_real_domain(struct task_struct
+struct tomoyo_domain_info **blob = tomoyo_cred(get_task_cred(task));
+ return *blob;
+}

/**
--- linux-4.15.0.orig/security/tomoyo/domain.c
+++ linux-4.15.0/security/tomoyo/domain.c
@@ -678,6 +678,7 @@
*/
int tomoyo_find_next_domain(struct linux_binprm *bprm)
{
+struct tomoyo_domain_info **blob;
struct tomoyo_domain_info *old_domain = tomoyo_domain();
struct tomoyo_domain_info *domain = NULL;
const char *original_name = bprm->filename;
@@ -843,7 +844,8 @@
domain = old_domain;
/* Update reference count on "struct tomoyo_domain_info". */
atomic_inc(&domain->users);
-bprm->cred->security = domain;
+blob = tomoyo_cred(bprm->cred);
+*blob = domain;
kfree(exename.name);
if (!retval) {
    ee->r.domain = domain;
--- linux-4.15.0.orig/security/tomoyo/securityfs_if.c
+++ linux-4.15.0/security/tomoyo/securityfs_if.c
@@ -71,9 +71,12 @@
if (!cred) {
    error = -ENOMEM;
} else {
-struct tomoyo_domain_info *old_domain =
-cred->security;
-cred->security = new_domain;
++struct tomoyo_domain_info **blob;
+struct tomoyo_domain_info *old_domain;
+
+blob = tomoyo_cred(cred);
+old_domain = *blob;
+*blob = new_domain;
atomic_inc(&new_domain->users);
atomic_dec(&old_domain->users);
commit_creds(cred);
@@ -234,10 +237,14 @@
 */
static int __init tomoyo_interface_init(void)
{
+struct tomoyo_domain_info *domain;
struct dentry *tomoyo_dir;

+if (!tomoyo_enabled)
+return 0;
+domain = tomoyo_domain();
/* Don't create securityfs entries unless registered. */
-if (current_cred()->security != &tomoyo_kernel_domain)
+if (domain != &tomoyo_kernel_domain)
    return 0;


tomoyo_dir = securityfs_create_dir("tomoyo", NULL);
--- linux-4.15.0.orig/security/tomoyo/tomoyo.c
+++ linux-4.15.0/security/tomoyo/tomoyo.c
@@ -18,7 +18,9 @@
 /*
 static int tomoyo_cred_alloc_blank(struct cred *new, gfp_t gfp)
 { 
- new->security = NULL;
+ struct tomoyo_domain_info **blob = tomoyo_cred(new);
+ *blob = NULL;
 return 0;
 }
@@ -34,8 +36,13 @@
 static int tomoyo_cred_prepare(struct cred *new, const struct cred *old,
 gfp_t gfp)
 { 
- struct tomoyo_domain_info *domain = old->security;
- new->security = domain;
+ struct tomoyo_domain_info **old_blob = tomoyo_cred(old);
+ struct tomoyo_domain_info **new_blob = tomoyo_cred(new);
+ struct tomoyo_domain_info *domain;
+ 
+ domain = *old_blob;
+ *new_blob = domain;
+ 
 if (domain)
 atomic_inc(&domain->users);
 return 0;
@@ -59,7 +66,9 @@
 */
 static void tomoyo_cred_free(struct cred *cred)
 { 
- struct tomoyo_domain_info *domain = cred->security;
- struct tomoyo_domain_info **blob = tomoyo_cred(cred);
+ struct tomoyo_domain_info *domain = *blob;
+ 
 if (domain)
 atomic_dec(&domain->users);
 } 
@@ -73,6 +82,9 @@
 */
 static int tomoyo_bprm_set_creds(struct linux_binprm *bprm)
 { 
+ struct tomoyo_domain_info **blob;
+ struct tomoyo_domain_info *domain;


+ /*
 * Do only if this function is called for the first time of an execve
 * operation.
 @@ -93,13 +105,14 @@
 * stored inside "bprm->cred->security" will be acquired later inside
 * tomoyo_find_next_domain().
 */
-atomic_dec(&((struct tomoyo_domain_info *)
- bprm->cred->security)->users);
+blob = tomoyo_cred(bprm->cred);
+domain = *blob;
+atomic_dec(&domain->users);
 */
 * Tell tomoyo_bprm_check_security() is called for the first time of an
 * execve operation.
 */
-bprm->cred->security = NULL;
+*blob = NULL;
 return 0;
}

@@ -112,8 +125,11 @@
*/
static int tomoyo_bprm_check_security(struct linux_binprm *bprm)
{
-struct tomoyo_domain_info *domain = bprm->cred->security;
+struct tomoyo_domain_info **blob;
+struct tomoyo_domain_info *domain;
+
+blob = tomoyo_cred(bprm->cred);
+domain = *blob;
/*
 * Execute permission is checked against pathname passed to do_execve()
 * using current domain.
@@ -493,6 +509,10 @@
return tomoyo_socket_sendmsg_permission(sock, msg, size);
}
+struct lsm_blob_sizes tomoyo_blob_sizes = {
+.lbs_cred = sizeof(struct tomoyo_domain_info *),
+};
+
/*
 * tomoyo_security_ops is a "struct security_operations" which is used for
 * registering TOMOYO.
@@ -531,6 +551,8 @@
/* Lock for GC. */

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DEFINE_SRCU(tomoyo_ss);

+bool tomoyo_enabled;
+
/**
 * tomoyo_init - Register TOMOYO Linux as a LSM module.
 *
@@ -538,14 +560,29 @@
 */
static int __init tomoyo_init(void)
{
+static int finish;
struct cred *cred = (struct cred *) current_cred();
+struct tomoyo_domain_info **blob;
+
+if (!security_module_enable("tomoyo",
+IS_ENABLED(CONFIG_SECURITY_TOMOYO_STACKED))) {
+tomoyo_enabled = false;
+return 0;
+}
+tomoyo_enabled = true;

-if (!security_module_enable("tomoyo"))
+if (!finish) {
+security_add_blobs(&tomoyo_blob_sizes);
+finish = 1;
return 0;
+
+/* register ourselves with the security framework */
security_add_hooks(tomoyo_hooks, ARRAY_SIZE(tomoyo_hooks), "tomoyo");
printk(KERN_INFO "TOMOYO Linux initialized\n");
-cred->security = &tomoyo_kernel_domain;
+lsm_early_cred(cred);
+blob = tomoyo_cred(cred);
+*blob = &tomoyo_kernel_domain;
tomoyo_mm_init();
return 0;
}
--- linux-4.15.0.orig/security/yama/yama_lsm.c
+++ linux-4.15.0/security/yama/yama_lsm.c
@@ -373,7 +373,9 @@
 break;
case YAMA_SCOPE_RELATIONAL:
 rcu_read_lock();
-if (!task_is_descendant(current, child) &
+if (!pid_alive(child))
+rc = -EPERM;

+if (!rc && !task_is_descendant(current, child) &&
    !ptracer_exception_found(current, child) &&
    !ns_capable(__task_cred(child)->user_ns, CAP_SYS_PTRACE))
rc = -EPERM;
--- linux-4.15.0.orig/snapcraft.yaml
+++ linux-4.15.0/snapcraft.yaml
@@ -0,0 +1,36 @@
+name: pc-kernel
+version: null
+version-script: |
+  . debian/debian.env
+  dpkg-parsechangelog -l $DEBIAN/changelog -S version
+summary: The Ubuntu generic Linux kernel
+description: This Ubuntu generic Linux kernel
+grade: stable
+confinement: strict
+type: kernel
+
+parts:
+  kernel:
+    plugin: kernel
+    source: .
+    source-type: git
+    kconfigflavour: generic
+    kconfigs:
+    - CONFIG_DEBUG_INFO=n
+    override-build: |
+    cp debian/scripts/retpoline-extract-one \
+    $SNAPCRAFT_PART_BUILD/scripts/ubuntu-retpoline-extract-one
+    snapcraftctl build
+    kernel-with-firmware: false
+ firmware:
+    plugin: nil
+ stage-packages:
+    - linux-firmware
+ organize:
+    lib/firmware: firmware
+ prime:
+    - -usr
+    - -lib
+ build-packages:
+    - cpio
+    - libssl-dev
--- linux-4.15.0.orig/sound/ac97/bus.c
+++ linux-4.15.0/sound/ac97/bus.c
@@ -100,16 +100,12 @@
dev_set_name(&codec->dev, "%s:%u", dev_name(ac97_ctrl->parent), idx);
ret = device_add(&codec->dev);
-if (ret)
-goto err_free_codec;
+if (ret) {
+put_device(&codec->dev);
+return ret;
+
return 0;
-err_free_codec:
-put_device(&codec->dev);
-kfree(codec);
-ac97_ctrl->codecs[idx] = NULL;
-
-return ret;
}

unsigned int snd_ac97_bus_scan_one(struct ac97_controller *adrv,
@@ -503,7 +499,7 @@
int ret;

ret = pm_runtime_get_sync(dev);
-if (ret)
+if (ret < 0)
return ret;

ret = adrv->remove(adev);
@@ -511,6 +507,8 @@
if (ret == 0)
    ac97_put_disable_clk(adev);
    +pm_runtime_disable(dev);
    +
    return ret;
}

--- linux-4.15.0.orig/sound/ac97/snd_ac97_compat.c
+++ linux-4.15.0/sound/ac97/snd_ac97_compat.c
@@ -15,6 +15,11 @@
    #include "ac97_core.h"

+static void compat_ac97_release(struct device *dev)
+{
+    kfree(to_ac97_t(dev));
+}
+static void compat_ac97_reset(struct snd_ac97 *ac97)
struct ac97_codec_device *adev = to_ac97_device(ac97->private_data);

struct snd_ac97 *snd_ac97_compat_alloc(struct ac97_codec_device *adev)
{
    struct snd_ac97 *ac97;
    int ret;

    ac97 = kzalloc(sizeof(struct snd_ac97), GFP_KERNEL);
    if (ac97 == NULL)
        return ERR_PTR(-ENOMEM);

    ac97->dev = adev->dev;
    ac97->private_data = adev;
    ac97->bus = &compat_soc_ac97_bus;
+    ac97->dev.parent = &adev->dev;
+    ac97->dev.release = compat_ac97_release;
+    dev_set_name(&ac97->dev, "%s-compat", dev_name(&adev->dev));
+    ret = device_register(&ac97->dev);
+    if (ret) {
+        put_device(&ac97->dev);
+        return ERR_PTR(ret);
+    }
+    return ac97;
}

EXPORT_SYMBOL_GPL(snd_ac97_compat_alloc);

void snd_ac97_compat_release(struct snd_ac97 *ac97)
{
    kfree(ac97);
    device_unregister(&ac97->dev);
}

EXPORT_SYMBOL_GPL(snd_ac97_compat_release);

--- linux-4.15.0.orig/sound/aoa/codecs/onyx.c
+++ linux-4.15.0/sound/aoa/codecs/onyx.c
@@ -74,8 +74,10 @@
    return 0;
}

v = i2c_smbus_read_byte_data(onyx->i2c, reg);
-    if (v < 0)
-        *value = 0;
+    if (v < 0) {
+        *value = 0;
+        return -1;
+    }
    *value = (u8)v;

onyx->cache[ONYX_REG_CONTROL-FIRSTREGISTER] = *value;
return 0;
--- linux-4.15.0.orig/sound/aoa/core/gpio-feature.c
+++ linux-4.15.0/sound/aoa/core/gpio-feature.c
@@ -88,8 +88,10 @@
}
}

reg = of_get_property(np, "reg", NULL);
-if (!reg)
+if (!reg) {
+of_node_put(np);
return NULL;
+
}*gpioptr = *reg;

--- linux-4.15.0.orig/sound/core/compress_offload.c
+++ linux-4.15.0/sound/core/compress_offload.c
@@ -529,7 +529,8 @@
{
/* first let's check the buffer parameter's */
if (params->buffer.fragment_size == 0 ||
-    params->buffer.fragments > INT_MAX / params->buffer.fragment_size)
+    params->buffer.fragments > U32_MAX / params->buffer.fragment_size ||
+    params->buffer.fragments == 0)
return -EINVAL;
/* now codec parameters */
 @@ -574,10 +575,7 @@
stream->metadata_set = false;
stream->next_track = false;

-if (stream->direction == SND_COMPRESS_PLAYBACK)
-  stream->runtime->state = SNDRV_PCM_STATE_SETUP;
-else
-  stream->runtime->state = SNDRV_PCM_STATE_PREPARED;
+stream->runtime->state = SNDRV_PCM_STATE_SETUP;
 } else {
return -EPERM;
}

@@ -693,8 +691,17 @@
{
int retval;

-if (stream->runtime->state != SNDRV_PCM_STATE_PREPARED)
+switch (stream->runtime->state) {
+case SNDRV_PCM_STATE_SETUP:
+if (stream->direction != SND_COMPRESS_CAPTURE)
return -EPERM;
+break;
+case SNDRV_PCM_STATE_PREPARED:
+break;
+default:
return -EPERM;
+
retval = stream->ops->trigger(stream, SNDRV_PCM_TRIGGER_START);
if (!retval)
stream->runtime->state = SNDRV_PCM_STATE_RUNNING;
@@ -705,11 +712,20 @@
{
    int retval;

    -if (stream->runtime->state == SNDRV_PCM_STATE_PREPARED ||
    -stream->runtime->state == SNDRV_PCM_STATE_SETUP)
+switch (stream->runtime->state) {
+    +case SNDRV_PCM_STATE_OPEN:
+    +case SNDRV_PCM_STATE_SETUP:
+    +case SNDRV_PCM_STATE_PREPARED:
    return -EPERM;
+    +default:
+    +break;
+    +}
+
    retval = stream->ops->trigger(stream, SNDRV_PCM_TRIGGER_STOP);
    if (!retval) {
        /* clear flags and stop any drain wait */
        +stream->partial_drain = false;
        +stream->metadata_set = false;
        snd_compr_drain_notify(stream);
        stream->runtime->total_bytes_available = 0;
        stream->runtime->total_bytes_transferred = 0;
@@ -795,9 +811,17 @@
{
    int retval;

    -if (stream->runtime->state == SNDRV_PCM_STATE_PREPARED ||
    -stream->runtime->state == SNDRV_PCM_STATE_SETUP)
+switch (stream->runtime->state) {
+    +case SNDRV_PCM_STATE_OPEN:
+    +case SNDRV_PCM_STATE_SETUP:
+    +case SNDRV_PCM_STATE_PAUSED:
+    +case SNDRV_PCM_STATE_XRUN:
    return -EPERM;
+    +default:
+    +return -EPIPE;
default:
break;
}

retval = stream->ops->trigger(stream, SND_COMPR_TRIGGER_DRAIN);
if (retval) {
    pr_debug("Partial drain returned failure
");
    @ @ -817.6 +841.10 @@
    if (stream->runtime->state != SNDRV_PCM_STATE_RUNNING)
        return -EPERM;

    /* next track doesn't have any meaning for capture streams */
    if (stream->direction == SND_COMPRESS_CAPTURE)
        return -EPERM;

    /* you can signal next track if this is intended to be a gapless stream
    * and current track metadata is set
    */
    @ @ -834.13 +862.28 @@
    static int snd_compr_partial_drain(struct snd_compr_stream *stream)
        int retval;
        -if (stream->runtime->state == SNDRV_PCM_STATE_PREPARED ||
           -stream->runtime->state == SNDRV_PCM_STATE_SETUP)
           +
           +switch (stream->runtime->state) {
           +case SNDRV_PCM_STATE_OPEN:
           +case SNDRV_PCM_STATE_SETUP:
           +case SNDRV_PCM_STATE_PREPARED:
           +case SNDRV_PCM_STATE_PAUSED:
           +return -EPERM;
           +case SNDRV_PCM_STATE_XRUN:
           +return -EPIPE;
           +default:
           +break;
           +}
           +
           /* partial drain doesn't have any meaning for capture streams */
           +if (stream->direction == SND_COMPRESS_CAPTURE)
           return -EPERM;

           /* stream can be drained only when next track has been signalled */
           if (stream->next_track == false)
               return -EPERM;
           stream->partial_drain = true;
           retval = stream->ops->trigger(stream, SND_COMPR_TRIGGER_PARTIAL_DRAIN);
           if (retval) {
               pr_debug("Partial drain returned failure\n");
               }
```c
/* add a new kcontrol object; call with card->controls_rwlock locked */
+static int __snd_ctl_add(struct snd_card *card, struct snd_kcontrol *kcontrol)
+{
+struct snd_ctl_elem_id id;
+unsigned int idx;
+unsigned int count;
+
+id = kcontrol->id;
+if (id.index > UINT_MAX - kcontrol->count)  
+return -EINVAL;
+
+if (snd_ctl_find_id(card, &id)) {  
+dev_err(card->dev,  
+"control %i:%i:%i:%s:%i is already present\n",  
+id.iface, id.device, id.subdevice, id.name, id.index);
+return -EBUSY;
+}
+
+if (snd_ctl_find_hole(card, kcontrol->count) < 0)  
+return -ENOMEM;
+
+list_add_tail(&kcontrol->list, &card->controls);
+card->controls_count += kcontrol->count;
+kcontrol->id.numid = card->last_numid + 1;
+card->last_numid += kcontrol->count;
+
+id = kcontrol->id;
+count = kcontrol->count;
+for (idx = 0; idx < count; idx++, id.index++, id.numid++)  
+snd_ctl_notify(card, SND_RT_CTL_EVENT_MASK_ADD, &id);
+
+return 0;
+}
+
/**
 * snd_ctl_add - add the control instance to the card
 * @card: the card instance
 * @id: the control instance
 */
int snd_ctl_add(struct snd_card *card, struct snd_kcontrol *kcontrol)
{
-struct snd_ctl_elem_id id;
```
-unsigned int idx;
-unsigned int count;
int err = -EINVAL;

if (!kcontrol)
    return err;
if (snd_BUG_ON(!card || !kcontrol->info))
    goto error;
-id = kcontrol->id;
-if (id.index > UINT_MAX - kcontrol->count)
    -goto error;
down_write(&card->controls_rwsem);
-if (snd_ctl_find_id(card, &id)) {
    -up_write(&card->controls_rwsem);
    -dev_err(card->dev, "control %i:%i:%i:%s:%i is already present\n",
            -id.iface,
            -id.device,
            -id.subdevice,
            -id.name,
            -id.index);
    -err = -EBUSY;
    -goto error;
    -}
-if (snd_ctl_find_hole(card, kcontrol->count) < 0) {
    -up_write(&card->controls_rwsem);
    -err = -ENOMEM;
    -goto error;
    -}
-list_add_tail(&kcontrol->list, &card->controls);
-card->controls_count += kcontrol->count;
-kcontrol->id.numid = card->last_numid + 1;
-card->last_numid += kcontrol->count;
-id = kcontrol->id;
-count = kcontrol->count;
+err = __snd_ctl_add(card, kcontrol);
up_write(&card->controls_rwsem);
-for (idx = 0; idx < count; idx++, id.index++, id.numid++)
   -snd_ctl_notify(card, SNDRV_CTL_EVENT_MASK_ADD, &id);
+if (err < 0)
+goto error;
return 0;

error:
@@ -888,7 +895,7 @@
index_offset = snd_ctl_get_ioff(kctl, &control->id);
vd = &kctl->vd[index_offset];
-if (!(vd->access & SNDRV_CTL_ELEM_ACCESS_READ) & kctl->get == NULL)
+if (!(vd->access & SNDRV_CTL_ELEM_ACCESS_READ) || kctl->get == NULL)
    return -EPERM;

    snd_ctl_build_ioff(&control->id, kctl, index_offset);
@@ -1360,9 +1367,12 @@
kctl->tlv.c = snd_ctl_elem_user_tlv;

    /* This function manage to free the instance on failure. */
    -err = snd_ctl_add(card, kctl);
    -if (err < 0)
    -return err;
    +down_write(&card->controls_rwsem);
    +err = __snd_ctl_add(card, kctl);
    +if (err < 0) {
    +snd_ctl_free_one(kctl);
    +goto unlock;
    +}
    offset = snd_ctl_get_ioff(kctl, &info->id);
    snd_ctl_build_ioff(&info->id, kctl, offset);
    /*
    @@ -1373,11 +1383,11 @@
    * which locks the element.
    */

    -down_write(&card->controls_rwsem);
    card->user_ctl_count++;
    -up_write(&card->controls_rwsem);

    -return 0;
    + unlock:
    +up_write(&card->controls_rwsem);
    +return err;
    }

static int snd_ctl_elem_add_user(struct snd_ctl_file *file,
@@ -1457,8 +1467,9 @@
    if (kctl->tlv.c == NULL)
        return -ENXIO;
    /* When locked, this is unavailable. */
    -if (vd->owner != NULL && vd->owner != file)
    +if (op_flag != SNDRV_CTL_TLV_OP_READ &&
        -vd->owner != NULL && vd->owner != file)
        return -EPERM;
        
        return kctl->tlv.c(kctl, op_flag, size, buf);

if (copy_from_user(&data->id, &data32->id, sizeof(data->id)) ||
    copy_from_user(&data->type, &data32->type, 3 * sizeof(u32)))
  goto error;
  if (get_user(data->owner, &data32->owner) ||
      get_user(data->type, &data32->type))
    goto error;
  switch (data->type) {
    case SNDRV_CTL_ELEM_TYPE_BOOLEAN:
    /* check whether the dsp was already loaded */
    case SNDRV_CTL_ELEM_TYPE_BOOLEAN:
      if (hw->dsp_loaded & (1 << info.index))
        return -EBUSY;
      if (!access_ok(VERIFY_READ, info.image, info.length))
        return -EFAULT;
      err = hw->ops.dsp_load(hw, &info);
      if (err < 0)
        return err;
      hw->dsp_loaded |= (1u << info.index);
      return 0;
    }
-if (parent)
+if (parent) {
+mutex_lock(&parent->access);
list_add_tail(&entry->list, &parent->children);
+mutex_unlock(&parent->access);
+
return entry;
}

@@ -805,7 +810,12 @@
list_for_each_entry_safe(p, n, &entry->children, list)
snd_info_free_entry(p);

-list_del(&entry->list);
+p = entry->parent;
+if (p) {
+mutex_lock(&p->access);
+list_del(&entry->list);
+mutex_unlock(&p->access);
+
} kfree(entry->name);
if (entry->private_free)
entry->private_free(entry);
--- linux-4.15.0.orig/sound/core/init.c
+++ linux-4.15.0/sound/core/init.c
@@ -405,17 +405,8 @@
return 0;
}

card->shutdown = 1;
-spin_unlock(&card->files_lock);

-/\* phase 1: disable fops (user space) operations for ALSA API */
-mutex_lock(&snd_card_mutex);
-snd_cards[card->number] = NULL;
-clear_bit(card->number, snd_cards_lock);
-mutex_unlock(&snd_card_mutex);
-
-/\* phase 2: replace file->f_op with special dummy operations */
-
-spin_lock(&card->files_lock);
+/* replace file->f_op with special dummy operations */
list_for_each_entry(mfile, &card->files_list, list) {
 /* it's critical part, use endless loop */
 /* we have no room to fail */
@@ -430,7 +421,7 @@
}
spin_unlock(&card->files_lock);
-/* phase 3: notify all connected devices about disconnection */
+/* notify all connected devices about disconnection */
/* at this point, they cannot respond to any calls except release() */

#if IS_ENABLED(CONFIG_SND_MIXER_OSS)
@@ -446,6 +437,13 @@
device_del(&card->card_dev);
card->registered = false;
}
+
+/* disable fops (user space) operations for ALSA API */
+mutex_lock(&snd_card_mutex);
+snd_cards[card->number] = NULL;
+clear_bit(card->number, snd_cards_lock);
+mutex_unlock(&snd_card_mutex);
+
ifdef CONFIG_PM
wake_up(&card->power_sleep);
#endif
--- linux-4.15.0.orig/sound/core/memalloc.c
+++ linux-4.15.0/sound/core/memalloc.c
@@ -242,16 +242,12 @@
 int err;

 while ((err = snd_dma_alloc_pages(type, device, size, dmab)) < 0) {
- size_t aligned_size;
- if (err != -ENOMEM)
- return err;
- if (size <= PAGE_SIZE)
- return -ENOMEM;
- aligned_size = PAGE_SIZE << get_order(size);
- if (size != aligned_size)
- size = aligned_size;
- else
- size >>= 1;
+ size >>= 1;
+ size = PAGE_SIZE << get_order(size);
 }
 if (! dmab->area)
 return -ENOMEM;
--- linux-4.15.0.orig/sound/core/oss/linear.c
+++ linux-4.15.0/sound/core/oss/linear.c
@@ -107,6 +107,8 @@

 if (frames > dst_channels[0].frames)
 frames = dst_channels[0].frames;

Open Source Used In 5GaaS Edge AC-4 35294
convert(plugin, src_channels, dst_channels, frames);
return frames;
}
--- linux-4.15.0.orig/sound/core/oss/mulaw.c
+++ linux-4.15.0/sound/core/oss/mulaw.c
@@ -269,6 +269,8 @@
}
}
#endif
+if (frames > dst_channels[0].frames)
+frames = dst_channels[0].frames;
data = (struct mulaw_priv *)plugin->extra_data;
data->func(plugin, src_channels, dst_channels, frames);
return frames;
@@ -327,8 +329,8 @@
snd_BUG();
return -EINVAL;
}
-if (snd_BUG_ON(!snd_pcm_format_linear(format->format)))
-return -ENXIO;
+if (!snd_pcm_format_linear(format->format))
+return -EINVAL;

err = snd_pcm_plugin_build(plug, "Mu-Law<->linear conversion",
                     src_format, dst_format,
--- linux-4.15.0.orig/sound/core/oss/pcm_oss.c
+++ linux-4.15.0/sound/core/oss/pcm_oss.c
@@ -708,6 +708,8 @@
oss_buffer_size = snd_pcm_plug_client_size(substream,
                              snd_pcm_hw_param_value_max(slave_params, SNDRV_PCM_HW_PARAM_BUFFER_SIZE, NULL)) *
oss_frame_size;
+if (!oss_buffer_size)
+return -EINVAL;
oss_buffer_size = rounddown_pow_of_two(oss_buffer_size);
if (atomic_read(&substream->mmap_count)) {
if (oss_buffer_size > runtime->oss.mmap_bytes)
@@ -743,17 +745,21 @@
min_period_size = snd_pcm_plug_client_size(substream,
                              snd_pcm_hw_param_value_min(slave_params, SNDRV_PCM_HW_PARAM_PERIOD_SIZE, NULL));
-min_period_size *= oss_frame_size;
-min_period_size = roundup_pow_of_two(min_period_size);
-if (oss_period_size < min_period_size)
-oss_period_size = min_period_size;
+if (min_period_size) {
+    min_period_size *= oss_frame_size;
+    min_period_size = roundup_pow_of_two(min_period_size);
if (oss_period_size < min_period_size)
  oss_period_size = min_period_size;
+
max_period_size = snd_pcm_plug_client_size(substream,
    snd_pcm_hw_param_value_max(slave_params, SNDRV_PCM_HW_PARAM_PERIOD_SIZE, NULL));
  -max_period_size *= oss_frame_size;
  -max_period_size = roundup_pow_of_two(max_period_size);
  -if (oss_period_size > max_period_size)
  -oss_period_size = max_period_size;
  +if (max_period_size) {
    +max_period_size *= oss_frame_size;
    +max_period_size = roundup_pow_of_two(max_period_size);
    +if (oss_period_size > max_period_size)
    +oss_period_size = max_period_size;
  +}

oss_periods = oss_buffer_size / oss_period_size;

@@ -823,8 +829,25 @@
return snd_pcm_hw_param_near(substream, params, SNDRV_PCM_HW_PARAM_RATE, best_rate, NULL);
}

-static int snd_pcm_oss_change_params(struct snd_pcm_substream *substream,
-    bool trylock)
+/* parameter locking: returns immediately if tried during streaming */
+static int lock_params(struct snd_pcm_runtime *runtime)
+{
+  if (mutex_lock_interruptible(&runtime->oss.params_lock))
+    return -ERESTARTSYS;
+  if (atomic_read(&runtime->oss.rw_ref)) {
+    mutex_unlock(&runtime->oss.params_lock);
+    return -EBUSY;
+  }
+  return 0;
+}
+
+static void unlock_params(struct snd_pcm_runtime *runtime)
+{
+  mutex_unlock(&runtime->oss.params_lock);
+}
+ /* call with params_lock held */
+static int snd_pcm_oss_change_params_locked(struct snd_pcm_substream *substream)
+{
+  struct snd_pcm_runtime *runtime = substream->runtime;
+  struct snd_pcm_hw_params *sparams;
+  @ @ -838,11 +861,8 @@
const struct snd_mask *sformat_mask;
struct snd_mask mask;

-if (trylock) {
-if (!mutex_trylock(&runtime->oss.params_lock))
-return -EAGAIN;
-} else if (mutex_lock_interruptible(&runtime->oss.params_lock))
-return -EINTR;
+if (!runtime->oss.params)
+return 0;
sw_params = kzalloc(sizeof(*sw_params), GFP_KERNEL);
params = kmalloc(sizeof(*params), GFP_KERNEL);
sparams = kmalloc(sizeof(*sparams), GFP_KERNEL);
@@ -926,6 +946,28 @@
oss_frame_size = snd_pcm_format_physical_width(params_format(params)) *
 params_channels(params) / 8;
+err = snd_pcm_oss_period_size(substream, params, sparams);
+if (err < 0)
+goto failure;
+
+n = snd_pcm_plug_slave_size(substream, runtime->oss.period_bytes / oss_frame_size);
+err = snd_pcm_hw_param_near(substream, sparams, SNDRV_PCM_HW_PARAM_PERIOD_SIZE, n, NULL);    
+if (err < 0)
+goto failure;
+
+err = snd_pcm_hw_param_near(substream, sparams, SNDRV_PCM_HW_PARAM_PERIODS,  
+    runtime->oss.periods, NULL);
+if (err < 0)
+goto failure;
+
+snd_pcm_kernel_ioctl(substream, SNDRV_PCM_IOCTL_DROP, NULL);
+
+err = snd_pcm_kernel_ioctl(substream, SNDRV_PCM_IOCTL_HW_PARAMS, sparams);
+if (err < 0) {
+pcm_dbg(substream->pcm, "HW_PARAMS failed: %i\n", err);
+goto failure;
+}
+#ifdef CONFIG_SND_PCM_OSS_PLUGINS
snd_pcm_oss_plugin_clear(substream);
if (!direct) {
@@ -960,27 +1002,6 @@
}
#endif

-err = snd_pcm_oss_period_size(substream, params, sparams);
-if (err < 0)
goto failure;
-
-n = snd_pcm_plug_slave_size(substream, runtime->oss.period_bytes / oss_frame_size);
-err = snd_pcm_hw_param_near(substream, sparams, SNDRC_PCM_HW_PARAM_PERIOD_SIZE, n, NULL);
-if (err < 0)
-goto failure;
-
-err = snd_pcm_hw_param_near(substream, sparams, SNDRC_PCM_HW_PARAM_PERIODS,
- runtime->oss.periods, NULL);
-if (err < 0)
-goto failure;
-
-snd_pcm_kernel_ioctl(substream, SNDRC_PCM_IOCTL_DROP, NULL);
-
-if ((err = snd_pcm_kernel_ioctl(substream, SNDRC_PCM_IOCTL_HW_PARAMS, sparams)) < 0) {
-pcm_dbg(substream->pcm, "HW_PARAMS failed: %i\n", err);
-goto failure;
-}
-
if (runtime->oss.trigger) {
 sw_params->start_threshold = 1;
} else {
 @@ -1048,8 +1069,8 @@
 runtime->oss.channels = params_channels(params);
 runtime->oss.rate = params_rate(params);
-
-vfree(runtime->oss.buffer);
-runtime->oss.buffer = vmalloc(runtime->oss.period_bytes);
+kvfree(runtime->oss.buffer);
 +runtime->oss.buffer = kvzalloc(runtime->oss.period_bytes, GFP_KERNEL);
 if (!runtime->oss.buffer) {
 err = -ENOMEM;
 goto failure;
 @@ -1068,6 +1089,23 @@
 kfree(sw_params);
 kfree(params);
 kfree(sparams);
+return err;
+}
+
+/* this one takes the lock by itself */
+static int snd_pcm_oss_change_params(struct snd_pcm_substream *substream,
 + bool trylock)
+{
+struct snd_pcm_runtime *runtime = substream->runtime;
+int err;
+
+if (trylock) {

if (!(mutex_trylock(&runtime->oss.params_lock)))
    return -EAGAIN;
} else if (mutex_lock_interruptible(&runtime->oss.params_lock))
    return -ERESTARTSYS;

err = snd_pcm_oss_change_params_locked(substream);
mutex_unlock(&runtime->oss.params_lock);
return err;
}
@@ -1096,6 +1134,10 @@
return 0;
}

+/* call with params_lock held */
+/* NOTE: this always call PREPARE unconditionally no matter whether
+ * runtime->oss.prepare is set or not
+ */
+static int snd_pcm_oss_prepare(struct snd_pcm_substream *substream)
{
    int err;
    @@ -1120,8 +1162,6 @@
    struct snd_pcm_runtime *runtime;
    int err;
    
    -if (substream == NULL)
    -return 0;
    runtime = substream->runtime;
    if (runtime->oss.params) {
        err = snd_pcm_oss_change_params(substream, false);
        @@ -1129,6 +1169,29 @@
        return err;
    }
    if (runtime->oss.prepare) {
        +if (mutex_lock_interruptible(&runtime->oss.params_lock))
        +return -ERESTARTSYS;
        +err = snd_pcm_oss_prepare(substream);
        +mutex_unlock(&runtime->oss.params_lock);
        +if (err < 0)
        +return err;
        +}
        +return 0;
    +}
    +
    +/* call with params_lock held */
    +static int snd_pcm_oss_make_ready_locked(struct snd_pcm_substream *substream)
    +{
        +struct snd_pcm_runtime *runtime;
        +int err:
+runtime = substream->runtime;
+if (runtime->oss.params) {
  +err = snd_pcm_oss_change_params_locked(substream);
+if (err < 0)
+return err;
+
+if (runtime->oss.prepare) {
  err = snd_pcm_oss_prepare(substream);
  if (err < 0)
    return err;
  @ @ -1326,19 +1389,21 @@
static ssize_t snd_pcm_oss_write1(struct snd_pcm_substream *substream, const char __user *buf, size_t bytes)
{
  size_t xfer = 0;
  -ssize_t tmp;
  +ssize_t tmp = 0;
  struct snd_pcm_runtime *runtime = substream->runtime;
  if (atomic_read(&substream->mmap_count))
    return -ENXIO;
  -if ((tmp = snd_pcm_oss_make_ready(substream)) < 0)
  -return tmp;
  +atomic_inc(&runtime->oss.rw_ref);
  while (bytes > 0) {
    if (mutex_lock_interruptible(&runtime->oss.params_lock)) {
      tmp = -ERESTARTSYS;
      break;
    }
    +tmp = snd_pcm_oss_make_ready_locked(substream);
    +if (tmp < 0)
      +goto err;
    if (bytes < runtime->oss.period_bytes || runtime->oss.buffer_used > 0) {
      tmp = bytes;
      if (tmp + runtime->oss.buffer_used > runtime->oss.period_bytes)
        @ @ -1394,6 +1459,7 @@
    }
    tmp = 0;
  }
  +atomic_dec(&runtime->oss.rw_ref);
  return xfer > 0 ? (snd_pcm_sframes_t)xfer : tmp;
}

@@ -1433,19 +1499,21 @@
static ssize_t snd_pcm_oss_read1(struct snd_pcm_substream *substream, char __user *buf, size_t bytes)
{
  size_t xfer = 0;
ssize_t tmp;
ssize_t tmp = 0;
struct snd_pcm_runtime *runtime = substream->runtime;

if (atomic_read(&substream->mmap_count))
    return -ENXIO;

if ((tmp = snd_pcm_oss_make_ready(substream)) < 0)
    return tmp;
atomic_inc(&runtime->oss.rw_ref);
while (bytes > 0) {
    if (mutex_lock_interruptible(&runtime->oss.params_lock)) {
        tmp = -ERESTARTSYS;
        break;
    }
    tmp = snd_pcm_oss_make_ready_locked(substream);
    if (tmp < 0)
        goto err;
    goto err;
    if (bytes < runtime->oss.period_bytes || runtime->oss.buffer_used > 0) {
        if (runtime->oss.buffer_used == 0) {
            tmp = snd_pcm_oss_read2(substream, runtime->oss.buffer, runtime->oss.period_bytes, 1);
        }
        tmp = 0;
    }
    atomic_dec(&runtime->oss.rw_ref);
    return xfer > 0 ? (snd_pcm_sframes_t)xfer : tmp;
}

continue;
runtime = substream->runtime;
snd_pcm_kernel_ioctl(substream, SNDRV_PCM_IOCTL_DROP, NULL);
mutex_lock(&runtime->oss.params_lock);
runtime->oss.prepare = 1;
runtime->oss.buffer_used = 0;
runtime->oss.prev_hw_ptr_period = 0;
runtime->oss.period_ptr = 0;
mutex_unlock(&runtime->oss.params_lock);
} return 0;

@ @ -1590,9 +1661,13 @ @
goto __direct;
if ((err = snd_pcm_oss_make_ready(substream)) < 0)
    return err;
    atomic_inc(&runtime->oss.rw_ref);
    if (mutex_lock_interruptible(&runtime->oss.params_lock)) {

atomic_dec(&runtime->oss.rw_ref);
+return -ERESTARTSYS;
+
format = snd_pcm_oss_format_from(runtime->oss.format);
width = snd_pcm_format_physical_width(format);
mutex_lock(&runtime->oss.params_lock);
if (runtime->oss.buffer_used > 0) {
#ifdef OSS_DEBUG
pcm_dbg(substream->pcm, "sync: buffer_used\n");
@@ -1602,10 +1677,8 @@
          runtime->oss.buffer + runtime->oss.buffer_used,
          size);
err = snd_pcm_oss_sync1(substream, runtime->oss.period_bytes);
-if (err < 0) {
-mutex_unlock(&runtime->oss.params_lock);
-return err;
-}
+if (err < 0)
+goto unlock;
} else if (runtime->oss.period_ptr > 0) {
#ifdef OSS_DEBUG
pcm_dbg(substream->pcm, "sync: period_ptr\n");
@@ -1615,10 +1688,8 @@
          runtime->oss.buffer,
          size * 8 / width);
err = snd_pcm_oss_sync1(substream, size);
-if (err < 0) {
-mutex_unlock(&runtime->oss.params_lock);
-return err;
-}
+if (err < 0)
+goto unlock;
} /*
 * The ALSA's period might be a bit large than OSS one.
@@ -1632,7 +1703,11 @@
else if (runtime->access == SNDRV_PCM_ACCESS_RW_NONINTERLEAVED)
snd_pcm_lib_writev(substream, NULL, size);
}
+unlock:
mutex_unlock(&runtime->oss.params_lock);
+atomic_dec(&runtime->oss.rw_ref);
+if (err < 0)
+return err;
/*
 * finish sync: drain the buffer
*/
@@ -1643,7 +1718,9 @@
substream->f_flags = saved_f_flags;
if (err < 0)
    return err;
+mutex_lock(&runtime->oss.params_lock);
runtime->oss.prepare = 1;
+mutex_unlock(&runtime->oss.params_lock);
}

substream = pcm_oss_file->streams[SNDRV_PCM_STREAM_CAPTURE];
@@ -1654,8 +1731,10 @@
err = snd_pcm_kernel_ioctl(substream, SNDRV_PCM_IOCTL_DROP, NULL);
if (err < 0)
    return err;
+mutex_lock(&runtime->oss.params_lock);
runtime->oss.buffer_used = 0;
runtime->oss.prepare = 1;
+mutex_unlock(&runtime->oss.params_lock);
}
return 0;
}
@@ -1667,6 +1746,8 @@
for (idx = 1; idx >= 0; --idx) {
    struct snd_pcm_substream *substream = pcm_oss_file->streams[idx];
    struct snd_pcm_runtime *runtime;
+int err;
+
    if (substream == NULL)
        continue;
    runtime = substream->runtime;
@@ -1674,10 +1755,14 @@
        rate = 1000;
    else if (rate > 192000)
        rate = 192000;
    +err = lock_params(runtime);
    +if (err < 0)
    +return err;
    if (runtime->oss.rate != rate) {
        runtime->oss.params = 1;
        runtime->oss.rate = rate;
    }
    +unlock_params(runtime);
}
return snd_pcm_oss_get_rate(pcm_oss_file);
}
@@ -1702,13 +1787,19 @@
    for (idx = 1; idx >= 0; --idx) {
        struct snd_pcm_substream *substream = pcm_oss_file->streams[idx];
        struct snd_pcm_runtime *runtime;


+int err;
+
+if (substream == NULL)
+    continue;
+runtime = substream->runtime;
+err = lock_params(runtime);
+if (err < 0)
+    return err;
+err = lock_params(runtime);
+if (runtime->oss.channels != channels) {
    runtime->oss.params = 1;
    runtime->oss.channels = channels;
}
+unlock_params(runtime);
}
return snd_pcm_oss_get_channels(pcm_oss_file);
}
@@ -1762,10 +1853,9 @@
return -ENOMEM;
_snd_pcm_hw_params_any(params);
err = snd_pcm_hw_refine(substream, params);
-format_mask = hw_param_mask_c(params, SNDRV_PCM_HW_PARAM_FORMAT);
-kfree(params);
if (err < 0)
    return err;
+    goto error;
+    format_mask = hw_param_mask_c(params, SNDRV_PCM_HW_PARAM_FORMAT);
for (fmt = 0; fmt < 32; ++fmt) {
    if (snd_mask_test(format_mask, fmt)) {
        int f = snd_pcm_oss_format_to(fmt);
@@ -1773,12 +1863,16 @@
    formats |= f;
    }
    }
-    return formats;
+error:
+    kfree(params);
+    return err < 0 ? err : formats;
}

static int snd_pcm_oss_set_format(struct snd_pcm_oss_file *pcm_oss_file, int format)
{
    int formats, idx;
    int err;
    if (format != AFMT_QUERY) {
        formats = snd_pcm_oss_get_formats(pcm_oss_file);
@@ -1792,10 +1886,14 @@
if (substream == NULL)
continue;
runtime = substream->runtime;
+err = lock_params(runtime);
+if (err < 0)
+return err;
if (runtime->oss.format != format) {
runtime->oss.params = 1;
runtime->oss.format = format;
}
+unlock_params(runtime);
}
return snd_pcm_oss_get_format(pcm_oss_file);
@@ -1815,8 +1913,6 @@
{
struct snd_pcm_runtime *runtime;

-if (substream == NULL)
-return 0;
-runtime = substream->runtime;
-if (subdivide == 0) {
-subdivide = runtime->oss.subdivision;
@@ -1840,9 +1936,17 @@

for (idx = 1; idx >= 0; --idx) {
struct snd_pcm_substream *substream = pcm_oss_file->streams[idx];
+struct snd_pcm_runtime *runtime;
 +
 if (substream == NULL)
 continue;
-if (err = snd_pcm_oss_set_subdivide1(substream, subdivide)) < 0)
+runtime = substream->runtime;
+err = lock_params(runtime);
+if (err < 0)
+return err;
+err = snd_pcm_oss_set_subdivide1(substream, subdivide);
+unlock_params(runtime);
+if (err < 0)
 return err;
 }
return err;
@@ -1851,13 +1955,15 @@
static int snd_pcm_oss_set_fragment1(struct snd_pcm_substream *substream, unsigned int val)
 {
 struct snd_pcm_runtime *runtime;
+int fragshift;


-if (substream == NULL)
- return 0;
runtime = substream->runtime;
if (runtime->oss.subdivision || runtime->oss.fragshift)
 return -EINVAL;
-runtime->oss.fragshift = val & 0xffff;
+fragshift = val & 0xffff;
+if (fragshift >= 31)
+ return -EINVAL;
+runtime->oss.fragshift = fragshift;
runtime->oss.maxfrags = (val >> 16) & 0xffff;
if (runtime->oss.fragshift < 4)/* < 16 */
runtime->oss.fragshift = 4;
@@ -1873,9 +1979,17 @@
for (idx = 1; idx >= 0; --idx) {
 struct snd_pcm_substream *substream = pcm_oss_file->streams[idx];
 +struct snd_pcm_runtime *runtime;
 +
 if (substream == NULL)
 continue;
-if ((err = snd_pcm_oss_set_fragment1(substream, val)) < 0)
+runtime = substream->runtime;
+err = lock_params(runtime);
+if (err < 0)
+ return err;
+err = snd_pcm_oss_set_fragment1(substream, val);
+unlock_params(runtime);
+if (err < 0)
 return err;
 }
 return err;
@@ -1959,6 +2073,19 @@
 }
 if (psubstream) {
 runtime = psubstream->runtime;
+cmd = 0;
+if (mutex_lock_interruptible(&runtime->oss.params_lock))
+ return -ERESTARTSYS;
 if (trigger & PCM_ENABLE_OUTPUT) {
 if (runtime->oss.trigger)
 goto _skip1;
@@ -1976,13 +2093,19 @@
 cmd = SNDRV_PCM_IOCTL_DROP;
runtime->oss.prepare = 1;
 }
-err = snd_pcm_kernel_ioctl(psubstream, cmd, NULL);
- if (err < 0)
-return err;
-
_skip1:
+mutex_unlock(&runtime->oss.params_lock);
+if (cmd) {
+err = snd_pcm_kernel_ioctl(psubstream, cmd, NULL);
+if (err < 0)
+return err;
+
+
if (csubstream) {
		mutex_unlock(&runtime->oss.params_lock);
		if (cmd) {
			err = snd_pcm_kernel_ioctl(csubstream, cmd, NULL);
			if (err < 0)
				return err;
		}
	}
	
+
+}
+}
return 0;
+
+
@@ -1997,11 +2120,14 @@
   cmd = SNDRV_PCM_IOCTL_DROP;
   runtime->oss.prepare = 1;
 }
-err = snd_pcm_kernel_ioctl(csubstream, cmd, NULL);
-if (err < 0)
-return err;
-
-
@@ -2213,7 +2339,7 @@
 {
 struct snd_pcm_runtime *runtime;
 runtime = substream->runtime;
-vfree(runtime->oss.buffer);
 +kvfree(runtime->oss.buffer);
 runtime->oss.buffer = NULL;
 #ifdef CONFIG_SND_PCM_OSS_PLUGINS
 snd_pcm_oss_plugin_clear(substream);
@@ -2253,6 +2379,7 @@
 runtime->oss.maxfrags = 0;


runtime->oss.subdivision = 0;
substream->pcm_release = snd_pcm_oss_release_substream;
+atomic_set(&runtime->oss.rw_ref, 0);
}

static int snd_pcm_oss_release_file(struct snd_pcm_oss_file *pcm_oss_file)
--- linux-4.15.0.orig/sound/core/oss/pcm_plugin.c
+++ linux-4.15.0/sound/core/oss/pcm_plugin.c
@@ -66,8 +66,8 @@
     return -ENXIO;
size /= 8;
if (plugin->buf_frames < frames) {
    vfree(plugin->buf);
-    plugin->buf = vmalloc(size);
+    kvfree(plugin->buf);
+    plugin->buf = kvzalloc(size, GFP_KERNEL);
    plugin->buf_frames = frames;
}
if (!plugin->buf) {
@@ -111,7 +111,7 @@
     while (plugin->next) {
     if (plugin->dst_frames)
frames = plugin->dst_frames(plugin, frames);
-    if (snd_BUG_ON(frames <= 0))
+    if ((snd_pcm_sframes_t)frames <= 0)
        return -ENXIO;
     plugin = plugin->next;
     err = snd_pcm_plugin_alloc(plugin, frames);
@@ -123,7 +123,7 @@
     while (plugin->prev) {
     if (plugin->src_frames)
frames = plugin->src_frames(plugin, frames);
-    if (snd_BUG_ON(frames <= 0))
+    if ((snd_pcm_sframes_t)frames <= 0)
        return -ENXIO;
     plugin = plugin->prev;
     err = snd_pcm_plugin_alloc(plugin, frames);
@@ -191,12 +191,14 @@
     if (plugin->private_free)
         plugin->private_free(plugin);
kfree(plugin->buf_channels);
-    vfree(plugin->buf);
+    kvfree(plugin->buf);
kfree(plugin);
    return 0;
}

-snd_pcm_sframes_t snd_pcm_plug_client_size(struct snd_pcm_substream *plug, snd_pcm_uframes_t dry_frames)
+static snd_pcm_sframes_t plug_client_size(struct snd_pcm_substream *plug,
+   snd_pcm_uframes_t drv_frames,
+   bool check_size)
{
    struct snd_pcm_plugin *plugin, *plugin_prev, *plugin_next;
    int stream;
    plugin_prev = plugin->prev;
    if (plugin->src_frames)
      drv_frames = plugin->src_frames(plugin, drv_frames);
    if (check_size && plugin->buf_frames &&
        drv_frames > plugin->buf_frames)
      drv_frames = plugin->buf_frames;
    plugin = plugin_prev;
  }
}

+static snd_pcm_sframes_t plug_slave_size(struct snd_pcm_substream *plug,
   snd_pcm_uframes_t clt_frames,
   bool check_size)
{
    struct snd_pcm_plugin *plugin, *plugin_prev, *plugin_next;
    snd_pcm_sframes_t frames;
    plugin = snd_pcm_plug_first(plug);
    while (plugin && frames > 0) {
      plugin_next = plugin->next;
      if (check_size && plugin->buf_frames &&
          frames > plugin->buf_frames)
        frames = plugin->buf_frames;
      if (plugin->dst_frames) {
        frames = plugin->dst_frames(plugin, frames);
        if (frames < 0)
          return frames;
      }
    }
    if (frames < 0)
return frames;
}
+if (check_size && plugin->buf_frames &&
+ frames > plugin->buf_frames)
+frames = plugin->buf_frames;
plugin = plugin_prev;
} else
@@ -266,6 +282,18 @@ return frames;
}

+snd_pcm_sframes_t snd_pcm_plug_client_size(struct snd_pcm_substream *plug,
+ snd_pcm_uframes_t drv_frames)
+{
+return plugin_client_size(plug, drv_frames, false);
+}
+
+snd_pcm_sframes_t snd_pcm_plug_slave_size(struct snd_pcm_substream *plug,
+ snd_pcm_uframes_t clt_frames)
+{
+return plugin_slave_size(plug, clt_frames, false);
+}
+
static int snd_pcm_plug_formats(const struct snd_mask *mask,
 snd_pcm_format_t format)
{
@@ -621,7 +649,7 @@
 src_channels = dst_channels;
 plugin = next;
 }
-return snd_pcm_plug_client_size(plug, frames);
+return plugin_client_size(plug, frames, true);
}

snd_pcm_sframes_t snd_pcm_plug_read_transfer(struct snd_pcm_substream *plug, struct snd_pcm_plugin_channel
 *dst_channels_final, snd_pcm_uframes_t size)
@@ -631,7 +659,7 @@
 snd_pcm_sframes_t frames = size;
 int err;

-frames = snd_pcm_plug_slave_size(plug, frames);
+frames = plug_slave_size(plug, frames, true);
if (frames < 0)
return frames;

--- linux-4.15.0.orig/sound/core/oss/route.c
+++ linux-4.15.0/sound/core/oss/route.c
return -ENXIO;
if (frames == 0)
return 0;
+if (frames > dst_channels[0].frames)
+frames = dst_channels[0].frames;

nsrcs = plugin->src_format.channels;
dsts = plugin->dst_format.channels;
--- linux-4.15.0.orig/sound/core/pcm.c
+++ linux-4.15.0/sound/core/pcm.c
@@ -25,9 +25,11 @@
#include <linux/time.h>
#include <linux/mutex.h>
#include <linux/device.h>
+#include <linux/nospec.h>
#include <sound/core.h>
#include <sound/minors.h>
#include <sound/pcm.h>
+include <sound/timer.h>
#include <sound/control.h>
#include <sound/info.h>

@@ -128,6 +130,7 @@
return -EFAULT;
if (stream < 0 || stream > 1)
return -EINVAL;
+stream = array_index_nospec(stream, 2);
if (get_user(subdevice, &info->subdevice))
return -EFAULT;
mutex_lock(&register_mutex);
@@ -1054,8 +1057,13 @@
snd_free_pages((void*)runtime->control,
              PAGE_ALIGN(sizeof(struct snd_pcm_mmap_control)));
kfree(runtime->hw_constraints.rules);
-kfree(runtime);
+/* Avoid concurrent access to runtime via PCM timer interface */
+if (substream->timer)
+spin_lock_irq(&substream->timer->lock);
substream->runtime = NULL;
+if (substream->timer)
+spin_unlock_irq(&substream->timer->lock);
+kfree(runtime);
put_pid(substream->pid);
substream->pid = NULL;
substream->pstr->substream_opened--;
--- linux-4.15.0.orig/sound/core/pcm_compat.c
+++ linux-4.15.0/sound/core/pcm_compat.c
@@ -27,10 +27,11 @@
s32 __user *src)
{
    snd_pcm_sframes_t delay;
    +int err;

    -delay = snd_pcm_delay(substream);
    -if (delay < 0)
    -return delay;
    +err = snd_pcm_delay(substream, &delay);
    +if (err)
    +return err;
    if (put_user(delay, src))
        return -EFAULT;
    return 0;
    @@ -422,6 +423,8 @@
        return -EINVAL;
        +if (substream->runtime->status->state == SNDRV_PCM_STATE_OPEN)
        +return -EBADFD;

        if ((ch = substream->runtime->channels) > 128)
            return -EINVAL;
        --- linux-4.15.0.orig/sound/core/pcm_lib.c
        +++ linux-4.15.0/sound/core/pcm_lib.c
        @@ -440,6 +440,7 @@
    no_delta_check:
        if (runtime->status->hw_ptr == new_hw_ptr) {
            +runtime->hw_ptr_jiffies = curr_jiffies;
            update_audio_tstamp(substream, &curr_tstamp, &audio_tstamp);
            return 0;
        }
    @@ -629,27 +630,33 @@
 static int snd_interval_refine_first(struct snd_interval *i)
 {
    +const unsigned int last_max = i->max;
    +if (snd_BUG_ON(snd_interval_empty(i)))
        return -EINVAL;
    if (snd_interval_single(i))
        return 0;
    i->max = i->min;
    -i->openmax = i->openmin;
    -if (i->openmax)
    +if (i->openmax)
static int snd_interval_refine_last(struct snd_interval *i)
{
    const unsigned int last_min = i->min;
    if (snd_BUG_ON(snd_interval_empty(i)))
        return -EINVAL;
    if (snd_interval_single(i))
        return 0;
    i->min = i->max;
    -i->openmin = i->openmax;
    -if (i->openmin)
        if (i->openmax)
            i->min--;
    /* only exclude min value if also excluded before refine */
    +i->openmin = (i->openmin && i->min <= last_min);
    return 1;
}

@@ -1750,7 +1757,7 @@
    channels = params_channels(params);
    frame_size = snd_pcm_format_size(format, channels);
    if (frame_size > 0)
        -params->fifo_size /= (unsigned)frame_size;
        +params->fifo_size /= frame_size;
    } return 0;
    }
@@ -1797,11 +1804,14 @@
    if (!snd_pcm_running(substream) ||
        -if (PCM_RUNTIME_CHECK(substream))
        +if (snd_BUG_ON(!substream))
            return;
        -runtime = substream->runtime;
        +runtime = substream->runtime;
        snd_pcm_stream_lock_irqsave(substream, flags);
        +if (PCM_RUNTIME_CHECK(substream))
            goto_unlock;
        +runtime = substream->runtime;
        +if (!snd_pcm_running(substream) ||
snd_pcm_update_hw_ptr0(substream, 1) < 0)
goto _end;
@@ -1812,6 +1822,7 @@
@endif
@end:
kill_fasync(&runtime->fasync, SIGIO, POLL_IN);
+ _unlock:
  snd_pcm_stream_unlock_irqrestore(substream, flags);
}
EXPORT_SYMBOL(snd_pcm_period_elapsed);
--- linux-4.15.0.orig/sound/core/pcm_native.c
+++ linux-4.15.0/sound/core/pcm_native.c
@@ -36,6 +36,7 @@
#include <sound/timer.h>
#include <sound/minors.h>
#include <linux/uio.h>
+#include <linux/delay.h>
#include "pcm_local.h"

@@ -91,12 +92,12 @@
  * and this may lead to a deadlock when the code path takes read sem
  * twice (e.g. one in snd_pcm_action_nonatomic() and another in
  * snd_pcm_stream_lock()). As a (suboptimal) workaround, let writer to
- * spin until it gets the lock.
+ * sleep until all the readers are completed without blocking by writer.
 */
-static inline void down_write_nonblock(struct rw_semaphore *lock)
+static inline void down_write_nonfifo(struct rw_semaphore *lock)
{
  while (!down_write_trylock(lock))
    -cond_resched();
    +msleep(1);
}
/**
@@ -717,6 +718,15 @@
while (runtime->boundary * 2 <= LONG_MAX - runtime->buffer_size)
  runtime->boundary *= 2;
+
/+* clear the buffer for avoiding possible kernel info leaks */
+if (runtime->dma_area && !substream->ops->copy_user) {
+  +size_t size = runtime->dma_bytes;
+  +if (runtime->info & SNDRV_PCM_INFO_MMAP)
+    +size = PAGE_ALIGN(size);
+    +memset(runtime->dma_area, 0, size);
+}
snd_pcm_timer_resolution_change(substream);
snd_pcm_set_state(substream, SNDRV_PCM_STATE_SETUP);

@@ -1392,8 +1402,15 @@
static int snd_pcm_pre_suspend(struct snd_pcm_substream *substream, int state)
{
    struct snd_pcm_runtime *runtime = substream->runtime;
    -if (runtime->status->state == SNDRV_PCM_STATE_SUSPENDED)
    +switch (runtime->status->state) {
    +case SNDRV_PCM_STATE_SUSPENDED:
        return -EBUSY;
    +/* unresumable PCM state; return -EBUSY for skipping suspend */
    +case SNDRV_PCM_STATE_OPEN:
    +case SNDRV_PCM_STATE_SETUP:
    +case SNDRV_PCM_STATE_DISCONNECTED:
        +return -EBUSY;
    +}
    runtime->trigger_master = substream;
    return 0;
}
@@ -1472,6 +1489,14 @@
/* FIXME: the open/close code should lock this as well */
    if (substream->runtime == NULL)
        continue;
    +
    +/*
    + * Skip BE dai link PCM's that are internal and may
    + * not have their substream ops set.
    + */
    +if (!substream->ops)
        +continue;
    +
    err = snd_pcm_suspend(substream);
    if (err < 0 && err != -EBUSY)
        return err;
@@ -1928,12 +1953,17 @@
pcm_file = f.file->private_data;
substream1 = pcm_file->substream;
    +if (substream == substream1) {
    +res = -EINVAL;
    +goto _badf;
    +}
    +
    group = kmalloc(sizeof(*group), GFP_KERNEL);
    if (!group) {
        res = -ENOMEM;
        }
goto _nolock;
}
-down_write_nonblock(&snd_pcm_link_rwsem);
+down_write_nonfifo(&snd_pcm_link_rwsem);
write_lock_irq(&snd_pcm_link_rwlock);
if (substream->runtime->status->state == SNDRV_PCM_STATE_OPEN ||
    substream->runtime->status->state != substream1->runtime->status->state ||
@@ -1980,7 +2010,7 @@
    struct snd_pcm_substream *s;
    int res = 0;

-down_write_nonblock(&snd_pcm_link_rwsem);
+down_write_nonfifo(&snd_pcm_link_rwsem);
write_lock_irq(&snd_pcm_link_rwlock);
if (!snd_pcm_stream_linked(substream)) {
    res = -EALREADY;
@@ -2335,7 +2365,8 @@
static void pcm_release_private(struct snd_pcm_substream *substream)
{
    -snd_pcm_unlink(substream);
    +if (snd_pcm_stream_linked(substream))
    +snd_pcm_unlink(substream);
}

void snd_pcm_release_substream(struct snd_pcm_substream *substream)
@@ -2687,7 +2718,8 @@
return err;
}

-static snd_pcm_sframes_t snd_pcm_delay(struct snd_pcm_substream *substream)
+static int snd_pcm_delay(struct snd_pcm_substream *substream,
    + snd_pcm_sframes_t *delay)
{
    struct snd_pcm_runtime *runtime = substream->runtime;
    int err;
@@ -2703,7 +2735,9 @@
    n += runtime->delay;
 }
 snd_pcm_stream_unlock_irq(substream);
-return err < 0 ? err : n;
+if (!err)
+*delay = n;
+return err;
}

static int snd_pcm_sync_ptr(struct snd_pcm_substream *substream,
@@ -2746,6 +2780,7 @@
Open Source Used In 5GaaS Edge AC-4  35316
sync_ptr.s.status.hw_ptr = status->hw_ptr;
sync_ptr.s.status.tstamp = status->tstamp;
sync_ptr.s.status.suspended_state = status->suspended_state;
+sync_ptr.s.status.audio_tstamp = status->audio_tstamp;
snd_pcm_stream_unlock_irq(substream);
if (copy_to_user(_sync_ptr, &sync_ptr, sizeof(sync_ptr)))
    return -EFAULT;
    @@ -2911,11 +2946,13 @@
    return snd_pcm_hwsync(substream);
case SNDRV_PCM_IOCTL_DELAY:
    {
    -snd_pcm_sframes_t delay = snd_pcm_delay(substream);
    +snd_pcm_sframes_t delay;
    snd_pcm_sframes_t __user *res = arg;
    +int err;

    -if (delay < 0)
    -return delay;
    +err = snd_pcm_delay(substream, &delay);
    +if (err)
    +return err;
    if (put_user(delay, res))
        return -EFAULT;
    return 0;
    @@ -3003,13 +3040,7 @@
case SNDRV_PCM_IOCTL_DROP:
    return snd_pcm_drop(substream);
case SNDRV_PCM_IOCTL_DELAY:
    {
    -result = snd_pcm_delay(substream);
    -if (result < 0)
    -return result;
    -*frames = result;
    -return 0;
    -}
    +return snd_pcm_delay(substream, frames);
    default:
    return -EINVAL;
    }
    @@ -3422,7 +3453,7 @@
    area,
    substream->runtime->dma_area,
    substream->runtime->dma_addr,
    - area->vm_end - area->vm_start);
    + substream->runtime->dma_bytes);
    #endif /* CONFIG_X86 */
    /* mmap with fault handler */
    area->vm_ops = &snd_pcm_vm_ops_data_fault;
    Open Source Used In 5GaaS Edge AC-4  35317
--- linux-4.15.0.orig/sound/core/rawmidi.c
+++ linux-4.15.0/sound/core/rawmidi.c
@@ -29,6 +29,7 @@
 #include <linux/mutex.h>
 #include <linux/module.h>
 #include <linux/delay.h>
+#include <linux/nospec.h>
 #include <sound/rawmidi.h>
 #include <sound/info.h>
 #include <sound/control.h>
 @@ -85,12 +86,23 @@
 }
 }

 static inline int snd_rawmidi_ready(struct snd_rawmidi_substream *substream)
+static inline bool __snd_rawmidi_ready(struct snd_rawmidi_runtime *runtime)
 { 
-struct snd_rawmidi_runtime *runtime = substream->runtime;
 return runtime->avail >= runtime->avail_min;
 }

+static bool snd_rawmidi_ready(struct snd_rawmidi_substream *substream)
 +{
 +struct snd_rawmidi_runtime *runtime = substream->runtime;
 +unsigned long flags;
 +bool ready;
 +
 +spin_lock_irqsave(&runtime->lock, flags);
 +ready = __snd_rawmidi_ready(runtime);
 +spin_unlock_irqrestore(&runtime->lock, flags);
 +return ready;
 +}
 +
 static inline int snd_rawmidi_ready_append(struct snd_rawmidi_substream *substream,
 size_t count)
 { 
-@ @ -107,6 +119,17 @@
 runtime->event(runtime->substream);
 }

+/* buffer refcount management: call with runtime->lock held */
+static inline void snd_rawmidi_buffer_ref(struct snd_rawmidi_runtime *runtime)
 +{
 +runtime->buffer_ref++;
 +}
 +
+static inline void snd_rawmidi_buffer_unref(struct snd_rawmidi_runtime *runtime)
+{

static int snd_rawmidi_runtime_create(struct snd_rawmidi_substream *substream)
{
    struct snd_rawmidi_runtime *runtime;
    runtime->avail = 0;
    else
    runtime->avail = runtime->buffer_size;
    -if ((runtime->buffer = kmalloc(runtime->buffer_size, GFP_KERNEL)) == NULL) {
    +if ((runtime->buffer = kzalloc(runtime->buffer_size, GFP_KERNEL)) == NULL) {
        kfree(runtime);
        return -ENOMEM;
    }    
    @@ -591,6 +614,7 @@
    return -ENOMEM;
    }
    @@ -635,7 +659,7 @@
    int snd_rawmidi_output_params(struct snd_rawmidi_substream *substream,
                                                 struct snd_rawmidi_params * params)
    {
        char *newbuf;
        +char *newbuf, *oldbuf;
        struct snd_rawmidi_runtime *runtime = substream->runtime;

        if (substream->append && substream->use_count > 1)
            @@ -648,13 +672,22 @@
            return -EINVAL;
        }
        if (params->buffer_size != runtime->buffer_size) {
            -newbuf = krealloc(runtime->buffer, params->buffer_size, GFP_KERNEL);
            - GFP_KERNEL);
            +newbuf = kzalloc(params->buffer_size, GFP_KERNEL);
            if (!newbuf)
                return -ENOMEM;
            +spin_lock_irq(&runtime->lock);
            +if (runtime->buffer_ref) {
                +spin_unlock_irq(&runtime->lock);
                +kfree(newbuf);
                +return -EBUSY;
            +}
            +oldbuf = runtime->buffer;
runtime->buffer = newbuf;
runtime->buffer_size = params->buffer_size;
runtime->avail = runtime->buffer_size;
+runtime->appl_ptr = runtime->hw_ptr = 0;
+spin_unlock_irq(&runtime->lock);
+kfree(oldbuf);
}
runtime->avail_min = params->avail_min;
substream->active_sensing = !params->no_active_sensing;

@@ -665,7 +698,7 @@
int snd_rawmidi_input_params(struct snd_rawmidi_substream *substream,
    struct snd_rawmidi_params * params)
{
    char *newbuf;
+    char *newbuf, *oldbuf;
    struct snd_rawmidi_runtime *runtime = substream->runtime;

    snd_rawmidi_drain_input(substream);
@@ -676,12 +709,16 @@
    return -EINVAL;
}
if (params->buffer_size != runtime->buffer_size) {
    -newbuf = krealloc(runtime->buffer, params->buffer_size,
-    -GFP_KERNEL);
+    newbuf = kmalloc(params->buffer_size, GFP_KERNEL);
    if (!newbuf)
        return -ENOMEM;
+    spin_lock_irq(&runtime->lock);
+    oldbuf = runtime->buffer;
    runtime->buffer = newbuf;
    runtime->buffer_size = params->buffer_size;
+    runtime->appl_ptr = runtime->hw_ptr = 0;
+    spin_unlock_irq(&runtime->lock);
+    kfree(oldbuf);
}
runtime->avail_min = params->avail_min;
return 0;
@@ -936,7 +973,7 @@
if (result > 0) {
    if (runtime->event)
        schedule_work(&runtime->event_work);
-else if ( snd_rawmidi_ready(substream))
+else if (__snd_rawmidi_ready(runtime))
        wake_up(&runtime->sleep);
    }
    spin_unlock_irqrestore(&runtime->lock, flags);
@@ -952,8 +989,10 @@
    long result = 0, count1;
struct snd_rawmidi_runtime *runtime = substream->runtime;
unsigned long appl_ptr;
+int err = 0;

spin_lock_irqsave(&runtime->lock, flags);
+snd_rawmidi_buffer_ref(runtime);
while (count > 0 && runtime->avail) {
    count1 = runtime->buffer_size - runtime->appl_ptr;
    if (count1 > count)
        @@ -972,16 +1011,19 @@
            if (userbuf) {
                spin_unlock_irqrestore(&runtime->lock, flags);
                if (copy_to_user(userbuf + result,
                    - runtime->buffer + appl_ptr, count1)) {
                    -return result > 0 ? result : -EFAULT;
                -}
                + runtime->buffer + appl_ptr, count1))
                    +err = -EFAULT;
                spin_lock_irqsave(&runtime->lock, flags);
                +if (err)
                    +goto out;
                }
            result += count1;
            count -= count1;
        + out:
            +snd_rawmidi_buffer_unref(runtime);
            spin_unlock_irqrestore(&runtime->lock, flags);
            return result > 0 ? result : err;
    }

long snd_rawmidi_kernel_read(struct snd_rawmidi_substream *substream,
    @@ -1010,7 +1052,7 @@
        result = 0;
        while (count > 0) {
            spin_lock_irq(&runtime->lock);
            -while (!snd_rawmidi_ready(substream)) {
                +while (!__snd_rawmidi_ready(runtime)) {
                    wait_queue_entry_t wait;
                    if ((file->f_flags & O_NONBLOCK) != 0 || result > 0) {
                        spin_unlock_irq(&runtime->lock);
                        @@ -1026,9 +1068,11 @@
                            return -ENODEV;
                            if (signal_pending(current))
                                return result > 0 ? result : -ERESTARTSYS;
                            -if (!runtime->avail)
                                -return result > 0 ? result : -EIO;

spin_lock_irq(&runtime->lock);
+if (!runtime->avail) {
+spin_unlock_irq(&runtime->lock);
+return result > 0 ? result : -EIO;
+}
}
}
spin_unlock_irq(&runtime->lock);
count1 = snd_rawmidi_kernel_read1(substream,
@@ -1166,7 +1210,7 @@
runtime->avail += count;
substream->bytes += count;
if (count > 0) {
- if (runtime->drain || snd_rawmidi_ready(substream))
+ if (runtime->drain || __snd_rawmidi_ready(runtime))
 wake_up(&runtime->sleep);
}
return count;
@@ -1252,6 +1296,7 @@
return -EAGAIN;
}
}
+snd_rawmidi_buffer_ref(runtime);
while (count > 0 && runtime->avail > 0) {
 count1 = runtime->buffer_size - runtime->appl_ptr;
if (count1 > count)
@@ -1283,6 +1328,7 @@
}
__end:
count1 = runtime->avail < runtime->buffer_size;
+snd_rawmidi_buffer_unref(runtime);
spin_unlock_irqrestore(&runtime->lock, flags);
if (count1)
snd_rawmidi_output_trigger(substream, 1);
@@ -1330,9 +1376,11 @@
return -ENODEV;
if (signal_pending(current))
return result > 0 ? result : -ERESTARTSYS;
-if (!runtime->avail && !timeout)
-return result > 0 ? result : -EIO;
spin_lock_irq(&runtime->lock);
+if (!runtime->avail && !timeout) {
+spin_unlock_irq(&runtime->lock);
+return result > 0 ? result : -EIO;
+
}
}
spin_unlock_irq(&runtime->lock);
count1 = snd_rawmidi_kernel_write1(substream, buf, NULL, count);
@@ -1412,6 +1460,7 @@
struct snd_rawmidi *rmidi;
struct snd_rawmidi_substream *substream;
struct snd_rawmidi_runtime *runtime;
unsigned long buffer_size, avail, xruns;

rmidi = entry->private_data;
snd_iprintf(buffer, "%s
", rmidi->name);
@@ -1430,13 +1479,16 @@
 " Owner PID    : %d
     pid_vnr(substream->pid));
runtime = substream->runtime;
+spin_lock_irq(&runtime->lock);
+buffer_size = runtime->buffer_size;
+avail = runtime->avail;
+spin_unlock_irq(&runtime->lock);
snd_iprintf(buffer,
     " Mode         : %s
" buffer size : %lu
" Avail        : %lu

runtime->oss ? "OSS compatible" : "native",
- (unsigned long) runtime->buffer_size,
- (unsigned long) runtime->avail);
+ buffer_size, avail);
} }
}
@@ -1454,13 +1506,16 @@
 " Owner PID    : %d
     pid_vnr(substream->pid));
runtime = substream->runtime;
+spin_lock_irq(&runtime->lock);
+buffer_size = runtime->buffer_size;
+avail = runtime->avail;
+xruns = runtime->xruns;
+spin_unlock_irq(&runtime->lock);
snd_iprintf(buffer,
     " Buffer size : %lu
" Avail        : %lu
" Overruns     : %lu

(runtime->oss ? "OSS compatible" : "native",
- (unsigned long) runtime->buffer_size,
- (unsigned long) runtime->avail,
- (unsigned long) runtime->xruns);
+ buffer_size, avail, xruns);
} }
} --- linux-4.15.0.org/sound/core/rawmidi_compat.c
+++ linux-4.15.0/sound/core/rawmidi_compat.c
struct snd_rawmidi_params params;
unsigned int val;

@if (rfile->output == NULL)
@return -EINVAL;
@if (get_user(params.stream, &src->stream) ||
   get_user(params.buffer_size, &src->buffer_size) ||
   get_user(params.avail_min, &src->avail_min) ||
params.no_active_sensing = val;
switch (params.stream) {
case SNDRV_RAWMIDI_STREAM_OUTPUT:
@if (!rfile->output)
@return -EINVAL;
return snd_rawmidi_output_params(rfile->output, &params);
case SNDRV_RAWMIDI_STREAM_INPUT:
@if (!rfile->input)
@return -EINVAL;
return snd_rawmidi_input_params(rfile->input, &params);
}
@return -EINVAL;

@if (rfile->output == NULL)
@return -EINVAL;
@if (get_user(status.stream, &src->stream))
{return -EFAULT;
switch (status.stream) {
case SNDRV_RAWMIDI_STREAM_OUTPUT:
@if (!rfile->output)
@return -EINVAL;
err = snd_rawmidi_output_status(rfile->output, &status);
break;
case SNDRV_RAWMIDI_STREAM_INPUT:
@if (!rfile->input)
@return -EINVAL;
err = snd_rawmidi_input_status(rfile->input, &status);
break;
default:
int err;
struct snd_rawmidi_status status;

@if (rfile->output == NULL)
@return -EINVAL;
@if (get_user(status.stream, &src->stream))
{return -EFAULT;
switch (status.stream) {
case SNDRV_RAWMIDI_STREAM_OUTPUT:
@if (!rfile->output)
@return -EINVAL;
err = snd_rawmidi_output_status(rfile->output, &status);
break;
case SNDRV_RAWMIDI_STREAM_INPUT:
@if (!rfile->input)
@return -EINVAL;
err = snd_rawmidi_input_status(rfile->input, &status);
break;
default:
int err;
struct snd_rawmidi_status status;

@if (rfile->output == NULL)
if (get_user(status.stream, &src->stream))
    return -EFAULT;

switch (status.stream) {
    case SNDRV_RAWMIDI_STREAM_OUTPUT:
    +if (!rfile->output)
    +return -EINVAL;
    err = snd_rawmidi_output_status(rfile->output, &status);
    break;
    case SNDRV_RAWMIDI_STREAM_INPUT:
    +if (!rfile->input)
    +return -EINVAL;
    err = snd_rawmidi_input_status(rfile->input, &status);
    break;
    default:
        return -EINVAL;
}

odev_ioctl(struct file *file, unsigned int cmd, unsigned long arg)
{
    struct seq_oss_devinfo *dp;
    +long rc;
    dp = file->private_data;
    if (snd BUG_ON(!dp))
        return -ENXIO;
    -return snd_seq_oss_ioctl(dp, cmd, arg);
    +if (cmd != SNDCTL_SEQ_SYNC &&
      mutex_lock_interruptible(&register_mutex))
        return -ERESTARTSYS;
    +rc = snd_seq_oss_ioctl(dp, cmd, arg);
    +if (cmd != SNDCTL_SEQ_SYNC)
        mutex_unlock(&register_mutex);
    +return rc;
}

#ifdef CONFIG_COMPAT
    #include <sound/seq_oss_legacy.h>
    #include "seq_oss_readq.h"
    #include "seq_oss_writeq.h"
    +#include <linux/nospec.h>
struct seq_oss_synthinfo *info;

@if (!snd_seq_oss_synth_is_valid(dp, dev))
+info = snd_seq_oss_synth_info(dp, dev);
+if (!info)
return -ENXIO;

-info = &dp->synths[dev];
switch (info->arg.event_passing) {
  case SNDRV_SEQ_OSS_PROCESS_EVENTS:
if (! info->ch || ch < 0 || ch >= info->nr_voices) {
  @ @ -298,6 +299,7 @ @
return set_note_event(dp, dev, SNDRV_SEQ_EVENT_NOTEON, ch, note, vel, ev);
  }

+ch = array_index_nospec(ch, info->nr_voices);
if (note == 255 && info->ch[ch].note >= 0) {
  /* volume control */
int type;
  @ @ -347,10 +349,10 @ @
  }
struct seq_oss_synthinfo *info;

-if (!snd_seq_oss_synth_is_valid(dp, dev))
+info = snd_seq_oss_synth_info(dp, dev);
+if (!info)
return -ENXIO;

-info = &dp->synths[dev];
switch (info->arg.event_passing) {
  case SNDRV_SEQ_OSS_PROCESS_EVENTS:
if (! info->ch || ch < 0 || ch >= info->nr_voices) {
  @ @ -358,6 +360,7 @ @
return set_note_event(dp, dev, SNDRV_SEQ_EVENT_NOTEON, ch, note, vel, ev);
  }

+ch = array_index_nospec(ch, info->nr_voices);
if (info->ch[ch].note >= 0) {
  note = info->ch[ch].note;
info->ch[ch].vel = 0;
  @ @ -381,7 +384,7 @ @
static int
set_note_event(struct seq_oss_devinfo *dp, int dev, int type, int ch, int note, int vel, struct snd_seq_event *ev)
  {
-if (!snd_seq_oss_synth_is_valid(dp, dev))

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+if (!snd_seq_oss_synth_info(dp, dev))
return -ENXIO;

ev->type = type;
@@ -399,7 +402,7 @@
static int
set_control_event(struct seq_oss_devinfo *dp, int dev, int type, int ch, int param, int val, struct snd_seq_event *ev)
{
-!if (! snd_seq_oss_synth_is_valid(dp, dev))
+if (!snd_seq_oss_synth_info(dp, dev))
return -ENXIO;

ev->type = type;
--- linux-4.15.0.orig/sound/core/seq/oss/seq_oss_ioctl.c
+++ linux-4.15.0/sound/core/seq/oss/seq_oss_ioctl.c
@@ -62,7 +62,7 @@
if (copy_from_user(ev, arg, 8))
return -EFAULT;
memset(&tmpev, 0, sizeof(tmpev));
-snd_seq_oss_fill_addr(dp, &tmpev, dp->addr.port, dp->addr.client);
+snd_seq_oss_fill_addr(dp, &tmpev, dp->addr.client, dp->addr.port);
tmpev.time.tick = 0;
if (! snd_seq_oss_process_event(dp, (union evrec *)ev, &tmpev)) {
    snd_seq_oss_dispatch(dp, &tmpev, 0, 0);
--- linux-4.15.0.orig/sound/core/seq/oss/seq_oss_midi.c
+++ linux-4.15.0/sound/core/seq/oss/seq_oss_midi.c
@@ -29,6 +29,7 @@
#include <linux/slab.h>
/*
@@ -315,6 +316,7 @@
if (dev < 0 || dev >= dp->max_mididev)
return NULL;
+dev = array_index_nospec(dev, dp->max_mididev);
return get_mdev(dev);
}
@@ -613,6 +615,7 @@
len = snd_seq_oss_timer_start(dp->timer);
if (ev->type == SNDRV_SEQ_EVENT_SYSEX) {
    snd_seq_oss_readq_sysex(dp->readq, mdev->seq_device, ev);
+snd_midi_event_reset_decode(mdev->coder);
} else {
len = snd_midi_event_decode(mdev->coder, msg, sizeof(msg), ev);
if (len > 0)
--- linux-4.15.0.orig/sound/core/seq/oss/seq_oss_rw.c
+++ linux-4.15.0/sound/core/seq/oss/seq_oss_rw.c
@@ -174,7 +174,7 @@
    memset(&event, 0, sizeof(event));
    /* set dummy -- to be sure */
    event.type = SNDRV_SEQ_EVENT_NOTEOFF;
-snd_seq_oss_fill_addr(dp, &event, dp->addr.port, dp->addr.client);
+snd_seq_oss_fill_addr(dp, &event, dp->addr.client, dp->addr.port);

if (snd_seq_oss_process_event(dp, rec, &event))
    return 0; /* invalid event - no need to insert queue */
--- linux-4.15.0.orig/sound/core/seq/oss/seq_oss_synth.c
+++ linux-4.15.0/sound/core/seq/oss/seq_oss_synth.c
@@ -26,6 +26,7 @@
 #include <linux/init.h>
 #include <linux/module.h>
 #include <linux/slab.h>
+  #include <linux/nospec.h>

 /*
  * constants
  @@ -339,17 +340,13 @@
  dp->max_synthdev = 0;
 }

-/*
- * check if the specified device is MIDI mapped device
- */
-static int
-is_midi_dev(struct seq_oss_devinfo *dp, int dev)
+static struct seq_oss_synthinfo *
+get_synthinfo_nospec(struct seq_oss_devinfo *dp, int dev)
 {
  if (dev < 0 || dev >= dp->max_synthdev)
    return 0;
-if (dp->synths[dev].is_midi)
-  return 1;
-  return 0;
+  return NULL;
+  dev = array_index_nospec(dev, SNDRV_SEQ_OSS_MAX_SYNTH_DEVS);
+  return &dp->synths[dev];
 }

 /*
 @@ -359,14 +356,20 @@
 get_synthdev(struct seq_oss_devinfo *dp, int dev)
struct seq_oss_synth *rec;
-if (dev < 0 || dev >= dp->max_synthdev)
-return NULL;
-if (! dp->synths[dev].opened)
+struct seq_oss_synthinfo *info = get_synthinfo_nospec(dp, dev);
 +
 +if (!info)
 return NULL;
 -if (dp->synths[dev].is_midi)
 -return &midi_synth_dev;
 -if ((rec = get_sdev(dev)) == NULL)
 +if (!info->opened)
 return NULL;
 +if (info->is_midi) {
 +rec = &midi_synth_dev;
 +snd_use_lock_use(&rec->use_lock);
 +} else {
 +rec = get_sdev(dev);
 +if (!rec)
 +return NULL;
 +}
 if (!rec->opened) {
 snd_use_lock_free(&rec->use_lock);
 return NULL;
 @ @ -402,10 +405,8 @@
 struct seq_oss_synth *rec;
 struct seq_oss_synthinfo *info;

 -if (snd_BUG_ON(dev < 0 || dev >= dp->max_synthdev))
 -return;
 -info = &dp->synths[dev];
 -if (!info->opened)
 +info = get_synthinfo_nospec(dp, dev);
 +if (!info || !info->opened)
 return;
 if (info->sysex)
 info->sysex->len = 0; /* reset sysex */
 @ @ -454,12 +455,14 @@
 const char __user *buf, int p, int c)
 {
 struct seq_oss_synth *rec;
 +struct seq_oss_synthinfo *info;
 int rc;

 -if (dev < 0 || dev >= dp->max_synthdev)
 +info = get_synthinfo_nospec(dp, dev);
 +if (!info)
return -ENXIO;

-if (is_midi_dev(dp, dev))
+if (info->is_midi)
 return 0;
if ((rec = get_synthdev(dp, dev)) == NULL)
 return -ENXIO;
@@ -467,24 +470,25 @@
if (rec->oper.load_patch == NULL)
 rc = -ENXIO;
 else
-rec = rec->oper.load_patch(&dp->synths[dev].arg, fmt, buf, p, c);
+rc = rec->oper.load_patch(&info->arg, fmt, buf, p, c);
 snd_use_lock_free(&rec->use_lock);
 return rc;
 }
*/
-* check if the device is valid synth device
+- * check if the device is valid synth device and return the synth info
 */
-int
-snd_seq_oss_synth_is_valid(struct seq_oss_devinfo *dp, int dev)
+struct seq_oss_synthinfo *
+snd_seq_oss_synth_info(struct seq_oss_devinfo *dp, int dev)
 {
 struct seq_oss_synth *rec;
 +
 rec = get_synthdev(dp, dev);
 if (rec) {
 snd_use_lock_free(&rec->use_lock);
 -return 1;
 +return get_synthinfo_nospec(dp, dev);
 }
 -return 0;
 +return NULL;
 }
@@ -499,16 +503,18 @@
 int i, send;
 unsigned char *dest;
 struct seq_oss_synth_sysex *sysex;
+struct seq_oss_synthinfo *info;

 -if (! snd_seq_oss_synth_is_valid(dp, dev))
+info = snd_seq_oss_synth_info(dp, dev);
 +if (!info)
return -ENXIO;

-sysex = dp->synths[dev].sysex;
+sysex = info->sysex;
if (sysex == NULL) {
    sysex = kzalloc(sizeof(*sysex), GFP_KERNEL);
    if (sysex == NULL)
        return -ENOMEM;
    -dp->synths[dev].sysex = sysex;
    +info->sysex = sysex;
}

send = 0;
@@ -553,10 +559,12 @@
int
    snd_seq_oss_synth_addr(struct seq_oss_devinfo *dp, int dev, struct snd_seq_event *ev)
{
    -if (! snd_seq_oss_synth_is_valid(dp, dev))
    +struct seq_oss_synthinfo *info = snd_seq_oss_synth_info(dp, dev);
    +
    +if (!info)
        return -EINVAL;
    -snd_seq_oss_fill_addr(dp, ev, dp->synths[dev].arg.addr.client,
    -    dp->synths[dev].arg.addr.port);
    +snd_seq_oss_fill_addr(dp, ev, info->arg.addr.client,
    +    info->arg.addr.port);
    return 0;
}

@@ -568,16 +576,18 @@
int
    snd_seq_oss_synth_ioctl(struct seq_oss_devinfo *dp, int dev, unsigned int cmd, unsigned long addr)
{
    struct seq_oss_synth *rec;
    +struct seq_oss_synthinfo *info;
    int rc;

    -if (is_midi_dev(dp, dev))
    +info = get_synthinfo_nospec(dp, dev);
    +if (!info || info->is_midi)
        return -ENXIO;
    if ((rec = get_synthdev(dp, dev)) == NULL)
        return -ENXIO;
    if (rec->oper.ioctl == NULL)
        rc = -ENXIO;
    else
        -rc = rec->oper.ioctl(&dp->synths[dev].arg, cmd, addr);
        +rc = rec->oper.ioctl(&info->arg, cmd, addr);
    snd_use_lock_free(&rec->use_lock);
}

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return rc;
}
@@ -589,7 +599,10 @@
int
snd_seq_oss_synth_raw_event(struct seq_oss_devinfo *dp, int dev, unsigned char *data, struct snd_seq_event *ev)
{
- if (! snd_seq_oss_synth_is_valid(dp, dev) || is_midi_dev(dp, dev))
+ struct seq_oss_synthinfo *info;
+ if (!info || info->is_midi)
    return -ENXIO;
    ev->type = SNDRV_SEQ_EVENT_OSS;
    memcpy(ev->data.raw8.d, data, 8);
@@ -604,13 +617,15 @@
    snd_seq_oss_synth_make_info(struct seq_oss_devinfo *dp, int dev, struct synth_info *inf)
    {
        struct seq_oss_synth *rec;
+        struct seq_oss_synthinfo *info = get_synthinfo_nospec(dp, dev);
+        if (!info)
+            return -ENXIO;
        if (dev < 0 || dev >= dp->max_synthdev)
+            return -ENXIO;
            -if (dp->synths[dev].is_midi) {
+            if (info->is_midi) {
                struct midi_info minf;
                -snd_seq_oss_midi_make_info(dp, dp->synths[dev].midi_mapped, &minf);
+                if (snd_seq_oss_midi_make_info(dp, info->midi_mapped, &minf))
                    return -ENXIO;
                inf->synth_type = SYNTTH_TYPE_MIDI;
                inf->synth_subtype = 0;
                inf->nr_voices = 16;
                --- linux-4.15.0.orig/sound/core/seq/oss/seq_oss_synth.h
                +++ linux-4.15.0/sound/core/seq/oss/seq_oss_synth.h
                @ @ -37,7 +37,8 @@
                void snd_seq_oss_synth_reset(struct seq_oss_devinfo *dp, int dev);
                int snd_seq_oss_synth_load_patch(struct seq_oss_devinfo *dp, int dev, int fmt,
                    const char __user *buf, int p, int c);
                -int snd_seq_oss_synth_is_valid(struct seq_oss_devinfo *dp, int dev);
+                struct seq_oss_synthinfo *snd_seq_oss_synth_info(struct seq_oss_devinfo *dp,
+                    + int dev);
                int snd_seq_oss_synth_sysex(struct seq_oss_devinfo *dp, int dev, unsigned char *buf,
                    struct snd_seq_event *ev);
                int snd_seq_oss_synth_addr(struct seq_oss_devinfo *dp, int dev, struct snd_seq_event *ev);
                --- linux-4.15.0.orig/sound/core/seq/seq_clientmgr.c
                +++ linux-4.15.0/sound/core/seq/seq_clientmgr.c
                @ @ -255,12 +255,12 @@
if (!client)
    return 0;
-snd_seq_delete_all_ports(client);
-snd_seq_queue_client_leave(client->number);
spin_lock_irqsave(&clients_lock, flags);
clienttablock[client->number] = 1;
clienttab[client->number] = NULL;
spin_unlock_irqrestore(&clients_lock, flags);
+snd_seq_delete_all_ports(client);
+snd_seq_queue_client_leave(client->number);
snd_use_lock_sync(&client->use_lock);
snd_seq_queue_client_termination(client->number);
if (client->pool)
@@ -564,7 +564,7 @@
event->queue = queue;
event->flags &= ~SNDRV_SEQ_TIME_STAMP_MASK;
if (real_time) {
-    event->time.time = snd_seq_timer_get_cur_time(q->timer);
+    event->time.time = snd_seq_timer_get_cur_time(q->timer, true);
    event->flags |= SNDRV_SEQ_TIME_STAMP_REAL;
} else {
    event->time.tick = snd_seq_timer_get_cur_tick(q->timer);
@@ -910,7 +910,8 @@
static int snd_seq_client_enqueue_event(struct snd_seq_client *client,
    struct snd_seq_event *event,
    struct file *file, int blocking,
-    int atomic, int hop)
+    int atomic, int hop,
+    struct mutex *mutexp)
{
    struct snd_seq_event_cell *cell;
    int err;
@@ -948,7 +949,8 @@
return -ENXIO; /* queue is not allocated */
/* allocate an event cell */
-err = snd_seq_event_dup(client->pool, event, &cell, !blocking || atomic, file);
+err = snd_seq_event_dup(client->pool, event, &cell, !blocking || atomic,
+    file, mutexp);
if (err < 0)
    return err;
@@ -1003,7 +1005,7 @@
{
    struct snd_seq_client *client = file->private_data;
    int written = 0, len;
-    int err = -EINVAL;
+    int err = -EINVAL;
+int err, handled;
struct snd_seq_event event;

if (!snd_seq_file_flags(file) & SNDRV_SEQ_LFLG_OUTPUT))
@@ -1016,13 +1018,18 @@
if (!client->accept_output || client->pool == NULL)
    return -ENXIO;

+ repeat:
+handled = 0;
/* allocate the pool now if the pool is not allocated yet */
+mutex_lock(&client->ioctl_mutex);
if (client->pool->size > 0 && !snd_seq_write_pool_allocated(client)) {
-    if (snd_seq_pool_init(client->pool) < 0)
-        return -ENOMEM;
+    err = snd_seq_pool_init(client->pool);
+    if (err < 0)
+        goto out;
}

/* only process whole events */
+err = -EINVAL;
while (count >= sizeof(struct snd_seq_event)) {
/* Read in the event header from the user */
    len = sizeof(event);
@@ -1069,17 +1076,26 @@
/* ok, enqueue it */
    err = snd_seq_client_enqueue_event(client, &event, file,
                        !(file->f_flags & O_NONBLOCK),
+                        0, 0, &client->ioctl_mutex);
if (err < 0)
    break;
+handled++;

__skip_event:
/* Update pointers and counts */
count -= len;
buf += len;
written += len;
+
+/* let's have a coffee break if too many events are queued */
+if (++handled >= 200) {
+    mutex_unlock(&client->ioctl_mutex);
+    goto repeat;
+}
}
mutex_unlock(&client->ioctl_mutex);
return written ? written : err;
}

/* fill the info fields */
if (client_info->name[0])
-strlcpy(client->name, client_info->name, sizeof(client->name));
+strscpy(client->name, client_info->name, sizeof(client->name));
client->filter = client_info->filter;
client->event_lost = client_info->event_lost;

/* set queue name */
if (!info->name[0])
    snprintf(info->name, sizeof(info->name), "Queue-%d", q->queue);
-strlcpy(q->name, info->name, sizeof(q->name));
+strscpy(q->name, info->name, sizeof(q->name));

return 0;
}

/* set queue name */
if (!info->name[0])
    snprintf(info->name, sizeof(info->name), "Queue-%d", q->queue);
-strlcpy(q->name, info->name, sizeof(q->name));
+strscpy(q->name, info->name, sizeof(q->name));
queuefree(q);

return 0;

/* set queue name */
if (!info->name[0])
    snprintf(info->name, sizeof(info->name), "Queue-%d", q->queue);
-strlcpy(q->name, info->name, sizeof(q->name));
+strscpy(q->name, info->name, sizeof(q->name));
queuefree(q);

return 0;

if (cptr->type == USER_CLIENT) {
    info->input_pool = cptr->data.user.fifo_pool_size;
    info->input_free = info->input_pool;
    -if (cptr->data.user.fifo)
       -info->input_free = snd_seq_unused_cells(cptr->data.user.fifo->pool);
     +info->input_free = snd_seq_fifo_unused_cells(cptr->data.user.fifo);
} else {
  info->input_pool = 0;
  info->input_free = 0;
  if (! snd_seq_write_pool_allocated(client) ||
      info->output_pool != client->pool->size)) {
    if (snd_seq_write_pool_allocated(client)) {
      /* is the pool in use? */
      if (atomic_read(&client->pool->counter))
        return -EBUSY;
    /* remove all existing cells */
    snd_seq_pool_mark_closing(client->pool);
    snd_seq_queue_client_leave_cells(client->number);
  } else {
    info->input_pool = 0;
    info->input_free = 0;
  }
}
if (! snd_seq_write_pool_allocated(client) ||
    info->output_pool != client->pool->size)) {
  return -EINVAL;
}
if ((sender = snd_seq_client_use_ptr(subs->sender.client)) == NULL)
  goto __end;
if ((sport = snd_seq_port_use_ptr(sender, subs->sender.port)) == NULL)
  goto __end;
  p = snd_seq_port_get_subscription(&sport->c_src, &subs->dest);
  if (p) {
    result = 0;
    ?*subs = p->info;
    } else
    result = -ENOENT;
#include "snd_seq.h"

result = snd_seq_port_get_subscription(&sport->c_src, &subs->dest,
  sub);
result = -EPERM;
else /* send it */
    -result = snd_seq_client_enqueue_event(cptr, ev, file, blocking, atomic, hop);
+    result = snd_seq_client_enqueue_event(cptr, ev, file, blocking,
      +    atomic, hop, NULL);

snd_seq_client_unlock(cptr);
return result;
--- linux-4.15.0.orig/sound/core/seq/seq_fifo.c
+++ linux-4.15.0/sound/core/seq/seq_fifo.c
@@ -125,7 +125,7 @@
return -EINVAL;
snd_use_lock_use(&f->use_lock);
-err = snd_seq_event_dup(f->pool, event, &cell, 1, NULL); /* always non-blocking */
+err = snd_seq_event_dup(f->pool, event, &cell, 1, NULL, NULL); /* always non-blocking */
if (err < 0) {
  if ((err == -ENOMEM) || (err == -EAGAIN))
    atomic_inc(&(f->overflow));
@@ -280,3 +280,20 @@
return 0;
}
+
+/* get the number of unused cells safely */
+int snd_seq_fifo_unused_cells(struct snd_seq_fifo *f)
+{
+  unsigned long flags;
+  int cells;
+  +if (!f)
+    return 0;
+  +snd_use_lock_use(&f->use_lock);
+  +spin_lock_irqsave(&f->lock, flags);
+  +cells = snd_seq_unused_cells(f->pool);
+  +spin_unlock_irqrestore(&f->lock, flags);
+  +snd_use_lock_free(&f->use_lock);
+  +return cells;
+}
static int snd_seq_cell_alloc(struct snd_seq_pool *pool,
   struct snd_seq_event_cell **cellp,
   int nonblock, struct file *file)
+  int nonblock, struct file *file,
+  struct mutex *mutexp)
{
  struct snd_seq_event_cell *cell;
  unsigned long flags;

  set_current_state(TASK_INTERRUPTIBLE);
  add_wait_queue(&pool->output_sleep, &wait);
  spin_unlock_irq(&pool->lock);
  +if (mutexp)
  +mutex_unlock(mutexp);
  schedule();
  +if (mutexp)
  +mutex_lock(mutexp);
  spin_lock_irq(&pool->lock);
  remove_wait_queue(&pool->output_sleep, &wait);
  /* interrupted? */
  @@ -287,7 +292,7 @@
  */
  int snd_seq_event_dup(struct snd_seq_pool *pool, struct snd_seq_event *event,
   struct snd_seq_event_cell **cellp, int nonblock,
   - struct file *file)
   + struct file *file, struct mutex *mutexp)
{
  int ncells, err;
  unsigned int extlen;
  if (ncells >= pool->total_elements)
    return -ENOMEM;
    -err = snd_seq_cell_alloc(pool, &cell, nonblock, file);
    +err = snd_seq_cell_alloc(pool, &cell, nonblock, file, mutexp);
  if (err < 0)
    return err;

  @@ -330,7 +335,8 @@
  int size = sizeof(struct snd_seq_event);
  if (len < size)
    size = len;
err = snd_seq_cell_alloc(pool, &tmp, nonblock, file);
+err = snd_seq_cell_alloc(pool, &tmp, nonblock, file,
+ mutex);
if (err < 0)
goto __error;
if (cell->event.data.ext.ptr == NULL)
--- linux-4.15.0.orig/sound/core/seq/seq_memory.h
+++ linux-4.15.0/sound/core/seq/seq_memory.h
@@ -66,7 +66,8 @@

void snd_seq_cell_free(struct snd_seq_event_cell *cell);

int snd_seq_event_dup(struct snd_seq_pool *pool, struct snd_seq_event *event,
-       struct snd_seq_event_cell **cellp, int nonblock, struct file *file);
+       struct snd_seq_event_cell **cellp, int nonblock,
+       struct file *file, struct mutex *mutexp);

/* return number of unused (free) cells */
static inline int snd_seq_unused_cells(struct snd_seq_pool *pool)
--- linux-4.15.0.orig/sound/core/seq/seq_ports.c
+++ linux-4.15.0/sound/core/seq/seq_ports.c
@@ -532,10 +532,11 @@

return err;
}

-static void delete_and_unsubscribe_port(struct snd_seq_client *client,
-       struct snd_seq_client_port *port,
-       struct snd_seq_subscribers *subs,
-       bool is_src, bool ack)
+/* called with grp->list_mutex held */
+static void __delete_and_unsubscribe_port(struct snd_seq_client *client,
+       struct snd_seq_client_port *port,
+       struct snd_seq_subscribers *subs,
+       bool is_src, bool ack)
{
struct snd_seq_port_subs_info *grp;
struct list_head *list;
@@ -543,19 +544,30 @@

grp = is_src ? &port->c_src : &port->c_dest;
list = is_src ? &subs->src_list : &subs->dest_list;
-down_write(&grp->list_mutex);
-write_lock_irq(&grp->list_lock);
empty = list_empty(list);
if (!empty)
    list_del_init(list);
grp->exclusive = 0;
-write_unlock_irq(&grp->list_lock);
-up_write(&grp->list_mutex);

if (!empty)
unsubscribe_port(client, port, grp, &subs->info, ack);
}

+static void delete_and_unsubscribe_port(struct snd_seq_client *client,
+struct snd_seq_client_port *port,
+struct snd_seq_subscribers *subs,
+bool is_src, bool ack)
+{
+struct snd_seq_port_subs_info *grp;
+
+grp = is_src ? &port->c_src : &port->c_dest;
+down_write(&grp->list_mutex);
+_delete_and_unsubscribe_port(client, port, subs, is_src, ack);
+up_write(&grp->list_mutex);
+}
+
/* connect two ports */
int snd_seq_port_connect(struct snd_seq_client *connector,
struct snd_seq_client *src_client,
struct snd_seq_client_port *dest_port,
struct snd_seq_port_subscribe *info)
{
-struct snd_seq_port_subs_info *src = &src_port->c_src;
+struct snd_seq_port_subs_info *dest = &dest_port->c_dest;
struct snd_seq_subscribers *subs;
int err = -ENOENT;

-down_write(&src->list_mutex);
+/* always start from deleting the dest port for avoiding concurrent
+ * deletions
+ */
+down_write(&dest->list_mutex);
/* look for the connection */
-list_for_each_entry(subs, &src->list_head, src_list) {
+list_for_each_entry(subs, &dest->list_head, dest_list) {
if (match_subs_info(info, &subs->info)) {
.atomic_dec(&subs->ref_count); /* mark as not ready */
+_delete_and_unsubscribe_port(dest_client, dest_port,
+ subs, false,
+ connector->number != dest_client->number);
err = 0;
break;
}
}
-up_write(&src->list_mutex);
+up_write(&dest->list_mutex);
if (err < 0)
  return err;

delete_and_unsubscribe_port(src_client, src_port, subs, true,
    connector->number != src_client->number);
-delete_and_unsubscribe_port(dest_client, dest_port, subs, false,
  -  connector->number != dest_client->number);
kfree(subs);
return 0;
}

/* get matched subscriber */
-struct snd_seq_subscribers *snd_seq_port_get_subscription(struct snd_seq_port_subs_info *src_grp,
  -  struct snd_seq_addr *dest_addr)
+int snd_seq_port_get_subscription(struct snd_seq_port_subs_info *src_grp,
  + struct snd_seq_addr *dest_addr,
  + struct snd_seq_port_subscribe *subs)
{
  -struct snd_seq_subscribers *s, *found = NULL;
  +struct snd_seq_subscribers *s;
  +int err = -ENOENT;

down_read(&src_grp->list_mutex);
list_for_each_entry(s, &src_grp->list_head, src_list) {
  if (addr_match(dest_addr, &s->info.dest)) {
    -found = s;
    +*subs = s->info;
    +err = 0;
    break;
  }
}
up_read(&src_grp->list_mutex);
return found;
return err;
}

/*
--- linux-4.15.0.orig/sound/core/seq/seq_ports.h
+++ linux-4.15.0/sound/core/seq/seq_ports.h
@@ -135,7 +135,8 @@
struct snd_seq_port_subscribe *info);
}

/* get matched subscriber */
-struct snd_seq_subscribers *snd_seq_port_get_subscription(struct snd_seq_port_subs_info *src_grp,
  - struct snd_seq_addr *dest_addr);
+int snd_seq_port_get_subscription(struct snd_seq_port_subs_info *src_grp,
+ struct snd_seq_addr *dest_addr,
+ struct snd_seq_port_subscribe *subs);

#endif
--- linux-4.15.0.orig/sound/core/seq/seq_prioq.c
+++ linux-4.15.0/sound/core/seq/seq_prioq.c
@@ -87,7 +87,7 @@
if (f->cells > 0) {
 /* drain prioQ */
 while (f->cells > 0)
- snd_seq_cell_free(snd_seq_prioq_cell_out(f));
+ snd_seq_cell_free(snd_seq_prioq_cell_out(f, NULL));
 }

 kfree(f);
@@ -214,8 +214,18 @@
 return 0;
 }

+/* return 1 if the current time >= event timestamp */
+static int event_is_ready(struct snd_seq_event *ev, void *current_time)
+{
+ if ((ev->flags & SNDRV_SEQ_TIME_STAMP_MASK) == SNDRV_SEQ_TIME_STAMP_TICK)
+ return snd_seq_compare_tick_time(current_time, &ev->time.tick);
+ else
+ return snd_seq_compare_real_time(current_time, &ev->time.time);
+}
+
+/* dequeue cell from prioq */
-struct snd_seq_event_cell *snd_seq_prioq_cell_out(struct snd_seq_prioq *f)
+struct snd_seq_event_cell *snd_seq_prioq_cell_out(struct snd_seq_prioq *f, 
+ void *current_time)
{
 struct snd_seq_event_cell *cell;
 unsigned long flags;
@@ -227,6 +237,8 @@
 spin_lock_irqsave(&f->lock, flags);

cell = f->head;
+ if (cell & current_time & & 'event_is_ready(&cell->event, current_time))
+ cell = NULL;
 if (cell) {
 f->head = cell->next;
@@ -252,18 +264,6 @@
 return f->cells;
 }

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- /* peek at cell at the head of the prioq */
- struct snd_seq_event_cell *snd_seq_prioq_cell_peek(struct snd_seq_prioq * f)
- {
- if (f == NULL) {
- pr_debug("ALSA: seq: snd_seq_prioq_cell_in() called with NULL prioq\n");
- return NULL;
- }
- return f->head;
- }

- static inline int prioq_match(struct snd_seq_event_cell *cell,
int client, int timestamp)
{

/* dequeue cell from prioq */
- struct snd_seq_event_cell *snd_seq_prioq_cell_out(struct snd_seq_prioq *f);
+ struct snd_seq_event_cell *snd_seq_prioq_cell_out(struct snd_seq_prioq *f,
+ void *current_time);

/* return number of events available in prioq */
int snd_seq_prioq_avail(struct snd_seq_prioq *f);

- /* peek at cell at the head of the prioq */
- struct snd_seq_event_cell *snd_seq_prioq_cell_peek(struct snd_seq_prioq * f);

- /* client left queue */
void snd_seq_prioq_leave(struct snd_seq_prioq *f, int client, int timestamp);

---linux-4.15.0.orig/sound/core/seq/seq_queue.c
+++linux-4.15.0/sound/core/seq/seq_queue.c
@@ -261,6 +261,8 @@
{
 unsigned long flags;
 struct snd_seq_event_cell *cell;
+snd_seq_tick_time_t cur_tick;
+snd_seq_real_time_t cur_time;

 if (q == NULL)
 return;
@@ -277,30 +279,21 @@

 __again:
/* Process tick queue... */
-while ((cell = snd_seq_prioq_cell_peek(q->tickq)) != NULL) {
  -if (snd_seq_compare_tick_time(&q->timer->tick.cur_tick,
    -   &cell->event.time.tick)) {
    -cell = snd_seq_prioq_cell_out(q->tickq);
    -if (cell)
      -snd_seq_dispatch_event(cell, atomic, hop);
  -} else {
    -/* event remains in the queue */
    +cur_tick = snd_seq_timer_get_cur_tick(q->timer);
    +for (;;) {
      +cell = snd_seq_prioq_cell_out(q->tickq, &cur_tick);
      +if (!cell)
        break;
    -}
    +snd_seq_dispatch_event(cell, atomic, hop);
  }

-/* Process time queue... */
-while ((cell = snd_seq_prioq_cell_peek(q->timeq)) != NULL) {
  -if (snd_seq_compare_real_time(&q->timer->cur_time,
    -   &cell->event.time.time)) {
    -cell = snd_seq_prioq_cell_out(q->timeq);
    -if (cell)
      -snd_seq_dispatch_event(cell, atomic, hop);
  -} else {
    -/* event remains in the queue */
    +cur_time = snd_seq_timer_get_cur_time(q->timer, false);
    +for (;;) {
      +cell = snd_seq_prioq_cell_out(q->timeq, &cur_time);
      +if (!cell)
        break;
    -}
    +snd_seq_dispatch_event(cell, atomic, hop);
  }

/* free lock */
@@ -425,6 +418,7 @@
int snd_seq_queue_set_owner(int queueid, int client, int locked)
{ }
struct snd_seq_queue *q = queueptr(queueid);
+unsigned long flags;

if (q == NULL)
  return -EINVAL;
@@ -434,8 +428,10 @@
return -EPERM;
unsigned long flags;

for (i = 0; i < SNDRV_SEQ_MAX_QUEUES; i++) {
    if ((q = queueptr(i)) == NULL)
        continue;
    spin_lock_irqsave(&q->owner_lock, flags);
    -if (q->owner == client)
        matched = (q->owner == client);
    +if (matched) {
        if (q->timer->running)
            snd_seq_timer_stop(q->timer);
        snd_seq_timer_reset(q->timer);
    }
    spin_unlock_irqrestore(&q->owner_lock, flags);
    if (matched) {
        if (q->timer->running)
            snd_seq_timer_stop(q->timer);
        snd_seq_timer_reset(q->timer);
    } for (i = 0; i < SNDRV_SEQ_MAX_QUEUES; i++) {
    if ((q = queueptr(i)) == NULL)
        @ @ -785,9 +785,14 @@
        else
            bpm = 0;
    +spin_lock_irq(&q->owner_lock);
    +locked = q->locked;
    +owner = q->owner;
    +spin_unlock_irq(&q->owner_lock);
    +
    snd_iprintf(buffer, "queue %d: [%s]\n", q->queue, q->name);
- snd_iprintf(buffer, "owned by client : %d\n", q->owner);
- snd_iprintf(buffer, "lock status : %s\n", q->locked ? "Locked" : "Free");
+ snd_iprintf(buffer, "owned by client : %d\n", owner);
+ snd_iprintf(buffer, "lock status : %s\n", locked ? "Locked" : "Free");
snd_iprintf(buffer, "queued time events : %d\n", snd_seq_prioq_avail(q->timeq));
snd_iprintf(buffer, "queued tick events : %d\n", snd_seq_prioq_avail(q->tickq));
snd_iprintf(buffer, "timer state : %s\n", tmr->running ? "Running" : "Stopped");
--- linux-4.15.0.orig/sound/core/seq/seq_queue.h
+++ linux-4.15.0/sound/core/seq/seq_queue.h
@@ -40,10 +40,10 @@
 struct snd_seq_timer *timer; /* time keeper for this queue */
 int owner; /* client that 'owns' the timer */
 unsigned int intlocked:1, /* timer is only accesible by owner if set */
-klocked:1, /* kernel lock (after START) */
-check_again:1,
-check_blocked:1;
+bool locked; /* timer is only accesible by owner if set */
+bool klocked; /* kernel lock (after START) */
+bool check_again; /* concurrent access happened during check */
+bool check_blocked; /* queue being checked */

 unsigned int flags; /* status flags */
 unsigned int info_flags; /* info for sync */
--- linux-4.15.0.orig/sound/core/seq/seq_system.c
+++ linux-4.15.0/sound/core/seq/seq_system.c
@@ -123,6 +123,7 @@
 {
 struct snd_seq_port_callback pcallbacks;
 struct snd_seq_port_info *port;
+int err;

 port = kzalloc(sizeof(*port), GFP_KERNEL);
 if (!port)
@@ -144,7 +145,10 @@
 port->addr.client = sysclient;
 port->addr.port = SND RV_SEQ_PORT_SYSTEM_TIMER;
-snd_seq_kernel_client_ctl(sysclient, SND RV_SEQ_IOCTL_CREATE_PORT, port);
+err = snd_seq_kernel_client_ctl(sysclient, SND RV_SEQ_IOCTL_CREATE_PORT, port);
 +if (err < 0)
+go to error_port;
+if (port)

 /* register announcement port */
 strcpy(port->name, "Announce");
@@ -154,16 +158,24 @@
 port->flags = SND RV_SEQ_PORT_FLG_GIVEN_PORT;
 port->flags = SND RV_SEQ_PORT_FLG_GIVEN_PORT;
port->addr.client = sysclient;
port->addr.port = SNDRV_SEQ_PORT_SYSTEM_ANNOUNCE;
-snd_seq_kernel_client_ctl(sysclient, SNDRV_SEQ_IOCTL_CREATE_PORT, port);
+err = snd_seq_kernel_client_ctl(sysclient, SNDRV_SEQ_IOCTL_CREATE_PORT, +port);
+if (err < 0)
+goto error_port;
announce_port = port->addr.port;
kfree(port);
return 0;
+
+ error_port:
+snd_seq_system_client_done();
kfree(port);
+return err;
}
{  
- return tmr->tick.cur_tick;  
+ snd_seq_tick_time_t cur_tick;  
+ unsigned long flags;  
+  
+ spin_lock_irqsave(&tmr->lock, flags);  
+ cur_tick = tmr->tick.cur_tick;  
+ spin_unlock_irqrestore(&tmr->lock, flags);  
+ return cur_tick;  
}  

@@ -479,15 +486,19 @@
q = queueptr(idx);  
if (q == NULL)  
  continue;  
- if ((tmr = q->timer) == NULL ||  
- (ti = tmr->timeri) == NULL) {  
- queuefree(q);  
- continue;  
- }  
+ mutex_lock(&q->timer_mutex);  
+ tmr = q->timer;  
+ if (!tmr)  
+ goto unlock;  
+ ti = tmr->timeri;  
+ if (!ti)  
+ goto unlock;  
  snd_iprintf(buffer, "Timer for queue %i : %s\n", q->queue, ti->timer->name);  
  resolution = snd_timer_resolution(ti) * tmr->ticks;  
  snd_iprintf(buffer, " Period time : %lu.%09lu\n", resolution / 1000000000, resolution % 1000000000);  
  snd_iprintf(buffer, " Skew : %u / %u\n", tmr->skew, tmr->skew_base);  
+ unlock:  
+ mutex_unlock(&q->timer_mutex);  
  queuefree(q);  
}  
}  
--- linux-4.15.0.orig/sound/core/seq/seq_timer.h  
+++ linux-4.15.0/sound/core/seq/seq_timer.h  
@@ -135,7 +135,8 @@
 int snd_seq_timer_set_position_tick(struct snd_seq_timer *tmr, snd_seq_tick_time_t position);  
 int snd_seq_timer_set_position_time(struct snd_seq_timer *tmr, snd_seq_real_time_t position);  
 int snd_seq_timer_set_skew(struct snd_seq_timer *tmr, unsigned int skew, unsigned int base);  
- snd_seq_real_time_t snd_seq_timer_get_cur_time(struct snd_seq_timer *tmr);  
+ bool adjust_ktime);  
+ snd_seq_tick_time_t snd_seq_timer_get_cur_tick(struct snd_seq_timer *tmr);  

extern int seq_default_timer_class;
--- linux-4.15.0.orig/sound/core/seq/seq_virmidi.c
+++ linux-4.15.0/sound/core/seq/seq_virmidi.c
@@ -95,6 +95,7 @@
 if ((ev->flags & SNDRV_SEQ_EVENT_LENGTH_MASK) != SNDRV_SEQ_EVENT_LENGTH_VARIABLE)
 continue;
 snd_seq_dump_var_event(ev, (snd_seq_dump_func_t)snd_rawmidi_receive, vmidi->substream);
+snd_midi_event_reset_decode(vmidi->parser);
 } else {
  len = snd_midi_event_decode(vmidi->parser, msg, sizeof(msg), ev);
 if (len > 0)
@@ -163,6 +164,7 @@
 int count, res;
 unsigned char buf[32], *pbuf;
 unsigned long flags;
+bool check_resched = !in_atomic();

 if (up) {
  vmidi->trigger = 1;
@@ -174,12 +176,12 @@
 } return;
 } +spin_lock_irqsave(&substream->runtime->lock, flags);
 if (vmidi->event.type != SNDRV_SEQ_EVENT_NONE) {
 if (snd_seq_kernel_client_dispatch(vmidi->client, &vmidi->event, in_atomic(), 0) < 0)
-  return;
+  goto out;
  vmidi->event.type = SNDRV_SEQ_EVENT_NONE;
 } -spin_lock_irqsave(&substream->runtime->lock, flags);
 while (1) {
 count = _snd_rawmidi_transmit_peek(substream, buf, sizeof(buf));
 if (count <= 0)
@@ -200,6 +202,15 @@
  vmidi->event.type = SNDRV_SEQ_EVENT_NONE;
 } +spin_unlock_irqrestore(&substream->runtime->lock, flags);
+if (!check_resched)
+  continue;
+/* do temporary unlock & cond_resched() for avoiding
+ * CPU soft lockup, which may happen via a write from
+ * a huge rawmidi buffer
+ */
+spin_unlock_irqrestore(&substream->runtime->lock, flags);
+cond_resched();
+spin_lock_irqsave(&substream->runtime->lock, flags);
}
out:
spin_unlock_irqrestore(&substream->runtime->lock, flags);
--- linux-4.15.0.orig/sound/core/seq_device.c
+++ linux-4.15.0/sound/core/seq_device.c
@@ -162,6 +162,8 @@
 struct snd_seq_device *dev = device->device_data;
cancel_autoload_drivers();
+if (dev->private_free)
+dev->private_free(dev);
put_device(&dev->dev);
return 0;
}
@@ -189,11 +191,7 @@
static void snd_seq_dev_release(struct device *dev)
 {
 -struct snd_seq_device *sdev = to_seq_dev(dev);
 -
 -if (sdev->private_free)
 -sdev->private_free(sdev);
 -kfree(sdev);
 +kfree(to_seq_dev(dev));
 }

/*
--- linux-4.15.0.orig/sound/core/timer.c
+++ linux-4.15.0/sound/core/timer.c
@@ -88,6 +88,9 @@
 /* lock for slave active lists */
 static DEFINE_SPINLOCK(slave_active_lock);
 
+#define MAX_SLAVE_INSTANCES1000
 +static int num_slaves;
 +
 +static DEFINE_MUTEX(register_mutex);

 static int snd_timer_free(struct snd_timer *timer);
@@ -240,7 +243,8 @@
 return 0;
 }
-static int snd_timer_close_locked(struct snd_timer_instance *timeri);
+static int snd_timer_close_locked(struct snd_timer_instance *timeri,
+struct device **card_devp_to_put);

 /*
 * open a timer instance
struct snd_timer *timer;
struct snd_timer_instance *timeri = NULL;

/* open a slave instance */
if (tid->dev_class == SNDRV_TIMER_CLASS_SLAVE) {
    /* open a slave instance */
    if (tid->dev_sclass <= SNDRV_TIMER_SCLASS_NONE ||
        tid->dev_sclass > SNDRV_TIMER_SCLASS_OSS_SEQUENCER) {
        pr_debug("ALSA: timer: invalid slave class \%\n",
            tid->dev_sclass);
        -err = -EINVAL;
        goto unlock;
    }
    if (num_slaves >= MAX_SLAVE_INSTANCES) {
        -err = -EBUSY;
        goto unlock;
    }
    mutex_lock(&register_mutex);
    timeri = snd_timer_instance_new(owner, NULL);
    if (!timeri) {
        mutex_unlock(&register_mutex);
        -err = -ENOMEM;
        goto unlock;
    }
    timeri->slave_class = tid->dev_sclass;
    timeri->slave_id = tid->device;
    timeri->flags |= SNDRV_TIMER_IFLG_SLAVE;
    list_add_tail(&timeri->open_list, &snd_timer_slave_list);
    num_slaves++;
    err = snd_timer_check_slave(timeri);
    if (err < 0) {
        snd_timer_close_locked(timeri);
    }
    mutex_unlock(&register_mutex);
    -*ti = timeri;
    return err;
}

/* open a master instance */
mutex_lock(&register_mutex);
timer = snd_timer_find(tid);
#ifdef CONFIG_MODULES
if (!timer) {
    mutex_unlock(&register_mutex);
    return -ENODEV;
}
#endif
if (!timer) {
    mutex_unlock(&register_mutex);
    return -ENODEV;
}
if (!list_empty(&timer->open_list_head)) {
    timeri = list_entry(timer->open_list_head.next,
    struct snd_timer_instance *t =
    list_entry(timer->open_list_head.next,
    struct snd_timer_instance, open_list);
    if (timeri->flags & SNDRV_TIMER_IFLG_EXCLUSIVE) {
        mutex_unlock(&register_mutex);
        return -EBUSY;
    } else if (t->flags & SNDRV_TIMER_IFLG_EXCLUSIVE) {
        err = -EBUSY;
        goto unlock;
    }
}
if (timer->num_instances >= timer->max_instances) {
    mutex_unlock(&register_mutex);
    return -EBUSY;
}
err = -ENOMEM;
unlock:
}
/* take a card refcount for safe disconnection */
if (timer->card)
    timeri->slave_id = slave_id;
if (list_empty(&timer->open_list_head) && timer->hw.open) {
    int err = timer->hw.open(timer);
    if (err) {
kfree(timeri->owner);
kfree(timeri);
+timeri = NULL;

if (timer->card)
-put_device(&timer->card->card_dev);
+card_dev_to_put = &timer->card->card_dev;
module_put(timer->module);
-mutex_unlock(&register_mutex);
-return err;
+goto unlock;
}
}

@@ -338,10 +347,15 @@
timer->num_instances++;
err = snd_timer_check_master(timeri);
if (err < 0) {
-snd_timer_close_locked(timeri);
+snd_timer_close_locked(timeri, &card_dev_to_put);
timeri = NULL;
}
+
+ unlock:
mutex_unlock(&register_mutex);
+/* put_device() is called after unlock for avoiding deadlock */
+if (card_dev_to_put)
+put_device(card_dev_to_put);
*ti = timeri;
return err;
}
@@ -351,12 +365,15 @@
* close a timer instance
* call this with register_mutex down.
*/
-static int snd_timer_close_locked(struct snd_timer_instance *timeri)
+static int snd_timer_close_locked(struct snd_timer_instance *timeri,
+ struct device **card_devp_to_put)
{
struct snd_timer *timer = NULL;
struct snd_timer_instance *slave, *tmp;

list_del(&timeri->open_list);
+if (timeri->flags & SNDRV_TIMER_IIFLG_SLAVE)
+num_slaves--;

/* force to stop the timer */
snd_timer_stop(timeri);
timer->hw.close(timer);
/* release a card refcount for safe disconnection */
if (timer->card)
-put_device(&timer->card->card_dev);
+*card_devp_to_put = &timer->card->card_dev;
module_put(timer->module);
}

int snd_timer_close(struct snd_timer_instance *timeri)
{
+struct device *card_dev_to_put = NULL;

if (snd_BUG_ON(!timeri))
return -ENXIO;

mutex_lock(&register_mutex);
-err = snd_timer_close_locked(timeri);
+err = snd_timer_close_locked(timeri, &card_dev_to_put);
mutex_unlock(&register_mutex);
+/* put_device() is called after unlock for avoiding deadlock */
+if (card_dev_to_put)
+put_device(card_dev_to_put);
return err;
}

EXPORT_SYMBOL(snd_timer_close);

/* start/continue a master timer */
@
return;
if (timer->hw.flags & SNDRV_TIMER_HW_SLAVE)
return;
+event += 10; /* convert to SNDRV_TIMER_EVENT_MXXX */
list_for_each_entry(ts, &ti->slave_active_head, active_list)
if (ts->ccallback)
-ts->ccallback(ts, event + 100, &tstamp, resolution);
+ts->ccallback(ts, event, &tstamp, resolution);
}

/* start/continue a master timer */
@
else
	timeri->flags |= SNDRV_TIMER_IFLG_PAUSED;
+snd_timer_notify1(timeri, stop ? SNDRV_TIMER_EVENT_STOP :
+SNDRV_TIMER_EVENT_CONTINUE);
unlock:
spin_unlock_irqrestore(&timer->lock, flags);
return result;
@@ -614,7 +636,7 @@
list_del_init(&timer->ack_list);
list_del_init(&timer->active_list);
snd_timer_notify1(timeri, stop ? SNDRV_TIMER_EVENT_STOP :
- SNDRV_TIMER_EVENT_CONTINUE);
+ SNDRV_TIMER_EVENT_PAUSE);
spin_unlock(&timer->timer->lock);
}
spin_unlock_irqrestore(&slave_active_lock, flags);
@@ -1517,7 +1539,7 @@
    if (id.subdevice < 0)
        id.subdevice = 0;
    -else
+    +else if (id.subdevice < INT_MAX)
        id.subdevice++;
    }
}
--- linux-4.15.0.orig/sound/core/vmaster.c
+++ linux-4.15.0/sound/core/vmaster.c
@@ -68,10 +68,13 @@
return -ENOMEM;
uctl->id = slave->slave.id;
err = slave->slave.get(&slave->slave, uctl);
+    if (err < 0)
+        goto error;
for (ch = 0; ch < slave->info.count; ch++)
slave->vals[ch] = uctl->value.integer.value[ch];
+    error:
kfree(uctl);
    -return 0;
+    return err < 0 ? err : 0;
}
/* get the slave ctl info and save the initial values */
--- linux-4.15.0.orig/sound/drivers/aloop.c
+++ linux-4.15.0/sound/drivers/aloop.c
@@ -192,6 +192,11 @@
dpcm->timer.expires = 0;
}
+static inline void loopback_timer_stop_sync(struct loopback_pcm *dpcm)
+{
+    del_timer_sync(&dpcm->timer);
+}
```c
#define CABLE_VALID_PLAYBACK (1 << SNDRV_PCM_STREAM_PLAYBACK)
#define CABLE_VALID_CAPTURE (1 << SNDRV_PCM_STREAM_CAPTURE)
#define CABLE_VALID_BOTH (CABLE_VALID_PLAYBACK | CABLE_VALID_CAPTURE)

@@ -291,6 +296,8 @@
cable->pause |= stream;
    loopback_timer_stop(dpcm);
    spin_unlock(&cable->lock);
+    if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK)
+        loopback_active_notify(dpcm);
    break;
    case SNDRV_PCM_TRIGGER_PAUSE_RELEASE:
    case SNDRV_PCM_TRIGGER_RESUME:
@@ -299,6 +306,8 @@
cable->pause &= ~stream;
    loopback_timer_start(dpcm);
    spin_unlock(&cable->lock);
+    if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK)
+        loopback_active_notify(dpcm);
    break;
    default:
    return -EINVAL;
@@ -326,6 +335,8 @@
    struct loopback_cable *cable = dpcm->cable;
    int bps, salign;

+    loopback_timer_stop_sync(dpcm);
+    salign = (snd_pcm_format_width(runtime->format) *
    runtime->channels) / 8;
    bps = salign * runtime->rate;
@@ -659,7 +670,9 @@
    return;
    if (cable->streams[!substream->stream]) {
        /* other stream is still alive */
+        spin_lock_irq(&cable->lock);
        cable->streams[!substream->stream] = NULL;
+        spin_unlock_irq(&cable->lock);
    } else {
        /* free the cable */
        loopback->cables[substream->number][dev] = NULL;
@@ -698,7 +711,9 @@
        return;
    }
  }
    dpcm->cable = cable;
    -cable->streams[substream->stream] = dpcm;

    snd_pcm_hw_constraint_integer(runtime, SNDRV_PCM_HW_PARAM_PERIODS);
```

runtime->hw = loopback_pcm_hardware;
else
runtime->hw = cable->hw;
+
+spin_lock_irq(&cable->lock);
+cable->streams[substream->stream] = dpcm;
+spin_unlock_irq(&cable->lock);
+
unlock:
if (err < 0) {
  free_cable(substream);
@@ -744,7 +761,7 @@
  struct loopback *loopback = substream->private_data;
  struct loopback_pcm *dpcm = substream->runtime->private_data;

  loopback_timer_stop(dpcm);
+loopback_timer_stop_sync(dpcm);
  mutex_lock(&loopback->cable_lock);
  free_cable(substream);
  mutex_unlock(&loopback->cable_lock);
@@ -814,9 +831,11 @@
  }
  struct loopback *loopback = snd_kcontrol_chip(kcontrol);

+mutex_lock(&loopback->cable_lock);
  ucontrol->value.integer.value[0] =
  loopback->setup[kcontrol->id.subdevice]
    [kcontrol->id.device].rate_shift;
+mutex_unlock(&loopback->cable_lock);
  return 0;
}
@@ -848,9 +867,11 @@
  }
  struct loopback *loopback = snd_kcontrol_chip(kcontrol);

+mutex_lock(&loopback->cable_lock);
  ucontrol->value.integer.value[0] =
  loopback->setup[kcontrol->id.subdevice]
    [kcontrol->id.device].notify;
+mutex_unlock(&loopback->cable_lock);
  return 0;
}
@@ -862,12 +883,14 @@
  int change = 0;

val = ucontrol->value.integer.value[0] ? 1 : 0;
+mutex_lock(&loopback->cable_lock);
if (val != loopback->setup[kcontrol->id.subdevice]
[kcontrol->id.device].notify) {
loopback->setup[kcontrol->id.subdevice]
[kcontrol->id.device].notify = val;
change = 1;
}
+mutex_unlock(&loopback->cable_lock);
return change;
}

@@ -875,13 +898,18 @@
struct snd_ctl_elem_value *ucontrol)
{
struct loopback *loopback = snd_kcontrol_chip(kcontrol);
-struct loopback_cable *cable = loopback->cables
- [kcontrol->id.subdevice][kcontrol->id.device ^ 1];
+struct loopback_cable *cable;
+
unsigned int val = 0;

-if (cable != NULL)
-val = (cable->running & (1 << SNDRV_PCM_STREAM_PLAYBACK)) ?
-1 : 0;
+mutex_lock(&loopback->cable_lock);
+cable = loopback->cables[kcontrol->id.subdevice][kcontrol->id.device ^ 1];
+if (cable != NULL) {
+unsigned int running = cable->running ^ cable->pause;
+
+val = (running & (1 << SNDRV_PCM_STREAM_PLAYBACK)) ? 1 : 0;
+}
+mutex_unlock(&loopback->cable_lock);
    ucontrol->value.integer.value[0] = val;
    return 0;
}
@@ -924,9 +952,11 @@

 struct loopback *loopback = snd_kcontrol_chip(kcontrol);

+mutex_lock(&loopback->cable_lock);
    ucontrol->value.integer.value[0] =
loopback->setup[kcontrol->id.subdevice]
[kcontrol->id.device].rate;
+mutex_unlock(&loopback->cable_lock);
    return 0;
}
struct loopback *loopback = snd_kcontrol_chip(kcontrol);

+mutex_lock(&loopback->cable_lock);
ucontrol->value.integer.value[0] =
loopback->setup[kcontrol->id.subdevice]
    [kcontrol->id.device].channels;
+mutex_unlock(&loopback->cable_lock);
return 0;
}

return -ENOMEM;

kctl->id.device = dev;
kctl->id.subdevice = substr;
+
+/* Add the control before copying the id so that
+ * the numid field of the id is set in the copy.
+ */
+err = snd_ctl_add(card, kctl);
+if (err < 0)
+return err;
+
switch (idx) {
  case ACTIVE_IDX:
    setup->active_id = kctl->id;
    break;
}

-int i;

-for (i = 0; i < SNDRV_PCM_FORMAT_LAST; i++) {
+for (i = 0; i <= SNDRV_PCM_FORMAT_LAST; i++) {
  if (dummy->pcm_hwformats & (1ULL << i))
    snd_iprintf(buffer, " %s", snd_pcm_format_name(i));
}
--- linux-4.15.0.orig/sound/drivers/opl3/opl3_synth.c
+++ linux-4.15.0/sound/drivers/opl3/opl3_synth.c
@@ -21,6 +21,7 @@

#include <linux/slab.h>
#include <linux/export.h>
+#include <linux/nospec.h>
#include <sound/opl3.h>
#include <sound/asound_fm.h>

@@ -103,6 +104,8 @@
{
    struct snd_dm_fm_info info;

+    memset(&info, 0, sizeof(info));
+
    info.fm_mode = opl3->fm_mode;
    info.rhythm = opl3->rhythm;
    if (copy_to_user(argp, &info, sizeof(struct snd_dm_fm_info)))
@@ -448,7 +451,7 @@
{
    unsigned short reg_side;
    unsigned char op_offset;
-    unsigned char voice_offset;
+    unsigned char voice_offset, voice_op;

    unsigned short opl3_reg;
    unsigned char reg_val;
@@ -473,7 +476,9 @@
    voice_offset = voice->voice - MAX_OPL2_VOICES;
 }
 /* Get register offset of operator */
-    op_offset = snd_opl3_regmap[voice_offset][voice->op];
+    voice_offset = array_index_nospec(voice_offset, MAX_OPL2_VOICES);
+    voice_op = array_index_nospec(voice->op, 4);
+    op_offset = snd_opl3_regmap[voice_offset][voice_op];

    reg_val = 0x00;
/* Set amplitude modulation (tremolo) effect */
--- linux-4.15.0.orig/sound/drivers/opl3/opl3_voice.h
+++ linux-4.15.0/sound/drivers/opl3/opl3_voice.h
@@ -41,7 +41,7 @@

/* Prototypes for opl3_drums.c */
void snd_opl3_load_drums(struct snd_opl3 *opl3);
-void snd_opl3_drum_switch(struct snd_opl3 *opl3, int note, int on_off, int vel, struct snd_midi_channel *chan);
+void snd_opl3_drum_switch(struct snd_opl3 *opl3, int note, int vel, int on_off, struct snd_midi_channel *chan);
/* Prototypes for opl3_oss.c */
#if IS_ENABLED(CONFIG_SND_SEQUENCER_OSS)
--- linux-4.15.0.orig/sound/firewire/Kconfig
+++ linux-4.15.0/sound/firewire/Kconfig
@@ -37,10 +37,11 @@
* Mackie(Loud) Onyx 1640i (former model)
* Mackie(Loud) Onyx Satellite
* Mackie(Loud) Tapco Link.Firewire
- * Mackie(Loud) d.2 pro/d.4 pro
+  * Mackie(Loud) d.2 pro/d.4 pro (built-in FireWire card with OXFW971 ASIC)
* Mackie(Loud) U.420/U.420d
* TASCAM FireOne
* Stanton Controllers & Systems 1 Deck/Mixer
+ * APOGEE duet FireWire

To compile this driver as a module, choose M here: the module
will be called snd-oxfw.
@@ -82,7 +83,7 @@
* PreSonus FIREBOX/FIREPOD/FP10/Inspire1394
* BridgeCo RDAudio1/Audio5
* Mackie Onyx 1220/1620/1640 (FireWire I/O Card)
- * Mackie d.2 (FireWire Option)
+  * Mackie d.2 (optional FireWire card with DM1000 ASIC)
* Stanton FinalScratch 2 (ScratchAmp)
* Tascam IF-FW/DM
* BEHRINGER XENIX UFX 1204/1604
@@ -108,6 +109,7 @@
* M-Audio Ozonic/NRV10/ProfireLightBridge
* M-Audio FireWire 1814/ProjectMix IO
* Digidesign Mbox 2 Pro
+  * ToneWeal FW66

To compile this driver as a module, choose M here: the module
will be called snd-bebob.
--- linux-4.15.0.orig/sound/firewire/amdtp-am824.c
+++ linux-4.15.0/sound/firewire/amdtp-am824.c
@@ -321,7 +321,7 @@
   b = (u8 *)&buffer[p->midi_position];

for (f = 0; f < frames; f++) {
-  port = (s->data_block_counter + f) % 8;
+  port = (8 - s->tx_first_dbc + s->data_block_counter + f) % 8;
  b = (u8 *)&buffer[buffer->midi_position];

  len = b[0] - 0x80;
--- linux-4.15.0.orig/sound/firewire/amdtp-stream-trace.h
+++ linux-4.15.0/sound/firewire/amdtp-stream-trace.h
@@ -131,7 +131,7 @@

static int handle_in_packet_without_header(struct amdtp_stream *s,
   unsigned int payload_quadlets, unsigned int cycle,
   unsigned int index)
{
    __be32 *buffer;
    unsigned int payload_quadlets;
    unsigned int data_blocks;
    struct snd_pcm_substream *pcm;
    unsigned int pcm_frames;

    buffer = s->buffer.packets[s->packet_index].buffer;
    payload_quadlets = payload_length / 4;
    data_blocks = payload_quadlets / s->data_block_quadlets;

    trace_in_packet_without_header(s, cycle, payload_quadlets, data_blocks,
      u32 cycle;
    unsigned int packets;

    s->max_payload_length = amdtp_stream_get_max_payload(s);

    /*
     * For in-stream, first packet has come.
     * For out-stream, prepared to transmit first packet
    */
    @} -773,8 +775,6 @@
    @} -879,6 +879,9 @@
amdtp_stream_update(s);

+if (s->direction == AMDTP_IN_STREAM)
+s->max_payload_length = amdtp_stream_get_max_payload(s);
+
if (s->flags & CIP_NO_HEADER)
  s->tag = TAG_NO_CIP_HEADER;
else

--- linux-4.15.0.orig/sound/firewire/bebob/bebob.c
+++ linux-4.15.0/sound/firewire/bebob/bebob.c
@@ -60,6 +60,7 @@
#define VEN_MAUDIO1	0x00000d6c
#define VEN_MAUDIO2	0x000007f5
#define VEN_DIGIDESIGN	0x00a07e
+#define OUI_SHOUYO	0x002327

#define MODEL_FOCUSRITE_SAFFIRE_BOTH0x00000000
#define MODEL_MAUDIO_AUDIOPHILE_BOTH0x0010060
@@ -263,6 +264,7 @@
error:
mutex_unlock(&devices_mutex);
snd_bebob_stream_destroy_duplex(bebob);
+kfree(bebob->maudio_special_quirk);
+bebob->maudio_special_quirk = NULL;
snd_card_free(bebob->card);
dev_info(&bebob->unit->device,
"Sound card registration failed: %d\n", err);
@@ -412,7 +415,7 @@
/* Mackie, ScratchAmp */
SND_BEBOB_DEV_ENTRY(VEN_STANTON, 0x00000001, &spec_normal),
/* AcousticReality, eARMasterOne */
/* Focusrite, SaffirePro 26 I/O */
SND_BEBOB_DEV_ENTRY(VEN_FOCUSRITE, 0x00000003, &saffirepro_26_spec),
 /* Focusrite, SaffirePro 10 I/O */
-SND_BEBOB_DEV_ENTRY(VEN_FOCUSRITE, 0x00000006, &saffirepro_10_spec),
+		// The combination of vendor_id and model_id is the same as the
+		// same as the one of Liquid Saffire 56.
+
matched_data: IEEE1394_MATCH_VENDOR_ID |
+ IEEE1394_MATCH_MODEL_ID |
+ IEEE1394_MATCH_SPECIFIER_ID |
+ IEEE1394_MATCH_VERSION,
+vendor_id: VEN_FOCUSRITE,
+model_id: 0x000006,
+specifier_id: 0x00a02d,
+version= 0x010001,
+driver_data= (kernel_ulong_t)&saffirepro_10_spec,
+
/* Focusrite, Saffire(no label and LE) */
SND_BEBOB_DEV_ENTRY(VEN_FOCUSRITE, MODEL_FOCUSRITE_SAFFIRE_BOTH,
					t		&spec_normal),
/* Digidesign Mbox 2 Pro */
SND_BEBOB_DEV_ENTRY(VEN_DIGIDESIGN, 0x0000a9, &spec_normal),
+	// Toneweal FW66.
+	SND_BEBOB_DEV_ENTRY(OUI_SHOUYO, 0x020002, &spec_normal),
/* IDs are unknown but able to be supported */
/* Apogee, Mini-ME Firewire */
/* Apogee, Mini-DAC Firewire */
--- linux-4.15.0.orig/sound/firewire/bebob/bebob_focusrite.c
+++ linux-4.15.0/sound/firewire/bebob/bebob_focusrite.c
@@ -28,6 +28,8 @@
#define SAFFIRE_CLOCK_SOURCE_SPDIF1
 /* clock sources as returned from register of Saffire Pro 10 and 26 */
+#define SAFFIREPRO_CLOCK_SOURCE_SELECT_MASK 0x000000ff
+#define SAFFIREPRO_CLOCK_SOURCE_DETECT_MASK 0x0000ff00
 #define SAFFIREPRO_CLOCK_SOURCE_INTERNAL
 #define SAFFIREPRO_CLOCK_SOURCE_SKIP /* never used on hardware */
 #define SAFFIREPRO_CLOCK_SOURCE_SPDIF2
@@ -190,6 +192,7 @@
map = saffirepro_clk_maps[1];

/* In a case that this driver cannot handle the value of register. */
+value &= SAFFIREPRO_CLOCK_SOURCE_SELECT_MASK;
if (value >= SAFFIREPRO_CLOCK_SOURCE_COUNT || map[value] < 0) {
err = -EIO;
goto end;
--- linux-4.15.0.orig/sound/firewire/bebob/bebob_hwdep.c
memset(&event, 0, sizeof(event));
+count = min_t(long, count, sizeof(event.lock_status));
if (bebob->dev_lock_changed) {
    event.lock_status.type = SNDRV_FIREWIRE_EVENT_LOCK_STATUS;
    event.lock_status.status = (bebob->dev_lock_count > 0);
    bebob->dev_lock_changed = false;
    count = min_t(long, count, sizeof(event.lock_status));
}

spin_unlock_irq(&bebob->lock);
--- linux-4.15.0.orig/sound/firewire/bebob/bebob_maudio.c
+++ linux-4.15.0/sound/firewire/bebob/bebob_maudio.c
@@ -96,17 +96,13 @@
struct fw_device *device = fw_parent_device(unit);
int err, rcode;

u64 date;
-__le32 cues[3] = {
-    cpu_to_le32(MAUDIO_BOOTLOADER_CUE1),
-    cpu_to_le32(MAUDIO_BOOTLOADER_CUE2),
-    cpu_to_le32(MAUDIO_BOOTLOADER_CUE3)
-};
+__le32 *cues;
/* check date of software used to build */
err = snd_bebob_read_block(unit, INFO_OFFSET_SW_DATE,
    &date, sizeof(u64));
if (err < 0)
    goto end;
    return err;
/*
 * firmware version 5058 or later has date later than "20070401", but
 * 'date' is not null-terminated.
 @@ -114,20 +110,28 @@
if (date < 0x3230303730343031LL) {
    dev_err(&unit->device,
        "Use firmware version 5058 or later\n"");
-    err = -ENOSYS;
-    goto end;
+    return -ENXIO;
 }
+cues = kmalloc_array(3, sizeof(*cues), GFP_KERNEL);
+if (!cues)
return -ENOMEM;

cues[0] = cpu_to_le32(MAUDIO_BOOTLOADER_CUE1);
cues[1] = cpu_to_le32(MAUDIO_BOOTLOADER_CUE2);
cues[2] = cpu_to_le32(MAUDIO_BOOTLOADER_CUE3);

rcode = fw_run_transaction(device->card, TCODE_WRITE_BLOCK_REQUEST,
   device->node_id, device->generation,
   device->max_speed, BEBOB_ADDR_REG_REQ,
-   cues, sizeof(cues));
+   cues, 3 * sizeof(*cues));
kfree(cues);
if (rcode != RCODE_COMPLETE) {
   dev_err(&unit->device,
   "Failed to send a cue to load firmware\n");
err = -EIO;
}
@end:
+
return err;
}

@@ -290,10 +294,6 @@
bebob->midi_output_ports = 2;
}
end:
-if (err < 0) {
-kfree(params);
-bebob->maudio_special_quirk = NULL;
-
mutex_unlock(&bebob->mutex);
return err;
}

--- linux-4.15.0.orig/sound/firewire/bebob/bebob_stream.c
+++ linux-4.15.0/sound/firewire/bebob/bebob_stream.c
@@ -253,8 +253,7 @@
return err;
}

-static int
-static unsigned int
-static map_data_channels(struct snd_bebob *bebob, struct amdtp_stream *s)
+static int map_data_channels(struct snd_bebob *bebob, struct amdtp_stream *s)
{
   unsigned int sec, sections, ch, channels;
   unsigned int pcm, midi, location;
--- linux-4.15.0.orig/sound/firewire/dice/dice-stream.c
+++ linux-4.15.0/sound/firewire/dice/dice-stream.c
@@ -435,7 +435,7 @@
return err;
}
err = init_stream(dice, AMDTP_IN_STREAM, i);
if (err < 0) {
  for (; i >= 0; i--)
    destroy_stream(dice, AMDTP_OUT_STREAM, i);
  destroy_stream(dice, AMDTP_IN_STREAM, i);
  goto end;
}

--- linux-4.15.0.orig/sound/firewire/dice/dice.c
+++ linux-4.15.0/sound/firewire/dice/dice.c
@@ -14,7 +14,7 @@
#define OUI_WEISS		0x001c6a
#define OUI_LOUD0x000ff2
#define OUI_FOCUSRITE0x00130e
-#define OUI_TCELECTRONIC0x001486
+#define OUI_TCELECTRONIC0x000166

#define DICE_CATEGORY_ID0x04
#define WEISS_CATEGORY_ID0x00
--- linux-4.15.0.orig/sound/firewire/digi00x/digi00x.c
+++ linux-4.15.0/sound/firewire/digi00x/digi00x.c
@@ -15,6 +15,7 @@
#define VENDOR_DIGIDESIGN0x00a07e
#define MODEL_CONSOLE0x000001
#define MODEL_RACK0x000002
+#define SPEC_VERSION0x000001

static int name_card(struct snd_dg00x *dg00x)
{
 /fw_unit_put(dg00x->unit);
  mutex_destroy(&dg00x->mutex);
  kfree(dg00x);
}

static void dg00x_card_free(struct snd_card *card)
@@ -184,14 +186,18 @@
/* Both of 002/003 use the same ID. */
{
  .match_flags = IEEE1394_MATCH_VENDOR_ID |
+    IEEE1394_MATCH_VERSION |
    IEEE1394_MATCH_MODEL_ID,
  .vendor_id = VENDOR_DIGIDESIGN,
+  .version = SPEC_VERSION,
  .model_id = MODEL_CONSOLE,
},

}
.match_flags = IEEE1394_MATCH_VENDOR_ID |
    IEEE1394_MATCH_VERSION |
    IEEE1394_MATCH_MODEL_ID,
.vendor_id = VENDOR_DIGIDESIGN,
.version = SPEC_VERSION,
.model_id = MODEL_RACK,
},
{}
--- linux-4.15.0.orig/sound/firewire/fireface/ff-protocol-ff400.c
+++ linux-4.15.0/sound/firewire/fireface/ff-protocol-ff400.c
@@ -30,7 +30,7 @@
     err = snd_fw_transaction(ff->unit, TCODE_READ_QUADLET_REQUEST,
       FF400_SYNC_STATUS, &reg, sizeof(reg), 0);
   + FF400_CLOCK_CONFIG, &reg, sizeof(reg), 0);
   if (err < 0)
         return err;
     data = le32_to_cpu(reg);
@@ -146,12 +146,13 @@
       reg[i] = cpu_to_le32(0x00000001);
   }
   /*
   * Each quadlet is corresponding to data channels in a data
   * blocks in reverse order. Precisely, quadlets for available
@@ -163,9 +164,11 @@
   reg[i] = cpu_to_le32(0x00000001);
   }

-return snd_fw_transaction(ff->unit, TCODE_WRITE_BLOCK_REQUEST,
   FF400_FETCH_PCM_FRAMES, reg,
   sizeof(__le32) * 18, 0);
+err = snd_fw_transaction(ff->unit, TCODE_WRITE_BLOCK_REQUEST,
+       FF400_FETCH_PCM_FRAMES, reg,
+       sizeof(__le32) * 18, 0);
+kfree(reg);
+return err;
}
static void ff400_dump_sync_status(struct snd_ff *ff, 
--- linux-4.15.0.orig/sound/firewire/fireface/ff-transaction.c 
+++ linux-4.15.0/sound/firewire/fireface/ff-transaction.c 
@@ -99,7 +99,7 @@
 /* Set interval to next transaction. */
 ff->next_ktime[port] = ktime_add_ns(ktime_get(),
 -   len * 8 * NSEC_PER_SEC / 31250);
+   len * 8 * (NSEC_PER_SEC / 31250));
 ff->rx_bytes[port] = len;

 /*
 --- linux-4.15.0.orig/sound/firewire/fireworks/fireworks.c 
+++ linux-4.15.0/sound/firewire/fireworks/fireworks.c 
@@ -301,6 +301,8 @@
 snd_efw_transaction_remove_instance(efw);
 snd_efw_stream_destroy_duplex(efw);
 snd_card_free(efw->card);
+kfree(efw->resp_buf);
+efw->resp_buf = NULL;
 dev_info(&efw->unit->device,
 "Sound card registration failed: %d\n", err);
}
 --- linux-4.15.0.orig/sound/firewire/fireworks/fireworks_transaction.c 
+++ linux-4.15.0/sound/firewire/fireworks/fireworks_transaction.c 
@@ -124,7 +124,7 @@
 t = (struct snd_efw_transaction *)data;
 length = min_t(size_t, be32_to_cpu(t->length) * sizeof(u32), length);

-spin_lock_irq(&efw->lock);
+spin_lock_irq(&efw->lock);

 if (efw->push_ptr < efw->pull_ptr)
 capacity = (unsigned int)(efw->pull_ptr - efw->push_ptr);
@@ -191,7 +191,7 @@
 copy_resp_to_buf(efw, data, length, rcode);
 end:
-spin_unlock_irq(&instances_lock);
+spin_unlock(&instances_lock);
 }

 static void 
--- linux-4.15.0.orig/sound/firewire/issight.c 
+++ linux-4.15.0/sound/firewire/issight.c 
@@ -639,7 +639,7 @@
 if (!isight->audio_base) {
 dev_err(&unit->device, "audio unit base not found\n");


err = -ENXIO;
-goto err_unit;
+goto error;
}
fw_iso_resources_init(&isight->resources, unit);

dev_set_drvdata(&unit->device, isight);

return 0;
-
-err_unit:
-    fw_unit_put(isight->unit);
-    mutex_destroy(&isight->mutex);
error:
    snd_card_free(card);
+
+    mutex_destroy(&isight->mutex);
+    fw_unit_put(isight->unit);
+
+    return err;
}

--- linux-4.15.0.orig/sound/firewire/motu/amdtp-motu.c
+++ linux-4.15.0/sound/firewire/motu/amdtp-motu.c
@@ -136,7 +136,9 @@
   for (c = 0; c < channels; ++c) {
+       *dst = (byte[0] << 24) |
+               (byte[1] << 16) |
+               (byte[2] << 8);
       byte += 3;
       dst++;
   }
--- linux-4.15.0.orig/sound/firewire/motu/motu-proc.c
+++ linux-4.15.0/sound/firewire/motu/motu-proc.c
@@ -17,7 +17,7 @@
[SND_MOTU_CLOCK_SOURCE_SPDIF_ON_COAX] = "S/PDIF on coaxial interface",
[SND_MOTU_CLOCK_SOURCE_AESEBU_ON_XLR] = "AES/EBU on XLR interface",
[SND_MOTU_CLOCK_SOURCE_WORD_ON_BNC] = "Word clock on BNC interface",
};
--- linux-4.15.0.orig/sound/firewire/motu/motu-stream.c
+++ linux-4.15.0/sound/firewire/motu/motu-stream.c
@@ -345,7 +345,7 @@
    }

    amdtp_stream_destroy(stream);
    -fw_iso_resources_free(resources);
    +fw_iso_resources_destroy(resources);
    }

int snd_motu_stream_init_duplex(struct snd_motu *motu)
--- linux-4.15.0.orig/sound/firewire/oxfw/oxfw.c
+++ linux-4.15.0/sound/firewire/oxfw/oxfw.c
@@ -20,6 +20,7 @@
    #define OUI_APOGEE	0x0003db
    #define MODEL_SATELLITE	0x00200f

-define VENDOR_LACIE0x00d04b
-define VENDOR_TASCAM0x00022e
-define OUI_STANTON0x001260
+#define OUI_APOGEE0x0003db

+#define MODEL_SATELLITE0x00200f

@@ -136,6 +137,7 @@
    }

    kfree(oxfw->spec);
    mutex_destroy(&oxfw->mutex);
    +kfree(oxfw);
    }

/*
@@ -174,9 +176,6 @@
    oxfw->midi_input_ports = 0;
    oxfw->midi_output_ports = 0;

-/* Output stream exists but no data channels are useful. */
-oxfw->has_output = false;
- return snd_oxfw_scs1x_add(oxfw);
 }

@@ -213,6 +212,7 @@
 static void do_registration(struct work_struct *work)
 {
    struct snd_oxfw *oxfw = container_of(work, struct snd_oxfw, dwork.work);
    +int i;
    int err;

    if (oxfw->registered)
@@ -275,7 +275,15 @@
    snd_oxfw_stream_destroy_simplex(oxfw, &oxfw->rx_stream);

if (oxfw->has_output)
 snd_oxfw_stream_destroy_simplex(oxfw, &oxfw->tx_stream);
 +for (i = 0; i < SND_OXFW_STREAM_FORMAT_ENTRIES; ++i) {
 + kfree(oxfw->tx_stream_formats[i]);
 + oxfw->tx_stream_formats[i] = NULL;
 + kfree(oxfw->rx_stream_formats[i]);
 + oxfw->rx_stream_formats[i] = NULL;
 + }
 snd_card_free(oxfw->card);
 + kfree(oxfw->spec);
 + oxfw->spec = NULL;
 dev_info(&oxfw->unit->device,
 "Sound card registration failed: %d\n", err);
 }
@@ -398,8 +406,7 @@
 * Onyx-i series (former models): 0x081216
 * Mackie Onyx Satellite: 0x002000f
 * Tapco LINK.firewire 4x6: 0x000460
- * d.2 pro: Unknown
- * d.4 pro: Unknown
+ * d.2 pro/d.4 pro (built-in card): Unknown
 * U.420: Unknown
 * U.420d: Unknown
 */
@@ -432,6 +439,13 @@
 .model_id= 0x002000,
 },
+ // APOGEE, duet FireWire
+{
+ .match_flags= IEEE1394_MATCH_VENDOR_ID |
+ IEEE1394_MATCH_MODEL_ID,
+ .vendor_id= OUI_APOGEE,
+ .model_id= 0x01dddd,
+ },
+ // APOGEE, duet FireWire
+
+ MODULE_DEVICE_TABLE(ieee1394, oxfw_id_table);
--- linux-4.15.0.orig/sound/firewire/packets-buffer.c
+++ linux-4.15.0/sound/firewire/packets-buffer.c
@@ -37,7 +37,7 @@
 packets_per_page = PAGE_SIZE / packet_size;
 if (WARN_ON(!packets_per_page)) {
  err = -EINVAL;
- goto error;
+ goto err_packets;
 }
err = snd_tscm_stream_get_clock(tscm, &clock);
+if (err < 0)
+goto err_locked;
+
+if (clock != SND_TSCM_CLOCK_INTERNAL ||
    amdtp_stream_pcm_running(&tscm->rx_stream) ||
    amdtp_stream_pcm_running(&tscm->tx_stream)) {

static int get_clock(struct snd_tscm *tscm, u32 *data)
{
    int trial = 0;
    __be32 reg;
    int err;

    -err = snd_fw_transaction(tscm->unit, TCODE_READ_QUADLET_REQUEST,
- TSCM_ADDR_BASE + TSCM_OFFSET_CLOCK_STATUS,
- &reg, sizeof(reg), 0);
-if (err >= 0)
+while (trial++ < 5) {
+err = snd_fw_transaction(tscm->unit, TCODE_READ_QUADLET_REQUEST,
+TSCM_ADDR_BASE + TSCM_OFFSET_CLOCK_STATUS,
+&reg, sizeof(reg), 0);
+if (err < 0)
+return err;
+
*data = be32_to_cpu(reg);
+if (*data & CLOCK_STATUS_MASK)
+break;
+
+// In intermediate state after changing clock status.
+msleep(50);
+}
static int set_clock(struct snd_tscm *tscm, unsigned int rate,
                    unsigned int trials = 0) {
    u32 data = 0x0;
    if (trials++ < 5) {
        err = get_clock(tscm, &data);
        if (err < 0)
            return err;
        data &= 0x000000ff;
        if (rate > 0) {
            data &= 0x000000ff;
            if ((data & 0x0f) == 0x01)
                /* Check base rate. */
                if (((data & 0x0f) == 0x01)
                    /* Set interval to next transaction. */
                    port->next_ktime = ktime_add_ns(ktime_get(),
                    /* Still in the intermediate state. */
                    if ((trial >= 5)
                        +err = get_clock(tscm, &data);
                        if (err < 0)
                            return err;
                        data &= 0x0000ffff;
                        +data &= CLOCK_CONFIG_MASK;
                        if (rate > 0) {
                            data &= 0x000000ff;
                            @ @ -35.7 +52.7 @ @
                            if (err < 0)
                                return err;
                            data &= 0x000000ff;
                            @ @ -80,17 +97,14 @ @
                            int snd_tscm_stream_get_rate(struct snd_tscm *tscm, unsigned int *rate)
                            { -u32 data = 0x0;
                            -unsigned int trials = 0;
                            +u32 data;
                            int err;

                            -while (data == 0x0 || trials++ < 5) {
                                -err = get_clock(tscm, &data);
                                -if (err < 0)
                                    -return err;
                                +err = get_clock(tscm, &data);
                                +if (err < 0)
                                    +return err;

                                -data = (data & 0xff000000) >> 24;
                                -}
                                +data = (data & 0xff000000) >> 24;

                                /* Check base rate. */
                                if (((data & 0x0f) == 0x01)
                                    /* Set interval to next transaction. */
                                    port->next_ktime = ktime_add_ns(ktime_get(),
                                    /* Still in the intermediate state. */
                                    if ((trial >= 5)
-port->consume_bytes * 8 * NSEC_PER_SEC / 31250);
+port->consume_bytes * 8 * (NSEC_PER_SEC / 31250));

/* Start this transaction. */
port->idling = false;
--- linux-4.15.0.orig/sound/firewire/tascam/tascam.c
+++ linux-4.15.0/sound/firewire/tascam/tascam.c
@@ -93,6 +93,7 @@
 fw_unit_put(tscm->unit);
 mutex_destroy(&tscm->mutex);
+kfree(tscm);
}

static void tscm_card_free(struct snd_card *card)
@@ -224,11 +225,39 @@
}

static const struct ieee1394_device_id snd_tscm_id_table[] = {
+// Tascam, FW-1884.
+{
+.match_flags = IEEE1394_MATCH_VENDOR_ID |
- IEEE1394_MATCH_SPECIFIER_ID,
+ IEEE1394_MATCH_SPECIFIER_ID |
+ IEEE1394_MATCH_VERSION,
 .vendor_id = 0x00022e,
 .specifier_id = 0x00022e,
 .version = 0x800000,
+},
+// Tascam, FE-8 (.version = 0x800001)
+// This kernel module doesn't support FE-8 because the most of features
+// can be implemented in userspace without any specific support of this
+// module.
+//
+// .version = 0x800002 is unknown.
+//
+// Tascam, FW-1082.
+{
+.match_flags = IEEE1394_MATCH_VENDOR_ID |
+ IEEE1394_MATCH_SPECIFIER_ID |
+ IEEE1394_MATCH_VERSION,
 .vendor_id = 0x00022e,
 .specifier_id = 0x00022e,
 .version = 0x800003,
+},
+// Tascam, FW-1804.
+{
+.match_flags = IEEE1394_MATCH_VENDOR_ID |
IEEE1394_MATCH_SPECIFIER_ID | IEEE1394_MATCH_VERSION,
+ vendor_id = 0x00022e,
+ specifier_id = 0x00022e,
+ version = 0x800004,
},
/* FE-08 requires reverse-engineering because it just has faders. */

--- linux-4.15.0.orig/sound/hda/ext/hdac_ext_controller.c
+++ linux-4.15.0/sound/hda/ext/hdac_ext_controller.c
@@ -49,9 +49,11 @@

if (enable)
- snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL, 0, AZX_PPCTL_GPROCEN);
+ snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL,
+ AZX_PPCTL_GPROCEN, AZX_PPCTL_GPROCEN);
else
- snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL, AZX_PPCTL_GPROCEN, 0);
+ snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL,
+ AZX_PPCTL_GPROCEN, 0);
}  
EXPORT_SYMBOL_GPL(snd_hdac_ext_bus_ppcap_enable);

@@ -70,9 +72,11 @@

if (enable)
- snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL, 0, AZX_PPCTL_PIE);
+ snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL,
+ AZX_PPCTL_PIE, AZX_PPCTL_PIE);
else
- snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL, AZX_PPCTL_PIE, 0);
+ snd_hdac_update((bus->ppcap, AZX_REG_PP_PPCTL,
+ AZX_PPCTL_PIE, 0);
}  
EXPORT_SYMBOL_GPL(snd_hdac_ext_bus_ppcap_int_enable);

@@ -155,6 +159,8 @@

return NULL;
if (ebus->idx != bus_idx)
return NULL;
+if (addr < 0 || addr > 31)
+return NULL;
list_for_each_entry(hlink, &ebus->hlink_list, list) {
for (i = 0; i < HDA_MAX_CODECS; i++) {
@@ -197,7 +203,8 @@
int snd_hdac_ext_bus_link_power_up(struct hdac_ext_link *link)
{
    snd_hdac_update(link->ml_addr, AZX_REG_ML_LCTL, 0, AZX_MLCTL_SPA);
    snd_hdac_update(link->ml_addr, AZX_REG_ML_LCTL,
                    AZX_MLCTL_SPA, AZX_MLCTL_SPA);

    return check_hdac_link_power_active(link, true);
}
@@ -225,8 +232,8 @@
int ret;

list_for_each_entry(hlink, &ebus->hlink_list, list) {
    snd_hdac_update(hlink->ml_addr,
                    AZX_REG_ML_LCTL, 0, AZX_MLCTL_SPA);
    snd_hdac_update(hlink->ml_addr, AZX_REG_ML_LCTL,
                    AZX_MLCTL_SPA, AZX_MLCTL_SPA);
    ret = check_hdac_link_power_active(hlink, true);
    if (ret < 0)
        return ret;
@@ -246,7 +253,8 @@
int ret;

list_for_each_entry(hlink, &ebus->hlink_list, list) {
    snd_hdac_update(hlink->ml_addr, AZX_REG_ML_LCTL, AZX_MLCTL_SPA, 0);
    snd_hdac_update(hlink->ml_addr, AZX_REG_ML_LCTL,
                    AZX_MLCTL_SPA, 0);
    ret = check_hdac_link_power_active(hlink, false);
    if (ret < 0)
        return ret;
--- linux-4.15.0.orig/sound/hda/hdac_bus.c
+++ linux-4.15.0/sound/hda/hdac_bus.c
@@ -155,6 +155,7 @@
struct hdac_driver *drv;
unsigned int rp, caddr, res;

+spin_lock_irq(&bus->reg_lock);
while (bus->unsol_rp != bus->unsol_wp) {
    rp = (bus->unsol_rp + 1) % HDA_UNSOL_QUEUE_SIZE;
    bus->unsol_rp = rp;
@@ -166,10 +167,13 @@
codec = bus->caddr_tbl[caddr & 0x0f];
    if (!codec || !codec->dev.driver)
        continue;
+spin_unlock_irq(&bus->reg_lock);
    drv = drv_to_hdac_driver(codec->dev.driver);
    if (drv->unsol_event)
        drv->unsol_event(codec, res);
spin_lock_irq(&bus->reg_lock); 
} 
spin_unlock_irq(&bus->reg_lock); 

/**
--- linux-4.15.0.orig/sound/hda/hdac_controller.c
+++ linux-4.15.0/sound/hda/hdac_controller.c
@@ -40,6 +40,8 @@
*/
void snd_hdac_bus_init_cmd_io(struct hdac_bus *bus)
{
+WARN_ON_ONCE(!bus->rb.area);
+
spin_lock_irq(&bus->reg_lock);
/* CORB set up */
bus->corb.addr = bus->rb.addr;
@@ -383,13 +385,14 @@
EXPORT_SYMBOL_GPL(snd_hdac_bus_exit_link_reset);

/* reset codec link */
-static int azx_reset(struct hdac_bus *bus, bool full_reset)
+int snd_hdac_bus_reset_link(struct hdac_bus *bus, bool full_reset)
{
if (!full_reset)
goto skip_reset;

-/* clear STATESTS */
-snd_hdac_chip_writew(bus, STATESTS, STATESTS_INT_MASK);
+/* clear STATESTS if not in reset */
+if (snd_hdac_chip_readb(bus, GCTL) & AZX_GCTL_RESET)
+snd_hdac_chip_writew(bus, STATESTS, STATESTS_INT_MASK);

/* reset controller */
snd_hdac_bus_enter_link_reset(bus);
@@ -408,7 +411,7 @@
skip_reset:
/* check to see if controller is ready */
if (!snd_hdac_chip_readb(bus, GCTL)) {
-dev_dbg(bus->dev, "azx_reset: controller not ready!\n");
+dev_dbg(bus->dev, "controller not ready!\n");
return -EBUSY;
}
@@ -423,6 +426,7 @@
return 0;
}
+EXPORT_SYMBOL_GPL(snd_hdac_bus_reset_link);

/* enable interrupts */
static void azx_int_enable(struct hdac_bus *bus)
@@ -477,15 +481,17 @@
    return false;

/* reset controller */
-azx_reset(bus, full_reset);
+snd_hdac_bus_reset_link(bus, full_reset);

-/* initialize interrupts */
+/* clear interrupts */
azx_int_clear(bus);
-azx_int_enable(bus);

/* initialize the codec command I/O */
snd_hdac_bus_init_cmd_io(bus);

+/* enable interrupts after CORB/RIRB buffers are initialized above */
+azx_int_enable(bus);
+
/* program the position buffer */
if (bus->use_posbuf && bus->posbuf.addr) {
    snd_hdac_chip_writel(bus, DPLBASE, (u32)bus->posbuf.addr);
    --- linux-4.15.0.orig/sound/hda/hdac_device.c
    +++ linux-4.15.0/sound/hda/hdac_device.c
    @@ -123,6 +123,8 @@
    void snd_hdac_device_exit(struct hdac_device *codec)
    {
        pm_runtime_put_noidle(&codec->dev);
    +/* keep balance of runtime PM child_count in parent device */
    +pm_runtime_set_suspended(&codec->dev);
        snd_hdac_bus_remove_device(codec->bus, codec);
        kfree(codec->vendor_name);
        kfree(codec->chip_name);
        --- linux-4.15.0.orig/sound/hda/hdmi_chmap.c
        +++ linux-4.15.0/sound/hda/hdmi_chmap.c
        @@ -249,7 +249,7 @@
            for (i = 0, j = 0; i < ARRAY_SIZE(cea_speaker_allocation_names); i++) {
                if (spk_alloc & (1 << i))
                    -j += snprintf(buf + j, buflen - j, " %s",
                    +j += scnprintf(buf + j, buflen - j, " %s",
                    cea_speaker_allocation_names[i]);
            }
            buf[j] = '\0';/* necessary when j == 0 */
            --- linux-4.15.0.orig/sound/i2c/cs8427.c
struct cs8427 *chip = device->private_data;
char *hw_data = udata ?
chip->playback.hw_udata : chip->playback.hw_status;
unsigned char data[32];
int err, idx;

if (!memcmp(hw_data, ndata, count))

memset(&knew, 0, sizeof(knew));
-knew.name = ak->adc_info[mixer_ch].selector_name;
-/if (!knew.name) {
+if (!ak->adc_info ||
+!ak->adc_info[mixer_ch].selector_name) {
knew.name = "Capture Channel";
knew.index = mixer_ch + ak->idx_offset * 2;
-} else
+} else
+knew.name = ak->adc_info[mixer_ch].selector_name;

knew.iface = SNDRV_CTL_ELEM_IFACE_MIXER;
knew.info = ak4xxx_capture_source_info;
-\} if (acard->sb->hardware != SB_HW_16) {
+\} if (acard->sb->hardware != SB_HW_16) {
+snd_printk(KERN_ERR PFX "SB16 not found during probe\n");
\return err;
+\return -ENODEV;
} else {
mpu_irq[dev] = pnp_irq(pdev, 0);
    } else {
mpu_irq[dev] = -1; /* disable interrupt */
--- linux-4.15.0.orig/sound/isa/es1688/es1688.c
+++ linux-4.15.0/sound/isa/es1688/es1688.c
@@ -284,8 +284,10 @@
return error;
    }
error = snd_es1688_probe(card, dev);
-if (error < 0)
+if (error < 0) {
+    snd_card_free(card);
return error;
+
} pnp_set_card_drvdata(pcard, card);
snd_es968_pnp_is_probed = 1;
return 0;
--- linux-4.15.0.orig/sound/isa/msnd/msnd_pinnacle.c
+++ linux-4.15.0/sound/isa/msnd/msnd_pinnacle.c
@@ -82,10 +82,10 @@
static void set_default_audio_parameters(struct snd_msnd *chip)
{
-    chip->play_sample_size = DEFSAMPLESIZE;
+    chip->play_sample_size = snd_pcm_format_width(DEFSAMPLESIZE);
     chip->play_sample_rate = DEFSAMPLERATE;
     chip->play_channels = DEFCHANNELS;
-    chip->capture_sample_size = DEFSAMPLESIZE;
+    chip->capture_sample_size = snd_pcm_format_width(DEFSAMPLESIZE);
     chip->capture_sample_rate = DEFSAMPLERATE;
     chip->capture_channels = DEFCHANNELS;
 }
--- linux-4.15.0.orig/sound/isa/opti9xx/miro.c
+++ linux-4.15.0/sound/isa/opti9xx/miro.c
@@ -875,10 +875,13 @@
spin_unlock_irqrestore(&chip->lock, flags);
}

+static inline void snd_miro_write_mask(struct snd_miro *chip,
+    unsigned char reg, unsigned char value, unsigned char mask)
+{
+    unsigned char oldval = snd_miro_read(chip, reg);

-#define snd_miro_write_mask(chip, reg, value, mask)\n-snd_miro_write(chip, reg,\n-    (snd_miro_read(chip, reg) & ~(mask)) | ((value) & (mask)))
+snd_miro_write(chip, reg, (oldval & ~mask) | (value & mask));
+}
{-#define snd_opti9xx_write_mask(chip, reg, value, mask)\-snd_opti9xx_write(chip, reg,\-(snd_opti9xx_read(chip, reg) & ~(mask)) | ((value) & (mask)))\+static inline void snd_opti9xx_write_mask(struct snd_opti9xx *chip,\+unsigned char reg, unsigned char value, unsigned char mask)\+{\+unsigned char oldval = snd_opti9xx_read(chip, reg);\+
+snd_opti9xx_write(chip, reg, (oldval & ~mask) | (value & mask));\+}\}

static int snd_opti9xx_configure(struct snd_opti9xx *chip,\+long port,\+-linux-4.15.0.orig/sound/isa/sb/emu8000.c\+-linux-4.15.0/sound/isa/sb/emu8000.c\-@ @ -1042,8 +1042,10 @@\+memset(emu->controls, 0, sizeof(emu->controls));\+for (i = 0; i < EMU8000_NUM_CONTROLS; i++) {\+-if ((err = snd_ctl_add(card, emu->controls[i] = snd_ctl_new1(mixer_defs[i], emu))) < 0)\+if ((err = snd_ctl_add(card, emu->controls[i] = snd_ctl_new1(mixer_defs[i], emu))) < 0) {\+emu->controls[i] = NULL;\+goto __error;\+}\+}
return 0;

spin_unlock_irqrestore(&p->chip->mixer_lock, flags);
spin_lock(&p->chip->reg_lock);
set_mode_register(p->chip, 0xc0); /* c0 = STOP */\-867,6 +868,7 @@
spin_unlock(&p->chip->reg_lock);
/* restore PCM volume */
+spin_lock_irqsave(&p->chip->mixer_lock, flags);
snd_sbmixer_write(p->chip, SB_DSP4_PCM_DEV, mixL);
snd_sbmixer_write(p->chip, SB_DSP4_PCM_DEV + 1, mixR);
spin_unlock_irqrestore(&p->chip->mixer_lock, flags);
@@ -892,6 +894,7 @@
mixR = snd_sbmixer_read(p->chip, SB_DSP4_PCM_DEV + 1);
snd_sbmixer_write(p->chip, SB_DSP4_PCM_DEV, mixL & 0x7);
snd_sbmixer_write(p->chip, SB_DSP4_PCM_DEV + 1, mixR & 0x7);
+spin_unlock_irqrestore(&p->chip->mixer_lock, flags);

spin_lock(&p->chip->reg_lock);
if (p->running & SNDRV_SB_CSP_ST_QSOUND) {
    @ @ -906,6 +909,7 @@
spin_unlock(&p->chip->reg_lock);

/* restore PCM volume */
+spin_lock_irqsave(&p->chip->mixer_lock, flags);
snd_sbmixer_write(p->chip, SB_DSP4_PCM_DEV, mixL);
snd_sbmixer_write(p->chip, SB_DSP4_PCM_DEV + 1, mixR);
spin_unlock_irqrestore(&p->chip->mixer_lock, flags);
@@ -1059,10 +1063,14 @@
spin_lock_init(&p->q_lock);

- if ((err = snd_ctl_add(card, p->qsound_switch = snd_ctl_new1(&snd_sb_qsound_switch, p))) < 0)
-+if ((err = snd_ctl_add(card, p->qsound_switch = snd_ctl_new1(&snd_sb_qsound_switch, p))) < 0) {
+   +p->qsound_switch = NULL;
goto __error;
- if ((err = snd_ctl_add(card, p->qsound_space = snd_ctl_new1(&snd_sb_qsound_space, p))) < 0)
-+} 
+   } 
+   +p->qsound_space = NULL;
goto __error;
+}

return 0;

@ @ -1082,10 +1090,14 @@
card = p->chip->card;

down_write(&card->controls_rwsem);
- if (p->qsound_switch)
-+if (p->qsound_switch) {
    snd_ctl_remove(card, p->qsound_switch);
- if (p->qsound_space)
-+p->qsound_switch = NULL;
+if (p->qsound_space) {
    snd_ctl_remove(card, p->qsound_space);
    p->qsound_space = NULL;
    }
    up_write(&card->controls_rwlock);

    /* cancel pending transfer of QSound parameters */
    --- linux-4.15.0.orig/sound/isa/wavefront/wavefront_synth.c
    +++ linux-4.15.0/sound/isa/wavefront/wavefront_synth.c
    @@ -1175,7 +1175,10 @@
            "alias for %dn",
            header->number,
            header->hdr.a.OriginalSample);
    -
    +if (header->number >= WF_MAX_SAMPLE)
    +return -EINVAL;
    +
    munge_int32 (header->number, &alias_hdr[0], 2);
    munge_int32 (header->hdr.a.OriginalSample, &alias_hdr[2], 2);
    munge_int32 (*((unsigned int *)&header->hdr.a.sampleStartOffset),
             @@ -1206,6 +1209,9 @@
          int num_samples;
          unsigned char *msample_hdr;
          
          +if (header->number >= WF_MAX_SAMPLE)
          +return -EINVAL;
          +
          msample_hdr = kmalloc(WF_MSAMPLE_BYTES, GFP_KERNEL);
          if (! msample_hdr)
          return -ENOMEM;
          --- linux-4.15.0.orig/sound/isa/wss/wss_lib.c
          +++ linux-4.15.0/sound/isa/wss/wss_lib.c
          @@ -1531,7 +1531,6 @@
          if (err < 0) {
            if (chip->release_dma)
            chip->release_dma(chip, chip->dma_private_data, chip->dma1);
            -snd_free_pages(runtime->dma_area, runtime->dma_bytes);
            return err;
        }
        chip->playback_substream = substream;
        @@ -1572,7 +1571,6 @@
        if (err < 0) {
            if (chip->release_dma)
            chip->release_dma(chip, chip->dma_private_data, chip->dma2);
            -snd_free_pages(runtime->dma_area, runtime->dma_bytes);
            return err;
chip->capture_substream = substream;
--- linux-4.15.0.orig/sound/pci/ac97/ac97_codec.c
+++ linux-4.15.0/sound/pci/ac97/ac97_codec.c
@@ -824,7 +824,7 @@
{
    struct snd_ac97 *ac97 = snd_kcontrol_chip(kcontrol);
    int reg = kcontrol->private_value & 0xff;
    int shift = (kcontrol->private_value >> 8) & 0xff;
-   int mask = (kcontrol->private_value >> 16) & 0xff;
+   int mask = (kcontrol->private_value >> 16) & 0x0f;
    int invert = (kcontrol->private_value >> 24) & 0xff;
    unsigned short value, old, new;
--- linux-4.15.0.orig/sound/pci/asihpi/hpimsginit.c
+++ linux-4.15.0/sound/pci/asihpi/hpimsginit.c
@@ -23,6 +23,7 @@
#endif
#include "hp_internal.h"
#include "hpimsginit.h"
+#include <linux/nospec.h>
/* The actual message size for each object type */
static u16 msg_size[HPI_OBJ_MAXINDEX + 1] = HPI_MESSAGE_SIZE_BY_OBJECT;
@@ -39,10 +40,12 @@
    size = sizeof(*phm);
  } else {
    size = sizeof(*phm);
+}

  memset(phm, 0, size);
  phm->size = size;
@@ -66,10 +69,12 @@
  } u16 size;

-#if ((object > 0) && (object <= HPI_OBJ_MAXINDEX))
+#if ((object > 0) && (object <= HPI_OBJ_MAXINDEX))
+  object = array_index_nospec(object, HPI_OBJ_MAXINDEX + 1);
   size = msg_size[object];
- } else
+ } else {
  size = sizeof(*phm);
  +
  memset(phm, 0, size);
  phm->size = size;
@@ -66,10 +69,12 @@
  } u16 size;

-#if ((object > 0) && (object <= HPI_OBJ_MAXINDEX))
+#if ((object > 0) && (object <= HPI_OBJ_MAXINDEX))
+  object = array_index_nospec(object, HPI_OBJ_MAXINDEX + 1);
   size = res_size[object];
- } else
+ } else {
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size = sizeof(*phr);
+

memset(phr, 0, sizeof(*phr));
phr->size = size;
--- linux-4.15.0.orig/sound/pci/asihpi/hpioctl.c
+++ linux-4.15.0/sound/pci/asihpi/hpioctl.c
@@ -33,6 +33,7 @@
#include <linux/stringify.h>
#include <linux/module.h>
#include <linux/vmalloc.h>
+#include <linux/nospec.h>
#ifdef MODULE_FIRMWARE
MODULE_FIRMWARE("asihpi/dsp5000.bin");
@@ -186,7 +187,8 @@
struct hpi_adapter *pa = NULL;
if (hm->h.adapter_index < ARRAY_SIZE(adapters))
-pa = &adapters[hm->h.adapter_index];
+pa = &adapters[array_index_nospec(hm->h.adapter_index,
+ ARRAY_SIZE(adapters))];

if (!pa || !pa->adapter || !pa->adapter->type) {
    hpi_init_response(&hr->r0, hm->h.object,
@@ -348,7 +350,7 @@
struct hpi_message hm;
struct hpi_response hr;
struct hpi_adapter adapter;
-struct hpi_pci pci;
+struct hpi_pci pci = { 0 };

memset(&adapter, 0, sizeof(adapter));
@@ -504,7 +506,7 @@
return 0;

err:
-    for (idx = 0; idx < HPI_MAX_ADAPTER_MEM_SPACES; idx++) {
+    while (--idx >= 0) {
        if (pci.ap_mem_base[idx]) {
            iounmap(pci.ap_mem_base[idx]);
            pci.ap_mem_base[idx] = NULL;
--- linux-4.15.0.orig/sound/pci/ca0106/ca0106.h
+++ linux-4.15.0/sound/pci/ca0106/ca0106.h
@@ -582,7 +582,7 @@
#define SPI_PL_BIT_R_R		(2<<7)	/* right channel = right */
#define SPI_PL_BIT_R_C		(3<<7)	/* right channel = (L+R)/2 */
#define SPI_I2C_REG 2
#define SPI_I2C_BIT (1<<4)/* infinite zero detect */
+#define SPI_I2C_BIT (0<<4)/* infinite zero detect */

#define SPI_FMT_REG 3
#define SPI_FMT_BIT_RJ (0<<0)/* right justified mode */

--- linux-4.15.0.orig/sound/pci/ca0106/ca0106_main.c
+++ linux-4.15.0/sound/pci/ca0106/ca0106_main.c
@@ -551,7 +551,8 @@
   else /* Power down */
   chip->spi_dac_reg[reg] |= bit;
   -return snd_ca0106_spi_write(chip, chip->spi_dac_reg[reg]);
   +if (snd_ca0106_spi_write(chip, chip->spi_dac_reg[reg]) != 0)
   +return -ENXIO;
 }
 return 0;
}

--- linux-4.15.0.orig/sound/pci/cs46xx/cs46xx_lib.c
+++ linux-4.15.0/sound/pci/cs46xx/cs46xx_lib.c
@@ -780,7 +780,7 @@
   rate = 48000 / 9;

 /* We can not capture at a rate greater than the Input Rate (48000).
+* We can not capture at a rate greater than the Input Rate (48000).
* Return an error if an attempt is made to stray outside that limit.
 */
if (rate > 48000)
--- linux-4.15.0.orig/sound/pci/cs46xx/dsp_spos.c
+++ linux-4.15.0/sound/pci/cs46xx/dsp_spos.c
@@ -900,6 +900,9 @@
   struct dsp_spos_instance * ins = chip->dsp_spos_instance;
   int i;

  +if (!ins)
  +return 0;
  +
   snd_info_free_entry(ins->proc_sym_info_entry);
   ins->proc_sym_info_entry = NULL;

--- linux-4.15.0.orig/sound/pci/cs46xx/dsp_spos_scb_lib.c
+++ linux-4.15.0/sound/pci/cs46xx/dsp_spos_scb_lib.c
@@ -1742,7 +1742,7 @@
   struct dsp_spos_instance * ins = chip->dsp_spos_instance;

   if ( ins->spdif_status_out & DSP_SPDIF_STATUS_OUTPUT_ENABLED ) {
  -/* remove AsynchFGTxSCB and and PCMSerialInput_II */
  +/* remove AsynchFGTxSCB and and PCMSerialInput_II */

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/* remove AsynchFGTxSCB and PCMSerialInput_II */
cs46xx_dsp_disable_spdif_out (chip);

/* save state */
--- linux-4.15.0.orig/sound/pci/cs5535audio/cs5535audio.h
+++ linux-4.15.0/sound/pci/cs5535audio/cs5535audio.h
@@ -67,9 +67,9 @@
    
 struct cs5535audio_dma_desc {
    -u32 addr;
--- linux-4.15.0.orig/sound/pci/cs5535audio/cs5535audio_pcm.c
+++ linux-4.15.0/sound/pci/cs5535audio/cs5535audio_pcm.c
@@ -158,8 +158,8 @@
    lastdesc->addr = cpu_to_le32((u32) dma->desc_buf.addr);
    lastdesc->size = 0;
    lastdesc->ctlreserved = cpu_to_le16(PRD_JMP);
--- linux-4.15.0.orig/sound/pci/ctxfi/cthw20k2.c
+++ linux-4.15.0/sound/pci/ctxfi/cthw20k2.c
@@ -995,7 +995,7 @@
    if (idx < 4) {
        /* S/PDIFF output */
        switch ((conf & 0x7)) {
--- linux-4.15.0.orig/sound/pci/echoaudio/echoaudio.c
+++ linux-4.15.0/sound/pci/echoaudio/echoaudio.c
@@ -1953,6 +1953,11 @@
    chip->dsp_registers = (volatile u32 __iomem *)

ioremap_nocache(chip->dsp_registers_phys, sz);
+if (!chip->dsp_registers) {
+dev_err(chip->card->dev, "ioremap failed\n");
+snd_echo_free(chip);
+return -ENOMEM;
+}

if (request_irq(pci->irq, snd_echo_interrupt, IRQF_SHARED,
KBUILD_MODNAME, chip)) {
@@ -2210,7 +2215,6 @@
if (err < 0) {
 kfree(commpage_bak);
 dev_err(dev, "resume init_hw err=%d\n", err);
-snd_echo_free(chip);
 return err;
}

@@ -2237,7 +2241,6 @@
if (request_irq(pci->irq, snd_echo_interrupt, IRQF_SHARED,
KBUILD_MODNAME, chip)) {
 dev_err(chip->card->dev, "cannot grab irq\n");
-snd_echo_free(chip);
 return -EBUSY;
}
chip->irq = pci->irq;
--- linux-4.15.0.orig/sound/pci/emu10k1/emufx.c
+++ linux-4.15.0/sound/pci/emu10k1/emufx.c
@@ -36,6 +36,7 @@
#include <linux/init.h>
#include <linux/mutex.h>
#include <linux/moduleparam.h>
+#include <linux/nospec.h>
#include <sound/core.h>
#include <sound/tlv.h>
@@ -1033,6 +1034,8 @@
if (ipcm->substream >= EMU10K1_FX8010_PCM_COUNT)
return -EINVAL;
+ipcm->substream = array_index_nospec(ipcm->substream,
+EMU10K1_FX8010_PCM_COUNT);
if (ipcm->channels > 32)
return -EINVAL;
pcm = &emu->fx8010.pcm[ipcm->substream];
@@ -1079,6 +1082,8 @@
if (ipcm->substream >= EMU10K1_FX8010_PCM_COUNT)
return -EINVAL;
ipcm->substream = array_index_nospec(ipcm->substream,
+ EMU10K1_FX8010_PCM_COUNT);
pcm = &emu->fx8010.pcm[ipcm->substream];
mutex_lock(&emu->fx8010.lock);
spin_lock_irq(&emu->reg_lock);
@@ -2547,7 +2552,7 @@
emu->support_tlv = 1;
return put_user(SNDRV_EMU10K1_VERSION, (int __user *)argp);
case SNDRV_EMU10K1_IOCTL_INFO:
- info = kmalloc(sizeof(*info), GFP_KERNEL);
+ info = kzalloc(sizeof(*info), GFP_KERNEL);
if (!info)
return -ENOMEM;
snd_emu10k1_fx8010_info(emu, info);
--- linux-4.15.0.orig/sound/pci/emu10k1/emupcm.c
+++ linux-4.15.0/sound/pci/emu10k1/emupcm.c
@@ -1850,7 +1850,9 @@
if (!kctl)
return -ENOMEM;
-kctl->id.device = device;
-snd_ctl_add(emu->card, kctl);
+err = snd_ctl_add(emu->card, kctl);
+if (err < 0)
+return err;
}
snd_pcm_lib_preallocate_pages_for_all(pcm, SNDRV_DMA_TYPE_DEV, snd_dma_pci_data(emu->pci),
64*1024, 64*1024);
--- linux-4.15.0.orig/sound/pci/emu10k1/memory.c
+++ linux-4.15.0/sound/pci/emu10k1/memory.c
@@ -237,13 +237,13 @@
static int is_valid_page(struct snd_emu10k1 *emu, dma_addr_t addr)
{
 if (addr & ~emu->dma_mask) {
- dev_err(emu->card->dev,
+ dev_err_ratelimited(emu->card->dev,
 "max memory size is 0x%lx (addr = 0x%lx)!!\n",
 emu->dma_mask, (unsigned long)addr);
 return 0;
 }
 if (addr & (EMUPAGESIZE-1)) {
- dev_err(emu->card->dev, "page is not aligned\n");
+ dev_err_ratelimited(emu->card->dev, "page is not aligned\n");
 return 0;
 }
 return 1;
@@ -334,7 +334,7 @@

addr = snd_pcm_sgbuf_get_addr(substream, ofs);
if (!is_valid_page(emu, addr)) {
-dev_err(emu->card->dev,
+dev_err_ratelimited(emu->card->dev,
"emu: failure page = %d\n", idx);
mutex_unlock(&hdr->block_mutex);
return NULL;
--- linux-4.15.0.orig/sound/pci/fm801.c
+++ linux-4.15.0/sound/pci/fm801.c
@@ -1068,11 +1068,19 @@
if ((err = snd_ac97_mixer(chip->ac97_bus, &ac97, &chip->ac97_sec)) < 0)
return err;
}
-for (i = 0; i < FM801_CONTROLS; i++)
-snd_ctl_add(chip->card, snd_ctl_new1(&snd_fm801_controls[i], chip));
+for (i = 0; i < FM801_CONTROLS; i++) {
+err = snd_ctl_add(chip->card,
+snd_ctl_new1(&snd_fm801_controls[i], chip));
+if (err < 0)
+return err;
+}
if (chip->multichannel) {
-for (i = 0; i < FM801_CONTROLS_MULTI; i++)
-snd_ctl_add(chip->card, snd_ctl_new1(&snd_fm801_controls_multi[i], chip));
+for (i = 0; i < FM801_CONTROLS_MULTI; i++) {
+err = snd_ctl_add(chip->card,
+snd_ctl_new1(&snd_fm801_controls_multi[i], chip));
+if (err < 0)
+return err;
+}
} return 0;
--- linux-4.15.0.orig/sound/pci/hda/Kconfig
+++ linux-4.15.0/sound/pci/hda/Kconfig
@@ -88,7 +88,6 @@
config SND_HDA_CODEC_REALTEK
tristate "Build Realtek HD-audio codec support"
-select SND_HDA_GENERIC
-select INPUT
+help
 Say Y or M here to include Realtek HD-audio codec support in
 snd-hda-intel driver, such as ALC880.
--- linux-4.15.0.orig/sound/pci/hda/hda_auto_parser.c
+++ linux-4.15.0/sound/pci/hda/hda_auto_parser.c
@@ -76,6 +76,12 @@
if (a->type != b->type)
return (int)(a->type - b->type);

/* If has both hs_mic and hp_mic, pick the hs_mic ahead of hp_mic. */
+if (a->is_headset_mic && b->is_headphone_mic)
+return -1; /* don't swap */
+else if (a->is_headphone_mic && b->is_headset_mic)
+return 1; /* swap */
+
+/* In case one has boost and the other one has not,
pick the one with boost first. */
return (int)(b->has_boost_on_pin - a->has_boost_on_pin);
@@ -828,6 +834,8 @@
while (id >= 0) {
    const struct hda_fixup *fix = codec->fixup_list + id;

+if (++depth > 10)
+break;
    if (fix->chained_before)
        apply_fixup(codec, fix->chain_id, action, depth + 1);
@@ -867,8 +875,6 @@
}
if (!fix->chained || fix->chained_before)
    break;
-if (++depth > 10)
-    break;
    id = fix->chain_id;
}
}
@@ -888,7 +894,8 @@
#define IGNORE_SEQ_ASSOC (~(AC_DEFCFG_SEQUENCE | AC_DEFCFG_DEF_ASSOC))

static bool pin_config_match(struct hda_codec *codec,
    const struct hda_pintbl *pins)
+    const struct hda_pintbl *pins,
+    bool match_all_pins)
{
    int i;

@@ -912,7 +919,8 @@
    return false;
}
}
-if (!found && (cfg & 0xf0000000) != 0x40000000)
+if (match_all_pins &&
+    !found && (cfg & 0xf0000000) != 0x40000000)
    return false;
void snd_hda_pick_pin_fixup(struct hda_codec *codec,
    const struct snd_hda_pin_quirk *pin_quirk,
    const struct hda_fixup *fixlist,
    bool match_all_pins)
{
    const struct snd_hda_pin_quirk *pq;

    if (pin_config_match(codec, pq->pins, match_all_pins)) {
        codec->fixup_id = pq->value;
        #ifdef CONFIG_SND_DEBUG_VERBOSE
        codec->fixup_name = pq->name;
        --- linux-4.15.0.orig/sound/pci/hda/hda_beep.c
        +++ linux-4.15.0/sound/pci/hda/hda_beep.c
        @@ -310,8 +310,12 @@
        }
        struct hda_codec *codec = snd_kcontrol_chip(kcontrol);
        struct hda_beep *beep = codec->beep;
        +int chs = get_amp_channels(kcontrol);
        +if (beep && (!beep->enabled || !ctl_has_mute(kcontrol))) {
            -ucontrol->value.integer.value[0] =
            +ucontrol->value.integer.value[0] = beep->enabled;
            +if (chs & 1)
                ucontrol->value.integer.value[1] = beep->enabled;
        return 0;
        }
    -- linux-4.15.0.orig/sound/pci/hda/hda_bind.c
    +++ linux-4.15.0/sound/pci/hda/hda_bind.c
    @@ -42,6 +42,14 @@
    }
    struct hda_codec *codec = container_of(dev, struct hda_codec, core);

    /* ignore unsol events during shutdown */
    +if (codec->bus->shutdown)
    +return;
+ /* ignore unsol events during system suspend/resume */
+ if (codec->core.dev.power.power_state.event != PM_EVENT_ON)
+ return;
+
+ if (codec->patch_ops.unsol_event)
    codec->patch_ops.unsol_event(codec, ev);
} 
@@ -109,7 +117,8 @@
err = snd_hda_codec_build_controls(codec);
if (err < 0)
    goto error_module;
-if (codec->card->registered) {
+    /* only register after the bus probe finished; otherwise it's racy */
+    if (!codec->bus->bus_probing && codec->card->registered) {
    err = snd_card_register(codec->card);
    if (err < 0)
        goto error_module;
--- linux-4.15.0.orig/sound/pci/hda/hda_codec.c
+++ linux-4.15.0/sound/pci/hda/hda_codec.c
@@ -942,6 +942,7 @@
    /* power-up all before initialization */
    hda_set_power_state(codec, AC_PWRST_D0);
    +codec->core.dev.power.power_state = PMSG_ON;

    snd_hda_codec_proc_new(codec);

@@ -1756,7 +1757,7 @@
    return -EBUSY;

/* OK, let it free */
-snd_hdac_device_unregister(&codec->core);
+device_release_driver(hda_codec_dev(codec));

/* allow device access again */
    snd_hda_unlock_devices(bus);
@@ -2900,6 +2901,7 @@
    hda_jackpoll_work(&codec->jackpoll_work.work);
    else
        snd_hda_jack_report_sync(codec);
+    codec->core.dev.power.power_state = PMSG_ON;
        atomic_dec(&codec->core.in_pm);
    }

@@ -2913,8 +2915,9 @@
    list_for_each_entry(pcm, &codec->pcm_list_head, list)
    snd_pcm_suspend_all(pcm->pcm);

---
state = hda_call_codec_suspend(codec);
-if (codec_has_clkstop(codec) &amp;&amp; codec_has_epss(codec) &amp;&amp;
- (state &amp; AC_PWRST_CLK_STOP_OK))
+if (codec-&gt;link_down_at_suspend ||
+ (codec_has_clkstop(codec) &amp;&amp; codec_has_epss(codec) &amp;&amp;
+ (state &amp; AC_PWRST_CLK_STOP_OK)))
snd_hdac_codec_link_down(&amp;codec-&gt;core);
snd_hdac_link_power(&amp;codec-&gt;core, false);
return 0;
@@ -2932,10 +2935,66 @@
}
#endif /* CONFIG_PM */

+if define CONFIG_PM_SLEEP
+static int hda_codec_force_resume(struct device *dev)
+{
+ struct hda_codec *codec = dev_to_hda_codec(dev);
+ bool forced_resume = !codec-&gt;relaxed_resume;
+int ret;
+ + /* The get/put pair below enforces the runtime resume even if the
+ * device hasn't been used at suspend time. This trick is needed to
+ * update the jack state change during the sleep.
+ * */
+if (forced_resume)
+ pm_runtime_get_noresume(dev);
+ret = pm_runtime_force_resume(dev);
+if (forced_resume)
+ pm_runtime_put(dev);
+return ret;
+}
+
+static int hda_codec_pm_suspend(struct device *dev)
+{
+dev-&gt;power.power_state = PMSG_SUSPEND;
+return pm_runtime_force_suspend(dev);
+}
+
+static int hda_codec_pm_resume(struct device *dev)
+{
+dev-&gt;power.power_state = PMSG_RESUME;
+return hda_codec_force_resume(dev);
+}
+
+static int hda_codec_pm_freeze(struct device *dev)
+{
+dev-&gt;power.power_state = PMSG_FREEZE;
+return pm_runtime_force_suspend(dev);
static int hda_codec_pm_thaw(struct device *dev)
{
    dev->power.power_state = PMSG_THAW;
    return hda_codec_force_resume(dev);
}

static int hda_codec_pm_restore(struct device *dev)
{
    dev->power.power_state = PMSG_RESTORE;
    return hda_codec_force_resume(dev);
}

const struct dev_pm_ops hda_codec_driver_pm = {
    .suspend = hda_codec_pm_suspend,
    .resume = hda_codec_pm_resume,
    .freeze = hda_codec_pm_freeze,
    .thaw = hda_codec_pm_thaw,
    .poweroff = hda_codec_pm_suspend,
    .restore = hda_codec_pm_restore,
    .pm_runtime_force_suspend,
    .pm_runtime_force_resume
};

list_for_each_codec(codec, bus) {
    /* FIXME: maybe a better way needed for forced reset */
    cancel_delayed_work_sync(&codec->jackpoll_work);
    if (current_work() != &codec->jackpoll_work)
        cancel_delayed_work_sync(&codec->jackpoll_work);
    #ifdef CONFIG_PM
    if (hda_codec_is_power_on(codec)) {
        /* Check whether the given NID is in the amp list. If it's in the list,
         * check the current AMP status, and update the the power-status according
         * to the mute status.
         * This function is supposed to be set or called from the check_power_status
         */
    }}
hda_call_codec_suspend(codec);
@@ -3948,7 +4008,7 @@
 for (i = 0, j = 0; i < ARRAY_SIZE(bits); i++)
 if (pcm & (AC_SUPPCM_BITS_8 << i))
 -j += snprintf(buf + j, buflen - j, " %d", bits[i]);
+-j += scnprintf(buf + j, buflen - j, " %d", bits[i]);

 buf[j] = \0; /* necessary when j == 0 */
}
--- linux-4.15.0.orig/sound/pci/hda/hda_codec.h
+++ linux-4.15.0/sound/pci/hda/hda_codec.h
@@ -68,6 +68,7 @@
 unsigned int response_reset:1;/* controller was reset */
 unsigned int in_reset:1;/* during reset operation */
 unsigned int no_response_fallback:1; /* don't fallback at RIRB error */
+unsigned int bus_probing :1; /* during probing process */

 int primary_dig_out_type;/* primary digital out PCM type */
 unsigned int mixer_assigned;/* codec addr for mixer name */
@@ -258,6 +259,9 @@
 unsigned int power_save_node:1; /* advanced PM for each widget */
 unsigned int auto_runtime_pm:1; /* enable automatic codec runtime pm */
 unsigned int force_pin_prefix:1; /* Add location prefix */
+unsigned int link_down_at_suspend:1; /* link down at runtime suspend */
+unsigned int relaxed_resume:1; /* don't resume forcibly for jack */
+/
+#ifdef CONFIG_PM
 unsigned long power_on_acct;
 unsigned long power_off_acct;
--- linux-4.15.0.orig/sound/pci/hda/hda_controller.c
+++ linux-4.15.0/sound/pci/hda/hda_controller.c
@@ -609,11 +609,9 @@
 }
 runtime->private_data = azx_dev;

-azx_pcm_hw.info = azx_pcm_hw.info |
-SNDRV_PCM_INFO_HAS_LINK_SYNCHRONIZED_ATIME;
-
 runtime->hw = azx_pcm_hw;
+if (chip->gts_present)
+runtime->hw.info |= SNDRV_PCM_INFO_HAS_LINK_SYNCHRONIZED_ATIME;
runtime->hw.channels_min = hinfo->channels_min;
runtime->hw.channels_max = hinfo->channels_max;
runtime->hwformats = hinfo->formats;
@@ -748,8 +746,10 @@
 return err;
strcpy(pcm->name, cpcm->name, sizeof(pcm->name));
apcm = kzalloc(sizeof(*apcm), GFP_KERNEL);
-if (apcm == NULL)
+if (apcm == NULL) {
+snd_device_free(chip->card, pcm);
return -ENOMEM;
+
} apcm->chip = chip;
apcm->pcm = pcm;
apcm->codec = codec;
@@ -870,6 +870,9 @@
/*
if (hbus->allow_bus_reset && !hbus->response_reset && !hbus->in_reset) {
    hbus->response_reset = 1;
+    dev_err(chip->card->dev,
+        "No response from codec, resetting bus: last cmd=0x%08x\n",
+        bus->last_cmd[addr]);
return -EAGAIN; /* give a chance to retry */
 }
@@ -1159,16 +1162,23 @@
if (snd_hdac_bus_handle_stream_irq(bus, status, stream_update))
    active = true;

-/* clear rirb int */
status = azx_readb(chip, RIRBSTS);
if (status & RIRB_INT_MASK) {
+/#
+    * Clearing the interrupt status here ensures that no
+    * interrupt gets masked after the RIRB wp is read in
+    * snd_hdac_bus_update_rirb. This avoids a possible
+    * race condition where codec response in RIRB may
+    * remain unserviced by IRQ, eventually falling back
+    * to polling mode in azx_rirb_get_response.
+    */
+    azx_writeb(chip, RIRBSTS, RIRB_INT_MASK);
    active = true;
    if (status & RIRB_INT_RESPONSE) {
        if (chip->driver_caps & AZX_DCAPS_CTX_WORKAROUND)
            udelay(80);
        snd_hdac_bus_update_rirb(bus);
    }
-azx_writeb(chip, RIRBSTS, RIRB_INT_MASK);
    }
} while (active && ++repeat < 10);

--- linux-4.15.0.org/sound/pci/hda/hda_controller.h
+++ linux-4.15.0/sound/pci/hda/hda_controller.h
/* 14 unused */
#define AZX_DCAPS_CTX_WORKAROUND (1 << 15) /* X-Fi workaround */
#define AZX_DCAPS_POSFIX_LPIB (1 << 16) /* Use LPIB as default */
/* 17 unused */
#define AZX_DCAPS_AMD_WORKAROUND (1 << 17) /* AMD-specific workaround */
#define AZX_DCAPS_NO_64BIT (1 << 18) /* No 64bit address */
#define AZX_DCAPS_SYNC_WRITE (1 << 19) /* sync each cmd write */
#define AZX_DCAPS_OLD_SSYNC (1 << 20) /* Old SSYNC reg for ICH */
@@ -40,7 +40,7 @@
 /* codec probing phase */
 unsinged int msi:1;
 unsigned int probing:1; /* codec probing phase */
unsinged int snoop:1;
/* non-cached pages for stream buffers */
unsigned int uc_buffer:1; /* non-cached pages for stream buffers */
unsigned int region_requested:1;
unsigned int disabled:1; /* disabled by vga_switcheroo */
@@ -160,6 +160,7 @@
 unsigned int uc_buffer:1; /* non-cached pages for stream buffers */
 unsigned int align_buffer_size:1;
 unsigned int region_requested:1;
 unsigned int disabled:1; /* disabled by vga_switcheroo */
@@ -175,11 +176,10 @@
 #define azx_bus(chip) (&(chip)->bus.core)
 #define bus_to_azx(_bus) container_of(_bus, struct azx, bus.core)
 
#ifdef CONFIG_X86
-#define azx_snoop(chip) ((chip)->snoop)
-#else
-#define azx_snoop(chip) true
-#endif
+static inline bool azx_snoop(struct azx *chip)
+{
+return !IS_ENABLED(CONFIG_X86) || chip->snoop;
+}

/*
 * macros for easy use
--- linux-4.15.0.orig/sound/pci/hda/hda_eld.c
+++ linux-4.15.0/sound/pci/hda/hda_eld.c
@@ -373,7 +373,7 @@
for (i = 0, j = 0; i < ARRAY_SIZE(alsa_rates); i++)
if (pcm & (1 << i))
  -j += snprintf(buf + j, buflen - j, " %d",
  +j += scnprintf(buf + j, buflen - j, " %d",
  also_rates[i]);

buf[j] = '0'; /* necessary when j == 0 */
--- linux-4.15.0.orig/sound/pci/hda/hda_generic.c
+++ linux-4.15.0/sound/pci/hda/hda_generic.c
@@ -373,7 +373,7 @@
for (i = 0, j = 0; i < ARRAY_SIZE(alsa_rates); i++)
if (pcm & (1 << i))
  -j += snprintf(buf + j, buflen - j, " %d",
  +j += scnprintf(buf + j, buflen - j, " %d",
  also_rates[i]);

buf[j] = '0'; /* necessary when j == 0 */
/* sync power of each widget in the given path */
static hda_nid_t path_power_update(struct hda_codec *codec,
    struct nid_path *path,
    bool allow_powerdown)
@@ -1214,11 +1214,17 @@
    *index = ch;
    return "Headphone";
    
    case AUTO_PIN_LINE_OUT:
    -/* This deals with the case where we have two DACs and
    -  * one LO, one HP and one Speaker */
    -if (!ch && cfg->speaker_outs && cfg->hp_outs) {
    -bool hp_lo_shared = !path_has_mixer(codec, spec->hp_paths[0], ctl_type);
    -bool spk_lo_shared = !path_has_mixer(codec, spec->speaker_paths[0], ctl_type);
    +/* This deals with the case where one HP or one Speaker or
    +  * one HP + one Speaker need to share the DAC with LO
    + */
    +if (!ch) {
    +bool hp_lo_shared = false, spk_lo_shared = false;
    +
    +if (cfg->speaker_outs)
    +spk_lo_shared = !path_has_mixer(codec, spec->speaker_paths[0], ctl_type);
    +if (cfg->hp_outs)
    +hp_lo_shared = !path_has_mixer(codec, spec->hp_paths[0], ctl_type);
    if (hp_lo_shared && spk_lo_shared)
    return spec->vmaster_mute.hook ? "PCM" : "Master";
    if (hp_lo_shared)
    @@ -1376,16 +1382,20 @@
    struct nid_path *path;
    hda_nid_t pin = pins[i];
    -path = snd_hda_get_path_from_idx(codec, path_idx[i]);
    -if (path) {
    -badness += assign_out_path_ctls(codec, path);
    -continue;
    +if (!spec->obey_preferred_dacs) {
    +path = snd_hda_get_path_from_idx(codec, path_idx[i]);
    +if (path) {
    +badness += assign_out_path_ctls(codec, path);
    +continue;
    +}
    }
    dacs[i] = get_preferred_dac(codec, pin);
    if (dacs[i]) {

if (is_dac_already_used(codec, dacs[i]))
badness += bad->shared_primary;
} else if (spec->obey_preferred_dacs) {
+badness += BAD_NO_PRIMARY_DAC;
}

if (!dacs[i])
@@ -3460,7 +3470,7 @@
struct hda_gen_spec *spec = codec->spec;
const struct hda_input_mux *imux;
struct nid_path *path;
-int i, adc_idx, err = 0;
+int i, adc_idx, ret, err = 0;

imux = &spec->input_mux;
adc_idx = kcontrol->id.index;
@@ -3470,9 +3480,13 @@
if (!path || !path->ctls[type])
continue;
kcontrol->private_value = path->ctls[type];
-err = func(kcontrol, ucontrol);
-if (err < 0)
+ret = func(kcontrol, ucontrol);
+if (ret < 0) {
+err = ret;
break;
+}
+if (ret > 0)
+err = 1;
}
mutex_unlock(&codec->control_mutex);
if (err >= 0 && spec->cap_sync_hook)
@@ -5856,7 +5870,24 @@
snd_hda_apply_verbs(codec);
-spec->init_hook(codec);
-snd_hda_apply_verbs(codec);
+if (!spec->skip_verbs)
 +snd_hda_apply_verbs(codec);

init_multi_out(codec);
init_extra_out(codec);
@@ -5898,6 +5913,24 @@
}EXPORT_SYMBOL_GPL(snd_hda_gen_free);

+/**
+ * snd_hda_gen_reboot_notify - Make codec enter D3 before rebooting
+ */
+ * @codec: the HDA codec
+ *
+ * This can be put as patch_ops reboot_notify function.
+ */
+void snd_hda_gen_reboot_notify(struct hda_codec *codec)
+{
+/* Make the codec enter D3 to avoid spurious noises from the internal
+ * speaker during (and after) reboot
+ */
+snd_hda_codec_set_power_to_all(codec, codec->core.afg, AC_PWRST_D3);
+snd_hda_codec_write(codec, codec->core.afg, 0,
+                     AC_VERB_SET_POWER_STATE, AC_PWRST_D3);
+msleep(10);
+}
+EXPORT_SYMBOL_GPL(snd_hda_gen_reboot_notify);
+
+#ifdef CONFIG_PM
/**
 * snd_hda_gen_check_power_status - check the loopback power save state
@@ -5925,6 +5958,7 @@
 .init = snd_hda_gen_init,
 .free = snd_hda_gen_free,
 .unsol_event = snd_hda_jack_unsol_event,
+.reboot_notify = snd_hda_gen_reboot_notify,
 #ifdef CONFIG_PM
 .check_power_status = snd_hda_gen_check_power_status,
 #endif
@@ -5947,7 +5981,7 @@
 err = snd_hda_parse_pin_defcfg(codec, &spec->autocfg, NULL, 0);
 if (err < 0)
  return err;
+goto error;

 err = snd_hda_gen_parse_auto_config(codec, &spec->autocfg);
 if (err < 0)
 --- linux-4.15.0.orig/sound/pci/hda/hda_generic.h
 +++ linux-4.15.0/sound/pci/hda/hda_generic.h
@@ @ -230,6 +230,7 @
 unsigned int power_down_unused:1; /* power down unused widgets */
 unsigned int dac_min_mute:1; /* minimal = mute for DACs */
 unsigned int suppress_vmaster:1; /* don't create vmaster kctls */
+unsigned int obey_preferred_dacs:1; /* obey preferred_dacs assignment */

 /* other internal flags */
 unsigned int no_analog:1; /* digital I/O only */
@@ @ -237,6 +238,7 @
 unsigned int indep_hp_enabled:1; /* independent HP enabled */
unsigned int have_aamix_ctl:1;
unsigned int hp_mic_jack_modes:1;
+unsigned int skip_verbs:1; /* don't apply verbs at snd_hda_gen_init() */

/* additional mute flags (only effective with auto_mute_via_amp=1) */
u64 mute_bits:
@@ -323,6 +325,7 @@
    struct auto_pin_cfg *cfg);
int snd_hda_gen_build_controls(struct hda_codec *codec);
int snd_hda_gen_build_pcms(struct hda_codec *codec);
+void snd_hda_gen_reboot_notify(struct hda_codec *codec);

/* standard jack event callbacks */
void snd_hda_gen_hp_automute(struct hda_codec *codec,
--- linux-4.15.0.orig/sound/pci/hda/hda_hwdep.c
+++ linux-4.15.0/sound/pci/hda/hda_hwdep.c
@@ -21,6 +21,7 @@
    #include <linux/init.h>
    #include <linux/slab.h>
    #include <linux/compat.h>
+    #include <linux/nospec.h>
    #include <sound/core.h>
    #include "hda_codec.h"
    #include "hda_local.h"
    @@ -51,7 +52,16 @@
    if (get_user(verb, &arg->verb))
        return -EFAULT;
    -res = get_wcaps(codec, verb >> 24);
+/* open-code get_wcaps(verb>>24) with nospec */
+verb >>= 24;
+if (verb < codec->core.start_nid ||
+    verb >= codec->core.start_nid + codec->core.num_nodes) {
+    res = 0;
+} else {
+    verb = codec->core.start_nid;
+    verb = array_index_nospec(verb, codec->core.num_nodes);
+    res = codec->wcaps[verb];
+}
    if (put_user(res, &arg->res))
        return -EFAULT;
    return 0;
--- linux-4.15.0.orig/sound/pci/hda/hda_intel.c
+++ linux-4.15.0/sound/pci/hda/hda_intel.c
@@ -78,6 +78,7 @@
    POS_FIX_VIACOMBO,
    POS_FIX_COMBO,
    POS_FIX_SKL,
+POS_FIX_FIFO,
];

/* Defines for ATI HD Audio support in SB450 south bridge */
MODULE_PARM_DESC(model, "Use the given board model.");
module_param_array(position_fix, int, NULL, 0444);
MODULE_PARM_DESC(position_fix, "DMA pointer read method.
- "(-1 = system default, 0 = auto, 1 = LPIB, 2 = POSBUF, 3 = VIACOMBO, 4 = COMBO, 5 = SKL+)."");
+ "(-1 = system default, 0 = auto, 1 = LPIB, 2 = POSBUF, 3 = VIACOMBO, 4 = COMBO, 5 = SKL+, 6 = FIFO).";
module_param_array(bdl_pos_adj, int, NULL, 0644);
MODULE_PARM_DESC(bdl_pos_adj, "BDL position adjustment offset.");
module_param_array(probe_mask, int, NULL, 0444);
MODULE_PARM_DESC(power_save, "Automatic power-saving timeout 
"(in second, 0 = disable)." );

+static bool pm_blacklist = true;
+module_param(pm_blacklist, bool, 0644);
+MODULE_PARM_DESC(pm_blacklist, "Enable power-management blacklist");
+

/* reset the HD-audio controller in power save mode.
* this may give more power-saving, but will take longer time to
* wake up.
@@ -324,13 +329,11 @@
#define AZX_DCAPS_INTEL_SKYLAKE (AZX_DCAPS_INTEL_PCH_BASE | AZX_DCAPS_PM_RUNTIME |
+ AZX_DCAPS_SEPARATE_STREAM_TAG | AZX_DCAPS_I915_COMPONENT |
+AZX_DCAPS_I915_POWERWELL)

-#define AZX_DCAPS_INTEL_BROXTON (AZX_DCAPS_INTEL_PCH_BASE | AZX_DCAPS_PM_RUNTIME |
- AZX_DCAPS_SEPARATE_STREAM_TAG | AZX_DCAPS_I915_COMPONENT |
- AZX_DCAPS_I915_POWERWELL)
+#define AZX_DCAPS_INTEL_BROXTON AZX_DCAPS_INTEL_SKYLAKE

/* quirks for ATI SB / AMD Hudson */
#define AZX_DCAPS_PRESET_ATI_SB
@@ -346,6 +349,11 @@

/* quirks for AMD SB */
+#define AZX_DCAPS_PRESET_AMD_SB			(AZX_DCAPS_NO_TCSEL | AZX_DCAPS_SYNC_WRITE | AZX_DCAPS_AMD_WORKAROUND |
+ AZX_DCAPS_SNOOP_TYPE(ATI) | AZX_DCAPS_PM_RUNTIME)
+ /* quirks for Nvidia */
# define AZX_DCAPS_PRESET_NVIDIA \
(AZX_DCAPS_NO_MSI | AZX_DCAPS_CORBRP_SELF_CLEAR) \
((pci)->device == 0x160c))

# define IS_BXT(pci) ((pci)->vendor == 0x160c)
+ # define IS_CFL(pci) ((pci)->vendor == 0x8086 && (pci)->device == 0xa348)
+ # define IS_CNL(pci) ((pci)->vendor == 0x8086 && (pci)->device == 0x9dc8)

static char *driver_short_names[] = { 
[AZX_DRIVER_ICH] = "HDA Intel",
}@ @ -405,7 +415,7 @ @
# ifdef CONFIG_SND_DMA_SGBUF
if (dmab->dev.type == SNDRV_DMA_TYPE_DEV_SG) {
  struct snd_sg_buf *sgbuf = dmab->private_data;
 -if (chip->driver_type == AZX_DRIVER_CMEDIA)
 +if (!chip->uc_buffer)
return; /* deal with only CORB/RIRB buffers */
if (on)
  set_pages_array_wc(sgbuf->page_table, sgbuf->pages);
}@ @ -911,6 +921,49 @ @
return bound_pos + mod_dma_pos;
}

+# define AMD_FIFO_SIZE 32
+
+/* get the current DMA position with FIFO size correction */
+static unsigned int azx_get_pos_fifo(struct azx *chip, struct azx_dev *azx_dev)
+{
+  struct snd_pcm_substream *substream = azx_dev->core.substream;
+  struct snd_pcm_runtime *runtime = substream->runtime;
+  unsigned int pos, delay;
+
+  pos = snd_hdac_stream_get_pos_lpib(azx_stream(azx_dev));
+  if (!runtime)
+    return pos;
+  runtime->delay = AMD_FIFO_SIZE;
+  delay = frames_to_bytes(runtime, AMD_FIFO_SIZE);
+  if (azx_dev->insufficient) {
+    if (pos < delay) {
+      delay = pos;
+      runtime->delay = bytes_to_frames(runtime, pos);
+    } else {
+      azx_dev->insufficient = 0;
+    }
+  } else {
+    runtime->delay = AMD_FIFO_SIZE;
+    delay = frames_to_bytes(runtime, AMD_FIFO_SIZE);
+    if (azx_dev->insufficient) {
+      if (pos < delay) {
+        delay = pos;
+        runtime->delay = bytes_to_frames(runtime, pos);
+      } else {
+        azx_dev->insufficient = 0;
+      }
+  }
+ /* correct the DMA position for capture stream */
+ if (substream->stream == SNDRV_PCM_STREAM_CAPTURE) {
+ if (pos < delay)
+ pos += azx_dev->core.bufsize;
+ pos -= delay;
+ }
+ +return pos;
+ }
+ +
+static int azx_get_delay_from_fifo(struct azx *chip, struct azx_dev *azx_dev,
+ unsigned int pos)
+ {
+ struct snd_pcm_substream *substream = azx_dev->core.substream;
+ + /* just read back the calculated value in the above */
+ +return substream->runtime->delay;
+ }
+ +
+static unsigned int azx_skl_get_dpib_pos(struct azx *chip,
+ struct azx_dev *azx_dev)
+ {
+ @ -1227,6 +1280,7 @@
+ struct snd_card *card = pci_get_drvdata(pci);
+ struct azx *chip = card->private_data;
+ struct hda_intel *hda = container_of(chip, struct hda_intel, chip);
+ +struct hda_codec *codec;
+ bool disabled;
+
+ wait_for_completion(&hda->probe_wait);
+ @ -1251,8 +1305,12 @@
+ dev_info(chip->card->dev, "%s via vga_switcheroo\n",
+ disabled ? "Disabling" : "Enabling");
+ if (disabled) {
+ -pm_runtime_put_sync_suspend(card->dev);
+ -azx_suspend(card->dev);
+ +list_for_each_codec(codec, &chip->bus) {
+ +pm_runtime_suspend(hda_codec_dev(codec));
+ +pm_runtime_disable(hda_codec_dev(codec));
+ +}
+ +pm_runtime_suspend(card->dev);
+ +pm_runtime_disable(card->dev);
+ /* when we get suspended by vga_switcheroo we end up in D3cold,
+ * however we have no ACPI handle, so pci/acpi can't put us there,
+ * put ourselves there */
+ @ -1263,9 +1321,12 @@
"Cannot lock devices!");
] else {
snd_hda_unlock_devices(&chip->bus);
-pm_runtime_get_noresume(card->dev);
chip->disabled = false;
-azx_resume(card->dev);
+pm_runtime_enable(card->dev);
+list_for_each_codec(codec, &chip->bus) {
+pm_runtime_enable(hda_codec_dev(codec));
+pm_runtime_resume(hda_codec_dev(codec));
+
}
}
@@ -1295,6 +1356,7 @@
dev_info(chip->card->dev,
    "Handle vga_switcheroo audio client\n");
hda->use_vga_switcheroo = 1;
+chip->driver_caps |= AZX_DCAPS_PM_RUNTIME;
pci_dev_put(p);
}
}
@@ -1307,22 +1369,20 @@
static int register_vga_switcheroo(struct azx *chip)
{
 struct hda_intel *hda = container_of(chip, struct hda_intel, chip);
+struct pci_dev *p;
 int err;

 if (!hda->use_vga_switcheroo)
 return 0;
-/* FIXME: currently only handling DIS controller
 - * is there any machine with two switchable HDMI audio controllers?
 - */
-err = vga_switcheroo_register_audio_client(chip->pci, &azx_vs_ops,
- VGA_SWITCHEROO_DIS);
+ p = get_bound_vga(chip->pci);
+err = vga_switcheroo_register_audio_client(chip->pci, &azx_vs_ops, p);
+pci_dev_put(p);
+if (err < 0)
 return err;
 hda->vga_switcheroo_registered = 1;

-/* register as an optimus hdmi audio power domain */
-vga_switcheroo_init_domain_pm_optimus_hdmi_audio(chip->card->dev,
- &hda->hdmi_pm_domain);
return 0;
}

#else
@@ -1351,10 +1411,8 @@
if (use_vga_switcheroo(hda)) {
  if (chip->disabled && hda->probe_continued)
    snd_hda_unlock_devices(&chip->bus);
-  if (hda->vga_switcheroo_registered) {
-    +if (hda->vga_switcheroo_registered)
      vga_switcheroo_unregister_client(chip->pci);
-    }
-}
+

if (bus->chip_init) {
@@ -1395,8 +1453,11 @@
static int azx_dev_disconnect(struct snd_device *device)
{
  struct azx *chip = device->device_data;
  +struct hdac_bus *bus = azx_bus(chip);

  chip->bus.shutdown = 1;
  +cancel_work_sync(&bus->unsol_work);
  +return 0;
}

@@ -1422,7 +1483,7 @@
p = pci_get_domain_bus_and_slot(pci_domain_nr(pci->bus),
  pci->bus->number, 0);
  if (p) {
    -if (((p->class >> 8) == PCI_CLASS_DISPLAY_VGA)
    +if (((p->class >> 16) == PCI_BASE_CLASS_DISPLAY)
      return p;
    pci_dev_put(p);
  }
@@ -1478,6 +1539,7 @@
case POS_FIX_VIACOMBO:
  case POS_FIX_COMBO:
  case POS_FIX_SKL:
+  case POS_FIX_FIFO:
    return fix;
  }

@@ -1494,6 +1556,10 @@
  dev_dbg(chip->card->dev, "Using VIACOMBO position fix\n");
  return POS_FIX_VIACOMBO;
}
+if (chip->driver_caps & AZX_DCAPS_AMD_WORKAROUND) {
+dev_dbg(chip->card->dev, "Using FIFO position fix\n");
+return POS_FIX_FIFO;
+}
if (chip->driver_caps & AZX_DCAPS_POSFIX_LPIB) {
dev_dbg(chip->card->dev, "Using LPIB position fix\n");
return POS_FIX_LPIB;
@@ -1514,6 +1580,7 @@
[POS_FIX_VIACOMBO] = azx_via_get_position,
[POS_FIX_COMBO] = azx_get_pos_lpib,
[POS_FIX_SKL] = azx_get_pos_skl,
+[POS_FIX_FIFO] = azx_get_pos_fifo,
};

chip->get_position[0] = chip->get_position[1] = callbacks[fix];
@@ -1528,6 +1595,9 @@
azx_get_delay_from_lpib;
}

+if (fix == POS_FIX_FIFO)
+chip->get_delay[0] = chip->get_delay[1] =
+azx_get_delay_from_fifo;
}

/*
@@ -1629,6 +1699,7 @@
dev_info(chip->card->dev, "Force to %s mode by module option\n",
    snoop ? "snoop" : "non-snoop");
chip->snoop = snoop;
+chip->uc_buffer = !snoop;
return;
}

@@ -1640,7 +1711,8 @@
*/
u8 val;
pci_read_config_byte(chip->pci, 0x42, &val);
-if (!(val & 0x80) && chip->pci->revision == 0x30)
+if (!(val & 0x80) && (chip->pci->revision == 0x30 ||
    + chip->pci->revision == 0x20))
snoop = false;
}

@@ -1648,8 +1720,12 @@
snoop = false;
}

chip->snoop = snoop;
-if (!snoop)
+if (!snoop) {
    dev_info(chip->card->dev, "Force to non-snoop mode\n");
+/* C-Media requires non-cached pages only for CORB/RIRB */
+if (chip->driver_type != AZX_DRIVER_CMEDIA)
  +chip->uc_buffer = true;
+}
+
static void azx_probe_work(struct work_struct *work)
@@ -1740,6 +1816,10 @@
else
    chip->bdl_pos_adj = bdl_pos_adj[dev];
+
+/* Workaround for a communication error on CFL (bko#199007) and CNL */
+if (IS_CFL(pci) || IS_CNL(pci))
  +chip->polling_mode = 1;
+
  err = azx_bus_init(chip, model[dev], &pci_hda_io_ops);
  if (err < 0) {
    kfree(hda);
@@ -1824,9 +1904,6 @@

chip->msi = 0;
}

-if (azx_acquire_irq(chip, 0) < 0)
-  return -EBUSY;
-
  pci_set_master(pci);
  synchronize_irq(bus->irq);
@@ -1938,9 +2015,12 @@
/* codec detection */
if (!azx_bus(chip)->codec_mask) {
  dev_err(card->dev, "no codecs found!\n");
  -return -ENODEV;
+/* keep running the rest for the runtime PM */
}

+if (azx_acquire_irq(chip, 0) < 0)
+  return -EBUSY;
+
  strcpy(card->driver, "HDA-Intel");
  strlcpy(card->shortname, driver_short_names[chip->driver_type],
  sizeof(card->shortname));
@@ -1957,24 +2037,15 @@
  {
    struct snd_card *card = context;
    struct azx *chip = card->private_data;


struct pci_dev *pci = chip->pci;

if (!fw) {
	dev_err(card->dev, "Cannot load firmware, aborting\n");
goto error;
} -
-
-chip->fw = fw;
+if (fw)
+chip->fw = fw;
+else
+dev_err(card->dev, "Cannot load firmware, continue without patching\n");
if (!chip->disabled) {
/* continue probing */
-if (azx_probe_continue(chip))
-goto error;
+azx_probe_continue(chip);
}
-return; /* OK */
-
- error:
-snd_card_free(card);
 pci_set_drvdata(pci, NULL);
}
#endif

@@ -2084,7 +2155,7 @@
#ifdef CONFIG_X86
 struct azx_pcm *apcm = snd_pcm_substream_chip(substream);
 struct azx *chip = apcm->chip;
-if (!azx_snoop(chip) && chip->driver_type != AZX_DRIVER_CMEDIA)
+if (chip->uc_buffer)
 area->vm_page_prot = pgprot_writecombine(area->vm_page_prot);
#endif
}
@@ -2100,6 +2171,17 @@
 .dma_free_pages = dma_free_pages,
};

+/* Blacklist for skipping the whole probe:
+ * some HD-audio PCI entries are exposed without any codecs, and such devices
+ * should be ignored from the beginning.
+ */
+static const struct pci_device_id driver_blacklist[] = {
+ { PCI_DEVICE_SUB(0x1022, 0x1487, 0x1043, 0x874f) }, /* ASUS ROG Zenith II / Strix */
+ { PCI_DEVICE_SUB(0x1022, 0x1487, 0x1462, 0xcb59) }, /* MSI TRX40 Creator */
+ { PCI_DEVICE_SUB(0x1022, 0x1487, 0x1462, 0xcb60) }, /* MSI TRX40 */
+ { }
static const struct hda_controller_ops pci_hda_ops = {
    .disable_msi_reset_irq = disable_msi_reset_irq,
    .substream_alloc_pages = substream_alloc_pages,
    @ @ -2119,6 +2201,11 @@
bool schedule_probe;
int err;

@if (pci_match_id(driver_blacklist, pci)) {
+dev_info(&pci->dev, "Skipping the blacklisted device\n");
+return -ENODEV;
+}
+
if (dev >= SNDRV_CARDS)
return -ENODEV;
if (!enable[dev]) {
@@ -2186,6 +2273,44 @@
return err;
}

#ifdef CONFIG_PM
+/* On some boards setting power_save to a non 0 value leads to clicking /
+ * popping sounds when ever we enter/leave powersaving mode. Ideally we would
+ * figure out how to avoid these sounds, but that is not always feasible.
+ * So we keep a list of devices where we disable powersaving as its known
+ * to causes problems on these devices.
+ */
+static struct snd_pci_quirk power_save_blacklist[] = {
+/* https://bugzilla.redhat.com/show_bug.cgi?id=1525104 */
+SND_PCI_QUIRK(0x1849, 0xc892, "Asrock B85M-ITX", 0),
+/* https://bugzilla.redhat.com/show_bug.cgi?id=1525104 */
+SND_PCI_QUIRK(0x1849, 0x0397, "Asrock N68C-S UCC", 0),
+/* https://bugzilla.redhat.com/show_bug.cgi?id=1525104 */
+SND_PCI_QUIRK(0x1849, 0x7662, "Asrock H81M-HDS", 0),
+/* https://bugzilla.redhat.com/show_bug.cgi?id=1525104 */
+SND_PCI_QUIRK(0x1043, 0x8733, "Asus Prime X370-Pro", 0),
+/* https://bugzilla.redhat.com/show_bug.cgi?id=1525104 */
+SND_PCI_QUIRK(0x8086, 0x2040, "Intel DZ77BH-55K", 0),
+/* https://bugs.launchpad.net/bugs/1821663 */
+SND_PCI_QUIRK(0x8086, 0x2064, "Intel SDP 8086:2064", 0),
+/* https://bugzilla.redhat.com/show_bug.cgi?id=1520902 */
+SND_PCI_QUIRK(0x8086, 0x2068, "Intel NUC7i3BNB", 0),
+/* https://bugzilla.kernel.org/show_bug.cgi?id=198611 */
SND_PCI_QUIRK(0x17aa, 0x2227, "Lenovo X1 Carbon 3rd Gen", 0),
/* https://bugzilla.redhat.com/show_bug.cgi?id=1689623 */
SND_PCI_QUIRK(0x17aa, 0x367b, "Lenovo IdeaCentre B550", 0),
/* https://bugzilla.redhat.com/show_bug.cgi?id=1572975 */
SND_PCI_QUIRK(0x17aa, 0x36a7, "Lenovo C50 All in one", 0),
/* https://bugs.launchpad.net/bugs/1821663 */
SND_PCI_QUIRK(0x1631, 0xe017, "Packard Bell NEC IMEDIA 5204", 0),
{}
*/
#endif /* CONFIG_PM */
+
/* number of codec slots for each chipset: 0 = default slots (i.e. 4) */
static unsigned int azx_max_codecs[AZX_NUM_DRIVERS] = {
    [AZX_DRIVER_NVIDIA] = 8,
    @ @ -2197,9 +2322,12 @@
    struct hda_intel *hda = container_of(chip, struct hda_intel, chip);
    struct hdac_bus *bus = azx_bus(chip);
    struct pci_dev *pci = chip->pci;
    struct hda Codec *codec;
    int dev = chip->dev_index;
    int val;
    int err;

    to_hda_bus(bus)->bus_probing = 1;
    hda->probe_continued = 1;

    *@ -2250,9 +2378,11 @@
    #endif

    /* bind with i915 if needed */
    +
    @ @ -2197,9 +2322,12 @@
    #ifdef CONFIG_SND_HDA_PATCH_LOADER
    if (chip->fw) {
    @@ -2266,7 +2396,7 @@
    #endif
    }

    #ifdef CONFIG_SND_HDA_PATCH_LOADER
    if (chip->fw) {
    *-err = azx_probe_codecs(chip, azx_max_codecs[chip->driver_type]);
    -if (err < 0)
    -goto out_free;
    +if (bus->codec_mask) {
    +err = azx_probe_codecs(chip, azx_max_codecs[chip->driver_type]);
    +if (err < 0)
    +goto out_free;
    +}

    #ifdef CONFIG_SND_HDA_PATCH_LOADER
    if (chip->fw) {
    @@ -2266,7 +2396,7 @@
    #endif
    }
    
    -if ((probe_only[dev] & 1) == 0) {
    +if (bus->codec_mask && !(probe_only[dev] & 1)) {
err = azx_codec_configure(chip);
if (err < 0)
goto out_free;
@@ -2278,9 +2408,33 @@
chip->running = 1;
azx_add_card_list(chip);
-snd_hda_set_power_save(&chip->bus, power_save * 1000);
-if (azx_has_pm_runtime(chip) || hda->use_vga_switcheroo)
+/*
+ * The discrete GPU cannot power down unless the HDA controller runtime
+ * suspends, so activate runtime PM on codecs even if power_save == 0.
+ */
+if (use_vga_switcheroo(hda))
+list_for_each_codec(codec, &chip->bus)
+codec->auto_runtime_pm = 1;
+
+val = power_save;
+#endif CONFIG_PM
+if (pm_blacklist) {
+const struct snd_pci_quirk *q;
+
+q = snd_pci_quirk_lookup(chip->pci, power_save_blacklist);
+if (q & & val) {
+dev_info(chip->card->dev, "device %04x:%04x is on the power_save blacklist, forcing power_save to 0n",
+q->subvendor, q->subdevice);
+val = 0;
+}
+
+sn
+}
+}
+endif /* CONFIG_PM */
+snd_hda_set_power_save(&chip->bus, val * 1000);
+if (azx_has_pm_runtime(chip)) {
+pm_runtime_use_autosuspend(&pci->dev);
+pm_runtime_put_autosuspend(&pci->dev);
+}

out_free:
if ((chip->driver_caps & AZX_DCAPS_I915_POWERWELL)
@@ -2291,6 +2547,18 @@
if (err < 0)
hda->init_failed = 1;
complete_all(&hda->probe_wait);
+to_hda_bus(bus)->bus_probing = 0;
return err;
}
@@ -2392,6 +2547,18 @@
/* Cannonlake */
{ PCI_DEVICE(0x8086, 0x9dc8),
  .driver_data = AZX_DRIVER_SKL | AZX_DCAPS_INTEL_SKYLAKE},
/* CometLake-LP */
{ PCI_DEVICE(0x8086, 0x02C8),
  .driver_data = AZX_DRIVER_SKL | AZX_DCAPS_INTEL_SKYLAKE},
/* CometLake-H */
{ PCI_DEVICE(0x8086, 0x06C8),
  .driver_data = AZX_DRIVER_SKL | AZX_DCAPS_INTEL_SKYLAKE},
/* CometLake-S */
{ PCI_DEVICE(0x8086, 0xa3f0),
  .driver_data = AZX_DRIVER_SKL | AZX_DCAPS_INTEL_SKYLAKE},
/* Icelake */
{ PCI_DEVICE(0x8086, 0x34c8),
  .driver_data = AZX_DRIVER_SKL | AZX_DCAPS_INTEL_SKYLAKE},
/* Broxton-P(Apollolake) */
{ PCI_DEVICE(0x8086, 0x5a98),
  .driver_data = AZX_DRIVER_SKL | AZX_DCAPS_INTEL_BROXTON },
@@ -2463,9 +2630,19 @@
/* AMD Hudson */
{ PCI_DEVICE(0x1022, 0x780d),
  .driver_data = AZX_DRIVER_GENERIC | AZX_DCAPS_PRESET_ATI_SB },
/* AMD, X370 & co */
{ PCI_DEVICE(0x1022, 0x1457),
  .driver_data = AZX_DRIVER_GENERIC | AZX_DCAPS_PRESET_AMD_SB },
/* AMD, X570 & co */
{ PCI_DEVICE(0x1022, 0x1487),
  .driver_data = AZX_DRIVER_GENERIC | AZX_DCAPS_PRESET_AMD_SB },
/* AMD Stoney */
{ PCI_DEVICE(0x1022, 0x157a),
  .driver_data = AZX_DRIVER_GENERIC | AZX_DCAPS_PRESET_ATI_SB |
  AZX_DCAPS_PM_RUNTIME },
/* AMD Raven */
{ PCI_DEVICE(0x1022, 0x15e3),
  .driver_data = AZX_DRIVER_GENERIC | AZX_DCAPS_PRESET_ATI_SB },
+ .driver_data = AZX_DRIVER_GENERIC | AZX_DCAPS_PRESET_AMD_SB },
/* ATI HDMI */
{ PCI_DEVICE(0x1002, 0x0002),
  .driver_data = AZX_DRIVER_ATIHDMI_NS | AZX_DCAPS_PRESET_ATI_HDMI_NS },
--- linux-4.15.0.orig/sound/pci/hda/hda_intel.h
+++ linux-4.15.0/sound/pci/hda/hda_intel.h
@@ -40,9 +40,6 @@
unsigned int vga_switcheroo_registered:1;
unsigned int init_failed:1; /* delayed init failed */
*/
-/* secondary power domain for hdmi audio under vga device */
-struct dev_pm_domain hdmi_pm_domain;
-
bool need_i915_power; /* the hda controller needs i915 power */

--- linux-4.15.0.orig/sound/pci/hda/hda_local.h
+++ linux-4.15.0/sound/pci/hda/hda_local.h
@@ -374,7 +374,8 @@
 const struct hda_fixup *fixlist);
 void snd_hda_pick_pin_fixup(struct hda_codec *codec,
    const struct hda_pin_quirk *pin_quirk,
-    const struct hda_fixup *fixlist);
+    const struct hda_fixup *fixlist,
+    bool match_all_pins);

/* helper macros to retrieve pin default-config values */
#define get_defcfg_connect(cfg) \
--- linux-4.15.0.orig/sound/pci/hda/hda_sysfs.c
+++ linux-4.15.0/sound/pci/hda/hda_sysfs.c
@@ -138,7 -138,7 @@
 "The codec is being used, can't reconfigure.
"
 goto error;
+err = snd_hda_codec_configure(codec);
+err = device_reprobe(hda_codec_dev(codec));
 if (err < 0)
    goto error;
 err = snd_card_register(codec->card);
@@ -221,7 +221,7 @@
 mutex_lock(&codec->user_mutex);
 for (i = 0; i < codec->init_verbs.used; i++) {
    struct hda_verb *v = snd_array_elem(&codec->init_verbs, i);
-    len += snprintf(buf + len, PAGE_SIZE - len,
+    len += scnprintf(buf + len, PAGE_SIZE - len,
     "0x%02x 0x%03x 0x%04x\n",
     v->nid, v->verb, v->param);
    }
@@ -271,7 +271,7 @@
 mutex_lock(&codec->user_mutex);
 for (i = 0; i < codec->hints.used; i++) {
    struct hda_hint *hint = snd_array_elem(&codec->hints, i);
-    len += snprintf(buf + len, PAGE_SIZE - len,
+    len += scnprintf(buf + len, PAGE_SIZE - len,
     "%s = %s
", hint->key, hint->val);
   }
 mutex_unlock(&codec->user_mutex);
--- linux-4.15.0.orig/sound/pci/hda/hda_tegra.c
+++ linux-4.15.0/sound/pci/hda/hda_tegra.c
@@ -249,10 +249,12 @@
 struct snd_card *card = dev_get_drvdata(dev);

struct azx *chip = card->private_data;
struct hda_tegra *hda = container_of(chip, struct hda_tegra, chip);
+struct hdac_bus *bus = azx_bus(chip);

snd_power_change_state(card, SNDRV_CTL_POWER_D3hot);

azx_stop_chip(chip);
+synchronize_irq(bus->irq);
azx_enter_link_reset(chip);
hda_tegra_disable_clocks(hda);

@@ -361,6 +363,9 @@
unsigned short gcap;
int irq_id = platform_get_irq(pdev, 0);

+if (irq_id < 0)
+return irq_id;
+
err = hda_tegra_init_chip(chip, pdev);
if (err)
return err;

--- linux-4.15.0.orig/sound/pci/hda/patch_analog.c
+++ linux-4.15.0/sound/pci/hda/patch_analog.c
@@ -370,6 +370,7 @@
static const struct snd_pci_quirk ad1986a_fixup_tbl[] = {
SND_PCI_QUIRK(0x103c, 0x30af, "HP B2800", AD1986A_FIXUP_LAPTOP_IMIC),
+SND_PCI_QUIRK(0x1043, 0x1153, "ASUS M9V", AD1986A_FIXUP_LAPTOP_IMIC),
SND_PCI_QUIRK(0x1043, 0x1443, "ASUS Z99He", AD1986A_FIXUP_EAPD),
SND_PCI_QUIRK(0x1043, 0x1447, "ASUS A8JN", AD1986A_FIXUP_EAPD),
SND_PCI_QUIRK_MASK(0x1043, 0xff00, 0x8100, "ASUS P5", AD1986A_FIXUP_3STACK),
--- linux-4.15.0.orig/sound/pci/hda/patch_ca0132.c
+++ linux-4.15.0/sound/pci/hda/patch_ca0132.c
@@ -28,6 +28,7 @@
#include <linux/module.h>
#include <linux/firmware.h>
#include <linux/kernel.h>
+#include <asm/io.h>
#include <sound/core.h>
#include "hda_codec.h"
#include "hda_local.h"
@@ -28,6 +28,7 @@
/* Enable this to see controls for tuning purpose. */
/*#define ENABLE_TUNING_CONTROLS*/
+#ifndef ENABLE_TUNING_CONTROLS
+include <sound/tlv.h>
+endif
static void dspio_clear_response_queue(struct hda_codec *codec)
{
    unsigned long timeout = jiffies + msecs_to_jiffies(1000);
    unsigned int dummy = 0;
    int status = -1;
    int status;

    /* clear all from the response queue */
    do {
        status = dspio_read(codec, &dummy);
    } while (status == 0);
    } while (status == 0 && time_before(jiffies, timeout));
}

static int dspio_get_response_data(struct hda_codec *codec)
{ return 1;
}

-const DECLARE_TLV_DB_SCALE(voice_focus_db_scale, 2000, 100, 0);
-const DECLARE_TLV_DB_SCALE(eq_db_scale, -2400, 100, 0);
+static const SNDRV_CTL_TLVD_DECLARE_DB_SCALE(voice_focus_db_scale, 2000, 100, 0);
+static const SNDRV_CTL_TLVD_DECLARE_DB_SCALE(eq_db_scale, -2400, 100, 0);

static int add_tuning_control(struct hda_codec *codec,
hda_nid_t pnid, hda_nid_t nid,
{ struct ca0132_spec *spec = codec->spec;

codec_dbg(codec, "ca0132_process_dsp_response\n");
+snd_hda_power_up_pm(codec);
if (spec->wait_scp) {
    if (dspio_get_response_data(codec) >= 0)
        spec->wait_scp = 0;
}

dspio_clear_response_queue(codec);
+snd_hda_power_down_pm(codec);
}

static void hp_callback(struct hda_codec *codec, struct hda_jack_callback *cb)
{
/* Delay enabling the HP amp, to let the mic-detection
 * state machine run.
 */
cancel_delayed_work_sync(&spec->unsol_hp_work);
schedule_delayed_work(&spec->unsol_hp_work, msecs_to_jiffies(500));
tbl = snd_hda_jack_tbl_get(codec, cb->nid);
if (tbl)
tbl->block_report = 1;
schedule_delayed_work(&spec->unsol_hp_work, msecs_to_jiffies(500));
}

static void amic_callback(struct hda_codec *codec, struct hda_jack_callback *cb)
kfree(codec->spec);

#ifdef CONFIG_PM
static int ca0132_suspend(struct hda_codec *codec)
{
struct ca0132_spec *spec = codec->spec;

cancel_delayed_work_sync(&spec->unsol_hp_work);
return 0;
}
#endif

static const struct hda_codec_ops ca0132_patch_ops = {
.build_controls = ca0132_build_controls,
.build_pcms = ca0132_build_pcms,
.init = ca0132_init,
.free = ca0132_free,
.unsol_event = snd_hda_jack_unsol_event,
#ifdef CONFIG_PM
.suspend = ca0132_suspend,
#endif
};

static void ca0132_config(struct hda_codec *codec)
--- linux-4.15.0.orig/sound/pci/hda/patch_conexant.c
+++ linux-4.15.0/sound/pci/hda/patch_conexant.c
@@ -210,21 +210,10 @@
{
struct conexant_spec *spec = codec->spec;

-switch (codec->core.vendor_id) {
-case 0x14f150f2: /* CX20722 */
-case 0x14f150f4: /* CX20724 */
-break;

-default:
-return;
-}
-
-/* Turn the CX20722 codec into D3 to avoid spurious noises */
+/* Turn the problematic codec into D3 to avoid spurious noises from the internal speaker during (and after) reboot */
-cx_auto_turn_eapd(codec, spec->num_eapds, spec->eapds, false);
-
-snd_hda_codec_set_power_to_all(codec, codec->core.afg, AC_PWRST_D3);
-snd_hda_codec_write(codec, codec->core.afg, 0,
-   AC_VERB_SET_POWER_STATE, AC_PWRST_D3);
+snd_hda_gen_reboot_notify(codec);
}

static void cx_auto_free(struct hda_codec *codec)
@@ -669,18 +658,20 @@

/* update LED status via GPIO */
static void cxt_update_gpio_led(struct hda_codec *codec, unsigned int mask,
  -bool enabled)
+bool led_on)
{  
  struct conexant_spec *spec = codec->spec;
  unsigned int oldval = spec->gpio_led;

  if (spec->mute_led_polarity)
      enabled = !enabled;
+  led_on = !led_on;
  spec->gpio_led &= ~mask;
  else
+    led_on
spec->gpio_led |= mask;
+else
  spec->gpioLed &= ~mask;
  codec_dbg(codec, "mask:%d enabled:%d gpioLed:%d\n",
     +mask, led_on, spec->gpio_led);
if (spec->gpioLed != oldval)
snd_hda_codec_write(codec, 0x01, 0, AC_VERB_SET_GPIO_DATA,
   +spec->gpioLed);
@@ -691,8 +682,8 @@
{
  struct hda_codec *codec = private_data;
  struct conexant_spec *spec = codec->spec;
-
  -cxt_update_gpioLed(codec, spec->gpiomuteLed_mask, enabled);
+/* muted -> LED on */
+ctxt_update_gpio_led(codec, spec->gpio_mute_led_mask, !enabled);
}

/* turn on/off mic-mute LED via GPIO per capture hook */
@@ -718,7 +709,6 @@
{ 0x01, AC_VERB_SET_GPIO_DIRECTION, 0x03 },
}
};
-cdc_info(cdc, "action: %d gpio_led: %d\n", action, spec->gpio_led);

if (action == HDA_FIXUP_ACT_PRE_PROBE) {
spec->gen.vmaster_mute_hook = cxt_fixup_gpio_mute_hook;
@@ -957,12 +947,25 @@
SND_PCI_QUIRK(0x1025, 0x054c, "Acer Aspire 3830TG", CXT_FIXUP_ASPIRE_DMIC),
SND_PCI_QUIRK(0x1025, 0x054f, "Acer Aspire 4830T", CXT_FIXUP_ASPIRE_DMIC),
SND_PCI_QUIRK(0x103c, 0x8079, "HP EliteBook 840 G3", CXT_FIXUP_HP_DOCK),
-SND_PCI_QUIRK(0x103c, 0x8174, "HP EliteBook 820 G3", CXT_FIXUP_HP_DOCK),
+SND_PCI_QUIRK(0x103c, 0x807C, "HP EliteBook 840 G2", CXT_FIXUP_HP_DOCK),
+SND_PCI_QUIRK(0x103c, 0x80FD, "HP ProBook 640 G2", CXT_FIXUP_HP_DOCK),
+SND_PCI_QUIRK(0x103c, 0x8115, "HP Z1 Gen3", CXT_FIXUP_HP_GATE_MIC),
SND_PCI_QUIRK(0x103c, 0x814f, "HP ZBook 15u G3", CXT_FIXUP_MUTE_LED_GPIO),
+SND_PCI_QUIRK(0x103c, 0x828c, "HP EliteBook 840 G4", CXT_FIXUP_HP_DOCK),
+SND_PCI_QUIRK(0x103c, 0x8299, "HP 800 G3 SFF", CXT_FIXUP_HP_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x103c, 0x829a, "HP 800 G3 DM", CXT_FIXUP_HP_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x103c, 0x8366, "HP ProBook 455 G5", CXT_FIXUP_MUTE_LED_GPIO),
+SND_PCI_QUIRK(0x103c, 0x837f, "HP ProBook 470 G5", CXT_FIXUP_MUTE_LED_GPIO),
+SND_PCI_QUIRK(0x103c, 0x83b2, "HP EliteBook 840 G5", CXT_FIXUP_HP_DOCK),
+SND_PCI_QUIRK(0x103c, 0x83b3, "HP EliteBook 830 G5", CXT_FIXUP_HP_DOCK),
+SND_PCI_QUIRK(0x103c, 0x83d3, "HP ProBook 640 G4", CXT_FIXUP_HP_DOCK),
+SND_PCI_QUIRK(0x103c, 0x8402, "HP ProBook 645 G4", CXT_FIXUP_MUTE_LED_GPIO),
+SND_PCI_QUIRK(0x103c, 0x8455, "HP Z2 G4", CXT_FIXUP_HP_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x103c, 0x8456, "HP Z2 G4 SFF", CXT_FIXUP_HP_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x103c, 0x8457, "HP Z2 G4 mini", CXT_FIXUP_HP_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x103c, 0x8458, "HP Z2 G4 mini premium", CXT_FIXUP_HP_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x138d, "Asus", CXT_FIXUP_HEADPHONE_MIC_PIN),
SND_PCI_QUIRK(0x152d, 0x0833, "OLPC XO-1.5", CXT_FIXUP_OLPC_XO),
SND_PCI_QUIRK(0x17aa, 0x20f2, "Lenovo T400", CXT_PINCFG_LENOVO_TP410),
@@ -970,9 +973,11 @@
SND_PCI_QUIRK(0x17aa, 0x215f, "Lenovo T510", CXT_PINCFG_LENOVO_TP410),
SND_PCI_QUIRK(0x17aa, 0x21ce, "Lenovo T420", CXT_PINCFG_LENOVO_TP410),
SND_PCI_QUIRK(0x17aa, 0x21cf, "Lenovo T520", CXT_PINCFG_LENOVO_TP410),
+SND_PCI_QUIRK(0x17aa, 0x21d2, "Lenovo T420s", CXT_PINCFG_LENOVO_TP410),
+SND_PCI_QUIRK(0x17aa, 0x21da, "Lenovo X220", CXT_PINCFG_LENOVO_TP410),
+SND_PCI_QUIRK(0x17aa, 0x21db, "Lenovo X220-tablet", CXT_PINCFG_LENOVO_TP410),
SND_PCI_QUIRK(0x17aa, 0x38af, "Lenovo IdeaPad Z560", CXT_FIXUP_MUTE_LED_EAPD),

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static const struct hda_device_id snd_hda_id_conexant[] = {
    HDA_CODEC_ENTRY(0x14f11f86, "CX8070", patch_conexant_auto),
    HDA_CODEC_ENTRY(0x14f12008, "CX8200", patch_conexant_auto),
    HDA_CODEC_ENTRY(0x14f120d0, "CX11970", patch_conexant_auto),
    HDA_CODEC_ENTRY(0x14f15045, "CX20549 (Venice)", patch_conexant_auto),
    HDA_CODEC_ENTRY(0x14f15047, "CX20551 (Waikiki)", patch_conexant_auto),
    HDA_CODEC_ENTRY(0x14f15051, "CX20561 (Hermosa)", patch_conexant_auto),
};
mutex_lock(&spec->pcm_lock);
@@ -364,16 +366,15 @@
    /* no pin is bound to the pcm */
    memset(ucontrol->value.bytes.data, 0,
           ARRAY_SIZE(ucontrol->value.bytes.data));
-    mutex_unlock(&spec->pcm_lock);
-    return 0;
+    goto unlock;
 }
-eld = &per_pin->sink_eld;
+eld = &per_pin->sink_eld;

 if (eld->eld_size > ARRAY_SIZE(ucontrol->value.bytes.data) ||
     eld->eld_size > ELD_MAX_SIZE) {
    mutex_unlock(&spec->pcm_lock);
    snd_BUG();
    -return -EINVAL;
+    err = -EINVAL;
    +goto unlock;
 }

 memset(ucontrol->value.bytes.data, 0,
@@ -381,9 +382,10 @@
    if (eld->eld_valid)
        memcpy(ucontrol->value.bytes.data, eld->eld_buffer,
               eld->eld_size);
-    mutex_unlock(&spec->pcm_lock);
+    mutex_unlock(&spec->pcm_lock);
    return 0;
+ unlock:
+    mutex_unlock(&spec->pcm_lock);
+    return err;
 }

 static const struct snd_kcontrol_new eld_bytes_ctl = {
@@ -764,8 +766,10 @@
    if (pin_idx < 0)
        return;
+    mutex_lock(&spec->pcm_lock);
    if (hdmi_present_sense(get_pin(spec, pin_idx), 1))
        snd_hda_jack_report_sync(codec);
+    mutex_unlock(&spec->pcm_lock);
 } 

 static void jack_callback(struct hda_codec *codec,
@@ -1206,8 +1210,8 @@
    pin_idx = hinfo_to_pin_index(codec, hinfo);
if (!spec->dyn_pcm_assign) {
  if (snd_BUG_ON(pin_idx < 0)) {
    -mutex_unlock(&spec->pcm_lock);
    -return -EINVAL;
    +err = -EINVAL;
    +goto unlock;
  }
} else {
  /* no pin is assigned to the PCM */
  @@ -1215,16 +1219,13 @@

  if (pin_idx < 0) {
    err = hdmi_pcm_open_no_pin(hinfo, codec, substream);
    -mutex_unlock(&spec->pcm_lock);
    -return err;
    +mutex_unlock(&spec->pcm_lock);
    +err = hdmi_choose_cvt(codec, pin_idx, &cvt_idx);
    -if (err < 0) {
    -mutex_unlock(&spec->pcm_lock);
    -return err;
    -}
    +if (err < 0)
    +goto unlock;
  }
  
  err = hdmi_choose_cvt(codec, pin_idx, &cvt_idx);
  -if (err < 0) {
  -mutex_unlock(&spec->pcm_lock);
  -return err;
  -}
  +if (err < 0)
  +goto unlock;

  per_cvt = get_cvt(spec, cvt_idx);
  /* Claim converter */
  @@ -1261,12 +1262,11 @@
    per_cvt->assigned = 0;
    hinfo->nid = 0;
    snd_hda_spdif_ctls_unassign(codec, pcm_idx);
    -mutex_unlock(&spec->pcm_lock);
    -return -ENODEV;
    +err = -ENODEV;
    +goto unlock;
  }
}

  -mutex_unlock(&spec->pcm_lock);
  /* Store the updated parameters */
  runtime->hw.channels_min = hinfo->channels_min;
  runtime->hw.channels_max = hinfo->channels_max;
  @@ -1275,7 +1275,9 @@

  snd_pcm_hw_constraint_step(substream->runtime, 0,
    SNDRCV_PCM_HW_PARAM_CHANNELS, 2);
return 0;
+ unlock:
+ mutex_unlock(&spec->pcm_lock);
+ return err;
}

/*
@@ -1383,6 +1385,8 @@
pcm = get_pcm_rec(spec, per_pin->pcm_idx);
 else
 return;
+ if (!pcm->pcm)
+ return;
if (!test_bit(per_pin->pcm_idx, &spec->pcm_in_use))
return;

@@ -1544,9 +1548,11 @@
ret = !repoll || !eld->monitor_present || eld->eld_valid;

jack = snd_hda_jack_tbl_get(codec, pin_nid);
- if (jack)
+ if (jack) {
 jack->block_report = !ret;
- +jack->pin_sense = (eld->monitor_present && eld->eld_valid) ?
+ +AC_PINSENSE_PRESENCE : 0;
+ }
 mutex_unlock(&per_pin->lock);
 return ret;
}
@@ -1626,21 +1632,23 @@
static bool hdmi_present_sense(struct hdmi_spec_per_pin *per_pin, int repoll)
 {
 struct hda_codec *codec = per_pin->codec;
- if (!codec_has_acomp(codec))
- snd_hda_power_up_pm(codec);
+ if (!codec_has_acomp(codec)) {
+ ret = snd_hda_power_up_pm(codec);
+ if (ret < 0 && pm_runtime_suspended(hda_codec_dev(codec))) {
+ snd_hda_power_down_pm(codec);
+ return false;
+ }
+ }
mutex_lock(&spec->pcm_lock);

if (codec_has_acomp(codec)) {
    sync_eld_via_acomp(codec, per_pin);
    ret = false; /* don't call snd_hda_jack_report_sync() */
} else {
    ret = hdmi_present_sense_via_verbs(per_pin, repoll);
}
mutex_unlock(&spec->pcm_lock);

if (!codec_has_acomp(codec))
    snd_hda_power_down_pm(codec);
@@ -1652,12 +1660,21 @@
{
    struct hdmi_spec_per_pin *per_pin =
    container_of(to_delayed_work(work), struct hdmi_spec_per_pin, work);
+    struct hda_codec *codec = per_pin->codec;
+    struct hdmi_spec *spec = codec->spec;
+    struct hda_jack_tbl *jack =
+        snd_hda_jack_tbl_get(codec, per_pin->pin_nid);
+    if (jack)
+        jack->jack_dirty = 1;

    if (per_pin->repoll_count++ > 6)
        per_pin->repoll_count = 0;
+
    mutex_lock(&spec->pcm_lock);
    if (hdmi_present_sense(per_pin, per_pin->repoll_count))
        snd_hda_jack_report_sync(per_pin->codec);
    mutex_unlock(&spec->pcm_lock);
}

static void intel_haswell_fixup_connect_list(struct hda_codec *codec,
@@ -1831,8 +1848,10 @@
/* Add sanity check to pass klockwork check.
 * This should never happen.
 */
-    if (WARN_ON(spdif == NULL))
+    if (WARN_ON(spdif == NULL)) {
+        mutex_unlock(&codec->spdif_mutex);
    return true;
+    }
    non_pcm = !!(spdif->status & IEC958_AES0_NONAUDIO);
    mutex_unlock(&codec->spdif_mutex);
    return non_pcm;
@@ -1856,7 +1875,7 @@
 struct snd_pcm_runtime *runtime = substream->runtime;
 bool non_pcm;
int pinctl;
-int err;
+int err = 0;

mutex_lock(&spec->pcm_lock);
pin_idx = hinfo_to_pin_index(codec, hinfo);
@@ -1868,13 +1887,12 @@
pin_cvt_fixup(codec, NULL, cvt_nid);
snd_hda_codec_setup_stream(codec, cvt_nid, stream_tag, 0, format);
-mutex_unlock(&spec->pcm_lock);
-return 0;
+goto unlock;
}

if (snd_BUG_ON(pin_idx < 0)) {
-mutex_unlock(&spec->pcm_lock);
-return -EINVAL;
+err = -EINVAL;
+goto unlock;
}
per_pin = get_pin(spec, pin_idx);
pin_nid = per_pin->pin_nid;
@@ -1913,6 +1931,7 @@ /* snd_hda_set_dev_select() has been called before */
err = spec->ops.setup_stream(codec, cvt_nid, pin_nid, stream_tag, format);
+unlock:
mutex_unlock(&spec->pcm_lock);
return err;
}
@@ -1934,32 +1953,34 @@
struct hdmi_spec_per_cvt *per_cvt;
struct hdmi_spec_per_pin *per_pin;
int pinctl;
+int err = 0;

+mutex_lock(&spec->pcm_lock);
if (hinfo->nid) {
 pcm_idx = hinfo_to_pcm_index(codec, hinfo);
-if (snd_BUG_ON(pcm_idx < 0))
-return -EINVAL;
+if (snd_BUG_ON(pcm_idx < 0)) {
+err = -EINVAL;
+goto unlock;
+}
 cvt_idx = cvt_nid_to_cvt_index(codec, hinfo->nid);
-if (snd_BUG_ON(cvt_idx < 0))
- return -EINVAL;
+ if (snd_BUG_ON(cvt_idx < 0)) {
+ err = -EINVAL;
+ goto unlock;
+ }
 per_cvt = get_cvt(spec, cvt_idx);
- snd_BUG_ON(!per_cvt->assigned);
 per_cvt->assigned = 0;
hinfo->nid = 0;

- mutex_lock(&spec->pcm_lock);
snd_hda_spdif_ctls_unassign(codec, pcm_idx);
clear_bit(pcm_idx, &spec->pcm_in_use);
pin_idx = hinfo_to_pin_index(codec, hinfo);
- if (spec->dyn_pcm_assign && pin_idx < 0) {
- mutex_unlock(&spec->pcm_lock);
- return 0;
- }
+ if (spec->dyn_pcm_assign && pin_idx < 0)
+ goto unlock;

if (snd_BUG_ON(pin_idx < 0)) {
- mutex_unlock(&spec->pcm_lock);
- return -EINVAL;
+ err = -EINVAL;
+ goto unlock;
}
per_pin = get_pin(spec, pin_idx);

@@ -1978,10 +1999,12 @@
 per_pin->setup = false;
 per_pin->channels = 0;
 mutex_unlock(&per_pin->lock);
- mutex_unlock(&spec->pcm_lock);

- return 0;
+ unlock:
+ mutex_unlock(&spec->pcm_lock);
+ return err;
}

static const struct hda_pcm_ops generic_ops = {
@@ -1978,10 +1999,12 @@
 int dev, err;
 int pin_idx, pcm_idx;

---
for (pcm_idx = 0; pcm_idx < spec->pcm_used; pcm_idx++) {
+if (!get_pcm_rec(spec, pcm_idx)->pcm) {
+/* no PCM: mark this for skipping permanently */
+set_bit(pcm_idx, &spec->pcm_bitmap);
+continue;
+}
+
er = generic_hdmi_build_jack(codec, pcm_idx);
if (err < 0)
return err;
@@ -2187,7 +2215,9 @@
for (pin_idx = 0; pin_idx < spec->num_pins; pin_idx++) {
struct hdmi_spec_per_pin *per_pin = get_pin(spec, pin_idx);
+struct hdmi_eld *pin_eld = &per_pin->sink_eld;

+pin_eld->eld_valid = false;
hdmi_present_sense(per_pin, 0);
}
@@ -2271,8 +2301,10 @@
struct hdmi_spec *spec = codec->spec;
int pin_idx, pcm_idx;

-if (codec_has_acomp(codec))
+if (codec_has_acomp(codec)) {
    snd_hdac_i915_register_notifier(NULL);
+    codec->relaxed_resume = 0;
+}

for (pin_idx = 0; pin_idx < spec->num_pins; pin_idx++) {
struct hdmi_spec_per_pin *per_pin = get_pin(spec, pin_idx);
@@ -2294,6 +2326,18 @@
}

#ifdef CONFIG_PM
+static int generic_hdmi_suspend(struct hda_codec *codec) {
+    struct hdmi_spec *spec = codec->spec;
+    int pin_idx;
+    for (pin_idx = 0; pin_idx < spec->num_pins; pin_idx++) {
+        struct hdmi_spec_per_pin *per_pin = get_pin(spec, pin_idx);
+        cancel_delayed_work_sync(&per_pin->work);
+    }
+    return 0;

}
static int generic_hdmi_resume(struct hda_codec *codec)
{
    struct hdmi_spec *spec = codec->spec;
    .build_controls = generic_hdmi_build_controls,
    .unsol_event = hdmi_unsol_event,
#ifdef CONFIG_PM
    .suspend = generic_hdmi_suspend,
    .resume = generic_hdmi_resume,
#endif
};
@@ -2503,6 +2548,8 @@
    wmb();
    spec->i915_audio_ops.pin_eld_notify = intel_pin_eld_notify;
    snd_hda_i915_register_notifier(&spec->i915_audio_ops);
+/* no need for forcible resume for jack check thanks to notifier */
+codec->relaxed_resume = 1;
}
/* setup_stream ops override for HSW */
@@ -2519,6 +2566,7 @@
    hda_nid_t cvt_nid)
{
    if (per_pin)
+    haswell_verify_D0(codec, per_pin->cvt_nid, per_pin->pin_nid);
    snd_hda_set_dev_select(codec, per_pin->pin_nid,
        per_pin->dev_id);
    intel_verify_pin_cvt_connect(codec, per_pin);
@@ -2532,21 +2580,31 @@
    /* precondition and allocation for Intel codecs */
 static int alloc_intel_hdmi(struct hda_codec *codec)
{
+    int err;
+    /* requires i915 binding */
    if (!codec->bus->core.audio_component) {
        codec_info(codec, "No i915 binding for Intel HDMI/DP codec\n");
        return -ENOODEV;
    }
    -return alloc_generic_hdmi(codec);
    +err = alloc_generic_hdmi(codec);
    +if (err < 0)
    +return err;
+/* no need to handle unsol events */
+codec->patch_ops.unsol_event = NULL;

/* parse and post-process for Intel codecs */
static int parse_intel_hdmi(struct hda_codec *codec)
{
    int err;
    int err, retries = 3;
    do {
        err = hdmi_parse_codec(codec);
    } while (err < 0 && retries--);
    err = hdmi_parse_codec(codec);
    if (err < 0) {
        generic_spec_free(codec);
        return err;
    }
    codec->link_down_at_suspend = 1;
    return 0;
}

static int patch_tegra_hdmi(struct hda_codec *codec)
{
    struct hdmi_spec *spec;
    int err;
    err = patch_generic_hdmi(codec);
    return err;
    codec->patch_ops.build_pcm = tegra_hdmi_build_pcm;
    spec = codec->spec;
    spec->chmap.ops.chmap_validate = nvhdmi_chmap_validate;
    return 0;
}

spec->chmap.channels_max = max(spec->chmap.channels_max, 8u);
/* AMD GPUs have neither EPSS nor CLKSTOP bits, hence preventing
 * the link-down as is. Tell the core to allow it.
 */
codec->link_down_at_suspend = 1;
+
return 0;
}

HDA_CODEC_ENTRY(0x10de0097, "GPU 97 HDMI/DP", patch_nvhdmi),
HDA_CODEC_ENTRY(0x10de0098, "GPU 98 HDMI/DP", patch_nvhdmi),
HDA_CODEC_ENTRY(0x10de0099, "GPU 99 HDMI/DP", patch_nvhdmi),
+HDA_CODEC_ENTRY(0x10de009a, "GPU 9a HDMI/DP", patch_nvhdmi),
+HDA_CODEC_ENTRY(0x10de009d, "GPU 9d HDMI/DP", patch_nvhdmi),
+HDA_CODEC_ENTRY(0x10de009e, "GPU 9e HDMI/DP", patch_nvhdmi),
+HDA_CODEC_ENTRY(0x10de009f, "GPU 9f HDMI/DP", patch_nvhdmi),
+HDA_CODEC_ENTRY(0x10de00a0, "GPU a0 HDMI/DP", patch_nvhdmi),
HDA_CODEC_ENTRY(0x10de8001, "MCP73 HDMI", patch_nvhdmi_2ch),
HDA_CODEC_ENTRY(0x10de8067, "MCP67/68 HDMI", patch_nvhdmi_2ch),
HDA_CODEC_ENTRY(0x11069f80, "VX900 HDMI/DP", patch_via_hdmi),
--- linux-4.15.0.orig/sound/pci/hda/patch_realtek.c
+++ linux-4.15.0/sound/pci/hda/patch_realtek.c
@@ -118,6 +118,8 @@
int codec_variant;/* flag for other variants */
unsigned int has_alc5505_dsp:1;
unsigned int no_depop_delay:1;
+unsigned int done_hp_init:1;
+unsigned int no_shutup_pins:1;

/* for PLL fix */
hda_nid_t pll_nid;
@@ -331,7 +333,9 @@
case 0x10ec0215:
    case 0x10ec0235:
+    case 0x10ec0245:
case 0x10ec0255:
    case 0x10ec0256:
    case 0x10ec0257:
    @ @ -342,11 +346,16 @@
case 0x10ec0285:
case 0x10ec0298:
case 0x10ec0289:
+case 0x10ec0300:
alc_update_coef_idx(codec, 0x10, 1<<9, 0);
break;
case 0x10ec0275:
alc_update_coef_idx(codec, 0xe, 0, 1<<0);
break;
+case 0x10ec0287:
+alc_update_coef_idx(codec, 0x10, 1<<9, 0);
+alc_write_coef_idx(codec, 0x8, 0x4ab7);
+break;
case 0x10ec0293:
alc_update_coef_idx(codec, 0xa, 1<<13, 0);
break;
@@ -356,6 +365,7 @@
case 0x10ec0700:
case 0x10ec0701:
case 0x10ec0703:
+case 0x10ec0711:
alc_update_coef_idx(codec, 0x10, 1<<15, 0);
break;
case 0x10ec0662:
@@ -371,6 +381,10 @@
case 0x10ec0672:
alc_update_coef_idx(codec, 0xd, 0, 1<<14); /* EAPD Ctrl */
break;
+case 0x10ec0222:
+case 0x10ec0623:
+alc_update_coef_idx(codec, 0x19, 1<<13, 0);
+break;
case 0x10ec0668:
alc_update_coef_idx(codec, 0x7, 3<<13, 0);
break;
@@ -382,10 +396,49 @@
case 0x10ec0892:
+case 0x10ec0897:
alc_update_coef_idx(codec, 0x7, 1<<5, 0);
break;
case 0x10ec0899:
case 0x10ec0900:
+case 0x10ec0b00:
case 0x10ec1168:
case 0x10ec1220:
alc_update_coef_idx(codec, 0x7, 1<<1, 0);
@@ -428,6 +444,49 @@
set_eapd(codec, *p, on);
}

+static int find_ext_mic_pin(struct hda_codec *codec);
msleep(200);
-snd_hda_shutup_pins(codec);
+alc_shutup_pins(codec);
}

/* generic EAPD initialization */
@@ -475,6 +534,15 @@
}
}

+/* get a primary headphone pin if available */
+static hda_nid_t alc_get_hp_pin(struct alc_spec *spec)
+{
+ if (spec->gen.autocfg.hp_pins[0])
+ return spec->gen.autocfg.hp_pins[0];
+ if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
+ return spec->gen.autocfg.line_out_pins[0];
+ return 0;
+ }
+
/*
 * Realtek SSID verification
@@ -683,9 +751,7 @@
* 15   : 1 --> enable the function "Mute internal speaker
*        when the external headphone out jack is plugged"
*/
-if (!spec->gen.autocfg.hp_pins[0] &&
- !(spec->gen.autocfg.line_out_pins[0] &&
- spec->gen.autocfg.line_out_type == AUTO_PIN_HP_OUT)) {
+ if (!alc_get_hp_pin(spec)) {
    hda_nid_t nid;
    tmp = (ass >> 11) & 0x3; /* HP to chassis */
    nid = ports[tmp];
@@ -778,10 +844,11 @@
if (spec->init_hook)
spec->init_hook(codec);

+spec->gen.skip_verbs = 1; /* applied in below */
+snd_hda_gen_init(codec);
alc_fix_pll(codec);
alc_auto_init_amp(codec, spec->init_amp);
-snd_hda_gen_init(codec);
+snd_hda_apply_verbs(codec); /* apply verbs here after own init */
 snd_hda_apply_fixup(codec, HDA_FIXUP_ACT_INIT);
@@ -795,7 +862,7 @@
if (spec && spec->shutup)
spec->shutup(codec);
else
    snd_hda_shutup_pins(codec);
+alc_shutup_pins(codec):
}

static void alc_reboot_notify(struct hda_codec *codec)
@@ -808,15 +875,6 @@
alc_shutup(codec):
}

-/* power down codec to D3 at reboot/shutdown; set as reboot_notify ops */
-static void alc_d3_at_reboot(struct hda_codec *codec)
-{ 
-    snd_hda_codec_set_power_to_all(codec, codec->core.afg, AC_PWRST_D3);
-    snd_hda_codec_write(codec, codec->core.afg, 0,
-        AC_VERB_SET_POWER_STATE, AC_PWRST_D3);
-    msleep(10);
-}
-
#define alc_freesnd_hda_gen_free

#ifdef CONFIG_PM
@@ -982,6 +1040,9 @@
SND_PCI_QUIRK(0x1043, 0x834a, "EeePC", 1),
SND_PCI_QUIRK(0x1458, 0xa002, "GA-MA790X", 1),
SND_PCI_QUIRK(0x8086, 0xd613, "Intel", 1),
+/* blacklist -- no beep available */
+SND_PCI_QUIRK(0x17aa, 0x309e, "Lenovo ThinkCentre M73", 0),
+SND_PCI_QUIRK(0x17aa, 0x30a3, "Lenovo ThinkCentre M93", 0),
{ }
};

@@ -1785,6 +1846,7 @@
ALC889_FIXUP_FRONT_HP_NO_PRESENCE,
ALC889_FIXUP_VAIO_TT,
ALC888_FIXUP_EEE1601,
+ALC886_FIXUP_EAPD,
ALC882_FIXUP_EAPD,
ALC883_FIXUP_EAPD,
ALC883_FIXUP_ACER_EAPD,
@@ -1810,6 +1872,10 @@
ALC887_FIXUP_BASS_CHMAP,
ALC1220_FIXUP_GB_DUAL_CODECS,
ALC1220_FIXUP_CLEVO_P950,
+ALC1220_FIXUP_CLEVO_PB51ED,
+ALC1220_FIXUP_CLEVO_PB51ED_PINS,
static void alc889_fixup_coef(struct hda_codec *codec, snd_hda_override_conn_list(codec, 0x1b, 1, conn1);
}

+static void alc889_fixup_headset_mode_no_hp_mic(struct hda_codec *codec, const struct hda_fixup *fix, int action);
+static void alc1220_fixup_clevo_pb51ed(struct hda_codec *codec, const struct hda_fixup *fix, int action)
{
    alc1220_fixup_clevo_p950(codec, fix, action);
    alc_fixup_headset_mode_no_hp_mic(codec, fix, action);
}
+static void alc887_asus_hp_automute_hook(struct hda_codec *codec, struct hda_jack_callback *jack)
{
    struct alc_spec *spec = codec->spec;
    unsigned int vref;
+
snd_hda_gen_hp_automute(codec, jack);
+
    if (spec->gen.hp_jack_present)
        vref = AC_PINCTL_VREF_80;
    else
        vref = AC_PINCTL_VREF_HIZ;
    snd_hda_set_pin_ctl(codec, 0x19, PIN_HP | vref);
+
    snd_hda_gen_hp_automute(codec, jack);
+
    if (spec->gen.hp_jack_present)
        vref = AC_PINCTL_VREF_80;
    else
        vref = AC_PINCTL_VREF_HIZ;
    snd_hda_set_pin_ctl(codec, 0x19, PIN_HP | vref);
+
    static void alc887_fixup_asus_jack(struct hda_codec *codec, const struct hda_fixup *fix, int action)
{
    struct alc_spec *spec = codec->spec;
    unsigned int vref;
+
    if (spec->gen.hp_jack_present)
        vref = AC_PINCTL_VREF_80;
    else
        vref = AC_PINCTL_VREF_HIZ;
    snd_hda_set_pin_ctl(codec, 0x19, PIN_HP | vref);
+
    \静态 const struct hda_fixup alc882_fixups[] = {
    [ALC882_FIXUP_MIGNON] = {
        .type = HDA_FIXUP_PINS,
+[ALC886_FIXUP_EAPD] = {
+  .type = HDA_FIXUP_VERBS,
+  .v.verbs = (const struct hda_verb[]) {
+    /* change to EAPD mode */
+    { 0x20, AC_VERB_SET_COEF_INDEX, 0x07 },
+    { 0x20, AC_VERB_SET_PROC_COEF, 0x0068 },
+    {} } +
+},
+[ALC882_FIXUP_EAPD] = {
  .type = HDA_FIXUP_VERBS,
  .v.verbs = (const struct hda_verb[]) {
  @ @ -2288,6 +2399,33 @@
  .type = HDA_FIXUP_FUNC,
  .v.func = alc1220_fixup_clevo_p950,
  },
+[ALC1220_FIXUP_CLEVO_PB51ED] = {
+  .type = HDA_FIXUP_FUNC,
+  .v.func = alc1220_fixup_clevo_pb51ed,
+},
+[ALC1220_FIXUP_CLEVO_PB51ED_PINS] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x19, 0x01a1913c }, /* use as headset mic, without its own jack detect */
+    {} } +
+},
+.chained = true,
+.chain_id = ALC1220_FIXUP_CLEVO_PB51ED,
+},
+[ALC887_FIXUP_ASUS_AUDIO] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x15, 0x02a14150 }, /* use as headset mic, without its own jack detect */
+    { 0x19, 0x22219420 },
+    {} } +
+},
+.chained = true,
+.chain_id = ALC887_FIXUP_ASUS_AUDIO,
+},
+[ALC887_FIXUP_ASUS_HMIC] = {
+  .type = HDA_FIXUP_FUNC,
+  .v.func = alc887_fixup_asus_jack,
+.chained = true,
+.chain_id = ALC887_FIXUP_ASUS_AUDIO,
+};
static const struct snd_pci_quirk alc882_fixup_tbl[] = {
    ALC882_FIXUP_ACER_ASPIRE_8930G),
SND_PCI_QUIRK(0x1025, 0x0146, "Acer Aspire 6935G",
    ALC882_FIXUP_ACER_ASPIRE_8930G),
    +SND_PCI_QUIRK(0x1025, 0x0142, "Acer Aspire 7730G",
A + ALC882_FIXUP_ACER_ASPIRE_4930G),
    +SND_PCI_QUIRK(0x1025, 0x0155, "Packard-Bell M5120", ALC882_FIXUP_PB_M5210),
SND_PCI_QUIRK(0x1025, 0x015e, "Acer Aspire 6930G",
    ALC882_FIXUP_ACER_ASPIRE_4930G),
SND_PCI_QUIRK(0x1025, 0x0166, "Acer Aspire 6530G",
    ALC882_FIXUP_ACER_ASPIRE_4930G),
    -SND_PCI_QUIRK(0x1025, 0x0142, "Acer Aspire 7730G",
- - ALC882_FIXUP_ACER_ASPIRE_4930G),
    -SND_PCI_QUIRK(0x1025, 0x0155, "Packard-Bell M5120", ALC882_FIXUP_PB_M5210),
SND_PCI_QUIRK(0x1025, 0x021e, "Acer Aspire 5739G",
    ALC882_FIXUP_ACER_ASPIRE_4930G),
SND_PCI_QUIRK(0x1025, 0x0259, "Acer Aspire 5935", ALC889_FIXUP_DAC_ROUTE),
    @ @ -2321,14 +2459,15 @ @
SND_PCI_QUIRK(0x1043, 0x13c2, "Asus A7M", ALC882_FIXUP_EAPD),
SND_PCI_QUIRK(0x1043, 0x1873, "ASUS W90V", ALC882_FIXUP_ASUS_W90V),
SND_PCI_QUIRK(0x1043, 0x1971, "Asus W2JC", ALC882_FIXUP_ASUS_W2JC),
    +SND_PCI_QUIRK(0x1043, 0x2390, "Asus D7005A", ALC887_FIXUP_ASUS_HMIC),
SND_PCI_QUIRK(0x1043, 0x835f, "Asus Eee 1601", ALC888_FIXUP_EEE1601),
SND_PCI_QUIRK(0x1043, 0x84bc, "ASUS ET2700", ALC887_FIXUP_ASUS_BASS),
SND_PCI_QUIRK(0x1043, 0x8691, "ASUS ROG Ranger VIII", ALC882_FIXUP_GPIO3),
    +SND_PCI_QUIRK(0x104d, 0x9043, "Sony Vaio VGC-LN51JGB", ALC882_FIXUP_NO_PRIMARY_HP),
+SND_PCI_QUIRK(0x104d, 0x9044, "Sony VAIO AiO", ALC882_FIXUP_NO_PRIMARY_HP),
SND_PCI_QUIRK(0x104d, 0x9047, "Sony Vaio TT", ALC889_FIXUP_VAIO_TT),
SND_PCI_QUIRK(0x104d, 0x905a, "Sony Vaio Z", ALC882_FIXUP_NO_PRIMARY_HP),
SND_PCI_QUIRK(0x104d, 0x9060, "Sony Vaio VPCL14M1R", ALC882_FIXUP_NO_PRIMARY_HP),
    -SND_PCI_QUIRK(0x104d, 0x9043, "Sony Vaio VGC-LN51JGB", ALC882_FIXUP_NO_PRIMARY_HP),
    -SND_PCI_QUIRK(0x104d, 0x9044, "Sony VAIO AiO", ALC882_FIXUP_NO_PRIMARY_HP),
/* All Apple entries are in codec SSIDs */
SND_PCI_QUIRK(0x106b, 0x00a0, "MacBookPro 3,1", ALC889_FIXUP_MBP_VREF),
    @ @ -2355,13 +2494,45 @ @
SND_PCI_QUIRK(0x106b, 0x4a00, "Macbook 5,2", ALC889_FIXUP_MBA11_VREF),
SND_PCI_QUIRK(0x1071, 0x8258, "Evesham Voyaeger", ALC882_FIXUP_EAPD),
+SND_PCI_QUIRK(0x13fe, 0x1009, "Advantech MIT-W101", ALC886_FIXUP_EAPD),
SND_PCI_QUIRK(0x1458, 0xa002, "Gigabyte EP45-DS3/Z87X-UD3H",
    ALC889_FIXUP_FRONT_HP_NO_PRESENCE),
SND_PCI_QUIRK(0x1458, 0xa0b8, "Gigabyte AZ370-Gaming", ALC1220_FIXUP_GB_DUAL_CODEC),
+SND_PCI_QUIRK(0x1458, 0xa0c0, "Gigabyte X570 Aorus Master", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1458, 0xa0ce, "Gigabyte X570 Aorus Xtreme", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1462, 0x11f7, "MSI-GE63", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1462, 0x1228, "MSI-GP63", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1462, 0x1229, "MSI-GP73", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1462, 0x1275, "MSI-GL63", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1462, 0x1276, "MSI-GL73", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1462, 0x1293, "MSI-GP65", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1462, 0x7350, "MSI-7350", ALC889_FIXUP_CD),
+SND_PCI_QUIRK(0x1462, 0x1228, "MSI Godlike X570", ALC1220_FIXUP_GB_DUAL_CODEC),
+SND_PCI_QUIRK_VENDOR(0x1462, "MSI", ALC882_FIXUP_GPIO3),
+SND_PCI_QUIRK(0x147b, 0x107a, "Abit AW9D-MAX", ALC882_FIXUP_ABIT_AW9D_MAX),
+SND_PCI_QUIRK(0x1558, 0x50d3, "Clevo PB51ED_PINS", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x65d1, "Clevo PB71[ED][CDF]", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x65d2, "Clevo PB71[DE][CDF]", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x65e1, "Clevo PB71[ER][CDF]", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x65e5, "Clevo PB70D[PRS][?:D-G]?", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x65f1, "Clevo PC70D[PRS][?:D-G]?", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x67d1, "Clevo PB71[ER][CDF]", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x67e1, "Clevo PB71[DE][CDF]", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x67e5, "Clevo PB70D[PRS][?:D-G]?", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x67f1, "Clevo PC70D[PRS][?:D-G]?", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x70d1, "Clevo PC70[ER][CDF]", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x7714, "Clevo X170", ALC1220_FIXUP_CLEVO_PB51ED_PINS),
+SND_PCI_QUIRK(0x1558, 0x9501, "Clevo P950HR", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x9506, "Clevo P955HQ", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x950a, "Clevo P955H[PR]", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x95e1, "Clevo P95xER", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x95e2, "Clevo P950ER", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x95e3, "Clevo P955[ER][T]", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x95e4, "Clevo P955ER", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x95e5, "Clevo P955EE6", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x95e6, "Clevo P950R[CDF]", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x96e1, "Clevo P960[ER][CDFN]-K", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x97e1, "Clevo P970[ER][CDFN]", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK(0x1558, 0x97e2, "Clevo P970RC-M", ALC1220_FIXUP_CLEVO_P950),
+SND_PCI_QUIRK_VENDOR(0x1558, "Fujitsu Lifebook S7110", ALC262_FIXUP_FSC_S7110),
+SND_PCI_QUIRK(0x17aa, 0x3a0d, "Lenovo Y530", ALC882_FIXUP_LENOVO_Y530),
+SND_PCI_QUIRK(0x161f, 0x2054, "Medion laptop", ALC883_FIXUP_EAPD),
+SND_PCI_QUIRK_VENDOR(0x17aa, "Fujitsu Lifebook S7110", ALC262_FIXUP_FSC_S7110),

@@ -2407,6 +2578,7 @@
case 0x10ec0882:
case 0x10ec0885:
case 0x10ec0900:
  +case 0x10ec0b00:
case 0x10ec1220:
  break;
default:
@@ -2540,6 +2712,7 @@
  SND_PCI_QUIRK(0x10cf, 0x1397, "Fujitsu Lifebook S7110", ALC262_FIXUP_FSC_S7110),
SND_PCI_QUIRK(0x10cf, 0x142d, "Fujitsu Lifebook E8410", ALC262_FIXUP_BENQ),
SND_PCI_QUIRK(0x10f1, 0x2915, "Tyan Thunder n6650W", ALC262_FIXUP_TYAN),
SND_PCI_QUIRK(0x1734, 0x1141, "FSC ESPRIMO U9210", ALC262_FIXUP_FSC_H270),
SND_PCI_QUIRK(0x1734, 0x1147, "FSC Celsius H270", ALC262_FIXUP_FSC_H270),
SND_PCI_QUIRK(0x17aa, 0x384e, "Lenovo 3000", ALC262_FIXUP_LENOVO_3000),
SND_PCI_QUIRK(0x17ff, 0x0560, "Benq ED8", ALC262_FIXUP_BENQ),
@@ -2779,6 +2952,8 @@
 ALC269_TYPE_ALC215,
 ALC269_TYPE_ALC225,
 ALC269_TYPE_ALC294,
+ALC269_TYPE_ALC300,
+ALC269_TYPE_ALC623,
 ALC269_TYPE_ALC700,
};
@@ -2813,6 +2988,8 @@
case ALC269_TYPE_ALC215:
case ALC269_TYPE_ALC225:
case ALC269_TYPE_ALC294:
+case ALC269_TYPE_ALC300:
+case ALC269_TYPE_ALC623:
case ALC269_TYPE_ALC700:
    ssids = alc269_ssids;
    break;
@@ -2824,27 +3001,6 @@
 return alc_parse_auto_config(codec, alc269_ignore, ssids);
}
-static int find_ext_mic_pin(struct hda_codec *codec);
-
-static void alc286_shutup(struct hda_codec *codec)
{-
  int i;
  int mic_pin = find_ext_mic_pin(codec);
  /* don't shut up pins when unloading the driver; otherwise it breaks
  * the default pin setup at the next load of the driver
  */
  -if (codec->bus->shutdown)
   -return;
  -for (i = 0; i < codec->init_pins.used; i++) {
   -struct hda_pincfg *pin = snd_array_elem(&codec->init_pins, i);
   -/* use read here for syncing after issuing each verb */
   -if (pin->nid != mic_pin)
    -snd_hda_codec_read(codec, pin->nid, 0,
   -AC_VERB_SET_PIN_WIDGET_CONTROL, 0);
  -}
  -codec->pins_shutup = 1;
-}
static void alc269vb_toggle_power_output(struct hda_codec *codec, int power_up)
{
    alc_update_coef_idx(codec, 0x04, 1 << 11, power_up ? (1 << 11) : 0);
    msleep(150);
    snd_hda_shutup_pins(codec);
    alc_shutup_pins(codec);
}

static struct coef_fw alc282_coefs[] = {
    alc_get_coef0(codec) & 0x00ff == 0x018, {
        hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
        if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
            if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
                hp_pin = spec->gen.autocfg.line_out_pins[0];
        }
        alc282_restore_default_value(codec);
        if (!hp_pin) {
            alc269_shutup(codec);
            return;
        }

        alc282_init(codec);
        
        alc282_shutup(codec);
        return;
    }
};

static struct alc_spec *spec = codec->spec;

if (!hp_pin) {
    alc269_shutup(codec);
    return;
}
if (hp_pin_sense)
msleep(85);

-snd_hda_codec_write(codec, hp_pin, 0,
- AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+if (!spec->no_shutup_pins)
+snd_hda_codec_write(codec, hp_pin, 0,
 + AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);

if (hp_pin_sense)
msleep(100);

alc_auto_setup_eapd(codec, false);
-snd_hda_shutup_pins(codec);
+alc_shutup_pins(codec);
alc_write_coef_idx(codec, 0x78, coef78);
}

@@ -3019,14 +3186,9 @@
static void alc283_init(struct hda_codec *codec)
{
    struct alc_spec *spec = codec->spec;
    -hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
    +hda_nid_t hp_pin = alc_get_hp_pin(spec);
    bool hp_pin_sense;

    -if (!spec->gen.autocfg.hp_outs) {
    -if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
    -hp_pin = spec->gen.autocfg.line_out_pins[0];
    -}

    alc283_restore_default_value(codec);

if (!hp_pin)
@@ -3060,14 +3222,9 @@
static void alc283_shutup(struct hda_codec *codec)
{
    struct alc_spec *spec = codec->spec;
    -hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
    +hda_nid_t hp_pin = alc_get_hp_pin(spec);
    bool hp_pin_sense;

    -if (!spec->gen.autocfg.hp_outs) {
    -if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
    -hp_pin = spec->gen.autocfg.line_out_pins[0];
    -}

    if (!hp_pin) {
alc269_shutup(codec);
return;
@@ -3086,24 +3243,30 @@
if (hp_pin_sense)
msleep(100);

-snd_hda_codec_write(codec, hp_pin, 0,
-    AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
-if (!spec->no_shutup_pins)
+ if (!spec->no_shutup_pins)
+snd_hda_codec_write(codec, hp_pin, 0,
+    AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);

alc_update_coef_idx(codec, 0x46, 3 << 12);

if (hp_pin_sense)
msleep(100);
alc_auto_setup_eapd(codec, false);
-snd_hda_shutup_pins(codec);
+alc_shutup_pins(codec);
alc_write_coef_idx(codec, 0x43, 0x9614);
}

static void alc256_init(struct hda_codec *codec)
{
struct alc_spec *spec = codec->spec;
-hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
+hda_nid_t hp_pin = alc_get_hp_pin(spec);
bool hp_pin_sense;

+if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
+    if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
+        hp_pin = spec->gen.autocfg.line_out_pins[0];
+} +
if (!hp_pin)
return;
@@ -3130,14 +3293,28 @@
alc_update_coef_idx(codec, 0x46, 3 << 12, 0);
alc_update_coefex_idx(codec, 0x57, 0x04, 0x0007, 0x4); /* Hight power */
+alc_update_coefex_idx(codec, 0x53, 0x02, 0x8000, 1 << 15); /* Clear bit */
+alc_update_coefex_idx(codec, 0x53, 0x02, 0x8000, 0 << 15);
+/
+ * Expose headphone mic (or possibly Line In on some machines) instead
+ * of PC Beep on 1Ah, and disable 1Ah loopback for all outputs. See
+ * Documentation/sound/hd-audio/realtek-pc-beep.rst for details of
+ * this register.
static void alc256_shutup(struct hda_codec *codec)
{
    struct alc_spec *spec = codec->spec;
    hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
    hp_pin = alc_get_hp_pin(spec);
    bool hp_pin_sense;

    if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
        if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
            hp_pin = spec->gen.autocfg.line_out_pins[0];
        return;
    }

    if (!hp_pin) {
        alc269_shutup(codec);
        return;
    }

    if (!hp_pin_sense) {
        msleep(85);
        snd_hda_codec_write(codec, hp_pin, 0,
            AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
        /* 3k pull low control for Headset jack. */
        /* NOTE: call this before clearing the pin, otherwise codec stalls */
        /* If disable 3k pulldown control for alc257, the Mic detection will not work correctly
        * when booting with headset plugged. So skip setting it for the codec alc257
        */
        if (codec->core.vendor_id != 0x10ec0257)
            alc_update_coef_idx(codec, 0x46, 0, 3 << 12);

        alc_update_coef_idx(codec, 0x46, 0, 3 << 12); /* 3k pull low control for Headset jack. */
        if (!spec->no_shutup_pins)
            snd_hda_codec_write(codec, hp_pin, 0,
                AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);

        if (hp_pin_sense)
            msleep(100);

        alc_auto_setup_eapd(codec, false);
        snd_hda_shutup_pins(codec);
        alc_shutup_pins(codec);
    }
}

static void alc225_init(struct hda_codec *codec)
+struct alc_spec *spec = codec->spec;
+hda_nid_t hp_pin = alc_get_hp_pin(spec);
+bool hp1_pin_sense, hp2_pin_sense;
+
+if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
+if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
+hp_pin = spec->gen.autocfg.line_out_pins[0];
+}
+
+if (!hp_pin)
+return;
+
+msleep(30);
+
+hp1_pin_sense = snd_hda_jack_detect(codec, hp_pin);
+hp2_pin_sense = snd_hda_jack_detect(codec, 0x16);
+
+if (hp1_pin_sense || hp2_pin_sense)
+msleep(2);
+
+alc_update_coefex_idx(codec, 0x57, 0x04, 0x0007, 0x1); /* Low power */
+
+if (hp1_pin_sense)
+snd_hda_codec_write(codec, hp_pin, 0,
+    AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_MUTE);
+if (hp2_pin_sense)
+snd_hda_codec_write(codec, 0x16, 0,
+    AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_MUTE);
+
+if (hp1_pin_sense || hp2_pin_sense)
+msleep(85);
+
+if (hp1_pin_sense)
+snd_hda_codec_write(codec, hp_pin, 0,
+    AC_VERB_SET_PIN_WIDGET_CONTROL, PIN_OUT);
+if (hp2_pin_sense)
+snd_hda_codec_write(codec, 0x16, 0,
+    AC_VERB_SET_PIN_WIDGET_CONTROL, PIN_OUT);
+
+if (hp1_pin_sense || hp2_pin_sense)
+msleep(100);
+
+alc_update_coef_idx(codec, 0x57, 0x04, 0x0007, 0x4); /* High power */
+}
+
+static void alc225_shutup(struct hda_codec *codec)
struct alc_spec *spec = codec->spec;
+hda_nid_t hp_pin = alc_get_hp_pin(spec);
+bool hp1_pin_sense, hp2_pin_sense;
+
+if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
+if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
+hp_pin = spec->gen.autocfg.line_out_pins[0];
+}
+
+if (!hp_pin) {
+alc269_shutup(codec);
+return;
+}
+
+/* 3k pull low control for Headset jack. */
+alc_update_coef_idx(codec, 0x4a, 0, 3 << 10);
+
+hp1_pin_sense = snd_hda_jack_detect(codec, hp_pin);
+hp2_pin_sense = snd_hda_jack_detect(codec, 0x16);
+
+if (hp1_pin_sense || hp2_pin_sense)
+msleep(2);
+
+if (hp1_pin_sense)
+snd_hda_codec_write(codec, hp_pin, 0,
+    AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_MUTE);
+if (hp2_pin_sense)
+snd_hda_codec_write(codec, 0x16, 0,
+    AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_MUTE);
+
+if (hp1_pin_sense || hp2_pin_sense)
+msleep(85);
+
+if (hp1_pin_sense)
+snd_hda_codec_write(codec, hp_pin, 0,
+    AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+if (hp2_pin_sense)
+snd_hda_codec_write(codec, 0x16, 0,
+    AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+
+if (hp1_pin_sense || hp2_pin_sense)
+msleep(100);
+
+alc_auto_setup_eapd(codec, false);
+alc_shutup_pins(codec);
}

static void alc_default_init(struct hda_codec *codec)
\{ 
  struct alc_spec *spec = codec->spec;
-  hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
+  hda_nid_t hp_pin = alc_get_hp_pin(spec);
  bool hp_pin_sensitive;

+  if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
+    if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
-      hp_pin = spec->gen.autocfg.line_out_pins[0];
+      hp_pin = alc_get_hp_pin(spec);
+    }
+  }
+  if (!hp_pin) {
+    alc269_shutup(codec);
+    return;
+  }
@@ -3198,9 +3484,14 @@ 
static void alc_default_shutup(struct hda_codec *codec)
\{
  struct alc_spec *spec = codec->spec;
-  hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
+  hda_nid_t hp_pin = alc_get_hp_pin(spec);
  bool hp_pin_sensitive;

+  if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
+    if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
+      hp_pin = spec->gen.autocfg.line_out_pins[0];
+    }
+  }
+  if (!hp_pin) {
+    alc269_shutup(codec);
+    return;
+  }
@@ -3217,14 +3508,64 @@ 
+    if (hp_pin_sensitive)
+      msleep(85);
+  
-    snd_hda_codec_write(codec, hp_pin, 0,
-    -      AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+    if (!spec->no_shutup_pins)
+      snd_hda_codec_write(codec, hp_pin, 0,
+        +      AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);

  if (hp_pin_sensitive)
    msleep(100);

  alc_auto_setup_eapd(codec, false);
-  snd_hda_shutup_pins(codec);
+  alc_shutup_pins(codec);
+\}
+static void alc294_hp_init(struct hda_codec *codec) +{
+struct alc_spec *spec = codec->spec;
+hda_nid_t hp_pin = alc_get_hp_pin(spec);
+int i, val;
+
+if (!spec->gen.autocfg.hp_outs && spec->gen.suppress_auto_mute) {
+if (spec->gen.autocfg.line_out_type == AC_JACK_HP_OUT)
+hp_pin = spec->gen.autocfg.line_out_pins[0];
+}
+
+if (!hp_pin)
+return;
+
+snd_hda_codec_write(codec, hp_pin, 0,
+ AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_MUTE);
+
+msleep(100);
+
+snd_hda_codec_write(codec, hp_pin, 0,
+ AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+
+alc_update_coef_idx(codec, 0x6f, 0x000f, 0); /* Set HP depop to manual mode */
+alc_update_coefex_idx(codec, 0x58, 0x00, 0x8000, 0x8000); /* HP depop procedure start */
+
+/* Wait for depop procedure finish */
+val = alc_read_coefex_idx(codec, 0x58, 0x01);
+for (i = 0; i < 20 && val & 0x0080; i++) {
+msleep(50);
+val = alc_read_coefex_idx(codec, 0x58, 0x01);
+}
+/* Set HP depop to auto mode */
+alc_update_coef_idx(codec, 0x6f, 0x000f, 0x000b);
+msleep(50);
+
+}
+
+static void alc294_init(struct hda_codec *codec) +{
+struct alc_spec *spec = codec->spec;
+
+/* required only at boot or S4 resume time */
+if (!spec->done_hp_init ||
+ codec->core.dev.power.power_state.event == PM_EVENT_RESTORE) {
+alc294_hp_init(codec);
+spec->done_hp_init = true;
+}
+alc_default_init(codec);
}
static void alc5505_coef_set(struct hda_codec *codec, unsigned int index_reg, 
@@ -3376,6 +3717,19 @@
  spec->parse_flags = HDA_PINCFG_NO_HP_FIXUP;
 }

+static void alc269_fixup_pincfg_U7x7_headset_mic(struct hda_codec *codec, 
+  const struct hda_fixup *fix,
+  int action)
+{
+  unsigned int cfg_headphone = snd_hda_codec_get_pincfg(codec, 0x21);
+  unsigned int cfg_headset_mic = snd_hda_codec_get_pincfg(codec, 0x19);
+  
+  +if (cfg_headphone &\& cfg_headset_mic == 0x411111f0)
+    +snd_hda_codec_set_pincfg(codec, 0x19,
+      +(cfg_headphone & ~AC_DEFCFG_DEVICE) | 
+      +(AC_JACK_MIC_IN << AC_DEFCFGDEVICE_SHIFT));
  +}

+static void alc269_fixup_hp_mute_led_mic3(struct hda_codec *codec, 
+  const struct hda_fixup *fix, int action)
+
{
  /* temporarily power up/down for setting VREF */
  +snd_hda_power_up_pm(codec);
  +snd_hda_set_pin_ctl_cache(codec, spec->mute_led_nid, pinval);
  +snd_hda_power_down_pm(codec);
  +}

/* Make sure the led works even in runtime suspend */
@@ -3569,6 +3927,19 @@
  }

+static void alc269_fixup_hp_mute_led_mic3(struct hda_codec *codec, 
+  const struct hda_fixup *fix, int action)
+{
+  +struct alc_spec *spec = codec->spec;
+  +if (action == HDA_FIXUP_ACT_PRE_PROBE) {
+      +spec->mute_led_polarity = 0;
+      +spec->mute_led_nid = 0x1b;
+      +spec->gen.vmaster_mute.hook = alc269_fixupMic_mute_hook;

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+spec->gen.vmaster_mute_enum = 1;
+codec->power_filter = led_power_filter;
+}
+}
+
/* update LED status via GPIO */
static void alc_update_gpio_led(struct hda_codec *codec, unsigned int mask,
  bool enabled)
@@ -3723,6 +4094,7 @@
}
}
+
#endif /* IS_REACHABLE(CONFIG_INPUT) */
static void gpio2_mic_hotkey_event(struct hda_codec *codec,
  struct hda_jack_callback *event)
@@ -3855,6 +4227,10 @@
spec->kb_dev = NULL;
}
}
#endif /* INPUT */
#define alc280_fixup_hp_gpio2_mic_hotkey NULL
#define alc233_fixup_lenovo_line2_mic_hotkey NULL
+#endif /* INPUT */

static void alc269_fixup_hp_line1_mic1_led(struct hda_codec *codec,
  const struct hda_fixup *fix, int action)
@@ -3886,18 +4262,19 @@
static void alc_headset_mode_unplugged(struct hda_codec *codec)
{
  static struct coef_fw coef0255[] = {
+WRITE_COEF(0x1b, 0x0c0b), /* LDO and MISC control */
  WRITE_COEF(0x45, 0xd089), /* UAJ function set to manual mode */
  UPDATE_COEFEX(0x57, 0x05, 1<<14, 0), /* Direct Drive HP Amp control(Set to verb control)*/
  WRITE_COEF(0x06, 0x6104), /* Set MIC2 Vref gate with HP */
  WRITE_COEFEX(0x57, 0x03, 0x09a3), /* Direct Drive HP Amp control */
  UPDATE_COEFEX(0x57, 0x05, 1<<14, 0), /* Direct Drive HP Amp control(Set to verb control)*/
  
-];
-};
+static struct coef_fw coef0255_1[] = {
+WRITE_COEF(0x1b, 0x0c0b), /* LDO and MISC control */
  
-};
-};
+static struct coef_fw coef0256[] = {
  WRITE_COEF(0x1b, 0x0c4b), /* LDO and MISC control */
+WRITE_COEF(0x45, 0xd089), /* UAJ function set to manual mode */
  +WRITE_COEF(0x06, 0x6104), /* Set MIC2 Vref gate with HP */
  +WRITE_COEFEX(0x57, 0x03, 0x09a3), /* Direct Drive HP Amp control */
  +UPDATE_COEFEX(0x57, 0x05, 1<<14, 0), /* Direct Drive HP Amp control(Set to verb control)*/
  

static struct coef_fw coef0233[] = {
    0x35, 0, 1<<14,
    0x06, 0x2100,
};

switch (codec->core.vendor_id) {
    case 0x10ec0255:
        alc_process_coef_fw(codec, coef0255_1);
        alc_process_coef_fw(codec, coef0255);
        break;
    case 0x10ec0236:
        alc_process_coef_fw(codec, coef0256);
        break;
    case 0x10ec0256:
        alc_process_coef_fw(codec, coef0256);
        break;
    case 0x10ec0234:
        alc_process_coef_fw(codec, alc225_pre_hsmode);
        alc_process_coef_fw(codec, coef0225);
        break;
    case 0x10ec0867:
        WRITE_COEF(0x06, 0x6100), /* Set MIC2 Vref gate to normal */
        {};
    +case 0x10ec0215:
        case 0x10ec0225:
        +case 0x10ec0285:
            case 0x10ec0295:
                case 0x10ec0289:
                    +case 0x10ec0299:
                        +alc_process_coef_fw(codec, alc225_pre_hsmode);
                        alc_process_coef_fw(codec, coef0225);
                        break;
        case 0x10ec0867:
            @ @ -4015,6 +4394,12 @ @
        WRITE_COEF(0x06, 0x6100), /* Set MIC2 Vref gate to normal */
        {};
    +static struct coef_fw coef0256[] = {
        +UPDATE_COEFEX(0x57, 0x05, 1<<14, 1<<14), /* Direct Drive HP Amp control(Set to verb control)*/
        +WRITE_COEFEX(0x57, 0x03, 0x09a3),
        +WRITE_COEF(0x06, 0x6100), /* Set MIC2 Vref gate to normal */
        +{};
    +};
    static struct coef_fw coef0233[] = {
        UPDATE_COEF(0x35, 0, 1<<14),
        WRITE_COEF(0x06, 0x2100),
        @ @ -4062,14 +4447,19 @ @
    };
};

switch (codec->core.vendor_id) {
-case 0x10ec0236:
case 0x10ec0255:
-alc_write_coef_idx(codec, 0x45, 0xc489);
snd_hda_set_pin_ctl_cache(codec, hp_pin, 0);
alc_process_coef_fw(codec, coef0255);
snd_hda_set_pin_ctl_cache(codec, mic_pin, PIN_VREF50);
break;
+case 0x10ec0236:
+case 0x10ec0256:
+alc_write_coef_idx(codec, 0x45, 0xc489);
+snd_hda_set_pin_ctl_cache(codec, hp_pin, 0);
+alc_process_coef_fw(codec, coef0256);
+snd_hda_set_pin_ctl_cache(codec, mic_pin, PIN_VREF50);
+break;
case 0x10ec0234:
case 0x10ec0274:
case 0x10ec0294:
@@ -4117,8 +4507,11 @@
alc_process_coef_fw(codec, coef0688);
snd_hda_set_pin_ctl_cache(codec, mic_pin, PIN_VREF50);
break;
+case 0x10ec0215:
case 0x10ec0225:
+case 0x10ec0285:
case 0x10ec0295:
+case 0x10ec0289:
case 0x10ec0299:
alc_process_coef_fw(codec, alc225_pre_hsmode);
alc_update_coef_idx(codec, 0x45, 0x3f<<10, 0x31<<10);
@@ -4148,6 +4541,14 @@
WRITE_COEF(0x49, 0x0049),
{};
+static struct coef_fw coef0256[] = {
+WRITE_COEF(0x45, 0xc489),
+WRITE_COEFE(0x57, 0x05, 1<<14, 0), /* Direct Drive HP Amp control(Set to verb control)*/
+WRITE_COEF(0x06, 0x6100),
+{};
};
static struct coef_fw coef0233[] = {
WRITE_COEF(0x06, 0x2100),
WRITE_COEF(0x32, 0x4ea3),
@@ -4189,17 +4590,25 @@

switch (codec->core.vendor_id) {
+case 0x10ec0215:
+case 0x10ec0225:
+case 0x10ec0285:
+case 0x10ec0295:
+case 0x10ec0289:
+case 0x10ec0299:
alc_process_coef_fw(codec, alc225_pre_hsmode);
alc_process_coef_fw(codec, coef0225);
break;
-\tcase 0x10ec0236:
-\tcase 0!xec0255:
-\tcase 0x10ec0256:
alc_process_coef_fw(codec, coef0255);
break;
+\tcase 0x10ec0236:
+\tcase 0x10ec0256:
+\t\talc_write_coef_idx(codec, 0x1b, 0x0e4b);
+\t\talc_write_coef_idx(codec, 0x45, 0xc089);
+\t\tmsleep(50);
+\t\talc_process_coef_fw(codec, coef0256);
+\tbreak;
\tcase 0x10ec0234:
\tcase 0x10ec0274:
\tcase 0x10ec0294:
\tcase 0x10ec0299:
@@ -4243,8 +4652,7 @@
\}\nstatic struct coef_fw coef0256[] = {
WRITE_COEF(0x45, 0xd489), /* Set to CTIA type */
-\tWRITE_COEF(0x1b, 0xo4b),
-\tWRITE_COEF(0x45, 0xc089);
+WRITE_COEF(0x1b, 0x0e4b),
\t{};
\nstatic struct coef_fw coef0233[] = {
@@ -4332,8 +4740,11 @@
\tcase 0x10ec0668:
alc_process_coef_fw(codec, coef0688);
break;
+\tcase 0x10ec0215:
+\tcase 0x10ec0225:
+\tcase 0x10ec0285:
+\tcase 0x10ec0295:
+\tcase 0x10ec0289:
+\tcase 0x10ec0299:
\tval = alc_read_coef_idx(codec, 0x45);
\tif (val & (1 <<< 9))
@@ -4359,8 +4770,7 @@

static struct coef_fw coef0256[] = {
    WRITE_COEF(0x45, 0xe489), /* Set to OMTP Type */
    WRITE_COEF(0x1b, 0x0c6b),
    WRITE_COEFEX(0x57, 0x03, 0x8ea6),
    WRITE_COEF(0x1b, 0x0e6b),
};
static struct coef_fw coef0233[] = {
    case 0x10ec0668:
    alc_process_coef_fw(codec, coef0688);
    break;
    +case 0x10ec0215:
    case 0x10ec0225:
    +case 0x10ec0285:
    case 0x10ec0295:
    +case 0x10ec0289:
    case 0x10ec0299:
    alc_process_coef_fw(codec, coef0225);
    break;
    @ @ -4436,8 +4846,11 @ @
case 0x10ec0668:
    alc_process_coef_fw(codec, coef0688);
    break;
    +case 0x10ec0215:
    case 0x10ec0225:
    +case 0x10ec0285:
    case 0x10ec0295:
    +case 0x10ec0289:
    case 0x10ec0299:
    alc_process_coef_fw(codec, coef0225);
    break;
    @ @ -4489,19 +4902,43 @ @
};
switch (codec->core.vendor_id) {
    -case 0x10ec0236:
    case 0x10ec0255:
    +alc_process_coef_fw(codec, coef0255);
    +msleep(300);
    +val = alc_read_coef_idx(codec, 0x46);
    +is_ctia = (val & 0x0070) == 0x0070;
    +break;
    +case 0x10ec0236:
    case 0x10ec0256:
    +alc_write_coef_idx(codec, 0x1b, 0x0e4b);
    +alc_write_coef_idx(codec, 0x06, 0x6104);
    +alc_write_coefex_idx(codec, 0x57, 0x3, 0x09a3);
    +
    +snd_hda_codec_write(codec, 0x21, 0,
    +    AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_MUTE);
    +msleep(80);
    +snd_hda_codec_write(codec, 0x21, 0,
    +    AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
    +
    alc_process_coef_fw(codec, coef0255);
    msleep(300);
    val = alc_read_coef_idx(codec, 0x46);
    is_ctia = (val & 0x0070) == 0x0070;
    +
}
+ alc_write_coefex_idx(codec, 0x57, 0x3, 0x0da3);
+ alc_update_coefex_idx(codec, 0x57, 0x5, 1<<14, 0);
+
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0234);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, PIN_OUT);
+ msleep(80);
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0274);
+ AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_UNMUTE);
+ break;
+ case 0x10ec0294:
+ case 0x10ec0295:
+ case 0x10ec0289:
+ case 0x10ec0299:
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0215);
+ AC_VERB_SET_AMP_GAIN_MUTE, AMP_OUT_MUTE);
+ msleep(80);
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0225);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0285);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+ alc_process_coef_fw(codec, alc225_pre_hsmode);
+ alc_update_coef_idx(codec, 0x67, 0xf000, 0x1000);
+ val = alc_read_coef_idx(codec, 0x45);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, PIN_OUT);
+ msleep(80);
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0295);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+ alc_process_coef_fw(codec, alc225_pre_hsmode);
+ alc_update_coef_idx(codec, 0x67, 0xf000, 0x1000);
+ val = alc_read_coef_idx(codec, 0x45);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, PIN_OUT);
+ msleep(80);
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0295);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, 0x0);
+ alc_process_coef_fw(codec, alc225_pre_hsmode);
+ alc_update_coef_idx(codec, 0x67, 0xf000, 0x1000);
+ val = alc_read_coef_idx(codec, 0x45);
+ AC_VERB_SET_PIN_WIDGET_CONTROL, PIN_OUT);
+ msleep(80);
+ snd_hda_codec_write(codec, 0x21, 0, 0x10ec0295);
break;
case 0x10ec0867:
is_ctia = true;
@@ -4604,7 +5056,7 @@
struct alc_spec *spec = codec->spec;

hda_nid_t mux_pin = spec->gen.imux_pins[spec->gen.cur_mux[0]];
-hda_nid_t hp_pin = spec->gen.autocfg.hp_pins[0];
+hp_pin = alc_get_hp_pin(spec);

int new_headset_mode;
@@ -4670,6 +5122,7 @@
struct alc_spec *spec = codec->spec;
spec->current_headset_type = ALC_HEADSET_TYPE_UNKNOWN;
snd_hda_gen_hp_automute(codec, jack);
+alc_update_headset_mode(codec);
}

static void alc_probe_headset_mode(struct hda_codec *codec)
@@ -4805,16 +5258,12 @@
}

static void alc_no_shutup(struct hda_codec *codec)
-
-{
-
-}
-
-static void alc_fixup_no_shutup(struct hda_codec *codec,
const struct hda_fixup *fix, int action)
{
if (action == HDA_FIXUP_ACT_PROBE) {
 struct alc_spec *spec = codec->spec;
-spec->shutup = alc_no_shutup;
+spec->no_shutup_pins = 1;
}
}

@@ -4840,18 +5289,57 @@
struct alc_spec *spec = codec->spec;

if (action == HDA_FIXUP_ACT_PRE_PROBE) {
-spec->shutup = alc_no_shutup; /* reduce click noise */
-spec->reboot_notify = alc_d3_at_reboot; /* reduce noise */
+spec->reboot_notify = snd_hda_gen_reboot_notify; /* reduce noise */
-spec->parse_flags = HDA_PINCFG_NO_HP_FIXUP;
-codec->power_save_node = 0; /* avoid click noises */
 snd_hda_apply_pincfgs(codec, pincfgs);
+static void alc_fixup_tpt470_dock(struct hda_codec *codec,
+  const struct hda_fixup *fix, int action)
+{
+static const struct hda_pintbl pincfgs[] = {
+{ 0x17, 0x21211010 }, /* dock headphone */
+{ 0x19, 0x21a11010 }, /* dock mic */
+{ }
+};
+struct alc_spec *spec = codec->spec;
+
+if (action == HDA_FIXUP_ACT_PRE_PROBE) {
+spec->parse_flags = HDA_PINCFG_NO_HP_FIXUP;
+snd_hda_apply_pincfgs(codec, pincfgs);
+} else if (action == HDA_FIXUP_ACT_INIT) {
+/* Enable DOCK device */
+snd_hda_codec_write(codec, 0x17, 0,
+    AC_VERB_SET_CONFIG_DEFAULT_BYTES_3, 0);
+/* Enable DOCK device */
+snd_hda_codec_write(codec, 0x19, 0,
+    AC_VERB_SET_CONFIG_DEFAULT_BYTES_3, 0);
+}
+
+static void alc_fixup_tpt470_dacs(struct hda_codec *codec,
+  const struct hda_fixup *fix, int action)
+{
+/* Assure the speaker pin to be coupled with DAC NID 0x03; otherwise
+ * the speaker output becomes too low by some reason on Thinkpads with
+ * ALC298 codec
+ */
+static hda_nid_t preferred_pairs[] = {
+0x14, 0x03, 0x17, 0x02, 0x21, 0x02,
+0
+};
+struct alc_spec *spec = codec->spec;
+
+if (action == HDA_FIXUP_ACT_PRE_PROBE)
+spec->gen.preferred_dacs = preferred_pairs;
+}
+
+static hda_nid_t preferred_pairs[] = {
+0x14, 0x03, 0x17, 0x02, 0x21, 0x02,
+0
+};
+struct alc_spec *spec = codec->spec;
+
+if (action == HDA_FIXUP_ACT_PRE_PROBE)
+spec->gen.preferred_dacs = preferred_pairs;
+}
+
+static void alc_shutup_dell_xps13(struct hda_codec *codec)
+{
+struct alc_spec *spec = codec->spec;
+int hp_pin = spec->gen.autocfg.hp_pins[0];
+int hp_pin = alc_get_hp_pin(spec);
/* Prevent pop noises when headphones are plugged in */
snd_hda_codec_write(codec, hp_pin, 0,
@@ -4945,7 +5433,7 @@
if (action == HDA_FIXUP_ACT_PROBE) {
    int mic_pin = find_ext_mic_pin(codec);
    -int hp_pin = spec->gen.autocfg.hp_pins[0];
+int hp_pin = alc_get_hp_pin(spec);

    if (snd_BUG_ON(!mic_pin || !hp_pin))
        return;
@@ -5114,6 +5602,26 @@
} }

+/* disable DAC3 (0x06) selection on NID 0x17 as it has no volume amp control */
+static void alc295_fixup_disable_dac3(struct hda_codec *codec,
+    const struct hda_fixup *fix, int action)
+{ }
+if (action == HDA_FIXUP_ACT_PRE_PROBE) {
+    hda_nid_t conn[2] = { 0x02, 0x03 }; }
+    snd_hda_override_conn_list(codec, 0x17, 2, conn);
+} +}
+
+/* force NID 0x17 (Bass Speaker) to DAC1 to share it with the main speaker */
+static void alc285_fixup_speaker2_to_dac1(struct hda_codec *codec,
+    const struct hda_fixup *fix, int action)
+{ }
+if (action == HDA_FIXUP_ACT_PRE_PROBE) {
+    hda_nid_t conn[1] = { 0x02 };
+    snd_hda_override_conn_list(codec, 0x17, 1, conn);
+} +}
+
+/* Hook to update amp GPIO4 for automute */
static void alc280_hp_gpio4_automute_hook(struct hda_codec *codec,
    struct hda_jack_callback *jack)
@@ -5187,6 +5695,15 @@
} }

+static void alc225_fixup_s3_pop_noise(struct hda_codec *codec,
+    const struct hda_fixup *fix, int action)
+{ }
+if (action != HDA_FIXUP_ACT_PRE_PROBE)
+return;
+codec->power_save_node = 1;
+
+ /* Forcibly assign NID 0x03 to HP/LO while NID 0x02 to SPK for EQ */
static void alc274_fixup_bind_dacs(struct hda_codec *codec,
    const struct hda_fixup *fix, int action)
@@ -5201,11 +5718,37 @@
    return;

    spec->gen.preferred_dacs = preferred_pairs;
+    spec->gen.auto_mute_via_amp = 1;
+    codec->power_save_node = 0;
+    }
+
+    /* The DAC of NID 0x3 will introduce click/pop noise on headphones, so invalidate it */
+static void alc285_fixup_invalidate_dacs(struct hda_codec *codec,
+    const struct hda_fixup *fix, int action)
+{
+    if (action != HDA_FIXUP_ACT_PRE_PROBE)
+        return;
+
+    snd_hda_override_wcaps(codec, 0x03, 0);
+    }
+
+static void alc_fixup_disable_mic_vref(struct hda_codec *codec,
+    const struct hda_fixup *fix, int action)
+{
+    if (action == HDA_FIXUP_ACT_PRE_PROBE)
+        snd_hda_codec_set_pin_target(codec, 0x19, PIN_VREFHIZ);
+    }
}
/* for hda_fixup_thinkpad_acpi() */
#include "thinkpad_helper.c"

+static void alc_fixup_thinkpad_acpi(struct hda_codec *codec,
+    const struct hda_fixup *fix, int action)
+{
+    alc_fixup_no_shutup(codec, fix, action); /* reduce click noise */
+    hda_fixup_thinkpad_acpi(codec, fix, action);
+    }
+
+ /* for dell wmi mic mute led */
#include "dell_wmi_helper.c"

@@ -5227,6 +5770,7 @@
 ALC269_FIXUP_LIFEBOOK_EXTMIC,
 ALC269_FIXUP_LIFEBOOK_HP_PIN,
ALC269_FIXUP_LIFEBOOK_NO_HP_TO_LINEOUT,
+ALC255_FIXUP_LIFEBOOK_U7x7_HEADSET_MIC,
ALC269_FIXUP_AMIC,
ALC269_FIXUP_DMIC,
ALC269VB_FIXUP_AMIC,
@@ -5234,11 +5778,13 @@
ALC269_FIXUP_HP_MUTE_LED,
ALC269_FIXUP_HP_MUTE_LED_MIC1,
ALC269_FIXUP_HP_MUTE_LED_MIC2,
+ALC269_FIXUP_HP_MUTE_LED_MIC3,
ALC269_FIXUP_HP_GPIO_LED,
ALC269_FIXUP_HP_GPIO_MIC1_LED,
ALC269_FIXUP_HP_LINE1_MIC1_LED,
ALC269_FIXUP_INV_DMIC,
ALC269_FIXUP_LENOVO_DOCK,
+ALC269_FIXUP_LENOVO_DOCK_LIMIT_BOOST,
ALC269_FIXUP_NO_SHUTUP,
ALC286_FIXUP_SONY_MIC_NO_PRESENCE,
ALC269_FIXUP_PINCFG_NO_HP_TO_LINEOUT,
@@ -5300,15 +5846,18 @@
ALC298_FIXUP_DELL1_MIC_NO_PRESENCE,
ALC298_FIXUP_DELL_AIO_MIC_NO_PRESENCE,
ALC275_FIXUP_DELL_XPS,
-ALC256_FIXUP_DELL_XPS_13_HEADPHONE_NOISE,
ALC293_FIXUP_LENOVO_SPK_NOISE,
ALC233_FIXUP_LENOVO_LINE2_MIC_HOTKEY,
ALC255_FIXUP_DELL_SPK_NOISE,
+ALC225_FIXUP_DISABLE_MIC_VREF,
ALC225_FIXUP_DELL1_MIC_NO_PRESENCE,
+ALC295_FIXUP_DISABLE_DAC3,
+ALC285_FIXUP_SPEAKER2_TO_DAC1,
ALC280_FIXUP_HP_HEADSET_MIC,
ALC221_FIXUP_HP_FRONT_MIC,
ALC292_FIXUP_TPT460,
ALC298_FIXUP_SPK_VOLUME,
+ALC298_FIXUP_LENOVO_SPK_VOLUME,
ALC256_FIXUP_DELL_INSPIRON_7559_SUBWOOFER,
ALC269_FIXUP_ATIV_BOOK_8,
ALC221_FIXUP_HP_MIC_NO_PRESENCE,
@@ -5319,9 +5868,33 @@
ALC233_FIXUP_EAPD_COEF_AND_MIC_NO_PRESENCE,
ALC233_FIXUP_LENOVO_MULTI_CODECS,
ALC294_FIXUP_LENOVO_MIC_LOCATION,
+ALC225_FIXUP_DELL_WYSE_MIC_NO_PRESENCE,
+ALC225_FIXUP_S3_POP_NOISE,
ALC700_FIXUP_INTEL_REFERENCE,
ALC274_FIXUP_DELL_BIND_DACS,
ALC274_FIXUP_DELL_AIO_LINEOUT_VERB,
+ALC298_FIXUP_TPT470_DOCK_FIX,
+ALC298_FIXUP_TPT470_DOCK,
+ALC255_FIXUP_DUMMY_LINEOUT_VERB,
+ALC255_FIXUP_DELL_HEADSET_MIC,
+ALC256_FIXUP_HUAWEI_MBPX_PINS,
+ALC221_FIXUP_HP_HEADSET_MIC,
+ALC285_FIXUP_LENOVO_HEADPHONE_NOISE,
+ALC286_FIXUP_ACER_AIO_MIC_NO_PRESENCE,
+ALC285_FIXUP_LENOVO_PC_BEEP_IN_NOISE,
+ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE,
+ALC294_FIXUP_ASUS_MIC,
+ALC294_FIXUP_ASUS_HEADSET_MIC,
+ALC294_FIXUP_ASUS_SPK,
+ALC225_FIXUP_DELL_WYSE_AIO_MIC_NO_PRESENCE,
+ALC225_FIXUP_WYSE_AUTO_MUTE,
+ALC225_FIXUP_WYSE_DISABLE_MIC_VREF,
+ALC286_FIXUP_ACER_AIO_HEADSET_MIC,
+ALC256_FIXUP_ASUS_HEADSET_MIC,
+ALC256_FIXUP_ASUS_MIC_NO_PRESENCE,
+ALC299_FIXUP_PREDATOR_SPK,
+ALC294_FIXUP_ASUS_INTSPK_HEADSET_MIC,
+ALC256_FIXUP_MEDION_HEADSET_NO_PRESENCE,
};

static const struct hda_fixup alc269_fixups[] = {
  @ @ -5432,6 +6005,10 @ @
  .type = HDA_FIXUP_FUNC,
  .v.func = alc269_fixup_pincfg_no_hp_to_lineout,
},
+[ALC255_FIXUP_LIFEBOOK_U7x7_HEADSET_MIC] = {
  +.type = HDA_FIXUP_FUNC,
  +.v.func = alc269_fixup_pincfg_U7x7_headset_mic,
  +}

[ALC269_FIXUP_AMIC] = {
  .type = HDA_FIXUP_PINS,
  .v.pins = (const struct hda_pintbl[]) {
    @ @ -5484,6 +6061,10 @ @
    .type = HDA_FIXUP_FUNC,
    .v.func = alc269_fixup_hp_mute_led_mic2,
  },
+[ALC269_FIXUP_HP_MUTE_LED_MIC3] = {
  +.type = HDA_FIXUP_FUNC,
  +.v.func = alc269_fixup_hp_mute_led_mic3,
  +}

[ALC269_FIXUP_HP_GPIO_LED] = {
  .type = HDA_FIXUP_FUNC,
  .v.func = alc269_fixup_hp_gpio_led,
  @ @ -5514,6 +6095,12 @ @
.chained = true,
.chain_id = ALC269_FIXUP_PINCFG_NO_HP_TO_LINEOUT
},
+[ALC269_FIXUP_LENOVO_DOCK_LIMIT_BOOST] = {
+ type = HDA_FIXUP_FUNC,
+ v.func = alc269_fixup_limit_int_mic_boost,
+ chained = true,
+ chain_id = ALC269_FIXUP_LENOVO_DOCK,
+},
[ALC269_FIXUP_PINCFG_NO_HP_TO_LINEOUT] = {
.type = HDA_FIXUP_FUNC,
.v.func = alc269_fixup_pincfg_no_hp_to_lineout,
@@ -5588,6 +6175,22 @@
.chained = true,
.chain_id = ALC269_FIXUP_HEADSET_MIC
},
+[ALC256_FIXUP_HUAWEI_MBPX_PINS] = {
+ type = HDA_FIXUP_PINS,
+ v.pins = (const struct hda_pintbl[]) {
++ {0x12, 0x90a60130},
++ {0x13, 0x40000000},
++ {0x14, 0x90170110},
++ {0x18, 0x411111f0},
++ {0x19, 0x04a11040},
++ {0x1a, 0x411111f0},
++ {0x1b, 0x90170112},
++ {0x1d, 0x40759a05},
++ {0x1e, 0x411111f0},
++ {0x21, 0x04211020},
++ }
++ },
++ },
+[ALC269_FIXUP_ASUS_X101_FUNC] = {
+ type = HDA_FIXUP_FUNC,
+ v.func = alc269_fixup_x101_headset_mic,
@@ -5739,7 +6342,7 @@
},
[ALC269_FIXUP_THINKPAD_ACPI] = {
+ type = HDA_FIXUP_FUNC,
- v.func = hda_fixup_thinkpad_acpi,
+ v.func = alc_fixup_thinkpad_acpi,
+ chained = true,
+ chain_id = ALC269_FIXUP_SKU_IGNORE,
},
@@ -5969,17 +6572,6 @@
{ }
}
-[ALC256_FIXUP_DELL_XPS_13_HEADPHONE_NOISE] = {
    .type = HDA_FIXUP_VERBS,
    .v.verbs = (const struct hda_verb[]) {
        /* Disable pass-through path for FRONT 14h */
        {-0x20, AC_VERB_SET_COEF_INDEX, 0x36},
        {-0x20, AC_VERB_SET_PROC_COEF, 0x1737},
        -{} }
    },
    chained = true,
    chain_id = ALC255_FIXUP_DELL1_MIC_NO_PRESENCE
},
[ALC293_FIXUP_LENOVO_SPK_NOISE] = {
    .type = HDA_FIXUP_FUNC,
    .v.func = alc_fixup_disable_aamix,
    @ @ -5996.6 +6588.12 @ @
    chained = true,
    chain_id = ALC255_FIXUP_DELL1_MIC_NO_PRESENCE
},
+[ALC225_FIXUP_DISABLE_MIC_VREF] = {
    .type = HDA_FIXUP_FUNC,
    .v.func = alc_fixup_disable_mic_vref,
    chained = true,
    chain_id = ALC269_FIXUP_DELL1_MIC_NO_PRESENCE
},
[ALC225_FIXUP_DELL1_MIC_NO_PRESENCE] = {
    .type = HDA_FIXUP_VERBS,
    .v.verbs = (const struct hda_verb[]) {
        @ @ -6005.7 +6603.7 @ @
    },
    chained = true,
    chain_id = ALC269_FIXUP_DELL1_MIC_NO_PRESENCE
},
+[ALC280_FIXUP_HP_HEADSET_MIC] = {
    .type = HDA_FIXUP_FUNC,
    @ @ -6032.6 +6630.20 @ @
    chained = true,
    chain_id = ALC298_FIXUP_DELL_AIO_MIC_NO_PRESENCE,
},
+[ALC298_FIXUP_LENNOVO_SPK_VOLUME] = {
    .type = HDA_FIXUP_FUNC,
    .v.func = alc298_fixup_speaker_volume,
    },
+[ALC295_FIXUP_DISABLE_DAC3] = {
    .type = HDA_FIXUP_FUNC,
    .v.func = alc295_fixup_disable_dac3,
    },
+[ALC285_FIXUP_SPEAKER2_TO_DAC1] = {
.type = HDA_FIXUP_FUNC,
.v.func = alc285_fixup_speaker2_to_dac1,
.chained = true,
.chain_id = ALC269_FIXUP_THINKPAD_ACPI
+},
[ALC256_FIXUP_DELL_INSPIRON_7559_SUBWOOFER] = {
.type = HDA_FIXUP_PINS,
.v.pins = (const struct hda_pintbl[])
@@ -6117,6 +6729,24 @@
},
},
+[ALC225_FIXUP_DELL_WYSE_MIC_NO_PRESENCE] = {
.type = HDA_FIXUP_PINS,
.v.pins = (const struct hda_pintbl[])
+{ 0x16, 0x0101102f }, /* Rear Headset HP */
+{ 0x19, 0x02a1913c }, /* use as Front headset mic, without its own jack detect */
+{ 0x1a, 0x01a19030 }, /* Rear Headset MIC */
+{ 0x1b, 0x02011020 },
+} +]
+, chained = true,
.chain_id = ALC225_FIXUP_S3_POP_NOISE
+],
+[ALC225_FIXUP_S3_POP_NOISE] = {
.type = HDA_FIXUP_FUNC,
.v.func = alc225_fixup_s3_pop_noise,
.chained = true,
.chain_id = ALC269_FIXUP_HEADSET_MODE_NO_HP_MIC
+],
[ALC700_FIXUP_INTEL_REFERENCE] = {
.type = HDA_FIXUP_VERBS,
.v.verbs = (const struct hda_verb[])
@@ -6147,6 +6777,189 @@
.chained = true,
.chain_id = ALC274_FIXUP_DELL_BIND_DACS
},
+[ALC298_FIXUP_TPT470_DOCK_FIX] = {
.type = HDA_FIXUP_FUNC,
.v.func = alc_fixup_tpt470_dock,
.chained = true,
.chain_id = ALC293_FIXUP_LENOVO_SPK_NOISE
+],
+[ALC298_FIXUP_TPT470_DOCK] = {
.type = HDA_FIXUP_FUNC,
.v.func = alc_fixup_tpt470_dacs,
.chained = true,
`.chain_id = ALC298_FIXUP_TPT470_DOCK_FIX`
+
`+[ALC255_FIXUP_DUMMY_LINEOUT_VERB] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x14, 0x0201101f },
+  }
+},
+.chained = true,
+.chain_id = ALC255_FIXUP_DELL1_MIC_NO_PRESENCE`
+
`+[ALC255_FIXUP_DELL_HEADSET_MIC] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x19, 0x01a1913c }, /* use as headset mic, without its own jack detect */
+  }
+},
+.chained = true,
+.chain_id = ALC269_FIXUP_HEADSET_MIC`
+
`+[ALC221_FIXUP_HP_HEADSET_MIC] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x19, 0x0181313f },
+  }
+},
+.chained = true,
+.chain_id = ALC269_FIXUP_HEADSET_MIC`
+
`+[ALC285_FIXUP_LENOVO_HEADPHONE_NOISE] = {
+  .type = HDA_FIXUP_FUNC,
+  .v.func = alc285_fixup_invalidate_dacs,
+  .chained = true,
+  .chain_id = ALC269_FIXUP_THINKPAD_ACPI`
+
`+[ALC285_FIXUP_LENOVO_PC_BEEP_IN_NOISE] = {
+  .type = HDA_FIXUP_VERBS,
+  .v.verbs = (const struct hda_verb[]) {
+    /* Disable PCBEEP-IN passthrough */
+    { 0x20, AC_VERB_SET_COEF_INDEX, 0x36 },
+    { 0x20, AC_VERB_SET_PROC_COEF, 0x57d7 },
+  }
+},
+.chained = true,
+.chain_id = ALC285_FIXUP_LENOVO_HEADPHONE_NOISE`
+
`+[ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE] = {
+  .type = HDA_FIXUP_PINS,
+=v.pins = (const struct hda_pintbl[]) {
+  { 0x1a, 0x01a1913c }, /* use as headset mic, without its own jack detect */
+  { }  
+}.
+.chained = true,
+.chain_id = ALC269_FIXUP_HEADSET_MODE_NO_HP_MIC 
+}.
+[ALC225_FIXUP_DELT_WYSE_AIO_MIC_NO_PRESENCE] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x16, 0x01011020 }, /* Rear Line out */
+    { 0x19, 0x01a1913c }, /* use as Front headset mic, without its own jack detect */
+    { }  
+  }.
+  .chained = true,
+  .chain_id = ALC225_FIXUP_WYSE_AUTO_MUTE 
+}.
+[ALC225_FIXUP_WYSE_AUTO_MUTE] = {
+  .type = HDA_FIXUP_FUNC,
+  .v.func = alc_fixup_auto_mute_via_amp,
+  .chained = true,
+  .chain_id = ALC225_FIXUP_WYSE_DISABLE_MIC_VREF 
+}.
+[ALC225_FIXUP_WYSE_DISABLE_MIC_VREF] = {
+  .type = HDA_FIXUP_FUNC,
+  .v.func = alc_fixup_disable_mic_vref,
+  .chained = true,
+  .chain_id = ALC269_FIXUP_HEADSET_MODE_NO_HP_MIC 
+}.
+[ALC286_FIXUP_ACER_AIO_MIC_NO_PRESENCE] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x18, 0x01a1913c }, /* use as headset mic, without its own jack detect */
+    { }  
+  }.
+  .chained = true,
+  .chain_id = ALC269_FIXUP_HEADSET_MIC 
+}.
+[ALC294_FIXUP_ASUS_MIC] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x13, 0x90a60160 }, /* use as internal mic */
+    { 0x19, 0x04a11120 }, /* use as headset mic, without its own jack detect */
+    { }  
+  }.
+  .chained = true,
+  .chain_id = ALC269_FIXUP_HEADSET_MIC 
+}.
+[ALC294_FIXUP_ASUS_HEADSET_MIC] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x19, 0x01a1103c }, /* use as headset mic */
+    {}
+  },
+  .chained = true,
+  .chain_id = ALC269_FIXUP_HEADSET_MIC
+},
+[ALC294_FIXUP_ASUS_SPK] = {
+  .type = HDA_FIXUP_VERBS,
+  .v.verbs = (const struct hda_verb[]) {
+    /* Set EAPD high */
+    { 0x20, AC_VERB_SET_COEF_INDEX, 0x40 },
+    { 0x20, AC_VERB_SET_PROC_COEF, 0x8800 },
+    { 0x20, AC_VERB_SET_COEF_INDEX, 0x0f },
+    { 0x20, AC_VERB_SET_PROC_COEF, 0x7774 },
+  }
+},
+  .chained = true,
+  .chain_id = ALC294_FIXUP_ASUS_HEADSET_MIC
+},
+[ALC286_FIXUP_ACER_AIO_HEADSET_MIC] = {
+  .type = HDA_FIXUP_VERBS,
+  .v.verbs = (const struct hda_verb[]) {
+    { 0x20, AC_VERB_SET_COEF_INDEX, 0x4f },
+    { 0x20, AC_VERB_SET_PROC_COEF, 0x5029 },
+  }
+},
+  .chained = true,
+  .chain_id = ALC286_FIXUP_ACER_AIO_MIC_NO_PRESENCE
+},
+[ALC256_FIXUP_ASUS_HEADSET_MIC] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x19, 0x03a11020 }, /* headset mic with jack detect */
+    {}
+  },
+  .chained = true,
+  .chain_id = ALC256_FIXUP_ASUS_HEADSET_MODE
+},
+[ALC256_FIXUP_ASUS_MIC_NO_PRESENCE] = {
+  .type = HDA_FIXUP_PINS,
+  .v.pins = (const struct hda_pintbl[]) {
+    { 0x19, 0x03a11020 }, /* use as headset mic, without its own jack detect */
+    {}
+  },
+  .chained = true,
+chain_id = ALC256_FIXUP_ASUS_HEADSET_MODE +, +[ALC299_FIXUP_PREDATOR_SPK] = { +.type = HDA_FIXUP_PINS, +.v.pins = (const struct hda_pintbl[]) { +{ 0x21, 0x90170150 }, /* use as headset mic, without its own jack detect */ +{ } +}, +[ALC294_FIXUP_ASUS_INTSPK_HEADSET_MIC] = { +.type = HDA_FIXUP_PINS, +.v.pins = (const struct hda_pintbl[]) { +{ 0x14, 0x411111f0 }, /* disable confusing internal speaker */ +{ 0x19, 0x04a11150 }, /* use as headset mic, without its own jack detect */ +{ } +}, + chained = true, +chain_id = ALC269_FIXUP_HEADSET_MODE_NO_HP_MIC +}, +[ALC256_FIXUP_MEDION_HEADSET_NO_PRESENCE] = { +.type = HDA_FIXUP_PINS, +.v.pins = (const struct hda_pintbl[]) { +{ 0x19, 0x04a11040 }, +{ 0x21, 0x04211020 }, +{ } +}, + chained = true, +chain_id = ALC256_FIXUP_ASUS_HEADSET_MODE +}, +};

static const struct snd_pci_quirk alc269_fixup_tbl[] = {
  SND_PCI_QUIRK(0x1025, 0x0762, "Acer Aspire E1-472", ALC271_FIXUP_HP_GATE_MIC_JACK_E1_572),
  SND_PCI_QUIRK(0x1025, 0x0775, "Acer Aspire E1-572", ALC271_FIXUP_HP_GATE_MIC_JACK_E1_572),
  SND_PCI_QUIRK(0x1025, 0x079b, "Acer Aspire V5-573G", ALC282_FIXUP_ASPIRE_V5_PINS),
  SND_PCI_QUIRK(0x1025, 0x102b, "Acer Aspire C24-860", ALC286_FIXUP_ACER_AIO_MIC_NO_PRESENCE),
  SND_PCI_QUIRK(0x1025, 0x106d, "Acer Cloudbook 14", ALC283_FIXUP_CHROME_BOOK),
  SND_PCI_QUIRK(0x1025, 0x1099, "Acer Aspire E5-523G", ALC255_FIXUP_ACER_MIC_NO_PRESENCE),
  SND_PCI_QUIRK(0x1025, 0x110e, "Acer Aspire ES1-432", ALC255_FIXUP_ACER_MIC_NO_PRESENCE),
  SND_PCI_QUIRK(0x1025, 0x1246, "Acer Predator Helios 500", ALC299_FIXUP_PREDATOR_SPK),
  SND_PCI_QUIRK(0x1025, 0x128f, "Acer Veriton Z6860G", ALC286_FIXUP_ACER_AIO_HEADSET_MIC),
  SND_PCI_QUIRK(0x1025, 0x1290, "Acer Veriton Z4860G", ALC286_FIXUP_ACER_AIO_HEADSET_MIC),
  SND_PCI_QUIRK(0x1025, 0x1291, "Acer Veriton Z4660G", ALC286_FIXUP_ACER_AIO_HEADSET_MIC),
  SND_PCI_QUIRK(0x1025, 0x1308, "Acer Aspire Z24-890", ALC286_FIXUP_ACER_AIO_HEADSET_MIC),
  SND_PCI_QUIRK(0x1028, 0x0470, "Dell M101z", ALC269_FIXUP_DELL_M101Z),
  SND_PCI_QUIRK(0x1028, 0x054b, "Dell XPS one 2710", ALC275_FIXUP_DELL_XPS),
};
SND_PCI_QUIRK(0x1028, 0x05bd, "Dell Latitude E6440", ALC292_FIXUP_DELL_E7X),
@@ -6190,47 +7011,41 @@
SND_PCI_QUIRK(0x1028, 0x06de, "Dell", ALC293_FIXUP_DISABLE_AAMIX_MULTIJACK),
SND_PCI_QUIRK(0x1028, 0x06df, "Dell", ALC293_FIXUP_DISABLE_AAMIX_MULTIJACK),
-SND_PCI_QUIRK(0x1028, 0x0704, "Dell XPS 13 9350", ALC256_FIXUP_DELL_XPS_13_HEADPHONE_NOISE),
SND_PCI_QUIRK(0x1028, 0x0706, "Dell Inspiron 7559", ALC256_FIXUP_DELL_INSPIRON_7559_SUBWOOFER),
-SND_PCI_QUIRK(0x1028, 0x0725, "Dell Inspiron 3162", ALC255_FIXUP_DELL_SPK_NOISE),
-SND_PCI_QUIRK(0x1028, 0x073b, "Dell XPS 13 9360", ALC256_FIXUP_DELL_XPS_13_HEADPHONE_NOISE),
+SND_PCI_QUIRK(0x1028, 0x0738, "Dell Precision 5820", ALC269_FIXUP_NO_SHUTUP),
+SND_PCI_QUIRK(0x1028, 0x075c, "Dell XPS 27 7760", ALC298_FIXUP_SPK_VOLUME),
SND_PCI_QUIRK(0x1028, 0x075d, "Dell AIO", ALC298_FIXUP_SPK_VOLUME),
SND_PCI_QUIRK(0x1028, 0x0798, "Dell Inspiron 17 7000 Gaming", ALC256_FIXUP_DELL_INSPIRON_7559_SUBWOOFER),
-SND_PCI_QUIRK(0x1028, 0x082a, "Dell XPS 13 9360", ALC256_FIXUP_DELL_XPS_13_HEADPHONE_NOISE),
+SND_PCI_QUIRK(0x1028, 0x080c, "Dell WYSE", ALC225_FIXUP_DELL_WYSE_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1028, 0x084b, "Dell", ALC274_FIXUP_DELL_AIO_LINEOUT_VERB),
+SND_PCI_QUIRK(0x1028, 0x0871, "Dell Precision 3630", ALC255_FIXUP_DELL_HEADSET_MIC),
+SND_PCI_QUIRK(0x1028, 0x0872, "Dell Precision 3630", ALC255_FIXUP_DELL_HEADSET_MIC),
+SND_PCI_QUIRK(0x1028, 0x0873, "Dell Precision 3930", ALC255_FIXUP_DUMMY_LINEOUT_VERB),
+SND_PCI_QUIRK(0x1028, 0x08ad, "Dell WYSE AIO", ALC225_FIXUP_DELL_WYSE_AIO_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1028, 0x08ae, "Dell WYSE NB", ALC225_FIXUP_DELL1_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1028, 0x0935, "Dell", ALC274_FIXUP_DELL_AIO_LINEOUT_VERB),
+SND_PCI_QUIRK(0x1028, 0x098d, "Dell Precision", ALC233_FIXUP_ASUS_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1028, 0x09bf, "Dell Precision", ALC233_FIXUP_ASUS_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1028, 0x164a, "Dell", ALC293_FIXUP_DELL1_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1028, 0x164b, "Dell", ALC293_FIXUP_DELL1_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x103c, 0x1586, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x15f6, "HP", ALC269_FIXUP_HP_GPIO1_LED),
SND_PCI_QUIRK(0x103c, 0x218b, "HP", ALC269_FIXUP_LIMIT_INT_MIC_BOOT_MUTE_LED),
-SND_PCI_QUIRK(0x103c, 0x225f, "HP", ALC280_FIXUP_HP_GPIO2_MIC_HOTKEY),
"*/ ALC282 */
SND_PCI_QUIRK(0x103c, 0x21f9, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x2210, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x2214, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
+SND_PCI_QUIRK(0x103c, 0x221b, "HP", ALC269_FIXUP_HP_GPIO1_MIC1_LED),
+SND_PCI_QUIRK(0x103c, 0x221c, "HP EliteBook 755 G2", ALC280_FIXUP_HP_HEADSET_MIC),
+SND_PCI_QUIRK(0x103c, 0x2221, "HP", ALC269_FIXUP_HP_GPIO1_MIC1_LED),
+SND_PCI_QUIRK(0x103c, 0x2225, "HP", ALC269_FIXUP_HP_GPIO1_MIC1_LED),
+SND_PCI_QUIRK(0x103c, 0x2236, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
+SND_PCI_QUIRK(0x103c, 0x2237, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x2238, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x2239, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x224b, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
-SND_PCI_QUIRK(0x103c, 0x2268, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x226a, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2266, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x226e, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2271, "HP", ALC286_FIXUP_HP_GPIO_LED),
-SND_PCI_QUIRK(0x103c, 0x2272, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2273, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x229e, "HP", ALC290_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b7, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b9, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b7, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22bf, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b2, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b2, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x226e, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2271, "HP", ALC286_FIXUP_HP_GPIO_LED),
-SND_PCI_QUIRK(0x103c, 0x2272, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2273, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2275, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2275, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x227f, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2282, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x228b, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x228e, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x2238, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x2239, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x224b, "HP", ALC269_FIXUP_HP_LINE1_MIC1_LED),
-SND_PCI_QUIRK(0x103c, 0x2268, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x226a, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2266, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x226e, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2271, "HP", ALC286_FIXUP_HP_GPIO_LED),
-SND_PCI_QUIRK(0x103c, 0x2272, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2273, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x229e, "HP", ALC290_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b7, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b9, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b2, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b2, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22bf, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b2, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x22b2, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x226e, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2271, "HP", ALC286_FIXUP_HP_GPIO_LED),
-SND_PCI_QUIRK(0x103c, 0x2272, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2273, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2275, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x2275, "HP", ALC280_FIXUP_HP_DOCK_PINS),
-SND_PCI_QUIRK(0x103c, 0x227f, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x2282, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x228b, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
-SND_PCI_QUIRK(0x103c, 0x228e, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x229e, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22b2, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22b7, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22bf, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22c4, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22c5, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22c7, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22c8, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22cf, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x22db, "HP", ALC280_FIXUP_HP_9480M),
SND_PCI_QUIRK(0x103c, 0x22dc, "HP", ALC269_FIXUP_HP_GPIO_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x22fb, "HP", ALC269_FIXUP_HP_GPIO_MIC1_LED),
SND_PCI_QUIRK(0x103c, 0x2334, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x2335, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x2336, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x2337, "HP", ALC269_FIXUP_HP_MUTE_LED_MIC1),
SND_PCI_QUIRK(0x103c, 0x802e, "HP Z240 SFF", ALC221_FIXUP_HP_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x103c, 0x802f, "HP Z240", ALC221_FIXUP_HP_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x103c, 0x8256, "HP", ALC221_FIXUP_HP_FRONT_MIC),
SND_PCI_QUIRK(0x103c, 0x82bf, "HP", ALC221_FIXUP_HP_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x103c, 0x82c0, "HP", ALC221_FIXUP_HP_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x103c, 0x827e, "HP x360", ALC269_FIXUP_HP_MUTE_LED_MIC3),
SND_PCI_QUIRK(0x103c, 0x827f, "HP x360", ALC269_FIXUP_HP_MUTE_LED_MIC3),
SND_PCI_QUIRK(0x103c, 0x82bf, "HP G3 mini", ALC221_FIXUP_HP_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x103c, 0x82c0, "HP G3 mini premium", ALC221_FIXUP_HP_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x103e, "ASUS X540SA", ALC256_FIXUP_ASUS_MIC),
SND_PCI_QUIRK(0x1043, 0x103f, "ASUS TX300", ALC282_FIXUP_ASUS_TX300),
SND_PCI_QUIRK(0x1043, 0x106d, "Asus K53BE", ALC269_FIXUP_LIMIT_INT_MIC_BOOST),
SND_PCI_QUIRK(0x1043, 0x10a1, "ASUS UX391UA", ALC294_FIXUP_ASUS_SPK),
SND_PCI_QUIRK(0x1043, 0x10c0, "ASUS X540SA", ALC256_FIXUP_ASUS_MIC),
SND_PCI_QUIRK(0x1043, 0x10d0, "ASUS UX50", ALC269_FIXUP_STEREO_DMIC),
SND_PCI_QUIRK(0x1043, 0x10e0, "ASUS UX50", ALC255_FIXUP_ASUS_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x1115d, "Asus 1015E", ALC269_FIXUP_LIMIT_INT_MIC_BOOST),
SND_PCI_QUIRK(0x1043, 0x11c0, "ASUS X556UR", ALC255_FIXUP_ASUS_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x1271, "ASUS X430UN", ALC256_FIXUP_ASUS_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x1290, "ASUS X441SA", ALC233_FIXUP_EAPD_COEF_AND_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x12a0, "ASUS X441UV", ALC233_FIXUP_EAPD_COEF_AND_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x12f0, "ASUS X541UV", ALC256_FIXUP_ASUS_MIC),
SND_PCI_QUIRK(0x1043, 0x1427, "Asus Zenbook UX31E", ALC269VB_FIXUP_ASUS_ZENBOOK),
SND_PCI_QUIRK(0x1043, 0x1517, "Asus Zenbook UX31A", ALC269VB_FIXUP_ASUS_ZENBOOK_UX31A),
SND_PCI_QUIRK(0x1043, 0x1427, "Asus Zenbook UX31A", ALC269VB_FIXUP_ASUS_ZENBOOK_UX31A),
SND_PCI_QUIRK(0x1043, 0x16e3, "ASUS UX50", ALC269_FIXUP_STEREO_DMIC),
SND_PCI_QUIRK(0x1043, 0x18b1, "Asus MJ401TA", ALC256_FIXUP_ASUS_HEADSET_MIC),
SND_PCI_QUIRK(0x1043, 0x1a13, "Asus G73Jw", ALC269_FIXUP_ASUS_G73JW),
SND_PCI_QUIRK(0x1043, 0x1a30, "ASUS X705UD", ALC256_FIXUP_ASUS_MIC),
SND_PCI_QUIRK(0x1043, 0x1b13, "Asus U41SV", ALC269_FIXUP_INV_DMIC),
SND_PCI_QUIRK(0x1043, 0x1bba, "ASUS Z550MA", ALC255_FIXUP_ASUS_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x1c23, "Asus X55U", ALC269_FIXUP_LIMIT_INT_MIC_BOOST),
SND_PCI_QUIRK(0x1043, 0x125e, "ASUS Q524UQK", ALC255_FIXUP_ASUS_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1043, 0x1ccd, "ASUS X555UB", ALC266_FIXUP_ASUS_MIC),
SND_PCI_QUIRK(0x1043, 0x3030, "ASUS ZN270IE", ALC256_FIXUP_ASUS_AIO_GPIO2),
SND_PCI_QUIRK(0x1043, 0x831a, "ASUS P901", ALC269_FIXUP_STEREO_DMIC),

SND_PCI_QUIRK(0x1043, 0x8398, "ASUS P1005", ALC269_FIXUP_STEREO_DMIC),
SND_PCI_QUIRK(0x1043, 0x83ce, "ASUS P1005", ALC269_FIXUP_STEREO_DMIC),
SND_PCI_QUIRK(0x1043, 0x8516, "ASUS X101CH", ALC269_FIXUP_ASUS_X101),
SND_PCI_QUIRK(0x104d, 0x90b5, "Sony VAIO Pro 11", ALC286_FIXUP_SONY_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x104d, 0x90b6, "Sony VAIO Pro 13", ALC286_FIXUP_SONY_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x104d, 0x9073, "Sony VAIO", ALC275_FIXUP_SONY_VAIO_GPIO2),
SND_PCI_QUIRK(0x104d, 0x907b, "Sony VAIO", ALC275_FIXUP_SONY_HWEQ),
SND_PCI_QUIRK(0x104d, 0x9084, "Sony VAIO", ALC275_FIXUP_SONY_HWEQ),
SND_PCI_QUIRK(0x104d, 0x9099, "Sony VAIO S13", ALC275_FIXUP_SONY_DISABLE_AAMIX),
SND_PCI_QUIRK(0x104d, 0x90b5, "Sony VAIO Pro 11", ALC286_FIXUP_SONY_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x104d, 0x90b6, "Sony VAIO Pro 13", ALC286_FIXUP_SONY_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x10cf, 0x1475, "Lifebook", ALC269_FIXUP_LIFEBOOK),
SND_PCI_QUIRK(0x10cf, 0x159f, "Lifebook E780", ALC269_FIXUP_LIFEBOOK_NO_HP_TO_LINEOUT),
SND_PCI_QUIRK(0x10cf, 0x15dc, "Lifebook T731", ALC269_FIXUP_LIFEBOOK_HP_PIN),
SND_PCI_QUIRK(0x10cf, 0x1757, "Lifebook E752", ALC269_FIXUP_LIFEBOOK_HP_PIN),
SND_PCI_QUIRK(0x10cf, 0x1629, "Lifebook U7x7", ALC255_FIXUP_LIFEBOOK_U7x7_HEADSET_MIC),
SND_PCI_QUIRK(0x10cf, 0x1845, "Lifebook U904", ALC269_FIXUP_LIFEBOOK_EXTMIC),
SND_PCI_QUIRK(0x10cf, 0x10f2, "Intel Reference board", ALC700_FIXUP_INTEL_REFERENCE),
SND_PCI_QUIRK(0x10cf, 0x10f7, "Panasonic CF-SZ6", ALC269_FIXUP_HEADSET_MODE),
SND_PCI_QUIRK(0x144d, 0xc109, "Samsung Ativ book 9 (NP900X3G)", ALC269_FIXUP_INV_DMIC),
SND_PCI_QUIRK(0x144d, 0xc740, "Samsung Ativ book 8 (NP870Z5G)", ALC269_FIXUP_ATIV_BOOK_8),
SND_PCI_QUIRK(0x1458, 0xfa53, "Gigabyte BXBT-2807", ALC283_FIXUP_HEADSET_MIC),
SND_PCI_QUIRK(0x1462, 0xb120, "MSI Cubi MS-B120", ALC283_FIXUP_HEADSET_MIC),
SND_PCI_QUIRK(0x1462, 0xb171, "Cubi N 8GL (MS-B171)", ALC283_FIXUP_HEADSET_MIC),
SND_PCI_QUIRK(0x152d, 0x1082, "Quanta NL3", ALC269_FIXUP_LIFEBOOK),
SND_PCI_QUIRK(0x1558, 0x1323, "Clevo N130ZU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x1325, "System76 Darter Pro (darp5)", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x1401, "Clevo L140[ CZ]U", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x1403, "Clevo N140CU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x1404, "Clevo N150CU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x14a1, "Clevo L141MU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x4018, "Clevo NV40M[ BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x4019, "Clevo NV40MZ", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x4020, "Clevo NV40MB", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x40a1, "Clevo NL40GU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
SND_PCI_QUIRK(0x1558, 0x40e1, "Clevo NL40[ CZ]U",
+SND_PCI_QUIRK(0x1558, 0x40d1, "Clevo NL41DU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50a3, "Clevo NJ51GU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50b3, "Clevo NK50S[BEZ]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50b6, "Clevo NK50SS", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50b8, "Clevo NK50SZ", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50d5, "Clevo NP50DS", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50f0, "Clevo NH50A[CFD]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50f2, "Clevo NH50E[PR]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50f3, "Clevo NH55DPQ", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x50f6, "Clevo NH55D[BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x5101, "Clevo S510WU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x5157, "Clevo W517GU1", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x51a1, "Clevo NS50MU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x70a1, "Clevo NB70T[HJK]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x70b3, "Clevo NK70SB", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x70f2, "Clevo NH79EPY", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x70f3, "Clevo NH77D[BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x70f4, "Clevo NH77EPY", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x70f6, "Clevo NH77DPQ-Y", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8228, "Clevo NR40BU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8520, "Clevo NH50D[CD]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8521, "Clevo NH77D[CD]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8535, "Clevo NH50D[BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8536, "Clevo NH79D[BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8550, "System76 Gazelle (gaze14)", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8551, "System76 Gazelle (gaze14)", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8555, "System76 Gazelle (gaze14)", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8560, "System76 Gazelle (gaze14)", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8561, "System76 Gazelle (gaze14)", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8562, "Clevo NH[5][7][0-9][RZ][Q]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8668, "Clevo NP50B[BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8680, "Clevo NJ50LU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8686, "Clevo NH50[CZ]U", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8a20, "Clevo NH55DCQ-Y", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE).
+SND_PCI_QUIRK(0x1558, 0x8a51, "Clevo NH70RCQ-Y", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x8d50, "Clevo NH55RCQ-M", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x951d, "Clevo N950T[CDF]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x9600, "Clevo N960K[PR]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x961d, "Clevo N960S[CDF]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0x971d, "Clevo N970T[CDF]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xa500, "Clevo NL53RU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xa600, "Clevo NL5XNU", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xb018, "Clevo NP50D[BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xb019, "Clevo NH77D[BE]Q", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xb022, "Clevo NH77D[DC][QW]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xc018, "Clevo NP50D[BE]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xc019, "Clevo NH77D[BE]Q", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x1558, 0xc022, "Clevo NH77D[DC][QW]", ALC293_FIXUP_SYSTEM76_MIC_NO_PRESENCE),
+SND_PCI_QUIRK(0x17aa, 0x1036, "Lenovo P520", ALC233_FIXUP_LENOVO_MULTI_CODECS),
+SND_PCI_QUIRK(0x17aa, 0x1048, "ThinkCentre Station", ALC283_FIXUP_HEADSET_MIC),
+SND_PCI_QUIRK(0x17aa, 0x20f2, "Thinkpad SL410/510", ALC269_FIXUP_SKU_IGNORE),
+SND_PCI_QUIRK(0x17aa, 0x215e, "Thinkpad L512", ALC269_FIXUP_SKU_IGNORE),
+SND_PCI_QUIRK(0x17aa, 0x21b8, "Thinkpad Edge 14", ALC269_FIXUP_SKU_IGNORE),
+SND_PCI_QUIRK(0x17aa, 0x21ca, "Thinkpad L412", ALC269_FIXUP_SKU_IGNORE),
+SND_PCI_QUIRK(0x17aa, 0x21e9, "Thinkpad Edge 15", ALC269_FIXUP_SKU_IGNORE),
+SND_PCI_QUIRK(0x17aa, 0x21f3, "Thinkpad T430", ALC269_FIXUP_LENOVO_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x21f6, "Thinkpad T530", ALC269_FIXUP_LENOVO_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x21fa, "Thinkpad X230", ALC269_FIXUP_LENOVO_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x21f6, "Thinkpad T530", ALC269_FIXUP_LENOVO_DOCK_LIMIT_BOOST),
+SND_PCI_QUIRK(0x17aa, 0x21fa, "Thinkpad X230", ALC269_FIXUP_LENOVO_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x21fb, "Thinkpad T430s", ALC269_FIXUP_LENOVO_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x2203, "Thinkpad X230 Tablet", ALC269_FIXUP_LENOVO_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x2208, "Thinkpad T431s", ALC269_FIXUP_LENOVO_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x2218, "Thinkpad X1 Carbon 2nd", ALC292_FIXUP_TPT440_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x2223, "ThinkPad T550", ALC292_FIXUP_TPT440_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x2226, "ThinkPad X250", ALC292_FIXUP_TPT440_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x222d, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
+SND_PCI_QUIRK(0x17aa, 0x222e, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),

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SND_PCI_QUIRK(0x17aa, 0x2231, "Thinkpad T560", ALC292_FIXUP_TPT460),
SND_PCI_QUIRK(0x17aa, 0x2233, "Thinkpad", ALC292_FIXUP_TPT460),
SND_PCI_QUIRK(0x17aa, 0x2245, "Thinkpad T470", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x2246, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x2247, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x2249, "Thinkpad", ALC298_FIXUP_TPT460),
SND_PCI_QUIRK(0x17aa, 0x224b, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x224c, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x224d, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x225d, "Thinkpad T480", ALC269_FIXUP_LIMIT_INT_MIC_BOOST),
SND_PCI_QUIRK(0x17aa, 0x2292, "Thinkpad X1 Yoga 7th", ALC285_FIXUP_SPEAKER2_TO_DAC1),
SND_PCI_QUIRK(0x17aa, 0x2293, "Thinkpad X1 Carbon 7th", ALC285_FIXUP_SPEAKER2_TO_DAC1),
SND_PCI_QUIRK(0x17aa, 0x30bb, "ThinkCentre AIO", ALC233_FIXUP_LENOVO_LINE2_MIC_HOTKEY),
SND_PCI_QUIRK(0x17aa, 0x30e2, "ThinkCentre AIO", ALC233_FIXUP_LENOVO_LINE2_MIC_HOTKEY),
SND_PCI_QUIRK(0x17aa, 0x310c, "ThinkCentre Station", ALC294_FIXUP_LENOVO_MIC_LOCATION),
SND_PCI_QUIRK(0x17aa, 0x3111, "ThinkCentre Station", ALC294_FIXUP_LENOVO_MIC_LOCATION),
SND_PCI_QUIRK(0x17aa, 0x311f, "ThinkCentre Station", ALC294_FIXUP_LENOVO_MIC_LOCATION),
SND_PCI_QUIRK(0x17aa, 0x312a, "ThinkCentre Station", ALC294_FIXUP_LENOVO_MIC_LOCATION),
SND_PCI_QUIRK(0x17aa, 0x313c, "ThinkCentre Station", ALC294_FIXUP_LENOVO_MIC_LOCATION),
SND_PCI_QUIRK(0x17aa, 0x3151, "ThinkCentre Station", ALC283_FIXUP_HEADSET_MIC),
SND_PCI_QUIRK(0x17aa, 0x3176, "ThinkCentre Station", ALC283_FIXUP_HEADSET_MIC),
SND_PCI_QUIRK(0x17aa, 0x3178, "ThinkCentre Station", ALC283_FIXUP_HEADSET_MIC),
SND_PCI_QUIRK(0x17aa, 0x3181, "Lenovo C940", ALC298_FIXUP_LENOVO_SPK_VOLUME),
SND_PCI_QUIRK(0x17aa, 0x3902, "Lenovo E50-80", ALC269_FIXUP_DMIC_THINKPAD_ACP),
SND_PCI_QUIRK(0x17aa, 0x3977, "IdeaPad S210", ALC283_FIXUP_INT_MIC),
SND_PCI_QUIRK(0x17aa, 0x3978, "IdeaPad Y410P", ALC269_FIXUP_NO_SHUTUP),
SND_PCI_QUIRK(0x17aa, 0x3978, "Lenovo B50-70", ALC269_FIXUP_DMIC_THINKPAD_ACP),
SND_PCI_QUIRK(0x17aa, 0x3bf8, "Quanta FL1", ALC269_FIXUP_PCM_44K),
SND_PCI_QUIRK(0x17aa, 0x5013, "Thinkpad", ALC269_FIXUP_LIMIT_INT_MIC_BOOST),
SND_PCI_QUIRK(0x17aa, 0x501a, "Thinkpad", ALC283_FIXUP_INT_MIC),
SND_PCI_QUIRK(0x17aa, 0x501e, "Thinkpad L440", ALC292_FIXUP_TPT440_DOCK),
SND_PCI_QUIRK(0x17aa, 0x5050, "Thinkpad T560p", ALC292_FIXUP_TPT460),
SND_PCI_QUIRK(0x17aa, 0x5051, "Thinkpad L460", ALC292_FIXUP_TPT460),
SND_PCI_QUIRK(0x17aa, 0x5053, "Thinkpad T460", ALC292_FIXUP_TPT460),
SND_PCI_QUIRK(0x17aa, 0x505d, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x505f, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x5062, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x5109, "Thinkpad", ALC269_FIXUP_LIMIT_INT_MIC_BOOST),
SND_PCI_QUIRK(0x17aa, 0x510f, "Quanta FL1", ALC269_FIXUP_PCM_44K),
SND_PCI_QUIRK(0x17aa, 0x511e, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x511f, "Thinkpad", ALC298_FIXUP_TPT470_DOCK),
SND_PCI_QUIRK(0x17aa, 0x59e54, "LENOVO NB", ALC269_FIXUP_LENOVO_EAPD),
SND_PCI_QUIRK(0x19e5, 0x3204, "Huawei MBXP", ALC256_FIXUP_HUAWEI_MBXP_PINS),
SND_PCI_QUIRK(0x1b7d, 0xa381, "Ordissimo EVE2", ALC269VB_FIXUP_ORDISSIMO_EVE2), /* Also known as Malata PC-B1303 */
SND_PCI_QUIRK(0x1d72, 0x1901, "RedmiBook 14", ALC256_FIXUP_ASUS_HEADSET_MIC),
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+SND_PCI_QUIRK(0x10ec, 0x118c, "Medion EE4254 MD62100", ALC256_FIXUP_MEDION_HEADSET_NO_PRESENCE),

#if 0
/* Below is a quirk table taken from the old code.
@@ -6422,15 +7351,20 @@
    {.id = ALC269_FIXUP_HEADSET_MODE, .name = "headset-mode"},
    {.id = ALC269_FIXUP_HEADSET_MODE_NO_HP_MIC, .name = "headset-mode-no-hp-mic"},
    {.id = ALC269_FIXUP_LENOVO_DOCK, .name = "lenovo-dock"},
+    {.id = ALC269_FIXUP_LENOVO_DOCK_LIMIT_BOOST, .name = "lenovo-dock-limit-boost"},
    {.id = ALC269_FIXUP_HP_GPIO_LED, .name = "hp-gpio-led"},
    {.id = ALC269_FIXUP_HP_DOCK_GPIO_MIC1_LED, .name = "hp-dock-gpio-mic1-led"},
    {.id = ALC269_FIXUP_DELL1_MIC_NO_PRESENCE, .name = "dell-headset-multi"},
    {.id = ALC269_FIXUP_DELL2_MIC_NO_PRESENCE, .name = "dell-headset-dock"},
+    {.id = ALC299_FIXUP_PREDATOR_SPK, .name = "predator-spk"},
+    {.id = ALC285_FIXUP_SPEAKER2_TO_DAC1, .name = "alc285-speaker2-to-dac1"},
    {.id = ALC256_FIXUP_MEDION_HEADSET_NO_PRESENCE, .name = "alc256-medion-headset"},
    {.id = ALC283_FIXUP_CHROME_BOOK, .name = "alc283-dac-wcaps"},
    {.id = ALC283_FIXUP_SENSE_COMBO_JACK, .name = "alc283-sense-combo"},
    {.id = ALC292_FIXUP_TPT440_DOCK, .name = "tpt440-dock"},
    {.id = ALC292_FIXUP_TPT440, .name = "tpt440"},
+    {.id = ALC298_FIXUP_TPT470_DOCK_FIX, .name = "tpt470-dock-fix"},
    {.id = ALC233_FIXUP_LENOVO_MULTI_CODECS, .name = "dual-codecs"},
    {.id = ALC700_FIXUP_INTEL_REFERENCE, .name = "alc700-ref"},
    
@@ -6463,6 +7397,12 @@
    {0x21, 0x0321102f}),
SND_HDA_PIN_QUIRK(0x10ec0255, 0x1025, "Acer", ALC233_FIXUP_LENOVO_LINE2_MIC_HOTKEY,
    {0x12, 0x90a60140},
    {0x14, 0x90170110},
+    {0x19, 0x02a11030},
+    {0x21, 0x0221102f}),
SND_HDA_PIN_QUIRK(0x10ec0255, 0x1025, "Acer", ALC255_FIXUP_ACER_MIC_NO_PRESENCE,
    {0x12, 0x90a601c0},
    {0x14, 0x90171120},
@@ -6499,13 +7439,32 @@
    {0x12, 0x90a601c0},
    {0x14, 0x90170110},
    {0x17, 0x90170110},
    {0x18, 0x02a11030},
    {0x19, 0x0181303F},
+    {0x21, 0x0221102f}),
SND_HDA_PIN_QUIRK(0x10ec0255, 0x1025, "Acer", ALC255_FIXUP_ACER_MIC_NO_PRESENCE,
    {0x12, 0x90a601c0},
    {0x14, 0x90171120},
@@ -6499,13 +7439,32 @@
    {0x12, 0x90a601c0},
    {0x14, 0x90170110},
    {0x17, 0x90170110},
    {0x18, 0x02a11030},
+    {0x19, 0x02a11030},
+    {0x21, 0x0221102f}),
SND_HDA_PIN_QUIRK(0x10ec0255, 0x1025, "Acer", ALC255_FIXUP_ACER_MIC_NO_PRESENCE,
    {0x12, 0x90a601c0},
    {0x14, 0x90170110},
+    {0x19, 0x02a11030},
{0x21, 0x02211020}),
-SND_HDA_PIN_QUIRK(0x10ec0236, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
+SND_HDA_PIN_QUIRK(0x10ec0235, 0x17aa, "Lenovo", ALC294_FIXUP_LENOVO_MIC_LOCATION,
+{0x14, 0x90170110},
+{0x19, 0x02a11030},
+{0x1a, 0x02a11040},
+{0x1b, 0x01014020},
+{0x21, 0x0221101f}),
+SND_HDA_PIN_QUIRK(0x10ec0235, 0x17aa, "Lenovo", ALC294_FIXUP_LENOVO_MIC_LOCATION,
+{0x14, 0x90170110},
+{0x19, 0x02a11030},
+{0x1a, 0x02a11040},
+{0x1b, 0x01011020},
+{0x21, 0x0221101f}),
+SND_HDA_PIN_QUIRK(0x10ec0235, 0x17aa, "Lenovo", ALC233_FIXUP_LENOVO_LINE2_MIC_HOTKEY,
+{0x14, 0x90170110},
+{0x19, 0x02a11020},
+{0x1a, 0x02a11030},
+{0x21, 0x0221101f}),
+SND_HDA_PIN_QUIRK(0x10ec0255, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
+{0x14, 0x90170110},
+{0x19, 0x02a11030},
+{0x21, 0x0221101f}),
-SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
+{0x12, 0x90a60130},
+{0x14, 0x90170110},
+{0x1b, 0x01011020},
+{0x21, 0x0221101f}),
-SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
+{0x12, 0x90a60130},
+{0x14, 0x90170110},
+{0x1b, 0x01011020},
+{0x21, 0x0221101f}),
-SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
+{0x12, 0x90a60130},
+{0x14, 0x90170110},
+{0x21, 0x02211030}),
-SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
+{0x12, 0x90a60130},
+{0x14, 0x90170120},
+{0x21, 0x02211030}),
-SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell Inspiron 5468", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
+{0x12, 0x90a60180},
+{0x14, 0x90170120},
SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x21, 0x02211030}),
SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x12, 0xb7a60130}),
SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x14, 0x90170110}),
SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x21, 0x02211020}),
SND_HDA_PIN_QUIRK(0x10ec0274, 0x1028, "Dell", ALC274_FIXUP_DELL_AIO_LINEOUT_VERB,
{0x12, 0xb7a60130}),
SND_HDA_PIN_QUIRK(0x10ec0280, 0x103c, "HP", ALC280_FIXUP_HP_GPIO4,
{0x12, 0x90a60130}),
SND_HDA_PIN_QUIRK(0x10ec0285, 0x17aa, "Lenovo", ALC285_FIXUP_LENOVO_PC_BEEP_IN_NOISE,
{0x12, 0x90a60130}),
SND_HDA_PIN_QUIRK(0x10ec0288, 0x1028, "Dell", ALC288_FIXUP_DELL_XPS_13_GPIO6,
{0x12, 0x90a60120}),
SND_HDA_PIN_QUIRK(0x10ec0293, 0x1028, "Dell", ALC293_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x12, 0x90a60130}),
SND_HDA_PIN_QUIRK(0x10ec0293, 0x1028, "Dell", ALC293_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x19, 0x04a11040}),
SND_HDA_PIN_QUIRK(0x10ec0293, 0x1028, "Dell", ALC293_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x21, 0x04211020}),
SND_HDA_PIN_QUIRK(0x10ec0293, 0x1028, "Dell", ALC293_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x21, 0x03211020}),
SND_HDA_PIN_QUIRK(0x10ec0293, 0x1028, "Dell", ALC293_FIXUP_DELL1_MIC_NO_PRESENCE,
{0x21, 0x03211020}),
SND_HDA_PIN_QUIRK(0x10ec0294, 0x1043, "ASUS", ALC294_FIXUP_ASUS_MIC,
+{0x14, 0x90170110},
+{0x1b, 0x90a70130},
+{0x21, 0x04211020}),
SND_HDA_PIN_QUIRK(0x10ec0294, 0x1043, "ASUS", ALC294_FIXUP_ASUS_SPK,
+{0x12, 0x90a60130},
+{0x17, 0x90170110},
+{0x21, 0x03211020}),
SND_HDA_PIN_QUIRK(0x10ec0295, 0x1043, "ASUS", ALC294_FIXUP_ASUS_SPK,
+{0x12, 0x90a60130},
+{0x17, 0x90170110},
+{0x21, 0x04211020}),
SND_HDA_PIN_QUIRK(0x10ec0295, 0x1043, "ASUS", ALC294_FIXUP_ASUS_SPK,
+{0x12, 0x90a60130},
+{0x17, 0x90170110},
+{0x21, 0x03211020}),
SND_HDA_PIN_QUIRK(0x10ec0295, 0x1028, "Dell", ALC269_FIXUP_DELL4_MIC_NO_PRESENCE,
+{0x14, 0x90170110},
+{0x21, 0x04211020}),
SND_HDA_PIN_QUIRK(0x10ec0295, 0x1028, "Dell", ALC269_FIXUP_DELL4_MIC_NO_PRESENCE,
+{0x14, 0x90170110},
+{0x21, 0x04211030}),
SND_HDA_PIN_QUIRK(0x10ec0295, 0x1028, "Dell", ALC269_FIXUP_DELL1_MIC_NO_PRESENCE,
ALC295_STANDARD_PINS,
{0x17, 0x21014020},
@@ -6763,6 +7733,38 @@
ALC225_STANDARD_PINS,
{0x12, 0xb7a60130},
{0x17, 0x90170110}),
SND_HDA_PIN_QUIRK(0x10ec0286, 0x1025, "Acer", ALC286_FIXUP_ACER_AIO_MIC_NO_PRESENCE,
+{0x12, 0x90a60130},
+{0x17, 0x90170110},
+{0x21, 0x02211020}),
SND_HDA_PIN_QUIRK(0x10ec0623, 0x17aa, "Lenovo", ALC283_FIXUP_HEADSET_MIC,
+{0x14, 0x01014010},
+{0x17, 0x90170120},
+{0x18, 0x02a11030},
+{0x19, 0x02a1103f},
+{0x21, 0x0221101f}),
+{]
+};
+
+/* This is the fallback pin_fixup_tbl for alc269 family, to make the tbl match
+ * more machines, don't need to match all valid pins, just need to match
+ * all the pins defined in the tbl. Just because of this reason, it is possible
+ * that a single machine matches multiple tbls, so there is one limitation:
+ * at most one tbl is allowed to define for the same vendor and same codec
static const struct snd_hda_pin_quirk alc269_fallback_pin_fixup_tbl[] = {
    SND_HDA_PIN_QUIRK(0x10ec0289, 0x1028, "Dell", ALC269_FIXUP_DELL4_MIC_NO_PRESENCE,
        {0x19, 0x40000000},
        {0x1b, 0x40000000}),
    SND_HDA_PIN_QUIRK(0x10ec0256, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
        {0x19, 0x40000000},
        {0x1a, 0x40000000}),
    SND_HDA_PIN_QUIRK(0x10ec0236, 0x1028, "Dell", ALC255_FIXUP_DELL1_MIC_NO_PRESENCE,
        {0x19, 0x40000000},
        {0x1a, 0x40000000}),
    SND_HDA_PIN_QUIRK(0x10ec0274, 0x1028, "Dell", ALC274_FIXUP_DELL_AIO_LINEOUT_VERB,
        {0x19, 0x40000000},
        {0x1a, 0x40000000}),
    {}};

spec = codec->spec;
spec->gen.shared_mic_vref_pin = 0x18;
-codec->power_save_node = 1;
+codec->power_save_node = 0;

#ifdef CONFIG_PM
codec->patch_ops.suspend = alc269_suspend;
#endif

snd_hda_pick_fixup(codec, alc269_fixup_models,
    alc269_fixup_tbl, alc269_fixups);
-snd_hda_pick_pin_fixup(codec, alc269_pin_fixup_tbl, alc269_fixups);
+snd_hda_pick_pin_fixup(codec, alc269_pin_fixup_tbl, alc269_fixups, true);
+snd_hda_pick_pin_fixup(codec, alc269_fallback_pin_fixup_tbl, alc269_fixups, false);
snd_hda_pick_fixup(codec, NULL, alc269_fixup_vendor_tbl,
    alc269_fixups);
snd_hda_apply_fixup(codec, HDA_FIXUP_ACT_PRE_PROBE);

case 0x10ec0286:
case 0x10ec0288:
    spec->codec_variant = ALC269_TYPE_ALC286;
    -spec->shutup = alc286_shutup;
    break;
case 0x10ec0298:
    spec->codec_variant = ALC269_TYPE_ALC298;
    break;
+case 0x10ec0235:
case 0x10ec0255:
    spec->codec_variant = ALC269_TYPE_ALC255;
+spec->shutup = alc256_shutup;
+spec->init_hook = alc256_init;
break;
case 0x10ec0236:
case 0x10ec0256:
    spec->shutup = alc256_shutup;
    spec->init_hook = alc256_init;
    spec->gen.mixer_nid = 0; /* ALC256 does not have any loopback mixer path */
-    alc_update_coef_idx(codec, 0x36, 1 << 13, 1 << 5); /* Switch pcbeep path to Line in path*/
    break;
case 0x10ec0257:
spec->codec_variant = ALC269_TYPE_ALC257;
+spec->shutup = alc256_shutup;
+spec->init_hook = alc256_init;
spec->gen.mixer_nid = 0;
break;
case 0x10ec0215:
+case 0x10ec0245:
+case 0x10ec0285:
+case 0x10ec0287:
    case 0x10ec0289:
spec->codec_variant = ALC269_TYPE_ALC215;
    spec->gen.mixer_nid = 0;
    alc_update_coef_idx(codec, 0x6b, 0x0018, (1<<4) | (1<<3)); /* UAJ MIC Vref control by verb */
+    spec->init_hook = alc294_init;
    break;
+case 0x10ec0300:
    +spec->codec_variant = ALC269_TYPE_ALC300;
    +spec->gen.mixer_nid = 0; /* no loopback on ALC300 */
    break;
+case 0x10ec0623:
    +spec->codec_variant = ALC269_TYPE_ALC623;
    break;
case 0x10ec0700:
case 0x10ec0701:
case 0x10ec0703:
+case 0x10ec0711:
spec->codec_variant = ALC269_TYPE_ALC700;
spec->gen.mixer_nid = 0; /* ALC700 does not have any loopback mixer path */
alc_update_coef_idx(codec, 0x4a, 1 << 15, 0); /* Combo jack auto trigger control */
+spec->init_hook = alc294_init;
break;
}
@@ -7056,8 +8076,7 @@
SND_PCI_QUIRK(0x1043, 0x1393, "ASUS A6Rp", ALC861_FIXUP_ASUS_A6RP),
SND_PCI_QUIRK_VENDOR(0x1043, "ASUS laptop", ALC861_FIXUP_ALC861_FIXUP_VREF_0F),
SND_PCI_QUIRK(0x1462, 0x7254, "HP DX2200", ALC861_FIXUP_NO_JACK_DETECT),
-    SND_PCI_QUIRK(0x1584, 0x2b01, "Haier W18", ALC861_FIXUP_ALC861_FIXUP_VREF_0F),
-    SND_PCI_QUIRK(0x1584, 0x0000, "Uniwill ECS M31EI", ALC861_FIXUP_ALC861_FIXUP_VREF_0F),
+    SND_PCI_QUIRK_VENDOR(0x1584, "Haier/Uniwill", ALC861_FIXUP_ALC861_FIXUP_VREF_0F),
SND_PCI_QUIRK(0x1734, 0x10c7, "FSC Amilo Pi1505", ALC861_FIXUP_FSC_AMILO_PI1505),
{};
}
@@ -7370,6 +8389,8 @@
ALC662_FIXUP_ASUS_Nx50,
ALC668_FIXUP_ASUS_Nx51_HEADSET_MODE,
ALC668_FIXUP_ASUS_Nx51,
+    ALC668_FIXUP_MIC_COEF,
+    ALC668_FIXUP_ASUS_G751,
ALC891_FIXUP_HEADSET_MODE,
ALC891_FIXUP_DELL_MIC_NO_PRESENCE,
ALC662_FIXUP_ACER_VERITON,
@@ -7639,6 +8660,23 @@
    chained = true,
    .chain_id = ALC668_FIXUP_ASUS_Nx51_HEADSET_MODE,
    },
+  [ALC668_FIXUP_MIC_COEF] = {
+    .type = HDA_FIXUP_VERBS,
+    .v.verbs = (const struct hda_verb[]) {
+      { 0x20, AC_VERB_SET_COEF_INDEX, 0xc3 },
+      { 0x20, AC_VERB_SET_PROC_COEF, 0x4000 },
+    }
+  },
+  [ALC668_FIXUP_ASUS_G751] = {
+    .type = HDA_FIXUP_PINS,
+    .v.pins = (const struct hda_pintbl[]) {
+      { 0x16, 0x0421101f }, /* HP */
+    }
+  },

.chained = true,
.chain_id = ALC668_FIXUP_MIC_COEF
+
}.

[ALC891_FIXUP_HEADSET_MODE] = {
.type = HDA_FIXUP_FUNC,
.v.func = alc_fixup_headset_mode,
@@ -7712,6 +8750,7 @@
SND_PCI_QUIRK(0x1043, 0x11cd, "Asus N550", ALC662_FIXUP_ASUS_Nx50),
SND_PCI_QUIRK(0x1043, 0x13df, "Asus N550JX", ALC662_FIXUP_BASS_1A),
SND_PCI_QUIRK(0x1043, 0x129d, "Asus N750", ALC662_FIXUP_ASUS_Nx50),
+SND_PCI_QUIRK(0x1043, 0x12ff, "ASUS G751", ALC668_FIXUP_ASUS_G751),
SND_PCI_QUIRK(0x1043, 0x1477, "ASUS N56VZ", ALC662_FIXUP_BASS_MODE4_CHMAP),
SND_PCI_QUIRK(0x1043, 0x15a7, "ASUS UX51VZH", ALC662_FIXUP_BASS_16),
SND_PCI_QUIRK(0x1043, 0x177d, "ASUS N551", ALC668_FIXUP_ASUS_Nx51),
@@ -7813,6 +8852,11 @@
{0x18, 0x01a19030},
{0x1a, 0x01813040},
{0x21, 0x01014020}),
+SND_HDA_PIN_QUIRK(0x10ec0867, 0x1028, "Dell", ALC891_FIXUP_DELL_MIC_NO_PRESENCE,
+{0x16, 0x01813030},
+{0x17, 0x02211010},
+{0x18, 0x01a19040},
+{0x21, 0x01014020}),
SND_HDA_PIN_QUIRK(0x10ec0662, 0x1028, "Dell", ALC662_FIXUP_DELL_MIC_NO_PRESENCE,
{0x14, 0x01014010},
{0x18, 0x01a19020},
@@ -7872,7 +8916,7 @@
snd_hda_pick_fixup(codec, alc662_fixup_models,
alc662_fixup_tbl, alc662_fixups);
-snd_hda_pick_pin_fixup(codec, alc662_pin_fixup_tbl, alc662_fixups);
+snd_hda_pick_pin_fixup(codec, alc662_pin_fixup_tbl, alc662_fixups, true);
snd_hda_apply_fixup(codec, HDA_FIXUP_ACT_PREF_PROBE);

alc_parse_customize_define(codec);
@@ -7955,12 +8999,14 @@
static const struct hda_device_id snd_hda_id_realtek[] = {
HDA_CODEC_ENTRY(0x10ec0215, "ALC215", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0221, "ALC221", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0222, "ALC222", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0225, "ALC225", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0231, "ALC231", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0233, "ALC233", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0234, "ALC234", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0235, "ALC235", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0236, "ALC236", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0245, "ALC245", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0255, "ALC255", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0256, "ALC256", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0257, "ALC257", patch_alc269),
@@ -7980,6 +9026,7 @@
HDA_CODEC_ENTRY(0x10ec0284, "ALC284", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0285, "ALC285", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0286, "ALC286", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0287, "ALC287", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0288, "ALC288", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0289, "ALC289", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0290, "ALC290", patch_alc269),
@@ -7989,6 +9036,8 @@
HDA_CODEC_ENTRY(0x10ec0295, "ALC295", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0298, "ALC298", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0299, "ALC299", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0300, "ALC300", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0623, "ALC623", patch_alc269),
HDA_CODEC_REV_ENTRY(0x10ec0861, 0x100340, "ALC660", patch_alc861),
HDA_CODEC_ENTRY(0x10ec0660, "ALC660-VD", patch_alc861vd),
HDA_CODEC_ENTRY(0x10ec0287, "ALC287", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0288, "ALC288", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0289, "ALC289", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0290, "ALC290", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0295, "ALC295", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0298, "ALC298", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0299, "ALC299", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0300, "ALC300", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0623, "ALC623", patch_alc269),
HDA_CODEC_REV_ENTRY(0x10ec0861, 0x100340, "ALC660", patch_alc861),
HDA_CODEC_ENTRY(0x10ec0660, "ALC660-VD", patch_alc861vd),
HDA_CODEC_ENTRY(0x10ec0287, "ALC287", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0288, "ALC288", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0289, "ALC289", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0290, "ALC290", patch_alc269),
@@ -8006,6 +9055,7 @@
HDA_CODEC_ENTRY(0x10ec0700, "ALC700", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0701, "ALC701", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0703, "ALC703", patch_alc269),
+HDA_CODEC_ENTRY(0x10ec0711, "ALC711", patch_alc269),
HDA_CODEC_ENTRY(0x10ec0867, "ALC891", patch_alc662),
HDA_CODEC_ENTRY(0x10ec0860, "ALC880", patch_alc880),
HDA_CODEC_ENTRY(0x10ec0882, "ALC882", patch_alc882),
@@ -8018,8 +9068,10 @@
HDA_CODEC_ENTRY(0x10ec0888, "ALC888", patch_alc882),
HDA_CODEC_ENTRY(0x10ec0889, "ALC889", patch_alc882),
HDA_CODEC_ENTRY(0x10ec0892, "ALC892", patch_alc662),
+HDA_CODEC_ENTRY(0x10ec0897, "ALC897", patch_alc662),
HDA_CODEC_ENTRY(0x10ec0899, "ALC898", patch_alc882),
HDA_CODEC_ENTRY(0x10ec0900, "ALC1150", patch_alc882),
+HDA_CODEC_ENTRY(0x10ec0b00, "ALCS1200A", patch_alc882),
HDA_CODEC_ENTRY(0x10ec1168, "ALC1220", patch_alc882),
HDA_CODEC_ENTRY(0x10ec1220, "ALC1220", patch_alc882),
{} /* terminator */
/* linux-4.15.0.orig/sound/pci/hda/patch_sigmatel.c
+++ linux-4.15.0/sound/pci/hda/patch_sigmatel.c
@@ -77,6 +77,7 @@
STAC_DELL_M6_BOTH,
STAC_DELL_EQ,
STAC_ALIENWARE_M17X,
+STAC_ELO_VUPOINT_15MX,
STAC_92HD89XX_HP_FRONT_JACK,
STAC_92HD89XX_HP_Z1_G2_RIGHT_MIC_JACK,
STAC_92HD73XX_ASUS_MOBO.
static struct snd_kcontrol_new beep_vol_ctl = HDA_CODEC_VOLUME(NULL, 0, 0, 0);

// check for mute support for the amp */
*/ check for mute support for the amp */
if ((caps & AC_AMPCAP_MUTE) >> AC_AMPCAP_MUTE_SHIFT) {
    const struct snd_kcontrol_new *temp;
    if (spec->anabeep_nid == nid)
        codec->no_jack_detect = 1;
}

+static void stac92hd73xx_disable_automute(struct hda_codec *codec, const struct hda_fixup *fix, int action)
{+
+struct sigmatel_spec *spec = codec->spec;
+
+if (action != HDA_FIXUP_ACT_PRE_PROBE) +return;
+
+spec->gen.suppress_auto_mute = 1;
+}
+
static const struct hda_fixup stac92hd73xx_fixups[] = {
    [STAC_92HD73XX_REF] = {
        .type = HDA_FIXUP_FUNC,
        .v.func = stac92hd73xx_disable_automute,
    },
    [STAC_ELO_VUPOINT_15MX] = {
        .type = HDA_FIXUP_FUNC,
        .v.func = stac92hd73xx_disable_automute,
    },
    [STAC_92HD73XX_INTEL] = {
        .type = HDA_FIXUP_PINS,
        .v.pins = intel_dg45id_pin_configs,
    },
};
"Alienware M17x", STAC_ALIENWARE_M17X),
SND_PCI_QUIRK(PPCI_VENDOR_ID_DELL, 0x0490,
"Alienware M17x R3", STAC_DELL_EQ),
+SND_PCI_QUIRK(0x1059, 0x1011,
+ "ELO VuPoint 15MX", STAC_ELO_VUPOINT_15MX),
SND_PCI_QUIRK(PPCI_VENDOR_ID_HP, 0x1927,
"HP Z1 G2", STAC_92HD89XX_HP_Z1_G2_RIGHT_MIC_JACK),
SND_PCI_QUIRK(PPCI_VENDOR_ID_HP, 0x2b17,
--- linux-4.15.0.orig/sound/pci/hda/patch_via.c
+++ linux-4.15.0/sound/pci/hda/patch_via.c
@@ -135,6 +135,7 @@
spec->codec_type = VT1708S;
spec->gen.indep_hp = 1;
spec->gen.keep_eapd_on = 1;
+spec->gen.dac_min_mute = 1;
spec->gen.pcm_playback_hook = via_playback_pcm_hook;
spec->gen.add_stereo_mix_input = HDA_HINT_STEREO_MIX_AUTO;
codec->power_save_node = 1;
--- linux-4.15.0.orig/sound/pci/ice1712/ice1712.c
+++ linux-4.15.0/sound/pci/ice1712/ice1712.c
@@ -2377,7 +2377,8 @@
pci_write_config_byte(ice->pci, 0x61, ice->eeprom.data[ICE_EEP1_ACLINK]);
pci_write_config_byte(ice->pci, 0x62, ice->eeprom.data[ICE_EEP1_I2SID]);
pci_write_config_byte(ice->pci, 0x63, ice->eeprom.data[ICE_EEP1_SPDIF]);
-if (ice->eeprom.subvendor != ICE1712_SUBDEVICE_STDSP24) {
+if (ice->eeprom.subvendor != ICE1712_SUBDEVICE_STDSP24 &&
+ ice->eeprom.subvendor != ICE1712_SUBDEVICE_STAUDIO_ADCIII) {
ice->gpio.write_mask = ice->eeprom.gpiomask;
icе->gpio.direction = ice->eeprom.gpiodir;
snd_ice1712_write(ice, ICE1712_IREG_GPIO_WRITE_MASK,
--- linux-4.15.0.orig/sound/pci/ice1712/ice1724.c
+++ linux-4.15.0/sound/pci/ice1712/ice1724.c
@@ -661,6 +661,7 @@
unsigned long flags;
unsigned char mclk_change;
unsigned int i, old_rate;
+bool call_set_rate = false;

if (rate > ice->hw_rates->list[ice->hw_rates->count - 1])
return -EINVAL;
@@ -684,7 +685,7 @@
* setting clock rate for internal clock mode */
old_rate = ice->get_rate(ice);
if (force || (old_rate != rate))
-ice->set_rate(ice, rate);
+call_set_rate = true;
else if (rate == ice->cur_rate) {
spin_unlock_irqrestore(&ice->reg_lock, flags);
return 0;
@@ -692,12 +693,14 @@

spin_unlock_irqrestore(&ice->reg_lock, flags);
+	spin_unlock_irqrestore(&ice->reg_lock, flags);
+	if (call_set_rate)
+		ice->set_rate(ice, rate);

/* setting master clock */
mclk_change = ice->set_mclk(ice, rate);

-spin_unlock_irqrestore(&ice->reg_lock, flags);
-
if (mclk_change && ice->gpio.i2s_mclk_changed)
ice->gpio.i2s_mclk_changed(ice);
if (ice->gpio.set_pro_rate)
--- linux-4.15.0.orig/sound/pci/ice1712/prodigy192.c
+++ linux-4.15.0/sound/pci/ice1712/prodigy192.c
@@ -31,7 +31,7 @@
		  Experimentally I found out that only a combination of
		  OCKS0=1, OCKS1=1 (128fs, 64fs output) and ice1724 -
		  VT1724_MT_I2S_MCLK_128X=0 (256fs input) yields correct
- *		  sampling rate. That means the the FPGA doubles the
+ *		  sampling rate. That means that the FPGA doubles the
		  MCK01 rate.
*
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--- linux-4.15.0.orig/sound/pci/ice1712/prodigy_hifi.c
+++ linux-4.15.0/sound/pci/ice1712/prodigy_hifi.c
@@ -569,7 +569,7 @@
        oval = wm_get(ice, WM_ADC_MUX);
    mutex_unlock(&ice->gpio_mutex);
    return 0;
@@ -583,7 +583,7 @@
        oval = wm_get(ice, WM_ADC_MUX);
    mutex_lock(&ice->gpio_mutex);
    oval = wm_get(ice, WM_ADC_MUX);
    -nval = (oval & 0xe0) | ucontrol->value.integer.value[0];
+    nval = (oval & 0xe0) | ucontrol->value.enumerated.item[0];
    mutex_unlock(&ice->gpio_mutex);
    return 0;
}
change = 1;
--- linux-4.15.0.orig/sound/pci/intel8x0m.c
+++ linux-4.15.0/sound/pci/intel8x0m.c
@@ -1171,16 +1171,6 @@
 {
 }
-chip->irq = pci->irq;
-pci_set_master(pci);
--synchronize_irq(chip->irq);
-
/* initialize offsets */
chip->bdbars_count = 2;
tbl = intel_regs;
@@ -1224,11 +1214,21 @@
 chip->int_sta_reg = ICH_REG_GLOB_STA;
 chip->int_sta_mask = int_sta_masks;
   }
+pci_set_master(pci);
+
if ((err = snd_intel8x0m_chip_init(chip, 1)) < 0) {
  snd_intel8x0m_free(chip);
  return err;
}

+if (request_irq(pci->irq, snd_intel8x0m_interrupt, IRQF_SHARED,
   +KBUILD_MODNAME, chip)) {
   +dev_err(card->dev, "unable to grab IRQ %d\n", pci->irq);
   +snd_intel8x0m_free(chip);
   +return -EBUSY;
   +}
+chip->irq = pci->irq;
+
if ((err = snd_device_new(card, SNDRV_DEV_LOWLEVEL, chip, &ops)) < 0) {
  snd_intel8x0m_free(chip);
  return err;
--- linux-4.15.0.orig/sound_pci/lx6464es/lx6464es.c
+++ linux-4.15.0/soundpci/lx6464es/lx6464es.c
@@ -65,6 +65,14 @@
 }/* LX6464ES-CAE */
{ 0, },
};

--- linux-4.15.0.orig/sound/pci/mixart/mixart_core.c
+++ linux-4.15.0/sound/pci/mixart/mixart_core.c
@@ -83,7 +83,6 @@
 unsigned int i;
 #endif
- mutex_lock(&mgr->msg_lock);
 err = 0;
 /* copy message descriptor from miXart to driver */
 @@ -132,8 +131,6 @@
 writel_be(headptr, MIXART_MEM(mgr, MSG_OUTBOUND_FREE_HEAD));

 _clean_exit:
- mutex_unlock(&mgr->msg_lock);
  return err;
 }

 @@ -271,7 +268,9 @@
 resp.data = resp_data;
 resp.size = max_resp_size;

+mutex_lock(&mgr->msg_lock);
 err = get_msg(mgr, &resp, msg_frame);
+mutex_unlock(&mgr->msg_lock);

 if( request->message_id != resp.message_id )
 dev_err(&mgr->pci->dev, "RESPONSE ERROR!
'');
--- linux-4.15.0.orig/sound/pci/oxygen/xonar_dg.c
+++ linux-4.15.0/sound/pci/oxygen/xonar_dg.c
@@ -39,7 +39,7 @@
*   GPIO 4 <- headphone detect
*   GPIO 5 -> enable ADC analog circuit for the left channel
*   GPIO 6 -> enable ADC analog circuit for the right channel
- *   GPIO 7 -> switch green rear output jack between CS4245 and and the first
+ *   GPIO 7 -> switch green rear output jack between CS4245 and and the first

 * GPIO 4 <- headphone detect
 * GPIO 5 -> enable ADC analog circuit for the left channel
 * GPIO 6 -> enable ADC analog circuit for the right channel
- * GPIO 7 -> switch green rear output jack between CS4245 and and the first
+ * GPIO 7 -> switch green rear output jack between CS4245 and and the first

* channel of CS4361 (mechanical relay)
* GPIO 8 -> enable output to speakers
*
--- linux-4.15.0.orig/sound/pci/rme9652/hdsp.c
+++ linux-4.15.0/sound/pci/rme9652/hdsp.c
@@ -30,6 +30,7 @@
#include <linux/math64.h>
#include <linux/vmalloc.h>
#include <linux/io.h>
+##include <linux/nospec.h>

#include <sound/core.h>
#include <sound/control.h>
@@ -4092,15 +4093,16 @@
struct snd_pcm_channel_info *info)
{
  struct hdsp *hdsp = snd_pcm_substream_chip(substream);
  int mapped_channel;
+  unsigned int channel = info->channel;
  if (snd_BUG_ON(info->channel >= hdsp->max_channels))
    return -EINVAL;
+  if (snd_BUG_ON(channel >= hdsp->max_channels))
    return -EINVAL;
    channel = array_index_nospec(channel, hdsp->max_channels);
  if ((mapped_channel = hdsp->channel_map[info->channel]) < 0)
    return -EINVAL;
+  if (hdsp->channel_map[channel] < 0)
    return -EINVAL;
    info->offset = mapped_channel * HDSP_CHANNEL_BUFFER_BYTES;
+  info->offset = hdsp->channel_map[channel] * HDSP_CHANNEL_BUFFER_BYTES;
  info->first = 0;
  info->step = 32;
  return 0;
@@ -5341,7 +5343,8 @@
if (hdsp->port)
  pci_release_regions(hdsp->pci);
-pci_disable_device(hdsp->pci);
+if (pci_is_enabled(hdsp->pci))
+ pci_disable_device(hdsp->pci);
  return 0;
}

--- linux-4.15.0.orig/sound/pci/rme9652/hdspm.c
+++ linux-4.15.0/sound/pci/rme9652/hdspm.c
@@ -137,6 +137,7 @@
  if (hdsp->port)
    pci_release_regions(hdsp->pci);
-pci_disable_device(hdsp->pci);
+if (pci_is_enabled(hdsp->pci))
+  pci_disable_device(hdsp->pci);
  return 0;
}

--- linux-4.15.0.orig/sound/pci/rme9652/hdspm.c
+++ linux-4.15.0/sound/pci/rme9652/hdspm.c
@@ -137,6 +137,7 @@
  if (hdsp->port)
    pci_release_regions(hdsp->pci);
-pci_disable_device(hdsp->pci);
+if (pci_is_enabled(hdsp->pci))
+  pci_disable_device(hdsp->pci);
  return 0;
}
include <linux/math64.h>
#include <linux/io.h>
+#include <linux/nospec.h>

#include <sound/core.h>
#include <sound/control.h>
@@ -5698,40 +5699,43 @@
    struct snd_pcm_channel_info *info)
{
    struct hdspm *hdspm = snd_pcm_substream_chip(substream);
+    unsigned int channel = info->channel;

    if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK) {
        -if (snd_BUG_ON(info->channel >= hdspm->max_channels_out)) {
+        if (snd_BUG_ON(channel >= hdspm->max_channels_out)) {
            dev_info(hdspm->card->dev,
                "snd_hdspm_channel_info: output channel out of range (%d)\n",
                - info->channel);
+            channel);
            return -EINVAL;
        }

        -if (hdspm->channel_map_out[info->channel] < 0) {
+        channel = array_index_nospec(channel, hdspm->max_channels_out);
+        if (hdspm->channel_map_out[channel] < 0) {
            dev_info(hdspm->card->dev,
                "snd_hdspm_channel_info: output channel %d mapped out\n",
                - info->channel);
+            channel);
            return -EINVAL;
        }

        -info->offset = hdspm->channel_map_out[info->channel] *
+        info->offset = hdspm->channel_map_out[channel] *
        HDSPM_CHANNEL_BUFFER_BYTES;
    } else {
        -if (snd_BUG_ON(info->channel >= hdspm->max_channels_in)) {
+        if (snd_BUG_ON(channel >= hdspm->max_channels_in)) {
            dev_info(hdspm->card->dev,
                "snd_hdspm_channel_info: input channel out of range (%d)\n",
                - info->channel);
+            channel);
            return -EINVAL;
        }

        -if (hdspm->channel_map_in[info->channel] < 0) {
+        channel = array_index_nospec(channel, hdspm->max_channels_in);
+        if (hdspm->channel_map_in[channel] < 0) {


dev_info(hdspm-&gt;card-&gt;dev,
"snd_hdspm_channel_info: input channel %d mapped out\n",
- info-&gt;channel);
+ channel);
return -EINVAL;
}

-info-&gt;offset = hdspm-&gt;channel_map_in[info-&gt;channel] *
+info-&gt;offset = hdspm-&gt;channel_map_in[channel] *
HDSPM_CHANNEL_BUFFER_BYTES;
}

@@ -6909,7 +6913,8 @@
if (hdspm-&gt;port)
pci_release_regions(hdspm-&gt;pci);

-pci_disable_device(hdspm-&gt;pci);
+if (pci_is_enabled(hdspm-&gt;pci))
+pci_disable_device(hdspm-&gt;pci);
return 0;
}

--- linux-4.15.0.orig/sound/pci/rme9652/rme9652.c
+++ linux-4.15.0/sound/pci/rme9652/rme9652.c
@@ -26,6 +26,7 @@
#include <linux/pci.h>
#include <linux/module.h>
#include <sound/core.h>
+#include <linux/nospec.h>
#include <sound/control.h>
#include <linux/io.h>
+#include <linux/nospec.h>

#include <sound/core.h>
#include <sound/control.h>
@@ -1760,7 +1761,8 @@
if (rme9652-&gt;port)
pci_release_regions(rme9652-&gt;pci);

-pci_disable_device(rme9652-&gt;pci);
+if (pci_is_enabled(rme9652-&gt;pci))
+pci_disable_device(rme9652-&gt;pci);
return 0;
}

@@ -2071,9 +2073,10 @@
if (snd_BUG_ON(info-&gt;channel &gt;= RME9652_NCHANNELS))
return -EINVAL;

-if ((chn = rme9652-&gt;channel_map[info-&gt;channel]) &lt; 0) {
+chn = rme9652-&gt;channel_map[array_index_nospec(info-&gt;channel,
+ RME9652_NCHANNELS);}
+if (chn < 0)
  return -EINVAL;
-
  info->offset = chn * RME9652_CHANNEL_BUFFER_BYTES;
  info->first = 0;
--- linux-4.15.0.orig/sound/pci/trident/trident.c
+++ linux-4.15.0/sound/pci/trident/trident.c
@@ -123,7 +123,7 @@
 } else {
   strcpy(card->shortname, "Trident ");
 }
-strcat(card->shortname, card->driver);
+strcat(card->shortname, str);
 sprintf(card->longname, "%s PCI Audio at 0x%lx, irq %d", card->shortname, trident->port, trident->irq);

--- linux-4.15.0.orig/sound/pci/vx222/vx222_ops.c
+++ linux-4.15.0/sound/pci/vx222/vx222_ops.c
@@ -275,7 +275,7 @@
 length >>= 2; /* in 32bit words */
 /* Transfer using pseudo-dma. */
 for (; length > 0; length--) {
-outl(cpu_to_le32(*addr), port);
+outl(*addr, port);
  addr++;
 }
 addr = (u32 *)runtime->dma_area;
@@ -285,7 +285,7 @@
 count >>= 2; /* in 32bit words */
 /* Transfer using pseudo-dma. */
 for (; count > 0; count--) {
-outl(cpu_to_le32(*addr), port);
+outl(*addr, port);
  addr++;
 }
@@ -313,7 +313,7 @@
 length >>= 2; /* in 32bit words */
 /* Transfer using pseudo-dma. */
 for (; length > 0; length--)
-  *addr++ = le32_to_cpu(inl(port));
+  *addr++ = inl(port);
  addr = (u32 *)runtime->dma_area;
 pipe->hw_ptr = 0;
 }
@@ -321,7 +321,7 @@
count >>= 2; /* in 32bit words */
/* Transfer using pseudo-dma. */
for (; count > 0; count--)
  -addr++ = le32_to_cpu(inl(port));
  +addr++ = inl(port);

vx2_release_pseudo_dma(chip);
}
--- linux-4.15.0.orig/sound/pcmcia/vx/vxp_ops.c
+++ linux-4.15.0/sound/pcmcia/vx/vxp_ops.c
@@ -375,7 +375,7 @@
    length >>= 1; /* in 16bit words */
    /* Transfer using pseudo-dma. */
    for (; length > 0; length--) {
-      outw(cpu_to_le16(*addr), port);
+      outw(*addr, port);
        addr++;
    }
    addr = (unsigned short *)runtime->dma_area;
@@ -385,7 +385,7 @@
    length >>= 1; /* in 16bit words */
    /* Transfer using pseudo-dma. */
    for (; count > 0; count--) {
-      outw(cpu_to_le16(*addr), port);
+      outw(*addr, port);
        addr++;
    }
    vx_release_pseudo_dma(chip);
@@ -417,7 +417,7 @@
    length >>= 1; /* in 16bit words */
    /* Transfer using pseudo-dma. */
    for (; length > 0; length--)
-      *addr++ = le16_to_cpu(inw(port));
+      *addr++ = inw(port);
    addr = (unsigned short *)runtime->dma_area;
    pipe->hw_ptr = 0;
    }
@@ -425,12 +425,12 @@
    count >>= 1; /* in 16bit words */
    /* Transfer using pseudo-dma. */
    for (; count > 1; count--)
-      *addr++ = le16_to_cpu(inw(port));
+      *addr++ = inw(port);
    /* Disable DMA */
    pchip->regDIALOG &= ~VXP_DLG_DMAREAD_SEL_MASK;
    vx_outb(chip, DIALOG, pchip->regDIALOG);
    /* Read the last word (16 bits) */
-    *addr = le16_to_cpu(inw(port));
/* addr = inw(port); */
*pchip->regDIALOG &= ~VXP_DLG_DMA16_SEL_MASK;
vx_outb(chip, DIALOG, pchip->regDIALOG);
--- linux-4.15.0.orig/sound/ppc/powermac.c
+++ linux-4.15.0/sound/ppc/powermac.c
@@ -90,7 +90,11 @@
 sprintf(card->shortname, "PowerMac %s", name_ext);
sprintf(card->longname, "%s (Dev %d) Sub-frame %d",
 card->shortname, chip->device_id, chip->subframe);
- if ( snd_pmac_tumbler_init(chip) < 0 || snd_pmac_tumbler_post_init() < 0)
+ err = snd_pmac_tumbler_init(chip);
+ if (err < 0)
+ goto __error;
+ err = snd_pmac_tumbler_post_init();
+ if (err < 0)
+ goto __error;
 break;
case PMAC_AWACS:
--- linux-4.15.0.orig/sound/sh/aica.c
+++ linux-4.15.0/sound/sh/aica.c
@@ -117,10 +117,10 @@
 }
/* spu_memload - write to SPU address space */
-static void spu_memload(u32 toi, void *from, int length)
+static void spu_memload(u32 toi, const void *from, int length)
{ unsigned long flags;
- u32 *froml = from;
+ const u32 *froml = from;
 u32 __iomem *to = (u32 __iomem *) (SPU_MEMORY_BASE + toi);
 int i;
 u32 val;
@@ -303,7 +303,7 @@
 }
 struct snd_card_aica *dreamcastcard = from_timer(dreamcastcard,
 t, timer);
-struct snd_pcm_substream *substream = dreamcastcard->timer_substream;
+struct snd_pcm_substream *substream = dreamcastcard->substream;
/*timer function - so cannot sleep */
 int play_period;
 struct snd_pcm_runtime *runtime;
@@ -335,13 +335,6 @@
 dreamcastcard = substream->pcm->private_data;
/* get the queue to do the work */
 schedule_work(&((dreamcastcard->spu_dma_work));
-/* Timer may already be running */
if (unlikely(dreamcastcard->timer_substream)) {
    mod_timer(&dreamcastcard->timer, jiffies + 4);
    return;
}

-timer_setup(&dreamcastcard->timer, aica_period_elapsed, 0);
-dreamcastcard->timer_substream = substream;
-mod_timer(&dreamcastcard->timer, jiffies + 4);
}

@@ -379,8 +372,8 @@
{
struct snd_card_aica *dreamcast = substream->pcm->private_data;
flush_work(&(dreamcastcard->spu_dma_work));
-if (dreamcastcard->timer_substream)
-    del_timer(&dreamcastcard->timer);
+    del_timer(&dreamcastcard->timer);
+    dreamcastcard->substream = NULL;
kfree(dreamcastcard->channel);
spu_disable();
return 0;
@@ -615,6 +608,7 @@
"Yamaha AICA Super Intelligent Sound Processor for SEGA Dreamcast");
/* Prepare to use the queue */
INIT_WORK(&(dreamcastcard->spu_dma_work), run_spudma);
+timer_setup(&dreamcastcard->timer, aica_period_elapsed, 0);
/* Load the PCM 'chip' */
err = snd_aicapcmchip(dreamcastcard, 0);
if (unlikely(err < 0))
    --- linux-4.15.0.orig/sound/sh/sh_dac_audio.c
+++ linux-4.15.0/sound/sh/sh_dac_audio.c
@@ -190,7 +190,6 @@
{
/* channel is not used (interleaved data) */
struct snd_sh_dac *chip = snd_pcm_substream_chip(substream);
-struct snd_pcm_runtime *runtime = substream->runtime;

if (copy_from_user_toio(chip->data_buffer + pos, src, count))
    return -EFAULT;
@@ -210,7 +209,6 @@
{
/* channel is not used (interleaved data) */
struct snd_sh_dac *chip = snd_pcm_substream_chip(substream);
-struct snd_pcm_runtime *runtime = substream->runtime;

memcpy_toio(chip->data_buffer + pos, src, count);
chip->buffer_end = chip->data_buffer + pos + count;
@@ -229,7 +227,6 @@
/* channel is not used (interleaved data) */
struct snd_sh_dac *chip = snd_pcm_substream_chip(substream);
-struct snd_pcm_runtime *runtime = substream->runtime;

memset_io(chip->data_buffer + pos, 0, count);
chip->buffer_end = chip->data_buffer + pos + count;
--- linux-4.15.0.orig/sound/soc/atmel/Kconfig
+++ linux-4.15.0/sound/soc/atmel/Kconfig
@@ -25,6 +25,8 @@
config SND_ATMEL_SOC_SSC_DMA
tristate
+select SND_ATMEL_SOC_DMA
+select SND_ATMEL_SOC_PDC

config SND_ATMEL_SOC_SSC
tristate
--- linux-4.15.0.orig/sound/soc/au1x/ac97c.c
+++ linux-4.15.0/sound/soc/au1x/ac97c.c
@@ -91,8 +91,8 @@
do {
 mutex_lock(&ctx->lock);

-tmo = 5;
-while (((RD(ctx, AC97_STATUS) & STAT_CP) && tmo--)
+tmo = 6;
+while (((RD(ctx, AC97_STATUS) & STAT_CP) && --tmo)
udelay(21); /* wait an ac97 frame time */
if (!tmo) {
 pr_debug("ac97rd timeout #1\n");
 @ @ -105,7 +105,7 @@
 * poll, Forrest, poll...
 */
 tmo = 0x10000;
-while (((RD(ctx, AC97_STATUS) & STAT_CP) && tmo--)
+while (((RD(ctx, AC97_STATUS) & STAT_CP) && --tmo)
asm volatile ("nop");
data = RD(ctx, AC97_CMDRESP);

--- linux-4.15.0.orig/sound/soc/cirrus/edb93xx.c
+++ linux-4.15.0/sound/soc/cirrus/edb93xx.c
@@ -67,7 +67,7 @@
 .cpu_dai_name = "ep93xx-i2s",
 .codec_name = "spi0.0",
 .codec_dai_name = "cs4271-hifi",
-.dai_fmt = SND_SOC_DAIFMT_I2S | SND_SOC_DAIFMT_NB_IF |
+.dai_fmt = SND_SOC_DAIFMT_I2S | SND_SOC_DAIFMT_NB_NF |
 SND_SOC_DAIFMT_CBS_CFS,
.ops &= &edb93xx_ops,
];
--- linux-4.15.0.orig/sound/soc/cirrus/ep93xx-i2s.c
+++ linux-4.15.0/sound/soc/cirrus/ep93xx-i2s.c
@@ -51,7 +51,9 @@
#define EP93XX_I2S_WRDLEN_24(1 << 0)
#define EP93XX_I2S_WRDLEN_32(2 << 0)

-#define EP93XX_I2S_LINCTRLDATA_R_JUST(1 << 2) /* Right justify */
+#define EP93XX_I2S_RXLINCTRLDATA_R_JUST(Bit(1) /* Right justify */
 +
+#define EP93XX_I2S_TXLINCTRLDATA_R_JUST(Bit(2) /* Right justify */

#define EP93XX_I2S_CLKCFG_LRS(1 << 0) /* lrclk polarity */
#define EP93XX_I2S_CLKCFG_CKP(1 << 1) /* Bit clock polarity */
@@ -170,25 +172,25 @@
unsigned int fmt)
{
 struct ep93xx_i2s_info *info = snd_soc_dai_get_drvdata(cpu_dai);
-unsigned int clk_cfg, lin_ctrl;
+unsigned int clk_cfg;
+unsigned int txlin_ctrl = 0;
+unsigned int rxlin_ctrl = 0;

 clk_cfg  = ep93xx_i2s_read_reg(info, EP93XX_I2S_RXCLKCFG);
-lin_ctrl = ep93xx_i2s_read_reg(info, EP93XX_I2S_RXLINCTRLDATA);

 switch (fmt & SND_SOC_DAIFMT_FORMAT_MASK) {
 case SND_SOC_DAIFMT_I2S:
 clk_cfg |= EP93XX_I2S_CLKCFG_REL;
-lin_ctrl &= ~EP93XX_I2S_LINCTRLDATA_R_JUST;
 break;

 case SND_SOC_DAIFMT_LEFT_J:
 clk_cfg &= ~EP93XX_I2S_CLKCFG_REL;
-lin_ctrl &~ EP93XX_I2S_LINCTRLDATA_R_JUST;
 break;

 case SND_SOC_DAIFMT_RIGHT_J:
 clk_cfg &~ EP93XX_I2S_CLKCFG_REL;
-lin_ctrl |= EP93XX_I2S_LINCTRLDATA_R_JUST;
+txlin_ctrl |= EP93XX_I2S_TXLINCTRLDATA_R_JUST;
+rxlin_ctrl |= EP93XX_I2S_RXLINCTRLDATA_R_JUST;
 break;

 default:
 @@ -213,32 +215,32 @@
 switch (fmt & SND_SOC_DAIFMT_INV_MASK) {


case SND_SOC_DAIFMT_NB_NF:
    /* Negative bit clock, lrclk low on left word */
    clk_cfg &= ~(EP93XX_I2S_CLKCFG_CKP | EP93XX_I2S_CLKCFG_REL);
    break;

case SND_SOC_DAIFMT_NB_IF:
    /* Negative bit clock, lrclk low on right word */
    clk_cfg &= ~EP93XX_I2S_CLKCFG_CKP;
    clk_cfg |= EP93XX_I2S_CLKCFG_REL;
    break;

case SND_SOC_DAIFMT_IB_NF:
    /* Positive bit clock, lrclk low on left word */
    clk_cfg |= EP93XX_I2S_CLKCFG_CKP;
    clk_cfg &= ~EP93XX_I2S_CLKCFG_REL;
    break;

case SND_SOC_DAIFMT_IB_IF:
    /* Positive bit clock, lrclk low on right word */
    clk_cfg |= EP93XX_I2S_CLKCFG_CKP | EP93XX_I2S_CLKCFG_REL;
    break;
}

/* Write new register values */
ep93xx_i2s_write_reg(info, EP93XX_I2S_RXCLKCFG, clk_cfg);
ep93xx_i2s_write_reg(info, EP93XX_I2S_TXCLKCFG, clk_cfg);
ep93xx_i2s_write_reg(info, EP93XX_I2S_RXLINCTRLDATA, lin_ctrl);
ep93xx_i2s_write_reg(info, EP93XX_I2S_TXLINCTRLDATA, lin_ctrl);
ep93xx_i2s_write_reg(info, EP93XX_I2S_RXLINCTRLDATA, rxlin_ctrl);
ep93xx_i2s_write_reg(info, EP93XX_I2S_TXLINCTRLDATA, txlin_ctrl);
return 0;
}
--- linux-4.15.0.orig/sound/soc/codecs/cs35l33.c
+++ linux-4.15.0/sound/soc/codecs/cs35l33.c
@@ -1206,6 +1206,7 @@
     dev_err(&i2c_client->dev,
     "CS35L33 Device ID (%X). Expected ID %X\n",
     devid, CS35L33_CHIP_ID);
+    ret = -EINVAL;
    goto err_enable;
}

--- linux-4.15.0.orig/sound/soc/codecs/cs35l35.c
+++ linux-4.15.0/sound/soc/codecs/cs35l35.c
@@ -1106,6 +1106,7 @@
     .cache_type = REGCACHE_RBTREE,
     .use_single_rw = true,
 }

static irqreturn_t cs35l35_irq(int irq, void *data)
--- linux-4.15.0.orig/sound/soc/codecs/cs4265.c
+++ linux-4.15.0/sound/soc/codecs/cs4265.c
@@ -60,7 +60,7 @@
     switch (reg) {
     -case CS4265_CHIP_ID ... CS4265_SPDIF_CTL2:
     +case CS4265_CHIP_ID ... CS4265_MAX_REGISTER:
       return true;
     default:
       return false;
@@ -157,8 +157,8 @@
     SND_SOC_BYTES("C Data Buffer", CS4265_C_DATA_BUFF, 24),
     {};

--- linux-4.15.0.orig/sound/soc/codecs/cs4270.c
+++ linux-4.15.0/sound/soc/codecs/cs4270.c
@@ -643,6 +643,7 @@
     .reg_defaults =		cs4270_reg_defaults,
     .num_reg_defaults =	ARRAY_SIZE(cs4270_reg_defaults),
     .cache_type =		REGCACHE_RBTREE,
.write_flag_mask = CS4270_I2C_INCR,
.readable_reg = cs4270_reg_is_readable,
.volatile_reg = cs4270_reg_is_volatile,
--- linux-4.15.0.orig/sound/soc/codecs/cs42l42.c
+++ linux-4.15.0/sound/soc/codecs/cs42l42.c
@@ -404,8 +404,8 @@
    .cache_type = REGCACHE_RBTREE,
};

-static DECLARE_TLV_DB_SCALE(adc_tlv, -9600, 100, false);
-static DECLARE_TLV_DB_SCALE(mixer_tlv, -6200, 100, false);
+static DECLARE_TLV_DB_SCALE(adc_tlv, -9700, 100, true);
+static DECLARE_TLV_DB_SCALE(mixer_tlv, -6300, 100, true);

static const char * const cs42l42_hpf_freq_text[] = {
    "1.86Hz", "120Hz", "235Hz", "466Hz"
@@ -424,34 +424,23 @@
    CS42L42_ADC_WNF_CF_SHIFT,
    cs42l42_wnf3_freq_text);

-static const char * const cs42l42_wnf05_freq_text[] = {
    "280Hz", "315Hz", "350Hz", "385Hz", 
    "420Hz", "455Hz", "490Hz", "525Hz"
-};
-}
-}
-static SOC_ENUM_SINGLE_DECL(cs42l42_wnf05_freq_enum, CS42L42_ADC_WNF_HPF_CTL,
- CS42L42_ADC_WNF_CF_SHIFT,
- cs42l42_wnf05_freq_text);
-
-static const struct snd_kcontrol_new cs42l42_snd_controls[] = {
    /* ADC Volume and Filter Controls */
    SOC_SINGLE("ADC Notch Switch", CS42L42_ADC_CTL,
        -CS42L42_ADC_NOTCH_DIS_SHIFT, true, false),
    +CS42L42_ADC_NOTCH_DIS_SHIFT, true, true),
    SOC_SINGLE("ADC Weak Force Switch", CS42L42_ADC_CTL,
        CS42L42_ADC_FORCE_WEAK_VCM_SHIFT, true, false),
    SOC_SINGLE("ADC Invert Switch", CS42L42_ADC_CTL,
        CS42L42_ADC_INV_SHIFT, true, false),
    SOC_SINGLE("ADC Boost Switch", CS42L42_ADC_CTL,
        CS42L42_ADC_DIG_BOOST_SHIFT, true, false),
    -SOC_SINGLE_SX_TLV("ADC Volume", CS42L42_ADC_VOLUME,
        -CS42L42_ADC_VOL_SHIFT, 0xA0, 0x6C, adc_tlv),
    +SOC_SINGLE_S8_TLV("ADC Volume", CS42L42_ADC_VOLUME, -97, 12, adc_tlv),
    SOC_SINGLE("ADC WNF Switch", CS42L42_ADC_WNF_HPF_CTL,
        CS42L42_ADC_WNF_EN_SHIFT, true, false),
    SOC_SINGLE("ADC HPF Switch", CS42L42_ADC_WNF_HPF_CTL,
        CS42L42_ADC_HPFF_EN_SHIFT, true, false),
SOC_ENUM("HPF Corner Freq", cs42l42_hpfd_freq_enum),
SOC_ENUM("WNF 3dB Freq", cs42l42_wnf3_freq_enum),
-SOC_ENUM("WNF 05dB Freq", cs42l42_wnf05_freq_enum),

/* DAC Volume and Filter Controls */
SOC_SINGLE("DACA Invert Switch", CS42L42_DAC_CTL1,
@@ -462,7 +451,7 @@
CS42L42_DAC_HPF_EN_SHIFT, true, false),
SOC_DOUBLE_R_TLV("Mixer Volume", CS42L42_MIXER_CHA_VOL,
CS42L42_MIXER_ChB_VOL, CS42L42_MIXER_CH_VOL_SHIFT,
+0x3f, 1, mixer_tlv)
+0x3f, 1, mixer_tlv)
};

static int cs42l42_hpdrv_evt(struct snd_soc_dapm_widget *w,
@@ -672,15 +661,6 @@
CS42L42_FSYNC_PULSE_WIDTH_MASK,
CS42L42_FSYNC_PULSE_WIDTH_SHIFT );
-snd_soc_update_bits(codec,
-CS42L42_ASP_FRM_CFG,
-CS42L42_ASP_5050_MASK,
-CS42L42_ASP_5050_MASK);  
-/* Set the frame delay to 1.0 SCLK clocks */
-snd_soc_update_bits(codec, CS42L42_ASP_FRM_CFG,
-CS42L42_ASP_FSD_MASK,
-CS42L42_ASP_FSD_1_0 <<
-CS42L42_ASP_FSD_SHIFT);
/* Set the sample rates (96k or lower) */
snd_soc_update_bits(codec, CS42L42_FS_RATE_EN,
CS42L42_FS_EN_MASK,
@@ -794,7 +774,18 @@
/* interface format */
switch (fmt & SND_SOC_DAIFMT_FORMAT_MASK) {
case SND_SOC_DAIFMT_I2S:
-case SND_SOC_DAIFMT_LEFT_J: 
+ /* 5050 mode, frame starts on falling edge of LRCLK, 
+ * frame delayed by 1.0 SCLKs 
+ */
+ snd_soc_update_bits(codec,
+ CS42L42_ASP_FRM_CFG,
+ CS42L42_ASP_STP_MASK | 
+ CS42L42_ASP_5050_MASK | 
+ CS42L42_ASP_FSD_MASK, 
+ CS42L42_ASP_5050_MASK | 
+ (CS42L42_ASP_FSD_1_0 << 
+ CS42L42_ASP_FSD_SHIFT));


break;
default:
return -EINVAL;
@@ -1809,7 +1800,7 @@
dev_dbg(&i2c_client->dev, "Found reset GPIO\n");
gpiod_set_value_cansleep(cs42l42->reset_gpio, 1);
}
-mdelay(3);
+usleep_range(CS42L42_BOOT_TIME_US, CS42L42_BOOT_TIME_US * 2);

/* Request IRQ */
ret = devm_request_threaded_irq(&i2c_client->dev,
@@ -1936,6 +1927,7 @@
dev_err(&i2c_client->dev,
@@ -743,6 +743,7 @@
#define CS42L42_ADC_PDN_MASK (1 << CS42L42_ADC_PDN_SHIFT)
#define CS42L42_PDN_ALL_SHIFT	0
#define CS42L42_PDN_ALL_MASK	(1 << CS42L42_PDN_ALL_SHIFT)

@@ -743,6 +743,7 @@
#define CS42L42_PDN_ALL_MASK (1 << CS42L42_PDN_ALL_SHIFT)

#define CS42L42_ADC_PDN_MASK (1 << CS42L42_ADC_PDN_SHIFT)
+#define CS42L42_BOOT_TIME_US	3000

static const char *const cs42l42_supply_names[CS42L42_NUM_SUPPLIES] = {
"VA",
--- linux-4.15.0.orig/sound/soc/codecs/cs42l56.c
+++ linux-4.15.0/sound/soc/codecs/cs42l56.c
@@ -1266,6 +1266,7 @@
dev_err(&i2c_client->dev,
@@ -1266,6 +1266,7 @@
#define CS42L42.Num_SUPPLIES5
+#define CS42L42_BOOT_TIME_US3000

static const char *const cs42l42_supply_names[CS42L42_NUM_SUPPLIES] = {
"VA",
--- linux-4.15.0.orig/sound/soc/codecs/cs42l56.c
+++ linux-4.15.0/sound/soc/codecs/cs42l56.c
@@ -1266,6 +1266,7 @@
dev_err(&i2c_client->dev,
"CS42L56 Device ID (%X). Expected %Xn",
devid, CS42L56.DEVID);
+ret = -EINVAL;
goto err_enable;
}
alpha_rev = reg & CS42L56_AREV_MASK;
@@ -1323,7 +1324,7 @@
ret = snd_soc_register_codec(&i2c_client->dev,
&soc_codec_dev_cs42l56, &cs42l56_dai, 1);
if (ret < 0)
-    return ret;
+    goto err_enable;
+    goto err_enable;

return 0;

--- linux-4.15.0.orig/sound/soc/codecs/cs42xx8.c
+++ linux-4.15.0/sound/soc/codecs/cs42xx8.c
@@ -559,6 +559,7 @@
         msleep(5);
    regcache_cache_only(cs42xx8->regmap, false);
    +regcache_mark_dirty(cs42xx8->regmap);

    ret = regcache_sync(cs42xx8->regmap);
    if (ret) {
--- linux-4.15.0.orig/sound/soc/codecs/cs4349.c
+++ linux-4.15.0/sound/soc/codecs/cs4349.c
@@ -380,6 +380,7 @@
 .driver = {
         .name= "cs4349",
         .of_match_table= cs4349_of_match,
--- linux-4.15.0.orig/sound/soc/codecs/es8316.c
+++ linux-4.15.0/sound/soc/codecs/es8316.c
@@ -46,20 +46,18 @@
        static const SNDRV_CTL_TLVD_DECLARE_DB_SCALE(alc_max_gain_tlv, -650, 150, 0);
        static const SNDRV_CTL_TLVD_DECLARE_DB_SCALE(alc_min_gain_tlv, -1200, 150, 0);
        static const SNDRV_CTL_TLVD_DECLARE_DB_SCALE(alc_target_tlv, -1650, 150, 0);
- static const SNDRV_CTL_TLVD_DECLARE_DB_SCALE(hpmixer_gain_tlv, -1200, 150, 0),
+ static const SNDRV_CTL_TLVD_DECLARE_DB_RANGE(hpmixer_gain_tlv,
+ 0, 4, TLV_DB_SCALE_ITEM(-1200, 150, 0),
+ 8, 11, TLV_DB_SCALE_ITEM(-450, 150, 0),
+);

        static const SNDRV_CTL_TLVD_DECLARE_DB_RANGE(adc_pga_gain_tlv,
 0, 0, TLV_DB_SCALE_ITEM(-350, 0, 0),
 1, 1, TLV_DB_SCALE_ITEM(0, 0, 0),
 2, 2, TLV_DB_SCALE_ITEM(250, 0, 0),
 3, 3, TLV_DB_SCALE_ITEM(450, 0, 0),
-4, 4, TLV_DB_SCALE_ITEM(700, 0, 0),

-5, 5, TLV_DB_SCALE_ITEM(1000, 0, 0),
-6, 6, TLV_DB_SCALE_ITEM(1300, 0, 0),
-7, 7, TLV_DB_SCALE_ITEM(1600, 0, 0),
-8, 8, TLV_DB_SCALE_ITEM(1800, 0, 0),
-9, 9, TLV_DB_SCALE_ITEM(2100, 0, 0),
-10, 10, TLV_DB_SCALE_ITEM(2400, 0, 0),
+4, 7, TLV_DB_SCALE_ITEM(700, 300, 0),
+8, 10, TLV_DB_SCALE_ITEM(1800, 300, 0),
);

static const SNDRV_CTL_TLVD_DECLARE_DB_RANGE(hpout_vol_tlv,
    @ @ @ -84.7 +82.7 @ @
SOC_DOUBLE_TLV("Headphone Playback Volume", ES8316_CPHP_ICAL_VOL,
    4, 0, 3, 1, hpout_vol_tlv),
SOC_DOUBLE_TLV("Headphone Mixer Volume", ES8316_HPMIX_VOL,
    -    0, 4, 7, 0, hpmixer_gain_tlv),
    +    0, 4, 11, 0, hpmixer_gain_tlv),

SOC_ENUM("Playback Polarity", dacpol),
SOC_DOUBLE_R_TLV("DAC Playback Volume", ES8316_DAC_VOLL,
--- linux-4.15.0.orig/sound/soc/codecs/es8328.c
+++ linux-4.15.0/sound/soc/codecs/es8328.c
@@ -84,7 +82,7 @@
   ARRAY_SIZE(es8328_line_texts),
   es8328_line_texts);
static const struct snd_kcontrol_new es8328_right_line_controls =
-SOC_DAPM_ENUM("Route", es8328_lline_enum);
+SOC_DAPM_ENUM("Route", es8328_rline_enum);

/* Left Mixer */
static const struct snd_kcontrol_new es8328_left_mixer_controls[] = {
--- linux-4.15.0.orig/sound/soc/codecs/hdac_hdmi.c
+++ linux-4.15.0/sound/soc/codecs/hdac_hdmi.c
@@ -142,14 +142,14 @@
   hdcad_hdmi_get_pcm_from_cvt(struct hdcad_hdmi_priv *hdmi,
       struct hdcad_hdmi_cvt *cvt)
   {
-    struct hdcad_hdmi_pcm *pcm = NULL;
+    struct hdcad_hdmi_pcm *pcm;

   list_for_each_entry(pcm, &hdmi->pcm_list, head) {
     if (pcm->cvt == cvt)
       -break;
       +return pcm;
   }

   -return pcm;
   +return NULL;
static void hdac_hdmi_jack_report(struct hdac_hdmi_pcm *pcm, 

if (ret) 
return ret;

+/* Filter out 44.1, 88.2 and 176.4Khz */
+rates &= ~(SNDRV_PCM_RATE_44100 | SNDRV_PCM_RATE_88200 | 
+ SNDRV_PCM_RATE_176400);
+if (!rates) 
+return -EINVAL;
+
+sprintf(dai_name, "intel-hdmi-hifi%d", i+1); 
+hdmi_dais[i].name = devm_kstrdup(&hdac->dev, 
+dai_name, GFP_KERNEL);

--- linux-4.15.0.orig/sound/soc/codecs/hdmi-codec.c
+++ linux-4.15.0/sound/soc/codecs/hdmi-codec.c
@@ -291,10 +291,6 @@

SND_SOC_DAPM_OUTPUT("TX"), 
];

-static const struct snd_soc_dapm_route hdmi_routes[] = {
-    { "TX", NULL, "Playback" },
-};
-
enum { 
    DAI_ID_I2S = 0,
    DAI_ID_SPDIF,
@@ -443,8 +439,12 @@
    if (!ret) {
    ret = snd_pcm_hw_constraint_eld(substream->runtime, 
    hcp->eld);
-    if (ret) {
-        mutex_lock(&hcp->current_stream_lock);
-        hcp->current_stream = NULL;
-        mutex_unlock(&hcp->current_stream_lock);
+    return ret;
+}
    } 
    /* Select chmap supported */
    hdmi_codec_eld_chmap(hcp);
@@ -533,73 +533,71 @@
    }
    struct hdmi_codec_priv *hcp = snd_soc_dai_get_drvdata(dai);
    struct hdmi_codec_daifmt cf = { 0 };
-    int ret = 0;
-    /* Select chmap supported */
-    hdmi_codec_eld_chmap(hcp);
-    if (ret) {
-        mutex_lock(&hcp->current_stream_lock);
-        hcp->current_stream = NULL;
-        mutex_unlock(&hcp->current_stream_lock);
-    return ret;
-}
-/* Select chmap supported */
-    hdmi_codec_eld_chmap(hcp);
-    if (ret) {
-        mutex_lock(&hcp->current_stream_lock);
-        hcp->current_stream = NULL;
-        mutex_unlock(&hcp->current_stream_lock);
-    return ret;
-}
-/* Select chmap supported */
-    hdmi_codec_eld_chmap(hcp);
-    if (ret) {
-        mutex_lock(&hcp->current_stream_lock);
-        hcp->current_stream = NULL;
-        mutex_unlock(&hcp->current_stream_lock);
-    return ret;
-}
-/* Select chmap supported */
-    hdmi_codec_eld_chmap(hcp);
-    if (ret) {
-        mutex_lock(&hcp->current_stream_lock);
-        hcp->current_stream = NULL;
-        mutex_unlock(&hcp->current_stream_lock);
-    return ret;
-}
dev_dbg(dai->dev, "\%s()\n", __func__);

-if (dai->id == DAI_ID_SPDIF) {
  cf.fmt = HDMI_SPDIF;
} else {
  switch (fmt & SND_SOC_DAIFMT_MASTER_MASK) {
  -case SND_SOC_DAIFMT_CBM_CFM:
  -cf.bit_clk_master = 1;
  -cf.frame_clk_master = 1;
  -break;
  -case SND_SOC_DAIFMT_CBS_CFM:
  -cf.frame_clk_master = 1;
  -break;
  -case SND_SOC_DAIFMT_CBM_CFS:
  -cf.bit_clk_master = 1;
  -break;
  -case SND_SOC_DAIFMT_CBS_CFS:
  -break;
  -default:
  -return -EINVAL;
  -}
+if (dai->id == DAI_ID_SPDIF)
+return 0;

+switch (fmt & SND_SOC_DAIFMT_MASTER_MASK) {
+  -case SND_SOC_DAIFMT_CBM_CFM:
+    cf.bit_clk_master = 1;
+    cf.frame_clk_master = 1;
+    break;
+  -case SND_SOC_DAIFMT_CBS_CFM:
+    cf.frame_clk_master = 1;
+    break;
+  -case SND_SOC_DAIFMT_CBM_CFS:
+    break;
  -switch (fmt & SND_SOC_DAIFMT_INV_MASK) {
  -case SND_SOC_DAIFMT_NB_NF:
  -break;
  -case SND_SOC_DAIFMT_NB_IF:
  -cf.frame_clk_inv = 1;
  -break;
  -case SND_SOC_DAIFMT_IB_NF:
  -cf.bit_clk_inv = 1;
  -break;
  -case SND_SOC_DAIFMT_IB_IF:
  -cf.frame_clk_inv = 1;
  -cf.bit_clk_inv = 1;
  -break;
  -}
  +switch (fmt & SND_SOC_DAIFMT_MASTER_MASK) {
  +  -case SND_SOC_DAIFMT_CBM_CFM:
  +    cf.bit_clk_master = 1;
  +    cf.frame_clk_master = 1;
  +    break;
  +  -case SND_SOC_DAIFMT_CBS_CFM:
  +    cf.frame_clk_master = 1;
  +    break;
  +  -case SND_SOC_DAIFMT_CBM_CFS:
  +    break;
  +  }
  +case SND_SOC_DAIFMT_CBS_CFS:
  +cf.frame_clk_master = 1;
  +break;
  +case SND_SOC_DAIFMT_CBM_CFS:
  +break;
+cf.bit_clk_master = 1;
+break;
+case SND_SOC_DAIFMT_CBS_CFS:
+break;
+default:
+return -EINVAL;
+
-switch (fmt & SND_SOC_DAIFMT_INV_MASK) {
- case SND_SOC_DAIFMT_NB_NF:
- break;
- case SND_SOC_DAIFMT_NB_IF:
- cf.frame_clk_inv = 1;
- break;
- case SND_SOC_DAIFMT_IB_NF:
- cf.bit_clk_inv = 1;
- break;
- case SND_SOC_DAIFMT_IB_IF:
- cf.frame_clk_inv = 1;
- cf.bit_clk_inv = 1;
- break;
- default:
- dev_err(dai->dev, "Invalid DAI interface format\n");
- return -EINVAL;
- }
+switch (fmt & SND_SOC_DAIFMT_FORMAT_MASK) {
+ case SND_SOC_DAIFMT_I2S:
+ cf.fmt = HDMI_I2S;
+ break;
+ case SND_SOC_DAIFMT_DSP_A:
+ cf.fmt = HDMI_DSP_A;
+ break;
+ case SND_SOC_DAIFMT_DSP_B:
+ cf.fmt = HDMI_DSP_B;
+ break;
+ case SND_SOC_DAIFMT_RIGHT_J:
+ cf.fmt = HDMI_RIGHT_J;
+ break;
+ case SND_SOC_DAIFMT_LEFT_J:
+ cf.fmt = HDMI_LEFT_J;
+ break;
+ case SND_SOC_DAIFMT_AC97:
+ cf.fmt = HDMI_AC97;
+ break;
+ default:
+ dev_err(dai->dev, "Invalid DAI interface format\n");
+ return -EINVAL;
+ }

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+cf.fmt = HDMI_I2S;
+break;
+case SND_SOC_DAIFMT_DSP_A:
+cf.fmt = HDMI_DSP_A;
+break;
+case SND_SOC_DAIFMT_DSP_B:
+cf.fmt = HDMI_DSP_B;
+break;
+case SND_SOC_DAIFMT_RIGHT_J:
+cf.fmt = HDMI_RIGHT_J;
+break;
+case SND_SOC_DAIFMT_LEFT_J:
+cf.fmt = HDMI_LEFT_J;
+break;
+case SND_SOC_DAIFMT_AC97:
+cf.fmt = HDMI_AC97;
+break;
+default:
+dev_err(dai->dev, "Invalid DAI interface format\n");
+return -EINVAL;
}

hcp->daifmt[dai->id] = cf;

-return ret;
+return 0;
}

static int hdmi_codec_digital_mute(struct snd_soc_dai *dai, int mute)
@ @ -689,9 +687,23 @@
return snd_ctl_add(rtd->card->snd_card, kctl);
}

+static int hdmi_dai_probe(struct snd_soc_dai *dai)
+{
+ struct snd_soc_dapm_context *dapm;
+ struct snd_soc_dapm_route route = {
+ .sink = "TX",
+ .source = dai->driver->playback.stream_name,
+ };
+ +dapm = snd_soc_component_get_dapm(dai->component);
+ +return snd_soc_dapm_add_routes(dapm, &route, 1);
+ +
+ static const struct snd_soc_dai_driver hdmi_i2s_dai = {
+ .name = "i2s-hifi",
+ .dai

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.id = DAI_ID_I2S,
+  .probe = hdmi_dai_probe,
  .playback = {
    .stream_name = "I2S Playback",
    .channels_min = 2,
  }
@@ -707,6 +719,7 @@
static const struct snd_soc_dai_driver hdmi_spdif_dai = {
  .name = "spdif-hifi",
  .id = DAI_ID_SPDIF,
+  .probe = hdmi_dai_probe,
  .playback = {
    .stream_name = "SPDIF Playback",
    .channels_min = 2,
@@ -734,8 +747,6 @@
  .component_driver = {
    .dapm_widgets = hdmi_widgets,
    .num_dapm_widgets = ARRAY_SIZE(hdmi_widgets),
-   .dapm_routes = hdmi_routes,
-   .num_dapm_routes = ARRAY_SIZE(hdmi_routes),
    .of_xlate_dai_id = hdmi_of_xlate_dai_id,
  },
@@ -781,8 +792,12 @@
i++;
}
- if (hcd->spdif)
+ if (hcd->spdif) {
    hcp->daidrv[i] = hdmi_spdif_dai;
+   hcp->daifmt[DAI_ID_SPDIF].fmt = HDMI_SPDIF;
+ }
+ +dev_set_drvdata(dev, hcp);

ret = snd_soc_register_codec(dev, &hdmi_codec, hcp->daidrv,
    dai_count);
@@ -791,19 +806,12 @@
    __func__, ret);
 return ret;
}
- -dev_set_drvdata(dev, hcp);
 return 0;
}

static int hdmi_codec_remove(struct platform_device *pdev)
{
    struct device *dev = &pdev->dev;


-struct hdmi_codec_priv *hcp;
-
-hcp = dev_get_drvdata(dev);
-kfree(hcp->chmap_info);
-snd_soc_unregister_codec(dev);
+snd_soc_unregister_codec(&pdev->dev);

return 0;
}
--- linux-4.15.0.orig/sound/soc/codecs/max98090.c
+++ linux-4.15.0/sound/soc/codecs/max98090.c
@@ -1209,14 +1209,14 @@
&max98090_right_rcv_mixer Controls[0],
ARRAY_SIZE(max98090_right_rcv_mixer Controls),

-SND_SOC_DAPM_MUX("LINMOD Mux", M98090_REG_LOUTR_MIXER,
-M98090_LINMOD_SHIFT, 0, &max98090_linmod_mux),
+SND_SOC_DAPM_MUX("LINMOD Mux", SND_SOC_NOPM, 0, 0,
+&max98090_linmod_mux),

-SND_SOC_DAPM_MUX("MIXHPLSEL Mux", M98090_REG_HP_CONTROL,
-M98090_MIXHPLSEL_SHIFT, 0, &max98090_mixhplsel_mux),
+SND_SOC_DAPM_MUX("MIXHPLSEL Mux", SND_SOC_NOPM, 0, 0,
+&max98090_mixhplsel_mux),

-SND_SOC_DAPM_MUX("MIXHRPSEL Mux", M98090_REG_HP_CONTROL,
-M98090_MIXHRPSEL_SHIFT, 0, &max98090_mixhrpsel_mux),
+SND_SOC_DAPM_MUX("MIXHRPSEL Mux", SND_SOC_NOPM, 0, 0,
+&max98090_mixhrpsel_mux),

SND_SOC_DAPM_PGA("HP Left Out", M98090_REG_OUTPUT_ENABLE,
M98090_HPLEN_SHIFT, 0, NULL, 0),
@@ -1924,6 +1924,21 @@
return 0;
}

+static int max98090_dai_startup(struct snd_pcm_substream *substream,
+struct snd_soc_dai *dai)
+{
+struct snd_soc_component *component = dai->component;
+struct max98090_priv *max98090 = snd_soc_component_get_drvdata(component);
+unsigned int fmt = max98090->dai_fmt;
+
+/* Remove 24-bit format support if it is not in right justified mode. */
+if (!(fmt & SND_SOC_DAIFMT_FORMAT_MASK) != SND_SOC_DAIFMT_RIGHT_J) {
+substream->runtime->hw.formats = SNDRV_PCM_FMTBIT_S16_LE;
+snd_pcm_hw_constraint_msbits(substream->runtime, 0, 16, 16);
+}
+return 0;
+
+static int max98090_dai_hw_params(struct snd_pcm_substream *substream,
+     struct snd_pcm_hw_params *params,
+     struct snd_soc_dai *dai)
@@ -2106,10 +2121,8 @@
+    M98090_IULK_MASK, 0);
+
-static void max98090_pll_work(struct work_struct *work)
+static void max98090_pll_work(struct max98090_priv *max98090)
{
    struct max98090_priv *max98090 =
    -container_of(work, struct max98090_priv, pll_work);
    struct snd_soc_codec *codec = max98090->codec;

    if (!snd_soc_codec_is_active(codec))
@@ -2117,10 +2130,16 @@
        dev_info_ratelimited(codec->dev, "PLL unlocked\n");

        /* As the datasheet suggested, the maximum PLL lock time should be
        + 7 msec. The workaround resets the codec softly by toggling SHDN
        + off and on if PLL failed to lock for 10 msec. Notably, there is
        + no suggested hold time for SHDN off.
        +*/
+
        /* Toggle shutdown OFF then ON */
        snd_soc_update_bits(codec, M98090_REG_DEVICE_SHUTDOWN,
            M98090_SHDNN_MASK, 0);
        -msleep(10);
        snd_soc_update_bits(codec, M98090_REG_DEVICE_SHUTDOWN,
            M98090_SHDNN_MASK, M98090_SHDNN_MASK);
@@ -2262,7 +2281,7 @@
              @ @ -2262,7 +2281,7 @@

    if (active & M98090_ULK_MASK) {
        dev_dbg(codec->dev, "M98090_ULK\n");
        -schedule_work(&max98090->pll_work);
+max98090_pll_work(max98090);
    }

    if (active & M98090_JDET_MASK) {
@@ -2331,6 +2350,7 @@
        #define MAX98090_FORMATS (SNDRV_PCM_FMTBIT_S16_LE | SNDRV_PCM_FMTBIT_S24_LE)
static const struct snd_soc_dai_ops max98090_dai_ops = {
    .startup = max98090_dai_startup,
    .set_sysclk = max98090_dai_set_sysclk,
    .set_fmt = max98090_dai_set_fmt,
    .set_tdm_slot = max98090_set_tdm_slot,
@@ -2424,7 +2444,6 @@
     max98090_pll_det_enable_work);
 INIT_WORK(&max98090->pll_det_disable_work,
     max98090_pll_det_disable_work);
-@ -2424,7 +2444,6 @@
    max98090_pll_work);
/* Enable jack detection */
 snd_soc_write(codec, M98090_REG_JACK_DETECT,
@@ -2477,7 +2496,6 @@
 cancel_delayed_work_sync(&max98090->jack_work);
 cancel_delayed_work_sync(&max98090->pll_det_enable_work);
 cancel_work_sync(&max98090->pll_det_disable_work);
-@ -2424,7 +2444,6 @@
  cancel_work_sync(&max98090->pll_work);
 max98090->codec = NULL;
 return 0;
--- linux-4.15.0.orig/sound/soc/codecs/max98090.h
+++ linux-4.15.0/sound/soc/codecs/max98090.h
@@ -1533,7 +1533,6 @@
 struct delayed_work jack_work;
 struct delayed_work pll_det_enable_work;
 struct work_struct pll_det_disable_work;
-@ -1533,7 +1533,6 @@
 struct work_struct pll_work;
 struct snd_soc_jack *jack;
 unsigned int dai_fmt;
 int tdm_slots;
--- linux-4.15.0.orig/sound/soc/codecs/msm8916-wcd-analog.c
+++ linux-4.15.0/sound/soc/codecs/msm8916-wcd-analog.c
@@ -16,8 +16,8 @@
#define CDC_D_REVISION1	(0xf000)
#define CDC_D_PERPH_SUBTYPE(0xf005)
+-define CDC_D_INT_EN_SET(0x015)
+-define CDC_D_INT_EN_CLR(0x016)
 #define MBHC_SWITCH_INTBIT(7)
 #define MBHC_MIC_ELECTRICAL_INS_REM_DETBIT(6)
 #define MBHC_BUTTON_PRESS_DETBIT(5)
@@ -303,7 +303,7 @@
};

static const char *const adc2_mux_text[] = { "ZERO", "INP2", "INP3" };
static const char *const rdac2_mux_text[] = { "ZERO", "RX2", "RX1" };  
+static const char *const rdac2_mux_text[] = { "RX1", "RX2" };  
static const char *const hph_text[] = { "ZERO", "Switch", };

static const struct soc_enum hph_enum = SOC_ENUM_SINGLE_VIRT(@@ -318,7 +318,7 @@
/* RDAC2 MUX */
static const struct soc_enum rdac2_mux_enum = SOC_ENUM_SINGLE(-CDC_D_CDC_CONN_HPHR_DAC_CTL, 0, 3, rdac2_mux_text);
+CDC_D_CDC_CONN_HPHR_DAC_CTL, 0, 2, rdac2_mux_text);

static const struct snd_kcontrol_new spkr_switch[] = {
SOC_DAPM_SINGLE("Switch", CDC_A_SPKR_DAC_CTL, 7, 1, 0)@@ -883,10 +883,10 @@
SND_SOC_DAPM_SUPPLY("MIC BIAS External1", CDC_A_MICB_1_EN, 7, 0,
   pm8916_wcd_analog_enable_micbias_ext1,
   -SND_SOC_DAPM_PRE_PMU | SND_SOC_DAPM_POST_PMD),
   +SND_SOC_DAPM_POST_PMU),
SND_SOC_DAPM_SUPPLY("MIC BIAS External2", CDC_A_MICB_2_EN, 7, 0,
   pm8916_wcd_analog_enable_micbias_ext2,
   -SND_SOC_DAPM_POST_PMU | SND_SOC_DAPM_POST_PMD),
   +SND_SOC_DAPM_POST_PMU),

SND_SOC_DAPM_ADC_E("ADC1", NULL, CDC_A_TX_1_EN, 7, 0,
   pm8916_wcd_analog_enable_adc,
@@ -1189,7 +1189,8 @@
return irq;
}

-ret = devm_request_irq(dev, irq, pm8916_mbhc_switch_irq_handler,
+ret = devm_request_threaded_irq(dev, irq, NULL,
   + pm8916_mbhc_switch_irq_handler,
   IRQF_TRIGGER_RISING | IRQF_TRIGGER_FALLING | IRQF_ONESHOT,
   "mbhc switch irq", priv);
@@ -1203,7 +1204,8 @@
return irq;
}

-ret = devm_request_irq(dev, irq, mbhc_btn_press_irq_handler,
+ret = devm_request_threaded_irq(dev, irq, NULL,
   + mbhc_btn_press_irq_handler,
   IRQF_TRIGGER_RISING | IRQF_TRIGGER_FALLING | IRQF_ONESHOT,
   "mbhc btn press irq", priv);
@@ -1216,7 +1218,8 @@
return irq;
}

ret = devm_request_irq(dev, irq, mbhc_btn_release_irq_handler,
IRQF_TRIGGER_RISING | IRQF_TRIGGER_FALLING | IRQF_ONESHOT,
"mbhc btn release irq", priv);
--- linux-4.15.0.orig/sound/soc/codecs/nau8540.c
+++ linux-4.15.0/sound/soc/codecs/nau8540.c
@@ -548,7 +548,7 @@
fvco_max = 0;
fvco_sel = ARRAY_SIZE(mclk_src_scaling);
for (i = 0; i < ARRAY_SIZE(mclk_src_scaling); i++) {
    fvco = 256 * fs * 2 * mclk_src_scaling[i].param;
    if (fvco > NAU_FVCO_MIN && fvco < NAU_FVCO_MAX &&
        fvco > NAU_FVCO_MIN &&
    fvco_max < fvco) {
        fvco_max = fvco;
--- linux-4.15.0.orig/sound/soc/codecs/nau8810.c
+++ linux-4.15.0/sound/soc/codecs/nau8810.c
@@ -414,9 +414,9 @@
          + SND_SOC_DAPM_ADC("ADC", "Capture", NAU8810_REG_POWER2, NAU8810_ADC_EN_SFT, 0),
          + SND_SOC_DAPM_PGA("SpkN Out", NAU8810_REG_POWER3, NAU8810_NSPK_EN_SFT, 0, NULL, 0),
          --- linux-4.15.0.orig/sound/soc/codecs/nau8824.c
+++ linux-4.15.0/sound/soc/codecs/nau8824.c
@@ -784,6 +784,36 @@
          + SND_SOC_DAPM_DAC("DAC", Null, NAU8824_REG_RDAC, NAU8824_DACR_EN_SFT, 0),
          --- SND_SOC_DAPM_AIF_OUT("AIFTX", "HiFi Capture", 0, SND_SOC_NOPM, 0, 0),
          --- SND_SOC_DAPM_AIF_IN("AIFRX", "HiFi Playback", 0, SND_SOC_NOPM, 0, 0),
          + SND_SOC_DAPM_AIF_OUT("AIFTX", "Capture", 0, SND_SOC_NOPM, 0, 0),
          + SND_SOC_DAPM_AIF_IN("AIFRX", "Playback", 0, SND_SOC_NOPM, 0, 0),
          SND_SOC_DAPM_DAC("DACL", NULL, NAU8824_REG_RDAC, NAU8824_DACL_EN_SFT, 0),
          @ @ -784,6 +784,36 @@

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+static void nau8824_dapm_disable_pin(struct nau8824 *nau8824, const char *pin)
+{
+struct snd_soc_dapm_context *dapm = nau8824->dapm;
+const char *prefix = dapm->component->name_prefix;
+char prefixed_pin[80];
+
+if (prefix) {
+snprintf(prefixed_pin, sizeof(prefixed_pin), "%s %s",
+prefix, pin);
+snd_soc_dapm_disable_pin(dapm, prefixed_pin);
+} else {
+snd_soc_dapm_disable_pin(dapm, pin);
+}
+
+static void nau8824_dapm_enable_pin(struct nau8824 *nau8824, const char *pin)
+{
+struct snd_soc_dapm_context *dapm = nau8824->dapm;
+const char *prefix = dapm->component->name_prefix;
+char prefixed_pin[80];
+
+if (prefix) {
+snprintf(prefixed_pin, sizeof(prefixed_pin), "%s %s",
+prefix, pin);
+snd_soc_dapm_force_enable_pin(dapm, prefixed_pin);
+} else {
+snd_soc_dapm_force_enable_pin(dapm, pin);
+}
+
+static void nau8824_eject_jack(struct nau8824 *nau8824)
+
+struct snd_soc_dapm_context *dapm = nau8824->dapm;
+@ @ -792,8 +822,8 @ @
+/* Clear all interruption status */
+nau8824_int_status_clear_all(regmap);
+
-snd_soc_dapm_disable_pin(dapm, "SAR");
-snd_soc_dapm_disable_pin(dapm, "MICBIAS");
+nau8824_dapm_disable_pin(nau8824, "SAR");
+nau8824_dapm_disable_pin(nau8824, "MICBIAS");
+snd_soc_dapm_sync(dapm);
+
+/* Enable the insertion interruption, disable the ejection */
+@ @ -822,8 +852,8 @ @
struct regmap *regmap = nau8824->regmap;
int adc_value, event = 0, event_mask = 0;

snd_soc_dapm_force_enable_pin(dapm, "MICBIAS");
snd_soc_dapm_force_enable_pin(dapm, "SAR");
+nau8824_dapm_enable_pin(nau8824, "MICBIAS");
+nau8824_dapm_enable_pin(nau8824, "SAR");
snd_soc_dapm_sync(dapm);

msleep(100);
@@ -834,8 +864,8 @@
if (adc_value < HEADSET_SARADC_THD) {
    event |= SND_JACK_HEADPHONE;

    snd_soc_dapm_disable_pin(dapm, "SAR");
-    snd_soc_dapm_disable_pin(dapm, "MICBIAS");
+nau8824_dapm_disable_pin(nau8824, "SAR");
+nau8824_dapm_disable_pin(nau8824, "MICBIAS");
    snd_soc_dapm_sync(dapm);
} else {
    event |= SND_JACK_HEADSET;
--- linux-4.15.0.orig/sound/soc/codecs/pcm3168a.c
+++ linux-4.15.0/sound/soc/codecs/pcm3168a.c
@@ -24,8 +24,7 @@
#define PCM3168A_FORMATS (SNDRV_PCM_FMTBIT_S16_LE |
    SNDRV_PCM_FMTBIT_S24_3LE |
    SNDRV_PCM_FMTBIT_S32_LE)
#define PCM3168A_FMT_I2S0x0
#define PCM3168A_FMT_LEFT_J0x1
@@ -688,16 +687,23 @@
}
EXPORT_SYMBOL_GPL(pcm3168a_probe);
-void pcm3168a_remove(struct device *dev)
+static void pcm3168a_disable(struct device *dev)
{
    struct pcm3168a_priv *pcm3168a = dev_get_drvdata(dev);

    snd_soc_unregister_codec(dev);
-    pm_runtime_disable(dev);
+    regulator_bulk_disable(ARRAY_SIZE(pcm3168a->supplies),
+        pcm3168a->supplies);
    clk_disable_unprepare(pcm3168a->scki);
void pcm3168a_remove(struct device *dev) {
    pm_runtime_disable(dev);
    #ifndef CONFIG_PM
    pcm3168a_disable(dev);
    #endif
}
EXPORT_SYMBOL_GPL(pcm3168a_remove);

#ifdef CONFIG_PM
@@ -752,10 +758,7 @@
    regcache_cache_only(pcm3168a->regmap, true);

    -regulator_bulk_disable(ARRAY_SIZE(pcm3168a->supplies),
    -       pcm3168a->supplies);
    -
    -clk_disable_unprepare(pcm3168a->scki);
    +pcm3168a_disable(dev);

    return 0;
}
--- linux-4.15.0.orig/sound/soc/codecs/pcm512x-spi.c
+++ linux-4.15.0/sound/soc/codecs/pcm512x-spi.c
@@ -70,3 +70,7 @@
};
}
--- linux-4.15.0.orig/sound/soc/codecs/pcm512x.c
+++ linux-4.15.0/sound/soc/codecs/pcm512x.c
@@ -1438,13 +1438,15 @@
}
else {
    pcm512x->sclk = devm_clk_get(dev, NULL);
    -if (PTR_ERR(pcm512x->sclk) == -EPROBE_DEFER)
    -return -EPROBE_DEFER;
    +ret = -EPROBE_DEFER;
    +goto err;
    +}
    if (!IS_ERR(pcm512x->sclk)) {
        ret = clk_prepare_enable(pcm512x->sclk);
if (ret != 0) {
    dev_err(dev, "Failed to enable SCLK: %d\n", ret);
    return ret;
    goto err;
}

--- linux-4.15.0.orig/sound/soc/codecs/rt274.c
+++ linux-4.15.0/sound/soc/codecs/rt274.c
@@ -398,6 +398,8 @@
{
    struct rt274_priv *rt274 = snd_soc_codec_get_drvdata(codec);

        +rt274->jack = jack;
        +
    if (jack == NULL) {
        /* Disable jack detection */
        regmap_update_bits(rt274->regmap, RT274_EAPD_GPIO_IRQ_CTRL,
@@ -405,7 +407,6 @@
        return 0;
    }
    -rt274->jack = jack;

    regmap_update_bits(rt274->regmap, RT274_EAPD_GPIO_IRQ_CTRL,
RT274_IRQ_EN, RT274_IRQ_EN);
@@ -1128,8 +1129,11 @@
        return ret;
    }
    -regmap_read(rt274->regmap,
    +ret = regmap_read(rt274->regmap,
RT274_GET_PARAM(AC_NODE_ROOT, AC_PAR_VENDOR_ID), &val);
    +if (ret)
    +return ret;
    +
    if (val != RT274_VENDOR_ID) {
        dev_err(&i2c->dev,
"Device with ID register %#x is not rt274\n", val);
--- linux-4.15.0.orig/sound/soc/codecs/rt286.c
+++ linux-4.15.0/sound/soc/codecs/rt286.c
@@ -174,6 +174,9 @@
    case RT286_PROC_COEF:
    case RT286_SET_AMP_GAIN_ADC_IN1:
    case RT286_SET_AMP_GAIN_ADC_IN2:
    +case RT286_SET_GPIO_MASK:
    +case RT286_SET_GPIO_DIRECTION:
    +case RT286_SET_GPIO_DATA:
case RT286_SET_POWER(RT286_DAC_OUT1):
case RT286_SET_POWER(RT286_DAC_OUT2):
case RT286_SET_POWER(RT286_ADC_IN1):
    @ @ -1119,12 +1122,11 @@
    } }
};

-static const struct dmi_system_id dmi_dell_dino[] = {
+static const struct dmi_system_id dmi_dell[] = {
    
    -.ident = "Dell Dino",
    +.ident = "Dell",
    .matches = {
    DMI_MATCH(DMI_SYS_VENDOR, "Dell Inc."),
    -DMI_MATCH(DMI_PRODUCT_NAME, "XPS 13 9343")
    }
    },
    { }
    @ @ -1135,7 +1137,7 @@
    { struct rt286_platform_data *pdata = dev_get_platdata(&i2c->dev);
    struct rt286_priv *rt286;
    -int i, ret, val;
    +int i, ret, vendor_id;

    rt286 = devm_kzalloc(&i2c->dev, sizeof(*rt286),
    GFP_KERNEL);
    @ @ -1151,14 +1153,15 @@
    }

    ret = regmap_read(rt286->regmap,
    -RT286_GET_PARAM(AC_NODE_ROOT, AC_PAR_VENDOR_ID), &val);
    +RT286_GET_PARAM(AC_NODE_ROOT, AC_PAR_VENDOR_ID), &vendor_id);
    if (ret != 0) {
        dev_err(&i2c->dev, "I2C error %d\n", ret);
        return ret;
    }
    -if (val != RT286_VENDOR_ID && val != RT288_VENDOR_ID) {
    +if (vendor_id != RT286_VENDOR_ID && vendor_id != RT288_VENDOR_ID) {
        dev_err(&i2c->dev, "Device with ID register %#x is not rt286\n", val);
        +"Device with ID register %#x is not rt286\n",
        +vendor_id);
        return -ENODEV;
    }
    @ @ -1182,8 +1185,8 @@
    if (pdata)
rt286->pdata = *pdata;

-if (dmi_check_system(force_combo_jack_table) ||
-dmi_check_system(dmi_dell_dino))
+if (vendor_id == RT288_VENDOR_ID && dmi_check_system(dmi_dell)) ||
+dmi_check_system(force_combo_jack_table))
rt286->pdata.cbj_en = true;

regmap_write(rt286->regmap, RT286_SET_AUDIO_POWER, AC_PWRST_D3);
regmap_update_bits(rt286->regmap, RT286_DEPOP_CTRL3, 0xf777, 0x4737);
regmap_update_bits(rt286->regmap, RT286_DEPOP_CTRL4, 0x00ff, 0x003f);

-if (dmi_check_system(dmi_dell_dino)) {
+if (vendor_id == RT288_VENDOR_ID && dmi_check_system(dmi_dell)) {
regmap_update_bits(rt286->regmap,
RT286_SET_GPIO_MASK, 0x40, 0x40);
regmap_update_bits(rt286->regmap,
--- linux-4.15.0.orig/sound/soc/codecs/rt5514-spi.c
+++ linux-4.15.0/sound/soc/codecs/rt5514-spi.c
@@ -274,6 +274,8 @@
rt5514_dsp = devm_kzalloc(platform->dev, sizeof(*rt5514_dsp),
GF_KERNEL);
+if (!rt5514_dsp)
+return -ENOMEM;
rt5514_dsp->dev = &rt5514_spi->dev;
mutex_init(&rt5514_dsp->dma_lock);
--- linux-4.15.0.orig/sound/soc/codecs/rt5514.c
+++ linux-4.15.0/sound/soc/codecs/rt5514.c
@@ -64,8 +64,8 @@
static const struct reg_default rt5514_reg[] = {
@ @ -89,12 +89,13 @@
{RT5514_PLL3_CALIB_CTRL5,0x40220012},
{RT5514_ANA_CTRL_LDO10,0x00028604},
{RT5514_ANA_CTRL_ADCFED,0x00000800},
{RT5514 ASRC IN_CTRL1,0x00000003},
-{RT5514_DOWNFILTER0_CTRL3,0x10000362},
-{RT5514_DOWNFILTER1_CTRL3,0x10000362},
+{RT5514_DOWNFILTER0_CTRL3,0x10000342},
+{RT5514_DOWNFILTER1_CTRL3,0x10000342},
};
static const struct reg_default rt5514_reg[] = {
@ @ -89,12 +89,13 @@
{RT5514_PLL3_CALIB_CTRL5,0x40220012},
{RT5514 DELAY_BUF_CTRL1,0x7ff006a},
{RT5514 DELAY_BUF_CTRL3,0x00000000},
+{RT5514 ASRC IN_CTRL1,0x00000003},
{RT5514_DOWNFILTER0_CTRL1,0x00020c2f},
{RT5514_DOWNFILTER0_CTRL2,0x00020c2f},
-{RT5514_DOWNFILTER0_CTRL3,0x10000342},
+{RT5514_DOWNFILTER0_CTRL3,0x10000362},
{RT5514_DOWNFILTER1_CTRL1,0x00020c2f},
{RT5514_DOWNFILTER1_CTRL2,0x00020c2f},
-{RT5514_DOWNFILTER1_CTRL3,0x10000342},
+{RT5514_DOWNFILTER1_CTRL3,0x10000362},
{RT5514_ANA_CTRL_LDO10,0x00028604},
{RT5514_ANA_CTRL_LDO18_16,0x02000345},
{RT5514_ANA_CTRL_ADC12,0x000028604},
{RT5514_ANA_CTRL_ADC12,0x000028604},
@@ -181,6 +182,7 @@
case RT5514_PLL3_CALIB_CTRL5:
case RT5514_DELAY_BUF_CTRL1:
case RT5514_DOWNFILTER0_CTRL1:
+case RT5514_PERIOD_CALIB_CTRL:
  case RT5514_DOWNFILTER0_CTRL2:
case RT5514_DOWNFILTER0_CTRL3:
@@ -238,6 +240,7 @@
case RT5514_DSP_MAPPING | RT5514_PLL3_CALIB_CTRL5:
case RT5514_DSP_MAPPING | RT5514_DOWNFILTER1_CTRL1:
+case RT5514_DSP_MAPPING | RT5514_DOWNFILTER1_CTRL3:
case RT5514_DOWNFILTER0_CTRL1:
case RT5514_DOWNFILTER0_CTRL2:
case RT5514_DOWNFILTER0CTRL3:
@@ -245,6 +248,7 @@
case RT5514_DSP_MAPPING | RT5514_DOWNFILTER1_CTRL1:
+case RT5514_DSP_MAPPING | RT5514_DOWNFILTER1_CTRL3:
case RT5514_DOWNFILTER0_CTRL1:
case RT5514_DOWNFILTER0_CTRL2:
case RT5514_DOWNFILTER0_CTRL3:
--- linux-4.15.0.orig/sound/soc/codecs/rt5640.c
+++ linux-4.15.0/sound/soc/codecs/rt5640.c
@@ -341,9 +341,9 @@
} static const DECLARE_TLV_DB_SCALE(out_vol_tlv, -4650, 150, 0);
- static const DECLARE_TLV_DB_SCALE(dac_vol_tlv, -65625, 375, 0);
+ static const DECLARE_TLV_DB_MINMAX(dac_vol_tlv, -6562, 0);
 static const DECLARE_TLV_DB_SCALE(in_vol_tlv, -3450, 150, 0);
- static const DECLARE_TLV_DB_SCALE(adc_vol_tlv, -17625, 375, 0);
+ static const DECLARE_TLV_DB_MINMAX(adc_vol_tlv, -1762, 3000);
 static const DECLARE_TLV_DB_MINMAX(adc_vol_tlv, -1762, 3000);
 static const DECLARE_TLV_DB_MINMAX(adc_vol_tlv, -1762, 3000);
 static const DECLARE_TLV_DB_MINMAX(adc_vol_tlv, -1762, 3000);
 /* [0, +20, +24, +30, +35, +40, +44, +50, +52] dB */
 --- linux-4.15.0.orig/sound/soc/codecs/rt5645.c
+++ linux-4.15.0/sound/soc/codecs/rt5645.c
@@ -3681,6 +3681,23 @@
 { } +static const struct rt5645_platform_data lattepanda_board_platform_data = 
  };
+ .inv_jd1_1 = true,
+
+static const struct dmi_system_id dmi_platform_lattepanda_board[] = {
+{
+.ident = "LattePanda board",
+.matches = {
+ DMI_EXACT_MATCH(DMI_BOARD_VENDOR, "AMI Corporation"),
+ DMI_EXACT_MATCH(DMI_BOARD_NAME, "Cherry Trail CR"),
+ DMI_EXACT_MATCH(DMI_BOARD_VERSION, "Default string"),
+},
+},
+};
+
+static bool rt5645_check_dp(struct device *dev)
+
+static const DECLARE_TLV_DB_MINMAX(dac_vol_tlv, -6562, 0);
+static const DECLARE_TLV_DB_SCALE(in_vol_tlv, -3450, 150, 0);
+static const DECLARE_TLV_DB_MINMAX(adc_vol_tlv, -1762, 3000);
+static const DECLARE_TLV_DB_SCALE(adc_bst_tlv, 0, 1200, 0);
*/
/* {0, +20, +24, +30, +35, +40, +44, +50, +52} dB */
#if defined(CONFIG_OF)
--- linux-4.15.0.orig/sound/soc/codecs/rt5659.c
+++ linux-4.15.0/sound/soc/codecs/rt5659.c
@@ -2392,13 +2392,18 @@
 return 0;
 }

-static const struct snd_soc_dapm_widget rt5659_dapm_widgets[] = {
+static const struct snd_soc_dapm_widget rt5659_particular_dapm_widgets[] = {
 SND_SOC_DAPM_SUPPLY("LDO2", RT5659_PWR_ANLG_3, RT5659_PWR_LDO2_BIT, 0,
 NULL, 0),
-SND_SOC_DAPM_SUPPLY("PLL", RT5659_PWR_ANLG_3, RT5659_PWR_PLL_BIT, 0,
-NULL, 0),
+SND_SOC_DAPM_SUPPLY("MICBIAS1", RT5659_PWR_ANLG_2, RT5659_PWR_MB1_BIT,
+0, NULL, 0),
 SND_SOC_DAPM_SUPPLY("Mic Det Power", RT5659_PWR_VOL,
 RT5659_PWR_MIC_DET_BIT, 0, NULL, 0),
+}
+}

+static const struct snd_soc_dapm_widget rt5659_dapm_widgets[] = {
+SND_SOC_DAPM_SUPPLY("PLL", RT5659_PWR_ANLG_3, RT5659_PWR_PLL_BIT, 0,
+NULL, 0),
 SND_SOC_DAPM_SUPPLY("Mono Vref", RT5659_PWR_ANLG_1,
 RT5659_PWR_VREF3_BIT, 0, NULL, 0),
@@ -2423,8 +2428,6 @@
 RT5659_ADC_MONO_R_ASRC_SFT, 0, NULL, 0),
/* Input Side */
-SND_SOC_DAPM_SUPPLY("MICBIAS1", RT5659_PWR_ANLG_2, RT5659_PWR_MB1_BIT,
-0, NULL, 0),
 SND_SOC_DAPM_SUPPLY("MICBIAS2", RT5659_PWR_ANLG_2, RT5659_PWR_MB2_BIT,
 0, NULL, 0),
 SND_SOC_DAPM_SUPPLY("MICBIAS3", RT5659_PWR_ANLG_2, RT5659_PWR_MB3_BIT,
@@ -3390,12 +3393,17 @@
 }
 struct rt5659_priv *rt5659 = snd_soc_codec_get_drvdata(codec);
 unsigned int reg_val = 0;
+int ret;

 if (freq == rt5659->sysclk && clk_id == rt5659->sysclk_src)
 return 0;

 switch (clk_id) {
 case RT5659_SCLK_S_MCLK:
+ret = clk_set_rate(rt5659->mclk, freq);
+if (ret)
+return ret;

 return 0;

 switch (clk_id) {
 case RT5659_SCLK_S_MCLK:
+ret = clk_set_rate(rt5659->mclk, freq);
+if (ret)
+return ret;

 return 0;
reg_val |= RT5659_SCLK_SRC_MCLK;
break;
case RT5659_SCLK_S_PLL1:
    break;
@ @ -3619,10 +3627,23 @ @

static int rt5659_probe(struct snd_soc_codec *codec)
{
    struct snd_soc_dapm_context *dapm =
    snd_soc_component_get_dapm(component);
    struct rt5659_priv *rt5659 = snd_soc_codec_get_drvdata(codec);

    rt5659->codec = codec;

    switch (rt5659->pdata.jd_src) {
    case RT5659_JD_HDA_HEADER:
        break;
    +
    +default:
    +snd_soc_dapm_new_controls(dapm,
    +rt5659_particular_dapm_widgets,
    +ARRAY_SIZE(rt5659_particular_dapm_widgets));
    +break;
    +
    +
    return 0;
    }

--- linux-4.15.0.orig/sound/soc/codecs/rt5660.c
+++ linux-4.15.0/sound/soc/codecs/rt5660.c
@@ -9,6 +9,7 @@
*
* published by the Free Software Foundation.
*/

+#include <linux/acpi.h>
#include <linux/module.h>
#include <linux/moduleparam.h>
#include <linux/init.h>
@@ -1245,10 +1246,31 @@
static const struct acpi_device_id rt5660_acpi_match[] = {
    { "10EC5660", 0 },
    +{ "10EC3277", 0 },
    +}
    +);
    MODULE_DEVICE_TABLE(acpi, rt5660_acpi_match);

+static const struct acpi_gpio_params audio_wake_intr_gpio = { 0, 0, false };
static const struct acpi_gpio_params lineout_mute_gpio = { 1, 0, true };  
static const struct acpi_gpio_mapping byt_rt5660_gpios[] = {  
{ "audio-wake-intr-gpios", &audio_wake_intr_gpio, 1 },  
{ "lineout-mute-gpios", &lineout_mute_gpio, 1 },  
{ NULL },  
};  

static void rt5660_read_acpi_properties(struct rt5660_priv *rt5660,  
struct device *dev)  
{  
int ret;  
  
ret = acpi_dev_add_driver_gpios(ACPI_COMPANION(dev),  
byt_rt5660_gpios);  
if (ret)  
dev_warn(dev, "Failed to add driver gpios\n");  
}  

static int rt5660_parse_dt(struct rt5660_priv *rt5660, struct device *dev)  
{  
rt5660->pdata.in1_diff = device_property_read_bool(dev,  
@@ -1288,6 +1310,10 @@  
rt5660->pdata = *pdata;  
else if (i2c->dev.of_node)  
rt5660_parse_dt(rt5660, &i2c->dev);  
+else if (ACPI_HANDLE(&i2c->dev))  
+rt5660_read_acpi_properties(rt5660, &i2c->dev);  
+else  
+return -EINVAL;  
  
rt5660->regmap = devm_regmap_init_i2c(i2c, &rt5660_regmap);  
if (IS_ERR(rt5660->regmap)) {  
 --- linux-4.15.0.orig/sound/soc/codecs/rt5670.c  
+++ linux-4.15.0/sound/soc/codecs/rt5670.c  
@@ -34,18 +34,19 @@  
#include "rt5670.h"  
#include "rt5670-dsp.h"  

#define RT5670_DEV_GPIO BIT(0)  
#define RT5670_IN2_DIFF  BIT(1)  
#define RT5670_DMIC_EN BIT(2)  
#define RT5670_DMIC1_IN2P  BIT(3)  
#define RT5670_DMIC1_GPIO6  BIT(4)  
#define RT5670_DMIC1_GPIO7  BIT(5)  
#define RT5670_DMIC2_INR  BIT(6)  
#define RT5670_DMIC2_GPIO8  BIT(7)  
#define RT5670_DMIC3_GPIO5  BIT(8)  

#define RT5670_JD_MODE1 BIT(9)
#define RT5670_JD_MODE2 BIT(10)
#define RT5670_JD_MODE3 BIT(11)
+#define RT5670_DEV_GPIO BIT(0)
+#define RT5670_IN2_DIFF BIT(1)
+#define RT5670_DMIC_EN BIT(2)
+#define RT5670_DMIC1_IN2P BIT(3)
+#define RT5670_DMIC1_GPIO6 BIT(4)
+#define RT5670_DMIC1_GPIO7 BIT(5)
+#define RT5670_DMIC2_INR BIT(6)
+#define RT5670_DMIC2_GPIO8 BIT(7)
+#define RT5670_DMIC3_GPIO5 BIT(8)
+#define RT5670_JD_MODE1BIT(9)
+#define RT5670_JD_MODE2BIT(10)
+#define RT5670_JD_MODE3BIT(11)
+#define RT5670_GPIO1_IS_EXT_SPK_EN BIT(12)

static unsigned long rt5670_quirk;
static unsigned int quirk_override;
@@ -1504,6 +1505,33 @@
 return 0;
 }

+static int rt5670_spk_event(struct snd_soc_dapm_widget *w, 
+struct snd_kcontrol *kcontrol, int event)
+{
+struct snd_soc_component *component = snd_soc_dapm_to_component(w->dapm);
+struct rt5670_priv *rt5670 = snd_soc_component_get_drvdata(component);
+  if (!rt5670->pdata.gpio1_is_ext_spk_en)
+    return 0;
+  switch (event) {
+    case SND_SOC_DAPM_POST_PMU:
+      regmap_update_bits(rt5670->regmap, RT5670_GPIO_CTRL2, 
+        RT5670_GP1_OUT_MASK, RT5670_GP1_OUT_HI); 
+      break;
+    case SND_SOC_DAPM_PRE_PMD:
+      regmap_update_bits(rt5670->regmap, RT5670_GPIO_CTRL2, 
+        RT5670_GP1_OUT_MASK, RT5670_GP1_OUT_LO); 
+      break;
+    default:
+      return 0;
+  } 
+  return 0;
static int rt5670_bst1_event(struct snd_soc_dapm_widget *w, struct snd_kcontrol *kcontrol, int event) {
    @ -1917.7 +1945.9 @
};

static const struct snd_soc_dapm_widget rt5672_specific_dapm_widgets[] = {
    -SND_SOC_DAPM_PGA("SPO Amp", SND_SOC_NOPM, 0, 0, NULL, 0),
    +SND_SOC_DAPM_PGA_E("SPO Amp", SND_SOC_NOPM, 0, 0, NULL, 0,
    + rt5670_spk_event, SND_SOC_DAPM_PRE_PMD |
    + SND_SOC_DAPM_POST_PMU),
    SND_SOC_DAPM_OUTPUT("SPOLP"),
    SND_SOC_DAPM_OUTPUT("SPOLN"),
    SND_SOC_DAPM_OUTPUT("SPORP"),
    @ -2902.14 +2932.14 @
};
{
    .callback = rt5670_quirk_cb,
    -.ident = "Lenovo Thinkpad Tablet 10",
    +.ident = "Lenovo Miix 2 10",
    .matches = {
        DMI_MATCH(DMI_SYS_VENDOR, "LENOVO"),
        DMI_MATCH(DMI_PRODUCT_VERSION, "Lenovo Miix 2 10"),
    },
    .driver_data = (unsigned long *)(RT5670_DMIC_EN |
    RT5670_DMIC1_IN2P |
    - RT5670_DEV_GPIO |
    + RT5670_GPIO1_IS_EXT_SPK_EN |
    RT5670_ID_MODE2),
},
{
    @ -2957.6 +2987.10 @
rt5670->pdata.dev_gpio = true;
dev_info(&i2c->dev, "quirk dev_gpio\n");
}
+if (rt5670_quirk & RT5670_GPIO1_IS_EXT_SPK_EN)
    +rt5670->pdata.gpio1_is_ext_spk_en = true;
    +dev_info(&i2c->dev, "quirk GPIO1 is external speaker enable\n");
+
    if (rt5670_quirk & RT5670_IN2_DIFF) {
        rt5670->pdata.in2_diff = true;
dev_info(&i2c->dev, "quirk IN2_DIFF\n");
    @ -3055.6 +3089.13 @
regmap_update_bits(rt5670->regmap, RT5670_GPIO_CTRL2, 
    RT5670_GP1_PF_MASK, RT5670_GP1_PF_OUT);  
}
if (rt5670->pdata.gpio1_is_ext_spk_en) {
    regmap_update_bits(rt5670->regmap, RT5670_GPIO_CTRL1,
                      RT5670_GP1_PIN_MASK, RT5670_GP1_PIN_GPIO1);
    regmap_update_bits(rt5670->regmap, RT5670_GPIO_CTRL2,
                      RT5670_GP1_PF_MASK, RT5670_GP1_PF_OUT);
}

if (rt5670->pdata.jd_mode) {
    regmap_update_bits(rt5670->regmap, RT5670_GLB_CLK,
                      --- linux-4.15.0.orig/sound/soc/codecs/rt5670.h
                      +++ linux-4.15.0/sound/soc/codecs/rt5670.h
                      @ @ -760,7 +760,7 @@
                      #define RT5670_PWR_VREF2_BIT			4
                      #define RT5670_PWR_FV2				(0x1 << 3)
                      #define RT5670_PWR_FV2_BIT			3
                      -#define RT5670_LDO_SEL_MASK			(0x3)
                      +#define RT5670_LDO_SEL_MASK			(0x7)
                      #define RT5670_LDO_SEL_SFT			0
                      /* Power Management for Analog 2 (0x64) */
                      --- linux-4.15.0.orig/sound/soc/codecs/rt5677-spi.c
                      +++ linux-4.15.0/sound/soc/codecs/rt5677-spi.c
                      @ @ -58,13 +58,15 @@
                      * RT5677_SPI_READ/WRITE_32: Transfer 4 bytes
                      * RT5677_SPI_READ/WRITE_BURST: Transfer any multiples of 8 bytes
                      *
                      - * For example, reading 260 bytes at 0x60030002 uses the following commands:
                      - * 0x60030002 RT5677_SPI_READ_162 bytes
                      + * Note:
                      + * 16 Bit writes and reads are restricted to the address range
                      + * 0x18020000 ~ 0x18021000
                      + *
                      + * For example, reading 256 bytes at 0x60030004 uses the following commands:
                      + * 0x60030004 RT5677_SPI_READ_324 bytes
                      + * 0x60030008 RT5677_SPI_READ_BURST240 bytes
                      + * 0x600300F8 RT5677_SPI_READ_BURST8 bytes
                      + * 0x60030100 RT5677_SPI_READ_324 bytes
                      - * 0x60030104 RT5677_SPI_READ_162 bytes
                      *
                      * Input:
                      * @read: true for read commands; false for write commands
                      @ @ -79,15 +81,13 @@
                      }
                      u8 cmd;
                      -if (align == 2 || align == 6 || remain == 2) {
                      -cmd = RT5677_SPI_READ_16;
*len = 2;
-} else if (align == 4 || remain <= 6) {
+if (align == 4 || remain <= 4) {
  cmd = RT5677_SPI_READ_32;
  *len = 4;
} else {
  cmd = RT5677_SPI_READ_BURST;
  *len = min_t(u32, remain & ~7, RT5677_SPI_BURST_LEN);
  *len = (((remain - 1) >> 3) + 1) << 3;
  *len = min_t(u32, *len, RT5677_SPI_BURST_LEN);
}
return read ? cmd : cmd + 1;
}
@@ -108,7 +108,7 @@
}
}

/* Read DSP address space using SPI. addr and len have to be 2-byte aligned. */
+/* Read DSP address space using SPI. addr and len have to be 4-byte aligned. */
int rt5677_spi_read(u32 addr, void *rxbuf, size_t len)
{
  u32 offset;
  @@ -124,7 +124,7 @@
  if (!g_spi)
    return -ENODEV;
+if ((addr & 3) || (len & 3)) {
    dev_err(&g_spi->dev, "Bad read align 0x%x(%zu)\n", addr, len);
    return -EACCES;
  }
  @@ -159,13 +159,13 @@
  EXPORT_SYMBOL_GPL(rt5677_spi_read);

-/ * Write DSP address space using SPI. addr has to be 2-byte aligned.
- * If len is not 2-byte aligned, an extra byte of zero is written at the end
+/* Write DSP address space using SPI. addr has to be 4-byte aligned.
+ * If len is not 4-byte aligned, then extra zeros are written at the end
+ * as padding.
+/*
int rt5677_spi_write(u32 addr, const void *txbuf, size_t len)
{
  -u32 offset, len_with_pad = len;
  +u32 offset;
  int status = 0;
  struct spi_transfer t;
  struct spi_message m;
@@ -178,22 +178,19 @@
@if (!g_spi)
  return -ENODEV;
+
+if (addr & 3) {
  dev_err(&g_spi->dev, "Bad write align 0x%x(%zu)\n", addr, len);
  return -EACCES;
 }
-
-if (len & 1)
-len_with_pad = len + 1;
-
 memset(&t, 0, sizeof(t));
 t.tx_buf = buf;
 t.speed_hz = RT5677_SPI_FREQ;
 spi_message_init_with_transfers(&m, &t, 1);
-
+for (offset = 0; offset < len_with_pad;) {
+  for (offset = 0; offset < len;) {
+    spi_cmd = rt5677_spi_select_cmd(false, (addr + offset) & 7,
+      len - offset, &t.len);
+    -len_with_pad - offset, &t.len);
+  +len - offset, &t.len);
+  
+/* Construct SPI message header */
+buf[0] = spi_cmd;
- --- linux-4.15.0.orig/sound/soc/codecs/rt5677.c
--+ linux-4.15.0.orig/sound/soc/codecs/rt5677.c
+++ linux-4.15.0/sound/soc/codecs/rt5677.c
@@ -297,6 +297,7 @@
case RT5677_I2C_MASTER_CTRL7:
case RT5677_I2C_MASTER_CTRL8:
case RT5677_HAP_GENE_CTRL2:
+case RT5677_PWR_ANLG2: /* Modified by DSP firmware */
case RT5677_PWR_DSP_ST:
case RT5677_PRIV_DATA:
case RT5677_ASRC_22:
@@ -5017,7 +5018,7 @@
MODULE_DEVICE_TABLE(i2c, rt5677_i2c_id);

static const struct of_device_id rt5677_of_match[] = {
  -{ .compatible = "realtek,rt5677", RT5677 },
  +{ .compatible = "realtek,rt5677", .data = (const void *)RT5677 },
  [ ]);

MODULE_DEVICE_TABLE(of, rt5677_of_match);
--- linux-4.15.0.orig/sound/soc/codecs/sgtl5000.c
+++ linux-4.15.0/sound/soc/codecs/sgtl5000.c
@@ -35,6 +35,13 @@
#define SGTL5000_DAP_REG_OFFSET 0x0100
#define SGTL5000_MAX_REG_OFFSET 0x013A

+/* Delay for the VAG ramp up */
+#define SGTL5000_VAG_POWERUP_DELAY 500 /* ms */
+/* Delay for the VAG ramp down */
+#define SGTL5000_VAG_POWERDOWN_DELAY 500 /* ms */
+
+#define SGTL5000_OUTPUTS_MUTE (SGTL5000_HP_MUTE | SGTL5000_LINE_OUT_MUTE)
+
+/* default value of sgtl5000 registers */
static const struct reg_default sgtl5000_reg_defaults[] = {
  { SGTL5000_CHIP_DIG_POWER, 0x0000 },
  @@ -68,7 +75,7 @@
  { SGTL5000_DAP_EQ_BASS_BAND4, 0x002f },
  { SGTL5000_DAP_MAIN_CHAN, 0x8000 },
  { SGTL5000_DAP_MIX_CHAN, 0x0000 },
-+{ SGTL5000_DAP_AVC_CTRL, 0x0510 },
  +{ SGTL5000_DAP_AVC_CTRL, 0x5100 },
  { SGTL5000_DAP_AVC_THRESHOLD, 0x1473 },
  { SGTL5000_DAP_AVC_ATTACK, 0x0028 },
  { SGTL5000_DAP_AVC_DECAY, 0x0050 },
  @@ -120,6 +127,13 @@
  I2S_LRCLK_STRENGTH_HIGH,
  
  +enum {
  +HP_POWER_EVENT,
  +DAC_POWER_EVENT,
  +ADC_POWER_EVENT,
  +LAST_POWER_EVENT = ADC_POWER_EVENT
  +};
  +
  +/* sgtl5000 private structure in codec */
struct sgtl5000_priv {
  int sysclk;/* sysclk rate */
  @@ -133,8 +147,117 @@
  u8 micbias_resistor;
  u8 micbias_voltage;
  u8 lrclk_strength;
  +u16 mute_state[LAST_POWER_EVENT + 1];
  
  +static inline int hp_sel_input(struct snd_soc_component *component)
  +{
  +unsigned int ana_reg = 0;
  +
  +snd_soc_component_read(component, SGTL5000_CHIP_ANA_CTRL, &ana_reg);
return (ana_reg & SGTL5000_HP_SEL_MASK) >> SGTL5000_HP_SEL_SHIFT;
+
+
static inline u16 mute_output(struct snd_soc_component *component,
    u16 mute_mask)
+
unsigned int mute_reg = 0;
+
+snd_soc_component_read(component, SGTL5000_CHIP_ANA_CTRL, &mute_reg);
+
+snd_soc_component_update_bits(component, SGTL5000_CHIP_ANA_CTRL,
    mute_mask, mute_mask);
+return mute_reg;
+
+
static inline void restore_output(struct snd_soc_component *component,
    u16 mute_mask, u16 mute_reg)
+
+snd_soc_component_update_bits(component, SGTL5000_CHIP_ANA_CTRL,
    +mute_mask, mute_reg);
+
+
static void vag_power_on(struct snd_soc_component *component, u32 source)
+
unsigned int ana_reg = 0;
+
+snd_soc_component_read(component, SGTL5000_CHIP_ANA_POWER, &ana_reg);
+
+if (ana_reg & SGTL5000_VAG_POWERUP)
+return;
+
+snd_soc_component_update_bits(component, SGTL5000_CHIP_ANA_POWER,
    + SGTL5000_VAG_POWERUP, SGTL5000_VAG_POWERUP);
+
+/* When VAG powering on to get local loop from Line-In, the sleep
+ * is required to avoid loud pop.
+ */
+if (hp_sel_input(component) == SGTL5000_HP_SEL_LINE_IN &&
    + source == HP_POWER_EVENT)
+msleep(SGTL5000_VAG_POWERUP_DELAY);
+}
+
+static int vag_power_consumers(struct snd_soc_component *component,
    u16 ana_pwr_reg, u32 source)
+
+int consumers = 0;
+
/* count dac/adc consumers unconditional */
+if (ana_pwr_reg & SGTL5000_DAC_POWERUP)
+consumers++; 
+if (ana_pwr_reg & SGTL5000_ADC_POWERUP)
+consumers++; 
+
+/*
+ * If the event comes from HP and Line-In is selected,
+ * current action is 'DAC to be powered down'.
+ * As HP_POWERUP is not set when HP muxed to line-in,
+ * we need to keep VAG power ON.
+ */
+if (source == HP_POWER_EVENT) {
+if (hp_sel_input(component) == SGTL5000_HP_SEL_LINE_IN)
+consumers++; 
+} else { 
+if (ana_pwr_reg & SGTL5000_HP_POWERUP)
+consumers++; 
+} 
+
+return consumers; 
+
+static void vag_power_off(struct snd_soc_component *component, u32 source)
+{
+unsigned int ana_pwr = SGTL5000_VAG_POWERUP;
+
snd_soc_component_read(component, SGTL5000_CHIP_ANA_POWER, &ana_pwr);
+
+if (!((ana_pwr & SGTL5000_VAG_POWERUP))
+return; 
+
+/*
+ * This function calls when any of VAG power consumers is disappearing.
+ * Thus, if there is more than one consumer at the moment, as minimum
+ * one consumer will definitely stay after the end of the current
+ * event.
+ * Don't clear VAG_POWERUP if 2 or more consumers of VAG present:
+ * - LINE_IN (for HP events) / HP (for DAC/ADC events)
+ * - DAC
+ * - ADC
+ * (the current consumer is disappearing right now)
+ */
+if (vag_power_consumers(component, ana_pwr, source) >= 2)
+return; 
+
snd_soc_component_update_bits(component, SGTL5000_CHIP_ANA_POWER, 
+SGTL5000_VAG_POWERUP, 0);
/* In power down case, we need wait 400-1000 ms
 * when VAG fully ramped down.
 * As longer we wait, as smaller pop we've got.
 */
msleep(SGTL5000_VAG_POWERDOWN_DELAY);

/
* mic_bias power on/off share the same register bits with
* output impedance of mic bias, when power on mic bias, we
@@ -166,36 +289,46 @@
return 0;
}

-/*
- * As manual described, ADC/DAC only works when VAG powerup,
- * So enabled VAG before ADC/DAC up.
- * In power down case, we need wait 400ms when vag fully ramped down.
- */
-
-static int power_vag_event(struct snd_soc_dapm_widget *w,
-struct snd_kcontrol *kcontrol, int event)
+static int vag_and_mute_control(struct snd_soc_component *component,
+int event, int event_source)
{
-struct snd_soc_codec *codec = snd_soc_dapm_to_codec(w->dapm);
-const u32 mask = SGTL5000_DAC_POWERUP | SGTL5000_ADC_POWERUP;
+static const u16 mute_mask[] = {
+ /*
+ * Mask for HP_POWER_EVENT.
+ * Muxing Headphones have to be wrapped with mute/unmute
+ * headphones only.
+ */
+SGTL5000_HP_MUTE,
+/*
+ * Masks for DAC_POWER_EVENT/ADC_POWER_EVENT.
+ * Muxing DAC or ADC block have to be wrapped with mute/unmute
+ * both headphones and line-out.
+ */
+SGTL5000_OUTPUTS_MUTE,
+SGTL5000_OUTPUTS_MUTE
+};
+struct sgtl5000_priv *sgtl5000 =
+snd_soc_component_get_drvdata(component);

switch (event) {
+case SND_SOC_DAPM_PRE_PMU:
+sgtl5000->mute_state[event_source] =

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+mute_output(component, mute_mask[event_source]);
+break;
case SND_SOC_DAPM_POST_PMU:
-snd_soc_update_bits(codec, SGTL5000_CHIP_ANA_POWER,
-SGTL5000_VAG_POWERUP, SGTL5000_VAG_POWERUP);
-msleep(400);
+vag_power_on(component, event_source);
+restore_output(component, mute_mask[event_source],
+ sgtl5000->mute_state[event_source]);
break;
-
case SND_SOC_DAPM_PRE_PMD:
-/*
- * Don't clear VAG_POWERUP, when both DAC and ADC are
- * operational to prevent inadvertently starving the
- * other one of them.
- */
-if ((snd_soc_read(codec, SGTL5000_CHIP_ANA_POWER) &
-mask) != mask) {
-snd_soc_update_bits(codec, SGTL5000_CHIP_ANA_POWER,
-SGTL5000_VAG_POWERUP, 0);
-msleep(400);
-}
+sgtl5000->mute_state[event_source] =
+mute_output(component, mute_mask[event_source]);
+vag_power_off(component, event_source);
+break;
+case SND_SOC_DAPM_POST_PMU:
+restore_output(component, mute_mask[event_source],
+ sgtl5000->mute_state[event_source]);
break:
default:
break;
@@-204,6 +337,41 @@
return 0;
}
+/
+ * Mute Headphone when power it up/down.
+ * Control VAG power on HP power path.
+ */
+static int headphone_pga_event(struct snd_soc_dapm_widget *w,
+struct snd_kcontrol *kcontrol, int event)
+{
+struct snd_soc_component *component =
+snd_soc_dapm_to_component(w->dapm);
+
+return vag_and_mute_control(component, event, HP_POWER_EVENT);
As manual describes, ADC/DAC powering up/down requires * to mute outputs to avoid pops.
" Control VAG power on ADC/DAC power path.

```c
static int adc_updown_depop(struct snd_soc_dapm_widget *w,
   struct snd_kcontrol *kcontrol, int event)
{
    struct snd_soc_component *component = 
    snd_soc_dapm_to_component(w->dapm);
    
return vag_and_mute_control(component, event, ADC_POWER_EVENT);
}
```

```c
static int dac_updown_depop(struct snd_soc_dapm_widget *w,
    struct snd_kcontrol *kcontrol, int event)
{
    struct snd_soc_component *component = 
    snd_soc_dapm_to_component(w->dapm);
    
return vag_and_mute_control(component, event, DAC_POWER_EVENT);
}
```

/* input sources for ADC */
static const char *adc_mux_text[] = {
    "MIC_IN", "LINE_IN"
@ @ -239.7 +407.10 @ @
    mic_bias_event,
    SND_SOC_DAPM_POST_PMU | SND_SOC_DAPM_PRE_PMD),

-SND_SOC_DAPM_PGA("HP", SGTL5000_CHIP_ANA_POWER, 4, 0, NULL, 0),
+SND_SOC_DAPM_PGA_E("HP", SGTL5000_CHIP_ANA_POWER, 4, 0, NULL, 0,
    headphone_pga_event,
    + SND_SOC_DAPM_PRE_POST_PMU
    + SND_SOC_DAPM_PRE_POST_PMD),
SND_SOC_DAPM_PGA("LO", SGTL5000_CHIP_ANA_POWER, 0, NULL, 0),

SND_SOC_DAPM_MUX("Capture Mux", SND_SOC_NOPM, 0, 0, &adc_mux),
@ @ -255.11 +426.12 @ @
0, SGTL5000_CHIP_DIG_POWER,
1, 0),

-SND_SOC_DAPM_ADC("ADC", "Capture", SGTL5000_CHIP_ANA_POWER, 1, 0),
-SND_SOC_DAPM_DAC("DAC", "Playback", SGTL5000_CHIP_ANA_POWER, 3, 0),

-SND_SOC_DAPM_PRE("VAG_POWER_PRE", power_vag_event),
-SND_SOC_DAPM_POST("VAG_POWER_POST", power_vag_event),
+SND_SOC_DAPM_ADC_E("ADC", "Capture", SGTL5000_CHIP_ANA_POWER, 1, 0,
+    adc_updown_depop, SND_SOC_DAPM_PRE_POST_PMU |
+    SND_SOC_DAPM_PRE_POST_PMD),
+SND_SOC_DAPM_DAC_E("DAC", "Playback", SGTL5000_CHIP_ANA_POWER, 3, 0,
+    dac_updown_depop, SND_SOC_DAPM_PRE_POST_PMU |
+    SND_SOC_DAPM_PRE_POST_PMD),
};

/* routes for sgtl5000 */
@@ -871,15 +1043,26 @@
static int sgtl5000_set_bias_level(struct snd_soc_codec *codec,
    enum snd_soc_bias_level level)
{
    struct sgtl5000_priv *sgtl = snd_soc_codec_get_drvdata(codec);
    +int ret;
    +
    switch (level) {
    case SND_SOC_BIAS_ON:
    case SND_SOC_BIAS_PREPARE:
    case SND_SOC_BIAS_STANDBY:
    +    regcache_cache_only(sgtl->regmap, false);
    +    ret = regcache_sync(sgtl->regmap);
    +    if (ret) {
    +        regcache_cache_only(sgtl->regmap, true);
    +        return ret;
    +    }
    +
    snd_soc_update_bits(codec, SGTL5000_CHIP_ANA_POWER,
        SGTL5000_REFTOP_POWERUP,
        SGTL5000_REFTOP_POWERUP);
    break;
    case SND_SOC_BIAS_OFF:
    +    regcache_cache_only(sgtl->regmap, true);
    snd_soc_update_bits(codec, SGTL5000_CHIP_ANA_POWER,
        SGTL5000_REFTOP_POWERUP, 0);
    break;
    @@ -1073,12 +1256,17 @@
        SGTL5000_INT_OSC_EN);
    /* Enable VDDC charge pump */
    ana_pwr |= SGTL5000_VDDC_CHRGMPM_POWERUP;
    } else if (vddio >= 3100 && vdda >= 3100) {
    +    } else {
    +        ana_pwr &= ~SGTL5000_VDDC_CHRGMPM_POWERUP;
    +    /* VDDC use VDDIO rail */
    -lreg_ctrl |= SGTL5000_VDDC_ASSN_OVRD;
    -lreg_ctrl |= SGTL5000_VDDC_MAN_ASSN_VDDIO <<
    -    SGTL5000_VDDC_MAN_ASSN_SHIFT;
    */
if vddio == vdda the source of charge pump should be
assigned manually to VDDIO
*/
if (vddio == vdda) {
lreg_ctrl |= SGTL5000_VDDC_ASSN_OVRD;
lreg_ctrl |= SGTL5000_VDDC_MAN_ASSN_VDDIO <<
    SGTL5000_VDDC_MAN_ASSN_SHIFT;
}

snd_soc_write(codec, SGTL5000_CHIP_LINREG_CTRL, lreg_ctrl);
* Searching for a suitable index solving this formula:
* idx = 40 * log10(vag_val / lo_cagcntrl) + 15
*/
-vol_quot = (vag * 100) / lo_vag;
+vol_quot = lo_vag ? (vag * 100) / lo_vag : 0;
lo_vol = 0;
for (i = 0; i < ARRAY_SIZE(vol_quot_table); i++) {
if (vol_quot >= vol_quot_table[i])
@ @ -1375.6 +1563.40 @@
dev_err(&client->dev,
"Error %d initializing CHIP_CLK_CTRL\n", ret);
*/
+ret = regmap_write(sgtl5000->regmap, SGTL5000_CHIP_ANA_CTRL,
    SGTL5000_CHIP_ANA_CTRL_DEFAULT);
+ret = regmap_read(sgtl5000->regmap, SGTL5000_CHIP_ANA_POWER, &value);
+ret = regmap_update_bits(sgtl5000->regmap, SGTL5000_CHIP_ANA_POWER, &value);
+ SGTL5000_VAG_POWERUP, 
+ 0);
+if (ret) {
+dev_err(&client->dev, "Error %d disabling VAG\n", ret);
+goto disable_clk;
+}
+
+msleep(SGTL5000_VAG_POWERDOWN_DELAY);
+
+ /* Follow section 2.2.1.1 of AN3663 */
+ ana_pwr = SGTL5000_ANA_POWER_DEFAULT;
+ if (sgtl5000->num_supplies <= VDDD) {
+--- linux-4.15.0.orig/sound/soc/codecs/sgtl5000.h
+++ linux-4.15.0/sound/soc/codecs/sgtl5000.h
@@ -236,6 +236,7 @@
/*
 * SGTL5000_CHIP_ANA_CTRL
 */
+#define SGTL5000_CHIP_ANA_CTRL_DEFAULT		0x0133
#define SGTL5000_LINE_OUT_MUTE		0x0100
#define SGTL5000_HP_SEL_MASK		0x0040
#define SGTL5000_HP_SEL_SHIFT		6
--- linux-4.15.0.orig/sound/soc/codecs/ssm2602.c
+++ linux-4.15.0/sound/soc/codecs/ssm2602.c
@@ -54,10 +54,17 @@
-using 2 wire for device control, so we cache them instead.
-* There is no point in caching the reset register
*/
-static const u16 ssm2602_reg[SSM2602_CACHEREGNUM] = {
-0x0097, 0x0097, 0x0079, 0x0079,
-0x000a, 0x0008, 0x009f, 0x000a,
-0x0000, 0x0000
+static const struct reg_default ssm2602_reg[SSM2602_CACHEREGNUM] = {
+{ .reg = 0x00, .def = 0x0097 },
+{ .reg = 0x01, .def = 0x0097 },
+...
{ .reg = 0x02, .def = 0x0079 },
{ .reg = 0x03, .def = 0x0079 },
{ .reg = 0x04, .def = 0x000a },
{ .reg = 0x05, .def = 0x0008 },
{ .reg = 0x06, .def = 0x009f },
{ .reg = 0x07, .def = 0x000a },
{ .reg = 0x08, .def = 0x0000 },
{ .reg = 0x09, .def = 0x0000 }
};

volatile_reg = ssm2602_register_volatile,

.cache_type = REGCACHE_RBTREE,
.reg_defaults_raw = ssm2602_reg,
.num_reg_defaults_raw = ARRAY_SIZE(ssm2602_reg),
.reg_defaults = ssm2602_reg,
.num_reg_defaults = ARRAY_SIZE(ssm2602_reg),
];
EXPORT_SYMBOL_GPL(ssm2602_regmap_config);

--- linux-4.15.0.orig/sound/soc/codecs/sta32x.c
+++ linux-4.15.0/sound/soc/codecs/sta32x.c
@@ -879,6 +879,9 @@
 struct sta32x_priv *sta32x = snd_soc_codec_get_drvdata(codec);
 struct sta32x_platform_data *pdata = sta32x->pdata;
 int i, ret = 0, thermal = 0;
+sta32x->codec = codec;
+ret = regulator_bulk_enable(ARRAY_SIZE(sta32x->supplies),
 sta32x->supplies);
 if (ret != 0) {
 --- linux-4.15.0.orig/sound/soc/codecs/sti-sas.c
 +++ linux-4.15.0/sound/soc/codecs/sti-sas.c
 @@ -407,6 +407,7 @@
 },
 |
 |
+MODULE_DEVICE_TABLE(of, sti_sas_dev_match);

static int sti_sas_driver_probe(struct platform_device *pdev)
{
priv->regmap = devm_regmap_init(dev, NULL, client, 
priv->chip->regmap_config);
-if (IS_ERR(priv->regmap)) 
-return PTR_ERR(priv->regmap);
+if (IS_ERR(priv->regmap)) {
+ret = PTR_ERR(priv->regmap);
+goto disable_regs;
+
}

priv->pdn_gpio = devm_gpiod_get_optional(dev, "pdn", GPIOD_OUT_LOW);
if (IS_ERR(priv->pdn_gpio)) {
@@ -742,7 +744,7 @@
 ret = regmap_write(priv->regmap, TAS571X_OSC_TRIM_REG, 0);
 if (ret)
 -return ret;
+goto disable_regs;

 usleep_range(50000, 60000);

@@ -758,11 +760,19 @@ */
 ret = regmap_update_bits(priv->regmap, TAS571X_MVOL_REG, 1, 0);
 if (ret)
 -return ret;
+goto disable_regs;
 }

 -return snd_soc_register_codec(&client->dev, &priv->codec_driver,
+ret = snd_soc_register_codec(&client->dev, &priv->codec_driver,
 &tas571x_dai, 1);
+if (ret)
+goto disable_regs;
+}
+disable_regs:
+	regulator_bulk_disable(priv->chip->num_supply_names, priv->supplies);
+return ret;
 }

static int tas571x_i2c_remove(struct i2c_client *client)
--- linux-4.15.0.orig/sound/soc/codecs/tlv320aic31xx.c
+++ linux-4.15.0/sound/soc/codecs/tlv320aic31xx.c
@@ -924,6 +924,18 @@
 return -EINVAL;
}
/* signal polarity */
switch (fmt & SND_SOC_DAIFMT_INV_MASK) {
+case SND_SOC_DAIFMT_NB_NF:
+break;
+case SND_SOC_DAIFMT_IB_NF:
+iface_reg2 |= AIC31XX_BCLKINV_MASK;
+break;
+default:
+dev_err(codec->dev, "Invalid DAI clock signal polarity
");
+return -EINVAL;
+}
+
/* interface format */
switch (fmt & SND_SOC_DAIFMT_FORMAT_MASK) {
case SND_SOC_DAIFMT_I2S:
@@ -931,16 +943,12 @@
case SND_SOC_DAIFMT_DSP_A:
dsp_a_val = 0x1; /* fall through */
case SND_SOC_DAIFMT_DSP_B:
-/* NOTE: BCLKINV bit value 1 equas NB and 0 equals IB */
-switch (fmt & SND_SOC_DAIFMT_INV_MASK) {
-case SND_SOC_DAIFMT_NB_NF:
-iface_reg2 |= AIC31XX_BCLKINV_MASK;
-break;
-case SND_SOC_DAIFMT_IB_NF:
-break;
-default:
-return -EINVAL;
-}
+/*
+ * NOTE: This CODEC samples on the falling edge of BCLK in
+ * DSP mode, this is inverted compared to what most DAIs
+ * expect, so we invert for this mode
+ */
+iface_reg2 ^= AIC31XX_BCLKINV_MASK;
iface_reg1 |= (AIC31XX_DSP_MODE <<
AIC31XX_IFACE1_DATATYPE_SHIFT);
break;
--- linux-4.15.0.orig/sound/soc/codecs/tlv320aic32x4.c
+++ linux-4.15.0/sound/soc/codecs/tlv320aic32x4.c
@@ -462,6 +462,8 @@
SND_SOC_DAPM_INPUT("IN2_R"),
SND_SOC_DAPM_INPUT("IN3_L"),
SND_SOC_DAPM_INPUT("IN3_R"),
+SND_SOC_DAPM_INPUT("CM_L"),
+SND_SOC_DAPM_INPUT("CM_R"),
};
static const struct snd_soc_dapm_route aic32x4_dapm_routes[] = {
    @ @ -818.6 +820.10 @@
    case SND_SOC_BIAS_PREPARE:
    break;
    case SND_SOC_BIAS_STANDBY:
    "Initial cold start */
    +if (snd_soc_component_get_bias_level(component) == SND_SOC_BIAS_OFF)
    +break;
    +
    /* Switch off BCLK_N Divider */
    snd_soc_update_bits(codec, AIC32X4_BCLKN,
        AIC32X4_BCLKEN, 0);
--- linux-4.15.0.orig/sound/soc/codecs/tlv320aic3x.c
+++ linux-4.15.0/sound/soc/codecs/tlv320aic3x.c
@@ -1599,7 +1599,6 @@
    struct aic3x_priv *aic3x = snd_soc_codec_get_drvdata(codec);
    int ret, i;

-INIT_LIST_HEAD(&aic3x->list);
    aic3x->codec = codec;

    for (i = 0; i < ARRAY_SIZE(aic3x->supplies); i++) {
        @ @ -1682.7 +1681.6 @@
        struct aic3x_priv *aic3x = snd_soc_codec_get_drvdata(codec);
        int i;

- list_del(&aic3x->list);
    for (i = 0; i < ARRAY_SIZE(aic3x->supplies); i++)
        regulator_unregister_notifier(aic3x->supplies[i].consumer,
            &aic3x->disable_nb[i].nb);
        @ @ -1875.6 +1873.7 @@
    if (ret != 0)
        goto err_gpio;
    @ @ -1891.6 +1890.8 @@
    { 
        struct aic3x_priv *aic3x = i2c_get_clientdata(client);

+INIT_LIST_HEAD(&aic3x->list);
    list_add(&aic3x->list, &reset_list);

    return 0;
    @ @ -1891.6 +1890.8 @@
    }
    struct aic3x_priv *aic3x = i2c_get_clientdata(client);

+list_del(&aic3x->list);
    +
    snd_soc_unregister_codec(&client->dev);
    if (gpio_is_valid(aic3x->gpio_reset) &&
        !aic3x_is_shared_reset(aic3x))
--- linux-4.15.0.orig/sound/soc/codecs/wm2200.c
err_pm_runtime:
    pm_runtime_disable(&i2c->dev);
    +if (i2c->irq)
    +free_irq(i2c->irq, wm2200);
err_reset:
    if (wm2200->pdata.reset)
        gpio_set_value_cansleep(wm2200->pdata.reset, 0);
    @ @ -2432.6 +2434.7 @ @
    {
        struct wm2200_priv *wm2200 = i2c_get_clientdata(i2c);

        +pm_runtime_disable(&i2c->dev);
        snd_soc_unregister_codec(&i2c->dev);
        if (i2c->irq)
            free_irq(i2c->irq, wm2200);  
            @@ -2439.6 +2442.8 @@
            gpio_set_value_cansleep(wm2200->pdata.reset, 0);
            if (wm2200->pdata.ldo_ena)
                gpio_set_value_cansleep(wm2200->pdata.ldo_ena, 0);
                +regulator_bulk_disable(ARRAY_SIZE(wm2200->core_supplies),
                                +wm2200->core_supplies);
                return 0;
    }
--- linux-4.15.0.orig/sound/soc/codecs/wm5100.c
+++ linux-4.15.0/sound/soc/codecs/wm5100.c
@@ -2625,6 +2625,7 @@
return ret;

err_reset:
+pm_runtime_disable(&i2c->dev);
    if (i2c->irq)
        free_irq(i2c->irq, wm5100);  
@@ -2648.6 +2649.7 @@
    {
        struct wm5100_priv *wm5100 = i2c_get_clientdata(i2c);

        +pm_runtime_disable(&i2c->dev);
        snd_soc_unregister_codec(&i2c->dev);
        if (i2c->irq)
            free_irq(i2c->irq, wm5100);
            --- linux-4.15.0.orig/sound/soc/codecs/wm8737.c
            +++ linux-4.15.0/sound/soc/codecs/wm8737.c
@@ -170,7 +170,7 @@

SOC_SINGLE("3D Switch", WM8737_3D_ENHANCE, 0, 1, 0),
SOC_SINGLE("3D Depth", WM8737_3D_ENHANCE, 1, 15, 0),
SOC_ENUM("3D Low Cut-off", low_3d),
-SOC_ENUM("3D High Cut-off", low_3d),
+SOC_ENUM("3D High Cut-off", high_3d),
SOC_SINGLE_TLV("3D ADC Volume", WM8737_3D_ENHANCE, 7, 1, 1, adc_tlv),

SOC_SINGLE("Noise Gate Switch", WM8737_NOISE_GATE, 0, 1, 0),
--- linux-4.15.0.orig/sound/soc/codecs/wm8804-i2c.c
+++ linux-4.15.0/sound/soc/codecs/wm8804-i2c.c
@@ -13,6 +13,7 @@
 #include <linux/init.h>
 #include <linux/module.h>
 #include <linux/i2c.h>
+#include <linux/acpi.h>

 #include "wm8804.h"

 @@ -40,17 +41,29 @@
 MODULE_DEVICE_TABLE(i2c, wm8804_i2c_id);

+#if defined(CONFIG_OF)
static const struct of_device_id wm8804_of_match[] = {
    { .compatible = "wlf,wm8804", },
};
MODULE_DEVICE_TABLE(of, wm8804_of_match);
+#endif
+
+#ifdef CONFIG_ACPI
+static const struct acpi_device_id wm8804_acpi_match[] = {
+    { "1AE8804", 0 }, /* Wolfson PCI ID + part ID */
+    { "10138804", 0 }, /* Cirrus Logic PCI ID + part ID */
+};
+MODULE_DEVICE_TABLE(acpi, wm8804_acpi_match);
+#endif

static struct i2c_driver wm8804_i2c_driver = {
    .driver = {
        .name = "wm8804",
        .pm = &wm8804_pm,
        .of_match_table = wm8804_of_match,
    },
    .probe = wm8804_i2c_probe,
.remove = wm8804_i2c_remove,
--- linux-4.15.0.orig/sound/soc/codecs/wm8960.c
+++ linux-4.15.0/sound/soc/codecs/wm8960.c
@@ -710,7 +710,13 @@
     best_freq_out = -EINVAL;
     *sysclk_idx = *dac_idx = *bclk_idx = -1;

-for (i = 0; i < ARRAY_SIZE(sysclk_divs); ++i) {
+/*
+ * From Datasheet, the PLL performs best when f2 is between
+ * 90MHz and 100MHz, the desired sysclk output is 11.2896MHz
+ * or 12.288MHz, then sysclkdiv = 2 is the best choice.
+ * So search sysclk_divs from 2 to 1 other than from 1 to 2.
+ */
+for (i = ARRAY_SIZE(sysclk_divs) - 1; i >= 0; --i) {
    if (sysclk_divs[i] == -1)
        continue;
    for (j = 0; j < ARRAY_SIZE(dac_divs); ++j) {
@@ -749,9 +755,16 @@
     int i, j, k;
     int ret;

-if (!(iface1 & (1<<6))) {
-    dev_dbg(codec->dev,
-        "Codec is slave mode, no need to configure clock\n"");
+/*
+ * For Slave mode clocking should still be configured,
+ * so this if statement should be removed, but some platform
+ * may not work if the sysclk is not configured, to avoid such
+ * compatible issue, just add '!wm8960->sysclk' condition in
+ * this if statement.
+ */
+if (!(iface1 & (1 << 6)) && !wm8960->sysclk) {
    dev_warn(codec->dev,
        "slave mode, but proceeding with no clock configuration\n");
    return 0;
}

@@ -862,8 +875,7 @@
     wm8960->is_stream_in_use[tx] = true;

-if (snd_soc_codec_get_bias_level(codec) == SND_SOC_BIAS_ON &&
-    !wm8960->is_stream_in_use[!tx])
+if (!wm8960->is_stream_in_use[!tx])
     return wm8960_configure_clocking(codec);

return 0;
if (target % Fref == 0) {
    fll_div->theta = 0;
    fll_div->lambda = 0;
} else {
    gcd_fll = gcd(target, fratio * Fref);

    if (fll_div.theta || fll_div.lambda)
        fll1 |= WM8962_FLL_FRAC;
/* Stop the FLL while we reconfigure */

default:
    return -EINVAL;

switch (control->revision) {
    case 0:
        goto err_spk_irqs;
    case WM8958:
        wm8994->hubs.dcs_readback_mode = 1;
        break;
        +wm8994->hubs.micd_scthr = true;
        break;
    case WM8994:
        switch (control->revision) {
        case 0:
            goto err_spk_irqs;
        case WM8994:
            switch (control->revision) {
            case 0:
                goto err_spk_irqs;
return ret;
+
err_spk_irqs:
   arizona_free_spk_irqs(arizona);

--- linux-4.15.0.orig/sound/soc/codecs/wm8998.c
+++ linux-4.15.0/sound/soc/codecs/wm8998.c
@@ -1388,7 +1388,7 @@
ret = arizona_init_spk_irqs(arizona);
if (ret < 0)
   goto err_pm_disable;
++
ret = snd_soc_register_codec(&pdev->dev, &soc_codec_dev_wm8998,
   wm8998_dai, ARRAY_SIZE(wm8998_dai));
@@ -1401,6 +1401,8 @@
err_spk_irqs:
   arizona_free_spk_irqs(arizona);
+err_pm_disable:
   pm_runtime_disable(&pdev->dev);
   return ret;
}

--- linux-4.15.0.orig/sound/soc/codecs/wm9712.c
+++ linux-4.15.0/sound/soc/codecs/wm9712.c
@@ -638,13 +638,14 @@
{
   struct wm9712_priv *wm9712 = snd_soc_codec_get_drvdata(codec);
   struct regmap *regmap = snd_soc_new_ac97_codec(codec, WM9712_VENDOR_ID,
   WM9712_VENDOR_ID_MASK);
if (wm9712->mfd_pdata) {
   wm9712->ac97 = wm9712->mfd_pdata->ac97;
   regmap = wm9712->mfd_pdata->regmap;
} else {
   #ifdef CONFIG_SND_SOC_AC97_BUS
   int ret;
   +
   wm9712->ac97 = snd_soc_new_ac97_codec(codec, WM9712_VENDOR_ID,
      WM9712_VENDOR_ID_MASK);
if (IS_ERR(wm9712->ac97)) {
   --- linux-4.15.0.orig/sound/soc/codecs/wm_adsp.c
   +++ linux-4.15.0/sound/soc/codecs/wm_adsp.c
   @@ -787,38 +787,41 @@

static void wm_adsp2_show_fw_status(struct wm_adsp *dsp) {
    u16 scratch[4];
    unsigned int scratch[4];
    unsigned int addr = dsp->base + ADSP2_SCRATCH0;
    unsigned int i;
    int ret;

    ret = regmap_raw_read(dsp->regmap, dsp->base + ADSP2_SCRATCH0,
                          sizeof(scratch));
    if (ret) {
        adsp_err(dsp, "Failed to read SCRATCH regs: %d\n", ret);
        return;
    }
    for (i = 0; i < ARRAY_SIZE(scratch); ++i) {
        ret = regmap_read(dsp->regmap, addr + i, &scratch[i]);
        if (ret) {
            adsp_err(dsp, "Failed to read SCRATCH%d: %d\n", i, ret);
            return;
        }
    }
    adsp_dbg(dsp, "FW SCRATCH 0:0x%x 1:0x%x 2:0x%x 3:0x%x\n",
             be16_to_cpu(scratch[0]),
             be16_to_cpu(scratch[1]),
             be16_to_cpu(scratch[2]),
             be16_to_cpu(scratch[3]));
}

static void wm_adsp2v2_show_fw_status(struct wm_adsp *dsp) {
    u32 scratch[2];
    unsigned int scratch[2];
    int ret;

    ret = regmap_raw_read(dsp->regmap, dsp->base + ADSP2V2_SCRATCH0_1,
                          sizeof(scratch));
    if (ret) {
        adsp_err(dsp, "Failed to read SCRATCH regs: %d\n", ret);
        return;
    }
    scratch[0] = be32_to_cpu(scratch[0]);
}

static void wm_adsp2v2_show_fw_status(struct wm_adsp *dsp) {
    u32 scratch[2];
    unsigned int scratch[2];
    int ret;

    ret = regmap_raw_read(dsp->regmap, dsp->base + ADSP2V2_SCRATCH0_1,
                          sizeof(scratch));
    if (ret) {
        adsp_err(dsp, "Failed to read SCRATCH regs: %d\n", ret);
        return;
    }
    scratch[0] = be32_to_cpu(scratch[0]);
}
scratch[1] = be32_to_cpu(scratch[1]);
+ret = regmap_read(dsp->regmap, dsp->base + ADSP2V2_SCRATCH2_3,
+ &scratch[1]);
+if (ret) {
+adsp_err(dsp, "Failed to read SCRATCH2_3: %d\n", ret);
+return;
+}

adsp_dbg(dsp, "FW SCRATCH 0:0x%x 1:0x%x 2:0x%x 3:0x%x\n",
scratch[0] & 0xFFFF,
@@ -1166,8 +1169,7 @@)
}

if (in) {
-if (in & WMFW_CTL_FLAG_READABLE)
-out |= rd;
+out |= rd;
if (in & WMFW_CTL_FLAG_WRITEABLE)
out |= wr;
if (in & WMFW_CTL_FLAG_VOLATILE)
@@ -1204,12 +1206,14 @@
kcontrol->put = wm_coeff_put_acked;
break;
default:
-kcontrol->get = wm_coeff_get;
-kcontrol->put = wm_coeff_put;
-
-ctl->bytes_ext.max = ctl->len;
-ctl->bytes_ext.get = wm_coeff_tlv_get;
-ctl->bytes_ext.put = wm_coeff_tlv_put;
+if (kcontrol->access & SNDRV_CTL_ELEM_ACCESS_TLV_CALLBACK) {
+ctl->bytes_ext.max = ctl->len;
+ctl->bytes_ext.get = wm_coeff_tlv_get;
+ctl->bytes_ext.put = wm_coeff_tlv_put;
+} else {
+kcontrol->get = wm_coeff_get;
+kcontrol->put = wm_coeff_put;
+}
break;
}

@@ -1387,7 +1391,7 @@
ctl_work = kzalloc(sizeof(*ctl_work), GFP_KERNEL);
if (!ctl_work) {
ret = -ENOMEM;
-err_ctl_cache:
+err_list_del:
}
ctl_work->dsp = dsp;
@@ -1397,7 +1401,8 @@
    return 0;

-err_ctl_cache:
+err_list_del:
+list_del(&ctl->list);
kfree(ctl->cache);
err_ctl_name:
kfree(ctl->name);
@@ -3706,11 +3711,13 @@
    struct regmap *regmap = dsp->regmap;
    int ret = 0;

+mmutex_lock(&dsp->pwr_lock);
+
    ret = regmap_read(regmap, dsp->base + ADSP2_LOCK_REGION_CTRL, &val);
    if (ret) {
      adsp_err(dsp,
"Failed to read Region Lock Ctrl register: %d\n", ret);
-      return IRQ_HANDLED;
+      goto error;
    }

    if (val & ADSP2_WDT_TIMEOUT_STS_MASK) {
      @@ -3729,7 +3736,7 @@
      adsp_err(dsp,
"Failed to read Bus Err Addr register: %d\n", ret);
-      return IRQ_HANDLED;
+      goto error;
    }

    adsp_err(dsp, "bus error address = 0x%x\n",
      @@ -3742,7 +3749,7 @@
    adsp_err(dsp,
"Failed to read Pmem Xmem Err Addr register: %d\n", ret);
-    return IRQ_HANDLED;
+    goto error;
    }

    adsp_err(dsp, "xmem error address = 0x%x\n",
      @@ -3755,6 +3762,9 @@
    regmap_update_bits(regmap, dsp->base + ADSP2_LOCK_REGION_CTRL,
ADSP2_CTRL_ERR_EINT, ADSP2_CTRL_ERR_EINT);
+error:
+mutex_unlock(&dsp->pwr_lock);
+
+return IRQ_HANDLED;
}
EXPORT_SYMBOL_GPL(wm_adsp2_bus_error);
--- linux-4.15.0.orig/sound/soc/codecs/wm_hubs.c
+++ linux-4.15.0/sound/soc/codecs/wm_hubs.c
@@ -1227,6 +1227,9 @@
snd_soc_update_bits(codec, WM8993_ADDITIONAL_CONTROL,
     WM8993_LINEOUT2_FB, WM8993_LINEOUT2_FB);

+if (!hubs->micd_scthr)
+return 0;
+
snd_soc_update_bits(codec, WM8993_MICBIAS,
     WM8993_JD_SCTHR_MASK | WM8993_JD_THR_MASK |
     WM8993_MICB1_LVL | WM8993_MICB2_LVL,
--- linux-4.15.0.orig/sound/soc/codecs/wm_hubs.h
+++ linux-4.15.0/sound/soc/codecs/wm_hubs.h
@@ -31,6 +31,7 @@
    int hp_startup_mode;
    int series_startup;
    int no_series_update;
+    bool micd_scthr;
    bool no_cache_dac_hp_direct;
    struct list_head dcs_cache;
--- linux-4.15.0.orig/sound/soc/davinci/davinci-mcasp.c
+++ linux-4.15.0/sound/soc/davinci/davinci-mcasp.c
@@ -43,6 +43,7 @@
#define MCASP_MAX_AFIFO_DEPTH64

+#ifdef CONFIG_PM
static u32 context_regs[] = {
    DAVINCI_MCASP_TXFMCTL_REG,
    DAVINCI_MCASP_RXFMCTL_REG,
    @ @ -65,6 +66,7 @ @
    u32*xrsr_regs; /* for serializer configuration */
    bool pm_state;
};
+#endif

struct davinci_mcasp_ruledata {
    struct davinci_mcasp *mcasp;
    @ @ -880,14 +882,13 @ @
active_slots = hweight32(mcasp->tdm_mask[stream]);
active_serializers = (channels + active_slots - 1) / active_slots;
-if (active_serializers == 1) {
+if (active_serializers == 1)
active_slots = channels;
-for (i = 0; i < total_slots; i++) {
+for (i = 0; i < total_slots; i++) {
+if ((1 << i) & mcasp->tdm_mask[stream]) {
+mask |= (1 << i);
+if (--active_slots <= 0)
+break;
+}
}
} else {
@@ -1156,6 +1157,28 @@
return ret;
}
+
+static int davinci_mcasp_hw_rule_slot_width(struct snd_pcm_hw_params *params,
+    struct snd_pcm_hw_rule *rule)
+{
+struct davinci_mcasp_ruledata *rd = rule->private;
+struct snd_mask *fmt = hw_param_mask(params, SNDRV_PCM_HW_PARAM_FORMAT);
+struct snd_mask nfmt;
+int i, slot_width;
+
+snd_mask_none(&nfmt);
+slot_width = rd->mcasp->slot_width;
+
+for (i = 0; i <= SNDRV_PCM_FORMAT_LAST; i++) {
+    if (snd_mask_test(fmt, i)) {
+        if (snd_pcm_format_width(i) <= slot_width) {
+            snd_mask_set(&nfmt, i);
+        }
+    }
+}
+}
+
+return snd_mask_refine(fmt, &nfmt);
+}
+
+static const unsigned int davinci_mcasp_dai_rates[] = {
8000, 11025, 16000, 22050, 32000, 44100, 48000, 64000,
struct davinci_mcasp_ruledata *ruledata = &mcasp->ruledata[substream->stream];

u32 max_channels = 0;
-int i, dir;
+int i, dir, ret;
int tdm_slots = mcasp->tdm_slots;

/* Do not allow more then one stream per direction */
@ -1278,6 +1301,7 @@
max_channels++;
}
ruledata->serializers = max_channels;
+ruledata->mcasp = mcasp;
max_channels *= tdm_slots;
/
* If the already active stream has less channels than the calculated
@ -1303,20 +1327,22 @@
0, SNDDRV_PCM_HW_PARAM_CHANNELS,
 &mcasp->chconstr[substream->stream]);

-if (mcasp->slot_width)
-snd_pcm_hw_constraint_minmax(substream->runtime,
- SNDDRV_PCM_HW_PARAM_SAMPLE_BITS,
- 8, mcasp->slot_width);
+if (mcasp->slot_width) {
+ /* Only allow formats require <= slot_width bits on the bus */
+ret = snd_pcm_hw_rule_add(substream->runtime, 0,
+ SNDDRV_PCM_HW_PARAM_FORMAT,
+ davinci_mcasp_hw_rule_slot_width,
+ ruledata,
+ SNDDRV_PCM_HW_PARAM_FORMAT, -1);
+if (ret)
+return ret;
+}
/
* If we rely on implicit BCLK divider setting we should
* set constraints based on what we can provide.
*/
if (mcasp->bclk_master && mcasp->bclk_div == 0 && mcasp->sysclk_freq) {
-int ret;
- -ruledata->mcasp = mcasp;
- -
ret = snd_pcm_hw_rule_add(substream->runtime, 0,
 SNDDRV_PCM_HW_PARAM_RATE,
davinci_mcasp_hw_rule_rate,
@@ -1721,8 +1747,10 @@
 PTR_ERR(chan));
 return PTR_ERR(chan);
 }
-+if (WARN_ON(!chan->device || !chan->device->dev)) {
 +if (WARN_ON(!chan->device || !chan->device->dev)) {
 +dma_release_channel(chan);
 return -EINVAL;
 +}
 }

 if (chan->device->dev->of_node)
 ret = of_property_read_string(chan->device->dev->of_node,
 --- linux-4.15.0.orig/sound/soc/fsl/Kconfig
+++ linux-4.15.0/sound/soc/fsl/Kconfig
@@ -173,16 +173,17 @@
endif # SND_POWERPC_SOC

 +config SND_SOC_IMX_PCM_FIQ
 +tristate
 +default y if SND_SOC_IMX_SSI=y && (SND_SOC_FSL_SSI=m || SND_SOC_FSL_SPDIF=m) &&
 (MXC_TZIC || MXC_AVIC)
 +select FIQ
 +
 if SND_IMX_SOC

 config SND_SOC_IMX_SSI
 tristate
 select SND_SOC_FSL_UTILS

 -config SND_SOC_IMX_PCM_FIQ
 -tristate
 -select FIQ
 -
 comment "SoC Audio support for Freescale i.MX boards:"

 config SND_MXC_SOC_WM1133_EV1
@@ -221,7 +222,7 @@

 config SND_SOC_EUKREA_TLV320
 tristate "Eukrea TLV320"
 -depends on ARCH_MXC &amp; I2C
 +depends on ARCH_MXC &amp; !ARM64 &amp; I2C
 select SND_SOC_TLV320AIC23_I2C
 select SND_SOC_IMX_AUDMUX
 select SND_SOC_IMX_SSI
--- linux-4.15.0.orig/sound/soc/fsl/eukrea-tlv320.c
if (ret) {
    dev_err(&pdev->dev, "fsl,mux-int-port node missing or invalid.
");
    return ret;
}
ret = of_property_read_u32(np, "fsl,mux-ext-port", &ext_port);
if (ret) {
    dev_err(&pdev->dev, "fsl,mux-ext-port node missing or invalid.
");
    goto err;
}
/*
--- linux-4.15.0.orig/sound/soc/fsl/fsl-asoc-card.c
+++ linux-4.15.0/sound/soc/fsl/fsl-asoc-card.c
@@ -693,6 +693,7 @@
asrc_fail:
of_node_put(asrc_np);
of_node_put(codec_np);
+put_device(&cpu_pdev->dev);
fail:
of_node_put(cpu_np);
*/

-if ((outrate > 8000 && outrate < 30000) &&
   (outrate/inrate > 24 || inrate/outrate > 8)) {
+if ((outrate >= 8000 && outrate <= 30000) &&
   (outrate > 24 * inrate || inrate > 8 * outrate)) {
  pair_err("exceed supported ratio range [1/24, 8] for \
inrate/outrate: %d/%d\n", inrate, outrate);
  return -EINVAL;
}

--- linux-4.15.0.orig/sound/soc/fsl/fsl_asrc_dma.c
+++ linux-4.15.0/sound/soc/fsl/fsl_asrc_dma.c
@@ -243,6 +243,7 @@
ret = dmaengine_slave_config(pair->dma_chan[dir], &config_be);
if (ret) {
    dev_err(dev, "failed to config DMA channel for Back-End\n");
+dma_release_channel(pair->dma_chan[dir]);
    return ret;
}
--- linux-4.15.0.orig/sound/soc/fsl/fsl_esai.c
+++ linux-4.15.0/sound/soc/fsl/fsl_esai.c
@@ -58,6 +58,8 @@
    u32 fifo_depth;
    u32 slot_width;
    u32 slots;
+   u32 tx_mask;
+   u32 rx_mask;
    u32 hck_rate[2];
    u32 sck_rate[2];
    bool hck_dir[2];
@@ -144,6 +146,13 @@
    psr = ratio <= 256 * maxfp ? ESAI_xCCR_xPSR_BYPASS : ESAI_xCCR_xPSR_DIV8;

    /* Do not loop-search if PM (1 ~ 256) alone can serve the ratio */
+   if (ratio <= 256) {
+      pm = ratio;
+      fp = 1;
+      goto out;
+   }
+   
   /* Set the max fluctuation -- 0.1% of the max divisor */
   savesub = (psr ? 1 : 8) * 256 * maxfp / 1000;

@@ -240,6 +249,7 @@
    break;
    case ESAI_HCKT_EXTAL:
        ecr |= ESAI_ECR_ETI;
+       break;
    case ESAI_HCKR_EXTAL:
        ecr |= ESAI_ECR_ERI;
        break;
@@ -351,21 +361,13 @@
         .REG_ESAI_TCCR, ESAI_xCCR_xDC_MASK, ESAI_xCCR_xDC(slots));

-        regmap_update_bits(esai_priv->regmap, REG_ESAI_TSMA, 
-                           ESAI_xSMA_xS_MASK, ESAI_xSMA_xS(tx_mask));
-        regmap_update_bits(esai_priv->regmap, REG_ESAI_TSMB, 
-                           ESAI_xSMB_xS_MASK, ESAI_xSMB_xS(tx_mask));
-        regmap_update_bits(esai_priv->regmap, REG_ESAI_RCCR, 
-                           ESAI_xCCR_xDC_MASK, ESAI_xCCR_xDC(slots));
-        regmap_update_bits(esai_priv->regmap, REG_ESAI_RSMA,
- ESAl_xSMA_xS_MASK, ESAl_xSMA_xS(rx_mask));
- regmap_update_bits(esai_priv->regmap, REG_ESAI_RSMB,
- ESAl_xSMB_xS_MASK, ESAl_xSMB_xS(rx_mask));
-
esai_priv->slot_width = slot_width;
esai_priv->slots = slots;
+esai_priv->tx_mask = tx_mask;
+esai_priv->rx_mask = rx_mask;

return 0;
}
}
+ ESAI_xCCRxDC_MASK,
+ ESAI_xCCRxDC(esai_priv->slots));
}

return 0;
@@ -585,6 +590,7 @@
bool tx = substream->stream == SNDRC_PKM_STREAM_PLAYBACK;
u8 i, channels = substream->runtime->channels;
u32 pins = DIV_ROUND_UP(channels, esai_priv->slots);
+u32 mask;

switch (cmd) {
    case SNDRV_PCM_TRIGGER_START:
@@ -597,15 +603,38 @@
for (i = 0; tx && i < channels; i++)
    regmap_write(esai_priv->regmap, REG_ESAI_ETDR, 0x0);

    /*
    + * When set the TE/RE in the end of enablement flow, there
    + * will be channel swap issue for multi data line case.
    + * In order to workaround this issue, we switch the bit
    + * enablement sequence to below sequence
    + * 1) clear the xSMB & xSMA: which is done in probe and
    + *     stop state.
    + * 2) set TE/RE
    + * 3) set xSMB
    + * 4) set xSMA: xSMA is the last one in this flow, which
    + *     will trigger esai to start.
    + */
    regmap_update_bits(esai_priv->regmap, REG_ESAI_xCR(tx),
        tx ? ESAI_xCR_TE_MASK : ESAI_xCR_RE_MASK,
        tx ? ESAI_xCR_TE(pins) : ESAI_xCR_RE(pins));
    mask = tx ? esai_priv->tx_mask : esai_priv->rx_mask;
    +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMB(tx),
        +ESAI_xSMBxS_MASK, ESAI_xSMBxS(mask));
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMA(tx),
        +ESAI_xSMAxS_MASK, ESAI_xSMAxS(mask));
    +break;
    case SNDRV_PCM_TRIGGER_SUSPEND:
    case SNDRV_PCM_TRIGGER_STOP:
    case SNDRV_PCM_TRIGGER_PAUSE_PUSH:
        regmap_update_bits(esai_priv->regmap, REG_ESAI_xCR(tx),
            tx ? ESAI_xCR_TE_MASK : ESAI_xCR_RE_MASK, 0);
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMA(tx),
            +ESAI_xSMAxS_MASK, 0);
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMB(tx),
            +ESAI_xSMBxS_MASK, 0);
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMB(tx),
            +ESAI_xSMBxS_MASK, 0);
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMA(tx),
            +ESAI_xSMAxS_MASK, 0);
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMA(tx),
            +ESAI_xSMAxS_MASK, 0);
    case SNDRV_PCM_TRIGGER_PAUSE_CONTINUE:
        regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMB(tx),
            +ESAI_xSMBxS_MASK, 0);
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xSMA(tx),
            +ESAI_xSMAxS_MASK, 0);
        +regmap_update_bits(esai_priv->regmap, REG_ESAI_xCR(tx),
            tx ? ESAI_xCR_TE_MASK : ESAI_xCR_RE_MASK, 0);
    break;
/* Disable and reset FIFO */
regmap_update_bits(esai_priv->regmap, REG_ESAI_xFCR(tx),
@ @ -895.6 +924.15 @ @
return ret;
}
+esai_priv->tx_mask = 0xFFFFFFFF;
+esai_priv->rx_mask = 0xFFFFFFFF;
+
+/* Clear the TSMA, TSMB, RSMA, RSMB */
+regmap_write(esai_priv->regmap, REG_ESAI_TSMA, 0);
+regmap_write(esai_priv->regmap, REG_ESAI_TSMB, 0);
+regmap_write(esai_priv->regmap, REG_ESAI_RSMA, 0);
+regmap_write(esai_priv->regmap, REG_ESAI_RSMB, 0);
+
ret = devm_snd_soc_register_component(&pdev->dev, &fsl_esai_component,
   &fsl_esai_dai, 1);

if (ret) {
   --- linux-4.15.0.orig/sound/soc/fsl/fsl_sai.c
   +++ linux-4.15.0/sound/soc/fsl/fsl_sai.c
   @ @ -274,12 +274,14 @@
case SND_SOC_DAIFMT_CBS_CFS:
   val_cr2 |= FSL_SAI_CR2_BCD_MSTR;
   val_cr4 |= FSL_SAI_CR4_FSD_MSTR;
   +sai->is_slave_mode = false;
   break;
case SND_SOC_DAIFMT_CBCM_CFM:
   sai->is_slave_mode = true;
   break;
case SND_SOC_DAIFMT_CBCM_CFS:
   val_cr4 |= FSL_SAI_CR4_FSD_MSTR;
   val_cr2 |= FSL_SAI_CR2_BCD_MSTR;
   +sai->is_slave_mode = false;
   break;
case SND_SOC_DAIFMT_CBCM_CBS:
   val_cr4 |= FSL_SAI_CR4_FSD_MSTR;
   --- linux-4.15.0.orig/sound/soc/fsl/fsl_ssi.c
   +++ linux-4.15.0/sound/soc/fsl/fsl_ssi.c
   @ @ -358,8 +358,7 @@
   
   struct fsl_ssi_private *ssi_private = dev_id;
   struct regmap *regs = ssi_private->regs;
   __be32 sisr;
   __be32 sisr2;
   u32 sisr, sisr2;

   /* We got an interrupt, so read the status register to see what we
were interrupted for. We mask it with the Interrupt Enable register

```c
struct fsl_ssi_private *ssi_private;
```

```c
struct device_node *np = pdev->dev.of_node;
```

```c
+struct device_node *root;
```

```c
const struct of_device_id *of_id;
```

```c
const char *p, *sprop;
```

```c
const uint32_t *iprop;
```

```c
//@ -1624,7 +1624,9 @@
```

```c
* device tree. We also pass the address of the CPU DAI driver
```

```c
* structure.
```

```c
*/
```

```c
-sprop = of_get_property(of_find_node_by_path("/"), "compatible", NULL);
```

```c
+root = of_find_node_by_path("/");
```

```c
+sprop = of_get_property(root, "compatible", NULL);
```

```c
+of_node_put(root);
```

```c
/* Sometimes the compatible name has a "fsl," prefix, so we strip it. */
```

```c
p = strrchr(sprop,
```

```c
--- linux-4.15.0.orig/sound/soc/fsl/fsl_utils.c
```

```c
+++ linux-4.15.0/sound/soc/fsl/fsl_utils.c
```

```c
@@ -75,6 +75,7 @@
```

```c
iprop = of_get_property(dma_np, "cell-index", NULL);
```

```c
if (iprop) {
```

```c
of_node_put(dma_np);
```

```c
+of_node_put(dma_channel_np);
```

```c
return -EINVAL;
```

```c
/*dma_id = be32_to_cpup(iprop);
```

```c
--- linux-4.15.0.orig/sound/soc/fsl/imx-audmux.c
```

```c
+++ linux-4.15.0/sound/soc/fsl/imx-audmux.c
```

```c
@@ -86,49 +86,49 @@
```

```c
if (!buf)
```

```c
return -ENOMEM;
```

```c
-ret = snprintf(buf, PAGE_SIZE, "PDCR: %08x
PTCR: %08x
",
```

```c
+ret = scnprintf(buf, PAGE_SIZE, "PDCR: %08x
PTCR: %08x
",
```

```c
pdcr, ptcr);
```

```c
if (ptcr & IMX_AUDMUX_V2_PTCR_TFSDIR)
```

```c
-ret += snprintf(buf + ret, PAGE_SIZE - ret, 
```

```c
+ret += scnprintf(buf + ret, PAGE_SIZE - ret, 
```

```c
"TxFS output from %s, ",
```

```c
audmux_port_string((ptcr >> 27) & 0x7));
```

```c
else
```

```c
-ret += snprintf(buf + ret, PAGE_SIZE - ret, 
```

```c
+ret += scnprintf(buf + ret, PAGE_SIZE - ret, 
```

```c```

---
if (ptcr & IMX_AUDMUX_V2_PTCR_TCLKDIR)
  -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
  "TxClk output from %s",
  audmux_port_string((ptcr >> 22) & 0x7));
else
  -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
  "TxClk input");

  -ret += snprintf(buf + ret, PAGE_SIZE - ret, "u");
+ret += snprintf(buf + ret, PAGE_SIZE - ret, "u");

if (ptcr & IMX_AUDMUX_V2_PTCR_SYN) {
  -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
  "Port is symmetric");
} else {
  if (ptcr & IMX_AUDMUX_V2_PTCR_RFSDIR)
    -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
    "RxFS output from %s ",
    audmux_port_string((ptcr >> 17) & 0x7));
  else
    -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
    "RxFS input ");
}

if (ptcr & IMX_AUDMUX_V2_PTCR_RCLKDIR)
  -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
  "RxClk output from %s",
  audmux_port_string((ptcr >> 12) & 0x7));
else
  -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
  "RxClk input");
}

  -ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ret += snprintf(buf + ret, PAGE_SIZE - ret,
  "nData received from %s
",
  audmux_port_string((pdcr >> 13) & 0x7));

--- linux-4.15.0.orig/sound/soc/fsl/imx-sgtl5000.c
+++ linux-4.15.0/sound/soc/fsl/imx-sgtl5000.c
ret = -EPROBE_DEFER;
}
+put_device(&ssi_pdev->dev);
codec_dev = of_find_i2c_device_by_node(codec_np);
if (!codec_dev) {
    dev_err(&pdev->dev, "failed to find codec platform device\n");
    -return -EPROBE_DEFER;
    +ret = -EPROBE_DEFER;
    +goto fail;
    }

data = devm_kzalloc(&pdev->dev, sizeof(*data), GFP_KERNEL);

for (n = 0; n < i2s->clocks; n++) {
    ret = clk_prepare_enable(i2s->clk[n]);
    -if (ret) {
        -while (n--)
        -clk_disable_unprepare(i2s->clk[n]);
        -return ret;
    }
    +if (ret)
    +goto err_unprepare_clk;
    +goto err_unprepare_clk;
}

ret = clk_set_rate(i2s->clk[CLK_I2S_BASE], 49152000);
if (ret) {
    dev_err(i2s->dev, "%s: setting 49.152MHz base rate failed %d\n", __func__, ret);
    -return ret;
    +goto err_unprepare_clk;
}

/* enable clock before frequency division */

return 0;
+
+err_unprepare_clk:
+while (n--)
+clk_disable_unprepare(i2s->clk[n]);
+return ret;
}
static void hi6210_i2s_shutdown(struct snd_pcm_substream *substream,
--- linux-4.15.0.orig/sound/soc/img/img-i2s-in.c
+++ linux-4.15.0/sound/soc/img/img-i2s-in.c
@@ -346,8 +346,10 @@
chan_control_mask = IMG_I2S_IN_CH_CTL_CLK_TRANS_MASK;

ret = pm_runtime_get_sync(i2s->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put_noidle(i2s->dev);
 return ret;
+ }

for (i = 0; i < i2s->active_channels; i++)
img_i2s_in_ch_disable(i2s, i);
@@ -485,6 +487,7 @@
if (IS_ERR(rst)) {
 if (PTR_ERR(rst) == -EPROBE_DEFER) {
 ret = -EPROBE_DEFER;
+ pm_runtime_put(&pdev->dev);
 goto err_suspend;
 }

--- linux-4.15.0.orig/sound/soc/img/img-i2s-out.c
+++ linux-4.15.0/sound/soc/img/img-i2s-out.c
@@ -350,8 +350,10 @@
chan_control_mask = IMG_I2S_OUT_CHAN_CTL_CLKT_MASK;

ret = pm_runtime_get_sync(i2s->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put_noidle(i2s->dev);
 return ret;
+ }

img_i2s_out_disable(i2s);
@@ -491,8 +493,10 @@
goto err_pm_disable;
 }
 ret = pm_runtime_get_sync(&pdev->dev);
- if (ret < 0)
+ if (ret < 0) {
+ pm_runtime_put_noidle(&pdev->dev);
 goto err_suspend;
+ }
reg = IMG_I2S_OUT_CTL_FRM_SIZE_MASK;
img_i2s_out_writel(i2s, reg, IMG_I2S_OUT_CTL);
--- linux-4.15.0.orig/sound/soc/img/img-parallel-out.c
+++ linux-4.15.0/sound/soc/img/img-parallel-out.c
@@ -166,8 +166,10 @@
}
ret = pm_runtime_get_sync(prl->dev);
-if (ret < 0)
+if (ret < 0) {
+.pm_runtime_put_noidle(prl->dev);
return ret;
+
reg = img_prl_out_readl(prl, IMG_PRL_OUT_CTL);
reg = (reg & ~IMG_PRL_OUT_CTL_EDGE_MASK) | control_set;
--- linux-4.15.0.orig/sound/soc/intel/atom/sst-atom-controls.c
+++ linux-4.15.0/sound/soc/intel/atom/sst-atom-controls.c
@@ -974,7 +974,9 @@
+mutex_unlock(&drv->lock);
if (ret)
return ret;
+
ret = sst_send_pipe_module_params(w, k);
@@ -1341,7 +1343,7 @@
(w->source) & p->source(w, p->sink))
+if (p->source(w, p->sink))
continue;

if (p->source(w, p->sink))
-snd_pcm_uframes_t period_size;
snd_pcm_uframes_t period_size;
ssize_t buffer_bytes = snd_pcm_lib_buffer_bytes(substream);
-u32 buffer_addr = virt_to_phys(substream->dma_buffer.area);
+u32 buffer_addr = virt_to_phys(substream->runtime->dma_area);

channels = substream->runtime->channels;
period_size = substream->runtime->period_size;
/* set codec params and inform SST driver the same */
sst_fill_pcm_params(substream, &param);
sst_fill_alloc_params(substream, &alloc_params);
substream->runtime->dma_area = substream->dma_buffer.area;
str_params.sparams = param;
str_params.aparams = alloc_params;
str_params.codec = SST_CODEC_TYPE_PCM;

ret_val = power_up_sst(stream);
if (ret_val < 0)
    -return ret_val;
+goto out_power_up;

/* Make sure, that the period size is always even */
snd_pcm_hw_constraint_step(substream->runtime, 0,
@@ -348,8 +347,9 @@    SNDRCV_PCM_HW_PARAM_PERIODS);
out_ops:
-kfree(stream);
mutex_unlock(&sst_lock);
+out_power_up:
+kfree(stream);
return ret_val;
}

struct snd_pcm_hw_params *params,
struct snd_soc_dai *dai)
{
-snd_pcm_lib_malloc_pages(substream, params_buffer_bytes(params));
+int ret;
+
+ret =
+snd_pcm_lib_malloc_pages(substream,
+params_buffer_bytes(params));
+if (ret)
+    return ret;
memset(substream->runtime->dma_area, 0, params_buffer_bytes(params));
return 0;
}

.open source used in 5g as edge ac-4 35568
.formats = SNDRV_PCM_FMTBIT_S16_LE,
],
.capture = {
.stream_name = "Headset Capture",
.channels_min = 1,
.channels_max = 2,
.rates = SNDRV_PCM_RATE_44100|SNDRV_PCM_RATE_48000,
.formats = SNDRV_PCM_FMTBIT_S16_LE | SNDRV_PCM_FMTBIT_S24_LE,
+	.formats = SNDRV_PCM_FMTBIT_S16_LE,
},
},
},
{
@@ -519,7 +525,7 @@
.channels_min = SST_STEREO,
.channels_max = SST_STEREO,
.rates = SNDRV_PCM_RATE_44100|SNDRV_PCM_RATE_48000,
.formats = SNDRV_PCM_FMTBIT_S16_LE | SNDRV_PCM_FMTBIT_S24_LE,
+	.formats = SNDRV_PCM_FMTBIT_S16_LE,
},
},
{
--- linux-4.15.0.orig/sound/soc/intel/atom/sst/sst_loader.c
+++ linux-4.15.0/sound/soc/intel/atom/sst/sst_loader.c
@@ -354,14 +354,14 @@
const struct firmware *fw;

retval = request_firmware(&fw, sst->firmware_name, sst->dev);
-if (fw == NULL) {
-    dev_err(sst->dev, "fw is returning as null\n");
-    return -EINVAL;
-}
+if (fw == NULL) {
+    dev_err(sst->dev, "fw is returning as null\n");
+    return -EINVAL;
+}
    if (retval) {
        dev_err(sst->dev, "request fw failed %d\n", retval);
        return retval;
    }
  } +if (fw == NULL) {
  +    dev_err(sst->dev, "fw is returning as null\n");
  +    return -EINVAL;
  +}
mutex_lock(&sst->sst_lock);
retval = sst_cache_and_parse_fw(sst, fw);
mutex_unlock(&sst->sst_lock);
--- linux-4.15.0.orig/sound/soc/intel/atom/sst/sst_pci.c
+++ linux-4.15.0/sound/soc/intel/atom/sst/sst_pci.c
@@ -107,7 +107,7 @@
dev_dbg(ctx->dev, "DRAM Ptr %p\n", ctx->dram);
do_release_regions:
pci_release_regions(pci):
-return 0;
+return ret;
}

/*
--- linux-4.15.0.orig/sound/soc/intel/atom/sst/sst_stream.c
+++ linux-4.15.0/sound/soc/intel/atom/sst/sst_stream.c
@@ -220,7 +220,7 @@
sst_free_block(sst_drv_ctx, block);
 out:
 test_and_clear_bit(pvt_id, &sst_drv_ctx->pvt_id);
 -return 0;
+return ret;
}

/*
--- linux-4.15.0.orig/sound/soc/intel/boards/Kconfig
+++ linux-4.15.0/sound/soc/intel/boards/Kconfig
@@ -93,6 +93,18 @@
 Say Y if you have such a device.
 If unsure select "N".

+config SND_SOC_INTEL_BYTCR_RT5660_MACH
+    tristate "ASoC Audio driver for Intel Baytrail and Baytrail-CR with RT5660 codec"
+    depends on X86 && I2C && ACPI
+    select SND_SOC_RT5660
+    depends on SND_SST_ATOM_HIFI2_PLATFORM
+    select SND_SST_IPC_ACPI
+    help
+    +  This adds support for ASoC machine driver for Intel(R) Baytrail and Baytrail-CR
+    +  platforms with RT5660 audio codec.
+    +  Say Y if you have such a device.
+    +  If unsure select "N".
+    +
+    config SND_SOC_INTEL_CHT_BSW_RT5672_MACH
        tristate "ASoC Audio driver for Intel Cherrytrail & Braswell with RT5672 codec"
        depends on X86_INTEL_LPSS && I2C && ACPI
--- linux-4.15.0.orig/sound/soc/intel/boards/Makefile
+++ linux-4.15.0/sound/soc/intel/boards/Makefile
@@ -8,6 +8,7 @@
snd-soc-sst-bxt-rt298-objs := bxt_rt298.o
 snd-soc-sst-bytcr-rt5640-objs := bytcr_rt5640.o
 snd-soc-sst-bytcr-rt5651-objs := bytcr_rt5651.o
+snd-soc-sst-bytcr-rt5660-objs := bytcr_rt5660.o
 snd-soc-sst-cht-bsw-rt5672-objs := cht_bsw_rt5672.o
 snd-soc-sst-cht-bsw-max98090_ti-objs := cht_bsw_max98090_ti.o
@@ -29,6 +30,7 @@
lsmod

--- linux-4.15.0.orig/sound/soc/intel/boards/broadwell.c
+++ linux-4.15.0/sound/soc/intel/boards/broadwell.c
@@ -191,7 +191,7 @@
         .stream_name = "Loopback",
         .cpu_dai_name = "Loopback Pin",
         .platform_name = "haswell-pcm-audio",
-    .dynamic = 0,
+    .dynamic = 1,
         .codec_name = "snd-soc-dummy",
         .codec_dai_name = "snd-soc-dummy-dai",
         .trigger = {SND_SOC_DPCM_TRIGGER_POST, SND_SOC_DPMC_TRIGGER_POST},
--- linux-4.15.0.orig/sound/soc/intel/boards/bxt_rt298.c
+++ linux-4.15.0/sound/soc/intel/boards/bxt_rt298.c
@@ -529,6 +529,7 @@
     /* broxton audio machine driver for SPT + RT298S */
 static struct snd_soc_card broxton_rt298 = {
     .name = "broxton-rt298",
-    .owner = THIS_MODULE,
+    .owner = THIS_MODULE,
     .dai_link = broxton_rt298_dais,
     .num_links = ARRAY_SIZE(broxton_rt298_dais),
     .controls = broxton_controls,
@@ -544,6 +545,7 @@
     static struct snd_soc_card geminilake_rt298 = {
         .name = "geminilake-rt298",
         .owner = THIS_MODULE,
-        .dai_link = broxton_rt298_dais,
+        .dai_link = broxton_rt298_dais,
         .num_links = ARRAY_SIZE(broxton_rt298_dais),
         .controls = broxton_controls,
         --- linux-4.15.0.orig/sound/soc/intel/boards/bytcr_rt5640.c
+++ linux-4.15.0/sound/soc/intel/boards/bytcr_rt5640.c
@@ -213,9 +213,6 @@
 static const struct snd_soc_dapm_route byt_rt5640_audio_map[] = {
     {"Headphone", NULL, "Platform Clock"},
     {"Headset Mic", NULL, "Platform Clock"},
-    {"Internal Mic", NULL, "Platform Clock"},
-    {"Speaker", NULL, "Platform Clock"},
-    {"Headset Mic", NULL, "MICBIAS1"},
-    {"IN2P", NULL, "Headset Mic"},
-    {"Headphone", NULL, "HPOL"},
---
static const struct snd_soc_dapm_route byt_rt5640_intmic_dmic1_map[] = {
+{"Internal Mic", NULL, "Platform Clock"},
{"DMIC1", NULL, "Internal Mic"},
};

static const struct snd_soc_dapm_route byt_rt5640_intmic_dmic2_map[] = {
+{"Internal Mic", NULL, "Platform Clock"},
{"DMIC2", NULL, "Internal Mic"},
};

static const struct snd_soc_dapm_route byt_rt5640_intmic_in1_map[] = {
+{"Internal Mic", NULL, "Platform Clock"},
{"Internal Mic", NULL, "MICBIAS1"},
{"IN1P", NULL, "Internal Mic"},
};
@@ -277,6 +278,7 @@

static const struct snd_soc_dapm_route byt_rt5640_intmic_in3_map[] = {
+{"Internal Mic", NULL, "Platform Clock"},
{"IN3P", NULL, "Internal Mic"},
};
@@ -284,6 +286,7 @@

static const struct snd_soc_dapm_route byt_rt5640_stereo_spk_map[] = {
+{"Speaker", NULL, "Platform Clock"},
{"Speaker", NULL, "SPOLP"},
{"Speaker", NULL, "SPOLN"},
{"Speaker", NULL, "SPORP"},
@@ -284.6 +286.7 @@

static const struct snd_soc_dapm_route byt_rt5640_mono_spk_map[] = {
+{"Speaker", NULL, "Platform Clock"},
{"Speaker", NULL, "SPOLP"},
{"Speaker", NULL, "SPOLN"},
};
--- linux-4.15.0.orig/sound/soc/intel/boards/bytcr_rt5660.c
+++ linux-4.15.0/sound/soc/intel/boards/bytcr_rt5660.c
@@ -0,0 +1,429 @@
+/*
+ * Intel Baytrail SST RT5660 machine driver
+ * Copyright (C) 2016 Shrirang Bagul <shrirang.bagul@canonical.com>
+ *
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ */
+
+#include <linux/init.h>
+#include <linux/module.h>
+#include <linux/moduleparam.h>
+#include <linux/platform_device.h>
+#include <linux/gpio/consumer.h>
+#include <linux/acpi.h>
+#include <linux/clk.h>
+#include <linux/device.h>
+#include <linux/slab.h>
+#include <asm/cpu_device_id.h>
+#include <asm/platform_sst_audio.h>
+#include <sound/pcm.h>
+#include <sound/pcm_params.h>
+#include <sound/soc.h>
+#include <sound/jack.h>
+#include <sound/soc-acpi.h>
+#include "../codecs/rt5660.h"
+#include "../atom/sst-atom-controls.h"
+#include "../common/sst-dsp.h"
+
+#define BYT_RT5660_MCLK_ENBIT(17)
+#define BYT_RT5660_MCLK_25MHZBIT(18)
+
+struct byt_rt5660_private {
+    struct clk *mclk;
+    struct gpio_desc *gpio_lo_mute;
+};
+
+static unsigned long byt_rt5660_quirk = BYT_RT5660_MCLK_EN;
+
+static void log_quirks(struct device *dev)
+{
+    if (byt_rt5660_quirk & BYT_RT5660_MCLK_EN)
+        dev_info(dev, "quirk MCLK_EN enabled");
+    if (byt_rt5660_quirk & BYT_RT5660_MCLK_25MHZ)
+        dev_info(dev, "quirk MCLK_25MHZ enabled");
+}
+static int byt_rt5660_event_lineout(struct snd_soc_dapm_widget *w,  
+struct snd_kcontrol *k, int event)  
+{  
+struct snd_soc_dapm_context *dapm = w->dapm;  
+struct snd_soc_card *card = dapm->card;  
+struct byt_rt5660_private *priv = snd_soc_card_get_drvdata(card);  
+  
gpiod_set_value_cansleep(priv->gpio_lo_mute,  
+!(SND_SOC_DAPM_EVENT_ON(event)));  
+  
+return 0;  
+}  
+  
+#define BYT_CODEC_DAI1 "rt5660-aif1"  
+  
+static int platform_clock_control(struct snd_soc_dapm_widget *w,  
+  struct snd_kcontrol *k, int event)  
+{  
+struct snd_soc_dapm_context *dapm = w->dapm;  
+struct snd_soc_card *card = dapm->card;  
+struct snd_soc_dai *codec_dai;  
+struct byt_rt5660_private *priv = snd_soc_card_get_drvdata(card);  
+int ret;  
++  
++codec_dai = snd_soc_card_get_codec_dai(card, BYT_CODEC_DAI1);  
+if (!codec_dai) {  
+  dev_err(card->dev,  
+"Codec dai not found; Unable to set platform clock\n");  
+return -EIO;  
+}  
++  
++if (SND_SOC_DAPM_EVENT_ON(event)) {  
++if (byt_rt5660_quirk & BYT_RT5660_MCLK_EN) {  
++ret = clk_prepare_enable(priv->mclk);  
++if (ret < 0) {  
++dev_err(card->dev,  
++"could not configure MCLK state");  
++return ret;  
++}  
++}  
++ret = snd_soc_dai_set_sysclk(codec_dai, RT5660_SCLK_S_PLL1,  
++ 48000 * 512,  
++  
++SND_SOC_CLOCK_IN);  
++} else {  
+/*  
++* Set codec clock source to internal clock before  
++* turning off the platform clock. Codec needs clock

Open Source Used In 5GaaS Edge AC-4 35574
* for Jack detection and button press
+ */
+ret = snd_soc_dai_set_sysclk(codec_dai, RT5660_SCLK_S_RCCLK,
+ 48000 * 512,
+ SND_SOC_CLOCK_IN);
+if (!ret)
+if (byt_rt5660_quirk & BYT_RT5660_MCLK_EN)
+clk_disable_unprepare(priv->mclk);
+
+if (ret < 0) {
+dev_err(card->dev, "can't set codec sysclk: %d\n", ret);
+return ret;
+
+}
+
+return 0;
+
+static const struct snd_soc_dapm_widget byt_rt5660_widgets[] = {
+SND_SOC_DAPM_MIC("Line In", NULL),
+SND_SOC_DAPM_LINE("Line Out", byt_rt5660_event_lineout),
+SND_SOC_DAPM_SUPPLY("Platform Clock", SND_SOC_NOPM, 0, 0,
+  platform_clock_control, SND_SOC_DAPM_PRE_PMU |
+  SND_SOC_DAPM_POST_PMD),
+};
+
+static const struct snd_soc_dapm_route byt_rt5660_audio_map[] = {
+{"IN1P", NULL, "Platform Clock"},
+{"IN2P", NULL, "Platform Clock"},
+{"Line Out", NULL, "Platform Clock"},
+
+{"IN1P", NULL, "Line In"},
+{"IN2P", NULL, "Line In"},
+{"Line Out", NULL, "LOUTR"},
+{"Line Out", NULL, "LOUTL"},
+
+{"ssp2 Tx", NULL, "codec_out0"},
+{"ssp2 Tx", NULL, "codec_out1"},
+{"codec_in0", NULL, "ssp2 Rx"},
+{"codec_in1", NULL, "ssp2 Rx"},
+{"AIF1 Playback", NULL, "ssp2 Tx"},
+{"ssp2 Rx", NULL, "AIF1 Capture"},
+};
+
+static const struct snd_kcontrol_new byt_rt5660_controls[] = {
+SOC_DAPM_PIN_SWITCH("Line In"),
+SOC_DAPM_PIN_SWITCH("Line Out"),
+};
static int byt_rt5660_aif1_hw_params(struct snd_pcm_substream *substream,
+struct snd_pcm_hw_params *params)
+{
+struct snd_soc_pcm_runtime *rtd = substream->private_data;
+struct snd_soc_dai *codec_dai = rtd->codec_dai;
+int ret;
+
+snd_soc_dai_set_bclk_ratio(codec_dai, 50);
+
+ret = snd_soc_dai_set_sysclk(codec_dai, RT5660_SCLK_S_PLL1,
+    params_rate(params) * 512,
+    SND_SOC_CLOCK_IN);
+if (ret < 0) {
+  dev_err(codec_dai->dev, "can't set codec clock %d\n", ret);
return ret;
+}
+
+if (!byt_rt5660_quirk & BYT_RT5660_MCLK_EN) {
/* 2x25 bit slots on SSP2 */
+ret = snd_soc_dai_set_pll(codec_dai, 0,
+    RT5660_PLL1_S_BCLK,
+    params_rate(params) * 50,
+    params_rate(params) * 512);
+} else {
+if (byt_rt5660_quirk & BYT_RT5660_MCLK_25MHZ) {
+ret = snd_soc_dai_set_pll(codec_dai, 0,
+    RT5660_PLL1_S_MCLK,
+    25000000,
+    params_rate(params) * 512);
+} else {
+ret = snd_soc_dai_set_pll(codec_dai, 0,
+    RT5660_PLL1_S_MCLK,
+    19200000,
+    params_rate(params) * 512);
+}
+}
+
+if (ret < 0) {
+  dev_err(codec_dai->dev, "can't set codec pll: %d\n", ret);
+return ret;
+}
+
+return 0;
+}
+
+static int byt_rt5660_init(struct snd_soc_pcm_runtime *runtime)
+{
```c
+struct snd_soc_card *card = runtime->card;
+struct byt_rt5660_private *priv = snd_soc_card_get_drvdata(card);
+struct snd_soc_codec *codec = runtime->codec;
+int ret;
+
+/* Request rt5660 GPIO for lineout mute control */
+priv->gpio_lo_mute = devm_gpiod_get_index(codec->dev,
+"lineout-mute", 0, 0);
+if (IS_ERR(priv->gpio_lo_mute)) {
+dev_err(card->dev, "Can't find GPIO_MUTE# gpio\n");
+return PTR_ERR(priv->gpio_lo_mute);
+}
+
+ret = gpiod_direction_output(priv->gpio_lo_mute, 1);
+if (ret)
+return ret;
+
+if (byt_rt5660_quirk & BYT_RT5660_MCLK_EN) {
+/*
+ * The firmware might enable the clock at
+ * boot (this information may or may not
+ * be reflected in the enable clock register).
+ * To change the rate we must disable the clock
+ * first to cover these cases. Due to common
+ * clock framework restrictions that do not allow
+ * to disable a clock that has not been enabled,
+ * we need to enable the clock first.
+ */
+ret = clk_prepare_enable(priv->mclk);
+if (!ret)
+clk_disable_unprepare(priv->mclk);
+
+if (byt_rt5660_quirk & BYT_RT5660_MCLK_25MHZ)
+ret = clk_set_rate(priv->mclk, 25000000);
+else
+ret = clk_set_rate(priv->mclk, 19200000);
+
+if (ret)
+dev_err(card->dev, "unable to set MCLK rate\n");
+}
+
+return ret;
+}
+
+static const struct snd_soc_pcm_stream byt_rt5660_dai_params = {
+.formats = SNDRV_PCM_FMTBIT_S24_LE,
+.rate_min = 48000,
+.rate_max = 48000,
```
+.channels_min = 2,
+.channels_max = 2,
+};
+
+static int byt_rt5660_codec_fixup(struct snd_soc_pcm_runtime *rtd,
+    struct snd_pcm_hw_params *params)
+{
+    struct snd_interval *rate = hw_param_interval(params,
+    SNDRV_PCM_HW_PARAM_RATE);
+    struct snd_interval *channels = hw_param_interval(params,
+    SNDRV_PCM_HW_PARAM_CHANNELS);
+    int ret;
+
+/* The DSP will covert the FE rate to 48k, stereo */
+rate->min = rate->max = 48000;
+channels->min = channels->max = 2;
+
+/* set SSP2 to 24-bit */
+params_set_format(params, SNDRV_PCM_FORMAT_S24_LE);
+
+/*
+ * Default mode for SSP configuration is TDM 4 slot, override config
+ * with explicit setting to I2S 2ch 24-bit. The word length is set with
+ * dai_set_tdm_slot() since there is no other API exposed
+ */
+ret = snd_soc_dai_set_fmt(rtd->cpu_dai,
+  SND_SOC_DAIFMT_I2S    |
+  SND_SOC_DAIFMT_NB_NF  |
+  SND_SOC_DAIFMT_CBS_CFS
+);
+if (ret < 0) {
+  dev_err(rtd->dev, "can't set format to I2S, err %d\n", ret);
+  return ret;
+}
+
+ret = snd_soc_dai_set_tdm_slot(rtd->cpu_dai, 0x3, 0x3, 2, 24);
+if (ret < 0) {
+  dev_err(rtd->dev, "can't set I2S config, err %d\n", ret);
+  return ret;
+}
+
+return 0;
+
+static int byt_rt5660_aif1_startup(struct snd_pcm_substream *substream)
+{
+    return snd_pcm_hw_constraint_single(substream->runtime,
+    SNDRV_PCM_HW_PARAM_RATE, 48000);
static struct snd_soc_ops byt_rt5660_aif1_ops = {
.startup = byt_rt5660_aif1_startup,
};

static struct snd_soc_ops byt_rt5660_be_ssp2_ops = {
.hw_params = byt_rt5660_aif1_hw_params,
};

static struct snd_soc_dai_link byt_rt5660_dais[] = {
[MERR_DPCM_AUDIO] = {
.name = "Baytrail Audio Port",
.stream_name = "Baytrail Audio",
.cpu_dai_name = "media-cpu-dai",
.codec_dai_name = "snd-soc-dummy-dai",
.codec_name = "snd-soc-dummy",
.platform_name = "sst-mfld-platform",
.nonatomic = true,
.dynamic = 1,
.dpcm_playback = 1,
.dpcm_capture = 1,
.ops = &byt_rt5660_aif1_ops,
},
[MERR_DPCM_DEEP_BUFFER] = {
.name = "Deep-Buffer Audio Port",
.stream_name = "Deep-Buffer Audio",
.cpu_dai_name = "deepbuffer-cpu-dai",
.codec_dai_name = "snd-soc-dummy-dai",
.codec_name = "snd-soc-dummy",
.platform_name = "sst-mfld-platform",
.nonatomic = true,
.dynamic = 1,
.dpcm_playback = 1,
.ops = &byt_rt5660_aif1_ops,
},
/* back ends */
{
.name = "SSP2-Codec",
.id = 0,
.cpu_dai_name = "ssp2-port",
.platform_name = "sst-mfld-platform",
.no_pcm = 1,
.codec_dai_name = "rt5660-aif1",
.codec_name = "i2c-10EC3277:00",
.dai_fmt = SND_SOC_DAIFMT_I2S | SND_SOC_DAIFMT_NB_NF
| SND_SOC_DAIFMT_CBS_CFS,
.be_hw_params_fixup = byt_rt5660_codec_fixup,
+ .ignore_suspend = 1,
+ .nonatomic = true,
+ .dpcm_playback = 1,
+ .dpcm_capture = 1,
+ .init = byt_rt5660_init,
+ .ops = &byt_rt5660_be_ssp2_ops,
+ );
+
+ static struct snd_soc_card byt_rt5660_card = {
+ .name = "baytrailcraaudio",
+ .owner = THIS_MODULE,
+ .dai_link = byt_rt5660_dais,
+ .num_links = ARRAY_SIZE(byt_rt5660_dais),
+ .dapm_widgets = byt_rt5660_widgets,
+ .num_dapm_widgets = ARRAY_SIZE(byt_rt5660_widgets),
+ .dapm_routes = byt_rt5660_audio_map,
+ .num_dapm_routes = ARRAY_SIZE(byt_rt5660_audio_map),
+ .controls = byt_rt5660_controls,
+ .num_controls = ARRAY_SIZE(byt_rt5660_controls),
+ .fully_routed = true,
+ );
+
+ static int byt_rt5660_probe(struct platform_device *pdev)
+ {
+ int ret_val = 0;
+ struct byt_rt5660_private *priv;
+ 
+ priv = devm_kzalloc(&pdev->dev, sizeof(*priv), GFP_ATOMIC);
+ if (!priv)
+ 	return -ENOMEM;
+ 
+ byt_rt5660_card.dev = &pdev->dev;
+ snd_soc_card_set_drvdata(&byt_rt5660_card, priv);
+ 
+ log_quirks(&pdev->dev);
+ 
+ if (byt_rt5660_private & BYT_RT5660_MCLK_EN) {
+ priv->mclk = devm_clk_get(pdev->dev, "pmc_plt_clk_3");
+ if (IS_ERR(priv->mclk)) {
+ dev_err(pdev->dev, "Failed to get MCLK from pmc_plt_clk_3: %ld\n",
+ PTR_ERR(priv->mclk));
+ */
+ * Fall back to bit clock usage for -ENOENT (clock not
+ * available likely due to missing dependencies), bail
+ * for all other errors, including -EPROBE_DEFER
+ */
### Linux Device Driver Code Snippet

```c
+if (ret_val != -ENOENT)
  +return ret_val;
+byt_rt5660_quirk &= ~BYT_RT5660_MCLK_EN;
+
+ret_val = devm_snd_soc_register_card(&pdev->dev, &byt_rt5660_card); 
+if (ret_val) {
+dev_err(&pdev->dev, "devm_snd_soc_register_card failed %d
",
+ret_val); 
+return ret_val; 
+
+platform_set_drvdata(pdev, &byt_rt5660_card); 
+return ret_val; 
+
+static int byt_rt5660_remove(struct platform_device *pdev)
+{
+struct snd_soc_card *card = platform_get_drvdata(pdev);
+struct byt_rt5660_private *priv = snd_soc_card_get_drvdata(card);
+devm_gpiod_put(&pdev->dev, priv->gpio_lo_mute);
+return 0;
+}
+
+static struct platform_driver byt_rt5660_audio = {
+.probe = byt_rt5660_probe,
+.remove = byt_rt5660_remove,
+.driver = {
+.name = "bytcr_rt5660",
+},
+};
+module_platform_driver(byt_rt5660_audio)
+
+#include <linux/dmi.h>
```

---

**Source Code Snippet**

```
#include <linux/dmi.h>

/* ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
*/
```

---

**Module Information**

```
--- linux-4.15.0.orig/sound/soc/intel/boards/cht_bsw_max98090_ti.c
+++ linux-4.15.0/sound/soc/intel/boards/cht_bsw_max98090_ti.c
@@ -19,6 +19,7 @@

*/

+#include <linux/dmi.h>
#include <linux/module.h>
```
```c
#include <linux/platform_device.h>
#include <linux/slab.h>
#define CHT_PLAT_CLK_3_HZ 19200000
#define CHT_CODEC_DAI "HiFi"

+#define QUIRK_PMC_PLT_CLK_0 0x01
+
struct cht_mc_private {
    struct clk *mclk;
    struct snd_soc_jack jack;
    ...
    .num_controls = ARRAY_SIZE(cht_mc_controls),
};

+static const struct dmi_system_id cht_max98090_quirk_table[] = {
    /**< Clapper model Chromebook */
    .matches = {
        DMI_MATCH(DMI_PRODUCT_NAME, "Clapper"),
    },
    .driver_data = (void *)QUIRK_PMC_PLT_CLK_0,
    +{
    /**< Gnawty model Chromebook (Acer Chromebook CB3-111) */
    .matches = {
        DMI_MATCH(DMI_PRODUCT_NAME, "Gnawty"),
    },
    .driver_data = (void *)QUIRK_PMC_PLT_CLK_0,
    +{
    /**< Swanky model Chromebook (Toshiba Chromebook 2) */
    .matches = {
        DMI_MATCH(DMI_PRODUCT_NAME, "Swanky"),
    },
    .driver_data = (void *)QUIRK_PMC_PLT_CLK_0,
    +{
    }
    +
    +static int snd_cht_mc_probe(struct platform_device *pdev)
    {
        const struct dmi_system_id *dmi_id;
        struct device *dev = &pdev->dev;
        int ret_val = 0;
        struct cht_mc_private *drv;
        +const char *mclk_name;
        +int quirks = 0;
```
+ dmi_id = dmi_first_match(cht_max98090_quirk_table);
+ if (dmi_id)
+ quirks = (unsigned long)dmi_id->driver_data;

drv = devm_kzalloc(&pdev->dev, sizeof(*drv), GFP_ATOMIC);
if (!drv)
@@ -411,11 +446,16 @@
snd_soc_card_cht.dev = &pdev->dev;
snd_soc_card_set_drvdata(&snd_soc_card_cht, drv);

-drv->mclk = devm_clk_get(&pdev->dev, "pmc_plt_clk_3");
+if (quirks & QUIRK_PMC_PLT_CLK_0)
+ mclk_name = "pmc_plt_clk_0";
+ else
+ mclk_name = "pmc_plt_clk_3";
+ 
+drv->mclk = devm_clk_get(&pdev->dev, mclk_name);
if (IS_ERR(drv->mclk)) {
  dev_err(&pdev->dev,
- "Failed to get MCLK from pmc_plt_clk_3: %ld
",
- PTR_ERR(drv->mclk));
+ "Failed to get MCLK from %s: %ld
",
  mclk_name, PTR_ERR(drv->mclk));
  return PTR_ERR(drv->mclk);
}
{"Headset Mic", NULL, "Platform Clock"},
{"Int Mic", NULL, "Platform Clock"},
+{"Int Analog Mic", NULL, "Platform Clock"},
+{"Int Analog Mic", NULL, "micbias1"},
+{"Int Analog Mic", NULL, "micbias2"},
{"Ext Spk", NULL, "Platform Clock"},
};

@@ -189,6 +195,7 @@
SOC_DAPM_PIN_SWITCH("Headphone"),
SOC_DAPM_PIN_SWITCH("Headset Mic"),
SOC_DAPM_PIN_SWITCH("Int Mic"),
+SOC_DAPM_PIN_SWITCH("Int Analog Mic"),
SOC_DAPM_PIN_SWITCH("Ext Spk"),
};

--- linux-4.15.0.orig/sound/soc/intel/boards/haswell.c
+++ linux-4.15.0/sound/soc/intel/boards/haswell.c
@@ -145,7 +145,7 @@
 .stream_name = "Loopback",
 .cpu_dai_name = "Loopback Pin",
 .platform_name = "haswell-pcm-audio",
- .dynamic = 0,
+ .dynamic = 1,
 .codec_name = "snd-soc-dummy",
 .codec_dai_name = "snd-soc-dummy-dai",
 .trigger = {SND_SOC_DPCM_TRIGGER_POST, SND_SOC_DPCM_TRIGGER_POST},
@@ -197,6 +197,7 @@
 .probe = haswell_audio_probe,
 .driver = {
 .name = "haswell-audio",
+ .pm = &snd_soc_pm_ops,
 },
};

--- linux-4.15.0.orig/sound/soc/intel/boards/kbl_rt5663_rt5514_max98927.c
+++ linux-4.15.0/sound/soc/intel/boards/kbl_rt5663_rt5514_max98927.c
@@ -406,7 +406,7 @@
static const unsigned int dmic_2ch[] = {
-4,
+2,
};

static const struct snd_pcm_hw_constraint_list constraints_dmic_2ch = {
@@ -423,6 +423,9 @@
snd_pcm_hw_constraint_list(runtime, 0, SNDRV_PCM_HW_PARAM_CHANNELS,
+runtime->hw.formats = SNDRV_PCM_FMTBIT_S16_LE;
+snd_pcm_hw_constraint_msbits(runtime, 0, 16, 16);
+
+return snd_pcm_hw_constraint_list(substream->runtime, 0,
SNDRV_PCM_HW_PARAM_RATE, &constraints_rates);
{
--- linux-4.15.0.orig/sound/soc/intel/common/soc-acpi-intel-byt-match.c
+++ linux-4.15.0/sound/soc/intel/common/soc-acpi-intel-byt-match.c
@@ -130,6 +130,15 @@
		.id = "10EC3277",
		.drv_name = "bytcr_rt5660",
		.fw_filename = "intel/fw_sst_0f28.bin",
		.board = "bytcr_rt5660",
		.sof_fw_filename = "intel/reef-byt.ri",
		.sof_tplg_filename = "intel/reef-byt-rt5660.tplg",
		.asoc_plat_name = "sst-mfld-platform",
+},
+
+	{.
	+ .id = "DLGS7212",
	+ .drv_name = "bytcht_da7213",
	+ .fw_filename = "intel/fw_sst_0f28.bin",
--- linux-4.15.0.orig/sound/soc/intel/common/sst-firmware.c
+++ linux-4.15.0/sound/soc/intel/common/sst-firmware.c
@@ -1253,11 +1253,15 @@
goto irq_err;

err = sst_dma_new(sst);
-if (err)
-dev_warn(dev, "sst_dma_new failed %d\n", err);
+if (err)  {
+ dev_err(dev, "sst_dma_new failed %d\n", err);
+ goto dma_err;
+ }
+
{return sst;

+dma_err:
+free_irq(sst->irq, sst);
irq_err:
if (sst->ops->free)
sst->ops->free(sst);
--- linux-4.15.0.orig/sound/soc/intel/common/sst-ipc.c
+++ linux-4.15.0/sound/soc/intel/common/sst-ipc.c
if (ipc->ops.reply_msg_match != NULL)
header = ipc->ops.reply_msg_match(header, &mask);
else
+mask = (u64)-1;

if (list_empty(&ipc->rx_list)) {
dev_err(ipc->dev, "error: rx list empty but received 0x%llx\n",
--- linux-4.15.0.orig/sound/soc/intel/skylake/cnl-sst.c
+++ linux-4.15.0/sound/soc/intel/skylake/cnl-sst.c
@@ -212,6 +212,7 @@
"dsp boot timeout, status=%#x error=%#x\n",
{
			ret = -ETIMEDOUT;
+sst_dsp_shim_read(ctx, CNL_ADSP_FW_STATUS),
			ret = -ETIMEDOUT;
 goto err;
 } else {
--- linux-4.15.0.orig/sound/soc/intel/skylake/skl-debug.c
+++ linux-4.15.0/sound/soc/intel/skylake/skl-debug.c
@@ -42,8 +42,8 @@
int i;
ssize_t ret = 0;

-for (i = 0; i < max_pin; i++)
-ret += snprintf(buf + size, MOD_BUF - size,
+for (i = 0; i < max_pin; i++) {
+ret += scnprintf(buf + size, MOD_BUF - size,
"%s %d\n\tModule %d\n\tInstance %d\n"
"In-used %s\n\tType %s\n"
"\tState %d\n\tIndex %d\n",
@@ -53,13 +53,15 @@
m_pin[i].in_use ? "Used" : "Unused",
 m_pin[i].is_dynamic ? "Dynamic" : "Static",
m_pin[i].pin_state, i);
+size += ret;
+}
return ret;
}

static ssize_t skl_print_fmt(struct skl_module_fmt *fmt, char *buf,
ssize_t size, bool direction)
{
-return snprintf(buf + size, MOD_BUF - size,
+return scnprintf(buf + size, MOD_BUF - size,
"%s %d\n\tCh %d\n\tFreq %d\n\tBit depth %d\n"
"Valid bit depth %d\n\tCh config %x\n\tInterleaving %d\n"

Open Source Used In 5GaaS Edge AC-4  35586
"Sample Type %d\n\nCh Map %#x\n",
@@ -81,16 +83,16 @@
if (!buf)
return -ENOMEM;

-ret = snprintf(buf, MOD_BUF, "Module:\n\nUUID %pUL\n\nModule id %d\n"
+ret = scnprintf(buf, MOD_BUF, "Module:\n\nUUID %pUL\n\nModule id %d\n"
 "Instance id %d\n\nPvt_id %d\n", mconfig->guid,
mconfig->id.module_id, mconfig->id.instance_id,
mconfig->id.pvt_id);

-ret += snprintf(buf + ret, MOD_BUF - ret,
+ret += scnprintf(buf + ret, MOD_BUF - ret,
"Resources:\n\nMCPS %#x\n\nIBS %#x\n\nOBS %#x\n",
mconfig->mcps, mconfig->ibs, mconfig->obs);

-ret += snprintf(buf + ret, MOD_BUF - ret,
+ret += scnprintf(buf + ret, MOD_BUF - ret,
"Module data:\n\nCore %d\n\nIn queue %d\n\nOut queue %d\n\nType %s\n",
mconfig->core_id, mconfig->max_in_queue,
@@ -100,38 +102,38 @@
ret += skl_print_fmt(mconfig->in_fmt, buf, ret, true);
ret += skl_print_fmt(mconfig->out_fmt, buf, ret, false);

-ret += snprintf(buf + ret, MOD_BUF - ret,
+ret += scnprintf(buf + ret, MOD_BUF - ret,
"Fixup:\n\nParams %#x\n\nConverter %#x\n",
mconfig->params_fixup, mconfig->converter);

-ret += snprintf(buf + ret, MOD_BUF - ret,
+ret += scnprintf(buf + ret, MOD_BUF - ret,
"Module Gateway:\n\nType %#x\n\nVbus %#x\n\nHW conn %#x\n\nSlot %#x\n",
mconfig->dev_type, mconfig->vbus_id,
mconfig->hw_conn_type, mconfig->time_slot);

-ret += snprintf(buf + ret, MOD_BUF - ret,
+ret += scnprintf(buf + ret, MOD_BUF - ret,
"Pipeline:\n\nID %d\n\nPriority %d\n\nConn Type %d\n\nPages %#x\n",
mconfig->pipe->ppl_id,
mconfig->pipe->pipe_priority, mconfig->pipe->conn_type,
mconfig->pipe->memory_pages);

-ret += snprintf(buf + ret, MOD_BUF - ret,
+ret += scnprintf(buf + ret, MOD_BUF - ret,
"Params:\n\nHost DMA %d\n\nLink DMA %d\n",
mconfig->pipe->p_params->host_dma_id,
mconfig->pipe->p_params->link_dma_id);
ret += snprintf(buf + ret, MOD_BUF - ret, "\tPCM params:
\t	Ch %d
\t	Freq %d
\t	Format %d",
 mconfig->pipe->p_params->ch,
 mconfig->pipe->p_params->s_freq,
 mconfig->pipe->p_params->s_fmt);

ret += snprintf(buf + ret, MOD_BUF - ret, "\tLink %#x
\tStream %#x",
 mconfig->pipe->p_params->linktype,
 mconfig->pipe->p_params->stream);

ret += snprintf(buf + ret, MOD_BUF - ret, "\tState %d
\tPassthru %s",
 mconfig->pipe->state,
 mconfig->pipe->passthru ? "true" : "false");
@@ -141,7 +143,7 @@
 ret += skl_print_pins(mconfig->m_out_pin, buf,
 mconfig->max_out_queue, ret, false);

ret += snprintf(buf + ret, MOD_BUF - ret, "Other:
\tDomain %d
\tHomogenous Input %s
\tHomogenous Output %s
\tIn Queue Mask %d
\tOut Queue Mask %d
\tDMA ID %d
\tMem Pages %d",
 mconfig->pipe->domain,
 mconfig->m_input_homogen,
 mconfig->m_output_homogen,
 mconfig->m_in_queue_mask,
 mconfig->m_out_queue_mask,
 mconfig->m_dma_id,
 mconfig->m_mem_pages);

memset(d->fw_read_buff, 0, FW_REG_BUF);
if (w0_stat_sz > 0)
	__iowrite32_copy(d->fw_read_buff, fw_reg_addr, w0_stat_sz >> 2);
+__ioread32_copy(d->fw_read_buff, fw_reg_addr, w0_stat_sz >> 2);

for (offset = 0; offset < FW_REG_SIZE; offset += 16) {
-ret += snprintf(tmp + ret, FW_REG_BUF - ret, "\%#.4x: ", offset);
+ret += scnprintf(tmp + ret, FW_REG_BUF - ret, "\%#.4x: ", offset);
hex_dump_to_buffer(d->fw_read_buff + offset, 16, 16, 4,
	tmp + ret, FW_REG_BUF - ret, 0);
ret += strlen(tmp + ret);
--- linux-4.15.0.orig/sound/soc/intel/skylake/skl-messages.c
+++ linux-4.15.0/sound/soc/intel/skylake/skl-messages.c
@@ -196,10 +198,10 @@
 memset(d->fw_read_buff, 0, FW_REG_BUF);

if (w0_stat_sz > 0)
	__iowrite32_copy(d->fw_read_buff, fw_reg_addr, w0_stat_sz >> 2);
+__ioread32_copy(d->fw_read_buff, fw_reg_addr, w0_stat_sz >> 2);

for (offset = 0; offset < FW_REG_SIZE; offset += 16) {
-ret += snprintf(tmp + ret, FW_REG_BUF - ret, "\%#.4x: ", offset);
+ret += scnprintf(tmp + ret, FW_REG_BUF - ret, "\%#.4x: ", offset);
hex_dump_to_buffer(d->fw_read_buff + offset, 16, 16, 4,
	tmp + ret, FW_REG_BUF - ret, 0);
ret += strlen(tmp + ret);
--- linux-4.15.0.orig/sound/soc/intel/skylake/skl-messages.c
@@ -404,7 +404,11 @@
 if (skl->skl_sst->is_first_boot == true)
 return 0;

 /* disable dynamic clock gating during fw and lib download */
+ctx->enable_miscbdege(ctx->dev, false);
+
ret = skl_dsp_wake(ctx->dsp);
+ctx->enable_miscbdege(ctx->dev, true);
if (ret < 0)
return ret;

--- linux-4.15.0.orig/sound/soc/intel/skylake/skl-nhlt.c
+++ linux-4.15.0/sound/soc/intel/skylake/skl-nhlt.c
@@ -43,7 +43,8 @@
obj = acpi_evaluate_dsm(handle, &osc_guid, 1, 1, NULL);
if (obj && obj->type == ACPI_TYPE_BUFFER) {
 nhlt_ptr = (struct nhlt_resource_desc *)obj->buffer.pointer;
- nhlt_table = (struct nhlt_acpi_table *)
+ if (nhlt_ptr->length)
+ nhlt_table = (struct nhlt_acpi_table *)
memremap(nhlt_ptr->min_addr, nhlt_ptr->length,
MEMREMAP_WB);
ACPI_FREE(obj);
@@ -228,7 +229,7 @@
struct hdac_bus *bus = ebus_to_hbus(&skl->ebus);
struct device *dev = bus->dev;
-dev_dbg(dev, "oem_id %.6s, oem_table_id %8s oem_revision %d\n",
+dev_dbg(dev, "oem_id %.6s, oem_table_id %.8s oem_revision %d\n",
nhlt->header.oem_id, nhlt->header.oem_table_id,
nhlt->header.oem_revision);

--- linux-4.15.0.orig/sound/soc/intel/skylake/skl-pcm.c
+++ linux-4.15.0/sound/soc/intel/skylake/skl-pcm.c
@@ -183,6 +183,7 @@
struct hdac_stream *hstream;
struct hdac_ext_stream *stream;
struct hdac_ext_link *link;
+unsigned char stream_tag;
hstream = snd_hdac_get_stream(bus, params->stream,
params->link_dma_id + 1);
@@ -201,10 +202,13 @@
snd_hdac_ext_link_stream_setup(stream, format_val);

-list_for_each_entry(link, &ebus->hlink_list, list) {
-if (link->index == params->link_index)
-snd_hdac_ext_link_set_stream_id(link,
-hstream->stream_tag);
+stream_tag = hstream->stream_tag;
+if (stream->hstream.direction == SNDRV_PCM_STREAM_PLAYBACK) {

+list_for_each_entry(link, &ebus->hlink_list, list) {
+if (link->index == params->link_index)
+snd_hdac_ext_link_set_stream_id(link, +stream_tag);
+}
+
stream->link_prepared = 1;
@@ -615,6 +619,7 @@
 struct hdac_ext_stream *link_dev =
snd_soc_dai_get_dma_data(dai, substream);
 struct hdac_ext_link *link;
+unsigned char stream_tag;

dev_dbg(dai->dev, "%s: %s\n", __func__, dai->name);
@@ -624,7 +629,11 @@
 if (!link)
 return -EINVAL;
- snd_hdac_ext_link_clear_stream_id(link, hdac_stream(link_dev)->stream_tag);
+ if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK) {
+ stream_tag = hdac_stream(link_dev)->stream_tag;
+ snd_hdac_ext_link_clear_stream_id(link, stream_tag);
+ }
+ snd_hdac_ext_stream_release(link_dev, HDAC_EXT_STREAM_TYPE_LINK);
 return 0;
}@@ -1343,7 +1352,11 @@
 return -EIO;
}
	/* disable dynamic clock gating during fw and lib download */
+skl->skl_sst->enable_miscbdcge(platform->dev, false);
+ ret = ops->init_fw(platform->dev, skl->skl_sst);
+ skl->skl_sst->enable_miscbdcge(platform->dev, true);
 if (ret < 0) {
 dev_err(platform->dev, "Failed to boot first fw: %\d\n", ret);
 return ret;
--- linux-4.15.0.orig/sound/soc/intel/skylake/skl-topology.c
+++ linux-4.15.0/sound/soc/intel/skylake/skl-topology.c
@@ -2369,6 +2369,7 @@
 case SKL_TKN_U8_CORE_ID:
 mconfig->core_id = tkn_elem->value;
+ break;
case SKL_TKN_U8_MOD_TYPE:
    mconfig->m_type = tkn_elem->value;

--- linux-4.15.0.orig/sound/soc/intel/skylake/skl.c
+++ linux-4.15.0/sound/soc/intel/skylake/skl.c
@@ -701,7 +701,7 @@
    return -ENXIO;
 }

-skl_init_chip(bus, true);
+snd_hdac_bus_reset_link(bus, true);

snd_hdac_bus_parse_capabilities(bus);

--- linux-4.15.0.orig/sound/soc/jz4740/jz4740-i2s.c
+++ linux-4.15.0/sound/soc/jz4740/jz4740-i2s.c
@@ -92,7 +92,7 @@
#define I2SDIV_DV_SHIFT 8
#define I2SDIV_DV_MASK (0xf << I2SDIV_DV_SHIFT)
#define I2SDIV_IDV_SHIFT 8
#define I2SDIV_IDV_MASK (0xf << I2SDIV_IDV_SHIFT)
@@ -318,10 +318,14 @@
    switch (clk_id) {
        case JZ4740_I2S_CLKSRC_EXT:
            parent = clk_get(NULL, "ext");
            +if (IS_ERR(parent))
+            +return PTR_ERR(parent);
            clk_set_parent(i2s->clk_i2s, parent);
            break;
        case JZ4740_I2S_CLKSRC_PLL:
            parent = clk_get(NULL, "pll half");
            +if (IS_ERR(parent))
+            +return PTR_ERR(parent);
            clk_set_parent(i2s->clk_i2s, parent);
            ret = clk_set_rate(i2s->clk_i2s, freq);
            break;
--- linux-4.15.0.orig/sound/soc/kirkwood/kirkwood-dma.c
+++ linux-4.15.0/sound/soc/kirkwood/kirkwood-dma.c
@@ -136,7 +136,7 @@
        err = request_irq(priv->irq, kirkwood_dma_irq, IRQF_SHARED,
            "kirkwood-i2s", priv);
        if (err)
            -return -EBUSY;
            +return err;
/*
 * Enable Error interrupts. We're only ack'ing them but
--- linux-4.15.0.orig/sound/soc/kirkwood/kirkwood-i2s.c
+++ linux-4.15.0/sound/soc/kirkwood/kirkwood-i2s.c
@@ -569,10 +569,6 @@
     return PTR_ERR(priv->clk);
 }

-err = clk_prepare_enable(priv->clk);
-if (err < 0)
-    return err;
-
 priv->extclk = devm_clk_get(&pdev->dev, "extclk");
 if (IS_ERR(priv->extclk)) {
 if (PTR_ERR(priv->extclk) == -EPROBE_DEFER)
@@ -588,6 +584,10 @@
 }
 }

+err = clk_prepare_enable(priv->clk);
+if (err < 0)
+    return err;
+
 /* Some sensible defaults - this reflects the powerup values */
 priv->ctl_play = KIRKWOOD_PLAYCTL_SIZE_24;
 priv->ctl_rec = KIRKWOOD_RECCCTL_SIZE_24;
--- linux-4.15.0.orig/sound/soc/mediatek/common/mtk-afe-platform-driver.c
+++ linux-4.15.0/sound/soc/mediatek/common/mtk-afe-platform-driver.c
@@ -63,13 +63,13 @@
 static int mtk_afe_pcm_new(struct snd_soc_pcm_runtime *rtd)
 {
     size_t size;
-    struct snd_card *card = rtd->card->snd_card;
 struct snd_pcm *pcm = rtd->pcm;
 struct mtk_base_afe *afe = snd_soc_platform_get_drvdata(rtd->platform);

     size = afe->mtk_afe_hardware->buffer_bytes_max;
     return snd_pcm_lib_preallocate_pages_for_all(pcm, SNDRCV_DMA_TYPE_DEV,
-        card->dev, size, size);
+        rtd->platform->dev,
+        size, size);
     }

 static void mtk_afe_pcm_free(struct snd_pcm *pcm)
--- linux-4.15.0.orig/sound/soc/nuc900/nuc900-ac97.c
+++ linux-4.15.0/sound/soc/nuc900/nuc900-ac97.c
@@ -67,7 +67,7 @@

/* polling the AC_R_FINISH */
while (!(AUDIO_READ(nuc900_audio->mmio + ACTL_ACCON) & AC_R_FINISH)
-&& timeout--)
+&& --timeout)
mdelay(1);

if (!timeout) {
@@ -121,7 +121,7 @@
/* polling the AC_W_FINISH */
while ((AUDIO_READ(nuc900_audio->mmio + ACTL_ACCON) & AC_W_FINISH)
-&& timeout--)
+&& --timeout)
mdelay(1);

if (!timeout)
--- linux-4.15.0.orig/sound/soc/omap/mcbsp.c
+++ linux-4.15.0/sound/soc/omap/mcbsp.c
@@ -854,7 +854,7 @@
return size;
}

static DEVICE_ATTR(oma_dai_menu, 0644, oma_dai_menu_show, oma_dai_menu_store);
+static DEVICE_ATTR_RW(dma_op_mode);

static const struct attribute *additional_attrs[] = {
    &dev_attr_max_tx_thres.attr,
    @ @ -923,7 +923,7 @@
return size;
}

-static DEVICE_ATTR(dma_op_mode, 0644, dma_op_mode_show, dma_op_mode_store);
+static DEVICE_ATTR_RW(dma_op_mode);

static const struct attribute *sidetone_attrs[] = {
    &dev_attr_st_taps.attr,
--- linux-4.15.0.orig/sound/soc/omap/omap-abe-twl6040.c
+++ linux-4.15.0/sound/soc/omap/omap-abe-twl6040.c
@@ -36,6 +36,8 @@
#include "../codecs/twl6040.h"

struct abe_twl6040 {
    +struct snd_soc_card card;
    +struct snd_soc_dai_link dai_links[2];
    int jack_detection;/* board can detect jack events */
    int mclk_freq;/* MCLK frequency speed for twl6040 */
};
ARRAY_SIZE(dmic_audio_map));
}

/* Digital audio interface glue - connects codec <-> CPU */
static struct snd_soc_dai_link abe_twl6040_dai_links[] = {
-{
	.name = "TWL6040",
	.stream_name = "TWL6040",
	.codec_dai_name = "twl6040-legacy",
	.codec_name = "twl6040-codec",
	.init = omap_abe_twl6040_init,
	.ops = &omap_abe_ops,
-},
-
-{
	.name = "DMIC",
	.stream_name = "DMIC Capture",
	.codec_dai_name = "dmic-hifi",
	.codec_name = "dmic-codec",
	.init = omap_abe_dmic_init,
	.ops = &omap_abe_dmic_ops,
-},
-}

/* Audio machine driver */
static struct snd_soc_card omap_abe_card = {
- .owner = THIS_MODULE,
-
- .dapm_widgets = twl6040_dapm_widgets,
- .num_dapm_widgets = ARRAY_SIZE(twl6040_dapm_widgets),
- .dapm_routes = audio_map,
- .num_dapm_routes = ARRAY_SIZE(audio_map),
-};

static int omap_abe_probe(struct platform_device *pdev)
{
 struct device_node *node = pdev->dev.of_node;
-struct snd_soc_card *card = &omap_abe_card;
+struct snd_soc_card *card;
 struct device_node *dai_node;
 struct abe_twl6040 *priv;
 int num_links = 0;
@@ -252,12 +224,18 @@
 return -ENODEV;
 }
 -card->dev = &pdev->dev;
 -
priv = devm_kzalloc(&pdev->dev, sizeof(struct abe_twl6040), GFP_KERNEL);
if (priv == NULL)
    return -ENOMEM;
+card = &priv->card;
+card->dev = &pdev->dev;
+card->owner = THIS_MODULE;
+card->dapm_widgets = twl6040_dapm_widgets;
+card->num_dapm_widgets = ARRAY_SIZE(twl6040_dapm_widgets);
+card->dapm_routes = audio_map;
+card->num_dapm_routes = ARRAY_SIZE(audio_map);
+
+if (snd_soc_of_parse_card_name(card, "ti,model")) {
    dev_err(&pdev->dev, "Card name is not provided\n");
    return -ENODEV;
}
@@ -274,14 +252,27 @@
    dev_err(&pdev->dev, "McPDM node is not provided\n");
    return -EINVAL;
-
-abe_twl6040_dai_links[0].cpu_of_node = dai_node;
-abe_twl6040_dai_links[0].platform_of_node = dai_node;
+
+priv->dai_links[0].name = "DMIC";
+priv->dai_links[0].stream_name = "TWL6040";
+priv->dai_links[0].cpu_of_node = dai_node;
+priv->dai_links[0].platform_of_node = dai_node;
+priv->dai_links[0].codec_dai_name = "twl6040-legacy";
+priv->dai_links[0].codec_name = "twl6040-codec";
+priv->dai_links[0].init = omap_abe_twl6040_init;
+priv->dai_links[0].ops = &omap_abe_ops;

  dai_node = of_parse_phandle(node, "ti,codec", 0);
if (dai_node) {
    num_links = 2;
-abe_twl6040_dai_links[1].cpu_of_node = dai_node;
-abe_twl6040_dai_links[1].platform_of_node = dai_node;
+priv->dai_links[1].name = "TWL6040";
+priv->dai_links[1].stream_name = "DMIC Capture";
+priv->dai_links[1].cpu_of_node = dai_node;
+priv->dai_links[1].platform_of_node = dai_node;
+priv->dai_links[1].codec_dai_name = "dmic-hifi";
+priv->dai_links[1].codec_name = "dmic-codec";
+priv->dai_links[1].init = omap_abe_dmic_init;
+priv->dai_links[1].ops = &omap_abe_dmic_ops;
} else {
    num_links = 1;
}
@@ -300,7 +291,7 @@
return -ENODEV;
}

-card->dai_link = abe_tw16040_dai_links;
+card->dai_link = priv->dai_links;

snd_soc_card_set_drvdata(card, priv);
--- linux-4.15.0.orig/sound/soc/omap/omap-dmic.c
+++ linux-4.15.0/sound/soc/omap/omap-dmic.c
@@ -48,6 +48,8 @@
     "dev",
     "id",
     "pm_qos_request",
-struct pm_qos_request pm_qos_req;
+struct pm_qos_request pm_qos_req;
+int latency;
     int fclk_freq;
     int out_freq;
     int clk_div;
@@ -124,6 +126,8 @@
 mutex_lock(&dmic->mutex);
     +pm_qos_remove_request(&dmic->pm_qos_req);
     if (!dai->active)
@@ -226,6 +230,8 @@
     /* packet size is threshold * channels */
     dma_data = snd_soc_dai_get_dma_data(dai, substream);
     dma_data->maxburst = dmic->threshold * channels;
+    dmic->latency = (OMAP_DMIC_THRES_MAX - dmic->threshold) * USEC_PER_SEC /
+    params_rate(params);

     return 0;
    }
@@ -236,6 +242,9 @@
    struct omap_dmic *dmic = snd_soc_dai_get_drvdata(dai);
    u32 ctrl;

    +if (pm_qos_request_active(&dmic->pm_qos_req))
    +pm_qos_update_request(&dmic->pm_qos_req, dmic->latency);
    +/* Configure uplink threshold */
    omap_dmic_write(dmic, OMAP_DMIC_FIFO_CTRL_REG, dmic->threshold);
@@ -281,7 +290,7 @@
static int omap_dmic_select_fclk(struct omap_dmic *dmic, int clk_id, unsigned int freq)
{
    struct clk *parent_clk;
    struct clk *parent_clk, *mux;
    char *parent_clk_name;
    int ret = 0;

    return -ENODEV;
}

+mux = clk_get_parent(dmic->fclk);
+if (IS_ERR(mux)) {
    +dev_err(dmic->dev, "can't get fck mux parent\n");
    +clk_put(parent_clk);
    +return -ENODEV;
    +}

+mutex_lock(&dmic->mutex);
if (dmic->active) {
    /* disable clock while re-parenting */
    pm_runtime_put_sync(dmic->dev);
    -ret = clk_set_parent(dmic->fclk, parent_clk);
    +ret = clk_set_parent(mux, parent_clk);
    pm_runtime_get_sync(dmic->dev);
} else {
    -ret = clk_set_parent(dmic->fclk, parent_clk);
    +ret = clk_set_parent(mux, parent_clk);
}
mutex_unlock(&dmic->mutex);

clk_put(mux);
clk_put(parent_clk);
return ret;
--- linux-4.15.0.orig/sound/soc/omap/omap-mcbsp.c
+++ linux-4.15.0/sound/soc/omap/omap-mcbsp.c
@@ -308,9 +308,9 @@
pkt_size = channels;
    -latency = ((((buffer_size - pkt_size) / channels) * 1000)
    - / (params->rate_num / params->rate_den));
latency = (buffer_size - pkt_size) / channels;
latency = latency * USEC_PER_SEC /
    (params->rate_num / params->rate_den);
mcbsp->latency[substream->stream] = latency;

omap_mcbsp_set_threshold(substream, pkt_size);
--- linux-4.15.0.orig/sound/soc/omap/omap-mcpdm.c
+++ linux-4.15.0/sound/soc/omap/omap-mcpdm.c
@@ -54,6 +54,8 @@
 unsigned long phys_base;
 void __iomem *io_base;
 int irq;
+struct pm_qos_request pm_qos_req;
+int latency[2];

 struct mutex mutex;

@@ -277,6 +279,9 @@
 {  
 struct omap_mcpdm *mcpdm = snd_soc_dai_get_drvdata(dai);
+int tx = (substream->stream == SNDRV_PCM_STREAM_PLAYBACK);
+int stream1 = tx ? SNDRV_PCM_STREAM_PLAYBACK : SNDRV_PCM_STREAM_CAPTURE;
+int stream2 = tx ? SNDRV_PCM_STREAM_CAPTURE : SNDRV_PCM_STREAM_PLAYBACK;

 mutex_lock(&mcpdm->mutex);

@@ -289,6 +294,14 @@
+if (mcpdm->latency[stream2])
+    pm_qos_update_request(&mcpdm->pm_qos_req,
+            mcpdm->latency[stream2]);
+else if (mcpdm->latency[stream1])
+    pm_qos_remove_request(&mcpdm->pm_qos_req);
+    mcpdm->latency[stream1] = 0;
+    mutex_unlock(&mcpdm->mutex);

@@ -300,7 +313,7 @@
 int stream = substream->stream;
 struct snd_dmaengine_dai_dma_data *dma_data;
 u32 threshold;
-int channels;
int channels, latency;
int link_mask = 0;

channels = params_channels(params);
@@ -340,14 +353,25 @@
dma_data->maxburst = (MCPDM_DN_THRES_MAX - threshold) * channels;
+latency = threshold;
} else {
/* If playback is not running assume a stereo stream to come */
if (!mcpdm->config[!stream].link_mask)
mcpdm->config[!stream].link_mask = (0x3 << 3);

dma_data->maxburst = threshold * channels;
+latency = (MCPDM_DN_THRES_MAX - threshold);
}

/*
 * The DMA must act to a DMA request within latency time (usec) to avoid
 * under/overflow
 */
+mcpd->latency[stream] = latency * USEC_PER_SEC / params_rate(params);
+
*if (!mcpd->latency[stream])
+mcpd->latency[stream] = 10;
+
/* Check if we need to restart McPDM with this stream */
if (mcpd->config[!stream].link_mask &&
    mcpdm->config[!stream].link_mask != link_mask)
@@ -362,6 +386,20 @@
    struct snd_soc_dai *dai)
{
    struct omap_mcpdm *mcpdm = snd_soc_dai_get_drvdata(dai);
+    struct pm_qos_request *pm_qos_req = &mcpdm->pm_qos_req;
+    int tx = (substream->stream == SNDRC_PCM_STREAM_PLAYBACK);
+    int stream1 = tx ? SNDRC_PCM_STREAM_PLAYBACK : SNDRC_PCM_STREAM_CAPTURE;
+    int stream2 = tx ? SNDRC_PCM_STREAM_CAPTURE : SNDRC_PCM_STREAM_PLAYBACK;
+    int latency = mcpdm->latency[stream2];
+
+/* Prevent omap hardware from hitting off between FIFO fills */
+if (!latency || mcpdm->latency[stream1] < latency)
+    latency = mcpdm->latency[stream1];
+
+if (pm_qos_request_active(pm_qos_req))
+    pm_qos_update_request(pm_qos_req, latency);
+else if (latency)
+    pm_qos_add_request(pm_qos_req, PM_QOS_CPU_DMA_LATENCY, latency);
if (!omap_mcpdm_active(mcpdm)) {
    omap_mcpdm_start(mcpdm);
    free_irq(mcpdm->irq, (void *)mcpdm);
    pm_runtime_disable(mcpdm->dev);
}

if (pm_qos_request_active(&mcpdm->pm_qos_req))
    pm_qos_remove_request(&mcpdm->pm_qos_req);

return 0;
}

--- linux-4.15.0.orig/sound/soc/qcom/apq8016_sbc.c
+++ linux-4.15.0/sound/soc/qcom/apq8016_sbc.c
@@ -163,41 +163,52 @@
if (!cpu || !codec) {
    dev_err(dev, "Can't find cpu/codec DT node\n");
    -return ERR_PTR(-EINVAL);
    +ret = -EINVAL;
    +goto error;
}

link->cpu_of_node = of_parse_phandle(cpu, "sound-dai", 0);
if (!link->cpu_of_node) {
    dev_err(card->dev, "error getting cpu phandle\n");
    -return ERR_PTR(-EINVAL);
    +ret = -EINVAL;
    +goto error;
}

ret = snd_soc_of_get_dai_name(cpu, &link->cpu_dai_name);
if (ret) {
    dev_err(card->dev, "error getting cpu dai name\n");
    -return ERR_PTR(-EINVAL);
    +goto error;
}

ret = snd_soc_of_get_dai_link_codecs(dev, codec, link);
if (ret < 0) {
    dev_err(card->dev, "error getting codec dai name\n");
    -return ERR_PTR(ret);
    +goto error;
}

link->platform_of_node = link->cpu_of_node;
ret = of_property_read_string(np, "link-name", &link->name);
if (ret) {
    dev_err(card->dev, "error getting codec dai_link name\n");
    return ERR_PTR(ret);
    goto error;
}

link->stream_name = link->name;
link->init = apq8016_sbc_dai_init;
link++;
+    of_node_put(cpu);
+    of_node_put(codec);
}

return data;
+
+ error:
+    of_node_put(np);
+    of_node_put(cpu);
+    of_node_put(codec);
+    return ERR_PTR(ret);
}

static const struct snd_soc_dapm_widget apq8016_sbc_dapm_widgets[] = {
    @ @ -221.6 +232.7 @ @
}
return -ENOMEM;

card->dev = dev;
+    card->owner = THIS_MODULE;
card->dapm_widgets = apq8016_sbc_dapm_widgets;
card->num_dapm_widgets = ARRAY_SIZE(apq8016_sbc_dapm_widgets);
data = apq8016_sbc_parse_of(card);
--- linux-4.15.0.orig/sound/soc/qcom/lpass-cpu.c
+++ linux-4.15.0/sound/soc/qcom/lpass-cpu.c
@@ -182,21 +182,6 @@
         return 0;
     }
-
static int lpass_cpu_daiops_hw_free(struct snd_pcm_substream *substream,
    -struct snd_soc_dai *dai)
    -{
         struct lpass_data *drvdata = snd_soc_dai_get_drivdata(dai);
         -int ret;
         -
         -ret = regmap_write(drvdata->lpaif_map,
             -LPAIF_I2SCTL_REG(drvdata->variant, dai->driver->id),
             -0);
-if (ret)
-dev_err(dai->dev, "error writing to i2sctl reg: %d\n", ret);
-
-return ret;
-
static int lpass_cpu_daiops_prepare(struct snd_pcm_substream *substream, 
struct snd_soc_dai *dai)
{
@@ -277,7 +262,6 @@
    .startup= lpass_cpu_daiops_startup,
    .shutdown= lpass_cpu_daiops_shutdown,
    .hw_params= lpass_cpu_daiops_hw_params,
-    .hw_free= lpass_cpu_daiops_hw_free,
    .prepare= lpass_cpu_daiops_prepare,
    .trigger= lpass_cpu_daiops_trigger,
    );
--- linux-4.15.0.orig/sound/soc/qcom/lpass-platform.c
+++ linux-4.15.0/sound/soc/qcom/lpass-platform.c
@@ -67,7 +67,7 @@
     int ret, dma_ch, dir = substream->stream;
 struct lpass_pcm_data *data;

-data = devm_kzalloc(soc_runtime->dev, sizeof(*data), GFP_KERNEL);
+data = kzalloc(sizeof(*data), GFP_KERNEL);
if (!data)
    return -ENOMEM;
@@ -79,8 +79,10 @@
     else
     dma_ch = 0;

-    -if (dma_ch < 0)
+    +if (dma_ch < 0) {
+    +kfree(data);
+    return dma_ch;
+=

drvdata->substream[dma_ch] = substream;

@@ -101,6 +103,7 @@
     ret = snd_pcm_hw_constraint_integer(runtime,
     SNDRVR_PCM_HW_PARAM_PERIODS);
     if (ret < 0) {
+    +kfree(data);
       dev_err(soc_runtime->dev, "setting constraints failed: %d\n", 
       ret);
     return -EINVAL;
     

if (v->free_dma_channel)
    v->free_dma_channel(drvdata, data->dma_ch);

+kfree(data);
return 0;
}

--- linux-4.15.0.orig/sound/soc/qcom/storm.c
+++ linux-4.15.0/sound/soc/qcom/storm.c
@@ -99,6 +99,7 @@
    return -ENOMEM;
card->dev = &pdev->dev;
+card->owner = THIS_MODULE;

ret = snd_soc_of_parse_card_name(card, "qcom,model");
if (ret) {
--- linux-4.15.0.orig/sound/soc/rockchip/Kconfig
+++ linux-4.15.0/sound/soc/rockchip/Kconfig
@@ -56,6 +56,9 @@
    select SND_SOC_ES8328_I2C
    select SND_SOC_ES8328_SPI if SPI_MASTER
    select DRM_DW_HDMI_I2S_AUDIO if DRM_DW_HDMI
help
    Say Y or M here if you want to add support for SoC audio on Rockchip
    RK3288 boards using an analog output and the built-in HDMI audio.
--- linux-4.15.0.orig/sound/soc/rockchip/rk3399_gru_sound.c
+++ linux-4.15.0/sound/soc/rockchip/rk3399_gru_sound.c
@@ -367,7 +367,8 @@
    switch (index) {

[DAILINK_RT5514_DSP] = {
    .name = "RT5514 DSP",
    .stream_name = "Wake on Voice",
    .codec_dai_name = "rt5514-dsp-cpu-dai",
    .codec_name = "snd-soc-dummy",
    .codec_dai_name = "snd-soc-dummy-dai",
},
};

if (index < 0)
    continue;
-np_cpu = (index == DAILINK_CDNDP) ? np_cpu1 : np_cpu0;
+switch (index) {


+case DAILINK_CDNDP:
+np_cpu = np_cpu1;
+break;
+case DAILINK_RT5514_DSP:
+np_cpu = np_codec;
+break;
+default:
+np_cpu = np_cpu0;
+break;
+
+if (!np_cpu) {
+    dev_err(dev, "Missing 'rockchip,cpu' for \%s\n",
+            rockchip_dais[index].name);
+    @ @ -538,7 +550,8 @@
+    dai = &card->dai_link[card->num_links++];
+    *dai = rockchip_dais[index];
+
+    -dai->codec_of_node = np_codec;
+    +if (!dai->codec_name)
+    +dai->codec_of_node = np_codec;
+    dai->platform_of_node = np_cpu;
+    dai->cpu_of_node = np_cpu;
+
+    --- linux-4.15.0.orig/sound/soc/rockchip/rockchip_i2s.c
+    +++ linux-4.15.0/sound/soc/rockchip/rockchip_i2s.c
+    @@ -188,7 +188,9 @@
+    {
+        struct rk_i2s_dev *i2s = to_info(cpu_dai);
+        unsigned int mask = 0, val = 0;
+        +int ret = 0;
+
+        +pm_runtime_get_sync(cpu_dai->dev);
+        mask = I2S_CKR_MSS_MASK;
+        switch (fmt & SND_SOC_DAIFMT_MASTER_MASK) {
+        case SND_SOC_DAIFMT_CBS_CFS:
+            @ @ -201,7 +203,8 @@
+            i2s->is_master_mode = false;
+            break;
+        default:
+            return -EINVAL;
+            +ret = -EINVAL;
+            +goto err_pm_put;
+        }
+        regmap_update_bits(i2s->regmap, I2S_CKR, mask, val);
+        @@ -215,7 +218,8 @@
+            val = I2S_CKR_CKP_POS;
break;
default:
+ret = -EINVAL;
+goto err_pm_put;
}

regmap_update_bits(i2s->regmap, I2S_CKR, mask, val);
@@ -231,14 +235,15 @@
case SND_SOC_DAIFMT_I2S:
val = I2S_TXCR_IBM_NORMAL;
break;
-case SND_SOC_DAIFMT_DSP_A: /* PCM no delay mode */
-val = I2S_TXCR_TFS_PCM;
-break;
-case SND_SOC_DAIFMT_DSP_B: /* PCM delay 1 mode */
+case SND_SOC_DAIFMT_DSP_A: /* PCM delay 1 bit mode */
+val = I2S_TXCR_TFS_PCM | I2S_TXCR_PBM_MODE(1);
break;
+case SND_SOC_DAIFMT_DSP_B: /* PCM no delay mode */
+val = I2S_TXCR_TFS_PCM;
+break;
default:
-return -EINVAL;
+ret = -EINVAL;
+goto err_pm_put;
}

regmap_update_bits(i2s->regmap, I2S_TXCR, mask, val);
@@ -254,19 +259,23 @@
case SND_SOC_DAIFMT_I2S:
val = I2S_RXCR_IBM_NORMAL;
break;
-case SND_SOC_DAIFMT_DSP_A: /* PCM no delay mode */
-val = I2S_RXCR_TFS_PCM;
-break;
-case SND_SOC_DAIFMT_DSP_B: /* PCM delay 1 mode */
+case SND_SOC_DAIFMT_DSP_A: /* PCM delay 1 bit mode */
+val = I2S_RXCR_TFS_PCM | I2S_RXCR_PBM_MODE(1);
break;
+case SND_SOC_DAIFMT_DSP_B: /* PCM no delay mode */
+val = I2S_RXCR_TFS_PCM;
+break;
default:
-return -EINVAL;
+ret = -EINVAL;
+goto err_pm_put;
}
regmap_update_bits(i2s->regmap, I2S_RXCR, mask, val);

- return 0;
+ err_pm_put:
+ pm_runtime_put(cpu_dai->dev);
+
+ return ret;
}

static int rockchip_i2s_hw_params(struct snd_pcm_substream *substream,
@@ -504,6 +513,7 @@
 case I2S_INTCR:
 case I2S_XFER:
 case I2S_CLR:
+ case I2S_TXDR:
 case I2S_RXDR:
 case I2S_FIFOLR:
 case I2S_INTSR:
@@ -518,6 +528,9 @@
 switch (reg) {
 case I2S_INTSR:
 case I2S_CLR:
+ case I2S_FIFOLR:
+ case I2S_TXDR:
+ case I2S_RXDR:
 return true;
 default:
 return false;
@@ -527,6 +540,8 @@
static bool rockchip_i2s_precious_reg(struct device *dev, unsigned int reg)
{
 switch (reg) {
+ case I2S_RXDR:
+ return true;
 default:
 return false;
}
@@ -670,7 +685,7 @@
 ret = devm_snd_dmaengine_pcm_register(&pdev->dev, NULL, 0);
 if (ret) {
 dev_err(&pdev->dev, "Could not register PCM\n");
- return ret;
+ goto err_suspend;
 }

 return 0;
--- linux-4.15.0.orig/sound/soc/rockchip/rockchip_pdm.c
+++ linux-4.15.0/sound/soc/rockchip/rockchip_pdm.c
@@ -208,7 +208,9 @@
     return -EINVAL;
 }

+pm_runtime_get_sync(cpu_dai->dev);
 regmap_update_bits(pdm->regmap, PDM_CLK_CTRL, mask, val);
+pm_runtime_put(cpu_dai->dev);

 return 0;
 }
@@ -476,8 +478,10 @@
 int ret;

 ret = pm_runtime_get_sync(dev);
- if (ret < 0)
+ if (ret < 0) {
+     pm_runtime_put(dev);
     return ret;
+ }

 ret = regcache_sync(pdm->regmap);

--- linux-4.15.0.orig/sound/soc/samsung/i2s.c
+++ linux-4.15.0/sound/soc/samsung/i2s.c
@@ -604,6 +604,7 @@
 {
     struct i2s_dai *i2s = to_info(dai);
     struct i2s_dai *other = get_other_dai(i2s);
+    int lrp_shift, sdf_shift, sdf_mask, lrp_rlow, mod_slave;
     u32 mod, tmp = 0;
     unsigned long flags;
@@ -656,8 +657,13 @@
         tmp |= mod_slave;
     break;
     case SND_SOC_DAIFMT_CBS_CFS:
-/* Set default source clock in Master mode */
-    if (i2s->rclk_srcrate == 0)
-        + /* Set default source clock in Master mode, only when the
-           * CLK_I2S_RCLK_SRC clock is not exposed so we ensure any
-           * clock configuration assigned in DT is not overwritten.
-           */
-        + if (i2s->rclk_srcrate == 0 && i2s->clk_data.clks == NULL &&
-           +     other->clk_data.clks == NULL)
-            + i2s_set_sysclk(dai, SAMSUNG_I2S_RCLKSRC_0,
-                0, SND_SOC_CLOCK_IN);
break;
@@ -695,7 +701,9 @@
     struct snd_pcm_hw_params *params, struct snd_soc_dai *dai)
 {
     struct i2s_dai *i2s = to_info(dai);
+    struct i2s_dai *other = get_other_dai(i2s);
     u32 mod, mask = 0, val = 0;
+    struct clk *rclksrc;
     unsigned long flags;

 WARN_ON(!pm_runtime_active(dai->dev));
@@ -777,6 +785,13 @@
       rclksrc = i2s->clk_table[CLK_I2S_RCLK_SRC];
+     if (!rclksrc || IS_ERR(rclksrc))
+       rclksrc = other->clk_table[CLK_I2S_RCLK_SRC];
+     if (rclksrc && !IS_ERR(rclksrc))
+       i2s->rclk_srcrate = clk_get_rate(rclksrc);
+     return 0;
   }

--- linux-4.15.0.orig/sound/soc/samsung/odroid.c
+++ linux-4.15.0/sound/soc/samsung/odroid.c
@@ -36,23 +36,26 @@
 {
     struct snd_soc_pcm_runtime *rtd = substream->private_data;
     struct odroid_priv *priv = snd_soc_card_get_drvdata(rtd->card);
-    unsigned int pll_freq, rclk_freq;
+    unsigned int pll_freq, rclk_freq, rfs;
     int ret;

     switch (params_rate(params)) {
-    case 32000:
-        case 64000:
-            pll_freq = 131072006U;
+    case 32000:
+        case 64000:
+            pll_freq = 196608001U;
+            rfs = 384;
+            break;
+        case 44100:
+            case 88200:
+            case 176400:
+                pll_freq = 180633609U;
+                rfs = 512;
+                break;
case 32000:
case 48000:
case 96000:
case 192000:
plfreq = 196608001U;
+rfst = 512;
break;
default:
return -EINVAL;
@@ -63,11 +66,11 @@
return ret;
/
- * We add 1 to the rclk_freq value in order to avoid too low clock
+ * We add 2 to the rclk_freq value in order to avoid too low clock
* frequency values due to the EPLL output frequency not being exact
* multiple of the audio sampling rate.
*/
-rclk_freq = params_rate(params) * 256 + 1;
+rclk_freq = params_rate(params) * rst + 2;
ret = clk_set_rate(priv->sclk_i2s, rclk_freq);
if (ret < 0)
--- linux-4.15.0.orig/sound/soc/sh/rcar/adg.c
+++ linux-4.15.0/sound/soc/sh/rcar/adg.c
@@ -33,6 +33,7 @@
struct clk *clkout[CLKOUTMAX];
struct clk_onecell_data onecell;
struct rsnd_mod mod;
+int clk_rate[CLKMAX];
u32 flags;
u32 ckr;
u32 rbga;
@@ -116,9 +117,9 @@
unsigned int val, en;
unsigned int min, diff;
unsigned int sel_rate[] = {
-clk_get_rate(adg->clk[CLKA]),/* 0000: CLKA */
-clk_get_rate(adg->clk[CLKB]),/* 0001: CLKB */
-clk_get_rate(adg->clk[CLKC]),/* 0010: CLKC */
+adg->clk_rate[CLKA],/* 0000: CLKA */
+adg->clk_rate[CLKB],/* 0001: CLKB */
+adg->clk_rate[CLKC],/* 0010: CLKC */
adg->rbga_rate_for_441khz,/* 0011: RBGA */
adg->rbgb_rate_for_48khz,/* 0100: RBGB */
};
@@ -320,7 +321,6 @@
int rsnd_adg_clk_query(struct rsnd_priv *priv, unsigned int rate)
struct rsnd_adg *adg = rsnd_priv_to_adg(priv);
-struct clk *clk;
int i;
int sel_table[] = {
[CLKA] = 0x1,
@@ -333,10 +333,9 @@
 * find suitable clock from
 * AUDIO_CLKA/AUDIO_CLKB/AUDIO_CLKC/AUDIO_CLKI.
 */
-for_each_rsnd_clk(clk, adg, i) {
-\tif (rate == clk_get_rate(clk))
+for (i = 0; i < CLKMAX; i++)
+\tif (rate == adg->clk_rate[i])
\treturn sel_table[i];
-}

/*
 * find divided clock from BRGA/BRGB
@@ -401,10 +400,18 @@

for_each_rsnd_clk(clk, adg, i) {
ret = 0;
-\tif (enable)
+\tif (enable) {
\t+if (enable) {
\t\tret = clk_prepare_enable(clk);
\t-else
\t+  /* We shouldn't use clk_get_rate() under
\t+ atomic context. Let's keep it when
\t+ rsnd_adg_clk_enable() was called
\t+ */
\t+adg->clk_rate[i] = clk_get_rate(adg->clk[i]);
\t} else {
\t\tclk_disable_unprepare(clk);
\t}

if (ret < 0)
dev_warn(dev, "can't use clk %d\n", i);
@@ -465,6 +472,11 @@
goto rsnd_adg_get_clkout_end;

req_size = prop->length / sizeof(u32);
+if (req_size > REQ_SIZE) {
+\tdev_err(dev,
+\t"too many clock-frequency, use top %d\n", REQ_SIZE);
\treq_size = REQ_SIZE;
of_property_read_u32_array(np, "clock-frequency", req_rate, req_size);
req_48kHz_rate = 0;
--- linux-4.15.0.orig/sound/soc/sh/rcar/core.c
+++ linux-4.15.0/sound/soc/sh/rcar/core.c
@@ -478,7 +478,7 @@
 if (func_call && (mod)->ops->fn) ? "fn" : ");
 if (func_call && (mod)->ops->fn)
 tmp = (mod)->ops->fn(mod, io, param);
@@ -668,6 +668,7 @@
 /* set format */
 +rdai->bit_clk_inv = 0;
 switch (fmt & SND_SOC_DAIFMT_FORMAT_MASK) {
 case SND_SOC_DAIFMT_I2S:
 rdai->sys_delay = 0;
@@ -917,12 +918,23 @@
 rsnd_dai_call(nolock_stop, io, priv);
 }
+static int rsnd_soc_dai_prepare(struct snd_pcm_substream *substream,
+struct snd_soc_dai *dai)
+{
+struct rsnd_priv *priv = rsnd_dai_to_priv(dai);
+struct rsnd_dai *rdai = rsnd_dai_to_rdai(dai);
+struct rsnd_dai_stream *io = rsnd_rdai_to_io(rdai, substream);
+ return rsnd_dai_call(prepare, io, priv);
+}
+
 static const struct snd_soc_dai_ops rsnd_soc_dai_ops = {
 .startup= rsnd_soc_dai_startup,
 .shutdown= rsnd_soc_dai_shutdown,
 .trigger= rsnd_soc_dai_trigger,
 .set_fmt= rsnd_soc_dai_set_fmt,
 .set_tdm_slot= rsnd_soc_set_dai_tdm_slot,
+ .prepare= rsnd_soc_dai_prepare,
 };
int ret;

+/*
+ * 1) Avoid duplicate register for DVC with MIX case
+ * 2) Allow duplicate register for MIX
+ * 3) re-register if card was rebinded
+ */
+list_for_each_entry(kctrl, &card->controls, list) {
+struct rsnd_kctrl_cfg *c = kctrl->private_data;
+
+if (c == cfg)
+return 0;
+
+}
+
+if (size > RSND_MAX_CHANNELS)
+return -EINVAL;
+
@@ -1477,6 +1501,14 @@
+rsnd_dai_call(remove, &rdai->capture, priv);
+
+/*/  
+* adg is very special mod which can't use rsnd_dai_call(remove),
+* and it registers ADG clock on probe.
+* It should be unregister if probe failed.
+* Mainly it is assuming -EPROBE_DEFER case
+ */
+rsnd_adg_remove(priv);
+ return ret;
+
--- linux-4.15.0.orig/sound/soc/sh/rcar/dma.c
+++ linux-4.15.0/sound/soc/sh/rcar/dma.c
@@ -262,6 +262,10 @@
 /* try to get DMAEngine channel */
 chan = rsnd_dmaen_request_channel(io, mod_from, mod_to);
 if (IS_ERR Or NULL(chan)) {
+ */ Let's follow when -EPROBE_DEFER case */
+if (PTR_ERR(chan) == -EPROBE_DEFER)
+return PTR_ERR(chan);
+
+ */
+ * DMA failed. try to PIO mode
+ * see
--- linux-4.15.0.orig/sound/soc/sh/rcar/rsnd.h
+++ linux-4.15.0/sound/soc/sh/rcar/rsnd.h
int (*nolock_stop)(struct rsnd_mod *mod,
   struct rsnd_dai_stream *io,
   struct rsnd_priv *priv);
+int (*prepare)(struct rsnd_mod *mod,
+       struct rsnd_dai_stream *io,
+       struct rsnd_priv *priv);
};

struct rsnd_dai_stream;

* H0: fallback
* H0: hw_params
* H0: pointer
+ * H0: prepare
*/
#define __rsnd_mod_shift_nolock_start0
#define __rsnd_mod_shift_nolock_stop0
#define __rsnd_mod_shift_fallback28 /* always called */
#define __rsnd_mod_shift_hw_params28 /* always called */
#define __rsnd_mod_shift_pointer28 /* always called */
+define __rsnd_mod_shift_prepare28 /* always called */

#define __rsnd_mod_add_probe0
#define __rsnd_mod_add_remove0
#define __rsnd_mod_add_fallback0
#define __rsnd_mod_add_hw_params0
#define __rsnd_mod_add_pointer0
+define __rsnd_mod_add_prepare0

#define __rsnd_mod_call_probe0
#define __rsnd_mod_call_remove0
#define __rsnd_mod_call_fallback0
#define __rsnd_mod_call_pointer0
#define __rsnd_mod_call_nolock_start0
#define __rsnd_mod_call_nolock_stop1
+define __rsnd_mod_call_prepare0

#define rsnd_mod_to_priv(mod)((mod)->priv)
#define rsnd_mod_name(mod)((mod)->ops->name)
char name[RSND_DAI_NAME_SIZE];
struct snd_pcm_substream *substream;
struct rsnd_mod *mod[RSND_MOD_MAX];
+struct rsnd_mod *dma;
struct rsnd_dai *rdai;
```c
#define CHNL_4 (1 << 22) /* Channels */
#define CHNL_6 (2 << 22) /* Channels */
#define CHNL_8 (3 << 22) /* Channels */
+#define DWL_MASK (7 << 19) /* Data Word Length mask */
#define DWL_8 (0 << 19) /* Data Word Length */
#define DWL_16 (1 << 19) /* Data Word Length */
#define DWL_18 (2 << 19) /* Data Word Length */
@@ -28,6 +28,7 @@

struct rsnd_ssi {
    struct rsnd_mod mod;
    -struct rsnd_mod *dma;
    u32 flags;
    u32 cr_own;
    @ @ -277,7 +277,7 @@
    if (rsnd_ssi_is_multi_slave(mod, io))
        return 0;

    -if (ssi->usrcnt > 1) {
    +if (ssi->usrcnt > 0) {
        if (ssi->rate != rate) {
            dev_err(dev, "SSI parent/child should use same rate\n");
            return -EINVAL;
        }
    }
    -if (rsnd_ssi_is_parent(mod, io))
    -return;

    is_tdm = rsnd_runtime_is_ssi_tdm(io);
    */
    * always use 32bit system word.
```
* see also rsnd_ssi_master_clk_enable()

-cr_own = FORCE | SWL_32;
+cr_own |= FORCE | SWL_32;

if (rdai->bit_clk_inv)
  cr_own |= SCKP;
@@ -368,9 +365,18 @@
  cr_own |= SCKP;
  cr_own |= SDTA;
if (rdai->sys_delay)
-  cr_own |= DEL;
+  cr_own |= SCKP;
  cr_own |= SDTA;
  if (rdai->sys_delay)
    cr_own |= DEL;
 +
+/*
+ * We shouldn't exchange SWSP after running.
+ * This means, parent needs to care it.
+ */
+if (rsnd_ssi_is_parent(mod, io))
+  goto init_end;
+
+ if (rsnd_io_is_play(io))
  cr_own |= TRMD;

+cr_own &= ~DWL_MASK;
switch (runtime->sample_bits) {
  case 16:
    cr_own |= DWL_16;
    wsr|= WS_MODE;
    cr_own|= CHNL_8;
  }
-
+  init_end:
  ssi->cr_own= cr Own;
  ssi->cr_mode= cr_mode;
  ssi->wsr= wsr;
  @ @ -479.7 +485.6 @@
  struct rsnd_priv *priv)
{} struct rsnd_ssi *ssi = rsnd_mod_to_ssi(mod);
-int ret;

if (!rsnd_ssi_is_run_mods(mod, io))
  return 0;
@@ -490,10 +495,6 @@
  rsnd_mod_power_on(mod);

-ret = rsnd_ssi_master_clk_start(mod, io);
-if (ret < 0)
-return ret;
-
rsnd_ssi_config_init(mod, io);

rsnd_ssi_register_setup(mod);
@@ -520,15 +521,18 @@
return -EIO;
}

-if (!rsnd_ssi_is_parent(mod, io))
-ssi->cr_own= 0;
-
rsnd_ssi_master_clk_stop(mod, io);

rsnd_mod_power_off(mod);

ssi->usrcnt--;

+if (!ssi->usrcnt) {
+sii->cr_own= 0;
+sii->cr_mode= 0;
+sii->wsr= 0;
+}
+
return 0;
}

@@ -616,10 +620,16 @@
* Capture: It might not receive data. Do nothing */
if (rsnd_io_is_play(io)) {
-rsnd_mod_write(mod, SSICR, cr | EN);
+rsnd_mod_write(mod, SSICR, cr | ssi->cr_en);
rsnd_ssi_status_check(mod, DIRQ);
}

+/* In multi-SSI mode, stop is performed by setting ssi0129 in
+ * SSI CONTROL to 0 (in rsnd_ssiop_stop_gen2). Do nothing here.
+ */
+if (rsnd_ssi_multi_slaves_runtime(io))
+return 0;
+
/*
 * disable SSI,
 * and, wait idle state
 @@ -739,6 +749,9 @@
if (!rsnd_rdai_is_clk_master(rdai))
return;

+if (rsnd_ssi_is_multi_slave(mod, io))
+return;
+
switch (rsnd_mod_id(mod)) {
    case 1:
    case 2:
        return 0;
}

+static int rsnd_ssi_prepare(struct rsnd_mod *mod,
    struct rsnd_dai_stream *io,
    struct rsnd_priv *priv)
+
{+
    return rsnd_ssi_master_clk_start(mod, io);
    +}
+
static struct rsnd_mod_ops rsnd_ssi_pio_ops = {
    .name= SSI_NAME,
    .probe= rsnd_ssi_common_probe,
    .pointer= rsnd_ssi_pointer,
    .pcm_new = rsnd_ssi_pcm_new,
    .hw_params = rsnd_ssi_hw_params,
    .prepare = rsnd_ssi_prepare,
};

static int rsnd_ssi_dma_probe(struct rsnd_mod *mod,
    struct rsnd_dai_stream *io,
    struct rsnd_priv *priv)
{
    struct rsnd_ssi *ssi = rsnd_mod_to_ssi(mod);
    int ret;

    /*
    @@ -880,7 +900,7 @@
    return ret;
    /* SSI probe might be called many times in MUX multi path */
    -ret = rsnd_dma_attach(io, mod, &ssi->dma);
    +ret = rsnd_dma_attach(io, mod, &io->dma);
    return ret;
    }
.fallback = rsnd_ssi_fallback,
.hw_params = rsnd_ssi_hw_params,
+prepare = rsnd_ssi_prepare,
};

int rsnd_ssi_is_dma_mode(struct rsnd_mod *mod)
--- linux-4.15.0.orig/sound/soc/sh/rcar/ssiu.c
+++ linux-4.15.0/sound/soc/sh/rcar/ssiu.c
@@ -175,7 +175,7 @@
  i;

 for_each_rsnd_mod_array(i, pos, io, rsnd_ssi_array) {
-  shift = (i * 4) + 16;
+  shift = (i * 4) + 20;
  val = (val & ~(0xF << shift)) |
    rsnd_mod_id(pos) << shift;
 }

--- linux-4.15.0.orig/sound/soc/sirf/sirf-usp.c
+++ linux-4.15.0/sound/soc/sirf/sirf-usp.c
@@ -370,10 +370,9 @@
  if (base == NULL)
-    return -ENOMEM;
+    base = devm_ioremap_resource(&pdev->dev, mem_res);
+    if (IS_ERR(base))
+      return PTR_ERR(base);
  usp->regmap = devm_regmap_init_mmio(&pdev->dev, base,
-     &sirf_usp_regmap_config);
+     &usp_regmap_config);
  if (IS_ERR(usp->regmap))
--- linux-4.15.0.orig/sound/soc/soc-acpi.c
+++ linux-4.15.0/sound/soc/soc-acpi.c
@@ -81,14 +81,18 @@
  snd_soc_acpi_find_machine(struct snd_soc_acpi_mach *machines)
  {
    struct snd_soc_acpi_mach *mach;
+   struct snd_soc_acpi_mach *mach_alt;

    for (mach = machines; mach->id[0]; mach++) {
      if (snd_soc_acpi_check_hid(mach->id) == true) {
-        if (mach->machine_quirk == NULL)
-          return mach;
+        if (mach->machine_quirk) {
+          mach_alt = mach->machine_quirk(mach);
+          if (!mach_alt)
+continue; /* not full match, ignore */
+mach = mach_alt;
+
-if (mach->machine_quirk(mach) != NULL)
-    return mach;
+    return mach;
 }
 }
 return NULL;
--- linux-4.15.0.orig/sound/soc/soc-compress.c
+++ linux-4.15.0/sound/soc/soc-compress.c
@@ -944,7 +944,7 @@
 struct snd_soc_platform *platform = rtd->platform;
 struct snd_soc_component *component;
 struct snd_soc_rtdcom_list *rtdcom;
-int ret = 0, __ret;
+int ret = 0;
 mutex_lock_nested(&rtd->pcm_mutex, rtd->pcm_subclass);

 @@ -965,10 +965,10 @@
       !component->driver->compr_ops->copy)
 continue;
 
-__ret = component->driver->compr_ops->copy(cstream, buf, count);
-if (__ret < 0)
-    ret = __ret;
+ret = component->driver->compr_ops->copy(cstream, buf, count);
+    break;
 }
+
 err:
 mutex_unlock(&rtd->pcm_mutex);
 return ret;
--- linux-4.15.0.orig/sound/soc/soc-core.c
+++ linux-4.15.0/sound/soc/soc-core.c
@@ -173,7 +173,7 @@
 return soc_codec_reg_show(rtd->codec, buf, PAGE_SIZE, 0);
 }

-static DEVICE_ATTR(codec_reg, 0444, codec_reg_show, NULL);
+static DEVICE_ATTR_RO(codec_reg);

 static ssize_t pmdown_time_show(struct device *dev,
 struct device_attribute *attr, char *buf)
 @@ -1697,7 +1697,7 @@
 sink = codec_dai->playback_widget;
source = cpu_dai->capture_widget;
if (sink && source) {
    ret = snd_soc_dapm_new_pcm(card, dai_link->params,
    ret = snd_soc_dapm_new_pcm(card, rtd, dai_link->params,
    dai_link->num_params,
    source, sink);
    if (ret != 0) {
        sink = cpu_dai->playback_widget;
        source = codec_dai->capture_widget;
        if (sink && source) {
            ret = snd_soc_dapm_new_pcm(card, dai_link->params,
            ret = snd_soc_dapm_new_pcm(card, rtd, dai_link->params,
            dai_link->num_params,
            source, sink);
            if (ret != 0) {
                return -EINVAL;
            }
        }
    }
}
for (i = 0; i < num_routes; i++) {
    [snd_soc_dapm_clock_supply] = 1,
    [snd_soc_dapm_supply] = 2,
    [snd_soc_dapm_micbias] = 3,
    [snd_soc_dapm_vmid] = 3,
    [snd_soc_dapm_dai_link] = 2,
    [snd_soc_dapm_dai_in] = 4,
    [snd_soc_dapm_dai_out] = 4,
    [snd_soc_dapm_aif_in] = 4,
    [snd_soc_dapm_aif_out] = 4,
    [snd_soc_dapm_mic] = 5,
    [snd_soc_dapm_siggen] = 5,
    [snd_soc_dapm_input] = 5,
+[snd_soc_dapm_output] = 5,
[snd_soc_dapm_mux] = 6,
[snd_soc_dapm_demux] = 6,
[snd_soc_dapm_dac] = 7,
@@ -88,11 +92,19 @@
[snd_soc_dapm_mixer] = 8,
[snd_soc_dapm_mixer_named_ctl] = 8,
[snd_soc_dapm_pga] = 9,
+[snd_soc_dapm_buffer] = 9,
+[snd_soc_dapm_scheduler] = 9,
+[snd_soc_dapm_effect] = 9,
+[snd_soc_dapm_src] = 9,
+[snd_soc_dapm_asrc] = 9,
+[snd_soc_dapm_encoder] = 9,
+[snd_soc_dapm_decoder] = 9,
[snd_soc_dapm_adc] = 10,
[snd_soc_dapm_out_drv] = 11,
[snd_soc_dapm_hp] = 11,
[snd_soc_dapm_spk] = 11,
[snd_soc_dapm_line] = 11,
+[snd_soc_dapm_sink] = 11,
[snd_soc_dapm_kcontrol] = 12,
[snd_soc_dapm_post] = 13,
};
@@ -105,13 +117,25 @@
[snd_soc_dapm_spk] = 3,
[snd_soc_dapm_line] = 3,
[snd_soc_dapm_out_drv] = 3,
+[snd_soc_dapm_sink] = 3,
+[snd_soc_dapm_pga] = 4,
+[snd_soc_dapm_buffer] = 4,
+[snd_soc_dapm_scheduler] = 4,
+[snd_soc_dapm_effect] = 4,
+[snd_soc_dapm_src] = 4,
+[snd_soc_dapm_asrc] = 4,
+[snd_soc_dapm_encoder] = 4,
+[snd_soc_dapm_decoder] = 4,
[snd_soc_dapm_switch] = 5,
[snd_soc_dapm_mixer_named_ctl] = 5,
[snd_soc_dapm_mixer] = 5,
[snd_soc_dapm_dac] = 6,
[snd_soc_dapm_mic] = 7,
+[snd_soc_dapm_sigen] = 7,
+[snd_soc_dapm_input] = 7,
+[snd_soc_dapm_output] = 7,
[snd_soc_dapm_micbias] = 8,
+[snd_soc_dapm_vmid] = 8,
[snd_soc_dapm_mux] = 9,
memset(&template, 0, sizeof(template));
template.reg = e->reg;
-template.mask = e->mask << e->shift_l;
+template.mask = e->mask;
template.shift = e->shift_l;
template.off_val = snd_soc_enum_item_to_val(e, 0);
template.on_val = template.off_val;
static void dapm_kcontrol_free(struct snd_kcontrol *kctl)
{
    struct dapm_kcontrol_data *data = snd_kcontrol_chip(kctl);
    list_del(&data->paths);
kfree(data->wlist);
kfree(data);
}

if (data->value == value)
    return false;

-if (data->widget)
-data->widget->on_val = value;
+if (data->widget) {
    +switch (dapm_kcontrol_get_wlist(kcontrol)->widgets[0]->id) {
    +case snd_soc_dapm_switch:
    +case snd_soc_dapm_mixer:
    +case snd_soc_dapm_mixer_named_ctl:
        +data->widget->on_val = value & data->widget->mask;
    +break;
    +case snd_soc_dapm_demux:
    +case snd_soc_dapm_mux:
        +data->widget->on_val = value >> data->widget->shift;
    +break;
    +default:
        +data->widget->on_val = value;
    +break;
    +}
    +}

-data->value = value;

val = max - val;
p->connect = !!val;
} else {
- */
- p->connect = 0;
+ /* since a virtual mixer has no backing registers to
+ * decide which path to connect, it will try to match
+ * with initial state. This is to ensure
+ * that the default mixer choice will be
+ * correctly powered up during initialization.
+ */
+ p->connect = invert;
}

@@ -1126,8 +1172,8 @@
list_add_tail(&widget->work_list, list);

if (custom_stop_condition && custom_stop_condition(widget, dir)) {
- widget->endpoints[dir] = 1;
- return widget->endpoints[dir];
+ list = NULL;
+ custom_stop_condition = NULL;
}

if ((widget->is_ep & SND_SOC_DAPM_DIR_TO_EP(dir)) && widget->connected) {
 @@ -1164,8 +1210,8 @@
 * Optionally, can be supplied with a function acting as a stopping condition.
 * This function takes the dapm widget currently being examined and the walk
- * direction as an arguments, it should return true if the walk should be
- * stopped and false otherwise.
+ * direction as an arguments, it should return true if widgets from that point
+ * in the graph onwards should not be added to the widget list.
+ */
static int is_connected_output_ep(struct snd_soc_dapm_widget *widget,
 struct list_head *list,
@@ -2007,19 +2053,19 @@
out = is_connected_output_ep(w, NULL, NULL);
}

- ret = snprintf(buf, PAGE_SIZE, "%s: %s%s in %d out %d",
+ ret = scnprintf(buf, PAGE_SIZE, "%s: %s%s in %d out %d",
    w->name, w->power ? "On" : "Off",
    w->force ? " (forced)" : "", in, out);

    if (w->reg >= 0)
- ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ ret += scnprintf(buf + ret, PAGE_SIZE - ret,
    " - R%d(0x%x) mask 0x%x",
    w->reg, w->reg, mask << w->shift);
- ret += snprintf(buf + ret, PAGE_SIZE - ret, "\n");
+ ret += scnprintf(buf + ret, PAGE_SIZE - ret, "\n");

if (w->sname)
- ret += snprintf(buf + ret, PAGE_SIZE - ret, " stream %s %s\n",
+ ret += scnprintf(buf + ret, PAGE_SIZE - ret, " stream %s %s\n",
    w->sname,
    w->active ? "active" : "inactive");

@@ -2032,7 +2078,7 @@
if (!p->connect)
    continue;

- ret += snprintf(buf + ret, PAGE_SIZE - ret,
+ ret += scnprintf(buf + ret, PAGE_SIZE - ret,
    "% s %s %s %s\n",
    (rdir == SND_SOC_DAPM_DIR_IN) ? "in" : "out",
    p->name ? p->name : "static",
@@ -2094,23 +2140,25 @@
    { }
    struct dentry *d;

- if (!parent)
+ if (!parent || IS_ERR(parent))
    return;

    dapm->debugfs_dapm = debugfs_create_dir("dapm", parent);

- if (!dapm->debugfs_dapm) {
+ if (IS_ERR(dapm->debugfs_dapm)) {
        dev_warn(dapm->dev,
- "ASoC: Failed to create DAPM debugfs directory\n");
+ "ASoC: Failed to create DAPM debugfs directory %ld\n",
        PTR_ERR(dapm->debugfs_dapm));
        return;
    }

    d = debugfs_create_file("bias_level", 0444,
    dapm->debugfs_dapm, dapm,
    &dapm_bias_fops);
- if (!d)
+ if (IS_ERR(d))
        dev_warn(dapm->dev,
- "ASoC: Failed to create bias level debugfs file\n");
+ "ASoC: Failed to create bias level debugfs file: %ld\n",
        PTR_ERR(d));
static void dapm_debugfs_add_widget(struct snd_soc_dapm_widget *w)
@@ -2124,10 +2172,10 @@
d = debugfs_create_file(w->name, 0444, dapm->debugfs_dapm, w, &dapm_widget_power_fops);
-      if (!d)
-          dev_warn(w->dapm->dev, "ASoC: Failed to create %s debugfs file\n", w->name);
+      if (IS_ERR(d))
+          dev_warn(w->dapm->dev, "ASoC: Failed to create %s debugfs file: %ld\n", w->name, PTR_ERR(d));
 }

static void dapm_debugfs_cleanup(struct snd_soc_dapm_context *dapm)
@@ -2364,7 +2412,7 @@
 return count;
 }

-_static DEVICE_ATTR(dapm_widget, 0444, dapm_widget_show, NULL);
+static DEVICE_ATTR_RO(dapm_widget);

struct attribute *soc_dapm_dev_attrs[] = {
  &dev_attr_dapm_widget.attr,
@@ -2386,6 +2434,7 @@
 enum snd_soc_dapm_direction dir;

 list_del(&w->list);
+  list_del(&w->dirty);
 /*
 * remove source and sink paths associated to this widget.
 * While removing the path, remove reference to it from both
@@ -2446,6 +2495,7 @@
 const char *pin, int status)
 {
 struct snd_soc_dapm_widget *w = dapm_find_widget(dapm, pin, true);
+  int ret = 0;

dapm_assert_locked(dapm);
@@ -2458,13 +2508,14 @@
dapm_mark_dirty(w, "pin configuration");
dapm_widget_invalidate_input_paths(w);
dapm_widget_invalidate_output_paths(w);
+  ret = 1;
 }


w->connected = status;
if (status == 0)
w->force = 0;

return 0;
+return ret;
}

/**
@@ -3392,14 +3443,15 @@
{
 struct snd_soc_card *card = snd_kcontrol_chip(kcontrol);
 const char *pin = (const char *)kcontrol->private_value;
+int ret;

 if (ucontrol->value.integer.value[0])
- snd_soc_dapm_enable_pin(&card->dapm, pin);
+ ret = snd_soc_dapm_enable_pin(&card->dapm, pin);
 else
- snd_soc_dapm_disable_pin(&card->dapm, pin);
+ ret = snd_soc_dapm_disable_pin(&card->dapm, pin);

 snd_soc_dapm_sync(&card->dapm);
- return 0;
+ return ret;
}
EXPORT_SYMBOL_GPL(snd_soc_dapm_put_pin_switch);

@@ -3618,6 +3670,7 @@
{
 struct snd_soc_dapm_path *source_p, *sink_p;
 struct snd_soc_dai *source, *sink;
+ struct snd_soc_pcm_runtime *rtd = w->priv;
 const struct snd_soc_pcm_stream *config = w->params + w->params_select;
 struct snd_pcm_substream substream;
 struct snd_pcm_hw_params *params = NULL;
@@ -3677,6 +3829,7 @@
go to out;
}
 substream.runtime = runtime;
+substream.private_data = rtd;

 switch (event) {
 case SND_SOC_DAPM_PRE_PMU:
@@ -3775,7 +3829,7 @@
 w->params_select = ucontrol->value.enumerated.item[0];
-return 0;
+return 1;
}

static void
@@ -3787,6 +3841,10 @@
    int count;
    devm_kfree(card->dev, (void *)private_value);
    +if (!w_param_text)
    +return;
    +for (count = 0 ; count < num_params; count++)
    devm_kfree(card->dev, (void *)w_param_text[count]);
    devm_kfree(card->dev, w_param_text);
@@ -3861,6 +3919,7 @@
}

int snd_soc_dapm_new_pcm(struct snd_soc_card *card,
    struct snd_soc_pcm_runtime *rtd,
    const struct snd_soc_pcm_stream *params,
@@ -3929,6 +3988,7 @@
    w->params = params;
    w->num_params = num_params;
    +w->priv = rtd;

    ret = snd_soc_dapm_add_path(&card->dapm, source, w, NULL, NULL);
    if (ret)
@@ -4033,6 +4093,13 @@
        continue;
    }

    /* let users know there is no DAI to link */
    +if (!dai_w->priv) {
    +dev_dbg(card->dev, "dai widget %s has no DAI\n", 
    +dai_w->name);
    +continue;
    +}
    +dai = dai_w->priv;

    /* ...find all widgets with the same stream and link them */
@@ -4476,7 +4543,7 @@
        continue;
    }

    /* let users know there is no DAI to link */
    +if (!dai_w->priv) {
    +dev_dbg(card->dev, "dai widget %s has no DAI\n", 
    +dai_w->name);
    +continue;
    +}
    +dai = dai_w->priv;

    /* ...find all widgets with the same stream and link them */
@@ -4476,7 +4543,7 @@
        continue;
if (w->power) {
    dapm_seq_insert(w, &down_list, false);
    w->power = 0;
    w->new_power = 0;
    powerdown = 1;
}

--- linux-4.15.0.orig/sound/soc/soc-generic-dmaengine-pcm.c
+++ linux-4.15.0/sound/soc/soc-generic-dmaengine-pcm.c
@@ -311,6 +311,12 @@
    if (!dmaengine_pcm_can_report_residue(dev, pcm->chan[i]))
    pcm->flags |= SND_DMAENGINE_PCM_FLAG_NO_RESIDUE;
    +
    +if (rtd->pcm->streams[i].pcm->name[0] == '\0') {
    +    strncpy(rtd->pcm->streams[i].pcm->name,
    +            rtd->pcm->streams[i].pcm->id,
    +            sizeof(rtd->pcm->streams[i].pcm->name));
    +}
    
    return 0;
--- linux-4.15.0.orig/sound/soc/soc-jack.c
+++ linux-4.15.0/sound/soc/soc-jack.c
@@ -127,10 +127,9 @@
    unsigned int sync = 0;
    int enable;
    -
    -trace_snd_soc_jack_report(jack, mask, status);
    -
    if (!jack)
    +trace_snd_soc_jack_report(jack, mask, status);
    dapm = &jack->card->dapm;

--- linux-4.15.0.orig/sound/soc/soc-ops.c
+++ linux-4.15.0/sound/soc/soc-ops.c
@@ -837,7 +837,7 @@
    unsigned int regwshift = component->val_bytes * BITS_PER_BYTE;
    -unsigned int regwmask = (1<<regwshift)-1;
    +unsigned int regwmask = (1UL<<regwshift)-1;
    unsigned int invert = mc->invert;
    unsigned long mask = (1UL<<mc->nbits)-1;
    long min = mc->min;
@@ -886,7 +886,7 @@
unsigned int regbase = mc->regbase;
unsigned int regcount = mc->regcount;
unsigned int regwshift = component->val_bytes * BITS_PER_BYTE;
-unsigned int regwmask = (1<<regwshift)-1;
+unsigned int regwmask = (1UL<<regwshift)-1;
unsigned int invert = mc->invert;
unsigned long mask = (1UL<<mc->nbits)-1;
long max = mc->max;
--- linux-4.15.0.orig/sound/soc/soc-pcm.c
+++ linux-4.15.0/sound/soc/soc-pcm.c
@@ -48,8 +48,8 @@
 else
 codec_stream = &dai->driver->capture;

-/* If the codec specifies any rate at all, it supports the stream. */
-return codec_stream->rates;
+/* If the codec specifies any channels at all, it supports the stream */
+return codec_stream->channels_min;
}

/**
 @@ -973,10 +973,13 @@
 codec_params = *params;

 /* fixup params based on TDM slot masks */
-if (codec_dai->tx_mask)
+if (substream->stream == SNDRV_PCM_STREAM_PLAYBACK &&
    codec_dai->tx_mask)
 soc_pcm_codec_params_fixup(&codec_params,
    codec_dai->tx_mask);
-else
+    codec_dai->rx_mask)
 soc_pcm_codec_params_fixup(&codec_params,
    codec_dai->rx_mask);
for (i = 0; i < be->num_codecs; i++) {
    /*
    * Skip CODECs which don't support the current stream
    * type. See soc_pcm_init_runtime_hw() for more details
    */
    +if (!snd_soc_dai_stream_valid(be->codec_dais[i],
        stream))
        +continue;
    +
    codec_dai_drv = be->codec_dais[i]->driver;
    if (stream == SNDRV_PCM_STREAM_PLAYBACK)
        codec_stream = &codec_dai_drv->playback;
    @@ -1954,8 +1965,10 @@
        continue;
    if ((be->dpcm[stream].state != SND_SOC_DPCM_STATE_HW_FREE) &&
        - (be->dpcm[stream].state != SND_SOC_DPCM_STATE_OPEN))
        -continue;
    + (be->dpcm[stream].state != SND_SOC_DPCM_STATE_OPEN)) {
        +soc_pcm_hw_free(be_substream);
    +be->dpcm[stream].state = SND_SOC_DPCM_STATE_HW_FREE;
    +}
    dev_dbg(be->dev, "ASoC: close BE %s\n",
        be->dai_link->name);
    @@ -2210,7 +2223,8 @@
        switch (cmd) {
        case SNDRV_PCM_TRIGGER_START:
            if ((be->dpcm[stream].state != SND_SOC_DPCM_STATE_PREPARE) &&
                - (be->dpcm[stream].state != SND_SOC_DPCM_STATE_STOP))
                + (be->dpcm[stream].state != SND_SOC_DPCM_STATE_STOP) &&
                + (be->dpcm[stream].state != SND_SOC_DPCM_STATE_PAUSED))
                continue;
            ret = dpcm_do_trigger(dpcm, be_substream, cmd);
            @@ -2240,7 +2254,8 @@
                be->dpcm[stream].state = SND_SOC_DPCM_STATE_START;
                break;
        case SNDRV_PCM_TRIGGER_STOP:
            -if (be->dpcm[stream].state != SND_SOC_DPCM_STATE_START)
            +if ((be->dpcm[stream].state != SND_SOC_DPCM_STATE_START) &&
            + (be->dpcm[stream].state != SND_SOC_DPCM_STATE_PAUSED))
                continue;
            if (!snd_soc_dpcm_can_be_free_stop(fe, be, stream))
                @@ -2285,42 +2300,83 @@
                }

EXPORT_SYMBOL_GPL(dpcm_be_dai_trigger);

+static int dpcm_dai_trigger_fe_be(struct snd_pcm_substream *substream,
+   int cmd, bool fe_first)
+{
+  struct snd_soc_pcm_runtime *fe = substream->private_data;
+  int ret;
+
+  /* call trigger on the frontend before the backend. */
+  if (fe_first) {
+    dev_dbg(fe->dev, "ASoC: pre trigger FE %s cmd %d\n",
+            fe->dai_link->name, cmd);
+    ret = soc_pcm_trigger(substream, cmd);
+    if (ret < 0)
+      return ret;
+    ret = dpcm_be_dai_trigger(fe, substream->stream, cmd);
+    return ret;
+  }
+
+  /* call trigger on the frontend after the backend. */
+  ret = dpcm_be_dai_trigger(fe, substream->stream, cmd);
+  if (ret < 0)
+    return ret;
+  dev_dbg(fe->dev, "ASoC: post trigger FE %s cmd %d\n",
+            fe->dai_link->name, cmd);
+  ret = soc_pcm_trigger(substream, cmd);
+  return ret;
+}
+
static int dpcm_fe_dai_do_trigger(struct snd_pcm_substream *substream, int cmd)
{
  struct snd_soc_pcm_runtime *fe = substream->private_data;
  int stream = substream->stream, ret;
  int stream = substream->stream;
  int ret = 0;
  enum snd_soc_dpcm_trigger trigger = fe->dai_link->trigger[stream];
  fe->dpcm[stream].runtime_update = SND_SOC_DPCM_UPDATE_FE;

  switch (trigger) {
    case SND_SOC_DPCM_TRIGGER_PRE:
      /* call trigger on the frontend before the backend. */
      -
-dev_dbg(fe->dev, "ASoC: pre trigger FE %s cmd %d\n", 
-fe->dai_link->name, cmd);
-
-ret = soc_pcm_trigger(substream, cmd);
-if (ret < 0) {
-dev_err(fe->dev,"ASoC: trigger FE failed %d\n", ret);
-goto out;
+switch (cmd) {
+  case SNDRV_PCM_TRIGGER_POST:
+    /* call trigger on the frontend after the backend. */
+    
+    -ret = dpcm_be_dai_trigger(fe, substream->stream, cmd);
+    break;
+  case SND_SOC_DPCM_TRIGGER_POST:
+    
+    -ret = dpcm_be_dai_trigger(fe, substream->stream, cmd);
+    if (ret < 0) {
+      -dev_err(fe->dev,"ASoC: trigger FE failed %d\n", ret);
+      -goto out;
+    switch (cmd) {
+      case SNDRV_PCM_TRIGGER_START:
+      case SNDRV_PCM_TRIGGER_RESUME:
+      case SNDRV_PCM_TRIGGER_PAUSE_RELEASE:
+      case SNDRV_PCM_TRIGGER_DRAIN:
+        ret = dpcm_dai_trigger_fe_be(substream, cmd, true);
+        +break;
+      case SNDRV_PCM_TRIGGER_STOP:
+      case SNDRV_PCM_TRIGGER_SUSPEND:
+      case SNDRV_PCM_TRIGGER_PAUSE_PUSH:
+        ret = dpcm_dai_trigger_fe_be(substream, cmd, false);
+        +break;
+      +default:
+        +ret = -EINVAL;
+        +break;
+    }
+    
+    -ret = dpcm_be_dai_trigger(fe, substream->stream, cmd);
+    break;
+case SND_SOC_DPCM_TRIGGER_POST:
+    /* call trigger on the frontend after the backend. */
+    
+    -ret = dpcm_be_dai_trigger(fe, substream->stream, cmd);
+    if (ret < 0) {
+      -dev_err(fe->dev,"ASoC: trigger FE failed %d\n", ret);
+      -goto out;
+    switch (cmd) {
+      case SNDRV_PCM_TRIGGER_START:
+      case SNDRV_PCM_TRIGGER_RESUME:
+      case SNDRV_PCM_TRIGGER_PAUSE_RELEASE:
+      case SNDRV_PCM_TRIGGER_DRAIN:
+        ret = dpcm_dai_trigger_fe_be(substream, cmd, true);
+        +break;
+      case SNDRV_PCM_TRIGGER_STOP:
+      case SNDRV_PCM_TRIGGER_SUSPEND:
+      case SNDRV_PCM_TRIGGER_PAUSE_PUSH:
+        ret = dpcm_dai_trigger_fe_be(substream, cmd, false);
+        +break;
+      +default:
+        +ret = -EINVAL;
+        +break;
}
-dev_dbg(fe->dev, "ASoC: post trigger FE %s cmd %d\n",
-fe->dai_link->name, cmd);
-ret = soc_pcm_trigger(substream, cmd);
break;
case SND_SOC_DPCM_TRIGGER_BESPOKE:
/* bespoke trigger() - handles both FE and BEs */
@@ -2329,10 +2385,6 @@
fe->dai_link->name, cmd);
ret = soc_pcm_bespoke_trigger(substream, cmd);
-if (ret < 0) {
-dev_err(fe->dev,"ASoC: trigger FE failed %d\n", ret);
-goto out;
-}
break;
default:
dev_err(fe->dev, "ASoC: invalid trigger cmd %d for %s\n", cmd,
@@ -2341,6 +2393,12 @@
goto out;
}
+if (ret < 0) {
+dev_err(fe->dev, "ASoC: trigger FE cmd: %d failed: %d\n",
+cmd, ret);
+goto out;
+}
+
switch (cmd) {
case SNDRV_PCM_TRIGGER_START:
case SNDRV_PCM_TRIGGER_RESUME:
@@ -2395,7 +2453,8 @@
if ((be->dpcm[stream].state != SND_SOC_DPCM_STATE_HW_PARAMS) &&
(be->dpcm[stream].state != SND_SOC_DPCM_STATE_STOP) &&
- (be->dpcm[stream].state != SND_SOC_DPCM_STATE_SUSPEND))
+ (be->dpcm[stream].state != SND_SOC_DPCM_STATE_SUSPEND) &&
+ (be->dpcm[stream].state != SND_SOC_DPCM_STATE_PAUSED))
continue;
dev_dbg(be->dev, "ASoC: prepare BE %s\n",
@@ -3272,16 +3331,16 @@
ssize_t offset = 0;
/* FE state */
-offset += snprintf(buf + offset, size - offset,

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+offset += scnprintf(buf + offset, size - offset, "[%s - %s]\n", fe->dai_link->name, 
stream ? "Capture" : "Playback");

-offset += snprintf(buf + offset, size - offset, "State: %s\n", 
+offset += scnprintf(buf + offset, size - offset, "State: %s\n", 
dpcm_state_string(fe->dpcm[stream].state));

if ((fe->dpcm[stream].state >= SND_SOC_DPCM_STATE_HW_PARAMS) &&
    (fe->dpcm[stream].state <= SND_SOC_DPCM_STATE_STOP))
-offset += snprintf(buf + offset, size - offset, "Hardware Params: "
+offset += scnprintf(buf + offset, size - offset, "Hardware Params: "
"Format = %s, Channels = %d, Rate = %d\n", 
snd_pcm_format_name(params_format(params)), 
@@ -3289,10 +3348,10 @@
params_rate(params));

/* BEs state */
-offset += snprintf(buf + offset, size - offset, "Backends:\n");
+offset += scnprintf(buf + offset, size - offset, "Backends:\n");

if (list_empty(&fe->dpcm[stream].be_clients)) {
-offset += snprintf(buf + offset, size - offset, "- %s\n", be->dai_link->name);
+offset += scnprintf(buf + offset, size - offset, "- %s\n", be->dai_link->name); 
  " No active DSP links\n");
go to out;
}

struct snd_soc_pcm_runtime *be = dpcm->be;
params = &dpcm->hw_params;

-offset += snprintf(buf + offset, size - offset, 
+offset += scnprintf(buf + offset, size - offset, 
" - %s\n", be->dai_link->name); 

-offset += snprintf(buf + offset, size - offset, 
+offset += scnprintf(buf + offset, size - offset, 
" State: %s\n", 
dpcm_state_string(be->dpcm[stream].state));

if ((be->dpcm[stream].state >= SND_SOC_DPCM_STATE_HW_PARAMS) &&
    (be->dpcm[stream].state <= SND_SOC_DPCM_STATE_STOP))
-offset += snprintf(buf + offset, size - offset, 
+offset += scnprintf(buf + offset, size - offset, 
" Hardware Params: "
"Format = %s, Channels = %d, Rate = %d\n", 
snd_pcm_format_name(params_format(params)), 
@@ -3301,16 +3360,16 @@
params_rate(params));
struct snd_soc_component *comp = tpg->comp;

return soc_tplg_add_dcontrol(comp->card->snd_card,
-comp->dev, k, NULL, comp, kcontrol);
+comp->dev, k, comp->name_prefix, comp, kcontrol);
}

/* remove a mixer kcontrol */
@@ -510,7 +510,7 @@
/*
 if (dobj->widget.kcontrol_type == SND_SOC_TPLG_TYPE_ENUM) {
 /* enumerated widget mixer */
- for (i = 0; i < w->num_kcontrols; i++) {
-+for (i = 0; w->kcontrols != NULL && i < w->num_kcontrols; i++) {
 struct snd_kcontrol *kcontrol = w->kcontrols[i];
 struct soc_enum *se =
 (struct soc_enum *)kcontrol->private_value;
- @ @ -.523,11 +523,12 @@
 kfree(se->dobj.control.dtexts[j]);

 kfree(se);
+kfree(w->kcontrol_news[i].name);
 }
 kfree(w->kcontrol_news);
 } else {
/* volume mixer or bytes controls */
- for (i = 0; i < w->num_kcontrols; i++) {
-+for (i = 0; w->kcontrols != NULL && i < w->num_kcontrols; i++) {
 struct snd_kcontrol *kcontrol = w->kcontrols[i];

 if (dobj->widget.kcontrol_type
 @@ -.540,6 +541,7 @@
 */
 kfree((void *)kcontrol->private_value);
 snd_ctl_remove(card, kcontrol);
+kfree(w->kcontrol_news[i].name);
 }
 kfree(w->kcontrol_news);
 }
@@ -1233,7 +1235,9 @@
dev_dbg(tpgl->dev, " adding DAPM widget mixer control %s at %d\n",
 mc->hdr.name, i);

-kc[i].name = mc->hdr.name;
+kstrdup(mc->hdr.name, GFP_KERNEL);
if (kc[i].name == NULL)
  goto err_str;
k[i].private_value = (long)sm;
k[i].iface = SNDRV_CTL_ELEM_IFACE_MIXER;
k[i].access = mc->hdr.access;
@@ -1272,14 +1276,19 @@
kfree(sm);
  continue;
}
+
+/* create any TLV data */
+soc_tplg_create_tlv(tplg, &kc[i], &mc->hdr);
}
return kc;

err_str:
kfree(sm);
err:
- for (--i; i >= 0; i--)
+ for (--i; i >= 0; i--) {
kfree((void *)kc[i].private_value);
+ kfree(kc[i].name);
+
  kfree(kc);
 return NULL;
}
@@ -1310,7 +1319,9 @@
dev_dbg(tplg->dev, " adding DAPM widget enum control %s\n",
 ec->hdr.name);

- kc[i].name = ec->hdr.name;
+ kc[i].name = kstrdup(ec->hdr.name, GFP_KERNEL);
+ if (kc[i].name == NULL)
+ goto err_se;
k[i].private_value = (long)se;
k[i].iface = SNDRV_CTL_ELEM_IFACE_MIXER;
k[i].access = ec->hdr.access;
@@ -1386,6 +1397,7 @@
kfree(se->dobj.control.dtexts[j]);

  kfree(se);
+ kfree(kc[i].name);
}
err:
  kfree(kc);
@@ -1424,7 +1436,9 @@
  "ASoC: adding bytes kcontrol %s with access 0x%x\n",
 be->hdr.name, be->hdr.access);
-kc[i].name = be->hdr.name;
+kc[i].name = kstrdup(be->hdr.name, GFP_KERNEL);
+if (kc[i].name == NULL)
+goto err;
kc[i].private_value = (long)sbe;
kc[i].iface = SNDRV_CTL_ELEM_IFACE_MIXER;
kc[i].access = be->hdr.access;
@@ -1454,8 +1468,10 @@
return kc;

err:
- for (--i; i >= 0; i--)
+ for (--i; i >= 0; i--) {
  kfree((void *)kc[i].private_value);
+ kfree(kc[i].name);
+ }

 kfree(kc);
 return NULL;
@@ -1905,6 +1921,7 @@
 int count = hdr->count;
 int i;
 bool abi_match;
+int ret;

 if (tplg->pass != SOC_TPLG_PASS_PCM_DAI)
 return 0;
@@ -1937,11 +1954,18 @@
 _pcm = pcm;
 } else {
  abi_match = false;
- pcm_new_ver(tplg, pcm, &_pcm);
+ ret = pcm_new_ver(tplg, pcm, &_pcm);
+ if (ret < 0)
+ return ret;
 }

 /* create the FE DAIs and DAI links */
- soc_tplg_pcm_create(tplg, _pcm);
+ ret = soc_tplg_pcm_create(tplg, _pcm);
+ if (ret < 0) {
+  if (!abi_match)
+    kfree(_pcm);
+  return ret;
+ }

 /* offset by version-specific struct size and
link->dai_fmt = hw_config->fmt & SND_SOC_DAIFMT_FORMAT_MASK;

/* clock gating */
+if (hw_config->clock_gated == SND_SOC_TPLG_DAI_CLK_GATE_GATED)
+link->dai_fmt |= SND_SOC_DAIFMT_GATED;
+else if (hw_config->clock_gated ==
+ SND_SOC_TPLG_DAI_CLK_GATE_CONT)
+link->dai_fmt |= SND_SOC_DAIFMT_CONT;
+
/* clock signal polarity */
invert_bclk = hw_config->invert_bclk;
invert_fsync = hw_config->invert_fsync;

/* clock masters */
-bclk_master = hw_config->bclk_master;
-fsync_master = hw_config->fsync_master;
-if (!bclk_master && !fsync_master)
+ bclk_master = (hw_config->bclk_master ==
+ SND_SOC_TPLG_BCLK_CM);
+ fsync_master = (hw_config->fsync_master ==
+ SND_SOC_TPLG_FSYNC_CM);
+ if (bclk_master && fsync_master)
+link->dai_fmt |= SND_SOC_DAIFMT_CBM_CFM;
-else if (bclk_master && !fsync_master)
+link->dai_fmt |= SND_SOC_DAIFMT CBS_CFM;
-else if (!bclk_master && fsync_master)
+link->dai_fmt |= SND_SOC_DAIFMT CBS_CFM;
+else if (bclk_master && ! fsync_master)
+link->dai_fmt |= SND_SOC_DAIFMT CBM_CFS;
-else
+link->dai_fmt |= SND_SOC_DAIFMT CBS_CFS;
@@ -2146,8 +2179,11 @@
 }

ret = soc_tplg_link_config(tplg, _link);
-if (ret < 0)
+if (ret < 0) {
 +if (!abi_match)
 +kfree(_link);
+return ret;
+}

/* offset by version-specific struct size and
* real priv data size
@@ -2299,7 +2335,7 @@
     {
     struct snd_soc_tplg_manifest *manifest, *manifest;
     bool abi_match;
-    int err;
+    int ret = 0;

     if (tplg->pass != SOC_TPLG_PASS_MANIFEST)
     return 0;
@@ -2312,19 +2348,19 @@
         _manifest = manifest;
     } else {
         abi_match = false;
-        err = manifest_new_ver(tplg, manifest, &_manifest);
-        if (err < 0)
-            return err;
+        ret = manifest_new_ver(tplg, manifest, &_manifest);
+        if (ret < 0)
+            return ret;
     +return ret;
     }

     /* pass control to component driver for optional further init */
     if (tplg->comp && tplg->ops && tplg->ops->manifest)
     -return tplg->ops->manifest(tplg->comp, _manifest);
     +return ret = tplg->ops->manifest(tplg->comp, _manifest);
     
     if (!abi_match)/* free the duplicated one */
     kfree(_manifest);
-    return 0;
+    +return ret;
     }

     /* validate header magic, size and type */
@@ -2488,6 +2524,7 @@
     struct snd_soc_tplg_ops *ops, const struct firmware *fw, u32 id)
     {
     struct soc_tplg tplg;
+    int ret;

     /* setup parsing context */
     memset(&tplg, 0, sizeof(tplg));
@@ -2501,7 +2538,12 @@
         tplg.bytes_ext_ops = ops->bytes_ext_ops;
         tplg.bytes_ext_ops_count = ops->bytes_ext_ops_count;

         -return soc_tplg_load(&tplg);
ret = soc_tplg_load(&tplg);
/* free the created components if fail to load topology */
if (ret)
    snd_soc_tplg_component_remove(comp, SND_SOC_TPLG_INDEX_ALL);
return ret;
}
EXPORT_SYMBOL_GPL(snd_soc_tplg_component_load);

/*@ -2555,7 +2597,7 @*/

/* match index */
if (dobj->index != index &&
    index != SND_SOC_TPLG_INDEX_ALL)
    continue;

switch (dobj->type) {

/* sampling frequency. If no sample rate is already specified, then
  set one. */
-mutex_lock(&player->ctrl_lock);
if (runtime) {
    switch (runtime->rate) {
        case 22050:
            --linux-4.15.0.orig/sound/soc/sti/uniperif_player.c
            "-mutex_lock(&player->ctrl_lock);
            if (runtime) {
                switch (runtime->rate) {
                    case 22050:
                        @ @ -226,7 +226,6 @ @
                        player->stream_settings.iec958.status[3 + (n * 4)] << 24;
                        SET_UNIPERIF_CHANNEL_STA_REGN(player, n, status);
                    }
                    mutex_unlock(&player->ctrl_lock);
                } /* Update the channel status */
            if (player->ver < SND_ST_UNIPERIF_VERSION_UNI_PLR_TOP_1_0)
                @ @ -365,8 +363,10 @ @
                SET_UNIPERIF_CTRL_ZERO_STUFF_HW(player);

            +mutex_lock(&player->ctrl_lock);
            /* Update the channel status */
            uni_player_set_channel_status(player, runtime);
            mutex_unlock(&player->ctrl_lock);

            /* Clear the user validity user bits */
            SET_UNIPERIF_USER_VALIDITY_VALIDITY_LR(player, 0);
            @ @ -598,7 +598,6 @ @
iec958->status[1] = ucontrol->value.iec958.status[1];
iec958->status[3] = ucontrol->value.iec958.status[3];
mutex_unlock(&player->ctrl_lock);

spin_lock_irqsave(&player->irq_lock, flags);
if (player->substream && player->substream->runtime)
@@ -608,6 +607,8 @@
uni_player_set_channel_status(player, NULL);

spin_unlock_irqrestore(&player->irq_lock, flags);
+mutex_unlock(&player->ctrl_lock);
+
return 0;
}

--- linux-4.15.0.orig/sound/soc/stm/stm32_i2s.c
+++ linux-4.15.0/sound/soc/stm/stm32_i2s.c
@@ -246,8 +246,8 @@
return IRQ_NONE;
}

-regmap_update_bits(i2s->regmap, STM32_I2S_IFCR_REG,
- I2S_IFCR_MASK, flags);
+regmap_write_bits(i2s->regmap, STM32_I2S_IFCR_REG,
+ I2S_IFCR_MASK, flags);

if (flags & I2S_SR_OVR) {
    dev_dbg(&pdev->dev, "Overrun\n");
@@ -276,7 +276,6 @@
case STM32_I2S_CFG2_REG:
case STM32_I2S_IER_REG:
case STM32_I2S_SR_REG:
-case STM32_I2S_IFCR_REG:
case STM32_I2S_TXDR_REG:
case STM32_I2S_RXDR_REG:
case STM32_I2S_CGFR_REG:
@@ -488,7 +487,7 @@
{
    struct stm32_i2s_data *i2s = snd_soc_dai_get_drvdata(cpu_dai);
    int format = params_width(params);
-u32 cfgr, cfgr_mask, cfg1, cfg1_mask;
+u32 cfgr, cfgr_mask, cfg1;
    unsigned int fthlv;
    int ret;

@@ -501,7 +500,7 @@
    switch (format) {

case 16:
cfgfr = I2S_CGFR_DATLEN_SET(I2S_I2SMOD_DATLEN_16);
-cfgfr_mask = I2S_CGFR_DATLEN_MASK;
+cfgfr_mask = I2S_CGFR_DATLEN_MASK | I2S_CGFR_CHLEN;
break;

case 32:
 cfgfr = I2S_CGFR_DATLEN_SET(I2S_I2SMOD_DATLEN_32) |
@@ -529,15 +528,11 @@
   if (ret < 0)
     return ret;

  -cfg1 = I2S_CFG1_RXDMAEN | I2S_CFG1_TXDMAEN;
  -cfg1_mask = cfg1;
  -
-fthlv = STM32_I2S_FIFO_SIZE * I2S_FIFO_TH_ONE_QUARTER / 4;
-+fthlv = STM32_I2S_FIFO_SIZE * I2S_FIFO_TH_ONE_QUARTER / 4;
-+cfg1 |= I2S_CFG1_FTHVL_SET(fthlv - 1);
-+cfg1_mask |= I2S_CFG1_FTHVL_MASK;
+  return regmap_update_bits(i2s->regmap, STM32_I2S_CFG1_REG, 
     -cfg1_mask, cfg1);
+        I2S_CFG1_FTHVL_MASK, cfg1);
 }

static int stm32_i2s_startup(struct snd_pcm_substream *substream, 
@@ -551,8 +546,8 @@
  i2s->refcount++;
  spin_unlock(&i2s->lock_fd);

  -return regmap_update_bits(i2s->regmap, STM32_I2S_IFCR_REG, 
  -  I2S_IFCR_MASK, I2S_IFCR_MASK);
  +return regmap_write_bits(i2s->regmap, STM32_I2S_IFCR_REG, 
  +         I2S_IFCR_MASK, I2S_IFCR_MASK);
 }

static int stm32_i2s_hw_params(struct snd_pcm_substream *substream, 
@@ -603,8 +602,8 @@
 /* Enable i2s */
 dev_dbg(cpu_dai->dev, "start I2S\n");

  +cfg1_mask = I2S_CFG1_RXDMAEN | I2S_CFG1_TXDMAEN;
  +regmap_update_bits(i2s->regmap, STM32_I2S_CFG1_REG, 
  +        cfg1_mask, cfg1_mask);
  +ret = regmap_update_bits(i2s->regmap, STM32_I2S_CR1_REG, 
   + 12S_CR1_SPE, 12S_CR1_SPE);
  if (ret < 0) {
    @ @ -603,8 +602,8 @@
return ret;
}

-regmap_update_bits(i2s->regmap, STM32_I2S_I2CR_REG, - I2S_I2CR_MASK, I2S_I2CR_MASK);
+regmap_write_bits(i2s->regmap, STM32_I2S_I2CR_REG, + I2S_I2CR_MASK, I2S_I2CR_MASK);

if (playback_flg) {
  ier = I2S_IER_UDRIE;
}

if (STM_SAI_PROTOCOL_IS_SPDIF(sai)) {
  +snd_pcm_hw_constraint_mask64(substream->runtime, + SNDROID_PCM_HW_PARAM_FORMAT, + SNDROID_PCM_FMTBIT_S32_LE);
  +snd_pcm_hw_constraint_single(substream->runtime, + SNDROID_PCM_HW_PARAM_CHANNELS, 2);
}

ret = clk_prepare_enable(sai->sai_ck);
if (ret < 0) {
  dev_err(cpu_dai->dev, "Failed to enable clock: %d\n", ret);
}

-sai->cpu_dai_drv->name = dev_name(&pdev->dev);
if (STM_SAI_IS_PLAYBACK(sai)) {
  memcpy(sai->cpu_dai_drv, &stm32_sai_playback_dai, sizeof(stm32_sai_playback_dai));
  sai->cpu_dai_drv->capture.stream_name = sai->cpu_dai_drv->name;
}
+sai->cpu_dai_drv->name = dev_name(&pdev->dev);

return 0;
}

-- linux-4.15.0.orig/sound/soc/stm/stm32_spdifrx.c
+++ linux-4.15.0/sound/soc/stm/stm32_spdifrx.c
@@ -213,6 +213,7 @@
   * @slave_config: dma slave channel runtime config pointer
   * @phys_addr: SPDIFRX registers physical base address

---
* @lock: synchronization enabling lock
+  * @irq_lock: prevent race condition with IRQ on stream state
* @cs: channel status buffer
* @ub: user data buffer
* @irq: SPDIFRX interrupt line
@@ -233,6 +234,7 @@
    struct dma_slave_config slave_config;
    dma_addr_t phys_addr;
    spinlock_t lock; /* Sync enabling lock */
+    spinlock_t irq_lock; /* Prevent race condition on stream state */
    unsigned char cs[SPDIFRX_CS_BYTES_NB];
    unsigned char ub[SPDIFRX_UB_BYTES_NB];
    int irq;
@@ -313,6 +315,7 @@
    static int stm32_spdifrx_start_sync(struct stm32_spdifrx_data *spdifrx)
    {
        int cr, cr_mask, imr, ret;
+        unsigned long flags;

        /* Enable IRQs */
        imr = SPDIFRX_IMR_IFEIE | SPDIFRX_IMR_SYNCDIE | SPDIFRX_IMR_PERRIE;
@@ -320,7 +323,7 @@
        if (ret)
            return ret;
-        spin_lock(&spdifrx->lock);
+        spin_lock_irqsave(&spdifrx->lock, flags);

        spdifrx->refcount++;
@@ -353,7 +356,7 @@
        "Failed to start synchronization\n");}
    }

    -spin_unlock(&spdifrx->lock);
+spin_unlock_irqrestore(&spdifrx->lock, flags);

    return ret;
    }
@ @ -361,11 +364,12 @@
    static void stm32_spdifrx_stop(struct stm32_spdifrx_data *spdifrx)
    {
        int cr, cr_mask, reg;
+        unsigned long flags;

        -spin_lock(&spdifrx->lock);
+spin_lock_irqsave(&spdifrx->lock, flags);
if (--spdifrx->refcount) {
-    spin_unlock(&spdifrx->lock);
+    spin_unlock_irqrestore(&spdifrx->lock, flags);
    return;
}

@@ -384,7 +388,7 @@
regmap_read(spdifrx->regmap, STM32_SPDIFRX_DR, &reg);
regmap_read(spdifrx->regmap, STM32_SPDIFRX_CSR, &reg);

-    spin_unlock(&spdifrx->lock);
+    spin_unlock_irqrestore(&spdifrx->lock, flags);
}

static int stm32_spdifrx_dma_ctrl_register(struct device *dev,
@@ -643,7 +647,6 @@
static irqreturn_t stm32_spdifrx_isr(int irq, void *devid)
{
    struct stm32_spdifrx_data *spdifrx = (struct stm32_spdifrx_data *)devid;
-    struct snd_pcm_substream *substream = spdifrx->substream;
    struct platform_device *pdev = spdifrx->pdev;
    unsigned int cr, mask, sr, imr;
    unsigned int flags;
@@ -711,14 +714,19 @@
regmap_update_bits(spdifrx->regmap, STM32_SPDIFRX_CR,
                     SPDIFRX_CR_SPDIFEN_MASK, cr);

-    if (substream)
-        snd_pcm_stop(substream, SNDRV_PCM_STATE_DISCONNECTED);
+    spin_lock(&spdifrx->irq_lock);
+    if (spdifrx->substream)
+        snd_pcm_stop(spdifrx->substream,
+                     SNDRV_PCM_STATE_DISCONNECTED);
+    spin_unlock(&spdifrx->irq_lock);

    return IRQ_HANDLED;
}

-    if (err_xrun && substream)
-        snd_pcm_stop_xrun(substream);
-    spin_lock(&spdifrx->irq_lock);
+    spin_lock(&spdifrx->irq_lock);
+    if (err_xrun && spdifrx->substream)
+        snd_pcm_stop_xrun(spdifrx->substream);
+    spin_unlock(&spdifrx->irq_lock);

    return IRQ_HANDLED;
}
@@ -727,9 +735,12 @@
struct snd_soc_dai *cpu_dai)
{
struct stm32_spdifrx_data *spdifrx = snd_soc_dai_get_drvdata(cpu_dai);
  unsigned long flags;
  int ret;

  spin_lock_irqsave(&spdifrx->irq_lock, flags);
  spdifrx->substream = substream;
  spin_unlock_irqrestore(&spdifrx->irq_lock, flags);

  ret = clk_prepare_enable(spdifrx->kclk);
  if (ret)
    @ @ -805,8 +816,12 @ @
    struct snd_soc_dai *cpu_dai)
    {
    struct stm32_spdifrx_data *spdifrx = snd_soc_dai_get_drvdata(cpu_dai);
    unsigned long flags;

    spin_lock_irqsave(&spdifrx->irq_lock, flags);
    spdifrx->substream = NULL;
    spin_unlock_irqrestore(&spdifrx->irq_lock, flags);
    
    clk_disable_unprepare(spdifrx->kclk);
    }

    @ @ -911,6 +926,7 @ @
    spdifrx->pdev = pdev;
    init_completion(&spdifrx->cs_completion);
    spin_lock_init(&spdifrx->lock);
    spin_lock_init(&spdifrx->irq_lock);

    platform_set_drvdata(pdev, spdifrx);

    --- linux-4.15.0.orig/sound/soc/sunxi/sun4i-codec.c
+++ linux-4.15.0/sound/soc/sunxi/sun4i-codec.c
@@ -1218,6 +1218,7 @@
    return ERR_PTR(-ENOMEM);
    card->dev		= dev;
    card->owner		= THIS_MODULE;
    card->name		= "sun4i-codec";
    card->dapm_widgets= sun4i_codec_card_dapm_widgets;
    card->num_dapm_widgets= ARRAY_SIZE(sun4i_codec_card_dapm_widgets);
    @ @ -1250,6 +1251,7 @ @
    return ERR_PTR(-ENOMEM);

    card->dev= dev;
    +card->owner= THIS_MODULE;

card->name = "A31 Audio Codec";
card->dapm_widgets= sun6i_codec_card_dapm_widgets;
card->num_dapm_widgets= ARRAY_SIZE(sun6i_codec_card_dapm_widgets);
@@ -1303,6 +1305,7 @@
         return ERR_PTR(-ENOMEM);

 card->dev= dev;
+card->owner= THIS_MODULE;
 card->name = "A23 Audio Codec";
card->dapm_widgets= sun6i_codec_card_dapm_widgets;
card->num_dapm_widgets= ARRAY_SIZE(sun6i_codec_card_dapm_widgets);
@@ -1341,6 +1344,7 @@
         return ERR_PTR(-ENOMEM);

 card->dev= dev;
+card->owner= THIS_MODULE;
 card->name = "H3 Audio Codec";
card->dapm_widgets= sun6i_codec_card_dapm_widgets;
card->num_dapm_widgets= ARRAY_SIZE(sun6i_codec_card_dapm_widgets);
@@ -1379,6 +1383,7 @@
         return ERR_PTR(-ENOMEM);

 card->dev= dev;
+card->owner= THIS_MODULE;
 card->name = "V3s Audio Codec";
card->dapm_widgets= sun6i_codec_card_dapm_widgets;
card->num_dapm_widgets= ARRAY_SIZE(sun6i_codec_card_dapm_widgets);
--- linux-4.15.0.orig/sound/soc/sunxi/sun4i-i2s.c
+++ linux-4.15.0/sound/soc/sunxi/sun4i-i2s.c
@@ -80,8 +80,8 @@
 #define SUN4I_I2S_CLK_DIV_MCLK_MASK	 GENMASK(3, 0)
 #define SUN4I_I2S_CLK_DIV_MCLK(mclk)	 ((mclk) << 0)
-#define SUN4I_I2S_RX_CNT_REG	 0x28
-#define SUN4I_I2S_TX_CNT_REG	 0x2c
+#define SUN4I_I2S_TX_CNT_REG	 0x28
+#define SUN4I_I2S_RX_CNT_REG	 0x2c

 #define SUN4I_I2S_TX_CHAN_SEL_REG	 0x30
 #define SUN4I_I2S_CHAN_SEL(num_chan)	 (((num_chan) - 1) << 0)
@@ -104,13 +104,13 @@
 #define SUN4I_I2S_RX_CNT_REG0x28
 -#define SUN4I_I2S_TX_CNT_REG0x2c
 +#define SUN4I_I2S_TX_CNT_REG0x28
 +#define SUN4I_I2S_RX_CNT_REG0x2c

 #define SUN4I_I2S_TX_CHAN_SEL_REG0x30
 #define SUN4I_I2S_CHAN_SEL(num_chan)(((num_chan) - 1) << 0)
@@ -104,13 +104,13 @@
 #define SUNI_I2S_CHAN_CFG_REG0x30
 #define SUNI_I2S_CHAN_CFG_RX_SLOT_NUM_MASK0x3F
 -#define SUNI_I2S_CHAN_CFG_RX_SLOT_NUM(chan)(chan - 1)
 +#define SUNI_I2S_CHAN_CFG_RX_SLOT_NUM(chan)(chan - 1) << 4
 #define SUNI_I2S_CHAN_CFG_TX_SLOT_NUM_MASK0x3F
 #define SUNI_I2S_CHAN_CFG_TX_SLOT_NUM(chan)(chan - 1)
#define SUN8I_I2S_TX_CHAN_MAP_REG	0x44
#define SUN8I_I2S_TX_CHAN_SEL_REG	0x34
+#define SUN8I_I2S_TX_CHAN_OFFSET_MASK	GENMASK(13, 12)
#define SUN8I_I2S_TX_CHAN_OFFSET(offset)	(offset << 12)
#define SUN8I_I2S_TX_CHAN_EN_MASK	GENMASK(11, 4)
#define SUN8I_I2S_TX_CHAN_EN(num_chan)	(((1 << num_chan) - 1) << 4)

static int sun4i_i2s_get_bclk_div(struct sun4i_i2s *i2s,
-unsigned int oversample_rate,
+unsigned long parent_rate,
+unsigned int sampling_rate,
+unsigned int word_size)
{
-    int div = oversample_rate / word_size / 2;
+    int div = parent_rate / sampling_rate / word_size / 2;
    int i;

    for (i = 0; i < ARRAY_SIZE(sun4i_i2s_bclk_div); i++) {
      @@ -311,8 +312,8 @@
        if (!(sun4i_i2s_oversample_is_valid(oversample_rate))
            return -EINVAL;

        -bclk_div = sun4i_i2s_get_bclk_div(i2s, oversample_rate,
-            word_size);
+        bclk_div = sun4i_i2s_get_bclk_div(i2s, i2s->mclk_freq,
+            rate, word_size);
        if (bclk_div < 0)
            return -EINVAL;

      @@ -442,6 +443,10 @@
        regmap_update_bits(i2s->regmap, SUN8I_I2S_TX_CHAN_SEL_REG,
            SUN8I_I2S_TX_CHAN_OFFSET_MASK,
            SUN8I_I2S_TX_CHAN_OFFSET(offset));
+        +regmap_update_bits(i2s->regmap, SUN8I_I2S_RX_CHAN_SEL_REG,
+            SUN8I_I2S_TX_CHAN_OFFSET_MASK,
+            SUN8I_I2S_TX_CHAN_OFFSET(offset));
      }

      regmap_field_write(i2s->field_fmt_mode, val);

--- linux-4.15.0.orig/sound/soc/sunxi/sun8i-codec.c
+++ linux-4.15.0/sound/soc/sunxi/sun8i-codec.c
@@ -71,6 +71,7 @@
```
#define SUN8I_SYS_SR_CTRL_AIF1_FS_MASK	GENMASK(15, 12)
#define SUN8I_SYS_SR_CTRL_AIF2_FS_MASK	GENMASK(11, 8)
+#define SUN8I_AIF1CLK_CTRL_AIF1_DATA_FMT_MASK	GENMASK(3, 2)
#define SUN8I_AIF1CLK_CTRL_AIF1_WORD_SIZ_MASK	GENMASK(5, 4)
#define SUN8I_AIF1CLK_CTRL_AIF1_LRCK_DIV_MASK	GENMASK(8, 6)
#define SUN8I_AIF1CLK_CTRL_AIF1_BCLK_DIV_MASK	GENMASK(12, 9)
@@ -232,7 +233,7 @@
     return -EINVAL;
 }
regmap_update_bits(scodec->regmap, SUN8I_AIF1CLK_CTRL,
- BIT(SUN8I_AIF1CLK_CTRL_AIF1_DATA_FMT),
+ BIT(SUN8I_AIF1CLK_CTRL_AIF1_DATA_FMT_MASK),
     value << SUN8I_AIF1CLK_CTRL_AIF1_DATA_FMT);

return 0;
@@ -509,17 +510,11 @@
static int sun8i_codec_remove(struct platform_device *pdev)
{
    struct snd_soc_card *card = platform_get_drvdata(pdev);
    struct sun8i_codec *scodec = snd_soc_card_get_drvdata(card);
-    pm_runtime_disable(&pdev->dev);
    if (!pm_runtime_status_suspended(&pdev->dev))
        sun8i_codec_runtime_suspend(&pdev->dev);

    snd_soc_unregister_codec(&pdev->dev);
    -clk_disable_unprepare(scodec->clk_module);
    -clk_disable_unprepare(scodec->clk_bus);
-    return 0;
}

--- linux-4.15.0.orig/sound/soc/tegra/tegra30_ahub.c
+++ linux-4.15.0/sound/soc/tegra/tegra30_ahub.c
@@ -655,8 +655,10 @@
 int ret;

    ret = pm_runtime_get_sync(dev);
-    if (ret < 0)
+    if (ret < 0) {
+        pm_runtime_put(dev);
        return ret;
+    }

    ret = regcache_sync(ahub->regmap_ahub);
    ret |= regcache_sync(ahub->regmap_apbif);
    pm_runtime_put(dev);
--- linux-4.15.0.orig/sound/soc/tegra/tegra30_i2s.c
```
int ret;

ret = pm_runtime_get_sync(dev);
-if (ret < 0)
+if (ret < 0) {
+    pm_runtime_put(dev);
return ret;
+
ret = regcache_sync(i2s->regmap);
pm_runtime_put(dev);

--- linux-4.15.0.orig/sound/soc/tegra/tegra_alc5632.c
+++ linux-4.15.0/sound/soc/tegra/tegra_alc5632.c
@@ -137,6 +137,7 @@
static struct snd_soc_card snd_soc_tegra_alc5632 = {
    .name = "tegra-alc5632",
    .driver_name = "tegra",
    .owner = THIS_MODULE,
--- linux-4.15.0.orig/sound/soc/tegra/tegra_max98090.c
+++ linux-4.15.0/sound/soc/tegra/tegra_max98090.c
@@ -188,6 +188,7 @@
static struct snd_soc_card snd_soc_tegra_max98090 = {
    .name = "tegra-max98090",
    .driver_name = "tegra",
    .owner = THIS_MODULE,
--- linux-4.15.0.orig/sound/soc/tegra/tegra_rt5640.c
+++ linux-4.15.0/sound/soc/tegra/tegra_rt5640.c
@@ -138,6 +138,7 @@
static struct snd_soc_card snd_soc_tegra_rt5640 = {
    .name = "tegra-rt5640",
    .driver_name = "tegra",
    .owner = THIS_MODULE,
--- linux-4.15.0.orig/sound/soc/tegra/tegra_rt5677.c
+++ linux-4.15.0/sound/soc/tegra/tegra_rt5677.c
@@ -181,6 +181,7 @@
static struct snd_soc_card snd_soc_tegra_rt5677 = {

static struct snd_soc_card snd_soc_tegra_sgtl5000 = {
    .name = "tegra-sgtl5000",
    .driver_name = "tegra",
    .owner = THIS_MODULE,
    .dai_link = &tegra_sgtl5000_dai,
    .num_links = 1,
};

ret = tegra_asoc_utils_init(&machine->util_data, &pdev->dev);
if (ret) {
    goto err_put_cpu_of_node;
}

ret = snd_soc_register_card(card);
if (ret) {
    @ @ -169,13 +170,14 @@
    dev_err(&pdev->dev,
        "Property 'nvidia,i2s-controller' missing/invalid"");
    ret = -EINVAL;
    goto err;
    +goto err_put_codec_of_node;
}

tegra_sgtl5000_dai.platform_of_node = tegra_sgtl5000_dai.cpu_of_node;

err_fini_utils:
    tegra_asoc_utils_fini(&machine->util_data);
    +err_put_cpu_of_node:
    +of_node_put(tegra_sgtl5000_dai.cpu_of_node);
    +tegra_sgtl5000_dai.cpu_of_node = NULL;
    +tegra_sgtl5000_dai.platform_of_node = NULL;
    +err_put_codec_of_node:
    +of_node_put(tegra_sgtl5000_dai.codec_of_node);
    +tegra_sgtl5000_dai.codec_of_node = NULL;
}

err:
    return ret;
}
tegra_asoc_utils_fini(&machine->util_data);

+of_node_put(tegra_sgtl5000_dai.cpu_of_node);
+tegra_sgtl5000_dai.cpu_of_node = NULL;
+tegra_sgtl5000_dai.platform_of_node = NULL;
+of_node_put(tegra_sgtl5000_dai.codec_of_node);
+tegra_sgtl5000_dai.codec_of_node = NULL;
+
return ret;
}

--- linux-4.15.0.orig/sound/soc/tegra/tegra_wm8753.c
+++ linux-4.15.0/sound/soc/tegra/tegra_wm8753.c
@@ -110,6 +110,7 @@
static struct snd_soc_card snd_soc_tegra_wm8753 = {
         .name = "tegra-wm8753",
         .driver_name = "tegra",
         .owner = THIS_MODULE,
--- linux-4.15.0.orig/sound/soc/tegra/tegra_wm8903.c
+++ linux-4.15.0/sound/soc/tegra/tegra_wm8903.c
@@ -173,6 +173,7 @@
         struct snd_soc_codec *codec = codec_dai->codec;
         struct snd_soc_card *card = rtd->card;
         struct tegra_wm8903 *machine = snd_soc_card_get_drvdata(card);
+         int shrt = 0;

         if (gpio_is_valid(machine->gpio_hp_det)) {
             tegra_wm8903_hp_jack_gpio.gpio = machine->gpio_hp_det;
@@ -185,12 +186,15 @@
         if (of_property_read_bool(card->dev->of_node, "nvidia,headset"))
             +shrt = SND_JACK_MICROPHONE;
+         
+         snd_soc_card_jack_new(rtd->card, "Mic Jack", SND_JACK_MICROPHONE,
+                              &tegra_wm8903_mic_jack,
+                              &tegra_wm8903_mic_jack_pins,
+                              ARRAY_SIZE(tegra_wm8903_mic_jack_pins));
+         wm8903_mic_detect(codec, &tegra_wm8903_mic_jack, SND_JACK_MICROPHONE,
+                           -0);
+         +shrt);
+
+         snd_soc_dapm_force_enable_pin(&card->dapm, "MICBIAS");


static struct snd_soc_card snd_soc_tegra_wm8903 = {
    .name = "tegra-wm8903",
    .driver_name = "tegra",
    .owner = THIS_MODULE,
    .dai_link = &tegra_wm8903_dai,
    .num_links = 1,
};

static struct snd_soc_card snd_soc_tegra_wm9712 = {
    .name = "tegra-wm9712",
    .driver_name = "tegra",
    .owner = THIS_MODULE,
    .dai_link = &tegra_wm9712_dai,
    .num_links = 1,
};

static struct snd_soc_card snd_soc_trimslice = {
    .name = "tegra-trimslice",
    .driver_name = "tegra",
    .owner = THIS_MODULE,
    .dai_link = &trimslice_tlv320aic23_dai,
    .num_links = 1,
};

module_platform_driver(snd_soc_mop500_driver);
+
+MODULE_LICENSE("GPL v2");
+MODULE_DESCRIPTION("ASoC MOP500 board driver");
+MODULE_AUTHOR("Ola Lilja");
--- linux-4.15.0.orig/sound/soc/ux500/ux500_pcm.c
+++ linux-4.15.0/sound/soc/ux500/ux500_pcm.c
@@ -165,3 +165,8 @@
 return 0;
 }
 EXPORT_SYMBOL_GPL(ux500_pcm_unregister_platform);
+
+MODULE_AUTHOR("Ola Lilja");
+MODULE_AUTHOR("Roger Nilsson");
+MODULE_DESCRIPTION("ASoC UX500 driver");
+MODULE_LICENSE("GPL v2");
--- linux-4.15.0.orig/sound/soc/zte/zx-tdm.c
+++ linux-4.15.0/sound/soc/zte/zx-tdm.c
@@ -144,8 +144,8 @@
#define ZX_TDM_RATES	(SNDRV_PCM_RATE_8000 | SNDRV_PCM_RATE_16000)
#define ZX_TDM_FMTBIT \
-(SNDRV_PCM_FMTBIT_S16_LE | SNDRV_PCM_FORMAT_MU_LAW | \
-SNDRV_PCM_FORMAT_A_LAW)
+(SNDRV_PCM_FMTBIT_S16_LE | SNDRV_PCM_FMTBIT_MU_LAW | \
+SNDRV_PCM_FMTBIT_A_LAW)

static int zx_tdm_dai_probe(struct snd_soc_dai *dai)
{
--- linux-4.15.0.orig/sound/sound_core.c
+++ linux-4.15.0/sound/sound_core.c
@@ -287,7 +287,8 @@
 goto retry;
 }
 spin_unlock(&sound_loader_lock);
-r = -EBUSY;
+  r = -EBUSY;
+goto fail;
 }
 }

--- linux-4.15.0.orig/sound/sparc/cs4231.c
+++ linux-4.15.0/sound/sparc/cs4231.c
@@ -1146,10 +1146,8 @@
 runtime->hw = snd_cs4231_playback;
 
 err = snd_cs4231_open(chip, CS4231_MODE_PLAY);
-r = -EBUSY;
+  if (err < 0)
+    snd_free_pages(runtime->dma_area, runtime->dma_bytes);
+  else
   return err;
+}
 chip->playback_substream = substream;
 chip->p_periods_sent = 0;
 snd_pcm_set_sync(substream);
@@ -1167,10 +1165,8 @@
 runtime->hw = snd_cs4231_capture;
 
 err = snd_cs4231_open(chip, CS4231_MODE_RECORD);
-r = -EBUSY;
+  if (err < 0)
+    snd_free_pages(runtime->dma_area, runtime->dma_bytes);
+  else
   return err;
+}
chip->capture_substream = substream;
chip->c_periods_sent = 0;
snd_pcm_set_sync(substream);
@ @ -22.9 +22.9 @@
#include <sound/core.h>
#include <sound/hwdep.h>
#include <linux/uaccess.h>
+ #include <linux/nospec.h>
#include "emux_voice.h"

#define TMP_CLIENT_ID 0x1001

/*
 @ @ -66.13 +66.16 @@
 return -EFAULT;
 if (info.mode < 0 || info.mode >= EMUX_MD_END)
 return -EINVAL;
+info.mode = array_index_nospec(info.mode, EMUX_MD_END);

if (info.port < 0) {
 for (i = 0; i < emu->num_ports; i++)
 emu->portptrs[i]->ctrls[info.mode] = info.value;
 } else {
- if (info.port < emu->num_ports)
+ if (info.port < emu->num_ports) {
+ info.port = array_index_nospec(info.port, emu->num_ports);
 emu->portptrs[info.port]->ctrls[info.mode] = info.value;
 + }
 }
 return 0;
}
--- linux-4.15.0.orig/sound/usb/card.c
+++ linux-4.15.0/sound/usb/card.c
@@ -183,9 +183,8 @@
ctrlif, interface);
 return -EINVAL;
 }
-usb_driver_claim_interface(&usb_audio_driver, iface, (void *)-1L);
-
-return 0;
+return usb_driver_claim_interface(&usb_audio_driver, iface,
+ USB_AUDIO_IFACE_UNUSED);
}
if ((altsd->bInterfaceClass != USB_CLASS_AUDIO &&
@@ -205,7 +204,8 @@
if (! snd_usb_parse_audio_interface(chip, interface)) {
    usb_set_interface(dev, interface, 0); /* reset the current interface */
    -usb_driver_claim_interface(&usb_audio_driver, iface, (void *)-1L);
    +return usb_driver_claim_interface(&usb_audio_driver, iface,
    + USB_AUDIO_IFACE_UNUSED);
}

return 0;
@@ -346,6 +346,90 @@
return snd_usb_audio_free(chip);
}

+static void usb_audio_make_shortname(struct usb_device *dev,
+    struct snd_usb_audio *chip,
+    const struct snd_usb_audio_quirk *quirk)
+{
+    struct snd_card *card = chip->card;
+    
+    if (quirk && quirk->product_name && *quirk->product_name) {
+        strlcpy(card->shortname, quirk->product_name,
+            sizeof(card->shortname));
+        return;
+    }
+    
+    /* retrieve the device string as shortname */
+    if (!dev->descriptor.iProduct ||
+        usb_string(dev, dev->descriptor.iProduct,
+            card->shortname, sizeof(card->shortname)) <= 0) {
+        /* no name available from anywhere, so use ID */
+        sprintf(card->shortname, "USB Device %#04x:%#04x",
+            USB_ID_VENDOR(chip->usb_id),
+            USB_ID_PRODUCT(chip->usb_id));
+    }
+    
+    strim(card->shortname);
+}
+
+static void usb_audio_make_longname(struct usb_device *dev,
+    struct snd_usb_audio *chip,
+    const struct snd_usb_audio_quirk *quirk)
+{
+    struct snd_card *card = chip->card;
+    int len;
+    
+    /* shortcut - if any pre-defined string is given, use it */
+if (quirk && quirk->profile_name && *quirk->profile_name) {
+strlcpy(card->longname, quirk->profile_name, sizeof(card->longname));
+return;
+}
+
+if (quirk && quirk->vendor_name && *quirk->vendor_name) {
+len = strlcpy(card->longname, quirk->vendor_name, sizeof(card->longname));
+} else {
+"/* retrieve the vendor and device strings as longname */
+if (dev->descriptor.iManufacturer)
+len = usb_string(dev, dev->descriptor.iManufacturer, card->longname, sizeof(card->longname));
+else
+len = 0;
+"/* we don't really care if there isn't any vendor string */
+}
+if (len > 0) {
+strtrim(card->longname);
+if (*card->longname)
+strlcat(card->longname, ",", sizeof(card->longname));
+}
+
+strlcat(card->longname, card->shortname, sizeof(card->longname));
+
+len = strlcat(card->longname, " at ", sizeof(card->longname));
+
+if (len < sizeof(card->longname))
+usb_make_path(dev, card->longname + len, sizeof(card->longname) - len);
+
+switch (snd_usb_get_speed(dev)) {
+case USB_SPEED_LOW:
+strlcat(card->longname, ", low speed", sizeof(card->longname));
+break;
+case USB_SPEED_FULL:
+strlcat(card->longname, ", full speed", sizeof(card->longname));
+break;
+case USB_SPEED_HIGH:
+strlcat(card->longname, ", high speed", sizeof(card->longname));
+break;
+case USB_SPEED_SUPER:
+strlcat(card->longname, ", super speed", sizeof(card->longname));
+break;
+case USB_SPEED_SUPER_PLUS:
+strlcat(card->longname, ", super speed plus", sizeof(card->longname));
+break;
+default:
+break;
* create a chip instance and set its names.
*/
@@ -357,7 +441,7 @@
{
    struct snd_card *card;
    struct snd_usb_audio *chip;
-int err, len;
+int err;
char component[14];
static struct snd_device_ops ops = {
    .dev_free = snd_usb_audio_dev_free,
@@ -419,64 +503,8 @@
USB_ID_VENDOR(chip->usb_id), USB_ID_PRODUCT(chip->usb_id));
snd_component_add(card, component);
-/* retrieve the device string as shortname */
-if (quirk && &quirk->product_name && *quirk->product_name) {
-    strlcpy(card->shortname, quirk->product_name, sizeof(card->shortname));
-} else {
-    if (!dev->descriptor.iProduct ||
-        usb_string(dev, dev->descriptor.iProduct,
-        card->shortname, sizeof(card->shortname)) <= 0) {
-        /* no name available from anywhere, so use ID */
-        snprintf(card->shortname, "USB Device %#04x:%#04x", 
-            USB_ID_VENDOR(chip->usb_id),
-            USB_ID_PRODUCT(chip->usb_id));
-    }
-}
-}
-}
-strim(card->shortname);
-
-/* retrieve the vendor and device strings as longname */
-if (quirk && &quirk->vendor_name && *quirk->vendor_name) {
-    len = strlcpy(card->longname, quirk->vendor_name, sizeof(card->longname));
-} else {
-    if (dev->descriptor.iManufacturer)
-        len = usb_string(dev, dev->descriptor.iManufacturer,
-            card->longname, sizeof(card->longname));
-    else
-        len = 0;
-/* we don't really care if there isn't any vendor string */
-}
-}
-strim(card->longname);
-if (*card->longname)
strlcat(card->longname, " ", sizeof(card->longname));
-
- strlcat(card->longname, card->shortname, sizeof(card->longname));
-
- len = strlcat(card->longname, " at ", sizeof(card->longname));
-
- if (len < sizeof(card->longname))
- usb_make_path(dev, card->longname + len, sizeof(card->longname) - len);
-
- switch (snd_usb_get_speed(dev)) {
- case USB_SPEED_LOW:
- strlcat(card->longname, ", low speed", sizeof(card->longname));
- break;
- case USB_SPEED_FULL:
- strlcat(card->longname, ", full speed", sizeof(card->longname));
- break;
- case USB_SPEED_HIGH:
- strlcat(card->longname, ", high speed", sizeof(card->longname));
- break;
- case USB_SPEED_SUPER:
- strlcat(card->longname, ", super speed", sizeof(card->longname));
- break;
- case USB_SPEED_SUPER_PLUS:
- strlcat(card->longname, ", super speed plus", sizeof(card->longname));
- break;
- default:
- break;
- }
+ usb_audio_make_shortname(dev, chip, quirk);
+ usb_audio_make_longname(dev, chip, quirk);

snd_usb_audio_create_proc(chip);

@@ -630,10 +658,14 @@
goto __error;
 }

-/* we are allowed to call snd_card_register() many times */
-err = snd_card_register(chip->card);
- if (err < 0)
- goto __error;
+/* we are allowed to call snd_card_register() many times, but first
+ * check to see if a device needs to skip it or do anything special
+ */
+ if (!snd_usb_registration_quirk(chip, ifnum)) {
+ err = snd_card_register(chip->card);
+ if (err < 0)
usb_chip[chip->index] = chip;
chip->num_interfaces++;
@@ -644,9 +676,12 @@
__error:
if (chip) {
+/* chip->active is inside the chip->card object,
+ * decrement before memory is possibly returned.
+ */
+atomic_dec(&chip->active);
if (!chip->num_interfaces)
snd_card_free(chip->card);
-atomic_dec(&chip->active);
}  
mutex_unlock(&register_mutex);
return err;
@@ -662,7 +697,7 @@
struct snd_card *card;
struct list_head *p;

-if (chip == (void *)-1L)
+if (chip == USB_AUDIO_IFACE_UNUSED)
return;

card = chip->card;
@@ -762,12 +797,9 @@
struct usb_mixer_interface *mixer;
struct list_head *p;

-if (chip == (void *)-1L)
+if (chip == USB_AUDIO_IFACE_UNUSED)
return 0;

-chip->autosuspended = !!PMSG_IS_AUTO(message);
-if (!chip->autosuspended)
  -snd_power_change_state(chip->card, SNDRV_CTL_POWER_D3hot);
if (!chip->num_suspended_intf++) {
    list_for_each_entry(as, &chip->pcm_list, list) {
        snd_pcm_suspend_all(as->pcm);
@@ -780,6 +812,11 @@
    snd_usb_mixer_suspend(mixer);
  }
+if (!PMSG_IS_AUTO(message) && !chip->system_suspend) {
+  snd_power_change_state(chip->card, SNDRV_CTL_POWER_D3hot);
+}
+chip->system_suspend = chip->num_suspended_intf;
+
+ return 0;
+
 @} -790,12 +827,13 @} 

 struct list_head *p;
 int err = 0;

- if (chip == (void *)-1L)
- return 0;
- if (--chip->num_suspended_intf)
+ if (chip == USB_AUDIO_IFACE_UNUSED)
- return 0;
+ if (chip->num_suspended_intf > 1)
+ goto out;
+
+ /*
+ * ALSA leaves material resumption to user space
+ * we just notify and restart the mixers
+ */
- if (!chip->autosuspended)
- out:
+ out:
+ if (chip->num_suspended_intf == chip->system_suspend) {
+ snd_power_change_state(chip->card, SNDRV_CTL_POWER_D0);
+ -chip->autosuspended = 0;
+ +chip->system_suspend = 0;
+ } +chip->num_suspended_intf--;

 atomic_inc(&chip->active); /* avoid autopm */
+ if (chip->num_suspended_intf > 1)
+ goto out;
+
+ /*
+ * ALSA leaves material resumption to user space
+ * we just notify and restart the mixers
+ */
- if (!chip->autosuspended)
- out:
+ out:
+ if (chip->num_suspended_intf == chip->system_suspend) {
 snd_power_change_state(chip->card, SNDRV_CTL_POWER_D0);
 -chip->autosuspended = 0;
 +chip->system_suspend = 0;
+ } +chip->num_suspended_intf--;

 err_out:
 atomic_dec(&chip->active); /* allow autopm after this point */
 --- linux-4.15.0.orig/sound/usb/card.h
+++ linux-4.15.0/sound/usb/card.h
@@ -126,6 +126,7 @@
 unsigned int tx_length_quirk:1;/* add length specifier to transfers */
 unsigned int fmt_type;/* USB audio format type (1-3) */
 unsigned int pkt_offset_adj;/* Bytes to drop from beginning of packets (for non-compliant devices) */
+unsigned int stream_offset_adj;/* Bytes to drop from beginning of stream (for non-compliant devices) */

 unsigned int running:1;/* running status */
struct snd_usb_endpoint *sync_endpoint;
unsigned long flags;
bool need_setup_ep; /* (re)configure EP at prepare? */
+bool need_setup_fmt; /* (re)configure fmt after resume? */
unsigned int speed; /* USB_SPEED_XXX */

u64 formats; /* format bitmasks (all or'ed) */
--- linux-4.15.0.orig/sound/usb/clock.c
+++ linux-4.15.0/sound/usb/clock.c
@@ -147,12 +147,12 @@
   snd_usb_find_clock_source(chip->ctrl_intf, source_id);

   if (!cs_desc)
     -return 0;
     +return false;

   /* If a clock source can't tell us whether it's valid, we assume it is */
   if (!uac2_control_is_readable(cs_desc->bmControls,
       UAC2_CS_CONTROL_CLOCK_VALID - 1))
     -return 1;
     +return true;
   err = snd_usb_ctl_msg(dev, usb_rcvctrlpipe(dev, 0), UAC2_CS_CUR,
    USB_TYPE_CLASS | USB_RECIP_INTERFACE | USB_DIR_IN,
@@ -164,10 +164,10 @@
   dev_warn(&dev->dev,
      "%s(): cannot get clock validity for id %d\n",
      __func__, source_id);
     -return 0;
     +return false;
 }

 -return !!data;
 +return data ? true : false;
 }

 static int __uac_clock_find_source(struct snd_usb_audio *chip,
@@ -327,6 +327,12 @@
   crate = data[0] | (data[1] << 8) | (data[2] << 16);
   if (!crate) {
     +dev_info(&dev->dev, "failed to read current rate; disabling the check\n");
     +chip->sample_rate_read_error = 3; /* three strikes, see above */
     +return 0;
     +}
     +

if (crate != rate) {
    dev_warn(&dev->dev, "current rate %d is different from the runtime rate %d\n", crate, rate);
    // runtime->rate = crate;

    --- linux-4.15.0.orig/sound/usb/endpoint.c
    +++ linux-4.15.0/sound/usb/endpoint.c
    @@ -335,16 +335,17 @@
    ep->next_packet_read_pos %= MAX_URBS;

    /* take URB out of FIFO */
    -if (!list_empty(&ep->ready_playback_urbs))
    +if (!list_empty(&ep->ready_playback_urbs)) {
        ctx = list_first_entry(&ep->ready_playback_urbs,
                               struct snd_urb_ctx, ready_list);
        +list_del_init(&ctx->ready_list);
        +}
    }
    spin_unlock_irqrestore(&ep->lock, flags);

    if (ctx == NULL)
        return;

    -list_del_init(&ctx->ready_list);
    urb = ctx->urb;

    /* copy over the length information */
    @@ -403,6 +404,9 @@

    prepare_outbound_urb(ep, ctx);
    +/* can be stopped during prepare callback */
    +if (unlikely(!test_bit(EP_FLAG_RUNNING, &ep->flags)))
    +goto exit_clear;
    } else {
        retire_inbound_urb(ep, ctx);
        /* can be stopped during retire callback */
    --- linux-4.15.0.orig/sound/usb/format.c
    +++ linux-4.15.0/sound/usb/format.c
    @@ -52,6 +52,8 @@
    case UAC_VERSION_1:
        default: {
            struct uac_format_type_i_discrete_descriptor *fmt = _fmt;
            +if (format >= 64)
            +return 0; /* invalid format */
            sample_width = fmt->bBitResolution;
            sample_bytes = fmt->bSubframeSize;
            format = 1 << format;
        @@ -187,9 +189,11 @@
            continue;
/ C-Media CM6501 mislabels its 96 kHz altsetting */
/* Terratec Aureon 7.1 USB C-Media 6206, too */
/+*/ Ozone Z90 USB C-Media, too */
if (rate == 48000 && nr_rates == 1 &&
    (chip->usb_id == USB_ID(0x0d8c, 0x0201) ||
     chip->usb_id == USB_ID(0x0d8c, 0x0102) ||
     chip->usb_id == USB_ID(0x0d8c, 0x0078) ||
     chip->usb_id == USB_ID(0x0ccd, 0x00b1)) &&
    fp->altsetting == 5 &&
    fp->maxpacksize == 392)
rate = 96000;
@@ -221,6 +225,52 @@
}

/*
 * Many Focusrite devices supports a limited set of sampling rates per
 * altsetting. Maximum rate is exposed in the last 4 bytes of Format Type
 * descriptor which has a non-standard bLength = 10.
 */
+static bool focusrite_valid_sample_rate(struct snd_usb_audio *chip,
    struct audioformat *fp,
    unsigned int rate)
+
+{  
+    struct usb_interface *iface;
+    struct usb_host_interface *alts;
+    unsigned char *fmt;
+    unsigned int max_rate;
+    
+    iface = usb_ifnum_to_if(chip->dev, fp->iface);
+    if (!iface)
+        return true;
+    
+    alts = &iface->altsetting[fp->altset_idx];
+    fmt = snd_usb_find_csint_desc(alts->extra, alts->extralen,
+        NULL, UAC_FORMAT_TYPE);
+    if (!fmt)
+        return true;
+    
+    if (fmt[0] == 10) { /* bLength */
+        max_rate = combine_quad(&fmt[6]);
+        
+        /* Validate max rate */
+        if (max_rate != 48000 &&
+            max_rate != 96000 &&
+            max_rate != 192000 &&
+            max_rate != 384000)
+            
+            usb_audio_info(chip,
+                "%u:%d : unexpected max rate: %u\n",
+                
+                }  

for (rate = min; rate <= max; rate += res) {
/* Filter out invalid rates on Focusrite devices */
if (USB_ID_VENDOR(chip->usb_id) == 0x1235 &&
    !focusrite_valid_sample_rate(chip, fp, rate))
goto skip_rate;
if (fp->rate_table)
    fp->rate_table[nr_rates] = rate;
if (!fp->rate_min || rate < fp->rate_min)
    goto skip_rate;
break;
}

for (rate = min; rate <= max; rate += res) {
/* Filter out invalid rates on Focusrite devices */
if (USB_ID_VENDOR(chip->usb_id) == 0x1235 &&
    !focusrite_valid_sample_rate(chip, fp, rate))
goto skip_rate;
if (fp->rate_table)
    fp->rate_table[nr_rates] = rate;
if (!fp->rate_min || rate < fp->rate_min)
    goto skip_rate;
break;
}

+/*
   * Helper function to walk the array of sample rate triplets reported by
   * the device. The problem is that we need to parse whole array first to
   * get to know how many sample rates we have to expect.
   */
@@ -256,6 +306,11 @@
}

for (rate = min; rate <= max; rate += res) {
/* Filter out invalid rates on Focusrite devices */
if (USB_ID_VENDOR(chip->usb_id) == 0x1235 &&
    !focusrite_valid_sample_rate(chip, fp, rate))
goto skip_rate;
if (fp->rate_table)
    fp->rate_table[nr_rates] = rate;
if (!fp->rate_min || rate < fp->rate_min)
    goto skip_rate;
break;
}

+skip_rate:
   /* avoid endless loop */
   if (res == 0)
       break;
--- linux-4.15.0.orig/sound/usb/hiface/pcm.c
+++ linux-4.15.0/sound/usb/hiface/pcm.c
@@ -605,14 +605,13 @@
ret = hiface_pcm_init_urb(&rt->out_urbs[i], chip, OUT_EP,
        hiface_pcm_out_urb_handler);
if (ret < 0)
    -return ret;
+goto error;
}

ret = snd_pcm_new(chip->card, "USB-SPDIF Audio", 0, 1, 0, &pcm);
if (ret < 0) {
    -kfree(rt);
}
dev_err(&chip->dev->dev, "Cannot create pcm instance\n");
+goto error;
}

chip->pcm = rt;
return 0;
+
+error:
+for (i = 0; i < PCM_N_URBS; i++)
+kfree(rt->out_urbs[i].buffer);
+kfree(rt);
+return ret;
}
--- linux-4.15.0.orig/sound/usb/line6/capture.c
+++ linux-4.15.0/sound/usb/line6/capture.c
@@ -291,6 +291,8 @@
urb->interval = LINE6_ISO_INTERVAL;
urb->error_count = 0;
urb->complete = audio_in_callback;
+if (usb_urb_ep_type_check(urb))
+return -EINVAL;
}
return 0;
--- linux-4.15.0.orig/sound/usb/line6/driver.c
+++ linux-4.15.0/sound/usb/line6/driver.c
@@ -320,7 +320,7 @@
line6_midibuf_read(mb, line6->buffer_message, LINE6_MIDI_MESSAGE_MAXLEN);

-if (done == 0)
+if (done <= 0)
 break;

 line6->message_length = done;
@@ -351,12 +351,16 @@
{
 struct usb_device *usbdev = line6->usbdev;
 int ret;
-unsigned char len;
+unsigned char *len;
 unsigned count;

 if (address > 0xffff || datalen > 0xff)
return -EINVAL;
+len = kmalloc(sizeof(*len), GFP_KERNEL);
+if (!len)
+return -ENOMEM;
+
/* query the serial number: */
ret = usb_control_msg(usbdev, usb_sndctrlpipe(usbdev, 0), 0x67,
USB_TYPE_VENDOR | USB_RECIP_DEVICE | USB_DIR_OUT,
@@ -365,7 +369,7 @@
if (ret < 0) {
dev_err(line6->ifcdev, "read request failed (error %d)\n", ret);
-return ret;
+goto exit;
}
/* Wait for data length. We'll get 0xff until length arrives. */
@@ -375,28 +379,29 @@
ret = usb_control_msg(usbdev, usb_rcvctrlpipe(usbdev, 0), 0x67,
USB_TYPE_VENDOR | USB_RECIP_DEVICE |
USB_DIR_IN,
0x0012, 0x0000, &len, 1,
+
0x0012, 0x0000, len, 1,
LINE6_TIMEOUT * HZ);
if (ret < 0) {
dev_err(line6->ifcdev,
"receive length failed (error %d)\n", ret);
-return ret;
+goto exit;
}
-if (len != 0xff)
+if (*len != 0xff)
break;
}
-if (len == 0xff) {
+ret = -EIO;
+if (*len == 0xff) {
dev_err(line6->ifcdev, "read failed after %d retries\n",
count);
-return -EIO;
-} else if (len != datalen) {
+goto exit;
+} else if (*len != datalen) {
/* should be equal or something went wrong */
dev_err(line6->ifcdev,

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"length mismatch (expected %d, got %d)\n",
- (int)datalen, (int)*len);
- return -EINVAL;
+ (int)datalen, (int)*len);
+ goto exit;
}

/* receive the result: */
@@ -405,12 +410,12 @@
 0x0013, 0x0000, data, datalen,
 LINE6_TIMEOUT * HZ);

-if (ret < 0) {
 +if (ret < 0)
  dev_err(line6->ifcdev, "read failed (error %d)\n", ret);
- return ret;
 - }

-exit:
+ kfree(len);
 + return ret;
 }

EXPORT_SYMBOL_GPL(line6_read_data);

@@ -422,12 +427,16 @@
{
 struct usb_device *usbdev = line6->usbdev;
 int ret;
- unsigned char status;
+ unsigned char *status;
+ int count;

 if (address > 0xffff || datalen > 0xffff)
  return -EINVAL;
+ status = kmalloc(sizeof(*status), GFP_KERNEL);
+ if (!status)
+ return -ENOMEM;
+ ret = usb_control_msg(usbdev, usb_sndctrlpipe(usbdev, 0), 0x67,
+ USB_TYPE_VENDOR | USB_RECIP_DEVICE | USB_DIR_OUT,
+ 0x0022, address, data, datalen,
@@ -436,7 +445,7 @@
 if (ret < 0) {
  dev_err(line6->ifcdev,
   "write request failed (error %d)\n", ret);
- return ret;
for (count = 0; count < LINE6_READ_WRITE_MAX_RETRIES; count++) {
    USB_TYPE_VENDOR | USB_RECIP_DEVICE |
    USB_DIR_IN,
    0x0012, 0x0000,
        &status, 1, LINE6_TIMEOUT * HZ);
    status, 1, LINE6_TIMEOUT * HZ);

    if (ret < 0) {
        dev_err(line6->ifcdev,
            "receiving status failed (error %d)\n", ret);
        return ret;
    }

    if (*status != 0xff)
        break;
}

    if (status != 0xff) {
        if (*status != 0xff)
            break;
    }

    if (status == 0xff) {
        if (*status == 0xff)
            dev_err(line6->ifcdev, "write failed after %d retries\n", count);
            return -EIO;
        } else if (status != 0) {
            ret = -EIO;
            +ret = -EIO;
        } else if (*status != 0) {
            dev_err(line6->ifcdev, "write failed (error %d)\n", ret);
            -return -EIO;
            +return ret;
        } else {
            -return 0;
            +exit;
            +kfree(status);
            +return ret;

    EXPORT_SYMBOL_GPL(line6_write_data);

    line6->buffer_message = kmalloc(LINE6_MIDI_MESSAGE_MAXLEN, GFP_KERNEL);
    if (!line6->buffer_message)
        return -ENOMEM;

    @ @ -695,6 +705,10 @ @

ret = line6_init_midi(line6);
if (ret < 0)
  return ret;
else {
  ret = line6_hwdep_init(line6);
  if (ret < 0)
    return 0;
}

static void line6_startup_work(struct work_struct *work)
{
  struct usb_line6 *line6 =
    container_of(work, struct usb_line6, startup_work);
  if (line6->startup)
    line6->startup(line6);
}

/*
Probe USB device.
*/

line6->properties = properties;
line6->usbdev = usbdev;
line6->ifcdev = &interface->dev;

INIT_DELAYED_WORK(&line6->startup_work, line6_startup_work);

strcpy(card->id, properties->id);
strcpy(card->driver, driver_name);

if (WARN_ON(usbdev != line6->usbdev))
  return;

cancel_delayed_work_sync(&line6->startup_work);
if (line6->urb_listen != NULL)
  line6_stop_listen(line6);

--- linux-4.15.0.orig/sound/usb/line6/driver.h
+++ linux-4.15.0/sound/usb/line6/driver.h
@@ -178,11 +178,15 @@
fifo; } messages;

+cancel_delayed_work_sync(&line6->startup_work);
+
+-Work for delayed PCM startup */
+struct delayed_work startup_work;
+

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/* If MIDI is supported, buffer_message contains the pre-processed data;
 * otherwise the data is only in urb_listen (buffer_incoming).
 */

void (*process_message)(struct usb_line6 *);
void (*disconnect)(struct usb_line6 *line6);
+void (*startup)(struct usb_line6 *line6);
};

extern char *line6_alloc_sysex_buffer(struct usb_line6 *line6, int code1,
--- linux-4.15.0.orig/sound/usb/line6/midi.c
+++ linux-4.15.0/sound/usb/line6/midi.c
@@ -125,7 +125,7 @@
    }
    usb_fill_int_urb(urb, line6->usbdev,
-       usb_sndbulkpipe(line6->usbdev,
+       usb_sndintpipe(line6->usbdev,
            line6->properties->ep_ctrl_w),
            transfer_buffer, length, midi_sent, line6,
            line6->interval);
--- linux-4.15.0.orig/sound/usb/line6/midibuf.c
+++ linux-4.15.0/sound/usb/line6/midibuf.c
@@ -163,7 +163,7 @@
    int midi_length_prev =
        midibuf_message_length(this->command_prev);
    
-    if (midi_length_prev > 0) {
+    if (midi_length_prev > 1) {
        midi_length = midi_length_prev - 1;
        repeat = 1;
    } else
--- linux-4.15.0.orig/sound/usb/line6/pcm.c
+++ linux-4.15.0/sound/usb/line6/pcm.c
@@ -552,13 +552,6 @@
    line6pcm->volume_monitor = 255;
    line6pcm->line6 = line6;
-    line6pcm->max_packet_size_in =
-       usb_maxpacket(line6->usbdev,
-       usb_rcvisocpipe(line6->usbdev, ep_read), 0);
-    line6pcm->max.packet_size_out =
-       usb_maxpacket(line6->usbdev,
-       usb_sndisocpipe(line6->usbdev, ep_write), 1);
-    spin_lock_init(&line6pcm->out.lock);
spin_lock_init(&line6pcm->in.lock);
    line6pcm->impulse_period = LINE6_IMPULSE_DEFAULT_PERIOD;
    
---
pcm->private_data = line6pcm;
pcm->private_free = line6_cleanup_pcm;
+
+line6pcm->max_packet_size_in =
+usb_maxpacket(line6->usbdev,
+usb_rcvisocpipe(line6->usbdev, ep_read), 0);
+line6pcm->max_packet_size_out =
+usb_maxpacket(line6->usbdev,
+usb_sndisocpipe(line6->usbdev, ep_write), 1);
+if (!line6pcm->max_packet_size_in || !line6pcm->max_packet_size_out) {
+dev_err(line6pcm->line6->ifcdev,
+"cannot get proper max packet size\n");
+return -EINVAL;
+
+err = line6_create_audio_out_urbs(line6pcm);
+if (err < 0)
+return err;
--- linux-4.15.0.orig/sound/usb/line6/playback.c
+++ linux-4.15.0/sound/usb/line6/playback.c
@@ -436,6 +436,8 @@
urb->interval = LINE6_ISO_INTERVAL;
urb->error_count = 0;
urb->complete = audio_out_callback;
+if (usb_urb_ep_type_check(urb))
+return -EINVAL;
}
return 0;
--- linux-4.15.0.orig/sound/usb/line6/pod.c
+++ linux-4.15.0/sound/usb/line6/pod.c
@@ -420,11 +420,6 @@
if (err < 0)
return err;
 /* initialize MIDI subsystem: */
-err = line6_init_midi(line6);
-if (err < 0)
-return err;
-
/* initialize PCM subsystem: */
err = line6_init_pcm(line6, &pod_pcm_properties);
if (err < 0)
--- linux-4.15.0.orig/sound/usb/line6/podhd.c
+++ linux-4.15.0/sound/usb/line6/podhd.c
@@ -225,28 +225,32 @@
static int podhd_dev_start(struct usb_line6_podhd *pod)
{

-/* initialize MIDI subsystem: */
-err = line6_init_midi(line6);
-if (err < 0)
-return err;
-
/* initialize PCM subsystem: */
err = line6_init_pcm(line6, &pod_pcm_properties);
if (err < 0)
--- linux-4.15.0.orig/sound/usb/line6/podhd.c
+++ linux-4.15.0/sound/usb/line6/podhd.c
@@ -225,28 +225,32 @@
static int podhd_dev_start(struct usb_line6_podhd *pod)
{
int ret;
- u8 init_bytes[8];
+ u8 *init_bytes;
int i;
struct usb_device *usbdev = pod->line6.usbdev;

+ init_bytes = kmalloc(8, GFP_KERNEL);
+ if (!init_bytes)
+ return -ENOMEM;
+
ret = usb_control_msg(usbdev, usb_sndctrlpipe(usbdev, 0),
0x67, USB_TYPE_VENDOR | USB_RECIP_DEVICE | USB_DIR_OUT,
0x11, 0,
NULL, 0, LINE6_TIMEOUT * HZ);
if (ret < 0) {
    dev_err(pod->line6.ifcdev, "read request failed (error %d)\n", ret);
    return ret;
    goto exit;
} /* NOTE: looks like some kind of ping message */
ret = usb_control_msg(usbdev, usb_rcvctrlpipe(usbdev, 0), 0x67,
USB_TYPE_VENDOR | USB_RECIP_DEVICE | USB_DIR_IN,
0x11, 0x0,
-&init_bytes, 3, LINE6_TIMEOUT * HZ);
+ init_bytes, 3, LINE6_TIMEOUT * HZ);
if (ret < 0) {
    dev_err(pod->line6.ifcdev, 
        "receive length failed (error %d)\n", ret);
    -return ret;
    +goto exit;
}

pod->firmware_version =
@@ -255,7 +259,7 @@
for (i = 0; i <= 16; i++) {
ret = line6_read_data(&pod->line6, 0xf000 + 0x08 * i, init_bytes, 8);
if (ret < 0)
    -return ret;
    +goto exit;
}

ret = usb_control_msg(usbdev, usb_sndctrlpipe(usbdev, 0),
@@ -263,10 +267,9 @@
USB_TYPE_STANDARD | USB_RECIP_DEVICE | USB_DIR_OUT,
1, 0,
NULL, 0, LINE6_TIMEOUT * HZ);
- if (ret < 0)
static void podhd_startup_workqueue(struct work_struct *work)
{
    +return ret;
    +exit:
    +kfree(init_bytes);
    +return ret;
}

-struct usb_line6_toneport *toneport = from_timer(toneport, t, timer);
-struct usb_line6 *line6 = &toneport->line6;
-
line6_pcm_acquire(line6->line6pcm, LINE6_STREAM_MONITOR, true);
}
static int toneport_setup(struct usb_line6_toneport *toneport)
{
    struct usb_line6 *line6 = &toneport->line6;
    struct usb_device *usbdev = line6->usbdev;

    /* sync time on device with host: */
    -ticks = (int)get_seconds();
    -line6_write_data(line6, 0x80c6, &ticks, 4);
    +ticks = (int)get_seconds();
    +line6_write_data(line6, 0x80c6, ticks, 4);
    +kfree(ticks);

    /* enable device: */
    toneport_send_cmd(usbdev, 0x0301, 0x0000);

    if (toneport_has_led(toneport))
        toneport_update_led(toneport);

    /* sync time on device with host: */
    -ticks = (int)get_seconds();
    -line6_write_data(line6, 0x80c6, &ticks, 4);
    +ticks = (int)get_seconds();
    +line6_write_data(line6, 0x80c6, ticks, 4);
    +kfree(ticks);

    /* enable device: */
    toneport_send_cmd(usbdev, 0x0301, 0x0000);

    if (toneport_has_led(toneport))
        toneport_update_led(toneport);

    -mod_timer(&toneport->timer, jiffies + TONEPORT_PCM_DELAY * HZ);
    +schedule_delayed_work(&toneport->line6.startup_work,
        +msecs_to_jiffies(TONEPORT_PCM_DELAY * 1000));
    +return 0;
}

/* del_timer_sync(&toneport->timer); */
if (toneport_has_led(toneport))
    toneport_remove_leds(toneport);
}

struct usb_line6_toneport *toneport =  (struct usb_line6_toneport *) line6;

del_timer_sync(&toneport->timer);
-
if (toneport_has_led(toneport))
    toneport_remove_leds(toneport);
}

struct usb_line6_toneport *toneport = (struct usb_line6_toneport *) line6;
toneport->type = id->driver_info;
timer_setup(&toneport->timer, toneport_start_pcm, 0);

line6->disconnect = line6_toneport_disconnect;
+line6->startup = toneport_startup;
/* initialize PCM subsystem: */
err = line6_init_pcm(line6, &toneport_pcm_properties);
@@ -450,7 +449,9 @@
return err;
}

-toneport_setup(toneport);
+err = toneport_setup(toneport);
+if (err)
+return err;

/* register audio system: */
return snd_card_register(line6->card);
@@ -462,7 +463,11 @@
*/
static int toneport_reset_resume(struct usb_interface *interface)
{
-toneport_setup(usb_get_intfdata(interface));
+int err;
+err = toneport_setup(usb_get_intfdata(interface));
+if (err)
+return err;
return line6_resume(interface);
}
#endif
--- linux-4.15.0.orig/sound/usb/line6/variax.c
+++ linux-4.15.0/sound/usb/line6/variax.c
@@ -217,7 +217,6 @@
const struct usb_device_id *id)
{
struct usb_line6_variax *variax = (struct usb_line6_variax *) line6;
-int err;

line6->process_message = line6_variax_process_message;
line6->disconnect = line6_variax_disconnect;
@@ -233,11 +232,6 @@
if (variax->buffer_activate == NULL)
return -ENOMEM;
-t/* initialize MIDI subsystem: */
-err = line6_init_midi(&variax->line6);
-if (err < 0)
-return err;
-
/* initiate startup procedure: */
variax_startup1(variax);
return 0;
--- linux-4.15.0.orig/sound/usb/midi.c
+++ linux-4.15.0/sound/usb/midi.c
@@ -1332,7 +1332,7 @@
 error:
snd_usbmidi_in_endpoint_delete(ep);
-return -ENOMEM;
+return err;
}
/*
 @@ -1499,6 +1499,8 @@
 spin_unlock_irq(&umidi->disc_lock);
 up_write(&umidi->disc_rwsem);
+del_timer_sync(&umidi->error_timer);
 +
 for (i = 0; i < MIDI_MAX_ENDPOINTS; ++i) {
 struct snd_usb_midi_endpoint *ep = &umidi->endpoints[i];
 if (ep->out)
@@ -1525,7 +1527,6 @@
 ep->in = NULL;
 } }
 } -del_timer_sync(&umidi->error_timer);
 }
 EXPORT_SYMBOL(snd_usbmidi_disconnect);
@@ -1826,6 +1827,28 @@
 return 0;
 }

+static struct usb_ms_endpoint_descriptor *find_usb_ms_endpoint_descriptor(
 +struct usb_host_endpoint *hostep)
+{
+unsigned char *extra = hostep->extra;
+int extralen = hostep->extralen;
+while (extralen > 3) {
+struct usb_ms_endpoint_descriptor *ms_ep =
+((struct usb_ms_endpoint_descriptor *)extra);
+if (ms_ep->bLength > 3 &&
+ ms_ep->bDescriptorType == USB_DT_CS_ENDPOINT &&
+ ms_ep->bDescriptorSubtype == UAC_MS_GENERAL)
+return ms_ep;
+if (!extra[0])
break;
extralen -= extra[0];
extra += extra[0];
}
return NULL;
}

/*
* Returns MIDIStreaming device capabilities.
*/
ep = get_ep_desc(hostep);
if (!usb_endpoint_xfer_bulk(ep) && !usb_endpoint_xfer_int(ep))
continue;

-ep = (struct usb_ms_endpoint_descriptor *)hostep->extra;
-if (hostep->extralen < 4 ||
 - ms_ep->bLength < 4 ||
 - ms_ep->bDescriptorType != USB_DT_CS_ENDPOINT ||
 - ms_ep->bDescriptorSubtype != UAC_MS_GENERAL)
+ms_ep = find_usb_ms_endpoint_descriptor(hostep);
+if (!ms_ep)
+continue;
+if (ms_ep->bLength <= sizeof(*ms_ep))
+continue;
+if (ms_ep->bNumEmbMIDIJack > 0x10)
+continue;
+if (ms_ep->bLength < sizeof(*ms_ep) + ms_ep->bNumEmbMIDIJack)
+continue;
-if (usb_endpoint_dir_out(ep)) {
-if (endpoints[epidx].out_ep) {
@@ -2121,6 +2147,8 @@
cs_desc[1] == USB_DT_CS_INTERFACE &&
cs_desc[2] == 0xf1 &&
cs_desc[3] == 0x02) {
+if (cs_desc[4] > 0x10 || cs_desc[5] > 0x10)
+continue;
endpoint->in_cables = (1 << cs_desc[4]) - 1;
endpoint->out_cables = (1 << cs_desc[5]) - 1;
return snd_usbmididev_endpoints(umidi, endpoint, 1);
@@ -2282,16 +2310,22 @@
}
EXPORT_SYMBOL(snd_usbmididev_endpoints);

-static void snd_usbmididev_input_start_ep(struct snd_usb_mididev_in_endpoint *ep)
+static void snd_usbmididev_input_start_ep(struct snd_usb_mididev *umidi,
+ struct snd_usb_mididev_in_endpoint *ep)
{ unbibed
unsigned long flags;

if (!ep)
    return;

for (i = 0; i < INPUT_URBS; ++i) {
    struct urb *urb = ep->urbs[i];
    urb->dev = ep->umidi->dev;
    snd_usbmidi_submit_urb(urb, GFP_KERNEL);
    spin_lock_irqsave(&umidi->disc_lock, flags);
    if (!atomic_read(&urb->use_count)) {
        urb->dev = ep->umidi->dev;
        snd_usbmidi_submit_urb(urb, GFP_ATOMIC);
    }
    spin_unlock_irqrestore(&umidi->disc_lock, flags);
}

if (umidi->input_running || !umidi->opened[1])
    return;
for (i = 0; i < MIDI_MAX_ENDPOINTS; ++i)
    snd_usbmidi_input_start_ep(umidi->endpoints[i].in);
umidi->input_running = 1;
}
EXPORT_SYMBOL(snd_usbmidi_input_start);

unsigned char *buffer;
unsigned int buflen;
DECLARE_BITMAP(unitbitmap, MAX_ID_ELEMS);
DECLARE_BITMAP(termbitmap, MAX_ID_ELEMS);
struct usb_audio_term oterm;
const struct usbmix_name_map *map;
const struct usbmix_selector_map *selector_map;

int validx, int *value_ret)
{
    struct snd_usb_audio *chip = cval->head.mixer->chip;
    unsigned char buf[4 + 3 * sizeof(__u32)]; /* enough space for one range */
    /* enough space for one range */
    unsigned char buf[sizeof(__u16) + 3 * sizeof(__u32)];
    unsigned char *val;
    int idx = 0, ret, size;
    /* ret, val_size, size; */
    __u8 bRequest;
+val_size = uac2_ctl_value_size(cval->val_type);
+if (request == UAC_GET_CUR) {
    bRequest = UAC2_CS_CUR;
    +size = uac2_ctl_value_size(cval->val_type);
    +size = val_size;
} else {
    bRequest = UAC2_CS_RANGE;
    -size = sizeof(buf);
    +size = sizeof(__u16) + 3 * val_size;
}

memset(buf, 0, sizeof(buf));
@@ -390,16 +394,17 @@
 val = buf + sizeof(__u16);
 break;
 case UAC_GET_MAX:
-    val = buf + sizeof(__u16) * 2;
+    val = buf + sizeof(__u16) + val_size;
 break;
 case UAC_GET_RES:
-    val = buf + sizeof(__u16) * 3;
+    val = buf + sizeof(__u16) + val_size * 2;
 break;
 default:
 return -EINVAL;
}

-*value_ret = convert_signed_value(cval, snd_usb_combine_bytes(val, sizeof(__u16)));
+*value_ret = convert_signed_value(cval,
+    snd_usb_combine_bytes(val, val_size));

return 0;
}
@@ -586,8 +591,9 @@
 * if failed, give up and free the control instance.
 */

-int snd_usb_mixer_add_control(struct usb.mixer_elem_list *list,
-    struct snd_kcontrol *kctl)
+int snd_usb_mixer_add_list(struct usb.mixer_elem_list *list,
+    struct snd_kcontrol *kctl,
+    bool is_std_info)
{
    struct usb.mixer_interface *mixer = list->mixer;
    int err;
@@ -600,6 +606,7 @@
 return err;

static int check_input_term(struct mixer_build *state, int id, struct usb_audio_term *term)
{
    int err;
    void *p1;
    unsigned char *hdr;

    memset(term, 0, sizeof(*term));
    while ((p1 = find_audio_control_unit(state, id)) != NULL) {
        unsigned char *hdr = p1;
        for (;;) {
            /* a loop in the terminal chain? */
            if (test_and_set_bit(id, state->termbitmap))
                return -EINVAL;

            p1 = find_audio_control_unit(state, id);
            if (!p1)
                break;
            hdr = p1;
            term->id = id;
            switch (hdr[2]) {
            case UAC_INPUT_TERMINAL:
                err = check_input_term(state, d->bCSourceID, term);
                if (err < 0)
                    return err;

            case UAC2_CLOCK_SELECTOR:
                struct uac_selector_unit_descriptor *d = p1;
                /* call recursively to retrieve the channel info */
                err = check_input_term(state, d->baSourceID[0], term);
                if (err < 0)
                    return err;
            }
        }
    }
    return 0;
}
err = __check_input_term(state, d->baSourceID[0], term);
if (err < 0)
    return err;
term->type = d->bDescriptorSubtype << 16; /* virtual type */
@@ -814,6 +830,15 @@
return -ENODEV;
}
+
+static int check_input_term(struct mixer_build *state, int id,
+    struct usb_audio_term *term)
+{
+    memset(term, 0, sizeof(*term));
+    memset(state->termbitmap, 0, sizeof(state->termbitmap));
+    return __check_input_term(state, id, term);
+}
+
/*
 * Feature Unit
*/
@@ -907,6 +932,14 @@
break;
+
+case USB_ID(0x0d8c, 0x0103):
  +if (!strcmp(kctl->id.name, "PCM Playback Volume")) {
  +    usb_audio_info(chip,
  +        "set volume quirk for CM102-A+/102S+\n");
+    cval->min = -256;
+    }
+    break;
+  
+case USB_ID(0x0471, 0x0101):
    case USB_ID(0x0471, 0x0104):
    case USB_ID(0x0471, 0x0105):
        @@ -955,6 +988,14 @@
cval->res = 384;
    }
    break;
+case USB_ID(0x0495, 0x3042): /* ESS Technology Asus USB DAC */
  +if ((strstr(kctl->id.name, "Playback Volume") != NULL) ||
  +    strstr(kctl->id.name, "Capture Volume") != NULL) {
    +cval->min >>= 8;
    +cval->max = 0;
    +cval->res = 1;
    +}
    +break;
}
if (cval->min + cval->res < cval->max) {
    int last_valid_res = cval->res;
    int saved, test, check;
    get_cur_mix_raw(cval, minchn, &saved);
    if (get_cur_mix_raw(cval, minchn, &saved) < 0)
        goto no_res_check;
    for (;;) {
        test = saved;
        if (test < cval->max)
            snd_usb_set_cur_mix_value(cval, minchn, 0, saved);
    }
}

no_res_check:
cval->initialized = 1;
}

int pin, ich, err;

if (desc->bLength < 11 || (input_pins = desc->bNrInPins) ||
    desc->bLength < sizeof(*desc) + desc->bNrInPins ||
    (num_outs = uac_mixer_unit_bNrChannels(desc)) {
    usb_audio_err(state->chip, "invalid MIXER UNIT descriptor %d\n",
        @ @ -1876,7 +1920,7 @@
    char *name)
    }
struct uac_processing_unit_descriptor *desc = raw_desc;
-int num_ins = desc->bNrInPins;
+int num_ins;
struct usb_mixer_elem_info *cval;
struct snd_kcontrol *kctl;
int i, err, nameid, type, len;
@@ -1891,7 +1935,13 @@
0, NULL, default_value_info
};

-if (desc->bLength < 13 || desc->bLength < 13 + num_ins ||
+if (desc->bLength < 13) {
    usb_audio_err(state->chip, "invalid %s descriptor (id %d)\n", name, unitid);
+return -EINVAL;
+}
+
+num_ins = desc->bNrInPins;
+if (desc->bLength < 13 + num_ins ||
    desc->bLength < num_ins + uac_processing_unit_bControlSize(desc, state->mixer->protocol)) {
    usb_audio_err(state->chip, "invalid %s descriptor (id %d)\n", name, unitid);
    return -EINVAL;
}
@@ -2166,6 +2216,8 @@
kctl = snd_ctl_new1(&mixer_selectunit_ctl, cval);
    if (! kctl) {
        usb_audio_err(state->chip, "cannot malloc kcontrol\n");
        +for (i = 0; i < desc->bNbrInPins; i++)
+            kfree(namelist[i]);
        kfree(namelist);
        kfree(cval);
        return -ENOMEM;
@@ -2300,7 +2352,7 @@
    if (map->id == state.chip->usb_id) {
        state.map = map->map;
        state.selector_map = map->selector_map;
-        mixer->ignore_ctl_error = map->ignore_ctl_error;
+        mixer->ignore_ctl_error |= map->ignore_ctl_error;
        break;
    }
}
@@ -2353,9 +2405,12 @@
{
    struct usb_mixer_elem_list *list;
    -for (list = mixer->id_elems[unitid]; list; list = list->next_id_elem) {
-        struct usb_mixer_elem_info *info =
-            (struct usb_mixer_elem_info *)list;
+        for_each_mixer_elem(list, mixer, unitid) {
+            struct usb_mixer_elem_info *info;
+            +if (!list->is_std_info)
+                continue;
+            +info = mixer_elem_list_to_info(list);
+            /* invalidate cache, so the value is read from the device */
+            info->cached = 0;
+        snd_ctl_notify(mixer->chip->card, SNDV_CTL_EVENT_MASK_VALUE,
+            +static void snd_usb_mixer_dump_cval(struct snd_info_buffer *buffer,
+                struct usb_mixer_elem_list *list){
+    -struct usb_mixer_elem_info *cval = (struct usb_mixer_elem_info *)list;
+        -static char *val_types[] = {"BOOLEAN", "INV_BOOLEAN",
+            "S8", "U8", "S16", "U16"};
+        +static char *val_types[] = {
for (unitid = 0; unitid < MAX_ID_ELEMS; unitid++) {
  for (list = mixer->id_elements[unitid]; list; list = list->next_id_elem) {
    for_each_mixer_elem(list, mixer, unitid) {
      snd_iprintf(buffer, "Card: %s\n", chip->card->longname);
      for (int i = 0; i < count; i++) {
        if (count > 1 && info->control != control)
          continue;
      }
      struct usb_mixer_elem_info *info = mixer_elem_list_to_info(list);
      if (!info || !info->is_std_info)
        continue;
      if (count > 1 && info->control != control)
        continue;
      info = (struct usb_mixer_elem_info *)list;
      info = mixer_elem_list_to_info(list);
      if (count > 1 && info->control != control)
        continue;
      if (err = snd_usb_mixer_status_create(mixer)) < 0)
        goto _error;
      ++count;
      if (count == 0)
        return;
      for (list = mixer->id_elements[unitid]; list; list = list->next_id_elem) {
        for_each_mixer_elem(list, mixer, unitid) {
          struct usb_mixer_elem_info *info = mixer_elem_list_to_info(list);
          if (!info || !info->is_std_info)
            continue;
          if (count > 1 && info->control != control)
            continue;
          if (err = snd_usb_mixer_status_create(mixer)) < 0)
            goto _error;
          ++count;
          if (count == 0)
            return;
          for (list = mixer->id_elements[unitid]; list; list = list->next_id_elem) {
            for_each_mixer_elem(list, mixer, unitid) {
              struct usb_mixer_elem_info *info = mixer_elem_list_to_info(list);
              if (!info || !info->is_std_info)
                continue;
              if (count > 1 && info->control != control)
                continue;
              if (err = snd_usb_mixer_status_create(mixer)) < 0)
                goto _error;
              ++count;
              if (count == 0)
                return;
              for (list = mixer->id_elements[unitid]; list; list = list->next_id_elem) {
                for_each_mixer_elem(list, mixer, unitid) {
                  struct usb_mixer_elem_info *info = mixer_elem_list_to_info(list);
                  if (!info || !info->is_std_info)
                    continue;
                  if (count > 1 && info->control != control)
                    continue;
                  if (err = snd_usb_mixer_status_create(mixer)) < 0)
                    goto _error;
                  ++count;
                  if (count == 0)
                    return;
                  for (list = mixer->id_elements[unitid]; list; list = list->next_id_elem) {
                    for_each_mixer_elem(list, mixer, unitid) {
                      struct usb_mixer_elem_info *info = mixer_elem_list_to_info(list);
                      if (!info || !info->is_std_info)
                        continue;
                      if (count > 1 && info->control != control)
                        continue;
                      if (err = snd_usb_mixer_status_create(mixer)) < 0)
                        goto _error;
                      ++count;
                      if (count == 0)
                        return;
                      for (list = mixer->id_elements[unitid]; list; list = list->next_id_elem) {
                        for_each_mixer_elem(list, mixer, unitid) {
                          struct usb_mixer_elem_info *info = mixer_elem_list_to_info(list);
                          if (!info || !info->is_std_info)
                            continue;
                          if (count > 1 && info->control != control)
                            continue;
                          if (err = snd_usb_mixer_status_create(mixer)) < 0)
                            goto _error;
                          ++count;
                          if (count == 0)
                            return;
                          for (list = mixer->id_elements[unitid]; list; list = list->next_id_elem) {
                            for_each_mixer_elem(list, mixer, unitid) {
                              struct usb_mixer_elem_info *info = mixer_elem_list_to_info(list);
                              if (!info || !info->is_std_info)
                                continue;
                              if (count > 1 && info->control != control)
                                continue;
                              if (err = snd_usb_mixer_status_create(mixer)) < 0)
                                goto _error;
                              ++count;
                              if (count == 0)
                                return;
                            }
                          }
                      }
                    }
                  }
                }
              }
            }
          }
        }
      }
    }
  }
}
```
err = snd_device_new(chip->card, SNDRV_DEV_CODEC, mixer, &dev_ops);
if (err < 0)
@@ -2653,7 +2712,7 @@
static int restore_mixer_value(struct usb_mixer_elem_list *list)
{
-struct usb_mixer_elem_info *cval = (struct usb_mixer_elem_info *)list;
+struct usb_mixer_elem_info *cval = mixer_elem_list_to_info(list);
  int c, err, idx;

  if (cval->cmask) {
@@ -2689,8 +2748,7 @@
if (reset_resume) {
    /* restore cached mixer values */
    for (id = 0; id < MAX_ID_ELEMS; id++) {
-        for (list = mixer->id_elems[id]; list;
+        for_each_mixer_elem(list, mixer, id) {
            if (list->resume) {
                err = list->resume(list);
                if (err < 0)
--- linux-4.15.0.orig/sound/usb/mixer.h
+++ linux-4.15.0/sound/usb/mixer.h
@@ -49,10 +49,17 @@
  struct usb_mixer_elem_list *next_id_elem; /* list of controls with same id */
  struct snd_kcontrol *kctl;
  unsigned int id;
  +bool is_std_info;
  +usb_mixer_elem_dump_func_t dump;
  +usb_mixer_elem_resume_func_t resume;
  
};

+/* iterate over mixer element list of the given unit id */
+#define for_each_mixer_elem(list, mixer, id)\
+for ((list) = (mixer)->id_elems[id]; (list); (list) = (list)->next_id_elem)
+  #define mixer_elem_list_to_info(list)\
+    container_of(list, struct usb_mixer_elem_info, head)
+  +
  struct usb_mixer_elem_info {
    struct usb_mixer_elem_list head;
    unsigned int control;/* CS or ICN (high byte) */
@@ -80,8 +87,12 @@
    int snd_usb_mixer_set_ctl_value(struct usb_mixer_elem_info *cval, int request, int validx, int value_set);

-    int snd_usb_mixer_add_control(struct usb_mixer_elem_list *list,
-        struct snd_kcontrol *kctl);
+    int snd_usb_mixer_add_list(struct usb_mixer_elem_list *list,

+ struct snd_kcontrol *kctl,
+ bool is_std_info);
+
+#define snd_usb_mixer_add_control(list, kctl) \
+snd_usb_mixer_add_list(list, kctl, true)

void snd_usb_mixer_elem_init_std(struct usb_mixer_elem_list *list,
    struct usb_mixer_interface *mixer,
--- linux-4.15.0.orig/sound/usb/mixer_maps.c
+++ linux-4.15.0/sound/usb/mixer_maps.c
@@ -350,16 +350,49 @@
{ 0 } /* terminator */
};

+/* Sennheiser Communications Headset [PC 8], the dB value is reported as -6 negative maximum */
+static struct usbmix_db_map sennheiser_pc8_dB = {-9500, 0};
+static const struct usbmix_name_map sennheiser_pc8_map[] = {
+{ 9, NULL, .dB = &sennheiser_pc8_dB },
+{ 0 } /* terminator */
+};
+
+/* Dell usb dock with ALC4020 codec had a firmware problem where it got
+ screwed up when zero volume is passed; just skip it as a workaround
+ */
+/* Also the extension unit gives an access error, so skip it as well.
+ */
+static const struct usbmix_name_map dell_alc4020_map[] = {
+{ 4, NULL }, /* extension unit */
+{ 16, NULL },
+{ 19, NULL },
+{ 0 }
+};
+
+/* Some mobos shipped with a dummy HD-audio show the invalid GET_MIN/GET_MAX
+ * response for Input Gain Pad (id=19, control=12). Skip it.
+ */
+*/
+static const struct usbmix_name_map asus_rog_map[] = {
+{ 19, NULL, 12 }, /* FU, Input Gain Pad */
+{ 17, NULL }, /* OT, IEC958?, disabled */
+{ 19, NULL, 12 }, /* FU, Input Gain Pad - broken response, disabled */
+{ 16, "Line Out" }, /* OT */
+{ 22, "Line Out Playback" }, /* FU */
--- linux-4.15.0.orig/sound/usb/mixer_quirks.c
+++ linux-4.15.0/sound/usb/mixer_quirks.c
@@ -169,7 +169,8 @@
     return -ENOMEM;
 }
 kctl->private_free = snd_usb_mixer_elem_free;
-    return snd_usb_mixer_add_control(list, kctl);
+    /* don't use snd_usb_mixer_add_control() here, this is a special list element */
+    return snd_usb_mixer_add_list(list, kctl, false);
 }

 /*
@@ -195,6 +196,7 @@
 { USB_ID(0x041e, 0x3042), 0, 1, 1, 1, 1, 0x000d }, /* Usb X-Fi S51 */
 { USB_ID(0x041e, 0x30df), 0, 1, 1, 1, 1, 0x000d }, /* Usb X-Fi S51 Pro */
 { USB_ID(0x041e, 0x3237), 0, 1, 1, 1, 1, 0x000d }, /* Usb X-Fi S51 Pro */
+{ USB_ID(0x041e, 0x3263), 0, 1, 1, 1, 1, 0x000d }, /* Usb X-Fi S51 Pro */
 { USB_ID(0x041e, 0x3048), 2, 2, 6, 6, 2, 0x6e91 }, /* Toshiba SB0500 */
 }

@@ -754,7 +756,7 @@
 return err;
 }
-kctl->private_value |= (value << 24);
+kctl->private_value |= ((unsigned int)value << 24);
 return 0;
 }

@@ -915,7 +917,7 @@
 if (err < 0)
     return err;
-kctl->private_value |= value[0] << 24;
+kctl->private_value |= (unsigned int)value[0] << 24;
 return 0;
 }

@@ -1171,7 +1173,7 @@
 int unitid = 12; /* SamleRate ExtensionUnit ID */

 list_for_each_entry(mixer, &chip->mixer_list, list) {
-    cval = (struct usb_mixer_elem_info *)mixer->id_elems[unitid];
+    cval = mixer_elem_list_to_info(mixer->id_elems[unitid]);
     if (cval) {
         snd_usb_mixer_set_ctl_value(cval, UAC_SET_CUR,
             cval->control << 8,
@@ -1520,11 +1522,15 @@
/* use known values for that card: interface#1 altsetting#1 */
ife = usb_ifnum_to_if(chip->dev, 1);
-if (!iface || iface->num_altsetting < 2)
  -return -EINVAL;
+if (!iface || iface->num_altsetting < 2) {
  +err = -EINVAL;
  +goto end;
  +}
alts = iface->altsetting[1];
- if (get_iface_desc(alts)->bNumEndpoints < 1)
-  -return -EINVAL;
+ if (get_iface_desc(alts)->bNumEndpoints < 1) {
  +err = -EINVAL;
  +goto end;
  +}
ep = get_endpoint(alts, 0)->bEndpointAddress;

err = snd_usb_ctl_msg(chip->dev,
@@ -1703,7 +1709,7 @@
static int snd_microii_controls_create(struct usb_mixer_interface *mixer)
{
  int err, i;
  -static usb_mixer_elem_resume_func_t resume_funcs[] = {
  +static const usb_mixer_elem_resume_func_t resume_funcs[] = {
    snd_microii_spdif_default_update,
    NULL,
    snd_microii_spdif_switch_update
--- linux-4.15.0.orig/sound/usb/mixer_scarlett.c
+++ linux-4.15.0/sound/usb/mixer_scarlett.c
@@ -287,8 +287,7 @@
static int scarlett_ctl_resume(struct usb_mixer_elem_list *list)
{
  -struct usb_mixer_elem_info *elem =
  -container_of(list, struct usb_mixer_elem_info, head);
  +struct usb_mixer_elem_info *elem = mixer_elem_list_to_info(list);
  int i;

  for (i = 0; i < elem->channels; i++)
@@ -447,8 +446,7 @@
static int scarlett_ctl_enum_resume(struct usb_mixer_elem_list *list)
{
  -struct usb_mixer_elem_info *elem =
  -container_of(list, struct usb_mixer_elem_info, head);
  +struct usb_mixer_elem_info *elem = mixer_elem_list_to_info(list);
if (elem->cached)
snd_usb_set_cur_mixer_value(elem, 0, 0, *elem->cache_val);
--- linux-4.15.0.orig/sound/usb/mixer_us16x08.c
+++ linux-4.15.0/sound/usb/mixer_us16x08.c
@@ -617,7 +617,7 @@
static int snd_us16x08_meter_info(struct snd_kcontrol *kcontrol,
                                   struct snd_ctl_elem_info *uinfo)
{
    -uinfo->count = 1;
+    uinfo->count = 34;
    uinfo->type = SNDRV_CTL_ELEM_TYPE_INTEGER;
    uinfo->value.integer.max = 0x7FFF;
    uinfo->value.integer.min = 0;
--- linux-4.15.0.orig/sound/usb/pcm.c
+++ linux-4.15.0/sound/usb/pcm.c
@@ -313,6 +313,9 @@
 return 0;
}

+/* Setup an implicit feedback endpoint from a quirk. Returns 0 if no quirk
+ * applies. Returns 1 if a quirk was found.
+ */
static int set_sync_ep_implicit_fb_quirk(struct snd_usb_substream *subs,
                                         struct usb_device *dev,
                                         struct usb_interface_descriptor *altsd,
+                                         unsigned int ifnum;
                                         struct usb_host_interface *alts;
                                         struct usb_interface *iface;
                                         unsigned int ep;
                                         unsigned int ifnum;
                                         /* Implicit feedback sync EPs consumers are always playback EPs */
                                         if (subs->direction != SNDRV_PCM_STREAM_PLAYBACK)
                                         @ @ -329,36 +333,25 @@
                                         switch (subs->stream->chip->usb_id) {
                                         case USB_ID(0x0763, 0x2030): /* M-Audio Fast Track C400 */
                                         case USB_ID(0x0763, 0x2031): /* M-Audio Fast Track C600 */
+                                         case USB_ID(0x22f0, 0x0006): /* Allen&Heath Qu-16 */
                                         ep = 0x81;
                                         -iface = usb_ifnum_to_if(dev, 3);
                                         -if (!iface || iface->num_altsetting == 0)
                                         -return -EINVAL;
                                         -alts = &iface->altsetting[1];
                                         -goto add_sync_ep;
                                         -break;
                                         +ifnum = 3;
goto add_sync_ep_from_ifnum;
case USB_ID(0x0763, 0x2080): /* M-Audio FastTrack Ultra */
case USB_ID(0x0763, 0x2081):
    ep = 0x81;
    iface = usb_ifnum_to_if(dev, 2);
    -
    -if (!iface || iface->num_altsetting == 0)
    -return -EINVAL;
    -
    -alts = &iface->altsetting[1];
    -goto add_sync_ep;
    -case USB_ID(0x2466, 0x8003):
    +ifnum = 2;
    +goto add_sync_ep_from_ifnum;
    +case USB_ID(0x2466, 0x8003): /* Fractal Audio Axe-Fx II */
    ep = 0x86;
    -iface = usb_ifnum_to_if(dev, 2);
    -
    -if (!iface || iface->num_altsetting == 0)
    -return -EINVAL;
    -
    -alts = &iface->altsetting[1];
    -goto add_sync_ep;
    -
    +ifnum = 2;
    +goto add_sync_ep_from_ifnum;
    +case USB_ID(0x1397, 0x0002): /* Behringer UFX1204 */
    +ep = 0x81;
    +ifnum = 1;
    +goto add_sync_ep_from_ifnum;
}
+
+if (attr == USB_ENDPOINT_SYNC_ASYNC &&
     altsd->bInterfaceClass == USB_CLASS_VENDOR_SPEC &&
     altsd->bInterfaceProtocol == 2 &&
@@ -373,6 +366,14 @@
 /* No quirk */
 return 0;

+add_sync_ep_from_ifnum:
+iface = usb_ifnum_to_if(dev, ifnum);
+
+if (!iface || iface->num_altsetting < 2)
+return -EINVAL;
+
+alts = &iface->altsetting[1];
+
 add_sync_ep:
subs->sync_endpoint = snd_usb_add_endpoint(subs->stream->chip, 
    alts, ep, !subs->direction, 
@@ -382,7 +383,7 @@
    subs->data_endpoint->sync_master = subs->sync_endpoint;

    -return 0;
    +return 1;
    }

static int set_sync_endpoint(struct snd_usb_substream *subs,
@@ -421,6 +422,10 @@
    if (err < 0)
        return err;

    /* endpoint set by quirk */
+    if (err > 0)
+        return 0;
+    
+    if (altsd->bNumEndpoints < 2)
        return 0;

@@ -454,6 +459,7 @@
    ep = get_endpoint(alts, 1)->bEndpointAddress;
    if (get_endpoint(alts, 0)->bLength >= USB_DT_ENDPOINT_AUDIO_SIZE &&
+        get_endpoint(alts, 0)->bSynchAddress != 0 &&
        ((is_playback && ep != (unsigned int)(get_endpoint(alts, 0)->bSynchAddress | USB_DIR_IN)) ||
         ((is_playback && ep != (unsigned int)(get_endpoint(alts, 0)->bSynchAddress & ~USB_DIR_IN))))) {
        dev_err(&dev->dev,
@@ -503,11 +509,11 @@
            WARN_ON(altsd->bAlternateSetting != fmt->altsetting))
        return -EINVAL;

    /* close the old interface */
    -if (fmt == subs->cur_audiofmt)
    +if (fmt == subs->cur_audiofmt && !subs->need_setup_fmt)
        return 0;

    /* close the old interface */
    -if (subs->interface >= 0 && subs->interface != fmt->iface) {
    +if (subs->interface >= 0 && (subs->interface != fmt->iface || subs->need_setup_fmt)) {
        err = usb_set_interface(subs->dev, subs->interface, 0);
        if (err < 0) {
            dev_err(&dev->dev,
@@ -519,6 +525,9 @@
                subs->altset_idx = 0;
            }

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if (subs->need_setup_fmt)
    subs->need_setup_fmt = false;

/* set interface */
if (subs->interface != fmt->iface ||
    subs->altset_idx != fmt->altset_idx) {
    return -1296,13 +1305,19 @@
    // continue;
}

bytes = urb->iso_frame_desc[i].actual_length;
if (subs->stream_offset_adj > 0) {
    unsigned int adj = min(subs->stream_offset_adj, bytes);
    cp += adj;
    bytes -= adj;
    subs->stream_offset_adj -= adj;
}

frames = bytes / stride;
if (!subs->txfr_quirk)
    bytes = frames * stride;
if (bytes % (runtime->sample_bits >> 3) != 0) {
    int oldbytes = bytes;
    bytes = frames * stride;
    dev_warn(&subs->dev->dev, dev_warn_ratelimited(&subs->dev->dev, "Corrected urb data len. %d->%d\n", oldbytes, bytes);}

subs->data_endpoint->retire_data_urb = retire_playback_urb;
subs->running = 0;
return 0;

+case SNDRV_PCM_TRIGGER_SUSPEND:
+if (subs->stream->chip->setup_fmt_after_resume_quirk) {
    +stop_endpoints(subs, true);
    +return 0;
+} +break;

return -EINVAL;

subs->data_endpoint->retire_data_urb = retire_capture_urb;
subs->running = 1;
return 0;

+case SNDRV_PCM_TRIGGER_SUSPEND:
+if (subs->stream->chip->setup_fmt_after_resume_quirk) {
    +stop_endpoints(subs, true);
+subs->need_setup_fmt = true;
+return 0;
+
+break;
+
}  

return -EINVAL;
--- linux-4.15.0.orig/sound/usb/quirks-table.h
+++ linux-4.15.0/sound/usb/quirks-table.h
@@ -39,6 +39,26 @@
     .idProduct = prod, \
     .bInterfaceClass = USB_CLASS_VENDOR_SPEC

+/* HP Thunderbolt Dock Audio Headset */
+{
+    USB_DEVICE(0x03f0, 0x0269),
+    .driver_info = (unsigned long) &(const struct snd_usb_audio_quirk) {
+        .vendor_name = "HP",
+        .product_name = "Thunderbolt Dock Audio Headset",
+        .profile_name = "HP-Thunderbolt-Dock-Audio-Headset",
+        .ifnum = QUIRK_NO_INTERFACE
+    }
+},
+
+/* HP Thunderbolt Dock Audio Module */
+{
+    USB_DEVICE(0x03f0, 0x0567),
+    .driver_info = (unsigned long) &(const struct snd_usb_audio_quirk) {
+        .vendor_name = "HP",
+        .product_name = "Thunderbolt Dock Audio Module",
+        .profile_name = "HP-Thunderbolt-Dock-Audio-Module",
+        .ifnum = QUIRK_NO_INTERFACE
+    }
+},
/* FTDI devices */
{
    USB_DEVICE_VENDORSPEC(0x0944, 0x0204),
    .driver_info = (unsigned long) & (const struct snd_usb_audio_quirk) {
        .vendor_name = "KORG, Inc.",
        .product_name = "ToneLab EX", */
        .ifnum = 3,
        .type = QUIRK_MIDI_STANDARD_INTERFACE,
+}
+},
+
/* AKAI devices */
{
USB_DEVICE(0x09e8, 0x0062),
@@ -2875,7 +2905,8 @@
*/

#define AU0828_DEVICE(vid, pid, vname, pname) { \
-USBDEVICE_VENDOR_SPEC(vid, pid), \n+.idVendor = vid, \n+.idProduct = pid, \n.match_flags = USB_DEVICE_ID_MATCH_DEVICE | \n    USB_DEVICE_ID_MATCH_INT_CLASS | \n    USB_DEVICE_ID_MATCH_INT_SUBCLASS, \n@@ -3277,4 +3308,241 @@
}\
},
+
+
/*
 * Bower's & Wilkins PX headphones only support the 48 kHz sample rate
 * even though it advertises more. The capture interface doesn't work
 * even on windows.
 */
+USB_DEVICE(0x19b5, 0x0021),
+.driver_info = (unsigned long) &\(const\ struct\ snd_usb_audio_quirk\) { \
+.ifnum = QUIRK_ANY_INTERFACE, 
+.type = QUIRK_COMPOSITE, 
+.data = (const struct snd_usb_audio_quirk[]) { 
+{ 
  +.ifnum = 0, 
  +.type = QUIRK_AUDIO_STANDARD_MIXER, 
  +},
+/* Playback */
++
+.ifnum = 1, 
+.type = QUIRK_AUDIO_FIXED_ENDPOINT, 
+.data = (const struct audioformat) { 
  +.formats = SNDRV_PCM_FMTBIT_S16_LE, 
  +.channels = 2, 
  +.iface = 1, 
  +.altsetting = 1, 
  +.altset_idx = 1, 
  +.attributes = UAC_EP_CS_ATTR_FILL_MAX | 
+UAC_EP_CS_ATTR_SAMPLE_RATE, 
  +.endpoint = 0x03, 
  +.ep_attr = USB_ENDPOINT_XFER_ISOCH, 
  +},
rates = SNDRV_PCM_RATE_48000,
+rate_min = 48000,
+rate_max = 48000,
+nr_rates = 1,
+rate_table = (unsigned int[]) {
+48000
+}
+}
+},
+}.
+}
+},
+ /* Dell WD15 Dock */
+{
+USB_DEVICE(0x0bda, 0x4014),
+.driver_info = (unsigned long) & (const struct snd_usb_audio_quirk) {
+.vendor_name = "Dell",
+.product_name = "WD15 Dock",
+.profile_name = "Dell-WD15-Dock",
+.ifnum = QUIRK_NO_INTERFACE
+}
+},
+/* Dell WD19 Dock */
+{
+USB_DEVICE(0x0bda, 0x402e),
+.driver_info = (unsigned long) & (const struct snd_usb_audio_quirk) {
+.vendor_name = "Dell",
+.product_name = "WD19 Dock",
+.profile_name = "Dell-WD15-Dock",
+.ifnum = QUIRK_ANY_INTERFACE,
+.type = QUIRK_SETUP_FMT_AFTER_RESUME
+}
+},
+ /* Two entries for Gigabyte TRX40 Aorus Master:
+ * TRX40 Aorus Master has two USB-audio devices, one for the front headphone
+ * with ESS SABRE9218 DAC chip, while another for the rest I/O (the rear
+ * panel and the front mic) with Realtek ALC1220-VB.
+ * Here we provide two distinct names for making UCM profiles easier.
+ * */
+{
+USB_DEVICE(0x0414, 0xa000),
+.driver_info = (unsigned long) & (const struct snd_usb_audio_quirk) {
+.vendor_name = "Gigabyte",
+.product_name = "Aorus Master Front Headphone",
+}
+ .profile_name = "Gigabyte-Aorus-Master-Front-Headphone",
+ .ifnum = QUIRK_NO_INTERFACE
+
+
+USBDEVICE(0x0414, 0xa001),
+.driver_info = (unsigned long) & (const struct snd_usb_audio_quirk) {
+ .vendor_name = "Gigabyte",
+ .product_name = "Aorus Master Main Audio",
+ .profile_name = "Gigabyte-Aorus-Master-Main-Audio",
+ .ifnum = QUIRK_NO_INTERFACE
+
+},
+
+/*
+ * MacroSilicon MS2109 based HDMI capture cards
+ *
+ * These claim 96kHz 1ch in the descriptors, but are actually 48kHz 2ch.
+ * They also need QUIRK_AUDIO_ALIGN_TRANSFER, which makes one wonder if
+ * they pretend to be 96kHz mono as a workaround for stereo being broken
+ * by that...
+ *
+ * They also have an issue with initial stream alignment that causes the
+ * channels to be swapped and out of phase, which is dealt with in quirks.c.
+ */
+
+{  
+ .match_flags = USB_DEVICE_ID_MATCH_DEVICE |
+     USB_DEVICE_ID_MATCH_INT_CLASS |
+     USB_DEVICE_ID_MATCH_INT_SUBCLASS,
+ .idVendor = 0x534d,
+ .idProduct = 0x2109,
+ .bInterfaceClass = USB_CLASS_AUDIO,
+ .bInterfaceSubClass = USB_SUBCLASS_AUDIOCONTROL,
+ .driver_info = (unsigned long) & (const struct snd_usb_audio_quirk) {
+ .vendor_name = "MacroSilicon",
+ .product_name = "MS2109",
+ .ifnum = QUIRK_ANY_INTERFACE,
+ .type = QUIRK_COMPOSITE,
+ .data = & (const struct snd_usb_audio_quirk[]) {
+ {  
+ .ifnum = 2,
+ .type = QUIRK_AUDIO_ALIGN_TRANSFER,
+ },
+ {  
+ .ifnum = 2,
+ .type = QUIRK_AUDIO_STANDARD_MIXER,
+ },
+{  
+ .type = QUIRK_AUDIO_STANDARD_MIXER,
+ },
+{  
+ .ifnum = 2,
+ .type = QUIRK_AUDIO_STANDARD_MIXER,
+ .ifnum = 3,
+ .type = QUIRK_AUDIO_FIXED_ENDPOINT,
+ .data = &((const struct audioformat) { 
  + .formats = SND_RV_PCM_FMTBIT_S16_LE,
  + .channels = 2,
  + .iface = 3,
  + .altsetting = 1,
  + .altset_idx = 1,
  + .attributes = 0,
  + .endpoint = 0x82,
  + .ep_attr = USB_ENDPOINT_XFER_ISOC | USB_ENDPOINT_SYNC_SYNC_ASYNC,
  + .rates = SND_RV_PCM_RATE_CONTINUOUS,
  + .rate_min = 48000,
  + .rate_max = 48000,
+ })
+ },
+ {
  + .ifnum = -1
+ }
+ },
+ {
  + /*
  + * PIONEER DJ DDJ-RB
  + * PCM is 4 channels out, 2 dummy channels in @ 44.1 fixed
  + * The feedback for the output is the dummy input.
  + */
  + USB_DEVICE_VENDOR_SPEC(0x2b73, 0x000e),
  + .driver_info = (unsigned long) &((const struct snd_usb_audio_quirk) { 
    + .ifnum = QUIRK_ANY_INTERFACE,
    + .type = QUIRK_COMPOSITE,
    + .data = (const struct snd_usb_audio_quirk[]) { 
      + {
        + .ifnum = 0,
        + .type = QUIRK_AUDIO_FIXED_ENDPOINT,
        + .data = &((const struct audioformat) { 
          + .formats = SND_RV_PCM_FMTBIT_S24_3LE,
          + .channels = 4,
          + .iface = 0,
          + .altsetting = 1,
          + .altset_idx = 1,
          + .endpoint = 0x01,
          + .ep_attr = USB_ENDPOINT_XFER_ISOC | USB_ENDPOINT_SYNC_SYNC_ASYNC,
          + .rates = SND_RV_PCM_RATE_44100,
          + .rate_min = 44100,
        },
      },
  ),
+ */
+ .rate_max = 44100,
+ .nr_rates = 1,
+ .rate_table = (unsigned int[]) { 44100 }
+
+
+.ifnum = 0,
+.type = QUIRK_AUDIO_FIXED_ENDPOINT,
+.data = &(const struct audioformat) {
+ .formats = SNDRV_PCM_FMTBIT_S24_3LE,
+ .channels = 2,
+ .iface = 0,
+ .altsetting = 1,
+ .altset_idx = 1,
+ .endpoint = 0x82,
+ .ep_attr = USB_ENDPOINT_XFER_ISOC| USB_ENDPOINT_SYNC_ASYNC| USB_ENDPOINT_USAGE_IMPLICIT_FB,
+ .rates = SNDRV_PCM_RATE_44100,
+ .rate_min = 44100,
+ .rate_max = 44100,
+ .nr_rates = 1,
+ .rate_table = (unsigned int[]) { 44100 }
+
+
+ .ifnum = -1
+
+
+/
+ /* Sennheiser GSP670
+ /* Change order of interfaces loaded
+ */
+USB_DEVICE(0x1395, 0x0300),
+.bInterfaceClass = USB_CLASS_PER_INTERFACE,
+.driver_info = (unsigned long) &(const struct snd_usb_audio_quirk) {
+ .ifnum = QUIRK_ANY_INTERFACE,
+ .type = QUIRK_COMPOSITE,
+ .data = &(const struct snd_usb_audio_quirk[]) {
+ // Communication
+
+ .ifnum = 3,
+ .type = QUIRK_AUDIO_STANDARD_INTERFACE
+
+ // Recording
+{
+    .ifnum = 4,
+    .type = QUIRK_AUDIO_STANDARD_INTERFACE
+},
+// Main
+{
+    .ifnum = 1,
+    .type = QUIRK_AUDIO_STANDARD_INTERFACE
+},
+{
+    .ifnum = -1
+}
+}
+
 +#undef USB_DEVICE_VENDOR_SPEC
--- linux-4.15.0.orig/sound/usb/quirks.c
+++ linux-4.15.0/sound/usb/quirks.c
@@ -66,8 +66,12 @@
if (!iface)
    continue;
if (quirk->ifnum != probed_ifnum &&
-    !usb_interface_claimed(iface))
-    usb_driver_claim_interface(driver, iface, (void *)-1L);
+    !usb_interface_claimed(iface)) {
+    err = usb_driver_claim_interface(driver, iface,
+    USB_AUDIO_IFACE_UNUSED);
+    if (err < 0)
+        return err;
+    }
+
 return 0;
@@ -398,8 +402,12 @@
continue;

    err = create_autodetect_quirk(chip, iface, driver);
    -if (err >= 0)
    -usb_driver_claim_interface(driver, iface, (void *)-1L);
    +if (err >= 0) {
    +err = usb_driver_claim_interface(driver, iface,
    +USB_AUDIO_IFACE_UNUSED);
    +if (err < 0)
    +return err;
    +}
return 0;
@@ -516,6 +524,16 @@
return snd_usb_create_mixer(chip, quirk->ifnum, 0);
}

+static int setup_fmt_after_resume_quirk(struct snd_usb_audio *chip,
+    struct usb_interface *iface,
+    struct usb_driver *driver,
+    const struct snd_usb_audio_quirk *quirk)
+{
+    chip->setup_fmt_after_resume_quirk = 1;
+    return 1;
+    /* Continue with creating streams and mixer */
+}
+
/* audio-interface quirks
 *
@@ -554,6 +572,7 @@
[QUIRK_AUDIO_EDIROL_UAXX] = create_uaxx_quirk,
[QUIRK_AUDIO_ALIGN_TRANSFER] = create_align_transfer_quirk,
[QUIRK_AUDIO_STANDARD_MIXER] = create_standard_mixer_quirk,
+[QUIRK_SETUP_FMT_AFTER_RESUME] = setup_fmt_after_resume_quirk,
};

if (quirk->type < QUIRK_TYPE_COUNT) {
@@ -1120,6 +1139,9 @@
case USB_ID(0x041e, 0x3f19): /* E-Mu 0204 USB */
    set_format_emu_quirk(subs, fmt);
    break;
+case USB_ID(0x534d, 0x2109): /* MacroSilicon MS2109 */
+    subs->stream_offset_adj = 2;
+    break;
}

@@ -1131,10 +1153,14 @@
case USB_ID(0x04D8, 0xFEEA): /* Benchmark DAC1 Pre */
case USB_ID(0x0556, 0x0014): /* Phoenix Audio TMX320VC */
case USB_ID(0x05A3, 0x9420): /* ELP HD USB Camera */
+case USB_ID(0x05a7, 0x1020): /* Bose Companion 5 */
case USB_ID(0x074D, 0x3553): /* Outlaw RR2150 (Micronas UAC3553B) */
case USB_ID(0x1395, 0x740a): /* Sennheiser DECT */
case USB_ID(0x1901, 0x0191): /* GE B850V3 CP2114 audio interface */
case USB_ID(0x21B4, 0x0081): /* AudioQuest DragonFly */
+case USB_ID(0x2912, 0x30c8): /* Audioengine D1 */
+case USB_ID(0x413c, 0xa506): /* Dell AE515 sound bar */
+case USB_ID(0x046d, 0x084c): /* Logitech ConferenceCam Connect */

return true;
}

return false;
}

/* Marantz/Denon USB DACs need a vendor cmd to switch ITF-USB DSD based DACs need a vendor cmd to switch * between PCM and native DSD mode + * (2 altsets version) */
-
static bool is_marantz_denon_dac(unsigned int id)
+static bool is_itf_usb_dsd_2alts_dac(unsigned int id)
{
  switch (id) {
    case USB_ID(0x154e, 0x1002): /* Denon DCD-1500RE */
    case USB_ID(0x154e, 0x1003): /* Denon DA-300USB */
    case USB_ID(0x154e, 0x3005): /* Marantz HD-DAC1 */
    case USB_ID(0x154e, 0x3006): /* Marantz SA-14S1 */
    +case USB_ID(0x1852, 0x5065): /* Luxman DA-06 */
    return true;
  }
  return false;
}

/* TEAC UD-501/UD-503/NT-503 USB DACs need a vendor cmd to switch between PCM/DOP and native DSD mode * ITF-USB DSD based DACs need a vendor cmd to switch * (3 altsets version) */
-
static bool is_teac_dsd_dac(unsigned int id)
+static bool is_itf_usb_dsd_3alts_dac(unsigned int id)
{
  switch (id) {
    case USB_ID(0x0644, 0x8043): /* TEAC UD-501/UD-503/NT-503 */
    case USB_ID(0x0644, 0x8044): /* Esoteric D-05X */
    +case USB_ID(0x0644, 0x804a): /* TEAC UD-301 */
    return true;
  }
  return false;
}

if (is_marantz_denon_dac(subs->stream->chip->usb_id)) {
  return true;
}

if (is_itf_usb_dsd_2alts_dac(subs->stream->chip->usb_id)) {
  return true;
}

if (is_itf_usb_dsd_3alts_dac(subs->stream->chip->usb_id)) {
  return true;
}

if (is_teac_dsd_dac(subs->stream->chip->usb_id)) {
  return true;
}

struct usb_device *dev = subs->dev;
int err;
@
@@ -1149,28 +1175,33 @@
return true;
}

return false;
}

/* Marantz/Denon USB DACs need a vendor cmd to switch */

*/

-/* Marantz/Denon USB DACs need a vendor cmd to switch */
+/* ITF-USB DSD based DACs need a vendor cmd to switch */
+ * between PCM and native DSD mode
+ * (2 altsets version)
+ */
-STATIC bool is_marantz_denon_dac(unsigned int id)
+STATIC bool is_itf_usb_dsd_2alts_dac(unsigned int id)
{
  switch (id) {
    case USB_ID(0x154e, 0x1002): /* Denon DCD-1500RE */
    case USB_ID(0x154e, 0x1003): /* Denon DA-300USB */
    case USB_ID(0x154e, 0x3005): /* Marantz HD-DAC1 */
    case USB_ID(0x154e, 0x3006): /* Marantz SA-14S1 */
    +case USB_ID(0x1852, 0x5065): /* Luxman DA-06 */
    return true;
  }
  return false;
}

/* TEAC UD-501/UD-503/NT-503 USB DACs need a vendor cmd to switch */
-/* between PCM/DOP and native DSD mode */
+/* ITF-USB DSD based DACs need a vendor cmd to switch */
+ * between PCM and native DSD mode
+ * (3 altsets version)
+ */
-STATIC bool is_teac_dsd_dac(unsigned int id)
+STATIC bool is_itf_usb_dsd_3alts_dac(unsigned int id)
{
  switch (id) {
    case USB_ID(0x0644, 0x8043): /* TEAC UD-501/UD-503/NT-503 */
    case USB_ID(0x0644, 0x8044): /* Esoteric D-05X */
    +case USB_ID(0x0644, 0x804a): /* TEAC UD-301 */
    return true;
  }
  return false;
}

-if (is_marantz_denon_dac(subs->stream->chip->usb_id)) {
  return true;
}

-if (is_itf_usb_dsd_2alts_dac(subs->stream->chip->usb_id)) {
  return true;
}

-if (is_itf_usb_dsd_3alts_dac(subs->stream->chip->usb_id)) {
  return true;
}

if (is_teac_dsd_dac(subs->stream->chip->usb_id)) {
  return true;
}

struct usb_device *dev = subs->dev;
int err;
@
@@ -1182,7 +1213,7 @@
return false;
)

+if (is_itf_usb_dsd_2alts_dac(subs->stream->chip->usb_id)) {
  return true;
}

+if (is_itf_usb_dsd_3alts_dac(subs->stream->chip->usb_id)) {
  return true;
}
/* First switch to alt set 0, otherwise the mode switch cmd
 * will not be accepted by the DAC
 */
@@ -1203,7 +1234,7 @@
 break;
 }
 mdelay(20);
-} else if (is_teac_dsd_dac(subs->stream->chip->usb_id)) {
+} else if (is_itf_usb_dsd_3alts_dac(subs->stream->chip->usb_id)) {
 /* Vendor mode switch cmd is required. */
 switch (fmt->altsetting) {
 case 3: /* DSD mode (DSD_U32) requested */
@@ -1299,22 +1330,40 @@
 (requesttype & USB_TYPE_MASK) == USB_TYPE_CLASS)
 mdelay(20);

-/* Marantz/Denon devices with USB DAC functionality need a delay
 */
+/* ITF-USB DSD based DACs functionality need a delay
 * after each class compliant request
 */
-if (is_marantz_denon_dac(chip->usb_id)
+if (is_itf_usb_dsd_2alts_dac(chip->usb_id)
     && (requesttype & USB_TYPE_MASK) == USB_TYPE_CLASS)
     mdelay(20);

-/* Zoom R16/24, Logitech H650e, Jabra 550a needs a tiny delay here,
- * otherwise requests like get/set frequency return as failed despite
- * actually succeeding.
 */
+/*
+ * Plantronics headsets (C320, C320-M, etc) need a delay to avoid
+ * random microphone failures.
+ */
+if (USB_ID_VENDOR(chip->usb_id) == 0x047f &&
     (requesttype & USB_TYPE_MASK) == USB_TYPE_CLASS)
     msleep(20);
+
+/* Zoom R16/24, many Logitech(at least H650e/H570e/BCC950),
+ * Jabra 550a, Kingston HyperX needs a tiny delay here,
+ * otherwise requests like get/set frequency return
+ * as failed despite actually succeeding.
 */
 if ((chip->usb_id == USB_ID(0x1686, 0x00dd) ||
-    chip->usb_id == USB_ID(0x046d, 0x0a46) ||
-    chip->usb_id == USB_ID(0x0b0e, 0x0349)) &&
+    USB_ID_VENDOR(chip->usb_id) == 0x046d ||/* Logitech */
+    chip->usb_id == USB_ID(0x0b0e, 0x0349) ||
+    chip->usb_id == USB_ID(0x0951, 0x16ad)) &&
     (requesttype & USB_TYPE_MASK) == USB_TYPE_CLASS)
mdelay(1);
+
+/*
+ * Samsung USBC Headset (AKG) need a tiny delay after each
+ * class compliant request. (Model number: AAM625R or AAM627R)
+ */
+if (chip->usb_id == USB_ID(0x04e8, 0xa051) &&
+    (requesttype & USB_TYPE_MASK) == USB_TYPE_CLASS)
+    usleep_range(5000, 6000);
}
/*
@@ -1345,26 +1394,23 @@
/* XMOS based USB DACs */
switch (chip->usb_id) {
-    case USB_ID(0x20b1, 0x3008): /* iFi Audio micro/nano iDSD */
-    case USB_ID(0x20b1, 0x2008): /* Matrix Audio X-Sabre */
-    case USB_ID(0x20b1, 0x300a): /* Matrix Audio Mini-i Pro */
-case USB_ID(0x22d9, 0x0416): /* OPPO HA-1 */
-case USB_ID(0x2772, 0x0230): /* Pro-Ject Pre Box S2 Digital */
-if (fp->altsetting == 2)
-    return SNDRV_PCM_FMTBIT_DSD_U32_BE;
-    break;
-
-case USB_ID(0x20b1, 0x000a): /* Gustard DAC-X20U */
-case USB_ID(0x20b1, 0x2009): /* DIYINHK DSD DXD 384kHz USB to I2S/DSD */
-case USB_ID(0x20b1, 0x2023): /* JLsounds I2SoverUSB */
-case USB_ID(0x20b1, 0x3023): /* Aune X1S 32BIT/384 DSD DAC */
+case USB_ID(0x10cb, 0x0103): /* The Bit Opus #3; with fp->dsd_raw */
-case USB_ID(0x2616, 0x0106): /* PS Audio NuWave DAC */
-if (fp->altsetting == 3)
-    return SNDRV_PCM_FMTBIT_DSD_U32_BE;
-    break;
-
-/" Amanero Combo384 USB interface with native DSD support */
-case USB_ID(0x16d0, 0x071a):
+/" Amanero Combo384 USB based DACs with native DSD support */
+case USB_ID(0x16d0, 0x071a): /* Amanero - Combo384 */
+case USB_ID(0x2ab6, 0x0004): /* T+A DAC8DSD-V2.0, MP1000E-V2.0, MP2000R-V2.0, MP2500R-V2.0, MP3100HV-V2.0 */
+case USB_ID(0x2ab6, 0x0005): /* T+A USB HD Audio 1 */
+case USB_ID(0x2ab6, 0x0006): /* T+A USB HD Audio 2 */
-if (fp->altsetting == 2) {
-switch (le16_to_cpu(chip->dev->descriptor.bcdDevice)) {
-case 0x199:
-@@ -1386,17 +1432,53 @@
-    break;
-/* Denon/Marantz devices with USB DAC functionality */
-if (is_marantz_denon_dac(chip->usb_id)) {
+/* ITF-USB DSD based DACs (2 altsets version) */
+if (is_itf_usb_dsd_2alts_dac(chip->usb_id)) {
    if (fp->altsetting == 2)
        return SNDRV_PCM_FMTBIT_DSD_U32_BE;
}

-/* TEAC devices with USB DAC functionality */
-if (is_teac_dsd_dac(chip->usb_id)) {
+/* ITF-USB DSD based DACs (3 altsets version) */
+if (is_itf_usb_dsd_3alts_dac(chip->usb_id)) {
    if (fp->altsetting == 3)
        return SNDRV_PCM_FMTBIT_DSD_U32_BE;
}

return 0;
}

+/
+/
+ * registration quirk:
+ * the registration is skipped if a device matches with the given ID,
+ * unless the interface reaches to the defined one. This is for delaying
+ * the registration until the last known interface, so that the card and
+ * devices appear at the same time.
+ */
+
+struct registration_quirk {
+    unsigned int usb_id; /* composed via USB_ID() */
+    unsigned int interface; /* the interface to trigger register */
+};

+#define REG_QUIRK_ENTRY(vendor, product, iface) \
+    { .usb_id = USB_ID(vendor, product), .interface = (iface) }
+
+static const struct registration_quirk registration_quirks[] = {
+    REG_QUIRK_ENTRY(0x0951, 0x16d8, 2), /* Kingston HyperX AMP */
+    REG_QUIRK_ENTRY(0x0951, 0x16ed, 2), /* Kingston HyperX Cloud Alpha S */
+    REG_QUIRK_ENTRY(0x0951, 0x16ea, 2), /* Kingston HyperX Cloud Flight S */
+    { 0 } /* terminator */
+};

+/* return true if skipping registration */
+bool snd_usb_registration_quirk(struct snd_usb_audio *chip, int iface)
+{
+    const struct registration_quirk *q;
for (q = registration_quirks; q->usb_id; q++)
if (chip->usb_id == q->usb_id)
return iface != q->interface;

/* Register as normal */
return false;

--- linux-4.15.0.orig/sound/usb/quirks.h
+++ linux-4.15.0/sound/usb/quirks.h
@@ -42,4 +42,6 @@
struct audioformat *fp,
unsigned int sample_bytes);

+bool snd_usb_registration_quirk(struct snd_usb_audio *chip, int iface);
+
#endif /* __USBAUDIO_QUIRKS_H */
--- linux-4.15.0.orig/sound/usb/stream.c
+++ linux-4.15.0/sound/usb/stream.c
@@ -95,6 +95,7 @@
subs->tx_length_quirk = as->chip->tx_length_quirk;
subs->speed = snd_usb_get_speed(subs->dev);
subs->pkt_offset_adj = 0;
+subs->stream_offset_adj = 0;

snd_usb_set_pcm_ops(as->pcm, stream);

@@ -184,16 +185,16 @@
struct snd_pcm_chmap *info = snd_kcontrol_chip(kcontrol);
struct snd_usb_substream *subs = info->private_data;
struct snd_pcm_chmap_elem *chmap = NULL;
-int i;
+int i = 0;

-memset(ucontrol->value.integer.value, 0,
-    sizeof(ucontrol->value.integer.value));
if (subs->cur_audiofmt)
chmap = subs->cur_audiofmt->chmap;
if (chmap) {
    for (i = 0; i < chmap->channels; i++)
        ucontrol->value.integer.value[i] = chmap->map[i];
}
+for (; i < subs->channels_max; i++)
+ucontrol->value.integer.value[i] = 0;
return 0;
}

--- linux-4.15.0.orig/sound/usb/usbaudio.h
info->chip_ready = 1;
- info->version = USX2Y_DRIVER_VERSION;
+ info->version = USX2Y_DRIVER_VERSION;
return 0;
}

--- linux-4.15.0.orig/sound/usb/usx2y/usbusx2yaudio.c
+++ linux-4.15.0/sound/usb/usx2y/usbusx2yaudio.c
@@ -692,6 +692,8 @@
 us->submitted = 2*NOOF_SETRATE_URBS;
 for (i = 0; i < NOOF_SETRATE_URBS; ++i) {
 struct urb *urb = us->urb[i];
+if (!urb)
+continue;
 if (urb->status) {
 if (!err)
 err = -ENODEV;
--- linux-4.15.0.orig/sound/x86/intel_hdmi_audio.c
+++ linux-4.15.0/sound/x86/intel_hdmi_audio.c
@@ -1827,6 +1827,8 @@
 ctx->port = port;
 ctx->pipe = -1;
+spin_lock_init(&ctx->had_spinlock);
+mutex_init(&ctx->mutex);
INIT_WORK(&ctx->hdmi_audio_wq, had_audio_wq);

ret = snd_pcm_new(card, INTEL_HAD, port, MAX_PB_STREAMS,
@@ -1837,7 +1839,7 @@
 /* setup private data which can be retrieved when required */
 pcm->private_data = ctx;
 pcm->info_flags = 0;
-strcpy(pcm->name, card->shortname, strlen(card->shortname));
+strlcpy(pcm->name, card->shortname, strlen(card->shortname));
 /* setup the ops for playback */
 snd_pcm_set_ops(pcm, SNDRV_PCM_STREAM_PLAYBACK, &had_pcm_ops);
@@ -1885,7 +1887,6 @@
 pm_runtime_use_autosuspend(&pdev->dev);
 pm_runtime_mark_last_busy(&pdev->dev);
-pm_runtime_set_active(&pdev->dev);
 dev_dbg(&pdev->dev, "%s: handle pending notification\n", __func__);
msg.g.version = 0x1;
na = (struct nlattr *) GENLMSG_DATA(&msg);
na->nla_type = nla_type;
-na->nla_len = nla_len + 1 + NLA_HDRLEN;
+na->nla_len = nla_len + NLA_HDRLEN;
memcpy(NLA_DATA(na), nla_data, nla_len);
msg.n.nlmsg_len += NLMSG_ALIGN(na->nla_len);

--- linux-4.15.0.orig/tools/arch/arm/include/uapi/asm/kvm.h
+++ linux-4.15.0/tools/arch/arm/include/uapi/asm/kvm.h
@@ -186,6 +186,12 @@
  #define KVM_REG_ARM_VFP_FPINST		0x1009
  #define KVM_REG_ARM_VFP_FPINST0x1009
  #define KVM_REG_ARM_VFP_FPINST2x100A
+/* KVM-as-firmware specific pseudo-registers */
+  #define KVM_REG_ARM_FW(0x0014 << KVM_REG_ARM_COPROC_SHIFT)
+  #define KVM_REG_ARM_FW_REG(r)(KVM_REG_ARM | KVM_REG_SIZE_U64 | \n+    KVM_REG_ARM_FW | ((r) & 0xffff))
+  #define KVM_REG_ARM_PSCI_VERSIONKVM_REG_ARM_FW_REG(0)
+
+  /* Device Control API: ARM VGIC */
+  #define KVM_DEV_ARM_VGIC_GRP_ADDR0
+  #define KVM_DEV_ARM_VGIC_GRP_DIST_REG0
--- linux-4.15.0.orig/tools/arch/arm64/include/uapi/asm/kvm.h
+++ linux-4.15.0/tools/arch/arm64/include/uapi/asm/kvm.h
@@ -206,6 +206,12 @@
  #define KVM_REG_ARM_TIMER_CNT		ARM64_SYS_REG(3, 3, 14, 3, 2)
  #define KVM_REG_ARM_TIMER_CVAL		ARM64_SYS_REG(3, 3, 14, 0, 2)
+/* KVM-as-firmware specific pseudo-registers */
+  #define KVM_REG_ARM_FW(0x0014 << KVM_REG_ARM_COPROC_SHIFT)
+  #define KVM_REG_ARM_FW_REG(r)(KVM_REG_ARM64 | KVM_REG_SIZE_U64 | \n+    KVM_REG_ARM_FW | ((r) & 0xffff))
+  #define KVM_REG_ARM_PSCI_VERSIONKVM_REG_ARM_FW_REG(0)
+
+  /* Device Control API: ARM VGIC */
+  #define KVM_DEV_ARM_VGIC_GRP_ADDR0
+  #define KVM_DEV_ARM_VGIC_GRP_DIST_REG1
--- linux-4.15.0.orig/tools/arch/ia64/include/asm/barrier.h
+++ linux-4.15.0/tools/arch/ia64/include/asm/barrier.h
@@ -39,9 +39,6 @@
 * sequential memory pages only.
 */

-/* XXX From arch/ia64/include/uapi/asm/gcc_intrin.h */
-#define ia64_mf()     asm volatile ("mf" ::: "memory")
-
-#define mb(jia64_mf())
```c
#define rmb() \n		\n#define wmb() \n
--- linux-4.15.0.orig/tools/arch/powerpc/include/uapi/asm/kvm.h
+++ linux-4.15.0/tools/arch/powerpc/include/uapi/asm/kvm.h
@@ -443,6 +443,31 @@
 __u32 ap_encodings[8]; 
 }

+/* For KVM_PPC_GET_CPU_CHAR */
+struct kvm_ppc_cpu_char { 
+ __u64 character; /* characteristics of the CPU */
+ __u64 behaviour; /* recommended software behaviour */
+ __u64 character_mask; /* valid bits in character */
+ __u64 behaviour_mask; /* valid bits in behaviour */
+};
+
+/* Values for character and character_mask.
+ * These are identical to the values used by H_GET_CPU_CHARACTERISTICS.
+ */
+#define KVM_PPC_CPU_CHAR_SPEC_BAR_ORI31 (1ULL << 63)
+#define KVM_PPC_CPU_CHAR_BCCTRL_SERIALISED (1ULL << 62)
+#define KVM_PPC_CPU_CHAR_L1D_FLUSH_ORI30 (1ULL << 61)
+#define KVM_PPC_CPU_CHAR_L1D_FLUSH_TRIG2 (1ULL << 60)
+#define KVM_PPC_CPU_CHAR_L1D_THREAD_PRIV (1ULL << 59)
+#define KVM_PPC_CPU_CHAR_BR_HINT_HONOURED (1ULL << 58)
+#define KVM_PPC_CPU_CHAR_MTTRIG_THR_RECONF (1ULL << 57)
+#define KVM_PPC_CPU_CHAR_COUNT_CACHE_DIS (1ULL << 56)
+
+#define KVM_PPC_CPU_BEHAV_FAVOUR_SECURITY (1ULL << 63)
+#define KVM_PPC_CPU_BEHAV_L1D_FLUSH_PR (1ULL << 62)
+#define KVM_PPC_CPU_BEHAV_BNDS_CHK_SPEC_BAR (1ULL << 61)
+
/* Per-vcpu XICS interrupt controller state */
#define KVM_REG_PPC_ICP_STATE (KVM_REG_PPC | KVM_REG_SIZE_U64 | 0x8c)

@@ -607,6 +632,8 @@
#define KVM_REG_PPC_TIDR (KVM_REG_PPC | KVM_REG_SIZE_U64 | 0xbc)
#define KVM_REG_PPC_PSSCR (KVM_REG_PPC | KVM_REG_SIZE_U64 | 0xbd)
+
+#define KVM_REG_PPC_DEC_EXPIRY (KVM_REG_PPC | KVM_REG_SIZE_U64 | 0xbe)
+
/* Transactional Memory checkpointed state:
 * This is all GPRs, all VSX regs and a subset of SPRs
 */
--- linux-4.15.0.orig/tools/arch/s390/include/uapi/asm/kvm.h
+++ linux-4.15.0/tools/arch/s390/include/uapi/asm/kvm.h
@@ -152,7 +152,8 @@

#endif

@ @ -607,6 +632,8 @@
#define KVM_REG_PPC_TIDR(KVM_REG_PPC | KVM_REG_SIZE_U64 | 0xbc)
#define KVM_REG_PPC_PSSCR(KVM_REG_PPC | KVM_REG_SIZE_U64 | 0xbd)

+#define KVM_REG_PPC_DEC_EXPIRY(KVM_REG_PPC | KVM_REG_SIZE_U64 | 0xbe)
+
/* This is all GPRs, all VSX regs and a subset of SPRs */
```
/* kvm attributes for crypto */
#endif
#define KVM_SYNC_RICCB (1UL << 7)
#define KVM_SYNC_FPRS (1UL << 8)
#define KVM_SYNC_GSCB (1UL << 9)
+#define KVM_SYNC_BPBC (1UL << 10)
/* length and alignment of the sdnx as a power of two */
#define SDNXC 8
#define SDNXL (1UL << SDNXC)

/* for future vector expansion */
__u8 reserved[512];
__u32 fpc:// valid on KVM_SYNC_VRS or KVM_SYNC_FPRS */
-__u8 padding1[52];/* riccb needs to be 64byte aligned */
+__u8 bpbc : 1;/* bp mode */
+__u8 reserved2 : 7;
+__u8 padding1[51];/* riccb needs to be 64byte aligned */
-__u8 riccb[64];/* runtime instrumentation controls block */
-__u8 padding2[192];/* sdnx needs to be 256byte aligned */
union {
    --- linux-4.15.0.orig/tools/arch/x86/include/asm/cpufeatures.h
+++ linux-4.15.0/tools/arch/x86/include/asm/cpufeatures.h
@@ -13,7 +13,7 @@
    #define NCAPINTS 18 /* N 32-bit words worth of info */
    #define NBUGINTS 1 /* N 32-bit bug flags */
    #define X86_FEATURE_CAT_L3  (7*32+ 4) /* Cache Allocation Technology L3 */
    #define X86_FEATURE_CAT_L2  (7*32+ 5) /* Cache Allocation Technology L2 */
    #define X86_FEATURE_CDP_L3  (7*32+ 6) /* Code and Data Prioritization L3 */
    +#define X86_FEATURE_INVPCID_SINGLE( 7*32+ 7) /* Effectively INVPCID && CR4.PCIDE=1 */
    +#define X86_FEATURE_HW_PSTATE( 7*32+ 8) /* AMD HW-PState */
    +#define X86_FEATURE_PROC_FEEDBACK( 7*32+ 9) /* AMD ProcFeedbackInterface */
    +#define X86_FEATURE_SME( 7*32+10) /* AMD Secure Memory Encryption */


+\#define X86_FEATURE_PTI (7*32+11) /* Kernel Page Table Isolation enabled */
+\#define X86_FEATURE_RETPOLINE(7*32+12) /* Generic Retpoline mitigation for Spectre variant 2 */
+\#define X86_FEATURE_RETPOLINE_AMD(7*32+13) /* AMD Retpoline mitigation for Spectre variant 2 */
+\#define X86_FEATURE_INTEL_PPN(7*32+14) /* Intel Processor Inventory Number */
+\#define X86_FEATURE_INTEL_PT(7*32+15) /* Intel Processor Trace */
+\#define X86_FEATURE_AVX512_4VNNIW(7*32+16) /* AVX-512 Neural Network Instructions */
+\#define X86_FEATURE_AVX512_4FMAPS(7*32+17) /* AVX-512 Multiply Accumulation Single precision */
+\#define X86_FEATURE_CDP_L2(7*32+15) /* Code and Data Prioritization L2 */
+\#define X86_FEATURE_MSR_SPEC_CTRL(7*32+16) /* MSR SPEC_CTRL is implemented */
+\#define X86_FEATURE_SSBD(7*32+17) /* Speculative Store Bypass Disable */
+\#define X86_FEATURE_MBA(7*32+18) /* Memory Bandwidth Allocation */
+\#define X86_FEATURE_RSB_CTXSW(7*32+19) /* Fill RSB on context switches */
+\#define X86_FEATURE_USE_IBPB(7*32+21) /* Indirect Branch Prediction Barrier enabled */
+\#define X86_FEATURE_USE_IBRS_FW(7*32+22) /* Use IBRS during runtime firmware calls */
+\#define X86_FEATURE_SPEC_STORE_BYPASS_DISABLE(7*32+23) /* Disable Speculative Store Bypass. */
+\#define X86_FEATURE_LS_CFG_SSBD(7*32+24) /* AMD SSBD implementation via LS_CFG MSR */
+\#define X86_FEATURE_IBRS(7*32+25) /* Indirect Branch Restricted Speculation */
+\#define X86_FEATURE_IBPB(7*32+26) /* Indirect Branch Prediction Barrier */
+\#define X86_FEATURE_STIBP(7*32+27) /* Single Thread Indirect Branch Predictors */
+\#define X86_FEATURE_ZEN(7*32+28) /* CPU is AMD family 0x17 (Zen) */
+\#define X86_FEATURE_LITF_PTEINV(7*32+29) /* LITF workaround PTE inversion */

/* Virtualization flags: Linux defined, word 8 */
+\#define X86_FEATURE_TPR_SHADOW(8*32+0) /* Intel TPR Shadow */
@ @ -242,6 +254,7 @@
+\#define X86_FEATURE_AVX512IFMA(9*32+21) /* AVX-512 Integer Fused Multiply-Add instructions */
+\#define X86_FEATURE_CLFUSHOPT(9*32+23) /* CLFUSHOPT instruction */
+\#define X86_FEATURE_CLWB(9*32+24) /* CLWB instruction */
+\#define X86_FEATURE_INTEL_PT(9*32+25) /* Intel Processor Trace */
+\#define X86_FEATURE_AVX512PF(9*32+26) /* AVX-512 Prefetch */
+\#define X86_FEATURE_AVX512ER(9*32+27) /* AVX-512 Exponential and Reciprocal */
+\#define X86_FEATURE_AVX512CD(9*32+28) /* AVX-512 Conflict Detection */
@ @ -267,6 +280,10 @@
+\#define X86_FEATURE_CLZERO(13*32+0) /* CLZERO instruction */
+\#define X86_FEATURE_IRPERF(13*32+1) /* Instructions Retired Count */
+\#define X86_FEATURE_XSAVEERPRTR(13*32+2) /* Always save/restore FP error pointers */
+\#define X86_FEATURE_AMD_IBPB(13*32+12) /* Indirect Branch Prediction Barrier */
+\#define X86_FEATURE_AMD_IBRS(13*32+14) /* Indirect Branch Restricted Speculation */
+\#define X86_FEATURE_AMD_STIBP(13*32+15) /* Single Thread Indirect Branch Predictors */
+\#define X86_FEATURE_VIRT_SSBD(13*32+25) /* Virtualized Speculative Store Bypass Disable */

/* Thermal and Power Management Leaf, CPUID level 0x00000006 (EAX), word 14 */
+\#define X86_FEATURE_DTHERM(14*32+0) /* Digital Thermal Sensor */
@ @ -306,6 +323,7 @@
```c
#define X86_FEATURE_VPCLMULQDQ (16*32+10) /* Carry-Less Multiplication Double Quadword */
#define X86_FEATURE_AVX512_VNNI (16*32+11) /* Vector Neural Network Instructions */
#define X86_FEATURE_AVX512_BITALG (16*32+12) /* Support for VPOPcnt[B,W] and VPUSHFBITQMB instructions */
+#define X86_FEATURE_TME (16*32+13) /* Intel Total Memory Encryption */
#define X86_FEATURE_AVX512_VPOPCNTDQ (16*32+14) /* POPCNT for vectors of DW/QW */
#define X86_FEATURE_LA57 (16*32+16) /* 5-level page tables */
#define X86_FEATURE_RDPID (16*32+22) /* RDPID instruction */
@@ -315,6 +333,16 @@
#define X86_FEATURE_SUCCOR (17*32+1) /* Uncorrectable error containment and recovery */
#define X86_FEATURE_SMCA (17*32+3) /* Scalable MCA */
/+ /* Intel-defined CPU features, CPUID level 0x00000007:0 (EDX), word 18 */
+#define X86_FEATURE_AVX512_4VNNIW (18*32+2) /* AVX-512 Neural Network Instructions */
+#define X86_FEATURE_AVX512_4FMAPS (18*32+3) /* AVX-512 Multiply Accumulation Single precision */
+#define X86_FEATURE_PCONFIG (18*32+18) /* Intel PCONFIG */
+#define X86_FEATURE_SPEC_CTRL (18*32+26) /* Speculation Control (IBRS + IBPB) */
+#define X86_FEATURE_INTEL_STIBP (18*32+27) /* Single Thread Indirect Branch Predictors */
+#define X86_FEATURE_FLUSH_L1D (18*32+28) /* Flush L1D cache */
+#define X86_FEATURE_ARCH_CAPABILITIES (18*32+29) /* IA32_ARCH_CAPABILITIES MSR (Intel) */
+#define X86_FEATURE_SPEC_CTRL_SSBD (18*32+31) /* Speculative Store Bypass Disable */
+ */
*/
* BUG word(s)
*/
@@ -340,5 +368,10 @@
#define X86_BUG_SWAPGS_FENCE X86_BUG(11) /* SWAPGS without input dep on GS */
#define X86_BUG_MONITORX86_BUG(12) /* IPI required to wake up remote CPU */
#define X86_BUG_AMD_E400X86_BUG(13) /* CPU is among the affected by Erratum 400 */
+#define X86_BUG_CPU_MELTDOWNX86_BUG(14) /* CPU is affected by meltdown attack and needs kernel page table isolation */
+#define X86_BUG_SPECTRE_V1X86_BUG(15) /* CPU is affected by Spectre variant 1 attack with conditional branches */
+#define X86_BUG_SPECTRE_V2X86_BUG(16) /* CPU is affected by Spectre variant 2 attack with indirect branches */
+#define X86_BUG_SPEC_STORE_BYPASSX86_BUG(17) /* CPU is affected by speculative store bypass attack */
+#define X86_BUG_L1TFX86_BUG(18) /* CPU is affected by L1 Terminal Fault */

#endif /* _ASM_X86_CPUFEATURES_H */
--- linux-4.15.0.orig/tools/arch/x86/include/asm/disabled-features.h
+++ linux-4.15.0/tools/arch/x86/include/asm/disabled-features.h
@@ -50,6 +50,12 @@
#define DISABLE_LA57 (1<<(X86_FEATURE_LA57 & 31))
#endif
+#ifdef CONFIG_PAGE_TABLE_ISOLATION
+ #define DISABLE_PTI 0
```
/* Make sure to add features to the correct mask */
 @@ -60,7 +66,7 @@
#define DISABLED_MASK4(DISABLE_PCID)
#define DISABLED_MASK50
#define DISABLED_MASK60
-#define DISABLED_MASK7
+#define DISABLED_MASK7(DISABLE_PTI)
#define DISABLED_MASK80
#define DISABLED_MASK9(DISABLE_MPX)
#define DISABLED_MASK100
 --- linux-4.15.0.orig/tools/arch/x86/include/asm/required-features.h
+++ linux-4.15.0/tools/arch/x86/include/asm/required-features.h
@@ @ -106,6 +106,7 @@
#define REQUIRED_MASK150
#define REQUIRED_MASK16(NEED_LA57)
#define REQUIRED_MASK170
-#define REQUIRED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 18)
+#define REQUIRED_MASK180
+#define REQUIRED_MASK180
#define REQUIRED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 19)

#define DISABLED_PCID
#define DISABLED_PTI		(1 << (X86_FEATURE_PTI & 31))
#define DISABLED_MPX
#define REQUIRED_MASK15
#define REQUIRED_MASK16(NEED_LA57)
#define REQUIRED_MASK170
-#define REQUIRED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 18)
+#define REQUIRED_MASK180
+#define REQUIRED_MASK180
#define REQUIRED_MASK_CHECK BUILD_BUG_ON_ZERO(NCAPINTS != 19)

--- linux-4.15.0.orig/tools/bpf/Makefile
+++ linux-4.15.0/tools/bpf/Makefile
@@ -9,6 +9,35 @@
CFLAGS += -Wall -O2
CFLAGS += -D__EXPORTED_HEADERS__ -I../../include/uapi -I../../include
+ifeq ($(srctree),)
+srctree := $(patsubst %/,%,$(dir $(CURDIR)))
+srctree := $(patsubst %/,%,$(dir $(srctree)))
+endif
+
+FEATURE_USER = .bpf
+FEATURE_TESTS = libbfd disassembler-four-args
+FEATURE_DISPLAY = libbfd disassembler-four-args
+
+ifeq ($($(srctree)),)
+ifeq ($(filter-out $(NON_CHECK_FEAT_TARGETS),$(MAKECMDGOALS)),)
+endif

+endif
+
+ifeq ($(check_feat),1)
+ifeq ($(FEATURES_DUMP),)
+include $(srctree)/tools/build/Makefile.feature
+else
+include $(FEATURES_DUMP)
+endif
+endif
+
+ifeq ($(feature-disassembler-four-args), 1)
+CFLAGS += -DDISASM_FOUR_ARGS_SIGNATURE
+endif
+
%.yacc.c: %.y
$(YACC) -o $@ -d $<
--- linux-4.15.0.orig/tools/bpf/bpf_dbg.c
+++ linux-4.15.0/tools/bpf/bpf_dbg.c
@@ -1063,7 +1063,7 @@
static int cmd_load(char *arg)
{
-char *subcmd, *cont, *tmp = strdup(arg);
+char *subcmd, *cont = NULL, *tmp = strdup(arg);
int ret = CMD_OK;
subcmd = strtok_r(tmp, " ", &cont);
@@ -1073,7 +1073,10 @@
bpf_reset();
bpf_reset_breakpoints();
-ret = cmd_load_bpf(cont);
+if (!cont)
+ret = CMD_ERR;
+else
+ret = cmd_load_bpf(cont);
} else if (matches(subcmd, "pcap") == 0) {
ret = cmd_load_pcap(cont);
} else {
--- linux-4.15.0.orig/tools/bpf/bpf_jit_disasm.c
+++ linux-4.15.0/tools/bpf/bpf_jit_disasm.c
@@ -72,7 +72,14 @@
disassemble_init_for_target(&info);
+#ifdef DISASM_FOUR_ARGS_SIGNATURE
+disassemble = disassembler(info.arch,

Open Source Used In 5GaaS Edge AC-4 35716


+ bfd_big_endian(bfdf),
+ info.mach,
+ bfd);  
+#else
    disassemble = disassembler(bfdf);
+#endif
assert(disassemble);

do {
--- linux-4.15.0.orig/tools/bpf/bpftool/Makefile
+++ linux-4.15.0/tools/bpf/bpftool/Makefile
@@ -53,13 +53,46 @@
CFLAGS += -O2
CFLAGS += -W -Wall -Wextra -Wno-unused-parameter -Wshadow
CFLAGS += -D__EXPORTED_HEADERS__ -I$(srctree)/tools/include/uapi -I$(srctree)/tools/include -I$(srctree)/tools/lib/bpf -I$(srctree)/kernel/bpf/
-LIBS = -lelf -lbfd -lopcodes $(LIBBPF)
+LIBS = -lelf $(LIBBPF)
+
+FEATURE_USER = .bpftool
+FEATURE_TESTS = libbfd disassembler-four-args
+FEATURE_DISPLAY = libbfd disassembler-four-args
+
+check_feat := 1
+NONE_CHECK_FEAT_TARGETS := clean uninstall doc doc-clean doc-install doc-uninstall
+ifdef MAKECMDGOALS
+ifeq ($(filter-out $(NON_CHECK_FEAT_TARGETS),$(MAKECMDGOALS)),)
+  check_feat := 0
+endif
+endif
+
+ifeq ($(feature-disassembler-four-args), 1)
+endif
+
+ifeq ($(check_feat),1)
+ifeq ($(FEATURES_DUMP),)
+include $(srctree)/tools/build/Makefile.feature
+else
+include $(FEATURES_DUMP)
+endif
+endif
+
+ifeq ($(feature-disassembler-four-args), 1)
+CFLAGS += -DDISASM_FOUR_ARGS_SIGNATURE
+endif

include $(wildcard *.d)

all: $(OUTPUT)bpftool

-SRCS=$(wildcard *.c)
+BFD_SRCS = jit_disasm.c
+
+SRCS = $(filter-out $(BFD_SRCS),$(wildcard *.c))
+
+ifeq ($(feature-libbfd),1)
+CFLAGS += -DHAVE_LIBBFD_SUPPORT
+SRCS += $(BFD_SRCS)
+LIBS += -lbfd -lopcodes
+endif
+
OBJJS=$(patsubst %.c,${OUTPUT%.o},${SRCS}) ${OUTPUT}disasm.o

$(OUTPUT)disasm.o: $(srctree)/kernel/bpf/disasm.c

--- linux-4.15.0.orig/tools/bpf/bpftool/bash-completion/bpftool
+++ linux-4.15.0/tools/bpf/bpftool/bash-completion/bpftool
@@ -98,7 +98,7 @@
    printf $type
+
    [[ -n $type ]] && printf $type
}

_bpftool_map_update_get_id()
--- linux-4.15.0.orig/tools/bpf/bpftool/common.c
+++ linux-4.15.0/tools/bpf/bpftool/common.c
@@ -124,16 +124,17 @@
    return 0;
 }

-int open_obj_pinned(char *path)
+int open_obj_pinned(char *path, bool quiet)
{
    int fd;

    fd = bpf_obj_get(path);
    if (fd < 0) { 
        -p_err("bpf obj get (%s): %s", path,
-      errno == EACCES && !is_bpfss(dirname(path)) ?
-      "directory not in bpf file system (bpffs)"
-      : 
-      strerror(errno));
+    if (!quiet)
+        +p_err("bpf obj get (%s): %s", path,
+      errno == EACCES && !is_bpfss(dirname(path)) ?
+      "directory not in bpf file system (bpffs)"
+      : 
+      strerror(errno));
    return -1;
    }
enum bpf_obj_type type;
int fd;

-fd = open_obj_pinned(path);
+fd = open_obj_pinned(path, false);
if (fd < 0)
  return -1;

fd = get_fd_by_id(id);
if (fd < 0) {
  -p_err("can't get prog by id (%u): %s", id, strerror(errno));
  +p_err("can't open object by id (%u): %s", id, strerror(errno));
  return -1;
}

while ((n = getline(&line, &line_n, fdi))) {
  char *value;
  int len;

  while ((ftse = fts_read(fts))) {
    if (!(ftse->fts_info & FTS_F))
      continue;
    -fd = open_obj_pinned(ftse->fts_path);
    +fd = open_obj_pinned(ftse->fts_path, true);
    if (fd < 0)
      continue;

--- linux-4.15.0.orig/tools/bpf/bpftool/jit_disasm.c
+++ linux-4.15.0/tools/bpf/bpftool/jit_disasm.c
@@ -10,6 +10,8 @@
 * Licensed under the GNU General Public License, version 2.0 (GPLv2)
 */

+#define _GNU_SOURCE
+#include <stdio.h>
#include <stdarg.h>
#include <stdint.h>
#include <stdio.h>

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va_start(ap, fmt);
+err = vasprintf(&s, fmt, ap);
+va_end(ap);
+if (err < 0)
+return -1;
++if (!oper_count) {
    int i;

-s = va_arg(ap, char *);
-
/* Strip trailing spaces */
i = strlen(s) - 1;
while (s[i] == ' ')
@@ -68,11 +74,10 @@
} else if (!strcmp(fmt, ",")) {
    /* Skip */
} else {
-s = va_arg(ap, char *);
jsonw_string(json_wtr, s);
oper_count++;
}
-va_end(ap);
+free(s);
return 0;
}

disassemble_init_for_target(&info);

+#ifdef DISASM_FOUR_ARGS_SIGNATURE
+disassemble = disassembler(info.arch,
+  bfd_big_endian(bfdf),
+  info.mach,
+  bfd);
+#else
+disassemble = disassembler(bfdf);
+#endif
+assert(disassemble);

if (json_output)
bfd_close(bfdf);
}
+
+int disasm_init(void)
+{
+bfd_init();
+return 0;
+
--- linux-4.15.0.orig/tools/bpf/bpftool/main.c
+++ linux-4.15.0/tools/bpf/bpftool/main.c
@@ -33,7 +33,6 @@
/* Author: Jakub Kicinski <kubakici@wp.pl> */

-#include <bfd.h>
#include <ctype.h>
#include <errno.h>
#include <getopt.h>
@@ -327,8 +326,6 @@
if (argc < 0)
usage();

-bfd_init();
-
ret = cmd_select(cmds, argc, argv, do_help);

if (json_output)
+static inline
+void disasm_print_insn(unsigned char *image, ssize_t len, int opcodes)
+{
+}
+
+static inline int disasm_init(void)
+{
+p_err("No libbfd support");
+return -1;
+}
+
+/* on per cpu maps we must copy the provided value on all value instances */
+static void fill_per_cpu_value(struct bpf_map_info *info, void *value)
+{
+unsigned int i, n, step;
+
+if (!map_is_per_cpu(info->type))
+    return;
+
+n = get_possible_cpus();
+step = round_up(info->value_size, 8);
+for (i = 1; i < n; i++)
+    memcpy(value + i * step, value, info->value_size);
+
+static int parse_elem(char **argv, struct bpf_map_info *info,
        void *key, void *value, __u32 key_size, __u32 value_size,
        __u32 *flags, __u32 **value_fd)
@@ -381,6 +395,8 @@
        argv = parse_bytes(argv, "value", value, value_size);
        if (!argv)
            return -1;
+        fill_per_cpu_value(info, value);
    }
+
    return parse_elem(argv, info, key, NULL, key_size, value_size,
-- linux-4.15.0.orig/tools/bpf/bpftool/map.c
+++ linux-4.15.0/tools/bpf/bpftool/map.c
@@ -302,6 +302,20 @@

return argv + i;
}

/* on per cpu maps we must copy the provided value on all value instances */
+static void fill_per_cpu_value(struct bpf_map_info *info, void *value)
+{
+unsigned int i, n, step;
+
+if (!map_is_per_cpu(info->type))
+    return;
+
+n = get_possible_cpus();
+step = round_up(info->value_size, 8);
+for (i = 1; i < n; i++)
+    memcpy(value + i * step, value, info->value_size);
+
+static int parse_elem(char **argv, struct bpf_map_info *info,
        void *key, void *value, __u32 key_size, __u32 value_size,
        __u32 *flags, __u32 **value_fd)
@@ -381,6 +395,8 @@
        argv = parse_bytes(argv, "value", value, value_size);
        if (!argv)
            return -1;
+        fill_per_cpu_value(info, value);
    }
+
    return parse_elem(argv, info, key, NULL, key_size, value_size,
-- linux-4.15.0.orig/tools/bpf/bpftool/prog.c
+++ linux-4.15.0/tools/bpf/bpftool/prog.c
@@ -95,13 +95,14 @@
static int prog_fd_by_tag(unsigned char *tag)
{
    struct bpf_prog_info info = {};  
    __u32 len = sizeof(info);
    unsigned int id = 0;
    int err;
    int fd;

    while (true) {
        struct bpf_prog_info info = {};    
        __u32 len = sizeof(info);
        err = bpf_prog_get_next_id(id, &id);
        if (err) {
            p_err("%s", strerror(errno));
            @ @ -359,7 +360,9 @@
            if (fd < 0)
                return -1;

            -return show_prog(fd);
            +err = show_prog(fd);
            +close(fd);
            +return err;
        }

        if (argc)
            @@ -518,6 +521,9 @@
            int fd;

            if (is_prefix(*argv, "jited")) {
                +if (disasm_init())
                +return -1;
                
                member_len = &info.jited_prog_len;
                member_ptr = &info.jited_prog_insns;
            } else if (is_prefix(*argv, "xlated")) {

            --- linux-4.15.0.orig/tools/build/Build.include
            +++ linux-4.15.0/tools/build/Build.include
                @ @ -12,6 +12,7 @@
            # Convenient variables
            comma   := ,
            squote  := '
            +pound   := \\#

            ###
            # Name of target with a ' ' as filename prefix. foo/bar.o => foo/.bar.o
            @ @ -43,11 +44,11 @@
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-HOSTCC ?= gcc
-HOSTLD ?= ld
-HOSTAR ?= ar
-
export HOSTCC HOSTLD HOSTAR

ifeq ($(V),1)
@@ -43,7 +39,7 @@
$(Q)$(MAKE) $(build)=fixdep
$(OUTPUT)fixdep: $(OUTPUT)fixdep-in.o
-$(QUIET_LINK)$HOSTCC $(LDFLAGS) -o $@ $<
+$(QUIET_LINK)$HOSTCC $(HOSTLDFLAGS) -o $@ $<

FORCE:

--- linux-4.15.0.orig/tools/build/Makefile.feature
+++ linux-4.15.0/tools/build/Makefile.feature
@@ -7,7 +7,7 @@
feature_check = $(eval $(feature_check_code))
define feature_check_code
- feature-$(1) := $(shell $(MAKE) OUTPUT=$(OUTPUT_FEATURES) CFLAGS="$(EXTRA_CFLAGS) $(FEATURE_CHECK_CFLAGS-$(1))" CXXFLAGS="$(FEATURE_CHECK_CXXFLAGS-$(1))" LDFLAGS="$(LDFLAGS) $(FEATURE_CHECK_LDFLAGS-$(1))"
+C $(feature_dir) $(OUTPUT_FEATURES)test-$1.bin >/dev/null 2>/dev/null && echo 1 || echo 0)
+ feature-$(1) := $(shell $(MAKE) OUTPUT=$(OUTPUT_FEATURES) CC="$(CC)" CXX="$(CXX)"
+ CFLAGS="$(EXTRA_CFLAGS) $(FEATURE_CHECK_CFLAGS-$(1))"
+CXXFLAGS="$(FEATURE_CHECK_CXXFLAGS-$(1))" LDFLAGS="$(LDFLAGS) $(FEATURE_CHECK_LDFLAGS-$(1))"
+ $(feature_dir) $(OUTPUT_FEATURES)test-$1.bin >/dev/null 2>/dev/null && echo 1 || echo 0)
endef

feature_set = $(eval $(feature_set_code))
@@ -31,8 +31,11 @@
backtrace        \
  dwarf           \
  dwarf_getlocations  \
+ eventfd         \
  fortify-source  \
  sync-compare-and-swap  \
+  get_current_dir_name  \
+  gettid\n  glibc          \
  gtk2           \
  gtk2-infobar   \
@@ -56,6 +59,7 @@
libunwind-arm   \

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libunwind-aarch64
pthread-attr-setaffinity-np
+ pthread-barrier
stackprotect-all
timerfd
libdw-dwarf-unwind
@@ -76,8 +80,8 @@
cplus-demangle
hello
libbabeltrace
-l liberty
-l liberty-z
+ + libbfd-liberty
+ + libbfd-liberty-z
libunwind-debug-frame
libunwind-debug-frame-arm
libunwind-debug-frame-aarch64
--- linux-4.15.0.orig/tools/build/feature/Makefile
+++ linux-4.15.0/tools/build/feature/Makefile
@@ -5,16 +5,19 @@
test-bionic.bin
test-dwarf.bin
test-dwarf_getlocations.bin
+ test-eventfd.bin
test-fortify-source.bin
test-sync-compare-and-swap.bin
+ test-get_current_dir_name.bin
test-glibc.bin
test-gtk2.bin
test-gtk2-infobar.bin
test-hello.bin
test-libaudit.bin
test-libbfd.bin
- test-liberty.bin
- test-liberty-z.bin
+ + test-disassembler-four-args.bin
+ + test-libbfd-liberty.bin
+ + test-libbfd-liberty-z.bin
test-cplus-demangle.bin
test-libelf.bin
test-libelf-getphdrnum.bin
@@ -37,6 +40,7 @@
test-libunwind-debug-frame-arm.bin
test-libunwind-debug-frame-aarch64.bin
test-pthread-attr-setaffinity-np.bin
+ test-pthread-barrier.bin
+ test-stackprotect-all.bin
test-timerfd.bin
FILES := $(addprefix $(OUTPUT),$(FILES))

-CC ?= $(CROSS_COMPILE)gcc
-CXX ?= $(CROSS_COMPILE)g++
PKG_CONFIG ?= $(CROSS_COMPILE)pkg-config
LLVM_CONFIG ?= llvm-config

@ @ -79.6 +82.9 @@
$(OUTPUT)test-pthread-attr-setaffinity-np.bin:
 $(BUILD) -D_GNU_SOURCE -lpthread

+$($(OUTPUT)test-pthread-barrier.bin:
 +$(BUILD) -lpthread
 +
 $(OUTPUT)test-stackprotector-all.bin:
 $(BUILD) -fstack-protector-all

@ @ -91.6 +97.12 @@
$(OUTPUT)test-libelf.bin:
 $(BUILD) -lelf

+$($(OUTPUT)test-eventfd.bin:
 +$(BUILD)
 +
 +$(OUTPUT)test-get_current_dir_name.bin:
 +$(BUILD)
 +
 $(OUTPUT)test-glibc.bin:
 $(BUILD)

@ @ -186.12 +198.15 @@
$(BUILD)

$(OUTPUT)test-libbfd.bin:
 -$(BUILD) -DPACKAGE="perf" -lbfd -lz -liberty -ldl
 +$(BUILD) -DPACKAGE="perf" -lbfd -ldl
 +
 +$(OUTPUT)test-disassembler-four-args.bin:
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+$\text{(BUILD)}$ -lbfd -lopcodes

-$\text{(OUTPUT)}$test-liberty.bin:
+$\text{(OUTPUT)}$test-libbfd-liberty.bin:
$\text{(CC)}$ $(\text{CFLAGS})$ -Wall -Werror $\text{test-libbfd.c}$ -DPACKAGE=""perf"" $(\text{LDFLAGS})$ -lbfd -ldl -liberty

-$\text{(OUTPUT)}$test-liberty-z.bin:
+$\text{(OUTPUT)}$test-libbfd-liberty-z.bin:
$\text{(CC)}$ $(\text{CFLAGS})$ -Wall -Werror $\text{test-libbfd.c}$ -DPACKAGE=""perf"" $(\text{LDFLAGS})$ -lbfd -ldl -liberty -lz

$\text{(OUTPUT)}$test-cplus-demangle.bin:
@ @ -236,6 +251,9 @@
$\text{(OUTPUT)}$test-cxx.bin:
$\text{(BUILDXX)}$ -std=gnu++11

+$\text{(OUTPUT)}$test-gettid.bin:
+$\text{(BUILD)}$
+
$\text{(OUTPUT)}$test-jvmti.bin:
$\text{(BUILD)}$

--- linux-4.15.0.orig/tools/build/feature/test-all.c
+++ linux-4.15.0/tools/build/feature/test-all.c
@@ -34,6 +34,14 @@
 # include "test-libelf-mmap.c"
 
 #undef main

+#define main main_test_get_current_dir_name
+#include "test-get_current_dir_name.c"
+#undef main
+
+#define main main_test_gettid
+#include "test-gettid.c"
+#undef main
+
+#define main main_test_glibc
# include "test-glibc.c"
#undef main
@@ -46,6 +54,10 @@
 # include "test-dwarf_getlocations.c"
 #undef main

+#define main main_test_eventfd
+#include "test-eventfd.c"
+#undef main
+
+#define main main_test_libelf_getphdrnum
# include "test-libelf-getphdrnum.c"
#include "test-pthread-atr-setaffinity-np.c"

#undef main
@@ -118,6 +130,10 @@
# include "test-pthread-barrier.c"
+#define main main_test_pthread_barrier
+
# define main main_test_sched_getcpu
# include "test-sched_getcpu.c"
#undef main
@@ -166,9 +182,12 @@
main_test_hello();
main_test_libelf();
main_test_libelf_mmap();
+main_test_get_current_dir_name();
+main_test_gettid();
main_test_glibc();
main_test_dwarf();
main_test_dwarf_getlocations();
+main_test_eventfd();
main_test_libelf_getphdrnum();
main_test_libelf_getelfnote();
main_test_libelf_getshdrstrndx();
@@ -187,6 +206,7 @@
main_test_sync_compare_and_swap(argc, argv);
main_test_zlib();
main_test_pthread_atr_setaffinity_np();
+main_test_pthread_barrier();
main_test_lzma();
main_test_get_cpuid();
main_test_bpf();
--- linux-4.15.0.orig/tools/build/feature/test-disassembler-four-args.c
+++ linux-4.15.0/tools/build/feature/test-disassembler-four-args.c
@@ -0,0 +1,15 @@
+#include <bfd.h>
+#include <dis-asm.h>
+
+int main(void)
+{
+bfd *abfd = bfd_openr(NULL, NULL);
+
+disassembler(bfd_get_arch(abfd),
+             bfd_big_endian(abfd),
+             bfd_get_mach(abfd),
+             abfd);
+ return 0;
+
--- linux-4.15.0.orig/tools/build/feature/test-eventfd.c
+++ linux-4.15.0/tools/build/feature/test-eventfd.c
@@ -0,0 +1,9 @@
+// SPDX-License-Identifier: GPL-2.0
+// Copyright (C) 2018, Red Hat Inc, Arnaldo Carvalho de Melo <acme@redhat.com>
+
+#include <sys/eventfd.h>
+
+int main(void)
+{
+  return eventfd(0, EFD_NONBLOCK);
+}
--- linux-4.15.0.orig/tools/build/feature/test-get_current_dir_name.c
+++ linux-4.15.0/tools/build/feature/test-get_current_dir_name.c
@@ -0,0 +1,10 @@
+// SPDX-License-Identifier: GPL-2.0
+#define _GNU_SOURCE
+#include <unistd.h>
+#include <stdlib.h>
+
+int main(void)
+{
+  free(get_current_dir_name());
+  return 0;
+}
--- linux-4.15.0.orig/tools/build/feature/test-gettid.c
+++ linux-4.15.0/tools/build/feature/test-gettid.c
@@ -0,0 +1,11 @@
+// SPDX-License-Identifier: GPL-2.0
+// Copyright (C) 2019, Red Hat Inc, Arnaldo Carvalho de Melo <acme@redhat.com>
+#define _GNU_SOURCE
+#include <unistd.h>
+
+int main(void)
+{
+  return gettid();
+}
+  
+#undef _GNU_SOURCE
--- linux-4.15.0.orig/tools/build/feature/test-pthread-barrier.c
+++ linux-4.15.0/tools/build/feature/test-pthread-barrier.c
@@ -0,0 +1,12 @@
+// SPDX-License-Identifier: GPL-2.0
+// Copyright (C) 2019, Red Hat Inc, Arnaldo Carvalho de Melo <acme@redhat.com>
+#define _GNU_SOURCE
+#include <unistd.h>
+
+int main(void)
+{
+  return pthread_barrier_init();
+}
+  
+#undef _GNU_SOURCE
+int main(void)
+
+pthread_barrier_t barrier;
+
+pthread_barrier_init(&barrier, NULL, 1);
+pthread_barrier_wait(&barrier);
+return pthread_barrier_destroy(&barrier);
+
} ---

--- linux-4.15.0.orig/tools/cgroup/Makefile
+++ linux-4.15.0/tools/cgroup/Makefile
@@ -1,7 +1,6 @@
# SPDX-License-Identifier: GPL-2.0
# Makefile for cgroup tools

-CC = $(CROSS_COMPILE)gcc
CFLAGS = -Wall -Wextra

all: cgroup_event_listener
---
+++ linux-4.15.0/tools/gpio/Build
@@ -1,3 +1,4 @@
+gpio-utils-y += gpio-utils.o
lsgpio-y += lsgpio.o gpio-utils.o
gpio-hammer-y += gpio-hammer.o gpio-utils.o
gpio-event-mon-y += gpio-event-mon.o gpio-utils.o
---
+++ linux-4.15.0/tools/gpio/Makfile
@@ -3,7 +3,11 @@
bindir ?= /usr/bin

-ifeq ($(srctree),)
+ifndef building_out_of_srctree
srctree := $(patsubst %/,%,$(dir $(CURDIR)))
srctree := $(patsubst %/,%,$(dir $(srctree)))
endif
@@ -12,8 +16,6 @@
# (this improves performance and avoids hard-to-debug behaviour);
MAKEFLAGS += -r

-CC = $(CROSS_COMPILE)gcc
-LD = $(CROSS_COMPILE)ld
CFLAGS += -O2 -Wall -g -DGNU_SOURCE -I$(OUTPUT)include
ALL_TARGETS := lsgpio gpio-hammer gpio-event-mon
@@ -33,11 +35,15 @@
prepare: \$(OUTPUT)include/linux/gpio.h

+\$(GPIO_UTILS_IN): prepare FORCE
+\$(Q)\$(MAKE) \$(build)=gpio-utils
+
#
# lsgpio
#
LSGPIO_IN := \$(OUTPUT)lsgpio-in.o
-\$(LSGPIO_IN): prepare FORCE
+\$(LSGPIO_IN): prepare FORCE \$(OUTPUT)gpio-utils-in.o
\$(Q)\$(MAKE) \$(build)=lsgpio
\$(OUTPUT)lsgpio: \$(LSGPIO_IN)
\$(QUIET_LINK)\$(CC) \$(CFLAGS) \$(LDFLAGS) \$< -o \$@
@@ -46,7 +52,7 @@
# gpio-hammer
#
GPIO_HAMMER_IN := \$(OUTPUT)gpio-hammer-in.o
-\$(GPIO_HAMMER_IN): prepare FORCE
+\$(GPIO_HAMMER_IN): prepare FORCE \$(OUTPUT)gpio-utils-in.o
\$(Q)\$(MAKE) \$(build)=gpio-hammer
\$(OUTPUT)gpio-hammer: \$(GPIO_HAMMER_IN)
\$(QUIET_LINK)\$(CC) \$(CFLAGS) \$(LDFLAGS) \$< -o \$@
@@ -55,7 +61,7 @@
# gpio-event-mon
#
GPIO_EVENT_MON_IN := \$(OUTPUT)gpio-event-mon-in.o
-\$(GPIO_EVENT_MON_IN): prepare FORCE
+\$(GPIO_EVENT_MON_IN): prepare FORCE \$(OUTPUT)gpio-utils-in.o
\$(Q)\$(MAKE) \$(build)=gpio-event-mon
\$(OUTPUT)gpio-event-mon: \$(GPIO_EVENT_MON_IN)
\$(QUIET_LINK)\$(CC) \$(CFLAGS) \$(LDFLAGS) \$< -o \$@
--- linux-4.15.0.orig/tools/gpio/gpio-event-mon.c
+++ linux-4.15.0/tools/gpio/gpio-event-mon.c
@@ -23,6 +23,7 @@
#include <getopt.h>
#include <inttypes.h>
#include <sys/ioctl.h>
+##include <sys/types.h>
#include <linux/gpio.h>

int monitor_device(const char *device_name,
--- linux-4.15.0.orig/tools/gpio/gpio-hammer.c
device_name = optarg;
break;
case 'o':
    -lines[i] = strtoul(optarg, NULL, 10);
+/*
+ * Avoid overflow. Do not immediately error, we want to
+ * be able to accurately report on the amount of times
+ * '-o' was given to give an accurate error message
+ */
+if (i < GPIOHANDLES_MAX)
+lines[i] = strtoul(optarg, NULL, 10);
+i++;
break;
case '?':
    @ @ -146,6 +153,14 @ @
return -1;
}
+
+if (i >= GPIOHANDLES_MAX) {
+fprintf(stderr,
+"Only %d occurences of '-o' are allowed, %d were found\n",
+GPIOHANDLES_MAX, i + 1);
+return -1;
+}
+nlines = i;

if (!device_name || !nlines) {
    --- linux-4.15.0.orig/tools/hv/Makefile
    +++ linux-4.15.0/tools/hv/Makefile
    @ @ -1,7 +1,6 @ @
    # SPDX-License-Identifier: GPL-2.0
    # Makefile for Hyper-V tools

    -CC = $(CROSS_COMPILE)gcc
    WARNINGS = -Wall -Wextra
    CFLAGS = $(WARNINGS) -g $(shell getconf LFS_CFLAGS)

    --- linux-4.15.0.orig/tools/hv_fcopy_daemon.c
    +++ linux-4.15.0/tools/hv_fcopy_daemon.c
    @ @ -23,13 +23,14 @ @
    #include <unistd.h>
    #include <errno.h>
    #include <linux/hyperv.h>
static int target_fd;
-static char target_fname[W_MAX_PATH];
+static char target_fname[PATH_MAX];
static unsigned long long filesize;

static int hv_start_fcopy(struct hv_start_fcopy *smsg)
@@ -232,6 +233,7 @@
    break;

default:
+    error = HV_E_FAIL;
    syslog(LOG_ERR, "Unknown operation: %d",
               buffer.hdr.operation);

--- linux-4.15.0.orig/tools/hv/hv_kvp_daemon.8
+++ linux-4.15.0/tools/hv/hv_kvp_daemon.8
@@ -0,0 +1,26 @@
+.TH HV_KVP_DAEMON 8
+.SH NAME
+hv_kvp_daemon \- Hyper-V Key Value Pair daemon
+.SH SYNOPSIS
+.ft B
+.B hv_kvp_daemon
+.br
+.SH DESCRIPTION
+Ifhv_kvp_daemon
+is the userspace component of the Hyper-V key value pair functionality,
+communicating via a netlink socket with the kernel HV-KVP driver.
+This pairing allows the Hyper-V host to pass configuration information
+(such as IP addresses) to the guest and allows the host to obtain guest
+version information.
+
+.SH FILES
+.ta
+.nf
+/var/opt/hyperv/.kvp_pool_*
+.fi
+
+.SH AUTHORS
+.nf
Found a match; just move the remaining entries up.
*/

-struct hv_kvp_ipaddr_value *ip_buffer;
+struct hv_kvp_ipaddr_value *ip_buffer = NULL;

int str_len;

/*
 * This is a little overcautious, but it's necessary to suppress some
 * false warnings from gcc 8.0.1.
 */

-snprintf(cmd, sizeof(cmd), KVPS ничего_path "%s %s",
  "hv_set_ifconfig", if_file);
+str_len = snprintf(cmd, sizeof(cmd), KVPS ничего_path "%s %s",
   "hv_set_ifconfig", if_file);
+/+

+if (str_len <= 0 || (unsigned int)str_len >= sizeof(cmd)) {
  +syslog(LOG_ERR, "Cmd '%s' (len=%d) may be too long",
    cmd, str_len);
  +return HV_E_FAIL;
  +}
  +
  if (system(cmd)) {
syslog(LOG_ERR, "Failed to execute cmd '%s'; error: %d %s",
cmd, errno, strerror(errno));
@@ -1369,6 +1380,8 @@
daemonize = 0;
break;
case 'h':
+print_usage(argv);
+exit(0);
default:
  print_usage(argv);
  exit(EXIT_FAILURE);
--- linux-4.15.0.orig/tools/hv/hv_vss_daemon.c
+++ linux-4.15.0/tools/hv/hv_vss_daemon.c
@@ -22,6 +22,7 @@
#include <sys/poll.h>
#include <sys/ioct1.h>
#include <sys/stat.h>
+#include <sys/sysmacros.h>
#include <fcntl.h>
#include <stdio.h>
#include <mntent.h>
@@ -171,6 +172,8 @@
daemonize = 0;
break;
case 'h':
+print_usage(argv);
+exit(0);
default:
  print_usage(argv);
  exit(EXIT_FAILURE);
--- linux-4.15.0.orig/tools/hv/lsvmbus
+++ linux-4.15.0/tools/hv/lsvmbus
@@ -1,13 +1,13 @@
-#!/usr/bin/env python
+#!/usr/bin/env python3
# SPDX-License-Identifier: GPL-2.0

import os
from optparse import OptionParser

+help_msg = "print verbose messages. Try -vv, -vvv for more verbose messages"
parser = OptionParser()
-parse.add_option("-v", "--verbose", dest="verbose",
- help="print verbose messages. Try -vv, -vvv for more verbose messages",
-dest="verbose", action="count")
+parser.add_option(  
+  "-v", "--verbose", dest="verbose", help=help_msg, action="count")
(options, args) = parser.parse_args()

vmbus_sys_path = '/sys/bus/vmbus/devices'
if not os.path.isdir(vmbus_sys_path):
    -print "%s doesn't exist: exiting..." % vmbus_sys_path
+print("%s doesn't exist: exiting..." % vmbus_sys_path)
exit(-1)

vmbus_dev_dict = {
    '{0e0b6031-5213-4934-818b-38d90ced39db}' : '[Operating system shutdown]',
    '{9527e630-d0ae-497b-adce-e80ab0175caf}' : '[Time Synchronization]',
    '{57164f39-9115-4e78-ab55-382f3bd5422d}' : '[Heartbeat]',
    '{a9a0f4e7-5a45-4d96-b827-8a841e8c03e6}' : '[Data Exchange]',
    '{35fae29-ea23-4236-96ae-3a6ebacba440}' : '[Backup (volume checkpoint)]',
    '{3d414be3-dee4-41c8-9ae7-6b174977c192}' : '[Guest services]',
    '{525074dc-8985-46e2-8057-a307dc18a502}' : '[Dynamic Memory]',
    '{cfa8b69e-5b4a-4cc0-b98b-8ba1a1f3f95a}' : 'Synthetic mouse',
    '{f912ad66-2b17-48ea-bd65-f927a61c7684}' : 'Synthetic keyboard',
    '{da07a802-e377-4aac-8e77-0558b1073f8}' : 'Synthetic framebuffer adapter',
    '{f8615163-df3e-46c5-913f-f2d2f965ed0e}' : 'Synthetic network adapter',
    '{32421632-86cb-44a2-9b5e-50d1417354f5}' : 'Synthetic IDE Controller',
    '{ba61639d-04a1-4d29-b605-72e2ff1bdcf7}' : 'Synthetic SCSI Controller',
    '{2f9b8c4a-0069-4af3-b76b-6fd0be528cda}' : 'Synthetic fiber channel adapter',
    '{8c2eaf3-32a7-4b09-ab99-9b1f1e865b01}' : 'Synthetic RDMA adapter',
    '{44c4f61d-4444-4400-95d2-802e27ede19f}' : 'PCI Express pass-through',
    '{276aac4-ac15-426c-98dd-7521ad3f01fe}' : 'Reserved system device',
    '{f865716-3cb3-4a06-9a60-1889c5c45a5}' : 'Reserved system device',
    '{3375ab4f-9e15-4b30-b765-67acb0d607b}' : 'Reserved system device',
    '{0e06b031-5213-4934-818b-38d90ced39db}' : 'Operating system shutdown',
+    '{9527e630-d0ae-497b-adce-e80ab0175caf}' : '[Time Synchronization]',
+    '{57164f39-9115-4e78-ab55-382f3bd5422d}' : '[Heartbeat]',
+    '{a9a0f4e7-5a45-4d96-b827-8a841e8c03e6}' : '[Data Exchange]',
+    '{35fae29-ea23-4236-96ae-3a6ebacba440}' : '[Backup (volume checkpoint)]',
+    '{3d414be3-dee4-41c8-9ae7-6b174977c192}' : '[Guest services]',
+    '{525074dc-8985-46e2-8057-a307dc18a502}' : '[Dynamic Memory]',
+    '{f8e67716-3cb3-4a06-9a60-1889c5c45a5}' : 'Reserved system device',
+    '{f8615163-df3e-46c5-913f-f2d2f965ed0e}' : 'Synthetic network adapter',
+    '{32421632-86cb-44a2-9b5e-50d1417354f5}' : 'Synthetic IDE Controller',
+    '{ba61639d-04a1-4d29-b605-72e2ff1bdcf7}' : 'Synthetic SCSI Controller',
+    '{2f9b8c4a-0069-4af3-b76b-6fd0be528cda}' : 'Synthetic fiber channel adapter',
+    '{8c2eaf3-32a7-4b09-ab99-9b1f1e865b01}' : 'Synthetic RDMA adapter',
+    '{44c4f61d-4444-4400-95d2-802e27ede19f}' : 'PCI Express pass-through',
+    '{276aac4-ac15-426c-98dd-7521ad3f01fe}' : 'Reserved system device',
+    '{f865716-3cb3-4a06-9a60-1889c5c45a5}' : 'Reserved system device',
}
def get_vmbus_dev_attr(dev_name, attr):
    try:
        f = open('%s/%s/%s' % (vmbus_sys_path, dev_name, attr), 'r')
    return lines

class VMBus_Dev:
    pass

d = VMBus_Dev()
d.sysfs_path = '%s/%s' % (vmbus_sys_path, f)
d.vmbus_id = vmbus_id

vmbus_dev_list.append(d)

-vmbus_dev_list  = sorted(vmbus_dev_list, key = lambda d : int(d.vmbus_id))
+vmbus_dev_list = sorted(vmbus_dev_list, key=lambda d: int(d.vmbus_id))

for d in vmbus_dev_list:
    if verbose == 0:
        -print ('VMBUS ID ' + format0) % (d.vmbus_id, d.dev_desc)
elif verbose == 1:
    print('VMBUS ID ' + format1) %
    print('
    (''VMBUS ID ' + format1) %
    (d.vmbus_id, d.class_id, d.dev_desc, d.chn_vp_mapping)
}
else:
    print('VMBUS ID ' + format2) %
    print('
    (''VMBUS ID ' + format2) %
    (d.vmbus_id, d.class_id, d.dev_desc, d.device_id, d.sysfs_path, d.chn_vp_mapping)

--- linux-4.15.0.orig/tools/hv/lsvmbus.8
+++ linux-4.15.0/tools/hv/lsvmbus.8
@@ -0,0 +1,23 @@
+"  This page Copyright (C) 2016 Andy Whitcroft <apw@canonical.com>
+"  Distributed under the GPL v2 or later.
+.TH LSVMBUS 8
+.SH NAME
+lsvmbus \- List Hyper-V VMBus devices
+.SH SYNOPSIS
+.ft B
+.B lsvmbus [-vv]
+.br
+.SH DESCRIPTION
+\fBlsvmbus\fP
+displays devices attached to the Hyper-V VMBus.
+.SH OPTIONS
+\"  With -v more information is printed including the VMBus Rel_ID, class ID,
+Rel_ID, and which channel is bound to which virtual processor. Use -vv
+for additional detail including the Device_ID and the sysfs path.
+\"
+.SH AUTHORS
+.nf
+Written by Dexuan Cui <decui@microsoft.com>
--- linux-4.15.0.orig/tools/iio/Makefile
+++ linux-4.15.0/tools/iio/Makefile
@@ -12,8 +12,6 @@
# (this improves performance and avoids hard-to-debug behaviour);
MAKEFLAGS += -r

-CC = $(CROSS_COMPILE)gcc
-LD = $(CROSS_COMPILE)ld
CFLAGS += -O2 -Wall -g -D_GNU_SOURCE -I$(OUTPUT)include

ALL_TARGETS := iio_event_monitor lsio iio_generic_buffer
--- linux-4.15.0.orig/tools/iio/iio_utils.c
+++ linux-4.15.0/tools/iio/iio_utils.c
@@ -159,9 +159,9 @@
    *be = (endianchar == 'b');
    *bytes = padint / 8;
    if (*bits_used == 64)
@@ -159,9 +159,9 @@
    -*mask = ~0;
    +*mask = ~(0ULL);
    else
@@ -159,9 +159,9 @@
    -*mask = (1ULL << *bits_used) - 1;
    +*mask = (1ULL << *bits_used) - 1ULL;

    *is_signed = (signchar == 's');
    if (fclose(sysfsfp)) {
--- linux-4.15.0.orig/tools/include/linux/bitops.h
+++ linux-4.15.0/tools/include/linux/bitops.h
@@ -3,8 +3,6 @@
# include <asm/types.h>
-# include <linux/compiler.h>
-
+# ifndef __WORDSIZE
+# define __WORDSIZE (__SIZEOF_LONG__ * 8)
+endif
@@ -12,10 +10,9 @@
# ifndef BITS_PER_LONG
+ # define BITS_PER_LONG __WORDSIZE
+ #endif
+# include <linux/bits.h>
+ #include <linux/compiler.h>

-#define BIT_MASK(nr)(1UL << ((nr) % BITS_PER_LONG))
-#define BIT_WORD(nr)((nr) / BITS_PER_LONG)
-#define BITS_PER_BYTE
+ #define BITS_TO_LONGS(nr)DIV_ROUND_UP(nr, BITS_PER_BYTE * sizeof(long))
+ #define BITS_TO_U64(nr)DIV_ROUND_UP(nr, BITS_PER_BYTE * sizeof(u64))
+ #define BITS_TO_U32(nr)DIV_ROUND_UP(nr, BITS_PER_BYTE * sizeof(u32))
---- linux-4.15.0.orig/tools/include/linux/bits.h
+++ linux-4.15.0/tools/include/linux/bits.h
@@ -0,0 +1,26 @@
/* SPDX-License-Identifier: GPL-2.0 */
#endif /* __LINUX_BITS_H */
#include <asm/bitsperlong.h>

#define BIT(nr)            (1UL << (nr))
#define BIT_ULL(nr)        (1ULL << (nr))
#define BIT_MASK(nr)       (1UL << ((nr) % BITS_PER_LONG))
#define BIT_WORD(nr)       ((nr) / BITS_PER_LONG)
#define BIT_ULL_MASK(nr)   (1ULL << ((nr) % BITS_PER_LONG_LONG))
#define BIT_ULL_WORD(nr)   ((nr) / BITS_PER_LONG_LONG)
#define BITS_PER_BYTE     8

/*
 * Create a contiguous bitmask starting at bit position @l and ending at
 * position @h. For example
 * GENMASK_ULL(39, 21) gives us the 64bit vector 0x0000000fffffffff.
 * */
#define GENMASK(h, l)     
	 (((~0UL) - (1UL << (l)) + 1) & (~0UL >> (BITS_PER_LONG - 1 - (h))))

#define GENMASK_ULL(h, l) 
	 (((~0ULL) - (1ULL << (l)) + 1) & 
	 (~0ULL >> (BITS_PER_LONG_LONG - 1 - (h))))
#endif /* __LINUX_BITS_H */
--- linux-4.15.0.orig/tools/include/linux/string.h
+++ linux-4.15.0/tools/include/linux/string.h
@@ -14,7 +14,15 @@ */
* However uClibc headers also define __GLIBC__ hence the hack below
 */
#define strlcpy(char *dest, const char *src, size_t size) {
-if defined(__GLIBC__) && !defined(__UCLIBC__) 
+// pragma diagnostic was introduced in gcc 4.6
+// pragma diagnostic was introduced in gcc 4.6
+// pragma GCC diagnostic was introduced in gcc 4.6
+// pragma GCC diagnostic was introduced in gcc 4.6
+// pragma GCC diagnostic push
+// pragma GCC diagnostic ignored "-Wredundant-decls"
+extern size_t strlcpy(char *dest, const char *src, size_t size);
+/*
+ * GCC diagnostic ignored "-Wredundant-decls"
+ */
+} 
+/*
+ */
+extern size_t strlcpy(char *dest, const char *src, size_t size);
+if defined(__GLIBC__) && !defined(__UCLIBC__) 
+// GCC diagnostic was introduced in gcc 4.6
+// GCC diagnostic was introduced in gcc 4.6
+// GCC diagnostic was introduced in gcc 4.6
+// GCC diagnostic was introduced in gcc 4.6
+// GCC diagnostic push
+// GCC diagnostic ignored "-Wredundant-decls"
+endif 
endif

define KVM_CAP_HYPERV_SYNIC2 148

---
#!/usr/bin/env python3
#
# top-like utility for displaying kvm statistics
#
import struct
import re
import subprocess
from collections import defaultdict, namedtuple

VMX_EXIT_REASONS = {
    'EXCEPTION_NMI': 0,
}

ENCODING = locale.getpreferredencoding(False)

TRACE_FILTER = re.compile(r'^\[\d\]*$')

class Arch(object):
    @ -260,13 +261,23 @@
        return ArchX86(SVM_EXIT_REASONS)
    return

    + def tracepoint_is_child(self, field):
    +     if (TRACE_FILTER.match(field)):
    +         return None
    +     return field.split('(', 1)[0]

class ArchX86(Arch):
    def __init__(self, exit_reasons):
        self.sc_perf_evt_open = 298
        self.ioctl_numbers = IOCTL_NUMBERS
    self.exit_reason_field = 'exit_reason'
    self.exit_reasons = exit_reasons

    + def debugfs_is_child(self, field):
    +     """ Returns name of parent if 'field' is a child, None otherwise """
    +     return None

    class ArchPPC(Arch):
        def __init__(self):

---
# numbers depend on the wordsize.
char_ptr_size = ctypes.sizeof(ctypes.c_char_p)
self.ioctl_numbers['SET_FILTER'] = 0x80002406 | char_ptr_size << 16
+ self.exit_reason_field = 'exit_nr'
self.exit_reasons = {}

+ def debugfs_is_child(self, field):
+       """ Returns name of parent if 'field' is a child, None otherwise """
+       return None
+

class ArchA64(Arch):
    def __init__(self):
        self.sc_perf_evt_open = 241
        self.ioctl_numbers = IOCTL_NUMBERS
        self.exit_reason_field = 'esr_ec'
        self.exit_reasons = AARCH64_EXIT_REASONS

+ def debugfs_is_child(self, field):
+       """ Returns name of parent if 'field' is a child, None otherwise """
+       return None
+

class ArchS390(Arch):
    def __init__(self):
        self.sc_perf_evt_open = 331
        self.ioctl_numbers = IOCTL_NUMBERS
        self.exit_reason_field = None
        self.exit_reasons = None

+ def debugfs_is_child(self, field):
+       """ Returns name of parent if 'field' is a child, None otherwise """
+       if field.startswith('instruction_ '):
+           return 'exit_instruction'
+
+ARCH = Arch.get_arch()

@@ -331,9 +359,6 @@
PERF_TYPE_TRACEPOINT = 2
PERF_FORMAT_GROUP = 1 << 3

-PATH_DEBUGFS_TRACING = '/sys/kernel/debug/tracing'
-PATH_DEBUGFS_KVM = '/sys/kernel/debug/kvm'
-
class Group(object):
    """Represents a perf event group."""
    self.syscall = self.libc.syscall
    self.name = name
    self.fd = None
    - self.setup_event(group, trace_cpu, trace_pid, trace_point,
    -     trace_filter, trace_set)
    + self._setup_event(group, trace_cpu, trace_pid, trace_point,
    +     trace_filter, trace_set)

    def __del__(self):
        """Closes the event's file descriptor.
        """
        if self.fd:
            os.close(self.fd)

    - def perf_event_open(self, attr, pid, cpu, group_fd, flags):
    + def _perf_event_open(self, attr, pid, cpu, group_fd, flags):
        """Wrapper for the sys_perf_evt_open() syscall.

        Used to set up performance events, returns a file descriptor or -1
        """
        ctypes.c_int(pid), ctypes.c_int(cpu),
        ctypes.c_int(group_fd), ctypes.c_long(flags))

    - def setup_event_attribute(self, trace_set, trace_point):
    + def _setup_event_attribute(self, trace_set, trace_point):
        """Returns an initialized ctype perf_event_attr struct."""

        id_path = os.path.join(PATH_DEBUGFS_TRACING, 'events', trace_set,
        @ @ -419,8 +444,8 @@
        event_attr.config = int(open(id_path).read())
        return event_attr

    - def setup_event(self, group, trace_cpu, trace_pid, trace_point,
    -     trace_filter, trace_set):
    + def _setup_event(self, group, trace_cpu, trace_pid, trace_point,
    +     trace_filter, trace_set):
        """Sets up the perf event in Linux.

        Issues the syscall to register the event in the kernel and
        """
        event_attr = self.setup_event_attribute(trace_set, trace_point)
    + event_attr = self._setup_event_attribute(trace_set, trace_point)
# First event will be group leader.
group_leader = -1

if group.events:
    group_leader = group.events[0].fd

if fd == -1:
    err = ctypes.get_errno()
    raise OSError(err, os.strerror(err),

class Provider(object):
    """Encapsulates functionalities used by all providers."""
    def __init__(self, pid):
        self.child_events = False
        self.pid = pid

    @staticmethod
    def is_field_wanted(fields_filter, field):
        """Indicate whether field is valid according to fields_filter."""

    def __init__(self, pid, fields_filter):
        self.group_leaders = []
        self.filters = self.get_filters()
        self.pid = pid
        super(TracepointProvider, self).__init__(pid)

    @staticmethod
    def get_filters():
        """Returns a dict of trace events, their filter ids and
        the values that can be filtered."

    filters = []
    filters['kvm_userspace_exit'] = ('reason', USERSPACE_EXIT_REASONS)
    if ARCH.exit_reason_field and ARCH.exit_reasons:
def get_available_fields(self):
    return filters

    def get_available_fields(self):
        return filters

    def _get_available_fields(self):
        return filters

    def update_fields(self, fields_filter):
        self.fields = [field for field in self.get_available_fields() if self.is_field_wanted(fields_filter, field)]

    @staticmethod
    def get_online_cpus():
        return parse_int_list(cpu_string)

    def setup_traces(self):
        fields = self.get_available_fields()
        if self._pid > 0:
            path = os.path.join('/proc', str(self._pid), 'task')
            groupids = self.walkdir(path)[1]
            else:
                groupids = self.get_online_cpus()
        else:
            groupids = self._get_online_cpus()
# The constant is needed as a buffer for python libs, std streams and other files that the script opens.

@@ -663,7 +697,7 @@
 # The garbage collector will get rid of all Event/Group objects and open files after removing the references.
 self.group_leaders = []
 - self.setup_traces()
+ self._setup_traces()
 self.fields = self._fields

def read(self, by_guest=0):
@@ -671,8 +705,12 @@
 ret = defaultdict(int)
 for group in self.group_leaders:
     for name, val in group.read().items():
-        if name in self._fields:
-            ret[name] += val
+        if name not in self._fields:
+            continue
+        parent = ARCH.tracepoint_is_child(name)
+        if parent:
+            name += ' ' + parent
+        ret[name] += val

return ret

def reset(self):
@@ -690,11 +728,11 @@
 self._baseline = {}
 self.do_read = True
 self.paths = []
- self.pid = pid
+ super(DebugfsProvider, self).__init__(pid)
 if include_past:
-    self.restore()
+    self._restore()

def get_available_fields(self):
+    def _get_available_fields(self):
+        """Returns a list of available fields.
+        The fields are all available KVM debugfs files
@@ -704,8 +742,13 @@
 def update_fields(self, fields_filter):
+    def _update_fields(self, fields_filter):
+        """Refresh fields, applying fields_filter""
+        self._fields = [field for field in self.get_available_fields()]
+        if self.is_field_wanted(fields_filter, field)
+
+
+
+
+

# add parents for child fields - otherwise we won't see any output!
for field in self._fields:
parent = ARCH.debugfs_is_child(field)
if (parent and parent not in self._fields):
self.fields.append(parent)

@property
def fields(self):
@@ -728,13 +771,20 @@
if len(vms) == 0:
self.do_read = False
+

self.paths = filter(lambda x: "{}-".format(pid) in x, vms)
self.paths = list(filter(lambda x: "{}-".format(pid) in x, vms))
else:
self.paths = []
self.do_read = True
self.reset()

+
+
+
+
+
+
+

def _verify_paths(self):
"""Remove invalid paths"""
for path in self.paths:
if not os.path.exists(os.path.join(PATH_DEBUGFS_KVM, path)):
self.paths.remove(path)
continue
def read(self, reset=0, by_guest=0):
"""Returns a dict with format:'file name / field -> current value'.

@@ -749,6 +799,7 @@
# If no debugfs filtering support is available, then don't read.
if not self.do_read:
return results
+
self._verify_paths()
paths = self.paths
if self._pid == 0:
@@ -758,7 +809,7 @@
paths.append(dir)
for path in paths:
for field in self._fields:
value = self.read_field(field, path)
+
value = self._read_field(field, path)
key = path + field
if reset == 1:
self._baseline[key] = value
@@ -766,20 +817,21 @@

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self._baseline[key] = 0
if self._baseline.get(key, -1) == -1:
    self._baseline[key] = value
    increment = (results.get(field, 0) + value -
                  self._baseline.get(key, 0))
    if by_guest:
        pid = key.split('-')[0]
        if pid in results:
            results[pid] += increment
        else:
            results[pid] = increment
    else:
        parent = ARCH.debugfs_is_child(field)
        if parent:
            field = field + ' ' + parent
        else:
            if by_guest:
                field = key.split('-')[0]
            # set 'field' to 'pid'
            increment = value - self._baseline.get(key, 0)
            if field in results:
                results[field] += increment
        results[field] = increment

return results

- def read_field(self, field, path):
+ def _read_field(self, field, path):
    
    """Returns the value of a single field from a specific VM."""
    try:
        return int(open(os.path.join(PATH_DEBUGFS_KVM,
@ @ -794,12 +846,15 @@
        self._baseline = {}
        self.read(1)

- def restore(self):
+ def _restore(self):
    
    """Reset field counters"""
    self._baseline = {}
    self.read(2)

+EventStat = namedtuple('EventStat', ['value', 'delta'])
+
+class Stats(object):
    """Manages the data providers and the data they provide.

@ @ -808,13 +863,13 @@
def __init__(self, options):
    self.providers = self.get_providers(options)
    self._providers = self._get_providers(options)
    self._pid_filter = options.pid
    self._fields_filter = options.fields
    self.values = {}
    self._child_events = False

    @staticmethod
    @staticmethod
    def get_providers(options):
        def _get_providers(self, options):
            """Returns a list of data providers depending on the passed options.""
            providers = []

            return providers

    def update_provider_filters(self):
        def _update_provider_filters(self):
            """Propagates fields filters to providers.""
            # As we reset the counters when updating the fields we can
            # also clear the cache of old values.

    def fields_filter(self, fields_filter):
        if fields_filter != self._fields_filter:
            self._fields_filter = fields_filter
            self.update_provider_filters()

    @property
    def pid_filter(self):
        def pid_filter(self):
            for provider in self.providers:
                provider.pid = self._pid_filter

            @property
            def child_events(self):
                return self._child_events

            @child_events.setter
            def child_events(self, val):
                self._child_events = val
                for provider in self.providers:
                    provider.child_events = val
def get(self, by_guest=0):
    ""
    Returns a dict with field -> (value, delta to last value) of all
    provider data.""
+        provider data.
+        Key formats:
+          * plain: 'key' is event name
+          * child-parent: 'key' is in format '<child> <parent>'
+          * pid: 'key' is the pid of the guest, and the record contains the
+              aggregated event data
+        These formats are generated by the providers, and handled in class TUI.
+        ""
    for provider in self.providers:
        new = provider.read(by_guest=by_guest)
        for key in new:
            oldval = self.values.get(key, EventStat(0, 0)).value
            newval = new.get(key, 0)
            newdelta = newval - oldval
            self.values[key] = EventStat(newval, newdelta)
        return self.values

    def toggle_display_guests(self, to_pid):
        self.get(to_pid)
        return 0

+        DELAY_DEFAULT = 3.0
MAX_GUEST_NAME_LEN = 48
MAX_REGEX_LEN = 44
-DEFAULT_REGEX = r'^\[\(\)*$'
SORT_DEFAULT = 0

    def print_all_gnames(self, row):
        self.screen.addstr(row, 2, '%8s  %-60s' %
                          ('Pid', 'Guest Name (fuzzy list, might be ')
                          ('Pid', 'Guest Name (fuzzy list, might be ')
                          (row, 2, '%8s  %-60s' %
                          (row, 2, '%8s  %-60s' %
                          ' ')%s  %s  %s' %
                          )%s  %s  %s' %
                          )%s  %s  %s' %
        return name
- def update_drilldown(self):
  """Sets or removes a filter that only allows fields without braces."""
  if not self.stats.fields_filter:
    self.stats.fields_filter = DEFAULT_REGEX
  elif self.stats.fields_filter == DEFAULT_REGEX:
    self.stats.fields_filter = None

- def update_pid(self, pid):
+ def _update_pid(self, pid):
  """Propagates pid selection to stats object."""
  self.screen.addstr(4, 1, 'Updating pid filter...')
  self.screen.refresh()
  self.stats.pid_filter = pid

- def refresh_header(self, pid=None):
+ def _refresh_header(self, pid=None):
  """Refreshes the header."""
  if pid is None:
    pid = self.stats.pid_filter
@@ -1059,8 +1125,7 @@
        .format(pid, gname), curses.A_BOLD)
  else:
    self.screen.addstr(0, 0, 'kvm statistics - summary', curses.A_BOLD)
- if self.stats.fields_filter and self.stats.fields_filter \
-   != DEFAULT_REGEX:
+ if self.stats.fields_filter:
    regex = self.stats.fields_filter
    if len(regex) > MAX_REGEX_LEN:
      regex = regex[:MAX_REGEX_LEN] + '...
@@ -1075,56 +1140,101 @@
    self.screen.addstr(4, 1, 'Collecting data...')
    self.screen.refresh()

- def refresh_body(self, sleeptime):
+ def _refresh_body(self, sleeptime):
+   def insert_child(sorted_items, child, values, parent):
+     num = len(sorted_items)
+     for i in range(0, num):
+         # only add child if parent is present
+         if parent.startswith(sorted_items[i][0]):
+             sorted_items.insert(i + 1, ('  ' + child, values))
+
+   def get_sorted_events(self, stats):
+     """separate parent and child events""
+     if self._sorting == SORT_DEFAULT:
+         def sortkey(pair):
# sort by (delta value, overall value)
    v = pair[1]
    return (v.delta, v.value)
else:
    def sortkey(pair):
        # sort by overall value
        v = pair[1]
        return v.value

    childs = []
    sorted_items = []
    # we can't rule out child events to appear prior to parents even
    # when sorted - separate out all children first, and add in later
    for key, values in sorted(stats.items(), key=sortkey, reverse=True):
        if values == (0, 0):
            continue
        if key.find(' ') != -1:
            if not self.stats.child_events:
                continue
            childs.insert(0, (key, values))
        else:
            sorted_items.append((key, values))
        if self.stats.child_events:
            for key, values in childs:
                (child, parent) = key.split(' ')
                insert_child(sorted_items, child, values, parent)

    return sorted_items

if not self._is_running_guest(self.stats.pid_filter):
    # leave final data on screen
    return

row = 3
self.screen.move(row, 0)
self.screen.clrtobot()
stats = self.stats.get(self._display_guests)
-
-    # sort by current events if available
-    if stats[x][1]:
-        return (-stats[x][1], -stats[x][0])
+    total = 0.
+    ctotal = 0.
+    for key, values in stats.items():
+        if self._display_guests:
+            if self.get_gname_from_pid(key):
+                total += values.value
+        continue
+        if not key.find(' ') != -1:
+            total += values.value
else:
-            return (0, -stats[x][0])
+            ctotal += values.value
+            if total == 0.:
+                # we don't have any fields, or all non-child events are filtered
+                total = ctotal

-    def sortTotal(x):
-        # sort by totals
-        return (0, -stats[x][0])
-        total = 0.
-        for key in stats.keys():
-            if key.find('(') is -1:
-                total += stats[key][0]
-        if self._sorting == SORT_DEFAULT:
-            sortkey = sortCurAvg
-        else:
-            sortkey = sortTotal
-        # print events
+        tavg = 0
    tavg = 0
-    for key in sorted(stats.keys(), key=sortkey):
-        if row >= self.screen.getmaxyx()[0] - 1:
+    for key, values in get_sorted_events(self, stats):
+        if row >= self.screen.getmaxyx()[0] -1 or values == (0, 0):
+            break
-        values = stats[key]
-        if not values[0] and not values[1]:
-            break
-        if values[0] is not None:
-            cur = int(round(values[1] / sleeptime)) if values[1] else ''
-            if self._display_guests:
-                key = self.get_gname_from_pid(key)
-                self.screen.addstr(row, 1, '%-40s %10d%7.1f %8s' %
-                               (key, values[0], values[0] * 100 / total,
-                                cur))
-            if cur is not '' and key.find('') is -1:
-                tavg += cur
+        if self._display_guests:
+            key = self.get_gname_from_pid(key)
+        if not key:
+            continue
+        cur = int(round(values.delta / sleeptime)) if values.delta else ''
+        if key[0] != ' ':
+            if values.delta:
tcur += values.delta
ptotal = values.value
ltotal = total
else:
    ltotal = ptotal
self.screen.addstr(row, 1, '%-40s %10d%7.1f %8s % (key,
    values.value,
    values.value * 100 / float(ltotal), cur))
    row += 1
if row == 3:
    self.screen.addstr(4, 1, 'No matching events reported yet')
else:
    if row > 4:
        tavg = int(round(tcur / sleeptime)) if tcur > 0 else ''
        self.screen.addstr(row, 1, 'Total', total, tavg if tavg else ''),
        curses.A_BOLD)
    self.screen.refresh()

def show_msg(self, text):
    def _show_msg(self, text):
        """Display message centered text and exit on key press""
        hint = 'Press any key to continue'
curses.cbreak()
(x, term_width) = self.screen.getmaxyx()
row = 2
for line in text:
    start = (term_width - len(line)) / 2
    start = (term_width - len(line)) // 2
self.screen.addstr(row, start, line)
row += 1
self.screen.addstr(row + 1, (term_width - len(hint)) / 2, hint,
curses.A_BOLD)
self.screen.getkey()

def show_help_interactive(self):
    def _show_help_interactive(self):
        """Display help with list of interactive commands""
        msg = ('  b  toggle events by guests (debugfs only, honors'
        ' filters)',
        '  c  clear filter',
        '  f  filter by regular expression',
        '  g  filter by guest name',
        '  g  filter by guest name/PID',
        '  h  display interactive commands reference',

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' o  toggle sorting order (Total vs CurAvg/s)',
- ' p  filter by PID',
+ ' p  filter by guest name/PID',
' q  quit',
' r  reset stats',
' s  set update interval',

```
self.screen.addstr(row, 0, line)
row += 1
self.screen.getkey()
- self.refresh_header()
+ self._refresh_header()

- def show_filter_selection(self):
+ def _show_filter_selection(self):
  """Draws filter selection mask.

  Asks for a valid regex and sets the fields filter accordingly.

  ""
  + msg = 
  while True:
    self.screen.erase()
    self.screen.addstr(0, 0,
    "Current regex: {0}".format(self.stats.fields_filter))
+ self.screen.addstr(5, 0, msg)
    self.screen.addstr(3, 0, "New regex: ")
curses.echo()
regex = self.screen.getstr().decode(ENCODING)
curses.noecho()
if len(regex) == 0:
- self.stats.fields_filter = DEFAULT_REGEX
- self.refresh_header()
+ self.stats.fields_filter = ""
+ self._refresh_header()
return
try:
  re.compile(regex)
  self.stats.fields_filter = regex
- self.refresh_header()
+ self._refresh_header()
return
except re.error:
+ msg = ": Not a valid regular expression'
continue
```
def show_vm_selection_by_pid(self):
    
    def show_set_update_interval(self):
        
        except ValueError:
            msg = '"' + str(val) + '"': Invalid value'
- self.refresh_header()
+ self._refresh_header()

- def show_vm_selection_by_guest_name(self):
+ def _is_running_guest(self, pid):
+     """Check if pid is still a running process."""
+     if not pid:
+         return True
+     return os.path.isdir(os.path.join('/proc/', str(pid)))
+ 
+ def _show_vm_selection_by_guest(self):
+     """Draws guest selection mask.
+     Asks for a guest name or pid until a valid guest name or """" is entered.
+     Asks for a guest name until a valid guest name or """" is entered.
+     ""
+     msg = ""
+     while True:
+         self.screen.erase()
+         self.screen.addstr(0, 0,
+             'Show statistics for specific guest.',
+             'Show statistics for specific guest or pid.',
+             curses.A_BOLD)
+         self.screen.addstr(1, 0,
+             'This might limit the shown data to the trace ' 
+             'statistics."
+         self.screen.addstr(5, 0, msg)
+         - self.print_all_gnames(7)
+         + self._print_all_gnames(7)
+         curses.echo()
+         - self.screen.addstr(3, 0, "Guest [ENTER or guest]: ")
+         - gname = self.screen.getstr().decode(ENCODING)
+         + guest = self.screen.getstr().decode(ENCODING)
+         curses.noecho()
+         - if not gname:
+         -     self.refresh_header(0)
+         -     self.update_pid(0)
+         + pid = 0
+         + if not guest or guest == '0':
+         +     break
+         - else:
+         -     pids = []
+         -     try:
+         -         pids = self.get_pid_from_gname(gname)
except:
    msg = "" + gname + "": Internal error while searching, use pid filter instead"
    continue
    if len(pids) == 0:
        msg = "" + gname + "": Not an active guest"
        continue
    if len(pids) > 1:
        msg = "" + gname + "": Multiple matches found, use pid filter instead"
        continue
    pids = []
    try:
       pids = self.get_pid_from_gname(guest)
    except:
        msg = "" + guest + "": Internal error while searching, use pid filter instead"
        continue
    if len(pids) == 0:
        msg = "" + guest + "": Not an active guest"
        continue
    if len(pids) > 1:
        msg = "" + guest + "": Multiple matches found, use pid filter instead"
        continue
    pid = pids[0]
    break
+    pids = []
+    try:
+      pids = self.get_pid_from_gname(guest)
+    except:
+      msg = "" + guest + "": Internal error while searching, use pid filter instead"
+    continue
+    if len(pids) == 0:
+      msg = "" + guest + "": Not an active guest"
+      continue
+    if len(pids) > 1:
+      msg = "" + guest + "": Multiple matches found, use pid filter instead"
+      continue
+    pid = pids[0]
+    break
+    curses.curs_set(0)
+    self._refresh_header(pid)
+    self._update_pid(pid)

def show_stats(self):
    """Refreshes the screen and processes user input."""
    sleeptime = self._delay_initial
    self.refresh_header()
    self._refresh_header()
    start = 0.0  # result based on init value never appears on screen while True:
    self.refresh_body(time.time() - start)
    self._refresh_body(time.time() - start)
    curses.halfdelay(int(sleeptime * 10))
start = time.time()
sleeptime = self._delay_regular
@@ -1327,47 +1415,39 @@
    if char == 'b':
        self._display_guests = not self._display_guests
        if self.stats.toggle_display_guests(self._display_guests):
            -            self.show_msg(['Command not available with tracepoints'
            -                ' enabled', 'Restart with debugfs only '
            -                '(see option \-d) and try again!'])
            +            self._show_msg(['Command not available with'
            +                'tracepoints enabled', 'Restart with'
            +                'debugfs only (see option \-d) and '
            +                'try again!'])
        self._display_guests = not self._display_guests
        self.refresh_header()
    +    self._refresh_header()
    if char == 'c':
        -            self.stats.fields_filter = DEFAULT_REGEX
        -            self.refresh_header(0)
        -            self.update_pid(0)
        +            self.stats.fields_filter = ''
        +            self._refresh_header(0)
        +            self._update_pid(0)
        if char == 'f':
            curses.curs_set(1)
            -            self.show_filter_selection()
            +            self._show_filter_selection()
        curses.curs_set(0)
        sleeptime = self._delay_initial
        -        if char == 'g':
        -            curses.curs_set(1)
        -            self.show_vm_selection_by_guest_name()
        -            curses.curs_set(0)
        +        if char == 'g' or char == 'p':
        +            self._show_vm_selection_by_guest()
        sleeptime = self._delay_initial
        if char == 'h':
            -            self.show_help_interactive()
            +            self._show_help_interactive()
        if char == 'o':
            self._sorting = not self._sorting
            -        if char == 'p':
            -            curses.curs_set(1)
            -            self.show_vm_selection_by_pid()
            -            curses.curs_set(0)
            -            sleeptime = self._delay_initial
            if char == 'q':
                break
if char == 'r':
    self.stats.reset()
if char == 's':
    curses.curs_set(1)
-    self.show_set_update_interval()
+    self._show_set_update_interval()
    curses.curs_set(0)
sleeptime = self._delay_initial
if char == 'x':
-    self.update_drilldown()
-          # prevents display of current values on next refresh
-    self.stats.get(self._display_guests)
+    self.stats.child_events = not self.stats.child_events
except KeyboardInterrupt:
    break
except curses.error:
@@ -1380,9 +1460,9 @@
s = stats.get()
time.sleep(1)
s = stats.get()
-    for key in sorted(s.keys()):
-        values = s[key]
-        print("%42s%10d%10d" % (key, values[0], values[1]))
+    for key, values in sorted(s.items()):
+        print("%42s%10d%10d" % (key.split(' ')[0], values.value,
+                                  values.delta))
except KeyboardInterrupt:
    pass
@@ -1392,14 +1472,14 @@
    keys = sorted(stats.get().keys())

    def banner():
-        for k in keys:
-            print(k, end=' ')  
+        for key in keys:
+            print(key.split(' ')[0], end=' ') 
    print()

    def statline():
-        s = stats.get()
-        for k in keys:
-            print( "%9d" % s[k][1], end=' ')  
+        for key in keys:
+            print( "%9d" % s[key].delta, end=' ')  
    print()

    line = 0
    banner_repeat = 20
@@ -1504,7 +1584,7 @@
        )
    optparser.add_option('-f', '--fields',
        action='store',
-       default=DEFAULT_REGEX,
+       default='',
        dest='fields',
        help="fields to display (regex)
        "-f help" for a list of available events",
@@ -1539,17 +1619,6 @@
def check_access(options):
    """Exits if the current user can't access all needed directories."""
    if not os.path.exists('/sys/kernel/debug'):
-        sys.stderr.write('Please enable CONFIG_DEBUG_FS in your kernel.
-        sys.exit(1)
-    if not os.path.exists(PATH_DEBUGFS_KVM):
-        sys.stderr.write("Please make sure, that debugfs is mounted and 
-        "readable by the current user:
-        "(mount -t debugfs debugfs /sys/kernel/debug)\n"
-        "Also ensure, that the kvm modules are loaded\n")
-        sys.exit(1)
-    if not os.path.exists(PATH_DEBUGFS_TRACING) and (options.tracepoints or
-        not options.debugfs):
        sys.stderr.write("Please enable CONFIG_TRACING in your kernel"
@@ -1567,7 +1636,33 @@
    return options

def assign_globals():
    global PATH_DEBUGFS_KVM
+    global PATH_DEBUGFS_TRACING
+
+    debugfs = "
+    for line in open('/proc/mounts'):
+        if line.split(' ')[0] == 'debugfs':
+            debugfs = line.split(' ')[1]
+            break
+    if debugfs == ":
+        sys.stderr.write("Please make sure that CONFIG_DEBUG_FS is enabled in 
+        "your kernel, mounted and readable by the current 
+        "user:\n"
+        "(mount -t debugfs debugfs /sys/kernel/debug)\n")
+        sys.exit(1)
+
+    PATH_DEBUGFS_KVM = os.path.join(debugfs, 'kvm')
```python
+    PATH_DEBUGFS_TRACING = os.path.join(debugfs, 'tracing')
+    if not os.path.exists(PATH_DEBUGFS_KVM):
+        sys.stderr.write("Please make sure that CONFIG_KVM is enabled in ")
+        "your kernel and that the modules are loaded.\n")
+        sys.exit(1)
+
def main():
+    assign_globals()
+    options = get_options()
+    options = check_access(options)
```

--- linux-4.15.0.orig/tools/kvm/kvm_stat/kvm_stat.txt
+++ linux-4.15.0/tools/kvm/kvm_stat/kvm_stat.txt
@@ -34,14 +34,16 @@
  *c*:: clear filter
  *f*:: filter by regular expression
  +:: *Note*: Child events pull in their parents, and parents' stats summarize
  +    all child events, not just the filtered ones
  -*g*:: filter by guest name
  +*g*:: filter by guest name/PID
  *
  *h*:: display interactive commands reference
  *
  *o*:: toggle sorting order (Total vs CurAvg/s)
  -*p*:: filter by PID
  +*p*:: filter by guest name/PID
  *
  *q*:: quit

--- linux-4.15.0.orig/tools/laptop/freefall/Makefile
+++ linux-4.15.0/tools/laptop/freefall/Makefile
@@ -2,7 +2,6 @@
 PREFIX ?= /usr
 SBINDIR ?= sbin
 INSTALL ?= install
-CROSS_COMPILE = gcc
-CROSS_COMPILE = $(CROSS_COMPILE)
gcc

TARGET = freefall

--- linux-4.15.0.orig/tools/leds/Makefile
+++ linux-4.15.0/tools/leds/Makefile
@@ -1,7 +1,6 @@
# SPDX-License-Identifier: GPL-2.0

```

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# Makefile for LEDs tools

-CC = $(CROSS_COMPILE)gcc
CFLAGS = -Wall -Wextra -g -I../../include/uapi

all: uledmon led_hw_brightness_mon
--- linux-4.15.0.orig/tools/lib/api/fs/fs.c
+++ linux-4.15.0/tools/lib/api/fs/fs.c
@@ -90,6 +90,7 @@
 const char * const*mounts;
 char path[PATH_MAX];
 bool found;
+bool checked;
 long magic;
}

@@ -111,31 +112,37 @@
 .name = "sysfs",
 .mounts= sysfs__fs_known_mountpoints,
 .magic= SYSFS_MAGIC,
+.checked = false,
 },
[FS__PROCFS] = {
 .name = "proc",
 .mounts= procfs__known_mountpoints,
 .magic= PROC_SUPER_MAGIC,
+.checked = false,
 },
[FS__DEBUGFS] = {
 .name = "debugfs",
 .mounts= debugfs__known_mountpoints,
 .magic= DEBUGFS_MAGIC,
+.checked = false,
 },
[FS__TRACEFS] = {
 .name = "tracefs",
 .mounts= tracefs__known_mountpoints,
 .magic= TRACEFS_MAGIC,
+.checked = false,
 },
[FS__HUGETLBFS] = {
 .name = "hugetlbfs",
 .mounts = hugetlbfs__known_mountpoints,
 .magic= HUGETLBFS_MAGIC,
+.checked = false,
 },
[FS__BPF_FS] = {
 .name = "bpf",

.mounts = bpf_fs__known_mountpoints,
.magic = BPF_FS_MAGIC,
.checked = false,
};

fclose(fp);
+fs->checked = true;
return fs->found = found;
}

size_t name_len = strlen(fs->name);
/* name + "_PATH" + \0 */
char upper_name[name_len + 5 + 1];
+
memcpy(upper_name, fs->name, name_len);
mem toupper(upper_name, name_len);
strcpy(&upper_name[name_len], "_PATH");

if (fs->found)
return (const char *)fs->path;
-strcpy(fs->path, override_path, sizeof(fs->path));
+fs->checked = true;
+strcpy(fs->path, override_path, sizeof(fs->path) - 1);
+fs->path[sizeof(fs->path) - 1] = \0;
return true;
}

if (fs->found)
return (const char *)fs->path;

/* the mount point was already checked for the mount point
* but and did not exist, so return NULL to avoid scanning again.
* This makes the found and not found paths cost equivalent
* in case of multiple calls.
*/
+if (fs->checked)
+return NULL;
++fs__get_mountpoint(fs);
const char *name##__mount(void);
bool name##__configured(void);

+/
+ * The xxxx__mountpoint() entry points find the first match mount point for each
+ * filesystems listed below, where xxxx is the filesystem type.
+ *
+ * The interface is as follows:
+ *
+ * - If a mount point is found on first call, it is cached and used for all
+ *   subsequent calls.
+ *
+ * - If a mount point is not found, NULL is returned on first call and all
+ *   subsequent calls.
+ */
FS(sysfs)
FS(procfs)
FS(debugfs)

--- linux-4.15.0.orig/tools/bpf/Makefile
+++ linux-4.15.0/tools/bpf/Makefile
@@ -69,7 +69,7 @@
FEATURE_TESTS = libelf libelf-getphdnum libelf-mmap bpf
FEATURE_DISPLAY = libelf bpf

-INCLUDES = -I. -I$(srctree)/tools/include -I$(srctree)/tools/arch/$(ARCH)/include/uapi -I$(srctree)/arch/$(ARCH)/include/uapi -I$(srctree)/arch/$(ARCH)/include/generated/uapi -I$(srctree)/include/uapi -I$(srctree)/include/generated/uapi
FEATURE_CHECK_CFLAGS-bpf = $(INCLUDES)

check_feat := 1
@@ -150,7 +150,8 @@
TARGETS = $(CMD_TARGETS)

-all: fixdep $(VERSION_FILES) all_cmd
+all: fixdep $(VERSION_FILES)
+$Q$(MAKE) all_cmd

all_cmd: $(CMD_TARGETS)

@@ -183,7 +184,7 @@
if [ ! -d '$(DESTDIR_SQ)$2' ]; then
 $(INSTALL) -d -m 755 '$(DESTDIR_SQ)$2';

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fi;
-$(INSTALL) $1 `$(DESTDIR_SQ)$2`
+$($(INSTALL) $(if $3,-m $3,) $1 `$(DESTDIR_SQ)$2`
endef

install_lib: all_cmd
--- linux-4.15.0.orig/tools/lib/bpf/bpf.c
+++ linux-4.15.0/tools/lib/bpf/bpf.c
@@ -41,6 +41,8 @@
 # define __NR_bpf 349
 # elif defined(__s390__)
 # define __NR_bpf 351
+# elif defined(__arc__)
+# define __NR_bpf 280
 # else
 # error __NR_bpf not defined. libcbbf does not support your arch.
 # endif
--- linux-4.15.0.orig/tools/lib/bpf/bpf.h
+++ linux-4.15.0/tools/lib/bpf/bpf.h
@@ -23,6 +23,7 @@
 #include <linux/bpf.h>
 #include <stddef.h>
 #include <stdint.h>

 int bpf_create_map_node(enum bpf_map_type map_type, const char *name,
 int key_size, int value_size, int max_entries,
 --- linux-4.15.0.orig/tools/lib/bpf/libbpf.c
+++ linux-4.15.0/tools/lib/bpf/libbpf.c
@@ -387,6 +387,8 @@
 continue;
 if (sym.st_shndx != prog->idx)
 continue;
+#if (GELF_ST_BIND(sym.st_info) != STB_GLOBAL)
+continue;

 name = elf_strptr(obj->efile.elf,
 obj->efile.strtabidx,
@@ -724,6 +726,24 @@
 return 0;
 }

+static bool section_have_execinstr(struct bpf_object *obj, int idx)
+{
+ Elf_Scn *scn;
+ GElf_Shdr sh;
+ +scn = elf_getscn(obj->efile.elf, idx);
}
+if (!scn)
+    return false;
+
+if (gelf_getshdr(scn, &sh) != &sh)
+    return false;
+
+if (sh.sh_flags & SHF_EXECINSTR)
+    return true;
+
+return false;
+
static int bpf_object__elf_collect(struct bpf_object *obj)
{
    Elf *elf = obj->efile.elf;

    else if (sh.sh_type == SHT_REL) {
        void *reloc = obj->efile.reloc;
        int nr_reloc = obj->efile.nr_reloc + 1;
        +int sec = sh.sh_info; /* points to other section */
        +
        +/* Only do relo for section with exec instructions */
        +if (!section_have_execinstr(obj, sec)) {
            pr_debug("skip relo %s(%d) for section(%d)\n",
                     name, idx, sec);
            +continue;
            +}

        reloc = realloc(reloc,
                        sizeof(*obj->efile.reloc) * nr_reloc);

    --- linux-4.15.0.orig/tools/lib/str_error_r.c
    +++ linux-4.15.0/tools/lib/str_error_r.c
    @@ -22,6 +22,6 @@
    {
        int err = strerror_r(errnum, buf, buflen);
        if (err)
            +snprintf(buf, buflen, "INTERNAL ERROR: strerror_r(%d, %p, %zd)=%d", errnum, buf, buflen, err);
            +snprintf(buf, buflen, "INTERNAL ERROR: strerror_r(%d, [buf], %zd)=%d", errnum, buflen, err);
            return buf;
    }

    --- linux-4.15.0.orig/tools/lib/string.c
    +++ linux-4.15.0/tools/lib/string.c
    @@ -95,6 +95,10 @@
    * If libc has strlcpy() then that version will override this
    * implementation:
    */
    +#ifdef __clang__
    +#pragma clang diagnostic push

size_t __weak strlcpy(char *dest, const char *src, size_t size) {
    size_t ret = strlen(src);
    return ret;
}

// clang diagnostic ignored "-.Wignored-attributes"

--- linux-4.15.0.orig/tools/lib/subcmd/Makefile
+++ linux-4.15.0/tools/lib/subcmd/Makefile
@@ -20,9 +20,17 @@
LIBFILE = $(OUTPUT)libsubcmd.a

CFLAGS := $(EXTRA_WARNINGS) $(EXTRA_CFLAGS)
-CFLAGS += -ggdb3 -Wall -Wextra -std=gnu99 -U_FORTIFY_SOURCE -D_FORTIFY_SOURCE=2 -fPIC
+CFLAGS += -ggdb3 -Wall -Wextra -std=gnu99 -fPIC

-ifeq ($(DEBUG),0)
+ifeq ($(DEBUG),0)
  ifeq ($(feature-fortify-source), 1)
+    CFLAGS += -U_FORTIFY_SOURCE -D_FORTIFY_SOURCE=2
+  endif
+endif
+
+ifeq ($(DEBUG),1)
  CFLAGS += -O0
+else ifeq ($(DEBUG),0)
CFLAGS += -O3
else
CFLAGS += -O6
@@ -36,8 +44,6 @@
CFLAGS += -D_LARGEFILE64_SOURCE -D_FILE_OFFSET_BITS=64 -D_GNU_SOURCE

CFLAGS += -I$(srctree)/tools/include/
-CFLAGS += -I$(srctree)/include/uapi
-CFLAGS += -I$(srctree)/include

SUBCMD_IN := $(OUTPUT)libsubcmd-in.o

--- linux-4.15.0.orig/tools/lib/subcmd/pager.c
+++ linux-4.15.0/tools/lib/subcmd/pager.c
@@ -30,10 +30,13 @@
 * have real input
 */
fd_set in;
+fd_set exception;

FD_ZERO(&in);
+FD_ZERO(&exception);
FD_SET(0, &in);
-select(1, &in, NULL, &in, NULL);
+FD_SET(0, &exception);
+select(1, &in, NULL, &exception, NULL);

setenv("LESS", "FRSX", 0);
}
--- linux-4.15.0.orig/tools/lib/traceevent/Makefile
+++ linux-4.15.0/tools/lib/traceevent/Makefile
@@ -55,15 +55,15 @@
# Set plugin_dir to preffered global plugin location
# If we install under $HOME directory we go under
-# $(HOME)/.traceevent/plugins
+# $(HOME)/.local/lib/traceevent/plugins
#
# We dont set PLUGIN_DIR in case we install under $HOME
# directory, because by default the code looks under:
-# $(HOME)/.traceevent/plugins by default.
+# $(HOME)/.local/lib/traceevent/plugins by default.
#
ifeq ($(plugin_dir),)
ifeq ($(prefix),$(HOME))
-override plugin_dir = $(HOME)/.traceevent/plugins
+override plugin_dir = $(HOME)/.local/lib/traceevent/plugins
set_plugin_dir := 0
else
override plugin_dir = $(libdir)/traceevent/plugins
@@ -115,6 +115,7 @@
LIB_INSTALL = libtraceevent.a libtraceevent.so.$(EVENT_PARSE_VERSION)
+LIB_INSTALL := $(addprefix $(OUTPUT),$(LIB_INSTALL))

INCLUDES = -I -I $(srctree)/tools/include $(CONFIG_INCLUDES)
@@ -259,8 +260,8 @@
define do_generate_dynamic_list_file
symbol_type=`$(NM) -u -D $1 | awk 'NF>1 (print $$1)' \ 
-xargs echo "U W w" | tr \ "’\n’ | sort -u | xargs echo\;
-if "$symbol_type" = "U W w" then\ 
+xargs echo "U w W" | tr ' w '’WU' | sort -u | xargs echo\;

+if [ "$symbol_type" = "U W" ];then
  (echo '{
    $(NM) -u -D $1 | awk 'NF>1 {print "$2";"}'} | sort -u;
  echo '};
--- linux-4.15.0.orig/tools/lib/traceevent/event-parse.c
+++ linux-4.15.0/tools/lib/traceevent/event-parse.c
@@ -268,10 +268,10 @@
  errno = ENOMEM;
  return -1;
}
+pevent->cmdlines = cmdlines;

  cmdlines[pevent->cmdline_count].comm = strdup(comm);
  if (!cmdlines[pevent->cmdline_count].comm) {
    -free(cmdlines);
    errno = ENOMEM;
    return -1;
  }
@@ -282,7 +282,6 @@
  pevent->cmdline_count++;

  qsort(cmdlines, pevent->cmdline_count, sizeof(*cmdlines), cmdline_cmp);
  -pevent->cmdlines = cmdlines;
  return 0;
}
@@ -2206,7 +2205,7 @@
  return val & 0xffffffff;

 if (strcmp(type, "u64") == 0 ||
  - strcmp(type, "s64"))
  + strcmp(type, "s64") == 0)
  return val;

 if (strcmp(type, "s8") == 0)
@@ -2430,7 +2429,7 @@
 static char *arg_eval (struct print_arg *arg)
 {
  long long val;
  -static char buf[20];
  +static char buf[24];

 switch (arg->type) {
 case PRINT_ATOM:
@@ -2781,6 +2780,7 @@
   if (read_expected(EVENT_DELIM, ",") < 0)
     goto out_err;

+free_token(token);
type = read_token(&token);
*tok = token;

@@ -4949,21 +4949,22 @@
else
ls = 2;

-if (*(ptr+1) == 'F' || *(ptr+1) == 'f'
- *ptr++;
+ *ptr++;
    + if (*ptr == 'F' || *ptr == 'f'
+    *ptr++;
        if (*(ptr+1) == 'S' || *(ptr+1) == 's') {
            show_func = *ptr;
        }

- } else if (*(ptr+1) == 'M' || *(ptr+1) == 'm') {
- print_macArg(s, *(ptr+1), data, size, event, arg);
- ptr++;
+ } else if (*ptr == 'M' || *ptr == 'm') {
+ print_macArg(s, *ptr, data, size, event, arg);
arg = arg->next;
break;
- } else if (*(ptr+1) == 'I' || *(ptr+1) == 'i') {
- n = print_ipArg(s, ptr+1, data, size, event, arg);
+ n = print_ipArg(s, ptr, data, size, event, arg);
if (n > 0) {
    -ptr += n;
    +ptr += n - 1;
    arg = arg->next;
    break;
}
--- linux-4.15.0.orig/tools/lib/traceevent/event-plugin.c
+++ linux-4.15.0/tools/lib/traceevent/event-plugin.c
@@ -30,7 +30,7 @@
#include "event-parse.h"
#include "event-utils.h"

+#define LOCAL_PLUGIN_DIR ".traceevent/plugins"
+#define LOCAL_PLUGIN_DIR ".local/lib/traceevent/plugins/"

static struct registered_plugin_options {
    struct registered_plugin_options*next;
    --- linux-4.15.0.orig/tools/lib/traceevent/parse-filter.c
+++ linux-4.15.0/tools/lib/traceevent/parse-filter.c
filter_type = add_filter_type(filter, event->id);
-if (filter_type == NULL)
+if (filter_type == NULL) {
+free_arg(arg);
return PEVENT_ERRNO__MEM_ALLOC_FAILED;
+

if (filter_type->filter)
free_arg(filter_type->filter);
@@ -1492,8 +1494,10 @@
if (strcmp(str, "TRUE") == 0 || strcmp(str, "FALSE") == 0) {
/* Add trivial event */
arg = allocate_arg();
-if (arg == NULL)
+if (arg == NULL) {
+free(str);
return -1;
+
arg->type = FILTER_ARG_BOOLEAN;
if (strcmp(str, "TRUE") == 0)
@@ -1502,8 +1506,11 @@
arg->boolean.value = 0;

filter_type = add_filter_type(filter, event->id);
-if (filter_type == NULL)
+if (filter_type == NULL) {
+free(str);
+free_arg(arg);
return -1;
+
filter_type->filter = arg;

@@ -1879,17 +1886,25 @@
struct pevent *pevent;
unsigned long long addr;
const char *val = NULL;
+unsigned int size;
char hex[64];

/* If the field is not a string convert it */
if (arg->str.field->flags & FIELD_IS_STRING) {
val = record->data + arg->str.field->offset;
+size = arg->str.field->size;

+free_arg(arg);
return -1;
+
filter_type->filter = arg;

@@ -1492,8 +1494,10 @@
if (strcmp(str, "TRUE") == 0 || strcmp(str, "FALSE") == 0) {
/* Add trivial event */
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-if (filter_type == NULL)
+if (filter_type == NULL) {
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+free_arg(arg);
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filter_type->filter = arg;

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+if (filter_type == NULL) {
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+free_arg(arg);
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+if (filter_type == NULL) {
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+free_arg(arg);
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+
filter_type->filter = arg;

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unsigned long long addr;
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char hex[64];

/* If the field is not a string convert it */
if (arg->str.field->flags & FIELD_IS_STRING) {
val = record->data + arg->str.field->offset;
+size = arg->str.field->size;

+free_arg(arg);
return -1;
+}

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if (strcmp(str, "TRUE") == 0)
@@ -1502,8 +1506,11 @@
arg->boolean.value = 0;

filter_type = add_filter_type(filter, event->id);
-if (filter_type == NULL)
+if (filter_type == NULL) {
+free(str);
+free_arg(arg);
return -1;
+
filter_type->filter = arg;

@@ -1879,17 +1886,25 @@
struct pevent *pevent;
unsigned long long addr;
const char *val = NULL;
+unsigned int size;
char hex[64];

/* If the field is not a string convert it */
if (arg->str.field->flags & FIELD_IS_STRING) {
val = record->data + arg->str.field->offset;
+size = arg->str.field->size;

+free_arg(arg);
return -1;
+}

arg->type = FILTER_ARG_BOOLEAN;
if (strcmp(str, "TRUE") == 0)
@@ -1502,8 +1506,11 @@
arg->boolean.value = 0;

filter_type = add_filter_type(filter, event->id);
-if (filter_type == NULL)
+if (filter_type == NULL) {
+free(str);
+free_arg(arg);
return -1;
+
filter_type->filter = arg;

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+if (filter_type == NULL) {
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+free_arg(arg);
return -1;
+
filter_type->filter = arg;

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unsigned long long addr;
const char *val = NULL;
+unsigned int size;
char hex[64];

/* If the field is not a string convert it */
if (arg->str.field->flags & FIELD_IS_STRING) {
val = record->data + arg->str.field->offset;
+size = arg->str.field->size;

+free_arg(arg);
return -1;
+}

arg->type = FILTER_ARG_BOOLEAN;
if (strcmp(str, "TRUE") == 0)
+ if (arg->str.field->flags & FIELD_IS_DYNAMIC) {
  +addr = *(unsigned int *)val;
  +val = record->data + (addr & 0xffff);
  +size = addr >> 16;
  +}

/*
 * We need to copy the data since we can’t be sure the field
 * is null terminated.
 */
-if (*((val + arg->str.field->size - 1))} {
+if (*((val + size - 1))} {
/* copy it */
memcpy(arg->str.buffer, val, arg->str.field->size);
/* the buffer is already NULL terminated */
--- linux-4.15.0.orig/tools/objtool/Makefile
+++ linux-4.15.0/tools/objtool/Makefile
@@ -7,11 +7,9 @@
endif
# always use the host compiler
-HOSTCC?= gcc
-HOSTLD?= ld
+AR = $(HOSTAR)
CC = $(HOSTCC)
LD = $(HOSTLD)
-AR = ar
-ifeq ($(srctree),)
srctree := $(patsubst %/,%,$(dir $(CURDIR)))
@@ -25,17 +23,20 @@
OBJTOOL    := $(OUTPUT)objtool
OBJTOOL_IN := $(OBJTOOL)-in.o
+LIBELF_FLAGS := $(shell pkg-config libelf --cflags 2>/dev/null)
+LIBELF_LIBS  := $(shell pkg-config libelf --libs 2>/dev/null || echo -lelf)
+all: $(OBJTOOL)
+LIBELF_FLAGS := $(shell pkg-config libelf --cflags 2>/dev/null)
+LIBELF_LIBS := $(shell pkg-config libelf --libs 2>/dev/null || echo -lelf)
+
+all: $(OBJTOOL)

INCLUDES := -I$(srctree)/tools/include 
-I$(srctree)/tools/arch/$(HOSTARCH)/include/uapi 
-I$(srctree)/tools/objtool/arch/$(ARCH)/include
WARNINGS := $(EXTRA_WARNINGS) -Wno-switch-default -Wno-switch-enum -Wno-packed
-CFLAGS += -Wall -Werror $(WARNINGS) -fomit-frame-pointer -O2 -g $(INCLUDES)
-LDFLAGS += -lelf $(LIBSUBCMD)
+LIBELF_FLAGS := $(shell pkg-config libelf --cflags 2>/dev/null)
+LIBELF_LIBS := $(shell pkg-config libelf --libs 2>/dev/null || echo -lelf)
+LIBELF_FLAGS := $(shell pkg-config libelf --cflags 2>/dev/null)
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+LIBELF_FLAGS += $(shell pkg-config libelf --cflags 2>/dev/null)
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+LIBELF_LIBS += $(shell pkg-config libelf --libs 2>/dev/null || echo -lelf)
+LIBELF_FLAGS += $(shell pkg-config libelf --cflags 2>/dev/null)
+LIBELF_LIBS += $(shell pkg-config libelf --libs 2>/dev/null || echo -lelf)
+LIBELF_FLAGS += $(shell pkg-config libelf --cflags 2>/dev/nul...
# Allow old libelf to be used:

```
-elfshdr := $(shell echo \"#include <libelf.h>\" | $(CC) $(CFLAGS) -x c -E - | grep elf_getshdr)
+elfshdr := $(shell echo \$(pound)include <libelf.h>\" | $(CC) $(CFLAGS) -x c -E - | grep elf_getshdr)
CFLAGS += $(if $(elfshdr),,-DLIBELF_USE_DEPRECATED)
```

```
AWK = awk
--- linux-4.15.0.orig/tools/objtool/arch/x86/include/asm/insn.h
+++ linux-4.15.0/tools/objtool/arch/x86/include/asm/insn.h
@@ -208,4 +208,37 @@
 return insn_offset_displacement(insn) + insn->displacement.nbytes;
 }

+/**
+ * for_each_insn_prefix() -- Iterate prefixes in the instruction
+ * @insn: Pointer to struct insn.
+ * @idx:  Index storage.
+ * @prefix: Prefix byte.
+ *
+ * Iterate prefix bytes of given @insn. Each prefix byte is stored in @prefix
+ * and the index is stored in @idx (note that this @idx is just for a cursor,
+ * do not change it.)
+ * Since prefixes.nbytes can be bigger than 4 if some prefixes
+ * are repeated, it cannot be used for looping over the prefixes.
+ */
+#define for_each_insn_prefix(insn, idx, prefix)	
to for (idx = 0; idx < ARRAY_SIZE(insn->prefixes.bytes) && (prefix = insn->prefixes.bytes[idx]) != 0; idx++)
+
+#define POP_SS_OPCODE 0x1f
+#define MOV_SREG_OPCODE 0x8e
+
+/**
+ * Intel SDM Vol.3A 6.8.3 states;
+ * "Any single-step trap that would be delivered following the MOV to SS
+ * instruction or POP to SS instruction (because EFLAGS.TF is 1) is
+ * suppressed."
+ * This function returns true if @insn is MOV SS or POP SS. On these
+ * instructions, single stepping is suppressed.
+ */
+static inline int insn_masking_exception(struct insn *insn)
+{
+ return insn->opcode.bytes[0] == POP_SS_OPCODE ||
+ (insn->opcode.bytes[0] == MOV_SREG_OPCODE &&
+ X86_MODRM_REG(insn->modrm.bytes[0]) == 2);
+ }
+
+#endif /* _ASM_X86_INSNS_H */
--- linux-4.15.0.orig/tools/objtool/arch/x86/lib/x86-opcode-map.txt
+++ linux-4.15.0/tools/objtool/arch/x86/lib/x86-opcode-map.txt
@@ -333,7 +333,7 @@
 06: CLTS
 07: SYSRET (o64)
 08: INVD
-09: WBINVD
+09: WBINVD | WBNOINVD (F3)
 0a:
 0b: UD2 (1B)
 0c:
@@ -364,7 +364,7 @@
 # a ModR/M byte.
 1a: BNDCL Gv,Ev (F3) | BNDCU Gv,Ev (F2) | BNDMOV Gv,Ev (66) | BNDLDX Gv,Ev
 1b: BNDCN Gv,Ev (F2) | BNDMOV Ev, Gv (66) | BNDMK Gv, Ev (F3) | BNDSTX Ev, Gv
-1c:
+1c: Grp20 (1A),(1C)
 1d:
 1e:
 1f: NOP Ev
@@ -792,6 +792,8 @@
 f5: BZHI Gy, Ey, By (v) | PEXT Gy, By, Ey (F3),(v) | PDEP Gy, By, Ey (F2),(v)
 f6: ADCX Gy, Ey (66) | ADOX Gy, Ey (F3) | MULX By, Gy, rDX, Ey (F2),(v)
 f7: BEXTR Gy, Ey, By (v) | SHLX Gy, Ey, By (66),(v) | SARX Gy, Ey, By (F3),(v) | SHRX Gy, Ey, By (F2),(v)
+f8: MOVDIR64B Gv, Mdqq (66) | ENQCMD Gv, Mdqq (F2) | ENQCMDS Gv, Mdqq (F3)
+f9: MOVDIRI My, Gy
EndTable

Table: 3-byte opcode 2 (0x0f 0x3a)
@@ -907,7 +909,7 @@
 GrpTable: Grp3_2
 0: TEST Ev, Iz
-1:
+1: TEST Ev, Iz
 2: NOT Ev
 3: NEG Ev
 4: MUL rAX, Ev
@@ -943,9 +945,9 @@
EndTable

GrpTable: Grp7
-0: SGDT Ms | VMCALL (001),(11B) | VMLAUNCH (010),(11B) | VMRESUME (011),(11B) | VMXOFF (100),(11B)
-1: SIDT Ms | MONITOR (000),(11B) | MWAIT (001),(11B) | CLAC (010),(11B) | STAC (011),(11B)
-2: LGDT Ms | XGETBV (000),(11B) | XSETBV (001),(11B) | VMFUNC (100),(11B) | XEND (101)(11B) | XTEST (110)(11B)
+0: SGDT Ms | VMCALL (001),(11B) | VMLAUNCH (010),(11B) | VMRESUME (011),(11B) | VMXOFF (100),(11B) | PCONFIG (101),(11B) | ENCLV (000),(11B)
1: SIDT Ms | MONITOR (000),(11B) | MWAIT (001),(11B) | CLAC (010),(11B) | STAC (011),(11B) | ENCLS (111),(11B)
2: LGDT Ms | XGETBV (000),(11B) | XSETBV (001),(11B) | VMFUNC (100),(11B) | XEND (101)(11B) | XTEST (110),(11B) | ENCLU (111),(11B)
3: LIDT Ms
4: SMSW Mw/Rv
5: rdpkru (110),(11B) | wrpkru (111),(11B)
   @@ -1020,7 +1022,7 @@
   3: vstmxcsr Md (v1) | WRGSBASE Ry (F3),(11B)
4: XSAVE | ptwrite Ey (F3),(11B)
5: XRSTOR | lfence (11B)
   -6: XSAVEOPT | clwb (66) | mfence (11B)
   +6: XSAVEOPT | clwb (66) | mfence (11B) | TPAUSE Rd (66),(11B) | UMONITOR Rv (F3),(11B) | UMWAIT Rd (F2),(11B)
7: clflush | clflushopt (66) | sfence (11B)
EndTable

@@ -1051,6 +1053,10 @@
   6: vscatterp1qps/d Wx (66),(ev)
EndTable

+GrpTable: Grp20
+0: cldemote Mb
+EndTable
+
# AMD’s Prefetch Group
GrpTable: GrpP
0: PREFETCH
--- linux-4.15.0.orig/tools/objtool/arch/x86/tools/gen-insn-atru-x86.awk
+++ linux-4.15.0/tools/objtool/arch/x86/tools/gen-insn-atru-x86.awk
@@ -69,7 +69,7 @@
lprefix1_expr = "\((66|!F3)\)"
lprefix2_expr = "\((F3)\)"
-lprefix3_expr = "\((F2|!F3|66\&F2)\)"
+lprefix3_expr = "\((F2|!F3|66&F2)\)"
lprefix_expr = "\((66|F2|F3)\)"
max_lprefix = 4

@@ -257,7 +257,7 @@
return add_flags(imm, mod)
}

-/*[0-9a-f]+\:/ {                          
+/*[0-9a-f]+\:/ {                          
   if (NR == 1)
      next
      # get index
--- linux-4.15.0.orig/tools/objtool/builtin-check.c
+++ linux-4.15.0/tools/objtool/builtin-check.c
@@ -29,7 +29,7 @@
 #include "builtin.h"
 #include "check.h"

 -bool no_fp, no_unreachable;
+bool no_fp, no_unreachable, retpoline, module;

 static const char * const check_usage[] = {
 "objtool check [options] file.o",
 @@ -39,6 +39,8 @@
 const struct option check_options[] = {
 OPT_BOOLEAN('f', "no-fp", &no_fp, "Skip frame pointer validation"),
 OPT_BOOLEAN('u', "no-unreachable", &no_unreachable, "Skip 'unreachable instruction' warnings"),
+OPT_BOOLEAN('r', "retpoline", &retpoline, "Validate ret polyline assumptions"),
+OPT_BOOLEAN('m', "module", &module, "Indicates the object will be part of a kernel module"),
 OPT_END(),
);
@@ -53,5 +55,5 @@
 objname = argv[0];

 -return check(objname, no_fp, no_unreachable, false);
+return check(objname, false);
 }

 --- linux-4.15.0.orig/tools/objtool/builtin-orc.c
+++ linux-4.15.0/tools/objtool/builtin-orc.c
@@ -25,7 -25,6 @@
 */

 #include <string.h>
-#include <subcmd/parse-options.h>
#include "builtin.h"
#include "check.h"

 @@ -36,9 +35,6 @@
 NULL,
 };

-extern const struct option check_options[];
-extern bool no_fp, no_unreachable;
-
 int cmd_orc(int argc, const char **argv)
 {
  const char *objname;
@@ -54,7 +50,7 @@
if (!strcmp(argv[0], "dump")) {
    return check(objname, true);
}

--- linux-4.15.0.orig/tools/objtool/builtin.h
+++ linux-4.15.0/tools/objtool/builtin.h
@@ -17,6 +17,11 @@
#ifndef _BUILTIN_H
#define _BUILTIN_H

+#include <subcmd/parse-options.h>
+
+extern const struct option check_options[];
+extern bool no_fp, no_unreachable, retpoline, module;
+
extern int cmd_check(int argc, const char **argv);
extern int cmd_orc(int argc, const char **argv);

--- linux-4.15.0.orig/tools/objtool/check.c
+++ linux-4.15.0/tools/objtool/check.c
@@ -18,6 +18,7 @@
#include <string.h>
#include <stdlib.h>
+#include "builtin.h"
#include "check.h"
#include "elf.h"
#include "special.h"
@@ -27,13 +28,14 @@
#include <linux/hashtable.h>
#include <linux/kernel.h>

+#define FAKE_JUMP_OFFSET -1
+
struct alternative {
    struct list_head list;
    struct instruction *insn;
};

const char *objname;
-static bool no_fp;
struct cfi_state initial_func_cfi;

struct instruction *find_insn(struct objtool_file *file,
static struct instruction *next_insn_same_func(struct objtool_file *file, 
    struct instruction *insn) 
{
    struct instruction *next = list_next_entry(insn, list);
    struct symbol *func = insn->func;
    
    if (!func) 
        return NULL;
    
    if (&next->list != &file->insn_list && next->func == func) 
        return next;
    
    /* Check if we're already in the subfunction: */
    if (func == func->cfunc) 
        return NULL;
    
    /* Move to the subfunction: */
    return find_insn(file, func->cfunc->sec, func->cfunc->offset);
}

#define func_for_each_insn_all(file, func, insn) 
    for (insn = find_insn(file, func->sec, func->offset); 
           insn; 
           insn = next_insn_same_func(file, insn))

#define func_for_each_insn(file, func, insn) 
    for (insn = find_insn(file, func->sec, func->offset); 
           insn && &insn->list != &file->insn_list &&
          @ @ -138,6 +165,8 @ @
"_reiserfs_panic",
"lbug_with_loc",
"fortify_panic",
+"machine_real_restart",
+"rewind_stack_do_exit",
    );

if (func->bind == STB_WEAK)
    @ @ -148,10 +177,14 @ @
if (!strcmp(func->name, global_noreturns[i]))
    return 1;

-if (!func->sec)
    +if (!func->len)
    +return 0;

if (insn->type == INSN_RETURN)
@@ -166,35 +199,28 @@
    * case, the function's dead-end status depends on whether the target
    * of the sibling call returns.
 */
-void func_for_each_insn(file, func, insn) {
-    if (insn->sec != func->sec ||
-        insn->offset >= func->offset + func->len)
-        break;
-
+void func_for_each_insn_all(file, func, insn) {
    if (insn->type == INSN_JUMP_UNCONDITIONAL) {
        struct instruction *dest = insn->jump_dest;
        struct symbol *dest_func;

        if (!dest)
            /* sibling call to another file */
            return 0;
-    if (dest->sec != func->sec ||
-        dest->offset < func->offset ||
-        dest->offset >= func->offset + func->len) {
-        /* local sibling call */
-        dest_func = find_symbol_by_offset(dest->sec,
-            dest->offset);
-        if (!dest_func)
-            continue;
+    if (dest->func && dest->func->pfunc != insn->func->pfunc) {
+        /* local sibling call */
+        if (recursion == 5) {
+            WARN_FUNC("infinite recursion (objtool bug!");
+            dest->sec, dest->offset);
+            return -1;
+        }
+        /* Infinite recursion: two functions
+         * have sibling calls to each other.
+         * This is a very rare case. It means
+         * they aren't dead ends.
+ return 0;
}  

-return __dead_end_function(file, dest_func,
+return __dead_end_function(file, dest->func,
    recursion + 1);
}  
}  

if (!ignore_func(file, func))
continue;

-func_for_each_insn(file, func, insn)
+func_for_each_insn_all(file, func, insn)
insn->ignore = true;
}
}

insn->type != INSN_JUMP_UNCONDITIONAL)
continue;

-if (insn->ignore)
+if (insn->offset == FAKE_JUMP_OFFSET)
continue;

rela = find_rela_by_dest_range(insn->sec, insn->offset,
@@ -496,6 +522,7 @@
    * disguise, so convert them accordingly.
    */
    insn->type = INSN_JUMP_DYNAMIC;
+insn->retpoline_safe = true;
    continue;
} else {
    /* sibling call */
@@ -543,18 +570,15 @@
    dest_off = insn->offset + insn->len + insn->immediate;
    insn->call_dest = find_symbol_by_offset(insn->sec, 
    dest_off);
    */
    /* FIXME: Thanks to retpolines, it's now considered
    * normal for a function to call within itself. So
    * disable this warning for now.
    */
-#if 0
-    if (insn->call_dest) {
-        WARN_FUNC("can't find call dest symbol at offset 0x%lx",
-            insn->sec, insn->offset, dest_off);
+    if (insn->call_dest) {
-        WARN_FUNC("can't find call dest symbol at offset 0x%lx",
-            insn->sec, insn->offset, dest_off);
+if (!insn->call_dest && !insn->ignore) {
+WARN_FUNC("unsupported intra-function call",
+ insn->sec, insn->offset);
+if (retpoline)
+WARN("If this is a retpoline, please patch it in with alternatives and annotate it with
+ANNOTATE_NOSPEC_ALTERNATIVE.");
return -1;
}
#endif
+
+} else if (rela->sym->type == STT_SECTION) {
 insn->call_dest = find_symbol_by_offset(rela->sym->sec,
 rela->addend+4);
@@ -598,7 +622,7 @@
 struct instruction *orig_insn,
 struct instruction **new_insn)
 {
+struct instruction *last_orig_insn, *last_new_insn, *insn, *fake_jump = NULL;
 unsigned long dest_off;

 last_orig_insn = NULL;
@@ -614,28 +638,30 @@
 last_orig_insn = insn;
 }

-if (!next_insn_same_sec(file, last_orig_insn)) {
-WARN("%s: don't know how to handle alternatives at end of section",
-     special_alt->orig_sec->name);
-return -1;
-}
-
-fake_jump = malloc(sizeof(*fake_jump));
-if (!fake_jump) {
-WARN("malloc failed");
-return -1;
+if (next_insn_same_sec(file, last_orig_insn)) {
+fake_jump = malloc(sizeof(*fake_jump));
+if (!fake_jump) {
+WARN("malloc failed");
+return -1;
+
+memset(fake_jump, 0, sizeof(*fake_jump));
+INIT_LIST_HEAD(&fake_jump->alts);
+clear_insn_state(&fake_jump->state);
+
+fake_jump->sec = special_alt->new_sec;
fake_jump->offset = FAKE_JUMP_OFFSET;
fake_jump->type = INSN_JUMP_UNCONDITIONAL;
fake_jump->jump_dest = list_next_entry(last_orig_insn, list);
fake_jump->func = orig_insn->func;
}
memset(fake_jump, 0, sizeof(*fake_jump));
INIT_LIST_HEAD(&fake_jump->alts);
clear_insn_state(&fake_jump->state);
-
fake_jump->sec = special_alt->new_sec;
fake_jump->offset = -1;
fake_jump->type = INSN_JUMP_UNCONDITIONAL;
fake_jump->jump_dest = list_next_entry(last_orig_insn, list);
fake_jump->ignore = true;

if (!special_alt->new_len) {
  if (!fake_jump) {
    WARN("%s: empty alternative at end of section",
     special_alt->orig_sec->name);
    return -1;
  }
  *
  *new_insn = fake_jump;
  return 0;
}
@@ -648,6 +674,8 @@
last_new_insn = insn;

+insn->ignore = orig_insn->ignore_alts;
+
+if (insn->type != INSN_JUMP_CONDITIONAL &&
    insn->type != INSN_JUMP_UNCONDITIONAL)
  continue;
@@ -656,8 +684,14 @@
continue;

dest_off = insn->offset + insn->len + insn->immediate;
-if (dest_off == special_alt->new_off + special_alt->new_len)
+if (dest_off == special_alt->new_off + special_alt->new_len) {
+  if (!fake_jump) {
+    WARN("%s: alternative jump to end of section",
+         special_alt->orig_sec->name);
+    return -1;
+  }
 insn->jump_dest = fake_jump;
+}
if (!insn->jump_dest) {
    WARN_FUNC("can't find alternative jump destination", 
    return -1;
}

-list_add(&fake_jump->list, &last_new_insn->list);
+if (fake_jump)
+    list_add(&fake_jump->list, &last_new_insn->list);

return 0;
}
@@ -729,10 +764,6 @@
goto out;
}

-/* Ignore retpoline alternatives. */
-if (orig_insn->ignore_alts)
-    continue;
-
new_insn = NULL;
if (special_alt->group || special_alt->new_len) {
    new_insn = find_insn(file, special_alt->new_sec,
    @ @ -747.6 +778.12 @@
}

if (special_alt->group) {
    +if (!special_alt->orig_len) {
    +WARN_FUNC("empty alternative entry", 
    + orig_insn->sec, orig_insn->offset);
    +continue;
    +}
    +
    ret = handle_group_alt(file, special_alt, orig_insn,
        &new_insn);
    if (ret)
    @ @ -776.30 +813.35 @@
    return ret;
}

-static int add_switch_table(struct objtool_file *file, struct symbol *func,
-    struct instruction *insn, struct rela *table,
-    struct rela *next_table)
+static int add_switch_table(struct objtool_file *file, struct instruction *insn,
+    struct rela *table, struct rela *next_table)
{
    struct rela *rela = table;
    struct instruction *rela = table;
    struct instruction *alt_insn;
struct alternative *alt;
+struct symbol *pfunc = insn->func->pfunc;
+unsigned int prev_offset = 0;

-list_for_each_entry_from(rela, &file->rodata->rela->rela_list, list) {
+list_for_each_entry_from(rela, &table->rela_sec->rela_list, list) {
if (rela == next_table)
break;

-  
-rela->sym->sec != insn->sec ||
-rela->addend != func->offset ||
-rela->addend != func->offset + func->len)
+/* Make sure the switch table entries are consecutive: */
+if (prev_offset && rela->offset != prev_offset + 8)
break;

-alt_insn = find_insn(file, insn->sec, rela->addend);
-  
-if (!alt_insn) {
-    WARN("%s: can't find instruction at %s+0x%x",
-    file->rodata->rela->name, insn->sec->name,
-    rela->addend);
-    return -1;
-  }
-  
+/* Detect function pointers from contiguous objects: */
+if (rela->sym->sec == pfunc->sec &&
+    rela->addend == pfunc->offset)
+break;
+
+alt_insn = find_insn(file, rela->sym->sec, rela->addend);
+if (!alt_insn)
+break;
+
+/* Make sure the jmp dest is in the function or subfunction: */
+if (alt_insn->func->pfunc != pfunc)
+break;

alt = malloc(sizeof(*alt));
if (!alt) {
    @ @ -809,6 +851,13 @@

alt->insn = alt_insn;
list_add_tail(&alt->list, &insn->alts);
+prev_offset = rela->offset;
+}
+
+if (!prev_offset) {
+    WARN_FUNC("can't find switch jump table",
+        insn->sec, insn->offset);
+return -1;
}

return 0;
@ @ -848,8 +897,14 @@
* This is a fairly uncommon pattern which is new for GCC 6. As of this
* writing, there are 11 occurrences of it in the allmodconfig kernel.
* + * As of GCC 7 there are quite a few more of these and the 'in between' code
+ * is significant. Esp. with KASAN enabled some of the code between the mov
+ * and jmpq uses .rodata itself, which can confuse things.
+ *
* TODO: Once we have DWARF CFI and smarter instruction decoding logic,
* ensure the same register is used in the mov and jump instructions.
+ *
+ * NOTE: RETPOLINE made it harder still to decode dynamic jumps.
*/
static struct rela *find_switch_table(struct objtool_file *file,
    struct symbol *func,
@ @ -857,27 +912,19 @@
}{
struct rela *text_rela, *rodata_rela;
struct instruction *orig_insn = insn;
+struct section *rodata_sec;
+unsigned long table_offset;

-text_rela = find_rela_by_dest_range(insn->sec, insn->offset, insn->len);
-if (text_rela && text_rela->sym == file->rodata->sym) {
-/* case 1 */
-rodata_rela = find_rela_by_dest(file->rodata,
-text_rela->addend);
-if (rodata_rela)
-return rodata_rela;
-
-/* case 2 */
-rodata_rela = find_rela_by_dest(file->rodata,
-text_rela->addend + 4);
-if (!rodata_rela)
-return NULL;
-file->ignore_unreachables = true;
-return rodata_rela;
-}
+/*
+ * Backward search using the @first_jump_src links, these help avoid
+ * much of the 'in between' code. Which avoids us getting confused by
+ * it.
+ */
+for (;
&insn->list != &file->insn_list & insn->func & insn->func->pfunc == func;
+ insn = insn->first_jump_src ?: list_prev_entry(insn, list)) {

-/* case 3 */
-func_for_each_insn_continue_reverse(file, func, insn) {
- if (insn->type == INSN_JUMP_DYNAMIC)
+ if (insn != orig_insn && insn->type == INSN_JUMP_DYNAMIC)
 break;

 /* allow small jumps within the range */
@@ -890,30 +937,66 @@
 /* look for a relocation which references .rodata */
 text_rela = find_rela_by_dest_range(insn->sec, insn->offset,
       insn->len);
- if (!text_rela || text_rela->sym != file->rodata->sym)
+ if (!text_rela || text_rela->sym->type != STT_SECTION ||
+     !text_rela->sym->sec->rodata)
 continue;
+
+ table_offset = text_rela->addend;
+ rodata_sec = text_rela->sym->sec;
+ + if (text_rela->type == R_X86_64_PC32)
+ table_offset += 4;
+ + /
+ * Make sure the .rodata address isn't associated with a
+ * symbol. gcc jump tables are anonymous data.
+ */
- if (find_symbol_containing(file->rodata, text_rela->addend))
+ if (find_symbol_containing(rodata_sec, table_offset))
 continue;

 -return find_rela_by_dest(file->rodata, text_rela->addend);
 +rodata_rela = find_rela_by_dest(rodata_sec, table_offset);
+ if (rodata_rela) {
+ + /*
+ + * Use of RIP-relative switch jumps is quite rare, and
+ + * indicates a rare GCC quirk/bug which can leave dead
+ + * code behind.
+ + */
+ + if (text_rela->type == R_X86_64_PC32)
+ file->ignore_unreachables = true;
+ + return rodata_rela;
+ +}
static int add_func_switch_tables(struct objtool_file *file, 
    struct symbol *func) 
{
    struct instruction *insn, *prev_jump = NULL;
    struct instruction *insn, *last = NULL, *prev_jump = NULL;
    struct rela *rela, *prev_rela = NULL;
    int ret;

    func_for_each_insn(file, func, insn) {
        func_for_each_insn_all(file, func, insn) {
            if (!last)
                last = insn;

        /*
         * Store back-pointers for unconditional forward jumps such
         * that find_switch_table() can back-track using those and
         * avoid some potentially confusing code.
         */
        if (insn->type == INSN_JUMP_UNCONDITIONAL && insn->jump_dest &&
            insn->offset > last->offset &&
            insn->jump_dest->offset > insn->offset &&
            !insn->jump_dest->first_jump_src) {
            insn->jump_dest->first_jump_src = insn;
            last = insn->jump_dest;
        } else if (insn->type != INSN_JUMP_DYNAMIC)
            continue;

    // @ @ -927.8 +1010.7 @@
    /* the beginning of another switch table in the same function. */
    /*
    if (prev_jump) {
        -ret = add_switch_table(file, func, prev_jump, prev_rela,
        "rela);
        +ret = add_switch_table(file, prev_jump, prev_rela, rela);
        if (ret)
            return ret;
    } @@ -938.7 +1020.7 @@
    */
    
    if (prev_jump) {
    

    return NULL;
    }

    return NULL;
}
-ret = add_switch_table(file, func, prev_jump, prev_rela, NULL);
+ret = add_switch_table(file, prev_jump, prev_rela, NULL);
if (ret)
    return ret;
}
@@ -957,7 +1039,7 @@
struct symbol *func;
int ret;

@if (!file->rodata || !file->rodata->rela)
+if (!file->rodata)
    return 0;

for_each_sec(file, sec) {
@@ -1067,10 +1149,68 @@
    return 0;
 }

+static int read_retpoline_hints(struct objtool_file *file)
+{ 
+    struct section *sec;
+    struct instruction *insn;
+    struct rela *rela;
+    
+    sec = find_section_by_name(file->elf, ".rela.discard.retpoline_safe");
+    if (!sec)
+        return 0;
+    
+    list_for_each_entry(rela, &sec->rela_list, list) {
+        if (rela->sym->type != STT_SECTION) {
+            WARN("unexpected relocation symbol type in %s", sec->name);
+            return -1;
+        }
+        
+        insn = find_insn(file, rela->sym->sec, rela->addend);
+        if (!insn) {
+            WARN("bad .discard.retpoline_safe entry");
+            return -1;
+        }
+        
+        if (insn->type != INSN_JUMP_DYNAMIC &&
+            insn->type != INSN_CALL_DYNAMIC) {
+            WARN_FUNC("retpoline_safe hint not an indirect jump/call",
+                insn->sec, insn->offset);
+            return -1;
+        }
+        
+        insn->retpoline_safe = true;
static void mark_rodata(struct objtool_file *file)
{
struct section *sec;
bool found = false;

/*
 * This searches for the .rodata section or multiple .rodata.func_name
 * sections if -fdata-sections is being used. The .str.1.1 and .str.1.8
 * rodata sections are ignored as they don't contain jump tables.
 */
for_each_sec(file, sec) {
    if (!strncmp(sec->name, "rodata", 7) &&
        !strstr(sec->name, ".str1.")) {
        sec->rodata = true;
        found = true;
    }
}

file->rodata = found;

static int decode_sections(struct objtool_file *file)
{
    int ret;

    mark_rodata(file);
    ret = decode_instructions(file);
    if (ret)
        return ret;

    if (ret)
        return ret;

    ret = add_call_destinations(file);
    ret = add_special_section_alts(file);
    if (ret)
        return ret;

    ret = add_special_section_alts(file);
    ret = add_call_destinations(file);
    if (ret)
        return ret;

    ret = add_call_destinations(file);
    ret = add_special_section_alts(file);
    if (ret)
        return ret;

    return ret;
}
@@ -1105,6 +1245,10 @@
 if (ret)
 return ret;

 +ret = read_retpoline_hints(file);
+if (ret)
+ret = read_retpoline_hints(file);
 return ret;
 }

@@ -1153,7 +1297,7 @@
 struct cfi_reg *cfa = &state->cfa;
 struct stack_op *op = &insn->stack_op;

-if (cfa->base != CFI_SP)
+if (cfa->base != CFI_SP && cfa->base != CFI_SP_INDIRECT)
 return 0;

 /* push */
@@ -1652,15 +1796,14 @@
 while (1) {
     next_insn = next_insn_same_sec(file, insn);

-    -if (file->c_file && func && insn->func && func != insn->func) {
-        WARN("%s() falls through to next function %s()”,
-            func->name, insn->func->name);
-        return 1;
-    } 
+
     if (insn->func)
         func = insn->func;
     +func = insn->func->pfunc;
     if (func && insn->ignore) {
         WARN_FUNC("BUG: why am I validating an ignored function?",
@@ -1681,7 +1824,7 @@
         WARN_FUNC("BUG: why am I validating an ignored function?",
     i = insn;
     save_insn = NULL;
-    -func_for_each_insn_continue_reverse(file, func, i) {
-        +func_for_each_insn_continue_reverse(file, insn->func, i) {
        if (i->save) {
            save_insn = i;
            break;
insn->visited = true;

-list_for_each_entry(alt, &insn->alts, list) {
-ret = validate_branch(file, alt->insn, state);
-if (ret)
-return 1;
+if (!insn->ignore_alts) {
+list_for_each_entry(alt, &insn->alts, list) {
+ret = validate_branch(file, alt->insn, state);
+if (ret)
+return 1;
+}

switch (insn->type) {
@@ -1766,7 +1911,7 @@
case INSN_JUMP_UNCONDITIONAL:
if (insn->jump_dest &&
     (!func || !insn->jump_dest->func ||
-     func == insn->jump_dest->func)) {
+     insn->jump_dest->func->pfunc == func)) {
    ret = validate_branch(file, insn->jump_dest,
                     state);
    if (ret)
@@ -1848,6 +1993,38 @@
     return warnings;
 }

+static int validate_retpoline(struct objtool_file *file)
+{  
+struct instruction *insn;
+int warnings = 0;
+  
+  for_each_insn(file, insn) {
+    if (insn->type != INSN_JUMP_DYNAMIC &&
+        insn->type != INSN_CALL_DYNAMIC)
+      continue;
+  
+  if (insn->retpoline_safe)
+    continue;
+  
+/*
+ * .init.text code is ran before userspace and thus doesn't
+ * strictly need retpolines, except for modules which are
+ * loaded late, they very much do need retpoline in their
+ */

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+ */
+if (!strcmp(insn->sec->name, ".init.text") && !module)
+continue;
+
+WARN_FUNC("indirect %s found in RETPOLINE build",
+ insn->sec, insn->offset,
+ insn->type == INSN_JUMP_DYNAMIC ? "jump" : "call");
+
+warnings++;
+
+
+return warnings;
+
+
static bool is_kasan_insn(struct instruction *insn)
{
 return (insn->type == INSN_CALL &&
@@ -1880,26 +2057,45 @@
!strcmp(insn->sec->name, ".altinstr_aux")
 return true;
+
+if (!insn->func)
+return false;
+
+/*
+ * CONFIG_UBSAN_TRAP inserts a UD2 when it sees
+ * __builtin_unreachable(). The BUG() macro has an unreachable() after
+ * the UD2, which causes GCC's undefined trap logic to emit another UD2
+ * (or occasionally a JMP to UD2).
+ */
+if (list_prev_entry(insn, list)->dead_end &&
+ (insn->type == INSN_BUG ||
+ (insn->type == INSN_JUMP_UNCONDITIONAL &&
+ insn->jump_dest && insn->jump_dest->type == INSN_BUG)))
+return true;
+
/*
 * Check if this (or a subsequent) instruction is related to
 * CONFIG_UBSAN or CONFIG_KASAN.
 *
 * End the search at 5 instructions to avoid going into the weeds.
 */
-if (!insn->func)
-return false;

for (i = 0; i < 5; i++) {

  if (is_kasan_insn(insn) || is_ubsan_insn(insn))
    return true;
-if (insn->type == INSN_JUMP_UNCONDITIONAL && insn->jump_dest) {
-insn = insn->jump_dest;
-continue;
+if (insn->type == INSN_JUMP_UNCONDITIONAL) {
+if (insn->jump_dest &&
+    insn->jump_dest->func == insn->func) {
+insn = insn->jump_dest;
+continue;
+
+break;
}

if (insn->offset + insn->len >= insn->func->offset + insn->func->len)
break;
+
insn = list_next_entry(insn, list);
}

@@ -1923,7 +2119,7 @@
 for_each_sec(file, sec) {
 list_for_each_entry(func, &sec->symbol_list, list) {
-    if (func->type != STT_FUNC)
+    if (func->type != STT_FUNC || func->pfunc != func)
        continue;

    insn = find_insn(file, sec, func->offset);
@@ -1973,13 +2169,13 @@
     elf_close(file->elf);
 }

 -int check(const char *objname, bool _no_fp, bool no_unreachable, bool orc)
+static struct objtool_file file;
+
+int check(const char *objname, bool orc)
{ }

-int check(const char *objname, bool _no_fp, bool no_unreachable, bool orc)
+struct objtool_file file;
+
+int check(const char *objname, bool orc)
{ }

-struct objtool_file file;
int ret, warnings = 0;

objname = _objname;
-no_fp = _no_fp;

file.elf = elf_open(objname, orc ? O_RDWR : O_RDONLY);
if (!file.elf)
@@ -1988,7 +2184,6 @@
     INIT_LIST_HEAD(&file.insn_list);
hash_init(file.insn_hash);
file.whitelist = find_section_by_name(file.elf, ".discard.func_stack_frame_non_standard");
-file.rodata = find_section_by_name(file.elf, ".rodata");
file.c_file = find_section_by_name(file.elf, ".comment");
file.ignore_unreachables = no_unreachable;
file.hints = false;
@@ -2003,6 +2198,13 @@
it (list_empty(&file.insn_list))
  goto out;

  +if (retpoline) {
  +  ret = validate_retpoline(&file);
  +if (ret < 0)
  +return ret;
  +warnings += ret;
  +}
  +
  +ret = validate_functions(&file);
  if (ret < 0)
     goto out;
--- linux-4.15.0.orig/tools/objtool/check.h
+++ linux-4.15.0/tools/objtool/check.h
@@ -45,8 +45,10 @@
   unsigned char type;
   unsigned long immediate;
   bool alt_group, visited, dead_end, ignore, hint, save, restore, ignore_alts;
   +bool retpoline_safe;
   struct symbol *call_dest;
   struct instruction *jump_dest;
   +struct instruction *first_jump_src;
   struct list_head alts;
   struct symbol *func;
   struct stack_op stack_op;
@@ -58,11 +60,11 @@
   struct elf *elf;
   struct list_head insn_list;
   DECLARE_HASHTABLE(insn_hash, 16);
   -struct section *rodata, *whitelist;
   -bool ignore_unreachables, c_file, hints;
   +struct section *whitelist;
   +bool ignore_unreachables, c_file, hints, rodata;
    };

-int check(const char *objname, bool no_fp, bool no_unreachable, bool orc);
+int check(const char *objname, bool orc);

 struct instruction *find_insn(struct objtool_file *file,
   struct section *sec, unsigned long offset);
--- linux-4.15.0.orig/tools/objtool/elf.c
+++ linux-4.15.0/tools/objtool/elf.c
@@ -31,6 +31,8 @@
#include "elf.h"
#include "warn.h"

+define MAX_NAME_LEN 128
+
+struct section *find_section_by_name(struct elf *elf, const char *name)
{  
    struct section *sec;
@@ -79,6 +81,19 @@
      return NULL;
   }

+struct symbol *find_symbol_by_name(struct elf *elf, const char *name)
+{  
+    struct section *sec;
+    struct symbol *sym;
+    
+    list_for_each_entry(sec, &elf->sections, list)
+    list_for_each_entry(sym, &sec->symbol_list, list)
+    if (!strcmp(sym->name, name))
+      return sym;
+    
+    return NULL;
+   }

+struct symbol *find_symbol_containing(struct section *sec, unsigned long offset)
{  
    struct symbol *sym;
@@ -203,15 +218,19 @@
 static int read_symbols(struct elf *elf)
 {  
     struct section *symtab;
-    struct symbol *sym;
+    struct section *symtab, *sec;
+    struct symbol *sym, *pfunc;
     struct list_head *entry, *tmp;
     int symbols_nr, i;
     char *coldstr;

     symtab = find_section_by_name(elf, ".symtab");
     if (!symtab) {
         -WARN("missing symbol table");
     -return -1;
     +/*
+ * A missing symbol table is actually possible if it's an empty 
+ * .o file. This can happen for thunk_64.o. 
+ */ 
+return 0; 
} 

symbols_nr = symtab->sh.sh_size / symtab->sh.sh_entsize; 
@@ -281,6 +300,54 @@
hash_add(sym->sec->symbol_hash, &sym->hash, sym->idx); 
} 

+/* Create parent/child links for any cold subfunctions */
+list_for_each_entry(sec, &elf->sections, list) { 
+list_for_each_entry(sym, &sec->symbol_list, list) { 
+char pname[MAX_NAME_LEN + 1];
+size_t pnamelen;
+if (sym->type != STT_FUNC) 
+continue;
+sym->pfunc = sym->cfunc = sym;
+coldstr = strstr(sym->name, ".cold");
+if (!coldstr)
+continue;
+ 
+pnamelen = coldstr - sym->name;
+if (pnamelen > MAX_NAME_LEN) {
+WARN("%s(): parent function name exceeds maximum length of %d characters",
+sym->name, MAX_NAME_LEN);
+return -1;
+}
+
+strcpy(pname, sym->name, pnamelen);
+pnamelen = \0;
+pfunc = find_symbol_by_name(elf, pname);
+
+if (!pfunc) {
+WARN("%s(): can't find parent function",
+sym->name);
+return -1;
+}
+
+sym->pfunc = pfunc;
+pfunc->cfunc = sym;
+
+/*
+ * Unfortunately, -fnoreorder-functions puts the child
+ * inside the parent. Remove the overlap so we can
+ * have sane assumptions.
+ *
+ * Note that pfunc->len now no longer matches
+ * pfunc->sym.st_size.
+ */
+if (sym->sec == pfunc->sec &&
+ sym->offset >= pfunc->offset &&
+ sym->offset + sym->len == pfunc->offset + pfunc->len) {
+ pfunc->len -= sym->len;
+}
+}
+
+ return 0;

err:
@@ -326,6 +393,7 @@
    rela->rela_sec = sec;
if (!rela->sym) {
    WARN("can't find rela entry symbol %d for %s",
        symndx, sec->name);
--- linux-4.15.0.orig/tools/objtool/elf.h
+++ linux-4.15.0/tools/objtool/elf.h
@@ -48,7 +48,7 @@
    struct symbol {
        @ @ -61,12 +61,14 @ @
        unsigned char bind, type;
+struct symbol *pfunc, *cfunc;
   );

    struct rela {
        struct list_head list;
+struct symbol *rela_sec;
        struct section *sym;
        unsigned int len;
    GElf_Rela rela;
+struct section *rela_sec;
    struct symbol *sym;
        unsigned int type;
        unsigned long offset;

@@ -86,6 +88,7 @@
 struct elf *elf_open(const char *name, int flags);
 struct section *find_section_by_name(struct elf *elf, const char *name);
 struct symbol *find_symbol_by_offset(struct section *sec, unsigned long offset);
+struct symbol *find_symbol_by_name(struct elf *elf, const char *name);
 struct symbol *find_symbol_containing(struct section *sec, unsigned long offset);
 struct rela *find_rela_by_dest(struct section *sec, unsigned long offset);
 struct rela *find_rela_by_dest_range(struct section *sec, unsigned long offset,
 --- linux-4.15.0.orig/tools/objtool/orc_dump.c
 +++ linux-4.15.0/tools/objtool/orc_dump.c
 @@ -78,7 +78,7 @@
 char *name;
 size_t nr_sections;
 Elf64_Addr orc_ip_addr = 0;
-size_t shstrtab_idx;
+size_t shstrtab_idx, strtab_idx = 0;
 Elf *elf;
 Elf_Scn *scn;
 GElf_Shdr sh;
@@ -139,6 +139,8 @@
 if (!strcmp(name, ".symtab")) {
     symtab = data;
 +} else if (!strcmp(name, ".strtab")) {
+       strtab_idx = i;
     } else if (!strcmp(name, ".orc_unwind")) {
         orc = data->d_buf;
         orc_size = sh.sh_size;
@@ -150,7 +152,7 @@
     if (!shstrtab_idx) {
         Warn_ELF("elf_getshstrtab");
         return -1;
     }
 
     -if (!symtab || !orc || !orc_ip)
     +if (!symtab || !strtab_idx || !orc || !orc_ip)
         return 0;
 if (orc_size % sizeof(*orc) != 0) {
@@ -171,21 +173,29 @@
     return -1;
 }

 -scn = elf_getscn(elf, sym.st_shndx);
-    if (!scn) {
-      WARN_ELF("elf_getscn");
-      return -1;
-    }
-    
-    if (!gelf_getshdr(scn, &sh)) {
-WARN_ELF("gelf_getshdr");
-return -1;
-
-name = elf_strptr(elf, shstrtab_idx, sh.sh_name);
-if (!name || !*name) {
-WARN_ELF("elf_strptr");
-return -1;
+
-if (GELF_ST_TYPE(sym.st_info) == STT_SECTION) {
+scn = elf_getscn(elf, sym.st_shndx);
+if (!scn) {
+WARN_ELF("elf_getscn");
+return -1;
+}
+
+if (!gelf_getshdr(scn, &sh)) {
+WARN_ELF("gelf_getshdr");
+return -1;
+}
+
+name = elf_strptr(elf, shstrtab_idx, sh.sh_name);
+if (!name) {
+WARN_ELF("elf_strptr");
+return -1;
+}
+}
+ else {
+name = elf_strptr(elf, strtab_idx, sym.st_name);
+if (!name) {
+WARN_ELF("elf_strptr");
+return -1;
+}
+}
}

printf("%s+%llx:", name, (unsigned long long)rela.r_addend);
--- linux-4.15.0.orig/tools/objtool/orc_gen.c
+++ linux-4.15.0/tools/objtool/orc_gen.c
@@ -110,8 +110,32 @@
}
memset(rela, 0, sizeof(*rela));
-rela->sym = insn_sec->sym;
-rela->addend = insn_off;
+if (insn_sec->sym) {
+rela->sym = insn_sec->sym;
+rela->addend = insn_off;
+} else {
+/*
+ * The Clang assembler doesn't produce section symbols, so we
+ */
+}
+ * have to reference the function symbol instead:
+ */
+rela->sym = find_symbol_containing(insn_sec, insn_off);
+if (!rela->sym) {
+*/
+ * Hack alert. This happens when we need to reference
+ * the NOP pad insn immediately after the function.
+ */
+rela->sym = find_symbol_containing(insn_sec,
+ insn_off - 1);
+}
+if (!rela->sym) {
+WARN("missing symbol for insn at offset 0x%lx\n",
+ insn_off);
+return -1;
+}
+
+rela->addend = insn_off - rela->sym->offset;
+
rela->type = R_X86_64_PC32;
rela->offset = idx * sizeof(int);

--- linux-4.15.0.orig/tools/pci/pcitest.c
+++ linux-4.15.0/tools/pci/pcitest.c
@@ -23,7 +23,6 @@
 #include <stdio.h>
 #include <stdlib.h>
 #include <sys/ioctl.h>
-#include <time.h>
 #include <stdlib.h>
 #include <sys/ioctl.h>
-#include <time.h>
 #include <unistd.h>

 #include <linux/pcitest.h>
 @@ -45,15 +44,13 @@
 static int run_test(struct pci_test *test)
 {
- long ret;
+ int ret = -EINVAL;
 int fd;
- struct timespec start, end;
- double time;

 fd = open(test->device, O_RDWR);
 if (fd < 0) {
 perror("can't open PCI Endpoint Test device");
- return fd;
+ return -ENODEV;


if (test->barnum >= 0 && test->barnum <= 5) {

--- linux-4.15.0.orig/tools/perf/Documentation/perf-config.txt
+++ linux-4.15.0/tools/perf/Documentation/perf-config.txt
@@ -114,7 +114,7 @@

[report]
# Defaults
-sort-order = comm,dso,symbol
+sort_order = comm,dso,symbol
percent-limit = 0
queue-size = 0
children = true

--- linux-4.15.0.orig/tools/perf/Documentation/perf-record.txt
+++ linux-4.15.0/tools/perf/Documentation/perf-record.txt
@@ -33,6 +33,10 @@
-	- a raw PMU event (eventsel+umask) in the form of rNNN where NNN is a hexadecimal event descriptor.
+	+ - a symbolic or raw PMU event followed by an optional colon
+	+ and a list of event modifiers, e.g., cpu-cycles:p. See the
+	+ - a symbolically formed PMU event like 'pmu/param1=0x3,param2/' where
	+ 'param1', 'param2', etc are defined as formats for the PMU in
	+ /sys/bus/event_source/devices/<pmu>/format/*.

--- linux-4.15.0.orig/tools/perf/Documentation/perf-stat.txt
+++ linux-4.15.0/tools/perf/Documentation/perf-stat.txt
@@ -39,6 +39,10 @@
-	- a raw PMU event (eventsel+umask) in the form of rNNN where NNN is a hexadecimal event descriptor.
+	+ - a symbolic or raw PMU event followed by an optional colon
+	+ and a list of event modifiers, e.g., cpu-cycles:p. See the
+	+ - a symbolically formed event like 'pmu/param1=0x3,param2/' where
	+ param1 and param2 are defined as formats for the PMU in
	+ /sys/bus/event_source/devices/<pmu>/format/*

--- linux-4.15.0.orig/tools/perf/Makefile
+++ linux-4.15.0/tools/perf/Makefile
@@ -35,7 +35,7 @@

# Only pass canonical directory names as the output directory:
#
ifneq ($($(O).))
- FULL_O := $(shell readlink -f $(O) || echo $(O))
+ FULL_O := $(shell cd $(PWD); readlink -f $(O) || echo $(O))

---
endif

# @ @ -84,10 +84,10 @ @
endif # MAKECMDGOALS

#
- The clean target is not really parallel, don't print the jobs info:
+ Explicitly disable parallelism for the clean target.
#
clean:
- $(make)
+ $(make) -j1

#
# The build-test target is not really parallel, don't print the jobs info,
--- linux-4.15.0.orig/tools/perf/Makefile.config
+++ linux-4.15.0/tools/perf/Makefile.config
@@ -183,12 +183,20 @@
PYTHON_CONFIG_SQ := $(call shell-sq,$(PYTHON_CONFIG))

+ Python 3.8 changed the output of `python-config --ldflags` to not include the
+ `-lpythonX.Y` flag unless `-embed` is also passed. The feature check for
+ libpython fails if that flag is not included in LDFLAGS
+ifeq ($(shell $(PYTHON_CONFIG_SQ) --ldflags --embed 2>&1 1>/dev/null; echo $?), 0)
+ PYTHONCONFIG_LDFLAGS := --ldflags --embed
+else
+ PYTHONCONFIG_LDFLAGS := --ldflags
+endif
+ PYTHONCONFIG_LDFLAGS := --ldflags
+endif
+
+ifdef PYTHONCONFIG
+ PYTHON_EMBED_LDOPTS := $(shell $(PYTHON_CONFIG_SQ) --ldflags 2>/dev/null)
+ PYTHON_EMBED_LDOPTS := $(shell $(PYTHON_CONFIG_SQ) $(PYTHON_CONFIG_LDFLAGS) 2>/dev/null)
+ PYTHON_EMBED_LDOPTS := $(shell $(PYTHON_CONFIG_SQ) $(PYTHON_CONFIG_LDFLAGS) $(PYTHON_EMBED_LDOPTS))
+ PYTHON_EMBED_LIBADD := $(call grep-libs,$(PYTHON_EMBED_LDOPTS)) -lutil
- PYTHON_EMBED_CCOPTS := $(shell $(PYTHON_CONFIG_SQ) --cflags 2>/dev/null)
- PYTHON_EMBED_CCOPTS := $(shell $(PYTHON_CONFIG_SQ) --cflags 2>/dev/null)
- PYTHON_EMBED_CCOPTS := $(shell $(PYTHON_CONFIG_SQ) --cflags 2>/dev/null)
+ PYTHON_EMBED_CCOPTS := $(shell $(PYTHON_CONFIG_SQ) --cflags 2>/dev/null)
+ PYTHON_EMBED_LDOPTS := $(shell $(PYTHON_CONFIG_SQ) $(PYTHON_EMBED_LDOPTS))
+endif

@@ -265,15 +273,33 @@
 CFLAGS += -DHAVE_PTHREAD_ATTR_SETAFFINITY_NP
endif

+ifeq ($(feature-pthread-barrier), 1)
+ CFLAGS += -DHAVE_PTHREAD_BARRIER
+endif
+
+ifndef NO_BIONIC
  $(call feature_check,bionic)
  ifeq($(feature-bionic), 1)
    BIONIC := 1
    CFLAGS += -DLACKS_SIGQUEUE_PROTOTYPE
    CFLAGS += -DLACKS_OPEN_MEMSTREAM_PROTOTYPE
    EXTLIBS := $(filter-out -lrt,$(EXTLIBS))
    EXTLIBS := $(filter-out -lpthread,$(EXTLIBS))
  endif
endif
+
+ifeq ($(feature-eventfd), 1)
+  CFLAGS += -DHAVE_EVENTFD
+endif
+
+ifeq ($(feature-get_current_dir_name), 1)
+  CFLAGS += -DHAVE_GET_CURRENT_DIR_NAME
+endif
+
+ifeq ($(feature-gettid), 1)
+  CFLAGS += -DHAVE_GETTID
+endif
+
+ifdef NO_LIBELF
    NO_DWARF := 1
    NO_DEMANGLE := 1
    @ @ -649.20 +675.26 @ @
  endif
endif
+
+ifdef HAVE_NO_LIBBFD
+  feature-libbfd := 0
+endif
+
+ifeq ($(feature-libbfd), 1)
+    EXTLIBS += -lbfd
+else
+    # we are on a system that requires -liberty and (maybe) -lz
+    # to link against -lbfd; test each case individually here
+    # call all detections now so we get correct
+    # status in VF output
+    - $(call feature_check,liberty)
+    - $(call feature_check,liberty-z)
+    - $(call feature_check,cplus-demangle)
+ $(call feature_check,libbfd-liberty)
+ $(call feature_check,libbfd-liberty-z)

- ifeq ($(feature-liberty), 1)
- EXTLIBS += -liberty
+ ifeq ($(feature-libbfd-liberty), 1)
+ EXTLIBS += -lbfd -liberty
else
- ifeq ($(feature-liberty-z), 1)
- EXTLIBS += -liberty -lz
+ ifeq ($(feature-libbfd-liberty-z), 1)
+ EXTLIBS += -lbfd -liberty -lz
endif
endif
endif
@@ -672,24 +704,24 @@
else
 ifdef HAVE_CPLUS_DEMANGLE_SUPPORT
  EXTLIBS += -liberty
- CFLAGS += -DHAVE_CPLUS_DEMANGLE_SUPPORT
 else
- ifeq ($(feature-libbfd), 1)
- ifeq ($(feature-liberty), 1)
- ifeq ($(feature-liberty-z), 1)
- # we dont have neither HAVE_CPLUS_DEMANGLE_SUPPORT
- # or any of 'bfd iberty z' trinity
- ifeq ($(feature-cplus-demangle), 1)
- EXTLIBS += -liberty
- CFLAGS += -DHAVE_CPLUS_DEMANGLE_SUPPORT
- else
- msg := $(warning No bfd.h/libbfd found, please install binutils-dev[el]/zlib-static/libiberty-dev to gain symbol demangling)
- CFLAGS += -DNO_DEMANGLE
- endif
- endif
+ ifeq ($(filter -liberty,$(EXTLIBS)),)
+ $(call feature_check,cplus-demangle)
+
+ # we dont have neither HAVE_CPLUS_DEMANGLE_SUPPORT
+ # or any of 'bfd iberty z' trinity
+ ifeq ($(feature-cplus-demangle), 1)
+ EXTLIBS += -liberty
+ else
+ msg := $(warning No bfd.h/libbfd found, please install binutils-dev[el]/zlib-static/libiberty-dev to gain symbol demangling)
+ CFLAGS += -DNO_DEMANGLE
   endif
endif
endif
+
+ ifndef $(filter -liberty,$(EXTLIBS)),
+  CFLAGS += -DHAVE_CPLUS_DEMANGLE_SUPPORT
+ endif
endif
endif
endif
endif
endif
endif
endif
ifndef JDIR
--- linux-4.15.0.orig/tools/perf/Makefile.perf
+++ linux-4.15.0/tools/perf/Makefile.perf
@@ -144,18 +144,8 @@
 $(eval $(1) = $(2)))
 endef
-
-# Allow setting CC and AR and LD, or setting CROSS_COMPILE as a prefix.
-$\text{\textbackslash (call allow-override,CC,$(CROSS_COMPILE)}gcc\text{\textbackslash)}$
-\$\text{\textbackslash (call allow-override,AR,$(CROSS_COMPILE)ar\text{\textbackslash)}$
-\$\text{\textbackslash (call allow-override,LD,$(CROSS_COMPILE)ld\text{\textbackslash)}$
-\$\text{\textbackslash (call allow-override,CXX,$(CROSS_COMPILE)g++\text{\textbackslash)}$
-
- LD += $(EXTRA_LDFLAGS)
 -
-HOSTCC  ?= gcc
-HOSTLD  ?= ld
-HOSTAR  ?= ar
 -
 PKG_CONFIG = $(CROSS_COMPILE)pkg-config
 LLVM_CONFIG ?= llvm-config

@@ -368,7 +358,8 @@
ifeq $(USE_CLANG), 1)
  CLANGLIBS_LIST = AST Basic CodeGen Driver Frontend Lex Tooling Edit Sema Analysis Parse Serialization
 - LIBCLANG = $(foreach l,$(CLANGLIBS_LIST),$(wildcard $(shell $(LLVM_CONFIG) --libdir)/libclang$(l).a))
+ CLANGLIBS_NOEXT_LIST = $(foreach l,$(CLANGLIBS_LIST),$(shell $(LLVM_CONFIG) --
--libdir)/libclang$(l))
+ LIBCLANG = $(foreach l,$(CLANGLIBS_NOEXT_LIST),$(wildcard $(l).a $(l).so))
 LIBS += -Wl,--start-group $(LIBCLANG) -Wl,--end-group
endif

--- linux-4.15.0.orig/tools/perf/arch/arm/util/cs-etm.c
+++ linux-4.15.0/tools/perf/arch/arm/util/cs-etm.c
@@ -43,6 +43,8 @@
 struct auxtrace_record itr;
 struct perf_pmu *cs_etm_pmu;
 struct perf_evlist *evlist;
+int wrapped_cnt;
+bool *wrapped;
 bool snapshot_mode;
 size_t snapshot_size;
};
@@ -485,16 +487,131 @@
 return 0;
 }

-static int cs_etm_find_snapshot(struct auxtrace_record *itr __maybe_unused,
 +static int cs_etm_alloc_wrapped_array(struct cs_etm_recording *ptr, int idx)
 +{
+ bool *wrapped;
+ int cnt = ptr->wrapped_cnt;
+ +/* Make @ptr->wrapped as big as @idx */
+ +while (cnt <= idx)
+ +cnt++;
+ +/*
+ * Free'ed in cs_etm_recording_free(). Using realloc() to avoid
+ * cross compilation problems where the host's system supports
+ * reallocarray() but not the target.
+ */
+ +wrapped = realloc(ptr->wrapped, cnt * sizeof(bool));
+ +if (!wrapped)
+ +return -ENOMEM;
+ +wrapped[cnt - 1] = false;
+ +ptr->wrapped_cnt = cnt;
+ +ptr->wrapped = wrapped;
+ +return 0;
+ +}

+static bool cs_etm_buffer_has_wrapped(unsigned char *buffer,
+ size_t buffer_size, u64 head)
+{
+ u64 i, watermark;
+ u64 *buf = (u64 *)buffer;

---
size_t buf_size = buffer_size;
+
+/*
+ * We want to look the very last 512 byte (chosen arbitrarily) in
+ * the ring buffer.
+ */
+watermark = buf_size - 512;
+
+/*
+ * @head is continuously increasing - if its value is equal or greater
+ * than the size of the ring buffer, it has wrapped around.
+ */
+if (head >= buffer_size)
+return true;
+
+/*
+ * The value of @head is somewhere within the size of the ring buffer.
+ * This can be that there hasn't been enough data to fill the ring
+ * buffer yet or the trace time was so long that @head has numerically
+ * wrapped around. To find we need to check if we have data at the very
+ * end of the ring buffer. We can reliably do this because mmap'ed
+ * pages are zeroed out and there is a fresh mapping with every new
+ * session.
+ */
+
+/*
+ * @head is less than 512 byte from the end of the ring buffer */
+if (head > watermark)
+watermark = head;
+
+/*
+ * Speed things up by using 64 bit transactions (see "u64 *buf" above)
+ */
+watermark >>= 3;
+buf_size >>= 3;
+
+/*
+ * If we find trace data at the end of the ring buffer, @head has
+ * been there and has numerically wrapped around at least once.
+ */
+for (i = watermark; i < buf_size; i++)
+if (buf[i])
+return true;
+
+return false;
}
-unsigned char *data __maybe_unused,
+unsigned char *data,
 u64 *head, u64 *old)
 {
 +int err;
 +bool wrapped;
 +struct cs_etm_recording *ptr =
 +container_of(itr, struct cs_etm_recording, itr);
 +
 +/*
 + * Allocate memory to keep track of wrapping if this is the first
 + * time we deal with this *mm.
 + */
 +if (idx >= ptr->wrapped_cnt) {
 +err = cs_etm_alloc_wrapped_array(ptr, idx);
 +if (err)
 +return err;
 +}
 +
 +/*
 + * Check to see if *head has wrapped around. If it hasn't only the
 + * amount of data between *head and *old is snapshot'ed to avoid
 + * bloating the perf.data file with zeros. But as soon as *head has
 + * wrapped around the entire size of the AUX ring buffer it taken.
 + */
 +wrapped = ptr->wrapped[idx];
 +if (!wrapped && cs_etm_buffer_has_wrapped(data, mm->len, *head)) {
 +wrapped = true;
 +ptr->wrapped[idx] = true;
 +}
 +
 +pr_debug3("%s: mmap index %d old head %zu new head %zu size %zu\n",
 +__func__, idx, (size_t)*old, (size_t)*head, mm->len);
 -*old = *head;
 -*head += mm->len;
 +/* No wrap has occurred, we can just use *head and *old. */
 +if (!wrapped)
 +return 0;
 +
 +/*
 + * *head has wrapped around - adjust *head and *old to pickup the
 + * entire content of the AUX buffer.
 + */
 +if (*head >= mm->len) {
 +*old = *head - mm->len;
 +} else {
 +*head += mm->len;
return 0;
}
@@ -535,6 +652,8 @@
{
 struct cs_etm_recording *ptr =
 container_of(itr, struct cs_etm_recording, itr);
+  tfree(&ptr->wrapped);
 free(ptr);
}

--- linux-4.15.0.orig/tools/perf/arch/arm64/util/Build
+++ linux-4.15.0/tools/perf/arch/arm64/util/Build
@@ -1,3 +1,4 @@
+libperf-y += header.o
libperf-$ (CONFIG_DWARF) += dwarf-regs.o
libperf-$ (CONFIG_LOCAL_LIBUNWIND) += unwind-libunwind.o

--- linux-4.15.0.orig/tools/perf/arch/arm64/util/header.c
+++ linux-4.15.0/tools/perf/arch/arm64/util/header.c
@@ -0,0 +1,65 @@
+#include <stdio.h>
+#include <stdlib.h>
+#include "fs.h"
+#include "header.h"
+
+#define MIDR="/regs/identification/midr_el1"
+#define MIDR_SIZE 19
+#define MIDR_REVISION_MASK 0xf
+#define MIDR_VARIANT_SHIFT 20
+#define MIDR_VARIANT_MASK (0xf << MIDR_VARIANT_SHIFT)
+
+char *get_cpuid_str(struct perf_pmu *pmu)
+{
+  char *buf = NULL;
+  char path[PATH_MAX];
+  const char *sysfs = sysfs__mountpoint();
+  int cpu;
+  u64 midr = 0;
+  struct cpu_map *cpus;
+  FILE *file;
+  
+  +if (!sysfs || !pmu || !cpus)
+    return NULL;
+  +

buf = malloc(MIDR_SIZE);
if (!buf)
  return NULL;
+
/* read midr from list of cpus mapped to this pmu */
cpus = cpu_map__get(pmu->cpus);
for (cpu = 0; cpu < cpus->nr; cpu++) {
  scnprintf(path, PATH_MAX, "%s/devices/system/cpu/cpu%d"MIDR,
  sysfs, cpus->map[cpu]);
+
  file = fopen(path, "r");
  if (!file) {
    pr_debug("fopen failed for file %s\n", path);
    continue;
  }
  +
  if (!fgets(buf, MIDR_SIZE, file)) {
    fclose(file);
    continue;
  }
  fclose(file);
+
  /* Ignore/clear Variant[23:20] and
   * Revision[3:0] of MIDR
   */
midr = strtoul(buf, NULL, 16);
midr &= ~(MIDR_VARIANT_MASK | MIDR_REVISION_MASK);
  scnprintf(buf, MIDR_SIZE, "0x%016lx", midr);
  /* got midr break loop */
  break;
  +}
  +
  if (!midr) {
    pr_err("failed to get cpuid string for PMU %s\n", pmu->name);
  free(buf);
  ++buf = NULL;
  +}
  +
cpu_map__put(cpus);
  return buf;
+}
#include <stdio.h>
#include <stdlib.h>
@ -31,11 +32,11 @@
buffer[nb-1] = '\0';
return 0;
}
-return -1;
+return ENOBUFS;
}

char *
-get_cpuid_str(void)
+get_cpuid_str(struct perf_pmu *pmu __maybe_unused)
{
 char *bufp;

--- linux-4.15.0.orig/tools/perf/arch/powerpc/util/skip-callchain-idx.c
+++ linux-4.15.0/tools/perf/arch/powerpc/util/skip-callchain-idx.c
@@ -58,9 +58,13 @@
}
/*
 * Check if return address is on the stack.
 * + Check if return address is on the stack. If return address
 * + is in a register (typically R0), it is yet to be saved on
 * + the stack.
 */
-if (nops != 0 || ops != NULL)
+if ((nops != 0 || ops != NULL) &&
+!(nops == 1 && ops[0].atom == DW_OP_regx &&
+ops[0].number2 == 0 && ops[0].offset == 0))
return 0;
/**<n
@@ -243,10 +247,10 @@
u64 ip;
 u64 skip_slot = -1;

-if (chain->nr < 3)
+if (!chain || chain->nr < 3)
return skip_slot;

+ip = chain->ips[1];
-thread__find_addr_location(thread, PERF_RECORD_MISC_USER,
- MAP__FUNCTION, ip, &al);
--- linux-4.15.0.orig/tools/perf/arch/powerpc/util/sym-handling.c
```c
int arch__choose_best_symbol(struct symbol *syma, struct symbol *symb __maybe_unused)
{
    char *sym = syma->name;

    /* Skip over any initial dot */
    if (*sym == '.')
        sym++;

    /* Avoid "SyS" kernel syscall aliases */
    if (strlen(sym) >= 3 && strncmp(sym, "SyS", 3))
        return SYMBOL_A;
}

int arch__compare_symbol_names(const char *namea, const char *nameb)
{
    returnstrncmp(namea, nameb, n);
}

const char *arch__normalize_symbol_name(const char *name)
{
    /* Skip over initial dot */
    if (name && *name == '.')
        name++;

    return name;
}

for (i = 0; i < ntevs; i++) {
    tev = &pev->tevs[i];
    map__for_each_symbol(map, sym, tmp) {
        -if (map->unmap_ip(map, sym->start) == tev->point.address)
        +if (map->unmap_ip(map, sym->start) == tev->point.address) {
```
arch__fix_tev_from_maps(hev, tev, map, sym);
+break;
+
}
}
}

--- linux-4.15.0.orig/tools/perf/arch/s390/annotate/instructions.c
+++ linux-4.15.0/tools/perf/arch/s390/annotate/instructions.c
@@ -18,7 +18,8 @@
if (!strcmp(name, "br"))
 ops = &ret_ops;

-arch__associate_ins_ops(arch, name, ops);
+if (ops)
+arch__associate_ins_ops(arch, name, ops);
return ops;
}

--- linux-4.15.0.orig/tools/perf/arch/s390/util/header.c
+++ linux-4.15.0/tools/perf/arch/s390/util/header.c
@@ -10,6 +10,7 @@
*/

#include <sys/types.h>
+#include <errno.h>
#include <unistd.h>
#include <stdio.h>
#include <string.h>
@@ -21,7 +22,7 @@
const char *cpuid = "IBM/S390":

if (strlen(cpuid) + 1 > sz)
 -return -1;
+return ENOBUFS;

strcpy(buffer, cpuid);
return 0;

--- linux-4.15.0.orig/tools/perf/arch/s390/util/kvm-stat.c
+++ linux-4.15.0/tools/perf/arch/s390/util/kvm-stat.c
@@ -102,7 +102,7 @@

int cpu_isa_init(struct perf_kvm_stat *kvm, const char *cpuid)
{
  -if (strstr(cpuid, "IBM/S390")) {
+if (strstr(cpuid, "IBM")) {
    kvm->exit_reasons = sie_exit_reasons;
    kvm->exit_reasons_isa = "SIE";
  } else
--- linux-4.15.0.orig/tools/perf/arch/s390/util/machine.c
+++ linux-4.15.0/tools/perf/arch/s390/util/machine.c
@@ -5,16 +5,48 @@
 #include "util.h"
 #include "machine.h"
 #include "api/fs/fs.h"
+#include "debug.h"
+#include "symbol.h"

 -int arch__fix_module_text_start(u64 *start, const char *name)
+int arch__fix_module_text_start(u64 *start, u64 *size, const char *name)
 {
 +u64 m_start = *start;
 char path[PATH_MAX];

   snprintf(path, PATH_MAX, "module/%.*s/sections/.text",
             (int)strlen(name) - 2, name + 1);
-
   -if (sysfs__read_ull(path, (unsigned long long *)start) < 0)
     -return -1;
+    if (sysfs__read_ull(path, (unsigned long long *)start) < 0) {
+      pr_debug2("Using module %s start:%#lx
", path, m_start);
+      -*start = m_start;
+    } else { /* Successful read of the modules segment text start address. */
+      *start += m_start;
+      *size -= (*start - m_start);
+    }

 return 0;
 }

 /* On s390 kernel text segment start is located at very low memory addresses,
 + for example 0x10000. Modules are located at very high memory addresses,
 + for example 0x3ff8011b000. The gap between end of kernel text segment
 + and beginning of first module's text segment is very big.
 + Therefore do not fill this gap and do not assign it to the kernel dso map.
 + */
+void arch__symbols__fixup_end(struct symbol *p, struct symbol *c)
+{
#include <sys/types.h>
#include <errno.h>
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>

char *
get_cpuid_str(void)

get_cpuid_str(struct perf_pmu *pmu __maybe_unused)

char *buf = malloc(128);

-if (__get_cpuid(buf, 128, "%s-%u-%X$") < 0) {
+if (buf && __get_cpuid(buf, 128, "%s-%u-%X$") < 0) {
  free(buf);
  return NULL;
}
return 0;

+/
+ /* If supported, force pass-through config term (pt=1) even if user
+ * sets pt=0, which avoids senseless kernel errors.
+ */
+if (perf_pmu__scan_file(intel_pt_pmu, "format/pt", "%c", &c) == 1 &&
+    !(evsel->attr.config & 1)) {
+  pr_warning("pt=0 doesn’t make sense, forcing pt=1\n");
+  evsel->attr.config |= 1;
+
+  err = intel_pt_val_config_term(intel_pt_pmu, "caps/cycle_thresholds",
+                                 "cyc_thres", "caps/psb_cyc",
+                                 evsel->attr.config);
++
++  if (strstr(cpuid, "Intel")) {
++    kvm->exit_reasons = svm_exit_reasons;
++    kvm->exit_reasons_isa = "SVM"
++  } else if (strstr(cpuid, "AMD") || strstr(cpuid, "Hygon")) {
++    kvm->exit_reasons = svm_exit_reasons;
++    kvm->exit_reasons_isa = "SVM"
++  } else
++  if (rm[2].rm_so != rm[2].rm_eo)
++    prefix[0] = '+';
++  else
++    strncpy(prefix, "+0", 2);
++    scnprintf(prefix, sizeof(prefix), "+0");
++
++} /* Rename register */
++
#include "../util/unwind.h"
-#include "../util/debug.h"
#endif

#elif HAVE_ARCH_X86_64_SUPPORT
--- linux-4.15.0.orig/tools/perf/bench/mem-functions.c
+++ linux-4.15.0/tools/perf/bench/mem-functions.c
@@ -222,12 +222,8 @@
    return 0;
 }

 static u64 do_memcpy_cycles(const struct function *r, size_t size, void *src, void *dst)
+static void memcpy_prefault(memcpy_t fn, size_t size, void *src, void *dst)
{
    u64 cycle_start = 0ULL, cycle_end = 0ULL;
    memcpy_t fn = r->fn.memcpy;
    int i;

    /* Make sure to always prefault zero pages even if MMAP_THRESH is crossed: */
    memset(src, 0, size);

    @@ -236,6 +232,15 @@
    * to not measure page fault overhead:
    */
    fn(dst, src, size);
+
    +static u64 do_memcpy_cycles(const struct function *r, size_t size, void *src, void *dst)
    +{
        u64 cycle_start = 0ULL, cycle_end = 0ULL;
        memcpy_t fn = r->fn.memcpy;
        int i;

        +memcpy_prefault(fn, size, src, dst);

    cycle_start = get_cycles();
    for (i = 0; i < nr_loops; ++i)
@@ -251,11 +256,7 @@
        memcpy_t fn = r->fn.memcpy;
        int i;

        /*
         - * We prefault the freshly allocated memory range here,
         - * to not measure page fault overhead:
         - */
        -fn(dst, src, size);
        +memcpy_prefault(fn, size, src, dst);
BUG_ON(gettimeofday(&tv_start, NULL));
for (i = 0; i < nr_loops; ++i)
--- linux-4.15.0.orig/tools/perf/bench/numa.c
+++ linux-4.15.0/tools/perf/bench/numa.c
@@ -38,6 +38,10 @@
 #include <numa.h>
 #include <numaif.h>

+#ifndef RUSAGE_THREAD
+#define RUSAGE_THREAD 1
+#endif
+
/*
 * Regular printout to the terminal, supressed if -q is specified:
 */
@@ -374,8 +378,10 @@
/* Allocate and initialize all memory on CPU#0: */
if (init_cpu0) {
-orig_mask = bind_to_node(0);
-bind_to_memnode(0);
+int node = numa_node_of_cpu(0);
+	int node = numa_node_of_cpu(0);
+orig_mask = bind_to_node(node);
+bind_to_memnode(node);
}

bytes = bytes0 + HPSIZE;
@@ -1098,7 +1104,7 @@
         int global_data;
         int process_data;
         int thread_data;
-       u64 bytes_done;
+       u64 bytes_done, secs;
   long work_done;
   u32 l;
   struct rusage rusage;
@@ -1254,7 +1260,8 @@
      timersub(&stop, &start0, &diff);
      td->runtime_ns = diff.tv_sec * NSEC_PER_SEC;
      td->runtime_ns += diff.tv_usec * NSEC_PER_USEC;
-      td->speed_gbs = bytes_done / (td->runtime_ns / NSEC_PER_SEC) / 1e9;
+      secs = td->runtime_ns / NSEC_PER_SEC;
+      td->speed_gbs = secs ? bytes_done / secs / 1e9 : 0;

      getrusage(RUSAGE_THREAD, &rusage);
      td->system_time_ns = rusage.ru_stime.tv_sec * NSEC_PER_SEC;
--- linux-4.15.0.orig/tools/perf/builtin-annotate.c
+++ linux-4.15.0/tools/perf/builtin-annotate.c
@@ -216,6 +216,15 @@
     return ret;
 }

+static int process_feature_event(struct perf_tool *tool,
+union perf_event *event,
+struct perf_session *session)
+{
+if (event->feat.feat_id < HEADER_LAST_FEATURE)
+return perf_event__process_feature(tool, event, session);
+return 0;
+}

+static int hist_entry__tty_annotate(struct hist_entry *he,
+struct perf_evsel *evsel,
+struct perf_annotate *ann)
@@ -396,7 +405,7 @@
 .attr = perf_event__process_attr,
 .build_id = perf_event__process_build_id,
 .tracing_data = perf_event__process_tracing_data,
-.feature = perf_event__process_feature,
+.feature = process_feature_event,
 .ordered_events = true,
 .orderingRequiresTimestamps = true,
 },
--- linux-4.15.0.orig/tools/perf/builtin-c2c.c
+++ linux-4.15.0/tools/perf/builtin-c2c.c
@@ -528,8 +528,8 @@
{
 struct c2c_hist_entry *c2c_left;
 struct c2c_hist_entry *c2c_right;
-unsigned int tot_hitm_left;
-unsigned int tot_hitm_right;
+c2c_left  = container_of(left, struct c2c_hist_entry, he);
+c2c_right = container_of(right, struct c2c_hist_entry, he);
 @ @ -562,7 +562,8 @@
 \c2c_left = container_of(left, struct c2c_hist_entry, he);
 c2c_right = container_of(right, struct c2c_hist_entry, he);
 \-
\-return c2c_left->stats.__f - c2c_right->stats.__f;
+return (uint64_t) c2c_left->stats.__f -				
+ (uint64_t) c2c_right->stats.__f;
}
```c
#define STAT_FN(__f)
@@ -615,7 +616,8 @@
c2c_left = container_of(left, struct c2c_hist_entry, he);
c2c_right = container_of(right, struct c2c_hist_entry, he);
-	return llc_miss(&c2c_left->stats) - llc_miss(&c2c_right->stats);
+return (uint64_t) llc_miss(&c2c_left->stats) -
+       (uint64_t) llc_miss(&c2c_right->stats);
}

static uint64_t total_records(struct c2c_stats *stats)
@@ -1935,6 +1937,12 @@
if (!set)
  return -ENOMEM;
+nodes[node] = set;
+
+/* empty node, skip */
+if (cpu_map__empty(map))
+  continue;
+
  for (cpu = 0; cpu < map->nr; cpu++) {
    set_bit(map->map[cpu], set);
    @@ -1943,8 +1951,6 @@
cpu2node[map->map[cpu]] = node;
  }
-
-nodes[node] = set;
  }

setup_nodes_header();
@@ -2229,6 +2235,9 @@
  " s             Togle full lenght of symbol and source line columns \n"
  " q             Return back to cacheline list \n";
+
+if (!he)
+  return 0;
+
  /* Display compact version first. */
c2c.symbol_full = false;

@@ -2393,9 +2402,10 @@
  enum perf_call_graph_mode mode = CALLCHAIN_NONE;

  if ((sample_type & PERF_SAMPLE_REGS_USER) &&
-    (sample_type & PERF_SAMPLE_STACK_USER))
```
+(sample_type & PERF_SAMPLE_STACK_USER)) {
    mode = CALLCHAIN_DWARF;
-else if (sample_type & PERF_SAMPLE_BRANCH_STACK)
  +dwarf_callchain_users = true;
+} else if (sample_type & PERF_SAMPLE_BRANCH_STACK)
    mode = CALLCHAIN_LBR;
else if (sample_type & PERF_SAMPLE_CALLCHAIN)
    mode = CALLCHAIN_FP;
@@ -2446,6 +2456,7 @@
    bool add_sym = false;
    bool add_dso = false;
    bool add_src = false;
+int ret = 0;

    if (!buf)
      return -ENOMEM;
@@ -2464,7 +2475,8 @@
      add_dso = true;
  } else if (strcmp(tok, "offset")) {
    pr_err("unrecognized sort token: %s\n", tok);
-    return -EINVAL;
+    ret = -EINVAL;
+    goto err;
  }
}
@@ -2487,13 +2499,15 @@
    add_sym ? "symbol," : "",
    add_dso ? "dso," : "",
    add_src ? "cl_srcline," : "",
-    "node") < 0)
-    return -ENOMEM;
+    "node") < 0) {
+      ret = -ENOMEM;
+      goto err;
+    }
}

    c2c.show_src = add_src;
    -
    +err:
    free(buf);
    -return 0;
    +return ret;
}

static int setup_coalesce(const char *coalesce, bool no_source)
--- linux-4.15.0.orig/tools/perf/builtin-ftrace.c
+++ linux-4.15.0/tools/perf/builtin-ftrace.c
int last_cpu;

last_cpu = cpu_map__cpu(cpumap, cpumap->nr - 1);
-mask_size = (last_cpu + 3) / 4 + 1;
+mask_size = last_cpu / 4 + 2; /* one more byte for EOS */
mask_size += last_cpu / 32; /* ',' is needed for every 32th cpus */

cpumask = malloc(mask_size);
--- linux-4.15.0.orig/tools/perf/builtin-help.c
+++ linux-4.15.0/tools/perf/builtin-help.c
@@ -189,7 +189,7 @@
while (*p)
  *p = zalloc(sizeof(**p) + len + 1);
-strcpy((*p)->name, name);
+strcpy((*p)->name, name);
  }

static int supported_man_viewer(const char *name, size_t len)
--- linux-4.15.0.orig/tools/perf/builtin-kmem.c
+++ linux-4.15.0/tools/perf/builtin-kmem.c
@@ -686,6 +686,7 @@
new = realloc(new_flags, len + strlen(cpt) + 2);
if (new == NULL) {
  free(new_flags);
+  free(orig_flags);
  return NULL;
}

static int cpu_isa_config(struct perf_kvm_stat *kvm)
--- linux-4.15.0.orig/tools/perf/builtin-kvm.c
+++ linux-4.15.0/tools/perf/builtin-kvm.c
@@ -696,14 +696,15 @@
{  
  int err;

  if (kvm->live) {
    err = get_cpuid(buf, sizeof(buf));
    if (err != 0) {
      -pr_err("Failed to look up CPU type\n");
      -return err;
+str_error_r(err, buf, sizeof(buf));
      +return -err;

---
case SEQ_STATE_READ_ACQUIRED:
    seq->read_count--;
    BUG_ON(seq->read_count < 0);
    if (!seq->read_count) {
        ls->nr_release++;
        goto end;
    }
    for (k = 0; k < pev->ntevs; k++) {
        struct probe_trace_event *tev = &pev->tevs[k];
        /* Skipped events have no event name */
        if (!tev->event)
            continue;
        /* We use tev's name for showing new events */
        show_perf_probe_event(tev->group, tev->event, pev,
                               /* When perf_add_probe_events() fails it calls
                               * cleanup_perf_probe_events(pevs, npevs), i.e.
                               * cleanup_perf_probe_events(params.events, params.nevents), which
                               * will call clear_perf_probe_event(), so set nevents to zero
                               * to avoid cleanup_params() to call clear_perf_probe_event() again
                               * on the same pevs.
                               */
        +params.nevents = 0;
        pr_err_with_code(" Error: Failed to add events.", ret);
        return ret;
    }
    ret = perf_add_probe_events(params.events, params.nevents);
    if (ret < 0) {
        +/*
        + * When perf_add_probe_events() fails it calls
        + * cleanup_perf_probe_events(pevs, npevs), i.e.
        + * cleanup_perf_probe_events(params.events, params.nevents), which
        + * will call clear_perf_probe_event(), so set nevents to zero
        + * to avoid cleanup_params() to call clear_perf_probe_event() again
        + * on the same pevs.
        + */
        +params.nevents = 0;
        pr_err_with_code(" Error: Failed to add events.", ret);
        return ret;
    }

if (data->is_pipe) {
    -err = perf_event__synthesize_features(
            tool, session, rec->evlist, process_synthesized_event);
    -if (err < 0) {
        -pr_err("Couldn't synthesize features.
                ");
        -return err;
    -}

  /*
    * We need to synthesize events first, because some
    * features works on top of them (on report side).
    */
  err = perf_event__synthesize_attrs(tool, session,
          process_synthesized_event);
  if (err < 0) {
    @@ -734,6 +731,13 @@
      goto out;
  }

  +err = perf_event__synthesize_features(tool, session, rec->evlist,
+        process_synthesized_event);
  +if (err < 0) {
        +pr_err("Couldn't synthesize features.
                ");
        +return err;
    +}

  +if (have_tracepoints(&rec->evlist->entries)) {
        /*
        * FIXME err <= 0 here actually means that
        @@ -1533,7 +1537,8 @@
          OPT_BOOLEAN_SET('T', "timestamp", &record.opts.sample_time,
                      &record.opts.sample_time_set,
                      "Record the sample timestamps"),
          -OPT_BOOLEAN('P', "period", &record.opts.period, "Record the sample period"),
          +OPT_BOOLEAN_SET('P', "period", &record.opts.period, &record.opts.period_set,
                      "Record the sample period"),
          OPT_BOOLEAN('n', "no-samples", &record.opts.no_samples,
                      "don't sample"),
          OPT_BOOLEAN_SET('N', "no-buildid-cache", &record.no_buildid_cache,
                      @ @ -1781.8 +1786.8 @ @
                          goto out;
                      }

        */

  -/* Enable ignoring missing threads when -u option is defined. */
  -rec->opts.ignore_missing_thread = rec->opts.target.uid != UINT_MAX;
  +/* Enable ignoring missing threads when -u/-p option is defined. */
  +rec->opts.ignore_missing_thread = rec->opts.target.uid != UINT_MAX || rec->opts.target.pid;

err = -ENOMEM;
if (perf_evlist__create_maps(rec->evlist, &rec->opts.target) < 0)
--- linux-4.15.0.orig/tools/perf/builtin-report.c
+++ linux-4.15.0/tools/perf/builtin-report.c
@@ -162,12 +162,28 @@
       struct hist_entry *he = iter->he;
       struct report *rep = arg;
       struct branch_info *bi;
+      struct perf_sample *sample = iter->sample;
+      struct perf_evsel *evsel = iter->evsel;
+      int err;
+      
+      if (!ui__has_annotation())
+         return 0;
+      
+      hist__account_cycles(sample->branch_stack, al, sample,
+                           rep->nonany_branch_mode);

     bi = he->branch_info;
+    err = addr_map_symbol__inc_samples(&bi->from, sample, evsel->idx);
+    if (err)
+       goto out;
+    
+    err = addr_map_symbol__inc_samples(&bi->to, sample, evsel->idx);
+    
    branch_type_count(&rep->brtype_stat, &bi->flags,
                      bi->from.addr, bi->to.addr);

    -return 0;
    +out:
    +return err;
}

static int process_sample_event(struct perf_tool *tool,
@@ -312,9 +328,10 @@
       if (symbol_conf.use_callchain || symbol_conf.cumulate_callchain) {
       if ((sample_type & PERF_SAMPLE_REGS_USER) &&
          ! (sample_type & PERF_SAMPLE_STACK_USER)) {
+         callchain_param.record_mode = CALLCHAIN_DWARF;
          -else if (sample_type & PERF_SAMPLE_BRANCH_STACK)
+         dwarf_callchain_users = true;
+      } else if (sample_type & PERF_SAMPLE_BRANCH_STACK)
           callchain_param.record_mode = CALLCHAIN_LBR;
       else
           callchain_param.record_mode = CALLCHAIN_FP;
@@ -325,6 +342,13 @@
PERF_SAMPLE_BRANCH_ANY))
rep->nonany_branch_mode = true;

+if !defined(HAVE_LIBUNWIND_SUPPORT) && !defined(HAVE_DWARF_SUPPORT)
+if (dwarf_callchain_users) {
+ui__warning("Please install libunwind or libdw 
+ "development packages during the perf build.
");
+}
+#endif
+
return 0;
}

@@ -377,8 +401,7 @@
if (evname != NULL)
ret += fprintf(fp, " of event '%s'", evname);

-if (symbol_conf.show_ref_callgraph &&
-    strstr(evname, "call-graph=no")) {
+if (symbol_conf.show_ref_callgraph && evname && strstr(evname, "call-graph=no")) {
ret += fprintf(fp, ", show reference callgraph";
}

@@ -721,6 +744,7 @@
struct stat st;
bool has_br_stack = false;
int branch_mode = -1;
+int last_key = 0;
bool branch_call_mode = false;
callchain_default_opt[] = CALLCHAIN_DEFAULT_OPT;
const char * const report_usage[] = {
@@ -1027,7 +1051,8 @@
else
use_browser = 0;

-if (setup_sorting(session->evlist) < 0) {
+if ((last_key != K_SWITCH_INPUT_DATA) &&
+    (setup_sorting(session->evlist) < 0)) {
if (sort_order)
parse_options_usage(report_usage, options, "s", 1);
if (field_order)
@@ -1087,6 +1112,7 @@
ret = __cmd_report(&report);
if (ret == K_SWITCH_INPUT_DATA) {
perf_session__delete(session);
+last_key = K_SWITCH_INPUT_DATA;
goto repeat;
} else

ret = 0;
--- linux-4.15.0.orig/tools/perf/builtin-script.c
+++ linux-4.15.0/tools/perf/builtin-script.c
@@ -25,6 +25,7 @@
#include "util/string2.h"
#include "util/thread-stack.h"
#include "util/time-utils.h"
+include "util/path.h"
#include "print_binary.h"
#include <linux/bitmap.h>
#include <linux/kernel.h>
@@ -401,7 +402,7 @@
"selected. Hence, no address to lookup the source line number.
")
return -EINVAL;
}
@if (PRINT_FIELD(BRSTACKINSN) &&
+if (PRINT_FIELD(BRSTACKINSN) && !allow_user_set &&
!(perf_evlist__combined_branch_type(session->evlist) &
PERF_SAMPLE_BRANCH_ANY)) {
pr_err("Display of branch stack assembler requested, but non all-branch filter set\n"
@@ -965,7 +966,7 @@
continue;

insn = 0;
-for (off = 0;; off += ilen) {
+for (off = 0; off < (unsigned)len; off += ilen) {
uint64_t ip = start + off;

printed += ip__fprintf_sym(ip, thread, x.cpumode, x.cpu, &lastsym, attr, fp);
@@ -973,6 +974,7 @@
printed += ip__fprintf_jump(ip, &br->entries[i], &x, buffer + off, len - off, insn, fp);
break;
} else {
+ilen = 0;
printed += fprintf(fp, "\t%016" PRIx64 "\t%s\n", ip,
    dump_insn(&x, ip, buffer + off, len - off, &ilen));
if (ilen == 0)
@@ -980,6 +982,8 @@
insn++;}
}

+if (off != end - start)
+printed += fprintf(fp, "\tmismatch of LBR data and executable\n");
}

/*
@@ -1010,6 +1014,7 @@
go to out;
for (off = 0; off <= end - start; off += ilen) {
    ilen = 0;
    printed += fprintf(fp, "\t%016" PRIx64 "\t%s\n", start + off, 
        dump_insn(&x, start + off, buffer + off, len - off, &ilen));
    if (ilen == 0)
        @ @ -1515.7 +1520.7 @@
        return;
}

-if (PRINT_FIELD(TRACE)) {
+if (PRINT_FIELD(TRACE) && sample->raw_data) {
    event_format__fprintf(evsel->tp_format, sample->cpu, 
        sample->raw_data, sample->raw_size, fp);
}
@@ -1515,7 +1520,7 @@
struct perf_evlist *evlist;
struct perf_evsel *evsel, *pos;
int err;
+static struct perf_evsel_script *es;

err = perf_event__process_attr(tool, event, pevlist);
if (err)
@@ -1694,6 +1700,19 @@
    evlist = *pevlist;
    evsel = perf_evlist__last(*pevlist);
+if (!evsel->priv) {
+    if (scr->per_event_dump) {
+        evsel->priv = perf_evsel_script__new(evsel, 
+            scr->session->data);
+    } else {
+        es = zalloc(sizeof(*es));
+        if (!es)
+            return -ENOMEM;
+        es->fp = stdout;
+        evsel->priv = es;
+    }
+    if (evsel->attr.type >= PERF_TYPE_MAX &&
+        evsel->attr.type != PERF_TYPE_SYNTH)
        return 0;
@@ -2311,19 +2330,6 @@
        return rc;
    }

/* Helper function for filesystems that return a dent->d_type DT_UNKNOWN */
static int is_directory(const char *base_path, const struct dirent *dent) {
    char path[PATH_MAX];
    struct stat st;
    
    sprintf(path, "%s/%s", base_path, dent->d_name);
    if (stat(path, &st))
        return 0;
    
    return S_ISDIR(st.st_mode);
}

#define for_each_lang(scripts_path, scripts_dir, lang_dirent) 
    while ((lang_dirent = readdir(scripts_dir)) != NULL)
    if ((lang_dirent->d_type == DT_DIR ||
        
    for_each_lang(scripts_path, scripts_dir, lang_dirent) {
        snprintf(lang_path, MAXPATHLEN, "%s/%s/bin", scripts_path, 
            lang_dirent->d_name);
        
        lang_dir = opendir(lang_path);
        if (!lang_dir)
            continue;
    }

int match, len;
FILE *fp;
    
    sprintf(filename, "%s/bin/%s-record", dir_name, scriptname);
    fp = fopen(filename, "r");
    if (!fp)
        return 0;
for_each_lang(scripts_path, scripts_dir, lang_dirent) {
- snprintf(lang_path, MAXPATHLEN, "%s/%s", scripts_path,
- lang_dirent->d_name);
+ snprintf(lang_path, MAXPATHLEN, "%s/%s", scripts_path,
+ lang_dirent->d_name);
#ifdef NO_LIBPERL
if (strstr(lang_path, "perl"))
    continue;
@@ -2679,8 +2685,8 @@
return NULL;
for_each_lang(scripts_path, scripts_dir, lang_dirent) {
- snprintf(lang_path, MAXPATHLEN, "%s/%s/bin", scripts_path,
- lang_dirent->d_name);
+ snprintf(lang_path, MAXPATHLEN, "%s/%s/bin", scripts_path,
+ lang_dirent->d_name);
lang_dir = opendir(lang_path);
if (!lang_dir)
    continue;
@@ -2691,8 +2697,8 @@
free(__script_root);
closedir(lang_dir);
closedir(scripts_dir);
- snprintf(script_path, MAXPATHLEN, "%s/%s",
- lang_path, script_dirent->d_name);
+ snprintf(script_path, MAXPATHLEN, "%s/%s",
+ lang_path, script_dirent->d_name);
return strdup(script_path);
}
free(__script_root);
@@ -2758,9 +2764,10 @@
if (symbol_conf.use_callchain || symbol_conf.cumulate_callchain) {
if (sample_type & PERF_SAMPLE_REGS_USER) &&
- (sample_type & PERF_SAMPLE_STACK_USER)) {
+ (sample_type & PERF_SAMPLE_STACK_USER)) {
    callchain_param.record_mode = CALLCHAIN_DWARF;
-} else if (sample_type & PERF_SAMPLE_BRANCH_STACK)
+ dwarf_callchain_users = true;
+ } else if (sample_type & PERF_SAMPLE_BRANCH_STACK)
    callchain_param.record_mode = CALLCHAIN_LBR;
else
callchain_param.record_mode = CALLCHAIN_FP;
@@ -2848,6 +2855,15 @@
return set_maps(script);
}
static int process_feature_event(struct perf_tool *tool,
    union perf_event *event,
    struct perf_session *session)
{```
    if (event->feat.feat_id < HEADER_LAST_FEATURE)
        return perf_event__process_feature(tool, event, session);
    return 0;
}
```

#ifdef HAVE_AUXTRACE_SUPPORT
    static int perf_script__process_auxtrace_info(struct perf_tool *tool,
        union perf_event *event,
        struct perf_session *session)
{```
    .attr = process_attr,
    .event_update = perf_event__process_event_update,
    .tracing_data = perf_event__process_tracing_data,
    .feature = perf_event__process_feature,
    .build_id = perf_event__process_build_id,
    .id_index = perf_event__process_id_index,
    .auxtrace_info = perf_script__process_auxtrace_info,
```
"hardware transaction statistics"),
OPT_CALLBACK('e', "event", &evsel_list, "event", @@ -2256,11 +2256,16 @@
return 0;

if (transaction_run) {
+struct parse_events_error errinfo;
+
+ if (pmu_have_event("cpu", "cycles-ct") &&
+     pmu_have_event("cpu", "el-start"))
-err = parse_events(evsel_list, transaction_attrs, NULL);
+err = parse_events(evsel_list, transaction_attrs,
+     &errinfo);
else
-err = parse_events(evsel_list, transaction_limited_attrs, NULL);
+err = parse_events(evsel_list,
+     transaction_limited_attrs,
+     &errinfo);
if (err) {
    fprintf(stderr, "Cannot set up transaction events\n");
    return -1;
@@ -2651,6 +2656,12 @@
return -ENOMEM;
parse_events__shrink_config_terms();
+
+/* String-parsing callback-based options would segfault when negated */
+set_option_flag(stat_options, 'e', "event", PARSE_OPT_NONEG);
+set_option_flag(stat_options, 'M', "metrics", PARSE_OPT_NONEG);
+set_option_flag(stat_options, 'G', "cgroup", PARSE_OPT_NONEG);
+
+argc = parse_options_subcommand(argc, argv, stat_options, stat_subcommands,
+(const char **) stat_usage,
+PARSE_OPT_STOP_AT_NON_OPTION);
@@ -2835,8 +2846,11 @@
    fprintf(output, "[ perf stat: executing run #\%d ... ]\n",
    run_idx + 1);
+
+if (run_idx != 0)
+    perf_evlist__reset_prev_raw_counts(evsel_list);
+
    status = run_perf_stat(argc, argv);
    -if (forever &&& status != -1) {
+if (forever &&& status != -1 &&& !interval) {
        print_counters(NULL, argc, argv);
        perf_stat__reset_stats();
    }
--- linux-4.15.0.orig/tools/perf/builtin-timechart.c
```
+++ linux-4.15.0/tools/perf/builtin-timechart.c
@@ -43,6 +43,10 @@
#include "util/data.h"
#include "util/debug.h"
+#ifdef LACKS_OPEN_MEMSTREAM_PROTOTYPE
+FILE *open_memstream(char **ptr, size_t *sizeloc);
+#endif
+
#define SUPPORT_OLD_POWER_EVENTS 1
#define PWR_EVENT_EXIT -1
--- linux-4.15.0.orig/tools/perf/builtin-top.c
+++ linux-4.15.0/tools/perf/builtin-top.c
@@ -647,7 +647,9 @@
delay_msecs = top->delay_secs * MSEC_PER_SEC;
set_term_quiet_input(&save);
/* trash return*/
-getc(stdin);
+clearerr(stdin);
+if (poll(&stdin_poll, 1, 0) > 0)
+getc(stdin);

while (!done) {
    perf_top__print_sym_table(top);
@@ -1085,8 +1087,10 @@
static int perf_top_config(const char *var, const char *value, void *cb __maybe_unused)
{
    -if (!strcmp(var, "top.call-graph"))
    -var = "call-graph.record-mode"; /* fall-through */
+if (!strcmp(var, "top.call-graph")) {
+    var = "call-graph.record-mode";
+    return perf_default_config(var, value, cb);
+}
    if (!strcmp(var, "top.children")) {
        symbol_conf.cumulate_callchain = perf_config_bool(var, value);
        return 0;
@@ -1351,8 +1355,9 @@
goto out_delete_evlist;

symbol_conf.try_vmlinux_path = (symbol_conf.vmlinux_name == NULL);
-if (symbol__init(NULL) < 0)
-return -1;
+status = symbol__init(NULL);
+if (status < 0)
+goto out_delete_evlist;
```
sort__setup_elide(stdout);

--- linux-4.15.0.orig/tools/perf/builtin-trace.c
+++ linux-4.15.0/tools/perf/builtin-trace.c
@@ -2137,19 +2137,30 @@
 static bool perf_evlist__add_vfs_getname(struct perf_evlist *evlist)
 {
- struct perf_evsel *evsel = perf_evsel__newtp("probe", "vfs_getname");
+ bool found = false;
+ struct perf_evsel *evsel, *tmp;
+ struct parse_events_error err = { .idx = 0, };
+ int ret = parse_events(evlist, "probe:vfs_getname*", &err);

- if (IS_ERR(evsel))
+ if (ret)
 return false;

- if (perf_evsel__field(evsel, "pathname") == NULL) {
+ evlist__for_each_entry_safe(evlist, evsel, tmp) {
+ if (!strstarts(perf_evsel__name(evsel), "probe:vfs_getname"))
+ continue;
+}
+ if (perf_evsel__field(evsel, "pathname")) {
+ evsel->handler = trace__vfs_getname;
+ found = true;
+ continue;
+}
+ list_del_init(&evsel->node);
+ evsel->evlist = NULL;
 perf_evsel__delete(evsel);
- return false;
 }

 evsel->handler = trace__vfs_getname;
 perf_evlist__add(evlist, evsel);
- return true;
+ return found;
 }

 static struct perf_evsel *perf_evsel__new_pgfault(u64 config)
--- linux-4.15.0.orig/tools/perf/check-headers.sh
+++ linux-4.15.0/tools/perf/check-headers.sh
@@ -13,6 +13,7 @@
 include/uapi/linux/stat.h
 include/uapi/linux/vhost.h
 include/uapi/sound/asound.h

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#include/linux/bits.h
#include/linux/hash.h
#include/uapi/linux/hw_breakpoint.h
arch/x86/include/asm/disabled-features.h
--- linux-4.15.0.orig/tools/perf/jvmti/jvmti_agent.c
+++ linux-4.15.0/tools/perf/jvmti/jvmti_agent.c
@@ -35,6 +35,7 @@
 #include <sys/mman.h>
 #include <syscall.h> /* for gettid() */
 #include <err.h>
+#include <linux/kernel.h>
 #include "jvmti_agent.h"
 #include ".util/jitdump.h"
 @ @ -44.10 +45.12 @@
 static char jit_path[PATH_MAX];
 static void *marker_addr;

+#ifdef HAVE_GETTID
 static inline pid_t gettid(void)
 { return (pid_t)syscall(__NR_gettid);
 } +\#endif

 static int get_e_machine(struct jitheader *hdr)
 { @@ -124,7 +127,7 @@
 } static int
 -debug_cache_init(void)
 +create_jit_cache_dir(void)
 { char str[32];
   char *base, *p;
   @ @ -143,8 +146,13 @@

 strftime(str, sizeof(str), JIT_LANG"-jit-%Y%m%d", &tm);

 -snprintf(jit_path, PATH_MAX - 1, "%s/debug/", base);
 -+ret = snprintf(jit_path, PATH_MAX, "%s/debug/", base);
 +if (ret >= PATH_MAX) {
 +warnx("jvmti: cannot generate jit cache dir because %s/debug/"
 +"is too long, please check the cwd, JITDUMPDIR, and"
 +"HOME variables", base);
 +return -1;
ret = mkdir(jit_path, 0755);
if (ret == -1) {
  if (errno != EEXIST) {
    @ -153,20 +161,32 @@
  }
}

+snprintf(jit_path, PATH_MAX - 1, "%s/.debug/jit", base);
+ret = snprintf(jit_path, PATH_MAX, "%s/.debug/jit", base);
+if (ret >= PATH_MAX) {
+  warnx("jvmti: cannot generate jit cache dir because"
+        "%s/.debug/jit is too long, please check the cwd,"
+        "% JITDUMPDIR, and HOME variables", base);
+  return -1;
+}
+ret = mkdir(jit_path, 0755);
if (ret == -1) {
  if (errno != EEXIST) {
  -warn("cannot create jit cache dir %s", jit_path);
  +warn("jvmti: cannot create jit cache dir %s", jit_path);
  return -1;
  }
}

-snprintf(jit_path, PATH_MAX - 1, "%s/.debug/jit/%s.XXXXXXXX", base, str);
+ret = snprintf(jit_path, PATH_MAX, "%s/.debug/jit/%s.XXXXXXXX", base, str);
+if (ret >= PATH_MAX) {
+  warnx("jvmti: cannot generate jit cache dir because"
+        "%s/.debug/jit/%s.XXXXXXXX is too long, please check"
+        "% the cwd, JITDUMPDIR, and HOME variables", 
+        base, str);
+  return -1;
+}
p = mkdtemp(jit_path);
if (p != jit_path) {
  -warn("cannot create jit cache dir %s", jit_path);
  +warn("jvmti: cannot create jit cache dir %s", jit_path);
  return -1;
}

@@ -227,7 +247,7 @@
{
  char dump_path[PATH_MAX];
  struct jitheader header;
  -int fd;
  +int fd, ret;
FILE *fp;

init_arch_timestamp();
@@ -244,12 +264,22 @@
 memset(&header, 0, sizeof(header));
 
-    debug_cache_init();
+    /*
+     * jitdump file dir
+     */
+    +if (create_jit_cache_dir() < 0)
+    +return NULL;

/*
 * jitdump file name
 */
-    snprintf(dump_path, PATH_MAX, "%s/jit-%i.dump", jit_path, getpid());
+    ret = snprintf(dump_path, PATH_MAX, "%s/jit-%i.dump", jit_path, getpid());
+    +if (ret >= PATH_MAX) {
+    +warnx("jvmti: cannot generate jitdump file full path because"
+    +"%s/jit-%i.dump is too long, please check the cwd,
+    +"JITDUMPDIR, and HOME variables", jit_path, getpid());
+    +return NULL;
+    +}

fd = open(dump_path, O_CREAT|O_TRUNC|O_RDWR, 0666);
if (fd == -1)
--- linux-4.15.0.orig/tools/perf/perf.c
+++ linux-4.15.0/tools/perf/perf.c
@@ -452,6 +452,9 @@
 srandom(time(NULL));
 */
+    /* Setting $PERF_CONFIG makes perf read _only_ the given config file. */
+    +config_exclusive_filename = getenv("PERF_CONFIG");
+    +perf_config__init();
    err = perf_config(perf_default_config, NULL);
    if (err)
--- linux-4.15.0.orig/tools/perf/perf.h
+++ linux-4.15.0/tools/perf/perf.h
@@ -24,7 +24,9 @@
     }
   }#define MAX_NR_CPUS 1024
   +#ifndef MAX_NR_CPUS

extern const char *input_name;
extern bool perf_host, perf_guest;
@@ -50,6 +52,7 @@
    bool sample_time_set;
    bool sample_cpu;
    bool period;
+    bool period_set;
    bool running_time;
    bool full_auxtrace;
    bool auxtrace_snapshot_mode;
--- linux-4.15.0.orig/tools/perf/pmu-events/Build
+++ linux-4.15.0/tools/perf/pmu-events/Build
@@ -1,10 +1,12 @@
hostprogs := jevents
jevents-y+= json.o jsmn.o jevents.o
+HOSTCFLAGS_jevents.o = -I$(srctree)/tools/include
pmu-events-y+= pmu-events.o
JDIR= pmu-events/arch/$ (SRCARCH)
JSON= $(shell [ -d $(JDIR) ] &&				find $(JDIR) -name '*.json' -o -name 'mapfile.csv')
+
#
# Locate/process JSON files in pmu-events/arch/
# directory and create tables in pmu-events.c.
--- linux-4.15.0.orig/tools/perf/pmu-events/README
+++ linux-4.15.0/tools/perf/pmu-events/README
@@ -11,12 +11,17 @@
- Regular files with '.json' extension in the name are assumed to be
- JSON files, each of which describes a set of PMU events.
-
-- Regular files with basename starting with 'mapfile.csv' are assumed
- to be a CSV file that maps a specific CPU to its set of PMU events.
- (see below for mapfile format)
+- The CSV file that maps a specific CPU to its set of PMU events is to
+ be named 'mapfile.csv' (see below for mapfile format).
-
- Directories are traversed, but all other files are ignored.
+- To reduce JSON event duplication per architecture, platform JSONs may
+ use "ArchStdEvent" keyword to dereference an "Architecture standard
+ events", defined in architecture standard JSONs.
+ Architecture standard JSONs must be located in the architecture root
+ folder. Matching is based on the "EventName" field.
+
The PMU events supported by a CPU model are expected to grouped into topics such as Pipelining, Cache, Memory, Floating-point etc. All events for a topic should be placed in a separate JSON file - where the file name identifies

Cache.json Memory.json Virtual-Memory.json
Frontend.json Pipeline.json

+The JSONs folder for a CPU model/family may be placed in the root arch
+folder, or may be placed in a vendor sub-folder under the arch folder
+for instances where the arch and vendor are not the same.
+
Using the JSON files and the mapfile, 'jevents' generates the C source file, 'pmu-events.c', which encodes the two sets of tables:

--- linux-4.15.0.orig/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/branch.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/branch.json
@@ -0,0 +1,25 @@
+[{
+  "ArchStdEvent": "BR_INDIRECT_SPEC",
+},
+{
+  "EventCode": "0xC9",
+  "EventName": "BR_COND",
+  "BriefDescription": "Conditional branch executed",
+},
+{
+  "EventCode": "0xCA",
+  "EventName": "BR_INDIRECT_MISPRED",
+  "BriefDescription": "Indirect branch mispredicted",
+},
+{
+  "EventCode": "0xCB",
+  "EventName": "BR_INDIRECT_MISPRED_ADDR",
+  "BriefDescription": "Indirect branch mispredicted because of address miscompare",
+},
+{
+  "EventCode": "0xCC",
+  "EventName": "BR_COND_MISPRED",
+  "BriefDescription": "Conditional branch mispredicted"
+}]

--- linux-4.15.0.orig/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/bus.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/bus.json
@@ -0,0 +1,8 @@
+[{
+  "ArchStdEvent": "BUS_ACCESS_RD",
+}]

--- linux-4.15.0.org/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/cache.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/cache.json
@@ -0,0 +1,27 @@
+
+      "EventName": "PREFETCH_LINEFILL",
+      "BriefDescription": "Linefill because of prefetch"
+  },
+
+      "EventCode": "0xC3",
+      "EventName": "PREFETCH_LINEFILL_DROP",
+      "BriefDescription": "Instruction Cache Throttle occurred"
+  },
+
+      "EventCode": "0xC4",
+      "EventName": "READ_ALLOC_ENTER",
+      "BriefDescription": "Entering read allocate mode"
+  },
+
+      "EventCode": "0xC5",
+      "EventName": "READ_ALLOC",
+      "BriefDescription": "Read allocate mode"
+  },
+
+      "EventCode": "0xC8",
+      "EventName": "EXT_SNOOP",
+      "BriefDescription": "SCU Snooped data from another CPU for this CPU"
+]

--- linux-4.15.0.org/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/memory.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/memory.json
@@ -0,0 +1,12 @@
+
+      "EventName": "EXT_MEM_REQ",
+      "BriefDescription": "External memory request"
+  },
+
+      "EventName": "EXT_MEM_REQ_NC",
+      "BriefDescription": "Non-cacheable external memory request"
+ 
+ 
--- linux-4.15.0.orig/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/other.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/other.json
@@ -0,0 +1,28 @@
+[+
+  {+
+    "ArchStdEvent": "EXC_IRQ",
+  },
+  {
+    "ArchStdEvent": "EXC_FIQ",
+  },
+  {
+    "EventCode": "0xC6",
+    "EventName": "PRE_DECODE_ERR",
+    "BriefDescription": "Pre-decode error"
+  },
+  {
+    "EventCode": "0xD0",
+    "EventName": "L1I_CACHE_ERR",
+    "BriefDescription": "L1 Instruction Cache (data or tag) memory error"
+  },
+  {
+    "EventCode": "0xD1",
+    "EventName": "L1D_CACHE_ERR",
+    "BriefDescription": "L1 Data Cache (data, tag or dirty) memory error, correctable or non-correctable"
+  },
+  {
+    "EventCode": "0xD2",
+    "EventName": "TLB_ERR",
+    "BriefDescription": "TLB memory error"
+}
+]

--- linux-4.15.0.orig/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/pipeline.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/arm64/arm/cortex-a53/pipeline.json
@@ -0,0 +1,52 @@
+[+
+  {
+    "EventCode": "0xC7",
+    "EventName": "STALL_SB_FULL",
+    "BriefDescription": "Data Write operation that stalls the pipeline because the store buffer is full"
+  },
+  {
+    "EventCode": "0xE0",
+    "EventName": "OTHER_IQ_DEPSTALL",
+    "BriefDescription": "Cycles that the DPU IQ is empty and that is not because of a recent micro-TLB miss, instruction cache miss or pre-decode error"
+  },

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+ {  
  +  "EventCode": "0xE1",
  +  "EventName": "IC_DEP_STALL",
  +  "BriefDescription": "Cycles the DPU IQ is empty and there is an instruction cache miss being processed"
  + },
+ {  
  +  "EventCode": "0xE2",
  +  "EventName": "IUTLB_DEP_STALL",
  +  "BriefDescription": "Cycles the DPU IQ is empty and there is an instruction micro-TLB miss being processed"
  + },
+ {  
  +  "EventCode": "0xE3",
  +  "EventName": "DECODE_DEP_STALL",
  +  "BriefDescription": "Cycles the DPU IQ is empty and there is a pre-decode error being processed"
  + },
+ {  
  +  "EventCode": "0xE4",
  +  "EventName": "OTHER_INTERLOCK_STALL",
  +  "BriefDescription": "Cycles there is an interlock other than Advanced SIMD/Floating-point instructions or load/store instruction"
  + },
+ {  
  +  "EventCode": "0xE5",
  +  "EventName": "AGU_DEP_STALL",
  +  "BriefDescription": "Cycles there is an interlock for a load/store instruction waiting for data to calculate the address in the AGU"
  + },
+ {  
  +  "EventCode": "0xE6",
  +  "EventName": "SIMD_DEP_STALL",
  +  "BriefDescription": "Cycles there is an interlock for an Advanced SIMD/Floating-point operation."
  + },
+ {  
  +  "EventCode": "0xE7",
  +  "EventName": "LD_DEP_STALL",
  +  "BriefDescription": "Cycles there is a stall in the Wr stage because of a load miss"
  + },
+ {  
  +  "EventCode": "0xE8",
  +  "EventName": "ST_DEP_STALL",
  +  "BriefDescription": "Cycles there is a stall in the Wr stage because of a store"
  + }
+]
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+ @ @ -0,0 +1,452 @ @
"PublicDescription": "Attributable Level 1 data cache access, read",
"EventCode": "0x40",
"EventName": "L1D_CACHE_RD",
"BriefDescription": "L1D cache access, read"
},

"PublicDescription": "Attributable Level 1 data cache access, write",
"EventCode": "0x41",
"EventName": "L1D_CACHE_WR",
"BriefDescription": "L1D cache access, write"
},

"PublicDescription": "Attributable Level 1 data cache refill, read",
"EventCode": "0x42",
"EventName": "L1D_CACHE_REFILL_RD",
"BriefDescription": "L1D cache refill, read"
},

"PublicDescription": "Attributable Level 1 data cache refill, write",
"EventCode": "0x43",
"EventName": "L1D_CACHE_REFILL_WR",
"BriefDescription": "L1D cache refill, write"
},

"PublicDescription": "Attributable Level 1 data cache refill, inner",
"EventCode": "0x44",
"EventName": "L1D_CACHE_REFILL_INNER",
"BriefDescription": "L1D cache refill, inner"
},

"PublicDescription": "Attributable Level 1 data cache refill, outer",
"EventCode": "0x45",
"EventName": "L1D_CACHE_REFILL_OUTER",
"BriefDescription": "L1D cache refill, outer"
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"PublicDescription": "Attributable Level 1 data cache Write-Back, victim",
"EventCode": "0x46",
"EventName": "L1D_CACHE_WB_VICTIM",
"BriefDescription": "L1D cache Write-Back, victim"
},

"PublicDescription": "Level 1 cache Write-Back, cleaning and coherency",
"EventCode": "0x47",
"EventName": "L1D_CACHE_WB_CLEAN",
"BriefDescription": "L1D cache Write-Back, cleaning and coherency"
}
"PublicDescription": "Attributable Level 1 data cache invalidate",
"EventCode": "0x48",
"EventName": "L1D_CACHE_INVAL",
"BriefDescription": "L1D cache invalidate"
},
{
"PublicDescription": "Attributable Level 1 data TLB refill, read",
"EventCode": "0x4C",
"EventName": "L1D_TLB_REFILL_RD",
"BriefDescription": "L1D tlb refill, read"
},
{
"PublicDescription": "Attributable Level 1 data TLB refill, write",
"EventCode": "0x4D",
"EventName": "L1D_TLB_REFILL_WR",
"BriefDescription": "L1D tlb refill, write"
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{
"PublicDescription": "Attributable Level 1 data or unified TLB access, read",
"EventCode": "0x4E",
"EventName": "L1D_TLB_RD",
"BriefDescription": "L1D tlb access, read"
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{
"PublicDescription": "Attributable Level 1 data or unified TLB access, write",
"EventCode": "0x4F",
"EventName": "L1D_TLB_WR",
"BriefDescription": "L1D tlb access, write"
},
{
"PublicDescription": "Attributable Level 2 data cache access, read",
"EventCode": "0x50",
"EventName": "L2D_CACHE_RD",
"BriefDescription": "L2D cache access, read"
},
{
"PublicDescription": "Attributable Level 2 data cache access, write",
"EventCode": "0x51",
"EventName": "L2D_CACHE_WR",
"BriefDescription": "L2D cache access, write"
},
{
"PublicDescription": "Attributable Level 2 data cache refill, read",
"EventCode": "0x52",
"EventName": "L2D_CACHE_REFILL_RD",
"BriefDescription": "L2D cache refill, read"
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{
"PublicDescription": "Attributable Level 2 data cache refill, write",
"EventCode": "0x53",
"EventName": "L2D_CACHE_REFILL_WR",
"BriefDescription": "L2D cache refill, write"
"PublicDescription": "Attributable Level 2 data cache refill, write",
"EventCode": "0x53",
"EventName": "L2D_CACHE_REFILL_WR",
"BriefDescription": "L2D cache refill, write"
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"PublicDescription": "Attributable Level 2 data cache Write-Back, victim",
"EventCode": "0x56",
"EventName": "L2D_CACHE_WB_VICTIM",
"BriefDescription": "L2D cache Write-Back, victim"
},
{
"PublicDescription": "Level 2 data cache Write-Back, cleaning and coherency",
"EventCode": "0x57",
"EventName": "L2D_CACHE_WB_CLEAN",
"BriefDescription": "L2D cache Write-Back, cleaning and coherency"
},
{
"PublicDescription": "Attributable Level 2 data cache invalidate",
"EventCode": "0x58",
"EventName": "L2D_CACHE_INVAL",
"BriefDescription": "L2D cache invalidate"
},
{
"PublicDescription": "Attributable Level 2 data or unified TLB refill, read",
"EventCode": "0x5c",
"EventName": "L2D_TLB_REFILL_RD",
"BriefDescription": "L2D cache refill, read"
},
{
"PublicDescription": "Attributable Level 2 data or unified TLB refill, write",
"EventCode": "0x5d",
"EventName": "L2D_TLB_REFILL_WR",
"BriefDescription": "L2D cache refill, write"
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{
"PublicDescription": "Attributable Level 2 data or unified TLB access, read",
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"EventName": "L2D_TLB_RD",
"BriefDescription": "L2D cache access, read"
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{
"PublicDescription": "Attributable Level 2 data or unified TLB access, write",
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"BriefDescription": "L2D cache access, write"
+  "PublicDescription": "Bus access read",
+  "EventCode": "0x60",
+  "EventName": "BUS_ACCESS_RD",
+  "BriefDescription": "Bus access read"
+ },
+  {
+    "PublicDescription": "Bus access write",
+    "EventCode": "0x61",
+    "EventName": "BUS_ACCESS_WR",
+    "BriefDescription": "Bus access write"
+  }
+  {
+    "PublicDescription": "Bus access, Normal, Cacheable, Shareable",
+    "EventCode": "0x62",
+    "EventName": "BUS_ACCESS_SHARED",
+    "BriefDescription": "Bus access, Normal, Cacheable, Shareable"
+  }
+  {
+    "PublicDescription": "Bus access, not Normal, Cacheable, Shareable",
+    "EventCode": "0x63",
+    "EventName": "BUS_ACCESS_NOT_SHARED",
+    "BriefDescription": "Bus access, not Normal, Cacheable, Shareable"
+  }
+  {
+    "PublicDescription": "Bus access, Normal",
+    "EventCode": "0x64",
+    "EventName": "BUS_ACCESS_NORMAL",
+    "BriefDescription": "Bus access, Normal"
+  }
+  {
+    "PublicDescription": "Bus access, peripheral",
+    "EventCode": "0x65",
+    "EventName": "BUS_ACCESS_PERIPH",
+    "BriefDescription": "Bus access, peripheral"
+  }
+  {
+    "PublicDescription": "Data memory access, read",
+    "EventCode": "0x66",
+    "EventName": "MEM_ACCESS_RD",
+    "BriefDescription": "Data memory access, read"
+  }
+  {
+    "PublicDescription": "Data memory access, write",
+    "EventCode": "0x67",
+    "EventName": "MEM_ACCESS_WR",
+    "BriefDescription": "Data memory access, write"
+  }
"PublicDescription": "Unaligned access, read",
"EventCode": "0x68",
"EventName": "UNALIGNED_LD_SPEC",
"BriefDescription": "Unaligned access, read"
} 

{"PublicDescription": "Unaligned access, write",
"EventCode": "0x69",
"EventName": "UNALIGNED_ST_SPEC",
"BriefDescription": "Unaligned access, write"
} 

{"PublicDescription": "Unaligned access",
"EventCode": "0x6a",
"EventName": "UNALIGNED_LDST_SPEC",
"BriefDescription": "Unaligned access"
} 

{"PublicDescription": "Exclusive operation speculatively executed, LDREX or LDX",
"EventCode": "0x6c",
"EventName": "LDREX_SPEC",
"BriefDescription": "Exclusive operation speculatively executed, LDREX or LDX"
} 

{"PublicDescription": "Exclusive operation speculatively executed, STREX or STX pass",
"EventCode": "0x6d",
"EventName": "STREX_PASS_SPEC",
"BriefDescription": "Exclusive operation speculatively executed, STREX or STX pass"
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{"PublicDescription": "Exclusive operation speculatively executed, STREX or STX fail",
"EventCode": "0x6e",
"EventName": "STREX_FAIL_SPEC",
"BriefDescription": "Exclusive operation speculatively executed, STREX or STX fail"
} 

{"PublicDescription": "Exclusive operation speculatively executed, STREX or STX",
"EventCode": "0x6f",
"EventName": "STREX_SPEC",
"BriefDescription": "Exclusive operation speculatively executed, STREX or STX"
} 

{"PublicDescription": "Operation speculatively executed, load",
"EventCode": "0x70",
"EventName": "LD_SPEC",
"BriefDescription": "Operation speculatively executed, load"
}
"PublicDescription": "Operation speculatively executed, store",
"EventCode": "0x71",
"EventName": "ST_SPEC",
"BriefDescription": "Operation speculatively executed, store"
}

{
"PublicDescription": "Operation speculatively executed, load or store",
"EventCode": "0x72",
"EventName": "LDST_SPEC",
"BriefDescription": "Operation speculatively executed, load or store"
}

{
"PublicDescription": "Operation speculatively executed, integer data processing",
"EventCode": "0x73",
"EventName": "DP_SPEC",
"BriefDescription": "Operation speculatively executed, integer data processing"
}

{
"PublicDescription": "Operation speculatively executed, Advanced SIMD instruction",
"EventCode": "0x74",
"EventName": "ASE_SPEC",
"BriefDescription": "Operation speculatively executed, Advanced SIMD instruction"
}

{
"PublicDescription": "Operation speculatively executed, floating-point instruction",
"EventCode": "0x75",
"EventName": "VFP_SPEC",
"BriefDescription": "Operation speculatively executed, floating-point instruction"
}

{
"PublicDescription": "Operation speculatively executed, software change of the PC",
"EventCode": "0x76",
"EventName": "PC_WRITE_SPEC",
"BriefDescription": "Operation speculatively executed, software change of the PC"
}

{
"PublicDescription": "Operation speculatively executed, Cryptographic instruction",
"EventCode": "0x77",
"EventName": "CRYPTO_SPEC",
"BriefDescription": "Operation speculatively executed, Cryptographic instruction"
}

{
"PublicDescription": "Branch speculatively executed, immediate branch",
"EventCode": "0x78",
"EventName": "BR_IMMED_SPEC",
"BriefDescription": "Branch speculatively executed, immediate branch"
}
"PublicDescription": "Branch speculatively executed, procedure return",
"EventCode": "0x79",
"EventName": "BR_RETURN_SPEC",
"BriefDescription": "Branch speculatively executed, procedure return"
}  
+
"PublicDescription": "Branch speculatively executed, indirect branch",
"EventCode": "0x7a",
"EventName": "BR_INDIRECT_SPEC",
"BriefDescription": "Branch speculatively executed, indirect branch"
}  
+
"PublicDescription": "Barrier speculatively executed, ISB",
"EventCode": "0x7c",
"EventName": "ISB_SPEC",
"BriefDescription": "Barrier speculatively executed, ISB"
}  
+
"PublicDescription": "Barrier speculatively executed, DSB",
"EventCode": "0x7d",
"EventName": "DSB_SPEC",
"BriefDescription": "Barrier speculatively executed, DSB"
}  
+
"PublicDescription": "Barrier speculatively executed, DMB",
"EventCode": "0x7e",
"EventName": "DMB_SPEC",
"BriefDescription": "Barrier speculatively executed, DMB"
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+
"PublicDescription": "Exception taken, Other synchronous",
"EventCode": "0x81",
"EventName": "EXC_UNDEF",
"BriefDescription": "Exception taken, Other synchronous"
}  
+
"PublicDescription": "Exception taken, Supervisor Call",
"EventCode": "0x82",
"EventName": "EXC_SVC",
"BriefDescription": "Exception taken, Supervisor Call"
}  
+
"PublicDescription": "Exception taken, Instruction Abort",
"EventCode": "0x83",
"EventName": "EXC_PABORT",
"BriefDescription": "Exception taken, Instruction Abort"
"PublicDescription": "Exception taken, Data Abort and SError",
"EventCode": "0x84",
"EventName": "EXC_DABORT",
"BriefDescription": "Exception taken, Data Abort and SError"
}
+
{  
+    "PublicDescription": "Exception taken, IRQ"
+    "EventCode": "0x86",
+    "EventName": "EXC_IRQ",
+    "BriefDescription": "Exception taken, IRQ"
+ }
+
{  
+    "PublicDescription": "Exception taken, FIQ"
+    "EventCode": "0x87",
+    "EventName": "EXC_FIQ",
+    "BriefDescription": "Exception taken, FIQ"
+ }
+
{  
+    "PublicDescription": "Exception taken, Secure Monitor Call"
+    "EventCode": "0x88",
+    "EventName": "EXC_SMC",
+    "BriefDescription": "Exception taken, Secure Monitor Call"
+ }
+
{  
+    "PublicDescription": "Exception taken, Hypervisor Call"
+    "EventCode": "0x8a",
+    "EventName": "EXC_HVC",
+    "BriefDescription": "Exception taken, Hypervisor Call"
+ }
+
{  
+    "PublicDescription": "Exception taken, Instruction Abort not taken locally"
+    "EventCode": "0x8b",
+    "EventName": "EXC_TRAP_PABORT",
+    "BriefDescription": "Exception taken, Instruction Abort not taken locally"
+ }
+
{  
+    "PublicDescription": "Exception taken, Data Abort or SError not taken locally"
+    "EventCode": "0x8c",
+    "EventName": "EXC_TRAP_DABORT",
+    "BriefDescription": "Exception taken, Data Abort or SError not taken locally"
+ }
+
{  
+    "PublicDescription": "Exception taken, Other traps not taken locally"
+    "EventCode": "0x8d",
+    "EventName": "EXC_TRAP_OTHER",
+    "BriefDescription": "Exception taken, Other traps not taken locally"
+ }
"PublicDescription": "Exception taken, IRQ not taken locally",
"EventCode": "0x8e",
"EventName": "EXC_TRAP_IRQ",
"BriefDescription": "Exception taken, IRQ not taken locally"
} +
{
"PublicDescription": "Exception taken, FIQ not taken locally",
"EventCode": "0x8f",
"EventName": "EXC_TRAP_FIQ",
"BriefDescription": "Exception taken, FIQ not taken locally"
} +
{
"PublicDescription": "Release consistency operation speculatively executed, Load-Acquire",
"EventCode": "0x90",
"EventName": "RC_LD_SPEC",
"BriefDescription": "Release consistency operation speculatively executed, Load-Acquire"
} +
{
"PublicDescription": "Release consistency operation speculatively executed, Store-Release",
"EventCode": "0x91",
"EventName": "RC_ST_SPEC",
"BriefDescription": "Release consistency operation speculatively executed, Store-Release"
} +
{
"PublicDescription": "Attributable Level 3 data or unified cache access, read",
"EventCode": "0xa0",
"EventName": "L3D_CACHE_RD",
"BriefDescription": "Attributable Level 3 data or unified cache access, read"
} +
{
"PublicDescription": "Attributable Level 3 data or unified cache access, write",
"EventCode": "0xa1",
"EventName": "L3D_CACHE_WR",
"BriefDescription": "Attributable Level 3 data or unified cache access, write"
} +
{
"PublicDescription": "Attributable Level 3 data or unified cache refill, read",
"EventCode": "0xa2",
"EventName": "L3D_CACHE_REFILL_RD",
"BriefDescription": "Attributable Level 3 data or unified cache refill, read"
} +
{
"PublicDescription": "Attributable Level 3 data or unified cache refill, write",
"EventCode": "0xa3",
"EventName": "L3D_CACHE_REFILL_WR",
"BriefDescription": "Attributable Level 3 data or unified cache refill, write"
} +
"PublicDescription": "Attributable Level 3 data or unified cache Write-Back, victim",
"EventCode": "0xa6",
"EventName": "L3D_CACHE_WB_VICTIM",
"BriefDescription": "Attributable Level 3 data or unified cache Write-Back, victim"
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+
+ {  
+ "PublicDescription": "Attributable Level 3 data or unified cache Write-Back, cache clean"
+ "EventCode": "0xa7",
+ "EventName": "L3D_CACHE_WB_CLEAN",
+ "BriefDescription": "Attributable Level 3 data or unified cache Write-Back, cache clean"
+ }
+
+ {  
+ "PublicDescription": "Attributable Level 3 data or unified cache access, invalidate"
+ "EventCode": "0xa8",
+ "EventName": "L3D_CACHE_INVAL",
+ "BriefDescription": "Attributable Level 3 data or unified cache access, invalidate"
+ }
+
--- linux-4.15.0.orig/tools/perf/pmu-events/arch/arm64/cavium/thunderx2/core-imp-def.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/arm64/cavium/thunderx2/core-imp-def.json
@@ -0,0 +1,113 @@
+
+ {  
+ "ArchStdEvent": "L1D_CACHE_RD",
+ },
+ {  
+ "ArchStdEvent": "L1D_CACHE_WR",
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+ {  
+ "ArchStdEvent": "L1D_CACHE_REFILL_RD",
+ },
+ {  
+ "ArchStdEvent": "L1D_CACHE_REFILL_WR",
+ },
+ {  
+ "ArchStdEvent": "L1D_CACHE_REFILL_INNER",
+ },
+ {  
+ "ArchStdEvent": "L1D_CACHE_REFILL_OUTER",
+ },
+ {  
+ "ArchStdEvent": "L1D_CACHE_WB_VICTIM",
+ },
+ {  
+ "ArchStdEvent": "L1D_CACHE_WB_CLEAN",
+ },
+ {  
+ "ArchStdEvent": "L1D_CACHE_INVAL",
+ }
+ },
+ {  
+   "ArchStdEvent": "L1D_TLB_REFILL_RD",
+ },
+ {  
+   "ArchStdEvent": "L1D_TLB_REFILL_WR",
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+   "ArchStdEvent": "MEM_ACCESS_WR",
+ },
+ {  
+   "ArchStdEvent": "UNALIGNED_LD_SPEC",
+ },
+ {  
+   "ArchStdEvent": "UNALIGNED_ST_SPEC",
+ },
+ {  
+   "ArchStdEvent": "UNALIGNED_LDST_SPEC",
+ },
+ {  
+   "ArchStdEvent": "EXC_UNDEF",
+ },
+ { "ArchStdEvent": "L1D_CACHE_REFILL_RD" },
+ { "ArchStdEvent": "L1D_CACHE_REFILL_WR" },
+ { "ArchStdEvent": "L1D_CACHE_WB_VICTIM" },
+ { "ArchStdEvent": "L1D_CACHE_WB_CLEAN" },
+ { "ArchStdEvent": "L1D_CACHE_INVAL" },
+ { "ArchStdEvent": "L1D_TLB_REFILL_RD" },
+ { "ArchStdEvent": "L1D_TLB_REFILL_WR" },
+ { "ArchStdEvent": "L1D_TLB_RD" },
+ { "ArchStdEvent": "L1D_TLB_WR" },
+ { "ArchStdEvent": "L2D_CACHE_RD" },
+ { "ArchStdEvent": "L2D_CACHE_WR" },
+ { "ArchStdEvent": "L2D_CACHE_REFILL_RD" },
+ { "ArchStdEvent": "L2D_CACHE_REFILL_WR" },
+ { "ArchStdEvent": "L2D_CACHE_WB_VICTIM" },
+ { "ArchStdEvent": "L2D_CACHE_WB_CLEAN" },
+ { "ArchStdEvent": "L2D_CACHE_INVAL" }.
+ { "PublicDescription": "Level 1 instruction cache prefetch access count", "EventCode": "0x102e", "EventName": "L1I_CACHE_PRF", "BriefDescription": "L1I cache prefetch access count", },
+ { "PublicDescription": "Level 1 instruction cache miss due to prefetch access count", "EventCode": "0x102f", "EventName": "L1I_CACHE_PRF_REFILL", "BriefDescription": "L1I cache miss due to prefetch access count", },
+ { "PublicDescription": "Instruction queue is empty", "EventCode": "0x1043", "EventName": "IQ_IS_EMPTY", "BriefDescription": "Instruction queue is empty", },
+ { "PublicDescription": "Instruction fetch stall cycles", "EventCode": "0x1044", "EventName": "IF_IS_STALL", "BriefDescription": "Instruction fetch stall cycles", },
+ { "PublicDescription": "Instructions can receive, but not send", "EventCode": "0x2014", "EventName": "FETCH_BUBBLE", "BriefDescription": "Instructions can receive, but not send", },
+ { "PublicDescription": "Prefetch request from LSU", "EventCode": "0x6013", "EventName": "PRF_REQ", "BriefDescription": "Prefetch request from LSU", },
+ { "PublicDescription": "Hit on prefetched data", "EventCode": "0x6014", "EventName": "HIT_ON_PRF", "BriefDescription": "Hit on prefetched data", },
+ { "PublicDescription": "Cycles of that the number of issuing micro operations are less than 4", "EventCode": "0x7001", "EventName": "EXESTALL_CYCLE", "BriefDescription": "Cycles of that the number of issue ups are less than 4", }

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+  {
+      "PublicDescription": "No any micro operation is issued and meanwhile any load operation is not resolved",
+      "EventCode": "0x7004",
+      "EventName": "MEM_STALL_ANYLOAD",
+      "BriefDescription": "No any micro operation is issued and meanwhile any load operation is not resolved",
+  },
+  {
+      "PublicDescription": "No any micro operation is issued and meanwhile there is any load operation missing L1 cache and pending data refill",
+      "EventCode": "0x7006",
+      "EventName": "MEM_STALL_L1MISS",
+      "BriefDescription": "No any micro operation is issued and meanwhile there is any load operation missing L1 cache and pending data refill",
+  },
+  {
+      "PublicDescription": "No any micro operation is issued and meanwhile there is any load operation missing both L1 and L2 cache and pending data refill from L3 cache",
+      "EventCode": "0x7007",
+      "EventName": "MEM_STALL_L2MISS",
+      "BriefDescription": "No any micro operation is issued and meanwhile there is any load operation missing both L1 and L2 cache and pending data refill from L3 cache",
+  },
+}

---
---
---
---
---
---
---
---
# Power8 entries
-004b0000,1,power8,core
-004b0201,1,power8,core
-004c0000,1,power8,core
-004d0000,1,power8,core
-004d0100,1,power8,core
-004d0200,1,power8,core
-004e0100,1,power8,core
-004e0200,1,power9,core
-004e1200,1,power9,core
+004[bcde][[:xdigit:]]{4},1,power8,core
+004e[[:xdigit:]]{4},1,power9,core

--- linux-4.15.0.orig/tools/perf/pmu-events/arch/x86/ivytown/uncore-power.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/x86/ivytown/uncore-power.json
@@ -188,7 +188,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xb",
  "EventName": "UNC_P_FREQ_GE_1200MHZ_CYCLES",
- "Filter": "filter_band0=1200",
+ "Filter": "filter_band0=12",
  "MetricExpr": "(UNC_P_FREQ_GE_1200MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
  "MetricName": "freq_ge_1200mhz_cycles %",
  "PerPkg": "1."
@@ -199,7 +199,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xe",
  "EventName": "UNC_P_FREQ_GE_2000MHZ_CYCLES",
- "Filter": "filter_band1=2000",
+ "Filter": "filter_band1=20",
  "MetricExpr": "((UNC_P_FREQ_GE_2000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
  "MetricName": "freq_ge_2000mhz_cycles %",
  "PerPkg": "1."
@@ -210,7 +210,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xd",
  "EventName": "UNC_P_FREQ_GE_3000MHZ_CYCLES",
- "Filter": "filter_band2=3000",
+ "Filter": "filter_band2=30",
  "MetricExpr": "((UNC_P_FREQ_GE_3000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
  "MetricName": "freq_ge_3000mhz_cycles %",
  "PerPkg": "1."
@@ -221,7 +221,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xe",
  "EventName": "UNC_P_FREQ_GE_4000MHZ_CYCLES",
- "Filter": "filter_band3=4000",

"Filter": "filter_band3=40",
"MetricExpr": "((UNC_P_FREQ_GE_4000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.)",
"MetricName": "freq_ge_4000mhz_cycles %",
"PerPkg": "1",
@@ -232,7 +232,7 @@
 "Counter": "0,1,2,3",
 "EventCode": "0xb",
 "EventName": "UNC_P_FREQ_GE_1200MHZ_TRANSITIONS",
- "Filter": "edge=1,filter_band0=1200",
+ "Filter": "edge=1,filter_band0=12",
 "MetricExpr": "((UNC_P_FREQ_GE_1200MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.)",
 "MetricName": "freq_ge_1200mhz_cycles %",
 "PerPkg": "1",
@@ -243,7 +243,7 @@
 "Counter": "0,1,2,3",
 "EventCode": "0xc",
 "EventName": "UNC_P_FREQ_GE_2000MHZ_TRANSITIONS",
- "Filter": "edge=1,filter_band1=2000",
+ "Filter": "edge=1,filter_band1=20",
 "MetricExpr": "((UNC_P_FREQ_GE_2000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.)",
 "MetricName": "freq_ge_2000mhz_cycles %",
 "PerPkg": "1",
@@ -254,7 +254,7 @@
 "Counter": "0,1,2,3",
 "EventCode": "0xd",
 "EventName": "UNC_P_FREQ_GE_3000MHZ_TRANSITIONS",
- "Filter": "edge=1,filter_band2=4000",
+ "Filter": "edge=1,filter_band2=30",
 "MetricExpr": "((UNC_P_FREQ_GE_3000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.)",
 "MetricName": "freq_ge_3000mhz_cycles %",
 "PerPkg": "1",
@@ -265,7 +265,7 @@
 "Counter": "0,1,2,3",
 "EventCode": "0xe",
 "EventName": "UNC_P_FREQ_GE_4000MHZ_TRANSITIONS",
- "Filter": "edge=1,filter_band3=4000",
+ "Filter": "edge=1,filter_band3=40",
 "MetricExpr": "((UNC_P_FREQ_GE_4000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.)",
 "MetricName": "freq_ge_4000mhz_cycles %",
 "PerPkg": "1",
--- linux-4.15.0.orig/tools/perf/pmu-events/arch/x86/jaketown/uncore-power.json
+++ linux-4.15.0/tools/perf/pmu-events/arch/x86/jaketown/uncore-power.json
@@ -187,7 +187,7 @@
 "Counter": "0,1,2,3",
 "EventCode": "0xb",
 "EventName": "UNC_P_FREQ_GE_1200MHZ_CYCLES",
- "Filter": "filter_band0=1200",
+ "Filter": "filter_band0=12",
 "MetricExpr": "((UNC_P_FREQ_GE_1200MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.)",
 "MetricName": "freq_ge_1200mhz_cycles %",
 "PerPkg": "1",
"MetricExpr": "(UNC_P_FREQ_GE_1200MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
"MetricName": "freq_ge_1200mhz_cycles \%",
"PerPkg": "1",
@@ -198,7 +198,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xc",
  "EventName": "UNC_P_FREQ_GE_2000MHZ_CYCLES",
- "Filter": "filter_band1=2000",
+ "Filter": "filter_band1=20",
 "MetricExpr": "(UNC_P_FREQ_GE_2000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
"MetricName": "freq_ge_2000mhz_cycles \%",
"PerPkg": "1",
@@ -209,7 +209,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xd",
  "EventName": "UNC_P_FREQ_GE_3000MHZ_CYCLES",
- "Filter": "filter_band2=3000",
+ "Filter": "filter_band2=30",
 "MetricExpr": "(UNC_P_FREQ_GE_3000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
"MetricName": "freq_ge_3000mhz_cycles \%",
"PerPkg": "1",
@@ -220,7 +220,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xe",
  "EventName": "UNC_P_FREQ_GE_4000MHZ_CYCLES",
- "Filter": "filter_band3=4000",
+ "Filter": "filter_band3=40",
 "MetricExpr": "(UNC_P_FREQ_GE_4000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
"MetricName": "freq_ge_4000mhz_cycles \%",
"PerPkg": "1",
@@ -231,7 +231,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xb",
  "EventName": "UNC_P_FREQ_GE_1200MHZ_TRANSITIONS",
- "Filter": "edge=1,filter_band0=1200",
+ "Filter": "edge=1,filter_band0=12",
 "MetricExpr": "(UNC_P_FREQ_GE_1200MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
"MetricName": "freq_ge_1200mhz_cycles \%",
"PerPkg": "1",
@@ -242,7 +242,7 @@
  "Counter": "0,1,2,3",
  "EventCode": "0xc",
  "EventName": "UNC_P_FREQ_GE_2000MHZ_TRANSITIONS",
- "Filter": "edge=1,filter_band1=2000",
+ "Filter": "edge=1,filter_band1=20",
 "MetricExpr": "(UNC_P_FREQ_GE_2000MHZ_CYCLES / UNC_P_CLOCKTICKS) * 100.",
"MetricName": "freq_ge_2000mhz_cycles \%",
"PerPkg": "1",
"BriefDescription": "Actual Average Latency for L1 data-cache miss demand loads",
- "MetricExpr": "L1D_PEND_MISS.PENDING / ( MEM_LOAD RETIRED.L1_MISS_PS + MEM_LOAD RETIRED.FB_HIT_PS )",
+ "MetricExpr": "L1D_PEND_MISS.PENDING / ( MEM_LOAD RETIRED.L1_MISS + MEM_LOAD RETIRED.FB_HIT )",
  "MetricGroup": "Memory_Bound;Memory_Lat",
  "MetricName": "Load_Miss_Real_Latency"
},
/* allocate space for a new string */
fixed = (char *) malloc(len + esc_count + 1);
if (!fixed)
    return NULL;

/* copy over the characters */
q = fixed;
for (p = s; *p; p++) {
    if (*p == '\') {
        *q = '\';
        ++q;
    }
    *q = *p;
    ++q;
}
*q = '\0';
return fixed;
}

static struct msrmap {
    const char *num;
    const char *pname;
} msrmap[] = {
    /* ... */
}

static struct msrmap {
    jsmntok_t *loc = (t);
    if (!(t)->start && (t) > tokens)
        loc = (t) - 1;
    -pr_err("%s:%d: " m ", got %s\n", fn, 
    -json_line(map, loc),
    -json_name(t));
    +err = -EIO;
    goto out_free;
} while (0)

#define TOPIC_DEPTH 256
static char *topic_array[TOPIC_DEPTH];
static int   topic_level;
static char *get_topic(void)
{
    char *tp_old, *tp = NULL;
    int i;
    -for (i = 0; i < topic_level + 1; i++) {

-int n;
-
-tp_old = tp;
-n = asprintf(&tp, "%s%s", tp ?: "", topic_array[i]);
-if (n < 0) {
-pr_info("%s: asprintf() error %s\n", prog);
-return NULL;
-}
-free(tp_old);
+/* tp is free'd in process_one_file() */
+i = asprintf(&tp, "%s", topic);
+if (i < 0) {
+pr_info("%s: asprintf() error %s\n", prog);
+return NULL;
}

for (i = 0; i < (int) strlen(tp); i++) {
@@ -253,25 +286,15 @@
    return tp;
}

-static int add_topic(int level, char *bname)
+static int add_topic(char *bname)
{
-  char *topic;
-  
-  if (level >= TOPIC_DEPTH)
-    return -EINVAL;
-  
-  +free(topic);
-  topic = strdup(bname);
-  if (!topic) {
-    pr_info("%s: strdup() error %s for file %s\n", prog,
-      strerror(errno), bname);
-    return -ENOMEM;
-  }
-  
-  +free(topic_array[topic_level]);
-  -topic_array[topic_level] = topic;
-  +topic_level = level;
-  return 0;
}

@@ -329,6 +352,81 @@
    return 0;
}
+struct event_struct {
+struct list_head list;
+char *name;
+char *event;
+char *desc;
+char *long_desc;
+char *pmu;
+char *unit;
+char *perpkg;
+char *metric_expr;
+char *metric_name;
+char *metric_group;
+};
+
+#define ADD_EVENT_FIELD(field) do { if (field) {
+  es->field = strdup(field);
+  if (!es->field)
+    goto out_free;
+} } while (0)
+
+#define FREE_EVENT_FIELD(field) free(es->field)
+
+#define TRY_FIXUP_FIELD(field) do { if (es->field && !*field) {
+  *field = strdup(es->field);
+  if (!*field)
+    return -ENOMEM;
+} } while (0)
+
+#define FOR_ALL_EVENT_STRUCT_FIELDS(op) do {
+  op(name);
+  op(event);
+  op(desc);
+  op(long_desc);
+  op(pmu);
+  op(unit);
+  op(perpkg);
+  op(metric_expr);
+  op(metric_name);
+  op(metric_group);
+} while (0)
+
+static LIST_HEAD(arch_std_events);
+
+static void free_arch_std_events(void)
+{
+  struct event_struct *es, *next;
+}
list_for_each_entry_safe(es, next, &arch_std_events, list) {
+FOR_ALL_EVENT_STRUCT_FIELDS(FREE_EVENT_FIELD);
+list_del(&es->list);
+free(es);
+
+
+static int save_arch_std_events(void *data, char *name, char *event,
+char *desc, char *long_desc, char *pmu,
+char *unit, char *perpkg, char *metric_expr,
+char *metric_name, char *metric_group)
+
+{
+struct event_struct *es;
+struct stat *sb = data;
+
+es = malloc(sizeof(*es));
+if (!es)
+    return -ENOMEM;
+memset(es, 0, sizeof(*es));
+FOR_ALL_EVENT_STRUCT_FIELDS(ADD_EVENT_FIELD);
+list_add_tail(&es->list, &arch_std_events);
+return 0;
+out_free:
+FOR_ALL_EVENT_STRUCT_FIELDS(FREE_EVENT_FIELD);
+free(es);
+return -ENOMEM;
+}
+
+static void print_events_table_suffix(FILE *outfp)
+
+
+{  printf(outfp, "{\n");
+    @ @ -346,11 +444,12 @@
+    const char *name;
+    const char *event;
+    ] fixed[] = {
+    -{ "inst_retired.any", "event=0xc0" },
+    -{ "inst_retired.any_p", "event=0xc0" },
+    -{ "cpu_clk_unhalted.ref", "event=0x0,umask=0x03" },
+    -{ "cpu_clk_unhalted.thread", "event=0x3c" },
+    -{ "cpu_clk_unhalted.thread_any", "event=0x3c,any=1" },
+    +{ "inst_retired.any", "event=0xc0,period=2000003" },
+    +{ "inst_retired.any_p", "event=0xc0,period=2000003" },
+    +{ "cpu_clk_unhalted.ref", "event=0x0,umask=0x03,period=2000003" },
+    +{ "cpu_clk_unhalted.thread", "event=0x3c,period=2000003" },
+    +{ "cpu_clk_unhalted.core", "event=0x3c,period=2000003" },
+    +{ "cpu_clk_unhalted.thread_any", "event=0x3c,any=1,period=2000003" },
+    [ NULL, NULL],
+    };
return event;

+static int
+try_fixup(const char *fn, char *arch_std, char **event, char **desc,
+  char **name, char **long_desc, char **pmu, char **filter,
+  char **perpkg, char **unit, char **metric_expr, char **metric_name,
+  char **metric_group, unsigned long long eventcode)
+{
+  /* try to find matching event from arch standard values */
+  struct event_struct *es;
+  
+  list_for_each_entry(es, &arch_std_events, list) {
+    if (!strcmp(arch_std, es->name)) {
+      if (!eventcode && es->event) {
+        /* allow EventCode to be overridden */
+        free(*event);
+        *event = NULL;
+      }
+      FOR_ALL_EVENT_STRUCT_FIELDS(TRY_FIXUP_FIELD);
+      return 0;
+    }
+  }
+  
+  pr_err("%s: could not find matching %s for %s\n", 
+           prog, arch_std, fn);
+  return -1;
+}
+
+/* Call func with each event in the json file */
+int json_events(const char *fn,
+int (*func)(void *data, char *name, char *event, char *desc,
+char *metric_name, char *metric_group),
+void *data)
+{
+  int err = -EIO;
+  int err;
+  size_t size;
+  jsmntok_t *tokens, *tok;
+  int i, j, len;
+  char *metric_expr = NULL;
+  char *metric_name = NULL;
+  char *metric_group = NULL;
+  char *arch_std = NULL;
unsigned long long eventcode = 0;
struct msrmap *msr = NULL;
jsmntok_t *msrval = NULL;
@@ -490,6 +616,10 @@
addfield(map, &metric_expr, "", "", val);
for (s = metric_expr; *s; s++)
  *s = tolower(*s);
+} else if (json_streq(map, field, "ArchStdEvent")) {
+  addfield(map, &arch_std, "", "", val);
+  for (s = arch_std; *s; s++)
+  *s = tolower(*s);
+}
/* ignore unknown fields */
}
@@ -514,8 +644,21 @@
if (name)
  fixname(name);

+if (arch_std) {
+/*
+ * An arch standard event is referenced, so try to
+ * fixup any unassigned values.
+ */
+err = try_fixup(fn, arch_std, &event, &desc, &name,
+  &long_desc, &pmu, &filter, &perpkg,
+  &unit, &metric_expr, &metric_name,
+  &metric_group, eventcode);
+if (err)
+  goto free_strings;
+}
err = func(data, name, real_event(name, event), desc, long_desc,
  pmu, unit, perpkg, metric_expr, metric_name, metric_group);
+free_strings:
free(event);
free(desc);
free(name);
@@ -528,6 +671,8 @@
free(metric_expr);
free(metric_name);
free(metric_group);
+free(arch_std);
+
if (err)
  break;
tok += j;
@@ -551,7 +696,7 @@
* Derive rest of table name from basename of the JSON file,
* replacing hyphens and stripping out .json suffix.
/*
- n = asprintf(&tblname, "pme_%s", basename(fname));
+ n = asprintf(&tblname, "pme_%s", fname);
if (n < 0) {
  pr_info("%s: asprintf() error %s for file %s\n", prog,
    strerror(errno), fname);
  @ @ -561,7 +706,7 @@
  for (i = 0; i < strlen(tblname); i++) {
    c = tblname[i];

-  if (c == '-')
+  if (c == '-' || c == '/')
    tblname[i] = '_';
  else if (c == '.') {
    tblname[i] = '\0';
  @ @ -607,6 +752,7 @@
  char *line, *p;
  int line_num;
  char *tblname;
  +int ret = 0;

  pr_info("%s: Processing mapfile %s\n", prog, fpath);
  @ @ -618,6 +764,7 @@
  if (!mapfp) {
    pr_info("%s: Error %s opening %s\n", prog, strerror(errno),
      fpath);
      +free(line);
      return -1;
  }

  @ @ -644,11 +791,12 @@
  /* TODO Deal with lines longer than 16K */
  pr_info("%s: Mapfile %s: line %d too long, aborting\n", prog, fpath, line_num);
  -return -1;
  +ret = -1;
  +goto out;
  }
  line[strlen(line)-1] = '\0';

  -cpuid = strtok_r(p, ",", &save);
  +cpuid = fixregex(strtok_r(p, ",", &save));
  version = strtok_r(NULL, ",", &save);
  fname = strtok_r(NULL, ",", &save);
  type = strtok_r(NULL, ",", &save);
  @ @ -674,7 +822,9 @@
out:
print_mapping_table_suffix(outfp);
- return 0;
+ fclose(mapfp);
+ free(line);
+ return ret;
}

/*
@@ -706,7 +856,7 @@
struct rlimit rlim;

if (getrlimit(RLIMIT_NOFILE, &rlim) == 0)
- return min((int)rlim.rlim_max / 2, 512);
+ return min(rlim.rlim_max / 2, (rlim_t)512);

return 512;
}
@@ -718,25 +868,106 @@
static FILE *eventsfp;
static char *mapfile;

+ static int is_leaf_dir(const char *fpath)
+ {
+ DIR *d;
+ struct dirent *dir;
+ int res = 1;
+ +
+ d = opendir(fpath);
+ + if (!d)
+ + return 0;
+ + while ((dir = readdir(d)) != NULL) {
+ + if ([strcmp(dir->d_name, ".") || strcmp(dir->d_name, "..")])
+ + continue;
+ + +
+ + if (dir->d_type == DT_DIR) {
+ + res = 0;
+ + break;
+ + } else if (dir->d_type == DT_UNKNOWN) {
+ + char path[PATH_MAX];
+ + struct stat st;
+ + + fprintf(path, "%s/%s", fpath, dir->d_name);
+ + if (stat(path, &st))
+ + break;
+ + + if (S_ISDIR(st.st_mode)) {
res = 0;
break;
}
+
}
+
}
+
closedir(d);
+
return res;
+
+
static int is_json_file(const char *name)
+
+const char *suffix;
+
+if (strlen(name) < 5)
+return 0;
+
+suffix = name + strlen(name) - 5;
+
+if (strncmp(suffix, ".json", 5) == 0)
+return 1;
+return 0;
+
+
static int preprocess_arch_std_files(const char *fpath, const struct stat *sb,
+int typeflag, struct FTW *ftwbuf)
+
+int level = ftwbuf->level;
+int is_file = typeflag == FTW_F;
+
+if (level == 1 && is_file && is_json_file(fpath))
+return json_events(fpath, save_arch_std_events, (void *)sb);
+
+return 0;
+
static int process_one_file(const char *fpath, const struct stat *sb,
+int typeflag, struct FTW *ftwbuf)
{
-
-char *tblname, *bname  = (char *) fpath + ftwbuf->base;
+
-+char *tblname, +*bname;
+
+int is_dir  = typeflag == FTW_D;
+int is_file  = typeflag == FTW_F;
+int level  = ftwbuf->level;
+int err = 0;
+
+if (level == 2 && is_dir) {

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/*
 * For level 2 directory, bname will include parent name,
 * like vendor/platform. So search back from platform dir
 * to find this.
 */
bname = (char *) fpath + ftwbuf->base - 2;
for (;;) {
    if (*bname == '/')
        break;
    bname--;
} else
    bname = (char *) fpath + ftwbuf->base;

pr_debug("%s %d %7jd %-20s %s
",
is_file ? "f" : is_dir ? "d" : "x",
level, sb->st_size, bname, fpath);

/* base dir */
if (level == 0)
/* base dir or too deep */
if (level == 0 || level > 3)
    return 0;

/* model directory, reset topic */
if (level == 1 && is_dir) {
    if ((level == 1 && is_dir && is_leaf_dir(fpath)) ||
        (level == 2 && is_dir)) {
        if (close_table)
            print_events_table_suffix(eventsfp);
    }
}

if (level == 1 && is_file) {
    if (!strncmp(bname, "mapfile.csv", 11)) {
        if (mapfile) {
            pr_info("%s: Many mapfiles? Using %s, ignoring %s
",
                prog, mapfile, fpath);
        } else {
            mapfile = strdup(fpath);
        }
    } else {
        if (!strcmp(bname, "mapfile.csv")) {

*/
mapfile = strdup(fpath);
return 0;
}

@@ -783,16 +1008,14 @@
    * ignore it. It could be a readme.txt for instance.
    */
    if (is_file) {
-      char *suffix = bname + strlen(bname) - 5;
-      -
-      -
-      if (strncmp(suffix, ".json", 5)) {
+      if (!is_json_file(bname)) {
          pr_info("%s: Ignoring file without .json suffix %s\n", prog, fpath);
          return 0;
      }
      }

-      if (level > 1 && add_topic(level, bname))
+      if (level > 1 && add_topic(bname))
        return -ENOMEM;

    /*
    @@ -839,10 +1062,9 @@
    */
    int main(int argc, char *argv[])
    {
        -int rc;
+        int rc, ret = 0;
        int maxfds;
        char ldirname[PATH_MAX];
        -
        const char *arch;
        const char *output_file;
        const char *start_dirname;
@@ -891,13 +1113,30 @@
        maxfds = get_maxfds();
        mapfile = NULL;
        +rc = nftw(ldirname, preprocess_arch_std_files, maxfds, 0);
+        if (rc &&& verbose) {
+            pr_info("%s: Error preprocessing arch standard files %s\n", 
+                prog, ldirname);
+            goto empty_map;
+        } else if (rc < 0) {
+            /* Make build fail */
+            fclose(eventsfp);
+            free_arch_std_events();

return 1;
} else if (rc) {
  goto empty_map;
}

rc = nftw(ldirname, process_one_file, maxfds, 0);
if (rc && verbose) {
  pr_info("%s: Error walking file tree %s\n", prog, ldirname);
  goto empty_map;
} else if (rc < 0) {
  /* Make build fail */
  return 1;
  fclose(eventsfp);
  free_arch_std_events();
  ret = 1;
  goto out_free_mapfile;
} else if (rc) {
  goto empty_map;
}

if (process_mapfile(eventsfp, mapfile)) {
  pr_info("%s: Error processing mapfile %s\n", prog, mapfile);
  /* Make build fail */
  return 1;
  fclose(eventsfp);
  free_arch_std_events();
  ret = 1;
}

return 0;

if (process_mapfile(eventsfp, mapfile)) {
  pr_info("%s: Error processing mapfile %s\n", prog, mapfile);
  /* Make build fail */
  return 1;
  fclose(eventsfp);
  free_arch_std_events();
  ret = 1;
}

@ @ -913,13 +1152,19 @@
if (process_mapfile(eventsfp, mapfile)) {
  pr_info("%s: Error processing mapfile %s\n", prog, mapfile);
  /* Make build fail */
  return 1;
  fclose(eventsfp);
  free_arch_std_events();
  ret = 1;
}

return 0;

+ empty_map:
  fclose(eventsfp);
  create_empty_mapping(output_file);
  return 0;
+ free_arch_std_events();
+ out_free_mapfile:
+ free(mapfile);
+ return ret;
}

--- linux-4.15.0.orig/tools/perf/python/tracepoint.py
+++ linux-4.15.0/tools/perf/python/tracepoint.py
@@ -1,4 +1,4 @@
-#! /usr/bin/python
+#!/usr/bin/env python
# SPDX-License-Identifier: GPL-2.0

# SPDX-License-Identifier: GPL-2.0
# -*- python -*-
# -*- coding: utf-8 -*-
--- linux-4.15.0.orig/tools/perf/scripts/python/export-to-postgresql.py
+++ linux-4.15.0/tools/perf/scripts/python/export-to-postgresql.py
@@ -204,14 +204,23 @@
 libpq = CDLL("libpq.so.5")
 PQconnectdb = libpq.PQconnectdb
 PQconnectdb.restype = c_void_p
+PQconnectdb.argtypes = [ c_char_p ]
 PQfinish = libpq.PQfinish
+PQfinish.argtypes = [ c_void_p ]
 PQstatus = libpq.PQstatus
+PQstatus.restype = c_int
+PQstatus.argtypes = [ c_void_p ]
 PQexec = libpq.PQexec
 PQexec.restype = c_void_p
+PQexec.argtypes = [ c_void_p, c_char_p ]
 PQresultStatus = libpq.PQresultStatus
+PQresultStatus.restype = c_int
+PQresultStatus.argtypes = [ c_void_p ]
 PQputCopyData = libpq.PQputCopyData
+PQputCopyData.restype = c_int
+PQputCopyData.argtypes = [ c_void_p, c_void_p, c_int ]
 PQputCopyEnd = libpq.PQputCopyEnd
+PQputCopyEnd.restype = c_int
+PQputCopyEnd.argtypes = [ c_void_p, c_void_p ]

 sys.path.append(os.environ["PERF_EXEC_PATH"] + \
--- linux-4.15.0.orig/tools/perf/scripts/python/export-to-sqlite.py
+++ linux-4.15.0/tools/perf/scripts/python/export-to-sqlite.py
@@ -440,7 +440,11 @@
 def sample_table(*x):
 if branches:
- +bind_exec(sample_query, 18, x)
+ for xx in x[0:15]:
+ sample_query.addBindValue(str(xx))
+ for xx in x[19:22]:
+ sample_query.addBindValue(str(xx))
+ do_query_(sample_query)
 else:
 bind_exec(sample_query, 22, x)

--- linux-4.15.0.orig/tools/perf/tests/attr.c
+++ linux-4.15.0/tools/perf/tests/attr.c
@@ -164,8 +164,8 @@
 if (verbose > 0)
 vcnt++;

--- linux-4.15.0.orig/tools/perf/tests/attr.c
+++ linux-4.15.0/tools/perf/tests/attr.c
@@ @ -164,8 +164,8 @@
 if (verbose > 0)
 vcnt++;
-snprintf(cmd, 3*PATH_MAX, PYTHON " %s/attr.py -d %s/attr/ -p %s %.*s",
- d, d, perf, vcnt, v);
+_snprintf(cmd, 3*PATH_MAX, PYTHON " %s/attr.py -d %s/attr/ -p %s %.*s",
+ d, d, perf, vcnt, v);

return system(cmd) ? TEST_FAIL : TEST_OK;
}
--- linux-4.15.0.orig/tools/perf/tests/attr.py
+++ linux-4.15.0/tools/perf/tests/attr.py
@@ -116,7 +116,7 @@
if not self.has_key(t) or not other.has_key(t):
    continue
    if not data_equal(self[t], other[t]):
-log.warning("expected %s=%s, got %s" % (t, self[t], other[t]))
+                log.warning("expected %s=%s, got %s" % (t, self[t], other[t]))

# Test file description needs to have following sections:
# [config]
--- linux-4.15.0.orig/tools/perf/tests/bp_signal.c
+++ linux-4.15.0/tools/perf/tests/bp_signal.c
@@ -44,10 +44,13 @@
#if defined (__x86_64__)
 extern void __test_function(volatile long *ptr);
 asm (  
+  ".pushsection .text;"
+  ".globl __test_function\n"
+  ".type __test_function, @function;"
+  "__test_function:\n"
+  "incq (%rdi)\n"
+  "ret\n"),
+  "ret\n"
+  ".popsection\n"),
#if defined (__aarch64__)
 extern void __test_function(volatile long *ptr);
 asm (  
+  ".pushsection .text;"
+  ".globl __test_function\n"
+  ".type __test_function, @function;"
+  "__test_function:\n"
+  "incq (%rdi)\n"
+  "ret\n"),
+  "ret\n"
+  ".popsection\n"),
#include <errno.h>
#include <stdio.h>
+#include <stdlib.h>
#include <sys/epoll.h>
#include <sys/types.h>
#include <sys/stat.h>
@@ -275,6 +275,7 @@
}
out:
+free(obj_buf);

bpf__clear();
return ret;
}
--- linux-4.15.0.orig/tools/perf/tests/builtin-test.c
+++ linux-4.15.0/tools/perf/tests/builtin-test.c
@@ -376,7 +376,7 @@
if (!t->subtest.get_nr)
 pr_debug("%s:", t->desc);
else
-+pr_debug("%s subtest %d:", t->desc, subtest);
+pr_debug("%s subtest %d:", t->desc, subtest + 1);

switch (err) {
 case TEST_OK:
@@ -590,7 +590,7 @@
 for (subi = 0; subi < subn; subi++) {
 pr_info("%2d.%1d: %-*s:", i, subi + 1, subw,
 t->subtest.get_desc(subi));
-err = test_and_print(t, skip, subi);
+err = test_and_print(t, skip, subi + 1);
 if (err != TEST_OK && t->subtest.skip_if_fail)
 skip = true;
 }
--- linux-4.15.0.orig/tools/perf/tests/code-reading.c
+++ linux-4.15.0/tools/perf/tests/code-reading.c
@@ -527,6 +527,7 @@
 pid = getpid();

 machine = machine__new_host();
+machine->env = &perf_env;

 ret = machine__create_kernel_maps(machine);
 if (ret < 0) {
 --- linux-4.15.0.orig/tools/perf/tests/dwarf-unwind.c
+++ linux-4.15.0/tools/perf/tests/dwarf-unwind.c
 @@ -37,6 +37,19 @@
 mmap_handler, machine, true, 500);
 }

+/*
+ * We need to keep these functions global, despite the
+ * fact that they are used only locally in this object,
+ * in order to keep them around even if the binary is
+ * stripped. If they are gone, the unwind check for
+ * symbol fails.
+ */
+int test_dwarf_unwind__thread(struct thread *thread);
+int test_dwarf_unwind__compare(void *p1, void *p2);
+int test_dwarf_unwind__krava_3(struct thread *thread);
+int test_dwarf_unwind__krava_2(struct thread *thread);
+int test_dwarf_unwind__krava_1(struct thread *thread); +
#define MAX_STACK 8

static int unwind_entry(struct unwind_entry *entry, void *arg)
@@ -45,12 +58,12 @@
    char *symbol = entry->sym ? entry->sym->name : NULL;
    static const char *funcs[MAX_STACK] = {
        "test__arch_unwind_sample",
-        "unwind_thread",
-        "compare",
+        "test_dwarf_unwind__thread",
+        "test_dwarf_unwind__compare",
        "bsearch",
-        "krava_3",
-        "krava_2",
-        "krava_1",
+        "test_dwarf_unwind__krava_3",
+        "test_dwarf_unwind__krava_2",
+        "test_dwarf_unwind__krava_1",
        "test__dwarf_unwind"
    };
/
/*
@@ -77,7 +90,7 @@
    return strcmp((const char *) symbol, funcs[idx]);
  }

-static noinline int unwind_thread(struct thread *thread)
+static noinline int test_dwarf_unwind__thread(struct thread *thread)
{
    struct perf_sample sample;
    unsigned long cnt = 0;
    @@ -108,7 +121,7 @@

    static int global_unwind_retval = -INT_MAX;

-static noinline int compare(void *p1, void *p2)
+static noinline int test_dwarf_unwind__compare(void *p1, void *p2)
{ /* Any possible value should be 'thread' */
    struct thread *thread = *(struct thread **)p1;
    @@ -117,17 +130,17 @@
    /* Call unwinder twice for both callchain orders. */
    callchain_param.order = ORDER_CALLER;
-static noinline int krava_3(struct thread *thread)
+ninline int test_dwarf_unwind__krava_3(struct thread *thread)
{
    struct thread *array[2] = {thread, thread};
    void *fp = &bsearch;
    @@ -141,18 +154,19 @@
    size_t, int (*)(void *, void *));

    _bsearch = fp;
-    _bsearch(array, &thread, 2, sizeof(struct thread **), compare);
+    _bsearch(array, &thread, 2, sizeof(struct thread **),
+             test_dwarf_unwind__compare);
    return global_unwind_retval;
}

-static noinline int krava_2(struct thread *thread)
+ninline int test_dwarf_unwind__krava_2(struct thread *thread)
{
    -return krava_3(thread);
+    return test_dwarf_unwind__krava_3(thread);
}

-static noinline int krava_1(struct thread *thread)
+ninline int test_dwarf_unwind__krava_1(struct thread *thread)
{
    -return krava_2(thread);
+    return test_dwarf_unwind__krava_2(thread);
}

int test__dwarf_unwind(struct test *test __maybe_unused, int subtest __maybe_unused)
@@ -173,6 +187,7 @@
    }

    callchain_param.record_mode = CALLCHAIN_DWARF;
+ninline int test_dwarf_unwind__thread(thread);
if (init_live_machine(machine)) {
    pr_err("Could not init machine\n");
    goto out;
}

-err = krava_1(thread);
+err = test_dwarf_unwind__krava_1(thread);
thread__put(thread);

out:
--- linux-4.15.0.orig/tools/perf/tests/evsel-tp-sched.c
+++ linux-4.15.0/tools/perf/tests/evsel-tp-sched.c
@@ -17,7 +17,7 @@
    return -1;
}

-is_signed = !!(field->flags | FIELD_IS_SIGNED);
+is_signed = !!(field->flags & FIELD_IS_SIGNED);
if (should_be_signed && !is_signed) {
    pr_debug("%s: ".s signedness(%d) is wrong, should be %d\n",
        evsel->name, name, is_signed, should_be_signed);
@@ -43,7 +43,7 @@
    return -1;
}

-if (perf_evsel__test_field(evsel, "prev_comm", 16, true))
+if (perf_evsel__test_field(evsel, "prev_comm", 16, false))
    ret = -1;

    if (perf_evsel__test_field(evsel, "prev_pid", 4, true))
@@ -55,7 +55,7 @@
        return -1;

-if (perf_evsel__test_field(evsel, "next_comm", 16, true))
+if (perf_evsel__test_field(evsel, "next_comm", 16, false))
    ret = -1;

    if (perf_evsel__test_field(evsel, "next_pid", 4, true))
@@ -73,7 +73,7 @@
        return -1;
}

-if (perf_evsel__test_field(evsel, "comm", 16, true))
+if (perf_evsel__test_field(evsel, "comm", 16, false))
    ret = -1;
if (perf_evsel__test_field(evsel, "pid", 4, true))
@@ -85,5 +85,6 @@
if (perf_evsel__test_field(evsel, "target_cpu", 4, true))
 ret = -1;

+perf_evsel__delete(evsel);
return ret;
}
--- linux-4.15.0.orig/tools/perf/tests/expr.c
+++ linux-4.15.0/tools/perf/tests/expr.c
@@ -19,7 +19,7 @@
   const char *p;
   const char **other;
   double val;
-int ret;
+int i, ret;
   struct parse_ctx ctx;
   int num_other;

@@ -56,6 +56,9 @@
   TEST_ASSERT_VAL("find other", !strcmp(other[1], "BAZ");
   TEST_ASSERT_VAL("find other", !strcmp(other[2], "BOZO");
   TEST_ASSERT_VAL("find other", other[3] == NULL);
   +
   +for (i = 0; i < num_other; i++)
   +free((void *)other[i]);
   free((void *)other);

return 0;
--- linux-4.15.0.orig/tools/perf/tests/mem.c
+++ linux-4.15.0/tools/perf/tests/mem.c
@@ -16,7 +16,7 @@
   n = perf_mem__snp_scnprintf(out, sizeof out, &mi);
   n += perf_mem__lvl_scnprintf(out + n, sizeof out - n, &mi);
   -snprintf(failure, sizeof failure, "unexpected %s", out);
+scnprintf(failure, sizeof failure, "unexpected %s", out);
   TEST_ASSERT_VAL(failure, !strcmp(string, out));
   return 0;
}
--- linux-4.15.0.orig/tools/perf/tests/mmap-thread-lookup.c
+++ linux-4.15.0/tools/perf/tests/mmap-thread-lookup.c
@@ -52,7 +52,7 @@
{
   struct thread_data *td = arg;
   ssize_t ret;
   -int go;
int go = 0;

if (thread_init(td))
return NULL;
--- linux-4.15.0.orig/tools/perf/tests/openat-syscall-all-cpus.c
+++ linux-4.15.0/tools/perf/tests/openat-syscall-all-cpus.c
@@ -45,7 +45,7 @@
if (IS_ERR(evsel)) {
    tracing_path__strerror_open_tp(errno, errbuf, sizeof(errbuf), "syscalls", "sys_enter_openat");
    pr_debug("%s\n", errbuf);
    -goto out_thread_map_delete;
+    goto out_cpu_map_delete;
}

if (perf_evsel__open(evsel, cpus, threads) < 0) {
@@ -119,6 +119,8 @@
    perf_evsel__delete(evsel);
    out_evsel_delete:
    perf_evsel__delete_evsel(evsel);
+    out_cpu_map_delete:
+    cpu_map__put(cpus);
    out_thread_map_delete:
    thread_map__put(threads);
    return err;
--- linux-4.15.0.orig/tools/perf/tests/parse-events.c
+++ linux-4.15.0/tools/perf/tests/parse-events.c
@@ -19,6 +19,32 @@
#include "events.h"

#define PERF_TP_SAMPLE_TYPE (PERF_SAMPLE_RAW | PERF_SAMPLE_TIME |
+                        PERF_SAMPLE_CPU | PERF_SAMPLE_PERIOD)

+if defined(__s390x__)
+/* Return true if kvm module is available and loaded. Test this
+ * and return success when trace point kvm_s390_create_vm
+ * exists. Otherwise this test always fails.
+ */
+static bool kvm_s390_create_vm_valid(void)
+{
+    char *eventfile;
+    bool rc = false;
+    
+    eventfile = get_tracing_file("events/kvm-s390");
+    
+    if (eventfile) {
+        DIR *mydir = opendir(eventfile);
+        
+        if (mydir) {
+            rc = true;
+        closedir(mydir);
+    }
static int test__checkevent_tracepoint(struct perf_evlist *evlist)
{
    struct perf_evsel *evsel = perf_evlist__first(evlist);
    const char *name;
    __u32 type;
    const int id;
    bool (*valid)(void);
    int (*check)(struct perf_evlist *evlist);
};

static int test_event(struct evlist_test *e)
{
    struct parse_events_error err = { .idx = 0, };  
    struct perf_evlist *evlist;
    int ret;

    if (e->valid && !e->valid()) {
        pr_debug("... SKIP");
        return 0;
    }

    evlist = perf_evlist__new();
    if (evlist == NULL)
        return -ENOMEM;

    ret = parse_events(evlist, e->name, &err);
    if (ret) {
        pr_debug("failed to parse event '%s', err %d\n", e->name, ret);
    } else {
        pr_debug("parsed event '%s'\n", e->name);
        evlist = perf_evlist__new();
        if (evlist == NULL)
            return -ENOMEM;

        ret = parse_events(evlist, e->name, &err);
        if (ret) {
            pr_debug("failed to parse event '%s', err %d\n", e->name, ret);
        } else {
            pr_debug("parsed event '%s'\n", e->name);
        }
    }
}

static int test__checkevent_tracepoint(struct perf_evlist *evlist)
{
    struct perf_evsel *evsel = perf_evlist__first(evlist);
    const char *name;
    __u32 type;
    const int id;
    bool (*valid)(void);
    int (*check)(struct perf_evlist *evlist);
};

static int test_event(struct evlist_test *e)
{
    struct parse_events_error err = { .idx = 0, };  
    struct perf_evlist *evlist;
    int ret;

    if (e->valid && !e->valid()) {
        pr_debug("... SKIP");
        return 0;
    }

    evlist = perf_evlist__new();
    if (evlist == NULL)
        return -ENOMEM;

    ret = parse_events(evlist, e->name, &err);
    if (ret) {
        pr_debug("failed to parse event '%s', err %d\n", e->name, ret);
    } else {
        pr_debug("parsed event '%s'\n", e->name);
        evlist = perf_evlist__new();
        if (evlist == NULL)
            return -ENOMEM;

        ret = parse_events(evlist, e->name, &err);
        if (ret) {
            pr_debug("failed to parse event '%s', err %d\n", e->name, ret);
        } else {
            pr_debug("parsed event '%s'\n", e->name);
        }
    }
}
- e->name, ret);
+pr_debug("failed to parse event '%s', err %d, str '%s'
",
+ e->name, ret, err.str);
+parse_events_print_error(&err, e->name);
} else {
ret = e->check(evlist);
}
@@ -1701,10 +1736,11 @@
for (i = 0; i < cnt; i++) {
struct evlist_test *e = &events[i];

-pr_debug("running test %d '%s'
", e->id, e->name);
+pr_debug("running test %d '%s'", e->id, e->name);
ret1 = test_event(e);
if (ret1)
ret2 = ret1;
+pr_debug("\n");
}

return ret2;
@@ -1786,7 +1822,7 @@
while (!ret && (ent = readdir(dir))) {
-struct evlist_test e;
+struct evlist_test e = { .id = 0, };
char name[2 * NAME_MAX + 1 + 12 + 3];

/* Names containing . are special and cannot be used directly */
--- linux-4.15.0.orig/tools/perf/tests/perf-hooks.c
+++ linux-4.15.0/tools/perf/tests/perf-hooks.c
@@ -20,12 +20,11 @@
static void the_hook(void *_hook_flags)
{
int *hook_flags = _hook_flags;
-*p = 0;
+raise(SIGSEGV);
}

int test__perf_hooks(struct test *test __maybe_unused, int subtest __maybe_unused)
--- linux-4.15.0.orig/tools/perf/tests/pmu.c
+++ linux-4.15.0/tools/perf/tests/pmu.c
@@ -98,7 +98,7 @@
struct test_format *format = &test_formats[i];
FILE *file;

-snprintf(name, PATH_MAX, "%s/%s", dir, format->name);
+snprintf(name, PATH_MAX, "%s/%s", dir, format->name);

file = fopen(name, "w");
if (!file)
@@ -172,6 +172,7 @@
ret = 0;
} while (0);

+perf_pmu__del_formats(&formats);
test_format_dir_put(format);
return ret;
}
--- linux-4.15.0.orig/tools/perf/tests/sample-parsing.c
+++ linux-4.15.0/tools/perf/tests/sample-parsing.c
@@ -173,7 +173,7 @@
    .data = {1, 211, 212, 213},
    u64 regs[64];
-const u64 raw_data[] = {0x123456780a0b0c0dULL, 0x1102030405060708ULL};
+const u32 raw_data[] = {0x12345678, 0x0a0b0c0d, 0x11020304, 0x05060708, 0};
const u64 data[] = {0x2211443366558877ULL, 0, 0xaabbccddeeff4321ULL};
struct perf_sample sample = {
    .ip = 101,
--- linux-4.15.0.orig/tools/perf/tests/shell/lib/probe_vfs_getname.sh
+++ linux-4.15.0/tools/perf/tests/shell/lib/probe_vfs_getname.sh
@@ -13,7 +13,8 @@
    local verbose=$1
    if [ $had_vfs_getname -eq 1 ] ; then
        line=$(perf probe -L getname_flags 2>&1 | egrep 'result.*=.*filename;' | sed -r
-"s/\[[[:space:]]*([[:digit:]]+)\[[[:space:]]*result->uptr.*/\1/"
-"perf probe $verbose "vfs_getname=getname_flags:$line" pathname=result->name:string"
+"perf probe -q "vfs_getname=getname_flags:$line" pathname=result->name:string"
+"perf probe $verbose "vfs_getname=getname_flags:$line" pathname=filename:ustring"
    fi

--- linux-4.15.0.orig/tools/perf/tests/shell/trace+probe_libc_inet_pton.sh
+++ linux-4.15.0/tools/perf/tests/shell/trace+probe_libc_inet_pton.sh
@@ -21,11 +21,24 @@
    expected[3]=".*packets transmitted.*"
    expected[4]="rtt min.*"
-expected[6]=".*inet_pton[[:space:]]*$libc$"
-expected[7]="getaddrinfo[[:space:]]*$libc$"
-expected[8]=".*(\*/bin/ping.*\$"
+expected[6]=".*inet_pton\[(space:)].*($libc|inlined)\$"
+case "$(uname -m)" in
+390x
+eventattr='call-graph=dwarf'
+expected[7]="gaih_inet.*\[(space:)].*($libc|inlined)\$"
+expected[8]=".*GL_getaddrinfo\[(space:)].*($libc|inlined)\$"
+expected[9]="main\[(space:)].*($bin/ping.*\$"
+expected[10]=".*libc_start_main\[(space:)].*($libc)\$"
+expected[11]=".*_start\[(space:)].*($bin/ping.*\$"
+;
+*)
+eventattr='max-stack=3'
+expected[7]="getaddrinfo\[(space:)].*($libc)\$"
+expected[8]=".*($bin/ping.*\$"
+;
+esac

-open trace --no-syscalls -e probe_libc:inet_pton/max-stack=3/ ping -6 -c 1 ::1 2>&1 | grep -v ^$ | while read line ; do
+open trace --no-syscalls -e probe_libc:inet_pton/$(eventattr)/ ping -6 -c 1 ::1 2>&1 | grep -v ^$ | while read line ; do
+echo "$line" | egrep -q "{expected[$idx]"
if [ $? -ne 0 ] ; then
@@ -33,7 +46,7 @@
  exit 1
 fi
 let idx+=1
- [ $idx -eq 9 ] && break
+ [ -z "{expected[$idx]" ] && break
 done

--- linux-4.15.0.orig/tools/perf/tests/shell/trace+probe_vfs_getname.sh
+++ linux-4.15.0/tools/perf/tests/shell/trace+probe_vfs_getname.sh
@@ -30,6 +30,10 @@
 exit $err
 fi
 # Do not use whatever ~/.perfconfig file, it may change the output
+via trace.{show_timestamp,show_prefix,etc}
+export PERF_CONFIG=/dev/null
+
 trace_open_vfs_getname
 err=$?
 rm -f $[file]
--- linux-4.15.0.orig/tools/perf/tests/task-exit.c
+++ linux-4.15.0/tools/perf/tests/task-exit.c
@@ -30,6 +30,10 @@
 exit $err
 fi

+## Do not use whatever ~/.perconfig file, it may change the output
+## via trace.{show_timestamp,show_prefix,etc}
+export PERF_CONFIG=/dev/null
+trace_open_vfs_getname
 err=$?
 rm -f $[file]
if (perf_evlist__mmap(evlist, 128, true) < 0) {
    pr_debug("failed to mmap events: %d (%s)\n", errno,
             str_error_r(errno, sbuf, sizeof(sbuf)));
    err = -1;
    goto out_delete_evlist;
}

--- linux-4.15.0.orig/tools/perf/tests/topology.c
+++ linux-4.15.0/tools/perf/tests/topology.c
@@ -45,6 +45,7 @@

    perf_header__set_feat(&session->header, HEADER_CPU_TOPOLOGY);
    perf_header__set_feat(&session->header, HEADER_NRCPUS);
    +perf_header__set_feat(&session->header, HEADER_ARCH);

    session->header.data_size += DATA_SIZE;

@@ -70,6 +71,27 @@
    TEST_ASSERT_VAL("can't get session", session);

    /* On platforms with large numbers of CPUs process_cpu_topology()
     * might issue an error while reading the perf.data file section
     * HEADER_CPU_TOPOLOGY and the cpu_topology_map pointed to by member
     * cpu is a NULL pointer.
     * Example: On s390
     * CPU 0 is on core_id 0 and physical_package_id 6
     * CPU 1 is on core_id 1 and physical_package_id 3
     * Core_id and physical_package_id are platform and architecture
     * dependend and might have higher numbers than the CPU id.
     * This actually depends on the configuration.
     * In this case process_cpu_topology() prints error message:
     * "socket_id number is too big. You may need to upgrade the
     * perf tool."
     * This is the reason why this test might be skipped.
     */
    +if (!session->header.env.cpu)
    +return TEST_SKIP;

        for (i = 0; i < session->header.env.nr_cpus_avail; i++) {
            if (!cpu_map__has(map, i))
                continue;
@@ -95,7 +117,7 @@
char path[PATH_MAX];
struct cpu_map *map;
-int ret = -1;
+int ret = TEST_FAIL;

TEST_ASSERT_VAL("can't get templ file", !get_temp(path));

@@ -110,12 +132,9 @@
goto free_path;
}

-if (check_cpu_topology(path, map))
-get free_map;
-ret = 0;
-
-free_map:
+ret = check_cpu_topology(path, map);
+cpu_map__put(map);
+free_path:
unlink(path);
return ret;
--- linux-4.15.0.orig/tools/perf/tests/vmlinux-kallsyms.c
+++ linux-4.15.0/tools/perf/tests/vmlinux-kallsyms.c
@@ -125,7 +125,7 @@
if (pair && UM(pair->start) == mem_start) {
    next_pair:
    -if (strcmp(sym->name, pair->name) == 0) {
    +if (arch__compare_symbol_names(sym->name, pair->name) == 0) {
        /*
         * kallsyms don't have the symbol end, so we
         * set that by using the next symbol start - 1,
     --- linux-4.15.0.orig/tools/perf/trace/beauty/ioctl.c
     +++ linux-4.15.0/tools/perf/trace/beauty/ioctl.c
    @@ -22,7 +22,7 @@
    static size_t ioctl__scnprintf_tty_cmd(int nr, int dir, char *bf, size_t size)
    {
    static const char *ioctl_tty_cmd[] = {
-"TCGETS", "TCSETS", "TCSETSW", "TCSETSF", "TCGETA", "TCSETA", "TCSETAW",
+"[IOC_NR(TCGETS)] = "TCGETS", "TCSETS", "TCSETSW", "TCSETSF", "TCGETA", "TCSETA", "TCSETAW",
     "TCSETAF", "TCSBRK", "TCXONC", "TCFLSH", "TIOCSEXCL", "TIOCNXCL", "TIOCSCTTY",
     "TIOCUPR", "TIOCUPRGPR", "TIOCUTQ", "TIOCSTI", "TIOCGETWINSZ", "TIOCSWINSS", "TIOCSWINSS",
     "TIOCIGNGET", "TIOCMCBIS", "TIOCMCBIC", "TIOCIGNSET", "TIOCGSOFTCAR", "TIOCSSOFTCAR",
--- linux-4.15.0.orig/tools/perf/trace/annotate.c
--- linux-4.15.0.orig/tools/perf/trace/annotate.c
+++ linux-4.15.0/tools/perf/trace/annotate.c
@@ -312,6 +312,7 @@
    }
    static const char *ioctl_tty_cmd[] = {
    -"TCGETS", "TCSETS", "TCSETSW", "TCSETSF", "TCGETA", "TCSETA", "TCSETAW",
+"[IOC_NR(TCGETS)] = "TCGETS", "TCSETS", "TCSETSW", "TCSETSF", "TCGETA", "TCSETA", "TCSETAW",
     "TCSETAF", "TCSBRK", "TCXONC", "TCFLSH", "TIOCSEXCL", "TIOCNXCL", "TIOCSCTTY",
     "TIOCUPR", "TIOCUPRGPR", "TIOCUTQ", "TIOCSTI", "TIOCGETWINSZ", "TIOCSWINSS", "TIOCSWINSS",
     "TIOCIGNGET", "TIOCMCBIS", "TIOCMCBIC", "TIOCMIGNSET", "TIOCGSOFTCAR", "TIOCSSOFTCAR",
struct map_symbol *ms = ab->b.priv;
struct symbol *sym = ms->sym;

u8 pcnt_width = annotate_browser__pcnt_width(ab);
int width = 0;

/* PLT symbols contain external offsets */
if (strstr(sym->name, "@plt"))
    @ @ -335,13 +336,17 @@
to = (u64)btarget->idx;
}

+if (ab->have_cycles)
+    width = IPC_WIDTH + CYCLES_WIDTH;
+
+ui_browser__set_color(browser, HE_COLORSET_JUMP_ARROWS);
+__ui_browser__line_arrow(browser, pcnt_width + 2 + ab->addr_width,
+    pcnt_width + 2 + ab->addr_width + width,
    from, to);

if (is_fused(ab, cursor)) {
    ui_browser__mark_fused(browser,
        pcnt_width + 3 + ab->addr_width,
        pcnt_width + 3 + ab->addr_width + width,
        from - 1,
        to > from ? true : false);
}
--- linux-4.15.0.orig/tools/perf/ui/browsers/hists.c
+++ linux-4.15.0/tools/perf/ui/browsers/hists.c
@@ -2986,6 +2986,7 @@
continue;
}
+actions->ms.map = map;
    top = pstack__peek(browser->pstack);
if (top == &browser->hists->dso_filter) {
/*
--- linux-4.15.0.orig/tools/perf/ui/tui/helpline.c
+++ linux-4.15.0/tools/perf/ui/tui/helpline.c
@@ -24,7 +24,7 @@
SLsmg_set_color(0);
SLsmg_write_nstring((char *)msg, SLtt_Screen_Cols);
SLsmg_refresh();
-strncpy(ui_helpline__current, msg, sz)[sz - 1] = '\0';
+strlcpy(ui_helpline__current, msg, sz);
}

static int tui_helpline__show(const char *format, va_list ap)
--- linux-4.15.0.orig/tools/perf/util/Build
+++ linux-4.15.0/tools/perf/util/Build
@@ -10,6 +10,7 @@
 libperf-y += evsel.o
 libperf-y += evsel_fprintf.o
 libperf-y += find_bit.o
+libperf-y += get_current_dir_name.o
 libperf-y += kallsyms.o
 libperf-y += levenshtein.o
 libperf-y += llvm-utils.o
--- linux-4.15.0.orig/tools/perf/util/annotate.c
+++ linux-4.15.0/tools/perf/util/annotate.c
@@ -322,6 +322,8 @@
 return 0;
 *addrp = strtoull(comment, &endptr, 16);
 +if (endptr == comment)
+return 0;
 name = strchr(endptr, '<');
 if (name == NULL)
 return -1;
@@ -435,8 +437,8 @@
 return 0;
 comment = ltrim(comment);
 -comment__symbol(ops->source.raw, comment, &ops->source.addr, &ops->source.name);
 -comment__symbol(ops->target.raw, comment, &ops->target.addr, &ops->target.name);
+comment__symbol(ops->source.raw, comment + 1, &ops->source.addr, &ops->source.name);
+comment__symbol(ops->target.raw, comment + 1, &ops->target.addr, &ops->target.name);
 return 0;
@@ -480,7 +482,7 @@
 return 0;
 comment = ltrim(comment);
 -comment__symbol(ops->target.raw, comment, &ops->target.addr, &ops->target.name);
+comment__symbol(ops->target.raw, comment + 1, &ops->target.addr, &ops->target.name);
 return 0;
@@ -865,16 +867,14 @@
 *namep = strdup(name);
 if (*namep == NULL)
   goto out_free_name;
+goto out;

---
(*rawp)[0] = tmp;
*rawp = ltrim(*rawp);

return 0;

-out_free_name:
-free((void *)namep);
-*namep = NULL;
+out:
return -1;
}

@@ -1429,7 +1429,7 @@
struct arch **parch, char *cpuid)
{
 struct dso *dso = map->dso;
-char command[PATH_MAX * 2];
+char *command;
 struct arch *arch = NULL;
 FILE *file;
 char symfs_filename[PATH_MAX];
@@ -1446,11 +1446,11 @@
  arch_name = annotate__norm_arch(arch_name);
  if (!arch_name)
    -return -1;
-+return errno;

  arch = arch__find(arch_name);
  if (arch == NULL)
    -return -ENOTSUP;
  +return ENOTSUP;

  if (parch)
-  *parch = arch;
  @ @ -1490,7 +1490,7 @@
    strcpy(symfs_filename, tmp);
  }

  snprintf(command, sizeof(command),
+err = asprintf(&command,
     "%s %s %s --start-address=0x%.16" PRIx64
    " --stop-address=0x%.16" PRIx64
    " -l -d %s %s-C %s" 2>/dev/null|grep -v %s:\"|expand",
- @ @ -1503,12 +1503,17 @@
  symbol_conf.annotate_src ? ".S" ; ":
  symfs_filename, symfs_filename);
if (err < 0) {
    pr_err("Failure allocating memory for the command to run\n");
    goto out_remove_tmp;
}
pr_debug("Executing: %s\n", command);

err = -1;
if (pipe(stdout_fd) < 0) {
    pr_err("Failure creating the pipe to run %s\n", command);
    goto out_remove_tmp;
}
    goto out_free_command;
}

nline = 0;
fclose(file);
err = 0;
out_free_command:
    free(command);
out_remove_tmp:
close(stdout_fd[0]);

out_close_stdout:
close(stdout_fd[1]);
    goto out_free_command;
}

static void insert_source_line(struct rb_root *root, struct source_line *src_line) {  
}
+queue_array[i].tid = queues->queue_array[i].tid;
+queue_array[i].cpu = queues->queue_array[i].cpu;
+queue_array[i].set = queues->queue_array[i].set;
queue_array[i].priv = queues->queue_array[i].priv;
}

@@ -247,10 +250,6 @@
queue->set = true;
queue->tid = buffer->tid;
queue->cpu = buffer->cpu;
-} else if (buffer->cpu != queue->cpu || buffer->tid != queue->tid) {
-  pr_err("auxtrace queue conflict: cpu %d, tid %d vs cpu %d, tid %d\n",
-  queue->cpu, queue->tid, buffer->cpu, buffer->tid);
-  return -EINVAL;
-}

buffer->buffer_nr = queues->next_buffer_nr++;
@@ -1261,9 +1260,9 @@
/* padding must be written by fn() e.g. record__process_auxtrace() */
-padding = size & 7;
+padding = size & (PERF_AUXTRACE_RECORD_ALIGNMENT - 1);
if (padding)
-  padding = 8 - padding;
+  padding = PERF_AUXTRACE_RECORD_ALIGNMENT - padding;

memset(&ev, 0, sizeof(ev));
ev.auxtrace.header.type = PERF_RECORD_AUXTRACE;
--- linux-4.15.0.orig/tools/perf/util/auxtrace.h
+++ linux-4.15.0/tools/perf/util/auxtrace.h
@@ -38,6 +38,9 @@
struct auxtrace_info_event;
struct events_stats;
+/* Auxtrace records must have the same alignment as perf event records */
+#define PERF_AUXTRACE_RECORD_ALIGNMENT 8
+
enum auxtrace_type {
  PERF_AUXTRACE_UNKNOWN,
  PERF_AUXTRACE_INTEL_PT,
--- linux-4.15.0.orig/tools/perf/util/bpf-loader.c
+++ linux-4.15.0/tools/perf/util/bpf-loader.c
@@ -66,7 +66,7 @@
}

obj = bpf_object__open_buffer(obj_buf, obj_buf_sz, name);
-if (IS_ERR(obj))
+if (IS_ERR(obj)) {
+if (IS_ERR_OR_NULL(obj)) {
  pr_debug("bpf: failed to load buffer\n");
  return ERR_PTR(-EINVAL);
}
@@ -102,14 +102,14 @@
  pr_debug("bpf: successfull builtin compilation\n");
  obj = bpf_object__open_buffer(obj_buf, obj_buf_sz, filename);
-
ething (!IS_ERR(obj) && llvm_param.dump_obj)
+thing (!IS_ERR_OR_NULL(obj) && llvm_param.dump_obj)
  llvm__dump_obj(filename, obj_buf, obj_buf_sz);

  free(obj_buf);
} else
  obj = bpf_object__open(filename);

-ife (IS_ERR(obj)) {
+ife (IS_ERR_OR_NULL(obj)) {
  pr_debug("bpf: failed to load %s\n", filename);
  return obj;
}
--- linux-4.15.0.orig/tools/perf/util/build-id.c
+++ linux-4.15.0/tools/perf/util/build-id.c
@@ -185,6 +185,7 @@
 return bf;
}
+/* The caller is responsible to free the returned buffer. */
char *build_id_cache__origname(const char *sbuild_id)
{
  char *linkname;
--- linux-4.15.0.orig/tools/perf/util/c++/clang.cpp
+++ linux-4.15.0/tools/perf/util/c++/clang.cpp
@@ -9,6 +9,7 @@
 * Copyright (C) 2016 Huawei Inc.
 */

+#include "clang/Basic/Version.h"
#include "clang/CodeGen/CodeGenAction.h"
#include "clang/Frontend/CompilerInvocation.h"
#include "clang/Frontend/CompilerInstance.h"
@@ -58,7 +59,8 @@
     FrontendOptions&Opts = CI->getFrontendOpts();
    Opts.Inputs.clear();
    -Opts.Inputs.emplace_back(Path, IK_C);
+Opts.Inputs.emplace_back(Path, 
+     FrontendOptions::getInputKindForExtension("c"));
return CI;
}

@@ -71,10 +73,17 @@
Clang.setVirtualFileSystem(&*VFS);

+if CLANG_VERSION_MAJOR < 4
IntrusiveRefPtr<CompilerInvocation> CI =
createCompilerInvocation(std::move(CFlags), Path,
Clang.getDiagnostics());
Clang.setInvocation(&*CI);
+else
+std::shared_ptr<CompilerInvocation> CI(
+createCompilerInvocation(std::move(CFlags), Path,
+Clang.getDiagnostics()));
+Clang.setInvocation(CI);
+} 

std::unique_ptr<CodeGenAction> Act(new EmitLLVMOnlyAction(&*LLVMCtx));
if (!Clang.ExecuteAction(*Act))
@@ -137,8 +146,15 @@
raw_svector_ostream ostream(*Buffer);

legacy::PassManager PM;
-if (TargetMachine->addPassesToEmitFile(PM, ostream,
- TargetMachine::CGFT_ObjectFile)) { 
+bool NotAdded;
+if (CLANG_VERSION_MAJOR < 7
+NotAdded = TargetMachine->addPassesToEmitFile(PM, ostream,
+ TargetMachine::CGFT_ObjectFile);
+elseif
+NotAdded = TargetMachine->addPassesToEmitFile(PM, ostream, nullptr,
+ TargetMachine::CGFT_ObjectFile);
+} 
+if (NotAdded) {
llvm::errs() << "TargetMachine can't emit a file of this type\n"
return std::unique_ptr<llvm::SmallVectorImpl<char>>(nullptr);
} 
--- linux-4.15.0.orig/tools/perf/util/callchain.c
+++ linux-4.15.0/tools/perf/util/callchain.c
@@ -37,6 +37,15 @@
+} 
+/*
+ * Are there any events usind DWARF callchains?
+ */
+/
+/*
+ * I.e.
+ * -e cycles/call-graph=dwarf/
+ */
+bool dwarf_callchain_users;
+
+ struct callchain_param callchain_param_default = {
+ CALLCHAIN_PARAM_DEFAULT
+ };
+ @@ -265,6 +274,7 @@
+ ret = 0;
+ param->record_mode = CALLCHAIN_DWARF;
+ param->dump_size = default_stack_dump_size;
+ +dwarf_callchain_users = true;
+
+ tok = strtok_r(NULL, ",", &saveptr);
+ if (tok) {
+ @@ -756,6 +766,7 @@
+ cnode->from_count++;
+ }
+ }
+
+ @@ -1335,10 +1346,10 @@
+ static int branch_from_str(char *bf, int bfsize,
+ u64 branch_count,
+ u64 cycles_count, u64 iter_count,
- u64 iter_cycles)
+ + u64 iter_cycles, u64 from_count)
+ {
+ int printed = 0, i = 0;
+ -u64 cycles;
+ +u64 cycles, v = 0;
+ 
+ cycles = cycles_count / branch_count;
+ if (cycles) {
+ @@ -1347,14 +1358,16 @@
+ bf + printed, bfsize - printed);
+ }
+ 
+ -if (iter_count) {
+ -printed += count_pri64_printf(i++, "iter",
+ -iter_count,
+ -bf + printed, bfsize - printed);
+ -
+ -printed += count_pri64_printf(i++, "avg_cycles",
+ 

-iter_cycles / iter_count,
-bf + printed, bfsize - printed);
+if (iter_count && from_count) {
  +v = iter_count / from_count;
+if (v) {
  +printed += count_PRI64_PRINTF(i++, "iter",
+  v, bf + printed, bfsize - printed);
  +
  +printed += count_PRI64_PRINTF(i++, "avg_cycles",
  +iter_cycles / iter_count,
  +bf + printed, bfsize - printed);
  +}
}

if (i)
@@ -1367,6 +1380,7 @@
   u64 branch_count, u64 predicted_count,
   u64 abort_count, u64 cycles_count,
   u64 iter_count, u64 iter_cycles,
+   u64 from_count,
   struct branch_type_stat *brtype_stat)
{
  int printed;
@@ -1379,7 +1393,8 @@
   predicted_count, abort_count, brtype_stat);
 } else {
   printed = branch_from_str(bf, bfsize, branch_count,
@@ -1392,13 +1407,14 @@
   u64 branch_count, u64 predicted_count,
   u64 abort_count, u64 cycles_count,
   u64 iter_count, u64 iter_cycles,
+   u64 from_count,
   struct branch_type_stat *brtype_stat)
{
  char str[256];

counts_str_build(str, sizeof(str), branch_count,
   predicted_count, abort_count, cycles_count,
@@ -1399,9 +1415,10 @@
   - iter_count, iter_cycles, brtype_stat);
   + iter_count, iter_cycles, from_count, brtype_stat);

  if (fp)
return fprintf(fp, "%s", str);
@@ -1412,6 +1428,7 @@
  
 u64 branch_count, predicted_count;
 u64 abort_count, cycles_count;
+u64 from_count;

 branch_count = clist->branch_count;
 predicted_count = clist->predicted_count;
@@ -1419,11 +1436,12 @@
   cycles_count = clist->cycles_count;
   iter_count = clist->iter_count;
   iter_cycles = clist->iter_cycles;
+from_count = clist->from_count;

 return callchain_counts_printf(fp, bf, bfsize, branch_count,
   predicted_count, abort_count,
-  cycles_count, iter_count, iter_cycles,
-  &clist->brtype_stat);
+  from_count, &clist->brtype_stat);
 }

static void free_callchain_node(struct callchain_node *node)
--- linux-4.15.0.orig/tools/perf/util/callchain.h
+++ linux-4.15.0/tools/perf/util/callchain.h
@@ -89,6 +89,8 @@
    CCVAL_COUNT,
    //
+extern bool dwarf_callchain_users;
+    
+struct callchain_param {

  bool enabled;
  enum perf_call_graph_mode record_mode;
@@ -116,6 +118,7 @@
        bool has_children;
    };
  u64 branch_count;
+  u64 from_count;
  u64 predicted_count;
  u64 abort_count;
  u64 cycles_count;
--- linux-4.15.0.orig/tools/perf/util/cgroup.c
+++ linux-4.15.0/tools/perf/util/cgroup.c
@@ -78,7 +78,7 @@
        if (cgroupfs_find_mountpoint(mnt, PATH_MAX + 1))
            return -1;
#include <sys/stat.h>

- snprintf(path, PATH_MAX, "%s/%s", mnt, name);
+ snprintf(path, PATH_MAX, "%s/%s", mnt, name);

fd = open(path, O_RDONLY);
if (fd == -1)
--- linux-4.15.0.orig/tools/perf/util/comm.c
+++ linux-4.15.0/tools/perf/util/comm.c
@@ -20,9 +20,10 @@
 static struct comm_str *comm_str__get(struct comm_str *cs)
 {
 - if (cs)
-     refcount_inc(&cs->refcnt);
-     return cs;
+     if (cs && refcount_inc_not_zero(&cs->refcnt))
+         return cs;
+     return NULL;
 }

static void comm_str__put(struct comm_str *cs)
@@ -67,9 +68,14 @@
parent = *p;
iter = rb_entry(parent, struct comm_str, rb_node);

+/*
+ * If we race with comm_str__put, iter->refcnt is 0
+ * and it will be removed within comm_str__put call
+ * shortly, ignore it in this search.
+ */
cmp = strcmp(str, iter->str);
-if (!cmp)
-    return comm_str__get(iter);
+if (!cmp && comm_str__get(iter))
+    return iter;
if (cmp < 0)
    p = &(*p)->rb_left;
--- linux-4.15.0.orig/tools/perf/util/config.c
+++ linux-4.15.0/tools/perf/util/config.c
@@ -628,11 +628,10 @@
ret = set_value(item, value);
-out_free:
-free(key);

ret = set_value(item, value);
-out_free:
-free(key);
int perf_config_set__collect(struct perf_config_set *set, const char *file_name,
--- linux-4.15.0.orig/tools/perf/util/cpumap.c
+++ linux-4.15.0/tools/perf/util/cpumap.c
@@ -134,7 +134,12 @@
if (!cpu_list)
return cpu_map__read_all_cpu_map();

-if (!isdigit(*cpu_list))
+/*
+ * must handle the case of empty cpumap to cover
+ * TOPOLOGY header for NUMA nodes with no CPU
+ * ( e.g., because of CPU hotplug)
+ */
+if (!isdigit(*cpu_list) && *cpu_list != '\0')
goto out;

while (isdigit(*cpu_list)) {
@@ -181,8 +186,10 @@
if (nr_cpus > 0)
cpus = cpu_map__trim_new(nr_cpus, tmp_cpus);
-else
+else if (*cpu_list != '\0')
cpus = cpu_map__default_new();
+else
+cpus = cpu_map__dummy_new();
invalid:
free(tmp_cpus);
out:
@@ -455,7 +462,7 @@
/* get the highest possible cpu number for a sparse allocation */
ret = snprintf(path, PATH_MAX, "%s/devices/system/cpu/possible", mnt);
-if (ret == PATH_MAX) {
+if (ret >= PATH_MAX) {
 pr_err("sysfs path crossed PATH_MAX(%d) size\n", PATH_MAX);
goto out;
}
pr_err("sysfs path crossed PATH_MAX(%d) size\n", PATH_MAX);
go_to out;
}
@@ -494,7 +501,7 @@

/* get the highest possible cpu number for a sparse allocation */
ret = snprintf(path, PATH_MAX, "%s/devices/system/node/possible", mnt);
-if (ret == PATH_MAX) {
+if (ret >= PATH_MAX) {
    pr_err("sysfs path crossed PATH_MAX(%d) size\n", PATH_MAX);
go_to out;
}
@@ -579,7 +586,7 @@
return 0;

n = snprintf(path, PATH_MAX, "%s/devices/system/node", mnt);
-if (n == PATH_MAX) {
+if (n >= PATH_MAX) {
    pr_err("sysfs path crossed PATH_MAX(%d) size\n", PATH_MAX);
    return -1;
}
@@ -594,7 +601,7 @@
continue;

n = snprintf(buf, PATH_MAX, "%s/%s", path, dent1->d_name);
-if (n == PATH_MAX) {
+if (n >= PATH_MAX) {
    pr_err("sysfs path crossed PATH_MAX(%d) size\n", PATH_MAX);
    continue;
}
@@ -694,7 +701,10 @@
unsigned char *bitmap;
int last_cpu = cpu_map__cpu(map, map->nr - 1);

-bitmap = zalloc((last_cpu + 7) / 8);
+if (buf == NULL)
+    return 0;
+
+bitmap = zalloc(last_cpu / 8 + 1);
if (bitmap == NULL) {
    buf[0] = '\0';
    return 0;
--- linux-4.15.0.orig/tools/perf/util/data-convert-bt.c
+++ linux-4.15.0/tools/perf/util/data-convert-bt.c
@@ -271,7 +271,7 @@
if (i > 0)
strncpy(buffer, string, i);}
-strncat(buffer + p, numstr, 4);
+memcpy(buffer + p, numstr, 4);
p += 3;
}
}
--- linux-4.15.0.orig/tools/perf/util/dso.c
+++ linux-4.15.0/tools/perf/util/dso.c
@@ -38,6 +38,7 @@
[DSO_BINARY_TYPE__BUILD_ID_CACHE_DEBUGINFO]= 'D',
[DSO_BINARY_TYPE__FEDORA_DEBUGINFO]= 'f',
[DSO_BINARY_TYPE__UBUNTU_DEBUGINFO]= 'u',
+[DSO_BINARY_TYPE__MIXEDUP_UBUNTU_DEBUGINFO]= 'x',
[DSO_BINARY_TYPE__OPENEMBEDDED_DEBUGINFO]= 'o',
[DSO_BINARY_TYPE__BUILDID_DEBUGINFO]= 'b',
[DSO_BINARY_TYPE__SYSTEM_PATH_DSO]= 'd',
@@ -120,6 +121,21 @@
snprintf(filename + len, size - len, "%s", dso->long_name);
break;

+case DSO_BINARY_TYPE__MIXEDUP_UBUNTU_DEBUGINFO:
+/*
+ * Ubuntu can mixup /usr/lib with /lib, putting debuginfo in
+ * /usr/lib/debug/lib when it is expected to be in
+ * /usr/lib/debug/usr/lib
+ * */
+if (strlen(dso->long_name) < 9 ||
+ strncmp(dso->long_name, "/usr/lib/", 9)) {
+ ret = -1;
+break;
+}
+len = __symbol__join_symfs(filename, size, "/usr/lib/debug");
+snprintf(filename + len, size - len, "%s", dso->long_name + 4);
+break;
+
+case DSO_BINARY_TYPE__OPENEMBEDDED_DEBUGINFO:
{ const char *last_slash;
@@ -354,6 +370,8 @@
if ((strncmp(name, "[kernel.kallsyms]", 17) == 0) ||
 (strncmp(name, "[guest.kernel.kallsyms": 22) == 0) ||
 (strncmp(name, "[vdso]", 6) == 0) ||
+ (strncmp(name, "[vdso32]", 8) == 0) ||
+ (strncmp(name, "[vdsox32]", 9) == 0) ||
 (strncmp(name, "[vsyscall]", 10) == 0)) {
 m->kmod = false;
@@ -1013,8 +1031,10 @@
 struct map *map = NULL;

struct dso *dso = dso__new(name);

-if (dso)
+if (dso) {
map = map__new2(0, dso, MAP__FUNCTION);
+dso__put(dso);
+
return map;
}

--- linux-4.15.0.orig/tools/perf/util/dso.h
+++ linux-4.15.0/tools/perf/util/dso.h
@@ -25,6 +25,7 @@
DSO_BINARY_TYPE__BUILD_ID_CACHE_DEBUGINFO,
DSO_BINARY_TYPE__FEDORA_DEBUGINFO,
DSO_BINARY_TYPE__UBUNTU_DEBUGINFO,
+DSO_BINARY_TYPE__MIXEDUP_UBUNTU_DEBUGINFO,
DSO_BINARY_TYPE__BUILDID_DEBUGINFO,
DSO_BINARY_TYPE__SYSTEM_PATH_DSO,
DSO_BINARY_TYPE__GUEST_KMODULE,
--- linux-4.15.0.orig/tools/perf/util/dwarf-aux.c
+++ linux-4.15.0/tools/perf/util/dwarf-aux.c
@@ -321,20 +321,58 @@
}
/**
 * die_entrypc - Returns entry PC (the lowest address) of a DIE
 * @dw_die: a DIE
 * @addr: where to store entry PC
 * *
 * Since dwarf_entrypc() does not return entry PC if the DIE has only address
 * @addr range, we have to use this to retrieve the lowest address from the address
 * @addr range attribute.
 * */
+int die_entrypc(Dwarf_Die *dw_die, Dwarf.Addr *addr)
+{
+Dwarf.Addr base, end;
+Dwarf_Attribute attr;
++
+if (!addr)
+return -EINVAL;
++
+if (dwarf_entrypc(dw_die, addr) == 0)
+return 0;
++
+/*
+ * Since the dwarf_ranges() will return 0 if there is no
+ * DW_AT_ranges attribute, we should check it first.
+ */
+if (!dwarf_attr(dw_die, DW_AT_ranges, &attr))
+return -ENOENT;
+}
+
+return dwarf_ranges(dw_die, 0, &base, addr, &end) < 0 ? -ENOENT : 0;
+
+/**
 * die_is_func_instance - Ensure that this DIE is an instance of a subprogram
 * @dw_die: a DIE
 *
 * Ensure that this DIE is an instance (which has an entry address).
 * This returns true if @dw_die is a function instance. If not, you need to
 * call die_walk_instances() to find actual instances.
 * This returns true if @dw_die is a function instance. If not, the @dw_die
 * must be a prototype. You can use die_walk_instances() to find actual
 * instances.
 /**
 bool die_is_func_instance(Dwarf_Die *dw_die)
 {
 Dwarf_Addr tmp;
 +Dwarf_Attribute attr_mem;
 +int tag = dwarf_tag(dw_die);
 +
 +if (tag != DW_TAG_subprogram &&
 + tag != DW_TAG_inlined_subroutine)
 +return dwarf_entrypc(dw_die, &tmp) == 0 ||
 +dwarf_attr(dw_die, DW_AT_ranges, &attr_mem) != NULL;
 +}
 +
 /**
 * die_get_data_member_location - Get the data-member offset
 * @mb_die: a DIE of a member of a data structure
 @@ -611,6 +649,9 @@
 Dwarf_Die *origin;
 int tmp;
 +
 +if (!dwarf_is_func_instance(inst))
 +return DIE_FIND_CB_CONTINUE;
 +
 attr = dwarf_attr(inst, DW_AT_abstract_origin, &attr_mem);
 if (attr != NULL)
 return DIE_FIND_CB_CONTINUE;
 @@ -682,15 +723,14 @@
if (dwarf_tag(in_die) == DW_TAG_inlined_subroutine) {
    fname = die_get_call_file(in_die);
    lineno = die_get_call_lineno(in_die);
    if (fname && lineno > 0 && dwarf_entrypc(in_die, &addr) == 0) {
        lw->retval = lw->callback(fname, lineno, addr, lw->data);
        if (lw->retval != 0)
            return DIE_FIND_CB_END;
    } +if (!lw->recursive)
    +return DIE_FIND_CB_SIBLING;
    if (!lw->recursive)
        /* Don't need to search recursively */
        return DIE_FIND_CB_SIBLING;
}

if (addr) {
    fname = dwarf_decl_file(in_die);
    /* Handle function declaration line */
    dwarf_decl_file(sp_die);
    if (fname && dwarf_decl_line(sp_die, &lineno) == 0 &&
        dwarf_entrypc(sp_die, &addr) == 0) {
        lw->retval = __die_walk_funclines(sp_die, true, lw->callback, lw->data);
        if (lw->retval != 0)
            goto done;
    }
}

struct __line_walk_param *lw = data;

/* Since inlined function can include another inlined function in
 * the same file, we need to walk in it recursively.
 */
lw->retval = __die_walk_funclines(sp_die, true, lw->callback, lw->data);
if (lw->retval != 0)
    return DWARF_CB_ABORT;
bool flag;

/* Get the CU die */
if (dwarf_tag(rt_die) != DW_TAG_compile_unit) {
  "Possible error in debuginfo\n";
  continue;
}
/* Skip end-of-sequence */
if (dwarf_lineendsequence(line, &flag) != 0 || flag)
  continue;
/* Skip Non statement line-info */
if (dwarf_linebeginstatement(line, &flag) != 0 || !flag)
  continue;
/* Filter lines based on address */
if (rt_die != cu_die) {
  /* Don't need walk functions recursively, because nested
   * inlined functions don't have lines of the specified DIE.
   * Don't need walk inlined functions recursively, because
   * inner inlined functions don't have the lines of the
   * specified function.
   */
  if (!dwarf_haspc(rt_die, addr))
    continue;
  if (die_find_inlinefunc(rt_die, addr, &die_mem)) {
    /* Call-site check */
    inf = die_get_call_file(&die_mem);
    if ((inf && !strcmp(inf, decf)) &&
        die_get_call_lineno(&die_mem) == lineno)
      goto found;
    dwarf_decl_line(&die_mem, &inl);
    if (inl != decl ||
        decf != dwarf_decl_file(&die_mem))
      continue;
  }
  /* Get source line */
  fname = dwarf_linesrc(line, NULL, NULL);
  if (rt_die != cu_die)
    /* Don't need walk functions recursively, because nested
     * inlined functions don't have lines of the specified DIE.
     * Don't need walk inlined functions recursively, because
     * inner inlined functions don't have the lines of the
     * specified function. */
ret = __die_walk_funclines(rt_die, false, callback, data);
else {
    bool first = true;
    const char *name;

    /* Get DW_AT_linkage_name (should be NULL for C binary) */
    const char *die_get_linkage_name(Dwarf_Die *dw_die);

    /* Get the lowest PC in DIE (including range list) */
    int die_entrypc(Dwarf_Die *dw_die, Dwarf_Addr *addr);

    /* Ensure that this DIE is a subprogram and definition (not declaration) */
    bool die_is_func_def(Dwarf_Die *dw_die);

    --- linux-4.15.0.orig/tools/perf/util/dwarf-aux.h
    +++ linux-4.15.0/tools/perf/util/dwarf-aux.h
    @@ -41,6 +41,9 @@
        /* Get DW_AT_linkage_name (should be NULL for C binary) */
        const char *die_get_linkage_name(Dwarf_Die *dw_die);

        /* Get the lowest PC in DIE (including range list) */
        int die_entrypc(Dwarf_Die *dw_die, Dwarf_Addr *addr);
        +
        /* Ensure that this DIE is a subprogram and definition (not declaration) */
        bool die_is_func_def(Dwarf_Die *dw_die);

    --- linux-4.15.0.orig/tools/perf/util/env.c
    +++ linux-4.15.0/tools/perf/util/env.c
    @@ -3,6 +3,7 @@
            #include "env.h"
            #include "util.h"
            #include <errno.h>
            +#include <sys/utsname.h>

            struct perf_env perf_env;

            @@ -87,6 +88,37 @@
            return 0;
        }

        +static int perf_env__read_arch(struct perf_env *env)
{ struct utsname uts;
 + if (env->arch)
 + return 0;
 +
 + if (!uname(&uts))
 + env->arch = strdup(uts.machine);
 +
 + return env->arch ? 0 : -ENOMEM;
 +
 + static int perf_env__read_nr_cpus_avail(struct perf_env *env)
 + {
 + if (env->nr_cpus_avail == 0)
 + env->nr_cpus_avail = cpu__max_present_cpu();
 +
 + return env->nr_cpus_avail ? 0 : -ENOENT;
 +
 +
 + const char *perf_env__raw_arch(struct perf_env *env)
 + {
 + return env && !perf_env__read_arch(env) ? env->arch : "unknown";
 +
 +
 + int perf_env__nr_cpus_avail(struct perf_env *env)
 + {
 + return env && !perf_env__read_nr_cpus_avail(env) ? env->nr_cpus_avail : 0;
 +
 +
 void cpu_cache_level__free(struct cpu_cache_level *cache)
 |
 free(cache->type);
 --- linux-4.15.0.orig/tools/perf/util/env.h
 +++ linux-4.15.0/tools/perf/util/env.h
 @@ -65,4 +65,8 @@
 int perf_env__read_cpu_topology_map(struct perf_env *env);

 void cpu_cache_level__free(struct cpu_cache_level *cache);
 +
 + const char *perf_env__raw_arch(struct perf_env *env);
 + int perf_env__nr_cpus_avail(struct perf_env *env);
 +
 #endif /* __PERF_ENV_H */
 --- linux-4.15.0.orig/tools/perf/util/event.c
 +++ linux-4.15.0/tools/perf/util/event.c
 @@ -901,11 +901,13 @@
 int err;
union perf_event *event;

-if (symbol_conf.kptr_restrict)
- return -1;
if (map == NULL)
return -1;

+kmap = map__kmap(map);
+if (!kmap->ref_reloc_sym)
+ return -1;
+
/*
 * We should get this from /sys/kernel/sections/.text, but till that is
 * available use this, and after it is use this as a fallback for older
 @@ -929,7 +931,6 @@
 event->header.misc = PERF_RECORD_MISC_GUEST_KERNEL;
 }

-kmap = map__kmap(map);
size = snprintf(event->mmap.filename, sizeof(event->mmap.filename),
 "%%s", mmap_name, kmap->ref_reloc_sym->name) + 1;
size = PERF_ALIGN(size, sizeof(u64));
@@ -1058,6 +1059,7 @@
 }

*size += sizeof(struct cpu_map_data);
+*size = PERF_ALIGN(*size, sizeof(u64));
return zalloc(*size);
}

@@ -1627,6 +1629,8 @@
 }

al->sym = map__find_symbol(al->map, al->addr);
+} else if (symbol_conf.dso_list) {
+al->filtered |= (1 << HIST_FILTER__DSO);
+}

if (symbol_conf.sym_list &&
--- linux-4.15.0.orig/tools/perf/util/evlist.c
+++ linux-4.15.0/tools/perf/util/evlist.c
@@ -33,6 +33,10 @@
 #include <linux/log2.h>
 #include <linux/err.h>

+#ifdef LACKS_SIGQUEUE_PROTOTYPE
+int sigqueue(pid_t pid, int sig, const union sigval value);
+#endif
#define FD(e, x, y) (*(int *)xyarray__entry(e->fd, x, y))
#define SID(e, x, y) xyarray__entry(e->sample_id, x, y)

--- linux-4.15.0.orig/tools/perf/util/evsel.c
+++ linux-4.15.0/tools/perf/util/evsel.c
@@ -36,6 +36,7 @@
#include "debug.h"
#include "trace-event.h"
#include "stat.h"
+#include "memswap.h"
#include "util/parse-branch-options.h"

#include "sane_ctype.h"
@@ -259,8 +260,9 @@
{
struct perf_evsel *evsel = zalloc(perf_evsel__object.size);

-if (evsel != NULL)
-perf_evsel__init(evsel, attr, idx);
+if (!evsel)
+return NULL;
+perf_evsel__init(evsel, attr, idx);

if (perf_evsel__is_bpf_output(evsel)) {
  evsel->attr.sample_type |= (PERF_SAMPLE_RAW | PERF_SAMPLE_TIME |
@@ -586,6 +588,9 @@
{
char bf[128];

-if (evsel)
+goto out_unknown;
+
if (evsel->name)
  return evsel->name;

@@ -622,7 +627,10 @@
evsel->name = strdup(bf);

-return evsel->name ?: "unknown";
+if (evsel->name)
+return evsel->name;
+out_unknown:
+return "unknown";
}

const char *perf_evsel__group_name(struct perf_evsel *evsel)
struct perf_event_attr *attr = &evsel->attr;
-struct callchain_param param;  
+struct callchain_param param = {
+    .record_mode = callchain_param.record_mode,
+};

u32 dump_size = 0;
int max_stack = 0;
const char *callgraph_buf = NULL;

-param.record_mode = callchain_param.record_mode;
-
list_for_each_entry(term, config_terms, list) {
    switch (term->type) {
    case PERF_EVSEL__CONFIG_TERM_PERIOD:
        if (!(term->weak && opts->user_interval != ULLONG_MAX)) {
            attr->sample_period = term->val.period;
            attr->freq = 0;
            +perf_evsel__reset_sample_bit(evsel, PERIOD);
        }
        break;
    case PERF_EVSEL__CONFIG_TERM_FREQ:
        if (!(term->weak && opts->user_freq != UINT_MAX)) {
            attr->sample_freq = term->val.freq;
            attr->freq = 1;
            +perf_evsel__set_sample_bit(evsel, PERIOD);
        }
        break;
    case PERF_EVSEL__CONFIG_TERM_TIME:
        @ @ -822,6 +832,12  @ @
    }

+static bool is_dummy_event(struct perf_evsel *evsel)
+{  
+return (evsel->attr.type == PERF_TYPE_SOFTWARE) &&
+    (evsel->attr.config == PERF_COUNT_SW_DUMMY);
+}
+
/*
* The enable_on_exec/disabled value strategy:
*
@ @ -948,9 +964,6  @ @
if (target__has_cpu(&opts->target) || opts->sample_cpu)
perf_evsel__set_sample_bit(evsel, CPU);

-if (opts->period)
-perf_evsel__set_sample_bit(evsel, PERIOD);
-
/*
 * When the user explicitly disabled time don't force it here.
 */
@@ -1052,6 +1065,22 @@
 apply_config_terms(evsel, opts);

 evsel->ignore_missing_thread = opts->ignore_missing_thread;
+ /* The --period option takes the precedence. */
+if (opts->period_set) {
+if (opts->period)
+perf_evsel__set_sample_bit(evsel, PERIOD);
+else
+perf_evsel__reset_sample_bit(evsel, PERIOD);
+
+/*
+ * For initial_delay, a dummy event is added implicitly.
+ + The software event will trigger -EOPNOTSUPP error out,
+ + if BRANCH_STACK bit is set.
+ */
+if (opts->initial_delay && is_dummy_event(evsel))
+perf_evsel__reset_sample_bit(evsel, BRANCH_STACK);
}

static int perf_evsel__alloc_fd(struct perf_evsel *evsel, int ncpus, int nthreads)
@@ -1212,6 +1241,7 @@
{
assert(list_empty(&evsel->node));
assert(evsel->evlist == NULL);
+perf_evsel__free_counts(evsel);
 perf_evsel__free_fd(evsel);
 perf_evsel__free_id(evsel);
 perf_evsel__free_config_terms(evsel);
@@ -1221,6 +1251,8 @@
 thread_map__put(evsel->threads);
 zfree(&evsel->group_name);
 zfree(&evsel->name);
+zfree(&evsel->per_pkg_mask);
+zfree(&evsel->metric_events);
 perf_evsel__object.fini(evsel);
}
return fprintf(fp, "%-32s %s\n", name, val);
}

+static void perf_evsel__remove_fd(struct perf_evsel *pos,
+ int nr_cpus, int nr_threads,
+ int thread_idx)
+{
+for (int cpu = 0; cpu < nr_cpus; cpu++)
+for (int thread = thread_idx; thread < nr_threads - 1; thread++)
+FD(pos, cpu, thread) = FD(pos, cpu, thread + 1);
+}
+
+static int update_fds(struct perf_evsel *evsel,
+ int nr_cpus, int cpu_idx,
+ int nr_threads, int thread_idx)
+{
+struct perf_evsel *pos;
+
+if (cpu_idx >= nr_cpus || thread_idx >= nr_threads)
+return -EINVAL;
+
+evlist__for_each_entry(evsel->evlist, pos) {
+nr_cpus = pos != evsel ? nr_cpus : cpu_idx;
+
+perf_evsel__remove_fd(pos, nr_cpus, nr_threads, thread_idx);
+
+/*
+ * Since fds for next evsel has not been created,
+ * there is no need to iterate whole event list.
+ */
+if (pos == evsel)
+break;
+}
+return 0;
+}
+
+static bool ignore_missing_thread(struct perf_evsel *evsel,
+ int nr_cpus, int cpu,
+struct thread_map *threads,
+ int thread, int err)
{
+pid_t ignore_pid = thread_map__pid(threads, thread);
+
+if (!evsel->ignore_missing_thread)
+return false;
+}

@@ -1596,10 +1628,46 @@
@@ -1615,11 +1683,18 @@
if (threads->nr == 1)
    return false;

/*
 * We should remove fd for missing_thread first
 * because thread_map__remove() will decrease threads->nr.
 */
+if (update_fds(evsel, nr_cpus, cpu, threads->nr, thread))
  +return false;
+
if (thread_map__remove(threads, thread))
return false;

pr_warning("WARNING: Ignored open failure for pid %d\n",
   thread_map__pid(threads, thread));
   ignore_pid);
return true;
}

@@ -1724,7 +1799,7 @@
if (fd < 0) {
    err = -errno;

-if (ignore_missing_thread(evsel, threads, thread, err)) {
+if (ignore_missing_thread(evsel, cpus->nr, cpu, threads, thread, err)) {
    /* We just removed 1 thread, so take a step
     * back on thread index and lower the upper
@@ -2120,14 +2195,27 @@
if (type & PERF_SAMPLE_RAW) {
    OVERFLOW_CHECK_u64(array);
    u.val64 = *array;
    -if (WARN_ONCE(swapped,
    -      "Endianness of raw data not corrected!\n") ) {
    -/* undo swap of u64, then swap on individual u32s */
    +
    +/*
    + * Undo swap of u64, then swap on individual u32s,
    + * get the size of the raw area and undo all of the
    + * swap. The pevent interface handles endianity by
    + * itself.
    + */
    +if (swapped) {
        u.val64 = bswap_64(u.val64);
        u.val32[0] = bswap_32(u.val32[0]);
        u.val32[1] = bswap_32(u.val32[1]);
    }
    data->raw_size = u.val32[0];
+ /*
+ * The raw data is aligned on 64bits including the
+ * u32 size, so it's safe to use mem_bswap_64.
+ */
+ if (swapped)
+ mem_bswap_64((void *) array, data->raw_size);
+ array = (void *)array + sizeof(u32);

OVERFLOW_CHECK(array, data->raw_size, max_size);
--- linux-4.15.0.orig/tools/perf/util/expr.y
+++ linux-4.15.0/tools/perf/util/expr.y
@@ -10,7 +10,8 @@
#define MAXIDLEN 256
%
}

-%pure-parser
+%define api.pure full
+
+%parse-param { double *final_val }
+%parse-param { struct parse_ctx *ctx }
+%parse-param { const char **pp }
--- linux-4.15.0.orig/tools/perf/util/get_current_dir_name.c
+++ linux-4.15.0/tools/perf/util/get_current_dir_name.c
@@ -0,0 +1,18 @@
+// SPDX-License-Identifier: GPL-2.0
+// Copyright (C) 2018, Red Hat Inc, Arnaldo Carvalho de Melo <acme@redhat.com>
+//
+﻿#ifndef HAVE_GET_CURRENT_DIR_NAME
+#+#+include "util.h"
+#+#+include <unistd.h>
+#+#+include <stdlib.h>
+#+#+include <stdlib.h>
+(Html) Android's 'bionic' library, for one, doesn't have this */
+
+char *get_current_dir_name(void)
+{
+char pwd[PATH_MAX];
+
+return getcwd(pwd, sizeof(pwd)) == NULL ? NULL : strdup(pwd);
+
+} // HAVE_GET_CURRENT_DIR_NAME
--- linux-4.15.0.orig/tools/perf/util/header.c
+++ linux-4.15.0/tools/perf/util/header.c
@@ -1063,7 +1063,7 @@
scnprintf(file, PATH_MAX, "%s/shared_cpu_list", path);
if (sysfs__read_str(file, &cache->map, &len)) {
    free(cache->map);
    free(cache->size);
    free(cache->type);
    return -1;
}
return 0;

#define MAX_CACHES 2000
+#define MAX_CACHES (MAX_NR_CPUS * 4)

static int write_cache(struct feat_fd *ff, struct perf_evlist *evlist __maybe_unused)
{
    int cpu_nr = ff->ph->env.nr_cpus_avail;
    u64 size = 0;
    struct perf_header *ph = ff->ph;
    bool do_core_id_test = true;

    ph->env.cpu = calloc(cpu_nr, sizeof(*ph->env.cpu));
    if (!ph->env.cpu)
        goto free_cpu;

    /* On s390 the socket_id number is not related to the numbers of cpus.
     * The socket_id number might be higher than the numbers of cpus.
     * This depends on the configuration.
     * AArch64 is the same.
     */
    if (ph->env.arch && (!strncmp(ph->env.arch, "s390", 4)
            || !strncmp(ph->env.arch, "aarch64", 7)))
        do_core_id_test = false;
    for (i = 0; i < (u32)cpu_nr; i++) {
        if (do_read_u32(ff, &nr))
            goto free_cpu;
        if (do_core_id_test && nr != (u32)-1 && nr > (u32)cpu_nr) {
            pr_debug("socket_id number is too big.
" "You may need to upgrade the perf tool.
");
            goto free_cpu;
        }
    }
    return 0;
}
goto free_cpu;
@@ -2201,7 +2211,7 @@
 FEAT_OPR(NUMA_TOPOLOGY,numa_topology,true),
 FEAT_OPR(BRANCH_STACK,branch_stack,false),
 FEAT_OPR(PMU_MAPPINGS,pmu_mappings,false),
 FEAT_OPN(GROUP_DESC,group_desc,false),
 +FEAT_OPR(GROUP_DESC,group_desc,false),
 FEAT_OPN(AUXTRACE,auxtrace,false),
 FEAT_OPN(STAT,stat,false),
 FEAT_OPN(CACHE,cache,true),
@@ -2251,6 +2261,7 @@
 struct perf_header *header = &session->header;
 int fd = perf_data__fd(session->data);
 struct stat st;
 +time_t stctime;
 int ret, bit;

 hd.fp = fp;
@@ -2260,7 +2271,8 @@
 if (ret == -1)
 return -1;

 -fprintf(fp, "# captured on: %s", ctime(&st.st_ctime));
 +stctime = st.st_ctime;
 +fprintf(fp, "# captured on: %s", ctime(&stctime));

 perf_header__process_sections(header, fd, &hd,
 perf_file_section__fprintf_info);
@@ -2893,6 +2905,13 @@
} {

 +if (f_header.attr_size == 0) {
 +pr_err("ERROR: The %s file's attr size field is 0 which is unexpected.\n"
 + "Was the 'perf record' command properly terminated?\n",
 + data->file.path);
 +return -EINVAL;
 +}
 +
 +nr_attrs = f_header.attrs.size / f_header.attr_size;
lseek(fd, f_header.attrs.offset, SEEK_SET);

@@ -2975,7 +2994,7 @@
 size += sizeof(struct perf_event_header);
 size += ids * sizeof(u64);

 -ev = malloc(size);
 +ev = zalloc(size);
if (ev == NULL)
return -ENOMEM;
@@ -3064,7 +3083,7 @@
pr_warning("invalid record type %d in pipe-mode\n", type);
return 0;
}
-if (feat == HEADER_RESERVED || feat > HEADER_LAST_FEATURE) {
+if (feat == HEADER_RESERVED || feat >= HEADER_LAST_FEATURE) {
pr_warning("invalid record type %d in pipe-mode\n", type);
return -1;
}
@@ -3073,7 +3092,7 @@
return 0;

ff.buf  = (void *)fe->data;
-ff.size = event->header.size - sizeof(event->header);
+ff.size = event->header.size - sizeof(*fe);
ff.ph = &session->header;

if (feat_ops[feat].process(&ff, NULL))
@@ -3124,7 +3143,7 @@
if (ev == NULL)
return -ENOMEM;

-strncpy(ev->data, evsel->unit, size);
+strlcpy(ev->data, evsel->unit, size + 1);
err = process(tool, (union perf_event *)ev, NULL, NULL);
free(ev);
return err;
@@ -3163,7 +3182,7 @@
if (ev == NULL)
return -ENOMEM;

-strncpy(ev->data, evsel->name, len);
+strlcpy(ev->data, evsel->name, len + 1);
err = process(tool, (union perf_event *)ev, NULL, NULL);
free(ev);
return err;
--- linux-4.15.0.orig/tools/perf/util/header.h
+++ linux-4.15.0/tools/perf/util/header.h
@@ -9,6 +9,7 @@
#include <linux/types.h>
#include "event.h"
#include "env.h"
+#include "pmu.h"

enum {
int get_cpuid(char *buffer, size_t sz);

char *get_cpuid_str(void);

@endif /* __PERF_HEADER_H */
--- linux-4.15.0.orig/tools/perf/util/hist.c
+++ linux-4.15.0/tools/perf/util/hist.c
@@ -166,5 +167,5 @@
*/

int get_cpuid(char *buffer, size_t sz);

char *get_cpuid_str(void);
@endif /* __PERF_HEADER_H */
--- linux-4.15.0.orig/tools/perf/util/hist.c
+++ linux-4.15.0/tools/perf/util/hist.c
@@ -879,7 +879,7 @@
* cumulated only one time to prevent entries more than 100%
* overhead.
*/
-he_cache = malloc(sizeof(*he_cache) * (iter->max_stack + 1));
+he_cache = malloc(sizeof(*he_cache) * (callchain_cursor.nr + 1));
if (he_cache == NULL)
    return -ENOMEM;

@@ -1042,10 +1042,10 @@

err = sample__resolve_callchain(iter->sample, &callchain_cursor, &iter->parent,
iter->evsel, al, max_stack_depth);
-    if (err)
+    if (err) {
+     map__put(alm);
        return err;
    -
-    iter->max_stack = max_stack_depth;
+    }

err = iter->ops->prepare_entry(iter, al);
if (err)
@@ -1501,7 +1501,7 @@
    return 0;
}

-static int hist_entry__sort(struct hist_entry *a, struct hist_entry *b)
+static int64_t hist_entry__sort(struct hist_entry *a, struct hist_entry *b)
{
    struct hists *hists = a->hists;
    struct perf_hpp_fmt *fmt;
    --- linux-4.15.0.orig/tools/perf/util/hist.h
+++ linux-4.15.0/tools/perf/util/hist.h
@@ -107,7 +107,6 @@
    int curr;

    bool hide_unresolved;
-int max_stack;

struct perf_evsel *evsel;
struct perf_sample *sample;
@@ -318,10 +317,10 @@
 list_for_each_entry_safe(format, tmp, &(_list)->sorts, sort_list)

#define hists__for_each_format(hists, format) \  
-perf_hpp_list__for_each_format((hists)->hpp_list, fmt)  
+perf_hpp_list__for_each_format((hists)->hpp_list, format)

#define hists__for_each_sort_list(hists, format) \  
-perf_hpp_list__for_each_sort_list((hists)->hpp_list, fmt)  
+perf_hpp_list__for_each_sort_list((hists)->hpp_list, format)

extern struct perf_hpp_fmt perf_hpp__format[];

--- linux-4.15.0.orig/tools/perf/util/intel-pt-decoder/insn.h
+++ linux-4.15.0/tools/perf/util/intel-pt-decoder/insn.h
@@ -208,4 +208,19 @@
 return insn_offset_displacement(insn) + insn->displacement.nbytes;
 }

+/**
+ * for_each_insn_prefix() -- Iterate prefixes in the instruction
+ * @insn: Pointer to struct insn.
+ * @idx: Index storage.
+ * @prefix: Prefix byte.
+ */
+#define for_each_insn_prefix(insn, idx, prefix)	+	for (idx = 0; idx < ARRAY_SIZE(insn->prefixes.bytes) && (prefix = insn->prefixes.bytes[idx]) != 0; idx++)
+
#endif /* _ASM_X86_INSN_H */

--- linux-4.15.0.orig/tools/perf/util/intel-pt-decoder/intel-pt-decoder.c
+++ linux-4.15.0/tools/perf/util/intel-pt-decoder/intel-pt-decoder.c
@@ -26,6 +26,7 @@
 #include <string.h>
 #include <stdio.h>
 #include <stdlib.h>
+include <../auxtrace.h>

#include "../cache.h"
#include "../util.h"
+include "../auxtrace.h"

#include "intel-pt-insn-decoder.h"
#include "intel-pt-pkt-decoder.h"
@@ -57,6 +58,7 @@
 INTEL_PT_STATE_NO_IP,
 INTEL_PT_STATE_ERR_RESYNC,
 INTEL_PT_STATE_IN_SYNC,
+INTEL_PT_STATE_TNT_CONT,
 INTEL_PT_STATE_TNT,
 INTEL_PT_STATE_TIP,
 INTEL_PT_STATE_TIP_PGD,
@@ -71,8 +73,9 @@
case INTEL_PT_STATE_NO_IP:
case INTEL_PT_STATE_ERR_RESYNC:
case INTEL_PT_STATE_IN_SYNC:
-case INTEL_PT_STATE_TNT:
+case INTEL_PT_STATE_TNT_CONT:
    return true;
+case INTEL_PT_STATE_TNT:
    case INTEL_PT_STATE_TIP:
    case INTEL_PT_STATE_TIP_PGD:
    case INTEL_PT_STATE_FUP:
@@ -113,6 +116,7 @@
    bool have_cyc;
    bool fixup_last_mtc;
    bool have_last_ip;
+    enum intel_pt_param_flags flags;
    uint64_t pos;
    uint64_t last_ip;
    uint64_t ip;
@@ -226,6 +230,8 @@
    decoder->return_compression = params->return_compression;
    decoder->branch_enable      = params->branch_enable;

+    decoder->flags              = params->flags;
+    decoder->period             = params->period;
    decoder->period_type        = params->period_type;
@@ -247,19 +253,15 @@
    if (!(decoder->tsc_ctc_ratio_n % decoder->tsc_ctc_ratio_d))
    decoder->tsc_ctc_mult = decoder->tsc_ctc_ratio_n /
 decoder->tsc_ctc_ratio_d;
-/*
- * Allow for timestamps appearing to backwards because a TSC
- * packet has slipped past a MTC packet, so allow 2 MTC ticks
- * or ...
- */
-decoder->tsc_slip = multdiv(2 << decoder->mtc_shift,
-decoder->tsc_ctc_ratio_n,
-decoder->tsc_ctc_ratio_d);
}
/* ... or 0x100 paranoia */
-if (decoder->tsc_slip < 0x100)
-decoder->tsc_slip = 0x100;
+
+/*
+ * A TSC packet can slip past MTC packets so that the timestamp appears
+ * to go backwards. One estimate is that can be up to about 40 CPU
+ * cycles, which is certainly less than 0x1000 TSC ticks, but accept
+ * slippage an order of magnitude more to be on the safe side.
+ */
+decoder->tsc_slip = 0x10000;

intel_pt_log("timestamp: mtc_shift %u\n", decoder->mtc_shift);
intel_pt_log("timestamp: tsc_ctc_ratio_n %u\n", decoder->tsc_ctc_ratio_n);
@@ -888,16 +890,20 @@
timestamp = decoder->timestamp + decoder->timestamp_insn_cnt;
masked_timestamp = timestamp & decoder->period_mask;
if (decoder->continuous_period) {
-\t\tif (masked_timestamp != decoder->last_masked_timestamp)
+\t\tif (masked_timestamp > decoder->last_masked_timestamp)
\t\t\treturn 1;
\t\} else {
\t\tif (masked_timestamp < decoder->last_masked_timestamp)
\t\t\treturn decoder->period_ticks;
\t\t}
\t}
\t+
+return decoder->period_ticks - (timestamp - masked_timestamp);
}

@@ -926,7 +932,10 @@
case INTEL_PT_PERIOD_TICKS:
timestamp = decoder->timestamp + decoder->timestamp_insn_cnt;
masked_timestamp = timestamp & decoder->period_mask;
-decoder->last_masked_timestamp = masked_timestamp;
+if (masked_timestamp > decoder->last_masked_timestamp)
+decoder->last_masked_timestamp = masked_timestamp;
+else
+decoder->last_masked_timestamp += decoder->period_ticks;
break;
case INTEL_PT_PERIOD_NONE:
case INTEL_PT_PERIOD_MTC:
@@ -1054,6 +1063,8 @@
decoder->set_fup_tx_flags = false;
decoder->tx_flags = decoder->fup_tx_flags;
decoder->state.type = INTEL_PT_TRANSACTION;
+if (decoder->fup_tx_flags & INTEL_PT_ABORT_TX)
+decoder->state.type |= INTEL_PT_BRANCH;
decoder->state.from_ip = decoder->ip;
decoder->state.to_ip = 0;
decoder->state.flags = decoder->fup_tx_flags;
@@ -1097,6 +1108,15 @@
return ret;
}

+static inline bool intel_pt_fup_with_nlip(struct intel_pt_decoder *decoder,
+       struct intel_pt_insn *intel_pt_insn,
+       uint64_t ip, int err)
+{
+    return decoder->flags & INTEL_PT_FUP_WITH_NLIP && !err &&
+        intel_pt_insn->branch == INTEL_PT_BR_INDIRECT &&
+        ip == decoder->ip + intel_pt_insn->length;
+}
+
+static int intel_pt_walk_fup(struct intel_pt_decoder *decoder)
{
    struct intel_pt_insn intel_pt_insn;
    @@ -1109,10 +1129,14 @@
    err = intel_pt_walk_insn(decoder, &intel_pt_insn, ip);
    if (err == INTEL_PT_RETURN)
        return 0;
-    if (err == -EAGAIN) {
-        if (intel_pt_fup_event(decoder))
+    if (err == -EAGAIN ||
+        intel_pt_fup_with_nlip(decoder, &intel_pt_insn, ip, err)) {
+        bool no_tip = decoder->pkt_state != INTEL_PT_STATE_FUP;
+        +decoder->pkt_state = INTEL_PT_STATE_IN_SYNC;
+        if (intel_pt_fup_event(decoder) && no_tip)
            return 0;
-        return -EAGAIN;
+        return -EAGAIN;
    }
    decoder->set_fup_tx_flags = false;
    if (err)
@@ -1239,7 +1263,9 @@
return -ENOENT;
}
decoder->tnt.count -= 1;
-if (!decoder->tnt.count)
+if (decoder->tnt.count)
+decoder->pkt_state = INTEL_PT_STATE_TNT_CONT;
+else
decoder->pkt_state = INTEL_PT_STATE_IN_SYNC;
decoder->tnt.payload <<= 1;
decoder->state.from_ip = decoder->ip;
@@ -1270,7 +1296,9 @@
      	if (!decoder->tnt.count)
+      			if (decoder->tnt.count)
+      				decoder->pkt_state = INTEL_PT_STATE_TNT_CONT;
+      			else
decoder->pkt_state = INTEL_PT_STATE_IN_SYNC;
if (decoder->tnt.payload & BIT63) {
    decoder->tnt.payload <<= 1;
@@ -1290,8 +1318,11 @@
      	return 0;
    }
decoder->ip += intel_pt_insn.length;
-if (!decoder->tnt.count)
+if (!decoder->tnt.count)
+      	decoder->sample_timestamp = decoder->timestamp;
+      	decoder->sample_insn_cnt = decoder->timestamp_insn_cnt;
return -EAGAIN;
+}
decoder->tnt.payload <<= 1;
continue;
}
@@ -1376,8 +1407,9 @@
{
    intel_pt_log("ERROR: Buffer overflow\n");
    intel_pt_clear_tx_flags(decoder);
-case INTEL_PT_Cyc:
    +intel_pt_calc_cyc_timestamp(decoder);
    break;
    

break;
+
case INTEL_PT_VMCS:
case INTEL_PT_MNT:
case INTEL_PT_PAD:
@@ -1603,7 +1635,6 @@
case INTEL_PT_PSB:
case INTEL_PT_TSC:
case INTEL_PT_TMA:
- case INTEL_PT_CBR:
case INTEL_PT_MODE_TSX:
case INTEL_PT_BAD:
case INTEL_PT_PSBEND:
@@ -1618,6 +1649,10 @@
decoder->pkt_state = INTEL_PT_STATE_ERR3;
return -ENOENT;
+
+ case INTEL_PT_CBR:
+ intel_pt_calc_cbr(decoder);
+ break;
+
+ case INTEL_PT_OVF:
return intel_pt_overflow(decoder);

@@ -1751,17 +1786,13 @@
}
if (decoder->set_fup_mwait)
  no_tip = true;
+if (no_tip)
  +decoder->pkt_state = INTEL_PT_STATE_FUP_NO_TIP;
+else
  +decoder->pkt_state = INTEL_PT_STATE_FUP;
err = intel_pt_walk_fup(decoder);
- if (err != -EAGAIN) {
- if (err)
- return err;
- if (no_tip)
- decoder->pkt_state =
- INTEL_PT_STATE_FUP_NO_TIP;
- else
- decoder->pkt_state = INTEL_PT_STATE_FUP;
- return 0;
- }
+ if (err != -EAGAIN)
+ return err;
if (no_tip) {
  no_tip = false;
break;
err = intel_pt_walk_trace(decoder); break;
case INTEL_PT_STATE_TNT:
  case INTEL_PT_STATE_TNT_CONT:
    err = intel_pt_walk_tnt(decoder); if (err == -EAGAIN)
      err = intel_pt_walk_trace(decoder);
    @ @ -2345,15 +2377,11 @@
    err = intel_pt_walk_tip(decoder); break;
case INTEL_PT_STATE_FUP:
  -decoder->pkt_state = INTEL_PT_STATE_IN_SYNC;
  err = intel_pt_walk_fup(decoder);
  if (err == -EAGAIN)
    err = intel_pt_walk_fup_tip(decoder);
  -else if (!err)
    -decoder->pkt_state = INTEL_PT_STATE_FUP;
    break;
case INTEL_PT_STATE_FUP_NO_TIP:
  -decoder->pkt_state = INTEL_PT_STATE_IN_SYNC;
  err = intel_pt_walk_fup(decoder);
  if (err == -EAGAIN)
    err = intel_pt_walk_trace(decoder);
  @@ -2390,14 +2418,6 @@ return &decoder->state;
  }

-static bool intel_pt_at_psb(unsigned char *buf, size_t len)
  { -
    -if (len < INTEL_PT_PSB_LEN)
      return false;
    -return memmem(buf, INTEL_PT_PSB_LEN, INTEL_PT_PSB_STR,
      -INTEL_PT_PSB_LEN);
    -}
    -
    /**
    * intel_pt_next_psb - move buffer pointer to the start of the next PSB packet.
    * @buf: pointer to buffer pointer
    @ @ -2486,6 +2506,7 @@
    * @buf: buffer
    * @len: size of buffer
    * @tsc: TSC value returned
    + * @rem: returns remaining size when TSC is found
    * 
    * Find a TSC packet in @buf and return the TSC value. This function assumes
    * that @buf starts at a PSB and that PSB+ will contain TSC and so stops if a
    @ @ -2493,7 +2514,8 @@
static bool intel_pt_next_tsc(unsigned char *buf, size_t len, uint64_t *tsc)
{
    struct intel_pt_pkt packet;
    int ret;
    return false;
    if (packet.type == INTEL_PT_TSC) {
        *tsc = packet.payload;
        *rem = len;
        return true;
    }
    if (packet.type == INTEL_PT_PSBEND)
    return true;
}

#define MAX_PADDING (PERF_AUXTRACE_RECORD_ALIGNMENT - 1)

static unsigned char *adj_for_padding(unsigned char *buf_b, unsigned char *buf_a, size_t len_a)
{
    unsigned char *p = buf_b - MAX_PADDING;
    unsigned char *q = buf_a + len_a - MAX_PADDING;
    int i;

    for (i = MAX_PADDING; i; i--, p++, q++) {
        if (*p != *q)
            break;
    }
    return p;
}
/**
 * intel_pt_find_overlap_tsc - determine start of non-overlapped trace data
 * using TSC.
 * @len_a: size of first buffer
 * @buf_b: second buffer
 * @len_b: size of second buffer
 * @consecutive: returns true if there is data in buf_b that is consecutive
 * @consecutive: returns true if there is data in buf_b that is consecutive
 * @consecutive: returns true if there is data in buf_b that is consecutive
 * @consecutive: returns true if there is data in buf_b that is consecutive
 * If the trace contains TSC we can look at the last TSC of @buf_a and the
 * first TSC of @buf_b in order to determine if the buffers overlap, and then
 * static unsigned char *intel_pt_find_overlap_tsc(unsigned char *buf_a,
 * size_t len_a,
 * unsigned char *buf_b,
 * size_t len_b)
 * +size_t len_b, bool *consecutive)
 * {
 * uint64_t tsc_a, tsc_b;
 * unsigned char *p;
 * -size_t len;
 * +size_t len, rem_a, rem_b;
 *
 * p = intel_pt_last_psb(buf_a, len_a);
 * if (!p)
 * return buf_b; /* No PSB in buf_a => no overlap */
 *
 * len = len_a - (p - buf_a);
 * -if (!intel_pt_next_tsc(p, len, &tsc_a)) {
 * +if (!intel_pt_next_tsc(p, len, &tsc_a, &rem_a)) {
 * /* The last PSB+ in buf_a is incomplete, so go back one more */
 * len_a -= len;
 * p = intel_pt_last_psb(buf_a, len_a);
 * if (!p)
 * return buf_b; /* No full PSB+ => assume no overlap */
 * len = len_a - (p - buf_a);
 * -if (!intel_pt_next_tsc(p, len, &tsc_a))
 * +if (!intel_pt_next_tsc(p, len, &tsc_a, &rem_a))
 * return buf_b; /* No TSC in buf_a => assume no overlap */
 * }
 *
 * while (1) {
 * /* Ignore PSB+ with no TSC */
 * -if (intel_pt_next_tsc(buf_b, len_b, &tsc_b) &&
 * - intel_pt_tsc_cmp(tsc_a, tsc_b) < 0)
 * -return buf_b; /* tsc_a < tsc_b => no overlap */
 * }
 */
if (intel_pt_next_tsc(buf_b, len_b, &tsc_b, &rem_b)) {  
  int cmp = intel_pt_tsc_cmp(tsc_a, tsc_b);  
  /* Same TSC, so buffers are consecutive */  
  if (!cmp & rem_b >= rem_a) {  
    unsigned char *start;  
    *consecutive = true;  
    start = buf_b + len_b - (rem_b - rem_a);  
    return adj_for_padding(start, buf_a, len_a);  
  }  
  if (cmp < 0)  
    return buf_b; /* tsc_a < tsc_b => no overlap */  
}  

if (!intel_pt_step_psb(&buf_b, &len_b))  
  return buf_b + len_b; /* No PSB in buf_b => no data */  
@@ -2606,6 +2670,8 @@  *
* @buf_b: second buffer  
* @len_b: size of second buffer  
* @have_tsc: can use TSC packets to detect overlap  
+ * @consecutive: returns true if there is data in buf_b that is consecutive  
+ * to buf_a  
+  
* When trace samples or snapshots are recorded there is the possibility that  
* the data overlaps. Note that, for the purposes of decoding, data is only  
@@ -2616,7 +2682,7 @@  *
*/  
unsigned char *intel_pt_find_overlap(unsigned char *buf_a, size_t len_a,  
  unsigned char *buf_b, size_t len_b,  
  -   bool have_tsc)  
+   bool have_tsc, bool *consecutive)  
{  
  unsigned char *found;  
  
@@ -2628,7 +2694,8 @@  
  return buf_b; /* No overlap */  

  if (have_tsc) {  
    -found = intel_pt_find_overlap_tsc(buf_a, len_a, buf_b, len_b);  
+found = intel_pt_find_overlap_tsc(buf_a, len_a, buf_b, len_b,  
+   consecutive);  
  if (found)  
    return found;  
  }  
@@ -2643,28 +2710,16 @@  
  }  
}
/* Now len_b >= len_a */
-if (len_b > len_a) {
  /* The leftover buffer 'b' must start at a PSB */
  -while (!intel_pt_at_psb(buf_b + len_a, len_b - len_a)) {
    -if (!intel_pt_step_psb(&buf_a, &len_a))
      -return buf_b; /* No overlap */
  -}
  -}

  while (1) {
  /* Potential overlap so check the bytes */
  found = memmem(buf_a, len_a, buf_b, len_a);
  -if (found)
    -return buf_b + len_a;
  +if (found) {
    +*consecutive = true;
    +return adj_for_padding(buf_b + len_a, buf_a, len_a);
  +}

  /* Try again at next PSB in buffer 'a' */
  if (!intel_pt_step_psb(&buf_a, &len_a))
    return buf_b; /* No overlap */
  
  /* The leftover buffer 'b' must start at a PSB */
  -while (!intel_pt_at_psb(buf_b + len_a, len_b - len_a)) {
    -if (!intel_pt_step_psb(&buf_a, &len_a))
      -return buf_b; /* No overlap */
  -}
  }

--- linux-4.15.0.orig/tools/perf/util/intel-pt-decoder/intel-pt-decoder.h
+++ linux-4.15.0/tools/perf/util/intel-pt-decoder/intel-pt-decoder.h
@@ -60,6 +60,14 @@
INTEL_PT_ERR_MAX,

+enum intel_pt_param_flags {
  +/*
  + * FUP packet can contain next linear instruction pointer instead of
  + * current linear instruction pointer.
  + */
  +INTEL_PT_FUP_WITH_NLIP	= 1 << 0,
  +}
  +}

+struct intel_pt_state {
  +enum intel_pt_sample_type type;
  +int err;
  @ @ -106,6 +114,7 @@
unsigned int mtc_period;
uint32_t tsc_ctc_ratio_n;
uint32_t tsc_ctc_ratio_d;
+enum intel_pt_param_flags flags;
};

struct intel_pt_decoder;
@@ -117,7 +126,7 @@
unsigned char *intel_pt_find_overlap(unsigned char *buf_a, size_t len_a,
               unsigned char *buf_b, size_t len_b,
-      bool have_tsc);
+      bool have_tsc, bool *consecutive);

int intel_pt_strerror(int code, char *buf, size_t buflen);
--- linux-4.15.0.orig/tools/perf/util/intel-pt-decoder/intel-pt-pkt-decoder.c
+++ linux-4.15.0/tools/perf/util/intel-pt-decoder/intel-pt-pkt-decoder.c
@@ -366,7 +366,7 @@
   if (len < offs)
 return INTEL_PT_NEED_MORE_BYTES;
 byte = buf[offs++];
-   payload |= (byte >> 1) << shift;
+   payload |= ((uint64_t)byte >> 1) << shift;
 }

 packet->type = INTEL_PT_CYC;
--- linux-4.15.0.orig/tools/perf/util/intel-pt.c
+++ linux-4.15.0/tools/perf/util/intel-pt.c
@@ -209,14 +209,17 @@
 static int intel_pt_do_fix_overlap(struct intel_pt *pt, struct auxtrace_buffer *a,
               struct auxtrace_buffer *b)
 { 
+   bool consecutive = false;
   void *start;

   start = intel_pt_find_overlap(a->data, a->size, b->data, b->size,
-      pt->have_tsc);
+      pt->have_tsc, &consecutive);
   if (!start)
 return -EINVAL;
   b->use_size = b->data + b->size - start;
   b->use_data = start;
+   if (b->use_size && consecutive)
+   b->consecutive = true;
   return 0;
 }
@@ -531,8 +534,10 @@
  
 -if (to_ip && *ip == to_ip)
 +if (to_ip && *ip == to_ip) {
   +intel_pt_insn->length = 0;
   goto out_no_cache;
 +}

 if (*ip >= al.map->end)
 break;
@@ -780,6 +785,7 @@
 unsigned int queue_nr)
 {
 struct intel_pt_params params = { .get_trace = 0, }; 
+struct perf_env *env = pt->machine->env;
 struct intel_pt_queue *ptq;

 ptq = zalloc(sizeof(struct intel_pt_queue));
@@ -861,6 +867,9 @@
 } 
 } 

+if (env->cpuid && !strncmp(env->cpuid, "GenuineIntel,6,92," , 18))
+params.flags |= INTEL_PT_FUP_WITH_NLIP;
 +
 ptq->decoder = intel_pt_decoder_new(&params);
 if (!ptq->decoder)
 goto out_free;
@@ -898,6 +907,8 @@
 if (queue->tid == -1 || pt->have_sched_switch) {
 ptq->tid = machine__get_current_tid(pt->machine, ptq->cpu);
 +if (ptq->tid == -1)
 +ptq->pid = -1;
 thread__zput(ptq->thread);
 } 

@@ -913,6 +924,7 @@
 static void intel_pt_sample_flags(struct intel_pt_queue *ptq)
 {
   +ptq->insn_len = 0;
 if (ptq->state->flags & INTEL_PT_ABORT_TX) {
   ptq->flags = PERF_IP_FLAG_BRANCH | PERF_IP_FLAG_TX_ABORT;
 } else if (ptq->state->flags & INTEL_PT_ASYNC) {
@@ -1554,6 +1566,7 @@

if (intel_pt_is_switch_ip(ptq, state->to_ip)) {
    switch (ptq->switch_state) {
        case INTEL_PT_SS_NOT_TRACING:
        case INTEL_PT_SS_UNKNOWN:
        case INTEL_PT_SS_EXPECTING_SWITCH_IP:
            err = intel_pt_next_tid(pt, ptq);
            @@ -1922,10 +1935,8 @@
            tid = sample->tid;
        }
    -if (tid == -1) {
        -pr_err("context_switch event has no tid\n");
        -return -EINVAL;
        -}
    +if (tid == -1)
        +intel_pt_log("context_switch event has no tid\n");

    intel_pt_log("context_switch: cpu %d pid %d tid %d time %"PRIu64" tsc %"PRIx64"\n",
        cpu, pid, tid, sample->time, perf_time_to_tsc(sample->time,
        @@ -2519,6 +2530,8 @@
    }

    pt->timeless_decoding = intel_pt_timeless_decoding(pt);
    +if (pt->timeless_decoding && !pt->tc.time_mult)
    +pt->tc.time_mult = 1;
    pt->have_tsc = intel_pt_have_tsc(pt);
    pt->sampling_mode = false;
    pt->est_tsc = !pt->timeless_decoding;
    --- linux-4.15.0.orig/tools/perf/util/jitdump.c
    +++ linux-4.15.0/tools/perf/util/jitdump.c
    @@ -394,7 +394,7 @@
    return -1;
    filename = event->mmap2.filename;
    -size = snprintf(filename, PATH_MAX, "%s/jitted-%d-%u.so",
    +size = snprintf(filename, PATH_MAX, "%s/jitted-%d-%" PRIu64 ".so",
    jd->dir,
    pid,
count);
@@ -530,7 +530,7 @@
return -1;

filename = event->mmap2.filename;
-size = snprintf(filename, PATH_MAX, "%s/jitted-%d-%"PRIu64,
+size = snprintf(filename, PATH_MAX, "%s/jitted-%d-%"PRIu64 "so",
    jd->dir,
    pid,
    jr->move.code_index);
--- linux-4.15.0.orig/tools/perf/util/llvm-utils.c
+++ linux-4.15.0/tools/perf/util/llvm-utils.c
@@ -225,14 +225,14 @@
 const char *prefix_dir = "";
 const char *suffix_dir = "";

+/* _UTSNAME_LENGTH is 65 */
+char release[128];
+
 char *autoconf_path;

 int err;

 if (!test_dir) {
-/* _UTSNAME_LENGTH is 65 */
-#char release[128];
-
 err = fetch_kernel_version(NULL, release,
    sizeof(release));
 if (err)
 @@ -265,16 +265,16 @@
 "#!/usr/bin/env sh"
 "if ! test -d "$KBUILD_DIR"
 then\n"
-"exit -1\n"
+"exit 1\n"
 "fi\n"
 "if ! test -f "$KBUILD_DIR/include/generated/autoconf.h"
 then\n"
-"exit -1\n"
+"exit 1\n"
 "fi\n"
 "TMPDIR=`mktemp -d`
 if test -z "$TMPDIR"
 then\n"
-"exit -1\n"
+"exit 1\n"
 "fi\n"
"cat << EOF > $TMPDIR/Makefile
'obj-y := dummy.o"
--- linux-4.15.0.orig/tools/perf/util/lzma.c
+++ linux-4.15.0/tools/perf/util/lzma.c
@@ -64,7 +64,7 @@
  if (ferror(infile)) {
    pr_err("lzma: read error: %s\n", strerror(errno));
    -goto err_fclose;
+    goto err_lzma_end;
  }

  if (feof(infile))
@@ -78,7 +78,7 @@
  if (writen(output_fd, buf_out, write_size) != write_size) {
    pr_err("lzma: write error: %s\n", strerror(errno));
    -goto err_fclose;
+    goto err_lzma_end;
  }

  strm.next_out = buf_out;
@@ -90,11 +90,13 @@
  break;

  pr_err("lzma: failed %s\n", lzma_strerror(ret));
    -goto err_fclose;
+    goto err_lzma_end;
  }
  }

  err = 0;
+err_lzma_end:
+  lzma_end(&strm);
  err_fclose:
    fclose(infile);
  return err;
--- linux-4.15.0.orig/tools/perf/util/machine.c
+++ linux-4.15.0/tools/perf/util/machine.c
@@ -634,24 +634,6 @@
  return 0;
}

-static void dso__adjust_kmod_long_name(struct dso *dso, const char *filename)
-{
-  const char *dup_filename;
-  if (!filename || !dso || !dso->long_name)
-return;
-if (dso->long_name[0] != '[')
-return;
-if (!strchr(filename, '/'))
-return;
-
dup_filename = strdup(filename);
-if (!dup_filename)
-return;
-
-dso__set_long_name(dso, dup_filename, true);
-
struct map *machine__findnew_module_map(struct machine *machine, u64 start,
const char *filename)
{
    map = map_groups__find_by_name(&machine->kmaps, MAP__FUNCTION,
        m.name);
    -if (map) {
        /*
        * If the map's dso is an offline module, give dso__load()
        * a chance to find the file path of that module by fixing
        * long_name.
        * /
        -dso__adjust_kmod_long_name(map->dso, filename);
        +if (map)
            goto out;
    -}

dso = machine__findnew_module_dso(machine, &m, filename);
    if (dso == NULL)
        return 0;
    }

    /* Kernel-space maps for symbols that are outside the main kernel map and module maps */
+struct extra_kernel_map {
    +u64 start;
    +u64 end;
    +u64 pgoff;
    +};
+static int machine__create_extra_kernel_map(struct machine *machine,
    + struct dso *kernel,
    + struct extra_kernel_map *xm)
    +{
+struct kmap *kmap;
+struct map *map;
+
+map = map__new2(xm->start, kernel, MAP__FUNCTION);
+if (!map)
+    return -1;
+
+map->end   = xm->end;
+map->pgoff = xm->pgoff;
+
+kmap = map__kmap(map);
+
+kmap->kmaps = &machine->kmaps;
+
+map_groups__insert(&machine->kmaps, map);
+
+pr_debug2("Added extra kernel map %" PRIx64 "-%" PRIx64 "un",
+     map->start, map->end);
+
+map__put(map);
+
+return 0;
+
+}
+
+static u64 find_entry_trampoline(struct dso *dso)
+{
+    /* Duplicates are removed so lookup all aliases */
+    const char *syms[] = {
+        "_entry_trampoline",
+        "__entry_trampoline_start",
+        "entry_SYSCALL_64_trampoline",
+    };
+
+    struct symbol *sym = dso__first_symbol(dso, MAP__FUNCTION);
+    unsigned int i;
+
+    for (; sym; sym = dso__next_symbol(sym)) {
+        if (sym->binding != STB_GLOBAL)
+            continue;
+
+        for (i = 0; i < ARRAY_SIZE(syms); i++) {
+            if (!strcmp(sym->name, syms[i]))
+                return sym->start;
+        }
+
+    }
+
+    return 0;
+}
+
+/*
+ * These values can be used for kernels that do not have symbols for the entry
+ * trampolines in kallsyms.
+ */
+#define X86_64_CPU_ENTRY_AREA_PER_CPU0xfffffe0000000000ULL
+#define X86_64_CPU_ENTRY_AREA_SIZE0x2c000
+#define X86_64_ENTRY_TRAMPOLINE0x6000
+
+/* Map x86_64 PTI entry trampolines */
+int machine__map_x86_64_entry_trampoline(struct machine *machine,
+ struct dso *kernel)
+{
+u64 pgoff = find_entry_trampoline(kernel);
+int nr_cpus avail, cpu;
+
+if (!pgoff)
+return 0;
+
+nr_cpus avail = machine__nr_cpus_avail(machine);
+
+/* Add a 1 page map for each CPU's entry trampoline */
+for (cpu = 0; cpu < nr_cpus avail; cpu++) {
+u64 va = X86_64_CPU_ENTRY_AREA_PER_CPU +
+ cpu * X86_64_CPU_ENTRY_AREA_SIZE +
+ X86_64_ENTRY_TRAMPOLINE;
+struct extra_kernel_map xm = {
+.start = va,
+.end = va + page_size,
+.pgoff = pgoff,
+};
+
+if (machine__create_extra_kernel_map(machine, kernel, &xm) < 0)
+return -1;
+}
+
+return 0;
+
+int __machine__create_kernel_maps(struct machine *machine, struct dso *kernel)
{    
int type;
@@ -1165,6 +1236,7 @@    
return map_groups__set_modules_path_dir(&machine->kmaps, modules_path, 0);
}
int __weak arch__fix_module_text_start(u64 *start __maybe_unused,
+u64 *size __maybe_unused,
const char *name __maybe_unused)
{    
return 0;

@@ -1176,7 +1248,7 @@
        struct machine *machine = arg;
        struct map *map;

        -if (arch__fix_module_text_start(&start, name) < 0)
        +if (arch__fix_module_text_start(&start, &size, name) < 0)
             return -1;

             map = machine__findnew_module_map(machine, start, name);
@@ -1756,6 +1828,7 @@
        al.filtered = 0;
        al.sym = NULL;
        +al.srcline = NULL;
        if (!cpumode) {
            thread__find_cpumode_addr_location(thread, MAP__FUNCTION,
                ip, &al);
@@ -1837,7 +1910,7 @@
            int i;

            -iter->nr_loop_iter = nr;
            +iter->nr_loop_iter++;
            iter->cycles = 0;

            for (i = 0; i < nr; i++)
@@ -2135,7 +2208,8 @@
                if (!symbol_conf.inline_name || !map || !sym)
                    return ret;

                -addr = map__rip_2objdump(map, ip);
                +addr = map__map_ip(map, ip);
                +addr = map__rip_2objdump(map, addr);

                inline_node = inlines__tree_find(&map->dso->inlined_nodes, addr);
                if (!inline_node) {
@@ -2161,6 +2243,14 @@
                    struct callchain_cursor *cursor = arg;
                    const char *srcline = NULL;
                    +u64 addr = entry->ip;

                    if (symbol_conf.hide_unresolved && entry->sym == NULL)
                        return 0;
@@ -2168,7 +2243,14 @@
                        if (append_inlines(cursor, entry->map, entry->sym, entry->ip) == 0)
                            return 0;
-srcline = callchain_srcline(entry->map, entry->sym, entry->ip);
+/
+ * Convert entry->ip from a virtual address to an offset in
+ * its corresponding binary.
+ */
+if (entry->map)
+addr = map__map_ip(entry->map, entry->ip);
+
+srcline = callchain_srcline(entry->map, entry->sym, addr);
return callchain_cursor_append(cursor, entry->ip,
    entry->map, entry->sym,
    false, NULL, 0, 0, 0, srcline);
@@ -2341,6 +2423,20 @@
return 0;
}
+/*
+ * Compares the raw arch string. N.B. see instead perf_env__arch() if a
+ * normalized arch is needed.
+ */
+bool machine__is(struct machine *machine, const char *arch)
+{
+return machine && !strcmp(perf_env__raw_arch(machine->env), arch);
+}
+
+int machine__nr_cpus_avail(struct machine *machine)
+{
+return machine ? perf_env__nr_cpus_avail(machine->env) : 0;
+}
+
+int machine__get_kernel_start(struct machine *machine)
+
{
    struct map *map = machine__kernel_map(machine);
    @ @ -2357,7 +2453,12 @ @
    machine->kernel_start = 1ULL << 63;
    if (map) {
        err = map__load(map);
        if (!err)
            /*
             * On x86_64, PTI entry trampolines are less than the
             * start of kernel text, but still above 2^63. So leave
             * kernel_start = 1ULL << 63 for x86_64.
             */
            if (!err && !machine__is(machine, "x86_64")
                machine->kernel_start = map->start;
        }
    return err;
    --- linux-4.15.0.orig/tools/perf/util/machine.h
return machine ? machine->pid == HOST_KERNEL_ID : false;
}

+bool machine__is(struct machine *machine, const char *arch);
+int machine__nr_cpus_avail(struct machine *machine);
+
struct thread *__machine__findnew_thread(struct machine *machine, pid_t pid, pid_t tid);
struct thread *machine__findnew_thread(struct machine *machine, pid_t pid, pid_t tid);

int __machine__load_kallsyms(struct machine *machine, const char *filename,
   enum map_type type, bool no_kcore);

int arch__fix_module_text_start(u64 *start, const char *name);

int arch__fix_module_text_start(u64 *start, u64 *size, const char *name);

int __machine__load_kallsyms(struct machine *machine, const char *filename,
   enum map_type type, bool no_kcore);

char *machine__resolve_kernel_addr(void *vmachine, unsigned long long *addrp, char **modp);

int machine__map_x86_64_entry_trampoline(struct machine *machine,
   struct dso *kernel);

+int machine__map_x86_64_entry_trampoline(struct machine *machine,
   struct dso *kernel);

+#endif /* __PERF_MACHINE_H */
--- linux-4.15.0.orig/tools/perf/util/map.c
+++ linux-4.15.0/tools/perf/util/map.c
@@ -1,5 +1,6 @@

#include "symbol.h"
+#include <assert.h>
 #include <errno.h>
 +#include <inttypes.h>
 #include <limits.h>
 @@ -89,11 +90,10 @@

 return true;
}

@if (!strcmp(filename, "/system/lib/", 11)) {
+if (!strcmp(filename, "/system/lib/", 12)) {
 char *ndk, *app;
 const char *arch;
 -size_t ndk_length;
 -size_t app_length;
 +int ndk_length, app_length;
ndk = getenv("NDK_ROOT");
app = getenv("APP_PLATFORM");
@@ -121,8 +121,8 @@
if (new_length > PATH_MAX)
return false;
snprintf(newfilename, new_length,
-"%s/platforms/%s/arch-%s/usr/lib/%s",
-ndk, app, arch, libname);
+"%.*s/platforms/%.*s/arch-%s/usr/lib/%s",
+ndk_length, ndk, app_length, app, arch, libname);

return true;
}
@@ -581,6 +581,13 @@
return NULL;
}

+static bool map__contains_symbol(struct map *map, struct symbol *sym)
+{
+u64 ip = map->unmap_ip(map, sym->start);
+
+return ip >= map->start && ip < map->end;
+}
+
struct symbol *maps__find_symbol_by_name(struct maps *maps, const char *name,
struct map **mapp)
{
@@ -596,6 +603,10 @@
if (sym == NULL)
continue;
+if (!map__contains_symbol(pos, sym)) {
+sym = NULL;
+continue;
+}
if (mapp != NULL)
*mapp = pos;
goto out;
@@ -737,6 +748,8 @@
}

after->start = map->end;
+after->pgoff += map->end - pos->start;
+assert(pos->map_ip(pos, map->end) == after->map_ip(after, map->end));
__map_groups__insert(pos->groups, after);
if (verbose >= 2 && !use_browser)
map__fprintf(after, fp);
static struct perf_evsel *find_evsel(struct perf_evlist *perf_evlist,
    const char **ids,
    int idnum,
    struct perf_evsel **metric_events)
{ static bool record_evsel(int *ind, struct perf_evsel **start,
    int idnum,
    struct perf_evsel **metric_events,
    struct perf_evsel *ev)
{ metric_events[*ind] = ev;
    if (*ind == 0)
        *start = ev;
    else {
        metric_events[*ind] = NULL;
        return true;
    }
    return false;
}

static struct perf_evsel *find_evsel_group(struct perf_evlist *perf_evlist,
    const char **ids,
    int idnum,
    struct perf_evsel **metric_events)
{
    struct perf_evsel *ev, *start = NULL;
    int ind = 0;
    evlist__for_each_entry (perf_evlist, ev)
    { if (ev->collect_stat)
        continue;
    if (!strcmp(ev->name, ids[ind]))
        { metric_events[ind] = ev;
            if (ind == 0)
                *start = ev;
            else {
                metric_events[ind] = NULL;
                return true;
            }
        } else {
        /*
     */
    }
}

/*
*/
We saw some other event that is not
in our list of events. Discard
the whole match and start again.
*/

ind = 0;
start = NULL;
if (!strcmp(ev->name, ids[ind])) {
    if (record_evsel(&ind, &start, idnum,
                     metric_events, ev))
        return start;
}
}

/*
@@ -141,11 +164,12 @@
ret = -ENOMEM;
break;
}
-evsel = find_evsel(perf_evlist, eg->ids, eg->idnum,
- metric_events);
+evsel = find_evsel_group(perf_evlist, eg->ids, eg->idnum,
 + metric_events);
if (!evsel) {
    pr_debug("Cannot resolve %s: %s\n",
            eg->metric_name, eg->metric_expr);
    free(metric_events);
    continue;
}
for (i = 0; i < eg->idnum; i++)
@@ -153,11 +177,13 @@
    me = metricgroup__lookup(metric_events_list, evsel, true);
    if (!me) {
        ret = -ENOMEM;
        free(metric_events);
        break;
    }
    expr = malloc(sizeof(struct metric_expr));
    if (!expr) {
        ret = -ENOMEM;
        free(metric_events);
        break;
    }
    expr->metric_expr = eg->metric_expr;
@@ -270,7 +296,7 @@
    void metricgroup__print(bool metrics, bool metricgroups, char *filter,
                          bool raw)
    {
-struct pmu_events_map *map = perf_pmu__find_map();
static int metricgroup__add_metric(const char *metric, struct strbuf *events,
    struct list_head *group_list)
{
    struct pmu_events_map *map = perf_pmu__find_map(NULL);
    struct pmu_event *pe;
    int i, j;
    --- linux-4.15.0.orig/tools/perf/util/namespaces.c
    +++ linux-4.15.0/tools/perf/util/namespaces.c
    @@ -18,6 +18,7 @@
        #include <stdio.h>
        #include <string.h>
        #include <unistd.h>
        +#include <asm/bug.h>
        
        struct namespaces *namespaces__new(struct namespaces_event *event)
    {
        @ @ -139,6 +140,9 @@
            struct nsinfo *nnsi;

        +if (nsi == NULL)
            +return NULL;
            +
            nnsi = calloc(1, sizeof(*nnsi));
        if (nnsi != NULL) {
            nnsi->pid = nsi->pid;
            @ @ -183,6 +187,7 @@
            char curpath[PATH_MAX];
            int oldns = -1;
            int newns = -1;
            +char *oldcwd = NULL;

        if (nc == NULL)
            return;
        @ @ -196,9 +201,13 @@
        if (snprintf(curpath, PATH_MAX, "/proc/self/ns/mnt") >= PATH_MAX)
            return;

        +oldcwd = get_current_dir_name();
        +if (!oldcwd)
            +return;
oldns = open(curpath, O_RDONLY);
if (oldns < 0)
- goto errout;
+ return;

newns = open(nsi->mntns_path, O_RDONLY);
if (newns < 0)
@@ -207,11 +216,13 @@
if (setns(newns, CLONE_NEWNS) < 0)
goto errout;

+nc->oldcwd = oldcwd;
nc->oldns = oldns;
nc->newns = newns;
return;

errout:
+free(oldcwd);
if (oldns > -1)
close(oldns);
if (newns > -1)
@@ -220,11 +231,16 @@
void nsinfo__mountns_exit(struct nscookie *nc)
{
- if (nc == NULL || nc->oldns == -1 || nc->newns == -1)
+ if (nc == NULL || nc->oldns == -1 || nc->newns == -1 || !nc->oldcwd)
 return;

 setns(nc->oldns, CLONE_NEWNS);

+ if (nc->oldcwd) {
+ WARN_ON_ONCE(chdir(nc->oldcwd));
+ zfree(&nc->oldcwd);
+ }
+ if (nc->oldns > -1) {
 close(nc->oldns);
 nc->oldns = -1;
 --- linux-4.15.0.orig/tools/perf/util/namespaces.h
 +++ linux-4.15.0/tools/perf/util/namespaces.h
 @@ -37,6 +37,7 @@
 struct nscookie {
 intoldns;
 intnewns;
+ char*oldcwd;
+};
int nsinfo__init(struct nsinfo *nsi);

--- linux-4.15.0.orig/tools/perf/util/parse-events.c
+++ linux-4.15.0/tools/perf/util/parse-events.c
@@ -203,8 +203,8 @@
for_each_event(sys_dirent, evt_dir, evt_dirent) {
-  snprintf(evt_path, MAXPATHLEN, "%s/%s/id", dir_path,
-           evt_dirent->d_name);
+  scnprintf(evt_path, MAXPATHLEN, "%s/%s/id", dir_path,
+            evt_dirent->d_name);
  fd = open(evt_path, O_RDONLY);
  if (fd < 0)
    continue;
@@ -1260,8 +1260,15 @@
  return -ENOMEM;

-  if (perf_pmu__config(pmu, &attr, head_config, parse_state->error))
-    return -EINVAL;
+  if (perf_pmu__config(pmu, &attr, head_config, parse_state->error)) {
+    struct perf_evsel_config_term *pos, *tmp;
+    if (!ret) {
+      list_for_each_entry_safe(pos, tmp, &config_terms, list) {
+        list_del_init(&pos->list);
+        free(pos);
+      }
+      return -EINVAL;
+    }

    evsel = __add_event(list, &parse_state->idx, &attr,
      get_config_name(head_config), pmu,
@@ -1709,15 +1716,20 @@
    perf_pmu__parse_cleanup();
    if (!ret) {
      if (!ret & & list_empty(&parse_state.list)) {
-        WARN_ONCE(true, "WARNING: event parser found nothing\n");
+        return -1;
+      }
+      +/*
+       * Add list to the evlist even with errors to allow callers to clean up.
+       */
+      perf_evlist__splice_list_tail(evlist, &parse_state.list); 
+      if (!ret) {
struct perf_evsel *last;

- if (list_empty(&parse_state.list)) {
- WARN_ONCE(true, "WARNING: event parser found nothing");
- return -1;
- }
-
- perf_evlist__splice_list_tail(evlist, &parse_state.list);
evlist->nr_groups += parse_state.nr_groups;
last = perf_evlist__last(evlist);
last->cmdline_group_boundary = true;
@@ -2122,6 +2134,7 @@
perf_evsel__delete(evsel);
}
+
+thread_map__put(tmap);
return ret;
}
@@ -2192,6 +2205,7 @@
printf(" %-50s [%s]\n", buf, "SDT event");
free(buf);
}
+free(path);
} else
printf(" %-50s [%s]\n", nd->s, "SDT event");
if (nd2) {
@@ -2313,7 +2327,7 @@
if (!name_only &&& strlen(syms->alias))
snprintf(name, MAX_NAME_LEN, "%s OR %s", syms->symbol, syms->alias);
else
-strncpy(name, syms->symbol, MAX_NAME_LEN);
+strlcpy(name, syms->symbol, MAX_NAME_LEN);
evt_list[evt_i] = strdup(name);
if (evt_list[evt_i] == NULL)
--- linux-4.15.0.orig/tools/perf/util/parse-events.y
+++ linux-4.15.0/tools/perf/util/parse-events.y
@@ -1,4 +1,4 @@
-%pure-parser
+%define api.pure full
%parse-param {void * _parse_state}
%parse-param {void * scanner}
%lex-param {void* scanner}
@@ -72,6 +72,7 @@
%type <num> value_sym
%type <head> event_config
%type <head> opt_event_config


event_pmu:
  -PE_NAME opt_event_config
  +PE_NAME opt_pmu_config
{
  +struct parse_events_state *parse_state = _parse_state;
  +struct parse_events_error *error = parse_state->error;
  struct list_head *list, *orig_terms, *terms;

  if (parse_events_copy_term_list($2, &orig_terms))
    YYABORT;

  +if (error)
    +error->idx = @1.first_column;
    +
    ALLOC_LIST(list);
  if (parse_events_add_pmu(_parse_state, list, $1, $2)) {
    struct perf_pmu *pmu = NULL;
    @@ -485,6 +491,17 @@
      { $S$ = NULL;
      } +
    +opt_pmu_config:
    +/\ event_config \
      +{ +$S$ = $2; +} +
    +/\ 
    +{ +$S$ = NULL; +}
    start_terms: event_config
      {
      --- linux-4.15.0.orig/tools/perf/util/parse-regs-options.c
      +++ linux-4.15.0/tools/perf/util/parse-regs-options.c
      @@ -41,7 +41,7 @@
      } fputc(\n', stderr); /* just printing available regs */
-return -1;
+goto error;
}
for (r = sample_reg_masks; r->name; r++) {
if (!strcasecmp(s, r->name))
--- linux-4.15.0.orig/tools/perf/util/path.c
+++ linux-4.15.0/tools/perf/util/path.c
@@ -18,6 +18,7 @@
#include <stdio.h>
#include <sys/types.h>
#include <sys/stat.h>
+#include <dirent.h>
#include <unistd.h>
static char bad_path[] = "/bad-path/";
@@ -77,3 +78,16 @@
return S_ISREG(st.st_mode);
}
+
+ /* Helper function for filesystems that return a dent->d_type DT_UNKNOWN */
+bool is_directory(const char *base_path, const struct dirent *dent)
+{
+char path[PATH_MAX];
+struct stat st;
+
sprintf(path, "%s/%s", base_path, dent->d_name);
+if (stat(path, &st))
+return false;
+
+return S_ISDIR(st.st_mode);
+}
--- linux-4.15.0.orig/tools/perf/util/path.h
+++ linux-4.15.0/tools/perf/util/path.h
@@ -2,9 +2,12 @@
#ifndef _PERF_PATH_H
#define _PERF_PATH_H
+struct dirent;
+
+int path__join(char *bf, size_t size, const char *path1, const char *path2);
+int path__join3(char *bf, size_t size, const char *path1, const char *path2, const char *path3);

bool is_regular_file(const char *file);
+bool is_directory(const char *base_path, const struct dirent *dent);

#endif /* _PERF_PATH_H */
--- linux-4.15.0.orig/tools/perf/util/perf_regs.h
### `/tools/perf/util/perf_regs.h` (Line 34)

```c
static inline const char *perf_reg_name(int id __maybe_unused) {
    return NULL;  // Original
    return "unknown";  // Modified
}
```

### `/tools/perf/util/pmu.c` (Line 12)

```c
#include <locale.h>
#include <regex.h>
```

### `/tools/perf/util/pmu.c` (Line 124)

```c
snprintf(path, PATH_MAX, "%s/%s.scale", dir, name);
```

### `/tools/perf/util/pmu.c` (Line 144)

```c
snprintf(path, PATH_MAX, "%s/%s.scale", dir, name);
```

### `/tools/perf/util/pmu.c` (Line 161)

```c
snprintf(path, PATH_MAX, "%s/%s.per-pkg", dir, name);
```

### `/tools/perf/util/pmu.c` (Line 174)

```c
scnprintf(path, PATH_MAX, "%s/%s.scale", dir, name);
```

### `/tools/perf/util/pmu.c` (Line 174)

```c
scnprintf(path, PATH_MAX, "%s/%s.scale", dir, name);
```

### `/tools/perf/util/pmu.c` (Line 191)

```c
fd = open(path, O_RDONLY);
```

### `/tools/perf/util/pmu.c` (Line 206)

```c
fd = open(path, O_RDONLY);
```

### `/tools/perf/util/pmu.c` (Line 222)

```c
fd = open(path, O_RDONLY);
```

### `/tools/perf/util/pmu.c` (Line 222)

```c
fd = open(path, O_RDONLY);
```
char path[PATH_MAX];
int fd;

snprintf(path, PATH_MAX, "%s/%s.snapshot", dir, name);
+snprintf(path, PATH_MAX, "%s/%s.snapshot", dir, name);

fd = open(path, O_RDONLY);
if (fd == -1)
@@ -350,7 +351,7 @@
if (pmu_alias_info_file(name))
    continue;

-snprintf(path, PATH_MAX, "%s/%s", dir, name);
+snprintf(path, PATH_MAX, "%s/%s", dir, name);
+snprintf(path, PATH_MAX, "%s/%s", dir, name);

file = fopen(path, "r");
if (!file) {
@@ -537,17 +538,40 @@
/*
 + PMU CORE devices have different name other than cpu in sysfs on some
 + platforms.
 + Looking for possible sysfs files to identify the arm core device.
 + */
+static int is_arm_pmu_core(const char *name)
+{
    +struct stat st;
    +char path[PATH_MAX];
    +const char *sysfs = sysfs__mountpoint();
    +
    +if (!sysfs)
        +return 0;
    +
    +/* Look for cpu sysfs (specific to arm) */
    +snprintf(path, PATH_MAX, "%s/bus/event_source/devices/%s/cpus", 
        +sysfs, name);
    +if (stat(path, &st) == 0)
        +return 1;
    +
    +return 0;
    +
    +/*
 * Return the CPU id as a raw string.
 * Each architecture should provide a more precise id string that
 * can be use to match the architecture's "mapfile". 
 */
Open Source Used In 5GaaS Edge AC-4 35955
-static char *perf_pmu__getcpuid(void)
+static char *perf_pmu__getcpuid(struct perf_pmu *pmu)
{
    char *cpuid;
    static bool printed;
    @@ -556,7 +580,7 @@
    if (cpuid)
        cpuid = strdup(cpuid);
    if (!cpuid)
        -cpuid = get_cpuid_str();
+cpuid = get_cpuid_str(pmu);
    if (!cpuid)
        return NULL;

    @@ -567,22 +591,45 @@
    return cpuid;
}

-struct pmu_events_map *perf_pmu__find_map(void)
+struct pmu_events_map *perf_pmu__find_map(struct perf_pmu *pmu)
{
    struct pmu_events_map *map;
    -char *cpuid = perf_pmu__getcpuid();
+char *cpuid = perf_pmu__getcpuid(pmu);
    int i;

    /* on some platforms which uses cpus map, cpuid can be NULL for
    * PMUs other than CORE PMUs.
    * */
    +if (!cpuid)
        +return NULL;
        +i = 0;
        +for (;;) {
        +regex_t re;
        +regmatch_t pmatch[1];
        +int match;
        +map = &pmu_events_map[i++];
        +if (!map->table) {
            map = NULL;
break;
}

if (!strcmp(map->cpuid, cpuid))
+if (regcomp(&re, map->cpuid, REG_EXTENDED) != 0) {
+/* Warn unable to generate match particular string. */
+pr_info("Invalid regular expression %s\n", map->cpuid);
+break;
+}
+
+match = !regexec(&re, cpuid, 1, pmatch, 0);
+regfree(&re);
+if (match) {
+size_t match_len = (pmatch[0].rm_eo - pmatch[0].rm_so);
+/* Verify the entire string matched. */
+if (match_len == strlen(cpuid))
+break;
+}
}
free(cpuid);
return map;

@@ -593,13 +640,13 @@
* to the current running CPU. Then, add all PMU events from that table
* as aliases.
*/
-static void pmu_add_cpu_aliases(struct list_head *head, const char *name)
+static void pmu_add_cpu_aliases(struct list_head *head, struct perf_pmu *pmu)
{
    int i;
    struct pmu_events_map *map;
    -struct pmu_event *pe;
    +const char *name = pmu->name;

    -map = perf_pmu__find_map();
    +map = perf_pmu__find_map(pmu);
    if (!map)
        return;

    @@ -593,13 +640,13 @@
    */
    i = 0;
    while (1) {
        -const char *pname;
        +const char *cpu_name = is_arm_pmu_core(name) ? name : "cpu";
        +struct pmu_event *pe = &map->table[i++];
        +const char *pname = pe->pmu ? pe->pmu : cpu_name;

        if (!strcmp(pname, pmu->name))
            break;

        pe = &map->table[i++];
        if (!pmu->name || !strcmp(pname, pmu->name))
            break;

        /* Verify the entire string matched. */
        if (match_len == strlen(pname))
            break;
    }
    free(pname);
    return pmu;
-pe = &map->table[i++];
if (!pe->name) {
    if (pe->metric_group || pe->metric_name)
        continue;
    break;
}

-pname = pe->pmu ? pe->pmu : "cpu";
-if (strncmp(pname, name, strlen(pname)))
    /*
     * uncore alias may be from different PMU
     * with common prefix
     */
    +if (pmu_is_uncore(name) &&
        !strncmp(pname, name, strlen(pname)))
        goto new_alias;
    +if (strcmp(pname, name))
        continue;

    +new_alias:
    /* need type casts to override 'const' */
    __perf_pmu__new_alias(head, NULL, (char *)pe->name,
                          (char *)pe->desc, (char *)pe->event,
                          @ @ -661,21 +717,20 @ @
    if (pmu_aliases(name, &aliases))
        return NULL;

    -pmu_add_cpu_aliases(&aliases, name);
    pmu = zalloc(sizeof(*pmu));
    if (!pmu)
        return NULL;

    pmu->cpus = pmu_cpumask(name);
    
    +pmu->name = strdup(name);
    +pmu->type = type;
    pmu->is_uncore = pmu_is_uncore(name);
    +pmu_add_cpu_aliases(&aliases, pmu);

    INIT_LIST_HEAD(&pmu->format);
    INIT_LIST_HEAD(&pmu->aliases);
    list_splice(&format, &pmu->format);
    list_splice(&aliases, &pmu->aliases);
    -pmu->name = strdup(name);
    -pmu->type = type;
    list_add_tail(&pmu->list, &pmus);
pmu->default_config = perf_pmu__get_default_config(pmu);
@@ -775,13 +830,14 @@ static __u64 pmu_format_max_value(const unsigned long *format)
 {
     __u64 w = 0;
     int fbit;
-    for_each_set_bit(fbit, format, PERF_PMU_FORMAT_BITS)
     -w |= (1ULL << fbit);
     +int w;
-    return w;
+    w = bitmap_weight(format, PERF_PMU_FORMAT_BITS);
+    if (!w)
+        return 0;
+    if (w < 64)
+        return (1ULL << w) - 1;
     +return -1;
 } /*
 @@ -1120,6 +1176,17 @@ set_bit(b, bits);
 } 
 
+void perf_pmu__del_formats(struct list_head *formats)
+{
+    struct perf_pmu_format *fmt, *tmp;
+    
+    list_for_each_entry_safe(fmt, tmp, formats, list) {
+        list_del(&fmt->list);
+        free(fmt->name);
+        free(fmt);
+    }
+    
+    static int sub_non_neg(int a, int b)
+    {
+        if (b > a)
+{
+            return -1;
+        }
+    }
+    
+    static int sub_non_neg(int a, int b)
+    {
+        if (b > a)
+            return -1;
+        }
+    
+    void perf_pmu__set_format(unsigned long *bits, long from, long to);
+    int perf_pmu__format_parse(char *dir, struct list_head *head);
+    void perf_pmu__del_formats(struct list_head *formats);

--- linux-4.15.0.orig/tools/perf/util/pmu.h
+++ linux-4.15.0/tools/perf/util/pmu.h
@@ -79,6 +79,7 @@
 int config, unsigned long *bits);
 void perf_pmu__set_format(unsigned long *bits, long from, long to);
 int perf_pmu__format_parse(char *dir, struct list_head *head);
+void perf_pmu__del_formats(struct list_head *formats);
struct perf_pmu *perf_pmu__scan(struct perf_pmu *pmu);

@@ -92,6 +93,6 @@

struct perf_event_attr *perf_pmu__get_default_config(struct perf_pmu *pmu);

-struct pmu_events_map *perf_pmu__find_map(void);
+struct pmu_events_map *perf_pmu__find_map(struct perf_pmu *pmu);

#endif /* __PMU_H */
--- linux-4.15.0.orig/tools/perf/util/print_binary.c
+++ linux-4.15.0/tools/perf/util/print_binary.c
@@ -50,7 +50,7 @@

    for (i = 0; i < len; i++) {
+    for (i = 0; i < len && p[i]; i++) {
        if (!isprint(p[i]) && !isspace(p[i]))
            return 0;
    }
--- linux-4.15.0.orig/tools/perf/util/probe-event.c
+++ linux-4.15.0/tools/perf/util/probe-event.c
@@ -122,7 +122,7 @@

    return machine__find_kernel_function(host_machine, addr, mapp);
 }

-static struct ref_reloc_sym *kernel_get_ref_reloc_sym(void)
+static struct ref_reloc_sym *kernel_get_ref_reloc_sym(struct map **pmap)
{
    /* kmap->ref_reloc_sym should be set if host_machine is initialized */
    struct kmap *kmap;
    @@ -134,6 +134,10 @@
    kmap = map__kmap(map);
    if (!kmap)
        return NULL;
+    +if (pmap)
+        +*pmap = map;
+    +return kmap->ref_reloc_sym;
 }

 @@ -145,7 +149,7 @@

struct map *map;
/* ref_reloc_sym is just a label. Need a special fix*/
-reloc_sym = kernel_get_ref_reloc_sym();
+reloc_sym = kernel_get_ref_reloc_sym(NULL);
if (reloc_sym && strcmp(name, reloc_sym->name) == 0)
    *addr = (reloc) ? reloc_sym->addr : reloc_sym->unrelocated_addr;
else {
    @ @ -169,8 +173,10 @@
    if (module && strchr(module, '/'))
    return dso__new_map(module);

    -if (!module)
    -module = "kernel";
    +if (!module) {
      +pos = machine__kernel_map(host_machine);
      +return map__get(pos);
    +}

    for (pos = maps__first(maps); pos; pos = map__next(pos)) {
        /* short_name is ":[module]" */
    @@ -191,8 +197,10 @@
        struct map *map;

        map = dso__new_map(target);
    -if (map && map->dso)
    +if (map && map->dso) {
    +
    +    nsinfo__put(map->dso->nsinfo);
        map->dso->nsinfo = nsinfo__get(nsi);
    +}
        return map;
    } else {
        return kernel_get_module_map(target);
    @@ -252,21 +260,22 @@
    static bool kprobe_blacklist__listed(unsigned long address);
    static bool kprobe_warn_out_range(const char *symbol, unsigned long address)
    {
        -u64 etext_addr = 0;
        -int ret;
    +struct map *map;
        +bool ret = false;

        -/* Get the address of _etext for checking non-probable text symbol */
        -ret = kernel_get_symbol_address_by_name("_etext", &etext_addr,
        -false, false);
        -
        -if (ret == 0 && etext_addr < address)
        -pr_warning("%s is out of .text, skip it\n", symbol);
    
        +map = kernel_get_module_map(NULL);
    +if (map) {
        +ret = address <= map->start || map->end < address;

+if (ret)
+pr_warning("%s is out of .text, skip it\n", symbol);
+map__put(map);
+}
+if (!ret && kprobe_blacklist__listed(address)) {
    pr_warning("%s is blacklisted function, skip it\n", symbol);
    return false;
+ret = true;
+
    return true;
+return ret;
}

/*@ -762,6 +771,7 @@

    int ntevs)
{
    struct ref_reloc_sym *reloc_sym;
    struct map *map;
    char *tmp;
    int i, skipped = 0;

    //@ -770,7 +780,7 @@
    return post_process_offline_probe_trace_events(tevs, ntevs,
        symbol_conf.vmlinux_name);

    -reloc_sym = kernel_get_ref_reloc_sym();
    +reloc_sym = kernel_get_ref_reloc_sym(&map);
    if (!reloc_sym) {
        pr_warning("Relocated base symbol is not found!\n");
        return -EINVAL;
    }

    continue;
    if (tevs[i].point.retprobe && !kretprobe_offset_is_supported())
        continue;

    /* If we found a wrong one, mark it by NULL symbol */
    */
    +/*
    + * Since addresses in debuginfo is same as objdump, we need
    + * to convert it to addresses on memory.
    + */
    if (kprobe_warn_out_range(tevs[i].point.symbol,
        - tevs[i].point.address)) {
        +map__objdump_2mem(map, tevs[i].point.address))) {
            tmp = NULL;
            skipped++;
        }
} else {
    if (fmt1_str == NULL || strlen(fmt1_str) != 1 || fmt2_str == NULL
        || fmt3_str == NULL) {
        semantic_error("Failed to parse event name: %s\n", argv[0]);
        ret = -EINVAL;
        goto out;
    }
}

out:
    free(nbase);
    +
    /* Final validation */
    +if (ret >= 0 && !is_c_func_name(buf)) {
        pr_warning("Internal error: \"%s\" is an invalid event name.\n", buf);
        +ret = -EINVAL;
    } +
    return ret;
}

int found = 0;
struct symbol *sym;
struct rb_node *tmp;
const char *norm, *ver;
char *buf = NULL;
if (map__load(map) < 0)
    return 0;
map__for_each_symbol(map, sym, tmp) {
    -if (strglobmatch(sym->name, name)) {
+norm = arch__normalize_symbol_name(sym->name);
+if (!norm)
+    continue;
+    /* We don't care about default symbol or not */
+    ver = strchr(norm, '@');
+    if (ver) {
+        buf = strndup(norm, ver - norm);
+        if (!buf)
+            return -ENOMEM;
+norm = buf;
+}
+if (strglobmatch(norm, name)) {
    found++;
    if (syms && found < probe_conf.max_probes)
        syms[found - 1] = sym;
}
+if (buf)
+zfree(&buf);
}

return found;
@@ -2847,7 +2884,7 @@
    // Notes that the symbols in the kmodule are not relocated */
    if (!pev->uprobes && !pev->target &&
        (!pp->retprobe || kretprobe_offset_is_supported())) {
        -reloc_sym = kernel_get_ref_reloc_sym();
        +reloc_sym = kernel_get_ref_reloc_sym(NULL);
        if (!reloc_sym) {
            pr_warning("Relocated base symbol is not found!
        ret = -EINVAL;
        -- linux-4.15.0.orig/tools/perf/util/probe-file.c
        +++ linux-4.15.0/tools/perf/util/probe-file.c
        @@ -343,11 +343,11 @@

    if (ret < 0)
        -return ret;
        +goto out;

    ret = probe_file__del_strlist(fd, namelist);
    +out:
    strlist__delete(namelist);
    -
    return ret;
}
@@ -425,7 +425,7 @@
if (target && build_id_cache__cached(target)) {
  /* This is a cached buildid */
  -strncpy(sbuid, target, SBUILD_ID_SIZE);
  +strlcpy(sbuid, target, SBUILD_ID_SIZE);
  dir_name = build_id_cache__linkname(sbuid, NULL, 0);
  goto found;
}
--- linux-4.15.0.orig/tools/perf/util/probe-finder.c
+++ linux-4.15.0/tools/perf/util/probe-finder.c
@@ -114,6 +114,7 @@
   DSO_BINARY_TYPE__UBUNTU_DEBUGINFO,
   DSO_BINARY_TYPE__OPENEMBEDDED_DEBUGINFO,
   DSO_BINARY_TYPE__BUILDID_DEBUGINFO,
+  DSO_BINARY_TYPE__MIXEDUP_UBUNTU_DEBUGINFO,
   DSO_BINARY_TYPE__NOT_FOUND,
};

 @@ -615,38 +616,31 @@
       const char *function,
       struct probe_trace_point *tp)
 {
-    Dwarf_Addr eaddr, highaddr;
+    Dwarf_Addr eaddr;
    GElf_Sym sym;
    const char *symbol;
    /* Verify the address is correct */
-   if (dwarf_entrypc(sp_die, &eaddr) != 0) {
-     pr_warning("Failed to get entry address of %s\n",
-               dwarf_diename(sp_die));
-     return -ENOENT;
-   }
-   if (dwarf_highpc(sp_die, &highaddr) != 0) {
-     pr_warning("Failed to get end address of %s\n",
-               dwarf_diename(sp_die));
-     return -ENOENT;
-   }
-   if (paddr > highaddr) {
-     pr_warning("Offset specified is greater than size of %s\n",
-                dwarf_diename(sp_die));
+   if (!dwarf_haspc(sp_die, paddr)) {
+     pr_warning("Specified offset is out of %s\n",
                     dwarf_diename(sp_die));
     return -EINVAL;
   }
-   symbol = dwarf_diename(sp_die);
-   if (!symbol) {
-     /* Try to get the symbol name from symtab */
-
```c
+if (dwarf_entrypc(sp_die, &eaddr) == 0) {
+/* If the DIE has entrypc, use it. */
+symbol = dwarf_diename(sp_die);
+} else {
+/* Try to get actual symbol name and address from symtab */
+symbol = dwfl_module_addrsym(mod, paddr, &sym, NULL);
+-if (!symbol) {
+-pr_warning("Failed to find symbol at 0x%lx\n",
- (unsigned long)paddr);
-} else {
-/* Try to get actual symbol name and address from symtab */
-symbol = dwfl_module_addrsym(mod, paddr, &sym, NULL);
-} else {
-/* Try to get actual symbol name and address from symtab */
-}
+eaddr = sym.st_value;
+
+if (!symbol) {
+pr_warning("Failed to find symbol at 0x%lx\n",
+ (unsigned long)paddr);
+return -ENOENT;
+} else {
+tp->offset = (unsigned long)(paddr - eaddr);
+tp->address = (unsigned long)paddr;
+tp->symbol = strdup(symbol);
+}
+}
+
+/* Return innermost DIE */
+static int find_inner_scope_cb(Dwarf_Die *fn_die, void *data)
+{
+struct find_scope_param *fsp = data;
+
+memcpy(fsp->die_mem, fn_die, sizeof(Dwarf_Die));
+fsp->found = true;
+return 1;
+}
+
+/* Find an appropriate scope fits to given conditions */
+static Dwarf_Die *find_best_scope(struct probe_finder *pf, Dwarf_Die *die_mem)
+{
+cu_walk_functions_at(&pf->cu_die, pf->addr, find_best_scope_cb, &fsp);
+return 0;
+}
+
+/* Find an appropriate scope fits to given conditions */
+static Dwarf_Die *find_best_scope(struct probe_finder *pf, Dwarf_Die *die_mem)
+{
+cu_walk_functions_at(&pf->cu_die, pf->addr, find_best_scope_cb, &fsp);
+ret = cu_walk_functions_at(&pf->cu_die, pf->addr, find_best_scope_cb,
+ &fsp);
+ret = cu_walk_functions_at(&pf->cu_die, pf->addr, find_best_scope_cb,
+ &fsp);
+}
```
+if (!ret && !fsp.found)
+cu_walk_functions_at(&pf->cu_die, pf->addr,
+     find_inner_scope_cb, &fsp);

return fsp.found ? die_mem : NULL;
}
@@ -953,7 +962,7 @@
ret = find_probe_point_lazy(in_die, pf);
else {
    /* Get probe address */
-    if (dwarf_entrypc(in_die, &addr) != 0) {
+    if (die_entrypc(in_die, &addr) != 0) {
        pr_warning("Failed to get entry address of \%s,\n",
            dwarf_diename(in_die));
        return -ENOENT;
    }
    -dwarf_entrypc(sp_die, &pf->addr);
+die_entrypc(sp_die, &pf->addr);
    /* But in some case the entry address is 0 */
    if (pf->addr == 0) {
        pr_debug("\%s has no entry PC. Skipped\n",
-@@ -1345,7 +1354,7 @@
    tf.ntevs = 0;

    ret = debuginfo__find_probes(dbg, &tf.pf);
-    if (ret < 0) {
+    if (ret < 0 || tf.ntevs == 0) {
        for (i = 0; i < tf.ntevs; i++)
            clear_probe_trace_event(&tf.tevs[i]);
        zfree(tevs);
@@ -1417,6 +1426,18 @@
        return DIE_FIND_CB_END;
    }

+static bool available_var_finder_overlap(struct available_var_finder *af)
+{
+int i;
+
+for (i = 0; i < af->nvls; i++) {
+    if (af->pf.addr == af->vls[i].point.address)
+        return true;
+}
+    return false;
+}
/* Add a found vars into available variables list */
static int add_available_vars(Dwarf_Die *sc_die, struct probe_finder *pf)
{
    Dwarf_Die die_mem;
    int ret;

    /* For some reason (e.g. different column assigned to same address),
     * this callback can be called with the address which already passed.
     * Ignore it first.
     */
    if (available_var_finder_overlap(af))
        return 0;

    /* Check number of tevs */
    if (af->nvls == af->max_vls) {
        pr_warning("Too many( > %d) probe point found.
", af->max_vls);
    }

    /* Get function entry information */
    func = basefunc = dwarf_dienamex(&spdie);
    if (!func ||
        dwarf_entrypc(&spdie, &baseaddr) != 0 ||
        die_entrypc(&spdie, &baseaddr) != 0 ||
        dwarf_decl_line(&spdie, &baseline) != 0) {
        lineno = 0;
    goto post;
    }

    while (die_find_top_inlinefunc(&spdie, (Dwarf_Addr)addr, &indie)) {
        /* There is an inline function */
        if (dwarf_entrypc(&indie, &_addr) == 0 &&
            _addr == addr) {
            /* addr is at an inline function entry.
             * There is an inline function */
        goto post;
    }

--- linux-4.15.0.orig/tools/perf/util/python-ext-sources
+++ linux-4.15.0/tools/perf/util/python-ext-sources
@@ -10,6 +10,7 @@
util/evlist.c
util/evsel.c
util/cpumap.c
+util/memswap.c
util/mmap.c
util/namespaces.c
../lib/bitmap.c
--- linux-4.15.0.orig/tools/perf/util/scripting-engines/trace-event-python.c
if (_PyTuple_Resize(&t, n) == -1)
Py_FatalError("error resizing Python tuple");

call_object(handler, t, handler_name);

if (!dict)
else
call_object(handler, t, default_handler_name);

Py_XDECREF(all_entries_dict);
Py_DECREF(t);

if (sample_id_all) {
void *data = &event->mmap2.filename;

if (!evsel)
return;

read_format = evsel->attr.read_format;

if (read_format & PERF_FORMAT_TOTAL_TIME_ENABLED)
{

}
struct ordered_events *oe = &session->ordered_events;
struct perf_tool *tool = session->tool;
+struct perf_sample sample = { .time = 0, };
int fd = perf_data__fd(session->data);
int err;

-dump_event(session->evlist, event, file_offset, NULL);
+dump_event(session->evlist, event, file_offset, &sample);

/* These events are processed right away */
switch (event->header.type) {
@@ -1471,6 +1476,7 @@
if (event->header.size < hdr_sz || event->header.size > buf_sz)
    return -1;

    buf += hdr_sz;
rest = event->header.size - hdr_sz;

    if (readn(fd, buf, rest) != (ssize_t)rest)
--- linux-4.15.0.orig/tools/perf/util/setup.py
+++ linux-4.15.0/tools/perf/util/setup.py
@@ -27,7 +27,9 @@
cflags = getenv('CFLAGS', '').split()
    # switch off several checks (need to be at the end of cflags list)
    cflags += ['-fno-strict-aliasing', '-Wno-write-strings', '-Wno-unused-parameter']
+    cflags += ['-fno-strict-aliasing', '-Wno-write-strings', '-Wno-unused-parameter', '-Wno-redundant-decls']
+    if cc != "clang":
+        cflags += ['-Wno-cast-function-type']

    src_perf  = getenv('srctree') + '/tools/perf'
    build_lib = getenv('PYTHON_EXTBUILD_LIB')
--- linux-4.15.0.orig/tools/perf/util/sort.c
+++ linux-4.15.0/tools/perf/util/sort.c
@@ -226,8 +226,14 @@
    if (sym_l == sym_r)
        return 0;
-    if (sym_l->inlined || sym_r->inlined)
-        return strcmp(sym_l->name, sym_r->name);
+    if (sym_l->inlined || sym_r->inlined) {
+        int ret = strcmp(sym_l->name, sym_r->name);
+        if (ret)
+            return ret;
+        if ((sym_l->start <= sym_r->end) && (sym_l->end >= sym_r->start))
+            return 0;
+    }
if (sym_l->start != sym_r->start)
    return (int64_t)(sym_r->start - sym_l->start);
@@ -2673,7 +2679,7 @@
    return str;
    if (asprintf(&n, "%s,%s", pre, str) < 0)
        return NULL;
    +n = NULL;
    free(str);
    return n;
--- linux-4.15.0.orig/tools/perf/util/srcline.c
+++ linux-4.15.0/tools/perf/util/srcline.c
@@ -85,6 +85,9 @@
 struct symbol *inline_sym;
 char *demangled = NULL;

 +if (!funcname)
 +    funcname = "??";
 +
 if (dso)
     demangled = dso__demangle_sym(dso, 0, funcname);
 if (demangled)
@@ -101,7 +104,7 @@
 /* create a fake symbol for the inline frame */
 inline_sym = symbol__new(base_sym ? base_sym->start : 0,
 - base_sym ? base_sym->end : 0,
 + base_sym ? (base_sym->end - base_sym->start) : 0,
 base_sym ? base_sym->binding : 0,
 funcname);
 if (inline_sym)
@@ -187,16 +190,30 @@
 bfd_vma pc, vma;
 bfd_size_type size;
 struct a2l_data *a2l = data;
+flagword flags;

 if (a2l->found)
    return;

-if ((bfd_get_section_flags(abfd, section) & SEC_ALLOC) == 0)
+#ifdef bfd_get_section_flags
+    flags = bfd_get_section_flags(abfd, section);
+#elif
+    flags = bfd_section_flags(section);
+#elseendif
+if ((flags & SECALLOC) == 0)
    return;

    pc = a2l->addr;
+if (pc < vma || pc >= vma + size)
    return;

--- linux-4.15.0.orig/tools/perf/util/stat-shadow.c
+++ linux-4.15.0/tools/perf/util/stat-shadow.c
@@ -269,7 +269,7 @@
 struct perf_evsel *c2;

  evlist__for_each_entry (evsel_list, c2) {
+if (!strcasecmp(c2->name, name) && !c2->collect_stat)
    return c2;
  }
  return NULL;
@@ -308,7 +308,8 @@
 if (leader) {
 /* Search in group */
 for_each_group_member (oc, leader) {
-+if (!strcasecmp(oc->name, metric_names[i])
+if (!strcasecmp(oc->name, metric_names[i]) && !oc->collect_stat)
    found = true;
    break;
  }
--- linux-4.15.0.orig/tools/perf/util/stat.c
+++ linux-4.15.0/tools/perf/util/stat.c
@@ -154,6 +154,15 @@
      evsel->prev_raw_counts = NULL;
    }
+static void perf_evsel__reset_prev_raw_counts(struct perf_evsel *evsel)
+{
+    if (evsel->prev_raw_counts)
+        evsel->prev_raw_counts->aggr.val = 0;
  }


+evsel->prev_raw_counts->aggr.ena = 0;
+evsel->prev_raw_counts->aggr.run = 0;
+  }
+
+}
+
+static int perf_evsel__alloc_stats(struct perf_evsel *evsel, bool alloc_raw)
+{
+  int ncpus = perf_evsel__nr_cpus(evsel);
+  @@ -204,6 +213,14 @@
+  }
+
+}
+
+static int perf_stat_process_counter(struct perf_stat_config *config,
+struct perf_evsel *counter);
+
+void perf_evlist__reset_prev_raw_counts(struct perf_evlist *evlist)
+{
+  struct perf_evsel *evsel;
+  
+  evlist__for_each_entry(evlist, evsel)
+  perf_evsel__reset_prev_raw_counts(evsel);
+  }
+
+}
+
+static void zero_per_pkg(struct perf_evsel *counter)
+{
+  if (counter->per_pkg_mask)
+    @ @ -.334.8 +351.10 @@
+    * interval mode, otherwise overall avg running
+    * averages will be shown for each interval.
+  */
+  -if (config->interval)
+    -init_stats(ps->res_stats);
+    +if (config->interval) {
+      +for (i = 0; i < 3; i++)
+        +init_stats(&ps->res_stats[i]);
+      +}
+    }
+
+  if (counter->per_pkg)
+    zero_per_pkg(counter);
+    --- linux-4.15.0.orig/tools/perf/util/stat.h
+++, linux-4.15.0/tools/perf/util/stat.h
+    @@ -102.6 +102.7 @@
+    int perf_evlist__alloc_stats(struct perf_evlist *evlist, bool alloc_raw);
+    void perf_evlist__free_stats(struct perf_evlist *evlist);
+    void perf_evlist__reset_stats(struct perf_evlist *evlist);
+    +void perf_evlist__reset_prev_raw_counts(struct perf_evlist *evlist);
+    
+    int perf_stat_process_counter(struct perf_stat_config *config,
+        struct perf_evsel *counter);
+    --- linux-4.15.0.orig/tools/perf/util/strbuf.c
+++ linux-4.15.0/tools/perf/util/strbuf.c
va_copy(ap_saved, ap);
len = vsnprintf(sb->buf + sb->len, sb->alloc - sb->len, fmt, ap);
-if (len < 0)
+if (len < 0) {
+va_end(ap_saved);
return len;
+}
if (len > strbuf_avail(sb)) {
ret = strbuf_grow(sb, len);
-if (ret)
+if (ret) {
+va_end(ap_saved);
return ret;
+}
len = vsnprintf(sb->buf + sb->len, sb->alloc - sb->len, fmt, ap_saved);
-va_end(ap_saved);
if (len > strbuf_avail(sb)) {
pr_debug("this should not happen, your vsnprintf is broken");
+va_end(ap_saved);
return -EINVAL;
}
+va_end(ap_saved);
return strbuf_setlen(sb, sb->len + len);
}

--- linux-4.15.0.orig/tools/perf/util/svghelper.c
+++ linux-4.15.0/tools/perf/util/svghelper.c
@@ -334,7 +334,7 @@
if (file) {
while (fgets(buf, 255, file)) {
if (strstr(buf, "model name")) {
-strncpy(cpu_m, &buf[13], 255);
+strlcpy(cpu_m, &buf[13], 255);
break;
}
}
--- linux-4.15.0.orig/tools/perf/util/symbol-elf.c
+++ linux-4.15.0/tools/perf/util/symbol-elf.c
@@ -87,6 +87,11 @@
return GELF_ST_TYPE(sym->st_info);
}
+static inline uint8_t elf_sym__visibility(const GElf_Sym *sym)
+{
+return GELF_ST_VISIBILITY(sym->st_other);
```c
#ifndef STT_GNU_IFUNC
#define STT_GNU_IFUNC 10
#endif
@@ -111,7 +116,9 @@
  return elf_sym__type(sym) == STT_NOTYPE &&
  sym->st_name != 0 &&
  sym->st_shndx != SHN_UNDEF &&
-     sym->st_shndx != SHN_ABS;
+     sym->st_shndx != SHN_ABS &&
+    elf_sym__visibility(sym) != STV_HIDDEN &&
+    elf_sym__visibility(sym) != STV_INTERNAL;
 }

static bool elf_sym__is_a(GElf_Sym *sym, enum map_type type)
@@ -338,7 +345,17 @@
  plt_header_size = 16;
  break;

-default: /* FIXME: s390/alpha/mips/popc/sh/sparc/xtensa need to be checked */
+case EM_SPARC:
+    plt_header_size = 48;
+    plt_entry_size = 12;
+    break;
+    
+case EM_SPARCV9:
+    plt_header_size = 128;
+    plt_entry_size = 32;
+    break;
+    
+default: /* FIXME: s390/alpha/mips/popc/sh/sparc/xtensa need to be checked */
    plt_header_size = shdr_plt.sh_entsize;
    plt_entry_size = shdr_plt.sh_entsize;
    break;
@@ -1403,6 +1420,7 @@
 u64 first_module;
 u64 last_module;
 struct phdr_data kernel_map;
@@ -1417,6 +1435,8 @@
 return 0;
if (strchr(name, '[')) { }
+if (!kci->first_module_symbol || start < kci->first_module_symbol)
```
+kci->first_module_symbol = start;
if (start > kci->last_module_symbol)
  kci->last_module_symbol = start;
return 0;
@@ -1541,6 +1561,10 @@
kci->etext += page_size;
}

+if (kci->first_module_symbol &&
+    (!kci->first_module || kci->first_module_symbol < kci->first_module))
+kci->first_module = kci->first_module_symbol;
+
kci->first_module = round_down(kci->first_module, page_size);

if (kci->last_module_symbol) {
--- linux-4.15.0.orig/tools/perf/util/symbol.c
+++ linux-4.15.0/tools/perf/util/symbol.c
@@ -65,6 +65,7 @@
 DSO_BINARY_TYPE__SYSTEM_PATH_KMODULE,
 DSO_BINARY_TYPE__SYSTEM_PATH_KMODULE_COMP,
 DSO_BINARY_TYPE__OPENEMBEDDED_DEBUGINFO,
+DSO_BINARY_TYPE__MIXEDUP UBUNTU_DEBUGINFO,
 DSO_BINARY_TYPE__NOT_FOUND,
};

@@ -94,6 +95,16 @@
return tail - str;
}

+void __weak arch__symbols__fixup_end(struct symbol *p, struct symbol *c)
+{
+  *p->end = c->start;
+}
+
+const char * __weak arch__normalize_symbol_name(const char *name)
+{
+  +return name;
+}
+
+int __weak arch__compare_symbol_names(const char *namea, const char *nameb)
{  
return strcmp(namea, nameb);
@@ -215,7 +226,7 @@
curr = rb_entry(nd, struct symbol, rb_node);

if (prev->end == prev->start && prev->end != curr->start)
  arch__symbols__fixup_end(prev, curr);
/* Last entry */
@@ -1403,6 +1414,7 @@
case DSO_BINARY_TYPE__SYSTEM_PATH_DSO:
case DSO_BINARY_TYPE__FEDORA_DEBUGINFO:
case DSO_BINARY_TYPE__UBUNTU_DEBUGINFO:
+ case DSO_BINARY_TYPE__MIXEDUP_UBUNTU_DEBUGINFO:
case DSO_BINARY_TYPE__BUILDID_DEBUGINFO:
case DSO_BINARY_TYPE__OPENEMBEDDED_DEBUGINFO:
return !kmod && dso->kernel == DSO_TYPE_USER;
@@ -1509,20 +1521,22 @@
goto out;
}

+if (map->groups && map->groups->machine)
+ machine = map->groups->machine;
+else
+ machine = NULL;
+
if (dso->kernel) {
 if (dso->kernel == DSO_TYPE_KERNEL)
 ret = dso__load_kernel_sym(dso, map);
 else if (dso->kernel == DSO_TYPE_GUEST_KERNEL)
 ret = dso__load_guest_kernel_sym(dso, map);

 +if (machine__is(machine, "x86_64"))
 + machine__map_x86_64_entry_trampoline(machine, dso);
 goto out;
 }

 -if (map->groups && map->groups->machine)
 -machine = map->groups->machine;
 -else
 -machine = NULL;
 -
 dso->adjust_symbols = 0;

 if (perfmap) {
 @@ -2089,16 +2103,14 @@
 int symbol__annotation_init(void)
 {
 +if (symbol_conf.init_annotation)
 + return 0;
 +
 if (symbol_conf.initialized) {
 pr_err("Annotation needs to be init before symbol__init()\n");

return -1;
}

if (symbol_conf.init_annotation) {
    pr_warning("Annotation being initialized multiple times\n");
    return 0;
}

symbol_conf.priv_size += sizeof(struct annotation);
symbol_conf.init_annotation = true;
return 0;
--- linux-4.15.0.orig/tools/perf/util/symbol.h
+++ linux-4.15.0/tools/perf/util/symbol.h
@@ -349,9 +349,11 @@
 void arch__sym_update(struct symbol *s, GElf_Sym *sym);
 #endif
+const char *arch__normalize_symbol_name(const char *name);
#define SYMBOL_A 0
#define SYMBOL_B 1

+void arch__symbols__fixup_end(struct symbol *p, struct symbol *c);
int arch__compare_symbol_names(const char *namea, const char *nameb);
int arch__compare_symbol_names_n(const char *namea, const char *nameb,
                                    unsigned int n);
--- linux-4.15.0.orig/tools/perf/util/symbol_fprintf.c
+++ linux-4.15.0/tools/perf/util/symbol_fprintf.c
@@ -66,7 +66,7 @@
 for (nd = rb_first(&dso->symbol_names[type]); nd; nd = rb_next(nd)) {
     pos = rb_entry(nd, struct symbol_name_rb_node, rb_node);
     fprintf(fp, "%s\n", pos->sym.name);
+    ret += fprintf(fp, "%s\n", pos->sym.name);
 }

 return ret;
--- linux-4.15.0.orig/tools/perf/util/thread.c
+++ linux-4.15.0/tools/perf/util/thread.c
@@ -128,7 +128,7 @@
 }
 }

-struct namespaces *thread__namespaces(const struct thread *thread)
+static struct namespaces *__thread__namespaces(const struct thread *thread)
{
    if (list_empty(&thread->namespaces_list))
        return NULL;
@@ -136,10 +136,21 @@


return list_first_entry(&thread->namespaces_list, struct namespaces, list);
}\
+}\n+struct namespaces *thread__namespaces(const struct thread *thread)\
+{
+struct namespaces *ns;
+
+down_read((struct rw_semaphore *)&thread->namespaces_lock);
+ns = __thread__namespaces(thread);
+up_read((struct rw_semaphore *)&thread->namespaces_lock);
+
+return ns;
+}
+
+static int __thread__set_namespaces(struct thread *thread, u64 timestamp,
+struct namespaces_event *event)
+{}
+struct namespaces *new, *curr = thread__namespaces(thread);
+struct namespaces *new, *curr = __thread__namespaces(thread);

new = namespaces__new(event);
if (!new)
@@ -181,14 +192,24 @@

struct comm *thread__exec_comm(const struct thread *thread)
{
-struct comm *comm, *last = NULL;
+struct comm *comm, *last = NULL, *second_last = NULL;

list_for_each_entry(comm, &thread->comm_list, list) {
if (comm->exec)
return comm;
+second_last = last;
last = comm;
}

/*
+ * 'last' with no start time might be the parent's comm of a synthesized
+ * thread (created by processing a synthesized fork event). For a main
+ * thread, that is very probably wrong. Prefer a later comm to avoid
+ * that case.
+ */
+if (second_last && !last->start && thread->pid_ == thread->tid)
+return second_last;
+
return last;
}
static int record_saved_cmdline(void)
{
    unsigned int size;
    unsigned long long size;
    char *path;
    struct stat st;
    int ret, err = 0;
    @ @ -532.12 +532.14 @@
    "/tmp/perf-XXXXXX");
    if (!mkstemp(tdata->temp_file)) {
        pr_debug("Can't make temp file");
        +free(tdata);
        return NULL;
    }
    temp_fd = open(tdata->temp_file, O_RDWR);
    if (temp_fd < 0) {
        pr_debug("Can't read '%s'", tdata->temp_file);
        +free(tdata);
        return NULL;
    }

    --- linux-4.15.0.orig/tools/perf/util/trace-event-read.c
    +++ linux-4.15.0/tools/perf/util/trace-event-read.c
    @@ -349,9 +349,12 @@
    for (x=0; x < count; x++) {
        size = read8(pevent);
        ret = read_event_file(pevent, sys, size);
        -if (ret)
        +if (ret) {
            +free(sys);
            return ret;
        +}
    }
    +free(sys);
    return 0;
}
parse_saved_cmdline(pevent, buf, size);
ret = 0;
--- linux-4.15.0.orig/tools/perf/util/trigger.h
+++ linux-4.15.0/tools/perf/util/trigger.h
@@ -12,7 +12,7 @@
  * States and transits:
  *
  * - * OFF--(on)---> READY --(hit)---> HIT
+ * OFF---> ON --> READY --(hit)---> HIT
   *
   *  ^               |
   *               (ready)
@@ -27,8 +27,9 @@
 volatile enum {
  TRIGGER_ERROR = -2,
  TRIGGER_OFF = -1,
-TRIGGER_READY = 0,
-TRIGGER_HIT = 1,
+TRIGGER_ON = 0,
+TRIGGER_READY = 1,
+TRIGGER_HIT = 2,
 } state;
 const char *name;
};
@@ -50,7 +51,7 @@
 static inline void trigger_on(struct trigger *t)
 { 
  TRIGGER_WARN_ONCE(t, TRIGGER_OFF);
-  t->state = TRIGGER_READY;
+  t->state = TRIGGER_ON;
 } 
 
 static inline void trigger_ready(struct trigger *t)
--- linux-4.15.0.orig/tools/perf/util/unwind-libdw.c
+++ linux-4.15.0/tools/perf/util/unwind-libdw.c
@@ -44,13 +44,13 @@
 Dwarf_Addr s;
dwfl_module_info(mod, NULL, &s, NULL, NULL, NULL, NULL, NULL, NULL);
-if (s != al->map->start)
+if (s != al->map->start - al->map->pgoff)
  mod = 0;
 }

 if (!mod)
 mod = dwfl_report_elf(ui->dwfl, dso->short_name,
- dso->long_name, -1, al->map->start,
+        dso->long_name, -1, al->map->start - al->map->pgoff, false);

return mod && dwfl_addrmodule(ui->dwfl, ip) == mod ? 0 : -1;
@@ -76,7 +76,7 @@
    if (__report_module(&al, ip, ui))
        return -1;

-e->ip  = al.addr;
+e->ip  = ip;
    e->map = al.map;
    e->sym = al.sym;

--- linux-4.15.0.orig/tools/perf/util/unwind-libunwind-local.c
+++ linux-4.15.0/tools/perf/util/unwind-libunwind-local.c
@@ -589,7 +589,7 @@
    thread__find_addr_location(thread, PERF_RECORD_MISC_USER, MAP__FUNCTION, ip, &al);

-e.ip = al.addr;
+e.ip = ip;
    e.map = al.map;
    e.sym = al.sym;

@@ -631,9 +631,8 @@

static int _unwind__prepare_access(struct thread *thread)
{
    -if (callchain_param.record_mode != CALLCHAIN_DWARF)
+    if (!dwarf_callchain_users)
        return 0;
    
    thread->addr_space = unw_create_addr_space(&accessors, 0);
    if (!thread->addr_space) {
@@ -646,17 +645,15 @@

static void _unwind__flush_access(struct thread *thread)
{
    -if (callchain_param.record_mode != CALLCHAIN_DWARF)
+    if (!dwarf_callchain_users)
        return;
    
    unw_flush_cache(thread->addr_space, 0, 0);
}

static void _unwind__finish_access(struct thread *thread)
{
-if (callchain_param.record_mode != CALLCHAIN_DWARF)
+if (!(dwarf_callchain_users)
    return;
-
    unw_destroy_addr_space(thread->addr_space);
}

--- linux-4.15.0.orig/tools/perf/util/util.c
+++ linux-4.15.0/tools/perf/util/util.c
@@ -210,7 +210,7 @@
size -= ret;
off_in += ret;
-off_out -= ret;
+off_out += ret;
}
munmap(ptr, off_in + size);

--- linux-4.15.0.orig/tools/perf/util/util.h
+++ linux-4.15.0/tools/perf/util/util.h
@@ -23,7 +23,7 @@
return calloc(1, size);
}

-#define zfree(ptr) ({ free(*ptr); *ptr = NULL; })
+#define zfree(ptr) ({ free((void *)*ptr); *ptr = NULL; })

struct dirent;
struct strlist;
@@ -55,6 +55,10 @@
const char *perf_tip(const char *dirpath);

+#ifndef HAVE_GET_CURRENT_DIR_NAME
+char *get_current_dir_name(void);
+#endif
+
#ifndef HAVE_SCHED_GETCPU_SUPPORT
int sched_getcpu(void);
#endif

--- linux-4.15.0.orig/tools/perf/xyarray.h
+++ linux-4.15.0/tools/perf/xyarray.h
@@ -2,6 +2,7 @@
#ifndef _PERF_XYARRAY_H_
#include <linux/compiler.h>
#include <sys/types.h>
struct xyarray {
  size_t entries;
  size_t max_x;
  size_t max_y;
  char contents[] __aligned(8);
};

struct xyarray *xyarray_new(int xlen, int ylen, size_t entry_size);

OUTPUT=$(srctree)/
ifeq ("$(origin O)", "command line")
  OUTPUT := $(O)/power/acpi/
endif

cc-supports = $(shell if $(CC) $(1) -S -o /dev/null -x c /dev/null > /dev/null 2>&1; then echo "$(1)"; fi;)

current_action++;
if (current_action > AP_MAX_ACTIONS) {
  fprintf(stderr, "Too many table options (max %u)\n",
  +fprintf(stderr, "Too many table options (max %d)\n",
  AP_MAX_ACTIONS);
  return (-1);
}

---
ifeq ($(strip $(STATIC)),true)
LIBS = -L../ -L$(OUTPUT) -lm
OBJS = $(OUTPUT)main.o $(OUTPUT)parse.o $(OUTPUT)system.o $(OUTPUT)benchmark.o \
- $(OUTPUT)/lib/cpufreq.o $(OUTPUT)/lib/sysfs.o
+ $(OUTPUT)/lib/cpufreq.o $(OUTPUT)/lib/cpupower.o
else
LIBS = -L../ -L$(OUTPUT) -lm -lcpupower
OBJS = $(OUTPUT)main.o $(OUTPUT)parse.o $(OUTPUT)system.o $(OUTPUT)benchmark.o
--- linux-4.15.0.orig/tools/power/cpufreq.c
+++ linux-4.15.0/tools/power/cpufreq.c
@@ -28,7 +28,7 @@
    snprintf(path, sizeof(path), PATH_TO_CPU "cpu%u/cpufreq/%s",
        cpu, fname);
    return sysfs_read_file(path, buf, buflen);
+    return cpupower_read_sysfs(path, buf, buflen);
}

/* helper function to write a new value to a /sys file */
--- linux-4.15.0.orig/tools/power/cpuidle.c
+++ linux-4.15.0/tools/power/cpuidle.c
@@ -319,7 +319,7 @@
    snprintf(path, sizeof(path), PATH_TO_CPU "cpuidle/%s", fname);
    return sysfs_read_file(path, buf, buflen);
+    return cpupower_read_sysfs(path, buf, buflen);
}

--- linux-4.15.0.orig/tools/power/cpupower.c
+++ linux-4.15.0/tools/power/cpupower.c
@@ @ -15,7 +15,7 @@
 #include "cpupower.h"
 #include "cpupower_intern.h"

-unsigned int sysfs_read_file(const char *path, char *buf, size_t buflen)
+unsigned int cpupower_read_sysfs(const char *path, char *buf, size_t buflen)
{
    int fd;
    ssize_t numread;
    @@ @ -95,7 +95,7 @@
    ssize_t numread;
    @@ @ -95,7 +95,7 @@
    snprintf(path, sizeof(path), PATH_TO_CPU "cpu%u/topology/%s",
        cpu, fname);
    -if (sysfs_read_file(path, linebuf, MAX_LINE_LEN) == 0)
+    if (cpupower_read_sysfs(path, linebuf, MAX_LINE_LEN) == 0)
        return -1;
*result = strtol(linebuf, &endp, 0);
if (endp == linebuf || errno == ERANGE)
--- linux-4.15.0.orig/tools/power/cpupower/lib/cpupower_intern.h
+++ linux-4.15.0/tools/power/cpupower/lib/cpupower_intern.h
@@ -3,4 +3,4 @@
#define MAX_LINE_LEN 4096
#define SYSFS_PATH_MAX 255

-unsigned int sysfs_read_file(const char *path, char *buf, size_t buflen);
+unsigned int cpupower_read_sysfs(const char *path, char *buf, size_t buflen);
--- linux-4.15.0.orig/tools/power/cpupower/utils/cpufreq-info.c
+++ linux-4.15.0/tools/power/cpupower/utils/cpufreq-info.c
@@ -200,6 +200,8 @@
 printf(_("    Boost States: %d\n"), b_states);
 printf(_("    Total States: %d\n"), pstate_no);
 for (i = 0; i < pstate_no; i++) {
+if (!pstates[i])
+continue;

if (i < b_states)
printf(_("    Pstate-Pb%d: %luMHz (boost state)")
        "\n"), i, pstates[i]);
--- linux-4.15.0.orig/tools/power/cpupower/utils/cpufreq-set.c
+++ linux-4.15.0/tools/power/cpupower/utils/cpufreq-set.c
@@ -306,6 +306,8 @@
 bitmask_setbit(cpus_chosen, cpus->cpu);
 cpus = cpus->next;
}
+/* Set the last cpu in related cpus list */
+bitmask_setbit(cpus_chosen, cpus->cpu);
+cpufreq_put_related_cpus(cpus);
}
}
--- linux-4.15.0.orig/tools/power/cpupower/utils/helpers/amd.c
+++ linux-4.15.0/tools/power/cpupower/utils/helpers/amd.c
@@ -33,7 +33,7 @@
 unsigned vid:8;
 unsigned iddval:8;
 unsigned idddiv:2;
-unsigned res1:30;
+unsigned res1:31;
 unsigned en:1;
 } fam17h_bits;
 unsigned long long val;
@@ -119,6 +119,11 @@
 if (read_msr(cpu, MSR_AMD_PSTATE + i, &pstate.val))
 return -1;
+if ((cpu_family == 0x17) && (!pstate.fam17h_bits.en))
continue;
+else if (!pstate.bits.en)
+continue;
+
pstates[i] = get_cof(cpu_family, pstate);
}
*no = i;

--- linux-4.15.0.orig/tools/power/cpupower/utils/idle_monitor/amd_fam14h_idle.c
+++ linux-4.15.0/tools/power/cpupower/utils/idle_monitor/amd_fam14h_idle.c
@@ -83,7 +83,7 @@
 static struct pci_dev *amd_fam14h_pci_dev;
 static int nbpl1_entered;

-struct timespec start_time;
+static struct timespec start_time;
 static unsigned long long timediff;

 ifndef DEBUG
 --- linux-4.15.0.orig/tools/power/cpupower/utils/idle_monitor/cpuidle_sysfs.c
+++ linux-4.15.0/tools/power/cpupower/utils/idle_monitor/cpuidle_sysfs.c
@@ -21,7 +21,7 @@
 static unsigned long long **previous_count;
 static unsigned long long **current_count;
-struct timespec start_time;
+static struct timespec start_time;
 static unsigned long long timediff;

 static int cpuidle_get_count_percent(unsigned int id, double *percent,
 @@ -126,6 +126,20 @@
 }
 }

+#ifdef __powerpc__
+void map_power_idle_state_name(char *tmp)
+{  
+if (!strncmp(tmp, "stop0_lite", CSTATE_NAME_LEN))
+strcpy(tmp, "stop0L");
+else if (!strncmp(tmp, "stop1_lite", CSTATE_NAME_LEN))
+strcpy(tmp, "stop1L");
+else if (!strncmp(tmp, "stop2_lite", CSTATE_NAME_LEN))
+strcpy(tmp, "stop2L");
+}
+#else
+void map_power_idle_state_name(char *tmp) { }  
+#endif
+
 static struct cpuidle_monitor *cpuidle_register(void)
int num;
if (tmp == NULL)
    continue;

+map_power_idle_state_name(tmp);
fix_up_intel_idle_driver_name(tmp, num);
strncpy(cpuidle_cstates[num].name, tmp, CSTATE_NAME_LEN - 1);
free(tmp);
--- linux-4.15.0.orig/tools/power/cpupower/utils/idle_monitor/cpupower-monitor.c
+++ linux-4.15.0/tools/power/cpupower/utils/idle_monitor/cpupower-monitor.c
@@ -145,6 +159,7 @@
if (tmp == NULL)
        continue;
    map_power_idle_state_name(tmp);
    fix_up_intel_idle_driver_name(tmp, num);
    strncpy(cpuidle_cstates[num].name, tmp, CSTATE_NAME_LEN - 1);
    free(tmp);

int cpu_count;
static struct cpuidle_monitor *monitors[MONITORS_MAX];
static unsigned int avail_monitors;

@@ -29,6 +29,8 @@
    printf(" ");
}

/* size of s must be at least n + 1 */
/*s is filled with left and right spaces
 *to make its length atleast n+1
 * /
int fill_string_with_spaces(char *s, int n)
{
    char *temp;
    int len = strlen(s);
    -if (len > n)
    +
        +if (len >= n)
    return -1;
    +
    +temp = malloc(sizeof(char) * (n+1));
    for (; len < n; len++)
        s[len] = '\0';
    +snprintf(temp, n+1, "%s", s);
    +strncpy(s, temp);
    +free(temp);
    return 0;
}
```c
#define MAX_COL_WIDTH 6
void print_header(int topology_depth) {
    int unsigned mon;
    int state, need_len;
    cstate_t s;
    char buf[128] = "";
    -int percent_width = 4;
    fill_string_with_spaces(buf, topology_depth * 5 - 1);
    printf("%s|", buf);

    for (mon = 0; mon < avail_monitors; mon++) {
        -need_len = monitors[mon]->hw_states_num * (percent_width + 3)
        +need_len = monitors[mon]->hw_states_num * (MAX_COL_WIDTH + 1)
        - 1;
        -if (mon != 0) {
            -printf("|" );
            -need_len--;
        -}
+if (mon != 0)
+printf("|" );
        sprintf(buf, "%s", monitors[mon]->name);
        fill_string_with_spaces(buf, need_len);
        printf("%s", buf);
    }

    if (topology_depth > 2)
        -printf("PKG |" );
    +printf(" PKG|" );
    if (topology_depth > 1)
        printf("CORE|" );
    if (topology_depth > 0)
        -printf("CPU |");
    +printf(" CPU|" );

    for (mon = 0; mon < avail_monitors; mon++) {
        if (mon != 0)
            -printf("|" );
        else
            -printf(" ");
        +printf("|" );
        for (state = 0; state < monitors[mon]->hw_states_num; state++) {
            if (state != 0)
                -printf(" | ");
            +printf(" |");
            s = monitors[mon]->hw_states[state];
```
sprintf(buf, "%s", s.name);
- fill_string_with_spaces(buf, percent_width);
+ fill_string_with_spaces(buf, MAX_COL_WIDTH);
printf("%s", buf);
}
printf(" ");
--- linux-4.15.0.orig/tools/power/cpupower/utils/idle_monitor/cpupower-monitor.h
+++ linux-4.15.0/tools/power/cpupower/utils/idle_monitor/cpupower-monitor.h
@@ -15,10 +15,19 @@
#define MONITORS_MAX 20
#define MONITOR_NAME_LEN 20
+
+/* CSTATE_NAME_LEN is limited by header field width defined
+ * in cpupower-monitor.c. Header field width is defined to be
+ * sum of percent width and two spaces for padding.
+ */
+#ifndef __powerpc__
+#if CSTATE_NAME_LEN 7
+else
+#define CSTATE_NAME_LEN 5
+endif
+#endif
#define CSTATE_DESC_LEN 60

-int cpu_count;
+extern int cpu_count;

/* Hard to define the right names ...: */
enum power_range_e {
- --- linux-4.15.0.orig/tools/power/cpupower/utils/idle_monitor/hsw_ext_idle.c
- +++ linux-4.15.0/tools/power/cpupower/utils/idle_monitor/hsw_ext_idle.c
- @ @ -40,7 +40,6 @@
- }
- .name= "PC9",
- .desc= N_("Processor Package C9"),
- .desc= N_("Processor Package C2"),
- .id= PC9,
- .range= RANGE_PACKAGE,
- .get_count_percent= hsw_ext_get_count_percent,
- --- linux-4.15.0.orig/tools/power/x86/intel_pstate_tracer/intel_pstate_tracer.py
- +++ linux-4.15.0/tools/power/x86/intel_pstate_tracer/intel_pstate_tracer.py
- @ @ -10,11 +10,11 @@
and generates performance plots.

Prerequisites:
- Python version 2.7.x
+ Python version 2.7.x or higher
gnuplot 5.0 or higher
- gnuplot-py 1.8
+ gnuplot-py 1.8 or higher
   (Most of the distributions have these required packages. They may be called
- gnuplot-py, python-gnuplot. )
+ gnuplot-py, python-gnuplot or python3-gnuplot, gnuplot-nox, ... )

HWP (Hardware P-States are disabled)
Kernel config for Linux trace is enabled
@@ -178,7 +178,7 @@
g_plot('set xlabel "Samples"
     g_plot('set ylabel "P-State"
     g_plot('set title "{} : cpu pstate vs. sample : {:%F %H:%M}"'.format(testname, datetime.now()))
-    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).replace(\n', '')
+    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).decode('utf-8').replace(\n', '')
     plot_str = "plot for [i in title_list] i:\.csv' using {d}:{d} pt 7 ps 1 title i".format(C_SAMPLE, C_TO)
     g_plot('title_list = "{}"'.format(title_list))
     g_plot(plot_str)
@@ -195,7 +195,7 @@
#    the following command is really cool, but doesn't work with the CPU masking option because it aborts on the
first missing file.
#    plot_str = 'plot for [i=0:*] file=sprintf("cpu%03d.csv",i) title_s=sprintf("cpu%03d",i) file using 16:7 pt 7 ps 1
title title_s'
#    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).replace(\n', '')
    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).decode('utf-8').replace(\n', '')
    plot_str = "plot for [i in title_list] i:\.csv' using {d}:{d} pt 7 ps 1 title i".format(C_ELAPSED, C_TO)
    g_plot('title_list = "{}"'.format(title_list))
    g_plot(plot_str)
@@ -209,7 +209,7 @@
g_plot('set ylabel "CPU load (percent)"
     g_plot('set title "{} : cpu loads : {:%F %H:%M}"'.format(testname, datetime.now()))
-    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).replace(\n', '')
+    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).decode('utf-8').replace(\n', '')
    plot_str = "plot for [i in title_list] i:\.csv' using {d}:{d} pt 7 ps 1 title i".format(C_ELAPSED, C_LOAD)
    g_plot('title_list = "{}"'.format(title_list))
    g_plot(plot_str)
@@ -223,7 +223,7 @@
g_plot('set ylabel "CPU Frequency (GHz)"
     g_plot('set title "{} : cpu frequencies : {:%F %H:%M}"'.format(testname, datetime.now()))
-    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).replace(\n', '')
+    title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv//,shell=True).decode('utf-8').replace(\n', '')
    plot_str = "plot for [i in title_list] i:\.csv' using {d}:{d} pt 7 ps 1 title i".format(C_ELAPSED, C_FREQ)
    g_plot('title_list = "{}"'.format(title_list))
    g_plot(plot_str)
@@ -238,7 +238,7 @@

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g_plot('set ylabel "Timer Duration (Milliseconds)"

- title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv/\n',shell=True).replace('n', '')
+ title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv/\n',shell=True).decode('utf-8').replace('n', '')
plot_str = "plot for [i in title_list] i'.csv' using[:,:] pt 7 ps 1 title i".format(C_ELAPSED, C_DURATION)
g_plot(title_list = "["],format(title_list))
g_plot(plot_str)

- title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv/\n',shell=True).replace('n', '')
+ title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv/\n',shell=True).decode('utf-8').replace('n', '')
plot_str = "plot for [i in title_list] i'.csv' using[:,:] pt 7 ps 1 title i".format(C_ELAPSED, C_SCALED)
g_plot(title_list = "["],format(title_list))
g_plot(plot_str)

- title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv/\n',shell=True).replace('n', '')
+ title_list = subprocess.check_output('ls cpu???.csv | sed -e \s/csv/\n',shell=True).decode('utf-8').replace('n', '')
plot_str = "plot for [i in title_list] i'.csv' using[:,:] pt 7 ps 1 title i".format(C_ELAPSED, C_BOOST)
g_plot(title_list = "["],format(title_list))
g_plot(plot_str)

--- linux-4.15.0.orig/tools/power/x86/turbostat/Makefile
+++ linux-4.15.0/tools/power/x86/turbostat/Makefile
@@ -9,7 +9,7 @@
turbostat : turbostat.c
-CFLAGS +=-Wall
+CFLAGS +=-Wall -I../include
CFLAGS +=-DMSRHEADER="../../arch/x86/include/asm/msr-index.h"
CFLAGS +=-DINTEL_FAMILY_HEADER="../../arch/x86/include/asm/intel-family.h"

--- linux-4.15.0.orig/tools/power/x86/turbostat/turbostat.c
if (!printed || !summary_only)
    print_header("\t");

    -if (topo.num_cpus > 1)
    -format_counters(&average.threads, &average.cores,
    -&average.packages);
+format_counters(&average.threads, &average.cores, &average.packages);

    printed = 1;

@@ -1487,7 +1485,7 @@
    if (get_msr(cpu, mp->msr_num, counterp))
        return -1;
    } else {
-    char path[128];
+    char path[128 + PATH_BYTES];

        if (mp->flags & SYSFS_PERCPU)
            sprintf(path, "/sys/devices/system/cpu/cpu%d/%s",
@@ -1756,11 +1754,12 @@
#define PCL_7S 11 /* PC7 Shrink */
#define PCL__8 12 /* PC8 */
#define PCL__9 13 /* PC9 */
-#define PCLUNL 14 /* Unlimited */
+#define PCL_10 14 /* PC10 */
+#define PCLUNL 15 /* Unlimited */

        int pkg_cstate_limit = PCLUKN;
        char *pkg_cstate_limit_strings[] = { "reserved", "unknown", "pc0", "pc1", "pc2",
-"pc3", "pc4", "pc6", "pc6n", "pc6r", "pc7", "pc7s", "pc8", "pc9", "unlimited"};
+"pc3", "pc4", "pc6", "pc6n", "pc6r", "pc7", "pc7s", "pc8", "pc9", "pc10", "unlimited"};

        int nhm_pkg_cstate_limits[16] = {PCL__0, PCL__1, PCL__3, PCL__6, PCL__7, PCLRSV, PCLRSV, PCLUNL,
PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV};
        int snb_pkg_cstate_limits[16] = {PCL__0, PCL__2, PCL__4, PCL__7, PCLRSV, PCLRSV, PCLUNL,
PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV};
@@ -1768,7 +1767,7 @@
        int slv_pkg_cstate_limits[16] = {PCL__0, PCL__1, PCL__2, PCL__6N, PCL__6R, PCL__7, PCL__7S, PCLRSV, PCLUNL,
PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV};
@@ -1768,7 +1767,7 @@
        int amt_pkg_cstate_limits[16] = {PCL__0, PCL__1, PCL__2, PCL__4, PCLRSV, PCLRSV, PCL__6, PCL__7,
PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV};
        int phi_pkg_cstate_limits[16] = {PCLUNL, PCL__1, PCL__2, PCLRSV, PCLRSV, PCL__6, PCL__7,
PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV};
        int bxt_pkg_cstate_limits[16] = {PCL__0, PCL__2, PCLUNL, PCLRSV, PCLRSV, PCLRSV, PCLRSV, PCLRSV};
        int glm_pkg_cstate_limits[16] = {PCLUNL, PCL__1, PCL__3, PCL__6, PCL__7, PCL__7S, PCL__8, PCL__9,
@@ -1885,7 +1884,7 @@
switch (model) {
    case INTEL_FAM6_ATOM_GOLDMONT:
    case INTEL_FAM6_SKYLAKE_X:
-        case INTEL_FAM6_ATOM_DENVERTON:
+        case INTEL_FAM6_ATOM_GOLDMONT_X:
            return 1;
    }
    return 0;
@@ -2747,9 +2746,9 @@
    pkg_cstate_limits = skx_pkg_cstate_limits;
    has_misc_feature_control = 1;
    break;
-        case INTEL_FAM6_ATOM_SILVERMONT1:/* BYT */
+        case INTEL_FAM6_ATOM_SILVERMONT:/* BYT */
        no_MSR_MISC_PWR_MGMT = 1;
-        case INTEL_FAM6_ATOM_SILVERMONT2:/* AVN */
+        case INTEL_FAM6_ATOM_SILVERMONT_X:/* AVN */
        pkg_cstate_limits = slv_pkg_cstate_limits;
        break;
    case INTEL_FAM6_ATOM_AIRMONT:/* AMT */
@@ -2761,9 +2760,9 @@
    pkg_cstate_limits = phi_pkg_cstate_limits;
    break;
    case INTEL_FAM6_ATOM_GOLDMONT:/* BXT */
-        case INTEL_FAM6_ATOM_GEMINI_LAKE:
-        case INTEL_FAM6_ATOM_DENVERTON:/* DNV */
-        pkg_cstate_limits = bxt_pkg_cstate_limits;
+        case INTEL_FAM6_ATOM_GOLDMONT_PLUS:
+        case INTEL_FAM6_ATOM_GOLDMONT_X:/* DNV */
+        pkg_cstate_limits = glm_pkg_cstate_limits;
        break;
    default:
        return 0;
@@ -2791,9 +2790,9 @@
    return 0;

switch (model) {
-        case INTEL_FAM6_ATOM_SILVERMONT1:
-        case INTEL_FAM6_ATOM_MERRIFIELD:
-        case INTEL_FAM6_ATOM_MOOREFIELD:
+        case INTEL_FAM6_ATOM_SILVERMONT:
+        case INTEL_FAM6_ATOM_SILVERMONT_MID:

+case INTEL_FAM6_ATOM_AIRMONT_MID:
  return 1;
}
return 0;
@@ -2805,7 +2804,7 @@
return 0;
switch (model) {
-  case INTEL_FAM6_ATOM_DENVERTON:
+  case INTEL_FAM6_ATOM_GOLDMONT_X:
    return 1;
  }
return 0;
@@ -3321,8 +3320,8 @@
return ((msr >> 0) & RAPL_POWER_GRANULARITY) * rapl_power_units;
switch (model) {
-  case INTEL_FAM6_ATOM_SILVERMONT1:
-    case INTEL_FAM6_ATOM_SILVERMONT2:
+  case INTEL_FAM6_ATOM_SILVERMONT:
+    case INTEL_FAM6_ATOM_SILVERMONT_X:
      return 30.0;
    default:
      return 135.0;
@@ -3446,8 +3445,8 @@
      BIC_PRESENT(BIC_RAMWatt);
    break;
  case INTEL_FAM6_ATOM_GOLDMONT: /* BXT */
-    case INTEL_FAM6_ATOM_GEMINI_LAKE:
+    case INTEL_FAM6_ATOM_GOLDMONT_PLUS:
      do_rapl = RAPL_PKG | RAPL_PKG_POWER_INFO;
      if (rapl_joules)
        BIC_PRESENT(BIC_Pkg_J);
@@ -3457,7 +3456,7 @@
        BIC_PRESENT(BIC_CorWatt);
      }
    break;
-  case INTEL_FAM6_ATOM_SILVERMONT1: /* BYT */
-    case INTEL_FAM6_ATOM_SILVERMONT2: /* AVN */
+  case INTEL_FAM6_ATOM_SILVERMONT: /* BYT */
+    case INTEL_FAM6_ATOM_SILVERMONT_X: /* AVN */
      do_rapl = RAPL_PKG | RAPL_CORES;
      if (rapl_joules) {
        BIC_PRESENT(BIC_Pkg_J);
@@ -3507,7 +3506,7 @@
        BIC_PRESENT(BIC_CorWatt);
      }
    break;
-case INTEL_FAM6_ATOM_DENVERTON: /* DNV */
+case INTEL_FAM6_ATOM_GOLDMONT_X: /* DNV */
do_rapl = RAPL_PKG | RAPL_DRAM | RAPL_DRAM_POWER_INFO | RAPL_DRAM_PERF_STATUS |
RAPL_PKG_PERF_STATUS | RAPL_PKG_POWER_INFO | RAPL_CORES_ENERGY_STATUS;
BIC_PRESENT(BIC_PKG__);
BIC_PRESENT(BIC_RAM__);
@@ -3480,7 +3479,7 @@ return;
rapl_power_units = 1.0 / (1 << (msr & 0xF));
-if (model == INTEL_FAM6_ATOM_SILVERMONT1)
+if (model == INTEL_FAM6_ATOM_SILVERMONT)
rapl_energy_units = 1.0 * (1 << (msr >> 8 & 0x1F)) / 1000000;
else
rapl_energy_units = 1.0 / (1 << (msr >> 8 & 0x1F));
@@ -3730,8 +3729,8 @@ return 1;
} return 0;
@@ -3762,7 +3761,7 @@ case INTEL_FAM6_ATOM_GOLDMONT: /* BXT */
-case INTEL_FAM6_ATOM_GEMINI_LAKE:
-case INTEL_FAM6_ATOM_DENVERTON: /* DNV */
+case INTEL_FAM6_ATOM_GOLDMONT_PLUS:
+case INTEL_FAM6_ATOM_GOLDMONT_X: /* DNV */
return 1;
}
return 0;
@@ -4031,7 +4030,9 @@
family = (fms >> 8) & 0xf;

-
model = (fms >> 4) & 0xf;
stepping = fms & 0xf;
-if (family == 6 || family == 0xf)
+if (family == 0xf)
+f = (fms >> 20) & 0xff;
+if (family >= 6)
model += ((fms >> 16) & 0xf) << 4;

if (!quiet) {
@@ -4153,11 +4154,11 @@
crystal_hz = 24000000; /* 24.0 MHz */
break;
case INTEL_FAM6_SKYLAKE_X; /* SKX */
-case INTEL_FAM6_ATOM_DENVERTON; /* DNV */
+case INTEL_FAM6_ATOM_GOLDMONT_X; /* DNV */
crystal_hz = 25000000; /* 25.0 MHz */
break;
case INTEL_FAM6_ATOM_GOLDMONT; /* BXT */
-case INTEL_FAM6_ATOM_GEMINI_LAKE;
+case INTEL_FAM6_ATOM_GOLDMONT_PLUS:
crystal_hz = 19200000; /* 19.2 MHz */
break;
default:
@@ -4488,7 +4489,7 @@
void allocate_output_buffer()
{
-output_buffer = calloc(1, (1 + topo.num_cpus) * 1024);
+output_buffer = calloc(1, (1 + topo.num_cpus) * 2048);
outp = output_buffer;
if (outp == NULL)
err(-1, "calloc output buffer");
@@ -4588,6 +4589,9 @@
signal(SIGQUIT, SIG_IGN);
if (waitpid(child_pid, &status, 0) == -1)
err(status, "waitpid");
+
+if (WIFEXITED(status))
+status = WEXITSTATUS(status);
}

/*
 * n.b. fork_it() does not check for errors from for_all_cpus()
@@ -4647,9 +4651,9 @@

msrp->msr_num = msr_num;
-strncpy(msrp->name, name, NAME_BYTES);
+strncpy(msrp->name, name, NAME_BYTES - 1);
if (path)
strarcpy(msrp->path, path, PATH_BYTES);
+strncpy(msrp->path, path, PATH_BYTES - 1);
msrp->width = width;
msrp->type = type;
msrp->format = format;
--- linux-4.15.0.orig/tools/power/x86/x86_energy_perf_policy/Makefile
+++ linux-4.15.0/tools/power/x86/x86_energy_perf_policy/Makefile
@@ -9,7 +9,7 @@
endif

x86_energy_perf_policy : x86_energy_perf_policy.c
-CFLAGS +=-Wall
+CFLAGS +=-Wall -I../../../include
CFLAGS +=DMSRHEADER="../../../../arch/x86/include/asm/msr-index.h"

%: %.c
--- linux-4.15.0.orig/tools/power/x86/x86_energy_perf_policy/x86_energy_perf_policy.c
+++ linux-4.15.0/tools/power/x86/x86_energy_perf_policy/x86_energy_perf_policy.c
@@ -546,7 +546,7 @@
progname = argv[0];

-while ((opt = getopt_long_only(argc, argv, "+a:c:dD:E:e:f:m:M:rt:u:vw",
+while ((opt = getopt_long_only(argc, argv, "+a:c:dD:E:e:f:m:M:rt:u:vw:",
long_options, &option_index)) != -1) {
switch (opt) {
    case 'a':
@@ -1260,6 +1260,15 @@
if (system("/sbin/modprobe msr > /dev/null 2>&1"))
err(-5, "no /dev/cpu/0/msr, Try \"# modprobe msr\"");
}
+
+static void get_cpuid_or_exit(unsigned int leaf,
+    unsigned int *eax, unsigned int *ebx,
+    unsigned int *ecx, unsigned int *edx)
+{
+if (!__get_cpuid(leaf, eax, ebx, ecx, edx))
+errx(1, "Processor not supported\n");
+}
+
/*
 * early_cpuid()
 * initialize turbo_is_enabled, has_hwp, has_epb
@@ -1267,15 +1276,10 @@
*/
void early_cpuid(void)
{
unsigned int eax, ebx, ecx, edx, max_level;
unsigned int eax, ebx, ecx, edx;
unsigned int fms, family, model;

__get_cpuid(0, &max_level, &ebx, &ecx, &edx);

if (max_level < 6)
  errx(1, "Processor not supported\n");

__get_cpuid(1, &fms, &ebx, &ecx, &edx);
get_cpuid_or_exit(1, &fms, &ebx, &ecx, &edx);
family = (fms >> 8) & 0xf;
model = (fms >> 4) & 0xf;
if (family == 6 || family == 0xf)
  @ @ -1289.7 +1293.7 @@
bdx_highest_ratio = msr & 0xFF;
}

__get_cpuid(0x6, &eax, &ebx, &ecx, &edx);
get_cpuid_or_exit(0x6, &eax, &ebx, &ecx, &edx);
turbo_is_enabled = (eax >> 1) & 1;
has_hwp = (eax >> 7) & 1;
has_epb = (ecx >> 3) & 1;
@ @ -1307.7 +1311.7 @@
eax = ebx = ecx = edx = 0;

__get_cpuid(0, &max_level, &ebx, &ecx, &edx);
get_cpuid_or_exit(0, &max_level, &ebx, &ecx, &edx);
if (ebx == 0x756e6547 && edx == 0x49656e69 && ecx == 0x6c65746e)
genuine_intel = 1;
@ @ -1316.7 +1320.7 @@
fprintf(stderr, "CPUID(0): %.4s%.4s%.4s ",
(char *)&ebx, (char *)&edx, (char *)&ecx);

__get_cpuid(1, &fms, &ebx, &ecx, &edx);
get_cpuid_or_exit(1, &fms, &ebx, &ecx, &edx);
family = (fms >> 8) & 0xf;
model = (fms >> 4) & 0xf;
stepping = fms & 0xf;
@ @ -1341.7 +1345.7 @@
errx(1, "CPUID: no MSR");

__get_cpuid(0x6, &eax, &ebx, &ecx, &edx);
get_cpuid_or_exit(0x6, &eax, &ebx, &ecx, &edx);
/* turbo_is_enabled already set */
/* has_hwp already set */
has_hwp_notify = eax & (1 << 8);
--- linux-4.15.0.orig/tools/scripts/Makefile.include
+++ linux-4.15.0/tools/scripts/Makefile.include
@@ -1,8 +1,8 @@
# SPDX-License-Identifier: GPL-2.0
ifneq ($O),
ifeq ($origin O), command line
-dummy := $(if $($(shell test -d $(O) || echo $(O)),$(error O=$(O) does not exist),)
-ABSOLUTE_O := $(shell cd $(O) ; pwd)
+dummy := $(if $($(shell cd $(PWD); test -d $(O) || echo $(O)),$(error O=$(O) does not exist),)
+ABSOLUTE_O := $(shell cd $(PWD); cd $(O) ; pwd)
OUTPUT := $(ABSOLUTE_O)/$(if $(subdir),$dir)/
COMMAND_O := O=$(ABSOLUTE_O)
ifeq ($objtree),
@@ -42,6 +42,34 @@
CC_NO_CLANG := $(shell $(CC) -dM -E -x c /dev/null | grep -Fq "__clang__"; echo $$?)

+# Makefiles suck: This macro sets a default value of $2 for the
+# variable named by $1, unless the variable has been set by
+# environment or command line. This is necessary for CC and AR
+# because make sets default values, so the simpler ?= approach
+# won't work as expected.
+define allow-override
+ $(if $(or $(findstring environment,$(origin $(1))),
+                $(findstring command line,$(origin $(1)))),,
+    $(eval $(1) = $(2)))
+endef
+
+# Allow setting various cross-compile vars or setting CROSS_COMPILE as a prefix.
+$($(call allow-override,CC,$(CROSS_COMPILE)gcc))
+$($(call allow-override,AR,$(CROSS_COMPILE)ar))
+$($(call allow-override,LD,$(CROSS_COMPILE)ld))
+$($(call allow-override,CXX,$(CROSS_COMPILE)g++))
+$($(call allow-override,STRIP,$(CROSS_COMPILE)strip))
+
+ifeq ($(LLVM),)
+HOSTAR  ?= llvm-ar
+HOSTCC  ?= clang
+HOSTLD  ?= ld.lld
+else
+HOSTAR  ?= ar
+HOSTCC  ?= gcc
+HOSTLD  ?= ld
+endif
+
ifeq ($(CC_NO_CLANG), 1)
EXTRA_WARNINGS += -Wstrict-aliasing=3
endif
@@ -101,3 +129,5 @@
QUIET_INSTALL = @printf 'INSTALL %s
' $1;
endif
endif
+
pound := 
--- linux-4.15.0.orig/tools/spi/Makefile
+++ linux-4.15.0/tools/spi/Makefile
@@ -11,8 +11,6 @@
# (this improves performance and avoids hard-to-debug behaviour);
MAKEFLAGS += -r

-CC = $(CROSS_COMPILE)gcc
-LD = $(CROSS_COMPILE)ld
CFLAGS += -O2 -Wall -g -D_GNU_SOURCE -I$(OUTPUT)include

ALL_TARGETS := spidev_test spidev_fdx
--- linux-4.15.0.orig/tools/testing/ktest/compare-ktest-sample.pl
+++ linux-4.15.0/tools/testing/ktest/compare-ktest-sample.pl
@@ -1,4 +1,4 @@
-#!/usr/bin/perl
+#!/usr/bin/env perl
# SPDX-License-Identifier: GPL-2.0
open (IN,"ktest.pl");
--- linux-4.15.0.orig/tools/testing/ktest/ktest.pl
+++ linux-4.15.0/tools/testing/ktest/ktest.pl
@@ -1345,7 +1345,7 @@
} else {
# Make sure everything has been written to disk
-run_ssh("sync");
+run_ssh("sync", 10);

if (defined($time)) {
    start_monitor;
--- linux-4.15.0.orig/tools/testing/nvdimm/pmem-dax.c
+++ linux-4.15.0/tools/testing/nvdimm/pmem-dax.c
@@ -31,17 +31,21 @@
if (get_nfit_res(pmem->phys_addr + offset)) {
    struct page *page;

    -*kaddr = pmem->virt_addr + offset;
+if (kaddr)
+    -*kaddr = pmem->virt_addr + offset;
    page = vmalloc_to_page(pmem->virt_addr + offset);
- *pfn = page_to_pfn_t(page);
+ *pfn = page_to_pfn_t(page);
    pr_debug_ratelimited("%s: pmem: %p pgoff: %#lx pfn: %#lx\n",
    __func__, pmem, pgoff, page_to_pfn(page));

    return 1;
}

- *kaddr = pmem->virt_addr + offset;
- *pfn = phys_to_pfn_t(pmem->phys_addr + offset, pmem->pfn_flags);
+ if (kaddr)
+   *kaddr = pmem->virt_addr + offset;
+ if (pfn)
+   *pfn = phys_to_pfn_t(pmem->phys_addr + offset, pmem->pfn_flags);

/*
 * If badblocks are present, limit known good range to the
--- linux-4.15.0.orig/tools/testing/nvdimm/test/iomap.c
+++ linux-4.15.0/tools/testing/nvdimm/test/iomap.c
@@ -114,7 +114,7 @@
    return nfit_res->buf + offset - nfit_res->res.start;
 return devm_memremap_pages(dev, res, ref, altmap);
 }
-EXPORT_SYMBOL(__wrap_devm_memremap_pages);
+EXPORT_SYMBOL_GPL(__wrap_devm_memremap_pages);

 pfnt __wrap_phys_to_pfn_t(phys_addr_t addr, unsigned long flags)
 {
--- linux-4.15.0.orig/tools/testing/nvdimm/test/nfit.c
+++ linux-4.15.0/tools/testing/nvdimm/test/nfit.c
@@ -174,6 +175,8 @@
     static struct workqueue_struct *nfit_wq;
+    static struct gen_pool *nfit_pool;
+    
+    static nfit_test *to_nfit_test(struct device *dev)
+    {
        struct platform_device *pdev = to_platform_device(dev);
list_del(&nfit_res->list);
spin_unlock(&nfit_test_lock);

+if (resource_size(&nfit_res->res) >= DIMM_SIZE)
+gen_pool_free(nfit_pool, nfit_res->res.start,
+resource_size(&nfit_res->res));
vfree(nfit_res->buf);
kfree(nfit_res);
}
@@ -716,7 +722,7 @@
GFP_KERNEL);
int rc;

-if (!buf || !nfit_res)
+if (!buf || !nfit_res || !*dma)
goto err;
rc = devm_add_action(dev, release_nfit_res, nfit_res);
if (rc)
@@ -736,6 +742,8 @@
return nfit_res->buf;
err:
+if (*dma && size >= DIMM_SIZE)
+gen_pool_free(nfit_pool, *dma, size);
if (buf)
vfree(buf);
kfree(nfit_res);
@@ -744,9 +752,16 @@
static void *test_alloc(struct nfit_test *t, size_t size, dma_addr_t *dma)
{
+struct genpool_data_align data = {
+.align = SZ_128M,
+};
void *buf = vmalloc(size);

-*dma = (unsigned long) buf;
+if (size >= DIMM_SIZE)
+*dma = gen_pool_alloc_algo(nfit_pool, size,
+gen_pool_first_fit_align, &data);
+else
+*dma = (unsigned long) buf;
return __test_alloc(t, size, dma, buf);
}
+nfit_pool = gen_pool_create(ilog2(SZ_4M), NUMA_NO_NODE);
+if (!nfit_pool) {
+rc = -ENOMEM;
+goto err_register;
++
+
+if (gen_pool_add(nfit_pool, SZ_4G, SZ_4G, NUMA_NO_NODE)) {
+rc = -ENOMEM;
+goto err_register;
++
+
for (i = 0; i < NUM_NFITS; i++) {
struct nfit_test *nfit_test;
struct platform_device *pdev;
    @@ -2226,6 +2252,9 @@
return 0;

err_register:
+if (nfit_pool)
+gen_pool_destroy(nfit_pool);
+
destroy_workqueue(nfit_wq);
for (i = 0; i < NUM_NFITS; i++)
if (instances[i])
    @@ -2249,6 +2278,8 @@
platform_driver_unregister(&nfit_test_driver);
nfit_test_teardown();

+gen_pool_destroy(nfit_pool);
+
for (i = 0; i < NUM_NFITS; i++)
put_device(&instances[i]->pdev.dev);
class_destroy(nfit_test_dimm);
--- linux-4.15.0.orig/tools/testing/radix-tree/idr-test.c
+++ linux-4.15.0/tools/testing/radix-tree/idr-test.c
@@ -177,6 +177,57 @@
idr_destroy(&idr);
}

+static inline void *idr_mk_value(unsigned long v)
+{
+BUG_ON((long)v < 0);
+return (void *)((v & 1) | 2 | (v << 1));
++
++DEFINE_IDR(find_idr);
static void *idr_throbber(void *arg)
{
    time_t start = time(NULL);
    int id = *(int *)arg;
    
    rcu_register_thread();
    
    do {
        idr_alloc(&find_idr, idr_mk_value(id), id, id + 1, GFP_KERNEL);
        idr_remove(&find_idr, id);
    } while (time(NULL) < start + 10);
    rcu_unregister_thread();
    
    return NULL;
}

void idr_find_test_1(int anchor_id, int throbber_id)
{
    pthread_t throbber;
    time_t start = time(NULL);
    
    pthread_create(&throbber, NULL, idr_throbber, &throbber_id);
    
    BUG_ON(idr_alloc(&find_idr, idr_mk_value(anchor_id), anchor_id, anchor_id + 1, GFP_KERNEL) != anchor_id);
    
    do {
        int id = 0;
        void *entry = idr_get_next(&find_idr, &id);
        BUG_ON(entry != idr_mk_value(id));
    } while (time(NULL) < start + 11);
    
    pthread_join(throbber, NULL);
    
    idr_remove(&find_idr, anchor_id);
    BUG_ON(!idr_is_empty(&find_idr));
    
    do {
        int id = 0;
        void *entry = idr_get_next(&find_idr, &id);
        BUG_ON(entry != idr_mk_value(id));
    } while (time(NULL) < start + 11);
    
    pthread_join(throbber, NULL);
    
    idr_remove(&find_idr, anchor_id);
    BUG_ON(!idr_is_empty(&find_idr));
    
    idr_find_test_1(100000, 0);
    idr_find_test_1(0, 100000);
    
    void idr_find_test(void)
    {
        idr_find_test_1(100000, 0);
        idr_find_test_1(0, 100000);
    }
    
    void idr_checks(void)
    {
        unsigned long i;
        @ @ -202.6 +253.13 @@
idr_remove(&idr, 3);
idr_remove(&idr, 0);

+assert(idr_alloc(&idr, DUMMY_PTR, 0, 0, GFP_KERNEL) == 0);
+idr_remove(&idr, 1);
+for (i = 1; i < RADIX_TREE_MAP_SIZE; i++)
+assert(idr_alloc(&idr, DUMMY_PTR, 0, 0, GFP_KERNEL) == i);
+idr_remove(&idr, 1 << 30);
+idr_destroy(&idr);
+
+ for (i = INT_MAX - 3UL; i < INT_MAX + 1UL; i++) {
+ struct item *item = item_create(i, 0);
+ assert(idr_alloc(&idr, item, i, i + 10, GFP_KERNEL) == i);
+ @@ -227,6 +285,7 @@
+ idr_null_test();
+ idr_nowait_test();
+ idr_get_next_test();
+ idr_find_test();
+ }

/*
--- linux-4.15.0.orig/tools/testing/selftests/Makefile
+++ linux-4.15.0/tools/testing/selftests/Makefile
@@ -7,6 +7,7 @@
 TARGETS += cpu-hotplug
 TARGETS += efivarfs
 TARGETS += exec
+TARGETS += filesystems
 TARGETS += firmware
 TARGETS += ftrace
 TARGETS += futex
@@ -21,6 +22,7 @@
 TARGETS += mount
 TARGETS += mqueue
 TARGETS += net
+TARGETS += netfilter
 TARGETS += nfs
 TARGETS += powerpc
 TARGETS += pstore
@@ -58,16 +60,58 @@
 override LDFLAGS =
 endif

-BUILD := $(O)
-ifndef BUILD
- - BUILD := $(KBUILD_OUTPUT)
-endif
-ifndef BUILD

- BUILD := $(shell pwd)
+ifneq ($(O),)
+BUILD := $(O)
+else
+ifneq ($(KBUILD_OUTPUT),)
+BUILD := $(KBUILD_OUTPUT)
+else
+BUILD := $(shell pwd)
+DEFAULT_INSTALL_HDR_PATH := 1
+endif
+endif
+
+# KSFT_TAP_LEVEL is used from KSFT framework to prevent nested TAP header
+# printing from tests. Applicable to run_tests case where run_tests adds
+# TAP header prior running tests and when a test program invokes another
+# with system() call. Export it here to cover override RUN_TESTS defines.
+export KSFT_TAP_LEVEL=`echo 1`
+
+# Prepare for headers install
+top_srcdir ?= ../../..
+include $(top_srcdir)/scripts/subarch.include
+ARCH     ?= $(SUBARCH)
+export KSFT_KHDR_INSTALL_DONE := 1
+export BUILD
+
+# set default goal to all, so make without a target runs all, even when
+# all isn't the first target in the file.
+.DEFAULT_GOAL := all
+
+# Install headers here once for all tests. KSFT_KHDR_INSTALL_DONE
+# is used to avoid running headers_install from lib.mk.
+# Invoke headers install with --no-built-in-rules to avoid circular
+# dependency in "make kselftest" case. In this case, second level
+# make inherits built-in-rules which will use the rule generate
+# Makefile.o and runs into
+# "Circular Makefile.o <- prepare dependency dropped."
+# and headers_install fails and test compile fails.
+#
+# O= KBUILD_OUTPUT cases don't run into this error, since main Makefile
+# invokes them as sub-makes and --no-built-in-rules is not necessary,
+# but doesn't cause any failures. Keep it simple and use the same
+# flags in both cases.
+# Local build cases: "make kselftest", "make -C" - headers are installed
+# in the default INSTALL_HDR_PATH usr/include.
+khdr:
+ifeq (1,$(DEFAULT_INSTALL_HDR_PATH))
+make --no-built-in-rules ARCH=$(ARCH) -C $(top_srcdir) headers_install
+else
+make --no-built-in-rules INSTALL_HDR_PATH=/$$BUILD/usr \
+ARCH=$$(ARCH) -C $$(top_srcdir) headers_install
endif

-extract BUILD

-all:
+all: khdr
@for TARGET in $(TARGETS); do
    BUILD_TARGET=/$$BUILD/$$TARGET;
    mkdir $$BUILD_TARGET -p;
    @ @ -116,13 +160,23 @@

    @@ -116,13 +160,23 @@
    # Ask all targets to emit their test scripts
    echo "#!/bin/sh" > $(ALL_SCRIPT)
    -echo "cd $$($$(dirname $$0))" >> $(ALL_SCRIPT)
    +echo "BASE_DIR=$$(realpath $$($$(dirname $$0)))" >> $(ALL_SCRIPT)
    +echo "cd $$BASE_DIR" >> $(ALL_SCRIPT)
    echo "ROOT=$$$PWD" >> $(ALL_SCRIPT)
    +echo "if [ "$" $$1" = "--summary" ]; then" >> $(ALL_SCRIPT)
    +echo "  OUTPUT=$$(BASE_DIR)/output.log" >> $(ALL_SCRIPT)
    +echo "else" >> $(ALL_SCRIPT)
    +echo "  OUTPUT=/dev/stdout" >> $(ALL_SCRIPT)
    +echo "fi" >> $(ALL_SCRIPT)
    +echo "export KSFT_TAP_LEVEL=`echo 1`" >> $(ALL_SCRIPT)
    for TARGET in $(TARGETS); do
        BUILD_TARGET=$$BUILD/$$TARGET;
        -echo "echo ; echo Running tests in $$TARGET" >> $(ALL_SCRIPT); \
        +echo "echo ; echo TAP version 13" >> $(ALL_SCRIPT); \
        +echo "echo Running tests in $$TARGET" >> $(ALL_SCRIPT); \
        echo "echo ========================================" >> $(ALL_SCRIPT); \
        +echo "[ -w /dev/kmsg ] && echo "kselftest: Running tests in $$TARGET" >> /dev/kmsg" >> $(ALL_SCRIPT); \
        echo "cd $$TARGET" >> $(ALL_SCRIPT); \
        make -s --no-print-directory OUTPUT=$$BUILD_TARGET -C $$TARGET emit_tests >> $(ALL_SCRIPT); \
        echo "cd $$ROOT" >> $(ALL_SCRIPT); \
    done;

    -.PHONY: all run_tests hotplug run_hotplug clean_hotplug run_pstore_crash install clean
    +.PHONY: khdr all run_tests hotplug run_hotplug clean_hotplug run_pstore_crash install clean
    --- linux-4.15.0.orig/tools/testing/selftests/android/config
    +++ linux-4.15.0/tools/testing/selftests/android/config
    @ @ -0,0 +1,4 @@
    +CONFIG_ANDROID=y
    +CONFIG_STAGING=y
    +CONFIG_ION=y
+CONFIG_ION_SYSTEM_HEAP=y
--- linux-4.15.0.orig/tools/testing/selftests/android/ion/Makefile
+++ linux-4.15.0/tools/testing/selftests/android/ion/Makefile
@@ -10,6 +10,8 @@
TEST_PROGS := ion_test.sh

+KSFT_KHDR_INSTALL := 1
+top_srcdir = ../../../../..
include ../..lib.mk

$(OUTPUT)/ionapp: ionapp_export.c ipcsocket.c ionutils.c
--- linux-4.15.0.orig/tools/testing/selftests/android/ion/ionapp_export.c
+++ linux-4.15.0/tools/testing/selftests/android/ion/ionapp_export.c
@@ -51,6 +51,7 @@
heap_size = 0;
flags = 0;
+heap_type = ION_HEAP_TYPE_SYSTEM;

while ((opt = getopt(argc, argv, "hi:s:")) != -1) {
switch (opt) {
--- linux-4.15.0.orig/tools/testing/selftests/bpf/bpf_util.h
+++ linux-4.15.0/tools/testing/selftests/bpf/bpf_util.h
@@ -13,7 +13,7 @@
unsigned int start, end, possible_cpus = 0;
char buff[128];
FILE *fp;
-int n;
+int len, n, i, j = 0;

fp = fopen(fcpu, "r");
if (!fp) {
@@ -21,17 +21,27 @@
exit(1);
}

-while (fgets(buff, sizeof(buff), fp)) {
-n = sscanf(buff, "%u-%u", &start, &end);
-if (n == 0) {
-printf("Failed to retrieve # possible CPUs\n");
-exit(1);
-} else if (n == 1) {
+if (!fgets(buff, sizeof(buff), fp)) {
+printf("Failed to read %s!\n", fcpu);
+exit(1);
+}
len = strlen(buff);
for (i = 0; i <= len; i++) {
  if (buff[i] == ',' || buff[i] == '\0') {
    buff[i] = '\0';
    n = sscanf(&buff[j], "%u-%u", &start, &end);
    if (n <= 0) {
      printf("Failed to retrieve # possible CPUs!\n");
      exit(1);
    } else if (n == 1) {
      end = start;
    }
    possible_cpus += end - start + 1;
    j = i + 1;
  }
}
possible_cpus = start == 0 ? end + 1 : 0;
break;
+
fclose(fp);

return possible_cpus;
--- linux-4.15.0.orig/tools/testing/selftests/bpf/cgroup_helpers.c
+++ linux-4.15.0/tools/testing/selftests/bpf/cgroup_helpers.c
@@ -43,7 +43,7 @@
*/
int setup_cgroup_environment(void)
{
  char cgroup_workdir[PATH_MAX + 1];
+  char cgroup_workdir[PATH_MAX - 24];
  format_cgroup_path(cgroup_workdir, "");

  --- linux-4.15.0.orig/tools/testing/selftests/bpf/test_align.c
  +++ linux-4.15.0/tools/testing/selftests/bpf/test_align.c
  @@ -446,11 +446,9 @@
    .insns = {
      PREP_PKT_POINTERS,
      BPF_MOV64_IMM(BPF_REG_0, 0),
-/* ptr & const => unknown & const */
-  BPF_MOV64_REG(BPF_REG_5, BPF_REG_2),
-  BPF_ALU64_IMM(BPF_AND, BPF_REG_5, 0x40),
-/* ptr << const => unknown << const */
-  BPF_MOV64_REG(BPF_REG_5, BPF_REG_2),
+/* (ptr - ptr) << 2 */
+  BPF_MOV64_REG(BPF_REG_5, BPF_REG_3),
+  BPF_ALU64_REG(BPF_SUB, BPF_REG_5, BPF_REG_2),
  BPF_ALU64_IMM(BPF_LSH, BPF_REG_5, 2),
/* We have a (4n) value. Let's make a packet offset * out of it. First add 14, to make it a (4n+2) */ 
@ @ -473,8 +471,26 @ @
.prog_type = BPF_PROG_TYPE_SCHED_CLS,
.result = REJECT,
.matches = {
-{4, "R5=pkt(id=0,off=0,r=0,imm=0)"},
/* R5 bitwise operator &= on pointer prohibited */
+{4, "R5=pkt_end(id=0,off=0,imm=0)"},
+/* (ptr - ptr) << 2 == unknown, (4n) */
+{6, "R5=inv(id=0,smax_value=9223372036854775804,umax_value=18446744073709551612,var_off=(0x0; 0xfffffffffffffffc))"},
+/* (4n) + 14 == (4n+2). We blow our bounds, because */
+ * the add could overflow.
+ */
+{7, "R5=inv(id=0,var_off=(0x2; 0xfffffffffffffffc))"},
+/* Checked s>=0 */
+{9, "R5=inv(id=0,umin_value=2,umax_value=9223372036854775806,var_off=(0x2; 0x7ffffffffffffffc))"},
+/* packet pointer + nonnegative (4n+2) */
+{11, "R6=pkt(id=1,off=0,r=0,umin_value=2,umax_value=9223372036854775806,var_off=(0x2; 0x7ffffffffffffffc))"},
+{13, "R4=pkt(id=1,off=4,r=0,umin_value=2,umax_value=9223372036854775806,var_off=(0x2; 0x7ffffffffffffffc))"},
+/* NET_IP_ALIGN + (4n+2) == (4n), alignment is fine. */
+ * We checked the bounds, but it might have been able */
+ * to overflow if the packet pointer started in the */
+ * upper half of the address space. */
+ * So we did not get a 'range' on R6, and the access */
+ * attempt will fail. */
+ */
+{15, "R6=pkt(id=1,off=0,r=0,umin_value=2,umax_value=9223372036854775806,var_off=(0x2; 0x7ffffffffffffffc))"},
}
}
{
--- linux-4.15.0.orig/tools/testing/selftests/bpf/test_kmod.sh
+++ linux-4.15.0/tools/testing/selftests/bpf/test_kmod.sh
@@ -1,6 +1,15 @@
#!/bin/sh
# SPDX-License-Identifier: GPL-2.0

+# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+
+msg="skip all tests:"
+if [ "$id -u" != "0" ]; then
+echo $msg please run this as root >&2
+exit $ksft_skip

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test_run()
--- linux-4.15.0.orig/tools/testing/selftests/bpf/test_lpm_map.c
+++ linux-4.15.0/tools/testing/selftests/bpf/test_lpm_map.c
@@ -472,6 +472,16 @@
     assert(bpf_map_lookup_elem(map_fd, key, &value) == -1 &&
     errno == ENOENT);
+
     key->prefixlen = 30; // unused prefix so far
     inet_pton(AF_INET, "192.255.0.0", key->data);
     assert(bpf_map_delete_elem(map_fd, key) == -1 &&
     errno == ENOENT);
     +
     key->prefixlen = 16; // same prefix as the root node
     inet_pton(AF_INET, "192.255.0.0", key->data);
     assert(bpf_map_delete_elem(map_fd, key) == -1 &&
     errno == ENOENT);
     +
     /* assert initial lookup */
     key->prefixlen = 32;
     inet_pton(AF_INET, "192.168.0.1", key->data);
--- linux-4.15.0.orig/tools/testing/selftests/bpf/test_maps.c
+++ linux-4.15.0/tools/testing/selftests/bpf/test_maps.c
@@ -126,6 +126,8 @@
     fd = bpf_create_map(BPF_MAP_TYPE_HASH, i, j,
     2, map_flags);
     if (fd < 0) {
         +if (errno == ENOMEM)
         +return;
         printf("Failed to create hashmap key=%d value=%d "
         i, j, strerror(errno));
         exit(1);
         @ @ -463,7 +465,7 @ @
 #define SOCKMAP_VERDICT_PROG "/sockmap_verdict_prog.o"
 static void test_sockmap(int tasks, void *data)
 {
     -int one = 1, map_fd_rx, map_fd_tx, map_fd_break, s, sc, rc;
     +int one = 1, map_fd_rx = 0, map_fd_tx = 0, map_fd_break, s, sc, rc;
     struct bpf_map *bpf_map_rx, *bpf_map_tx, *bpf_map_break;
     int ports[] = {50200, 50201, 50202, 50204};
     int err, i, fd, udp, sfd[6] = {0xdeadbeef};
     @ @ -728,7 +730,7 @@
to.tv_sec = 1;
to.tv_usec = 0;
s = select(sfd[3] + 1, &w, NULL, NULL, &to);
if (s == -1) {
    goto out_sockmap;
}

/* Test map close sockets */
for (i = 0; i < 6; i++)
+
/* Test map close sockets and empty maps */
+for (i = 0; i < 6; i++) {
+bpf_map_delete_elem(map_fd_tx, &i);
+bpf_map_delete_elem(map_fd_rx, &i);
+close(sfd[i]);
+
+close(fd);
+close(map_fd_rx);
+bpf_object__close(obj);
}

printf("Failed to create sockmap \"%i:%s\"!", i, strerror(erno));
exit(1);
out_sockmap:
-
+for (i = 0; i < 6; i++) {
+if (map_fd_tx)
+    bpf_map_delete_elem(map_fd_tx, &i);
+if (map_fd_rx)
+    bpf_map_delete_elem(map_fd_rx, &i);
+close(sfd[i]);
+
+close(fd);
+exit(1);
+
+for (i = 0; i < tasks; i++) {
+pid[i] = fork();
+if (pid[i] == 0) {
+    --- linux-4.15.0.orig/tools/testing/selftests/bpf/test_progs.c
+++ linux-4.15.0/tools/testing/selftests/bpf/test_progs.c
@@ -46,10 +46,10 @@
struct iphdr iph;
struct tcphdr tcp;
} __packed pkt_v4 = {
    .eth.h_proto = bpf_htons(ETH_P_IP),
    .eth.h_proto = __bpf_constant_htons(ETH_P_IP),
    .iph.ihl = 5,
    .iph.protocol = 6,
    .iph.tot_len = bpf_htons(MAGIC_BYTES),
    .iph.tot_len = __bpf_constant_htons(MAGIC_BYTES),
    .tcp.urg_ptr = 123,
};

@@ -59,9 +59,9 @@
struct ipv6hdr iph;
struct tcphdr tcp;
} __packed pkt_v6 = {
    .eth.h_proto = bpf_htons(ETH_P_IPV6),
    .eth.h_proto = __bpf_constant_htons(ETH_P_IPV6),
    .iph.nexthdr = 6,
    .iph.payload_len = bpf_htons(MAGIC_BYTES),
    .iph.payload_len = __bpf_constant_htons(MAGIC_BYTES),
    .tcp.urg_ptr = 123,
};

--- linux-4.15.0.orig/tools/testing/selftests/bpf/test_verifier.c
+++ linux-4.15.0/tools/testing/selftests/bpf/test_verifier.c
@@ -20,6 +20,8 @@
 #include <stddef.h>
 #include <stdbool.h>
 #include <sched.h>
+#include <limits.h>
+#include <assert.h>

 #include <sys/capability.h>
 #include <sys/resource.h>
@@ -28,6 +30,7 @@
 #include <linux/filter.h>
 #include <linux/bpf_perf_event.h>
 #include <linux/bpf.h>
+#include <linux/if_ether.h>

 #include <bpf/bpf.h>

@@ -48,6 +51,8 @@
 #define MAX_INSNS512
 #define MAX_FIXUPS8
 #define MAX_NR_MAPS4
+#define POINTER_VALUE0xc4afe4all
+#define TEST_DATA_LEN64


```c
#define F_NEEDS_EFFICIENT_UNALIGNED_ACCESS (1 << 0)
#define F_LOAD_WITH_STRICT_ALIGNMENT (1 << 1)

int fixup_map_in_map[MAX_FIXUPS];
const char *errstr;
const char *errstr_unpriv;
+uint32_t retval;
enum {
    UNDEF,
    ACCEPT,
};
BPF_EXIT_INSN(),
.
.result = ACCEPT,
+=retval = -3,
+
+="DIV32 by 0, zero check 1",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_0, 42),
+BPF_MOV32_IMM(BPF_REG_1, 0),
+BPF_MOV32_IMM(BPF_REG_2, 1),
+BPF_ALU32_REG(BPF_DIV, BPF_REG_2, BPF_REG_1),
+BPF_EXIT_INSN(),
+},
.result = ACCEPT,
+=retval = 42,
+
+="DIV32 by 0, zero check 2",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_0, 42),
+BPF_LD_IMM64(BPF_REG_1, 0xffffffff00000000LL),
+BPF_MOV32_IMM(BPF_REG_2, 1),
+BPF_ALU32_REG(BPF_DIV, BPF_REG_2, BPF_REG_1),
+BPF_EXIT_INSN(),
+},
.result = ACCEPT,
+=retval = 42,
+
+="DIV64 by 0, zero check",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_0, 42),
+BPF_MOV32_IMM(BPF_REG_1, 0),
+BPF_MOV32_IMM(BPF_REG_2, 1),
+BPF_ALU64_REG(BPF_DIV, BPF_REG_2, BPF_REG_1),
```

+BPF_EXIT_INSN().
+}.  
+.result = ACCEPT, 
+.retval = 42, 
+}. 
+
+"MOD32 by 0, zero check 1", 
+.insns = { 
+ BPF_MOV32_IMM(BPF_REG_0, 42), 
+ BPF_MOV32_IMM(BPF_REG_1, 0), 
+ BPF_MOV32_IMM(BPF_REG_2, 1), 
+ BPF_ALU32_REG(BPF_MOD, BPF_REG_2, BPF_REG_1), 
+ BPF_EXIT_INSN(), 
+}. 
+.result = ACCEPT, 
+.retval = 42, 
+}. 
+
+"MOD32 by 0, zero check 2", 
+.insns = { 
+ BPF_MOV32_IMM(BPF_REG_0, 42), 
+ BPF_LD_IMM64(BPF_REG_1, 0xffffffff00000000LL), 
+ BPF_MOV32_IMM(BPF_REG_2, 1), 
+ BPF_ALU32_REG(BPF_MOD, BPF_REG_2, BPF_REG_1), 
+ BPF_EXIT_INSN(), 
+}. 
+.result = ACCEPT, 
+.retval = 42, 
+}. 
+
+"MOD64 by 0, zero check", 
+.insns = { 
+ BPF_MOV32_IMM(BPF_REG_0, 42), 
+ BPF_MOV32_IMM(BPF_REG_1, 0), 
+ BPF_MOV32_IMM(BPF_REG_2, 1), 
+ BPF_ALU64_REG(BPF_MOD, BPF_REG_2, BPF_REG_1), 
+ BPF_EXIT_INSN(), 
+}. 
+.result = ACCEPT, 
+.retval = 42, 
+}. 
+
+"DIV32 by 0, zero check ok, cls", 
+.insns = { 
+ BPF_MOV32_IMM(BPF_REG_0, 42), 
+ BPF_MOV32_IMM(BPF_REG_1, 2), 
+ BPF_MOV32_IMM(BPF_REG_2, 16), 
+ BPF_ALU32_REG(BPF_DIV, BPF_REG_2, BPF_REG_1),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_2),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 8,
+},
+ "DIV32 by 0, zero check 1, cls",
+ .insn = {
+ BPF_MOV32_IMM(BPF_REG_1, 0),
+ BPF_MOV32_IMM(BPF_REG_0, 1),
+ BPF_ALU32_REG(BPF_DIV, BPF_REG_0, BPF_REG_1),
+ BPF_EXIT_INSN(),
+ },
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 0,
+},
+ "DIV32 by 0, zero check 2, cls",
+ .insn = {
+ BPF_LD_IMM64(BPF_REG_1, 0xffffffff00000000LL),
+ BPF_MOV32_IMM(BPF_REG_0, 1),
+ BPF_ALU32_REG(BPF_DIV, BPF_REG_0, BPF_REG_1),
+ BPF_EXIT_INSN(),
+ },
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 0,
+},
+ "DIV64 by 0, zero check, cls",
+ .insn = {
+ BPF_MOV32_IMM(BPF_REG_1, 0),
+ BPF_MOV32_IMM(BPF_REG_0, 1),
+ BPF_ALU64_REG(BPF_DIV, BPF_REG_0, BPF_REG_1),
+ BPF_EXIT_INSN(),
+ },
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 0,
+},
+ "MOD32 by 0, zero check ok, cls",
+ .insn = {
+ BPF_MOV32_IMM(BPF_REG_0, 42),
+ BPF_MOV32_IMM(BPF_REG_1, 3),
+BPF_MOV32_IMM(BPF_REG_2, 5),
+BPF_ALU32_REG(BPF_MOD, BPF_REG_2, BPF_REG_1),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_2),
+BPF_EXIT_INSN(),
+}
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 2,
+}
+{
+"MOD32 by 0, zero check 1, cls",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 0),
+BPF_MOV32_IMM(BPF_REG_0, 1),
+BPF_ALU32_REG(BPF_MOD, BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+}
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 1,
+}
+
+{
+"MOD32 by 0, zero check 2, cls",
+.insns = {
+BPF_LD_IMM64(BPF_REG_1, 0xffffffff00000000LL),
+BPF_MOV32_IMM(BPF_REG_0, 1),
+BPF_ALU32_REG(BPF_MOD, BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+}
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 1,
+}
+
+{
+"MOD64 by 0, zero check 1, cls",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 0),
+BPF_MOV32_IMM(BPF_REG_0, 2),
+BPF_ALU64_REG(BPF_MOD, BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+}
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 2,
+}
+
+{
+"MOD64 by 0, zero check 2, cls",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 0),
+BPF_MOV32_IMM(BPF_REG_0, -1),
+BPF_ALU64_REG(BPF_MOD, BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+);
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = -1,
+},
+/* Just make sure that JITs used udiv/umod as otherwise we get
+ * an exception from INT_MIN/-1 overflow similarly as with div
+ * by zero.
+ */
+{
+"DIV32 overflow, check 1",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, -1),
+BPF_MOV32_IMM(BPF_REG_0, INT_MIN),
+BPF_ALU32_REG(BPF_DIV, BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 0,
+},
+{
+"DIV32 overflow, check 2",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_0, INT_MIN),
+BPF_ALU32_IMM(BPF_DIV, BPF_REG_0, -1),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 0,
+},
+{
+"DIV64 overflow, check 1",
+.insns = {
+BPF_MOV64_IMM(BPF_REG_1, -1),
+BPF_LD_IMM64(BPF_REG_0, LLONG_MIN),
+BPF_ALU64_REG(BPF_DIV, BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 0,
+}.
+{  
+"DIV64 overflow, check 2",  
+.insns = {  
+BPF_LD_IMM64(BPF_REG_0, LLONG_MIN),  
+BPF_ALU64_IMM(BPF_DIV, BPF_REG_0, -1),  
+BPF_EXITInsn(),  
+},  
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,  
+.result = ACCEPT,  
+.retval = 0,  
+}.  
+{  
+"MOD32 overflow, check 1",  
+.insns = {  
+BPF_MOV32_IMM(BPF_REG_1, -1),  
+BPF_MOV32_IMM(BPF_REG_0, INT_MIN),  
+BPF_ALU32_REG(BPF_MOD, BPF_REG_0, BPF_REG_1),  
+BPF_EXITInsn(),  
+},  
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,  
+.result = ACCEPT,  
+.retval = INT_MIN,  
+}.  
+{  
+"MOD32 overflow, check 2",  
+.insns = {  
+BPF_MOV32_IMM(BPF_REG_1, -1),  
+BPF_ALU32_IMM(BPF_MOD, BPF_REG_0, -1),  
+BPF_EXITInsn(),  
+},  
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,  
+.result = ACCEPT,  
+.retval = INT_MIN,  
+}.  
+{  
+"MOD64 overflow, check 1",  
+.insns = {  
+BPF_MOV64_IMM(BPF_REG_1, -1),  
+BPF_LD_IMM64(BPF_REG_2, LLONG_MIN),  
+BPF_ALU64_REG(BPF_REG_3, BPF_REG_2, BPF_REG_1),  
+BPF_EXITInsn(),  
+},  
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,  
+.result = ACCEPT,
+retval = 1,
+{
+"MOD64 overflow, check 2",
+.insns = {
+BPF_LD_IMM64(BPF_REG_2, LLONG_MIN),
+BPF_MOV64_REG(BPF_REG_3, BPF_REG_2),
+BPF_ALU64_IMM(BPF_MOD, BPF_REG_2, -1),
+BPF_MOV32_IMM(BPF_REG_0, 0),
+BPF_JMP_REG(BPF_JNE, BPF_REG_3, BPF_REG_2, 1),
+BPF_MOV32_IMM(BPF_REG_0, 1),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 1,
+{
+.insns = {
+BPF_MOV32_IMM(BPF_REG_2, -1),
+BPF_ALU64_IMM(BPF_LSH, BPF_REG_2, 32),
+BPF_ALU64_IMM(BPF_OR, BPF_REG_2, 0xffff),
+BPF_ALU32_REG(BPF_XOR, BPF_REG_2, BPF_REG_2),
+BPF_MOV32_IMM(BPF_REG_0, 2),
+BPF_JMP_IMM(BPF_JNE, BPF_REG_2, 0, 1),
+BPF_MOV32_IMM(BPF_REG_0, 1),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+.retval = 1,
+{
+.insns = {
+.errstr = "jump out of range from insn 0 to 1",
+.result = REJECT,
+},
+{
+"empty prog",
+.insns = {
+},
+.errstr = "jump out of range from insn 0 to 1",
+.result = REJECT,
+},
+{
+"only exit insn",
+.insns = {
+BPF_EXIT_INSN(),
+},
+.errstr = "R0 !read_ok",
+.result = REJECT,
}
{  
"unreachable",
@@ -209,6 +535,7 @@
BPF_EXIT_INSN(),
}
.result = ACCEPT,
+ retval = 1,
},
{
"test8 ld_imm64",
@@ -516,6 +843,7 @@
.errstr_unpriv = "R0 leaks addr",
.result = ACCEPT,
.result_unpriv = REJECT,
+ retval = POINTER_VALUE,
},
{
"check valid spill/fill, skb mark",
@@ -802,6 +1130,7 @@
.errstr_unpriv = "R1 pointer comparison",
.result_unpriv = REJECT,
.result = ACCEPT,
+ retval = -ENOENT,
},
{
"jump test 4",
@@ -1822,6 +2151,7 @@
BPF_EXIT_INSN(),
},
.result = ACCEPT,
+ retval = 0xfaceb00c,
},
{
"PTR_TO_STACK store/load - bad alignment on off",
@@ -1858,6 +2211,7 @@
.errstr = "invalid stack off=-79992 size=8",
+ errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
},
{
"PTR_TO_STACK store/load - out of bounds high",
@@ -1880,6 +2211,7 @@
.result = ACCEPT,
.result_unpriv = REJECT,
.errstr_unpriv = "R0 leaks addr",
+ retval = POINTER_VALUE,
},

"unpriv: add const to pointer",
@@ -2053,6 +2385,7 @@
BPF_LDX_MEM(BPF_DW, BPF_REG_1, BPF_REG_6, 0),
BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
    BPF_FUNC_get_hash_recalc),
+BPF_MOV64_IMM(BPF_REG_0, 0),
BPF_EXIT_INSN(),
},
.result = ACCEPT,
@@ -2157,6 +2490,18 @@
BPF_EXIT_INSN(),
},
{ +"alu32: mov u32 const",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_7, 0),
+BPF_ALU32_IMM(BPF_AND, BPF_REG_7, 1),
+BPF_MOV32_REG(BPF_REG_0, BPF_REG_7),
+BPF_JMP_IMM(BPF_JEQ, BPF_REG_0, 0, 1),
+BPF_LDX_MEM(BPF_DW, BPF_REG_0, BPF_REG_7, 0),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
+{ +"unpriv: partial copy of pointer",
+.insns = {
BPF_MOV32_REG(BPF_REG_1, BPF_REG_10),
@@ -2231,7 +2576,7 @@
    BPF_EXIT_INSN(),
    },
-"unpriv: adding of fp",
+"unpriv: adding of fp, reg",
+.insns = {
BPF_MOV64_IMM(BPF_REG_0, 0),
BPF_MOV64_IMM(BPF_REG_1, 0),
@@ -2239,6 +2584,21 @@
    BPF_EXIT_INSN(),
    },
.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+result_unpriv = REJECT,
+result = ACCEPT,
+},
+{ +"unpriv: adding of fp, imm",
+.insns = {
+  BPF_MOV64_IMM(BPF_REG_0, 0),
+  BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+  BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, 0),
+  BPF_STX_MEM(BPF_DW, BPF_REG_1, BPF_REG_0, -8),
+  BPF_EXIT_INSN(),
+};
+.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+.result_unpriv = REJECT,
.result = ACCEPT,
};
{
@@ -2255,6 +2615,258 @@
  .result = ACCEPT,
  },
  {
+   "runtime/jit: pass negative index to tail_call",
+   .insns = {
+     BPF_MOV64_IMM(BPF_REG_3, -1),
+     BPF_LD_MAP_FD(BPF_REG_2, 0),
+     BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+                  BPF_FUNC_tail_call),
+     BPF_MOV64_IMM(BPF_REG_0, 0),
+     BPF_EXIT_INSN(),
+  },
+  .fixup_prog = { 1 },
+  .result = ACCEPT,
+  },
+{
+   "runtime/jit: pass > 32bit index to tail_call",
+   .insns = {
+     BPF_LD_IMM64(BPF_REG_3, 0x100000000ULL),
+     BPF_LD_MAP_FD(BPF_REG_2, 0),
+     BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+                  BPF_FUNC_tail_call),
+     BPF_MOV64_IMM(BPF_REG_0, 0),
+     BPF_EXIT_INSN(),
+  },
+  .fixup_prog = { 2 },
+  .result = ACCEPT,
+  },
+{
+   "PTR_TO_STACK check high 1",
+   .insns = {
+     BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+     BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -1),
+     BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+     BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+     BPF_EXIT_INSN(),
+};
+BPF_EXIT_INSN(),
+}.  
+.result = ACCEPT,
+].  
+"PTR_TO_STACK check high 2",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ST_MEM(BPF_B, BPF_REG_1, -1, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, -1),
+BPF_EXIT_INSN(),
+].  
+.result = ACCEPT,
+].  
+"PTR_TO_STACK check high 3",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, 0),
+BPF_ST_MEM(BPF_B, BPF_REG_1, -1, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, -1),
+BPF_EXIT_INSN(),
+}.  
+.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+.result_unpriv = REJECT,
+.result = ACCEPT,
+].  
+"PTR_TO_STACK check high 4",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, 0),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+BPF_EXIT_INSN(),
+}.  
+.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+.errstr = "invalid stack off=0 size=1",
+.result = REJECT,
+].  
+"PTR_TO_STACK check high 5",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, (1 << 29) - 1),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+BPF_EXIT_INSN(),
+}.
+result = REJECT,
+.errstr = "invalid stack off",
+}.
+"PTR_TO_STACK check high 6",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, (1 << 29) - 1),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, (1 << 29) - 1),
+BPF_ST_MEM(BPF_B, BPF_REG_1, SHRT_MAX, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, SHRT_MAX),
+BPF_EXIT_INSN(),
+},
+result = REJECT,
+.errstr = "invalid stack off",
+}.
+"PTR_TO_STACK check high 7",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, (1 << 29) - 1),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, (1 << 29) - 1),
+BPF_ST_MEM(BPF_B, BPF_REG_1, SHRT_MAX, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, SHRT_MAX),
+BPF_EXIT_INSN(),
+},
+.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+.errstr = "fp pointer offset",
+}.
+"PTR_TO_STACK check low 1",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -512),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+,}.
+"PTR_TO_STACK check low 2",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -513),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 1, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 1),
+BPF_EXIT_INSN().
+
+.result_unpriv = REJECT,
+.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+.result = ACCEPT,
+
+
+"PTR_TO_STACK check low 3",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -513),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+BPF_EXIT_INSN(),
+
+.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+.errstr = "invalid stack off=-513 size=1",
+.result = REJECT,
+
+
+"PTR_TO_STACK check low 4",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, INT_MIN),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+BPF_EXIT_INSN(),
+
+.result = REJECT,
+.errstr = "math between fp pointer",
+
+
+"PTR_TO_STACK check low 5",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -(1 << 29) - 1)),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+BPF_EXIT_INSN(),
+
+.result = REJECT,
+.errstr = "invalid stack off",
+
+
+"PTR_TO_STACK check low 6",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -(1 << 29) - 1)),
+BPF_ST_MEM(BPF_B, BPF_REG_1, SHRT_MIN, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, SHRT_MIN),
+BPF_EXIT_INSN(),
+},
+.result = REJECT,
+.errstr = "invalid stack off",
+},
+{
+"PTR_TO_STACK check low 7",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -(1 << 29) - 1),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -(1 << 29) - 1),
+BPF_ST_MEM(BPF_B, BPF_REG_1, SHRT_MIN, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, SHRT_MIN),
+BPF_EXIT_INSN(),
+},
+.result = REJECT,
+.errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
+.errstr = "fp pointer offset",
+},
+{
+"PTR_TO_STACK mixed reg/k, 1",
+.insns = {
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -3),
+BPF_MOV64_IMM(BPF_REG_2, -3),
+BPF_ALU64_REG(BPF_ADD, BPF_REG_1, BPF_REG_2),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
+{
+"PTR_TO_STACK mixed reg/k, 2",
+.insns = {
+BPF_ST_MEM(BPF_DW, BPF_REG_10, -8, 0),
+BPF_ST_MEM(BPF_DW, BPF_REG_10, -16, 0),
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -3),
+BPF_MOV64_IMM(BPF_REG_2, -3),
+BPF_ALU64_REG(BPF_ADD, BPF_REG_1, BPF_REG_2),
+BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+BPF_MOV64_REG(BPF_REG_5, BPF_REG_10),
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_5, -6),
+BPF_EXIT_INSN(),
+}.
+ .result = ACCEPT,
+ }
+ {
+ "PTR_TO_STACK mixed reg/k, 3",
+ .insns = {
+ BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+ BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -3),
+ BPF_MOV64_IMM(BPF_REG_2, -3),
+ BPF_ALU64_REG(BPF_ADD, BPF_REG_1, BPF_REG_2),
+ BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+ BPF_MOV64_REG(BPF_REG_0, BPF_REG_2),
+ BPF_EXIT_INSN(),
+ },
+ .result = ACCEPT,
+ }
+ {
+ "PTR_TO_STACK reg",
+ .insns = {
+ BPF_MOV64_REG(BPF_REG_1, BPF_REG_10),
+ BPF_MOV64_IMM(BPF_REG_2, -3),
+ BPF_ALU64_REG(BPF_ADD, BPF_REG_1, BPF_REG_2),
+ BPF_ST_MEM(BPF_B, BPF_REG_1, 0, 42),
+ BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_1, 0),
+ BPF_EXIT_INSN(),
+ },
+ .result = ACCEPT,
+ }
+ {
+ "stack pointer arithmetic",
+ .insns = {
+ BPF_MOV64_IMM(BPF_REG_1, 4),
+ @ @ -2840,6 +3452,7 @ @
+ },
+ .result = ACCEPT,
+ .prog_type = BPF_PROG_TYPE_SCHED_CLS,
+ .retval = 1,
+ },
+ {
+ "direct packet access: test12 (and, good access)",
+ @ @ -2864,6 +3477,7 @ @
+ },
+ .result = ACCEPT,
+ .prog_type = BPF_PROG_TYPE_SCHED_CLS,
+ .retval = 1,
+ },
+ {
+ "direct packet access: test13 (branches, good access)",
+ @ @ -2894,6 +3508,7 @ @


{  
  .result = ACCEPT,
  .prog_type = BPF_PROG_TYPE_SCHED_CLS,
  .retval = 1,
},

"direct packet access: test14 (pkt_ptr += 0, CONST_IMM, good access)",
@@ -2917,6 +3532,7 @@
},
  .result = ACCEPT,
  .prog_type = BPF_PROG_TYPE_SCHED_CLS,
  .retval = 1,
},

"direct packet access: test15 (spill with xadd)",
@@ -3203,6 +3819,7 @@
},
  .result = ACCEPT,
  .prog_type = BPF_PROG_TYPE_SCHED_CLS,
  .retval = 1,
},

"direct packet access: test28 (marking on <=, bad access)",
@@ -5822,6 +6439,7 @@

BPF_MOV64_REG(BPF_REG_1, BPF_REG_0),
BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
  BPF_FUNC_map_lookup_elem),
-BPF_MOV64_REG(BPF_REG_0, 0),
+BPF_MOV64_IMM(BPF_REG_0, 0),
BPF_EXIT_INSN(),
},

"helper access to variable memory: size = 0 not allowed on NULL (!ARG_PTR_TO_MEM_OR_NULL)",
@@ -6044,7 +6662,7 @@
BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, 8),
BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
  BPF_FUNC_map_lookup_elem),
-BPF_MOV64_REG(BPF_REG_0, 0),
+BPF_MOV64_IMM(BPF_REG_0, 0),
BPF_EXIT_INSN(),
},

.fixup_map_in_map = { 3 },
@@ -6067,7 +6685,7 @@
.fixup_map_in_map = \{3\},
@@ -6089,7 +6707,7 @@
  BPF_RAW_INS(BPF_JMP | BPF_CALL, 0, 0, 0,
    BPF_FUNC_map_lookup_ELEM),
-BPF_MOV64_REG(BPF_REG_0, 0),
+BPF_MOV64_IMM(BPF_REG_0, 0),
  BPF_EXIT_INSN(),
},
.fixup_map_in_map = \{3\},
@@ -6190,6 +6808,7 @@
  .prog_type = BPF_PROG_TYPE_SCHED_CLS,
  .result = ACCEPT,
}.retval = 42 /* ultimate return value */,
,
"ld_ind: check calling conv, r1",
@@ -6261,6 +6880,7 @@
  BPF_EXIT_INSN(),
},
.result = ACCEPT,
}.retval = 1,
,
"check bpf_perf_event_data->sample_period byte load permitted",
@@ -6732,7 +7352,7 @@
  BPF_JMP_IMM(BPF_JA, 0, 0, -7),
},
.fixup_map1 = \{4\},
-errstr = "R0 invalid mem access 'inv'",
+.errstr = "unbounded min value",
.result = REJECT,
,
@ -6813.9 +7433.39 @
},
.fixup_map1 = \{3\},
.errstr = "R0 min value is negative, either use unsigned index or do a if (index >=0) check."
+.errstr_unpriv = "R1 has unknown scalar with mixed signed bounds",
.result = REJECT,
,
+"check subtraction on pointers for unpriv",
+insn =
+BPF_MOV64_IMM(BPF_REG_0, 0),
+BPF_LD_MAP_FD(BPF_REG_ARG1, 0),
+BPF_MOV64_REG(BPF_REG_ARG2, BPF_REG_FP),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_ARG2, -8),
+BPF_ST_MEM(BPF_dw, BPF_REG_ARG2, 0, 9),
+BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+     BPF_FUNC_map_lookup_elem),
+BPF_MOV64_REG(BPF_REG_9, BPF_REG_FP),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_9, BPF_REG_0),
+BPF_LD_MAP_FD(BPF_REG_ARG1, 0),
+BPF_MOV64_REG(BPF_REG_ARG2, BPF_REG_FP),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_ARG2, -8),
+BPF_ST_MEM(BPF_dw, BPF_REG_ARG2, 0, 0),
+BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+     BPF_FUNC_map_lookup_elem),
+BPF_JMP_IMM(BPF_JNE, BPF_REG_0, 0, 1),
+BPF_EXIT_INSN(),
+BPF_STX_MEM(BPF_dw, BPF_REG_0, BPF_REG_9, 0),
+BPF_MOV64_IMM(BPF_REG_0, 0),
+BPF_EXIT_INSN(),
+},
+.fixup_map1 = { 1, 9 },
+.result = ACCEPT,
+.result_unpriv = REJECT,
+.errstr_unpriv = "R9 pointer -= pointer prohibited",
+},
"bounds check based on zero-extended MOV",
+.insn = {
BPF_ST_MEM(BPF_dw, BPF_REG_10, -8, 0),
@@ -7146,6 +7796,36 @@
 .result = REJECT
 },
{
"bounds check after 32-bit right shift with 64-bit input",
+.insn = {
+BPF_ST_MEM(BPF_dw, BPF_REG_10, -8, 0),
+BPF_MOV64_REG(BPF_REG_2, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_2, -8),
+BPF_LD_MAP_FD(BPF_REG_1, 0),
+BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+     BPF_FUNC_map_lookup_elem),
+BPF_JMP_IMM(BPF_JEQ, BPF_REG_0, 0, 6),
+/* r1 = 2 */
+BPF_MOV64_IMM(BPF_REG_1, 2),
+/* r1 = 1<<32 */
+BPF_ALU64_IMM(BPF_LSH, BPF_REG_1, 31),
+/* r1 = 0 (NOT 2!) */
+BPF_ALU32_IMM(BPF_RSH, BPF_REG_1, 31),
+/* r1 = 0xffffffff (NOT 0!) */
+BPF_ALU32_IMM(BPF_SUB, BPF_REG_1, 2),
/* computes OOB pointer */
+BPF_ALU64_REG(BPF_ADD, BPF_REG_0, BPF_REG_1),
/* OOB access */
+BPF_LDX_MEM(BPF_B, BPF_REG_0, BPF_REG_0, 0),
/* exit */
+BPF_MOV64_IMM(BPF_REG_0, 0),
+BPF_EXIT_INSN(),
+}
+.fixup_map1 = { 3 },
+.errstr = "R0 invalid mem access",
+.result = REJECT,
+}
+
"bounds check map access with off+size signed 32bit overflow. test1",
.insns = { 
BPF_ST_MEM(BPF_DW, BPF_REG_10, -8, 0),
@@ -7185,6 +7865,7 @@
 }
+.fixup_map1 = { 3 },
+.errstr = "pointer offset 1073741822",
+.errstr_unpriv = "R0 pointer arithmetic of map value goes out of range",
+.result = REJECT
 },
{ 
@@ -7206,6 +7887,7 @@
 }
+.fixup_map1 = { 3 },
+.errstr = "pointer offset -1073741822",
+.errstr_unpriv = "R0 pointer arithmetic of map value goes out of range",
+.result = REJECT
 },
{ 
@@ -7248,6 +7930,7 @@
 }
+.fixup_map1 = { 3 },
+.result = ACCEPT,
+.retval = POINTER_VALUE,
+.result_unpriv = REJECT,
+.errstr_unpriv = "R0 leaks addr as return value"
 },
@@ -7268,6 +7951,7 @@
 }
+.fixup_map1 = { 3 },
+.result = ACCEPT,
+.retval = POINTER_VALUE,
+.result_unpriv = REJECT,
+.errstr_unpriv = "R0 leaks addr as return value"
 },

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@@ -7375,6 +8059,7 @@
 BPF_EXIT_INSN()
 }
 .errstr = "fp pointer offset 1073741822",
+ .errstr_unpriv = "R1 stack pointer arithmetic goes out of range",
 .result = REJECT
 },
 {
 @@ -7694,7 +8379,7 @@
 BPF_EXIT_INSN(),
 .errstr = "dereference of modified ctx ptr R1 off=68+8, ctx+const is allowed, ctx+const+const is not",
+ .errstr = "dereference of modified ctx ptr",
 .result = REJECT,
 .prog_type = BPF_PROG_TYPE_SCHED_CLS,
 },
@@ -7709,6 +8394,7 @@
 BPF_EXIT_INSN(),
 .result = ACCEPT,
+.retval = TEST_DATA_LEN,
 .prog_type = BPF_PROG_TYPE_SCHED_CLS,
 },
 {
 @@ -8641,8 +9327,9 @@
 BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),
 BPF_EXIT_INSN(),
 .result = REJECT,
+ .errstr_unpriv = "R1 has pointer with unsupported alu operation",
 .errstr = "R0 tried to subtract pointer from scalar",
+ .result = REJECT,
 },
 {
 "check deducing bounds from const, 2",
@@ -8655,6 +9342,8 @@
 BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),
 BPF_EXIT_INSN(),
 .result = REJECT,
+ .errstr_unpriv = "R1 has pointer with unsupported alu operation",
+ .result = REJECT,
 },
 {
 "check deducing bounds from const, 2",
@@ -8665,32 +9354,37 @@
 BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),
 BPF_EXIT_INSN(),
+.errstr_unpriv = "R1 has pointer with unsupported alu operation",
+.result_unpriv = REJECT,
 .result = ACCEPT,
 },
 {
 .result = REJECT,
+.errstr_unpriv = "R1 has pointer with unsupported alu operation",
+.result_unpriv = REJECT,
 .result = ACCEPT,
 },
 {
@@ -8665,32 +9354,37 @@
 BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),
 BPF_EXIT_INSN(),
+.errstr_unpriv = "R1 has pointer with unsupported alu operation",
+.result_unpriv = REJECT,
 .result = ACCEPT,
result = REJECT,
.errstr_unpriv = "R1 has pointer with unsupported alu operation",
.errstr = "R0 tried to subtract pointer from scalar",
.result = REJECT,
}
{
"check deducing bounds from const, 4",
.insns = {
+BPF_MOV64_REG(BPF_REG_6, BPF_REG_1),
BPF_MOV64_IMM(BPF_REG_0, 0),
BPF_JMP_IMM(BPF_JSLE, BPF_REG_0, 0, 1),
BPF_EXIT_INSN(),
BPF_JMP_IMM(BPF_JSGE, BPF_REG_0, 0, 1),
BPF_EXIT_INSN(),
-BPF_ALU64_REG(BPF_SUB, BPF_REG_1, BPF_REG_0),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_6, BPF_REG_0),
BPF_EXIT_INSN(),
},
+errstr_unpriv = "R6 has pointer with unsupported alu operation",
.result_unpriv = REJECT,
.result = ACCEPT,
}
{
"check deducing bounds from const, 5",
.insns = {
BPF_MOV64_IMM(BPF_REG_0, 0),
-BPF_JMP_IMM(BPF_JSGE, BPF_REG_0, 1, 1),
BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),
BPF_EXIT_INSN(),
},
.result = REJECT,
+errstr_unpriv = "R1 has pointer with unsupported alu operation",
.errstr = "R0 tried to subtract pointer from scalar",
.result = REJECT,
}
{
"check deducing bounds from const, 6",
@@ -8701,8 +9395,9 @@
BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),
BPF_EXIT_INSN(),
},
.result = REJECT,
+errstr_unpriv = "R1 has pointer with unsupported alu operation",
.errstr = "R0 tried to subtract pointer from scalar",
.result = REJECT,
}
{ "check deducing bounds from const, 7",@@ -8714,8 +9409,9 @@
   offsetof(struct __sk_buff, mark)),BPF_EXIT_INSN(),
 },
-  .result = REJECT,
+  .errstr_unpriv = "R1 has pointer with unsupported alu operation",
+  .errstr = "dereference of modified ctx ptr",
+  .result = REJECT,
 },
 { "check deducing bounds from const, 8",
 @@ -8727,8 +9423,9 @@
   offsetof(struct __sk_buff, mark)),BPF_EXIT_INSN(),
 },
-  .result = REJECT,
+  .errstr_unpriv = "R1 has pointer with unsupported alu operation",
+  .errstr = "dereference of modified ctx ptr",
+  .result = REJECT,
 },
 { "check deducing bounds from const, 9",
 @@ -8738,8 +9435,9 @@
 BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),BPF_EXIT_INSN(),
 },
-  .result = REJECT,
+  .errstr_unpriv = "R1 has pointer with unsupported alu operation",
+  .errstr = "R0 tried to subtract pointer from scalar",
+  .result = REJECT,
 },
 { "check deducing bounds from const, 10",
 @@ -8751,8 +9449,8 @@
 BPF_ALU64_REG(BPF_SUB, BPF_REG_0, BPF_REG_1),BPF_EXIT_INSN(),
 },
-  .result = REJECT,
+  .errstr = "math between ctx pointer and register with unbounded min value is not allowed",
+  .result = REJECT,
 },
 { "bpf_exit with invalid return code. test1",
 @@ -8826,6 +9524,422 @@
 BPF_PROG_TYPE_CGROUP_SOCKET,
{"xadd/w check unaligned stack",
+insns = {
+BPF_MOV64_IMM(BPF_REG_0, 1),
+BPF_STX_MEM(BPF_DW, BPF_REG_10, BPF_REG_0, -8),
+BPF_STX_XADD(BPF_W, BPF_REG_10, BPF_REG_0, -7),
+BPF_LDX_MEM(BPF_DW, BPF_REG_0, BPF_REG_10, -8),
+BPF_EXIT_INSN(),
+},
+result = REJECT,
+errstr = "misaligned stack access off",
+prog_type = BPF_PROG_TYPE_SCHED_CLS,
+},
+"xadd/w check unaligned map",
+insns = {
+BPF_ST_MEM(BPF_DW, BPF_REG_10, -8, 0),
+BPF_MOV64_REG(BPF_REG_2, BPF_REG_10),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_2, -8),
+BPF_LD_MAP_FD(BPF_REG_1, 0),
+BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+     BPF_FUNC_map_lookup_elem),
+BPF_JMP_IMM(BPF_JNE, BPF_REG_0, 0, 1),
+BPF_EXIT_INSN(),
+BPF_MOV64_IMM(BPF_REG_1, 1),
+BPF_STX_XADD(BPF_W, BPF_REG_0, BPF_REG_1, 3),
+BPF_LDX_MEM(BPF_W, BPF_REG_0, BPF_REG_0, 3),
+BPF_EXIT_INSN(),
+},
+fixup_map1 = { 3 },
+result = REJECT,
+errstr = "misaligned value access off",
+prog_type = BPF_PROG_TYPE_SCHED_CLS,
+},
+"xadd/w check unaligned pkt",
+insns = {
+BPF_LDX_MEM(BPF_W, BPF_REG_2, BPF_REG_1,
+     offsetof(struct xdp_md, data)),
+BPF_LDX_MEM(BPF_W, BPF_REG_3, BPF_REG_1,
+     offsetof(struct xdp_md, data_end)),
+BPF_MOV64_REG(BPF_REG_1, BPF_REG_2),
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, 8),
+BPF_JMP_REG(BPF_JLT, BPF_REG_1, BPF_REG_3, 2),
+BPF_MOV64_IMM(BPF_REG_0, 99),
+BPF_JMP_IMM(BPF_JNE, BPF_REG_0, 0, 6),
+BPF_MOV64_IMM(BPF_REG_0, 1),
}
+BPF_ST_MEM(BPF_W, BPF_REG_2, 0, 0),
+BPF_ST_MEM(BPF_W, BPF_REG_2, 3, 0),
+BPF_STX_XADD(BPF_W, BPF_REG_2, BPF_REG_0, 1),
+BPF_STX_XADD(BPF_W, BPF_REG_2, BPF_REG_0, 2),
+BPF_LDX_MEM(BPF_W, BPF_REG_0, BPF_REG_2, 1),
+BPF_EXIT_INSN(),
+},
+result = REJECT,
+errstr = "BPF_XADD stores into R2 packet",
+.prog_type = BPF_PROG_TYPE_XDP,
+},
+"pass unmodified ctx pointer to helper",
+.insns = {
+BPF_MOV64_IMM(BPF_REG_2, 0),
+BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+ BPF_FUNC_csum_update),
+BPF_MOV64_IMM(BPF_REG_0, 0),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = ACCEPT,
+},
+"pass modified ctx pointer to helper, 1",
+.insns = {
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -612),
+BPF_MOV64_IMM(BPF_REG_2, 0),
+BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+ BPF_FUNC_csum_update),
+BPF_MOV64_IMM(BPF_REG_0, 0),
+BPF_EXIT_INSN(),
+},
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = REJECT,
+.errstr = "dereference of modified ctx ptr",
+},
+"pass modified ctx pointer to helper, 2",
+.insns = {
+BPF_ALU64_IMM(BPF_ADD, BPF_REG_1, -612),
+BPF_RAW_INSN(BPF_JMP | BPF_CALL, 0, 0, 0,
+ BPF_FUNC_get_socket_cookie),
+BPF_MOV64_IMM(BPF_REG_0, 0),
+BPF_EXIT_INSN(),
+},
+.result_unpriv = REJECT,
+.result = REJECT,
+.errstr_unpriv = "dereference of modified ctx ptr",
+.errstr = "dereference of modified ctx ptr",
+}
+
+"pass modified ctx pointer to helper, 3",
+.insns = {
+BPF_LDX_MEM(BPF_W, BPF_REG_3, BPF_REG_1, 0),
+BPF_ALU64_IMM(BPF_AND, BPF_REG_3, 4),
+BPF_ALU64_REG(BPF_ADD, BPF_REG_1, BPF_REG_3),
+BPF_MOV64_IMM(BPF_REG_2, 0),
+BPF_RAWInsn(BPF_JMP | BPF_CALL, 0, 0, 0,
+     BPF_FUNC_csum_update),
+BPF_MOV64_IMM(BPF_REG_0, 0),
+BPF_EXITInsn(),
+}
+.prog_type = BPF_PROG_TYPE_SCHED_CLS,
+.result = REJECT,
+.errstr = "variable ctx access var_off=(0x0; 0x4)",
+}
+
+"masking, test out of bounds 1",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 5),
+BPF_MOV32_IMM(BPF_REG_2, 5 - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXITInsn(),
+}
+.result = ACCEPT,
+}
+
+"masking, test out of bounds 2",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 1),
+BPF_MOV32_IMM(BPF_REG_2, 1 - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXITInsn(),
+}
+.result = ACCEPT,
+*"masking, test out of bounds 3",
+  .insns = {
+    +BPF_MOV32_IMM(BPF_REG_1, 0xffffffff),
+    +BPF_MOV32_IMM(BPF_REG_2, 0xffffffff - 1),
+    +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+    +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+    +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+    +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+    +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+    +BPF_mov64_REG(BPF_REG_0, BPF_REG_1),
+    +BPF_EXIT_INSN(),
+  },
+  .result = ACCEPT,
+*},
 *
+*"masking, test out of bounds 4",
+  .insns = {
+    +BPF_MOV32_IMM(BPF_REG_1, 0xffffffff),
+    +BPF_MOV32_IMM(BPF_REG_2, 1 - 1),
+    +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+    +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+    +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+    +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+    +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+    +BPF_mov64_REG(BPF_REG_0, BPF_REG_1),
+    +BPF_EXIT_INSN(),
+  },
+  .result = ACCEPT,
+*},
 *
+*"masking, test out of bounds 5",
+  .insns = {
+    +BPF_MOV32_IMM(BPF_REG_1, -1),
+    +BPF_MOV32_IMM(BPF_REG_2, 1 - 1),
+    +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+    +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+    +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+    +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+    +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+    +BPF_mov64_REG(BPF_REG_0, BPF_REG_1),
+    +BPF_EXIT_INSN(),
+  },
+  .result = ACCEPT,
+*},
 *
+*"masking, test out of bounds 6",


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+insns = {
    +BPF_MOV32_IMM(BPF_REG_1, -1),
    +BPF_MOV32_IMM(BPF_REG_2, 0xffffffff - 1),
    +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
    +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
    +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
    +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
    +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
    +BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
    +BPF_EXIT_INSN(),
    +},
+result = ACCEPT,
+},
+"masking, test out of bounds 7",
+insns = {
    +BPF_MOV64_IMM(BPF_REG_1, 5),
    +BPF_MOV32_IMM(BPF_REG_2, 5 - 1),
    +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
    +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
    +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
    +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
    +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
    +BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
    +BPF_EXIT_INSN(),
    +},
+result = ACCEPT,
+},
+"masking, test out of bounds 8",
+insns = {
    +BPF_MOV64_IMM(BPF_REG_1, 1),
    +BPF_MOV32_IMM(BPF_REG_2, 1 - 1),
    +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
    +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
    +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
    +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
    +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
    +BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
    +BPF_EXIT_INSN(),
    +},
+result = ACCEPT,
+},
+"masking, test out of bounds 9",
+insns = {
    +BPF_MOV64_IMM(BPF_REG_1, 0xffffffff),
    +BPF_MOV32_IMM(BPF_REG_2, 0xffffffff - 1),
```
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
+"masking, test out of bounds 10",
+.insns = {
+BPF_MOV64_IMM(BPF_REG_1, 0xffffffff),
+BPF_MOV32_IMM(BPF_REG_2, 1 - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
+"masking, test out of bounds 11",
+.insns = {
+BPF_MOV64_IMM(BPF_REG_1, -1),
+BPF_MOV32_IMM(BPF_REG_2, 1 - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
+"masking, test out of bounds 12",
+.insns = {
+BPF_MOV64_IMM(BPF_REG_1, -1),
+BPF_MOV32_IMM(BPF_REG_2, 0xffffffff - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+}.
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+].
+.result = ACCEPT,
+].
+{  
+"masking, test in bounds 1",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 4),
+BPF_MOV32_IMM(BPF_REG_2, 5 - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+].
+.result = ACCEPT,
+].
+{  
+"masking, test in bounds 2",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 0),
+BPF_MOV32_IMM(BPF_REG_2, 0xffffffff - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN(),
+].
+.result = ACCEPT,
+].
+{  
+"masking, test in bounds 3",
+.insns = {
+BPF_MOV32_IMM(BPF_REG_1, 0xffffffffe),
+BPF_MOV32_IMM(BPF_REG_2, 0xffffffff - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+BPF_EXIT_INSN().
+}.
+.result = ACCEPT,
+}
+{  
+"masking, test in bounds 4",
+.insns = {
+  +BPF_MOV32_IMM(BPF_REG_1, 0xabcde),
+  +BPF_MOV32_IMM(BPF_REG_2, 0xabcdef - 1),
+  +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+  +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+  +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+  +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+  +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+  +BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+  +BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+}.
+{  
+"masking, test in bounds 5",
+.insns = {
+  +BPF_MOV32_IMM(BPF_REG_1, 0),
+  +BPF_MOV32_IMM(BPF_REG_2, 1 - 1),
+  +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+  +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+  +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+  +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+  +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+  +BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+  +BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+}.
+{  
+"masking, test in bounds 6",
+.insns = {
+  +BPF_MOV32_IMM(BPF_REG_1, 46),
+  +BPF_MOV32_IMM(BPF_REG_2, 47 - 1),
+  +BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_1),
+  +BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_1),
+  +BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+  +BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+  +BPF_ALU64_REG(BPF_AND, BPF_REG_1, BPF_REG_2),
+  +BPF_MOV64_REG(BPF_REG_0, BPF_REG_1),
+  +BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
+
+"masking, test in bounds 7",
+.insns = {
+BPF_MOV64_IMM(BPF_REG_3, -46),
+BPF_ALU64_IMM(BPF_MUL, BPF_REG_3, -1),
+BPF_MOV32_IMM(BPF_REG_2, 47 - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_3),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_3),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_3, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_3),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
+
+"masking, test in bounds 8",
+.insns = {
+BPF_MOV64_IMM(BPF_REG_3, -47),
+BPF_ALU64_IMM(BPF_MUL, BPF_REG_3, -1),
+BPF_MOV32_IMM(BPF_REG_2, 47 - 1),
+BPF_ALU64_REG(BPF_SUB, BPF_REG_2, BPF_REG_3),
+BPF_ALU64_REG(BPF_OR, BPF_REG_2, BPF_REG_3),
+BPF_ALU64_IMM(BPF_NEG, BPF_REG_2, 0),
+BPF_ALU64_IMM(BPF_ARSH, BPF_REG_2, 63),
+BPF_ALU64_REG(BPF_AND, BPF_REG_3, BPF_REG_2),
+BPF_MOV64_REG(BPF_REG_0, BPF_REG_3),
+BPF_EXIT_INSN(),
+},
+.result = ACCEPT,
+},
};

static int probe_filter_length(const struct bpf_insn *fp)
@@ -8937,10 +10051,12 @@
int fd_prog, expected_ret, reject_from_alignment;
struct bpf_insn *prog = test->insns;
int prog_len = probe_filter_length(prog);
+char data_in[TEST_DATA_LEN] = {};
int prog_type = test->prog_type;
int map_fds[MAX_NR_MAPS];
const char *expected_err;
-int i;
+uint32_t retval;
+int i, err;

static int probe_filter_length(const struct bpf_insn *fp)
@@ -8937,10 +10051,12 @@
int fd_prog, expected_ret, reject_from_alignment;
struct bpf_insn *prog = test->insns;
int prog_len = probe_filter_length(prog);
+char data_in[TEST_DATA_LEN] = {};
int prog_type = test->prog_type;
int map_fds[MAX_NR_MAPS];
const char *expected_err;
-int i;
+uint32_t retval;
+int i, err;
for (i = 0; i < MAX_NR_MAPS; i++)
map_fds[i] = -1;
@@ -8958,7 +10074,7 @@
reject_from_alignment = fd_prog < 0 &&
(test->flags & F_NEEDS_EFFICIENT_UNALIGNED_ACCESS) &&
-strstr(bpf_vlog, "Unknown alignment.");
+strstr(bpf_vlog, "misaligned");
#ifdef CONFIG_HAVE_EFFICIENT_UNALIGNED_ACCESS
if (reject_from_alignment) {
printf("FAIL\nFailed due to alignment despite having unaligned access: "/m/s!\n",
@@ -8983,6 +10099,19 @@
            }
            }
*passes)++;
printf("OK\n", reject_from_alignment ?
    " (NOTE: reject due to unknown alignment)" : "");
--- linux-4.15.0.orig/tools/testing/selftests/cpu-hotplug/cpu-on-off-test.sh
+++ linux-4.15.0/tools/testing/selftests/cpu-hotplug/cpu-on-off-test.sh
@@ -35,6 +35,10 @@
exit 0
fi
+present_cpus=`cat $SYSFS/devices/system/cpu/present`
+present_max=${present_cpus##*-}
+echo "present_cpus = $present_cpus present_max = $present_max"
+echo -e \"Cpus in online state: $online_cpus\"
offline_cpus=`cat $SYSFS/devices/system/cpu/ offline`
@@ -149,6 +153,8 @@
 offline_max=0
 offline_cpus=0
 offline_max=0

while getopts e:ahp: opt; do
case $opt in
  @)
      online_cpu_expect_success $online_max
    fi
    if [[ $offline_cpus -gt 0 ]]; then
      echo -e "offline to online to offline: cpu $offline_max"
      online_cpu_expect_success $offline_max
      offline_cpu_expect_success $offline_max
      echo -e "offline to online to offline: cpu $present_max"
      online_cpu_expect_success $present_max
      offline_cpu_expect_success $present_max
      online_cpu $present_max
    fi
    exit 0
  else
    --- linux-4.15.0.orig/tools/testing/selftests/efivarfs/config
    +++ linux-4.15.0/tools/testing/selftests/efivarfs/config
    @ @ -0,0 +1 @ @
    +CONFIG_EFIVAR_FS=y
    --- linux-4.15.0.orig/tools/testing/selftests/efivarfs/efivarfs.sh
    +++ linux-4.15.0/tools/testing/selftests/efivarfs/efivarfs.sh
    @@ -4,18 +4,27 @@
    efivarfs_mount=/sys/firmware/efi/efivars
    test_guid=210be57c-9849-4fc7-a635-e6382d1aec27
    +# Kselftest framework requirement - SKIP code is 4.
    +ksft_skip=4
    +
    +file_cleanup()
    +{
      +chattr -i $1
      +rm -f $1
    +}
    +
    check_prereqs()
    {
      local msg="skip all tests:"
      if [ $UID != 0 ]; then
        echo $msg must be run as root >&2
        exit 0
      +exit $ksft_skip
      fi
    }
if ! grep -q "^\S+ $efivarfs_mount efivarfs" /proc/mounts; then
echo $msg efivarfs is not mounted on $efivarfs_mount >&2
-exit 0
+exit $ksft_skip
fi
}

@@ -55,8 +64,10 @@
if [ $(stat -c %s $file) -ne 5 ]; then
  echo "$file has invalid size" >&2
+  file_cleanup $file
  exit 1
fi
+  file_cleanup $file
}

test_create_empty()
@@ -69,12 +80,14 @@
  echo "$file can not be created without writing" >&2
  exit 1
fi
+  file_cleanup $file
}

test_create_read()
{
  local file=$efivarfs_mount/$FUNCNAME-$test_guid
  ./create-read $file
+  file_cleanup $file
}

test_delete()
@@ -89,11 +102,7 @@
  exit 1
fi

-rm $file 2>/dev/null
-if [ $? -ne 0 ]; then
-  chattr -i $file
-  rm $file
-  fi
+  file_cleanup $file

if [ -e $file ]; then
  echo "$file couldn't be deleted" >&2
@@ -147,11 +156,7 @@
  echo "$file could not be created" >&2

if [-e $file ]; then
echo "Creating $file should have failed" >&2
-rm $file 2>/dev/null
-if [ $? -ne 0 ]; then
-chattr -i $file
-rm $file
-fi
+file_cleanup $file
fi
done

@@ -184,11 +189,7 @@
if [ -e $file ]; then
echo "Creating $file should have failed" >&2
-rm $file 2>/dev/null
-if [ $? -ne 0 ]; then
-chattr -i $file
-rm $file
-fi
+file_cleanup $file
ret=1
fi
done
--- linux-4.15.0.orig/tools/testing/selftests/filesystems/Makefile
+++ linux-4.15.0/tools/testing/selftests/filesystems/Makefile
@@ -1,5 +1,7 @@
# SPDX-License-Identifier: GPL-2.0
-TEST_PROGS := dnotify_test
+
+CFLAGS += -I../../../../usr/include/
+TEST_PROGS := dnotify_test devpts_pts
all: $(TEST_PROGS)
include ../lib.mk
--- linux-4.15.0.orig/tools/testing/selftests/filesystems/devpts_pts.c
+++ linux-4.15.0/tools/testing/selftests/filesystems/devpts_pts.c
@@ -0,0 +1,316 @@
+#define _GNU_SOURCE
+#include <errno.h>
+#include <fcntl.h>
+#include <sched.h>
+#include <stdbool.h>
+#include <stdio.h>
+#include <stdlib.h>
+#include <string.h>
+#include <unistd.h>
```c
#include <asm/ioctls.h>
#include <sys/mount.h>
#include <sys/wait.h>
#include "../kselftest.h"

static bool terminal_dup2(int duplicate, int original)
{
    int ret;
    
    ret = dup2(duplicate, original);
    if (ret < 0)
        return false;
    
    return true;
}

static int terminal_set_stdfds(int fd)
{
    int i;
    
    if (fd < 0)
        return 0;
    
    for (i = 0; i < 3; i++)
        if (!terminal_dup2(fd, (int[]) {STDIN_FILENO, STDOUT_FILENO, STDERR_FILENO}[i]))
            return -1;
    
    return 0;
}

static int login_pty(int fd)
{
    int ret;
    
    setsid();
    
    ret = ioctl(fd, TIOCSCTTY, NULL);
    if (ret < 0)
        return -1;
    
    ret = terminal_set_stdfds(fd);
    if (ret < 0)
        return -1;
    
    if (fd > STDERR_FILENO)
        close(fd);
```
return 0;
+
+static int wait_for_pid(pid_t pid)
+
+int status, ret;
+
+again:
+ret = waitpid(pid, &status, 0);
+if (ret == -1) {
+if (errno == EINTR)
+goto again;
+return -1;
+}
+if (ret != pid)
+goto again;
+
+if (!WIFEXITED(status) || WEXITSTATUS(status) != 0)
+return -1;
+
+return 0;
+}
+
+static int resolve_procfd_symlink(int fd, char *buf, size_t buflen)
{+int ret;
+char procfd[4096];
+
+ret = snprintf(procfd, 4096, "/proc/self/fd/%d", fd);
+if (ret < 0 || ret >= 4096)
+return -1;
+
+ret = readlink(procfd, buf, buflen);
+if (ret < 0 || (size_t)ret >= buflen)
+return -1;
+
+buf[ret] = '0';
+
+return 0;
+}
+
+static int do_tiocgptpeer(char *ptmx, char *expected_procfd_contents)
{+int ret;
+int master = -1, slave = -1, fret = -1;
+
+master = open(ptmx, O_RDWR | O_NOCTTY | O_CLOEXEC);
+if (master < 0) {
+return 0;
+}
+fprintf(stderr, "Failed to open \"%s\": %s\n", ptmx,
+strerror(errno));
+return -1;
+
+/*
+ * grantpt() makes assumptions about /dev/pts/ so ignore it. It's also
+ * not really needed.
+ */
+ret = unlockpt(master);
+if (ret < 0) {
+fprintf(stderr, "Failed to unlock terminal\n");
+goto do_cleanup;
+
+#ifdef TIOCGPTPEER
+slave = ioctl(master, TIOCGPTPEER, O_RDWR | O_NOCTTY | O_CLOEXEC);
+#endif
+if (slave < 0) {
+if (errno == EINVAL) {
+fprintf(stderr, "TIOCGPTPEER is not supported. 
" Skipping test.\n");
+fret = KSFT_SKIP;
+} else {
+fprintf(stderr, 
"Failed to perform TIOCGPTPEER ioctl\n");
+fret = EXIT_FAILURE;
+}
+goto do_cleanup;
+
+pid_t pid = fork();
+if (pid < 0)
+goto do_cleanup;
+
+if (pid == 0) {
+char buf[4096];
+
+ret = login_pty(slave);
+if (ret < 0) {
+fprintf(stderr, "Failed to setup terminal\n");
+_exit(EXIT_FAILURE);
+
+ret = resolve_procfd_symlink(STDIN_FILENO, buf, sizeof(buf));
+if (ret < 0) {
+fprintf(stderr, "Failed to retrieve pathname of pts \
+"slave file descriptor\n");
+}
+_exit(EXIT_FAILURE);
+
+if (strncmp(expected_procfd_contents, buf,
+    strlen(expected_procfd_contents)) != 0) {
+    fprintf(stderr, "Received invalid contents for 
+    "/proc/<pid>/fd/%d" symlink: %s\n",
+    STDERR_FILENO, buf);
+    _exit(-1);
+}  
+
+fprintf(stderr, "Contents of "/proc/<pid>/fd/%d" symlink are valid: %s\n",
+    STDERR_FILENO, buf);
+    _exit(EXIT_SUCCESS);
+  }
+
+ret = wait_for_pid(pid);
+if (ret < 0)
+    goto do_cleanup;
+
+fret = EXIT_SUCCESS;
+
do_cleanup:
+if (master >= 0)
+    close(master);
+if (slave >= 0)
+    close(slave);
+
+return fret;
+}
+
+static int verify_non_standard_devpts_mount(void)
+{
+  char *mntpoint;
+  int ret = -1;
+  char devpts[] = P_tmpdir "/devpts_fs_XXXXXX";
+  char ptmx[] = P_tmpdir "/devpts_fs_XXXXXX/ptmx";
+
+  ret = umount("/dev/pts");
+  if (ret < 0) {
+      fprintf(stderr, "Failed to unmount "/dev/pts": %s\n",
+        strerror(errno));
+      return -1;
+  }
+  
+  return fret;
+} 
+
+static int verify_non_standard_devpts_mount(void) {
mntpoint = makedev(pts);
if (!mntpoint) {
    fprintf(stderr, "Failed to create temporary mountpoint: %s\n",
            strerror(errno));
    return -1;
}
ret = mount("devpts", mntpoint, "devpts", MS_NOSUID | MS_NOEXEC,
            "newinstance,ptmxmode=0666,mode=0620,gid=5");
if (ret < 0) {
    fprintf(stderr, "Failed to mount devpts fs to \"%s\" in new ":
            "mount namespace: %s\n", mntpoint,
            strerror(errno));
    unlink(mntpoint);
    return -1;
}
ret = snprintf(ptmx, sizeof(ptmx), "%s/ptmx", devpts);
if (ret < 0 || (size_t)ret >= sizeof(ptmx)) {
    unlink(mntpoint);
    return -1;
}
ret = do_tiocgptpeer(ptmx, mntpoint);
unlink(mntpoint);
if (ret < 0)
    return -1;
return 0;
}

static int verify_ptmx_bind_mount(void)
{
    int ret;
    ret = mount("/dev/pts/ptmx", "/dev/ptmx", NULL, MS_BIND, NULL);
    if (ret < 0) {
        fprintf(stderr, "Failed to bind mount "/dev/pts/ptmx" to ":
                "/dev/ptmx" mount namespace\n\n"); return -1;
    }
    ret = do_tiocgptpeer("/dev/ptmx", "/dev/ptmx");
    if (ret < 0)
        return -1;
    return 0;
}
+static int verify_invalid_ptmx_bind_mount(void)
+{
+    int ret;
+    char mntpoint_fd;
+    char ptmx[] = P_tmpdir */devpts_ptmx_XXXXXX*;
+    
+    mntpoint_fd = mkstemp(ptmx);
+    if (mntpoint_fd < 0) {
+        fprintf(stderr, "Failed to create temporary directory: %s\n",
+                strerror(errno));
+        return -1;
+    }
+    
+    ret = mount("/dev/pts/ptmx", ptmx, NULL, MS_BIND, NULL);
+    close(mntpoint_fd);
+    if (ret < 0) {
+        fprintf(stderr, "Failed to bind mount "/dev/pts/ptmx" to "
+                ""%s" mount namespace\n", ptmx);
+        return -1;
+    }
+    
+    ret = do_tiocgptpeer(ptmx, "/dev/pts/");
+    if (ret == 0)
+        return -1;
+    
+    return 0;
+}
+
+int main(int argc, char *argv[])
+{
+    int ret;
+    
+    if (!isatty(STDIN_FILENO)) {
+        fprintf(stderr, "Standard input file descriptor is not attached "
+                "to a terminal. Skipping test\n");
+        exit(KSFT_SKIP);
+    }
+    
+    ret = unshare(CLONE_NEWNS);
+    if (ret < 0) {
+        fprintf(stderr, "Failed to unshare mount namespace\n");
+        exit(EXIT_FAILURE);
+    }
+    
+    ret = mount("", "/", NULL, MS_PRIVATE | MS_REC, 0);
+    if (ret < 0) {
+        fprintf(stderr, "Failed to make "/A" MS_PRIVATE in new mount "
+                
+                "\n"
"namespace"
);
+exit(EXIT_FAILURE);
+
+ret = verify_ptmx_bind_mount();
+if (ret < 0)
+exit(EXIT_FAILURE);
+
+ret = verify_invalid_ptmx_bind_mount();
+if (ret < 0)
+exit(EXIT_FAILURE);
+
+ret = verify_non_standard_devpts_mount();
+if (ret < 0)
+exit(EXIT_FAILURE);
+
+exit(EXIT_SUCCESS);
+
--- linux-4.15.0.orig/tools/testing/selftests/firmware/fw_filesystem.sh
+++ linux-4.15.0/tools/testing/selftests/firmware/fw_filesystem.sh
@@ -45,7 +45,12 @@
if [ "$HAS_FW_LOADER_USER_HELPER" = "yes" ]; then
    echo "$OLD_TIMEOUT" >/sys/class/firmware/timeout
    fi
-    echo -n "$OLD_PATH" >/sys/module/firmware_class/parameters/path
+    if [ "$OLD_FWPATH" = "" ]; then
+        # A zero-length write won't work; write a null byte
+        printf '\000' >/sys/module/firmware_class/parameters/path
+    else
+    echo -n "$OLD_FWPATH" >/sys/module/firmware_class/parameters/path
+    fi
rm -f "$FW"
rmdir "$FWPATH"
}
+  --fail-unresolved)
+  UNRESOLVED_RESULT=1
+  shift 1
+  ;;
+  --logdir|-l)
    LOG_DIR=$2
    shift 2
@@ -117,6 +122,7 @@
    DEBUG=0
    VERBOSE=0
    UNSUPPORTED_RESULT=0
+UNRESOLVED_RESULT=0
# Parse command-line options
parse_opts $*
@@ -192,7 +198,7 @@
     $UNRESOLVED)
         prlog "[UNRESOLVED]"
         UNRESOLVED_CASES="$UNRESOLVED_CASES $CASENO"
     -        return 1 # this is a kind of bug.. something happened.
+        return $UNRESOLVED_RESULT # depends on use case
     ;;
     $UNTESTED)
         prlog "[UNTESTED]"
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/settings
+++ linux-4.15.0/tools/testing/selftests/ftrace/settings
@@ -0,0 +1 @@
+timeout=0
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/00basic/snapshot.tc
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/00basic/snapshot.tc
@@ -0,0 +1,28 @@
+#!/bin/sh
+# description: Snapshot and tracing setting
+# flags: instance
+
+[ ! -f snapshot ] & & exit_unsupported
+
+echo "Set tracing off"
+echo 0 > tracing_on
+
+echo "Allocate and take a snapshot"
+echo 1 > snapshot
+
+## Since trace buffer is empty, snapshot is also empty, but allocated
+grep -q "Snapshot is allocated" snapshot
+
+echo "Ensure keep tracing off"
+test `cat tracing_on` -eq 0
+ echo "Set tracing on"
++ echo 1 > tracing_on
+
+ echo "Take a snapshot again"
++ echo 1 > snapshot
+
+ echo "Ensure keep tracing on"
++ test `cat tracing_on` -eq 1
+
++ exit 0

--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/ftrace/func-filter-glob.tc
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/ftrace/func-filter-glob.tc
@@ -29,6 +29,12 @@
    # filter by *, end match
    ftrace_filter_check 'schedule*' '^schedule.*$'

++## filter by *mid*end
++ftrace_filter_check '*pin*lock'.*pin.*lock$'
+
++## filter by start*mid*
++ftrace_filter_check 'mutex*try*' '^mutex.*try.*'
+
+# Advanced full-glob matching feature is recently supported.
# Skip the tests if we are sure the kernel does not support it.
if grep -q 'accepts: .* glob-matching-pattern' README ; then
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/functions
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/functions
@@ -15,14 +15,29 @@
    echo nop > current_tracer
}

-reset_trigger() { # reset all current setting triggers
-    grep -v ^# events/*/*/trigger |
+reset_trigger_file() {
+    # remove action triggers first
+    grep -H `on[^:]*(' $@ |
+    while read line; do
+        cmd=`echo $line | cut -f2- -d: | cut -f1 -d" "
+        file=`echo $line | cut -f1 -d`.
+        echo "$cmd" >> $file
+    done
+    grep -Hv ^# $@ |
+    while read line; do
+        cmd=`echo $line | cut -f2- -d: | cut -f1 -d" "`
-echo "$cmd" > `echo $line | cut -f1 -d`
-echo "$cmd" > $file

done
}

+reset_trigger() { # reset all current setting triggers
  +  if [-d events/synthetic ]; then
  +    reset_trigger_file events/synthetic/*/trigger
  +  fi
  +  reset_trigger_file events/*/*/trigger
  +}
+
reset_events_filter() { # reset all current setting filters
  grep -v ^none events/*/*/filter |
  while read line; do
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/kprobe/kprobe_args_string.tc
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/kprobe/kprobe_args_string.tc
@@ -0,0 +1,48 @@
+#!/bin/sh
+# SPDX-License-Identifier: GPL-2.0
+## description: Kprobe event string type argument
+
+[ -f kprobe_events ] || exit_unsupported # this is configurable
+
+echo 0 > events/enable
+echo > kprobe_events
+
+case `uname -m` in
+x86_64)
+  ARG1=%di
+;;
i[3456]86)
+  ARG1=%ax
+;;
aarch64)
+  ARG1=%x0
+;;
arm*)
+  ARG1=%r0
+;;
ppc64*)
+  ARG1=%r3
+;;
ppc*)
+  ARG1=%r3
+;;
*+)
+  echo "Please implement other architecture here"
+  exit_untested
+esac
+ "Test get argument (1)"
+ echo "p:testprobe tracefs_create_dir arg1=+0($ARG1):string" > kprobe_events
+ echo 1 > events/kprobes/testprobe/enable
+ echo "p:test_do_fork" >> kprobe_events
+ grep -qe "testprobe.* arg1="" trace
+ echo 0 > events/kprobes/testprobe/enable
+ "Test get argument (2)"
+ echo "p:testprobe tracefs_create_dir arg1=+0($ARG1):string arg2=+0($ARG1):string" > kprobe_events
+ echo 1 > events/kprobes/testprobe/enable
+ echo "p:test_do_fork" >> kprobe_events
+ grep -qe "testprobe.* arg1="" arg2="" trace
+ echo 0 > events/enable
+ echo > kprobe_events
+ PROBEFUNC="vfs_read"
+ GOODREG=
+ BADREG=
+ GOOODSYM="_sdata"
+ if ! grep -qw $GOODSYM /proc/kallsyms ; then
+ GOODSYM=PROBEFUNC
+ fi
+ BADSYM="deaqswdefr"
+ SYMADDR=0x`grep -w $GOODSYM /proc/kallsyms | cut -f 1 -d " "`
+ GOODTYPE="x16"
+ BADTYPE="y16"
+ case `uname -m` in
+ x86_64|i[3456]86)
+ GOODREG=%ax
+ BADREG=%ex
+ ;;
+ aarch64)
GOODREG=\%x0
BADREG=\%ax

+arm*)
GOODREG=\%r0
BADREG=\%ax

+ppc*)
GOODREG=\%r3
BADREG=\%msr

+

echo "Please implement other architecture here"
exit_untested


test_goodarg() # Good-args
{
  while [ "$1" ]; do
    echo "p ${PROBEFUNC} $1" > kprobe_events
    shift 1
  done;
}

test_badarg() # Bad-args
{
  while [ "$1" ]; do
    ! echo "p ${PROBEFUNC} $1" > kprobe_events
    shift 1
  done;
}

echo > kprobe_events

:Register access

test_goodarg ${GOODREG}
test_badarg ${BADREG}

(Symbol access)
test_goodarg @${GOODSYM} @${SYMADDR} @${GOODSYM}+10 @${GOODSYM}-10
test_badarg @ @${BADSYM} @${GOODSYM}*10 @${GOODSYM}/10 @${GOODSYM}%10 @${GOODSYM}&10 @${GOODSYM}|10

(Stack access)
test_goodarg $stack $stack0 $stack1
test_badarg $stackp $stack0+10 $stack1-10

(Retval access)
+echo "r ${PROBEFUNC} \$retval" > kprobe_events
+! echo "p ${PROBEFUNC} \$retval" > kprobe_events
+
+# $comm was introduced in 4.8, older kernels reject it.
+if grep -A1 "fetcharg:" README | grep -q \$comm'; then
+  "Comm access"
+test_goodarg "\$comm"
+fi
+
+  "Indirect memory access"
+test_goodarg "+0(${GOODREG})" "+0(${GOODREG})" "+10($stack)"
+"+0(\$stack1)" "+10(@GOODSYM-10)" "+0(+10(+$stack))"
+test_badarg "+($GOODREG)" "($GOODREG)+10" "+($GOODREG)" "($GOODREG)"
+"+10($comm)" "+0($GOODREG)+10"
+
+  "Name assignment"
+test_goodarg "varname=${GOODREG}";
+test_badarg "varname=varname2=${GOODREG}";
+
+  "Type syntax"
+test_goodarg "$\{GOODREG\}:$$\{GOODTYPE\}";
+test_badarg "$\{GOODREG\}::$$\{GOODTYPE\}" "$\{GOODREG\}:$$\{BADTYPE\}";
+"$$\{GOODTYPE\}:$$\{GOODREG\}"
+
+  "Combination check"
+
+test_goodarg "\$comm:string" "+0($stack):string"
+test_badarg "\$comm:x64" "$stack:string" "$\{GOODREG\}:string"
+
+echo > kprobe_events
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/kprobe/multiple_kprobes.tc
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/kprobe/multiple_kprobes.tc
@@ -12,8 +12,8 @@
*) OFFS=0;;
esac

-echo "Setup up to 256 kprobes"
-grep t /proc/kallsyms | cut -f3 -d " | grep -v .*/..* | \n+echo "Setup up kprobes on first 256 text symbols"
+grep -i t /proc/kallsyms | cut -f3 -d " | grep -v .*/..* | \nhead -n 256 | while read i; do echo p ${i}+${OFFS} ; done > kprobe_events |:

echo 1 > events/kprobes/enable
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/kprobe/probepoint.tc
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/kprobe/probepoint.tc
@@ -0,0 +1,43 @@
+#!/bin/sh
+# SPDX-License-Identifier: GPL-2.0
#!/bin/sh

# description: event trigger - test multiple actions on hist trigger

# We have to decode symbol addresses to get correct offsets.
# If the offset is not an instruction boundary, it cause -EILSEQ.

set_offs `grep -A1 -B1 ${TARGET_FUNC} /proc/kallsyms | cut -f1 -d " " | xargs`

UINT_TEST=no

if [ `printf "%x" -1 | wc -c` != 9 ]; then
  UINT_TEST=yes
fi

echo 0 > events/enable

++> kprobe_events

++> p:testprobe ${TARGET_FUNC} > kprobe_events
++> p:testprobe ${TARGET} > kprobe_events
++> p:testprobe ${TARGET_FUNC}${NEXT} > kprobe_events
!! echo "p:testprobe ${TARGET_FUNC}${PREV}" > kprobe_events
++ if [ "$UINT_TEST" = yes ]; then
!! echo "p:testprobe ${TARGET_FUNC}${OVERFLOW}" > kprobe_events
++fi

++> kprobe_events

clear_trace
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/trigger/inter-event/trigger-multi-actions-accept.tc
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/trigger/inter-event/trigger-multi-actions-accept.tc
@@ -0,0 +1,44 @@
+do_reset() {
+    reset_trigger
+    echo > set_event
+    clear_trace
+}
+
+fail() { #msg
+    do_reset
+    echo $1
+    exit_fail
+}
+
+if [ ! -f set_event ]; then
+    echo "event tracing is not supported"
+    exit_unsupported
+fi
+
+if [ ! -f synthetic_events ]; then
+    echo "synthetic event is not supported"
+    exit_unsupported
+fi
+
+clear_synthetic_events
+reset_tracer
+do_reset
+
+echo "Test multiple actions on hist trigger"
+echo 'wakeup_latency u64 lat; pid_t pid' >> synthetic_events
+TRIGGER1=events/sched/sched_wakeup/trigger
+TRIGGER2=events/sched/sched_switch/trigger
+
+echo 'hist:keys=pid:ts0=common_timestamp.usecs if comm=="cyclictest"' >> $TRIGGER1
+echo 'hist:keys=next_pid:wakeup_lat=common_timestamp.usecs-$ts0 if next_comm=="cyclictest"' >> $TRIGGER2
+
+echo 'hist:keys=next_pid:onmatch(sched.sched_wakeup).wakeup_latency(sched.sched_switch.$wakeup_lat,next_pid) if next_comm=="cyclictest"' >> $TRIGGER2
+
+echo 'hist:keys=next_pid:onmatch(sched.sched_wakeup).wakeup_latency(sched.sched_switch.$wakeup_lat,prev_pid) if next_comm=="cyclictest"' >> $TRIGGER2
+
+do_reset
+
+exit 0
--- linux-4.15.0.orig/tools/testing/selftests/ftrace/test.d/trigger/inter-event/trigger-synthetic-event-syntax.tc
+++ linux-4.15.0/tools/testing/selftests/ftrace/test.d/trigger/inter-event/trigger-synthetic-event-syntax.tc
@@ -0,0 +1,80 @@
#!/bin/sh
+# SPDX-License-Identifier: GPL-2.0
+# description: event trigger - test synthetic_events syntax parser
+
+do_reset() {
+   reset_trigger
+   echo > set_event
+   clear_trace
+}
+
+fail() { #msg
+   do_reset
+   echo $1
+   exit_fail
+}
+
+if [ ! -f set_event ]; then
+   echo "event tracing is not supported"
+   exit_unsupported
+fi
+
+if [ ! -f synthetic_events ]; then
+   echo "synthetic event is not supported"
+   exit_unsupported
+fi
+
+reset_tracer
+do_reset
+
+echo "Test synthetic_events syntax parser"
+
+echo > synthetic_events
+
+# synthetic event must have a field
+! echo "myevent" >> synthetic_events
+echo "myevent u64 var1" >> synthetic_events
+
+# synthetic event must be found in synthetic_events
+grep "myevent[:;space:]u64 var1" synthetic_events
+
+# it is not possible to add same name event
+! echo "myevent u64 var2" >> synthetic_events
+
+# Non-append open will cleanup all events and add new one
+echo "myevent u64 var2" > synthetic_events
+
+# multiple fields with different spaces
+echo "myevent u64 var1; u64 var2:" > synthetic_events
+grep "myevent[:space:]u64 var1; u64 var2" synthetic_events
+echo "myevent u64 var1 ; u64 var2 ;" > synthetic_events
+grep "myevent[:space:]u64 var1; u64 var2" synthetic_events
+echo "myevent u64 var1 ;u64 var2" > synthetic_events
+grep "myevent[:space:]u64 var1; u64 var2" synthetic_events
+
+# test field types
+echo "myevent u32 var" > synthetic_events
+echo "myevent u16 var" > synthetic_events
+echo "myevent u8 var" > synthetic_events
+echo "myevent s64 var" > synthetic_events
+echo "myevent s32 var" > synthetic_events
+echo "myevent s16 var" > synthetic_events
+echo "myevent s8 var" > synthetic_events
+
# test string type
+echo "myevent char var[10]" > synthetic_events
+grep "myevent[:space:]char\[10\] var" synthetic_events
+
+do_reset
+
+exit 0
--- linux-4.15.0.orig/tools/testing/selftests/futex/Makefile
+++ linux-4.15.0/tools/testing/selftests/futex/Makefile
@@ -12,9 +12,9 @@
 BUILD_TARGET=$(OUTPUT)/$$DIR/;
     mkdir $$BUILD_TARGET  -p;
     make OUTPUT=$$BUILD_TARGET -C $$DIR $@
@@ -12.9 +12.9 @@
 mkdir $$BUILD_TARGET -p;
 make OUTPUT=$$BUILD_TARGET -C $$DIR $@
-if [ -e $$DIR/$(TEST_PROGS) ]; then
-    rsync -a $$DIR/$(TEST_PROGS) $$BUILD_TARGET/;
-fi
+if [ -e $$DIR/$(TEST_PROGS) ]; then \
+    rsync -a $$DIR/$(TEST_PROGS) $$BUILD_TARGET/; \
+fi \
 done

override define RUN_TESTS
--- linux-4.15.0.orig/tools/testing/selftests/futex/functional/Makefile
+++ linux-4.15.0/tools/testing/selftests/futex/functional/Makefile
@@ -18,6 +18,8 @@
TEST_PROGS := run.sh
+top_srcdir = ../../../../..
+KSFT_KHDR_INSTALL := 1
include ../..lib.mk

$(TEST_GEN_FILES): $(HEADERS)
--- linux-4.15.0.orig/tools/testing/selftests/gpio/Makefile
+++ linux-4.15.0/tools/testing/selftests/gpio/Makefile
@@ -9,6 +9,7 @@
EXTRA_OBJS += ../gpiogpio-hammer-in.o ../gpiogpio-utils.o ../gpiolsgpio-in.o
EXTRA_OBJS += ../gpiolsgpio.o

+KSFT_KHDR_INSTALL := 1
include ../lib.mk

all: $(BINARIES)
@@ -21,11 +22,8 @@
CFLAGS += -O2 -g -std=gnu99 -Wall -I../../../../usr/include/
LDLIBS += -lmount -l/usr/include/libmount

-$(BINARIES): ../../../gpio/gpio-utils.o ../../../../usr/include/linux/gpio.h
+$($(BINARIES)):| khdr
+$($(BINARIES)): ../../../gpio/gpio-utils.o

./../../../gpio/gpio-utils.o:
make ARCH=$(ARCH) CROSS_COMPILE=$(CROSS_COMPILE) -C ../../../gpio
-.
-./../../../usr/include/linux/gpio.h:
-make -C ../../../usr/include/linux/gpio.h:
-headers_install INSTALL_HDR_PATH=$(shell pwd)/../../../../usr/
--- linux-4.15.0.orig/tools/testing/selftests/gpio/gpio-mockup-chardev.c
+++ linux-4.15.0/tools/testing/selftests/gpio/gpio-mockup-chardev.c
@@ -37,7 +37,7 @@
struct libmnt_table *tb;
struct libmnt_iter *itr = NULL;
struct libmnt_fs *fs;
-    int found = 0;
+    int found = 0, ret;

    cxt = mnt_new_context();
    if (!cxt)
        @@ -58,8 +58,11 @@
        break;
}
if (found) {
    ret = asprintf(path, "%s/gpio", mnt_fs_get_target(fs));
    if (ret < 0)
        err(EXIT_FAILURE, "failed to format string");
}

mnt_free_iter(itr);
mnt_free_context(cxt);

--- linux-4.15.0.orig/tools/testing/selftests/intel_pstate/run.sh
+++ linux-4.15.0/tools/testing/selftests/intel_pstate/run.sh
@@ -30,9 +30,12 @@
EVALUATE_ONLY=0

+        # Kselftest framework requirement - SKIP code is 4.
+        ksft_skip=4
+
+        if !(uname -m | sed -e s/i.86/x86/ -e s/x86_64/x86/ | grep -q x86; then
            echo "$0 # Skipped: Test can only run on x86 architectures."
-        exit 0
-        exit $ksft_skip
+        fi
+
        max_cpus=$((($nproc)-1))
        @@ -48,11 +51,12 @@
        echo "sleeping for 5 seconds"
        sleep 5
        -num_freqs=$(cat /proc/cpuinfo | grep MHz | sort -u | wc -l)
        if [ $num_freqs -le 2 ]; then
            cat /proc/cpuinfo | grep MHz | sort -u | tail -1 > /tmp/result.$1
+        grep MHz /proc/cpuinfo | sort -u > /tmp/result.freqs
+        num_freqs=$(wc -l /tmp/result.freqs | awk '{ print $1 }')
+        if [ $num_freqs -ge 2 ]; then
+            tail -n 1 /tmp/result.freqs > /tmp/result.$1
        else
            cat /proc/cpuinfo | grep MHz | sort -u > /tmp/result.$1
            cp /tmp/result.freqs /tmp/result.$1
        fi
        ./msr 0 >> /tmp/result.$1

        @@ -82,21 +86,20 @@
        max_freq=$(($max_freq / 1000))
-for freq in `seq $max_freq -100 $min_freq`
+[ SEVALUATE_ONLY -eq 0 ] & & for freq in `seq $max_freq -100 $min_freq`
do
echo "Setting maximum frequency to $freq"
cpupower frequency-set -g powersave --max=${freq}MHz & & /dev/null
-[ SEVALUATE_ONLY -eq 0 ] & & run_test $freq
+run_test $freq
done

-echo
"=============================================================================="
+[ SEVALUATE_ONLY -eq 0 ] & & cpupower frequency-set -g powersave --max=${max_freq}MHz & & /dev/null
+echo
"=============================================================================="

echo "The marketing frequency of the cpu is $mkt_freq MHz"
echo "The maximum frequency of the cpu is $max_freq MHz"
echo "The minimum frequency of the cpu is $min_freq MHz"

cpupower frequency-set -g powersave --max=${max_freq}MHz & & /dev/null
-
# make a pretty table
echo "Target Actual Difference MSR(0x199) max_perf_pct"
for freq in `seq $max_freq -100 $min_freq`
@@ -104,10 +107,6 @@
result_freq=$(cat /tmp/result.${freq} | grep "cpu MHz" | awk '{ print $4 }' | awk -F "." '{ print $1 } ')
msr=$(cat /tmp/result.${freq} | grep "msr" | awk '{ print $3 } ')
max_perf_pct=$(cat /tmp/result.${freq} | grep "max_perf_pct" | awk '{ print $2 } ')
-if [ $result_freq -eq $freq ]; then
-echo " $freq $result_freq 0 $msr $((max_perf_pct*3300))"
-else
-echo " $freq $result_freq $((result_freq-freq)) $msr $((max_perf_pct*max_freq))"
-fi
+echo " $freq $result_freq $((result_freq-freq)) $msr $((max_perf_pct*max_freq))"
done
exit 0
--- linux-4.15.0.orig/tools/testing/selftests/ipc/msgque.c
+++ linux-4.15.0/tools/testing/selftests/ipc/msgque.c
@@ -1,9 +1,10 @@
// SPDX-License-Identifier: GPL-2.0
+#define _GNU_SOURCE
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <errno.h>
-#include <linux/msg.h>
+#include <sys/msg.h>
#include <fcntl.h>
#include "../kselftest.h"
@@ -73,7 +74,7 @@
 return 0;

destroy:
- if (msgctl(id, IPC_RMID, 0))
+ if (msgctl(id, IPC_RMID, NULL))
 printf("Failed to destroy queue: %d\n", -errno);
 return ret;
 }
@@ -120,7 +121,7 @@
 ret = 0;
 err:
- if (msgctl(msgque->msq_id, IPC_RMID, 0)) {
+ if (msgctl(msgque->msq_id, IPC_RMID, NULL)) {
 printf("Failed to destroy queue: %d\n", -errno);
 return -errno;
 }
@@ -129,14 +130,14 @@
 int dump_queue(struct msgque_data *msgque)
 {
- struct msqid64_ds ds;
+ struct msqid_ds ds;
 int kern_id;
 int i, ret;

 for (kern_id = 0; kern_id < 256; kern_id++) {
 ret = msgctl(kern_id, MSG_STAT, &ds);
 if (ret < 0) {
- if (errno == -EINVAL)
+ if (errno == EINVAL)
 continue;
 printf("Failed to get stats for IPC queue with id %d\n", kern_id);
@@ -246,7 +247,7 @@
 return ksft_exit_pass();

 err_destroy:
- if (msgctl(msgque.msq_id, IPC_RMID, 0)) {
+ if (msgctl(msgque.msq_id, IPC_RMID, NULL)) {
 printf("Failed to destroy queue: %d\n", -errno);
 return ksft_exit_fail();
 }
--- linux-4.15.0.orig/tools/testing/selftests/kmod/kmod.sh
+++ linux-4.15.0/tools/testing/selftests/kmod/kmod.sh
function get_test_count()
{
    test_num $1
    TEST_DATA=$(echo $ALL_TESTS | awk '{print $'$1'}')
    echo $TEST_DATA
}

function get_test_data()
{
    test_num $1
    field_num=$(echo $1 | sed 's/^0*//')
    echo $ALL_TESTS | awk '{print $'$field_num'}'
}
/**
 * ASSERT_NE(expected, seen)
 * @ @ -341.7 +341.7 @ @
 * ASSERT_NE(expected, measured): expected != measured
 */
#define ASSERT_NE(expected, seen) \ 
- __EXPECT(expected, seen, !=, 1) \\
+ __EXPECT(expected, #expected, seen, #seen, !=, 1)
/**
 * ASSERT_LT(expected, seen)
 * @ @ -352.7 +352.7 @ @
 * ASSERT_LT(expected, measured): expected < measured
 */
#define ASSERT_LT(expected, seen) \ 
- __EXPECT(expected, seen, <, 1) \\
+ __EXPECT(expected, #expected, seen, #seen, <, 1)
/**
 * ASSERT_LE(expected, seen)
 * @ @ -363.7 +363.7 @ @
 * ASSERT_LE(expected, measured): expected <= measured
 */
#define ASSERT_LE(expected, seen) \ 
- __EXPECT(expected, seen, <=, 1) \\
+ __EXPECT(expected, #expected, seen, #seen, <=, 1)
/**
 * ASSERT_GT(expected, seen)
 * @ @ -374.7 +374.7 @ @
 * ASSERT_GT(expected, measured): expected > measured
 */
#define ASSERT_GT(expected, seen) \ 
- __EXPECT(expected, seen, >, 1) \\
+ __EXPECT(expected, #expected, seen, #seen, >, 1)
/**
 * ASSERT_GE(expected, seen)
 * @ @ -385.7 +385.7 @ @
 * ASSERT_GE(expected, measured): expected >= measured
 */
#define ASSERT_GE(expected, seen) \ 
- __EXPECT(expected, seen, >=, 1) \\
+ __EXPECT(expected, #expected, seen, #seen, >=, 1)
/**
 * ASSERT_NULL(seen)
 */
* ASSERT_NULL(measured): NULL == measured

#define ASSERT_NULL(seen) \
	__EXPECT(NULL, seen, ==, 1)

* ASSERT_TRUE(seen)

#define ASSERT_TRUE(seen) \
	ASSERT_NE(0, seen)

* ASSERT_FALSE(seen)

#define ASSERT_FALSE(seen) \
	ASSERT_EQ(0, seen)

* ASSERT_STREQ(expected, seen)

#define EXPECT_EQ(expected, seen) \
	__EXPECT(expected, seen, ==, 0)

* EXPECT_NE(expected, seen)

#define EXPECT_NE(expected, seen) \
	__EXPECT(expected, seen, !=, 0)

* EXPECT_LT(expected, seen)

#define EXPECT_LT(expected, seen) \
	__EXPECT(expected, seen, <, 0)

* EXPECT_LE(expected, seen)

#define EXPECT_LE(expected, seen) \
	__EXPECT(expected, seen, <=, 0)

* EXPECT_GE(expected, seen)

#define EXPECT_GE(expected, seen) \
	__EXPECT(expected, seen, >=, 0)

* EXPECT_GT(expected, seen)

#define EXPECT_GT(expected, seen) \
	__EXPECT(expected, seen, >, 0)

* EXPECT_EQ(expected, seen)

#define EXPECT_EQ(expected, seen) \
	__EXPECT(expected, seen, ==, 0)
# define EXPECT_LT(expected, seen) \ 
- __EXPECT(expected, seen, <, 0) 
+ __EXPECT(expected, #expected, seen, #seen, <, 0)

/**
 * EXPECT_LE(expected, seen)
 * @ @ -481,7 +481.7 @ @
 * EXPECT_LE(expected, measured): expected <= measured */
#define EXPECT_LE(expected, seen) \
- __EXPECT(expected, seen, <=, 0) 
+ __EXPECT(expected, #expected, seen, #seen, <=, 0)

/**
 * EXPECT_GT(expected, seen)
 * @ @ -492,7 +492.7 @ @
 * EXPECT_GT(expected, measured): expected > measured */
#define EXPECT_GT(expected, seen) \
- __EXPECT(expected, seen, >, 0) 
+ __EXPECT(expected, #expected, seen, #seen, >, 0)

/**
 * EXPECT_GE(expected, seen)
 * @ @ -503,7 +503.7 @ @
 * EXPECT_GE(expected, measured): expected >= measured */
#define EXPECT_GE(expected, seen) \
- __EXPECT(expected, seen, >=, 0) 
+ __EXPECT(expected, #expected, seen, #seen, >=, 0)

/**
 * EXPECT_NULL(seen)
 * @ @ -513,7 +513.7 @ @
 * EXPECT_NULL(measured): NULL == measured */
#define EXPECT_NULL(seen) \
- __EXPECT(NULL, seen, ==, 0) 
+ __EXPECT(NULL, "NULL", seen, #seen, ==, 0)

/**
 * EXPECT_TRUE(seen)
 * @ @ -523,7 +523.7 @ @
 * EXPECT_TRUE(measured): 0 != measured */
#define EXPECT_TRUE(seen) \
- EXPECT_NE(0, seen) 
+ __EXPECT(0, "0", seen, #seen, !=, 0)
/**
 * EXPECT_FALSE(seen)
 **@
 * EXPECT_FALSE(measured): 0 == measured
 */
#define EXPECT_FALSE(seen)
   \-EXPECT_EQ(0, seen)
+	__EXPECT(0, "0", seen, #seen, ==, 0)
/**
 * EXPECT_STREQ(expected, seen)
 **@
 if (_metadata->passed && _metadata->step < 255)\
 _metadata->step++;

#pragma function(_metadata)
#define __EXPECT(_expected, _seen, _t, _assert) do {\
    /* Avoid multiple evaluation of the cases */\
    __typeof__(_expected) __exp = (_expected);\
    __typeof__(_seen) __seen = (_seen);\
    @ @ -582,8 +582,8 @ @
    unsigned long long __exp_print = (uintptr_t)__exp;\
    unsigned long long __seen_print = (uintptr_t)__seen;\
    __TH_LOG("Expected %s (%llu) %s %s (%llu)",\
          #_expected, __exp_print, #_t,\
          #_seen, __seen_print);\
    _metadata->passed = 0;\
} /* Ensure the optional handler is triggered */\
metadata->trigger = 1;\
--- linux-4.15.0.orig/tools/testing/selftests/kvm/config
+++ linux-4.15.0/tools/testing/selftests/kvm/config
@@ -0,0 +1,3 @@
+CONFIG_KVM=y
+CONFIG_KVM_INTEL=y
+CONFIG_KVM_AMD=y
--- linux-4.15.0.orig/tools/testing/selftests/lib.mk
+++ linux-4.15.0/tools/testing/selftests/lib.mk
@@ -1,9 +1,16 @@
 # This mimics the top-level Makefile. We do it explicitly here so that this
 # Makefile can operate with or without the kbuild infrastructure.
 ifdef $(LLVM),
+CC := clang
+else
 CC := $$(CROSS_COMPILE)gcc
+endif

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ifeq (0,$(MAKELEVEL))
-OUTPUT := $(shell pwd)
+ ifeq ($(OUTPUT),)
+OUTPUT := $(shell pwd)
+DEFAULT_INSTALL_HDR_PATH := 1
+ endif
endif

# The following are built by lib.mk common compile rules.
@@ -16,13 +23,53 @@
TEST_GEN_PROGS_EXTENDED := $(patsubst %,$(OUTPUT)/%,$(TEST_GEN_PROGS_EXTENDED))
TEST_GEN_FILES := $(patsubst %,$(OUTPUT)/%,$(TEST_GEN_FILES))

+ifdef KSFT_KHDR_INSTALL
+top_srcdir ?= ../../../..
+include $(top_srcdir)/scripts/subarch.include
+ARCH		?= $(SUBARCH)
+
+## set default goal to all, so make without a target runs all, even when
+## all isn't the first target in the file.
+.
+.
+.DEFAULT_GOAL := all

+## Invoke headers install with --no-builtin-rules to avoid circular
+## dependency in "make kselftest" case. In this case, second level
+## make inherits builtin-rules which will use the rule generate
+## Makefile.o and runs into
+## "Circular Makefile.o <- prepare dependency dropped."
+## and headers_install fails and test compile fails.
+## O= KBUILD_OUTPUT cases don't run into this error, since main Makefile
+## invokes them as sub-makes and --no-builtin-rules is not necessary,
+## but doesn't cause any failures. Keep it simple and use the same
+## flags in both cases.
+## Note that the support to install headers from lib.mk is necessary
+## when test Makefile is run directly with "make -C".
+## When local build is done, headers are installed in the default
+## INSTALL_HDR_PATH usr/include.
+.PHONY: khdr
+.NOTPARALLEL:
+khdr:
+ifndef KSFT_KHDR_INSTALL_DONE
+ifeq (1,$(DEFAULT_INSTALL_HDR_PATH))
+make --no-builtin-rules ARCH=$(ARCH) -C $(top_srcdir) headers_install
+else
+make --no-builtin-rules INSTALL_HDR_PATH=$(OUTPUT)/usr
+ARCH=$(ARCH) -C $(top_srcdir) headers_install
+endif
+endif
+ all: khdr $(TEST_GEN_PROGS) $(TEST_GEN_PROGS_EXTENDED) $(TEST_GEN_FILES)
+ else
all: $(TEST_GEN_PROGS) $(TEST_GEN_PROGS_EXTENDED) $(TEST_GEN_FILES)
+ endif

_.ONESHELL:
define RUN_TESTS
-@test_num=`echo 0`;
-@echo "TAP version 13";
-@for TEST in $(1); do
  +@export KSFT_TAP_LEVEL=`echo 1`;
  +test_num=`echo 0`;
  +skip=`echo 4`;
  +echo "TAP version 13";
  +for TEST in $(1); do
  BASENAME_TEST=`basename $$TEST`;
test_num=`echo $$test_num+1 | bc`;
echo "selftests: $$BASENAME_TEST";
@@ -31,11 +78,23 @@
echo "selftests: Warning: file $$BASENAME_TEST is not executable, correct this.";\n  echo "not ok 1..$$test_num selftests: $$BASENAME_TEST [FAIL]";\n  else\n  -if [ "$X$(summary)" != "X" ]; then\n  -cd `dirname $$TEST` > /dev/null; (/$$BASENAME_TEST > /tmp/$$BASENAME_TEST 2>&1 && echo "ok 1..$$test_num selftests: $$BASENAME_TEST [PASS]" || echo "not ok 1..$$test_num selftests: $$BASENAME_TEST [FAIL]"; cd - > /dev/null;\n  +cd `dirname $$TEST` > /dev/null; \n  +if [ "$$(summary)" != "X" ]; then\n  +($$BASENAME_TEST > /tmp/$$BASENAME_TEST 2>&1 && \n  +echo "ok 1..$$test_num selftests: $$BASENAME_TEST [PASS]" || ($($$? -eq $$skip ) && then)\n  +echo "not ok 1..$$test_num selftests: $$BASENAME_TEST [SKIP]";\n  +else echo "not ok 1..$$test_num selftests: $$BASENAME_TEST [FAIL]";\n  +fi;\n  else\n  -cd `dirname $$TEST` > /dev/null; (/$$BASENAME_TEST && echo "ok 1..$$test_num selftests: $$BASENAME_TEST [PASS]" || echo "not ok 1..$$test_num selftests: $$BASENAME_TEST [FAIL]"; cd - > /dev/null;\n  +($$BASENAME_TEST &&\n  +echo "ok 1..$$test_num selftests: $$BASENAME_TEST [PASS]" || ($($$? -eq $$skip ) && then)\n  +echo "not ok 1..$$test_num selftests: $$BASENAME_TEST [SKIP]";\n  +else echo "not ok 1..$$test_num selftests: $$BASENAME_TEST [FAIL]";\n  +fi;\n  fi;\n  +cd - > /dev/null;\nfi;
done;
endef
@@ -54,17 +113,20 @@
$(call RUN_TESTS, $(TEST_GEN_PROGS) $(TEST_CUSTOM_PROGS) $(TEST_PROGS))
endif
+define INSTALL_SINGLE_RULE
+$(if $(INSTALL_LIST),@mkdir -p $(INSTALL_PATH))
+$(if $(INSTALL_LIST),@echo rsync -a $(INSTALL_LIST) $(INSTALL_PATH)/)
+$(if $(INSTALL_LIST),@rsync -a $(INSTALL_LIST) $(INSTALL_PATH)/)
+endif
+define INSTALL_RULE
-@if [ "X$(TEST_PROGS)$(TEST_PROGS_EXTENDED)$(TEST_FILES)" != "X" ]; then
-@mkdir -p ${INSTALL_PATH}/
-@echo "rsync -a $(TEST_PROGS) $(TEST_PROGS_EXTENDED) $(TEST_FILES) $(INSTALL_PATH)/";
-@rsync -a $(TEST_PROGS) $(TEST_PROGS_EXTENDED) $(TEST_FILES) $(INSTALL_PATH)/;
-fi
-@if [ "X$(TEST_GEN_PROGS)$(TEST_CUSTOM_PROGS)$(TEST_GEN_PROGS_EXTENDED)$(TEST_GEN_FILES)" != "X" ]; then
-@mkdir -p ${INSTALL_PATH}/
-@echo "rsync -a $(TEST_GEN_PROGS) $(TEST_CUSTOM_PROGS) $(TEST_GEN_PROGS_EXTENDED) $(TEST_GEN_FILES) $(INSTALL_PATH)/";
-@rsync -a $(TEST_GEN_PROGS) $(TEST_CUSTOM_PROGS) $(TEST_GEN_PROGS_EXTENDED) $(TEST_GEN_FILES) $(INSTALL_PATH)/;
-fi
+$(eval INSTALL_LIST = $(TEST_PROGS)) $(INSTALL_SINGLE_RULE)
+$(eval INSTALL_LIST = $(TEST_PROGS_EXTENDED)) $(INSTALL_SINGLE_RULE)
+$(eval INSTALL_LIST = $(TEST_FILES)) $(INSTALL_SINGLE_RULE)
+$(eval INSTALL_LIST = $(TEST_GEN_PROGS)) $(INSTALL_SINGLE_RULE)
+$(eval INSTALL_LIST = $(TEST_CUSTOM_PROGS)) $(INSTALL_SINGLE_RULE)
+$(eval INSTALL_LIST = $(TEST_GEN_PROGS_EXTENDED)) $(INSTALL_SINGLE_RULE)
+$(eval INSTALL_LIST = $(TEST_GEN_FILES)) $(INSTALL_SINGLE_RULE)
endef
install: all
@@ -77,7 +139,7 @@
define EMIT_TESTS
@for TEST in $(TEST_GEN_PROGS) $(TEST_CUSTOM_PROGS) $(TEST_PROGS); do \
BASENAME_TEST=`basename $$TEST`;	\n-@echo "/\"./$$BASENAME_TEST > /tmp/$$BASENAME_TEST 2>&1 && echo \"selftests: $$BASENAME_TEST [PASS]\"\" || echo \"selftests: $$BASENAME_TEST [FAIL]\"\"; \
+@echo ">\"$$OUTPUT 2>&1 && echo \"selftests: $$BASENAME_TEST [PASS]\"\" || echo \"selftests: $$BASENAME_TEST [FAIL]\"\";
 done;
endef
--- linux-4.15.0.orig/tools/testing/selftests/memfd/Makefile
+++ linux-4.15.0/tools/testing/selftests/memfd/Makefile
@@ -5,6 +5,7 @@
 CFLAGS += -I../../../../usr/include/

 TEST_PROGS := run_tests.sh
+TEST_FILES := run_fuse_test.sh
 TEST_GEN_FILES := memfd_test fuse_mnt fuse_test

 fuse_mnt.o: CFLAGS += $(shell pkg-config fuse --cflags)
--- linux-4.15.0.orig/tools/testing/selftests/memfd/config
+++ linux-4.15.0/tools/testing/selftests/memfd/config
@@ -0,0 +1 @@
+CONFIG_FUSE_FS=m
--- linux-4.15.0.orig/tools/testing/selftests/memfd/run_tests.sh
+++ linux-4.15.0/tools/testing/selftests/memfd/run_tests.sh
@@ -1,6 +1,9 @@
 
 #!/bin/bash
 
 +ksft_skip=4
 +
 +# please run as root
+
 +# Kselftest framework requirement - SKIP code is 4.
 +# Normal tests requiring no special resources
 +
 +nr_hugepgs=`cat /proc/sys/vm/nr_hugepages`
 hpages_needed=`expr $hpages_test - $freepgs`
-	if [ $UID != 0 ]; then
-		echo "Please run memfd with hugetlbfs test as root"
-		exit $ksft_skip
+
+if [ $SUID != 0 ]; then
+echo "Please run memfd with hugetlbfs test as root"
+exit $ksft_skip
+fi
+
echo 3 > /proc/sys/vm/drop_caches
 echo $( $hpages_needed + $nr_hugepgs ) > /proc/sys/vm/nr_hugepages
-if [ $? -ne 0 ]; then
-echo "Please run this test as root"
-echo 1
-fi
+while read name size unit; do
+  if [ "$name" = "HugePages_Free:" ]; then
+    freepgs=$size
+  fi
+done
printf "Not enough huge pages available (%d < %d)\n" $freepgs $needpgs

---
-exit 1
+exit $ksft_skip
fi

#
--- linux-4.15.0.orig/tools/testing/selftests/memory-hotplug/config
+++ linux-4.15.0/tools/testing/selftests/memory-hotplug/config
@@ -2,3 +2,4 @@
 CONFIG_MEMORY_HOTPLUG_SPARSE=y
 CONFIG_NOTIFIER_ERROR_INJECTION=y
 CONFIG_MEMORY_NOTIFIER_ERROR_INJECT=m
+CONFIG_MEMORY_HOTREMOVE=y
--- linux-4.15.0.orig/tools/testing/selftests/memory-hotplug/mem-on-off-test.sh
+++ linux-4.15.0/tools/testing/selftests/memory-hotplug/mem-on-off-test.sh
@@ -278,7 +278,9 @@
 #
 echo $error > $NOTIFIER_ERR_INJECT_DIR/actions/MEM_GOING_OFFLINE/error
 for memory in `hotpluggable_online_memory`; do
-  offline_memory_expect_fail $memory
+  if [ $((RANDOM % 100)) -lt $ratio ]; then
+    offline_memory_expect_fail $memory
+  fi
 done
 echo 0 > $NOTIFIER_ERR_INJECT_DIR/actions/MEM_GOING_OFFLINE/error
--- linux-4.15.0.orig/tools/testing/selftests/net/Makefile
+++ linux-4.15.0/tools/testing/selftests/net/Makefile
@@ -5,11 +5,17 @@
 TEST_PROGS += run_netsocktests run_apackettests test_bpf.sh netdevice.sh rtnetlink.sh
+TEST_PROGS += fib-onlink-tests.sh
+TEST_PROGS += msg_zerocopy.sh
+TEST_GEN_FILES_EXTENDED := in_netns.sh
 TEST_GEN_FILES = socket
 TEST_GEN_FILES += psck_fanout psck_tpacket msg_zerocopy
 TEST_GEN_PROGS = reuseport_bpf reuseport_bpf_cpu reuseport_bpf_numa
 TEST_GEN_PROGS += reuseport_dualstack reauseaddr_conflict
+TEST_FILES := settings
 +
+KSFT_KHDR_INSTALL := 1
 include ../lib.mk

-$(OUTPUT)/reuseport_bpf_numa: LDFLAGS += -lnuma
+$(OUTPUT)/reuseport_bpf_numa: LDLIBS += -lnuma
--- linux-4.15.0.orig/tools/testing/selftests/net/config
+++ linux-4.15.0/tools/testing/selftests/net/config

CONFIG_BPF_SYSCALL=y
CONFIG_TEST_BPF=m
CONFIG_NUMA=y
+CONFIG_KALLSYMS=y
+CONFIG_NET_FOU=m

--- linux-4.15.0.orig/tools/testing/selftests/net/fib-onlink-tests.sh
+++ linux-4.15.0/tools/testing/selftests/net/fib-onlink-tests.sh
@@ -0,0 +1,375 @@
+#!/bin/bash
+# SPDX-License-Identifier: GPL-2.0
+
+## IPv4 and IPv6 onlink tests
+
+## Network interfaces
+## - odd in current namespace; even in peer ns
+declare -A NETIFS
+# default VRF
+NETIFS[p1]=veth1
+NETIFS[p2]=veth2
+NETIFS[p3]=veth3
+NETIFS[p4]=veth4
+# VRF
+NETIFS[p5]=veth5
+NETIFS[p6]=veth6
+NETIFS[p7]=veth7
+NETIFS[p8]=veth8
+
+## /24 network
+declare -A V4ADDRS
+V4ADDRS[p1]=169.254.1.1
+V4ADDRS[p2]=169.254.1.2
+V4ADDRS[p3]=169.254.3.1
+V4ADDRS[p4]=169.254.3.2
+V4ADDRS[p5]=169.254.5.1
+V4ADDRS[p6]=169.254.5.2
+V4ADDRS[p7]=169.254.7.1
+V4ADDRS[p8]=169.254.7.2
+
+## /64 network
+declare -A V6ADDRS
+V6ADDRS[p1]=2001:db8:101::1
+V6ADDRS[p2]=2001:db8:101::2
+V6ADDRS[p3]=2001:db8:301::1
+V6ADDRS[p5]=2001:db8:501::1
+V6ADDRS[p6]=2001:db8:501::2
+V6ADDRS[p7]=2001:db8:701::1
+V6ADDRS[p8]=2001:db8:701::2
+
+## Test networks:
+## [1] = default table
+## [2] = VRF
+##
+## /32 host routes
+declare -A TEST_NET4
+TEST_NET4[1]=169.254.101
+TEST_NET4[2]=169.254.102
+
+## /128 host routes
+declare -A TEST_NET6
+TEST_NET6[1]=2001:db8:101
+
+## connected gateway
+CONGW[1]=169.254.1.254
+CONGW[2]=169.254.5.254
+
+## recursive gateway
+RECGW4[1]=169.254.11.254
+RECGW6[1]=2001:db8:11::64
+RECGW6[2]=2001:db8:12::64
+
+## for v4 mapped to v6
+declare -A TEST_NET4IN6IN6
+TEST_NET4IN6[1]=10.1.1.254
+TEST_NET4IN6[2]=10.2.1.254
+
+## mcast address
+MCAST6=ff02::1
+
+
+PEER_NS=bart
+PEER_CMD="ip netns exec ${PEER_NS}"
+VRF=lisa
+VRF_TABLE=1101
+PBR_TABLE=101
+
+================================================================================
+
+## utilities
+
+log_test()
+
+{ local rc=$1

local expected=$2
local msg="$3"

if [ ${rc} -eq ${expected} ]; then
    nsuccess=$((nsuccess+1))
    printf "\n    TEST: %-50s  [ OK ]\n" "$msg"
else
    nfail=$((nfail+1))
    printf "\n    TEST: %-50s  [FAIL]\n" "$msg"
    if [ "${PAUSE_ON_FAIL}" = "yes" ]; then
        echo "hit enter to continue, 'q' to quit"
        read a
        [ "$a" = "q" ] && exit 1
    fi
fi

log_section() {
    echo "######################################################################"
    echo "TEST SECTION: $*"
    echo "######################################################################"
}

log_subsection() {
    echo "#########################################"
    echo "TEST SUBSECTION: $*"
}

run_cmd() {
    echo "COMMAND: $*"
    eval $*
}

get_linklocal() {
    local dev=$1
    local pfx
    local addr

    addr=$(<${pfx} ip -6 -br addr show dev ${dev} | awk '/'}
+for (i = 3; i <= NF; ++i) {
+if ($i ~ /^fe80/) {
+print $i
+}
+}
+}
+addr=${addr/A/}
+
+[-z "$addr"] && return 1
+
+echo $addr
+
+return 0
+
+}
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+}
+
+break
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+}
+for n in 1 3 5 7; do
+ip li set ${NETIFS[p${n}]} up
+ip addr add ${V4ADDRS[p${n}]}/24 dev ${NETIFS[p${n}]} up
+ip addr add ${V6ADDRS[p${n}]}/64 dev ${NETIFS[p${n}]} up
+done
+
+## move peer interfaces to namespace and add addresses
+for n in 2 4 6 8; do
+ip li set ${NETIFS[p${n}]} netns ${PEER_NS} up
+ip -netns ${PEER_NS} addr add ${V4ADDRS[p${n}]}/24 dev ${NETIFS[p${n}]} up
+ip -netns ${PEER_NS} addr add ${V6ADDRS[p${n}]}/64 dev ${NETIFS[p${n}]} up
+done
+
+set +e
+
+## let DAD complete - assume default of 1 probe
+sleep 1
+
+}
+
+cleanup()
+
+{
+## make sure we start from a clean slate
+ip netns del ${PEER_NS} 2>/dev/null
+for n in 1 3 5 7; do
+ip link del ${NETIFS[p${n}]} 2>/dev/null
+done
+ip link del ${VRF} 2>/dev/null
+ip ro flush table ${VRF_TABLE}
+ip -6 ro flush table ${VRF_TABLE}
+
+}

+################################################################################
+## IPv4 tests
+
+run_ip()
+
+{
+local table="$1"
+local prefix="$2"
+local gw="$3"
+local dev="$4"
+local exp_rc="$5"
+local desc="$6"
+
+## dev arg may be empty
+![ -n "$dev" ] && dev="dev $dev"
+
+run_cmd ip ro add table "$table" "$prefix"/32 via "$gw" "$dev" onlink
log_test $? ${exp_rc} "$\{desc\}"
+
valid_onlink_ipv4()
+
valid_onlink_ipv4()
+
log_subsection "default VRF - main table"
+
+run_ip 254 $\{TEST_NET4[1]\}.1 $\{CONGW[1]\} $\{NETIFS[p1]\} 0 "unicast connected"
+run_ip 254 $\{TEST_NET4[1]\}.2 $\{RECGW4[1]\} $\{NETIFS[p1]\} 0 "unicast recursive"
+
+log_subsection "VRF $\{VRF\}"
+
+run_ip $\{VRF_TABLE\} $\{TEST_NET4[2]\}.1 $\{CONGW[2]\} $\{NETIFS[p5]\} 0 "unicast connected"
+run_ip $\{VRF_TABLE\} $\{TEST_NET4[2]\}.2 $\{RECGW4[2]\} $\{NETIFS[p5]\} 0 "unicast recursive"
+
+log_subsection "VRF device, PBR table"
+
+run_ip $\{PBR_TABLE\} $\{TEST_NET4[2]\}.3 $\{CONGW[2]\} $\{NETIFS[p5]\} 0 "unicast connected"
+run_ip $\{PBR_TABLE\} $\{TEST_NET4[2]\}.4 $\{RECGW4[2]\} $\{NETIFS[p5]\} 0 "unicast recursive"
+
invalid_onlink_ipv4()
+
invalid_onlink_ipv4()
+
run_ip6()
+
run_ip6()
+
IPv6 tests
+
run_ip6()
+
local table="$1"
local prefix="$2"
local gw="$3"
local dev="$4"
local exp_rc="$5"
local desc="$6"
+
# dev arg may be empty
+[-n "$dev" ] && dev="dev $dev"
+
run_cmd ip -6 ro add table "$table" "$(prefix)"/128 via "$gw" "$dev" onlink
+log_test $? $exp_rc "$desc"
+
+valid_onlink_ipv6()
+
# - unicast connected, unicast recursive, v4-mapped
#
+log_subsection "default VRF - main table"
+
+run_ip6 254 $TEST_NET6[1]::1 $V6ADDR[p1]::*:64 $NETIFS[p1] 0 "unicast connected"
+run_ip6 254 $TEST_NET6[1]::2 $RECGW6[1] $NETIFS[p1] 0 "unicast recursive"
+run_ip6 254 $TEST_NET6[1]::3 :fff: $TEST_NET4IN6[1] $NETIFS[p1] 0 "v4-mapped"
+
+log_subsection "VRF $VRF"
+
+run_ip6 $VRF_TABLE $TEST_NET6[2]::1 $V6ADDR[p5]::*:64 $NETIFS[p5] 0 "unicast connected"
+
+log_subsection "VRF device, PBR table"
+
+run_ip6 $PBR_TABLE $TEST_NET6[2]::4 $V6ADDR[p5]::*:64 $NETIFS[p5] 0 "unicast connected"
+
+invalid_onlink_ipv6()
+
+local lladdr
+
+lladdr=$(get_linklocal $NETIFS[p1]) || return 1
+
+run_ip6 254 $TEST_NET6[1]::11 $V6ADDR[p1] $NETIFS[p1] 2 \
+"Invalid gw - local unicast address"
+run_ip6 254 $TEST_NET6[1]::12 $lladdr $NETIFS[p1] 2 \
+"Invalid gw - local linklocal address"
+run_ip6 254 $TEST_NET6[1]::12 $MCAST6 $NETIFS[p1] 2 \

+ "Invalid gw - multicast address"
+ lladdr=$(get_linklocal ${NETIFS[p5]}) || return 1
+ run_ip6 ${VRF_TABLE} ${TEST_NET6[2]}::11 ${V6ADDRS[p5]} ${NETIFS[p5]} 2 \n+ "Invalid gw - local unicast address, VRF"
+ run_ip6 ${VRF_TABLE} ${TEST_NET6[2]}::12 ${lladdr} ${NETIFS[p5]} 2 \n+ "Invalid gw - local linklocal address, VRF"
+ run_ip6 ${VRF_TABLE} ${TEST_NET6[2]}::12 ${MCAST6} ${NETIFS[p5]} 2 \n+ "Invalid gw - multicast address, VRF"
+
+ run_ip6 254 ${TEST_NET6[1]}::101 ${V6ADDRS[p1]} "" 2 \n+ "No nexthop device given"
+
+## default VRF validation is done against LOCAL table
+ run_ip6 254 ${TEST_NET6[1]}::102 ${V6ADDRS[p3]/::[0-9]/::64} ${NETIFS[p1]} 2 \n+ ## "Gateway resolves to wrong nexthop device"
+
+ run_ip6 ${VRF_TABLE} ${TEST_NET6[2]}::103 ${V6ADDRS[p7]/::[0-9]/::64} ${NETIFS[p5]} 2 \n+ "Gateway resolves to wrong nexthop device - VRF"
+
+run_onlink_tests()
+
+log_section "IPv4 onlink"
+log_subsection "Valid onlink commands"
+valid_onlink_ipv4
+log_subsection "Invalid onlink commands"
+invalid_onlink_ipv4
+
+log_section "IPv6 onlink"
+log_subsection "Valid onlink commands"
+valid_onlink_ipv6
+invalid_onlink_ipv6
+
+# main
+
+nsuccess=0
+nfail=0
+
+cleanup
+setup
+run_onlink_tests
+cleanup
+
+if [ "$TESTS" != "none" ]; then
+printf "\nTests passed: %3d\n" $nsuccess
+
+printf "Tests failed: %3d\n" $nfail
+fi
--- linux-4.15.0.orig/tools/testing/selftests/net/in_netns.sh
+++ linux-4.15.0/tools/testing/selftests/net/in_netns.sh
@@ -0,0 +1,23 @@
+#!/bin/sh
+# SPDX-License-Identifier: GPL-2.0
+#
+# Execute a subprocess in a network namespace
+
+set -e
+
+readonly NETNS="ns-$(mktemp -u XXXXXX)"
+
+setup() {
+    ip netns add "$NETNS"
+    ip -netns "$NETNS" link set lo up
+
+
+cleanup() {
+    ip netns del "$NETNS"
+
+
+trap cleanup EXIT
+setup
+
++"$@
+exit "$?"
--- linux-4.15.0.orig/tools/testing/selftests/msg_zerocopy.c
+++ linux-4.15.0/tools/testing/selftests/msg_zerocopy.c
@@ -121,9 +121,8 @@
    CPU_ZERO(&mask);
    CPU_SET(cpu, &mask);
    if (sched_setaffinity(0, sizeof(mask), &mask))
-error(1, 0, "setaffinity %d", cpu);
-
-if (cfg_verbose)
+fprintf(stderr, "cpu: unable to pin, may increase variance.\n");
+else if (cfg_verbose)
fprintf(stderr, "cpu: %u\n", cpu);

    return 0;
@@ -259,22 +258,28 @@
    return sizeof(*ip6h);
    }

+static void setup_sockaddr(int domain, const char *str_addr, void *sockaddr)
+static void setup_sockaddr(int domain, const char *str_addr,
+  struct sockaddr_storage *sockaddr)
{
  struct sockaddr_in6 *addr6 = (void *) sockaddr;
  struct sockaddr_in *addr4 = (void *) sockaddr;

  switch (domain) {
    case PF_INET:
      memset(addr4, 0, sizeof(*addr4));
      addr4->sin_family = AF_INET;
      addr4->sin_port = htons(cfg_port);
      if (inet_pton(AF_INET, str_addr, &(addr4->sin_addr)) != 1)
        error(1, 0, "ipv4 parse error: %s", str_addr);
      break;
    case PF_INET6:
      memset(addr6, 0, sizeof(*addr6));
      addr6->sin6_family = AF_INET6;
      addr6->sin6_port = htons(cfg_port);
      if (inet_pton(AF_INET6, str_addr, &(addr6->sin6_addr)) != 1)
        error(1, 0, "ipv6 parse error: %s", str_addr);
      break;
    default:
  }

  int c;
  +char *daddr = NULL, *saddr = NULL;
  cfg_payload_len = max_payload_len;

  @@ -638,7 +644,7 @@
  cfg_cpu = strtol(optarg, NULL, 0);
  break;
  case 'D':
    -setup_sockaddr(cfg_family, optarg, &cfg_dst_addr);
    +daddr = optarg;
    break;
  case 'i':
    cfg_ifindex = if_nametoindex(optarg);
    @@ -638,7 +644,7 @@
    cfg_cork_mixed = true;
    break;
  case 'p':
    -cfg_port = htons(strtoul(optarg, NULL, 0));
+cfg_port = strtoul(optarg, NULL, 0);
break;
case 'r':
cfg_rx = true;
@@ -647,7 +653,7 @@
cfg_payload_len = strtoul(optarg, NULL, 0);
break;
case 'S':
-setup_sockaddr(cfg_family, optarg, &cfg_src_addr);
-wall saddr = optarg;
break;
case 't':
cfg_runtime_ms = 200 + strtoul(optarg, NULL, 10) * 1000;
@@ -660,6 +666,8 @@
break;
}
}
+setup_sockaddr(cfg_family, daddr, &cfg_dst_addr);
+setup_sockaddr(cfg_family, saddr, &cfg_src_addr);

if (cfg_payload_len > max_payload_len)
error(1, 0, "-s: payload exceeds max (%d)", max_payload_len);
--- linux-4.15.0.orig/tools/testing/selftests/net/msg_zerocopy.sh
+++ linux-4.15.0/tools/testing/selftests/net/msg_zerocopy.sh
@@ -21,6 +21,14 @@
readonly path_sysctl_mem="net.core.optmem_max"

+# No arguments: automated test
+if [[ "$#" -eq "0" ]]; then
+ $0 4 tcp -t 1
+ $0 6 tcp -t 1
+ echo "OK. All tests passed"
+ exit 0
+fi
+
# Argument parsing
if [[ "$#" -lt "2" ]]; then
  echo "Usage: $0 [4|6] [tcp|udp|raw|raw_hdrincl|packet|packet_dgram] <args>"
--- linux-4.15.0.orig/tools/testing/selftests/net/netdevice.sh
+++ linux-4.15.0/tools/testing/selftests/net/netdevice.sh
@@ -8,6 +8,9 @@
    # if not they probably have failed earlier in the boot process and their logged error will be catched by another test
    #
    +# Kselftest framework requirement - SKIP code is 4.
    +ksft_skip=4
    +
# this function will try to up the interface
# if already up, nothing done
# arg1: network interface name
@@ -18,7 +21,7 @@
ip link show "$netdev" |grep -q UP
if [ $? -eq 0 ];then
echo "SKIP: $netdev: interface already up"
    return 0
+    return $ksft_skip
fi

ip link set "$netdev" up
@@ -61,12 +64,12 @@
ip address show "$netdev" |grep '^([[:space:]])inet'
if [ $? -eq 0 ];then
echo "SKIP: $netdev: already have an IP"
    return 0
+    return $ksft_skip
fi

# TODO what ipaddr to set ? DHCP ?
echo "SKIP: $netdev: set IP address"
    return 0
+    return $ksft_skip
}

# test an ethtool command
@@ -84,6 +87,7 @@
if [ $ret -eq "$1" ];then
else
echo "FAIL: $netdev: ethtool $2"
    return 1
@@ -104,7 +108,7 @@
ethtool --version 2>/dev/null >/dev/null
if [ $? -ne 0 ];then
echo "SKIP: ethtool not present"
    return 1
+    return $ksft_skip
fi

TMP_ETHTOOL_FEATURES="$(mktemp)"
@@ -176,13 +180,13 @@
#check for needed privileges
if [ "$id -u" -ne 0 ];then
echo "SKIP: Need root privileges"

exit 0
+exit $ksft_skip
fi

ip link show 2>/dev/null >/dev/null
if [ $? -ne 0 ];then
echo "SKIP: Could not run test without the ip tool"
exit 0
+exit $ksft_skip
fi

TMP_LIST_NETDEV="$tmpnetdev"
--- linux-4.15.0.orig/tools/testing/selftests/net/psock_fanout.c
+++ linux-4.15.0/tools/testing/selftests/net/psock_fanout.c
@@ -50,6 +50,7 @@
#include <linux/filter.h>
#include <linux/bpf.h>
#include <linux/if_packet.h>
+#include <net/if.h>
#include <net/ethernet.h>
#include <net/udp.h>
#include <netinet/ip.h>
#include <netinet/udp.h>
@@ -73,14 +74,29 @@
* @return -1 if mode is bad, a valid socket otherwise */
static int sock_fanout_open(uint16_t typeflags, uint16_t group_id)
{
+struct sockaddr_ll addr = {0};
int fd, val;

-fd = socket(PF_PACKET, SOCK_RAW, htons(ETH_P_IP));
+fd = socket(PF_PACKET, SOCK_RAW, 0);
if (fd < 0) {
    perror("socket packet");
exit(1);
}

+pair_udp_setfilter(fd);
+
+addr.sll_family = AF_PACKET;
+addr.sll_protocol = htons(ETH_P_IP);
+addr.sll_ifindex = if_nametoindex("lo");
+if (addr.sll_ifindex == 0) {
+    perror("if_nametoindex");
+    exit(1);
+
+if (bind(fd, (void *) &addr, sizeof(addr))) {
+    perror("bind packet");
+    exit(1);
val = (((int) typeflags) << 16) | group_id;
if (setsockopt(fd, SOL_PACKET, PACKET_FANOUT, &val, sizeof(val))) {
    return -1;
}
pair_udp_setfilter(fd);
return fd;

static void sock_fanout_set_ebpf(int fd)
{
    static char log_buf[65536];
    const int len_off = __builtin_offsetof(struct __sk_buff, len);
    struct bpf_insn prog[] = {
        { BPF_ALU64 | BPF_MOV | BPF_X,   6, 1, 0, 0 },
        @ @ -140,7 +157,6 @ @
        { BPF_ALU | BPF_MOV | BPF_K,   0, 0, 0, 0 },
        { BPF_JMP | BPF_EXIT,          0, 0, 0, 0 }
    };
    char log_buf[512];
    union bpf_attr attr;
    int pfd;

    if ((!(ret[0] == expect[0] && ret[1] == expect[1])) &&
        !(ret[0] == expect[1] && ret[1] == expect[0]))) {
        fprintf(stderr, "ERROR: incorrect queue lengths\n");
    } else {
        fprintf(stderr, "warning: incorrect queue lengths\n");
    } return 1;
}

uint8_t type = typeflags & 0xFF;
int fds[2], fds_udp[2][2], ret;

-fprintf(stderr, "test: datapath 0x%hx\n", typeflags);
+fprintf(stderr, "\ntest: datapath 0x%hx ports %hu,%hu\n", typeflags, (uint16_t)PORT_BASE,
    +((uint16_t)(PORT_BASE + port_off));
fds[0] = sock_fanout_open(typeflags, 0);
fds[1] = sock_fanout_open(typeflags, 0);
@@ -418,7 +436,7 @@
 const int expect_cpu1[2][2] = { { 0, 20 }, { 0, 20 } };
 const int expect_bpf[2][2] = { { 15, 5 }, { 15, 20 } };
 const int expect_uniqueid[2][2] = { { 20, 20 }, { 20, 20 } };
-int port_off = 2, tries = 5, ret;
+int port_off = 2, tries = 20, ret;

test_control_single();
test_control_group();
@@ -427,10 +445,14 @@
 /* find a set of ports that do not collide onto the same socket */
 ret = test_datapath(PACKET_FANOUT_HASH, port_off,
    expect_hash[0], expect_hash[1]);
-while (ret && tries--) {
+while (ret) {
 fprintf(stderr, "info: trying alternate ports (%d)\n", tries);
 ret = test_datapath(PACKET_FANOUT_HASH, ++port_off,
    expect_hash[0], expect_hash[1]);
+if (!--tries) {
+ fprintf(stderr, "too many collisions\n");
+ return 1;
+ }
 }

 ret |= test_datapath(PACKET_FANOUT_HASH | PACKET_FANOUT_FLAG_ROLLOVER,
 --- linux-4.15.0.orig/tools/testing/selftests/net/psock_tpacket.c
+++ linux-4.15.0/tools/testing/selftests/net/psock_tpacket.c
@@ -60,6 +60,8 @@
#include "psock_lib.h"

+#include ".../kselftest.h"
+
 #ifndef bug_on
 # define bug_on(cond) assert(!(cond))
 #endif
-@ @ -825,7 +827,7 @@
 fprintf(stderr, "test: skip %s %s since user and kernel "
 "space have different bit width\n",
 tpacket_str[version], type_str[type]);
 -return 0;
+return KSFT_SKIP;
 }

 sock = pfsocket(version);
--- linux-4.15.0.orig/tools/testing/selftests/net/reuseport_bpf.c
+++ linux-4.15.0/tools/testing/selftests/net/reuseport_bpf.c
@@ -21,6 +21,7 @@
 #include <sys/epoll.h>
 #include <sys/types.h>
 #include <sys/socket.h>
+#include <sys/resource.h>
 #include <unistd.h>

 ifndef ARRAY_SIZE
 @@ -190,11 +191,14 @@
 struct sockaddr * const saddr = new_any_sockaddr(p.send_family, sport);
 struct sockaddr * const daddr =
 new_loopback_sockaddr(p.send_family, p.recv_port);
-const int fd = socket(p.send_family, p.protocol, 0);
+const int fd = socket(p.send_family, p.protocol, 0), one = 1;

 if (fd < 0)
 error(1, errno, "failed to create send socket");

 +if (setsockopt(fd, SOL_SOCKET, SO_REUSEADDR, &one, sizeof(one)))
+error(1, errno, "failed to set reuseaddr");
 +
 if (bind(fd, saddr, sockaddr_size()))
 error(1, errno, "failed to bind send socket");

 @@ -433,6 +437,26 @@
 }
 }

 +static struct rlimit rlim_old;
 +
 +static __attribute__((constructor)) void main_ctor(void)
 +{
 +getrlimit(RLIMIT_MEMLOCK, &rlim_old);
 +
 +if (rlim_old.rlim_cur != RLIM_INFINITY) {
 +
 +rlim_new.rlim_cur = rlim_old.rlim_cur + (1UL << 20);
 +rlim_new.rlim_max = rlim_old.rlim_max + (1UL << 20);
 +setrlimit(RLIMIT_MEMLOCK, &rlim_new);
 +}
 +
 +static __attribute__((destructor)) void main_dtor(void)
 +{
 +setrlimit(RLIMIT_MEMLOCK, &rlim_old);
 +}
int main(void)
{
    fprintf(stderr, "---- IPv4 UDP ----
");
    #include <unistd.h>
    #include <numa.h>
    static const int PORT = 8888;

    static void build_rcv_group(int *rcv_fd, size_t len, int family, int proto)

    /* Forward iterate */
    for (node = 0; node < len; ++node) {
        +if (!numa_bitmask_isbitset(numa_nodes_ptr, node))
        +continue;
        send_from_node(node, family, proto);
        receive_on_node(rcv_fd, len, epfd, node, proto);
    }

    /* Reverse iterate */
    for (node = len - 1; node >= 0; --node) {
        +if (!numa_bitmask_isbitset(numa_nodes_ptr, node))
        +continue;
        send_from_node(node, family, proto);
        receive_on_node(rcv_fd, len, epfd, node, proto);
    }

    int *rcv_fd, nodes;

    if (numa_available() < 0)
        -error(1, errno, "no numa api support");
    +ksft_exit_skip("no numa api support\n");

    nodes = numa_max_node() + 1;
int test_family;
socklen_t len;

epdev = epoll_create(1);
@
send_from_v4(proto);

test_fd = receive_once(epfd, proto);
+len = sizeof(test_family);
if (getsockopt(test_fd, SOL_SOCKET, SO_DOMAIN, &test_family, &len))
error(1, errno, "failed to read socket domain");
if (test_family != AF_INET)
--- linux-4.15.0.orig/tools/testing/selftests/net/rtnetlink.sh
+++ linux-4.15.0/tools/testing/selftests/net/rtnetlink.sh
@@ -1,11 +1,13 @@
-#!/bin/sh
+#!/bin/bash
#
# This test is for checking rtnetlink callpaths, and get as much coverage as possible.
#
# set -e

devdummy="test-dummy0"
-ret=0
+
+## Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4

# set global exit status, but never reset nonzero one.
check_err()
@ ret=0
+
-devbr="test-br0"
-vlandev="testbr-vlan1"

-ret=0
+local ret=0
ip link add name "$devbr" type bridge
check_err $?}

@ rem=10.42.42.1
loc=10.0.0.1

-ret=0
+local ret=0
ip tunnel add $gredev mode gre remote $rem local $loc ttl 1
check_err $?}
ip link set $gredev up
kci_test_tc()
{
    dev=lo
    -ret=0
    +local ret=0

tc qdisc add dev "$dev" root handle 1: htb
check_err $?  
}

kci_test_polrouting()
{
    -ret=0
    +local ret=0
    ip rule add fwmark 1 lookup 100
check_err $?  
ip route add local 0.0.0.0/0 dev lo table 100
}

kci_test_route_get()
{
    -ret=0
    +local ret=0

    ip route get 127.0.0.1 > /dev/null
check_err $?  
}

++kci_test_addrlft()
++{
    +for i in $(seq 10 100) ;do
    +lft=$((((RANDOM%3) + 1))
    +ip addr add 10.23.11.$i/32 dev "$devdummy" preferred_lft $lft valid_lft $((lft+1))
    +check_err $?  
    +done
    +
    +sleep 5
    +
    +ip addr show dev "$devdummy" | grep "10.23.11."
    +if [ $ ? -eq 0 ]; then
    +echo "FAIL: preferred_lft addresses remaining"
    +check_err 1
    +return
    +fi
    +
}
+echo "PASS: preferred_lft addresses have expired"
+
kci_test_addrlabel()
{
    -ret=0
+local ret=0

    ip addrlabel add prefix dead::/64 dev lo label 1
    check_err $? @@ -273,7 +295,7 @@

    kci_test_ifalias()
    {
        -ret=0
+local ret=0
        namewant=$(uuidgen)
        syspathname="/sys/class/net/$devdummy/ifalias"

        @@ -328,12 +350,12 @@
        kci_test_vrf()
        {
            vrfname="test-vrf"
            -ret=0
+local ret=0

            ip link show type vrf 2>/dev/null
            if [ $? -ne 0 ]; then
                echo "SKIP: vrf: iproute2 too old"
                -return 0
+return $ksft_skip
            fi

            ip link add "$vrfname" type vrf table 10
            @@ -368,7 +390,7 @@

        kci_test_encap_vxlan()
        {
            -ret=0
+local ret=0
            vxlan="test-vxlan0"
            vlan="test-vlan0"
            testns="$1"
            @@ -402,16 +424,21 @@
local ret=0
name="test-fou"
testns="S1"

ip fou help 2>&1 |grep -q 'Usage: ip fou'
if [ $? -ne 0 ];then
echo "SKIP: fou: iproute2 too old"
+return 1
+return $ksft_skip
fi

+if ! /sbin/modprobe -q -n fou; then
+echo "SKIP: module fou is not found"
+return $ksft_skip
+fi
+sbin/modprobe -q fou
ip netns exec "$testns" ip fou add port 7777 ipproto 47 2>/dev/null
if [ $? -ne 0 ];then
echo "FAIL: can't add fou port 7777, skipping test"
@@ -439,12 +466,12 @@
kci_test_encap()
{
    testns="testns"
    ret=0
    +local ret=0

    ip netns add "$testns"
    if [ $? -ne 0 ]; then
        echo "SKIP encap tests: cannot add net namespace $testns"
    -return 1
    +return $ksft_skip
    fi

    ip netns exec "$testns" ip link set lo up
    @@ -456,20 +483,23 @@
    check_err $? 
    kci_test_encap_vxlan "$testns"
    +check_err $? 
    kci_test_encap_fou "$testns"
    +check_err $? 

    ip netns del "$testns"
    +return $ret
    }

kci_test_macsec()
{
msname="test_macsec0"
-ret=0
+local ret=0

ip macsec help 2>&1 | grep -q "^Usage: ip macsec"
if [ $? -ne 0 ]; then
echo "SKIP: macsec: iproute2 too old"
-return 0
+return $ksft_skip
fi

ip link add link "$devdummy" "$msname" type macsec port 42 encrypt on
@@ -504,6 +534,7 @@
kci_test_rtnl()
{
+local ret=0
kci_add_dummy
if [ $ret -ne 0 ];then
echo "FAIL: cannot add dummy interface"
@@ -511,33 +542,46 @@
fi

kci_test_polrouti
+kci_test_route_get
+kci_test_addrlft
+kci_test_tc
+kci_test_gre
+kci_test_bridge
+kci_test_addrlabel
+kci_test_ifalias
+kci_test_vrf
+kci_test_encap
+kci_test_macsec
+kci_del_dummy
+return $ret
#check for needed privileges
if [ "$ID" = "root" ]; then
    echo "SKIP: Need root privileges"
    exit 0
else
    exit $ksft_skip
fi

for x in ip tc do
    $x -version 2>/dev/null >/dev/null
    if [ $? -ne 0 ]; then
        echo "SKIP: Could not run test without the $x tool"
        exit 0
    fi
    exit $ksft_skip
done

ci_test_rtnl

exit $ret
exit $?
+./in_netns.sh ./psock_tpacket
+if [ $? -ne 0 ]; then
+echo "[FAIL]"
+ret=1
+else
+echo "[PASS]"
+fi
else
-echo "[PASS]"
+echo "[SKIP] CONFIG_KALLSYMS not enabled"
fi
+exit $ret
--- linux-4.15.0.orig/tools/testing/selftests/net/run_netsocktests
+++ linux-4.15.0/tools/testing/selftests/net/run_netsocktests
@@ -7,7 +7,7 @@
 ./socket
if [ $? -ne 0 ]; then
 echo "[FAIL]"
+	exit 1
else
 echo "[PASS]"
fi
-}
--- linux-4.15.0.orig/tools/testing/selftests/net/settings
+++ linux-4.15.0/tools/testing/selftests/net/settings
@@ -0,0 +1 @@
+timeout=300
--- linux-4.15.0.orig/tools/testing/selftests/net/socket.c
+++ linux-4.15.0/tools/testing/selftests/net/socket.c
@@ -6,6 +6,7 @@
 #include <sys/types.h>
 #include <sys/socket.h>
 #include <netinet/in.h>
+
 #include <limits.h>
 struct socket_testcase {
   int domain;
   @ @ -24,7 +25,10 @ @
   @ @ -7,7 +7,7 @ @
   @ @ -0,0 +1 @ @
   @ @ -6,6 +6,7 @ @
   @ @ -7,7 +7,7 @ @
   @ @ -7,7 +7,7 @ @
   @ @ -7,7 +7,7 @ @

 static struct socket_testcase tests[] = {
   -{ AF_MAX, 0, 0, -EAFNOSUPPORT, 0 },
+/* libc might have a smaller value of AF_MAX than the kernel
+ * actually supports, so use INT_MAX instead.
+ */
   +{ INT_MAX, 0, 0, -EAFNOSUPPORT, 0 },
   { AF_INET, SOCK_STREAM, IPPROTO_TCP, 0, 1 },
   { AF_INET, SOCK_DGRAM, IPPROTO_TCP, -EPROTO Não SUPPORT, 1 },
{ AF_INET, SOCK_DGRAM, IPPROTO_UDP, 0 },

--- linux-4.15.0.orig/tools/testing/selftests/netfilter/Makefile
+++ linux-4.15.0/tools/testing/selftests/netfilter/Makefile
@@ -0,0 +1,6 @@
+# SPDX-License-Identifier: GPL-2.0
+# Makefile for netfilter selftests
+
+TEST_PROGS := nft_trans_stress.sh nft_nat.sh conntrack_icmp_related.sh
+
+include ../lib.mk

--- linux-4.15.0.orig/tools/testing/selftests/netfilter/config
+++ linux-4.15.0/tools/testing/selftests/netfilter/config
@@ -0,0 +1,2 @@
+CONFIG_NET_NS=y
+CONFIG_NF_TABLES_INET=y

--- linux-4.15.0.orig/tools/testing/selftests/netfilter/conntrack_icmp_related.sh
+++ linux-4.15.0/tools/testing/selftests/netfilter/conntrack_icmp_related.sh
@@ -0,0 +1,283 @@
#!/bin/bash
#
# check that ICMP df-needed/pkttooobig icmp are set are set as related
#
# Setup is:
#
# nsclient1 -> nsrouter1 -> nsrouter2 -> nsclient2
# MTU 1500, except for nsrouter2 <-> nsclient2 link (1280).
# ping nsclient2 from nsclient1, checking that conntrack did set RELATED
# 'fragmentation needed' icmp packet.
#
# In addition, nsrouter1 will perform IP masquerading, i.e. also
# check the icmp errors are propagated to the correct host as per
# nat of "established" icmp-echo "connection".
+
# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+ret=0
+
+nft --version > /dev/null 2>&1
+if [ $? -ne 0 ];then
+echo "$KSFT_SKIP: Could not run test without nft tool"
+exit $ksft_skip
+fi
+
ip -Version > /dev/null 2>&1
+if [ $? -ne 0 ];then
+echo "$KSFT_SKIP: Could not run test without ip tool"
+exit $ksft_skip

+cleanup() {
+  for i in 1 2;do ip netns del nsclient$i;done
+  for i in 1 2;do ip netns del nsrouter$i;done
+
+ipv4() {
+  echo -n 192.168.$1.2
+
+
+ipv6 () {
+  echo -n dead:$1::2
+
+
+check_counter()
+{
+  $ns=$1
+  $name=$2
+  $expect=$3
+  $lret=0
+
+  $cnt=$(ip netns exec $ns nft list counter inet filter "$name" | grep -q "$expect")
+  if [ $? -ne 0 ]; then
+    echo "ERROR: counter $name in $ns has unexpected value (expected $expect)" 1>&2
+    ip netns exec $ns nft list counter inet filter "$name" 1>&2
+    $lret=1
+  fi
+
+  return $lret
+
+
+check_unknown() {
+{
+  $expect="packets 0 bytes 0"
+  for n in nsclient1 nsclient2 nsrouter1 nsrouter2; do
+    check_counter $n "unknown" "$expect"
+    if [ $? -ne 0 ]; then
+      return 1
+    fi
+  done
+
+  return 0
+
+
+for n in nsclient1 nsclient2 nsrouter1 nsrouter2; do
+  ip netns add $n
+  ip -net $n link set lo up
+done
+
+for netns in nsrouter1 nsrouter2; do
+ip netns exec $netns nft -f - <<EOF
+table inet filter {
+counter unknown { }
+counter related { }
+chain forward {
+type filter hook forward priority 0; policy accept;
+meta l4proto icmpv6 icmpv6 type "packet-too-big" ct state "related" counter name "related" accept
+meta l4proto icmp icmp type "destination-unreachable" ct state "related" counter name "related" accept
+meta l4proto { icmp, icmpv6 } ct state new,established accept
+counter name "unknown" drop
+
+EOF
+done
+
+ip netns exec nsclient1 nft -f - <<EOF
+table inet filter {
+counter unknown { }
+counter related { }
+chain input {
+type filter hook input priority 0; policy accept;
+meta l4proto { icmp, icmpv6 } ct state established,untracked accept
+
+meta l4proto { icmp, icmpv6 } ct state "related" counter name "related" accept
+counter name "unknown" drop
+
+EOF
+
+ip netns exec nsclient2 nft -f - <<EOF
+table inet filter {
+counter unknown { }
+counter new { }
+counter established { }
+
+chain input {
+type filter hook input priority 0; policy accept;
+meta l4proto { icmp, icmpv6 } ct state established,untracked accept
+
+meta l4proto { icmp, icmpv6 } ct state "new" counter name "new" accept
+meta l4proto { icmp, icmpv6 } ct state "established" counter name "established" accept
+counter name "unknown" drop
+
+chain output {
+type filter hook output priority 0; policy accept;
+meta l4proto { icmp, icmpv6 } ct state established,untracked accept
+
+meta l4proto { icmp, icmpv6 } ct state "new" counter name "new"
+meta l4proto { icmp, icmpv6 } ct state "established" counter name "established"
+counter name "unknown" drop
+
+# make sure NAT core rewrites adress of icmp error if nat is used according to
+# conntrack nat information (icmp error will be directed at nsrouter1 address,
+# but it needs to be routed to nsclient1 address).
+ip netns exec nsrouter1 nft -f - <<EOF
+table ip nat {
+chain postrouting {
+type nat hook postrouting priority 0; policy accept;
+ip protocol icmp oifname "veth0" counter masquerade
+}
+}
+table ip6 nat {
+chain postrouting {
+type nat hook postrouting priority 0; policy accept;
+ip6 nexthdr icmpv6 oifname "veth0" counter masquerade
+}
+}
+EOF
+
+ip netns exec nsrouter2 ip link set eth1 mtu 1280
+ip netns exec nsclient2 ip link set veth0 mtu 1280
+sleep 1
+
+ip netns exec nsclient1 ping -c 1 -s 1000 -q -M do 192.168.2.2 >/dev/null
+if [ $? -ne 0 ]; then
+echo "ERROR: netns ip routing/connectivity broken" 1>&2
+cleanup
+exit 1
+fi
+ip netns exec nsclient1 ping6 -q -c 1 -s 1000 dead:2::2 >/dev/null
+if [ $? -ne 0 ]; then
+echo "ERROR: netns ipv6 routing/connectivity broken" 1>&2
+cleanup
+exit 1
+fi

+check_unknown
+if [ $? -ne 0 ]; then
+ret=1

+expect="packets 0 bytes 0"
+for netns in nsrouter1 nsrouter2 nsclient1;do
+check_counter "$netns" "related" "$expect"
+if [ $? -ne 0 ]; then
+ret=1
+fi
+done
+
+expect="packets 2 bytes 2076"
+check_counter nsclient2 "new" "$expect"
+if [ $? -ne 0 ]; then
+ret=1
+fi
+
+ip netns exec nsclient1 ping -q -c 1 -s 1300 -M do 192.168.2.2 > /dev/null
+if [ $? -eq 0 ]; then
+echo "ERROR: ping should have failed with PMTU too big error" 1>&2
+ret=1
+fi
+
+## nsrouter2 should have generated the icmp error, so
+## related counter should be 0 (its in forward).
+expect="packets 0 bytes 0"
+check_counter "nsrouter2" "related" "$expect"
+if [ $? -ne 0 ]; then
+ret=1
+fi
+
+## but nsrouter1 should have seen it, same for nsclient1.
+expect="packets 1 bytes 576"
+for netns in nsrouter1 nsclient1;do
+check_counter "$netns" "related" "$expect"
+if [ $? -ne 0 ]; then
+ret=1
+fi
+done
+
+ip netns exec nsclient1 ping6 -c 1 -s 1300 dead:2::2 > /dev/null
+if [ $? -eq 0 ]; then
+echo "ERROR: ping6 should have failed with PMTU too big error" 1>&2
+ret=1
+fi
+
+expect="packets 2 bytes 1856"
+for netns in nsrouter1 nsclient1;do
+check_counter "$netns" "related" "$expect"
+if [ $? -ne 0 ]; then
+ret=1
+fi
+done
+
+if [ $ret -eq 0 ]; then
+echo "PASS: icmp mtu error had RELATED state"
+else
+echo "ERROR: icmp error RELATED state test has failed"
+fi
+
+cleanup
+exit $ret

--- linux-4.15.0.orig/tools/testing/selftests/netfilter/nft_nat.sh
+++ linux-4.15.0/tools/testing/selftests/netfilter/nft_nat.sh
@@ -0,0 +1,766 @@
+#!/bin/bash
+
+This test is for basic NAT functionality: snat, dnat, redirect, masquerade.
+
+# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+ret=0
+
+nft --version > /dev/null 2>&1
+if [ $? -ne 0 ]; then
+echo "SKIP: Could not run test without nft tool"
+exit $ksft_skip
+fi
+
ip -Version > /dev/null 2>&1
+if [ $? -ne 0 ]; then
+echo "SKIP: Could not run test without ip tool"
+exit $ksft_skip
+fi
+
+ip netns add ns0
+ip netns add ns1
+ip netns add ns2
+
+ip link add veth0 netns ns0 type veth peer name eth0 netns ns1 > /dev/null 2>&1
+if [ $? -ne 0 ]; then
+    echo "SKIP: No virtual ethernet pair device support in kernel"
+    exit $ksft_skip
+fi
+ip link add veth1 netns ns0 type veth peer name eth0 netns ns2
+
+ip -net ns0 link set lo up
+ip -net ns0 link set veth0 up
+ip -net ns0 addr add 10.0.1.1/24 dev veth0
+ip -net ns0 addr add dead:1::1/64 dev veth0
+
+ip -net ns0 link set veth1 up
+ip -net ns0 addr add 10.0.2.1/24 dev veth1
+ip -net ns0 addr add dead:2::1/64 dev veth1
+
+for i in 1 2; do
  ip -net ns$i link set lo up
  ip -net ns$i link set eth0 up
  ip -net ns$i addr add 10.0.$i.99/24 dev eth0
  ip -net ns$i route add default via 10.0.$i.1
  ip -net ns$i addr add dead:$i::99/64 dev eth0
  ip -net ns$i route add default via dead:$i::1
+done
+
+bad_counter()
+
+local ns=$1
+local counter=$2
+local expect=$3
+
+echo "ERROR: $counter counter in $ns has unexpected value (expected $expect)" 1>&2
+ip netns exec $ns nft list counter inet filter $counter 1>&2
+
+check_counters()
+
+ns=$1
+local lret=0
+
+cnt=$(ip netns exec $ns nft list counter inet filter ns0in | grep -q "packets 1 bytes 84")
+if [ $? -ne 0 ]; then
  +bad_counter $ns ns0in "packets 1 bytes 84"
  +lret=1
+fi
+
+expect="packets 1 bytes 84"
+cnt=$(ip netns exec $ns nft list counter inet filter ns0in6 | grep -q "$expect")
+if [ $? -ne 0 ]; then
  +bad_counter $ns ns0in6 "$expect"
  +lret=1
+fi
+
+cnt=$(ip netns exec $ns nft list counter inet filter ns0out | grep -q "packets 1 bytes 84")
+if [ $? -ne 0 ]; then
  +bad_counter $ns ns0out "packets 1 bytes 84"
  +lret=1
+fi
+
+cnt=$(ip netns exec $ns nft list counter inet filter ns0out6 | grep -q "$expect")
+if [ $? -ne 0 ]; then
  +bad_counter $ns ns0out6 "$expect"
  +lret=1
+fi

+lret=1
+fi
+cnt=$(ip netns exec $ns nft list counter inet filter ns0out6 | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter $ns ns0out6 "$expect"
+lret=1
+fi
+
+return $lret
+
+
+check_ns0_counters()
+{
+local ns=$1
+local lret=0
+
+cnt=$(ip netns exec ns0 nft list counter inet filter ns0in | grep -q "packets 0 bytes 0")
+if [ $? -ne 0 ]; then
+bad_counter ns0 ns0in "packets 0 bytes 0"
+lret=1
+fi
+
+cnt=$(ip netns exec ns0 nft list counter inet filter ns0in6 | grep -q "packets 0 bytes 0")
+if [ $? -ne 0 ]; then
+bad_counter ns0 ns0in6 "packets 0 bytes 0"
+lret=1
+fi
+
+for dir in "in" "out" ; do
+expect="packets 1 bytes 84"
+cnt=$(ip netns exec ns0 nft list counter inet filter ns0out | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns0 ns0out "$expect"
+lret=1
+fi
+
+expect="packets 1 bytes 104"
cnt=$(ip netns exec ns0 nft list counter filter inet $ns$dir6 | grep -q "$expect")
if [ $? -ne 0 ]; then
  bad_counter ns0 $ns$dir6 "$expect"
  lret=1
fi
done

return $lret
}

reset_counters()
{
  for i in 0 1 2;do
    ip netns exec ns$i nft reset counters inet > /dev/null
done
}

test_local_dnat6()
{
  local lret=0
  ip netns exec ns0 nft -f - <<EOF
table ip6 nat {
  chain output {
    type nat hook output priority 0; policy accept;
    ip6 daddr dead:1::99 dnat to dead:2::99
  }
  }
EOF
  if [ $? -ne 0 ]; then
    echo "SKIP: Could not add ip6 dnat hook"
    return $ksft_skip
  fi

  # ping netns1, expect rewrite to netns2
  ip netns exec ns0 ping -c 1 dead:1::99 > /dev/null
  if [ $? -ne 0 ]; then
    lret=1
    echo "ERROR: ping6 failed"
    return $lret
  fi

  expect="packets 0 bytes 0"
  for dir in "in6" "out6" ; do
    cnt=$(ip netns exec ns0 nft list counter inet filter ns1$dir | grep -q "$expect")
    if [ $? -ne 0 ]; then
      bad_counter ns0 ns1$dir "$expect"
      lret=1
    fi
  done

  # ping netns2, expect rewrite to netns0
  ip netns exec $ns$dir6 ping -c 1 dead:2::99 > /dev/null
  if [ $? -ne 0 ]; then
    lret=1
    echo "ERROR: ping6 failed"
    return $lret
  fi

  expect="packets 0 bytes 0"
  for dir in "in6" "out6" ; do
    cnt=$(ip netns exec $ns$dir6 nft list counter inet filter ns0$dir | grep -q "$expect")
    if [ $? -ne 0 ]; then
      bad_counter ns1$dir "$expect"
      lret=1
    fi
  done

  # ping netns1, expect rewrite to netns2
  ip netns exec ns1 ping -c 1 dead:2::99 > /dev/null
  if [ $? -ne 0 ]; then
    lret=1
    echo "ERROR: ping6 failed"
    return $lret
  fi

  expect="packets 0 bytes 0"
  for dir in "in6" "out6" ; do
    cnt=$(ip netns exec ns1 nft list counter inet filter ns0$dir | grep -q "$expect")
    if [ $? -ne 0 ]; then
      bad_counter ns1 ns0$dir "$expect"
      lret=1
    fi
  done

  # ping netns0, expect rewrite to netns1
  ip netns exec ns0 ping -c 1 dead:1::99 > /dev/null
  if [ $? -ne 0 ]; then
    lret=1
    echo "ERROR: ping6 failed"
    return $lret
  fi

  expect="packets 0 bytes 0"
  for dir in "in6" "out6" ; do
    cnt=$(ip netns exec ns0 nft list counter inet filter ns1$dir | grep -q "$expect")
    if [ $? -ne 0 ]; then
      bad_counter ns0 ns1$dir "$expect"
      lret=1
    fi
  done

  echo "SUCCESS: ping6 succeed"
  return $lret
}

done
+
+expect="packets 1 bytes 104"
+for dir in "in6" "out6" ; do
+cnt=$(ip netns exec ns0 nft list counter inet filter ns2$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bew_counter ns0 ns2$dir "$expect"
+lret=1
+fi
+done
+
+expect 0 count in ns1
+expect="packets 0 bytes 0"
+for dir in "in6" "out6" ; do
+cnt=$(ip netns exec ns1 nft list counter inet filter ns0$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bew_counter ns1 ns0$dir "$expect"
+lret=1
+fi
+done
+
+expect 1 packet in ns2
+expect="packets 1 bytes 104"
+for dir in "in6" "out6" ; do
+cnt=$(ip netns exec ns2 nft list counter inet filter ns0$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bew_counter ns2 ns0$dir "$expect"
+lret=1
+fi
+done
+
+test $lret -eq 0 && echo "PASS: ipv6 ping to ns1 was NATted to ns2"
+ip netns exec ns0 nft flush chain ip6 nat output
+
+return $lret
+
+test_local_dnat()
+{
+local lret=0
+ip netns exec ns0 nft -f - <<EOF
+table ip nat {
+chain output {
+type nat hook output priority 0; policy accept;
+ip daddr 10.0.1.99 dnat to 10.0.2.99
+
+
+EOF

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# ping netns1, expect rewrite to netns2
+ip netns exec ns0 ping -q -c 1 10.0.1.99 > /dev/null
+if [ $? -ne 0 ]; then
+lret=1
+echo "ERROR: ping failed"
+return $lret
+fi
+
+expect="packets 0 bytes 0"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns0 nft list counter inet filter ns1$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bard_counter ns0 ns1$dir "$expect"
+lret=1
+fi
+done
+
+expect="packets 1 bytes 84"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns0 nft list counter inet filter ns2$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bard_counter ns0 ns2$dir "$expect"
+lret=1
+fi
+done
+
+# expect 0 count in ns1
+expect="packets 0 bytes 0"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns1 nft list counter inet filter ns0$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bard_counter ns1 ns0$dir "$expect"
+lret=1
+fi
+done
+
+# expect 1 packet in ns2
+expect="packets 1 bytes 84"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns2 nft list counter inet filter ns0$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bard_counter ns2 ns0$dir "$expect"
+lret=1
+fi
+done
+
+test $lret -eq 0 && echo "PASS: ping to ns1 was NATted to ns2"
+
ip netns exec ns0 nft flush chain ip nat output
+
reset_counters
ip netns exec ns0 ping -q -c 1 10.0.1.99 > /dev/null
+if [ $? -ne 0 ]; then
+lret=1
+echo "ERROR: ping failed"
+return $lret
+fi
+
expect="packets 1 bytes 84"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns0 nft list counter inet filter ns1$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns1 ns1$dir "$expect"
+lret=1
+fi
+done
+
expect="packets 0 bytes 0"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns0 nft list counter inet filter ns2$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns0 ns2$dir "$expect"
+lret=1
+fi
+done
+
# expect 1 count in ns1
+expect="packets 1 bytes 84"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns1 nft list counter inet filter ns0$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns0 ns0$dir "$expect"
+lret=1
+fi
+done
+
# expect 0 packet in ns2
+expect="packets 0 bytes 0"
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns2 nft list counter inet filter ns0$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns2 ns2$dir "$expect"
+lret=1
+fi
+done
+
test $lret -eq 0 && echo "PASS: ping to ns1 OK after nat output chain flush"
+ return $lret
+
+
+test_masquerade6()
+{
+local lret=0
+
+ip netns exec ns0 sysctl.net.ipv6.conf.all.forwarding=1 > /dev/null
+
+ip netns exec ns2 ping -q -c 1 dead:1::99 > /dev/null # ping ns2->ns1
+if [ $? -ne 0 ]; then
+echo "ERROR: cannot ping ns1 from ns2 via ipv6"
+return 1
+lret=1
+fi
+
+expect="packets 1 bytes 104"
+for dir in "in6" "out6" ; do
+cnt=$(ip netns exec ns1 nft list counter inet filter ns2${dir} | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns1 ns2$dir "$expect"
+lret=1
+fi
+
cnt=$(ip netns exec ns2 nft list counter inet filter ns1${dir} | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns2 ns1$dir "$expect"
+lret=1
+fi
+done
+
+reset_counters
+
+# add masquerading rule
+ip netns exec ns0 nft -f - <<EOF
+table ip6 nat {
+  chain postrouting {
+    type nat hook postrouting priority 0; policy accept;
+    meta oif veth0 masquerade
+  }
+}
+}
+EOF
+
+ip netns exec ns2 ping -q -c 1 dead:1::99 > /dev/null # ping ns2->ns1
+if [ $? -ne 0 ]; then
+echo "ERROR: cannot ping ns1 from ns2 with active ipv6 masquerading"
+lret=1
 +# ns1 should have seen packets from ns0, due to masquerade
+expect="packets 1 bytes 104"
+for dir in "in6" "out6" ; do
+
+ cnt=$(ip netns exec ns1 nft list counter inet filter ns0$dir | grep -q "$expect")
+ if [ $? -ne 0 ]; then
+ bad_counter ns1 ns0$dir "$expect"
+ lret=1
+ fi
+
+ cnt=$(ip netns exec ns2 nft list counter inet filter ns0$dir | grep -q "$expect")
+ if [ $? -ne 0 ]; then
+ bad_counter ns2 ns0$dir "$expect"
+ lret=1
+ fi
+ done
+
+ ns1 should not have seen packets from ns2, due to masquerade
+ expect="packets 0 bytes 0"
+ for dir in "in6" "out6" ; do
+
+ cnt=$(ip netns exec ns1 nft list counter inet filter ns2$dir | grep -q "$expect")
+ if [ $? -ne 0 ]; then
+ bad_counter ns1 ns0$dir "$expect"
+ lret=1
+ fi
+
+ cnt=$(ip netns exec ns2 nft list counter inet filter ns2$dir | grep -q "$expect")
+ if [ $? -ne 0 ]; then
+ bad_counter ns2 ns1$dir "$expect"
+ lret=1
+ fi
+
+ ip netns exec ns0 nft flush chain ip6 nat postrouting
+ if [ $? -ne 0 ]; then
+ echo "ERROR: Could not flush ip6 nat postrouting" 1>&2
+ lret=1
+ fi
+
+ test $lret -eq 0 && echo "PASS: IPv6 masquerade for ns2"
+ return $lret
+
+ test_masquerade()
local lret=0
+ ip netns exec ns0 sysctl.net.ipv4.conf.veth0.forwarding=1 > /dev/null
+ ip netns exec ns0 sysctl.net.ipv4.conf.veth1.forwarding=1 > /dev/null
+
+ ip netns exec ns2 ping -q -c 1 10.0.1.99 > /dev/null # ping ns2->ns1
+ if [ $? -ne 0 ] ; then
+ echo "ERROR: cannot ping ns1 from ns2"
+ lret=1
+ fi
+
+ expect="packets 1 bytes 84"
+ for dir in "in" "out" ; do
+ cnt=$(ip netns exec ns1 nft list counter inet filter ns2$dir | grep -q "$expect")
+ if [ $? -ne 0 ] ; then
+ bad_counter ns1 ns2$dir "$expect"
+ lret=1
+ fi
+ done
+
+ reset_counters
+
+ # add masquerading rule
+ ip netns exec ns0 nft -f - <<EOF
+ table ip nat {
+ chain postrouting {
+ type nat hook postrouting priority 0; policy accept;
+ meta oif veth0 masquerade
+ }
+ }
+}
+EOF
+
+ ip netns exec ns2 ping -q -c 1 10.0.1.99 > /dev/null # ping ns2->ns1
+ if [ $? -ne 0 ] ; then
+ echo "ERROR: cannot ping ns1 from ns2 with active ip masquerading"
+ lret=1
+ fi
+
+ # ns1 should have seen packets from ns0, due to masquerade
+ expect="packets 1 bytes 84"
+ for dir in "in" "out" ; do
+ cnt=$(ip netns exec ns1 nft list counter inet filter ns0$dir | grep -q "$expect")
+ if [ $? -ne 0 ] ; then
bad_counter ns1 ns0$dir "$expect"
+lret=1
+fi
+
+cnt=$(ip netns exec ns2 nft list counter inet filter ns1$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns2 ns1$dir "$expect"
+lret=1
+fi
+done
+
+for dir in "in" "out" ; do
+cnt=$(ip netns exec ns1 nft list counter inet filter ns2$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns1 ns0$dir "$expect"
+lret=1
+fi
+
+cnt=$(ip netns exec ns1 nft list counter inet filter ns2$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns2 ns1$dir "$expect"
+lret=1
+fi
+done
+
ip netns exec ns0 nft flush chain ip nat postrouting
+if [ $? -ne 0 ]; then
+echo "ERROR: Could not flush nat postrouting" 1>&2
+lret=1
+fi
+
test $lret -eq 0 & & echo "PASS: IP masquerade for ns2"
+
+return $lret
+
+
test_redirect6()
+
+
+ip netns exec ns0 sysctl net.ipv6.conf.all.forwarding=1 > /dev/null
+
+ip netns exec ns2 ping -q -c 1 dead:1::99 > /dev/null # ping ns2->ns1
+if [ $? -ne 0 ]; then
+echo "ERROR: cannot ping ns1 from ns2 via ipv6"
+lret=1
+ expect="packets 1 bytes 104"
+ for dir in "in6" "out6" ; do
+ cnt=$(ip netns exec ns1 nft list counter inet filter ns2$dir | grep -q "$expect")
+ if [ $? -ne 0 ]; then
+ bad_counter ns1 ns2$dir "$expect"
+ lret=1
+ fi
+ cnt=$(ip netns exec ns2 nft list counter inet filter ns1$dir | grep -q "$expect")
+ if [ $? -ne 0 ]; then
+ bad_counter ns2 ns1$dir "$expect"
+ lret=1
+ fi
+ done
+ reset_counters
+
+ # add redirect rule
+ ip netns exec ns0 nft -f - <<EOF
+ table ip6 nat {
+ chain prerouting {
+ type nat hook prerouting priority 0; policy accept;
+ meta iif veth1 meta l4proto icmpv6 ip6 saddr dead:2::99 ip6 daddr dead:1::99 redirect + }
+ +}
+EOF
+ ip netns exec ns2 ping -q -c 1 dead:1::99 > /dev/null # ping ns2->ns1
+ if [ $? -ne 0 ] ; then
+ echo "ERROR: cannot ping ns1 from ns2 with active ip6 redirect"
+ lret=1
+ fi
+ ns1 should have seen no packets from ns2, due to redirection
+ expect="packets 0 bytes 0"
+ for dir in "in6" "out6" ; do
+ cnt=$(ip netns exec ns1 nft list counter inet filter ns2$dir | grep -q "$expect")
+ if [ $? -ne 0 ]; then
+ bad_counter ns1 ns0$dir "$expect"
+ lret=1
+ fi
+ done
+
+ # ns0 should have seen packets from ns2, due to masquerade
+ expect="packets 1 bytes 104"
+ for dir in "in6" "out6" ; do
+ cnt=$(ip netns exec ns0 nft list counter inet filter ns2$dir | grep -q "$expect")

if [ $? -ne 0 ]; then
    bad_counter ns1 ns0$dir "$expect"
    lret=1
    fi
  done

  ip netns exec ns0 nft delete table ip6 nat
  if [ $? -ne 0 ]; then
    echo "ERROR: Could not delete ip6 nat table" 1>&2
    lret=1
    fi
  fi

test $lret -eq 0 && echo "PASS: IPv6 redirection for ns2"
  return $lret
}

test_redirect()
{
  local lret=0

  ip netns exec ns0 sysctl net.ipv4.conf.veth0.forwarding=1 > /dev/null
  ip netns exec ns0 sysctl net.ipv4.conf.veth1.forwarding=1 > /dev/null

  ip netns exec ns2 ping -q -c 1 10.0.1.99 > /dev/null # ping ns2->ns1
  if [ $? -ne 0 ]; then
    echo "ERROR: cannot ping ns1 from ns2"
    lret=1
    fi

  expect="packets 1 bytes 84"
  for dir in "in" "out" ; do
    cnt=$(ip netns exec ns1 nft list counter inet filter ns2${dir} | grep -q "$expect")
    if [ $? -ne 0 ]; then
      bad_counter ns1 ns2$dir "$expect"
      lret=1
      fi
    done

  cnt=$(ip netns exec ns2 nft list counter inet filter ns1${dir} | grep -q "$expect")
  if [ $? -ne 0 ]; then
      bad_counter ns2 ns1$dir "$expect"
      lret=1
      fi
  done
  reset_counters

  # add redirect rule

+ip netns exec ns0 nft -f - <<EOF
+table ip nat {
+chain prerouting {
+type nat hook prerouting priority 0; policy accept;
+meta iif veth1 ip protocol icmp ip saddr 10.0.2.99 ip daddr 10.0.1.99 redirect
+}
+
+EOF
+ip netns exec ns2 ping -q -c 1 10.0.1.99 > /dev/null # ping ns2->ns1
+if [ $? -ne 0 ]; then
+echo "ERROR: cannot ping ns1 from ns2 with active ip redirect"
+lret=1
+fi
+
+# ns1 should have seen no packets from ns2, due to redirection
+expect="packets 0 bytes 0"
+for dir in "in" "out" ; do
+
+cnt=$(ip netns exec ns1 nft list counter inet filter ns2$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns1 ns0$dir "$expect"
+lret=1
+fi
+done
+
+# ns0 should have seen packets from ns2, due to masquerade
+expect="packets 1 bytes 84"
+for dir in "in" "out" ; do
+
+cnt=$(ip netns exec ns0 nft list counter inet filter ns2$dir | grep -q "$expect")
+if [ $? -ne 0 ]; then
+bad_counter ns1 ns0$dir "$expect"
+lret=1
+fi
+done
+
+ip netns exec ns0 nft delete table ip nat
+if [ $? -ne 0 ]; then
+echo "ERROR: Could not delete nat table" 1>&2
+lret=1
+fi
+
+test $lret -eq 0 && echo "PASS: IP redirection for ns2"
+
+return $lret
+
+
+# ip netns exec ns0 ping -c 1 -q 10.0.$i.99
+for i in 0 1 2; do
+ ip netns exec ns$i nft -f - <<EOF
+ table inet filter { 
+ counter ns0in {}
+ counter ns1in {}
+ counter ns2in {}
+
+ counter ns0out {}
+ counter ns1out {}
+ counter ns2out {}
+
+ counter ns0in6 {}
+ counter ns1in6 {}
+ counter ns2in6 {}
+
+ counter ns0out6 {}
+ counter ns1out6 {}
+ counter ns2out6 {}
+
+ map nsincounter {
+ type ipv4_addr : counter
+ elements = { 10.0.1.1 : "ns0in",
+ 10.0.2.1 : "ns0in",
+ 10.0.1.99 : "ns1in",
+ 10.0.2.99 : "ns2in" }
+}
+
+ map nsincounter6 {
+ type ipv6_addr : counter
+ elements = { dead:1::1 : "ns0in6",
+ dead:2::1 : "ns0in6",
+ dead:1::99 : "ns1in6",
+ dead:2::99 : "ns2in6" }
+}
+
+ map nsoutcounter {
+ type ipv4_addr : counter
+ elements = { 10.0.1.1 : "ns0out",
+ 10.0.2.1 : "ns0out",
+ 10.0.1.99 : "ns1out",
+ 10.0.2.99 : "ns2out" }
+}
+
+ map nsoutcounter6 {
+ type ipv6_addr : counter
+ elements = { dead:1::1 : "ns0out6",
+ dead:2::1 : "ns0out6",
+ dead:1::99 : "ns1out6",
+ dead:2::99 : "ns2out6" ,
+dead:1::99 : "ns1out6",}
dead:2::99 : "nsOut6" 
+
+chain input {
  +type filter hook input priority 0; policy accept;
  +counter name ip saddr map nsInCounter
  +icmpv6 type { "echo-request", "echo-reply" } counter name ip6 saddr map nsInCounter6
  +}
+chain output {
  +type filter hook output priority 0; policy accept;
  +counter name ip daddr map nsOutCounter
  +icmpv6 type { "echo-request", "echo-reply" } counter name ip6 daddr map nsOutCounter6
  +}
+EOF
+done
+
+sleep 3
+# test basic connectivity
+for i in 1 2; do
  + ip netns exec ns0 ping -c 1 -q 10.0.$i.99 >/dev/null
  + if [ $? -ne 0 ];then
    + echo "ERROR: Could not reach other namespace(s)" 1>&2
    +ret=1
    + fi
    +
    + ip netns exec ns0 ping -c 1 -q dead:$i::99 >/dev/null
    + if [ $? -ne 0 ];then
      +echo "ERROR: Could not reach other namespace(s) via ipv6" 1>&2
      +ret=1
      + fi
      + check_counters ns$i
      + if [ $? -ne 0 ]; then
        +ret=1
        + fi
        +
        + check_ns0_counters ns$i
        + if [ $? -ne 0 ]; then
          +ret=1
          + fi
          + reset_counters
          +done
          +
          +if [ $ret -eq 0 ];then
            +echo "PASS: netns routing/connectivity: ns0 can reach ns1 and ns2"
            +fi
          +
          +reset_counters
+test_local_dnat
+test_local_dnat6
+
+reset_counters
+test_masquerade
+test_masquerade6
+
+reset_counters
+test_redirect
+test_redirect6
+
+for i in 0 1 2; do ip netns del ns$i;done
+
+exit $ret
--- linux-4.15.0.orig/tools/testing/selftests/netfilter/nft_trans_stress.sh
+++ linux-4.15.0/tools/testing/selftests/netfilter/nft_trans_stress.sh
@@ -0,0 +1,78 @@
+#!/bin/bash
+
+
+set -e
+
+# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+
+testns=testns1
+tables="foo bar baz quux"
+
+nft --version >/dev/null 2>&1
+if [ $? -ne 0 ];then
+echo "SKIP: Could not run test without nft tool"
+exit $ksft_skip
+fi
+
+ip -Version >/dev/null 2>&1
+if [ $? -ne 0 ];then
+echo "SKIP: Could not run test without ip tool"
+exit $ksft_skip
+fi
+
+tmp=$(mktemp)
+
+for table in $tables; do
+echo add table inet "$table" >> "$tmp"
+echo flush table inet "$table" >> "$tmp"
+done
+exit $ret
+echo "add chain inet $table INPUT { type filter hook input priority 0; }" >> "$tmp"
+echo "add chain inet $table OUTPUT { type filter hook output priority 0; }" >> "$tmp"
+for c in $(seq 1 400); do
+    chain=$(printf "chain%03u" "$c")
+    echo "add chain inet $table $chain" >> "$tmp"
+done
+
+for c in $(seq 1 400); do
+    chain=$(printf "chain%03u" "$c")
+    for BASE in INPUT OUTPUT; do
+        echo "add rule inet $table $BASE counter jump $chain" >> "$tmp"
+    done
+    echo "add rule inet $table $chain counter return" >> "$tmp"
+done
+done
+
ip netns add "$testns"
ip -netns "$testns" link set lo up
+
+lscpu | grep ^CPU\(s\): | ( read cpu cpunum ;
+    cpunum=$(($cpunum-1))
+    for i in $(seq 0 $cpunum);do
+        mask=$(printf 0x%x $((1<<$i)))
+        ip netns exec "$testns" taskset $mask ping -4 127.0.0.1 -fq > /dev/null &
+        ip netns exec "$testns" taskset $mask ping -6 ::1 -fq > /dev/null &
+    done)
+
sleep 1
+
+for i in $(seq 1 10) ; do ip netns exec "$testns" nft -f "$tmp" & done
+
+for table in $tables;do
+    randsleep=$((RANDOM%10))
+    sleep $randsleep
+    ip netns exec "$testns" nft delete table inet $table 2>/dev/null
+done
+
+randsleep=$((RANDOM%10))
+sleep $randsleep
+
pkill -9 ping
+
+wait
+
+rm -f "$tmp"
ip netns del "$testns"
--- linux-4.15.0.org/tools/testing/selftests/networking/timestamping/Makefile
+++ linux-4.15.0/tools/testing/selftests/networking/timestamping/Makefile
@@ -5,6 +5,8 @@
+top_srcdir = ../../../../..
+KSFT_KHDR_INSTALL := 1
include ../../lib.mk

clean:
--- linux-4.15.0.orig/tools/testing/selftests/networking/timestamping/rxtimestamp.c
+++ linux-4.15.0/tools/testing/selftests/networking/timestamping/rxtimestamp.c
@@ -114,6 +114,7 @@
+{ NULL, 0, NULL, 0 },
];

static int next_port = 19999;
@@ -327,8 +328,7 @@
+-int s, t;
+int s, t, opt;

bool all_tests = true;
int arg_index = 0;
int failures = 0;
-while ((opt = getopt_long(argc, argv, "", long_options, &arg_index)) != -1) {
+-while ((opt = getopt_long(argc, argv, "", long_options, &arg_index)) != -1) {

int val;
socklen_t len;
struct timeval next;
+size_t if_len;

if (argc < 2) usage(0);
interface = argv[1];
+if_len = strlen(interface);
+if (if_len >= IFNAMSIZ) {
+printf("interface name exceeds IFNAMSIZ\n");
+exit(1);
+}

for (i = 2; i < argc; i++) {
if (!strcasecmp(argv[i], "SO_TIMESTAMP"))
@@ -369,12 +375,12 @@
bail("socket");

memset(&device, 0, sizeof(device));
-strncpy(device.ifr_name, interface, sizeof(device.ifr_name));
+memcpy(device.ifr_name, interface, if_len + 1);
if (ioctl(sock, SIOCGIFADDR, &device) < 0)
bail("getting interface IP address");

memset(&hwconfig, 0, sizeof(hwconfig));
-strncpy(hwtstamp.ifr_name, interface, sizeof(hwtstamp.ifr_name));
+memcpy(hwtstamp.ifr_name, interface, if_len + 1);
hwtstamp.ifr_data = (void *)&hwconfig;
memset(&hwconfig, 0, sizeof(hwconfig));
hwconfig.tx_type =
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/Makefile
@@ -17,7 +17,6 @@
 benchmarks\  
cache_shape\  
copyloops\  
- context_switch\  
dscr\  
mm\  

--- linux-4.15.0.orig/tools/testing/selftests/powerpc/alignment/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/alignment/Makefile
@@ -1,5 +1,6 @@
-TEST_GEN_PROGS := copy_unaligned copy_first_unaligned paste_unaligned paste_last_unaligned
+TEST_GEN_PROGS := copy_first_unaligned alignment_handler

+top_srcdir = ../../..
include ../lib.mk

$(TEST_GEN_PROGS): ../harness.c ../utils.c copy_paste_unaligned_common.c
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/alignment/alignment_handler.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/alignment/alignment_handler.c
@@ -0,0 +1,491 @@
+/
+ * Test the powerpc alignment handler on POWER8/POWER9
+ *  
+ * Copyright (C) 2017 IBM Corporation (Michael Neuling, Andrew Donnellan)
+ *  
+ *  
+ * This program is free software; you can redistribute it and/or  
+ * modify it under the terms of the GNU General Public License  
+ * as published by the Free Software Foundation; either version  
+ * 2 of the License, or (at your option) any later version.  
+ */
+ *
This selftest exercises the powerpc alignment fault handler.

We create two sets of source and destination buffers, one in regular memory, the other cache-inhibited (we use /dev/fb0 for this).

We initialise the source buffers, then use whichever set of load/store instructions is under test to copy bytes from the source buffers to the destination buffers. For the regular buffers, these instructions will execute normally. For the cache-inhibited buffers, these instructions will trap and cause an alignment fault, and the alignment fault handler will emulate the particular instruction under test. We then compare the destination buffers to ensure that the native and emulated cases give the same result.

TODO:
   - Any FIXMEs below
   - Test VSX regs < 32 and > 32
   - Test all loads and stores
   - Check update forms do update register
   - Test alignment faults over page boundary
   - Some old binutils may not support all the instructions.

#include <sys/mman.h>
#include <sys/types.h>
#include <sys/stat.h>
#include <fcntl.h>
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <assert.h>
#include <getopt.h>
#include <unistd.h>
#include "utils.h"

int bufsize;
int debug;
testing;
volatile int gotsig;
+void sighandler(int sig, siginfo_t *info, void *ctx)
+
+{ ucontext_t *ucp = ctx;
+
+    if (!testing) {
+        signal(sig, SIG_DFL);
+        kill(0, sig);
+    }
+    gotsig = sig;
+}
+
+ifdef __powerpc64__
+    ucp->uc_mcontext.gp_regs[PT_NIP] += 4;
+endif
+
+define XFORM(reg, n)  " " #reg " ,%"#n",%2 ;"
+define DFORM(reg, n)  " " #reg " ,0(%"#n") ;"
+
+define TEST(name, ld_op, st_op, form, ld_reg, st_reg)
+
+    void test_##name(char *s, char *d)
+        {
+            asm volatile(
+                ld_op form(ld_reg, 0)
+                st_op form(st_reg, 1)
+                :: "r"(s), "r"(d), "r"(0)
+                : "memory", "vs0", "vs32", "r31");
+        }
+        rc |= do_test(#name, test_##name)
+
+define LOAD_VSX_XFORM_TEST(op) TEST(op, op, stxvd2x, XFORM, 32, 32)
+define STORE_VSX_XFORM_TEST(op) TEST(op, lxvd2x, op, XFORM, 32, 32)
+define LOAD_VSX_DFORM_TEST(op) TEST(op, op, stxv, DFORM, 32, 32)
+define STORE_VSX_DFORM_TEST(op) TEST(op, lxv, op, DFORM, 32, 32)
+define LOAD_VMX_XFORM_TEST(op) TEST(op, op, stxvd2x, XFORM, 0, 32)
+define STORE_VMX_XFORM_TEST(op) TEST(op, lxvd2x, op, XFORM, 32, 0)
+define LOAD_VMX_DFORM_TEST(op) TEST(op, lxv, op, DFORM, 0, 32)
+define STORE_VMX_DFORM_TEST(op) TEST(op, lxv, op, DFORM, 32, 0)
+
+define LOAD_XFORM_TEST(op) TEST(op, op, stdx, XFORM, 31, 31)
+define STORE_XFORM_TEST(op) TEST(op, ldx, op, XFORM, 31, 31)
+define LOAD_DFORM_TEST(op) TEST(op, op, std, DFORM, 31, 31)
+define STORE_DFORM_TEST(op) TEST(op, ld, op, DFORM, 31, 31)
+
+define LOAD_FLOAT_DFORM_TEST(op) TEST(op, op, stfd, DFORM, 0, 0)
+define STORE_FLOAT_DFORM_TEST(op) TEST(op, lfd, op, DFORM, 0, 0)
+define LOAD_FLOAT_XFORM_TEST(op) TEST(op, op, stfdx, XFORM, 0, 0)
+define STORE_FLOAT_XFORM_TEST(op) TEST(op, lfdx, op, XFORM, 0, 0)

Open Source Used In 5GaaS Edge AC-4 36132
+/* FIXME: Unimplemented tests: */
+// STORE_DFORM_TEST(stq) /* FIXME: need two registers for quad */
+// STORE_DFORM_TEST(stswi) /* FIXME: string instruction */
+
+// STORE_XFORM_TEST(stwat) /* AMO can't emulate or run on CI */
+// STORE_XFORM_TEST(stdat) /* ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^ */
+
+/* preload byte by byte */
+void preload_data(void *dst, int offset, int width)
+{
+char *c = dst;
+int i;
+
+c += offset;
+
+for (i = 0 ; i < width ; i++)
+c[i] = i;
+
+
+int test_memcpy(void *dst, void *src, int size, int offset,
+void (*test_func)(char *, char *))
+{
+char *s, *d;
+
+s = src;
+s += offset;
+d = dst;
+d += offset;
+
+assert(size == 16);
+gotsig = 0;
+testing = 1;
+
+test_func(s, d); /* run the actual test */
+
+testing = 0;
+if (gotsig) {
+if (debug)
+printf(" Got signal %i\n", gotsig);
+return 1;
+
+}
+return 0;
+
+void dumpdata(char *s1, char *s2, int n, char *test_name)
+{
+  int i;
+
+  printf(" %s: unexpected result:\n", test_name);
+  printf("   mem:");
+  for (i = 0; i < n; i++)
+    printf(" %02x", s1[i]);
+  printf("\n");
+  printf(" ci: ");
+  for (i = 0; i < n; i++)
+    printf(" %02x", s2[i]);
+  printf("\n");
+
+
+int test_memcmp(void *s1, void *s2, int n, int offset, char *test_name)
+{
+  char *s1c, *s2c;
+
+  s1c = s1;
+  s1c += offset;
+  s2c = s2;
+  s2c += offset;
+
+  if (memcmp(s1c, s2c, n)) {
+    if (debug) {
+      printf("\n Compare failed. Offset:%i length:%i\n",
+        offset, n);
+      dumpdata(s1c, s2c, n, test_name);
+    }
+    return 1;
+  }
+  return 0;
+}
+
+int test_memcmp(void *s1, void *s2, int n, int offset, char *test_name)
+{
+  char *s1c, *s2c;
+
+  s1c = s1;
+  s1c += offset;
+  s2c = s2;
+  s2c += offset;
+
+  if (memcmp(s1c, s2c, n)) {
+    if (debug) {
+      printf("\n Compare failed. Offset:%i length:%i\n",
+        offset, n);
+      dumpdata(s1c, s2c, n, test_name);
+    }
+    return 1;
+  }
+  return 0;
+}
+
+/*
 * Do two memcpy tests using the same instructions. One cachable
 * memory and the other doesn't.
 */
+int do_test(char *test_name, void (*test_func)(char *, char *))
+{
+  int offset, width, fd, rc = 0, r;
+  void *mem0, *mem1, *ci0, *ci1;
+
+  printf("atDoing %s:\n", test_name);
+  fd = open(”/dev/fb0”, O_RDWR);
+  if (fd < 0) {
+    printf("\n");
+  }
  /*
  * Do two memcpy tests using the same instructions. One cachable
  * memory and the other doesn't.
  */
  +int do_test(char *test_name, void (*test_func)(char *, char *))
  +{
  +  int offset, width, fd, rc = 0, r;
  +  void *mem0, *mem1, *ci0, *ci1;
  +
  +  printf("atDoing %s:\n", test_name);
  +  fd = open("/dev/fb0", O_RDWR);
  +  if (fd < 0) {
  +    printf("\n");
+perror("Can't open /dev/fb0");
+SKIP_IF(1);
+
+ci0 = mmap(NULL, bufsize, PROT_WRITE, MAP_SHARED,
+    fd, 0x0);
+ci1 = mmap(NULL, bufsize, PROT_WRITE, MAP_SHARED,
+    fd, bufsize);
+if ((ci0 == MAP_FAILED) || (ci1 == MAP_FAILED)) {
+printf("\n");
+perror("mmap failed");
+SKIP_IF(1);
+
+rc = posix_memalign(&mem0, bufsize, bufsize);
+if (rc) {
+printf("\n");
+return rc;
+}
+
+rc = posix_memalign(&mem1, bufsize, bufsize);
+if (rc) {
+printf("\n");
+free(mem0);
+return rc;
+}
+
+/* offset = 0 no alignment fault, so skip */
+for (offset = 1; offset < 16; offset++) {
+    width = 16; /* vsx == 16 bytes */
+    r = 0;
+    /* load pattern into memory byte by byte */
+    preload_data(ci0, offset, width);
+    preload_data(mem0, offset, width); // FIXME: remove??
+    memcpy(ci0, mem0, bufsize);
+    memcpy(ci1, mem1, bufsize); /* initialise output to the same */
+    /* sanity check */
+    test_memcmp(mem0, ci0, width, offset, test_name);
+    +r |= test_memcmp(ci1, ci0, width, offset, test_func);
+    +r |= test_memcmp(mem1, mem0, width, offset, test_func);
+    +if (r && !debug) {
+        printf("FAILED: Got signal");
+        break;
+    }
+}


```c
int test_memcmp(mem1, ci1, width, offset, test_name);
+r |= r;
+if (r && !debug) {
+printf("FAILED: Wrong Data");
+break;
+}
+}
+}
+if (!r)
+printf("PASSED");
+
+munmap(ci0, bufsize);
+munmap(ci1, bufsize);
+free(mem0);
+free(mem1);
+
+return rc;
+}
+
+int test_alignment_handler_vsx_206(void)
+{
+int rc = 0;
+
+printf("VSX: 2.06B\n");
+LOAD_VSX_XFORM_TEST(lxvd2x);
+LOAD_VSX_XFORM_TEST(lxvw4x);
+LOAD_VSX_XFORM_TEST(lxsdx);
+LOAD_VSX_XFORM_TEST(lxvdssx);
+STORE_VSX_XFORM_TEST(stxvd2x);
+STORE_VSX_XFORM_TEST(stxvw4x);
+STORE_VSX_XFORM_TEST(stxsdx);
+return rc;
+}
+
+int test_alignment_handler_vsx_207(void)
+{
+int rc = 0;
+
+printf("VSX: 2.07B\n");
+LOAD_VSX_XFORM_TEST(lxssp);
+LOAD_VSX_XFORM_TEST(lxsiwax);
+LOAD_VSX_XFORM_TEST(lxsiwzx);
+STORE_VSX_XFORM_TEST(stxsspx);
+STORE_VSX_XFORM_TEST(stxsiwpx);
+return rc;
+}
+
+int test_alignment_handler_vsx_300(void)
```
+{
+int rc = 0;
+
+SKIP_IF(!have_hwcap2(PPC_FEATURE2_ARCH_3_00));
+printf("VSX: 3.00B\n");
+LOAD_VMX_DFORM_TEST(lxsd);
+LOAD_VSX_XFORM_TEST(lxsbx);
+LOAD_VSX_XFORM_TEST(lxshx);
+LOAD_VMX_DFORM_TEST(lxssp);
+LOAD_VSX_DFORM_TEST(lxv);
+LOAD_VSX_XFORM_TEST(lxvb16x);
+LOAD_VSX_XFORM_TEST(lxvh8x);
+LOAD_VSX_XFORM_TEST(lxvx);
+LOAD_VSX_XFORM_TEST(lxvwsx);
+LOAD_VSX_XFORM_TEST(lxv);
+LOAD_VSX_XFORM_TEST(lxv);
+LOAD_VMX_DFORM_TEST(stxsd);
+STORE_VSX_XFORM_TEST(stxsibx);
+STORE_VSX_XFORM_TEST(stxshx);
+STORE_VMX_DFORM_TEST(stxssp);
+STORE_VSX_XFORM_TEST(stxvb16x);
+STORE_VSX_XFORM_TEST(stxvh8x);
+STORE_VSX_XFORM_TEST(stxvx);
+STORE_VSX_XFORM_TEST(stxv);
+STORE_VSX_XFORM_TEST(stxvb16x);
+STORE_VSX_XFORM_TEST(stxvh8x);
+STORE_VSX_XFORM_TEST(stxvx);
+STORE_VSX_XFORM_TEST(stxv);
+return rc;
+
+int test_alignment_handler_integer(void)
+{
+int rc = 0;
+
+printf("Integer\n");
+LOAD_DFORM_TEST(lbz);
+LOAD_DFORM_TEST(lbz);
+LOAD_XFORM_TEST(lbxz);
+LOAD_XFORM_TEST(lbxz);
+LOAD_DFORM_TEST(lhz);
+LOAD_DFORM_TEST(lhz);
+LOAD_DFORM_TEST(lhz);
+LOAD_DFORM_TEST(lhz);
+LOAD_DFORM_TEST(lzh);
+LOAD_DFORM_TEST(lzh);
+LOAD_DFORM_TEST(lzh);
+LOAD_DFORM_TEST(lha);
+LOAD_DFORM_TEST(lha);
+LOAD_XFORM_TEST(lhax);
+LOAD_XFORM_TEST(lhax);
+LOAD_XFORM_TEST(lhbrx);
+LOAD_DFORM_TEST(lwz);
+LOAD_DFORM_TEST(lwz);}
LOAD_DFORM_TEST(lwzu);
LOAD_XFORM_TEST(lwzx);
LOAD_XFORM_TEST(lwzux);
LOAD_DFORM_TEST(lwa);
LOAD_XFORM_TEST(lwax);
LOAD_XFORM_TEST(lwaux);
LOAD_XFORM_TEST(lwbrix);
LOAD_DFORM_TEST(ld);
LOAD_DFORM_TEST(ldu);
LOAD_XFORM_TEST(ldx);
LOAD_XFORM_TEST(ldux);
LOAD_XFORM_TEST(ldbrx);
STORE_DFORM_TEST(stb);
STORE_XFORM_TEST(stbx);
STORE_DFORM_TEST(stbu);
STORE_XFORM_TEST(stbux);
STORE_DFORM_TEST(sth);
STORE_XFORM_TEST(sthx);
STORE_DFORM_TEST(sthu);
STORE_XFORM_TEST(sthux);
STORE_XFORM_TEST(sthbrx);
STORE_DFORM_TEST(stw);
STORE_XFORM_TEST(stwx);
STORE_DFORM_TEST(stwu);
STORE_XFORM_TEST(stwux);
STORE_XFORM_TEST(stwbrx);
STORE_DFORM_TEST(std);
STORE_XFORM_TEST(stdx);
STORE_DFORM_TEST(stdu);
STORE_XFORM_TEST(stdux);
STORE_XFORM_TEST(stdbrx);
STORE_DFORM_TEST(stmw);
return rc;
+
+
int test_alignment_handler_vmx(void)
+
+
int rc = 0;
+
+
printf("VMX\n");
LOAD_VMX_XFORM_TEST(lvx);
+
+
/*
 * FIXME: These loads only load part of the register, so our
 * testing method doesn't work. Also they don't take alignment
 * faults, so it's kinda pointless anyway
 * 
 *
int test_alignment_handler_fp(void)
{
    int rc = 0;

    printf("Floating point\n");
    LOAD_FLOAT_DFORM_TEST(lfd);
    LOAD_FLOAT_XFORM_TEST(lfdx);
    LOAD_FLOAT_DFORM_TEST(lfdp);
    LOAD_FLOAT_XFORM_TEST(lfdpx);
    LOAD_FLOAT_DFORM_TEST(lfdu);
    LOAD_FLOAT_XFORM_TEST(lfdux);
    LOAD_FLOAT_DFORM_TEST(lfs);
    LOAD_FLOAT_XFORM_TEST(lfsx);
    LOAD_FLOAT_DFORM_TEST(lfsu);
    LOAD_FLOAT_XFORM_TEST(lfsux);
    LOAD_FLOAT_XFORM_TEST(lfiwzx);
    LOAD_FLOAT_XFORM_TEST(lfiwax);
    STORE_FLOAT_DFORM_TEST(stfd);
    STORE_FLOAT_XFORM_TEST(stfdx);
    STORE_FLOAT_DFORM_TEST(stfdp);
    STORE_FLOAT_XFORM_TEST(stfdpx);
    STORE_FLOAT_DFORM_TEST(stfdu);
    STORE_FLOAT_XFORM_TEST(stfdux);
    STORE_FLOAT_DFORM_TEST(stfs);
    STORE_FLOAT_XFORM_TEST(stfsx);
    STORE_FLOAT_DFORM_TEST(stfsu);
    STORE_FLOAT_XFORM_TEST(stfsux);
    STORE_FLOAT_XFORM_TEST(stfiwx);
    +
    +return rc;
    +}
+
+void usage(char *prog)
+{
+printf("Usage: %s [options]\n", prog);
+printf(" -dEnable debug error output\n");
+printf("\n");
+printf("This test requires a POWER8 or POWER9 CPU and a usable ");
+printf("framebuffer at /dev/fb0.\n");
+
+int main(int argc, char *argv[])
+
+
+struct sigaction sa;
+int rc = 0;
+int option = 0;
+
+while ((option = getopt(argc, argv, "d")) != -1) {
+    switch (option) {
+    case 'd':
+        debug++;
+        break;
+    default:
+        usage(argv[0]);
+        exit(1);
+    }
+}
+
+bufsize = getpagesize();
+
+sa.sa_sigaction = sighandler;
+sigemptyset(&sa.sa_mask);
+sa.sa_flags = SA_SIGINFO;
+if (sigaction(SIGSEGV, &sa, NULL) == -1
+    || sigaction(SIGBUS, &sa, NULL) == -1
+    || sigaction(SIGILL, &sa, NULL) == -1) {
+    perror("sigaction");
+    exit(1);
+}
+
+rc |= test_harness(test_alignment_handler_vsx_206,
+ "test_alignment_handler_vsx_206");
+rc |= test_harness(test_alignment_handler_vsx_207,
+ "test_alignment_handler_vsx_207");
+rc |= test_harness(test_alignment_handler_vsx_300,
+ "test_alignment_handler_vsx_300");
+rc |= test_harness(test_alignment_handler_integer,
+ "test_alignment_handler_integer");
+rc |= test_harness(test_alignment_handler_vmx,
+ "test_alignment_handler_vmx");
+rc |= test_harness(test_alignment_handler_fp,
+ "test_alignment_handler_fp");
CFLAGS += -O2

top_srcdir = ..../..
include ../lib.mk

S(TEST_GEN_PROGS): ../harness.c
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/benchmarks/context_switch.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/benchmarks/context_switch.c
@@ -23,6 +23,7 @@
 #include <sys/time.h>
 #include <sys/syscall.h>
+#include <sys/sysinfo.h>
 #include <sys/types.h>
 #include <sys/shm.h>
 #include <linux/futex.h>
@@ -108,8 +109,9 @@
 static void start_process_on(void *(*fn)(void *), void *arg, unsigned long cpu)
 {
     int pid;
-    cpu_set_t cpuset;
+    int pid, ncpus;
+    cpu_set_t *cpuset;
        size_t size;

     pid = fork();
     if (pid == -1) {
@@ -120,14 +122,23 @@
         return;

-    CPU_ZERO(&cpuset);
-    CPU_SET(cpu, &cpuset);
+    ncpus = get_nprocs();
+    size = CPU_ALLOC_SIZE(ncpus);
+    cpuset = CPU_ALLOC(ncpus);
+    if (!cpuset) {
+        perror("malloc");
+        exit(1);
+    }
+    CPU_ZERO_S(size, cpuset);
CPU_SET_S(cpu, size, cpuset);

if (sched_setaffinity(0, sizeof(cpuset), &cpuset)) {
  if (sched_setaffinity(0, size, cpuset)) {
    perror("sched_setaffinity");
    CPU_FREE(cpuset);
  }
}

CPU_FREE(cpuset);
fn(arg);

exit(0);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/cache_shape/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/cache_shape/Makefile
@@ -1,11 +1,7 @@
 # SPDX-License-Identifier: GPL-2.0
 -TEST_PROGS := cache_shape
 -
 -all: $(TEST_PROGS)
 -
 -$(TEST_PROGS): ../harness.c ../utils.c
 +TEST_GEN_PROGS := cache_shape
 +
 +top_srcdir = ../../../../..
 include ../../lib.mk

-clean:
-rm -f $(TEST_PROGS) *.o
+$TEST_GEN_PROGS): ../harness.c ../utils.c
- test
 + test
 --- linux-4.15.0.orig/tools/testing/selftests/powerpc/copyloops/Makefile
 +++ linux-4.15.0/tools/testing/selftests/powerpc/copyloops/Makefile
 @@ -11,6 +11,7 @@
 TEST_GEN_PROGS := copyuser_64 copyuser_power7 memcpy_64 memcpy_power7
 EXTRA_SOURCES := validate.c ../harness.c
 +top_srcdir = ../../../../..
 include ../../lib.mk

$(OUTPUT)/copyuser_64: CPPFLAGS += -D COPY_LOOP=test___copy_tofrom_user_base
 --- linux-4.15.0.orig/tools/testing/selftests/powerpc/dscr/Makefile
 +++ linux-4.15.0/tools/testing/selftests/powerpc/dscr/Makefile
 @@ -3,6 +3,7 @@
 dscr_inherit_exec_test dscr_sysfs_thread_test
+top_srcdir = ../../../../..
 include ../../lib.mk

--- linux-4.15.0.orig/tools/testing/selftests/powerpc/copyloops/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/copyloops/Makefile
@@ -11,6 +11,7 @@
 TEST_GEN_PROGS := copyuser_64 copyuser_power7 memcpy_64 memcpy_power7
 EXTRA_SOURCES := validate.c ../harness.c
 +top_srcdir = ../../../../..
 include ../../lib.mk

$(OUTPUT)/copyuser_64: CPPFLAGS += -D COPY_LOOP=test___copy_tofrom_user_base
 --- linux-4.15.0.orig/tools/testing/selftests/powerpc/dscr/Makefile
 +++ linux-4.15.0/tools/testing/selftests/powerpc/dscr/Makefile
 @@ -3,6 +3,7 @@
 dscr_inherit_exec_test dscr_sysfs_thread_test
+top_srcdir = ../../../../..
 include ../../lib.mk
$(OUTPUT)/dscr_default_test: LDLIBS += -lpthread
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/harness.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/harness.c
@@ -85,13 +85,13 @@
    return status;
 }

-static void alarm_handler(int signum)
+static void sig_handler(int signum)
 {
-/* Just wake us up from waitpid */
+/* Just wake us up from waitpid */
 }

-static struct sigaction alarm_action = {
-    .sa_handler = alarm_handler,
+static struct sigaction sig_action = {
+    .sa_handler = sig_handler,
    };

 void test_harness_set_timeout(uint64_t time)
@@ -106,8 +106,14 @@
    test_start(name);
    test_set_git_version(GIT_VERSION);

    -if (sigaction(SIGALRM, &alarm_action, NULL)) {
-    perror("sigaction");
+    if (sigaction(SIGINT, &sig_action, NULL)) {
+        perror("sigaction (sigint)");
+        test_error(name);
+        return 1;
+    }
+    
+    +if (sigaction(SIGALRM, &sig_action, NULL)) {
+        perror("sigaction (sigalrm)");
+        test_error(name);
        return 1;
    }
    --- linux-4.15.0.orig/tools/testing/selftests/powerpc/math/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/math/Makefile
@@ @ -1,6 +1,7 @@
      include ../../lib.mk

 # SPDX-License-Identifier: GPL-2.0
 TEST_GEN_PROGS := fpu_syscall fpu_preempt fpu_signal vmx_syscall vmx_preempt vmx_signal vsx_preempt
+top_srcdir = ../../../..

off_t filesize;
int fd;

+SKIP_IF(!syscall_available());
+
fd = open(file_name, O_RDWR);
if (fd == -1) {
    perror("failed to open file");
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/mm/tlbie_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/mm/tlbie_test.c
@@ -0,0 +1,734 @@
+// SPDX-License-Identifier: GPL-2.0
+
+/*
+ * Copyright 2019, Nick Piggin, Gautham R. Shenoy, Aneesh Kumar K.V, IBM Corp.
+ */
+
+/*
+ * Test tlbie/ntpidr race. We have 4 threads doing flush/load/compare/store
+ * sequence in a loop. The same threads also run a context switch task
+ * that does sched_yield() in loop.
+ *
+ * The snapshot thread mark the mmap area PROT_READ in between, make a copy
+ * and copy it back to the original area. This helps us to detect if any
+ * store continued to happen after we marked the memory PROT_READ.
+ */
+
+#define _GNU_SOURCE
+#include <stdio.h>
+#include <sys/mman.h>
+#include <sys/types.h>
+#include <sys/wait.h>
+#include <sys/ipc.h>
+#include <sys/shm.h>
+#include <sys/stat.h>
+#include <sys/time.h>
+#include <linux/futex.h>
+#include <unistd.h>
+#include <asm/unistd.h>
+#include <string.h>
+#include <stdlib.h>
+#include <fcntl.h>
+#include <sched.h>
+#include <time.h>
+#include <stdarg.h>
+#include <sched.h>
+#include <pthread.h>

---
include <signal.h>
#include <sys/prctl.h>

static inline void dcbf(volatile unsigned int *addr)
{
__asm__ __volatile__ ("dcbf %y0; sync" : : "Z"(*(unsigned char *)addr) : "memory");
}

static void err_msg(char *msg)
{

time_t now;
time(&now);
printf("=================================
");
printf("    Error: %s
", msg);
printf("    %s", ctime(&now));
printf("=================================
");
exit(1);
}

static char *map1;
static char *map2;
static pid_t rim_process_pid;

/*
 * A "rim-sequence" is defined to be the sequence of the following
 * operations performed on a memory word:
 * 1) FLUSH the contents of that word.
 * 2) LOAD the contents of that word.
 * 3) COMPARE the contents of that word with the content that was
 *    previously stored at that word
 * 4) STORE new content into that word.
 *
 * The threads in this test that perform the rim-sequence are termed
 * as rim_threads.
 */

/*
 * A "corruption" is defined to be the failed COMPARE operation in a
 * rim-sequence.
 *
 * A rim_thread that detects a corruption informs about it to all the
 * other rim_threads, and the mem_snapshot thread.
 */

static volatile unsigned int corruption_found;

/* This defines the maximum number of rim_threads in this test.*/
The THREAD_ID_BITS denote the number of bits required to represent the thread_ids [0..MAX_THREADS - 1]. We are being a bit paranoid here and set it to 8 bits, though 6 bits suffice.

#define MAX_THREADS 64
#define THREAD_ID_BITS8
#define THREAD_ID_MASK((1 << THREAD_ID_BITS) - 1)
static unsigned int rim_thread_ids[MAX_THREADS];
static pthread_t rim_threads[MAX_THREADS];
+

Each rim_thread works on an exclusive "chunk" of size RIM_CHUNK_SIZE.
The ith rim_thread works on the ith chunk.
The ith chunk begins at
map1 + (i * RIM_CHUNK_SIZE)

#define RIM_CHUNK_SIZE 1024
#define BITS_PER_BYTE 8
#define WORD_SIZE (sizeof(unsigned int))
#define WORD_BITS(WORD_SIZE * BITS_PER_BYTE)
#define WORDS_PER_CHUNK(RIM_CHUNK_SIZE/WORD_SIZE)
+
static inline char *compute_chunk_start_addr(unsigned int thread_id)
{
	char *chunk_start;

	chunk_start = (char *)((unsigned long)map1 +
	(thread_id * RIM_CHUNK_SIZE));
+
return chunk_start;
+

The "word-offset" of a word-aligned address inside a chunk, is defined to be the number of words that precede the address in that chunk.

#define WORD_OFFSET_BITS(__builtin_ctz(WORDS_PER_CHUNK))
+ *
+ * A "sweep" is defined to be the sequential execution of the
+ * rim-sequence by a rim_thread on its chunk one word at a time.
+ * starting from the first word of its chunk and ending with the last
+ * word of its chunk.
+ * Each sweep of a rim_thread is uniquely identified by a sweep_id.
+ * SWEEP_ID_BITS denote the number of bits required to represent
+ * the sweep_ids of rim_threads.
+ * As to why SWEEP_ID_BITS are computed as a function of THREAD_ID_BITS,
+ * WORD_OFFSET_BITS, and WORD_BITS, see the "store-pattern" below.
+ */
+#define SWEEP_ID_BITS(WORD_BITS - (THREAD_ID_BITS + WORD_OFFSET_BITS))
+#define SWEEP_ID_MASK((1 << SWEEP_ID_BITS) - 1)
+*/
+ * A "store-pattern" is the word-pattern that is stored into a word
+ * location in the 4)STORE step of the rim-sequence.
+ * In the store-pattern, we shall encode:
+ * - The thread-id of the rim_thread performing the store
+ *   (The most significant THREAD_ID_BITS)
+ * - The word-offset of the address into which the store is being
+ *   performed (The next WORD_OFFSET_BITS)
+ * - The sweep_id of the current sweep in which the store is
+ *   being performed. (The lower SWEEP_ID_BITS)
+ * Store Pattern: 32 bits
+ |------------------|--------------------|---------------------------------|
+ |    Thread id     |  Word offset       |         sweep_id                |
+ |------------------|--------------------|---------------------------------|
+ |    THREAD_ID_BITS     WORD_OFFSET_BITS          SWEEP_ID_BITS
In the store pattern, the (Thread-id + Word-offset) uniquely identify the address to which the store is being performed i.e,

$$ \text{address} = \text{map1} + \text{(Thread-id \times RIM_CHUNK_SIZE)} + (\text{Word-offset \times WORD_SIZE})$$

And the sweep_id in the store pattern identifies the time when the store was performed by the rim_thread.

We shall use this property in the 3)COMPARE step of the rim-sequence.

```c
#define SWEEP_ID_SHIFT 0
#define WORD_OFFSET_SHIFT(SWEEP_ID_BITS)
#define THREAD_ID_SHIFT(WORD_OFFSET_BITS + SWEEP_ID_BITS)

/* Compute the store pattern for a given thread with id @tid, at location @addr in the sweep identified by @sweep_id */
static inline unsigned int compute_store_pattern(unsigned int tid, unsigned int *addr, unsigned int sweep_id)
{
    unsigned int ret = 0;
    char *start = compute_chunk_start_addr(tid);
    unsigned int word_offset = compute_word_offset(start, addr);

    ret += (tid & THREAD_ID_MASK) << THREAD_ID_SHIFT;
    ret += (word_offset & WORD_OFFSET_MASK) << WORD_OFFSET_SHIFT;
    ret += (sweep_id & SWEEP_ID_MASK) << SWEEP_ID_SHIFT;
    return ret;
}

/* Extract the thread-id from the given store-pattern */
static inline unsigned int extract_tid(unsigned int pattern)
{
    unsigned int ret;
    ret = (pattern >> THREAD_ID_SHIFT) & THREAD_ID_MASK;
    return ret;
}

/* Extract the word-offset from the given store-pattern */
static inline unsigned int extract_word_offset(unsigned int pattern)
{
    unsigned int ret;
    ret = (pattern >> WORD_OFFSET_SHIFT) & WORD_OFFSET_MASK;
    return ret;
}
```

[36x36]Open Source Used In 5GaaS Edge AC-4  36149
ret = (pattern >> WORD_OFFSET_SHIFT) & WORD_OFFSET_MASK;
+
+return ret;
+
+/* Extract the sweep-id from the given store-pattern */
+static inline unsigned int extract_sweep_id(unsigned int pattern)
+
+{
+unsigned int ret;
+
+ret = (pattern >> SWEEP_ID_SHIFT) & SWEEP_ID_MASK;
+
+return ret;
+
+}/* Logging the output of the verification */
+ валют #define LOGDIR_NAME_SIZE 100
+static char logdir[LOGDIR_NAME_SIZE];
+
+static FILE *fp[MAX_THREADS];
+static const char logfilename[] = "Thread-%02d-Chunk";
+
+static inline void start_verification_log(unsigned int tid,
+unsigned int *addr,
+unsigned int cur_sweep_id,
+unsigned int prev_sweep_id)
+{
+FILE *f;
+char logfile[30];
+char path[LOGDIR_NAME_SIZE + 30];
+char separator[2] = "/";
+char *chunk_start = compute_chunk_start_addr(tid);
+unsigned int size = RIM CHUNK_SIZE;
+
+sprintf(logfile, logfilename, tid);
+strcpy(path, logdir);
+strcat(path, separator);
+strcat(path, logfile);
+f = fopen(path, "w");
+
+if (!f) {
+err_msg("Unable to create logfile\n");
+}
+fp[tid] = f;
+
+fprintf(f, "----------------------------------------------------------\n");
+fprintf(f, "PID %02d\n", rim_process_pid);
+fprintf(f, "Thread id %02d\n", tid);
+fprintf(f, "Chunk Start Addr = 0x%16lx\n", (unsigned long)chunk_start);
+fprintf(f, "Chunk Size %d\n", size);
+fprintf(f, "Next Store Addr = 0x%16lx\n", (unsigned long)addr);
+fprintf(f, "Current sweep-id = 0x%8x\n", cur_sweep_id);
+fprintf(f, "Previous sweep-id = 0x%8x\n", prev_sweep_id);
+fprintf(f, "----------------------------------------------------------\n");
+
static inline void log_anamoly(unsigned int tid, unsigned int *addr,
    unsigned int expected, unsigned int observed)
{
    FILE *f = fp[tid];
    
    fprintf(f, "Thread %02d: Addr 0x%lx: Expected 0x%lx, Observed 0x%lx\n",
        tid, (unsigned long)addr, expected, observed);
    fprintf(f, "Thread %02d: Expected Thread id %02d\n", tid, extract_tid(expected));
    fprintf(f, "Thread %02d: Observed Thread id %02d\n", tid, extract_tid(observed));
    fprintf(f, "Thread %02d: Expected Word offset %03d\n", tid, extract_word_offset(expected));
    fprintf(f, "Thread %02d: Observed Word offset %03d\n", tid, extract_word_offset(observed));
    fprintf(f, "Thread %02d: Expected sweep-id 0x%lx\n", tid, extract_sweep_id(expected));
    fprintf(f, "Thread %02d: Observed sweep-id 0x%lx\n", tid, extract_sweep_id(observed));
    fprintf(f, "----------------------------------------------------------\n");
+
static inline void end_verification_log(unsigned int tid, unsigned nr_anamolies)
{
    FILE *f = fp[tid];
    char logfile[30];
    char path[LOGDIR_NAME_SIZE + 30];
    char separator[] = "/
    
close(f);
    
    if (nr_anamolies == 0) {
        remove(path);
        return;
    }
    
    strcat(logfile, logfilename, tid);
    strcpy(path, logdir);
    strcat(path, separator);
    strcat(path, logfile);
    }
printf("Thread %02d chunk has %d corrupted words. For details check %s\n", tid, nr_anamolies, path);
}
+
+
+/*
+ * When a COMPARE step of a rim-sequence fails, the rim_thread informs
+ * everyone else via the shared_memory pointed to by
+ * corruption_found variable. On seeing this, every thread verifies the
+ * content of its chunk as follows.
+ *
+ * Suppose a thread identified with @tid was about to store (but not
+ * yet stored) to @next_store_addr in its current sweep identified
+ * @cur_sweep_id. Let @prev_sweep_id indicate the previous sweep_id.
+ *
+ * This implies that for all the addresses @addr < @next_store_addr,
+ * Thread @tid has already performed a store as part of its current
+ * sweep. Hence we expect the content of such @addr to be:
+ *
+ * |-------------------------------------------------|
+ * | tid   | word_offset(addr) |    cur_sweep_id     |
+ * |-------------------------------------------------|
+ *
+ * Since Thread @tid is yet to perform stores on address
+ * @next_store_addr and above, we expect the content of such an
+ * address @addr to be:
+ *
+ * |-------------------------------------------------|
+ * | tid   | word_offset(addr) |    prev_sweep_id    |
+ * |-------------------------------------------------|
+ *
+ * The verifier function @verify_chunk does this verification and logs
+ * any anomalies that it finds.
+ */
+static void verify_chunk(unsigned int tid, unsigned int *next_store_addr,
+  unsigned int cur_sweep_id,
+  unsigned int prev_sweep_id)
+{
+  unsigned int *iter_ptr;
+  unsigned int size = RIM_CHUNK_SIZE;
+  unsigned int expected;
+  unsigned int observed;
+  char *chunk_start = compute_chunk_start_addr(tid);
+  +int nr_anamolies = 0;
+  +start_verification_log(tid, next_store_addr,
+    cur_sweep_id, prev_sweep_id);
+  +for (iter_ptr = (unsigned int *)chunk_start;
(unsigned long)iter_ptr < (unsigned long)chunk_start + size;  
iter_ptr++) {
    unsigned int expected_sweep_id;
    if (iter_ptr < next_store_addr) {
      expected_sweep_id = cur_sweep_id;
    } else {  
      expected_sweep_id = prev_sweep_id;
    }
    expected = compute_store_pattern(tid, iter_ptr, expected_sweep_id);
    dcbf((volatile unsigned int*)iter_ptr); //Flush before reading
    observed = *iter_ptr;
    if (observed != expected) {
      nr_anamolies++;
      log_anomaly(tid, iter_ptr, expected, observed);
    }
    +end_verification_log(tid, nr_anamolies);
    +
    +static void set_pthread_cpu(pthread_t th, int cpu) {
      +
      +CPU_ZERO(&run_cpu_mask);
      +CPU_SET(cpu, &run_cpu_mask);
      +pthread_setaffinity_np(th, sizeof(cpu_set_t), &run_cpu_mask);
      +param.sched_priority = 1;
      +if (0 && sched_setscheduler(0, SCHED_FIFO, &param) == -1) {
        /* haven't reproduced with this setting, it kills random preemption which may be a factor */
        +fprintf(stderr, "could not set SCHED_FIFO, run as root?\n");
      }
      +}
      +
      +static void set_mycpu(int cpu) {
        +
        +CPU_ZERO(&run_cpu_mask);
        +CPU_SET(cpu, &run_cpu_mask);
        +sched_setaffinity(0, sizeof(cpu_set_t), &run_cpu_mask);
+param.sched_priority = 1;
+if (0 && sched_setscheduler(0, SCHED_FIFO, &param) == -1) {
+fprintf(stderr, "could not set SCHED_FIFO, run as root?\n");
+}
+
+static volatile int segv_wait;
+
+static void segv_handler(int signo, siginfo_t *info, void *extra)
+{
+while (segv_wait) {
+sched_yield();
+}
+
+}
+
+static void set_segv_handler(void)
+{
+struct sigaction sa;
+
+sa.sa_flags = SA_SIGINFO;
+sa.sa_sigaction = segv_handler;
+
+if (sigaction(SIGSEGV, &sa, NULL) == -1) {
+perror("sigaction");
+exit(EXIT_FAILURE);
+}
+
+int timeout = 0;
+/
+ * This function is executed by every rim_thread.
+ * This function performs sweeps over the exclusive chunks of the
+ * rim_threads executing the rim-sequence one word at a time.
+ */
+static void *rim_fn(void *arg)
+{
+unsigned int tid = *((unsigned int *)arg);
+
+int size = RIM_CHUNK_SIZE;
+char *chunk_start = compute_chunk_start_addr(tid);
+
+unsigned int prev_sweep_id;
+unsigned int cur_sweep_id = 0;
+
+/* word access */
unsigned int pattern = cur_sweep_id;
unsigned int *pattern_ptr = &pattern;
unsigned int *w_ptr, read_data;
+
+set_segv_handler();
+
+ /*
+ * Let us initialize the chunk:
+ *
+ * Each word-aligned address addr in the chunk,
+ * is initialized to:
+ *   |-------------------------------------------------|
+ *   | tid   | word_offset(addr) |         0           |
+ *   |-------------------------------------------------|
+ */
+for (w_ptr = (unsigned int *)chunk_start;
+     (unsigned long)w_ptr < (unsigned long)(chunk_start) + size;
+     w_ptr++) {
+    *pattern_ptr = compute_store_pattern(tid, w_ptr, cur_sweep_id);
+    *w_ptr = *pattern_ptr;
+}
+
+while (!corruption_found && !timeout) {
+   prev_sweep_id = cur_sweep_id;
+   cur_sweep_id = cur_sweep_id + 1;
+
+   for (w_ptr = (unsigned int *)chunk_start;
+        (unsigned long)w_ptr < (unsigned long)(chunk_start) + size;
+        w_ptr++) {
+    unsigned int old_pattern;
+    
+    /* Compute the pattern that we would have
+     * stored at this location in the previous
+     * sweep.
+     */
+    old_pattern = compute_store_pattern(tid, w_ptr, prev_sweep_id);
+    
+    /* FLUSH: Ensure that we flush the contents of
+     * the cache before loading
+     */
+    dcbf((volatile unsigned int*)w_ptr); //Flush
+    
+    /* LOAD: Read the value */
+    read_data = *w_ptr; //Load
+    
+}
/*
 * COMPARE: Is it the same as what we had stored
 * in the previous sweep? It better be!
 */
if (read_data != old_pattern) {
    /* No it isn't! Tell everyone */
corruption_found = 1;
}

/* Before performing a store, let us check if
 * any rim_thread has found a corruption.
 */
if (corruption_found || timeout) {
    /* Yes. Someone (including us!) has found
     * a corruption :( 
     * Let us verify that our chunk is
     * correct. 
     */
    /* But first, let us allow the dust to settle down! */
    verify_chunk(tid, w_ptr, cur_sweep_id, prev_sweep_id);
    return 0;
}

/* Compute the new pattern that we are going
 * to write to this location 
 */
*pattern_ptr = compute_store_pattern(tid, w_ptr, cur_sweep_id);

/* STORE: Now let us write this pattern into
 * the location 
 */
w_ptr = *pattern_ptr;

return NULL;
}

static unsigned long start_cpu = 0;
static unsigned long nrthreads = 4;
+static pthread_t mem_snapshot_thread;
+
+static void *mem_snapshot_fn(void *arg)
+{ 
+int page_size = getpagesize();
+size_t size = page_size;
+void *tmp = malloc(size);
+
+while (!corruption_found && !timeout) {
+ /* Stop memory migration once corruption is found */
+ segv_wait = 1;
+
+mprotect(map1, size, PROT_READ);
+
+ * Load from the working alias (map1). Loading from map2
+ * also fails.
+ */
+memcpy(tmp, map1, size);
+
+ * Stores must go via map2 which has write permissions, but
+ * the corrupted data tends to be seen in the snapshot buffer,
+ * so corruption does not appear to be introduced at the
+ * copy-back via map2 alias here.
+ */
+memcpy(map2, tmp, size);
+
+ * Before releasing other threads, must ensure the copy
+ * back to
+ */
+asm volatile("sync" ::: "memory");
+mprotect(map1, size, PROT_READ|PROT_WRITE);
+asm volatile("sync" ::: "memory");
+segv_wait = 0;
+
+usleep(1); /* This value makes a big difference */
+}
+
+return 0;
+}
+
+void alrm_sighandler(int sig)
+{ 
+timeout = 1;
+}
+
+int main(int argc, char *argv[])
+{  +int c;  +int page_size = getpagesize();  +time_t now;  +int i, dir_error;  +pthread_attr_t attr;  +key_t shm_key = (key_t) getpid();  +int shmid, run_time = 20 * 60;  +struct sigaction sa_alrm;  +  +snprintf(logdir, LOGDIR_NAME_SIZE,  +    "/tmp/logdir-%u", (unsigned int)getpid());  +while ((c = getopt(argc, argv, "r:hn:l:t:")) != -1) {  +switch(c) {  +case 'r':  +start_cpu = strtoul(optarg, NULL, 10);  +break;  +case 'h':  +printf("%s [-r <start_cpu>] [-n <nrthreads>] [-l <logdir>] [-t <timeout>]\n", argv[0]);  +exit(0);  +break;  +case 'n':  +nrthreads = strtoul(optarg, NULL, 10);  +break;  +case 'l':  +strncpy(logdir, optarg, LOGDIR_NAME_SIZE - 1);  +break;  +case 't':  +run_time = strtoul(optarg, NULL, 10);  +break;  +default:  +printf("invalid option\n");  +exit(0);  +break;  +}  +}  +  +if (nrthreads > MAX_THREADS)  +nrthreads = MAX_THREADS;  +  +shmid = shmget(shm_key, page_size, IPC_CREAT|0666);  +if (shmid < 0) {  +err_msg("Failed shmget\n");  +}  +  +map1 = shmat(shmid, NULL, 0);  +if (map1 == (void *)-1) {  +err_msg("Failed shmat");
map2 = shmat(shmid, NULL, 0);
if (map2 == (void *) -1) {
    err_msg("Failed shmat");
}

dir_error = mkdir(logdir, 0755);
if (dir_error) {
    err_msg("Failed mkdir");
}

printf("start_cpu list:%lu\n", start_cpu);
printf("number of worker threads:%lu + 1 snapshot thread\n", nrthreads);
printf("Allocated address:0x%016lx + secondary map:0x%016lx\n", (unsigned long)map1, (unsigned long)map2);
printf("logdir at : %s\n", logdir);
printf("Timeout: %d seconds\n", run_time);

time(&now);
printf("=================================

time(&now);
printf("Starting Test\n
time(&now);
printf("%s", ctime(&now));
printf("=================================

for (i = 0; i < nrthreads; i++) {
    if (1 && !fork()) {
        prctl(PR_SET_PDEATHSIG, SIGKILL);
        set_mycpu(start_cpu + i);
        for (;
             sched_yield();
        exit(0);
    }
}

sa_alrm.sa_handler = &alrm_sighandler;
sigemptyset(&sa_alrm.sa_mask);
sa_alrm.sa_flags = 0;
if (sigaction(SIGALRM, &sa_alrm, 0) == -1) {
    err_msg("Failed signal handler registration\n");
}
alarm(run_time);
pthread_attr_init(&attr);
for (i = 0; i < nrthreads; i++) {
trim_thread_ids[i] = i;
+ pthread_create(&rim_threads[i], &attr, rim_fn, &trim_thread_ids[i]);
+ set_pthread_cpu(rim_threads[i], start_cpu + i);
+
+ pthread_create(&mem_snapshot_thread, &attr, mem_snapshot_fn, map1);
+ set_pthread_cpu(mem_snapshot_thread, start_cpu + i);
+
+ pthread_join(mem_snapshot_thread, NULL);
+ for (i = 0; i < nrthreads; i++) {
+     pthread_join(rim_threads[i], NULL);
+ }
+
+ if (!timeout) {
+     time(&now);
+     printf("=================================
");
+     printf(" Data Corruption Detected\n");
+     printf(" %s", ctime(&now));
+     printf(" See logfiles in %s\n", logdir);
+     printf("=================================
");
+     return 1;
+ }
+ return 0;
+}
+
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/Makefile
@@ -5,6 +5,7 @@
TEST_GEN_PROGS := count_instructions l3_bank_test per_event_excludes
EXTRA_SOURCES := ../harness.c event.c lib.c ../utils.c

+top_srcdir = ../../../../..
include ../../lib.mk

all: $(TEST_GEN_PROGS) ebb
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/Makefile
@@ -5,6 +5,9 @@
# The EBB handler is 64-bit code and everything links against it
CFLAGS += -m64
+
TEST_GEN_PROGS := reg_access_test event_attributes_test cycles_test
cycles_with_freeze_test pmc56_overflow_test
ebb_vs_cpu_event_test cpu_event_vs_ebb_test
@@ @ -5.6 +5,9 @@
# Toolchains may build PIE by default which breaks the assembly
+LDFLAGS += -no-pie
+
TEST_GEN_PROGS := reg_access_test event_attributes_test cycles_test\
cycles_with_freeze_test pmc56_overflow_test\
ebb_vs_cpu_event_test cpu_event_vs_ebb_test
@@ @ -17.6 +20,7 @@
lost_exception_test no_handler_test
cycles_with_mmcr2_test

top_srcdir = .././../..
include .././../lib.mk

$(TEST_GEN_PROGS): ../../../harness.c ../../../utils.c ../event.c ../lib.c
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/back_to_back_ebb_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/back_to_back_ebb_test.c
@@ -91,8 +91,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

  -count_pmc(1, sample_period);
  -
  dump_ebb_state();

  event_close(&event);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/cycles_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/cycles_test.c
@@ -42,8 +42,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

  -count_pmc(1, sample_period);
  -
  dump_ebb_state();

  event_close(&event);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/cycles_with_freeze_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/cycles_with_freeze_test.c
@@ -99,8 +99,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

  -count_pmc(1, sample_period);
  -
  dump_ebb_state();

  event_close(&event);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/cycles_with_mmcr2_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/cycles_with_mmcr2_test.c
@@ -71,8 +71,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

  -count_pmc(1, sample_period);
  -
  dump_ebb_state();

  printf("EBBs while frozen %d\n", ebbs_while_frozen);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/cycles_with_mmcr2_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/cycles_with_mmcr2_test.c
@@ -71,8 +71,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

  -count_pmc(1, sample_period);
  -
dump_ebb_state();

event_close(&event);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/ebb.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/ebb.c
@@ -396,8 +396,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

 -count_pmc(1, sample_period);
 -
  dump_ebb_state();

event_close(&event);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/ebb_on_willing_child_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/ebb_on_willing_child_test.c
@@ -38,8 +38,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

 -count_pmc(1, sample_period);
 -
  dump_ebb_state();

FAIL_IF(ebb_state.stats.ebb_count == 0);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/lost_exception_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/lost_exception_test.c
@@ -75,7 +75,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

 -count_pmc(4, sample_period);
 mtspr(SPRN_PMC4, 0xdead);

dump_summary_ebb_state();
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/multi_counter_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/multi_counter_test.c
@@ -70,13 +70,6 @@
  ebb_global_disable();
  ebb_freeze_pmcs();

 -count_pmc(1, sample_period);
 -count_pmc(2, sample_period);
 -count_pmc(3, sample_period);
 -count_pmc(4, sample_period);
 -count_pmc(5, sample_period);
 -count_pmc(6, sample_period);
dump_ebb_state();

for (i = 0; i < 6; i++)
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/multi_ebb_procs_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/multi_ebb_procs_test.c
@@ -61,8 +61,6 @@
ebb_global_disable();
ebb_freeze_pmcs();

-dump_summary_ebb_state();
-
event_close(&event);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/no_handler_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/no_handler_test.c
@@ -50,8 +50,6 @@
event_close(&event);

-dump_ebb_state();
-
-/* The real test is that we never took an EBB at 0x0 */

return 0;
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/pmae_handling_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/pmae_handling_test.c
@@ -82,8 +82,6 @@
ebb_global_disable();
ebb_freeze_pmcs();

-count_pmc(1, sample_period);
-
dump_ebb_state();

if (mmcr0_mismatch)
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/pmu/ebb/pmc56_overflow_test.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/pmu/ebb/pmc56_overflow_test.c
@@ -76,8 +76,6 @@
ebb_global_disable();
ebb_freeze_pmcs();

-count_pmc(2, sample_period);
-
dump_ebb_state();

printf("PMC5/6 overflow \%d\n", pmc56_overflowed);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/primitives/Makefile
TEST_GEN_PROGS := load_unaligned_zeropad

top_srcdir = ../../../..
include ../../../lib.mk

$(TEST_GEN_PROGS): ../../../harness.c
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/Makefile
@@ -1,8 +1,9 @@
# SPDX-License-Identifier: GPL-2.0
TEST_PROGS := ptrace-gpr ptrace-tm-gpr ptrace-tm-spd-gpr \\
- ptrace-tar ptrace-tm-tar ptrace-tm-spd-tar ptrace-vmx ptrace-tm-vmx \\
- ptrace-vmx ptrace-tm-vmx ptrace-tm-spr \\
+ ptrace-tar ptrace-tm-tar ptrace-tm-spd-tar ptrace-vsx \\
+ ptrace-hwbreak
+top_srcdir = ../../../..
include ../../../lib.mk

all: $(TEST_PROGS)
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-gpr.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-gpr.c
@@ -31,7 +31,7 @@
ASM_LOAD_GPR_IMMED(gpr_1)
ASM_LOAD_FPR_SINGLE_PRECISION(flt_1)
: \\
-: [gpr_1]"i"(GPR_1), [flt_1] "r" (&a)
+: [gpr_1]"i"(GPR_1), [flt_1] "b" (&a)
: "memory", "r6", "r7", "r8", "r9", "r10", \\
 "r11", "r12", "r13", "r14", "r15", "r16", "r17", \\
 "r18", "r19", "r20", "r21", "r22", "r23", "r24",
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-hwbreak.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-hwbreak.c
@@ -0,0 +1,342 @@
+// SPDX-License-Identifier: GPL-2.0+
+ *
+/*
+ * Ptrace test for hw breakpoints
+ *
+ * Based on tools/testing/selftests/breakpoints/breakpoint_test.c
+ *
+ * This test forks and the parent then traces the child doing various
+ * types of ptrace enabled breakpoints
+ *
+ * Copyright (C) 2018 Michael Neuling, IBM Corporation.

/* Breakpoint access modes */
enum {
    BP_X = 1,
    BP_RW = 2,
    BP_W = 4,
};

static pid_t child_pid;
static struct ppc_debug_info dbginfo;

static void get_dbginfo(void)
{
    int ret;

    ret = ptrace(PPC_PTRACE_GETHWDBGINFO, child_pid, NULL, &dbginfo);
    if (ret)
    {
        perror("Can't get breakpoint info\n");
        exit(-1);
    }
}

static bool hwbreak_present(void)
{
    return (dbginfo.num_data_bps != 0);
}

static bool dawr_present(void)
{
    return !!(dbginfo.features & PPC_DEBUG_FEATURE_DATA_BP_DAWR);
}

static void set_breakpoint_addr(void *addr)
{
    int ret;

    ret = ptrace(PPC_PTRACE_SETHWDBPINFO, child_pid, NULL, addr);
    if (ret)
    {
        perror("Can't set breakpoint\n");
        exit(-1);
    }
}
ret = ptrace(PTRACE_SET_DEBUGREG, child.pid, 0, addr);
if (ret) {
    perror("Can't set breakpoint addr\n");
    exit(-1);
}

static int set_hwbreakpoint_addr(void *addr, int range)
{
    int ret;
    struct ppc_hw_breakpoint info;
    info.version = 1;
    info.trigger_type = PPC_BREAKPOINT_TRIGGER_RW;
    info.addr_mode = PPC_BREAKPOINT_MODE_EXACT;
    if (range > 0)
        info.addr_mode = PPC_BREAKPOINT_MODE_RANGE_INCLUSIVE;
    info.condition_mode = PPC_BREAKPOINT_CONDITION_NONE;
    info.addr = (__u64)addr;
    info.addr2 = (__u64)addr + range;
    info.condition_value = 0;
    ret = ptrace(PPC_PTRACE_SETHWDEBUG, child.pid, 0, &info);
    if (ret < 0) {
        perror("Can't set breakpoint\n");
        exit(-1);
    }
    return ret;
}

static int del_hwbreakpoint_addr(int watchpoint_handle)
{
    int ret;
    ret = ptrace(PPC_PTRACE_DELHWDEBUG, child.pid, 0, watchpoint_handle);
    if (ret < 0) {
        perror("Can't delete hw breakpoint\n");
        exit(-1);
    }
    return ret;
}

#define DAWR_LENGTH_MAX 512

/* Dummy variables to test read/write accesses */
static unsigned long long
dummy_array[DAWR_LENGTH_MAX / sizeof(unsigned long long)]
+__attribute__((aligned(512)));
+static unsigned long long *dummy_var = dummy_array;
+
+static void write_var(int len)
+{
+long long *plval;
+char *pcval;
+short *psval;
+int  *pival;
+
+switch (len) {
+case 1:
+pcval = (char *)dummy_var;
+*pcval = 0xff;
+break;
+case 2:
+psval = (short *)dummy_var;
+*psval = 0xffff;
+break;
+case 4:
+pival = (int  *)dummy_var;
+*pival = 0xffffffff;
+break;
+case 8:
+plval = (long long *)dummy_var;
+*plval = 0xffffffffffffffffLL;
+break;
+}
+}
+
+static void read_var(int len)
+{
+char cval __attribute__((unused));
+short sval __attribute__((unused));
+int  ival __attribute__((unused));
+long long lval __attribute__((unused));
+
+switch (len) {
+case 1:
+cval = *(char *)dummy_var;
+break;
+case 2:
+sval = *(short *)dummy_var;
+break;
+case 4:
+ival = *(int  *)dummy_var;
+break;
+case 8:
+ival = *(long long *)dummy_var;
+break;
+
+*/
+ /* Do the r/w accesses to trigger the breakpoints. And run
+ * the usual traps.
+ */
+static void trigger_tests(void)
+{
+int len, ret;
+
+ret = ptrace(PTRACE_TRACEME, 0, NULL, 0);
+if (ret) {
+perror("Can't be traced?n");
+return;
+}
+
+/* Wake up father so that it sets up the first test */
+kill(getpid(), SIGUSR1);
+
+/* Test write watchpoints */
+for (len = 1; len <= sizeof(long); len <<= 1)
+write_var(len);
+
+/* Test read/write watchpoints (on read accesses) */
+for (len = 1; len <= sizeof(long); len <<= 1)
+read_var(len);
+
+/* Test when breakpoint is unset */
+
+/* Test write watchpoints */
+for (len = 1; len <= sizeof(long); len <<= 1)
+write_var(len);
+
+/* Test read/write watchpoints (on read accesses) */
+for (len = 1; len <= sizeof(long); len <<= 1)
+read_var(len);
+
+/* Wait for the child to SIGTRAP */
+wait(&status);
+
+static void check_success(const char *msg)
+{
+const char *msg2;
+int status;
+
+/* Wait for the child to SIGTRAP */
+wait(&status);
```c
+ msg2 = "Failed";
+
+ if (WIFSTOPPED(status) && WSTOPSIG(status) == SIGTRAP) {
+ msg2 = "Child process hit the breakpoint";
+ }
+
+ printf("%s Result: [%s]\n", msg, msg2);
+ }
+
+ static void launch_watchpoints(char *buf, int mode, int len,
+     struct ppc_debug_info *dbginfo, bool dawr)
+ {
+ const char *mode_str;
+ unsigned long data = (unsigned long)(dummy_var);
+ int wh, range;
+ 
+     data &= ~0x7UL;
+ 
+     if (mode == BP_W) {
+         data |= (1UL << 1);
+         mode_str = "write";
+     } else {
+         data |= (1UL << 0);
+         data |= (1UL << 1);
+         mode_str = "read";
+     }
+ 
+     /* Set DABR_TRANSLATION bit */
+     data |= (1UL << 2);
+ 
+     /* use PTRACE_SET_DEBUGREG breakpoints */
+     set_breakpoint_addr((void *)data);
+     ptrace(PTRACE_CONT, child_pid, NULL, 0);
+     sprintf(buf, "Test %s watchpoint with len: %d \n", mode_str, len);
+     check_success(buf);
+     /* Unregister hw brkpoint */
+     set_breakpoint_addr(NULL);
+     
+     data = (data & ~7); /* remove dabr control bits */
+ 
+     /* use PPC_PTRACE_SETHWDEBUG breakpoint */
+     if (!(dbginfo->features & PPC_DEBUG_FEATURE_DATA_BP_RANGE))
+         return; /* not supported */
+     wh = set_hwbreakpoint_addr((void *)data, 0);
+     ptrace(PTRACE_CONT, child_pid, NULL, 0);
+     sprintf(buf, "Test %s watchpoint with len: %d \n", mode_str, len);
+     check_success(buf);
```
+/* Unregister hw brkpoint */
+del_hwbreakpoint_addr(wh);
+
+/* try a wider range */
+range = 8;
+if (dawr)
+range = 512 - ((int)data & (DAWR_LENGTH_MAX - 1));
+wh = set_hwbreakpoint_addr((void *)data, range);
+ptrace(PTRACE_CONT, child_pid, NULL, 0);
+sprintf(buf, "Test %s watchpoint with len: %d ", mode_str, len);
+check_success(buf);
+/* Unregister hw brkpoint */
+del_hwbreakpoint_addr(wh);
+
+/* Set the breakpoints and check the child successfully trigger them */
+static int launch_tests(bool dawr)
+{
+char buf[1024];
+int len, i, status;
+
+struct ppc_debug_info dbginfo;
+
+i = ptrace(PPC_PTRACE_GETHWDBGINFO, child_pid, NULL, &dbginfo);
+if (i) {
+ perror("Can't set breakpoint info\n");
+exit(-1);
+}
+if (!(dbginfo.features & PPC_DEBUG_FEATURE_DATA_BP_RANGE))
+printf("WARNING: Kernel doesn't support PPC_PTRACE_SETHWDEBUG\n");
+
+/* Write watchpoint */
+for (len = 1; len <= sizeof(long); len <<= 1)
+launch_watchpoints(buf, BP_W, len, &dbginfo, dawr);
+
+/* Read-Write watchpoint */
+for (len = 1; len <= sizeof(long); len <<= 1)
+launch_watchpoints(buf, BP_RW, len, &dbginfo, dawr);
+
+ptrace(PTRACE_CONT, child_pid, NULL, 0);
+
+ /* Now we have unregistered the breakpoint, access by child
+ * should not cause SIGTRAP.
+ */
+
+wait(&status);
+}
+if (WIFSTOPPED(status) && WSTOPSIG(status) == SIGTRAP) {
+printf("FAIL: Child process hit the breakpoint, which is not expected\n");
+ptrace(PTRACE_CONT, child_pid, NULL, 0);
+return TEST_FAIL;
+}
+
+if (WIFEXITED(status))
+printf("Child exited normally\n");
+
+return TEST_PASS;
+}
+
+static int ptrace_hwbreak(void)
+{
+pid_t pid;
+int ret;
+bool dawr;
+
+pid = fork();
+if (!pid) {
+trigger_tests();
+return 0;
+}
+
+wait(NULL);
+
+child_pid = pid;
+
+get_dbginfo();
+SKIP_IF(!hwbreak_present());
+dawr = dawr_present();
+
+ret = launch_tests(dawr);
+
+wait(NULL);
+
+return ret;
+}
+
+int main(int argc, char **argv, char **envp)
+{
+return test_harness(ptrace_hwbreak, "ptrace-hwbreak");
+}

--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-tm-gpr.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-tm-gpr.c
@@ -59,8 +59,8 @@
"3: ;"
 : [res] "="r" (result), [texasr] "="r" (texasr)
: [gpr_1]\"i\"(GPR_1), [gpr_2]\"i\"(GPR_2),
- [sprn_texasr] \"i\" (SPRN_TEXASR), [flt_1] \"r\" (&a),
- [flt_2] \"r\" (&b), [cptr1] \"r\" (&cptr[1])
+ [sprn_texasr] \"i\" (SPRN_TEXASR), [flt_1] \"b\" (&a),
+ [flt_2] \"b\" (&b), [cptr1] \"b\" (&cptr[1])
: \"memory\", \"r7\", \"r8\", \"r9\", \"r10\",
\"r11\", \"r12\", \"r13\", \"r14\", \"r15\", \"r16\",
\"r17\", \"r18\", \"r19\", \"r20\", \"r21\", \"r22\",
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-tm-spd-gpr.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-tm-spd-gpr.c
@@ -67,8 +67,8 @@
 \"3: ;\"
: [res] \"=r\" (result), [texasr] \"=r\" (texasr)
: [gpr_1]\"i\"(GPR_1), [gpr_2]\"i\"(GPR_2), [gpr_4]\"i\"(GPR_4),
- [sprn_texasr] \"i\" (SPRN_TEXASR), [flt_1] \"r\" (&a),
- [flt_2] \"r\" (&b), [cptr4] \"r\" (&d)
+ [sprn_texasr] \"i\" (SPRN_TEXASR), [flt_1] \"b\" (&a),
+ [flt_4] \"b\" (&d)
: \"memory\", \"r5\", \"r6\", \"r7\",
\"r8\", \"r9\", \"r10\", \"r11\", \"r12\", \"r13\", \"r14\", \"r15\",
\"r16\", \"r17\", \"r18\", \"r19\", \"r20\", \"r21\", \"r22\", \"r23\",
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-tm-spd-tar.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-tm-spd-tar.c
@@ -72,7 +72,7 @@
 \"3: ;\"
: [res] \"=r\" (result), [texasr] \"=r\" (texasr)
: [val] \"i\" (cptr[1]), [sprn_dscr]\"i\"(SPRN_DSCR),
+ [sprn_dscr]\"i\"(SPRN_DSCR),
[spnr_tara]\"i\"(SPRN_TAR), [sprn_ppr]\"i\"(SPRN_PPR),
[spnr_texasr]\"i\"(SPRN_TEXASR), [tar_1]\"i\"(TAR_1),
[dscr_1]\"i\"(DSCR_1), [tar_2]\"i\"(TAR_2), [dscr_2]\"i\"(DSCR_2),
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-tm-spd-vsx.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-tm-spd-vsx.c
@@ -77,8 +77,7 @@
 \"3: ;\"
: [res] \"=r\" (result), [texasr] \"=r\" (texasr)
: [fp_load] \"r\" (fp_load), [fp_load_ckpt] \"r\" (fp_load_ckpt),
- [sprn_texasr] \"i\" (SPRN_TEXASR)
+ [sprn_texasr] \"i\" (SPRN_TEXASR)
: \"memory\", \"r0\", \"r1\", \"r2\", \"r3\", \"r4\",
\"r8\", \"r9\", \"r10\", \"r11\"
);
"3: ;
: [tflhar] "r" (tflhar), [res] "r" (result),
- [texasr] "r" (texasr), [cptr1] "r" (cptr1)
+ [texasr] "r" (texasr), [cptr1] "b" (cptr1)
: [sprn_texasr] "i" (SPRN_TEXASR)
: "memory", "r0", "r1", "r2", "r3", "r4",
"r5", "r6", "r7", "r8", "r9", "r10", "r11", "r31"
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-tm-tar.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-tm-tar.c
@@ -65,7 +65,7 @@
: [sprn_dscr] "i" (SPRN_DSCR), [sprn_tar] "i" (SPRN_TAR),
[sprn_pptr] "i" (SPRN_PPR), [sprn_texasr] "i" (SPRN_TEXASR),
[tar_1] "i" (TAR_1), [dscr_1] "i" (DSCR_1), [tar_2] "i" (TAR_2),
- [dscr_2] "i" (DSCR_2), [cptr1] "r" (&cptr[1])
+ [dscr_2] "i" (DSCR_2), [cptr1] "b" (&cptr[1])
: "memory", "r0", "r1", "r3", "r4", "r5", "r6"
);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/ptrace/ptrace-tm-vsx.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/ptrace/ptrace-tm-vsx.c
@@ -65,8 +65,7 @@
: [res] "r" (result), [texasr] "r" (texasr)
: [fp_load] "r" (fp_load), [fp_load_ckpt] "r" (fp_load_ckpt),
- [sprn_texasr] "i" (SPRN_TEXASR), [cptr1] "r" (&cptr[1])
+ [sprn_texasr] "i" (SPRN_TEXASR), [cptr1] "b" (&cptr[1])
: "memory", "r0", "r1", "r2", "r3", "r4",
"r7", "r8", "r9", "r10", "r11"
);
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/signal/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/signal/Makefile
@@ -1,14 +1,10 @@
 # SPDX-License-Identifier: GPL-2.0
 -TEST_PROGS := signal signal_tm
-
-$(TEST_PROGS): ../harness.c ../utils.c signal.S
+TEST_GEN_PROGS := signal signal_tm

 CFLAGS += -maltivec
 -signal_tm: CFLAGS += -mhtm
 +$(OUTPUT)/signal_tm: CFLAGS += -mhtm

 +top_srcdir = ../../../../..
 include ../../lib.mk
-clean:
-rm -f $(TEST_PROGS) *.o
+$ (TEST_GEN_PROGS): ./harness.c ./utils.c signal.S
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/stringloops/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/stringloops/Makefile
@@ -6,6 +6,7 @@
 TEST_GEN_PROGS := memcmp
 EXTRA_SOURCES := memcmp_64.S ./harness.c

 +top_srcdir = ../../../..
 include ../../../lib.mk

 $(TEST_GEN_PROGS): $(EXTRA_SOURCES)
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/switch_endian/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/switch_endian/Makefile
@@ -5,8 +5,10 @@
 EXTRA_CLEAN = $(OUTPUT)/*.o $(OUTPUT)/check-reversed.S

 +top_srcdir = ../../../..
 include ../../../lib.mk

 +$(OUTPUT)/switch_endian_test: ASFLAGS += -I $(OUTPUT)
 $(OUTPUT)/switch_endian_test: $(OUTPUT)/check-reversed.S

 $(OUTPUT)/check-reversed.o: $(OUTPUT)/check.o
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/syscalls/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/syscalls/Makefile
@@ -2,6 +2,7 @@
 CFLAGS += -I../../../../../usr/include

 +top_srcdir = ../../../..
 include ../../../lib.mk

 $(TEST_GEN_PROGS): ./harness.c
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/tm/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/tm/Makefile
@@ -6,6 +6,7 @@
 tm-vmxcopy tm-fork tm-tar tm-tmspr tm-vmx-unavail tm-unavailable \
 $(SIGNAL_CONTEXT_CHK_TESTS)

 +top_srcdir = ../../../..
 include ../../../lib.mk

 $(TEST_GEN_PROGS): ./harness.c ./utils.c
--- linux-4.15.0.orig/tools/testing/selftests/powerpc/tm-tmspr.c
+++ linux-4.15.0/tools/testing/selftests/powerpc/tm-tmspr.c
int test_tmspr() {
    pthread_t thread;
    pthread_t *thread;
    int thread_num;
    unsigned long i;

    thread_num = 10 * sysconf(_SC_NPROCESSORS_ONLN);

    thread = malloc(thread_num * sizeof(pthread_t));
    if (thread == NULL)
        return EXIT_FAILURE;

    /* Test TFIAR and TFHAR */
    for (i = 0; i < thread_num; i += 2) {
        if (pthread_create(&thread, NULL, (void*)tfiar_tfhar, (void *)i))
            return EXIT_FAILURE;
    }
    if (pthread_join(thread, NULL) != 0)
        return EXIT_FAILURE;

    /* Test TEXASR */
    for (i = 0; i < thread_num; i++) {
        if (pthread_create(&thread[i], NULL, (void *)texasr, (void *)i))
            return EXIT_FAILURE;
    }
    if (pthread_join(thread, NULL) != 0)
        return EXIT_FAILURE;
    free(thread);

    if (passed)
        return 0;
}

--- linux-4.15.0.orig/tools/testing/selftests/powerpc/tm/tm-unavailable.c
```c
#define _GNU_SOURCE
+/#include <error.h>
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
@@ -33,6 +34,11 @@
#define VSX_UNA_EXCEPTION	2
#define NUM_EXCEPTIONS	3
+#define err_at_line(status, errnum, format, ...)
+ error_at_line(status, errnum, __FILE__, __LINE__, format ##__VA_ARGS__)
+
+ #define pr_warn(code, format, ...) err_at_line(0, code, format, ##__VA_ARGS__)
+ #define pr_err(code, format, ...) err_at_line(1, code, format, ##__VA_ARGS__)

struct Flags {
  int touch_fp;
@@ -74,7 +80,7 @@
  return ((condition_reg >> 28) & 0xa) == 0xa;
 }

-void *ping(void *input)
+void *tm_una_ping(void *input)
{

 /* Check if we were not expecting a failure and a it occurred. */
-  -if (!expecting_failure() && is_failure(cr_)) {
+  +if (!expecting_failure() && is_failure(cr_) &&
+      !failure_is_reschedule()) {
    printf("\n\tUnexpected transaction failure 0x%02lx\n\t",
       failure_code());
    return (void *) -1;
@@ -238,9 +245,11 @@

  /* Check if TM failed due to the cause we were expecting. 0xda is a
  - * TM_CAUSE_FAC_UNAV cause, otherwise it's an unexpected cause.
+  + * TM_CAUSE_FAC_UNAV cause, otherwise it's an unexpected cause, unless
+  + * it was caused by a reschedule.
  */
```
-if (is_failure(cr_) && !failure_is_unavailable()) {
+if (is_failure(cr_) && !failure_is_unavailable() &&
+    !failure_is_reschedule()) {
  printf("\nExpected failure cause 0x%02lx\n", failure_code());
  return (void *) -1;
}

/* Thread to force context switch */
-void *pong(void *not_used)
+void *tm_una_pong(void *not_used)
{
/* Wait thread get its name "pong". */
if (DEBUG)
  @ @ -303,10 +312,19 @ @
  * checking if the failure cause is the one we expect.
  */
  do {
    /* Bind 'ping' to CPU 0, as specified in 'attr'. */
    -pthread_create(&t0, attr, ping, (void *) &flags);
    -pthread_setname_np(t0, "ping");
    -pthread_join(t0, &ret_value);
    +int rc;
    +
    /* Bind to CPU 0, as specified in 'attr'. */
    +rc = pthread_create(&t0, attr, tm_una_ping, (void *) &flags);
    +if (rc)
      +pr_err(rc, "pthread_create()");
    +rc = pthread_setname_np(t0, "tm_una_ping");
    +if (rc)
      +pr_warn(rc, "pthread_setname_np");
    +rc = pthread_join(t0, &ret_value);
    +if (rc)
      +pr_err(rc, "pthread_join");
    +
    retries--;
  } while (ret_value != NULL && retries);

  @ @ -318,25 +336,37 @ @
}
}

-int main(int argc, char **argv)
+int tm_unavailable_test(void)
{
  -int exception; /* FP = 0, VEC = 1, VSX = 2 */
  +int rc, exception; /* FP = 0, VEC = 1, VSX = 2 */
pthread_t t1;
pthread_attr_t attr;
cpu_set_t cpuset;

+SKIP_IF(!have_htm());
+
/* Set only CPU 0 in the mask. Both threads will be bound to CPU 0. */
CPU_ZERO(&cpuset);
CPU_SET(0, &cpuset);

/* Init pthread attribute. */
pthread_attr_init(&attr);

rc = pthread_attr_init(&attr);
if (rc)
  pr_err(rc, "pthread_attr_init()");

/* Set CPU 0 mask into the pthread attribute. */
pthread_attr_setaffinity_np(&attr, sizeof(cpu_set_t), &cpuset);

rc = pthread_create(&t1, &attr /* Bind 'pong' to CPU 0 */, pong, NULL);
pthread_setname_np(t1, "pong"); /* Name it for systemtap convenience */
rc = pthread_attr_setaffinity_np(&attr, sizeof(cpu_set_t), &cpuset);
if (rc)
  pr_err(rc, "pthread_attr_setaffinity_np()");

rc = pthread_create(&t1, &attr /* Bind to CPU 0 */, tm_una_pong, NULL);
if (rc)
  pr_err(rc, "pthread_create()");

/* Name it for systemtap convenience */
rc = pthread_setname_np(t1, "tm_una_pong");
if (rc)
  pr_warn(rc, "pthread_setname_np()");

flags.result = 0;

exit(0);
return (failure_code() & TM_CAUSE_FAC_UNAV) == TM_CAUSE_FAC_UNAV;
}

+static inline bool failure_is_reschedule(void)
+{
+    if ((failure_code() & TM_CAUSE_RESCHED) == TM_CAUSE_RESCHED ||
+        (failure_code() & TM_CAUSE_KVM_RESCHED) == TM_CAUSE_KVM_RESCHED)
+        return true;
+    return false;
+}

static inline bool failure_is_nesting(void)
{
    return (__builtin_get_texasru() & 0x400000);
}

#include <sched.h>
#include <stdio.h>
#include <sys/stat.h>
#include <sys/sysinfo.h>
#include <sys/types.h>
#include <unistd.h>

int pick_online_cpu(void)
{
    cpu_set_t mask;
    int cpu;
    int ncpus, cpu = -1;
    cpu_set_t *mask;
    size_t size;
    ncpus = get_nprocs_conf();
    size = CPU_ALLOC_SIZE(ncpus);
    mask = CPU_ALLOC(ncpus);
    if (!mask)
    {
        perror("malloc");
        return -1;
    }
    CPU_ZERO(&mask);
    CPU_ZERO_S(size, mask);
    if (sched_getaffinity(0, sizeof(mask), &mask)) {
        -CPU_ZERO(&mask);
        CPU_ZERO_S(size, mask);
        -if (sched_getaffinity(0, sizeof(mask), &mask)) {

if (sched_getaffinity(0, size, mask)) {
    perror("sched_getaffinity");
    return -1;
    goto done;
}

/* We prefer a primary thread, but skip 0 */
-for (cpu = 8; cpu < CPU_SETSIZE; cpu += 8)
-if (CPU_ISSET(cpu, &mask))
    return cpu;
+for (cpu = 8; cpu < ncpus; cpu += 8)
+if (CPU_ISSET_S(cpu, size, mask))
+goto done;

/* Search for anything, but in reverse */
-for (cpu = CPU_SETSIZE - 1; cpu >= 0; cpu--)
-if (CPU_ISSET(cpu, &mask))
    return cpu;
+for (cpu = ncpus - 1; cpu >= 0; cpu--)
+if (CPU_ISSET_S(cpu, size, mask))
+goto done;

printf("No cpus in affinity mask?!\n");
-return -1;
+
+done:
+CPU_FREE(mask);
+return cpu;
}

--- linux-4.15.0.orig/tools/testing/selftests/powerpc/vphn/Makefile
+++ linux-4.15.0/tools/testing/selftests/powerpc/vphn/Makefile
@@ -2,6 +2,7 @@
CFLAGS += -m64
+top_srcdir = ../../../../..
include ../../lib.mk

$(TEST_GEN_PROGS): ../harness.c
--- linux-4.15.0.orig/tools/testing/selftests/pstore/config
+++ linux-4.15.0/tools/testing/selftests/pstore/config
@@ -2,3 +2,4 @@
CONFIG_PSTORE=y
CONFIG_PSTORE_PMSG=y
CONFIG_PSTORE_CONSOLE=y
+CONFIG_PSTORE_RAM=m
--- linux-4.15.0.orig/tools/testing/selftests/pstore/pstore_post_reboot_tests
+++ linux-4.15.0/tools/testing/selftests/pstore/pstore_post_reboot_tests

@@ -7,13 +7,16 @@
# Released under the terms of the GPL v2.
#
+Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+
 . ./common_tests

if [ -e $REBOOT_FLAG ]; then
  rm $REBOOT_FLAG
else
  prlog "pstore_crash_test has not been executed yet. we skip further tests."
  - exit 0
+  exit $ksft_skip
fi

prlog -n "Mounting pstore filesystem ... 

--- linux-4.15.0.orig/tools/testing/selftests/rcutorture/bin/configinit.sh
+++ linux-4.15.0/tools/testing/selftests/rcutorture/bin/configinit.sh
@@ -51,7 +51,7 @@
mkdir $builddir
fi
else
-  echo Bad build directory: "$builddir"
+  echo Bad build directory: "$buildloc"
  exit 2
fi

--- linux-4.15.0.orig/tools/testing/selftests/rseq/settings
+++ linux-4.15.0/tools/testing/selftests/rseq/settings
@@ -0,0 +1 @@
+timeout=0

--- linux-4.15.0.orig/tools/testing/selftests/seccomp/Makefile
+++ linux-4.15.0/tools/testing/selftests/seccomp/Makefile
@@ @ @ -9,7 +9,7 @@
CFLAGS += -Wl,-no-as-needed -Wall

seccomp_bpf: seccomp_bpf.c ./kselftest_harness.h
-$CC $(CFLAGS) $(LDFLAGS) -lpthread $< -o $@
+$CC $(CFLAGS) $(LDFLAGS) $< -lpthread -o $@

TEST_PROGS += $(BINARIES)
EXTRA_CLEAN := $(BINARIES)
--- linux-4.15.0.orig/tools/testing/selftests/seccomp/seccomp_bpf.c
+++ linux-4.15.0/tools/testing/selftests/seccomp/seccomp_bpf.c
@@ @ @ -134,11 +134,15 @@
#endif
#ifndef SECCOMP_FILTER_FLAG_TSYNC
-#define SECCOMP_FILTER_FLAG_TSYNC 1
+#define SECCOMP_FILTER_FLAG_TSYNC (1UL << 0)
#endif

#ifndef SECCOMP_FILTER_FLAG_LOG
-#define SECCOMP_FILTER_FLAG_LOG 2
+#define SECCOMP_FILTER_FLAG_LOG (1UL << 1)
+#endif
+
+#ifndef SECCOMP_FILTER_FLAG_SPEC_ALLOW
+#define SECCOMP_FILTER_FLAG_SPEC_ALLOW (1UL << 2)
#endif

#ifndef seccomp
@@ -1536,6 +1540,7 @@
 # define ARCH_REGS     s390_regs
 # define SYSCALL_NUM   gprs[2]
 # define SYSCALL_RET   gprs[2]
+# define SYSCALL_NUM_RET_SHARE_REG
#endif

#if defined(__mips__)
 # define ARCH_REGS	struct pt_regs
 # define SYSCALL_NUM	regs[2]
@@ -1550,7 +1555,16 @@
 #ifdef SYSCALL_NUM_RET_SHARE_REG
 # define EXPECT_SYSCALL_RETURN(val, action)	EXPECT_EQ(-1, action)
#else
-# define EXPECT_SYSCALL_RETURN(val, action)	EXPECT_EQ(val, action)
+# define EXPECT_SYSCALL_RETURN(val, action)		|
+do {						|
+  errno = 0;\n+  if (val < 0) {\n+    EXPECT_EQ(-1, action);\n+    EXPECT_EQ(-(val), errno);\n+  } else {						|
+    EXPECT_EQ(val, action);\n+  }\n+} while (0)
#endif

/* Use PTRACE_GETREGS and PTRACE_SETREGS when available. This is useful for
@@ -1589,7 +1603,7 @@
/* Architecture-specific syscall changing routine. */
void change_syscall(struct __test_metadata *_metadata,
-    pid_t tracee, int syscall)
+    pid_t tracee, int syscall, int result)
int ret;
ARCH_REGS regs;
@@ -1648,7 +1662,15 @@
#ifdef SYSCALL_NUM_RET_SHARE_REG
TH_LOG("Can't modify syscall return on this architecture");
#else
-reg.SYSCALL_RET = EPERM;
+regs.SYSCALL_RET = result;
+## if defined(__powerpc__)
+if (result < 0) {
+regs.SYSCALL_RET = -result;
+regs.ccr |= 0x10000000;
+} else {
+regs.ccr &= ~0x10000000;
+
+# endif
#endif
#endif

#ifdef HAVE_GETREGS
@@ -1676,14 +1698,19 @@
case 0x1002:
    /* change getpid to getppid. */
    EXPECT_EQ(__NR_getpid, get_syscall(_metadata, tracee));
-    change_syscall(_metadata, tracee, __NR_getppid);
-    change_syscall(_metadata, tracee, __NR_getppid, 0);
    break;

  case 0x1003:
-    /* skip gettid. */
+    /* skip gettid with valid return code. */
    EXPECT_EQ(__NR_gettid, get_syscall(_metadata, tracee));
    -change_syscall(_metadata, tracee, __NR_getppid);
+change_syscall(_metadata, tracee, __NR_getppid, 0);
    break;

case 0x1004:
    /* skip openat with error. */
+EXPECT_EQ(__NR_openat, get_syscall(_metadata, tracee));
+change_syscall(_metadata, tracee, -1, -ESRCH);
+break;
+case 0x1005:
    /* do nothing (allow getppid) */
    EXPECT_EQ(__NR_getppid, get_syscall(_metadata, tracee));
    break;
@@ -1702,6 +1729,7 @@
int ret, nr;
unsigned long msg;
static bool entry;
+int *syscall_nr = args;
/* Make sure we got an empty message. */
ret = ptrace(PTRACE_GETEVENTMSG, tracee, NULL, &msg);
@@ -1710,15 +1738,22 @@
/* The only way to tell PTRACE_SYSCALL entry/exit is by counting. */
entry = !entry;
@if (!entry)
+if (!entry && !syscall_nr)
return;
-nr = get_syscall(_metadata, tracee);
+if (entry)
+nr = get_syscall(_metadata, tracee);
+else
+nr = *syscall_nr;
+if (syscall_nr)
+*syscall_nr = nr;

if (nr == __NR_getpid)
- change_syscall(_metadata, tracee, __NR_getpid);
- if (nr == __NR_open)
- change_syscall(_metadata, tracee, -1);
+ change_syscall(_metadata, tracee, __NR_getppid, 0);
+ if (nr == __NR_gettid)
+ change_syscall(_metadata, tracee, -1, 45000);
+ if (nr == __NR_openat)
+ change_syscall(_metadata, tracee, -1, -ESRCH);
}

FIXTURE_DATA(TRACE_syscall) {
@@ -1735,8 +1770,10 @@
 BPF_STMT(BPF_RET|BPF_K, SECCOMP_RET_TRACE | 0x1002),
 BPF_JUMP(BPF_JMP|BPF_JEQ|BPF_K, __NR_gettid, 0, 1),
 BPF_STMT(BPF_RET|BPF_K, SECCOMP_RET_TRACE | 0x1003),
- BPF_JUMP(BPF_JMP|BPF_JEQ|BPF_K, __NR_gettid, 0, 1),
+ BPF_JUMP(BPF_JMP|BPF_JEQ|BPF_K, __NR_getppid, 0, 1),
+ BPF_STMT(BPF_RET|BPF_K, SECCOMP_RET_TRACE | 0x1004),
+ BPF_STMT(BPF_RET|BPF_K, SECCOMP_RET_TRACE | 0x1005),
 BPF_STMT(BPF_RET|BPF_K, SECCOMP_RET_ALLOW),
};
@@ -1784,15 +1821,28 @@
 EXPECT_NE(self->mypid, syscall(__NR_getpid));
}

-TEST_F(TRACE_syscall, ptrace_syscall_dropped)
TEST_F(TRACE_syscall, ptrace_syscall_errno)
{
    int syscall_nr = -1;
    /* Swap SECCOMP_RET_TRACE tracer for PTRACE_SYSCALL tracer. */
    teardown_trace_fixture(_metadata, self->tracer);
    self->tracer = setup_trace_fixture(_metadata, tracer_ptrace, NULL,
                                        self->tracer = setup_trace_fixture(_metadata, tracer_ptrace, &syscall_nr,
                                        + true);
    +/* Tracer should skip the open syscall, resulting in ESRCH. */
    +EXPECT_SYSCALL_RETURN(-ESRCH, syscall(__NR_openat));
    +}
    +
    TEST_F(TRACE_syscall, ptrace_syscall_faked)
    +{
        int syscall_nr = -1;
        /* Swap SECCOMP_RET_TRACE tracer for PTRACE_SYSCALL tracer. */
        teardown_trace_fixture(_metadata, self->tracer);
        self->tracer = setup_trace_fixture(_metadata, tracer_ptrace, &syscall_nr,
                                          tru);
        /* Tracer should skip the open syscall, resulting in EPERM. */
        -EXPECT_SYSCALL_RETURN(EPERM, syscall(__NR_open));
        /* Tracer should skip the gettid syscall, resulting fake pid. */
        +EXPECT_SYSCALL_RETURN(45000, syscall(__NR_gettid));
    }

    TEST_F(TRACE_syscall, syscall_allowed)
    \@@ -1825,7 +1875,21 @@
    EXPECT_NE(self->mypid, syscall(__NR_getpid));
    }

    TEST_F(TRACE_syscall, syscall_dropped)
    +TEST_F(TRACE_syscall, syscall_errno)
    +{
        long ret;
        +ret = prctl(PR_SET_NO_NEW_PRIVS, 1, 0, 0, 0);
        +ASSERT_EQ(0, ret);
        +ret = prctl(PR_SET_SECCOMP, SECCOMP_MODE_FILTER, &self->prog, 0, 0);
        +ASSERT_EQ(0, ret);
        +/* openat has been skipped and an errno return. */
        +EXPECT_SYSCALL_RETURN(-ESRCH, syscall(__NR_openat));
    +}
    +
    TEST_F(TRACE_syscall, syscall_faked)
{  
    long ret;

    ASSERT_EQ(0, ret);

    /* gettid has been skipped and an altered return value stored. */
    EXPECT_SYSCALL_RETURN(EPERM, syscall(__NR_gettid));
    EXPECT_NE(self->mytid, syscall(__NR_gettid));
    EXPECT_SYSCALL_RETURN(45000, syscall(__NR_gettid));
}

TEST_F(TRACE_syscall, skip_after_RET_TRACE)
    TEST(detect_seccomp_filter_flags)
    {  
        unsigned int flags[] = { SECCOMP_FILTER_FLAG_TSYNC,  
                                SECCOMP_FILTER_FLAG_LOG,  
                                SECCOMP_FILTER_FLAG_SPEC_ALLOW };  
        unsigned int flag, all_flags;
        int i;
        long ret;

        /* Test detection of known-good filter flags */
        for (i = 0, all_flags = 0; i < ARRAY_SIZE(flags); i++) {
            int bits = 0;
            flag = flags[i];
            /* Make sure the flag is a single bit! */
            while (flag) {
                if (flag & 0x1)
                    bits ++;
                flag >>= 1;
            }
            ASSERT_EQ(1, bits);
            flag = flags[i];
            ret = seccomp(SECCOMP_SET_MODE_FILTER, flag, NULL);
            ASSERT_NE(ENOSYS, errno) {
                TH_LOG("Kernel does not support seccomp syscall!");
                --- linux-4.15.0.orig/tools/testing/selftests/size/get_size.c
                +++ linux-4.15.0/tools/testing/selftests/size/get_size.c
                @@ -12,23 +12,35 @@
                * own execution. It also attempts to have as few dependencies
                * on kernel features as possible.
                *
                - * It should be statically linked, with startup libs avoided.
- * It uses no library calls, and only the following 3 syscalls:
+ * It should be statically linked, with startup libs avoided. It uses
+ * no library calls except the syscall() function for the following 3
+ * syscalls:
*   sysinfo(), write(), and _exit()
*   
*   For output, it avoids printf (which in some C libraries
*   has large external dependencies) by implementing it's own
*   number output and print routines, and using __builtin_strlen()
+ *
+ * The test may crash if any of the above syscalls fails because in some
+ * libc implementations (e.g. the GNU C Library) errno is saved in
+ * thread-local storage, which does not get initialized due to avoiding
+ * startup libs.
*/

#include <sys/sysinfo.h>
#include <unistd.h>
+#include <sys/syscall.h>

#define STDOUT_FILENO 1

static int print(const char *s)
{
-    return write(STDOUT_FILENO, s, __builtin_strlen(s));
+    size_t len = 0;
+    
+    while (s[len] != '\0')
+        len++;
+    
+    return syscall(SYS_write, STDOUT_FILENO, s, len);
}

static inline char *num_to_str(unsigned long num, char *buf, int len)
@@ -80,12 +92,12 @@
    print("TAP version 13\n");
    print("# Testing system size.\n");

    -ccode = sysinfo(&info);
    +ccode = syscall(SYS_sysinfo, &info);
    if (ccode < 0) {
        print("not ok 1 ");
        print(test_name);
        print(" ---\n reason: \"could not get sysinfo\" ...\n");
        _exit(ccode);
        +syscall(SYS_exit, ccode);
    }
    print("ok 1 ");
}
print(test_name);
@@ -101,5 +113,5 @@
    
    -exit(0);
    +syscall(SYS_exit, 0);
    
--- linux-4.15.0.orig/tools/testing/selftests/static_keys/test_static_keys.sh
+++ linux-4.15.0/tools/testing/selftests/static_keys/test_static_keys.sh
@@ -2,6 +2,19 @@
# SPDX-License-Identifier: GPL-2.0
# Runs static keys kernel module tests
+
+# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+
+if ! /sbin/modprobe -q -n test_static_key_base; then
+echo "static_key: module test_static_key_base is not found [SKIP]"
+exit $ksft_skip
+fi
+
+if ! /sbin/modprobe -q -n test_static_keys; then
+echo "static_key: module test_static_keys is not found [SKIP]"
+exit $ksft_skip
+fi
+
if /sbin/modprobe -q test_static_key_base; then
if /sbin/modprobe -q test_static_keys; then
echo "static_key: ok"
--- linux-4.15.0.orig/tools/testing/selftests/sync/Makefile
+++ linux-4.15.0/tools/testing/selftests/sync/Makefile
@@ -30,7 +30,7 @@
$(CC) -o $(TEST_CUSTOM_PROGS) $(OBJS) $(TESTS) $(CFLAGS) $(LDFLAGS)

$(OBJS): $(OUTPUT)/%.o: %.c
-$(CC) -c $^ -o $@
+$CC -c $^ -o $@ $(CFLAGS)

$(TESTS): $(OUTPUT)/%.o: %.c
$(CC) -c $^ -o $@
--- linux-4.15.0.orig/tools/testing/selftests/sync/config
+++ linux-4.15.0/tools/testing/selftests/sync/config
@@ -0,0 +1,4 @@
+CONFIG_STAGING=y
+CONFIG_ANDROID=y
+CONFIG_SYNC=y
+CONFIG_SW_SYNC=y

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# This performs a series tests against the proc sysctl interface.

+## Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+
+TEST_NAME="sysctl"
+TEST_DRIVER="test_${TEST_NAME}"
+TEST_DIR=$(dirname $0)
+@ @ -41,7 +44,7 @@
+    echo "$0: $DIR not present" >&2
+    echo "You must have the following enabled in your kernel:" >&2
+    cat $TEST_DIR/config >&2
+    exit 1
+    exit $ksft_skip
+fi
+
+@ @ -98,28 +101,30 @@
+uid=$(id -u)
+if [ $uid -ne 0 ]; then
+    echo $msg must be run as root >&2
+    exit 0
+    exit $ksft_skip
+fi
+
+if ! which perl 2> /dev/null > /dev/null; then
+    echo "$0: You need perl installed"
+    exit 1
+    exit $ksft_skip
+fi
+
+if ! which getconf 2> /dev/null > /dev/null; then
+    echo "$0: You need getconf installed"
+    exit 1
+    exit $ksft_skip
+fi
+
+if ! which diff 2> /dev/null > /dev/null; then
+    echo "$0: You need diff installed"
+    exit 1
+    exit $ksft_skip
+fi
+
+
+function load_req_mod()
+{
+    
+}
-trap "test_modprobe" EXIT
-
if [ ! -d $DIR ]; then
+if ! modprobe -q -n $TEST_DRIVER; then
+echo "$0: module $TEST_DRIVER not found [SKIP]"
+exit $ksft_skip
+fi
modprobe $TEST_DRIVER
if [ S? -ne 0 ]; then
exit
@@ -765,6 +770,7 @@
test_reqs
allow_user_defaults
check_production_sysctl_writes_strict
+test_modprobe
load_req_mod

trap "test_finish" EXIT
--- linux-4.15.0.orig/tools/testing/selftests/tc-testing/tc-tests/actions/mirred.json
+++ linux-4.15.0/tools/testing/selftests/tc-testing/tc-tests/actions/mirred.json
@@ -44,7 +44,8 @@
    "matchPattern": "action order \[0-9\]*: mirred \(Egress Redirect to device lo\)\.*index 2 ref",
    "matchCount": "1",
    "teardown": [
-            "$TC actions flush action mirred"
+            "$TC actions flush action mirred",
+            "$TC actions flush action gact"
    ]
},
{--- linux-4.15.0.orig/tools/testing/selftests/tc-testing/tc-tests/actions/police.json
+++ linux-4.15.0/tools/testing/selftests/tc-testing/tc-tests/actions/police.json
@@ -322,6 +322,54 @@
    ]
},
+        "id": "6aaf",
+        "name": "Add police actions with conform-exceed control pass/pipe [with numeric values]",
+        "category": [
+            "actions",
+            "police"
+        ],
+        "setup": [
+            [
+                "$TC actions flush action police",
+                0,
+                1,
+                255
+            ]
+        ]
}
"cmdUnderTest": "$TC actions add action police rate 3mbit burst 250k conform-exceed 0/3 index 1",
"expExitCode": "0",
"verifyCmd": "$TC actions get action police index 1",
"matchPattern": "action order [0-9]*: police 0x1 rate 3Mbit burst 250Kb mtu 2Kb action pass/pipe",
"matchCount": "1",
"teardown": [
"$TC actions flush action police"
]
}
}

"id": "29b1",
"name": "Add police actions with conform-exceed control <invalid>/drop",
"category": [
"actions",
"police"
],
"setup": [
[
"$TC actions flush action police",
0,
1,
255
]
],
"cmdUnderTest": "$TC actions add action police rate 3mbit burst 250k conform-exceed 10/drop index 1",
"expExitCode": "255",
"verifyCmd": "$TC actions ls action police",
"matchPattern": "action order [0-9]*: police 0x1 rate 3Mbit burst 250Kb mtu 2Kb action ",
"matchCount": "0",
"teardown": [
"$TC actions flush action police"
]
]
}

"id": "aa43",
"name": "Get single police action without specifying index",
"category": [
--- linux-4.15.0.orig/tools/testing/selftests/tc-testing/tdc.py
+++ linux-4.15.0/tools/testing/selftests/tc-testing/tdc.py
@@ -51,9 +51,9 @@
 (rawout, serr) = proc.communicate()

 if proc.returncode != 0 and len(serr) > 0:
-    foutput = serr.decode("utf-8")
+    foutput = serr.decode("utf-8", errors="ignore")
 else:
foutput = rawout.decode("utf-8")
proc.stdout.close()
proc.stderr.close()

--- linux-4.15.0.orig/tools/testing/selftests/tc-testing/tdc_batch.py
+++ linux-4.15.0/tools/testing/selftests/tc-testing/tdc_batch.py
@@ -1,4 +1,4 @@
-#!/usr/bin/python3
+#!/usr/bin/env python3

"""
tdc_batch.py - a script to generate TC batch file
"""

--- linux-4.15.0.orig/tools/testing/selftests/timers/Makefile
+++ linux-4.15.0/tools/testing/selftests/timers/Makefile
@@ -1,6 +1,6 @@
# SPDX-License-Identifier: GPL-2.0
CFLAGS += -O3 -Wl,-no-as-needed -Wall
-LDFLAGS += -lrt -lpthread -lm
+LDLIBS += -lrt -lpthread -lm

# these are all "safe" tests that don't modify
# system time or require escalated privileges
--- linux-4.15.0.orig/tools/testing/selftests/timers/adjtick.c
+++ linux-4.15.0/tools/testing/selftests/timers/adjtick.c
@@ -136,6 +136,7 @@
eppm = get_ppm_drift();
printf("%lld usec, %lld ppm", systick + (systick * eppm / MILLION), eppm);
+fflush(stdout);

tx1.modes = 0;
adjtimex(&tx1);
--- linux-4.15.0.orig/tools/testing/selftests/timers/leapcrash.c
+++ linux-4.15.0/tools/testing/selftests/timers/leapcrash.c
@@ -101,6 +101,7 @@
}
clear_time_state();
printf(".");
+fflush(stdout);
}
printf("[OK]\n");
return ksft_exit_pass();
--- linux-4.15.0.orig/tools/testing/selftests/timers/mqueue-lat.c
+++ linux-4.15.0/tools/testing/selftests/timers/mqueue-lat.c
@@ -102,6 +102,7 @@
int ret;
printf("Mqueue latency : ");
+fflush(stdout);

ret = mqueue_lat_test();
if (ret < 0) {
    --- linux-4.15.0.orig/tools/testing/selftests/timers/nanosleep.c
+++ linux-4.15.0/tools/testing/selftests/timers/nanosleep.c
@@ -142,6 +142,7 @@
    continue;

    printf("Nanosleep %-31s ", clockstring(clockid));
    +fflush(stdout);

    length = 10;
    while (length <= (NSEC_PER_SEC * 10)) {
        --- linux-4.15.0.orig/tools/testing/selftests/timers/nsleep-lat.c
+++ linux-4.15.0/tools/testing/selftests/timers/nsleep-lat.c
@@ -155,6 +155,7 @@
        continue;

        printf("nsleep latency %-26s ", clockstring(clockid));
        +fflush(stdout);

        length = 10;
        while (length <= (NSEC_PER_SEC * 10)) {
            --- linux-4.15.0.orig/tools/testing/selftests/timers/raw_skew.c
+++ linux-4.15.0/tools/testing/selftests/timers/raw_skew.c
@@ -112,6 +112,7 @@
            WARNING: ADJ_OFFSET in progress, this will cause inaccurate results
        
            printf("Estimating clock drift: ");
            +fflush(stdout);
            sleep(120);

            get_monotonic_and_raw(&mon, &raw);
            @@ -134,6 +135,11 @@
            printf(" %lld.%i(act)", ppm/1000, abs((int)(ppm%1000)));

            if (llabs(eppm - ppm) > 1000) {
                +if (tx1.offset || tx2.offset ||
                    tx1.freq != tx2.freq || tx1.tick != tx2.tick) {
                    +printf("[SKIP]\n");
                    +return ksft_exit_skip("The clock was adjusted externally. Shutdown NTPd or other time sync daemons\n");
                +}
                printf("[FAILED]\n");
                return ksft_exit_fail();
            }
            --- linux-4.15.0.orig/tools/testing/selftests/timers/set-tai.c
printf("tai offset started at %i\n", ret);

printf("Checking tai offsets can be properly set: ");
++flush(stdout);
for (i = 1; i <= 60; i++) {
    ret = set_tai(i);
    ret = get_tai();
}

printf("Checking tz_minuteswest can be properly set: ");
++flush(stdout);
for (i = -15*60; i < 15*60; i += 30) {
    ret = set_tz(i, dst);
    ret = get_tz_min();
}

printf("Checking invalid tz_minuteswest values are caught: ");
++flush(stdout);
if (!set_tz(-15*60-1, dst)) {
    printf("[FAILED] %i didn't return failure!\n", -15*60-1);
}

strftime(buf, 255, "%a, %d %b %Y %T %z", localtime(&start));
printf("%s\n", buf);
printf("Testing consistency with %i threads for %ld seconds: ", thread_count, runtime);
++flush(stdout);

/* spawn */
for (i = 0; i < thread_count; i++) {
    printf("Testing ADJ_FREQ... ");
    ++flush(stdout);
    for (i = 0; i < NUM_FREQ_VALID; i++) {
        tx.modes = ADJ_FREQUENCY;
        tx.freq = valid_freq[i];
    }
}
int validate_set_offset(void)
{
    printf("Testing ADJ_SETOFFSET...
");
    fflush(stdout);

    /* Test valid values */
    if (set_offset(NSEC_PER_SEC - 1, 1))
        return 1;

    // ...more code...

    if (!modprobe -q -n test_user_copy)
        echo "module test_user_copy is not found [SKIP]"
        exit $ksft_skip
    fi

    echo "user_copy: ok"

    ifdef CROSS_COMPILE
    CFLAGS := -std=gnu99
    CFLAGS_vdso_standalone_test_x86 := -nostdlib -fno-asynchronous-unwind-tables -fno-stack-protector
    endif

    -TEST_PROGS := vdso_test vdso_standalone_test_x86
    +TEST_PROGS := $\(OUTPUT\)/vdso_test $\(OUTPUT\)/vdso_standalone_test_x86

    all: $\(TEST_PROGS\)
    -vdso_test: parse_vdso.c vdso_test.c
    -vdso_standalone_test_x86: vdso_standalone_test_x86.c parse_vdso.c
    +$\(OUTPUT\)/vdso_test: parse_vdso.c vdso_test.c
    +$\(OUTPUT\)/vdso_standalone_test_x86: vdso_standalone_test_x86.c parse_vdso.c
    $\(CC\) $\(CFLAGS\) $\(CFLAGS\_vdso\_standalone\_test\_x86\)
    vdso_standalone_test_x86.c parse_vdso.c
    -o vdso_standalone_test_x86
    +o $@
-include ../lib.mk
-clean:
-rm -fr $(TEST_PROGS)
+EXTRA_CLEAN := $(TEST_PROGS)
endif
--- linux-4.15.0.orig/tools/testing/selftests/vDSO/vdso_test.c
+++ linux-4.15.0/tools/testing/selftests/vDSO/vdso_test.c
@@ -15,6 +15,8 @@
 
 #include <sys/auxv.h>
 #include <sys/time.h>
+
+#include "../kselftest.h"
+
 extern void *vdso_sym(const char *version, const char *name);
 extern void vdso_init_from_sysinfo_ehdr(uintptr_t base);
 extern void vdso_init_from_auxv(void *auxv);
@@ -37,7 +39,7 @@
 unsigned long sysinfo_ehdr = getauxval(AT_SYSINFO_EHDR);
 if (!sysinfo_ehdr) {
     printf("AT_SYSINFO_EHDR is not present\n");
-    return 0;
+    return KSFT_SKIP;
 }
vdso_init_from_sysinfo_ehdr(getauxval(AT_SYSINFO_EHDR));
@@ -48,7 +50,7 @@
 if (!gtod) {
     printf("Could not find %s\n", name);
-    return 1;
+    return KSFT_SKIP;
 }
 struct timeval tv;
@@ -59,6 +61,7 @@
     (long long)tv.tv_sec, (long long)tv.tv_usec);
 } else {
     printf("%s failed\n", name);
+    return KSFT_FAIL;
 }

 return 0;
--- linux-4.15.0.orig/tools/testing/selftests/vm/Makefile
+++ linux-4.15.0/tools/testing/selftests/vm/Makefile
@@ -1,10 +1,6 @@
 # SPDX-License-Identifier: GPL-2.0
 # Makefile for vm selftests

ifndef OUTPUT
- OUTPUT := $(shell pwd)
endif
-
CFLAGS = -Wall -I ../../../usr/include $(EXTRA_CFLAGS)
LDLIBS = -lrt
TEST_GEN_FILES = compaction_test
@@ -22,12 +18,11 @@
TEST_PROGS := run_vmtests
+
+TEST_FILES := test_vmalloc.sh
+
+KSFT_KHDR_INSTALL := 1
include ../../../lib.mk

-$(OUTPUT)/userfaultfd: ../../../usr/include/linux/kernel.h
$(OUTPUT)/userfaultfd: LDLIBS += -lpthread

$(OUTPUT)/mlock-random-test: LDLIBS += -lcap
-
-../../../usr/include/linux/kernel.h:
-include ../../../headers_install
--- linux-4.15.0.orig/tools/testing/selftests/vm/compaction_test.c
+++ linux-4.15.0/tools/testing/selftests/vm/compaction_test.c
@@ -16,6 +16,8 @@
#include <unistd.h>
#include <string.h>
+include ../../../kselftest.h
+
#define MAP_SIZE 1048576

struct map_list {
@@ -137,6 +139,8 @@
printf("No of huge pages allocated = %d\n",
       (atoi(nr_hugepages)));
+
seek(fd, 0, SEEK_SET);
+
if (write(fd, initial_nr_hugepages, strlen(initial_nr_hugepages))
    != strlen(initial_nr_hugepages)) {
        perror("Failed to write value to /proc/sys/vm/nr_hugepages\n");
        @ @ -167,7 +171,7 @@
        printf("Either the sysctl compact_unevictable_allowed is not\n"
            "set to 1 or couldn't read the proc file.\n"
            "Skipping the test\n"亵);
-return 0;
+return KSFT_SKIP;
}

lim.rlim_cur = RLIM_INFINITY;
--- linux-4.15.0.orig/tools/testing/selftests/vm/gup_benchmark.c
+++ linux-4.15.0/tools/testing/selftests/vm/gup_benchmark.c
@@ -22,6 +22,7 @@
 __u64 size;
 __u32 nr_pages_per_call;
 __u32 flags;
+__u64 expansion[10];/* For future use */
);}

int main(int argc, char **argv)
@@ -50,6 +51,7 @@
 break;
 case 'w':
 write = 1;
+break;
 default:
 return -1;
 }
--- linux-4.15.0.orig/tools/testing/selftests/vm/mlock2-tests.c
+++ linux-4.15.0/tools/testing/selftests/vm/mlock2-tests.c
@@ -9,6 +9,8 @@
 #include "mlock2.h"
 #include "../kselftest.h"
+#include "../kselftest.h"
 +
 struct vm_boundaries {
 unsigned long start;
 unsigned long end;
@@ -65,59 +67,6 @@
 return ret;
 }

-static uint64_t get_pageflags(unsigned long addr)
-{ }
-FILE *file;
-uint64_t pfn;
-unsigned long offset;
- 
-FILE = fopen("/proc/self/pagemap", "r");
-if (!file) {
-perror("fopen pagemap");
-_exit(1);
- offset = addr / getpagesize() * sizeof(pfn);

-if (fseek(file, offset, SEEK_SET)) {
    perror("fseek pagemap");
    _exit(1);
}

-if (fread(&pfn, sizeof(pfn), 1, file) != 1) {
    perror("fread pagemap");
    _exit(1);
}

-fclose(file);
-return pfn;
-
-
-static uint64_t get_kpageflags(unsigned long pfn)
{
    uint64_t flags;
    FILE *file;

    file = fopen("/proc/kpageflags", "r");
    if (!file) {
        perror("fopen kpageflags");
        _exit(1);
    }

    if (fseek(file, pfn * sizeof(flags), SEEK_SET)) {
        perror("fseek kpageflags");
        _exit(1);
    }

    if (fread(&flags, sizeof(flags), 1, file) != 1) {
        perror("fread kpageflags");
        _exit(1);
    }

    fclose(file);
    return flags;
}

#define VMFLAGS "VmFlags:

static bool is_vmflag_set(unsigned long addr, const char *vmflag)
@@ -157,19 +106,13 @@
#define RSS  "Rss:"

#define LOCKED "lo"

static bool is_vma_lock_on_fault(unsigned long addr)
+static unsigned long get_value_for_name(unsigned long addr, const char *name)
{
    -bool ret = false;
            - bool locked;
    -FILE *smaps = NULL;
            -unsigned long vma_size, vma_rss;
    char *line = NULL;
    -char *value;
    size_t size = 0;

    -locked = is_vmflag_set(addr, LOCKED);
    -if (!locked)
        -goto out;
    +char *value_ptr;
    +FILE *smaps = NULL;
    +unsigned long value = -1UL;

    smaps = seek_to_smaps_entry(addr);
    if (!smaps) {
        @@ -178,112 +121,70 @@
            }

    while (getline(&line, &size, smaps) > 0) {
        -if (!strstr(line, SIZE)) {
        +if (!strstr(line, name)) {
            free(line);
            line = NULL;
            size = 0;
            continue;
        }

        -value = line + strlen(SIZE);
        -if (sscanf(value, "%lu kB", &vma_size) < 1) {
            +value_ptr = line + strlen(name);
            +if (sscanf(value_ptr, "%lu kB", &value) < 1) {
                printf("Unable to parse smaps entry for Size\n");
                goto out;
            }
        }
        break;
    }

    -while (getline(&line, &size, smaps) > 0) {
        -if (!strstr(line, RSS)) {
            -free(line);
            -line = NULL;
            break;
        }

    -
size = 0;
-continue;
-{ 
-
-value = line + strlen(RSS);
-if (sscanf(value, "%lu kB", &vma_rss) < 1) { 
-printf("Unable to parse smaps entry for Rss\n");
-goto out;
-
-break;
-
-
-ret = locked && (vma_rss < vma_size);
out:
-free(line);
if (smaps)
fclose(smaps);
-return ret;
+free(line);
+return value;
}

#define PRESENT_BIT 0x8000000000000000ULL
#define PFN_MASK 0x007FFFFFFFFFFFFFULL
#define UNEVICTABLE_BIT (1UL << 18)
-
-static int lock_check(char *map)
+static bool is_vma_lock_on_fault(unsigned long addr)
{ 
-unsigned long page_size = getpagesize();
-uint64_t page1_flags, page2_flags;
+bool locked;
+-unsigned long vma_size, vma_rss;
-
-page1_flags = get_pageflags((unsigned long)map);
-page2_flags = get_pageflags((unsigned long)map + page_size);
+locked = is_vmflag_set(addr, LOCKED);
+if (!locked)
+return false;

-/* Both pages should be present */
-if (((page1_flags & PRESENT_BIT) == 0) ||
-
-((page2_flags & PRESENT_BIT) == 0)) {
-printf("Failed to make both pages present\n");
-return 1;
-

+vma_size = get_value_for_name(addr, SIZE);
+vma_rss = get_value_for_name(addr, RSS);
-page1_flags = get_kpageflags(page1_flags & PFN_MASK);
-page2_flags = get_kpageflags(page2_flags & PFN_MASK);
+/* only one page is faulted in */
+return (vma_rss < vma_size);
+
+/* Both pages should be unevictable */
-if (((page1_flags & UNEVICTABLE_BIT) == 0) ||
-    ((page2_flags & UNEVICTABLE_BIT) == 0)) {
-    printf("Failed to make both pages unevictable\n");
-    return 1;
-}
+#define PRESENT_BIT     0x8000000000000000ULL
+#define PFN_MASK        0x007FFFFFFFFFFFFFULL
+#define UNEVICTABLE_BIT (1UL << 18)

-if (!is_vmflag_set((unsigned long)map, LOCKED)) {
-    printf("VMA flag %s is missing on page 1\n", LOCKED);
-    return 1;
-}

+static int lock_check(unsigned long addr)
+{
+    bool locked;
+    unsigned long vma_size, vma_rss;

-    if (!is_vmflag_set((unsigned long)map + page_size, LOCKED)) {
-        printf("VMA flag %s is missing on page 2\n", LOCKED);
-        return 1;
-    }
+    locked = is_vmflag_set(addr, LOCKED);
+    if (!locked)
+        return false;

    return 0;
+    vma_size = get_value_for_name(addr, SIZE);
+    vma_rss = get_value_for_name(addr, RSS);
+    return (vma_rss == vma_size);
}
if ((page1_flags & UNEVICTABLE_BIT) || (page2_flags & UNEVICTABLE_BIT)) {
    printf("A page is still marked unevictable after unlock\n");
    return 1;
}

if (is_vmflag_set((unsigned long)map, LOCKED)) {
    printf("VMA flag %s is present on page 1 after unlock\n", LOCKED);
    return 1;
}

if (is_vmflag_set((unsigned long)map + page_size, LOCKED)) {
    printf("VMA flag %s is present on page 2 after unlock\n", LOCKED);
    return 1;
}

return 0;

if (mlock2_(map, 2 * page_size, 0)) {
    if (errno == ENOSYS) {
        printf("Cannot call new mlock family, skipping test\n");
        _exit(KSFT_SKIP);
    }
    perror("mlock2\n");
    goto unmap;
}

if (!lock_check((unsigned long)map))
    goto unmap;

/* Now unlock and recheck attributes */

static int onfault_check(char *map)
{
    unsigned long page_size = getpagesize();
    uint64_t page1_flags, page2_flags;

    page1_flags = get_pageflags((unsigned long)map);
    page2_flags = get_pageflags((unsigned long)map + page_size);

    /* Neither page should be present */
if ((page1_flags & PRESENT_BIT) || (page2_flags & PRESENT_BIT)) {
    printf("Pages were made present by MLOCK_ONFAULT\n");
    return 1;
}

*map = 'a';
page1_flags = get_pageflags((unsigned long)map);
page2_flags = get_pageflags((unsigned long)map + page_size);

/* Only page 1 should be present */
if ((page1_flags & PRESENT_BIT) == 0) {
    printf("Page 1 is not present after fault\n");
    return 1;
} else if (page2_flags & PRESENT_BIT) {
    printf("Page 2 was made present\n");
    return 1;
}

page1_flags = get_kpageflags(page1_flags & PFN_MASK);

/* Page 1 should be unevictable */
if ((page1_flags & UNEVICTABLE_BIT) == 0) {
    printf("Failed to make faulted page unevictable\n");
    return 1;
}

if (!is_vma_lock_on_fault((unsigned long)map)) {
    printf("VMA is not marked for lock on fault\n");
    return 1;
}

if (!is_vma_lock_on_fault((unsigned long)map + page_size)) {
    printf("VMA is not marked for lock on fault\n");
    return 1;
}

return 0;

static int unlock_onfault_check(char *map)
{
    unsigned long page_size = getpagesize();
    uint64_t page1_flags;
    page1_flags = get_pageflags((unsigned long)map);
    page1_flags = get_kpageflags(page1_flags & PFN_MASK);
    if (page1_flags & UNEVICTABLE_BIT) {
if (is_vma_lock_on_fault((unsigned long)map) ||
    is_vma_lock_on_fault((unsigned long)map + page_size)) {
    if (mlock2_(map, 2 * page_size, MLOCK_ONFAULT)) {
        if (errno == ENOSYS) {
            printf("Cannot call new mlock family, skipping test\n");
            _exit(0);
            +_exit(KSFT_SKIP);
        }
        perror("mlock2(MLOCK_ONFAULT)\n");
        goto unmap;
    }
    if (munlock(map, 2 * page_size)) {
        if (errno == ENOSYS) {
            printf("Cannot call new mlock family, skipping test\n");
            _exit(0);
            +_exit(KSFT_SKIP);
        }
        perror("munlock()\n");
        goto unmap;
    }
    char *map;
    int ret = 1;
    unsigned long page_size = getpagesize();
    -uint64_t page1_flags, page2_flags;
    map = mmap(NULL, 2 * page_size, PROT_READ | PROT_WRITE,
        MAP_ANONYMOUS | MAP_PRIVATE, -1, 0);
    if (mlock2_(map, 2 * page_size, MLOCK_ONFAULT)) {
        if (errno == ENOSYS) {
            printf("Cannot call new mlock family, skipping test\n");
            _exit(0);
            +_exit(KSFT_SKIP);
        }
        perror("mlock2(MLOCK_ONFAULT)\n");
        goto unmap;
    }
    page1_flags = get_pageflags((unsigned long)map);
    page2_flags = get_pageflags((unsigned long)map + page_size);
    -page1_flags = get_kpageflags(page1_flags & PFN_MASK);
    -page2_flags = get_kpageflags(page2_flags & PFN_MASK);
/* Page 1 should be unevictable */
-if ((page1_flags & UNEVICTABLE_BIT) == 0) {
-printf("Failed to make present page unevictable\n");
-goto unmap;
-}
-
-if (!is_vma_lock_on_fault((unsigned long)map) ||
 !is_vma_lock_on_fault((unsigned long)map + page_size)) {
 printf("VMA with present pages is not marked lock on fault\n");
@@ -505,7 +348,7 @@
goto out;
}

-if (lock_check(map))
+if (!lock_check((unsigned long)map))
goto unmap;

if (munlockall()) {
@@ -547,7 +390,7 @@
goto out;
}

-if (lock_check(map))
+if (!lock_check((unsigned long)map))
goto unmap;

if (munlockall()) {
@@ -583,7 +426,7 @@
if (call_mlock && mlock2_(map, 3 * page_size, MLOCK_ONFAULT)) {
 if (errno == ENOSYS) {
 printf("Cannot call new mlock family, skipping test\n");
- _exit(0);
+_exit(KSFT_SKIP);
 } perror("mlock(ONFAULT)\n");
goto out;
--- linux-4.15.0.orig/tools/testing/selftests/vm/run_vmtests
+++ linux-4.15.0/tools/testing/selftests/vm/run_vmtests
@@ -2,25 +2,36 @@
# SPDX-License-Identifier: GPL-2.0
#please run as root

-#we need 256M, below is the size in kB
-needmem=262144
+# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+
+mnt=./huge
exitcode=0

# get pagesize and freepages from /proc/meminfo
+# get huge pagesize and freepages from /proc/meminfo
while read name size unit; do
  if [ "$name" = "HugePages_Free:" ]; then
    freepgs=$size
  fi
  if [ "$name" = "Hugepagesize:" ]; then
    -pgsize=$size
    +hpgsize_KB=$size
  fi
done < /proc/meminfo

+# Simple hugetlbfs tests have a hardcoded minimum requirement of
# huge pages totaling 256MB (262144KB) in size. The userfaultfd
# hugetlb test requires a minimum of 2 * nr_cpus huge pages. Take
# both of these requirements into account and attempt to increase
# number of huge pages available.
#nr_cpus=$(nproc)
+nr_cpus=$(nproc)
+hpgsize_MB=$(hpgsize_GB / 1024)
+half_ufd_size_MB=$(((nr_cpus * hpgsize MB + 127) / 128) * 128))
+needmem_KB=$((half_ufd size MB * 2 * 1024))
+
# set proper nr_hugepages
-if [ -n "$freepgs" ] && [ -n "$pgsize" ]; then
+if [ -n "$freepgs" ] && [ -n "$hpgsize_KB" ]; then
  nr_hugepgs=`cat /proc/sys/vm/nr_hugepages`
  needpgs=`expr $needmem / $pgsize`
  tries=2
  while [ $tries -gt 0 ] && [ $freepgs -lt $needpgs ]; do
    lackpgs=$(( $needpgs - $freepgs ))
    @ @ -28,7 +39,7 @ @
    echo $(( $slackpgs + $nr hugepgs )) > /proc/sys/vm/nr_hugepages
  if [ $? -ne 0 ]; then
    echo "Please run this test as root"
    -exit 1
+exit $ksft_skip
  fi
while read name size unit; do
  if [ "$name" = "HugePages_Free:" ]; then
    @ @ -107,8 +118,9 @ @
    echo "---------------------------"
    echo "running userfaultfd_hugetlb"
    echo "---------------------------"
    -# 256MB total huge pages == 128MB src and 128MB dst
    -./userfaultfd hugetlb 128 32 $mnt/ufd_test_file
    echo "---------------------------"
    echo "running userfaultfd_hugetlb"
    echo "---------------------------"
    -exit 1
+exit $ksft_skip
  fi
while read name size unit; do
  if [ "$name" = "HugePages_Free:" ]; then
    @ @ -107,8 +118,9 @ @
    echo "---------------------------"
    echo "running userfaultfd_hugetlb"
    echo "---------------------------"
    -exit 1
+exit $ksft_skip
  fi
while read name size unit; do
  if [ "$name" = "HugePages_Free:" ]; then
    @ @ -107,8 +118,9 @ @
    echo "---------------------------"
    echo "running userfaultfd_hugetlb"
    echo "---------------------------"
    -exit 1
+exit $ksft_skip
Test requires source and destination huge pages. Size of source
(half_ufd_size_MB) is passed as argument to test.

```
./userfaultfd hugetlb $half_ufd_size_MB 32 $mnt/ufd_test_file
```

```
if [ $? -ne 0 ]; then
  echo "[FAIL]"
  exitcode=1
```

--- linux-4.15.0.orig/tools/testing/selftests/vm/userfaultfd.c
+++ linux-4.15.0/tools/testing/selftests/vm/userfaultfd.c
@@ -69,6 +69,8 @@
 #include <setjmp.h>
 #include <stdbool.h>
+  #include "../kselftest.h"

 #ifdef __NR_userfaultfd

 static unsigned long nr_cpus, nr_pages, nr_pages_per_cpu, page_size;
@@ -127,8 +129,10 @@
         ( posix_memalign(alloc_area, page_size, nr_pages * page_size) ) { 
             fprintf(stderr, "out of memory\n");
+         *alloc_area = mmap(NULL, nr_pages * page_size, PROT_READ | PROT_WRITE,
+             MAP_ANONYMOUS | MAP_PRIVATE, -1, 0);
+         if (*alloc_area == MAP_FAILED) {
+             fprintf(stderr, "mmap of anonymous memory failed\n");
         *alloc_area = NULL;
+     } } 
+ }
@@ -1322,7 +1326,7 @@
 int main(void)
 { 
     printf("skip: Skipping userfaultfd test (missing __NR_userfaultfd)\n");
-    return 0;
+    return KSFT_SKIP;
     }

 #endif /* __NR_userfaultfd */
```

--- linux-4.15.0.orig/tools/testing/selftests/watchdog/watchdog-test.c
+++ linux-4.15.0/tools/testing/selftests/watchdog/watchdog-test.c
@@ -89,7 +89,13 @@
     fd = open("/dev/watchdog", O_WRONLY);
     if (fd == -1) {
         -printf("Watchdog device not enabled.\n");
+        if (errno == ENOENT)
+            printf("Watchdog device not enabled.\n");
         ```
else if (errno == EACCES)
    printf("Run watchdog as root.\n");
else
    printf("Watchdog device open failed %s\n", strerror(errno));
exit(-1);
}

printf("Last boot is caused by: %s", (flags != 0) ? "Watchdog" : "Power-On-Reset");
else
    printf("WDIOC_GETBOOTSTATUS errno '%s'
", strerror(errno));
break;
case 'd':
    flags = WDIOS_DISABLECARD;
    printf("Watchdog card disabled.\n");
    break;
case 'e':
    flags = WDIOS_ENABLECARD;
    printf("Watchdog card enabled.\n");
    break;
case 'p':
    ping_rate = strtoul(optarg, NULL, 0);
    printf("Watchdog timeout set to %u seconds.\n", flags);
    break;
default:
    usage(argv[0]);
--- linux-4.15.0.orig/tools/testing/selftests/x86/Makefile
+++ linux-4.15.0/tools/testing/selftests/x86/Makefile
@@ -5,16 +5,26 @@
.PHONY: all all_32 all_64 warn_32bit_failure clean

-TARGETS_C_BOTHBITS := single_step_syscall sysret_ss_attr syscall_nt ptrace_syscall test_mremap_vdso \
  -check_initial_reg_state sigreturn ldt_gdt iopl mpx-mini-test ioperm \
  -protection_keys test_vdso test_vsyscall
+UNAME_M := $(shell uname -m)
+CAN_BUILD_I386 := $(shell ./check_cc.sh $(CC) trivial_32bit_program.c -m32)
+CAN_BUILD_X86_64 := $(shell ./check_cc.sh $(CC) trivial_64bit_program.c)
+
+TARGETS_C_BOTHBITS := single_step_syscall sysret_ss_attr syscall_nt test_mremap_vdso \
+check_initial_reg_state sigreturn ldt_gdt iopl mpx-mini-test ioperm \
+protection_keys test_vdso test_vsyscall mov_ss_trap
TARGETS_C_32BIT_ONLY := entry_from_vm86 syscall_arg_fault test_syscall_vdso unwind_vdso \
  test_FCMOV test_FCOMI test_FISTTP \
  vdso_restorer
-TARGETS_C_64BITONLY := fsgsbase sysret_rip 5lvl
+TARGETS_C_64BITONLY := fsgsbase sysret_rip
+## Some selftests require 32bit support enabled also on 64bit systems
+TARGETS_C_32BIT_NEEDED := ldt_gdt ptrace_syscall

-TARGETS_C_32BIT_ALL := $(TARGETS_C_BOTHBITS) $(TARGETS_C_32BIT_ONLY)
+TARGETS_C_32BIT_ALL := $(TARGETS_C_BOTHBITS) $(TARGETS_C_32BIT_ONLY)
+$(TARGETS_C_32BIT_NEEDED)
TARGETS_C_64BIT_ALL := $(TARGETS_C_BOTHBITS) $(TARGETS_C_64BIT_ONLY)
+ifeq ($(CAN_BUILD_I386)$(CAN_BUILD_X86_64),11)
+TARGETS_C_64BIT_ALL += $(TARGETS_C_32BIT_NEEDED)
+endif
+
+BINARIES_32 := $(TARGETS_C_32BIT_ALL:%=%_32)
BINARIES_64 := $(TARGETS_C_64BIT_ALL:%=%_64)
@@ -23,18 +33,16 @@

CFLAGS := -O2 -g -std=gnu99 -pthread -Wall -no-pie

-UNAME_M := $(shell uname -m)
-CAN_BUILD_I386 := $(shell ./check_cc.sh $(CC) trivial_32bit_program.c -m32)
-CAN_BUILD_X86_64 := $(shell ./check_cc.sh $(CC) trivial_64bit_program.c)
-
-ifeq ($(CAN_BUILD_I386),1)
-all: all_32
-TEST_PROGS += $(BINARIES_32)
+EXTRA_CFLAGS += -DCAN_BUILD_32
endif

ifeq ($(CAN_BUILD_X86_64),1)
all: all_64
TEST_PROGS += $(BINARIES_64)

+EXTRA_CFLAGS += -DCAN_BUILD_64
endif

all_32: $(BINARIES_32)
--- linux-4.15.0.orig/tools/testing/selftests/x86/entry_from_vm86.c
+++ linux-4.15.0/tools/testing/selftests/x86/entry_from_vm86.c
@@ -95,6 +95,10 @@
 "int3\n"
 "vmcode_int80:\n"
 "int $0x80\n"
+ "vmcode_popf_hlt:\n"
+ "push %ax\n"
+ "popf\n"
+ "hlt\n"
 "vmcode_umip:\n"
 /* addressing via displacements */
 "smsw (2052)\n"
@@ -124,8 +128,8 @@
 extern unsigned char vmcode[], end_vmcode[];
 extern unsigned char vmcode_bound[], vmcode_sysenter[], vmcode_syscall[],
 -vmcode_sti[], vmcode_int3[], vmcode_int80[], vmcode_umip[],
-vmcode_umip_str[], vmcode_umip_sldt[];
+vmcode_sti[], vmcode_int3[], vmcode_int80[], vmcode_popf_hlt[],
+vmcode_umip[], vmcode_umip_str[], vmcode_umip_sldt[];

 /* Returns false if the test was skipped. */
 static bool do_test(struct vm86plus_struct *v86, unsigned long eip,
@@ -175,7 +179,7 @@
         (VM86_TYPE(ret) == rettype && VM86_ARG(ret) == retarg)) {
             printf("[OK]\tReturned correctly\n");
         } else {
-         printf("[FAIL]\tIncorrect return reason\n");
+         printf("[FAIL]\tIncorrect return reason (started at eip = 0x%lx, ended at eip = 0x%lx)\n", eip, v86->regs.eip);
             nerrs++;
         }
@@ -264,6 +268,9 @@
         v86.regs.ds = load_addr / 16;
         v86.regs.es = load_addr / 16;

+/* Use the end of the page as our stack. */
+    v86.regs.esp = 4096;
+    assert((v86.regs.cs & 3) == 0); /* Looks like RPL = 0 */

 /* #BR -- should deliver SIG??? */
@@ -295,6 +302,23 @@
v86.regs.eflags &= ~X86_EFLAGS_IF;
do_test(&v86, vmcode_sti - vmcode, VM86_STI, 0, "STI with VIP set");

+/* POPF with VIP set but IF clear: should not trap */
v86.regs.eflags = X86_EFLAGS_VIP;
v86.regs.eax = 0;
do_test(&v86, vmcode_popf_hlt - vmcode, VM86_UNKNOWN, 0, "POPF with VIP set and IF clear");
+
+/* POPF with VIP set and IF set: should trap */
v86.regs.eflags = X86_EFLAGS_VIP;
v86.regs.eax = X86_EFLAGS_IF;
do_test(&v86, vmcode_popf_hlt - vmcode, VM86_STI, 0, "POPF with VIP and IF set");
+
+/* POPF with VIP clear and IF set: should not trap */
v86.regs.eflags = 0;
v86.regs.eax = X86_EFLAGS_IF;
do_test(&v86, vmcode_popf_hlt - vmcode, VM86_UNKNOWN, 0, "POPF with VIP clear and IF set");
+
+v86.regs.eflags = 0;
+
/* INT3 -- should cause #BP */
do_test(&v86, vmcode_int3 - vmcode, VM86_TRAP, 3, "INT3");

@@ -318,7 +342,7 @@
clearhandler(SIGSEGV);

/* Make sure nothing explodes if we fork. */
-if (fork() > 0)
+if (fork() == 0)
    return 0;

return (nerrs == 0 ? 0 : 1);
--- linux-4.15.0.orig/tools/testing/selftests/x86/mov_ss_trap.c
+++ linux-4.15.0/tools/testing/selftests/x86/mov_ss_trap.c
@@ -0,0 +1,285 @@
+/* SPDX-License-Identifier: GPL-2.0 */
+/
+* mov_ss_trap.c: Exercise the bizarre side effects of a watchpoint on MOV SS
+ *
+* This does MOV SS from a watchpointed address followed by various
+* types of kernel entries. A MOV SS that hits a watchpoint will queue
+* up a #DB trap but will not actually deliver that trap. The trap
+* will be delivered after the next instruction instead. The CPU's logic
+* seems to be:
+* 
+* - Any fault: drop the pending #DB trap.
+* - INT $N, INT3, INTO, SYSCALL, SYSENTER: enter the kernel and then
+*    deliver #DB.
ICEBP: enter the kernel but do not deliver the watchpoint trap
- breakpoint: only one #DB is delivered (phew!)
- There are plenty of ways for a kernel to handle this incorrectly. This
test tries to exercise all the cases.
- This should mostly cover CVE-2018-1087 and CVE-2018-8897.

```c
#define _GNU_SOURCE

#include <stdlib.h>
#include <sys/ptrace.h>
#include <sys/types.h>
#include <sys/wait.h>
#include <sys/user.h>
#include <sys/syscall.h>
#include <unistd.h>
#include <errno.h>
#include <stddef.h>
#include <stdio.h>
#include <err.h>
#include <string.h>
#include <setjmp.h>
#include <sys/prctl.h>

#define X86_EFLAGS_RF (1UL << 16)

#if __x86_64__
#define REG_IP REG_RIP
#else
#define REG_IP REG_EIP
#endif

unsigned short ss;
extern unsigned char breakpoint_insn[];
sigjmp_buf jmpbuf;
static unsigned char altstack_data[SIGSTKSZ];

static void enable_watchpoint(void)
{
  pid_t parent = getpid();
  int status;

  pid_t child = fork();
  if (child < 0)
    err(1, "fork");
  
  if (child)
  {
```
```c
if (waitpid(child, &status, 0) != child)
    err(1, "waitpid for child");
} else {

    unsigned long dr0, dr1, dr7;
    dr0 = (unsigned long)&ss;
    dr1 = (unsigned long)breakpoint_insn;
    dr7 = ((1UL << 1) /* G0 */
        + (3UL << 16) /* RW0 = read or write */
        + (1UL << 18) /* LEN0 = 2 bytes */
        + (1UL << 3)); /* G1, RW1 = insn */

    if (ptrace(PTRACE_ATTACH, parent, NULL, NULL) != 0)
        err(1, "PTRACE_ATTACH");

    if (waitpid(parent, &status, 0) != parent)
        err(1, "waitpid for child");

    if (ptrace(PTRACE_POKEUSER, parent, (void *)offsetof(struct user, u_debugreg[0]), dr0) != 0)
        err(1, "PTRACE_POKEUSER DR0");

    if (ptrace(PTRACE_POKEUSER, parent, (void *)offsetof(struct user, u_debugreg[1]), dr1) != 0)
        err(1, "PTRACE_POKEUSER DR1");

    if (ptrace(PTRACE_POKEUSER, parent, (void *)offsetof(struct user, u_debugreg[7]), dr7) != 0)
        err(1, "PTRACE_POKEUSER DR7");

    printf("DR0 = %lx, DR1 = %lx, DR7 = %lx\n", dr0, dr1, dr7);

    if (ptrace(PTRACE_DETACH, parent, NULL, NULL) != 0)
        err(1, "PTRACE_DETACH");  

    exit(0);  
}
```

---

```c
static void sethandler(int sig, void (*handler)(int, siginfo_t *, void *),
        int flags)
{
    struct sigaction sa;
    memset(&sa, 0, sizeof(sa));
    sa.sa_sigaction = handler;
    sa.sa_flags = SA_SIGINFO | flags;
    sigemptyset(&sa.sa_mask);
    if (sigaction(sig, &sa, 0))
        err(1, "sigaction");
}
```
+static char const * const signames[] = {
+  [SIGSEGV] = "SIGSEGV",
+  [SIGBUS] = "SIGBUS",
+  [SIGTRAP] = "SIGTRAP",
+  [SIGILL] = "SIGILL",
+};
+
+static void sigtrap(int sig, siginfo_t *si, void *ctx_void)
+{
+  ucontext_t *ctx = ctx_void;
+
+  printf("\tGot SIGTRAP with RIP=%lx, EFLAGS.RF=%d\n",
+         (unsigned long)ctx->uc_mcontext.gregs[REG_IP],
+         !!(ctx->uc_mcontext.gregs[REG_EFL] & X86_EFLAGS_RF));
+}
+
+static void handle_and_return(int sig, siginfo_t *si, void *ctx_void)
+{
+  ucontext_t *ctx = ctx_void;
+
+  printf("\tGot %s with RIP=%lx\n", signames[sig],
+         (unsigned long)ctx->uc_mcontext.gregs[REG_IP]);
+}
+
+static void handle_and_longjmp(int sig, siginfo_t *si, void *ctx_void)
+{
+  ucontext_t *ctx = ctx_void;
+
+  printf("\tGot %s with RIP=%lx\n", signames[sig],
+         (unsigned long)ctx->uc_mcontext.gregs[REG_IP]);
+  siglongjmp(jmpbuf, 1);
+}
+
+int main()
+{
+  unsigned long nr;
+
+  asm volatile ("mov %ss, %[ss]" : [ss] "=m" (ss));
+  printf("\tSS = 0x%hx, &SS = 0x%p\n", ss, &ss);
+  if (prctl(PR_SET_PTRACER, PR_SET_PTRACER_ANY, 0, 0, 0) == 0)
+    printf("\tPR_SET_PTRACER_ANY succeeded\n");
+  sethandler(SIGTRAP, sigtrap, 0);
+  enable_watchpoint();
+}
printf("[RUN]\u00bf Read from watched memory (should get SIGTRAP)\n");

asm volatile ("mov %[ss], %[tmp] : [tmp] \="r" (nr) : %[ss] \="m" (ss));
+
printf("[RUN]\u00bf MOV SS; INT3\n");

asm volatile ("mov %[ss], %[ss]; int3 :: %[ss] \="m" (ss));
+
printf("[RUN]\u00bf MOV SS; INT 3\n");

asm volatile ("mov %[ss], %[ss]; byte 0x0c, 0x3 \="ss \="m" (ss));
+
printf("[RUN]\u00bf MOV SS; CS CS INT3\n");

asm volatile ("mov %[ss], %[ss]; byte 0x2e, 0x2e; int3 :: %[ss] \="m" (ss));
+
printf("[RUN]\u00bf MOV SS; CSx14 INT3\n");

asm volatile ("mov %[ss], %[ss]; .fill 14,1,0x2e; int3 :: %[ss] \="m" (ss));
+
printf("[RUN]\u00bf MOV SS; INT 4\n");

sethandler(SIGSEGV, handle_and_return, SA_RESETHAND);

asm volatile ("mov %[ss], %[ss]; int $4 :: %[ss] \="m" (ss));
+
#ifdef __i386__
printf("[RUN]\u00bf INTO\n");

sethandler(SIGSEGV, handle_and_return, SA_RESETHAND);
+nr = -1;

asm volatile ("add $1, %[tmp]; mov %[ss], %[ss]; into"+
+ : [tmp] \="r" (nr) : %[ss] \="m" (ss));
+
#endif
+
if (sigsetjmp(jmpbuf, 1) == 0) {
printf("[RUN]\u00bf ICEBP\n");
+
/* Some emulators (e.g. QEMU TCG) don't emulate ICEBP. */

sethandler(SIGILL, handle_and_longjmp, SA_RESETHAND);
+
asm volatile ("mov %[ss], %[ss]; byte 0xf1 :: %[ss] \="m" (ss));
+
}
+
if (sigsetjmp(jmpbuf, 1) == 0) {
printf("[RUN]\u00bf CLI\n");

sethandler(SIGSEGV, handle_and_longjmp, SA_RESETHAND);

asm volatile ("mov %[ss], %[ss]; cli" :: %[ss] \="m" (ss));
+
}
+
if (sigsetjmp(jmpbuf, 1) == 0) {
printf("[RUN]\u00bf PP\n");

sethandler(SIGSEGV, handle_and_longjmp, SA_RESETHAND);

asm volatile ("mov %[ss], %[ss]; mov (-1), %[tmp]"+
+ : [tmp] \="r" (nr) : %[ss] \="m" (ss));
+
}
+ /*
+ * INT $1: if #DB has DPL=3 and there isn't special handling,
+ * then the kernel will die.
+ */
+if (sigsetjmp(jmpbuf, 1) == 0) {
+printf("[RUN]\tMOV SS; INT 1\n");
+sethandler(SIGSEGV, handle_and_longjmp, SA_RESETHAND);
+asm volatile ("mov %[ss], %%ss; int $1" :: [ss] "m" (ss));
+}
+
+#ifdef __x86_64__
+
+ /*
+ * In principle, we should test 32-bit SYSCALL as well, but
+ * the calling convention is so unpredictable that it's
+ * not obviously worth the effort.
+ */
+if (sigsetjmp(jmpbuf, 1) == 0) {
+printf("[RUN]\tMOV SS; SYSCALL\n");
+sethandler(SIGILL, handle_and_longjmp, SA_RESETHAND);
+nr = SYS_getpid;
+/*
+ * Toggle the high bit of RSP to make it noncanonical to
+ * strengthen this test on non-SMAP systems.
+ */
+asm volatile ("btc $63, %%rsp\unt"
+ + "mov %[ss], %%ss; syscall\unt"
+ + "btc $63, %rsp"
+ + : "+a" (nr) : [ss] "m" (ss)
+ + : "rcx"
+#ifdef __x86_64__
+ +, "r11"
+#endif
+);}
+#endif
+
+printf("[RUN]\tMOV SS; breakpointed NOP\n");
+asm volatile ("mov %[ss], %%ss; breakpoint_insn: nop" :: [ss] "m" (ss));
+
+/*
+ * Invoking SYSENTER directly breaks all the rules. Just handle
+ * the SIGSEGV.
+ */
+if (sigsetjmp(jmpbuf, 1) == 0) {
+printf("[RUN]\tMOV SS; SYSENTER\n");
+stack_t stack = {
+.ss_sp = altstack_data,
+.ss_size = SIGSTKSZ,
+};
+if (sigaltstack(&stack, NULL) != 0)
+err(1, "sigaltstack");
+sethandler(SIGSEGV, handle_and_longjmp, SA_RESETHAND | SA_ONSTACK);
+nr = SYS_getpid;
+asm volatile ("mov %[ss], %%ss; SYSENTER" : "+a" (nr)
+ : [ss] "m" (ss) : "flags", "rcx"
+#ifdef __x86_64__
+ , "r11"
+#endif
+);
+
+ /* We're unreachable here. SYSENTER forgets RIP. */
+ }
+
+if (sigsetjmp(jmpbuf, 1) == 0) {
+ printf("[RUN]\tMOV SS; INT $0x80
" +
+ );
+
+if (sigsetjmp(jmpbuf, 1) == 0) {
+ printf("[RUN]\tMOV SS; INT $0x80"");
+ sethandler(SIGSEGV, handle_and_longjmp, SA_RESETHAND);
+ nr = 20;/* compat getpid */
+ asm volatile ("mov %[ss], %%ss; int $0x80"
+ : "+a" (nr) : [ss] "m" (ss)
+ : "flags"
+#ifdef __x86_64__
+ , "r8", "r9", "r10", "r11"
+#endif
+ );
+
+printf("[OK]\0If aten't dead\n");
+ return 0;
+}
--- linux-4.15.0.orig/tools/testing/selftests/x86/mpx-mini-test.c
+++ linux-4.15.0/tools/testing/selftests/x86/mpx-mini-test.c
@@ -315,11 +315,39 @@
 return si->si_upper;
 }

 #else
+
+/*
+ * This deals with old version of _sigfault in some distros:
+ * 
+ +old__sigfault:
+ + struct {
+ + void *si_addr;
+ + }__sigfault;
+ +
+ */
+}

Open Source Used In 5GaaS Edge AC-4 36218
+new _sigfault:
+struct {
+void __user *__addr;
+int __trapno;
+short __addr_lsb;
+union {
+struct {
+void __user *__lower;
+void __user *__upper;
+} _addr_bnd;
+__u32 _pkey;
+};
+} _sigfault;
+	*
+	*/
+
static inline void **__si_bounds_hack(siginfo_t *si)
{
void *sigfault = &si->_sifields._sigfault;
void *end_sigfault = sigfault + sizeof(si->_sifields._sigfault);
-void **__si_lower = end_sigfault;
+int *__trapno = (int*)end_sigfault;
+*/ skip __trapno and __addr_lsb */
+void **__si_lower = (void**)(__trapno + 2);

return __si_lower;
}
@@ -331,7 +359,7 @@
static inline void *__si_bounds_upper(siginfo_t *si)
{
-return (*__si_bounds_hack(si)) + sizeof(void *);
+return *(__si_bounds_hack(si) + 1);
}
#endif

@@ -340,6 +368,11 @@
uint64_t shadow_plb[NR_MPX_BOUNDS_REGISTERS][2]; /* shadow MPX bound registers */
unsigned long shadow_map[NR_MPX_BOUNDS_REGISTERS];

+/* Failed address bound checks: */
+ifndef SEGV_BNDERR
+## define SEGV_BNDERR3
+#endif
+
/*
 * The kernel is supposed to provide some information about the bounds
 * exception in the siginfo. It should match what we have in the bounds

@@ -391,8 +424,6 @@
    br_count++;
    dprintf1("#BR 0x%jx (total seen: %d)\n", status, br_count);

-#define SEGV_BNDERR     3 /* failed address bound checks */
-
    dprintf2("Saw a #BR! status 0x%jx at %016lx br_reason: %jx\n", status, ip, br_reason);
    dprintf2("si_signo: %d\n", si->si_signo);
--- linux-4.15.0.orig/tools/testing/selftests/x86/pkey-helpers.h
+++ linux-4.15.0/tools/testing/selftests/x86/pkey-helpers.h
@@ -26,30 +26,26 @@
{
    va_list ap;

-va_start(ap, format);
+va_start(ap, format);
    if (!dprint_in_signal) {
-va_start(ap, format);
+va_start(ap, format);
    vprintf(format, ap);
+va_end(ap);
    } else {
        int ret;
-    int len = vsnprintf(dprint_in_signal_buffer,
-        DPRINT_IN_SIGNAL_BUF_SIZE,
-        format, ap);
+    int len = vsnprintf(dprint_in_signal_buffer,
+        DPRINT_IN_SIGNAL_BUF_SIZE,
+        format, ap);
+/*
+    * len is amount that would have been printed,
+    * but actual write is truncated at BUF_SIZE.
+    +* No printf() functions are signal-safe.
+    +* They deadlock easily. Write the format
+    +* string to get some output, even if
+    +* incomplete.
+    */
+if (len > DPRINT_IN_SIGNAL_BUF_SIZE)
    -len = DPRINT_IN_SIGNAL_BUF_SIZE;
    -ret = write(1, dprint_in_signal_buffer, len);
    +ret = write(1, format, strlen(format));
    if (ret < 0)
        -abort();
        +exit(1);
    }
    -va_end(ap);
    }
#define dprintf_level(level, args...) do {\n    if (level <= DEBUG_LEVEL)\n        sigsafe_printf(args);\n    -fflush(NULL);\n} while (0)
#define dprintf0(args...) dprintf_level(0, args)
#define dprintf1(args...) dprintf_level(1, args)
--- linux-4.15.0.orig/tools/testing/selftests/x86/protection_keys.c
+++ linux-4.15.0/tools/testing/selftests/x86/protection_keys.c
@@ -24,6 +24,7 @@
#define _GNU_SOURCE
#include <errno.h>
#include <linux/futex.h>
+include <time.h>
#include <sys/time.h>
#include <sys/syscall.h>
#include <string.h>
@@ -72,10 +73,9 @@
test_nr, iteration_nr):
    dprintf0("errno at assert: %d", errno);
    abort_hooks();
-    assert(condition);
+    exit(__LINE__);
}
} while (0)
#define raw_assert(cond) assert(cond)

void cat_into_file(char *str, char *file)
{
    @@ -87,12 +87,17 @@
    * these need to be raw because they are called under
    * pkey_assert()
    /*
-raw_assert(fd >= 0);
+if (fd < 0) {
    +fprintf(stderr, "error opening '%s'
 str);    
    +perror("error: ");
    +exit(__LINE__);
+    +
}    +
ret = write(fd, str, strlen(str));
    if (ret != strlen(str)) {
        perror("write to file failed");
        fprintf(stderr, "file: '%s' str: '%s'
", file, str);
-raw_assert(0);
+exit(__LINE__);
    }
    close(fd);
}
@@ -191,26 +196,30 @@
 ifdef __i386__

 ifndef SYS_mprotect_key

 Open Source Used In 5GaaS Edge AC-4  36221
-# define SYS_mprotect_key 380
+# define SYS_mprotect_key 380
#endif
+
 ifndef SYS_pkey_alloc
-# define SYS_pkey_alloc 381
-# define SYS_pkey_free 382
+# define SYS_pkey_alloc 381
+# define SYS_pkey_free 382
#endif
-# define REG_IP_IDX REG_EIP
-# define si_pkey_offset 0x14
+
+# define REG_IP_IDX REG_EIP
+# define si_pkey_offset 0x14

#else

ifndef SYS_mprotect_key
-# define SYS_mprotect_key 329
+# define SYS_mprotect_key 329
#endif
+
 ifndef SYS_pkey_alloc
-# define SYS_pkey_alloc 330
-# define SYS_pkey_free 331
+# define SYS_pkey_alloc 330
+# define SYS_pkey_free 331
#endif
-# define REG_IP_IDX REG_RIP
-# define si_pkey_offset 0x20
+
+# define REG_IP_IDX REG_RIP
+# define si_pkey_offset 0x20

#endif

@@ -225,8 +234,14 @@
}
}
}

-#define SEGV_BNDERR 3 /* failed address bound checks */
-#define SEGV_PKUERR 4
+/* Failed address bound checks: */
+#ifndef SEGV_BNDERR
+# define SEGV_BNDERR3
+#endif
+
+ifndef SEGV_PKUERR
+# define SEGV_PKUERR4
+#endif

static char *si_code_str(int si_code)
{
    @ -289.13 +304.6 @
dump_mem(pkru_ptr - 128, 256);
pkey_assert(*pkru_ptr);

    -si_pkey_ptr = (u32 *)(((u8 *)si) + si_pkey_offset);
    -dumpf1("si_pkey_ptr: %p\n", si_pkey_ptr);
    -dump_mem(si_pkey_ptr - 8, 24);
    -siginfo_pkey = *si_pkey_ptr;
    -pkey_assert(siginfo_pkey < NR_PKEYS);
    -last_si_pkey = siginfo_pkey;

    if ((si->si_code == SEGV_MAPERR) ||
        (si->si_code == SEGV_ACCERR) ||
        (si->si_code == SEGV_BNDERR)) {
        @ -303.6 +311.13 @
        exit(4);
    }

    +si_pkey_ptr = (u32 *)(((u8 *)si) + si_pkey_offset);
    +dumpf1("si_pkey_ptr: %p\n", si_pkey_ptr);
    +dump_mem((u8 *)si_pkey_ptr - 8, 24);
    +siginfo_pkey = *si_pkey_ptr;
    +pkey_assert(siginfo_pkey < NR_PKEYS);
    +last_si_pkey = siginfo_pkey;

    + dumpf1("signal pkru from xsave: %08x\n", *pkru_ptr);
    /* need __rdpkru() version so we do not do shadow_pkru checking */
    dumpf1("signal pkru from pkru: %08x\n", __rdpkru());
    @ -311.22 +326.6 @
    dumpf1("WARNING: set PRKU=0 to allow faulting instruction to continue\n");
    pkru_faults++;
    dumpf1("<<<<==================================================\n");
    return;
    -if (trapno == 14) {
    -dumpf(stderr, 
    -"ERROR: In signal handler, page fault, trapno = %d, ip = %016lx\n",
    -trapno, ip);
    -dumpf(stderr, "si_addr %p\n", si->si_addr);
    -dumpf(stderr, "REG_ERR: %lx\n",
    -(unsigned long)uctxt->uc_mcontext.gregs[REG_ERR]);
    -exit(1);
    -} else {


fprintf(stderr, "unexpected trap %d! at 0x%lx\n", trapno, ip);
fprintf(stderr, "si_addr %p\n", si->si_addr);
fprintf(stderr, "REG_ERR: %lx\n",
(unsigned long)uctxt->uc_mcontext.gregs[REG_ERR]);
exit(2);
}
dprint_in_signal = 0;
}

return forkret;
}

void davecmp(void *_a, void *_b, int len)
{
- int i;
- unsigned long *a = _a;
- unsigned long *b = _b;
-
- for (i = 0; i < len / sizeof(*a); i++) {
- if (a[i] == b[i])
- continue;
-
- dprintf3("[%3d]: a: %016lx b: %016lx\n", i, a[i], b[i]);
-}
-}
-
-void dumpit(char *f)
{
- int fd = open(f, O_RDONLY);
- char buf[100];
- int nr_read;
-
- dprintf2("maps fd: %d\n", fd);
- do {
- nr_read = read(fd, &buf[0], sizeof(buf));
- write(1, buf, nr_read);
- } while (nr_read > 0);
- close(fd);
-}
+#ifndef PKEY_DISABLE_ACCESS
+# define PKEY_DISABLE_ACCESS 0x1
+#endif

-#define PKEY_DISABLE_ACCESS 0x1
-#define PKEY_DISABLE_WRITE 0x2
+#ifndef PKEY_DISABLE_WRITE
+# define PKEY_DISABLE_WRITE 0x2
+#endif
- u32 pkey_get(int pkey, unsigned long flags)
  +static u32 hw_pkey_get(int pkey, unsigned long flags)
  {
    u32 mask = (PKEY_DISABLE_ACCESS | PKEY_DISABLE_WRITE);
    u32 pkru = __rdpkru();
    @@ -446,7 +422,7 @@
    return masked_pkru;
  }

-int pkey_set(int pkey, unsigned long rights, unsigned long flags)
+static int hw_pkey_set(int pkey, unsigned long rights, unsigned long flags)
  {
    u32 mask = (PKEY_DISABLE_ACCESS | PKEY_DISABLE_WRITE);
    u32 old_pkru = __rdpkru();
    @@ -480,15 +456,15 @@
    pkey, flags);
    pkey_assert(flags & (PKEY_DISABLE_ACCESS | PKEY_DISABLE_WRITE));

    -pkey_rights = pkey_get(pkey, syscall_flags);
    +pkey_rights = hw_pkey_get(pkey, syscall_flags);

    -dprintf1("%s(%d) pkey_get(%d): %x\n", __func__, pkey, pkey, pkey_rights);
    +dprintf1("%s(%d) hw_pkey_get(%d): %x\n", __func__, pkey, pkey, pkey_rights);
    pkey_assert(pkey_rights >= 0);

    pkey_rights |= flags;

    -ret = pkey_set(pkey, pkey_rights, syscall_flags);
    +ret = hw_pkey_set(pkey, pkey_rights, syscall_flags);
    assert(!ret);
    /* pkru and flags have the same format */
    shadow_pkru |= flags << (pkey * 2);
    @@ -496,8 +472,8 @@
    pkey_assert(ret >= 0);

    -pkey_rights = pkey_get(pkey, syscall_flags);
    +pkey_rights = hw_pkey_get(pkey, syscall_flags);

    -dprintf1("%s(%d) pkey_get(%d): %x\n", __func__, pkey, pkey, pkey_rights);
    +dprintf1("%s(%d) hw_pkey_get(%d): %x\n", __func__, pkey, pkey, pkey_rights);
    dprintf1("%s(%d) pkru: 0x%x\n", __func__, pkey, rdpkru());
    @@ -511,24 +487,24 @@

unsigned long syscall_flags = 0;
int ret;
-int pkey_rights = pkey_get(pkey, syscall_flags);
+int pkey_rights = hw_pkey_get(pkey, syscall_flags);
u32 orig_pkru = rdpkru();

pkey_assert(flags & (PKEY_DISABLE_ACCESS | PKEY_DISABLE_WRITE));

-dprintf1("%s(%d) pkey_get(%d): %x\n", __func__,
  pkey, syscall_flags);
+dprintf1("%s(%d) hw_pkey_get(%d): %x\n", __func__,
  pkey, syscall_flags);

pkey Assert(pkey_rights >= 0);

pkey_rights |= flags;

-ret = pkey_set(pkey, pkey_rights, 0);
+ret = hw_pkey_set(pkey, pkey_rights, 0);
/* pkru and flags have the same format */
shadow_pkru &= ~(flags << (pkey * 2));
pkey Assert(ret >= 0);

-pkey_rights = pkey_get(pkey, syscall_flags);
-dprintf1("%s(%d) pkey_get(%d): %x\n", __func__,
  pkey, syscall_flags);
+nprintf1("%s(%d) hw_pkey_get(%d): %x\n", __func__,
  pkey, syscall_flags);

pkey_rights = hw_pkey_get(pkey, syscall_flags);

-dprintf1("%s(%d) pkru: 0x%x\n", __func__, pkey, rdpkru());
@@ -640,7 +616,6 @@

/* allocate every possible key and make a note of which ones we got */
max_nr_pkey_allocs = NR_PKEYS;
-max_nr_pkey_allocs = 1;
for (i = 0; i < max_nr_pkey_allocs; i++) {
  int new_pkey = alloc_pkey();
  if (new_pkey < 0)
@@ -702,10 +677,12 @@
struct pkey_malloc_record {
  void *ptr;
  long size;
  +int prot;
  };
+struct pkey_malloc_record *pkey_malloc_records;
+struct pkey_malloc_record *pkey_last_malloc_record;
long nr_pkey_malloc_records;
-void record_pkey_malloc(void *ptr, long size)
+void record_pkey_malloc(void *ptr, long size, int prot)
long i;
struct pkey_malloc_record *rec = NULL;
@@ -737,6 +714,8 @@
    (int)(rec - pkey_malloc_records), rec, ptr, size);
    rec->ptr = ptr;
    rec->size = size;
+    rec->prot = prot;
    +pkey_last_malloc_record = rec;
    nr_pkey_malloc_records++;
}

@@ -781,7 +760,7 @@
pkey_assert(ptr != (void *)-1);
ret = mprotect_pkey((void *)ptr, PAGE_SIZE, prot, pkey);
pkey_assert(!ret);
-record_pkey_malloc(ptr, size);
+record_pkey_malloc(ptr, size, prot);
rdpkru();

dprintf1("%s() for pkey %d @ %p\n", __func__, pkey, ptr);
@@ -802,7 +781,7 @@
size = ALIGN_UP(size, HPAGE_SIZE * 2);
ptr = mmap(NULL, size, PROT_NONE, MAP_ANONYMOUS|MAP_PRIVATE, -1, 0);
pkey_assert(ptr != (void *)-1);
-record_pkey_malloc(ptr, size);
+record_pkey_malloc(ptr, size, prot);
mprotect_pkey(ptr, size, prot, pkey);

dprintf1("unaligned ptr: %p\n", ptr);
@@ -875,7 +854,7 @@
pkey_assert(ptr != (void *)-1);
mprotect_pkey(ptr, size, prot, pkey);

-record_pkey_malloc(ptr, size);
+record_pkey_malloc(ptr, size, prot);

dprintf1("mmap()'d hugetlbfs for pkey %d @ %p\n", pkey, ptr);
return ptr;
@@ -897,7 +876,7 @@
mprotect_pkey(ptr, size, prot, pkey);

-record_pkey_malloc(ptr, size);
+record_pkey_malloc(ptr, size, prot);

dprintf1("mmap()'d for pkey %d @ %p\n", pkey, ptr);
close(fd);
@@ -946,13 +925,21 @@
int last_pkru_faults;
+#define UNKNOWN_PKEY -2
void expected_pk_fault(int pkey)
{
    dprintf2("%s(): last_pkru_faults: %d pkru_faults: %d\n", __func__, last_pkru_faults, pkru_faults);
    dprintf2("%s(pkey: %d): %d\n", __func__, pkey, last_si_pkey);
    pkey_assert(last_pkru_faults + 1 == pkru_faults);
    -pkey_assert(last_si_pkey == pkey);
    +
    /*
     * For exec-only memory, we do not know the pkey in
     * advance, so skip this check.
     */
    +if (pkey != UNKNOWN_PKEY)
    +pkey_assert(last_si_pkey == pkey);
    +
    /*
     * The signal handler shold have cleared out PKRU to let the
     * test program continue. We now have to restore it.
     */
    @ @ -967,10 +954,11 @ @
    last_si_pkey = -1;
}
-
void do_not_expect_pk_fault(void)
-
{-
    -pkey_assert(last_pkru_faults == pkru_faults);
    -}
+#define do_not_expect_pk_fault(msg)do {
+    +if (last_pkru_faults != pkru_faults)
+        dprintf0("unexpected PK fault: %s\n", msg);
+    +pkey_assert(last_pkru_faults == pkru_faults);
+} while (0)

int test_fds[10] = { -1 };
int nr_test_fds;
@@ -1145,6 +1133,21 @@
pkey_assert(err);
}
+
void become_child(void)
{
    +
    +pid_t forkret;
    +
    +forkret = fork();
    +pkey_assert(forkret >= 0);
+dprintf3("[%d] fork() ret: %d\n", getpid(), forkret);
+
+if (!forkret) {
+ /* in the child */
+ return;
+}
+exit(0);
+
+ /* Assumes that all pkeys other than 'pkey' are unallocated */
void test_pkey_alloc_exhaust(int *ptr, u16 pkey)
{
    int nr_allocated_pkeys = 0;
    int i;

    for (i = 0; i < NR_PKEYS*2; i++) {
+for (i = 0; i < NR_PKEYS*3; i++) {
        int new_pkey;
        dprintf1("%s() alloc loop: %d\n", __func__, i);
        new_pkey = alloc_pkey();
@@ -1164,27 +1167,36 @@
        if ((new_pkey == -1) && (errno == ENOSPC)) {
            dprintf2("%s() failed to allocate pkey after %d tries\n", __func__, nr_allocated_pkeys);
            break;
+} else {
+    /* Ensure the number of successes never
+    * exceeds the number of keys supported
+    * in the hardware.
+    */
+    +pkey_assert(nr_allocated_pkeys < NR_PKEYS);
+    +allocated_pkeys[nr_allocated_pkeys++] = new_pkey;
    }
    -pkey_assert(nr_allocated_pkeys < NR_PKEYS);
    -allocated_pkeys[nr_allocated_pkeys++] = new_pkey;
+
+ /* Make sure that allocation state is properly
+ preserved across fork().
+ */
+if (i == NR_PKEYS*2)
+ become_child();
    }

dprintf3("%s():%d\n", __func__, __LINE__);
/*
 * ensure it did not reach the end of the loop without
 * failure:
 * There are 16 pkeys supported in hardware.  Three are
 * allocated by the time we get here:
 * 1. The default key (0)
 * 2. One possibly consumed by an execute-only mapping.
 * 3. One allocated by the test code and passed in via
 *    'pkey' to this function.
 * Ensure that we can allocate at least another 13 (16-3).
 */
-pkey_assert(i < NR_PKEYS*2);
-
-/*
 * There are 16 pkeys supported in hardware.  One is taken
 * up for the default (0) and another can be taken up by
 * an execute-only mapping.  Ensure that we can allocate
 * at least 14 (16-2).
 */
-pkey_assert(i >= NR_PKEYS-2);
+pkey_assert(i >= NR_PKEYS-3);

for (i = 0; i < nr_allocated_pkeys; i++) {
    err = sys_pkey_free(allocated_pkeys[i]);
}
+prot = pkey_last_malloc_record->prot;
+
+/* Use pkey 0 */
+mprotect_pkey(ptr, size, prot, 0);
+
+/* Make sure that we can set it back to the original pkey. */
+mprotect_pkey(ptr, size, prot, pkey);
+
}
+
void test_ptrace_of_child(int *ptr, u16 pkey)
{

    __attribute__((__unused__)) int peek_result;
    @@ -1256,7 +1297,7 @@
        pkey_assert(ret != -1);
        /* Now access from the current task, and expect NO exception: */
        peek_result = read_ptr(plain_ptr);
    -do_not_expect_pk_fault();
    +do_not_expect_pk_fault("read plain pointer after ptrace");

    ret = ptrace(PTRACE_DETACH, child_pid, ignored, 0);
    pkey_assert(ret != -1);
    @@ -1269,12 +1310,9 @@
        free(plain_ptr_unaligned);
    }

-void test_executing_on_unreadable_memory(int *ptr, u16 pkey)
+void *get_pointer_to_instructions(void)
{
    void *p1;
    -int scratch;
    -int ptr_contents;
    -int ret;

    p1 = ALIGN_PTR_UP(&lots_o_noops_around_write, PAGE_SIZE);
    dprintf3("&lots_o_noops: %p\n", &lots_o_noops_around_write);
    @@ -1284,7 +1322,23 @@
        /* Point 'p1' at the *second* page of the function: */
        p1 += PAGE_SIZE;

        + /* Try to ensure we fault this in on next touch to ensure
        + we get an instruction fault as opposed to a data one
        + */
        madvise(p1, PAGE_SIZE, MADV_DONTNEED);
        +
        +return p1;
    +}
    +
    +
+void test_executing_on_unreadable_memory(int *ptr, u16 pkey)
+{
+void *p1;
+int scratch;
+int ptr_contents;
+int ret;
+
+p1 = get_pointer_to_instructions();
lots_o_noops_around_write(&scratch);
ptr_contents = read_ptr(p1);
dprintf2("ptr (%p) contents@%d: %x\n", p1, __LINE__, ptr_contents);
@@ -1300,12 +1354,55 @@*/
advise(p1, PAGE_SIZE, MADV_DONTNEED);
lots_o_noops_around_write(&scratch);
do_not_expect_pk_fault();
+do_not_expect_pk_fault("executing on PROT_EXEC memory");
ptr_contents = read_ptr(p1);
dprintf2("ptr (%p) contents@%d: %x\n", p1, __LINE__, ptr_contents);
expected_pk_fault(pkey);
}

+void test_implicit_mprotect_exec_only_memory(int *ptr, u16 pkey)
+{
+void *p1;
+int scratch;
+int ptr_contents;
+int ret;
+
+dprintf1("%s() start\n", __func__);
+
+p1 = get_pointer_to_instructions();
lots_o_noops_around_write(&scratch);
ptr_contents = read_ptr(p1);
dprintf2("ptr (%p) contents@%d: %x\n", p1, __LINE__, ptr_contents);
+
+/* Use a *normal* mprotect(), not mprotect_pkey(): */
+ret = mprotect(p1, PAGE_SIZE, PROT_EXEC);
pkey_assert(!ret);
+
+dprintf2("pkru: %x\n", rdpkru());
+
+/* Make sure this is an *instruction* fault */
+advise(p1, PAGE_SIZE, MADV_DONTNEED);
lots_o_noops_around_write(&scratch);
do_not_expect_pk_fault("executing on PROT_EXEC memory");
ptr_contents = read_ptr(p1);
dprintf2("ptr (%p) contents@%d: %x\n", p1, __LINE__, ptr_contents);
expected_pk_fault(UNKNOWN_PKEY);
+
+/
+ * Put the memory back to non-PROT_EXEC. Should clear the
+ * exec-only pkey off the VMA and allow it to be readable
+ * again. Go to PROT_NONE first to check for a kernel bug
+ * that did not clear the pkey when doing PROT_NONE.
+ */
+ret = mprotect(p1, PAGE_SIZE, PROT_NONE);
pkey_assert(!ret);
+
+ret = mprotect(p1, PAGE_SIZE, PROT_READ|PROT_EXEC);
pkey_assert(!ret);
+ptr_contents = read_ptr(p1);
do_not_expect_pk_fault("plain read on recently PROT_EXEC area");
+
void test_mprotect_pkey_on_unsupported_cpu(int *ptr, u16 pkey)
{
int size = PAGE_SIZE;
@test_kernel_gup_of_access_disabled_region,
test_kernel_gup_write_to_write_disabled_region,
test_executing_on_unreadable_memory,
test_implicit_mprotect_exec_only_memory,
test_mprotect_with_pkey_0,
test_ptrace_of_child,
test_pkey_syscalls_on_non_allocated_pkey,
test_pkey_syscalls_bad_args,
{int nr_iterations = 22;
+srand((unsigned int)time(NULL));
+
setupHandlers();

printf("has pku: %d\n", cpu_has_pku());
--- linux-4.15.0.orig/tools/testing/selftests/x86/ptrace_syscall.c
+++ linux-4.15.0/tools/testing/selftests/x86/ptrace_syscall.c
@@ -183,8 +183,10 @@
if (ptrace(PTRACE_TRACEME, 0, 0, 0) != 0)
err(1, "PTRACE_TRACEME");
+pid_t pid = getpid(), tid = syscall(SYS_gettid);
+
printf("\nChild will make one syscall\n");
-raise(SIGSTOP);
+syscall(SYS_tgkill, pid, tid, SIGSTOP);

syscall(SYS_gettid, 10, 11, 12, 13, 14, 15);
_exit(0);
@@ -301,9 +303,11 @@
if (ptrace(PTRACE_TRACEME, 0, 0, 0) != 0)
err(1, "PTRACE_TRACEME");

+pid_t pid = getpid(), tid = syscall(SYS_gettid);
+
printf("Child will take a nap until signaled\n");
setsigign(SIGUSR1, SA_RESTART);
raise(SIGSTOP);
+syscall(SYS_tgkill, pid, tid, SIGSTOP);

syscall(SYS_pause, 0, 0, 0, 0, 0);
_exit(0);
@@ -410,8 +414,12 @@
#if defined(__i386__) && (!defined(__GLIBC__) || __GLIBC__ > 2 || __GLIBC_MINOR__ >= 16)
  vsyscall32 = (void *)getauxval(AT_SYSINFO);
-printf("[RUN]tCheck AT_SYSINFO return regs\n");
-test_sys32_regs(do_full_vsyscall32);
+if (vsyscall32) {
+  printf("[RUN]tCheck AT_SYSINFO return regs\n");
+  test_sys32_regs(do_full_vsyscall32);
+} else {
+  printf("[SKIP]tAT_SYSINFO is not available\n");
+}
#endif

test_ptrace_syscall_restart();
--- linux-4.15.0.orig/tools/testing/selftests/x86/sigreturn.c
+++ linux-4.15.0/tools/testing/selftests/x86/sigreturn.c
@@ -610,21 +610,41 @@
/*
 for (int i = 0; i < NGREG; i++) {
  greg_t req = requested_regs[i], res = resulting_regs[i];
+  if (i == REG_TRAPNO || i == REG_IP)
   continue;/* don't care */
-  if (i == REG_SP) {
-    printf("tSP: %llx -> %llx\n", (unsigned long long)req,
-       (unsigned long long)res);
+  if (i == REG_SP) {
+    /*
-     * In many circumstances, the high 32 bits of rsp

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- * are zeroed. For example, we could be a real
- * 32-bit program, or we could hit any of a number
- * of poorly-documented IRET or segmented ESP
- * oddities. If this happens, it's okay.
+ * If we were using a 16-bit stack segment, then
+ * the kernel is a bit stuck: IRET only restores
+ * the low 16 bits of ESP/RSP if SS is 16-bit.
+ * The kernel uses a hack to restore bits 31:16,
+ * but that hack doesn't help with bits 63:32.
+ * On Intel CPUs, bits 63:32 end up zeroed, and, on
+ * AMD CPUs, they leak the high bits of the kernel
+ * espfix64 stack pointer. There's very little that
+ * the kernel can do about it.
+ *
+ * Similarly, if we are returning to a 32-bit context,
+ * the CPU will often lose the high 32 bits of RSP.
*/
-if (res == (req & 0xFFFFFFFF))
-continue; /* OK; not expected to work */
+
+if (res == req)
+continue;
+
+if (cs_bits != 64 && ((res ^ req) & 0xFFFFFFFF) == 0) {
+printf("[NOTE]\tSP: %llx -> %llx
",
+       (unsigned long long)req,
+       (unsigned long long)res);
+continue;
+}
+
+printf("[FAIL]\tSP mismatch: requested 0x%llx; got 0x%llx\n",
+       (unsigned long long)requested_regs[i],
+       (unsigned long long)resulting_regs[i]);
+nerrs++;
+continue;
}

bool ignore_reg = false;
@@ -654,25 +674,18 @@
#endif
/* Sanity check on the kernel */
-if (i == REG_CX && requested_regs[i] != resulting_regs[i]) {
+if (i == REG_CX && req != res) {
    printf("[FAIL]\tCX (saved SP) mismatch: requested 0x%llx; got 0x%llx\n",
       (unsigned long long)requested_regs[i],
       (unsigned long long)resulting_regs[i]);
+nerrs++;
    continue;
}
+ (unsigned long long)res);
nerrs++; continue;
}

- if (requested_regs[i] != resulting_regs[i] && !ignore_reg) {
   /*
   * SP is particularly interesting here. The
   * usual cause of failures is that we hit the
   * nasty IRET case of returning to a 16-bit SS,
   * in which case bits 16:31 of the *kernel*
   * stack pointer persist in ESP.
   * */
   + if (req != res && !ignore_reg) {
     printf("[FAIL]\tReg %d mismatch: requested 0x%llx; got 0x%llx\n",
          i, (unsigned long long)requested_regs[i],
          (unsigned long long)resulting_regs[i]);
     + i, (unsigned long long)req,
     + (unsigned long long)res);
     nerrs++; }
}

--- linux-4.15.0.orig/tools/testing/selftests/x86/single_step_syscall.c
+++ linux-4.15.0/tools/testing/selftests/x86/single_step_syscall.c
@@ -119,7 +119,9 @@
 int main()
 {
+  #ifdef CAN_BUILD_32
 int tmp;
+  #endif

  sethandler(SIGTRAP, sigtrap, 0);

@@ -139,12 +141,13 @@
             : "c" (post_nop) : "r11";
          check_result();
+        #endif
+    -
+  #ifdef CAN_BUILD_32
 printf("[RUN]\tSet TF and check int80\n");
              set_eflags(get_eflags() | X86_EFLAGS_TF);
              asm volatile("int $0x80": "=a" (tmp) : "a" (SYS_getpid)
               : INT80_CLOBBERS);
              check_result();
+        #endif

 /*
* This test is particularly interesting if fast syscalls use
--- linux-4.15.0.orig/tools/testing/selftests/x86/syscall_nt.c
+++ linux-4.15.0/tools/testing/selftests/x86/syscall_nt.c
@@ -67,6 +67,7 @@
    set_eflags(get_eflags() | extraflags);
    syscall(SYS_getpid);
    flags = get_eflags();
+    set_eflags(X86_EFLAGS_IF | X86_EFLAGS_FIXED);
    if ((flags & extraflags) == extraflags) {
        printf("[OK]\tThe syscall worked and flags are still set\n");
    } else {
--- linux-4.15.0.orig/tools/testing/selftests/x86/test_mremap_vdso.c
+++ linux-4.15.0/tools/testing/selftests/x86/test_mremap_vdso.c
@@ -90,8 +90,12 @@
        vdso_size += PAGE_SIZE;
    }

+#ifdef __i386__
/* Glibc is likely to explode now - exit with raw syscall */
asm volatile("int $0x80": : "a" (__NR_exit), "b" (!ret));
+#else /* __x86_64__ */
+    syscall(SYS_exit, ret);
+#endif
} else {
    int status;
--- linux-4.15.0.orig/tools/testing/selftests/x86/test_syscall_vdso.c
+++ linux-4.15.0/tools/testing/selftests/x86/test_syscall_vdso.c
@@ -100,12 +100,19 @@
        "shl	$32, %r8n"
        "orq$0x7f7f7f7f, %r8n"
        "movq%r8, %r9n"
-        "movq%r8, %r10n"
-        "movq%r8, %r11n"
-        "movq%r8, %r12n"
-        "movq%r8, %r13n"
-        "movq%r8, %r14n"
-        "movq%r8, %r15n"
+        "incq%r9n"
+        "movq%r9, %r10n"
+        "incq%r10n"
+        "movq%r10, %r11n"
+        "incq%r11n"
+        "movq%r11, %r12n"
+        "incq%r12n"
+        "movq%r12, %r13n"
+        "incq%r13n"
+        "movq%r13, %r14n"
"incq\%r14\n"
"movq\%r14, \%r15\n"
"incq\%r15\n"
"ret\n"
".code32\n"
".popsection\n"
@@ -128,12 +135,13 @@
int err = 0;
int num = 8;
uint64_t *r64 = &regs64.r8;
+uint64_t expected = 0x7f7f7f7f7f7f7f7fULL;

if (!kernel_is_64bit)
    return 0;

do {
    -if (*r64 == 0x7f7f7f7f7f7f7f7fULL)
+    if (*r64 == expected++)
        continue; /* register did not change */
    if (syscall_addr != (long)&int80) {
        /* INT80 syscall entrypoint can be used by
 + * INT80 syscall entrypoint can be used by
 + * 64-bit programs too, unlike SYSCALL/SYSENTER.
 + * Therefore it must preserve R12+
 + * (they are callee-saved registers in 64-bit C ABI).
 + *
 + * This was probably historically not intended,
 + * but R8..11 are clobbered (cleared to 0).
 + * IOW: they are the only registers which aren't
 + * preserved across INT80 syscall.
 + * Starting in Linux 4.17 (and any kernel that
 + * backports the change), R8..11 are preserved.
 + * Historically (and probably unintentionally), they
 + * were clobbered or zeroed.
 + */
    -if (*r64 == 0 && num <= 11)
    -continue;
+    } else {
+        -/* INT80 syscall entrypoint can be used by
+        + */
+        + * INT80 syscall entrypoint can be used by
+        + * 64-bit programs too, unlike SYSCALL/SYSENTER.
+        + * Therefore it must preserve R12+
+        + * (they are callee-saved registers in 64-bit C ABI).
+        + *
+        + * This was probably historically not intended,
+        + * but R8..11 are clobbered (cleared to 0).
+        + * IOW: they are the only registers which aren't
+        + * preserved across INT80 syscall.
+        + * Starting in Linux 4.17 (and any kernel that
+        + * backports the change), R8..11 are preserved.
+        + * Historically (and probably unintentionally), they
+        + * were clobbered or zeroed.
+        */
        -if (*r64 == 0 && num <= 11)
        -continue;
        }
    printf("[FAIL]\tR%d has changed:%016llx\n", num, *r64);
    err++;
    --- linux-4.15.0.orig/tools/testing/selftests/x86/test_vdso.c
+++ linux-4.15.0/tools/testing/selftests/x86/test_vdso.c

#include <errno.h>
#include <sched.h>
#include <stdbool.h>
+#include <limits.h>

#ifndef SYS_getcpu
# ifdef __x86_64__
@@ -26,20 +27,67 @@
# endif
#endif

+/* max length of lines in /proc/self/maps - anything longer is skipped here */
+#define MAPS_LINE_LEN 128
+
int nerrs = 0;

-#ifdef __x86_64__
-# define VSYS(x) (x)
-#else
-# define VSYS(x) 0
-endif
+typedef int (*vgettime_t)(clockid_t, struct timespec *);
++vgettime_t vdso_clock_gettime;
+
+typedef long (*vgtod_t)(struct timeval *, struct timezone *tz);
++vgtod_t vdso_gettimeofday;

typedef long (*getcpu_t)(unsigned *, unsigned *, void *);

-const getcpu_t vgetcpu = (getcpu_t)VSYS(0xffffffff600800);
+getcpu_t vgetcpu;
getcpu_t vdso_getcpu;

-void fill_function_pointers()
+static void *vsyscall_getcpu(void)
+{
+#ifdef __x86_64__
+FILE *maps;
+char line[MAPS_LINE_LEN];
+bool found = false;
+maps = fopen("/proc/self/maps", "r");
+if (!maps) /* might still be present, but ignore it here, as we test vDSO not vsyscall */
+return NULL;
+}
while (fgets(line, MAPS_LINE_LEN, maps)) {
    char r, x;
    void *start, *end;
    char name[MAPS_LINE_LEN];
    
    /* sscanf() is safe here as strlen(name) >= strlen(line) */
    if (sscanf(line, "%p-%p %c-%cp %*x %*x:%*x %*u %s",
                &start, &end, &r, &x, name) != 5)
        continue;
    
    if (strcmp(name, "[vsyscall]"))
        continue;
    
    /* assume entries are OK, as we test vDSO here not vsyscall */
    found = true;
    break;
}

fclose(maps);

if (!found) {
    printf("Warning: failed to find vsyscall getcpu\n");
    return NULL;
}

return (void *) (0xffffffffff600800);
}

#else
    return NULL;
#endif

static void fill_function_pointers()
{
    void *vdso = dlopen("linux-vdso.so.1",
            RTLD_LAZY | RTLD_LOCAL | RTLD_NOLOAD);
    @ @ -54,6 +102,17 @ @
    vdso_getcpu = (getcpu_t)dlsym(vdso, "__vdso_getcpu");
    if (!vdso_getcpu)
        printf("Warning: failed to find getcpu in vDSO\n");
    
    +vgetcpu = (getcpu_t) vsyscall_getcpu();
    +
    +vdso_clock_gettime = (vgettime_t)dlsym(vdso, "__vdso_clock_gettime");
    +if (!vdso_clock_gettime)
        printf("Warning: failed to find clock_gettime in vDSO\n");
    +
    +vdso_gettimeofday = (vgtod_t)dlsym(vdso, "__vdso_gettimeofday");
    +if (!vdso_gettimeofday)
printf("Warning: failed to find gettimeofday in vDSO\n");
+
}

static long sys_getcpu(unsigned * cpu, unsigned * node,
@@ -62,6 +121,16 @@
return syscalls(__NR_getcpu, cpu, node, cache);
 }

+static inline int sys_clock_gettime(clockid_t id, struct timespec *ts)
+{
+return syscall(__NR_clock_gettime, id, ts);
+}
+
+static inline int sys_gettimeofday(struct timeval *tv, struct timezone *tz)
+{
+return syscall(__NR_gettimeofday, tv, tz);
+}
+
static void test_getcpu(void)
{
printf("[RUN]\tTesting getcpu...\n");
@@ -114,10 +183,154 @@
}
}

+static bool ts_leq(const struct timespec *a, const struct timespec *b)
+{
+if (a->tv_sec != b->tv_sec)
+return a->tv_sec < b->tv_sec;
+else
+return a->tv_nsec <= b->tv_nsec;
+}
+
+static bool tv_leq(const struct timeval *a, const struct timeval *b)
+{
+if (a->tv_sec != b->tv_sec)
+return a->tv_sec < b->tv_sec;
+else
+return a->tv_usec <= b->tv_usec;
+}
+
+static char const * const clocknames[] = {
+[0] = "CLOCK_REALTIME",
+[1] = "CLOCK_MONOTONIC",

+[5] = "CLOCK_REALTIME_COARSE",
+[7] = "CLOCK_BOOTTIME",
+[8] = "CLOCK_REALTIME_ALARM",
+[9] = "CLOCK_BOOTTIME_ALARM",
+[10] = "CLOCK_SGI_CYCLE",
+};
+
+static void test_one_clock_gettime(int clock, const char *name)
+{
+    struct timespec start, vdso, end;
+    int vdso_ret, end_ret;
+
+    printf("[RUN]\tTesting clock_gettime for clock %s (%d)...\n", name, clock);
+    
+    if (sys_clock_gettime(clock, &start) < 0) {
+        if (errno == EINVAL) {
+            vdso_ret = vdso_clock_gettime(clock, &vdso);
+            if (vdso_ret == -EINVAL) {
+                printf("[OK]\tNo such clock.\n");
+            } else {
+                printf("[WARN]\t sys_clock_gettime(%d) syscall returned error %d\n", clock, errno);
+                return;
+            }
+        } else {
+            printf("[FAIL]\tNo such clock, but __vdso_clock_gettime returned %d\n", vdso_ret);
+        } ++nerrs;
+    } else {
+        printf("[FAIL]\tNo such clock, but __vdso_clock_gettime returned %d\n", vdso_ret);
+    } ++nerrs;
+    
+    if (!ts_leq(&start, &vdso) || !ts_leq(&vdso, &end)) {
+        printf("[FAIL]\tTimes are out of sequence\n");
+    } ++nerrs;
+    
+    +print("%llu.%09ld %llu.%09ld %llu.%09ld\n",
+    (unsigned long long)start.tv_sec, start.tv_nsec,
+    (unsigned long long)vdso.tv_sec, vdso.tv_nsec,
+    (unsigned long long)end.tv_sec, end.tv_nsec);
+    
+    +if (!ts_leq(&start, &vdso) || !ts_leq(&vdso, &end)) {
+        printf("[FAIL]\tTimes are out of sequence\n");
+    } ++nerrs;
+nerrs++;
+
+static void test_clock_gettime(void)
+{
+for (int clock = 0; clock < sizeof(clocknames) / sizeof(clocknames[0]);
+    clock++) {
+test_one_clock_gettime(clock, clocknames[clock]);
+}
+
+/* Also test some invalid clock ids */
+test_one_clock_gettime(-1, "invalid");
+test_one_clock_gettime(INT_MIN, "invalid");
+test_one_clock_gettime(INT_MAX, "invalid");
+}
+
+static void test_gettimeofday(void)
+{
+struct timeval start, vdso, end;
+struct timezone sys_tz, vdso_tz;
+int vdso_ret, end_ret;
+
+if (!vdso_gettime)
+    return;
+
+printf("[RUN]\tTesting gettimeofday...
");
+
+if (sys_gettimeofday(&start, &sys_tz) < 0) {
+    printf("[FAIL]\tsys_gettimeofday failed (%d)\n", errno);
+    nerrs++;
+    return;
+}
+
+vdso_ret = vdso_gettime(&vdso, &vdso_tz);
+end_ret = sys_gettimeofday(&end, NULL);
+
+if (vdso_ret != 0 || end_ret != 0) {
+    printf("[FAIL]\tvDSO returned %d, syscall errno=%d\n",
+           vdso_ret, errno);
+    nerrs++;
+    return;
+}
+
+printf("%llu.%06ld %llu.%06ld %llu.%06ld
",
+        (unsigned long long)start.tv_sec, start.tv_usec,
+        (unsigned long long)vdso.tv_sec, vdso.tv_usec,
+        (unsigned long long)end.tv_sec, end.tv_usec);
+if (!tv_leq(&start, &vdso) || !tv_leq(&vdso, &end)) {
+printf("[FAIL]\tTimes are out of sequence\n");
+nerrs++;
+}
+
+if (sys_tz.tz_minuteswest == vdso_tz.tz_minuteswest &&
+ sys_tz.tz_dsttime == vdso_tz.tz_dsttime) {
+printf("[OK]\ttimezones match: minuteswest=%d, dsttime=%d\n",
+ sys_tz.tz_minuteswest, sys_tz.tz_dsttime);
+} else {
+printf("[FAIL]\ertimezones do not match\n");
+nerrs++;
+}
+
+/* And make sure that passing NULL for tz doesn't crash. */
+vdso_gettimeofday(&vdso, NULL);
+}
+
+int main(int argc, char **argv)
+{
+fill_function_pointers();
+
+test_clock_gettime();
+test_gettimeofday();
+
+/*
+ * Test getcpu() last so that, if something goes wrong setting affinity,
+ * we still run the other tests.
+ */
+test_getcpu();
+
+return nerrs ? 1 : 0;
--- linux-4.15.0.orig/tools/testing/selftests/x86/test_vsyscall.c
+++ linux-4.15.0/tools/testing/selftests/x86/test_vsyscall.c
@@ -33,6 +33,9 @@
#endif
#endif
+/* max length of lines in /proc/self/maps - anything longer is skipped here */
+#define MAPS_LINE_LEN 128
+
+static void sethandler(int sig, void (*handler)(int, siginfo_t *, void *),
+                        int flags)
+{ 
+    @ @ -98,7 +101,7 @ @
+#ifdef __x86_64__
+    int nerrs = 0;
+    @ @ -33,6 +33,9 @ @
+    #endif
+    #endif
+    @ @ -98,7 +101,7 @ @
FILE *maps;
-char line[128];
+char line[MAPS_LINE_LEN];
bool found = false;

maps = fopen("/proc/self/maps", "r");
@@ -108,10 +111,12 @@
return 0;
}

-while (fgets(line, sizeof(line), maps)) {
+while (fgets(line, MAPS_LINE_LEN, maps)) {
char r, x;
void *start, *end;
-char name[128];
+char name[MAPS_LINE_LEN];
+	/* sscanf() is safe here as strlen(name) >= strlen(line) */
if (sscanf(line, "%p-%p %c-%cp %*x %*x:%*x %*u %s",
    &start, &end, &r, &x, name) != 5)
continue;
--- linux-4.15.0.orig/tools/testing/selftests/zram/zram.sh
+++ linux-4.15.0/tools/testing/selftests/zram/zram.sh
@@ -2,6 +2,9 @@
# SPDX-License-Identifier: GPL-2.0
TCID="zram.sh"

+# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+
+. /zram_lib.sh

run_zram () {
@@ -24,5 +27,5 @@
else
echo "$TCID : No zram.ko module or /dev/zram0 device file not found"
echo "$TCID : CONFIG_ZRAM is not set"
-exit 1
+exit $ksft_skip
fi
--- linux-4.15.0.orig/tools/testing/selftests/zram/zram_lib.sh
+++ linux-4.15.0/tools/testing/selftests/zram/zram_lib.sh
@@ -18,6 +18,9 @@
dev_makeswap=-1
dev Mounted=-1

+# Kselftest framework requirement - SKIP code is 4.
+ksft_skip=4
+ trap INT

check_prereqs()
@@ -27,7 +30,7 @@

if [ $uid -ne 0 ]; then
echo $msg must be run as root >&2
- exit 0
+ exit $ksft_skip
fi
}

--- linux-4.15.0.orig/tools/thermal/tmon/sysfs.c
+++ linux-4.15.0/tools/thermal/tmon/sysfs.c
@@ -486,6 +486,7 @@

int update_thermal_data()
{
    int i;
+    int next_thermal_record = cur_thermal_record + 1;
    char tz_name[256];
    static unsigned long samples;

    @@ -495,9 +496,9 @@
}

/* circular buffer for keeping historic data */
-if (cur_thermal_record >= NR_THERMAL_RECORDS)
-cur_thermal_record = 0;
-gettimeofday(&trec[cur_thermal_record].tv, NULL);
+if (next_thermal_record >= NR_THERMAL_RECORDS)
+next_thermal_record = 0;
+gettimeofday(&trec[next_thermal_record].tv, NULL);
    if (tmon_log) {
        fprintf(tmon_log, "%lu ", ++samples);
        fprintf(tmon_log, "%3.1f ", p_param.t_target);
 @@ -507,11 +508,12 @@
        snprintf(tz_name, 256, "%s/%s%d", THERMAL_SYSFS, TZONE, ptdata.tzi[i].instance);
        sysfs_get_ulong(tz_name, "temp",
-        &trec[cur_thermal_record].temp[i]);
+        &trec[next_thermal_record].temp[i]);
        if (tmon_log)
            fprintf(tmon_log, "%lu ",
-            trec[cur_thermal_record].temp[i]/1000);
+            trec[next_thermal_record].temp[i] / 1000);
    }
+    cur_thermal_record = next_thermal_record;
for (i = 0; i < ptdata.nr_cooling_dev; i++) {
    char cdev_name[256];
    unsigned long val;
    -- linux-4.15.0.orig/tools/thermal/tmon/tmon.c
    +++ linux-4.15.0/tools/thermal/tmon/tmon.c
    @ @ -336,7 +336,6 @@
    show_data_w();
    show_cooling_device();
}
-cur_thermal_record++;
time_elapsed += ticktime;
controller_handler(trec[0].temp[target_tz_index] / 1000, &yk);
--- linux-4.15.0.orig/tools/usb/Makefile
+++ linux-4.15.0/tools/usb/Makefile
@@ -1,7 +1,6 @@
# SPDX-License-Identifier: GPL-2.0
# Makefile for USB tools

-CC = $(CROSS_COMPILE)gcc
PTHREAD_LIBS = -lpthread
WARNINGS = -Wall -Wextra
CFLAGS = $(WARNINGS) -g -I../include
--- linux-4.15.0.orig/tools/usb/ffs-test.c
+++ linux-4.15.0/tools/usb/ffs-test.c
@@ -44,12 +44,25 @@
    
    #define cpu_to_le16(x)  htole16(x)
    #define cpu_to_le32(x)  htole32(x)
+/*
+ * cpu_to_le16/32 are used when initializing structures, a context where a
+ * function call is not allowed. To solve this, we code cpu_to_le16/32 in a way
+ * that allows them to be used when initializing structures.
+ */
+
+#if __BYTE_ORDER == __LITTLE_ENDIAN
+#define cpu_to_le16(x)  (x)
+#define cpu_to_le32(x)  (x)
+#else
+#define cpu_to_le16(x)  (((x) >> 8) & 0xffu) | (((x) & 0xffu) << 8))
+#define cpu_to_le32(x)  
+(((x) & 0xffff0000u) >> 24) | (((x) & 0x00ff0000u) >> 8) | 
+(((x) & 0x0000ff00u) << 8) | (((x) & 0x000000ffu) << 24))
+#endif
+
#define le32_to_cpu(x)  le32toh(x)
#define le16_to_cpu(x)  le16toh(x)

/******************** Messages and Errors ********************/

static const char argv0[] = "ffs-test";
--- linux-4.15.0.orig/tools/usb/testusb.c
+++ linux-4.15.0/tools/usb/testusb.c
@@ -278,12 +278,6 @@
entry->ifnum = ifnum;
-
-/* FIXME update USBDEVFS_CONNECTINFO so it tells about high speed etc */
-
-fprintf(stderr, "%s speed\t%st\t%u\n",
-speed(entry->speed), entry->name, entry->ifnum);
-
entry->next = testdevs;
testdevs = entry;
return 0;
@@ -312,6 +306,14 @@
return 0;
}

+status = ioctl(fd, USBDEVFS_GET_SPEED, NULL);
+if (status < 0)
+-printf(stderr, "USBDEVFS_GET_SPEED failed %d\n", status);
+else
+dev->speed = status;
+-printf(stderr, "%s speed\t%st\t%u\n",
+-speed(dev->speed), dev->name, dev->ifnum);
+
restart:
for (i = 0; i < TEST_CASES; i++) {
if (dev->test != -1 & & dev->test != i)
--- linux-4.15.0.orig/tools/usb/usbip/libsrc/usbip_device_driver.c
+++ linux-4.15.0/tools/usb/usbip/libsrc/usbip_device_driver.c
@@ -81,7 +81,7 @@
FILE *fd = NULL;
struct udev_device *plat;
const char *speed;
-int ret = 0;
+size_t ret;

plat = udev_device_get_parent(sdev);
path = udev_device_get_syspath(plat);
@@ -91,8 +91,10 @@

if (!fd)
  return -1;
ret = fread((char *) &descr, sizeof(descr), 1, fd);
-if (ret < 0)
+if (ret != 1) {
+  err("Cannot read vudec device descr file: %s", strerror(errno));
  return -1;
+}
fclose(fd);

copy_descr_attr(dev, &descr, bDeviceClass);
--- linux-4.15.0.orig/tools/usb/usbip/libsrc/usbip_host_common.c
+++ linux-4.15.0/tools/usb/usbip/libsrc/usbip_host_common.c
@@ -35,7 +35,7 @@
 #include "list.h"
 #include "sysfs_utils.h"

-struct udev *udev_context;
+extern struct udev *udev_context;

static int32_t read_attr_usbip_status(struct usbip_usb_device *udev)
{
@@ -43,7 +43,7 @@
 int size;
 int fd;
 int length;
-  char status;
+  char status[2] = { 0 };
 int value = 0;

 size = snprintf(status_attr_path, sizeof(status_attr_path),
@@ -61,15 +61,15 @@
 return -1;
 }

-length = read(fd, &status, 1);
+length = read(fd, status, 1);
 if (length < 0) {
  err("error reading attribute %s", status_attr_path);
  close(fd);
  return -1;
 }

-value = atoi(&status);
-
+value = atoi(status);
+close(fd);
 return value;
--- linux-4.15.0.orig/tools/usb/usbip/libsrc/vhci_driver.c
+++ linux-4.15.0/tools/usb/usbip/libsrc/vhci_driver.c
@@ -135,11 +135,11 @@
     return 0;
 }

-static int get_nports(void)
+static int get_nports(struct udev_device *hc_device)
 {
     const char *attr_nports;

     -attr_nports = udev_device_get_sysattr_value(vhci_driver->hc_device, "nports");
     +attr_nports = udev_device_get_sysattr_value(hc_device, "nports");
     if (!attr_nports) {
         err("udev_device_get_sysattr_value nports failed");
         return -1;
     
     @@ -150,7 +150,7 @@

 static int vhci_hcd_filter(const struct dirent *dirent)
 {
     -return strcmp(dirent->d_name, "vhci_hcd") >= 0;
+     return !strncmp(dirent->d_name, "vhci_hcd.", 9);
 }

 static int get_ncontrollers(void)
@@ -242,35 +242,41 @@

 int usbip_vhci_driver_open(void)
 {
     +int nports;
     +struct udev_device *hc_device;
     +
     udev_context = udev_new();
     if (!udev_context) {
         err("udev_new failed");
     return -1;
 }

-vhci_driver = calloc(1, sizeof(struct usbip_vhci_driver));
-
-/* will be freed in usbip_driver_close() */
-vhci_driver->hc_device =
+hc_device =
    udev_device_new_from_subsystem_sysname(udev_context,
        USBIP_VHCI_BUS_TYPE,
        USBIP_VHCI_DEVICE_NAME);
-if (!vhci_driver->hc_device) {
+if (!hc_device) {
    err("udev_device_new_from_subsystem_sysname failed");
    goto err;
}

-vhci_driver->nports = get_nports();
-dbgh("available ports: %d", vhci_driver->nports);
-
-    -if (vhci_driver->nports <= 0) {
+    +nports = get_nports(hc_device);
+    +if (nports <= 0) {
        err("no available ports");
        goto err;
-    } else if (vhci_driver->nports > MAXNPORT) {
-        -err("port number exceeds %d", MAXNPORT);
+        +}
+    +dbg("available ports: %d", nports);
+}
+vhci_driver = calloc(1, sizeof(struct usbip_vhci_driver) +
+    +nports * sizeof(struct usbip_imported_device));
+if (!vhci_driver) {
+    +err("vhci_driver allocation failed");
+    goto err;
+
+vhci_driver->nports = nports;
+vhci_driver->hc_device = hc_device;
 vhci_driver->ncontrollers = get_ncontrollers();
 dbgh("available controllers: %d", vhci_driver->ncontrollers);

@@ -285,7 +291,7 @@
 return 0;

 err:
-udev_device_unref(vhci_driver->hc_device);
+udev_device_unref(hc_device);

if (vhci_driver)
 free(vhci_driver);
--- linux-4.15.0.orig/tools/usb/usbip/libsrc/vhci_driver.h
+++ linux-4.15.0/tools/usb/usbip/libsrc/vhci_driver.h
@@ -13,7 +13,6 @@
#define USBIP_VHCI_BUS_TYPE "platform"
#define USBIP_VHCI_DEVICE_NAME "vhci_hcd.0"
-#define MAXNPORT 128
enum hub_speed {
    HUB_SPEED_HIGH = 0,
    @@ -41,7 +40,7 @@
    int ncontrollers;
    \tint nports;
    -\t\tstruct usbip_imported_device idev[\text{MAXNPORT}];
    +\t\tstruct usbip_imported_device idev[];
};

--- \text{linux-4.15.0.orig/tools/usb/usbip/src/usbip_bind.c}
+++ \text{linux-4.15.0/tools/usb/usbip/src/usbip_bind.c}
@@ -144,6 +144,7 @@
    int rc;
    struct udev *udev;
    struct udev_device *dev;
    +const char *devpath;

    /* Check whether the device with this bus ID exists. */
    udev = udev_new();
    @@ -152,8 +153,16 @@
    err("device with the specified bus ID does not exist");
    return -1;
    }
    +\tdevpath = udev_device_get_devpath(dev);
    udev_unref(udev);

    +/* If the device is already attached to vhci_hcd - bail out */
    +if (strstr(devpath, USBIP_VHCI_DRV_NAME)) {
    +err("bind loop detected: device: %s is attached to %s\n", 
    + \tdevpath, USBIP_VHCI_DRV_NAME);
    +return -1;
    +}
    +
    rc = unbind_other(busid);
    if (rc == UNBIND_ST_FAILED) {
    err("could not unbind driver from device on busid %s", busid);
--- \text{linux-4.15.0.orig/tools/usb/usbip/src/usbip_detach.c}
+++ \text{linux-4.15.0/tools/usb/usbip/src/usbip_detach.c}
@@ -43,7 +43,7 @@
 static int detach_port(char *port)
 {
    -int ret;
    +int ret = 0;
    uint8_t portnum;
    char path[\text{PATH_MAX}+1];
ret = usbip_vhci_detach_device(portnum);
-if (ret < 0)
-    return -1;
+if (ret < 0) {
+    ret = -1;
+    goto call_driver_close;
+}

+call_driver_close:
usbip_vhci_driver_close();

return ret;
--- linux-4.15.0.orig/tools/usb/usbip/src/usbip_list.c
+++ linux-4.15.0/tools/usb/usbip/src/usbip_list.c
@@ -187,6 +187,7 @@
    const char *devpath;
    char product_name[128];
    int ret = -1;
+    const char *devpath;

    /* Create libudev context. */
    udev = udev_new();
-@ @ -209,6 +210,14 @@
+    path = udev_list_entry_get_name(dev_list_entry);
+    dev = udev_device_new_from_syspath(udev, path);

+    /* Ignore devices attached to vhci_hcd */
+    devpath = udev_device_get_devpath(dev);
+    if (strstr(devpath, USBIP_VHCI_DRV_NAME)) {
+        dbg("Skip the device %s already attached to %s\n", devpath, USBIP_VHCI_DRV_NAME);
+        continue;
+    }
+
    /* Get device information. */
    idVendor = udev_device_get_sysattr_value(dev, "idVendor");
    idProduct = udev_device_get_sysattr_value(dev, "idProduct");
--- linux-4.15.0.orig/tools/usb/usbip/src/usbip_network.c
+++ linux-4.15.0/tools/usb/usbip/src/usbip_network.c
@@ -62,39 +62,39 @@
        info("using port %d (\"%s\")", usbip_port, usbip_port_string);
    }

-void usbip_net_pack_uint32_t(int pack, uint32_t *num)
+uint32_t ushpi_net_pack_uint32_t(int pack, uint32_t num)
    
    uint32_t i;

    if (pack)
        -i = htonl(*num);
        +i = htonl(num);
    else
        -i = ntohl(*num);
        +i = ntohl(num);

    -*num = i;
    +return i;

-void ushpi_net_pack_uint16_t(int pack, uint16_t *num)
+uint16_t ushpi_net_pack_uint16_t(int pack, uint16_t num)
    
    uint16_t i;

    if (pack)
        -i = htons(*num);
        +i = htons(num);
    else
        -i = ntohs(*num);
        +i = ntohs(num);

    -*num = i;
    +return i;

void ushpi_net_pack_usb_device(int pack, struct usbip_usb_device *udev)
    
    -ushpi_net_pack_uint32_t(pack, &udev->busnum);
    -ushpi_net_pack_uint32_t(pack, &udev->devnum);
    -ushpi_net_pack_uint32_t(pack, &udev->speed);

    -ushpi_net_pack_uint16_t(pack, &udev->idVendor);
    -ushpi_net_pack_uint16_t(pack, &udev->idProduct);
    -ushpi_net_pack_uint16_t(pack, &udev->bcdDevice);
    +udev->busnum = ushpi_net_pack_uint32_t(pack, udev->busnum);
    +udev->devnum = ushpi_net_pack_uint32_t(pack, udev->devnum);
    +udev->speed = ushpi_net_pack_uint32_t(pack, udev->speed);

    +udev->idVendor = ushpi_net_pack_uint16_t(pack, udev->idVendor);
    +udev->idProduct = ushpi_net_pack_uint16_t(pack, udev->idProduct);
    +udev->bcdDevice = ushpi_net_pack_uint16_t(pack, udev->bcdDevice);
}
void usbip_net_pack_usb_interface(int pack __attribute__((unused)),
@@ -141,6 +141,14 @@
    return usbip_net_xmit(sockfd, buff, bufflen, 1);
 }

+static inline void usbip_net_pack_op_common(int pack,
+    struct op_common *op_common)
+{
+    op_common->version = usbip_net_pack_uint16_t(pack, op_common->version);
+    op_common->code = usbip_net_pack_uint16_t(pack, op_common->code);
+    op_common->status = usbip_net_pack_uint32_t(pack, op_common->status);
+}
+
+int usbip_net_send_op_common(int sockfd, uint32_t code, uint32_t status)
{
    struct op_common op_common;
@@ -152,7 +160,7 @@
    op_common.code    = code;
    op_common.status  = status;

    -PACK_OP_COMMON(1, &op_common);
+usbip_net_pack_op_common(1, &op_common);

    rc = usbip_net_send(sockfd, &op_common, sizeof(op_common));
    if (rc < 0) {
@@ -176,7 +184,7 @@
        goto err;
    }

    -PACK_OP_COMMON(0, &op_common);
+usbip_net_pack_op_common(0, &op_common);

    if (op_common.version != USBIP_VERSION) {
        dbg("version mismatch: %d %d", op_common.version,
--- linux-4.15.0.orig/tools/usb/usbip/src/usbip_network.h
+++ linux-4.15.0/tools/usb/usbip/src/usbip_network.h
@@ -34,12 +34,6 @@
 }

 #define PACK_OP_COMMON(pack, op_common)  do {
  -usbip_net_pack_uint16_t(pack, &(op_common)->version);
  -usbip_net_pack_uint16_t(pack, &(op_common)->code);
  -usbip_net_pack_uint32_t(pack, &(op_common)->status);
 -} while (0)

 /* __________________________________________________________ */
/* Dummy Code */
#define OP_UNSPEC 0x00
@@ -165,11 +159,11 @@
} while (0)

#define PACK_OP_DEVLIST_REPLY(pack, reply) do {
-usbip_net_pack_uint32_t(pack, &(reply)->ndev);
+(reply)->ndev = usbip_net_pack_uint32_t(pack, (reply)->ndev);
} while (0)

-void usbip_net_pack_uint32_t(int pack, uint32_t *num);
-void usbip_net_pack_uint16_t(int pack, uint16_t *num);
+uint32_t usbip_net_pack_uint32_t(int pack, uint32_t num);
+uint16_t usbip_net_pack_uint16_t(int pack, uint16_t num);

void usbip_net_pack_usb_device(int pack, struct usbip_usb_device *udev);
void usbip_net_pack_usb_interface(int pack, struct usbip_usb_interface *uinf);

--- linux-4.15.0.orig/tools/usb/usbip/src/usbipd.c
+++ linux-4.15.0/tools/usb/usbip/src/usbipd.c
@@ -456,7 +456,7 @@
sigaction(SIGTERM, &act, NULL);
sigaction(SIGINT, &act, NULL);
act.sa_handler = SIG_IGN;
-sigaction(SIGCLD, &act, NULL);
+sigaction(SIGCHLD, &act, NULL);
}

static const char *pid_file;
--- linux-4.15.0.orig/tools/virtio/linux/kernel.h
+++ linux-4.15.0/tools/virtio/linux/kernel.h
@@ -23,6 +23,10 @@
#define PAGE_SIZE (~((PAGE_SIZE-1))
#define PAGE_ALIGN(x) ((x + PAGE_SIZE - 1) & PAGE_MASK)

+/* generic data direction definitions */
+#define READ 0
+#define WRITE 1
+
typedef unsigned long long phys_addr_t;
typedef unsigned long long dma_addr_t;
typedef size_t __kernel_size_t;
--- linux-4.15.0.orig/tools/vm/Makefile
+++ linux-4.15.0/tools/vm/Makefile
@@ -1,12 +1,13 @@
# SPDX-License-Identifier: GPL-2.0
# Makefile for vm tools
#
+include ../scripts/Makefile.include

Open Source Used In 5GasS Edge AC-4  36256
TARGETS=page-types slabinfo page_owner_sort

LIB_DIR = ../lib/api
LIBS = $(LIB_DIR)/libapi.a

-CC = $(CROSS_COMPILE)gcc
CFLAGS = -Wall -Wextra -I../lib/
LDFLAGS = $(LIBS)

--- linux-4.15.0.orig/tools/vm/page-types.c
+++ linux-4.15.0/tools/vm/page-types.c
@@ -155,12 +155,6 @@
  
- static const char * const debugfs_known_mountpoints[] = {
- "\%/sys/kernel/debug",
- "\%/debug",
- 0,
-  
- /* data structures */
--- linux-4.15.0.orig/tools/vm/slabinfo.c
+++ linux-4.15.0/tools/vm/slabinfo.c
@@ -30,8 +30,8 @@
 int alias;
 int refs;
 int aliases, align, cache_dma, cpu_slabs, destroy_by_rcu;
- int hwcache_align, object_size, objs_per_slab;
- int sanity_checks, slab_size, store_user, trace;
+ unsigned int hwcache_align, object_size, objs_per_slab;
+ unsigned int sanity_checks, slab_size, store_user, trace;
 int order, poison, reclaim_account, red_zone;
 unsigned long partial, objects, slabs, objects_partial, objects_total;
 unsigned long alloc_fastpath, alloc_slowpath;
--- linux-4.15.0.orig/ubuntu/Kconfig
+++ linux-4.15.0/ubuntu/Kconfig
@@ -0,0 +1,21 @@
+ menu "Ubuntu Supplied Third-Party Device Drivers"
+ 
+ #
+ ## NOTE: to allow drivers to be added and removed without causing merge
+ ## collisions you should add new entries in the middle of the six lines
+ ## of ## at the bottom of the list. Always add three lines of ## above
+ ## your new entry and maintain the six lines below.
+##
+##
+##
+##
+source "ubuntu/hio/Kconfig"
+##
+##
+##
+##
+
+endmenu

--- linux-4.15.0.orig/ubuntu/Makefile
+++ linux-4.15.0/ubuntu/Makefile
@@ -0,0 +1,39 @@
#
# Makefile for the Linux kernel ubuntu supplied third-party device drivers.
#
#
##
##
##
##
##
##
ifeq ($(ARCH),x86)
 obj-y                         += vbox/
endif
##
##
##
##
##
##
obj-$(CONFIG_HIO)             += hio/
##
##
##
##
##
##
ifeq ($(ARCH),x86)
 obj-y += xr-usb-serial/
endif
This is a stupid trick to get kbuild to create ubuntu/built-in.o
obj- += foo.o
--- linux-4.15.0.orig/ubuntu/hio/Kconfig
+++ linux-4.15.0/ubuntu/hio/Kconfig
@@ -0,0 +1,4 @@
+config HIO
+tristate "ES3000 V2 High-Performance PCIe SSD"
+---help---
+Driver for ES3000 V2 High-Performance PCIe SSD.
--- linux-4.15.0.orig/ubuntu/hio/Makefile
+++ linux-4.15.0/ubuntu/hio/Makefile
@@ -0,0 +1 @@
+obj-$(CONFIG_HIO) += hio.o
--- linux-4.15.0.orig/ubuntu/hio/hio.c
+++ linux-4.15.0/ubuntu/hio/hio.c
@@ -0,0 +1,13249 @@
/*
 * Huawei SSD device driver
 + Copyright (c) 2016, Huawei Technologies Co., Ltd.
 +
 + This program is free software; you can redistribute it and/or modify it
 + under the terms and conditions of the GNU General Public License,
 + version 2, as published by the Free Software Foundation.
 +
 + This program is distributed in the hope it will be useful, but WITHOUT
 + ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or
 + FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for
 + more details.
 */
+
+ifndef LINUX_VERSION_CODE
+include <linux/version.h>
+#endif
+if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,16))
+include <linux/config.h>
+#endif
+include <linux/types.h>
+include <linux/kernel.h>
+include <linux/module.h>
+include <linux/bio.h>
+include <linux/timer.h>
+include <linux/init.h>
+#include <linux/pci.h>
+#include <linux/slab.h>
+#include <linux/spinlock.h>
+#include <linux/blkdev.h>
+#include <linux/sched.h>
+#include <linux/fcntl.h>
+#include <linux/interrupt.h>
+#include <linux/compiler.h>
+#include <linux/bitops.h>
+#include <linux/delay.h>
+#include <linux/time.h>
+#include <linux/stat.h>
+#include <linux/stre.h>
+#include <linux/completion.h>
+#include <linux/workqueue.h>
+#include <lib/mm.h>
+#include <linux/slab.h>
+#include <linux/ioct.h>
+#include <linux/hdreg.h> /* HDIO_GETGEO */
+#include <linux/list.h>
+#include <linux/reboot.h>
+#include <linux/kthread.h>
+%if (LINUX_VERSION_CODE >= KERNEL_VERSION(3,2,0))
+  +#include <linux/seq_file.h>
+  +#endif
  +#include <asm/uaccess.h>
+%if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,2,0))
  +#include <linux/scatterlist.h>
  +#include <linux/vmalloc.h>
+  +#else
  +#include <asm/scatterlist.h>
+  +#endif
  +#include <asm/io.h>
+%if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,17))
  +#include <linux/devfs_fs_kernel.h>
+  +#endif
+
/* driver */
+define MODULE_NAME "hio"
+define DRIVER_VERSION "2.1.0.40"
+define DRIVER_VERSION_LEN 16
+define SSD_FW_MIN 0x1
+
+define SSD_DEV_NAME MODULE_NAME
+define SSD_DEV_NAME_LEN 16
+define SSD_CDEV_NAME c"SSD_DEV_NAME"
+define SSD_SDEV_NAME s"SSD_DEV_NAME"
+  
+  +#define SSD_CMAJOR0  
+  +#define SSD_MAJOR0  
+  +#define SSD_MAJOR_SL0  
+  +#define SSD_MINORS16  
+  
+  +#define SSD_MAX_DEV702  
+  +#define SSD_ALPHABET_NUM26  
+  
+  +#define hio_info(f, arg...) printk(KERN_INFO MODULE_NAME"info: " f , ## arg)  
+  +#define hio_note(f, arg...) printk(KERN_NOTICE MODULE_NAME"note: " f , ## arg)  
+  +#define hio_warn(f, arg...) printk(KERN_WARNING MODULE_NAME"warn: " f , ## arg)  
+  +#define hio_err(f, arg...) printk(KERN_ERR MODULE_NAME"err: " f , ## arg)  
+  
+  /* slave port */  
+  +#define SSD_SLAVE_PORT_DEVID0x000a  
+  
+  /* int mode */  
+  
+  /* 2.6.9 msi affinity bug, should turn msi & msi-x off */  
+  +#define SSD_MSI  
+  +#define SSD_ESCAPE_IRQ  
+  
+  /* Over temperature protect */  
+  +#define SSD_OT_PROTECT  
+  
+  /* debug */  
+  +#define SSD_DEBUG_ERR  
+  
+  /* cmd timer */  
+  
+  /* Over temperature protect */  
+  +#define SSD_OT_PROTECT  
+  
+  /* debug */  
+  +#define SSD_DEBUG_ERR  
+  
+  /* cmd timer */  
+  
+  /* Over temperature protect */  
+  +#define SSD_OT_PROTECT  
+  
+  /* debug */  
+  +#define SSD_DEBUG_ERR  
+  
+  /* cmd timer */
#define SSD_CMD_TIMEOUT (60*HZ)
+
+/* i2c & smbus */
+#define SSD_SPI_TIMEOUT (5*HZ)
+#define SSD_I2C_TIMEOUT (5*HZ)
+
+#define SSD_I2C_MAX_DATA(127)
+#define SSD_SMBUS_BLOCK_MAX(32)
+#define SSD_SMBUS_DATA_MAX(SSD_SMBUS_BLOCK_MAX + 2)
+
+/* wait for init */
+#define SSD_INIT_WAIT(1000) //1s
+#define SSD_CONTROLLER_WAIT(20*1000/SSD_INIT_WAIT)//20s
+#define SSD_INIT_MAX_WAIT(500*1000/SSD_INIT_WAIT)//500s
+#define SSD_INIT_MAX_WAIT_V3_2(1400*1000/SSD_INIT_WAIT)//1400s
+#define SSD_RAM_INIT_MAX_WAIT(10*1000/SSD_INIT_WAIT)//10s
+#define SSD_CH_INFO_MAX_WAIT(10*1000/SSD_INIT_WAIT)//10s
+
+/* blkdev busy wait */
+#define SSD_DEV_BUSY_WAIT 1000 //ms
+#define SSD_DEV_BUSY_MAX_WAIT (8*1000/SSD_DEV_BUSY_WAIT) //8s
+
+/* smbus retry */
+#define SSD_SMBUS_RETRY_INTERVAL (5) //ms
+#define SSD_SMBUS_RETRY_MAX (1000/SSD_SMBUS_RETRY_INTERVAL)
+
+#define SSD_BM_RETRY_MAX 7
+
+/* bm routine interval */
+#define SSD_BM_CAP_LEARNING_DELAY (10*60*1000)
+
+/* routine interval */
+#define SSD_ROUTINE_INTERVAL (10*1000)//10s
+#define SSD_HWMON_ROUTINE_TICK (60*1000/SSD_ROUTINE_INTERVAL)
+#define SSD_CAPMON_ROUTINE_TICK ((3600*1000/SSD_ROUTINE_INTERVAL)*24*30)
+#define SSD_CAPMON2_ROUTINE_TICK (10*60*1000/SSD_ROUTINE_INTERVAL)//fault recover
+
+/* dma align */
+#define SSD_DMA_ALIGN 16
+
+/* some hw defalut */
+#define SSD_LOG_MAX_SZ 4096
+
+#define SSD_NAND_OOB_SZ 1024
+#define SSD_NAND_ID_SZ 8
+#define SSD_NAND_ID_BUFF_SZ 1024
+#define SSD_NAND_MAX_CE 2
```c
#define SSD_BBT_RESERVED	8
#define SSD_ECC_MAX_FLIP(64+1)
#define SSD_RAM_ALIGN16
#define SSD_RELOAD_FLAG	0x3333CCCC
#define SSD_RELOAD_FW	0xAA5555AA
#define SSD_RESET_NOINIT0xAA5555AA
#define SSD_RESET0x55AAA55
#define SSD_RESET_FULL0x5A
#define SSD_RESET_WAIT1000//1s
#define SSD_RESET_MAX_WAIT(200*1000/SSD_RESET_WAIT) //200s

/* reverion 1 */
#define SSD_PROTOCOL_V1	0x0

#define SSD_ROM_SIZE (16*1024*1024)
#define SSD_ROM_BLK_SIZE (256*1024)
#define SSD_ROM_PAGE_SIZE (256)
#define SSD_ROM_NR_BRIDGE_FW 2
#define SSD_ROM_NR_CTRL_FW 2
#define SSD_ROM_BRIDGE_FW_BASE 0
#define SSD_ROM_BRIDGE_FW_SIZE (2*1024*1024)
#define SSD_ROM_CTRL_FW_BASE (SSD_ROM_NR_BRIDGE_FW*SSD_ROM_BRIDGE_FW_SIZE)
#define SSD_ROM_CTRL_FW_SIZE (5*1024*1024)
#define SSD_ROM_LABEL_BASE (SSD_ROM_CTRL_FW_BASE+SSD_ROM_CTRL_FW_SIZE*SSD_ROM_NR_CTRL_FW)
#define SSD_ROM_VP_BASE (SSD_ROM_LABEL_BASE+SSD_ROM_BLK_SIZE)

/* reverion 3 */
#define SSD_PROTOCOL_V3 0x3000000
#define SSD_PROTOCOL_V3_1 0x3010001
#define SSD_PROTOCOL_V3_1_3 0x3010003
#define SSD_PROTOCOL_V3_2 0x3020000
#define SSD_PROTOCOL_V3_2_1 0x3020001 /* <4KB improved */
#define SSD_PROTOCOL_V3_2_2 0x3020002 /* ot protect */
#define SSD_PROTOCOL_V3_2_4 0x3020004

#define SSD_PV3_ROM_NR_BM_FW 1
#define SSD_PV3_ROM_BM_FW_SZ (64*1024*8)
#define SSD_ROM_LOG_SZ (64*1024*4)
```
+\#define SSD_PV3_ROM_NR_SMART
+\#define SSD_PV3_ROM_NR_SMART_MAX
+/* reverion 3.2 */
+\#define SSD_PV3_2_ROM_LOG_SZ(64*1024*80) /* 5MB */
+\#define SSD_PV3_2_ROM_SEC_SZ(256*1024) /* 256KB */
+
+/* register */
+\#define SSD_REQ_FIFO_REG0x0000
+\#define SSD_RESP_FIFO_REG0x0008//0x0010
+\#define SSD_RESP_PTR_REG0x0010/0x0018
+\#define SSD_INTR_INTERVAL_REG0x0018
+\#define SSD_READY_REG0x001C
+\#define SSD_BRIDGE_TEST_REG0x0020
+\#define SSD_STRIPE_SIZE_REG0x0028
+\#define SSD_CTRL_VER_REG0x0030//controller
+\#define SSD_BRIDGE_VER_REG0x0034//bridge
+\#define SSD_PCB_VER_REG0x0038
+\#define SSD_BURN_FLAG_REG0x0040
+\#define SSD_BRIDGE_INFO_REG0x0044
+
+\#define SSD_WL_VAL_REG0x0048//32-bit
+
+\#define SSD_BB_INFO_REG0x004C
+
+\#define SSD_ECC_TEST_REG0x0050 //test only
+\#define SSD_ERASE_TEST_REG0x0058 //test only
+\#define SSD_WRITE_TEST_REG0x0060 //test only
+
+\#define SSD_RESET_REG 0x0068
+\#define SSD_RELOAD_FW_REG0x0070
+
+\#define SSD_RESERVED_BLKS_REG0x0074
+\#define SSD_VALID_PAGES_REG0x0078
+\#define SSD_CH_INFO_REG0x007C
+
+\#define SSD_CTRL_TEST_REG_SZ0x8
+\#define SSD_CTRL_TEST_REG0x0080
+\#define SSD_CTRL_TEST_REG0x0088
+\#define SSD_CTRL_TEST_REG20x0090
+\#define SSD_CTRL_TEST_REG30x0098
+\#define SSD_CTRL_TEST_REG40x00A0
+\#define SSD_CTRL_TEST_REG50x00A8
+\#define SSD_CTRL_TEST_REG60x00B0
+\#define SSD_CTRL_TEST_REG70x00B8
+
+\#define SSD_FLASH_INFO_REG0x00C0
+define SSD_FLASH_INFO_REG0x00C8
+define SSD_FLASH_INFO_REG0x00D0
+define SSD_FLASH_INFO_REG0x00D8
+define SSD_FLASH_INFO_REG0x00E0
+define SSD_FLASH_INFO_REG0x00E8
+define SSD_FLASH_INFO_REG0x00F0
+define SSD_FLASH_INFO_REG0x00F8
+
+define SSD_RESP_INFO_REG0x01B8
+define SSD_NAND_BUFF_BASE0x01BC //for nand write
+
+define SSD_CHIP_INFO_REG_SZ0x10
+define SSD_CHIP_INFO_REG0x0100//128 bit
+define SSD_CHIP_INFO_REG0x0110
+define SSD_CHIP_INFO_REG0x0120
+define SSD_CHIP_INFO_REG0x0130
+define SSD_CHIP_INFO_REG0x0140
+define SSD_CHIP_INFO_REG0x0150
+define SSD_CHIP_INFO_REG0x0160
+define SSD_CHIP_INFO_REG0x0170
+
+define SSD_RAM_INFO_REG0x01C4
+
+define SSD_BBT_BASE_REG0x01C8
+define SSD_ECT_BASE_REG0x01CC
+
+define SSD_CLEAR_INTR_REG0x01F0
+
+define SSD_INIT_STATE_REG_SZ0x8
+define SSD_INIT_STATE_REG0x0200
+define SSD_INIT_STATE_REG0x0208
+define SSD_INIT_STATE_REG0x0210
+define SSD_INIT_STATE_REG0x0218
+define SSD_INIT_STATE_REG0x0220
+define SSD_INIT_STATE_REG0x0228
+define SSD_INIT_STATE_REG0x0230
+define SSD_INIT_STATE_REG0x0238
+
+define SSD_ROM_INFO_REG0x0600
+define SSD_ROM_BRIDGE_FW_INFO_REG0x0604
+define SSD_ROM_CTRL_FW_INFO_REG0x0608
+define SSD_ROM_vp_INFO_REG0x060C
+
+define SSD_LOG_INFO_REG0x0610
+define SSD_LED_REG0x0614
+define SSD_MSG_BASE_REG0x06F8
+
+/*spi reg */
+* define SSD_SPI_REG_CMD 0x0180
+* define SSD_SPI_REG_CMD_HI 0x0184
+* define SSD_SPI_REG_WDATA 0x0188
+* define SSD_SPI_REG_ID 0x0190
+* define SSD_SPI_REG_STATUS 0x0198
+* define SSD_SPI_REG_RDATA 0x01A0
+* define SSD_SPI_REG_READY 0x01A8
+
+* i2c register */
+* define SSD_I2C_CTRL_REG 0x06F0
+* define SSD_I2C_RDATA_REG 0x06F4
+
+* temperature reg */
+* define SSD_BRIGE_TEMP_REG 0x0618
+
+* define SSD_CTRL_TEMP_REG0 0x0700
+* define SSD_CTRL_TEMP_REG1 0x0708
+* define SSD_CTRL_TEMP_REG2 0x0710
+* define SSD_CTRL_TEMP_REG3 0x0718
+* define SSD_CTRL_TEMP_REG4 0x0720
+* define SSD_CTRL_TEMP_REG5 0x0728
+* define SSD_CTRL_TEMP_REG6 0x0730
+* define SSD_CTRL_TEMP_REG7 0x0738
+
+* reversion 3 reg */
+* define SSD_PROTOCOL_VER_REG 0x01B4
+
+* define SSD_FLUSH_TIMEOUT_REG 0x02A4
+* define SSD_BM_FAULT_REG 0x0660
+
+* define SSD_PV3_RAM_STATUS_REG_SZ 0x4
+* define SSD_PV3_RAM_STATUS_REG0 0x0260
+* define SSD_PV3_RAM_STATUS_REG1 0x0264
+* define SSD_PV3_RAM_STATUS_REG2 0x0268
+* define SSD_PV3_RAM_STATUS_REG3 0x0270
+* define SSD_PV3_RAM_STATUS_REG4 0x0274
+* define SSD_PV3_RAM_STATUS_REG5 0x0278
+* define SSD_PV3_RAM_STATUS_REG6 0x027C
+
+* define SSD_PV3_CHIP_INFO_REG_SZ 0x40
+* define SSD_PV3_CHIP_INFO_REG0 0x0300
+* define SSD_PV3_CHIP_INFO_REG1 0x0340
+* define SSD_PV3_CHIP_INFO_REG2 0x0380
+* define SSD_PV3_CHIP_INFO_REG3 0x03B0
+* define SSD_PV3_CHIP_INFO_REG4 0x0400
+* define SSD_PV3_CHIP_INFO_REG5 0x0440
+* define SSD_PV3_CHIP_INFO_REG6 0x0480
+\#define SSD_PV3_CHIP_INFO_REG70x04B0
+
+\#define SSD_PV3_INIT_STATE_REG_SZ 0x20
+\#define SSD_PV3_INIT_STATE_REG0x0000
+\#define SSD_PV3_INIT_STATE_REG10x0520
+\#define SSD_PV3_INIT_STATE_REG20x0540
+\#define SSD_PV3_INIT_STATE_REG30x0560
+\#define SSD_PV3_INIT_STATE_REG40x0580
+\#define SSD_PV3_INIT_STATE_REG50x05A0
+\#define SSD_PV3_INIT_STATE_REG60x05C0
+\#define SSD_PV3_INIT_STATE_REG70x05E0
+
+\#define SSD_FULL_RESET_REG 0x01B0
+
+\#define SSD_CTRL_REG_ZONE_SZ 0x800
+
+\#define SSD_BB_THRESHOLD_L1_REG 0x2C0
+\#define SSD_BB_THRESHOLD_L2_REG 0x2C4
+
+\#define SSD_BB_ACC_REG_SZ 0x4
+\#define SSD_BB_ACC_REG0 0x21C0
+\#define SSD_BB_ACC_REG1 0x29C0
+\#define SSD_BB_ACC_REG2 0x31C0
+
+\#define SSD_EC_THRESHOLD_L1_REG 0x2C8
+\#define SSD_EC_THRESHOLD_L2_REG 0x2CC
+
+\#define SSD_EC_ACC_REG_SZ 0x4
+\#define SSD_EC_ACC_REG0 0x21E0
+\#define SSD_EC_ACC_REG1 0x29E0
+\#define SSD_EC_ACC_REG2 0x31E0
+
+\#define SSD_HW_STATUS_REG 0x02AC
+
+\#define SSD_PLP_INFO_REG 0x0664
+
+\#define SSD_PCIE_LINKSTATUS_REG 0x01F8
+\#define SSD_PL_CAP_LEARN_REG 0x01FC
+
+\#define SSD_FPGA_1V0_REG0 0x2070
+\#define SSD_FPGA_1V8_REG0 0x2078
+\#define SSD_FPGA_1V0_REG1 0x2870
+\#define SSD_FPGA_1V8_REG1 0x2878
+
/*reversion 3.2 reg*/
#define SSD_READ_OT_REG0		0x2260
#define SSD_WRITE_OT_REG0		0x2264
#define SSD_READ_OT_REG1		0x2A60
#define SSD_WRITE_OT_REG1		0x2A64
+
+
/* function */
#define SSD_FUNC_READ			0x01
#define SSD_FUNC_WRITE			0x02
#define SSD_FUNC_NAND_READ_WOOB	0x03
#define SSD_FUNC_NAND_READ		0x04
#define SSD_FUNC_NAND_WRITE		0x05
#define SSD_FUNC_NAND_ERASE		0x06
#define SSD_FUNC_NAND_READ_ID	0x07
#define SSD_FUNC_READ_LOG		0x08
#define SSD_FUNC_TRIM			0x09
#define SSD_FUNC_RAM_READ		0x10
#define SSD_FUNC_RAM_WRITE		0x11
#define SSD_FUNC_FLUSH			0x12	//cache / bbt
+
+/* spi function */
#define SSD_SPI_CMD_PROGRAM		0x02
#define SSD_SPI_CMD_READ		0x03
#define SSD_SPI_CMD_W_DISABLE	0x04
#define SSD_SPI_CMD_READ_STATUS	0x05
#define SSD_SPI_CMD_W_ENABLE	0x06
#define SSD_SPI_CMD_ERASE		0xd8
#define SSD_SPI_CMD_CLSR		0x30
#define SSD_SPI_CMD_READ_ID		0x9f
+
+/* i2c */
#define SSD_I2C_CTRL_READ		0x00
#define SSD_I2C_CTRL_WRITE		0x01
+
+/* i2c internal register */
#define SSD_I2C_CFG_REG0		0x00
#define SSD_I2C_DATA_REG0		0x01
#define SSD_I2C_CMD_REG0		0x02
#define SSD_I2C_STATUS_REG0		0x03
#define SSD_I2C_SADDR_REG0		0x04
#define SSD_I2C_LEN_REG0		0x05
#define SSD_I2C_RLEN_REG0		0x06
#define SSD_I2C_WLEN_REG0		0x07
#define SSD_I2C_RESET_REG0		0x08//write for reset
#define SSD_I2C_PRER_REG0	0x09
+
+
/* hw mon */
/* FPGA volt = ADC_value / 4096 * 3v */
#define SSD_FPGA_1V0_ADC_MIN 1228 // 0.9v
#define SSD_FPGA_1V0_ADC_MAX 1502 // 1.1v
#define SSD_FPGA_1V8_ADC_MIN 2211 // 1.62v
#define SSD_FPGA_1V8_ADC_MAX 2703 // 1.98

/* ADC value */
#define SSD_FPGA_VOLT_MAX(val) (((val) & 0xffff) >> 4)
#define SSD_FPGA_VOLT_MIN(val) (((val >> 16) & 0xffff) >> 4)
#define SSD_FPGA_VOLT_CUR(val) (((val >> 32) & 0xffff) >> 4)
#define SSD_FPGA_VOLT(val) ((val * 3000) >> 12)

#define SSD_VOLT_LOG_DATA(idx, ctrl, volt) (((uint32_t)idx << 24) | ((uint32_t)ctrl << 16) | ((uint32_t)volt))

enum ssd_fpga_volt
{
    SSD_FPGA_1V0 = 0,
    SSD_FPGA_1V8,
    SSD_FPGA_VOLT_NR
};

enum ssd_clock
{
    SSD_CLOCK_166M_LOST = 0,
    SSD_CLOCK_166M_SKEW,
    SSD_CLOCK_156M_LOST,
    SSD_CLOCK_156M_SKEW,
    SSD_CLOCK_NR
};

/* sensor */
#define SSD_SENSOR_LM75_SADDRESS (0x49 << 1)
#define SSD_SENSOR_LM80_SADDRESS (0x28 << 1)

#define SSD_SENSOR_CONVERT_TEMP(val) ((int)(val >> 8))
#define SSD_INLET_OT_TEMP 55 //55 DegC
#define SSD_INLET_OT_HYST 50 //50 DegC
#define SSD_FLASH_OT_TEMP 70 //70 DegC
#define SSD_FLASH_OT_HYST 65 //65 DegC

enum ssd_sensor
{
    SSD_SENSOR_LM80 = 0,
    SSD_SENSOR_LM75,
    SSD_SENSOR_NR
};
+/* lm75 */
+enum ssd_lm75_reg
+{
+  SSD_LM75_REG_TEMP = 0,
+  SSD_LM75_REG_CONF,
+  SSD_LM75_REG_THYST,
+  SSD_LM75_REG_TOS
+};
+
+/* lm96080 */
+//define SSD_LM80_REG_IN_MAX(nr)(0x2a + (nr) * 2)
+//define SSD_LM80_REG_IN_MIN(nr)(0x2b + (nr) * 2)
+//define SSD_LM80_REG_IN(nr)(0x20 + (nr))
+
+//define SSD_LM80_REG_FAN10x28
+//define SSD_LM80_REG_FAN20x29
+//define SSD_LM80_REG_FAN_MIN(nr)(0x3b + (nr))
+
+//define SSD_LM80_REG_TEMP0x27
+//define SSD_LM80_REG_TEMP_HOT_MAX0x38
+//define SSD_LM80_REG_TEMP_HOT_HYST0x39
+//define SSD_LM80_REG_TEMP_OS_MAX0x3a
+//define SSD_LM80_REG_TEMP_OS_HYST0x3b
+
+//define SSD_LM80_REG_CONFIG0x00
+//define SSD_LM80_REG_ALARM10x01
+//define SSD_LM80_REG_ALARM20x02
+//define SSD_LM80_REG_MASK10x03
+//define SSD_LM80_REG_MASK20x04
+//define SSD_LM80_REG_FANDIV0x05
+//define SSD_LM80_REG_RES0x06
+
+//define SSD_LM80_CONVERT_VOLT(val)((val * 10) >> 8)
+
+//define SSD_LM80_3V3_VOLT(val)((val)*33/19)
+
+//define SSD_LM80_CONV_INTERVAL(1000)
+
+enum ssd_lm80_in
+{
+  SSD_LM80_IN_CAP = 0,
+  SSD_LM80_IN_1V2,
+  SSD_LM80_IN_1V2a,
+  SSD_LM80_IN_1V5,
+  SSD_LM80_IN_1V8,
+  SSD_LM80_IN_FPGA_3V3,
+SSD_LM80_IN_3V3,
+SSD_LM80_IN_NR
+};
+
+struct ssd_lm80_limit
+
+{
+uint8_t t_low;
+uint8_t t_high;
+};
+
+/* +/- 5% except cap in */
+static struct ssd_lm80_limit ssd_lm80_limit[SSD_LM80_IN_NR] = {
+{171, 217}, /* CAP in: 1710 ~ 2170 */
+{114, 126},
+{114, 126},
+{142, 158},
+{171, 189},
+{180, 200},
+{180, 200},
+};
+
+/* temperature sensors */
+enum ssd_temp_sensor
+
+{
+SSD_TEMP_INLET = 0,
+SSD_TEMP_FLASH,
+SSD_TEMP_CTRL,
+SSD_TEMP_NR
+};
+
+/* fpga temperature */
+#define SSD_OT_PROTECT
+#define SSD_OT_DELAY (60) //ms
+
+#define SSD_OT_TEMP (90) //90 DegC
+
+#define SSD_OT_TEMP_HYST (85) //85 DegC
+#endif
+
+#define MAX_TEMP(val) CONVERT_TEMP(((val & 0xffff) >> 4))
+#define MIN_TEMP(val) CONVERT_TEMP(((val >>16) & 0xffff) >> 4))
+#define CUR_TEMP(val) CONVERT_TEMP(((val>>32) & 0xffff) >> 4))
+
+/*温度传感器*/
+enum ssd_temp_sensor
+{
+SSD_TEMP_INLET = 0,
+SSD_TEMP_FLASH,
+SSD_TEMP_CTRL,
+SSD_TEMP_NR
+};
+
+#define SSD_OT_PROTECT
+#define SSD_OT_DELAY (60) //ms
+
+#define SSD_OT_TEMP (90) //90 DegC
+
+#define SSD_OT_TEMP_HYST (85) //85 DegC
+#endif
+
+/*温度传感器*/
+enum ssd_temp_sensor
+{
+SSD_TEMP_INLET = 0,
+SSD_TEMP_FLASH,
+SSD_TEMP_CTRL,
+SSD_TEMP_NR
+};
+
+/* fpga temperature */
+#define SSD_OT_PROTECT
+#define SSD_OT_DELAY (60) //ms
+
+#define SSD_OT_TEMP (90) //90 DegC
+
+#define SSD_OT_TEMP_HYST (85) //85 DegC
+#endif
+
+/*温度传感器*/
+enum ssd_temp_sensor
+{
+SSD_TEMP_INLET = 0,
+SSD_TEMP_FLASH,
+SSD_TEMP_CTRL,
+SSD_TEMP_NR
+};
+
+/* fpga temperature */
+#define SSD_OT_PROTECT
+#define SSD_OT_DELAY (60) //ms
+
+#define SSD_OT_TEMP (90) //90 DegC
+
+#define SSD_OT_TEMP_HYST (85) //85 DegC
+#endif
+
+/*温度传感器*/
+enum ssd_temp_sensor
+{
+SSD_TEMP_INLET = 0,
+SSD_TEMP_FLASH,
+SSD_TEMP_CTRL,
+SSD_TEMP_NR
+};
+
/* CAP monitor */
#define SSD_PL_CAP_U1 SSD_LM80_REG_IN(SSD_LM80_IN_CAP)
#define SSD_PL_CAP_U2 SSD_LM80_REG_IN(SSD_LM80_IN_1V8)
#define SSD_PL_CAP_LEARN(u1, u2, t)((t*(u1+u2))/(2*162*(u1-u2)))
#define SSD_PL_CAP_LEARN_WAIT(20) //20ms
#define SSD_PL_CAP_LEARN_MAX_WAIT((1000/SSD_PL_CAP_LEARN_WAIT)) //1s
+
#define SSD_PL_CAP_CHARGE_WAIT(1000)
#define SSD_PL_CAP_CHARGE_MAX_WAIT(((120*1000)/SSD_PL_CAP_CHARGE_WAIT)) //120s
+
#define SSD_PL_CAP_VOLT(val) (val*7)
+
#define SSD_PL_CAP_VOLT_FULL(13700)
#define SSD_PL_CAP_VOLT_READY(12880)
+
#define SSD_PL_CAP_THRESHOLD(8900)
#define SSD_PL_CAP_CP_THRESHOLD(5800)
#define SSD_PL_CAP_THRESHOLD_HYST(100)
+
+enum ssd_pl_cap_status
+{
  +SSD_PL_CAP = 0,
  +SSD_PL_CAP_NR
+};
+
+enum ssd_pl_cap_type
+{
  +SSD_PL_CAP_DEFAULT = 0, /* 4 cap */
  +SSD_PL_CAP_CP /* 3 cap */
+};
+
+/* hwmon offset */
#define SSD_HWMON_OFFS_TEMP(0)
#define SSD_HWMON_OFFS_SENSOR(SSD_HWMON_OFFS_TEMP + SSD_TEMP_NR)
#define SSD_HWMON_OFFS_PL_CAP(SSD_HWMON_OFFS_SENSOR + SSD_SENSOR_NR)
#define SSD_HWMON_OFFS_LM80(SSD_HWMON_OFFS_PL_CAP + SSD_PL_CAP_NR)
#define SSD_HWMON_OFFS_CLOCK(SSD_HWMON_OFFS_LM80 + SSD_LM80_IN_NR)
#define SSD_HWMON_OFFS_FPGA (SSD_HWMON_OFFS_CLOCK + SSD_CLOCK_NR)
+
#define SSD_HWMON_TEMP(idx) (SSD_HWMON_OFFS_TEMP + idx)
#define SSD_HWMON_SENSOR(idx) (SSD_HWMON_OFFS_SENSOR + idx)
#define SSD_HWMON_PL_CAP(idx)(SSD_HWMON_OFFS_PL_CAP + idx)
#define SSD_HWMON_LM80(idx)(SSD_HWMON_OFFS_LM80 + idx)
#define SSD_HWMON_CLOCK(idx)(SSD_HWMON_OFFS_CLOCK + idx)
#define SSD_HWMON_FPGA(ctrl, idx)(SSD_HWMON_OFFS_FPGA + (ctrl * SSD_FPGA_VOLT_NR) + idx)
+
+
```c
+/* fifo */
+typedef struct sfifo
+{
+    uint32_t in;
+    uint32_t out;
+    uint32_t size;
+    uint32_t esize;
+    uint32_t mask;
+    spinlock_t lock;
+    void *data;
+} sfifo_t;
+
+static int sfifo_alloc(struct sfifo *fifo, uint32_t size, uint32_t esize)
+{
+    uint32_t __size = 1;
+
+    if (!fifo || size > INT_MAX || esize == 0) {
+        return -EINVAL;
+    }
+
+    while (__size < size) __size <<= 1;
+
+    if (__size < 2) {
+        return -EINVAL;
+    }
+
+    fifo->data = vmalloc(esize * __size);
+    if (!fifo->data) {
+        return -ENOMEM;
+    }
+
+    fifo->in = 0;
+    fifo->out = 0;
+    fifo->mask = __size - 1;
+    fifo->size = __size;
+    fifo->esize = esize;
+    spin_lock_init(&fifo->lock);
+
+    return 0;
+}
+
+static void sfifo_free(struct sfifo *fifo)
+{
+    if (!fifo) {
+        return;
+    }
+
+    vfree(fifo->data);
+}
```
void free(fifo->data);
fifo->data = NULL;
fifo->in = 0;
fifo->out = 0;
fifo->mask = 0;
fifo->size = 0;
fifo->esize = 0;
+
+
static int __sfifo_put(struct sfifo *fifo, void *val)
+
+if (((fifo->in + 1) & fifo->mask) == fifo->out) {
+return -1;
+
+memcpy((fifo->data + (fifo->in * fifo->esize)), val, fifo->esize);
+fifo->in = (fifo->in + 1) & fifo->mask;
+
+return 0;
+
+}
+
+static int sfifo_put(struct sfifo *fifo, void *val)
+
+
+int ret = 0;
+
+if (!fifo || !val) {
+return -EINVAL;
+
+}
+
+if (!in_interrupt()) {
+spin_lock_irq(&fifo->lock);
+ret = __sfifo_put(fifo, val);
+spin_unlock_irq(&fifo->lock);
+} else {
+spin_lock(&fifo->lock);
+ret = __sfifo_put(fifo, val);
+spin_unlock(&fifo->lock);
+
+}
+
+return ret;
+
+
static int __sfifo_get(struct sfifo *fifo, void *val)
+
+if (fifo->out == fifo->in) {
+return -1;
+
+}
memcpy(val, (fifo->data + (fifo->out * fifo->esize)), fifo->esize);
fifo->out = (fifo->out + 1) & fifo->mask;
+
+return 0;
+
+static int sfifo_get(struct sfifo *fifo, void *val)
+{
+int ret = 0;
+
+if (!fifo || !val) {
+return -EINVAL;
+}
+
+if (!in_interrupt()) {
+spin_lock_irq(&fifo->lock);
+ret = __sfifo_get(fifo, val);
+spin_unlock_irq(&fifo->lock);
+} else {
+spin_lock(&fifo->lock);
+ret = __sfifo_get(fifo, val);
+spin_unlock(&fifo->lock);
+}
+
+return ret;
+
+/* bio list */
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,30))
+struct ssd_blist {
+struct bio *prev;
+struct bio *next;
+};
+
+static inline void ssd_blist_init(struct ssd_blist *ssd_bl)
+{
+ssd_bl->prev = NULL;
+ssd_bl->next = NULL;
+}
+
+static inline struct bio *ssd_blist_get(struct ssd_blist *ssd_bl)
+{
+struct bio *bio = ssd_bl->prev;
+
+ssd_bl->prev = NULL;
+ssd_bl->next = NULL;
+}
+
+static inline void ssd_blist_init(struct ssd_blist *ssd_bl)
+{
+ssd_bl->prev = NULL;
+ssd_bl->next = NULL;
+}
+
+struct bio *bio = ssd_bl->prev;
+
+ssd_bl->prev = NULL;
+ssd_bl->next = NULL;
+}
+
+return bio;
+static inline void ssd_blist_add(struct ssd_blist *ssd_bl, struct bio *bio)
+{
+bio->bi_next = NULL;
+
+if (ssd_bl->next) {
+ssd_bl->next->bi_next = bio;
+} else {
+ssd_bl->prev = bio;
+}
+
+ssd_bl->next = bio;
+}
+
+#else
+#define ssd_blist bio_list
+#define ssd_blist_init bio_list_init
+#define ssd_blist_get bio_list_get
+#define ssd_blist_add bio_list_add
+#endif
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(3,14,0))
+#define bio_start(bio) (bio->bi_sector)
+#else
+#define bio_start(bio) (bio->bi_iter.bi_sector)
+#endif
+
+/* mutex */
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,16))
+#define mutex_lock down
+#define mutex_unlock up
+#define mutex semaphore
+#define mutex_init init_MUTEX
+#endif
+
+/* i2c */
+typedef union ssd_i2c_ctrl {
+    uint32_t val;
+    struct {
+        uint8_t wdata;
+        uint8_t addr;
+        uint16_t rw:1;
+        uint16_t pad:15;
+    } bits;
+} __attribute__((packed)) ssd_i2c_ctrl_t;
+
+typedef union ssd_i2c_data {
+uint32_t val;
+struct {
+uint32_t rdata:8;
+uint32_t valid:1;
+uint32_t pad:23;
+} bits;
+}__attribute__((packed)) ssd_i2c_data_t;
+
+/* write mode */
+enum ssd_write_mode
+{
+SSD_WMODE_BUFFER = 0,
+SSD_WMODE_BUFFER_EX,
+SSD_WMODE_FUA,
+/* dummy */
+SSD_WMODE_AUTO,
+SSD_WMODE_DEFAULT
+};
+
+/* reset type */
+enum ssd_reset_type
+{
+SSD_RST_NOINIT = 0,
+SSD_RST_NORMAL,
+SSD_RST_FULL
+};
+
+/* ssd msg */
+typedef struct ssd_sg_entry
+{
+uint64_t block:48;
+uint64_t length:16;
+uint64_t buf;
+}__attribute__((packed))ssd_sg_entry_t;
+
+typedef struct ssd_rw_msg
+{
+uint8_t tag;
+uint8_t flag;
+uint8_t nsegs;
+uint32_t reserved;//for 64-bit align
+struct ssd_sg_entry sge[1]; //base
+}__attribute__((packed))ssd_rw_msg_t;
+
+typedef struct ssd_resp_msg
+{
+uint8_t tag;
```c
+uint8_t status:2;
+uint8_t bitflip:6;
+uint8_t log;
+uint8_t fun;
+uint32_t reserved;
+}__attribute__((packed))ssd_resp_msg_t;
+
typedef struct ssd_flush_msg
+{
  +uint8_t tag;
  +uint8_t flag:2;//flash cache 0 or bbt 1
  +uint8_t flash:6;
  +uint8_t ctrl_idx;
  +uint8_t fun;
  +uint32_t reserved://align
+}__attribute__((packed))ssd_flush_msg_t;
+
typedef struct ssd_nand_op_msg
+{
  +uint8_t tag;
  +uint8_t flag;
  +uint8_t ctrl_idx;
  +uint8_t fun;
  +uint32_t reserved://align
  +uint16_t page_count;
  +uint8_t chip_ce;
  +uint8_t chip_no;
  +uint32_t page_no;
  +uint64_t buf;
+}__attribute__((packed))ssd_nand_op_msg_t;
+
typedef struct ssd_ram_op_msg
+{
  +uint8_t tag;
  +uint8_t flag;
  +uint8_t ctrl_idx;
  +uint8_t fun;
  +uint32_t reserved://align
  +uint32_t start;
  +uint32_t length;
  +uint64_t buf;
+}__attribute__((packed))ssd_ram_op_msg_t;
+
/* log msg */
typedef struct ssd_log_msg
+{
  +uint8_t tag;
+*/
```
+uint8_t flag;
+uint8_t ctrl_idx;
+uint8_t fun;
+uint32_t reserved://align
+uint64_t buf;
+}__attribute__((packed))ssd_log_msg_t;
+
+typedef struct ssd_log_op_msg
+{
+uint8_t tag;
+uint8_t flag;
+uint8_t ctrl_idx;
+uint8_t fun;
+uint32_t reserved://align
+uint64_t reserved1://align
+uint64_t buf;
+}__attribute__((packed))ssd_log_op_msg_t;
+
+typedef struct ssd_log_resp_msg
+{
+uint8_t tag;
+uint16_t status :2;
+uint16_t reserved1 :2://align with the normal resp msg
+uint16_t nr_log :12;
+uint8_t fun;
+uint32_t reserved;
+}__attribute__((packed))ssd_log_resp_msg_t;
+
+/* resp msg */
+typedef union ssd_response_msq
+{
+ssd_resp_msg_t resp_msg;
+ssd_log_resp_msg_t log_resp_msg;
+uint64_t u64_msg;
+uint32_t u32_msg[2];
+} ssd_response_msq_t;
+
+/* custom struct */
+typedef struct ssd_protocol_info
+{
+uint32_t ver;
+uint32_t init_state_reg;
+uint32_t init_state_reg_sz;
+uint32_t chip_info_reg;
+uint32_t chip_info_reg_sz;
+} ssd_protocol_info_t;
typedef struct ssd_hw_info {
  uint32_t bridge_ver;
  uint32_t ctrl_ver;
  uint32_t cmdfifo_sz;
  uint32_t cmdfifo_sz_mask;
  uint32_t cmd_max_sg;
  uint32_t sg_max_sec;
  uint32_t resp_ptr_sz;
  uint32_t resp_msg_sz;
  uint16_t nr_ctrl;
  uint16_t nr_data_ch;
  uint16_t nr_ch;
  uint16_t max_ch;
  uint16_t nr_chip;
  uint8_t pcb_ver;
  uint8_t upper_pcb_ver;
  uint8_t nand_vendor_id;
  uint8_t nand_dev_id;
  uint8_t max_ce;
  uint8_t id_size;
  uint16_t oob_size;
  uint16_t bbfpages;
  uint16_t bbf_seek;
  uint16_t page_count; //per block
  uint32_t page_size;
  uint32_t block_count; //per flash
  uint64_t ram_size;
  uint32_t ram_align;
  uint32_t ram_max_len;
  uint64_t bbt_base;
  uint32_t bbt_size;
  uint64_t md_base; //metadata
  uint32_t md_size;
  uint32_t md_entry_sz;
  uint32_t log_sz;
}
# SSD Hardware Information

```c
typedef struct ssd_hw_info_t {
    uint64_t nand_wbuff_base;
    uint32_t md_reserved_blks;
    uint32_t reserved_blks;
    uint32_t valid_pages;
    uint32_t max_valid_pages;
    uint64_t size;
} ssd_hw_info_t;

typedef struct ssd_hw_info_extend {
    uint8_t board_type;
    uint8_t cap_type;
    uint8_t plp_type;
    uint8_t work_mode;
    uint8_t form_factor;
    uint8_t pad[59];
} ssd_hw_info_extend_t;

typedef struct ssd_rom_info {
    uint32_t size;
    uint32_t block_size;
    uint16_t page_size;
    uint8_t nr_bridge_fw;
    uint8_t nr_ctrl_fw;
    uint8_t nr_bm_fw;
    uint8_t nr_smart;
    uint32_t bridge_fw_base;
    uint32_t bridge_fw_sz;
    uint32_t ctrl_fw_base;
    uint32_t ctrl_fw_sz;
    uint32_t bm_fw_base;
    uint32_t bm_fw_sz;
    uint32_t log_base;
    uint32_t log_sz;
    uint32_t smart_base;
    uint32_t smart_sz;
    uint32_t vp_base;
} ssd_rom_info_t;

/* debug info */
enum ssd_debug_type {
    SSD_DEBUG_NONE = 0,
    /* ... */
};
```
+SSD_DEBUG_READ_ERR,
+SSD_DEBUG_WRITE_ERR,
+SSD_DEBUG_RW_ERR,
+SSD_DEBUG_READ_TO,
+SSD_DEBUG_WRITE_TO,
+SSD_DEBUG_RW_TO,
+SSD_DEBUG_LOG,
+SSD_DEBUG_OFFLINE,
+SSD_DEBUG_NR
+;
+
+typedef struct ssd_debug_info
+{
+    int type;
+    union {
+        struct {
+            uint64_t off;
+            uint32_t len;
+        } loc;
+        struct {
+            int event;
+            uint32_t extra;
+        } log;
+    } data;
+} ssd_debug_info_t;
+
+/* label */
+#define SSD_LABEL_FIELD_SZ 32
+#define SSD_SN_SZ 16
+
+typedef struct ssd_label
+{
+    char date[SSD_LABEL_FIELD_SZ];
+    char sn[SSD_LABEL_FIELD_SZ];
+    char part[SSD_LABEL_FIELD_SZ];
+    char desc[SSD_LABEL_FIELD_SZ];
+    char other[SSD_LABEL_FIELD_SZ];
+    char maf[SSD_LABEL_FIELD_SZ];
+} ssd_label_t;
+
+#define SSD_LABEL_DESC_SZ 256
+
+typedef struct ssd_labelv3
+{
+    char boardtype[SSD_LABEL_FIELD_SZ];
+    char barcode[SSD_LABEL_FIELD_SZ];
+    char item[SSD_LABEL_FIELD_SZ];
+    char description[SSD_LABEL_DESC_SZ];
+}
typedef struct ssd_power_stat {
  uint64_t nr_poweron;
  uint64_t nr_powerloss;
  uint64_t init_failed;
} ssd_power_stat_t;

typedef struct ssd_io_stat {
  uint64_t run_time;
  uint64_t nr_to;
  uint64_t nr_ioretry;
  uint64_t nr_rwerror;
  uint64_t nr_read;
  uint64_t nr_write;
  uint64_t rsectors;
  uint64_t wsectors;
} ssd_io_stat_t;

typedef struct ssd_ecc_info {
  uint64_t bitflip[SSD_ECC_MAX_FLIP];
} ssd_ecc_info_t;

enum ssd_log_level {
  SSD_LOG_LEVEL_INFO = 0,
  SSD_LOG_LEVEL_NOTICE,
  SSD_LOG_LEVEL_WARNING,
  SSD_LOG_LEVEL_ERR,
  SSD_LOG_NR_LEVEL
typedef struct ssd_log_info {
        uint64_t nr_log;
        uint64_t stat[SSD_LOG_NR_LEVEL];
} ssd_log_info_t;

/* S.M.A.R.T. */
#define SSD_SMART_MAGIC (0x5452414D534453ull)

typedef struct ssd_smart {
        struct ssd_power_stat pstat;
        struct ssd_io_stat io_stat;
        struct ssd_ecc_info ecc_info;
        struct ssd_log_info log_info;
        uint64_t version;
        uint64_t magic;
} ssd_smart_t;

/* internal log */
typedef struct ssd_internal_log {
        uint32_t nr_log;
        void *log;
} ssd_internal_log_t;

/* ssd cmd */
typedef struct ssd_cmd {
        struct bio *bio;
        struct scatterlist *sgl;
        struct list_head list;
        void *dev;
        int nsegs;
        int flag; /* pbio(1) or bio(0) */
        int tag;
        void *msg;
        dma_addr_t msg_dma;
        unsigned long start_time;
        int errors;
        unsigned int nr_log;
} ssd_cmd_t;
+struct completion *waiting;
+} ssd_cmd_t;
+
+typedef void (*send_cmd_func)(struct ssd_cmd *);
+typedef int (*ssd_event_call)(struct gendisk *, int, int); /* gendisk, event id, event level */
+
+/* dcmd sz */
+#define SSD_DCMD_MAX_SZ 32
+
+typedef struct ssd_dcmd
+{
+struct list_head list;
+void *dev;
+uint8_t msg[SSD_DCMD_MAX_SZ];
+} ssd_dcmd_t;
+
+
+enum ssd_state {
+SSD_INIT_WORKQ,
+SSD_INIT_BD,
+SSD_ONLINE,
+/* full reset */
+SSD_RESETING,
+/* hw log */
+SSD_LOG_HW,
+/* log err */
+SSD_LOG_ERR,
+};
+
+#define SSD_QUEUE_NAME_LEN	16
+typedef struct ssd_queue {
+char name[SSD_QUEUE_NAME_LEN];
+void *dev;
+
+int idx;
+
+uint32_t resp_idx;
+uint32_t resp_idx_mask;
+uint32_t resp_msg_sz;
+
+void *resp_msg;
+void *resp_ptr;
+
+struct ssd_cmd *cmd;
+
+struct ssd_io_stat io_stat;
+struct ssd_ecc_info ecc_info;
+} ssd_queue_t;
typedef struct ssd_device {
    char name[SSD_DEV_NAME_LEN];
    int idx;
    int major;
    int readonly;
    int int_mode;
    #ifdef SSD_ESCAPE_IRQ
    int irq_cpu;
    #endif
    int reload_fw;
    int ot_delay; //in ms
    atomic_t refcnt;
    atomic_t tocnt;
    atomic_t in_flight[2]; //r&w
    uint64_t uptime;
    struct list_head list;
    struct pci_dev *pdev;
    unsigned long mmio_base;
    unsigned long mmio_len;
    void __iomem *ctrlp;
    struct mutex spi_mutex;
    struct mutex i2c_mutex;
    struct ssd_protocol_info protocol_info;
    struct ssd_hw_info hw_info;
    struct ssd_rom_info rom_info;
    struct ssd_label label;
    struct ssd_smart smart;
    atomic_t in_sendq;
    spinlock_t sendq_lock;
    struct ssd_blist sendq;
    struct task_struct *send_thread;
    wait_queue_head_t send_waitq;
    atomic_t in_doneq;
    spinlock_t doneq_lock;
+struct ssd_blist doneq;
+struct task_struct *done_thread;
+wait_queue_head_t done_waitq;
+
+struct ssd_dcmd *dcmd;
+spinlock_t dcmd_lock;
+struct list_head dcmd_list; /* direct cmd list */
+wait_queue_head_t dcmd_wq;
+
+unsigned long *tag_map;
+wait_queue_head_t tag_wq;
+
+spinlock_t cmd_lock;
+struct ssd_cmd *cmd;
+send_cmd_func scmd;
+
+ssd_event_call event_call;
+void *msg_base;
+dma_addr_t msg_base_dma;
+
+uint32_t resp_idx;
+void *resp_msg_base;
+void *resp_ptr_base;
+dma_addr_t resp_msg_base_dma;
+dma_addr_t resp_ptr_base_dma;
+
+int nr_queue;
+struct msix_entry entry[SSD_MSIX_VEC];
+struct ssd_queue queue[SSD_MSIX_VEC];
+
+struct request_queue *rq; /* The device request queue */
+struct gendisk *gd; /* The gendisk structure */
+
+struct mutex internal_log_mutex;
+struct ssd_internal_log internal_log;
+struct workqueue_struct *workq;
+struct work_struct log_work; /* get log */
+void *log_buf;
+
+unsigned long state; /* device state, for example, block device init */
+
+struct module *owner;
+
+/* extend */
+
+int slave;
+int cmajor;
+int save_md;
+int ot_protect;
+
+struct kref kref;
+
+struct mutex gd_mutex;
+struct ssd_log_info log_info; /* volatile */
+
+atomic_t queue_depth;
+struct mutex barrier_mutex;
+struct mutex fw_mutex;
+
+struct ssd_hw_info_extend hw_info_ext;
+struct ssd_labelv3 labelv3;
+
+int wmode;
+int user_wmode;
+struct mutex bm_mutex;
+struct work_struct bm_work; /* check bm */
+struct timer_list bm_timer;
+struct sfifo log_fifo;
+
+struct timer_list routine_timer;
+unsigned long routine_tick;
+unsigned long hwmon;
+
+struct work_struct hwmon_work; /* check hw */
+struct work_struct capmon_work; /* check battery */
+struct work_struct tempmon_work; /* check temp */
+
+/* debug info */
+struct ssd_debug_info db_info;
+uint64_t reset_time;
+int has_non_0x98_reg_access;
+spinlock_t in_flight_lock;
+
+uint64_t last_poweron_id;
+
+} ssd_device_t;
+
+
+/* Iocl struct */
+typedef struct ssd_acc_info {
+uint32_t threshold_l1;
+uint32_t threshold_l2;
+uint32_t val;
+} ssd_acc_info_t;
+
+typedef struct ssd_reg_op_info
+{  
+uint32_t offset;  
+uint32_t value;  
+} ssd_reg_op_info_t;  
+  
+typedef struct ssd_spi_op_info  
+{  
+void __user *buf;  
+uint32_t off;  
+uint32_t len;  
+} ssd_spi_op_info_t;  
+  
+typedef struct ssd_i2c_op_info  
+{  
+uint8_t saddr;  
+uint8_t wsize;  
+uint8_t rsize;  
+void __user *wbuf;  
+void __user *rbuf;  
+} ssd_i2c_op_info_t;  
+  
+typedef struct ssd_smbus_op_info  
+{  
+uint8_t saddr;  
+uint8_t cmd;  
+uint8_t size;  
+void __user *buf;  
+} ssd_smbus_op_info_t;  
+  
+typedef struct ssd_ram_op_info {  
+uint8_t ctrl_idx;  
+uint32_t length;  
+uint64_t start;  
+uint8_t __user *buf;  
+} ssd_ram_op_info_t;  
+  
+typedef struct ssd_flash_op_info {  
+uint32_t page;  
+uint16_t flash;  
+uint8_t chip;  
+uint8_t ctrl_idx;  
+uint8_t __user *buf;  
+} ssd_flash_op_info_t;  
+  
+typedef struct ssd_sw_log_info {  
+uint16_t event;  
+uint16_t pad;  
+uint32_t data;
typedef struct ssd_version_info
{
    uint32_t bridge_ver; /* bridge fw version */
    uint32_t ctrl_ver; /* controller fw version */
    uint32_t bm_ver; /* battery manager fw version */
    uint8_t pcb_ver; /* main pcb version */
    uint8_t upper_pcb_ver;
    uint8_t pad0;
    uint8_t pad1;
} ssd_version_info_t;

typedef struct pci_addr
{
    uint16_t domain;
    uint8_t bus;
    uint8_t slot;
    uint8_t func;
} pci_addr_t;

typedef struct ssd_drv_param_info
{
    int mode;
    int status_mask;
    int int_mode;
    int threaded_irq;
    int log_level;
    int wmode;
    int ot_protect;
    int finject;
    int pad[8];
} ssd_drv_param_info_t;

/* form factor */
enum ssd_form_factor
{
    SSD_FORM_FACTOR_HHHL = 0,
    SSD_FORM_FACTOR_FHHL
};

/* ssd power loss protect */
enum ssd_plp_type
{
    SSD_PLP_SCAP = 0,
    SSD_PLP_CAP,
    SSD_PLP_NONE
};
/* ssd bm */
#define SSD_BM_SLAVE_ADDRESS	0x16
#define SSD_BM_CAP 5

/* SBS cmd */
#define SSD_BM_SAFETYSTATUS	0x51
#define SSD_BM_OPERATIONSTATUS	0x54

/* Manufacturer Access */
#define SSD_BM_MANUFACTURERACCESS 0x00
#define SSD_BM_ENTER_CAP_LEARNING 0x0023
	/* cap learning */

/* Data flash access */
#define SSD_BM_DATA_FLASH_SUBCLASS_ID 0x77
#define SSD_BM_DATA_FLASH_SUBCLASS_ID_PAGE 0x78
#define SSD_BM_SYSTEM_DATA_SUBCLASS_ID 0x56
#define SSD_BM_CONFIGURATION_REGISTERS_ID 0x64

/* min cap voltage */
#define SSD_BM_CAP_VOLT_MIN 500

/* enum ssd bm_cap */
{
  SSD_BM_CAP_VINA = 1,
  SSD_BM_CAP_JH = 3
};

/* enum ssd bmstatus */
{
  SSD_BMSTATUS_OK = 0,
  SSD_BMSTATUS_CHARGING, /* not fully charged */
  SSD_BMSTATUS_WARNING
};

/* enum sbs unit */

SBS_UNIT_VALUE = 0,
SBS_UNIT_TEMPERATURE,
SBS_UNIT_VOLTAGE,
SBS_UNIT_CURRENT,
SBS_UNIT_ESR,
SBS_UNIT_PERCENT,
SBS_UNIT_CAPACITANCE
};

/* enum sbs size */
+SBS_SIZE_BYTE = 1,
+SBS_SIZE_WORD,
+SBS_SIZE_BLK,
+};
+
+struct sbs_cmd {
+uint8_t cmd;
+uint8_t size;
+uint8_t unit;
+uint8_t off;
+uint16_t mask;
+char *desc;
+};
+
+struct ssd_bm {
+uint16_t temp;
+uint16_t volt;
+uint16_t curr;
+uint16_t esr;
+uint16_t rsoc;
+uint16_t health;
+uint16_t cap;
+uint16_t chg_curr;
+uint16_t chg_volt;
+uint16_t cap_volt[SSD_BM_CAP];
+uint16_t sf_alert;
+uint16_t sf_status;
+uint16_t op_status;
+uint16_t sys_volt;
+}
+
+struct ssd_bm_manufacturer_data {
+{ 
+uint16_t pack_lot_code;
+uint16_t pcb_lot_code;
+uint16_t firmware_ver;
+uint16_t hardware_ver;
+};
+
+struct ssd_bm_configuration_registers {
+{ 
+struct {
+uint16_t cc:3;
+uint16_t rsvd:5;
+uint16_t stack:1;
+uint16_t rsvd1:2;
+uint16_t temp:2;
+uint16_t rsvd2:1;
#define SBS_VALUE_MASK 0xffff

#define bm_var_offset(var) ((size_t) &((struct ssd_bm *)0)->var)
#define bm_var(start, offset)((void *) start + (offset))

static struct sbs_cmd ssd_bm_sbs[] = {
  {0x08, SBS_SIZE_WORD, SBS_UNIT_TEMPERATURE, bm_var_offset(temp), SBS_VALUE_MASK, "Temperature"},
  {0x09, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, bm_var_offset(volt), SBS_VALUE_MASK, "Voltage"},
  {0x0a, SBS_SIZE_WORD, SBS_UNIT_CURRENT, bm_var_offset(curr), SBS_VALUE_MASK, "Current"},
  {0x0b, SBS_SIZE_WORD, SBS_UNIT_ESR, bm_var_offset(esr), SBS_VALUE_MASK, "ESR"},
  {0x0d, SBS_SIZE_BYTE, SBS_UNIT_PERCENT, bm_var_offset(rsoc), SBS_VALUE_MASK, "RelativeStateOfCharge"},
  {0x0e, SBS_SIZE_BYTE, SBS_UNIT_PERCENT, bm_var_offset(health), SBS_VALUE_MASK, "Health"},
  {0x10, SBS_SIZE_WORD, SBS_UNIT_CAPACITANCE, bm_var_offset(cap), SBS_VALUE_MASK, "Capacitance"},
  {0x14, SBS_SIZE_WORD, SBS_UNIT_CURRENT, bm_var_offset(chg_curr), SBS_VALUE_MASK, "ChargingCurrent"},
  {0x15, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, bm_var_offset(chg_volt), SBS_VALUE_MASK, "ChargingVoltage"},
  {0x3b, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, (uint8_t)bm_var_offset(cap_volt[4]), SBS_VALUE_MASK, "CapacitorVoltage5"},
  {0x3c, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, (uint8_t)bm_var_offset(cap_volt[3]), SBS_VALUE_MASK, "CapacitorVoltage4"},
  {0x3d, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, (uint8_t)bm_var_offset(cap_volt[2]), SBS_VALUE_MASK, "CapacitorVoltage3"},
  {0x3e, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, (uint8_t)bm_var_offset(cap_volt[1]), SBS_VALUE_MASK, "CapacitorVoltage2"},
  {0x3f, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, (uint8_t)bm_var_offset(cap_volt[0]), SBS_VALUE_MASK, "CapacitorVoltage1"},
  {0x50, SBS_SIZE_WORD, SBS_UNIT_VALUE, bm_var_offset(sf_alert), 0x870F, "SafetyAlert"},
  {0x51, SBS_SIZE_WORD, SBS_UNIT_VALUE, bm_var_offset(sf_status), 0xE7BF, "SafetyStatus"},
  {0x54, SBS_SIZE_WORD, SBS_UNIT_VALUE, bm_var_offset(op_status), 0x79F4, "OperationStatus"},
  {0x5a, SBS_SIZE_WORD, SBS_UNIT_VOLTAGE, bm_var_offset(sys_volt), SBS_VALUE_MASK, "SystemVoltage"},
  {0, 0, 0, 0, 0, NULL},
};
+#define SSD_CMD_GET_PROTOCOL_INFO_IOR(H, 100, struct ssd_protocol_info)
+#define SSD_CMD_GET_HW_INFO_IOR(H, 101, struct ssd_hw_info)
+#define SSD_CMD_GET_ROM_INFO_IOR(H, 102, struct ssd_rom_info)
+#define SSD_CMD_GET_SMART_IOR(H, 103, struct ssd_smart)
+#define SSD_CMD_GETIDX_IOR(H, 105, int)
+#define SSD_CMD_GET_AMOUNT_IOR(H, 106, int)
+#define SSD_CMD_GET_DRV_VER_IOR(H, 107, int)
+#define SSD_CMD_GET_TOINFO_IOR(H, 108, char[DRIVER_VERSION_LEN])
+
+#define SSD_CMD_GET_BBACC_INFO_IOR(H, 109, struct ssd_acc_info)
+#define SSD_CMD_GET_ECACC_INFO_IOR(H, 110, struct ssd_acc_info)
+
+#define SSD_CMD_GET_HW_INFO_EXT_IOR(H, 111, struct ssd_hw_info_extend)
+
+#define SSD_CMD_REG_READ_IOWR(H, 120, struct ssd_reg_op_info)
+#define SSD_CMD_REG_WRITE_IOWR(H, 121, struct ssd_reg_op_info)
+
+#define SSD_CMD_SPI_READ_IOWR(H, 125, struct ssd_spi_op_info)
+#define SSD_CMD_SPI_WRITE_IOWR(H, 126, struct ssd_spi_op_info)
+
+#define SSD_CMD_I2C_READ_IOWR(H, 128, struct ssd_i2c_op_info)
+#define SSD_CMD_I2C_WRITE_IOWR(H, 129, struct ssd_i2c_op_info)
+
+#define SSD_CMD_SMBUS_SEND_BYTE_IOWR(H, 131, struct ssd_smbus_op_info)
+#define SSD_CMD_SMBUS_RECEIVE_BYTE_IOWR(H, 132, struct ssd_smbus_op_info)
+
+#define SSD_CMD_BM_GET_VER_IOR(H, 140, uint16_t)
+#define SSD_CMD_BM_GET_NR_CAP_IOR(H, 141, int)
+
+#define SSD_CMD_CAP_LEARN_IOR(H, 143, uint32_t)
+
+#define SSD_CMD_RAM_READ_IOWR(H, 150, struct ssd_ram_op_info)
+
+#define SSD_CMD_NAND_READ_ID_IOR(H, 160, struct ssd_flash_op_info)
+
+#define SSD_CMD_NAND_READ_IOWR(H, 161, struct ssd_flash_op_info) // with oob
+
+#define SSD_CMD_NAND_WRITE_IOWR(H, 162, struct ssd_flash_op_info)
+
+#define SSD_CMD_NAND_ERASE_IOWR(H, 163, struct ssd_flash_op_info)
+
+#define SSD_CMD_NAND_READ_EXT_IOWR(H, 164, struct ssd_flash_op_info) // ignore EIO
```c
#define SSD_CMD_UPDATE_BBT			_IOW('H', 180, struct ssd_flash_op_info)
#define SSD_CMD_CLEAR_ALARM			_IOW('H', 190, int)
#define SSD_CMD_SET_ALARM			_IOW('H', 191, int)
#define SSD_CMD_RESET				_IOW('H', 200, int)
#define SSD_CMD_RELOAD_FW			_IOW('H', 201, int)
#define SSD_CMD_UNLOAD_DEV			_IOW('H', 202, int)
#define SSD_CMD_LOAD_DEV			_IOW('H', 203, int)
#define SSD_CMD_UPDATE_VP			_IOWR('H', 205, uint32_t)
#define SSD_CMD_FULL_RESET			_IOW('H', 206, int)
#define SSD_CMD_GET_NR_LOG			_IOR('H', 220, uint32_t)
#define SSD_CMD_GET_LOG				_IOR('H', 221, void *)
#define SSD_CMD_LOG_LEVEL			_IOW('H', 222, int)
#define SSD_CMD_OT_PROTECT			_IOW('H', 223, int)
#define SSD_CMD_GET_OT_STATUS		_IOR('H', 224, int)
#define SSD_CMD_CLEAR_LOG			_IOW('H', 230, int)
#define SSD_CMD_CLEAR_SMART			_IOW('H', 231, int)
#define SSD_CMD_SW_LOG				_IOW('H', 232, struct ssd_sw_log_info)
#define SSD_CMD_GET_LABEL			_IOR('H', 235, struct ssd_label)
#define SSD_CMD_GET_VERSION			_IOR('H', 236, struct ssd_version_info)
#define SSD_CMD_GET_TEMPERATURE		_IOR('H', 237, int)
#define SSD_CMD_GET_BMSTATUS		_IOR('H', 238, int)
#define SSD_CMD_GET_LABEL2			_IOR('H', 239, void *)
#define SSD_CMD_FLUSH				_IOW('H', 240, int)
#define SSD_CMD_SAVE_MD				_IOW('H', 241, int)
#define SSD_CMD_SET_WMODE			_IOW('H', 242, int)
#define SSD_CMD_GET_WMODE			_IOR('H', 243, int)
#define SSD_CMD_GET_USER_WMODE		_IOR('H', 244, int)
#define SSD_CMD_DEBUG				_IOW('H', 250, struct ssd_debug_info)
#define SSD_CMD_DRV_PARAM_INFO		_IOR('H', 251, struct ssd_drv_param_info)
#define SSD_CMD_CLEAR_WARNING		_IOW('H', 260, int)

/* log */
#define SSD_LOG_MAX_SZ				4096
#define SSD_LOG_LEVEL				SSD_LOG_LEVEL_NOTICE
```
+#define SSD_DIF_WITH_OLD_LOG 0x3f
+
+enum ssd_log_data
+{
+SSD_LOG_DATA_NONE = 0,
+SSD_LOG_DATA_LOC,
+SSD_LOG_DATA_HEX
+};
+
+typedef struct ssd_log_entry
+{
+union {
+struct {
+uint32_t page:10;
+uint32_t block:14;
+uint32_t flash:8;
+} loc;
+struct {
+uint32_t page:12;
+uint32_t block:12;
+uint32_t flash:8;
+} loc1;
+uint32_t val;
+} data;
+uint16_t event:10;
+uint16_t mod:6;
+uint16_t idx;
+} __attribute__((packed)) ssd_log_entry_t;
+
+typedef struct ssd_log
+{
+uint64_t time:56;
+uint64_t ctrl_idx:8;
+ssd_log_entry_t le;
+} __attribute__((packed)) ssd_log_t;
+
+typedef struct ssd_log_desc
+{
+uint16_t event;
+uint8_t level;
+uint8_t data;
+uint8_t sblock;
+uint8_t spage;
+char *desc;
+} __attribute__((packed)) ssd_log_desc_t;
+
+#define SSD_LOG_SW_IDX 0xF
+#define SSD_UNKNOWN_EVENT ((uint16_t)-1)
+static struct ssd_log_desc ssd_log_desc[] = {
+/* event, level, show flash, show block, show page, desc */
+{0x0, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_LOC, 0, 0, "Create BBT failure"}, //g3
+{0x1, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_LOC, 0, 0, "Read BBT failure"}, //g3
+{0x2, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "Mark bad block"},
+{0x3, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 0, 0, "Flush BBT failure"},
+{0x4, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_LOC, 1, 1, "Program failure"},
+{0x7, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "No available blocks"},
+{0x8, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "Bad EC header"},
+{0x9, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_LOC, 1, 0, "Bad VID header"}, //g3
+{0xa, SSD_LOG_LEVEL_INFO, SSD_LOG_DATA_LOC, 1, 0, "Wear leveling"},
+{0xb, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "WL read back failure"},
+{0x11, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Data recovery failure"}, // err
+{0x20, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Init: scan mapping table failure"}, // err g3
+{0x21, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Program failure"},
+{0x22, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Program failure"},
+{0x23, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Program failure"},
+{0x24, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "Merge: read mapping page failure"},
+{0x25, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Merge: read back failure"},
+{0x26, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Program failure"},
+{0x27, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Data corrupted for abnormal power down"}, //g3
+{0x28, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Merge: mapping page corrupted"},
+{0x29, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "Init: no mapping page"},
+{0x2a, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: mapping pages incomplete"},
+{0x2b, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Read back failure after programming failure"}, // err
+{0x1f, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Read failure without recovery"}, // err
+{0x22, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 0, 0, "No available blocks"}, // maybe err g3
+{0x3, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 0, "Init: RAID incomplete"}, // maybe g3
+{0x4, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Program failure"},
+{0x5, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Read failure in moving data"},
+{0x6, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Program failure"},
+{0x7, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_LOC, 1, 1, "Init: RAID not complete"},
+{0x8, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "Init: data moving interrupted"},
+{0xe, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Data inspection failure"},
+{0xff, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "IO: ECC failed"},
+
+/* new */
+{0xe, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 0, 0, "No available reserved blocks"}, // err
+{0x30, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 0, 0, "Init: PMT membership not found"},
+{0x31, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Init: PMT corrupted"},
+{0x32, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 0, 0, "Init: PBT membership not found"},
+{0x33, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 0, 0, "Init: PBT not found"},
+{0x34, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 0, 0, "Init: PBT corrupted"},
+{0x35, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: PMT page read failure"},
+{0x36, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: PBT page read failure"},
+{0x37, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: PBT backup page read failure"},
+{0x38, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: PBMT read failure"},
+{0x39, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Init: PBMT scan failure"}, // err
+{0x3a, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: first page read failure"},
+{0x3b, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Init: first page scan failure"}, // err
+{0x3c, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Init: scan unclosed block failure"}, // err
+{0x3d, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: write pointer mismatch"},
+{0x3e, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: PMT recovery: PBMT read failure"},
+{0x3f, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "Init: PMT recovery: PBMT scan failure"},
+{0x40, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "Init: PMT recovery: data page read failure"}, // err
+{0x41, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: PBT write pointer mismatch"},
+{0x42, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: PBT latest version corrupted"},
+{0x43, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 0, "Init: too many unclosed blocks"},
+{0x44, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Init: PDW block found"},
+{0x45, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_HEX, 0, 0, "Init: more than one PDW block found"}, // err
+{0x46, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Init: first page is blank or read failure"},
+{0x47, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 0, 0, "Init: PDW block not found"},
+{0x50, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 0, "Cache: hit error data"}, // err
+{0x51, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 0, "Cache: read back failure"}, // err
+{0x52, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Cache: unknown command"}, //?
+{0x53, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_LOC, 1, 1, "GC/WL read back failure"}, // err
+{0x60, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "Erase failure"},
+{0x70, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "LPA not matched"},
+{0x71, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "PBN not matched"},
+{0x72, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Read retry failure"},
+{0x73, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Need raid recovery"},
+{0x74, SSD_LOG_LEVEL_INFO, SSD_LOG_DATA_LOC, 1, 1, "Need read retry"},
+{0x75, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Read invalid data page"},
+{0x76, SSD_LOG_LEVEL_INFO, SSD_LOG_DATA_LOC, 1, 1, "ECC error, data in cache, PBN matched"},
+{0x77, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "ECC error, data in cache, PBN not matched"},
+{0x78, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "ECC error, data in flash, PBN not matched"},
+{0x79, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "ECC ok, data in cache, LPA not matched"},
+{0x7a, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "ECC ok, data in flash, LPA not matched"},
+{0x7b, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID data in cache, LPA not matched"},
+{0x7c, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID data in flash, LPA not matched"},
+{0x7d, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Read data page status error"},
+{0x7e, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Read blank page"},
+{0x7f, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Access flash timeout"},
+\{0x80, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "EC overflow"},
+\{0x81, SSD_LOG_LEVEL_INFO, SSD_LOG_DATA_NONE, 0, 0, "Scrubbing completed"},
+\{0x82, SSD_LOG_LEVEL_INFO, SSD_LOG_DATA_LOC, 1, 0, "Unstable block(too much bit flip)"},
+\{0x83, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "GC: ram error"}, //?
+\{0x84, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "GC: one PBMT read failure"},
+
+\{0x88, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "GC: mark bad block"},
+\{0x89, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 0, "GC: invalid page count error"}, // maybe err
+\{0x8a, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_NONE, 0, 0, "Warning: Bad Block close to limit"},
+\{0x8b, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_NONE, 0, 0, "Error: Bad Block over limit"},
+\{0x8c, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_NONE, 0, 0, "Warning: P/E cycles close to limit"},
+\{0x8d, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_NONE, 0, 0, "Error: P/E cycles over limit"},
+
+\{0x90, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Warning: Over temperature"}, //90
+\{0x91, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Info: Temperature is OK"}, //80
+\{0x92, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_NONE, 0, 0, "Battery fault"},
+\{0x93, SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_NONE, 0, 0, "SEU fault"}, //err
+\{0x94, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_NONE, 0, 0, "DDR error"}, //err
+\{0x95, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_NONE, 0, 0, "Controller serdes error"}, //err
+\{0x96, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_NONE, 0, 0, "Bridge serdes 1 error"}, //err
+\{0x97, SSD_LOG_LEVEL_ERR, SSD_LOG_DATA_NONE, 0, 0, "Bridge serdes 2 error"}, //err
+\{0x98, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "SEU fault (corrected)"}, //err
+\{0x99, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Battery is OK"},
+\{0xa0, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Info: Temperature close to limit"}, //85
+
+\{0xa9b, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "SEU address (low)"},
+\{0xa9c, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "SEU address (high)"},
+\{0xa9d, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "I2C fault"},
+\{0xa9e, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "DDR single bit error"},
+\{0xa9f, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Board voltage fault"},
+
+\{0xa00, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "LPA not matched"},
+\{0xa01, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Re-read data in cache"},
+\{0xa02, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Read blank page"},
+\{0xa03, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID recovery: Read blank page"},
+\{0xa04, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID recovery: new data in cache"},
+\{0xa05, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID recovery: PBN not matched"},
+\{0xa06, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Read data with error flag"},
+\{0xa07, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID recovery: recoverd data with error flag"},
+\{0xa08, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Blank page in cache, PBN matched"},
+\{0xa09, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID recovery: Blank page in cache, PBN matched"},
+\{0xaa, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 0, 0, "Flash init failure"},
+\{0xab, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "Mapping table recovery failure"},
+\{0xac, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_LOC, 1, 1, "RAID recovery: ECC failed"},
typedef enum
{
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Warning: Temperature is 95 degrees C"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Warning: Temperature is 100 degrees C"},
    SSD_LOG_LEVEL_ERROR, SSD_LOG_DATA_HEX, 0, 0, "CMD timeout"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Power on"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Power off"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Clear log"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Set capacity"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Clear data"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "BM safety status"},
    SSD_LOG_LEVEL_ERROR, SSD_LOG_DATA_HEX, 0, 0, "I/O error"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "CMD error"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Set wmode"},
    SSD_LOG_LEVEL_ERROR, SSD_LOG_DATA_HEX, 0, 0, "DDR init failed"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "PCIe link status"},
    SSD_LOG_LEVEL_ERROR, SSD_LOG_DATA_HEX, 0, 0, "Controller reset sync error"},
    SSD_LOG_LEVEL_ERROR, SSD_LOG_DATA_HEX, 0, 0, "Clock fault"},
    SSD_LOG_LEVEL_ERROR, SSD_LOG_DATA_HEX, 0, 0, "FPGA voltage fault status"},
    SSD_LOG_LEVEL_ERROR, SSD_LOG_DATA_HEX, 0, 0, "Set capacity finished"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Clear data finished"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Reset"},
    SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_HEX, 0, 0, "CAP: voltage fault"},
    SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_HEX, 0, 0, "CAP: learn fault"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "CAP status"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Board voltage fault status"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Info: Inlet temperature is 55 degrees C"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Info: Inlet temperature is 50 degrees C"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Info: Flash over temperature"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Info: Flash temperature is OK"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "CAP: short circuit"},
    SSD_LOG_LEVEL_WARNING, SSD_LOG_DATA_HEX, 0, 0, "Sensor fault"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Erase all data"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Erase all data finished"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "Temperature sensor event"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Clear smart"},
    SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_NONE, 0, 0, "Clear warning"},
    SSD_LOG_UNKNOWN_EVENT, SSD_LOG_LEVEL_NOTICE, SSD_LOG_DATA_HEX, 0, 0, "unknown event"},
    SSD_LOG_OVER_TEMP, SSD_LOG_DATA_NONE, 0, 0, "I/O error"},
    SSD_LOG_NORMAL_TEMP, SSD_LOG_DATA_NONE, 0, 0, "CMD error"},
    SSD_LOG_DATA_HEX, 0, 0, "Set wmode"},
    SSD_LOG_DATA_HEX, 0, 0, "DDR init failed"},
    SSD_LOG_DATA_HEX, 0, 0, "PCIe link status"},
    SSD_LOG_DATA_HEX, 0, 0, "Controller reset sync error"},
    SSD_LOG_DATA_HEX, 0, 0, "Clock fault"},
    SSD_LOG_DATA_HEX, 0, 0, "FPGA voltage fault status"},
    SSD_LOG_DATA_HEX, 0, 0, "Set capacity finished"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear data finished"},
    SSD_LOG_DATA_HEX, 0, 0, "Reset"},
    SSD_LOG_DATA_HEX, 0, 0, "CAP: voltage fault"},
    SSD_LOG_DATA_HEX, 0, 0, "CAP: learn fault"},
    SSD_LOG_DATA_HEX, 0, 0, "CAP status"},
    SSD_LOG_DATA_HEX, 0, 0, "Board voltage fault status"},
    SSD_LOG_DATA_NONE, 0, 0, "Info: Inlet temperature is 55 degrees C"},
    SSD_LOG_DATA_NONE, 0, 0, "Info: Inlet temperature is 50 degrees C"},
    SSD_LOG_DATA_NONE, 0, 0, "Info: Flash over temperature"},
    SSD_LOG_DATA_NONE, 0, 0, "Info: Flash temperature is OK"},
    SSD_LOG_DATA_HEX, 0, 0, "CAP: short circuit"},
    SSD_LOG_DATA_HEX, 0, 0, "Sensor fault"},
    SSD_LOG_DATA_NONE, 0, 0, "Erase all data"},
    SSD_LOG_DATA_NONE, 0, 0, "Erase all data finished"},
    SSD_LOG_DATA_HEX, 0, 0, "Temperature sensor event"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear smart"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear warning"},
    SSD_LOG_DATA_NONE, 0, 0, "unknown event"},
    SSD_LOG_DATA_HEX, 0, 0, "Temperature sensor event"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear smart"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear warning"},
    SSD_LOG_DATA_NONE, 0, 0, "unknown event"},
    SSD_LOG_DATA_HEX, 0, 0, "Temperature sensor event"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear smart"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear warning"},
    SSD_LOG_DATA_NONE, 0, 0, "unknown event"},
    SSD_LOG_DATA_HEX, 0, 0, "Temperature sensor event"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear smart"},
    SSD_LOG_DATA_NONE, 0, 0, "Clear warning"},
    SSD_LOG_DATA_NONE, 0, 0, "unknown event"},
    SSD_LOG_DATA_HEX, 0, 0, "Temperature sensor event"}};

/* */
#define SSD_LOG_OVER_TEMP 0x90
#define SSD_LOG_NORMAL_TEMP 0x91

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+#define SSD_LOG_WARN_TEMP 0x9a
+#define SSD_LOG_SEUFAULT 0x93
+#define SSD_LOG_SEUFAULT1 0x98
+#define SSD_LOG_BATTERY_FAULT 0x92
+#define SSD_LOG_BATTERY_OK 0x99
+#define SSD_LOG_BOARD_VOLT_FAULT 0x9f
+
+/* software log */
+define SSD_LOG_TIMEOUT 0x300
+define SSD_LOG_POWER_ON 0x301
+define SSD_LOG_POWER_OFF 0x302
+define SSD_LOG_CLEAR_LOG 0x303
+define SSD_LOG_SET_CAPACITY 0x304
+define SSD_LOG_CLEAR_DATA 0x305
+define SSD_LOG_BM_SFSTATUS 0x306
+define SSD_LOG_EIO 0x307
+define SSD_LOG_ECMD 0x308
+define SSD_LOG_SET_WMODE 0x309
+define SSD_LOG_DDR_INIT_ERR 0x30a
+define SSD_LOG_PCIE_LINK_STATUS 0x30b
+define SSD_LOG_CTRL_RST_SYNC 0x30c
+define SSD_LOG_CLK_FAULT 0x30d
+define SSD_LOG_VOLT_FAULT 0x30e
+define SSD_LOG_SET_CAPACITY_END 0x30f
+define SSD_LOG_CLEAR_DATA_END 0x310
+define SSD_LOG_RESET 0x311
+define SSD_LOG_CAP_VOLT_FAULT 0x312
+define SSD_LOG_CAP_LEARN_FAULT 0x313
+define SSD_LOG_CAPACITY 0x314
+define SSD_LOG_VOLT_STATUS 0x315
+define SSD_LOG_INLET_OVER_TEMP 0x316
+define SSD_LOG_INLET_NORMAL_TEMP 0x317
+define SSD_LOG_FLASH_OVER_TEMP 0x318
+define SSD_LOG_FLASH_NORMAL_TEMP 0x319
+define SSD_LOG_CAP_SHORT_CIRCUIT 0x31a
+define SSD_LOG_SENSOR_FAULT 0x31b
+define SSD_LOG_ERASE_ALL 0x31c
+define SSD_LOG_ERASE_ALL_END 0x31d
+define SSD_LOG_TEMP_SENSOR_EVENT 0x320
+define SSD_LOG_PERCENT_DONE 0x350
+define SSD_LOG_PERCENT_CLEAR 0x351
+
+/
+/* sw log fifo depth */
+define SSD_LOG_FIFO_SZ 1024
+
+/* done queue */
+static DEFINE_PER_CPU(struct list_head, ssd_doneq);
+static DEFINE_PER_CPU(struct tasklet_struct, ssd_tasklet);
+
+ /* unloading driver */
+static volatile int ssd_exiting = 0;
+
+#elif (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,12))
+static struct class_simple *ssd_class;
+#else
+static struct class *ssd_class;
+endif
+
+static int ssd_cmajor = SSD_CMAJOR;
+
+ /* ssd block device major, minors */
+static int ssd_major = SSD_MAJOR;
+static int ssd_major_sl = SSD_MAJOR_SL;
+static int ssd_minors = SSD_MINORS;
+
+ /* ssd device list */
+static struct list_head ssd_list;
+static unsigned long ssd_index_bits[SSD_MAX_DEV / BITS_PER_LONG + 1];
+static unsigned long ssd_index_bits_sl[SSD_MAX_DEV / BITS_PER_LONG + 1];
+static atomic_t ssd_nr;
+
+ /* module param */
+enum ssd_drv_mode
+{
+  SSD_DRV_MODE_STANDARD = 0, /* full */
+  SSD_DRV_MODE_DEBUG = 2, /* debug */
+  SSD_DRV_MODE_BASE /* base only */
+};
+
+enum ssd_int_mode
+{
+  SSD_INT_LEGACY = 0,
+  SSD_INT_MSI,
+  SSD_INT_MSIX
+};
+
+#elif (defined SSD_MSIX)
+//define SSD_INT_MODE_DEFAULT SSD_INT_MSIX
+#else (defined SSD_MSI)
+//define SSD_INT_MODE_DEFAULT SSD_INT_MSI
+#else
+ /* auto select the defaut int mode according to the kernel version*/
+/* suse 11 sp1 irqbalance bug: use msi instead*/
static int mode = SSD_DRV_MODE_STANDARD;
static int status_mask = 0xFF;
static int int_mode = SSD_INT_MODE_DEFAULT;
static int threaded_irq = 0;
static int log_level = SSD_LOG_LEVEL_WARNING;
static int ot_protect = 1;
static int wmode = SSD_WMODE_DEFAULT;
static int finject = 0;

module_param(mode, int, 0);
module_param(status_mask, int, 0);
module_param(int_mode, int, 0);
module_param(threaded_irq, int, 0);
module_param(log_level, int, 0);
module_param(ot_protect, int, 0);
module_param(wmode, int, 0);
module_param(finject, int, 0);

MODULE_PARM_DESC(mode, "driver mode, 0 - standard, 1 - debug, 2 - debug without IO, 3 - basic debug mode");
MODULE_PARM_DESC(status_mask, "command status mask, 0 - without command error, 0xff - with command error");
MODULE_PARM_DESC(int_mode, "preferred interrupt mode, 0 - legacy, 1 - msi, 2 - msix");
MODULE_PARM_DESC(threaded_irq, "threaded irq, 0 - normal irq, 1 - threaded irq");
MODULE_PARM_DESC(log_level, "log level to display, 0 - info and above, 1 - notice and above, 2 - warning and above, 3 - error only");
MODULE_PARM_DESC(ot_protect, "over temperature protect, 0 - disable, 1 - enable");
MODULE_PARM_DESC(wmode, "write mode, 0 - write buffer (with risk for the 6xx firmware), 1 - write buffer ex, 2 - write through, 3 - auto, 4 - default");
MODULE_PARM_DESC(finject, "enable fault simulation, 0 - off, 1 - on, for debug purpose only");

// API adaption layer
static inline void ssd_bios_endio(struct bio *bio, int error)
{
#if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,4,0))
#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,13,0))
    bio->bi_error = error;
#else
    bio->bi_status = errno_to_blk_status(error);
#endif
#endif
}
+#endif
+bio_endio(bio);
+#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,24))
+bio_endio(bio, error);
+#else
+bio_endio(bio, bio->bi_size, error);
+#endif
+
+static inline int ssd_bio_has_discard(struct bio *bio)
+{
+  +#ifndef SSD_TRIM
+  +return 0;
+  +#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(4,8,0))
+    +return bio_op(bio) == REQ_OP_DISCARD;
+  +#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,36))
+    +return bio->bi_rw & REQ_DISCARD;
+  +#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,32))
+    +return bio_rw_flagged(bio, BIO_RW_DISCARD);
+  +#else
+    +return 0;
+  +#endif
+  +
+  +static inline int ssd_bio_has_flush(struct bio *bio)
+  +{
+    +#if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,8,0))
+      +return bio_op(bio) == REQ_OP_FLUSH;
+    +#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,37))
+      +return bio->bi_rw & REQ_FLUSH;
+    +#else
+      +return 0;
+    +#endif
+  +}
+  +
+  +static inline int ssd_bio_has_barrier_or_fua(struct bio *bio)
+  +{
+    +#if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,8,0))
+      +return bio->bi_opf & REQ_FUA;
+    +#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,37))
+      +return bio->bi_rw & REQ_FUA;
+    +#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,36))
+      +return bio->bi_rw & REQ_HARDBARRIER;
+    +#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,32))
+      +return bio_rw_flagged(bio, BIO_RW_BARRIER);
+    +#else
+      +return bio_barrier(bio);
+    +#endif
+}
+
+ ifndef MODULE
+ static int __init ssd_drv_mode(char *str)
+ {
+ mode = (int) simple_strtoul(str, NULL, 0);
+ +
+ return 1;
+ +}
+
+ static int __init ssd_status_mask(char *str)
+ {
+ status_mask = (int) simple_strtoul(str, NULL, 16);
+ +
+ return 1;
+ +}
+
+ static int __init ssd_int_mode(char *str)
+ {
+ int_mode = (int) simple_strtoul(str, NULL, 0);
+ +
+ return 1;
+ +}
+
+ static int __init ssd_threaded_irq(char *str)
+ {
+ threaded_irq = (int) simple_strtoul(str, NULL, 0);
+ +
+ return 1;
+ +}
+
+ static int __init ssd_log_level(char *str)
+ {
+ log_level = (int) simple_strtoul(str, NULL, 0);
+ +
+ return 1;
+ +}
+
+ static int __init ssd_ot_protect(char *str)
+ {
+ ot_protect = (int) simple_strtoul(str, NULL, 0);
+ +
+ return 1;
+ +}
+
+ static int __init ssd_wmode(char *str)
+ {
+ wmode = (int) simple_strtoul(str, NULL, 0);
+ return 1;
+
+static int __init ssd_finject(char *str)
+
+finject = (int)simple_strtoul(str, NULL, 0);
+
+return 1;
+
+
+__setup(MODULE_NAME"_mode=", ssd_drv_mode);
+__setup(MODULE_NAME"_status_mask=", ssd_status_mask);
+__setup(MODULE_NAME"_int_mode=", ssd_int_mode);
+__setup(MODULE_NAME"_threaded_irq=", ssd_threaded_irq);
+__setup(MODULE_NAME"_log_level=", ssd_log_level);
+__setup(MODULE_NAME"_ot_protect=", ssd_ot_protect);
+__setup(MODULE_NAME"_wmode=", ssd_wmode);
+__setup(MODULE_NAME"_finject=", ssd_finject);
+
+#endif
+

+#ifdef CONFIG_PROC_FS
+#include <linux/proc_fs.h>
+#include <asm/uaccess.h>
+
+#define SSD_PROC_DIR	MODULE_NAME
+#define SSD_PROC_INFO	"info"
+
+static struct proc_dir_entry *ssd_proc_dir = NULL;
+static struct proc_dir_entry *ssd_proc_info = NULL;
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(3,2,0))
+static int ssd_proc_read(char *page, char **start,
+off_t off, int count, int *eof, void *data)
+{
+struct ssd_device *dev = NULL;
+struct ssd_device *n = NULL;
+uint64_t size;
+int idx;
+int len = 0;
+//char type; //xx
+
+if (ssd_exiting || off != 0) {
+return 0;
+}
+
+len += snprintf((page + len), (count - len), "Driver          Version:	%s
", DRIVER_VERSION);
list_for_each_entry_safe(dev, n, &ssd_list, list) {
    idx = dev->idx + 1;
    size = dev->hw_info.size;
    do_div(size, 1000000000);
    len += snprintf((page + len), (count - len), "\n");
    len += snprintf((page + len), (count - len), "HIO %d  Size:\t%uGB\n", idx, (uint32_t)size);
    len += snprintf((page + len), (count - len), "HIO %d     Bridge FW VER:\t%03X\n", idx, dev->hw_info.bridge_ver);
    if (dev->hw_info.ctrl_ver != 0) {
        len += snprintf((page + len), (count - len), "HIO %d Controller FW VER:\t%03X\n", idx, dev->hw_info.ctrl_ver);
    }
    len += snprintf((page + len), (count - len), "HIO %d           PCB VER:\t.%c\n", idx, dev->hw_info.pcb_ver);
    if (dev->hw_info.upper_pcb_ver >= 'A') {
        len += snprintf((page + len), (count - len), "HIO %d     Upper PCB VER:\t.%c\n", idx, dev->hw_info.upper_pcb_ver);
    }
    len += snprintf((page + len), (count - len), "HIO %d            Device:\t%s\n", idx, dev->name);
}
*eof = 1;
return len;
#else

static int ssd_proc_show(struct seq_file *m, void *v) {
    struct ssd_device *dev = NULL;
    struct ssd_device *n = NULL;
    uint64_t size;
    int idx;

    if (ssd_exiting) {
        return 0;
    }

    seq_printf(m, "Driver          Version:\t%s\n", DRIVER_VERSION);
    +struct ssd_device *dev = NULL;
    +struct ssd_device *n = NULL;
    +uint64_t size;
    +int idx;
    +
    +if (ssd_exiting) {
        return 0;
    }

    +seq_printf(m, "Driver          Version:\t%s\n", DRIVER_VERSION);
    +
    list_for_each_entry_safe(dev, n, &ssd_list, list) {
        idx = dev->idx + 1;
        size = dev->hw_info.size ;

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+do_div(size, 1000000000);
+
+seq_printf(m, "\n");
+
+seq_printf(m, "HIO %d    Size:\t%uGB\n", idx, (uint32_t)size);
+
+seq_printf(m, "HIO %d    Bridge FW VER:\t%03X\n", idx, dev->hw_info.bridge_ver);
+if (dev->hw_info.ctrl_ver != 0) {
+    seq_printf(m, "HIO %d    Controller FW VER:\t%03X\n", idx, dev->hw_info.ctrl_ver);
+
+seq_printf(m, "HIO %d    PCB VER:\t.%c\n", idx, dev->hw_info.pcb_ver);
+if (dev->hw_info.upper_pcb_ver >= 'A') {
+    seq_printf(m, "HIO %d    Upper PCB VER:\t.%c\n", idx, dev->hw_info.upper_pcb_ver);
+
+seq_printf(m, "HIO %d    Device:\t%s\n", idx, dev->name);
+
+return 0;
+
+}
+
+static int ssd_proc_open(struct inode *inode, struct file *file)
+{
+    if (LINUX_VERSION_CODE <= KERNEL_VERSION(3,9,0))
+        return single_open(file, ssd_proc_show, PDE(inode)->data);
+    else
+        return single_open(file, ssd_proc_show, PDE_DATA(inode));
+}
+
+static void ssd_cleanup_proc(void)
+{
+    if (ssd_proc_info) {
+        remove_proc_entry(SSD_PROC_INFO, ssd_proc_dir);
+        ssd_proc_info = NULL;
+    }
+}

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+static int ssd_init_proc(void)
{+
+ssd_proc_dir = proc_mkdir(SSD_PROC_DIR, NULL);
+if (!ssd_proc_dir)
+goto out_proc_mkdir;
+
#if (LINUX_VERSION_CODE < KERNEL_VERSION(3,2,0))
+ssd_proc_info = create_proc_entry(SSD_PROC_INFO, S_IFREG | S_IRUGO | S_IWUSR, ssd_proc_dir);
+if (!ssd_proc_info)
+goto out_create_proc_entry;
+
+ssd_proc_info->read_proc = ssd_proc_read;
+
+/* kernel bug */
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,30))
+ssd_proc_info->owner = THIS_MODULE;
+#endif
+#else
+ssd_proc_info = proc_create(SSD_PROC_INFO, 0600, ssd_proc_dir, &ssd_proc_fops);
+if (!ssd_proc_info)
+goto out_create_proc_entry;
+#endif
+
+return 0;

out_create_proc_entry:
+remove_proc_entry(SSD_PROC_DIR, NULL);
+out_proc_mkdir:
+return -ENOMEM;
}

#else
static void ssd_cleanup_proc(void)
{
+return;
}
static int ssd_init_proc(void)
{+
+return 0;
}
#endif /* CONFIG_PROC_FS */

/* sysfs */
static void ssd_unregister_sysfs(struct ssd_device *dev)
static int ssd_register_sysfs(struct ssd_device *dev)
{
	return 0;
}

static void ssd_cleanup_sysfs(void)
{
	return;
}

static int ssd_init_sysfs(void)
{
	return 0;
}

static inline void ssd_put_index(int slave, int index)
{
	unsigned long *index_bits = ssd_index_bits;

	if (slave) {
		index_bits = ssd_index_bits_sl;
	}

	if (test_and_clear_bit(index, index_bits)) {
		atomic_dec(&ssd_nr);
	}

static inline int ssd_get_index(int slave)
{
	unsigned long *index_bits = ssd_index_bits;

	int index = find_first_zero_bit(index_bits, SSD_MAX_DEV);

	if ((index = find_first_zero_bit(index_bits, SSD_MAX_DEV)) >= SSD_MAX_DEV) {
		return -1;
	}

	if (test_and_set_bit(index, index_bits)) {
	
goto find_index;
	}

	if (test_and_set_bit(index, index_bits)) {
	
goto find_index;
	}
+ atomic_inc(&ssd_nr);
+ return index;
+
+static void ssd_cleanup_index(void)
+{
+ return;
+}
+
+static int ssd_init_index(void)
+{
+ INIT_LIST_HEAD(&ssd_list);
+ atomic_set(&ssd_nr, 0);
+ memset(ssd_index_bits, 0, sizeof(ssd_index_bits));
+ memset(ssd_index_bits_sl, 0, sizeof(ssd_index_bits_sl));
+ return 0;
+}
+
+static void ssd_set_dev_name(char *name, size_t size, int idx)
+{
+ if(idx < SSD_ALPHABET_NUM) {
+ snprintf(name, size, "%c", 'a'+idx);
+ } else {
+ idx -= SSD_ALPHABET_NUM;
+ snprintf(name, size, "%c%c", 'a' + (idx/SSD_ALPHABET_NUM), 'a' + (idx%SSD_ALPHABET_NUM));
+ }
+}
+
+/* pci register r&w */
+static inline void ssd_reg_write(void *addr, uint64_t val)
+{
+ iowrite32((uint32_t)val, addr);
+ iowrite32((uint32_t)(val >> 32), addr + 4);
+ wmb();
+}
+
+static inline uint64_t ssd_reg_read(void *addr)
+{
+ uint64_t val;
+ uint32_t val_lo, val_hi;
+ val_lo = ioread32(addr);
+ val_hi = ioread32(addr + 4);
+
+rmb();
+val = val_lo | ((uint64_t)val_hi << 32);
+
+return val;
+
+#define ssd_reg32_write(addr, val) writel(val, addr)
+#define ssd_reg32_read(addr) readl(addr)
+
+ /* alarm led */
+static void ssd_clear_alarm(struct ssd_device *dev)
+{
+uint32_t val;
+
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+return;
+}
+
+val = ssd_reg32_read(dev->ctrlp + SSD_LED_REG);
+
+ /* firmware control */
+val &= ~0x2;
+
+ssd_reg32_write(dev->ctrlp + SSD_LED_REG, val);
+
+static void ssd_set_alarm(struct ssd_device *dev)
+{
+uint32_t val;
+
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+return;
+}
+
+val = ssd_reg32_read(dev->ctrlp + SSD_LED_REG);
+
+ /* light up */
+val &= ~0x1;
+
+ /* software control */
+val |= 0x2;
+
+ssd_reg32_write(dev->ctrlp + SSD_LED_REG, val);
+
+#define u32_swap(x) \ 
+((uint32_t)( \ 
+((uint32_t)(x) & (uint32_t)0x000000ffUL) << 24) | \


```c
+((uint32_t)(x) & (uint32_t)0x0000ff00UL) << 8) |
+((uint32_t)(x) & (uint32_t)0x00ff0000UL) >> 8) |
+((uint32_t)(x) & (uint32_t)0xff000000UL) >> 24))
+
+#define u16_swap(x)
+((uint16_t)(
+((uint16_t)(x) & (uint16_t)0x00ff) << 8) | 
+((uint16_t)(x) & (uint16_t)0xff00) >> 8)
+
+
+#if 0
+/* No lock, for init only*/
+static int ssd_spi_read_id(struct ssd_device *dev, uint32_t *id)
+{
+uint32_t val;
+unsigned long st;
+int ret = 0;
+
+if (!dev || !id) {
+return -EINVAL;
+
+}
+
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_READ_ID);
+
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+
+st = jiffies;
+for (;;) {
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+if (val == 0x1000000) {
+break;
+
+}
+
+if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out;
+
+}
+cond_resched();
+}
+
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_ID);
+*id = val;
+
+out:
+return ret;
```
```c
+} #endif
+
+/# sp access */
+static int ssd_init_spi(struct ssd_device *dev)
+{
+  uint32_t val;
+  unsigned long st;
+  int ret = 0;
+
+  mutex_lock(&dev->spi_mutex);
+  st = jiffies;
+  for(;;) {
+    ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_READ_STATUS);
+    do {
+      val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+      if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+        ret = -ETIMEDOUT;
+        goto out;
+      }
+      cond_resched();
+    } while (val != 0x1000000);
+    val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_STATUS);
+    if (!(val & 0x1)) {
+      break;
+    }
+    if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+      ret = -ETIMEDOUT;
+      goto out;
+    }
+    cond_resched();
+  }
+  while (val != 0x1000000);
+
+  val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_STATUS);
+  if (!((val & 0x1)) {
+    break;
+  }
+
+  if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+    ret = -ETIMEDOUT;
+    goto out;
+  }
+  cond_resched();
+}
+
+out:
+
+  if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+    if (val & 0x1) {
+      ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_CLSR);
+    }
+  }
+
+  ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_W_DISABLE);
+  mutex_unlock(&dev->spi_mutex);
+  ret = 0;
+
```
+return ret;
+
+static int ssd_spi_page_read(struct ssd_device *dev, void *buf, uint32_t off, uint32_t size)
+{
+uint32_t val;
+uint32_t rlen = 0;
+unsigned long st;
+int ret = 0;
+
+if (!dev || !buf) {
+    return -EINVAL;
+}
+
+if ((off % sizeof(uint32_t)) != 0 || (size % sizeof(uint32_t)) != 0 || size == 0 ||
+((uint64_t)off + (uint64_t)size) > dev->rom_info.size || size > dev->rom_info.page_size) {
+    return -EINVAL;
+}
+
+mutex_lock(&dev->spi_mutex);
+while (rlen < size) {
+    ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD_HI, ((off + rlen) >> 24));
+    wmb();
+    ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, (((off + rlen) << 8) | SSD_SPI_CMD_READ));
+
+    void)ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+    void)ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+    void)ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+    void)ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+
+    st = jiffies;
+    for (;;) {
+        val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+        if (val == 0x1000000) {
+            break;
+        }
+        cond_resched();
+    }
+    if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+        ret = -ETIMEDOUT;
+        goto out;
+    }
+
+    void)ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_RDATA);
+    *(uint32_t *)(buf + rlen)= u32_swap(val);
+    rlen += sizeof(uint32_t);
+
}
mutex_unlock(&dev->spi_mutex);
return ret;
}

static int ssd_spi_page_write(struct ssd_device *dev, void *buf, uint32_t off, uint32_t size)
{
  int ret = 0;
  
  if (!dev || !buf) {
    return -EINVAL;
  }
  
  if ((off % sizeof(uint32_t)) != 0 || (size % sizeof(uint32_t)) != 0 || size == 0 ||
      ((off + size - 1) / dev->rom_info.page_size) != ((off + size - 1) / dev->rom_info.page_size)) {
    return -EINVAL;
  }
  
  mutex_lock(&dev->spi_mutex);
  
  ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_W_ENABLE);

  wlen = size / sizeof(uint32_t);
  for (i=0; i<(int)wlen; i++) {
    ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_WDATA, u32_swap(*((uint32_t *)buf + i)));
  }
  wmb();
  ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD_HI, (off >> 24));
  wmb();
  ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, ((off << 8) | SSD_SPI_CMD_PROGRAM));
  udelay(1);

  st = jiffies;
  for (;;) {
    ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_REG_READ_STATUS);
    do {
      val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
    } while (val == SSD_SPI_REG_READY);
  }
}
ret = -ETIMEDOUT;
+goto out;
+
+while (val != 0x1000000);
+
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_STATUS);
+if (!(val & 0x1)) {
+break;
+}
+
+if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out;
+}
+cond_resched();
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+if ((val >> 6) & 0x1) {
+ret = -EIO;
+goto out;
+}
+
+out:
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+if (val & 0x1) {
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_CLSR);
+
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_W_DISABLE);
+
+mutex_unlock(&dev->spi_mutex);
+
+return ret;
+}
+
+static int ssd_spi_block_erase(struct ssd_device *dev, uint32_t off)
+{
+uint32_t val;
+unsigned long st;
+int ret = 0;
+
+if (!dev) {
+return -EINVAL;
+}
+
```c
+if ((off % dev->rom_info.block_size) != 0 || off >= dev->rom_info.size) {
+return -EINVAL;
+
+mutex_lock(&dev->spi_mutex);
+
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_W_ENABLE);
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_W_ENABLE);
+
+wmb();
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD_HI, (off >> 24));
+wmb();
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, ((off << 8) | SSD_SPI_CMD_ERASE));
+
+st = jiffies;
+for (;;) {
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_READ_STATUS);
+
+do {
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_READY);
+
+if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out;
+
+cond_resched();
+} while (val != 0x1000000);
+
+val = ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_STATUS);
+if (!(val & 0x1)) {
+break;
+
+if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out;
+
+cond_resched();
+} while (val != 0x1000000);
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+if (((val >> 5) & 0x1) {
+break;
+
+if (time_after(jiffies, (st + SSD_SPI_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out;
+
+cond_resched();
+} while (val != 0x1000000);
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+if (((val >> 5) & 0x1) {
+ret = -EIO;
+goto out;
+
+}
+
+}
+
+out:
```
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+    if (val & 0x1) {
+        ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_CLSR);
+    }
+}
+ssd_reg32_write(dev->ctrlp + SSD_SPI_REG_CMD, SSD_SPI_CMD_W_DISABLE);
+
+mutex_unlock(&dev->spi_mutex);
+
+return ret;
+
+static int ssd_spi_read(struct ssd_device *dev, void *buf, uint32_t off, uint32_t size)
+{
+    uint32_t len = 0;
+    uint32_t roff;
+    uint32_t rsize;
+    int ret = 0;
+
+    if (!dev || !buf) {
+        return -EINVAL;
+    }
+
+    if ((off % sizeof(uint32_t)) != 0 || (size % sizeof(uint32_t)) != 0 || size == 0 ||
+        ((uint64_t)off + (uint64_t)size) > dev->rom_info.size) {
+        return -EINVAL;
+    }
+
+    while (len < size) {
+        roff = (off + len) % dev->rom_info.page_size;
+        rsize = dev->rom_info.page_size - roff;
+        if ((size - len) < rsize) {
+            rsize = (size - len);
+        }
+        roff = off + len;
+        ret = ssd_spi_page_read(dev, (buf + len), roff, rsize);
+        if (ret) {
+            goto out;
+        }
+        len += rsize;
+    }
+    out:
+    return ret;
static int ssd_spi_write(struct ssd_device *dev, void *buf, uint32_t off, uint32_t size)
{
    uint32_t len = 0;
    uint32_t woff;
    uint32_t wsize;
    int ret = 0;

    if (!dev || !buf)
    {
        return -EINVAL;
    }

    if ((off % sizeof(uint32_t)) != 0 || (size % sizeof(uint32_t)) != 0 || size == 0 || ((uint64_t)off + (uint64_t)size) > dev->rom_info.size)
    {
        return -EINVAL;
    }

    while (len < size)
    {
        woff = (off + len) % dev->rom_info.page_size;
        wsize = dev->rom_info.page_size - woff;
        if (size - len < wsize)
        {
            wsize = (size - len);
        }
        woff = off + len;

        ret = ssd_spi_page_write(dev, (buf + len), woff, wsize);
        if (ret)
        {
            goto out;
        }

        len += wsize;

    }

    out:
    return ret;
}

static int ssd_spi_erase(struct ssd_device *dev, uint32_t off, uint32_t size)
{
    uint32_t len = 0;
    uint32_t eoff;
    int ret = 0;

    if (!dev)
    {
        return -EINVAL;
    }

    while (len < size)
    {
        eoff = off + len;
        if ((size - len) < eoff - off)
        {
            eoff = off + len;
        }

        ret = ssd_spi_page_erase(dev, (buf + len), eoff, wsize);
        if (ret)
        {
            goto out;
        }

        len += wsize;

    }

    out:
    return ret;
}

static int ssd_spi_erase(struct ssd_device *dev, uint32_t off, uint32_t size)
{
    uint32_t len = 0;
    uint32_t eoff;
    int ret = 0;

    if (!dev)
    {
        return -EINVAL;
    }

    while (len < size)
    {
        eoff = off + len;
        if ((size - len) < eoff - off)
        {
            eoff = off + len;
        }

        ret = ssd_spi_page_erase(dev, (buf + len), eoff, wsize);
        if (ret)
        {
            goto out;
        }

        len += wsize;

    }

    out:
    return ret;
}
+if (size == 0 || ((uint64_t)off + (uint64_t)size) > dev->rom_info.size ||
  (off % dev->rom_info.block_size) != 0 || (size % dev->rom_info.block_size) != 0) {
  +return -EINVAL;
  +}
  +
  +while (len < size) {
  +eoff = (off + len);
  +
  +ret = ssd_spi_block_erase(dev, eoff);
  +if (ret) {
  +goto out;
  +}
  +
  +len += dev->rom_info.block_size;
  +
  +cond_resched();
  +}
  +}
  +out:
  +return ret;
  +}
  +
  +/* i2c access */
  +static uint32_t __ssd_i2c_reg32_read(void *addr)
  +{
  +return ssd_reg32_read(addr);
  +}
  +
  +static void __ssd_i2c_reg32_write(void *addr, uint32_t val)
  +{
  +ssd_reg32_write(addr, val);
  +ssd_reg32_read(addr);
  +}
  +
  +static int __ssd_i2c_clear(struct ssd_device *dev, uint8_t saddr)
  +{
  +ssd_i2c_ctrl_t ctrl;
  +ssd_i2c_data_t data;
  +uint8_t_t status = 0;
  +int nr_data = 0;
  +unsigned long st;
  +int ret = 0;
  +
  +check_status:
  +ctrl.bits.wdata= 0;
  +ctrl.bits.addr= SSD_I2C_STATUS_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_READ;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+st = jiffies;
+for (;;) {
+data.val = __ssd_i2c_reg32_read(dev->ctrlp + SSD_I2C_RDATA_REG);
+if (data.bits.valid == 0) {
+break;
+
+/* retry */
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out;
+
+cond_resched();
+
+status = data.bits.rdata;
+
+if (!(status & 0x4)) {
+/* clear read fifo data */
+ctrl.bits.wdata = 0;
+ctrl.bits.addr = SSD_I2C_DATA_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_READ;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+st = jiffies;
+for (;;) {
+data.val = __ssd_i2c_reg32_read(dev->ctrlp + SSD_I2C_RDATA_REG);
+if (data.bits.valid == 0) {
+break;
+
+/* retry */
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out;
+
+cond_resched();
+
+nr_data++;
+if (nr_data <= SSD_I2C_MAX_DATA) {
+goto check_status;
+} else {
+goto out_reset;
+
+}
if (status & 0x3) {
    /* clear int */
    ctrl.bits.wdata = 0x04;
    ctrl<bits.addr = SSD_I2C_CMD_REG;
    ctrl<bits.rw = SSD_I2C_CTRL_WRITE;
    __ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
} +
+
if (!(status & 0x8)) {
    /* reset i2c controller */
    ctrl<bits.wdata = 0x0;
    ctrl<bits.addr = SSD_I2C_RESET_REG;
    ctrl<bits.rw = SSD_I2C_CTRL_WRITE;
    __ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
} +
+
return ret;
} +

/* slave addr */
ctrl<bits.wdata = saddr;
ctrl<bits.addr = SSD_I2C_SADDR_REG;
ctrl<bits.rw = SSD_I2C_CTRL_WRITE;
__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
/* data */
while (off < size) {
    ctrl<bits.wdata = buf[off];
    ctrl<bits.addr = SSD_I2C_DATA_REG;
    ctrl<bits.rw = SSD_I2C_CTRL_WRITE;
    __ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
} +
+off++; 
+} 
+
+ /* write */ 
+ctrl.bits.wdata = 0x01; 
+ctrl.bits.addr = SSD_I2C_CMD_REG; 
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE; 
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val); 
+
+ /* wait */ 
+st = jiffies; 
+for (;;) {
+  ctrl.bits.wdata = 0; 
+  ctrl.bits.addr = SSD_I2C_STATUS_REG; 
+  ctrl.bits.rw = SSD_I2C_CTRL_READ; 
+  __ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val); 
+  for (;;) {
+    data.val = __ssd_i2c_reg32_read(dev->ctrlp + SSD_I2C_RDATA_REG); 
+    if (data.bits.valid == 0) {
+      break; 
+    }
+    /* retry */ 
+    if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+      ret = -ETIMEDOUT; 
+      goto out_clear; 
+    }
+    cond_resched(); 
+  }
+  status = data.bits.rdata; 
+  if (status & 0x1) {
+    break; 
+  }
+  if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+    ret = -ETIMEDOUT; 
+    goto out_clear; 
+  }
+  cond_resched(); 
+  }
+  if (!(status & 0x1)) {
+    ret = -1; 
+    goto out_clear; 
+  }
+  }
/* busy? */
+if (status & 0x20) {
+ret = -2;
+goto out_clear;
+}
+
/* ack? */
+if (status & 0x10) {
+ret = -3;
+goto out_clear;
+}
+
/* clear */
+out_clear:
+if (__ssd_i2c_clear(dev, saddr)) {
+if (!ret) ret = -4;
+}
+
+mutex_unlock(&dev->i2c_mutex);
+
+return ret;
+}
+
+static int ssd_i2c_read(struct ssd_device *dev, uint8_t saddr, uint8_t size, uint8_t *buf)
+{
+ssd_i2c_ctrl_t ctrl;
+ssd_i2c_data_t data;
+uint8_t off = 0;
+uint8_t status = 0;
+unsigned long st;
+int ret = 0;
+
+mutex_lock(&dev->i2c_mutex);
+
+ctrl.val = 0;
+
+/* slave addr */
+ctrl.bits.wdata= saddr;
+ctrl.bits.addr= SSD_I2C_SADDR_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+/* read len */
+ctrl.bits.wdata= size;
+ctrl.bits.addr= SSD_I2C_LEN_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
/* read */
+ctrl.bits.wdata = 0x02;
+ctrl.bits.addr = SSD_I2C_CMD_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
/* wait */
+st = jiffies;
+for (;;) {
+ctrl.bits.wdata = 0;
+ctrl.bits.addr = SSD_I2C_STATUS_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_READ;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+for (;;) {
+data.val = __ssd_i2c_reg32_read(dev->ctrlp + SSD_I2C_RDATA_REG);
+if (data.bits.valid == 0) {
+break;
+}
+
/* retry */
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out_clear;
+}
+cond_resched();
+}
+
+status = data.bits.rdata;
+if (status & 0x2) {
+break;
+}
+
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out_clear;
+}
+cond_resched();
+}
+
+if (!status & 0x2) {
+ret = -1;
+goto out_clear;
+}
+
/* busy ? */
+if (status & 0x20) {
+ret = -2;
goto out_clear;
+
+/* ack */
+if (status & 0x10) {
+ret = -3;
+goto out_clear;
+}
+
+/* data */
+while (off < size) {
+ctrl.bits.wdata = 0;
+ctrl.bits.addr = SSD_I2C_DATA_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_READ;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+st = jiffies;
+for (;;) {
+data.val = __ssd_i2c_reg32_read(dev->ctrlp + SSD_I2C_RDATA_REG);
+if (data.bits.valid == 0) {
+break;
+}
+
+/* retry */
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out_clear;
+}
+cond_resched();
+}
+
+buf[off] = data.bits.rdata;
+
+off++;
+}
+
+/* clear */
+out_clear:
+if (__ssd_i2c_clear(dev, saddr)) {
+if ('!ret) ret = -4;
+}
+
+mutex_unlock(&dev->i2c_mutex);
+
+return ret;
+
+static int ssd_i2c_write_read(struct ssd_device *dev, uint8_t saddr, uint8_t wsize, uint8_t *wbuf, uint8_t rsize,
uint8_t *rbuf) {
+ssd_i2c_ctrl_t ctrl;
+ssd_i2c_data_t data;
+uint8_t off = 0;
+uint8_t status = 0;
+unsigned long st;
+int ret = 0;
+
+mutex_lock(&dev->i2c_mutex);
+
+ctrl.val = 0;
+
+/* slave addr */
+ctrl.bits.wdata = saddr;
+ctrl.bits.addr = SSD_I2C_SADDR_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+/* data */
+off = 0;
+while (off < wsize) {
+ctrl.bits.wdata = wbuf[off];
+ctrl.bits.addr = SSD_I2C_DATA_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+off++;
+}
+
+/* read len */
+ctrl.bits.wdata = rsize;
+ctrl.bits.addr = SSD_I2C_LEN_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+/* write -> read */
+ctrl.bits.wdata = 0x03;
+ctrl.bits.addr = SSD_I2C_CMD_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_WRITE;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+/* wait */
+st = jiffies;
+for (;;) {
+ctrl.bits.wdata = 0;
+ctrl.bits.addr = SSD_I2C_STATUS_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_READ;
elif __ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+for (;;) {
+data.val = __ssd_i2c_reg32_read(dev->ctrlp + SSD_I2C_RDATA_REG);
+if (data.bits.valid == 0) {
+break;
+}
+
+retry:
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out_clear;
+
+cond_resched();
+}
+
+status = data.bits.rdata;
+if (status & 0x2) {
+break;
+}
+
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out_clear;
+
+cond_resched();
+}
+
+if (!((status & 0x2)) {
+ret = -1;
+goto out_clear;
+}
+
+retry:
+if (status & 0x20) {
+ret = -2;
+goto out_clear;
+
+}
+
+retry:
+if (status & 0x10) {
+ret = -3;
+goto out_clear;
+
+}
+
+retry:
+if (off < rsize) {
+
+ctrl.bits.wdata = 0;
+ctrl.bits.addr = SSD_I2C_DATA_REG;
+ctrl.bits.rw = SSD_I2C_CTRL_READ;
+__ssd_i2c_reg32_write(dev->ctrlp + SSD_I2C_CTRL_REG, ctrl.val);
+
+st = jiffies;
+for (;;) {
+data.val = __ssd_i2c_reg32_read(dev->ctrlp + SSD_I2C_RDATA_REG);
+if (data.bits.valid == 0) {
+break;
+}
+
+"retry */
+if (time_after(jiffies, (st + SSD_I2C_TIMEOUT))) {
+ret = -ETIMEDOUT;
+goto out_clear;
+}
+cond_resched();
+
+rbuf[off] = data.bits.rdata;
+
+off++;}
+
+/* clear */
+out_clear:
+if (__ssd_i2c_clear(dev, saddr)) {
+if (!ret) ret = -4;
+}
+mutex_unlock(&dev->i2c_mutex);
+
+return ret;
+}
+
+static int ssd_smbus_send_byte(struct ssd_device *dev, uint8_t saddr, uint8_t *buf)
+{
+int i = 0;
+int ret = 0;
+
+for (;;) {
+ret = ssd_i2c_write(dev, saddr, 1, buf);
+if (!ret || -ETIMEDOUT == ret) {
+break;
+}
+
+i++;}
+if (i >= SSD_SMBUS_RETRY_MAX) {
+}
break;
+
+msleep(SSD_SMBUS_RETRY_INTERVAL);
+
+
+return ret;
+
+
+static int ssd_smbus_receive_byte(struct ssd_device *dev, uint8_t saddr, uint8_t *buf)
+{
+  int i = 0;
+  int ret = 0;
+
+  for (;;)
+  {
+    ret = ssd_i2c_read(dev, saddr, 1, buf);
+    if (!ret || -ETIMEDOUT == ret) {
+      break;
+    }
+    i++;
+    if (i >= SSD_SMBUS_RETRY_MAX) {
+      break;
+    }
+    msleep(SSD_SMBUS_RETRY_INTERVAL);
+  }
+
+  return ret;
+
+
+static int ssd_smbus_write_byte(struct ssd_device *dev, uint8_t saddr, uint8_t cmd, uint8_t *buf)
+{
+  uint8_t smb_data[SSD_SMBUS_DATA_MAX] = {0};
+  int i = 0;
+  int ret = 0;
+
+  smb_data[0] = cmd;
+  memcpy((smb_data + 1), buf, 1);
+
+  for (;;)
+  {
+    ret = ssd_i2c_write(dev, saddr, 2, smb_data);
+    if (!ret || -ETIMEDOUT == ret) {
+      break;
+    }
+    i++;
+    if (i >= SSD_SMBUS_RETRY_MAX) {
+      break;
+    }
+msleep(SSD_SMBUS_RETRY_INTERVAL);
+
+return ret;
+
+static int ssd_smbus_read_byte(struct ssd_device *dev, uint8_t addr, uint8_t cmd, uint8_t *buf)
+{
+uint8_t smb_data[SSD_SMBUS_DATA_MAX] = {0};
+int i = 0;
+int ret = 0;
+
+smb_data[0] = cmd;
+
+for (;; ) {
+ret = ssd_i2c_write_read(dev, addr, 1, smb_data, 1, buf);
+if (!ret || -ETIMEDOUT == ret) {
+break;
+}
+
+i++;
+if (i >= SSD_SMBUS_RETRY_MAX) {
+break;
+}
+msleep(SSD_SMBUS_RETRY_INTERVAL);
+
+return ret;
+
+static int ssd_smbus_write_word(struct ssd_device *dev, uint8_t addr, uint8_t cmd, uint8_t *buf)
+{
+uint8_t smb_data[SSD_SMBUS_DATA_MAX] = {0};
+int i = 0;
+int ret = 0;
+
+smb_data[0] = cmd;
+memcpy((smb_data + 1), buf, 2);
+
+for (;; ) {
+ret = ssd_i2c_write(dev, addr, 3, smb_data);
+if (!ret || -ETIMEDOUT == ret) {
+break;
+}
+
+i++;
+if (i >= SSD_SMBUS_RETRY_MAX) {
+break;
+msleep(SSD_SMBUS_RETRY_INTERVAL);
+
+return ret;
+
+static int ssd_smbus_read_word(struct ssd_device *dev, uint8_t saddr, uint8_t cmd, uint8_t *buf)
+{
+uint8_t smb_data[SSD_SMBUS_DATA_MAX] = {0};
+int i = 0;
+int ret = 0;
+
+smb_data[0] = cmd;
+
+for (;;) {
+ret = ssd_i2c_write_read(dev, saddr, 1, smb_data, 2, buf);
+if (!ret || -ETIMEDOUT == ret) {
+break;
+}
+
+i++;
+if (i >= SSD_SMBUS_RETRY_MAX) {
+break;
+}
+msleep(SSD_SMBUS_RETRY_INTERVAL);
+}
+
+return ret;
+
+static int ssd_smbus_write_block(struct ssd_device *dev, uint8_t saddr, uint8_t cmd, uint8_t size, uint8_t *buf)
+{
+uint8_t smb_data[SSD_SMBUS_DATA_MAX] = {0};
+int i = 0;
+int ret = 0;
+
+smb_data[0] = cmd;
+smb_data[1] = size;
+memcpy((smb_data + 2), buf, size);
+
+for (;;) {
+ret = ssd_i2c_write(dev, saddr, (2 + size), smb_data);
+if (!ret || -ETIMEDOUT == ret) {
+break;
+}
+
+i++;
+if (i >= SSD_SMBUS_RETRY_MAX) {
+break;
+}
+msleep(SSD_SMBUS_RETRY_INTERVAL);
+
+static int ssd_smbus_read_block(struct ssd_device *dev, uint8_t saddr, uint8_t cmd, uint8_t size, uint8_t *buf) {
+uint8_t smb_data[SSD_SMBUS_DATA_MAX] = {0};
+uint8_t rsize;
+int i = 0;
+int ret = 0;
+
+smb_data[0] = cmd;
+
+for (;;) {
+ret = ssd_i2c_write_read(dev, saddr, 1, smb_data, (SSD_SMBUS_BLOCK_MAX + 1), (smb_data + 1));
+if (!ret || -ETIMEDOUT == ret) {
+break;
+}
+
+i++;
+if (i >= SSD_SMBUS_RETRY_MAX) {
+break;
+}
+msleep(SSD_SMBUS_RETRY_INTERVAL);
+}
+if (ret) {
+return ret;
+}
+
rsize = smb_data[1];
+
+if (rsize > size) {
+rsize = size;
+}
+
+memcpy(buf, (smb_data + 2), rsize);
+
+return 0;
+}
+
+static int ssd_gen_swlog(struct ssd_device *dev, uint16_t event, uint32_t data);
+/* sensor */
+static int ssd_init_lm75(struct ssd_device *dev, uint8_t saddr)
+{
+    uint8_t conf = 0;
+    int ret = 0;
+    
+    ret = ssd_smbus_read_byte(dev, saddr, SSD_LM75_REG_CONF, &conf);
+    if (ret) {
+        goto out;
+    }
+    conf &= (uint8_t)(~1u);
+    ret = ssd_smbus_write_byte(dev, saddr, SSD_LM75_REG_CONF, &conf);
+    if (ret) {
+        goto out;
+    }
+out:
+    return ret;
+}
+
+static int ssd_lm75_read(struct ssd_device *dev, uint8_t saddr, uint16_t *data)
+{
+    uint16_t val = 0;
+    int ret;
+    
+    ret = ssd_smbus_read_word(dev, saddr, SSD_LM75_REG_TEMP, (uint8_t *)&val);
+    if (ret) {
+        return ret;
+    }
+    *data = u16_swap(val);
+    return 0;
+}
+
+static int ssd_init_lm80(struct ssd_device *dev, uint8_t saddr)
+{
+    uint8_t val;
+    uint8_t low, high;
+    int i;
+    int ret = 0;
+    
+    /* init */
+    val = 0x80;
+    ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_CONFIG, &val);
+    if (ret) {
+        return ret;
+    }
+    /* data = u16_swap(val); */
+    return 0;
+}
+
+static int ssd_init_lm80(struct ssd_device *dev, uint8_t saddr)
+{
+    uint8_t val;
+    uint8_t low, high;
+    int i;
+    int ret = 0;
+    
+    /* init */
+    val = 0x80;
+    ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_CONFIG, &val);
+    if (ret) {
+goto out;
+
+;*/ 11-bit temp */
+val = 0x08;
+ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_RES, &val);
+if (ret) {
+goto out;
+
+;*/ set volt limit */
+for (i=0; i<SSD_LM80_IN_NR; i++) {
+high = ssd_lm80_limit[i].high;
+low = ssd_lm80_limit[i].low;
+
+if (SSD_LM80_IN_CAP == i) {
+low = 0;
+
+} /* high limit */
+ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_IN_MAX(i), &high);
+if (ret) {
+goto out;
+
+} /* low limit */
+ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_IN_MIN(i), &low);
+if (ret) {
+goto out;
+
+} /* set interrupt mask: allow volt in interrupt except cap in*/
+val = 0x81;
+ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_MASK1, &val);
+if (ret) {
+goto out;
+
+} /* set interrupt mask: disable others */
+val = 0xFF;
+ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_MASK2, &val);
+if (ret) {

+goto out;
+
+ /* start */
+ val = 0x03;
+ ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_CONFIG, &val);
+ if (ret) {
+ goto out;
+ }
+
+out:
+ return ret;
+
+static int ssd_lm80_enable_in(struct ssd_device *dev, uint8_t saddr, int idx)
+{
+ uint8_t val = 0;
+ int ret = 0;
+
+ if (idx >= SSD_LM80_IN_NR || idx < 0) {
+ return -EINVAL;
+ }
+
+ ret = ssd_smbus_read_byte(dev, saddr, SSD_LM80_REG_MASK1, &val);
+ if (ret) {
+ goto out;
+ }
+
+ val &= ~(1UL << (uint32_t)idx);
+ 
+ ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_MASK1, &val);
+ if (ret) {
+ goto out;
+ }
+
+out:
+ return ret;
+
+static int ssd_lm80_disable_in(struct ssd_device *dev, uint8_t saddr, int idx)
+{
+ uint8_t val = 0;
+ int ret = 0;
+
+ if (idx >= SSD_LM80_IN_NR || idx < 0) {
+ return -EINVAL;
+ }
+
+ret = ssd_smbus_read_byte(dev, saddr, SSD_LM80_REG_MASK1, &val);
+ if (ret) {
+ goto out;
+ }
+
+val &= ~(1UL << (uint32_t)idx);
+ 
+ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_MASK1, &val);
+ if (ret) {
+ goto out;
+ }
+
+out:
+ return ret;
+}
+ret = ssd_smbus_read_byte(dev, saddr, SSD_LM80_REG_MASK1, &val);
+if (ret) {
+goto out;
+}
+
+val |= (1UL << (uint32_t)idx);
+
+ret = ssd_smbus_write_byte(dev, saddr, SSD_LM80_REG_MASK1, &val);
+if (ret) {
+goto out;
+}
+)
+
+out:
+return ret;
+}
+
+static int ssd_lm80_read_temp(struct ssd_device *dev, uint8_t saddr, uint16_t *data)
+{
+uint16_t val = 0;
+int ret;
+
+ret = ssd_smbus_read_word(dev, saddr, SSD_LM80_REG_TEMP, (uint8_t *)&val);
+if (ret) {
+return ret;
+}
+
+*data = u16_swap(val);
+
+return 0;
+}
+
+static int ssd_generate_sensor_fault_log(struct ssd_device *dev, uint16_t event, uint8_t addr,uint32_t ret)
+{
+uint32_t data;
+data = ((ret & 0xffff) << 16) | (addr << 8) | addr;
+ssd_gen_swlog(dev,event,data);
+return 0;
+}
+
+static int ssd_lm80_check_event(struct ssd_device *dev, uint8_t saddr)
+{
+uint32_t volt;
+uint16_t val = 0, status;
+uint8_t alarm1 = 0, alarm2 = 0;
+uint32_t low, high;
+int i,j=0;
+int ret = 0;
+
+/* read interrupt status to clear interrupt */
+ret = ssd_smbus_read_byte(dev, saddr, SSD_LM80_REG_ALARM1, &alarm1);
+if (ret) {
+  goto out;
+}
+
+ret = ssd_smbus_read_byte(dev, saddr, SSD_LM80_REG_ALARM2, &alarm2);
+if (ret) {
+  goto out;
+}
+
+status = (uint16_t)alarm1 | ((uint16_t)alarm2 << 8);
+
+/* parse inerrupt status */
+for (i=0; i<SDD_LM80_IN_NR; i++) {
+  if (!((status >> (uint32_t)i) & 0x1)) {
+    if (test_and_clear_bit(SSD_HWMON_LM80(i), &dev->hwmon)) {
+      /* enable INx irq */
+      ret = ssd_lm80_enable_in(dev, saddr, i);
+      if (ret) {
+        goto out;
+      }
+    }
+    continue;
+  }
+}
+
+/* disable INx irq */
+ret = ssd_lm80_disable_in(dev, saddr, i);
+if (ret) {
+  goto out;
+}
+
+if (test_and_set_bit(SSD_HWMON_LM80(i), &dev->hwmon)) {
+  continue;
+}
+
+high = (uint32_t)ssd_lm80_limit[i].high * (uint32_t)10;
+low = (uint32_t)ssd_lm80_limit[i].low * (uint32_t)10;
+
+for (j=0; j<3; j++) {
+  ret = ssd_smbus_read_word(dev, saddr, SSD_LM80_REG_IN(i), (uint8_t *)&val);
+  if (ret) {
+    goto out;
+  }
+  volt = SSD_LM80_CONVERT_VOLT(u16_swap(val));
+  if ((volt>high) || (volt<=low)) {
+    if (j<2) {
+      msleep(SSD_LM80_CONV_INTERVAL);
+    }
+  }
+}
+} else {
+break;
+}
+
+if (j<3) {
+continue;
+}
+
+switch (i) {
+case SSD_LM80_IN_CAP: {
+if (0 == volt) {
+ssd_gen_swlog(dev, SSD_LOG_CAP_SHORT_CIRCUIT, 0);
+} else {
+ssd_gen_swlog(dev, SSD_LOG_CAP_VOLT_FAULT, SSD_PL_CAP_VOLT(volt));
+}
+brea
+}
+
+case SSD_LM80_IN_1V2:
+case SSD_LM80_IN_1V2a:
+case SSD_LM80_IN_1V5:
+case SSD_LM80_IN_1V8: {
+ssd_gen_swlog(dev, SSD_LOG_VOLT_STATUS, SSD_VOLT_LOG_DATA(i, 0, volt));
+brea
+}
+
+case SSD_LM80_IN_FPGA_3V3:
+case SSD_LM80_IN_3V3: {
+ssd_gen_swlog(dev, SSD_LOG_VOLT_STATUS, SSD_VOLT_LOG_DATA(i, 0, SSD_LM80_3V3_VOLT(volt)));
+brea
+}
+
+default:
+brea
+}
+
+out:
+if (ret) {
+if (!test_and_set_bit(SSD_HWMON_SENSOR(SSD_SENSOR_LM80), &dev->hwmon)) {
+ssd_generate_sensor_fault_log(dev, SSD_LOG_SENSOR_FAULT, (uint32_t)saddr,ret);
+}
+} else {
+test_and_clear_bit(SSD_HWMON_SENSOR(SSD_SENSOR_LM80), &dev->hwmon);
+}
+return ret;
+}
static int ssd_init_sensor(struct ssd_device *dev) {
    int ret = 0;
    
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        goto out;
    }
    
    ret = ssd_init_lm75(dev, SSDSENSOR_LM75_SADDRESS);
    if (ret) {
        hio_warn("%s: init lm75 failed\n", dev->name);
        if (!test_and_set_bit(SSD_HWMON_SENSOR(SSDSENSOR_LM75), &dev->hwmon)) {
            ssd_generate_sensor_fault_log(dev, SSDLOG_SENSOR_FAULT, SSDSENSOR_LM75_SADDRESS, ret);
        }
        goto out;
    }
    
    if (dev->hw_info.pcb_ver >= 'B' || dev->hw_info_ext.form_factor == SSDFORM_FACTOR_HHHL) {
        ret = ssd_init_lm80(dev, SSDSENSOR_LM80_SADDRESS);
        if (ret) {
            hio_warn("%s: init lm80 failed\n", dev->name);
            if (!test_and_set_bit(SSD_HWMON_SENSOR(SSDSENSOR_LM80), &dev->hwmon)) {
                ssd_generate_sensor_fault_log(dev, SSDLOG_SENSOR_FAULT, SSDSENSOR_LM80_SADDRESS, ret);
            }
            goto out;
        }
    }
    
    out:
    /* skip error if not in standard mode */
    if (mode != SSD_DRV_MODE_STANDARD) {
        ret = 0;
    }
    return ret;
}

static int ssd_mon_boardvolt(struct ssd_device *dev) {
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        return 0;
    }
    
    if (!test_and_set_bit(SSD_HWMON_SENSOR(SSDSENSOR_LM80), &dev->hwmon)) {
        ssd_generate_sensor_fault_log(dev, SSDLOG_SENSOR_FAULT, SSDSENSOR_LM80_SADDRESS, ret);
    }
    return 0;
}

/* board volt */
static int ssd_mon_boardvolt(struct ssd_device *dev) {
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        return 0;
    }
    
    if (!test_and_set_bit(SSD_HWMON_SENSOR(SSDSENSOR_LM80), &dev->hwmon)) {
        ssd_generate_sensor_fault_log(dev, SSDLOG_SENSOR_FAULT, SSDSENSOR_LM80_SADDRESS, ret);
    }
    return 0;
}
+return ssd_lm80_check_event(dev, SSDSENSOR_LM80_SADDRESS);
+
+*/ temperature */
+static int ssd_mon_temp(struct ssd_device *dev)
+{
+int cur;
+uint16_t val = 0;
+int ret = 0;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+    return 0;
+}
+
+if (dev->hw_info_ext.form_factor == SSDFORM_FACTOR_FHHL && dev->hw_info.pcb_ver < 'B') {
+    return 0;
+}
+
+/* inlet */
+ret = ssd_lm80_read_temp(dev, SSDSENSOR_LM80_SADDRESS, &val);
+if (ret) {
+    if (!test_and_set_bit(SSDHWMON_SENSOR(SSDSENSOR_LM80), &dev->hwmon)) {
+        ssd_generate_sensor_fault_log(dev, SSDLOG_TEMP_SENSOR_EVENT, SSDSENSOR_LM80_SADDRESS, ret);
+    }
+    goto out;
+}
+test_and_clear_bit(SSDHWMON_SENSOR(SSDSENSOR_LM80), &dev->hwmon);
+
+cur = SSDSENSOR_CONVERT_TEMP(val);
+
+if (cur >= SSD_INLET_OT_TEMP) {
+    if (!test_and_set_bit(SSDHWMON_TEMP(SSDTEMP_INLET), &dev->hwmon)) {
+        ssd_gen_swlog(dev, SSDLOG_INLET_OVER_TEMP, (uint32_t)cur);
+    }
+    } else if (cur < SSD_INLET_OT_HYST) {
+    if (test_and_clear_bit(SSDHWMON_TEMP(SSDTEMP_INLET), &dev->hwmon)) {
+        ssd_gen_swlog(dev, SSDLOG_INLET_NORMAL_TEMP, (uint32_t)cur);
+    }
+    }
+
+    } else if (cur < SSD_INLET_OT_HYST) {
+    if (test_and_clear_bit(SSDHWMON_TEMP(SSDTEMP_INLET), &dev->hwmon)) {
+        ssd_gen_swlog(dev, SSDLOG_INLET_NORMAL_TEMP, (uint32_t)cur);
+    }
+    } else if (cur < SSD_INLET_OT_HYST) {
+    if (test_and_clear_bit(SSDHWMON_TEMP(SSDTEMP_INLET), &dev->hwmon)) {
+        ssd_gen_swlog(dev, SSDLOG_INLET_NORMAL_TEMP, (uint32_t)cur);
+    }
+
+    } else if (cur < SSD_INLET_OT_HYST) {
+    if (test_and_clear_bit(SSDHWMON_TEMP(SSDTEMP_INLET), &dev->hwmon)) {
+        ssd_gen_swlog(dev, SSDLOG_INLET_NORMAL_TEMP, (uint32_t)cur);
+    }

+*/ flash */
+ret = ssd_lm75_read(dev, SSDSENSOR_LM75_SADDRESS, &val);
+if (ret) {
+    if (!test_and_set_bit(SSDHWMON_SENSOR(SSDSENSOR_LM75), &dev->hwmon)) {
+        ssd_generate_sensor_fault_log(dev, SSDLOG_TEMP_SENSOR_EVENT, SSDSENSOR_LM75_SADDRESS, ret);
+    }
+    goto out;
+test_and_clear_bit(SSD_HWMON_SENSOR(SSD_SENSOR_LM75), &dev->hwmon);
+
cur = SSD_SENSOR_CONVERT_TEMP(val);
+if (cur >= SSD_FLASH_OT_TEMP) {
+if (!test_and_set_bit(SSD_HWMON_TEMP(SSD_TEMP_FLASH), &dev->hwmon)) {
+ssd_gen_swlog(dev, SSD_LOG_FLASH_OVER_TEMP, (uint32_t)cur);
+}
+}
+
out:
+return ret;
+
/* cmd tag */
+static inline void ssd_put_tag(struct ssd_device *dev, int tag)
+{
+test_and_clear_bit(tag, dev->tag_map);
+wake_up(&dev->tag_wq);
+}
+
+static inline int ssd_get_tag(struct ssd_device *dev, int wait)
+{
+tag;
+
find_tag:
+while ((tag = find_first_zero_bit(dev->tag_map, dev->hw_info.cmd_fifo_sz)) >= atomic_read(&dev->queue_depth)) {
+DEFINE_WAIT(__wait);
+
+if (!wait) {
++return -1;
+}
+
prepare_to_wait_exclusive(&dev->tag_wq, &__wait, TASK_UNINTERRUPTIBLE);
+schedule();
+
finish_wait(&dev->tag_wq, &__wait);
+}
+
+if (test_and_set_bit(tag, dev->tag_map)) {
+goto find_tag;
+}
+}
+return tag;
+
+static void ssd_barrier_put_tag(struct ssd_device *dev, int tag)
+{
+  test_and_clear_bit(tag, dev->tag_map);
+}
+
+static void ssd_barrier_end(struct ssd_device *dev)
+{
+  atomic_set(&dev->queue_depth, dev->hw_info.cmd_fifo_sz);
+  wake_up_all(&dev->tag_wq);
+  mutex_unlock(&dev->barrier_mutex);
+
+static int ssd_barrier_get_tag(struct ssd_device *dev)
+{
+  int tag = 0;
+
+  if (test_and_set_bit(tag, dev->tag_map)) {
+    return -1;
+  }
+  
+  return tag;
+}
+
+static void ssd_barrier_start(struct ssd_device *dev)
+{
+  int i;
+
+  mutex_lock(&dev->barrier_mutex);
+  
+  atomic_set(&dev->queue_depth, 0);
+
+  for (i=0; i<SSD_CMD_TIMEOUT; i++) {
+    if (find_first_bit(dev->tag_map, dev->hw_info.cmd_fifo_sz) >= dev->hw_info.cmd_fifo_sz) {
+      return 0;
+    }
+    
+    __set_current_state(TASK_INTERRUPTIBLE);
+    schedule_timeout(1);
+  }
+  
+  atomic_set(&dev->queue_depth, dev->hw_info.cmd_fifo_sz);
+  wake_up_all(&dev->tag_wq);
+  mutex_unlock(&dev->barrier_mutex);
+}
static int ssd_busy(struct ssd_device *dev)
{
    if (find_first_bit(dev->tag_map, dev->hw_info.cmd_fifo_sz) >= dev->hw_info.cmd_fifo_sz) {
        return 0;
    }
    return 1;
}

static int ssd_wait_io(struct ssd_device *dev)
{
    int i;
    for (i=0; i<SSD_CMD_TIMEOUT; i++) {
        if (find_first_bit(dev->tag_map, dev->hw_info.cmd_fifo_sz) >= dev->hw_info.cmd_fifo_sz) {
            return 0;
        }
        __set_current_state(TASK_INTERRUPTIBLE);
        schedule_timeout(1);
    }
    return -EBUSY;
}

#if 0
static int ssd_in_barrier(struct ssd_device *dev)
{
    return (0 == atomic_read(&dev->queue_depth));
}
#endif

static void ssd_cleanup_tag(struct ssd_device *dev)
{
    kfree(dev->tag_map);
}

static int ssd_init_tag(struct ssd_device *dev)
{
    int nr_ulongs = ALIGN(dev->hw_info.cmd_fifo_sz, BITS_PER_LONG) / BITS_PER_LONG;
    mutex_init(&dev->barrier_mutex);
    atomic_set(&dev->queue_depth, dev->hw_info.cmd_fifo_sz);
    int nr_ulongs = ALIGN(dev->hw_info.cmd_fifo_sz, BITS_PER_LONG) / BITS_PER_LONG;
    mutex_init(&dev->barrier_mutex);
    atomic_set(&dev->queue_depth, dev->hw_info.cmd_fifo_sz);
+ dev->tag_map = kmalloc(nr_ulongs * sizeof(unsigned long), GFP_ATOMIC);
+ if (!dev->tag_map) {
+ return -ENOMEM;
+ }
+ memset(dev->tag_map, 0, nr_ulongs * sizeof(unsigned long));
+ +init_waitqueue_head(&dev->tag_wq);
+ +return 0;
+ }
+
+ /* io stat */
+ static void ssd_end_io_acct(struct ssd_cmd *cmd)
+ {
+ struct ssd_device *dev = cmd->dev;
+ struct bio *bio = cmd->bio;
+ unsigned long dur = jiffies - cmd->start_time;
+ int rw = bio_data_dir(bio);
+ 
+ #if ((LINUX_VERSION_CODE >= KERNEL_VERSION(3,0,0)) || (defined RHEL_MAJOR && RHEL_MAJOR
+ == 6 && & RHEL_MINOR >= 7))
+ #else
+ unsigned long flag;
+ +#endif
+ 
+ #if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,14,0))
+ struct hd_struct *part = disk_map_sector_rcu(dev->gd, bio_start(bio));
+ generic_end_io_acct(dev->rq, rw, part, cmd->start_time);
+ +#elif ((LINUX_VERSION_CODE >= KERNEL_VERSION(3,0,0)) || (defined RHEL_MAJOR &&
+ RHEL_MAJOR == 6 & & RHEL_MINOR >= 7))
+ int cpu = part_stat_lock();
+ struct hd_struct *part = disk_map_sector_rcu(dev->gd, bio_start(bio));
+ part_round_stats(cpu, part);
+ part_stat_add(cpu, part, ticks[rw], dur);
+ part_dec_in_flight(part, rw);
+ part_stat_unlock();
+ +#elif (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,27))
+ int cpu = part_stat_lock();
+ struct hd_struct *part = &dev->gd->part0;
+ part_round_stats(cpu, part);
+ part_stat_add(cpu, part, ticks[rw], dur);
+ +spin_lock_irqsave(&dev->in_flight_lock,flag);
+ part->in_flight[rw]--;
+ spin_unlock_irqsave(&dev->in_flight_lock,flag);
+ +part_stat_unlock();
+ 
+ Open Source Used In 5GaaS Edge AC-4  36346
+ #elif (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,14))
+ preempt_disable();
+ disk_round_stats(dev->gd);
+ disk_stat_add(dev->gd, ticks[rw], dur);
+ spin_lock_irqsave(&dev->in_flight_lock,flag);
+ dev->gd->in_flight--;
+ spin_unlock_irqrestore(&dev->in_flight_lock,flag);
+ preempt_enable();
+
+ #else
+ preempt_disable();
+ disk_round_stats(dev->gd);
+ if (rw == WRITE) {
+ disk_stat_add(dev->gd, write_ticks, dur);
+ } else {
+ disk_stat_add(dev->gd, read_ticks, dur);
+ }
+ spin_lock_irqsave(&dev->in_flight_lock,flag);
+ dev->gd->in_flight--;
+ spin_unlock_irqrestore(&dev->in_flight_lock,flag);
+ preempt_enable();
+ }
+ #endif
+
+ static void ssd_start_io_acct(struct ssd_cmd *cmd)
+ {
+ struct ssd_device *dev = cmd->dev;
+ struct bio *bio = cmd->bio;
+ int rw = bio_data_dir(bio);
+ #if ((LINUX_VERSION_CODE >= KERNEL_VERSION(3,0,0)) || (defined RHEL_MAJOR && RHEL_MAJOR == 6 && RHEL_MINOR >= 7))
+ int cpu = part_stat_lock();
+ struct hd_struct *part = disk_map_sector_rcu(dev->gd, bio_start(bio));
+ generic_start_io_acct(dev->rq, rw, bio_sectors(bio), part);
+ #elif ((LINUX_VERSION_CODE >= KERNEL_VERSION(3,0,0)) || (defined RHEL_MAJOR && RHEL_MAJOR == 6 && RHEL_MINOR >= 7))
+ int cpu = part_stat_lock();
+ struct hd_struct *part = disk_map_sector_rcu(dev->gd, bio_start(bio));
+ part_round_stats(cpu, part);
+part_stat_inc(cpu, part, ios[rw]);
+part_stat_add(cpu, part, sectors[rw], bio_sectors(bio));
+part_inc_in_flight(part, rw);
+part_stat_unlock();
+\#elif (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,27))
+\tint cpu = part_stat_lock();
+\tstruct hd_struct *part = &dev->gd->part0;
+\tpart_round_stats(cpu, part);
+\tpart_stat_inc(cpu, part, ios[rw]);
+\tpart_stat_add(cpu, part, sectors[rw], bio_sectors(bio));
+  
+\tspin_lock_irqsave(&dev->in_flight_lock,flag);
+\tpart->in_flight[rw]++;
+\tpart_unlock_irqrestore(&dev->in_flight_lock,flag);
+  
+\tpart_stat_unlock();
+  
+\#elif (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,14))
+\tpreempt_disable();
+\tdisk_round_stats(dev->gd);
+\tdisk_stat_inc(dev->gd, ios[rw]);
+\tdisk_stat_add(dev->gd, sectors[rw], bio_sectors(bio));
+  
+\tspin_lock_irqsave(&dev->in_flight_lock,flag);
+\tdisk->in_flight[rw]++;
+\tpart_unlock_irqrestore(&dev->in_flight_lock,flag);
+  
+\tpreempt_enable();
+\#else
+\tpreempt_disable();
+\tdisk_round_stats(dev->gd);
+\tif (rw == WRITE) {
+\t\tdisk_stat_inc(dev->gd, writes);
+\tdisk_stat_add(dev->gd, write_sectors, bio_sectors(bio));
+\t} else {
+\t\tdisk_stat_inc(dev->gd, reads);
+\tdisk_stat_add(dev->gd, read_sectors, bio_sectors(bio));
+\t}
+  
+\tspin_lock_irqsave(&dev->in_flight_lock,flag);
+\tdisk->in_flight[rw]++;
+\tpart_unlock_irqrestore(&dev->in_flight_lock,flag);
+  
+\tpreempt_enable();
+\#endif
+  
+\tcmd->start_time = jiffies;
static void ssd_queue_bio(struct ssd_device *dev, struct bio *bio)
{
    spin_lock(&dev->sendq_lock);
    ssd_blist_add(&dev->sendq, bio);
    spin_unlock(&dev->sendq_lock);
    atomic_inc(&dev->in_sendq);
    wake_up(&dev->send_waitq);
}

static inline void ssd_end_request(struct ssd_cmd *cmd)
{
    struct ssd_device *dev = cmd->dev;
    struct bio *bio = cmd->bio;
    int errors = cmd->errors;
    int tag = cmd->tag;

    if (bio) {
        if (!ssd_bio_has_discard(bio)) {
            ssd_end_io_acct(cmd);
            if (!cmd->flag) {
                pci_unmap_sg(dev->pdev, cmd->sgl, cmd->nsegs,
                bio_data_dir(bio) == READ ? PCI_DMA_FROMDEVICE : PCI_DMA_TODEVICE);
            }
        }
    }

    cmd->bio = NULL;
    ssd_put_tag(dev, tag);

    if (SSD_INT_MSIX == dev->int_mode || tag < 16 || errors) {
        spin_lock(&dev->doneq_lock);
        ssd_blist_add(&dev->doneq, bio);
        spin_unlock(&dev->doneq_lock);
        atomic_inc(&dev->in_doneq);
        wake_up(&dev->done_waitq);
    } else {
        if (cmd->waiting) {
            complete(cmd->waiting);
        }
    }
}
+static void ssd_end_timeout_request(struct ssd_cmd *cmd)
+{
+struct ssd_device *dev = cmd->dev;
+struct ssd_rw_msg *msg = (struct ssd_rw_msg *)cmd->msg;
+int i;
+
+for (i=0; i<dev->nr_queue; i++) {
+    if (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+        disable_irq(dev->entry[i].vector);
+    else
+        disable_irq(pci_irq_vector(dev->pdev, i));
+    }
+
+atomic_inc(&dev->tocnt);
+    hio_err("%s: cmd timeout: tag %d fun %#x\n", dev->name, msg->tag, msg->fun);
+    cmd->errors = -ETIMEDOUT;
+    ssd_end_request(cmd);
+    }
+
+for (i=0; i<dev->nr_queue; i++) {
+    if (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+        enable_irq(dev->entry[i].vector);
+    else
+        enable_irq(pci_irq_vector(dev->pdev, i));
+    }
+    
/* alarm led */
+    ssd_set_alarm(dev);
+}

+/* cmd timer */
+    if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
+        static void ssd_cmd_add_timer(struct ssd_cmd *cmd, int timeout, void (*complt)(struct ssd_cmd *))
+    else
+        static void ssd_cmd_add_timer(struct ssd_cmd *cmd, int timeout, void (*complt)(struct timer_list *))
+    }
+
+    if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
+        init_timer(&cmd->cmd_timer);
+        cmd->cmd_timer.data = (unsigned long)cmd;
+        cmd->cmd_timer.function = (void (*)(unsigned long)) complt;
+    else
+        timer_setup(&cmd->cmd_timer, complt, 0);
+endif
+
+cmd->cmd_timer.expires = jiffies + timeout;
+add_timer(&cmd->cmd_timer);
+}
+
+static int ssd_cmd_del_timer(struct ssd_cmd *cmd)
+{
+return del_timer(&cmd->cmd_timer);
+}
+
+endif
+
+static int ssd_cmd_del_timer(struct ssd_cmd *cmd)
+{
+return del_timer(&cmd->cmd_timer);
+}
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
+static void ssd_add_timer(struct timer_list *timer, int timeout, void (*complt)(void *), void *data)
+#else
+static void ssd_add_timer(struct timer_list *timer, int timeout, void (*complt)(struct timer_list *), void *data)
+#endif
+{
+timer_setup(timer, complt, 0);
+
+timer->data = (unsigned long)data;
+timer->function = (void *)(unsigned long)complt;
+#else
+timer_setup(timer, complt, 0);
+#endif
+
+timer->expires = jiffies + timeout;
+add_timer(timer);
+}
+
+static int ssd_del_timer(struct timer_list *timer)
+{
+return del_timer(timer);
+}
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
+static void ssd_del_timer_timeout(struct ssd_cmd *cmd)
+#else
+static void ssd_del_timer_timeout(struct timer_list *t)
+#endif
+{
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,15,0))
+struct ssd_cmd *cmd = from_timer(cmd, t, cmd_timer);
+#endif
+struct ssd_device *dev = cmd->dev;
+uint32_t msg = *(uint32_t *)cmd->msg;
+
+ssd_end_timeout_request(cmd);
+ssd_gen_swlog(dev, SSD_LOG_TIMEOUT, msg);
+
+static void __ssd_done(unsigned long data)
+
+struct ssd_cmd *cmd;
+LIST_HEAD(localq);
+
+local_irq_disable();
+if (LINUX_VERSION_CODE < KERNEL_VERSION(3,13,0))
+list_splice_init(&__get_cpu_var(ssd_doneq), &localq);
+else
+list_splice_init(this_cpu_ptr(&ssd_doneq), &localq);
+endif
+
+while (!list_empty(&localq)) {
+cmd = list_entry(localq.next, struct ssd_cmd, list);
+list_del_init(&cmd->list);
+
+ssd_end_request(cmd);
+}
+
+static void __ssd_done_db(unsigned long data)
+
+struct ssd_cmd *cmd;
+struct ssd_device *dev;
+struct bio *bio;
+LIST_HEAD(localq);
+
+local_irq_disable();
+if (LINUX_VERSION_CODE < KERNEL_VERSION(3,13,0))
+list_splice_init(&__get_cpu_var(ssd_doneq), &localq);
+else
+list_splice_init(this_cpu_ptr(&ssd_doneq), &localq);
+endif
+
+while (!list_empty(&localq)) {
+cmd = list_entry(localq.next, struct ssd_cmd, list);
+list_del_init(&cmd->list);
+
+dev = (struct ssd_device *)cmd->dev;
+bio = cmd->bio;
if (bio) {
+sector_t off = dev->db_info.data.loc.off;
+uint32_t len = dev->db_info.data.loc.len;
+
+switch (dev->db_info.type) {
+case SSD_DEBUG_READ_ERR:
+if (bio_data_dir(bio) == READ &&
+(off + len) < bio_start(bio) || off >= (bio_start(bio) + bio_sectors(bio))) {
+cmd->errors = -EIO;
+}
+break;
+case SSD_DEBUG_WRITE_ERR:
+if (bio_data_dir(bio) == WRITE &&
+(off + len) < bio_start(bio) || off >= (bio_start(bio) + bio_sectors(bio))) {
+cmd->errors = -EROFS;
+}
+break;
+case SSD_DEBUG_RW_ERR:
+if (!((off + len) <= bio_start(bio) || off >= (bio_start(bio) + bio_sectors(bio)))) {
+if (bio_data_dir(bio) == READ) {
+cmd->errors = -EIO;
+} else {
+cmd->errors = -EROFS;
+}
+}
+break;
+default:
+break;
+
+ssd_end_request(cmd);
+
+ssd_done_bh(struct ssd_cmd *cmd);
+
+
+static inline void ssd_done_bh(struct ssd_cmd *cmd)
+
+{unsigned long flags = 0;
+
+if (unlikely(!ssd_cmd_del_timer(cmd))) {
+struct ssd_device *dev = cmd->dev;
+struct ssd_rw_msg *msg = (struct ssd_rw_msg *)cmd->msg;
+hio_err("%s: unknown cmd: tag %d fun %#x\n", dev->name, msg->tag, msg->fun);
+
+# alarm led */
+ssd_set_alarm(dev);
+return;
+}
local_irq_save(flags);
#if (LINUX_VERSION_CODE < KERNEL_VERSION(3,13,0))
    list_add_tail(&cmd->list, &__get_cpu_var(ssd_doneq));
tasklet_hi_schedule(&__get_cpu_var(ssd_tasklet));
#else
    list_add_tail(&cmd->list, this_cpu_ptr(&ssd_doneq));
tasklet_hi_schedule(this_cpu_ptr(&ssd_tasklet));
#endif
local_irq_restore(flags);

return;
}

static inline void ssd_done(struct ssd_cmd *cmd)
{
    if (unlikely(!ssd_cmd_del_timer(cmd))) {
        struct ssd_device *dev = cmd->dev;
        struct ssd_rw_msg *msg = (struct ssd_rw_msg *)cmd->msg;
        hio_err("%s: unknown cmd: tag %d fun %#x\n", dev->name, msg->tag, msg->fun);
        /* alarm led */
        ssd_set_alarm(dev);
        return;
    }
    ssd_end_request(cmd);
    return;
}

static inline void ssd_dispatch_cmd(struct ssd_cmd *cmd)
{
    struct ssd_device *dev = (struct ssd_device *)cmd->dev;
    ssd_cmd_add_timer(cmd, SSD_CMD_TIMEOUT, ssd_cmd_timeout);
    spin_lock(&dev->cmd_lock);
    ssd_reg_write(dev->ctrlp + SSD_REQ_FIFO_REG, cmd->msg_dma);
    spin_unlock(&dev->cmd_lock);
}

static inline void ssd_send_cmd(struct ssd_cmd *cmd)
{
    struct ssd_device *dev = (struct ssd_device *)cmd->dev;
    ssd_cmd_add_timer(cmd, SSD_CMD_TIMEOUT, ssd_cmd_timeout);
    spin_lock(&dev->cmd_lock);
    ssd_reg_write(dev->ctrlp + SSD_REQ_FIFO_REG, cmd->msg_dma);
    spin_unlock(&dev->cmd_lock);
}
static inline void ssd_send_cmd_db(struct ssd_cmd *cmd) {
    struct ssd_device *dev = (struct ssd_device *)cmd->dev;
    struct bio *bio = cmd->bio;

    ssd_cmd_add_timer(cmd, SSD_CMD_TIMEOUT, ssd_cmd_timeout);

    if (bio) {
        switch (dev->db_info.type) {
            case SSD_DEBUG_READ_TO:
                if (bio_data_dir(bio) == READ) {
                    return;
                }
                break;
            case SSD_DEBUG_WRITE_TO:
                if (bio_data_dir(bio) == WRITE) {
                    return;
                }
                break;
            case SSD_DEBUG_RW_TO:
                return;
                break;
            default:
        }
    }

    ssd_reg32_write(dev->ctrlp + SSD_REQ_FIFO_REG, ((uint32_t)cmd->tag | ((uint32_t)cmd->nsegs << 16)));}

/* fixed for BIOVEC_PHYS_MERGEABLE */
#ifdef SSD_BIOVEC_PHYS_MERGEABLE_FIXED
#include <linux/bio.h>
#include <linux/io.h>
#include <xen/page.h>

static bool xen_biovec_phys_mergeable_fixed(const struct bio_vec *vec1, const struct bio_vec *vec2) {
    unsigned long mfn1 = pfn_to_mfn(page_to_pfn(vec1->bv_page));
    unsigned long mfn2 = pfn_to_mfn(page_to_pfn(vec2->bv_page));

    return __BIOVEC_PHYS_MERGEABLE(vec1, vec2) &&
        ((mfn1 == mfn2) || ((mfn1+1) == mfn2));
#endif
static inline int ssd_bio_map_sg(struct ssd_device *dev, struct bio *bio, struct scatterlist *sgl)
{
#if (LINUX_VERSION_CODE < KERNEL_VERSION(3,14,0))
    struct bio_vec *bvec, *bvprv = NULL;
    struct scatterlist *sg = NULL;
    int i = 0, nsegs = 0;
    
    #if (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,23))
    sg_init_table(sgl, dev->hw_info.cmd_max_sg);
    #endif

    /*
     * for each segment in bio
     */
    bio_for_each_segment(bvec, bio, i) {
        #if (bvec && BIOVEC_PHYS_MERGEABLE(bvprv, bvec))
            sg->length += bvec->bv_len;
        #} else {
            #if (unlikely(nsegs >= (int)dev->hw_info.cmd_max_sg))
                break;
            #}
            #if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,24))
                sg_set_page(sg, bvec->bv_page, bvec->bv_len, bvec->bv_offset);
            #else
                sg->page = bvec->bv_page;
                sg->length = bvec->bv_len;
                sg->offset = bvec->bv_offset;
            #endif
            nsegs++;
        
        sg = sg ? (sg + 1) : sgl;
    #if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,24))
        sg_set_page(sg, bvec->bv_page, bvec->bv_len, bvec->bv_offset);
    #else
        sg->page = bvec->bv_page;
        sg->length = bvec->bv_len;
        sg->offset = bvec->bv_offset;
    #endif
    
    bvprv = bvec;
    
#if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,24))
    if (sg) {

+sg_mark_end(sg);
+
+#endif
+
+bio->bi_idx = i;
+
+return nsegs;
+
#else
+
+struct bio_vec bvec, bvprv;
+struct bvec_iter iter;
+struct scatterlist *sg = NULL;
+int nsegs = 0;
+int first = 1;
+
+sg_init_table(sgl, dev->hw_info.cmd_max_sg);
+
+/*
+ * for each segment in bio
+ */
+/*
+bio_for_each_segment(bvec, bio, iter) {
+if (!first && BIOVEC_PHYS_MERGEABLE(&bvprv, &bvec)) {
+sg->length += bvec.bv_len;
+} else {
+if (unlikely(nsegs >= (int)dev->hw_info.cmd_max_sg)) {
+break;
+}
+}
+sg = sg ? (sg + 1) : sgl;
+
+sg_set_page(sg, bvec.bv_page, bvec.bv_len, bvec.bv_offset);
+
+nsegs++;
+first = 0;
+}
+bvprv = bvec;
+}
+
+if (sg) {
+sg_mark_end(sg);
+}
+
+return nsegs;
+#endif
+
+}
+
+
+static int __ssd_submit_pbio(struct ssd_device *dev, struct bio *bio, int wait)
+
{
+struct ssd_cmd *cmd;
+struct ssd_rw_msg *msg;
+struct ssd_sg_entry *sge;
+sector_t block = bio_start(bio);
+int tag;
+int i;
+
+tag = ssd_get_tag(dev, wait);
+if (tag < 0) {
+    return -EBUSY;
+}
+
+cmd = &dev->cmd[tag];
+cmd->bio = bio;
+cmd->flag = 1;
+
+msg = (struct ssd_rw_msg *)cmd->msg;
+
+if (ssd_bio_has_discard(bio)) {
+    unsigned int length = bio_sectors(bio);
+
+    printk(KERN_WARNING "%s: discard len %u, block %llu\n", dev->name, bio_sectors(bio), block);
+    msg->tag = tag;
+    msg->fun = SSD_FUNC_TRIM;
+
+    sge = msg->sge;
+    for (i=0; i<(dev->hw_info.cmd_max_sg); i++) {
+        sge->block = block;
+        sge->length = (length >= dev->hw_info.sg_max_sec) ? dev->hw_info.sg_max_sec : length;
+        sge->buf = 0;
+        block += sge->length;
+        length -= sge->length;
+        sge++;
+    }
+    msg->nsegs = cmd->nsegs = i;
+}
+
+dev->scmd(cmd);
+return 0;
+
+//msg->nsegs = cmd->nsegs = ssd_bio_map_sg(dev, bio, sgl);
+msg->nsegs = cmd->nsegs = bio->bi_vcnt;
  +//xx
  +if (bio_data_dir(bio) == READ) {
  +msg->fun = SSD_FUNC_READ;
  +msg->flag = 0;
  +} else {
  +msg->fun = SSD_FUNC_WRITE;
  +msg->flag = dev->wmode;
  +}
  +
  +sge = msg->sge;
  +for (i=0; i<bio->bi_vcnt; i++) {
  +sge->block = block;
  +sge->length = bio->bi_io_vec[i].bv_len >> 9;
  +sge->buf = (uint64_t)((void *)bio->bi_io_vec[i].bv_page + bio->bi_io_vec[i].bv_offset);
  +
  +block += sge->length;
  +sge++;
  +}
  +msg->tag = tag;
  +
  +#ifdef SSD_OT_PROTECT
  +if (unlikely(dev->ot_delay > 0 && dev->ot_protect != 0)) {
  +msleep_interruptible(dev->ot_delay);
  +}
  +#endif
  +
  +ssd_start_io_acct(cmd);
  +dev->scmd(cmd);
  +
  +return 0;
  +}
  +
  +static inline int ssd_submit_bio(struct ssd_device *dev, struct bio *bio, int wait)
  +{
  +struct ssd_cmd *cmd;
  +struct ssd_rw_msg *msg;
  +struct ssd_sg_entry *sge;
  +struct scatterlist *sgl;
  +sector_t block = bio_start(bio);
  +int tag;
  +int i;
  +
  +tag = ssd_get_tag(dev, wait);
  +if (tag < 0) {
  +return -EBUSY;
  +}
+cmd = &dev->cmd[tag];
+cmd->bio = bio;
+cmd->flag = 0;
+
+msg = (struct ssd_rw_msg *)cmd->msg;
+
+sgl = cmd->sgl;
+
+if (ssd_bio_has_discard(bio)) {
+unsigned int length = bio_sectors(bio);
+
+//printk(KERN_WARNING "\%s: discard len %u, block %llu\n", dev->name, bio_sectors(bio), block);
+msg->tag = tag;
+msg->fun = SSD_FUNC_TRIM;
+
+sge = msg->sge;
+for (i=0; i<dev->hw_info.cmd_max_sg; i++) {
++sge->block = block;
+sge->length = (length >= dev->hw_info.sg_max_sec) ? dev->hw_info.sg_max_sec : length;
+sge->buf = 0;
+
++block += sge->length;
+length -= sge->length;
+sge++;
+
+if (length <= 0) {
++i;
+break;
+}
+
+msg->nsegs = cmd->nsegs = i;
+
+dev->scmd(cmd);
+return 0;
+}
+
+msg->nsegs = cmd->nsegs = ssd_bio_map_sg(dev, bio, sgl);
+
+//xx
+if (bio_data_dir(bio) == READ) {
+msg->fun = SSD_FUNC_READ;
+msg->flag = 0;
+pci_map_sg(dev->pdev, sgl, cmd->nsegs, PCI_DMA_FROMDEVICE);
+} else {
+msg->fun = SSD_FUNC_WRITE;
+msg->flag = dev->wmode;
+pci_map_sg(dev->pdev, sgl, cmd->nsegs, PCI_DMA_TODEVICE);
+} 
+ 
+sge = msg->sge; 
+for (i=0; i<cmd->nsegs; i++) {
+sge->block = block;
+sge->length = sg_dma_len(sgl) >> 9;
+sge->buf = sg_dma_address(sgl);
+ 
+block += sge->length;
+sgl++;
+sge++;
+}
+ 
+msg->tag = tag; 
+
+#ifdef SSD_OT_PROTECT 
+if (unlikely(dev->ot_delay > 0 && dev->ot_protect != 0)) {
+msleep_interruptible(dev->ot_delay);
+}
+#endif 
+
+ssd_start_io_acct(cmd); 
+dev->scmd(cmd);
+ 
+return 0;
+}
+
+/* threads */
+static int ssd_done_thread(void *data)
+{
+struct ssd_device *dev;
+struct bio *bio;
+struct bio *next;
+ 
+if (!data) {
+return -EINVAL;
+}
+dev = data;
+ 
+current->flags |= PF_NOFREEZE;
+//set_user_nice(current, -5);
+ 
+while (!kthread_should_stop()) {
+wait_event_interuptible(dev->done_waitq, (atomic_read(&dev->in_doneq) || kthread_should_stop()));
+ 
+while (atomic_read(&dev->in_doneq)) {
+if (threaded_irq) {
+spin_lock(&dev->doneq_lock);
+} 
+} 
+} 
+if (!data) {
+return -EINVAL;
+}
+dev = data;
+ 
+current->flags |= PF_NOFREEZE;
+//set_user_nice(current, -5);
+ 
+while (!kthread_should_stop()) {
+wait_event_interuptible(dev->done_waitq, (atomic_read(&dev->in_doneq) || kthread_should_stop()));
+ 
+while (atomic_read(&dev->in_doneq)) {
+if (threaded_irq) {
+spin_lock(&dev->doneq_lock);
+bio = ssd_blist_get(&dev->doneq);
+spin_unlock(&dev->doneq_lock);
+} else {
+spin_lock_irq(&dev->doneq_lock);
+bio = ssd_blist_get(&dev->doneq);
+spin_unlock_irq(&dev->doneq_lock);
+
+while (bio) {
+next = bio->bi_next;
+bio->bi_next = NULL;
+ssd_bio_endio(bio, 0);
+atomic_dec(&dev->in_doneq);
+bio = next;
+}
+
+cond_resched();
+
+#ifdef SSD.Escape_IRQ
+if (unlikely(smp_processor_id() == dev->irq_cpu)) {
+#if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,28))
+cpumask_var_t new_mask;
+#if (alloc_cpumask_var(&new_mask, GFP_ATOMIC)) {
+cpumask_setall(new_mask);
+cpumask_clear_cpu(dev->irq_cpu, new_mask);
+set_cpus_allowed_ptr(current, new_mask);
+free_cpumask_var(new_mask);
+}
+#else
+cpumask_t new_mask;
+cpus_setall(new_mask);
+cpu_clear(dev->irq_cpu, new_mask);
+set_cpus_allowed(current, new_mask);
+#endif
+}
+#else
+cpumask_t new_mask;
+cpus_setall(new_mask);
+cpu_clear(dev->irq_cpu, new_mask);
+set_cpus_allowed(current, new_mask);
+#endif
+}
+#endif
+
+return 0;
+
+}
+
+static int ssd_send_thread(void *data)
+{
+struct ssd_device *dev;
+struct bio *bio;
+struct bio *next;
+
+if (!data) {
+bio = ssd_blist_get(&dev->doneq);
+spin_unlock(&dev->doneq_lock);
+} else {
+spin_lock_irq(&dev->doneq_lock);
+bio = ssd_blist_get(&dev->doneq);
+spin_unlock_irq(&dev->doneq_lock);
+
+while (bio) {
+next = bio->bi_next;
+bio->bi_next = NULL;
+ssd_bio_endio(bio, 0);
+atomic_dec(&dev->in_doneq);
+bio = next;
+}
+
+cond_resched();
+
+#ifdef SSD.Escape_IRQ
+if (unlikely(smp_processor_id() == dev->irq_cpu)) {
+#if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,28))
+cpumask_var_t new_mask;
+#if (alloc_cpumask_var(&new_mask, GFP_ATOMIC)) {
+cpumask_setall(new_mask);
+cpumask_clear_cpu(dev->irq_cpu, new_mask);
+set_cpus_allowed_ptr(current, new_mask);
+free_cpumask_var(new_mask);
+}
+#else
+cpumask_t new_mask;
+cpus_setall(new_mask);
+cpu_clear(dev->irq_cpu, new_mask);
+set_cpus_allowed(current, new_mask);
+#endif
+}
+#else
+cpumask_t new_mask;
+cpus_setall(new_mask);
+cpu_clear(dev->irq_cpu, new_mask);
+set_cpus_allowed(current, new_mask);
+#endif
+}
+#endif
+
+return 0;
+
+}
+
+static int ssd_send_thread(void *data)
+{
+struct ssd_device *dev;
+struct bio *bio;
+struct bio *next;
+
+if (!data) {
+return -EINVAL;
+
+dev = data;
+
+current->flags |= PF_NOFREEZE;
+//set_user_nice(current, -5);
+
+while (!kthread_should_stop()) {
+wait_event_interruptible(dev->send_waitq, (atomic_read(&dev->in_sendq) || kthread_should_stop()));
+
+while (atomic_read(&dev->in_sendq)) {
+spin_lock(&dev->sendq_lock);
+bio = ssd_blist_get(&dev->sendq);
+spin_unlock(&dev->sendq_lock);
+
+while (bio) {
+next = bio->bi_next;
+bio->bi_next = NULL;
+#ifdef SSD_QUEUE_PBIO
+if (test_and_clear_bit(BIO_SSD_PBIO, &bio->bi_flags)) {
+__ssd_submit_pbio(dev, bio, 1);
+} else {
+ssd_submit_bio(dev, bio, 1);
+}
+#else
+ssd_submit_bio(dev, bio, 1);
+#endif
+atomic_dec(&dev->in_sendq);
+bio = next;
+}
+
+cond_resched();
+
+#ifdef SSD_ESCAPE_IRQ
+if (unlikely(smp_processor_id() == dev->irq_cpu)) {
+#if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,28))
+cpumask_var_t new_mask;
+if (alloc_cpumask_var(&new_mask, GFP_ATOMIC)) {
+cpumask_setall(new_mask);
+cpumask_clear_cpu(dev->irq_cpu, new_mask);
+set_cpus_allowed_ptr(current, new_mask);
+free_cpumask_var(new_mask);
+}
+#else
+cpumask_t new_mask;
+cpus_setall(new_mask);
+cpu_clear(dev->irq_cpu, new_mask);
+set_cpus_allowed(current, new_mask);
+}
+
+static void ssd_cleanup_thread(struct ssd_device *dev)
+{
+kthread_stop(dev->send_thread);
+kthread_stop(dev->done_thread);
+}
+
+static int ssd_init_thread(struct ssd_device *dev)
+{ }
+int ret;
+
+atomic_set(&dev->in_doneq, 0);
+atomic_set(&dev->in_sendq, 0);
+
+spin_lock_init(&dev->doneq_lock);
+spin_lock_init(&dev->sendq_lock);
+
+ssd_blist_init(&dev->doneq);
+ssd_blist_init(&dev->sendq);
+
+init_waitqueue_head(&dev->done_waitq);
+init_waitqueue_head(&dev->send_waitq);
+
+dev->done_thread = kthread_run(ssd_done_thread, dev, "%s/d", dev->name);
+if (IS_ERR(dev->done_thread)) {
+ret = PTR_ERR(dev->done_thread);
+goto out_done_thread;
+}
+
+dev->send_thread = kthread_run(ssd_send_thread, dev, "%s/s", dev->name);
+if (IS_ERR(dev->send_thread)) {
+ret = PTR_ERR(dev->send_thread);
+goto out_send_thread;
+}
+
+return 0;
+
+out_send_thread:
+kthread_stop(dev->done_thread);
+out_done_thread:
return ret;
+
+/* dcmd pool */
+static void ssd_put_dcmd(struct ssd_dcmd *dcmd)
+{
+struct ssd_device *dev = (struct ssd_device *)dcmd->dev;
+
+spin_lock(&dev->dcmd_lock);
+list_add_tail(&dcmd->list, &dev->dcmd_list);
+spin_unlock(&dev->dcmd_lock);
+
+static struct ssd_dcmd *ssd_get_dcmd(struct ssd_device *dev)
+{
+struct ssd_dcmd *dcmd = NULL;
+
+spin_lock(&dev->dcmd_lock);
+if (!list_empty(&dev->dcmd_list)) {
+dcmd = list_entry(dev->dcmd_list.next,
+struct ssd_dcmd, list);
+list_del_init(&dcmd->list);
+
+spin_unlock(&dev->dcmd_lock);
+
+return dcmd;
+
+
+static void ssd_cleanup_dcmd(struct ssd_device *dev)
+{
+kfree(dev->dcmd);
+
+
+static int ssd_init_dcmd(struct ssd_device *dev)
+{
+struct ssd_dcmd *dcmd;
+int dcmd_sz = sizeof(struct ssd_dcmd)*dev->hw_info.cmd_fifo_sz;
+int i;
+
+spin_lock_init(&dev->dcmd_lock);
+INIT_LIST_HEAD(&dev->dcmd_list);
+init_waitqueue_head(&dev->dcmd_wq);
+
+dev->dcmd = kmalloc(dcmd_sz, GFP_KERNEL);
+if (!dev->dcmd) {
+hio_warn("%s: can not alloc dcmd\n", dev->name);
+goto out_alloc_dcmd;
+

memset(dev->dcmd, 0, dcmd_sz);
+
+for (i=0, dcmd=dev->dcmd; i<(int)dev->hw_info.cmd_fifo_sz; i++, dcmd++) {
+ dcmd->dev = dev;
+ INIT_LIST_HEAD(&dcmd->list);
+ list_add_tail(&dcmd->list, &dev->dcmd_list);
+ }
+
+ return 0;
+
+out_alloc_dcmd:
+ return -ENOMEM;
+
+static void ssd_put_dmsg(void *msg)
+ {
+ struct ssd_dcmd *dcmd = container_of(msg, struct ssd_dcmd, msg);
+ struct ssd_device *dev = (struct ssd_device *)dcmd->dev;
+ 
+ memset(dcmd->msg, 0, SSD_DCMD_MAX_SZ);
+ ssd_put_dcmd(dcmd);
+ wake_up(&dev->dcmd_wq);
+ }
+
+static void *ssd_get_dmsg(struct ssd_device *dev)
+ {
+ struct ssd_dcmd *dcmd = ssd_get_dcmd(dev);
+ 
+ while (!dcmd) {
+ DEFINE_WAIT(wait);
+ prepare_to_wait_exclusive(&dev->dcmd_wq, &wait, TASK_UNINTERRUPTIBLE);
+ schedule();
+ 
+ dcmd = ssd_get_dcmd(dev);
+ 
+ finish_wait(&dev->dcmd_wq, &wait);
+ }
+ return dcmd->msg;
+ }
+
+/* do direct cmd */
+static int ssd_do_request(struct ssd_device *dev, int rw, void *msg, int *done)
+ {
+ DECLARE_COMPLETION(wait);
+ struct ssd_cmd *cmd;
+ int tag;
+ int ret = 0;
+ 
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tag = ssd_get_tag(dev, 1);
if (tag < 0) {
  return -EBUSY;
  
  cmd = &dev->cmd[tag];
  cmd->nsegs = 1;
  memcpy(cmd->msg, msg, SSD_DCMD_MAX_SZ);
  *((struct ssd_rw_msg *)cmd->msg)->tag = tag;
  
  cmd->waiting = &wait;
  
  dev->scmd(cmd);
  
  wait_for_completion(cmd->waiting);
  cmd->waiting = NULL;
  
  if (cmd->errors == -ETIMEDOUT) {
    ret = cmd->errors;
  } else if (cmd->errors) {
    ret = -EIO;
  }
  
  if (done != NULL) {
    *done = cmd->nr_log;
  } 
  ssd_put_tag(dev, cmd->tag);
  
  return ret;
}

static int ssd_do_barrier_request(struct ssd_device *dev, int rw, void *msg, int *done)
{
  DECLARE_COMPLETION(wait);
  struct ssd_cmd *cmd;
  int tag;
  int ret = 0;

  tag = ssd_barrier_get_tag(dev);
  if (tag < 0) {
    return -EBUSY;
    
    cmd = &dev->cmd[tag];
    cmd->nsegs = 1;
    memcpy(cmd->msg, msg, SSD_DCMD_MAX_SZ);
    *((struct ssd_rw_msg *)cmd->msg)->tag = tag;
    

+cmd->waiting = &wait;
+ +dev->scmd(cmd);
+ +wait_for_completion(cmd->waiting);
+cmd->waiting = NULL;
+ +if (cmd->errors == -ETIMEDOUT) {
+ret = cmd->errors;
+} else if (cmd->errors) {
+ret = -EIO;
+}
+
+if (done != NULL) {
+*done = cmd->nr_log;
+
+ssd_barrier_put_tag(dev, cmd->tag);
+
+return ret;
+}
+
+#ifdef SSD_OT_PROTECT
+static void ssd_check_temperature(struct ssd_device *dev, int temp)
+{
+uint64_t val;
+uint32_t off;
+int cur;
+int i;
+
+if (mode != SSD_DRV_MODE_STANDARD) {
+return;
+}
+
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+
+for (i=0; i<dev->hw_info.nr_ctrl; i++) {
+off = SSD_CTRL_TEMP_REG0 + i * sizeof(uint64_t);
+
+val = ssd_reg_read(dev->ctrlp + off);
+
+if (val == 0xffffffffffffffffull) {
+continue;
+
+}
+
+cur = (int)CUR_TEMP(val);
+
+if (cur >= temp) {
+if (!test_and_set_bit(SSD_HWMON_TEMP(SSD_TEMP_CTRL), &dev->hwmon)) {
+if (dev->protocol_info.ver > SSD_PROTOCOL_V3 && dev->protocol_info.ver < SSD_PROTOCOL_V3_2_2) {
hio_warn("%s: Over temperature, please check the fans.\n", dev->name);
+dev->ot_delay = SSD_OT_DELAY;
+
+return;
+
+if (test_and_clear_bit(SSD_HWMON_TEMP(SSD_TEMP_CTRL), &dev->hwmon)) {
+if (dev->protocol_info.ver > SSD_PROTOCOL_V3 && dev->protocol_info.ver < SSD_PROTOCOL_V3_2_2) {
+hio_warn("%s: Temperature is OK.\n", dev->name);
+dev->ot_delay = 0;
+
+#endif
+
+static int ssd_get_ot_status(struct ssd_device *dev, int *status)
+
+{ uint32_t off;
+uint32_t val;
+int i;
+
+if (!dev || !status) {
+return -EINVAL;
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2_2) {
+for (i=0; i<dev->hw_info.nr_ctrl; i++) {
+offset = SSD_READ_OT_REG0 + (i * SSD_CTRL_REG_ZONE_SZ);
+val = ssd_reg32_read(dev->ctrlp + off);
+if (((val >> 22) & 0x1) {
+*status = 1;
+goto out;
+}
+
+*off = SSD_WRITE_OT_REG0 + (i * SSD_CTRL_REG_ZONE_SZ);
+val = ssd_reg32_read(dev->ctrlp + off);
+if (((val >> 22) & 0x1) {
+*status = 1;
+goto out;
+}
+
+} else {
+*status = !(dev->ot_delay;
+}
+}
+out:
+return 0;
+
+static void ssd_set_ot_protect(struct ssd_device *dev, int protect)
+{
+uint32_t off;
+uint32_t val;
+int i;
+
+mutex_lock(&dev->fw_mutex);
+
+dev->ot_protect = !!protect;
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2_2) {
+for (i=0; i<dev->hw_info.nr_ctrl; i++) {
+off = SSD_READ_OT_REG0 + (i * SSD_CTRL_REG_ZONE_SZ);
+val = ssd_reg32_read(dev->ctrlp + off);
+if (dev->ot_protect) {
+val |= (1U << 21);
+} else {
+val &= ~(1U << 21);
+}
+ssd_reg32_write(dev->ctrlp + off, val);
+
+off = SSD_WRITE_OT_REG0 + (i * SSD_CTRL_REG_ZONE_SZ);
+val = ssd_reg32_read(dev->ctrlp + off);
+if (dev->ot_protect) {
+val |= (1U << 21);
+} else {
+val &= ~(1U << 21);
+}
+ssd_reg32_write(dev->ctrlp + off, val);
+
+
+mutex_unlock(&dev->fw_mutex);
+}
+
+static int ssd_init_ot_protect(struct ssd_device *dev)
+{
+ssd_set_ot_protect(dev, ot_protect);
+
+#ifdef SSD_OT_PROTECT
+ssd_check_temperature(dev, SSD_OT_TEMP);
+#endif
+}
return 0;
}

static int ssd_read_log(struct ssd_device *dev, int ctrl_idx, void *buf, int *nr_log)
{
    struct ssd_log_op_msg *msg;
    struct ssd_log_msg *lmsg;
    dma_addr_t buf_dma;
    size_t length = dev->hw_info.log_sz;
    int ret = 0;

    if (ctrl_idx >= dev->hw_info.nr_ctrl) {
        return -EINVAL;
    }

    buf_dma = pci_map_single(dev->pdev, buf, length, PCI_DMA_FROMDEVICE);
    if (ret) {
        hio_warn("%s: unable to map read DMA buffer\n", dev->name);
        goto out_dma_mapping;
    }

    msg = (struct ssd_log_op_msg *)ssd_get_dmsg(dev);

    if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
        lmsg = (struct ssd_log_msg *)msg;
        lmsg->fun = SSD_FUNC_READ_LOG;
        lmsg->ctrl_idx = ctrl_idx;
        lmsg->buf = buf_dma;
    } else {
        msg->fun = SSD_FUNC_READ_LOG;
        msg->ctrl_idx = ctrl_idx;
        msg->buf = buf_dma;
    }

    ret = ssd_do_request(dev, READ, msg, nr_log);
    ssd_put_dmsg(msg);

    pci_unmap_single(dev->pdev, buf_dma, length, PCI_DMA_FROMDEVICE);

out_dma_mapping:
    return ret;
}
+#define SSD_LOG_PRINT_BUF_SZ256
+static int ssd_parse_log(struct ssd_device *dev, struct ssd_log *log, int print)
+{
+    struct ssd_log_desc *log_desc = ssd_log_desc;
+    struct ssd_log_entry *le;
+    char *sn = NULL;
+    char print_buf[SSD_LOG_PRINT_BUF_SZ];
+    int print_len;
+    +le = &log->le;
+    +/* find desc */
+    while (log_desc->event != SSD_UNKNOWN_EVENT) {
+        if (log_desc->event == le->event) {
+            break;
+        }
+        log_desc++;
+    }
+    +if (!print) {
+        goto out;
+    }
+    +if (log_desc->level < log_level) {
+        goto out;
+    }
+    +/* parse */
+    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+        sn = dev->label.sn;
+    } else {
+        sn = dev->labelv3.barcode;
+    }
+    +print_len = snprintf(print_buf, SSD_LOG_PRINT_BUF_SZ, "%s (%s): <%#x>", dev->name, sn, le->event);
+    +if (log->ctrl_idx != SSD_LOG_SW_IDX) {
+        print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " controller %d", log-
+    +switch (log_desc->data) {
+        case SSD_LOG_DATA_NONE:
+            break;
+        case SSD_LOG_DATA_LOC:
+            if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+                print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " flash %d", le-
>data.loc.flash);
+if (log_desc->sblock) {
+print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " block %d", le-
>data.loc.block);
+}
+if (log_desc->spage) {
+print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " page %d", le-
>data.loc.page);
+}
+} else {
+print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " flash %d", le-
>data.loc1.flash);
+if (log_desc->sblock) {
+print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " block %d", le-
>data.loc1.block);
+}
+if (log_desc->spage) {
+print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " page %d", le-
>data.loc1.page);
+}
+}
+break;
+case SSD_LOG_DATA_HEX:
+print_len += snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), " info %#x", le-
>data.val);
+break;
+default:
+break;
+}
+/*print_len += */ snprintf((print_buf + print_len), (SSD_LOG_PRINT_BUF_SZ - print_len), ": %s", log_desc-
>desc);
+
+switch (log_desc->level) {
+case SSD_LOG_LEVEL_INFO:
+hio_info("%s\n", print_buf);
+break;
+case SSD_LOG_LEVEL_NOTICE:
+hio_note("%s\n", print_buf);
+break;
+case SSD_LOG_LEVEL_WARNING:
+hio_warn("%s\n", print_buf);
+break;
+case SSD_LOG_LEVEL_ERR:
+hio_err("%s\n", print_buf);
+break;
+case SSD_LOG_LEVEL_ERR:
+hio_err("%s\n", print_buf);
+break;
+default:
+hio_warn("%s\n", print_buf);
+//printk(KERN_ERR MODULE_NAME": some exception occurred, please check the data or refer to FAQ.");
+break;
+default:
+hio_warn("%s\n", print_buf);
+break;
+
+out:
+return log_desc->level;
+
+
+static int ssd_bm_get_sfstatus(struct ssd_device *dev, uint16_t *status);
+static int ssd_switch_wmode(struct ssd_device *dev, int wmode);
+
+static int ssd_handle_event(struct ssd_device *dev, uint16_t event, int level)
+{
+int ret = 0;
+
+switch (event) {
+case SSD_LOG_OVER_TEMP: {
+#ifdef SSD_OT_PROTECT
+if (!test_and_set_bit(SSD_HWMON_TEMP(SSD_TEMP_CTRL), &dev->hwmon)) {
+if (dev->protocol_info.ver > SSD_PROTOCOL_V3 && dev->protocol_info.ver < SSD_PROTOCOL_V3_2_2) {
+hio_warn("%s: Over temperature, please check the fans.\n", dev->name);
+dev->ot_delay = SSD_OT_DELAY;
+}
+}
+#endif
+break;
+
+case SSD_LOG_NORMAL_TEMP: {
+#ifdef SSD_OT_PROTECT
+/# need to check all controller's temperature */
+ssd_check_temperature(dev, SSD_OT_TEMP_HYST);
+#endif
+break;
+
+case SSD_LOG_BATTERY_FAULT: {
+uint16_t sfstatus;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+if (!ssd_bm_get_sfstatus(dev, &sfstatus)) {
+ssd_gen_swlog(dev, SSD_LOG_BM_SFSTATUS, sfstatus);
+}
+}
+
+if (!test_and_set_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
+ssd_switch_wmode(dev, dev->user_wmode);
+}
+break;
+
+case SSD_LOG_BATTERY_OK: {
+  if (test_and_clear_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
+    ssd_switch_wmode(dev, dev->user_wmode);
+  }
+  break;
+
+case SSD_LOG_BOARD_VOLT_FAULT: {
+  ssd_mon_boardvolt(dev);
+  break;
+
+case SSD_LOG_CLEAR_LOG: {
+  /* update smart */
+  memset(&dev->smart.log_info, 0, sizeof(struct ssd_log_info));
+  break;
+
+case SSD_LOG_CAP_VOLT_FAULT:
+  case SSD_LOG_CAP_LEARN_FAULT:
+  case SSD_LOG_CAP_SHORT_CIRCUIT: {
+    if (!test_and_set_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
+      ssd_switch_wmode(dev, dev->user_wmode);
+    }
+    break;
+
+default:
+    break;
+  }
+
+?></span>
+/* ssd event call */
+if (dev->event_call) {
+  dev->event_call(dev->gd, event, level);
+}
+/* FIXME */
+if (SSD_LOG_CAP_VOLT_FAULT == event || SSD_LOG_CAP_LEARN_FAULT == event ||
+ SSD_LOG_CAP_SHORT_CIRCUIT == event) {
+  dev->event_call(dev->gd, SSD_LOG_BATTERY_FAULT, level);
+}
+}
+
+return ret;
+}
+static int ssd_save_log(struct ssd_device *dev, struct ssd_log *log)
+{
+uint32_t off, size;
+void *internal_log;
+int ret = 0;
+
+mutex_lock(&dev->internal_log_mutex);
+
+size = sizeof(struct ssd_log);
+off = dev->internal_log.nr_log * size;
+
+if (off == dev->rom_info.log_sz) {
+if (dev->internal_log.nr_log == dev->smart.log_info.nr_log) {
+hio_warn("%s: internal log is full\n", dev->name);
+}
+goto out;
+}
+
+internal_log = dev->internal_log.log + off;
+memcpy(internal_log, log, size);
+
+if (dev->protocol_info.ver > SSD_PROTOCOL_V3) {
+off += dev->rom_info.log_base;
+
+ret = ssd_spi_write(dev, log, off, size);
+
+if (ret) {
+goto out;
+}
+}
+
+dev->internal_log.nr_log++;
+
+out:
+mutex_unlock(&dev->internal_log_mutex);
+return ret;
+}

+/** CRC table for the CRC-16. The poly is 0x8005 (x^16 + x^15 + x^2 + 1) */
+static unsigned short const crc16_table[256] = {
+0x0000, 0xC0C1, 0xC181, 0x0140, 0xC301, 0x03C0, 0x0280, 0xC241,
+0xC601, 0x06C0, 0x0780, 0xC741, 0x0500, 0xC5C1, 0xC481, 0x0440,
+0xCC01, 0x0CC0, 0x0D80, 0xCD41, 0x0F00, 0xCFC1, 0xCE81, 0x0E40,
+0x0A00, 0xCA01, 0xCB81, 0x0B40, 0xC901, 0x09C0, 0x0880, 0xC841,
+0xD801, 0x18C0, 0x1980, 0xD941, 0x1B00, 0xDBC1, 0xDA81, 0x1A40,
+0x1E00, 0xDE01, 0xDF81, 0x1F00, 0xDD01, 0x1DC0, 0x1C80, 0xDC41,
+0x1400, 0xD4C1, 0xD581, 0x1540, 0xD701, 0x17C0, 0x1680, 0xD641,
+0xD201, 0x12C0, 0x1380, 0xD341, 0x1100, 0xD1C1, 0xD081, 0x1040,
+0xF001, 0x30C0, 0x3180, 0xF141, 0x3300, 0xF3C1, 0xF281, 0x3240,
static unsigned short crc16_byte(unsigned short crc, const unsigned char data)
{
    return (crc >> 8) ^ crc16_table[(crc ^ data) & 0xff];
}

/**
 * crc16 - compute the CRC-16 for the data buffer
 * @crc:	previous CRC value
 * @buffer:	data pointer
 * @len:	number of bytes in the buffer
 *
 * Returns the updated CRC value.
 */
static unsigned short crc16(unsigned short crc, unsigned char const *buffer, int len)
{
    while (len--)
        crc = crc16_byte(crc, *buffer++);
    return crc;
}

static int ssd_save_swlog(struct ssd_device *dev, uint16_t event, uint32_t data)
{
    struct ssd_log log;
    struct timeval tv;
int level;
int ret = 0;

if (unlikely(mode != SSD_DRV_MODE_STANDARD))
return 0;

memset(&log, 0, sizeof(struct ssd_log));

do_gettimeofday(&tv);
log.ctrl_idx = SSD_LOG_SW_IDX;
log.time = tv.tv_sec;
log.le.event = event;
log.le.data.val = data;

log.le.mod = SSD_DIF_WITH_OLD_LOG;
log.le.idx = crc16(0,(const unsigned char *)&log,14);
if (level >= SSD_LOG_LEVEL)
{
ret = ssd_save_log(dev, &log);
}

/* set alarm */
if (SSD_LOG_LEVEL_ERR == level) {
ssd_set_alarm(dev);
}

/* update smart */
dev->smart.log_info.nr_log++;
dev->smart.log_info.stat[level]++;

/* handle event */
ssd_handle_event(dev, event, level);

return ret;

static int ssd_gen_swlog(struct ssd_device *dev, uint16_t event, uint32_t data)
{
struct ssd_log_entry le;
int ret;

if (unlikely(mode != SSD_DRV_MODE_STANDARD))
return 0;

/* slave port */
if (dev->slave) {
return 0;
}
memset(&le, 0, sizeof(struct ssd_log_entry));
le.event = event;
le.data.val = data;
+
ret = sfifo_put(&dev->log_fifo, &le);
+if (ret) {
+return ret;
+}
+
+if (test_bit(SSD_INIT_WORKQ, &dev->state)) {
+queue_work(dev->workq, &dev->log_work);
+}
+
+return 0;
+
+
+static int ssd_do_swlog(struct ssd_device *dev)
+
+
+static int __ssd_clear_log(struct ssd_device *dev)
+
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+return 0;
+
+if (dev->internal_log.nr_log == 0) {
+return 0;
+
+mutex_lock(&dev->internal_log_mutex);
+off = dev->rom_info.log_base;  
+length = dev->rom_info.log_sz;
+
+ret = ssd_spi_erase(dev, off, length);
+if (ret) {
+hio_warn("%s: log erase: failed\n", dev->name);
+goto out;
+}
+
+dev->internal_log.nr_log = 0;
+
+out:
+mutex_unlock(&dev->internal_log_mutex);
+return ret;
+}
+
+static int ssd_clear_log(struct ssd_device *dev)
+{
+int ret;
+
+ret = __ssd_clear_log(dev);
+if(!ret) {
+ssd_gen_swlog(dev, SSD_LOG_CLEAR_LOG, 0);
+}
+
+return ret;
+}
+
+static int ssd_do_log(struct ssd_device *dev, int ctrl_idx, void *buf)
+{
+struct ssd_log_entry *le;
+struct ssd_log log;
+struct timeval tv;
+int nr_log = 0;
+int level;
+int ret = 0;
+
+ret = ssd_read_log(dev, ctrl_idx, buf, &nr_log);
+if (ret) {
+return ret;
+}
+
+do_gettimeofday(&tv);
+
+log.time = tv.tv_sec;
+log.ctrl_idx = ctrl_idx;
+
+le = (ssd_log_entry_t *)buf;
+while (nr_log > 0) {
+memcpy(&log.le, le, sizeof(struct ssd_log_entry));
+
+log.le.mod = SSD_DIF_WITH_OLD_LOG;
+log.le.idx = crc16(0,(const unsigned char *)&log,14);
+level = ssd_parse_log(dev, &log, 1);
+if (level >= SSD_LOG_LEVEL) {
+ssd_save_log(dev, &log);
+}
+
+/* set alarm */
+if (SSD_LOG_LEVEL_ERR == level) {
+ssd_set_alarm(dev);
+}
+
+dev->smart.log_info.nr_log++;
+if (SSD_LOG_SEU_FAULT != le->event && SSD_LOG_SEU_FAULT1 != le->event) {
+dev->smart.log_info.stat[level]++;
+} else {
+/* SEU fault */
+
+/* log to the volatile log info */
+dev->log_info.nr_log++;
+dev->log_info.stat[level]++;
+
+/* do something */
+dev->reload_fw = 1;
+ssd_reg32_write(dev->ctrlp + SSD_RELOAD_FW_REG, SSD_RELOAD_FLAG);
+if (le->event != SSD_LOG_SEU_FAULT1) {
+dev->has_non_0x98_reg_access = 1;
+}
+
+/*dev->readonly = 1;
+set_disk_ro(dev->gd, 1);
+hio_warn("%s: switched to read-only mode\n", dev->name);*/
+
+/* handle event */
+ssd_handle_event(dev, le->event, level);
+
+le++;
+nr_log--;
+}
+
+return 0;
+}
+
+if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+static void ssd_log_worker(void *data)
+{
+struct ssd_device *dev = (struct ssd_device *)data;
+#else
+static void ssd_log_worker(struct work_struct *work)
+{
+struct ssd_device *dev = container_of(work, struct ssd_device, log_work);
+#endif
+int i;
+int ret;
+
+if (!test_bit(SSD_LOG_ERR, &dev->state) && test_bit(SSD_ONLINE, &dev->state)) {
+ /* alloc log buf */
+if (!dev->log_buf) {
+dev->log_buf = kmalloc(dev->hw_info.log_sz, GFP_KERNEL);
+if (!dev->log_buf) {
+ hio_warn("%s: ssd_log_worker: no mem\n", dev->name);
+ return;
+}
+ /* get log */
+if (test_and_clear_bit(SSD_LOG_HW, &dev->state)) {
+for (i=0; i<dev->hw_info.nr_ctrl; i++) {
+ret = ssd_do_log(dev, i, dev->log_buf);
+if (ret) {
+hio_warn("%s: do log fail\n", dev->name);
+}
+}
+}
+}
+ /* alloc log buf */
+return;
+}
+}
+
+/* get log */
+if (test_and_clear_bit(SSD_LOG_HW, &dev->state)) {
+for (i=0; i<dev->hw_info.nr_ctrl; i++) {
+ret = ssd_do_log(dev, i, dev->log_buf);
+if (ret) {
+(void)test_and_set_bit(SSD_LOG_ERR, &dev->state);
+hio_warn("%s: do log fail\n", dev->name);
+}
+}
+}
+
+ret = ssd_do_swlog(dev);
+if (ret) {
+hio_warn("%s: do swlog fail\n", dev->name);
+}
+}
+}
+
+static void ssd_cleanup_log(struct ssd_device *dev)
+{
+if (dev->log_buf) {
+kfree(dev->log_buf);
+dev->log_buf = NULL;
+}
+ssfifo_free(&dev->log_fifo);
+}
+if (dev->internal_log.log) {
+vfree(dev->internal_log.log);
+dev->internal_log.nr_log = 0;
+dev->internal_log.log = NULL;
+}
+
+static int ssd_init_log(struct ssd_device *dev)
+{
+struct ssd_log *log;
+uint32_t off, size;
+uint32_t len = 0;
+int ret = 0;
+
+mutex_init(&dev->internal_log_mutex);
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+INIT_WORK(&dev->log_work, ssd_log_worker, dev);
+#else
+INIT_WORK(&dev->log_work, ssd_log_worker);
+#endif
+
+off = dev->rom_info.log_base;
+size = dev->rom_info.log_sz;
+
+dev->internal_log.nr_log = 0;
+dev->internal_log.log = vmalloc(size);
+if (!dev->internal_log.log) {
+ret = -ENOMEM;
+goto out_alloc_log;
+}
+
+ret = sfifo_alloc(&dev->log_fifo, SSD_LOG_FIFO_SZ, sizeof(struct ssd_log_entry));
+if (ret < 0) {
+goto out_alloc_log_fifo;
+}
+
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+return 0;
+}
+
+log = (struct ssd_log *)dev->internal_log.log;
+while (len < size) {
+ret = ssd_spi_read(dev, log, off, sizeof(struct ssd_log));
+if (ret) {
+goto out_read_log;
+}
+}
+if (log->ctrl_idx == 0xff) {
+break;
+}
+
+if (log->le.event == SSD_LOG_POWER_ON) {
+if (dev->internal_log.nr_log > dev->last_poweron_id) {
+dev->last_poweron_id = dev->internal_log.nr_log;
+}
+}
+
+dev->internal_log.nr_log++;
+log++;
+len += sizeof(struct ssd_log);
+off += sizeof(struct ssd_log);
+}
+
+return 0;
+
+out_read_log:
+sfifo_free(&dev->log_fifo);
+out_alloc_log_fifo:
+vfree(dev->internal_log.log);
+dev->internal_log.log = NULL;
+dev->internal_log.nr_log = 0;
+out_alloc_log:
+/* skip error if not in standard mode */
+if (mode != SSD_DRV_MODE_STANDARD) {
+ret = 0;
+}
+return ret;
+
+/* work queue */
+static void ssd_stop_workq(struct ssd_device *dev)
+{
+test_and_clear_bit(SSD_INIT_WORKQ, &dev->state);
+flush_workqueue(dev->workq);
+}
+
+static void ssd_start_workq(struct ssd_device *dev)
+{
+(void)test_and_set_bit(SSD_INIT_WORKQ, &dev->state);
+
+/* log */
+queue_work(dev->workq, &dev->log_work);
+}
+
+static void ssd_cleanup_workq(struct ssd_device *dev)
static int ssd_init_workq(struct ssd_device *dev) {
    int ret = 0;

    dev->workq = create_singlethread_workqueue(dev->name);
    if (!dev->workq) {
        ret = -ESRCH;
        goto out;
    }

out:
    return ret;
}

/* rom */
static int ssd_init_rom_info(struct ssd_device *dev) {
    uint32_t val;

    mutex_init(&dev->spi_mutex);
    mutex_init(&dev->i2c_mutex);

    if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
        /* fix bug: read data to clear status */
        (void)ssd_reg32_read(dev->ctrlp + SSD_SPI_REG_RDATA);

        dev->rom_info.size = SSD_ROM_SIZE;
        dev->rom_info.block_size = SSD_ROM_BLK_SIZE;
        dev->rom_info.page_size = SSD_ROM_PAGE_SIZE;

        dev->rom_info.bridge_fw_base = SSD_ROM_BRIDGE_FW_BASE;
        dev->rom_info.bridge_FW_sz = SSD_ROM_BRIDGE_FW_SIZE;
        dev->rom_info.nr_bridge-fw = SSD_ROM_NR_BRIDGE_FW;

        dev->rom_info.ctrl_fw_base = SSD_ROM_CTRL_FW_BASE;
        dev->rom_info.ctrl_FW_sz = SSD_ROM_CTRL_FW_SIZE;
        dev->rom_info.nr_ctlr_fw = SSD_ROM_NR_CTRL_FW;

        dev->rom_info.log_sz = SSD_ROM_LOG_SZ;

        dev->rom_info.vp_base = SSD_ROM_VP_BASE;
        dev->rom_info.label_base = SSD_ROM_LABEL_BASE;
+{ else if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+\tval = ssd_reg32_read(dev->ctrlp + SSD_ROM_INFO_REG);
+\tdev->rom_info.size = 0x100000 * (1U << (val & 0xFF));
+\tdev->rom_info.block_size = 0x10000 * (1U << ((val>>8) & 0xFF));
+\tdev->rom_info.page_size = (val>>16) & 0xFFFF;
+\t+\tval = ssd_reg32_read(dev->ctrlp + SSD_ROM_BRIDGE_FW_INFO_REG);
+\t+\tdev->rom_info.bridge_fw_base = dev->rom_info.block_size * (val & 0xFFFF);
+\t+\tdev->rom_info.bridge_fw_sz = dev->rom_info.block_size * ((val>>16) & 0x3FFF);
+\t+\tdev->rom_info.nr_bridge_fw = ((val >> 30) & 0x3) + 1;
+\t+\tval = ssd_reg32_read(dev->ctrlp + SSD_ROM_CTRL_FW_INFO_REG);
+\t+\tdev->rom_info.ctrl_fw_base = dev->rom_info.block_size * (val & 0xFFFF);
+\t+\tdev->rom_info.ctrl_fw_sz = dev->rom_info.block_size * ((val>>16) & 0x3FFF);
+\t+\tdev->rom_info.nr_ctrl_fw = ((val >> 30) & 0x3) + 1;
+\t+\tdev->rom_info.bm_fw_base = dev->rom_info.ctrl_fw_base + (dev->rom_info.nr_ctrl_fw * dev->rom_info.ctrl_fw_sz);
+\t+\tdev->rom_info.bm_fw_sz = SSD_PV3_ROM_BM_FW_SZ;
+\t+\tdev->rom_info.nr_bm_fw = SSD_PV3_ROM_NR_BM_FW;
+\t+\tdev->rom_info.label_base = dev->rom_info.bm_fw_base + (dev->rom_info.nr_bm_fw * dev->rom_info.bm_fw_sz);
+\t+\tdev->rom_info.label_sz = SSD_ROM_LOG_SZ;
+\t+\tdev->rom_info.smart_base = dev->rom_info.label_base + dev->rom_info.label_sz;
+\t+\tdev->rom_info.smart_sz = SSD_PV3_ROM_SMART_SZ;
+\t+\tdev->rom_info.nr_smart = SSD_PV3_ROM_NR_SMART;
+\t+\tval = ssd_reg32_read(dev->ctrlp + SSD_ROM_VP_INFO_REG);
+\t+\tdev->rom_info.vp_base = dev->rom_info.block_size * val;
+\t+\tdev->rom_info.label_base = dev->rom_info.vp_base + dev->rom_info.block_size;
+\t+\tif (dev->rom_info.label_base >= dev->rom_info.size) {
+\t+\t\tdev->rom_info.label_base = dev->rom_info.vp_base - dev->rom_info.block_size;
+\t+\t\t}
+\t+\tval = ssd_reg32_read(dev->ctrlp + SSD_ROM_INFO_REG);
+\t+\tdev->rom_info.size = 0x100000 * (1U << (val & 0xFF));
+\t+\tdev->rom_info.block_size = 0x10000 * (1U << ((val>>8) & 0xFF));
+\t+\tdev->rom_info.page_size = (val>>16) & 0xFFFF;
+\t+\tval = ssd_reg32_read(dev->ctrlp + SSD_ROM_BRIDGE_FW_INFO_REG);
+\t+\tdev->rom_info.bridge_fw_base = dev->rom_info.block_size * (val & 0xFFFF);
+\t+\tdev->rom_info.bridge_fw_sz = dev->rom_info.block_size * ((val>>16) & 0x3FFF);
+\t+\tdev->rom_info.nr_bridge_fw = ((val >> 30) & 0x3) + 1;
+\t+\tval = ssd_reg32_read(dev->ctrlp + SSD_ROM_CTRL_FW_INFO_REG);
+\t+\tdev->rom_info.ctrl_fw_base = dev->rom_info.block_size * (val & 0xFFFF);
}
+dev->rom_info.ctrl_fw_sz = dev->rom_info.block_size * ((val>>16) & 0x3FFF);
+dev->rom_info.nr_ctrl_fw = ((val >> 30) & 0x3) + 1;
+
+val = ssd_reg32_read(dev->ctrlp + SSD_ROM_VP_INFO_REG);
+dev->rom_info.vp_base = dev->rom_info.block_size * val;
+dev->rom_info.label_base = dev->rom_info.vp_base - SSD_PV3_2_ROM_SEC_SZ;
+
+dev->rom_info.nr_smart = SSD_PV3_ROM_NR_SMART;
+dev->rom_info.smart_sz = SSD_PV3_2_ROM_SEC_SZ;
+dev->rom_info.smart_base = dev->rom_info.label_base - (dev->rom_info.smart_sz * dev->rom_info.nr_smart);
+if (dev->rom_info.smart_sz > dev->rom_info.block_size) {
+dev->rom_info.smart_sz = dev->rom_info.block_size;
+
+dev->rom_info.log_sz = SSD_PV3_2_ROM_LOG_SZ;
+dev->rom_info.log_base = dev->rom_info.smart_base - dev->rom_info.log_sz;
+}
+
+return ssd_init_spi(dev);
+
+/* smart */
+static int ssd_update_smart(struct ssd_device *dev, struct ssd_smart *smart)
+{
+struct timeval tv;
+uint64_t run_time;
+##if (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,27))
+struct hd_struct *part;
+int cpu;
+##endif
+int i, j;
+int ret = 0;
+
+if (!test_bit(SSD_INIT_BD, &dev->state)) {
+return 0;
+}
+
+do_gettimeofday(&tv);
+if ((uint64_t)tv.tv_sec < dev->uptime) {
+run_time = 0;
+} else {
+run_time = tv.tv_sec - dev->uptime;
+}
+
+/* avoid frequently update */
+if (run_time >= 60) {
+ret = 1;
+}
/* io stat */
smart->io_stat.run_time += run_time;

#if (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,27))
cpu = part_stat_lock();
+part = &dev->gd->part0;
#endif
+part_round_stats(dev->rq, cpu, part);
#else
+part_round_stats(cpu, part);
#endif
+part_stat_unlock();

+smart->io_stat.nr_read += part_stat_read(part, ios[READ]);
+smart->io_stat.nr_write += part_stat_read(part, ios[WRITE]);
+smart->io_stat.rsectors += part_stat_read(part, sectors[READ]);
+smart->io_stat.wsectors += part_stat_read(part, sectors[WRITE]);
#elif (LINUX_VERSION_CODE > KERNEL_VERSION(2,6,14))
+preempt_disable();
disk_round_stats(dev->gd);
+preempt_enable();
+smart->io_stat.nr_read += disk_stat_read(dev->gd, ios[READ]);
+smart->io_stat.nr_write += disk_stat_read(dev->gd, ios[WRITE]);
+smart->io_stat.rsectors += disk_stat_read(dev->gd, sectors[READ]);
+smart->io_stat.wsectors += disk_stat_read(dev->gd, sectors[WRITE]);
#else
+preempt_disable();
disk_round_stats(dev->gd);
+preempt_enable();
+smart->io_stat.nr_read += disk_stat_read(dev->gd, reads);
+smart->io_stat.nr_write += disk_stat_read(dev->gd, writes);
+smart->io_stat.rsectors += disk_stat_read(dev->gd, read_sectors);
+smart->io_stat.wsectors += disk_stat_read(dev->gd, write_sectors);
#endif

+smart->io_stat.nr_to += atomic_read(&dev->tocnt);

+for (i=0; i<dev->nr_queue; i++) {
+smart->io_stat.nr_rwerr += dev->queue[i].io_stat.nr_rwerr;
+smart->io_stat.nr_ioerr += dev->queue[i].io_stat.nr_ioerr;
+}

+for (i=0; i<dev->nr_queue; i++) {
+for (j=0; j<SSD_ECC_MAX_FLIP; j++) {
+smart->ecc_info.bitflip[j] += dev->queue[i].ecc_info.bitflip[j];
+}
static int __ssd_clear_smart(struct ssd_device *dev)
{
    struct timeval tv;
    uint64_t sversion;
    uint32_t off, length;
    int i;
    int ret;

    if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
        return 0;
    }

    /* clear smart */
    off = dev->rom_info.smart_base;
    length = dev->rom_info.smart_sz * dev->rom_info.nr_smart;
    ret = ssd_spi_erase(dev, off, length);
    if (ret) {
        hio_warn("%s: info erase: failed\n", dev->name);
        goto out;
    }

    sversion = dev->smart.version;
    memset(&dev->smart, 0, sizeof(struct ssd_smart));
    dev->smart.version = sversion + 1;
    dev->smart.magic = SSD_SMART_MAGIC;

    /* clear all tmp acc */
    for (i=0; i<dev->nr_queue; i++) {
        memset(&(dev->queue[i].io_stat), 0, sizeof(struct ssd_io_stat));
        memset(&(dev->queue[i].ecc_info), 0, sizeof(struct ssd_ecc_info));
    }

    atomic_set(&dev->tocnt, 0);

    /* clear tmp log info */
    memset(&(dev->log_info), 0, sizeof(struct ssd_log_info));

    gettimeofday(&tv);
+dev->uptime = tv.tv_sec;
+
+/* clear alarm */
+ssd_clear_alarm(dev);
+out:
+return ret;
+
+static int __ssd_clear_warning(struct ssd_device *dev)
+{
+uint32_t off, size;
+int i, ret = 0;
+
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+return 0;
+}
+
+/* clear log_info warning */
+memset(&dev->smart.log_info, 0, sizeof(dev->smart.log_info));
+
+/* clear io_stat warning */
+dev->smart.io_stat.nr_to = 0;
+dev->smart.io_stat.nr_rwerr = 0;
+dev->smart.io_stat.nr_ioerr = 0;
+
+/* clear ecc_info warning */
+memset(&dev->smart.ecc_info, 0, sizeof(dev->smart.ecc_info));
+
+/* clear queued warnings */
+for (i=0; i<dev->nr_queue; i++) {
+/* queued io_stat warning */
+dev->queue[i].io_stat.nr_to = 0;
+dev->queue[i].io_stat.nr_rwerr = 0;
+dev->queue[i].io_stat.nr_ioerr = 0;
+
+/* queued ecc_info warning */
+memset(&(dev->queue[i].ecc_info), 0, sizeof(dev->queue[i].ecc_info));
+}
+
+/* write smart back to nor */
+for (i = 0; i < dev->rom_info.nr_smart; i++) {
+off = dev->rom_info.smart_base + (dev->rom_info.smart_sz * i);
+size = dev->rom_info.smart_sz;
+
+ret = ssd_spi_erase(dev, off, size);
+if (ret) {
+hio_warn("%s: warning erase: failed with code %d", dev->name);
+goto out;
}
size = sizeof(struct ssd_smart);
+ret = ssd_spi_write(dev, &dev->smart, off, size);
+if (ret) {
+hio_warn("%s: warning erase: failed with code 2\n", dev->name);
+goto out;
+}
+
+dev->smart.version++;
+
+/* clear cmd timeout warning */
+atomic_set(&dev->tocnt, 0);
+
+/* clear tmp log info */
+memset(&dev->log_info, 0, sizeof(dev->log_info));
+
+out:
+return ret;
+}
+
+static int ssd_clear_smart(struct ssd_device *dev)
+{
+int ret;
+
+ret = __ssd_clear_smart(dev);
+if(!ret) {
+ssd_gen_swlog(dev, SSD_LOG_CLEAR_SMART, 0);
+}
+
+return ret;
+}
+
+static int ssd_clear_warning(struct ssd_device *dev)
+{
+int ret;
+
+ret = __ssd_clear_warning(dev);
+if(!ret) {
+ssd_gen_swlog(dev, SSD_LOG_CLEAR_WARNING, 0);
+}
+
+return ret;
+}
+
+static int ssd_save_smart(struct ssd_device *dev)
uint32_t off, size;
int i;
int ret = 0;
+
if (unlikely(mode != SSD_DRV_MODE_STANDARD))
+return 0;
+
if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+return 0;
+}
+
if (!ssd_update_smart(dev, &dev->smart)) {
+return 0;
+}
+
+dev->smart.version++;
+
+for (i=0; i<dev->rom_info.nr_smart; i++) {
+off = dev->rom_info.smart_base + (dev->rom_info.smart_sz * i);
+size = dev->rom_info.smart_sz;
+
+ret = ssd_spi_erase(dev, off, size);
+if (ret) {
+hio_warn("%s: info erase failed\n", dev->name);
+goto out;
+}
+
+size = sizeof(struct ssd_smart);
+
+ret = ssd_spi_write(dev, &dev->smart, off, size);
+if (ret) {
+hio_warn("%s: info write failed\n", dev->name);
+goto out;
+}
+
+//xx
+}
+
+out:
+return ret;
+}
+
+static int ssd_init_smart(struct ssd_device *dev)
+{
+struct ssd_smart *smart;
+struct timeval tv;
+uint32_t off, size, val;
int i;
int ret = 0;
int update_smart = 0;

do_gettimeofday(&tv);
dev->uptime = tv.tv_sec;

if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
    return 0;
}

smart = kmalloc(sizeof(struct ssd_smart) * SSD_ROM_NR_SMART_MAX, GFP_KERNEL);
if (!smart) {
    ret = -ENOMEM;
    goto out_nomem;
}

memset(&dev->smart, 0, sizeof(struct ssd_smart));

/* read smart */
for (i=0; i<dev->rom_info.nr_smart; i++) {
    memset(&smart[i], 0, sizeof(struct ssd_smart));
    off = dev->rom_info.smart_base + (dev->rom_info.smart_sz * i);
    size = sizeof(struct ssd_smart);
    ret = ssd_spi_read(dev, &smart[i], off, size);
    if (ret) {
        hio_warn("%s: info read failed\n", dev->name);
        goto out;
    }
    if (smart[i].magic != SSD_SMART_MAGIC) {
        smart[i].magic = 0;
        smart[i].version = 0;
        continue;
    }
    if (smart[i].version > dev->smart.version) {
        memcpy(&dev->smart, &smart[i], sizeof(struct ssd_smart));
    }
}

if (dev->smart.magic != SSD_SMART_MAGIC) {
    /* first time power up */
    dev->smart.magic = SSD_SMART_MAGIC;
    dev->smart.version = 1;
}
val = ssd_reg32_read(dev->ctrlp + SSD_INTR_INTERVAL_REG);
if (!val) {
    dev->last_poweron_id = -1;
    ssd_gen_swlog(dev, SSD_LOG_POWER_ON, dev->hw_info.bridge_ver);
    if (dev->smart.io_stat.nr_to) {
        dev->smart.io_stat.nr_to = 0;
        update_smart = 1;
    }
}

/* check log info */
{
    struct ssd_log_info log_info;
    struct ssd_log *log = (struct ssd_log *)dev->internal_log.log;
    memset(&log_info, 0, sizeof(struct ssd_log_info));
    while (log_info.nr_log < dev->internal_log.nr_log) {
        int skip = 0;
        switch (log->le.event) {
            /* skip the volatile log info */
            case SSD_LOG_SEU_FAULT:
                skip = 1;
                break;
            case SSD_LOG_SEU_FAULT1:
                skip = (dev->last_poweron_id >= log_info.nr_log);
                break;
            case SSD_LOG_TIMEOUT:
                skip = (dev->last_poweron_id >= log_info.nr_log);
                break;
            }
            if (!skip) {
                log_info.stat[ssd_parse_log(dev, log, 0)]++;
            }
            log_info.nr_log++;
            log++;
        }
        /* check */
        for (i=(SSD_LOG_NR_LEVEL-1); i>=0; i--) {
            if (log_info.stat[i] != dev->smart.log_info.stat[i]) {
                /* unclean */
                memcpy(&dev->smart.log_info, &log_info, sizeof(struct ssd_log_info));
                update_smart = 1;
                break;
            }
        }
    }
}
if (update_smart) {
    dev->smart.version;
}

if (smart[i].magic == SSD_SMART_MAGIC && smart[i].version == dev->smart.version) {
    continue;
}

off = dev->rom_info.smart_base + (dev->rom_info.smart_sz * i);
size = dev->rom_info.smart_sz;
ret = ssd_spi_erase(dev, off, size);
if (ret) {
    hio_warn("%s: info erase failed\n", dev->name);
    goto out;
}

size = sizeof(struct ssd_smart);
ret = ssd_spi_write(dev, &dev->smart, off, size);
if (ret) {
    hio_warn("%s: info write failed\n", dev->name);
    goto out;
}

//xx

/* sync smart with alarm led */
if (dev->smart.io_stat.nr_to || dev->smart.io_stat.nr_rwerr || dev->smart.log_info.stat[SSD_LOG_LEVEL_ERR]) {
    hio_warn("%s: some fault found in the history info\n", dev->name);
    ssd_set_alarm(dev);
}

out:
free(smart);
out_nomem:
/* skip error if not in standard mode */
if (mode != SSD_DRV_MODE_STANDARD) {
    ret = 0;
}
return ret;
}
+static int __ssd_bm_get_version(struct ssd_device *dev, uint16_t *ver)
+
+struct ssd_bm_manufacturer_data bm_md = {0};
+uint16_t sc_id = SSD_BM_SYSTEM_DATA_SUBCLASS_ID;
+uint8_t cmd;
+int ret = 0;
+
+if (!dev || !ver) {
+    return -EINVAL;
+
+    mutex_lock(&dev->bm_mutex);
+
+    cmd = SSD_BM_DATA_FLASH_SUBCLASS_ID;
+    ret = ssd_smbus_write_word(dev, SSD_BM_SLAVE_ADDRESS, cmd, (uint8_t *)&sc_id);
+    if (ret) {
+        goto out;
+
+        cmd = SSD_BM_DATA_FLASH_SUBCLASS_ID_PAGE1;
+        ret = ssd_smbus_read_block(dev, SSD_BM_SLAVE_ADDRESS, cmd, sizeof(struct ssd_bm_manufacturer_data),
+            (uint8_t *)&bm_md);
+        if (ret) {
+            goto out;
+
+            if (bm_md.firmware_ver & 0xF000) {
+                ret = -EIO;
+                goto out;
+
+            }
+
+            *ver = bm_md.firmware_ver;
+
+        out:
+        mutex_unlock(&dev->bm_mutex);
+        return ret;
+
+        +static int ssd_bm_get_version(struct ssd_device *dev, uint16_t *ver)
+
+        +uint16_t tmp = 0;
+        +int i = SSD_BM_RETRY_MAX;
+        +int ret = 0;
+        +
+        +while (i-- > 0) {
+        +    ret = __ssd_bm_get_version(dev, &tmp);
+        +    if (!ret) {
+        +        break;
if (ret) {
    return ret;
}

*ver = tmp;
return 0;

static int __ssd_bm_nr_cap(struct ssd_device *dev, int *nr_cap)
{
    struct ssd_bm_configuration_registers bm_cr;
    uint16_t sc_id = SSD_BM_CONFIGURATION_REGISTERS_ID;
    uint8_t cmd;
    int ret;

    mutex_lock(&dev->bm_mutex);
    cmd = SSD_BM_DATA_FLASH_SUBCLASS_ID;
    ret = ssd_smbus_write_word(dev, SSD_BM_SLAVE_ADDRESS, cmd, (uint8_t *)&sc_id);
    if (ret) {
        goto out;
    }
    cmd = SSD_BM_DATA_FLASH_SUBCLASS_ID_PAGE1;
    ret = ssd_smbus_read_block(dev, SSD_BM_SLAVE_ADDRESS, cmd, sizeof(struct ssd_bm_configuration_registers), (uint8_t *)&bm_cr);
    if (ret) {
        goto out;
    }
    if (bm_cr.operation_cfg.cc == 0 || bm_cr.operation_cfg.cc > 4) {
        ret = -EIO;
        goto out;
    }
    *nr_cap = bm_cr.operation_cfg.cc + 1;
out:
    mutex_unlock(&dev->bm_mutex);
    return ret;
}

static int ssd_bm_nr_cap(struct ssd_device *dev, int *nr_cap)
{
    int tmp = 0;

    +static int _ssd_bm_nr_cap(struct ssd_device *dev, int *nr_cap)
    +{
        struct ssd_bm_configuration_registers bm_cr;
        uint16_t sc_id = SSD_BM_CONFIGURATION_REGISTERS_ID;
        uint8_t cmd;
        int ret;

        mutex_lock(&dev->bm_mutex);
        cmd = SSD_BM_DATA_FLASH_SUBCLASS_ID;
        +ret = ssd_smbus_write_word(dev, SSD_BM_SLAVE_ADDRESS, cmd, (uint8_t *)&sc_id);
        if (ret) {
            goto out;
        }
        cmd = SSD_BM_DATA_FLASH_SUBCLASS_ID_PAGE1;
        +ret = ssd_smbus_read_block(dev, SSD_BM_SLAVE_ADDRESS, cmd, sizeof(struct ssd_bm_configuration_registers), (uint8_t *)&bm_cr);
        if (ret) {
            goto out;
        }
        +if (bm_cr.operation_cfg.cc == 0 || bm_cr.operation_cfg.cc > 4) {
            ret = -EIO;
            goto out;
        }
        +*nr_cap = bm_cr.operation_cfg.cc + 1;
        +
        out:
        +mutex_unlock(&dev->bm_mutex);
        +return ret;
    +}
    +
    +static int ssd_bm_nr_cap(struct ssd_device *dev, int *nr_cap)
    +{
        int tmp = 0;

}
```c
int i = SSD_BM_RETRY_MAX;
int ret = 0;

while (i-- > 0) {
    ret = __ssd_bm_nr_cap(dev, &tmp);
    if (!ret) {
        break;
    }
}

if (ret) {
    return ret;
}

*nr_cap = tmp;

return 0;

static int ssd_bm_enter_cap_learning(struct ssd_device *dev) {
    uint16_t buf = SSD_BM_ENTER_CAP_LEARNING;
    uint8_t cmd = SSD_BM_MANUFACTURERACCESS;
    int ret;

    ret = ssd_smbus_write_word(dev, SSD_BM_SLAVE_ADDRESS, cmd, (uint8_t *)&buf);
    if (ret) {
        goto out;
    }
    out:
    return ret;
}

static int ssd_bm_get_sfstatus(struct ssd_device *dev, uint16_t *status) {
    uint16_t val = 0;
    uint8_t cmd = SSD_BM_SAFETYSTATUS;
    int ret;

    ret = ssd_smbus_read_word(dev, SSD_BM_SLAVE_ADDRESS, cmd, (uint8_t *)&val);
    if (ret) {
        goto out;
    }
    out:
    *status = val;
    return ret;
}
```
static int ssd_bm_get_opstatus(struct ssd_device *dev, uint16_t *status) {
    uint16_t val = 0;
    uint8_t cmd = SSD_BM_OPERATIONSTATUS;
    int ret;
    ret = ssd_smbus_read_word(dev, SSD_BM_SLAVE_ADDRESS, cmd, (uint8_t *)&val);
    if (ret) {
        goto out;
    }
    *status = val;
    out:
    return ret;
}

static int ssd_get_bmstruct(struct ssd_device *dev, struct ssd_bm *bm_status_out) {
    struct sbs_cmd *bm_sbs = ssd_bm_sbs;
    struct ssd_bm bm_status;
    uint8_t buf[2] = {0, };
    uint16_t val = 0;
    uint16_t cval;
    int ret = 0;
    memset(&bm_status, 0, sizeof(struct ssd_bm));
    while (bm_sbs->desc != NULL) {
        switch (bm_sbs->size) {
        case SBS_SIZE_BYTE:
            ret = ssd_smbus_read_byte(dev, SSD_BM_SLAVE_ADDRESS, bm_sbs->cmd, buf);
            if (ret) {
                //printf("Error: smbus read byte \%x\n", bm_sbs->cmd);
                goto out;
            }
            val = buf[0];
            break;
        case SBS_SIZE_WORD:
            ret = ssd_smbus_read_word(dev, SSD_BM_SLAVE_ADDRESS, bm_sbs->cmd, (uint8_t *)&val);
            if (ret) {
                //printf("Error: smbus read word \%x\n", bm_sbs->cmd);
                goto out;
            }
            //val = *(uint16_t *)buf;
            break;
        default:
            ret = -1;
            break;
        }
    }
    return ret;
}
goto out;
break;
}

switch (bm_sbs->unit) {

case SBS_UNIT_VALUE:
  *(uint16_t *)bm_var(&bm_status, bm_sbs->off) = val & bm_sbs->mask;
  break;

case SBS_UNIT_TEMPERATURE:
  cval = (uint16_t)((val - 2731) / 10);
  *(uint16_t *)bm_var(&bm_status, bm_sbs->off) = cval;
  break;

case SBS_UNIT_VOLTAGE:
  *(uint16_t *)bm_var(&bm_status, bm_sbs->off) = val;
  break;

case SBS_UNIT_CURRENT:
  *(uint16_t *)bm_var(&bm_status, bm_sbs->off) = val;
  break;

case SBS_UNIT_ESR:
  *(uint16_t *)bm_var(&bm_status, bm_sbs->off) = val;
  break;

case SBS_UNIT_PERCENT:
  *(uint16_t *)bm_var(&bm_status, bm_sbs->off) = val;
  break;

case SBS_UNIT_CAPACITY:
  *(uint16_t *)bm_var(&bm_status, bm_sbs->off) = val;
  break;

default:
  ret = -1;
  goto out;
  break;
}

bm_sbs++;

memcpy(bm_status_out, &bm_status, sizeof(struct ssd_bm));

out:
return ret;
}
ret = ssd_get_bmstruct(dev, &bm_status);
if (ret) {
    goto out;
}

/* capacitor voltage */
ret = ssd_bm_nr_cap(dev, &nr_cap);
if (ret) {
    goto out;
}

for (i=0; i<nr_cap; i++) {
    if (bm_status.cap_volt[i] < SSD_BM_CAP_VOLT_MIN) {
        *status = SSD_BMSTATUS_WARNING;
        goto out;
    }
}

/* Safety Status */
if (bm_status.sf_status) {
    *status = SSD_BMSTATUS_WARNING;
    goto out;
}

/* charge status */
if (!((bm_status.op_status >> 12) & 0x1)) {
    *status = SSD_BMSTATUS_CHARGING;
} else {
    *status = SSD_BMSTATUS_OK;
}

out:
return ret;

static void ssd_set_flush_timeout(struct ssd_device *dev, int mode);

#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
static void ssd_bm_worker(void *data)
{
    struct ssd_device *dev = (struct ssd_device *)data;
#else
static void ssd_bm_worker(struct work_struct *work)
{
    struct ssd_device *dev = container_of(work, struct ssd_device, bm_work);
#endif

```c
+uint16_t opstatus;
+int ret = 0;
+
+if (mode != SSD_DRV_MODE_STANDARD) {
+    return;
+
+    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_1) {
+        return;
+
+        if (dev->hw_info_ext.plp_type != SSD_PLP_SCAP) {
+            return;
+
+            ret = ssd_bm_get_opstatus(dev, &opstatus);
+            if (ret) {
+                hio_warn("%s: get bm operationstatus failed\n", dev->name);
+                return;
+
+                /* need cap learning ? */
+                if (!(opstatus & 0xF0)) {
+                    ret = ssd_bm_enter_cap_learning(dev);
+                    if (ret) {
+                        hio_warn("%s: enter capacitance learning failed\n", dev->name);
+                        return;
+
+                        +#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
+                        static void ssd_bm_routine_start(void *data)
+                        +#else
+                        static void ssd_bm_routine_start(struct timer_list *t)
+                        +#endif
+                        +{
+                            struct ssd_device *dev;
+                            +
+                            +#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
+                            +#else
+                            +dev = from_timer(dev, t, bm_timer);
+                            +#endif
+                            +
+
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```
```c
+if (test_bit(SSD_INIT_WORKQ, &dev->state)) {
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+queue_work(dev->workq, &dev->bm_work);
+} else {
+queue_work(dev->workq, &dev->capmon_work);
+
+/* CAP */
+static int ssd_do_cap_learn(struct ssd_device *dev, uint32_t *cap)
+{
+uint32_t u1, u2, t;
+uint16_t val = 0;
+int wait = 0;
+int ret = 0;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+*cap = 0;
+return 0;
+}
+
+if (dev->hw_info_ext.form_factor == SSD_FORM_FACTOR_FHHL && dev->hw_info.pcb_ver < 'B') {
+*cap = 0;
+return 0;
+}
+
+/* make sure the lm80 voltage value is updated */
+msleep(SSD_LM80_CONV_INTERVAL);
+
+/* check if full charged */
+wait = 0;
+for (; ;)
+ret = ssd_smbus_read_word(dev, SSD_SENSOR_LM80_SADDRESS, SSD_PL_CAP_U1, (uint8_t *)&val);
+if (ret) {
+if (!test_and_set_bit(SSD_HWMON_SENSOR(SSD_SENSOR_LM80), &dev->hwmon)) {
+ssd_generate_sensor_fault_log(dev, SSD_LOG_SENSOR_FAULT, SSD_SENSOR_LM80_SADDRESS,ret);
+
+goto out;
+
+}
+u1 = SSD_LM80_CONVERT_VOLT(u16_swap(val));
+if (SSD_PL_CAP_VOLT(u1) >= SSD_PL_CAP_VOLT_FULL) {
+break;
+
+}
+
+wait++;
+if (wait > SSD_PL_CAP_CHARGE_MAX_WAIT) {
+ret = -ETIMEDOUT;
```

---

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goto out;
+
} 
+msleep(SSD_PL_CAP_CHARGE_WAIT);
+
+
+ret = ssd_smbus_read_word(dev, SSD_SENSOR_LM80_SADDRESS, SSD_PL_CAP_U2, (uint8_t *)&val);
+if (ret) {
+if (!test_and_set_bit(SSD_HWMON_SENSOR(SSD_SENSOR_LM80), &dev->hwmon)) {
+ssd_generate_sensor_fault_log(dev, SSD_LOG_SENSOR_FAULT, SSD_SENSOR_LM80_SADDRESS, ret);
+}
+goto out;
+
+u2 = SSD_LM80_CONVERT_VOLT(u16_swap(val));
+
+if (u1 == u2) {
+ret = -EINVAL;
+goto out;
+
+}
+
+/* enter cap learn */
+ssd_reg32_write(dev->ctrlp + SSD_PL_CAP_LEARN_REG, 0x1);
+
+wait = 0;
+for (;;) {
+msleep(SSD_PL_CAP_LEARN_WAIT);
+
+t = ssd_reg32_read(dev->ctrlp + SSD_PL_CAP_LEARN_REG);
+if (!(t >> 1) & 0x1) {
+break;
+}
+
+wait++;
+if (wait > SSD_PL_CAP_LEARN_MAX_WAIT) {
+ret = -ETIMEDOUT;
+goto out;
+
+}
+
+if ((t >> 4) & 0x1) {
+ret = -ETIMEDOUT;
+goto out;
+
+}
+
+t = (t >> 8);
+if (0 == t) {
+ret = -EINVAL;
+goto out;
+
+}
+ *cap = SSD_PL_CAP_LEARN(u1, u2, t);
+ +out:
+ +return ret;
+ +}
+ +static int ssd_cap_learn(struct ssd_device *dev, uint32_t *cap)
+ +{
+ +int ret = 0;
+ +
+ +if (!dev || !cap) {
+ +return -EINVAL;
+ +}
+ +
+ +mutex_lock(&dev->bm_mutex);
+ +
+ +ssd_stop_workq(dev);
+ +
+ +ret = ssd_do_cap_learn(dev, cap);
+ +if (ret) {
+ +ssd_gen_swlog(dev, SSD_LOG_CAP_LEARN_FAULT, 0);
+ +goto out;
+ +}
+ +
+ +ssd_gen_swlog(dev, SSD_LOG_CAP_STATUS, *cap);
+ +
+ +out:
+ +ssd_start_workq(dev);
+ +mutex_unlock(&dev->bm_mutex);
+ +
+ +return ret;
+ +}
+ +
+ +static int ssd_check_pl_cap(struct ssd_device *dev)
+ +{
+ +uint32_t u1;
+ +uint16_t val = 0;
+ +uint8_t low = 0;
+ +int wait = 0;
+ +int ret = 0;
+ +
+ +if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+ +return 0;
+ +}
+ +
+ +if (dev->hw_info_ext.form_factor == SSD_FORM_FACTOR_FHHL && dev->hw_info.pcb_ver < 'B') {
+ +return 0;
+ +}
} +
+ /* cap ready ? */
+ wait = 0;
+ for (;;) {
+ ret = ssd_smbus_read_word(dev, SSD_SENSOR_LM80_SADDRESS, SSD_PL_CAP_U1, (uint8_t *)&val);
+ if (ret) {
+ if (!test_and_set_bit(SSD_HWMON_SENSOR(SSD_SENSOR_LM80), &dev->hwmon)) {
+ ssd_generate_sensor_fault_log(dev, SSD_LOG_SENSOR_FAULT, SSD_SENSOR_LM80_SADDRESS, ret);
+ }
+ goto out;
+ }
+ u1 = SSD_LM80_CONVERT_VOLT(u16_swap(val));
+ if (SSD_PL_CAP_VOLT(u1) >= SSD_PL_CAP_VOLT_READY) {
+ break;
+ }
+ 
+ wait++;
+ if (wait > SSD_PL_CAP_CHARGE_MAX_WAIT) {
+ ret = -ETIMEDOUT;
+ ssd_gen_swlog(dev, SSD_LOG_CAP_VOLT_FAULT, SSD_PL_CAP_VOLT(u1));
+ goto out;
+ }
+ msleep(SSD_PL_CAP_CHARGE_WAIT);
+ }
+ 
+ low = ssd_lm80_limit[SSD_LM80_IN_CAP].low;
+ ret = ssd_smbus_write_byte(dev, SSD_SENSOR_LM80_SADDRESS, SSD_LM80_REG_IN_MIN(SSD_LM80_IN_CAP), &low);
+ if (ret) {
+ goto out;
+ }
+ /* enable cap INx */
+ ret = ssd_lm80_enable_in(dev, SSD_SENSOR_LM80_SADDRESS, SSD_LM80_IN_CAP);
+ if (ret) {
+ if (!test_and_set_bit(SSD_HWMON_SENSOR(SSD_SENSOR_LM80), &dev->hwmon)) {
+ ssd_generate_sensor_fault_log(dev, SSD_LOG_SENSOR_FAULT, SSD_SENSOR_LM80_SADDRESS, ret);
+ }
+ goto out;
+ }
+ 
+ out:
+ /* skip error if not in standard mode */
+ if (mode != SSD_DRV_MODE_STANDARD) {
+ ret = 0;
+ }
+ return ret;
static int ssd_check_pl_cap_fast(struct ssd_device *dev)
{
    uint32_t u1;
    uint16_t val = 0;
    int ret = 0;
    
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        return 0;
    }
    
    if (dev->hw_info_ext.form_factor == SSD_FORM_FACTOR_FHHL && dev->hw_info.pcb_ver < 'B') {
        return 0;
    }
    
    /* cap ready ? */
    ret = ssd_smbus_read_word(dev, SSD_SENSOR_LM80_SADDRESS, SSD_PL_CAP_U1, (uint8_t *)&val);
    if (ret) {
        goto out;
    }
    
    u1 = SSD_LM80_CONVERT_VOLT(u16_swap(val));
    if (SSD_PL_CAP_VOLT(u1) < SSD_PL_CAP_VOLT_READY) {
        ret = 1;
    }

out:
    return ret;
}

static int ssd_init_pl_cap(struct ssd_device *dev)
{
    int ret = 0;
    
    /* set here: user write mode */
    dev->user_wmode = wmode;
    mutex_init(&dev->bm_mutex);
    
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        uint32_t val;
        val = ssd_reg32_read(dev->ctrlp + SSD_BM_FAULT_REG);
        if ((val >> 1) & 0x1) {
            (void)test_and_set_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwm);
        } else {
            (void)test_and_set_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwm);
        }
    } else {
        ret = ssd_check_pl_cap(dev);
        if (ret) {

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+(void)test_and_set_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon);
+
+
+return 0;
+
+*/ label */
+static void __end_str(char *str, int len)
+
+for(i=0; i<len; i++) {
+if (*str+i == '\0')
+    return;
+}
+*str = '\0';
+
+static int ssd_init_label(struct ssd_device *dev)
+
+uint32_t off;
+uint32_t size;
+int ret;
+
+/* label location */
+off = dev->rom_info.label_base;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+size = sizeof(struct ssd_label);
+
+/* read label */
+ret = ssd_spi_read(dev, &dev->label, off, size);
+if (ret) {
+    memset(&dev->label, 0, size);
+    goto out;
+}
+
+__end_str(dev->label.date, SSD_LABEL_FIELD_SZ);
+__end_str(dev->label.sn, SSD_LABEL_FIELD_SZ);
+__end_str(dev->label.part, SSD_LABEL_FIELD_SZ);
+__end_str(dev->label.desc, SSD_LABEL_FIELD_SZ);
+__end_str(dev->label.other, SSD_LABEL_FIELD_SZ);
+__end_str(dev->label.maf, SSD_LABEL_FIELD_SZ);
+} else {
+size = sizeof(struct ssd_labelv3);
+
+/* read label */
ret = ssd_spi_read(dev, &dev->labelv3, off, size);
+ if (ret) {
+ memset(&dev->labelv3, 0, size);
+ goto out;
+ }
+
+ __end_str(dev->labelv3.boardtype, SSD_LABEL_FIELD_SZ);
+ __end_str(dev->labelv3.barcode, SSD_LABEL_FIELD_SZ);
+ __end_str(dev->labelv3.item, SSD_LABEL_FIELD_SZ);
+ __end_str(dev->labelv3.description, SSD_LABEL_DESC_SZ);
+ __end_str(dev->labelv3.manufactured, SSD_LABEL_FIELD_SZ);
+ __end_str(dev->labelv3.issuenumber, SSD_LABEL_FIELD_SZ);
+ __end_str(dev->labelv3.cleicode, SSD_LABEL_FIELD_SZ);
+ __end_str(dev->labelv3.bom, SSD_LABEL_FIELD_SZ);
+ }
+
+ out:
+ /* skip error if not in standard mode */
+ if (mode != SSD_DRV_MODE_STANDARD) {
+ ret = 0;
+ }
+ return ret;
+
+int ssd_get_label(struct block_device *bdev, struct ssd_label *label) {
+ struct ssd_device *dev;
+
+ if (!bdev || !label || !(bdev->bd_disk)) {
+ return -EINVAL;
+ }
+ dev = bdev->bd_disk->private_data;
+ +
+ if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+ memcpy(label, 0, sizeof(struct ssd_label));
+ memcpy(label->date, dev->labelv3.manufactured, SSD_LABEL_FIELD_SZ);
+ memcpy(label->sn, dev->labelv3.barcode, SSD_LABEL_FIELD_SZ);
+ memcpy(label->desc, dev->labelv3.boardtype, SSD_LABEL_FIELD_SZ);
+ memcpy(label->maf, dev->labelv3.vendormake, SSD_LABEL_FIELD_SZ);
+ } else {
+ memcpy(label, &dev->label, sizeof(struct ssd_label));
+ }
+ return 0;
+ }
+static int __ssd_get_version(struct ssd_device *dev, struct ssd_version_info *ver)
+{
+uint16_t bm_ver = 0;
+int ret = 0;
+
+if (dev->protocol_info.ver > SSD_PROTOCOL_V3 && dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+ret = ssd_bm_get_version(dev, &bm_ver);
+if(ret){
+goto out;
+
+
+out:
+return ret;
+
+
+
+int ssd_get_version(struct block_device *bdev, struct ssd_version_info *ver)
+{
+struct ssd_device *dev;
+
+if (!bdev || !ver || !(bdev->bd_disk)) {
+return -EINVAL;
+
+
+dev = bdev->bd_disk->private_data;
+
+mutex_lock(&dev->fw_mutex);
+ret = __ssd_get_version(dev, ver);
+mutex_unlock(&dev->fw_mutex);
+
+return ret;
+
+
+static int __ssd_get_temperature(struct ssd_device *dev, int *temp)
+{
+uint64_t val;
+uint32_t off;
+int max = -300;
+int cur;
+int i;
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+*temp = 0;
+return 0;
+}
+
+if (finject) {
+if (dev->db_info.type == SSD_DEBUG_LOG &&
+(dev->db_info.data.log.event == SSD_LOG_OVER_TEMP ||
+dev->db_info.data.log.event == SSD_LOG_NORMAL_TEMP ||
+dev->db_info.data.log.event == SSD_LOG_WARN_TEMP)) {
+*temp = (int)dev->db_info.data.log.extra;
+return 0;
+}
+}
+
++for (i=0; i<dev->hw_info.nr_ctrl; i++) {
+off = SSD_CTRL_TEMP_REG0 + i * sizeof(uint64_t);
+
+val = ssd_reg_read(dev->ctrlp + off);
+if (val == 0xffffffffffffffffull) {
+continue;
+}
+
+cur = (int)CUR_TEMP(val);
+if (cur >= max) {
+max = cur;
+}
+
+*temp = max;
+
+return 0;
+}
+
+int ssd_get_temperature(struct block_device *bdev, int *temp)
+{
+struct ssd_device *dev;
+int ret;
+
+if (!bdev || !temp || !(bdev->bd_disk)) {
+return -EINVAL;
+}
+
+dev = bdev->bd_disk->private_data;
+
+mutex_lock(&dev->fw_mutex);
int ssd_set_otprotect(struct block_device *bdev, int otprotect) {
    struct ssd_device *dev;
    if (!bdev || !(bdev->bd_disk)) {
        return -EINVAL;
    }
    dev = bdev->bd_disk->private_data;
    ssd_set_ot_protect(dev, !!otprotect);
    return 0;
}

int ssd_bm_status(struct block_device *bdev, int *status) {
    struct ssd_device *dev;
    int ret = 0;
    if (!bdev || !status || !(bdev->bd_disk)) {
        return -EINVAL;
    }
    dev = bdev->bd_disk->private_data;
    mutex_lock(&dev->fw_mutex);
    if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
        if (test_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
            *status = SSD_BMSTATUS_WARNING;
        } else {
            *status = SSD_BMSTATUS_OK;
        }
    } else if(dev->protocol_info.ver > SSD_PROTOCOL_V3) {
        ret = __ssd_bm_status(dev, status);
    } else {
        *status = SSD_BMSTATUS_OK;
    }
    mutex_unlock(&dev->fw_mutex);
    return ret;
}
+int ssd_get_pciaddr(struct block_device *bdev, struct pci_addr *paddr)
+{
+struct ssd_device *dev;
+
+if (!bdev || !paddr || !bdev->bd_disk) {
+return -EINVAL;
+}
+
+dev = bdev->bd_disk->private_data;
+
+paddr->domain = pci_domain_nr(dev->pdev->bus);
+paddr->bus = dev->pdev->bus->number;
+paddr->slot = PCI_SLOT(dev->pdev->devfn);
+paddr->func= PCI_FUNC(dev->pdev->devfn);
+
+return 0;
+}
+
+/* acc */
+static int ssd_bb_acc(struct ssd_device *dev, struct ssd_acc_info *acc)
+{
+  uint32_t val;
+  int ctrl, chip;
+
+  if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_1) {
+    return -EOPNOTSUPP;
+  }
+
+  acc->threshold_l1 = ssd_reg32_read(dev->ctrlp + SSD_BB_THRESHOLD_L1_REG);
+  if (0xffffffffull == acc->threshold_l1) {
+    return -EIO;
+  }
+  acc->threshold_l2 = ssd_reg32_read(dev->ctrlp + SSD_BB_THRESHOLD_L2_REG);
+  if (0xffffffffull == acc->threshold_l2) {
+    return -EIO;
+  }
+  acc->val = 0;
+
+  for (ctrl=0; ctrl<dev->hw_info.nr_ctrl; ctrl++) {
+    for (chip=0; chip<dev->hw_info.nr_chip; chip++) {
+      val = ssd_reg32_read(dev->ctrlp + SSD_BB_ACC_REG0 + (SSD_CTRL_REG_ZONE_SZ * ctrl) +
+(SSD_BB_ACC_REG_SZ * chip));
+      if (0xffffffffull == acc->val) {
+        return -EIO;
+      }
+      if (val > acc->val) {
+        acc->val = val;
+      }
+    }
+  }
static int ssd_ec_acc(struct ssd_device *dev, struct ssd_acc_info *acc)
{
    uint32_t val;
    int ctrl, chip;
    
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_1) {
        return -EOPNOTSUPP;
    }
    
    acc->threshold_l1 = ssd_reg32_read(dev->ctrlp + SSD_EC_THRESHOLD_L1_REG);
    if (0xffffffffull == acc->threshold_l1) {
        return -EIO;
    }
    
    acc->threshold_l2 = ssd_reg32_read(dev->ctrlp + SSD_EC_THRESHOLD_L2_REG);
    if (0xffffffffull == acc->threshold_l2) {
        return -EIO;
    }
    
    acc->val = 0;
    
    for (ctrl=0; ctrl<dev->hw_info.nr_ctrl; ctrl++) {
        for (chip=0; chip<dev->hw_info.nr_chip; chip++) {
            val = ssd_reg32_read(dev->ctrlp + SSD_EC_ACC_REG0 + (SSD_CTRL_REG_ZONE_SZ * ctrl) + (SSD_EC_ACC_REG_SZ * chip));
            if (0xffffffffull == acc->val) {
                return -EIO;
            }
            
            if (val > acc->val) {
                acc->val = val;
            }
        }
    }
    
    return 0;
}

/* ram r&w */
static int ssd_ram_read_4k(struct ssd_device *dev, void *buf, size_t length, loff_t ofs, int ctrl_idx)
{
    struct ssd_ram_op_msg *msg;
    dma_addr_t buf_dma;
size_t len = length;
loff_t ofs_w = ofs;
int ret = 0;

if (ctrl_idx >= dev->hw_info.nr_ctrl || (uint64_t)(ofs + length) > dev->hw_info.ram_size
|| !length || length > dev->hw_info.ram_max_len
|| (length & (dev->hw_info.ram_align - 1)) != 0 || ((uint64_t)ofs & (dev->hw_info.ram_align - 1)) != 0) {
    return -EINVAL;
}

len /= dev->hw_info.ram_align;
do_div(ofs_w, dev->hw_info.ram_align);

buf_dma = pci_map_single(dev->pdev, buf, length, PCI_DMA_FROMDEVICE);
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
    ret = dma_mapping_error(buf_dma);
#else
    ret = dma_mapping_error(&(dev->pdev->dev), buf_dma);
#endif
#if (ret)
    hio_warn("%s: unable to map read DMA buffer\n", dev->name);
    goto out_dma_mapping;
#endif

msg = (struct ssd_ram_op_msg *)ssd_get_dmsg(dev);

msg->fun = SSD_FUNC_RAM_READ;
msg->ctrl_idx = ctrl_idx;
msg->start = (uint32_t)ofs_w;
msg->length = len;
msg->buf = buf_dma;

ret = ssd_do_request(dev, READ, msg, NULL);
ssd_put_dmsg(msg);

pci_unmap_single(dev->pdev, buf_dma, length, PCI_DMA_FROMDEVICE);

out_dma_mapping:
return ret;
}

static int ssd_ram_write_4k(struct ssd_device *dev, void *buf, size_t length, loff_t ofs, int ctrl_idx) {  
  struct ssd_ram_op_msg *msg;
  dma_addr_t buf_dma;
  size_t len = length;
  loff_t ofs_w = ofs;
  int ret = 0;
+ if (ctrl_idx >= dev->hw_info.nr_ctrl || (uint64_t)(ofs + length) > dev->hw_info.ram_size 
+ length > dev->hw_info.ram_max_len
+ !length || (length & (dev->hw_info.ram_align - 1)) != 0 || ((uint64_t)ofs & (dev->hw_info.ram_align - 1)) != 0) {
+ return -EINVAL;
+ }
+
+ len /= dev->hw_info.ram_align;
+ do_div(ofs_w, dev->hw_info.ram_align);
+
+ buf_dma = pci_map_single(dev->pdev, buf, length, PCI_DMA_TODEVICE);
+ if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
+ ret = dma_mapping_error(buf_dma);
+ #else
+ ret = dma_mapping_error(&dev->pdev->dev, buf_dma);
+ #endif
+ if (ret) {
+ hio_warn("%s: unable to map write DMA buffer\n", dev->name);
+ goto out_dma_mapping;
+ }
+
+ msg = (struct ssd_ram_op_msg *)ssd_get_dmsg(dev);
+ +
+ msg->fun = SSD_FUNC_RAM_WRITE;
+ msg->ctrl_idx = ctrl_idx;
+ msg->start = (uint32_t)ofs_w;
+ msg->length = len;
+ msg->buf = buf_dma;
+ +
+ ret = ssd_do_request(dev, WRITE, msg, NULL);
+ ssd_put_dmsg(msg);
+ +
+ pcu_unmap_single(dev->pdev, buf_dma, length, PCI_DMA_TODEVICE);
+ +
+ out_dma_mapping:
+ return ret;
+ +
+
+ static int ssd_ram_read(struct ssd_device *dev, void *buf, size_t length, loff_t ofs, int ctrl_idx)
+ {
+ int left = length;
+ size_t len;
+ loff_t off = ofs;
+ int ret = 0;
+ +
+ if (ctrl_idx >= dev->hw_info.nr_ctrl || (uint64_t)(ofs + length) > dev->hw_info.ram_size || !length 
+ length & (dev->hw_info.ram_align - 1)) != 0 || ((uint64_t)ofs & (dev->hw_info.ram_align - 1)) != 0) {
return -EINVAL;
+
+while (left > 0) {
+len = dev->hw_info.ram_max_len;
+if (left < (int)dev->hw_info.ram_max_len) {
+len = left;
+
+ret = ssd_ram_read_4k(dev, buf, len, off, ctrl_idx);
+if (ret) {
+break;
+
+left -= len;
+off += len;
+buf += len;
+
+return ret;
+
+
+static int ssd_ram_write(struct ssd_device *dev, void *buf, size_t length, loff_t ofs, int ctrl_idx)
+{
+int left = length;
+size_t len;
+loff_t off = ofs;
+int ret = 0;
+
+if (ctrl_idx >= dev->hw_info.nr_ctrl || (uint64_t)(ofs + length) > dev->hw_info.ram_size || !length
+|| (length & (dev->hw_info.ram_align - 1)) != 0 || ((uint64_t)ofs & (dev->hw_info.ram_align - 1)) != 0) {
+return -EINVAL;
+
+while (left > 0) {
+len = dev->hw_info.ram_max_len;
+if (left < (int)dev->hw_info.ram_max_len) {
+len = left;
+
+ret = ssd_ram_write_4k(dev, buf, len, off, ctrl_idx);
+if (ret) {
+break;
+
+left -= len;
+off += len;
+buf += len;
+
static int ssd_check_flash(struct ssd_device *dev, int flash, int page, int ctrl_idx)
{
    int cur_ch = flash % dev->hw_info.max_ch;
    int cur_chip = flash /dev->hw_info.max_ch;
    if (ctrl_idx >= dev->hw_info.nr_ctrl) {
        return -EINVAL;
    }
    if (cur_ch >= dev->hw_info.nr_ch || cur_chip >= dev->hw_info.nr_chip) {
        return -EINVAL;
    }
    if (page >= (int)(dev->hw_info.block_count * dev->hw_info.page_count)) {
        return -EINVAL;
    }
    return 0;
}

static int ssd_nand_read_id(struct ssd_device *dev, void *id, int flash, int chip, int ctrl_idx)
{
    struct ssd_nand_op_msg *msg;
    dma_addr_t buf_dma;
    int ret = 0;
    if (unlikely(!id))
        return -EINVAL;
    buf_dma = pci_map_single(dev->pdev, id, SSD_NAND_ID_BUFF_SZ, PCI_DMA_FROMDEVICE);
    #if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
    ret = dma_mapping_error(buf_dma);
    #else
    ret = dma_mapping_error(&(dev->pdev->dev), buf_dma);
    #endif
    if (ret) {
        hio_warn("%s: unable to map read DMA buffer\n", dev->name);
        goto out_dma_mapping;
    }
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
        flash = ((uint32_t)flash << 1) | (uint32_t)chip;
        buf_dma = pci_map_single(dev->pdev, id, SSD_NAND_ID_BUFF_SZ, PCI_DMA_FROMDEVICE);
        #if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
        ret = dma_mapping_error(buf_dma);
        #else
        ret = dma_mapping_error(&(dev->pdev->dev), buf_dma);
        #endif
        if (ret) {
            hio_warn("%s: unable to map read DMA buffer\n", dev->name);
            goto out_dma_mapping;
        }
        if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
            flash = ((uint32_t)flash << 1) | (uint32_t)chip;
            return -EINVAL;
        }
        return 0;
    }
    return 0;
}

static int ssd_nand_read_id(struct ssd_device *dev, void *id, int flash, int chip, int ctrl_idx)
{
    struct ssd_nand_op_msg *msg;
    dma_addr_t buf_dma;
    int ret = 0;
    if (unlikely(!id))
        return -EINVAL;
    buf_dma = pci_map_single(dev->pdev, id, SSD_NAND_ID_BUFF_SZ, PCI_DMA_FROMDEVICE);
    #if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
    ret = dma_mapping_error(buf_dma);
    #else
    ret = dma_mapping_error(&(dev->pdev->dev), buf_dma);
    #endif
    if (ret) {
        hio_warn("%s: unable to map read DMA buffer\n", dev->name);
        goto out_dma_mapping;
    }
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
        flash = ((uint32_t)flash << 1) | (uint32_t)chip;
        return -EINVAL;
    }
    return 0;
}
chip = 0;
+
+msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+
+msg->fun = SSD_FUNC_NAND_READ_ID;
+msg->chip_no = flash;
+msg->chip_ce = chip;
+msg->ctrl_idx = ctrl_idx;
+msg->buf = buf_dma;
+
+ret = ssd_do_request(dev, READ, msg, NULL);
+ssd_put_dmsg(msg);
+
+pci_unmap_single(dev->pdev, buf_dma, SSD_NAND_ID_BUFF_SZ, PCI_DMA_FROMDEVICE);
+
+out_dma_mapping:
+return ret;
+
+}
+
+#if 0
+static int ssd_nand_read(struct ssd_device *dev, void *buf,
+int flash, int chip, int page, int page_count, int ctrl_idx)
+{
+struct ssd_nand_op_msg *msg;
+dma_addr_t buf_dma;
+int length;
+int ret = 0;
+
+if (!buf) {
+return -EINVAL;
+}
+
+if ((page + page_count) > dev->hw_info.block_count*dev->hw_info.page_count) {
+return -EINVAL;
+}
+
+ret = ssd_check_flash(dev, flash, page, ctrl_idx);
+
+if (ret) {
+return ret;
+}
+
+length = page_count * dev->hw_info.page_size;
+
+buf_dma = pci_map_single(dev->pdev, buf, length, PCI_DMA_FROMDEVICE);
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
+ret = dma_mapping_error(buf_dma);
+#else
+}
+ret = dma_mapping_error(&dev->pdev->dev, buf_dma);
+#endif
+if (ret) {
+hio_warn("%s: unable to map read DMA buffer\n", dev->name);
+goto out_dma_mapping;
+}
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
+flash = (flash << 1) | chip;
+chip = 0;
+}
+
+msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+
+msg->fun = SSD_FUNC_NAND_READ;
+msg->ctrl_idx = ctrl_idx;
+msg->chip_no = flash;
+msg->chip_ce = chip;
+msg->page_no = page;
+msg->page_count = page_count;
+msg->buf = buf_dma;
+
+ret = ssd_do_request(dev, READ, msg, NULL);
+ssd_put_dmsg(msg);
+
pici_unmap_single(dev->pdev, buf_dma, length, PCI_DMA_FROMDEVICE);
+
+out_dma_mapping:
+return ret;
+#endif
+
+static int ssd_nand_read_w_oob(struct ssd_device *dev, void *buf,
+int flash, int chip, int page, int count, int ctrl_idx)
+{
+struct ssd_nand_op_msg *msg;
+dma_addr_t buf_dma;
+int length;
+int ret = 0;
+
+if (!buf) {
+return -EINVAL;
+}
+
+if ((page + count) > (int)(dev->hw_info.block_count * dev->hw_info.page_count)) {
+return -EINVAL;
+}
+ret = ssd_check_flash(dev, flash, page, ctrl_idx);
+if (ret) {
+return ret;
+}
+
+length = count * (dev->hw_info.page_size + dev->hw_info.oob_size);
+
+buf_dma = pci_map_single(dev->pdev, buf, length, PCI_DMA_FROMDEVICE);
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
+ret = dma_mapping_error(buf_dma);
+#else
+ret = dma_mapping_error(&((dev->pdev->dev), buf_dma);
+#endif
+
+if (ret) {
+hidb_warn("%s: unable to map read DMA buffer\n", dev->name);
+goto out_dma_mapping;
+}
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
+flash = ((uint32_t)flash << 1) | (uint32_t)chip;
+chip = 0;
+}
+
+msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+
+msg->fun = SSD_FUNC_NAND_READ_WOOB;
+msg->ctrl_idx = ctrl_idx;
+msg->chip_no = flash;
+msg->chip_ce = chip;
+msg->page_no = page;
+msg->page_count = count;
+msg->buf = buf_dma;
+
+ret = ssd_do_request(dev, READ, msg, NULL);
+ssd_put_dmsg(msg);
+
+pci_unmap_single(dev->pdev, buf_dma, length, PCI_DMA_FROMDEVICE);
+
+out_dma_mapping:
+return ret;
+}
+
+/* write 1 page */
+static int ssd_nand_write(struct ssd_device *dev, void *buf,
+int flash, int chip, int page, int count, int ctrl_idx)
+{  
+struct ssd_nand_op_msg *msg;
+dma_addr_t buf_dma;
+int length;
+int ret = 0;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {  
+ret = -EINVAL;
+}
+
+if (!buf) {  
+ret = -EINVAL;
+}
+
+if (count != 1) {  
+ret = -EINVAL;
+}
+
+ret = ssd_check_flash(dev, flash, page, ctrl_idx);
+if (ret) {  
+ret = ret;
+}
+
+length = count * (dev->hw_info.page_size + dev->hw_info.oob_size);
+
+/* write data to ram */
+ret = ssd_ram_write(dev, buf, length, dev->hw_info.nand_wbuff_base, ctrl_idx);
+if (ret) {  
+ret = ret;
+}
+
+buf_dma = pci_map_single(dev->pdev, buf, length, PCI_DMA_TODEVICE);
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
+ret = dma_mapping_error(buf_dma);
+#else
+ret = dma_mapping_error(&dev->pdev->dev, buf_dma);
+#endif
+
+if (ret) {  
+hio_warn("%s: unable to map write DMA buffer\n", dev->name);
+goto out_dma_mapping;
+}
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {  
+flash = ((uint32_t)flash << 1) | (uint32_t)chip;
+chip = 0;
+}
+
+msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+
+msg->fun = SSD_FUNC_NAND_WRITE;
+msg->ctrl_idx = ctrl_idx;
+}
+msg->chip_no = flash;
+msg->chip_ce = chip;
+
+msg->page_no = page;
+msg->page_count = count;
+msg->buf = buf_dma;
+
+ret = ssd_do_request(dev, WRITE, msg, NULL);
+ssd_put_dmsg(msg);
+
+pci_unmap_single(dev->pdev, buf_dma, length, PCI_DMA_TODEVICE);
+
+out_dma_mapping:
+return ret;
+
+static int ssd_nand_erase(struct ssd_device *dev, int flash, int chip, int page, int ctrl_idx)
+{
+struct ssd_nand_op_msg *msg;
+int ret = 0;
+
+ret = ssd_check_flash(dev, flash, page, ctrl_idx);
+if (ret) {
+return ret;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
+flash = ((uint32_t)flash << 1) | (uint32_t)chip;
+chip = 0;
+
+msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+
+msg->fun = SSD_FUNC_NAND_ERASE;
+msg->ctrl_idx = ctrl_idx;
+msg->chip_no = flash;
+msg->chip_ce = chip;
+msg->page_no = page;
+
+ret = ssd_do_request(dev, WRITE, msg, NULL);
+ssd_put_dmsg(msg);
+
+return ret;
+
+static int ssd_update_bbt(struct ssd_device *dev, int flash, int ctrl_idx)
+{
+struct ssd_nand_op_msg *msg;
struct ssd_flush_msg *fmsg;
int ret = 0;

ret = ssd_check_flash(dev, flash, 0, ctrl_idx);
if (ret) {
    return ret;
}

msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);

if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
    fmsg = (struct ssd_flush_msg *)msg;
    fmsg->fun = SSD_FUNC_FLUSH;
    fmsg->flag = 0x1;
    fmsg->flash = flash;
    fmsg->ctrl_idx = ctrl_idx;
} else {
    msg->fun = SSD_FUNC_FLUSH;
    msg->flag = 0x1;
    msg->chip_no = flash;
    msg->ctrl_idx = ctrl_idx;
}

ret = ssd_do_request(dev, WRITE, msg, NULL);
ssd_put_dmsg(msg);
return ret;

/* flash controller init state */
static int __ssd_check_init_state(struct ssd_device *dev)
{
    uint32_t *init_state = NULL;
    int reg_base, reg_sz;
    int max_wait = SSD_INIT_MAX_WAIT;
    int init_wait = 0;
    int i, j, k;
    int ch_start = 0;

    for (i=0; i<dev->hw_info.nr_ctrl; i++) {
        ssd_reg32_write(dev->ctrlp + SSD_CTRL_TEST_REG0 + i * 8, test_data);
        read_data = ssd_reg32_read(dev->ctrlp + SSD_CTRL_TEST_REG0 + i * 8);
        if (read_data == ~test_data) {
            dev->hw_info.nr_ctrl++;
            dev->hw_info.nr_ctrl_map |= 1<<i;
        }
    }
read_data = ssd_reg32_read(dev->ctrlp + SSD_READY_REG);
+j=0;
+for (i=0; i<dev->hw_info.nr ctrl; i++) {
+if (((read_data>>i) & 0x1) == 0) {
+j++;
+}
+}
+
+if (dev->hw_info.nr ctrl != j) {
+printk(KERN_WARNING "%s: nr_ctrl mismatch: %d %d\n", dev->name, dev->hw_info.nr ctrl, j);
+return -1;
+}
+/*
+init_state = ssd_reg_read(dev->ctrlp + SSD_FLASH_INFO_REG0);
+for (j=1; j<dev->hw_info.nr ctrl;j++) {
+if (init_state != ssd_reg_read(dev->ctrlp + SSD_FLASH_INFO_REG0 + j*8)) {
+printk(KERN_WARNING "SSD_FLASH_INFO_REG[%d], not match\n", j);
+return -1;
+}
+}
+*/
+
+/*
+init_state = ssd_reg_read(dev->ctrlp + SSD_CHIP_INFO_REG0);
+for (j=1; j<dev->hw_info.nr ctrl; j++) {
+if (init_state != ssd_reg_read(dev->ctrlp + SSD_CHIP_INFO_REG0 + j*16)) {
+printk(KERN_WARNING "SSD_CHIP_INFO_REG Lo [%d], not match\n", j);
+return -1;
+}
+
+init_state = ssd_reg_read(dev->ctrlp + SSD_CHIP_INFO_REG0 + 8);
+for (j=1; j<dev->hw_info.nr ctrl; j++) {
+if (init_state != ssd_reg_read(dev->ctrlp + SSD_CHIP_INFO_REG0 + 8 + j*16)) {
+printk(KERN_WARNING "SSD_CHIP_INFO_REG Hi [%d], not match\n", j);
+return -1;
+}
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+max_wait = SSD_INIT_MAX_WAIT_V3_2;
+}
+reg_base = dev->protocol_info.init_state_reg;
+reg_sz = dev->protocol_info.init_state_reg_sz;
+
+init_state = (uint32_t *)kmalloc(reg_sz, GFP_KERNEL);
+if (!init_state) {
+return -ENOMEM;
+}
+
+for (i=0; i<dev->hw_info.nr_ctl; i++) {
+check_init:
+for (j=0, k=0; j<reg_sz; j+=sizeof(uint32_t), k++) {
+init_state[k] = ssd_reg32_read(dev->ctrlp + reg_base + j);
+} else {
+ch_start = 0;
+}
+
+for (j=0; j<dev->hw_info.nr_chip; j++) {
+for (k=ch_start; k<dev->hw_info.max_ch; k++) {
+if (test_bit((j*dev->hw_info.max_ch + k), (void *)init_state)) {
+continue;
+} else {
+ch_start = 0;
+}
+
+init_wait++;
+if (init_wait <= max_wait) {
+msleep(SSD_INIT_WAIT);
+goto check_init;
+} else {
+if (k < dev->hw_info.nr_ch) {
+hio_warn("%s: controller %d chip %d ch %d init failed\n",
+dev->name, i, j, k);
+} else {
+hio_warn("%s: controller %d chip %d init failed\n",
+dev->name, i, j);
+}
+
+kfree(init_state);
+return -1;
+}
+
+reg_base += reg_sz;
+}
//printk(KERN_WARNING "%s: init wait %d\n", dev->name, init_wait);
+kfree(init_state);
+return 0;
+
+static int ssd_check_init_state(struct ssd_device *dev)
+{
+    if (mode != SSD_DRV_MODE_STANDARD) {
+        return 0;
+    }
+    return __ssd_check_init_state(dev);
+}
+
+static void ssd_resetResp_ptr(struct ssd_device *dev);
+
+/* reset flash controller etc */
+static int __ssd_reset(struct ssd_device *dev, int type)
+{
+    struct timeval tv;
+    if (type < SSD_RST_NOINIT || type > SSD_RST_FULL) {
+        return -EINVAL;
+    }
+    mutex_lock(&dev->fw_mutex);
+    if (type == SSD_RST_NOINIT) {
+        ssd_reg32_write(dev->ctrlp + SSD_RESET_REG, SSD_RESET_NOINIT);
+    } else if (type == SSD_RST_NORMAL) {
+        ssd_reg32_write(dev->ctrlp + SSD_RESET_REG, SSD_RESET);
+    } else {
+        if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+            mutex_unlock(&dev->fw_mutex);
+            return -EINVAL;
+        }
+        ssd_reg32_write(dev->ctrlp + SSD_FULL_RESET_REG, SSD_RESET_FULL);
+        /* ?? */
+        ssd_resetResp_ptr(dev);
+    }
+    +ssd_reg32_write(dev->ctrlp + SSD_FULL_RESET_REG, SSD_RESET_FULL);
+    +#ifdef SSD_OT_PROTECT
+    +dev->ot_delay = 0;
+    +#endif
+    +msleep(1000);
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+/*@ xx */
+ssd_set_flush_timeout(dev, dev->wmode);
+
+mutex_unlock(&dev->fw_mutex);
+ssd_gen_swlog(dev, SSD_LOG_RESET, (uint32_t)type);
+do_gettimeofday(&tv);
+dev->reset_time = tv.tv_sec;
+
+return __ssd_check_init_state(dev);
+}
+
+static int ssd_save_md(struct ssd_device *dev)
+{
+struct ssd_nand_op_msg *msg;
+int ret = 0;
+
+if (unlikely(mode != SSD_DRV_MODE_STANDARD))
+return 0;
+
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+return 0;
+}
+
+if (!dev->save_md) {
+return 0;
+}
+
+msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+
+msg->fun = SSD_FUNC_FLUSH;
+msg->flag = 0x2;
+msg->ctrl_idx = 0;
+msg->chip_no = 0;
+
+ret = ssd_do_request(dev, WRITE, msg, NULL);
+ssd_put_dmsg(msg);
+
+return ret;
+}
+
+static int ssd_barrier_save_md(struct ssd_device *dev)
+{
+struct ssd_nand_op_msg *msg;
+int ret = 0;
+
+if (unlikely(mode != SSD_DRV_MODE_STANDARD))
+return 0;
+ if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+ return 0;
+ }
+
+ if (!dev->save_md) {
+ return 0;
+ }
+
+ msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+ 
+ msg->fun = SSD_FUNC_FLUSH;
+ msg->flag = 0x2;
+ msg->ctrl_idx = 0;
+ msg->chip_no = 0;
+ 
+ ret = ssd_do_barrier_request(dev, WRITE, msg, NULL);
+ 
+ ret = ssd_do_request(dev, WRITE, msg, NULL);
+ 
+ return ret;
+
+ static int ssd_flush(struct ssd_device *dev) {
+ 
+ struct ssd_nand_op_msg *msg;
+ struct ssd_flush_msg *fmsg;
+ int ret = 0;
+
+ if (unlikely(mode != SSD_DRV_MODE_STANDARD))
+ return 0;
+
+ msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
+ 
+ if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
+ fmsg = (struct ssd_flush_msg *)msg;
+ }
+
+ msg->fun = SSD_FUNC_FLUSH;
+ 
+ fmsg->flag = 0;
+ fmsg->ctrl_idx = 0;
+ fmsg->flash = 0;
+ } else {
+ msg->fun = SSD_FUNC_FLUSH;
+ 
+ msg->flag = 0;
+ msg->ctrl_idx = 0;
+ msg->chip_no = 0;
+ }
+
+ ret = ssd_do_request(dev, WRITE, msg, NULL);
static int ssd_barrier_flush(struct ssd_device *dev)
{
    struct ssd_nand_op_msg *msg;
    struct ssd_flush_msg *fmsg;
    int ret = 0;

    if (unlikely(mode != SSD_DRV_MODE_STANDARD))
        return 0;

    msg = (struct ssd_nand_op_msg *)ssd_get_dmsg(dev);
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
        fmsg = (struct ssd_flush_msg *)msg;
        fmsg->fun = SSD_FUNC_FLUSH;
        fmsg->flag = 0;
        fmsg->ctrl_idx = 0;
        fmsg->flash = 0;
    } else {
        msg->fun = SSD_FUNC_FLUSH;
        msg->flag = 0;
        msg->ctrl_idx = 0;
        msg->chip_no = 0;
    }

    ret = ssd_do_barrier_request(dev, WRITE, msg, NULL);
    ssd_put_dmsg(msg);
    return ret;
}

#define SSD_WMODE_BUFFER_TIMEOUT	0x00c82710
#define SSD_WMODE_BUFFER_EX_TIMEOUT	0x000500c8
#define SSD_WMODE_FUA_TIMEOUT		0x000503E8

static void ssd_set_flush_timeout(struct ssd_device *dev, int m)
{
    uint32_t to;
    uint32_t val = 0;

    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_1) {
        return;
    }

    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_1) {
        return;
    }

    +uint32_t to;
    +uint32_t val = 0;
    +
    +if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_1) {
        +return;
    +}
switch(m) {
+case SSD_WMODE_BUFFER:
+to = SSD_WMODE_BUFFER_TIMEOUT;
+break;
+case SSD_WMODE_BUFFER_EX:
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2_1) {
+to = SSD_WMODE_BUFFER_EX_TIMEOUT;
+} else {
+to = SSD_WMODE_BUFFER_TIMEOUT;
+}
+break;
+case SSD_WMODE_FUA:
+to = SSD_WMODE_FUA_TIMEOUT;
+break;
+default:
+return;
+
+val = (((uint32_t)((uint32_t)m & 0x3) << 28) | to);
+
+ssd_reg32_write(dev->ctrlp + SSD_FLUSH_TIMEOUT_REG, val);
+
+static int ssd_do_switch_wmode(struct ssd_device *dev, int m) {
+int ret = 0;
+
+ret = ssd_barrier_start(dev);
+if (ret) {
+goto out;
+}
+
+ret = ssd_barrier_flush(dev);
+if (ret) {
+goto out_barrier_end;
+}
+
+ /* set controller flush timeout */
+ssd_set_flush_timeout(dev, m);
+
+dev->wmode = m;
+mb();
+
+out_barrier_end:
+ssd_barrier_end(dev);
+out:
+return ret;
+}
static int ssd_switch_wmode(struct ssd_device *dev, int m)
{
    int default_wmode;
    int next_wmode;
    int ret = 0;
    
    if (!test_bit(SSD_ONLINE, &dev->state)) {
        return -ENODEV;
    }
    
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        default_wmode = SSD_WMODE_BUFFER;
    } else {
        default_wmode = SSD_WMODE_BUFFER_EX;
    }
    
    if (SSD_WMODE_AUTO == m) {
        /* battery fault ? */
        if (test_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
            next_wmode = SSD_WMODE_FUA;
        } else {
            next_wmode = default_wmode;
        }
    } else if (SSD_WMODE_DEFAULT == m) {
        next_wmode = default_wmode;
    } else {
        next_wmode = m;
    }
    
    if (next_wmode != dev->wmode) {
        hio_warn("%s: switch write mode (%d -> %d)\n", dev->name, dev->wmode, next_wmode);
        ret = ssd_do_switch_wmode(dev, next_wmode);
        if (ret) {
            hio_err("%s: can not switch write mode (%d -> %d)\n", dev->name, dev->wmode, next_wmode);
        }
    }
    
    return ret;
}

static int ssd_init_wmode(struct ssd_device *dev)
{
    int default_wmode;
    int ret = 0;
    
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        default_wmode = SSD_WMODE_BUFFER;
    }
    
    if (next_wmode != dev->wmode) {
        hio_warn("%s: switch write mode (%d -> %d)\n", dev->name, dev->wmode, next_wmode);
        ret = ssd_do_switch_wmode(dev, next_wmode);
        if (ret) {
            hio_err("%s: can not switch write mode (%d -> %d)\n", dev->name, dev->wmode, next_wmode);
        }
    }
    
    return ret;
}

static int ssd_init_wmode(struct ssd_device *dev)
else {
default_wmode = SSD_WMODE_BUFFER_EX;
}

/* dummy mode */
if (SSD_WMODE_AUTO == dev->user_wmode) {
/* battery fault ? */
if (test_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
dev->wmode = SSD_WMODE_FUA;
} else {
dev->wmode = default_wmode;
}
} else if (SSD_WMODE_DEFAULT == dev->user_wmode) {
dev->wmode = default_wmode;
} else {
dev->wmode = dev->user_wmode;
}
ssd_set_flush_timeout(dev, dev->wmode);
return ret;
}

static int __ssd_set_wmode(struct ssd_device *dev, int m) {
int ret = 0;

/* not support old fw*/
if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_1) {
ret = -EOPNOTSUPP;
goto out;
}

if (m < SSD_WMODE_BUFFER || m > SSD_WMODE_DEFAULT) {
ret = -EINVAL;
goto out;
}

ssd_gen_swlog(dev, SSD_LOG_SET_WMODE, m);

dev->user_wmode = m;

ret = ssd_switch_wmode(dev, dev->user_wmode);
if (ret) {
goto out;
}

out:
return ret;
```c
int ssd_set_wmode(struct block_device *bdev, int m)
{
    struct ssd_device *dev;

    if (!bdev || !(bdev->bd_disk)) {
        return -EINVAL;
    }
    dev = bdev->bd_disk->private_data;
    return __ssd_set_wmode(dev, m);
}

static int ssd_do_reset(struct ssd_device *dev)
{
    int ret = 0;
    if (test_and_set_bit(SSD_RESETING, &dev->state)) {
        return 0;
    }
    ssd_stop_workq(dev);
    ret = ssd_barrier_start(dev);
    if (ret) {
        goto out;
    }
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        /* old reset */
        ret = __ssd_reset(dev, SSD_RST_NORMAL);
    } else {
        /* full reset */
        //ret = __ssd_reset(dev, SSD_RST_FULL);
        ret = __ssd_reset(dev, SSD_RST_NORMAL);
    }
    if (ret) {
        goto out_barrier_end;
    }
    out_barrier_end:
    ssd_barrier_end(dev);
    ssd_start_workq(dev);
    test_and_clear_bit(SSD_RESETING, &dev->state);
    return ret;
}
```
static int ssd_full_reset(struct ssd_device *dev) {
    int ret = 0;
    if (test_and_set_bit(SSD_RESETING, &dev->state)) {
        return 0;
    }
    ssd_stop_workq(dev);
    ret = ssd_barrier_start(dev);
    if (ret) {
        goto out;
    }
    ret = ssd_barrier_flush(dev);
    if (ret) {
        goto out_barrier_end;
    }
    ret = ssd_barrier_save_md(dev);
    if (ret) {
        goto out_barrier_end;
    }
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        /* old reset */
        ret = __ssd_reset(dev, SSD_RST_NORMAL);
    } else {
        /* full reset */
        //ret = __ssd_reset(dev, SSD_RST_FULL);
        ret = __ssd_reset(dev, SSD_RST_NORMAL);
    }
    if (ret) {
        goto out_barrier_end;
    }

out_barrier_end:
    ssd_barrier_end(dev);
out:
    ssd_start_workq(dev);
    test_and_clear_bit(SSD_RESETING, &dev->state);
    return ret;
}

int ssd_reset(struct block_device *bdev)
+{
+int ret;
+struct ssd_device *dev;
+
+if (!bdev || !(bdev->bd_disk)) { 
+return -EINVAL;
+} 
+
+dev = bdev->bd_disk->private_data;
+
+ret = ssd_full_reset(dev);
+if (!ret) {
+if (!dev->has_non_0x98_reg_access) {
+ssd_reg32_write(dev->ctrlp + SSD_RELOAD_FW_REG, 0);
+}
+}
+
+return ret;
+}
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+static int ssd_issue_flush_fn(struct request_queue *q, struct gendisk *disk,
+sector_t *error_sector) {
+{
+struct ssd_device *dev = q->queuedata;
+
+return ssd_flush(dev);
+}
+#endif
+
+void ssd_submit_pbio(struct request_queue *q, struct bio *bio) {
+{
+struct ssd_device *dev = q->queuedata;
+
+#ifdef SSD_QUEUE_PBIO
+int ret = -EBUSY;
+#endif
+
+if (!test_bit(SSD_ONLINE, &dev->state)) {
+ssd_bio_endio(bio, -ENODEV);
+goto out;
+}
+
+#ifdef SSD_DEBUG_ERR
+if (!test_bit(SSD_ONLINE, &dev->state)) {
+ssd_bio_endio(bio, -ENODEV);
+goto out;
+}
+}
+\#endif
+
+if (unlikely(ssd_bio_has_barrier_or_fua(bio))) {
+ssd_bio_endio(bio, -EOPNOTSUPP);
+goto out;
+}
+
+if (unlikely(dev->readonly && bio_data_dir(bio) == WRITE)) {
+ssd_bio_endio(bio, -EROFS);
+goto out;
+}
+
+\#ifdef SSD_QUEUE_PBI0
+if (0 == atomic_read(&dev->in_sendq)) {
+ret = __ssd_submit_pbio(dev, bio, 0);
+}
+
+if (ret) {
+(void)test_and_set_bit(BIO_SSD_PBI0, &bio->bi_flags);
+ssd_queue_bio(dev, bio);
+}
+%else
+__ssd_submit_pbio(dev, bio, 1);
+%endif
+
+out:
+return;
+}
+
+\#if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,4,0))
+static blk_qc_t ssd_make_request(struct request_queue *q, struct bio *bio)
+\#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(3,2,0))
+static void ssd_make_request(struct request_queue *q, struct bio *bio)
+\#else
+static int ssd_make_request(struct request_queue *q, struct bio *bio)
+\#endif
+
+if (!test_bit(SSD_ONLINE, &dev->state)) {
+ssd_bio_endio(bio, -ENODEV);
+goto out;
+}
+
+\#if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,13,0))
+blk_queue_split(q, &bio);
+\#elif (LINUX_VERSION_CODE >= KERNEL_VERSION(4,3,0))
+\#else
+blk_queue_split(q, &bio);
+\#endif
+
blk_queue_split(q, &bio, q->bio_split);
#ifdef SSD_DEBUG_ERR
+if (atomic_read(&dev->tocnt)) {
+bio_warn("%s: IO rejected because of IO timeout!\n", dev->name);
+ssd_bio_endio(bio, -EIO);
+goto out;
+}
#endif

#ifdef SSD_DEBUG_ERR
+if (unlikely(ssd_bio_has_barrier_or_fua(bio))) {
+ssd_bio_endio(bio, -EOPNOTSUPP);
+goto out;
+}
+
+/* writeback_cache_control.txt: REQ_FLUSH requests without data can be completed successfully without doing any work */
+if (unlikely(ssd_bio_has_flush(bio) && !bio_sectors(bio))) {
+ssd_bio_endio(bio, 0);
+goto out;
+}
+
+if (0 == atomic_read(&dev->in_sendq)) {
+ret = ssd_submit_bio(dev, bio, 0);
+}
+
+if (ret) {
+ssd_queue_bio(dev, bio);
+}
+
+out:
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,4,0))
+return BLK_QC_T_NONE;
+elif (LINUX_VERSION_CODE >= KERNEL_VERSION(3,2,0))
+return;
+else
+return 0;
+endif
+
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,16))
+static int ssd_block_getgeo(struct block_device *bdev, struct hd_geometry *geo)
+{
+struct ssd_device *dev;
+
+if (!bdev) {
+return -EINVAL;
+}
+
+/* getgeo */
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,4,0))
+do_getgeo(bdev, &geo);
+else
+return -ENODEV;
+endif
+}
+return geo;
+
+return;
+endif
+
+if (!bdev) {
+return -EINVAL;
+}
+
+/* getgeo */
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,4,0))
+do_getgeo(bdev, &geo);
+else
+return -ENODEV;
+endif
+return geo;
+}
dev = bdev->bd_disk->private_data;
if (!dev) {
    return -EINVAL;
}
geo->heads = 4;
geo->sectors = 16;
geo->cylinders = (dev->hw_info.size & ~0x3f) >> 6;
return 0;
}
#endif

static int ssd_init_queue(struct ssd_device *dev);
static void ssd_cleanup_queue(struct ssd_device *dev);
static void ssd_cleanup_blkdev(struct ssd_device *dev);
static int ssd_init_blkdev(struct ssd_device *dev);
static int ssd_ioctl_common(struct ssd_device *dev, unsigned int cmd, unsigned long arg)
{  
  void __user *argp = (void __user *)arg;
  void __user *buf = NULL;
  void *kbuf = NULL;
  int ret = 0;
  
  switch (cmd) {
    case SSD_CMD_GET_PROTOCOL_INFO:
      if (copy_to_user(argp, &dev->protocol_info, sizeof(struct ssd_protocol_info))) {
        hio_warn("%s: copy_to_user: failed\n", dev->name);
        ret = -EFAULT;
        break;
      }
      break;
    case SSD_CMD_GET_HW_INFO:
      if (copy_to_user(argp, &dev->hw_info, sizeof(struct ssd_hw_info))) {
        hio_warn("%s: copy_to_user: failed\n", dev->name);
        ret = -EFAULT;
        break;
      }
      break;
    case SSD_CMD_GET_ROM_INFO:
      if (copy_to_user(argp, &dev->rom_info, sizeof(struct ssd_rom_info))) {
        hio_warn("%s: copy_to_user: failed\n", dev->name);
        ret = -EFAULT;
        break;
      }
      break;
  }
}
break;
+
case SSD_CMD_GET_SMART:
+struct ssd_smart smart;
+int i;
+
+memcpy(&smart, &dev->smart, sizeof(struct ssd_smart));
+
+mutex_lock(&dev->gd_mutex);
+ssd_update_smart(dev, &smart);
+mutex_unlock(&dev->gd_mutex);
+
+/* combine the volatile log info */
+if (dev->log_info.nr_log) {
+for (i=0; i<SSD_LOG_NR_LEVEL; i++) {
+smart.log_info.stat[i] += dev->log_info.stat[i];
+}
+}
+
+if (copy_to_user(argp, &smart, sizeof(struct ssd_smart))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+break;
+
+case SSD_CMD_GET_IDX:
+
+if (copy_to_user(argp, &dev->idx, sizeof(int))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+break;
+
+case SSD_CMD_GET_AMOUNT:
+
+int nr_ssd = atomic_read(&ssd_nr);
+
+if (copy_to_user(argp, &nr_ssd, sizeof(int))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+break;
+
+case SSD_CMD_GET_TO_INFO:
+
+int tocnt = atomic_read(&dev->tocnt);
+  +if (copy_to_user(argp, &tocnt, sizeof(int))) {
+  hio_warn("%s: copy_to_user: failed\n", dev->name);
+  ret = -EFAULT;
+  +break;
+  +break;
+  +}
+  +break;
+  +}
+  +case SSD_CMD_GET_DRV_VER: {
+    char ver[] = DRIVER_VERSION;
+    int len = sizeof(ver);
+    +
+    +if (len > (DRIVER_VERSION_LEN - 1)) {
+      len = (DRIVER_VERSION_LEN - 1);
+    +}
+    +if (copy_to_user(argp, ver, len)) {
+      hio_warn("%s: copy_to_user: failed\n", dev->name);
+      ret = -EFAULT;
+      +break;
+      +}
+      +break;
+      +}
+      +break;
+      +
+      +case SSD_CMD_GET_BBACC_INFO: {
+        struct ssd_acc_info acc;
+        +
+        +mutex_lock(&dev->fw_mutex);
+        +ret = ssd_bb_acc(dev, &acc);
+        +mutex_unlock(&dev-&gt;fw_mutex);
+        +if (ret) {
+          +break;
+          +}
+          +
+          +if (copy_to_user(argp, &acc, sizeof(struct ssd_acc_info))) {
+            hio_warn("%s: copy_to_user: failed\n", dev-&gt;name);
+            ret = -EFAULT;
+            +break;
+            +}
+            +break;
+            +}
+            +break;
+            +}
+            +case SSD_CMD_GET_ECACC_INFO: {
+              struct ssd_acc_info acc;
+              +
+              +mutex_lock(&dev-&gt;fw_mutex);
+              +ret = ssd_ec_acc(dev, &acc);
+              +mutex_unlock(&dev-&gt;fw_mutex);
if (ret) {
	break;
}
+
+if (copy_to_user(argp, &acc, sizeof(struct ssd_acc_info))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+break;
+
+case SSD_CMD_GET_HW_INFO_EXT:
+if (copy_to_user(argp, &dev->hw_info_ext, sizeof(struct ssd_hw_info_extend))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+break;
+
+case SSD_CMD_REG_READ: {
+struct ssd_reg_op_info reg_info;
+
+if (copy_from_user(&reg_info, argp, sizeof(struct ssd_reg_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+if (reg_info.offset > dev->mmio_len-sizeof(uint32_t)) {
+ret = -EINVAL;
+break;
+}
+
+reg_info.value = ssd_reg32_read(dev->ctrlp + reg_info.offset);
+if (copy_to_user(argp, &reg_info, sizeof(struct ssd_reg_op_info))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+break;
+
+case SSD_CMD_REG_WRITE: {
+struct ssd_reg_op_info reg_info;
+
+if (copy_from_user(&reg_info, argp, sizeof(struct ssd_reg_op_info))) {

if (reg_info.offset > dev->mmio_len-sizeof(uint32_t)) {
    ret = -EINVAL;
    break;
}
+
if (reg_info.offset > dev->mmio_len-sizeof(uint32_t)) {
    ret = -EFAULT;
    break;
}
+
ssd_reg32_write(dev->ctrlp + reg_info.offset, reg_info.value);
+
break;
+
+case SSD_CMD_SPI_READ: {
    struct ssd_spi_op_info spi_info;
+
    if (copy_from_user(&spi_info, argp, sizeof(struct ssd_spi_op_info))) {
        hio_warn("%s: copy_from_user: failed
", dev->name);
        ret = -EFAULT;
        break;
    }
+
    off = spi_info.off;
    size = spi_info.len;
    buf = spi_info.buf;
    +
    if (size > dev->rom_info.size || 0 == size || (off + size) > dev->rom_info.size) {
        ret = -EINVAL;
        break;
    }
    +
    kbuf = kmalloc(size, GFP_KERNEL);
    if (!kbuf) {
        ret = -ENOMEM;
        break;
    }
    +
    ret = ssd_spi_page_read(dev, kbuf, off, size);
    if (ret) {
        kfree(kbuf);
        break;
    }
    +
    if (copy_to_user(buf, kbuf, size)) {
        hio_warn("%s: copy_to_user: failed
", dev->name);
```c
+kfree(kbuf);
+ret = -EFAULT;
+break;
+
+kfree(kbuf);
+
+break;
+}
+
+case SSD_CMD_SPI_WRITE: {
+struct ssd_spi_op_info spi_info;
+uint32_t off, size;
+
+if (copy_from_user(&spi_info, argp, sizeof(struct ssd_spi_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
op = spi_info.off;
+size = spi_info.len;
+buf = spi_info.buf;
+
+if (size > dev->rom_info.size || 0 == size || (off + size) > dev->rom_info.size) {
+ret = -EINVAL;
+break;
+}
+
+kbuf = kmalloc(size, GFP_KERNEL);
+if (!kbuf) {
+ret = -ENOMEM;
+break;
+}
+
+if (copy_from_user(kbuf, buf, size)) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+kfree(kbuf);
+ret = -EFAULT;
+break;
+}
+
+ret = ssd_spi_page_write(dev, kbuf, off, size);
+if (ret) {
+kfree(kbuf);
+break;
+}
```
+kfree(kbuf);
+
++break;
+
+}
+
+case SSD_CMD_SPI_ERASE: {
+    struct ssd_spi_op_info spi_info;
+    uint32_t off;
+
+    if (copy_from_user(&spi_info, argp, sizeof(struct ssd_spi_op_info))) {
+        hio_warn("%s: copy_from_user: failed\n", dev->name);
+        ret = -EFAULT;
+        break;
+    }
+
+    off = spi_info.off;
+
+    if ((off + dev->rom_info.block_size) > dev->rom_info.size) {
+        ret = -EINVAL;
+        break;
+    }
+
+    ret = ssd_spi_block_erase(dev, off);
+    if (ret) {
+        break;
+    }
+
+    break;
+
+}
+
+case SSD_CMD_I2C_READ: {
+    struct ssd_i2c_op_info i2c_info;
+    uint8_t saddr;
+    uint8_t rsize;
+
+    if (copy_from_user(&i2c_info, argp, sizeof(struct ssd_i2c_op_info))) {
+        hio_warn("%s: copy_from_user: failed\n", dev->name);
+        ret = -EFAULT;
+        break;
+    }
+
+    saddr = i2c_info.saddr;
+    rsize = i2c_info.rsize;
+    buf = i2c_info.rbuf;
+
+    if (rsize <= 0 || rsize > SSD_I2C_MAX_DATA) {
+        ret = -EINVAL;
+        break;
+    }
+
+}
+}
+
+kbuf = kmalloc(rsize, GFP_KERNEL);
+if (!kbuf) {
+ret = -ENOMEM;
+break;
+}
+
+ret = ssd_i2c_read(dev, saddr, rsize, kbuf);
+if (ret) {
+kfree(kbuf);
+break;
+}
+
+if (copy_to_user(buf, kbuf, rsize)) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+kfree(kbuf);
+ret = -EFAULT;
+break;
+}
+
+kfree(kbuf);
+
+break;
+
+case SSD_CMD_I2C_WRITE: {
+struct ssd_i2c_op_info i2c_info;
+uint8_t saddr;
+uint8_t wsize;
+
+if (copy_from_user(&i2c_info, argp, sizeof(struct ssd_i2c_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+saddr = i2c_info.saddr;
+wsize = i2c_info.wsize;
+buf = i2c_info.wbuf;
+
+if (wsize <= 0 || wsize > SSD_I2C_MAX_DATA) {
+ret = -EINVAL;
+break;
+}
+
+kbuf = kmalloc(wsize, GFP_KERNEL);
+if (!kbuf) {
+ret = -ENOMEM;
+break;
+
+if (copy_from_user(kbuf, buf, wsize)) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+kfree(kbuf);
+ret = -EFAULT;
+break;
+
+ret = ssd_i2c_write(dev, saddr, wsize, kbuf);
+if (ret) {
+kfree(kbuf);
+break;
+
+kfree(kbuf);
+
+break;
+
+case SSD_CMD_I2C_WRITE_READ: {
+struct ssd_i2c_op_info i2c_info;
+uint8_t saddr;
+uint8_t wsize;
+uint8_t rsize;
+uint8_t size;
+
+if (copy_from_user(&i2c_info, argp, sizeof(struct ssd_i2c_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
+saddr = i2c_info.saddr;
+wsize = i2c_info.wsize;
+rsize = i2c_info.rsize;
+buf = i2c_info.wbuf;
+
+if (wsize <= 0 || wsize > SSD_I2C_MAX_DATA) {
+ret = -EINVAL;
+break;
+
+if (rsize <= 0 || rsize > SSD_I2C_MAX_DATA) {
+ret = -EINVAL;
+break;
size = wsize + rsize;
+kbuf = kmalloc(size, GFP_KERNEL);
+if (!kbuf) {
+    ret = -ENOMEM;
+    break;
+}
+
+if (copy_from_user((kbuf + rsize), buf, wsize)) {
+    hio_warn("%s: copy_from_user: failed\n", dev->name);
+    kfree(kbuf);
+    ret = -EFAULT;
+    break;
+}
+
+buf = i2c_info.rbuf;
+
+ret = ssd_i2c_write_read(dev, saddr, wsize, (kbuf + rsize), rsize, kbuf);
+if (ret) {
+    kfree(kbuf);
+    break;
+}
+
+if (copy_to_user(buf, kbuf, rsize)) {
+    hio_warn("%s: copy_to_user: failed\n", dev->name);
+    kfree(kbuf);
+    ret = -EFAULT;
+    break;
+}
+
+kfree(kbuf);
+
+break;
+
+case SSD_CMD_SMBUS_SEND_BYTE: {
+    struct ssd_smbus_op_info smbus_info;
+    uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
+    uint8_t saddr;
+    uint8_t size;
+    if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
+        hio_warn("%s: copy_from_user: failed\n", dev->name);
+        kfree(kbuf);
+        ret = -EFAULT;
+        break;
+    }
+    +
+    kfree(kbuf);
+    +
+    break;
+}
+    +
+    case SSD_CMD_SMBUS_SEND_BYTE: {
+        struct ssd_smbus_op_info smbus_info;
+        uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
+        uint8_t saddr;
+        uint8_t size;
+        if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
+            hio_warn("%s: copy_from_user: failed\n", dev->name);
+            ret = -EFAULT;
+            break;
+        }
+        +
+    }
+ saddr = smbus_info.saddr;
+ buf = smbus_info.buf;
+ size = 1;
+
+ if (copy_from_user(smb_data, buf, size)) {
+ hio_warn("%s: copy_from_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
+
+ ret = ssd_smbus_send_byte(dev, saddr, smb_data);
+ if (ret) {
+ break;
+ }
+
+ break;
+ }
+
+ case SSD_CMD_SMBUS_RECEIVE_BYTE: {
+ struct ssd_smbus_op_info smbus_info;
+ uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
+ uint8_t saddr;
+ uint8_t size;
+
+ if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
+ hio_warn("%s: copy_from_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
+
+ saddr = smbus_info.saddr;
+ buf = smbus_info.buf;
+ size = 1;
+
+ ret = ssd_smbus_receive_byte(dev, saddr, smb_data);
+ if (ret) {
+ break;
+ }
+
+ if (copy_to_user(buf, smb_data, size)) {
+ hio_warn("%s: copy_to_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
+
+ break;
+ }
+case SSD_CMD_SMBUS_WRITE_BYTE: {
+  struct ssd_smbus_op_info smbus_info;
+  uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
+  uint8_t saddr;
+  uint8_t command;
+  uint8_t size;
+
+  if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
+    hio_warn("%s: copy_from_user: failed\n", dev->name);
+    ret = -EFAULT;
+    break;
+  }
+
+  saddr = smbus_info.saddr;
+  command = smbus_info.cmd;
+  buf = smbus_info.buf;
+  size = 1;
+
+  if (copy_from_user(smb_data, buf, size)) {
+    hio_warn("%s: copy_from_user: failed\n", dev->name);
+    ret = -EFAULT;
+    break;
+  }
+
+  ret = ssd_smbus_write_byte(dev, saddr, command, smb_data);
+  if (ret) {
+    break;
+  }
+
+  case SSD_CMD_SMBUS_READ_BYTE: {
+  struct ssd_smbus_op_info smbus_info;
+  uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
+  uint8_t saddr;
+  uint8_t command;
+  uint8_t size;
+
+  if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
+    hio_warn("%s: copy_from_user: failed\n", dev->name);
+    ret = -EFAULT;
+    break;
+  }
+
+  saddr = smbus_info.saddr;
+  command = smbus_info.cmd;

buf = smbus_info.buf;
+size = 1;
+
+ret = ssd_smbus_read_byte(dev, saddr, command, smb_data);
+if (ret) {
+break;
+}
+
+if (copy_to_user(buf, smb_data, size)) {
+pio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+break;
+
+case SSD_CMD_SMBUS_WRITE_WORD: {
+struct ssd_smbus_op_info smbus_info;
+uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
+uint8_t saddr;
+uint8_t command;
+uint8_t size;
+
+if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
+pio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+saddr = smbus_info.saddr;
+command = smbus_info.cmd;
+buf = smbus_info.buf;
+size = 2;
+
+if (copy_from_user(smb_data, buf, size)) {
+pio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+ret = ssd_smbus_write_word(dev, saddr, command, smb_data);
+if (ret) {
+break;
+}
+
+break;
+}
case SSD_CMD_SMBUS_READ_WORD: {
  struct ssd_smbus_op_info smbus_info;
  uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
  uint8_t saddr;
  uint8_t command;
  uint8_t size;

  if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
    hio_warn("%s: copy_from_user: failed\n", dev->name);
    ret = -EFAULT;
    break;
  }

  saddr = smbus_info.saddr;
  command = smbus_info.cmd;
  buf = smbus_info.buf;
  size = 2;

  ret = ssd_smbus_read_word(dev, saddr, command, smb_data);
  if (ret) {
    break;
  }

  if (copy_to_user(buf, smb_data, size)) {
    hio_warn("%s: copy_to_user: failed\n", dev->name);
    ret = -EFAULT;
    break;
  }

  break;
}

case SSD_CMD_SMBUS_WRITE_BLOCK: {
  struct ssd_smbus_op_info smbus_info;
  uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
  uint8_t saddr;
  uint8_t command;
  uint8_t size;

  if (copy_from_user(&smbus_info, argp, sizeof(struct ssd_smbus_op_info))) {
    hio_warn("%s: copy_from_user: failed\n", dev->name);
    ret = -EFAULT;
    break;
  }

  saddr = smbus_info.saddr;
  command = smbus_info.cmd;
buf = smbus_info.buf;
size = smbus_info.size;
+
if (size > SSD_SMBUS_BLOCK_MAX) {
ret = -EINVAL;
break;
}
+
if (copy_from_user(smb_data, buf, size)) {
hi0_warn("%s: copy_from_user: failed\n", dev->name);
ret = -EFAULT;
break;
}
+
ret = ssd_smbus_write_block(dev, saddr, command, size, smb_data);
if (ret) {
break;
}
+
break;
+
+
switch (SMBUS(optarg)) {
+
case SSD_CMD_SMBUS_READ_BLOCK: { 
struct ssd_smbus_op_info smbus_info;
uint8_t smb_data[SSD_SMBUS_BLOCK_MAX];
saddr = smbus_info.saddr;
command = smbus_info.cmd;
buf = smbus_info.buf;
size = smbus_info.size;
+
if (size > SSD_SMBUS_BLOCK_MAX) {
ret = -EINVAL;
break;
}
+
ret = ssd_smbus_read_block(dev, saddr, command, size, smb_data);
if (ret) {
break;
}
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
+
break;
if (copy_to_user(buf, smb_data, size)) {
    hio_warn("%s: copy_to_user: failed\n", dev->name);
    ret = -EFAULT;
    break;
}
+
if (copy_to_user(argp, &ver, sizeof(uint16_t))) {
    hio_warn("%s: copy_to_user: failed\n", dev->name);
    ret = -EFAULT;
    break;
}
+
+if (copy_to_user(argp, &nr_cap, sizeof(int))) {
    hio_warn("%s: copy_to_user: failed\n", dev->name);
    ret = -EFAULT;
    break;
}
+
+case SSD_CMD_BM_GET_VER: {
    uint16_t ver;
    +
    ret = ssd_bm_get_version(dev, &ver);
    +if (ret) {
        +break;
    +}
    +
    +if (copy_to_user(argp, &ver, sizeof(uint16_t))) {
        hio_warn("%s: copy_to_user: failed\n", dev->name);
        ret = -EFAULT;
        break;
    +}
    +
    +break;
    +}
    +
    +case SSD_CMD_BM_GET_NR_CAP: {
        int nr_cap;
        +
        ret = ssd_bm_nr_cap(dev, &nr_cap);
        +if (ret) {
            +break;
        +}
        +
        +if (copy_to_user(argp, &nr_cap, sizeof(int))) {
            hio_warn("%s: copy_to_user: failed\n", dev->name);
            ret = -EFAULT;
            break;
        +}
        +
        +break;
        +}
        +
        +case SSD_CMD_BM_CAP_LEARNING: {
            ret = ssd_bm_enter_cap_learning(dev);
+if (ret) {
+break;
+
+break;
+
+break;
++
+case SSD_CMD_CAP_LEARN: {
+uint32_t cap = 0;
+
+ret = ssd_cap_learn(dev, &cap);
+if (ret) {
+break;
+
++break;
+
++break;
++
+case SSD_CMD_GET_CAP_STATUS: {
+int cap_status = 0;
+
+if (test_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
+cap_status = 1;
+
++}
+
++if (copy_to_user(argp, &cap, sizeof(uint32_t))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
++
++break;
++
+case SSD_CMD_RAM_READ: {
+struct ssd_ram_op_info ram_info;
+uint64_t ofs;
+uint32_t length;
+size_t rlen, len = dev->hw_info.ram_max_len;
+int ctrl_idx;
+
+if (copy_from_user(&ram_info, argp, sizeof(struct ssd_ram_op_info))) {
+break;
+
+break;
+
+break;
++
+break;
++
++;
+hio_warn("%s: copy_from_user: failed\n", dev->name);  
+ret = -EFAULT;  
+break;  
+}  
+  
+of = ram_info.start;  
+length = ram_info.length;  
+buf = ram_info.buf;  
+ctrl_idx = ram_info.ctrl_idx;  
+  
+if (ofs >= dev->hw_info.ram_size || length > dev->hw_info.ram_size || 0 == length || (ofs + length) > dev->hw_info.ram_size) {  
+ret = -EINVAL;  
+break;  
+}  
+  
+kbuf = kmalloc(len, GFP_KERNEL);  
+if (!kbuf) {  
+ret = -ENOMEM;  
+break;  
+}  
+  
+for (rlen=0; rlen<len; rlen+=len, buf+=len, ofs+=len) {  
+if ((length - rlen) < len) {  
+len = length - rlen;  
+}  
+  
+ret = ssd_ram_read(dev, kbuf, len, ofs, ctrl_idx);  
+if (ret) {  
+break;  
+}  
+  
+if (copy_to_user(buf, kbuf, len)) {  
+ret = -EFAULT;  
+break;  
+}  
+  
+kfree(kbuf);  
+  
+break;  
+}  
+  
+case SSD_CMD_RAM_WRITE: {  
+struct ssd_ram_op_info ram_info;  
+uint64_t ofs;  
+uint32_t length;  
+size_t wlen, len = dev->hw_info.ram_max_len;
+int ctrl_idx;
+
+if (copy_from_user(&ram_info, argp, sizeof(struct ssd_ram_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
+ofs = ram_info.start;
+length = ram_info.length;
+buf = ram_info.buf;
+ctrl_idx = ram_info.ctrl_idx;
+
+if (ofs >= dev->hw_info.ram_size || length > dev->hw_info.ram_size || 0 == length || (ofs + length) > dev-
+hw_info.ram_size) {
+ret = -EINVAL;
+break;
+}
+
+kbuf = kmalloc(len, GFP_KERNEL);
+if (!kbuf) {
+ret = -ENOMEM;
+break;
+}
+
+for (wlen=0; wlen<length; wlen+=len, buf+=len, ofs+=len) {
+if ((length - wlen) < len) {
+len = length - wlen;
+
+if (copy_from_user(kbuf, buf, len)) {
+ret = -EFAULT;
+break;
+}
+
+ret = ssd_ram_write(dev, kbuf, len, ofs, ctrl_idx);
+
+if (ret) {
+break;
+}
+
+kfree(kbuf);
+
+break;
+}
+
+case SSD_CMD_NAND_READ_ID: {
+struct ssd_flash_op_info flash_info;
+int chip_no, chip_ce, length, ctrl_idx;
+ if (copy_from_user(&flash_info, argp, sizeof(struct ssd_flash_op_info))) {
+ hio_warn("%s: copy_from_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
+
+ chip_no = flash_info.flash;
+ chip_ce = flash_info.chip;
+ ctrl_idx = flash_info.ctrl_idx;
+ buf = flash_info.buf;
+ length = dev->hw_info.id_size;
+
+ kbuf = kmalloc(length, GFP_KERNEL);
+ if (!kbuf) {
+ ret = -ENOMEM;
+ break;
+ }
+ memset(kbuf, 0, length);
+
+ ret = ssd_nand_read_id(dev, kbuf, chip_no, chip_ce, ctrl_idx);
+ if (ret) {
+ kfree(kbuf);
+ break;
+ }
+
+ if (copy_to_user(buf, kbuf, length)) {
+ kfree(kbuf);
+ ret = -EFAULT;
+ break;
+ }
+
+ case SSD_CMD_NAND_READ: { // with oob
+ struct ssd_flash_op_info flash_info;
+ uint32_t length;
+ int flash, chip, page, ctrl_idx;
+ int err = 0;
+
+ if (copy_from_user(&flash_info, argp, sizeof(struct ssd_flash_op_info))) {
+ hio_warn("%s: copy_from_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
+ }
flash = flash_info.flash;
chip = flash_info.chip;
page = flash_info.page;
buf = flash_info.buf;
ctrl_idx = flash_info.ctrl_idx;

+length = dev->hw_info.page_size + dev->hw_info.oob_size;
+kbuf = kmalloc(length, GFP_KERNEL);
+if (!kbuf) {
+ret = -ENOMEM;
+break;
+}
+
+err = ret = ssd_nand_read_w_oob(dev, kbuf, flash, chip, page, 1, ctrl_idx);
+if (ret && (-EIO != ret)) {
+kfree(kbuf);
+break;
+}
+
+if (copy_to_user(buf, kbuf, length)) {
+kfree(kbuf);
+ret = -EFAULT;
+break;
+}
+
+ret = err;
+
+kfree(kbuf);
+break;
+}
+
+case SSD_CMD_NAND_WRITE: {
+struct ssd_flash_op_info flash_info;
+int flash, chip, page, ctrl_idx;
+uint32_t length;
+
+if (copy_from_user(&flash_info, argp, sizeof(struct ssd_flash_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+flash = flash_info.flash;
+chip = flash_info.chip;
+page = flash_info.page;
buf = flash_info.buf;
ctrl_idx = flash_info.ctrl_idx;
+length = dev->hw_info.page_size + dev->hw_info.oob_size;
+kbuf = kmalloc(length, GFP_KERNEL);
+if (!kbuf) {
+ret = -ENOMEM;
+break;
+}
+
+if (copy_from_user(kbuf, buf, length)) {
+kfree(kbuf);
+ret = -EFAULT;
+break;
+}
+
+ret = ssd_nand_write(dev, kbuf, flash, chip, page, 1, ctrl_idx);
+if (ret) {
+kfree(kbuf);
+break;
+}
+
kfree(kbuf);
+break;
+
+case SSD_CMD_NAND_ERASE: {
+struct ssd_flash_op_info flash_info;
+int flash, chip, page, ctrl_idx;
+
+if (copy_from_user(&flash_info, argp, sizeof(struct ssd_flash_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
kfree(kbuf);
+break;
+
+flash = flash_info.flash;
+chip = flash_info.chip;
+page = flash_info.page;
+ctrl_idx = flash_info.ctrl_idx;
+
+if ((page % dev->hw_info.page_count) != 0) {
+ret = -EINVAL;
+break;
+}
+
+//hio_warn("erase fs = %llx\n", ofs);
+ret = ssd_nand_erase(dev, flash, chip, page, ctrl_idx);
+if (ret) {
+break;
+}
+
+break;
+
+break;
+
+break;
+
+break;
+
+case SSD_CMD_NAND_READ_EXT: {//ignore EIO
+struct ssd_flash_op_info flash_info;
+uint32_t length;
+int flash, chip, page, ctrl_idx;
+
+if (copy_from_user(&flash_info, argp, sizeof(struct ssd_flash_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+flash = flash_info.flash;
+chip = flash_info.chip;
+page = flash_info.page;
+buf = flash_info.buf;
+ctrl_idx = flash_info.ctrl_idx;
+
+length = dev->hw_info.page_size + dev->hw_info.oob_size;
+
+kbuf = kmalloc(length, GFP_KERNEL);
+if (!kbuf) {
+ret = -ENOMEM;
+break;
+}
+
+ret = ssd_nand_read_w_oob(dev, kbuf, flash, chip, page, 1, ctrl_idx);
+if (-EIO == ret) {//ignore EIO
+ret = 0;
+}
+if (ret) {
+kfree(kbuf);
+break;
+}
+
+if (copy_to_user(buf, kbuf, length)) {
+kfree(kbuf);
+ret = -EFAULT;
+break;
+}
+kfree(kbuf);
+kbreak;
+
+case SSD_CMD_UPDATE_BBT: { 
+struct ssd_flash_op_info flash_info;
+int ctrl_idx, flash;
+
+if (copy_from_user(&flash_info, argp, sizeof(struct ssd_flash_op_info))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+kbreak;
+
+ctrl_idx = flash_info.ctrl_idx;
+kflash = flash_info.flash;
+kret = ssd_update_bbt(dev, flash, ctrl_idx);
+kif (ret) {
+kbreak;
+k}
+
+kbreak;
+
+kbreak;
+
+case SSD_CMD_CLEAR_ALARM: 
+kssd_clear_alarm(dev);
+kbreak;
+
+case SSD_CMD_SET_ALARM: 
+kssd_set_alarm(dev);
+kbreak;
+
+case SSD_CMD_RESET: 
+kret = ssd_do_reset(dev);
+kbreak;
+
+case SSD_CMD_RELOAD_FW: 
+kdev->reload_fw = 1;
+kdev->has_non_0x98_reg_access = 1;
+kif (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+kssd_reg32_write(dev->ctrlp + SSD_RELOAD_FW_REG, SSD_RELOAD_FLAG);
+k} else if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_1_1) {
+kssd_reg32_write(dev->ctrlp + SSD_RELOAD_FW_REG, SSD_RELOAD_FW);
+k}
+kbreak;
+
+case SSD_CMD_UNLOAD_DEV: {
+if (atomic_read(&dev->refcnt)) {
+ret = -EBUSY;
+break;
+}
+
+/* save smart */
+ssd_save_smart(dev);
+
+ret = ssd_flush(dev);
+if (ret) {
+break;
+}
+
+/* cleanup the block device */
+if (test_and_clear_bit(SSD_INIT_BD, &dev->state)) {
+mutex_lock(&dev->gd_mutex);
+ssd_cleanup_blkdev(dev);
+ssd_cleanup_queue(dev);
+mutex_unlock(&dev->gd_mutex);
+}
+
+break;
+}
+
+case SSD_CMD_LOAD_DEV: {
+
+if (test_bit(SSD_INIT_BD, &dev->state)) {
+ret = -EINVAL;
+break;
+}
+
+ret = ssd_init_smart(dev);
+if (ret) {
+hio_warn("%s: init info: failed\n", dev->name);
+break;
+}
+
+ret = ssd_init_queue(dev);
+if (ret) {
+hio_warn("%s: init queue failed\n", dev->name);
+break;
+}
+
+ret = ssd_init_blkdev(dev);
+if (ret) {
+hio_warn("%s: register block device: failed\n", dev->name);
+break;
+}
+(void)test_and_set_bit(SSD_INIT_BD, &dev->state);
+
+break;
+
+case SSD_CMD_UPDATE_VP: {
+uint32_t val;
+uint32_t new_vp, new_vp1 = 0;
+
+if (test_bit(SSD_INIT_BD, &dev->state)) {
+ret = -EINVAL;
+break;
+}
+
+if (copy_from_user(&new_vp, argp, sizeof(uint32_t))) {
+hio_warn("%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+}
+
+if (new_vp > dev->hw_info.max_valid_pages || new_vp <= 0) {
+ret = -EINVAL;
+break;
+}
+
+while (new_vp <= dev->hw_info.max_valid_pages) {
+ssd_reg32_write(dev->ctrlp + SSD_VALID_PAGES_REG, new_vp);
+msleep(10);
+val = ssd_reg32_read(dev->ctrlp + SSD_VALID_PAGES_REG);
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+new_vp1 = val & 0x3FF;
+} else {
+new_vp1 = val & 0x7FF;
+}
+
+if (new_vp1 == new_vp) {
+break;
+}
+
+new_vp++;
+/*! if (new_vp == dev->hw_info.valid_pages) {
+new_vp++;
+} */
+
+if (new_vp1 != new_vp || new_vp > dev->hw_info.max_valid_pages) {
+/*! restore */
+ssd_reg32_write(dev->ctrlp + SSD_VALID_PAGES_REG, dev->hw_info.valid_pages);
+ret = -EINVAL;
+}
+break;
+}
+
+for (i = 0; i < sizeof(copy_to_user); i++) {
+if (copy_to_user(argp, &new_vp, sizeof(uint32_t))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ssd_reg32_write(dev->ctrlp + SSD_VALID_PAGES_REG, dev->hw_info.valid_pages);
+ret = -EFAULT;
+break;
+}
+
+/* new */
+dev->hw_info.valid_pages = new_vp;
+dev->hw_info.size = (uint64_t)dev->hw_info.valid_pages * dev->hw_info.page_size;
+dev->hw_info.size *= (dev->hw_info.block_count - dev->hw_info.reserved_blks);
+dev->hw_info.size *= ((uint64_t)dev->hw_info.nr_data_ch * (uint64_t)dev->hw_info.nr_chip * (uint64_t)dev->
+hw_info.nr_ctrl);
+
+break;
+}
+
+case SSD_CMD_FULL_RESET: {
+ret = ssd_full_reset(dev);
+break;
+}
+
+case SSD_CMD_GET_NR_LOG: {
+if (copy_to_user(argp, &dev->internal_log.nr_log, sizeof(dev->internal_log.nr_log))) {
+ret = -EFAULT;
+break;
+}
+
+break;
+}
+
+case SSD_CMD_GET_LOG: {
+uint32_t length = dev->rom_info.log_sz;
+
+buf = argp;
+
+if (copy_to_user(buf, dev->internal_log.log, length)) {
+ret = -EFAULT;
+break;
+}
+
+break;
+}
+
+case SSD_CMD_LOG_LEVEL: {
+int level = 0;
+break;
+if (copy_from_user(&level, argp, sizeof(int))) {
+  hio_warn("%s: copy_from_user: failed\n", dev->name);
+  ret = -EFAULT;
+  break;
+}
+
+if (level >= SSD_LOG_NR_LEVEL || level < SSD_LOG_LEVEL_INFO) {
+  level = SSD_LOG_LEVEL_ERR;
+} 
+
+//just for showing log, no need to protect 
+log_level = level;
+break;
+
+case SSD_CMD_OT_PROTECT: {
+  int protect = 0;
+
+  if (copy_from_user(&protect, argp, sizeof(int))) {
+    hio_warn("%s: copy_from_user: failed\n", dev->name);
+    ret = -EFAULT;
+    break;
+  }
+
+  ssd_set_ot_protect(dev, !!protect);
+  break;
+}
+
+case SSD_CMD_GET_OT_STATUS: {
+  int status = ssd_get_ot_status(dev, &status);
+
+  if (copy_to_user(argp, &status, sizeof(int))) {
+    hio_warn("%s: copy_to_user: failed\n", dev->name);
+    ret = -EFAULT;
+    break;
+  }
+
+  break;
+}
+
+case SSD_CMD_CLEAR_LOG: {
+  ret = ssd_clear_log(dev);
+  break;
+}
+
+case SSD_CMD_CLEAR_SMART: {
+  ret = ssd_clear_smart(dev);
+  break;
+}
+ case SSD_CMD_CLEAR_WARNING: {
+ ret = ssd_clear_warning(dev);
+ break;
+ }
+
+ case SSD_CMD_SW_LOG: {
+ struct ssd_sw_log_info sw_log;
+
+ if (copy_from_user(&sw_log, argp, sizeof(struct ssd_sw_log_info))) {
+ hio_warn("%s: copy_from_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
+
+ ret = ssd_gen_swlog(dev, sw_log.event, sw_log.data);
+ break;
+ }
+
+ case SSD_CMD_GET_LABEL: {
+
+ if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+ ret = -EINVAL;
+ break;
+ }
+
+ if (copy_to_user(argp, &dev->label, sizeof(struct ssd_label))) {
+ hio_warn("%s: copy_to_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
+
+ break;
+ }
+
+ case SSD_CMD_GET_VERSION: {
+ struct ssd_version_info ver;
+
+ mutex_lock(&dev->fw_mutex);
+ ret = __ssd_get_version(dev, &ver);
+ mutex_unlock(&dev->fw_mutex);
+ if (ret) {
+ break;
+ }
+
+ if (copy_to_user(argp, &ver, sizeof(struct ssd_version_info))) {
+ hio_warn("%s: copy_to_user: failed\n", dev->name);
+ ret = -EFAULT;
+ break;
+ }
}
case SSD_CMD_GET_TEMPERATURE: {
    int temp;
    mutex_lock(&dev->fw_mutex);
    ret = __ssd_get_temperature(dev, &temp);
    mutex_unlock(&dev->fw_mutex);
    if (ret) {
        break;
    }
    if (copy_to_user(argp, &temp, sizeof(int))) {
        hio_warn("%s: copy_to_user: failed\n", dev->name);
        ret = -EFAULT;
        break;
    }
    break;
}
+
case SSD_CMD_GET_BMSTATUS: {
    int status;
    mutex_lock(&dev->fw_mutex);
    if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
        if (test_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
            status = SSD_BMSTATUS_WARNING;
        } else {
            status = SSD_BMSTATUS_OK;
        }
    } else if(dev->protocol_info.ver > SSD_PROTOCOL_V3) {
        ret = __ssd_bm_status(dev, &status);
    } else {
        status = SSD_BMSTATUS_OK;
    }
    mutex_unlock(&dev->fw_mutex);
    if (ret) {
        break;
    }
    if (copy_to_user(argp, &status, sizeof(int))) {
        hio_warn("%s: copy_to_user: failed\n", dev->name);
        ret = -EFAULT;
        break;
    }
    break;
+}
+
+case SSD_CMD_GET_LABEL2: {
+    void *label;
+    int length;
+
+    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+      label = &dev->label;
+      length = sizeof(struct ssd_label);
+    } else {
+      label = &dev->labelv3;
+      length = sizeof(struct ssd_labelv3);
+    }
+
+    if (copy_to_user(argp, label, length)) {
+      ret = -EFAULT;
+      break;
+    }
+    break;
+
+  case SSD_CMD_FLUSH:
+    ret = ssd_flush(dev);
+    if (ret) {
+      hio_warn("%s: ssd_flush: failed
", dev->name);
+      ret = -EFAULT;
+      break;
+    }
+    break;
+
+  case SSD_CMD_SAVE_MD: {
+      int save_md = 0;
+      
+      if (copy_from_user(&save_md, argp, sizeof(int))) {
+        hio_warn("%s: copy_from_user: failed\n", dev->name);
+        ret = -EFAULT;
+        break;
+      }
+      dev->save_md = !!save_md;
+      break;
+    }
+
+  case SSD_CMD_SET_WMODE: {
+      int new_wmode = 0;
+      
+      if (copy_from_user(&new_wmode, argp, sizeof(int))) {
+        hio_warn("%s: copy_from_user: failed\n", dev->name);
+        ret = -EFAULT;
+        break;
+      }
+    }
+    break;
  }
+ret = -EFAULT;
+break;
+
+ret = __ssd_set_wmode(dev, new_wmode);
+if (ret) {
+break;
+
+break;
+
+break;
+
+case SSD_CMD_GET_WMODE: {
+if (copy_to_user(argp, &dev->wmode, sizeof(int))) {
+hio_warn("\%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
+break;
+
+break;
+
+case SSD_CMD_GET_USER_WMODE: {
+if (copy_to_user(argp, &dev->user_wmode, sizeof(int))) {
+hio_warn("\%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
+break;
+
+break;
+
+case SSD_CMD_DEBUG: {
+struct ssd_debug_info db_info;
+
+if (!finject) {
+ret = -EOPNOTSUPP;
+break;
+
+break;
+
+break;
+
+case SSD_CMD_GET_USER_WMODE: {
+if (copy_to_user(argp, &dev->user_wmode, sizeof(int))) {
+hio_warn("\%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
+break;
+
+break;
+
+case SSD_CMD_DEBUG: {
+struct ssd_debug_info db_info;
+
+if (!finject) {
+ret = -EOPNOTSUPP;
+break;
+
+break;
+
+if (copy_from_user(&db_info, argp, sizeof(struct ssd_debug_info))) {
+hio_warn("\%s: copy_from_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
+break;
+
+if (db_info.type < SSD_DEBUG_NONE || db_info.type >= SSD_DEBUG_NR) {
+ret = -EINVAL;
+break;
+
+/* IO */
+if (db_info.type >= SSD_DEBUG_READ_ERR && db_info.type <= SSD_DEBUG_RW_ERR &&
+(db_info.data.loc.off + db_info.data.loc.len) > (dev->hw_info.size >> 9)) {
+ret = -EINVAL;
+break;
+
+memcpy(&dev->db_info, &db_info, sizeof(struct ssd_debug_info));
+
+ifdef SSD_OT_PROTECT
+/* temperature */
+if (db_info.type == SSD_DEBUG_NONE) {
+ssd_check_temperature(dev, SSD_OT_TEMP);
+} else if (db_info.type == SSD_DEBUG_LOG) {
+if (db_info.data.log.event == SSD_LOG_OVER_TEMP) {
+dev->ot_delay = SSD_OT_DELAY;
+} else if (db_info.data.log.event == SSD_LOG_NORMAL_TEMP) {
+dev->ot_delay = 0;
+}
+}
+endif
+
+/* offline */
+if (db_info.type == SSD_DEBUG_OFFLINE) {
+test_and_clear_bit(SSD_ONLINE, &dev->state);
+} else if (db_info.type == SSD_DEBUG_NONE) {
+(void)test_and_set_bit(SSD_ONLINE, &dev->state);
+}
+
+/* log */
+if (db_info.type == SSD_DEBUG_LOG && dev->event_call && dev->gd) {
+dev->event_call(dev->gd, db_info.data.log.event, 0);
+}
+
+break;
+
+switch
++
+case SSD_CMD_DRV_PARAM_INFO: {
+struct ssd_drv_param_info drv_param;
+
+memset(&drv_param, 0, sizeof(struct ssd_drv_param_info));
+
+drv_param.mode = mode;
+drv_param.status_mask = status_mask;
+drv_param.int_mode = int_mode;
+drv_param.threaded_irq = threaded_irq;
+drv_param.log_level = log_level;
+drv_param.wmode = wmode;
+drv_param.ot_protect = ot_protect;
+drv_param.finject = finject;
+
+if (copy_to_user(argp, &drv_param, sizeof(struct ssd_drv_param_info))) {
+hio_warn("%s: copy_to_user: failed\n", dev->name);
+ret = -EFAULT;
+break;
+
+default:
+ret = -EINVAL;
+break;
+
+break;
+
+return ret;
+
+
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,27))
+static int ssd_block_ioctl(struct inode *inode, struct file *file,
+unsigned int cmd, unsigned long arg)
+
+{ struct ssd_device *dev;
+void __user *argp = (void __user *)arg;
+int ret = 0;
+
+if (!inode) {
+hreturn -EINVAL;
+
dev = inode->i_bdev->bd_disk->private_data;
+if (!dev) {
+hreturn -EINVAL;
+
+else
+static int ssd_block_ioctl(struct block_device *bdev, fmode_t mode,
+unsigned int cmd, unsigned long arg)
+
{ struct ssd_device *dev;
+void __user *argp = (void __user *)arg;
+int ret = 0;
+
+if (!bdev) {
+hreturn -EINVAL;
+} }
dev = bdev->bd_disk->private_data;
if (!dev) {
    return -EINVAL;
}
#endif

switch (cmd) {
case HDIO_GETGEO: {
    struct hd_geometry geo;
    geo.cylinders = (dev->hw_info.size & ~0x3f) >> 6;
    geo.heads = 4;
    geo.sectors = 16;
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,27))
    geo.start = get_start_sect(inode->i_bdev);
#else
    geo.start = get_start_sect(bdev);
#endif
    if (copy_to_user(argp, &geo, sizeof(geo))) {
        ret = -EFAULT;
        break;
    }
    break;
}

default:
    if (!dev->slave) {
        ret = ssd_ioctl_common(dev, cmd, arg);
    } else {
        ret = -EFAULT;
    }
    break;

default:
    if (!dev->slave) {
        ret = ssd_ioctl_common(dev, cmd, arg);
    } else {
        ret = -EFAULT;
    }
    break;

return ret;
+static void ssd_free_dev(struct kref *kref)
+{
+struct ssd_device *dev;
+
+if (!kref) {
+return;
+}
+
+dev = container_of(kref, struct ssd_device, kref);
+
+put_disk(dev->gd);
+
+ssd_put_index(dev->slave, dev->idx);
+
+kfree(dev);
+}
+
+static void ssd_put(struct ssd_device *dev)
+{
+kref_put(&dev->kref, ssd_free_dev);
+}
+
+static int ssd_get(struct ssd_device *dev)
+{
+kref_get(&dev->kref);
+return 0;
+}
+
+/* block device */
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,27))
+static int ssd_block_open(struct inode *inode, struct file *filp)
+{
+struct ssd_device *dev;
+
+if (!inode) {
+return -EINVAL;
+}
+
+dev = inode->i_bdev->bd_disk->private_data;
+
+if (!dev) {
+return -EINVAL;
+}
+#else
+static int ssd_block_open(struct block_device *bdev, fmode_t mode)
+{
+struct ssd_device *dev;
+
+if (!dev) {
+return -EINVAL;
+}
+#else
+static int ssd_block_open(struct block_device *bdev, fmode_t mode)
+{
+struct ssd_device *dev;
+

if (!bdev) {
    return -EINVAL;
}

dev = bdev->bd_disk->private_data;
if (!dev) {
    return -EINVAL;
}
#endif

#ifndef (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,27))
static int ssd_block_release(struct inode *inode, struct file *filp) {
    struct ssd_device *dev;

    if (!inode) {
        return -EINVAL;
    }

    dev = inode->i_bdev->bd_disk->private_data;
    if (!dev) {
        return -EINVAL;
    }
#endif

static int ssd_block_release(struct gendisk *disk, fmode_t mode) {
    struct ssd_device *dev;

    if (!disk) {
        return -EINVAL;
    }

    dev = disk->private_data;
    if (!dev) {
        return -EINVAL;
    }
#endif

#endif (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,27))
static int ssd_block_release(struct inode *inode, struct file *filp) {
    struct ssd_device *dev;

    if (!inode) {
        return -EINVAL;
    }

    dev = inode->i_bdev->bd_disk->private_data;
    if (!dev) {
        return -EINVAL;
    }
#endif

#endif (LINUX_VERSION_CODE <= KERNEL_VERSION(3,9,0))

static int ssd_block_release(struct gendisk *disk, fmode_t mode) {
    struct ssd_device *dev;

    if (!disk) {
        return -EINVAL;
    }

    dev = disk->private_data;
    if (!dev) {
        return -EINVAL;
    }
#else

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static void ssd_block_release(struct gendisk *disk, fmode_t mode)
{
    struct ssd_device *dev;

    if (!disk) {
        return;
    }

    dev = disk->private_data;
    if (!dev) {
        return;
    }

    atomic_dec(&dev->refcnt);

    ssd_put(dev);

    //module_put(dev->owner);
    #if (LINUX_VERSION_CODE <= KERNEL_VERSION(3,9,0))
        return 0;
    #endif

    #if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,16))
        getgeo = ssd_block_getgeo,
    #endif

    static struct block_device_operations ssd_fops = {
        .owner = THIS_MODULE,
        .open = ssd_block_open,
        .release = ssd_block_release,
        .ioctl = ssd_block_ioctl,
        #if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,32))
            .getgeo = ssd_block_getgeo,
        #endif
    };

    static void ssd_init_trim(ssd_device_t *dev)
    {
        #if (defined SSD_TRIM && (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,32)))
            if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
                return;
            }

            queue_flag_set_unlocked(QUEUE_FLAG_DISCARD, dev->rq);
            #if ((LINUX_VERSION_CODE >= KERNEL_VERSION(4,12,0))
                dev->rq->limits.discard_zeroes_data = 1;
            #endif
            dev->rq->limits.discard_alignment = 4096;

            #endif
        #if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,32)) || (defined RHEL_MAJOR && RHEL_MAJOR >= 6))
            dev->rq->limits.discard_zeroes_data = 1;
        #endif
        dev->rq->limits.discard_alignment = 4096;
+dev->rq->limits.discard_granularity = 4096;
+#endif
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2_4) {
+dev->rq->limits.max_discard_sectors = dev->hw_info.sg_max_sec;
+} else {
+dev->rq->limits.max_discard_sectors = (dev->hw_info.sg_max_sec) * (dev->hw_info.cmd_max_sg);
+}
+#endif
+
+static void ssd_cleanup_queue(struct ssd_device *dev)
+{
+    ssd_wait_io(dev);
+
+    blk_cleanup_queue(dev->rq);
+    dev->rq = NULL;
+}
+
+static int ssd_init_queue(struct ssd_device *dev)
+{
+    dev->rq = blk_alloc_queue(GFP_KERNEL);
+    if (dev->rq == NULL) {
+        hio_warn("%s: alloc queue: failed
", dev->name);
+        goto out_init_queue;
+    }
+    /* must be first */
+    blk_queue_make_request(dev->rq, ssd_make_request);
+    
+    +#if ((LINUX_VERSION_CODE < KERNEL_VERSION(2,6,34)) && !(defined RHEL_MAJOR && RHEL_MAJOR == 6))
+    blk_queue_max_hw_segments(dev->rq, dev->hw_info.cmd_max_sg);
+    blk_queue_max_phys_segments(dev->rq, dev->hw_info.cmd_max_sg);
+    blk_queue_max_sectors(dev->rq, dev->hw_info.sg_max_sec);
+    +#else
+    blk_queue_max_segments(dev->rq, dev->hw_info.cmd_max_sg);
+    blk_queue_max_hw_sectors(dev->rq, dev->hw_info.sg_max_sec);
+    +#endif
+    
+    +#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,31))
+    blk_queue_hardsect_size(dev->rq, 512);
+    +#else
+    blk_queue_logical_block_size(dev->rq, 512);
+    +#endif
+    /* not work for make_request based drivers(bio) */
+    blk_queue_max_segment_size(dev->rq, dev->hw_info.sg_max_sec << 9);
+    
+    blk_queue_bounce_limit(dev->rq, BLK_BOUNCE_HIGH);
+dev->rq->queuedata = dev;
+
+if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+blk_queue_issue_flush_fn(dev->rq, ssd_issue_flush_fn);
+endif
+
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,28))
+queue_flag_set_unlocked(QUEUE_FLAG_NONROT, dev->rq);
+endif
+
+ssd_init_trim(dev);
+
+return 0;
+
+out_init_queue:
+return -ENOMEM;
+
+static void ssd_cleanup_blkdev(struct ssd_device *dev)
+{
+del_gendisk(dev->gd);
+}
+
+static int ssd_init_blkdev(struct ssd_device *dev)
+{
+if (dev->gd) {
+put_disk(dev->gd);
+}
+
+dev->gd = alloc_disk(ssd_minors);
+if (!dev->gd) {
+hio_warn("%s: alloc_disk fail\n", dev->name);
+goto out_alloc_gd;
+}
+
+dev->gd->maj = dev->maj;
+dev->gd->first_minor = dev->idx * ssd_minors;
+dev->gd->fops = &ssd_fops;
+dev->gd->queue = dev->rq;
+dev->gd->private_data = dev;
+
+snprintf (dev->gd->disk_name, sizeof(dev->gd->disk_name), "%s", dev->name);
+
+set_capacity(dev->gd, dev->hw_info.size >> 9);
+
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(4,8,0))
+device_add_disk(&dev->pdev->dev, dev->gd);
+else
#ifdef dev->gd->driverfs_dev
+dev->gd->driverfs_dev = &dev->pdev->dev;
+#endif
+
+return 0;
+
+out_alloc_gd:
+return -ENOMEM;
+}
+
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,10))
+static int ssd_ioctl(struct inode *inode, struct file *file,
+unsigned int cmd, unsigned long arg)
+#else
+static long ssd_ioctl(struct file *file,
+unsigned int cmd, unsigned long arg)
+#endif
+
+
+{struct ssd_device *dev;
+
+if (!file) {
+return -EINVAL;
+}
+
+dev = file->private_data;
+
+dev = file->private_data;
+
+if (!dev) {
+return -EINVAL;
+}
+
+return (long)ssd_ioctl_common(dev, cmd, arg);
+}
+
+static int ssd_open(struct inode *inode, struct file *file)
+
+{struct ssd_device *dev = NULL;
+struct ssd_device *n = NULL;
+int idx;
+int ret = -ENODEV;
+
+if (!inode || !file) {
+return -EINVAL;
+}
+
+dev = inode->private_data;
+
+dev = file->private_data;
+
+if (!dev) {
+return -EINVAL;
+}
+
+ret = -EINVAL;
+
+dev = file->private_data;
+
+if (!dev || !file) {
+return -EINVAL;
+}
+
+idx = iminor(inode);
+
+list_for_each_entry_safe(dev, n, &ssd_list, list) {
+if (dev->idx == idx) {
+ret = 0;
+}
+break;
+
+if (ret) {
+ return ret;
+
+ file->private_data = dev;
+
+ ssd_get(dev);
+
+ return 0;
+
+
+ static int ssd_release(struct inode *inode, struct file *file)
+ {
+ struct ssd_device *dev;
+
+ if (!file) {
+ return -EINVAL;
+
+ dev = file->private_data;
+
+ if (!dev) {
+ return -EINVAL;
+
+ ssd_put(dev);
+
+ file->private_data = NULL;
+
+ return 0;
+
+ 
+ static int ssd_reload_ssd_ptr(struct ssd_device *dev)
+ {
+ ssd_reset_resp_ptr(dev);
+
+ // update base reg address
+ if (dev->protocol_info.ver >= SSD_PROTOCOL_V3) {
+ 
+ ssd_reg_write(dev->ctrlp + SSD_MSG_BASE_REG, dev->msg_base_dma);
+
+ 
+ // update response base reg address
+ ssd_reg_write(dev->ctrlp + SSD_RESP_FIFO_REG, dev->resp_msg_base_dma);
+ ssd_reg_write(dev->ctrlp + SSD_RESP_PTR_REG, dev->resp_ptr_base_dma);
static struct file_operations ssd_cfops = {
 .owner= THIS_MODULE,
 .open= ssd_open,
 .release= ssd_release,
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,10))
 .ioctl= ssd_ioctl,
#else
 .unlocked_ioctl = ssd_ioctl,
#endif
};

static void ssd_cleanup_chardev(struct ssd_device *dev)
{
 if (dev->slave) {
 return;
 }

#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,12))
 class_simple_device_remove(MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx));
 devfs_remove("c%s", dev->name);
#elif (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,14))
 class_device_destroy(ssd_class, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx));
 devfs_remove("c%s", dev->name);
#elif (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,17))
 class_device_destroy(ssd_class, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx));
 devfs_remove("c%s", dev->name);
#elif (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,24))
 class_device_destroy(ssd_class, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx));
#else
device_destroy(ssd_class, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx));
#endif
}

static int ssd_init_chardev(struct ssd_device *dev)
{
 int ret = 0;

 if (dev->slave) {
 return 0;
 }

#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,12))
 devfs_mk_cdev(MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), S_IFCHR|S_IRUSR|S_IWUSR, "c%s", dev->name);
#else
 devfs_mk_cdev(MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), S_IFCHR|S_IRUSR|S_IWUSR, "c%s", dev->name);
#endif
if (ret) {
  goto out;
}

class_simple_device_add(ssd_class, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), NULL, "c%s", dev->name);
out:
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,14))
  ret = devfs_mk_cdev(MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), S_IFCHR|S_IRUSR|S_IWUSR, "c%s", dev->name);
  if (ret) {
    goto out;
  }
  class_device_create(ssd_class, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), NULL, "c%s", dev->name);
#endif

out:
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,17))
  ret = devfs_mk_cdev(MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), S_IFCHR|S_IRUSR|S_IWUSR, "c%s", dev->name);
  if (ret) {
    goto out;
  }
  class_device_create(ssd_class, NULL, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), NULL, "c%s", dev->name);
#endif

out:
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,24))
  class_device_create(ssd_class, NULL, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), NULL, "c%s", dev->name);
#endif

out:
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,26))
  class_device_create(ssd_class, NULL, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), NULL, "c%s", dev->name);
#endif

out:
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,27))
  device_create(ssd_class, NULL, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), "c%s", dev->name);
#endif

else
  device_create(ssd_class, NULL, MKDEV((dev_t)dev->cmajor, (dev_t)dev->idx), NULL, "c%s", dev->name);
#endif

return ret;

}

static int ssd_check_hw(struct ssd_device *dev)
{
  uint32_t test_data = 0x55AA5AA5;
  uint32_t read_data;

  ssd_reg32_write(dev->ctrlp + SSD_BRIDGE_TEST_REG, test_data);
  read_data = ssd_reg32_read(dev->ctrlp + SSD_BRIDGE_TEST_REG);
  if (read_data != ~(test_data)) {
    //hio_warn("%s: check bridge error: %\x\n", dev->name, read_data);
    return -1;
  }

  return 0;
}
+static int ssd_check_fw(struct ssd_device *dev)
+{
+    uint32_t val = 0;
+    int i;
+
+    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_3) {
+        return 0;
+    }
+
+    for (i=0; i<SSD_CONTROLLER_WAIT; i++) {
+        val = ssd_reg32_read(dev->ctrlp + SSD_HW_STATUS_REG);
+        if (((val & 0x1) && ((val >> 8) & 0x1)) {
+            break;
+        }
+        msleep(SSD_INIT_WAIT);
+    }
+
+    if (!(val & 0x1)) {
+        /* controller fw status */
+        hio_warn("%s: controller firmware load failed: %x\n", dev->name, val);
+        return -1;
+    } else if (!(val >> 8) & 0x1) {
+        /* controller state */
+        hio_warn("%s: controller state error: %x\n", dev->name, val);
+        return -1;
+    }
+
+    val = ssd_reg32_read(dev->ctrlp + SSD_RELOAD_FW_REG);
+    if (val) {
+        dev->reload_fw = 1;
+    }
+
+    return 0;
+}
+
+static int ssd_init_fw_info(struct ssd_device *dev)
+{
+    uint32_t val;
+    int ret = 0;
+
+    val = ssd_reg32_read(dev->ctrlp + SSD_BRIDGE_VER_REG);
+    dev->hw_info.bridge_ver = val & 0xFFF;
+    if (dev->hw_info.bridge_ver < SSD_FW_MIN) {

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+hio_warn("%s: bridge firmware version %03X is not supported\n", dev->name, dev->hw_info.bridge_ver);
+return -EINVAL;
+
+build_firmware_version(dev);
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_3) {
+    return 0;
+}
+
+/* clock status */
+if (!test_and_set_bit(SSD_HWMON_CLOCK(SSD_CLOCK_166M_LOST), &dev->hwmon)) {
+    hio_warn("%s: 166MHz clock losed: %#x\n", dev->name, val);
+    ssd_gen_swlog(dev, SSD_LOG_CLK_FAULT, val);
+}
+ret = -1;
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_1_3) {
+    if (!test_and_set_bit(SSD_HWMON_CLOCK(SSD_CLOCK_156M_LOST), &dev->hwmon)) {
+        hio_warn("%s: 156MHz clock losed: %#x\n", dev->name, val);
+        ssd_gen_swlog(dev, SSD_LOG_CLK_FAULT, val);
+    }
+    ret = -1;
+}
+
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2) {
+    if (!test_and_set_bit(SSD_HWMON_CLOCK(SSD_CLOCK_166M_SKEW), &dev->hwmon)) {
+        hio_warn("%s: 166MHz clock is skew: %#x\n", dev->name, val);
+        ssd_gen_swlog(dev, SSD_LOG_CLK_FAULT, val);
+    }
+    ret = -1;
+}
+
+if (!test_and_set_bit(SSD_HWMON_CLOCK(SSD_CLOCK_156M_LOST), &dev->hwmon)) {
+    if (!test_and_set_bit(SSD_HWMON_CLOCK(SSD_CLOCK_156M_SKEW), &dev->hwmon)) {
+        hio_warn("%s: 156MHz clock is skew: %#x\n", dev->name, val);
+        ssd_gen_swlog(dev, SSD_LOG_CLK_FAULT, val);
+    }
+    ret = -1;
+}
```c
+hiu_warn("%s: 156.25MHz clock lost: %#x\n", dev->name, val);
+ssd_gen_swlog(dev, SSD_LOG_CLK_FAULT, val);
+
+ret = -1;
+
+if (!((val >> 7) & 0x1)) {
+if (!test_and_set_bit(SSD_HWMON_CLOCK(SSD_CLOCK_156M_SKEW), &dev->hwmon)) {
+hiu_warn("%s: 156.25MHz clock is skew: %#x\n", dev->name, val);
+ssd_gen_swlog(dev, SSD_LOG_CLK_FAULT, val);
+}
+ret = -1;
+}
+
+return ret;
+
+static int ssd_check_volt(struct ssd_device *dev)
+{
+int i = 0;
+uint64_t val;
+uint32_t adc_val;
+int ret = 0;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+return 0;
+}
+
+for (i=0; i<dev->hw_info.nr_ctrl; i++) {
+/* 1.0v */
+if (!test_bit(SSD_HWMON_FPGA(i, SSD_FPGA_1V0), &dev->hwmon)) {
+val = ssd_reg_read(dev->ctrlp + SSD_FPGA_1V0_REG0 + i * SSD_CTRL_REG_ZONE_SZ);
+adc_val = SSD_FPGA_VOLT_MAX(val);
+if (adc_val < SSD_FPGA_1V0_ADC_MIN || adc_val > SSD_FPGA_1V0_ADC_MAX) {
+(void)test_and_set_bit(SSD_HWMON_FPGA(i, SSD_FPGA_1V0), &dev->hwmon);
+hiu_warn("%s: controller %d 1.0V fault: %d mV\n", dev->name, i, SSD_FPGA_VOLT(adc_val));
+ssd_gen_swlog(dev, SSD_LOG_VOLT_FAULT, SSD_VOLT_LOG_DATA(SSD_FPGA_1V0, i, adc_val));
+ret = -1;
+}
+}
+
+adc_val = SSD_FPGA_VOLT_MIN(val);
+if (adc_val < SSD_FPGA_1V0_ADC_MIN || adc_val > SSD_FPGA_1V0_ADC_MAX) {
+(void)test_and_set_bit(SSD_HWMON_FPGA(i, SSD_FPGA_1V0), &dev->hwmon);
+hiu_warn("%s: controller %d 1.0V fault: %d mV\n", dev->name, i, SSD_FPGA_VOLT(adc_val));
+ssd_gen_swlog(dev, SSD_LOG_VOLT_FAULT, SSD_VOLT_LOG_DATA(SSD_FPGA_1V0, i, adc_val));
+ret = -2;
+}
+}
+
```
/* 1.8v */
if (!test_bit(SSD_HWMON_FPGA(i, SSD_FPGA_1V8), &dev->hwmon)) {
    val = ssd_reg_read(dev->ctrlp + SSD_FPGA_1V8_REG0 + i * SSD_CTRL_REG_ZONE_SZ);
    adc_val = SSD_FPGA_VOLT_MAX(val);
    if (adc_val < SSD_FPGA_1V8_ADC_MIN || adc_val > SSD_FPGA_1V8_ADC_MAX) {
        #if defined __GNUC__
        (void)test_and_set_bit(SSD_HWMON_FPGA(i, SSD_FPGA_1V8), &dev->hwmon);
        #endif
        hi0_warn("%s: controller %d 1.8V fault: %d mV,\n", dev->name, i, SSD_FPGA_VOLT(adc_val));
        ssd_gen_swlog(dev, SSD_LOG_VOLT_FAULT, SSD_VOLT_LOG_DATA(SSD_FPGA_1V8, i, adc_val));
        ret = -3;
    }
    adc_val = SSD_FPGA_VOLT_MIN(val);
    if (adc_val < SSD_FPGA_1V8_ADC_MIN || adc_val > SSD_FPGA_1V8_ADC_MAX) {
        #if defined __GNUC__
        (void)test_and_set_bit(SSD_HWMON_FPGA(i, SSD_FPGA_1V8), &dev->hwmon);
        #endif
        hi0_warn("%s: controller %d 1.8V fault: %d mV,\n", dev->name, i, SSD_FPGA_VOLT(adc_val));
        ssd_gen_swlog(dev, SSD_LOG_VOLT_FAULT, SSD_VOLT_LOG_DATA(SSD_FPGA_1V8, i, adc_val));
        ret = -4;
    }
}
return ret;

static int ssd_check_reset_sync(struct ssd_device *dev){
    uint32_t val;
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_3) {
        return 0;
    }
    val = ssd_reg32_read(dev->ctrlp + SSD_HW_STATUS_REG);
    if (!((val >> 8) & 0x1)) {
        /* controller state */
        hi0_warn("%s: controller state error: %#x,\n", dev->name, val);
        return -1;
    }
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
        return 0;
    }
    if (((val >> 9) & 0x1)) {
        hi0_warn("%s: controller reset asynchronously: %#x\n", dev->name, val);
        ssd_gen_swlog(dev, SSD_LOG_CTRL_RST_SYNC, val);
        return -1;
    }
static int ssd_check_hw_bh(struct ssd_device *dev) {
    int ret;
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_3) {
        return 0;
    }
    /* clock status */
    ret = ssd_check_clock(dev);
    if (ret) {
        goto out;
    }
    out:
    /* skip error if not in standard mode */
    if (mode != SSD_DRV_MODE_STANDARD) {
        ret = 0;
    }
    return ret;
}

static int ssd_check_controller(struct ssd_device *dev) {
    int ret;
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3_1_3) {
        return 0;
    }
    /* sync reset */
    ret = ssd_check_reset_sync(dev);
    if (ret) {
        goto out;
    }
    out:
    /* skip error if not in standard mode */
    if (mode != SSD_DRV_MODE_STANDARD) {
        ret = 0;
    }
    return ret;
}
static int ssd_check_controller_bh(struct ssd_device *dev) {
    uint32_t test_data = 0x55AA5AA5;
    uint32_t val;
    int reg_base, reg_sz;
    int init_wait = 0;
    int i;
    int ret = 0;

    /* controller */
    val = ssd_reg32_read(dev->ctrlp + SSD_READY_REG);
    if (val & 0x1) {
        hio_warn("%s: controller 0 not ready
", dev->name);
        return -1;
    }

    for (i=0; i<dev->hw_info.nr_ctrl; i++) {
        reg_base = SSD_CTRL_TEST_REG0 + i * SSD_CTRL_TEST_REG_SZ;
        ssd_reg32_write(dev->ctrlp + reg_base, test_data);
        val = ssd_reg32_read(dev->ctrlp + reg_base);
        if (val != ~(test_data)) {
            hio_warn("%s: check controller %d error: %#x\n", dev->name, i, val);
            return -1;
        }
    }

    /* clock */
    ret = ssd_check_volt(dev);
    if (ret) {
        return ret;
    }

    /* ddr */
    if (dev->protocol_info.ver > SSD_PROTOCOL_V3) {
        reg_base = SSD_PV3_RAM_STATUS_REG0;
        reg_sz = SSD_PV3_RAM_STATUS_REG_SZ;
        for (i=0; i<dev->hw_info.nr_ctrl; i++) {
            if (!((val >> 1) & 0x1)) {
                init_wait++;
            }
        }
    }
}
if (init_wait <= SSD_RAM_INIT_MAX_WAIT) {
    msleep(SSD_INIT_WAIT);
    goto check_ram_status;
} else {
    hio_warn("%s: controller %d ram init failed: %#x\n", dev->name, i, val);
    ssd_gen_swlog(dev, SSD_LOG_DDR_INIT_ERR, i);
    return -1;
}
+
reg_base += reg_sz;
+
/* ch info */
for (i=0; i<SSD_CH_INFO_MAX_WAIT; i++) {
    val = ssd_reg32_read(dev->ctrlp + SSD_CH_INFO_REG);
    if (!((val >> 31) & 0x1)) {
        break;
    }
    msleep(SSD_INIT_WAIT);
}
if ((val >> 31) & 0x1) {
    hio_warn("%s: channel info init failed: %#x\n", dev->name, val);
    return -1;
}
+
return 0;
}

static int ssd_init_protocol_info(struct ssd_device *dev)
{
    uint32_t val;
    
    val = ssd_reg32_read(dev->ctrlp + SSD_PROTOCOL_VER_REG);
    if (val == (uint32_t)-1) {
        hio_warn("%s: protocol version error: %#x\n", dev->name, val);
        return -EINVAL;
    }
    dev->protocol_info.ver = val;
    if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
        dev->protocol_info.init_state_reg = SSD_INIT_STATE_REG0;
        dev->protocol_info.init_state_reg_sz = SSD_INIT_STATE_REG_SZ;
        dev->protocol_info.chip_info_reg = SSD_CHIP_INFO_REG0;
        dev->protocol_info.chip_info_reg_sz = SSD_CHIP_INFO_REG_SZ;
    }
} else {
+dev->protocol_info.init_state_reg = SSD_PV3_INIT_STATE_REG0;
+dev->protocol_info.init_state_reg_sz = SSD_PV3_INIT_STATE_REG_SZ;
+
+dev->protocol_info.chip_info_reg = SSD_PV3_CHIP_INFO_REG0;
+dev->protocol_info.chip_info_reg_sz = SSD_PV3_CHIP_INFO_REG_SZ;
+
+ return 0;
+
+
static int ssd_init_hw_info(struct ssd_device *dev)
+
+{ uint64_t val64;
+uint32_t val;
+uint32_t nr_ctrl;
+int ret = 0;
+
+/* base info */
+val = ssd_reg32_read(dev->ctrlp + SSD_RESP_INFO_REG);
+dev->hw_info.resp_ptr_sz = 16 * (1U << (val & 0xFF));
+dev->hw_info.resp_msg_sz = 16 * (1U << ((val >> 8) & 0xFF));
+
+if (0 == dev->hw_info.resp_ptr_sz || 0 == dev->hw_info.resp_msg_sz) {
+ hio_warn("%s: response info error\n", dev->name);
+ ret = -EINVAL;
+ goto out;
+
+val = ssd_reg32_read(dev->ctrlp + SSD_BRIDGE_INFO_REG);
+dev->hw_info.cmd_fifo_sz = 1U << ((val >> 4) & 0xF);
+dev->hw_info.cmd_max_sg = 1U << ((val >> 8) & 0xF);
+dev->hw_info.sg_max_sec = 1U << ((val >> 12) & 0xF);
+dev->hw_info.cmd_fifo_sz_mask = dev->hw_info.cmd_fifo_sz - 1;
+
+if (0 == dev->hw_info.cmd_fifo_sz || 0 == dev->hw_info.cmd_max_sg || 0 == dev->hw_info.sg_max_sec) {
+ hio_warn("%s: cmd info error\n", dev->name);
+ ret = -EINVAL;
+ goto out;
+
+/* check hw */
+if (ssd_check_hw_bh(dev)) {
+hio_warn("%s: check hardware status failed\n", dev->name);
+ret = -EINVAL;
+ goto out;
+
+}
if (ssd_check_controller(dev)) {
    hio_warn("%s: check controller state failed\n", dev->name);
    ret = -EINVAL;
    goto out;
}

/* nr controller : read again */
val = ssd_reg32_read(dev->ctrlp + SSD_BRIDGE_INFO_REG);
(dev->hw_info.nr_ctrl = (val >> 16) & 0xF);

/* nr ctrl configured */
nr_ctrl = (val >> 20) & 0xF;
if (0 == dev->hw_info.nr_ctrl) {
    hio_warn("%s: nr controller error: %u\n", dev->name, dev->hw_info.nr_ctrl);
    ret = -EINVAL;
    goto out;
} else if (0 != nr_ctrl && nr_ctrl != dev->hw_info.nr_ctrl) {
    hio_warn("%s: nr controller error: configured %u but found %u\n", dev->name, nr_ctrl, dev->hw_info.nr_ctrl);
    if (mode <= SSD_DRV_MODE_STANDARD) {
        ret = -EINVAL;
        goto out;
    }
}

if (ssd_check_controller_bh(dev)) {
    hio_warn("%s: check controller failed\n", dev->name);
    ret = -EINVAL;
    goto out;
} else if (0 != nr_ctrl && nr_ctrl != dev->hw_info.nr_ctrl) {
    hio_warn("%s: nr controller error: configured %u but found %u\n", dev->name, nr_ctrl, dev->hw_info.nr_ctrl);
    if (mode <= SSD_DRV_MODE_STANDARD) {
        ret = -EINVAL;
        goto out;
    }
}

val = ssd_reg32_read(dev->ctrlp + SSD_PCB_VER_REG);
(dev->hw_info.pcb_ver = (uint8_t) ((val >> 4) & 0xF) + 'A' -1);
if ((val & 0xF) != 0xF) {
    dev->hw_info.upper_pcb_ver = (uint8_t) (val & 0xF) + 'A' -1;
}

if (dev->hw_info.pcb_ver < 'A' || (0 != dev->hw_info.upper_pcb_ver && dev->hw_info.upper_pcb_ver < 'A')) {
    hio_warn("%s: PCB version error: %#x %#x\n", dev->name, dev->hw_info.pcb_ver, dev->hw_info.upper_pcb_ver);
    ret = -EINVAL;
    goto out;
}

/* channel info */
if (mode <= SSD_DRV_MODE_DEBUG) {
    val = ssd_reg32_read(dev->ctrlp + SSD_CH_INFO_REG);
    (dev->hw_info.nr_data_ch = val & 0xFF);
    (dev->hw_info.nr_ch = dev->hw_info.nr_data_ch + ((val >> 8) & 0xFF));
}
```c
+dev->hw_info.nr_chip = (val >> 16) & 0xFF;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
  +dev->hw_info.max_ch = 1;
  +while (dev->hw_info.max_ch < dev->hw_info.nr_ch) dev->hw_info.max_ch <<= 1;
} else {
  /* set max channel 32 */
  +dev->hw_info.max_ch = 32;
  +
  +if (0 == dev->hw_info.nr_chip) {
    +//for debug mode
    +dev->hw_info.nr_chip = 1;
    +}
  +
  +//xx
  +dev->hw_info.id_size = SSD_NAND_ID_SZ;
  +dev->hw_info.max_ce = SSD_NAND_MAX_CE;
  +
  +if (0 == dev->hw_info.nr_data_ch || 0 == dev->hw_info.nr_ch || 0 == dev->hw_info.nr_chip) {
    +hio_warn("%s: channel info error: data_ch %u ch %u chip %u\n", dev->name, dev->hw_info.nr_data_ch, dev->hw_info nr_ch, dev->hw_info nr_chip);
    +ret = -EINVAL;
    +goto out;
    +}
  +
  +/* ram info */
  +if (mode <= SSD_DRV_MODE_DEBUG) {
    +val = ssd_reg32_read(dev->ctrlp + SSD_RAM_INFO_REG);
    +dev->hw_info.ram_size = 0x4000000ull * (1ULL << (val & 0xF));
    +dev->hw_info.ram_align = 1U << ((val >> 12) & 0xF);
    +if (dev->hw_info.ram_align < SSD_RAM_ALIGN) {
      +if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
        +dev->hw_info.ram_align = SSD_RAM_ALIGN;
      } else {
        +hio_warn("%s: ram align error: %u\n", dev->name, dev->hw_info.ram_align);
        +ret = -EINVAL;
        +goto out;
      }
    }
    +dev->hw_info.ram_max_len = 0x1000 * (1U << ((val >> 16) & 0xF));
    +
    +if (0 == dev->hw_info.ram_size || 0 == dev->hw_info.ram_align || 0 == dev->hw_info.ram_max_len) {
      +hio_warn("%s: ram info error\n", dev->name);
      +ret = -EINVAL;
      +goto out;
    }
  }
```
if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
    dev->hw_info.log_sz = SSD_LOG_MAX_SZ;
} else {
    val = ssd_reg32_read(dev->ctrlp + SSD_LOG_INFO_REG);
    dev->hw_info.log_sz = 0x1000 * (1U << (val & 0xFF));
}
if (0 == dev->hw_info.log_sz) {
    hio_warn("%s: log size error", dev->name);
    ret = -EINVAL;
    goto out;
}
val = ssd_reg32_read(dev->ctrlp + SSD_BBT_BASE_REG);
dev->hw_info.bbt_base = 0x40000ull * (val & 0xFFFF);
dev->hw_info.bbt_size = 0x40000 * (((val >> 16) & 0xFFFF) + 1) / (dev->hw_info.max_ch * dev-
    hw_info.nr_chip);
if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
    if (dev->hw_info.bbt_base > dev->hw_info.ram_size || 0 == dev->hw_info.bbt_size) {
        hio_warn("%s: bbt info error", dev->name);
        ret = -EINVAL;
        goto out;
    }
}
val = ssd_reg32_read(dev->ctrlp + SSD_ECT_BASE_REG);
dev->hw_info.md_base = 0x40000ull * (val & 0xFFFF);
if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
    dev->hw_info.md_size = 0x40000 * (((val >> 16) & 0xFFF) + 1) / (dev->hw_info.max_ch * dev-
        hw_info.nr_chip);
} else {
    dev->hw_info.md_size = 0x40000 * (((val >> 16) & 0xFFF) + 1) / (dev->hw_info.nr_chip);
    dev->hw_info.md_entry_sz = 8 * (1U << ((val >> 28) & 0xF));
    if (dev->protocol_info.ver >= SSD_PROTOCOL_V3) {
        if (dev->hw_info.md_base > dev->hw_info.ram_size || 0 == dev->hw_info.md_size ||
            0 == dev->hw_info.md_entry_sz || dev->hw_info.md_entry_sz > dev->hw_info.md_size) {
            hio_warn("%s: md info error", dev->name);
            ret = -EINVAL;
            goto out;
        }
    }
    dev->hw_info.md_entry_sz = 8 * (1U << (val >> 28) & 0xF);
    if (dev->protocol_info.ver >= SSD_PROTOCOL_V3) {
        if (dev->hw_info.md_base > dev->hw_info.ram_size || 0 == dev->hw_info.md_size ||
            0 == dev->hw_info.md_entry_sz || dev->hw_info.md_entry_sz > dev->hw_info.md_size) {
            hio_warn("%s: md info error", dev->name);
            ret = -EINVAL;
            goto out;
        }
    }
    dev->hw_info.md_base = dev->hw_info.ram_size + 1;
} else {
    val = ssd_reg32_read(dev->ctrlp + SSD_NAND_BUFF_BASE);
+dev->hw_info.nand_wbuff_base = 0x8000ull * val;
+
+/* flash info */
+if (mode <= SSD_DRV_MODE_DEBUG) {
+if (dev->hw_info.nr_ctrl > 1) {
+val = ssd_reg32_read(dev->ctrlp + SSD_CTRL_VER_REG);
+dev->hw_info.ctrl_ver = val & 0xFFFF;
+hio_info("%s: controller firmware version: %03Xn", dev->name, dev->hw_info.ctrl_ver);
+
+val64 = ssd_reg_read(dev->ctrlp + SSD_FLASH_INFO_REG0);
+dev->hw_info.nand_vendor_id = ((val64 >> 56) & 0xFF);
+dev->hw_info.nand_dev_id = ((val64 >> 48) & 0xFF);
+
+dev->hw_info.block_count = (((val64 >> 32) & 0xFFFF) + 1);
+dev->hw_info.page_count = ((val64>>16) & 0xFFFF);
+dev->hw_info.page_size = (val64 & 0xFFFF);
+
+val = ssd_reg32_read(dev->ctrlp + SSD_BB_INFO_REG);
+dev->hw_info.bbf_pages = val & 0xFF;
+dev->hw_info.bbf_seek = (val >> 8) & 0x1;
+
+if (0 == dev->hw_info.block_count || 0 == dev->hw_info.page_count || 0 == dev->hw_info.page_size || dev->hw_info.block_count > INT_MAX) {
+hio_warn("%s: flash info error
", dev->name);
+ret = -EINVAL;
+goto out;
+
+//xx
+dev->hw_info.oob_size = SSD_NAND_OOB_SZ;((dev->hw_info.page_size) >> 5);
+
+val = ssd_reg32_read(dev->ctrlp + SSD_VALID_PAGES_REG);
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+dev->hw_info.valid_pages = val & 0x3FF;
+dev->hw_info.max_valid_pages = (val>>20) & 0x3FF;
+} else {
+dev->hw_info.valid_pages = val & 0x7FFF;
+dev->hw_info.max_valid_pages = (val>>15) & 0x7FFF;
+}
+
+if (0 == dev->hw_info.valid_pages || 0 == dev->hw_info.max_valid_pages || dev->hw_info.valid_pages > dev->hw_info.max_valid_pages || dev->hw_info.max_valid_pages > dev->hw_info.page_count) {
+hio_warn("%s: valid page info error: valid_pages %d, max_valid_pages %d\n", dev->name, dev->hw_info.valid_pages, dev->hw_info.max_valid_pages);
+ret = -EINVAL;
+}
+goto out;
+
+val = ssd_reg32_read(dev->ctrlp + SSD_RESERVED_BLKS_REG);
+dev->hw_info.reserved_blks = val & 0xFFFF;
+dev->hw_info.md_reserved_blks = (val >> 16) & 0xFF;
+if (dev->protocol_info.ver <= SSD_PROTOCOL_V3) {
+    dev->hw_info.md_reserved_blks = SSD_BBT_RESERVED;
+}
+if (dev->hw_info.reserved_blks > dev->hw_info.block_count || dev->hw_info.md_reserved_blks > dev->hw_info.block_count) {
+    hio_warn("%s: reserved blocks info error: reserved_blks %d, md_reserved_blks %d\n", dev->name, dev->hw_info.reserved_blks, dev->hw_info.md_reserved_blks);
+    ret = -EINVAL;
+    goto out;
+}
+
+/* size */
+if (mode < SSD_DRV_MODE_DEBUG) {
+    dev->hw_info.size = (uint64_t)dev->hw_info.valid_pages * dev->hw_info.page_size;
+    dev->hw_info.size *= (dev->hw_info.block_count - dev->hw_info.reserved_blks);
+    dev->hw_info.size *= ((uint64_t)dev->hw_info.nr_data_ch * (uint64_t)dev->hw_info.nr_chip * (uint64_t)dev->hw_info.nr_ctrl);
+}
+
+/* extend hardware info */
+val = ssd_reg32_read(dev->ctrlp + SSD_PCB_VER_REG);
+dev->hw_info_ext.board_type = (val >> 24) & 0xF;
+
+dev->hw_info_ext.form_factor = SSD_FORM_FACTOR_FHHL;
+if (dev->protocol_info.ver >= SSD_PROTOCOL_V3_2_1) {
+    dev->hw_info_ext.form_factor = (val >> 31) & 0x1;
+}
+
+/* power loss protect */
+val = ssd_reg32_read(dev->ctrlp + SSD_PLP_INFO_REG);
+dev->hw_info_ext.plp_type = (val & 0x3);
+if (SSD_BM_CAP_VINA != dev->hw_info_ext.cap_type && SSD_BM_CAP_JH != dev->hw_info_ext.cap_type)
+    dev->hw_info_ext.cap_type = SSD_BM_CAP_VINA;
+}
+
+/* 3 or 4 cap */
+dev->hw_info_ext.cap_type = ((val >> 2) & 0x1);
+}
+ /* work mode */
+ val = ssd_reg32_read(dev->ctrlp + SSD_CH_INFO_REG);
+ dev->hw_info_ext.work_mode = (val >> 25) & 0x1;
+
+ out:
+ /* skip error if not in standard mode */
+ if (mode != SSD_DRV_MODE_STANDARD) {
+ ret = 0;
+ }
+ return ret;
+ }
+
+ static void ssd_cleanup_response(struct ssd_device *dev)
+ {
+ int resp_msg_sz = dev->hw_info.resp_msg_sz * dev->hw_info.cmd_fifo_sz * SSD_MSIX_VEC;
+ int resp_ptr_sz = dev->hw_info.resp_ptr_sz * SSD_MSIX_VEC;
+ 
+ pci_free_consistent(dev->pdev, resp_ptr_sz, dev->resp_ptr_base, dev->resp_ptr_base_dma);
+ pci_free_consistent(dev->pdev, resp_msg_sz, dev->resp_msg_base, dev->resp_msg_base_dma);
+ }
+
+ static int ssd_init_response(struct ssd_device *dev)
+ {
+ int resp_msg_sz = dev->hw_info.resp_msg_sz * dev->hw_info.cmd_fifo_sz * SSD_MSIX_VEC;
+ int resp_ptr_sz = dev->hw_info.resp_ptr_sz * SSD_MSIX_VEC;
+
+ dev->resp_msg_base = pci_alloc_consistent(dev->pdev, resp_msg_sz, &(dev->resp_msg_base_dma));
+ if (!dev->resp_msg_base) {
+ hio_warn("%s: unable to allocate resp msg DMA buffer\n", dev->name);
+ goto out_alloc_resp_msg;
+ }
+ memset(dev->resp_msg_base, 0xFF, resp_msg_sz);
+ 
+ dev->resp_ptr_base = pci_alloc_consistent(dev->pdev, resp_ptr_sz, &(dev->resp_ptr_base_dma));
+ if (!dev->resp_ptr_base) {
+ hio_warn("%s: unable to allocate resp ptr DMA buffer\n", dev->name);
+ goto out_alloc_resp_ptr;
+ }
+ memset(dev->resp_ptr_base, 0, resp_ptr_sz);
+ 
+ dev->resp_idx = *(uint32_t *)(dev->resp_ptr_base) = dev->hw_info.cmd_fifo_sz * 2 - 1;
+ 
+ ssd_reg_write(dev->ctrlp + SSD_RESP_FIFO_REG, dev->resp_msg_base_dma);
+ ssd_reg_write(dev->ctrlp + SSD_RESP_PTR_REG, dev->resp_ptr_base_dma);
+ 
+ return 0;
+ }
+
+ out_alloc_resp_ptr:
+pci_free_consistent(dev->pdev, resp_msg_sz, dev->resp_msg_base, dev->resp_msg_base_dma);
+out_alloc_resp_msg:
+return -ENOMEM;
+
+static int ssd_cleanup_cmd(struct ssd_device *dev)
+{
+int msg_sz = ALIGN(sizeof(struct ssd_rw_msg) + (dev->hw_info.cmd_max_sg - 1) * sizeof(struct ssd_sg_entry), SSD_DMA_ALIGN);
+int i;
+
+for (i=0; i<(int)dev->hw_info.cmd_fifo_sz; i++) {
+kfree(dev->cmd[i].sgl);
+}
+kfree(dev->cmd);
+pci_free_consistent(dev->pdev, (msg_sz * dev->hw_info.cmd_fifo_sz), dev->msg_base, dev->msg_base_dma);
+return 0;
+}
+
+static int ssd_init_cmd(struct ssd_device *dev)
+{
+int sgl_sz = sizeof(struct scatterlist) * dev->hw_info.cmd_max_sg;
+int cmd_sz = sizeof(struct ssd_cmd) * dev->hw_info.cmd_fifo_sz;
+int msg_sz = ALIGN(sizeof(struct ssd_rw_msg) + (dev->hw_info.cmd_max_sg - 1) * sizeof(struct ssd_sg_entry), SSD_DMA_ALIGN);
+int i;
+
+spin_lock_init(&dev->cmd_lock);
+
+dev->msg_base = pci_alloc_consistent(dev->pdev, (msg_sz * dev->hw_info.cmd_fifo_sz), &dev->msg_base_dma);
+if (!dev->msg_base) {
+hio_warn("%s: can not alloc cmd msg\n", dev->name);
+goto out_alloc_msg;
+}
+
+dev->cmd = kmalloc(cmd_sz, GFP_KERNEL);
+if (!dev->cmd) {
+hio_warn("%s: can not alloc cmd\n", dev->name);
+goto out_alloc_cmd;
+}
+memset(dev->cmd, 0, cmd_sz);
+
+for (i=0; i<(int)dev->hw_info.cmd_fifo_sz; i++) {
+dev->cmd[i].sgl = kmalloc(sgl_sz, GFP_KERNEL);
+if (!dev->cmd[i].sgl) {
+hio_warn("%s: can not alloc cmd sgl\n", dev->name, i);
+goto out_alloc_sgl;
+}

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+dev->cmd[i].msg = dev->msg_base + (msg_sz * i);
+dev->cmd[i].msg_dma = dev->msg_base_dma + ((dma_addr_t)msg_sz * i);
+
+dev->cmd[i].dev = dev;
+dev->cmd[i].tag = i;
+dev->cmd[i].flag = 0;
+
+INIT_LIST_HEAD(&dev->cmd[i].list);
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3) {
+  dev->scmd = ssd_dispatch_cmd;
+} else {
+  ssd_reg_write(dev->ctrlp + SSD_MSG_BASE_REG, dev->msg_base_dma);
+  if (finject) {
+    dev->scmd = ssd_send_cmd_db;
+  } else {
+    dev->scmd = ssd_send_cmd;
+  }
+}
+
+return 0;
+
+out_alloc_sgl:
+for (i--; i>=0; i--) {
+  kfree(dev->cmd[i].sgl);
+}
+kfree(dev->cmd);
+out_alloc_cmd:
pici_free_consistent(dev->pdev, (msg_sz * dev->hw_info.cmd_fifo_sz), dev->msg_base, dev->msg_base_dma);
+out_alloc_msg:
+return -ENOMEM;
+
+#if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,30))
+static irqreturn_t ssd_interrupt_check(int irq, void *dev_id)
+{
+  struct ssd_queue *queue = (struct ssd_queue *)dev_id;
+  if (*(uint32_t *)queue->resp_ptr == queue->resp_idx) {
+    return IRQ_NONE;
+  }
+  return IRQ_WAKE_THREAD;
+}
+}
+
+static irqreturn_t ssd_interrupt_threaded(int irq, void *dev_id)
+{
+struct ssd_queue *queue = (struct ssd_queue *)dev_id;
+struct ssd_device *dev = (struct ssd_device *)queue->dev;
+struct ssd_cmd *cmd;
+union ssd_response_msq __msg;
+union ssd_response_msq *msg = &__msg;
+uint64_t *u64_msg;
+uint32_t resp_idx = queue->resp_idx;
+uint32_t new_resp_idx = *(uint32_t *)queue->resp_ptr;
+uint32_t end_resp_idx;
+
+if (unlikely(resp_idx == new_resp_idx)) {
+return IRQ_NONE;
+}
+
+end_resp_idx = new_resp_idx & queue->resp_idx_mask;
+
+do {
+resp_idx = (resp_idx + 1) & queue->resp_idx_mask;
+
+/* the resp msg */
+u64_msg = (uint64_t *)(queue->resp_msg + queue->resp_msg_sz * resp_idx);
+msg->u64_msg = *u64_msg;
+
+if (unlikely(msg->u64_msg == (uint64_t)(-1))) {
+hio_err("%s: empty resp msg: queue %d idx %u\n", dev->name, queue->idx, resp_idx);
+continue;
+}
+
+/* clear the resp msg */
+*u64_msg = (uint64_t)(-1);
+
+cmd = &queue->cmd[msg->resp_msg.tag];
+
+if (unlikely(!cmd->bio)) {
+printk(KERN_WARNING "%s: unknown tag %d fun %#x\n", dev->name, msg->resp_msg.tag, msg->resp_msg.fun);
+continue;
+}
+
+if(unlikely(msg->resp_msg.status & (uint32_t)status_mask)) {
+cmd->errors = -EIO;
+} else {
+cmd->errors = 0;
+
+cmd->nr_log = msg->log_resp_msg.nr_log;
+
+ssd_done(cmd);
+
+}
+if (unlikely(msg->resp_msg.fun != SSD_FUNC_READ_LOG && msg->resp_msg.log > 0)) {
+(void)test_and_set_bit(SSD_LOG_HW, &dev->state);
+if (test_bit(SSD_INIT_WORKQ, &dev->state)) {
+queue_work(dev->workq, &dev->log_work);
+}
+
+if (unlikely(msg->resp_msg.status)) {
+if (msg->resp_msg.fun == SSD_FUNC_READ || msg->resp_msg.fun == SSD_FUNC_WRITE) {
+hio_err("%s: I/O error %d: tag %d fun %#x\n",
+dev->name, msg->resp_msg.status, msg->resp_msg.tag, msg->resp_msg.fun);
+
+/* alarm led */
+ssd_set_alarm(dev);
+queue->io_stat.nr_rwerr++;
+ssd_gen_swlog(dev, SSD_LOG_EIO, msg->u32_msg[0]);
+} else {
+hio_info("%s: CMD error %d: tag %d fun %#x\n",
+dev->name, msg->resp_msg.status, msg->resp_msg.tag, msg->resp_msg.fun);
+
+ssd_gen_swlog(dev, SSD_LOG_ECMD, msg->u32_msg[0]);
+}
+queue->io_stat.nr_ioerr++;
+
+if (msg->resp_msg.fun == SSD_FUNC_READ ||
+msg->resp_msg.fun == SSD_FUNC_NAND_READ_WOOB ||
+msg->resp_msg.fun == SSD_FUNC_NAND_READ) {
+
+queue->ecc_info.bitflip[msg->resp_msg.bitflip]++;
+}
+} while (resp_idx != end_resp_idx);
+
+queue->resp_idx = new_resp_idx;
+
+return IRQ_HANDLED;
+
+#endif
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,19))
+static irqreturn_t ssd_interrupt(int irq, void *dev_id, struct pt_regs *regs)
+#{else
+static irqreturn_t ssd_interrupt(int irq, void *dev_id)
+#{endif
+
+{ struct ssd_queue *queue = (struct ssd_queue *)dev_id;
+struct ssd_device *dev = (struct ssd_device *)queue->dev;
+struct ssd_cmd *cmd;

+union ssd_response_msg __msg;  
+union ssd_response_msg *msg = &__msg;  
+uint64_t *u64_msg;  
+uint32_t resp_idx = queue->resp_idx;  
+uint32_t new_resp_idx = *(uint32_t *)queue->resp_ptr;  
+uint32_t end_resp_idx;  
+  
+if (unlikely(resp_idx == new_resp_idx)) {  
+return IRQ_NONE;  
+}  
+  
+#if (defined SSD_ESCAPE_IRQ)  
+if (SSD_INT_MSIX != dev->int_mode) {  
+dev->irq_cpu = smp_processor_id();  
+}  
+#endif  
+  
+end_resp_idx = new_resp_idx & queue->resp_idx_mask;  
+  
+do {  
+resp_idx = (resp_idx + 1) & queue->resp_idx_mask;  
+  
+/* the resp msg */  
+u64_msg = (uint64_t *)(queue->resp_msg + queue->resp_msg_sz * resp_idx);  
+msg->u64_msg = *u64_msg;  
+  
+if (unlikely(msg->u64_msg == (uint64_t)(-1))) {  
+hio_err("%s: empty resp msg: queue %d idx %u
", dev->name, queue->idx, resp_idx);  
+continue;  
+}  
+/* clear the resp msg */  
+*u64_msg = (uint64_t)(-1);  
+  
+cmd = &queue->cmd[msg->resp_msg.tag];  
+/*if (unlikely(!cmd->bio)) {  
+printk(KERN_WARNING "%s: unknown tag %d fun %#x\n",  
+dev->name, msg->resp_msg.tag, msg->resp_msg.fun);  
+continue;  
+}*/  
+  
+if(unlikely(msg->resp_msg.status & (uint32_t)status_mask)) {  
+cmd->errors = -EIO;  
+} else {  
+cmd->errors = 0;  
+}  
+cmd->nr_log = msg->log_resp_msg.nr_log;  
+  
+ssd_done_bh(cmd);  

+if (unlikely(msg->resp_msg.fun != SSD_FUNC_READ_LOG && msg->resp_msg.log > 0)) {
+(void)test_and_set_bit(SSD_LOG_HW, &dev->state);
+if (test_bit(SSD_INIT_WORKQ, &dev->state)) {
+queue_work(dev->workq, &dev->log_work);
+}
+}
+
+if (unlikely(msg->resp_msg.status)) {
+if (msg->resp_msg.fun == SSD_FUNC_READ || msg->resp_msg.fun == SSD_FUNC_WRITE) {
+hio_err("%s: I/O error %d: tag %d fun %#x\n",
+dev->name, msg->resp_msg.status, msg->resp_msg.tag, msg->resp_msg.fun);
+
+/* alarm led */
+ssd_set_alarm(dev);
+ssd_gen_swlog(dev, SSD_LOG_EIO, msg->u32_msg[0]);
+} else {
+hio_info("%s: CMD error %d: tag %d fun %#x\n",
+dev->name, msg->resp_msg.status, msg->resp_msg.tag, msg->resp_msg.fun);
++
+ssd_gen_swlog(dev, SSD_LOG_ECMD, msg->u32_msg[0]);
+}
+queue->io_stat.nr_ioerr++;
+}
+
+if (msg->resp_msg.fun == SSD_FUNC_READ ||
+msg->resp_msg.fun == SSD_FUNC_NAND_READ_WOOB ||
+msg->resp_msg.fun == SSD_FUNC_NAND_READ) {
+
+queue->ecc_info.bitflip[msg->resp_msg.bitflip]++;
+}
+} while (resp_idx != end_resp_idx);
+
+queue->resp_idx = new_resp_idx;
+
+return IRQ_HANDLED;
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,19))
+static irqreturn_t ssd_interrupt_legacy(int irq, void *dev_id, struct pt_regs *regs)
+#else
+static irqreturn_t ssd_interrupt_legacy(int irq, void *dev_id)
+#endif
+{
+irqreturn_t ret;
+struct ssd_queue *queue = (struct ssd_queue *)dev_id;
+struct ssd_device *dev = (struct ssd_device *)queue->dev;
+
+//if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,19))
+ret = ssd_interrupt(irq, dev_id, regs);
+//else
+ret = ssd_interrupt(irq, dev_id);
+//endif
+
+/* clear intr */
+if (IRQ_HANDLED == ret) {
+ssd_reg32_write(dev->ctrlp + SSD_CLEAR_INTR_REG, 1);
+}
+
+return ret;
+
+static void ssd_reset_resp_ptr(struct ssd_device *dev)
+{
+int i;
+
+for (i=0; i<dev->nr_queue; i++) {
++(uint32_t *)dev->queue[i].resp_ptr = dev->queue[i].resp_idx = (dev->hw_info.cmd_fifo_sz * 2) - 1;
++}
+
+static void ssd_free_irq(struct ssd_device *dev)
+{
+int i;
+
+//if ((LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,35)) && (defined RHEL_MAJOR && RHEL_MAJOR == 6)) && (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+if (SSD_INT_MSIX == dev->int_mode) {
+for (i=0; i<dev->nr_queue; i++) {
+irq_set_affinity_hint(dev->entry[i].vector, NULL);
+}
+
+//endif
+
+for (i=0; i<dev->nr_queue; i++) {
+//if (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+free_irq(dev->entry[i].vector, &dev->queue[i]);
+//else
+free_irq(pci_irq_vector(dev->pdev, i), &dev->queue[i]);
+//endif
+}
+
+if (SSD_INT_MSIX == dev->int_mode) {
+pci_disable_msix(dev->pdev);
+} else if (SSD_INT_MSI == dev->int_mode) {
+
+pci_disable_msi(dev->pdev);
+
+}
+
+static int ssd_init_irq(struct ssd_device *dev)
+{
+    
+    +#if (!defined MODULE) && (defined SSD_MSIX_AFFINITY_FORCE) && (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+    +const struct cpumask *cpu_mask = NULL;
+    +static int cpu_affinity = 0;
+    +#endif
+    
+    +#if ((LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,35)) || (defined RHEL_MAJOR && RHEL_MAJOR == 6)) && (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+    +const struct cpumask *mask = NULL;
+    +static int cpu = 0;
+    +#endif
+    
+    +int i;
+    +unsigned long flags = 0;
+    +int ret = 0;
+    +
+    +ssd_reg32_write(dev->ctrlp + SSD_INTR_INTERVAL_REG, 0x800);
+    +
+    +#ifdef SSD_ESCAPE_IRQ
+    +dev->irq_cpu = -1;
+    +#endif
+    +
+    +#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+    +if (int_mode >= SSD_INT_MSIX && pci_find_capability(dev->pdev, PCI_CAP_ID_MSIX)) {
+        +dev->nr_queue = SSD_MSIX_VEC;
+        +
+        +for (i=0; i<dev->nr_queue; i++) {
+            +dev->entry[i].entry = i;
+            +}
+        +
+        +for (;;) {
+            +ret = pci_enable_msix(dev->pdev, dev->entry, dev->nr_queue);
+            +if (ret == 0) {
+                +break;
+            +} else if (ret > 0) {
+                +dev->nr_queue = ret;
+            +} else {
+                +hio_warn("%s: can not enable msix\n", dev->name);
+                +/* alarm led */
+                +ssd_set_alarm(dev);
+                +goto out;
+            +}
+        +}
+    +} else if (ret > 0) {
+        +dev->nr_queue = ret;
+    +} else {
+        +hio_warn("%s: can not enable msix\n", dev->name);
+        +/* alarm led */
+        +ssd_set_alarm(dev);
+        +goto out;
+    +}
+    +
+    +
+}
+  +#if ((LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,35)) || (defined RHEL_MAJOR &&
+ RHEL_MAJOR == 6))
+  #if ((0 == cpu) || (!cpumask_intersects(mask, cpumask_of(cpu)))) {
+    cpu = cpumask_first(mask);
+  }
+  +for (i=0; i<dev->nr_queue; i++) {
+    irq_set_affinity_hint(dev->entry[i].vector, cpumask_of(cpu));
+    cpu = cpumask_next(cpu, mask);
+    if (cpu >= nr_cpu_ids) {
+      cpu = cpumask_first(mask);
+    }
+  }
+  +#endif
+  +dev->int_mode = SSD_INT_MSIX;
+} else if (int_mode >= SSD_INT_MSI &&
+  pci_find_capability(dev->pdev, PCI_CAP_ID_MSI)) {
+  ret = pci_enable_msi(dev->pdev);
+  if (ret) {
+    hio_warn("%s: can not enable msi\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
+    goto out;
+  }
+  +dev->nr_queue = SSD_MSIX_VEC;
+  dev->nr_queue = pci_alloc_irq_vectors(dev->pdev, 1, dev->nr_queue, PCI_IRQ_MSIX | PCI_IRQ_AFFINITY);
+  if (dev->nr_queue <= 0) {
+    ret = -EIO;
+    hio_warn("%s: can not enable msix\n", dev->name);
+    ssd_set_alarm(dev);
+    goto out;
+  }
+ dev->int_mode = SSD_INT_MSIX;
+ } else if (int_mode >= SSD_INT_MSI && pci_find_capability(dev->pdev, PCI_CAP_ID_MSI)) {
+ ret = pci_alloc_irq_vectors(dev->pdev, 1, 1, PCI_IRQ_MSI | PCI_irq_Affinity);
+ if (ret <= 0) {
+ ret = -EIO;
+ hio_warn("%s: can not enable msi
", dev->name);
+ /* alarm led */
+ ssd_set_alarm(dev);
+ goto out;
+ }
+ dev->nr_queue = 1;
+ +
+ dev->int_mode = SSD_INT_MSI;
+ } else {
+ ret = pci_alloc_irq_vectors(dev->pdev, 1, 1, PCI_IRQ_LEGACY);
+ +
+ if (ret <= 0) {
+ ret = -EIO;
+ hio_warn("%s: can not enable msi
", dev->name);
+ /* alarm led */
+ ssd_set_alarm(dev);
+ goto out;
+ }
+ dev->nr_queue = 1;
+ +
+ dev->int_mode = SSD_INT_LEGACY;
+ +
+ #endif
+ +
+ for (i=0; i<dev->nr_queue; i++) {
+ + if (dev->nr_queue > 1) {
+ snprintf(dev->queue[i].name, SSD_QUEUE_NAME_LEN, "%s_e100-%d", dev->name, i);
+ } else {
+ snprintf(dev->queue[i].name, SSD_QUEUE_NAME_LEN, "%s_e100", dev->name);
+ }
+ +
+ dev->queue[i].dev = dev;
+ dev->queue[i].idx = i;
+ +
+ dev->queue[i].resp_idx = (dev->hw_info.cmd_fifo_sz * 2) - 1;
+ dev->queue[i].resp_idx_mask = dev->hw_info.cmd_fifo_sz - 1;
+ +
+ dev->queue[i].resp_msg_sz = dev->hw_info.resp_msg_sz;
+ dev->queue[i].resp_msg = dev->resp_msg_base + dev->hw_info.resp_msg_sz * dev->hw_info.cmd_fifo_sz * i;
+ dev->queue[i].resp_ptr = dev->resp_ptr_base + dev->hw_info.resp_ptr_sz * i;
+ *(uint32_t *)dev->queue[i].resp_ptr = dev->queue[i].resp_idx;
+ dev->queue[i].cmd = dev->cmd;
+
+} #if (LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,20))
+ flags = IRQF_SHARED;
+} #else
+ flags = SA_SHIRQ;
+} #endif
+
+for (i=0; i<dev->nr_queue; i++) {
+} #if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,30))
+ if (dev->int_mode == SSD_INT_LEGACY) {
+ ret = request_irq(dev->entry[i].vector, &ssd_interrupt_legacy, flags, dev->queue[i].name, &dev->queue[i]);
+ } else {
+ ret = request_irq(dev->entry[i].vector, &ssd_interrupt, flags, dev->queue[i].name, &dev->queue[i]);
+ }
+} #elif (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+ if (threaded_irq) {
+ ret = request_threaded_irq(dev->entry[i].vector, ssd_interrupt_check, ssd_interrupt_threaded, flags, dev->queue[i].name, &dev->queue[i]);
+ } else if (dev->int_mode == SSD_INT_LEGACY) {
+ ret = request_irq(dev->entry[i].vector, &ssd_interrupt_legacy, flags, dev->queue[i].name, &dev->queue[i]);
+ } else {
+ ret = request_irq(dev->entry[i].vector, &ssd_interrupt, flags, dev->queue[i].name, &dev->queue[i]);
+ }
+} #else
+ if (threaded_irq) {
+ ret = request_threaded_irq(pci_irq_vector(dev->pdev, i), ssd_interrupt_check, ssd_interrupt_threaded, flags, dev->queue[i].name, &dev->queue[i]);
+ } else if (dev->int_mode == SSD_INT_LEGACY) {
+ ret = request_irq(pci_irq_vector(dev->pdev, i), &ssd_interrupt_legacy, flags, dev->queue[i].name, &dev->queue[i]);
+ } else {
+ ret = request_irq(pci_irq_vector(dev->pdev, i), &ssd_interrupt, flags, dev->queue[i].name, &dev->queue[i]);
+ }
+} #endif
+
+ if (ret) {
+ hio_warn("%s: request irq failed\n", dev->name);
+ /* alarm led */
+ ssd_set_alarm(dev);
+ goto out_request_irq;
+ }
+} #if (!defined MODULE) && (defined SSD_MSIX_AFFINITY_FORCE) && (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
+ cpu_mask = (dev_to_node(&dev->pdev) == -1) ? cpu_online_mask : cpumask_of_node(dev_to_node(&dev->pdev));
if (SSD_INT_MSIX == dev->int_mode) {
+if (!cpu_affinity) || (!cpumask_intersects(mask, cpumask_of(cpu_affinity))) {
+cpu_affinity = cpumask_first(cpu_mask);
+
+irq_set_affinity(dev->entry[i].vector, cpumask_of(cpu_affinity));
+cpu_affinity = cpumask_next(cpu_affinity, cpu_mask);
+if (cpu_affinity >= nr_cpu_ids) {
+cpu_affinity = cpumask_first(cpu_mask);
+}
+}
+}
+}
+}
+
+out_request_irq:
+)
+
+for (i--; i>=0; i--) {
++if (LINUX_VERSION_CODE < KERNEL_VERSION(4,10,0))
++free_irq(dev->entry[i].vector, &dev->queue[i]);
++}
++}
++}
++
++free_irq(pci_irq_vector(dev->pdev, i), &dev->queue[i]);
++}
++}
++
++if (SSD_INT_MSIX == dev->int_mode) {
++pci_disable_msix(dev->pdev);
++} else if (SSD_INT_MSI == dev->int_mode) {
++pci_disable_msi(dev->pdev);
++}
++
++out:
++return ret;
++}
++
++static void ssd_initial_log(struct ssd_device *dev)
++{+uint32_t val;
++uint32_t speed, width;
+ if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+ return;
+ |
+ + val = ssd_reg32_read(dev->ctrlp + SSD_POWER_ON_REG);
+ if (val) {
+ // Poweron detection switched to SSD_INTR_INTERVAL_REG in 'ssd_init_smart'
+ // ssd_gen_swlog(dev, SSD_LOG_POWER_ON, dev->hw_info.bridge_ver);
+ }
+ + val = ssd_reg32_read(dev->ctrlp + SSD_PCIE_LINKSTATUS_REG);
+ +speed = val & 0xF;
+ +width = (val >> 4) & 0xF3;
+ +if (0x1 == speed) {
+ hio_info("%s: PCIe: 2.5GT/s, x%u\n", dev->name, width);
+ +} else if (0x2 == speed) {
+ hio_info("%s: PCIe: 5GT/s, x%u\n", dev->name, width);
+ +} else {
+ hio_info("%s: PCIe: unknown GT/s, x%u\n", dev->name, width);
+ +}
+ +ssd_gen_swlog(dev, SSD_LOG_PCIE_LINK_STATUS, val);
+ + return;
+ +}
+ +
+ +#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+ +static void ssd_hwmon_worker(void *data)
+ +{
+ +struct ssd_device *dev = (struct ssd_device *)data;
+ +else
+ +static void ssd_hwmon_worker(struct work_struct *work)
+ +{
+ +struct ssd_device *dev = container_of(work, struct ssd_device, hwmon_work);
+ +#endif
+ + if (ssd_check_hw(dev)) {
+ +hio_err("%s: check hardware failed\n", dev->name);
+ + return;
+ +}
+ + ssd_check_clock(dev);
+ + ssd_check_volt(dev);
+ + ssd_mon_boardvolt(dev);
+ +}
+ +
+ +#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+static void ssd_tempmon_worker(void *data) +{
+    struct ssd_device *dev = (struct ssd_device *)data; +
+} +
+static void ssd_tempmon_worker(struct work_struct *work) +{
+    struct ssd_device *dev = container_of(work, struct ssd_device, tempmon_work); +
+} +
+
+if (ssd_check_hw(dev)) {
+    //hio_err("%s: check hardware failed\n", dev->name); +
+    return; +
+}
+
+ssd_mon_temp(dev); +
+
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+static void ssd_capmon_worker(void *data) +{
+    struct ssd_device *dev = (struct ssd_device *)data; +
+} +
+else
+static void ssd_capmon_worker(struct work_struct *work) +{
+    struct ssd_device *dev = container_of(work, struct ssd_device, capmon_work); +
+} +
+#endif
+uint32_t cap = 0;
+uint32_t cap_threshold = SSD_PL_CAP_THRESHOLD;
+int ret = 0;
+
+if (dev->protocol_info.ver < SSD_PROTOCOL_V3_2) {
+    return; +
+}
+
+if (dev->hw_info_ext.form_factor == SSD_FORM_FACTOR_FHHL && dev->hw_info.pcb_ver < 'B') {
+    return; +
+} +
+
+/* fault before? */ +
+if (test_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon)) {
+    ret = ssd_check_pl_cap_fast(dev); +    if (ret) {
+        return; +
+    }
+
+/* learn */
ret = ssd_do_cap_learn(dev, &cap);
if (ret) {
    hio_err("%s: cap learn failed\n", dev->name);
    ssd_gen_swlog(dev, SSD_LOG_CAP_LEARN_FAULT, 0);
    return;
}

ssd_gen_swlog(dev, SSD_LOG_CAP_STATUS, cap);

if (SSD_PL_CAP_CP == dev->hw_info_ext.cap_type) {
    cap_threshold = SSD_PL_CAP_CP_THRESHOLD;
}

#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
static void ssd_routine_start(void *data)
#else
static void ssd_routine_start(struct timer_list *t)
#endif
{
    struct ssd_device *dev;

#if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
    if (!data) {
        return;
    }
    dev = data;
#else
    dev = from_timer(dev, t, routine_timer);
#endif

    dev->routine_tick++;

    if (test_bit(SSD_INIT_WORKQ, &dev->state) && !ssd_busy(dev)) {
        (void)test_and_set_bit(SSD_LOG_HW, &dev->state);
        queue_work(dev->workq, &dev->log_work);
    }

#else if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
static void ssd_routine_start(void *data)
#else
static void ssd_routine_start(struct timer_list *t)
#endif
{  
    struct ssd_device *dev;

#else if (LINUX_VERSION_CODE < KERNEL_VERSION(4,15,0))
    if (!data) {
        return;
    }
    dev = data;
#else
    dev = from_timer(dev, t, routine_timer);
#endif

    dev->routine_tick++;

    if (test_bit(SSD_INIT_WORKQ, &dev->state) && !ssd_busy(dev)) {
        (void)test_and_set_bit(SSD_LOG_HW, &dev->state);
        queue_work(dev->workq, &dev->log_work);
    }
if ((dev->routine_tick % SSD_HWMON_ROUTINE_TICK) == 0 && test_bit(SSD_INIT_WORKQ, &dev->state)) {
    queue_work(dev->workq, &dev->hwmon_work);
}
+
if ((dev->routine_tick % SSD_CAPMON_ROUTINE_TICK) == 0 && test_bit(SSD_INIT_WORKQ, &dev->state)) {
    queue_work(dev->workq, &dev->capmon_work);
}
+
if ((dev->routine_tick % SSD_CAPMON2_ROUTINE_TICK) == 0 && test_bit(SSD_HWMON_PL_CAP(SSD_PL_CAP), &dev->hwmon) && test_bit(SSD_INIT_WORKQ, &dev->state)) {
    /* CAP fault? check again */
    queue_work(dev->workq, &dev->capmon_work);
}
+
if (test_bit(SSD_INIT_WORKQ, &dev->state)) {
    queue_work(dev->workq, &dev->tempmon_work);
}
+
/* schedule routine */
mod_timer(&dev->routine_timer, jiffies + msecs_to_jiffies(SSD_ROUTINE_INTERVAL));
+
static void ssd_cleanup_routine(struct ssd_device *dev) {
    if (unlikely(mode != SSD_DRV_MODE_STANDARD))
        return;
    (void)ssd_del_timer(&dev->routine_timer);
    (void)ssd_del_timer(&dev->bm_timer);
}
+
static int ssd_init_routine(struct ssd_device *dev) {
    if (unlikely(mode != SSD_DRV_MODE_STANDARD))
        return 0;
    +#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
    INIT_WORK(&dev->bm_work, ssd_bm_worker, dev);
    INIT_WORK(&dev->hwmon_work, ssd_hwmon_worker, dev);
    INIT_WORK(&dev->capmon_work, ssd_capmon_worker, dev);
    INIT_WORK(&dev->tempmon_work, ssd_tempmon_worker, dev);
    +#else
    INIT_WORK(&dev->bm_work, ssd_bm_worker);
    +#endif

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INIT_WORK(&dev->hwmon_work, ssd_hwmon_worker);
INIT_WORK(&dev->capmon_work, ssd_capmon_worker);
INIT_WORK(&dev->tempmon_work, ssd_tempmon_worker);
#ifdef
+
/* initial log */
+ssd_initial_log(dev);
+
/* schedule bm routine */
+ssd_add_timer(&dev->bm_timer, msecs_to_jiffies(SSD_BM_CAP_LEARNING_DELAY), ssd_bm_routine_start, dev);
+
/* schedule routine */
+ssd_add_timer(&dev->routine_timer, msecs_to_jiffies(SSD_ROUTINE_INTERVAL), ssd_routine_start, dev);
+return 0;
+
+static void
+if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,38))
+__devexit
+#endif
+ssd_remove_one (struct pci_dev *pdev)
+{
+struct ssd_device *dev;
+
+if (!pdev) {
+return;
+}
+
+dev = pci_get_drvdata(pdev);
+
+if (!dev) {
+return;
+}
+
+list_del_init(&dev->list);
+
+ssd_unregister_sysfs(dev);
+
+offline firstly */
+test_and_clear_bit(SSD_ONLINE, &dev->state);
+
+clean work queue first */
+if (!dev->slave) {
+test_and_clear_bit(SSD_INIT_WORKQ, &dev->state);
+ssd_cleanup_workq(dev);
+}
+

/* flush cache */
(void)ssd_flush(dev);
(void)ssd_save_md(dev);
+
/* save smart */
if (!dev->slave) {
ssd_save_smart(dev);
}
+
if (test_and_clear_bit(SSD_INIT_BD, &dev->state)) {
ssd_cleanup_blkdev(dev);
}
+
if (!dev->slave) {
ssd_cleanup_chardev(dev);
}
+
/* clean routine */
if (!dev->slave) {
ssd_cleanup_routine(dev);
}
+
ssd_cleanup_queue(dev);
+
ssd_cleanup_tag(dev);
ssd_cleanup_thread(dev);
+
ssd_free_irq(dev);
+
ssd_cleanup_dcmd(dev);
ssd_cleanup_cmd(dev);
ssd_cleanup_response(dev);
+
if (!dev->slave) {
ssd_cleanup_log(dev);
}
+
if (dev->reload_fw) { //reload fw
dev->has_non_0x98_reg_access = 1;
ssd_reg32_write(dev->ctrlp + SSD_RELOAD_FW_REG, SSD_RELOAD_FW);
}
+
/* unmap physical adress */
#ifdef LINUX_SUSE_OS
iounmap(dev->ctrlp);
#else
pci_iounmap(pdev, dev->ctrlp);
#endif
+release_mem_region(dev->mmio_base, dev->mmio_len);
+
+pci_disable_device(pdev);
+
+pci_set_drvdata(pdev, NULL);
+
+ssd_put(dev);
+
}
+
+static int
+__devinit
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,38))
+__devinit
+#endif
+ssd_init_one(struct pci_dev *pdev,
+const struct pci_device_id *ent)
+{
+struct ssd_device *dev;
+struct timeval tv;
+int ret = 0;
+
+if (!pdev || !ent) {
+ret = -EINVAL;
+goto out;
+}
+
+dev = kmalloc(sizeof(struct ssd_device), GFP_KERNEL);
+if (!dev) {
+ret = -ENOMEM;
+goto out_alloc_dev;
+}
+
+dev = kmalloc(sizeof(struct ssd_device), GFP_KERNEL);
+if (!dev) {
+ret = -ENOMEM;
+goto out_alloc_dev;
+}
+
+memset(dev, 0, sizeof(struct ssd_device));
+
+dev->owner = THIS_MODULE;
+
+if (SSD_SLAVE_PORT_DEVID == ent->device) {
+dev->slave = 1;
+}
+
+dev->idx = ssd_get_index(dev->slave);
+if (dev->idx < 0) {
+ret = -ENOMEM;
+goto out_get_index;
+}
+
+snprintf(dev->name, SSD_DEV_NAME_LEN, SSD_DEV_NAME);
strlen(SSD_DEV_NAME), dev->idx);
+
+dev->major = ssd_major;
+dev->cmajor = ssd_cmajor;
+} else {
+snprintf(dev->name, SSD_DEV_NAME_LEN, SSD_SDEV_NAME);
+ssd_set_dev_name(&dev->name[strlen(SSD_SDEV_NAME)], SSD_DEV_NAME_LEN-
+strlen(SSD_SDEV_NAME), dev->idx);
+dev->major = ssd_major_sl;
+dev->cmajor = 0;
+}
+
+do_gettimeofday(&tv);
+dev->reset_time = tv.tv_sec;
+
+atomic_set(&(dev->refcnt), 0);
+atomic_set(&(dev->tocnt), 0);
+
+mutex_init(&dev->fw_mutex);
+
+mutex_init(&dev->gd_mutex);
+dev->has_non_0x98_reg_access = 0;
+
+//init in_flight lock
+spin_lock_init(&dev->in_flight_lock);
+
+dev->pdev = pdev;
+pci_set_drvdata(pdev, dev);
+
+kref_init(&dev->kref);
+
+ret = pci_enable_device(pdev);
+if (ret) {
+hio_warn("%s: can not enable device\n", dev->name);
+goto out_enable_device;
+}
+
+pci_set_master(pdev);
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,31))
+ret = pci_set_dma_mask(pdev, DMA_64BIT_MASK);
+#else
+ret = pci_set_dma_mask(pdev, DMA_BIT_MASK(64));
+#endif
+if (ret) {
+hio_warn("%s: set dma mask: failed\n", dev->name);
+goto out_set_dma_mask;
}
+} 
+ 
+##if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,31)) 
+ret = pci_set_consistent_dma_mask(pdev, DMA_64BIT_MASK); 
+##else 
+ret = pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(64)); 
+##endif 
+if (ret) { 
+hiowarn("%s: set consistent dma mask: failed\n", dev->name); 
goto out_set_dma_mask; 
+} 
+ 
+dev->mmio_base = pci_resource_start(pdev, 0); 
+dev->mmio_len = pci_resource_len(pdev, 0); 
+  
+##if (!request_mem_region(dev->mmio_base, dev->mmio_len, SSD_DEV_NAME)) { 
+hiowarn("%s: can not reserve MMIO region 0\n", dev->name); 
+ret = -EBUSY; 
goto out_request_mem_region; 
+} 
+  
+/* 2.6.9 kernel bug */ 
+dev->ctrlp = pci_iomap(pdev, 0, 0); 
+##if (!dev->ctrlp) { 
+hiowarn("%s: can not remap IO region 0\n", dev->name); 
+ret = -ENOMEM; 
goto out_pci_iomap; 
+} 
+  
+ret = ssd_check_hw(dev); 
+##if (ret) { 
+hiowerr("%s: check hardware failed\n", dev->name); 
goto out_check_hw; 
+} 
+  
+ret = ssd_init_protocol_info(dev); 
+##if (ret) { 
+hiowerr("%s: init protocol info failed\n", dev->name); 
goto out_init_protocol_info; 
+} 
+  
+/* alarm led ? */ 
+ssd_clear_alarm(dev); 
+  
+ret = ssd_init_fw_info(dev); 
+##if (ret) { 
+hiowerr("%s: init firmware info failed\n", dev->name); 
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_fw_info;
+
+/* slave port */
+if (dev->slave) {
+goto init_next1;
+}
+
+ret = ssd_init_rom_info(dev);
+if (ret) {
+hio_err("%s: init rom info failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_rom_info;
+
+ret = ssd_init_label(dev);
+if (ret) {
+hio_err("%s: init label failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_label;
+
+ret = ssd_init_workq(dev);
+if (ret) {
+hio_warn("%s: init workq failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_workq;
+
+(void)test_and_set_bit(SSD_INIT_WORKQ, &dev->state);
+
+ret = ssd_init_log(dev);
+if (ret) {
+hio_err("%s: init log failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_log;
+
+
+ret = ssd_init_smart(dev);
+if (ret) {
+hio_err("%s: init info failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_smart;
+
+}
+init_next1:
+ret = ssd_init_hw_info(dev);
+if (ret) {
+hio_err("%s: init hardware info failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_hw_info;
+}
+
+/* slave port ? */
+if (dev->slave) {
+goto init_next2;
+}
+
+ret = ssd_init_sensor(dev);
+if (ret) {
+hio_err("%s: init sensor failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_sensor;
+}
+
+ret = ssd_init_pl_cap(dev);
+if (ret) {
+hio_err("%s: int pl_cap failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_pl_cap;
+}
+
+init_next2:
+ret = ssd_check_init_state(dev);
+if (ret) {
+hio_err("%s: check init state failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_check_init_state;
+}
+
+ret = ssd_init_response(dev);
+if (ret) {
+hio_warn("%s: init resp_msg failed\n", dev->name);
+goto out_init_response;
+}
+
+ret = ssd_init_cmd(dev);
+if (ret) {
+hio_warn("%s: init msg failed\n", dev->name);
+}
+goto out_init_cmd;
+
+ret = ssd_init_dcmd(dev);
+if (ret) {
+hio_warn("%s: init cmd failed\n", dev->name);
+goto out_init_cmd;
+
+ret = ssd_init_irq(dev);
+if (ret) {
+hio_warn("%s: init irq failed\n", dev->name);
+goto out_init_irq;
+
+ret = ssd_init_thread(dev);
+if (ret) {
+hio_warn("%s: init thread failed\n", dev->name);
+goto out_init_thread;
+
+ret = ssd_init_tag(dev);
+if (ret) {
+hio_warn("%s: init tags failed\n", dev->name);
+goto out_init_tags;
+
+/* */
+(void)test_and_set_bit(SSD_ONLINE, &dev->state);
+
+ret = ssd_init_queue(dev);
+if (ret) {
+hio_warn("%s: init queue failed\n", dev->name);
+goto out_init_queue;
+
+/* slave port ? */
+if (dev->slave) {
+goto init_next3;
+
+ret = ssd_init_ot_protect(dev);
+if (ret) {
+hio_err("%s: int ot_protect failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_int_ot_protect;
+}
ret = ssd_init_wmode(dev);
if (ret) {
    hio_warn("%s: init write mode\n", dev->name);
    goto out_init_wmode;
}
/* init routine after hw is ready */
ret = ssd_init_routine(dev);
if (ret) {
    hio_warn("%s: init routine\n", dev->name);
    goto out_init_routine;
}

ret = ssd_init_chardev(dev);
if (ret) {
    hio_warn("%s: register char device failed\n", dev->name);
    goto out_init_chardev;
}

ret = ssd_init_blkdev(dev);
if (ret) {
    hio_warn("%s: register block device failed\n", dev->name);
    goto out_init_blkdev;
}
(void)test_and_set_bit(SSD_INIT_BD, &dev->state);

ret = ssd_register_sysfs(dev);
if (ret) {
    hio_warn("%s: register sysfs failed\n", dev->name);
    goto out_register_sysfs;
}

dev->save_md = 1;
list_add_tail(&dev->list, &ssd_list);
return 0;

out_register_sysfs:
test_and_clear_bit(SSD_INIT_BD, &dev->state);
ssd_cleanup_blkdev(dev);
out_init_blkdev:
if (!dev->slave) {
    ssd_cleanup_chardev(dev);
}

*/ slave port ? /*
if (!dev->slave) {
    ssd_cleanup_chardev(dev);
}
+out_init_chardev:
+/* slave port ? */
+if (!dev->slave) {
+ssd_cleanup_routine(dev);
+}
+out_init_routine:
+out_init_wmode:
+out_int_ot_protect:
+ssd_cleanup_queue(dev);
+out_init_queue:
+test_and_clear_bit(SSD_ONLINE, &dev->state);
+ssd_cleanup_tag(dev);
+out_init_tags:
+ssd_cleanup_thread(dev);
+out_init_thread:
+ssd_free_irq(dev);
+out_init_irq:
+ssd_cleanup_dcmd(dev);
+out_init_dcmd:
+ssd_cleanup_cmd(dev);
+out_init_cmd:
+ssd_cleanup_response(dev);
+out_init_response:
+out_check_init_state:
+out_init_pl_cap:
+out_init_sensor:
+out_init_hw_info:
+out_init_smart:
+/* slave port ? */
+if (!dev->slave) {
+ssd_cleanup_log(dev);
+}
+out_init_log:
+/* slave port ? */
+if (!dev->slave) {
+test_and_clear_bit(SSD_INIT_WORKQ, &dev->state);
+ssd_cleanup_workq(dev);
+}
+out_init_workq:
+out_init_label:
+out_init_rom_info:
+out_init_fw_info:
+out_init_protocol_info:
+out_check_hw:
+#ifdef LINUX_SUSE_OS
+iounmap(dev->ctrlp);
+#else
+pci_iounmap(pdev, dev->ctrlp);
+
+#endif
+out_pci_iomap:
+release_mem_region(dev->mmio_base, dev->mmio_len);
+out_request_mem_region:
+out_set_dma_mask:
+pci_disable_device(pdev);
+out_enable_device:
+pci_set_drvdata(pdev, NULL);
+out_get_index:
+kfree(dev);
+out_alloc_dev:
+out:
+return ret;
+
+static void ssd_cleanup_tasklet(void)
+{
+int i;
+for_each_online_cpu(i) {
+tasklet_kill(&per_cpu(ssd_tasklet, i));
+}
+}
+
+static int ssd_init_tasklet(void)
+{
+int i;
+
+for_each_online_cpu(i) {
+INIT_LIST_HEAD(&per_cpu(ssd_doneq, i));
+
+if (finject) {
+tasklet_init(&per_cpu(ssd_tasklet, i), __ssd_done_db, 0);
+} else {
+tasklet_init(&per_cpu(ssd_tasklet, i), __ssd_done, 0);
+}
+}
+return 0;
+
+static struct pci_device_id ssd_pci_tbl[] = {
+{ 0x10ee, 0x0007, PCI_ANY_ID, PCI_ANY_ID, }, /* g3 */
+{ 0x19e5, 0x0007, PCI_ANY_ID, PCI_ANY_ID, }, /* v1 */
+{ 0x19e5, 0x0008, PCI_ANY_ID, PCI_ANY_ID, }, /* v1 sp */
+{ 0x19e5, 0x0009, PCI_ANY_ID, PCI_ANY_ID, }, /* v2 */
+{ 0x19e5, 0x000a, PCI_ANY_ID, PCI_ANY_ID, }, /* v2 dp slave */
+{ 0, };
+};
+ /* driver power management handler for pm_ops */
+ #if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,32))
+ static int ssd_hio_suspend(struct pci_dev *pdev, pm_message_t state)
+ {
+ #else
+ static int ssd_hio_suspend(struct device *ddev)
+ {
+ struct pci_dev *pdev = to_pci_dev(ddev);
+ #endif
+ struct ssd_device *dev;
+
+ if (!pdev) {
+ return -EINVAL;
+ }
+
+ dev = pci_get_drvdata(pdev);
+ if (!dev) {
+ return -EINVAL;
+ }
+
+ hio_warn("%s: suspend disk start\n", dev->name);
+ ssd_unregister_sysfs(dev);
+
+ /* offline firstly */
+ test_and_clear_bit(SSD_ONLINE, &dev->state);
+
+ /* clean work queue first */
+ if (!dev->slave) {
+ test_and_clear_bit(SSD_INIT_WORKQ, &dev->state);
+ ssd_cleanup_workq(dev);
+ }
+
+ /* flush cache */
+ (void)ssd_flush(dev);
+ (void)ssd_save_md(dev);
+
+ /* save smart */
+ if (!dev->slave) {
+ ssd_save_smart(dev);
+ }
+
+ /* clean routine */
+ if (!dev->slave) {
+ ssd_cleanup_routine(dev);
+ }
+
+
+ssd_cleanup_thread(dev);
+
+ssd_free_irq(dev);
+
+if (!dev->slave) {
+ssd_cleanup_log(dev);
+
+
+if (dev->reload_fw) { //reload fw
+dev->has_non_0x98_reg_access = 1;
+ssd_reg32_write(dev->ctrlp + SSD_RELOAD_FW_REG, SSD_RELOAD_FW);
+
+
+/* unmap physical address */
+if (dev->ctrlp) {
+#ifdef LINUX_SUSE_OS
+iounmap(dev->ctrlp);
+#else
+pci_iounmap(pdev, dev->ctrlp);
+#endif
+dev->ctrlp = NULL;
+
+
+if (dev->mmio_base) {
+release_mem_region(dev->mmio_base, dev->mmio_len);
+dev->mmio_base = 0;
+
+
+pci_disable_device(pdev);
+
+hidw_warn("%s: suspend disk finish.\n", dev->name);
+
+return 0;
+
+
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,32))
+static int ssd_hio_resume(struct pci_dev *pdev)
+{
+#else
+static int ssd_hio_resume(struct device *ddev)
+{
+struct pci_dev *pdev = to_pci_dev(ddev);
+#endif
+struct ssd_device *dev = NULL;
+
+if (!pdev ) {
ret = -EINVAL;
goto out;
+
+dev = pci_get_drvdata(pdev);
+if (!dev) {
+ret = -ENOMEM;
+goto out_alloc_dev;
+
+hio_warn("%s: resume disk start\n", dev->name);
+ret = pci_enable_device(pdev);
+if (ret) {
+hio_warn("%s: can not enable device\n", dev->name);
+goto out_enable_device;
+
+pci_set_master(pdev);
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,31))
+ret = pci_set_dma_mask(pdev, DMA_64BIT_MASK);
+#else
+ret = pci_set_dma_mask(pdev, DMA_BIT_MASK(64));
+#endif
+if (ret) {
+hio_warn("%s: set dma mask: failed\n", dev->name);
+goto out_set_dma_mask;
+
+#if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,31))
+ret = pci_set_consistent_dma_mask(pdev, DMA_64BIT_MASK);
+#else
+ret = pci_set_consistent_dma_mask(pdev, DMA_BIT_MASK(64));
+#endif
+if (ret) {
+hio_warn("%s: set consistent dma mask: failed\n", dev->name);
+goto out_set_dma_mask;
+
+dev->mmio_base = pci_resource_start(pdev, 0);
+dev->mmio_len = pci_resource_len(pdev, 0);
+
+if (!request_mem_region(dev->mmio_base, dev->mmio_len, SSD_DEV_NAME)) {
+hio_warn("%s: can not reserve MMIO region 0\n", dev->name);
+ret = -EBUSY;
+goto out_request_mem_region;
+
+}
/* 2.6.9 kernel bug */
+dev->ctrlp = pci_iomap(pdev, 0, 0);
+if (!dev->ctrlp) {
+hio_warn("%s: can not remap IO region 0\n", dev->name);
+ret = -ENOMEM;
+goto out_pci_iomap;
+
+ret = ssd_check_hw(dev);
+if (ret) {
+hio_err("%s: check hardware failed\n", dev->name);
+goto out_check_hw;
+}
+
+/* alarm led ? */
+ssd_clear_alarm(dev);
+
+ret = ssd_init_fw_info(dev);
+if (ret) {
+hio_err("%s: init firmware info failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_fw_info;
+}
+
+/* slave port ? */
+if (dev->slave) {
+goto init_next1;
+}
+
+ret = ssd_init_rom_info(dev);
+if (ret) {
+hio_err("%s: init rom info failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_rom_info;
+}
+
+ret = ssd_init_label(dev);
+if (ret) {
+hio_err("%s: init label failed\n", dev->name);
+/* alarm led */
+ssd_set_alarm(dev);
+goto out_init_label;
+}
+
+ret = ssd_init_workq(dev);
+if (ret) {
+(void)test_and_set_bit(SSD_INIT_WORKQ, &dev->state);
+
+ret = ssd_init_log(dev);
+if (ret) {
+    hio_err("%s: init log failed\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
+    goto out_init_log;
+}
+
+ret = ssd_init_smart(dev);
+if (ret) {
+    hio_err("%s: init info failed\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
+    goto out_init_smart;
+}
+
+ret = ssd_init_hw_info(dev);
+if (ret) {
+    hio_err("%s: init hardware info failed\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
+    goto out_init_hw_info;
+}
+
+/* slave port ? */
+if (dev->slave) {
+    goto init_next2;
+}
+
+ret = ssd_init_sensor(dev);
+if (ret) {
+    hio_err("%s: init sensor failed\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
+    goto out_init_sensor;
+}
+
+ret = ssd_init_pl_cap(dev);
+if (ret) {
+    hio_err("%s: int pl_cap failed\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
goto out_init_pl_cap;
+
+init_next2:
+ret = ssd_check_init_state(dev);
+if (ret) {
+    hio_err("%s: check init state failed\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
+    goto out_check_init_state;
+}
+
+//flush all base pointer to ssd
+(void)ssd_reload_ssd_ptr(dev);
+
+ret = ssd_init_irq(dev);
+if (ret) {
+    hio_warn("%s: init irq failed\n", dev->name);
+    goto out_init_irq;
+}
+
+ret = ssd_init_thread(dev);
+if (ret) {
+    hio_warn("%s: init thread failed\n", dev->name);
+    goto out_init_thread;
+}
+
+/* */
+(void)test_and_set_bit(SSD_ONLINE, &dev->state);
+
+/* slave port ? */
+if (dev->slave) {
+    goto init_next3;
+}
+
+ret = ssd_init_ot_protect(dev);
+if (ret) {
+    hio_err("%s: int ot_protect failed\n", dev->name);
+    /* alarm led */
+    ssd_set_alarm(dev);
+    goto out_int_ot_protect;
+}
+
+ret = ssd_init_wmode(dev);
+if (ret) {
+    hio_warn("%s: init write mode\n", dev->name);
+    goto out_init_wmode;
+}
init routine after hw is ready */

ret = ssd_init_routine(dev);
if (ret) {
    hio_warn("%s: init routine\n", dev->name);
    goto out_init_routine;
}

init_next3:
(void)test_and_set_bit(SSD_INIT_BD, &dev->state);

dev->save_md = 1;

hio_warn("%s: resume disk finish.\n", dev->name);

return 0;

out_init_routine:
out_init_wmode:
out_int_ot_protect:
ssd_cleanup_thread(dev);
out_init_thread:
ssd_free_irq(dev);
out_init_irq:
out_check_init_state:
out_init_pl_cap:
out_init_sensor:
out_init_hw_info:
out_init_smart:
slave port ? */
if (!dev->slave) {
    ssd_cleanup_log(dev);
}
out_init_log:
slave port ? */
if (!dev->slave) {
    test_and_clear_bit(SSD_INIT_WORKQ, &dev->state);
    ssd_cleanup_workq(dev);
}
out_init_workq:
out_init_label:
out_init_rom_info:
out_init_fw_info:
out_check_hw:
#endif LINUX_SUSE_OS
iounmap(dev->ctrlp);
#else
pci_iounmap(pdev, dev->ctrlp);

+out_pci_iomap:
+release_mem_region(dev->mmio_base, dev->mmio_len);
+out_request_mem_region:
+out_set_dma_mask:
+pci_disable_device(pdev);
+out_enable_device:
+out_alloc_dev:
+out:
+
+hio_warn("%s: resume disk fail\n", dev->name);
+
+return ret;
+
+MODULE_DEVICE_TABLE(pci, ssd_pci_tbl);
+
+if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,32))
+else
+SIMPLE_DEV_PM_OPS(hio_pm_ops, ssd_hio_suspend, ssd_hio_resume);
+endif
+
+MODULE_DEVICE_TABLE(pci, ssd_pci_tbl);
+struct pci_driver ssd_driver = {
+.name = MODULE_NAME,
+.id_table = ssd_pci_tbl,
+.probe = ssd_init_one,
+if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,38))
+.remove = __devexit_p(ssd_remove_one),
+else
+.remove = ssd_remove_one,
+endif
+
+if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,32))
+.suspend = ssd_hio_suspend,
+.resume = ssd_hio_resume,
+else
+.driver = {
+.pm = &hio_pm_ops,
+},
+endif
+};
+
/* notifier block to get a notify on system shutdown/halt/reboot */
+static int ssd_notify_reboot(struct notifier_block *nb, unsigned long event, void *buf)
+{ 
+struct ssd_device *dev = NULL;
+struct ssd_device *n = NULL;
+list_for_each_entry_safe(dev, n, &ssd_list, list) {
+ssd_gen_swlog(dev, SSD_LOG_POWER_OFF, 0);
+
+(*dev)*ssd_flush(dev);
+(*dev)*ssd_save_md(dev);
+
+/* slave port */
+if (dev->slave) {
+ssd_save_smart(dev);
+
+ssd_stop_workq(dev);
+
+if (dev->reload_fw) {
+dev->has_non_0x98_reg_access = 1;
+ssd_reg32_write(dev->ctrlp + SSD_RELOAD_FW_REG, SSD_RELOAD_FW);
+
+}
+
+}
+
+
+return NOTIFY_OK;
+}
+
+static struct notifier_block ssd_notifier = {
+ssd_notify_reboot, NULL, 0
+};
+
+static int __init ssd_init_module(void)
+{
+int ret = 0;
+
+hid_info("driver version: %s
", DRIVER_VERSION);
+
+ret = ssd_init_index();
+if (ret) {  
+hid_warn("init index failed
");
+goto out_init_index;
+
+
+ret = ssd_init_proc();
+if (ret) {  
+hid_warn("init proc failed
");
+goto out_init_proc;
+
+
+ret = ssd_init_sysfs();
+if (ret) {  
+hid_warn("init sysfs failed
");
+}  
+}  
+}  
+}

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goto out_init_sysfs;
+
+ret = ssd_init_tasklet();
+if (ret) {
+hio_warn("init tasklet failed\n");
+goto out_init_tasklet;
+}
+
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,12))
+ssd_class = class_simple_create(THE_MODULE, SSD_DEV_NAME);
+#else
+ssd_class = class_create(THE_MODULE, SSD_DEV_NAME);
+#endif
+if (IS_ERR(ssd_class)) {
+ret = PTR_ERR(ssd_class);
+goto out_class_create;
+}
+
+if (ssd_cmajor > 0) {
+ret = register_chrdev(ssd_cmajor, SSD_CDEV_NAME, &ssd Cfops);
+} else {
+ret = ssd_cmajor = register_chrdev(ssd_cmajor, SSD_CDEV_NAME, &ssd Cfops);
+}
+if (ret < 0) {
+hio_warn("unable to register chardev major number\n");
+goto out_register_chardev;
+}
+
+if (ssd_major > 0) {
+ret = register_blkdev(ssd_major, SSD_DEV_NAME);
+} else {
+ret = ssd_major = register_blkdev(ssd_major, SSD_DEV_NAME);
+}
+if (ret < 0) {
+hio_warn("unable to register major number\n");
+goto out_register_blkdev;
+}
+
+if (ssd_major_sl > 0) {
+ret = register_blkdev(ssd_major_sl, SSD_SDEV_NAME);
+} else {
+ret = ssd_major_sl = register_blkdev(ssd_major_sl, SSD_SDEV_NAME);
+}
+if (ret < 0) {
+hio_warn("unable to register slave major number\n");
+goto out_register_blkdev_sl;
+}
+ if (mode < SSD_DRV_MODE_STANDARD || mode > SSD_DRV_MODE_BASE) {
+ mode = SSD_DRV_MODE_STANDARD;
+ }
+
+ /* for debug */
+ if (mode != SSD_DRV_MODE_STANDARD) {
+ ssd_minors = 1;
+ }
+
+ if (int_mode < SSD_INT_LEGACY || int_mode > SSD_INT_MSIX) {
+ int_mode = SSD_INT_MODE_DEFAULT;
+ }
+
+ if (threaded_irq) {
+ int_mode = SSD_INT_MSI;
+ }
+
+ if (log_level >= SSD_LOG_NR_LEVEL || log_level < SSD_LOG_LEVEL_INFO) {
+ log_level = SSD_LOG_LEVEL_ERR;
+ }
+
+ if (wmode < SSD_WMODE_BUFFER || wmode > SSD_WMODE_DEFAULT) {
+ wmode = SSD_WMODE_DEFAULT;
+ }
+
+ if (LINUX_VERSION_CODE < KERNEL_VERSION(2,6,20))
+ ret = pci_module_init(&ssd_driver);
+ else
+ ret = pci_register_driver(&ssd_driver);
+ endif
+
+ if (ret) {
+ hio_warn("pci init failed\n");
+ goto out_pci_init;
+ }
+
+ ret = register_reboot_notifier(&ssd_notifier);
+ if (ret) {
+ hio_warn("register reboot notifier failed\n");
+ goto out_register_reboot_notifier;
+ }
+
+ return 0;
+
+ out_register_reboot_notifier:
+ out_pci_init:
+ pci_unregister_driver(&ssd_driver);
+ unregister_blkdev(ssd_major_sl, SSD_SDEV_NAME);
+out_register_blkdev_sl:
+unregister_blkdev(ssd_major, SSD_DEV_NAME);
+out_register_blkdev:
+unregister_chrdev(ssd_cmajor, SSD_CDEV_NAME);
+out_register_chrdev:
#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,12))
+class_simple_destroy(ssd_class);
#else
+class_destroy(ssd_class);
#endif
+out_class_create:
+ssd_cleanup_tasklet();
+out_init_tasklet:
+ssd_cleanup_sysfs();
+out_init_sysfs:
+ssd_cleanup_proc();
+out_init_proc:
+ssd_cleanup_index();
+out_init_index:
+return ret;
+
}+
+
+static void __exit ssd_cleanup_module(void)
+
{+

+hio_info("unload driver: %s\n", DRIVER_VERSION);
+/* exiting */
+ssd_exiting = 1;
+
+unregister_reboot_notifier(&ssd_notifier);
+
+pci_unregister_driver(&ssd_driver);
+
+unregister_blkdev(ssd_major_sl, SSD_SDEV_NAME);
+unregister_blkdev(ssd_major, SSD_DEV_NAME);
+unregister_chrdev(ssd_cmajor, SSD_CDEV_NAME);
+#if (LINUX_VERSION_CODE <= KERNEL_VERSION(2,6,12))
+class_simple_destroy(ssd_class);
#else
+class_destroy(ssd_class);
#endif
+
+ssd_cleanup_tasklet();
+ssd_cleanup_sysfs();
+ssd_cleanup_proc();
+ssd_cleanup_index();
+
}
int ssd_register_event_notifier(struct block_device *bdev, ssd_event_call event_call)
{
    struct ssd_device *dev;
    struct timeval tv;
    struct ssd_log *le, *temp_le = NULL;
    uint64_t cur;
    int temp = 0;
    int log_nr;

    if (!bdev || !event_call || !(bdev->bd_disk)) {
        return -EINVAL;
    }
    dev = bdev->bd_disk->private_data;
    dev->event_call = event_call;
    do_gettimeofday(&tv);
    cur = tv.tv_sec;
    le = (struct ssd_log *)(dev->internal_log.log);
    log_nr = dev->internal_log.nr_log;
    while (log_nr--) {
        if (le->time <= cur && le->time >= dev->uptime) {
            if ((le->le.event == SSD_LOG_SEU_FAULT1) && (le->time < dev->reset_time)) {
                le++;
                continue;
            }
            if (le->le.event == SSD_LOG_OVER_TEMP || le->le.event == SSD_LOG_NORMAL_TEMP || le->le.event == SSD_LOG_WARN_TEMP) {
                if (!temp_le || le->time >= temp_le->time) {
                    temp_le = le;
                }
                le++;
                continue;
            }
            (void)dev->event_call(dev->gd, le->le.event, ssd_parse_log(dev, le, 0));
            le++;
        }
        if (le->le.event == SSD_LOG_OVER_TEMP || le->le.event == SSD_LOG_NORMAL_TEMP || le->le.event == SSD_LOG_WARN_TEMP) {
            if (!temp_le || le->time >= temp_le->time) {
                temp_le = le;
            }
            le++;
            continue;
        }
        (void)dev->event_call(dev->gd, le->le.event, ssd_parse_log(dev, le, 0));
        le++;
    }
    ssd_get_temperature(bdev, &temp);
    if (temp_le && (temp >= SSD_OT_TEMP_HYST)) {
        (void)dev->event_call(dev->gd, temp_le->le.event, ssd_parse_log(dev, temp_le, 0));
    }
    return 0;
+}
+ int ssd_unregister_event_notifier(struct block_device *bdev)
+ {
+ struct ssd_device *dev;
+ + if (!bdev || !(bdev->bd_disk)) {
+ return -EINVAL;
+ }
+ + dev = bdev->bd_disk->private_data;
+ dev->event_call = NULL;
+ + return 0;
+ }
+
+ EXPORT_SYMBOL(ssd_get_label);
+ EXPORT_SYMBOL(ssd_get_version);
+ EXPORT_SYMBOL(ssd_set_otprotect);
+ EXPORT_SYMBOL(ssd_bm_status);
+ EXPORT_SYMBOL(ssd_submit_pbio);
+ EXPORT_SYMBOL(ssd_get_pciaddr);
+ EXPORT_SYMBOL(ssd_get_temperature);
+ EXPORT_SYMBOL(ssd_register_event_notifier);
+ EXPORT_SYMBOL(ssd_unregister_event_notifier);
+ EXPORT_SYMBOL(ssd_reset);
+ EXPORT_SYMBOL(ssd_set_wmode);
+ +
+ MODULE_VERSION(DRIVER_VERSION);
+ MODULE_LICENSE("GPL");
+ MODULE_AUTHOR("Huawei SSD DEV Team");
+ MODULE_DESCRIPTION("Huawei SSD driver");
+ --- linux-4.15.0.orig/ubuntu/hio/hio.h
++ linux-4.15.0/ubuntu/hio/hio.h
 @ @ -0.0 +1,104 @ @
+/*
+ * Huawei SSD device driver
+ * Copyright (c) 2016, Huawei Technologies Co., Ltd.
+ */
+* This program is free software; you can redistribute it and/or modify it
+* under the terms and conditions of the GNU General Public License,
+* version 2, as published by the Free Software Foundation.
+* This program is distributed in the hope it will be useful, but WITHOUT
/* ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or 
* FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for 
* more details.
*/

#ifndef _HIO_H
#define _HIO_H

#include <linux/types.h>
#include <linux/genhd.h>
#include <linux/blkdev.h>
#include <linux/genhd.h>

typedef int (ssd_event_call)(struct gendisk *, int, int); /* gendisk, event id, event level */
extern int ssd_register_event_notifier(struct block_device *bdev, ssd_event_call event_call);
/* unregister event notifier before module exit */
extern int ssd_unregister_event_notifier(struct block_device *bdev);

/* label */
#define SSD_LABEL_FIELD_SZ 32
#define SSD_SN_SZ 16

typedef struct ssd_label {
  char date[SSD_LABEL_FIELD_SZ];
  char sn[SSD_LABEL_FIELD_SZ];
  char part[SSD_LABEL_FIELD_SZ];
  char desc[SSD_LABEL_FIELD_SZ];
  char other[SSD_LABEL_FIELD_SZ];
  char maf[SSD_LABEL_FIELD_SZ];
} ssd_label_t;

/* version */
typedef struct ssd_version_info {
  uint32_t bridge_ver; /* bridge fw version: hex */
  uint32_t ctrl_ver; /* controller fw version: hex */
  uint32_t bm_ver; /* battery manager fw version: hex */
  uint8_t  pcb_ver; /* main pcb version: char */
  uint8_t  upper_pcb_ver;
  uint8_t  pad0;
  uint8_t  pad1;
} ssd_version_info_t;


+extern int ssd_get_label(struct block_device *bdev, struct ssd_label *label);
+extern int ssd_get_version(struct block_device *bdev, struct ssd_version_info *ver);
+extern int ssd_get_temperature(struct block_device *bdev, int *temp);
+
+enum ssd_bmstatus
+{
+SSD_BMSTATUS_OK = 0,
+SSD_BMSTATUS_CHARGING,
+SSD_BMSTATUS_WARNING
+};
+extern int ssd_bm_status(struct block_device *bdev, int *status);
+
+enum ssd_otprotect
+{
+SSD_OTPROTECT_OFF = 0,
+SSD_OTPROTECT_ON
+};
+extern int ssd_set_otprotect(struct block_device *bdev, int otprotect);
+
+typedef struct pci_addr
+{
+uint16_t domain;
+uint8_t bus;
+uint8_t slot;
+uint8_t func;
+} pci_addr_t;
+extern int ssd_get_pciaddr(struct block_device *bdev, struct pci_addr *paddr);
+
+/* submit phys bio: phys addr in iovec */
+extern void ssd_submit_pbio(struct request_queue *q, struct bio *bio);
+
+extern int ssd_reset(struct block_device *bdev);
+
+enum ssd_write_mode
+{
+SSD_WMODE_BUFFER = 0,
+SSD_WMODE_BUFFER_EX,
+SSD_WMODE_FUA,
+/* dummy */
+SSD_WMODE_AUTO,
+SSD_WMODE_DEFAULT
+};
+extern int ssd_set_wmode(struct block_device *bdev, int wmode);
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/include/Kbuild
+++ linux-4.15.0/ubuntu/include/Kbuild
@@ -0,0 +1,2 @@
+ 
+ --- linux-4.15.0.orig/ubuntu/include/README
+++ linux-4.15.0/ubuntu/include/README
@@ -0,0 +1,4 @@
+Only use this directory for things which need to share their headers with
+other parts of the kernel or other modules in ubuntu/
+
+Otherwise, keep them local to the module directory.
--- linux-4.15.0.orig/ubuntu/vbox-update
+++ linux-4.15.0/ubuntu/vbox-update
@@ -0,0 +1,66 @@
+#!/bin/bash
#
# vbox-update <dkms top level>
+
+
+# NOTE: update vbox/BOM if you get the source from anywhere other than
+# the archive.
+
++
++ To update:
++ TMP=$HOME/tmp
++ wget -O TMP/virtualbox-guest-dkms.deb http://ports.ubuntu.com/pool/multiverse/v/virtualbox/virtualbox-guest-dkms_4.3.22-dfsg-1_all.deb
++ dpkg-deb -R TMP/virtualbox-guest-dkms.deb STMP/virtualbox-guest-update
++ vbox-update STMP/virtualbox-guest-update
++
++ To test build:
++ fakeroot debian/rules prepare-generic
++ make O=debian/build/build-generic/ ubuntu/vbox/vboxguest/vboxguest.ko ubuntu/vbox/vboxvideo/vboxvideo.ko ubuntu/vbox/vboxsf/vboxsf.ko
++
++ if [ "$#" -ne 1 ]; then
+echo "Usage: $0 <unpacked vbox dkms guest directory>" 1>&2
+exit 1
+fi
+
+ver="awk '{print $2}' vbox/DEBIAN/control"

Open Source Used In 5GasS Edge AC-4 36540
Fix up the KBUILD_EXTMOD as we are not building externally.

```
for make in vbox/*/Makefile
    do
        sed -i -e '1iKBUILD_EXTMOD=${srctree}/ubuntu/vbox' $make
    done

Fix up KERN_DIR to point at the kernel source tree

```

```
for make in vbox/*/Makefile.include.header
    do
        sed -i -e 's/^KERN_DIR := .*$/KERN_DIR := $(srctree)/' $make
    done
```

We're now using the vboxvideo module in drivers/staging, so disable
the version that was imported.

```
sed -i -e 's vboxvideo/:: vbox/Makefile
```

Reduce the version of the in-kernel module just slightly so it
will not clash with the dkms package.

```
for version in vbox/*/version-generated.h
    do
        sed -i -e 's/_Ubuntu"/_ KernelUbuntu"/' $version
    done
```

Record the version number and nominal source.

```
{ 
    echo "Source: http://ports.ubuntu.com/pool/multiverse/v/virtualbox/virtualbox-guest-dkms_${ver}_all.deb"
    echo "Version: $ver"
} > vbox/BOM

```

```
git add vbox
{
    echo "UBUNTU: ubuntu: vbox -- update to $ver"
} | git commit -s -F -
```

--- linux-4.15.0.orig/ubuntu/vbox/BOM
+++ linux-4.15.0/ubuntu/vbox/BOM
@@ -0,0 +1,2 @@
+Source: http://ports.ubuntu.com/pool/multiverse/v/virtualbox/virtualbox-guest-dkms_5.2.8-dfsg-2_all.deb
+Version: 5.2.8-dfsg-2
--- linux-4.15.0.orig/ubuntu/vbox/Makefile
+++ linux-4.15.0/ubuntu/vbox/Makefile
@@ -0,0 +1,3 @@
+.NOTPARALLEL:
+obj-m = vboxguest/ vboxsf/
--- linux-4.15.0.orig/ubuntu/vbox/dkms.conf
+++ linux-4.15.0/ubuntu/vbox/dkms.conf
@@ -0,0 +1,13 @@
+Source: http://ports.ubuntu.com/pool/multiverse/v/virtualbox/virtualbox-guest-dkms_5.2.8-dfsg-2_all.deb
+Version: 5.2.8-dfsg-2
--- linux-4.15.0.orig/ubuntu/vbox/Makefile
+++ linux-4.15.0/ubuntu/vbox/Makefile
@@ -0,0 +1,13 @@
+NOSTORAGE:
+obj-m = vboxguest/ vboxsf/
```
+PACKAGE_NAME="virtualbox-guest"
+PACKAGE_VERSION="5.2.8"
+CLEAN="rm -f *.o"
+BUILT_MODULE_NAME[0]="vboxguest"
+BUILT_MODULE_LOCATION[0]="/updates"
+BUILT_MODULE_NAME[1]="vboxsf"
+BUILT_MODULE_LOCATION[1]="/updates"
+BUILT_MODULE_NAME[2]="vboxvideo"
+BUILT_MODULE_LOCATION[2]="/updates"
+AUTOINSTALL="yes"
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/Makefile
+++ linux-4.15.0/ubuntu/vbox/vboxguest/Makefile
@@ -0,0 +1,161 @@
+KBUILD_EXTMOD=${srctree}/ubuntu/vbox
+## @file
+# VirtualBox Guest Additions Module Makefile.
+##
+#
+# Copyright (C) 2006-2017 Oracle Corporation
+#
+# This file is part of VirtualBox Open Source Edition (OSE), as
+# available from http://www.virtualbox.org. This file is free software;
+# you can redistribute it and/or modify it under the terms of the GNU
+# General Public License (GPL) as published by the Free Software
+# Foundation, in version 2 as it comes in the "COPYING" file of the
+# VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+# hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+#
+# The contents of this file may alternatively be used under the terms
+# of the Common Development and Distribution License Version 1.0
+# (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+# VirtualBox OSE distribution, in which case the provisions of the
+# CDDL are applicable instead of those of the GPL.
+#
+# You may elect to license modified versions of this file under the
+# terms and conditions of either the GPL or the CDDL or both.
+#
+# Linux kbuild sets this to our source directory if we are called from there
+obj ?= $(CURDIR)
+include $(obj)/Makefile.include.header
+
+MOD_NAME = vboxguest
+MOD_OBJS =
+VBoxGuest-linux.o 
+VBoxGuest.o 
+VBoxGuestR0LibGenericRequest.o 
+VBoxGuestR0LibHGCMInternal.o 
+VBoxGuestR0LibInit.o 
+VBoxGuestR0LibPhysHeap.o 
+VBoxGuestR0LibVMMDev.o 
+r0drv/alloc-r0drv.o 
+r0drv/initterm-r0drv.o 
+r0drv/memobj-r0drv.o 
+r0drv/mpnotification-r0drv.o 
+r0drv/powerNotification-r0drv.o 
+r0drv/linux/alloc-r0drv-linux.o 
+r0drv/linux/assert-r0drv-linux.o 
+r0drv/linux/initterm-r0drv-linux.o 
+r0drv/linux/memobj-r0drv-linux.o 
+r0drv/linux/memuserkernel-r0drv-linux.o 
+r0drv/linux/mp-r0drv-linux.o 
+r0drv/linux/mpnotification-r0drv-linux.o 
+r0drv/linux/process-r0drv-linux.o 
+r0drv/linux/semevent-r0drv-linux.o 
+r0drv/linux/semeventmulti-r0drv-linux.o 
+r0drv/linux/semfastmutex-r0drv-linux.o 
+r0drv/linux/semmutex-r0drv-linux.o 
+r0drv/linux/spinlock-r0drv-linux.o 
+r0drv/linux/thread-r0drv-linux.o 
+r0drv/linux/thread2-r0drv-linux.o 
+r0drv/linux/time-r0drv-linux.o 
+r0drv/linux/timer-r0drv-linux.o 
+r0drv/linux/RTLogWriteDebugger-r0drv-linux.o 
+r0drv/generic/semspinmutex-r0drv-generic.o 
+common/alloc/alloc.o 
+common/err/RTErrConvertFromErrno.o 
+common/err/RTErrConvertToErrno.o 
+common/err/errinfo.o 
+common/log/log.o 
+common/log/logellipsis.o 
+common/log/logrel.o 
+common/log/logrelellipsis.o 
+common/log/logcom.o 
+common/log/logformat.o 
+common/misc/RTAssertMsg1Weak.o 
+common/misc/RTAssertMsg2.o 
+common/misc/RTAssertMsg2Add.o 
+common/misc/RTAssertMsg2AddWeak.o 
+common/misc/RTAssertMsg2AddWeakV.o 

Open Source Used In 5GaaS Edge AC-4 36543
+ifdef
+ifeq ($(BUILD_TARGET_ARCH),arm64)
+ MOD_DEFS += -DVBOX_WITH_64_BITS_GUESTS
+endif
+MOD_INCL += $(addprefix -I$(KBUILD_EXTMOD),/r0drv/linux)
+MOD_INCL += $(addprefix -I$(KBUILD_EXTMOD)/vboxguest,/r0drv/linux)
+
+ifeq ($(wildcard $(KBUILD_EXTMOD)/vboxguest),)
+ MANGLING := $(KBUILD_EXTMOD)/vboxguest/include/VBox/VBoxGuestMangling.h
+else
+ MANGLING := $(KBUILD_EXTMOD)/include/VBox/VBoxGuestMangling.h
+endif
+ifeq ($(KERN_VERSION),24)
+ ## @todo move to MOD_DEFS when we have finished refactoring
+ MOD_CFLAGS = -DEXPORT_SYMTAB
+else
+ MOD_CFLAGS = -Wno-declaration-after-statement -include $(MANGLING) -fno-pie
+endif
+
+MOD_CLEAN = . linux r0drv generic r0drv/linux r0drv/generic VBox 
+common/alloc common/err common/log common/math/gcc common/misc 
+common/string common/table common/time 
+
+include $(obj)/Makefile.include.footer 
+
+check: $(MOD_NAME) 
+ @if ! readelf -p __ksymtab_strings vboxguest.ko | grep -E "\[.*\] *(RT|g_...*RT.*)"; then 
+ echo "All exported IPRT symbols are properly renamed!"; 
+ else 
+ echo "error: Some exported IPRT symbols was not properly renamed! See above." >&2; 
+ false; 
+ fi 
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/Makefile.include.footer 
+++ linux-4.15.0/ubuntu/vbox/vboxguest/Makefile.include.footer 
@@ -0,0 +1,112 @@
+## $Id: Makefile.include.footer $ 
++## @file 
++## VirtualBox Guest Additions kernel module Makefile, common parts. 
++## 
++## See Makefile.include.header for details of how to use this. 
++## 
++## Copyright (C) 2006-2017 Oracle Corporation 
++## 
++## This file is part of VirtualBox Open Source Edition (OSE), as 
++## available from http://www.virtualbox.org. This file is free software;
## Source Code Snippet

```plaintext
+## you can redistribute it and/or modify it under the terms of the GNU
+## General Public License (GPL) as published by the Free Software
+## Foundation, in version 2 as it comes in the "COPYING" file of the
+## VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+## hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+##
+## override is required by the Debian guys
+override MODULE = $(MOD_NAME)
+OBJS   = $(MOD_OBJS)
+
+KBUILD_VERBOSE $?= 1
+LINUX_VERBOSE = $(if $(KBUILD_VERBOSE),1,)
+
+## Compiler options
+##
+ifndef INCL
+ INCL   := $(addprefix -I,$(KERN_INCL) $(EXTRA_INCL))
+ ifndef KBUILD_EXTMOD
+  KBUILD_EXTMOD := $(shell pwd)
+ endif
+ INCL   += $(MOD_INCL)
+ export INCL
+endif
+KFLAGS   := -D__KERNEL__ -DMODULE $(MOD_DEFS)
+ifeq ($(BUILD_TYPE),debug)
+ KFLAGS  += -DDEBUG -DDEBUG_$(subst $(subst _, ,_),_,$(USERNAME)) -
+DDEBUG_USERNAME=$(subst $(subst _, ,_),_,$(USERNAME))
+endif
+
+ifeq ($(KERN_VERSION), 24)
+##
+## 2.4
+##
+## Note: while 2.4 kernels could also do "proper" builds from kbuild, the make
+## script needed to support it was somewhat different from 2.6. Since this
+## script works and 2.4 is not a moving target we will not try do do things the
+## "proper" way.
++ifeq ($(BUILD_TARGET_ARCH),amd64)
+ KFLAGS  += -mcmodel=kernel
+endif
+
+CFLAGS := -O2 -DVBOX_LINUX_2_4 $(MOD_CFLAGS) $(INCL) $(KFLAGS) $(MOD_EXTRA)
+$(KDEBUG)
+MODULE_EXT := o
```
# 2.4 Module linking

+$(MODULE).o: $(OBJS)
+$(LD) -o $@ -r $(OBJS)
+
+.PHONY: $(MODULE)
+all: $(MODULE)
+$(MODULE): $(MODULE).o
+
+install: $(MODULE)
+@mkdir -p $(MODULE_DIR); \\
+install -m 0644 -o root -g root $(MODULE).$(MODULE_EXT) $(MODULE_DIR); \\
+PATH="$PATH:/bin:/sbin" depmod -a;
+
+clean:
+for f in $(sort $(dir $(OBJS)))); do rm -f $$f/*.o $$f/*.cmd $$f/*.flags; done
+rm -rf .$(MOD_NAME)* .tmp_ver* $(MOD_NAME).* Modules.symvers modules.order
+
+else  # ! $(KERN_VERSION), 24
+#
+# 2.6 and later
+#
+
+MODULE_EXT := ko
+
+$MODULE)-y  := $(OBJS)
+
+# build defs
+EXTRA_CFLAGS += $(MOD_CFLAGS) $(INCL) $(KFLAGS) $(MOD_EXTRA) $(KDEBUG)
+
+.PHONY: $(MODULE)
+all: $(MODULE)
+
+obj-m += $(MODULE).o
+
+JOBS := $(shell (getconf _NPROCESSORS_ONLN || grep -Ec '^processor|^CPU[0-9]' /proc/cpuinfo) 2>/dev/null)
+ifeq ($(JOBS),0)
+  JOBS := 1
+endif
+
+# OL/UEK: disable module signing for external modules -- we don't have any private key
+$MODULE):
+$MAKE) V==$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
SRCROOT=$(CURDIR) $(if $(JOBS),-j$(JOBS),) modules
+
+install: $(MODULE)
+$MAKE) V==$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
SRCROOT=$(CURDIR) INSTALL_MOD_PATH=$(INSTALL_MOD_PATH)
INSTALL_MOD_DIR=$(INSTALL_MOD_DIR) modules_install
+
+modules_install: install
+
+clean:
+$ (MAKE) V=${(LINUX_VERBOSE)} CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
SRCROOT=$(CURDIR) clean
+
+PHONY: $(MODULE) install modules_install clean
+endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/Makefile.include.header
+++ linux-4.15.0.ubuntu/vbox/vboxguest/Makefile.include.header
@@ -0,0 +1,158 @@
+# $Id: Makefile.include.header $
+## @file
+# VirtualBox Guest Additions kernel module Makefile, common parts.
+#
+# (For 2.6.x, the main file must be called 'Makefile')
+#
+# Copyright (C) 2006-2017 Oracle Corporation
+##
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+# VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+# hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+#
+
+
+## Testing:
+## * Building with KERN_DIR set uses the value specified and
+##   the default value for the unspecified one if any.
++++
+## These file should be included by the Makefiles for any kernel modules we
+## build as part of the Guest Additions. The intended way of doing this is as
+## follows:
+##
+## # Linux kbuild sets this to our source directory if we are called from
+## # there
+## obj := $(CURDIR)
+## include $(obj)/Makefile.include.header
+## MOD_NAME = <name of the module to be built, without extension>
+## MOD_OBJS = <list of object files which should be included>
+## MOD_DEFS = <any additional defines which this module needs>
+# MOD_INCL = <any additional include paths which this module needs>
+# MOD_CFLAGS = <any additional CFLAGS which this module needs>
+# include $(obj)/Makefile.include.footer
+#
+## The kmk kBuild define KBUILD_TARGET_ARCH is available.
+#
+## First, figure out which architecture we're targeting and the build type.
+# (We have to support basic cross building (ARCH=i386|x86_64).)
+## While at it, warn about BUILD_* vars found to help with user problems.
+##
+ifeq ($(filter-out x86_64 amd64 AMD64,$(shell dpkg-architecture -qDEB_HOST_GNU_CPU))),
+ BUILD_TARGET_ARCH_DEF := amd64
+else
+ BUILD_TARGET_ARCH_DEF := x86
+endif
+ifneq ($(filter-out amd64 x86,$(BUILD_TARGET_ARCH)),
+ $(warning Ignoring unknown BUILD_TARGET_ARCH value '$(BUILD_TARGET_ARCH)'.)
+ BUILD_TARGET_ARCH :=
+endif
+ifeq ($(BUILD_TARGET_ARCH),)
+ ifeq ($(ARCH),x86_64)
+  BUILD_TARGET_ARCH := amd64
+ else
+  ifeq ($(ARCH),i386)
+  BUILD_TARGET_ARCH := x86
+ else
+  BUILD_TARGET_ARCH := $(BUILD_TARGET_ARCH_DEF)
+ endif
+ endif
+else
+ ifneq ($(BUILD_TARGET_ARCH),$(BUILD_TARGET_ARCH_DEF))
+ $(warning Using BUILD_TARGET_ARCH='$(BUILD_TARGET_ARCH)' from the $(origin BUILD_TARGET_ARCH).)
+ endif
+endif
+
+ifeq ($(filter-out release profile debug strict,$(BUILD_TYPE)),
+ $(warning Ignoring unknown BUILD_TYPE value '$(BUILD_TYPE)'.)
+ BUILD_TYPE :=
+endif
+endif
+
+ifeq ($(filter-out release profile debug strict,$(BUILD_TYPE)),$(BUILD_TYPE))
+ $(warning Ignoring unknown BUILD_TYPE value '$(BUILD_TYPE)'.)
+ BUILD_TYPE :=
+endif
+ifneq ($(BUILD_TYPE),)
+ BUILD_TYPE := release
+else
+ ifneq ($(BUILD_TYPE),release)
+ $(warning Using BUILD_TYPE='$(BUILD_TYPE)' from the $(origin BUILD_TYPE).)
+ endif
+endif
+ifeq ($($(USERNAME)),)
+ USERNAME := noname
+endif
+
+ifeq ($($(KERNELRELEASE)),)
+ #
+ # building from this directory
+ #
+
+ # kernel base directory
+ ifdef KERN_DIR
+ ifndef KERN_VER
+ ifeq ($(filter %/build,$(KERN_DIR)),)
+ $error The variable KERN_DIR must be a kernel build folder and end with /build without a trailing slash, or
KERN_VER must be set)
+ endif
+ endif
+ endif
+
+ ifdef KERN_VER
+ ifdef KERN_DIR
+ KERN_VER = $(notdir $(patsubst %/build,%%,\$(KERN_DIR)))
+ ifeq $($(shell expr $(KERN_VER) : '[0-9]*.[0-9]*.[0-9]*'),0)
+ $error The kernel build folder path must end in <version>/build, or the variable KERN_VER must be set)
+ endif
+ endif
+ KERN_VER ?= $(shell uname -r)
+ endif
+
+ # guess kernel major version (24 or later)
+ ifeq ($(shell if echo "$(VERSION).$(PATCHLEVEL)." | grep '2\.[4-9].\' /dev/null 2>&1; then echo yes; fi),yes)
+ KERN_VERSION := 24
+ else
+ KERN_VERSION := 26
+ endif
+
+ # building from kbuild (make -C <kernel_directory> M=`pwd`)
+ KERN_VERSION := 24
+ else
+ KERN_VERSION := 26
+ endif
+
+ KERN_VER := $(KERNELRELEASE)
+
+endif # neq($(KERNELRELEASE),)
+
+## Kernel build folder
+KERN_DIR := $(srctree)
+ifneq ($(shell if test -d $(KERN_DIR); then echo yes; fi),yes)
+ $(error Error: unable to find the headers of the Linux kernel to build against. \ 
+ Specify KERN_VER=<version> (currently $(KERN_VER)) and run Make again)
+endif
+
+## Kernel include folder
+KERN_INCL := $(KERN_DIR)/include
+
+# module install folder
+INSTALL_MOD_DIR ?= misc
+MODULE_DIR := $(INSTALL_MOD_PATH)/lib/modules/$(KERN_VER)/$(INSTALL_MOD_DIR)
+
+## debug - show guesses.
+ifdef DEBUG
+$(warning dbg: INSTALL_MOD_PATH = $(INSTALL_MOD_PATH))
+$(warning dbg: INSTALL_MOD_DIR  = $(INSTALL_MOD_DIR))
+$(warning dbg: KERN_DIR         = $(KERN_DIR))
+$(warning dbg: KERN_INCL        = $(KERN_INCL))
+$(warning dbg: KERN_VERSION     = $(KERN_VERSION))
+$(warning dbg: MODULE_DIR       = $(MODULE_DIR))
+endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/VBox/log-vbox.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/VBox/log-vbox.c
@@ -0,0 +1,777 @@
+/* $Id: log-vbox.cpp $ */
+/** @file
+ * VirtualBox Runtime - Logging configuration.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/** *
+ @page pg_rtlog    Runtime - Logging
+ *
+ VBox uses the IPRT logging system which supports group level flags and multiple
+ destinations. The GC logging is making it even more interesting since GC logging will
+ have to be buffered and written when back in host context.
+ *
+ [more later]
+ *
+ @section sec_logging_destination     The Destination Specifier.
+ *
+ The \{logger-env-base\}_DEST environment variable can be used to specify where
+ the log output goes. The following specifiers are recognized:
+ *
+ - file=\<filename\>
+   This sets the logger output filename to \<filename\>. Not formatting
+   or anything is supported. Each logger specifies a default name if
+   file logging should be enabled by default.
+ *
+ - nofile
+   This disables the file output.
+ *
+ - stdout
+   Enables logger output to stdout.
+ *
+ - nostdout
+   Disables logger output to stdout.
+ *
+ - stderr
+   Enables logger output to stderr.
+ *
+ - nostderr
+   Disables logger output to stderr.
+ *
+ - debugger
+   Enables logger output to native debugger. (Win32/64 only)
- nodebugger
  Disables logger output to native debugger. (Win32/64 only)

- user
  Enables logger output to special backdoor if in guest r0.

- nodebugger
  Disables logger output to special user stream.

@section sec_logging_group The Group Specifier.

The \{logger-env-base\} environment variable can be used to specify which
logger groups to enable and which to disable. By default all groups are
disabled. For your convenience this specifier is case in-sensitive (ASCII).

The specifier is evaluated from left to right.

[more later]

The groups settings can be reprogrammed during execution using the
RTLogGroupSettings() command and a group specifier.

@section sec_logging_default The Default Logger

The default logger uses VBOX_LOG_DEST as destination specifier. File output is
enabled by default and goes to a file "/VBox-\<pid\>.log".

The default logger have all groups turned off by default to force the developer
to be careful with what log information to collect - logging everything is
generally NOT a good idea.

The log groups of the default logger can be found in the LOGGROUP in enum. The
VBOX_LOG environment variable and the .log debugger command can be used to
configure the groups.

Each group have flags in addition to the enable/disable flag. These flags can
be appended to the group name using dot separators. The flags correspond to
RTLOGGRPFLAGS and have a short and a long version:

- e - Enabled: Whether the group is enabled at all.
- l - Level2: Level-2 logging.
- f - Flow: Execution flow logging (entry messages)
- s - Sander: Special Sander logging messages.
- b - Bird: Special Bird logging messages.
Example:

VBOX_LOG=+all+pgm.e.s.b.z.l-qemu

Space and ';' separators are allowed:

VBOX_LOG=+all +pgm.e.s.b.z.l ; - qemu

Example:

VBOX_LOG=+all+pgm.e.s.b.z.l-qemu

Space and ';' separators are allowed:

VBOX_LOG=+all +pgm.e.s.b.z.l ; - qemu

#include <VBox/log.h>
#include <iprt/log.h>
#include <iprt/asm.h>
#include <iprt/err.h>
#include <iprt/time.h>
#include <iprt/win/windows.h>
#include <unistd.h>
#include <stdlib.h>
#include <time.h>
#include <iprt/err.h>
#include <iprt/time.h>
#include <VBox/log.h>
#include <iprt/log.h>
#include <iprt/asm.h>
#include <iprt/err.h>
#include <iprt/time.h>
+ifdef IN_RING3
+# include <iprt/param.h>
+# include <iprt/assert.h>
+# include <iprt/path.h>
+# include <iprt/process.h>
+# include <iprt/string.h>
+# include <iprt/mem.h>
+# include <stdio.h>
+endif
+ifdef(IN_RING0) && defined(RT_OS_DARWIN)
+# include <iprt/asm-amd64-x86.h>
+# include <iprt/thread.h>
+endif
+
+
+ /*******************************************************************************************
+******************************************
+*   Global Variables
+******************************************
+*******************************************************************************************/
+*/ Global Variables
+******************************************************************************
+/** The default logger. */
+static PRTLOGGER g_pLogger = NULL;
+/** The default logger groups.
+ * This must match LOGGROUP! */
+static const char *g_apszGroups[] =
+VBOX_LOGGROUP_NAMES;
+
+ +
+/**
+ * Creates the default logger instance for a VBox process.
+ *
+ * Returns Pointer to the logger instance.
+ */
+RTDECL(PRTLOGGER) RTLogDefaultInit(void)
+{
+  /*
+  * Initialize the default logger instance.
+  * Take care to do this once and not recursively.
+  */
+  static volatile uint32_t fInitializing = 0;
+  PRTLOGGER pLogger;
+  int rc;
+
+  if (g_pLogger || !ASMAtomicCmpXchgU32(&fInitializing, 1, 0))
+    return g_pLogger;
+
+  ifdef IN_RING3
+  /*
+  */
+ * Assert the group definitions.
+ */
+
+#define ASSERT_LOG_GROUP(grp) ASSERT_LOG_GROUP2(LOG_GROUP_##grp, #grp)
+#define ASSERT_LOG_GROUP2(def, str) \
+  do { if (strcmp(g_apszGroups[def], str)) {printf("%s='%s' expects '%s'\n", #def, g_apszGroups[def], str); RTAssertDoPanic(); } } while (0)
+
+ ASSERT_LOG_GROUP(DEFAULT);
+ ASSERT_LOG_GROUP(AUDIO_MIXER);
+ ASSERT_LOG_GROUP(AUDIO_MIXER_BUFFER);
+ ASSERT_LOG_GROUP(AUTOLOGON);
+ ASSERT_LOG_GROUP(CFGM);
+ ASSERT_LOG_GROUP(CPUM);
+ ASSERT_LOG_GROUP(CSAM);
+ ASSERT_LOG_GROUP(DBGC);
+ ASSERT_LOG_GROUP(DBGF);
+ ASSERT_LOG_GROUP(DBGF_INFO);
+ ASSERT_LOG_GROUP(DBGG);
+ ASSERT_LOG_GROUP(DEV);
+ ASSERT_LOG_GROUP(DEV_AC97);
+ ASSERT_LOG_GROUP(DEV_ACPI);
+ ASSERT_LOG_GROUP(DEV_APIC);
+ ASSERT_LOG_GROUP(DEV_BUSLOGIC);
+ ASSERT_LOG_GROUP(DEV_DMA);
+ ASSERT_LOG_GROUP(DEV_E1000);
+ ASSERT_LOG_GROUP(DEV_EFI);
+ ASSERT_LOG_GROUP(DEV_EHCI);
+ ASSERT_LOG_GROUP(DEV_FDC);
+ ASSERT_LOG_GROUP(DEV_GIM);
+ ASSERT_LOG_GROUP(DEV_HDA);
+ ASSERT_LOG_GROUP(DEV_HDA_CODEC);
+ ASSERT_LOG_GROUP(DEV_HPET);
+ ASSERT_LOG_GROUP(DEV_IDE);
+ ASSERT_LOG_GROUP(DEV_INIP);
+ ASSERT_LOG_GROUP(DEV_KBD);
+ ASSERT_LOG_GROUP(DEV_LPC);
+ ASSERT_LOG_GROUP(DEV_LSILOGICSCSI);
+ ASSERT_LOG_GROUP(DEV_NVME);
+ ASSERT_LOG_GROUP(DEV_OHCI);
+ ASSERT_LOG_GROUP(DEV_PARALLEL);
+ ASSERT_LOG_GROUP(DEV_PC);
+ ASSERT_LOG_GROUP(DEV_PC_ARCH);
+ ASSERT_LOG_GROUP(DEV_PC_BIOS);
+ ASSERT_LOG_GROUP(DEV_PCI);
+ ASSERT_LOG_GROUP(DEV_PCIE_RAW);
+ ASSERT_LOG_GROUP(DEV_PCIE);
+ ASSERT_LOG_GROUP(DEV_PIT);
+ ASSERT_LOG_GROUP(DEV_RTC);
+ ASSERT_LOG_GROUP(DEV_SB16);
+ ASSERT_LOG_GROUP(DEV_SERIAL);
+ ASSERT_LOG_GROUP(DEV_SMC);
+ ASSERT_LOG_GROUP(DEV_VGA);
+ ASSERT_LOG_GROUP(DEV_VIRTIO);
+ ASSERT_LOG_GROUP(DEV_VIRTIO_NET);
+ ASSERT_LOG_GROUP(DEV_VMM);
+ ASSERT_LOG_GROUP(DEV_VMM_BACKDOOR);
+ ASSERT_LOG_GROUP(DEV_VMM_STDERR);
+ ASSERT_LOG_GROUP(DEV_VMSVGA);
+ ASSERT_LOG_GROUP(DEV_XHCI);
+ ASSERT_LOG_GROUP(DIS);
+ ASSERT_LOG_GROUP(DRV);
+ ASSERT_LOG_GROUP(DRV_ACPI);
+ ASSERT_LOG_GROUP(DRV_AUDIO);
+ ASSERT_LOG_GROUP(DRV_BLOCK);
+ ASSERT_LOG_GROUP(DRV_CHAR);
+ ASSERT_LOG_GROUP(DRV_DISK_INTEGRITY);
+ ASSERT_LOG_GROUP(DRV_DISPLAY);
+ ASSERT_LOG_GROUP(DRV_FLOPPY);
+ ASSERT_LOG_GROUP(DRV_HOST_AUDIO);
+ ASSERT_LOG_GROUP(DRV_HOST_BASE);
+ ASSERT_LOG_GROUP(DRV_HOST_DVD);
+ ASSERT_LOG_GROUP(DRV_HOST_FLOPPY);
+ ASSERT_LOG_GROUP(DRV_HOST_PARALLEL);
+ ASSERT_LOG_GROUP(DRV_HOST_SERIAL);
+ ASSERT_LOG_GROUP(DRV_INTNET);
+ ASSERT_LOG_GROUP(DRV_ISO);
+ ASSERT_LOG_GROUP(DRV_KBD_QUEUE);
+ ASSERT_LOG_GROUP(DRV_LWIP);
+ ASSERT_LOG_GROUP(DRV_MINIPORT);
+ ASSERT_LOG_GROUP(DRV_MOUSE_QUEUE);
+ ASSERT_LOG_GROUP(DRV_NAMEDPIPE);
+ ASSERT_LOG_GROUP(DRV_NAT);
+ ASSERT_LOG_GROUP(DRV_RAW_IMAGE);
+ ASSERT_LOG_GROUP(DRV_SCSI);
+ ASSERT_LOG_GROUP(DRV_SCSIHOST);
+ ASSERT_LOG_GROUP(DRV_TCP);
+ ASSERT_LOG_GROUP(DRV_TRANSPORT_ASYNC);
+ ASSERT_LOG_GROUP(DRV_TUN);
+ ASSERT_LOG_GROUP(DRV_UDPTUNNEL);
+ ASSERT_LOG_GROUP(DRV_USBPROXY);
+ ASSERT_LOG_GROUP(DRV_VBOXHDD);
+ ASSERT_LOG_GROUP(DRV_VD);
+ ASSERT_LOG_GROUP(DRV_VRDE_AUDIO);
+ ASSERT_LOG_GROUP(DRV_VSWITCH);
+ ASSERT_LOG_GROUP(DRV_VUSB);
+ ASSERT_LOG_GROUP(EM);
+ ASSERT_LOG_GROUP(FTM);
+ ASSERT_LOG_GROUP(GIM);
+ ASSERT_LOG_GROUP(GMM);
+ ASSERT_LOG_GROUP(GUEST_CONTROL);
+ ASSERT_LOG_GROUP(GUEST_DND);
+ ASSERT_LOG_GROUP(GUI);
+ ASSERT_LOG_GROUP(GVMM);
+ ASSERT_LOG_GROUP(HGCM);
+ ASSERT_LOG_GROUP(HGSMI);
+ ASSERT_LOG_GROUP(HM);
+ ASSERT_LOG_GROUP(IEM);
+ ASSERT_LOG_GROUP(IOM);
+ ASSERT_LOG_GROUP(IPC);
+ ASSERT_LOG_GROUP(LWIP);
+ ASSERT_LOG_GROUP(LWIP_API_LIB);
+ ASSERT_LOG_GROUP(LWIP_API_MSG);
+ ASSERT_LOG_GROUP(LWIP_ETHARP);
+ ASSERT_LOG_GROUP(LWIP_ICMP);
+ ASSERT_LOG_GROUP(LWIP_IGMP);
+ ASSERT_LOG_GROUP(LWIP_INET);
+ ASSERT_LOG_GROUP(LWIP_IP4);
+ ASSERT_LOG_GROUP(LWIP_IP4_REASS);
+ ASSERT_LOG_GROUP(LWIP_IP6);
+ ASSERT_LOG_GROUP(LWIP_MEM);
+ ASSERT_LOG_GROUP(LWIP_MEMP);
+ ASSERT_LOG_GROUP(LWIP_NETIF);
+ ASSERT_LOG_GROUP(LWIP_PBUF);
+ ASSERT_LOG_GROUP(LWIP_RAW);
+ ASSERT_LOG_GROUP(LWIP_SOCKETS);
+ ASSERT_LOG_GROUP(LWIP_SYS);
+ ASSERT_LOG_GROUP(LWIP_TCP);
+ ASSERT_LOG_GROUP(LWIP_TCPPIP);
+ ASSERT_LOG_GROUP(LWIP_TCP_CWND);
+ ASSERT_LOG_GROUP(LWIP_TCP_FR);
+ ASSERT_LOG_GROUP(LWIP_TCP_INPUT);
+ ASSERT_LOG_GROUP(LWIP_TCP_OUTPUT);
+ ASSERT_LOG_GROUP(LWIP_TCP_QLEN);
+ ASSERT_LOG_GROUP(LWIP_TCP_RST);
+ ASSERT_LOG_GROUP(LWIP_TCP_RTO);
+ ASSERT_LOG_GROUP(LWIP_TCP_WND);
+ ASSERT_LOG_GROUP(LWIP_TIMERS);
+ ASSERT_LOG_GROUP(LWIP_UDP);
+ ASSERT_LOG_GROUP(MAIN);
+ ASSERT_LOG_GROUP(MAIN_ADDITIONSFACTORILITY);
+ ASSERT_LOG_GROUP(MAIN_ADDITIONSSTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_APPLIANCE);
+ ASSERT_LOG_GROUP(MAIN_AUDIOADAPTER);
+ ASSERT_LOG_GROUP(MAIN_BANDWIDTHCONTROL);
+ ASSERT_LOG_GROUP(MAIN_BANDWIDTHGROUP);
+ ASSERT_LOG_GROUP(MAIN_BANDWIDTHGROUPCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_BIOSSETTINGS);
+ ASSERT_LOG_GROUP(MAIN_CANSHOWWINDOWEVENT);
+ ASSERT_LOG_GROUP(MAIN_CLIPBOARDMODECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_CONSOLE);
+ ASSERT_LOG_GROUP(MAIN_CPUCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_CPUEXECUTIONCAPCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_DHCPSERVER);
+ ASSERT_LOG_GROUP(MAIN_DIRECTORY);
+ ASSERT_LOG_GROUP(MAIN_DISPLAY);
+ ASSERT_LOG_GROUP(MAIN_DISPLAYSOURCEBITMAP);
+ ASSERT_LOG_GROUP(MAIN_DNDATABASE);
+ ASSERT_LOG_GROUP(MAIN_DNDMODECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_DNDSOURCE);
+ ASSERT_LOG_GROUP(MAIN_DNDTARGET);
+ ASSERT_LOG_GROUP(MAIN_EMULATEDUSB);
+ ASSERT_LOG_GROUP(MAIN_EVENT);
+ ASSERT_LOG_GROUP(MAIN_EVENTLISTENER);
+ ASSERT_LOG_GROUP(MAIN_EVENTSOURCE);
+ ASSERT_LOG_GROUP(MAIN_EVENTSOURCECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_EXTPACK);
+ ASSERT_LOG_GROUP(MAIN_EXTPACKBASE);
+ ASSERT_LOG_GROUP(MAIN_EXTPACKFILE);
+ ASSERT_LOG_GROUP(MAIN_EXTPACKMANAGER);
+ ASSERT_LOG_GROUP(MAIN_EXTPACKPLUGIN);
+ ASSERT_LOG_GROUP(MAIN_EXTRADATACANCHANGEEVENT);
+ ASSERT_LOG_GROUP(MAIN_EXTRADATACHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_FILE);
+ ASSERT_LOG_GROUP(MAIN_FRAMEBUFFER);
+ ASSERT_LOG_GROUP(MAIN_FRAMEBUFFEROVERLAY);
+ ASSERT_LOG_GROUP(MAIN_FSOBJINFO);
+ ASSERT_LOG_GROUP(MAIN_GUEST);
+ ASSERT_LOG_GROUP(MAIN_GUESTDIRECTORY);
+ ASSERT_LOG_GROUP(MAIN_GUESTDNDSOURCE);
+ ASSERT_LOG_GROUP(MAIN_GUESTDNDTARGET);
+ ASSERT_LOG_GROUP(MAIN_GUESTERRORINFO);
+ ASSERT_LOG_GROUP(MAIN_GUESTFILE);
+ ASSERT_LOG_GROUP(MAIN_GUESTFILEEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTFILEREADEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTFILESTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTFILEWRITEEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTFSOBJINFO);
+ ASSERT_LOG_GROUP(MAIN_GUESTKEYBOARDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTMONITORCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTMOUSEEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTMULTITOUCHEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTOSTYPE);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROCESS);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROCESSEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROCESSINPUTNOTIFYEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROCESSIOEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROCESSINPUTNOTIFYEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROCESSIOEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROCESSIOEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTPROPERTYCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTSESSION);
+ ASSERT_LOG_GROUP(MAIN_GUESTSESSIONEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTSESSIONREGISTEREDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTSESSIONSTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTSESSIONSTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_GUESTSESSIONSTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_HOST);
+ ASSERT_LOG_GROUP(MAIN_HOSTNAME RESOLUTIONCONFIGURATIONCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_HOSTNETWORKINTERFACE);
+ ASSERT_LOG_GROUP(MAIN_HOSTPCIDEVICEPLUGEVENT);
+ ASSERT_LOG_GROUP(MAIN_HOSTUSBDEVICE);
+ ASSERT_LOG_GROUP(MAIN_HOSTUSBDEVICEFILTER);
+ ASSERT_LOG_GROUP(MAIN_HOSTVIDEOUNPUTDEVICE);
+ ASSERT_LOG_GROUP(MAIN_INTERNALMACHINECONTROL);
+ ASSERT_LOG_GROUP(MAIN_INTERNALSESSIONCONTROL);
+ ASSERT_LOG_GROUP(MAIN_KEYBOARD);
+ ASSERT_LOG_GROUP(MAIN_KEYBOARDLEDSCONFIGURATIONCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEDATACHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEDEBUGGER);
+ ASSERT_LOG_GROUP(MAIN_MACHINEEVENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEREGISTEREDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINESTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEMEDIUM);
+ ASSERT_LOG_GROUP(MAIN_MACHINEMEDIUMATTACHMENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEMEDIUMCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEMEDIUMCONFIGCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEMEDIUMFORMAT);
+ ASSERT_LOG_GROUP(MAIN_MACHINEMEDIUMREGISTEREDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MOUSE);
+ ASSERT_LOG_GROUP(MAIN_MOUSECAPABILITYCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MOUSETHEMESTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MOUSETHEMESTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_MOUSETHEMESTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_NATNETWORKPORTFORWARDEVENT);
+ ASSERT_LOG_GROUP(MAIN_NATNETWORKSETTINGEVENT);
+ ASSERT_LOG_GROUP(MAIN_NATNETWORKSTARTSTOPEVENT);
+ ASSERT_LOG_GROUP(MAIN_NATREDIRECTEVENT);
+ ASSERT_LOG_GROUP(MAIN_NETWORKADAPTER);
+ ASSERT_LOG_GROUP(MAIN_NETWORKADAPTERCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_PARALLELPORT);
+ ASSERT_LOG_GROUP(MAIN_PARALLELPORTCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_PCIADDRESS);
+ ASSERT_LOG_GROUP(MAIN_PCIDEVICEATTACHMENT);
+ ASSERT_LOG_GROUP(MAIN_PERFORMANCECOLLECTOR);
+ ASSERT_LOG_GROUP(MAIN_PERFORMANCEMETRIC);
+ ASSERT_LOG_GROUP(MAIN_PROCESS);
+ ASSERT_LOG_GROUP(MAIN_PROGRESS);
+ ASSERT_LOG_GROUP(MAIN_REUSABLEEVENT);
+ ASSERT_LOG_GROUP(MAIN_RUNTIMEERROREVENT);
+ ASSERT_LOG_GROUP(MAIN_SERIALPORT);
+ ASSERT_LOG_GROUP(MAIN_SERIALPORTCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_SESSION);
+ ASSERT_LOG_GROUP(MAIN_SESSIONSTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_SHARED_FOLDER);
+ ASSERT_LOG_GROUP(MAIN_SHOWWINDOWEVENT);
+ ASSERT_LOG_GROUP(MAIN_SNAPSHOT);
+ ASSERT_LOG_GROUP(MAIN_SNAPSHOTDELETEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_SNAPSHOTRESTOREDEVENT);
+ ASSERT_LOG_GROUP(MAIN_SNAPSHOTTAKENEVENT);
+ ASSERT_LOG_GROUP(MAIN_SNAPSHOTCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_STATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_STORAGECONTROLLER);
+ ASSERT_LOG_GROUP(MAIN_STORAGECONTROLLERCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_STORAGEDEVICECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_SYSTEMPROPERTIES);
+ ASSERT_LOG_GROUP(MAIN_TOKEN);
+ ASSERT_LOG_GROUP(MAIN_USBCONTROLLER);
+ ASSERT_LOG_GROUP(MAIN_USBCONTROLLERCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_USBDEVICE);
+ ASSERT_LOG_GROUP(MAIN_USBDEVICEFILTERS);
+ ASSERT_LOG_GROUP(MAIN_USBDEVICESTATECHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_VBOXSVCAVAILABILITYCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_VIRTUALBOX);
+ ASSERT_LOG_GROUP(MAIN_VIRTUALBOXCLIENT);
+ ASSERT_LOG_GROUP(MAIN_VIRTUALBOXSDS);
+ ASSERT_LOG_GROUP(MAIN_VIRTUALSYSTEMDESCRIPTION);
+ ASSERT_LOG_GROUP(MAIN_VRDESERVER);
+ ASSERT_LOG_GROUP(MAIN_VRDESERVERCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MAIN_VRDESERVERINFO);
+ ASSERT_LOG_GROUP(MAIN_VRDESERVERINFOCHANGEDEVENT);
+ ASSERT_LOG_GROUP(MISC);
+ ASSERT_LOG_GROUP(MM);
+ ASSERT_LOG_GROUP(MM_HEAP);
+ ASSERT_LOG_GROUP(MM_HYPER);
+ ASSERT_LOG_GROUP(MM_HYPER_HEAP);
+ ASSERT_LOG_GROUP(MM_PHYS);
+ ASSERT_LOG_GROUP(MM_POOL);
+ ASSERT_LOG_GROUP(NAT_SERVICE);
+ ASSERT_LOG_GROUP(NET_ADP_DRV);
+ ASSERT_LOG_GROUP(NET_FLT_DRV);
+ ASSERT_LOG_GROUP(NET_SERVICE);
+ ASSERT_LOG_GROUP(NET_SHAPER);
+ ASSERT_LOG_GROUP(PATM);
+ ASSERT_LOG_GROUP(PDM);
+ ASSERT_LOG_GROUP(PDM_ASYNC_COMPLETION);
+ ASSERT_LOG_GROUP(PDM_BLK_CACHE);
+ ASSERT_LOG_GROUP(PDM_DEVICE);
+ ASSERT_LOG_GROUP(PDM_DRIVER);
+ ASSERT_LOG_GROUP(PDM_LDR);
+ ASSERT_LOG_GROUP(PDM_QUEUE);
+ ASSERT_LOG_GROUP(PGM);
+ ASSERT_LOG_GROUP(PGM_DYNMAP);
+ ASSERT_LOG_GROUP(PGM_PHYS);
+ ASSERT_LOG_GROUP(PGM_PHYS_ACCESS);
+ ASSERT_LOG_GROUP(PGM_POOL);
+ ASSERT_LOG_GROUP(PGM_SHARED);
+ ASSERT_LOG_Group(REM);
+ ASSERT_LOG_GROUP(REM_DISAS);
+ ASSERT_LOG_GROUP(REM_HANDLER);
+ ASSERT_LOG_GROUP(REM_IOPORT);
+ ASSERT_LOG_GROUP(REM_MMIO);
+ ASSERT_LOG_GROUP(REM_PRINTF);
+ ASSERT_LOG_GROUP(REM_RUN);
+ ASSERT_LOG_GROUP(SELM);
+ ASSERT_LOG_Group(SHARED_CLIPBOARD);
+ ASSERT_LOG_GROUP(SHARED_CROPENGL);
+ ASSERT_LOG_GROUP(SHARED_FOLDERS);
+ ASSERT_LOG_GROUP(SHARED_OPENGL);
+ ASSERT_LOG_GROUP(SRV_INETNET);
+ ASSERT_LOG_GROUP(SSM);
+ ASSERT_LOG_GROUP(STAM);
+ ASSERT_LOG_GROUP(SUP);
+ ASSERT_LOG_GROUP(TM);
+ ASSERT_LOG_GROUP(TRPM);
+ ASSERT_LOG_GROUP(USB_CARDREADER);
+ ASSERT_LOG_GROUP(USB_DRV);
+ ASSERT_LOG_GROUP(USB_FILTER);
+ ASSERT_LOG_GROUP(USB_KBD);
+ ASSERT_LOG_GROUP(USB_MOUSE);
+ ASSERT_LOG_GROUP(USB_MSD);
+ ASSERT_LOG_GROUP(USB_REMOTE);
+ ASSERT_LOG_GROUP(USB_WEBCAM);
+ ASSERT_LOG_GROUP(VGDRV);
+ ASSERT_LOG_GROUP(VBGL);
+ ASSERT_LOG_GROUP(VD);
+ ASSERT_LOG_GROUP(VD_DMG);
+ ASSERT_LOG_GROUP(VD_ISCSI);
+ ASSERT_LOG_GROUP(VD_PARALLELS);
+ ASSERT_LOG_GROUP(VD_QCOW);
+ ASSERT_LOG_GROUP(VD_QED);
+ ASSERT_LOG_GROUP(VD_RAW);
+ ASSERT_LOG_GROUP(VD_VDI);
+ ASSERT_LOG_GROUP(VD_VHD);
+ ASSERT_LOG_GROUP(VD_VHDX);
+ ASSERT_LOG_GROUP(VD_VMDK);
+ ASSERT_LOG_GROUP(VM);
+ ASSERT_LOG_GROUP(VMM);
+ ASSERT_LOG_GROUP(VRDE);
+ ASSERT_LOG_GROUP(VRDP);
+ ASSERT_LOG_GROUP(VSCSI);
+ ASSERT_LOG_GROUP(WEBSERVICE);
+#undef ASSERT_LOG_GROUP
+#undef ASSERT_LOG_GROUP2
+#endif /* IN_RING3 */
+
+    /*
+     * Create the default logging instance.
+     */
+    /*
+    */
+    #ifdef IN_RING3
+    +#ifndef IN_GUEST
+    char szExecName[RTPATH_MAX];
+    if (!RTProcGetExecutablePath(szExecName, sizeof(szExecName))
+        strcpy(szExecName, "VBox");
+    RTTIMESPEC TimeSpec;
+    RTTimeExplode(&Time, RTTimeNow(&TimeSpec));
+    rc = RTLogCreate(&pLogger, 0, NULL, "VBOX_LOG", RT_ELEMENTS(g_apszGroups), &g_apszGroups[0],
+        RTLOGDEST_FILE,
+        "./%04d-%02d-%02d-%02d-%02d-%02d-%03d-%s-%d.log",
+        Time.i32Year, Time.u8Month, Time.u8MonthDay, Time.u8Hour, Time.u8Minute, Time.u8Second,
+        Time.u32Nanosecond / 1000000,
+        RTPathFilename(szExecName), RTProcSelf());
+    if (RT_SUCCESS(rc))
+    {
+        /*
+         */
* Write a log header.
+ */
+ char szBuf[RTPATH_MAX];
+ RTTimeSpecToString(&TimeSpec, szBuf, sizeof(szBuf));
+ RTLogLoggerEx(pLogger, 0, ~0U, "Log created: %s\n", szBuf);
+ RTLogLoggerEx(pLogger, 0, ~0U, "Executable: %s\n", szExecName);
+
+ /* executable and arguments - tricky and all platform specific. */
+ if defined(RT_OS_WINDOWS)
+ RTLogLoggerEx(pLogger, 0, ~0U, "Commandline: %ls\n", GetCommandLineW());
+
+ if defined(RT_OS_SOLARIS)
+ psinfo_t psi;
+ char szArgFileBuf[80];
+ RTStrPrintf(szArgFileBuf, sizeof(szArgFileBuf), "/proc/%ld/psinfo", (long)getpid());
+ FILE* pFile = fopen(szArgFileBuf, "rb");
+ if (pFile)
+ {
+   if (fread(&psi, sizeof(psi), 1, pFile) == 1)
+     {
+       RTLogLoggerEx(pLogger, 0, ~0U, "Args: %s\n", psi.pr_psargs);
+     
+     RTLogLoggerEx(pLogger, 0, ~0U, "Arg[\%d]: %s", ARG(iArg));
+     
+     fclose(pFile);
+     
+
+     if defined(RT_OS_LINUX)
+     FILE *pFile = fopen("/proc/self/cmdline", "r");
+     if (pFile)
+       {
+         /* braindead */
+         unsigned iArg = 0;
+         int ch;
+         bool fNew = true;
+         while (!feof(pFile) && (ch = fgetc(pFile)) != EOF)
+         {
+           if (fNew)
+             {
+               RTLogLoggerEx(pLogger, 0, ~0U, "Arg[\%d]: %s", ARG(iArg++));
+               fNew = false;
+             }
+           
+           if (ch)
```c
+ RTLogLoggerEx(pLogger, 0, ~0U, "\%c", ch);
+ else
+ {
+     RTLogLoggerEx(pLogger, 0, ~0U, "\n")
+     fNew = true;
+ }
+ }
+ if (!fNew)
+     RTLogLoggerEx(pLogger, 0, ~0U, "\n");
+ fclose(pFile);
+ }
+
+#elif defined(RT_OS_HAIKU)
+    team_info info;
+    if (get_team_info(0, &info) == B_OK)
+    {
+        /* there is an info.argv, but no way to know arg boundaries */
+        RTLogLoggerEx(pLogger, 0, ~0U, "Commandline: %.64\n", info.argv);
+    }
+
+#elif defined(RT_OS_FREEBSD) || defined(RT_OS_NETBSD)
+    /* Retrieve the required length first */
+    int aiName[4];
+    #if defined(RT_OS_FREEBSD)
+        aiName[0] = CTL_KERN;
+        aiName[1] = KERN_PROC;
+        aiName[2] = KERN_PROC_ARGS; /* Introduced in FreeBSD 4.0 */
+        aiName[3] = getpid();
+    #endif
+    size_t cchArgs = 0;
+    int rcBSD = sysctl(aiName, RT_ELEMENTS(aiName), NULL, &cchArgs, NULL, 0);
+    if (cchArgs > 0)
+    {
+        char *pszArgFileBuf = (char *)RTMemAllocZ(cchArgs + 1 /* Safety */)RTMemAllocZ(cchArgs + 1 /* Safety */);
+        if (pszArgFileBuf)
+        {
+            /* Retrieve the argument list */
+            rcBSD = sysctl(aiName, RT_ELEMENTS(aiName), pszArgFileBuf, &cchArgs, NULL, 0);
+            if (!rcBSD)
+            {
+                unsigned iArg = 0;
+                size_t off = 0;
+                while (off < cchArgs)
```
size_t cchArg = strlen(&pszArgFileBuf[off]);
RTLogLoggerEx(pLogger, 0, ~0U, "Arg[%u]: %s\n", iArg, &pszArgFileBuf[off]);

/* advance */
off += cchArg + 1;
iArg++;

RTMemFree(pszArgFileBuf);

elseif defined(RT_OS_OS2) || defined(RT_OS_DARWIN)
    /* commandline? */
else
    error needs porting.
endif
}

else /* IN_GUEST */
    /* The user destination is backdoor logging. */
rc = RTLogCreate(&pLogger, 0, NULL, "VBOX_LOG", RT_ELEMENTS(g_apszGroups), &g_apszGroups[0], RTLOGDEST_USER, "VBox.log");
endif /* IN_GUEST */

else /* IN_RING0 */
    /* Some platforms has trouble allocating memory with interrupts and/or
preemption disabled. Check and fail before we panic. */
if defined(RT_OS_DARWIN)
    if ( !ASMIntAreEnabled()
        || !RTThreadPreemptIsEnabled(NIL_RTTHREAD))
        return NULL;
endif
#endif IN_RING0

if defined IN_GUEST
rc = RTLogCreate(&pLogger, 0, NULL, "VBOX_LOG", RT_ELEMENTS(g_apszGroups), &g_apszGroups[0], RTLOGDEST_FILE, "VBox-ring0.log");
endif /* IN_GUEST */

if (RT_SUCCESS(rc))
    {
    /* This is where you set your ring-0 logging preferences.
    */

* On platforms which don’t differ between debugger and kernel
* log printing, STDOUT is gonna be a stub and the DEBUGGER
* destination is the one doing all the work. On platforms
* that do differ (like Darwin), STDOUT is the kernel log.
+ */
+ \# if defined(DEBUG_bird)
+ /*RTLogGroupSettings(pLogger, "all=-0 -default.l6.l5.l4.l3");*/
+ RTLogFlags(pLogger, "enabled unbuffered pid tid");
+ \# if defined(IN_GUEST)
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER | RTLOGDEST_STDOUT;
+ \# else
+ RTLogGroupSettings(pLogger, "all=-0 -default.l6.l5.l4.l3");
+ \# endif
+ \# endif
+ \# endif
+ \# if defined(DEBUG_sandervl) && !defined(IN_GUEST)
+ RTLogGroupSettings(pLogger, "+all");
+ RTLogFlags(pLogger, "enabled unbuffered");
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER;
+ \# endif
+ \# if defined(DEBUG_ramshankar) /* Guest ring-0 as well */
+ RTLogGroupSettings(pLogger, "+all.e.l.f");
+ RTLogFlags(pLogger, "enabled unbuffered");
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER;
+ \# endif
+ \# if defined(DEBUG_aleksey) /* Guest ring-0 as well */
+ RTLogGroupSettings(pLogger, "net_flt_drv.e.l.f.13.14.15 +net_adp_drv.e.l.f.13.14.15.l6");
+ RTLogFlags(pLogger, "enabled unbuffered");
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER | RTLOGDEST_STDOUT;
+ \# endif
+ \# if defined(DEBUG_andy) /* Guest ring-0 as well */
+ RTLogGroupSettings(pLogger, "+all.e.l.f");
+ RTLogFlags(pLogger, "enabled unbuffered pid tid");
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER | RTLOGDEST_STDOUT;
+ \# endif
+ \# if defined(DEBUG_misha) /* Guest ring-0 as well */
+ RTLogFlags(pLogger, "enabled unbuffered");
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER;
+ \# endif
+ \# if defined(DEBUG_michael) && defined(IN_GUEST)
+ RTLogGroupSettings(pLogger, "+vga.e.l.f");
+ RTLogFlags(pLogger, "enabled unbuffered");
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER | RTLOGDEST_STDOUT;
+ \# endif
+ \# if defined(vboxdrv logging - ATTENTION: this is what we’re referring to guys! Change to ‘# if 1’. */
+ RTLogGroupSettings(pLogger, "all=-0 -default.l6.l5.l4.l3");
+ RTLogFlags(pLogger, "enabled unbuffered tid");
+ pLogger->fDestFlags |= RTLOGDEST_DEBUGGER | RTLOGDEST_STDOUT;
+ \# endif
+ } 
+#endif /* IN_RING0 */
+ return g_pLogger = RT_SUCCESS(rc) ? pLogger : NULL;
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/VBox/logbackdoor.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/VBox/logbackdoor.c
@@ -0,0 +1,95 @@
+/* $Id: logbackdoor.cpp $ */
+/** @file 
+ * VirtualBox Runtime - Guest Backdoor Logging.
+ */
+
+/*
 * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ *
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/**
+ **************************************
+ *   Header Files                                                                                                                 *
+ **************************************
+*******************************************************************************************
+A Header Files
+A
+A
+A
+A
+A
+A
+A
+A
+A
+A
+A
/* Internal Functions */

+static DECLCALLBACK(size_t) rtLogBackdoorOutput(void *pv, const char *pachChars, size_t cbChars);
+
+RTDECL(size_t) RTLogBackdoorPrintf(const char *pszFormat, ...)
+{
+    va_list args;
+    size_t cb;
+
+    va_start(args, pszFormat);
+    cb = RTLogBackdoorPrintfV(pszFormat, args);
+    va_end(args);
+
+    return cb;
+}
+
+RT_EXPORT_SYMBOL(RTLogBackdoorPrintf);
+
+RTDECL(size_t) RTLogBackdoorPrintfV(const char *pszFormat, va_list args)
+{
+    return RTLogFormatV(rtLogBackdoorOutput, NULL, pszFormat, args);
+}
+
+RT_EXPORT_SYMBOL(RTLogBackdoorPrintfV);
+
+/**
+ * Callback for RTLogFormatV which writes to the backdoor.
+ * See PFNRTSTROUTPUT() for details.
+ */
+static DECLCALLBACK(size_t) rtLogBackdoorOutput(void *pvArg, const char *pachChars, size_t cbChars)
+{
+    RT_NOREF_PV(pvArg);
+    RTLogWriteUser(pachChars, cbChars);
+    return cbChars;
+}
+
+RTDECL(void) RTLogWriteUser(const char *pch, size_t cb)
+{
+    #ifdef IN_GUEST_R3
+        VbglR3WriteLog(pch, cb);
+        else /* !IN_GUEST_R3 */
const uint8_t *pau8 = (const uint8_t *)pch;
if (cb > 1)
    ASMOutStrU8(RTLOG_DEBUG_PORT, pau8, cb);
else if (cb)
    ASMOutU8(RTLOG_DEBUG_PORT, *pau8);
#endif /* !IN_GUEST_R3 */

RT_EXPORT_SYMBOL(RTLogWriteUser);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/VBoxGuest-linux.c
+++ linux-4.15.0/ubuntu/vbox/guest/VBoxGuest-linux.c
@@ -0,0 +1,1193 @@
/* $Rev: 120349 $ */
/** @file
 * VBoxGuest - Linux specifics.
 *
 * Note. Unfortunately, the difference between this and SUPDrv-linux.c is
 * a little bit too big to be helpful.
 */
+
+/*
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 * You may elect to license modified versions of this file under the
 * terms and conditions of either the GPL or the CDDL or both.
 */
+
+/*******************************************************************************************
+safety
+*******************************************************************************************
+**********************************************************************************
+* Header Files
+**********************************************************************************
+*******************************************************************************/
+//define LOG_GROUP LOG_GROUP_SUP_DRV
+
+//include "the-linux-kernel.h"
+
+//if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 15)
+//define VBOXGUEST_WITH_INPUT_DRIVER
+//endif
+
+//if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 15, 0)
+//define CONST_4_15 const
+//else
+//define CONST_4_15
+//endif
+
+//include "VBoxGuestInternal.h"
+//ifdef VBOXGUEST_WITH_INPUT_DRIVER
+//include <linux/input.h>
+//endif
+//include <linux/miscdevice.h>
+//include <linux/poll.h>
+//include <VBox/version.h>
+//include "revision-generated.h"
+
+//include <iprt/assert.h>
+//include <iprt/asm.h>
+//include <iprt/err.h>
+//include <iprt/initterm.h>
+//include <iprt/mem.h>
+//include <iprt/mp.h>
+//include <iprt/process.h>
+//include <iprt/spinlock.h>
+//include <iprt/semaphore.h>
+//include <iprt/string.h>
+//include <VBox/log.h>
+
+="/********************************************************************************
 **************************************
+*   Defined Constants And Macros                                                                                                 *
************************************/

+#define DEVICE_NAME             "vboxguest"
+//** The device name for the device node open to everyone. */
+//define DEVICE_NAME_USER       "vboxuser"
+//** The name of the PCI driver */
+//define DRIVER_NAME            DEVICE_NAME
+
```c
/* 2.4.x compatibility macros that may or may not be defined. */
#define IRQ_RETVAL
#define irqreturn_t void
#define IRQ_RETVAL(n)
#endif

/*******************************************************************************************
**************************************
*   Internal Functions
********************************************************************************************

static void vgdrvLinuxTermPci(struct pci_dev *pPciDev);
static int  vgdrvLinuxProbePci(struct pci_dev *pPciDev, const struct pci_device_id *id);
static int  vgdrvLinuxModInit(void);
static void vgdrvLinuxModExit(void);
static int  vgdrvLinuxOpen(struct inode *pNode, struct file *pFilp);
static int  vgdrvLinuxRelease(struct inode *pNode, struct file *pFilp);
#if defined HAVE_UNLOCKED_IOCTL
static long vgdrvLinuxIOCtl(struct file *pFilp, unsigned int uCmd, unsigned long ulArg);
#else
static int  vgdrvLinuxIOCtl(struct inode *pInode, struct file *pFilp, unsigned int uCmd, unsigned long ulArg);
#endif
static int  vgdrvLinuxIOCtlSlow(struct file *pFilp, unsigned int uCmd, unsigned long ulArg, PVBOXGUESTSESSION pSession);
static int  vgdrvLinuxFAsync(int fd, struct file *pFile, int fOn);
static unsigned int vgdrvLinuxPoll(struct file *pFile, poll_table *pPt);
static ssize_t vgdrvLinuxRead(struct file *pFile, char *pbBuf, size_t cbRead, loff_t *poff);

/*******************************************************************************************
**************************************
*   Global Variables
********************************************************************************************

/** Device extention & session data association structure. */
static VBOXGUESTDEVEXT g_DevExt;
/** The PCI device. */
static struct pci_dev *g_pPciDev = NULL;
/** The base of the I/O port range. */
static RTIOPORT g_IOPortBase;
/** The base of the MMIO range. */
static RTHCPHYS g_MMIOPhysAddr = NIL_RTHCPHYS;
/** The size of the MMIO range as seen by PCI. */
static uint32_t g_cbMMIO;
```
+/** The pointer to the mapping of the MMIO range. */
+static void *g_pvMMIOBase;
+/** Wait queue used by polling. */
+static wait_queue_head_t g_PollEventQueue;
+/** Asynchronous notification stuff. */
+static struct fasync_struct *g_pFAsyncQueue;
+/** Pre-allocated mouse status VMMDev request for use in the IRQ
+ * handler. */
+static VMMDevReqMouseStatus *g_pMouseStatusReq;
 +#endif
+/** Whether we've create the logger or not. */
+static volatile bool g_fLoggerCreated;
+/** Release logger group settings. */
+static char g_szLogGrp[128];
+/** Release logger flags settings. */
+static char g_szLogFlags[128];
+/** Release logger destination settings. */
+static char g_szLogDst[128];
+#if 0
+/** Debug logger group settings. */
+static char g_szDbgLogGrp[128];
+/** Debug logger flags settings. */
+static char g_szDbgLogFlags[128];
+/** Debug logger destination settings. */
+static char g_szDbgLogDst[128];
+#endif
+/** The input device handle */
+#ifdef VBOXGUEST_WITH_INPUT_DRIVER
+static struct input_dev *g_pInputDevice = NULL;
+#endif
+/** The file_operations structure. */
+static struct file_operations g_FileOps =
+{
+  owner: THIS_MODULE,
+  open: vgdrvLinuxOpen,
+  release: vgdrvLinuxRelease,
+  unlocked_ioctl: vgdrvLinuxIOCtl,
+#ifdef HAVE_UNLOCKED_IOCTL
+  ioctl: vgdrvLinuxIOCtl,
+#else
+  ioctl: vgdrvLinuxIOCtl,
+#endif
+  fasync: vgdrvLinuxFAsync,
+  read: vgdrvLinuxRead,
+ poll: vgdrvLinuxPoll,
+ lseek: no_lseek,
+};
+
+/** The miscdevice structure. */
+static struct miscdevice g_MiscDevice =
+{
+    minor: MISC_DYNAMIC_MINOR,
+    name: DEVICE_NAME,
+    fops: &g_FileOps,
+};
+
+/** The file_operations structure for the user device.
* @remarks For the time being we'll be using the same implementation as
* /dev/vboxguest here. */
+static struct file_operations g_FileOpsUser =
+{
+    owner: THIS_MODULE,
+    open: vgdrvLinuxOpen,
+    release: vgdrvLinuxRelease,
+#ifdef HAVE_UNLOCKED_IOCTL
+    unlocked_ioctl: vgdrvLinuxIOCtl,
+#else
+    ioctl: vgdrvLinuxIOCtl,
+#endif
+    ioctl: vgdrvLinuxIOCtl,
+};
+
+/** The miscdevice structure for the user device. */
+static struct miscdevice g_MiscDeviceUser =
+{
+    minor: MISC_DYNAMIC_MINOR,
+    name: DEVICE_NAME_USER,
+    fops: &g_FileOpsUser,
+};
+
+/** PCI hotplug structure. */
+static const struct pci_device_id
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 8, 0)
__devinitdata
+g_VBoxGuestPciId[] =
+{
+    {
+        vendor: VMMDEV_VENDORID,
+        device: VMMDEV_DEVICEID
+    },
+};
/* empty entry */
}
+
+
+MODULE_DEVICE_TABLE(pci, g_VBoxGuestPciId);
+
+/** Structure for registering the PCI driver. */
+static struct pci_driver  g_PciDriver =
+
+  name: DRIVER_NAME,
+  id_table: g_VBoxGuestPciId,
+  probe: vgdrvLinuxProbePci,
+  remove: vgdrvLinuxTermPci
+};
+
+static PVBOXGUESTSESSION        g_pKernelSession = NULL;
+
+
+/**
+ * Converts a VBox status code to a linux error code.
+ *
+ * @returns corresponding negative linux error code.
+ * @param   rc  supdrv error code (SUPDRV_ERR_* defines).
+ */
+static int vgdrvLinuxConvertToNegErrno(int rc)
+
+  if (   rc > -1000
+       && rc < 1000)
+      return -RTErrConvertToErrno(rc);
+ switch (rc)
+  {
+    case VERR_HGCM_SERVICE_NOT_FOUND:       return -ESRCH;
+    case VINF_HGCM_CLIENT_REJECTED:          return 0;
+    case VERR_HGCM_INVALID_CMD_ADDRESS:      return -EFAULT;
+    case VINF_HGCM_ASYNC_EXECUTE:           return 0;
+    case VERR_HGCM_INTERNAL:                return -EPROTO;
+    case VERR_HGCM_INVALID_CLIENT_ID:        return -EINVAL;
+    case VINF_HGCM_SAVE_STATE:               return 0;
+    /* No reason to return this to a guest */
+    case VERR_HGCM_SERVICE_EXISTS:           return -EEXIST;
+    default:
+      AssertMsgFailed("Unhandled error code %Rrc\n", rc);
+      return -EPROTO;
+  }
+}
+/**
+ * Does the PCI detection and init of the device.
+ *
+ * @returns 0 on success, negated errno on failure.
+ */
+static int vgdrvLinuxProbePci(struct pci_dev *pPciDev, const struct pci_device_id *id)
+{
+    int rc;
+
+    NOREF(id);
+    AssertReturn(!g_pPciDev, -EINVAL);
+    rc = pci_enable_device(pPciDev);
+    if (rc >= 0)
+    {
+        /* I/O Ports are mandatory, the MMIO bit is not. */
+        g_IOPortBase = pci_resource_start(pPciDev, 0);
+        if (g_IOPortBase != 0)
+        {
+            /* Map the register address space. */
+            g_MMIOPhysAddr = pci_resource_start(pPciDev, 1);
+            g_cbMMIO = pci_resource_len(pPciDev, 1);
+            if (request_mem_region(g_MMIOPhysAddr, g_cbMMIO, DEVICE_NAME) != NULL)
+            {
+                g_pvMMIOBase = ioremap(g_MMIOPhysAddr, g_cbMMIO);
+                if (g_pvMMIOBase)
+                {
+                    /** @todo why aren't we requesting ownership of the I/O ports as well? */
+                    g_pPciDev = pPciDev;
+                    return 0;
+                }
+            }
+        }
+    }
+    /* failure cleanup path */
+    LogRel((DEVICE_NAME " : ioremap failed; MMIO Addr=%RHp cb=%#x\n", g_MMIOPhysAddr, g_cbMMIO));
+    rc = -ENOMEM;
+    release_mem_region(g_MMIOPhysAddr, g_cbMMIO);
+    }
+ else
+    {  
+        LogRel((DEVICE_NAME " : failed to obtain adapter memory\n"));
+        rc = -EBUSY;
+    }
+    g_MMIOPhysAddr = NIL_RTHCPHY;
+    g_cbMMIO = 0;
+    g_IOPortBase = 0;
+}
else
{
    LogRel((DEVICE_NAME " did not find expected hardware resources\n"));
    rc = -ENXIO;
}
pci_disable_device(pPciDev);
}
else
    LogRel((DEVICE_NAME " could not enable device: %d\n", rc));
return rc;
}
}

/**
 * Clean up the usage of the PCI device.
 */
static void vgdrvLinuxTermPci(struct pci_dev *pPciDev)
{
    g_pPciDev = NULL;
    if (pPciDev)
    {
        iounmap(g_pvMMIOBase);
        g_pvMMIOBase = NULL;

        release_mem_region(g_MMIOPhysAddr, g_cbMMIO);
        g_MMIOPhysAddr = NIL_RTHCPHYS;
        g_cbMMIO = 0;

        pci_disable_device(pPciDev);
    }
}

/**
 * Interrupt service routine.
 *
 * @returns In 2.4 it returns void.
 *          In 2.6 we indicate whether we've handled the IRQ or not.
 *
 * @param   iIrq            The IRQ number.
 * @param   pvDevId         The device ID, a pointer to g_DevExt.
 * @param   pRegs           Register set. Removed in 2.6.19.
 */
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 19) && !defined(DOXYGEN_RUNNING)
static irqreturn_t vgdrvLinuxISR(int iIrq, void *pvDevId)
#else
static irqreturn_t vgdrvLinuxISR(int iIrq, void *pvDevId, struct pt_regs *pRegs)
#endif

bool fTaken = VGDrvCommonISR(&g_DevExt);
return IRQ_RETVAL(fTaken);

/**
 * Registers the ISR and initializes the poll wait queue.
 */
static int __init vgdrvLinuxInitISR(void)
{
    int rc;

    init_waitqueue_head(&g_PollEventQueue);
    rc = request_irq(g_pPciDev->irq,
                     vgdrvLinuxISR,
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 20)
                     IRQF_SHARED,
#else
                     SA_SHIRQ,
#endif
                     DEVICE_NAME,
                     &g_DevExt);
    if (rc)
    {
        LogRel((DEVICE_NAME ": could not request IRQ %d: err=%d\n", g_pPciDev->irq, rc));
        return rc;
    }
    return 0;
}

/**
 * Deregisters the ISR.
 */
static void vgdrvLinuxTermISR(void)
{
    free_irq(g_pPciDev->irq, &g_DevExt);
}

#ifdef VBOXGUEST_WITH_INPUT_DRIVER

/**
 * Reports the mouse integration status to the host.
 */
* Calls the kernel IOCTL to report mouse status to the host on behalf of
 * our kernel session.
*/
+ * @param   fStatus     The mouse status to report.
+ */
+static int vgdrvLinuxSetMouseStatus(uint32_t fStatus)
+{
+    int rc;
+    VBGLIOCGSETMOUSESTATUS Req;
+    VBGLREQHDR_INIT(&Req.Hdr, SET_MOUSE_STATUS);
+    Req.u.In.fStatus = fStatus;
+    rc = VGDrvCommonIoCtl(VBGL_IOCTL_SET_MOUSE_STATUS, &g_DevExt, g_pKernelSession, &Req.Hdr, sizeof(Req));
+    if (RT_SUCCESS(rc))
+        rc = Req.Hdr.rc;
+    return rc;
+}
+
+/**
+ * Called when the input device is first opened.
+ *
+ * Sets up absolute mouse reporting.
+ */
+static int vboxguestOpenInputDevice(struct input_dev *pDev)
+{
+    int rc = vgdrvLinuxSetMouseStatus(VMMDEV_MOUSE_GUEST_CAN_ABSOLUTE | VMMDEV_MOUSE_NEW_PROTOCOL);
+    if (RT_FAILURE(rc))
+        return ENODEV;
+    NOREF(pDev);
+    return 0;
+}
+
+/**
+ * Called if all open handles to the input device are closed.
+ *
+ * Disables absolute reporting.
+ */
+static void vboxguestCloseInputDevice(struct input_dev *pDev)
+{
+    NOREF(pDev);
+    vgdrvLinuxSetMouseStatus(0);
+}
+
+/**
+ * Creates the kernel input device.
+ */
+static int __init vgdrvLinuxCreateInputDevice(void)
{ 
  int rc = VbgIR0GRAloc((VMMDevRequestHeader **)g_pMouseStatusReq, sizeof(*g_pMouseStatusReq),
VMMDevReq_GetMouseStatus);
  if (RT_SUCCESS(rc))
  {
    g_pInputDevice = input_allocate_device();
    if (g_pInputDevice)
    {
      g_pInputDevice->id.bustype = BUS_PCI;
      g_pInputDevice->id.vendor = VMMDEV_VENDORID;
      g_pInputDevice->id.product = VMMDEV_DEVICEID;
      g_pInputDevice->id.version = VBOX_SHORT_VERSION;
      g_pInputDevice->open = vboxguestOpenInputDevice;
      g_pInputDevice->close = vboxguestCloseInputDevice;
      if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 22)
        g_pInputDevice->cdev.dev = &g_pPciDev->dev;
      #endif
      rc = input_register_device(g_pInputDevice);
      if (rc == 0)
      {
        /* Do what one of our competitors apparently does as that works. */
        ASMBitSet(g_pInputDevice->evbit, EV_ABS);
        ASMBitSet(g_pInputDevice->evbit, EV_KEY);
        #ifdef EV_SYN
        ASMBitSet(g_pInputDevice->evbit, EV_SYN);
        #endif
        input_set_abs_params(g_pInputDevice, ABS_X, VMMDEV_MOUSE_RANGE_MIN,
VMMDEV_MOUSE_RANGE_MAX, 0, 0);
        input_set_abs_params(g_pInputDevice, ABS_Y, VMMDEV_MOUSE_RANGE_MIN,
VMMDEV_MOUSE_RANGE_MAX, 0, 0);
        ASMBitSet(g_pInputDevice->keybit, BTN_MOUSE);
        /** @todo this string should be in a header file somewhere. */
        g_pInputDevice->name = "VirtualBox mouse integration";
        return 0;
      }
    }
    else
    rc = -ENOMEM;
    VbgIR0GRFree(&g_pMouseStatusReq->header);
    g_pMouseStatusReq = NULL;
  }
  else
  rc = -ENOMEM;

---

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returns rc;
+
+/**
+ * Terminates the kernel input device.
+ */
+static void vgdrvLinuxTermInputDevice(void)
+{
+    VbglR0GRFree(&g_pMouseStatusReq->header);
+    g_pMouseStatusReq = NULL;
+
+    /* See documentation of input_register_device(): input_free_device()
+     * should not be called after a device has been registered. */
+    input_unregister_device(g_pInputDevice);
+}
+
+#endif /* VBOXGUEST_WITH_INPUT_DRIVER */
+
+/**
+ * Creates the device nodes.
+ *
+ * \returns 0 on success, negated errno on failure.
+ */
+static int __init vgdrvLinuxInitDeviceNodes(void)
+{
+    int rc = misc_register(&g_MiscDevice);
+    if (!rc)
+    {
+        int rc = misc_register(&g_MiscDeviceUser);
+        if (!rc)
+            return 0;
+        LogRel((DEVICE_NAME": misc_register failed for %s (rc=%d)\n", DEVICE_NAME_USER, rc));
+        misc_deregister(&g_MiscDevice);
+    }
+    else
+        LogRel((DEVICE_NAME": misc_register failed for %s (rc=%d)\n", DEVICE_NAME, rc));
+    return rc;
+}
+/**
+ * Deregisters the device nodes.
+ */
+static void vgdrvLinuxTermDeviceNodes(void)
+{
+    misc_deregister(&g_MiscDevice);
+    misc_deregister(&g_MiscDeviceUser);
+}
+
+/**
+ * Initialize module.
+ */
+static int __init vgdrvLinuxModInit(void)
+{
+    static const char * const   s_apszGroups[] = VBOX_LOGGROUP_NAMES;
+    PRTLOGGER                   pRelLogger;
+    int                         rc;
+    
+    /*
+     * Initialize IPRT first.
+     */
+    rc = RTR0Init(0);
+    if (RT_FAILURE(rc))
+    {
+        printk(KERN_ERR DEVICE_NAME": RTR0Init failed, rc=%d.\n", rc);
+        return -EINVAL;
+    }
+    
+    /*
+     * Create the release log.
+     * (We do that here instead of common code because we want to log
+     * early failures using the LogRel macro.)
+     */
+    rc = RTLogCreate(&pRelLogger, 0 /* fFlags */, "all",
+                     "VBOX_RELEASE_LOG", RT_ELEMENTS(s_apszGroups), s_apszGroups,
+                     RTLOGDEST_STDOUT | RTLOGDEST_DEBUGGER | RTLOGDEST_USER, NULL);
+    if (RT_SUCCESS(rc))
+    {
+        RTLogGroupSettings(pRelLogger, g_szLogGrp);
+        RTLogFlags(pRelLogger, g_szLogFlags);
+        RTLogDestinations(pRelLogger, g_szLogDst);
+        #ifdef LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+            RTLogGroupSettings(pRelLogger, g_szLogGrp);
+            RTLogFlags(pRelLogger, g_szLogFlags);
+            RTLogDestinations(pRelLogger, g_szLogDst);
+        #endif
+        RTLogRelSetDefaultInstance(pRelLogger);
+    }
+}
+
+    #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+    g_fLoggerCreated = true;
+    +#endif
+    +
+    +  /#
+    +  * Locate and initialize the PCI device.
+    +  */
+    +  rc = pci_register_driver(&g_PciDriver);
+    +  if (rc >= 0 && g_pPciDev)
+    +  {
+    +    /#
+    +    * Register the interrupt service routine for it.
+    +    */
+    +    rc = vgdvLinuxInitISR();
+    +    if (rc >= 0)
+    +    {
+    +    +    /#
+    +    +    * Call the common device extension initializer.
+    +    +    */
+    +    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0) && defined(RT_ARCH_X86)
+    +    +    VBOXOSTYPE enmOSType = VBOXOSTYPE_Linux26;
+    +    +#elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0) && defined(RT_ARCH_AMD64)
+    +    +    VBOXOSTYPE enmOSType = VBOXOSTYPE_Linux26_x64;
+    +    +#elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 0) && defined(RT_ARCH_X86)
+    +    +    VBOXOSTYPE enmOSType = VBOXOSTYPE_Linux24;
+    +    +#elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 0) && defined(RT_ARCH_AMD64)
+    +    +    VBOXOSTYPE enmOSType = VBOXOSTYPE_Linux24_x64;
+    +    +#else
+    +    +# warning "huh? which arch + version is this?"
+    +    +    VBOXOSTYPE enmOsType = VBOXOSTYPE_Linux;
+    +    +#endif
+    +    rc = VGDrvCommonInitDevExt(&g_DevExt,
+    +    +    g_IOPortBase,
+    +    +    g_pvMMIOBase,
+    +    +    g_cbMMIO,
+    +    +    enmOSType,
+    +    +    VMMDEV_EVENT_MOUSE_POSITION_CHANGED);
+    +    if (RT_SUCCESS(rc))
+    +    {
+    +    +    /*
+    +    +    * Create the kernel session for this driver.
+    +    +    */
+    +    +    rc = VGDrvCommonCreateKernelSession(&g_DevExt, &g_pKernelSession);
+    +    +    if (RT_SUCCESS(rc))
+    +    {
+    +    +    +    /*
+    +    +    +    * Create the kernel input device.
+    +    +    +    */
+    +    +    +    /*
ifdef VBOXGUEST_WITH_INPUT_DRIVER
    rc = vgdrvLinuxCreateInputDevice();
    if (rc >= 0)
    {
        /*
         * Finally, create the device nodes.
         */
        rc = vgdrvLinuxInitDeviceNodes();
        if (rc >= 0)
        {
            /* some useful information for the user but don't show this on the console */
            LogRel((DEVICE_NAME "": misc device minor %d, IRQ %d, I/O port %RTiop, MMIO at %RHp (size 0x%x))n",
                    g_MiscDevice.minor, g_pPciDev->irq, g_IOPortBase, g_MMIOPhysAddr, g_cbMMIO));
            printk(KERN_DEBUG DEVICE_NAME ": Successfully loaded version 
" VBOX_VERSION_STRING " (interface " RT_XSTR(VMMDEV_VERSION) ")\n");
            return rc;
        } /* bail out */
    }
#endif
#endif VBOXGUEST_WITH_INPUT_DRIVER
vgdrvLinuxTermInputDevice();

else
{
    LogRel((DEVICE_NAME "": vboxguestCreateInputDevice failed with rc=%Rrc\n", rc));
    rc = RTErrConvertFromErrno(rc);
}
#endif
VGDrvCommonCloseSession(&g_DevExt, g_pKernelSession);
VGDrvCommonDeleteDevExt(&g_DevExt);
elsec
LogRel((DEVICE_NAME ": VGDrvCommonInitDevExt failed with rc=%Rrc\n", rc));
rc = RTErrConvertFromErrno(rc);
vgdrvLinuxTermISR();
}
}
else
{
    LogRel((DEVICE_NAME "": PCI device not found, probably running on physical hardware.\n"));
    rc = -ENODEV;
}
cpci_unregister_driver(&g_PciDriver);
+ RTLogDestroy(RTLogRelSetDefaultInstance(NULL));
+ RTLogDestroy(RTLogSetDefaultInstance(NULL));
+ RTR0Term();
+ return rc;
+
+
+/**
+ * Unload the module.
+ */
+static void ___exit vgdrvLinuxModExit(void)
+
+ /*
+ * Inverse order of init.
+ */
+ vgdrvLinuxTermDeviceNodes();
+#ifdef VBOXGUEST_WITH_INPUT_DRIVER
+ vgdrvLinuxTermInputDevice();
+#endif
+ VGDrvCommonCloseSession(&g_DevExt, g_pKernelSession);
+ VGDrvCommonDeleteDevExt(&g_DevExt);
+ vgdrvLinuxTermISR();
+ pci_unregister_driver(&g_PciDriver);
+ RTLogDestroy(RTLogRelSetDefaultInstance(NULL));
+ RTLogDestroy(RTLogSetDefaultInstance(NULL));
+ RTR0Term();
+
+/**
+ * Device open. Called on open /dev/vboxdrv
+ *
+ * @param   pInode      Pointer to inode info structure.
+ * @param   pFilp       Associated file pointer.
+ */
+static int vgdrvLinuxOpen(struct inode *pInode, struct file *pFilp)
+
+ int                 rc;
+ PVBOXGUESTSESSION   pSession;
+ Log((DEVICE_NAME "": pFilp=%p pid=%d %d %s\n", pFilp, RTProcSelf(), current->pid, current->comm));
+
+ /*
+ * Call common code to create the user session. Associate it with
+ * the file so we can access it in the other methods.
+ */
+ rc = VGDrvCommonCreateUserSession(&g_DevExt, &pSession);
+ if (RT_SUCCESS(rc))
+ {
+ pFilp->private_data = pSession;
+ if (MINOR(pInode->i_rdev) == g_MiscDeviceUser.minor)
+     pSession->fUserSession = true;
+ }
+ 
+ Log(("vgdrvLinuxOpen: g_DevExt=%p pSession=%p rc=%d/%d (pid=%d/%d %s)\n",
+ &g_DevExt, pSession, rc, vgdrvLinuxConvertToNegErrno(rc), RTProcSelf(), current->pid, current->comm));
+ return vgdrvLinuxConvertToNegErrno(rc);
+
+ /* **
+ * Close device.
+ *
+ * @param   pInode      Pointer to inode info structure.
+ * @param   pFilp       Associated file pointer.
+ */
+ static int vgdrvLinuxRelease(struct inode *pInode, struct file *pFilp)
+ {
+     Log(("vgdrvLinuxRelease: pFilp=%p pSession=%p pid=%d/%d %s\n",
+ pFilp, pFilp->private_data, RTProcSelf(), current->pid, current->comm));
+ 
+ #if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 28)
+     /* This housekeeping was needed in older kernel versions to ensure that
+      * the file pointer didn't get left on the polling queue. */
+     vgdrvLinuxFAsync(-1, pFilp, 0);
+     #endif
+     VGDrvCommonCloseSession(&g_DevExt, (PVBOXGUESTSESSION)pFilp->private_data);
+     pFilp->private_data = NULL;
+     return 0;
+ }
+ 
+ /* **
+ * Device I/O Control entry point.
+ *
+ * @param   pFilp       Associated file pointer.
+ * @param   uCmd        The function specified to ioctl().
+ * @param   ulArg       The argument specified to ioctl().
+ */
+ #if defined(HAVE_UNLOCKED_IOCTL) || defined(DOXYGEN_RUNNING)
+ static long vgdrvLinuxIOCtl(struct file *pFilp, unsigned int uCmd, unsigned long ulArg)
+ #else
+ static int vgdrvLinuxIOCtl(struct inode *pInode, struct file *pFilp, unsigned int uCmd, unsigned long ulArg)
+ #endif
+ {
+     PVBOXGUESTSESSION pSession = (PVBOXGUESTSESSION)pFilp->private_data;
+ int rc;
+ #ifndef HAVE_UNLOCKED_IOCTL
+ unlock_kernel();
+ #endif
+ 
+ +#if 0 /* no fast I/O controls defined atm. */
+ + if (RT_LIKELY(  
+       (  
+         uCmd == SUP_IOCTL_FAST_DO_RAW_RUN  
+ + uCmd == SUP_IOCTL_FAST_DO_HM_RUN  
+ + uCmd == SUP_IOCTL_FAST_DO_NOP  
+ + && pSession->fUnrestricted == true))
+ + rc = VGDrvCommonIoCtlFast(uCmd, ulArg, &g_DevExt, pSession);
+ + else
+ +#endif
+ + rc = vgdrvLinuxIOCtlSlow(pFilp, uCmd, ulArg, pSession);
+ +
+ +#ifndef HAVE_UNLOCKED_IOCTL
+ lock_kernel();
+ #endif
+ + return rc;
+ +
+ +/**
+ * Device I/O Control entry point, slow variant.
+ *
+ * @param   pFilp       Associated file pointer.
+ * @param   uCmd        The function specified to ioctl().
+ * @param   ulArg       The argument specified to ioctl().
+ * @param   pSession    The session instance.
+ */
+ +static int vgdrvLinuxIOCtlSlow(struct file *pFilp, unsigned int uCmd, unsigned long ulArg, 
PVBOXGUESTSESSION pSession)
+ +{
+ + int                 rc;
+ + VBGLREQHDR          Hdr;
+ + PVBGLREQHDR         pHdr;
+ + uint32_t            cbBuf;
+ +
+ + Log6("vgdrvLinuxIOCtlSlow: pFilp=%p uCmd=%#x ulArg=%p pid=%d/%d\n", pFilp, uCmd, (void *)ulArg, 
RTProcSelf(), current->pid);
+ +
+ + /*
+ + * Read the header.
+ + */
+ + if (RT_FAILURE(RTR0MemUserCopyFrom(&Hdr, ulArg, sizeof(Hdr))))
+ + {
+ + Log("vgdrvLinuxIOCtlSlow: copy_from_user(%#lx,) failed; uCmd=%#x\n", ulArg, uCmd));
+ + return -EFAULT;
+ +}
+ if (RT_UNLIKELY(Hdr.uVersion != VBGLREQHDR_VERSION))
+ {
+     Log("vgdrvLinuxIOCtlSlow: bad header version %#x; uCmd=%#x\n", Hdr.uVersion, uCmd);
+     return -EINVAL;
+ }
+ /*
+ * Buffer the request.
+ * Note! The header is revalidated by the common code.
+ */
+ cbBuf = RT_MAX(Hdr.cbIn, Hdr.cbOut);
+ if (RT_UNLIKELY(cbBuf > _1M*16))
+ {
+     Log("vgdrvLinuxIOCtlSlow: too big cbBuf=%#x; uCmd=%#x\n", cbBuf, uCmd));
+     return -E2BIG;
+ }
+ if (RT_UNLIKELY(   Hdr.cbIn < sizeof(Hdr)
+                    || (cbBuf != _IOC_SIZE(uCmd) && _IOC_SIZE(uCmd) != 0)))
+ {
+     Log("vgdrvLinuxIOCtlSlow: bad ioctl cbBuf=%#x _IOC_SIZE=%#x; uCmd=%#x\n", cbBuf,
+          _IOC_SIZE(uCmd), uCmd));
+     return -EINVAL;
+ }
+ pHdr = RTMemAlloc(cbBuf);
+ if (RT_UNLIKELY(!pHdr))
+ {
+     LogRel("vgdrvLinuxIOCtlSlow: failed to allocate buffer of %d bytes for uCmd=%#x\n", cbBuf, uCmd));
+     return -ENOMEM;
+ }
+ if (RT_FAILURE(RTR0MemUserCopyFrom(pHdr, ulArg, Hdr.cbIn)))
+ {
+     Log("vgdrvLinuxIOCtlSlow: copy_from_user(,%#lx, %#x) failed; uCmd=%#x\n", ulArg, Hdr.cbIn, uCmd));
+     RTMemFree(pHdr);
+     return -EFAULT;
+ }
+ if (Hdr.cbIn < cbBuf)
+     RT_BZERO((uint8_t *)pHdr + Hdr.cbIn, cbBuf - Hdr.cbIn);
+ /*
+ * Process the IOCTL.
+ */
+ rc = VGDrvCommonIoCtl(uCmd, &g_DevExt, pSession, pHdr, cbBuf);
+ /*
+ * Copy ioctl data and output buffer back to user space.
+ */
+ if (RT_SUCCESS(rc))
```c
+ { uint32_t cbOut = pHdr->cbOut;
+ if (RT_UNLIKELY(cbOut > cbBuf))
+ { LogRel("vgdrvLinuxIOCtlSlow: too much output! %#x > %#x; uCmd=%#x\n", cbOut, cbBuf, uCmd));
+ cbOut = cbBuf;
+ }
+ if (RT_FAILURE(RTR0MemUserCopyTo(ulArg, pHdr, cbOut)))
+ { /* this is really bad! */
+ LogRel("vgdrvLinuxIOCtlSlow: copy_to_user(\%#lx,\%#x); uCmd=%#x\n", ulArg, cbOut, uCmd));
+ rc = -EFAULT;
+ }
+ }
+ else
+ { Log("vgdrvLinuxIOCtlSlow: pFilp=%p uCmd=%#x ulArg=%p failed, rc=%d\n", pFilp, uCmd, (void *)ulArg, rc));
+ rc = -EINVAL;
+ }
+ RTMemFree(pHdr);
+ Log6("vgdrvLinuxIOCtlSlow: returns %d (pid=%d/%d)\n", rc, RTProcSelf(), current->pid);
+ return rc;
+ }
+ } /* @note This code is duplicated on other platforms with variations, so please
+ keep them all up to date when making changes!
+ */
+ int VBOXCALL VBoxGuestIDC(void *pvSession, uintptr_t uReq, PVBGLREQHDR pReqHdr, size_t cbReq)
+ { /*
+ */
+ int rc;
+ if ( RT_VALID_PTR(pReqHdr)
+ && cbReq >= sizeof(*pReqHdr))
+ { /*
+ */
+ * All requests except the connect one requires a valid session.
+ */
+ PVBOXGUESTSESSION pSession = (PVBOXGUESTSESSION)pvSession;
+ if (pSession)
+ { if ( RT_VALID_PTR(pSession)
+ && pSession->pDevExt == &g_DevExt)
rc = VGDrvCommonIoCtl(uReq, &g_DevExt, pSession, pReqHdr, cbReq);
else
    rc = VERR_INVALID_HANDLE;
}
else if (uReq == VBGL_IOCTL_IDC_CONNECT)
{
    rc = VGDrvCommonCreateKernelSession(&g_DevExt, &pSession);
    if (RT_SUCCESS(rc))
    {
        rc = VGDrvCommonIoCtl(uReq, &g_DevExt, pSession, pReqHdr, cbReq);
        if (RT_FAILURE(rc))
            VGDrvCommonCloseSession(&g_DevExt, pSession);
    }
}
else
    rc = VERR_INVALID_HANDLE;
else
    rc = VERR_INVALID_POINTER;
return rc;

EXPORT_SYMBOL(VBoxGuestIDC);

/**
 * Asynchronous notification activation method.
 *
 * @returns 0 on success, negative errno on failure.
 *
 * @param   fd          The file descriptor.
 * @param   pFile       The file structure.
 * @param   fOn         On/off indicator.
 */
static int vgdrvLinuxFAsync(int fd, struct file *pFile, int fOn)
{
    return fasync_helper(fd, pFile, fOn, &g_pFAsyncQueue);
}

/**
 * Poll function.
 *
 * This returns ready to read if the mouse pointer mode or the pointer position
 * has changed since last call to read.
 *
 * @returns 0 if no changes, POLLIN | POLLRDNORM if there are unseen changes.
 *
 * @param   pFile       The file structure.
 */
+ * @param   pPt         The poll table.
+ *
+ * @remarks This is probably not really used, X11 is said to use the fasync
+ *         interface instead.
+ */
+static unsigned int vgdrvLinuxPoll(struct file *pFile, poll_table *pPt)
+{
+    PVBOXGUESTSESSION   pSession  = (PVBOXGUESTSESSION)pFile->private_data;
+    uint32_t            u32CurSeq = ASMAtomicUoReadU32(&g_DevExt.u32MousePosChangedSeq);
+    unsigned int        fMask     = pSession->u32MousePosChangedSeq != u32CurSeq
+                            ? POLLIN | POLLRDNORM
+                            : 0;
+    poll_wait(pFile, &g_PollEventQueue, pPt);
+    return fMask;
+}
+
+/**
+ * Read to go with our poll/fasync response.
+ *
+ * @returns 1 or -EINVAL.
+ *
+ * @param   pFile       The file structure.
+ * @param   pbBuf       The buffer to read into.
+ * @param   cbRead      The max number of bytes to read.
+ * @param   poff        The current file position.
+ *
+ * @remarks This is probably not really used as X11 lets the driver do its own
+ *         event reading. The poll condition is therefore also cleared when we
+ *         see VMMDevReq_GetMouseStatus in vgdrvIoCtl_VMMRequest.
+ */
+static ssize_t vgdrvLinuxRead(struct file *pFile, char *pbBuf, size_t cbRead, loff_t *poff)
+{
+    PVBOXGUESTSESSION   pSession  = (PVBOXGUESTSESSION)pFile->private_data;
+    uint32_t            u32CurSeq = ASMAtomicUoReadU32(&g_DevExt.u32MousePosChangedSeq);
+    if (*poff != 0)
+        return -EINVAL;
+    /*
+     * Fake a single byte read if we're not up to date with the current mouse position.
+     */
+    if (    pSession->u32MousePosChangedSeq != u32CurSeq
+        &&  cbRead > 0)
+    {
+        pSession->u32MousePosChangedSeq = u32CurSeq;
+        pbBuf[0] = 0;
+        return 1;
+ return 0;
+
+}
+
+void VGDrvNativeISRMousePollEvent(PVBOXGUESTDEVEXTP pDevExt)
+{
+    int rc;
+    NOREF(pDevExt);
+
+    /*
+ * Wake up everyone that's in a poll() and post anyone that has
+ * subscribed to async notifications.
+ */
+    Log3(("VGDrvNativeISRMousePollEvent: wake_up_all\n");
+    wake_up_all(&g_PollEventQueue);
+    Log3(("VGDrvNativeISRMousePollEvent: kill_fasync\n");
+    kill_fasync(&g_pFAsyncQueue, SIGIO, POLL_IN);
+    /* Report events to the kernel input device */
+    g_pMouseStatusReq->mouseFeatures = 0;
+    g_pMouseStatusReq->pointerXPos = 0;
+    g_pMouseStatusReq->pointerYPos = 0;
+    rc = VbglR0GRPerform(&g_pMouseStatusReq->header);
+    if (RT_SUCCESS(rc))
+    {
+        input_report_abs(g_pInputDevice, ABS_X,
+                         g_pMouseStatusReq->pointerXPos);
+        input_report_abs(g_pInputDevice, ABS_Y,
+                         g_pMouseStatusReq->pointerYPos);
+        if (EV_SYN)
+            input_sync(g_pInputDevice);
+    }
+    Log3(("VGDrvNativeISRMousePollEvent: done\n");
+}
PRTLOGGER pLogger = pParam->name[0] == 'd' ? RTLogDefaultInstance() : RTLogRelGetDefaultInstance();
  if (pLogger)
    RTLogGroupSettings(pLogger, pszValue);
  }
else if (pParam->name[0] != 'd')
  strlcpy(&g_szLogGrp[0], pszValue, sizeof(g_szLogGrp));
  return 0;
}

/** log and dbg_log parameter getter. */
static int vgdrvLinuxParamLogGrpGet(char *pszBuf, CONST_4_15 struct kernel_param *pParam)
{
  PRTLOGGER pLogger = pParam->name[0] == 'd' ? RTLogDefaultInstance() : RTLogRelGetDefaultInstance();
  *pszBuf = '\0';
  if (pLogger)
    RTLogGetGroupSettings(pLogger, pszBuf, _4K);
  return strlen(pszBuf);
}

/** log and dbg_log_flags parameter setter. */
static int vgdrvLinuxParamLogFlagsSet(const char *pszValue, CONST_4_15 struct kernel_param *pParam)
{
  if (g_fLoggerCreated)
  {
    PRTLOGGER pLogger = pParam->name[0] == 'd' ? RTLogDefaultInstance() : RTLogRelGetDefaultInstance();
    if (pLogger)
      RTLogFlags(pLogger, pszValue);
  } else if (pParam->name[0] != 'd')
    strlcpy(&g_szLogFlags[0], pszValue, sizeof(g_szLogFlags));
  return 0;
}

/** log and dbg_log_flags parameter getter. */
static int vgdrvLinuxParamLogFlagsGet(char *pszBuf, CONST_4_15 struct kernel_param *pParam)
{
  PRTLOGGER pLogger = pParam->name[0] == 'd' ? RTLogDefaultInstance() : RTLogRelGetDefaultInstance();
  *pszBuf = '0';
  if (pLogger)
    RTLogGetFlags(pLogger, pszBuf, _4K);
  return strlen(pszBuf);
}
+/** log and dbg_log_dest parameter setter. */
+static int vgdrvLinuxParamLogDstSet(const char *pszValue, CONST_4_15 struct kernel_param *pParam)
+{
+ if (g_fLoggerCreated)
+ {
+
PRTLOGGER pLogger = pParam->name[0] == 'd' ? RTLogDefaultInstance() :
RTLogRelGetDefaultInstance();
+
if (pLogger)
+
RTLogDestinations(pLogger, pszValue);
+ }
+ else if (pParam->name[0] != 'd')
+
strlcpy(&g_szLogDst[0], pszValue, sizeof(g_szLogDst));
+ return 0;
+}
+
+/** log and dbg_log_dest parameter getter. */
+static int vgdrvLinuxParamLogDstGet(char *pszBuf, CONST_4_15 struct kernel_param *pParam)
+{
+ PRTLOGGER pLogger = pParam->name[0] == 'd' ? RTLogDefaultInstance() : RTLogRelGetDefaultInstance();
+ *pszBuf = '\0';
+ if (pLogger)
+
RTLogGetDestinations(pLogger, pszBuf, _4K);
+ return strlen(pszBuf);
+}
+
+
+/** r3_log_to_host parameter setter. */
+static int vgdrvLinuxParamR3LogToHostSet(const char *pszValue, CONST_4_15 struct kernel_param *pParam)
+{
+ if ( pszValue == NULL
+
|| *pszValue == '\0'
+
|| *pszValue == 'n'
+
|| *pszValue == 'N'
+
|| *pszValue == 'd'
+
|| *pszValue == 'D'
+
|| ( (*pszValue == 'o' || *pszValue == 'O')
+
&& (*pszValue == 'f' || *pszValue == 'F') )
+
)
+
g_DevExt.fLoggingEnabled = false;
+ else
+
g_DevExt.fLoggingEnabled = true;
+ return 0;
+}
+
+/** r3_log_to_host parameter getter. */
+static int vgdrvLinuxParamR3LogToHostGet(char *pszBuf, CONST_4_15 struct kernel_param *pParam)
+{
+ strcpy(pszBuf, g_DevExt.fLoggingEnabled ? "enabled" : "disabled");

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return strlen(pszBuf); 
+
+
+/
+/* Define module parameters. */
+*/
+module_param_call(log, vgdrvLinuxParamLogGrpSet, vgdrvLinuxParamLogGrpGet, NULL, 0664);
+module_param_call(log_flags, vgdrvLinuxParamLogFlagsSet, vgdrvLinuxParamLogFlagsGet, NULL, 0664);
+module_param_call(log_dest, vgdrvLinuxParamLogDstSet, vgdrvLinuxParamLogDstGet, NULL, 0664);
+# ifdef LOG_ENABLED
+module_param_call(dbg_log, vgdrvLinuxParamLogGrpSet, vgdrvLinuxParamLogGrpGet, NULL, 0664);
+module_param_call(dbg_log_flags, vgdrvLinuxParamLogFlagsSet, vgdrvLinuxParamLogFlagsGet, NULL, 0664);
+# endif
+module_param_call(r3_log_to_host, vgdrvLinuxParamR3LogToHostSet, vgdrvLinuxParamR3LogToHostGet, NULL, 0664);
+
+endif /* 2.6.0 and later */
+
+
+module_init(vgdrvLinuxModInit);
+module_exit(vgdrvLinuxModExit);
+
+MODULE_AUTHOR(VBOX_VENDOR);
+MODULE_DESCRIPTION(VBOX_PRODUCT " Guest Additions for Linux Module");
+MODULE_LICENSE("GPL");
+#ifdef MODULE_VERSION
+MODULE_VERSION(VBOX_VERSION_STRING " r" RT_XSTR(VBOX_SVN_REV));
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/VBoxGuest.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/VBoxGuest.c
@@ -0,0 +1,4014 @@
+/* $Id: VBoxGuest.cpp $ */
+/** @file
+ * VBoxGuest - Guest Additions Driver, Common Code.
+ */
+/**
+ * Copyright (C) 2007-2017 Oracle Corporation
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+ * available from http://www.virtualbox.org. This file is free software;
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VBoxGuest is the device driver for VMMDev.

The device driver is shipped as part of the guest additions. It has roots in
the host VMM support driver (usually known as VBoxDrv), so fixes in platform
specific code may apply to both drivers.

The common code lives in VBoxGuest.cpp and is compiled both as C++ and C.
The VBoxGuest.cpp source file shall not contain platform specific code,
though it must occasionally do a few \#ifdef RT_OS_XXX tests to cater for
platform differences. Though, in those cases, it is common that more than
one platform needs special handling.

On most platforms the device driver should create two device nodes, one for
full (unrestricted) access to the feature set, and one which only provides a
restrict set of functions. These are generally referred to as 'vboxguest'
and 'vboxuser' respectively. Currently, this two device approach is only
implemented on Linux!

Header Files

#define LOG_GROUP   LOG_GROUP_DEFAULT
#include "VBoxGuestInternal.h"
#include <VBox/VMMDev.h> /* for VMMDEV_RAM_SIZE */
#include <VBox/log.h>
#include <iprt/mem.h>
#include <iprt/time.h>
#include <iprt/memobj.h>
```c
#include <iprt/asm.h>
#include <iprt/asm-amd64-x86.h>
#include <iprt/string.h>
#include <iprt/process.h>
#include <iprt/assert.h>
#include <iprt/param.h>
#include <iprt/timer.h>
#ifdef VBOX_WITH_HGCM
#include <iprt/thread.h>
#endif
#include "version-generated.h"
#if defined(RT_OS_LINUX) || defined(RT_OS_FREEBSD)
#include "revision-generated.h"
#endif
#if defined(RT_OS_SOLARIS) || defined(RT_OS_DARWIN)
#include <iprt/rand.h>
#endif

/*******************************************************************************************
**************************************
+* Defined Constants And Macros                                                              *
+*******************************************************************************************
#define VBOXGUEST_ACQUIRE_STYLE_EVENTS (VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST |
VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST)
+
+
+*******************************************************************************************
**************************************
+* Internal Functions                                                                     *
+*******************************************************************************************
#ifdef VBOX_WITH_HGCM
+static DECLCALLBACK(int) vgdrvHgcmAsyncWaitCallback(VMMDevHGCMRequestHeader
*pHdrNonVolatile, void *pvUser, uint32_t u32User);
#endif
+static int  vgdrvIoCtl_CancelAllWaitEvents(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession);
+static void vgdrvBitUsageTrackerClear(PVBOXGUESTBITUSAGETRACER pTracker);
+static uint32_t vgdrvGetAllowedEventMaskForSession(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession);
+static int  vgdrvResetEventFilterOnHost(PVBOXGUESTDEVEXT pDevExt, uint32_t fFixedEvents);
+static int  vgdrvResetMouseStatusOnHost(PVBOXGUESTDEVEXT pDevExt);
+static int  vgdrvResetCapabilitiesOnHost(PVBOXGUESTDEVEXT pDevExt);
+static int  vgdrvSetSessionEventFilter(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, uint32_t fOrMask, uint32_t fNotMask, bool fSessionTermination);
+static int  vgdrvSetSessionMouseStatus(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession);
```
static int vgdrvSetSessionCapabilities(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
    uint32_t fOrMask, uint32_t fNotMask, bool fSessionTermination);
+static int vgdrvAcquireSessionCapabilities(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
    uint32_t fOrMask, uint32_t fNotMask, bool fSessionTermination);
+static int vgdrvDispatchEventsLocked(PVBOXGUESTDEVEXT pDevExt, uint32_t fEvents);

+static const uint32_t g_cbChangeMemBalloonReq = RT_OFFSETOF(VMMDevChangeMemBalloon,
aPhysPage[VMMDEV_MEMORY_BALLOON_CHUNK_PAGES]);

+#if defined(RT_OS_DARWIN) || defined(RT_OS_SOLARIS)
+/**
+ * Drag in the rest of IRPT since we share it with the
+ * rest of the kernel modules on Solaris.
+ */
+PFNRT g_apfnVBoxGuestIPRTDeps[] =
+{
+  /* VirtioNet */
+  (PFNRT)RTRandBytes,
+  /* RTSemMutex */
+  (PFNRT)RTSemMutexCreate,
+  (PFNRT)RTSemMutexDestroy,
+  (PFNRT)RTSemMutexRequest,
+  (PFNRT)RTSemMutexRequestNoResume,
+  (PFNRT)RTSemMutexRequestDebug,
+  (PFNRT)RTSemMutexRequestNoResumeDebug,
+  (PFNRT)RTSemMutexRelease,
+  (PFNRT)RTSemMutexIsOwned,
+  NULL
+};
+#endif /* RT_OS_DARWIN || RT_OS_SOLARIS */

+/**
+ * Reserves memory in which the VMM can relocate any guest mappings
+ * that are floating around.
+ *
+ This operation is a little bit tricky since the VMM might not accept
just any address because of address clashes between the three contexts
+ * it operates in, so use a small stack to perform this operation.
+ *
+ * @returns VBox status code (ignored).
+ * @param  pDevExt   The device extension.
+ */
+static int vgdrvInitFixateGuestMappings(PVBOXGUESTDEVEXT pDevExt)
+{
+  /*
+  * Query the required space.
+  */
+  VMMDevReqHypervisorInfo *pReq;
+  int rc = VbgIR0GRAloc((VMMDevRequestHeader **)&pReq, sizeof(VMMDevReqHypervisorInfo),
+                 VMMDevReq_GetHypervisorInfo);
+  if (RT_FAILURE(rc)) /* this shouldn't happen! */
+  {
+      VbgIR0GRFree(&pReq->header);
+      return rc;
+  }
+  pReq->hypervisorStart = 0;
+  pReq->hypervisorSize  = 0;
+  rc = VbgIR0GRPerform(&pReq->header);
+  if (RT_FAILURE(rc)) /* this shouldn't happen! */
+  {
+      VbgIR0GRFree(&pReq->header);
+      return rc;
+  }
+  /*
+  * The VMM will report back if there is nothing it wants to map, like for
+  * instance in VT-x and AMD-V mode.
+  */
+  if (pReq->hypervisorSize == 0)
+  {
+      Log("vgdrvInitFixateGuestMappings: nothing to do\n");
+  } else
+  {
+    /*
+     * We have to try several times since the host can be picky
+     * about certain addresses.
+     */
+    RTR0MEMOBJ hFictive = NIL_RTR0MEMOBJ;
+    uint32_t cbHypervisor = pReq->hypervisorSize;
+    RTR0MEMOBJ ahTries[5];
+    uint32_t iTry;
+    bool fBitched = false;
+    Log("vgdrvInitFixateGuestMappings: cbHypervisor=%#x\n", cbHypervisor);
+    for (iTry = 0; iTry < RT_ELEMENTS(ahTries); iTry++)
+    {
+      /*
+       * Reserve space, or if that isn't supported, create a object for
+       * some fictive physical memory and map that in to kernel space.
+       */
To make the code a bit uglier, most systems cannot help with 4MB alignment, so we have to deal with that in addition to having two ways of getting the memory.

```
    uint32_t uAlignment = _4M;
    RTR0MEMOBJ hObj;
    rc = RTR0MemObjReserveKernel(&hObj, (void *)-1, RT_ALIGN_32(cbHypervisor, _4M), uAlignment);
    if (rc == VERR_NOT_SUPPORTED)
        {
        uAlignment = PAGE_SIZE;
        rc = RTR0MemObjReserveKernel(&hObj, (void *)-1, RT_ALIGN_32(cbHypervisor, _4M) + _4M, uAlignment);
        }
    /*
     * If both RTR0MemObjReserveKernel calls above failed because either not supported or not implemented at all at the current platform, try to map the memory object into the virtual kernel space.
     */
    if (rc == VERR_NOT_SUPPORTED)
        {
        if (hFictive == NIL_RTR0MEMOBJ)
            {
            rc = RTR0MemObjEnterPhys(&hObj, VBOXGUEST_HYPERVISOR_PHYSICAL_START, cbHypervisor + _4M, RTMEM_CACHE_POLICY_DONT_CARE);
            if (RT_FAILURE(rc))
                break;
            hFictive = hObj;
            }
        uAlignment = _4M;
        rc = RTR0MemObjMapKernel(&hObj, hFictive, (void *)-1, uAlignment, RTMEM_PROT_READ | RTMEM_PROT_WRITE);
        if (rc == VERR_NOT_SUPPORTED)
            {
            uAlignment = PAGE_SIZE;
            rc = RTR0MemObjMapKernel(&hObj, hFictive, (void *)-1, uAlignment, RTMEM_PROT_READ | RTMEM_PROT_WRITE);
            }
    if (RT_FAILURE(rc))
        {
        LogRel("VBoxGuest: Failed to reserve memory for the hypervisor: rc=%Rrc (cbHypervisor=%#x uAlignment=%#x iTry=%u)\n", rc, cbHypervisor, uAlignment, iTry));
        fBitched = true;
        break;
        }
```
+ /*
+ * Try set it.
+ */
+ pReq->header.requestType = VMMDevReq_SetHypervisorInfo;
+ pReq->header.rc = VERR_INTERNAL_ERROR;
+ pReq->hypervisorSize = cbHypervisor;
+ pReq->hypervisorStart = (RTGCPTR32)(uintptr_t)RTR0MemObjAddress(hObj);
+ if ( uAlignment == PAGE_SIZE
+     && pReq->hypervisorStart & (_4M - 1))
+     pReq->hypervisorStart = RT_ALIGN_32(pReq->hypervisorStart, _4M);
+ AssertMsg(RT_ALIGN_32(pReq->hypervisorStart, _4M) == pReq->hypervisorStart, "%#x
" + pReq->hypervisorStart);
+ rc = VbglR0GRPerform(&pReq->header);
+ if (RT_SUCCESS(rc))
+ {
+     pDevExt->hGuestMappings = hFictive != NIL_RTR0MEMOBJ ? hFictive : hObj;
+     Log(("VBoxGuest: %p LB %#x; uAlignment=%#x iTry=%u hGuestMappings=%p (%s)
", RTR0MemObjAddress(pDevExt->hGuestMappings), RTR0MemObjSize(pDevExt->hGuestMappings), uAlignment, iTry, pDevExt->hGuestMappings, hFictive != NIL_RTR0PTR ? "fictive" : "reservation ");
+     break;
+ }
+ ahTries[iTry] = hObj;
+ }
+ */
+ /* Cleanup failed attempts.
+ */
+ while (iTry-- > 0)
+     RTR0MemObjFree(ahTries[iTry], false /* fFreeMappings */);
+ if ( RT_FAILURE(rc)
+     && hFictive != NIL_RTR0PTR)
+     RTR0MemObjFree(hFictive, false /* fFreeMappings */);
+ if (RT_FAILURE(rc) && !fBitched)
+     LogRel("VBoxGuest: Warning: failed to reserve %#d of memory for guest mappings.\n", cbHypervisor));
+ } + VbglR0GRFree(&pReq->header);
+ + /*
+ * We ignore failed attempts for now.
+ */
+ return VINF_SUCCESS;
+}
+ + + /*
+ * Undo what vgdrvInitFixateGuestMappings did.
+ *
+ + * @param pDevExt The device extension.
+ */
+ static void vgdrvTermUnfixGuestMappings(PVBOXGUESTDEVEXT pDevExt)
+ {
+     if (pDevExt->hGuestMappings != NIL_RTR0PTR)
+     {
+         /*
+         * Tell the host that we're going to free the memory we reserved for
+         * it, the free it up. (Leak the memory if anything goes wrong here.)
+         */
+         VMMDevReqHypervisorInfo *pReq;
+         int rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pReq, sizeof(VMMDevReqHypervisorInfo),
+                              VMMDevReq_SetHypervisorInfo);
+         if (RT_SUCCESS(rc))
+         {
+             pReq->hypervisorStart = 0;
+             pReq->hypervisorSize  = 0;
+             rc = VbglR0GRPerform(&pReq->header);
+             VbglR0GRFree(&pReq->header);
+         }
+         if (RT_SUCCESS(rc))
+         {
+             rc = RTR0MemObjFree(pDevExt->hGuestMappings, true /* fFreeMappings */);
+             AssertRC(rc);
+         }
+         else
+             LogRel("vgdrvTermUnfixGuestMappings: Failed to unfix the guest mappings! rc=%Rrc
", rc));
+         pDevExt->hGuestMappings = NIL_RTR0MEMOBJ;
+     }
+ }
+ *
+ * Report the guest information to the host.
+ *
+ * @returns IPRT status code.
+ * @param enmOSType The OS type to report.
+ */
+ static int vgdrvReportGuestInfo(VBOXOSTYPE enmOSType)
+ {
+     /*
+      * Allocate and fill in the two guest info reports.
+      */
+     VMMDevReportGuestInfo2 *pReqInfo2 = NULL;
+ VMMDevReportGuestInfo  *pReqInfo1 = NULL;
+ int rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pReqInfo2, sizeof(VMMDevReportGuestInfo2),
+ VMMDevReq_ReportGuestInfo2);
+ Log(("vgdrvReportGuestInfo: VbglR0GRAlloc VMMDevReportGuestInfo2 completed with rc=%Rrc\n", rc));
+ if (RT_SUCCESS(rc))
+ {
+   pReqInfo2->guestInfo.additionsMajor    = VBOX_VERSION_MAJOR;
+   pReqInfo2->guestInfo.additionsMinor    = VBOX_VERSION_MINOR;
+   pReqInfo2->guestInfo.additionsBuild    = VBOX_VERSION_BUILD;
+   pReqInfo2->guestInfo.additionsRevision = VBOX_SVN_REV;
+   pReqInfo2->guestInfo.additionsFeatures = 0; /* (no features defined yet) */
+   RTStrCopy(pReqInfo2->guestInfo.szName, sizeof(pReqInfo2->guestInfo.szName),
+ VBOX_VERSION_STRING);
+
+   rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pReqInfo1, sizeof(VMMDevReportGuestInfo),
+ VMMDevReq_ReportGuestInfo);
+   Log(("vgdrvReportGuestInfo: VbglR0GRAlloc VMMDevReportGuestInfo completed with rc=%Rrc\n", rc));
+   if (RT_SUCCESS(rc))
+   {
+     pReqInfo1->guestInfo.interfaceVersion = VMMDEV_VERSION;
+     pReqInfo1->guestInfo.osType           = enmOSType;
+
+     /*
+     * There are two protocols here:
+     * 1. Info2 + Info1. Supported by >=3.2.51.
+     * 2. Info1 and optionally Info2. The old protocol.
+     *
+     * We try protocol 1 first. It will fail with VERR_NOT_SUPPORTED
+     * if not supported by the VMMDev (message ordering requirement).
+     */
+     rc = VbglR0GRPerform(&pReqInfo2->header);
+     Log(("vgdrvReportGuestInfo: VbglR0GRPerform VMMDevReportGuestInfo2 completed with
+ rc=%Rrc\n", rc));
+     if (RT_SUCCESS(rc))
+     {
+       rc = VbglR0GRPerform(&pReqInfo1->header);
+       Log(("vgdrvReportGuestInfo: VbglR0GRPerform VMMDevReportGuestInfo completed with
+ rc=%Rrc\n", rc));
+     }
+     else if (   rc == VERR_NOT_SUPPORTED
+                 || rc == VERR_NOT_IMPLEMENTED)
+     {
+       rc = VbglR0GRPerform(&pReqInfo1->header);
+       Log(("vgdrvReportGuestInfo: VbglR0GRPerform VMMDevReportGuestInfo completed with
+ rc=%Rrc\n", rc));
+     }
+   }
+ else if (   rc == VERR_NOT_SUPPORTED
+             || rc == VERR_NOT_IMPLEMENTED)
+ {
+   rc = VbglR0GRPerform(&pReqInfo1->header);
+   Log(("vgdrvReportGuestInfo: VbglR0GRPerform VMMDevReportGuestInfo completed with
+ rc=%Rrc\n", rc));
+   if (RT_SUCCESS(rc))
+   {
+     rc = VbglR0GRPerform(&pReqInfo2->header);
Log(("vgdrvReportGuestInfo: VbglR0GRPerform VMMDevReportGuestInfo2 completed with rc=%Rrc\n", rc));
        if (rc == VERR_NOT_IMPLEMENTED)
            rc = VINF_SUCCESS;
    }
    VbglR0GRFree(&pReqInfo1->header);
    }
    VbglR0GRFree(&pReqInfo2->header);
    }
    + return rc;
}

+/**
 + * Report the guest driver status to the host.
 + *
 + * @returns IPRT status code.
 + * @param fActive Flag whether the driver is now active or not.
 + */
+static int vgdrvReportDriverStatus(bool fActive)
+
+ {  
+    /* Report guest status of the VBox driver to the host. */
+    VMMDevReportGuestStatus *pReq2 = NULL;
+    int rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pReq2, sizeof(*pReq2),
+        VMMDevReq_ReportGuestStatus);
+    Log(("vgdrvReportDriverStatus: VbglR0GRAlloc VMMDevReportGuestStatus completed with rc=%Rrc\n", rc));
+    if (RT_SUCCESS(rc))
+    {
+        pReq2->guestStatus.facility = VBoxGuestFacilityType_VBoxGuestDriver;
+        pReq2->guestStatus.status = fActive ? VBoxGuestFacilityStatus_Active
+            : VBoxGuestFacilityStatus_Inactive;
+        rc = VbglR0GRPerform(&pReq2->header);
+        Log(("vgdrvReportDriverStatus: VbglR0GRPerform VMMDevReportGuestStatus completed with fActive=%d, rc=%Rrc\n", fActive, rc));
+        if (rc == VERR_NOT_IMPLEMENTED) /* Compatibility with older hosts. */
+            rc = VINF_SUCCESS;
+        VbglR0GRFree(&pReq2->header);
+    }
+    + return rc;
/** @name Memory Ballooning 
 * @{ 
 * @** 
 * Inflate the balloon by one chunk represented by an R0 memory object. 
 * @ * The caller owns the balloon mutex. 
 * @ 
 * @returns IPRT status code. 
 * @param   pMemObj     Pointer to the R0 memory object. 
 * @param   pReq        The pre-allocated request for performing the VMMDev call. 
 * @ */ 
+ static int vgdrvBalloonInflate(PRTR0MEMOBJ pMemObj, VMMDevChangeMemBalloon *pReq) 
+{ 
+    uint32_t iPage; 
+    int rc; 
+    
+    for (iPage = 0; iPage < VMMDEV_MEMORY_BALLOON_CHUNK_PAGES; iPage++) 
+    { 
+        RTHCPHYS phys = RTR0MemObjGetPagePhysAddr(*pMemObj, iPage); 
+        pReq->aPhysPage[iPage] = phys; 
+    } 
+    pReq->fInflate = true; 
+    pReq->header.size = g_cbChangeMemBalloonReq; 
+    pReq->cPages = VMMDEV_MEMORY_BALLOON_CHUNK_PAGES; 
+    rc = VbgIR0GRPerform(&pReq->header); 
+    if (RT_FAILURE(rc)) 
+        LogRel("vgdrvBalloonInflate: VbgIR0GRPerform failed. rc=%Rrc\n", rc); 
+    return rc; 
+} 
+ 
+/** 
 * Deflate the balloon by one chunk - info the host and free the memory object. 
 * @ 
 * @returns IPRT status code. 
 * @param   pMemObj     Pointer to the R0 memory object. 
 *                      The memory object will be freed afterwards. 
 * @param   pReq        The pre-allocated request for performing the VMMDev call. 
 * @ */ 
+
+static int vgdrvBalloonDeflate(PRTR0MEMOBJ pMemObj, VMMDevChangeMemBalloon *pReq)
+{
+    uint32_t iPage;
+    int rc;
+    for (iPage = 0; iPage < VMMDEV_MEMORY_BALLOON_CHUNK_PAGES; iPage++)
+    {
+        RTHCPHYS phys = RTR0MemObjGetPagePhysAddr(*pMemObj, iPage);
+        pReq->aPhysPage[iPage] = phys;
+    }
+    pReq->fInflate = false;
+    pReq->header.size = g_cbChangeMemBalloonReq;
+    pReq->cPages = VMMDEV_MEMORY_BALLOON_CHUNK_PAGES;
+    rc = VbglR0GRPerform(&pReq->header);
+    if (RT_FAILURE(rc))
+    {
+        LogRel("vgdrvBalloonDeflate: VbglR0GRPerform failed. rc=%Rrc
", rc));
+        return rc;
+    }
+    rc = RTR0MemObjFree(*pMemObj, true);
+    if (RT_FAILURE(rc))
+    {
+        LogRel("vgdrvBalloonDeflate: RTR0MemObjFree(%p,true) -> %Rrc; this is *BAD*\n", *pMemObj, rc));
+        return rc;
+    }
+    *pMemObj = NIL_RTR0MEMOBJ;
+    return VINF_SUCCESS;
+
+/**
+ * Inflate/deflate the memory balloon and notify the host.
+ * This is a worker used by vgdrvIoCtl_CheckMemoryBalloon - it takes the mutex.
+ *
+ * @returns VBox status code.
+ * @param   pDevExt         The device extension.
+ * @param   cBalloonChunks  The new size of the balloon in chunks of 1MB.
+ * @param   pfHandleInR3    Where to return the handle-in-ring3 indicator
+ *                          (VINF_SUCCESS if set).
+ */
+static int vgdrvSetBalloonSizeKernel(PVBOXGUESTDEVEXT pDevExt, uint32_t cBalloonChunks, bool
+    *pfHandleInR3)
+{
+    uint32_t iPage;
+    int rc;
+    for (iPage = 0; iPage < VMMDEV_MEMORY_BALLOON_CHUNK_PAGES; iPage++)
+    {
+        RTHCPHYS phys = RTR0MemObjGetPagePhysAddr(*pMemObj, iPage);
+        pReq->aPhysPage[iPage] = phys;
+    }
+    pReq->fInflate = false;
+    pReq->header.size = g_cbChangeMemBalloonReq;
+    pReq->cPages = VMMDEV_MEMORY_BALLOON_CHUNK_PAGES;
+    rc = VbglR0GRPerform(&pReq->header);
+    if (RT_FAILURE(rc))
+    {
+        LogRel("vgdrvBalloonDeflate: VbglR0GRPerform failed. rc=%Rrc
", rc));
+        return rc;
+    }
+    rc = RTR0MemObjFree(*pMemObj, true);
+    if (RT_FAILURE(rc))
+    {
+        LogRel("vgdrvBalloonDeflate: RTR0MemObjFree(%p,true) -> %Rrc; this is *BAD*\n", *pMemObj, rc));
+        return rc;
+    }
+    *pMemObj = NIL_RTR0MEMOBJ;
+    return VINF_SUCCESS;
+}
int rc = VINF_SUCCESS;

if (pDevExt->MemBalloon.fUseKernelAPI)
{
    VMMDevChangeMemBalloon *pReq;
    uint32_t i;

    if (cBalloonChunks > pDevExt->MemBalloon.cMaxChunks)
    {
        LogRel("vgdrvSetBalloonSizeKernel: illegal balloon size %u (max=%u)\n",
                cBalloonChunks, pDevExt->MemBalloon.cMaxChunks);
        return VERR_INVALID_PARAMETER;
    }

    if (cBalloonChunks == pDevExt->MemBalloon.cMaxChunks)
        return VINF_SUCCESS; /* nothing to do */

    if (cBalloonChunks > pDevExt->MemBalloon.cChunks
        && !pDevExt->MemBalloon.paMemObj)
    {
        pDevExt->MemBalloon.paMemObj = (PRTR0MEMOBJ)RTMemAllocZ(sizeof(RTR0MEMOBJ) *
                        pDevExt->MemBalloon.cMaxChunks);
        if (!pDevExt->MemBalloon.paMemObj)
            LogRel("vgdrvSetBalloonSizeKernel: no memory for paMemObj!\n");
        return VERR_NO_MEMORY;
    }

    rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pReq, g_cbChangeMemBalloonReq,
                        VMMDevReq_ChangeMemBalloon);
    if (RT_FAILURE(rc))
        return rc;

    if (cBalloonChunks > pDevExt->MemBalloon.cChunks)
    {
        /* inflate */
        for (i = pDevExt->MemBalloon.cChunks; i < cBalloonChunks; i++)
            rc = RTR0MemObjAllocPhysNC(&pDevExt->MemBalloon.paMemObj[i],
                                        VMMDEV_MEMORY_BALLOON_CHUNK_SIZE, NIL_RTHCPHYS);
        VMMDEV_MEMORY_BALLOON_CHUNK_SIZE, NIL_RTHCPHYS);
        if (RT_FAILURE(rc))
            if (rc == VERR_NOT_SUPPORTED)
                pDevExt->MemBalloon.fUseKernelAPI = false;
        rc = VINF_SUCCESS;
    }
Assert(pDevExt->MemBalloon.cChunks == 0);
Log("VBoxGuestSetBalloonSizeKernel: PhysNC allocs not supported, falling back to R3 allocs.");

/* else if (rc == VERR_NO_MEMORY || rc == VERR_NO_PHYS_MEMORY):
   * cannot allocate more memory => don't try further, just stop here */
/* else: XXX what else can fail? VERR_MEMOBJ_INIT_FAILED for instance. just stop. */
break;
}

rc = vgdrvBalloonInflate(&pDevExt->MemBalloon.paMemObj[i], pReq);
if (RT_FAILURE(rc))
{
    Log("vboxGuestSetBalloonSize(inflate): failed, rc=%Rrc!", rc);
    RTR0MemObjFree(pDevExt->MemBalloon.paMemObj[i], true);
    pDevExt->MemBalloon.paMemObj[i] = NIL_RTR0MEMOBJ;
    break;
}
    pDevExt->MemBalloon.cChunks++;
}
else
{
    /* deflate */
    for (i = pDevExt->MemBalloon.cChunks; i-- > cBalloonChunks;)
    {
        rc = vgdrvBalloonDeflate(&pDevExt->MemBalloon.paMemObj[i], pReq);
        if (RT_FAILURE(rc))
        {
            Log("vboxGuestSetBalloonSize(deflate): failed, rc=%Rrc!", rc);
            break;
        }
        pDevExt->MemBalloon.cChunks--;
    }
    VbglR0GRFree(&pReq->header);
}

/* Set the handle-in-ring3 indicator. When set Ring-3 will have to work
   * the balloon changes via the other API.
*/
*pfHandleInR3 = pDevExt->MemBalloon.fUseKernelAPI ? false : true;
return rc;
+
+/**
+ * Inflate/deflate the balloon by one chunk.
+*
+ * Worker for vgdrvIoCtl_ChangeMemoryBalloon - it takes the mutex.
+*
+ * @returns VBox status code.
+ * @param pDevExt
The device extension.
+ * @param pSession
The session.
+ * @param pvChunk
The address of the chunk to add to / remove from the
+*
balloon. (user space address)
+ * @param fInflate
Inflate if true, deflate if false.
+ */
+static int vgdrvSetBalloonSizeFromUser(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
RTR3PTR pvChunk, bool fInflate)
+{
+ VMMDevChangeMemBalloon *pReq;
+ PRTR0MEMOBJ pMemObj = NULL;
+ int rc = VINF_SUCCESS;
+ uint32_t i;
+ RT_NOREF1(pSession);
+
+ if (fInflate)
+ {
+
if ( pDevExt->MemBalloon.cChunks > pDevExt->MemBalloon.cMaxChunks - 1
+
|| pDevExt->MemBalloon.cMaxChunks == 0 /* If called without first querying. */)
+
{
+
LogRel(("vgdrvSetBalloonSizeFromUser: cannot inflate balloon, already have %u chunks (max=%u)\n",
+
pDevExt->MemBalloon.cChunks, pDevExt->MemBalloon.cMaxChunks));
+
return VERR_INVALID_PARAMETER;
+
}
+
+
if (!pDevExt->MemBalloon.paMemObj)
+
{
+
pDevExt->MemBalloon.paMemObj = (PRTR0MEMOBJ)RTMemAlloc(sizeof(RTR0MEMOBJ) *
pDevExt->MemBalloon.cMaxChunks);
+
if (!pDevExt->MemBalloon.paMemObj)
+
{
+
LogRel(("vgdrvSetBalloonSizeFromUser: no memory for paMemObj!\n"));
+
return VERR_NO_MEMORY;
+
}
+
for (i = 0; i < pDevExt->MemBalloon.cMaxChunks; i++)
+
pDevExt->MemBalloon.paMemObj[i] = NIL_RTR0MEMOBJ;
+
}
+ }
+ else
+ {
+
if (pDevExt->MemBalloon.cChunks == 0)

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+  }  
+  AssertMsgFailed("vgdrvSetBalloonSizeFromUser: cannot decrease balloon, already at size 0\n");  
+  return VERR_INVALID_PARAMETER;  
+ }  
+ }  
+ }  
+ /*  
+ * Enumerate all memory objects and check if the object is already registered.  
+ */  
+ for (i = 0; i < pDevExt->MemBalloon.cMaxChunks; i++)  
+ {  
+   if (   fInflate  
+       && !pMemObj  
+       && pDevExt->MemBalloon.paMemObj[i] == NIL_RTR0MEMOBJ)  
+       pMemObj = &pDevExt->MemBalloon.paMemObj[i]; /* found free object pointer */  
+   if (RTR0MemObjAddressR3(pDevExt->MemBalloon.paMemObj[i]) == pvChunk)  
+   {  
+     if (fInflate)  
+       return VERR_ALREADY_EXISTS; /* don't provide the same memory twice */  
+     pMemObj = &pDevExt->MemBalloon.paMemObj[i];  
+     break;  
+   }  
+ }  
+ if (!pMemObj)  
+ {  
+   if (fInflate)  
+   {  
+     /* no free object pointer found -- should not happen */  
+     return VERR_NO_MEMORY;  
+   }  
+ }  
+ /* cannot free this memory as it wasn't provided before */  
+ return VERR_NOT_FOUND;  
+ }  
+ }  
+ /*  
+ * Try inflate / default the balloon as requested.  
+ */  
+ rc = VbglIR0GRAlloc((VMMDevRequestHeader **)&pReq, g_cbChangeMemBalloonReq,  
+ VMMDevReq_ChangeMemBalloon);  
+ if (RT_FAILURE(rc))  
+ return rc;  
+ }  
+ if (fInflate)  
+ {  
+   rc = RTR0MemObjLockUser(pMemObj, pvChunk, VMMDEV_MEMORY_BALLOON_CHUNK_SIZE,  
+   RTMEM_PROT_READ | RTMEM_PROT_WRITE, NIL_RTR0PROCESS);  
+   if (RT_SUCCESS(rc))
+ { 
+   rc = vgdrvBalloonInflate(pMemObj, pReq);
+   if (RT_SUCCESS(rc))
+     pDevExt->MemBalloon.cChunks++;
+   else
+     {
+       Log("vgdrvSetBalloonSizeFromUser(inflate): failed, rc=%Rrc\n", rc);
+       RTR0MemObjFree(*pMemObj, true);
+       *pMemObj = NIL_RTR0MEMOBJ;
+     }
+   }
+ else
+   {
+     rc = vgdrvBalloonDeflate(pMemObj, pReq);
+     if (RT_SUCCESS(rc))
+       pDevExt->MemBalloon.cChunks--;
+     else
+       Log("vgdrvSetBalloonSizeFromUser(deflate): failed, rc=%Rrc\n", rc));
+   }
+ VbglR0GRFree(&pReq->header);
+ return rc;
+
+/**
+ * Cleanup the memory balloon of a session.
+ *
+ * Will request the balloon mutex, so it must be valid and the caller must not
+ * own it already.
+ *
+ * @param   pDevExt     The device extension.
+ * @param   pSession    The session. Can be NULL at unload.
+ */
+static void vgdrvCloseMemBalloon(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession)
+{
+  RTSemFastMutexRequest(pDevExt->MemBalloon.hMtx);
+  if (    pDevExt->MemBalloon.pOwner == pSession
+       ||  pSession == NULL /*unload*/)
+  {
+    VMMDevChangeMemBalloon *pReq;
+    int rc = VbglR0GRAloc((VMMDevRequestHeader **)&pReq, g_cbChangeMemBalloonReq,
+      VMMDevReq_ChangeMemBalloon);
+    if (RT_SUCCESS(rc))
+      {
for (i = pDevExt->MemBalloon.cChunks; i-- > 0;)
{
    rc = vgdrvBalloonDeflate(&pDevExt->MemBalloon.paMemObj[i], pReq);
    if (RT_FAILURE(rc))
    {
        LogRel("vgdrvCloseMemBalloon: Deflate failed with rc=%Rrc. Will leak %u chunks\n",
                rc, pDevExt->MemBalloon.cChunks);
        break;
    }
    pDevExt->MemBalloon.paMemObj[i] = NIL_RTR0MEMOBJ;
    pDevExt->MemBalloon.cChunks--;
}
VbglR0GRFree(&pReq->header);
}
else
    LogRel("vgdrvCloseMemBalloon: Failed to allocate VMMDev request buffer (rc=%Rrc). Will leak %u
chunks\n",
           rc, pDevExt->MemBalloon.cChunks);
    RTMemFree(pDevExt->MemBalloon.paMemObj);
    pDevExt->MemBalloon.paMemObj = NULL;
}

pDevExt->MemBalloon.pOwner = NULL;
RTSemFastMutexRelease(pDevExt->MemBalloon.hMtx);
*/
/** @} */
/** @name Heartbeat */
/** @} */
/** @name Heartbeat */
* Sends heartbeat to host.
+ * @returns VBox status code.
+ */
+static int vgdrvHeartbeatSend(PVBOXGUESTDEVEXT pDevExt)
+{
    int rc;
    if (pDevExt->pReqGuestHeartbeat)
    {
        rc = VbglR0GRPerform(pDevExt->pReqGuestHeartbeat);
        Log3("vgdrvHeartbeatSend: VbglR0GRPerform vgdrvHeartbeatSend completed with rc=%Rrc\n", rc);
    }
}
+ else
+     rc = VERR_INVALID_STATE;
+ return rc;
+
+/**
+ * Callback for heartbeat timer.
+ */
+static DECLCALLBACK(void) vgdrvHeartbeatTimerHandler(PRTTIMER hTimer, void *pvUser, uint64_t iTick)
+
+ PVBOXGUESTDEVEXT pDevExt = (PVBOXGUESTDEVEXT)pvUser;
+ int rc;
+ AssertReturnVoid(pDevExt);
+
+ rc = vgdrvHeartbeatSend(pDevExt);
+ if (RT_FAILURE(rc))
+    Log(("HB Timer: vgdrvHeartbeatSend failed: rc=%Rrc\n", rc));
+
+ NOREF(hTimer); NOREF(iTick);
+
+/**
+ * Configure the host to check guest's heartbeat
+ * and get heartbeat interval from the host.
+ */
+static int vgdrvHeartbeatHostConfigure(PVBOXGUESTDEVEXT pDevExt, bool fEnabled)
+
+ VMMDevReqHeartbeat *pReq;
+ int rc = VbgIR0GRAloc((VMMDevRequestHeader **)&pReq, sizeof(*pReq), VMMDevReq_HeartbeatConfigure);
+ Log(("vgdrvHeartbeatHostConfigure: VbgIR0GRAloc vgdrvHeartbeatHostConfigure completed with
rc=%Rrc\n", rc));
+ if (RT_SUCCESS(rc))
+    {
+        pReq->fEnabled = fEnabled;
+        pReq->cNsInterval = 0;
+        rc = VbgIR0GPerform(&pReq->header);
+        Log(("vgdrvHeartbeatHostConfigure: VbgIR0GPerform vgdrvHeartbeatHostConfigure completed with
rc=%Rrc\n", rc));
+        pDevExt->cNsHeartbeatInterval = pReq->cNsInterval;
+        VbgIR0GFree(&pReq->header);
+} + return rc;
+}
+
+/**
+ * Initializes the heartbeat timer.
+ *
+ * This feature may be disabled by the host.
+ *
+ * @returns VBox status (ignored).
+ * @param   pDevExt             The device extension.
+ */
+static int vgdrvHeartbeatInit(PVBOXGUESTDEVEXTP pDevExt)
+{ + /*
+ * Make sure that heartbeat checking is disabled.
+ *
+ * @returns VBox status (ignored).
+ * @param   pDevExt             The device extension.
+ */
+int rc = vgdrvHeartbeatHostConfigure(pDevExt, false);
+if (RT_SUCCESS(rc))
+{ + rc = vgdrvHeartbeatHostConfigure(pDevExt, true);
+if (RT_SUCCESS(rc))
+{ + /*
+ * Preallocate the request to use it from the timer callback because:
+ * 1) on Windows VbglR0GRAloc must be called at IRQL <= APC_LEVEL
+ * and the timer callback runs at DISPATCH_LEVEL;
+ * 2) avoid repeated allocations.
+ */
+rc = VbglR0GRAloc(&pDevExt->pReqGuestHeartbeat, sizeof(*pDevExt->pReqGuestHeartbeat),
VMMDDevReq_GuestHeartbeat);
+if (RT_SUCCESS(rc))
+{ + LogRel("vgdrvHeartbeatInit: Setting up heartbeat to trigger every %RU64 milliseconds\n",
pDevExt->cNsHeartbeatInterval / RT_NS_1MS));
+rc = RTTimerCreateEx(&pDevExt->pHeartbeatTimer, pDevExt->cNsHeartbeatInterval, 0 /*fFlags*/,
(PFNRTTIMER)vgdrvHeartbeatTimerHandler, pDevExt);
+if (RT_SUCCESS(rc))
+{ + rc = RTTimerStart(pDevExt->pHeartbeatTimer, 0);
+if (RT_SUCCESS(rc))
+    return VINF_SUCCESS;
+    LogRel("vgdrvHeartbeatInit: Heartbeat timer failed to start, rc=%Rrc\n", rc));
+  }
+else
+    LogRel("vgdrvHeartbeatInit: Failed to create heartbeat timer: %Rrc\n", rc));
VbglR0GRFree(pDevExt->pReqGuestHeartbeat);

pDevExt->pReqGuestHeartbeat = NULL;
}

else

LogRel("vgdrvHeartbeatInit: VbglR0GRAlloc(VMMDevReq_GuestHeartbeat): %Rrc\n", rc));

LogRel("vgdrvHeartbeatInit: Failed to set up the timer, guest heartbeat is disabled\n");

vgdrvHeartbeatHostConfigure(pDevExt, false);
}

else

LogRel("vgdrvHeartbeatInit: Failed to configure host for heartbeat checking: rc=%Rrc\n", rc));
}

return rc;

/** @} */

/**
 * Helper to reinit the VMMDev communication after hibernation.
 * @returns VBox status code.
 * @param   pDevExt         The device extension.
 * @param   enmOSType       The OS type.
 * @todo Call this on all platforms, not just windows.
 */

int VGDrvCommonReinitDevExtAfterHibernation(PVBOXGUESTDEVEXT pDevExt, VBOXOSTYPE enmOSType)

int rc = vgdrvReportGuestInfo(enmOSType);
if (RT_SUCCESS(rc))
{
    rc = vgdrvReportDriverStatus(true /* Driver is active */);
    if (RT_FAILURE(rc))
        Log("VGDrvCommonReinitDevExtAfterHibernation: could not report guest driver status, rc=%Rrc\n", rc));
}
else
    Log("VGDrvCommonReinitDevExtAfterHibernation: could not report guest information to host, rc=%Rrc\n", rc));

LogFlow("VGDrvCommonReinitDevExtAfterHibernation: returned with rc=%Rrc\n", rc));

RT_NOREF1(pDevExt);

return rc;


+/**
+ * Initializes the VBoxGuest device extension when the
+ * device driver is loaded.
+ *
+ * The native code locates the VMMDev on the PCI bus and retrieve
+ * the MMIO and I/O port ranges, this function will take care of
+ * mapping the MMIO memory (if present). Upon successful return
+ * the native code should set up the interrupt handler.
+ *
+ * @returns VBox status code.
+ *
+ * @param   pDevExt         The device extension. Allocated by the native code.
+ * @param   IOPortBase      The base of the I/O port range.
+ * @param   pvMMIOBase      The base of the MMIO memory mapping.
+ *                          This is optional, pass NULL if not present.
+ * @param   cbMMIO          The size of the MMIO memory mapping.
+ *                          This is optional, pass 0 if not present.
+ * @param   enmOSType       The guest OS type to report to the VMMDev.
+ *
+ * @param   fFixedEvents    Events that will be enabled upon init and no client
+ *                          will ever be allowed to mask.
+ */
+ int VGDrvCommonInitDevExt(PVBOXGUESTDEVEXT pDevExt, uint16_t IOPortBase,
+                          void *pvMMIOBase, uint32_t cbMMIO, VBOXOSTYPE enmOSType, uint32_t fFixedEvents)
+{
+    int rc, rc2;
+
+    /* Adjust fFixedEvents. */
+    fFixedEvents |= VMMDEV_EVENT_HGCM;
+    /* If we allow fixed events, add native hook for getting
+     * config parameters and setting them. On linux we should use
+     * the module parameter stuff... */
+    
+    return VBox_GuestDrvCommonInitDevExt(pDevExt, IOPortBase, pvMMIOBase, cbMMIO, enmOSType, fFixedEvents);
+
+*/
/* Initialize the data. */

pDevExt->IOPortBase = IOPortBase;
pDevExt->pVMMDevMemory = NULL;
pDevExt->hGuestMappings = NIL_RTR0MEMOBJ;
pDevExt->EventSpinlock = NIL_RTSPINLOCK;
pDevExt->pIrqAckEvents = NULL;
pDevExt->PhysIrqAckEvents = NIL_RTCCPHYS;
RTListInit(&pDevExt->WaitList);
#ifdef VBOX_WITH_HGCM
   RTListInit(&pDevExt->HGCMWaitList);
#endif
#ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP
   RTListInit(&pDevExt->WakeUpList);
#endif
   RTListInit(&pDevExt->WokenUpList);
   RTListInit(&pDevExt->FreeList);
   RTListInit(&pDevExt->SessionList);
pDevExt->cSessions = 0;
pDevExt->fLoggingEnabled = false;
pDevExt->f32PendingEvents = 0;
pDevExt->u32MousePosChangedSeq = 0;
pDevExt->SessionSpinlock = NIL_RTSPINLOCK;
pDevExt->MemBalloon.hMtx = NIL_RTSEMFASTMUTEX;
pDevExt->MemBalloon.cChunks = 0;
pDevExt->MemBalloon.cMaxChunks = 0;
pDevExt->MemBalloon.fUseKernelAPI = true;
pDevExt->MemBalloon.paMemObj = NULL;
pDevExt->MemBalloon.pOwner = NULL;
pDevExt->pfMouseNotifyCallback = NULL;
pDevExt->pvMouseNotifyCallbackArg = NULL;
pDevExt->pReqGuestHeartbeat = NULL;

pDevExt->fFixedEvents = fFixedEvents;
vgdrvBitUsageTrackerClear(&pDevExt->EventFilterTracker);
pDevExt->fEventFilterHost = UINT32_MAX; /* forces a report */

vgdrvBitUsageTrackerClear(&pDevExt->MouseStatusTracker);
pDevExt->fMouseStatusHost = UINT32_MAX; /* forces a report */

pDevExt->fAcquireModeGuestCaps = 0;
pDevExt->fSetModeGuestCaps = 0;
pDevExt->fAcquiredGuestCaps = 0;
vgdrvBitUsageTrackerClear(&pDevExt->SetGuestCapsTracker);
pDevExt->fGuestCapsHost = UINT32_MAX; /* forces a report */

/*
/* If there is an MMIO region validate the version and size. */
if (pvMMIOBase)
{
    VMMDevMemory *pVMMDev = (VMMDevMemory *)pvMMIOBase;
    Assert(cbMMIO);
    if (pVMMDev->u32Version == VMMDEV_MEMORY_VERSION
        && pVMMDev->u32Size >= 32
        && pVMMDev->u32Size <= cbMMIO)
    {
        pDevExt->pVMMDevMemory = pVMMDev;
        Log("VGDrvCommonInitDevExt: VMMDevMemory: mapping=%p size=%#RX32 (%#RX32) version=%#RX32\n", pVMMDev, pVMMDev->u32Size, cbMMIO, pVMMDev->u32Version);
    } else /* try live without it. */
        LogRel("VGDrvCommonInitDevExt: Bogus VMMDev memory; u32Version=%RX32 (expected %RX32) u32Size=%RX32 (expected <= %RX32)\n", pVMMDev->u32Version, VMMDEV_MEMORY_VERSION, pVMMDev->u32Size, cbMMIO));
}

/* Create the wait and session spinlocks as well as the ballooning mutex. */
rc = RTSpinlockCreate(&pDevExt->EventSpinlock, RTSPINLOCK_FLAGS_INTERRUPT_SAFE, "VBoxGuestEvent");
if (RT_SUCCESS(rc))
    rc = RTSpinlockCreate(&pDevExt->SessionSpinlock, RTSPINLOCK_FLAGS_INTERRUPT_SAFE, "VBoxGuestSession");
if (RT_FAILURE(rc))
{
    LogRel("VGDrvCommonInitDevExt: failed to create spinlock, rc=%Rrc!\n", rc));
    if (pDevExt->EventSpinlock != NIL_RTSPINLOCK)
        RTSpinlockDestroy(pDevExt->EventSpinlock);
    return rc;
}
rc = RTSemFastMutexCreate(&pDevExt->MemBalloon.hMtx);
if (RT_FAILURE(rc))
{
    LogRel("VGDrvCommonInitDevExt: failed to create mutex, rc=%Rrc!\n", rc));
    RTSpinlockDestroy(pDevExt->SessionSpinlock);
    RTSpinlockDestroy(pDevExt->EventSpinlock);
    return rc;
}

/* Initialize the guest library and report the guest info back to VMMDev, */
* set the interrupt control filter mask, and fixate the guest mappings
+ */
+ rc = VbglR0InitPrimary(pDevExt->IOPortBase, (VMMDevMemory *)pDevExt->pVMMDevMemory);
+ if (RT_SUCCESS(rc))
+ {
+     rc = VbglR0GRAlloc((VMMDevRequestHeader **)pDevExt->pIrqAckEvents, sizeof(VMMDevEvents),
+                        VMMDevReq_AcknowledgeEvents);
+     if (RT_SUCCESS(rc))
+     {
+         pDevExt->PhysIrqAckEvents = VbglR0PhysHeapGetPhysAddr(pDevExt->pIrqAckEvents);
+         Assert(pDevExt->PhysIrqAckEvents != 0);
+         rc = vgdrvReportGuestInfo(enmOSType);
+         if (RT_SUCCESS(rc))
+         {
+             /*
+             * Set the fixed event and make sure the host doesn't have any lingering
+             * the guest capabilities or mouse status bits set.
+             */
+             rc = vgdrvResetEventFilterOnHost(pDevExt, pDevExt->fFixedEvents);
+             if (RT_SUCCESS(rc))
+             {
+                 rc = vgdrvResetCapabilitiesOnHost(pDevExt);
+                 if (RT_SUCCESS(rc))
+                 {
+                     rc = vgdrvResetMouseStatusOnHost(pDevExt);
+                     if (RT_SUCCESS(rc))
+                     {
+                         /*
+                         * Initialize stuff which may fail without requiring the driver init to fail.
+                         */
+                         vgdrvInitFixateGuestMappings(pDevExt);
+                         vgdrvHeartbeatInit(pDevExt);
+                         /*
+                         * Done!
+                         */
+                         rc = vgdrvReportDriverStatus(true /* Driver is active */);
+                         if (RT_FAILURE(rc))
+                             LogRel("VGDrvCommonInitDevExt: VBoxReportGuestDriverStatus failed, rc=%Rrc\n", rc);
+                         LogFlowFunc("VGDrvCommonInitDevExt: returns success\n");
+                         return VINF_SUCCESS;
+                     }
+                     LogRel("VGDrvCommonInitDevExt: failed to clear mouse status: rc=%Rrc\n", rc);
+                 }
+             }
+         }
+     }
+     LogRel("VGDrvCommonInitDevExt: VBoxReportGuestDriverStatus failed, rc=%Rrc\n", rc);
+ }
+ else
+     LogRel("VGDrvCommonInitDevExt: failed to clear guest capabilities: rc=%Rrc\n", rc));
+ }
+ else
+     LogRel("VGDrvCommonInitDevExt: failed to set fixed event filter: rc=%Rrc\n", rc));
+ }
+ else
+     LogRel("VGDrvCommonInitDevExt: vgdrvReportGuestInfo failed: rc=%Rrc\n", rc));
+ VbglR0GRFree((VMMDevRequestHeader *)pDevExt->pIrqAckEvents);
+ }
+ else
+     LogRel("VGDrvCommonInitDevExt: VbglR0GRAloc failed: rc=%Rrc\n", rc));
+ }
+ else
+     LogRel("VGDrvCommonInitDevExt: VbglR0InitPrimary failed: rc=%Rrc\n", rc));
+
+ rc2 = RTSemFastMutexDestroy(pDevExt->MemBalloon.hMtx); AssertRC(rc2);
+ rc2 = RTSpinlockDestroy(pDevExt->EventSpinlock); AssertRC(rc2);
+ rc2 = RTSpinlockDestroy(pDevExt->SessionSpinlock); AssertRC(rc2);
+
+#ifdef VBOX_GUESTDRV_WITH_RELEASE_LOGGER
+ RTLogDestroy(RTLogRelSetDefaultInstance(NULL));
+ RTLogDestroy(RTLogSetDefaultInstance(NULL));
+#endif
+ return rc; /* (failed) */
+
+/**
+ * Deletes all the items in a wait chain.
+ * @param   pList       The head of the chain.
+ */
+static void vgdrvDeleteWaitList(PRTLISTNODE pList)
+{
+    while (!RTListIsEmpty(pList))
+    {
+        int             rc2;
+        PVBOXGUESTWAIT pWait = RTListGetFirst(pList, VBOXGUESTWAIT, ListNode);
+        RTListNodeRemove(&pWait->ListNode);
+        rc2 = RTSemEventMultiDestroy(pWait->Event); AssertRC(rc2);
+        pWait->Event = NIL_RTSEMEVENTMULTI;
+        pWait->pSession = NULL;
+        RTMemFree(pWait);
+    }
+}
/**
 * Destroys the VBoxGuest device extension.
 *
 * The native code should call this before the driver is loaded, but don't call this on shutdown.
 *
 * @param   pDevExt   The device extension.
 */

void VGDrvCommonDeleteDevExt(PVBOXGUESTDEVEXT pDevExt)
{
    int rc2;
    Log(("VGDrvCommonDeleteDevExt:\n");
    Log(("VBoxGuest: The additions driver is terminating.\n");
    
    if (pDevExt->pHeartbeatTimer)
    {
        RTTimerDestroy(pDevExt->pHeartbeatTimer);
        vgdrvHeartbeatHostConfigure(pDevExt, false);
    }
    
    VbglR0GRFree(pDevExt->pReqGuestHeartbeat);
    pDevExt->pReqGuestHeartbeat = NULL;
    
    vgdrvTermUnfixGuestMappings(pDevExt);
    if (!RTListIsEmpty(&pDevExt->SessionList))
    {
        LogRelFunc(("session list not empty!\n");
        RTListInit(&pDevExt->SessionList);
    }
    
    vgdrvCloseMemBalloon(pDevExt, (PVBOXGUESTSESSION)NULL);
    
    vgdrvTermUnfixGuestMappings(pDevExt);
    pDevExt->SessionList = NULL;
    
    vgdrvResetEventFilterOnHost(pDevExt, 0 /*fFixedEvents*/);
    vgdrvResetCapabilitiesOnHost(pDevExt);
    vgdrvResetMouseStatusOnHost(pDevExt);
    
    vgdrvCloseMemBalloon(pDevExt, (PVBOXGUESTSESSION)NULL);
    
    /* Cleanup all the other resources. */
}
+ * 
+ rc2 = RTSpinlockDestroy(pDevExt->EventSpinlock); AssertRC(rc2); 
+ rc2 = RTSpinlockDestroy(pDevExt->SessionSpinlock); AssertRC(rc2); 
+ rc2 = RTSemFastMutexDestroy(pDevExt->MemBalloon.hMtx); AssertRC(rc2); 
+ 
+ vgdrvDeleteWaitList(&pDevExt->WaitList); 
+ #ifdef VBOX_WITH_HGCM 
+ vgdrvDeleteWaitList(&pDevExt->HGCMWaitList); 
+ #endif 
+ #ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP 
+ vgdrvDeleteWaitList(&pDevExt->WakeUpList); 
+ #endif 
+ vgdrvDeleteWaitList(&pDevExt->WokenUpList); 
+ vgdrvDeleteWaitList(&pDevExt->FreeList); 
+ 
+ VbglR0TerminatePrimary(); 
+ 
+ pDevExt->pVMMDevMemory = NULL; 
+ 
+ pDevExt->IOPortBase = 0; 
+ pDevExt->pIrqAckEvents = NULL; 
+ 
+ +#ifdef VBOX_GUESTDRV_WITH_RELEASE_LOGGER 
+ RTLLogDestroy(RTLLogRelSetDefaultInstance(NULL)); 
+ RTLLogDestroy(RTLLogSetDefaultInstance(NULL)); 
+ +#endif 
+ 
+ int VGDrvCommonCreateUserSession(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION *ppSession)
+ {
+     PVBOXGUESTSESSION pSession = (PVBOXGUESTSESSION)RTMemAllocZ(sizeof(*pSession));
+     if (RT_UNLIKELY(!pSession))
+     {
+         LogRel("VGDrvCommonCreateUserSession: no memory!\n");
+         return VERR_NO_MEMORY;
+     }
+ 
+     *ppSession = pSession;
+     
+     return VERR_SUCCESS;
+ }
+ } 
+ 
+ pSession->Process = RProcAddressSelf();
+ pSession->R0Process = RTR0ProcHandleSelf();
+ pSession->pDevExt = pDevExt;
+ RTSpinlockAcquire(pDevExt->SessionSpinlock);
+ RTListAppend(&pDevExt->SessionList, &pSession->ListNode);
+ pDevExt->cSessions++;
+ RTSpinlockRelease(pDevExt->SessionSpinlock);
+ 
+ *ppSession = pSession;
+ LogFlow("VGDrvCommonCreateUserSession: pSession=%p proc=%RTproc (%d) r0proc=%p\n", 
+ pSession, pSession->Process, (int)pSession->Process, (uintptr_t)pSession->R0Process); /** @todo 
+ return VINF_SUCCESS;
+ */
+ 
+ **
+ * Creates a VBoxGuest kernel session.
+ *
+ * The native code calls this when a ring-0 client connects to the device.
+ * Use VGDrvCommonCreateUserSession when a ring-3 client opens the device.
+ *
+ * @returns VBox status code.
+ * @param   pDevExt         The device extension.
+ * @param   ppSession       Where to store the session on success.
+ */ 
+int VGDrvCommonCreateKernelSession(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION *ppSession)
+{
+    PVBOXGUESTSESSION pSession = (PVBOXGUESTSESSION)RTMemAllocZ(sizeof(*pSession));
+    if (RT_UNLIKELY(!pSession))
+    {
+        LogRel("VGDrvCommonCreateKernelSession: no memory!\n");
+        return VERR_NO_MEMORY;
+    }
+
+    pSession->Process = NIL_RTPROCESS;
+    pSession->R0Process = NIL_RTR0PROCESS;
+    pSession->pDevExt = pDevExt;
+    RTSpinlockAcquire(pDevExt->SessionSpinlock);
+    RTListAppend(&pDevExt->SessionList, &pSession->ListNode);
+    pDevExt->cSessions++;
+    RTSpinlockRelease(pDevExt->SessionSpinlock);
+    
+    *ppSession = pSession;
+    LogFlow("VGDrvCommonCreateKernelSession: pSession=%p proc=%RTproc (%d) r0proc=%p\n", 

+    pSession, pSession->Process, (int)pSession->Process, (uintptr_t)pSession->R0Process)); /**< @todo %RT0proc */
+    return VINF_SUCCESS;
+}
+
+/**
+ * Closes a VBoxGuest session.
+ *
+ * @param   pDevExt         The device extension.
+ * @param   pSession        The session to close (and free).
+ */
+void VGDrvCommonCloseSession(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession)
+{
+    #ifdef VBOX_WITH_HGCM
+    unsigned i;
+    #endif
+    LogFlow("VGDrvCommonCloseSession: pSession=%p proc=%RTproc (%d) r0proc=%p\n",
+            pSession, pSession->Process, (int)pSession->Process, (uintptr_t)pSession->R0Process)); /**< @todo %RT0proc */
+    RTSpinlockAcquire(pDevExt->SessionSpinlock);
+    RTListNodeRemove(&pSession->ListNode);
+    pDevExt->cSessions--;
+    RTSpinlockRelease(pDevExt->SessionSpinlock);
+    vgdrvAcquireSessionCapabilities(pDevExt, pSession, 0, UINT32_MAX,
+                                    VBGL_IOC_AGC_FLAGS_DEFAULT, true /*fSessionTermination*/);
+    vgdrvSetSessionCapabilities(pDevExt, pSession, 0 /*fOrMask*/, UINT32_MAX /*fNotMask*/,
+                                 NULL /*pfSessionCaps*/, NULL /*pfGlobalCaps*/, true /*fSessionTermination*/);
+    vgdrvSetSessionEventFilter(pDevExt, pSession, 0 /*fOrMask*/, UINT32_MAX /*fNotMask*/, true
+                                /*fSessionTermination*/);
+    vgdrvSetSessionMouseStatus(pDevExt, pSession, 0 /*fOrMask*/, UINT32_MAX /*fNotMask*/, true
+                               /*fSessionTermination*/);
+    vgdrvIoCtl_CancelAllWaitEvents(pDevExt, pSession);
+
+    #ifdef VBOX_WITH_HGCM
+    for (i = 0; i < RT_ELEMENTS(pSession->aHGCMClientIds); i++)
+        if (pSession->aHGCMClientIds[i])
+            { uint32_t idClient = pSession->aHGCMClientIds[i];
+                pSession->aHGCMClientIds[i] = 0;
+                Log("VGDrvCommonCloseSession: disconnecting client id %#RX32\n", idClient);
+                VbglR0HGCMInternalDisconnect(idClient, vgdrvHgcmAsyncWaitCallback, pDevExt,
+                                               RT_INDEFINITE_WAIT);
+            };
+    #endif
+    +

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+ pSession->pDevExt = NULL;
+ pSession->Process = NIL_RTPROCESS;
+ pSession->R0Process = NIL_RTR0PROCESS;
+ vgdrvCloseMemBalloon(pDevExt, pSession);
+ RTMemFree(pSession);
+
+ /**
+ * Allocates a wait-for-event entry.
+ *
+ * @returns The wait-for-event entry.
+ * @param   pDevExt         The device extension.
+ * @param   pSession        The session that's allocating this. Can be NULL.
+ *
+ */
+static PVBOXGUESTWAIT vgdrvWaitAlloc(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession)
+{
+    /*
+     * Allocate it one way or the other.
+     */
+    PVBOXGUESTWAIT pWait = RTListGetFirst(&pDevExt->FreeList, VBOXGUESTWAIT, ListNode);
+    if (pWait)
+    {
+        RTSpinlockAcquire(pDevExt->EventSpinlock);
+        pWait = RTListGetFirst(&pDevExt->FreeList, VBOXGUESTWAIT, ListNode);
+        if (pWait)
+            RTListNodeRemove(&pWait->ListNode);
+        RTSpinlockRelease(pDevExt->EventSpinlock);
+    }
+    if (!pWait)
+    {
+        int rc;
+        pWait = (PVBOXGUESTWAIT)RTMemAlloc(sizeof(*pWait));
+        if (!pWait)
+        {
+            LogRelMax(32, ("vgdrvWaitAlloc: out-of-memory!\n"));
+            return NULL;
+        }
+        rc = RTSemEventMultiCreate(&pWait->Event);
+        if (RT_FAILURE(rc))
+        {
+            LogRelMax(32, ("vgdrvWaitAlloc: RTSemEventMultiCreate failed with rc=%Rrc!\n", rc));
+            RTMemFree(pWait);
+        }
+    }
return NULL;
}

pWait->ListNode.pNext = NULL;
pWait->ListNode.pPrev = NULL;
}

/*
 * Zero members just as an precaution.
 */
pWait->fReqEvents = 0;
pWait->fResEvents = 0;
#endif
pWait->fPendingWakeUp = false;
pWait->fFreeMe = false;
#endif
pWait->pSession = pSession;
#endif
pWait->pHGCMReq = NULL;
#endif
RTSemEventMultiReset(pWait->Event);
return pWait;
}

/**
 * Frees the wait-for-event entry.
 *
 * The caller must own the wait spinlock !
 * The entry must be in a list!
 *
 * @param   pDevExt         The device extension.
 * @param   pWait           The wait-for-event entry to free.
 * @param   pDevExt         The device extension.
 */
static void vgdrvWaitFreeLocked(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTWAIT pWait)
{
pWait->fReqEvents = 0;
pWait->fResEvents = 0;
#endif
pWait->pHGCMReq = NULL;
#endif
#ifndef VBOXGUEST_USE_DEFERRED_WAKE_UP
    Assert(!pWait->fFreeMe);
    if (pWait->fPendingWakeUp)
        pWait->fFreeMe = true;
    else
#endif
    {

+ RTListNodeRemove(&pWait->ListNode);
+ RTListAppend(&pDevExt->FreeList, &pWait->ListNode);
+ }
+ }
+ +/**
+ + * Frees the wait-for-event entry.
+ + *
+ + * @param   pDevExt            The device extension.
+ + *
+ + * @param   pWait              The wait-for-event entry to free.
+ + */
+ static void vgdrvWaitFreeUnlocked(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTWAIT pWait)
+ {
+     RTSpinlockAcquire(pDevExt->EventSpinlock);
+     vgdrvWaitFreeLocked(pDevExt, pWait);
+     RTSpinlockRelease(pDevExt->EventSpinlock);
+ }
+ +
+ +
+ #ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP
+ /**
+ + * Processes the wake-up list.
+ + *
+ + * All entries in the wake-up list gets signalled and moved to the woken-up
+ + * list.
+ + * At least on Windows this function can be invoked concurrently from
+ + * different VCPUs. So, be thread-safe.
+ + *
+ + * @param   pDevExt            The device extension.
+ + */
+ void VGDrvCommonWaitDoWakeUps(PVBOXGUESTDEVEXT pDevExt)
+ {
+     if (!RTListIsEmpty(&pDevExt->WakeUpList))
+     {
+         RTSpinlockAcquire(pDevExt->EventSpinlock);
+         for (;;)
+         {
+             int            rc;
+             PVBOXGUESTWAIT pWait = RTListGetFirst(&pDevExt->WakeUpList, VBOXGUESTWAIT, ListNode);
+             if (!pWait)
+                 break;
+             /* Prevent other threads from accessing pWait when spinlock is released. */
+             RTListRemove(&pWait->ListNode);
+             pWait->fPendingWakeUp = true;
+             RTSpinlockRelease(pDevExt->EventSpinlock);
rc = RTSemEventMultiSignal(pWait->Event);
AssertRC(rc);

RTSpinlockAcquire(pDevExt->EventSpinlock);
Assert(pWait->ListNode.pNext == NULL && pWait->ListNode.pPrev == NULL);
RTListAppend(&pDevExt->WokenUpList, &pWait->ListNode);
pWait->fPendingWakeUp = false;
if (RT_LIKELY(!pWait->fFreeMe))
{ /* likely */
  pWait->fFreeMe = false;
  vgdrvWaitFreeLocked(pDevExt, pWait);
}
RTSpinlockRelease(pDevExt->EventSpinlock);

/* VBOXGUEST_USE_DEFERRED_WAKE_UP */
+
+
+**
+ * Implements the fast (no input or output) type of IOCtls.
+ *
+ * This is currently just a placeholder stub inherited from the support driver code.
+ *
+ * @returns VBox status code.
+ * @param iFunction The IOCTL function number.
+ * @param pDevExt The device extension.
+ * @param pSession The session.
+ */
+int VGDrvCommonIoCtlFast(uintptr_t iFunction, PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession)
+
+LogFlow("VGDrvCommonIoCtlFast: iFunction=%#x pDevExt=%p pSession=%p\n", iFunction, pDevExt, pSession));
+
+NOREF(iFunction);
+NOREF(pDevExt);
+NOREF(pSession);
+return VERR_NOT_SUPPORTED;
+}
+
+
+/**
+ * Gets the driver I/O control interface version, maybe adjusting it for
+ * backwards compatibility.
+ * The adjusting is currently not implemented as we only have one major I/O
+ * control interface version out there to support. This is something we will
+ * implement as needed.
+ *
+ * returns IPRT status code.
+ * @param   pDevExt         The device extension.
+ * @param   pSession        The session.
+ * @param   pReq            The request info.
+ *
+ */
+static int vgdrvIoCtl_DriverVersionInfo(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
PVBGLIOCDRIVERVERSIONINFO pReq)
+
+    int rc;
+    LogFlow(("VBGL_IOCTL_DRIVER_VERSION_INFO: uReqVersion=%#x uMinVersion=%#x
uReserved1=%#x uReserved2=%#x\n",
+    RT_NOREF2(pDevExt, pSession);
+
+    /*
+     * Input validation.
+     */
+    if (   pReq->u.In.uMinVersion <= pReq->u.In.uReqVersion
+        && RT_HI_U16(pReq->u.In.uMinVersion) == RT_HI_U16(pReq->u.In.uReqVersion))
+    {
+        /*
+         * Match the version.
+         * The current logic is very simple, match the major interface version.
+         */
+        if (   pReq->u.In.uMinVersion <= VBGL_IOC_VERSION
+            && RT_HI_U16(pReq->u.In.uMinVersion) == RT_HI_U16(VBGL_IOC_VERSION))
+            rc = VINF_SUCCESS;
+        else
+        {
+            LogRel(("VBGL_IOCTL_DRIVER_VERSION_INFO: Version mismatch. Requested: %#x  Min: %#x
Current: %#x\n",
+            rc = VERR_VERSION_MISMATCH;
+        }
+        else
+        {
+            LogRel(("VBGL_IOCTL_DRIVER_VERSION_INFO: Version mismatch. Requested: %#x  Min: %#x
Current: %#x doesn't match!\n",
+            rc = VERR_INVALID_PARAMETER;
+        }
+    }
+ pReq->u.Out.uDriverVersion = VBGL_IOC_VERSION;
+ pReq->u.Out.uDriverRevision = VBOX_SVN_REV;
+ pReq->u.Out.uReserved1  = 0;
+ pReq->u.Out.uReserved2  = 0;
+ return rc;
+ }
+
+
+/**
+ * Similar to vgdrvIoCtl_DriverVersionInfo, except its for IDC.
+ *
+ * returns IPRT status code.
+ */
+ @param pDevExt The device extension.
+ @param pSession The session.
+ @param pReq The request info.
+ */
+
+ static int vgdrvIoCtl_IdcConnect(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
+ PVBGLIOCIDCCONNECT pReq)
+ {
+ int rc;
+ LogFlow(("VBGL_IOCTL_IDC_CONNECT: u32MagicCookie=%#x uReqVersion=%#x uMinVersion=%#x
+ uReserved=%#x\n",
+ u.In.uReserved));
+ Assert(pSession != NULL);
+ RT_NOREF(pDevExt);
+
+ /*
+ * Input validation.
+ */
+ if (pReq->u.In.u32MagicCookie == VBGL_IOCTL_IDC_CONNECT_MAGIC_COOKIE)
+ { 
+ if ( pReq->u.In.uMinVersion <= pReq->u.In.uReqVersion
+ && RT_HI_U16(pReq->u.In.uMinVersion) == RT_HI_U16(pReq->u.In.uReqVersion))
+ { 
+ /*
+ * Match the version.
+ * The current logic is very simple, match the major interface version.
+ */
+ if ( pReq->u.In.uMinVersion <= VBGL_IOC_VERSION
+ && RT_HI_U16(pReq->u.In.uMinVersion) == RT_HI_U16(VBGL_IOC_VERSION))
+ { 
+ pReq->u.Out.pvSession       = pSession;
+ pReq->u.Out.uSessionVersion = VBGL_IOC_VERSION;
+ pReq->u.Out.uDriverVersion  = VBGL_IOC_VERSION;
+ pReq->u.Out.uDriverRevision = VBOX_SVN_REV;
+ pReq->u.Out.uReserved1      = 0;
+ pReq->u.Out.pvReserved2 = NULL;
+ return VINF_SUCCESS;
+
+ }
+ LogRel("VBGL_IOCTL_IDC_CONNECT: Version mismatch. Requested: %#x Min: %#x Current: %#x\n",
+ rc = VERR_VERSION_MISMATCH;
+ }
+ else
+ { }
+ LogRel("VBGL_IOCTL_IDC_CONNECT: uMinVersion=%#x uMaxVersion=%#x doesn't match!\n",
+         pReq->u.In.uMinVersion, pReq->u.In.uReqVersion);
+ rc = VERR_INVALID_PARAMETER;
+ }
+
+ pReq->u.Out.pvSession = NULL;
+ pReq->u.Out.uSessionVersion = UINT32_MAX;
+ pReq->u.Out.uDriverVersion = VBGL_IOC_VERSION;
+ pReq->u.Out.uDriverRevision = VBOX_SVN_REV;
+ pReq->u.Out.uReserved1 = 0;
+ pReq->u.Out.pvReserved2 = NULL;
+ }
+ else
+ { }
+ LogRel("VBGL_IOCTL_IDC_CONNECT: u32MagicCookie=%#x expected %#x!\n",
+         pReq->u.In.u32MagicCookie, VBGL_IOCTL_IDC_CONNECT_MAGIC_COOKIE);
+ rc = VERR_INVALID_PARAMETER;
+ }
+ return rc;
+
+/**
+ * Counterpart to vgdrvIoCtl_IdcConnect, destroys the session.
+ *
+ * returns IPRT status code.
+ */
+ static int vgdrvIoCtl_IdcDisconnect(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
+                                      PVBGLIOCIDCDISCONNECT pReq)
+ { }
+ LogFlow("VBGL_IOCTL_IDC_DISCONNECT: pvSession=%p vs pSession=%p\n", pReq->u.In.pvSession,
+          pSession);
+ RT_NOREF(pDevExt);
+ Assert(pSession != NULL);
if (pReq->u.In.pvSession == pSession)
{
    VGDrvCommonCloseSession(pDevExt, pSession);
    return VINF_SUCCESS;
}

LogRel("VBGL_IOCTL_IDC_DISCONNECT: In.pvSession=%p is not equal to pSession=%p\n", pReq->u.In.pvSession, pSession);
return VERR_INVALID_PARAMETER;

/**
 * Return the VMM device I/O info.
 *
 * returns IPRT status code.
 * @param   pDevExt         The device extension.
 * @param   pInfo           The request info.
 * @note    Ring-0 only, caller checked.
 */
static int vgdrvIoCtl_GetVMMDevIoInfo(PVBOXGUESTDEVEXT pDevExt,
PVBGLIOCGETVMMDEVIOINFO pInfo)
{
    LogFlow("VBGL_IOCTL_GET_VMMDEV_IO_INFO\n");

    pInfo->u.Out.IoPort          = pDevExt->IOPortBase;
    pInfo->u.Out.pvVmmDevMapping = pDevExt->pVMMDevMemory;
    pInfo->u.Out.auPadding[0]    = 0;
#if HC_ARCH_BITS != 32
    pInfo->u.Out.auPadding[1]    = 0;
#endif
    return VINF_SUCCESS;
}

/**
 * Set the callback for the kernel mouse handler.
 *
 * returns IPRT status code.
 * @param   pDevExt         The device extension.
 * @param   pNotify         The new callback information.
 */
int vgdrvIoCtl_SetMouseNotifyCallback(PVBOXGUESTDEVEXT pDevExt,
PVBGLIOCSETMOUSENOTIFYCALLBACK pNotify)
{
    LogFlow("VBOXGUEST_IOCTL_SET_MOUSE_NOTIFY_CALLBACK: pfnNotify=%p pvUser=%p\n",
pNotify->u.In.pfnNotify, pNotify->u.In.pvUser);

    return VINF_SUCCESS;
}
+    int fMatches = pDevExt->f32PendingEvents & fReqEvents;
+    if (fMatches & VBOXGUEST_ACQUIRE_STYLE_EVENTS)
+        fMatches &= vgdrvGetAllowedEventMaskForSession(pDevExt, pSession);
+    if (fMatches || pSession->fPendingCancelWaitEvents)
+    {
+        ASMAtomicAndU32(&pDevExt->f32PendingEvents, ~fMatches);
+        RTSpinlockRelease(pDevExt->EventSpinlock);
+        pInfo->u.Out.fEvents = fMatches;
+        if (!fMatches & ~((uint32_t)1 << iEvent))
+            LogFlow(("VBOXGUEST_IOCTL_WAITEVENT: returns %#x\n", pInfo->u.Out.fEvents));
+        else
+            LogFlow(("VBOXGUEST_IOCTL_WAITEVENT: returns %#x/%d\n", pInfo->u.Out.fEvents, iEvent));
+        pSession->fPendingCancelWaitEvents = false;
+        return VINF_SUCCESS;
+    }
+
+    RTSpinlockRelease(pDevExt->EventSpinlock);
+    return VERR_TIMEOUT;
+
+static int vgdrvIoCtl_WaitForEvents(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
+                                     PVBGLIOCWAITFOREVENTS pInfo, bool fInterruptible)
\{
+ uint32_t const  cMsTimeout = pInfo->u.In.cMsTimeOut;
+ const uint32_t  fReqEvents = pInfo->u.In.fEvents;
+ uint32_t        fResEvents;
+ int             iEvent;
+ PVBOXGUESTWAIT  pWait;
+ int             rc;
+
+ pInfo->u.Out.fEvents = 0;           /* Note! This overwrites pInfo->u.In.* fields! */
+
+ /*
+ * Copy and verify the input mask.
+ */
+ iEvent = ASMBitFirstSetU32(fReqEvents) - 1;
+ if (RT_UNLIKELY(iEvent < 0))
+ {
+    LogRel("VBOXGUEST_IOCTL_WAITEVENT: Invalid input mask %#x!!n", fReqEvents));
+    return VERR_INVALID_PARAMETER;
+ }
+
+ /*
+ * Check the condition up front, before doing the wait-for-event allocations.
+ */
+ RTSpinlockAcquire(pDevExt->EventSpinlock);
+ rc = vbdgCheckWaitEventCondition(pDevExt, pSession, pInfo, iEvent, fReqEvents);
+ if (rc == VINF_SUCCESS)
+    return rc;
+
+ if (!cMsTimeout)
+ {
+    LogFlow("VBOXGUEST_IOCTL_WAITEVENT: returns VERR_TIMEOUT
"));
+    return VERR_TIMEOUT;
+ }
+
+ pWait = vgdrvWaitAlloc(pDevExt, pSession);
+ if (!(pWait)
+    return VERR_NO_MEMORY;
+ pWait->fReqEvents = fReqEvents;
+
+ /*
+ * We've got the wait entry now, re-enter the spinlock and check for the condition.
+ * If the wait condition is met, return.
+ * Otherwise enter into the list and go to sleep waiting for the ISR to signal us.
+ */
+ RTSpinlockAcquire(pDevExt->EventSpinlock);
+ RTListAppend(&pDevExt->WaitList, &pWait->ListNode);
+ rc = vbdgCheckWaitEventCondition(pDevExt, pSession, pInfo, iEvent, fReqEvents);
+ if (rc == VINF_SUCCESS)
+ { 
+    vgdrvWaitFreeUnlocked(pDevExt, pWait);
+    return rc;
+ }
+
+ if (fInterruptible)
+    rc = RTSemEventMultiWaitNoResume(pWait->Event, cMsTimeout == UINT32_MAX ? RT_INDEFINITE_WAIT : cMsTimeout);
+ else
+    rc = RTSemEventMultiWait(pWait->Event, cMsTimeout == UINT32_MAX ? RT_INDEFINITE_WAIT : cMsTimeout);
+
+ /*
+ * There is one special case here and that's when the semaphore is
+ * destroyed upon device driver unload. This shouldn't happen of course,
+ * but in case it does, just get out of here ASAP.
+ */
+ if (rc == VERR_SEM_DESTROYED)
+    return rc;
+
+ /*
+ * Unlink the wait item and dispose of it.
+ */
+ RTSpinlockAcquire(pDevExt->EventSpinlock);
+ fResEvents = pWait->fResEvents;
+ vgdrvWaitFreeLocked(pDevExt, pWait);
+ RTSpinlockRelease(pDevExt->EventSpinlock);
+
+ /*
+ * Now deal with the return code.
+ */
+ if (fResEvents
+     && fResEvents != UINT32_MAX)
+ { 
+     pInfo->u.Out.fEvents = fResEvents;
+     if (fReqEvents & (~(uint32_t)1 << iEvent))
+         LogFlow(("VBOXGUEST_IOCTL_WAITEVENT: returns %#x\n", pInfo->u.Out.fEvents));
+     else
+         LogFlow(("VBOXGUEST_IOCTL_WAITEVENT: returns %#x/%d\n", pInfo->u.Out.fEvents, iEvent));
+     rc = VINF_SUCCESS;
+ }
+ else if (fResEvents == UINT32_MAX
+     || rc == VERR_INTERRUPTED)
+ { 
+     rc = VERR_INTERRUPTED;
+     LogFlow("VBOXGUEST_IOCTL_WAITEVENT: returns VERR_INTERRUPTED\n");
+ }
+ else if (rc == VERR_TIMEOUT)
+    LogFlow(("VBOXGUEST_IOCTL_WAITEVENT: returns VERR_TIMEOUT (2)\n"));
+  else
+  {  
+    if (RT_SUCCESS(rc))
+    {  
+      LogRelMax(32, ("VBOXGUEST_IOCTL_WAITEVENT: returns %Rrc but no events!\n", rc));
+      rc = VERR_INTERNAL_ERROR;
+    }
+    LogFlow(("VBOXGUEST_IOCTL_WAITEVENT: returns %Rrc\n", rc));
+  }
+  
+  return rc;
+
+/** @todo the semantics of this IoCtl have been tightened, so that no calls to
+ * VBOXGUEST_IOCTL_WAITEVENT are allowed in a session after it has been
+ * called. Change the code to make calls to VBOXGUEST_IOCTL_WAITEVENT made
+ * after that to return VERR_INTERRUPTED or something appropriate. */
+static int vgdrvIoCtl_CancelAllWaitEvents(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession)
+{
+  PVBOXGUESTWAIT pWait;
+  PVBOXGUESTWAIT pSafe;
+  int rc = 0;
+  /* Was at least one WAITEVENT in process for this session? If not we
+   * set a flag that the next call should be interrupted immediately. This
+   * is needed so that a user thread can reliably interrupt another one in a
+   * WAITEVENT loop. */
+  bool fCancelledOne = false;
+
+  LogFlow(("VBOXGUEST_IOCTL_CANCEL_ALL_WAITEVENTS\n");
+
+  /*
+  * Walk the event list and wake up anyone with a matching session.
+  */
+  RTSpinlockAcquire(pDevExt->EventSpinlock);
+  RTListForEachSafe(&pDevExt->WaitList, pWait, pSafe, VBOXGUESTWAIT, ListNode)
+  { 
+    if (pWait->pSession == pSession)
+    {
+      fCancelledOne = true;
+      pWait->fResEvents = UINT32_MAX;
+      RTListNodeRemove(&pWait->ListNode);
+      ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP
+      RTListAppend(&pDevExt->WakeUpList, &pWait->ListNode);
+    }
+    rc |= RTSemEventMultiSignal(pWait->Event);
+    RTListAppend(&pDevExt->WokenUpList, &pWait->ListNode);
+    } }
+    if (!fCancelledOne)
+        pSession->fPendingCancelWaitEvents = true;
+    RTSpinlockRelease(pDevExt->EventSpinlock);
+    Assert(rc == 0);
+    NOREF(rc);
+
+    if (defined(VBOXGUEST_USE_DEFERRED_WAKE_UP)
+        VGDrvCommonWaitDoWakeUps(pDevExt);
+    #endif
+
+    return VINF_SUCCESS;
+
+
+/**
+ * Checks if the VMM request is allowed in the context of the given session.
+ */
+ * @returns VINF_SUCCESS or VERR_PERMISSION_DENIED.
+ * @param   pDevExt             The device extension.
+ * @param   pSession            The calling session.
+ * @param   enmType             The request type.
+ * @param   pReqHdr             The request.
+ */
+static int vgdrvCheckIfVmmReqIsAllowed(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, VMMDevRequestType enmType,
                     VMMDevRequestHeader const *pReqHdr)
+{
+    /*
+     * Categorize the request being made.
+     */
+    /* @todo This need quite some more work! */
+    enum
+    {
+        kLevel_Invalid, kLevel_NoOne, kLevel_OnlyVBoxGuest, kLevel_OnlyKernel, kLevel_TrustedUsers,
+        kLevel_AllUsers
+    } enmRequired;
+    RT_NOREF1(pDevExt);
+
+    switch (enmType)
+    {
+        /*
+         * Deny access to anything we don't know or provide specialized I/O controls for.
+         */
+        #ifdef VBOX_WITH_HGCM
+        
+        #endif
+    }
+ case VMMDevReq_HGCMConnect:
+ case VMMDevReq_HGCMDisconnect:
+ ifdef VBOX_WITH_64_BITS_GUESTS
+ case VMMDevReq_HGCMCall32:
+ case VMMDevReq_HGCMCall64:
+ ifdef /* VBOX_WITH_64_BITS_GUESTS */
+ case VMMDevReq_HGCMCancel:
+ case VMMDevReq_HGCMCancel2:
+ endif /* VBOX_WITH_HGCM */
+ case VMMDevReq_SetGuestCapabilities:
+ default:
+ enmRequired = kLevel_NoOne;
+ break;
+
+ /*
+ * There are a few things only this driver can do (and it doesn't use
+ * the VMMRequest I/O control route anyway, but whatever).
+ */
+ case VMMDevReq_ReportGuestInfo:
+ case VMMDevReq_ReportGuestInfo2:
+ case VMMDevReq_GetHypervisorInfo:
+ case VMMDevReq_SetHypervisorInfo:
+ case VMMDevReq_RegisterPatchMemory:
+ case VMMDevReq_DeregisterPatchMemory:
+ case VMMDevReq_GetMemBalloonChangeRequest:
+ enmRequired = kLevel_OnlyVBoxGuest;
+ break;
+
+ /*
+ * Trusted users apps only.
+ */
+ case VMMDevReq_QueryCredentials:
+ case VMMDevReq_ReportCredentialsJudgement:
+ case VMMDevReq_RegisterSharedModule:
+ case VMMDevReq_UnregisterSharedModule:
+ case VMMDevReq_WriteCoreDump:
+ case VMMDevReq_GetCpuHotPlugRequest:
+ case VMMDevReq_SetCpuHotPlugStatus:
+ case VMMDevReq_CheckSharedModules:
+ case VMMDevReq_GetPageSharingStatus:
+ case VMMDevReq_DebugIsPageShared:
+ case VMMDevReq_ReportGuestStats:
+ case VMMDevReq_ReportGuestUserState:
+ case VMMDevReq_GetStatisticsChangeRequest:
+ case VMMDevReq_ChangeMemBalloon:
+ enmRequired = kLevel_TrustedUsers;
break;

*/
* Anyone.
*/
case VMMDevReq_GetMouseStatus:
case VMMDevReq_SetMouseStatus:
case VMMDevReq_SetPointerShape:
case VMMDevReq_GetHostVersion:
case VMMDevReq_Idle:
case VMMDevReq_GetHostTime:
case VMMDevReq_SetPowerStatus:
case VMMDevReq_AcknowledgeEvents:
case VMMDevReq_CtlGuestFilterMask:
case VMMDevReq_ReportGuestStatus:
case VMMDevReq_GetDisplayChangeRequest:
case VMMDevReq_VideoModeSupported:
case VMMDevReq_GetHeightReduction:
case VMMDevReq_GetDisplayChangeRequest2:
case VMMDevReq_VideoModeSupported2:
case VMMDevReq_VideoAccelEnable:
case VMMDevReq_VideoAccelFlush:
case VMMDevReq_VideoSetVisibleRegion:
case VMMDevReq_GetDisplayChangeRequestEx:
case VMMDevReq_GetSeamlessChangeRequest:
case VMMDevReq_GetVRDPCacheRequest:
case VMMDevReq_LogString:
case VMMDevReq_GetSessionId:
enmRequired = kLevel_AllUsers;
break;

/**
 * Depends on the request parameters...
 */
/** @todo this have to be changed into an I/O control and the facilities
 * tracked in the session so they can automatically be failed when the
 * session terminates without reporting the new status.
 *
 * The information presented by IGuest is not reliable without this! */
case VMMDevReq_ReportGuestCapabilities:
    switch (((VMMDevReportGuestStatus const *)pReqHdr)->guestStatus.facility)
    {
        case VBoxGuestFacilityType_All:
            enmRequired = kLevel_OnlyVBoxGuest;
            break;
        case VBoxGuestFacilityType_VBoxGuestDriver:
            enmRequired = kLevel_TrustedUsers;
            break;
        case VBoxGuestFacilityType_VBoxService:
            enmRequired = kLevel_TrustedUsers;
break;
    case VBoxGuestFacilityType_VBoxTrayClient:
    case VBoxGuestFacilityType_Seamless:
    case VBoxGuestFacilityType_Graphics:
    default:
        enmRequired = kLevel_AllUsers;
        break;
    }
    break;
    }
*/
+  /* Check against the session.
+ */
+  switch (enmRequired)
+  {
+    default:
++    case kLevel_NoOne:
+      break;
+    case kLevel_OnlyVBoxGuest:
+    case kLevel_OnlyKernel:
+      if (pSession->R0Process == NIL_RTR0PROCESS)
+        return VINF_SUCCESS;
+      break;
+    case kLevel_TrustedUsers:
+      if (pSession->fUserSession)
+        break;
+    case kLevel_AllUsers:
+      return VINF_SUCCESS;
+    }
+  return VERR_PERMISSION_DENIED;
+
static int vgdrvIoCtl_VMMDevRequest(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
                                    VMMDevRequestHeader *pReqHdr, size_t cbData)
{
    rc;
    VMMDevRequestHeader *pReqCopy;
    />
+  /* Validate the header and request size.
+ */
+  const VMMDevRequestType enmType = pReqHdr->requestType;
+  const uint32_t cbReq = pReqHdr->size;
+  const uint32_t cbMinSize = (uint32_t)vmmdevGetRequestSize(enmType);
+  LogFlow("VBOXGUEST_IOCTL_VMMREQUEST: type %d\n", pReqHdr->requestType);
if (cbReq < cbMinSize)
{
    LogRel("VBOXGUEST_IOCTL_VMMREQUEST: invalid hdr size %#x, expected >= %#x; type=%#x!!\n",
            cbReq, cbMinSize, enmType);
    return VERR_INVALID_PARAMETER;
}
if (cbReq > cbData)
{
    LogRel("VBOXGUEST_IOCTL_VMMREQUEST: invalid size %#x, expected >= %#x (hdr); type=%#x!!\n",
            cbData, cbReq, enmType);
    return VERR_INVALID_PARAMETER;
}
rc = VbglGR0Verify(pReqHdr, cbData);
if (RT_FAILURE(rc))
{
    Log("VBOXGUEST_IOCTL_VMMREQUEST: invalid header: size %#x, expected >= %#x (hdr);
         type=%#x; rc=%Rrc!!\n",
            cbData, cbReq, enmType, rc);
    return rc;
}
rc = vgdrvCheckIfVmmReqIsAllowed(pDevExt, pSession, enmType, pReqHdr);
if (RT_FAILURE(rc))
{
    Log("VBOXGUEST_IOCTL_VMMREQUEST: Operation not allowed! type=%#x rc=%Rrc\n", enmType, rc);
    return rc;
}

/*
 * Make a copy of the request in the physical memory heap so
 * the VBoxGuestLibrary can more easily deal with the request.
 * (This is really a waste of time since the OS or the OS specific
 * code has already buffered or locked the input/output buffer, but
 * it does makes things a bit simpler wrt to phys address.)
 */
rc = VbglR0GRAlloc(&pReqCopy, cbReq, enmType);
if (RT_FAILURE(rc))
{
    Log("VBOXGUEST_IOCTL_VMMREQUEST: failed to allocate %u (%#x) bytes to cache the request.
         rc=%Rrc!!\n",
        cbReq, cbReq, rc);
    return rc;
}
memcpy(pReqCopy, pReqHdr, cbReq);
Assert(pReqCopy->reserved1 == cbReq);
+ pReqCopy->reserved1 = 0;    /* VGDrvCommonIoCtl or caller sets cbOut, so clear it. */
+
+ if (enmType == VMMDevReq_GetMouseStatus) /* clear poll condition. */
+    pSession->u32MousePosChangedSeq = ASMAtomicUoReadU32(&pDevExt->u32MousePosChangedSeq);
+
+    rc = VbglR0GRPerform(pReqCopy);
+    if (   RT_SUCCESS(rc)
+        && RT_SUCCESS(pReqCopy->rc))
+    {
+        Assert(rc != VINF_HGCM_ASYNC_EXECUTE);
+        Assert(pReqCopy->rc != VINF_HGCM_ASYNC_EXECUTE);
+        memcpy(pReqHdr, pReqCopy, cbReq);
+        pReqHdr->reserved1 = cbReq; /* preserve cbOut */
+    }
+    else if (RT_FAILURE(rc))
+        Log(("VBOXGUEST_IOCTL_VMMREQUEST: VbglR0GRPerform - rc=%Rrc!n", rc));
+    else
+    {
+        Log(("VBOXGUEST_IOCTL_VMMREQUEST: request execution failed; VMMDev rc=%Rrc!n", pReqCopy->rc));
+        rc = pReqCopy->rc;
+    }
+
+    VbglR0GRFree(pReqCopy);
+    return rc;
+
+#ifdef VBOX_WITH_HGCM
+
+    assertCompile(RT_INDEFINITE_WAIT == (uint32_t)RT_INDEFINITE_WAIT); /* assumed by code below */
+    /* Worker for vgdrvHgcmAsyncWaitCallback*. */
+    static int vgdrvHgcmAsyncWaitCallbackWorker(VMMDevHGCMRequestHeader volatile *pHdr,
+                                                PVBOXGUESTEXT pDevExt,
+                                                bool fInterruptible, uint32_t cMillies)
+    {
+        int rc;
+
+        /*
+         * Check to see if the condition was met by the time we got here.
+         * *
+         * We create a simple poll loop here for dealing with out-of-memory
+         * conditions since the caller isn't necessarily able to deal with
+         * us returning too early.
+         */
+        PVBOXGUESTWAIT pWait;
+ for (;;)
+ {
+   RTSpinlockAcquire(pDevExt->EventSpinlock);
+   if (((pHdr->fu32Flags & VBOX_HGCM_REQ_DONE) != 0)
+       &
+   RTSpinlockRelease(pDevExt->EventSpinlock);
+   return VINF_SUCCESS;
+   }
+   RTSpinlockRelease(pDevExt->EventSpinlock);
+
+   pWait = vgdrvWaitAlloc(pDevExt, NULL);
+   if (pWait)
+      break;
+   if (!fInterruptible)
+      return VERR_INTERRUPTED;
+   RTThreadSleep(1);
+ }
+ pWait->fReqEvents = VMMDEV_EVENT_HGCM;
+ pWait->pHGCMReq = pHdr;
+
+ /*
+ * Re-enter the spinlock and re-check for the condition.
+ * If the condition is met, return.
+ * Otherwise link us into the HGCM wait list and go to sleep.
+ */
+ RTSpinlockAcquire(pDevExt->EventSpinlock);
+ RTListAppend(&pDevExt->HGCMWaitList, &pWait->ListNode);
+ if (((pHdr->fu32Flags & VBOX_HGCM_REQ_DONE) != 0)
+   &
+   vgdrvWaitFreeLocked(pDevExt, pWait);
+   RTSpinlockRelease(pDevExt->EventSpinlock);
+   return VINF_SUCCESS;
+   }
+   RTSpinlockRelease(pDevExt->EventSpinlock);
+
+   if (fInterruptible)
+      rc = RTSemEventMultiWaitNoResume(pWait->Event, cMillies);
+   else
+      rc = RTSemEventMultiWait(pWait->Event, cMillies);
+   if (rc == VERR_SEM_DESTROYED)
+      return rc;
+   
+   /*
+   * Unlink, free and return.
+   */
+   if (RT_FAILURE(rc)
+       && rc != VERR_TIMEOUT
+       && (!fInterruptible
+       &
+   &
+   &
+ || rc != VERR_INTERRUPTED))
+ LogRel("vgdrvHgcmAsyncWaitCallback: wait failed! %Rrc\n", rc);
+ vgdrvWaitFreeUnlocked(pdevExt, pWait);
+ return rc;
+
+ */
+ * This is a callback for dealing with async waits.
+ *
+ * It operates in a manner similar to vgdrvIoCtl_WaitEvent.
+ */
+static DECLCALLBACK(int) vgdrvHgcmAsyncWaitCallback(VMMDevHGCMRequestHeader *pHdr, void *
pvUser, uint32_t u32User)
+
+ PBOXGUESTDEVEXT pDevExt = (PBOXGUESTDEVEXT)pvUser;
+ LogFlow("vgdrvHgcmAsyncWaitCallback: requestType=%d\n", pHdr->header.requestType);
+ return vgdrvHgcmAsyncWaitCallbackWorker((VMMDevHGCMRequestHeader volatile *)pHdr, pDevExt,
+  false /* fInterruptible */, u32User /* cMillies */);
+
+ */
+ * This is a callback for dealing with async waits with a timeout.
+ *
+ * It operates in a manner similar to vgdrvIoCtl_WaitEvent.
+ */
+static DECLCALLBACK(int) vgdrvHgcmAsyncWaitCallbackInterruptible(VMMDevHGCMRequestHeader *
pHdr, void *pvUser, uint32_t u32User)
+
+ PBOXGUESTDEVEXT pDevExt = (PBOXGUESTDEVEXT)pvUser;
+ LogFlow("vgdrvHgcmAsyncWaitCallbackInterruptible: requestType=%d\n", pHdr->header.requestType);
+ return vgdrvHgcmAsyncWaitCallbackWorker((VMMDevHGCMRequestHeader volatile *)pHdr, pDevExt,
+  true /* fInterruptible */, u32User /* cMillies */);
+
+ */
+static int vgdrvIoCtl_HGCMConnect(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
+PVBGLIOCHGCMCONNECT pInfo)
+
+ int rc;
+ HGCMCLIENTID idClient = 0;
+
+ /*
+ * The VbgIHGCMConnect call will invoke the callback if the HGCM
+ * call is performed in an ASYNC fashion. The function is not able
+ * to deal with cancelled requests.
+
+ rc = VbglR0HGCMInternalConnect(&pInfo->u.In.Loc, &idClient, vgdrvHgcmAsyncWaitCallback, pDevExt, RT_INDEFINITE_WAIT);
+ Log("VBOXGUEST_IOCTL_HGCM_CONNECT: idClient=%RX32 (rc=%Rrc)\n", idClient, rc);
+ if (RT_SUCCESS(rc))
+ {
+ /* Append the client id to the client id table.
+ * If the table has somehow become filled up, we'll disconnect the session.
+ */
+ unsigned i;
+ RTSpinlockAcquire(pDevExt->SessionSpinlock);
+ for (i = 0; i < RT_ELEMENTS(pSession->aHGCMClientIds); i++)
+ if (!pSession->aHGCMClientIds[i])
+ {
+     pSession->aHGCMClientIds[i] = idClient;
+     break;
+ }
+ RTSpinlockRelease(pDevExt->SessionSpinlock);
+ if (i >= RT_ELEMENTS(pSession->aHGCMClientIds))
+ {
+     LogRelMax(32, ("VBOXGUEST_IOCTL_HGCM_CONNECT: too many HGCMConnect calls for one session!\n"));
+     VbglR0HGCMInternalDisconnect(idClient, vgdrvHgcmAsyncWaitCallback, pDevExt, RT_INDEFINITE_WAIT);
+     pInfo->u.Out.idClient = 0;
+     return VERR_TOO_MANY_OPEN_FILES;
+ }
+     pInfo->u.Out.idClient = idClient;
+     return rc;
+ }
+
+ static int vgdrvIoCtl_HGCMDisconnect(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, PVBGLIOCHGCMDISCONNECT pInfo)
+ {
+     /* Validate the client id and invalidate its entry while we're in the call.
+     */
+     int rc;
+     const uint32_t idClient = pInfo->u.In.idClient;
unsigned i;
RTSpinlockAcquire(pDevExt->SessionSpinlock);
for (i = 0; i < RT_ELEMENTS(pSession->aHGCMClientIds); i++)
    if (pSession->aHGCMClientIds[i] == idClient)
        {
            pSession->aHGCMClientIds[i] = UINT32_MAX;
            break;
        }
RTSpinlockRelease(pDevExt->SessionSpinlock);
if (i >= RT_ELEMENTS(pSession->aHGCMClientIds))
    {
        LogRelMax(32, ("VBOXGUEST_IOCTL_HGCM_DISCONNECT: idClient=%RX32u", idClient));
        return VERR_INVALID_HANDLE;
    }

    /*
     * The VbgIHGCMConnect call will invoke the callback if the HGCM
     * call is performed in an ASYNC fashion. The function is not able
     * to deal with cancelled requests.
     */
    Log(("VBOXGUEST_IOCTL_HGCM_DISCONNECT: idClient=%RX32u", idClient));
    rc = VbglR0HGCMInternalDisconnect(idClient, vgdrvHgcmAsyncWaitCallback, pDevExt,
RT_INDEFINITE_WAIT);
    LogFlow(("VBOXGUEST_IOCTL_HGCM_DISCONNECT: rc=%Rrc", rc));

    /* Update the client id array according to the result. */
    RTSpinlockAcquire(pDevExt->SessionSpinlock);
    if (pSession->aHGCMClientIds[i] == UINT32_MAX)
        pSession->aHGCMClientIds[i] = RT_SUCCESS(rc) ? 0 : idClient;
    RTSpinlockRelease(pDevExt->SessionSpinlock);
    return rc;
}

static int vgdrvIoCtl_HGCMCallInner(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
PVBGLIOCHGCMCALL pInfo,
                                    uint32_t cMillies, bool fInterruptible, bool f32bit, bool fUserData,
                                    size_t cbExtra, size_t cbData)
{
    const uint32_t u32ClientId = pInfo->u32ClientID;
    size_t cbActual;
    unsigned i;
    int rc;
    rc =
    /* Some more validations.*/
if (pInfo->cParms > 4096) /* (Just make sure it doesn't overflow the next check.) */
{
    LogRel("VBOXGUEST_IOCTL_HGCM_CALL: cParm=+%RX32 is not sane\n", pInfo->cParms);
    return VERR_INVALID_PARAMETER;
}

cbActual = cbExtra + sizeof(*pInfo);
#ifdef RT_ARCH_AMD64
    if (f32bit)
        cbActual += pInfo->cParms * sizeof(HGCMFunctionParameter32);
    else
#endif
        cbActual += pInfo->cParms * sizeof(HGCMFunctionParameter);
    if (cbData < cbActual)
    {
        LogRel("VBOXGUEST_IOCTL_HGCM_CALL: cbData=%#zx (%zu) required size is %#zx (%zu)\n",
               cbData, cbData, cbActual, cbActual);
        return VERR_INVALID_PARAMETER;
    }
    pInfo->Hdr.cbOut = (uint32_t)cbActual;

    /* Validate the client id. */
    RTSpinlockAcquire(pDevExt->SessionSpinlock);
    for (i = 0; i < RT_ELEMENTS(pSession->aHGCMClientIds); i++)
        if (pSession->aHGCMClientIds[i] == u32ClientId)
            break;
    RTSpinlockRelease(pDevExt->SessionSpinlock);
    if (RT_UNLIKELY(i >= RT_ELEMENTS(pSession->aHGCMClientIds)))
    {
        LogRelMax(32, "VBOXGUEST_IOCTL_HGCM_CALL: Invalid handle. u32Client=+%RX32\n",
                   u32ClientId);
        return VERR_INVALID_HANDLE;
    }

    /* The VbgIHGCMCall call will invoke the callback if the HGCM
     * call is performed in an ASYNC fashion. This function can
     * deal with cancelled requests, so we let user more requests
     * be interruptible (should add a flag for this later I guess).
     */
    LogFlow("VBOXGUEST_IOCTL_HGCM_CALL: u32Client=+%RX32\n", pInfo->u32ClientID);
    fFlags = !fUserData && pSession->R0Process == NIL_RTR0PROCESS ?
        VBGLR0_HGCMCALL_F_KERNEL : VBGLR0_HGCMCALL_F_USER;
    uint32_t cbInfo = (uint32_t)(cbData - cbExtra);
#ifdef RT_ARCH_AMD64
if (f32bit)
{
    if (fInterruptible)
        rc = VbgIR0HGCMInternalCall32(pInfo, cbInfo, fFlags, vgdrvHgcmAsyncWaitCallbackInterruptible, pDevExt, cMillies);
    else
        rc = VbgIR0HGCMInternalCall32(pInfo, cbInfo, fFlags, vgdrvHgcmAsyncWaitCallback, pDevExt, cMillies);
} else
#endif
{
    if (fInterruptible)
        rc = VbgIR0HGCMInternalCall(pInfo, cbInfo, fFlags, vgdrvHgcmAsyncWaitCallbackInterruptible, pDevExt, cMillies);
    else
        rc = VbgIR0HGCMInternalCall(pInfo, cbInfo, fFlags, vgdrvHgcmAsyncWaitCallback, pDevExt, cMillies);
} if (RT_SUCCESS(rc))
{
    rc = pInfo->Hdr.rc;
    LogFlow("VBOXGUEST_IOCTL_HGCM_CALL: result=\%Rrc\n", rc);
} else
{
    if (rc != VERR_INTERRUPTED
        && rc != VERR_TIMEOUT)
        LogRelMax(32, ("VBOXGUEST_IOCTL_HGCM_CALL: %s Failed. rc=\%Rrc (Hdr.rc=\%Rrc).\n", f32bit ? "32" : "64", rc, pInfo->Hdr.rc));
    else
        Log(("VBOXGUEST_IOCTL_HGCM_CALL: %s Failed. rc=\%Rrc (Hdr.rc=\%Rrc).\n", f32bit ? "32" : "64", rc, pInfo->Hdr.rc));
} return rc;

static int vgdrvIoCtl_HGCMCallWrapper(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, PVBGLIOCHGCMCALL pInfo,
                                                bool f32bit, bool fUserData, size_t cbData)
{+ return vgdrvIoCtl_HGCMCallInner(pDevExt, pSession, pInfo, pInfo->cMsTimeout,
        pInfo->fInterruptible || pSession->R0Process != NIL_RTR0PROCESS,
        f32bit, fUserData, 0 /* cbExtra */ , cbData);
}
Handle VBGL_IOCTL_CHECK_BALLOON from R3.

Ask the host for the size of the balloon and try to set it accordingly. If this approach fails because it's not supported, return with fHandleInR3 set and let the user land supply memory we can lock via the other ioctl.

@returns VBox status code.

@returns VBox status code.

static int vgdrvIoCtl_CheckMemoryBalloon(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, PVBGLIOCCHECKBALLOON pInfo)
{
    VMMDevGetMemBalloonChangeRequest *pReq;
    int rc;
    
    LogFlow("VBGL_IOCTL_CHECK_BALLOON:
    rc = RTSemFastMutexRequest(pDevExt->MemBalloon.hMtx);
    if (RT_SUCCESS(rc))
    {
        /*
         * This is a response to that event. Setting this bit means that
         * we request the value from the host and change the guest memory
         * balloon according to this value.
         */
        pReq->eventAck = VMMDEV_EVENT_BALLOON_CHANGE_REQUEST;
        rc = VbglR0GRPerform(&pReq->header);
        if (RT_SUCCESS(rc))
        {
            Assert(pDevExt->MemBalloon.cMaxChunks == pReq->cPhysMemChunks || pDevExt-
MemBalloon.cMaxChunks == 0); pDevExt->MemBalloon.cMaxChunks = pReq->cPhysMemChunks; pInfo->u.Out.cBalloonChunks = pReq->cBalloonChunks; pInfo->u.Out.fHandleInR3 = false; pInfo->u.Out.afPadding[0] = false; pInfo->u.Out.afPadding[1] = false; pInfo->u.Out.afPadding[2] = false; rc = vgdrvSetBalloonSizeKernel(pDevExt, pReq->cBalloonChunks, &pInfo->u.Out.fHandleInR3); /* Ignore various out of memory failures. */ if ( rc == VERR_NO_MEMORY || rc == VERR_NO_PHYS_MEMORY || rc == VERR_NO_CONT_MEMORY ) rc = VINF_SUCCESS; else LogRel("VBGL_IOCTL_CHECK_BALLOON: VbglR0GRPerform failed. rc=%Rrc\n", rc)); VbglR0GRFree(&pReq->header); } else rc = VERR_PERMISSION_DENIED; RTSemFastMutexRelease(pDevExt->MemBalloon.hMtx); LogFlow("VBGL_IOCTL_CHANGE_BALLOON returns %Rrc\n", rc); +/* Handle a request for changing the memory balloon. + * + *Context: + * + * @returns VBox status code. + * + * @param   pDevExt The device extension. + * @param   pSession The session. + * @param   pInfo The change request structure (input). + * + */ static int vgdrvIoCtl_ChangeMemoryBalloon(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, PVBGLIOCCHANGEBALLOON pInfo) +{ +  int rc; +  LogFlow("VBGL_IOCTL_CHANGE_BALLOON: fInflate=%RTbool u64ChunkAddr=%p\n", pInfo->u.In.fInflate, pInfo->u.In.pvChunk)); +  if ( pInfo->u.In.abPadding[0] +    || pInfo->u.In.abPadding[1] +    || pInfo->u.In.abPadding[2]
+    Log(("VBGL_IOCTL_CHANGE_BALLOON: Padding isn't all zero: %."Rhxs", sizeof(pInfo-
+        >u.In.abPadding), pInfo->u.In.abPadding));
+    return VERR_INVALID_PARAMETER;
+  }
+  
+  rc = RTSemFastMutexRequest(pDevExt->MemBalloon.hMtx);
+  AssertRCReturn(rc, rc);
+
+  if (!pDevExt->MemBalloon.fUseKernelAPI)
+  {
+    /*
+    * The first user trying to query/change the balloon becomes the
+    * owner and owns it until the session is closed (vgdrvCloseMemBalloon).
+    */
+    if (   pDevExt->MemBalloon.pOwner != pSession
+        && pDevExt->MemBalloon.pOwner == NULL)
+        pDevExt->MemBalloon.pOwner = pSession;
+
+    if (pDevExt->MemBalloon.pOwner == pSession)
+        rc = vgdrvSetBalloonSizeFromUser(pDevExt, pSession, pInfo->u.In.pvChunk, pInfo->u.In.fInflate !=
+            false);
+    else
+        rc = VERR_PERMISSION_DENIED;
+  }
+  else
+    rc = VERR_PERMISSION_DENIED;
+
+  RTSemFastMutexRelease(pDevExt->MemBalloon.hMtx);
+  return rc;
+
+}*/
+
+ * Handle a request for writing a core dump of the guest on the host.
+ *
+ */
+ * @returns VBox status code.
+ */
+ * @param pDevExt   The device extension.
+ * @param pInfo     The output buffer.
+ */
+static int vgdrvIoCtl_WriteCoreDump(PVBOXGUESTDEVEXT pDevExt, PVBGLIOCWRITECOREDUMP pInfo)
+{
+    VMMDevReqWriteCoreDump *pReq = NULL;
+    int rc;
+    LogFlow("VBOXGUEST_IOCTL_WRITE_CORE_DUMP\n");
+    RT_NOREF1(pDevExt);
+
+    rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pReq, sizeof(*pReq), VMMDevReq_WriteCoreDump);
+    if (RT_SUCCESS(rc))
+    {
+        pReq->fFlags = pInfo->u.In.fFlags;
+        rc = VbglR0GRPerform(&pReq->header);
+        if (RT_FAILURE(rc))
+            Log("VBOXGUEST_IOCTL_WRITE_CORE_DUMP: VbglR0GRPerform failed, rc=%Rrc\n", rc);)
+    
+    VbglR0GRFree(&pReq->header);
+    
+    Log("VBOXGUEST_IOCTL_WRITE_CORE_DUMP: %u (%#x) bytes to cache the request. rc=%Rrc!!
", sizeof(*pReq), sizeof(*pReq), rc);
+    return rc;
+}
+
+/***
+ * Guest backdoor logging.
+ *
+ * @returns VBox status code.
+ *
+ * @param   pDevExt             The device extension.
+ * @param   pch                 The log message (need not be NULL terminated).
+ * @param   cbData              Size of the buffer.
+ * @param   fUserSession        Copy of VBOXGUESTSESSION::fUserSession for the call. True normal user, false root user.
+ */
+static int vgdrvIoCtl_Log(PVBOXGUESTDEVEXT pDevExt, const char *pch, size_t cbData, bool fUserSession)
+{
+    if (pDevExt->fLoggingEnabled)
+        RTLogBackdoorPrintf("%.*s", cbData, pch);
+    else if (!fUserSession)
+        LogRel("%.*s", cbData, pch);
+    else
+        Log("%.*s", cbData, pch);
+ return VINF_SUCCESS;
+}
+
+
+/** @name Guest Capabilities, Mouse Status and Event Filter
+ * @{
+ */
+
+/**
+ * Clears a bit usage tracker (init time).
+*
+ * @param pTracker
The tracker to clear.
+ */
+static void vgdrvBitUsageTrackerClear(PVBOXGUESTBITUSAGETRACER pTracker)
+{
+ uint32_t iBit;
+ AssertCompile(sizeof(pTracker->acPerBitUsage) == 32 * sizeof(uint32_t));
+
+ for (iBit = 0; iBit < 32; iBit++)
+
pTracker->acPerBitUsage[iBit] = 0;
+ pTracker->fMask = 0;
+}
+
+
+#ifdef VBOX_STRICT
+/**
+ * Checks that pTracker->fMask is correct and that the usage values are within
+ * the valid range.
+*
+ * @param pTracker
The tracker.
+ * @param cMax
Max valid usage value.
+ * @param pszWhat
Identifies the tracker in assertions.
+ */
+static void vgdrvBitUsageTrackerCheckMask(PCVBOXGUESTBITUSAGETRACER pTracker, uint32_t cMax,
const char *pszWhat)
+{
+ uint32_t fMask = 0;
+ uint32_t iBit;
+ AssertCompile(sizeof(pTracker->acPerBitUsage) == 32 * sizeof(uint32_t));
+
+ for (iBit = 0; iBit < 32; iBit++)
+
if (pTracker->acPerBitUsage[iBit])
+
{
+
fMask |= RT_BIT_32(iBit);
+
AssertMsg(pTracker->acPerBitUsage[iBit] <= cMax,
+
("%s: acPerBitUsage[%u]=%#x cMax=%#x\n", pszWhat, iBit, pTracker->acPerBitUsage[iBit],
cMax));
+
}

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+ AssertMsg(fMask == pTracker->fMask, ("%s: %#x vs %#x\n", pszWhat, fMask, pTracker->fMask));
+ }
+ #endif
+
+ /**
+ * Applies a change to the bit usage tracker.
+ *
+ * @returns true if the mask changed, false if not.
+ * @param   pTracker            The bit usage tracker.
+ * @param   fChanged            The bits to change.
+ * @param   fPrevious           The previous value of the bits.
+ * @param   cMax                The max valid usage value for assertions.
+ * @param   pszWhat             Identifies the tracker in assertions.
+ */
+ static bool vgdrvBitUsageTrackerChange(PVBOXGUESTBITUSAGETRACER pTracker, uint32_t fChanged, uint32_t fPrevious, uint32_t cMax, const char *pszWhat)
+ {
+     bool fGlobalChange = false;
+     AssertCompile(sizeof(pTracker->acPerBitUsage) == 32 * sizeof(uint32_t));
+     while (fChanged)
+     {
+         uint32_t const iBit     = ASMBitFirstSetU32(fChanged) - 1;
+         uint32_t const fBitMask = RT_BIT_32(iBit);
+         Assert(iBit < 32); Assert(fBitMask & fChanged);
+         if (fBitMask & fPrevious)
+         {
+             pTracker->acPerBitUsage[iBit] -= 1;
+             AssertMsg(pTracker->acPerBitUsage[iBit] <= cMax,
+                       ("%s: acPerBitUsage[%u]=%#x cMax=%#x\n", pszWhat, iBit, pTracker->acPerBitUsage[iBit], cMax));
+             if (pTracker->acPerBitUsage[iBit] == 0)
+             {
+                 fGlobalChange = true;
+                 pTracker->fMask &= ~fBitMask;
+             }
+         }
+         if (fGlobalChange) {
+             AssertMsg((pTracker->acPerBitUsage[iBit] == 0) &&
+                        fGlobalChange = false;
+             return true;
+         } else {
+             if (pTracker->acPerBitUsage[iBit] == 0) {
+                 pTracker->acPerBitUsage[iBit] += 1;
+                 AssertMsg(pTracker->acPerBitUsage[iBit] > 0 && pTracker->acPerBitUsage[iBit] <= cMax,
+                           ("pTracker->acPerBitUsage[%u]=%#x cMax=%#x\n", pszWhat, iBit, pTracker->acPerBitUsage[iBit], cMax));
+             }
+         }
+     }
+ }
if (pTracker->acPerBitUsage[iBit] == 1)
{
    fGlobalChange = true;
    pTracker->fMask |= fBitMask;
}

fChanged &= ~fBitMask;
}

#ifdef VBOX STRICT
vgdrvBitUsageTrackerCheckMask(pTracker, cMax, pszWhat);
#endif
NOREF(pszWhat); NOREF(cMax);
return fGlobalChange;
}
static int vgdrvSetSessionEventFilter(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, 
        uint32_t fOrMask, uint32_t fNotMask, bool fSessionTermination)
{
    VMMDevCtlGuestFilterMask *pReq;
    uint32_t fChanged;
    uint32_t fPrevious;
    int rc;

    /*
     * Preallocate a request buffer so we can do all in one go without leaving the spinlock.
     * *
     * rc = VbgIR0GRAlloc((VMMDevRequestHeader **)&pReq, sizeof(*pReq),
     * VMMDevReq_CtlGuestFilterMask);
     * if (RT_SUCCESS(rc))
     * { /* nothing */ }
     * else if (!fSessionTermination)
     * {
     *     LogRel("vgdrvSetSessionFilterMask: VbgIR0GRAlloc failure: %Rrc\n", rc);
     *     return rc;
     * }
     * else
     *     pReq = NULL; /* Ignore failure, we must do session cleanup. */
     * +
     *
     * RTSpinlockAcquire(pDevExt->SessionSpinlock);
     * +
     * /*
     * + * Apply the changes to the session mask.
     * + */
     * + fPrevious = pSession->fEventFilter;
     * + pSession->fEventFilter |= fOrMask;
     * + pSession->fEventFilter &= ~fNotMask;
     * +
     * /*

+ * session cleanup.
+ *
+ * @returns VBox status code.
+ * @param pDevExt The device extension.
+ * @param pSession The session.
+ * @param fOrMask The events to add.
+ * @param fNotMask The events to remove.
+ * @param fSessionTermination Set if we're called by the session cleanup code.
+ * This tweakes the error handling so we perform
+ * proper session cleanup even if the host
+ * misbehaves.
+ *
+ * @remarks Takes the session spinlock.
+ */
+static int vgdrvSetSessionEventFilter(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
+        uint32_t fOrMask, uint32_t fNotMask, bool fSessionTermination)
If anything actually changed, update the global usage counters.
*/
fChanged = fPrevious ^ pSession->fEventFilter;
LogFlow("vgdrvSetSessionEventFilter: Session->fEventFilter: %#x -> %#x (changed %#x)n",
    fPrevious, pSession->fEventFilter, fChanged);
if (fChanged)
{
    bool fGlobalChange = vgdrvBitUsageTrackerChange(&pDevExt->EventFilterTracker, fChanged, fPrevious,
        pDevExt->cSessions, "EventFilterTracker");
    /*
     * If there are global changes, update the event filter on the host.
     */
    if (fGlobalChange || pDevExt->fEventFilterHost == UINT32_MAX)
    {
        Assert(pReq || fSessionTermination);
        if (pReq)
        {
            pReq->u32OrMask = pDevExt->fFixedEvents | pDevExt->EventFilterTracker.fMask;
            if (pReq->u32OrMask == pDevExt->fEventFilterHost)
                rc = VINF_SUCCESS;
            else
            {
                pDevExt->fEventFilterHost = pReq->u32OrMask;
                pReq->u32NotMask = ~pReq->u32OrMask;
                rc = VbglR0GRPerform(&pReq->header);
                if (RT_FAILURE(rc))
                    /*
                     * Failed, roll back (unless it's session termination time).
                     */
                    pDevExt->fEventFilterHost = UINT32_MAX;
                    if (!fSessionTermination)
                        { vgdrvBitUsageTrackerChange(&pDevExt->EventFilterTracker, fChanged, pSession-
                            >fEventFilter,
                            pDevExt->cSessions, "EventFilterTracker");
                            pSession->fEventFilter = fPrevious;
                        }
                    else
                    {
                        RTSpinlockRelease(pDevExt->SessionSpinlock);
                        rc = VINF_SUCCESS;
                    }
                }
            }
        }
    }
    RTSpinlockRelease(pDevExt->SessionSpinlock);
if (pReq)
    VbglR0GRFree(&pReq->header);
return rc;
}

/**
 * Handle VBGL_IOCTL_CHANGE_FILTER_MASK.
 *
 * @returns VBox status code.
 *
 * @param pDevExt The device extension.
 * @param pSession The session.
 * @param pInfo The request.
 */
static int vgdrvIoCtl_ChangeFilterMask(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, 
PVBGLIOCCHANGEFILTERMASK pInfo)
{
    LogFlow("VBGL_IOCTL_CHANGE_FILTER_MASK: or=%#x not=%#x\n", pInfo->u.In.fOrMask, pInfo->u.In.fNotMask);

    if ((pInfo->u.In.fOrMask | pInfo->u.In.fNotMask) & ~VMMDEV_EVENT_VALID_EVENT_MASK)
    {
        Log("VBGL_IOCTL_CHANGE_FILTER_MASK: or=%#x not=%#x: Invalid masks!\n", pInfo->u.In.fOrMask, pInfo->u.In.fNotMask);
        return VERR_INVALID_PARAMETER;
    }

    return vgdrvSetSessionEventFilter(pDevExt, pSession, pInfo->u.In.fOrMask, pInfo->u.In.fNotMask, false /*fSessionTermination*/);
}

/**
 * Init and termination worker for set mouse feature status to zero on the host.
 *
 * @returns VBox status code.
 * @param pDevExt The device extension.
 */
static int vgdrvResetMouseStatusOnHost(PVBOXGUESTDEVEXT pDevExt)
{
    VMMDevReqMouseStatus *pReq;
    int rc = VbglR0GRAlloc(VMMDevRequestHeader **)&pReq, sizeof(*pReq), VMMDevReq_SetMouseStatus);
    if (RT_SUCCESS(rc))
    {
        pReq->mouseFeatures = 0;
        pReq->pointerXPos   = 0;
+    pReq->pointerYPos = 0;
+    rc = VbglIR0GRPerform(&pReq->header);
+    if (RT_FAILURE(rc))
+        LogRelFunc("failed with rc=\%Rrc\n", rc);
+    VbglIR0GRFree(&pReq->header);
+    }
+    RT_NOREF1(pDevExt);
+    return rc;
+}
+
+/**
+ * Changes the mouse status mask for the given session.
+ *
+ * This is called in response to VBOXGUEST_IOCTL_SET_MOUSE_STATUS as well as to
+ * do session cleanup.
+ *
+ * @returns VBox status code.
+ * @param   pDevExt             The device extension.
+ * @param   pSession            The session.
+ * @param   fOrMask             The status flags to add.
+ * @param   fNotMask            The status flags to remove.
+ * @param   fSessionTermination Set if we're called by the session cleanup code.
+ *                              This tweaks the error handling so we perform
+ *                              proper session cleanup even if the host
+ *                              misbehaves.
+ *
+ * @remarks Takes the session spinlock.
+ */
+static int vgdrvSetSessionMouseStatus(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
+                                       uint32_t fOrMask, uint32_t fNotMask, bool fSessionTermination)
+{
+    VMMDevReqMouseStatus   *pReq;
+    uint32_t                fChanged;
+    uint32_t                fPrevious;
+    int                     rc;
+
+    /* Preallocate a request buffer so we can do all in one go without leaving the spinlock.
+    */
+    rc = VbglIR0GRAloc((VMMDevRequestHeader **)pReq, sizeof(*pReq), VMMDevReq_SetMouseStatus);
+    if (RT_SUCCESS(rc))
+        { /* nothing */ }
+    else if (!fSessionTermination)
+        {  
+        LogRel("vgdrvSetSessionMouseStatus: VbglIR0GRAloc failure: \%Rrc\n", rc);
+        return rc;
+        }
+}
else
    pReq = NULL; /* Ignore failure, we must do session cleanup. */
+
+ RTSpinlockAcquire(pDevExt->SessionSpinlock);
+
+ /*
+ * Apply the changes to the session mask.
+ */
+ fPrevious = pSession->fMouseStatus;
+ pSession->fMouseStatus |= fOrMask;
+ pSession->fMouseStatus &= ~fNotMask;
+
+ /*
+ * If anything actually changed, update the global usage counters.
+ */
+ fChanged = fPrevious ^ pSession->fMouseStatus;
+ if (fChanged)
+ {
+    bool fGlobalChange = vgdrvBitUsageTrackerChange(&pDevExt->MouseStatusTracker, fChanged, fPrevious,
+                                             pDevExt->cSessions, "MouseStatusTracker");
+
+    /*
+     * If there are global changes, update the event filter on the host.
+     */
+    if (fGlobalChange || pDevExt->fMouseStatusHost == UINT32_MAX)
+    {
+        Assert(pReq || fSessionTermination);
+        if (pReq)
+        {
+            pReq->mouseFeatures = pDevExt->MouseStatusTracker.fMask;
+            if (pReq->mouseFeatures == pDevExt->fMouseStatusHost)
+                rc = VINF_SUCCESS;
+            else
+                pDevExt->fMouseStatusHost = pReq->mouseFeatures;
+            pReq->pointerXPos = 0;
+            pReq->pointerYPos = 0;
+            rc = VbglR0GRPerform(&pReq->header);
+            if (RT_FAILURE(rc))
+            {
+                /*
+                 * Failed, roll back (unless it's session termination time).
+                 */
+                pDevExt->fMouseStatusHost = UINT32_MAX;
+                if (!fSessionTermination)
+                {
+                    vgdrvBitUsageTrackerChange(&pDevExt->MouseStatusTracker, fChanged, pSession-
> fMouseStatus,
  + pDevExt->cSessions, "MouseStatusTracker");
  + pSession->fMouseStatus = fPrevious;
  + }
  + }
  + }
  + }
  + else
  + rc = VINF_SUCCESS;
  + }
  + }
  + RTSpinlockRelease(pDevExt->SessionSpinlock);
  + if (pReq)
  + VbglIR0GRFree(&pReq->header);
  + return rc;
  + }
  + }

 + /**
  + * Sets the mouse status features for this session and updates them globally.
  + *
  + * @returns VBox status code.
  + *
  + * @param   pDevExt             The device extension.
  + * @param   pSession            The session.
  + * @param   fFeatures           New bitmap of enabled features.
  + */
 + static int vgdrvIoCtl_SetMouseStatus(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
            uint32_t fFeatures)
 + {
  + LogFlow("VBGL_IOCTL_SET_MOUSE_STATUS: features=%#x\n", fFeatures));
  + }
  + if (fFeatures & ~VMMDEV_MOUSE_GUEST_MASK)
  + return VERR_INVALID_PARAMETER;
  + return vgdrvSetSession_MouseStatus(pDevExt, pSession, fFeatures, ~fFeatures, false /*fSessionTermination*/);
  + }
  + }

 + /**
  + * Return the mask of VMM device events that this session is allowed to see (wrt
  + * to "acquire" mode guest capabilities).
  + *
  + * The events associated with guest capabilities in "acquire" mode will be
  + * restricted to sessions which has acquired the respective capabilities.
  + * If someone else tries to wait for acquired events, they won't be woken up
  + * when the event becomes pending. Should some other thread in the session
 acquire the capability while the corresponding event is pending, the waiting
+ * thread will woken up.
+ *
+ * @returns Mask of events valid for the given session.
+ * @param   pDevExt The device extension.
+ * @param   pSession The session.
+ *
+ * @remarks Needs only be called when dispatching events in the
+ * VBOXGUEST_ACQUIRE_STYLE_EVENTS mask.
+ */
+static uint32_t vgdrvGetAllowedEventMaskForSession(PVBOXGUESTDEVEXT pDevExt,
PVBOXGUESTSESSION pSession)
+{
+    uint32_t fAcquireModeGuestCaps;
+    uint32_t fAcquiredGuestCaps;
+    uint32_t fAllowedEvents;
+
+    /*
+     * Note! Reads pSession->fAcquiredGuestCaps and pDevExt->fAcquireModeGuestCaps
+     * WITHOUT holding VBOXGUESTDEVEXT::SessionSpinlock.
+     */
+    fAcquireModeGuestCaps = ASMAtomicUoReadU32(&pDevExt->fAcquireModeGuestCaps);
+    if (fAcquireModeGuestCaps == 0)
+        return VMMDEV_EVENT_VALID_EVENT_MASK;
+    fAcquiredGuestCaps = ASMAtomicUoReadU32(&pSession->fAcquiredGuestCaps);
+
+    /*
+     * Calculate which events to allow according to the cap config and caps
+     * acquired by the session.
+     */
+    fAllowedEvents = VMMDEV_EVENT_VALID_EVENT_MASK;
+    if (   !(fAcquiredGuestCaps   & VMMDEV_GUEST_SUPPORTS_GRAPHICS)
+        && (fAcquireModeGuestCaps & VMMDEV_GUEST_SUPPORTS_GRAPHICS))
+        fAllowedEvents &= ~VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST;
+    +
+    if (   !(fAcquiredGuestCaps   & VMMDEV_GUEST_SUPPORTS_SEAMLESS)
+        && (fAcquireModeGuestCaps & VMMDEV_GUEST_SUPPORTS_SEAMLESS))
+        fAllowedEvents &= ~VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST;
+    +
+    return fAllowedEvents;
+}
+
+/**
+ * Init and termination worker for set guest capabilities to zero on the host.
+ *
+ * @returns VBox status code.
+ * @param   pDevExt The device extension.
+ */
+ static int vgdrvResetCapabilitiesOnHost(PVBOXGUESTDEVEXT pDevExt)
+ {
+     VMMDevReqGuestCapabilities2 *pReq;
+     int rc = VbglR0GRAlloc((VMMDevRequestHeader **) &pReq, sizeof(*pReq),
+     VMMDevReq_SetGuestCapabilities);
+     if (RT_SUCCESS(rc))
+         {
+             pReq->u32NotMask = UINT32_MAX;
+             pReq->u32OrMask = 0;
+             rc = VbglR0GRPerform(&pReq->header);
+             if (RT_FAILURE(rc))
+                 LogRelFunc(("failed with rc=%Rrc\n", rc));
+             VbglR0GRFree(&pReq->header);
+         }
+     RT_NOREF1(pDevExt);
+     return rc;
+ }

/**
 * Sets the guest capabilities to the host while holding the lock.
 * This will ASSUME that we're the ones in charge of the mask, so
 * we'll simply clear all bits we don't set.
 *
 * @returns VBox status code.
 * @param  pDevExt     The device extension.
 * @param  pReq        The request.
 */
+ static int vgdrvUpdateCapabilitiesOnHostWithReqAndLock(PVBOXGUESTDEVEXT pDevExt,
+     VMMDevReqGuestCapabilities2 *pReq)
+ {
+     int rc;
+     
+     pReq->u32OrMask = pDevExt->fAcquiredGuestCaps | pDevExt->SetGuestCapsTracker.fMask;
+     if (pReq->u32OrMask == pDevExt->fGuestCapsHost)
+         rc = VINF_SUCCESS;
+     else
+         {
+             pDevExt->fGuestCapsHost = pReq->u32OrMask;
+             pReq->u32NotMask = ~pReq->u32OrMask;
+             rc = VbglR0GRPerform(&pReq->header);
+             if (RT_FAILURE(rc))
+                 pDevExt->fGuestCapsHost = UINT32_MAX;
+         }
+ }
+    return rc;
+}
+
+/**
+ * Switch a set of capabilities into "acquire" mode and (maybe) acquire them for
+ * the given session.
+ *
+ * This is called in response to VBOXGUEST_IOCTL_GUEST_CAPS_ACQUIRE as well as
+ * to do session cleanup.
+ *
+ * @returns VBox status code.
+ * @param   pDevExt             The device extension.
+ * @param   pSession            The session.
+ * @param   fOrMask             The capabilities to add .
+ * @param   fNotMask            The capabilities to remove. Ignored in
+ *                              VBOXGUESTCAPSACQUIRE_FLAGS_CONFIG_ACQUIRE_MODE.
+ * @param   fFlags              Confusing operation modifier.
+ *                              VBOXGUESTCAPSACQUIRE_FLAGS_NONE means to both
+ *                              configure and acquire/release the capabilities.
+ *                              VBOXGUESTCAPSACQUIRE_FLAGS_CONFIG_ACQUIRE_MODE
+ *                              means only configure capabilities in the
+ *                              @a fOrMask capabilities for "acquire" mode.
+ * @param   fSessionTermination Set if we're called by the session cleanup code.
+ *                              This tweaks the error handling so we perform
+ *                              proper session cleanup even if the host
+ *                              misbehaves.
+ *
+ * @remarks Takes both the session and event spinlocks.
+ */
+static int vgdrvAcquireSessionCapabilities(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
+                                           uint32_t fOrMask, uint32_t fNotMask, uint32_t fFlags,
+                                           bool fSessionTermination)
+{
+    uint32_t fCurrentOwnedCaps;
+    uint32_t fSessionRemovedCaps;
+    uint32_t fSessionAddedCaps;
+    uint32_t fOtherConflictingCaps;
+    VMMDevReqGuestCapabilities2 *pReq = NULL;
+    int rc;
+
+    /*
+     * Validate and adjust input.
+     */
+    if (fOrMask & ~(  VMMDEV_GUEST_SUPPORTS_SEAMLESS
+                                           | VMMDEV_GUEST_SUPPORTS_GUEST_HOST_WINDOW_MAPPING
+                                           | VMMDEV_GUEST_SUPPORTS_GUEST_HOST_WINDOW_MAPPING)
LogRel("vgdrvAcquireSessionCapabilities: invalid fOrMask=%#x (pSession=%p fNotMask=%#x fFlags=%#x)n",
        fOrMask, pSession, fNotMask, fFlags));
    return VERR_INVALID_PARAMETER;
    }

    if ((fFlags & ~VBGL_IOC_AGC_FLAGS_VALID_MASK) != 0)
    {
        LogRel("vgdrvAcquireSessionCapabilities: invalid fFlags=%#x (pSession=%p fOrMask=%#x fNotMask=%#x fFlags=%#x)\n",
                fFlags, pSession, fOrMask, fNotMask);
        return VERR_INVALID_PARAMETER;
    }
    Assert(!fOrMask || !fSessionTermination);

    /* The fNotMask no need to have all values valid, invalid ones will simply be ignored. */
    fNotMask &= ~fOrMask;

    /* Preallocate a update request if we're about to do more than just configure
    * the capability mode.
    */
    if (!(fFlags & VBGL_IOC_AGC_FLAGS_CONFIG_ACQUIRE_MODE))
    {
        rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pReq, sizeof(*pReq),
            VMMDevReq_SetGuestCapabilities);
        if (RT_SUCCESS(rc))
        { /* do nothing */ }
        else if (!fSessionTermination)
        {
            LogRel("vgdrvAcquireSessionCapabilities: pSession=%p fOrMask=%#x fNotMask=%#x fFlags=%#x: VbglR0GRAlloc failure: %Rrc\n",
                    pSession, fOrMask, fNotMask, fFlags, rc);
            return rc;
        }
        else
        {
            pReq = NULL; /* Ignore failure, we must do session cleanup. */
        }
    }
    /* Try switch the capabilities in the OR mask into "acquire" mode.
    * Note! We currently ignore anyone which may already have "set" the capabilities
    * in fOrMask. Perhaps not the best way to handle it, but it's simple...
    */
    RTSpinlockAcquire(pDevExt->EventSpinlock);
if (!(pDevExt->fSetModeGuestCaps & fOrMask))
    pDevExt->fAcquireModeGuestCaps |= fOrMask;
else
{
    RTSpinlockRelease(pDevExt->EventSpinlock);

    if (pReq)
        VbglR0GRFree(&pReq->header);
    AssertMsgFailed("Trying to change caps mode: %#x\n", fOrMask);
    LogRel("vgdrvAcquireSessionCapabilities: pSession=%p fOrMask=%#x fNotMask=%#x fFlags=%#x:
calling caps acquire for set caps\n",
            pSession, fOrMask, fNotMask, fFlags);
    return VERR_INVALID_STATE;
}

/*
 * If we only wanted to switch the capabilities into "acquire" mode, we're done now.
 */
if (fFlags & VBGL_IOC_AG C_FLAGS_CONFIG_ACQUIRE_MODE)
{
    RTSpinlockRelease(pDevExt->EventSpinlock);

    Assert(!pReq);
    Log("vgdrvAcquireSessionCapabilities: pSession=%p fOrMask=%#x fNotMask=%#x fFlags=%#x:
configured acquire caps: 0x%x\n",
            pSession, fOrMask, fNotMask, fFlags);
    return VINF_SUCCESS;
}
Assert(pReq || fSessionTermination);

/*
 * Caller wants to acquire/release the capabilities too.
 *
 * Note! The mode change of the capabilities above won't be reverted on
 * failure, this is intentional.
 */

fCurrentOwnedCaps      = pSession->fAcquiredGuestCaps;
fsSessionRemovedCaps    = fCurrentOwnedCaps & fNotMask;
fsSessionAddedCaps      = fOrMask & ~fCurrentOwnedCaps;
fOtherConflictingCaps  = pDevExt->fAcquiredGuestCaps & ~fCurrentOwnedCaps;
fOtherConflictingCaps &= fsSessionAddedCaps;

if (!fOtherConflictingCaps)
{
    if (fsSessionAddedCaps)
    {
        pSession->fAcquiredGuestCaps |= fsSessionAddedCaps;
    }
pDevExt->fAcquiredGuestCaps |= fSessionAddedCaps;
+
+
if (fSessionRemovedCaps)
+
+
    pSession->fAcquiredGuestCaps &= ~fSessionRemovedCaps;
    pDevExt->fAcquiredGuestCaps &= ~fSessionRemovedCaps;
+
+
/*
 * If something changes (which is very likely), tell the host.
 */
+
+
    if (fSessionAddedCaps || fSessionRemovedCaps || pDevExt->fGuestCapsHost == UINT32_MAX)
+
+
    Assert(pReq || fSessionTermination);
+
+
    if (pReq)
+
+
        { rcr = vgdrvUpdateCapabilitiesOnHostWithReqAndLock(pDevExt, pReq);
+
            if (RT_FAILURE(rc) && !fSessionTermination)
+
+
                /* Failed, roll back. */
+
                if (fSessionAddedCaps)
+
+
                    { pSession->fAcquiredGuestCaps &= ~fSessionAddedCaps;
                      pDevExt->fAcquiredGuestCaps &= ~fSessionAddedCaps;
+
                    }
+
+
                    if (fSessionRemovedCaps)
+
+
                        { pSession->fAcquiredGuestCaps |= fSessionRemovedCaps;
                          pDevExt->fAcquiredGuestCaps |= fSessionRemovedCaps;
+
                        }
+
+
                RTSpinlockRelease(pDevExt->EventSpinlock);
+
                LogRel("vgdrvAcquireSessionCapabilities: vgdrvUpdateCapabilitiesOnHostWithReqAndLock
failed: rc=%Rrc\n", rc);
+
                VbgIR0GRFree(&pReq->header);
+
                return rc;
+
+
        }
+
+
    else
+
+
        { RTSpinlockRelease(pDevExt->EventSpinlock);
+
            Log("vgdrvAcquireSessionCapabilities: Caps %#x were busy\n", fOtherConflictingCaps);
+
            VbgIR0GRFree(&pReq->header);
+
            return VERR_RESOURCE_BUSY;
+
+}
RTSpinlockRelease(pDevExt->EventSpinlock);
   if (pReq)
       VbgIR0GRFree(&pReq->header);

   /*
   * If we added a capability, check if that means some other thread in our
   * session should be unblocked because there are events pending.
   * *
   * HACK ALERT! When the seamless support capability is added we generate a
   * seamless change event so that the ring-3 client can sync with
   * the seamless state. Although this introduces a spurious
   * wakes of the ring-3 client, it solves the problem of client
   * state inconsistency in multiuser environment (on Windows).
   * */
   if (fSessionAddedCaps)
     {
       uint32_t fGenFakeEvents = 0;
       if (fSessionAddedCaps & VMMDEV_GUEST_SUPPORTS_SEAMLESS)
           fGenFakeEvents |= VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST;

       RTSpinlockAcquire(pDevExt->EventSpinlock);
       if (fGenFakeEvents || pDevExt->f32PendingEvents)
           vgdrvDispatchEventsLocked(pDevExt, fGenFakeEvents);
       RTSpinlockRelease(pDevExt->EventSpinlock);

#ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP
       VGDrvCommonWaitDoWakeUps(pDevExt);
#endif
     }

   return VINF_SUCCESS;
}

/**
 * Handle VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES.
 *
 * @returns VBox status code.
 *
 * @param pDevExt       The device extension.
 * @param pSession      The session.
 * @param pAcquire      The request.
 *
 */
static int vgdrvIoCtl_GuestCapsAcquire(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
                                         PVBGLIOCACQUIREGUESTCAPS pAcquire)
{

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int rc;
LogFlow("VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES: or=%#x not=%#x flags=%#x\n", pAcquire->u.In.fOrMask, pAcquire->u.In.fNotMask, pAcquire->u.In.fFlags);

if (RT_FAILURE(rc))
    LogRel("VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES failed rc=%Rrc\n", rc);
return rc;

/**
 * Sets the guest capabilities for a session.
 *
 * @returns VBox status code.
 * @param   pDevExt             The device extension.
 * @param   pSession            The session.
 * @param   fOrMask             The capabilities to add.
 * @param   fNotMask            The capabilities to remove.
 * @param   pfSessionCaps       Where to return the guest capabilities reported
 *                              for this session. Optional.
 * @param   pfGlobalCaps        Where to return the guest capabilities reported
 *                              for all the sessions. Optional.
 * @param   fSessionTermination Set if we're called by the session cleanup code.
 *                              This tweaks the error handling so we perform
 *                              proper session cleanup even if the host
 *                              misbehaves.
 * @remarks Takes the session spinlock.
 */
static int vgdrvSetSessionCapabilities(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
                            uint32_t fOrMask, uint32_t fNotMask, uint32_t *pfSessionCaps, uint32_t *pfGlobalCaps,
                            bool fSessionTermination)
{
    /* Preallocate a request buffer so we can do all in one go without leaving the spinlock.
    */
    VMMDevReqGuestCapabilities2 *pReq;
    int rc = VbgIR0GRAlloc((VMMDevRequestHeader **)&pReq, sizeof(*pReq), VMMDevReq_SetGuestCapabilities);
    if (RT_SUCCESS(rc))
    {
        /* nothing */
    } else if (!fSessionTermination)
    {
        if (pfSessionCaps)
        *
        *pfSessionCaps = UINT32_MAX;
if (pfGlobalCaps)
  *pfGlobalCaps = UINT32_MAX;
LogRel("vgdrvSetSessionCapabilities: VbgIR0GRAllc failure: %Rrc\n", rc);
return rc;
}
else
  pReq = NULL; /* Ignore failure, we must do session cleanup. */

RTSpinlockAcquire(pDevExt->SessionSpinlock);
+#ifdef VBOXGUEST_DISREGARD_ACQUIRE_MODE_GUEST_CAPS
+ /*
+ * Capabilities in "acquire" mode cannot be set via this API.
+ * (Acquire mode is only used on windows at the time of writing.)
+ */
+ if (!(fOrMask & pDevExt->fAcquireModeGuestCaps))
+#endif
  {
    *
    * Apply the changes to the session mask.
    */
    uint32_t fChanged;
    uint32_t fPrevious = pSession->fCapabilities;
    pSession->fCapabilities |= fOrMask;
    pSession->fCapabilities &= ~fNotMask;
    */
    * If anything actually changed, update the global usage counters.
    */
    fChanged = fPrevious ^ pSession->fCapabilities;
    if (fChanged)
      {
        bool fGlobalChange = vgdrvBitUsageTrackerChange(&pDevExt->SetGuestCapsTracker, fChanged, fPrevious,
                                                    pDevExt->cSessions, "SetGuestCapsTracker");
        */
        * If there are global changes, update the capabilities on the host.
        */
        if (fGlobalChange || pDevExt->fGuestCapsHost == UINT32_MAX)
          {
            Assert(pReq || fSessionTermination);
            if (pReq)
              {
                rc = vgdrvUpdateCapabilitiesOnHostWithReqAndLock(pDevExt, pReq);
                /* On failure, roll back (unless it's session termination time). */
              }
if (RT_FAILURE(rc) && !fSessionTermination)
{
    vgdrvBitUsageTrackerChange(&pDevExt->SetGuestCapsTracker, fChanged, pSession->fCapabilities,
                    pDevExt->cSessions, "SetGuestCapsTracker");
    pSession->fCapabilities = fPrevious;
    }
    }
}
}
#endif VBOXGUEST_DISREGARD_ACQUIRE_MODE_GUEST_CAPS
+ else
+ rc = VERR_RESOURCE_BUSY;
#endif
+
+ if (pfSessionCaps)
+    *pfSessionCaps = pSession->fCapabilities;
+ if (pfGlobalCaps)
+    *pfGlobalCaps = pDevExt->fAcquiredGuestCaps | pDevExt->SetGuestCapsTracker.fMask;
+
  RTSpinlockRelease(pDevExt->SessionSpinlock);
  if (pReq)
    VbglR0GRFree(&pReq->header);
  return rc;
}
else
    rc = VERR_INVALID_PARAMETER;
+
return rc;
+

/* @} */
+
+
/**
 * Common IOCTL for user to kernel and kernel to kernel communication.
 * This function only does the basic validation and then invokes
 * worker functions that takes care of each specific function.
 * @returns VBox status code.
 */
+
+ @param iFunction The requested function.
+ @param pDevExt The device extension.
+ @param pSession The client session.
+ @param pReqHdr Pointer to the request. This always starts with
  a request common header.
+ @param cbReq The max size of the request buffer.
+ */
+
int VGDrvCommonIoCtl(uintptr_t iFunction, PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession, PVBGLREQHDR pReqHdr, size_t cbReq)
+
+ * Define some helper macros to simplify validation.
+ */
+
#define REQ_CHECK_SIZES_EX(Name, cbInExpect, cbOutExpect) \
    do { \
        if (RT_LIKELY(   pReqHdr->cbIn == (cbInExpect) \
                      && (   pReqHdr->cbOut == (cbOutExpect) \
                          || ((cbInExpect) == (cbOutExpect) && pReqHdr->cbOut == 0) ) )) \
        { /* likely */ } \
        else \
        { \
            Log(( #Name ": Invalid input/output sizes. cbIn=%ld expected %ld. cbOut=%ld expected %ld.\n", \
                  (long)pReqHdr->cbIn, (long)(cbInExpect), (long)pReqHdr->cbOut, (long)(cbOutExpect)));
            return pReqHdr->rc = VERR_INVALID_PARAMETER;
        } \
    } /* likely */ \
+ \
+ \

}
+ } while (0)
+
+ /*#define REQ_CHECK_SIZES(Name) REQ_CHECK_SIZES_EX(Name, Name ## _SIZE_IN, Name ## _SIZE_OUT)
+ *
+ +#define REQ_CHECK_SIZE_IN(Name, cbInExpect) \
+ + do { \
+ + if (RT_LIKELY(pReqHdr->cbIn == (cbInExpect))) \
+ + { /* likely */ } \
+ + else \
+ + { \
+ + Log(( #Name ": Invalid input/output sizes. cbIn=%ld expected %ld\n", \n+ + (long)pReqHdr->cbIn, (long)(cbInExpect))); \
+ + return pReqHdr->rc = VERR_INVALID_PARAMETER; \n+ + } \
+ + } while (0)
+
+ +#define REQ_CHECK_SIZE_OUT(Name, cbOutExpect) \
+ + do { \
+ + if (RT_LIKELY(   pReqHdr->cbOut == (cbOutExpect) \n+ + || (pReqHdr->cbOut == 0 && pReqHdr->cbIn == (cbOutExpect)))) \
+ + { /* likely */ } \
+ + else \
+ + { \
+ + Log(( #Name ": Invalid input/output sizes. cbOut=%ld (%ld) expected %ld.
", \n+ + (long)pReqHdr->cbOut, (long)pReqHdr->cbIn, (long)(cbOutExpect))); \
+ + return pReqHdr->rc = VERR_INVALID_PARAMETER; \n+ + } \
+ + } while (0)
+
+ +#define REQ_CHECK_EXPR(Name, expr) \
+ + do { \
+ + if (RT_LIKELY(!!(expr))) \
+ + { /* likely */ } \
+ + else \
+ + { \
+ + Log(( #Name ": %s\n", #expr)); \
+ + return pReqHdr->rc = VERR_INVALID_PARAMETER; \n+ + } \
+ + } while (0)
+
+ +#define REQ_CHECK_EXPR_FMT(expr, fmt) \
+ + do { \
+ + if (RT_LIKELY(!!(expr))) \
+ + { /* likely */ } \
+ + else \
+ + { \
+ + Log( fmt ); \
+ + return pReqHdr->rc = VERR_INVALID_PARAMETER; \n+ + } \
+ + } while (0)
return pReqHdr->rc = VERR_INVALID_PARAMETER; \
} \n} while (0) \
+} \n+} while (0) \
+} do { \n+    do { \n+        if (pSession->R0Process != NIL_RTR0PROCESS) \n+        { \n+            LogFunc((mnemonic " : Ring-0 only, caller is %RTproc/%p%n", \n+                    pSession->Process, (uintptr_t)pSession->R0Process)); \n+            return pReqHdr->rc = VERR_PERMISSION_DENIED; \n+        } \n+    } while (0) \
+    /* 
+     * Validate the request.
+     */
+    if (RT_LIKELY(cbReq >= sizeof(*pReqHdr)))
+    { /* likely */ }
+    else
+    {
+        Log("VGDrvCommonIoCtl: Bad ioctl request size; cbReq=%#lx\n", (long)cbReq);
+        return VERR_INVALID_PARAMETER;
+    }
+    if (pReqHdr->cbOut == 0)
+        pReqHdr->cbOut = pReqHdr->cbIn;
+    if (RT_LIKELY(pReqHdr->uVersion == VBGLREQHDR_VERSION
+                  && pReqHdr->cbIn  >= sizeof(*pReqHdr)
+                  && pReqHdr->cbIn  <= cbReq
+                  && pReqHdr->cbOut >= sizeof(*pReqHdr)
+                  && pReqHdr->cbOut <= cbReq))
+    { /* likely */ }
+    else
+    {
+        Log("VGDrvCommonIoCtl: Bad ioctl request header; cbIn=%#lx cbOut=%#lx\n", (long)pReqHdr->cbIn, (long)pReqHdr->cbOut, (long)pReqHdr->uVersion);
+        return VERR_INVALID_PARAMETER;
+    }
+    if (RT_LIKELY(RT_VALID_PTR(pSession)))
+    { /* likely */ }
+    else
+    {
+        Log("VGDrvCommonIoCtl: Invalid pSession value %p (ioctl=%#x)n", pSession, iFunction);
+        return VERR_INVALID_PARAMETER;
+    }
rc = VINF_SUCCESS;
if (iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_VMMDEV_REQUEST(0))
    || iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_VMMDEV_REQUEST_BIG)) {
    REQ_CHECK_EXPR(VBGL_IOCTL_VMMDEV_REQUEST, pReqHdr->uType != VBGLREQHDR_TYPE_DEFAULT);
    REQ_CHECK_EXPR_FMT(pReqHdr->cbIn == pReqHdr->cbOut,
                       ("VBGL_IOCTL_VMMDEV_REQUEST: cbIn=%ld != cbOut=%ld\n", (long)pReqHdr->cbIn,
                        (long)pReqHdr->cbOut);
    pReqHdr->rc = vgdrvIoCtl_VMMDevRequest(pDevExt, pSession, (VMMDevRequestHeader *)pReqHdr,
                                             cbReq);
} else if (RT_LIKELY(pReqHdr->uType == VBGLREQHDR_TYPE_DEFAULT)) {
    if (iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_LOG(0)))
        REQ_CHECK_SIZE_OUT(VBGL_IOCTL_LOG, VBGL_IOCTL_LOG_SIZE_OUT);
    pReqHdr->rc = vgdrvIoCtl_Log(pDevExt, &((PVBGLIOCLOG)pReqHdr)->u.In.szMsg[0], pReqHdr-
                                           cbIn - sizeof(VBGLREQHDR),
                                           pSession->fUserSession);
} else if (iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_HGCM_CALL(0)))
    if (ARCH_BITS == 64)
        REQ_CHECK_EXPR(VBGL_IOCTL_HGCM_CALL, pReqHdr->cbIn >= sizeof(VBGLIOCHGCMCALL));
    pReqHdr->rc = vgdrvIoCtl_HGCMCallWrapper(pDevExt, pSession, (PVBGLIOCHGCMCALL)pReqHdr,
                                             iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_HGCM_CALL_32(0)),
                                             false /*fUserData*/, cbReq);
} else if (iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA(0)))
    false /*fUserData*/, cbReq);
} else if (iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_HGCM_CALL_32(0)))
    false /*fUserData*/, cbReq);
} else if (iFunctionStripped == VBGL_IOCTL_CODE_STRIPPED(VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA(0)))
    false /*fUserData*/, cbReq);
}
REQ_CHECK_EXPR(VBGL_IOCTL_HGCM_CALL, pReqHdr->cbIn == pReqHdr->cbOut);
 pReqHdr->rc = vgdrvIoCtl_HGCMCallWrapper(pDevExt, pSession, (PVBGLIOCHGCMCALL)pReqHdr,
      ARCH_BITS == 32, true /*fUserData*/. cbReq);
     
     } /* VBOX_WITH_HGCM */
    switch (iFunction)
    {
      /*
        * Ring-0 only:
        */
      case VBGL_IOCTL_IDC_CONNECT:
        REQ_CHECK_RING0("VBGL_IOCTL_IDC_CONNECT");
        REQ_CHECK_SIZES(VBGL_IOCTL_IDC_CONNECT);
        pReqHdr->rc = vgdrvIoCtl_IdcConnect(pDevExt, pSession, (PVBGLIOCIDCCONNECT)pReqHdr);
        break;

      case VBGL_IOCTL_IDC_DISCONNECT:
        REQ_CHECK_RING0("VBGL_IOCTL_IDC_DISCONNECT");
        REQ_CHECK_SIZES(VBGL_IOCTL_IDC_DISCONNECT);
        pReqHdr->rc = vgdrvIoCtl_IdcDisconnect(pDevExt, pSession,
(PVBGLIOCIDC disconnect)pReqHdr);
        break;

      case VBGL_IOCTL_GET_VMMDEV_IO_INFO:
        REQ_CHECK_SIZES(VBGL_IOCTL_GET_VMMDEV_IO_INFO);
        pReqHdr->rc = vgdrvIoCtl_GetVMMDevIoInfo(pDevExt,
(PVBGLIOCGETVMMDEVIOINFO)pReqHdr);
        break;

      case VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK:
        REQ_CHECK_SIZES(VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK);
        pReqHdr->rc = vgdrvIoCtl_SetMouseNotifyCallback(pDevExt,
(PVBGLIOCSETMOUSENOTIFYCALLBACK)pReqHdr);
        break;

      /*
        * Ring-3 only:
        */
      case VBGL_IOCTL_DRIVER_VERSION_INFO:
        REQ_CHECK_SIZES(VBGL_IOCTL_DRIVER_VERSION_INFO);
        pReqHdr->rc = vgdrvIoCtl_DriverVersionInfo(pDevExt, pSession,
(PVBGLIOCDRIVERVERSIONINFO)pReqHdr);
        break;

      /*
/* Both ring-3 and ring-0:
 */

case VBGL_IOCTL_WAIT_FOR_EVENTS:
    REQ_CHECK_SIZES(VBGL_IOCTL_WAIT_FOR_EVENTS);
    pReqHdr->rc = vgdrvIoCtl_WaitForEvents(pDevExt, pSession, (VBGLIOCWAITFOREVENTS*)pReqHdr, pSession->R0Process != NIL_RTR0PROCESS);
    break;

case VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS:
    REQ_CHECK_SIZES(VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS);
    pReqHdr->rc = vgdrvIoCtl_CancelAllWaitEvents(pDevExt, pSession);
    break;

case VBGL_IOCTL_CHANGE_FILTER_MASK:
    REQ_CHECK_SIZES(VBGL_IOCTL_CHANGE_FILTER_MASK);
    pReqHdr->rc = vgdrvIoCtl_ChangeFilterMask(pDevExt, pSession, (PVBGLOCGCHANGEDFILTERMASK)pReqHdr);
    break;

#ifdef VBOX_WITH_HGCM
    case VBGL_IOCTL_HGCM_CONNECT:
        REQ_CHECK_SIZES(VBGL_IOCTL_HGCM_CONNECT);
        pReqHdr->rc = vgdrvIoCtl_HGCMConnect(pDevExt, pSession, (PVBGLOCHGCMCONNECT)pReqHdr);
        break;

    case VBGL_IOCTL_HGCM_DISCONNECT:
        REQ_CHECK_SIZES(VBGL_IOCTL_HGCM_DISCONNECT);
        pReqHdr->rc = vgdrvIoCtl_HGCMDisconnect(pDevExt, pSession, (PVBGLOCHGCMCMDISCONNECT)pReqHdr);
        break;
#endif

    case VBGL_IOCTL_CHECK_BALLOON:
        REQ_CHECK_SIZES(VBGL_IOCTL_CHECK_BALLOON);
        pReqHdr->rc = vgdrvIoCtl_CheckMemoryBalloon(pDevExt, pSession, (PVBGLOCCHECKBALLOON)pReqHdr);
        break;

    case VBGL_IOCTL_CHANGE_BALLOON:
        REQ_CHECK_SIZES(VBGL_IOCTL_CHANGE_BALLOON);
        pReqHdr->rc = vgdrvIoCtl_ChangeMemoryBalloon(pDevExt, pSession, (PVBGLOCHGCMCMDISCONNECT)pReqHdr);
        break;

    case VBGL_IOCTL_WRITE_CORE_DUMP:
REQUIRE_CHECK_SIZES(VBGL_IOCTL_WRITE_CORE_DUMP);

pReqHdr->rc = vgdrvIoCtl_WriteCoreDump(pDevExt, (PVBGLIOCWRITECOREDUMP)pReqHdr);
bhreak;

case VBGL_IOCTL_SET_MOUSE_STATUS:
REQUIRE_CHECK_SIZES(VBGL_IOCTL_SET_MOUSE_STATUS);
pReqHdr->rc = vgdrvIoCtl_SetMouseStatus(pDevExt, pSession,
((PVBGLIOCSMSETMOUSESTATUS)pReqHdr)->u.In.fStatus);
bhreak;

case VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES:
REQUIRE_CHECK_SIZES(VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES);
pReqHdr->rc = vgdrvIoCtl_GuestCapsAcquire(pDevExt, pSession,
(PVBGLIOCACQUIREGUESTCAPS)pReqHdr);
bhreak;

case VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES:
REQUIRE_CHECK_SIZES(VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES);
pReqHdr->rc = vgdrvIoCtl_SetCapabilities(pDevExt, pSession,
(PVBGLIOCSGETGUESTCAPS)pReqHdr);
bhreak;

#ifdef VBOX_WITH_DPC_LATENCY_CHECKER
 case VBGL_IOCTL_DPC_LATENCY_CHECKER:
 REQUIRE_CHECK_SIZES(VBGL_IOCTL_DPC_LATENCY_CHECKER);
pReqHdr->rc = VGDrvNtIOCtl_DpcLatencyChecker();
bhreak;
#endif

default:
{
            LogRel("VGDrvCommonIoCtl: Unknown request iFunction=%#x (stripped %#x) cbReq=%#x\n",
                    iFunction, iFunctionStripped, cbReq);
pReqHdr->rc = rc = VERR_NOT_SUPPORTED;
bhreak;
        }

    LogFlow("VGDrvCommonIoCtl: returns %Rrc (req: rc=%Rrc cbOut=%#x)\n", rc, pReqHdr->rc, pReqHdr-
                    >cbOut));
    return rc;
static int vgdrvDispatchEventsLocked(PVBOXGUESTDEVEXT pDevExt, uint32_t fEvents)
{
    PVBOXGUESTWAIT pWait;
    PVBOXGUESTWAIT pSafe;
    int rc = VINF_SUCCESS;

    fEvents |= pDevExt->f32PendingEvents;

    RTListForEachSafe(&pDevExt->WaitList, pWait, pSafe, VBOXGUESTWAIT, ListNode)
    {
        uint32_t fHandledEvents = pWait->fReqEvents & fEvents;
        if (    fHandledEvents != 0
            &&  !pWait->fResEvents)
        {
            /* Does this one wait on any of the events we're dispatching? We do a quick
               check first, then deal with VBOXGUEST_ACQUIRE_STYLE_EVENTS as applicable. */
            if (fHandledEvents & VBOXGUEST_ACQUIRE_STYLE_EVENTS)
                fHandledEvents &= vgdrvGetAllowedEventMaskForSession(pDevExt, pWait->pSession);
            if (fHandledEvents)
            {
                pWait->fResEvents = pWait->fReqEvents & fEvents & fHandledEvents;
                fEvents &= ~pWait->fResEvents;
                RTListNodeRemove(&pWait->ListNode);
#ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP
                RTListAppend(&pDevExt->WakeUpList, &pWait->ListNode);
#else
                RTListAppend(&pDevExt->WokenUpList, &pWait->ListNode);
                rc |= RTSemEventMultiSignal(pWait->Event);
#endif
                if (!fEvents)
                    break;
            }
        }
    }

    ASMAtomicWriteU32(&pDevExt->f32PendingEvents, fEvents);
    return rc;
+/*
+ * Simply checks whether the IRQ is ours or not, does not do any interrupt
+ * processing.
+ *
+ * @returns true if it was our interrupt, false if it wasn't.
+ * @param   pDevExt   The VBoxGuest device extension.
+ */
+bool VGDrvCommonIsOurIRQ(PVBOXGUESTDEVEXT pDevExt)
+{
+    RTSpinlockAcquire(pDevExt->EventSpinlock);
+    bool const fOurIrq = pDevExt->pVMMDevMemory->V.V1_04.fHaveEvents;
+    RTSpinlockRelease(pDevExt->EventSpinlock);
+>
+    return fOurIrq;
+}
+
+/
+ * Common interrupt service routine.
+ *
+ * This deals with events and with waking up thread waiting for those events.
+ *
+ * @returns true if it was our interrupt, false if it wasn't.
+ * @param   pDevExt   The VBoxGuest device extension.
+ */
+bool VGDrvCommonISR(PVBOXGUESTDEVEXT pDevExt)
+{
+    VMMDevEvents volatile  *pReq                  = pDevExt->pIrqAckEvents;
+    bool                    fMousePositionChanged = false;
+    int                     rc                    = 0;
+    bool                    fOurIrq;
+>
+    /*
+     * Make sure we've initialized the device extension.
+     */
+>
+    if (RT_UNLIKELY(!pReq))
+        return false;
+>
+    /*
+     * Enter the spinlock and check if it's our IRQ or not.
+     */
+>
+    RTSpinlockAcquire(pDevExt->EventSpinlock);
+>
+    fOurIrq = pDevExt->pVMMDevMemory->V.V1_04.fHaveEvents;
+    if (fOurIrq)
+        {
+ /*
+ * Acknowledge events.
+ * We don't use VbglR0GRPPerform here as it may take another spinlocks.
+ */
+ pReq->header.rc = VERR_INTERNAL_ERROR;
+ pReq->events = 0;
+ ASMCompilerBarrier();
+ ASMOutU32(pDevExt->IOPortBase + VMMDEV_PORT_OFF_REQUEST, (uint32_t)pDevExt-
>PhysIrqAckEvents);
+ ASMCompilerBarrier(); /* paranoia */
+ if (RT_SUCCESS(pReq->header.rc))
+ { 
+     uint32_t fEvents = pReq->events;
+ 
+     Log3("VGDrvCommonISR: acknowledge events succeeded %#RX32n", fEvents);
+ 
+     /*
+     * VMMDEV_EVENT_MOUSE_POSITION_CHANGED can only be polled for.
+     */
+     if (fEvents & VMMDEV_EVENT_MOUSE_POSITION_CHANGED)
+     {
+         fMousePositionChanged = true;
+         fEvents &= ~VMMDEV_EVENT_MOUSE_POSITION_CHANGED;
+     #ifdef !defined(VBOXGUEST_MOUSE_NOTIFY_CAN_PREEMPT)
+     if (pDevExt->pfnMouseNotifyCallback)
+         pDevExt->pfnMouseNotifyCallback(pDevExt->pvMouseNotifyCallbackArg);
+     #endif
+     }
+ } 
+ 
+ #ifdef VBOX_WITH_HGCM
+ /*
+ * The HGCM event/list is kind of different in that we evaluate all entries.
+ */
+ if (fEvents & VMMDEV_EVENT_HGCM)
+ {
+     PVBOXGUESTWAIT pWait;
+     PVBOXGUESTWAIT pSafe;
+     RTLListForEachSafe(&pDevExt->HGCMWaitList, pWait, pSafe, VBOXGUESTWAIT, ListNode)
+     {
+         if (pWait->pHGCMReq->fu32Flags & VBOX_HGCM_REQ_DONE)
+         {
+             pWait->fResEvents = VMMDEV_EVENT_HGCM;
+             RTLListNodeRemove(&pWait->ListNode);
+         #ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP
+             RTLListAppend(&pDevExt->WakeUpList, &pWait->ListNode);
+         #else
+             RTLListAppend(&pDevExt->WokenUpList, &pWait->ListNode);
+         #endif
+         rc |= RTSemEventMultiSignal(pWait->Event);
+} #endif
+ } }
+ fEvents &= ~VMMDEV_EVENT_HGCM;
+ } #endif
+
+ */
+ */
++ rc |= vgdrvDispatchEventsLocked(pDevExt, fEvents);
+ } /* Normal FIFO waiter evaluation.
++ */
+ else /* something is serious wrong... */
+ Log(("VGDrvCommonISR: acknowledge events failed rc=%Rrc (events=%#x)!!n",
+ pReq->header.rc, pReq->events));
+ }
+ else
+ Log3("VGDrvCommonISR: not ours\n");
+ RTSpinlockRelease(pDevExt->EventSpinlock);
+
++ /*
++ * Execute the mouse notification callback here if it cannot be executed while
++ * holding the interrupt safe spinlock, see @bugref{8639}.
++ */
++ #if defined(VBOXGUEST_MOUSE_NOTIFY_CAN_PREEMPT) && !defined(RT_OS_WINDOWS) /*
++ (Windows does this in the Dpc callback) */
++ if ( fMousePositionChanged
++ && pDevExt->pfnMouseNotifyCallback)
++ pDevExt->pfnMouseNotifyCallback(pDevExt->pvMouseNotifyCallbackArg);
++ endif
++ #ifdef(VBOXGUEST_USE_DEFERRED_WAKE_UP) && !defined(RT_OS_DARWIN) &&
++ !defined(RT_OS_WINDOWS)
++ /*
++ * Do wake-ups.
++ * Note. On Windows this isn't possible at this IRQL, so a DPC will take
++ * care of it. Same on darwin, doing it in the work loop callback.
++ */
++ VGDrvCommonWaitDoWakeUps(pDevExt);
++ #endif
++ /*
++ * Work the poll and async notification queues on OSes that implements that.
++ * (Do this outside the spinlock to prevent some recursive spinlocking.)
++ */
++ if (fMousePositionChanged)
++ {

ASMAtomicIncU32(&pDevExt->u32MousePosChangedSeq); 
VGDrvNativeISRMousePollEvent(pDevExt);

+ } 
+ 
+ Assert(rc == 0); 
+ NOREF(rc); 
+ return fOurIrq; 
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/VBoxGuestInternal.h 
+++ linux-4.15.0/ubuntu/vbox/vboxguest/VBoxGuestInternal.h 
@@ -0,0 +1,365 @@ 
+/* $Id: VBoxGuestInternal.h $ */ 
+/** @file 
+ * VBoxGuest - Guest Additions Driver, Internal Header. 
+ */ 
+ 
+ /* Copyright (C) 2010-2017 Oracle Corporation 
+ * 
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+ * available from http://www.virtualbox.org. This file is free software; 
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+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind. 
+ */ 
+ 
+ /* The contents of this file may alternatively be used under the terms 
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+ * VirtualBox OSE distribution, in which case the provisions of the 
+ * CDDL are applicable instead of those of the GPL. 
+ */ 
+ 
+ /* You may elect to license modified versions of this file under the 
+ * terms and conditions of either the GPL or the CDDL or both. 
+ */ 
+ */ 
+
+ ifndef __VBoxGuestInternal_h 
+ define __VBoxGuestInternal_h 
+ 
+ include <iprt/types.h> 
+ include <iprt/list.h> 
+ include <iprt/semaphore.h> 
+ include <iprt/spinlock.h> 
+ include <iprt/timer.h> 
+ include <VBox/VMMDev.h> 
+ include <VBox/VBoxGuest.h>
```c
#include <VBox/VBoxGuestLib.h>

/** @def VBOXGUEST_USE_DEFERRED_WAKE_UP
+ * Defer wake-up of waiting thread when defined. */
#if defined(RT_OS_DARWIN) || defined(RT_OS_SOLARIS) || defined(RT_OS_WINDOWS) || defined(DOXYGEN_RUNNING)
# define VBOXGUEST_USE_DEFERRED_WAKE_UP
#endif

/** @def VBOXGUEST_MOUSE_NOTIFY_CAN_PREEMPT
+ * The mouse notification callback can cause preemption and must not be invoked
+ * while holding a high-level spinlock.
+ */
#if defined(RT_OS_SOLARIS) || defined(RT_OS_WINDOWS) || defined(DOXYGEN_RUNNING)
# define VBOXGUEST_MOUSE_NOTIFY_CAN_PREEMPT
#endif

/** Pointer to the VBoxGuest per session data. */
typedef struct VBOXGUESTSESSION *PVBOXGUESTSESSION;

/** Pointer to a wait-for-event entry. */
typedef struct VBOXGUESTWAIT *PVBOXGUESTWAIT;

/** VBox guest wait for event entry. */
* VBox guest wait for event entry.
+ *
+ * Each waiting thread allocates one of these items and adds
+ * it to the wait list before going to sleep on the event sem.
+ */
typedef struct VBOXGUESTWAIT
{
    /** The list node. */
    RTLISTNODE ListNode;
    /** The events we are waiting on. */
    uint32_t fReqEvents;
    /** The events we received. */
    uint32_t volatile fResEvents;
#if defined VBOXGUEST_USE_DEFERRED_WAKE_UP
    /** Set by VGDrvCommonWaitDoWakeUps before leaving the spinlock to call
    + * RTSemEventMultiSignal. */
    bool volatile fPendingWakeUp;
    /** Set by the requestor thread if it got the spinlock before the
    + * signaller. Deals with the race in VGDrvCommonWaitDoWakeUps. */
    bool volatile fFreeMe;
#endif
    /** The event semaphore. */
    RTSEMEVENTMULTI Event;
    /** The session that's waiting. */
```
+ PVBOXGUESTSESSION pSession;
+#ifdef VBOX_WITH_HGCM
+ /** The HGCM request we're waiting for to complete. */
+ VMMDevHGCMRequestHeader volatile *pHGCMReq;
+#endif
+
+} VBOXGUESTWAIT;
+
+ */
+ * VBox guest memory balloon.
+ */
+ */
typedef struct VBOXGUESTMEMBALLOON
+
+ /** Mutex protecting the members below from concurrent access. */
+ RTSEMFASTMUTEX hMtx;
+ /** The current number of chunks in the balloon. */
+ uint32_t cChunks;
+ /** The maximum number of chunks in the balloon (typically the amount of guest
+ memory / chunksize). */
+ uint32_t cMaxChunks;
+ /** This is true if we are using RTR0MemObjAllocPhysNC() / RTR0MemObjGetPagePhysAddr()
+ * and false otherwise. */
+ bool fUseKernelAPI;
+ /** The current owner of the balloon.
+ */
+ * This is automatically assigned to the first session using the ballooning
+ * API and first released when the session closes. */
+ PVBOXGUESTSESSION pOwner;
+ /** The pointer to the array of memory objects holding the chunks of the
+ * balloon. This array is cMaxChunks in size when present. */
+ PRTR0MEMOBJ paMemObj;
+
+} VBOXGUESTMEMBALLOON;
+/** Pointer to a memory balloon. */
typedef VBOXGUESTMEMBALLOON *PVBOXGUESTMEMBALLOON;
+
+ */
+ /** Per bit usage tracker for a uint32_t mask.
+ */
+ * Used for optimal handling of guest properties, mouse status and event filter.
+ */
typedef struct VBOXGUESTBITUSAGETRACER
+
+ /** Per bit usage counters. */
+ uint32_t acPerBitUsage[32];
+ /** The current mask according to acPerBitUsage. */
+ uint32_t iMask;
+
+} VBOXGUESTBITUSAGETRACER;
+/** Pointer to a per bit usage tracker. */
+typedef VBOXGUESTBITUSAGETRACER *PVBOXGUESTBITUSAGETRACER;
+/** Pointer to a const per bit usage tracker. */
+typedef VBOXGUESTBITUSAGETRACER const *PCVBOXGUESTBITUSAGETRACER;
+
+/**
+ * VBox guest device (data) extension.
+ */
+typedef struct VBOXGUESTDEVEXT
+{
+    /** The base of the adapter I/O ports. */
+    RTIOPORT        IOPortBase;
+    /** Pointer to the mapping of the VMMDev adapter memory. */
+    VMMDevMemory volatile   *pVMMDevMemory;
+    /** The memory object reserving space for the guest mappings. */
+    RTR0MEMOBJ        hGuestMappings;
+    /** Spinlock protecting the signaling and resetting of the wait-for-event
+     * semaphores as well as the event acking in the ISR. */
+    RTSPINLOCK       EventSpinlock;
+    /** Preallocated VMMDevEvents for the IRQ handler. */
+    VMMDevEvents    *pIrqAckEvents;
+    /** The physical address of pIrqAckEvents. */
+    RTCCPHYS        PhysIrqAckEvents;
+    /** Wait-for-event list for threads waiting for multiple events
+     * (VBOXGUESTWAIT). */
+    RTLISTANCHOR   WaitList;
+    /** Wait-for-event list for threads waiting on HGCM async completion
+     * (VBOXGUESTWAIT). */
+    RTLISTANCHOR   HGCMWaitList;
+    /** List of wait-for-event entries that needs waking up
+     * (VBOXGUESTWAIT). */
+    RTLISTANCHOR   WakeUpList;
+    /** List of free wait-for-event entries (VBOXGUESTWAIT). */
+    RTLISTANCHOR   WokenUpList;
+    /** Mask of pending events. */
+    uint32_t volatile   f32PendingEvents;
+    /** Current VMMDEV_EVENT_MOUSE_POSITION_CHANGED sequence number.
+    * Used to implement polling. */
+    uint32_t volatile u32MousePosChangedSeq;
+
+    /** Spinlock various items in the VBOXGUESTSESSION. */
+    RTSPINLOCK SessionSpinlock;
+
+    /** List of guest sessions (VBOXGUESTSESSION). We currently traverse this
+    * but do not search it, so a list data type should be fine. Use under the
+    * #SessionSpinlock lock. */
+    RTLISTANCHOR SessionList;
+
+    /** Number of session. */
+    uint32_t cSessions;
+
+    /** Flag indicating whether logging to the release log
+    * is enabled. */
+    bool fLoggingEnabled;
+
+    /** Memory balloon information for RTR0MemObjAllocPhysNC(). */
+    VBOXGUESTMEMBALLOON MemBalloon;
+
+    /** Mouse notification callback function. */
+    PFNVBOXGUESTMOUSENOTIFY pfnMouseNotifyCallback;
+
+    /** The callback argument for the mouse notification callback. */
+    void *pvMouseNotifyCallbackArg;
+
+    /** @name Host Event Filtering */
+    /** Events we won’t permit anyone to filter out. */
+    uint32_t fFixedEvents;
+
+    /** Usage counters for the host events. (Fixed events are not included.) */
+    VBOXGUESTBITUSAGETRACER EventFilterTracker;
+
+    /** The event filter last reported to the host (UINT32_MAX on failure). */
+    uint32_t fEventFilterHost;
+
+    /** @} */
+
+    /** @name Mouse Status */
+    /** Usage counters for the mouse statuses (VMMDEV_MOUSE_XXX). */
+    VBOXGUESTBITUSAGETRACER MouseStatusTracker;
+
+    /** The mouse status last reported to the host (UINT32_MAX on failure). */
+    uint32_t fMouseStatusHost;
+
+    /** @} */
+
+    /** @name Guest Capabilities */
+    /** Guest capabilities which have been set to “acquire” mode. This means
+    * that only one session can use them at a time, and that they will be
+    * automatically cleaned up if that session exits without doing so.
+    * */
+    uint32_t volatile fAcquireModeGuestCaps;
+ /**< Guest capabilities which have been set to "set" mode. This just means
+  * that they have been blocked from ever being set to "acquire" mode. */
+  uint32_t fSetModeGuestCaps;
+ /**< Mask of all capabilities which are currently acquired by some session
+  * and as such reported to the host. */
+  uint32_t fAcquiredGuestCaps;
+ /**< Usage counters for guest capabilities in "set" mode. Indexed by
+  * capability bit number, one count per session using a capability. */
+  VBoxGuestBitUsageTracer SetGuestCapsTracker;
+ /**< The guest capabilities last reported to the host (UINT32_MAX on failure). */
+  uint32_t fGuestCapsHost;
+ /**< @} */
+
+ /**< Heartbeat timer which fires with interval
+  * cNsHeartbeatInterval and its handler sends
+  * VMMDevReq_GuestHeartbeat to VMMDev. */
+  PRTTIMER pHeartbeatTimer;
+ /**< Heartbeat timer interval in nanoseconds. */
+  uint64_t cNsHeartbeatInterval;
+ /**< Preallocated VMMDevReq_GuestHeartbeat request. */
+  VMMDevRequestHeader *pReqGuestHeartbeat;
+} VBoxGuestDevExt;
+ /**< Pointer to the VBoxGuest driver data. */
typedef VBoxGuestDevExt *PVBoxGuestDevExt;
+
+ /**<*/
typedef struct VBoxGuestSession
+
+ { /*
+  /**< The list node. */
+  RTLListNode ListNode;
+  #if defined(RT_OS_DARWIN) || defined(RT_OS_FREEBSD) || defined(RT_OS_OS2) ||
+    defined(RT_OS_SOLARIS)
+  /**< Pointer to the next session with the same hash. */
+  VBoxGuestSession pNextHash;
+  #endif
+  #if defined(RT_OS_OS2)
+  /**< The system file number of this session. */
+  uint16_t sfn;
+  #endif
+  /**< The process (id) of the session.
+  * This is NIL if it's a kernel session. */
+  RTPROCESS Process;
+  /**< Which process this session is associated with.
+  * This is NIL if it's a kernel session. */
+  */
RTR0PROCESS R0Process;
/* Pointer to the device extension. */
PVBOXGUESTDEVEXT pDevExt;

#ifdef VBOX_WITH_HGCM
/* Array containing HGCM client IDs associated with this session.
 * This will be automatically disconnected when the session is closed. */
uint32_t volatile aHGCMClientIds[64];
#endif

/* The last consumed VMMDEV_EVENT_MOUSE_POSITION_CHANGED sequence number.
Used to implement polling. */
uint32_t volatile u32MousePosChangedSeq;

/* Host events requested by the session.
An event type requested in any guest session will be added to the host
filter. Protected by VBOXGUESTDEVEXT::SessionSpinlock. */
uint32_t fEventFilter;

/* Guest capabilities held in "acquired" by this session.
Protected by VBOXGUESTDEVEXT::SessionSpinlock, but is unfortunately read
without holding the lock in a couple of places. */
uint32_t volatile fAcquiredGuestCaps;

/* Guest capabilities in "set" mode for this session.
These accumulated for sessions via VBOXGUESTDEVEXT::acGuestCapsSet and
reported to the host. Protected by VBOXGUESTDEVEXT::SessionSpinlock. */
uint32_t fCapabilities;

/* Mouse features supported. A feature enabled in any guest session will
be enabled for the host.
@note We invert the VMMDEV_MOUSE_GUEST_NEEDS_HOST_CURSOR feature in this
bitmap. The logic of this is that the real feature is when the host
cursor is not needed, and we tell the host it is not needed if any
session explicitly fails to assert it. Storing it inverted simplifies
the checks.
Use under the VBOXGUESTDEVEXT#SessionSpinlock lock. */
uint32_t fMouseStatus;
#ifdef RT_OS_DARWIN
/* Pointer to the associated org_virtualbox_VBoxGuestClient object. */
void *pvVBoxGuestClient;
/* Whether this session has been opened or not. */
bool fOpened;
#endif

/* Whether a CANCEL_ALL_WAITEVENTS is pending. This happens when
CANCEL_ALL_WAITEVENTS is called, but no call to WAITEVENT is in process
in the current session. In that case the next call will be interrupted
at once. */
bool volatile fPendingCancelWaitEvents;
/* Does this session belong to a root process or a user one? */
bool fUserSession;

] VBOXGUESTSESSION;
+RT_C_DECLS_BEGIN
+
+int VGDrvCommonInitDevExt(PVBOXGUESTDEVEXT pDevExt, uint16_t IOPortBase, void *pvMMIOBase, uint32_t cbMMIO,
+                        VBOXOSTYPE enmOSType, uint32_t fEvents);
+bool VGDrvCommonIsOurIRQ(PVBOXGUESTDEVEXT pDevExt);
+bool VGDrvCommonISR(PVBOXGUESTDEVEXT pDevExt);
+void VGDrvCommonDeleteDevExt(PVBOXGUESTDEVEXT pDevExt);
+int VGDrvCommonReinitDevExtAfterHibernation(PVBOXGUESTDEVEXT pDevExt, VBOXOSTYPE enmOSType);
+#ifdef VBOXGUEST_USE_DEFERRED_WAKE_UP
+void VGDrvCommonWaitDoWakeUps(PVBOXGUESTDEVEXT pDevExt);
+#endif
+
+int VGDrvCommonCreateUserSession(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION *ppSession);
+int VGDrvCommonCreateKernelSession(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION *ppSession);
+void VGDrvCommonCloseSession(PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession);
+
+int VGDrvCommonIoCtlFast(uintptr_t iFunction, PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession);
+int VGDrvCommonIoCtl(uintptr_t iFunction, PVBOXGUESTDEVEXT pDevExt, PVBOXGUESTSESSION pSession,
                        PVBGLREQHDR pReqHdr, size_t cbReq);
+
+/**
+ * ISR callback for notifying threads polling for mouse events.
+ *
+ * This is called at the end of the ISR, after leaving the event spinlock, if
+ * VMMDEV_EVENT_MOUSE_POSITION_CHANGED was raised by the host.
+ *
+ * @param   pDevExt   The device extension.
+ */
+void VGDrvNativeISRMousePollEvent(PVBOXGUESTDEVEXT pDevExt);
+
+#ifdef VBOX_WITH_DPC_LATENCY_CHECKER
+int VGDrvNtIOCtl_DpcLatencyChecker(void);
+#endif
+
+#ifdef VBOXGUEST_MOUSE_NOTIFY_CAN_PREEMPT
+int VGDrvNativeSetMouseNotifyCallback(PVBOXGUESTDEVEXT pDevExt, PVBGLIOCSETMOUSENOTIFYCALLBACK pNotify);
+#endif
+
+RT_C_DECLS_END
/* $Id: VBoxGuestR0LibGenericRequest.cpp $ */
/** @file
 * VBoxGuestLibR0 - Generic VMMDev request management.
 */
+
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+
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+
+#ifndef
+
+DECLR0VBGL(int) VbglGR0Verify(const VMMDevRequestHeader *pReq, size_t cbReq)
+{
+    size_t cbReqExpected;
+    /* ...

#include "VBoxGuestR0LibInternal.h"
#include <iprt/asm.h>
#include <iprt/asm-amd64-x86.h>
#include <iprt/assert.h>
#include <iprt/string.h>
+
+DECLR0VBGL(int) VbglGR0Verify(const VMMDevRequestHeader *pReq, size_t cbReq)
+{
+    size_t cbReqExpected;
+    /* ...
if (RT_UNLIKELY(!pReq || cbReq < sizeof(VMMDevRequestHeader)))
{
    dprintf("VbglGR0Verify: Invalid parameter: pReq = %p, cbReq = %zu\n", pReq, cbReq));
    return VERR_INVALID_PARAMETER;
}

if (RT_UNLIKELY(pReq->size > cbReq))
{
    dprintf("VbglGR0Verify: request size %u > buffer size %zu\n", pReq->size, cbReq));
    return VERR_INVALID_PARAMETER;
}

/* The request size must correspond to the request type. */
cbReqExpected = vmmdevGetRequestSize(pReq->requestType);
if (RT_UNLIKELY(cbReq < cbReqExpected))
{
    dprintf("VbglGR0Verify: buffer size %zu < expected size %zu\n", cbReq, cbReqExpected));
    return VERR_INVALID_PARAMETER;
}

if (cbReqExpected == cbReq)
{
    /* This is most likely a fixed size request, and in this case the
     * request size must be also equal to the expected size.
     */
    if (RT_UNLIKELY(pReq->size != cbReqExpected))
    {
        dprintf("VbglGR0Verify: request size %u != expected size %zu\n", pReq->size, cbReqExpected));
        return VERR_INVALID_PARAMETER;
    }
    return VINF_SUCCESS;
}

/* This can be a variable size request. Check the request type and limit the size
 * to VMMDEV_MAX_VMMDEVREQ_SIZE, which is max size supported by the host.
 */
if (pReq->requestType == VMMDevReq_ChangeMemBalloon)

#define VBOX_WITH_64_BITS_GUESTS

#ifndef VMMDEV_MAX_VMMDEVREQ_SIZE

#define VMMDEV_MAX_VMMDEVREQ_SIZE

#else

#endif

else

#endif

#endif
|| pReq->requestType == VMMDevReq_RegisterSharedModule
+ || pReq->requestType == VMMDevReq_ReportGuestUserState
+ || pReq->requestType == VMMDevReq_LogString
+ || pReq->requestType == VMMDevReq_SetPointerShape
+ || pReq->requestType == VMMDevReq_VideoSetVisibleRegion)
+ {
+     if (RT_UNLIKELY(cbReq > VMMDEV_MAX_VMMDEVREQ_SIZE))
+     {
+         dprintf("VbglGR0Verify: VMMDevReq_LogString: buffer size %zu too big\n", cbReq));
+         return VERR_BUFFER_OVERFLOW; /** @todo is this error code ok? */
+     }
+ } else
+ {
+     dprintf("VbglGR0Verify: request size %u > buffer size %zu\n", pReq->size, cbReq));
+     return VERR_IO_BAD_LENGTH; /** @todo is this error code ok? */
+ }
+ return VINF_SUCCESS;
+
+DECLR0VBGL(int) VbglR0GRAlloc(VMMDevRequestHeader **ppReq, size_t cbReq, VMMDevRequestType enmReqType)
+
+int rc = vbglR0Enter();
+ if (RT_SUCCESS(rc))
+ {
+     if (ppReq && cbReq >= sizeof(VMMDevRequestHeader)
+         && cbReq == (uint32_t)cbReq)
+     {
+         VMMDevRequestHeader *pReq = (VMMDevRequestHeader *)VbglR0PhysHeapAlloc((uint32_t)cbReq);
+         AssertMsgReturn(pReq, ("VbglR0GRAlloc: no memory (cbReq=%u)\n", cbReq),
+                         VERR_NO_MEMORY);
+         memset(pReq, 0xAA, cbReq);
+         pReq->size        = (uint32_t)cbReq;
+         pReq->version     = VMMDEV_REQUEST_HEADER_VERSION;
+         pReq->requestType = enmReqType;
+         pReq->rc          = VERR_GENERAL_FAILURE;
+         pReq->reserved1   = 0;
+         pReq->reserved2   = 0;
+         *ppReq = pReq;
+         rc = VINF_SUCCESS;
+     }
+ else
+     {

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+ dprintf("VbgIR0GRAlloc: Invalid parameter: ppReq=%p cbReq=%u\n", ppReq, cbReq));
+ rc = VERR_INVALID_PARAMETER;
+ }
+ }
+ return rc;
+ }
+
+ #DECLR0VBGL(int) VbgIR0GRPerform(VMMDevRequestHeader *pReq)
+ {
+ int rc = vbglR0Enter();
+ if (RT_SUCCESS(rc))
+ {
+ if (pReq)
+ {
+ RTCCPHYS PhysAddr = VbgIR0PhysHeapGetPhysAddr(pReq);
+ if (PhysAddr != 0
+     && PhysAddr < _4G) /* Port IO is 32 bit. */
+     {  
+          ASMOutU32(g_vbgldata.portVMMDev + VMMDEV_PORT_OFF_REQUEST, (uint32_t)PhysAddr);
+     /* Make the compiler aware that the host has changed memory. */
+     ASMCompilerBarrier();
+     rc = pReq->rc;
+     }
+ else
+     rc = VERR_VBGL_INVALID_ADDR;
+     }
+ else
+     rc = VERR_INVALID_PARAMETER;
+ }
+ return rc;
+ }
+
+ #DECLR0VBGL(void) VbgIR0GRFree(VMMDevRequestHeader *pReq)
+ {
+ int rc = vbglR0Enter();
+ if (RT_SUCCESS(rc))
+ VbgIR0PhysHeapFree(pReq);
+ }
+
+ --- linux-4.15.0.orig/ubuntu/vbox/vboxguest/VBoxGuestR0LibHGCMInternal.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/VBoxGuestR0LibHGCMInternal.c
@@ -0,0 +1,1074 @@
+/* $Id: VBoxGuestR0LibHGCMInternal.cpp $ */
+/** @file
+ * VBoxGuestLib - Host-Guest Communication Manager internal functions, implemented by VBoxGuest
+ */
+/* @file
+ * VBoxGuestLib - Host-Guest Communication Manager internal functions, implemented by VBoxGuest
+ */
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* */
*

/*******************************************************************************************
**************************************
*   Header Files                                                                                                                 *
************************************************************/
#define LOG_GROUP LOG_GROUP_HGCM

#include "VBoxGuestR0LibInternal.h"
#include <iprt/alloca.h>
#include <iprt/asm.h>
#include <iprt/assert.h>
#include <iprt/mem.h>
#include <iprt/memobj.h>
#include <iprt/string.h>
#include <iprt/thread.h>
#include <iprt/time.h>

#ifndef VBGL_VBOXGUEST
#error "This file should only be part of the VBoxGuestR0LibBase library that is linked into VBoxGuest."
#endif

/*******************************************************************************************
**************************************
*   Defined Constants And Macros                                                                                                 *
************************************************************/

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+/** The max parameter buffer size for a user request. */
+#define VBGLR0_MAX_HGCM_USER_PARM  (24*_1M)
+/** The max parameter buffer size for a kernel request. */
+#define VBGLR0_MAX_HGCM_KERNEL_PARM (16*_1M)
+if defined(RT_OS_LINUX) || defined(RT_OS_DARWIN)
+/** Linux needs to use bounce buffers since RTR0MemObjLockUser has unwanted
+ * side effects.
+ * Darwin 32bit & 64bit also needs this because of 4GB/4GB user/kernel space. */
+# define USE_BOUNCE_BUFFERS
+#endif
+
+/**
+ * Structures and Typedefs
+ */
+*******************************************************************************************
+**************************************
+*   Structures and Typedefs                                                      
+*******************************************************************************************
+******************************************************************************
+*                      Structures and Typedefs                                    
+******************************************************************************
+/**
+ * Lock info structure used by VbgIR0HGCMInternalCall and its helpers.
+ */
+struct VbgIR0ParmInfo
+{
+  uint32_t cLockBufs;
+  struct
+  {
+    uint32_t iParam;
+    RTR0MEMOBJ hObj;
+#ifdef USE_BOUNCE_BUFFERS
+    void  *pvSmallBuf;
+#endif
+  } aLockBufs[10];
+};
+
+/* These functions can be only used by VBoxGuest. */
+
+DECLR0VBGL(int) VbgIR0HGCMInternalConnect(HGCMServiceLocation const *pLoc, HGCMCLIENTID
+                                       *pidClient,
+                                           PFNVBGLHGCMCALLBACK pfnAsyncCallback, void *pvAsyncData, uint32_t
+                                           u32AsyncData)
+{
+  int rc;
+  if (  RT_VALID_PTR(pLoc)
+        & RT_VALID_PTR(pidClient)
+        & RT_VALID_PTR(pfnAsyncCallback))
+  {
+    /* Allocate request */
+}
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+ VMMDevHGCMConnect *pHGCMConnect = NULL;
+ rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pHGCMConnect, sizeof(VMMDevHGCMConnect),
  VMMDevReq_HGCMConnect);
+ if (RT_SUCCESS(rc))
+ {
+    /**< Initialize request memory */
+    pHGCMConnect->header.fu32Flags = 0;
+    memcpy(&pHGCMConnect->loc, pLoc, sizeof(pHGCMConnect->loc));
+    pHGCMConnect->u32ClientID = 0;
+    /**< Issue request */
+    rc = VbglR0GRPerform(&pHGCMConnect->header.header);
+    if (RT_SUCCESS(rc))
+    {
+        /**< Check if host decides to process the request asynchronously. */
+        if (rc == VINF_HGCM_ASYNC_EXECUTE)
+        {
+            /**< Wait for request completion interrupt notification from host */
+            pfnAsyncCallback(&pHGCMConnect->header, pvAsyncData, u32AsyncData);
+        }
+        rc = pHGCMConnect->header.result;
+        if (RT_SUCCESS(rc))
+            *pidClient = pHGCMConnect->u32ClientID;
+    }
+    VbglR0GRFree(&pHGCMConnect->header.header);
+ }
+ else
+    rc = VERR_INVALID_PARAMETER;
+ return rc;
+
+DECLR0VBGL(int) VbglR0HGCMInternalDisconnect(HGCMCLIENTID idClient,
+                                             PFNVBGLHGCMCALLBACK pfnAsyncCallback, void *pvAsyncData, uint32_t
+ u32AsyncData)
+{
+ int rc;
+ if ( idClient != 0
+     && pfnAsyncCallback)
+ {
+    /**< Allocate request */
+    VMMDevHGCMDisconnect *pHGCMDisconnect = NULL;
+    rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pHGCMDisconnect, sizeof
+ (VMMDevHGCMDisconnect), VMMDevReq_HGCMDisconnect);
+    if (RT_SUCCESS(rc))

+    { /* Initialize request memory */
+        pHGCMDisconnect->header.fu32Flags = 0;
+        pHGCMDisconnect->u32ClientID = idClient;
+        /* Issue request */
+        rc = VbglR0GRPerform(&pHGCMDisconnect->header.header);
+        if (RT_SUCCESS(rc))
+        {
+            /* Check if host decides to process the request asynchronously. */
+            if (rc == VINF_HGCM_ASYNC_EXECUTE)
+            {
+                /* Wait for request completion interrupt notification from host */
+                pfnAsyncCallback(&pHGCMDisconnect->header, pvAsyncData, u32AsyncData);
+            }
+            rc = pHGCMDisconnect->header.result;
+        }
+        VbglR0GRFree(&pHGCMDisconnect->header.header);
+    }
+    else
+        rc = VERR_INVALID_PARAMETER;
+    return rc;
+}
+
+    static int vbglR0HGCMInternalPreprocessCall(PCVBGLIOCHGCMCALL pCallInfo, uint32_t cbCallInfo,
+                                                bool fIsUser, struct VbglR0ParmInfo *pParmInfo, size_t *pcbExtra)
+    {
+        HGCMFunctionParameter const *pSrcParm = VBGL_HGCM_GET_CALL_PARMS(pCallInfo);
+        bool fIsUser, struct VbglR0ParmInfo *pParmInfo, size_t *pcbExtra)
+    {
+        HGCMFunctionParameter const *pSrcParm = VBGL_HGCM_GET_CALL_PARMS(pCallInfo);
+        uint32_t const cParms = pCallInfo->cParms;
+        uint32_t iParm;
+        uint32_t cb;
+        // Preprocesses the HGCM call, validating and locking/buffering parameters.
+        // @returns VBox status code.
+        // @param pCallInfo The call info.
+        // @param cbCallInfo The size of the call info structure.
+        // @param fIsUser Is it a user request or kernel request.
+        // @param pcbExtra Where to return the extra request space needed for physical page lists.
+        //}
+        //static int vbglR0HGCMInternalPreprocessCall(PCVBGLIOCHGCMCALL pCallInfo, uint32_t cbCallInfo,
+        //    bool fIsUser, struct VbglR0ParmInfo *pParmInfo, size_t *pcbExtra)
+        //    {
+        //        HGCMFunctionParameter const *pSrcParm = VBGL_HGCM_GET_CALL_PARMS(pCallInfo);
+        //        uint32_t const cParms = pCallInfo->cParms;
+        //        uint32_t iParm;
+        //        uint32_t cb;
+        //    }
/*
 * Lock down the any linear buffers so we can get their addresses
 * and figure out how much extra storage we need for page lists.
 *
 * Note! With kernel mode users we can be assertive. For user mode users
 * we should just (debug) log it and fail without any fanfare.
 */

pcbExtra = 0;

pParmInfo->cLockBufs = 0;

for (iParm = 0; iParm < cParms; iParm++, pSrcParm++)
{
    switch (pSrcParm->type)
    {
    case VMMDevHGCMParmType_32bit:
        Log4("GstHGCMCall: parm=%u type=32bit: %#010x\n", iParm, pSrcParm->u.value32);
        break;

    case VMMDevHGCMParmType_64bit:
        Log4("GstHGCMCall: parm=%u type=64bit: %#018RX64\n", iParm, pSrcParm->u.value64);
        break;

    case VMMDevHGCMParmType_PageList:
        if (fIsUser)
            return VERR_INVALID_PARAMETER;
        cb = pSrcParm->u.PageList.size;
        if (cb)
        {
            uint32_t            off = pSrcParm->u.PageList.offset;
            HGCMPageListInfo   *pPgLst;
            uint32_t            cPages;
            uint32_t            u32;

            AssertMsgReturn(cb <= VBGLR0_MAX_HGCM_KERNEL_PARM, ("%#x > %#x\n", cb,
VBGLR0_MAX_HGCM_KERNEL_PARM),
VERR_OUT_OF_RANGE);
            AssertMsgReturn(   off >= cParms * sizeof(HGCMFunctionParameter)
                             && off <= cbCallInfo - sizeof(HGCMPageListInfo),
                             ("offset=%#x cParms=%#x cbCallInfo=%#x\n", off, cParms, cbCallInfo),
VERR_INVALID_PARAMETER);
            pPgLst = (HGCMPageListInfo *)((uint8_t *)pCallInfo + off);
            cPages = pPgLst->cPages;
            u32    = RT_OFFSETOF(HGCMPageListInfo, aPages[cPages]) + off;
            AssertMsgReturn(u32 <= cbCallInfo,
                             ("u32=%#x (cPages=%#x offset=%#x) cbCallInfo=%#x\n", u32, cPages, off, cbCallInfo),
VERR_INVALID_PARAMETER);
            AssertMsgReturn(pPgLst->offFirstPage < PAGE_SIZE,
                             ("#x\n", pPgLst->offFirstPage),
VERR_INVALID_PARAMETER);
            break;
    
    default:
        Log4("GstHGCMCall: parm=%u unknown type=%#x\n", iParm, pSrcParm->type);
        break;
    
}


+ u32 = RT_ALIGN_32(pPgLst->offFirstPage + cb, PAGE_SIZE) >> PAGE_SHIFT;
+ AssertMsgReturn(cPages == u32, ("cPages=%#x u32=%#x\n", cPages, u32),
VERR_INVALID_PARAMETER);
+ AssertMsgReturn(VBOX_HGCM_F_PARM_ARE_VALID(pPgLst->flags), ("%#x\n", pPgLst->
flags), VERR_INVALID_PARAMETER);
+ Log4(("GstHGCMCall: parm=%u type=pglst: cb=%#010x cPgs=%u offPg0=%#x flags=%#x\n",
+ iParm, cb, cPages, pPgLst->offFirstPage, pPgLst->flags));
+ u32 = cPages;
+ while (u32-- > 0)
+ {
+    Log4(("GstHGCMCall:   pg#%u=%RHp\n", u32, pPgLst->aPages[u32]));
+    AssertMsgReturn(!(pPgLst->aPages[u32] & (PAGE_OFFSET_MASK |
+ UINT64_C(0xfff0000000000000))),
+ ("pg#%u=%RHp\n", u32, pPgLst->aPages[u32]),
+ VERR_INVALID_PARAMETER);
+ }
+ *pcbExtra += RT_OFFSETOF(HGCMPageListInfo, aPages[pPgLst->cPages]);
+ }
+ else
+ Log4(("GstHGCMCall: parm=%u type=pglst: cb=0\n", iParm));
+ break;
+
+ case VMMDevHGCParmType_LinAddr_Locked_In:
+ case VMMDevHGCParmType_LinAddr_Locked_Out:
+ case VMMDevHGCParmType_LinAddr_Locked:
+ if (fIsUser)
+ return VERR_INVALID_PARAMETER;
+ if (!VBGLR0_CAN_USE_PHYS_PAGE_LIST(/*a_fLocked =*/ true))
+ {
+    cb = pSrcParm->u.Pointer.size;
+    AssertMsgReturn(cb <= VBGLR0_MAX_HGCM_KERNEL_PARM, ("%#x > %#x\n", cb,
+ VBGLR0_MAX_HGCM_KERNEL_PARM),
+ VERR_OUT_OF_RANGE);
+    if (cb != 0)
+        Log4(("GstHGCMCall: parm=%u type=%#x: cb=%#010x pv=%p\n", 
+ iParm, pSrcParm->type, cb, pSrcParm->u.linearAddr));
+ else
+        Log4(("GstHGCMCall: parm=%u type=%#x: cb=0\n", iParm, pSrcParm->type));
+    break;
+ }
+ RT_FALL_THRU();
+
+ case VMMDevHGCParmType_LinAddr_In:
+ case VMMDevHGCParmType_LinAddr_Out:
+ case VMMDevHGCParmType_LinAddr:
+ cb = pSrcParm->u.Pointer.size;
+ if (cb != 0)
    { /*ifdef USE_BOUNCE_BUFFERS*/
        void *pvSmallBuf = NULL;
    /*!ifdef USE_BOUNCE_BUFFERS*/
    +
    uint32_t iLockBuf = pParmInfo->cLockBufs;
    +
    RTR0MEMOBJ hObj;
    +
    int rc;
    +
    uint32_t fAccess = pSrcParm->type == VMMDevHGCMType_LinAddr_In
    +    || pSrcParm->type == VMMDevHGCMType_LinAddr_Locked_In
    +    ? RTMEM_PROT_READ
    +    : RTMEM_PROT_READ | RTMEM_PROT_WRITE;
    +
    AssertReturn(iLockBuf < RT_ELEMENTS(pParmInfo->aLockBufs),
VERR_INVALID_PARAMETER);
    +
    if (!fIsUser)
    +    {
    +        AssertMsgReturn(cb <= VBGLR0_MAX_HGCM_KERNEL_PARM, ("%#x > %#x\n", cb,
VBGLR0_MAX_HGCM_KERNEL_PARM),
VERR_OUT_OF_RANGE);
    +        rc = RTR0MemObjLockKernel(&hObj, (void *)pSrcParm->u.Pointer.u.linearAddr, cb, fAccess);
    +        if (RT_FAILURE(rc))
    +            {
    +                Log(("GstHGCMCall: id=%#x fn=%u parm=%u RTR0MemObjLockKernel(,%p,%#x) ->
%Rrc\n",
    +                    pCallInfo->u32ClientID, pCallInfo->u32Function, iParm, pSrcParm->u.Pointer.u.linearAddr,
    +                        cb, rc));
    +                return rc;
    +            }
    +        Log3(("GstHGCMCall: parm=%u type=%#x: cb=%#010x pv=%p locked kernel -> %p
",
    +                    iParm, pSrcParm->type, cb, pSrcParm->u.Pointer.u.linearAddr, hObj));
    +    }
    +    else if (cb > VBGLR0_MAX_HGCM_USER_PARM)
    +    {
    +        Log(("GstHGCMCall: id=%#x fn=%u parm=%u pv=%p cb=%#x > %#x -> out of range\n",
    +                    pCallInfo->u32ClientID, pCallInfo->u32Function, iParm, pSrcParm->u.Pointer.u.linearAddr,
    +                        cb, VBGLR0_MAX_HGCM_USER_PARM));
    +        return VERR_OUT_OF_RANGE;
    +    }
    +    else
    +    {
    +        rc = RTR0MemObjLockUser(&hObj, (RTR3PTR)pSrcParm->u.Pointer.u.linearAddr, cb, fAccess,
NIL_RTR0PROCESS);
    +        if (RT_FAILURE(rc))
    +            {
    +                Log(("GstHGCMCall: id=%#x fn=%u parm=%u RTR0MemObjLockUser(,%p,%#x,nil) ->
%Rrc\n",
    +                    pCallInfo->u32ClientID, pCallInfo->u32Function, iParm, pSrcParm->u.Pointer.u.linearAddr,
cb, rc));
+       return rc;
+   }
+   Log3(”GstHGCMCall: parm=%u type=%#x: cb=%#010x pv=%p locked user -> %p\n”,
+         iParm, pSrcParm->type, cb, pSrcParm->u.Pointer.u.linearAddr, hObj));
+
+#else /* USE_BOUNCE_BUFFERS */
+   /*
+    * This is a bit massive, but we don't want to waste a
+    * whole page for a 3 byte string buffer (guest props).
+    *
+    * The threshold is ASSUMING sizeof(RTMEMHDR) == 16 and
+    * the system is using some power of two allocator.
+    */
+   /** @todo A more efficient strategy would be to combine buffers. However it
+    * is probably going to be more massive than the current code, so
+    * it can wait till later. */
+   bool fCopyIn = pSrcParm->type != VMMDevHGCMParmType_LinAddr_Out
+                  && pSrcParm->type != VMMDevHGCMParmType_LinAddr_Locked_Out;
+   if (cb <= PAGE_SIZE / 2 - 16)
+   {
+     pvSmallBuf = fCopyIn ? RTMemTmpAlloc(cb) : RTMemTmpAllocZ(cb);
+     if (RT_UNLIKELY(!pvSmallBuf))
+       return VERR_NO_MEMORY;
+     if (fCopyIn)
+     {
+       rc = RTR0MemUserCopyFrom(pvSmallBuf, pSrcParm->u.Pointer.u.linearAddr, cb);
+       if (RT_FAILURE(rc))
+       {
+         RTMemTmpFree(pvSmallBuf);
+         Log(’GstHGCMCall: id=%u fn=%u parm=%u RTR0MemUserCopyFrom(,%p,%#x) ->
+             %Rrc\n’,
+               pCallInfo->u32ClientID, pCallInfo->u32Function, iParm,
+               pSrcParm->u.Pointer.u.linearAddr, cb, rc));
+         return rc;
+       }
+     }
+     rc = RTR0MemObjLockKernel(&hObj, pvSmallBuf, cb, fAccess);
+     if (RT_FAILURE(rc))
+     {
+       RTMemTmpFree(pvSmallBuf);
+       Log(’GstHGCMCall: RTR0MemObjLockKernel failed for small buffer: rc=%Rrc
+               pvSmallBuf=%p cb=%#x\n’,
+             rc, pvSmallBuf, cb));
+       return rc;
+     }
+   }
+   Log3(’GstHGCMCall: parm=%u type=%#x: cb=%#010x pv=%p small buffer %p -> %p\n’,
+         iParm, pSrcParm->type, cb, pSrcParm->u.Pointer.u.linearAddr, pvSmallBuf, hObj));
else {
    rc = RTR0MemObjAllocPage(&hObj, cb, false /*fExecutable*/);
    if (RT_FAILURE(rc))
        return rc;
    if (!fCopyIn)
        memset(RTR0MemObjAddress(hObj), '\0', cb);
    else {
        rc = RTR0MemUserCopyFrom(RTR0MemObjAddress(hObj), pSrcParm->u.Pointer.u.linearAddr, cb);
        if (RT_FAILURE(rc))
            RTR0MemObjFree(hObj, false /*fFreeMappings*/);
        Log("GstHGCMCall: id=%#x fn=%u parm=%u RTR0MemUserCopyFrom(,%p,%#x) -> %Rrc
", pCallInfo->u32ClientID, pCallInfo->u32Function, iParm, pSrcParm->u.Pointer.u.linearAddr, cb, rc);
        return rc;
    }

    Log3("GstHGCMCall: parm=%u type=%#x: cb=%#010x pv=%p big buffer -> %p\n", iParm, pSrcParm->type, cb, pSrcParm->u.Pointer.u.linearAddr, hObj);
}
#endif /* USE_BOUNCE_BUFFERS */

pParmInfo->aLockBufs[iLockBuf].iParm = iParm;
pParmInfo->aLockBufs[iLockBuf].hObj = hObj;

pParmInfo->aLockBufs[iLockBuf].pvSmallBuf = pvSmallBuf;

pParmInfo->cLockBufs = iLockBuf + 1;

if (VBGLR0_CAN_USE_PHYS_PAGE_LIST(/*a_fLocked=*/false))
    {
        size_t const cPages = RTR0MemObjSize(hObj) >> PAGE_SHIFT;
        *pcbExtra += RT_OFFSETOF(HGCMPageListInfo, aPages[cPages]);
    }
else
    Log4("GstHGCMCall: parm=%u type=%#x: cb=\0\n", iParm, pSrcParm->type); break;

default:
    return VERR_INVALID_PARAMETER;
+ /*
+ * Translates locked linear address to the normal type.
+ * The locked types are only for the guest side and not handled by the host.
+ *
+ * @returns normal linear address type.
+ * @param enmType The type.
+ */
+static HGCMFunctionParameterType vbglR0HGCMInternalConvertLinAddrType(HGCMFunctionParameterType enmType)
+{
+    switch (enmType)
+    {
+        case VMMDevHGCMParmType_LinAddr_Locked_In:
+            return VMMDevHGCMParmType_LinAddr_In;
+        case VMMDevHGCMParmType_LinAddr_Locked_Out:
+            return VMMDevHGCMParmType_LinAddr_Out;
+        case VMMDevHGCMParmType_LinAddr_Locked:
+            return VMMDevHGCMParmType_LinAddr;
+        default:
+            return enmType;
+    }
+}
+
+/**
+ * Translates linear address types to page list direction flags.
+ *
+ * @returns page list flags.
+ * @param enmType The type.
+ */
+static uint32_t vbglR0HGCMInternalLinAddrTypeToPageListFlags(HGCMFunctionParameterType enmType)
+{
+    switch (enmType)
+    {
+        case VMMDevHGCMParmType_LinAddr_In:
+        case VMMDevHGCMParmType_LinAddr_Locked_In:
+            return VBOX_HGCM_F_PARM_DIRECTION_TO_HOST;
+        case VMMDevHGCMParmType_LinAddr_Out:
+        case VMMDevHGCMParmType_LinAddr_Locked_Out:
+            return VBOX_HGCM_F_PARM_DIRECTION_FROM_HOST;
+        case VMMDevHGCMParmType_LinAddr_Locked:
+            return VBOX_HGCM_F_PARM_DIRECTION_TO_HOST;
+    }
+}
```c
+ default: AssertFailed();
+ case VMMDevHGCMParmType_LinAddr:
+     case VMMDevHGCMParmType_LinAddr_Locked:
+         return VBOX_HGCM_F_PARM_DIRECTION_BOTH;
+     }
+ }
+ +
+ +
+ */
+ * Initializes the call request that we're sending to the host.
+ *
+ */
+ @returns VBox status code.
+ *
+ * @param   pCallInfo       The call info.
+ * @param   cbCallInfo      The size of the call info structure.
+ * @param   fIsUser         Is it a user request or kernel request.
+ * @param   pcbExtra        Where to return the extra request space needed for
+ *                          physical page lists.
+ */
+ static void vbglR0HGCMInternalInitCall(VMMDevHGCMCall *pHGCMCall, PCVBGLIOCHGCMCALL pCallInfo,
+                                         uint32_t cbCallInfo, bool fIsUser, struct VbglR0ParmInfo *pParmInfo)
+ {
+     HGCMFunctionParameter const *pSrcParm = VBGL_HGCM_GET_CALL_PARMS(pCallInfo);
+     HGCMFunctionParameter       *pDstParm = VMMDEV_HGCM_CALL_PARMS(pHGCMCall);
+     uint32_t const               cParms   = pCallInfo->cParms;
+     uint32_t    offExtra = (uint32_t)((uintptr_t)(pDstParm + cParms) - (uintptr_t)pHGCMCall);
+     uint32_t    iLockBuf = 0;
+     uint32_t    iParm;
+     RT_NOREF1(cbCallInfo);
+     RT_NOREF1(fIsUser);
+     /*
+     * The call request headers.
+     */
+     pHGCMCall->header.fu32Flags = 0;
+     pHGCMCall->header.result    = VINF_SUCCESS;
+     pHGCMCall->header.u32ClientID = pCallInfo->u32ClientID;
+     pHGCMCall->u32Function = pCallInfo->u32Function;
+     pHGCMCall->cParms = cParms;
+     /*
+     * The parameters.
+     */
+     for (iParm = 0; iParm < cParms; iParm++, pSrcParm++, pDstParm++)
+         *pSrcParm = *pDstParm + offExtra;
+         if (fIsUser) { *pSrcParm |= VMMDEV_HGCM_PARM_USER; };
+         *pSrcParm &= ~VMMDEV_HGCM_PARM_USER;
+         *pSrcParm += offExtra;
+         iLockBuf = 0;
+         for (iParm = 0; iParm < cParms; iParm++, pSrcParm++, pDstParm++)
+             *pSrcParm = *pDstParm + offExtra;
+             if (fIsUser) { *pSrcParm |= VMMDEV_HGCM_PARM_USER; };
+             *pSrcParm &= ~VMMDEV_HGCM_PARM_USER;
+             *pSrcParm += offExtra;
+         iLockBuf = 0;
+         for (iParm = 0; iParm < cParms; iParm++, pSrcParm++, pDstParm++)
+             *pSrcParm = *pDstParm + offExtra;
+             if (fIsUser) { *pSrcParm |= VMMDEV_HGCM_PARM_USER; };
+             *pSrcParm &= ~VMMDEV_HGCM_PARM_USER;
+             *pSrcParm += offExtra;
+         iLockBuf = 0;
+         for (iParm = 0; iParm < cParms; iParm++, pSrcParm++, pDstParm++)
+             *pSrcParm = *pDstParm + offExtra;
+             if (fIsUser) { *pSrcParm |= VMMDEV_HGCM_PARM_USER; };
+             *pSrcParm &= ~VMMDEV_HGCM_PARM_USER;
+             *pSrcParm += offExtra;
+         iLockBuf = 0;
+         for (iParm = 0; iParm < cParms; iParm++, pSrcParm++, pDstParm++)
+             *pSrcParm = *pDstParm + offExtra;
+             if (fIsUser) { *pSrcParm |= VMMDEV_HGCM_PARM_USER; };
+             *pSrcParm &= ~VMMDEV_HGCM_PARM_USER;
+             *pSrcParm += offExtra;
+         iLockBuf = 0;
+         for (iParm = 0; iParm < cParms; iParm++, pSrcParm++, pDstParm++)
+             *pSrcParm = *pDstParm + offExtra;
+             if (fIsUser) { *pSrcParm |= VMMDEV_HGCM_PARM_USER; };
+             *pSrcParm &= ~VMMDEV_HGCM_PARM_USER;
+             *pSrcParm += offExtra;
+         iLockBuf = 0;
+     }
+ }
```

```c
+ { 
+     switch (pSrcParm->type) 
+     { 
+         case VMMDevHGCMParmType_32bit:
+         case VMMDevHGCMParmType_64bit:
+             *pDstParm = *pSrcParm;
+             break;
+
+         case VMMDevHGCMParmType_PageList:
+             pDstParm->type = VMMDevHGCMParmType_PageList;
+             if (pSrcParm->u.PageList.size)
+             { 
+                 HGCMPageListInfo const *pSrcPgLst = (HGCMPageListInfo *)((uint8_t *)pCallInfo + pSrcParm->u.PageList.offset);
+                 HGCMPageListInfo       *pDstPgLst = (HGCMPageListInfo *)((uint8_t *)pHGCMCall + offExtra);
+                 uint32_t const        cPages   = pSrcPgLst->cPages;
+                 uint32_t              iPage;
+
+                 pDstParm->u.PageList.offset = offExtra;
+                 pDstPgLst->flags           = pSrcPgLst->flags;
+                 pDstPgLst->offFirstPage    = pSrcPgLst->offFirstPage;
+                 pDstPgLst->cPages          = cPages;
+                 for (iPage = 0; iPage < cPages; iPage++)
+                     pDstPgLst->aPages[iPage] = pSrcPgLst->aPages[iPage];
+
+                 offExtra += RT_OFFSETOF(HGCMPageListInfo, aPages[cPages]);
+             }
+             else
+             { 
+                 pDstParm->u.PageList.offset = 0;
+             }
+             break;
+
+         case VMMDevHGCMParmType_LinAddr_Locked_In:
+         case VMMDevHGCMParmType_LinAddr_Locked_Out:
+         case VMMDevHGCMParmType_LinAddr_Locked:
+             if (!VBGLR0_CAN_USE_PHYS_PAGE_LIST(/*a_fLocked =*/ true))
+             { 
+                 *pDstParm = *pSrcParm;
+                 pDstParm->type = vbglR0HGCMInternalConvertLinAddrType(pSrcParm->type);
+             }
+             break;
+         } 
+         RT_FALL_THRU();
+     }
+     case VMMDevHGCMParmType_LinAddr_In:
+     case VMMDevHGCMParmType_LinAddr_Out:
+     case VMMDevHGCMParmType_LinAddr:
+         if (pSrcParm->u.Pointer.size != 0)
+         { 
```
+#ifndef USE_BOUNCE_BUFFERS
+    void     *pvSmallBuf = pParmInfo->aLockBufs[iLockBuf].pvSmallBuf;
+#endif
+    RTR0MEMOBJ hObj = pParmInfo->aLockBufs[iLockBuf].hObj;
+    Assert(iParm == pParmInfo->aLockBufs[iLockBuf].iParm);
+
+    if (VBGLR0_CAN_USE_PHYS_PAGE_LIST(/*a_fLocked =*/ false))
+    {
+        HGCMPageListInfo   *pDstPgLst = (HGCMPageListInfo *)((uint8_t *)pHGCMCall + offExtra);
+        size_t const        cPages = RTR0MemObjSize(hObj) >> PAGE_SHIFT;
+        size_t              iPage;
+
+        pDstParm->type = VMMDevHGCMParmType_PageList;
+        pDstParm->u.PageList.offset = offExtra;
+        pDstPgLst->flags = vbglR0HGCMInternalLinAddrTypeToPageListFlags(pSrcParm->type);
+        #ifdef USE_BOUNCE_BUFFERS
+        if (fIsUser)
+            pDstPgLst->offFirstPage = (uintptr_t)pvSmallBuf & PAGE_OFFSET_MASK;
+        else
+        #endif
+        pDstPgLst->offFirstPage = pSrcParm->u.Pointer.u.linearAddr & PAGE_OFFSET_MASK;
+        pDstPgLst->cPages = (uint32_t)cPages; Assert(pDstPgLst->cPages == cPages);
+        for (iPage = 0; iPage < cPages; iPage++)
+        {
+            pDstPgLst->aPages[iPage] = RTR0MemObjGetPagePhysAddr(hObj, iPage);
+            Assert(pDstPgLst->aPages[iPage] != NIL_RTHCPHYS);
+        }
+
+        offExtra += RT_OFFSETOF(HGCMPageListInfo, aPages[cPages]);
+    }
+    else
+    {
+        pDstPgLst->offFirstPage = pSrcParm->u(Pointer.u.linearAddr & PAGE_OFFSET_MASK;
+        pDstPgLst->cPages = (uint32_t)cPages; Assert(pDstPgLst->cPages == cPages);
+        for (iPage = 0; iPage < cPages; iPage++)
+        {
+            pDstPgLst->aPages[iPage] = RTR0MemObjGetPagePhysAddr(hObj, iPage);
+            Assert(pDstPgLst->aPages[iPage] != NIL_RTHCPHYS);
+        }
+
+        offExtra += RT_OFFSETOF(HGCMPageListInfo, aPages[cPages]);
+    }
+    else
+    {
+        pDstParm->type = vbglR0HGCMInternalConvertLinAddrType(pSrcParm->type);
+        #ifdef USE_BOUNCE_BUFFERS
+        if (fIsUser)
+            pDstParm->u.Pointer.u.linearAddr = pvSmallBuf
+            ? (uintptr_t)pvSmallBuf
+            : (uintptr_t)RTR0MemObjAddress(hObj);
+        else
+        #endif
+        pDstParm->u.Pointer.u.linearAddr = pSrcParm->u(Pointer.u.linearAddr;
+        }
+        iLockBuf++;
+    }
+    else
+    {

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pDstParm->type = vbglR0HGCMInternalConvertLinAddrType(pSrcParm->type);
pDstParm->u.Pointer.size = 0;
pDstParm->u(Pointer.u.linearAddr = 0;
}
break;

default:
    AssertFailed();
pDstParm->type = VMMDevHGCMParmType_Invalid;
break;
}
}
+
/**
 * Performs the call and completion wait.
 */
+ * @returns VBox status code of this operation, not necessarily the call.
+ *
+ * @param pHGCMCall The HGCM call info.
+ * @param pfAsyncCallback The async callback that will wait for the call to complete.
+ * @param pvAsyncData Argument for the callback.
+ * @param u32AsyncData Argument for the callback.
+ * @param pfLeakIt Where to return the leak it / free it, indicator. Cancellation fun.
+ */
+static int vbglR0HGCMInternalDoCall(VMMDevHGCMCall *pHGCMCall, PFNVBGLHGCMCALLBACK
+pfAsyncCallback,
+    void *pvAsyncData, uint32_t u32AsyncData, bool *pfLeakIt)
+{
+    int rc;
+
+    Log("calling VbglR0GRPerform\n");
+    rc = VbglR0GRPerform(&pHGCMCall->header.header);
+    Log("VbglR0GRPerform rc = %Rrc (header rc=%d)\n", rc, pHGCMCall->header.result);
+
+    /*
+     * If the call failed, but as a result of the request itself, then pretend success. Upper layers will interpret the result code in the packet.
+     */
+    if (RT_FAILURE(rc)
+        && rc == pHGCMCall->header.result)
+        {  
+            Assert(pHGCMCall->header.fu32Flags & VBOX_HGCM_REQ_DONE);
+            rc = VINF_SUCCESS;
+        }  

*/
* Check if host decides to process the request asynchronously,
* if so, we wait for it to complete using the caller supplied callback.
*/
*pfLeakIt = false;
if (rc == VINF_HGCM_ASYNC_EXECUTE)
{
    Log("Processing HGCM call asynchronously\n");
    rc = pfAsyncCallback(&pHGCMCall->header, pvAsyncData, u32AsyncData);
    if (pHGCMCall->header.fu32Flags & VBOX_HGCM_REQ_DONE)
    {
        Assert(!(pHGCMCall->header.fu32Flags & VBOX_HGCM_REQ_CANCELLED));
        rc = VINF_SUCCESS;
    }
    else
    {
        /*
         * The request didn't complete in time or the call was interrupted,
         * the RC from the callback indicates which. Try cancel the request.
         *
         * This is a bit messy because we're racing request completion. Sorry.
         */
        /]** @todo It would be nice if we could use the waiter callback to do further
        * waiting in case of a completion race. If it wasn't for WINNT having its own
        * version of all that stuff, I would've done it already. */
        VMMDevHGCMCancel2 *pCancelReq;
        int rc2 = VbglR0GRAlocate((VMMDevRequestHeader **)&pCancelReq, sizeof(*pCancelReq),
VMMDevReq_HGCMCancel2);
        if (RT_SUCCESS(rc2))
        {
            pCancelReq->physReqToCancel = VbglR0PhysHeapGetPhysAddr(pHGCMCall);
            rc2 = VbglR0GRPerform(&pCancelReq->header);
            VbglR0GRFree(&pCancelReq->header);
        }
    }
#endif
*/
if (RT_SUCCESS(rc)) rc = VERR_INTERRUPTED; /** @todo weed this out from the WINNT VBoxGuest code. */
if (RT_SUCCESS(rc2))
{
    Log(("vbglR0HGCMInternalDoCall: successfully cancelled\n");
pHGCMCall->header.fu32Flags |= VBOX_HGCM_REQ_CANCELLED;
}
else
{
    /*
    * Wait for a bit while the host (hopefully) completes it.
    */
    uint64_t u64Start       = RTTimeSystemMilliTS();
    uint32_t cMilliesToWait = rc2 == VERR_NOT_FOUND || rc2 == VERR_SEM_DESTROYED ? 500 : 2000;
    uint64_t cElapsed       = 0;
    if (rc2 != VERR_NOT_FOUND)
    {
        static unsigned s_cErrors = 0;
        if (s_cErrors++ < 32)
            LogRel(("vbglR0HGCMInternalDoCall: Failed to cancel the HGCM call on %Rrc: rc2=%Rrc\n", rc, rc2));
    }
    else
        Log(("vbglR0HGCMInternalDoCall: Cancel race rc=%Rrc rc2=%Rrc\n", rc, rc2));
    do
    {
        ASMCompilerBarrier(); /* paranoia */
        if (pHGCMCall->header.fu32Flags & VBOX_HGCM_REQ_DONE)
            break;
        RTThreadSleep(1);
        cElapsed = RTTimeSystemMilliTS() - u64Start;
    } while (cElapsed < cMilliesToWait);
    ASMCompilerBarrier(); /* paranoia^2 */
    if (pHGCMCall->header.fu32Flags & VBOX_HGCM_REQ_DONE)
        rc = VINF_SUCCESS;
    else
    {
        LogRel("vbglR0HGCMInternalDoCall: Leaking %u bytes. Pending call to %u with %u parms. (rc2=%Rrc)\n", pHGCMCall->header.header.size, pHGCMCall->u32Function, pHGCMCall->cParms, rc2));
        *pfLeakIt = true;
    }
    Log(("vbglR0HGCMInternalDoCall: Cancel race ended with rc=%Rrc (rc2=%Rrc) after %llu ms\n", rc, rc2, cElapsed));
+    Log(("GstHGCMCall: rc=%Rrc result=%Rrc fu32Flags=%#x fLeakIt=%d\n", rc, pHGCMCall->header.result, pHGCMCall->header.fu32Flags, *pfLeakIt));
+    return rc;
+}
+
+/**
+ * Copies the result of the call back to the caller info structure and user
+ * buffers (if using bounce buffers).
+ *
+ * @returns rc, unless RTR0MemUserCopyTo fails.
+ * @param   pCallInfo           Call info structure to update.
+ * @param   pHGCMCall           HGCM call request.
+ * @param   pParmInfo           Parameter locking/buffering info.
+ * @param   fIsUser             Is it a user (true) or kernel request.
+ * @param   rc                  The current result code. Passed along to
+ *                              preserve informational status codes.
+ */
+static int vbglR0HGCMInternalCopyBackResult(PVBGLIOCHGCMCALL pCallInfo, VMMDevHGCMCall const *pHGCMCall,
+                                           struct VbglR0ParmInfo *pParmInfo, bool fIsUser, int rc)
+{
+    HGCMFunctionParameter const *pSrcParm = VMMDEV_HGCM_CALL_PARMS(pHGCMCall);
+    HGCMFunctionParameter       *pDstParm = VBGL_HGCM_GET_CALL_PARMS(pCallInfo);
+    uint32_t const               cParms   = pCallInfo->cParms;
+    uint32_t    iLockBuf = 0;
+    uint32_t    iParm;
+    RT_NOREF1(pParmInfo);
+    RT_NOREF1(fIsUser);
+    uint32_t iParm;
+    RT_NOREF1(pParmInfo);
+    RT_NOREF1(fIsUser);
+    ifdef USE_BOUNCE_BUFFERS
+    uint32_t iParm;
+    RT_NOREF1(pParmInfo);
+    #ifndef USE_BOUNCE_BUFFERS
+    const uint32_t cParms = pCallInfo->cParms;
+    #endif
+    for (iParm = 0; iParm < cParms; iParm++, pSrcParm++, pDstParm++)
+    {
+        switch (pDstParm->type)
```c
+    {
+        case VMMDevHGCMParamType_32bit:
+        case VMMDevHGCMParamType_64bit:
+            *pDstParm = *pSrcParm;
+            break;
+        
+        case VMMDevHGCMParamType_PageList:
+            break;
+        
+        case VMMDevHGCMParamType_LinAddr_Locked_In:
+        case VMMDevHGCMParamType_LinAddr_In:
+            
+            case VMMDevHGCMParamType_LinAddr_Locked_Out:
+        case VMMDevHGCMParamType_LinAddr_Locked:
+            if (!VBGLR0_CAN_USE_PHYS_PAGE_LIST(/*a_fLocked=*/true))
+            {
+                break;
+            }
+            RT_FALL_THRU();
+            
+        case VMMDevHGCMParamType_LinAddr_Out:
+        case VMMDevHGCMParamType_LinAddr:
+            
+            if (fIsUser)
+            {
+                size_t cbOut = RT_MIN(pSrcParm->u.Pointer.size, pDstParm->u.Pointer.size);
+                if (cbOut)
+                {
+                    int rc2;
+                    Assert(pParmInfo->aLockBufs[iLockBuf].iParm == iParm);
+                    rc2 = RTR0MemUserCopyTo((RTR3PTR)pDstParm->u.Pointer.u.linearAddr,
+                                            pParmInfo->aLockBufs[iLockBuf].pvSmallBuf
+                                            ? pParmInfo->aLockBufs[iLockBuf].pvSmallBuf
+                                            : RTR0MemObjAddress(pParmInfo->aLockBufs[iLockBuf].hObj),
+                                            cbOut);
+                    if (RT_FAILURE(rc2))
+                        return rc2;
+                }
+                
+            }
+```
+ iLockBuf++;  
+ }  
+ else if (iLockBuf < pParmInfo->cLockBufs 
+       && iParm == pParmInfo->aLockBufs[iLockBuf].iParm)  
+        iLockBuf++;  
+ }  
+ #endif  
+ break;  
+ }  
+ 
+ default:  
+ AssertFailed();  
+ rc = VERR_INTERNAL_ERROR_4;  
+ break;  
+ }  
+ 
+ #ifdef USE_BOUNCE_BUFFERS  
+ Assert(!fIsUser || pParmInfo->cLockBufs == iLockBuf);  
+#endif  
+ return rc;  
+ 
+ +DECLR0VBGL(int) VbglR0HGCMInternalCall(PVBGLIOCHGCMCALL pCallInfo, uint32_t cbCallInfo,  
+                                           uint32_t fFlags,  
+                                           PFNVBGLHGCMCALLBACK pfnAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData)  
+ +{  
+   bool fIsUser = (fFlags & VBGLR0_HGCMCALL_F_MODE_MASK) == VBGLR0_HGCMCALL_F_USER;  
+   struct Vbglr0ParmInfo ParmInfo;  
+   size_t cbExtra;  
+   int rc;  
+   
+   /*  
+   * Basic validation.  
+   */  
+   AssertMsgReturn(!pCallInfo  
+                   || !pfnAsyncCallback  
+                   || pCallInfo->cParms > VBOX_HGCM_MAX_PARMS  
+                   || !(fFlags & ~VBGLR0_HGCMCALL_F_MODE_MASK),  
+                   ("pCallInfo=%p pfnAsyncCallback=%p fFlags=%#x\n", pCallInfo, pfnAsyncCallback, fFlags),  
+                   VERR_INVALID_PARAMETER);  
+   AssertReturn(cbCallInfo >= sizeof(VBGLIOCHGCMCALL)  
+                 || cbCallInfo >= pCallInfo->cParms * sizeof(HGCMFunctionParameter),  
+                 VERR_INVALID_PARAMETER);
+ Log("GstHGCMCall: u32ClientID=%#x u32Function=%u cParms=%u cbCallInfo=%#x fFlags=%#x\n",
+ pCallInfo->u32ClientID, pCallInfo->u32ClientID, pCallInfo->u32Function, pCallInfo->cParms, cbCallInfo,
+ fFlags));
+
+ /*
+ * Validate, lock and buffer the parameters for the call.
+ * This will calculate the amount of extra space for physical page list.
+ */
+ rc = vbglR0HGCMInternalPreprocessCall(pCallInfo, cbCallInfo, fIsUser, &ParmInfo, &cbExtra);
+ if (RT_SUCCESS(rc))
+ {
+    /*
+     * Allocate the request buffer and recreate the call request.
+     */
+    VMMDevHGCMCall *pHGCMCall;
+    rc = VbglR0GRAlloc((VMMDevRequestHeader **)&pHGCMCall,
+                      sizeof(VMMDevHGCMCall) + pCallInfo->cParms * sizeof(HGCMFunctionParameter) +
+                      cbExtra,
+                      VMMDevReq_HGCMCall);
+    if (RT_SUCCESS(rc))
+    {
+        bool fLeakIt;
+        vbglR0HGCMInternalInitCall(pHGCMCall, pCallInfo, cbCallInfo, fIsUser, &ParmInfo);
+        /*
+         * Perform the call.
+         */
+        rc = vbglR0HGCMInternalDoCall(pHGCMCall, pfnAsyncCallback, pvAsyncData, u32AsyncData,
+                                       &fLeakIt);
+        if (RT_SUCCESS(rc))
+        {
+            /*
+             * Copy back the result (parameters and buffers that changed).
+             */
+            rc = vbglR0HGCMInternalCopyBackResult(pCallInfo, pHGCMCall, &ParmInfo, fIsUser, rc);
+        }
+        else
+        {
+            if ( (rc != VERR_INTERRUPTED
+                 && rc != VERR_TIMEOUT)
+                 
+                static unsigned s_cErrors = 0;
+                if (s_cErrors++ < 32)
+                    LogRel("VbglR0HGCMInternalCall: vbglR0HGCMInternalDoCall failed. rc=%Rrc\n", rc));
+        }
+    }
+}
if (!fLeakIt)
    VbglR0GRFree(&pHGCMCall->header.header);
else
    LogRel("VbglR0HGCMInternalCall: vbglR0HGCMInternalPreprocessCall failed. rc=%Rrc\n", rc);
/
* Release locks and free bounce buffers. */
if (ParmInfo.cLockBufs)
    while (ParmInfo.cLockBufs-- > 0)
        RTMemObjFree(ParmInfo.aLockBufs[ParmInfo.cLockBufs].hObj, false /*fFreeMappings*/);
#endif USE_BOUNCE_BUFFERS
    RTMemTmpFree(ParmInfo.aLockBufs[ParmInfo.cLockBufs].pvSmallBuf);
#endif

return rc;
}

#if ARCH_BITS == 64
DECLR0VBGL(int) VbglR0HGCMInternalCall32(PVBGLIOCHGCMCALL pCallInfo, uint32_t cbCallInfo,
                                         uint32_t fFlags,
                                         PFNVBGLHGCMCALLBACK pfnAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData)
{
    PVBGLIOCHGCMCALL         pCallInfo64 = NULL;
    HGCMFunctionParameter   *pParm64 = NULL;
    HGCMFunctionParameter32 *pParm32 = NULL;
    uint32_t                 cParms = 0;
    uint32_t                 iParm = 0;
    int                      rc = VINF_SUCCESS;

    /* Input validation. */
    AssertMsgReturn(!pCallInfo
        || !pfnAsyncCallback
        || pCallInfo->cParms > VBOX_HGCM_MAX_PARMS
        || !(fFlags & ~VBGLR0_HGCMCALL_F_MODE_MASK),
        ("pCallInfo=%p pfnAsyncCallback=%p fFlags=%#x\n", pCallInfo, pfnAsyncCallback, fFlags),
        VERR_INVALID_PARAMETER);
    AssertReturn(cbCallInfo >= sizeof(VBGLIOCHGCMCALL)
        || cbCallInfo >= pCallInfo->cParms * sizeof(HGCMFunctionParameter32),
        VERR_INVALID_PARAMETER);
+ /* This Assert does not work on Solaris/Windows 64/32 mixed mode, not sure why, skipping for now */
+ #if !defined(RT_OS_SOLARIS) && !defined(RT_OS_WINDOWS)
+     AssertReturn((fFlags & VBGLR0_HGCMCALL_F_MODE_MASK) ==
+                   VBGLR0_HGCMCALL_F_KERNEL, VERR_WRONG_ORDER);
+ #endif
+ 
+   cParms = pCallInfo->cParms;
+   Log(("VbglR0HGCMInternalCall32: cParms=%d, u32Function=%d, fFlags=%#x\n", cParms, pCallInfo->u32Function, fFlags));
+ 
+   /*
+     * The simple approach, allocate a temporary request and convert the parameters.
+     */
+   
+   pCallInfo64 = (PVBGLIOCHGCMCALL)RTMemTmpAllocZ(sizeof(*pCallInfo64) + cParms * sizeof(HGCMFunctionParameter));
+   if (!pCallInfo64)
+       return VERR_NO_TMP_MEMORY;
+   
+   *pCallInfo64 = *pCallInfo;
+   pParm32 = VBGL_HGCM_GET_CALL_PARMS32(pCallInfo);
+   pParm64 = VBGL_HGCM_GET_CALL_PARMS(pCallInfo64);
+   for (iParm = 0; iParm < cParms; iParm++, pParm32++, pParm64++)
+   {
+       switch (pParm32->type)
+       {
+           case VMMDevHGCMParmType_32bit:
+               pParm64->type = VMMDevHGCMParmType_32bit;
+               pParm64->u.value32 = pParm32->u.value32;
+               break;
+           
+           case VMMDevHGCMParmType_64bit:
+               pParm64->type = VMMDevHGCMParmType_64bit;
+               pParm64->u.value64 = pParm32->u.value64;
+               break;
+           
+           case VMMDevHGCMParmType_LinAddr_Out:
+           case VMMDevHGCMParmType_LinAddr:
+           case VMMDevHGCMParmType_LinAddr_In:
+               pParm64->type = pParm32->type;
+               pParm64->u.Pointer.size = pParm32->u.Pointer.size;
+               pParm64->u.Pointer.u.linearAddr = pParm32->u.Pointer.u.linearAddr;
+               break;
+           
+           default:
+               rc = VERR_INVALID_PARAMETER;
+               LogRel("VbglR0HGCMInternalCall32: pParm32 type %#x invalid\n", pParm32->type);
+               break;
+   
+ Open Source Used In 5GaaS Edge AC-4 35716
if (RT_FAILURE(rc))
  break;
}
if (RT_SUCCESS(rc))
{
  rc = VbglR0HGCMInternalCall(pCallInfo64, sizeof(*pCallInfo64) + cParms * sizeof(HGCMFunctionParameter), fFlags,
                              pfnAsyncCallback, pvAsyncData, u32AsyncData);

  if (RT_SUCCESS(rc))
  {
    *pCallInfo = *pCallInfo64;

    /*
     * Copy back.
     */
    pParm32 = VBGL_HGCM_GET_CALL_PARMS32(pCallInfo);
    pParm64 = VBGL_HGCM_GET_CALL_PARMS(pCallInfo64);
    for (iParm = 0; iParm < cParms; iParm++, pParm32++, pParm64++)
    {
      switch (pParm64->type)
      {
        case VMMDevHGCMParmType_32bit:
          pParm32->u.value32 = pParm64->u.value32;
          break;

        case VMMDevHGCMParmType_64bit:
          pParm32->u.value64 = pParm64->u.value64;
          break;

        case VMMDevHGCMParmType_LinAddr_Out:
        case VMMDevHGCMParmType_LinAddr:
        case VMMDevHGCMParmType_LinAddr_In:
          pParm32->u.Pointer.size = pParm64->u.Pointer.size;
          break;

        default:
          LogRel("VbglR0HGCMInternalCall32: failed invalid pParm32 type \%d\n", pParm32->type);
          rc = VERR_INTERNAL_ERROR_3;
          break;
      }
    }
  } else
  {
    static unsigned s_cErrors = 0;
    if (s_cErrors++ < 32)
LogRel("VbglR0HGCMInternalCall32: VbglR0HGCMInternalCall failed. rc=%Rrc\n", rc));
}
}
else
{
    static unsigned s_cErrors = 0;
    if (s_cErrors++ < 32)
        LogRel("VbglR0HGCMInternalCall32: failed. rc=%Rrc\n", rc));
}

RTMemTmpFree(pCallInfo64);
return rc;
}
#endif /* ARCH_BITS == 64 */

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/VBoxGuestR0LibInit.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/VBoxGuestR0LibInit.c
@@ -0,0 +1,310 @@
+/* $Id: VBoxGuestR0LibInit.cpp $ */
+/** @file
+ * VBoxGuestLibR0 - Library initialization.
+ */
+
+/*
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 * terms and conditions of either the GPL or the CDDL or both.
 */
+
+/************************************************************
+********** Header Files
+*************************************************************************/
#include "VBoxGuestR0LibInternal.h"
+
+#include <iprt/string.h>
+#include <iprt/assert.h>
+#include <iprt/semaphore.h>
+
+
+/** The global VBGL instance data. */
+VBGLDATA g_vbgldata;
+
+/**
+ * Used by vbglR0QueryDriverInfo and VbglInit to try get the host feature mask
+ * and version information (g_vbgldata::hostVersion).
+ *
+ * This was first implemented by the host in 3.1 and we quietly ignore failures
+ * for that reason.
+ */
+static void vbglR0QueryHostVersion(void)
+{
+    VMMDevReqHostVersion *pReq;
+    int rc = VbglR0GRAlloc((VMMDevRequestHeader **) &pReq, sizeof (*pReq),
+                        VMMDevReq_GetHostVersion);
+    if (RT_SUCCESS(rc))
+    {
+        rc = VbglR0GRPerform(&pReq->header);
+        if (RT_SUCCESS(rc))
+        {
+            g_vbgldata.hostVersion = *pReq;
+            Log(("vbglR0QueryHostVersion: %u.%u.%ur%u %#x\n",
+                 pReq->major, pReq->minor, pReq->build, pReq->revision, pReq->features));
+        }
+        VbglR0GRFree(&pReq->header);
+    }
+}
because these values are provided by the VBoxGuest driver and it might be loaded later than other drivers.

* The VbgIEnter checks the current library status, tries to retrieve these values and fails if they are unavailable.

*/

static void vbglR0QueryDriverInfo(void)
{
#ifdef VBGLDATA_USE_FAST_MUTEX
    int rc = RTSemFastMutexRequest(g_vbgldata.hMtxIdcSetup);
#else
    int rc = RTSemMutexRequest(g_vbgldata.hMtxIdcSetup, RT_INDEFINITE_WAIT);
#endif
    if (RT_SUCCESS(rc))
    {
        if (g_vbgldata.status == VbgIStatusReady)
        { /* likely */ }
        else
        {
            rc = VbgIR0IdcOpen(&g_vbgldata.IdcHandle,
                               VBGL_IOC_VERSION /*uReqVersion*/,
                               VBGL_IOC_VERSION & UINT32_C(0xffff0000) /*uMinVersion*/,
                               NULL /*puSessionVersion*/, NULL /*puDriverVersion*/, NULL /*puDriverRevision*/);
            if (RT_SUCCESS(rc))
            {
                /* Try query the port info. */
                VBGLIOCGETVMMDEVIOINFO PortInfo;
                RT_ZERO(PortInfo);
                VBGLREQHDR_INIT(&PortInfo.Hdr, GET_VMMDEV_IO_INFO);
                rc = VbgIR0IdcCall(&g_vbgldata.IdcHandle, VBGL_IOCTL_GET_VMMDEV_IO_INFO,
                                   &PortInfo.Hdr, sizeof(PortInfo));
                if (RT_SUCCESS(rc))
                {
                    dprintf(("Port I/O = 0x%04x, MMIO = %p\n", PortInfo.u.Out.IoPort,
                              PortInfo.u.Out.pvVmmDevMapping));
                    g_vbgldata.portVMMDev   = PortInfo.u.Out.IoPort;
                    g_vbgldata.pVMMDevMemory = (VMMDevMemory *)PortInfo.u.Out.pvVmmDevMapping;
                    g_vbgldata.status       = VbgIStatusReady;
                    vbglR0QueryHostVersion();
                }
            }
            dprintf(("vbglQueryDriverInfo rc = %Rrc\n", rc));
        }
    }
}
ifdef VBGLDATA_USE_FAST_MUTEX
    RTSemFastMutexRelease(g_vbgldata.hMtxIdcSetup);
else
    RTSemMutexRelease(g_vbgldata.hMtxIdcSetup);
#endif

int vbglR0Enter(void)
{
    if (g_vbgldata.status == VbglStatusReady)
        return VINF_SUCCESS;
    #ifndef VBGL_VBOXGUEST
    if (g_vbgldata.status == VbglStatusInitializing)
    {
        vbglR0QueryDriverInfo();
        if (g_vbgldata.status == VbglStatusReady)
            return VINF_SUCCESS;
    }
    #endif
    return VERR_VBGL_NOT_INITIALIZED;
}

static int vbglR0InitCommon(void)
{
    int rc;
    RT_ZERO(g_vbgldata);
    g_vbgldata.status = VbglStatusInitializing;
    rc = VbglR0PhysHeapInit();
    if (RT_SUCCESS(rc))
    {
        dprintf("vbglR0InitCommon: returns rc = %d\n", rc);
        return rc;
    }
}
LogRel("vbglR0InitCommon: VbglR0PhysHeapInit failed: rc=%Rrc\n", rc));

+ g_vbgldata.status = VbglStatusNotInitialized;
+ return rc;
+
+static void vbglR0TerminateCommon(void)
+
+ VbglR0PhysHeapTerminate();
+ g_vbgldata.status = VbglStatusNotInitialized;
+
+#ifdef VBGL_VBOXGUEST
+
+DECLVBGL(int) VbglR0InitPrimary(RTIOPORT portVMMDev, VMMDevMemory *pVMMDevMemory)
+{
+    int rc;
+
+    if (   g_vbgldata.status == VbglStatusInitializing
+        || g_vbgldata.status == VbglStatusReady)
+    {
+        /* Initialization is already in process. */
+        return VINF_SUCCESS;
+    }
+
+    if (   g_vbgldata.status == VbglStatusNotInitialized)
+    {
+        vbglR0QueryHostVersion();
+        return VINF_SUCCESS;
+    }
+
+    g_vbgldata.portVMMDev = portVMMDev;
+    g_vbgldata.pVMMDevMemory = pVMMDevMemory;
+    g_vbgldata.status = VbglStatusReady;
+
+    vbglR0QueryHostVersion();
+    return VINF_SUCCESS;
+
+}

+DECLVBGL(void) VbglR0TerminatePrimary(void)
+{  
+    vbglR0TerminateCommon();  
+}  
+}  
+}  
+#else /* !VBGL_VBOXGUEST */  
+}  
+DECLVBGL(int) VbglR0InitClient(void)  
+{  
+    int rc;  
+    }  
+    /* @todo r=bird: explain why we need to be doing this, please... */  
+    if (   g_vbgldata.status == VbglStatusInitializing  
+        || g_vbgldata.status == VbglStatusReady)  
+    {  
+        /* Initialization is already in process. */  
+        return VINF_SUCCESS;  
+    }  
+    rc = vbglR0InitCommon();  
+    if (RT_SUCCESS(rc))  
+    {  
+        }  
+    }  
+    else  
+    }  
+        /* Try to obtain VMMDev port via IOCTL to VBoxGuest main driver. */  
+        vbglR0QueryDriverInfo();  
+        }  
+        if (RT_SUCCESS(rc))  
+        {  
+            }  
+        }  
+    if (RT_SUCCESS(rc))  
+    {  
+        }  
+    )  
+            }  
+        }  
+    if (RT_SUCCESS(rc))  
+    {  
+        }  
+    )  
+        }  
+    )  
+        }  
+    )  
+        vbglR0 HGCMInit();  
+        }  
+    if (RT_SUCCESS(rc))  
+    {  
+        }  
+    }  
+    )  
+        }  
+    )  
+        }  
+    rs  
+    )  
+        g_vbgldata.hMtxIdcSetup = NIL_RTSEMFASTMUTEX;  
+    }  
+    }  
+    )  
+        g_vbgldata.hMtxIdcSetup = NIL_RTSEMMUTEX;  
+    }  
+    }  
+    vbglR0TerminateCommon();  
+    }  
+}
return rc;
+
DECLVBGL(void) VbglR0TerminateClient(void)
+
+  ifdef VBOX_WITH_HGCM
+    VbglR0HGCMTerminate();
+  endif
+
+  /* driver open could fail, which does not prevent VbglInit from succeeding,
+   * close the driver only if it is opened */
+  VbglR0IdcClose(&g_vbgldata.IdcHandle);
+  endif
+
+int VBOXCALL vbglR0QueryIdcHandle(PVBGLIDCHANDLE *ppIdcHandle)
+
+  if (g_vbgldata.status == VbglStatusReady)
+    { /* likely */ }
+  else
+    {
+      vbglR0QueryDriverInfo();
+      if (g_vbgldata.status != VbglStatusReady)
+        {
+          *ppIdcHandle = NULL;
+          return VERR_TRY_AGAIN;
+        }
+    }
+  }
+
+  *ppIdcHandle = &g_vbgldata.IdcHandle;
+  return VINF_SUCCESS;
+
+  endif /* !VBGL_VBOXGUEST */
+
/* $Id: VBoxGuestR0LibInternal.h $ */

/** @file
 * VBoxGuestLibR0 - Internal header.
 */

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 */

#ifdef ___VBoxGuestLib_VBoxGuestR0LibInternal_h
#define ___VBoxGuestLib_VBoxGuestR0LibInternal_h

/** Define the private IDC handle structure before we include the VBoxGuestLib.h header. */

#include <iprt/types.h>
#include <iprt/assert.h>

RT_C_DECLS_BEGIN

#ifndef VBGL_VBOXGUEST

/** The hidden part of VBGLIDHANDLE. */

struct VBGLIDHANDLEPRIVATE
{
    /** Pointer to the session handle. */
    void *pvSession;

#ifdef RT_OS_WINDOWS && (defined(___iprt_nt_ntddk_h__) || defined(___iprt_nt_nt_h__))

    if defined(RT_OS_WINDOWS) && (defined(__iprt_nt_ntddk_h__) || defined(__iprt_nt_nt_h__))

```
/** Pointer to the NT device object. */
PDEVICE_OBJECT pDeviceObject;
/** Pointer to the NT file object. */
FILE_OBJECT pFileObject;
#endif

/** LDI device handle to keep the device attached. */
ldi_handle_t hDev;
#endif

/** Indicate that the VBGLIDCHANDLEPRIVATE structure is present. */
define VBGLIDCHANDLEPRIVATE_DECLARED 1
#endif

#include <VBox/VMMDev.h>
#include <VBox/VBoxGuest.h>
#include <VBox/VBoxGuestLib.h>

#ifdef VBGLIDCHANDLEPRIVATE_DECLARED
  AssertCompile(RT_SIZEOFMEMB(VBGLIDCHANDLE, apvPadding) >= sizeof(struct VBGLIDCHANDLEPRIVATE));
#endif

/* Native IDC functions. */
int VBOXCALL vbglR0IdcNativeOpen(PVBGLIDCHANDLE pHandle, PVBGLIOCIDCCONNECT pReq);
int VBOXCALL vbglR0IdcNativeClose(PVBGLIDCHANDLE pHandle, PVBGLIOCIDCDISCONNECT pReq);

/* Deprecated logging macro */
#include <VBox/log.h>
#ifdef RT_OS_WINDOWS /* todo dprintf() -> Log() */
#if (defined(DEBUG) && !defined(NO_LOGGING)) || defined(LOG_ENABLED)
#define dprintf(a) RTLogBackdoorPrintf a
#else
#define dprintf(a) do {} while (0)
#endif
#else
#define dprintf(a) Log(a)
#endif

/* Lazy bird: OS/2 doesn't currently implement the RTSemMutex API in ring-0, so
 * use a fast mutex instead. Unlike Windows, the OS/2 implementation
 * doesn't have any nasty side effects on IRQL-like context properties, so the

+ * fast mutexes on OS/2 are identical to normal mutexes except for the missing
+ * timeout aspec. Fortunately we don't need timeouts here.
+ */
+ #ifdef RT_OS_OS2
+ # define VBGLDATA_USE_FAST_MUTEX
+ #endif
+
+ #ifndef VBGL_VBOXGUEST
+ struct VBGLHGCMHANDEL DATA
+ {[
+ +   uint32_t fAllocated;
+ +   VBGLIDCHANDLE IdcHandle;
+ + ];
+ #endif
+
+ enum VbgLibStatus
+ {[
+ +   VbgLibStatusNotInitialized = 0,
+ +   VbgLibStatusInitializing,
+ +   VbgLibStatusReady
+ + ];
+ +
+ /**<
+ * Global VBGL ring-0 data.
+ * Lives in VbgIR0Init.cpp.
+ */
+ typedef struct VBGLDATA
+ {
+ +   enum VbgLibStatus status;
+ +   RTIOPORT portVMMDev;
+ +   VMMDevMemory *pVMMDevMemory;
+ +   /**
+ * Physical memory heap data.
+ * @
+ */
+   * VBGLPHYSHEAPBLOCK *pFreeBlocksHead;
+ +   * VBGLPHYSHEAPBLOCK *pAllocBlocksHead;
+ +   * VBGLPHYSHEAPCHUNK *pChunkHead;
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+ RTSEMMUTEX mutexHeap;
+ /**< @} */
+ 
+ /**<
+ * The host version data.
+ */
+ VMMDevReqHostVersion hostVersion;
+ 
+
+ ifdef VBGL_VBOXGUEST
+ /**< The IDC handle. This is used for talking to the main driver. */
+ VBGLIDCHANDLE IdcHandle;
+ /**< Mutex used to serialize IDC setup. */
+ #ifdef VBGLDATA_USE_FAST_MUTEX
+ RTSEMMUTEX hMtxIdcSetup;
+ #else
+ RTSEMMUTEX hMtxIdcSetup;
+ #endif
+ endif
+ } VBGLDATA;
+
+extern VBGLDATA g_vbgldata;
+
+/**
+ * Internal macro for checking whether we can pass physical page lists to the
+ * host.
+ *
+ * ASSUMES that vbglR0Enter has been called already.
+ *
+ * @param   a_fLocked       For the windows shared folders workarounds.
+ *
+ * @remarks Disabled the PageList feature for locked memory on Windows,
+ * because a new MDL is created by VBGL to get the page addresses
+ * and the pages from the MDL are marked as dirty when they should not.
+ */
+ #if defined(RT_OS_WINDOWS)
+ # define VBGLR0_CAN_USE_PHYS_PAGE_LIST(a_fLocked) \
+ ( !(a_fLocked) && (g_vbgldata.hostVersion.features & VMMDEV_HVF_HGCM_PHYS_PAGE_LIST) )
+ #else
+ # define VBGLR0_CAN_USE_PHYS_PAGE_LIST(a_fLocked) \
+ ( !(g_vbgldata.hostVersion.features & VMMDEV_HVF_HGCM_PHYS_PAGE_LIST) )
+ #endif
+ int vbglR0Enter (void);
+ 
+#ifdef VBOX_WITH_HGCM
+ struct VBGLHGCMMHANDLEDATA  *vbglR0HGCMHandleAlloc(void);
+ 

+void vbglR0HGCMHandleFree(struct VBGLHGCMHANDLEDATA *pHandle);
+#endif /* VBOX_WITH_HGCM */
+
+#ifndef VBGL_VBOXGUEST
+/**
+ * Get the IDC handle to the main VBoxGuest driver.
+ * @returns VERR_TRY_AGAIN if the main driver has not yet been loaded.
+ */
+int VBOXCALL vbglR0QueryIdcHandle(PVBGLIDCHANDLE *ppIdcHandle);
+#endif
+
+RT_C_DECLS_END
+
+#endif /* !___VBoxGuestLib_VBoxGuestR0LibInternal_h */
+
--- linux-4.15.0.org/ubuntu/vbox/vboxguest/VBoxGuestR0LibPhysHeap.c
+++ linux-4.15.0.org/ubuntu/vbox/vboxguest/VBoxGuestR0LibPhysHeap.c
@@ -0,0 +1,640 @@
+/* $Id: VBoxGuestR0LibPhysHeap.cpp $ */
+/** @file
+ * VBoxGuestLibR0 - Physical memory heap.
+ */
+
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+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+***************************************************************
+*******************************************************************************************
+***************************************************************
+* Header Files
+*
Main memory heap consists of double linked list
of chunks. Memory blocks are allocated inside these chunks
and are members of Allocated and Free double linked lists.

When allocating a block, we search in Free linked
list for a suitable free block. If there is no such block,
a new chunk is allocated and the new block is taken from
the new chunk as the only chunk-sized free block.
Allocated block is excluded from the Free list and goes to
Alloc list.

When freeing block, we check the pointer and then
exclude block from Alloc list and move it to free list.

For each chunk we maintain the allocated blocks counter.
If 2 (or more) entire chunks are free they are immediately
deallocated, so we always have at most 1 free chunk.

When freeing blocks, two subsequent free blocks are always
merged together. Current implementation merges blocks only
when there is a block after the just freed one.

#define VBGL_PH_ASSERT      Assert
#define VBGL_PH_ASSERTMsg   AssertMsg

// #define DUMPHEAP

#if defined DUMPHEAP
#define VBGL_PH_dprintf(a) RTAssertMsg2Weak a
#else
#endif

/* Heap block signature */
#define VBGL_PH_BLOCKSIGNATURE (0xADDBBBBB)

/* Heap chunk signature */
+define VBGL_PH_CHUNKSIGNATURE (0xADDCCCCC)
+/* Heap chunk allocation unit */
+define VBGL_PH_CHUNKSIZE (0x10000)
+
+/* Heap block bit flags */
+define VBGL_PH_BF_ALLOCATED (0x1)
+
+struct _VBGLPHYSHEAPBLOCK
+
+    uint32_t u32Signature;
+
+    /* Size of user data in the block. Does not include the block header. */
+    uint32_t cbDataSize;
+
+    uint32_t fu32Flags;
+
+    struct _VBGLPHYSHEAPBLOCK *pNext;
+    struct _VBGLPHYSHEAPBLOCK *pPrev;
+
+    struct _VBGLPHYSHEAPCHUNK *pChunk;
+
+
+struct _VBGLPHYSHEAPCHUNK
+
+    uint32_t u32Signature;
+
+    /* Size of the chunk. Includes the chunk header. */
+    uint32_t cbSize;
+
+    /* Physical address of the chunk */
+    uint32_t physAddr;
+
+    /* Number of allocated blocks in the chunk */
+    int32_t cAllocatedBlocks;
+
+    struct _VBGLPHYSHEAPCHUNK *pNext;
+    struct _VBGLPHYSHEAPCHUNK *pPrev;
+
+
+#ifndef DUMPHEAP
+#define dumpheap(a)
+#else
+void dumpheap (char *point)
+{
+    VBGL_PH_dprintf("VBGL_PH dump at '%s'
", point));
+
+    VBGL_PH_dprintf("Chunks:
");

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VBGLPHYSHEAPCHUNK *pChunk = g_vbgldata.pChunkHead;

while (pChunk)
{
    VBGL_PH_dprintf("%p: pNext = %p, pPrev = %p, sign = %08X, size = %8d, allocated = %8d, phys =
%08X\n",
            pChunk, pChunk->pNext, pChunk->pPrev, pChunk->u32Signature, pChunk->cbSize, pChunk->
cAllocatedBlocks, pChunk->physAddr);
    pChunk = pChunk->pNext;
}

VBGL_PH_dprintf("Allocated blocks:\n");

VBGLPHYSHEAPBLOCK *pBlock = g_vbgldata.pAllocBlocksHead;

while (pBlock)
{
    VBGL_PH_dprintf("%p: pNext = %p, pPrev = %p, sign = %08X, size = %8d, flags = %08X, pChunk =
%p\n",
                pBlock, pBlock->pNext, pBlock->pPrev, pBlock->u32Signature, pBlock->cbDataSize, pBlock->
fu32Flags, pBlock->pChunk);
    pBlock = pBlock->pNext;
}

VBGL_PH_dprintf("Free blocks:\n");

pBlock = g_vbgldata.pFreeBlocksHead;

while (pBlock)
{
    VBGL_PH_dprintf("%p: pNext = %p, pPrev = %p, sign = %08X, size = %8d, flags = %08X, pChunk =
%p\n",
                pBlock, pBlock->pNext, pBlock->pPrev, pBlock->u32Signature, pBlock->cbDataSize, pBlock->
fu32Flags, pBlock->pChunk);
    pBlock = pBlock->pNext;
}

VBGL_PH_dprintf("VBGL_PH dump at '%s' done\n", point);

#endif

DECLINLINE(void *) vbglPhysHeapBlock2Data (VBGLPHYSHEAPBLOCK *pBlock)
{
return (void *)(pBlock? (char *)pBlock + sizeof(VBGLPHYSHEAPBLOCK): NULL);
+
+
DECLINLINE(VBGLPHYSHEAPBLOCK *) vbglPhysHeapData2Block (void *p)
+
+ VBGLPHYSHEAPBLOCK *pBlock = (VBGLPHYSHEAPBLOCK *)(p? (char *)p - sizeof
(VBGLPHYSHEAPBLOCK): NULL);
+
+ VBGL_PH_ASSERTMsg(pBlock == NULL || pBlock->u32Signature == VBGL_PH_BLOCKSIGNATURE,
+ ("pBlock->u32Signature = %08X\n", pBlock->u32Signature));
+
+ return pBlock;
+
DECLINLINE(int) vbglPhysHeapEnter (void)
+
+ int rc = RTSemFastMutexRequest(g_vbgldata.mutexHeap);
+
+ VBGL_PH_ASSERTMsg(RT_SUCCESS(rc),
+ ("Failed to request heap mutex, rc = %Rrc\n", rc));
+
+ return rc;
+
DECLINLINE(void) vbglPhysHeapLeave (void)
+
+ RTSemFastMutexRelease(g_vbgldata.mutexHeap);
+
+
static void vbglPhysHeapInitBlock (VBGLPHYSHEAPBLOCK *pBlock, VBGLPHYSHEAPCHUNK *pChunk,
uint32_t cbDataSize)
+
+ VBGL_PH_ASSERT(pBlock != NULL);
+ VBGL_PH_ASSERT(pChunk != NULL);
+
+ pBlock->u32Signature = VBGL_PH_BLOCKSIGNATURE;
+ pBlock->cbDataSize = cbDataSize;
+ pBlock->fu32Flags = 0;
+ pBlock->pNext = NULL;
+ pBlock->pPrev = NULL;
+ pBlock->pChunk = pChunk;
+}
+
+
+static void vbglPhysHeapInsertBlock (VBGLPHYSHEAPBLOCK *pInsertAfter, VBGLPHYSHEAPBLOCK
*pBlock)
+{
VBGL_PH_ASSERTMsg(pBlock->pNext == NULL,
    ("pBlock->pNext = %p
", pBlock->pNext));
VBGL_PH_ASSERTMsg(pBlock->pPrev == NULL,
    ("pBlock->pPrev = %p
", pBlock->pPrev));

if (pInsertAfter)
{
    pBlock->pNext = pInsertAfter->pNext;
pBlock->pPrev = pInsertAfter;

    if (pInsertAfter->pNext)
    {
        pInsertAfter->pNext->pPrev = pBlock;
    }

    pInsertAfter->pNext = pBlock;
}
else
{
    /* inserting to head of list */
pBlock->pPrev = NULL;

    if (pBlock->fu32Flags & VBGL_PH_BF_ALLOCATED)
    {
        pBlock->pNext = g_vbgldata.pAllocBlocksHead;

        if (g_vbgldata.pAllocBlocksHead)
        {
            g_vbgldata.pAllocBlocksHead->pPrev = pBlock;
        }

        g_vbgldata.pAllocBlocksHead = pBlock;
    }
    else
    {
        pBlock->pNext = g_vbgldata.pFreeBlocksHead;

        if (g_vbgldata.pFreeBlocksHead)
        {
            g_vbgldata.pFreeBlocksHead->pPrev = pBlock;
        }

        g_vbgldata.pFreeBlocksHead = pBlock;
    }
}

static void vbglPhysHeapExcludeBlock (VBGLPHYSHEAPBLOCK *pBlock)
+{
+    if (pBlock->pNext)
+    {
+        pBlock->pNext->pPrev = pBlock->pPrev;
+    }
+    else
+    {
+        /* this is tail of list but we do not maintain tails of block lists.
+         * so do nothing.
+         */
+        ;
+    }
+    if (pBlock->pPrev)
+    {
+        pBlock->pPrev->pNext = pBlock->pNext;
+    }
+    else
+    {
+        /* this is head of list but we do not maintain tails of block lists. */
+        if (pBlock->fu32Flags & VBGL_PH_BF_ALLOCATED)
+        {
+            g_vbgldata.pAllocBlocksHead = pBlock->pNext;
+        }
+        else
+        {
+            g_vbgldata.pFreeBlocksHead = pBlock->pNext;
+        }
+    }
+    pBlock->pNext = NULL;
+    pBlock->pPrev = NULL;
+
+static VBGLPHYSHEAPBLOCK *vbglPhysHeapChunkAlloc (uint32_t cbSize)
+{
+    RTCCPHYS physAddr;
+    VBGLPHYSHEAPCHUNK *pChunk;
+    VBGLPHYSHEAPBLOCK *pBlock;
+    VBGL_PH_dprintf(("Allocating new chunk of size %d\n", cbSize));
+    /* Compute chunk size to allocate */
+    if (cbSize < VBGL_PH_CHUNKSIZE)
+    {
+        /* Includes case of block size 0 during initialization */
+        cbSize = VBGL_PH_CHUNKSIZE;
+    }
+    else
void vbglPhysHeapChunkDelete (VBGLPHYSHEAPCHUNK *pChunk)
{
    char *p;
    VBGL_PH_ASSERT(pChunk != NULL);
    VBGL_PH_ASSERTMsg(pChunk->u32Signature == VBGL_PH_CHUNKSIGNATURE,
                      ("pChunk->u32Signature = %08X
                        ", pChunk->u32Signature));
    p = (char *)pChunk + sizeof (VBGLPHYSHEAPCHUNK);
    assert(p);
    p -= sizeof (char);  // Unwind the pointer to the start of the free block
    /* The pointer was incremented (with memset) during allocation, so it needs to be unwound. */
    p -= sizeof (char);
    g_vbgldata.pChunkHead = pChunk;
    VBGL_PH_dprintf(("Allocated chunk %p, block = %p size=%x\n", pChunk, pBlock, cbSize));
    return pBlock;
}
+ VBGL_PH_dprintf("Deleting chunk %p size %x\n", pChunk, pChunk->cbSize);
+ /* first scan the chunk and exclude all blocks from lists */
+ p = (char *)pChunk + sizeof (VBGLPHYSHEAPCHUNK);
+ while (p < (char *)pChunk + pChunk->cbSize)
+ {
+     VBGLPHYSHEAPBLOCK *pBlock = (VBGLPHYSHEAPBLOCK *)p;
+     p += pBlock->cbDataSize + sizeof (VBGLPHYSHEAPBLOCK);
+     vbglPhysHeapExcludeBlock (pBlock);
+ }
+ VBGL_PH_ASSERTMsg(p == (char *)pChunk + pChunk->cbSize,
+                  ("p = %p, (char *)pChunk + pChunk->cbSize = %p, pChunk->cbSize = %08X\n",
+                   p, (char *)pChunk + pChunk->cbSize, pChunk->cbSize));
+ /* Exclude chunk from the chunk list */
+ if (pChunk->pNext)
+ {
+ }
+ else
+ {
+     /* we do not maintain tail */
+     ;
+ }
+ if (pChunk->pPrev)
+ {
+     pChunk->pPrev->pNext = pChunk->pNext;
+ }
+ else
+ {
+     /* the chunk was head */
+     g_vbgldata.pChunkHead = pChunk->pNext;
+ }
+ RTMemContFree (pChunk, pChunk->cbSize);
+
+ +DECLR0VBGL(void *) VbglR0PhysHeapAlloc (uint32_t cbSize)
+ { +VBGLPHYSHEAPBLOCK *pBlock, *iter;
int rc = vbglPhysHeapEnter();

if (RT_FAILURE(rc))
    return NULL;

dumpheap ("pre alloc");

pBlock = NULL;

/* If there are free blocks in the heap, look at them. */
iter = g_vbgldata.pFreeBlocksHead;

/* There will be not many blocks in the heap, so
* linear search would be fast enough.
*/

while (iter)
{
    if (iter->cbDataSize == cbSize)
    {
        /* exact match */
        pBlock = iter;
        break;
    }

    /* Looking for a free block with nearest size */
    if (iter->cbDataSize > cbSize)
    {
        if (pBlock)
        {
            if (iter->cbDataSize < pBlock->cbDataSize)
            {
                pBlock = iter;
            }
        }
        else
        {
            pBlock = iter;
        }
    }
    else
    {
        pBlock = iter;
    }

    iter = iter->pNext;
}

if (!pBlock)
{
    /* No free blocks, allocate a new chunk,
    * the only free block of the chunk will
* be returned.
 */
     pBlock = vbglPhysHeapChunkAlloc (cbSize);
 }

 if (pBlock)
 {
    VBGL_PH_ASSERTMsg(pBlock->u32Signature == VBGL_PH_BLOCKSIGNATURE,
                       ("pBlock = %p, pBlock->u32Signature = %08X\n", pBlock, pBlock->u32Signature));
    VBGL_PH_ASSERTMsg((pBlock->fu32Flags & VBGL_PH_BF_ALLOCATED) == 0,
                       ("pBlock = %p, pBlock->fu32Flags = %08X\n", pBlock, pBlock->fu32Flags));

 /* We have a free block, either found or allocated. */

 if (pBlock->cbDataSize > 2*(cbSize + sizeof (VBGLPHYSHEAPBLOCK)))
 {
    /* Data will occupy less than a half of the block,
     * the block should be split.
    */
    iter = (VBGLPHYSHEAPBLOCK *)((char *)pBlock + sizeof (VBGLPHYSHEAPBLOCK) + cbSize);

    /* Init the new 'iter' block, initialized blocks are always marked as free. */
    vbglPhysHeapInitBlock (iter, pBlock->pChunk, pBlock->cbDataSize - cbSize - sizeof (VBGLPHYSHEAPBLOCK));

    pBlock->cbDataSize = cbSize;

    /* Insert the new 'iter' block after the 'pBlock' in the free list */
    vbglPhysHeapInsertBlock (pBlock, iter);
 }

 /* Exclude pBlock from free list */
 vbglPhysHeapExcludeBlock (pBlock);

 /* Mark as allocated */
 pBlock->fu32Flags |= VBGL_PH_BF_ALLOCATED;

 /* Insert to allocated list */
 vbglPhysHeapInsertBlock (NULL, pBlock);

 /* Adjust the chunk allocated blocks counter */
 pBlock->pChunk->cAllocatedBlocks++;
 }

 dumpheap ("post alloc");

 vbglPhysHeapLeave ()
 VBGL_PH_dprintf("VbglR0PhysHeapAlloc %x size %x\n", vbglPhysHeapBlock2Data (pBlock), pBlock-
+return vbglPhysHeapBlock2Data (pBlock);
+
+DECLR0VBGL(uint32_t) VbglR0PhysHeapGetPhysAddr (void *p)
+{
+    uint32_t physAddr = 0;
+    VBGLPHYSHEAPBLOCK *pBlock = vbglPhysHeapData2Block (p);
+    if (pBlock)
+    {
+        VBGL_PH_ASSERTMsg((pBlock->fu32Flags & VBGL_PH_BF_ALLOCATED) != 0,
+            ("pBlock = %p, pBlock->fu32Flags = %08X\n", pBlock, pBlock->fu32Flags));
+        if (pBlock->fu32Flags & VBGL_PH_BF_ALLOCATED)
+            physAddr = pBlock->pChunk->physAddr + (uint32_t)((uintptr_t)p - (uintptr_t)pBlock->pChunk);
+    }
+    return physAddr;
+}
+DECLR0VBGL(void) VbglR0PhysHeapFree(void *p)
+{
+    VBGLPHYSHEAPBLOCK *pBlock;
+    VBGLPHYSHEAPBLOCK *pNeighbour;
+    int rc = vbglPhysHeapEnter ();
+    if (RT_FAILURE(rc))
+        return;
+    dumpheap ("pre free");
+    pBlock = vbglPhysHeapData2Block (p);
+    if (!pBlock)
+    {
+        vbglPhysHeapLeave ();
+        return;
+    }
+    VBGL_PH_ASSERTMsg((pBlock->fu32Flags & VBGL_PH_BF_ALLOCATED) != 0,
+        ("pBlock = %p, pBlock->fu32Flags = %08X\n", pBlock, pBlock->fu32Flags));
+    /* Exclude from allocated list */
+    vbglPhysHeapExcludeBlock (pBlock);
+    dumpheap ("post exclude");
VBGL_PH_dprintf("VbglR0PhysHeapFree %x size %x\n", p, pBlock->cbDataSize);

/* Mark as free */
pBlock->fu32Flags &= ~VBGL_PH_BF_ALLOCATED;

/* Insert to free list */
vbglPhysHeapInsertBlock(NULL, pBlock);

/* Adjust the chunk allocated blocks counter */
pBlock->pChunk->cAllocatedBlocks--;

VBGL_PH_ASSERT(pBlock->pChunk->cAllocatedBlocks >= 0);

/* Check if we can merge 2 free blocks. To simplify heap maintenance,
 * we will look at block after the just freed one.
 * This will not prevent us from detecting free memory chunks.
 * Also in most cases blocks are deallocated in reverse allocation order
 * and in that case the merging will work.
 */

pNeighbour = (VBGLPHYSHEAPBLOCK *)((char *)p + pBlock->cbDataSize);

if ((char *)pNeighbour < (char *)pBlock->pChunk + pBlock->pChunk->cbSize
    && (pNeighbour->fu32Flags & VBGL_PH_BF_ALLOCATED) == 0)
{
    /* The next block is free as well. */

    /* Adjust size of current memory block */
    pBlock->cbDataSize += pNeighbour->cbDataSize + sizeof (VBGLPHYSHEAPBLOCK);

    /* Exclude the next neighbour */
    vbglPhysHeapExcludeBlock(pNeighbour);
}

dumpheap("post merge");

/* now check if there are 2 or more free chunks */
if (pBlock->pChunk->cAllocatedBlocks == 0)
{
    VBGLPHYSHEAPCHUNK *pChunk = g_vbgldata.pChunkHead;

    uint32_t u32FreeChunks = 0;

    while (pChunk)
    {

if (pChunk->cAllocatedBlocks == 0)
{
    u32FreeChunks++;
}

pChunk = pChunk->pNext;
}

if (u32FreeChunks > 1)
{
    /* Delete current chunk, it will also exclude all free blocks
     * remaining in the chunk from the free list, so the pBlock
     * will also be invalid after this.
     */
    vbglPhysHeapChunkDelete (pBlock->pChunk);
}

dumpheap ("post free");

vbglPhysHeapLeave ();
}

DECLR0VBGL(int) VbglR0PhysHeapInit (void)
{
    int rc = VINF_SUCCESS;

    /* Allocate the first chunk of the heap. */
    VBGLPHYSHEAPBLOCK *pBlock = vbglPhysHeapChunkAlloc (0);

    if (!pBlock)
        rc = VERR_NO_MEMORY;

    RTSemFastMutexCreate(&g_vbgldata.mutexHeap);

    return rc;
}

DECLR0VBGL(void) VbglR0PhysHeapTerminate (void)
{
    while (g_vbgldata.pChunkHead)
    {
        vbglPhysHeapChunkDelete (g_vbgldata.pChunkHead);
    }

    RTSemFastMutexDestroy(g_vbgldata.mutexHeap);
}
DECLVBGL(int) VbglR0QueryVMMDevMemory(VMMDevMemory **ppVMMDevMemory)
{
    int rc = vbglR0Enter();
    if (RT_FAILURE(rc))
        return rc;

    /* If the memory was not found, return an error. */
    if (!g_vbgldata.pVMMDevMemory)
        return VERR_NOT_SUPPORTED;
+ *ppVMMDevMemory = g_vbgldata.pVMMDevMemory;
+ return rc;
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/alloc/alloc.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/alloc/alloc.c
@@ -0,0 +1,63 @@
+/* $Id: alloc.cpp $ */
+/** @file
+ * IPRT - Memory Allocation.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+*******************************************************************************************
+**************************************
+*   Header Files                                                                                                                 *
+**************************************
+*******************************************************************************************
+**************************************************************************
+* Header Files                                                           *
+**************************************************************************
+#ifndef RTMEM_NO_WRAP_TO_EF_APIS
+# define RTMEM_NO_WRAP_TO_EF_APIS
+#endif
+﻿#include <iprt/mem.h>
+﻿#define "internal/iprt.h"
+ +
+﻿#include <iprt/assert.h>
+ +#include <iprt/string.h>
+ +
RTDECL(void *) RTMemDupTag(const void *pvSrc, size_t cb, const char *pszTag) RT_NO_THROW_DEF
{
    void *pvDst = RTMemAllocTag(cb, pszTag);
    if (pvDst)
        memcpy(pvDst, pvSrc, cb);
    return pvDst;
}

RT_EXPORT_SYMBOL(RTMemDupTag);

RTDECL(void *) RTMemDupExTag(const void *pvSrc, size_t cbSrc, size_t cbExtra, const char *pszTag)
RT_NO_THROW_DEF
{
    void *pvDst = RTMemAllocTag(cbSrc + cbExtra, pszTag);
    if (pvDst)
    {
        memcpy(pvDst, pvSrc, cbSrc);
        memset((uint8_t *)pvDst + cbSrc, 0, cbExtra);
    }
    return pvDst;
}

RT_EXPORT_SYMBOL(RTMemDupExTag);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/alloc/heapsimple.c
+++ linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/alloc/heapsimple.c
@@ -0,0 +1,920 @@
/* $Id: heapsimple.cpp $ */
/** @file
 * IPRT - A Simple Heap.
 */
+#
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************************
**************************************
+*   Header Files                                                                                                                 *
************************************************************/
#
define LOG_GROUP RTLOGGROUP_DEFAULT
+#include <iprt/heap.h>
+#include "internal/iprt.h"
+
+/#include <iprt/assert.h>
+/#include <iprt/asm.h>
+/#include <iprt/err.h>
+/#include <iprt/log.h>
+/#include <iprt/string.h>
+/#include <iprt/param.h>
+
+/#include "internal/magics.h"
+
+
+ /*******************************************************************************************
**************************************
+*   Structures and Typedefs                                                                                                      *
************************************************************/
+/** Pointer to the heap anchor block. */
+typedef struct RTHEAPSIMPLEINTERNAL *PRTHEAPSIMPLEINTERNAL;
+/** Pointer to a heap block. */
+typedef struct RTHEAPSIMPLEBLOCK *PRTHEAPSIMPLEBLOCK;
+/** Pointer to a free heap block. */
+typedef struct RTHEAPSIMPLEFREE *PRTHEAPSIMPLEFREE;
+
+ /** Structure describing a simple heap block.
+ * If this block is allocated, it is followed by the user data.
+ * If this block is free, see RTHEAPSIMPLEFREE.
+ */
+typedef struct RTHEAPSIMPLEBLOCK {
+    /** The next block in the global block list. */
+    PRTHEAPSIMPLEBLOCK     pNext;
+    /* The previous block in the global block list. */
+}
+ PRTHEAPSIMPLEBLOCK   pPrev;
+ /**< Pointer to the heap anchor block. */
+ PRTHEAPSIMPLEINTERNAL   pHeap;
+ /**< Flags + magic. */
+ uintptr_t               fFlags;
+ } RTHEAPSIMPLEBLOCK;
+}AssertCompileSizeAlignment(RTHEAPSIMPLEBLOCK, 16);
+
+/** The block is free if this flag is set. When cleared it's allocated. */
+#define RTHEAPSIMPLEBLOCK_FLAGS_FREE        ((uintptr_t)RT_BIT(0))
+/** The magic value. */
+#define RTHEAPSIMPLEBLOCK_FLAGS_MAGIC       ((uintptr_t)0xbcdef00)
+/** The mask that needs to be applied to RTHEAPSIMPLEBLOCK::fFlags to obtain the magic value. */
+#define RTHEAPSIMPLEBLOCK_FLAGS_MAGIC_MASK  (~(uintptr_t)RT_BIT(0))
+
+/**
+ * Checks if the specified block is valid or not.
+ * @returns boolean answer.
+ * @param   pBlock      Pointer to a RTHEAPSIMPLEBLOCK structure.
+ */
+#define RTHEAPSIMPLEBLOCK_IS_VALID(pBlock)  \
+    ( ((pBlock)->fFlags & RTHEAPSIMPLEBLOCK_FLAGS_MAGIC_MASK) ==
RTHEAPSIMPLEBLOCK_FLAGS_MAGIC )
+
+/**
+ * Checks if the specified block is valid and in use.
+ * @returns boolean answer.
+ * @param   pBlock      Pointer to a RTHEAPSIMPLEBLOCK structure.
+ */
+#define RTHEAPSIMPLEBLOCK_IS_VALID_USED(pBlock)  \
+    ( ((pBlock)->fFlags & (RTHEAPSIMPLEBLOCK_FLAGS_MAGIC_MASK |
RTHEAPSIMPLEBLOCK_FLAGS_FREE)) \ 
+    == RTHEAPSIMPLEBLOCK_FLAGS_MAGIC )
+
+/**
+ * Checks if the specified block is valid and free.
+ * @returns boolean answer.
+ * @param   pBlock      Pointer to a RTHEAPSIMPLEBLOCK structure.
+ */
+#define RTHEAPSIMPLEBLOCK_IS_VALID_FREE(pBlock)  \
+    ( ((pBlock)->fFlags & (RTHEAPSIMPLEBLOCK_FLAGS_MAGIC_MASK |
RTHEAPSIMPLEBLOCK_FLAGS_FREE)) \ 
+    == (RTHEAPSIMPLEBLOCK_FLAGS_MAGIC | RTHEAPSIMPLEBLOCK_FLAGS_FREE) )
+
+/**
+ * Checks if the specified block is free or not.
+ * @returns boolean answer.
+ * @param   pBlock      Pointer to a valid RTHEAPSIMPLEBLOCK structure.
+ */
+#define RTHEAPSIMPLEBLOCK_IS_FREE(pBlock) (!!((pBlock)->fFlags &
RTHEAPSIMPLEBLOCK_FLAGS_FREE))
+
+/**
+ * A free heap block.
+ * This is an extended version of RTHEAPSIMPLEBLOCK that takes the unused
+ * user data to store free list pointers and a cached size value.
+ */
+typedef struct RTHEAPSIMPLEFREE
+{
+    /** Core stuff. */
+    RTHEAPSIMPLEBLOCK       Core;
+    /** Pointer to the next free block. */
+    PRTHEAPSIMPLEFREE       pNext;
+    /** Pointer to the previous free block. */
+    PRTHEAPSIMPLEFREE       pPrev;
+    /** The size of the block (excluding the RTHEAPSIMPLEBLOCK part). */
+    size_t                  cb;
+    /** An alignment filler to make it a multiple of (sizeof(void *) * 2). */
+    size_t                  Alignment;
+} RTHEAPSIMPLEFREE;
+
+
+/**
+ * The heap anchor block.
+ * This structure is placed at the head of the memory block specified to RTHeapSimpleInit(),
+ * which means that the first RTHEAPSIMPLEBLOCK appears immediately after this structure.
+ */
+typedef struct RTHEAPSIMPLEINTERNAL
+{
+    /** The typical magic (RTHEAPSIMPLE_MAGIC). */
+    size_t                  uMagic;
+    /** The heap size. (This structure is included!) */
+    size_t                  cbHeap;
+    /** Pointer to the end of the heap. */
+    void                   *pvEnd;
+    /** The amount of free memory in the heap. */
+    size_t                  cbFree;
+    /** Free head pointer. */
+    PRTHEAPSIMPLEFREE       pFreeHead;
+    /** Free tail pointer. */
+    PRTHEAPSIMPLEFREE       pFreeTail;
+    /** Make the size of this structure is a multiple of 32. */
+    size_t                  auAlignment[2];
+} RTHEAPSIMPLEINTERNAL;
+AssertCompileSizeAlignment(RTHEAPSIMPLEINTERNAL, 32);
+/** The minimum allocation size. */
+#define RTHEAPSIMPLE_MIN_BLOCK (sizeof(RTHEAPSIMPLEBLOCK))
+AssertCompile(RTHEAPSIMPLE_MIN_BLOCK >= sizeof(RTHEAPSIMPLEBLOCK));
+AssertCompile(RTHEAPSIMPLE_MIN_BLOCK >= sizeof(RTHEAPSIMPLEFREE) -
+sizeof(RTHEAPSIMPLEBLOCK));
+
+/** The minimum and default alignment. */
+#define RTHEAPSIMPLE_ALIGNMENT (sizeof(RTHEAPSIMPLEBLOCK))
+
+*******************************************************************************
+*******************************************************************************
+*******************************************************************************
+* Defined Constants And Macros *
+*******************************************************************************
+*******************************************************************************
+*******************************************************************************
+#ifdef RT_STRICT
+# define RTHEAPSIMPLE_STRICT 1
+#endif
+
+#define ASSERT_L(a, b)    AssertMsg((uintptr_t)(a) <  (uintptr_t)(b), ("a=%p b=%p\n", (uintptr_t)(a),
+(uintptr_t)(b))
+#define ASSERT_LE(a, b)   AssertMsg((uintptr_t)(a) <= (uintptr_t)(b), ("a=%p b=%p\n", (uintptr_t)(a),
+(uintptr_t)(b))
+#define ASSERT_G(a, b)    AssertMsg((uintptr_t)(a) >  (uintptr_t)(b), ("a=%p b=%p\n", (uintptr_t)(a),
+(uintptr_t)(b))
+#define ASSERT_GE(a, b)   AssertMsg((uintptr_t)(a) >= (uintptr_t)(b), ("a=%p b=%p\n", (uintptr_t)(a),
+(uintptr_t)(b))
+#define ASSERT_ALIGN(a)   AssertMsg(!((uintptr_t)(a) & (RTHEAPSIMPLE_ALIGNMENT - 1)), ("a=%p\n",
+(uintptr_t)(a))
+
+#define ASSERT_PREV(pHeapInt, pBlock)  
+  do { ASSERT_ALIGN((pBlock)->pPrev); 
+        if ((pBlock)->pPrev) 
+        { 
+            ASSERT_L((pBlock)->pPrev, (pBlock)); 
+            ASSERT_GE((pBlock)->pPrev, (pHeapInt) + 1); 
+        } 
+        else
+            Assert((pBlock) == (PRTHEAPSIMPLEBLOCK)((pHeapInt) + 1)); 
+   } while (0)
+
+#define ASSERT_NEXT(pHeap, pBlock)  
+  do { ASSERT_ALIGN((pBlock)->pNext); 
+        if ((pBlock)->pNext) 
+        { 
+            ASSERT_L((pBlock)->pNext, (pHeapInt)->pvEnd); 
+            ASSERT_G((pBlock)->pNext, (pBlock)); 
+        } 
+        else 
+            Assert((pBlock) == (PRTHEAPSIMPLEBLOCK)((pHeapInt) + 1)); 
+   } while (0)
+ } \ 
+ } while (0) 
+
+#define ASSERT_BLOCK(pHeapInt, pBlock) \ 
+ do { AssertMsg(RTHEAPSIMPLEBLOCK_IS_VALID(pBlock), "%#x\n", (pBlock)->fFlags)); \ 
+ AssertMsg((pBlock)->pHeap == (pHeapInt), "%p != %p\n", (pBlock)->pHeap, (pHeapInt))); \ 
+ ASSERT_GE((pBlock), (pHeapInt) + 1); \ 
+ ASSERT_L((pBlock), (pHeapInt)->pvEnd); \ 
+ ASSERT_NEXT(pHeapInt, pBlock); \ 
+ ASSERT_PREV(pHeapInt, pBlock); \ 
+ } while (0) 
+
+#define ASSERT_BLOCK_USED(pHeapInt, pBlock) \ 
+ do { AssertMsg(RTHEAPSIMPLEBLOCK_IS_VALID_USED((pBlock)), "%#x\n", (pBlock)->fFlags)); \ 
+ AssertMsg((pBlock)->pHeap == (pHeapInt), "%p != %p\n", (pBlock)->pHeap, (pHeapInt))); \ 
+ ASSERT_GE((pBlock), (pHeapInt) + 1); \ 
+ ASSERT_L((pBlock), (pHeapInt)->pvEnd); \ 
+ ASSERT_NEXT(pHeapInt, pBlock); \ 
+ ASSERT_PREV(pHeapInt, pBlock); \ 
+ } while (0) 
+
+#define ASSERT_FREE_PREV(pHeapInt, pBlock) \ 
+ do { ASSERT_ALIGN((pBlock)->pPrev); \ 
+ if ((pBlock)->pPrev) \ 
+ { \ 
+     ASSERT_GE((pBlock)->pPrev, (pHeapInt)->pFreeHead); \ 
+     ASSERT_L((pBlock)->pPrev, (pBlock)); \ 
+     ASSERT_LE((pBlock)->pPrev, (pBlock)->Core.pPrev); \ 
+     } \ 
+     else \ 
+     Assert((pBlock) == (pHeapInt)->pFreeHead); \ 
+ } while (0) 
+
+#define ASSERT_FREE_NEXT(pHeapInt, pBlock) \ 
+ do { ASSERT_ALIGN((pBlock)->pNext); \ 
+ if ((pBlock)->pNext) \ 
+ { \ 
+     ASSERT_LE((pBlock)->pNext, (pHeapInt)->pFreeTail); \ 
+     ASSERT_G((pBlock)->pNext, (pBlock)); \ 
+     ASSERT_GE((pBlock)->pNext, (pBlock)->Core.pNext); \ 
+     } \ 
+     else \ 
+     Assert((pBlock) == (pHeapInt)->pFreeTail); \ 
+ } while (0) 
+
+#ifdef RTHEAPSIMPLE_STRICT 
+## define ASSERT_FREE_CB(pHeapInt, pBlock) \ 
+ do { size_t cbCalc = ((pBlock)->Core.pNext ? (uintptr_t)(pBlock)->Core.pNext : (uintptr_t)(pHeapInt)->pvEnd)
+         AssertMsg((pBlock)->cb == cbCalc, ("cb=%#zx cbCalc=%#zx\n", (pBlock)->cb, cbCalc));
+     } while (0)
+ } while (0)
+
+ else
+ #define ASSERT_FREE_CB(pHeapInt, pBlock) do {} while (0)
+
+ /** Asserts that a free block is valid. */
+ #define ASSERT_BLOCK_FREE(pHeapInt, pBlock) \
+ do { ASSERT_BLOCK(pHeapInt, &(pBlock)->Core); \
+     Assert(RTHEAPSIMPLEBLOCK_IS_VALID_FREE(&(pBlock)->Core)); \
+     ASSERT_GE((pBlock), (pHeapInt)->pFreeHead); \
+     ASSERT_LE((pBlock), (pHeapInt)->pFreeTail); \
+     ASSERT_FREE_NEXT(pHeapInt, pBlock); \
+     ASSERT_FREE_PREV(pHeapInt, pBlock); \
+     ASSERT_FREE_CB(pHeapInt, pBlock); \
+     } while (0)
+
+ /** Asserts that the heap anchor block is ok. */
+ #define ASSERT_ANCHOR(pHeapInt) \
+ do { AssertPtr(pHeapInt);
+     Assert((pHeapInt)->uMagic == RTHEAPSIMPLE_MAGIC);
+     } while (0)
+
+ /*******************************************************************************************
+ **************************************
+ *    Internal Functions                                                                                                           *
+ *************************************/
+ #ifdef RTHEAPSIMPLE_STRICT
+ static void rtHeapSimpleAssertAll(PRTHEAPSIMPLEINTERNAL pHeapInt);
+ #endif
+ static PRTHEAPSIMPLEBLOCK rtHeapSimpleAllocBlock(PRTHEAPSIMPLEINTERNAL pHeapInt, size_t cb,
+ size_t uAlignment);
+ static void rtHeapSimpleFreeBlock(PRTHEAPSIMPLEINTERNAL pHeapInt, PRTHEAPSIMPLEBLOCK pBlock);
+ +
+ +RTDECL(int) RTHeapSimpleInit(PRTHEAPSIMPLE phHeap, void *pvMemory, size_t cbMemory)
+ +{
+ + PRTHEAPSIMPLEINTERNAL pHeapInt;
+ + PRTHEAPSIMPLEFREE pFree;
+ + unsigned i;
+ +
+ + /*
+ + * Validate input. The imposed minimum heap size is just a convenient value.
+    AssertReturn(cbMemory >= PAGE_SIZE, VERR_INVALID_PARAMETER);
+    AssertPtrReturn(pvMemory, VERR_INVALID_POINTER);
+    AssertReturn((uintptr_t)pvMemory + (cbMemory - 1) > (uintptr_t)cbMemory,
+                  VERR_INVALID_PARAMETER);
+    */
+    * Place the heap anchor block at the start of the heap memory,
+    * enforce 32 byte alignment of it. Also align the heap size correctly.
+    */
+    pHeapInt = (PRTHEAPSIMPLEINTERNAL)pvMemory;
+    if ((uintptr_t)pMemory & 31)
+    {
+        const uintptr_t off = 32 - ((uintptr_t)pMemory & 31);
+        cbMemory -= off;
+        pHeapInt = (PRTHEAPSIMPLEINTERNAL)((uintptr_t)pMemory + off);
+    }
+    cbMemory &= ~(RTHEAPSIMPLE_ALIGNMENT - 1);
+
+    /* Init the heap anchor block. */
+    pHeapInt->uMagic = RTHEAPSIMPLE_MAGIC;
+    pHeapInt->pvEnd = (uint8_t *)pHeapInt + cbMemory;
+    pHeapInt->cbHeap = cbMemory;
+    pHeapInt->cbFree = cbMemory
+                     - sizeof(RTHEAPSIMPLEBLOCK)
+                     - sizeof(RTHEAPSIMPLEINTERNAL);
+    pHeapInt->pFreeTail = pHeapInt->pFreeHead = (PRTHEAPSIMPLEFREE)(pHeapInt + 1);
+    for (i = 0; i < RT_ELEMENTS(pHeapInt->auAlignment); i++)
+        pHeapInt->auAlignment[i] = ~(size_t)0;
+
+    /* Init the single free block. */
+    pFree = pHeapInt->pFreeHead;
+    pFree->Core.pNext = NULL;
+    pFree->Core.pPrev = NULL;
+    pFree->Core.pHeap = pHeapInt;
+    pFree->Core.fFlags = RTHEAPSIMPLEBLOCK_FLAGS_MAGIC |
+    RTHEAPSIMPLEBLOCK_FLAGS_FREE;
+    pFree->pNext = NULL;
+    pFree->pPrev = NULL;
+    pFree->cb = pHeapInt->cbFree;
+    *
+    pHeapInt = pHeapInt;
+    +#ifdef RTHEAPSIMPLE_STRICT
+    rtHeapSimpleAssertAll(pHeapInt);
+    +#endif
+    return VINF_SUCCESS;
+RT_EXPORT_SYMBOL(RTHeapSimpleInit);
+
+RTDECL(int) RTHeapSimpleRelocate(RTHEAPSIMPLE hHeap, uintptr_t offDelta)
+
    PRTHEAPSIMPLEINTERNAL  pHeapInt = hHeap;
    PRTHEAPSIMPLEFREE      pCur;
+
    /*
    * Validate input.
    */
    AssertPtrReturn(pHeapInt, VERR_INVALID_HANDLE);
    AssertReturn(pHeapInt->uMagic == RTHEAPSIMPLE_MAGIC, VERR_INVALID_HANDLE);
    AssertMsgReturn((uintptr_t)pHeapInt - (uintptr_t)pHeapInt->pvEnd + pHeapInt->cbHeap == offDelta,
                     ("offDelta=%p, expected=%p\n", offDelta, (uintptr_t)pHeapInt->pvEnd - pHeapInt->cbHeap -
                     (uintptr_t)pHeapInt), VERR_INVALID_PARAMETER);
+
    /* Relocate the heap anchor block.*/
    *
    #define RELOCATE_IT(var, type, offDelta) do { if (RT_UNLIKELY((var) != NULL)) { (var) =
                     (type)((uintptr_t)(var) + offDelta); } } while (0)
    RELOCATE_IT(pHeapInt->pvEnd,     void *,            offDelta);
    RELOCATE_IT(pHeapInt->pFreeHead, PRTHEAPSIMPLEFREE, offDelta);
    RELOCATE_IT(pHeapInt->pFreeTail, PRTHEAPSIMPLEFREE, offDelta);
+
    /* Walk the heap blocks.*/
    *
    for (pCur = (PRTHEAPSIMPLEFREE)(pHeapInt + 1);
       pCur && (uintptr_t)pCur < (uintptr_t)pHeapInt->pvEnd;
       pCur = (PRTHEAPSIMPLEFREE)pCur->Core.pNext)
    {
        RELOCATE_IT(pCur->Core.pNext, PRTHEAPSIMPLEFREE, pCur->Core.pNext, offDelta);
        RELOCATE_IT(pCur->Core.pPrev, PRTHEAPSIMPLEFREE, pCur->Core.pPrev, offDelta);
        RELOCATE_IT(pCur->Core.pHeap, PRTHEAPSIMPLEFREE, pCur->Core.pHeap, offDelta);
        if (RTHEAPSIMPLEBLOCK_IS_FREE(&pCur->Core))
            RELOCATE_IT(pCur->pNext, PRTHEAPSIMPLEFREE, pCur->pNext, offDelta);
    }
+
    #endif
+
    #ifdef RTHEAPSIMPLE_STRICT

    /*
    */

    #endif RTHEAPSIMPLE_STRICT
+

---

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+ * Give it a once over before we return.
+ */
+ rtHeapSimpleAssertAll(pHeapInt);
+}  // endif
+ return VINF_SUCCESS;
+
+  /*
+   * Validate and adjust the input.
+   */
+  AssertPtrReturn(pHeapInt, NULL);
+  if (cb < RTHEAPSIMPLE_MIN_BLOCK)
+      cb = RTHEAPSIMPLE_MIN_BLOCK;
+  else
+      cb = RT_ALIGN_Z(cb, RTHEAPSIMPLE_ALIGNMENT);
+  if (!cbAlignment)
+      cbAlignment = RTHEAPSIMPLE_ALIGNMENT;
+  else
+      {
+          Assert(!(cbAlignment & (cbAlignment - 1)));
+          Assert((cbAlignment & ~(cbAlignment - 1)) == cbAlignment);
+          if (cbAlignment < RTHEAPSIMPLE_ALIGNMENT)
+              cbAlignment = RTHEAPSIMPLE_ALIGNMENT;
+      }
+  /*
+   * Do the allocation.
+   */
+  pBlock = rtHeapSimpleAllocBlock(pHeapInt, cb, cbAlignment);
+  if (RT_LIKELY(pBlock))
+      {
+          void *pv = pBlock + 1;
+          return pv;
+      }
+  return NULL;
+}
+  /*
+   */
+RT_EXPORT_SYMBOL(RTHeapSimpleRelocate);
+}
+
+RTDECL(void *) RTHeapSimpleAlloc(RTHEAPSIMPLE hHeap, size_t cb, size_t cbAlignment)
+{
+    PRTHEAPSIMPLEINTERNAL pHeapInt = hHeap;
+    PRTHEAPSIMPLEBLOCK pBlock;
+    /*
+     * Validate and adjust the input.
+     */
+    AssertPtrReturn(pHeapInt, NULL);
+    if (cb < RTHEAPSIMPLE_MIN_BLOCK)
+        cb = RTHEAPSIMPLE_MIN_BLOCK;
+    else
+        cb = RT_ALIGN_Z(cb, RTHEAPSIMPLE_ALIGNMENT);
+    if (!cbAlignment)
+        cbAlignment = RTHEAPSIMPLE_ALIGNMENT;
+    else
+    {
+        Assert(!(cbAlignment & (cbAlignment - 1)));
+        Assert((cbAlignment & ~(cbAlignment - 1)) == cbAlignment);
+        if (cbAlignment < RTHEAPSIMPLE_ALIGNMENT)
+            cbAlignment = RTHEAPSIMPLE_ALIGNMENT;
+    }
+    /*
+     * Do the allocation.
+     */
+    pBlock = rtHeapSimpleAllocBlock(pHeapInt, cb, cbAlignment);
+    if (RT_LIKELY(pBlock))
+        {
+            void *pv = pBlock + 1;
+            return pv;
+        }
+    return NULL;
+}
+RT_EXPORT_SYMBOL(RTHeapSimpleAlloc);
+}
+
+RTDECL(void *) RTHeapSimpleAllocZ(RTHEAPSIMPLE hHeap, size_t cb, size_t cbAlignment)
+{
+ PRTHEAPSIMPLEINTERNAL pHeapInt = hHeap;
+ PRTHEAPSIMPLEBLOCK pBlock;
+
+ /*
+ * Validate and adjust the input.
+ */
+ AssertPtrReturn(pHeapInt, NULL);
+ if (cb < RTHEAPSIMPLE_MIN_BLOCK)
+    cb = RTHEAPSIMPLE_MIN_BLOCK;
+ else
+    cb = RT_ALIGN_Z(cb, RTHEAPSIMPLE_ALIGNMENT);
+ if (!cbAlignment)
+    cbAlignment = RTHEAPSIMPLE_ALIGNMENT;
+ else
+    {  
+        Assert(!(cbAlignment & (cbAlignment - 1)));
+        Assert((cbAlignment & ~(cbAlignment - 1)) == cbAlignment);
+        if (cbAlignment < RTHEAPSIMPLE_ALIGNMENT)
+            cbAlignment = RTHEAPSIMPLE_ALIGNMENT;
+    }
+
+ /*
+ * Do the allocation.
+ */
+ pBlock = rtHeapSimpleAllocBlock(pHeapInt, cb, cbAlignment);
+ if (RT_LIKELY(pBlock))
+    {  
+        void *pv = pBlock + 1;
+        memset(pv, 0, cb);
+        return pv;
+    }
+    return NULL;
+}
+RT_EXPORT_SYMBOL(RTHeapSimpleAllocZ);
+
+/**
+ * Allocates a block of memory from the specified heap.
+ * No parameter validation or adjustment is performed.
+ * @returns Pointer to the allocated block.
+ * @returns NULL on failure.
+ * @param   pHeapInt    The heap.
+ * @param   cb          Size of the memory block to allocate.
+ * @param   uAlignment  The alignment specifications for the allocated block.
+ */
+static PRTHEAPSIMPLEBLOCK rtHeapSimpleAllocBlock(PRTHEAPSIMPLEINTERNAL pHeapInt, size_t cb, size_t uAlignment)
+{
+    PRTHEAPSIMPLEBLOCK pRet = NULL;
+    PRTHEAPSIMPLEFREE pFree;
+
+    rtHeapSimpleAssertAll(pHeapInt);
+#endif
+
+    /*
+     * Search for a fitting block from the lower end of the heap.
+     */
+    for (pFree = pHeapInt->pFreeHead;
+         pFree;
+         pFree = pFree->pNext)
+    {
+        uintptr_t offAlign;
+        ASSERT_BLOCK_FREE(pHeapInt, pFree);
+
+        /*
+         * Match for size and alignment.
+         */
+        if (pFree->cb < cb)
+            continue;
+        offAlign = (uintptr_t)(&pFree->Core + 1) & (uAlignment - 1);
+        if (offAlign)
+        {
+            PRTHEAPSIMPLEFREE Free;
+            PRTHEAPSIMPLEBLOCK pPrev;
+            offAlign = uAlignment - offAlign;
+            if (pFree->cb - offAlign < cb)
+                continue;
+
+            /*
+             * Make a stack copy of the free block header and adjust the pointer.
+             */
+            Free = *pFree;
+            pFree = (PRTHEAPSIMPLEFREE)((uintptr_t)pFree + offAlign);
+
+            /*
+             * Donate offAlign bytes to the node in front of us.
+             */
+            if (pFree->cb - offAlign < cb)
+                continue;
+
+            *Free = *pFree;
+            pFree = (PRTHEAPSIMPLEFREE)((uintptr_t)pFree + offAlign);
+
+            /*
+             * If we're the head node, we'll have to create a fake node. We'll
+             * mark it USED for simplicity.
+             */
+            if (pFree->cb - offAlign < cb)
+                continue;
+
+            /*
+             * (Should this policy of donating memory to the guy in front of us
+             * cause big 'leaks', we could create a new free node if there is room
* for that.
*/

pPrev = Free.Core.pPrev;

if (pPrev)
{
    AssertMsg(!RTHEAPSIMPLEBLOCK_IS_FREE(pPrev), ("Impossible!\n");
    pPrev->pNext = &pFree->Core;
}
else
{
    pPrev = (PRTHEAPSIMPLEBLOCK)(pHeapInt + 1);
    Assert(pPrev == &pFree->Core);
    pPrev->pPrev = NULL;
    pPrev->pNext = &pFree->Core;
    pPrev->pHeap = pHeapInt;
    pPrev->fFlags = RTHEAPSIMPLEBLOCK_FLAGS_MAGIC;
}

pHeapInt->cbFree -= offAlign;

/*
* Recreate pFree in the new position and adjust the neighbors.
*/
pFree = Free;

/* the core */
if (pFree->Core.pNext)

    pFree->Core.pNext->pPrev = &pFree->Core;

pFree->Core.pPrev = pPrev;

/* the free part */
pFree->cb -= offAlign;

if (pFree->pNext)

    pFree->pNext->pPrev = pFree;
else

    pHeapInt->pFreeTail = pFree;

if (pFree->pPrev)

    pFree->pPrev->pNext = pFree;
else

    pHeapInt->pFreeHead = pFree;

ASSERT_BLOCK_FREE(pHeapInt, pFree);

ASSERT_BLOCK_USED(pHeapInt, pPrev);

/*
* Split off a new FREE block?
*/

if (pFree->cb >= cb + RT_ALIGN_Z(sizeof(RTHEAPSIMPLEFREE), RTHEAPSIMPLE_ALIGNMENT))
/* Move the FREE block up to make room for the new USED block. */

PRTHEAPSIMPLEFREE pNew = (PRTHEAPSIMPLEFREE)((uintptr_t)&pFree->Core + cb + sizeof(RTHEAPSIMPLEBLOCK));

pNext->Core.pNext = pFree->Core.pNext;
if (pNext->Core.pNext)
    pFree->Core.pNext->pPrev = pNew->Core;
pNext->Core.pPrev = &pFree->Core;
pNext->Core.pHeap = pHeapInt;
pNext->Core.fFlags = RTHEAPSIMPLEBLOCK_FLAGS_MAGIC | RTHEAPSIMPLEBLOCK_FLAGS_FREE;

pNext->pNext = pFree->pNext;
if (pNext->pNext)
    pNext->pNext->pPrev = pNew;
else
    pHeapInt->pFreeTail = pNext;
pNext->pPrev = pFree->pPrev;
if (pNext->pPrev)
    pNext->pPrev->pNext = pNext;
else
    pHeapInt->pFreeHead = pNext;
pNext->cb = (pNext->Core.pNext ? (uintptr_t)pNext->Core.pNext : (uintptr_t)pHeapInt->pvEnd) - (uintptr_t)pNext - sizeof(RTHEAPSIMPLEBLOCK);
ASSERT_BLOCK_FREE(pHeapInt, pNext);

/*
 * Update the old FREE node making it a USED node.
 */
pFree->Core.fFlags &= ~RTHEAPSIMPLEBLOCK_FLAGS_FREE;
pFree->Core.pNext = &pNext->Core;
pHeapInt->cbFree -= pFree->cb;
pHeapInt->cbFree += pNext->cb;
Ret = &pFree->Core;
ASSERT_BLOCK_USED(pHeapInt, Ret);
}
else
{
/*
 * Link it out of the free list.
 */
if (pNext->pNext)
else
    pHeapInt->pFreeTail = pFree->pPrev;
if (pFree->pPrev)
pFree->pPrev->pNext = pFree->pNext;
else
    pHeapInt->pFreeHead = pFree->pNext;

    /*
     * Convert it to a used block.
     */
    pHeapInt->cbFree -= pFree->cb;
    pFree->Core.fFlags &= ~RTHEAPSIMPLEBLOCK_FLAGS_FREE;
    pRet = &pFree->Core;
    ASSERT_BLOCK_USED(pHeapInt, pRet);
    break;
}
break;

#ifdef RTHEAPSIMPLE_STRICT
    rtHeapSimpleAssertAll(pHeapInt);
#endif
    return pRet;
}
const size_t cbBlock = (pBlock->pNext ? (uintptr_t)pBlock->pNext : (uintptr_t)pHeapInt->pvEnd) - (uintptr_t)pBlock - sizeof(RTHEAPSIMPLEBLOCK);
memset(pBlock + 1, RTHEAPSIMPLE_FREE_POISON, cbBlock);
#endif

/* Call worker which does the actual job. */
rtHeapSimpleFreeBlock(pHeapInt, pBlock);

/**
 * Free a memory block.
 *
 * @param   pHeapInt       The heap.
 * @param   pBlock         The memory block to free.
 */
static void rtHeapSimpleFreeBlock(PRTHEAPSIMPLEINTERNAL pHeapInt, PRTHEAPSIMPLEBLOCK pBlock)
{
    PRTHEAPSIMPLEFREE pFree = (PRTHEAPSIMPLEFREE)pBlock;
    PRTHEAPSIMPLEFREE pLeft;
    PRTHEAPSIMPLEFREE pRight;

    /* Look for the closest free list blocks by walking the blocks right
    * of us (both lists are sorted by address).
    */
    pLeft = NULL;
    pRight = NULL;
    if (pHeapInt->pFreeTail)
    {
        pRight = (PRTHEAPSIMPLEFREE)pFree->Core.pNext;
        while (pRight && !RTHEAPSIMPLEBLOCK_IS_FREE(&pRight->Core))
        {
            ASSERT_BLOCK(pHeapInt, &pRight->Core);
            pRight = (PRTHEAPSIMPLEFREE)pRight->Core.pNext;
        }
        if (!pRight)
        {
            pLeft = pHeapInt->pFreeTail;
        }
        else
        {
            /* Find the closest free list block by walking the blocks left
            * of us (both lists are sorted by address).
            */
            pLeft = pFree->Core.pPrev;
            while (pLeft && RTHEAPSIMPLEBLOCK_IS_FREE(&pLeft->Core))
            {
                ASSERT_BLOCK(pHeapInt, &pLeft->Core);
                pLeft = (PRTHEAPSIMPLEFREE)pLeft->Core.pPrev;
            }
            if (pLeft)
            {
                pRight = pHeapInt->pFreeTail;
            }
            else
            {
                pRight = NULL;
            }

            /* Merge the two free lists together.
            */
            if (pRight)
            {
                pLeft->Core.pNext = pRight->Core.pNext;
                if (pRight->Core.pNext)
                    pRight->Core.pNext->Core.pPrev = pLeft;
                pRight->Core.pPrev = pLeft;
                if (pLeft->Core.pPrev)
                    pLeft->Core.pPrev->Core.pNext = pRight;
                if (pFree->Core.pNext)
+ ASSERT_BLOCK_FREE(pHeapInt, pRight);
+ pLeft = pRight->pPrev;
+ }
+ if (pLeft)
+    ASSERT_BLOCK_FREE(pHeapInt, pLeft);
+ }
+ AssertMsgReturnVoid(pLeft != pFree, ("Freed twice! pv=%p (pBlock=%p)ln", pBlock + 1, pBlock));
+ ASSERT_L(pLeft, pFree);
+ Assert(!pRight || (uintptr_t)pRight > (uintptr_t)pFree);
+ Assert(!pLeft || pLeft->pNext == pRight);
+ /*
+ * Insert at the head of the free block list?
+ */
+ if (!pLeft)
+ {
+    Assert(pRight == pHeapInt->pFreeHead);
+    pFree->Core.fFlags |= RTHEAPSIMPLEBLOCK_FLAGS_FREE;
+    pFree->pPrev = NULL;
+    pFree->pNext = pRight;
+    if (pRight)
+        pRight->pPrev = pFree;
+    else
+        pHeapInt->pFreeTail = pFree;
+    pHeapInt->pFreeHead = pFree;
+ }
+ else
+ {
+    /*
+     * Can we merge with left hand free block?
+     */
+    if (pLeft->Core.pNext == &pFree->Core)
+        {
+            pLeft->Core.pNext = pFree->Core.pNext;
+            if (pFree->Core.pNext)
+                pFree->Core.pNext->pPrev = &pLeft->Core;
+            pHeapInt->cbFree -= pLeft->cb;
+            pFree = pLeft;
+        }
+    /*
+     * No, just link it into the free list then.
+     */
+    else
+        {
+            pFree->Core.fFlags |= RTHEAPSIMPLEBLOCK_FLAGS_FREE;
+            pFree->pNext = pRight;
+            pFree->pPrev = pLeft;
+            pLeft->pNext = pFree;
if (pRight)
    pRight->pPrev = pFree;
else
    pHeapInt->pFreeTail = pFree;
}

/* Can we merge with right hand free block? */
if (pRight
    && pRight->Core.pPrev == &pFree->Core)
{
    /* core */
    pFree->Core.pNext = pRight->Core.pNext;
    if (pRight->Core.pNext)
        pRight->Core.pNext->pPrev = &pFree->Core;
    
    /* free */
    pFree->pNext = pRight->pNext;
    if (pRight->pNext)
        pRight->pNext->pPrev = pFree;
    else
        pHeapInt->pFreeTail = pFree;
    pHeapInt->cbFree -= pRight->cb;
}

/* Calculate the size and update free stats. */

/*
   pFree->cb = (pFree->Core.pNext ? (uintptr_t)pFree->Core.pNext : (uintptr_t)pHeapInt->pvEnd)
   - (uintptr_t)pFree - sizeof(RTHEAPSIMPLEBLOCK);
   pHeapInt->cbFree += pFree->cb;
   ASSERT_BLOCK_FREE(pHeapInt, pFree);
*/

#ifdef RTHEAPSIMPLE_STRICT

/**
 * Internal consistency check (relying on assertions).
 */
static void rtHeapSimpleAssertAll(PRTHEAPSIMPLEINTERNAL pHeapInt);
#endif

#ifdef RTHEAPSIMPLE_STRICT

#endif
PRTHEAPSIMPLEFREE pPrev = NULL;
PRTHEAPSIMPLEFREE pPrevFree = NULL;
PRTHEAPSIMPLEFREE pBlock;
for (pBlock = (PRTHEAPSIMPLEFREE)(pHeapInt + 1);
    pBlock;
    pBlock = (PRTHEAPSIMPLEFREE)pBlock->Core.pNext)
{
    if (RTHEAPSIMPLEBLOCK_IS_FREE(&pBlock->Core))
    {
        ASSERT_BLOCK_FREE(pHeapInt, pBlock);
        Assert(pBlock->pPrev == pPrevFree);
        Assert(pPrevFree || pHeapInt->pFreeHead == pBlock);
        pPrevFree = pBlock;
    }
    else
        ASSERT_BLOCK_USED(pHeapInt, &pBlock->Core);
    Assert(!pPrev || pPrev == (PRTHEAPSIMPLEFREE)pBlock->Core.pPrev);
    pPrev = pBlock;
}
Assert(pHeapInt->pFreeTail == pPrevFree);
}
#endif

RTDECL(size_t) RTHeapSimpleSize(RTHEAPSIMPLE hHeap, void *pv) {
    PRTHEAPSIMPLEINTERNAL pHeapInt;
    PRTHEAPSIMPLEBLOCK pBlock;
    size_t cbBlock;

    /* Validate input. */
    if (!pv)
        return 0;
    AssertPtrReturn(pv, 0);
    AssertReturn(RT_ALIGN_P(pv, RTHEAPSIMPLE_ALIGNMENT) == pv, 0);

    /* Get the block and heap. If in strict mode, validate these. */
    pBlock = (PRTHEAPSIMPLEBLOCK)pv - 1;
    pHeapInt = pBlock->pHeap;
    ASSERT_BLOCK_USED(pHeapInt, pBlock);
    ASSERT_ANCHOR(pHeapInt);
    Assert(pHeapInt == (PRTHEAPSIMPLEINTERNAL)hHeap || !hHeap); RT_NOREF_PV(hHeap);
}
+ * Calculate the block size.
+ */
+ cbBlock = (pBlock->pNext ? (uintptr_t)pBlock->pNext : (uintptr_t)pHeapInt->pvEnd)
+ - (uintptr_t)pBlock- sizeof(RTHEAPSIMPLEBLOCK);
+ return cbBlock;
+
+RT_EXPORT_SYMBOL(RTHeapSimpleSize);
+
+RTDECL(size_t) RTHeapSimpleGetHeapSize(RTHEAPSIMPLE hHeap)
+{
+ PRTHEAPSIMPLEINTERNAL pHeapInt;
+
+ if (hHeap == NIL_RTHEAPSIMPLE)
+ return 0;
+
+ pHeapInt = hHeap;
+ AssertPtrReturn(pHeapInt, 0);
+ ASSERT_ANCHOR(pHeapInt);
+ return pHeapInt->cbHeap;
+
+RT_EXPORT_SYMBOL(RTHeapSimpleGetHeapSize);
+
+RTDECL(size_t) RTHeapSimpleGetFreeSize(RTHEAPSIMPLE hHeap)
+{
+ PRTHEAPSIMPLEINTERNAL pHeapInt;
+
+ if (hHeap == NIL_RTHEAPSIMPLE)
+ return 0;
+
+ pHeapInt = hHeap;
+ AssertPtrReturn(pHeapInt, 0);
+ ASSERT_ANCHOR(pHeapInt);
+ return pHeapInt->cbFree;
+
+RT_EXPORT_SYMBOL(RTHeapSimpleGetFreeSize);
+
+RTDECL(void) RTHeapSimpleDump(RTHEAPSIMPLE hHeap, PFNRTHEAPSIMPLEPRINTF pfnPrintf)
+{
+ PRTHEAPSIMPLEINTERNAL pHeapInt = (PRTHEAPSIMPLEINTERNAL)hHeap;
+ PRTHEAPSIMPLEFREE pBlock;
+
+ pfnPrintf("**** Dumping Heap %p - cbHeap=%zx cbFree=%zx ****\n",
+ hHeap, pHeapInt->cbHeap, pHeapInt->cbFree);
+
+ for (pBlock = (PRTHEAPSIMPLEFREE)(pHeapInt + 1);
+ pBlock;
+ pBlock = (PRTHEAPSIMPLEFREE)pBlock->Core.pNext
+ {
+    size_t cb = (pBlock->pNext ? (uintptr_t)pBlock->Core.pNext : (uintptr_t)pHeapInt->pvEnd)
+       - (uintptr_t)pBlock - sizeof(RTHEAPSIMPLEBLOCK);
+    if (RTHEAPSIMPLEBLOCK_IS_FREE(&pBlock->Core))
+        pfnPrintf("%p  %06x FREE pNext=%p pPrev=%p fFlags=%#x cb=%#06x pNext=%p
+                pPrev=%p"
+                    , pBlock, (uintptr_t)pBlock - (uintptr_t)(pHeapInt + 1), pBlock->Core.pNext, pBlock->Core.pPrev,
+                    pBlock->Core.fFlags, cb,
+                    pBlock->cb, pBlock->pNext, pBlock->pPrev);
+    else
+        pfnPrintf("%p  %06x USED pNext=%p pPrev=%p fFlags=%#x cb=%#06x"
+                    , pBlock, (uintptr_t)pBlock - (uintptr_t)(pHeapInt + 1), pBlock->Core.pNext, pBlock->Core.pPrev,
+                    pBlock->Core.fFlags, cb);
+    }
+    pfnPrintf("**** Done dumping Heap %p ****\n", hHeap);
+}
+ /*********************************************************************************
+ **************************************
+ *   Header Files                                                                 *
+ *********************************************************************************/
+/#include <iprt/err.h>
+/#include "internal/iprt.h"
+ +
+/#include <iprt/log.h>
+/#include <iprt/assert.h>
+/#include <iprt/errno.h>
+ +
+RTDECL(int) RTErrConvertFromErrno(unsigned uNativeCode)
+{ +   /* very fast check for no error. */
+   if (uNativeCode == 0)
+     return VINF_SUCCESS;
+ +   /*
+     * Process error codes.
+     *
+     * (Use a switch and not a table since the numbers vary among compilers
+     * and OSes. So we let the compiler switch optimizer handle speed issues.)
+     *
+     * This switch is arranged like the Linux i386 errno.h! This switch is mirrored
+     * by RTErrConvertToErrno.
+     */
+     switch (uNativeCode)
+     { /* Linux number */
+       #ifdef EPERM
+         case EPERM: return VERR_ACCESS_DENIED; /* 1 */
+       +#endif
+       #ifdef ENOENT
+         case ENOENT: return VERR_FILE_NOT_FOUND;
+       +#endif
+       #ifdef ESRCH
+         case ESRCH: return VERR_PROCESS_NOT_FOUND;
+       +#endif
+       #ifdef EINTR
+         case EINTR: return VERR_INTERRUPTED;
+       +#endif
+       #ifdef EIO
+         case EIO: return VERR_DEV_IO_ERROR;
+       +#endif
+       #ifdef ENXIO
+         case ENXIO: return VERR_FILEStringUtilerror; /* 1 */
+       +#endif
+       default: return VINF_UNSUCCESSFUL; // No native code match?
+     }
+   }
+}
+}
+ case ENXIO:    return VERR_DEV_IO_ERROR; /**< @todo fix this duplicate error */
+#endif
+#ifdef E2BIG
+    case E2BIG:    return VERR_TOO MUCH_DATA;
+#endif
+#ifdef ENOEXEC
+    case ENOEXEC: return VERR_BAD.EXE_FORMAT;
+#endif
+#ifdef EBADF
+    case EBADF:    return VERR_INVALID_HANDLE;
+#endif
+#ifdef ECHILD
+    case ECHILD:   return VERR_PROCESS_NOT_FOUND; /* 10 */ /**< @todo fix duplicate error */
+#endif
+#ifdef EAGAIN
+    case EAGAIN:   return VERR.Try_AGAIN;
+#endif
+#ifdef ENOMEM
+    case ENOMEM:   return VERR_NO_MEMORY;
+#endif
+#ifdef EACCES
+    case EACCES:   return VERR_ACCESS_DENIED; /**< @todo fix duplicate error */
+#endif
+#ifdef EFAULT
+    case EFAULT:   return VERR_INVALID_POINTER;
+#endif
+#ifdef ENOTBLK
+    case ENOTBLK: return VERR_;
+endif
+#ifdef EBUSY
+    case EBUSY:    return VERR_RESOURCE_BUSY;
+endif
+#ifdef EEXIST
+    case EEXIST:   return VERR_ALREADY_EXISTS;
+endif
+#ifdef EXDEV
+    case EXDEV:    return VERR_NOT SAME_DEVICE;
+endif
+#ifdef ENODEV
+    case ENODEV:   return VERR_NOT_SUPPORTED; /**< @todo fix duplicate error */
+endif
+#ifdef ENOTDIR
+    case ENOTDIR: return VERR_PATH_NOT_FOUND; /* 20 */
+endif
+#ifdef EISDIR
+    case EISDIR:  return VERR_IS_A_DIRECTORY;
+endif
+    #ifdef EINVAL
+    case EINVAL:            return VERR_INVALID_PARAMETER;
+    +#endif
+    #ifdef ENFILE
+    case ENFILE:            return VERR_TOO_MANY_OPEN_FILES; /**< @todo fix duplicate error */
+    +#endif
+    #ifdef EMFILE
+    case EMFILE:            return VERR_TOO_MANY_OPEN_FILES;
+    +#endif
+    #ifdef ENOTTY
+    case ENOTTY:            return VERR_INVALID_FUNCTION;
+    +#endif
+    #ifdef ETXTBSY
+    case ETXTBSY:           return VERR_SHARING_VIOLATION;
+    +#endif
+    #ifdef EFBIG
+    case EFBIG:             return VERR_FILE_TOO_BIG;
+    +#endif
+    #ifdef ENOSPC
+    case ENOSPC:            return VERR_DISK_FULL;
+    +#endif
+    #ifdef EPIPE
+    case EPIPE:             return VERR_SEEK_ON_DEVICE;
+    +#endif
+    #ifdef EROFS
+    case EROFS:             return VERR_WRITE_PROTECT; /**< 30 */
+    +#endif
+    #ifdef EMLINK
+    //case EMLINK:
+    +#endif
+    #ifdef EPIPE
+    case EPIPE:             return VERR_BROKEN_PIPE;
+    +#endif
+    #ifdef EDOM
+    case EDOM:              return VERR_INVALID_PARAMETER; /**< @todo fix duplicate error */
+    +#endif
+    #ifdef ERANGE
+    case ERANGE:            return VERR_INVALID_PARAMETER; /**< @todo fix duplicate error */
+    +#endif
+    #ifdef EDEADLK
+    case EDEADLK:           return VERR_DEADLOCK;
+    +#endif
+    #ifdef ENAMETOOLONG
+    case ENAMETOOLONG:      return VERR_FILENAME_TOO_LONG;
+    +#endif
+    #ifdef ENOLCK
+    case ENOLCK:            return VERR_FILE_LOCK_FAILED;
+    +#endif
+ifdef ENOSYS /** @todo map this differently on solaris. */
    +     case ENOSYS: return VERR_NOT_SUPPORTED;
+endcode
+ifdef ENOTEMPTY
    +     case ENOTEMPTY: return VERR_DIR_NOT_EMPTY;
+endcode
+ifdef ELOOP
    +     case ELOOP: return VERR_TOO_MANY_SYMLINKS; /* 40 */
+endcode
+ifdef ENOMSG
    +     case ENOMSG 42 /* No message of desired type */
+endcode
+ifdef EIDRM
    +     case EIDRM 43 /* Identifier removed */
+endcode
+ifdef ECHRNG
    +     case ECHRNG 44 /* Channel number out of range */
+endcode
+ifdef EL2NSync
    +     case EL2NSync 45 /* Level 2 not synchronized */
+endcode
+ifdef EL3HLT
    +     case EL3HLT 46 /* Level 3 halted */
+endcode
+ifdef EL3RST
    +     case EL3RST 47 /* Level 3 reset */
+endcode
+ifdef ELNRNG
    +     case ELNRNG 48 /* Link number out of range */
+endcode
+ifdef EUNATCH
    +     case EUNATCH 49 /* Protocol driver not attached */
+endcode
+ifdef ENOCSI
    +     case ENOCSI 50 /* No CSI structure available */
+endcode
+ifdef EL2HLT
    +     case EL2HLT 51 /* Level 2 halted */
+endcode
+ifdef EBADE
    +     case EBADE 52 /* Invalid exchange */
+endcode
+ifdef EBAADR
    +     case EBAADR 53 /* Invalid request descriptor */
+endcode
+ifdef EXFULL
    +     case EXFULL 54 /* Exchange full */
+#endif
+#ifdef ENOANO
+    //case ENOANO 55 /* No anode */
+    #endif
+#ifdef EBADRQC
+    //case EBADRQC 56 /* Invalid request code */
+    #endif
+#ifdef EBADSLT
+    //case EBADSLT 57 /* Invalid slot */
+    #endif
+    //case 58:
+#ifdef EBFONT
+    //case EBFONT 59 /* Bad font file format */
+    #endif
+#ifdef ENOSTR
+    //case ENOSTR 60 /* Device not a stream */
+    #endif
+#ifdef ENODATA
+    case ENODATA: return VERR_NO_DATA;
+    #endif
+#ifdef ETIME
+    //case ETIME 62 /* Timer expired */
+    #endif
+#ifdef ENOSR
+    //case ENOSR 63 /* Out of streams resources */
+    #endif
+#ifdef ENONET
+    case ENONET: return VERR_NET_NO_NETWORK;
+    #endif
+#ifdef ENOPKG
+    //case ENOPKG 65 /* Package not installed */
+    #endif
+#ifdef EREMOTE
+    //case EREMOTE 66 /* Object is remote */
+    #endif
+#ifdef ENOLINK
+    //case ENOLINK 67 /* Link has been severed */
+    #endif
+#ifdef EADV
+    //case EADV 68 /* Advertise error */
+    #endif
+#ifdef ESRMNT
+    //case ESRMNT 69 /* Srmount error */
+    #endif
+#ifdef ECOMM
+    //case ECOMM 70 /* Communication error on send */
+    #endif
+#ifdef EPROTO
+ case EPROTO: return VERR_NET_PROTOCOL_ERROR;
+\#endif
+\#ifdef EMULTIHOP
+    \#if EMULTIHOP 72 /* Multihop attempted */
+\#endif
+\#ifdef EDOTDOT
+    \#if EDOTDOT 73 /* RFS specific error */
+\#endif
+\#ifdef EBADMSG
+    \#if EBADMSG 74 /* Not a data message */
+\#endif
+\#ifdef EOVERFLOW
+    case EOVERFLOW: return VERR_TOO_MUCH_DATA; /** @todo fix duplicate error */
+\#endif
+\#ifdef ENOTUNIQ
+    \#if ENOTUNIQ: return VERR_NET_NOT_UNIQUE_NAME;
+\#endif
+\#ifdef EBADFD
+    \#if EBADFD: return VERR_INVALID_HANDLE; /** @todo fix duplicate error? */
+\#endif
+\#ifdef EREMCHG
+    \#if EREMCHG 78 /* Remote address changed */
+\#endif
+\#ifdef ELIBACC
+    \#if ELIBACC 79 /* Can not access a needed shared library */
+\#endif
+\#ifdef ELIBBAD
+    \#if ELIBBAD 80 /* Accessing a corrupted shared library */
+\#endif
+\#ifdef ELIBSCN
+    \#if ELIBSCN 81 /* .lib section in a.out corrupted */
+\#endif
+\#ifdef ELIBMAX
+    \#if ELIBMAX 82 /* Attempting to link in too many shared libraries */
+\#endif
+\#ifdef ELIBEXEC
+    \#if ELIBEXEC 83 /* Cannot exec a shared library directly */
+\#endif
+\#ifdef EILSEQ
+    case EILSEQ: return VERR_NO_TRANSLATION;
+\#endif
+\#ifdef ERESTART
+    \#if ERESTART: return VERR_INTERRUPTED; /** @todo fix duplicate error? */
+\#endif
+\#ifdef ESTRPIPE
+    \#if ESTRPIPE 86 /* Streams pipe error */
+\#endif
+\#ifdef EUSERS
+    //case EUSERS     87 /* Too many users */
+#endif
+#ifdef ENOTSOCK
+    case ENOTSOCK: return VERR_NET_NOT_SOCKET;
+#endif
+#ifdef EDESTADDRREQ
+    case EDESTADDRREQ: return VERR_NET_DEST_ADDRESS_REQUIRED;
+#endif
+#ifdef EMSGSIZE
+    case EMSGSIZE: return VERR_NET_MSG_SIZE;
+#endif
+#ifdef EPROTOTYPE
+    case EPROTOTYPE: return VERR_NET_PROTOCOL_TYPE;
+#endif
+#ifdef ENOPROTOOPT
+    case ENOPROTOOPT: return VERR_NET_PROTOCOL_NOT_AVAILABLE;
+#endif
+#ifdef EPROTONOSUPPORT
+    case EPROTONOSUPPORT: return VERR_NET_PROTOCOL_NOT_SUPPORTED;
+#endif
+#ifdef ESOCKTNOSUPPORT
+    case ESOCKTNOSUPPORT: return VERR_NET_SOCKET_TYPE_NOT_SUPPORTED;
+#endif
+#ifdef EOPNOTSUPP /**< @todo map this differently on solaris. */
+    case EOPNOTSUPP: return VERR_NET_OPERATION_NOT_SUPPORTED;
+#endif
+#ifdef EPFNOSUPPORT
+    case EPFNOSUPPORT: return VERR_NET_PROTOCOL_FAMILY_NOT_SUPPORTED;
+#endif
+#ifdef EAFNOSUPPORT
+    case EAFNOSUPPORT: return VERR_NET_ADDRESS_FAMILY_NOT_SUPPORTED;
+#endif
+#ifdef EADDRINUSE
+    case EADDRINUSE: return VERR_NET_ADDRESS_IN_USE;
+#endif
+#ifdef EADDRNOTAVAIL
+    case EADDRNOTAVAIL: return VERR_NET_ADDRESS_NOT_AVAILABLE;
+#endif
+#ifdef ENETDOWN
+    case ENETDOWN: return VERR_NET_DOWN;
+#endif
+#ifdef ENETUNREACH
+    case ENETUNREACH: return VERR_NET_UNREACHABLE;
+#endif
+#ifdef ENETRESET
+    case ENETRESET: return VERR_NET_CONNECTION_RESET;
+#endif
+#ifdef ECONNABORTED
+    case ECONNABORTED: return VERR_NET_CONNECTION_ABORTED;
+ case ECONNABORTED: return VERR_NET_CONNECTION_ABORTED;
+#ifdef ECONNRESET
+ case ECONNRESET: return VERR_NET_CONNECTION_RESET_BY_PEER;
+#endif
+#ifdef ENOBUFS
+ case ENOBUFS: return VERR_NET_NO_BUFFER_SPACE;
+#endif
+#ifdef EISCONN
+ case EISCONN: return VERR_NET_ALREADY_CONNECTED;
+#endif
+#ifdef ENOTCONN
+ case ENOTCONN: return VERR_NET_NOT_CONNECTED;
+#endif
+ifdef ESHUTDOWN
+ case ESHUTDOWN: return VERR_NET_SHUTDOWN;
+endif
+ifdef ETOOMANYREFS
+ case ETOOMANYREFS: return VERR_NET_TOO_MANY_REFERENCES;
+endif
+ifdef ETIMEDOUT
+ case ETIMEDOUT: return VERR_TIMEOUT;
+endif
+ifdef ECONNREFUSED
+ case ECONNREFUSED: return VERR_NET_CONNECTION_REFUSED;
+endif
+ifdef EHOSTDOWN
+ case EHOSTDOWN: return VERR_NET_HOST_DOWN;
+endif
+ifdef EHOSTUNREACH
+ case EHOSTUNREACH: return VERR_NET_HOST_UNREACHABLE;
+endif
+ifdef EALREADY
+ case EALREADY: return VERR_NET_ALREADY_IN_PROGRESS;
+endif
+ifdef EINPROGRESS
+ case EINPROGRESS: return VERR_NET_IN_PROGRESS;
+endif
+ifdef ESTALE
+ //case ESTALE 116 /* Stale NFS file handle */
+endif
+ifdef EUCLEAN
+ //case EUCLEAN 117 /* Structure needs cleaning */
+endif
+ifdef ENOTNAM
+ //case ENOTNAM 118 /* Not a XENIX named type file */
+endif
+ifdef ENAVAIL
+ //case ENAVAIL 119 /* No XENIX semaphores available */
+#endif
+#ifdef EISNAM
+    //case EISNAM 120 /* Is a named type file */
+#endif
+#ifdef EREMOTEIO
+    //case EREMOTEIO 121 /* Remote I/O error */
+#endif
+#ifdef EDQUOT
+    case EDQUOT: return VERR_DISK_FULL; /**< @todo fix duplicate error */
+#endif
+#ifdef ENOMEDIUM
+    case ENOMEDIUM: return VERR_MEDIA_NOT_PRESENT;
+#endif
+#ifdef EMEDIUMTYPE
+    case EMEDIUMTYPE: return VERR_MEDIA_NOT_RECOGNIZED;
+#endif
+#if defined(EWOULDBLOCK) && (EWOULDBLOCK != EAGAIN)
+    case EWOULDBLOCK: return VERR_TRY_AGAIN;
+#endif
+
+    /* Non-linux */
+
+#ifdef EPROCLIM
+    case EPROCLIM: return VERR_MAX_PROCS_REACHED;
+#endif
+#ifdef EDOOFUS
+    #if EDOOFUS != EINVAL
+    case EDOOFUS: return VERR_INTERNAL_ERROR;
+    #endif
+#endif
+#ifdef ENOTSUP
+    #ifndef EOPNOTSUPP
+    case ENOTSUP: return VERR_NOT_SUPPORTED;
+    #else
+    #if ENOTSUP != EOPNOTSUPP
+    case ENOTSUP: return VERR_NOT_SUPPORTED;
+    #endif
+    #endif
+#endif
+    default:
+        AssertLogRelMsgFailed("Unhandled error code %d\n", uNativeCode);
+        return VERR_UNRESOLVED_ERROR;
+    }
+}
+RT_EXPORT_SYMBOL(RTErrConvertFromErrno);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/err/RTErrConvertToErrno.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/err/RTErrConvertToErrno.c
@@ @ -0,0 +1,451 @@
+/* $Id: RTErrConvertToErrno.cpp $ */
+/** @file
+ * IPRT - Convert iprt status codes to errno.
+ */
+*
+/* Copyright (C) 2007-2017 Oracle Corporation
+ */
+/* This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * Foundation, in version 2 as it comes in the "COPYING" file of the
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+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+/*
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+/* You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+
+/*******************************************************************************************
+**************************************
+*   Header Files                                                                                                                 *
+********************************************************************************************
+********************************************
+*include <iprt/err.h>
+*include "internal/iprt.h"
+*include <iprt/assert.h>
+*include <iprt/err.h>
+*include <iprt/errno.h>
+*+RTDECL(int) RTErrConvertToErrno(int iErr)
+{
+ /* very fast check for no error. */
+ if (RT_SUCCESS(iErr))
+ return 0;
+ `
/ * Process error codes.  
/*  
 * (Use a switch and not a table since the numbers vary among compilers
 * and OSes. So we let the compiler switch optimizer handle speed issues.)
 *  
 * This switch is arranged like the Linux i386 errno.h! It also mirrors the
 * conversions performed by RTErrConvertFromErrno with a few extra case since
 * there are far more IPRT status codes than Unix ones.
 */  
switch (iErr)
{
    #ifdef EPERM
        case VERR_ACCESS_DENIED: return EPERM;
    #endif
    #ifdef ENOENT
        case VERR_FILE_NOT_FOUND: return ENOENT;
    #endif
    #ifdef ESRCH
        case VERR_PROCESS_NOT_FOUND: return ESRCH;
    #endif
    #ifdef EINTR
        case VERR_INTERRUPTED: return EINTR;
    #endif
    #ifdef EIO
        case VERR_DEV_IO_ERROR: return EIO;
    #endif
    #ifdef ENXIO
        //case VERR_DEV_IO_ERROR: return ENXIO;
    #endif
    #ifdef E2BIG
        case VERR_TOO_MUCH_DATA: return E2BIG;
    #endif
    #ifdef ENOEXEC
        case VERR_BAD_EXE_FORMAT: return ENOEXEC;
    #endif
    #ifdef EBADF
        case VERR_INVALID_HANDLE: return EBADF;
    #endif
    #ifdef ECHILD
        //case VERR_PROCESS_NOT_FOUND: return ECHILD;
    #endif
    #ifdef EAGAIN
        case VERR_TRY_AGAIN: return EAGAIN;
    #endif
    #ifdef ENOMEM
        case VERR_NO_MEMORY: return ENOMEM;
    #endif

+ifdef EACCES
+    //case VERR_ACCESS_DENIED: return EACCES;
+endif
+ifdef EFAULT
+    case VERR_INVALID_POINTER: return EFAULT;
+endif
+ifdef ENOTBLK
+    //case ENOTBLK: return VERR_;
+endif
+ifdef EBUSY
+    case VERR_RESOURCE_BUSY: return EBUSY;
+endif
+ifdef EXDEV
+    case VERR_NOTSAMEDEVICE: return EXDEV;
+endif
+ifdef EEXIST
+    case VERR_ALREADYEXISTS: return EEXIST;
+endif
+ifdef EISDIR
+    case VERR_IS_A_DIRECTORY: return EISDIR;
+endif
+ifdef EINVAL
+    case VERR_INVALID_PARAMETER: return EINVAL;
+endif
+ifdef ENFILE
+    case VERR_TOO_MANY_OPEN_FILES: return ENFILE;
+endif
+ifdef EFBIG
+    case VERR_FILE_TOO_BIG: return EFBIG;
+endif
+ifdef ENOSPC
+    case VERR_DISK_FULL: return ENOSPC;
+endif
+#ifdef ESPIPE
+    case VERR.Seek_on_Device: return ESPIPE;
+#endif
+#ifdef EROFS
+    case VERR.Write_protect: return EROFS;
+#endif
+#ifdef EMLINK
+    //case EMLINK:
+#endif
+#ifdef EPIPE
+    case VERR.Broken_Pipe: return EPIPE;
+#endif
+#ifdef EDOM
+    //case VERR.Invalid_Parameter: return EDOM;
+#endif
+#ifdef ERANGE
+    //case VERR.Invalid_Parameter: return ERANGE;
+#endif
+#ifdef EDEADLK
+    case VERR.Deadlock: return EDEADLK;
+#endif
+#ifdef ENAMETOOLONG
+    case VERR_FILENAME_TOO_LONG: return ENAMETOOLONG;
+#endif
+#ifdef ENOLCK
+    case VERR.File_Lock_Failed: return ENOLCK;
+#endif
+#ifdef ENOSYS
+    case VERR.Not_Implemented: case VERR.Not_Supported: return ENOSYS;
+#endif
+#ifdef ENOTEMPTY
+    case VERR.DIR_NOT_EMPTY: return ENOTEMPTY;
+#endif
+#ifdef ELOOP
+    case VERR_TOO_MANY_SYMLINKS: return ELOOP;
+#endif
+    //41??
+#ifdef ENOMSG
+    //case ENOMSG 42 /* No message of desired type */
+#endif
+#ifdef EIDRM
+    //case EIDRM 43 /* Identifier removed */
+#endif
+#ifdef ECHRNG
+    //case ECHRNG 44 /* Channel number out of range */
+#endif

Open Source Used in 5GaaS Edge AC-4 36778
+ifdef EL2NSYNC
+    //case EL2NSYNC 45 /* Level 2 not synchronized */
+endif
+ifdef EL3HLT
+    //case EL3HLT 46 /* Level 3 halted */
+endif
+ifdef EL3RST
+    //case EL3RST 47 /* Level 3 reset */
+endif
+ifdef ELNRNG
+    //case ELNRNG 48 /* Link number out of range */
+endif
+ifdef EUNATCH
+    //case EUNATCH 49 /* Protocol driver not attached */
+endif
+ifdef ENOCSI
+    //case ENOCSI 50 /* No CSI structure available */
+endif
+ifdef EL2HLT
+    //case EL2HLT 51 /* Level 2 halted */
+endif
+ifdef EBADE
+    //case EBADE 52 /* Invalid exchange */
+endif
+ifdef EBADR
+    //case EBADR 53 /* Invalid request descriptor */
+endif
+ifdef EXFULL
+    //case EXFULL 54 /* Exchange full */
+endif
+ifdef ENOANO
+    //case ENOANO 55 /* No anode */
+endif
+ifdef EBADRQC
+    //case EBADRQC 56 /* Invalid request code */
+endif
+ifdef EBADSLT
+    //case EBADSLT 57 /* Invalid slot */
+endif
+ifdef 58:
+ifdef EBFONT
+    //case EBFONT 59 /* Bad font file format */
+endif
+ifdef ENOSTR
+    //case ENOSTR 60 /* Device not a stream */
+endif
+ifdef ENODATA
+case VERR_NO_DATA:
    return ENODATA;
+endif
+ifdef ETIME
+ //case ETIME 62 /* Timer expired */
+endif
+ifdef ENOSR
+ //case ENOSR 63 /* Out of streams resources */
+endif
+ifdef ENONET
+ case VERR_NET_NO_NETWORK: return ENONET;
+endif
+ifdef ENOPKG
+ //case ENOPKG 65 /* Package not installed */
+endif
+ifdef EREMOTE
+ //case EREMOTE 66 /* Object is remote */
+endif
+ifdef ENOLINK
+ //case ENOLINK 67 /* Link has been severed */
+endif
+ifdef EADV
+ //case EADV 68 /* Advertise error */
+endif
+ifdef ESRMNT
+ //case ESRMNT 69 /* Srmount error */
+endif
+ifdef ECOMM
+ //case ECOMM 70 /* Communication error on send */
+endif
+ifdef EPROTO
+ //case EPROTO 71 /* Protocol error */
+endif
+ifdef EMULTIHOP
+ //case EMULTIHOP 72 /* Multihop attempted */
+endif
+ifdef EDOTDOT
+ //case EDOTDOT 73 /* RFS specific error */
+endif
+ifdef EBADMSG
+ //case EBADMSG 74 /* Not a data message */
+endif
+ifdef EOVERFLOW
+ //case VERR_TOO_MUCH_DATA: return EOVERFLOW;
+endif
+ifdef ENOTUNIQ
+ case VERR_NET_NOT_UNIQUE_NAME: return ENOTUNIQ;
+endif
+ifdef EBADFD
+ //case VERR_INVALID_HANDLE: return EBADFD;
#ifndef
  case EREMCHG
        //case EREMCHG          78      /* Remote address changed */
#endif

#ifdef EREMCHG
        //case EREMCHG          78      /* Remote address changed */
#endif

#ifdef ELIBACC
        //case ELIBACC          79      /* Can not access a needed shared library */
#endif

#ifdef ELIBBAD
        //case ELIBBAD          80      /* Accessing a corrupted shared library */
#endif

#ifdef ELIBSCN
        //case ELIBSCN          81      /* .lib section in a.out corrupted */
#endif

#ifdef ELIBMAX
        //case ELIBMAX          82      /* Attempting to link in too many shared libraries */
#endif

#ifdef ELIBEXEC
        //case ELIBEXEC 83      /* Cannot exec a shared library directly */
#endif

#ifdef EILSEQ
        case VERR_NO_TRANSLATION:                   return EILSEQ;
#endif

#ifdef ERESTART
        //case VERR_INTERRUPTED:                      return ERESTART;
#endif

#ifdef ESTRPIPE
        //case ESTRPIPE 86      /* Streams pipe error */
#endif

#ifdef EUSERS
        //case EUSERS           87      /* Too many users */
#endif

#ifdef ENOTSOCK
        case VERR_NET_NOT_SOCKET:                   return ENOTSOCK;
#endif

#ifdef EDESTADDRREQ
        case VERR_NET_DEST_ADDRESS_REQUIRED:        return EDESTADDRREQ;
#endif

#ifdef EMSGSIZE
        case VERR_NET_MSG_SIZE:                     return EMSGSIZE;
#endif

#ifdef EPROTOTYPE
        case VERR_NET_PROTOCOL_TYPE:                return EPROTOTYPE;
#endif

#ifdef ENOPROTOOPT
        case VERR_NET_PROTOCOL_NOT_AVAILABLE:       return ENOPROTOOPT;
#endif

#ifdef EPROTONOSUPPORT
        case VERR_NET_PROTOCOL_NOT_SUPPORTED:       return EPROTONOSUPPORT;
#endif
+#endif
+ifdef ESOCKTNOSUPPORT
+    case VERR_NET_SOCKET_TYPE_NOT_SUPPORTED: return ESOCKTNOSUPPORT;
+endif
+ifdef EOPNOTSUPP
+    case VERR_NET_OPERATION_NOT_SUPPORTED: return EOPNOTSUPP;
+endif
+ifdef EPFNOSUPPORT
+    case VERR_NET_PROTOCOL_FAMILY_NOT_SUPPORTED: return EPFNOSUPPORT;
+endif
+ifdef EAFNOSUPPORT
+    case VERR_NET_ADDRESS_FAMILY_NOT_SUPPORTED: return EAFNOSUPPORT;
+endif
+ifdef EADDRINUSE
+    case VERR_NET_ADDRESS_IN_USE: return EADDRINUSE;
+endif
+ifdef EADDRNOTAVAIL
+    case VERR_NET_ADDRESS_NOT_AVAILABLE: return EADDRNOTAVAIL;
+endif
+ifdef ENETDOWN
+    case VERR_NET_DOWN: return ENETDOWN;
+endif
+ifdef ENETUNREACH
+    case VERR_NET_UNREACHABLE: return ENETUNREACH;
+endif
+ifdef ENETRESET
+    case VERR_NET_CONNECTION_RESET: return ENETRESET;
+endif
+ifdef ECONNABORTED
+    case VERR_NET_CONNECTION_ABORTED: return ECONNABORTED;
+endif
+ifdef ECONNRESET
+    case VERR_NET_CONNECTION_RESET_BY_PEER: return ECONNRESET;
+endif
+ifdef ENOBUFS
+    case VERR_NET_NO_BUFFER_SPACE: return ENOBUFS;
+endif
+ifdef EISCONN
+    case VERR_NET_ALREADY_CONNECTED: return EISCONN;
+endif
+ifdef ENOTCONN
+    case VERR_NET_NOT_CONNECTED: return ENOTCONN;
+endif
+ifdef ESHUTDOWN
+    case VERR_NET_SHUTDOWN: return ESHUTDOWN;
+endif
+ifdef ETOOMANYREFS
+    case VERR_NET_TOO_MANY_REFERENCES: return ETOOMANYREFS;
+#ifdef ETIMEDOUT
+    case VERR_TIMEOUT: return ETIMEDOUT;
+#endif
+#ifdef ECONNREFUSED
+    case VERR_NET_CONNECTION_REFUSED: return ECONNREFUSED;
+#endif
+#ifdef EHOSTDOWN
+    case VERR_NET_HOST_DOWN: return EHOSTDOWN;
+#endif
+#ifdef EHOSTUNREACH
+    case VERR_NET_HOST_UNREACHABLE: return EHOSTUNREACH;
+#endif
+#ifdef EALREADY
+    case VERR_NET_ALREADY_IN_PROGRESS: return EALREADY;
+#endif
+#ifdef EINPROGRESS
+    case VERR_NET_IN_PROGRESS: return EINPROGRESS;
+#endif
+#ifdef ESTALE
+    //case ESTALE 116 /* Stale NFS file handle */
+#endif
+#ifdef EUCLEAN
+    //case EUCLEAN 117 /* Structure needs cleaning */
+#endif
+#ifdef ENOTNAM
+    //case ENOTNAM 118 /* Not a XENIX named type file */
+#endif
+#ifdef ENAVAIL
+    //case ENAVAIL 119 /* No XENIX semaphores available */
+#endif
+#ifdef EISNAM
+    //case EISNAM 120 /* Is a named type file */
+#endif
+#ifdef EREMOTEIO
+    //case EREMOTEIO 121 /* Remote I/O error */
+#endif
+#ifdef EDQUOT
+    //case VERR_DISK_FULL: return EDQUOT;
+#endif
+#ifdef ENOMEDIUM
+    case VERR_MEDIA_NOT_PRESENT: return ENOMEDIUM;
+#endif
+#ifdef EMEDIACTYPE
+    case VERR_MEDIA_NOT_RECOGNIZED: return EMEDIACTYPE;
+#endif
+ /* Non-linux */
+ ifdef EPROCLIM
+     case VERR_MAX_PROCS_REACHED: return EPROCLIM;
+ #endif
+ ifdef EDOOFUS
+     case VERR_INTERNAL_ERROR:
+     case VERR_INTERNAL_ERROR_2:
+     case VERR_INTERNAL_ERROR_3: return EDOOFUS;
+ #endif
+
+     default:
+     /* The idea here is that if you hit this, you will have to
+       translate the status code yourself. */
+     AssertMsgFailed(("Unhandled error code %Rrc
, iErr));
+ ifdef EPROTO
+     return EPROTO;
+ else
+     return EINVAL;
+ #endif
+ }
+
+RT_EXPORT_SYMBOL(RTErrConvertToErrno);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/err/errinfo.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/err/errinfo.c
@@ -0,0 +1,127 @@
+/* $Id: errinfo.cpp $ */
+/** @file
+ * IPRT - Error Info, Setters.
+ */
+/*
+ * Copyright (C) 2010-2017 Oracle Corporation
+ */
+ /* Copyright (C) 2010-2017 Oracle Corporation
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */

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* terms and conditions of either the GPL or the CDDL or both.
*/

/*******************************************************************************
*********** Header Files ***********
*******************************************************************************

#include "internal/iprt.h"
#include <iprt/err.h>

#include <iprt/assert.h>
#include <iprt/string.h>

RTDECL(int) RTErrInfoSet(PRTERRINFO pErrInfo, int rc, const char *pszMsg)
{
    if (pErrInfo)
    {
        AssertPtr(pErrInfo);
        Assert((pErrInfo->fFlags & RTERRINFO_FLAGS_MAGIC_MASK) == RTERRINFO_FLAGS_MAGIC);
        RTStrCopy(pErrInfo->pszMsg, pErrInfo->cbMsg, pszMsg);
        pErrInfo->rc = rc;
        pErrInfo->fFlags |= RTERRINFO_FLAGS_SET;
    }
    return rc;
}

RTDECL(int) RTErrInfoSetF(PRTERRINFO pErrInfo, int rc, const char *pszFormat, ...)
{
    va_list va;
    va_start(va, pszFormat);
    RTErrInfoSetV(pErrInfo, rc, pszFormat, va);
    va_end(va);
    return rc;
}

RTDECL(int) RTErrInfoSetV(PRTERRINFO pErrInfo, int rc, const char *pszFormat, va_list va)
{
    if (pErrInfo)
    {
        AssertPtr(pErrInfo);
        Assert((pErrInfo->fFlags & RTERRINFO_FLAGS_MAGIC_MASK) == RTERRINFO_FLAGS_MAGIC);
+RTStrPrintfV(pErrInfo->pszMsg, pErrInfo->cbMsg, pszFormat, va);
+pErrInfo->rc = rc;
+pErrInfo->fFlags |= RTERRINFO_FLAGS_SET;
+
+return rc;
+
+
+RTDECL(int) RTErrInfoAdd(PRTERINFO pErrInfo, int rc, const char *pszMsg)
+{  
+  if (pErrInfo)
+  {  
+    AssertPtr(pErrInfo);
+    if (pErrInfo->fFlags & RTERRINFO_FLAGS_SET)
+      RTStrCat(pErrInfo->pszMsg, pErrInfo->cbMsg, pszMsg);
+    else
+      {  
+        while (*pszMsg == ' ')
+          pszMsg++;
+        return RTErrInfoSet(pErrInfo, rc, pszMsg);
+      }
+  }
+  return rc;
+}
+
+
+RTDECL(int) RTErrInfoAddF(PRTERINFO pErrInfo, int rc, const char *pszFormat, ...)
+{  
+  va_list va;
+  va_start(va, pszFormat);
+  RTErrInfoAddV(pErrInfo, rc, pszFormat, va);
+  va_end(va);
+  return rc;
+}
+
+
+RTDECL(int) RTErrInfoAddV(PRTERINFO pErrInfo, int rc, const char *pszFormat, va_list va)
+{  
+  if (pErrInfo)
+  {  
+    AssertPtr(pErrInfo);
+    Assert((pErrInfo->fFlags & RTERRINFO_FLAGS_MAGIC_MASK) == RTERRINFO_FLAGS_MAGIC);
+    if (pErrInfo->fFlags & RTERRINFO_FLAGS_SET)
+      {  
+        char *pszOut = (char *)memchr(pErrInfo->pszMsg, '\0', pErrInfo->cbMsg - 2);
+        if (pszOut)
+          RTStrPrintfV(pszOut, &pErrInfo->pszMsg[pErrInfo->cbMsg] - pszOut, pszFormat, va);
+      }
+   
+ }  
+ else  
+ {  
+     while (*pszFormat == ' ')  
+         pszFormat++;  
+     return RTErrInfoSetV(pErrInfo, rc, pszFormat, va);  
+ }  
+ }  
+ return rc;  
+ }  
+
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/log/log.c
@@ -0,0 +1,4072 @@
+/* $Id: log.cpp $ */
+/** @file
+ * Runtime VBox - Logger.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+//*******************************************************************************
+/**
+ * Header Files
+ *******************************************************************************/
+#include <iprt/log.h>
+#include "internal/iprt.h"
/*
+#ifndef IN_RC
+# include <iprt/alloc.h>
+# include <iprt/process.h>
+# include <iprt/semaphore.h>
+# include <iprt/thread.h>
+# include <iprt/mp.h>
+#endif
+#ifdef IN_RING3
+# include <iprt/env.h>
+# include <iprt/file.h>
+# include <iprt/lockvalidator.h>
+# include <iprt/path.h>
+#endif
+#include <iprt/time.h>
+#include <iprt/asm.h>
+#ifdef defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+# include <iprt/asm-amd64-x86.h>
+#endif
+#include <iprt/assert.h>
+#include <iprt/err.h>
+#include <iprt/param.h>
+
+#include <iprt/stdarg.h>
+#include <iprt/string.h>
+#include <iprt/ctype.h>
+#ifdef IN_RING3
+# include <iprt/alloca.h>
+#endif
+
+#/*******************************************************************************************
+**************************************
+*   Defined Constants And Macros                                                            *
+*******************************************************************************************
+*****************************************************************************/
+#ifdef IN_RING0
+@def RTLOG_RINGBUF_DEFAULT_SIZE
+ * The default ring buffer size. */
+#endif RTLOG_RINGBUF_MAX_SIZE
+ * The max ring buffer size. */
+#ifdef RTLOG_RINGBUF_MIN_SIZE
+ * The min ring buffer size. */
+#ifdef defined(IN_RING3) || defined(DOXYGEN_RUNNING)
+#define RTLOG_RINGBUF_DEFAULT_SIZE  _64K
+#define RTLOG_RINGBUF_MAX_SIZE  _4M
+#define RTLOG_RINGBUF_MIN_SIZE  _1K
+*/
+# define RTLOG_RINGBUF_DEFAULT_SIZE _512K
+# define RTLOG_RINGBUF_MAX_SIZE _1G
+# define RTLOG_RINGBUF_MIN_SIZE _4K
+#endif
+/** The start of ring buffer eye catcher (16 bytes). */
+/**define RTLOG_RINGBUF_EYE_CATCHER "START RING BUF0"
+AssertCompile(sizeof(RTLOG_RINGBUF_EYE_CATCHER) == 16);
+/** The end of ring buffer eye catcher (16 bytes). This also ensures that the ring buffer
+ * forms are properly terminated C string (leading zero chars). */
+/**define RTLOG_RINGBUF_EYE_CATCHER_END "\0\0\0END RING BUF"
+AssertCompile(sizeof(RTLOG_RINGBUF_EYE_CATCHER_END) == 16);
+
+*******************************************************************************************
+**************************************
+*   Structures and Typedefs
+********************************************************************************************
+/** Arguments passed to the output function. */
+#ifdef IN_RC
+
+typedef struct RTLOGOUTPUTPREFIXEDARGS
+{
+  /** The logger instance. */
+  PRTLOGGER pLogger;
+  /** The flags. (used for prefixing.) */
+  unsigned fFlags;
+  /** The group. (used for prefixing.) */
+  unsigned iGroup;
+} RTLOGOUTPUTPREFIXEDARGS, *PRTLOGOUTPUTPREFIXEDARGS;
+
+#ifndef IN_RC
+
+/** Internal logger data. */
+#endif
+
+typedef struct RTLOGGERINTERNAL
+{
+  /** The structure revision (RTLOGGERINTERNAL_REV). */
+  uint32_t uRevision;
+  /** The size of the internal logger structure. */
+  uint32_t cbSelf;
+  /** Spinning mutex semaphore. Can be NIL. */
+  RTSEMSPINMUTEX hSpinMtx;
+  /** Pointer to the flush function. */
+  RTLOGFLUSHFUNCTION
+}
+ PFNRTLOGFLUSH pfnFlush;
+
+ /**< Custom prefix callback. */
+ PFNRTLOGPREFIX pfnPrefix;
+ /**< Prefix callback argument. */
+ void *pvPrefixUserArg;
+ /**< This is set if a prefix is pending. */
+ bool fPendingPrefix;
+ /**< Alignment padding. */
+ bool afPadding1[2];
+ /**< Set if fully created. Used to avoid confusing in a few functions used to
+ * parse logger settings from environment variables. */
+ bool fCreated;
+
+ /**< The max number of groups that there is room for in afGroups and papszGroups.
+ * Used by RTLogCopyGroupAndFlags(). */
+ uint32_t cMaxGroups;
+ /**< Pointer to the group name array. */
+ const char * const *papszGroups;
+
+ /**< The number of log entries per group. NULL if
+ * RTLOGFLAGS_RESTRICT_GROUPS is not specified. */
+ uint32_t *pacEntriesPerGroup;
+ /**< The max number of entries per group. */
+ uint32_t cMaxEntriesPerGroup;

+ /**< @name Ring buffer logging
+ * The ring buffer records the last cbRingBuf - 1 of log output. The
+ * other configured log destinations are not touched until someone calls
+ * RTLogFlush(), when the ring buffer content is written to them all.
+ * 
+ * The aim here is a fast logging destination, that avoids wasting storage
+ * space saving disk space when dealing with huge log volumes where the
+ * interesting bits usually are found near the end of the log. This is
+ * typically the case for scenarios that crashes or hits assertions.
+ * 
+ * RTLogFlush() is called implicitly when hitting an assertion. While on a
+ * crash the most debuggers are able to make calls these days, it's usually
+ * possible to view the ring buffer memory.
+ * 
+ * @} */
+ /**< Ring buffer size (including both eye catchers). */
+ uint32_t cbRingBuf;
+ /**< Number of bytes passing thru the ring buffer since last RTLogFlush call.
+ * (This is used to avoid writing out the same bytes twice.) */
+ uint64_t volatile cbRingBufUnflushed;
+ /**< Ring buffer pointer (points at RTLOG_RINGBUF_EYE_CATCHER). */
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```c
+ char      *pszRingBuf;
+ /** Current ring buffer position (where to write the next char). */
+ char * volatile  pchRingBufCur;
+ /** @} */
+
+ ## ifdef IN_RING3 /* Note! Must be at the end! */
+ /** @} name File logging bits for the logger. */
+ * @ { */
+ /** Pointer to the function called when starting logging, and when */
+ * ending or starting a new log file as part of history rotation. */
+ * This can be NULL. */
+ PFNRTLOGPHASE  pfnPhase;
+
+ /** Handle to log file (if open). */
+ RTFILE  hFile;
+ /** Log file history settings: maximum amount of data to put in a file. */
+ uint64_t  cbHistoryFileMax;
+ /** Log file history settings: current amount of data in a file. */
+ uint64_t  cbHistoryFileWritten;
+ /** Log file history settings: maximum time to use a file (in seconds). */
+ uint32_t  cSecsHistoryTimeSlot;
+ /** Log file history settings: in what time slot was the file created. */
+ uint32_t  uHistoryTimeSlotStart;
+ /** Log file history settings: number of older files to keep. */
+ * 0 means no history. */
+ uint32_t  cHistory;
+ /** Pointer to filename. */
+ char  szFilename[RTPATH_MAX];
+ /** @} */
+ ## endif /* IN_RING3 */
+ } RTLOGGERINTERNAL;
+
+ /** The revision of the internal logger structure. */
+ #define RTLOGGERINTERNAL_REV    UINT32_C(10)
+
+ #ifdef IN_RING3
+ /** The size of the RTLOGGERINTERNAL structure in ring-0. */
+ #define RTLOGGERINTERNAL_R0_SIZE   RT_OFFSETOF(RTLOGGERINTERNAL, pfnPhase)
+ AssertCompileMemberAlignment(RTLOGGERINTERNAL, hFile, sizeof(void *));
+ AssertCompileMemberAlignment(RTLOGGERINTERNAL, cbHistoryFileMax, sizeof(uint64_t));
+ #endif
+ AssertCompileMemberAlignment(RTLOGGERINTERNAL, cbRingBufUnflushed, sizeof(uint64_t));
+
+ ##endif /* !IN_RC */
+
+ /***************************************************************************
+ **********************************

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/* Internal Functions */

#ifndef IN_RC
static unsigned rtlogGroupFlags(const char *psz);
#endif

#ifdef IN_RING0
static void rtR0LogLoggerExFallback(uint32_t fDestFlags, uint32_t fFlags, PRTLOGGERINTERNAL pInt,
 +
    const char *pszFormat, va_list va);
#endif

#ifdef IN_RING3
static int rtR3LogOpenFileDestination(PRTLOGGER pLogger, PRTERRINFO pErrInfo);
#endif

#ifndef IN_RC
static void rtLogRingBufFlush(PRTLOGGER pLogger);
#endif

static void rtlogFlush(PRTLOGGER pLogger, bool fNeedSpace);

static DECLCALLBACK(size_t) rtLogOutput(void *pv, const char *pachChars, size_t cbChars);

static DECLCALLBACK(size_t) rtLogOutputPrefixed(void *pv, const char *pachChars, size_t cbChars);

static void rtlogLoggerExVLocked(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char *
 *pszFormat, va_list args);

#ifndef IN_RC
static void rtlogLoggerExFLocked(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char *
 *pszFormat, ...);
#endif


#ifdef IN_RC
/** Default logger instance. Make it weak because our RC module loader does not
 * necessarily resolve this symbol and the compiler _must_ check if this is
 * the case or not. That doesn't work for Darwin ("incompatible feature used:
 * .weak_reference (must specify "-dynamic" to be used") */
#else RT_OS_DARWIN
extern "C" DECLIMPORT(RTLOGGERRC) g_Logger;
#else /* !IN_RC */
extern "C" DECLWEAK(DECLIMPORT(RTLOGGERRC)) g_Logger;
#endif

#else /* !IN RC */
/** Default logger instance. */

static PRTLOGGER                    g_pLogger;

#endif /* !IN_RING3 */

+/** The RTThreadGetWriteLockCount() change caused by the logger mutex semaphore. */
+static uint32_t volatile  g_cLoggerLockCount;
+#endif
+
+#ifdef IN_RING0
+/** Number of per-thread loggers. */
+static int32_t volatile             g_cPerThreadLoggers;
+/** Per-thread loggers.
+ * This is just a quick TLS hack suitable for debug logging only.
+ * If we run out of entries, just unload and reload the driver. */
+static struct RTLOGGERPERTHREAD
+{
+    /** The thread. */
+    RTNATIVETHREAD volatile NativeThread;
+    /** The (process / session) key. */
+    uintptr_t volatile      uKey;
+    /** The logger instance. */
+    PRTLOGGER volatile      pLogger;
+} g_aPerThreadLoggers[8] =
+{[1]
+    { NIL_RTNATIVETHREAD, 0, 0},
+    { NIL_RTNATIVETHREAD, 0, 0},
+    { NIL_RTNATIVETHREAD, 0, 0},
+    { NIL_RTNATIVETHREAD, 0, 0},
+    { NIL_RTNATIVETHREAD, 0, 0},
+    { NIL_RTNATIVETHREAD, 0, 0},
+    { NIL_RTNATIVETHREAD, 0, 0},
+    { NIL_RTNATIVETHREAD, 0, 0}
+};
+#endif /* IN_RING0 */
+
+/**
+ * Logger flags instructions.
+ */
+static struct
+{
+    const char *pszInstr;               /**< The name */
+    size_t      cchInstr;               /**< The size of the name. */
+    uint32_t    fFlag;                  /**< The flag value. */
+    bool        fInverted;              /**< Inverse meaning? */
+} const g_aLogFlags[] =
+{[1]
+    { "disabled", sizeof("disabled") - 1, RTLOGFLAGS_DISABLED,            false },
+    { "enabled", sizeof("enabled") - 1, RTLOGFLAGS_DISABLED,            true },
+    { "buffered", sizeof("buffered") - 1, RTLOGFLAGS_BUFFERED,            false },
+    { "unbuffered", sizeof("unbuffered") - 1, RTLOGFLAGS_BUFFERED,            true },
+    { "usecrlf", sizeof("usecrlf") - 1, RTLOGFLAGS_USECRLF,             false },
+    { "uself", sizeof("uself") - 1, RTLOGFLAGS_USECRLF,             true },
+    { "append", sizeof("append") - 1, RTLOGFLAGS_APPEND,              false },
+    { "overwrite", sizeof("overwrite") - 1, RTLOGFLAGS_APPEND, true },
+    { "rel", sizeof("rel") - 1, RTLOGFLAGS_REL_TS, false },
+    { "abs", sizeof("abs") - 1, RTLOGFLAGS_REL_TS, true },
+    { "dec", sizeof("dec") - 1, RTLOGFLAGS_DECIMAL_TS, false },
+    { "hex", sizeof("hex") - 1, RTLOGFLAGS_DECIMAL_TS, true },
+    { "writethru", sizeof("writethru") - 1, RTLOGFLAGS_WRITE_THROUGH, false },
+    { "writethrough", sizeof("writethrough") - 1, RTLOGFLAGS_WRITE_THROUGH, false },
+    { "flush", sizeof("flush") - 1, RTLOGFLAGS_FLUSH, false },
+    { "lockcnts", sizeof("lockcnts") - 1, RTLOGFLAGS_PREFIX_LOCK_COUNTS, false },
+    { "cpuid", sizeof("cpuid") - 1, RTLOGFLAGS_PREFIX_CPUID, false },
+    { "pid", sizeof("pid") - 1, RTLOGFLAGS_PREFIX_PID, false },
+    { "flagno", sizeof("flagno") - 1, RTLOGFLAGS_PREFIX_FLAG_NO, false },
+    { "flag", sizeof("flag") - 1, RTLOGFLAGS_PREFIX_FLAG, false },
+    { "groupno", sizeof("groupno") - 1, RTLOGFLAGS_PREFIX_GROUP_NO, false },
+    { "group", sizeof("group") - 1, RTLOGFLAGS_PREFIX_GROUP, false },
+    { "tid", sizeof("tid") - 1, RTLOGFLAGS_PREFIX_TID, false },
+    { "thread", sizeof("thread") - 1, RTLOGFLAGS_PREFIX_THREAD, false },
+    { "custom", sizeof("custom") - 1, RTLOGFLAGS_PREFIX_CUSTOM, false },
+    { "timeprog", sizeof("timeprog") - 1, RTLOGFLAGS_PREFIX_TIME_PROG, false },
+    { "time", sizeof("time") - 1, RTLOGFLAGS_PREFIX_TIME, false },
+    { "msprog", sizeof("msprog") - 1, RTLOGFLAGS_PREFIX_MS_PROG, false },
+    { "tsc", sizeof("tsc") - 1, RTLOGFLAGS_PREFIX_TSC, false }, /* before ts */
+    { "ts", sizeof("ts") - 1, RTLOGFLAGS_PREFIX_TS, false }, /* before ts */
+}; /* We intentionally omit RTLOGFLAGS_RESTRICT_GROUPS. */
+
+/**
+ * Logger destination instructions.
+ */
+static struct
+{
+    const char *pszInstr;       /**< The name. */
+    size_t      cchInstr;       /**< The size of the name. */
+    uint32_t    fFlag;          /**< The corresponding destination flag. */
+} const g_aLogDst[] =
+{
+    { RT_STR_TUPLE("file"), RTLOGDEST_FILE }, /* Must be 1st! */
+    { RT_STR_TUPLE("dir"), RTLOGDEST_FILE }, /* Must be 2nd! */
+    { RT_STR_TUPLE("history"), 0 }, /* Must be 3rd! */
+    { RT_STR_TUPLE("histsize"), 0 }, /* Must be 4th! */
+    { RT_STR_TUPLE("histtime"), 0 }, /* Must be 5th! */
+    { RT_STR_TUPLE("ringbuf"), RTLOGDEST_RINGBUF }, /* Must be 6th! */
+    { RT_STR_TUPLE("stdout"), RTLOGDEST_STDOUT },
+    { RT_STR_TUPLE("stderr"), RTLOGDEST_STDERR },
+    { RT_STR_TUPLE("debugger"), RTLOGDEST_DEBUGGER },
+    { RT_STR_TUPLE("com"), RTLOGDEST_COM },
+    { RT_STR_TUPLE("nodeny"), RTLOGDEST_F_NO_DENY },
+    { RT_STR_TUPLE("user"), RTLOGDEST_USER },
+};
+};
+
+#ifdef IN_RING3
+/** Log rotation backoff table - millisecond sleep intervals.
+ * Important on Windows host, especially for VBoxSVC release logging. Only a
+ * medium term solution, until a proper fix for log file handling is available.
+ * 10 seconds total.
+ */
+static const uint32_t g_acMsLogBackoff[] =
+{ 10, 10, 10, 20, 50, 100, 200, 200, 200, 200, 500, 500, 500, 500, 1000, 1000, 1000, 1000, 1000, 1000, 1000 };
+#endif
+
+
+/**
+ * Locks the logger instance.
+*
+ * @returns See RTSemSpinMutexRequest().
+ * @param pLogger The logger instance.
+ */
+DECLINLINE(int) rtlogLock(PRTLOGGER pLogger)
+{
+#ifndef IN_RC
+ PRTLOGGERINTERNAL pInt = pLogger->pInt;
+ AssertMsgReturn(pInt->uRevision == RTLOGGERINTERNAL_REV, ("%#x != %#x\n", pInt->uRevision,
RTLOGGERINTERNAL_REV),
+
VERR_LOG_REVISION_MISMATCH);
+ AssertMsgReturn(pInt->cbSelf == sizeof(*pInt), ("%#x != %#x\n", pInt->cbSelf, sizeof(*pInt)),
+
VERR_LOG_REVISION_MISMATCH);
+ if (pInt->hSpinMtx != NIL_RTSEMSPINMUTEX)
+ {
+
int rc = RTSemSpinMutexRequest(pInt->hSpinMtx);
+
if (RT_FAILURE(rc))
+
return rc;
+ }
+#else
+ NOREF(pLogger);
+#endif
+ return VINF_SUCCESS;
+}
+
+
+/**
+ * Unlocks the logger instance.
+ * @param pLogger The logger instance.
+ */
+DECLINLINE(void) rtlogUnlock(PRTLOGGER pLogger)
+{
+#ifndef IN_RC

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+ if (pLogger->pInt->hSpinMtx != NIL_RTSEMSPINMUTEX)
+    RTSemSpinMutexRelease(pLogger->pInt->hSpinMtx);
+} #else
+    NOREF(pLogger);
+} #endif
+
+## ifndef IN_RC
+## ifdef IN_RING3
+
+## ifdef SOME_UNUSED_FUNCTION
+/**
+ * Logging to file, output callback.
+ *
+ * @param  pvArg        User argument.
+ * @param  pachChars    Pointer to an array of utf-8 characters.
+ * @param  cbChars      Number of bytes in the character array pointed to by pachChars.
+ */
+static DECLCALLBACK(size_t) rtlogPhaseWrite(void *pvArg, const char *pachChars, size_t cbChars)
+{
+    PRTLOGGER pLogger = (PRTLOGGER)pvArg;
+    RTFileWrite(pLogger->pInt->hFile, pachChars, cbChars, NULL);
+    return cbChars;
+}
+
+/**
+ * Callback to format VBox formatting extentions.
+ * See @ref pg_rt_str_format for a reference on the format types.
+ *
+ * @returns The number of bytes formatted.
+ * @param   pvArg           Formatter argument.
+ * @param   pfnOutput       Pointer to output function.
+ * @param   pvArgOutput     Argument for the output function.
+ * @param   ppszFormat      Pointer to the format string pointer. Advance this till the char
+ *                          after the format specifier.
+ * @param   pArgs           Pointer to the argument list. Use this to fetch the arguments.
+ * @param   cchWidth        Format Width. -1 if not specified.
+ * @param   cchPrecision    Format Precision. -1 if not specified.
+ * @param   fFlags          Flags (RTSTR_NTFS_*).
+ * @param   chArgSize       The argument size specifier, 'l' or 'L'.
+ */
+static DECLCALLBACK(size_t) rtlogPhaseFormatStr(void *pvArg, PFNRTSTROUTPUT pfnOutput, void *pvArgOutput,
+ -----------------------------------------------
char ch = *(*ppszFormat)++;  
+ AssertMsgFailed("Invalid logger phase format type '%c%.10s\n", ch, *ppszFormat); NOREF(ch);  
+ return 0;  
+}  
+
+endif /* SOME_UNUSED_FUNCTION */  
+
+/**
+ * Log phase callback function, assumes the lock is already held
+ */
+ * @param pLogger The logger instance.
+ * @param pszFormat Format string.
+ * @param ... Optional arguments as specified in the format string.
+ */
+static DECLCALLBACK(void) rtlogPhaseMsgLocked(PRTLOGGER pLogger, const char *pszFormat, ...)
+{
+    va_list args;
+    AssertPtrReturnVoid(pLogger);
+    AssertPtrReturnVoid(pLogger->pInt);
+    Assert(pLogger->pInt->hSpinMtx != NIL_RTSEMSPINMUTEX);
+    va_start(args, pszFormat);
+    rtlogLoggerExVLocked(pLogger, 0, ~0U, pszFormat, args);
+    va_end(args);
+}
+
+/**
+ * Log phase callback function, assumes the lock is not held.
+ */
+ * @param pLogger The logger instance.
+ * @param pszFormat Format string.
+ * @param ... Optional arguments as specified in the format string.
+ */
+static DECLCALLBACK(void) rtlogPhaseMsgNormal(PRTLOGGER pLogger, const char *pszFormat, ...)
+{
+    va_list args;
+    AssertPtrReturnVoid(pLogger);
+    AssertPtrReturnVoid(pLogger->pInt);
+    Assert(pLogger->pInt->hSpinMtx != NIL_RTSEMSPINMUTEX);
+    va_start(args, pszFormat);
+    RTLogLoggerExV(pLogger, 0, ~0U, pszFormat, args);
+    va_end(args);
+}
### rtLogRingBufAdjust

Adjusts the ring buffer.

```c
static int rtLogRingBufAdjust(PRTLOGGER pLogger, uint32_t cbNewSize, bool fForce)
{
    /*
     * If this is early logger init, don't do anything.
     */
    if (!pLogger->pInt->fCreated && !fForce)
        return VINF_SUCCESS;

    /*
     * Lock the logger and make the necessary changes.
     */
    int rc = rtlogLock(pLogger);
    if (RT_SUCCESS(rc))
    {
        if (cbNewSize == 0)
            cbNewSize = RTLOG_RINGBUF_DEFAULT_SIZE;
        if (   pLogger->pInt->cbRingBuf != cbNewSize
            || !pLogger->pInt->pchRingBufCur)
        {
            uintptr_t offOld = pLogger->pInt->pchRingBufCur - pLogger->pInt->pszRingBuf;
            if (offOld < sizeof(RTLOG_RINGBUF_EYE_CATCHER))
                offOld = sizeof(RTLOG_RINGBUF_EYE_CATCHER);
            else if (offOld >= cbNewSize)
            {
                memmove(pLogger->pInt->pszRingBuf, &pLogger->pInt->pszRingBuf[offOld - cbNewSize],
                        cbNewSize);
                offOld = sizeof(RTLOG_RINGBUF_EYE_CATCHER);
            }
            void *pvNew = RTMemRealloc(pLogger->pInt->pchRingBufCur, cbNewSize);
            if (pvNew)
            {
                pLogger->pInt->pszRingBuf    = (char *)pvNew;
                pLogger->pInt->pchRingBufCur = (char *)pvNew + offOld;
                pLogger->pInt->cbRingBuf     = cbNewSize;
                memcpy(pvNew, RTLOG_RINGBUF_EYE_CATCHER,
```

---

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sizeof(RTLOG_RINGBUF_EYE_CATCHER));
+    memcp((char *)pvNew + cbNewSize - sizeof(RTLOG_RINGBUF_EYE_CATCHER_END),
+           RTLOG_RINGBUF_EYE_CATCHER_END,
sizeof(RTLOG_RINGBUF_EYE_CATCHER_END));
+    rc = VINF_SUCCESS;
+    } else
+    rc = VERR_NO_MEMORY;
+    }
+    rtlogUnlock(pLogger);
+  }
+
+  return rc;
+}
+
+
+/**
+ * Writes text to the ring buffer.
+ *
+ * @param   pInt                The internal logger data structure.
+ * @param   pachText            The text to write.
+ * @param   cchText             The number of chars (bytes) to write.
+ */
+static void rtLogRingBufWrite(PRTLOGGERINTERNAL pInt, const char *pachText, size_t cchText)
+{
+  /*
+   * Get the ring buffer data, adjusting it to only describe the writable
+   * part of the buffer.
+   */
+  char * const pchStart = &pInt->pszRingBuf[sizeof(RTLOG_RINGBUF_EYE_CATCHER)];
+  size_t const cchBuf   = pInt->cbRingBuf - sizeof(RTLOG_RINGBUF_EYE_CATCHER) -
  sizeof(RTLOG_RINGBUF_EYE_CATCHER_END);
+  char        *pchCur   = pInt->pchRingBufCur;
+  size_t       cchLeft  = pchCur - pchStart;
+  if (RT_LIKELY(cchLeft < cchBuf))
+    cchLeft = cchBuf - cchLeft;
+  else
+  {
+    /* May happen in ring-0 where a thread or two went ahead without getting the lock. */
+    pchCur = pchStart;
+    cchLeft = cchBuf;
+  }
+  Assert(cchBuf < pInt->cbRingBuf);
+  
+  if (cchText < cchLeft)
+  {
+    /* The text fits in the remaining space.
memcpy(pchCur, pachText, cchText);
  pchCur[cchText] = '\0';
  pInt->pchRingBufCur = &pchCur[cchText];
  pInt->cbRingBufUnflushed += cchText;
} else {
  /* The text wraps around. Taking the simple but inefficient approach
  * to input texts that are longer than the ring buffer since that
  * is unlikely to be a frequent case.
  */
  /* Fill to the end of the buffer. */
  memcpy(pchCur, pachText, cchLeft);
  pachText += cchLeft;
  cchText  -= cchLeft;
  pInt->cbRingBufUnflushed += cchLeft;
  pInt->pchRingBufCur       = pchStart;

  /* Ring buffer overflows (the plainly inefficient bit). */
  while (cchText >= cchBuf)
  {
    memcpy(pchStart, pachText, cchBuf);
    pachText += cchBuf;
    cchText  -= cchBuf;
    pInt->cbRingBufUnflushed += cchBuf;
  }

  /* The final bit, if any. */
  if (cchText > 0)
  {
    memcpy(pchStart, pachText, cchText);
    pInt->cbRingBufUnflushed += cchText;
  }
  pchStart[cchText] = '\0';
  pInt->pchRingBufCur = &pchStart[cchText];
}

***
* Flushes the ring buffer to all the other log destinations.
* *
* @param pLogger The logger instance which ring buffer should be flushed.
* */
+static void rtLogRingBufFlush(PRTLOGGER pLogger)
+{
+ const char *pszPreamble;
+ size_t cchPreamble;
+ const char *pszFirst;
+ size_t cchFirst;
+ const char *pszSecond;
+ size_t cchSecond;
+
+ /*
+ * Get the ring buffer data, adjusting it to only describe the writable
+ * part of the buffer.
+ */
+ uint64_t cchUnflushed = pLogger->pInt->cbRingBufUnflushed;
+ char * const pszBuf = &pLogger->pInt->pszRingBuf[sizeof(RTLOG_RINGBUF_EYE_CATCHER)];
+ size_t const cchBuf = pLogger->pInt->cbRingBuf - sizeof(RTLOG_RINGBUF_EYE_CATCHER) -
+ sizeof(RTLOG_RINGBUF_EYE_CATCHER_END);
+ size_t offCur = pLogger->pInt->pchRingBufCur - pszBuf;
+ size_t cchAfter;
+ if (RT_LIKELY(offCur < cchBuf))
+ cchAfter = cchBuf - offCur;
+ else /* May happen in ring-0 where a thread or two went ahead without getting the lock. */
+ {
+ offCur = 0;
+ cchAfter = cchBuf;
+ }
+
+ pLogger->pInt->cbRingBufUnflushed = 0;
+
+ /*
+ * Figure out whether there are one or two segments that needs writing,
+ * making the last segment is terminated. (The first is always
+ * terminated because of the eye-catcher at the end of the buffer.)
+ */
+ if (cchUnflushed == 0)
+ return;
+ pszBuf[offCur] = '\0';
+ if (cchUnflushed >= cchBuf)
+ {
+ pszFirst = &pszBuf[offCur + 1];
+ cchFirst = cchAfter ? cchAfter - 1 : 0;
+ pszSecond = pszBuf;
+ cchSecond = offCur;
+ pszPreamble = "\n*FLUSH RING BUF*\n";
+ cchPreamble = sizeof("\n*FLUSH RING BUF*\n") - 1;
+ }
+ else if ((size_t)cchUnflushed <= offCur)
+ {
+ cchFirst = (size_t)cchUnflushed;
+ pszFirst = &pszBuf[offCur - cchFirst];
+ /*
pszSecond = "";
chSecond = 0;
pszPreamble = "";
chPreamble = 0;
}
else
{
    chFirst = (size_t)cchUnflushed - offCur;
    pszFirst = &pszBuf[cchBuf - cchFirst];
    pszSecond = pszBuf;
    chSecond = offCur;
    pszPreamble = "";
    chPreamble = 0;
}

/*
 * Write the ring buffer to all other destinations.
 */
if (pLogger->fDestFlags & RTLOGDEST_USER)
{
    if (cchPreamble)
        RTLogWriteUser(pszPreamble, cchPreamble);
    if (cchFirst)
        RTLogWriteUser(pszFirst, cchFirst);
    if (cchSecond)
        RTLogWriteUser(pszSecond, cchSecond);
}
if (pLogger->fDestFlags & RTLOGDEST_DEBUGGER)
{
    if (cchPreamble)
        RTLogWriteDebugger(pszPreamble, cchPreamble);
    if (cchFirst)
        RTLogWriteDebugger(pszFirst, cchFirst);
    if (cchSecond)
        RTLogWriteDebugger(pszSecond, cchSecond);
}
#if defined IN_RING3
if (pLogger->fDestFlags & RTLOGDEST_FILE)
{
    if (pLogger->pInt->hFile != NIL_RTFILE)
    {
        if (cchPreamble)
            RTFileWrite(pLogger->pInt->hFile, pszPreamble, cchPreamble, NULL);
        if (cchFirst)
            RTFileWrite(pLogger->pInt->hFile, pszFirst, cchFirst, NULL);
        if (cchSecond)
RTFileWrite(pLogger->pInt->hFile, pszSecond, cchSecond, NULL);
+ if (pLogger->fFlags & RTLOGFLAGS_FLUSH)
    RTFileFlush(pLogger->pInt->hFile);
+
+ if (pLogger->pInt->cHistory)
    pLogger->pInt->cbHistoryFileWritten += cchFirst + cchSecond;
+
+}
+
+ if (pLogger->fDestFlags & RTLOGDEST_STDOUT)
+ {
+    if (cchPreamble)
        RTLogWriteStdOut(pszPreamble, cchPreamble);
+    if (cchFirst)
        RTLogWriteStdOut(pszFirst, cchFirst);
+    if (cchSecond)
        RTLogWriteStdOut(pszSecond, cchSecond);
+ }
+
+ if (pLogger->fDestFlags & RTLOGDEST_STDERR)
+ {
+    if (cchPreamble)
        RTLogWriteStdErr(pszPreamble, cchPreamble);
+    if (cchFirst)
        RTLogWriteStdErr(pszFirst, cchFirst);
+    if (cchSecond)
        RTLogWriteStdErr(pszSecond, cchSecond);
+ }
+
+ if (defined(IN_RING0) && !defined(LOG_NO_COM))
+ if (pLogger->fDestFlags & RTLOGDEST_COM)
+ {
+    if (cchPreamble)
        RTLogWriteCom(pszPreamble, cchPreamble);
+    if (cchFirst)
        RTLogWriteCom(pszFirst, cchFirst);
+    if (cchSecond)
        RTLogWriteCom(pszSecond, cchSecond);
+ }
int rc;
size_t offInternal;
size_t cbLogger;
PRTLOGGER pLogger;

/*
 * Validate input.
 */
if ( (cGroups && !papszGroups)
    || !VALID_PTR(ppLogger) )
{
    AssertMsgFailed("Invalid parameters!
");
    return VERR_INVALID_PARAMETER;
}
*ppLogger = NULL;

AssertMsgReturn(cHistory < _1M, ("%#x", cHistory), VERR_OUT_OF_RANGE);
/*
 * Allocate a logger instance.
 */
offInternal = RT_OFFSETOF(RTLOGGER, afGroups[cGroups]);
offInternal = RT_ALIGN_Z(offInternal, sizeof(uint64_t));
cbLogger = offInternal + sizeof(RTLOGGERINTERNAL);
if (fFlags & RTLOGFLAGS_RESTRICT_GROUPS)
    cbLogger += cGroups * sizeof(uint32_t);
pLogger = (PRTLOGGER)RTMemAllocZVar(cbLogger);
if (pLogger)
{
    uint8_t *pu8Code;
    pLogger->u32Magic       = RTLOGGER_MAGIC;
    pLogger->cGroups        = cGroups;
    pLogger->fFlags         = fFlags;
    pLogger->fDestFlags     = fDestFlags;
    pLogger->pInt           = (PRTLOGGERINTERNAL)((uintptr_t)pLogger + offInternal);
    pLogger->pInt->u32Revision    = RTLOGGERINTERNAL_REV;
    pLogger->pInt->cbSelf       = sizeof(RTLOGGERINTERNAL);
    pLogger->pInt->hSpinMtx     = NIL_RTSEMSPINMUTEX;
    pLogger->pInt->pfnFlush     = NULL;
    pLogger->pInt->pfnPrefix    = NULL;
    pLogger->pInt->pvPrefixUserArg = NULL;
    pLogger->pInt->afPadding1[0] = false;
    pLogger->pInt->afPadding1[1] = false;
    pLogger->pInt->fCreated     = false;
    pLogger->pInt->cMaxGroups   = cGroups;
+ pLogger->pInt->papszGroups = papszGroups;
+ if (fFlags & RTLOGFLAGS_RESTRICT_GROUPS)
+     pLogger->pInt->pacEntriesPerGroup = (uint32_t *)(pLogger->pInt + 1);
+ else
+     pLogger->pInt->pacEntriesPerGroup = NULL;
+ pLogger->pInt->cMaxEntriesPerGroup = UINT32_MAX;
+#ifdef IN_RING3
+ pLogger->pInt->pfnPhase = pfnPhase;
+ pLogger->pInt->hFile = NIL_RTFILE;
+ pLogger->pInt->cHistory = cHistory;
+ if (cbHistoryFileMax == 0)
+     pLogger->pInt->cbHistoryFileMax = UINT64_MAX;
+ else
+     pLogger->pInt->cbHistoryFileMax = cbHistoryFileMax;
+ if (cSecsHistoryTimeSlot == 0)
+     pLogger->pInt->cSecsHistoryTimeSlot = UINT32_MAX;
+ else
+     pLogger->pInt->cSecsHistoryTimeSlot = cSecsHistoryTimeSlot;
+#else /* !IN_RING3 */
+ RT_NOREF_PV(pfnPhase); RT_NOREF_PV(cHistory); RT_NOREF_PV(cbHistoryFileMax);
+ RT_NOREF_PV(cSecsHistoryTimeSlot);
+#endif /* !IN_RING3 */
+ if (pszGroupSettings)
+     RTLogGroupSettings(pLogger, pszGroupSettings);
+
+ +#if defined(RT_ARCH_X86) && (!defined(LOG_USE_C99) || !defined(RT_WITHOUT_EXEC_ALLOC))
+ /*
+  * Emit wrapper code.
+  */
+ pu8Code = (uint8_t *)RTMemExecAlloc(64);
+ if (pu8Code)
+ {
+     pLogger->pfnLogger = *(PFNRTLOGGER*)&pu8Code;
+     *pu8Code++ = 0x68; /* push imm32 */
+     *(void **)pu8Code = pLogger;
+     pu8Code += sizeof(void *)
+     *pu8Code++ = 0xe8; /* call rel32 */
+     *(uint32_t *)pu8Code = (uintptr_t)RTLogLogger - ((uintptr_t)pu8Code + sizeof(uint32_t));
+     pu8Code += sizeof(uint32_t);
+     *pu8Code++ = 0x8d; /* lea esp, [esp + 4] */
+     *pu8Code++ = 0x64;
+     *pu8Code++ = 0xc3; /* ret near */
+     AssertMsg((uintptr_t)pu8Code - (uintptr_t)pLogger->pfnLogger <= 64,
+             ("Wrapper assembly is too big! %d bytes\n", (uintptr_t)pu8Code - (uintptr_t)pLogger->pfnLogger));
+     rc = VINF_SUCCESS;
+ }
+ else
+ {  
+     rc = VERR_NO_MEMORY;
+ }  
+   ifdef RT_OS_LINUX
+     /* Most probably SELinux causing trouble since the larger RTMemAlloc succeeded. */
+     RTErrInfoSet(pErrInfo, rc, N_("mmap(PROT_WRITE | PROT_EXEC) failed -- SELinux?"));
+ }  
+ endif /* X86 wrapper code*/
+ {  
+   ifdef IN_RING3 /* files and env.vars. are only accessible when in R3 at the present time. */
+     /*
+     * Format the filename.
+     */
+     if (pszFilenameFmt)
+     {  
+         /** @todo validate the length, fail on overflow. */
+         RTStrPrintfV(pLogger->pInt->szFilename, sizeof(pLogger->pInt->szFilename), pszFilenameFmt, args);
+         if (pLogger->pInt->szFilename[0])
+             pLogger->fDestFlags |= RTLOGDEST_FILE;
+     }
+     
+     /*
+     * Parse the environment variables.
+     */
+     if (pszEnvVarBase)
+     {  
+         /* make temp copy of environment variable base. */
+         size_t cchEnvVarBase = strlen(pszEnvVarBase);
+         char *pszEnvVar = (char *)alloca(cchEnvVarBase + 16);
+         memcpy(pszEnvVar, pszEnvVarBase, cchEnvVarBase);
+         strcpy(pszEnvVar + cchEnvVarBase, "_DEST");
+         const char *pszValue = RTEnvGet(pszEnvVar);
+         if (pszValue)
+             RTLogDestinations(pLogger, pszValue);
+         
+         /*
+         * The flags.
+         */
+         strcpy(pszEnvVar + cchEnvVarBase, "_FLAGS");
+         pszValue = RTEnvGet(pszEnvVar);
+         if (pszValue)
+             RTLogFlags(pLogger, pszValue);  
+     }  
+ }
/*
 * The group settings.
*/
pszEnvVar[chEnvVarBase] = '\0';
pszValue = RTEnvGet(pszEnvVar);
if (pszValue)
    RTLogGroupSettings(pLogger, pszValue);
}
#endif /* !IN_RING3 */

/*
 * Open the destination(s).
*/
rc = VINF_SUCCESS;
if ((pLogger->fDestFlags & (RTLOGDEST_F_DELAY_FILE | RTLOGDEST_FILE)) ==
    RTLOGDEST_F_DELAY_FILE)
    pLogger->fDestFlags &= ~RTLOGDEST_F_DELAY_FILE;
#endif /* !IN_RING3 */

if ((pLogger->fDestFlags & RTLOGDEST_RINGBUF) && RT_SUCCESS(rc))
    rc = rtLogRingBufAdjust(pLogger, pLogger->pInt->cbRingBuf, true /*fForce*/);

/*
 * Create mutex and check how much it counts when entering the lock
 * so that we can report the values for RTLOGFLAGS_PREFIX_LOCK_COUNTS.
*/

if (RT_SUCCESS(rc))
{
    rc = RTSemSpinMutexCreate(&pLogger->pInt->hSpinMtx,
        RTSEMSPINMUTEX_FLAGS_IRQ_SAFE);
    if (RT_SUCCESS(rc))
    {
        RTTHREAD Thread = RTThreadSelf();
        if (Thread != NIL_RTTHREAD)
        {
            int32_t c = RTLockValidatorWriteLockGetCount(Thread);
            RTSemSpinMutexRequest(pLogger->pInt->hSpinMtx);
            c = RTLockValidatorWriteLockGetCount(Thread) - c;
            RTSemSpinMutexRelease(pLogger->pInt->hSpinMtx);
            ASMAtomicWriteU32(&g_cLoggerLockCount, c);
        }
    }
}
/* Use the callback to generate some initial log contents. */
Assert(VALID_PTR(pLogger->pInt->pfnPhase) || pLogger->pInt->pfnPhase == NULL);
if (pLogger->pInt->pfnPhase)
    pLogger->pInt->pfnPhase(pLogger, RTLOGPHASE_BEGIN, rtlogPhaseMsgNormal);
#endif
pLogger->pInt->fCreated = true;
*ppLogger = pLogger;
return VINF_SUCCESS;
}

RTErrInfoSet(pErrInfo, rc, N_("failed to create semaphore"));
}
#ifdef IN_RING3
RTFileClose(pLogger->pInt->hFile);
#endif
#ifdef LOG_USE_C99 && defined(RT_WITHOUT_EXEC_ALLOC)
RTMemFree(*(void **)&pLogger->pfnLogger);
#else
RTMemExecFree(*(void **)&pLogger->pfnLogger, 64);
#endif
RTMemFree(pLogger);
rc = VERR_NO_MEMORY;
return rc;
}
RT_EXPORT_SYMBOL(RTLogCreateExV);

RTDECL(int) RTLogCreate(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings,
                        const char *pszEnvVarBase, unsigned cGroups, const char * const * papszGroups,
                        uint32_t fDestFlags, const char *pszFilenameFmt, ...)
{
    va_list args;
    int rc = VERR_NO_MEMORY;
    va_start(args, pszFilenameFmt);
    rc = RTLogCreateExV(ppLogger, fFlags, pszGroupSettings, 
                        pszEnvVarBase, cGroups, papszGroups, 
                        fDestFlags, NULL /*pfnPhase*/ , 0 /*cHistory*/ , 0 /*cbHistoryFileMax*/ , 0 /*cSecsHistoryTimeSlot*/ ,
                        NULL /*pErrInfo*/ , pszFilenameFmt, args);
    va_end(args);
    return rc;
}
+RT_EXPORT_SYMBOL(RTLogCreate);
+
+RTDECL(int) RTLogCreateEx(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings,
+    const char *pszEnvVarBase, unsigned cGroups, const char * const * papszGroups,
+    uint32_t fDestFlags, PFNRTLOGPHASE pfnPhase, uint32_t cHistory,
+    uint64_t cbHistoryFileMax, uint32_t cSecsHistoryTimeSlot,
+    PRTErrInfo pErrInfo, const char *pszFilenameFmt, ...)
+
+{
  va_list args;
  int rc;

  va_start(args, pszFilenameFmt);
  rc = RTLogCreateExV(ppLogger, fFlags, pszGroupSettings, pszEnvVarBase, cGroups, papszGroups,
    fDestFlags, pfnPhase, cHistory, cbHistoryFileMax, cSecsHistoryTimeSlot,
    pErrInfo, pszFilenameFmt, args);
  va_end(args);
  return rc;
+
}+RT_EXPORT_SYMBOL(RTLogCreateEx);
+
+/**
+ * Destroys a logger instance.
+ *
+ * The instance is flushed and all output destinations closed (where applicable).
+ *
+ * @returns iprt status code.
+ * @param   pLogger             The logger instance which close destroyed. NULL is fine.
+ */
+RTDECL(int) RTLogDestroy(PRTLOGGER pLogger)
+
+{
  int rc;
  uint32_t iGroup;
  RTSEMSPINMUTEX hSpinMtx;

  /*
  * Validate input.
  */
  if (!pLogger)
    return VINF_SUCCESS;
  AssertPtrReturn(pLogger, VERR_INVALID_POINTER);
  AssertReturn(pLogger->u32Magic == RTLOGGER_MAGIC, VERR_INVALID_MAGIC);
  AssertPtrReturn(pLogger->pInt, VERR_INVALID_POINTER);

  /*
  * Acquire logger instance sem and disable all logging. (paranoia)
  */
  ...
rc = rtlogLock(pLogger);
AssertMsgRCReturn(rc, ("%Rrc\n", rc), rc);

pLogger->fFlags |= RTLOGFLAGS_DISABLED;
iGroup = pLogger->cGroups;
while (iGroup-- > 0)
pLogger->afGroups[iGroup] = 0;

/*
 * Flush it.
 */
rtlogFlush(pLogger, false /*fNeedSpace*/);

#ifdef IN_RING3
/*
 * Add end of logging message.
 */
if (   (pLogger->fDestFlags & RTLOGDEST_FILE)
    && pLogger->pInt->hFile != NIL_RTFILE)
pLogger->pInt->pfnPhase(pLogger, RTLOGPHASE_END, rtlogPhaseMsgLocked);

/*
 * Close output stuffs.
 */
if (pLogger->pInt->hFile != NIL_RTFILE)
{
    int rc2 = RTFileClose(pLogger->pInt->hFile);
    AssertRC(rc2);
    if (RT_FAILURE(rc2) && RT_SUCCESS(rc))
        rc = rc2;
    pLogger->pInt->hFile = NIL_RTFILE;
}
#endif

/*
 * Free the mutex, the wrapper and the instance memory.
 */
hSpinMtx = pLogger->pInt->hSpinMtx;
pLogger->pInt->hSpinMtx = NIL_RTSEMSPINMUTEX;
if (hSpinMtx != NIL_RTSEMSPINMUTEX)
{
    int rc2;
    RTSemSpinMutexRelease(hSpinMtx);
    rc2 = RTSemSpinMutexDestroy(hSpinMtx);
    AssertRC(rc2);
    if (RT_FAILURE(rc2) && RT_SUCCESS(rc))
        rc = rc2;
}
if (pLogger->pfnLogger)
{
    if (defined(LOG_USE_C99) && defined(RT_WITHOUT_EXEC_ALLOC))
        RTMemFree(*(void **)&pLogger->pfnLogger);
    else
        RTMemExecFree(*(void **)&pLogger->pfnLogger, 64);
    pLogger->pfnLogger = NULL;
}
RTMemFree(pLogger);

return rc;
}
RT_EXPORT_SYMBOL(RTLogDestroy);

/**
 * Create a logger instance clone for RC usage.
 *
 * @returns iprt status code.
 *
 * @param   pLogger             The logger instance to be cloned.
 * @param   pLoggerRC           Where to create the RC logger instance.
 * @param   cbLoggerRC          Amount of memory allocated to for the RC logger
 *                              instance clone.
 * @param   pfnLoggerRCPtr      Pointer to logger wrapper function for this
 *                              instance (RC Ptr).
 * @param   pfnFlushRCPtr       Pointer to flush function (RC Ptr).
 * @param   fFlags              Logger instance flags, a combination of the RTLOGFLAGS_* values.
 */
+RTDECL(int) RTLogCloneRC(PRTLOGGER pLogger, PRTLOGGERRC pLoggerRC, size_t cbLoggerRC,
                         RTRCPTR pfnLoggerRCPtr, RTRCPTR pfnFlushRCPtr, uint32_t fFlags)
+
+/*
 * Validate input.
 + */
+ if (pLoggerRC
    || !pfnFlushRCPtr
    || !pfnLoggerRCPtr)
+    AssertMsgFailed("Invalid parameters!
");
+    return VERR_INVALID_PARAMETER;
+
+ if (cbLoggerRC < sizeof(*pLoggerRC))
+    AssertMsgFailed("%d min=%dn", cbLoggerRC, sizeof(*pLoggerRC));
+    return VERR_INVALID_PARAMETER;
 */
+ */
+ */
+ */
+ * Initialize GC instance.
+ */
+ pLoggerRC->offScratch = 0;
+ pLoggerRC->fPendingPrefix = false;
+ pLoggerRC->pfnLogger = pfnLoggerRCPtr;
+ pLoggerRC->pfnFlush = pfnFlushRCPtr;
+ pLoggerRC->u32Magic = RTLOGGERRC_MAGIC;
+ pLoggerRC->fFlags = fFlags | RTLOGFLAGS_DISABLED;
+ pLoggerRC->cGroups = 1;
+ pLoggerRC->afGroups[0] = 0;
+
+ /*
+ * Resolve defaults.
+ */
+ if (!pLogger)
+ {
+     pLogger = RTLogDefaultInstance();
+     if (!pLogger)
+         return VINF_SUCCESS;
+ }
+
+ /*
+ * Check if there's enough space for the groups.
+ */
+ if (cbLoggerRC < (size_t)RT_OFFSETOF(RTLOGGERRC, afGroups[pLogger->cGroups]))
+ {
+     AssertMsgFailed("%d req=%d cGroups=%d\n", cbLoggerRC, RT_OFFSETOF(RTLOGGERRC,
+     afGroups[pLogger->cGroups]), pLogger->cGroups);
+     return VERR_BUFFER_OVERFLOW;
+ }
+ memcpy(&pLoggerRC->afGroups[0], &pLogger->afGroups[0], pLogger->cGroups * sizeof(pLoggerRC-
+     afGroups[0]));
+ pLoggerRC->cGroups = pLogger->cGroups;
+
+ /*
+ * Copy bits from the HC instance.
+ */
+ pLoggerRC->fPendingPrefix = pLogger->pInt->fPendingPrefix;
+ pLoggerRC->fFlags = pLogger->fFlags;
+
+ /*
+ * Check if we can remove the disabled flag.
+ */
+ if (    pLogger->fDestFlags
+        &&  !((pLogger->fFlags | fFlags) & RTLOGFLAGS_DISABLED))
+ pLoggerRC->fFlags &= ~RTLOGFLAGS_DISABLED;
+ return VINF_SUCCESS;
+
+}  
+RT_EXPORT_SYMBOL(RTLogCloneRC);
+
+/*
+ * Flushes a RC logger instance to a R3 logger.
+ *
+ *
+ * @returns iprt status code.
+ * @param   pLogger     The R3 logger instance to flush pLoggerRC to. If NULL
+ *                      the default logger is used.
+ * @param   pLoggerRC   The RC logger instance to flush.
+ */
+RTDECL(void) RTLogFlushRC(PRTLOGGER pLogger, PRTLOGGERRC pLoggerRC)
+{
+    /*
+     * Resolve defaults.
+     */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+        {
+            pLoggerRC->offScratch = 0;
+            return;
+        }
+    }
+    
+    /*
+     * Any thing to flush?
+     */
+    if (    pLogger->offScratch
+        ||  pLoggerRC->offScratch)
+    {
+        /*
+         * Acquire logger instance sem.
+         */
+        int rc = rtlogLock(pLogger);
+        if (RT_FAILURE(rc))
+            return;
+        
+        /*
+         * Write whatever the GC instance contains to the HC one, and then
+         * flush the HC instance.
+         */
+      if (pLoggerRC->offScratch)
+      {
+        rtLogOutput(pLogger, pLoggerRC->achScratch, pLoggerRC->offScratch);
+        rtLogOutput(pLogger, NULL, 0);
+        pLoggerRC->offScratch = 0;
+      }
+      
+      /*
+       * Release the semaphore.
+       */
+      rtlogUnlock(pLogger);
+    }
+  }
+
+  RT_EXPORT_SYMBOL(RTLogFlushRC);
+
+  /***********************************************************************/
+  #ifdef IN_RING3
+  /***********************************************************************/
+  #endif
+  #ifdef RTDECL(inline)
+  #define RT_DECL_ARG1(type,...) rtlogCreateForR0(type) RTDECL_ARG1(__VA_ARGS__,)
+  #else
+  #define RT_DECL_ARG1(type,...) rtlogCreateForR0(type) RTDECL_ARG1(__VA_ARGS__,)
+  #endif
+  #ifdef RTDECL(inline)
+  #define RTDECL(type) rtlogCreateForR0(type) RTDECL(type) __VA_ARGS__
+  #else
+  #define RTDECL(type) rtlogCreateForR0(type) RTDECL(type) __VA_ARGS__
+  #endif
+  /***********************************************************************/
+  /***********************************************************************/
+  RTDECL(int) RTLogCreateForR0(PRTLOGGER pLogger, size_t cbLogger,
+                              RTR0PTR pLoggerR0Ptr, RTR0PTR pfnLoggerR0Ptr, RTR0PTR pfnFlushR0Ptr,
+                              uint32_t fFlags, uint32_t fDestFlags)
+  {
+    /**********************************************************************/
+    /* Validate input.*/
+    /*
+    + AssertPtrReturn(pLogger, VERR_INVALID_PARAMETER);
+    + size_t const cbRequired = sizeof(*pLogger) + RTLOGGERINTERNAL_R0_SIZE;
+    + AssertReturn(cbLogger >= cbRequired, VERR_BUFFER_OVERFLOW);
+    + AssertReturn(pLoggerR0Ptr != NIL_RTR0PTR, VERR_INVALID_PARAMETER);
+    + AssertReturn(pfnLoggerR0Ptr != NIL_RTR0PTR, VERR_INVALID_PARAMETER);
+    +
+    + /*
+    + * Initialize the ring-0 instance.
+    + */
+    + pLogger->achScratch[0]  = 0;
+    + pLogger->offScratch     = 0;
+    + pLogger->pfnLogger      = (PFNRTLOGGER)pfnLoggerR0Ptr;
+    + pLogger->fFlags         = fFlags;
+    + pLogger->fDestFlags     = fDestFlags & ~RTLOGDEST_FILE;
+    + pLogger->pInt           = NULL;
+    + pLogger->cGroups        = 1;
+    + pLogger->afGroups[0]    = 0;
+    +
+    + uint32_t cMaxGroups     = (uint32_t)((cbLogger - cbRequired) / sizeof(pLogger->afGroups[0]));
+    + if ((fFlags & RTLOGFLAGS_RESTRICT_GROUPS)
+    + cMaxGroups /= 2;
+    + PRTLOGGERINTERNAL pInt;
+    + for (;);
+    +
+    */
+    /**********************************************************************/
+ AssertReturn(cMaxGroups > 0, VERR_BUFFER_OVERFLOW);
+ pInt = (PRTLOGGERINTERNAL)&pLogger->afGroups[cMaxGroups];
+ if (!((uintptr_t)pInt & (sizeof(uint64_t) - 1)))
+     break;
+     cMaxGroups--;
+ }
+ pLogger->pInt = (PRTLOGGERINTERNAL)(pLoggerR0Ptr + (uintptr_t)pInt - (uintptr_t)pLogger);
+ pInt->uRevision = RTLOGGERINTERNAL_REV;
+ pInt->cbSelf = RTLOGGERINTERNAL_R0_SIZE;
+ pInt->hSpinMtx = NIL_RTSEMSPINMUTEX; /* Not serialized. */
+ pInt->pfnFlush = (PFNRTLOGFLUSH)pfnFlushR0Ptr;
+ pInt->pfnPrefix = NULL;
+ pInt->pvPrefixUserArg = NULL;
+ pInt->pfnPrefix = NULL;
+ pInt->pfnFlush = (PFNRTLOGFLUSH)pfnFlushR0Ptr;
+ pInt->pfnPrefix = NULL;
+ pInt->pvPrefixUserArg = NULL;
+ pInt->fPendingPrefix = false;
+ pInt->cMaxGroups = cMaxGroups;
+ pInt->papszGroups = NULL;
+ pInt->cMaxEntriesPerGroup = UINT32_MAX;
+ if (fFlags & RTLOGFLAGS_RESTRICT_GROUPS)
+ {
+    memset(pInt + 1, 0, sizeof(uint32_t) * cMaxGroups);
+    pInt->pacEntriesPerGroup = (uint32_t *)(pLogger->pInt + 1);
+ }
+ else
+     pInt->pacEntriesPerGroup = NULL;
+
+ pInt->fCreated = true;
+ pLogger->u32Magic = RTLOGGER_MAGIC;
+ return VINF_SUCCESS;
+
+ /*
+ RTDECL(size_t) RTLogCalcSizeForR0(uint32_t cGroups, uint32_t fFlags)
+ {
+     size_t cb = RT_OFFSETOF(RTLOGGER, afGroups[cGroups]);
+     cb = RT_ALIGN_Z(cb, sizeof(uint64_t));
+     cb += sizeof(RTLOGGERINTERNAL);
+     if (fFlags & RTLOGFLAGS_RESTRICT_GROUPS)
+         cb += sizeof(uint32_t) * cGroups;
+     return cb;
+ }
+ */
+ RT_EXPORT_SYMBOL(RTLogCreateForR0);
+
+ /*
+ RTDECL(int) RTLogCopyGroupsAndFlagsForR0(PRTLOGGER pDstLogger, RTR0PTR pDstLoggerR0Ptr,
+                                          PCRTLOGGER pSrcLogger, uint32_t fFlagsOr, uint32_t fFlagsAnd)
+ {
+     /*
+ */
+ */
+ * Validate input.
+ */
+ AssertPtrReturn(pDstLogger, VERR_INVALID_PARAMETER);
+ AssertPtrNullReturn(pSrcLogger, VERR_INVALID_PARAMETER);
+
+ /*
+ * Resolve defaults.
+ */
+ if (!pSrcLogger)
+ {
+     pSrcLogger = RTLogDefaultInstance();
+     if (!pSrcLogger)
+     {
+         pDstLogger->fFlags |= RTLOGFLAGS_DISABLED | fFlagsOr;
+         pDstLogger->cGroups = 1;
+         pDstLogger->afGroups[0] = 0;
+         return VINF_SUCCESS;
+     }
+ }
+
+ /*
+ * Copy flags and group settings.
+ */
+ pDstLogger->fFlags = (pSrcLogger->fFlags & fFlagsAnd & ~RTLOGFLAGS_RESTRICT_GROUPS) | fFlagsOr;
+
+ PRTLOGGERINTERNAL   pDstInt = (PRTLOGGERINTERNAL)((uintptr_t)pDstLogger->pInt -
+ pDstLoggerR0Ptr + (uintptr_t)pDstLogger);
+ int                 rc = VINF_SUCCESS;
+ uint32_t            cGroups = pSrcLogger->cGroups;
+ if (cGroups > pDstInt->cMaxGroups)
+ {
+     AssertMsgFailed(("cMaxGroups=%zd cGroups=%zd (min size %d)\n", pDstInt->cMaxGroups,
+     pSrcLogger->cGroups, RT_OFFSETOF(RTLOGGER, afGroups[pSrcLogger->cGroups]) +
+     RTLOGGERINTERNAL_R0_SIZE));
+     rc = VERR_INVALID_PARAMETER;
+     cGroups = pDstInt->cMaxGroups;
+ }
+ memcpy(&pDstLogger->afGroups[0], &pSrcLogger->afGroups[0], cGroups * sizeof(pDstLogger-
+ >afGroups[0]));
+ pDstLogger->cGroups = cGroups;
+
+ return rc;
+
+ /*RT_EXPORT_SYMBOL(RTLogCopyGroupsAndFlagsForR0);
+ +
+ +RTDECL(int) RTLogSetCustomPrefixCallbackForR0(PRTLOGGER pLogger, RTR0PTR pLoggerR0Ptr,

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RTR0PTR pfnCallbackR0Ptr, RTR0PTR pvUserR0Ptr)
+
+ AssertPtrReturn(pLogger, VERR_INVALID_POINTER);
+ AssertReturn(pLogger->u32Magic == RTLOGGER_MAGIC, VERR_INVALID_MAGIC);
+
+ /*
+ * Do the work.
+ */
+ PRTLOGGERINTERNAL pInt = (PRTLOGGERINTERNAL)((uintptr_t)pLogger->pInt - pLoggerR0Ptr +
+ (uintptr_t)pLogger);
+ AssertReturn(pInt->uRevision == RTLOGGERINTERNAL_REV, VERR_LOG_REVISION_MISMATCH);
+ pInt->pvPrefixUserArg = (void *)pvUserR0Ptr;
+ pInt->pfnPrefix      = (PFNRTLOGPREFIX)pfnCallbackR0Ptr;
+
+ return VINF_SUCCESS;
+
+RT_EXPORT_SYMBOL(RTLogSetCustomPrefixCallbackForR0);
+
+RTDECL(void) RTLogFlushR0(PRTLOGGER pLogger, PRTLOGGER pLoggerR0)
+
+ /* Resolve defaults. */
+ if (!pLogger)
+ {
+   pLogger = RTLogDefaultInstance();
+   if (!pLogger)
+   {
+     /* flushing to "/dev/null". */
+     if (pLoggerR0->offScratch)
+       pLoggerR0->offScratch = 0;
+     return;
+   }
+ }
+
+ /* Anything to flush? */
+ if (pLoggerR0->offScratch
+     || pLogger->offScratch)
+ {
+   /* Acquire logger semaphores. */
+   int rc = rtlogLock(pLogger);
+   if (RT_FAILURE(rc))
+     return;
+   if (RT_SUCCESS(rc))
+     /*
+      *
/*
* Write whatever the GC instance contains to the HC one, and then
* flush the HC instance.
*/
if (pLoggerR0->offScratch)
{
    rtLogOutput(pLogger, pLoggerR0->achScratch, pLoggerR0->offScratch);
    rtLogOutput(pLogger, NULL, 0);
    pLoggerR0->offScratch = 0;
}
rtlogUnlock(pLogger);

+RT_EXPORT_SYMBOL(RTLogFlushR0);
+
+## endif /* IN_RING3 */
+
+/*
* Flushes the buffer in one logger instance onto another logger.
* @returns iprt status code.
* @param   pSrcLogger   The logger instance to flush.
* @param   pDstLogger   The logger instance to flush onto.
* If NULL the default logger will be used.
*/
+RTDECL(void) RTLogFlushToLogger(PRTLOGGER pSrcLogger, PRTLOGGER pDstLogger)
+
+/*
+ * Resolve defaults.
+ */
+ if (!pDstLogger)
+ {
+    pDstLogger = RTLogDefaultInstance();
+    if (!pDstLogger)
+    {
+        /* flushing to "/dev/null". */
+        if (pSrcLogger->offScratch)
+        {
+            int rc = rtlogLock(pSrcLogger);
+            if (RT_SUCCESS(rc))
+            {
+                pSrcLogger->offScratch = 0;
+                rtlogUnlock(pSrcLogger);
+            }
+        }
+    }
+}
/* Any thing to flush? */
if (pSrcLogger->offScratch || pDstLogger->offScratch)
{
    /* Acquire logger semaphores. */
    int rc = rtlogLock(pDstLogger);
    if (RT_FAILURE(rc))
        return;
    rc = rtlogLock(pSrcLogger);
    if (RT_SUCCESS(rc))
    {
        /* Write whatever the GC instance contains to the HC one, and then */
        /* flush the HC instance. */
        if (pSrcLogger->offScratch)
        {
            rtLogOutput(pDstLogger, pSrcLogger->achScratch, pSrcLogger->offScratch);
            rtLogOutput(pDstLogger, NULL, 0);
            pSrcLogger->offScratch = 0;
        }
        /* Release the semaphores. */
        rtlogUnlock(pSrcLogger);
    }
    rtlogUnlock(pDstLogger);
}

+RT_EXPORT_SYMBOL(RTLogFlushToLogger);

/**
 * Sets the custom prefix callback.
 * @returns IPRT status code.
 * @param   pLogger     The logger instance.
 * @param   pfnCallback The callback.
 */
+ * @param   pvUser    The user argument for the callback.
+ * */
+RTDECL(int) RTLogSetCustomPrefixCallback(PRTLOGGER pLogger, PFNRTLOGPREFIX pfnCallback, void *pvUser)
+{
+    /*
+     * Resolve defaults.
+     */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+            return VINF_SUCCESS;
+    }
+    AssertReturn(pLogger->u32Magic == RTLOGGER_MAGIC, VERR_INVALID_MAGIC);
+    /*
+     * Do the work.
+     */
+    rtlogLock(pLogger);
+    pLogger->pInt->pvPrefixUserArg = pvUser;
+    pLogger->pInt->pfnPrefix       = pfnCallback;
+    rtlogUnlock(pLogger);
+    return VINF_SUCCESS;
+}
+RT_EXPORT_SYMBOL(RTLogSetCustomPrefixCallback);
+
+/**
+ * Matches a group name with a pattern mask in an case insensitive manner (ASCII).
+ * @returns true if matching and *ppachMask set to the end of the pattern.
+ * @returns false if no match.
+ * @param   pszGrp    The group name.
+ * @param   ppachMask        Pointer to the pointer to the mask. Only wildcard supported is '*'.
+ * @param   cchMask    The length of the mask, including modifiers. The modifiers is why
+ *                      we update *ppachMask on match.
+ */
+static bool rtlogIsGroupMatching(const char *pszGrp, const char **ppachMask, size_t cchMask)
+{
+    const char *pachMask;
+    if (!pszGrp || !*pszGrp)
+        return false;
+    pachMask = *ppachMask;
+    for (; ;)
+    {
+        /*
+         * "\"*\" in the format of Regular Expression.
+         */
+        if (*pachMask == '*')
+            ++pachMask;
+        else if (tolower(*pachMask) == tolower(*pszGrp))
+            ++pszGrp;
+        else
+            break;
+    }
+    *ppachMask = pachMask;
+    return true;
+}
if (RT_C_TO_LOWER(pszGrp) != RT_C_TO_LOWER(pachMask))
{
    const char *pszTmp;

    /*
     * Check for wildcard and do a minimal match if found.
     */
    if (*pachMask != '*')
        return false;

    /* eat '*'s. */
    do  pachMask++;
    while (--cchMask && *pachMask == '*');

    /* is there more to match? */
    if (    !cchMask
        ||  *pachMask == '.'
        ||  *pachMask == '=')
        break; /* we're good */

    /* do extremely minimal matching (fixme) */
    pszTmp = strchr(pszGrp, RT_C_TO_LOWER(pachMask));
    if (!pszTmp)
        pszTmp = strchr(pszGrp, RT_C_TO_UPPER(pachMask));
    if (!pszTmp)
        return false;
    pszGrp = pszTmp;
    continue;
}

/* done? */
if (!*++pszGrp)
{
    /* trailing wildcard is ok. */
    do
    {
        pachMask++;
        cchMask--;
    } while (cchMask && *pachMask == '*');
    if (    !cchMask
        ||  *pachMask == '.'
        ||  *pachMask == '=')
        break; /* we're good */
    return false;
}

if (!--cchMask)
    return false;
/* match */
    *ppachMask = pachMask;
    return true;
+)
+
+/**
+ * Updates the group settings for the logger instance using the specified
+ * specification string.
+ *
+ * @returns iprt status code.
+ * Failures can safely be ignored.
+ * @param   pLogger     Logger instance.
+ * @param   pszValue    Value to parse.
+ */
+RTDECL(int) RTLogGroupSettings(PRTLOGGER pLogger, const char *pszValue)
+{
+  /*
+   * Resolve defaults.
+   */
+  if (!pLogger)
+  {
+    pLogger = RTLogDefaultInstance();
+    if (!pLogger)
+      return VINF_SUCCESS;
+  }
+
+  /*
+   * Iterate the string.
+   */
+  while (*pszValue)
+  {
+    /* Skip prefixes (blanks, ;, + and -). */
+    bool fEnabled = true;
+    char ch;
+    const char *pszStart;
+    unsigned i;
+    size_t cch;
+    while ((ch = pszValue) == '+' || ch == '.' || ch == ':' || ch == 'u' || ch == 'n' || ch == 's')
+      {
+        if (ch == '+' || ch == '.' || ch == ':')
+          fEnabled = ch != ':';
+        /*
+         * Sk
pszValue++;
}
if (!pszValue)
    break;

/*
 * Find end.
 */
pszStart = pszValue;
while ((ch = *pszValue) != '0' && ch != '+' && ch != '-' && ch != ' ' && ch != '	')
    pszValue++;

/*
 * Find the group (ascii case insensitive search).
 * Special group 'all'.
 */
cch = pszValue - pszStart;
if (cch >= 3
    && (pszStart[0] == 'a' || pszStart[0] == 'A')
{
    /*
     * All.
     */
    unsigned fFlags = cch == 3
        ? RTLOGGRPFLAGS_ENABLED | RTLOGGRPFLAGS_LEVEL_1
        : rtlogGroupFlags(&pszStart[3]);
    for (i = 0; i < pLogger->cGroups; i++)
    {
        if (fEnabled)
            pLogger->afGroups[i] |= fFlags;
        else
            pLogger->afGroups[i] &= ~fFlags;
    }
}
else
{
    /* Specific group(s). */
    for (i = 0; i < pLogger->cGroups; i++)
    {
        const char *psz2 = (const char*)pszStart;
        if (rtlogIsGroupMatching(pLogger->pInt->papszGroups[i], &psz2, cch))
        {
            unsigned fFlags = RTLOGGRPFLAGS_ENABLED | RTLOGGRPFLAGS_LEVEL_1;
        }
    }
}
if (*psz2 == '.' || *psz2 == '=')
    fFlags = rlogGroupFlags(psz2);
if (fEnabled)
    pLogger->afGroups[i] |= fFlags;
else
    pLogger->afGroups[i] &= ~fFlags;
} /* for each group */
}
} /* parse specification */

return VINF_SUCCESS;

RT_EXPORT_SYMBOL(RTLogGroupSettings);

/**
 * Interprets the group flags suffix.
 *
 * @returns Flags specified. (0 is possible!)
 * @param   psz     Start of Suffix. (Either dot or equal sign.)
 */
static unsigned rtlogGroupFlags(const char *psz)
{
    unsigned fFlags = 0;

    /*
     * Literal flags.
     */
    while (*psz == '.')
    {
        static struct
            {
                const char *pszFlag;        /* lowercase!! */
                unsigned    fFlag;
            } aFlags[] =
            {
                { "eo",         RTLOGGRPFLAGS_ENABLED   },
                { "enabledonly",RTLOGGRPFLAGS_ENABLED   },
                { "e",          RTLOGGRPFLAGS_ENABLED | RTLOGGRPFLAGS_LEVEL_1 | RTLOGGRPFLAGS_WARN   },
                { "enabled",    RTLOGGRPFLAGS_ENABLED | RTLOGGRPFLAGS_LEVEL_1 | RTLOGGRPFLAGS_WARN   },
                { "l1",         RTLOGGRPFLAGS_LEVEL_1 },
                { "level1",     RTLOGGRPFLAGS_LEVEL_1 },
                { "l",          RTLOGGRPFLAGS_LEVEL_2 },
                { "l2",         RTLOGGRPFLAGS_LEVEL_2 },
unsigned i;
bool fFound = false;
psz++;
for (i = 0; i < RT_ELEMENTS(aFlags) && !fFound; i++)
  {
    const char *psz1 = aFlags[i].pszFlag;
    const char *psz2 = psz;
    while (*psz1 == RT_C_TO_LOWER(*psz2))
      {
        psz1++;
        psz2++;
        if (!*psz1)
          break;
        fFlags |= aFlags[i].fFlag;
        fFound = true;
      }
psz = psz2;
break;

/* stricmp */
/* for each flags */
AssertMsg(fFound, ("%.15s...", psz));
}

/*
 * Flag value.
 */
if (*psz == '=') {
    psz++;
    if (*psz == '~')
        fFlags = ~RTStrToInt32(psz + 1);
    else
        fFlags = RTStrToInt32(psz);
}

return fFlags;
}

/**
 * Helper for RTLogGetGroupSettings.
 */
static int rtLogGetGroupSettingsAddOne(const char *pszName, uint32_t fGroup, char **ppszBuf, size_t *pcchBuf, bool *pfNotFirst)
{

    /* Add the name. */
    size_t cchName = strlen(pszName);
    if (cchName + 1 + *pfNotFirst > *pcchBuf)
        return VERR_BUFFER_OVERFLOW;
    if (*pfNotFirst)
        APPEND_CH(' ');
    else
        *pfNotFirst = true;
    APPEND_PSZ(pszName, cchName);

    /* Only generate mnemonics for the simple+common bits.
     * Flag value.
     */
    if (*psz == '=') {
        psz++;
        if (*psz == '~')
            fFlags = ~RTStrToInt32(psz + 1);
        else
            fFlags = RTStrToInt32(psz);
    }
    return fFlags;
}

static int rtLogGetGroupSettingsAdd(const char *pszName, uint32_t fGroup, const char *pszSettings, size_t cchSettings)
{
    int fFlags = 0;
    char *psz = NULL;
    size_t *pcchBuf = NULL;
    size_t cchName = strlen(pszName);
    if (cchName + 1 + *pfNotFirst > *pcchBuf)
        return VERR_BUFFER_OVERFLOW;
    if (*pfNotFirst)
        APPEND_CH(' ');
    else
        *pfNotFirst = true;
    APPEND_PSZ(pszName, cchName);

    /* Only generate mnemonics for the simple+common bits.
     */
    if (*psz == '=') {
        psz++;
        if (*psz == '~')
            fFlags = ~RTStrToInt32(psz + 1);
        else
            fFlags = RTStrToInt32(psz);
    }
    return fFlags;
}
if (fGroup == (RTLOGGRPFLAGS_ENABLED | RTLOGGRPFLAGS_LEVEL_1))
    /* nothing */;
else if (fGroup == (RTLOGGRPFLAGS_ENABLED | RTLOGGRPFLAGS_LEVEL_1 | RTLOGGRPFLAGS_LEVEL_2 | RTLOGGRPFLAGS_FLOW)
    && *pcchBuf >= sizeof(".e.l.f"))
    APPEND_SZ(".e.l.f");
else if (fGroup == (RTLOGGRPFLAGS_ENABLED | RTLOGGRPFLAGS_LEVEL_1 | RTLOGGRPFLAGS_FLOW)
    && *pcchBuf >= sizeof(".e.f"))
    APPEND_SZ(".e.f");
else if (*pcchBuf >= 1 + 10 + 1)
    {
        size_t cch;
        APPEND_CH(=);
        cch = RTStrFormatNumber(ppszBuf, fGroup, 16, 0, 0, RTSTR_F_SPECIAL | RTSTR_F_32BIT);
        *ppszBuf += cch;
        *pcchBuf -= cch;
    }
else
    return VERR_BUFFER_OVERFLOW;

#undef APPEND_PSZ
#undef APPEND_SZ
#undef APPEND_CH
return VINF_SUCCESS;
}

/**
 * Get the current log group settings as a string.
 *
 * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
 * @param   pLogger             Logger instance (NULL for default logger).
 * @param   pszBuf              The output buffer.
 * @param   cchBuf              The size of the output buffer. Must be greater
 *                              than zero.
 */
RTDECL(int) RTLogGetGroupSettings(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf)
{
    bool        fNotFirst = false;
    int         rc = VINF_SUCCESS;
    uint32_t    cGroups;
    uint32_t    fGroup;
    uint32_t    i;
    
    Assert(cchBuf);
+ /*
+  * Resolve defaults.
+  */
+ if (!pLogger)
+  {
+      pLogger = RTLogDefaultInstance();
+      if (!pLogger)
+      {
+          *pszBuf = '\0';
+          return VINF_SUCCESS;
+      }
+  }
+  
+  cGroups = pLogger->cGroups;
+  
+  /*
+   * Check if all are the same.
+   */
+  fGroup = pLogger->afGroups[0];
+  for (i = 1; i < cGroups; i++)
+      if (pLogger->afGroups[i] != fGroup)
+          break;
+  if (i >= cGroups)
+      rc = rtLogGetGroupSettingsAddOne("all", fGroup, &pszBuf, &cchBuf, &fNotFirst);
+  else
+  {
+      
+      /*
+       * Iterate all the groups and print all that are enabled.
+       */
+      for (i = 0; i < cGroups; i++)
+      {
+          fGroup = pLogger->afGroups[i];
+          if (fGroup)
+          {
+              const char *pszName = pLogger->pInt->papszGroups[i];
+              if (pszName)
+              {
+                  rc = rtLogGetGroupSettingsAddOne(pszName, fGroup, &pszBuf, &cchBuf, &fNotFirst);
+                  if (rc)
+                      break;
+              }
+          }
+      }
+      
+      *pszBuf = '\0';
+      return rc;
+  
+  /*
+   * Resolve defaults.
+   */
+   if (!pLogger)
+   {
+       pLogger = RTLogDefaultInstance();
+       if (!pLogger)
+       {
+           *pszBuf = '\0';
+           return VINF_SUCCESS;
+       }
+   }
+   
+   cGroups = pLogger->cGroups;
+   
+   /*
+    * Check if all are the same.
+    */
+   fGroup = pLogger->afGroups[0];
+   for (i = 1; i < cGroups; i++)
+       if (pLogger->afGroups[i] != fGroup)
+           break;
+   if (i >= cGroups)
+       rc = rtLogGetGroupSettingsAddOne("all", fGroup, &pszBuf, &cchBuf, &fNotFirst);
+   else
+   {
+       
+       /*
+        * Iterate all the groups and print all that are enabled.
+        */
+        for (i = 0; i < cGroups; i++)
+        {
+            fGroup = pLogger->afGroups[i];
+            if (fGroup)
+            {
+                const char *pszName = pLogger->pInt->papszGroups[i];
+                if (pszName)
+                {
+                    rc = rtLogGetGroupSettingsAddOne(pszName, fGroup, &pszBuf, &cchBuf, &fNotFirst);
+                    if (rc)
+                        break;
+                }
+            }
+        }
+        
+        *pszBuf = '\0';
+        return rc;
+} 
+RT_EXPORT_SYMBOL(RTLogGetGroupSettings); 
+ 
+/* !IN_RC */ 
+ 
+/** 
+ * Updates the flags for the logger instance using the specified 
+ * specification string. 
+ */ 
+ * @returns iprt status code. 
+ * Failures can safely be ignored. 
+ * @param   pLogger   Logger instance (NULL for default logger). 
+ * @param   pszValue  Value to parse. 
+ */ 
+RTDECL(int) RTLogFlags(PRTLOGGER pLogger, const char *pszValue) 
+{
+    int rc = VINF_SUCCESS;
+ 
+    /* Resolve defaults. */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+            return VINF_SUCCESS;
+    }
+ 
+    /* Iterate the string. */
+    while (*pszValue)
+    {
+        /* check no prefix. */
+        bool fNo = false;
+        char ch;
+        unsigned i;
+        
+        /* skip blanks. */
+        while (RT_C_IS_SPACE(*pszValue))
+            pszValue++;
+        if (!pszValue)
+            return rc;
+        
+        while ((ch = *pszValue) != '\0')
+        {
+            if (ch == 'n' && pszValue[1] == 'o')
+            {
+                /*
pszValue += 2;
fNo = !fNo;
}  
else if (ch == '+')
{
    pszValue++;
    fNo = true;
}  
else if (ch == '-' || ch == '!' || ch == '~')
{
    pszValue++;
    fNo = !fNo;
}  
else
    break;
}

/* instruction. */
for (i = 0; i < RT_ELEMENTS(g_aLogFlags); i++)
{
    if (!strncmp(pszValue, g_aLogFlags[i].pszInstr, g_aLogFlags[i].cchInstr))
    {
        if (fNo == g_aLogFlags[i].fInverted)
            pLogger->fFlags |= g_aLogFlags[i].fFlag;
        else
            pLogger->fFlags &= ~g_aLogFlags[i].fFlag;
        pszValue += g_aLogFlags[i].cchInstr;
        break;
    }
}

/* unknown instruction? */
if (i >= RT_ELEMENTS(g_aLogFlags))
{
    AssertMsgFailed("Invalid flags! unknown instruction %.20s\n", pszValue);
    pszValue++;
}

/* skip blanks and delimiters. */
while (RT_C_IS_SPACE(*pszValue) || *pszValue == ';')
    pszValue++;
} /* while more environment variable value left */
return rc;

+RT_EXPORT_SYMBOL(RTLogFlags);
+
+/**
+ * Changes the buffering setting of the specified logger.
+ * This can be used for optimizing longish logging sequences.
+ * @returns The old state.
+ * @param   pLogger         The logger instance (NULL is an alias for the
default logger).
+ * @param   fBuffered       The new state.
+ */
+RTDECL(bool) RTLogSetBuffering(PRTLOGGER pLogger, bool fBuffered)
+{
+    bool fOld;
+
+    /*
+     * Resolve the logger instance.
+     */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+            return false;
+    }
+
+    rtlogLock(pLogger);
+    fOld  = !!(pLogger->fFlags & RTLOGFLAGS_BUFFERED);
+    if (fBuffered)
+        pLogger->fFlags |= RTLOGFLAGS_BUFFERED;
+    else
+        pLogger->fFlags &= ~RTLOGFLAGS_BUFFERED;
+    rtlogUnlock(pLogger);
+    return fOld;
+}
+RT_EXPORT_SYMBOL(RTLogSetBuffering);
+
+#ifdef IN_RING3
+RTDECL(uint32_t) RTLogSetGroupLimit(PRTLOGGER pLogger, uint32_t cMaxEntriesPerGroup)
+{
+    /*
+     * Resolve the logger instance.
+     */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+            return UINT32_MAX;
+    }
+    rtlogLock(pLogger);
+    uint32_t cOld = pLogger->pInt->cMaxEntriesPerGroup;
+    pLogger->pInt->cMaxEntriesPerGroup = cMaxEntriesPerGroup;
+    rtlogUnlock(pLogger);
+    return cOld;
+}
+#endif
+
+#ifndef IN_RC
+
+/**
+ * Get the current log flags as a string.
+ *
+ * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
+ * @param   pLogger             Logger instance (NULL for default logger).
+ * @param   pszBuf              The output buffer.
+ * @param   cchBuf              The size of the output buffer. Must be greater
+ *                              than zero.
+ */
+RTDECL(int) RTLogGetFlags(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf)
+{
+    bool        fNotFirst = false;
+    int         rc        = VINF_SUCCESS;
+    uint32_t    fFlags;
+    unsigned    i;
+
+    Assert(cchBuf);
+
+    /*
+     * Resolve defaults.
+     */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+        {
+            *pszBuf = \'0\';
+            return VINF_SUCCESS;
+        }
+    }
+
+    /*
+     * Add the flags in the list.
+     */
+    fFlags = pLogger->fFlags;
+ for (i = 0; i < RT_ELEMENTS(g_aLogFlags); i++)
+   if (g_aLogFlags[i].fInverted
+       ? (g_aLogFlags[i].fFlag & fFlags)
+       : !(g_aLogFlags[i].fFlag & fFlags))
+   {
+     size_t cchInstr = g_aLogFlags[i].cchInstr;
+     if (cchInstr + fNotFirst + 1 > cchBuf)
+     {
+       rc = VERR_BUFFER_OVERFLOW;
+       break;
+     }
+     if (fNotFirst)
+     {
+       *pszBuf++ = ' ';
+       cchBuf--;
+     }
+     memcpy(pszBuf, g_aLogFlags[i].pszInstr, cchInstr);
+     pszBuf += cchInstr;
+     cchBuf -= cchInstr;
+     fNotFirst = true;
+   }
+ *pszBuf = '\0';
+ return rc;
+
+RT_EXPORT_SYMBOL(RTLogGetFlags);
+
+/**
+ * Finds the end of a destination value.
+ *
+ * The value ends when we counter a ';' or a free standing word (space on both
+ * from the g_aLogDst table. (If this is problematic for someone, we could
+ * always do quoting and escaping.)
+ *
+ * @returns Value length in chars.
+ * @param   pszValue            The first char after '=' or ':'.
+ */
+static size_t rtLogDestFindValueLength(const char *pszValue)
+{
+  size_t off = 0;
+  char ch;
+  while ((ch = pszValue[off]) != '\0' && ch != ' ')
+  {
+    if (!RT_C_IS_SPACE(ch))
+      off++;
+    else
+      i
+      unsigned i;
```c
+ size_t   cchThusFar = off;
+ do
+     off++;
+     while ((ch = pszValue[off]) != '\0' && RT_C_IS_SPACE(ch));
+     if (ch == ':')
+         return cchThusFar;
+ 
+     if (ch == 'n' && pszValue[off + 1] == 'o')
+         off += 2;
+     for (i = 0; i < RT_ELEMENTS(g_aLogDst); i++)
+         if (!strncmp(&pszValue[off], g_aLogDst[i].pszInstr, g_aLogDst[i].cchInstr))
+             { 
+                 ch = pszValue[off + g_aLogDst[i].cchInstr];
+                 if (ch == '\0' || RT_C_IS_SPACE(ch) || ch == '=' || ch == ':' || ch == ';')
+                     return cchThusFar;
+             }
+     }
+ return off;
+
+/**
+ * Updates the logger destination using the specified string.
+ * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
+ * @param   pLogger Logger instance (NULL for default logger).
+ * @param   pszValue The value to parse.
+ */
+RTDECL(int) RTLogDestinations(PRTLOGGER pLogger, char const *pszValue)
+{
+     /* Resolve defaults.
+     */
+     if (!pLogger)
+         { 
+             pLogger = RTLogDefaultInstance();
+             if (!pLogger)
+                 return VINF_SUCCESS;
+         }
+     /* Do the parsing.
+     */
+     while (*pszValue)
+     { 
+         bool fNo;
+         unsigned i;
```
/* skip blanks. */
while (RT_C_IS_SPACE(*pszValue))
pszValue++;
if (!*pszValue)
break;

/* check no prefix. */
fNo = false;
if (pszValue[0] == 'n'
    && pszValue[1] == 'o'
    && (pszValue[2] != 'd'
        || pszValue[3] != 'e'
        || pszValue[4] != 'n'
        || pszValue[5] != 'y'))
{
    fNo = true;
    pszValue += 2;
}

/* instruction. */
for (i = 0; i < RT_ELEMENTS(g_aLogDst); i++)
{
    size_t cchInstr = strlen(g_aLogDst[i].pszInstr);
    if (!strncmp(pszValue, g_aLogDst[i].pszInstr, cchInstr))
    {
        if (!fNo)
            pLogger->fDestFlags |= g_aLogDst[i].fFlag;
        else
            pLogger->fDestFlags &= ~g_aLogDst[i].fFlag;
        pszValue += cchInstr;

        /* check for value. */
        while (RT_C_IS_SPACE(*pszValue))
            pszValue++;
        if (*pszValue == '=' || *pszValue == ':')
        {
            pszValue++;
            size_t cch = rtLogDestFindValueLength(pszValue);
            const char *pszEnd = pszValue + cch;
            #ifdef IN_RING3
            char szTmp[sizeof(pLogger->pInt->szFilename)];
            #else
            char szTmp[32];
            #endif
            if (0)
            {
                /* nothing */
            }
            else
                pLogger->fDestFlags &= ~g_aLogDst[i].fFlag;
            pszValue += cch;
        }
    }
}
+#ifdef IN_RING3
+
+
/* log file name */
+
else if (i == 0 /* file */ && !fNo)
+
{
+
AssertReturn(cch < sizeof(pLogger->pInt->szFilename), VERR_OUT_OF_RANGE);
+
memcpy(pLogger->pInt->szFilename, pszValue, cch);
+
pLogger->pInt->szFilename[cch] = '\0';
+
/** @todo reopen log file if pLogger->pInt->fCreated is true ... */
+
}
+
/* log directory */
+
else if (i == 1 /* dir */ && !fNo)
+
{
+
const char *pszFile = RTPathFilename(pLogger->pInt->szFilename);
+
size_t
cchFile = pszFile ? strlen(pszFile) : 0;
+
AssertReturn(cchFile + cch + 1 < sizeof(pLogger->pInt->szFilename), VERR_OUT_OF_RANGE);
+
memcpy(szTmp, cchFile ? pszFile : "", cchFile + 1);
+
+
memcpy(pLogger->pInt->szFilename, pszValue, cch);
+
pLogger->pInt->szFilename[cch] = '\0';
+
RTPathStripTrailingSlash(pLogger->pInt->szFilename);
+
+
cch = strlen(pLogger->pInt->szFilename);
+
pLogger->pInt->szFilename[cch++] = '/';
+
memcpy(&pLogger->pInt->szFilename[cch], szTmp, cchFile);
+
pLogger->pInt->szFilename[cch + cchFile] = '\0';
+
/** @todo reopen log file if pLogger->pInt->fCreated is true ... */
+
}
+
else if (i == 2 /* history */)
+
{
+
if (!fNo)
+
{
+
uint32_t cHistory = 0;
+
int rc = RTStrCopyEx(szTmp, sizeof(szTmp), pszValue, cch);
+
if (RT_SUCCESS(rc))
+
rc = RTStrToUInt32Full(szTmp, 0, &cHistory);
+
AssertMsgReturn(RT_SUCCESS(rc) && cHistory < _1M, ("Invalid history value %s
(%Rrc)!\n", szTmp, rc), rc);
+
pLogger->pInt->cHistory = cHistory;
+
}
+
else
+
pLogger->pInt->cHistory = 0;
+
}
+
else if (i == 3 /* histsize */)
+
{
+
if (!fNo)
+
{
+
int rc = RTStrCopyEx(szTmp, sizeof(szTmp), pszValue, cch);

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if (RT_SUCCESS(rc))
    rc = RTStrToUInt64Full(szTmp, 0, &pLogger->pInt->cbHistoryFileMax);
AssertMsgRCReturn(rc, ("Invalid history file size value %s (%Rrc)\n", szTmp, rc), rc);
if (pLogger->pInt->cbHistoryFileMax == 0)
    pLogger->pInt->cbHistoryFileMax = UINT64_MAX;
else
    pLogger->pInt->cbHistoryFileMax = UINT64_MAX;
else if (i == 4 /* histtime */) {
    if (!fNo)
        {
            int rc = RTStrCopyEx(szTmp, sizeof(szTmp), pszValue, cch);
            if (RT_SUCCESS(rc))
                rc = RTStrToUInt32Full(szTmp, 0, &pLogger->pInt->cSecsHistoryTimeSlot);
            AssertMsgRCReturn(rc, ("Invalid history time slot value %s (%Rrc)\n", szTmp, rc), rc);
            if (pLogger->pInt->cSecsHistoryTimeSlot == 0)
                pLogger->pInt->cSecsHistoryTimeSlot = UINT32_MAX;
        }
    else
        pLogger->pInt->cSecsHistoryTimeSlot = UINT32_MAX;
#endif /* IN_RING3 */
else if (i == 5 /* ringbuf */ && !fNo) {
    int rc = RTStrCopyEx(szTmp, sizeof(szTmp), pszValue, cch);
    uint32_t cbRingBuf = 0;
    if (RT_SUCCESS(rc))
        rc = RTStrToUInt32Full(szTmp, 0, &cbRingBuf);
    AssertMsgRCReturn(rc, ("Invalid ring buffer size value '%s' (%Rrc)\n", szTmp, rc), rc);
    if (cbRingBuf == 0)
        cbRingBuf = RTLOG_RINGBUF_DEFAULT_SIZE;
    else if (cbRingBuf < RTLOG_RINGBUF_MIN_SIZE)
        cbRingBuf = RTLOG_RINGBUF_MIN_SIZE;
    else if (cbRingBuf > RTLOG_RINGBUF_MAX_SIZE)
        cbRingBuf = RTLOG_RINGBUF_MAX_SIZE;
    else
        cbRingBuf = RT_ALIGN_32(cbRingBuf, 64);
    rc = rtLogRingBufAdjust(pLogger, cbRingBuf, false /*fForce*/);
    if (RT_FAILURE(rc))
        return rc;
}
else
    AssertMsgFailedReturn(("Invalid destination value! %s%s doesn't take a value!\n", fNo ? "no" : "", g_aLogDst[i].pszInstr),
                         VERR_INVALID_PARAMETER);
pszValue = pszEnd + (*pszEnd != '\0');

else if (i == 5 /* ringbuf */ && !fNo && !pLogger->pInt->pszRingBuf)
{
    int rc = rtLogRingBufAdjust(pLogger, pLogger->pInt->cbRingBuf, false /*fForce*/);
    if (RT_FAILURE(rc))
        return rc;
    break;
}

/* assert known instruction */
AssertMsgReturn(i < RT_ELEMENTS(g_aLogDst),
    ("Invalid destination value! unknown instruction %.20s\n", pszValue),
    VERR_INVALID_PARAMETER);

/* skip blanks and delimiters. */
while (RT_C_IS_SPACE(*pszValue) || *pszValue == ';')
    pszValue++;
}
/* while more environment variable value left */

return VINF_SUCCESS;
}

RT_EXPORT_SYMBOL(RTLogDestinations);

/**
 * Clear the file delay flag if set, opening the destination and flushing.
 *
 * @returns IPRT status code.
 * @param   pLogger             Logger instance (NULL for default logger).
 * @param   pszValue            The value to parse.
 * @param   pErrInfo            Where to return extended error info. Optional.
 */
+RTDECL(int) RTLogClearFileDelayFlag(PRTLOGGER pLogger, PRTERRINFO pErrInfo)
+
+/**
 + * @returns IPRT status code.
 + * @param   pLogger             Logger instance (NULL for default logger).
 + * @param   pszValue            The value to parse.
 + * @param   pErrInfo            Where to return extended error info. Optional.
 + */
+RTDECL(int) RTLogClearFileDelayFlag(PRTLOGGER pLogger, PRTERRINFO pErrInfo)
+{  
+    /* Resolve defaults.  
+     */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+            return VINF_SUCCESS;
+    }
*/
+ * Do the work.
+ */
+ int rc = rtlogLock(pLogger);
+ if (RT_SUCCESS(rc))
+ {
+   if (pLogger->fDestFlags & RTLOGDEST_F_DELAY_FILE)
+   {
+     pLogger->fDestFlags &= ~RTLOGDEST_F_DELAY_FILE;
+   } else
+   {
+     if ( pLogger->fDestFlags & RTLOGDEST_FILE
+          && pLogger->pInt->hFile == NIL_RTFILE)
+     {
+       rc = rtR3LogOpenFileDestination(pLogger, pErrInfo);
+       if (RT_SUCCESS(rc))
+         rtlogFlush(pLogger, false /*fNeedSpace*/);
+     }
+   }
+   RT_NOREF(pErrInfo); /**< @todo fix create API to use RTErrInfo */
+   rtlogUnlock(pLogger);
+ }
+ return VINF_SUCCESS;
+}
+RT_EXPORT_SYMBOL(RTLogClearFileDelayFlag);
+
+/**
+ * Get the current log destinations as a string.
+ *
+ * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
+ * @param   pLogger             Logger instance (NULL for default logger).
+ * @param   pszBuf              The output buffer.
+ * @param   cchBuf              The size of the output buffer. Must be greater
+                                than 0.
+ */
+RTDECL(int) RTLogGetDestinations(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf)
+{
+  bool        fNotFirst = false;
+  int         rc        = VINF_SUCCESS;
+  uint32_t    fDestFlags;
+  unsigned    i;
+
+  AssertReturn(cchBuf, VERR_INVALID_PARAMETER);
+  *pszBuf = '0';
+  *fDestFlags &= ~RTLOGDEST_FILE;
+  rtlogUnlock(pLogger);
+  return VINF_SUCCESS;
+}
/*
 * Add the flags in the list.
 */
fDestFlags = pLogger->fDestFlags;
for (i = 6; i < RT_ELEMENTS(g_aLogDst); i++)
    if (g_aLogDst[i].fFlag & fDestFlags)
        {
            if (fNotFirst)
                {
                    rc = RTStrCopyP(&pszBuf, &cchBuf, " ");
                    if (RT_FAILURE(rc))
                        return rc;
                }
            rc = RTStrCopyP(&pszBuf, &cchBuf, g_aLogDst[i].pszInstr);
            if (RT_FAILURE(rc))
                return rc;
            fNotFirst = true;
        }

char szNum[32];

#ifdef IN_RING3
/*
 * Add the filename.
 */
#endif
if (fDestFlags & RTLOGDEST_FILE)
    {
        rc = RTStrCopyP(&pszBuf, &cchBuf, fNotFirst ? " file=" : "file=");
        if (RT_FAILURE(rc))
            return rc;
        rc = RTStrCopyP(&pszBuf, &cchBuf, pLogger->pInt->szFilename);
        if (RT_FAILURE(rc))
            return rc;
        fNotFirst = true;
        if (pLogger->pInt->cHistory)
            {
                RTStrPrintf(szNum, sizeof(szNum), fNotFirst ? " history=%u" : "history=%u", pLogger->pInt->cHistory);
                rc = RTStrCopyP(&pszBuf, &cchBuf, szNum);
                if (RT_FAILURE(rc))
return rc;
+ fNotFirst = true;
+
+ }
+ if (pLogger->pInt->cbHistoryFileMax != UINT64_MAX)
+ {
+    RTStrPrintf(szNum, sizeof(szNum), fNotFirst ? " histsize=%llu" : "histsize=%llu", pLogger->pInt->cbHistoryFileMax);
+    rc = RTStrCopyP(&pszBuf, &cchBuf, szNum);
+    if (RT_FAILURE(rc))
+        return rc;
+    fNotFirst = true;
+ }
+ if (pLogger->pInt->cSecsHistoryTimeSlot != UINT32_MAX)
+ {
+    RTStrPrintf(szNum, sizeof(szNum), fNotFirst ? " histtime=%llu" : "histtime=%llu", pLogger->pInt->cSecsHistoryTimeSlot);
+    rc = RTStrCopyP(&pszBuf, &cchBuf, szNum);
+    if (RT_FAILURE(rc))
+        return rc;
+    fNotFirst = true;
+ }
+    /* IN_RING3 */
+    *
+    /*
+     * Add the ring buffer.
+     */
+    if (fDestFlags & RTLOGDEST_RINGBUF)
+    {
+        if (pLogger->pInt->cbRingBuf == RTLOG_RINGBUF_DEFAULT_SIZE)
+            rc = RTStrCopyP(&pszBuf, &cchBuf, fNotFirst ? " ringbuf" : "ringbuf");
+        else
+        {
+            RTStrPrintf(szNum, sizeof(szNum), fNotFirst ? " ringbuf=%#x" : "ringbuf=%#x", pLogger->pInt->cbRingBuf);
+            rc = RTStrCopyP(&pszBuf, &cchBuf, szNum);
+        }
+        if (RT_FAILURE(rc))
+            return rc;
+        fNotFirst = true;
+    }
+    return VINF_SUCCESS;
+
+RT_EXPORT_SYMBOL(RTLogGetDestinations);
+
+#endif /* !IN_RC */
+/**
+ * Flushes the specified logger.
+ *
+ * @param   pLogger     The logger instance to flush.
+ *                      If NULL the default instance is used. The default instance
+ *                      will not be initialized by this call.
+ */
+RTDECL(void) RTLogFlush(PRTLOGGER pLogger)
{ +  /* Resolve defaults. */
  if (!pLogger)
  {
  +#ifdef IN_RC
  pLogger = &g_Logger;
  +#else
  pLogger = g_pLogger;
  +#endif
  if (!pLogger)
    return;
  
  /* Any thing to flush? */
  if (   pLogger->offScratch
  +#ifndef IN_RC
        || (pLogger->fDestFlags & RTLOGDEST_RINGBUF)
  +#endif
  )
  {
  +#ifdef IN_RC
  /* Acquire logger instance sem. */
  int rc = rtlogLock(pLogger);
  if (RT_FAILURE(rc))
    return;
  +#endif
  
  /* Call worker. */
  rtlogFlush(pLogger, false /*fNeedSpace*/);
  +#ifdef IN_RC
  /* Since this is an explicit flush call, the ring buffer content should
+ * be flushed to the other destinations if active.
+ */
+ if ((pLogger->fDestFlags & RTLOGDEST_RINGBUF)
+ && pLogger->pInt->pszRingBuf /* paranoia */)
+ rtLogRingBufFlush(pLogger);
+
+ /*
+ * Release the semaphore.
+ */
+ rtlogUnlock(pLogger);
+#endif
+
+RT_EXPORT_SYMBOL(RTLogFlush);
+
+
+/**
+ * Common worker for RTLogDefaultInstance and RTLogDefaultInstanceEx.
+ */
+DECL_FORCE_INLINE(PRTLOGGER) rtLogDefaultInstanceCommon(void)
+
+}
+ ifndef IN_RC
+ return &g_Logger;
+
+ else /* !IN_RC */
+ ifdef !IN_RC */
+ + * Check per thread loggers first.
+ */
+ + if (g_cPerThreadLoggers)
+ + {
+ + const RTNATIVETHREAD Self = RTThreadNativeSelf();
+ + int32_t i = RT_ELEMENTS(g_aPerThreadLoggers);
+ + while (i-- > 0)
+ + if (g_aPerThreadLoggers[i].NativeThread == Self)
+ + return g_aPerThreadLoggers[i].pLogger;
+ + }
+ + endif /* IN_RING0 */
+ 
+ /*
+ * If no per thread logger, use the default one.
+ */
+ + if (!g_pLogger)
+ + g_pLogger = RTLogDefaultInit();
+ + return g_pLogger;
+ + endif /* !IN_RC */
+ 
+ +
+RTDECL(PRTLOGGER) RTLogDefaultInstance(void)
+{
+    return rtLogDefaultInstanceCommon();
+}
+RT_EXPORT_SYMBOL(RTLogDefaultInstance);
+
+RTDECL(PRTLOGGER) RTLogDefaultInstanceEx(uint32_t fFlagsAndGroup)
+{
+    PRTLOGGER pLogger = rtLogDefaultInstanceCommon();
+    if (pLogger)
+    {  
+        if (pLogger->fFlags & RTLOGFLAGS_DISABLED)
+            pLogger = NULL;
+        else
+        {  
+            uint16_t const fFlags = RT_LO_U16(fFlagsAndGroup);
+            uint16_t const iGroup = RT_HI_U16(fFlagsAndGroup);
+            if (iGroup != UINT16_MAX
+                && (pLogger->afGroups[iGroup < pLogger->cGroups ? iGroup : 0] & (fFlags |
+                (uint32_t)RTLOGGRPFLAGS_ENABLED))
+                    != (fFlags | (uint32_t)RTLOGGRPFLAGS_ENABLED))
+                pLogger = NULL;
+            }
+        }
+        return pLogger;
+    }
+RT_EXPORT_SYMBOL(RTLogDefaultInstanceEx);
+
+/**
+ * Common worker for RTLogGetDefaultInstance and RTLogGetDefaultInstanceEx.
+ */
+DECL_FORCE_INLINE(PRTLOGGER) rtLogGetDefaultInstanceCommon(void)
+{
+    #ifdef IN_RC
+        return &g_Logger;
+    #else
+        #ifdef IN_RING0
+            /*
+             * Check per thread loggers first.
+             */
+            if (g_cPerThreadLoggers)
+            {
+                const RTNATIVETHREAD Self = RTThreadNativeSelf();
+                int32_t i = RT_ELEMENTS(g_aPerThreadLoggers);
+                while (i-- > 0)
if (g_aPerThreadLoggers[i].NativeThread == Self)
    return g_aPerThreadLoggers[i].pLogger;
}
#endif /* IN_RING0 */
+
+    return g_pLogger;
+#endif
+
+
+RTDECL(PRTLOGGER) RTLogGetDefaultInstance(void)
+{
+    return rtLogGetDefaultInstanceCommon();
+}
+RT_EXPORT_SYMBOL(RTLogGetDefaultInstance);
+
+RTDECL(PRTLOGGER) RTLogGetDefaultInstanceEx(uint32_t fFlagsAndGroup)
+{
+    PRTLOGGER pLogger = rtLogGetDefaultInstanceCommon();
+    if (pLogger)
+    {
+        if (pLogger->fFlags & RTLOGFLAGS_DISABLED)
+            pLogger = NULL;
+        else
+        {
+            uint32_t const fFlags = RT_LO_U16(fFlagsAndGroup);
+            uint16_t const iGroup = RT_HI_U16(fFlagsAndGroup);
+            if (iGroup != UINT16_MAX
+                && (pLogger->afGroups[iGroup < pLogger->cGroups ? iGroup : 0] & (fFlags | RTLOGGRPFLAGS_ENABLED))
+                    != (fFlags | RTLOGGRPFLAGS_ENABLED))
+                pLogger = NULL;
+            }
+        return pLogger;
+    }
+    RT_EXPORT_SYMBOL(RTLogGetDefaultInstanceEx);
+
+    +#ifndef IN_RC
+    /**
+    * Sets the default logger instance.
+    *
+    * @returns iprt status code.
+    * @param pLogger The new default logger instance.
+    */
+    RTDECL(PRTLOGGER) RTLogSetDefaultInstance(PRTLOGGER pLogger)
RTDECL(int) RTLogSetDefaultInstanceThread(PRTLOGGER pLogger, uintptr_t uKey)
{
    int             rc;
    RTNATIVETHREAD Self = RTThreadNativeSelf();
    if (pLogger)
    {
        int32_t i;
        unsigned j;

        AssertReturn(pLogger->u32Magic == RTLOGGER_MAGIC, VERR_INVALID_MAGIC);

        /* Iterate the table to see if there is already an entry for this thread. */
        /* */
        i = RT_ELEMENTS(g_aPerThreadLoggers);
        while (i-- > 0)
            if (g_aPerThreadLoggers[i].NativeThread == Self)
                break;

        /* Allocate a new table entry. */
        /* */
        i = ASMAtomicIncS32(&g_cPerThreadLoggers);
        if (i > (int32_t)RT_ELEMENTS(g_aPerThreadLoggers))
        {
            ASMAtomicDecS32(&g_cPerThreadLoggers);
        }
        else
        {
            ASMAtomicXchgPtrT(&g_aPerThreadLoggers[i].uKey, (void *)uKey);
            g_aPerThreadLoggers[i].pLogger = pLogger;
            return VINF_SUCCESS;
        }
    }
    return ASMAtomicXchgPtrT(&g_pLogger, pLogger, PRTLOGGER);
}
return VERR_BUFFER_OVERFLOW; /* horrible error code! */
}

for (j = 0; j < 10; j++)
{
    i = RT_ELEMENTS(g_aPerThreadLoggers);
    while (i-- > 0)
    {
        AssertCompile(sizeof(RTNATIVETHREAD) == sizeof(void*));
        if (    g_aPerThreadLoggers[i].NativeThread == NIL_RTNATIVETHREAD
            && ASMAtomicCmpXchgPtr((void * volatile *)&g_aPerThreadLoggers[i].NativeThread, (void *)Self, (void *)NIL_RTNATIVETHREAD))
            {
            ASMAtomicWritePtr((void * volatile *)&g_aPerThreadLoggers[i].uKey, (void *)uKey);
            ASMAtomicWritePtr(&g_aPerThreadLoggers[i].pLogger, pLogger);
            return VINF_SUCCESS;
            }
    }

    ASMAtomicDecS32(&g_cPerThreadLoggers);
    rc = VERR_INTERNAL_ERROR;
}

else
{
    /* Search the array for the current thread. */
    int32_t i = RT_ELEMENTS(g_aPerThreadLoggers);
    while (i-- > 0)
        if (    g_aPerThreadLoggers[i].NativeThread == Self
            || g_aPerThreadLoggers[i].uKey == uKey)
            {
            ASMAtomicWriteNullPtr((void * volatile *)&g_aPerThreadLoggers[i].uKey);
            ASMAtomicWriteNullPtr(&g_aPerThreadLoggers[i].pLogger);
            ASMAtomicWriteHandle(&g_aPerThreadLoggers[i].NativeThread, NIL_RTNATIVETHREAD);
            ASMAtomicDecS32(&g_cPerThreadLoggers);
            }
    rc = VINF_SUCCESS;
}
return rc;

+RT_EXPORT_SYMBOL(RTLogSetDefaultInstanceThread);
+#endif /* IN_RING0 */
+/
+/#
+ * Write to a logger instance.
+ *
+ * @param pLogger Pointer to logger instance.
+ * @param pszFormat Format string.
+ * @param args Format arguments.
+ */
+RTDECL(void) RTLogLoggerV(PRTLOGGER pLogger, const char *pszFormat, va_list args)
+{
+    RTLogLoggerExV(pLogger, 0, ~0U, pszFormat, args);
+}
+RT_EXPORT_SYMBOL(RTLogLoggerV);
+
+/**
+ * Write to a logger instance.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param pLogger Pointer to logger instance. If NULL the default logger instance will be attempted.
+ * @param fFlags The logging flags.
+ * @param iGroup The group.
+ * The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ * only for internal usage!
+ * @param pszFormat Format string.
+ * @param args Format arguments.
+ */
+RTDECL(void) RTLogLoggerExV(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char
+    *pszFormat, va_list args)
+{
+    int rc;
+    
+    /*
+     * A NULL logger means default instance.
+     */
+    if (!pLogger)
+    {
+        pLogger = RTLogDefaultInstance();
+        if (!pLogger)
+            return;
+    }
+    
+    /*
+     * Validate and correct iGroup.
+     */
+    if (iGroup != ~0U && iGroup >= pLogger->cGroups)
+        iGroup = 0;
+    
+    /*
+     * Write to a logger instance.
+     */
+    RTLogLoggerExV(pLogger, fFlags, iGroup, pszFormat, args);
+}
If no output, then just skip it.

/*
 * Acquire logger instance sem.
 */

rc = rtlogLock(pLogger);
if (RT_FAILURE(rc))
{
    if (pLogger->fDestFlags & ~RTLOGDEST_FILE)
        rtR0LogLoggerExFallback(pLogger->fDestFlags, pLogger->fFlags, pLogger->pInt, pszFormat, args);
    return;
}

/*
 * Check restrictions and call worker.
 */

if (RT_UNLIKELY((pLogger->fFlags & RTLOGFLAGS_RESTRICT_GROUPS)
        && iGroup < pLogger->cGroups
        && (pLogger->afGroups[iGroup] & RTLOGGRPFLAGS_RESTRICT)
        && ++pLogger->pInt->pacEntriesPerGroup[iGroup] >= pLogger->pInt->cMaxEntriesPerGroup))
{
    uint32_t cEntries = pLogger->pInt->pacEntriesPerGroup[iGroup];
    if (cEntries > pLogger->pInt->cMaxEntriesPerGroup)
        pLogger->pInt->pacEntriesPerGroup[iGroup] = cEntries - 1;
    else
    {
        rtLogLoggerExVLocked(pLogger, fFlags, iGroup, pszFormat, args);
        if (pLogger->pInt->papszGroups
            && pLogger->pInt->papszGroups[iGroup])
            rtLogLoggerExFlocked(pLogger, fFlags, iGroup, "%u messages from group %s (#%u), muting it.
", cEntries, pLogger->pInt->papszGroups[iGroup], iGroup);
        else
            rtLogLoggerExFlocked(pLogger, fFlags, iGroup, "%u messages from group #%u, muting it.
", cEntries, iGroup);
cEntries, iGroup);
}
#else
else
rtlogLoggerExVLocked(pLogger, fFlags, iGroup, pszFormat, args);
/*
  * Release the semaphore.
  */
rtlogUnlock(pLogger);
}
#endif

RT_EXPORT_SYMBOL(RTLogLoggerExV);

#ifdef IN_RING0
/**
 * For rtR0LogLoggerExFallbackOutput and rtR0LogLoggerExFallbackFlush.
 */
typedef struct RTR0LOGLOGGERFALLBACK
{
    /** The current scratch buffer offset. */
    uint32_t offScratch;
    /** The destination flags. */
    uint32_t fDestFlags;
    /** For ring buffer output. */
    PRTLOGGERINTERNAL pInt;
    /** The scratch buffer. */
    char achScratch[80];
} RTR0LOGLOGGERFALLBACK;
/** Pointer to RTR0LOGLOGGERFALLBACK which is used by
 * rtR0LogLoggerExFallbackOutput. */
typedef RTR0LOGLOGGERFALLBACK *PRTR0LOGLOGGERFALLBACK;

/** Flushes the fallback buffer.
 *
 * @param   pThis       The scratch buffer.
 */
static void rtR0LogLoggerExFallbackFlush(PRTR0LOGLOGGERFALLBACK pThis)
{
    if (!pThis->offScratch)
        return;

    if (   (pThis->fDestFlags & RTLOGDEST_RINGBUF)
        && pThis->pInt /* paranoia */)

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rtLogRingBufWrite(pThis->pInt, pThis->achScratch, pThis->offScratch);
else
{
    if (pThis->fDestFlags & RTLOGDEST_USER)
        RTLogWriteUser(pThis->achScratch, pThis->offScratch);
    if (pThis->fDestFlags & RTLOGDEST_DEBUGGER)
        RTLogWriteDebugger(pThis->achScratch, pThis->offScratch);
    if (pThis->fDestFlags & RTLOGDEST_STDOUT)
        RTLogWriteStdOut(pThis->achScratch, pThis->offScratch);
    if (pThis->fDestFlags & RTLOGDEST_STDERR)
        RTLogWriteStdErr(pThis->achScratch, pThis->offScratch);
    if (pThis->fDestFlags & RTLOGDEST_COM)
        RTLogWriteCom(pThis->achScratch, pThis->offScratch);
# ifndef LOG_NO_COM
    if (pThis->fDestFlags & RTLOGDEST_COM)
        RTLogWriteCom(pThis->achScratch, pThis->offScratch);
# endif
    /* empty the buffer. */
    pThis->offScratch = 0;
}

/* Callback for RTLogFormatV used by rtR0LogLoggerExFallback. */
/* See PFNLOGOUTPUT() for details. */
static DECLCALLBACK(size_t) rtR0LogLoggerExFallbackOutput(void *pv, const char *pachChars, size_t cbChars)
{
    PRTR0LOGLOGGERFALLBACK pThis = (PRTR0LOGLOGGERFALLBACK)pv;
    if (cbChars)
    {
        size_t cbRet = 0;
        for (;;)
        {
            /* how much */
            uint32_t cb = sizeof(pThis->achScratch) - pThis->offScratch - 1; /* minus 1 - for the string terminator. */
            if (cb > cbChars)
                cb = (uint32_t)cbChars;
            /* copy */
            memcpy(&pThis->achScratch[pThis->offScratch], pachChars, cb);
            /* advance */
            cbRet += cb;
            pThis->offScratch += cb;
        }
    }
}
pThis->offScratch += cb;
+ cbRet += cb;
+ cbChars -= cb;
+
+ /* done? */
+ if (cbChars <= 0)
+     return cbRet;
+
+ pachChars += cb;
+
+ /* flush */
+ pThis->achScratch[pThis->offScratch] = '\0';
+ rtR0LogLoggerExFallbackFlush(pThis);
+ }
+
+ /* won't ever get here! */
+ }
+ else
+ {  /*
+   */
+   /* Termination call, flush the log.
+   */
+   pThis->achScratch[pThis->offScratch] = '\0';
+   rtR0LogLoggerExFallbackFlush(pThis);
+   return 0;
+ }
+
+ +
+ /**
+ * Ring-0 fallback for cases where we're unable to grab the lock.
+ * This will happen when we're at a too high IRQL on Windows for instance and
+ * needs to be dealt with or we'll drop a lot of log output. This fallback will
+ * only output to some of the log destinations as a few of them may be doing
+ * dangerous things. We won't be doing any prefixing here either, at least not
+ * for the present, because it's too much hassle.
+ *
+ * @param   fDestFlags  The destination flags.
+ * @param   fFlags      The logger flags.
+ * @param   pInt        The internal logger data, for ring buffer output.
+ * @param   pszFormat   The format string.
+ * @param   va          The format arguments.
+ */
+static void rtR0LogLoggerExFallback(uint32_t fDestFlags, uint32_t fFlags, PRTLOGGERINTERNAL pInt,
+                                      const char *pszFormat, va_list va)
+{  
+    RTR0LOGLOGGERFALLBACK This;
This.fDestFlags = fDestFlags;
This.pInt = pInt;
+
/* fallback indicator */
This.offScratch = 2;
This.achScratch[0] = '[';
This.achScratch[1] = 'F';
+
/* selected prefixes */
if (fFlags & RTLOGFLAGS_PREFIX_PID)
{
    RTPROCESS Process = RTProcSelf();
    This.achScratch[This.offScratch++] = ' ';
    This.offScratch += RTStrFormatNumber(&This.achScratch[This.offScratch], Process, 16,
sizeof(RTPROCESS) * 2, 0, RTSTR_F_ZEROPAD);
}
if (fFlags & RTLOGFLAGS_PREFIX_TID)
{
    RTNATIVETHREAD Thread = RTThreadNativeSelf();
    This.achScratch[This.offScratch++] = ' ';
    This.offScratch += RTStrFormatNumber(&This.achScratch[This.offScratch], Thread, 16,
sizeof(RTNATIVETHREAD) * 2, 0, RTSTR_F_ZEROPAD);
}
This.achScratch[This.offScratch++] = ']';
This.achScratch[This.offScratch++] = ' ';

RTLogFormatV(rtR0LogLoggerExFallbackOutput, &This, pszFormat, va);
#endif /* IN_RING0 */
+
+/**
+ * vprintf like function for writing to the default log.
+ *
+ * @param   pszFormat   Printf like format string.
+ * @param   va          Optional arguments as specified in pszFormat.
+ *
+ * @remark The API doesn't support formatting of floating point numbers at the moment.
+ */
+RTDECL(void) RTLogPrintfV(const char *pszFormat, va_list va)
+{
+    RTLogLoggerV(NULL, pszFormat, va);
+
+RT_EXPORT_SYMBOL(RTLogPrintfV);
+
+/**
# * Dumper vprintf-like function outputting to a logger.
+ *
+ * @param   pvUser          Pointer to the logger instance to use, NULL for
+ *                 default instance.
+ * @param   pszFormat       Format string.
+ * @param   va              Format arguments.
+ */
+
+RTDECL(void) RTLogDumpPrintfV(void *pvUser, const char *pszFormat, va_list va)
+{
+    RTLogLoggerV((PRTLOGGER)pvUser, pszFormat, va);
+}
+
+RT_EXPORT_SYMBOL(RTLogDumpPrintfV);
+
+/*
+ * Opens/creates the log file.
+ *
+ * @param   pLogger         The logger instance to update. NULL is not allowed!
+ * @param   pErrInfo        Where to return extended error information.
+ *                 Optional.
+ */
+
+static int rtlogFileOpen(PRTLOGGER pLogger, PRERRINFO pErrInfo)
+{
+    uint32_t fOpen = RTFILE_O_WRITE | RTFILE_O_DENY_NONE;
+    if (pLogger->fFlags & RTLOGFLAGS_APPEND)
+        fOpen |= RTFILE_O_OPEN_CREATE | RTFILE_O_APPEND;
+    else
+        fOpen |= RTFILE_O_CREATE_REPLACE;
+    if (pLogger->fFlags & RTLOGFLAGS_WRITE_THROUGH)
+        fOpen |= RTFILE_O_WRITE_THROUGH;
+    if (pLogger->fDestFlags & RTLOGDEST_F_NO_DENY)
+        fOpen = (fOpen & ~RTFILE_O_DENY_NONE) | RTFILE_O_DENY_NOT_DELETE;
+    
+    unsigned cBackoff = 0;
+    int rc = RTFileOpen(&pLogger->pInt->hFile, pLogger->pInt->szFilename, fOpen);
+    while (  
+        rc == VERR_SHARING_VIOLATION
+        && cBackoff < RT_ELEMENTS(g_acMsLogBackoff)
+    )
+    {
+        RTThreadSleep(g_acMsLogBackoff[cBackoff++]);
+        rc = RTFileOpen(&pLogger->pInt->hFile, pLogger->pInt->szFilename, fOpen);
+    }
+    if (RT_SUCCESS(rc))
+    {
+        rc = RTFileGetSize(pLogger->pInt->hFile, &pLogger->pInt->cbHistoryFileWritten);
+        if (RT_FAILURE(rc))
+        {  
+            /*
+             * RTLogLog() function is not called when
+             * RTLogDumpPrintfV() is called with a
+             * NULL pvUser.  While it is possible
+             * to call RTLogLog() from another
+             * file that
+             */
+        
+    }
/* Don't complain if this fails, assume the file is empty. */
pLogger->pInt->cbHistoryFileWritten = 0;
rc = VINF_SUCCESS;
}
else
{
    pLogger->pInt->hFile = NIL_RTFILE;
    RTErrInfoSetF(pErrInfo, rc, _("could not open file '%s' (fOpen=%#x)"), pLogger->pInt->szFilename, fOpen);
}
return rc;
}

/**
 * Closes, rotates and opens the log files if necessary.
 */
/**
 * Used by the rtlogFlush() function as well as RTLogCreateExV.
 */
/**
 * @param   pLogger     The logger instance to update. NULL is not allowed!
 * @param   uTimeSlot   Current time slot (for tikme based rotation).
 * @param   fFirst      Flag whether this is the beginning of logging, i.e.
 *                      called from RTLogCreateExV. Prevents pfnd from
 *                      being called.
 * @param   pErrInfo    Where to return extended error information. Optional.
 */
static void rtlogRotate(PRTLOGGER pLogger, uint32_t uTimeSlot, bool fFirst, PRTERRINFO pErrInfo)
{
    /* Suppress rotating empty log files simply because the time elapsed. */
    if (RT_UNLIKELY(!pLogger->pInt->cbHistoryFileWritten))
        pLogger->pInt->uHistoryTimeSlotStart = uTimeSlot;

    /* Check rotation condition: file still small enough and not too old? */
    if (RT_LIKELY(pLogger->pInt->cbHistoryFileWritten < pLogger->pInt->cbHistoryFileMax
        && uTimeSlot == pLogger->pInt->uHistoryTimeSlotStart))
        return;

    /* Save "disabled" log flag and make sure logging is disabled.
     * The logging in the functions called during log file history
     * rotation would cause severe trouble otherwise.
     */
    uint32_t const fSavedFlags = pLogger->fFlags;
    pLogger->fFlags |= RTLOGFLAGS_DISABLED;

    /* Disable log rotation temporarily, otherwise with extreme settings and
chatty phase logging we could run into endless rotation.
*/
   uint32_t const cSavedHistory = pLogger->pInt->cHistory;
   pLogger->pInt->cHistory = 0;
   /*
   * Close the old log file.
   */
   if (pLogger->pInt->hFile != NIL_RTFILE)
   {
      /* Use the callback to generate some final log contents, but only if
       * this is a rotation with a fully set up logger. Leave the other case
       * to the RTLogCreateExV function. */
      if (pLogger->pInt->pfnPhase && !fFirst)
      {
         uint32_t fODestFlags = pLogger->fDestFlags;
         pLogger->fDestFlags &= RTLOGDEST_FILE;
         pLogger->pInt->pfnPhase(pLogger, RTLOGPHASE_PRERotate, rtlogPhaseMsgLocked);
         pLogger->fDestFlags = fODestFlags;
      }
      RTFileClose(pLogger->pInt->hFile);
      pLogger->pInt->hFile = NIL_RTFILE;
   }
   if (cSavedHistory)
   {
      /* Rotate the log files.
      */
      for (uint32_t i = cSavedHistory - 1; i + 1 > 0; i--)
      {
         char szOldName[sizeof(pLogger->pInt->szFilename) + 32];
         if (i > 0)
            RTStrPrintf(szOldName, sizeof(szOldName), "%s.%u", pLogger->pInt->szFilename, i);
         else
            RTStrCopy(szOldName, sizeof(szOldName), pLogger->pInt->szFilename);
         char szNewName[sizeof(pLogger->pInt->szFilename) + 32];
         RTStrPrintf(szNewName, sizeof(szNewName), "%s.%u", pLogger->pInt->szFilename, i + 1);
         unsigned cBackoff = 0;
         int rc = RTFileRename(szOldName, szNewName, RTFILEMOVE_FLAGS_REPLACE);
         while ( rc == VERR_SHARING_VIOLATION && cBackoff < RT_ELEMENTS(g_acMsLogBackoff) )
         {
            RTThreadSleep(g_acMsLogBackoff[cBackoff++]);
            rc = RTFileRename(szOldName, szNewName, RTFILEMOVE_FLAGS_REPLACE);
         }
if (rc == VERR_FILE_NOT_FOUND)
    RTFileDelete(szNewName);
}

/*
 * Delete excess log files.
 */
for (uint32_t i = cSavedHistory + 1; ; i++)
{
    char szExcessName[sizeof(pLogger->pInt->szFilename) + 32];
    RTStrPrintf(szExcessName, sizeof(szExcessName), "%s.%u", pLogger->pInt->szFilename, i);
    int rc = RTFileDelete(szExcessName);
    if (RT_FAILURE(rc))
        break;
}

/*
 * Update logger state and create new log file.
 */
plLogger->pInt->cbHistoryFileWritten = 0;
plLogger->pInt->uHistoryTimeSlotStart = uTimeSlot;
rtlogFileOpen(pLogger, pErrInfo);

/*
 * Use the callback to generate some initial log contents, but only if this
 * is a rotation with a fully set up logger. Leave the other case to the
 * RTLogCreateExV function.
 */
if (pLogger->pInt->pfnPhase && !fFirst)
{
    uint32_t const fSavedDestFlags = pLogger->fDestFlags;
    plLogger->fDestFlags &= RTLOGDEST_FILE;
    plLogger->pInt->pfnPhase(pLogger, RTLOGPHASE_POSTROTATE, rtlogPhaseMsgLocked);
    plLogger->fDestFlags = fSavedDestFlags;
}

/* Restore saved values. */
plLogger->pInt->cHistory = cSavedHistory;
plLogger->fFlags = fSavedFlags;

/*
 * Worker for RTLogCreateExV and RTLogClearFileDelayFlag.
 */
* This will later be used to reopen the file by RTLogDestinations.
static int rtR3LogOpenFileDestination(PRTLOGGER pLogger, PRTERRINFO pErrInfo)
{
    int rc;
    if (pLogger->fFlags & RTLOGFLAGS_APPEND)
    {
        rc = rtlogFileOpen(pLogger, pErrInfo);

        /* Rotate in case of appending to a too big log file, 
           otherwise this simply doesn't do anything. */
        rtlogRotate(pLogger, 0, true /* fFirst */, pErrInfo);
    }
    else
    {
        /* Force rotation if it is configured. */
        pLogger->pInt->cbHistoryFileWritten = UINT64_MAX;
        rtlogRotate(pLogger, 0, true /* fFirst */, pErrInfo);

        /* If the file is not open then rotation is not set up. */
        if (pLogger->pInt->hFile == NIL_RTFILE)
        {
            pLogger->pInt->cbHistoryFileWritten = 0;
            rc = rtlogFileOpen(pLogger, pErrInfo);
        }
        else
            rc = VINF_SUCCESS;
    }
    return rc;
}

static void rtlogFlush(PRTLOGGER pLogger, bool fNeedSpace)
{
    /* Writes the buffer to the given log device without checking for buffered 
       data or anything. 
    
    * Used by the RTLogFlush() function. 
    */
    /* @param pLogger The logger instance to write to. NULL is not allowed! 
    * @param fNeedSpace Set if the caller assumes space will be made available. 
    */
}
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```c
+ { uint32_t const cchScratch = pLogger->offScratch;
+   if (cchScratch == 0)
+       return; /* nothing to flush. */
+   NOREF(fNeedSpace);
+   
+   #ifndef IN_RC
+   /*
+   * If the ring buffer is active, the other destinations are only written
+   * to when the ring buffer is flushed by RTLogFlush().
+   */
+   + if (   (pLogger->fDestFlags & RTLOGDEST_RINGBUF)
+       && pLogger->pInt
+       && pLogger->pInt->pszRingBuf /* paranoia */)
+       { rtLogRingBufWrite(pLogger->pInt, pLogger->achScratch, pLogger->offScratch);
+         pLogger->offScratch = 0; /* empty the buffer. */
+       }
+   /*
+   * In file delay mode, we ignore flush requests except when we're full
+   * and the caller really needs some scratch space to get work done.
+   */
+   + else
+   #ifdef IN_RING3
+   #endif
+   { /* Make sure the string is terminated. On Windows, RTLogWriteDebugger
+     will get upset if it isn't. */
+     if (RT_LIKELY(cchScratch < sizeof(pLogger->achScratch)))
+         pLogger->achScratch[cchScratch] = '\0';
+     else
+         AssertFailed();
+   }
+   #ifndef IN_RC
+   if (pLogger->fDestFlags & RTLOGDEST_USER)
+       RTLogWriteUser(pLogger->achScratch, cchScratch);
+   if (pLogger->fDestFlags & RTLOGDEST_DEBUGGER)
+       RTLogWriteDebugger(pLogger->achScratch, cchScratch);
+   #ifdef IN_RING3
+   #endif
+   if ((pLogger->fDestFlags & (RTLOGDEST_FILE | RTLOGDEST_RINGBUF)) == RTLOGDEST_FILE)
+       { if (pLogger->pInt->hFile != NIL_RTFILE)
+           { RTFileWrite(pLogger->pInt->hFile, pLogger->achScratch, cchScratch, NULL);
+         }
```
if (pLogger->fFlags & RTLOGFLAGS_FLUSH)
    RTFileFlush(pLogger->pInt->hFile);
}

if (pLogger->pInt->cHistory)
    pLogger->pInt->cbHistoryFileWritten += cchScratch;
}
#endif

if (pLogger->fDestFlags & RTLOGDEST_STDOUT)
    RTLogWriteStdOut(pLogger->achScratch, cchScratch);

if (pLogger->fDestFlags & RTLOGDEST_STDERR)
    RTLogWriteStdErr(pLogger->achScratch, cchScratch);

#if (defined(IN_RING0) || defined(IN_RC)) && !defined(LOG_NO_COM)
    if (pLogger->fDestFlags & RTLOGDEST_COM)
        RTLogWriteCom(pLogger->achScratch, cchScratch);
#endif /* !IN_RC */
#endif /* IN_RC */

#ifdef IN_RC
    if (pLogger->pfnFlush)
        pLogger->pfnFlush(pLogger);
#else
    if (pLogger->pInt->pfnFlush)
        pLogger->pInt->pfnFlush(pLogger);
#endif

    /* empty the buffer. */
    pLogger->offScratch = 0;

#ifdef IN_RING3
    /*
     * Rotate the log file if configured. Must be done after everything is
     * flushed, since this will also use logging/flushing to write the header
     * and footer messages.
     */
    if (   (pLogger->fDestFlags & RTLOGDEST_FILE)
        && pLogger->pInt->cHistory)
        rtlogRotate(pLogger, RTTimeProgramSecTS() / pLogger->pInt->cSecsHistoryTimeSlot, false /*fFirst*/, NULL /*pErrInfo*/);
#endif /* IN_RING3 */

*/
if (pLogger->fFlags & RTLOGFLAGS_FLUSH)
    RTFileFlush(pLogger->pInt->hFile);
}

if (pLogger->pInt->cHistory)
    pLogger->pInt->cbHistoryFileWritten += cchScratch;
}
#endif

if (pLogger->fDestFlags & RTLOGDEST_STDOUT)
    RTLogWriteStdOut(pLogger->achScratch, cchScratch);

if (pLogger->fDestFlags & RTLOGDEST_STDERR)
    RTLogWriteStdErr(pLogger->achScratch, cchScratch);

#if (defined(IN_RING0) || defined(IN_RC)) && !defined(LOG_NO_COM)
    if (pLogger->fDestFlags & RTLOGDEST_COM)
        RTLogWriteCom(pLogger->achScratch, cchScratch);
#endif /* !IN_RC */
#endif /* !IN_RC */

if (pLogger->fDestFlags & RTLOGDEST_FILE)
    /*
     * Rotate the log file if configured. Must be done after everything is
     * flushed, since this will also use logging/flushing to write the header
     * and footer messages.
     */
    if (   (pLogger->fDestFlags & RTLOGDEST_FILE)
        && pLogger->pInt->cHistory)
        rtlogRotate(pLogger, RTTimeProgramSecTS() / pLogger->pInt->cSecsHistoryTimeSlot, false /*fFirst*/, NULL /*pErrInfo*/);
#endif /* !IN_RC */

else
    { /* Delay file open but the caller really need some space. So, give him half a
* buffer and insert a message indicating that we've dropped output.
*/
    uint32_t offHalf = sizeof(pLogger->achScratch) / 2;
    if (cchScratch > offHalf)
    {
        if (pLogger->fFlags & RTLOGFLAGS_USECRLF)
            pLogger->achScratch[offHalf++] = 'r';
        static const char s_szDropMsg[] = "\n[DROP DROP DROP]";
        memcpy(&pLogger->achScratch[offHalf], RT_STR_TUPLE(s_szDropMsg));
        offHalf += sizeof(s_szDropMsg) - 1;
        if (pLogger->fFlags & RTLOGFLAGS_USECRLF)
            pLogger->achScratch[offHalf++] = 'r';
        pLogger->achScratch[offHalf++] = 'n';
        pLogger->offScratch = offHalf;
    }
#endif
/**
 * Callback for RTLogFormatV which writes to the com port.
 * See PFNLOGOUTPUT() for details.
 */
static DECLCALLBACK(size_t) rtLogOutput(void *pv, const char *pachChars, size_t cbChars)
{
    PRTLOGGER pLogger = (PRTLOGGER)pv;
    if (cbChars)
    {
        size_t cbRet = 0;
        for (;;)
        {
#if defined(DEBUG) && defined(IN_RING3)
            /* sanity */
            if (pLogger->offScratch >= sizeof(pLogger->achScratch))
                fprintf(stderr, "pLogger->offScratch >= sizeof(pLogger->achScratch) (%#x >= %#x)\n",
                        pLogger->offScratch, (unsigned)sizeof(pLogger->achScratch));
            AssertBreakpoint(); AssertBreakpoint();
        }
#if defined(DEBUG) && defined(IN_RING3)
/* how much */
        size_t cb = sizeof(pLogger->achScratch) - pLogger->offScratch - 1;
        if (cb > cbChars)
            cb = cbChars;
/* copy */
memcpy(&pLogger->achScratch[pLogger->offScratch], pachChars, cb);

/* advance */
uint32_t cbRet = cb;
cbChars -= cb;

/* done? */
if (cbChars <= 0)
    return cbRet;

cbChars += cb;

/* flush */
rtlogFlush(pLogger, true /*fNeedSpace*/);

/* won't ever get here! */
}

else
{
    /* Termination call.
    * There's always space for a terminator, and it's not counted.
    */
    pLogger->achScratch[pLogger->offScratch] = '\0';
    return 0;
}

/**
 * stpncpy implementation for use in rtLogOutputPrefixed w/ padding.
 */
DECLINLINE(char *) rtLogStPNCpyPad(char *pszDst, const char *pszSrc, size_t cchSrcMax, size_t cchMinWidth)
{
    size_t cchSrc = 0;
    if (pszSrc)
+ { 
+     cchSrc = strlen(pszSrc);
+     if (cchSrc > cchSrcMax)
+         cchSrc = cchSrcMax;
+     
+     memcpy(pszDst, pszSrc, cchSrc);
+     pszDst += cchSrc;
+ } 
+ do 
+     *pszDst++ = ' '; 
+     while (cchSrc++ < cchMinWidth);
+ 
+     return pszDst;
+ }
+
+
+/**
+ * Callback for RTLogFormatV which writes to the logger instance.
+ * This version supports prefixes.
+ *
+ * See PFNLOGOUTPUT() for details.
+ */
+static DECLCALLBACK(size_t) rtLogOutputPrefixed(void *pv, const char *pachChars, size_t cbChars)
+{ 
+    PRTLOGOUTPUTPREFIXEDARGS pArgs = (PRTLOGOUTPUTPREFIXEDARGS)pv;
+    PRTLOGGER pLogger = pArgs->pLogger;
+    if (cbChars)
+    {
+        size_t cbRet = 0;
+        for (; ;)
+        {
+            uint32_t offScratch = pLogger->offScratch;
+            size_t cb = sizeof(pLogger->achScratch) - offScratch - 1;
+            const char *pszNewLine;
+            char *psz;
+            if (cb)
+            {
+                #ifdef IN_RC
+                    bool *pfPendingPrefix = &pLogger->fPendingPrefix;
+                #else
+                    bool *pfPendingPrefix = &pLogger->pInt->fPendingPrefix;
+                #endif
+                if (*pfPendingPrefix)
+                {
+                    #if defined IN_RC
+                        *pfPendingPrefix = &pLogger->fPendingPrefix;
+                    #else
+                        *pfPendingPrefix = &pLogger->pInt->fPendingPrefix;
+                    #endif
+                    *pfPendingPrefix = false;
+                }
+            }
+        }
+    }
+}
    /* sanity */
    if (offScratch >= sizeof(pLogger->achScratch))
    {
        fprintf(stderr, "offScratch >= sizeof(pLogger->achScratch) (%#x >= %#x)\n",
                offScratch, (unsigned)sizeof(pLogger->achScratch));
        AssertBreakpoint(); AssertBreakpoint();
    }

    /* Flush the buffer if there isn't enough room for the maximum prefix config.
     * Max is 256, add a couple of extra bytes. See CCH_PREFIX check way below.
     */
    if (cb < 256 + 16)
    {
        rtlogFlush(pLogger, true /*fNeedSpace*/);
        offScratch = pLogger->offScratch;
        cb = sizeof(pLogger->achScratch) - offScratch - 1;
    }

    /* Write the prefixes.
     * psz is pointing to the current position.
     */
    psz = &pLogger->achScratch[offScratch];
    if (pLogger->fFlags & RTLOGFLAGS_PREFIX_TS)
    {
        uint64_t  u64    = RTTimeNanoTS();
        int      iBase   = 16;
        unsigned int fFlags = RTSTR_F_ZEROPAD;
        if (pLogger->fFlags & RTLOGFLAGS_DECIMAL_TS)
        {
            iBase = 10;
            fFlags = 0;
        }
        if (pLogger->fFlags & RTLOGFLAGS_REL_TS)
        {
            static volatile uint64_t s_u64LastTs;
            uint64_t  u64DiffTs = u64 - s_u64LastTs;
            s_u64LastTs = u64;
            /* We could have been preempted just before reading of s_u64LastTs by
             * another thread which wrote s_u64LastTs. In that case the difference
             * is negative which we simply ignore. */
            u64     = (int64_t)u64DiffTs < 0 ? 0 : u64DiffTs;
        }
        /* 1E15 nanoseconds = 11 days */
psz += RTStrFormatNumber(psz, u64, iBase, 16, 0, fFlags);
"psz++ = '\';
}
#define CCH_PREFIX_01 0 + 17
+
+ if (pLogger->fFlags & RTLOGFLAGS_PREFIX_TSC)
+ {
+#if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+ uint64_t u64 = ASMReadTSC();
+#else
+ uint64_t u64 = RTTimeNanoTS();
+#endif
+ int iBase = 16;
+ unsigned int fFlags = RTSTR_F_ZEROPAD;
+ if (pLogger->fFlags & RTLOGFLAGS_DECIMAL_TS)
+ {
+     iBase = 10;
+     fFlags = 0;
+ }
+ if (pLogger->fFlags & RTLOGFLAGS_REL_TS)
+ {
+     static volatile uint64_t s_u64LastTsc;
+     int64_t i64DiffTsc = u64 - s_u64LastTsc;
+     s_u64LastTsc = u64;
+     /* We could have been preempted just before reading of s_u64LastTsc by
+     * another thread which wrote s_u64LastTsc. In that case the difference
+     * is negative which we simply ignore. */
+     u64 = i64DiffTsc < 0 ? 0 : i64DiffTsc;
+ }
+ /* 1E15 ticks at 4GHz = 69 hours */
+ psz += RTStrFormatNumber(psz, u64, iBase, 16, 0, fFlags);
+ "psz++ = '\';
+ }
#define CCH_PREFIX_02 CCH_PREFIX_01 + 17
+
+ if (pLogger->fFlags & RTLOGFLAGS_PREFIX_MS_PROG)
+ {
+#if defined(IN_RING3) || defined(IN_RC)
+     uint64_t u64 = RTTimeProgramMilliTS();
+#else
+     uint64_t u64 = 0;
+#endif
+ /* 1E8 milliseconds = 27 hours */
+ psz += RTStrFormatNumber(psz, u64, 10, 9, 0, RTSTR_F_ZEROPAD);
+ "psz++ = '\';
+ }
#define CCH_PREFIX_03 CCH_PREFIX_02 + 21
+
if (pLogger->fFlags & RTLOGFLAGS_PREFIX_TIME)
{
  if (defined(IN_RING3) || defined(IN_RING0))
  {
    RTTIMESPEC TimeSpec;
    RTTIME Time;
    RTTimeExplode(&Time, RTTimeNow(&TimeSpec));
    psz += RTStrFormatNumber(psz, Time.u8Hour, 10, 2, 0, RTSTR_F_ZEROPAD);
    *psz++ = ':';
    psz += RTStrFormatNumber(psz, Time.u8Minute, 10, 2, 0, RTSTR_F_ZEROPAD);
    *psz++ = ':';
    psz += RTStrFormatNumber(psz, Time.u8Second, 10, 2, 0, RTSTR_F_ZEROPAD);
    *psz++ = '.';
    psz += RTStrFormatNumber(psz, Time.u32Nanosecond / 1000, 10, 6, 0, RTSTR_F_ZEROPAD);
    *psz++ = ' ';
  }
  else
  {
    memset(psz, ' ', 16);
    psz += 16;
  }
}
#define CCH_PREFIX_04 CCH_PREFIX_03 + (3+1+3+1+3+1+7+1)

if (pLogger->fFlags & RTLOGFLAGS_PREFIX_TIME_PROG)
{
  if (defined(IN_RING3) || defined(IN_RC))
  {
    uint64_t u64 = RTTimeProgramMicroTS();
    psz += RTStrFormatNumber(psz, (uint32_t)(u64 / RT_US_1HOUR), 10, 2, 0, RTSTR_F_ZEROPAD);
    *psz++ = ':';
    uint32_t u32 = (uint32_t)(u64 % RT_US_1HOUR);
    psz += RTStrFormatNumber(psz, u32 / RT_US_1MIN, 10, 2, 0, RTSTR_F_ZEROPAD);
    *psz++ = ':';
    u32 %= RT_US_1MIN;
    psz += RTStrFormatNumber(psz, u32 / RT_US_1SEC, 10, 2, 0, RTSTR_F_ZEROPAD);
    *psz++ = ':';
    *psz++ = ' ';
  }
  else
  {
    memset(psz, ' ', 16);
    psz += 16;
  }
}
#define CCH_PREFIX_05 CCH_PREFIX_04 + (9+1+2+1+2+1+6+1)

if (pLogger->fFlags & RTLOGFLAGS_PREFIX_DATETIME)
{
  if (0)
  {
    if (pLogger->fFlags & RTLOGFLAGS_PREFIX_DATETIME)
    {

```c
char szDate[32];
RTTIMESPEC Time;
RTTimeSpecToString(RTTimeNow(&Time), szDate, sizeof(szDate));
size_t cch = strlen(szDate);
memcpy(psz, szDate, cch);
psz += cch;
"psz++ = '\';

#define CCH_PREFIX_06   CCH_PREFIX_05 + 32
#endif
#define CCH_PREFIX_06   CCH_PREFIX_05 + 0
#endif

if (pLogger->fFlags & RTLOGFLAGS_PREFIX_PID)
{
    #ifndef IN_RC
        RTPROCESS Process = RTProcSelf();
    #else
        RTPROCESS Process = NIL_RTPROCESS;
    #endif
    psz += RTStrFormatNumber(psz, Process, 16, sizeof(RTPROCESS) * 2, 0, RTSTR_F_ZEROPAD);
    "psz++ = '\';
}
#define CCH_PREFIX_07   CCH_PREFIX_06 + 9

if (pLogger->fFlags & RTLOGFLAGS_PREFIX_TID)
{
    #ifndef IN_RC
        RTNATIVETHREAD Thread = RTThreadNativeSelf();
    #else
        RTNATIVETHREAD Thread = NIL_RTNATIVETHREAD;
    #endif
    psz += RTStrFormatNumber(psz, Thread, 16, sizeof(RTNATIVETHREAD) * 2, 0,
RTSTR_F_ZEROPAD);
    "psz++ = '\';
}
#define CCH_PREFIX_08   CCH_PREFIX_07 + 17

if (pLogger->fFlags & RTLOGFLAGS_PREFIX_THREAD)
{
    #ifdef IN_RING3
        const char *pszName = RTThreadSelfName();
    #elif defined IN_RC
        const char *pszName = "EMT-RC";
    #else
        const char *pszName = "R0";
    #endif
    psz = rtLogStPNCpyPad(psz, pszName, 16, 8);
```

---

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#define CCH_PREFIX_09   CCH_PREFIX_08 + 17
+#if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
    const uint8_t idCpu = ASMGetApicId();
+#else
    const RTCPUID idCpu = RTMpCpuId();
+#endif
                  psz += RTStrFormatNumber(psz, idCpu, 16, sizeof(idCpu) * 2, 0, RTSTR_F_ZEROPAD);
                  *psz++ = ' ';
        }
#define CCH_PREFIX_10   CCH_PREFIX_09 + 17

#ifndef IN_RC
    if (    (pLogger->fFlags & RTLOGFLAGS_PREFIX_CUSTOM)
        &&  pLogger->pInt->pfnPrefix)
    {        psz += pLogger->pInt->pfnPrefix(pLogger, psz, 31, pLogger->pInt->pvPrefixUserArg);
        *psz++ = ' '; /* +32 */
    }
#endif
#define CCH_PREFIX_11   CCH_PREFIX_10 + 32

                if (pLogger->fFlags & RTLOGFLAGS_PREFIX_LOCK_COUNTS)
                {        #ifdef IN_RING3 /** @todo implement these counters in ring-0 too? */
                        RTTHREAD Thread = RTThreadSelf();
                        if (Thread != NIL_RTTHREAD)
                        {                            uint32_t cReadLocks  = RTLockValidatorReadLockGetCount(Thread);
                            uint32_t cWriteLocks = RTLockValidatorWriteLockGetCount(Thread) - g_cLoggerLockCount;
                            cReadLocks  = RT_MIN(0xfff, cReadLocks);
                            cWriteLocks = RT_MIN(0xfff, cWriteLocks);
                            psz += RTStrFormatNumber(psz, cReadLocks, 16, 1, 0, RTSTR_F_ZEROPAD);
                            *psz++ = '/';
                            psz += RTStrFormatNumber(psz, cWriteLocks, 16, 1, 0, RTSTR_F_ZEROPAD);
                            *psz++ = '/';
                            *psz++ = '?';
                            *psz++ = '?';
                            *psz++ = '?';
                        }
                        else
                        {                            *psz++ = '?';
                        }
                }
                *psz++ = ' ';
            }
+  if (pLogger->fFlags & RTLOGFLAGS_PREFIX_FLAG_NO)
+  {
+    psz += RTStrFormatNumber(psz, pArgs->fFlags, 16, 8, 0, RTSTR_F_ZEROPAD);
+    "psz++ = '";
+  }
+#define CCH_PREFIX_13 CCH_PREFIX_12 + 9
+  if (pLogger->fFlags & RTLOGFLAGS_PREFIX_FLAG)
+  {
+    ifdef IN_RING3
+    #else
+      const char *pszGroup = NULL;
+    #endif
+    psz = rtLogStPNCpyPad(psz, pszGroup, 16, 8);
+  }
+#define CCH_PREFIX_14 CCH_PREFIX_13 + 17
+  if (pLogger->fFlags & RTLOGFLAGS_PREFIX_GROUP_NO)
+  {
+    if (pArgs->iGroup != ~0U)
+    {
+      psz += RTStrFormatNumber(psz, pArgs->iGroup, 16, 3, 0, RTSTR_F_ZEROPAD);
+      /* +9 */
+    }
+    else
+    {
+      memcpy(psz, "-1  ", sizeof("-1  ") - 1);
+      psz += sizeof("-1  ") - 1;
+    }
+#define CCH_PREFIX_15 CCH_PREFIX_14 + 9
+  if (pLogger->fFlags & RTLOGFLAGS_PREFIX_GROUP)
+  {
+    const unsigned fGrp = pLogger->afGroups[pArgs->iGroup != ~0U ? pArgs->iGroup : 0];
+    const char *pszGroup;
+    size_t cch;
+    switch (pArgs->fFlags & fGrp)
+    {
+      case 0:          pszGroup = "--------"; cch = sizeof("--------") - 1; break;
+      case RTLOGGRPFLAGS_ENABLED: pszGroup = "enabled" ; cch = sizeof("enabled" ) - 1; break;
+      case RTLOGGRPFLAGS_LEVEL_1: pszGroup = "level 1" ; cch = sizeof("level 1") - 1; break;
+      case RTLOGGRPFLAGS_LEVEL_2: pszGroup = "level 2" ; cch = sizeof("level 2") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_3: pszGroup = "level 3"; cch = sizeof("level 3") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_4: pszGroup = "level 4"; cch = sizeof("level 4") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_5: pszGroup = "level 5"; cch = sizeof("level 5") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_6: pszGroup = "level 6"; cch = sizeof("level 6") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_7: pszGroup = "level 7"; cch = sizeof("level 7") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_8: pszGroup = "level 8"; cch = sizeof("level 8") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_9: pszGroup = "level 9"; cch = sizeof("level 9") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_10: pszGroup = "level 10"; cch = sizeof("level 10") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_11: pszGroup = "level 11"; cch = sizeof("level 11") - 1; break;
+ case RTLOGGRPFLAGS_LEVEL_12: pszGroup = "level 12"; cch = sizeof("level 12") - 1; break;
+ case RTLOGGRPFLAGS_FLOW: pszGroup = "flow"; cch = sizeof("flow") - 1; break;
+ case RTLOGGRPFLAGS_WARN: pszGroup = "warn"; cch = sizeof("warn") - 1; break;
+ default: pszGroup = "????????"; cch = sizeof("????????") - 1; break;
+ }
+ psz = rtLogStPNCpyPad(psz, pszGroup, 16, 8);
+ }
+ #define CCH_PREFIX_16 CCH_PREFIX_15 + 17
+ +#define CCH_PREFIX ( CCH_PREFIX_16 )
+ { AssertCompile(CCH_PREFIX < 256); }
+ */
+ /* Done, figure what we've used and advance the buffer and free size.
+ */
+ cb = psz - &pLogger->achScratch[offScratch];
+ AssertMsg(cb <= 223, ("%#zx (%zd) - fFlags=%#x\n", cb, cb, pLogger->fFlags));
+ pLogger->offScratch = offScratch += (uint32_t)cb;
+ cb = sizeof(pLogger->achScratch) - offScratch - 1;
+ }
+ else if (cb <= 0)
+ {
+ rtlogFlush(pLogger, true /*fNeedSpace*/);
+ offScratch = pLogger->offScratch;
+ cb = sizeof(pLogger->achScratch) - offScratch - 1;
+ }
+ /* if defined(DEBUG) && defined(IN_RING3) */
+ /* sanity */
+ if (offScratch >= sizeof(pLogger->achScratch))
+ {
+ fprintf(stderr, "offScratch >= sizeof(pLogger->achScratch) (%#x >= %#x)\n",
+ offScratch, (unsigned)sizeof(pLogger->achScratch));
+ AssertBreakpoint(); AssertBreakpoint();
+ }
+ #endif
/* how much */
if (cb > cbChars)
    cb = cbChars;

/* have newline? */
pszNewLine = (const char *)memchr(pachChars, '\n', cb);
if (pszNewLine)
    { 
        if (pLogger->fFlags & RTLOGFLAGS_USECRLF)
            cb = pszNewLine - pachChars;
        else
            { 
                cb = pszNewLine - pachChars + 1;
                *pfPendingPrefix = true;
            } 
    } 

/* copy */
memcpy(&pLogger->achScratch[offScratch], pachChars, cb);

/* advance */
pLogger->offScratch = offScratch += (uint32_t)cb;
cbRet += cb;
cbChars -= cb;

if (pszNewLine
    && (pLogger->fFlags & RTLOGFLAGS_USECRLF)
    && offScratch + 2 < sizeof(pLogger->achScratch))
    { 
        memcpy(&pLogger->achScratch[offScratch], "\n", 2);
pLogger->offScratch = offScratch += 2;
        cbRet++;
cbChars--; 
        cb++; 
        *pfPendingPrefix = true;
    } 

/* done? */
if (cbChars <= 0)
    return cbRet;
pachChars += cb;
}

/* won't ever get here! */

else
    

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+ /*
+ * Termination call.
+ * There's always space for a terminator, and it's not counted.
+ */
+ pLogger->achScratch[pLogger->offScratch] = '\0';
+ return 0;
+ }
+
+ */
+ * Write to a logger instance (worker function).
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param   pLogger     Pointer to logger instance. Must be non-NULL.
+ * @param   fFlags      The logging flags.
+ * @param   iGroup      The group.
+ *                      The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ *                      only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   args        Format arguments.
+ */
+ static void rtlogLoggerExVLocked(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char *pszFormat, va_list args)
+ {
+    /*
+     * Format the message and perhaps flush it.
+     */
+    if (pLogger->fFlags & (RTLOGFLAGS_PREFIX_MASK | RTLOGFLAGS_USECRLF))
+        {
+            RTLOGOUTPUTPREFIXEDARGS OutputArgs;
+            OutputArgs.pLogger = pLogger;
+            OutputArgs.iGroup = iGroup;
+            OutputArgs.fFlags = fFlags;
+            RTLogFormatV(rtLogOutputPrefixed, &OutputArgs, pszFormat, args);
+        }
+    else
+        RTLogFormatV(rtLogOutput, pLogger, pszFormat, args);
+    if (    !(pLogger->fFlags & RTLOGFLAGS_BUFFERED)
+        &&  pLogger->offScratch)
+        rtlogFlush(pLogger, false /*fNeedSpace*/);
+ }
+
+#ifndef IN_RC
+/**
+ */
+}
+ * For calling rtlogLoggerExVLocked.
+ *
+ * @param   pLogger     The logger.
+ * @param   fFlags      The logging flags.
+ * @param   iGroup      The group.
+ * The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ * only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   ...         Format arguments.
+ */
+static void rtlogLoggerExFLocked(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char
*pszFormat, ...)
+{
+    va_list va;
+    va_start(va, pszFormat);
+    rtlogLoggerExVLocked(pLogger, fFlags, iGroup, pszFormat, va);
+    va_end(va);
+}
#endif /* !IN_RC */

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/log/logcom.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/log/logcom.c
@@ -0,0 +1,146 @@
+/* $Id: logcom.cpp $ */
+/** @file
+ * IPRT - Logging to Serial Port.
+ */
+*/
+
+ /* Copyright (C) 2006-2017 Oracle Corporation
+ */
+ /*
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+ * available from http://www.virtualbox.org. This file is free software;
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+ */
+ /*
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+ /*
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
#ifndef IPRT_UART_BASE
/** The port address of the COM port to log to.
 * To override the default (COM1) append IPRT_UART_BASE=0xWXYZ to DEFS in your
 * LocalConfig.kmk. Alternatively you can edit this file, but the don’t forget
 * to also update the default found in VBox/asmdefs.h.
 *
 * Standard port assignments are: COM1=0x3f8, COM2=0x2f8, COM3=0x3e8, COM4=0x2e8.
 */
#define IPRT_UART_BASE 0x3f8
#endif

#include <iprt/log.h>
#include "internal/iprt.h"

#include <iprt/asm.h>
#if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86) /**< @todo consider fixing the config instead. */
#include <iprt/asm-amd64-x86.h>
#endif
#include <iprt/stdarg.h>
#include <iprt/string.h>

static DECLCALLBACK(size_t) rtLogComOutput(void *pv, const char *pachChars, size_t cbChars);

/** Prints a formatted string to the serial port used for logging. */
@returns Number of bytes written.
+ * @param pszFormat Format string.
+ * @param ... Optional arguments specified in the format string.
+ */
+RTDECL(size_t) RTLogComPrintf(const char *pszFormat, ...)
+{
+ va_list args;
+ size_t cb;
+ va_start(args, pszFormat);
+ cb = RTLogComPrintfV(pszFormat, args);
+ va_end(args);
+ return cb;
+}
+RT_EXPORT_SYMBOL(RTLogComPrintf);
+
+/**
+ * Prints a formatted string to the serial port used for logging.
+ *
+ * @returns Number of bytes written.
+ * @param pszFormat Format string.
+ * @param args Optional arguments specified in the format string.
+ */
+RTDECL(size_t) RTLogComPrintfV(const char *pszFormat, va_list args)
+{
+ return RTLogFormatV(rtLogComOutput, NULL, pszFormat, args);
+}
+RT_EXPORT_SYMBOL(RTLogComPrintfV);
+
+/**
+ * Callback for RTLogFormatV which writes to the com port.
+ * See PFNLOGOUTPUT() for details.
+ */
+static DECLCALLBACK(size_t) rtLogComOutput(void *pv, const char *pachChars, size_t cbChars)
+{
+ NOREF(pv);
+ if (cbChars)
+ RTLogWriteCom(pachChars, cbChars);
+ return cbChars;
+}
+
+/**
+ * Write log buffer to COM port.
+ *
+ * @param pach Pointer to the buffer to write.
+ * @param cb Number of bytes to write.
+ */
+ RTDECL(void) RTLogWriteCom(const char *pach, size_t cb)
+ {
+ #if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+     const uint8_t *pu8;
+     for (pu8 = (const uint8_t *)pach; cb-- > 0; pu8++)
+     {
+         register unsigned cMaxWait;
+         register uint8_t u8;
+ +         /* expand \n -> \r\n */
+         if (*pu8 == '\n')
+             RTLogWriteCom("\r", 1);
+ +         /* Check if port is ready. */
+         cMaxWait = ~0U;
+         do
+         {
+             u8 = ASMInU8(IPRT_UART_BASE + 5);
+             cMaxWait--;
+         } while (!(u8 & 0x20) && u8 != 0xff && cMaxWait);
+ +         /* write */
+         ASMOutU8(IPRT_UART_BASE, *pu8);
+     } while (!((u8 & 0x20) && u8 != 0xff && cMaxWait));
+ +     /* PORTME? */
+ #else
+     } while (!((u8 & 0x20) && u8 != 0xff && cMaxWait));
+ +     /* write */
+     ASMOutU8(IPRT_UART_BASE, *pu8);
+     }
+ #endif
+ }
+ RT_EXPORT_SYMBOL(RTLogWriteCom);
+ --- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/log/logellipsis.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/log/logellipsis.c
@@ -0,0 +1,105 @@
+ /* $Id: logellipsis.cpp $ */
+ /** @file
+  * Runtime VBox - Logger, the ellipsis variants.
+ */
+ + * Copyright (C) 2006-2017 Oracle Corporation
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ /*@******************************************************************************
+ * Header Files
+ ******************************************************************************/
+
+ /*#include <iprt/log.h>
+ +#include "internal/iprt.h"
+ +
+ +#include <iprt/asm.h>
+ +#include <iprt/stdarg.h>
+ +
+ */
+
+ /**
+ * Write to a logger instance.
+ *
+ + * @param pLogger Pointer to logger instance.
+ + * @param pvCallerRet Ignored.
+ + * @param pszFormat Format string.
+ + * ... Format arguments.
+ */
+ +RTDECL(void) RTLogLogger(PRTLOGGER pLogger, void *pvCallerRet, const char *pszFormat, ...)
+{
+    va_list args;
+    va_start(args, pszFormat);
+    if defined(RT_OS_DARWIN) && defined(RT_ARCH_X86) && defined(IN_RING3)
+        /* manually align the stack before doing the call. */
+        __asm__ __volatile__("andl $-32, %%esp" :: "%esp");
+    RTLogLoggerExV(pLogger, 0, ~0U, pszFormat, args);
+    else
+        RTLogLoggerExV(pLogger, 0, ~0U, pszFormat, args);
+    #endif
+    va_end(args);
+    NOREF(pvCallerRet);
+}
+RT_EXPORT_SYMBOL(RTLogLogger);
+
+/**
+ * Write to a logger instance.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param   pLogger     Pointer to logger instance. If NULL the default logger instance will be attempted.
+ * @param   fFlags      The logging flags.
+ * @param   iGroup      The group.
+ *                      The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ *                      only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   ...         Format arguments.
+ * @remark  This is a worker function of LogIt.
+ */
+RTDECL(void) RTLogLoggerEx(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char
+                          *pszFormat, ...)
+{
+    va_list args;
+    va_start(args, pszFormat);
+    RTLogLoggerExV(pLogger, fFlags, iGroup, pszFormat, args);
+    va_end(args);
+} +RT_EXPORT_SYMBOL(RTLogLoggerEx);
+
+/**
+ * printf like function for writing to the default log.
+ *
+ * @param   pszFormat   Printf like format string.
+ * @param   ...         Optional arguments as specified in pszFormat.
+ *
+ * @remark The API doesn't support formatting of floating point numbers at the moment.
+ */
+RTDECL(void) RTLogPrintf(const char *pszFormat, ...)
+{
+    va_list args;
+    va_start(args, pszFormat);
+    RTLogPrintfV(pszFormat, args);
+    va_end(args);
+} +RT_EXPORT_SYMBOL(RTLogPrintf);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/log/logformat.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/log/logformat.c

Open Source Used In 5GaaS Edge AC-4 36878
@@ -0,0 +1,100 @@
+/* $Id: logformat.cpp $ */
+/** @file
+ * IPRT - Log Formatter.
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+
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+* CDDL are applicable instead of those of the GPL.
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+* terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************************
+**************************************
+*   Header Files                                                                                                                 *
+********************************************************************************************
+**************************************/
+
+#include <iprt/log.h>
+#include "internal/iprt.h"
+
+}/*clude <iprt/string.h>
+#include <iprt/err.h>
+ifdef IN_RING3
+}# include <iprt/thread.h>
+}# include <iprt/tcp.h>
+}#endif
+
+}#include <iprt/stdlib.h>
+#include <iprt/string.h>
+

}#}/**
**Internal Functions**

```c
+static DECLCALLBACK(size_t) rtlogFormatStr(void *pvArg, PFNRTSTROUTPUT pfnOutput,
   + void *pvArgOutput, const char **ppszFormat,
   + va_list *pArgs, int cchWidth, int cchPrecision,
   + unsigned fFlags, char chArgSize);
+
+/**
+ * Partial vsprintf worker implementation.
+ *
+ * @returns number of bytes formatted.
+ * @param   pfnOutput   Output worker.
+ *                    Called in two ways. Normally with a string an it's length.
+ *                    For termination, it's called with NULL for string. 0 for length.
+ * @param   pvArg       Argument to output worker.
+ * @param   pszFormat   Format string.
+ * @param   args        Argument list.
+ */
+RTDECL(size_t) RTLogFormatV(PFNRTSTROUTPUT pfnOutput, void *pvArg, const char *pszFormat, va_list args)
+{
+    return RTStrFormatV(pfnOutput, pvArg, rtlogFormatStr, NULL, pszFormat, args);
+}
+RT_EXPORT_SYMBOL(RTLogFormatV);
+
+/**
+ * Callback to format VBox formatting extentions.
+ * See @ref pg_rt_str_format for a reference on the format types.
+ *
+ * @returns The number of bytes formatted.
+ * @param   pvArg           Formatter argument.
+ * @param   pfnOutput       Pointer to output function.
+ * @param   pvArgOutput     Argument for the output function.
+ * @param   ppszFormat      Pointer to the format string pointer. Advance this till the char
+ *                          after the format specifier.
+ * @param   pArgs           Pointer to the argument list. Use this to fetch the arguments.
+ * @param   cchWidth        Format Width. -1 if not specified.
+ * @param   cchPrecision    Format Precision. -1 if not specified.
+ * @param   fFlags          Flags (RTSTR_NTFS_*).
+ * @param   chArgSize       The argument size specifier, 't' or 'L'.
+ */
+static DECLCALLBACK(size_t) rtlogFormatStr(void *pvArg, PFNRTSTROUTPUT pfnOutput, void
   + *pvArgOutput,
   + const char **ppszFormat, va_list *pArgs, int cchWidth,
```

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int cchPrecision, unsigned fFlags, char chArgSize)
+
+  char ch = *(*ppszFormat)++;
+
+  AssertMsgFailed(("Invalid logger format type \"%%%c%.10s\"!", ch, *ppszFormat)); NOREF(ch);
+
+  NOREF(pvArg); NOREF(pfnOutput); NOREF(pvArgOutput); NOREF(pArgs); NOREF(cchWidth);
+  NOREF(cchPrecision); NOREF(fFlags); NOREF(chArgSize);
+  return 0;
+
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/log/logrel.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/log/logrel.c
@@ -0,0 +1,185 @@
+/* $Id: logrel.cpp $ */
+/** @file
+ * Runtime VBox - Release Logger.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************
+s**************************************
+s*   Header Files
+s***********************************************************************/
+
+#include <iprt/log.h>
+#include "internal/iprt.h"
+ ifndef IN_RC
+ /* include <iprt/alloc.h>
+ */ include <iprt/process.h>
+ /* include <iprt/semaphore.h>
+ */ include <iprt/thread.h>
+ /* include <iprt/mp.h>
+ */ endif
+ ifdef IN_RING3
+ /* include <iprt/file.h>
+ */ include <iprt/path.h>
+ */ endif
+ /* include <iprt/time.h>
+ */ include <iprt/asm.h>
+ /* include <iprt/assert.h>
+ */ include <iprt/err.h>
+ /* include <iprt/param.h>
+ */
+ /* include <iprt/stdarg.h>
+ */ include <iprt/string.h>
+ /* include <iprt/ctype.h>
+ */ ifdef IN_RING3
+ /* include <iprt/aloca.h>
+ */ include <stdio.h>
+ */ endif
+ +
+ /*******************************************************************************************
+ **************************************
+ */ Global Variables
+ ***************************************
+ /*******************************************************************************************
+ * Global Variables
+ * 
+ /*******************************************************************************************
+ ifdef IN_RC
+ /** Default release logger instance. */
+ extern "C" DECLIMPORT(RTLOGGERRC) g_RelLogger;
+ /*else */ !IN_RC */
+ */
+ static PRTLOGGER g_pRelLogger;
+ /*else */ !IN_RC */
+ +
+ + RTDECL(PRTLOGGER) RTLogRelGetDefaultInstance(void)
+ +
+ ifdef IN_RC
+ " return &g_RelLogger;
+ /*else */ !IN_RC */
+ " return g_pRelLogger;
+ */ endif /* !IN_RC */
+RT_EXPORT_SYMBOL(RTLogRelGetDefaultInstance);
+
+RTDECL(PRTLOGGER) RTLogRelGetDefaultInstanceEx(uint32_t fFlagsAndGroup)
+{
+    #ifdef IN_RC
+        PRTLOGGER pLogger = &g_RelLogger;
+    #else /* !IN_RC */
+        PRTLOGGER pLogger = g_pRelLogger;
+    #endif /* !IN_RC */
+    if (pLogger)
+    {
+        if (pLogger->fFlags & RTLOGFLAGS_DISABLED)
+            pLogger = NULL;
+        else
+        {
+            uint16_t const fFlags = RT_LO_U16(fFlagsAndGroup);
+            uint16_t const iGroup = RT_HI_U16(fFlagsAndGroup);
+            if (   iGroup != UINT16_MAX
+                 && (   (pLogger->afGroups[iGroup < pLogger->cGroups ? iGroup : 0] & (fFlags |
+                     (uint32_t)RTLOGGRPFLAGS_ENABLED))
+                     != (fFlags | (uint32_t)RTLOGGRPFLAGS_ENABLED)))
+                pLogger = NULL;
+        }
+    }
+    return pLogger;
+}
+RT_EXPORT_SYMBOL(RTLogRelGetDefaultInstanceEx);
+
+
+#ifndef IN_RC
+/**
+ * Sets the default logger instance.
+ *
+ * @returns iprt status code.
+ * @param pLogger The new default release logger instance.
+ */
+RTDECL(PRTLOGGER) RTLogRelSetDefaultInstance(PRTLOGGER pLogger)
+{
+    return ASMAtomicXchgPtrT(&g_pRelLogger, pLogger, PRTLOGGER);
+}
+RT_EXPORT_SYMBOL(RTLogRelSetDefaultInstance);
+#endif /* !IN_RC */
+/**
+ * Write to a logger instance, defaulting to the release one.
This function will check whether the instance, group and flags makes up a logging kind which is currently enabled before writing anything to the log.

@para pLogger Pointer to logger instance. If NULL the default release instance is attempted.
@para fFlags The logging flags.
@para iGroup The group.
* The value ~0U is reserved for compatibility with RTLogLogger[V] and is only for internal usage!
@para pszFormat Format string.
@para args Format arguments.

RTDECL(void) RTLogRelLoggerV(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char *pszFormat, va_list args)
{
    /*
    * A NULL logger means default instance.
    */
    if (!pLogger)
    {
        pLogger = RTLogRelGetDefaultInstance();
        if (!pLogger)
            return;
    }
    RTLogLoggerExV(pLogger, fFlags, iGroup, pszFormat, args);
}
RT_EXPORT_SYMBOL(RTLogRelLoggerV);

vprintf like function for writing to the default release log.

@para pszFormat Printf like format string.
@para args Optional arguments as specified in pszFormat.

* The API doesn't support formatting of floating point numbers at the moment.

RTDECL(void) RTLogRelPrintfV(const char *pszFormat, va_list args)
{
    RTLogRelLoggerV(NULL, 0, ~0U, pszFormat, args);
}
RT_EXPORT_SYMBOL(RTLogRelPrintfV);

Changes the buffering setting of the default release logger.

This can be used for optimizing longish logging sequences.
+ * @returns The old state.
+ * @param fBuffered The new state.
+ */
+RTDECL(bool) RTLogRelSetBuffering(bool fBuffered)
+{
+    PRTLOGGER pLogger = RTLogRelGetDefaultInstance();
+    if (pLogger)
+        return RTLogSetBuffering(pLogger, fBuffered);
+    return false;
+}
+RT_EXPORT_SYMBOL(RTLogRelSetBuffering);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/log/logrelellipsis.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/log/logrelellipsis.c
@@ -0,0 +1,78 @@
+/* $Id: logrelellipsis.cpp $ */
+/** @file
+ * Runtime VBox - Logger, the release ellipsis variants.
+ */
+*
+/* Copyright (C) 2006-2017 Oracle Corporation
+ */
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+ * CDDL are applicable instead of those of the GPL.
+ */
+/* You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+*
+**************************************************************************
+*************************
+* Header Files
+**************************************************************************

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```c
#include <iprt/log.h>
#include "internal/iprt.h"
+
#include <iprt/stdarg.h>
+
+/**
+ * Write to a logger instance, defaulting to the release one.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param   pLogger     Pointer to logger instance.
+ * @param   fFlags      The logging flags.
+ * @param   iGroup      The group.
+ *                      The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ *                      only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   ...         Format arguments.
+ * @remark  This is a worker function for LogRelIt.
+ */
+RTDECL(void) RTLogRelLogger(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char
+                          *pszFormat, ...)
+{
+    va_list args;
+    va_start(args, pszFormat);
+    RTLogRelLoggerV(pLogger, fFlags, iGroup, pszFormat, args);
+    va_end(args);
+}
+RT_EXPORT_SYMBOL(RTLogRelLogger);
+
+/**
+ * printf like function for writing to the default release log.
+ *
+ * @param   pszFormat   Printf like format string.
+ * @param   ...         Optional arguments as specified in pszFormat.
+ *
+ * @remark The API doesn't support formatting of floating point numbers at the moment.
+ */
+RTDECL(void) RTLogRelPrintf(const char *pszFormat, ...)
+{
+    va_list args;
+    va_start(args, pszFormat);
+    RTLogRelPrintfV(pszFormat, args);
+    va_end(args);
+}
+RT_EXPORT_SYMBOL(RTLogRelPrintf);
```
/*
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 * SUCH DAMAGE.
 */

#include <sys/cdefs.h>
#include <sys/cdefs.h>
#if defined(LIBC_SCCS) && !defined(lint)
# 0
#endif
static char sccsid[] = "@(#)divdi3.c 8.1 (Berkeley) 6/4/93";
#endif

/* $NetBSD: divdi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $*/

/*#include <sys/cdefs.h>
#endif
*/
```c
#include "quad.h"

/*
 * Divide two signed quads.
 * ??? if -1/2 should produce -1 on this machine, this code is wrong
 */
quad_t
__divdi3(a, b)
quad_t a, b;
{
u_quad_t ua, ub, uq;
int neg = 0;
+u ua = a;
+ub = b;
+if (a < 0)
+ua = -ua, neg ^= 1;
+if (b < 0)
+ub = -ub, neg ^= 1;
+uq = __qdivrem(ua, ub, (u_quad_t *)0);
+if (neg)
+uq = - uq;
+return uq;
}
```

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/*
*/

/*#include <sys/cdefs.h>
+if defined(LIBC_SCCS) && !defined(lint)
+if 0
+static char sccsid[] = "@(#)moddi3.c\t8.1 (Berkeley) 6/4/93";
+else
+__RCSID("$NetBSD: moddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $");
+endif
+#endif /* LIBC_SCCS and not lint */
+
+/*include "quad.h"
+
+*/
+
+ * Return remainder after dividing two signed quads.
+
+ * XXXwe assume a % b < 0 iff a < 0, but this is actually machine-dependent.
+
+quad_t
+__moddi3(a, b)
+quad_t a, b;
+{
+int neg = 0;
+
+ua = a;
+ub = b;
+
+if (a < 0)
+ua = -ua, neg ^= 1;
+if (b < 0)
+ub = -ub;
+(void)__qdivrem(ua, ub, &ur);
+if (neg)
+ur = -ur;
+return (ur);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/math/gcc/qdivrem.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/math/gcc/qdivrem.c
@@ -0,0 +1,285 @@
+/*
+
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+ * SUCH DAMAGE.
+ */
+
+/*#include <sys/cdefs.h>
+#undef defined(LIBC_SCCS) &
+if 0
+static char scsiz[] = "/(qdivrem$.c8.1 (Berkeley) 6/4/93"
+else
+endif

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# defineB((int)1 << HALF_BITS)/* digit base */
+
+ /* Combine two `digits' to make a single two-digit number. */
+ #defineCOMBINE(a, b) (((u_int)(a) << HALF_BITS) | (b))
+
+ /* select a type for digits in base B: use unsigned short if they fit */
+ #if UINT_MAX == 0xffffffffU && USHRT_MAX >= 0xffff
+ typedef unsigned short digit;
+ #else
+ typedef u_int digit;
+ #endif
+
+ static void shl __P((digit *p, int len, int sh));
+
+ /* __qdivrem(u, v, rem) returns u/v and, optionally, sets *rem to u%v. */
+ /* We do this in base 2-sup-HALF_BITS, so that all intermediate products
+ * fit within u_int. As a consequence, the maximum length dividend and
+ * divisor are 4 `digits' in this base (they are shorter if they have
+ * leading zeros).
+ */
+ /*
+ + u_quad_t
+ + __qdivrem(uq, vq, arq)
+ + u_quad_t uq, vq, *arq;
+ +
+ + union uu tmp;
+ + digit *u, *v, *q;
+ + digit v1, v2;
+ + u_int qhat, rhat, t;
+ + int m, n, d, j, i;
+ + digit uspace[5], vspace[5], qspace[5];
+ +
+ + /*
+ * Take care of special cases: divide by zero, and u < v.
+ */
+ + if (vq == 0) {
+ + /* divide by zero. */
+ + static volatile const unsigned int zero = 0;
+ +
+ +
+ + */
+ */
+ */
+  +tmp.ul[H] = tmp.ul[L] = 1 / zero;
+if (arq)
+  *arq = uq;
+return (tmp.q);
+
+  +if (uq < vq) {
+    if (arq)
+      *arq = uq;
+    return (0);
+  }
+u = &uspace[0];
+v = &vspace[0];
+q = &qspace[0];
+
+  */
+  * Break dividend and divisor into digits in base B, then
+  * count leading zeros to determine m and n. When done, we
+  * will have:
+  *u = (u[1]u[2]...u[m+n]) sub B
+  *v = (v[1]v[2]...v[n]) sub B
+  *v[1] != 0
+  *1 < n <= 4 (if n = 1, we use a different division algorithm)
+  *m >= 0 (otherwise u < v, which we already checked)
+  *m + n = 4
+  * and thus
+  *m = 4 - n <= 2
+  */
+tmp.uq = uq;
+u[0] = 0;
+u[1] = (digit)HHALF(tmp.ul[H]);
+u[2] = (digit)LHALF(tmp.ul[H]);
+u[3] = (digit)HHALF(tmp.ul[L]);
+u[4] = (digit)LHALF(tmp.ul[L]);
+tmp.uq = vq;
+v[1] = (digit)HHALF(tmp.ul[H]);
+v[2] = (digit)LHALF(tmp.ul[H]);
+v[3] = (digit)HHALF(tmp.ul[L]);
+v[4] = (digit)LHALF(tmp.ul[L]);
+for (n = 4; v[1] == 0; v++)
+  if (--n == 1) {
+    u_int rbj;/* r*B+u[j] (not root boy jim) */
+    digit q1, q2, q3, q4;
+    +
+    */
+    * Change of plan, per exercise 16.
+    *r = 0;
+    *for j = 1..4:
+ *q[j] = floor((r*B + u[j]) / v),
+ *r = (r*B + u[j]) % v;
+ * We unroll this completely here.
+ */
+ t = v[2] /* nonzero, by definition */
+ q1 = (digit)(u[1] / t);
+ rbj = COMBINE(u[1] % t, u[2]);
+ q2 = (digit)(rbj / t);
+ rbj = COMBINE(rbj % t, u[3]);
+ q3 = (digit)(rbj / t);
+ rbj = COMBINE(rbj % t, u[4]);
+ q4 = (digit)(rbj / t);
+ if (arq)
+ *arq = rbj % t;
+ tmp.ul[H] = COMBINE(q1, q2);
+ tmp.ul[L] = COMBINE(q3, q4);
+ return (tmp.q);
+ }
+ }
+ *
+ /*
+ * By adjusting q once we determine m, we can guarantee that
+ * there is a complete four-digit quotient at &qspace[1] when
+ * we finally stop.
+ */
+ for (m = 4 - n; u[1] == 0; u++)
+ m--;
+ for (i = 4 - m; --i >= 0;)
+ q[i] = 0;
+ q += 4 - m;
+ *
+ /*
+ * Here we run Program D, translated from MIX to C and acquiring
+ * a few minor changes.
+ */
+ * D1: choose multiplier 1 <= d to ensure v[1] >= B/2.
+ */
+ d = 0;
+ for (t = v[1]; t < B / 2; t <<= 1)
+ d++;
+ if (d > 0) {
+ shl(&u[0], m + n, d); /* u <<= d */
+ shl(&v[1], n - 1, d); /* v <<= d */
+ }
+ */
+ * D2: j = 0.
+ */
+ * j = 0;
+v1 = v[1]; /* for D3 -- note that v[1..n] are constant */
+v2 = v[2]; /* for D3 */
+do {
+  +  + digit uj0, uj1, uj2;
+  +
+  +  */
+  +  /* D3: Calculate \(q_{\text{hat}}\) (\(\hat{q}\) in TeX notation).
+  +  /* Let \(q_{\text{hat}} = \min((u[j]*B + u[j+1])/v[1], B-1)\), and
+  +  /* let \(r_{\text{hat}} = (u[j]*B + u[j+1]) \mod v[1]\).
+  +  /* While \(r_{\text{hat}} < B\) and \(v[2]*q_{\text{hat}} > r_{\text{hat}}*B+u[j+2]\),
+  +  /* decrement \(q_{\text{hat}}\) and increase \(r_{\text{hat}}\) correspondingly.
+  +  /* Note that if \(r_{\text{hat}} \geq B\), \(v[2]*q_{\text{hat}} < r_{\text{hat}}*B\).
+  +  */
+  +  +u[0] = u[j + 0]; /* for D3 only -- note that u[j+...] change */
+  +u[1] = u[j + 1]; /* for D3 only */
+  +u[2] = u[j + 2]; /* for D3 only */
+  +if (uj0 == v1) {
+  +  +qhat = B;
+  +  +rhat = uj1;
+  +  +goto qhat_too_big;
+  +} else {
+  +  +u_int nn = COMBINE(uj0, uj1);
+  +  +qhat = nn / v1;
+  +  +rhat = nn % v1;
+  +}
+  +while (v2 * qhat > COMBINE(rhat, uj2)) {
+  +  +qhat_too_big:
+  +  +qhat--;
+  +  +if ((rhat += v1) >= B)
+  +  +break;
+  +}
+  +  */
+  +  /* D4: Multiply and subtract.
+  +  /* The variable \(t\) holds any borrows across the loop.
+  +  /* We split this up so that we do not require \(v[0] = 0\),
+  +  /* and to eliminate a final special case.
+  +  */
+  +  +for (t = 0, i = n; i > 0; i--) {
+  +  +  +t = u[i + j] - v[i] * qhat - t;
+  +  +  +u[i + j] = (digit)LHALF(t);
+  +  +  +t = (B - HHALF(t)) & (B - 1);
+  +  +}
+  +  +t = u[j] - t;
+  +  +u[j] = (digit)LHALF(t);
+  +  */
+  +  /* D5: test remainder.
+  +  /* There is a borrow if and only if HHALF(t) is nonzero;
+  +  /* in that (rare) case, qhat was too large (by exactly 1).
+ * Fix it by adding v[1..n] to u[j..j+n].
+ */
+if (HHALF(t)) {
+qhat--;
+for (t = 0, i = n; i > 0; i--) { /* D6: add back. */
+ t += u[i + j] + v[i];
+ u[i + j] = (digit)LHALF(t);
+ t = HHALF(t);
+ }
+ u[j] = (digit)LHALF(u[j] + t);
+ }
+q[j] = (digit)qhat;
+} while (++j <= m); /* D7: loop on j. */
+
+/*
+ * If caller wants the remainder, we have to calculate it as
+ * u[m..m+n] >> d (this is at most n digits and thus fits in
+ * u[m+1..m+n], but we may need more source digits).
+ */
+if (arq) {
+if (d) {
+ for (i = m + n; i > m; --i)
+ u[i] = (digit)(((u_int)u[i] >> d) |
+ LHALF(((u_int)u[i - 1] <= (HALF_BITS - d)));
+ u[i] = 0;
+ } } }
+tmp.ul[H] = COMBINE(uspace[1], uspace[2]);
+tmp.ul[L] = COMBINE(uspace[3], uspace[4]);
+*arq = tmp.q;
+} 
+
+tmp.ul[H] = COMBINE(qspace[1], qspace[2]);
+tmp.ul[L] = COMBINE(qspace[3], qspace[4]);
+return (tmp.q);
+}
+
+/*
+ * Shift p[0]..p[len] left `sh' bits, ignoring any bits that
+ * `fall out' the left (there never will be any such anyway).
+ * We may assume len >= 0.  NOTE THAT THIS WRITES len+1 DIGITS.
+ */
+static void
+shl(digit *p, int len, int sh)
+{
+int i;
+
+for (i = 0; i < len; i++)
+p[i] = (digit)LHALF((u_int)p[i] << sh) |
+ ((u_int)p[i + 1] >> (HALF_BITS - sh));
+p[i] = (digit)(LHALF((u_int)p[i] << sh));
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/math/gcc/quad.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/math/gcc/quad.h
@@ -0,0 +1,165 @@
+/*
+*/
+/*- *
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+ * SUCH DAMAGE.
+ *
+ */
+quad.h8.1 (Berkeley) 6/4/93
+*/
+
+ /* Quad arithmetic.
+ *
+ * This library makes the following assumptions:
+ * - The type long long (aka quad_t) exists.
+ *
+ * - A quad variable is exactly twice as long as `int'.
+ *
+ * - The machine's arithmetic is two's complement.
+ *
+ * This library can provide 128-bit arithmetic on a machine with 128-bit
+ * quads and 64-bit ints, for instance, or 96-bit arithmetic on machines
+ * with 48-bit ints.
+ */
+
+#if 0 /* iprt */
+##include <sys/types.h>
+#if !defined(_KERNEL) && !defined(_STANDALONE)
+##include <limits.h>
+##else
+##include <machine/limits.h>
+##endif
+##else /* iprt */
+## include <iprt/types.h>
+## include <iprt/nocrt/limits.h>
+## undef __P
+## define __P(a) a
+## undef __GNUC_PREREQ__
+## define __GNUC_PREREQ__(m1,m2) 1
+## if 1 /* ASSUMES: little endian */
+## define _QUAD_HIGHWORD 1
+## define _QUAD_LOWWORD 0
+## else
+## define _QUAD_HIGHWORD 0
+## define _QUAD_LOWWORD 1
+## endif
+## if !defined(RT_OS_LINUX) || !defined(_KERNEL__) /* (linux/types.h defines u_int) */
+ + typedef unsigned intu_int;
+ ## endif
+## if !defined(RT_OS_SOLARIS)
+ + typedef int64_t quad_t;
+ ## else
+ + define quad_t int64_t
+ ## endif
+ + typedef uint64_t u_quad_t;
+ + typedef quad_t *qaddr_t;
+ +##endif /* iprt */
+
+ */
+
+ * Depending on the desired operation, we view a `long long' (aka quad_t) in
+ * one or more of the following formats.
+ */
union uu {
  +quad_t q; /* as a (signed) quad */
  +u_quad_t uq; /* as an unsigned quad */
  +int[2]; /* as two signed ints */
  +u_int[2]; /* as two unsigned ints */
};

/* Define high and low parts of a quad_t. */

#define H _QUAD_HIGHWORD
#define L _QUAD_LOWWORD

/* Total number of bits in a quad_t and in the pieces that make it up. */
/* These are used for shifting, and also below for halfword extraction */
/* and assembly. */

#define QUAD_BITS (sizeof(quad_t) * CHAR_BIT)
#define INT_BITS (sizeof(int) * CHAR_BIT)
#define HALF_BITS (sizeof(int) * CHAR_BIT / 2)

/* Extract high and low shortwords from longword, and move low shortword of */
/* longword to upper half of long, i.e., produce the upper longword of */
/* ((quad_t)(x) << (number_of_bits_in_int/2)). (x' must actually be u_int.) */
/* These are used in the multiply code, to split a longword into upper */
/* and lower halves, and to reassemble a product as a quad_t, shifted left */
/* (sizeof(int)*CHAR_BIT/2). */

#define HHALF(x) ((u_int)(x) >> HALF_BITS)
#define LHALF(x) ((u_int)(x) & (((int)1 << HALF_BITS) - 1))
#define LHUP(x) ((u_int)(x) << HALF_BITS)

/* XXX */
/* Compensate for gcc 1 vs gcc 2. Gcc 1 defines ?sh?di3's second argument */
/* as u_quad_t, while gcc 2 correctly uses int. Unfortunately, we still use */
/* both compilers. */

#ifndef __GNUC_PREREQ__(2, 0) || defined(lint)
typedef unsigned int qshift_t;
#else
typedef u_quad_t qshift_t;
#endif

RT_C_DECLS_BEGIN
+quad_t __adddi3 __P((quad_t, quad_t));
+quad_t __anddi3 __P((quad_t, quad_t));
+quad_t __ashldi3 __P((quad_t, qshift_t));
+quad_t __ashrdi3 __P((quad_t, qshift_t));
+int __cmpdi2 __P((quad_t, quad_t));
+quad_t __divdi3 __P((quad_t, quad_t));
+quad_t __fixdfdi __P((double));
+quad_t __fixsfdi __P((float));
+u_quad_t __fixunsdfdi __P((double));
+u_quad_t __fixunssfdi __P((float));
+double __floatdfdi __P((quad_t));
+float __floatsfdi __P((quad_t));
+double __floatunsdfdi __P((u_quad_t));
+quad_t __ijordi3 __P((quad_t, quad_t));
+quad_t __lshldi3 __P((quad_t, qshift_t));
+quad_t __lshrdi3 __P((quad_t, qshift_t));
+quad_t __moddi3 __P((quad_t, quad_t));
+quad_t __muldi3 __P((quad_t, quad_t));
+quad_t __negdi2 __P((quad_t));
+quad_t __one_cmpldi2 __P((quad_t));
+u_quad_t __qdivrem __P((u_quad_t, u_quad_t, u_quad_t *));
+quad_t __subdi3 __P((quad_t, quad_t));
+int __ucmpdi2 __P((u_quad_t, u_quad_t));
+u_quad_t __udivdi3 __P((u_quad_t, u_quad_t));
+u_quad_t __umoddi3 __P((u_quad_t, u_quad_t));
+quad_t __xordi3 __P((quad_t, quad_t));
+RT_C_DECLS_END

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/math/gcc/udivdi3.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/math/gcc/udivdi3.c
@@ -0,0 +1,56 @@
+/*	$NetBSD: udivdi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $*/
+*
+*/-
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   OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
   SUCH DAMAGE. */

#include <sys/cdefs.h>
#if defined(LIBC_SCCS) && !defined(lint)
#if 0
static char sccsid[] = "#@(#)udivdi3.c 8.1 (Berkeley) 6/4/93"
#else
__RCSID("$NetBSD: udivdi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $")
#endif
#endif /* LIBC_SCCS and not lint */

#include "quad.h"

/* Divide two unsigned quads. */

u_quad_t __udivdi3(a, b)
u_quad_t a, b;
{
  return (__qdivrem(a, b, (u_quad_t *)0));
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/math/gcc/udivmoddi4.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/math/gcc/udivmoddi4.c
@@ -0,0 +1,53 @@
/* $Id: udivmoddi4.c $ */
/** @file
 * IPRT - __udivmoddi4 implementation
 */
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+ */
+
+#include <iprt/stdint.h>
+#include <iprt/uint64.h>
+
+uint64_t __udivmoddi4(uint64_t u64A, uint64_t u64B, uint64_t *pu64R);
+
+/**
+ * __udivmoddi4() implementation to satisfy external references from 32-bit
+ * code generated by gcc-7 or later.
+ *
+ * @param   u64A        The divident value.
+ * @param   u64B        The divisor value.
+ * @param   pu64R       A pointer to the reminder. May be NULL.
+ *
+ * @returns u64A / u64B
+ */
+uint64_t __udivmoddi4(uint64_t u64A, uint64_t u64B, uint64_t *pu64R)
+{
+    RTUINT64U Divident;
+    RTUINT64U Divisor;
+    RTUINT64U Quotient;
+    RTUINT64U Reminder;
+    Divident.u = u64A;
+    Divisor.u = u64B;
+    RTUInt64DivRem(&Quotient, &Reminder, &Divident, &Divisor);
+    if (pu64R)
+        *pu64R = Reminder.u;
+    return Quotient.u;
+}
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/math/gcc/umoddi3.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/math/gcc/umoddi3.c
/*
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 * SUCH DAMAGE.
 */

#include <sys/cdefs.h>
#include "quad.h"

#if defined(LIBC_SCCS) && !defined(lint)
static char sccsid[] = "@(#)umoddi3.c 8.1 (Berkeley) 6/4/93"
#else
__RCSID("$NetBSD: umoddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp ");
#endif

#include "quad.h"
+ * Return remainder after dividing two unsigned quads.
+ */
+u_quad_t
+__umoddi3(a, b)
+u_quad_t a, b;
+{
+u_quad_t r;
+
+(void)__qdivrem(a, b, &r);
+return (r);
+
}
#include <iprt/stdarg.h>

RTDECL(void) RTAssertMsg1Weak(const char *pszExpr, unsigned uLine, const char *pszFile, const char *pszFunction)
{
    RTAssertMsg1(pszExpr, uLine, pszFile, pszFunction);
}

RT_EXPORT_SYMBOL(RTAssertMsg1Weak);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2.c
@@ -0,0 +1,45 @@
+/* $Id: RTAssertMsg2.cpp $ */
+/** @file
+ * IPRT - RTAssertMsg2.
+ */
+
+/*
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/* *******************************************************************************************
+ * Header Files
+ * ***************************************************************************/
+#include <iprt/assert.h>
+#include "internal/iprt.h"
#include <iprt/stdarg.h>

RTDECL(void) RTAssertMsg2(const char *pszFormat, ...)
{
    va_list va;
    va_start(va, pszFormat);
    RTAssertMsg2V(pszFormat, va);
    va_end(va);
}

RT_EXPORT_SYMBOL(RTAssertMsg2);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2Add.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2Add.c
@@ -0,0 +1,45 @@
+/* $Id: RTAssertMsg2Add.cpp $ */
+/** @file
+ * IPRT - RTAssertMsg2Add.
+ */
+/**
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+ */
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+ */
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************************
+**************************************
+*   Header Files                                                                                                                 *
+********************************************************************************************
+*******************************************************************************/
```c
#include <iprt/assert.h>
#include "internal/iprt.h"

#include <iprt/stdarg.h>

RTDECL(void) RTAssertMsg2Add(const char *pszFormat, ...)
{
    va_list va;
    va_start(va, pszFormat);
    RTAssertMsg2AddV(pszFormat, va);
    va_end(va);
}

RT_EXPORT_SYMBOL(RTAssertMsg2Add);
```

---

/* $Id: RTAssertMsg2AddWeak.cpp $ */
/** @file
 * IPRT - RTAssertMsg2AddWeak.
 */

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 * terms and conditions of either the GPL or the CDDL or both.
 */

/*******************************************************************************************
**************************************
*   Header Files
*******************************************************************************************/

/* Header Files */
#include <iprt/assert.h>
#include "internal/iprt.h"
+
#include <iprt/stdarg.h>
+
+RTDECL(void) RTAssertMsg2AddWeak(const char *pszFormat, ...)
+
va_list va;
+RTAssertMsg2AddWeakV(pszFormat, va);
+va_end(va);
+
+RT_EXPORT_SYMBOL(RTAssertMsg2AddWeak);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2AddWeakV.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2AddWeakV.c
@@ -0,0 +1,40 @@
+/* $Id: RTAssertMsg2AddWeakV.cpp $ */
++*/ @file
+ * IPRT - RTAssertMsg2AddWeakV.
+ */
+
+/*
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+>Description of the code...
#include <iprt/assert.h>
#include "internal/iprt.h"

RTDECL(void) RTAssertMsg2AddWeakV(const char *pszFormat, va_list va)
{
    RTAssertMsg2AddV(pszFormat, va);
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2Weak.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2Weak.c
@@ -0,0 +1,45 @@
/* $Id: RTAssertMsg2Weak.cpp $ */
/** @file
 * IPRT - RTAssertMsg2Weak.
 */

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 */

/***************************************************************************
 **************** Header Files *******************************************/
#include <iprt/assert.h>
#include "internal/iprt.h"
+
#include <iprt/stdarg.h>
+
+RTDECL(void) RTAssertMsg2Weak(const char *pszFormat, ...)
+{
+    va_list va;
+    va_start(va, pszFormat);
+    RTAssertMsg2WeakV(pszFormat, va);
+    va_end(va);
+}
+RT_EXPORT_SYMBOL(RTAssertMsg2Weak);
+
--- linux-4.15.0.org/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2WeakV.c
+++ linux-4.15.0.org/ubuntu/vbox/vboxguest/common/misc/RTAssertMsg2WeakV.c
@@ -0,0 +1,40 @@
+/* $Id: RTAssertMsg2WeakV.cpp $ */
+/** @file
+ * IPRT - RTAssertMsg2WeakV.
+ */
+ *
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+ */
+ *
/*#***************************************************************************/
/* Header Files */

#include <iprt/assert.h>
#include "internal/iprt.h"

RTDECL(void) RTAssertMsg2WeakV(const char *pszFormat, va_list va)
{
    RTAssertMsg2V(pszFormat, va);
}

RT_EXPORT_SYMBOL(RTAssertMsg2WeakV);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/misc/assert.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/misc/assert.c
@@ -0,0 +1,307 @@
+/* $Id: assert.cpp $ */
+/** @file
+ * IPRT - Assertions, common code.
+ */
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+ */
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+*/
+
+/* Header Files */
+/** Global Variables */
+/** The last assert message, 1st part. */
+RTDATADECL(char) g_szRTAssertMsg1[1024];
+/** The last assert message, 2nd part. */
+RTDATADECL(char) g_szRTAssertMsg2[4096];
+/** The length of the g_szRTAssertMsg2 content. */
+@remarks Race. */
+static uint32_t volatile g_cchRTAssertMsg2;
+/** The last assert message, expression. */
+RTDATADECL(const char * volatile) g_pszRTAssertExpr;
+/** The last assert message, function name. */
+RTDATADECL(const char * volatile) g_pszRTAssertFunction;
+/** The last assert message, file name. */
+RTDATADECL(const char * volatile) g_pszRTAssertFile;
+/** The last assert message, line number. */
+RTDATADECL(uint32_t volatile) g_u32RTAssertLine;
+/** Set if assertions are quiet. */
+static bool volatile g_fQuiet = false;
+/** Set if assertions may panic. */
+static bool volatile g_fMayPanic = true;
+
RTDECL(bool) RTAssertSetQuiet(bool fQuiet)
+
  return ASMAtomicXchgBool(&g_fQuiet, fQuiet);
+
+RT_EXPORT_SYMBOL(RTAssertSetQuiet);
+
+
+RTDECL(bool) RTAssertAreQuiet(void)
+
  return ASMAtomicUoReadBool(&g_fQuiet);
+
+RT_EXPORT_SYMBOL(RTAssertAreQuiet);
+
+
+RTDECL(bool) RTAssertSetMayPanic(bool fMayPanic)
+
  return ASMAtomicXchgBool(&g_fMayPanic, fMayPanic);
+
+RT_EXPORT_SYMBOL(RTAssertSetMayPanic);
+
+
+RTDECL(void) RTAssertMayPanic(void)
+
  return ASMAtomicUoReadBool(&g_fMayPanic);
+
+RT_EXPORT_SYMBOL(RTAssertMayPanic);
+
+
+RTDECL(void) RTAssertMsg1(const char *pszExpr, unsigned uLine, const char *pszFile, const char *
  *pszFunction)
+
  /*
+   * Fill in the globals.
+   */
+  + ASMAtomicUoWritePtr(&g_pszRTAssertExpr, pszExpr);
+  + ASMAtomicUoWritePtr(&g_pszRTAssertFile, pszFile);
+  + ASMAtomicUoWritePtr(&g_pszRTAssertFunction, pszFunction);
+  + ASMAtomicUoWriteU32(&g_u32RTAssertLine, uLine);
+  + RTStrPrintf(g_szRTAssertMsg1, sizeof(g_szRTAssertMsg1),
+                "\n!!Assertion Failed!!\n" +
+                "Expression: %s\n"
+                "Location : %s(%d) %s\n", +
                  pszExpr, pszFile, uLine, pszFunction);
+
+  /*
+   * If not quiet, make noise.
+   */
+  + if (!RTAssertAreQuiet())
  

+ {  
+     RTERRVARS SavedErrVars;
+     RTErrVarsSave(&SavedErrVars);
+     
+     +#ifdef IN_RING0  
+     +# ifdef IN_GUEST_R0  
+     +     RTLogBackdoorPrintf("!!Assertion Failed!!\n"
+     +     "Expression: %s\n"
+     +     "Location : %s(%d) %s\n",
+     +     pszExpr, pszFile, uLine, pszFunction);
+     +# endif  
+     + #ifdef IN_RING0  
+     +     rtR0AssertNativeMsg1(pszExpr, uLine, pszFile, pszFunction);
+     +  
+     +#ifdef (IN_RING3) && !defined(LOG_NO_COM)  
+     +# if 0 /* Enable this iff you have a COM port and really want this debug info. */  
+     +     RTLogComPrintf("!!Assertion Failed!!\n"
+     +     "Expression: %s\n"
+     +     "Location : %s(%d) %s\n",
+     +     pszExpr, pszFile, uLine, pszFunction);
+     +# endif  
+     +# endif  
+     +  
+     PRTLOGGER pLog = RTLogRelGetDefaultInstance();
+     + if (pLog)
+     +     {  
+     +         RTLogRelPrintf("!!Assertion Failed!!\n"
+     +         "Expression: %s\n"
+     +         "Location : %s(%d) %s\n",
+     +         pszExpr, pszFile, uLine, pszFunction);
+     +# ifndef IN_RC /* flushing is done automatically in RC */  
+     +         RTLogFlush(pLog);
+     +# endif  
+     +     }  
+     +  
+     +#ifndef LOG_ENABLED  
+     + if (!pLog)
+     +# endif  
+     +  
+     +     pLog = RTLogDefaultInstance();
+     + if (pLog)
+     +     {  
+     +         RTLogPrintf("!!Assertion Failed!!\n"
+     +         "Expression: %s\n"
+     +         "Location : %s(%d) %s\n",
+     +         pszExpr, pszFile, uLine, pszFunction);
+     +# ifndef IN_RC /* flushing is done automatically in RC */  
+     +         RTLogFlush(pLog);  
+     +# endif  
+     +     }  
+     +  
+ }
RTLogFlush(pLog);
#endif

#ifdef IN_RING3
    /* print to stderr, helps user and gdb debugging. */
    fprintf(stderr,
            "\n!!Assertion Failed!!\n" +
            "Expression: %s\n"
            +
            "Location : %s(%d) %s\n",
            VALID_PTR(pszExpr) ? pszExpr : "<none>",
            VALID_PTR(pszFile) ? pszFile : "<none>",
            uLine,
            VALID_PTR(pszFunction) ? pszFunction : "");
    fflush(stderr);
#endif /* !IN_RING0 */

RTErrVarsRestore(&SavedErrVars);
}

RTEXPORT_SYMBOL(RTAssertMsg1);

/**
 * Worker for RTAssertMsg2V and RTAssertMsg2AddV
 *
 * @param   fInitial            True if it's RTAssertMsg2V, otherwise false.
 * @param   pszFormat           The message format string.
 * @param   va                  The format arguments.
 * + *
 */
static void rtAssertMsg2Worker(bool fInitial, const char *pszFormat, va_list va)
{
    va_list vaCopy;
    size_t cch;
    
    /*
    * The global first.
    */
    if (fInitial)
    {
        va_copy(vaCopy, va);
        cch = RTStrPrintfV(g_szRTAssertMsg2, sizeof(g_szRTAssertMsg2), pszFormat, vaCopy);
        ASMAtomicWriteU32(&g_cchRTAssertMsg2, (uint32_t)cch);
        va_end(vaCopy);
    }
    else
{  
    cch = ASMAtomicReadU32(&g_cchRTAssertMsg2);
    if (cch < sizeof(g_szRTAssertMsg2) - 4)  
    {  
        va_copy(vaCopy, va);
        cch += RTStrPrintfV(&g_szRTAssertMsg2[cch], sizeof(g_szRTAssertMsg2) - cch, pszFormat, vaCopy);
        ASMAtomicWriteU32(&g_cchRTAssertMsg2, (uint32_t)cch);
        va_end(vaCopy);
    }
    */
    * If not quiet, make some noise.
    */
    if (!RTAssertAreQuiet())  
    {  
        RTERRVARS SavedErrVars;
        RTErrVarsSave(&SavedErrVars);

#ifdef IN_RING0
#ifdef IN_GUEST_R0
    va_copy(vaCopy, va);
    RTLogBackdoorPrintfV(pszFormat, vaCopy);
    va_end(vaCopy);
#endif  */
    if (!defined(IN_RING3) && !defined(LOG_NO_COM))  
    if 0 /* Enable this iff you have a COM port and really want this debug info. */
    va_copy(vaCopy, va);
    RTLogComPrintfV(pszFormat, vaCopy);
    va_end(vaCopy);
#endif  */ !IN_RING0 */
#ifdef IN_RING0  
#endif  */ !IN_RING0 */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
#endif  */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
endif
#endif */ !defined(IN_RING3) && !defined(LOG_NO_COM) */
endif
endif

  PRTLOGGER pLog = RTLogRelGetDefaultInstance();
  if (pLog)
  {  
      va_copy(vaCopy, va);
      RTLogRelPrintfV(pszFormat, vaCopy);
      va_end(vaCopy);
      ifndef IN_RC /* flushing is done automatically in RC */
      RTLogFlush(pLog);
      endif
  }
}
pLog = RTLogDefaultInstance();
if (pLog)
{
    va_copy(vaCopy, va);
    RTLogPrintV(pszFormat, vaCopy);
    va_end(vaCopy);
    ifndef IN_RC /* flushing is done automatically in RC */
    RTLogFlush(pLog);
#endif
}
#ifndef IN_RING3
    /* print to stderr, helps user and gdb debugging. */
    char szMsg[sizeof(g_szRTAssertMsg2)];
    va_copy(vaCopy, va);
    RTStrPrintfV(szMsg, sizeof(szMsg), pszFormat, vaCopy);
    va_end(vaCopy);
    fprintf(stderr, "%s", szMsg);
    fflush(stderr);
#endif /* !IN_RING0 */
}
RTDECL(void) RTAssertMsg2AddV(const char *pszFormat, va_list va)
{
    rtAssertMsg2Worker(false /*fInitial*/, pszFormat, va);
}
RTDECL(void) RTAssertMsg2V(const char *pszFormat, va_list va)
{
    rtAssertMsg2Worker(true /*fInitial*/, pszFormat, va);
}
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/misc/thread.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/misc/thread.c
@@ -0,0 +1,1602 @@
/* $Id: thread.cpp $ */
/** @file
 * IPRT - Threads, common routines.
 */
/*
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 */

/****************************************************************************
**************************************
+ * Header Files                                                                                                                 *
+ ***********************************************************************************************************************************/
+ #define LOG_GROUP RTLOGGROUP_THREAD
+ #include <iprt/thread.h>
+ #include "internal/iprt.h"
+ +
+ +#include <iprt/log.h>
+ +#include <iprt/av1.h>
+ +#include <iprt/alloc.h>
+ +#include <iprt/assert.h>
+ +#include <iprt/lockvalidator.h>
+ +#include <iprt/semaphore.h>
+ +#ifdef IN_RING0
+ +# include <iprt/spinlock.h>
+ +#endif
+ +#include <iprt/asm.h>
+ +#include <iprt/err.h>
+ +#include <iprt/string.h>
+ +# include "internal/magics.h"
+ +#include "internal/thread.h"
+ +#include "internal/sched.h"
+ +#include "internal/process.h"
+ +#ifdef RT_WITH_ICONV_CACHE

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+# include "internal/string.h"
+#endif
+
+
+/#******************************************************************************
+* Defined Constants And Macros *
+******************************************************************************
+#ifndef IN_RING0
+/* define RT_THREAD_LOCK_RW() RTSpinlockAcquire(g_ThreadSpinlock)
+/* define RT_THREAD_UNLOCK_RW() RTSpinlockRelease(g_ThreadSpinlock)
+/* define RT_THREAD_LOCK_RD() RTSpinlockAcquire(g_ThreadSpinlock)
+/* define RT_THREAD_UNLOCK_RD() RTSpinlockRelease(g_ThreadSpinlock)
+*/
+/* define RT_THREAD_LOCK_RW() rtThreadLockRW()
+/* define RT_THREAD_UNLOCK_RW() rtThreadUnLockRW()
+/* define RT_THREAD_LOCK_RD() rtThreadLockRD()
+/* define RT_THREAD_UNLOCK_RD() rtThreadUnLockRD()
+*/
+#endif
+
+/#******************************************************************************
+* Global Variables *
+******************************************************************************
+/** The AVL thread containing the threads. */
+static PAVLPVNODECORE g_ThreadTree;
+/** The number of threads in the tree (for ring-0 termination kludge). */
+static uint32_t volatile g_cThreadInTree;
+#ifdef IN_RING3
+/** The RW lock protecting the tree. */
+static RTSEMRW g_ThreadRWSem = NIL_RTSEMRW;
+#else
+/** The spinlocks protecting the tree. */
+static RTSPINLOCK g_ThreadSpinlock = NIL_RTSPINLOCK;
+#endif
+/** Indicates whether we've been initialized or not. */
+static bool g_frtThreadInitialized;
+
+/#******************************************************************************
+* Internal Functions *
+******************************************************************************
+static void rtThreadDestroy(PRTTHREADINT pThread);
**@page pg_rt_thread  IPRT Thread Internals**

+ * IPRT provides interface to whatever native threading that the host provides,
+ * preferably using a CRT level interface to better integrate with other libraries.

+ * Internally IPRT keeps track of threads by means of the RTTHREADINT structure.
+ * All the RTTHREADINT structures are kept in an AVL tree which is protected by a
+ * read/write lock for efficient access. A thread is inserted into the tree in
+ * three places in the code. The main thread is 'adopted' by IPRT on rtR3Init()
+ * by rtThreadAdopt(). When creating a new thread there the child and the parent
+ * race inserting the thread, this is rtThreadMain() and RTThreadCreate.

+ * RTTHREADINT objects are using reference counting as a mean of sticking around
+ * till no-one needs them any longer. Waitable threads is created with one extra
+ * reference so they won't go away until they are waited on. This introduces a
+ * major problem if we use the host thread identifier as key in the AVL tree - the
+ * host may reuse the thread identifier before the thread was waited on. So, on
+ * most platforms we are using the RTTHREADINT pointer as key and not the
+ * thread id. RTThreadSelf() then have to be implemented using a pointer stored
+ * in thread local storage (TLS).

+ * In Ring-0 we only try keep track of kernel threads created by RTThreadCreate
+ * at the moment. There we really only need the 'join' feature, but doing things
+ * the same way allow us to name threads and similar stuff.

+ */

+/**
+ * Initializes the thread database.
+ *
+ * @returns iprt status code.
+ */
+DECLHIDDEN(int) rtThreadInit(void)
+{
+    #ifndef IN_RING3
+    int rc = VINF_ALREADY_INITIALIZED;
+    if (g_ThreadRWSem == NIL_RTSEMRW)
+    {
+        /* We assume the caller is the 1st thread, which we'll call 'main'.
+        */
+    }
+    #endif
+}
* But first, we’ll create the semaphore.
* /
rc = RTSemRWCreateEx(&g_ThreadRWSem, RTSEMRW_FLAGS_NO_LOCK_VAL, NIL_RTLOCKVALCLASS, RTLOCKVAL_SUB_CLASS_NONE, NULL);
if (RT_SUCCESS(rc))
{
    rc = rtThreadNativeInit();
    if (RT_SUCCESS(rc))
        rc = rtThreadAdopt(RTTHREADTYPE_DEFAULT, 0, RTTHREADINT_FLAGS_MAIN, "main");
    if (RT_SUCCESS(rc))
        rc = rtSchedNativeCalcDefaultPriority(RTTHREADTYPE_DEFAULT);
    if (RT_SUCCESS(rc))
    {
        g_frtThreadInitialized = true;
        return VINF_SUCCESS;
    }

    /* failed, clear out */
    RTSemRWDestroy(g_ThreadRWSem);
    g_ThreadRWSem = NIL_RTSEMRW;
}
else
    /* !IN_RING0 && !IN_RING3 */
    return rc;
+ 
+ +#ifdef IN_RING3
+*/
+ * Called when IPRT was first initialized in unobtrusive mode and later changed
+ * to obtrusive.
+ *
+ * This is only applicable in ring-3.
+ */
+DECLHIDDEN(void) rtThreadReInitObtrusive(void)
+{
+    rtThreadNativeReInitObtrusive();
+}
+#endif
+
+/**
+ * Terminates the thread database.
+ */
+DECLHIDDEN(void) rtThreadTerm(void)
+{
+    /* we don't cleanup here yet */
+    
+    #ifdef IN_RING3
+    /* just destroy the spinlock and assume the thread is fine... */
+    RTSpinlockDestroy(g_ThreadSpinlock);
+    g_ThreadSpinlock = NIL_RTSPINLOCK;
+    if (g_ThreadTree != NULL)
+        RTAssertMsg2Weak("WARNING: g_ThreadTree=%p\n", g_ThreadTree);
+    #endif
+}
+
+DECLINLINE(void) rtThreadLockRW(void)
+{
+    if (g_ThreadRWSem == NIL_RTSEMRW)
+        rtThreadInit();
+    int rc = RTSemRWRequestWrite(g_ThreadRWSem, RT_INDEFINITE_WAIT);
+    AssertReleaseRC(rc);
+}
+
+DECLINLINE(void) rtThreadLockRD(void)
+{
+    if (g_ThreadRWSem == NIL_RTSEMRW)
rtThreadInit();
int rc = RTSemRWRequestRead(g_ThreadRWSem, RT_INDEFINITE_WAIT);
assertReleaseRC(rc);
+
+
+DECLINLINE(void) rtThreadUnLockRW(void)
+
+    int rc = RTSemRWReleaseWrite(g_ThreadRWSem);
+    assertReleaseRC(rc);
+
+
+DECLINLINE(void) rtThreadUnLockRD(void)
+
+    int rc = RTSemRWReleaseRead(g_ThreadRWSem);
+    assertReleaseRC(rc);
+
+
+/**
+  * Adopts the calling thread.
+  * No locks are taken or released by this function.
+  */
+static int rtThreadAdopt(RTTHREADTYPE enmType, unsigned fFlags, uint32_t fIntFlags, const char *pszName)
+
+    int rc;
+    PRTTHREADINT pThread;
+    assert(!(fFlags & RTTHREADFLAGS_WAITABLE));
+    fFlags &= ~RTTHREADFLAGS_WAITABLE;
+
+    /*
+     * Allocate and insert the thread.
+     * (It is vital that rtThreadNativeAdopt updates the TLS before
+     * we try inserting the thread because of locking.)
+     */
+    rc = VERR_NO_MEMORY;
+    pThread = rtThreadAlloc(enmType, fFlags, RTTHREADINT_FLAGS_ALIEN | fIntFlags, pszName);
+    if (pThread)
+    {
+        RTNATIVETHREAD NativeThread = RTThreadNativeSelf();
+        rc = rtThreadNativeAdopt(pThread);
+        if (RT_SUCCESS(rc))
+        {
+            rtThreadInsert(pThread, NativeThread);
+            rtThreadsetState(pThread, RTTHREADSTATE_RUNNING);
+            rtThreadRelease(pThread);
+        }
+      else
+      rThreadDestroy(pThread);
+    }
+    return rc;
+}
+
+/**
+  * Adopts a non-IPRT thread.
+  *
+  * @returns IPRT status code.
+  * @param enmType         The thread type.
+  * @param fFlags          The thread flags. RTTHREADFLAGS_WAITABLE is not currently allowed.
+  * @param pszName         The thread name. Optional.
+  * @param pThread         Where to store the thread handle. Optional.
+  */
+RTDECL(int) RTThreadAdopt(RTTHREADTYPE enmType, unsigned fFlags, const char *pszName, PRTTHREAD pThread)
+
+    int rc;
+    RTTHREAD Thread;
+
+    AssertReturn(!(fFlags & RTTHREADFLAGS_WAITABLE), VERR_INVALID_PARAMETER);
+    AssertReturn(!pszName || VALID_PTR(pszName), VERR_INVALID_POINTER);
+    AssertReturn(!pThread || VALID_PTR(pThread), VERR_INVALID_POINTER);
+
+    rc = VINF_SUCCESS;
+    Thread = RTThreadSelf();
+    if (Thread == NIL_RTTHREAD)
+    {
+        /* generate a name if none was given. */
+        char szName[RTTHREAD_NAME_LEN];
+        if (!pszName || !*pszName)
+        {
+            static uint32_t s_i32AlienId = 0;
+            uint32_t i32Id = ASMAtomicIncU32(&s_i32AlienId);
+            RTStrPrintf(szName, sizeof(szName), "ALIEN-%RX32", i32Id);
+            pszName = szName;
+        }
+
+        /* try adopt it */
+        rc = rThreadAdopt(enmType, fFlags, 0, pszName);
+        Thread = RTThreadSelf();
+        Log(\"RTThreadAdopt: %RTthrd %RTnthrd \"%, enmType=%d fFlags=%#x rc=%Rrc\n", t, szName, enmType, fFlags, rc);
+    }
+    else
+        Log(\"RTThreadAdopt: %RTthrd %RTnthrd \"%, enmType=%d fFlags=%#x - already adopted\n", t, szName, enmType, fFlags);
+ if (pThread)
+   *pThread = Thread;
+ return rc;
+
+RT_EXPORT_SYMBOL(RTThreadAdopt);
+
+/**
+ * Get the thread handle of the current thread, automatically adopting alien
+ * threads.
+ *
+ * @returns Thread handle.
+ */
+RTDECL(RTTHREAD) RTThreadSelfAutoAdopt(void)
++
+    RTTHREAD hSelf = RTThreadSelf();
+    if (RT_UNLIKELY(hSelf == NIL_RTTHREAD))
+        RTThreadAdopt(RTTHREADTYPE_DEFAULT, 0, NULL, &hSelf);
+    return hSelf;
+
+RT_EXPORT_SYMBOL(RTThreadSelfAutoAdopt);
+
+/**
+ * Allocates a per thread data structure and initializes the basic fields.
+ *
+ * @returns Pointer to per thread data structure.
+ *          This is reference once.
+ * @returns NULL on failure.
+ * @param   enmType     The thread type.
+ * @param   fFlags      The thread flags.
+ * @param   fIntFlags   The internal thread flags.
+ * @param   pszName     Pointer to the thread name.
+ */
+PRTTHREADINT rtThreadAlloc(RTTHREADTYPE enmType, unsigned fFlags, uint32_t fIntFlags, const char*
pszName)
++
+    PRTTHREADINT pThread = (PRTTHREADINT)RTMemAllocZ(sizeof(RTTHREADINT));
+    if (pThread)
+    {
+        size_t cchName;
+        int rc;
+        
+        pThread->Core.Key = (void*)NIL_RTTHREAD;
+        pThread->u32Magic = RTTHREADINT_MAGIC;
+        cchName = strlen(pszName);

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+ if (cchName >= RTTHREAD_NAME_LEN)
+   cchName = RTTHREAD_NAME_LEN - 1;
+ memcpy(pThread->szName, pszName, cchName);
+ pThread->szName[cchName] = '\0';
+ pThread->cRefs = 2 + !!(fFlags & RTTHREADFLAGS_WAITABLE); /* And extra reference if
waitable. */
+ pThread->rc = VERR_PROCESS_RUNNING; /** @todo get a better error code! */
+ pThread->enmType = enmType;
+ pThread->fFlags = fFlags;
+ pThread->fIntFlags = fIntFlags;
+ pThread->enmState = RTTHREADSTATE_INITIALIZING;
+ pThread->fReallySleeping = false;
+ #ifdef IN_RING3
+ rtLockValidatorInitPerThread(&pThread->LockValidator);
+ #endif
+ #ifdef RT_WITH_ICONV_CACHE
+ rtStrIconvCacheInit(pThread);
+ #endif
+ rc = RTSemEventMultiCreate(&pThread->EventUser);
+ if (RT_SUCCESS(rc))
+ {
+   rc = RTSemEventMultiCreate(&pThread->EventTerminated);
+   if (RT_SUCCESS(rc))
+     return pThread;
+   RTSemEventMultiDestroy(pThread->EventUser);
+ }
+ RTMemFree(pThread);
+ }
+ +
+/**
+ * Insert the per thread data structure into the tree.
+ *
+ * This can be called from both the thread it self and the parent,
+ * thus it must handle insertion failures in a nice manner.
+ *
+ * @param   pThread         Pointer to thread structure allocated by rtThreadAlloc().
+ * @param   NativeThread    The native thread id.
+ */
+ DECLHIDDEN(void) rtThreadInsert(PRTTHREADINT pThread, RTNATIVETHREAD NativeThread)
+ {
+   Assert(pThread);
+   Assert(pThread->u32Magic == RTTHREADINT_MAGIC);
+   
+   { 
+     RT_THREAD_LOCK_RW();
+   }
/*
 * Do not insert a terminated thread.
 *
 * This may happen if the thread finishes before the RTThreadCreate call
 * gets this far. Since the OS may quickly reuse the native thread ID
 * it should not be reinserted at this point.
 */
if (rtThreadGetState(pThread) != RTTHREADSTATE_TERMINATED)
{
    /*
     * Before inserting we must check if there is a thread with this id
     * in the tree already. We're racing parent and child on insert here
     * so that the handle is valid in both ends when they return / start.
     *
     * If it's not ourself we find, it's a dead alien thread and we will
     * unlink it from the tree. Alien threads will be released at this point.
     */
    PRTTHREADINT pThreadOther = (PRTTHREADINT)RTAvlPVGet(&g_ThreadTree, (void *)NativeThread);
    if (pThreadOther != pThread)
    {
        bool fRc;
        /* remove dead alien if any */
        if (pThreadOther)
        {
            AssertMsg(pThreadOther->fIntFlags & RTTHREADINT_FLAGS_ALIEN,("%p:%s; %p:%s\n", pThread, pThread->szName, pThreadOther, pThreadOther->szName));
            ASMAtomicBitClear(&pThread->fIntFlags, RTTHREADINT_FLAG_IN_TREE_BIT);
            rtThreadRemoveLocked(pThreadOther);
            if (pThreadOther->fIntFlags & RTTHREADINT_FLAGS_ALIEN)
                rtThreadRelease(pThreadOther);
        }
        /* insert the thread */
        ASMAtomicWritePtr(&pThread->Core.Key, (void *)NativeThread);
        fRc = RTAvlPVInsert(&g_ThreadTree, &pThread->Core);
        ASMAtomicOrU32(&pThread->fIntFlags, RTTHREADINT_FLAG_IN_TREE);
        if (fRc)
            ASMAtomicIncU32(&g_cThreadInTree);
        AssertReleaseMsg(fRc,("Lock problem? %p (%Rtnthr) %s\n", pThread, NativeThread, pThread->szName));
        NOREF(fRc);
    }
    RT_THREAD_UNLOCK_RW();
+ } }
+
+
+/**
+ * Removes the thread from the AVL tree, call owns the tree lock
+ * and has cleared the RTTHREADINT_FLAG_IN_TREE bit.
+ */
+ * @param  pThread  The thread to remove.
+ */
+static void rtThreadRemoveLocked(PRTTHREADINT pThread)
+
+ PRTHREADINT pThread2 = (PRTHREADINT)RTAvlPVRemove(&g_ThreadTree, pThread->Core.Key);
+if !defined(RT_OS_OS2) /** @todo this asserts for threads created by NSPR * /
+ AssertMsg(pThread2 == pThread, (%p(%s) != %p (%p/%s))n", pThread2, pThread2? pThread2->szName :
+ Thread, pThread->Core.Key, pThread->szName));
+endif
+ if (pThread2)
+    ASMAtomicDecU32(&g_cThreadInTree);
+
+/**
+ * Removes the thread from the AVL tree.
+ */
+static void rtThreadRemove(PRTTHREADINT pThread)
+
+ RT_THREAD_LOCK_RW();
+ if (ASMAtomicBitTestAndClear(&pThread->fIntFlags, RTTHREADINT_FLAG_IN_TREE_BIT))
+    rtThreadRemoveLocked(pThread);
+
+RT_THREAD_UNLOCK_RW();
+
+/**
+ * Checks if a thread is alive or not.
+ */
+DECLINLINE(bool) rtThreadIsAlive(PRTTHREADINT pThread)
+
+ return !(pThread->fIntFlags & RTTHREADINT_FLAGS_TERMINATED);
+}
+/**
+ * Gets a thread by it's native ID.
+ *
+ * @returns pointer to the thread structure.
+ * @returns NULL if not a thread IPRT knows.
+ * @param   NativeThread The native thread id.
+ */
+DECLHIDDEN(PRTTHREADINT) rtThreadGetByNative(RTNATIVETHREAD NativeThread)
+{
+    PRTTHREADINT pThread;
+    /*
+    * Simple tree lookup.
+    */
+    RT_THREAD_LOCK_RD();
+    pThread = (PRTTHREADINT)RTAvlPVGet(&g_ThreadTree, (void *)NativeThread);
+    RT_THREAD_UNLOCK_RD();
+    return pThread;
+}
+
+/**
+ * Gets the per thread data structure for a thread handle.
+ *
+ * @returns Pointer to the per thread data structure for Thread.
+ *          The caller must release the thread using rtThreadRelease().
+ * @returns NULL if Thread was not found.
+ * @param   Thread Thread id which structure is to be returned.
+ */
+DECLHIDDEN(PRTTHREADINT) rtThreadGet(RTTHREAD Thread)
+{
+    if ( Thread != NIL_RTTHREAD
+        &&  VALID_PTR(Thread))
+    {
+        PRTTHREADINT pThread = (PRTTHREADINT)Thread;
+        if ( pThread->u32Magic == RTTHREADINT_MAGIC
+            &&  pThread->cRefs > 0)
+        {
+            ASMAtomicIncU32(&pThread->cRefs);
+            return pThread;
+        }
+    }
+    AssertMsgFailed(("Thread=%RTthrd\n", Thread));
+    return NULL;
+}
+/**
+ * Release a per thread data structure.
+ *
+ * @returns New reference count.
+ * @param   pThread   The thread structure to release.
+ */
+DECLHIDDEN(uint32_t) rtThreadRelease(PRTTHREADINT pThread)
+{
+    uint32_t cRefs;
+
+    Assert(pThread);
+    if (pThread->cRefs >= 1)
+    {
+        cRefs = ASMAtomicDecU32(&pThread->cRefs);
+        if (!cRefs)
+            rtThreadDestroy(pThread);
+    }
+    else
+    {
+        cRefs = 0;
+        AssertFailed();
+    }
+    return cRefs;
+} 
+
+/**
+ * Destroys the per thread data.
+ *
+ * @param   pThread   The thread to destroy.
+ */
+static void rtThreadDestroy(PRTTHREADINT pThread)
+{
+    RTSEMEVENTMULTI hEvt1, hEvt2;
+    /*
+     * Remove it from the tree and mark it as dead.
+     * 
+     * Threads that has seen rtThreadTerminate and should already have been
+     * removed from the tree. There is probably no thread that should 
+     * require removing here. However, be careful making sure that cRefs 
+     * isn't 0 if we do or we'll blow up because the strict locking code 
+     * will be calling us back.
+     */
+    if (ASMBitTest(&pThread->fIntFlags, RTTHREADINT_FLAG_IN_TREE_BIT))
+    {
+        ASMAtomicIncU32(&pThread->cRefs);
+        rtThreadRemove(pThread);
+        ASMAtomicDecU32(&pThread->cRefs);
+    }
/ * Invalidate the thread structure. */
#ifdef IN_RING3
    rtLockValidatorSerializeDestructEnter();
    rtLockValidatorDeletePerThread(&pThread->LockValidator);
#endif
#ifdef RT_WITH_ICONV_CACHE
    rtStrIconvCacheDestroy(pThread);
#endif
    ASMAtomicXchgU32(&pThread->u32Magic, RTTHREADINT_MAGIC_DEAD);
    ASMAtomicWritePtr(&pThread->Core.Key, (void *)NIL_RTTHREAD);
    pThread->enmType         = RTTHREADTYPE_INVALID;
    hEvt1    = pThread->EventUser;
    pThread->EventUser       = NIL_RTSEMEVENTMULTI;
    hEvt2    = pThread->EventTerminated;
    pThread->EventTerminated = NIL_RTSEMEVENTMULTI;
#ifdef IN_RING3
    rtLockValidatorSerializeDestructLeave();
#endif
    /*
     * Destroy semaphore resources and free the bugger.
     */
    RTSemEventMultiDestroy(hEvt1);
    if (hEvt2 != NIL_RTSEMEVENTMULTI)
        RTSemEventMultiDestroy(hEvt2);
    rtThreadNativeDestroy(pThread);
    RTMemFree(pThread);
}/**
 * Terminates the thread.
 * Called by the thread wrapper function when the thread terminates.
 *
 * @param   pThread     The thread structure.
 * @param   rc          The thread result code.
 */
DECLHIDDEN(void) rtThreadTerminate(PRTTHREADINT pThread, int rc)
{
    Assert(pThread->cRefs >= 1);
#ifdef IPRT_WITH_GENERIC_TLS

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/* Destroy TLS entries. */
rtThreadTlsDestruction(pThread);
#ifdef /* IPRT_WITH_GENERIC_TLS */

/* Set the rc, mark it terminated and signal anyone waiting. */
pThread->rc = rc;
rtThreadSetState(pThread, RTTHREADSTATE_TERMINATED);
ASMAtomicOrU32(&pThread->fIntFlags, RTTHREADINT_FLAGS_TERMINATED);
if (pThread->EventTerminated != NIL_RTSEMEVENTMULTI)
    RTSemEventMultiSignal(pThread->EventTerminated);

/* Remove the thread from the tree so that there will be no
key clashes in the AVL tree and release our reference to ourself. */
rtThreadRemove(pThread);
rtThreadRelease(pThread);
}
}

/**
* The common thread main function.
* This is called by rtThreadNativeMain().
*
* @returns The status code of the thread.
*          pThread is dereference by the thread before returning!
* @param   pThread         The thread structure.
* @param   NativeThread    The native thread id.
* @param   pszThreadName   The name of the thread (purely a dummy for backtrace).
*
DECLCALLBACK(DECLHIDDEN(int)) rtThreadMain(PRTTHREADINT pThread, RTNATIVETHREAD NativeThread, const char *pszThreadName)
{
    int rc;
    NOREF(pszThreadName);
    rtThreadInsert(pThread, NativeThread);
    Log("rtThreadMain: Starting: pThread=%p NativeThread=%RT nthrd Name=%s pfnThread=%p pvUser=%p\n", pThread, NativeThread->szName, pThread->pfnThread, pThread->pvUser);
    pThread, NativeThread, pThread->szName, pThread->pfnThread, pThread->pvUser));
    
    /* Change the priority. */
    rc = rtThread NativeSetPriority(pThread, pThread->enmType);
+ AssertMsgRC(rc, ("Failed to set priority of thread %p (%RTnthrd / %s) to enmType=%d enmPriority=%d rc=%Rrc\n",
+ pThread, NativeThread, pThread->szName, pThread->enmType, g_enmProcessPriority, rc));
+}
+ else
+ AssertMsgRC(rc, ("Failed to set priority of thread %p (%RTnthrd / %s) to enmType=%d rc=%Rrc\n",
+ pThread, NativeThread, pThread->szName, pThread->enmType, rc));
+}
+
+ rtThreadSetState(pThread, RTTHREADSTATE_RUNNING);
+ rc = pThread->pfnThread(pThread, pThread->pvUser);
+
+ rtThreadTerminate(pThread, rc);
+ return rc;
+
+/**
+ * Create a new thread.
+ *
+ * @returns i32 status code.
+ * @param   pThread     Where to store the thread handle to the new thread. (optional)
+ * @param   pfnThread   The thread function.
+ * @param   pvUser      User argument.
+ * @param   cbStack     The size of the stack for the new thread.
+ *                      Use 0 for the default stack size.
+ * @param   enmType     The thread type. Used for deciding scheduling attributes
+ *                      of the thread.
+ * @param   fFlags      Flags of the RTTHREADFLAGS type (ORed together).
+ * @param   pszName     Thread name.
+ */
+RTDECL(int) RTThreadCreate(PRTTHREAD pThread, PFNRTTHREAD pfnThread, void *pvUser, size_t
cbStack,
+     RTTHREADTYPE enmType, unsigned fFlags, const char *pszName)
+{
+    int             rc;
+    PRTTHREADINT    pThreadInt;
+
+    LogFlow("RTThreadCreate: pThread=%p pfnThread=%p pvUser=%p cbStack=%#x enmType=%d
+            fFlags=%#x pszName=%p:%s\n",
+            pThread, pfnThread, pvUser, cbStack, enmType, fFlags, pszName, pszName));
+
+    /*
+     * Validate input.
+     */
+    if (!VALID_PTR(pThread) && pThread)
+    {        
+        Assert(VALID_PTR(pThread));
+        return VERR_INVALID_PARAMETER;
+    }
+    if (!VALID_PTR(pfnThread))
+    {
+        Assert(VALID_PTR(pfnThread));
+        return VERR_INVALID_PARAMETER;
+    }
+    if (pszName || *pszName || strlen(pszName) >= RTTHREAD_NAME_LEN)
+    {
+        AssertMsgFailed("pszName=%s (max len is %d because of logging)\n", pszName,
+            RTTHREAD_NAME_LEN - 1));
+        return VERR_INVALID_PARAMETER;
+    }
+    if (fFlags & ~RTTHREADFLAGS_MASK)
+    {
+        AssertMsgFailed("fFlags=%#x\n", fFlags);
+        return VERR_INVALID_PARAMETER;
+    }
+
+    /*
+     * Allocate thread argument.
+     */
+    pThreadInt = rtThreadAlloc(enmType, fFlags, 0, pszName);
+    if (pThreadInt)
+    {
+        RTNATIVETHREAD NativeThread;
+        
+        pThreadInt->pfnThread = pfnThread;
+        pThreadInt->pvUser = pvUser;
+        pThreadInt->cbStack = cbStack;
+        
+        rc = rtThreadNativeCreate(pThreadInt, &NativeThread);
+    }
if (RT_SUCCESS(rc)) {
    rtThreadInsert(pThreadInt, NativeThread);
    rtThreadRelease(pThreadInt);
    Log("RTThreadCreate: Created thread %p (%p) %s\n", pThreadInt, NativeThread, pszName);
    if (pThread)
        *pThread = pThreadInt;
    return VINF_SUCCESS;
}

pThreadInt->cRefs = 1;
rtThreadRelease(pThreadInt);
}
else
    rc = VERR_NO_TMP_MEMORY;
LogFlow("RTThreadCreate: Failed to create thread, rc=%Rrc\n", rc);
AssertReleaseRC(rc);
return rc;
}

RT_EXPORT_SYMBOL(RTThreadCreate);

+/**
 + * Create a new thread.
 + *
 + * Same as RTThreadCreate except the name is given in the RTStrPrintfV form.
 + *
 + * @returns iprt status code.
 + * @param   pThread     See RTThreadCreate.
 + * @param   pfnThread   See RTThreadCreate.
 + * @param   pvUser      See RTThreadCreate.
 + * @param   cbStack     See RTThreadCreate.
 + * @param   enmType     See RTThreadCreate.
 + * @param   fFlags      See RTThreadCreate.
 + * @param   pszNameFmt  Thread name format.
 + * @param   va          Format arguments.
 + */
+RTDECL(int) RTThreadCreateV(PRTTHREAD pThread, PFNRTTHREAD pfnThread, void *pvUser, size_t cbStack,
+RTTHREADTYPE enmType, uint32_t fFlags, const char *pszNameFmt, va_list va)
+{
    char szName[RTTHREAD_NAME_LEN * 2];
    RTStrPrintfV(szName, sizeof(szName), pszNameFmt, va);
    return RTThreadCreate(pThread, pfnThread, pvUser, cbStack, enmType, fFlags, szName);
}
/**
 * Create a new thread.
 *
 * Same as RTThreadCreate except the name is given in the RTStrPrintf form.
 *
 * @returns iprt status code.
 * @param   pThread     See RTThreadCreate.
 * @param   pfnThread   See RTThreadCreate.
 * @param   pvUser      See RTThreadCreate.
 * @param   cbStack     See RTThreadCreate.
 * @param   enmType     See RTThreadCreate.
 * @param   fFlags      See RTThreadCreate.
 * @param   pszNameFmt  Thread name format.
 * @param   ...         Format arguments.
 */
RTDECL(int) RTThreadCreateF(PRTTHREAD pThread, PFNRTTHREAD pfnThread, void *pvUser, size_t cbStack,
                            RTTHREADTYPE enmType, uint32_t fFlags, const char *pszNameFmt, ...)
{
    va_list va;
    int rc;
    va_start(va, pszNameFmt);
    rc = RTThreadCreateV(pThread, pfnThread, pvUser, cbStack, enmType, fFlags, pszNameFmt, va);
    va_end(va);
    return rc;
}
RT_EXPORT_SYMBOL(RTThreadCreateF);

/**
 * Gets the native thread id of a IPRT thread.
 *
 * @returns The native thread id.
 * @param   Thread   The IPRT thread.
 */
RTDECL(RTNATIVETHREAD) RTThreadGetNative(RTTHREAD Thread)
{
    PRTTHREADINT pThread = rtThreadGet(Thread);
    if (pThread)
    {
        RTNATIVETHREAD NativeThread = (RTNATIVETHREAD)pThread->Core.Key;
        rtThreadRelease(pThread);
        return NativeThread;
    }
    return NIL_RTNATIVETHREAD;
}
RT_EXPORT_SYMBOL(RTThreadGetNative);
+/**
+ * Gets the IPRT thread of a native thread.
+ *
+ * @returns The IPRT thread handle
+ * @returns NIL_RTTHREAD if not a thread known to IPRT.
+ * @param NativeThread The native thread handle/id.
+ */
+RTDECL(RTTHREAD) RTThreadFromNative(RTNATIVETHREAD NativeThread)
+{
+    PRTTHREADINT pThread = rtThreadGetByNative(NativeThread);
+    if (pThread)
+        return pThread;
+    return NIL_RTTHREAD;
+}
+RT_EXPORT_SYMBOL(RTThreadFromNative);
+
+/**
+ * Gets the name of the current thread thread.
+ *
+ * @returns Pointer to readonly name string.
+ * @returns NULL on failure.
+ */
+RTDECL(const char *) RTThreadSelfName(void)
+{
+    RTTHREAD Thread = RTThreadSelf();
+    if (Thread != NIL_RTTHREAD)
+    {
+        PRTTHREADINT pThread = rtThreadGet(Thread);
+        if (pThread)
+            {
+                const char *szName = pThread->szName;
+                rtThreadRelease(pThread);
+                return szName;
+            }
+        return NULL;
+    }
+} 
+RT_EXPORT_SYMBOL(RTThreadSelfName);
+
+/**
+ * Gets the name of a thread.
+ *
+ * @returns Pointer to readonly name string.
+ * @returns NULL on failure.
+ * @param Thread Thread handle of the thread to query the name of.
RTDECL(const char *) RTThreadGetName(RTTHREAD Thread)
{
    PRTTHREADINT pThread;
    if (Thread == NIL_RTTHREAD)
        return NULL;
    pThread = rtThreadGet(Thread);
    if (pThread)
    {
        const char *szName = pThread->szName;
        rtThreadRelease(pThread);
        return szName;
    }
    return NULL;
}

RT_EXPORT_SYMBOL(RTThreadGetName);

/**
 * Sets the name of a thread.
 *
 * @returns iprt status code.
 * @param   Thread      Thread handle of the thread to query the name of.
 * @param   pszName     The thread name.
 * @*/
+RTDECL(int) RTThreadSetName(RTTHREAD Thread, const char *pszName)
+
+ /*
 + * Validate input.
 + */
+ PRTTHREADIDENT pThread;
+ size_t cchName = strlen(pszName);
+ if (cchName >= RTTHREAD_NAME_LEN)
+ {
+     AssertMsgFailed(("pszName=%s is too long, max is %d\n", pszName, RTTHREAD_NAME_LEN - 1));
+     return VERR_INVALID_PARAMETER;
+ }
+ pThread = rtThreadGet(Thread);
+ if (!pThread)
+     return VERR_INVALID_HANDLE;
+
+ /*
 + * Update the name.
 + */
+ pThread->szName[cchName] = '\0';     /* paranoia */
+ memcpy(pThread->szName, pszName, cchName);
+ rtThreadRelease(pThread);
+ return VINF_SUCCESS;
+ RT_EXPORT_SYMBOL(RTThreadSetName);
+
+/**
+ * Checks if the specified thread is the main thread.
+ *
+ * @returns true if it is, false if it isn't.
+ *
+ * @param   hThread     The thread handle.
+ *
+ * @remarks This function may not return the correct value when rtR3Init was
+ * called on a thread of the than the main one. This could for
+ * instance happen when the DLL/DYLIB/SO containing IPRT is dynamically
+ * loaded at run time by a different thread.
+ */
+RTDECL(bool) RTThreadIsMain(RTTHREAD hThread)
+{
+    PRTTHREADINT pThread = rtThreadGet(hThread);
+    if (pThread)
+    {
+        bool fRc = !!(pThread->fIntFlags & RTTHREADINT_FLAGS_MAIN);
+        rtThreadRelease(pThread);
+        return fRc;
+    }
+    return false;
+
+RT_EXPORT_SYMBOL(RTThreadIsMain);
+
+RTDECL(bool) RTThreadIsSelfAlive(void)
+{
+    if (g_frtThreadInitialized)
+    {
+        RTTHREAD hSelf = RTThreadSelf();
+        if (hSelf != NIL_RTTHREAD)
+        {
+            /*
+             * Inspect the thread state. ASSUMES thread state order.
+             */
+            RTTHREADSTATE enmState = rtThreadGetState(hSelf);
+            if ( enmState >= RTTHREADSTATE_RUNNING
+                && enmState <= RTTHREADSTATE_END)
+                return true;
+        }
+    }
+    return false;
+}
+RT_EXPORT_SYMBOL(RTThreadIsSelfAlive);
+
+RTDECL(bool) RTThreadIsSelfKnown(void)
+{
+    if (g_frtThreadInitialized)
+    {
+        RTTHREAD hSelf = RTThreadSelf();
+        if (hSelf != NIL_RTTHREAD)
+            return true;
+    }
+    return false;
+}
+RT_EXPORT_SYMBOL(RTThreadIsSelfKnown);
+
+RTDECL(bool) RTThreadIsInitialized(void)
+{
+    return g_frtThreadInitialized;
+}
+RT_EXPORT_SYMBOL(RTThreadIsInitialized);
+
+*/
+ * Signal the user event.
+ *
+ * @returns iprt status code.
+ */
+RTDECL(int) RTThreadUserSignal(RTTHREAD Thread)
+{
+    int             rc;
+    PRTTHREADINT    pThread = rtThreadGet(Thread);
+    if (pThread)
+    {
+        rc = RTSemEventMultiSignal(pThread->EventUser);
+        rtThreadRelease(pThread);
+    }
+    else
+        rc = VERR_INVALID_HANDLE;
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTThreadUserSignal);
+
+*/
+ * Wait for the user event, resume on interruption.
+ *
+ * @returns iprt status code.
+ * @param       Thread          The thread to wait for.
+ * @param       cMillis        The number of milliseconds to wait. Use RT_INDEFINITE_WAIT for
+ * an indefinite wait.
+ */
+RTDECL(int) RTThreadUserWait(RTTHREAD Thread, RTMSINTERVAL cMillies)
+{
+    int             rc;
+    PRTTHREADINT    pThread = rtThreadGet(Thread);
+    if (pThread)
+    {
+        rc = RTSemEventMultiWait(pThread->EventUser, cMillies);
+        rtThreadRelease(pThread);
+    }
+    else
+    rc = VERR_INVALID_HANDLE;
+    return rc;
+
+RT_EXPORT_SYMBOL(RTThreadUserWait);
+
+/**
+ * Wait for the user event, return on interruption.
+ *
+ * @returns     iprt status code.
+ * @param       Thread          The thread to wait for.
+ * @param       cMillis        The number of milliseconds to wait. Use RT_INDEFINITE_WAIT for
+ * an indefinite wait.
+ */
+RTDECL(int) RTThreadUserWaitNoResume(RTTHREAD Thread, RTMSINTERVAL cMillies)
+{
+    int             rc;
+    PRTTHREADINT    pThread = rtThreadGet(Thread);
+    if (pThread)
+    {
+        rc = RTSemEventMultiWaitNoResume(pThread->EventUser, cMillies);
+        rtThreadRelease(pThread);
+    }
+    else
+    rc = VERR_INVALID_HANDLE;
+    return rc;
+
+RT_EXPORT_SYMBOL(RTThreadUserWaitNoResume);
+
+/**
+ * Reset the user event.
+ *
+ * @returns     iprt status code.
+ * @param       Thread          The thread to reset.
+ */
+RTDECL(int) RTThreadUserReset(RTTHREAD Thread)
+{
+    int     rc;
+    PRTTHREADINT  pThread = rtThreadGet(Thread);
+    if (pThread)
+    {
+        rc = RTSemEventMultiReset(pThread->EventUser);
+        rtThreadRelease(pThread);
+    }
+    else
+    + rc = VERR_INVALID_HANDLE;
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTThreadUserReset);
+
+/**
+ * Wait for the thread to terminate.
+ *
+ * @returns     iprt status code.
+ * @param       Thread          The thread to wait for.
+ * @param       cMillies        The number of milliseconds to wait. Use RT_INDEFINITE_WAIT for
+ *                              an indefinite wait.
+ * @param       prc             Where to store the return code of the thread. Optional.
+ * @param       fAutoResume     Whether or not to resume the wait on VERR_INTERRUPTED.
+ */
+static int rtThreadWait(RTTHREAD Thread, RTMSINTERVAL cMillies, int *prc, bool fAutoResume)
+{
+    int rc = VERR_INVALID_HANDLE;
+    if (Thread != NIL_RTTHREAD)
+    {
+        PRTTHREADINT pThread = rtThreadGet(Thread);
+        if (pThread)
+        {
+            if (pThread->fFlags & RTTHREADFLAGS_WAITABLE)
+            {
+                #if defined(IN_RING3) && defined(RT_OS_WINDOWS)
+                    if (RT_LIKELY(rtThreadNativeIsAliveKludge(pThread)))
+                        #endif
+                        {
+                            if (fAutoResume)
+                                rc = RTSemEventMultiWait(pThread->EventTerminated, cMillies);
+                            else
+                                rc = RTSemEventMultiWaitNoResume(pThread->EventTerminated, cMillies);
+                        }
+                        #endif
+        }
+    }
+    +
+    }
+    +
+    }
else
{
    rc = VINF_SUCCESS;
    if (pThread->rc == VERR_PROCESS_RUNNING)
        pThread->rc = VERR_THREAD_IS_DEAD;

}   #endif
if (RT_SUCCESS(rc))
{
    if (prc)
        *prc = pThread->rc;

    /*
     * If the thread is marked as waitable, we'll do one additional
     * release in order to free up the thread structure (see how we
     * init cRef in rtThreadAlloc()).
     */
    if (ASMAtomicBitTestAndClear(&pThread->fFlags, RTTHREADFLAGS_WAITABLE_BIT))
    {
        rtThreadRelease(pThread);

    }   #ifdef IN_RING0
    /*
     * IPRT termination kludge. Call native code to make sure
     * the last thread is really out of IPRT to prevent it from
     * crashing after we destroyed the spinlock in rtThreadTerm.
     */
    if (ASMAtomicReadU32(&g_cThreadInTree) == 1
        && ASMAtomicReadU32(&pThread->cRefs) > 1)
        rtThreadNativeWaitKludge(pThread);
    #endif
}
else
{
    rc = VERR_THREAD_NOT_WAITABLE;
    AssertRC(rc);

    rtThreadRelease(pThread);

    return rc;
}

*/
/**
 * Wait for the thread to terminate, resume on interruption.
 */
RTDECL(int) RTThreadWait(RTTHREAD Thread, RTMSINTERVAL cMillies, int *prc)
{
    int rc = rtThreadWait(Thread, cMillies, prc, true);
    Assert(rc != VERR_INTERRUPTED);
    return rc;
}

RT_EXPORT_SYMBOL(RTThreadWait);

RTDECL(int) RTThreadWaitNoResume(RTTHREAD Thread, RTMSINTERVAL cMillies, int *prc)
{
    return rtThreadWait(Thread, cMillies, prc, false);
}

RT_EXPORT_SYMBOL(RTThreadWaitNoResume);

RTDECL(int) RTThreadSetType(RTTHREAD Thread, RTTHREADTYPE enmType)
{
    /*
     * Validate input.
     */
    int rc;
    if (enmType > RTTHREADTYPE_INVALID
        && enmType < RTTHREADTYPE_END)
    {
# RTThreadSetType

**Synopsis**

Sets the type of the specified thread.

**Declaration**

```c
RTDECL(RTTHREADTYPE) RTThreadSetType(RTTHREAD Thread, RTTHREADTYPE enmType);
```

**Parameters**

- **Thread**
  - The thread in question.

- **enmType**
  - The thread type.

**Return Value**

- **RT_SUCCESS** if successful.
- **VERR_INVALID_HANDLE** if the thread handle is invalid.
- **VERR_INVALID_PARAMETER** if the thread handle is invalid.

**Description**

Sets the type of the specified thread. This function is exported for use in the RT implementation.

**Error Handling**

- If `enmType` is invalid, the function returns `VERR_INVALID_PARAMETER`.
- If the thread handle is invalid, the function returns `VERR_INVALID_HANDLE`.
- If the thread is not alive, the function returns `VERR_THREAD_IS_DEAD`.

**Examples**

```c
void example()
{
    RTTHREADTYPE enmType = RTTHREADTYPE_INVALID;
    RTTHREAD Thread = rtThreadCreate();
    RTThreadSetType(Thread, enmType);
}
```
RT_EXPORT_SYMBOL(RTThreadGetType);
+
+
+/**
+ * Recalculates scheduling attributes for the default process
+ * priority using the specified priority type for the calling thread.
+ *
+ * The scheduling attributes are targeted at threads and they are protected
+ * by the thread read-write semaphore, that's why RTProc is forwarding the
+ * operation to RTThread.
+ *
+ */
+int rtThreadDoCalcDefaultPriority(RTTHREADTYPE enmType)
+{
+    RT_THREAD_LOCK_RW();
+    int rc = rtSchedNativeCalcDefaultPriority(enmType);
+    RT_THREAD_UNLOCK_RW();
+    return rc;
+}

/**
 * Thread enumerator - sets the priority of one thread.
 *
 * @returns 0 to continue.
 * @returns !0 to stop. In our case a VERR_ code.
 * @param pNode The thread node.
 * @param pvUser The new priority.
 */
static DECLCALLBACK(int) rtThreadSetPriorityOne(PAVLPVNODECORE pNode, void *pvUser)
+{
+    PRTTHREADINT pThread = (PRTTHREADINT)pNode;
+    if (!rtThreadIsAlive(pThread))
+        return VINF_SUCCESS;
+    int rc = rtThreadNativeSetPriority(pThread, pThread->enmType);
+    if (RT_SUCCESS(rc)) /* hide any warnings */
+        return VINF_SUCCESS;
+    NOREF(pvUser);
+    return rc;
+}
Attempts to alter the priority of the current process.

The scheduling attributes are targeted at threads and they are protected by the thread read-write semaphore, that's why RTProc is forwarding the operation to RTThread. This operation also involves updating all thread which is much faster done from RTThread.

@returns iprt status code.
@param   enmPriority The new priority.

DECLHIDDEN(int) rtThreadDoSetProcPriority(RTPROCPRIORITY enmPriority)
{
    LogFlow(("rtThreadDoSetProcPriority: enmPriority=%d\n", enmPriority));

    /*
     * First validate that we're allowed by the OS to use all the scheduling attributes defined by the specified process priority.
     */
    RT_THREAD_LOCK_RW();
    int rc = rtProcNativeSetPriority(enmPriority);
    if (RT_SUCCESS(rc))
    {
        /*
         * Update the priority of existing thread.
         */
        rc = RTAvlIPVDoWithAll(&g_ThreadTree, true, rtThreadSetPriorityOne, NULL);
        if (RT_SUCCESS(rc))
            ASMAtomicXchgSize(&g_enmProcessPriority, enmPriority);
        else
        {
            /*
             * Failed, restore the priority.
             */
            rtProcNativeSetPriority(g_enmProcessPriority);
            RTAvlIPVDoWithAll(&g_ThreadTree, true, rtThreadSetPriorityOne, NULL);
        }
    }
    RT_THREAD_UNLOCK_RW();
    LogFlow(("rtThreadDoSetProcPriority: returns %Rrc\n", rc));
    return rc;
}
+ * @param   enmState        The sleep state.
+ * @param   fReallySleeping Really going to sleep now.
+ */
+RTDECL(void) RTThreadBlocking(RTTHREAD hThread, RTTHREADSTATE enmState, bool fReallySleeping)
+{
+    Assert(RTTHREAD_IS_SLEEPING(enmState));
+    PRTTHREADINT pThread = hThread;
+    if (pThread != NIL_RTTHREAD)
+    {
+        Assert(pThread == RTThreadSelf());
+        if (rtThreadGetState(pThread) == RTTHREADSTATE_RUNNING)
+            rtThreadSetState(pThread, enmState);
+        ASMAtomicWriteBool(&pThread->fReallySleeping, fReallySleeping);
+    }
+}
+RT_EXPORT_SYMBOL(RTThreadBlocking);
+
+/**
+ * Unblocks a thread.
+ *
+ * This function is paired with rtThreadBlocking.
+ *
+ * @param   hThread     The current thread.
+ * @param   enmCurState The current state, used to check for nested blocking.
+ *                      The new state will be running.
+ */
+RTDECL(void) RTThreadUnblocked(RTTHREAD hThread, RTTHREADSTATE enmCurState)
+{
+    PRTTHREADINT pThread = hThread;
+    if (pThread != NIL_RTTHREAD)
+    {
+        Assert(pThread == RTThreadSelf());
+        ASMAtomicWriteBool(&pThread->fReallySleeping, false);
+        RTTHREADSTATE enmActualState = rtThreadGetState(pThread);
+        if (enmActualState == enmCurState)
+            rtThreadSetState(pThread, RTTHREADSTATE_RUNNING);
+        else if (   (   enmActualState == RTTHREADSTATE_TERMINATED
+                        || enmActualState == RTTHREADSTATE_INITIALIZING)
+                        && pThread->LockValidator.pRec
+                        && pThread->LockValidator.eLockState == enmCurState)
+            ASMAtomicWriteNullPtr(&pThread->LockValidator.pRec);
+    }
+    /* This is a bit ugly... :-( */
else if (   (   enmActualState == RTTHREADSTATE_TERMINATED
                        || enmActualState == RTTHREADSTATE_INITIALIZING)
                        && pThread->LockValidator.pRec
                        && pThread->LockValidator.eLockState == enmCurState)
            ASMAtomicWriteNullPtr(&pThread->LockValidator.pRec);
}
/**
 * Get the current thread state.
 *
 * @returns The thread state.
 * @param hThread The thread.
 */
RTDECL(RTTHREADSTATE) RTThreadGetState(RTTHREAD hThread)
{
    RTTHREADSTATE   enmState = RTTHREADSTATE_INVALID;
    PRTTHREADINT    pThread = rtThreadGet(hThread);
    if (pThread)
    {
        enmState = rtThreadGetState(pThread);
        rtThreadRelease(pThread);
    }
    return enmState;
}

RT_EXPORT_SYMBOL(RTThreadGetState);

/**
 * Translate a thread state into a string.
 *
 * @returns Pointer to a read-only string containing the state name.
 * @param enmState The state.
 */
+RTDECL(RTTHREADSTATE) RTThreadGetReallySleeping(RTTHREAD hThread)
{
    RTTHREADSTATE   enmState = RTTHREADSTATE_INVALID;
    PRTTHREADINT    pThread = rtThreadGet(hThread);
    if (pThread)
    {
        enmState = rtThreadGetState(pThread);
        if (!ASMAtomicUoReadBool(&pThread->fReallySleeping))
            enmState = RTTHREADSTATE_RUNNING;
        rtThreadRelease(pThread);
    }
    return enmState;
}
RT_EXPORT_SYMBOL(RTThreadGetReallySleeping);

+/**
 + Assert( pThread->LockValidator.pRec == NULL
 +       || RTTHREAD_IS_SLEEPING(enmActualState));
 +
 +}
```c
+ RTDECL(const char *) RTThreadStateName(RTTHREADSTATE enmState)
+ {
+     switch (enmState)
+     {
+         case RTTHREADSTATE_INVALID: return "INVALID";
+         case RTTHREADSTATE_INITIALIZING: return "INITIALIZING";
+         case RTTHREADSTATE_TERMINATED: return "TERMINATED";
+         case RTTHREADSTATE_RUNNING: return "RUNNING";
+         case RTTHREADSTATE_CRITSECT: return "CRITSECT";
+         case RTTHREADSTATE_EVENT: return "EVENT";
+         case RTTHREADSTATE_EVENT_MULTI: return "EVENT_MULTI";
+         case RTTHREADSTATE_FAST_MUTEX: return "FAST_MUTEX";
+         case RTTHREADSTATE_MUTEX: return "MUTEX";
+         case RTTHREADSTATE_RW_READ: return "RW_READ";
+         case RTTHREADSTATE_RW_WRITE: return "RW_WRITE";
+         case RTTHREADSTATE_SLEEP: return "SLEEP";
+         case RTTHREADSTATE_SPIN_MUTEX: return "SPIN_MUTEX";
+         default: return "UnknownThreadState";
+     }
+ }
+ RT_EXPORT_SYMBOL(RTThreadStateName);
+
+#endif /* IN_RING3 */
+
+ #ifdef IPRT_WITH_GENERIC_TLS
+
+ /**
+  * Thread enumerator - clears a TLS entry.
+  *
+  * @returns 0.
+  * @param pNode   The thread node.
+  * @param pvUser  The TLS index.
+  */
+ static DECLCALLBACK(int) rtThreadClearTlsEntryCallback(PAVLPVNODECORE pNode, void *pvUser)
+ {
+     PRTTHREADINT pThread = (PRTTHREADINT)pNode;
+     RTTLS iTls = (RTTLS)(uintptr_t)pvUser;
+     ASMAtomicWriteNullPtr(&pThread->apvTlsEntries[iTls]);
+     return 0;
+ }
+
+ /**
+  * Helper for the generic TLS implementation that clears a given TLS
+  * entry on all threads.
+  *
+  * @param iTls  The TLS entry. (valid)
+  */
+```
DECLHIDDEN(void) rtThreadClearTlsEntry(RTTLS iTls)
{
    RT_THREAD_LOCK_RD();
    RTAvlPVDoWithAll(&g_ThreadTree, true /* fFromLeft*/, rtThreadClearTlsEntryCallback, (void *)((uintptr_t)iTls);
    RT_THREAD_UNLOCK_RD();
}

#if defined(RT_OS_WINDOWS) && defined(IN_RING3)

/**
 * Thread enumeration callback for RTThreadNameThreads
 */
static DECLCALLBACK(int) rtThreadNameThreadCallback(PAVLPVNODECORE pNode, void *pvUser)
{
    PRTTHREADINT pThread = (PRTTHREADINT)pNode;
    rtThreadNativeInformDebugger(pThread);
    RT_NOREF_PV(pvUser);
    return 0;
}

/**
 * A function that can be called from the windows debugger to get the names of
 * all threads when attaching to a process.
 * @returns 0
 * @remarks Do not call from source code as it skips locks.
 */
extern "C" RTDECL(int) RTThreadNameThreads(void);
RTDECL(int) RTThreadNameThreads(void)
{
    return RTAvlPVDoWithAll(&g_ThreadTree, true /* fFromLeft*/, rtThreadNameThreadCallback, NULL);
}
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/string/RTStrCat.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/string/RTStrCat.c
@@ -0,0 +1,56 @@
/* $Id: RTStrCat.cpp $ */
/** @file
 * IPRT - RTStrCat.
 */
+DECHOI
/*
 * Copyright (C) 2010-2017 Oracle Corporation
 *
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 */

#include <iprt/string.h>
#include "internal/iprt.h"

RTDECL(int) RTStrCat(char *pszDst, size_t cbDst, const char *pszSrc)
{
    char *pszDst2 = RTStrEnd(pszDst, cbDst);
    AssertReturn(pszDst2, VERR_INVALID_PARAMETER);
    cbDst -= pszDst2 - pszDst;

    size_t cchSrc = strlen(pszSrc);
    if (RT_LIKELY(cchSrc < cbDst))
    {
        memcpy(pszDst2, pszSrc, cchSrc + 1);
        return VINF_SUCCESS;
    }

    if (cbDst != 0)
    {
        memcpy(pszDst2, pszSrc, cbDst - 1);
        pszDst2[cbDst - 1] = '\0';
    }
RTDECL(int) RTStrCopy(char *pszDst, size_t cbDst, const char *pszSrc)
{
    size_t cchSrc = strlen(pszSrc);
    if (RT_LIKELY(cchSrc < cbDst))
    {  
        memcpy(pszDst, pszSrc, cchSrc + 1);
        return VINF_SUCCESS;
    }
    
    if (cbDst != 0)
    {  
        memcpy(pszDst, pszSrc, cbDst - 1);
        pszDst[cbDst - 1] = '\0';
    }  
    return VERR_BUFFER_OVERFLOW;
}  

RT_EXPORT_SYMBOL(RTStrCopy);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/string/RTStrCopyEx.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/string/RTStrCopyEx.c
@@ -0,0 +1,54 @@
+/* $Id: RTStrCopyEx.cpp $ */
+/** @file
+ * IPRT - RTStrCopyEx.
+ */
+/*
+ * Copyright (C) 2010-2017 Oracle Corporation
+ */
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+ */
+ /*
+ */
+ /*******************************************************************************************
+ **************************************
+ *   Header Files
+ *******************************************************************************************/

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```c
#include <iprt/string.h>
#include "internal/iprt.h"

RTDECL(int) RTStrCopyEx(char *pszDst, size_t cbDst, const char *pszSrc, size_t cchMaxSrc)
{
    const char *pszSrcEol = RTStrEnd(pszSrc, cchMaxSrc);
    size_t cchSrc = pszSrcEol ? (size_t)(pszSrcEol - pszSrc) : cchMaxSrc;
    if (RT_LIKELY(cchSrc < cbDst))
    {
        memcpy(pszDst, pszSrc, cchSrc);
        pszDst[cchSrc] = '\0';
        return VINF_SUCCESS;
    }
    if (cbDst != 0)
    {
        memcpy(pszDst, pszSrc, cbDst - 1);
        pszDst[cbDst - 1] = '\0';
    }
    return VERR_BUFFER_OVERFLOW;
}

RT_EXPORT_SYMBOL(RTStrCopyEx);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/string/RTStrCopyP.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/string/RTStrCopyP.c
@@ -0,0 +1,58 @@
+/* $Id: RTStrCopyP.cpp $ */
+/** @file
+ * IPRT - RTStrCopyP.
+ */
+/**
+ * Copyright (C) 2010-2017 Oracle Corporation
+ */
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```
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************************
+**************************************
+*   Header Files                                                                                                                 *
+********************************************************************************************
+****
+*#include <iprt/string.h>
+*#include "internal/iprt.h"
+
+RTDECL(int) RTStrCopyP(char **ppszDst, size_t *pcbDst, const char *pszSrc)
+{
+    size_t const    cchSrc = strlen(pszSrc);
+    size_t const    cbDst  = *pcbDst;
+    char           *pszDst = *ppszDst;
+    if (RT_LIKELY(cchSrc < cbDst))
+    {
+        memcpy(pszDst, pszSrc, cchSrc + 1);
+        *ppszDst = pszDst += cchSrc;
+        *pcbDst -= cchSrc;
+        return VINF_SUCCESS;
+    }
+
+    if (cbDst != 0)
+    {
+        memcpy(*ppszDst, pszSrc, cbDst - 1);
+        *ppszDst = pszDst += cbDst - 1;
+        *pcbDst -= cchSrc;
+        return VINF_SUCCESS;
+    }
+    return VERR_BUFFER_OVERFLOW;
+}
+RT_EXPORT_SYMBOL(RTStrCopyP);
/*
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 */

/*******************************************************************************************
**************************************
+* Defined Constants
+**************************************
*******************************************************************************************
*
#define ISDIGIT(c) ((c) >= '0' && (c) <= '9')
*
#define MAX(a, b)  ((a) >= (b) ? (a) : (b))
#define MIN(a, b)  ((a) < (b) ? (a) : (b))
*
*******************************************************************************************
**************************************
+* Header Files
+**************************************
*******************************************************************************************
*
#define LOG_GROUP RTLOGGROUP_STRING
*
#include <iprt/string.h>
*
#include "internal/iprt.h"
*
#include <iprt/assert.h>
*
#ifdef IN_RING3
*
#include <iprt/alloc.h>
*
#include <iprt/err.h>
*
#include <iprt/uni.h>
*
#endif
*
#include <iprt/string.h>
#include <iprt/stdarg.h>
#include "internal/string.h"
+
+/* Wrappers for converting to iprt facilities. */
+#define SSToDS(ptr) ptr
+#define kASSERT Assert
+#define KENDIAN_LITTLE 1
+#define KENDIAN KENDIAN_LITTLE
+#define KSIZE size_t
+typedef struct
+
+{
+  uint32_t ulLo;
+  uint32_t ulHi;
+} KSIZE64;
+
+/
+="/*******************************************************************************************
+ *   Internal Functions                                                                *
+ ********************************************************************************************/
+static unsigned _strnlen(const char *psz, unsigned cchMax);
+static unsigned _strnlenUtf16(PCRTUTF16 pwsz, unsigned cchMax);
+static int rtStrFormatNumber(char *psz, KSIZE64 ullValue, unsigned int uiBase, signed int cchWidth, signed int cchPrecision, unsigned int fFlags);
+
+/
+="/**
+ * Finds the length of a string up to cchMax.
+ * @returns Length.
+ * @param psz Pointer to string.
+ * @param cchMax Max length.
+ */
+static unsigned _strnlen(const char *psz, unsigned cchMax)
+
+{ const char *pszC = psz;
+
+  while (cchMax-- > 0 && *psz != '\0')
+    psz++;
+
+  return (unsigned)(psz - pszC);
+}
+
+/
+="/**
+ * Finds the length of a string up to cchMax.
+ * @returns Length.
+ * @param psz Pointer to string.
+ * @param pwsz
+ * @param cchMax Max length.
+ */
static unsigned _strnlenUtf16(PCRTUTF16 pwsz, unsigned cchMax)
+
#ifdef IN_RING3
+ unsigned cwc = 0;
+ while (cchMax-- > 0)
+ {
+     RTUNICP cp;
+     int rc = RTUtf16GetCpEx(&pwsz, &cp);
+     AssertRC(rc);
+     if (RT_FAILURE(rc) || !cp)
+         break;
+     cwc++;
+ }
+ return cwc;
#else /* !IN_RING3 */
+ PCRTUTF16 pwszC = pwsz;
+ while (cchMax-- > 0 && *pwsz != \0)
+     pwsz++;
+ return (unsigned)(pwsz - pwszC);
#endif /* !IN_RING3 */
+
/**
+ * Finds the length of a string up to cchMax.
+ * @returns Length.
+ * @param pusz Pointer to string.
+ * @param cchMax Max length.
+ */
static unsigned _strnlenUni(PCRTUNICP pusz, unsigned cchMax)
+
+ PCRTUNICP puszC = pusz;
+ while (cchMax-- > 0 && *pusz != \0)
+     pusz++;
+ return (unsigned)(pusz - puszC);
+
/**
+ * Formats an integer number according to the parameters.
+ */
+ * @returns Length of the formatted number.
+ * @param     psz            Pointer to output string buffer of sufficient size.
+ * @param     u64Value       Value to format.
+ * @param     uiBase         Number representation base.
+ * @param     cchWidth       Width.
+ * @param     cchPrecision   Precision.
+ * @param     fFlags         Flags (NTFS_ *).
+ */
+RTDECL(int) RTStrFormatNumber(char *psz, uint64_t u64Value, unsigned int uiBase, signed int cchWidth, signed int cchPrecision,
+                                  unsigned int fFlags)
+{  
+    return rtStrFormatNumber(psz, *(KSIZE64 *)(void *)&u64Value, uiBase, cchWidth, cchPrecision, fFlags);
+}
+RT_EXPORT_SYMBOL(RTStrFormatNumber);
+
+
+/**
+ * Formats an integer number according to the parameters.
+ *
+ * @returns   Length of the number.
+ * @param     psz            Pointer to output string.
+ * @param     ullValue       Value. Using the high part is optional.
+ * @param     uiBase         Number representation base.
+ * @param     cchWidth       Width
+ * @param     cchPrecision   Precision.
+ * @param     fFlags         Flags (NTFS_ *).
+ */
+static int rtStrFormatNumber(char *psz, KSIZE64 ullValue, unsigned int uiBase, signed int cchWidth, signed int cchPrecision,
+                             unsigned int fFlags)
+{  
+    const char     *pachDigits = "0123456789abcdef";
+    char           *pszStart = psz;
+    int             cchMax;
+    int             cchValue;
+    unsigned long   ul;
+    int             i;
+    int             j;
+
+    /*
+    * Validate and adjust input...
+    */
+    Assert(uiBase >= 2 && uiBase <= 16);
+    if (fFlags & RTSTR_F_CAPITAL)
+        pachDigits = "0123456789ABCDEF";
+    if (fFlags & RTSTR_F_LEFT)
+        fFlags &= ~RTSTR_F_ZEROPAD;
+    return rtStrFormatNumber(psz, *pachDigits, ullValue, uiBase, cchWidth, cchPrecision, fFlags);
+}
+ if ( (fFlags & RTSTR_F_THOUSAND_SEP)  
+ && ( uiBase != 10  
+ + (fFlags & RTSTR_F_ZEROPAD))) /**< @todo implement RTSTR_F_ZEROPAD + RTSTR_F_THOUSAND_SEP. */  
+ fFlags &= ~RTSTR_F_THOUSAND_SEP;  
+ + /*  
+ * Determine value length  
+ */  
+ cchValue = 0;  
+ if (ullValue.ulHi || (fFlags & RTSTR_F_64BIT))  
+ {  
+ uint64_t  u64 = *(uint64_t *)(void *)&ullValue;  
+ if ((fFlags & RTSTR_F_VALSIGNED) && (ullValue.ulHi & 0x80000000))  
+ u64 = -(int64_t)u64;  
+ do  
+ {  
+ cchValue++;  
+ u64 /= uiBase;  
+ } while (u64);  
+ }  
+ else  
+ {  
+ ul = (fFlags & RTSTR_F_VALSIGNED) && (ullValue.ulLo & 0x80000000) ? -(int32_t)ullValue.ulLo : ullValue.ulLo;  
+ do  
+ {  
+ cchValue++;  
+ ul /= uiBase;  
+ } while (ul);  
+ }  
+ if (fFlags & RTSTR_F_THOUSAND_SEP)  
+ {  
+ if (cchValue <= 3)  
+ fFlags &= ~RTSTR_F_THOUSAND_SEP;  
+ else  
+ cchValue += cchValue / 3 - (cchValue % 3 == 0);  
+ + /*  
+ * Sign (+/-).  
+ */  
+ i = 0;  
+ if (fFlags & RTSTR_F_VALSIGNED)  
+ {  
+ if ((ullValue.ulHi || (fFlags & RTSTR_F_64BIT)) ? ullValue.ulHi : ullValue.ulLo & 0x80000000)  
+ {  
+ ullValue.ulLo = -(int32_t)ullValue.ulLo;
if (ullValue.ulHi)
    ullValue.ulHi = ~ullValue.ulHi;
    psz[i++] = '-';

else if (fFlags & (RTSTR_F_PLUS | RTSTR_F_BLANK))
    psz[i++] = (char)(fFlags & RTSTR_F_PLUS ? '+' : '');

/*
 * Special (0/0x).
 */
if ((fFlags & RTSTR_F_SPECIAL) && (uiBase % 8) == 0)
    {
    psz[i++] = '0';
    if (uiBase == 16)
        psz[i++] = (char)(fFlags & RTSTR_F_CAPITAL ? 'X' : 'x');
    }

/*
 * width - only if ZEROPAD
 */
cchMax = 64 - (cchValue + i + 1);  /* HACK! 64 bytes seems to be the usual buffer size... */
cchWidth -= i + cchValue;
if (fFlags & RTSTR_F_ZEROPAD)
    while (--cchWidth >= 0 && i < cchMax)
    {
        AssertBreak(i < cchMax);
        psz[i++] = '0';
        cchPrecision--;
    }
else if (!fFlags & RTSTR_F_LEFT) && cchWidth > 0)
    {
        AssertStmt(cchWidth < cchMax, cchWidth = cchMax - 1);
        for (j = i - 1; j >= 0; j--)
            psz[cchWidth + j] = psz[j];
        for (j = 0; j < cchWidth; j++)
            psz[j] = ' ';
        i += cchWidth;
    }

/*
 * precision
 */
while (--cchPrecision >= cchValue)
    {
    AssertBreak(i < cchMax);
    psz[i++] = '0';
    }
+ psz += i;
+
+ /*
+ * write number - not good enough but it works
+ */
+ psz += cchValue;
+ i = -1;
+ if (ullValue.ulHi || (fFlags & RTSTR_F_64BIT))
+ {
+    uint64_t   u64 = *(uint64_t *)(void *)&ullValue;
+    if (fFlags & RTSTR_F_THOUSAND_SEP)
+    {
+        do
+        {
+            if ((-i - 1) % 4 == 3)
+               psz[i--] = ’ ’;
+            psz[i--] = pachDigits[u64 % uiBase];
+            u64 /= uiBase;
+        } while (u64);
+    }
+    else
+    {
+        do
+        {
+            ul = (fFlags & RTSTR_F_VALSIGNED) && (ullValue.ulLo & 0x80000000) ? -(int32_t)ullValue.ulLo :
+            ullValue.ulLo;
+        } while (ul);
+    }
+    else
+    {
+        do
+        {
+            psz[i--] = pachDigits[u64 % uiBase];
+            u64 /= uiBase;
+        } while (u64);
+    }
+}
+else
+{
+    do
+    {
+        psz[i--] = pachDigits[u64 % uiBase];
+        u64 /= uiBase;
+    } while (u64);
+}
+}
+else
+{
+    ul = (fFlags & RTSTR_F_THOUSAND_SEP)
psz[i--] = pachDigits[ul % uiBase];
ul /= uiBase;
} while (ul);
}

/*
 * width if RTSTR_F_LEFT
 */
if (fFlags & RTSTR_F_LEFT)
    while (--cchWidth >= 0)
        *psz++ = ' ';    

*psz = '0';
return (unsigned)(psz - pszStart);
}

/**
 * Partial implementation of a printf like formatter.
 * It doesn't do everything correct, and there is no floating point support.
 * However, it supports custom formats by the means of a format callback.
 *
 * @returns number of bytes formatted.
 * @param   pfnOutput   Output worker.
 * Called in two ways. Normally with a string an it's length.
 * For termination, it's called with NULL for string, 0 for length.
 * @param   pvArgOutput Argument to the output worker.
 * @param   pfnFormat   Custom format worker.
 * @param   pvArgFormat Argument to the format worker.
 * @param   pszFormat   Format string.
 * @param   InArgs      Argument list.
 */
RTDECL(size_t) RTStrFormatV(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, PFNSTRFORMAT pfnFormat, void *pvArgFormat,
                            const char *pszFormat, va_list InArgs)
{
    char        szTmp[64]; /* Worker functions assumes 64 byte buffer! Ugly but faster. */
    va_list     args;
    KSIZE       cch = 0;
    const char *pszStartOutput = pszFormat;
    va_copy(args, InArgs); /* make a copy so we can reference it (AMD64 / gcc). */
    while (*pszFormat != '\0')
    {
        if (*pszFormat == '%' )
        {
            const char *pszFormat, va_list InArgs)
+{  
+  char szTmp[64]; /* Worker functions assumes 64 byte buffer! Ugly but faster. */
+  va_list args;
+  KSIZE cch = 0;
+  const char *pszStartOutput = pszFormat;
+  
+  va_copy(args, InArgs); /* make a copy so we can reference it (AMD64 / gcc). */
+  
+  while (*pszFormat != '\0')
+  {
+    if (*pszFormat == '%' )
+    {
+  
+  char szTmp[64]; /* Worker functions assumes 64 byte buffer! Ugly but faster. */
+  va_list args;
+  KSIZE cch = 0;
+  const char *pszStartOutput = pszFormat;
+
+
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/* output pending string. */
if (pszStartOutput != pszFormat)
cch += pfnOutput(pvArgOutput, pszStartOutput, pszFormat - pszStartOutput);
/* skip '%' */
pszFormat++;
if (*pszFormat == '%') /* '%%'-> '%' */
pszStartOutput = pszFormat++;
else
{
unsigned int fFlags = 0;
int
cchWidth = -1;
int
cchPrecision = -1;
unsigned int uBase = 10;
char
chArgSize;
/* flags */
for (;;)
{
switch (*pszFormat++)
{
case '#': fFlags |= RTSTR_F_SPECIAL;
continue;
case '-': fFlags |= RTSTR_F_LEFT;
continue;
case '+': fFlags |= RTSTR_F_PLUS;
continue;
case ' ': fFlags |= RTSTR_F_BLANK;
continue;
case '0': fFlags |= RTSTR_F_ZEROPAD;
continue;
case '\'': fFlags |= RTSTR_F_THOUSAND_SEP; continue;
}
pszFormat--;
break;
}
/* width */
if (ISDIGIT(*pszFormat))
{
for (cchWidth = 0; ISDIGIT(*pszFormat); pszFormat++)
{
cchWidth *= 10;
cchWidth += *pszFormat - '0';
}
fFlags |= RTSTR_F_WIDTH;
}
else if (*pszFormat == '*')
{
pszFormat++;
cchWidth = va_arg(args, int);
if (cchWidth < 0)
{

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cchWidth = -cchWidth;
    fFlags |= RTSTR_F_LEFT;
    }
    fFlags |= RTSTR_F_WIDTH;
    }
+
    /* precision */
    if (*pszFormat == '.')
    {
        pszFormat++;
        if (ISDIGIT(*pszFormat))
        {
            for (cchPrecision = 0; ISDIGIT(*pszFormat); pszFormat++)
            {
                cchPrecision *= 10;
                cchPrecision += *pszFormat - '0';
            }
        }
        else if (*pszFormat == '*')
        {
            pszFormat++;
            cchPrecision = va_arg(args, int);
        }
        if (cchPrecision < 0)
            cchPrecision = 0;
        fFlags |= RTSTR_F_PRECISION;
    }
+
    /* Argument size.
    */
    chArgSize = *pszFormat;
    switch (chArgSize)
    {
        default:
            chArgSize = 0;
        break;
+
        case 'z':
            case 'L':
            case 'j':
            case 't':
                pszFormat++;
            break;
+
        case 'T':
            pszFormat++;
if (*pszFormat == 'T')
{
    chArgSize = 'L';
    pszFormat++;
}
break;

case 'h':
    pszFormat++;
    if (*pszFormat == 'h')
    {
        chArgSize = 'H';
        pszFormat++;
    }
    break;

case 'I': /* Used by Win32/64 compilers. */
    if (pszFormat[1] == '6'
        && pszFormat[2] == '4')
    {
        pszFormat += 3;
        chArgSize = 'L';
    }
    else if (pszFormat[1] == '3'
             && pszFormat[2] == '2')
    {
        pszFormat += 3;
        chArgSize = 0;
    }
    else
    {
        pszFormat += 1;
        chArgSize = 'j';
    }
    break;

* The type.
*/
switch (*pszFormat++)
{ /* char */
+
case 'c':
+
{
+
if (!(fFlags & RTSTR_F_LEFT))
+
while (--cchWidth > 0)
+
cch += pfnOutput(pvArgOutput, " ", 1);
+
+
szTmp[0] = (char)va_arg(args, int);
+
szTmp[1] = '\0';
/* Some output functions wants terminated strings. */
+
cch += pfnOutput(pvArgOutput, SSToDS(&szTmp[0]), 1);
+
+
while (--cchWidth > 0)
+
cch += pfnOutput(pvArgOutput, " ", 1);
+
break;
+
}
+
+
case 'S': /* Legacy, conversion done by streams now. */
+
case 's':
+
{
+
if (chArgSize == 'l')
+
{
+
/* utf-16 -> utf-8 */
+
int
cchStr;
+
PCRTUTF16 pwszStr = va_arg(args, PRTUTF16);
+
+
if (!VALID_PTR(pwszStr))
+
{
+
static RTUTF16 s_wszNull[] = {'<', 'N', 'U', 'L', 'L', '>', '\0' };
+
pwszStr = s_wszNull;
+
}
+
cchStr = _strnlenUtf16(pwszStr, (unsigned)cchPrecision);
+
if (!(fFlags & RTSTR_F_LEFT))
+
while (--cchWidth >= cchStr)
+
cch += pfnOutput(pvArgOutput, " ", 1);
+
cchWidth -= cchStr;
+
while (cchStr-- > 0)
+
{
+/** @todo \#ifndef IN_RC*/
+#ifdef IN_RING3
+
RTUNICP Cp;
+
RTUtf16GetCpEx(&pwszStr, &Cp);
+
char *pszEnd = RTStrPutCp(szTmp, Cp);
+
*pszEnd = '\0';
+
cch += pfnOutput(pvArgOutput, szTmp, pszEnd - szTmp);
+#else
+
char ch = (char)*pwszStr++;
+
cch += pfnOutput(pvArgOutput, &ch, 1);
+#endif
+
}

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+
while (--cchWidth >= 0)
+
cch += pfnOutput(pvArgOutput, " ", 1);
+
}
+
else if (chArgSize == 'L')
+
{
+
/* unicp -> utf8 */
+
int
cchStr;
+
PCRTUNICP puszStr = va_arg(args, PCRTUNICP);
+
+
if (!VALID_PTR(puszStr))
+
{
+
static RTUNICP s_uszNull[] = {'<', 'N', 'U', 'L', 'L', '>', '\0' };
+
puszStr = s_uszNull;
+
}
+
cchStr = _strnlenUni(puszStr, (unsigned)cchPrecision);
+
if (!(fFlags & RTSTR_F_LEFT))
+
while (--cchWidth >= cchStr)
+
cch += pfnOutput(pvArgOutput, " ", 1);
+
+
cchWidth -= cchStr;
+
while (cchStr-- > 0)
+
{
+/** @todo \#ifndef IN_RC*/
+#ifdef IN_RING3
+
char *pszEnd = RTStrPutCp(szTmp, *puszStr++);
+
cch += pfnOutput(pvArgOutput, szTmp, pszEnd - szTmp);
+#else
+
char ch = (char)*puszStr++;
+
cch += pfnOutput(pvArgOutput, &ch, 1);
+#endif
+
}
+
while (--cchWidth >= 0)
+
cch += pfnOutput(pvArgOutput, " ", 1);
+
}
+
else
+
{
+
int cchStr;
+
const char *pszStr = va_arg(args, char*);
+
+
if (!VALID_PTR(pszStr))
+
pszStr = "<NULL>";
+
cchStr = _strnlen(pszStr, (unsigned)cchPrecision);
+
if (!(fFlags & RTSTR_F_LEFT))
+
while (--cchWidth >= cchStr)
+
cch += pfnOutput(pvArgOutput, " ", 1);
+
+
cch += pfnOutput(pvArgOutput, pszStr, cchStr);
+

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while (--cchWidth >= cchStr)
    cch += pfnOutput(pArgOutput, " ", 1);
break;
}

/*-----------------*/
/* integer/pointer */
/*-----------------*/
case 'd':
case 'i':
case 'o':
case 'p':
case 'u':
case 'x':
case 'X':
{
    int cchNum;
    uint64_t u64Value;

    switch (pszFormat[-1])
    {
        case 'd': /* signed decimal integer */
        case 'i':
            fFlags |= RTSTR_F_VALSIGNED;
            break;

        case 'o':
            uBase = 8;
            break;

        case 'p':
            fFlags |= RTSTR_F_ZEROPAD; /* Note not standard behaviour (but I like it this way!) */
            uBase = 16;
            if (cchWidth < 0)
                cchWidth = sizeof(char *) * 2;
            break;

        case 'u':
            uBase = 10;
            break;

        case 'X':
            fFlags |= RTSTR_F_CAPITAL;
            RT_FALL_THRU();
            case 'x':
                uBase = 16;
                break;
if (pszFormat[-1] == 'p')
    u64Value = va_arg(args, uintptr_t);
else if (fFlags & RTSTR_F_VALSIGNED)
{
    if (chArgSize == 'L')
        { 
        u64Value = va_arg(args, int64_t);
        fFlags |= RTSTR_F_64BIT;
        }
    else if (chArgSize == 'l')
        { 
        u64Value = va_arg(args, signed long);
        fFlags |= RTSTR_GET_BIT_FLAG(unsigned long);
        }
    else if (chArgSize == 'h')
        { 
        u64Value = va_arg(args, /* signed short */ int);
        fFlags |= RTSTR_GET_BIT_FLAG(signed short);
        }
    else if (chArgSize == 'H')
        { 
        u64Value = va_arg(args, /*int8_t*/ int);
        fFlags |= RTSTR_GET_BIT_FLAG(int8_t);
        }
    else if (chArgSize == 'j')
        { 
        u64Value = va_arg(args, /*intmax_t*/ int64_t);
        fFlags |= RTSTR_F_64BIT;
        }
    else if (chArgSize == 'z')
        { 
        u64Value = va_arg(args, size_t);
        fFlags |= RTSTR_GET_BIT_FLAG(size_t);
        }
    else if (chArgSize == 't')
        { 
        u64Value = va_arg(args, ptrdiff_t);
        fFlags |= RTSTR_GET_BIT_FLAG(ptrdiff_t);
        }
    else
    { 
    u64Value = va_arg(args, signed int);
    fFlags |= RTSTR_GET_BIT_FLAG(signed int);
    }
{  
    if (chArgSize == 'L')  
    {  
        u64Value = va_arg(args, uint64_t);  
        fFlags |= RTSTR_F_64BIT;  
    }  
    else if (chArgSize == 't')  
    {  
        u64Value = va_arg(args, unsigned long);  
        fFlags |= RTSTR_GET_BIT_FLAG(unsigned long);  
    }  
    else if (chArgSize == 'h')  
    {  
        u64Value = va_arg(args, unsigned short);  
        fFlags |= RTSTR_GET_BIT_FLAG(unsigned short);  
    }  
    else if (chArgSize == 'H')  
    {  
        u64Value = va_arg(args, unsigned int);  
        fFlags |= RTSTR_GET_BIT_FLAG(int);  
    }  
    else if (chArgSize == 'j')  
    {  
        u64Value = va_arg(args, int64_t);  
        fFlags |= RTSTR_F_64BIT;  
    }  
    else if (chArgSize == 'z')  
    {  
        u64Value = va_arg(args, size_t);  
        fFlags |= RTSTR_GET_BIT_FLAG(size_t);  
    }  
    else if (chArgSize == 't')  
    {  
        u64Value = va_arg(args, ptrdiff_t);  
        fFlags |= RTSTR_GET_BIT_FLAG(ptrdiff_t);  
    }  
    else  
    {  
        u64Value = va_arg(args, unsigned int);  
        fFlags |= RTSTR_GET_BIT_FLAG(unsigned int);  
    }  
    
    cchNum = RTStrFormatNumber((char *)SSToDS(&szTmp), u64Value, uBase, cchWidth,  
                             cchPrecision, fFlags);  
    cch += pfnOutput(pvArgOutput, (char *)SSToDS(&szTmp), cchNum);  
    break;  
}
+ /*
+ * Nested extensions.
+ */
+ case 'M': /* replace the format string (not stacked yet). */
+ {
+     pszStartOutput = pszFormat = va_arg(args, const char *);
+     AssertPtr(pszStartOutput);
+     break;
+ }
+
+ case 'N': /* real nesting. */
+ {
+     const char *pszFormatNested = va_arg(args, const char *);
+     va_list *pArgsNested = va_arg(args, va_list *);
+     va_list ArgsNested;
+     va_copy(ArgsNested, *pArgsNested);
+     Assert(pszFormatNested);
+     cch += RTStrFormatV(pfnOutput, pvArgOutput, pfnFormat, pvArgFormat, pszFormatNested, ArgsNested);
+     va_end(ArgsNested);
+     break;
+ }
+
+ /*
+ * IPRT Extensions.
+ */
+ case 'R':
+ {
+     if (*pszFormat != '[')
+     {
+         pszFormat--;
+         cch += rtstrFormatRt(pfnOutput, pvArgOutput, &pszFormat, &args, cchWidth, cchPrecision, fFlags, chArgSize);
+     }
+     else
+     {
+         pszFormat--;
+         cch += rtstrFormatType(pfnOutput, pvArgOutput, &pszFormat, &args, cchWidth, cchPrecision, fFlags, chArgSize);
+     }
+     break;
+ }
+
+ /*
+ * Custom format.
+ */
+ default:
+ {
if (pfnFormat) {
    pszFormat--;
    cch += pfnFormat(pvArgFormat, pfnOutput, pvArgOutput, &pszFormat, &args, cchWidth, cchPrecision, fFlags, chArgSize);
}
else
    pszFormat++;

/* output pending string. */
if (pszStartOutput != pszFormat)
    cch += pfnOutput(pvArgOutput, pszStartOutput, pszFormat - pszStartOutput);

/* terminate the output */
pfnOutput(pvArgOutput, NULL, 0);

return cch;

+ /* Partial implementation of a printf like formatter. */
+ /* It doesn't do everything correct, and there is no floating point support. */
+ /* However, it supports custom formats by the means of a format callback. */
+ /* @returns number of bytes formatted. */
+ /* @param pfnOutput Output worker. */
+ /* Called in two ways. Normally with a string an it's length. */
+ /* For termination, it's called with NULL for string, 0 for length. */
+ /* @param pvArgOutput Argument to the output worker. */
+ /* @param pfnFormat Custom format worker. */
+ /* @param pvArgFormat Argument to the format worker. */
+ /* @param pszFormat Format string. */
+ /* @param ... Argument list. */
+ */
+RTDECL(size_t) RTStrFormat(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, PFNSTRFORMAT pfnFormat, void *pvArgFormat, const char *pszFormat, ...)
+
+ size_t cch;
+ va_list args;
+ va_start(args, pszFormat);
+ cch = RTStrFormatV(pfnOutput, pvArgOutput, pfnTheFormat, pvArgTheFormat, pszFormat, args);
+ va_end(args);
+ return cch;
+
+} RT_EXPORT_SYMBOL(RTStrFormat);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/string/strformatrt.c
+--- linux-4.15.0/ubuntu/vbox/vboxguest/common/string/strformatrt.c
@@ -0,0 +1,1377 @@
+/* $Id: strformatrt.cpp $ */
+/* @file
+ * IPRT - IPRT String Formatter Extensions.
+ */
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+* This file is part of VirtualBox Open Source Edition (OSE), as
+* available from http://www.virtualbox.org. This file is free software;
+* you can redistribute it and/or modify it under the terms of the GNU
+* General Public License (GPL) as published by the Free Software
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+* CDDL are applicable instead of those of the GPL.
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+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+/#define LOG_GROUP RTLOGGROUP_STRING
+#include <iprt/string.h>
+#ifndef RT_NO_EXPORT_SYMBOL
+
+/*-------------------------------------------------------------------------------
+ * Header Files
+ *-----------------------------------------------------------------------------
+ */
+#define LOG_GROUP RTLOGGROUP_STRING
+#include <iprt/string.h>
+#ifndef RT_NO_EXPORT_SYMBOL
+# define RT_NO_EXPORT_SYMBOL /* don't slurp <linux/module.h> which then again
+       slurps arch-specific headers defining symbols */
+#endif
#include "internal/iprt.h"
+
#include <iprt/log.h>
+#include <iprt/assert.h>
+#include <iprt/string.h>
+#include <iprt/stdarg.h>
+#ifdef IN_RING3
+# include <iprt/thread.h>
+# include <iprt/err.h>
+#endif
+#include <iprt/ctype.h>
+#include <iprt/time.h>
+#include <iprt/net.h>
+#include <iprt/path.h>
+#include <iprt/asm.h>
+#define STRFORMAT_WITH_X86
+#ifdef STRFORMAT_WITH_X86
+# include <iprt/x86.h>
+#endif
+#include "internal/string.h"
+
+(/[36x36]Open Source Used In 5GaaS Edge AC-4  36975[/36x36]
+***** Global Variables
+*******************************************************************************************
+**********
+static char g_szHexDigits[17] = "0123456789abcdef";
+
+/**
+  * Helper that formats a 16-bit hex word in a IPv6 address.
+  *
+  * @returns Length in chars.
+  * @param   pszDst      The output buffer. Written from the start.
+  * @param   uWord       The word to format as hex.
+  */
+static size_t rtstrFormatIPv6HexWord(char *pszDst, uint16_t uWord)
+{
+    size_t   off;
+    uint16_t cDigits;
+    
+    if (uWord & UINT16_C(0xff00))
+        cDigits = uWord & UINT16_C(0xf000) ? 4 : 3;
+    else
+        cDigits = uWord & UINT16_C(0x00f0) ? 2 : 1;
+    
+    off = 0;
+    
+}
switch (cDigits)
{
    case 4:
        pszDst[off++] = g_szHexDigits[(uWord >> 12) & 0xf]; RT_FALL_THRU();
    case 3:
        pszDst[off++] = g_szHexDigits[(uWord >> 8) & 0xf]; RT_FALL_THRU();
    case 2:
        pszDst[off++] = g_szHexDigits[(uWord >> 4) & 0xf]; RT_FALL_THRU();
    case 1:
        pszDst[off++] = g_szHexDigits[(uWord >> 0) & 0xf];
        break;
    }
    pszDst[off] = '\0';
    return off;
}

/**
 * Helper function to format IPv6 address according to RFC 5952.
 * @returns The number of bytes formatted.
 * @param   pfnOutput       Pointer to output function.
 * @param   pvArgOutput     Argument for the output function.
 * @param   pIpv6Addr       IPv6 address
 */
static size_t rtstrFormatIPv6(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, PCRTNETADDRIPV6 pIpv6Addr)
{
    size_t cch; /* result */
    bool fEmbeddedIpv4;
    size_t cwHexPart;
    size_t cwLongestZeroRun;
    size_t iLongestZeroStart;
    size_t idx;
    char szHexWord[8];

    Assert(pIpv6Addr != NULL);

    /*
     * Check for embedded IPv4 address.
     * *
     * IPv4-compatible - ::11.22.33.44 (obsolete)
     * IPv4-mapped     - ::ffff:11.22.33.44
     * IPv4-translated - ::ffff:0:11.22.33.44 (RFC 2765)
     */
    fEmbeddedIpv4 = false;
    cwHexPart = RT_ELEMENTS(pIpv6Addr->au16);
    if (   pIpv6Addr->au64[0] == 0
        && (   pIpv6Addr->au32[2] == 0
                && pIpv6Addr->au32[3] != 0
        || pIpv6Addr->au32[2] == RT_H2BE_U32_C(0x0000ffff)
|| plpv6Addr->au32[2] == RT_H2BE_U32_C(0xffff0000) ||
+ {  
+ ifEmbeddedIpv4 = true;  
+ cwHexPart -= 2;  
+ }
+
+ /*
+ * Find the longest sequences of two or more zero words.
+ */
+ cwLongestZeroRun = 0;
+ iLongestZeroStart = 0;
+ for (idx = 0; idx < cwHexPart; idx++)
+ if (plpv6Addr->au16[idx] == 0)
+ {
+   size_t iZeroStart = idx;
+   size_t cwZeroRun;
+   do
+     idx++;
+   while (idx < cwHexPart && plpv6Addr->au16[idx] == 0);
+   cwZeroRun = idx - iZeroStart;
+   if (cwZeroRun > 1 && cwZeroRun > cwLongestZeroRun)
+   {
+     cwLongestZeroRun = cwZeroRun;
+     iLongestZeroStart = iZeroStart;
+     if (cwZeroRun >= cwHexPart - idx)
+       break;
+   }
+ +}
+
+ /*
+ * Do the formatting.
+ */
+ cch = 0;
+ if (cwLongestZeroRun == 0)
+ {
+   for (idx = 0; idx < cwHexPart; ++idx)
+   {
+     if (idx > 0)
+       cch += pfnOutput(pvArgOutput, ":", 1);
+     cch += pfnOutput(pvArgOutput, szHexWord, rtstrFormatIPv6HexWord(szHexWord,
+ RT_BE2H_U16(plpv6Addr->au16[idx])));
+   }
+   if (fEmbeddedIpv4)
+     cch += pfnOutput(pvArgOutput, ":", 1);
+ }
+ else
+ {  
+   
+ }
const size_t iLongestZeroEnd = iLongestZeroStart + cwLongestZeroRun;

if (iLongestZeroStart == 0)
    cch += pfnOutput(pvArgOutput, ":", 1);
else
    for (idx = 0; idx < iLongestZeroStart; ++idx)
    {
        cch += pfnOutput(pvArgOutput, szHexWord, rtstrFormatIPv6HexWord(szHexWord, RT_BE2H_U16(pIpv6Addr->au16[idx])));
        cch += pfnOutput(pvArgOutput, ":", 1);
    }

if (iLongestZeroEnd == cwHexPart)
    cch += pfnOutput(pvArgOutput, ":", 1);
else
    {
        for (idx = iLongestZeroEnd; idx < cwHexPart; ++idx)
        {
            cch += pfnOutput(pvArgOutput, ":", 1);
            cch += pfnOutput(pvArgOutput, szHexWord, rtstrFormatIPv6HexWord(szHexWord, RT_BE2H_U16(pIpv6Addr->au16[idx])));
        }
        if (fEmbeddedIpv4)
            cch += pfnOutput(pvArgOutput, ":", 1);
    }

if (fEmbeddedIpv4)
    cch += RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
        "%u.%u.%u.%u",
        pIpv6Addr->au8[12],
        pIpv6Addr->au8[13],
        pIpv6Addr->au8[14],
        pIpv6Addr->au8[15]);

return cch;

/**
 * Callback to format iprt formatting extentions.
 * See @ref pg_rt_str_format for a reference on the format types.
 *
 * @returns The number of bytes formatted.
 * @param pfnOutput Pointer to output function.
 * @param pvArgOutput Argument for the output function.
 * @param ppszFormat Pointer to the format string pointer. Advance this till the char
DECLHIDDEN(size_t) rtstrFormatRt(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, const char **ppszFormat, va_list *pArgs,
    int cchWidth, int cchPrecision, unsigned fFlags, char chArgSize)
{
    const char *pszFormatOrg = *ppszFormat;
    char        ch = *(*ppszFormat)++;
    size_t      cch;
    char        szBuf[80];

    if (ch == 'R')
    {
        ch = *(*ppszFormat)++;
        switch (ch)
        {
            /*************************************************************************/
            /* Groups 1 and 2. */
            /*************************************************************************/
            case 'T':
            case 'G':
            case 'H':
            case 'R':
            case 'C':
            case 'I':
            case 'X':
            case 'U':
            case 'K':
            case 'K':
            {
                /*************************************************************************/
                /* Interpret the type. */
                /*************************************************************************/
                typedef enum
                {
                    RTSF_INT,
                    RTSF_INTW,
                    RTSF_BOOL,
                    RTSF_FP16,
                    RTSF_FP32,
                    RTSF_FP64,
                    RTSF_IPV4,
                    RTSF_IPV6,
                    RTSF_MAC,
                }
RTSF_NETADDR,
RTSF_UUID
} RTSF;
static const struct
{
  uint8_t     cch;    /**< the length of the string. */
  char        sz[10]; /**< the part following 'R'. */
  uint8_t     cb;     /**< the size of the type. */
  uint8_t     u8Base; /**< the size of the type. */
  RTSF        enmFormat; /**< The way to format it. */
  uint16_t    fFlags; /**< additional RTSTR_F_* flags. */
}
/** Sorted array of types, looked up using binary search! */
s_aTypes[] =
#
#define STRMEM(str) sizeof(str) - 1, str
  
{ STRMEM("Ci"), sizeof(RTINT), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("Cp"), sizeof(RTCCPHYS), 16, RTSF_INTW, 0 },
  { STRMEM("Cr"), sizeof(RTCCUINTREG), 16, RTSF_INTW, 0 },
  { STRMEM("Cu"), sizeof(RTUINT), 10, RTSF_INT, 0 },
  { STRMEM("Cx"), sizeof(void *), 16, RTSF_INTW, 0 },
  { STRMEM("Gi"), sizeof(RTGCIINT), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("Gp"), sizeof(RTGCPHYS), 16, RTSF_INTW, 0 },
  { STRMEM("Gr"), sizeof(RTGCUINTREG), 16, RTSF_INTW, 0 },
  { STRMEM("Gu"), sizeof(RTGCUINT), 10, RTSF_INT, 0 },
  { STRMEM("Gv"), sizeof(RTGCPTR), 16, RTSF_INTW, 0 },
  { STRMEM("Gx"), sizeof(RTGCUINT), 16, RTSF_INT, 0 },
  { STRMEM("Hi"), sizeof(RTHCINT), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("Hp"), sizeof(RTHCPHYS), 16, RTSF_INTW, 0 },
  { STRMEM("Hr"), sizeof(RTHCUINTREG), 16, RTSF_INTW, 0 },
  { STRMEM("Hu"), sizeof(RTHCUINT), 10, RTSF_INT, 0 },
  { STRMEM("Hv"), sizeof(RTHCPTR), 16, RTSF_INTW, 0 },
  { STRMEM("Hx"), sizeof(RTHCUINT), 16, RTSF_INT, 0 },
  { STRMEM("I16"), sizeof(int16_t), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("I32"), sizeof(int32_t), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("I64"), sizeof(int64_t), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("I8"), sizeof(int8_t), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("Kv"), sizeof(RTHCPTR), 16, RTSF_INT, RTSTR_F_OBFUSCATE_PTR },
  { STRMEM("Rv"), sizeof(RTRCPTR), 16, RTSF_INTW, 0 },
  { STRMEM("Tbool"), sizeof(bool), 10, RTSF_BOOL, 0 },
  { STRMEM("Tfile"), sizeof(RTFILE), 10, RTSF_INT, 0 },
  { STRMEM("Tfmode"), sizeof(RTFMODE), 16, RTSF_INTW, 0 },
  { STRMEM("Tfoff"), sizeof(RTFOFF), 10, RTSF_INT, RTSTR_F_VALSIGNED },
  { STRMEM("Tp16"), sizeof(RTFAR16), 16, RTSF_FP16, RTSTR_F_ZEROPAD },
  { STRMEM("Tp32"), sizeof(RTFAR32), 16, RTSF_FP32, RTSTR_F_ZEROPAD },
  { STRMEM("Tp64"), sizeof(RTFAR64), 16, RTSF_FP64, RTSTR_F_ZEROPAD },
  { STRMEM("Tgid"), sizeof(RTIGID), 10, RTSF_INT, RTSTR_F_VALSIGNED },

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+ { STRMEM("Tino"), sizeof(RTINODE), 16, RTSF_INTW, 0 },
+ { STRMEM("Tint"), sizeof(RTINT), 10, RTSF_INT, RTSTR_F_VALSIGNED },
+ { STRMEM("Tiop"), sizeof(RTIOPORT), 16, RTSF_INTW, 0 },
+ { STRMEM("Tldrm"), sizeof(RTLDRMOD), 16, RTSF_INTW, 0 },
+ { STRMEM("Tmac"), sizeof(PCRTMAC), 16, RTSF_MAC, 0 },
+ { STRMEM("Tnaddr"), sizeof(PCRTNETADDR), 10, RTSF_NETADDR, 0 },
+ { STRMEM("Tnaipv4"), sizeof(PCRTNETADDRIPV4), 10, RTSF_IPV4, 0 },
+ { STRMEM("Tnaipv6"), sizeof(PCRTNETADDRIPV6), 16, RTSF_IPV6, 0 },
+ { STRMEM("Tnthrd"), sizeof(RTNATIVETHREAD), 16, RTSF_INTW, 0 },
+ { STRMEM("Tproc"), sizeof(RTPROCESS), 16, RTSF_INTW, 0 },
+ { STRMEM("Tptr"), sizeof(RTUINTPTR), 16, RTSF_INTW, 0 },
+ { STRMEM("Treg"), sizeof(RTCCUINTREG), 16, RTSF_INTW, 0 },
+ { STRMEM("Tsel"), sizeof(RTSEL), 16, RTSF_INTW, 0 },
+ { STRMEM("Tsem"), sizeof(RTSEMEVENT), 16, RTSF_INTW, 0 },
+ { STRMEM("Tsock"), sizeof(RTSOCKET), 10, RTSF_INT, 0 },
+ { STRMEM("Tthrd"), sizeof(RTSEMEVENT), 16, RTSF_INTW, 0 },
+ { STRMEM("Tuid"), sizeof(RTUID), 10, RTSF_INT, RTSTR_F_VALSIGNED },
+ { STRMEM("Tuint"), sizeof(RTUINT), 10, RTSF_INT, 0 },
+ { STRMEM("Tunicp"), sizeof(RTUNICP), 16, RTSF_INTW, RTSTR_F_ZEROPAD },
+ { STRMEM("Tutf16"), sizeof(RTUINT), 16, RTSF_INTW, RTSTR_F_ZEROPAD },
+ { STRMEM("Txint"), sizeof(RTUINT), 16, RTSF_INT, 0 },
+ { STRMEM("U16"), sizeof(uint16_t), 16, RTSF_INT, 0 },
+ { STRMEM("U32"), sizeof(uint32_t), 16, RTSF_INT, 0 },
+ { STRMEM("U64"), sizeof(uint64_t), 16, RTSF_INT, 0 },
+ { STRMEM("U8"), sizeof(uint8_t), 16, RTSF_INT, 0 },
+ { STRMEM("U16"), sizeof(uint16_t), 16, RTSF_INT, 0 },
+ { STRMEM("U32"), sizeof(uint32_t), 16, RTSF_INT, 0 },
+ { STRMEM("U64"), sizeof(uint64_t), 16, RTSF_INT, 0 },
+ { STRMEM("X16"), sizeof(uint16_t), 16, RTSF_INT, 0 },
+ { STRMEM("X32"), sizeof(uint32_t), 16, RTSF_INT, 0 },
+ { STRMEM("X64"), sizeof(uint64_t), 16, RTSF_INT, 0 },
+ { STRMEM("X8"), sizeof(uint8_t), 16, RTSF_INT, 0 },
}

#define STRMEM
+
+ static const char s_szNull[] = "<NULL>";
+
+ const char *pszType = *ppszFormat - 1;
+ int iStart = 0;
+ int iEnd = RT_ELEMENTS(s_aTypes) - 1;
+ int i = RT_ELEMENTS(s_aTypes) / 2;
+
+ union
+ {
+   uint8_t u8;
+   uint16_t u16;
+   uint32_t u32;
+   uint64_t u64;
+   int8_t i8;
+   int16_t i16;
+   int32_t i32;
int64_t i64;
+ RTR0INTPTR uR0Ptr;
+ RTFAR16 fp16;
+ RTFAR32 fp32;
+ RTFAR64 fp64;
+ bool fBool;
+ PCRTMAC pMac;
+ RTNETADDRIPV4 Ipv4Addr;
+ PCRTNETADDRIPV6 pIpv6Addr;
+ PCRTNETADDR pNetAddr;
+ PCRTUUID pUuid;
+ } u;
+
+ AssertMsg(!chArgSize, ("Not argument size '%c' for RT types! \%s\n", chArgSize, pszFormatOrg));
+ RT_NOREF_PV(chArgSize);
+
+ /*
+ * Look up the type - binary search.
+ */
+ for (;;)
+ {
+     int iDiff = strncmp(pszType, s_aTypes[i].sz, s_aTypes[i].cch);
+     if (!iDiff)
+         break;
+     if (iEnd == iStart)
+         { AssertMsgFailed("Invalid format type \%s\n", pszFormatOrg));
+             return 0;
+         }
+     if (iDiff < 0)
+         iEnd = i - 1;
+     else
+         iStart = i + 1;
+     if (iEnd < iStart)
+         { AssertMsgFailed("Invalid format type \%s\n", pszFormatOrg));
+             return 0;
+         }
+     i = iStart + (iEnd - iStart) / 2;
+ }
+
+ /*
+ * Advance the format string and merge flags.
+ */
+ *ppszFormat += s_aTypes[i].cch - 1;
+ fFlags |= s_aTypes[i].fFlags;
+ /*
* Fetch the argument.
* It's important that a signed value gets sign-extended up to 64-bit.
*/
RT_ZERO(u);
if (fFlags & RTSTR_F_VALSIGNED)
{
    switch (s_aTypes[i].cb)
    {
        case sizeof(int8_t):
            u.i64 = va_arg(*pArgs, int);
            fFlags |= RTSTR_F_8BIT;
            break;
        case sizeof(int16_t):
            u.i64 = va_arg(*pArgs, int16_t);
            fFlags |= RTSTR_F_16BIT;
            break;
        case sizeof(int32_t):
            u.i64 = va_arg(*pArgs, int32_t);
            fFlags |= RTSTR_F_32BIT;
            break;
        case sizeof(int64_t):
            u.i64 = va_arg(*pArgs, int64_t);
            fFlags |= RTSTR_F_64BIT;
            break;
        default:
            AssertMsgFailed("Invalid format error, size %d'\n", s_aTypes[i].cb);
            break;
    }
}
else
{
    switch (s_aTypes[i].cb)
    {
        case sizeof(uint8_t):
            u.u8 = va_arg(*pArgs, unsigned);
            fFlags |= RTSTR_F_8BIT;
            break;
        case sizeof(uint16_t):
            u.u16 = va_arg(*pArgs, uint16_t);
            fFlags |= RTSTR_F_16BIT;
            break;
        case sizeof(uint32_t):
            u.u32 = va_arg(*pArgs, uint32_t);
            fFlags |= RTSTR_F_32BIT;
            break;
        case sizeof(uint64_t):
            u.u64 = va_arg(*pArgs, uint64_t);
            fFlags |= RTSTR_F_64BIT;
            break;
    }
}
break;
    case sizeof(RTFAR32):
        u.fp32 = va_arg(*pArgs, RTFAR32);
        break;
    case sizeof(RTFAR64):
        u.fp64 = va_arg(*pArgs, RTFAR64);
        break;
    default:
        AssertMsgFailed("Invalid format error, size %d\n", s_aTypes[i].cb);
        break;
    }
    }
#endif DEBUG
    /*
     * For now don't show the address.
     */
    */
    if (fFlags & RTSTR_F_OBFUSCATE_PTR)
    {
        cch = rtStrFormatKernelAddress(szBuf, sizeof(szBuf), u.uR0Ptr, cchWidth, cchPrecision, fFlags);
        return pfnOutput(pvArgOutput, szBuf, cch);
    }
#endif
    /*
     * Format the output.
     */
    */
    switch (s_aTypes[i].enmFormat)
    {
    case RTSF_INT:
    {
        cch = RTStrFormatNumber(szBuf, u.u64, s_aTypes[i].u8Base, cchWidth, cchPrecision, fFlags);
        break;
    }
    /* hex which defaults to max width. */
    case RTSF_INTW:
    {
        Assert(s_aTypes[i].u8Base == 16);
        if (cchWidth < 0)
        {
            cchWidth = s_aTypes[i].cb * 2 + (fFlags & RTSTR_F_SPECIAL ? 2 : 0);
            fFlags |= RTSTR_F_ZEROPAD;
        }
        cch = RTStrFormatNumber(szBuf, u.u64, s_aTypes[i].u8Base, cchWidth, cchPrecision, fFlags);
        break;
    }
case RTSF_BOOL:
{
    static const char s_szTrue[] = "true ";
    static const char s_szFalse[] = "false";
    if (u.u64 == 1)
        return pfnOutput(pvArgOutput, s_szTrue, sizeof(s_szTrue) - 1);
    if (u.u64 == 0)
        return pfnOutput(pvArgOutput, s_szFalse, sizeof(s_szFalse) - 1);
    /* invalid boolean value */
    return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, "!%lld!", u.u64);
}

case RTSF_FP16:
{
    fFlags &= ~(RTSTR_F_VALSIGNED | RTSTR_F_BIT_MASK | RTSTR_F_WIDTH |
    RTSTR_F_PRECISION | RTSTR_F_THOUSAND_SEP);
    cch = RTStrFormatNumber(&szBuf[0], u.fp16.sel, 16, 4, -1, fFlags | RTSTR_F_16BIT);
    Assert(cch == 4);
    szBuf[4] = ':';
    cch = RTStrFormatNumber(&szBuf[5], u.fp16.off, 16, 4, -1, fFlags | RTSTR_F_16BIT);
    Assert(cch == 4);
    cch = 4 + 1 + 4;
    break;
}

case RTSF_FP32:
{
    fFlags &= ~(RTSTR_F_VALSIGNED | RTSTR_F_BIT_MASK | RTSTR_F_WIDTH |
    RTSTR_F_PRECISION | RTSTR_F_THOUSAND_SEP);
    cch = RTStrFormatNumber(&szBuf[0], u.fp32.sel, 16, 4, -1, fFlags | RTSTR_F_16BIT);
    Assert(cch == 4);
    szBuf[4] = ':';
    cch = RTStrFormatNumber(&szBuf[5], u.fp32.off, 16, 8, -1, fFlags | RTSTR_F_32BIT);
    Assert(cch == 8);
    cch = 4 + 1 + 8;
    break;
}

case RTSF_FP64:
{
    fFlags &= ~(RTSTR_F_VALSIGNED | RTSTR_F_BIT_MASK | RTSTR_F_WIDTH |
    RTSTR_F_PRECISION | RTSTR_F_THOUSAND_SEP);
    cch = RTStrFormatNumber(&szBuf[0], u.fp64.sel, 16, 4, -1, fFlags | RTSTR_F_16BIT);
    Assert(cch == 4);
    szBuf[4] = ':';
    cch = RTStrFormatNumber(&szBuf[5], u.fp64.off, 16, 16, -1, fFlags | RTSTR_F_64BIT);
    Assert(cch == 16);
    cch = 4 + 1 + 16;
    break;
}
case RTSF_IPV4:
    return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
                       "%u.%u.%u.%u",
                       u.Ipv4Addr.au8[0],
                       u.Ipv4Addr.au8[1],
                       u.Ipv4Addr.au8[2],
                       u.Ipv4Addr.au8[3]);
  
  case RTSF_IPV6:
  {
    if (VALID_PTR(u.pIpv6Addr))
      return rtstrFormatIPv6(pfnOutput, pvArgOutput, u.pIpv6Addr);
    return pfnOutput(pvArgOutput, s_szNull, sizeof(s_szNull) - 1);
  }
  
  case RTSF_MAC:
  {
    if (VALID_PTR(u.pMac))
      return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
                         "%02x:%02x:%02x:%02x:%02x:%02x",
                         u.pMac->au8[0],
                         u.pMac->au8[1],
                         u.pMac->au8[2],
                         u.pMac->au8[3],
                         u.pMac->au8[4],
                         u.pMac->au8[5]);
    return pfnOutput(pvArgOutput, s_szNull, sizeof(s_szNull) - 1);
  }
  
  case RTSF_NETADDR:
  {
    if (VALID_PTR(u.pNetAddr))
      {
        switch (u.pNetAddr->enmType)
        {
          case RTNETADDRTYPE_IPV4:
            if (u.pNetAddr->uPort == RTNETADDR_PORT_NA)
              return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
                                 "%u.%u.%u.%u",
                                 u.pNetAddr->uAddr.IPv4.au8[0],
                                 u.pNetAddr->uAddr.IPv4.au8[1],
                                 u.pNetAddr->uAddr.IPv4.au8[2],
                                 u.pNetAddr->uAddr.IPv4.au8[3]);
            return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
                                "%u.%u.%u.%u",
                                u.pNetAddr->uAddr.IPv4.au8[0],
                                u.pNetAddr->uAddr.IPv4.au8[1],
                                u.pNetAddr->uAddr.IPv4.au8[2],
                                u.pNetAddr->uAddr.IPv4.au8[3]);
          
...
+ u.pNetAddr->uAddr.IPv4.au8[2],
+ u.pNetAddr->uAddr.IPv4.au8[3],
+ u.pNetAddr->uPort);
+
+ case RTNETADDRTYPE_IPV6:
+     if (u.pNetAddr->uPort == RTNETADDR_PORT_NA)
+         return rstrFormatIPv6(pfnOutput, pvArgOutput, &u.pNetAddr->uAddr.IPv6);
+     return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
+                         "[%RTnaipv6]%u",
+                         &u.pNetAddr->uAddr.IPv6,
+                         u.pNetAddr->uPort);
+
+ case RTNETADDRTYPE_MAC:
+     return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
+                        "%02x:%02x:%02x:%02x:%02x:%02x",
+                        u.pNetAddr->uAddr.Mac.au8[0],
+                        u.pNetAddr->uAddr.Mac.au8[1],
+                        u.pNetAddr->uAddr.Mac.au8[2],
+                        u.pNetAddr->uAddr.Mac.au8[3],
+                        u.pNetAddr->uAddr.Mac.au8[4],
+                        u.pNetAddr->uAddr.Mac.au8[5]);
+
+     default:
+     return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
+                         "unsupported-netaddr-type=%u", u.pNetAddr->enmType);
+
+     }
+     }
+ return pfnOutput(pvArgOutput, s_szNull, sizeof(s_szNull) - 1);
+ }
+
+ case RTSF_UUID:
+ {
+     if (VALID_PTR(u.pUuid))
+     {
+ /* cannot call RTUuidToStr because of GC/R0. */
+     return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
+                        "%08x-%04x-%04x-%02x%02x-%02x%02x%02x%02x%02x",
+                        RT_H2LE_U32(u.pUuid->Gen.u32TimeLow),
+                        RT_H2LE_U16(u.pUuid->Gen.u16TimeMid),
+                        RT_H2LE_U16(u.pUuid->Gen.u16TimeHiAndVersion),
+                        u.pUuid->Gen.u8ClockSeqHiAndReserved,
+                        u.pUuid->Gen.u8ClockSeqLow,
+                        u.pUuid->Gen.au8Node[0],
+                        u.pUuid->Gen.au8Node[1],
+                        u.pUuid->Gen.au8Node[2],
+                        u.pUuid->Gen.au8Node[3],
u.pUuid->Gen.au8Node[4],
    u.pUuid->Gen.au8Node[5]);
}
    return pfnOutput(pvArgOutput, s_szNull, sizeof(s_szNull) - 1);
}

default:
    AssertMsgFailed(("Internal error %d
", s_aTypes[i].enmFormat));
    return 0;
}

/*
  * Finally, output the formatted string and return.
  */
return pfnOutput(pvArgOutput, szBuf, cch);
}

/* Group 3 */

/*
  * Base name printing, big endian UTF-16.
  */
    case 'b':
    {
        switch (*(*ppszFormat)++)
        {
            case 'n':
                {
                    const char *pszLastSep;
                    const char *psz = pszLastSep = va_arg(*pArgs, const char *);
                    if (!VALID_PTR(psz))
                        return pfnOutput(pvArgOutput, RT_STR_TUPLE("<null>"));

                    while ((ch = *psz) != '\0')
                    {
                        if (RTPATH_IS_SEP(ch))
                            {
                                do
                                   psz++;
                                while ((ch = *psz) != '\0' && RTPATH_IS_SEP(ch));
                                if ('\'ch)
                                    break;
                                pszLastSep = psz;
                            }
                        psz++;
                    }
                }

            }
    }
return pfnOutput(pvArgOutput, pszLastSep, psz - pszLastSep);
}

/* %lRbs */
case 's':
  if (chArgSize == 'T')
  {
    /* utf-16BE -> utf-8 */
    int cchStr;
    PCRTUTF16 pwszStr = va_arg(*pArgs, PRTUTF16);

    if (RT_VALID_PTR(pwszStr))
    {
      cchStr = 0;
      while (cchStr < cchPrecision && pwszStr[cchStr] != '\0')
        cchStr++;

    }
    else
    {
      static RTUTF16 s_wszBigNull[] =
      {
        RT_H2BE_U16_C((uint16_t)<), RT_H2BE_U16_C((uint16_t)'N'),
        RT_H2BE_U16_C((uint16_t)'U'), RT_H2BE_U16_C((uint16_t)'L'), RT_H2BE_U16_C((uint16_t)'L'),
        RT_H2BE_U16_C((uint16_t)'>'), '\0'
      };
      pwszStr = s_wszBigNull;
      cchStr = RT_ELEMENTS(s_wszBigNull) - 1;
    }

    cch = 0;
    if (!(fFlags & RTSTR_F_LEFT))
      while (--cchWidth >= cchStr)
        cch += pfnOutput(pvArgOutput, " ", 1);
    cchWidth -= cchStr;
    while (cchStr-- > 0)
    {
/** @todo \ifndef IN_RC*/
#ifdef IN_RING3
    RTUNICP Cp = 0;
    RTUtf16BigGetCpEx(&pwszStr, &Cp);
    char *pszEnd = RTStrPutCp(szBuf, Cp);
    *pszEnd = '\0';
    cch += pfnOutput(pvArgOutput, szBuf, pszEnd - szBuf);
#else
    szBuf[0] = (char)(*pwszStr++ >> 8);
    cch += pfnOutput(pvArgOutput, szBuf, 1);
#endif
/+*/ @todo \ifndef IN_RC*/
  }
while (--cchWidth >= 0)
    cch += pfnOutput(pvArgOutput, " ", 1);
return cch;
}
	RT_FALL_THRU();

default:
    AssertMsgFailed("Invalid status code format type '%.10s'\n", pszFormatOrg);
    break;
    }
break;
}

/*
 * Pretty function / method name printing.
 */
case 'f':
{
    switch (*(*ppszFormat)++)
    {
    /*
     * Pretty function / method name printing.
     * This isn't 100% right (see classic signal prototype) and it assumes
     * standardized names, but it'll do for today.
     */
    case 'n':
    {
        const char *pszStart;
        const char *psz = pszStart = va_arg(*pArgs, const char *);
        int cAngle = 0;

        if (!VALID_PTR(psz))
            return pfnOutput(pvArgOutput, RT_STR_TUPLE("<null>"));

        while ((ch = *psz) != '\0' && ch != '(')
        {
            if (RT_C_IS_BLANK(ch))
            {
                psz++;
                while ((ch = *psz) != '\0' && (RT_C_IS_BLANK(ch) || ch == '('))
                    psz++;
                if (ch && cAngle == 0)
                   pszStart = psz;
            }
        else if (ch == '(')
        break;

    }
else if (ch == '<') {
    cAngle++;
    psz++;
} else if (ch == '>') {
    cAngle--;
    psz++;
} else {
    psz++;
}

return pfnOutput(pvArgOutput, pszStart, psz - pszStart);
}

default:
    AssertMsgFailed("Invalid status code format type '%.10s'\n", pszFormatOrg);
    break;

}
break;
}

/*
 * hex dumping and COM/XPCOM.
 */
case 'h':
{
    switch (*(*ppszFormat)++)
    {
    /*
     * Hex stuff.
    */
     case 'x':
     {
        uint8_t *pu8 = va_arg(*pArgs, uint8_t *);
        if (cchPrecision < 0)
            cchPrecision = 16;
        if (pu8)
        {
            switch (*(*ppszFormat)++)
            {
            /*
             * Regular hex dump.
            */
            case 'd':
{  
  int off = 0;  
  cch = 0;  

  if (cchWidth <= 0)  
    cchWidth = 16;  

  while (off < cchPrecision)  
  {  
    int i;  
    cch += RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,  
      "%s%0*p %04x:", off ? "\n" : "", sizeof(pu8) * 2, (uintptr_t)pu8, off);  
    for (i = 0; i < cchWidth && off + i < cchPrecision ; i++)  
      cch += RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,  
        off + i < cchPrecision ? !(i & 7) && i ? "-%02x" : " %02x" : " " ,  
        pu8[i]);  
    while (i++ < cchWidth)  
      cch += pfnOutput(pvArgOutput, " ", 3);  
    cch += pfnOutput(pvArgOutput, " ", 1);  

    for (i = 0; i < cchWidth && off + i < cchPrecision; i++)  
    {  
      uint8_t u8 = pu8[i];  
      cch += pfnOutput(pvArgOutput, u8 < 127 && u8 >= 32 ? (const char *)&u8 : ".", 1);  
    }  

    /* next */  
    pu8 += cchWidth;  
    off += cchWidth;  
  }  

  return cch;  
}  

/*  
 * Regular hex dump with dittoing.  
 */  

switch (case 'D':  
  {  
    int offEndDupCheck;  
    int cDuplicates = 0;  
    int off = 0;  
    cch = 0;  

    if (cchWidth <= 0)  
      cchWidth = 16;  
    offEndDupCheck = cchPrecision - cchWidth;  


while (off < cchPrecision)
{
    int i;
    if (off >= offEndDupCheck)
        if (off <= 0)
            if (memcmp(pu8, pu8 - cchWidth, cchWidth) != 0)
                if (cDuplicates == 0)
                    if (off + cchWidth >= offEndDupCheck)
                        if (memcmp(pu8 + cchWidth, pu8, cchWidth) != 0))
                {
                    if (cDuplicates > 0)
                    {
                        cch += RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
                                "%s%0*p %04x:", off ? "\n" : "", sizeof(pu8) * 2, (uintptr_t)pu8, off);
                        for (i = 0; i < cchWidth && off + i < cchPrecision ; i++)
                            cch += RTStrFormat(pfnOutput, pvArgOutput, NULL, 0,
                                    off + i < cchPrecision ? !(i & 7) && i
                                    ? "%02x" : "%02x" : " ",
                                    pu8[i]);
                        while (i++ < cchWidth)
                            cch += pfnOutput(pvArgOutput, " ", 3);
                        cch += pfnOutput(pvArgOutput, " ", 1);
                }
                else
                    cDuplicates++;
            
        for (i = 0; i < cchWidth && off + i < cchPrecision; i++)
        {
            uint8_t u8 = pu8[i];
            cch += pfnOutput(pvArgOutput, u8 < 127 && u8 >= 32 ? (const char *)&u8 : ".", 1);
        }
    }

/* next */
pu8 += cchWidth;
off += cchWidth;
} return cch;
}
/*
case 's':
{
    if (cchPrecision-- > 0)
    {
        cch = RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, "%02x", *pu8++);
        for (; cchPrecision > 0; cchPrecision--, pu8++)
            cch += RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, " %02x", *pu8);
        return cch;
    }
    break;
}

default:
    AssertMsgFailed("Invalid status code format type '%.10s'!

#ifdef IN_RING3
    /*
    * XPCOM / COM status code: %Rhrc, %Rhrf, %Rhra
    * ASSUMES: If Windows Then COM else XPCOM.
    */
    case 'r':
    {
        uint32_t hrc = va_arg(*pArgs, uint32_t);
        PCRTCOMERRMSG pMsg = RTErrCOMGet(hrc);
        switch (*(*ppszFormat)++)
        {
            case 'c':
                return pfnOutput(pvArgOutput, pMsg->pszDefine, strlen(pMsg->pszDefine));
            case 'f':
                return pfnOutput(pvArgOutput, pMsg->pszMsgFull,strlen(pMsg->pszMsgFull));
            case 'a':
                return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, "%s (0x%08X) - %s", pMsg->pszDefine, hrc, pMsg->pszMsgFull);
            default:
                AssertMsgFailed("Invalid status code format type '%.10s'!
        }
    }
#endif IN_RING3


+ #endif /* IN_RING3 */
+ 
+     default:
+     
+         AssertMsgFailed("Invalid status code format type '%.10s'\n", pszFormatOrg));
+         return 0;
+     
+     }
+     
+     break;
+ 
+ 
+ */
+ * iprt status code: %Rrc, %Rrs, %Rrf, %Rra.
+ */
+ 
+     case 'r':
+     {
+         int rc = va_arg(*pArgs, int);
+
+     +#ifdef IN_RING3
+     /* we don't want this anywhere else yet. */
+     +
+         PCRTSTATUSMSG pMsg = RTErrGet(rc);
+         switch (*(*ppszFormat)++)
+         {
+             case 'c':
+                 return pfnOutput(pvArgOutput, pMsg->pszDefine, strlen(pMsg->pszDefine));
+             case 's':
+                 return pfnOutput(pvArgOutput, pMsg->pszMsgShort, strlen(pMsg->pszMsgShort));
+             case 'f':
+                 return pfnOutput(pvArgOutput, pMsg->pszMsgFull, strlen(pMsg->pszMsgFull));
+             case 'a':
+                 return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, "%s (%d) - %s", pMsg->pszDefine, rc,
+                     pMsg->pszMsgFull);
+             
+             default:
+             
+                 AssertMsgFailed("Invalid status code format type '%.10s'\n", pszFormatOrg));
+                 return 0;
+             
+         } 
+     +#else /* !IN_RING3 */
+     +
+         switch (*(*ppszFormat)++)
+         {
+             case 'c':
+             case 's':
+             case 'f':
+             case 'a':
+                 return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, "%d", rc);
+             
+             default:
+             
+                 AssertMsgFailed("Invalid status code format type '%.10s'\n", pszFormatOrg));
+                 return 0;
+             
+         } 
+     +#endif /* !IN_RING3 */
+     +
+     break;
+ 
+ 

/*
 * Windows status code: %Rwc, %Rwf, %Rwa
 */

case 'w':
    {
        long rc = va_arg(*pArgs, long);
#if defined(RT_OS_WINDOWS)
        PCRTWINERRMSG pMsg = RTErrWinGet(rc);
#endif
        switch (*(*ppszFormat)++)
        {
#if defined(RT_OS_WINDOWS)
            case 'c':
                return pfnOutput(pvArgOutput, pMsg->pszDefine, strlen(pMsg->pszDefine));
            case 'f':
                return pfnOutput(pvArgOutput, pMsg->pszMsgFull,strlen(pMsg->pszMsgFull));
            case 'a':
                return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, "%s (0x%08X) - %s", pMsg->pszDefine, rc, pMsg->pszMsgFull);
#else
            case 'c':
            case 'f':
            case 'a':
                return RTStrFormat(pfnOutput, pvArgOutput, NULL, 0, "0x%08X", rc);
#endif
            default:
                AssertMsgFailed("Invalid status code format type '%.10s'!
                
                "
                
                return 0;
            
            break;
        }
    }
#endif /* IN_RING3 */

/*
 * Group 4, structure dumpers.
 */

case 'D':
    {
        /* Interprett the type.*/
        typedef enum
        {
            RTST_TIMESPEC
        } RTST;
        
        /* Set if it's a pointer */
#define RTST_FLAGS_POINTER RT_BIT(0)
+
+ static const struct
+ {
+   uint8_t   cch;    /**< the length of the string. */
+   char     sz[16-2]; /**< the part following 'R'. */
+   uint8_t   cb;     /**< the size of the argument. */
+   uint8_t   iFlags; /**< RTST_FLAGS_* */
+   RTST      enmType; /**< The structure type. */
+ }

  /** Sorted array of types, looked up using binary search! */
  + s_aTypes[] =
  +
  +#define STRMEM(str) sizeof(str) - 1, str
  +
  +   { STRMEM("Dtimespec"), sizeof(PCRTTIMESPEC), RTST_FLAGS_POINTER,
  +     RTST_TIMESPEC};
  +#undef STRMEM
  +
  + const char *pszType = *ppszFormat - 1;
  + int       iStart = 0;
  + int       iEnd   = RT_ELEMENTS(s_aTypes) - 1;
  + int       i      = RT_ELEMENTS(s_aTypes) / 2;

  +
  + union
  + {
  +   const void   *pv;
  +   uint64_t      u64;
  +   PCRTTIMESPEC  pTimeSpec;
  + } u;

  + AssertMsg(!chArgSize, ("Not argument size '%c' for RT types! '%.10s'n", chArgSize, pszFormatOrg));
  +
  +  /*
  +   * Lookup the type - binary search.
  +   */
  +  for (;;)
  +  {
  +    int iDiff = strncmp(pszType, s_aTypes[i].sz, s_aTypes[i].cch);
  +    if (!iDiff)
  +      break;
  +    if (iEnd == iStart)
  +      AssertMsgFailed("Invalid format type '%.10s'n", pszFormatOrg));
  +      return 0;
  +  }
  +  if (iDiff < 0)
  +    iEnd = i - 1;
  +  else
  +    iStart = i + 1;
if (iEnd < iStart)
{
    AssertMsgFailed("Invalid format type '%.10s'?n", pszFormatOrg);
    return 0;
}

i = iStart + (iEnd - iStart) / 2;

*ppszFormat += s_aTypes[i].cch - 1;

/*
 * Fetch the argument.
 */

u.u64 = 0;

switch (s_aTypes[i].cb)
{
    case sizeof(const void *):
        u.pv = va_arg(*pArgs, const void *);
        break;
    default:
        AssertMsgFailed("Invalid format error, size %d'?n", s_aTypes[i].cb);
        break;
}

/*
 * If it's a pointer, we'll check if it's valid before going on.
 */

if ((s_aTypes[i].fFlags & RTST_FLAGS_POINTER) && !VALID_PTR(u.pv))
    return pfnOutput(pvArgOutput, RT_STR_TUPLE("<null>"));

/*
 * Format the output.
 */

switch (s_aTypes[i].enmType)
{
    case RTST_TIMESPEC:
        return RTStrFormat(pfnOutput, pvArgOutput, NULL, NULL, "%'lld ns",
                          RTTimeSpecGetNano(u.pTimeSpec));
    default:
        AssertMsgFailed("Invalid/unhandled enmType=%d'?n", s_aTypes[i].enmType);
        break;
}

/*
 * Group 5, XML / HTML escapers.
 */

#ifdef IN_RING3

#endif


+     case 'M':
+     {
+         char chWhat = (*ppszFormat)[0];
+         bool fAttr = chWhat == 'a';
+         char chType = (*ppszFormat)[1];
+         AssertMsgBreak(chWhat == 'a' || chWhat == 'e', ("Invalid IPRT format type '%.10s'!n", pszFormatOrg));
+         *ppszFormat += 2;
+         switch (chType)
+         {
+             case 's':
+                 {
+                     static const char s_szElemEscape[] = "<>&";"\"";
+                     static const char s_szAttrEscape[] = "<>&\"\n\r"; /* more? */
+                     const char * const pszEscape = fAttr ? s_szAttrEscape : s_szElemEscape;
+                     size_t cchEscape = (fAttr ? RT_ELEMENTS(s_szAttrEscape) : RT_ELEMENTS(s_szElemEscape)) - 1;
+                     size_t cchOutput = 0;
+                     const char *pszStr = va_arg(*pArgs, char *);
+                     ssize_t cchStr;
+                     ssize_t offCur;
+                     ssize_t offLast;
+                     if (!VALID_PTR(pszStr))
+                         pszStr = "<NULL>";
+                     cchStr = RTStrNLen(pszStr, (unsigned)cchPrecision);
+                     if (fAttr)
+                         cchOutput += pfnOutput(pvArgOutput, "", 1);
+                     if (!(fFlags & RTSTR_F_LEFT))
+                         while (--cchWidth >= cchStr)
+                             cchOutput += pfnOutput(pvArgOutput, " ", 1);
+                     offLast = offCur = 0;
+                     while (offCur < cchStr)
+                     {
+                         if (memchr(pszEscape, pszStr[offCur], cchEscape))
+                             {
+                             if (offLast < offCur)
+                                 cchOutput += pfnOutput(pvArgOutput, &pszStr[offLast], offCur - offLast);
+                             switch (pszStr[offCur])
+                             {
+                                 case '<': cchOutput += pfnOutput(pvArgOutput, "\", 1); break;
+                                 case '>': cchOutput += pfnOutput(pvArgOutput, ">", 1); break;
+                                 case '&': cchOutput += pfnOutput(pvArgOutput, "&", 1); break;
+                                 case '"': cchOutput += pfnOutput(pvArgOutput, "", 1); break;
+                                 case ":": cchOutput += pfnOutput(pvArgOutput, "", 1); break;
+                             }}}}
case 'n': cchOutput += pfnOutput(pvArgOutput, "\nA", 5); break;
+ case 'r': cchOutput += pfnOutput(pvArgOutput, "\xD", 5); break;
+ default:
+   AssertFailed();
+   }
+   offLast = offCur + 1;
+   }
+   offCur++;
+ }
+ if (offLast < offCur)
+   cchOutput += pfnOutput(pvArgOutput, &pszStr[offLast], offCur - offLast);
+ 
+   while (--cchWidth >= cchStr)
+     cchOutput += pfnOutput(pvArgOutput, " ", 1);
+   if (fAttr)
+     cchOutput += pfnOutput(pvArgOutput, "\", 1);
+   return cchOutput;
+ 
+ default:
+   AssertMsgFailed(("Invalid IPRT format type '%.10s'!n", pszFormatOrg));
+   }
+   break;
+ }
+
+#endif /* IN_RING3 */
+
+#* Groups 6 - CPU Architecture Register Formatters.
+ * "%Aarch[reg]"
+ */
+ case 'A':
+ {
+   char const * const pszArch = *ppszFormat;
+   const char     *pszReg   = pszArch;
+   size_t         cchOutput = 0;
+   int            cPrinted = 0;
+   size_t         cchReg;
+ 
+   /* Parse out the */
+   while ((ch = *pszReg++) && ch != ']')
+     { /* nothing */ }
+   AssertMsgBreak(ch == ']', ("Malformed IPRT architecture register format type '%.10s'!n", pszFormatOrg));
+ 
+   cchReg = 0;
+   while ((ch = pszReg[cchReg]) && ch != ']')
+     cchReg++;
AssertMsgBreak(ch == ']', ("Malformed IPRT architecture register format type \%s!n", pszFormatOrg));
+
    *ppszFormat = &pszReg[cchReg + 1];
+
+#define REG_EQUALS(a_szReg) (sizeof(a_szReg) - 1 == cchReg && !strncmp(a_szReg, pszReg, sizeof(a_szReg) - 1))
+
#define REG_OUT_BIT(a_uVal, a_fBitMask, a_szName) \
    do { \n        if ((a_uVal) & (a_fBitMask)) \n        { \n            if (!cPrinted++) \n                cchOutput += pfnOutput(pvArgOutput, \"{\" a_szName, sizeof(a_szName)); \n            else \n                cchOutput += pfnOutput(pvArgOutput, "," a_szName, sizeof(a_szName)); \n            (a_uVal) &= ~ (a_fBitMask); \n        } \n    } while (0)
+
#define REG_OUT_CLOSE(a_uVal) \
    do { \n        if ((a_uVal)) \n        { \n            cchOutput += pfnOutput(pvArgOutput, !cPrinted ? \"{unkn=\" : \",unkn=\", 6); \n            cch = RTStrFormatNumber(&szBuf[0], (a_uVal), 16, 1, -1, fFlags); \n            cchOutput += pfnOutput(pvArgOutput, szBuf, cch); \n            cPrinted++; \n        } \n        if (cPrinted) \n            cchOutput += pfnOutput(pvArgOutput, \"}\", 1); \n    } while (0)
+
    if (0)
    { /* dummy */ }
+#ifdef STRFORMAT_WITH_X86
    
    /* X86 & AMD64.
     */
    else if (pszReg - pszArch == 3 + 1
        && pszArch[0] == 'x'
        && pszArch[1] == '8'
        && pszArch[2] == '6')
    { 
        if (REG_EQUALS("cr0"))
        { 
            uint64_t cr0 = va_arg(*pArgs, uint64_t);
            fFlags |= RTSTR_F_64BIT;
cch = RTStrFormatNumber(szBuf[0], cr0, 16, 8, -1, fFlags | RTSTR_F_ZEROPAD);
cchOutput += pfnOutput(pvArgOutput, szBuf, cch);
REG_OUT_BIT(cr0, X86_CR0_PE, "PE");
REG_OUT_BIT(cr0, X86_CR0_MP, "MP");
REG_OUT_BIT(cr0, X86_CR0_EM, "EM");
REG_OUT_BIT(cr0, X86_CR0_TS, "TS");
REG_OUT_BIT(cr0, X86_CR0_ET, "ET");
REG_OUT_BIT(cr0, X86_CR0_NE, "NE");
REG_OUT_BIT(cr0, X86_CR0_WP, "WP");
REG_OUT_BIT(cr0, X86_CR0_AM, "AM");
REG_OUT_BIT(cr0, X86_CR0_NE, "NW");
REG_OUT_BIT(cr0, X86_CR0_CD, "CD");
REG_OUT_BIT(cr0, X86_CR0_PG, "PG");
REG_OUT_CLOSE(cr0);
else if (REG_EQUALS("cr4"))
{
    uint64_t cr4 = va_arg(*pArgs, uint64_t);
fFlags |= RTSTR_F_64BIT;
cch = RTStrFormatNumber(szBuf[0], cr4, 16, 8, -1, fFlags | RTSTR_F_ZEROPAD);
cchOutput += pfnOutput(pvArgOutput, szBuf, cch);
REG_OUT_BIT(cr4, X86_CR4_VME, "VME");
REG_OUT_BIT(cr4, X86_CR4_PVI, "PVI");
REG_OUT_BIT(cr4, X86_CR4_TSD, "TSD");
REG_OUT_BIT(cr4, X86_CR4_DE, "DE");
REG_OUT_BIT(cr4, X86_CR4_PSE, "PSE");
REG_OUT_BIT(cr4, X86_CR4_PAE, "PAE");
REG_OUT_BIT(cr4, X86_CR4_MCE, "MCE");
REG_OUT_BIT(cr4, X86_CR4_PGE, "PGE");
REG_OUT_BIT(cr4, X86_CR4_PCE, "PCE");
REG_OUT_BIT(cr4, X86_CR4_MXIM, "OSFXSR", "OSFXSR");
REG_OUT_BIT(cr4, X86_CR4_OSXMMEEXCEPT, "OSXMMEEXCEPT");
REG_OUT_BIT(cr4, X86_CR4_VMXE, "VMXE");
REG_OUT_BIT(cr4, X86_CR4_MMXE, "SMXE");
REG_OUT_BIT(cr4, X86_CR4_PCIDE, "PCIDE");
REG_OUT_BIT(cr4, X86_CR4_OSXSAVE, "OSXSAVE");
REG_OUT_BIT(cr4, X86_CR4_SMEX, "SMMP");
REG_OUT_BIT(cr4, X86_CR4_SMAP, "SMAP");
REG_OUT_CLOSE(cr4);
else
    AssertMsgFailed("Unknown x86 register specified in '%.10s'!
pszFormatOrg));
}
#endif
else
    AssertMsgFailed("Unknown architecture specified in '%.10s'!
pszFormatOrg));
#undef REG_OUT_BIT
#undef REG_OUT_CLOSE
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```c
+#undef REG_EQUALS
+    return cchOutput;
+ }
+
+ /*
+ * Invalid/Unknown. Bitch about it.
+ */
+ default:
+    AssertMsgFailed("Invalid IPRT format type '%.10s'\n", pszFormatOrg);
+    break;
+ }
+ }
+
----- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/string/strformattype.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/string/strformattype.c
@@ -0,0 +1,476 @@
+/* $Id: strformattype.cpp $ */
+/** @file
+ * IPRT - IPRT String Formatter Extensions, Dynamic Types.
+ */
+ /*
+ * Copyright (C) 2008-2017 Oracle Corporation
+ *
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+ */
+```
#define LOG_GROUP RTLOGGROUP_STRING
#include <iprt/string.h>
#include "internal/iprt.h"
#include <iprt/assert.h>
#include <iprt/stdarg.h>
#include <iprt/asm.h>
#include "internal/string.h"

/* Global Variables */

/* Defined Constants And Macros */
#ifdef RT_STRICT
#define RTSTRFORMATTYPE_WITH_LOCKING
#endif
#ifdef RTSTRFORMATTYPE_WITH_LOCKING
#define RTSTRFORMATTYPE_LOCK_OFFSET 0x7fff0000
#endif

/* Structures and Typedefs */

/** Description of a registered formatting type. */
/** In GC we'll be using offsets instead of pointers just to try avoid having to */
/** do the bothersome relocating. This of course assumes that all the relevant */
/** code stays within the same mapping. */
/**
*/
typedef struct RTSTRDYNFMT {

    /** The length of the type. */
    uint8_t cchType;
    /** The type name. */
    char szType[47];
    /** The handler function. */
} RTSTRDYNFMT;
/* In GC the offset is relative to g_aTypes[0], so that &g_aTypes[0] + offHandler
gives the actual address. */
#endif
#endif
    PFNRTSTRFORMATTYPE  pfnHandler;
#endif
    int32_t             offHandler;
    /* Callback argument. */
    void * volatile     pvUser;
    #if ARCH_BITS == 32
    /* Size alignment padding. */
    char                abPadding[8];
#endif
} RTSTRDYNFMT;
AssertCompileSizeAlignment(RTSTRDYNFMT, 32);
typedef RTSTRDYNFMT *PRTSTRDYNFMT;
typedef RTSTRDYNFMT const *PCRTSTRDYNFMT;

/*******************************************************************************************
**************************************
*   Global Variables                                                                                                             *
********************************************************************************************
*************************************/
/** The registered types, sorted for binary lookup. */
static RTSTRDYNFMT      g_aTypes[64];
/** The number of registered types. */
static uint32_t         g_cTypes = 0;
#ifdef RTSTRFORMATTYPE_WITH_LOCKING
/** This is just a thing we assert/spin on.
 * Zero == unlocked, negative == write locked, positive == read locked.
 */
static int32_t volatile g_i32Spinlock = 0;
#endif

DECLINLINE(void) rtstrFormatTypeWriteLock(void)
{
#if defined(RTSTRFORMATTYPE_WITH_LOCKING)
    if (RT_UNLIKELY(!ASMAtomicCmpXchgS32(&g_i32Spinlock, -RTSTRFORMATTYPE_LOCK_OFFSET,
                                               RTSTRFORMATTYPE_LOCK_OFFSET)))
        return;
#endif
    int32_t volatile g_i32Spinlock = 0;
}
}
unsigned volatile i;

AssertFailed();
for (i = 0;; i++)
    if (!g_i32Spinlock && ASMAtomicCmpXchgS32(&g_i32Spinlock, -RTSTRFORMATTYPE_LOCK_OFFSET, 0))
        break;
#endif
*/
/* Undoing rtstrFormatTypeWriteLock.
 */
DECLINLINE(void) rtstrFormatTypeWriteUnlock(void)
{
#if defined(RTSTRFORMATTYPE_WITH_LOCKING)
    Assert(g_i32Spinlock < 0);
    ASMAtomicAddS32(&g_i32Spinlock, RTSTRFORMATTYPE_LOCK_OFFSET);
#endif
}

* Locks the stuff for reading.
 *
* This is just cheap stuff to make sure the caller is doing the right thing.
 */
DECLINLINE(void) rtstrFormatTypeReadLock(void)
{
#if defined(RTSTRFORMATTYPE_WITH_LOCKING)
    if (RT_UNLIKELY(ASMAtomicIncS32(&g_i32Spinlock) < 0))
    {
        unsigned volatile i;
        AssertFailed();
        for (i = 0;; i++)
            if (ASMAtomicUoReadS32(&g_i32Spinlock) > 0)
                break;
    }
#endif
}
DECLINLINE(void) rtstrFormatTypeReadUnlock(void)
{
#if defined(RTSTRFORMATTYPE_WITH_LOCKING)
    Assert(g_i32Spinlock > 0);
    ASMAtomicDecS32(&g_i32Spinlock);
#endif
}

DECLINLINE(int) rtstrFormatTypeCompare(const char *pszType, size_t cchType, PCRTSTRDYNFMT pType)
{
    size_t cch = RT_MIN(cchType, pType->cchType);
    int iDiff = memcmp(pszType, pType->szType, cch);
    if (!iDiff)
    {
        if (cchType == pType->cchType)
            return 0;
        iDiff = cchType < pType->cchType ? -1 : 1;
    }
    return iDiff;
}

DECLINLINE(int32_t) rtstrFormatTypeLookup(const char *pszType, size_t cchType)
{
    int32_t iStart = 0;
    int32_t iEnd   = g_cTypes - 1;
    int32_t i      = iEnd / 2;

    /*
     * Lookup the type - binary search.
     */
    /* Look up a type entry.
     */
    /* @returns The type index, -1 on failure.
     */
    /* @param   pszType   The type to look up. This doesn't have to be terminated.
     */
    /* @param   cchType   The length of the type.
     */
    /*
     * @returns Same as memcmp.
     */
    /* @param   pszType   The type string, doesn't need to be terminated.
     */
    /* @param   cchType   The number of chars in @a pszType to compare.
     */
    /* @param   pType     The type entry to compare with.
     */
    /*
     * Compares a type string with a type entry, the string doesn't need to be terminated.
     */
    /*
     * undoing rtstrFormatTypeReadLock.
     */
}
for (;;)
{
    int iDiff = rtstrFormatTypeCompare(pszType, cchType, &g_aTypes[i]);
    if (iDiff)
        return i;
    if (iEnd == iStart)
        break;
    if (iDiff < 0)
        iEnd = i - 1;
    else
        iStart = i + 1;
    if (iEnd < iStart)
        break;
    i = iStart + (iEnd - iStart) / 2;
}
return -1;

/**
 * Register a format handler for a type.
 *
 * The format handler is used to handle '%R[type]' format types, where the argument
 * in the vector is a pointer value (a bit restrictive, but keeps it simple).
 *
 * The caller must ensure that no other thread will be making use of any of
 * the dynamic formatting type facilities simultaneously with this call.
 *
 * @returns IPRT status code.
 * @retval  VINF_SUCCESS on success.
 * @retval  VERR_ALREADY_EXISTS if the type has already been registered.
 * @retval  VERR_TOO_MANY_OPEN_FILES if all the type slots has been allocated already.
 *
 * @param   pszType         The type name.
 * @param   pfnHandler      The handler address. See FNRTSTRFORMATTYPE for details.
 * @param   pvUser          The user argument to pass to the handler. See RTStrFormatTypeSetUser
 *                          for how to update this later.
 * @returns IPRT status code.
 * @retval  VINF_SUCCESS on success.
 * @retval  VERR_ALREADY_EXISTS if the type has already been registered.
 * @retval  VERR_TOO_MANY_OPEN_FILES if all the type slots has been allocated already.
 *
 * @returns IPRT status code.
 * @retval  VINF_SUCCESS on success.
 * @retval  VERR_ALREADY_EXISTS if the type has already been registered.
 * @retval  VERR_TOO_MANY_OPEN_FILES if all the type slots has been allocated already.
 */
RTDECL(int) RTStrFormatTypeRegister(const char *pszType, PFNRTSTRFORMATTYPE pfnHandler, void *pvUser)
{
    int rc;
    size_t cchType;
    uint32_t cTypes;
    ...
/*
 * Validate input.
 */
+ AssertPtr(pfnHandler);
+ AssertPtr(pszType);
+ cchType = strlen(pszType);
+ AssertReturn(cchType < RT_SIZEOFMEMB(RTSTRDYNFMT, szType), VERR_INVALID_PARAMETER);
+ /*
+ * Try add it.
+ */
+ rtstrFormatTypeWriteLock();
+
+ /* check that there are empty slots. */
+ cTypes = g_cTypes;
+ if (cTypes < RT_ELEMENTS(g_aTypes))
+ {
+ /* find where to insert it. */
+ uint32_t i = 0;
+ rc = VINF_SUCCESS;
+ while (i < cTypes)
+ {
+    int iDiff = rtstrFormatTypeCompare(pszType, cchType, &g_aTypes[i]);
+    if (!iDiff)
+    {
+        rc = VERR_ALREADY_EXISTS;
+        break;
+    }
+    if (iDiff < 0)
+        break;
+    i++;
+ }
+ if (RT_SUCCESS(rc))
+ {
+    /* make room. */
+    uint32_t cToMove = cTypes - i;
+    if (cToMove)
+        memmove(&g_aTypes[i + 1], &g_aTypes[i], cToMove * sizeof(g_aTypes[i]));
+    /* insert the new entry. */
+    memset(&g_aTypes[i], 0, sizeof(g_aTypes[i]));
+    memcpy(&g_aTypes[i].szType[0], pszType, cchType + 1);
+    g_aTypes[i].cchType = (uint8_t)cchType;
+    g_aTypes[i].pvUser = pvUser;
+#ifdef IN_RC
+    g_aTypes[i].offHandler = (intptr_t)pfnHandler - (intptr_t)&g_aTypes[0];
+#else
+    g_aTypes[i].pfnHandler = pfnHandler;
+#endif
+    ASMAtomicIncU32(&g_cTypes);
+    rc = VINF_SUCCESS;
+}
else
    rc = VERR_TOO_MANY_OPEN_FILES; /**< @todo fix error code */
+
    rtstrFormatTypeWriteUnlock();
+
    return rc;
}
+RT_EXPORT_SYMBOL(RTStrFormatTypeRegister);
+
+/**
+ * Deregisters a format type.
+ *
+ * The caller must ensure that no other thread will be making use of any of
+ * the dynamic formatting type facilities simultaneously with this call.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_FILE_NOT_FOUND if not found.
+ *
+ * @param   pszType     The type to deregister.
+ */
+RTDECL(int) RTStrFormatTypeDeregister(const char *pszType)
+{
+    int32_t i;
+
+    /* Validate input. */
+    AssertPtr(pszType);
+
+    /* Locate the entry and remove it. */
+    rtstrFormatTypeWriteLock();
+    i = rtstrFormatTypeLookup(pszType, strlen(pszType));
+    if (i >= 0)
+    {
+        const uint32_t cTypes = g_cTypes;
+        int32_t cToMove = cTypes - i - 1;
+        if (cToMove > 0)
+            memmove(&g_aTypes[i], &g_aTypes[i + 1], cToMove * sizeof(g_aTypes[i]));
+        memset(&g_aTypes[cTypes - 1], 0, sizeof(g_aTypes[0]));
+        ASMAtomicDecU32(&g_cTypes);
+    }
+    rtstrFormatTypeWriteUnlock();
+ Assert(i >= 0);
+ return i >= 0
+     ? VINF_SUCCESS
+     : VERR_FILE_NOT_FOUND; /**< @todo fix status code */
+
+RT_EXPORT_SYMBOL(RTStrFormatTypeDeregister);
+
+
+/**
+ * Sets the user argument for a type.
+ *
+ * This can be used if a user argument needs relocating in GC.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_FILE_NOT_FOUND if not found.
+ *
+ * @param   pszType     The type to update.
+ * @param   pvUser      The new user argument value.
+ */
+RTDECL(int) RTStrFormatTypeSetUser(const char *pszType, void *pvUser)
+{
+    int32_t i;
+
+    /*
+     * Validate input.
+     */
+    AssertPtr(pszType);
+
+    /*
+     * Locate the entry and update it.
+     */
+    rtstrFormatTypeReadLock();
+    i = rtstrFormatTypeLookup(pszType, strlen(pszType));
+    if (i >= 0)
+        ASMAtomicWritePtr(&g_aTypes[i].pvUser, pvUser);
+    rtstrFormatTypeReadUnlock();
+    Assert(i >= 0);
+    return i >= 0
+         ? VINF_SUCCESS
+         : VERR_FILE_NOT_FOUND; /**< @todo fix status code */
+}
+RT_EXPORT_SYMBOL(RTStrFormatTypeSetUser);
+/**
+ * Formats a type using a registered callback handler.
+ *
+ * This will handle %R[type].
+ *
+ * @returns The number of bytes formatted.
+ * @param pfnOutput Pointer to output function.
+ * @param pvArgOutput Argument for the output function.
+ * @param ppszFormat Pointer to the format string pointer. Advance this till the char
+ * after the format specifier.
+ * @param pArgs Pointer to the argument list. Use this to fetch the arguments.
+ * @param cchWidth Format Width. -1 if not specified.
+ * @param cchPrecision Format Precision. -1 if not specified.
+ * @param fFlags Flags (RTSTR_NTFS_*).
+ * @param chArgSize The argument size specifier, 't' or 'L'.
+ */
+DECLHIDDEN(size_t) rtstrFormatType(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, const char **ppszFormat,
                                       va_list *pArgs, int cchWidth, int cchPrecision, unsigned fFlags, char chArgSize)
+
+ size_t cch;
+ int32_t i;
+ char const *pszTypeEnd;
+ char const *pszType;
+ char ch;
+ void *pvValue = va_arg(*pArgs, void *);
+ NOREF(chArgSize);
+
+ /*
+ * Parse out the type.
+ */
+ pszType = *ppszFormat + 2;
+ *ppszFormat = pszType;
+ Assert(pszType[-1] == 't');
+ Assert(pszType[-2] == 'R');
+ pszTypeEnd = pszType;
+ while ((ch = *pszTypeEnd) != 't')
+ {
+     AssertReturn(ch != '0', 0);
+     AssertReturn(ch != '%', 0);
+     AssertReturn(ch != 't', 0);
+     pszTypeEnd++;
+ }
+ *ppszFormat = pszTypeEnd + 1;
+
+ /*
+ * Locate the entry and call the handler.
rtstrFormatTypeReadLock();

i = rtstrFormatTypeLookup(pszType, pszTypeEnd - pszType);
if (RT_LIKELY(i >= 0))
{
    #ifdef IN_RC
    PFNRTSTRFORMATTYPE pfnHandler = (PFNRTSTRFORMATTYPE)((intptr_t)&g_aTypes[0] +
g_aTypes[i].offHandler);
    #else
    PFNRTSTRFORMATTYPE pfnHandler = g_aTypes[i].pfnHandler;
    #endif
    void *pvUser = ASMAtomicReadPtr(&g_aTypes[i].pvUser);

    rtstrFormatTypeReadUnlock();

    cch = pfnHandler(pfnOutput, pvArgOutput, g_aTypes[i].szType, pvValue, cchWidth, cchPrecision, fFlags,
pvUser);
    }
else
    {
   (rtstrFormatTypeReadUnlock();

    cch  = pfnOutput(pvArgOutput, RT_STR_TUPLE("<missing:%R["));
    cch += pfnOutput(pvArgOutput, pszType, pszTypeEnd - pszType);
    cch += pfnOutput(pvArgOutput, RT_STR_TUPLE("]>"));
    }

    return cch;
}
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************
* Header Files
*******************************************************************************/
#include <iprt/string.h>
#include "internal/iprt.h"
+
+/* strbufoutput() argument structure. */
typedef struct STRBUFARG
{
    /** Pointer to current buffer position. */
    char   *psz;
    /** Number of bytes left in the buffer - not including the trailing zero. */
    size_t  cch;
} STRBUFARG;
+/** Pointer to a strbufoutput() argument structure. */
typedef STRBUFARG *PSTRBUFARG;
+
+/*******************************************************************************
* Structures and Typedefs
*******************************************************************************
+static DECLCALLBACK(size_t) strbufoutput(void *pvArg, const char *pachChars, size_t cbChars);
+ /**
+ * Output callback.
+ *
+ @returns number of bytes written.
+ *
+ @param pvArg Pointer to a STRBUFARG structure.
+ @param pachChars Pointer to an array of utf-8 characters.
+ @param cbChars Number of bytes in the character array pointed to by pachChars.
+ */
+ static DECLCALLBACK(size_t) strbufoutput(void *pvArg, const char *pachChars, size_t cbChars)
+ {
+    PSTRBUFARG pArg = (PSTRBUFARG)pvArg;
+    char *pszCur = pArg->psz; /* We actually have to spell this out for VS2010, or it will load for each case. */
+    cbChars = RT_MIN(pArg->cch, cbChars);
+    if (cbChars)
+    {
+        pArg->cch -= cbChars;
+        switch (cbChars)
+        {
+            default:
+                memcpy(pszCur, pachChars, cbChars);
+                break;
+            case 8: pszCur[7] = pachChars[7]; RT_FALL_THRU();
+            case 7: pszCur[6] = pachChars[6]; RT_FALL_THRU();
+            case 2: pszCur[1] = pachChars[1]; RT_FALL_THRU();
+            case 1: pszCur[0] = pachChars[0]; RT_FALL_THRU();
+            case 0:
+                break;
+            }
+        pArg->psz = pszCur += cbChars;
+    }
+    *pszCur = '\0';
+    return cbChars;
+} +
+ +
+ RTDECL(size_t) RTStrPrintf(char *pszBuffer, size_t cchBuffer, const char *pszFormat, ...)
+ {
+    /* Explicitly inline RTStrPrintfV + RTStrPrintfExV here because this is a frequently use API */
+    STRBUFARG Arg;
+}
+ va_list args;
+ size_t cbRet;
+
+ AssertMsgReturn(cchBuffer, ("Excellent idea! Format a string with no space for the output!\n"), 0);
+ Arg.psz = pszBuffer;
+ Arg.cch = cchBuffer - 1;
+
+ va_start(args, pszFormat);
+ cbRet = RTStrFormatV(strbufoutput, &Arg, NULL, NULL, pszFormat, args);
+ va_end(args);
+
+ return cbRet;
+}
+RT_EXPORT_SYMBOL(RTStrPrintf);
+
+}
+RTDECL(size_t) RTStrPrintfExV(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cchBuffer, const char *pszFormat, va_list args)
+{
+    STRBUFARG Arg;
+    AssertMsgReturn(cchBuffer, ("Excellent idea! Format a string with no space for the output!\n"), 0);
+    Arg.psz = pszBuffer;
+    Arg.cch = cchBuffer - 1;
+    return RTStrFormatV(strbufoutput, &Arg, pfnFormat, pvArg, pszFormat, args);
+}
+RT_EXPORT_SYMBOL(RTStrPrintfExV);
+
+}
+RTDECL(size_t) RTStrPrintfV(char *pszBuffer, size_t cchBuffer, const char *pszFormat, va_list args)
+{
+    return RTStrPrintfExV(NULL, NULL, pszBuffer, cchBuffer, pszFormat, args);
+}
+RT_EXPORT_SYMBOL(RTStrPrintfV);
+
+}
+RTDECL(size_t) RTStrPrintfEx(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cchBuffer, const char *pszFormat, va_list args)
+{
+    va_list args;
+    size_t cbRet;
+    va_start(args, pszFormat);
+    cbRet = RTStrPrintfExV(pfnFormat, pvArg, pszBuffer, cchBuffer, pszFormat, args);
+    va_end(args);
+    return cbRet;
+}
+RT_EXPORT_SYMBOL(RTStrPrintfEx);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/string/strtonum.c
Use of Open Source in 5GaaS Edge AC-4

+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/string/strtonum.c
@@ @ -0,0 +1,1013 @@
+/* $Id: strtonum.cpp $ */
+/** @file
+ * IPRT - String To Number Conversion.
+ */
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+/** This file is part of VirtualBox Open Source Edition (OSE), as
+ you can redistribute it and/or modify it under the terms of the GNU
+ General Public License (GPL) as published by the Free Software
+ Foundation, in version 2 as it comes in the "COPYING" file of the
+ VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+/** The contents of this file may alternatively be used under the terms
+ of the Common Development and Distribution License Version 1.0
+ (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ VirtualBox OSE distribution, in which case the provisions of the
+ CDDL are applicable instead of those of the GPL.
+ */
+/** You may elect to license modified versions of this file under the
+ terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/********************************************************************************
+ * Header Files
+*******************************************************************************/
+#include <iprt/string.h>
+#include "internal/iprt.h"
+
+/********************************************************************************
+ * Global Variables
+*******************************************************************************/
+/** 8-bit char -> digit. */
+static const unsigned char g_auchDigits[256] =
+{
+
5,255,255,255,255,255,
+ 255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255, 0, 1, 2, 3, 4, 5, 6, 7, 8,
9,255,255,255,255,255,255,
+ 255, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34,
35,255,255,255,255,255,
+ 255, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34,
35,255,255,255,255,255,
+
5,255,255,255,255,255,
+
5,255,255,255,255,255,
+
5,255,255,255,255,255,
+
5,255,255,255,255,255
+};
+/** Approximated overflow shift checks. */
+static const char g_auchShift[36] =
+{
+ /* 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 */
+ 64, 64, 63, 63, 62, 62, 62, 62, 61, 61, 61, 61, 61, 61, 61, 61, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60,
60, 60, 59, 59, 59, 59
+};
+
+/*
+#include <stdio.h>
+int main()
+{
+ int i;
+ printf("static const unsigned char g_auchDigits[256] =\n"
+
"{");
+ for (i = 0; i < 256; i++)
+ {
+
int ch = 255;
+
if (i >= '0' && i <= '9')
+
ch = i - '0';
+
else if (i >= 'a' && i <= 'z')
+
ch = i - 'a' + 10;
+
else if (i >= 'A' && i <= 'Z')

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ch = i - 'A' + 10;
if (i == 0)
    printf("\n    %3d", ch);
else if ((i % 32) == 0)
    printf("\n    %3d", ch);
else
    printf("%3d", ch);
}
printf("\n" + "\n    }\n" + "};\n");
return 0;
*/

/**
 * Converts a string representation of a number to a 64-bit unsigned number.
 *
 * @returns iprt status code.
 *          Warnings are used to indicate conversion problems.
 * @retval  VWRN_NUMBER_TOO_BIG
 * @retval  VWRN_NEGATIVE_UNSIGNED
 * @retval  VWRN_TRAILING_CHARS
 * @retval  VWRN_TRAILING_SPACES
 * @retval  VINF_SUCCESS
 * @retval  VERR_NO_DIGITS
 *
 * @param   pszValue    Pointer to the string value.
 * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
 * @param   uBase       The base of the representation used.
 *                      If the function will look for known prefixes before defaulting to 10.
 * @param   pu64        Where to store the converted number. (optional)
 */
RTDECL(int) RTStrToUInt64Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint64_t *pu64)
{
    const char   *psz = pszValue;
    int           iShift;
    int           rc;
    uint64_t      u64;
    unsigned char uch;
    /*
    * Positive/Negative stuff.
    */
    bool fPositive = true;
    for (; ; psz++)
    {
        if (*psz == '+')
           {...
fPositive = true;
else if (*psz == '-')
    fPositive = !fPositive;
else
    break;
}

/*
 * Check for hex prefix.
 */
if (!uBase)
{
    if (psz[0] == '0'
        && (psz[1] == 'x' || psz[1] == 'X')
        && g_auchDigits[(unsigned char)psz[2]] < 16)
    {
        uBase = 16;
        psz += 2;
    } else if (psz[0] == '0'
               && g_auchDigits[(unsigned char)psz[1]] < 8)
    {
        uBase = 8;
        psz++;}
    else
        uBase = 10;
} else if (uBase == 16
            && psz[0] == '0'
            && (psz[1] == 'x' || psz[1] == 'X')
            && g_auchDigits[(unsigned char)psz[2]] < 16)
    psz += 2;

/*
 * Interpret the value.
 * Note: We only support ascii digits at this time... :-) 
 */
iShift = g_auchShift[uBase];
pszValue = psz; /* (Prefix and sign doesn't count in the digit counting.) */
rc = VINF_SUCCESS;
u64 = 0;
while ((uch = (unsigned char)*psz) != 0)
{
    unsigned char chDigit = g_auchDigits[uch];
    uint64_t u64Prev;
    if (chDigit >= uBase)
break;

u64Prev = u64;

u64 *= uBase;

u64 += chDigit;

if (u64Prev > u64 || (u64Prev >> iShift))
    rc = VWRN_NUMBER_TOO_BIG;

psz++;

if (!fPositive)
{
    if (rc == VINF_SUCCESS)
        rc = VWRN_NEGATIVE_UNSIGNED;
    u64 = -(int64_t)u64;
}

if (pu64)
    *pu64 = u64;

if (psz == pszValue)
    rc = VERR_NO_DIGITS;

if (ppszNext)
    *ppszNext = (char *)psz;

/*
 * Warn about trailing chars/spaces.
 */

if (rc == VINF_SUCCESS && *psz)
{
    while (*psz == ' ' || *psz == '	')
        psz++;
    rc = *psz ? VWRN_TRAILING_CHARS : VWRN_TRAILING_SPACES;
}

return rc;

+RT_EXPORT_SYMBOL(RTStrToUInt64Ex);

+/**
 + * Converts a string representation of a number to a 64-bit unsigned number,
 + * making sure the full string is converted.
 + *
 + * @returns iprt status code.
 + *
 + * Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_TRAILING_CHARS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ * @param   pu64        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt64Full(const char *pszValue, unsigned uBase, uint64_t *pu64)
{  
    char *psz;
    int rc = RTStrToUInt64Ex(pszValue, &psz, uBase, pu64);
    if (RT_SUCCESS(rc) && *psz)
    {
        if (rc == VWRN_TRAILING_CHARS || rc == VWRN_TRAILING_SPACES)
            rc = -rc;
        else
        {
            while (*psz == ' ' || *psz == '	')
                psz++;
            rc = *psz ? VERR_TRAILING_CHARS : VERR_TRAILING_SPACES;
        }
    }
    return rc;
}  
+RT_EXPORT_SYMBOL(RTStrToUInt64Full);
+
+/**
+ * Converts a string representation of a number to a 64-bit unsigned number.
+ * The base is guessed.
+ */
+RTDECL(uint64_t) RTStrToUInt64(const char *pszValue)
{  
    uint64_t u64;
    int rc = RTStrToUInt64Ex(pszValue, NULL, 0, &u64);
    if (RT_SUCCESS(rc))
        return u64;
    return 0;
}
+RT_EXPORT_SYMBOL(RTStrToUInt64);
+
+/**
+ * Converts a string representation of a number to a 32-bit unsigned number.
+ *
+ * @returns iprt status code.
+ * @returns 0.
+ *
+ * Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ * @param   pu32        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt32Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint32_t *pu32)
+{
+    uint64_t u64;
+    int rc = RTStrToUInt64Ex(pszValue, ppszNext, uBase, &u64);
+    if (RT_SUCCESS(rc))
+    {
+        if (u64 & ~0xffffffffULL)
+            rc = VWRN_NUMBER_TOO_BIG;
+    }
+    if (pu32)
+        *pu32 = (uint32_t)u64;
+    return rc;
+}
```c
+ * @retval VERR_TRAILING_CHARS
+ *
+ * @param pszValue Pointer to the string value.
+ * @param uBase The base of the representation used.
+ *
+ * @param pu32 Where to store the converted number. (optional)
+ */
+ RTDECL(int) RTStrToUInt32Full(const char *pszValue, unsigned uBase, uint32_t *pu32)
+ {
+     uint64_t u64;
+     int rc = RTStrToUInt64Full(pszValue, uBase, &u64);
+     if (RT_SUCCESS(rc))
+     {
+         if (u64 & ~0xffffffffULL)
+             rc = VWRN_NUMBER_TOO_BIG;
+     }
+     if (pu32)
+         *pu32 = (uint32_t)u64;
+     return rc;
+ }
+RT_EXPORT_SYMBOL(RTStrToUInt32Full);
+
+/**
+ + * Converts a string representation of a number to a 64-bit unsigned number.
+ + * The base is guessed.
+ + * @returns 32-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param pszValue Pointer to the string value.
+ */
+RTDECL(uint32_t) RTStrToUInt32(const char *pszValue)
+ {
+     uint32_t u32;
+     int rc = RTStrToUInt32Ex(pszValue, NULL, 0, &u32);
+     if (RT_SUCCESS(rc))
+         return u32;
+     return 0;
+ }
+RT_EXPORT_SYMBOL(RTStrToUInt32);
+
+/**
+ + * Converts a string representation of a number to a 16-bit unsigned number.
+ + * @returns iprt status code.
+ * @returns VWRN_NUMBER_TOO_BIG
+ * Warnings are used to indicate conversion problems.
+ */
```
RTDECL(int) RTStrToUInt16Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint16_t *pu16)
{
    uint64_t u64;
    int rc = RTStrToUInt64Ex(pszValue, ppszNext, uBase, &u64);
    if (RT_SUCCESS(rc))
    {
        if (u64 & ~0xffffULL)
            rc = VWRN_NUMBER_TOO_BIG;
    }
    if (pu16)
        *pu16 = (uint16_t)u64;
    return rc;
}

RT_EXPORT_SYMBOL(RTStrToUInt16Ex);

RTDECL(int) RTStrToUInt16Full(const char *pszValue, unsigned uBase, uint16_t *pu16)
{
    uint64_t u64;
    int rc = RTStrToUInt64Ex(pszValue, &u64, uBase);
    if (RT_SUCCESS(rc))
    {
        if (u64 & ~0xffffULL)
            rc = VWRN_NUMBER_TOO_BIG;
    }
    if (pu16)
        *pu16 = (uint16_t)u64;
    return rc;
}

RT_EXPORT_SYMBOL(RTStrToUInt16Full);
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+ uint64_t u64;
+ int rc = RTStrToUInt64Full(pszValue, uBase, &u64);
+ if (RT_SUCCESS(rc))
+ {
+ if (u64 & ~0xffffULL)
+     rc = VWRN_NUMBER_TOO_BIG;
+ }
+ if (pu16)
+     *pu16 = (uint16_t)u64;
+ return rc;
+
+RT_EXPORT_SYMBOL(RTStrToUInt64Full);
+
+/**
+ * Converts a string representation of a number to a 16-bit unsigned number.
+ * The base is guessed.
+ *
+ * @returns 16-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(uint16_t) RTStrToUInt16(const char *pszValue)
+{
+    uint16_t u16;
+    int rc = RTStrToUInt16Ex(pszValue, NULL, 0, &u16);
+    if (RT_SUCCESS(rc))
+        return u16;
+    return 0;
+}
+RT_EXPORT_SYMBOL(RTStrToUInt16);
+
+/**
+ * Converts a string representation of a number to a 8-bit unsigned number.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ * If the function will look for known prefixes before defaulting to 10.
+ * @param pu8 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt8Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint8_t *pu8)
+{
+    uint64_t u64;
+    int rc = RTStrToUInt64Ex(pszValue, ppszNext, uBase, &u64);
+    if (RT_SUCCESS(rc))
+    {
+        if (u64 & ~0xffULL)
+            rc = VWRN_NUMBER_TOO_BIG;
+    }
+    if (pu8)
+        *pu8 = (uint8_t)u64;
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTStrToUInt8Ex);
+
+/**
+ * Converts a string representation of a number to a 8-bit unsigned number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_NEGATIVE_UNSIGNED
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ * @retval VERR_TRAILING_SPACES
+ * @retval VERR_TRAILING_CHARS
+ *
+ * @param pszValue Pointer to the string value.
+ * @param uBase The base of the representation used.
+ * @param pu8 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt8Full(const char *pszValue, unsigned uBase, uint8_t *pu8)
+{
+    uint64_t u64;
+    int rc = RTStrToUInt64Full(pszValue, uBase, &u64);
+    if (RT_SUCCESS(rc))
+    {
+        if (u64 & ~0xffULL)
+            rc = VWRN_NUMBER_TOO_BIG;
+    }
+    if (pu8)
+        *pu8 = (uint8_t)u64;
RTDECL(uint8_t) RTStrToUInt8(const char *pszValue)
{
    uint8_t u8;
    int rc = RTStrToUInt8Ex(pszValue, NULL, 0, &u8);
    if (RT_SUCCESS(rc))
        return u8;
    return 0;
}

RTDECL(int) RTStrToInt64Ex(const char *pszValue, char **ppszNext, unsigned uBase, int64_t *pi64)
{
    /* Converts a string representation of a number to a 8-bit unsigned number. */
    /* The base is guessed. */
    /* @returns 8-bit unsigned number on success. */
    /* @returns 0 on failure. */
    /* @param pszValue Pointer to the string value. */
    /* */
    uint8_t_t u8;
    int rc = RTStrToUInt8Ex(pszValue, NULL, 0, &u8);
    if (RT_SUCCESS(rc))
        return u8;
    return 0;
}
const char *psz = pszValue;
int iShift;
int rc;
int64_t i64;
unsigned char uch;

/*
 * Positive/Negative stuff.
 */
bool fPositive = true;
for (;; psz++)
{
    if (*psz == '+')
        fPositive = true;
    else if (*psz == '-')
        fPositive = !fPositive;
    else
        break;
}

/* Check for hex prefix. */
if (!uBase)
{
    if (*psz == '0'    
    {
        uBase = 16;
        psz += 2;
    }
    else if (*psz == '0' 
        && g_auchDigits[(unsigned char)psz[1]] < 8)
    {
        uBase = 8;
        psz++; 
    }
    else
    { uBase = 10; 
    }
    else if (uBase == 16 
        && *psz == '0' 
        && (psz[1] == 'x' || psz[1] == 'X') 
        && g_auchDigits[(unsigned char)psz[2]] < 16)
    {
        psz += 2;
    }
    else if (uBase == 16 
        && *psz == '0' 
        && (psz[1] == 'x' || psz[1] == 'X') 
        && g_auchDigits[(unsigned char)psz[2]] < 16) 
    
    /*
* Interpret the value.
* Note: We only support ascii digits at this time... :-(
 */
  iShift = g_auchShift[uBase]; /**< @todo test this, it's probably not 100% right yet. */
  pszValue = psz; /**< (Prefix and sign doesn't count in the digit counting.) */
  rc = VINF_SUCCESS;
  i64 = 0;
  while ((uch = (unsigned char)*psz) != 0)
  {
      unsigned char chDigit = g_auchDigits[uch];
      int64_t i64Prev;
      i64Prev = i64;
      i64 *= uBase;
      i64 += chDigit;
      if (i64Prev > i64 || (i64Prev >> iShift))
          rc = VWRN_NUMBER_TOO_BIG;
      psz++;
  }
  if (!fPositive)
      i64 = -i64;
  if (pi64)
      *pi64 = i64;
  if (psz == pszValue)
      rc = VERR_NO_DIGITS;
  if (ppszNext)
      *ppszNext = (char *)psz;
  /*
  * Warn about trailing chars/spaces.
  */
  if (rc == VINF_SUCCESS
      && *psz)
  {
      while (*psz == ' ' || *psz == '	')
          psz++;
      rc = *psz ? VWRN_TRAILING_CHARS : VWRN_TRAILING_SPACES;
  }
  return rc;
+RT_EXPORT_SYMBOL(RTStrToInt64Ex);
+
+/**
+ * Converts a string representation of a number to a 64-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_TRAILING_CHARS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ *                      If the function will look for known prefixes before defaulting to 10.
+ * @param   pi64        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt64Full(const char *pszValue, unsigned uBase, int64_t *pi64)
+{
+    char *psz;
+    int rc = RTStrToInt64Ex(pszValue, &psz, uBase, pi64);
+    if (RT_SUCCESS(rc) && *psz)
+    {
+        if (rc == VWRN_TRAILING_CHARS || rc == VWRN_TRAILING_SPACES)
+            rc = -rc;
+        else
+        {
+            while (*psz == ' ' || *psz == '	')
+                psz++;
+            rc = *psz ? VERR_TRAILING_CHARS : VERR_TRAILING_SPACES;
+        }
+    }
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTStrToInt64Full);
+
+/**
+ * Converts a string representation of a number to a 64-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 64-bit signed number on success.
+ *          0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */

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+RTDECL(int64_t) RTStrToInt64(const char *pszValue)
+{
  +  int64_t i64;
  +  int rc = RTStrToInt64Ex(pszValue, NULL, 0, &i64);
  +  if (RT_SUCCESS(rc))
  +    return i64;
  +  return 0;
+}
+RT_EXPORT_SYMBOL(RTStrToInt64);
+
+/**
+ * Converts a string representation of a number to a 32-bit signed number.
+ *
+ * @returns iprt status code.
+ * Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_TRAILING_CHARS
+ * @retval VWRN_TRAILING_SPACES
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ *
+ * @param pszValue    Pointer to the string value.
+ * @param ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param uBase       The base of the representation used.
+ * If the function will look for known prefixes before defaulting to 10.
+ * @param pi32        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt32Ex(const char *pszValue, char **ppszNext, unsigned uBase, int32_t *pi32)
+{
  +  int64_t i64;
  +  int rc = RTStrToInt64Ex(pszValue, ppszNext, uBase, &i64);
  +  if (RT_SUCCESS(rc))
  +    { +    int32_t i32 = (int32_t)i64;
  +      if (i64 != (int64_t)i32)
  +        rc = VWRN_NUMBER_TOO_BIG;
  +    }
  +  if (pi32)
  +    {*pi32 = (int32_t)i64;
  +      return rc;
  +    }
+}
+RT_EXPORT_SYMBOL(RTStrToInt32Ex);
+
+/**
+ * Converts a string representation of a number to a 32-bit signed number,
+ * making sure the full string is converted.
+ * @returns iprt status code.
+ * @returns VWRN_NUMBER_TOO_BIG
+ * @returns VINF_SUCCESS
+ * @returns VERR_TRAILING_CHARS
+ * @returns VERR_TRAILING_SPACES
+ * @returns VERR_NO_DIGITS
+ *
+ * @returns VWRN_NUMBER_TOO_BIG
+ * @returns VINF_SUCCESS
+ * @returns VERR_TRAILING_CHARS
+ * @returns VERR_TRAILING_SPACES
+ * @returns VERR_NO_DIGITS
+ *
+ * @returns VWRN_NUMBER_TOO_BIG
+ * @returns VINF_SUCCESS
+ * @returns VERR_TRAILING_CHARS
+ * @returns VERR_TRAILING_SPACES
+ * @returns VERR_NO_DIGITS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ * @returns 32-bit signed number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(int) RTStrToInt32Full(const char *pszValue, unsigned uBase, int32_t *pi32)
+{
+    int64_t i64;
+    int rc = RTStrToInt64Full(pszValue, uBase, &i64);
+    if (RT_SUCCESS(rc))
+    {
+        int32_t i32 = (int32_t)i64;
+        if (i64 != (int64_t)i32)
+            rc = VWRN_NUMBER_TOO_BIG;
+    }
+    if (pi32)
+        *pi32 = (int32_t)i64;
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTStrToInt32Full);
+
+/**
+ * Converts a string representation of a number to a 32-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 32-bit signed number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(int32_t) RTStrToInt32(const char *pszValue)
+{
+    int32_t i32;
+    int rc = RTStrToInt32Ex(pszValue, NULL, 0, &i32);
+    if (RT_SUCCESS(rc))
+        return i32;
+    return 0;
+}
+RT_EXPORT_SYMBOL(RTStrToInt32);
+ /**
+ * Converts a string representation of a number to a 16-bit signed number.
+ * @param pszValue Pointer to the string value.
+ * @param ppszNext Where to store the pointer to the first char following the number. (Optional)
+ * @param uBase The base of the representation used.
+ * If the function will look for known prefixes before defaulting to 10.
+ * @param pi16 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt16Ex(const char *pszValue, char **ppszNext, unsigned uBase, int16_t *pi16)
+{
+    int64_t i64;
+    int rc = RTStrToInt64Ex(pszValue, ppszNext, uBase, &i64);
+    if (RT_SUCCESS(rc))
+    {
+        int16_t i16 = (int16_t)i64;
+        if (i64 != (int64_t)i16)
+            rc = VWRN_NUMBER_TOO_BIG;
+    }
+    if (pi16)
+        *pi16 = (int16_t)i64;
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTStrToInt16Ex);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number, making sure the full string is converted.
+ * @returns iprt status code.
+ * Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VINF_SUCCESS
+ * @retval VERR_TRAILING_CHARS
+ * @retval VERR_TRAILING_SPACES
+ * @retval VERR_NO_DIGITS
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ * @param   pi16        Where to store the converted number. (optional)
+ */
+ */
+RTDECL(int) RTStrToInt16Full(const char *pszValue, unsigned uBase, int16_t *pi16)
+{
+    int64_t i64;
+    int rc = RTStrToInt64Full(pszValue, uBase, &i64);
+    if (RT_SUCCESS(rc))
+    {
+        int16_t i16 = (int16_t)i64;
+        if (i64 != (int64_t)i16)
+            rc = VWRN_NUMBER_TOO_BIG;
+    }
+    if (pi16)
+        *pi16 = (int16_t)i64;
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTStrToInt16Full);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 16-bit signed number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(int16_t) RTStrToInt16(const char *pszValue)
+{
+    int16_t i16;
+    int rc = RTStrToInt16Full(pszValue, NULL, &i16);
+    if (RT_SUCCESS(rc))
+        return i16;
+    return 0;
+}
+RT.Export_SYMBOL(RTStrToInt16);
+
+/**
+ * Converts a string representation of a number to a 8-bit signed number.
+ *
+ * @returns iprt status code.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(int) RTStrToInt8(const char *pszValue)
+{
+    int i8;
+    int rc = RTStrToInt8Full(pszValue, NULL, &i8);
+    if (RT_SUCCESS(rc))
+        return i8;
+    return 0;
+}
+RT.Export_SYMBOL(RTStrToInt8);

RT успех символ (RTStrToInt8);
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param   pszValue  Pointer to the string value.
+ * @param   ppszNext  Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase     The base of the representation used.
+ *          If the function will look for known prefixes before defaulting to 10.
+ * @param   pi8       Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt8Ex(const char *pszValue, char **ppszNext, unsigned uBase, int8_t *pi8)
+
+ int64_t i64;
+ int rc = RTStrToInt64Ex(pszValue, ppszNext, uBase, &i64);
+ if (RT_SUCCESS(rc))
+ {
+     int8_t i8 = (int8_t)i64;
+     if (i64 != (int64_t)i8)
+         rc = VWRN_NUMBER_TOO_BIG;
+ }
+ if (pi8)
+     *pi8 = (int8_t)i64;
+ return rc;
+}
```c
+    if (RT_SUCCESS(rc))
+    {
+        int8_t i8 = (int8_t)i64;
+        if (i64 != (int64_t)i8)
+            rc = VWRN_NUMBER_TOO_BIG;
+    }
+    if (pi8)
+        *pi8 = (int8_t)i64;
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTStrToInt8Full);
+
+/**
+ * Converts a string representation of a number to a 8-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 8-bit signed number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ * @returns
+ */
+RTDECL(int8_t) RTStrToInt8(const char *pszValue)
+{
+    int8_t i8;
+    int rc = RTStrToInt8Ex(pszValue, NULL, 0, &i8);
+    if (RT_SUCCESS(rc))
+        return i8;
+    return 0;
+}
+RT_EXPORT_SYMBOL(RTStrToInt8);
+
+RTDECL(int) RTStrConvertHexBytes(char const *pszHex, void *pv, size_t cb, uint32_t fFlags)
+{
+    size_t cbDst;
+    uint8_t *pbDst;
+    const char *pszSrc;
+    AssertPtrReturn(pszHex, VERR_INVALID_POINTER);
+    AssertReturn(!fFlags, VERR_INVALID_PARAMETER);
+    cbDst  = cb;
+    pbDst  = (uint8_t *)pv;
+    pszSrc = pszHex;
+    for (; ;)
+    {
+        /* Pick the next two digit from the string. */
+        char ch = *pszSrc++;
```
unsigned char uchDigit1 = g_auchDigits[(unsigned char)ch];
unsigned char uchDigit2;
if (uchDigit1 >= 16)
{
    if ('\0' || ch == 't')
        ch = *pszSrc++;
    return ch ? VWRN_TRAILING_CHARS : VWRN_TRAILING_SPACES;
}

ch = *pszSrc++;
uchDigit2 = g_auchDigits[(unsigned char)ch];
if (uchDigit2 >= 16)
    return VERR_UNEVEN_INPUT;

/* Add the byte to the output buffer. */
if (!cbDst)
    return VERR_BUFFER_OVERFLOW;
        cbDst--;
        *pbDst++ = (uchDigit1 << 4) | uchDigit2;
    }
}
RT_EXPORT_SYMBOL(RTStrConvertHexBytes);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/table/avl_Base.cpp.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/table/avl_Base.cpp.h
@@ -0,0 +1,460 @@
+/* $Id: avl_Base.cpp.h $ */
+/** @file
+ * kAVLBase - basic routines for all AVL trees.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation */
+
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef _kAVLBase_h_
+#define _kAVLBase_h_
+
+/** @page pg_rt_kAVL kAVL Template configuration.
+ * @internal
+ *
+ * This is a template made to implement multiple AVL trees. The differences
+ * among the implementations are related to the key used.
+ *
+ * \#define KAVL_FUNCTION
+ * Use this to alter the names of the AVL functions.
+ * Must be defined.
+ *
+ * \#define KAVL_EQUAL_ALLOWED
+ * Define this to tell us that equal keys are allowed.
+ * Then Equal keys will be put in a list pointed to by pList in the KAVLNODECORE.
+ * This is by default not defined.
+ *
+ * \#define KAVL_CHECK_FOR_EQUAL_INSERT
+ * Define this to enable insert check for equal nodes.
+ * This is by default not defined.
+ *
+ * \#define KAVL_MAX_HEAP
+ * Use this to specify the number of stack entries the stack will use when inserting
+ * and removing nodes from the tree. I think the size should be about
+ * \log2(<max nodes>) + 3
+ * Must be defined.
+ */
+
+/**************************************************************************/
*   Defined Constants And Macros                                           *
/**************************************************************************/
#define AVL_HEIGHTOF(pNode) ((unsigned char)((pNode) != NULL ? pNode->uchHeight : 0))

/** @def KAVL_GET_POINTER
 * Reads a 'pointer' value.
 *
 * @returns The native pointer.
 * @param pp Pointer to the pointer to read.
 */
/** @def KAVL_GET_POINTER_NULL
 * Reads a 'pointer' value which can be KAVL_NULL.
 * @returns The native pointer.
 * @returns NULL pointer if KAVL_NULL.
 * @param pp Pointer to the pointer to read.
 */

/** @def KAVL_SET_POINTER
 * Writes a 'pointer' value.
 * For offset-based schemes offset relative to pp is calculated and assigned to *pp.
 * @returns stored pointer.
 * @param pp Pointer to where to store the pointer.
 * @param p Native pointer to assign to *pp.
 */

/** @def KAVL_SET_POINTER_NULL
 * Writes a 'pointer' value which can be KAVL_NULL.
 * For offset-based schemes offset relative to pp is calculated and assigned to *pp,
 * if p is not KAVL_NULL of course.
 * @returns stored pointer.
 * @param pp Pointer to where to store the pointer.
 * @param pp2 Pointer to where to pointer to assign to pp. This can be KAVL_NULL
 */

#ifndef KAVL_GET_POINTER
#ifdef KAVL_OFFSET
#define KAVL_GET_POINTER(pp)              ( (PKAVLNODECORE)((intptr_t)(pp) + *(pp)) )
#define KAVL_GET_POINTER_NULL(pp)         ( *(pp) != KAVL_NULL ? KAVL_GET_POINTER(pp) :
#define KAVL_SET_POINTER(pp, p)           ( (*(pp)) = ((intptr_t)(p) - (intptr_t)(pp)) )
#define KAVL_SET_POINTER_NULL(pp, pp2)    ( (*(pp)) = *(pp2) != KAVL_NULL ?
#else
#define KAVL_GET_POINTER(pp)              ( *(pp) )
#define KAVL_GET_POINTER_NULL(pp)         ( *(pp) )
#define KAVL_SET_POINTER(pp, p)           ( *(pp)) = (p) )
#define KAVL_SET_POINTER_NULL(pp, pp2)    ( *(pp)) = *(pp2) )
#endif
#endif

/** @def KAVL_NULL
+ * The NULL 'pointer' equivalent.
+ */
+#ifndef KAVL_NULL
+ ifndef KAVL_OFFSET
+ define KAVL_NULL 0
+ else
+ define KAVL_NULL NULL
+ endif
+#endif
+
+#ifndef KAVL_RANGE
+ define KAVL_R_IS_INTERSECTING(key1B, key2B, key1E, key2E) KAVL_E(key1B, key2B)
+ define KAVL_R_IS_IDENTICAL(key1B, key2B, key1E, key2E) KAVL_E(key1B, key2B)
+ endif
+
+/** @def KAVL_DECL
+ * Function declation macro in the RTDECL tradition.
+ */
+#ifndef KAVL_DECL
+ define KAVL_DECL(a_Type) RTDECL(a_Type)
+ endif
+
+******************************************************************************
+*   Structures and Typedefs                                                *
+******************************************************************************
+* A stack used to avoid recursive calls...
+ */
typedef struct _kAvlStack
+
        unsigned cEntries;
        PPKAVLNODECORE aEntries[KAVL_MAX_STACK];
    } KAVLSTACK, *PKAVLSTACK;
+
+typedef struct _kAvlStack2
+
        unsigned cEntries;
        PKAVLNODECORE aEntries[KAVL_MAX_STACK];
        char achFlags[KAVL_MAX_STACK];
    } KAVLSTACK2, *PKAVLSTACK2;
+
+/**
+ * Rewinds a stack of pointers to pointers to nodes, rebalancing the tree.
+ */
+ @param pStack Pointer to stack to rewind.
+ @sketch LOOP thru all stack entries
+ * Get pointer to pointer to node (and pointer to node) from the stack.
+ * IF 2 higher left subtree than in right subtree THEN
+ * BEGIN
+ * IF higher (or equal) left-sub-subtree than right-sub-subtree THEN
+ *    * n+2|n+3
+ *     /   / \
+ *     n+2 n ==> n+1 n+1|n+2
+ *     / \   / \ 
+ *     n+1 n|n+1 n|n+1 n
+ *
+ *
+ * Or with keys:
+ *    4 2
+ *     / \ / \ 
+ *    2 5 ==> 1 4
+ *     /\ /\ 
+ *    1 3 3 5
+ *
+ * ELSE
+ *    * n+2
+ *     / \ / \ 
+ *     n+2 n n+1 n+1
+ *     / \ ==> / / /\ 
+ *     n n+1 n L R n
+ *     /\ 
+ *     L R
+ *
+ * Or with keys:
+ *    6 4
+ *     / \ / \ 
+ *    2 7 ==> 2 6
+ *     / \ / \ / \ 
+ *    1 4 1 3 5 7
+ *    /\ 
+ *    3 5
+ * END
+ * ELSE IF 2 higher in right subtree than in left subtree THEN
+ * BEGIN
+ * Same as above but left <= right. (invert the picture)
+ * ELSE
+ * IF correct height THEN break
+ * ELSE correct height.
+ * END
+ */
+DECLINLINE(void) KAVL_FN(Rebalance)(PKAVLSTACK pStack)
+{  
+    while (pStack->cEntries > 0)
/** @todo Perhaps some of these KAVL_SET_POINTER_NULL() cases could be optimized away.. */

PPKAVLNODECORE  ppNode = pStack->aEntries[--pStack->cEntries];
PPKAVLNODECORE  pNode = KAVL_GET_POINTER(ppNode);
PPKAVLNODECORE  pLeftNode = KAVL_GET_POINTER_NULL(&pNode->pLeft);
unsigned char  uchLeftHeight = AVL_HEIGHTOF(pLeftNode);
PPKAVLNODECORE  pRightNode = KAVL_GET_POINTER_NULL(&pNode->pRight);
unsigned char  uchRightHeight = AVL_HEIGHTOF(pRightNode);

if (uchRightHeight + 1 < uchLeftHeight)
{
    PPKAVLNODECORE  pLeftLeftNode = KAVL_GET_POINTER_NULL(&pLeftNode->pLeft);
    PPKAVLNODECORE  pLeftRightNode = KAVL_GET_POINTER_NULL(&pLeftNode->pRight);
    unsigned char  uchLeftRightHeight = AVL_HEIGHTOF(pLeftRightNode);

    if (AVL_HEIGHTOF(pLeftLeftNode) >= uchLeftRightHeight)
    {
        KAVL_SET_POINTER_NULL(&pNode->pLeft, &pLeftNode->pRight);
        KAVL_SET_POINTER(&pLeftNode->pRight, pNode);
        pLeftNode->uchHeight = (unsigned char)(1 + (pNode->uchHeight = (unsigned char)(1 + uchLeftRightHeight)));
        KAVL_SET_POINTER(ppNode, pLeftNode);
    }
    else
    {
        KAVL_SET_POINTER_NULL(&pLeftNode->pRight, &pLeftRightNode->pLeft);
        KAVL_SET_POINTER_NULL(&pNode->pLeft, &pLeftRightNode->pRight);
        KAVL_SET_POINTER(&pLeftRightNode->pLeft, pLeftNode);
        KAVL_SET_POINTER(&pLeftRightNode->pRight, pNode);
        pLeftNode->uchHeight = pNode->uchHeight = uchLeftRightHeight;
        pLeftRightNode->uchHeight = uchLeftHeight;
        KAVL_SET_POINTER(ppNode, pLeftRightNode);
    }
}
else if (uchLeftHeight + 1 < uchRightHeight)
{
    PPKAVLNODECORE  pRightLeftNode = KAVL_GET_POINTER_NULL(&pRightNode->pLeft);
    unsigned char  uchRightLeftHeight = AVL_HEIGHTOF(pRightLeftNode);
    PPKAVLNODECORE  pRightRightNode = KAVL_GET_POINTER_NULL(&pRightNode->pRight);

    if (AVL_HEIGHTOF(pRightRightNode) >= uchRightLeftHeight)
    {
        KAVL_SET_POINTER_NULL(&pNode->pRight, &pRightNode->pLeft);
        KAVL_SET_POINTER(&pRightNode->pLeft, pNode);
        pRightNode->uchHeight = (unsigned char)(1 + (pNode->uchHeight = (unsigned char)(1 + uchRightLeftHeight)));
        KAVL_SET_POINTER(ppNode, pRightNode);
    }
    else
    {
        KAVL_SET_POINTER_NULL(&pRightNode->pLeft, &pRightLeftNode->pRight);
        KAVL_SET_POINTER_NULL(&pRightNode->pRight, &pRightLeftNode->pLeft);
        KAVL_SET_POINTER(&pRightLeftNode->pRight, pRightNode);
        KAVL_SET_POINTER(&pRightLeftNode->pLeft, pNode);
        pRightNode->uchHeight = pNode->uchHeight = uchRightLeftHeight;
        pRightLeftNode->uchHeight = uchRightHeight;
        KAVL_SET_POINTER(ppNode, pRightLeftNode);
    }
}
else
{
    PPKAVLNODECORE  pRightLeftNode = KAVL_GET_POINTER_NULL(&pRightNode->pLeft);
    unsigned char  uchRightLeftHeight = AVL_HEIGHTOF(pRightLeftNode);
    PPKAVLNODECORE  pRightRightNode = KAVL_GET_POINTER_NULL(&pRightNode->pRight);

    if (AVL_HEIGHTOF(pRightRightNode) >= uchRightLeftHeight)
    {
        KAVL_SET_POINTER_NULL(&pNode->pRight, &pRightNode->pLeft);
        KAVL_SET_POINTER(&pRightNode->pLeft, pNode);
        pRightNode->uchHeight = (unsigned char)(1 + (pNode->uchHeight = (unsigned char)(1 + uchRightLeftHeight)));
        KAVL_SET_POINTER(ppNode, pRightNode);
    }
    else
    {
        KAVL_SET_POINTER_NULL(&pRightNode->pLeft, &pRightLeftNode->pRight);
        KAVL_SET_POINTER_NULL(&pRightNode->pRight, &pRightLeftNode->pLeft);
        KAVL_SET_POINTER(&pRightLeftNode->pRight, pRightNode);
        KAVL_SET_POINTER(&pRightLeftNode->pLeft, pNode);
        pRightNode->uchHeight = pNode->uchHeight = uchRightLeftHeight;
        pRightLeftNode->uchHeight = uchRightHeight;
        KAVL_SET_POINTER(ppNode, pRightLeftNode);
    }
}
else
{
    KAVL_SET_POINTER_NULL(&pRightNode->pLeft, &pRightLeftNode->pRight);
    KAVL_SET_POINTER_NULL(&pNode->pRight, &pRightLeftNode->pLeft);
    KAVL_SET_POINTER(&pRightLeftNode->pRight, pRightNode);
    KAVL_SET_POINTER(&pRightLeftNode->pLeft, pNode);
    pRightNode->uchHeight = pNode->uchHeight = uchRightLeftHeight;
    pRightLeftNode->uchHeight = uchRightHeight;
    KAVL_SET_POINTER(ppNode, pRightLeftNode);
}

if (uchHeight == pNode->uchHeight)
    break;

pNode->uchHeight = uchHeight;

/**
 * Inserts a node into the AVL-tree.
 * @returns TRUE if inserted.
 * @returns FALSE if node exists in tree.
 * @param ppTree Pointer to the AVL-tree root node pointer.
 * @param pNode Pointer to the node which is to be added.
 * @sketch Find the location of the node (using binary tree algorithm): LOOP until KAVL_NULL leaf pointer
 * BEGIN
 * Add node pointer pointer to the AVL-stack.
 * IF new-node-key < node key THEN
 * left
 * ELSE
 * right
 * END
 * Fill in leaf node and insert it.
 * Rebalance the tree.
 */
KAVL_DECL(bool) KAVL_FN(Insert)(PPKAVLNODECORE ppTree, PKAVLNODECORE pNode)
{
    KAVLSTACK AVLStack;
    PPKAVLNODECORE ppCurNode = ppTree;
    register PKAVLNODECORE pCurNode;
+ register KAVLKEY Key = pNode->Key; NOREF(Key);
+#ifndef KAVL_RANGE
+ register KAVLKEY KeyLast = pNode->KeyLast; NOREF(KeyLast);
+#endif

+ AVLStack.cEntries = 0;
+
+#ifndef KAVL_RANGE
+ if (Key > KeyLast)
+    return false;
+#endif

+ for (;;) {
+    if (*ppCurNode != KAVL_NULL)
+        pCurNode = KAVL_GET_POINTER(ppCurNode);
+    else
+        break;
+
+    kASSERT(AVLStack.cEntries < KAVL_MAX_STACK);
+    AVLStack.aEntries[AVLStack.cEntries++] = ppCurNode;
+#ifdef KAVL_EQUAL_ALLOWED
+    if (KAVL_R_IS_IDENTICAL(pCurNode->Key, Key, pCurNode->KeyLast, KeyLast))
+        {
+            /*
+             * If equal then we'll use a list of equal nodes.
+             */
+            pNode->pLeft = pNode->pRight = KAVL_NULL;
+            pNode->uchHeight = 0;
+            KAVL_SET_POINTER_NULL(&pNode->pList, &pCurNode->pList);
+            KAVL_SET_POINTER(&pCurNode->pList, pNode);
+            return true;
+        }
+#endif
+#ifdef KAVL_CHECK_FOR_EQUAL_INSERT
+    if (KAVL_R_IS_INTERSECTING(pCurNode->Key, Key, pCurNode->KeyLast, KeyLast))
+        return false;
+#endif
+    if (KAVL_G(pCurNode->Key, Key))
+        ppCurNode = &pCurNode->pLeft;
+    else
+        ppCurNode = &pCurNode->pRight;
+ }

+ pNode->pLeft = pNode->pRight = KAVL_NULL;
+#ifdef KAVL_EQUAL_ALLOWED
+ pNode->pList = KAVL_NULL;
+#endif
+ pNode->uchHeight = 1;
+ KAVL_SET_POINTER(ppCurNode, pNode);
+
+ KAVL_FN(Rebalance)(SSToDS(&AVLStack));
+ return true;
+
+
+/**
+ * Removes a node from the AVL-tree.
+ * @returns   Pointer to the node.
+ * @param     ppTree  Pointer to the AVL-tree root node pointer.
+ * @param     Key     Key value of the node which is to be removed.
+ * @sketch    Find the node which is to be removed:
+ *            LOOP until not found
+ *            BEGIN
+ *                Add node pointer pointer to the AVL-stack.
+ *                IF the keys matches THEN break!
+ *                IF remove key < node key THEN
+ *                    left
+ *                ELSE
+ *                    right
+ *            END
+ *            IF found THEN
+ *            BEGIN
+ *                IF left node not empty THEN
+ *                BEGIN
+ *                    Find the right most node in the left tree while adding the pointer to the pointer to it's parent to the
+ *                        stack:
+ *                    Start at left node.
+ *                    LOOP until right node is empty
+ *                    BEGIN
+ *                        Add to stack.
+ *                        go right.
+ *                    END
+ *                    Link out the found node.
+ *                    Replace the node which is to be removed with the found node.
+ *                    Correct the stack entry for the pointer to the left tree.
+ *                    END
+ *                    ELSE
+ *                    BEGIN
+ *                        Move up right node.
+ *                        Remove last stack entry.
+ *                    END
+ *                    Balance tree using stack.
+ *                    END
+ *                    return pointer to the removed node (if found).
+ */
+KAVAL_DECL(PKAVLNODECORE) KAVL_FN(Remove)(PKAVLNODECORE ppTree, KAVLKEY Key)
+
+    KAVLSTACK AVLStack;
+    PKAVLNODECORE ppDeleteNode = ppTree;
+    register PKAVLNODECORE pDeleteNode;
+
+    AVLStack.cEntries = 0;
+
+    for (;;) {
+        if (*ppDeleteNode != KAVL_NULL)
+            pDeleteNode = KAVL_GET_POINTER(ppDeleteNode);
+        else
+            return NULL;
+
+        kASSERT(AVLStack.cEntries < KAVL_MAX_STACK);
+        AVLStack.aEntries[AVLStack.cEntries++] = ppDeleteNode;
+        if (KAVL_E(pDeleteNode->Key, Key))
+            break;
+
+        if (KAVL_G(pDeleteNode->Key, Key))
+            ppDeleteNode = &pDeleteNode->pLeft;
+        else
+            ppDeleteNode = &pDeleteNode->pRight;
+    }
+
+    if (pDeleteNode->pLeft != KAVL_NULL)
+    {
+        /* find the rightmost node in the left tree. */
+        const unsigned iStackEntry = AVLStack.cEntries;
+        PPKAVLNODECORE ppLeftLeast = &pDeleteNode->pLeft;
+        register PKAVLNODECORE pLeftLeast = KAVL_GET_POINTER(ppLeftLeast);
+
+        while (pLeftLeast->pRight != KAVL_NULL)
+        {
+            kASSERT(AVLStack.cEntries < KAVL_MAX_STACK);
+            AVLStack.aEntries[AVLStack.cEntries++] = ppLeftLeast;
+            ppLeftLeast = &pLeftLeast->pRight;
+            pLeftLeast = KAVL_GET_POINTER(ppLeftLeast);
+        }
+
+        /* link out pLeftLeast */
+        KAVL_SET_POINTER_NULL(ppLeftLeast, &pLeftLeast->pLeft);
+
+        /* link it in place of the delete node. */
+        KAVL_SET_POINTER_NULL(&pLeftLeast->pLeft, &pDeleteNode->pLeft);
+        KAVL_SET_POINTER_NULL(&pLeftLeast->pRight, &pDeleteNode->pRight);
+        pLeftLeast->uchHeight = pDeleteNode->uchHeight;
+    }

+      KAVL_SET_POINTER(ppDeleteNode, pLeftLeast);
+      AVLStack.aEntries[iStackEntry] = &pLeftLeast->pLeft;
+  }
+  else
+  {
+    KAVL_SET_POINTER_NULL(ppDeleteNode, &pDeleteNode->pRight);
+    AVLStack.cEntries--;
+  }
+}
+
+    KAVL_FN(Rebalance)(SSToDS(&AVLStack));
+    return pDeleteNode;
+}
+
+#ifndef
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/table/avl_Destroy.cpp.h
+++ linux-4.15.0.orig/ubuntu/vboxguest/common/table/avl_Destroy.cpp.h
@@ -0,0 +1,110 @@
+/* $Id: avl_Destroy.cpp.h $ */
+/** @file
+ * kAVLDestroy - Walk the tree calling a callback to destroy all the nodes.
+ */
+*
+/**
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+ *
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef _kAVLDestroy_h_
+#define _kAVLDestroy_h_
+/**
+ */
+ * Destroys the specified tree, starting with the root node and working our way down.
+ *
+ * @returns 0 on success.
+ * @returns Return value from callback on failure. On failure, the tree will be in
+ * an unbalanced condition and only further calls to the Destroy should be
+ * made on it. Note that the node we fail on will be considered dead and
+ * no action is taken to link it back into the tree.
+ * @param ppTree Pointer to the AVL-tree root node pointer.
+ * @param pfnCallBack Pointer to callback function.
+ * @param pvUser User parameter passed on to the callback function.
+ */
+KAVL_DECL(int) KAVL_FN(Destroy)(PPKAVLNODECORE ppTree, PKAVLCALLBACK pfnCallBack, void *
pvUser)
+{
+    unsigned cEntries;
+    PAVLNODECORE apEntries[KAVL_MAX_STACK];
+    int rc;
+    
+    if (*ppTree == KAVL_NULL)
+        return VINF_SUCCESS;
+    
+    cEntries = 1;
+    apEntries[0] = KAVL_GET_POINTER(ppTree);
+    while (cEntries > 0)
+    {
+        /*
+         * Process the subtrees first.
+         */
+        PAVLNODECORE pNode = apEntries[cEntries - 1];
+        if (pNode->pLeft != KAVL_NULL)
+            apEntries[cEntries++] = KAVL_GET_POINTER(&pNode->pLeft);
+        else if (pNode->pRight != KAVL_NULL)
+            apEntries[cEntries++] = KAVL_GET_POINTER(&pNode->pRight);
+        else
+        {
+            if (!KAVL_EQUAL_ALLOWED
+            /*
+             * Process nodes with the same key.
+             */
+            while (pNode->pList != KAVL_NULL)
+            {
+                PAVLNODECORE pEqual = KAVL_GET_POINTER(&pNode->pList);
+                KAVL_SET_POINTER(&pNode->pList, KAVL_GET_POINTER_NULL(&pEqual->pList));
+                pEqual->pList = KAVL_NULL;
+                
+                rc = pfnCallBack(pEqual, pvUser);
+                if (rc != VINF_SUCCESS)
+                    return rc;
+            }
+            
+            break;
+        }
+        }
+    }
+    
+    return rc;
+}
/* Unlink the node. */
if (--cEntries > 0)
{
    PKAVLNODECORE pParent = apEntries[cEntries - 1];
    if (KAVL_GET_POINTER(&pParent->pLeft) == pNode)
        pParent->pLeft = KAVL_NULL;
    else
        pParent->pRight = KAVL_NULL;
}
else
    *ppTree = KAVL_NULL;

kASSERT(pNode->pLeft == KAVL_NULL);
kASSERT(pNode->pRight == KAVL_NULL);
rc = pfnCallBack(pNode, pvUser);
if (rc != VINF_SUCCESS)
    return rc;
}
} /* while */

kASSERT(*ppTree == KAVL_NULL);

return VINF_SUCCESS;
}
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#ifndef _kAVLDoWithAll_h_
#define _kAVLDoWithAll_h_

 /*!< Iterates thru all nodes in the given tree. */
@returns 0 on success. Return from callback on failure.
@params ppTree Pointer to the AVL-tree root node pointer.
 fFromLeft TRUE: Left to right.
 FALSE: Right to left.
 pfnCallBack Pointer to callback function.
 pvParam Userparameter passed on to the callback function.
 */

+KAVL_DECL(int) KAVL_FN(DoWithAll)(PPKAVLNODECORE ppTree, int fFromLeft, PKAVLCALLBACK pfnCallBack, void * pvParam)
+{ }
+ KAVLSTACK2 AVLStack;
+ PKAVLNODECORE pNode;
+KAVLEQUAL_ALLOWED
+ PKAVLNODECORE pEqual;
+endif
+ int rc;
+
+ if (*ppTree == KAVL_NULL)
+   return VINF_SUCCESS;
+
+ AVLStack.cEntries = 1;
+ AVLStack.achFlags[0] = 0;
+ AVLStack.aEntries[0] = KAVL_GET_POINTER(ppTree);
+
+ if (fFromLeft)
+ { /* from left */
+   while (AVLStack.cEntries > 0)
+   {
+     pNode = AVLStack.aEntries[AVLStack.cEntries - 1];
+     */
/* left */
if (!AVLStack.achFlags[AVLStack.cEntries - 1]++)
{
    if (pNode->pLeft != KAVL_NULL)
    {
        AVLStack.achFlags[AVLStack.cEntries] = 0; /* 0 first, 1 last */
        AVLStack.aEntries[AVLStack.cEntries++] = KAVL_GET_POINTER(&pNode->pLeft);
        continue;
    }
}
/* center */
rc = pfnCallBack(pNode, pvParam);
if (rc != VINF_SUCCESS)
    return rc;
#ifdef KAVL_EQUAL_ALLOWED
    if (pNode->pList != KAVL_NULL)
    {
        for (pEqual = KAVL_GET_POINTER(&pNode->pList); pEqual; pEqual =
            KAVL_GET_POINTER_NULL(&pEqual->pList))
            {
                rc = pfnCallBack(pEqual, pvParam);
                if (rc != VINF_SUCCESS)
                    return rc;
            }
#endif
/* right */
AVLStack.cEntries--;
if (pNode->pRight != KAVL_NULL)
{
    AVLStack.achFlags[AVLStack.cEntries] = 0;
    AVLStack.aEntries[AVLStack.cEntries++] = KAVL_GET_POINTER(&pNode->pRight);
}
} /* while */
else
{
    /* from right */
    while (AVLStack.cEntries > 0)
    {
        pNode = AVLStack.aEntries[AVLStack.cEntries - 1];
        /* right */
        if (!AVLStack.achFlags[AVLStack.cEntries - 1]++)
        {
            if (pNode->pRight != KAVL_NULL)
            {
                AVLStack.achFlags[AVLStack.cEntries] = 0; /* 0 first, 1 last */
            }
        }
}
AVLStack.aEntries[AVLStack.cEntries++] = KAVL_GET_POINTER(&pNode->pRight);
+ continue;
+ }
+
+ /* center */
+ rc = pfnCallBack(pNode, pvParam);
+ if (rc != VINF_SUCCESS)
+ return rc;
+
+ ifdef KAVL_EQUAL_ALLOWED
+ if (pNode->pList != KAVL_NULL)
+ for (pEqual = KAVL_GET_POINTER(&pNode->pList); pEqual; pEqual =
KAVL_GET_POINTER_NULL(&pEqual->pList))
+ +
+ rc = pfnCallBack(pEqual, pvParam);
+ if (rc != VINF_SUCCESS)
+ return rc;
+ +
+ endif
+
+ /* left */
+ AVLStack.cEntries--;
+ if (pNode->pLeft != KAVL_NULL)
+ {
+ AVLStack.achFlags[AVLStack.cEntries] = 0;
+ AVLStack.aEntries[AVLStack.cEntries++] = KAVL_GET_POINTER(&pNode->pLeft);
+ }
+ } /* while */
+
+ return VINF_SUCCESS;
+ }
+
+ endif
+
+ --- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/table/avl_Get.cpp.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/table/avl_Get.cpp.h
@@ -0,0 +1,67 @@
+/* $Id: avl_Get.cpp.h $ */
+/** @file
+ * kAVLGet - get routine for AVL trees.
+ */
+ *
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+ */
+
+#ifndef _KAVLGet_h_
+#define _KAVLGet_h_
+
+/**
+ * Gets a node from the tree (does not remove it!)
+ * @returns   Pointer to the node holding the given key.
+ * @param     ppTree  Pointer to the AVL-tree root node pointer.
+ * @param     Key     Key value of the node which is to be found.
+ * @author    knut st. osmundsen
+ */
+ KAVAL_DECL(PKAVLNODECORE) KAVL_FN(Get)(PPKAVLNODECORE ppTree, KAVLKEY Key)
+ {
+    register PKAVLNODECORE pNode = KAVL_GET_POINTER_NULL(ppTree);
+    if (pNode)
+    {
+        while (KAVL_NE(pNode->Key, Key))
+        {
+            if (KAVL_G(pNode->Key, Key))
+            {
+                if (pNode->pLeft != KAVL_NULL)
+                    pNode = KAVL_GET_POINTER(&pNode->pLeft);
+                else
+                    return NULL;
+            }
+            else
+            {
+                if (pNode->pRight != KAVL_NULL)
+                    pNode = KAVL_GET_POINTER(&pNode->pRight);
+                else
+                    return NULL;
+            }
+        }
+    }
+    else
+        return NULL;
+}
return NULL;
}
}
}

return pNode;
}

#endif

/* $Id: avl_GetBestFit.cpp.h $ */
/** @file
 * kAVLGetBestFit - Get Best Fit routine for AVL trees.
 * Intended specially on heaps. The tree should allow duplicate keys.
 * */

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 * */

#ifndef _kAVLGetBestFit_h_
#define _kAVLGetBestFit_h_

/** Finds the best fitting node in the tree for the given Key value.
 * @returns Pointer to the best fitting node found. */

#endif
@param ppTree Pointer to Pointer to the tree root node.
@param Key The Key of which is to be found a best fitting match for.
@param fAbove TRUE: Returned node is have the closest key to Key from above.
FALSE: Returned node is have the closest key to Key from below.
@sketch The best fitting node is always located in the searchpath above you.
>= (above): The node where you last turned left.
<= (below): the node where you last turned right.
*/
KAVL_DECL(PKAVLNODECORE) KAVL_FN(GetBestFit)(PPKAVLNODECORE ppTree, KAVLKEY Key, bool fAbove)
{
    register PKAVLNODECORE pNode = KAVL_GET_POINTER_NULL(ppTree);
    if (pNode)
    {
        PKAVLNODECORE pNodeLast = NULL;
        if (fAbove)
        {   /* pNode->Key >= Key */
            while (KAVL_NE(pNode->Key, Key))
            {
                if (KAVL_G(pNode->Key, Key))
                {
                    if (pNode->pLeft != KAVL_NULL)
                        pNodeLast = pNode;
                    pNode = KAVL_GET_POINTER(&pNode->pLeft);
                }
                else
                {
                    if (pNode->pRight != KAVL_NULL)
                        pNode = KAVL_GET_POINTER(&pNode->pRight);
                    else
                        return pNodeLast;
                }
            }
        }
        else
        {   /* pNode->Key <= Key */
            while (KAVL_NE(pNode->Key, Key))
            {
                if (KAVL_G(pNode->Key, Key))
                {
                    if (pNode->pLeft != KAVL_NULL)
                        pNode = KAVL_GET_POINTER(&pNode->pLeft);
                    else
                        return pNodeLast;
                }
                else
                {
                    if (pNode->pRight != KAVL_NULL)
                        pNode = KAVL_GET_POINTER(&pNode->pRight);
                    else
                        return pNodeLast;
                }
            }
        }
    }
}
if (pNode->pRight != KAVL_NULL)
    {
        pNodeLast = pNode;
        pNode = KAVL_GET_POINTER(&pNode->pRight);
    }

else
    {
        return pNode;
    }

/* perfect match or nothing. */
return pNode;

#ifendif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/table/avl_RemoveBestFit.cpp.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/table/avl_RemoveBestFit.cpp.h
@@ -0,0 +1,70 @@
/* $Id: avl_RemoveBestFit.cpp.h $ */
/** @file
 * kAVLRemoveBestFit - Remove Best Fit routine for AVL trees.
 *                     Intended specially on heaps. The tree should allow duplicate keys.
 */

/* Copyright (C) 2006-2017 Oracle Corporation
 */

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 */

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 CDDL are applicable instead of those of the GPL. */
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ifndef _kAVLRemoveBestFit_h_
define _kAVLRemoveBestFit_h_
+
+ * Finds the best fitting node in the tree for the given Key value. And removes it.
+ * @returns Pointer to the best fitting node found.
+ * @param ppTree Pointer to Pointer to the tree root node.
+ * @param Key The Key of which is to be found a best fitting match for..
+ * @param fAbove TRUE: Returned node is have the closest key to Key from above.
+ * FALSE: Returned node is have the closest key to Key from below.
+ * @sketch The best fitting node is always located in the searchpath above you.
+ * >= (above): The node where you last turned left.
+ * <= (below): the node where you last turned right.
+ * @remark This implementation should be speeded up slightly!
+ */

KAVL_DECL(PKAVLNODECORE) KAVL_FN(RemoveBestFit)(PPKAVLNODECORE ppTree, KAVLKEY Key, bool fAbove)
{
    /*
     * If we find anything we'll have to remove the node and return it.
     * But, if duplicate keys are allowed we'll have to check for multiple
     * nodes first and return one of them before doing an expensive remove+insert.
     */
    PKAVLNODECORE   pNode = KAVL_FN(GetBestFit)(ppTree, Key, fAbove);
    if (pNode != NULL)
    {
#ifdef KAVL_EQUAL_ALLOWED
        if (pNode->pList != KAVL_NULL)
        {
            PKAVLNODECORE pRet = KAVL_GET_POINTER(&pNode->pList);
            KAVL_SET_POINTER_NULL(&pNode->pList, &pRet->pList);
            return pRet;
        }
#endif
        pNode = KAVL_FN(Remove)(ppTree, pNode->Key);
    }
    return pNode;
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/table/avlpv.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/table/avlpv.c
@@ -0,0 +1,78 @@
+/* $Id: avlpv.cpp $ */
+/** @file
+ * IPRT - AVL tree, void *, unique keys.
+ */
+ +/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+ +#ifndef NOFILEID
+static const char szFileId[] = "Id: kAVLPVInt.c,v 1.5 2003/02/13 02:02:35 bird Exp ";
+ +#endif
+ +
+ + /*******************************************************************************************
+ *   Defined Constants And Macros                                                                 
+ *******************************************************************************************/
+ */
+ /* Defined Constants And Macros */
+ /*******************************************************************************************/
+ */
+ * AVL configuration.
+ */
+ #define KAVL_FN(a)                  RTAvlPV##a
+ #define KAVL_MAX_STACK              27  /* Up to 2^24 nodes. */
+ #define KAVL_CHECK_FOR_EQUAL_INSERT 1  /* No duplicate keys! */
+ #define KAVLNODECORE                AVLPVNODECORE
+ #define PKAVLNODECORE               PAVLPVNODECORE
+ #define PPKAVLNODECORE              PPAVLPVNODECORE
+ #define KAVLKEY                     AVLPVKEY
+#define PKAVLKEY       PAVLVPKEY
+define KAVLENUMDATA  AVLPVENUMDATA
+define PKAVLENUMDATA  PAVLVPVENUMDATA
+define PKAVLCALLBACK  PAVLVPVCALLBACK
+
+
+/*
+ * AVL Compare macros
+ */
+define KAVL_G(key1, key2)  ((const char*)(key1) >  (const char*)(key2) )
+define KAVL_E(key1, key2)  ((const char*)(key1) == (const char*)(key2) )
+define KAVL_NE(key1, key2) ((const char*)(key1) != (const char*)(key2) )
+
+
+*******************************************************************************************
+**************************************
+*   Header Files                                                                                      *
+*******************************************************************************************
+include <iprt/avl.h>
+include <iprt/assert.h>
+include <iprt/err.h>
+
+/*
+ * Include the code.
+ */
+define SSToDS(ptr) ptr
+define KMAX RT_MAX
+define kASSERT Assert
+include "avl_Base.cpp.h"
+include "avl_Get.cpp.h"
+include "avl_GetBestFit.cpp.h"
+include "avl_RemoveBestFit.cpp.h"
+include "avl_DoWithAll.cpp.h"
+include "avl_Destroy.cpp.h"
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/common/time/time.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/common/time/time.c
@@ -0,0 +1,1109 @@
+/* $Id: time.cpp $ */
+/** @file
+ * IPRT - Time.
+ */
+}
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ */
+/* This file is part of VirtualBox Open Source Edition (OSE), as

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+ * CDDL are applicable instead of those of the GPL.
+ * 
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ /*******************************************************************************************
+ *** Header Files ***
+ /*******************************************************************************************
+
+ #define LOG_GROUP RTLOGGROUP_TIME
+ #include <iprt/time.h>
+ #include "internal/iprt.h"
+ +
+ #include <iprt/ctype.h>
+ #include <iprt/string.h>
+ #include <iprt/assert.h>
+ #include "internal/time.h"
+ +
+ /*******************************************************************************************
+ *** Defined Constants And Macros ***
+ /*******************************************************************************************
+
+ /** The max year we possibly could implode. */
+ #define RTTIME_MAX_YEAR (292 + 1970)
+ /** The min year we possibly could implode. */
+ #define RTTIME_MIN_YEAR (-293 + 1970)
+
+ /** The max day supported by our time representation. (2262-04-11T23-47-16.854775807) */
+ #define RTTIME_MAX_DAY (365*292+71 + 101-1)
+ /** The min day supported by our time representation. (1677-09-21T00-12-43.145224192) */
+ #define RTTIME_MIN_DAY (365*-293-70 + 264-1)
+/** The max nano second into the max day. (2262-04-11T23-47-16.854775807) */
+#define RTTIME_MAX_DAY_NANO     ( INT64_C(1000000000) * (23*3600 + 47*60 + 16) + 854775807 )
+/** The min nano second into the min day. (1677-09-21T00-12-43.145224192) */
+#define RTTIME_MIN_DAY_NANO     ( INT64_C(1000000000) * (00*3600 + 12*60 + 43) + 145224192 )
+
+/**
+ * Asserts that a_pTime is normalized.
+ */
+#define RTTIME_ASSERT_NORMALIZED(a_pTime) \
+   do \ 
+       { \ 
+           Assert(RT_ABS((a_pTime)->offUTC) <= 840); \ 
+           Assert((a_pTime)->u32Nanosecond < 1000000000); \ 
+           Assert((a_pTime)->u8Second < 60); \ 
+           Assert((a_pTime)->u8Minute < 60); \ 
+           Assert((a_pTime)->u8Hour < 24); \ 
+           Assert((a_pTime)->u8Month >= 1 && (a_pTime)->u8Month <= 12); \ 
+           Assert((a_pTime)->u8MonthDay >= 1 && (a_pTime)->u8MonthDay <= 31); \ 
+           Assert( (a_pTime)->u16YearDay >= 1); \ 
+           Assert( (a_pTime)->u16YearDay <= (rtTimeIsLeapYear((a_pTime)->i32Year) ? 366 : 365)); \ 
+       } while (0)
+
+*******************************************************************************************
+**************************************
+*   Global Variables                                                                                                             *
+********************************************************************************************
+/**
+ * Days per month in a common year.
+ */
+static const uint8_t g_acDaysInMonths[12] =
+{ 
+  /*Jan Feb Mar Arp May Jun Jul Aug Sep Oct Nov Dec */
+  31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31
+};
+
+/**
+ * Days per month in a leap year.
+ */
+static const uint8_t g_acDaysInMonthsLeap[12] =
+{ 
+  /*Jan Feb Mar Arp May Jun Jul Aug Sep Oct Nov Dec */
+  31, 29, 31, 30, 31, 30, 31, 30, 31, 30, 31, 30
+};
```c
+ * The day of year for each month in a common year.
+ */
+static const uint16_t g_aiDayOfYear[12 + 1] =
+{
+  1,  /* Jan */
+  1 + 31,  /* Feb */
+  1 + 31 + 28,  /* Mar */
+  1 + 31 + 28 + 31,  /* Apr */
+  1 + 31 + 28 + 31 + 30,  /* May */
+  1 + 31 + 28 + 31 + 30 + 31,  /* Jun */
+  1 + 31 + 28 + 31 + 30 + 31 + 30,  /* Jul */
+  1 + 31 + 28 + 31 + 30 + 31 + 30 + 31,  /* Aug */
+  1 + 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31,  /* Sep */
+  1 + 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30,  /* Oct */
+  1 + 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31,  /* Nov */
+  1 + 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31 + 30,  /* Dec */
+  1 + 31 + 28 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31 + 30 + 31
+};
+
+/**
+ * The day of year for each month in a leap year.
+ */
+static const uint16_t g_aiDayOfYearLeap[12 + 1] =
+{
+  1,  /* Jan */
+  1 + 31,  /* Feb */
+  1 + 31 + 29,  /* Mar */
+  1 + 31 + 29 + 31,  /* Apr */
+  1 + 31 + 29 + 31 + 30,  /* May */
+  1 + 31 + 29 + 31 + 30 + 31,  /* Jun */
+  1 + 31 + 29 + 31 + 30 + 31 + 30,  /* Jul */
+  1 + 31 + 29 + 31 + 30 + 31 + 30 + 31,  /* Aug */
+  1 + 31 + 29 + 31 + 30 + 31 + 30 + 31 + 31,  /* Sep */
+  1 + 31 + 29 + 31 + 30 + 31 + 30 + 31 + 31 + 30,  /* Oct */
+  1 + 31 + 29 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31,  /* Nov */
+  1 + 31 + 29 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31 + 30,  /* Dec */
+  1 + 31 + 29 + 31 + 30 + 31 + 30 + 31 + 31 + 30 + 31 + 30 + 31
+};
+
+/**
+ * The index of 1970 in g_aoffYear
+ */
+#define OFF_YEAR_IDX_EPOCH 300
+/**
+ * The year of the first index.
+ */
+#define OFF_YEAR_IDX_0_YEAR 1670
+
+/**
+ * The number of days the 1st of January a year is offseted from 1970-01-01.
+ */
+static const int32_t g_aoffYear[] =
```
<table>
<thead>
<tr>
<th>Year</th>
<th>Sales (100s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>365,000</td>
</tr>
<tr>
<td>2011</td>
<td>365,100</td>
</tr>
<tr>
<td>2012</td>
<td>365,200</td>
</tr>
<tr>
<td>2013</td>
<td>365,300</td>
</tr>
<tr>
<td>2014</td>
<td>365,400</td>
</tr>
<tr>
<td>2015</td>
<td>365,500</td>
</tr>
<tr>
<td>2016</td>
<td>365,600</td>
</tr>
<tr>
<td>2017</td>
<td>365,700</td>
</tr>
<tr>
<td>2018</td>
<td>365,800</td>
</tr>
<tr>
<td>2019</td>
<td>365,900</td>
</tr>
<tr>
<td>2020</td>
<td>366,000</td>
</tr>
</tbody>
</table>

*Open Source Used In 5GaaS Edge AC-4 37064*
<table>
<thead>
<tr>
<th>Year</th>
<th>Months</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910</td>
<td>365* -63+16</td>
<td>365* -62+16</td>
</tr>
<tr>
<td>1920</td>
<td>365* -59+15</td>
<td>365* -58+15</td>
</tr>
<tr>
<td>1930</td>
<td>365* -55+15</td>
<td>365* -54+14</td>
</tr>
<tr>
<td>1940</td>
<td>365* -51+13</td>
<td>365* -50+13</td>
</tr>
<tr>
<td>1950</td>
<td>365* -47+12</td>
<td>365* -46+12</td>
</tr>
<tr>
<td>1960</td>
<td>365* -43+11</td>
<td>365* -42+11</td>
</tr>
<tr>
<td>1970</td>
<td>365* -39+10</td>
<td>365* -38+10</td>
</tr>
<tr>
<td>1980</td>
<td>365* -35+9</td>
<td>365* -34+9</td>
</tr>
<tr>
<td>1990</td>
<td>365* -31+8</td>
<td>365* -30+8</td>
</tr>
<tr>
<td>2000</td>
<td>365* -27+7</td>
<td>365* -26+6</td>
</tr>
<tr>
<td>2010</td>
<td>365* -23+6</td>
<td>365* -22+6</td>
</tr>
<tr>
<td>2020</td>
<td>365* -19+5</td>
<td>365* -18+5</td>
</tr>
<tr>
<td>2030</td>
<td>365* -15+4</td>
<td>365* -14+4</td>
</tr>
<tr>
<td>2040</td>
<td>365* -11+3</td>
<td>365* -10+3</td>
</tr>
<tr>
<td>2050</td>
<td>365* -7+2</td>
<td>365* -6+2</td>
</tr>
<tr>
<td>2060</td>
<td>365* -3+2</td>
<td>365* -2+2</td>
</tr>
<tr>
<td>2070</td>
<td>365* +0+1</td>
<td>365* +1+1</td>
</tr>
<tr>
<td>2080</td>
<td>365* +3+1</td>
<td>365* +4+1</td>
</tr>
<tr>
<td>2090</td>
<td>365* +6+1</td>
<td>365* +7+1</td>
</tr>
<tr>
<td>2100</td>
<td>365* +9+1</td>
<td>365* +10+1</td>
</tr>
<tr>
<td>2110</td>
<td>365* +12+1</td>
<td>365* +13+1</td>
</tr>
<tr>
<td>2120</td>
<td>365* +15+1</td>
<td>365* +16+1</td>
</tr>
<tr>
<td>2130</td>
<td>365* +18+1</td>
<td>365* +19+1</td>
</tr>
<tr>
<td>2140</td>
<td>365* +22+1</td>
<td>365* +23+1</td>
</tr>
</tbody>
</table>

**Open Source Used In 5GasS Edge AC-4 37065**
/* generator code: */
#include <stdio.h>

bool isLeapYear(int iYear)
{
    return iYear % 4 == 0 && (iYear % 100 != 0 || iYear % 400 == 0);
}

void printYear(int iYear, int iLeap)
{
    if (!(iYear % 10))
        printf("/ *%d:* /", iYear + 1970);
    printf(" 365*%4d+%-3d,", iYear, iLeap);
}

int main()
{
    int iYear = 0;
    int iLeap = 0;
    while (iYear > -300)
    {
        iLeap = isLeapYear(1970 + --iYear);
        printYear(iYear, iLeap);
    }
    return 0;
}
+ iLeap += isLeapYear(1970 + iYear++);
+ }
+ printf("n");
+ return 0;
+ }
+ */
+
+
+/**
+ * Checks if a year is a leap year or not.
+ *
+ * @returns true if it's a leap year.
+ * @returns false if it's a common year.
+ * @param   i32Year     The year in question.
+ */
+DECLINLINE(bool) rtTimeIsLeapYear(int32_t i32Year)
+{
+    return i32Year % 4 == 0
+    && (    i32Year % 100 != 0
+        ||  i32Year % 400 == 0);
+}
+
+
+/**
+ * Checks if a year is a leap year or not.
+ *
+ * @returns true if it's a leap year.
+ * @returns false if it's a common year.
+ * @param   i32Year     The year in question.
+ */
+RTDECL(bool) RTTimeIsLeapYear(int32_t i32Year)
+{
+    return rtTimeIsLeapYear(i32Year);
+}
+RT_EXPORT_SYMBOL(RTTimeIsLeapYear);
+
+
+/**
+ * Explodes a time spec (UTC).
+ *
+ * @returns pTime.
+ * @param   pTime       Where to store the exploded time.
+ * @param   pTimeSpec   The time spec to exploded.
+ */
+RTDECL(PRTTIME) RTTimeExplode(PRTTIME pTime, PCRTTIMESPEC pTimeSpec)
+{
+    int64_t i64Div;
+    int32_t i32Div;
+ int32_t i32Rem;
+ unsigned iYear;
+ const uint16_t *paiDayOfYear;
+ int iMonth;
+
+ //
+ * The simple stuff first.
+ */
+ pTime->fFlags = RTTIME_FLAGS_TYPE_UTC;
+ i64Div = pTimeSpec->i64NanosecondsRelativeToUnixEpoch;
+ i32Rem = (int32_t)(i64Div % 1000000000);
+ i64Div /= 1000000000;
+ if (i32Rem < 0)
+ {
+     i32Rem += 1000000000;
+     i64Div--;
+ }
+ pTime->u32Nanosecond = i32Rem;
+
+ /* second */
+ i32Rem = (int32_t)(i64Div % 60);
+ i64Div /= 60;
+ if (i32Rem < 0)
+ {
+     i32Rem += 60;
+     i64Div--;
+ }
+ pTime->u8Second = i32Rem;
+
+ /* minute */
+ i32Div = (int32_t)i64Div;  /* 60,000,000,000 > 33bit, so 31bit suffices. */
+ i32Rem = i32Div % 60;
+ i32Div /= 60;
+ if (i32Rem < 0)
+ {
+     i32Rem += 60;
+     i32Div--;
+ }
+ pTime->u8Minute = i32Rem;
+
+ /* hour */
+ i32Rem = i32Div % 24;
+ i32Div /= 24;  /* days relative to 1970-01-01 */
+ if (i32Rem < 0)
+ {
+     i32Rem += 24;
+     i32Div--;
+ }
+ pTime->u8Hour = i32Rem;
+
+ /* week */
+ i32Rem = i32Div % 7;
+ i32Div /= 7;
+ if (i32Rem < 0)
+ {
+     i32Rem += 7;
+     i32Div--;
+ }
+ pTime->u8Week = i32Rem;
+
+ /* year */
+ i32Rem = i32Div % 400;
+ i32Div /= 400;
+ if (i32Rem < 0)
+ {
+     i32Rem += 400;
+     i32Div--;
+ }
+ pTime->u16Year = i32Rem;
+
+ /* century */
+ if (i32Div < 0)
+ {
+     i32Div += 400;
+     i32Rem -= 1;
+ }
+ pTime->u8Century = i32Div / 100;
+
+ /* day of the year */
+ i32Rem = i32Div % 100;
+ i32Div /= 100;
+ if (i32Rem < 0)
+ {
+     i32Rem += 100;
+     i32Div--;
+ }
+ pTime->u16DayOfYear = i32Rem;
+
+ /* Appendix: old 1970-01-01 day */
+ i32Rem = (int32_t)(i32Div * 365);
+ i32Div /= 365;
+ if (i32Rem < 0)
+ {
+     i32Rem += 365;
+     i32Div--;
+ }
+ pTime->u32Old1970Day = i32Rem;
        i32Rem += 24;
        i32Div--;
    }
    pTime->u8Hour = i32Rem;
    /* weekday - 1970-01-01 was a Thursday (3) */
    pTime->u8WeekDay = ((int)(i32Div % 7) + 3 + 7) % 7;
    /*
     * We've now got a number of days relative to 1970-01-01.
     * To get the correct year number we have to mess with leap years. Fortunately,
     * the representation we've got only supports a few hundred years, so we can
     * generate a table and perform a simple two way search from the modulus 365 derived.
     */
    iYear = OFF_YEAR_IDX_EPOCH + i32Div / 365;
    while (g_aoffYear[iYear + 1] <= i32Div)
        iYear++;
    while (g_aoffYear[iYear] > i32Div)
        iYear--;
    pTime->i32Year = iYear + OFF_YEAR_IDX_0_YEAR;
    i32Div -= g_aoffYear[iYear];
    pTime->u16YearDay = i32Div + 1;
    /* Figuring out the month is done in a manner similar to the year, only here we
     * ensure that the index is matching or too small.
     */
    if (rtTimeIsLeapYear(pTime->i32Year))
    {
        pTime->fFlags |= RTTIME_FLAGSLeap_YEAR;
        paiDayOfYear = &g_aiDayOfYearLeap[0];
    }
    else
    {
        pTime->fFlags |= RTTIME_FLAGSCOMMON_YEAR;
        paiDayOfYear = &g_aiDayOfYear[0];
    }
    iMonth = i32Div / 32;
    i32Div++;
    while (paiDayOfYear[iMonth + 1] <= i32Div)
        iMonth++;
    pTime->u8Month = iMonth + 1;
    i32Div -= paiDayOfYear[iMonth];
    pTime->u8MonthDay = i32Div + 1;
    /* This is for UTC timespecs, so, no offset. */
    pTime->offUTC = 0;
+ return pTime;
+}
+RT_EXPORT_SYMBOL(RTTimeExplode);
+
+
+/**
+ * Implodes exploded time to a time spec (UTC).
+*
+ * @returns pTime on success.
+ * @returns NULL if the pTime data is invalid.
+ * @param pTimeSpec Where to store the imploded UTC time.
+*
If pTime specifies a time which outside the range, maximum or
+*
minimum values will be returned.
+ * @param pTime
Pointer to the exploded time to implode.
+*
The fields u8Month, u8WeekDay and u8MonthDay are not used,
+*
and all the other fields are expected to be within their
+*
bounds. Use RTTimeNormalize() to calculate u16YearDay and
+*
normalize the ranges of the fields.
+ */
+RTDECL(PRTTIMESPEC) RTTimeImplode(PRTTIMESPEC pTimeSpec, PCRTTIME pTime)
+{
+ int32_t i32Days;
+ uint32_t u32Secs;
+ int64_t i64Nanos;
+
+ /*
+ * Validate input.
+ */
+ AssertReturn(VALID_PTR(pTimeSpec), NULL);
+ AssertReturn(VALID_PTR(pTime), NULL);
+ AssertReturn(pTime->u32Nanosecond < 1000000000, NULL);
+ AssertReturn(pTime->u8Second < 60, NULL);
+ AssertReturn(pTime->u8Minute < 60, NULL);
+ AssertReturn(pTime->u8Hour < 24, NULL);
+ AssertReturn(pTime->u16YearDay >= 1, NULL);
+ AssertReturn(pTime->u16YearDay <= (rtTimeIsLeapYear(pTime->i32Year) ? 366 : 365), NULL);
+ AssertMsgReturn(pTime->i32Year <= RTTIME_MAX_YEAR && pTime->i32Year >=
RTTIME_MIN_YEAR, ("%RI32\n", pTime->i32Year), NULL);
+
+ /*
+ * Do the conversion to nanoseconds.
+ */
+ i32Days = g_aoffYear[pTime->i32Year - OFF_YEAR_IDX_0_YEAR]
+
+ pTime->u16YearDay - 1;
+ AssertMsgReturn(i32Days <= RTTIME_MAX_DAY && i32Days >= RTTIME_MIN_DAY, ("%RI32\n",
i32Days), NULL);
+
+ u32Secs = pTime->u8Second

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+    + pTime->u8Minute * 60
+    + pTime->u8Hour    * 3600;
+    i64Nanos = (uint64_t)pTime->u32Nanosecond
+    + u32Secs * UINT64_C(1000000000);
+    AssertMsgReturn(i32Days != RTTIME_MAX_DAY || i64Nanos <= RTTIME_MAX_DAY_NANO,
+    ("%RI64", i64Nanos), NULL);
+    AssertMsgReturn(i32Days != RTTIME_MIN_DAY || i64Nanos >= RTTIME_MIN_DAY_NANO, ("%RI64", i64Nanos), NULL);
+    + i64Nanos += i32Days * UINT64_C(86400000000000);
+    + pTimeSpec->i64NanosecondsRelativeToUnixEpoch = i64Nanos;
+    + return pTimeSpec;
+}
+RT_EXPORT_SYMBOL(RTTimeImplode);
+
+/**
+ * Internal worker for RTTimeNormalize and RTTimeLocalNormalize.
+ * It doesn't adjust the UCT offset but leaves that for RTTimeLocalNormalize.
+ */
+static PRTTIME rtTimeNormalizeInternal(PRTTIME pTime)
+{
+    unsigned    uSecond;
+    unsigned    uMinute;
+    unsigned    uHour;
+    bool        fLeapYear;
+
+    /*
+     * Fix the YearDay and Month/MonthDay.
+     */
+    fLeapYear = rtTimeIsLeapYear(pTime->i32Year);
+    if (!pTime->u16YearDay)
+    {  
+        /*
+         * The Month+MonthDay must present, overflow adjust them and calc the year day.
+         */
+        AssertMsgReturn(    pTime->u8Month
+                        &&  pTime->u8MonthDay,
+                        ("date=%d-%d-%d", pTime->i32Year, pTime->u8Month, pTime->u8MonthDay),
+                        NULL);
+        while (pTime->u8Month > 12)
+        {  
+            pTime->u8Month -= 12;
+            pTime->i32Year++;
+            fLeapYear = rtTimeIsLeapYear(pTime->i32Year);
+            pTime->fFlags &= ~(RTTIME_FLAGS_COMMON_YEAR | RTTIME_FLAGS_LEAP_YEAR);
+        }
+    }
for (;;)
{
    unsigned cDaysInMonth = fLeapYear
    ? g_acDaysInMonthsLeap[pTime->u8Month - 1]
    : g_acDaysInMonths[pTime->u8Month - 1];
    if (pTime->u8MonthDay <= cDaysInMonth)
        break;
    pTime->u8MonthDay -= cDaysInMonth;
    if (pTime->u8Month != 12)
        pTime->u8Month++;
    else
    {
        pTime->u8Month = 1;
        pTime->i32Year++;
        fLeapYear = rtTimeIsLeapYear(pTime->i32Year);
        pTime->fFlags &= ~(RTTIME_FLAGS_COMMON_YEAR | RTTIME_FLAGSLeap_YEAR);
    }
}

    pTime->u16YearDay = pTime->u8MonthDay - 1
    + (fLeapYear
    ? g_aiDayOfYearLeap[pTime->u8Month - 1]
    : g_aiDayOfYear[pTime->u8Month - 1]);
}
else
{
    /*
     * Are both YearDay and Month/MonthDay valid?
     * Check that they don't overflow and match, if not use YearDay (simpler).
     */
    bool fRecalc = true;
    if (    pTime->u8Month && pTime->u8MonthDay)
    {
        do
        {
            uint16_t u16YearDay;

            /* If you change one, zero the other to make clear what you mean. */
            AssertBreak(pTime->u8Month <= 12);
            AssertBreak(pTime->u8MonthDay <= (fLeapYear
                ? g_acDaysInMonthsLeap[pTime->u8Month - 1]
                : g_acDaysInMonths[pTime->u8Month - 1]));
            u16YearDay = pTime->u8MonthDay - 1
            + (fLeapYear
                ? g_aiDayOfYearLeap[pTime->u8Month - 1]
                : g_aiDayOfYear[pTime->u8Month - 1]);
        }
    }
+ AssertBreak(u16YearDay == pTime->u16YearDay);
+ fRecalc = false;
+ } while (0);
+ if (fRecalc)
+ {
+    const uint16_t *paiDayOfYear;
+
+    /* overflow adjust YearDay */
+    while (pTime->u16YearDay > (fLeapYear ? 366 : 365))
+    {
+        pTime->u16YearDay -= fLeapYear ? 366 : 365;
+        pTime->i32Year++;
+        fLeapYear = rtTimeIsLeapYear(pTime->i32Year);
+        pTime->iFlags &= ~(RTTIME_FLAGS_COMMON_YEAR | RTTIME_FLAGS_LEAP_YEAR);
+    }
+    /* calc Month and MonthDay */
+    paiDayOfYear = fLeapYear
+                     ? &g_aiDayOfYearLeap[0]
+                     : &g_aiDayOfYear[0];
+    pTime->u8Month = 1;
+    while (pTime->u16YearDay > paiDayOfYear[pTime->u8Month])
+        pTime->u8Month++;
+    Assert(pTime->u8Month >= 1 && pTime->u8Month <= 12);
+    pTime->u8MonthDay = pTime->u16YearDay - paiDayOfYear[pTime->u8Month - 1] + 1;
+ }
+ }
+
+ /* Fixup time overflows.
+ * Use unsigned int values internally to avoid overflows.
+ */
+ uSecond = pTime->u8Second;
+ uMinute = pTime->u8Minute;
+ uHour   = pTime->u8Hour;
+
+ while (pTime->u32Nanosecond >= 1000000000)
+ {
+    pTime->u32Nanosecond -= 1000000000;
+    uSecond++;
+ }
+
+ while (uSecond >= 60)
+ {
+    uSecond -= 60;
+    uMinute++;
+ }
    + while (uMinute >= 60)
    + {  
    +     uMinute -= 60;
    +     uHour++;
    + }

    + while (uHour >= 24)
    + {  
    +     uHour -= 24;
    +     /* This is really a RTTimeIncDay kind of thing... */
    +     if (pTime->u16YearDay + 1 != (fLeapYear ? g_aiDayOfYearLeap[pTime->u8Month] : g_aiDayOfYear[pTime->u8Month]))
    +     {
    +         pTime->u16YearDay++;
    +         pTime->u8MonthDay++;
    +     }
    +     else if (pTime->u8Month != 12)
    +     {
    +         pTime->u16YearDay++;
    +         pTime->u8Month++;
    +         pTime->u8MonthDay = 1;
    +     }
    +     else
    +     {
    +         pTime->i32Year++;
    +         fLeapYear = rtTimeIsLeapYear(pTime->i32Year);
    +         pTime->fFlags &= ~(RTTIME_FLAGS_COMMON_YEAR | RTTIME_FLAGS_LEAP_YEAR);
    +         pTime->u16YearDay = 1;
    +         pTime->u8Month = 1;
    +         pTime->u8MonthDay = 1;
    +     }
    +     
    +     pTime->u8Second = uSecond;
    +     pTime->u8Minute = uMinute;
    +     pTime->u8Hour = uHour;
    +     /*
    +     * Correct the leap year flag.
    +     * Assert if it's wrong, but ignore if unset.
    +     */
    +     if (fLeapYear)
    +     {
    +         Assert(!(pTime->fFlags & RTTIME_FLAGS_COMMON_YEAR));
    +         pTime->fFlags &= ~RTTIME_FLAGS_COMMON_YEAR;
    +         pTime->fFlags |= RTTIME_FLAGS_LEAP_YEAR;
+   }  
+ else  
+ {  
+   Assert(!(pTime->fFlags & RTTIME_FLAGS_LEAP_YEAR));  
+   pTime->fFlags &= ~RTTIME_FLAGS_LEAP_YEAR;  
+   pTime->fFlags |= RTTIME_FLAGS_COMMON_YEAR;  
+ }  
+ + /*  
+ * Calc week day.  
+ *  
+ * 1970-01-01 was a Thursday (3), so find the number of days relative to  
+ * that point. We use the table when possible and a slow+stupid+brute-force  
+ * algorithm for points outside it. Feel free to optimize the latter by  
+ * using some clever formula.  
+ */  
+ if (    pTime->i32Year >= OFF_YEAR_IDX_0_YEAR  
+     &&  pTime->i32Year <  OFF_YEAR_IDX_0_YEAR + (int32_t)RT_ELEMENTS(g_aoffYear))  
+ {  
+   int32_t offDays = g_aoffYear[pTime->i32Year - OFF_YEAR_IDX_0_YEAR]  
+     + pTime->u16YearDay -1;  
+   pTime->u8WeekDay = ((offDays % 7) + 3 + 7) % 7;  
+ }  
+ else  
+ {  
+   int32_t i32Year = pTime->i32Year;  
+   if (i32Year >= 1970)  
+   {  
+     uint64_t offDays = pTime->u16YearDay - 1;  
+     while ( --i32Year >= 1970)  
+       offDays += rtTimeIsLeapYear(i32Year) ? 366 : 365;  
+     pTime->u8WeekDay = (uint8_t)((offDays + 3) % 7);  
+   }  
+   else  
+ {  
+     int64_t offDays = (fLeapYear ? -366 - 1 : -365 - 1) + pTime->u16YearDay;  
+     while (++i32Year < 1970)  
+       offDays += rtTimeIsLeapYear(i32Year) ? 366 : 365;  
+     pTime->u8WeekDay = ((int)(offDays % 7) + 3 + 7) % 7;  
+   }  
+ }  
+ return pTime;  
+]  
+ + */  
+ * Normalizes the fields of a time structure.
+*
+ * It is possible to calculate year-day from month/day and vice
+ * versa. If you adjust any of these, make sure to zero the
+ * other so you make it clear which of the fields to use. If
+ * it's ambiguous, the year-day field is used (and you get
+ * assertions in debug builds).
+*
+ * All the time fields and the year-day or month/day fields will
+ * be adjusted for overflows. (Since all fields are unsigned, there
+ * is no underflows.) It is possible to exploit this for simple
+ * date math, though the recommended way of doing that to implode
+ * the time into a timespec and do the math on that.
+*
+ * @returns pTime on success.
+ * @returns NULL if the data is invalid.
+*
+ * @param pTime
The time structure to normalize.
+*
+ * @remarks This function doesn't work with local time, only with UTC time.
+ */
+RTDECL(PRTTIME) RTTimeNormalize(PRTTIME pTime)
+{
+ /*
+ * Validate that we've got the minimum of stuff handy.
+ */
+ AssertReturn(VALID_PTR(pTime), NULL);
+ AssertMsgReturn(!(pTime->fFlags & ~RTTIME_FLAGS_MASK), ("%#x\n", pTime->fFlags), NULL);
+ AssertMsgReturn((pTime->fFlags & RTTIME_FLAGS_TYPE_MASK) != RTTIME_FLAGS_TYPE_LOCAL,
("Use RTTimeLocalNormalize!\n"), NULL);
+ AssertMsgReturn(pTime->offUTC == 0, ("%d; Use RTTimeLocalNormalize!\n", pTime->offUTC), NULL);
+
+ pTime = rtTimeNormalizeInternal(pTime);
+ if (pTime)
+
pTime->fFlags |= RTTIME_FLAGS_TYPE_UTC;
+ return pTime;
+}
+RT_EXPORT_SYMBOL(RTTimeNormalize);
+
+
+/**
+ * Converts a time spec to a ISO date string.
+*
+ * @returns psz on success.
+ * @returns NULL on buffer underflow.
+ * @param pTime
The time. Caller should've normalized this.
+ * @param psz
Where to store the string.
+ * @param cb
The size of the buffer.
+ */

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+RTDECL(char *) RTTimeToString(PCRTTIME pTime, char *psz, size_t cb)
+
+    size_t cch;
+
+    /* (Default to UTC if not specified) */
+    if ((pTime->fFlags & RTTIME_FLAGS_TYPE_MASK) == RTTIME_FLAGS_TYPE_LOCAL
+        && pTime->offUTC)
+    {
+        int32_t offUTCHour = pTime->offUTC / 60;
+        int32_t offUTCMinute = pTime->offUTC % 60;
+        char chSign;
+        Assert(pTime->offUTC <= 840 && pTime->offUTC >= -840);
+        if (pTime->offUTC >= 0)
+            chSign = '+';
+        else
+        {
+            chSign = '-';
+            offUTCMinute = -offUTCMinute;
+            offUTCHour = -offUTCHour;
+        }
+        cch = RTStrPrintf(psz, cb,
+                          "%R132-%02u-%02uT%02u:%02u:%09RU32%e%02d%02d",
+                          pTime->i32Year, pTime->u8Month, pTime->u8MonthDay,
+                          pTime->u8Hour, pTime->u8Minute, pTime->u8Second, pTime->u32Nanosecond,
+                          chSign, offUTCHour, offUTCMinute);
+        if (cch <= 15
+            || psz[cch - 5] != chSign)
+            return NULL;
+    }
+    else
+    {
+        cch = RTStrPrintf(psz, cb,
+                          "%R132-%02u-%02uT%02u:%02u:%09RU32Z",
+                          pTime->i32Year, pTime->u8Month, pTime->u8MonthDay,
+                          pTime->u8Hour, pTime->u8Minute, pTime->u8Second, pTime->u32Nanosecond);
+        if (cch <= 15
+            || psz[cch - 1] != 'Z')
+            return NULL;
+    }
+    return psz;
+
+RT_EXPORT_SYMBOL(RTTimeToString);
+
+/**
+ * Converts a time spec to a ISO date string.
+ *
+ * @returns psz on success.
+ * @returns NULL on buffer underflow.
+ * @param   pTime       The time spec.
+ * @param   psz         Where to store the string.
+ * @param   cb          The size of the buffer.
+ */
+RTDECL(char *) RTTimeSpecToString(PCRTTIMESPEC pTime, char *psz, size_t cb)
+{
+    RTTIME Time;
+    return RTTimeToString(RTTimeExplode(&Time, pTime), psz, cb);
+}
+RT_EXPORT_SYMBOL(RTTimeSpecToString);

+/**
+ * Attempts to convert an ISO date string to a time structure.
+ *
+ * We're a little forgiving with zero padding, unspecified parts, and leading
+ * and trailing spaces.
+ *
+ * @retval  pTime on success,
+ * @retval  NULL on failure.
+ * @param   pTime       Where to store the time on success.
+ * @param   pszString   The ISO date string to convert.
+ */
+RTDECL(PRTTIME) RTTimeFromString(PRTTIME pTime, const char *pszString)
+{
+    /* Ignore leading spaces. */
+    while (RT_C_IS_SPACE(*pszString))
+        pszString++;

+    /* Init non date & time parts. */
+    pTime->fFlags = RTTIME_FLAGS_TYPE_LOCAL;
+    pTime->offUTC = 0;

+    /* Year */
+    int rc = RTStrToInt32Ex(pszString, (char **)&pszString, 10, &pTime->i32Year);
+    if (rc != VWRN_TRAILING_CHARS)
+        return NULL;

+    bool const fLeapYear = rtTimeIsLeapYear(pTime->i32Year);
+    if (fLeapYear)
+        pTime->fFlags |= RTTIME_FLAGS_LEAP_YEAR;
if (*pszString++ != '-')
    return NULL;

/* Month of the year. */
rc = RTStrToUInt8Ex(pszString, (char **)pszString, 10, &pTime->u8Month);
if (rc != VWRN_TRAILING_CHARS)
    return NULL;
if (pTime->u8Month == 0 || pTime->u8Month > 12)
    return NULL;
if (*pszString++ != '-')
    return NULL;

/* Day of month. */
rc = RTStrToUInt8Ex(pszString, (char **)&pszString, 10, &pTime->u8MonthDay);
if (rc != VWRN_TRAILING_CHARS && rc != VINF_SUCCESS)
    return NULL;
unsigned const cDaysInMonth = fLeapYear
                                ? g_acDaysInMonthsLeap[pTime->u8Month - 1]
                                : g_acDaysInMonths[pTime->u8Month - 1];
if (pTime->u8MonthDay == 0 || pTime->u8MonthDay > cDaysInMonth)
    return NULL;

/* Calculate year day. */
pTime->u16YearDay = pTime->u8MonthDay - 1
        + (fLeapYear
            ? g_aiDayOfYearLeap[pTime->u8Month - 1]
            : g_aiDayOfYear[pTime->u8Month - 1]);

/* The time part. */
if (*pszString++ != 'T')
    return NULL;

/* Hour. */
rc = RTStrToUInt8Ex(pszString, (char **)pszString, 10, &pTime->u8Hour);
if (rc != VWRN_TRAILING_CHARS)
    return NULL;
if (pTime->u8Hour > 23)
    return NULL;
if (*pszString++ != ':')
    return NULL;

/* Minute. */
rc = RTStrToUInt8Ex(pszString, (char **)pszString, 10, &pTime->u8Minute);
if (rc != VWRN_TRAILING_CHARS)
    return NULL;
+ if (pTime->u8Minute > 59)
+    return NULL;
+ if (*pszString++ != ':')
+    return NULL;
+
+ /* Second. */
+ rc = RTStrToUInt8Ex(pszString, (char **)&pszString, 10, &pTime->u8Minute);
+ if (rc != VINF_SUCCESS && rc != VWRN_TRAILING_CHARS && rc != VWRN_TRAILING_SPACES)
+    return NULL;
+ if (pTime->u8Second > 59)
+    return NULL;
+
+ /* Nanoseconds is optional and probably non-standard. */
+ if (*pszString == '.')
+ {
+    rc = RTStrToUInt32Ex(pszString + 1, (char **)&pszString, 10, &pTime->u32Nanosecond);
+    if (rc != VINF_SUCCESS && rc != VWRN_TRAILING_CHARS && rc != VWRN_TRAILING_SPACES)
+        return NULL;
+    if (pTime->u32Nanosecond >= 1000000000)
+        return NULL;
+    } else
+    pTime->u32Nanosecond = 0;
+
+ /*
+ * Time zone.
+ */
+ if (*pszString == 'Z')
+ {
+    pszString++;
+    pTime->fFlags &= ~RTTIME_FLAGS_TYPE_MASK;
+    pTime->fFlags |= ~RTTIME_FLAGS_TYPE_UTC;
+    pTime->offUTC = 0;
+ } else if ( *pszString == '+'
+      || *pszString == '-')
+ {
+    rc = RTStrToInt32Ex(pszString, (char **)&pszString, 10, &pTime->offUTC);
+    if (rc != VINF_SUCCESS && rc != VWRN_TRAILING_CHARS && rc != VWRN_TRAILING_SPACES)
+        return NULL;
+    } /* else: No time zone given, local with offUTC = 0. */
+
+ /* The rest of the string should be blanks.
+ */
+ char ch;
+ while ((ch = *pszString++) != '\0')
if (!RT_C_IS_BLANK(ch))
    return NULL;

return pTime;
}

RT_EXPORT_SYMBOL(RTTimeFromString);

/**
 * Attempts to convert an ISO date string to a time structure.
 * 
 * We're a little forgiving with zero padding, unspecified parts, and leading
 * and trailing spaces.
 * 
 * @retval  pTime on success,
 * @retval  NULL on failure.
 * @param   pTime       The time spec.
 * @param   pszString   The ISO date string to convert.
 * @ */

RTDECL(PRTTIMESPEC) RTTimeSpecFromString(PRTTIMESPEC pTime, const char *pszString)
{
    RTTIME Time;
    if (RTTimeFromString(&Time, pszString))
        return RTTimeImplode(pTime, &Time);
    return NULL;
}

RT_EXPORT_SYMBOL(RTTimeSpecFromString);

/**
 * Adds one day to @a pTime.
 * 
 * ASSUMES it is zulu time so DST can be ignored.
 * 
 * @ */

static PRTTIME rtTimeAdd1Day(PRTTIME pTime)
{
    Assert(!pTime->offUTC);
    rtTimeNormalizeInternal(pTime);
    pTime->u8MonthDay += 1;
    pTime->u16YearDay = 0;
    return rtTimeNormalizeInternal(pTime);
}

/**
 * Subtracts one day from @a pTime.
 * 
 * ASSUMES it is zulu time so DST can be ignored.
 * 
 * @ */
static PRTTIME rtTimeSub1Day(PRTTIME pTime)
{
    Assert(!pTime->offUTC);
    rtTimeNormalizeInternal(pTime);
    if (pTime->u16YearDay > 1)
    {
        pTime->u16YearDay -= 1;
        pTime->u8Month = 0;
        pTime->u8MonthDay = 0;
    }
    else
    {
        pTime->i32Year -= 1;
        pTime->u16YearDay = rtTimeIsLeapYear(pTime->i32Year) ? 366 : 365;
        pTime->u8MonthDay = 31;
        pTime->u8Month = 12;
    }
    return rtTimeNormalizeInternal(pTime);
}

static PRTTIME rtTimeAddMinutes(PRTTIME pTime, int32_t cAddend)
{
    Assert(RT_ABS(cAddend) < 31 * 24 * 60);
    int32_t const cMinutesInDay = 24 * 60;
    int32_t iDayMinute = (unsigned)pTime->u8Hour * 60 + pTime->u8Minute;
    iDayMinute += cAddend;
    while (iDayMinute >= cMinutesInDay)
    {
        rtTimeAdd1Day(pTime);
        iDayMinute -= cMinutesInDay;
    }
    return pTime;
}
while (iDayMinute < 0)
{
    rtTimeSub1Day(pTime);
    iDayMinute += cMinutesInDay;
}

pTime->u8Hour   = iDayMinute / 60;
pTime->u8Minute = iDayMinute % 60;

return pTime;

/**
 * Converts @a pTime to zulu time (UTC) if needed.
 * @returns pTime.
 * @param   pTime       What to convers (in/out).
 */
static PRTTIME rtTimeConvertToZulu(PRTTIME pTime)
{
    RTTIME_ASSERT_NORMALIZED(pTime);
    if ((pTime->fFlags & RTTIME_FLAGS_TYPE_MASK) != RTTIME_FLAGS_TYPE_UTC)
    {
        int32_t offUTC = pTime->offUTC;
        pTime->offUTC  = 0;
        pTime->fFlags &= ~RTTIME_FLAGS_TYPE_MASK;
        pTime->fFlags |= RTTIME_FLAGS_TYPE_UTC;
        if (offUTC != 0)
            rtTimeAddMinutes(pTime, offUTC);
    }
    return pTime;
}

/**
 * Compares two normalized time structures.
 * @retval  0 if equal.
 * @retval  -1 if @a pLeft is earlier than @a pRight.
 * @retval  1 if @a pRight is earlier than @a pLeft.
 * @param   pLeft       The left side time.  NULL is accepted.
 * @param   pRight      The right side time.  NULL is accepted.
 * @note    A NULL time is considered smaller than anything else.  If both are
 *          NULL, they are considered equal.
 */
+RTDECL(int) RTTimeCompare(PCRTTIME pLeft, PCRTTIME pRight)
+{
+    #ifdef RT STRICT
+        if (pLeft)
+            RTTIME_ASSUME_NORMALIZED(pLeft);
+        if (pRight)
+            RTTIME_ASSUME_NORMALIZED(pRight);
+    #endif
+    int iRet;
+    if (pLeft)
+    {
+        if (pRight)
+        {
+            /*
+             * Only work with normalized zulu time.
++            */
+            RTTIME TmpLeft;
+            if (pLeft->offUTC != 0
+                || pLeft->u16YearDay == 0
+                || pLeft->u16YearDay > 366
+                || pLeft->u8Hour >= 60
+                || pLeft->u8Minute >= 60
+                || pLeft->u8Second >= 60)
+            {
+                TmpLeft = *pLeft;
+                pLeft = rtTimeConvertToZulu(rtTimeNormalizeInternal(&TmpLeft));
+            }
+            /*
+             * Do the comparison.
+             */
+            if (pRight->offUTC != 0
+                || pRight->u16YearDay == 0
+                || pRight->u16YearDay > 366
+                || pRight->u8Hour >= 60
+                || pRight->u8Minute >= 60
+                || pRight->u8Second >= 60)
+            {
+                TmpRight = *pRight;
+                pRight = rtTimeConvertToZulu(rtTimeNormalizeInternal(&TmpRight));
+            }
+            if (pLeft->i32Year != pRight->i32Year)
+                iRet = pLeft->i32Year < pRight->i32Year ? -1 : 1;
+            else if (pLeft->u16YearDay != pRight->u16YearDay)
+                iRet = pLeft->u16YearDay < pRight->u16YearDay ? -1 : 1;
+        }
else if ( pLeft->u8Hour != pRight->u8Hour)  
iRet = pLeft->u8Hour < pRight->u8Hour ? -1 : 1;
else if ( pLeft->u8Minute != pRight->u8Minute)  
iRet = pLeft->u8Minute < pRight->u8Minute ? -1 : 1;
else if ( pLeft->u8Second != pRight->u8Second)  
iRet = pLeft->u8Second < pRight->u8Second ? -1 : 1;
else if ( pLeft->u32Nanosecond != pRight->u32Nanosecond)  
iRet = pLeft->u32Nanosecond < pRight->u32Nanosecond ? -1 : 1;
else
    iRet = 0;
}
else
    iRet = 1;
}
else
    iRet = pRight ? -1 : 0;
return iRet;
}
# Header Files

#include <iprt/assert.h>
#include "internal/iprt.h"

RTDECL(bool) RTAssertShouldPanic(void)
{
    #if 0 /* Enable this to not panic on assertions. (Make sure this code is used!) */
        return false;
    #else
        return RTAssertMayPanic();
    #endif
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/generic/RTLogWriteStdErr-stub-generic.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/generic/RTLogWriteStdErr-stub-generic.c
@@ -0,0 +1,42 @@
+/** $Id: RTLogWriteStdErr-stub-generic.cpp $ */
+/** @file
+ * IPRT - Log To StdErr, Generic Dummy.
+ */
+/*
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+ * terms and conditions of either the GPL or the CDDL or both.
RTDECL(void) RTLogWriteStdErr(const char *pch, size_t cb)
{
    NOREF(pch);
    NOREF(cb);
    return;
}

RT_EXPORT_SYMBOL(RTLogWriteStdErr);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/generic/RTLogWriteStdOut-stub-generic.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/generic/RTLogWriteStdOut-stub-generic.c
@@ -0,0 +1,42 @@
+/* $Id: RTLogWriteStdOut-stub-generic.cpp $ */
+/** @file
+ * IPRT - Log To StdOut, Generic Dummy.
+ */
+/*
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+ */
#include <iprt/log.h>
#include "internal/iprt.h"

RTDECL(void) RTLogWriteStdOut(const char *pch, size_t cb)
{
    NOREF(pch);
    NOREF(cb);
    return;
}

--- linux-4.15.0.org/ubuntu/vbox/vboxguest/generic/RTMpGetCoreCount-generic.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/generic/RTMpGetCoreCount-generic.c
@@ -0,0 +1,40 @@
/* $Id: RTMpGetCoreCount-generic.cpp $ */
/** @file
 * IPRT - Multiprocessor, Generic RTMpGetCoreCount.
 */

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 */
# Header Files

```c
#include <iprt/mp.h>
#include "internal/iprt.h"
```

```c
RTDECL(RTCPUID) RTMpGetCoreCount(void)
{
    return RTMpGetCount();
}
RT_EXPORT_SYMBOL(RTMpGetCoreCount);
```

---

```c
/* $Id: RTSemEventMultiWait-2-ex-generic.cpp $ */
/** @file
 * IPRT - RTSemEventMultiWait, implementation based on RTSemEventMultiWaitEx.
 */
```

```c
/* Copyright (C) 2010-2017 Oracle Corporation */
```

```c
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 */
```

```c
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 */
```

```c
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 */
```

---
# Header Files

```c
#define LOG_GROUP RTLOGGROUP_SEM
#define RTSEMEVENTMULTI_WITHOUT_REMAPPING
#include <iprt/semaphore.h>
#include "internal/iprt.h"
+
#include <iprt/err.h>
#include <iprt/assert.h>

RTDECL(int) RTSemEventMultiWait(RTSEMEVENTMULTI hEventMultiSem, RTMSINTERVAL cMillies)
{
    int rc;
    if (cMillies == RT_INDEFINITE_WAIT)
        rc = RTSemEventMultiWaitEx(hEventMultiSem, RTSEMWAIT_FLAGS_RESUME | RTSEMWAIT_FLAGS_INDEFINITE, 0);
    else
        rc = RTSemEventMultiWaitEx(hEventMultiSem,
                                   RTSEMWAIT_FLAGS_RESUME | RTSEMWAIT_FLAGS_RELATIVE | RTSEMWAIT_FLAGS_MILLISECS,
                                   cMillies);
    Assert(rc != VERR_INTERRUPTED);
    return rc;
}
RT_EXPORT_SYMBOL(RTSemEventMultiWait);
```

---

```c
/* $Id: RTSemEventMultiWaitNoResume-2-ex-generic.cpp $ */
/** @file
 * IPRT - RTSemEventMultiWaitNoResume, generic implementation based
 * on RTSemEventMultiWaitEx.
 */

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 */

---

```
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Header Files

```
#define LOG_GROUP RTLOGGROUP_SEM
#define RTSEMEVENTMULTI_WITHOUT_REMAPPING
#include <iprt/semap.h>
#include "internal/iprt.h"
#include <iprt/err.h>
#include <iprt/assert.h>

RTDECL(int) RTSemEventMultiWaitNoResume(RTSEMEVENTMULTI hEventMultiSem, RTMSINTERVAL cMillies)
{
    int rc;
    if (cMillies == RT_INDEFINITE_WAIT)
        rc = RTSemEventMultiWaitEx(hEventMultiSem, RTSEMWAIT_FLAGS_NORESUME | RTSEMWAIT_FLAGS_INDEFINITE, 0);
    else
        rc = RTSemEventMultiWaitEx(hEventMultiSem,
                                   RTSEMWAIT_FLAGS_NORESUME | RTSEMWAIT_FLAGS_RELATIVE | RTSEMWAIT_FLAGS_MILLISECS,
                                   cMillies);    
    return rc;
}
```

---

```
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/generic/RTSemEventWait-2-ex-generic.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/generic/RTSemEventWait-2-ex-generic.c
@@ -0,0 +1,53 @@
+/* $Id: RTSemEventWait-2-ex-generic.cpp $ */
+/** @file
+ * IPRT - RTSemEventWait, implementation based on RTSemEventWaitEx.
+ */
```

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 */

#include <iprt/semaphore.h>
#include "internal/iprt.h"

#include <iprt/err.h>
#include <iprt/assert.h>

RTDECL(int)  RTSemEventWait(RTSEMEVENT hEventSem, RTMSINTERVAL cMillies)
{
    int rc;
    if (cMillies == RT_INDEFINITE_WAIT)
        rc = RTSemEventWaitEx(hEventSem, RTSEMWAIT_FLAGS_RESUME |
RTSEMWAIT_FLAGS_INDEFINITE, 0);
    else
        rc = RTSemEventWaitEx(hEventSem,
RTSEMWAIT_FLAGS_RESUME | RTSEMWAIT_FLAGS_RELATIVE |
RTSEMWAIT_FLAGS_MILLISECS, cMillies);
Assert(rc != VERR_INTERRUPTED);

return rc;

+RT_EXPORT_SYMBOL(RTSemEventWait);
+
--- linux-4.15.0.org/ubuntu/vbox/vboxguest/generic/RTSemEventWaitNoResume-2-ex-generic.c
+++ linux-4.15.0.org/ubuntu/vbox/vboxguest/generic/RTSemEventWaitNoResume-2-ex-generic.c
@@ -0,0 +1,53 @@
+/* $Id: RTSemEventWaitNoResume-2-ex-generic.cpp $ */
+/** @file
+ * IPRT - RTSemEventWaitNoResume, generic implementation based
+ * on RTSemEventWaitEx.
+ */
+/*
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+ */
+
+/#define LOG_GROUP RTLOGGROUP_SEM
+/#define RTSEMEVENT_WITHOUT_REMAPPING
+/#include <iprt/semaphore.h>
+#include "internal/iprt.h"
+
+/#include <iprt/err.h>
+/#include <iprt/assert.h>
RTDECL(int) RTSemEventWaitNoResume(RTSEMEVENT hEventSem, RTMSINTERVAL cMillies)
{
    int rc;
    if (cMillies == RT_INDEFINITE_WAIT)
        rc = RTSemEventWaitEx(hEventSem, RTSEMWAIT_FLAGS_NORESUME | RTSEMWAIT_FLAGS_INDEFINITE, 0);
    else
        rc = RTSemEventWaitEx(hEventSem, RTSEMWAIT_FLAGS_NORESUME | RTSEMWAIT_FLAGS_RELATIVE | RTSEMWAIT_FLAGS_MILLISECS, cMillies);
    return rc;
}

RT_EXPORT_SYMBOL(RTSemEventWaitNoResume);

/* $Id: errvars-generic.cpp $ */
/** @file
 * IPRT - Save and Restore Error Variables, generic stub implementation.
 */

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 */
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 */
# Header Files

```c
#include <iprt/err.h>
#include "internal/iprt.h"

#include <iprt/assert.h>
#include "internal/magics.h"
```

```c
RTDECL(PRTERRVARS) RTErrVarsSave(PRTERRVARS pVars)
{
    pVars->ai32Vars[0] = RTERRVARS_MAGIC;
    return pVars;
}
```

```c
RTDECL(void) RTErrVarsRestore(PCRTERRVARS pVars)
{
    Assert(pVars->ai32Vars[0] == RTERRVARS_MAGIC);
    RT_NOREF_PV(pVars);
}
```

```c
RTDECL(bool) RTErrVarsAreEqual(PCRTERRVARS pVars1, PCRTERRVARS pVars2)
{
    Assert(pVars1->ai32Vars[0] == RTERRVARS_MAGIC);
    Assert(pVars2->ai32Vars[0] == RTERRVARS_MAGIC);
    return pVars1->ai32Vars[0] == pVars2->ai32Vars[0];
}
```

```c
RTDECL(bool) RTErrVarsHaveChanged(PCRTERRVARS pVars)
{
    Assert(pVars->ai32Vars[0] == RTERRVARS_MAGIC);
    RT_NOREF_PV(pVars);
    return false;
}
```

---

```c
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/generic/mppresent-generic.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/generic/mppresent-generic.c
@@ -0,0 +1,61 @@
+/* $Id: mppresent-generic.cpp $ */
+/** @file
+ * IPRT - Multiprocessor, Stubs for the RTMp*Present* API.
```
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   */

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   */

/*******************************************************************************************
**************************************
*   Header Files                                                                                                                 *
*************************************/
#include <iprt/mp.h>
#include "internal/iprt.h"

RTDECL(PRTCPUSET) RTMpGetPresentSet(PRTCPUSET pSet)
{
    return RTMpGetSet(pSet);
}
RT_EXPORT_SYMBOL(RTMpGetPresentSet);

RTDECL(RTCPUID) RTMpGetPresentCount(void)
{
    return RTMpGetCount();
}
RT_EXPORT_SYMBOL(RTMpGetPresentCount);

RTDECL(RTCPUID) RTMpGetPresentCoreCount(void)
+{  
+    return RTMpGetCoreCount();  
+}  
+RT_EXPORT_SYMBOL(RTMpGetPresentCoreCount);  
+  
+RTDECL(bool) RTMpIsCpuPresent(RTCPUID idCpu)  
+{  
+    return RTMpIsCpuPossible(idCpu);  
+}  
+RT_EXPORT_SYMBOL(RTMpIsCpuPresent);  
+  
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/generic/rtStrFormatKernelAddress-generic.c  
+++ linux-4.15.0/ubuntu/vbox/vboxguest/generic/rtStrFormatKernelAddress-generic.c  
@@ -0,0 +1,74 @@  
+/* $Id: rtStrFormatKernelAddress-generic.cpp $ */  
+/** @file  
+ * IPRT - IPRT String Formatter, ring-0 addresses.  
+ */  
+  
+/*  
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+ */  
+  
+/*  
+*******************************************************************************************  
+**************************************  
+*   Header Files  
+*******************************************************************************************  
+*/  
+#define LOG_GROUP RTLOGGROUP_STRING
DECLHIDDEN(size_t) rtStrFormatKernelAddress(char *pszBuf, size_t cbBuf, RTR0INTPTR uPtr, signed int cchWidth,
    signed int cchPrecision, unsigned int fFlags)
{
#ifndef DEBUG
    RT_NOREF(uPtr, cchWidth, cchPrecision);
#else  /* DEBUG */
    Assert(cbBuf >= 64);
    return RTStrFormatNumber(pszBuf, uPtr, 16, cchWidth, cchPrecision, fFlags);
#endif /* DEBUG */
}
#ifndef ___VBox_VBoxGuest_h
#define ___VBox_VBoxGuest_h

#include <VBox/types.h>
#include <iprt/assertcompile.h>
#include <VBox/VMMDevCoreTypes.h>
#include <VBox/VBoxGuestCoreTypes.h>

/** @defgroup grp_vboxguest  VirtualBox Guest Additions Device Driver
 * Also know as VBoxGuest.
 */

/** @defgroup grp_vboxguest_ioc  VirtualBox Guest Additions Driver Interface
 */

+#ifndef ___VBox_VBoxGuest_h
+#define ___VBox_VBoxGuest_h

+#include <VBox/types.h>
+#include <iprt/assertcompile.h>
+#include <VBox/VMMDevCoreTypes.h>
+#include <VBox/VBoxGuestCoreTypes.h>

/** @defgroup grp_vboxguest VBoxGuest - VirtualBox Guest Additions Driver Interface. (ADD.DEV)
 */

/** @note This file is used by 16-bit compilers too (OpenWatcom).
 */

/** @defgroup grp_vboxguest_ioc  VirtualBox Guest Additions Driver Interface
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 */

/* It is considered internal in ring-3, please use the VbgIR3 functions.

- I/O controls for user and/or kernel mode starts at 0.
*/
- IDC specific requests descends from 127.
- Bits 7 and 6 are currently reserved for future hacks.

@remarks When creating new IOCTL interfaces keep in mind that not all OSes supports reporting back the output size. (This got messed up a little bit in VBoxDrv.)

The request size is also a little bit tricky as it's passed as part of the request code on unix. The size field is 14 bits on Linux, 12 bits on *BSD, 13 bits Darwin, and 8-bits on Solaris. All the BSDs and Darwin kernels will make use of the size field, while Linux and Solaris will not. We're of course using the size to validate and/or map/lock the request, so it has to be valid.

For Solaris we will have to do something special though, 255 isn't sufficient for all we need. A 4KB restriction (BSD) is probably not too problematic (yet) as a general one.

More info can be found in SUPDRVIOC.h and related sources.

@remarks If adding interfaces that only has input or only has output, some new macros needs to be created so the most efficient IOCTL data buffering method can be used.

@if !defined(IN_RC) && !defined(IN_RING0_AGNOSTIC) && !defined(IPRT_NO_CRT)
*/
#endif

/** Fictive start address of the hypervisor physical memory for MmMapIoSpace. */
#define VBOXGUEST_HYPERVISOR_PHYSICAL_START UINT32_C(0xf8000000)

#ifdef RT_OS_DARWIN
/** Cookie used to fend off some unwanted clients to the IOService. */
#define VBOXGUEST_DARWIN_IOSERVICE_COOKIE UINT32_C(0x56426f78) /* 'VBox' */
#endif

#ifdef RT_OS_WINDOWS
#ifndef CTL_CODE
#include <iprt/win/windows.h>
#endif
  /* Automatic buffering, size not encoded. */
#define VBGL_IOCTL_CODE_SIZE(Function, Size)        CTL_CODE(FILE_DEVICE_UNKNOWN, 2048 + (Function), METHOD_BUFFERED, FILE_WRITE_ACCESS)
#define VBGL_IOCTL_CODE_BIG(Function)                CTL_CODE(FILE_DEVICE_UNKNOWN, 2048 + (Function), METHOD_BUFFERED, FILE_WRITE_ACCESS)
#define VBGL_IOCTL_CODE_FAST(Function)               CTL_CODE(FILE_DEVICE_UNKNOWN, 2048 + (Function), METHOD_NEITHER,  FILE_WRITE_ACCESS)
#define VBGL_IOCTL_CODE_STRIPPED(a_uIOCtl)          (a_uIOCtl)
```c
+/** define VBOXGUEST_DEVICE_NAME                      "\\\VBoxGuest"
+/** define VBOXGUEST_SERVICE_NAME                      "VBoxGuest"
+/** Global name for Win2k+ */
+/** define VBOXGUEST_DEVICE_NAME_GLOBAL               "\\\Global\\VBoxGuest"
+/** Win32 driver name */
+/** define VBOXGUEST_DEVICE_NAME_NT                   L"\\Device\\VBoxGuest"
+/** Device name. */
+/** define VBOXGUEST_DEVICE_NAME_DOS                  L"\\DosDevices\\VBoxGuest"
+
+*define VBOXGUEST_DEVICE_NAME_SHORT                "vboxgst$"
+
+ */ No automatic buffering. size not encoded. */
+*/ No automatic buffering, size not limited to 255 bytes => use VBGLBIGREQ for everything. */
+ */ No automatic buffering, size limited to 16KB. */
+ */ No automatic buffering, size limited to 16KB. */
+ */ No automatic buffering, size not encoded. */
+ */ todo do something better */
```
+# define VBGL_IOCTL_CODE_STRIPPED(a_uIOCtl)   (a_uIOCtl)
+# define VBOXGUEST_DEVICE_NAME                      "/dev/misc/vboxguest"
+
+#else /* BSD Like */
+ /* Automatic buffering, size limited to 4KB on *BSD and 8KB on Darwin - commands the limit, 4KB */
+# include <sys/ioccom.h>
+# define VBGL_IOCTL_CODE_SIZE(Function, Size)     _IOC(IOC_INOUT, 'V', (Function), (Size))
+# define VBGL_IOCTL_CODE_BIG(Function)            _IO('V', (Function))
+# define VBGL_IOCTL_CODE_FAST(Function)           _IO('F', (Function))
+# define VBGL_IOCTL_CODE_STRIPPED(a_uIOCtl)      ((a_uIOCtl) & ~(_IOC(0,0,0,IOCPARM_MASK)))
+# define VBGL_IOCTL_IS_FAST(a_uIOCtl)             ( IOCGROUP(a_uIOCtl) == 'F' )
+#endif
+
+/** @todo It would be nice if we could have two defines without paths. */
+
+/** @def VBOXGUEST_DEVICE_NAME 
+ * The support device name. */
++
+#ifndef VBOXGUEST_DEVICE_NAME /* PORTME */
+# define VBOXGUEST_DEVICE_NAME          "/dev/vboxguest"
+#endif
+
+/** @def VBOXGUEST_USERDEVICE_NAME 
+ * The support device name of the user accessible device node. */
++
+#ifndef VBOXGUEST_USERDEVICE_NAME
+# define VBOXGUEST_USERDEVICE_NAME  VBOXGUEST_DEVICE_NAME
+#endif
+
+/** The VBoxGuest I/O control version.
+ *
+ * As usual, the high word contains the major version and changes to it
+ * signifies incompatible changes.
+ *
+ * The lower word is the minor version number, it is increased when new
+ * functions are added or existing changed in a backwards compatible manner.
+ */
+#define VBGL_IOC_VERSION                       UINT32_C(0x00010000)
+#define VBGL_IOCTL_DRIVER_VERSION_INFO_VBGL_IOCTL_CODE_SIZE(0,
VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE)
+#define VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE sizeof(VBGLIOCDRIVERVERSIONINFO)
+#define VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE_IN
RT_UOFFSET_AFTER(VBGLIOCDRIVERVERSIONINFO, u.In)
+#define VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE_OUT sizeof(VBGLIOCDRIVERVERSIONINFO)
+typedef struct VBGLIOCDRIVERVERSIONINFO
+
+{  
+   /** The header. */  
+   VBGLREQHDR Hdr;
+
+   union
+   {
+       struct
+       {
+           /** The requested interface version number (VBGL_IOC_VERSION). */
+           uint32_t uReqVersion;
+           /** The minimum interface version number
+           (typically the major version part of VBGL_IOC_VERSION). */
+           uint32_t uMinVersion;
+           /** Reserved, MBZ. */
+           uint32_t uReserved1;
+           /** Reserved, MBZ. */
+           uint32_t uReserved2;
+       } In;
+       struct
+       {
+           /** Interface version for this session (typically VBGL_IOC_VERSION). */
+           uint32_t uSessionVersion;
+           /** The version of the IDC interface (VBGL_IOC_VERSION). */
+           uint32_t uDriverVersion;
+           /** The SVN revision of the driver. */
+           /** This will be set to 0 if not compiled into the driver. */
+           uint32_t uDriverRevision;
+           /** Reserved \#1 (will be returned as zero until defined). */
+           uint32_t uReserved1;
+           /** Reserved \#2 (will be returned as zero until defined). */
+           uint32_t uReserved2;
+       } Out;
+   } u;
+} VBGLIOCDRIVERVERSIONINFO, RT_FAR *PVBGLIOCDRIVERVERSIONINFO;
+AssertCompileSize(VBGLIOCDRIVERVERSIONINFO, 24 + 20);
+#if !defined(__GNUC__) /* Some GCC versions can't handle the complicated RT_UOFFSET_AFTER macro, it
seems. */
+  && (!defined(RT_OS_OS2) || (!defined(__IBMC__) && !defined(__IBMCPP__) &&
(!defined(__WATCOMC__) || !defined(__cplusplus))
+AssertCompile(VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE_IN == 24 + 16);
+条件
+/** @} */
+
+
+/** @name VBGL_IOCTL_GET_PORT_INFO
+ * Query VMMDev I/O port region and MMIO mapping address.
+ * @remarks Ring-0 only.
+ * @}
+ */
+
+/** @} */
+
+/** @name VBGL_IOCTL_VMMDEV_REQUEST
+ * IOCTL to VBoxGuest to perform a VMM Device request less than 1KB in size.
+ * @}
+ */
+
+/** @name VBGL_IOCTL_VMMDEV_REQUEST_BIG
+ * IOCTL to VBoxGuest to perform a VMM Device request that can 1KB or larger.
+ * @}
+ */

}
+/** @} */
+
+#elseif VBOX_WITH_HGCM
+/** @name VBGL_IOCTL_HGCM_CONNECT
+ * Connect to a HGCM service.
+ * @{ */
+#define VBGL_IOCTL_HGCM_CONNECT VBGL_IOCTL_CODE_SIZE(4,
+VBGL_IOCTL_HGCM_CONNECT_SIZE)
+#define VBGL_IOCTL_HGCM_CONNECT_SIZE sizeof(VBGLIOCHGCMCONNECT)
+#define VBGL_IOCTL_HGCM_CONNECT_SIZE_IN sizeof(VBGLIOCHGCMCONNECT)
+#define VBGL_IOCTL_HGCM_CONNECT_SIZE_OUT RT_UOFFSET_AFTER(VBGLIOCHGCMCONNECT, u.Out)
+
+typedef struct VBGLIOCHGCMCONNECT
+{
+    /** The header. */
+    VBGLREQHDR Hdr;
+    union
+    {
+        struct
+        {
+            HGCMServiceLocation Loc;
+        } In;
+        struct
+        {
+            uint32_t idClient;
+        } Out;
+    } u;
+} VBGLIOCHGCMCONNECT, RT_FAR *PVBGLIOCHGCMCONNECT;
+AssertCompileSize(VBGLIOCHGCMCONNECT, 24 + 132);
+#else if defined(__GNUC__) /* Some GCC versions can't handle the complicated RT_UOFFSET_AFTER macro, it seems. */\n+ && (!defined(RT_OS_OS2) || (!defined(__IBMC__) && !defined(__IBMCPP__) &&
+ (!defined(__WATCOMC__) || !defined(__cplusplus))))
+AssertCompile(VBGL_IOCTL_HGCM_CONNECT_SIZE_OUT == 24 + 4);
+endif
+/** @} */
+
+/** @name VBGL_IOCTL_HGCM_DISCONNECT
+ * Disconnect from a HGCM service.
+ * @{ */
+#define VBGL_IOCTL_HGCM_DISCONNECT VBGL_IOCTL_CODE_SIZE(5,
+VBGL_IOCTL_HGCM_DISCONNECT_SIZE)
+#define VBGL_IOCTL_HGCM_DISCONNECT_SIZE sizeof(VBGLIOCHGCMDisconnect)
+#define VBGL_IOCTL_HGCM_DISCONNECT_SIZE_IN sizeof(VBGLIOCHGCMDisconnect)
+#define VBGL_IOCTL_HGCM_DISCONNECT_SIZE_OUT sizeof(VBGLREQHDR)
+/** @note This is also used by a VbgIR0 API. */
typedef struct VBGLIOCHGCMDISCONNECT {
    VBGLREQHDR Hdr;
    union {
        struct {
            uint32_t idClient;
        } In;
    } u;
} VBGLIOCHGCMDISCONNECT, RT_FAR *PVBGLIOCHGCMDISCONNECT;

#define VBGL_IOCTL_HGCM_CALL_32(a_cb)              VBGL_IOCTL_CODE_SIZE(6, (a_cb))
#define VBGL_IOCTL_HGCM_CALL_64(a_cb)              VBGL_IOCTL_CODE_SIZE(7, (a_cb))
#if ARCH_BITS == 64
#define VBGL_IOCTL_HGCM_CALL(a_cb)                VBGL_IOCTL_HGCM_CALL_64(a_cb)
#else
#define VBGL_IOCTL_HGCM_CALL(a_cb)                VBGL_IOCTL_HGCM_CALL_32(a_cb)
#endif
#define VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA(a_cb)  VBGL_IOCTL_CODE_SIZE(8, (a_cb))

#define VBOXGUEST_IOCTL_LOG(Size)
#define VBGL_IOCTL_LOG(a_cchMsg)                    VBGL_IOCTL_CODE_BIG(9)
#define VBGL_IOCTL_LOG_SIZE(a_cchMsg)               (sizeof(VBGLREQHDR) + (a_cchMsg) + 1)
#define VBGL_IOCTL_LOG_SIZE_IN(a_cchMsg)            (sizeof(VBGLREQHDR) + (a_cchMsg) + 1)
#define VBGL_IOCTL_LOG_SIZE_OUT                     sizeof(VBGLREQHDR)

typedef struct VBGLIOCLOG {
    VBGLREQHDR Hdr;
} VBGLIOCLOG;

/* The header. */
+ " typedef struct VBGLIOCHGCMDISCONNECT 
+ {
+     /** The header. */
+     VBGLREQHDR Hdr;
+     union {
+         struct {
+             uint32_t idClient;
+         } In;
+     } u;
+ } VBGLIOCHGCMDISCONNECT, RT_FAR *PVBGLIOCHGCMDISCONNECT;
+/** @} */
+
+/* @name VBGL_IOCTL_HGCM_CALL, VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA 
+ * Make a call to a HGCM servicesure. There are several variations here.
+ * The VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA variation is for other drivers (like 
+ * the graphics ones) passing on requests from user land that contains user 
+ * data. These calls are always interruptible.
+ */
+/* @ { */
+## define VBGL_IOCTL_HGCM_CALL_32(a_cb)              VBGL_IOCTL_CODE_SIZE(6, (a_cb))
+## define VBGL_IOCTL_HGCM_CALL_64(a_cb)              VBGL_IOCTL_CODE_SIZE(7, (a_cb))
+## if ARCH_BITS == 64
+## define VBGL_IOCTL_HGCM_CALL(a_cb)                VBGL_IOCTL_HGCM_CALL_64(a_cb)
+## else
+## define VBGL_IOCTL_HGCM_CALL(a_cb)                VBGL_IOCTL_HGCM_CALL_32(a_cb)
+## endif
+## define VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA(a_cb)  VBGL_IOCTL_CODE_SIZE(8, (a_cb))
+/* @} */
+## endif /* VBOX_WITH_HGCM */
+
+/* @ name VBGL_IOCTL_LOG 
+ * IOCTL to VBoxGuest to perform backdoor logging.
+ */
+/* define VBOXGUEST_IOCTL_LOG(Size)
+##define VBOXGUEST_IOCTL_LOG(a_cchMsg) VBGL_IOCTL_CODE_BIG(9)
+##define VBOXGUEST_IOCTL_LOG_SIZE(a_cchMsg) (sizeof(VBGLREQHDR) + (a_cchMsg) + 1)
+##define VBOXGUEST_IOCTL_LOG_SIZE_IN(a_cchMsg) (sizeof(VBGLREQHDR) + (a_cchMsg) + 1)
+##define VBOXGUEST_IOCTL_LOG_SIZE_OUT sizeof(VBGLREQHDR)
+*/
union {
    struct {
        /** The log message.
         * The length is determined from the input size and zero termination. */
        char szMsg[RT_FLEXIBLE_ARRAY_IN_NESTED_UNION];
    } In;
} u;
} VBGLIOCLOG, RT_FAR *PVBGLIOCLOG;

/** @} */

/** @name VBGL_IOCTL_WAIT_FOR_EVENTS
 * Wait for a VMMDev host event notification.
 * @{
 */
#define VBGL_IOCTL_WAIT_FOR_EVENTS                  VBGL_IOCTL_CODE_SIZE(10,
VBGL_IOCTL_WAIT_FOR_EVENTS_SIZE)
#define VBGL_IOCTL_WAIT_FOR_EVENTS_SIZE             sizeof(VBGLIOCWAITFOREVENTS)
#define VBGL_IOCTL_WAIT_FOR_EVENTS_SIZE_IN          sizeof(VBGLIOCWAITFOREVENTS)
#define VBGL_IOCTL_WAIT_FOR_EVENTS_SIZE_OUT
RT_UOFFSET_AFTER(VBGLIOCWAITFOREVENTS, u.Out)
typedef struct VBGLIOCWAITFOREVENTS
{
    /** The header. */
    VBGLREQHDR Hdr;
    union {
        struct {
            /** Timeout in milliseconds. */
            uint32_t cMsTimeOut;
            /** Events to wait for. */
            uint32_t fEvents;
        } In;
        struct {
            /** Events that occurred. */
            uint32_t fEvents;
        } Out;
    } u;
} VBGLIOCWAITFOREVENTS, RT_FAR *PVBGLIOCWAITFOREVENTS;
AssertCompileSize(VBGLIOCWAITFOREVENTS, 24 + 8);
/** @} */
/** @name VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS
 * IOCTL to VBoxGuest to interrupt (cancel) any pending
 * VBGL_IOCTL_WAIT_FOR_EVENTS and return.
 * +
 * + Handled inside the guest additions and not seen by the host at all.
 * + After calling this, VBGL_IOCTL_WAIT_FOR_EVENTS should no longer be called in
 * + the same session. At the time of writing this is not enforced; at the time
 * + of reading it may be.
 * + @see VBGL_IOCTL_WAIT_FOR_EVENTS
 * +
 * + @}
 */

#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS    VBGL_IOCTL_CODE_SIZE(11,
    VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE)
#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE       sizeof(VBGLREQHDR)
#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE_IN       sizeof(VBGLREQHDR)
#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE_OUT   sizeof(VBGLREQHDR)
/** @} */

/** @name VBGL_IOCTL_CHANGE_FILTER_MASK
 * IOCTL to VBoxGuest to control the event filter mask.
 * @{
 */
#define VBGL_IOCTL_CHANGE_FILTER_MASK               VBGL_IOCTL_CODE_SIZE(12,
    VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE)
#define VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE          sizeof(VBGLIOCCHANGEFILTERMASK)
#define VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE_IN       sizeof(VBGLIOCCHANGEFILTERMASK)
#define VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE_OUT      sizeof(VBGLREQHDR)

typedef struct VBGLIOCCHANGEFILTERMASK
+
+ { /* The header. */
+    VBGLREQHDR       Hdr;
+    union
+    { +
+        struct +
+            /* Flags to set. */
+            uint32_t fOrMask;
+            /* Flags to remove. */
+            uint32_t fNotMask;
+        } In;
+    } u;
+    VBGLIOCCHANGEFILTERMASK, RT_FAR *PVBGLIOCCHANGEFILTERMASK;
+    AssertCompileSize(VBGLIOCCHANGEFILTERMASK, 24 + 8);
+/** @} */

```
+ * IOCTL to for acquiring and releasing guest capabilities.
+ *
+ * This is used for multiple purposes:
+ * 1. By doing @a acquire r3 client application (e.g. VBoxTray) claims it will
+ *    use the given session for performing operations like @a seamless or
+ *    @a auto-resize, thus, if the application terminates, the driver will
+ *    automatically cleanup the caps reported to host, so that host knows guest
+ *    does not support them anymore
+ * 2. In a multy-user environment this will not allow r3 applications (like
+ *    VBoxTray) running in different user sessions simultaneously to interfere
+ *    with each other. An r3 client application (like VBoxTray) is responsible
+ *    for Acquiring/Releasing caps properly as needed.
+ *
+ * VERR_RESOURCE_BUSY is returned if any capabilities in the fOrMask are
+ * currently acquired by some other VBoxGuest session.
+ *
+ */
+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES           VBGL_IOCTL_CODE_SIZE(13,
+VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE)
+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE
+sizeof(VBGLIOCACQUIREGUESTCAPS)
+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE_IN
+sizeof(VBGLIOCACQUIREGUESTCAPS)
+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE_OUT  sizeof(VBGLREQHDR)
+
+/* Default operation (full acquire/release). */
+#define VBGL_IOC_AGC_FLAGS_DEFAULT                      UINT32_C(0x00000000)
+/** Configures VBoxGuest to use the specified caps in Acquire mode, w/o making
+ * any caps acquisition/release.  This is only possible to set acquire mode for
+ * caps, but not clear it, so fNotMask is ignored when this flag is set. */
+#define VBGL_IOC_AGC_FLAGS_CONFIG_ACQUIRE_MODE          UINT32_C(0x00000001)
+/** Valid flag mask. */
+#define VBGL_IOC_AGC_FLAGS_VALID_MASK                   UINT32_C(0x00000001)
+
typedef struct VBGLIOCACQUIREGUESTCAPS
+{
+    /** The header. */
+   VBGLREQHDR      Hdr;
+   union
+    {
+        struct
+        {
+            /** Acquire flags (VBGL_IOC_AGC_FLAGS_XXX). */
+            uint32_t   fFlags;
+            /** Guest capabilities to acquire (VMMDEV_GUEST_SUPPORTS_XXX). */
+            uint32_t   fOrMask;
+        }
+        uint32_t   fNotMask;
+    }
+}
+ /** Guest capabilities to release (VMMDEV_GUEST_SUPPORTS_XXX). */
+     uint32_t  fNotMask;
+ } In;
+ } u;
+ } VBGLIOCACQUIREGUESTCAPS, RT_FAR *PVBGLIOCACQUIREGUESTCAPS;
+ AssertCompileSize(VBGLIOCACQUIREGUESTCAPS, 24 + 12);
+/** @} */ */
+
+
+/** @} name VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES */
+ * IOCTL to VBoxGuest to set guest capabilities.
+ * @} */
+#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES VBGL_IOCTL_CODE_SIZE(14,
+ VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE)
+#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE sizeof(VBGLIOCSETGUESTCAPS)
+#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE_IN sizeof(VBGLIOCSETGUESTCAPS)
+#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE_OUT sizeof(VBGLIOCSETGUESTCAPS)
+typedef struct VBGLIOCSETGUESTCAPS
+
+ /** The header. */
+ VBGLREQHDR Hdr;
+ union
+ {
+     struct
+     {
+         /** The capabilities to set (VMMDEV_GUEST_SUPPORTS_XXX). */
+         uint32_t  fOrMask;
+         /** The capabilities to drop (VMMDEV_GUEST_SUPPORTS_XXX). */
+         uint32_t  fNotMask;
+     } In;
+     struct
+     {
+         /** The capabilities held by the session after the call (VMMDEV_GUEST_SUPPORTS_XXX). */
+         uint32_t  fSessionCaps;
+         /** The capabilities for all the sessions after the call (VMMDEV_GUEST_SUPPORTS_XXX). */
+         uint32_t  fGlobalCaps;
+     } Out;
+ } u;
+ } VBGLIOCSETGUESTCAPS, RT_FAR *PVBGLIOCSETGUESTCAPS;
+ AssertCompileSize(VBGLIOCSETGUESTCAPS, 24 + 8);
+typedef VBGLIOCSETGUESTCAPS VBoxGuestSetCapabilitiesInfo;
+/** @} */ */
+
+
+/** @} name VBGL_IOCTL_SET_MOUSE_STATUS */
+ * IOCTL to VBoxGuest to update the mouse status features.
+ * @} */
+#define VBGL_IOCTL_SET_MOUSE_STATUS VBGL_IOCTL_CODE_SIZE(15,
VBGL_IOCTL_SET_MOUSE_STATUS_SIZE)
+#define VBGL_IOCTL_SET_MOUSE_STATUS_SIZE sizeof(VBGLIOCSETMOUSESTATUS)
+#define VBGL_IOCTL_SET_MOUSE_STATUS_SIZE_IN sizeof(VBGLIOCSETMOUSESTATUS)
+#define VBGL_IOCTL_SET_MOUSE_STATUS_SIZE_OUT sizeof(VBGLREQHDR)
+typedef struct VBGLIOCSETMOUSESTATUS
+
+ {+
+     /**< The header. */
+     VBGLREQHDR    Hdr;
+     union
+     {+
+         struct
+         {
+             /**< Mouse status flags (VMMDEV_MOUSE_XXX). */
+             uint32_t    fStatus;
+         } In;
+     } u;
+ } VBGLIOCSETMOUSESTATUS, RT_FAR *PVBGLIOCSETMOUSESTATUS;
+/** @} */
+
/** @name VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK
 *
 * IOCTL to for setting the mouse driver callback.
 * @note The callback will be called in interrupt context with the VBoxGuest
 *       device event spinlock held.
 * @note ring-0 only.
 *
 * @{ */
#define VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK            VBGL_IOCTL_CODE_SIZE(16,
VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK_SIZE)
#define VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK_SIZE
sizeof(VBGLIOCSETMOUSENOTIFYCALLBACK)
#define VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK_SIZE_IN
sizeof(VBGLIOCSETMOUSENOTIFYCALLBACK)
#define VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK_SIZE_OUT
sizeof(VBGLREQHDR)
+typedef struct VBGLIOCSETMOUSENOTIFYCALLBACK
+
+ {+
+     /**< The header. */
+     VBGLREQHDR    Hdr;
+     union
+     {+
+         struct
+         {
+             /**< Mouse notification callback function. */
+             PFNVBOXGUESTMOUSENOTIFY     pfnNotify;
+             /**< The callback argument. */
+             void                RT_FAR *pvUser;
+         } In;
*/
 */
} u;

} VBGLIOCSETMOUSENOTIFYCALLBACK, RT_FAR *PVBUGLIOCSETMOUSENOTIFYCALLBACK;
+/** @} */ */
+
+
+/** @} */
+
+
+/* The guest kernel module / device driver will ask the host for the current size of
+ the balloon and adjust the size. Or it will set fHandledInR0 = false and R3 is
+ responsible for allocating memory and calling R0 (VBGL_IOCTL_CHANGE_BALLOON).
+ */
+#define VBGL_IOCTL_CHECK_BALLOON                    VBGL_IOCTL_CODE_SIZE(17,
VBGL_IOCTL_CHECK_BALLOON_SIZE)
+#define VBGL_IOCTL_CHECK_BALLOON_SIZE               sizeof(VBGLIOCCHECKBALLOON)
+#define VBGL_IOCTL_CHECK_BALLOON_SIZE_IN            sizeof(VBGLREQHDR)
+#define VBGL_IOCTL_CHECK_BALLOON_SIZE_OUT           sizeof(VBGLIOCCHECKBALLOON)
+typedef struct VBGLIOCCHECKBALLOON
+
+ /** The header. */
+ VBGLREQHDR            Hdr;
+ union
+ {
+     struct
+     {
+         /** The size of the balloon in chunks of 1MB. */
+         uint32_t      cBalloonChunks;
+         /** false = handled in R0, no further action required. */
+         bool         fHandleInR3;
+         /** Explicit padding, please ignore. */
+         bool         afPadding[3];
+     } Out;
+ } u;
+
+} VBGLIOCCHECKBALLOON, RT_FAR *PVBUGLIOCCHECKBALLOON;
+AssertCompileSize(VBGLIOCCHECKBALLOON, 24 + 8);
+typedef VBGLIOCCHECKBALLOON VBoxGuestCheckBalloonInfo;
+/** @} */ */
+
+
+/** @} */
+
+
+/* The guest kernel module / device driver will lock down supplied memory or
+ unlock reclaimed memory and then forward the physical addresses of the
+ changed balloon chunk to the host.
+ */
+@ { */

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```c
#define VBGL_IOCTL_CHANGE_BALLOON VBGL_IOCTL_CODE_SIZE(18,
                                    VBGL_IOCTL_CHANGE_BALLOON_SIZE)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_IN sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_OUT sizeof(VBGLREQHDR)

typedef struct VBGLIOCCHANGEBALLOON
+{
    /** The header. */
    VBGLREQHDR Hdr;
    union
        { struct
            /** Address of the chunk (user space address). */
            RTR3PTR pvChunk;
            /** Explicit alignment padding, MBZ. */
            uint8_t abPadding[ARCH_BITS == 64 ? 0 + 7 : 4 + 7];
            /** true = inflate, false = deflate. */
            bool fInflate;
        } In;
        bool fInflate;
    } u;
} VBGLIOCCHANGEBALLOON, RT_FAR *PVBGLIOCCHANGEBALLOON;

AssertCompileSize(VBGLIOCCHANGEBALLOON, 24+16);
+)
+
++ @\ ]
+
+
/** @} */
+
/** @name VBGL_IOCTL_WRITE_CORE_DUMP *
 * IOCTL to VBoxGuest to write guest core.
 * @{ */
#define VBGL_IOCTL_WRITE_CORE_DUMP VBGL_IOCTL_CODE_SIZE(19,
                                        VBGL_IOCTL_WRITE_CORE_DUMP_SIZE)
#define VBGL_IOCTL_WRITE_CORE_DUMP_SIZE sizeof(VBGLIOCWRITECOREDUMP)
#define VBGL_IOCTL_WRITE_CORE_DUMP_SIZE_IN sizeof(VBGLIOCWRITECOREDUMP)
#define VBGL_IOCTL_WRITE_CORE_DUMP_SIZE_OUT sizeof(VBGLREQHDR)

typedef struct VBGLIOCWRITECOREDUMP
+{
    /** The header. */
    VBGLREQHDR Hdr;
    union
        { struct
            /** Flags (reserved, MBZ). */
            uint32_t fFlags;
        } In;
        uint32_t fFlags;
    } u;
} VBGLIOCWRITECOREDUMP, RT_FAR *PVBGLIOCWRITECOREDUMP;

AssertCompileSize(VBGLIOCWRITECOREDUMP, 24 + 4);
```

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typedef VBGLIOCWRITECOREDUMP VBoxGuestWriteCoreDump;
+/** @} */
+
+
#ifdef VBOX_WITH_DPC_LATENCY_CHECKER
+/** @} */
+ * IOCTL to VBoxGuest to perform DPC latency tests, printing the result in
+ * the release log on the host. Takes no data, returns no data.
+ */
+/** @} */
+#endif
+
#endif RT_OS_OS2
+/**
+ * The data buffer layout for the IDC entry point (AttachDD).
+ */
+@remark This is defined in multiple 16-bit headers / sources.
+ * Some places it's called VBGOS2IDC to short things a bit.
+ */
+typedef struct VBGLOS2ATTACHDD
+{
+  /** VBGL_IOC_VERSION. */
+  uint32_t u32Version;
+  /** Opaque session handle. */
+  uint32_t u32Session;
+
+  /**
+   * The 32-bit service entry point.
+   */
+  int (pfnServiceEP)(uint32_t u32Session, unsigned iFunction, PVBGLREQHDR pReqHdr, size_t cbReq);
+}
```c
+## else
+    uint32_t pfnServiceEP;
+##endif
+
+ /* The 16-bit service entry point for C code (cdecl).
+ * It's the same as the 32-bit entry point, but the types has
+ * changed to 16-bit equivalents.
+ * @code
+ * VBoxGuestOs2IDCServicel6(uint32_t u32Session, uint16_t iFunction,
+ *                          PVBLREQHDR fpvData, uint16_t cbData);
+ * @endcode
+ * @endcode
+ */
+## if ARCH_BITS == 16 || defined(DOXYGEN_RUNNING)
+    DECLCALLBACKMEMBER(int, fpfnServiceEP)(uint32_t u32Session, uint16_t iFunction, PVBLREQHDR fpvData, uint16_t cbData);
+## else
+    RTFAR16 fpfnServiceEP;
+## endif
+
+ /* The 16-bit service entry point for Assembly code (register).
+ * This is just a wrapper around fpfnServiceEP to simplify calls
+ * from 16-bit assembly code.
+ * @returns (e)ax: VBox status code; cx: The amount of data returned.
+ * @param   u32Session          eax   - The above session handle.
+ * @param   iFunction           dl    - The requested function.
+ * @param   pvData              es:bx - The input/output data buffer.
+ * @param   cbData              cx    - The size of the data buffer.
+ */
+    RTFAR16 fpfnServiceAsmEP;
+ } VBGLOS2ATTACHDD;
+}/* Pointer to VBOXGUESTOS2IDCONNECT buffer. */
+typedef VBGLOS2ATTACHDD RT_FAR *PVBGLOS2ATTACHDD;
+
+Prototype for the 16-bit callback returned by AttachDD on OS/2.
+ @param   pAttachInfo   Pointer to structure to fill in.
+ */
+## if defined(__IBMC__) || defined(__IBMCPP__)
+typedef void (* __cdecl RT_FAR_CODE PFNVBGLOS2ATTACHDD)(PVBGLOS2ATTACHDD pAttachInfo);
+## else
+typedef void (__cdecl RT_FAR_CODE *PFNVBGLOS2ATTACHDD)(PVBGLOS2ATTACHDD pAttachInfo);
+## endif
```
### VBGL_IOCTL_IDC_CONNECT

**IDC client connect request.**

* On platforms other than Windows and OS/2, this will also create a kernel session for the caller.

* @note ring-0 only.

```c
#define VBGL_IOCTL_IDC_CONNECT                      VBGL_IOCTL_CODE_SIZE(63,
VBGL_IOCTL_IDC_CONNECT_SIZE)
#define VBGL_IOCTL_IDC_CONNECT_SIZE                 sizeof(VBGLIOCIDCCONNECT)
#define VBGL_IOCTL_IDC_CONNECT_SIZE_IN              RT_UOFFSET_AFTER(VBGLIOCIDCCONNECT, u.In)
#define VBGL_IOCTL_IDC_CONNECT_SIZE_OUT             sizeof(VBGLIOCIDCCONNECT)
typedef struct VBGLIOCIDCCONNECT
{[
    /* The header. */
    VBGLREQHDR          Hdr;
    /* The payload union. */
    union
    {
        struct
        {
            /* VBGL_IOCTL_IDC_CONNECT_MAGIC_COOKIE. */
            uint32_t        u32MagicCookie;
            /* The desired version of the I/O control interface (VBGL_IOC_VERSION). */
            uint32_t        uReqVersion;
            /* The minimum version of the I/O control interface (VBGL_IOC_VERSION). */
            uint32_t        uMinVersion;
            /* Reserved, MBZ. */
            uint32_t        uReserved;
        } In;

        struct
        {
            /* The session handle (opaque). */
            #if ARCH_BITS >= 32
            void    RT_FAR *pvSession;
            #else
            uint32_t        pvSession;
            #endif
            /* The version of the I/O control interface for this session */
            *(typically VBGL_IOC_VERSION). */
            uint32_t        uSessionVersion;
            /* The I/O control interface version for of the driver (VBGL_IOC_VERSION). */
            uint32_t        uDriverVersion;
        } Out;
    }
} In;
```
+     /** The SVN revision of the driver. */
+     * This will be set to 0 if not compiled into the driver. */
+     uint32_t uDriverRevision;
+     /** Reserved \#1 (will be returned as zero until defined). */
+     uint32_t uReserved1;
+     /** Reserved \#2 (will be returned as NULL until defined). */
+     void    RT_FAR *pvReserved2;
+ } Out;
+ } u;
+} VBGLIOCICDCCONNECT, RT_FAR *PVBGLIOCICDCCONNECT;
+AssertCompileSize(VBGLIOCICDCCONNECT, 24 + 16 + (ARCH_BITS == 64 ? 8 : 4) * 2);
+#if  !defined(__GNUC__) /* Some GCC versions can't handle the complicated RT_UOFFSET_AFTER macro, it seems. */\n+    && (!defined(RT_OS_OS2) || (!defined(__IBMC__) && !defined(__IBMCPP__) &&
+        (!defined(__WATCOMC__) || !defined(__cplusplus))))
+  AssertCompile(VBGL_IOCTL_IDC_CONNECT_SIZE_IN == 24 + 16);
+#endif
+#define VBGL_IOCTL_IDC_CONNECT_MAGIC_COOKIE         UINT32_C(0x55aa4d5a) /**< Magic value for
+    doing an IDC connect. */
+/** @} */
+
+/** @name VBGL_IOCTL_IDC_DISCONNECT
+ * IDC client disconnect request.
+ *
+ * This will destroy the kernel session associated with the IDC connection.
+ *
+ * @note ring-0 only.
+ */
+#define VBGL_IOCTL_IDC_DISCONNECT                   VBGL_IOCTL_CODE_SIZE(62,
+    VBGL_IOCTL_IDC_DISCONNECT_SIZE)
+#define VBGL_IOCTL_IDC_DISCONNECT_SIZE              sizeof(VBGLIOCIDCDISCONNECT)
+#define VBGL_IOCTL_IDC_DISCONNECT_SIZE_IN           sizeof(VBGLIOCIDCDISCONNECT)
+#define VBGL_IOCTL_IDC_DISCONNECT_SIZE_OUT          sizeof(VBGLREQHDR)
+typedef struct VBGLIOCIDCDISCONNECT
+{
+    /** The header. */
+    VBGLREQHDR         Hdr;
+    union
+    +
+    struct
+    +
+    /** The session handle for platforms where this is needed. */
+#if ARCH_BITS >= 32
+    +    void RT_FAR *pvSession;
+#else
+    +    uint32_t pvSession;
+#endif

#if !defined(RT_OS_WINDOWS) && !defined(RT_OS_OS2)

RT_C_DECLS_BEGIN

/**
 * The VBoxGuest IDC entry point.
 *
 * @returns VBox status code.
 * @param   pvSession   The session.
 * @param   uReq        The request code.
 * @param   pReqHdr     The request.
 * @param   cbReq       The request size.
 */

int VBOXCALL VBoxGuestIDC(void RT_FAR *pvSession, uintptr_t uReq, PVBGLREQHDR pReqHdr, size_t cbReq);

RT_C_DECLS_END

#endif

#endif /* RT_OS_LINUX || RT_OS_SOLARIS || RT_OS_FREEBSD */

#endif /* !defined(IN_RC) && !defined(IN_RING0_AGNOSTIC) && !defined(IPRT_NO_CRT) */
+/** @} */ *
+
+/** @} */ *
+#elifdef *
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/VBoxGuestCoreTypes.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/VBox/VBoxGuestCoreTypes.h
@@ -0,0 +1,228 @@
+/** @file
+ * VBoxGuest - VirtualBox Guest Additions, Core Types.
+ *
+ * This contains types that are used both in the VBoxGuest I/O control interface
+ * and the VBoxGuestLib. The goal is to avoid having to include VBoxGuest.h
+ * everywhere VBoxGuestLib.h is used.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
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+ * of the Common Development and Distribution License Version 1.0
+ * only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef __VBoxGuestCoreTypes_h
+#define __VBoxGuestCoreTypes_h
+
+#include <iprt/types.h>
+#include <iprt/assertcompile.h>
+
+/** @addtogroup grp_vboxguest
+ * @{ */
/* Common in/out header. */
/* This is a copy/mirror of VMMDevRequestHeader to prevent duplicating data and
   needing to verify things multiple times. For that reason this differs a bit
   from SUPREQHDR.
/*
* @sa VMMDevRequestHeader */

typedef struct VBGLREQHDR
{
    /** IN: The request input size, and output size if cbOut is zero.
    * @sa VMMDevRequestHeader::size */
    uint32_t        cbIn;
    /** IN: Structure version (VBGLREQHDR_VERSION)
    * @sa VMMDevRequestHeader::version */
    uint32_t        uVersion;
    /** IN: The VMMDev request type, set to VBGLREQHDR_TYPE_DEFAULT unless this is a
    * kind of VMMDev request.
    * @sa VMMDevRequestType, VMMDevRequestHeader::requestType */
    uint32_t        uType;
    /** OUT: The VBox status code of the operation, out direction only. */
    int32_t         rc;
    /** IN: The output size. This is optional - set to zero to use cbIn as the
    * output size. */
    uint32_t        cbOut;
    /** Reserved, MBZ. */
    uint32_t        uReserved;
} VBGLREQHDR;

AssertCompileSize(VBGLREQHDR, 24);

/** Pointer to a IOC header. */
typedef VBGLREQHDR RT_FAR *PVBGLREQHDR;

/** Version of VMMDevRequestHeader structure. */
#define VBGLREQHDR_VERSION          UINT32_C(0x10001)
/** Default request type. Use this for non-VMMDev requests. */
#define VBGLREQHDR_TYPE_DEFAULT     UINT32_C(0)

/** Initialize a VBGLREQHDR structure for a fixed size I/O control call.
* @param   a_pHdr      Pointer to the header to initialize.
* @param   a_IOCtl     The base I/O control name, no VBGL_IOCTL_ prefix. We
*                      have to skip the prefix to avoid it getting expanded
*                      before we append _SIZE_IN and _SIZE_OUT to it.
*/
#define VBGLREQHDR_INIT(a_pHdr, a_IOCtl)  
    VBGLREQHDR_INIT_EX(a_pHdr, RT_CONCAT3(VBGL_IOCTL_,a_IOCtl,_SIZE_IN),
    RT_CONCAT3(VBGL_IOCTL_,a_IOCtl,_SIZE_OUT))

/** Initialize a VBGLREQHDR structure, extended version. */
#define VBGLREQHDR_INIT_EX(a_pHdr, a_cbln, a_cbOut)  

```c
+    do { \
+        (a_pHdr)->cbIn      = (uint32_t)(a_cbIn);  \
+        (a_pHdr)->uVersion  = VBGLREQHDR_VERSION; \
+        (a_pHdr)->uType     = VBGLREQHDR_TYPE_DEFAULT; \
+        (a_pHdr)->rc        = VERR_INTERNAL_ERROR; \  
+        (a_pHdr)->cbOut     = (uint32_t)(a_cbOut); \  
+        (a_pHdr)->uReserved = 0; \  
+    } while (0)
+/** Initialize a VBGLREQHDR structure for a VMMDev request. 
+ * Same as VMMDEV_REQ_HDR_INIT(). */
+#define VBGLREQHDR_INIT_VMMDEV(a_pHdr, a_cb, a_enmType) \  
+    do { \  
+        (a_pHdr)->cbIn      = (a_cb); \  
+        (a_pHdr)->uVersion  = VBGLREQHDR_VERSION; \  
+        (a_pHdr)->uType     = (a_enmType); \  
+        (a_pHdr)->rc        = VERR_INTERNAL_ERROR; \  
+        (a_pHdr)->cbOut     = 0; \  
+        (a_pHdr)->uReserved = 0; \  
+    } while (0)
+/**
+ * For VBGL_IOCTL_HGCM_CALL and VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA.
+ **
+ * @note This is used by alot of HGCM call structures.
+ */
typedef struct VBGLIOCHGCMCALL
+{
+  /**< Common header. */
+  VBGLREQHDR Hdr;
+  /**< Input: The id of the caller. */
+  uint32_t u32ClientID;
+  /**< Input: Function number. */
+  uint32_t u32Function;
+  /**< Input: How long to wait (milliseconds) for completion before cancelling the 
+   * call. This is ignored if not a VBGL_IOCTL_HGCM_CALL_TIMED or 
+   * VBGL_IOCTL_HGCM_CALL_TIMED_32 request. */
+  uint32_t cMsTimeout;
+  /**< Input: Whether a timed call is interruptible (ring-0 only). This is ignored 
+   * if not a VBGL_IOCTL_HGCM_CALL_TIMED or VBGL_IOCTL_HGCM_CALL_TIMED_32 
+   * request, or if made from user land. */
+  bool fInterruptible;
+  /**< Explicit padding, MBZ. */
+  uint8_t bReserved;
+  /**< Input: How many parameters following this structure. 
+   */
+  *
+  * The parameters are either HGCMFunctionParameter64 or HGCMFunctionParameter32,
+  * depending on whether we're receiving a 64-bit or 32-bit request.
+  */
```
+ * The current maximum is 61 parameters (given a 1KB max request size,
+ * and a 64-bit parameter size of 16 bytes).
+ *
+ * @note This information is duplicated by Hdr.cbIn, but it's currently too much
+ * work to eliminate this. */
+ uint16_t cParms;
+ /* Parameters follow in form HGCMFunctionParameter aParms[cParms] */
+ } VBGLIOCHGCMCALL, RT_FAR *PVBGLIOCHGCMCALL;
+ AssertCompileSize(VBGLIOCHGCMCALL, 24 + 16);
+ typedef VBGLIOCHGCMCALL const RT_FAR *PCVBGLIOCHGCMCALL;
+
+ /**
+ * Initialize a HGCM header (VBGLIOCHGCMCALL) for a non-timed call.
+ *
+ * @param   a_pHdr      The header to initialize.
+ * @param   a_idClient  The client connection ID to call thru.
+ * @param   a_idFunction The function we're calling
+ * @param   a_cParameters Number of parameters.
+ */
+ # define VBGL_HGCM_HDR_INIT(a_pHdr, a_idClient, a_idFunction, a_cParameters) \
+ do { \n+     VBGLREQHDR_INIT_EX(&(a_pHdr)->Hdr, \
+                     sizeof(VBGLIOCHGCMCALL) + (a_cParameters) * sizeof(HGCMFunctionParameter), \
+                     sizeof(VBGLIOCHGCMCALL) + (a_cParameters) * sizeof(HGCMFunctionParameter)); \
+     (a_pHdr)->u32ClientID    = (a_idClient); \
+     (a_pHdr)->u32Function    = (a_idFunction); \
+     (a_pHdr)->cMsTimeout     = RT_INDEFINITE_WAIT; \
+     (a_pHdr)->fInterruptible = true; \
+     (a_pHdr)->bReserved      = 0; \
+     (a_pHdr)->cParms         = (a_cParameters); \
+ } while (0) \
+
+ /**
+ * Initialize a HGCM header (VBGLIOCHGCMCALL) for a non-timed call, custom size.
+ *
+ * This is usually only needed when appending page lists to the call.
+ *
+ * @param   a_pHdr         The header to initialize.
+ * @param   a_idClient     The client connection ID to call thru.
+ * @param   a_idFunction   The function we're calling
+ * @param   a_cParameters  Number of parameters.
+ * @param   a_cbReq        The request size.
+ */
+ # define VBGL_HGCM_HDR_INIT_EX(a_pHdr, a_idClient, a_idFunction, a_cParameters, a_cbReq) \
+ do { \n+     Assert((a_cbReq) >= sizeof(VBGLIOCHGCMCALL) + (a_cParameters) * \n+                  sizeof(HGCMFunctionParameter)); \
+ }
+ VBGLREQHDR_INIT_EX(&(a_pHdr)->Hdr, (a_cbReq), (a_cbReq)); \
+ (a_pHdr)->u32ClientId   = (a_idClient); \
+ (a_pHdr)->u32Function   = (a_idFunction); \
+ (a_pHdr)->cMsTimeout    = RT_INDEFINITE_WAIT; \
+ (a_pHdr)->fInterruptible = true; \
+ (a_pHdr)->bReserved     = 0; \
+ (a_pHdr)->cParms        = (a_cParameters); \
+ } while (0)
+
+/**
+ * Initialize a HGCM header (VBGLIOCHGCMCALL), with timeout (interruptible).
+ *
+ + @param a_pHdr The header to initialize.
+ + @param a_idClient The client connection ID to call thru.
+ + @param a_idFunction The function we're calling
+ + @param a_cParameters Number of parameters.
+ + @param a_cMsTimeout The timeout in milliseconds.
+ */
+# define VBGL_HGCM_HDR_INIT_TIMED(a_pHdr, a_idClient, a_idFunction, a_cParameters, a_cMsTimeout) \
+ do { \
+    (a_pHdr)->u32ClientId   = (a_idClient); \
+    (a_pHdr)->u32Function   = (a_idFunction); \
+    (a_pHdr)->cMsTimeout    = (a_cMsTimeout); \
+    (a_pHdr)->fInterruptible = true; \
+    (a_pHdr)->bReserved     = 0; \
+    (a_pHdr)->cParms        = (a_cParameters); \
+ } while (0)
+
+/** Get the pointer to the first HGCM parameter. */
+# define VBGL_HGCM_GET_CALL_PARMS(a_pInfo)   ( (HGCMFunctionParameter   *)((uint8_t *)(a_pInfo) + sizeof(VBGLIOCHGCMCALL)))
+# define VBGL_HGCM_GET_CALL_PARMS32(a_pInfo) ( (HGCMFunctionParameter32 *)((uint8_t *)(a_pInfo) + sizeof(VBGLIOCHGCMCALL)))
+
+/** @} */
#
#
+
+/* Mouse event notification callback function. */
+ /* @param pvUser Argument given when setting the callback. */
+ typedef DECLCALLBACK(void) FNVBOXGUESTMOUSENOTIFY(void *pvUser);
+ typedef FNVBOXGUESTMOUSENOTIFY *PFNVBOXGUESTMOUSENOTIFY; /**< @todo fix type prefix */
+
+}*endif
+
/** @file
 * VBoxGuestLib - VirtualBox Guest Additions Library.
 */

/*
 * Copyright (C) 2006-2017 Oracle Corporation
 *
 * This file is part of VirtualBox Open Source Edition (OSE), as
 * available from http://www.virtualbox.org. This file is free software;
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 * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
 */

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 * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
 * VirtualBox OSE distribution, in which case the provisions of the
 * CDDL are applicable instead of those of the GPL.
 */

/* You may elect to license modified versions of this file under the
 * terms and conditions of either the GPL or the CDDL or both.
 */

#ifndef ___VBox_VBoxGuestLib_h
#define ___VBox_VBoxGuestLib_h

#include <VBox/types.h>
#include <VBox/VMMDevCoreTypes.h>
#include <VBox/VBoxGuestCoreTypes.h>

/** @defgroup grp_vboxguest_lib VirtualBox Guest Additions Library
 * @ingroup grp_vboxguest
 */

/** This is a library for abstracting the additions driver interface. There are
 * multiple versions of the library depending on the context. The main
 * distinction is between kernel and user mode where the interfaces are very
 * different.
 */
+ * @section sec_guest_lib_ring0   Ring-0
+ *
+ * In ring-0 there are two version:
+ *  - VBOX_LIB_VBGL_R0_BASE / VBoxGuestR0LibBase for the VBoxGuest main driver,
+ *    who is responsible for managing the VMMDev virtual hardware.
+ *  - VBOX_LIB_VBGL_R0 / VBoxGuestR0Lib for other (client) guest drivers.
+ *
+ * The library source code and the header have a define VBGL_VBOXGUEST, which is
+ * defined for VBoxGuest and undefined for other drivers. Drivers must choose
+ * right library in their makefiles and set VBGL_VBOXGUEST accordingly.
+ *
+ * The libraries consists of:
+ *  - common code to be used by both VBoxGuest and other drivers;
+ *  - VBoxGuest specific code;
+ *  - code for other drivers which communicate with VBoxGuest via an IOCTL.
+ *
+ *
+ * @section sec_guest_lib_ring3   Ring-3
+ *
+ * There are more variants of the library here:
+ *  - VBOX_LIB_VBGL_R3 / VBoxGuestR3Lib for programs.
+ *  - VBOX_LIB_VBGL_R3_XFREE86 / VBoxGuestR3LibXFree86 for old style XFree
+ *    drivers which uses special loader and or symbol resolving strategy.
+ *  - VBOX_LIB_VBGL_R3_SHARED / VBoxGuestR3LibShared for shared objects / DLLs /
+ *    Dylibs.
+ *
+ */

+RT_C_DECLS_BEGIN

/** HGCM client ID.
+ * @todo Promote to VBox/types.h */
+typedef uint32_t HGCMCLIENTID;
+
+/** @defgroup grp_vboxguest_lib_r0   Ring-0 interface.
+ * @}
+ */

DECLARE_API
+@ifdef IN_RING0
+@ifdef DECLR0VBGL
+ * Declare a VBGL ring-0 API with the right calling convention and visibility.
+ * @param type       Return type. */
+## ifdef RT_OS_DARWIN/@todo probably apply to all, but don’t want a forest fire on our hands right now. */
+## define DECLR0VBGL(type) DECLHIDDEN(type) VBOXCALL
+## else
+## define DECLR0VBGL(type) type VBOXCALL
+## endif

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/** define DECLVBGL(type) DECLR0VBGL(type) 
+ 
+ */
+ * The library initialization function to be used by the main VBoxGuest driver.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0InitPrimary(RTIOPORT portVMMDev, struct VMMDevMemory *pVMMDevMemory);
+
+/**
+ * The library termination function to be used by the main VBoxGuest driver.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(void) VbglR0TerminatePrimary(void);
+
+/**
+ * The library initialization function to be used by all drivers
+ * other than the main VBoxGuest system driver.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0InitClient(void);
+
+/**
+ * The library termination function.
+ */
+DECLR0VBGL(void) VbglR0TerminateClient(void);
+
+/** @name The IDC Client Interface
+ * @
+ */
+    typedef union VBGLIDCHANDLE
+{ 
+    /** Padding for opaque usage. 
+     * Must be greater or equal in size than the private struct. */
+    void *apvPadding[4];
+#ifdef VBGLIDCHANDLEPRIVATE_DECLARED
+    /** The private view. */
+    struct VBGLIDCHANDLEPRIVATE s;
+#endif
+}
+} VBGLIDCHANDLE;
+/** Pointer to a handle. */
typedef VBGLIDCHANDLE *PVBGLIDCHANDLE;
+
+DECLR0VBGL(int) VbglR0IdcOpen(PVBGLIDCHANDLE pHandle, uint32_t uReqVersion, uint32_t uMinVersion,
+                                uint32_t *puSessionVersion, uint32_t *puDriverVersion, uint32_t *puDriverRevision);
+struct VBGLREQHDR;
+DECLR0VBGL(int) VbglR0IdcCallRaw(PVBGLIDCHANDLE pHandle, uintptr_t uReq, struct VBGLREQHDR *pReqHdr, uint32_t cbReq);
+DECLR0VBGL(int) VbglR0IdcCall(PVBGLIDCHANDLE pHandle, uintptr_t uReq, struct VBGLREQHDR *pReqHdr, uint32_t cbReq);
+DECLR0VBGL(int) VbglR0IdcClose(PVBGLIDCHANDLE pHandle);
+
+/** @} */
+
+/** @name Generic request functions. */
+/** @} */
+
+/** */
+* Allocate memory for generic request and initialize the request header.
+* @returns VBox status code.
+* @param ppReq Where to return the pointer to the allocated memory.
+* @param cbReq Size of memory block required for the request.
+* @param enmReqType the generic request type.
+* */
+# if defined(___VBox_VMMDev_h) || defined(DOXYGEN_RUNNING)
+DECLR0VBGL(int) VbglR0GRAlloc(struct VMMDevRequestHeader **ppReq, size_t cbReq, VMMDevRequestType enmReqType);
+# else
+DECLR0VBGL(int) VbglR0GRAlloc(struct VMMDevRequestHeader **ppReq, size_t cbReq, int32_t enmReqType);
+# endif
+
+/** */
+* Perform the generic request.
+* */
+* @param pReq pointer the request structure.
+* */
+* @return VBox status code.
+* */
+DECLR0VBGL(int) VbglR0GRPerform(struct VMMDevRequestHeader *pReq);
+
+/** */
+* Free the generic request memory.
+ *
+ * @param pReq     pointer the request structure.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(void) VbgIR0GRFree(struct VMMDevRequestHeader *pReq);
+
+/**
+ * Verify the generic request header.
+ *
+ * @param pReq     pointer the request header structure.
+ * @param cbReq    size of the request memory block. It should be equal to the request size
+ *                 for fixed size requests. It can be greater than the request size for
+ *                 variable size requests.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbgGR0Verify(const struct VMMDevRequestHeader *pReq, size_t cbReq);
+
+/** @} */
+
+/*# ifdef VBOX_WITH_HGCM
+struct VBGLIOCHGCMCALL;
+
+# ifdef VBGL_VBOXGUEST
+
+/** Callback function called from HGCM helpers when a wait for request
+ * completion IRQ is required.
+ *
+ * @returns VINF_SUCCESS, VERR_INTERRUPT or VERR_TIMEOUT.
+ * @param   pvData      VBoxGuest pointer to be passed to callback.
+ * @param   u32Data     VBoxGuest 32 bit value to be passed to callback.
+ */
typedef DECLCALLBACK(int) FNVBGLHGCMCALLBACK(VMMDevHGCMRequestHeader *pHeader, void
    *pvData, uint32_t u32Data);
+/** Pointer to a FNVBGLHGCMCALLBACK. */
typedef FNVBGLHGCMCALLBACK *PFNVBGLHGCMCALLBACK;
+
+/**
+ * Perform a connect request.
+ *
+ * That is locate required service and obtain a client identifier for future
+ * access.
+ *
+ * @note This function can NOT handle cancelled requests!
+ *
+ * @param pLoc The service to connect to.
+ * @param   pidClient           Where to return the client ID on success.
+ * @param   pfnAsyncCallback    Required pointer to function that is called when
+ *                              host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest
+ *                              implements waiting for an IRQ in this function.
+ * @param   pvAsyncData         An arbitrary VBoxGuest pointer to be passed to callback.
+ * @param   u32AsyncData        An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ *
+ * @return  VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInternalConnect(HGCMServiceLocation const *pLoc, HGCMCLIENTID
+                                        *pidClient,
+                                        PFNVBGLHGCMCALLBACK pfnAsyncCallback, void *pvAsyncData, uint32_t
+                                        u32AsyncData);
+
+/**
+ * Perform a disconnect request.
+ *
+ * That is tell the host that the client will not call the service anymore.
+ *
+ * @note This function can NOT handle cancelled requests!
+ *
+ * @param   idClient            The client ID to disconnect.
+ * @param   pfnAsyncCallback    Required pointer to function that is called when
+ *                              host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest
+ *                              implements waiting for an IRQ in this function.
+ * @param   pvAsyncData         An arbitrary VBoxGuest pointer to be passed to callback.
+ * @param   u32AsyncData        An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ *
+ * @return  VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInternalDisconnect(HGCMCLIENTID idClient,
+                                             PFNVBGLHGCMCALLBACK pfnAsyncCallback, void *pvAsyncData, uint32_t
+                                             u32AsyncData);
+
+/** Call a HGCM service.
+ *
+ * @note This function can deal with cancelled requests.
+ *
+ * @param   pCallInfo           The request data.
+ * @param   fFlags              Flags, see VBGLR0_HGCMCALL_F_XXX.
+ * @param   pfnAsyncCallback    Required pointer to function that is called when
+ *                              host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest
+ *                              implements waiting for an IRQ in this function.
+ * @param   pvAsyncData         An arbitrary VBoxGuest pointer to be passed to callback.
+ * @param   u32AsyncData        An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInternalCall(struct VBGLIOCHGCMCALL *pCallInfo, uint32_t cbCallInfo, uint32_t fFlags,
+                                       PFNVBGLHGCMCALLBACK pfAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData);
+
+/** Call a HGCM service. (32 bits packet structure in a 64 bits guest)
+ *
+ * @note This function can deal with cancelled requests.
+ *
+ * @param   pCallInfo           The request data.
+ * @param   fFlags              Flags, see VBGL_R0_HGCMCALL_F_XXX.
+ * @param   pfAsyncCallback     Required pointer to function that is called when
+ *                              host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest
+ *                              implements waiting for an IRQ in this function.
+ * @param   pvAsyncData         An arbitrary VBoxGuest pointer to be passed to callback.
+ * @param   u32AsyncData        An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ *
+ * @return  VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInternalCall32(struct VBGLIOCHGCMCALL *pCallInfo, uint32_t cbCallInfo, uint32_t fFlags,
+                                         PFNVBGLHGCMCALLBACK pfAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData);
+
+ /* @name VbglR0HGCMInternalCall flags */
+### define VBGL_R0_HGCMCALL_F_USER     UINT32_C(0)
+/** User mode request.
+ * Indicates that only user mode addresses are permitted as parameters. */
+### define VBGL_R0_HGCMCALL_F_KERNEL    UINT32_C(1)
+/** Kernel mode request.
+ * Indicates that kernel mode addresses are permitted as parameters. Whether or
+ * not user mode addresses are permitted is, unfortunately, OS specific. The
+ * following OSes allows user mode addresses: Windows, TODO.
+ */
+### define VBGL_R0_HGCMCALL_F_MODE_MASK UINT32_C(1)
+/** Mode mask. */
+### define VBGL_R0_HGCMCALL_F_MODE_MASK(UINT32_C(1)
+/** @ } */
+
+/*!VBGL_VBOXGUEST */
+
+struct VBGLHGCMHANDLE;
+typedef struct VBGLHGCMHANDLE *VBGLHGCMHANDLE;
+
+/** @name HGCM functions */
+ * @}
+ */
+
+/**
+ * Initializes HGCM in the R0 guest library. Must be called before any HGCM
+ * connections are made. Is called by VbgInitClient().
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbgIR0HGCMInit(void);
+
+/**
+ * Terminates HGCM in the R0 guest library. Is called by VbgTerminate().
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbgIR0HGCMTerminate(void);
+
+/**
+ * Connect to a service.
+ *
+ * @param pHandle Pointer to variable that will hold a handle to be used
+ * further in VbgIHCMMCall and VbgIHCMMClose.
+ *
+ * @param pszServiceName The service to connect to.
+ *
+ * @param pidClient Where to return the client ID for the connection.
+ *
+ * @return VBox status code.
+ *
+ * @todo consider baking the client Id into the handle.
+ */
+DECLR0VBGL(int) VbgIR0HGCMMConnect(VBGLHGCMHANDLE *pHandle, const char *pszServiceName,
+HGCMCLIENTID *pidClient);
+
+/**
+ * Connect to a service.
+ *
+ * @param handle Handle of the connection.
+ *
+ * @param idClient The ID of the client connection.
+ *
+ * @return VBox status code.
+ *
+ * @todo consider baking the client Id into the handle.
+ */
+DECLR0VBGL(int) VbgIR0HGCMDisconnect(VBGLHGCMHANDLE handle, HGCMCLIENTID idClient);
+
+/**
+ * Call to a service, returning only the I/O control status code.
+ *
+ * @param handle Handle of the connection.
+ * @param pData Call request information structure, including function parameters.
+ * @param cbData Length in bytes of data.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMCallRaw(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);
+
+/** *
+ * Call to a service, returning the HGCM status code.
+ *
+ * @param handle Handle of the connection.
+ * @param pData Call request information structure, including function parameters.
+ * @param cbData Length in bytes of data.
+ *
+ * @return VBox status code. Either the I/O control status code if that failed,
+ *         or the HGCM status code (pData->Hdr.rc).
+ */
+DECLR0VBGL(int) VbglR0HGCMCall(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);
+
+/** *
+ * Call to a service with user-mode data received by the calling driver from the User-Mode process.
+ * The call must be done in the context of a calling process.
+ *
+ * @param handle Handle of the connection.
+ * @param pData Call request information structure, including function parameters.
+ * @param cbData Length in bytes of data.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMCallUserDataRaw(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);
+
+/** @} */
+
+/** @name Undocumented helpers for talking to the Chromium OpenGL Host Service
+ * @{ */
typedef VBGLHGCMHANDLE VBGLCRCTLHANDLE;
+DECLR0VBGL(int) VbgIR0CrCtlCreate(VBGLCRCTLHANDLE *phCtl);
+DECLR0VBGL(int) VbgIR0CrCtlDestroy(VBGLCRCTLHANDLE hCtl);
+DECLR0VBGL(int) VbgIR0CrCtlConConnect(VBGLCRCTLHANDLE hCtl, HGCMCLIENTID *pidClient);
+DECLR0VBGL(int) VbgIR0CrCtlConDisconnect(VBGLCRCTLHANDLE hCtl, HGCMCLIENTID idClient);
+struct VBGLIOCHGCMCALL;
+DECLR0VBGL(int) VbgIR0CrCtlConCallRaw(VBGLCRCTLHANDLE hCtl, struct VBGLIOCHGCMCALL *pCallInfo, int cbCallInfo);
+DECLR0VBGL(int) VbgIR0CrCtlConCall(VBGLCRCTLHANDLE hCtl, struct VBGLIOCHGCMCALL

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*pCallInfo, int cbCallInfo);
+DECLR0VBGL(int) VbglR0CrCtlConCallUserDataRaw(VBGLCRCTLHANDLE hCtl, struct
VBGLIOCHGCMCALL *pCallInfo, int cbCallInfo);
+/** @} */ *
+
+# endif /* !VBGL_VBOXGUEST */
+
+# endif /* VBOX_WITH_HGCM */
+
+/**
+ * Initialize the heap.
+ *
+ * @returns VBox status code.
+ */
+DECLR0VBGL(int)     VbglR0PhysHeapInit(void);
+
+/**
+ * Shutdown the heap.
+ */
+DECLR0VBGL(void)    VbglR0PhysHeapTerminate(void);
+
+/**
+ * Allocate a memory block.
+ *
+ * @returns Virtual address of the allocated memory block.
+ * @param cbSize    Size of block to be allocated.
+ */
+DECLR0VBGL(void *)  VbglR0PhysHeapAlloc(uint32_t cbSize);
+
+/**
+ * Get physical address of memory block pointed by the virtual address.
+ *
+ * @note WARNING!
+ * The function does not acquire the Heap mutex!
+ * When calling the function make sure that the pointer is a valid one and
+ * is not being deallocated. This function can NOT be used for verifying
+ * if the given pointer is a valid one allocated from the heap.
+ *
+ * @param   pv      Virtual address of memory block.
+ * @returns Physical address of the memory block.
+ */
+DECLR0VBGL(uint32_t) VbglR0PhysHeapGetPhysAddr(void *pv);
+
+/**
+ * Free a memory block.
+ *
+ * @param   pv      Virtual address of memory block.
+ */
DECLR0VBGL(void) VbglR0PhysHeapFree(void *pv);
+ DECLR0VBGL(int) VbglR0QueryVMMDevMemory(struct VMMDevMemory **ppVMMDevMemory);
+ DECLR0VBGL(bool) VbglR0CanUsePhysPageList(void);
+
+#ifndef VBOX_GUEST
+/** @name Mouse
+ * @{
+DECLR0VBGL(int) VbglR0SetMouseNotifyCallback(PFNVBOXGUESTMOUSENOTIFY pfnNotify, void *pvUser);
+DECLR0VBGL(int) VbglR0GetMouseStatus(uint32_t *pfFeatures, uint32_t *px, uint32_t *py);
+DECLR0VBGL(int) VbglR0SetMouseStatus(uint32_t fFeatures);
+xml echo/#endif */
+xml echo/+*/
+xml echo/+ VBOX_GUEST */
+xml echo/+ *
+xml echo/+ IN_RING0 */
+xml echo/+ */@
+xml echo/+ */
+xml echo/+ */ @def group grp_vboxguest_lib_r3    Ring-3 interface.
+xml echo/+ *@
+xml echo/+ */
+xml echo/+ifndef IN_RING3
+xml echo/+ */
+xml echo/+@def VBGLR3DECL
+xml echo/+ Ring 3 VBGL declaration.
+xml echo/+ *@
+xml echo/+ type    The return type of the function declaration.
+xml echo/+ */
+xml echo/+define VBGLR3DECL(type) DECLHIDDEN(type) VBOXCALL
+xml echo/+ */
+xml echo/+@name General-purpose functions
+xml echo/+ *@
+xml echo/+ */
+xml echo/+VBGLR3DECL(int) VbglR3Init(void);
+xml echo/+VBGLR3DECL(int) VbglR3InitUser(void);
+xml echo/+VBGLR3DECL(void) VbglR3Term(void);
+xml echo/+ifdef ___iprt_time_h
+xml echo/+VBGLR3DECL(int) VbglR3GetHostTime(PRTTIMESPEC pTime);
+xml echo/+endif
+xml echo/+VBGLR3DECL(int) VbglR3InterruptEventWaits(void);
+xml echo/+VBGLR3DECL(int) VbglR3WriteLog(const char *pch, size_t cch);
+xml echo/+VBGLR3DECL(int) VbglR3CtlFilterMask(uint32_t fOr, uint32_t fNot);
+xml echo/+VBGLR3DECL(int) VbglR3Daemonize(bool fNoChDir, bool fNoClose, bool fRespawn, unsigned *pcRespawn);
+xml echo/+VBGLR3DECL(int) VbglR3PidFile(const char *pszPath, PRTFILE phFile);
+xml echo/+VBGLR3DECL(void) VbglR3ClosePidFile(const char *pszPath, RTFILE hFile);
+xml echo/+VBGLR3DECL(int) VbglR3SetGuestCaps(uint32_t fOr, uint32_t fNot);
+VBGLR3DECL(int) VbgIR3AcquireGuestCaps(uint32_t fOr, uint32_t fNot, bool fConfig);
+VBGLR3DECL(int) VbgIR3WaitEvent(uint32_t fMask, uint32_t cMillies, uint32_t *pfEvents);
+VBGLR3DECL(int) VbgIR3ReportAdditionsStatus(VBoxGuestFacilityType Facility, VBoxGuestFacilityStatus StatusCurrent,
    uint32_t fFlags);
+VBGLR3DECL(int) VbgIR3GetAdditionsVersion(char **ppszVer, char **ppszVerEx, char **ppszRev);
+VBGLR3DECL(int) VbgIR3GetAdditionsInstallationPath(char **ppszPath);
+VBGLR3DECL(int) VbgIR3GetSessionId(uint64_t *pu64IdSession);
+/** @} */
+/** @name Shared clipboard
+ * @{ */
+VBGLR3DECL(int) VbgIR3ClipboardConnect(HGCMCLIENTID *pidClient);
+VBGLR3DECL(int) VbgIR3ClipboardDisconnect(HGCMCLIENTID idClient);
+VBGLR3DECL(int) VbgIR3ClipboardGetHostMsg(HGCMCLIENTID idClient, uint32_t *pMsg, uint32_t *pfFormats);
+VBGLR3DECL(int) VbgIR3ClipboardReportFormats(HGCMCLIENTID idClient, uint32_t fFormats);
+VBGLR3DECL(int) VbgIR3ClipboardWriteData(HGCMCLIENTID idClient, uint32_t fFormat, void *pv, uint32_t cb);
+/** @} */
+/** @name Seamless mode
+ * @{ */
+VBGLR3DECL(int) VbgIR3SeamlessSetCap(bool fState);
+VBGLR3DECL(int) VbgIR3SeamlessWaitEvent(VMMDevSeamlessMode *pMode);
+VBGLR3DECL(int) VbgIR3SeamlessSendRects(uint32_t cRects, PRTRECT pRects);
+VBGLR3DECL(int) VbgIR3SeamlessGetLastEvent(VMMDevSeamlessMode *pMode);
+/** @} */
+/** @name Mouse
+ * @{ */
+VBGLR3DECL(int) VbgIR3GetMouseStatus(uint32_t *pfFeatures, uint32_t *px, uint32_t *py);
+VBGLR3DECL(int) VbgIR3SetMouseStatus(uint32_t fFeatures);
+/** @} */
+/** @name Video
+ * @{ */
+VBGLR3DECL(int) VbgIR3VideoAccelEnable(bool fEnable);
+VBGLR3DECL(int) VbgIR3VideoAccelFlush(void);
+VBGLR3DECL(int) VbgIR3SetPointerShape(uint32_t fFlags, uint32_t xHot, uint32_t yHot, uint32_t cx,
    uint32_t cy,
    const void *pvImg, size_t cbImg);
+VBGLR3DECL(int) VbgIR3SetPointerShapeReq(struct VMMDevReqMousePointer *pReq);
+/** @} */
+
+/** @name Display */
+* @{ */
+/** The folder for the video mode hint unix domain socket on Unix-like guests. */
+#define VBGLR3HOSTDISPSOCKETPATH  "/tmp/.VBoxService"
+/** The path to the video mode hint unix domain socket on Unix-like guests. */
+#define VBGLR3HOSTDISPSOCKET     VBGLR3VIDEOMODEHINTSOCKETPATH "/VideoModeHint"
+
+/** The folder for saving video mode hints to between sessions. */
+#define VBGLR3HOSTDISPSAVEDMODEPATH "/var/lib/VBoxGuestAdditions"
+/** The path to the file for saving video mode hints to between sessions. */
+#define VBGLR3HOSTDISPSAVEDMODE  VBGLR3HOSTDISPSAVEDMODEPATH "/SavedVideoModes"
+
+VBGLR3DECL(int)     VbglR3GetDisplayChangeRequest(uint32_t *pcx, uint32_t *pcy, uint32_t *pcBits,
+                                                 uint32_t *pdx, uint32_t *pdy, bool *pfEnabled, bool *pfChangeOrigin, bool fAck);
+VBGLR3DECL(bool)    VbglR3HostLikesVideoMode(uint32_t cx, uint32_t cy, uint32_t cBits);
+VBGLR3DECL(int)     VbglR3VideoModeGetHighestSavedScreen(unsigned *pcScreen);
+VBGLR3DECL(int)     VbglR3SaveVideoMode(unsigned cScreen, unsigned cx, unsigned cy, unsigned cBits,
+                                      unsigned x, unsigned y, bool fEnabled);
+VBGLR3DECL(int)     VbglR3RetrieveVideoMode(unsigned cScreen, unsigned *pcx, unsigned *pcy, unsigned *pcBits,
+                                             unsigned *px, unsigned *py, bool *pfEnabled);
+/** @} */
+
+/** @name VRDP */
+* @{ */
+VBGLR3DECL(int)     VbglR3VrdpGetChangeRequest(bool *pfActive, uint32_t *puExperienceLevel);
+/** @} */
+
+/** @name VM Statistics */
+* @{ */
+VBGLR3DECL(int)     VbglR3StatQueryInterval(uint32_t *pu32Interval);
+/*# if defined(_VBox_VMMDev_h) || defined(DOXYGEN_RUNNING)
+VBGLR3DECL(int)     VbglR3StatReport(VMMDevReportGuestStats *pReq);
+/*# endif
+/** @} */
+
+/** @name Memory ballooning */
+* @{ */
+VBGLR3DECL(int)     VbglR3MemBalloonRefresh(uint32_t *pcChunks, bool *pfHandleInR3);
+VBGLR3DECL(int)     VbglR3MemBalloonChange(void *pv, bool fInflate);
+/** @} */
+
+/** @name Core Dump */
+* @{ */
+VBGLR3DECL(int)     VbglR3WriteCoreDump(void);
+
+/** @} */
+
+<!--[ifdef VBOX_WITH_GUEST_PROPS
+/** @name Guest properties
+ */
+<!--[endif]-->  */
+
+typedef struct VBGLR3GUESTPROPENUM VBGLR3GUESTPROPENUM;
+<!--[ifdef VBOX_WITH_GUEST_PROPS
+/** @todo Docs. */
+ <![endif]-->  */
+
+typedef VBGLR3GUESTPROPENUM *PVBGLR3GUESTPROPENUM;
+
+VBGLR3DECL(int)     VbglR3GuestPropConnect(uint32_t *pidClient);
+
+VBGLR3DECL(int)     VbglR3GuestPropDisconnect(HGCMCLIENTID idClient);
+
+VBGLR3DECL(int)     VbglR3GuestPropWrite(HGCMCLIENTID idClient, const char *pszName, const char *pszValue, const char *pszFlags);
+
+VBGLR3DECL(int)     VbglR3GuestPropWriteValue(HGCMCLIENTID idClient, const char *pszName, const char *pszValue);
+
+VBGLR3DECL(int)     VbglR3GuestPropWriteValueV(HGCMCLIENTID idClient, const char *pszName, const char *pszValueFormat, va_list va) RT_IPRT_FORMAT_ATTR(3, 0);
+
+VBGLR3DECL(int)     VbglR3GuestPropWriteValueF(HGCMCLIENTID idClient, const char *pszName, const char *pszValueFormat, ...) RT_IPRT_FORMAT_ATTR(3, 4);
+
+VBGLR3DECL(int)     VbglR3GuestPropRead(HGCMCLIENTID idClient, const char *pszName, void *pvBuf, uint32_t cbBuf, char **ppszValue,
+     uint64_t *pu64Timestamp, char **ppszFlags, uint32_t *pcbBufActual);
+
+VBGLR3DECL(int)     VbglR3GuestPropReadValue(uint32_t ClientId, const char *pszName, char *pszValue, uint32_t cchValue, uint32_t *pcchValueActual);
+
+VBGLR3DECL(int)     VbglR3GuestPropReadValueAlloc(HGCMCLIENTID idClient, const char *pszName, char **ppszValue);
+
+VBGLR3DECL(int)     VbglR3GuestPropEnumRaw(HGCMCLIENTID idClient, const char *paszPatterns, char *pcBuf, uint32_t cbBuf, uint32_t *pcbBufActual);
+
+VBGLR3DECL(int)     VbglR3GuestPropEnum(HGCMCLIENTID idClient, char const * const *ppaszPatterns, uint32_t cPatterns, PVBGLR3GUESTPROPENUM *ppHandle, char const * const *ppszName, char const **ppszValue,
+     uint64_t *pu64Timestamp, char const **ppszFlags);
+
+VBGLR3DECL(int)     VbglR3GuestPropEnumNext(PVBGLR3GUESTPROPENUM pHandle, char const **ppszName, char const **ppszValue, uint64_t *pu64Timestamp, char const **ppszFlags);
+
+VBGLR3DECL(int)     VbglR3GuestPropEnumFree(PVBGLR3GUESTPROPENUM pHandle);
+
+VBGLR3DECL(int)     VbglR3GuestPropDelete(HGCMCLIENTID idClient, const char *pszName);
+
+VBGLR3DECL(int)     VbglR3GuestPropDelSet(HGCMCLIENTID idClient, const char * const *papszPatterns, uint32_t cPatterns);
+
+VBGLR3DECL(int)     VbglR3GuestPropWait(HGCMCLIENTID idClient, const char *pszPatterns, void *pvBuf, uint32_t cbBuf, uint64_t u64Timestamp, uint32_t cMillies, char ** ppszName, char ** ppszValue,
+ uint64_t *pu64Timestamp, char **ppszFlags, uint32_t *pcbBufActual);
+/** @} */

+/** @name Guest user handling / reporting. */
+/** @} */
+VBGLR3DECL(int) VbglR3GuestUserReportState(const char *pszUser, const char *pszDomain,
+VBoxGuestUserState enmState,
+uint8_t *pbDetails, uint32_t cbDetails);
+/** @} */

+/** @name Host version handling */
+/** @} */
+VBGLR3DECL(int) VbglR3HostVersionCheckForUpdate(HGCMCLIENTID idClient, bool *pfUpdate, char
+**ppszHostVersion,
+char **ppszGuestVersion);
+VBGLR3DECL(int) VbglR3HostVersionLastCheckedLoad(HGCMCLIENTID idClient, char **ppszVer);
+VBGLR3DECL(int) VbglR3HostVersionLastCheckedStore(HGCMCLIENTID idClient, const char *pszVer);
+/** @} */
+
+### endif */ VBOX_WITH_GUEST_PROPS defined */
+
+### ifdef VBOX_WITH_SHARED_FOLDERS
+/** @name Shared folders */
+/** @} */
+
+* Structure containing mapping information for a shared folder.
+*/
+typedef struct VBGLR3SHAREDFOLDERMAPPING
+{
+    /** Mapping status. */
+    uint32_t u32Status;
+    /** Root handle. */
+    uint32_t u32Root;
+} VBGLR3SHAREDFOLDERMAPPING;
+
+typedef VBGLR3SHAREDFOLDERMAPPING *PVBGLR3SHAREDFOLDERMAPPING;
+typedef VBGLR3SHAREDFOLDERMAPPING const *PCVBGLR3SHAREDFOLDERMAPPING;
+
+VBGLR3DECL(int) VbglR3SharedFolderConnect(uint32_t *pidClient);
+VBGLR3DECL(int) VbglR3SharedFolderDisconnect(HGCMCLIENTID idClient);
+VBGLR3DECL(bool) VbglR3SharedFolderExists(HGCMCLIENTID idClient, const char *pszShareName);
+VBGLR3DECL(int) VbglR3SharedFolderGetMappings(HGCMCLIENTID idClient, bool fAutoMountOnly,
+PVBGLR3SHAREDFOLDERMAPPING *ppaMappings, uint32_t *pcMappings);
+VBGLR3DECL(void) VbglR3SharedFolderFreeMappings(PVBGLR3SHAREDFOLDERMAPPING paMappings);
+VBGLR3DECL(int) VbglR3SharedFolderGetName(HGCMCLIENTID idClient,uint32_t u32Root, char
+**ppszName);
+VBGLR3DECL(int) VbglR3SharedFolderGetMountPrefix(char **ppszPrefix);

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+VBGLR3DECL(int) VbgIR3SharedFolderGetMountDir(char **ppszDir);
+/** @ */ */
+#endif /* VBOX_WITH_SHARED_FOLDERS defined */
+
+ifdef VBOX_WITH_GUEST_CONTROL
+/** @} */
+
+ifdef VBOX_WITH_GUEST_CONTROL
+/** @} */
+
+/* Structure containing the context required for
+ * either retrieving or sending a HGCM guest control
+ * commands from or to the host.
+ *
+ * Note: Do not change parameter order without also
+ * adapting all structure initializers.
+ */
+
+typedef struct VBGLR3GUESTCTRLCMDCTX
+{
+    /** @todo This struct could be handy if we want to implement
+     * a second communication channel, e.g. via TCP/IP.
+     * Use a union for the HGCM stuff then. */
+    /** IN: HGCM client ID to use for
+     * communication. */
+    uint32_t uClientID;
+    /** IN/OUT: Context ID to retrieve
+     * or to use. */
+    uint32_t uContextID;
+    /** IN: Protocol version to use. */
+    uint32_t uProtocol;
+    /** OUT: Number of parameters retrieved. */
+    uint32_t uNumParms;
+} VBGLR3GUESTCTRLCMDCTX, *PVBGLR3GUESTCTRLCMDCTX;
+
+/* General message handling on the guest. */
+VBGLR3DECL(int) VbgIR3GuestCtrlConnect(uint32_t *pidClient);
+VBGLR3DECL(int) VbgIR3GuestCtrlDisconnect(uint32_t idClient);
+VBGLR3DECL(int) VbgIR3GuestCtrlMsgFilterSet(uint32_t uClientId, uint32_t uValue, uint32_t uMaskAdd,
+uint32_t uMaskRemove);
+VBGLR3DECL(int) VbgIR3GuestCtrlMsgFilterUnset(uint32_t uClientId);
+VBGLR3DECL(int) VbgIR3GuestCtrlMsgReply(PVBGLR3GUESTCTRLCMDCTX pCtx, int rc);
+VBGLR3DECL(int) VbgIR3GuestCtrlMsgReplyEx(PVBGLR3GUESTCTRLCMDCTX pCtx, int rc, uint32_t
+uint32_t uNumParms);
+VBGLR3DECL(int) VbgIR3GuestCtrlMsgSkip(uint32_t uClientId);
+VBGLR3DECL(int) VbgIR3GuestCtrlMsgWaitFor(uint32_t uClientId, uint32_t *puMsg, uint32_t
+uint32_t uNumParms);
+VBGLR3DECL(int) VbgIR3GuestCtrlCancelPendingWaits(HGCMCLIENTID idClient);
Guest session handling. */
+VBGLR3DECL(int) VbgIR3GuestCtrlSessionClose(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t tFlags);
+VBGLR3DECL(int) VbgIR3GuestCtrlSessionNotify(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uType, uint32_t uResult);
+VBGLR3DECL(int) VbgIR3GuestCtrlSessionGetOpen(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

*puProtocol, char *pszUser, uint32_t cbUser,
  + char *pszPassword, uint32_t cbPassword, char *pszDomain, uint32_t cbDomain,
  + uint32_t *pFlags, uint32_t *pidSession);
+/* Guest path handling. */
+VBGLR3DECL(int) VbgIR3GuestCtrlPathGetRename(PVBGLR3GUESTCTRLCMDCTX pCtx, char
  *pszSource, uint32_t cbSource, char *pszDest,
  + uint32_t cbDest, uint32_t *pfFlags);
+/* Guest process execution. */
+VBGLR3DECL(int) VbgIR3GuestCtrlProcGetStart(PVBGLR3GUESTCTRLCMDCTX pCtx, char *pszCmd, uint32_t cbCmd, uint32_t

*puNumArgs, char *pszArgs, uint32_t cbArgs, uint32_t *puNumEnvVars, char *pszEnv, uint32_t
*pcbEnv,
  + uint32_t *puNumEnvVars, char *pszUser, uint32_t cbUser, char *pszPassword,
  + uint32_t *puTimeoutMS, uint32_t *puPriority,
  + uint64_t *puAffinity, uint32_t cbAffinity, uint32_t *pcAffinity);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcGetTerminate(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

*puPID);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcGetInput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puPID, uint32_t

*pfFlags, void *pvData,
  + uint32_t cbData, uint32_t *pcbSize);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcGetOutput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

*puPID, uint32_t *puHandle, uint32_t *pfFlags);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcGetWaitFor(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

*puPID, uint32_t *puWaitFlags,
  + uint32_t *puTimeoutMS);
+/* Guest native directory handling. */
+VBGLR3DECL(int) VbgIR3GuestCtrlDirGetRemove(PVBGLR3GUESTCTRLCMDCTX pCtx, char *pszPath, uint32_t cbPath, uint32_t

*pfFlags);
+/* Guest native file handling. */
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetOpen(PVBGLR3GUESTCTRLCMDCTX pCtx, char *pszFileName, uint32_t cbFileName, char *pszOpenMode,
  + uint32_t cbOpenMode, char *pszDisposition, uint32_t cbDisposition, char *pszSharing,
  + uint32_t cbSharing, uint32_t *puCreationMode, uint64_t *puOffset);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetClose(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

*puHandle);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetRead(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

*puHandle, uint32_t *puToRead);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetReadAt(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

*puHandle,
  + uint32_t *puToRead, uint64_t *poffRead);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetWrite(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t

}
*puHandle,
+     void *pvData, uint32_t cbData, uint32_t *pcbActual);
+VBGLR3DECL(int) VbglR3GuestCtrlFileGetWriteAt(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t
*puHandle, void *pvData, uint32_t cbData,
+     uint32_t *pcbActual, uint64_t *poffWrite);
+VBGLR3DECL(int) VbglR3GuestCtrlFileGetPosition(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle,
+     uint32_t *puSeekMethod, uint64_t *poffSeek);
+VBGLR3DECL(int) VbglR3GuestCtrlFileGetTell(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t
*puHandle);
+/** Guest -> Host. */
+VBGLR3DECL(int) VbglR3GuestCtrlFileCbOpen(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc,
uint32_t uFileHandle);
+VBGLR3DECL(int) VbglR3GuestCtrlFileCbClose(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc);
+VBGLR3DECL(int) VbglR3GuestCtrlFileCbError(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc);
+VBGLR3DECL(int) VbglR3GuestCtrlFileCbRead(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc, void
*pvData, uint32_t cbData);
+VBGLR3DECL(int) VbglR3GuestCtrlFileCbWrite(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc,
uint32_t uWritten);
+VBGLR3DECL(int) VbglR3GuestCtrlFileCbSeek(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc,
uint64_t uOffActual);
+VBGLR3DECL(int) VbglR3GuestCtrlFileCbTell(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc,
uint64_t uOffActual);
+VBGLR3DECL(int) VbglR3GuestCtrlProcCbStatus(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uPID,
uint32_t uStatus, uint32_t fFlags,
+     void *pvData, uint32_t cbData);
+VBGLR3DECL(int) VbglR3GuestCtrlProcCbOutput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uPID,
uint32_t uHandle, uint32_t fFlags,
+     void *pvData, uint32_t cbData);
+VBGLR3DECL(int) VbglR3GuestCtrlProcCbStatusInput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t
u32PID, uint32_t uStatus,
+     uint32_t fFlags, uint32_t cbWritten);
+
+/** @} */
+#endif /* VBOX_WITH_GUEST_CONTROL defined */
+
+/** @name Auto-logon handling
+  */
+VBGLR3DECL(int) VbglR3AutoLogonReportStatus(VBoxGuestFacilityStatus enmStatus);
+VBGLR3DECL(bool) VbglR3AutoLogonIsRemoteSession(void);
+/** @} */
+
+/** @name User credentials handling
+  */
+VBGLR3DECL(int) VbglR3CredentialsQueryAvailability(void);
+VBGLR3DECL(int) VbglR3CredentialsRetrieve(char **ppszUser, char **ppszPassword, char **ppszDomain);
+VBGLR3DECL(int) VbglR3CredentialsRetrieveUtf16(PRTUTF16 *ppwszUser, PRTUTF16 *ppwszPassword,
PRTUTF16 *ppwszDomain);
+VBGLR3DECL(void) VbglR3CredentialsDestroy(char *pszUser, char *pszPassword, char *pszDomain,
uint32_t cPasses);
+VBGLR3DECL( void) VbgIR3CredentialsDestroyUtf16 (PRTUTF16 pwszUser, PRTUTF16 pwszPassword,
+                                        PRTUTF16 pwszDomain,
+                                        uint32_t cPasses);
+/** @} */
+
+/** @name CPU hotplug monitor
+ * @{ */
+VBGLR3DECL(int) VbgIR3CpuHotPlugInit(void);
+VBGLR3DECL(int) VbgIR3CpuHotPlugTerm(void);
+VBGLR3DECL(int) VbgIR3CpuHotPlugWaitForEvent(VMMDevCpuEventType *penmEventType, uint32_t
+                                             *pidCpuCore, uint32_t *pidCpuPackage);
+/** @} */
+
+/** @name Page sharing
+ * @{ */
+struct VMMDEVSHAREDREGIONDESC;
+VBGLR3DECL(int) VbgIR3RegisterSharedModule(char *pszModuleName, char *pszVersion, RTGCPRTR64
+                                             GCBaseAddr, uint32_t cbModule,
+                                             unsigned cRegions, struct VMMDEVSHAREDREGIONDESC *pRegions);
+VBGLR3DECL(int) VbgIR3UnregisterSharedModule(char *pszModuleName, char *pszVersion, RTGCPRTR64
+                                             GCBaseAddr, uint32_t cbModule);
+VBGLR3DECL(int) VbgIR3CheckSharedModules(void);
+VBGLR3DECL(bool) VbgIR3PageSharingIsEnabled(void);
+VBGLR3DECL(int) VbgIR3PageIsShared(RTGCPRTR pPage, bool *pfShared, uint64_t *puPageFlags);
+/** @} */
+
+#ifndef VBOX_WITH_DRAG_AND_DROP
+/** @name Drag and Drop
+ * @{ */
+/** @todo This struct could be handy if we want to implement
+ * a second communication channel, e.g. via TCP/IP.
+ * Use a union for the HGCM stuff then. */
+ typeof struct VBGLR3GUESTDNDCMDCTX
+{+/** * Note: Do not change parameter order without also
+ * adapting all structure initializers.
+ */
+typedef struct VBGLR3GUESTDNDCMDCTX
+{
+    /**
+     */
+    /** HGCM client ID to use for communication. */
+    uint32_t uClientID;
+    /** The VM's current session ID. */
+    uint64_t uSessionID;
+}
+    /** Protocol version to use. */
+    uint32_t uProtocol;
+    /** Number of parameters retrieved for the current command. */
+    uint32_t uNumParms;
+    /** Max chunk size (in bytes) for data transfers. */
+    uint32_t cbMaxChunkSize;
+} VBGLR3GUESTDNDNCMDCTX, *PVBGLR3GUESTDNDNCMDCTX;
+
+typedef struct VBGLR3DNDHGCMEEVENT
+{
+    uint32_t uType;               /** The event type this struct contains. */
+    uint32_t uScreenId;           /** Screen ID this request belongs to. */
+    char    *pszFormats;          /** Format list (\r\n separated). */
+    uint32_t cbFormats;           /** Size (in bytes) of pszFormats (\0 included). */
+} a; /** Values used in init, move and drop event type. */
+
+union
+
+{
+    struct
+
+        {  ** X position of guest screen. */
+            uint32_t uXpos;       /** X position of guest screen. */
+            uint32_t uYpos;       /** Y position of guest screen. */
+            uint32_t uDefAction;  /** Proposed DnD action. */
+            uint32_t uAllActions; /** Allowed DnD actions. */
+        } a; /** Values used in init, move and drop event type. */
+
+    struct
+
+        {  ** Data request. */
+            void    *pvData;      /** Data request. */
+            uint32_t cbData;      /** Size (in bytes) of pvData. */
+        } b; /** Values used in drop data event type. */
+    } u;
+} VBGLR3DNDHGCMEEVENT;
+
+typedef VBGLR3DNDHGCMEEVENT *PVBGLR3DNDHGCMEEVENT;
+typedef const PVBGLR3DNDHGCMEEVENT CPVBGLR3DNDHGCMEEVENT;
+
+VBGLR3DECL(int)     VbglR3DnDConnect(PVBGLR3GUESTDNDCMDCTX pCtx);
+VBGLR3DECL(int)     VbglR3DnDDisconnect(PVBGLR3GUESTDNDCMDCTX pCtx);
+
+VBGLR3DECL(int)     VbglR3DnDRecvNextMsg(PVBGLR3GUESTDNDCMDCTX pCtx,
+CPVBGLR3DNDHGCMEEVENT pEvent);
+
+VBGLR3DECL(int)     VbglR3DnDHGSendAckOp(PVBGLR3GUESTDNDCMDCTX pCtx, uint32_t uAction);
+VBGLR3DECL(int)     VbglR3DnDHGSendReqData(PVBGLR3GUESTDNDCMDCTX pCtx, const char
+    *pcszFormat);
+VBGLR3DECL(int)     VbglR3DnDHGSendProgress(PVBGLR3GUESTDNDCMDCTX pCtx, uint32_t uStatus,
+    uint8_t uPercent, int rcErr);
+#  ifdef VBOX_WITH_DRAG_AND_DROP_GH
+VBGLR3DECL(int)     VbglR3DnDHGSendAckPending(PVBGLR3GUESTDNDCMDCTX pCtx, uint32_t
+    uDefAction, uint32_t uAllActions, const char* pcszFormats, uint32_t cbFormats);
+VBGLR3DECL(int)     VbglR3DnDGHSendData(PVBGLR3GUESTDNDCMDCTX pCtx, const char
+    *pszFormat, void *pvData, uint32_t cbData);
+
+// 64K bytes
+/*##  
+const char *pszFormat;
+*/
+/**/
VBGLR3DECL(int) VbglR3DnDGHSendError(PVBGLR3GUESTNDNDCMDCTX pCtx, int rcOp);
+
/* VBOX_WITH_DRAG_AND_DROP_GH */
+
+/** @} */
+
+/* Generic Host Channel Service. */
+VBGLR3DECL(int) VbglR3HostChannelInit(uint32_t *pidClient);
+VBGLR3DECL(void) VbglR3HostChannelTerm(uint32_t *idClient);
+VBGLR3DECL(int) VbglR3HostChannelAttach(uint32_t *pu32ChannelHandle, uint32_t u32HGCMClientId,
+       const char *pszName, uint32_t u32Flags);
+VBGLR3DECL(void) VbglR3HostChannelDetach(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId);
+VBGLR3DECL(int) VbglR3HostChannelSend(uint32_t *u32ChannelHandle, uint32_t u32HGCMClientId,
+       void *pvData, uint32_t cbData);
+VBGLR3DECL(int) VbglR3HostChannelRecv(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId,
+       void *pvData, uint32_t cbData,
+       uint32_t *pu32SizeReceived, uint32_t *pu32SizeRemaining);
+VBGLR3DECL(int) VbglR3HostChannelControl(uint32_t *u32ChannelHandle, uint32_t u32HGCMClientId,
+       uint32_t u32Code, void *pvParm, uint32_t cbParm,
+       void *pvData, uint32_t cbData, uint32_t *pu32SizeDataReturned);
+VBGLR3DECL(int) VbglR3HostChannelEventWait(uint32_t *pu32ChannelHandle, uint32_t u32HGCMClientId,
+       uint32_t *pu32EventId, void *pvParm, uint32_t cbParm,
+       uint32_t *pu32SizeReturned);
+VBGLR3DECL(int) VbglR3HostChannelEventCancel(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId);
+VBGLR3DECL(int) VbglR3HostChannelQuery(const char *pszName, uint32_t u32HGCMClientId, uint32_t u32Code,
+       void *pvParm, uint32_t cbParm, void *pvData, uint32_t cbData,
+       uint32_t *pu32SizeDataReturned);
+
+/** @name Mode hint storage
+ * @{ */
+VBGLR3DECL(int) VbglR3ReadVideoMode(unsigned cDisplay, unsigned *cx,
+       unsigned *cy, unsigned *cBPP, unsigned *x,
+       unsigned *y, unsigned *fEnabled);
+VBGLR3DECL(int) VbglR3WriteVideoMode(unsigned cDisplay, unsigned cx,
+       unsigned cy, unsigned cBPP, unsigned x,
+       unsigned y, unsigned fEnabled);
+/** @} */
+
+/** @name Generic HGCM
+ * @{ */
+VBGLR3DECL(int) VbglR3HGCMConnect(const char *pszServiceName, HGCMCLIENTID *pidClient);
+VBGLR3DECL(int) VbglR3HGCMDisconnect(HGCMCLIENTID idClient);
+struct VBGLIOCHGCMCALL;
+VBGLR3DECL(int) VbglR3HGCMCall(struct VBGLIOCHGCMCALL *pInfo, size_t cbInfo);
+/** @} */
+
+#endif /* IN_RING3 */
+/** @} */
+
+RT_C_DECLS_END
+
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/VBoxGuestMangling.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/VBox/VBoxGuestMangling.h
@@ -0,0 +1,32 @@
+/** @file
+ * VBoxGuest - Mangling of IPRT symbols for guest drivers.
+ * This is included via a compiler directive on platforms with a global kernel
+ * symbol name space (i.e. not Windows, OS/2 and Mac OS X (?)).
+ */
+
+/**
+ * Copyright (C) 2011-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#define RT_MANGLER(symbol)   VBoxGuest_##symbol
+
+/**
+ * Virtual Device for Guest <-> VMM/Host communication (ADD,DEV).
+ */
+
+/#* Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef ___VBox_VMMDev_h
+ #define ___VBox_VMMDev_h
++
+
+ include <VBox/cdefs.h>
+ include <VBox/param.h>          /* for the PCI IDs. */
+ include <VBox/types.h>
+ include <VBox/err.h>
+ include <VBox/ostypes.h>
+ include <VBox/VMMDevCoreTypes.h>
+ include <iprt/assertcompile.h>
+
+
+pragma pack(4) /* force structure dword packing here. */
+RT_C_DECLS_BEGIN
+
+/** @defgroup grp_vmmdev   VMM Device
+ *
+ @note This interface cannot be changed, it can only be extended!
+ *
+ */
+
+
+/** Size of VMMDev RAM region accessible by guest.
* Must be big enough to contain VMMDevMemory structure (see further down).
* For now: 4 megabyte.
*/
#define VMMDEV_RAM_SIZE (4 * 256 * PAGE_SIZE)

+/** Size of VMMDev heap region accessible by guest.
+ (Must be a power of two (pci range.).)
+ */
#define VMMDEV_HEAP_SIZE (4 * PAGE_SIZE)

+/** Port for generic request interface (relative offset). */
#define VMMDEV_PORT_OFF_REQUEST 0

+/** @defgroup grp_vmmdev_req VMMDev Generic Request Interface
+ */
+/** @name Current version of the VMMDev interface.
+ */
+/** Additions are allowed to work only if
+ additions_major == vmmdev_current && additions_minor <= vmmdev_current.
+ Additions version is reported to host (VMMDev) by VMMDevReq_ReportGuestInfo.
+ */
+/** @remarks These defines also live in the 16-bit and assembly versions of this
+ header.
+ */
#define VMMDEV_VERSION 0x00010004
#define VMMDEV_VERSION_MAJOR (VMMDEV_VERSION >> 16)
#define VMMDEV_VERSION_MINOR (VMMDEV_VERSION & 0xffff)
+/** @} */

+/** Maximum request packet size. */
#define VMMDEV_MAX_VMMDEVREQ_SIZE _1M
+/** Maximum number of HGCM parameters.
+ This is wrong wrt user land calls. For them it iss 61.
+ See comments on VBGLIOCHGCMCALL::cParms. */
#define VMMDEV_MAX_HGCM_PARMS 1024
+/** Maximum total size of hgcm buffers in one call. */
#define VMMDEV_MAX_HGCM_DATA_SIZE UINT32_C(0x7FFFFFFF)

+/**
+ VMMDev request types.
+ @note when updating this, adjust vmmdevGetRequestSize() as well
+ */
typedef enum VMMDevRequestType
{|
+ VMMDevReq_InvalidRequest = 0,
+ VMMDevReq_GetMouseStatus = 1,
+ VMMDevReq_SetMouseStatus = 2,
+ VMMDevReq_SetPointerShape = 3,
+ VMMDevReq_GetHostVersion = 4,
+ VMMDevReq_Idle = 5,
+ VMMDevReq_GetHostTime = 10,
+ VMMDevReq_GetHypervisorInfo = 20,
+ VMMDevReq_SetHypervisorInfo = 21,
+ VMMDevReq_RegisterPatchMemory = 22, /**< @since version 3.0.6 */
+ VMMDevReq_DeregisterPatchMemory = 23, /**< @since version 3.0.6 */
+ VMMDevReq_SetPowerStatus = 30,
+ VMMDevReq_AcknowledgeEvents = 41,
+ VMMDevReq_CtlGuestFilterMask = 42,
+ VMMDevReq_ReportGuestInfo = 50,
+ VMMDevReq_ReportGuestInfo2 = 58, /**< @since version 3.2.0 */
+ VMMDevReq_ReportGuestStatus = 59, /**< @since version 3.2.8 */
+ VMMDevReq_ReportGuestUserState = 74, /**< @since version 4.3 */
+ /**<
+ * Retrieve a display resize request sent by the host using
+ * @a IDisplay:setVideoModeHint. Deprecated.
+ */
+ VMMDevReq_GetDisplayChangeRequest = 51,
+ VMMDevReq_VideoModeSupported = 52,
+ VMMDevReq_GetHeightReduction = 53,
+ /**<
+ * Retrieve a display resize request sent by the host using
+ * @a IDisplay:setVideoModeHint.
+ */
+ VMMDevReq_GetDisplayChangeRequest2 = 54,
+ VMMDevReq_ReportGuestCapabilities = 55,
+ VMMDevReq_SetGuestCapabilities = 56,
ifdef VBOX_WITH_HGCM
+ VMMDevReq_HGCMConnect = 60,
+ VMMDevReq_HGCMDisconnect = 61,
+ ifdef VBOX_WITH_64_BITS_GUESTS
+ VMMDevReq_HGCMCall32 = 62,
+ VMMDevReq_HGCMCall64 = 63,
+ else
+ VMMDevReq_HGCMCall = 62,
+ endif /* VBOX_WITH_64_BITS_GUESTS */
+ VMMDevReq_HGCMCancel = 64,
+ VMMDevReq_HGCMCancel2 = 65,
+ endif
+ VMMDevReq_VideoAccelEnable = 70,
+ VMMDevReq_VideoAccelFlush = 71,
+ VMMDevReq_VideoSetVisibleRegion = 72,
+ VMMDevReq_GetSeamlessChangeRequest = 73,
+ VMMDevReq_QueryCredentials = 100,
+ VMMDevReq_ReportCredentialsJudgement = 101,
+ VMMDevReq_ReportGuestStats = 110,
+ VMMDevReq_GetMemBalloonChangeRequest = 111,
+ VMMDevReq_GetStatisticsChangeRequest = 112,
+ VMMDevReq_ChangeMemBalloon = 113,
+ VMMDevReq_GetVRDPChangeRequest = 150,
+ VMMDevReq_LogString = 200,
+ VMMDevReq_GetCpuHotPlugRequest = 210,
+ VMMDevReq_SetCpuHotPlugStatus = 211,
+ VMMDevReq_RegisterSharedModule = 212,
+ VMMDevReq_UnregisterSharedModule = 213,
+ VMMDevReq_CheckSharedModules = 214,
+ VMMDevReq_GetPageSharingStatus = 215,
+ VMMDevReq_DebugIsPageShared = 216,
+ VMMDevReq_GetSessionId = 217, /**< @since version 3.2.8 */
+ VMMDevReq_WriteCoreDump = 218,
+ VMMDevReq_GuestHeartbeat = 219,
+ VMMDevReq_HeartbeatConfigure = 220,
+ VMMDevReq_SizeHack = 0x7fffffff
} VMMDevRequestType;
+
+
+ ifdef VBOX_WITH_64_BITS_GUESTS
+ /*
+ * Constants and structures are redefined for the guest.
+ *
+ * Host code MUST always use either *32 or *64 variant explicitly.
+ * Host source code will use VBOX_HGCM_HOST_CODE define to catch undefined
+ * data types and constants.
+ *
/* This redefinition means that the new additions builds will use
+ * the *64 or *32 variants depending on the current architecture bit count (ARCH_BITS).
+ */
ifndef VBOX_HGCM_HOST_CODE
if ARCH_BITS == 64
define VMMDevReq_HGCMCall VMMDevReq_HGCMCall64
elif ARCH_BITS == 32 || ARCH_BITS == 16
define VMMDevReq_HGCMCall VMMDevReq_HGCMCall32
else
error "Unsupported ARCH_BITS"
endif
endif /* !VBOX_HGCM_HOST_CODE */
define VMMDEV_REQUEST_HEADER_VERSION (0x10001)

/** Version of VMMDevRequestHeader structure. */
define VMMDEV_REQUEST_HEADER_VERSION (0x10001)
/** Generic VMMDev request header. */
/**
 * This structure is copied/mirrored by VBGLREQHDR in the VBoxGuest I/O control
 * interface. Changes there needs to be mirrored in it.
 */
#define VMMDevRequestHeader
+/
+typedef struct VMMDevRequestHeader
+{
+    /**< IN: Size of the structure in bytes (including body).
+     * (VBGLREQHDR uses this for input size and output if reserved1 is zero). */
+    uint32_t size;
+    /**< IN: Version of the structure. */
+    uint32_t version;
+    /**< IN: Type of the request.
+     * @note VBGLREQHDR uses this for optional output size. */
+    VMMDevRequestType requestType;
+    /**< OUT: VBox status code. */
+    int32_t rc;
+    /**< Reserved field no.1. MBZ.
+     * @note VBGLREQHDR uses this for optional output size, however never for a
+     * real VMMDev request, only in the I/O control interface. */
+    uint32_t reserved1;
+    /**< Reserved field no.2. MBZ. */
+    uint32_t reserved2;
+} VMMDevRequestHeader;
+AssertCompileSize(VMMDevRequestHeader, 24);
+/#* Initialize a VMMDevRequestHeader structure.
+ * Same as VBGLREQHDR_INIT_VMMDEV(). */
+ #define VMMDEV_REQ_HDR_INIT(a_pHdr, a_cb, a_enmType) \
+   do { \
+       (a_pHdr)->size        = (a_cb); \
+       (a_pHdr)->version     = VMMDEV_REQUEST_HEADER_VERSION; \
+       (a_pHdr)->requestType = (a_enmType); \
+       (a_pHdr)->rc          = VERR_INTERNAL_ERROR; \
+       (a_pHdr)->reserved1   = 0; \
+       (a_pHdr)->reserved2   = 0; \
+   } while (0)
+
+/#**
+ * Mouse status request structure.
+ *
+ * Used by VMMDevReq_GetMouseStatus and VMMDevReq_SetMouseStatus.
+ */
+typedef struct 
+{ 
+   /** header */
+   VMMDevRequestHeader header;
+   /** Mouse feature mask. See VMMDEV_MOUSE_*. */
+   uint32_t mouseFeatures;
+   /** Mouse x position. */
+   int32_t pointerXPos;
+   /** Mouse y position. */
+   int32_t pointerYPos;
+ } VMMDevReqMouseStatus;
+AssertCompileSize(VMMDevReqMouseStatus, 24+12);
+
+/#** @name Mouse capability bits (VMMDevReqMouseStatus::mouseFeatures).
+ * @{ */
+/#define VMMDEV_MOUSE_GUEST_CAN_ABSOLUTE                     RT_BIT(0)
+/#define VMMDEV_MOUSE_HOST_WANTS_ABSOLUTE                    RT_BIT(1)
+/#define VMMDEV_MOUSE_GUEST_NEEDS_HOST_CURSOR                RT_BIT(2)
+/#define VMMDEV_MOUSE_HOST_CANNOT_HWPOINTER                  RT_BIT(3)
+/#define VMMDEV_MOUSE_NEW_PROTOCOL                           RT_BIT(4)
+/** If the guest changes the status of the
+ * VMMDEV_MOUSE_GUEST_NEEDS_HOST_CURSOR bit, the host will honour this */
+#define VMMDEV_MOUSE_HOST_RECHECKS_NEEDS_HOST_CURSOR RT_BIT(5)
+/** The host supplies an absolute pointing device. The Guest Additions may
+ * wish to use this to decide whether to install their own driver */
+#define VMMDEV_MOUSE_HOST_HAS_ABS_DEV RT_BIT(6)
+/** The mask of all VMMDEV_MOUSE_* flags */
+#define VMMDEV_MOUSE_MASK UINT32_C(0x0000007f)
+/** The mask of guest capability changes for which notification events should
+ * be sent */
+#define VMMDEV_MOUSE_NOTIFY_HOST_MASK
+ (VMMDEV_MOUSE_GUEST_CAN_ABSOLUTE |
VMMDEV_MOUSE_GUEST_NEEDS_HOST_CURSOR)
+/** The mask of all capabilities which the guest can legitimately change */
+#define VMMDEV_MOUSE_GUEST_MASK 
+ (VMMDEV_MOUSE_NOTIFY_HOST_MASK | VMMDEV_MOUSE_NEW_PROTOCOL)
+/** The mask of host capability changes for which notification events should
+ * be sent */
+#define VMMDEV_MOUSE_NOTIFY_GUEST_MASK
+ VMMDEV_MOUSE_HOST_WANTS_ABSOLUTE
+/** The mask of all capabilities which the host can legitimately change */
+#define VMMDEV_MOUSE_HOST_MASK 
+ ( VMMDEV_MOUSE_NOTIFY_GUEST_MASK |
VMMDEV_MOUSE_HOST_CANNOT_HWPOINTER |
VMMDEV_MOUSE_HOST_RECHECKS_NEEDS_HOST_CURSOR |
VMMDEV_MOUSE_HOST_HAS_ABS_DEV)
+/** @} */
+
+/** @} name Absolute mouse reporting range
+ * @{ */
+/** @todo Should these be here? They are needed by both host and guest. */
+/** The minimum value our pointing device can return. */
+#define VMMDEV_MOUSE_RANGE_MIN 0
+/** The maximum value our pointing device can return. */
+#define VMMDEV_MOUSE_RANGE_MAX 0xFFFF
+/** The full range our pointing device can return. */
+#define VMMDEV_MOUSE_RANGE (VMMDEV_MOUSE_RANGE_MAX -
VMMDEV_MOUSE_RANGE_MIN)
+/** @} */
+
+/**
+ * Mouse pointer shape/visibility change request.
+ * @{ */
+/** Used by VMMDevReq_SetPointerShape. The size is variable.
+ */
+typedef struct VMMDevReqMousePointer
+{
/** Header. */
+ VMMDevRequestHeader header;
/** VBOX_MOUSE_POINTER_* bit flags from VBox/Graphics/VBoxVideo.h. */
+ uint32_t fFlags;
/** x coordinate of hot spot. */
+ uint32_t xHot;
/** y coordinate of hot spot. */
+ uint32_t yHot;
/** Width of the pointer in pixels. */
+ uint32_t width;
/** Height of the pointer in scanlines. */
+ uint32_t height;
/** Pointer data. */
+ *
+ ****
+ * The data consists of 1 bpp AND mask followed by 32 bpp XOR (color) mask.
+ *
+ * For pointers without alpha channel the XOR mask pixels are 32 bit values: (lsb)BGR0(msb).
+ * For pointers with alpha channel the XOR mask consists of (lsb)BGRA(msb) 32 bit values.
+ *
+ * Guest driver must create the AND mask for pointers with alpha channel, so if host does not
+ * support alpha, the pointer could be displayed as a normal color pointer. The AND mask can
+ * be constructed from alpha values. For example alpha value >= 0xf0 means bit 0 in the AND mask.
+ *
+ * The AND mask is 1 bpp bitmap with byte aligned scanlines. Size of AND mask,
+ * therefore, is cbAnd = (width + 7) / 8 * height. The padding bits at the
+ * end of any scanline are undefined.
+ *
+ * The XOR mask follows the AND mask on the next 4 bytes aligned offset:
+ * uint8_t *pXor = pAnd + (cbAnd + 3) & ~3
+ * Bytes in the gap between the AND and the XOR mask are undefined.
+ * XOR mask scanlines have no gap between them and size of XOR mask is:
+ * cXor = width * 4 * height.
+ ****
+ *
+ * Preallocate 4 bytes for accessing actual data as p->pointerData.
+ */
+ char pointerData[4];
+ } VMMDevReqMousePointer;
+ AssertCompileSize(VMMDevReqMousePointer, 24+24);
+ */
+ * Get the size that a VMMDevReqMousePointer request should have for a given
+ * size of cursor, including the trailing cursor image and mask data.
+ * @note an "empty" request still has the four preallocated bytes of data
+ *
+ * @returns the size
+ * @param width the cursor width
DECLINLINE(size_t) vmmdevGetMousePointerReqSize(uint32_t width, uint32_t height)
{
    size_t cbBase = RT_OFFSETOF(VMMDevReqMousePointer, pointerData[0]);
    size_t cbMask = (width + 7) / 8 * height;
    size_t cbArgb = width * height * 4;
    return RT_MAX(cbBase + ((cbMask + 3) & ~3) + cbArgb,
                  sizeof(VMMDevReqMousePointer));
}

/*
 * String log request structure.
 * *
 * Used by VMMDevReq_LogString.
 * @deprecated Use the IPRT logger or VbgIR3WriteLog instead.
 * */
typedef struct
{
    /** header */
    VMMDevRequestHeader header;
    /** variable length string data */
    char szString[1];
} VMMDevReqLogString;
AssertCompileSize(VMMDevReqLogString, 24+4);

/*
 * VirtualBox host version request structure.
 * *
 * Used by VMMDevReq_GetHostVersion.
 * *
 * @remarks VBGL uses this to detect the presence of new features in the
 *          interface.
 * */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Major version. */
    uint16_t major;
    /** Minor version. */
    uint16_t minor;
    /** Build number. */
    uint32_t build;
    /** SVN revision. */
    uint32_t revision;
+ /**< Feature mask. */
+ uint32_t features;
+} VMMDevReqHostVersion;
+AssertCompileSize(VMMDevReqHostVersion, 24+16);
+
+ /**< @name VMMDevReqHostVersion::features */
+ * @{ */
+ /**< Physical page lists are supported by HGCM. */
+ #define VMMDEV_HVF_HGCM_PHYS_PAGE_LIST RT_BIT(0)
+ /**< @} */
+
+ /**< * Guest capabilities structure. */
+ * Used by VMMDevReq_ReportGuestCapabilities. */
+ * */
+ typedef struct
+ {
+ /**< Header. */
+ VMMDevRequestHeader header;
+ /**< Capabilities (VMMDEV_GUEST_*). */
+ uint32_t caps;
+} VMMDevReqGuestCapabilities;
+AssertCompileSize(VMMDevReqGuestCapabilities, 24+4);
+
+ /**< * Guest capabilities structure, version 2. */
+ * Used by VMMDevReq_SetGuestCapabilities. */
+ * */
+ typedef struct
+ {
+ /**< Header. */
+ VMMDevRequestHeader header;
+ /**< Mask of capabilities to be added. */
+ uint32_t u32OrMask;
+ /**< Mask of capabilities to be removed. */
+ uint32_t u32NotMask;
+} VMMDevReqGuestCapabilities2;
+AssertCompileSize(VMMDevReqGuestCapabilities2, 24+8);
+
+ /**< * Idle request structure. */
+ * */
+ * Used by VMMDevReq_Idle.
typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
} VMMDevReqIdle;

AssertCompileSize(VMMDevReqIdle, 24);

+/**
+ * Host time request structure.
+ *
+ * Used by VMMDevReq_GetHostTime.
+ */
+typedef struct {
+    /** Header */
+    VMMDevRequestHeader header;
+    /** OUT: Time in milliseconds since unix epoch. */
+    uint64_t time;
+} VMMDevReqHostTime;

AssertCompileSize(VMMDevReqHostTime, 24+8);

+/**
+ * Hypervisor info structure.
+ *
+ * Used by VMMDevReq_GetHypervisorInfo and VMMDevReq_SetHypervisorInfo.
+ */
+typedef struct {
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** Guest virtual address of proposed hypervisor start.
+     * Not used by VMMDevReq_GetHypervisorInfo.
+     * @todo Make this 64-bit compatible? */
+    RTGCPTR32 hypervisorStart;
+    /** Hypervisor size in bytes. */
+    uint32_t hypervisorSize;
+} VMMDevReqHypervisorInfo;

AssertCompileSize(VMMDevReqHypervisorInfo, 24+8);

+/**
+ * Default patch memory size.
+ *
+ * Used by VMMDevReq_RegisterPatchMemory and VMMDevReq_DeregisterPatchMemory.
+ */
+#define VMMDEV_GUEST_DEFAULT_PATCHMEM_SIZE 8192
+/** @} */
/**
 * Patching memory structure. (locked executable & read-only page from the guest's perspective)
 *
 * Used by VMMDevReq_RegisterPatchMemory and VMMDevReq_DeregisterPatchMemory
 */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Guest virtual address of the patching page(s). */
    RTGCPTR64 pPatchMem;
    /** Patch page size in bytes. */
    uint32_t cbPatchMem;
} VMMDevReqPatchMemory;
AssertCompileSize(VMMDevReqPatchMemory, 24+12);

/**
 * Guest power requests.
 *
 * See VMMDevReq_SetPowerStatus and VMMDevPowerStateRequest.
 */
typedef enum
{
    VMMDevPowerState_Invalid   = 0,
    VMMDevPowerState_Pause     = 1,
    VMMDevPowerState_PowerOff  = 2,
    VMMDevPowerState_SaveState = 3,
    VMMDevPowerState_SizeHack = 0x7fffffff
} VMMDevPowerState;
AssertCompileSize(VMMDevPowerState, 4);

/**
 * VM power status structure.
 *
 * Used by VMMDevReq_SetPowerStatus.
 */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Power state request. */
    VMMDevPowerState powerState;
} VMMDevPowerStateRequest;
AssertCompileSize(VMMDevPowerStateRequest, 24+4);
typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** OUT: Pending event mask. */
    uint32_t events;
} VMMDevEvents;

typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** Mask of events to be added to the filter. */
    uint32_t u32OrMask;
    /** Mask of events to be removed from the filter. */
    uint32_t u32NotMask;
} VMMDevCtlGuestFilterMask;

typedef struct VBoxGuestInfo {
    /** The VMMDev interface version expected by additions. *
      * *Deprecated*, do not use anymore! Will be removed. */
    uint32_t interfaceVersion;
    /** Guest OS type. */
    VBOXOSTYPE osType;
} VBoxGuestInfo;
+ *
+ * Used by VMMDevReq_ReportGuestInfo.
+ */
+ typedef struct
+ {
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** Guest information. */
+    VBoxGuestInfo guestInfo;
+ } VMMDevReportGuestInfo;
+ AssertCompileSize(VMMDevReportGuestInfo, 24+8);
+ *
+ /***
+ * Guest information structure, version 2.
+ *
+ */
+ typedef struct VBoxGuestInfo2
+ {
+    /** Major version. */
+    uint16_t additionsMajor;
+    /** Minor version. */
+    uint16_t additionsMinor;
+    /** Build number. */
+    uint32_t additionsBuild;
+    /** SVN revision. */
+    uint32_t additionsRevision;
+    /** Feature mask, currently unused. */
+    uint32_t additionsFeatures;
+    /** The intentional meaning of this field was:
+     * Some additional information, for example 'Beta 1' or something like that.
+     *
+     * The way it was implemented was implemented: VBOX_VERSION_STRING.
+     *
+     * This means the first three members are duplicated in this field (if the guest
+     * build config is sane). So, the user must check this and chop it off before
+     * usage. There is, because of the Main code's blind trust in the field's
+     * content, no way back. */
+    char     szName[128];
+ } VBoxGuestInfo2;
+ AssertCompileSize(VBoxGuestInfo2, 144);
typedef struct
+
+     /** Header. */
+     VMMDevRequestHeader header;
+     /** Guest information. */
+     VBoxGuestInfo2 guestInfo;
+ } VMMDevReportGuestInfo2;
+AssertCompileSize(VMMDevReportGuestInfo2, 24+144);
+
+/**
+ * The facility class.
+ *
+ * This needs to be kept in sync with AdditionsFacilityClass of the Main API!
+ */
+typedef enum
+
+     VBoxGuestFacilityClass_None       = 0,
+     VBoxGuestFacilityClass_Driver     = 10,
+     VBoxGuestFacilityClass_Service    = 30,
+     VBoxGuestFacilityClass_Program    = 50,
+     VBoxGuestFacilityClass_Feature    = 100,
+     VBoxGuestFacilityClass_ThirdParty = 999,
+     VBoxGuestFacilityClass_All        = 0x7ffffffe,
+     VBoxGuestFacilityClass_SizeHack   = 0x7fffffff
+ } VBoxGuestFacilityClass;
+AssertCompileSize(VBoxGuestFacilityClass, 4);
+
+/**
+ * Guest status structure.
+ *
+ * Used by VMMDevReqGuestStatus.
+ */
+typedef struct VBoxGuestStatus
+
+     /** Facility the status is indicated for. */
+     VBoxGuestFacilityType facility;
+     /** Current guest status. */
+     VBoxGuestFacilityStatus status;
+     /** Flags, not used at the moment. */
+     uint32_t flags;
+ } VBoxGuestStatus;
+AssertCompileSize(VBoxGuestStatus, 12);
+
+/**
+ * Guest Additions status structure.
+ *
+ * Used by VMMDevReq_ReportGuestStatus.
+ **/  
+ typedef struct  
+ {  
+  /** Header. */  
+  VMMDevRequestHeader header;  
+  /** Guest information. */  
+  VBoxGuestStatus guestStatus;  
+ } VMMDevReportGuestStatus;  
+ AssertCompileSize(VMMDevReportGuestStatus, 24+12);  
+  
+  
+ /*  
+ * Guest user status updates.  
+ */  
+ typedef struct VBoxGuestUserStatus  
+ {  
+  /** The guest user state to send. */  
+  VBoxGuestUserState state;  
+  /** Size (in bytes) of szUser. */  
+  uint32_t cbUser;  
+  /** Size (in bytes) of szDomain. */  
+  uint32_t cbDomain;  
+  /** Size (in bytes) of aDetails. */  
+  uint32_t cbDetails;  
+  /** Note: Here begins the dynamically  
+   * allocated region. */  
+  char szUser[1];  
+  /** Domain the guest user is bound to. */  
+  char szDomain[1];  
+  /** Optional details of the state. */  
+  uint8_t aDetails[1];  
+ } VBoxGuestUserStatus;  
+ AssertCompileSize(VBoxGuestUserStatus, 20);  
+  
+  
+ /*  
+ * Guest user status structure.  
+ */  
+ * Used by VMMDevReq_ReportGuestUserStatus.  
+ */  
+ typedef struct  
+ {  
+  /** Header. */  
+  VMMDevRequestHeader header;  
+  /** Guest user status. */  
+  VBoxGuestUserStatus status;  
+ } VMMDevReportGuestUserState;
+AssertCompileSize(VMMDevReportGuestUserState, 24+20);
+
+/**
 + * Guest statistics structure.
 + *
 + */
+typedef struct VBoxGuestStatistics
+{
+    /** Virtual CPU ID. */
+    uint32_t u32CpuId;
+    /** Reported statistics. */
+    uint32_t u32StatCaps;
+    /** Idle CPU load (0-100) for last interval. */
+    uint32_t u32CpuLoad_Idle;
+    /** Kernel CPU load (0-100) for last interval. */
+    uint32_t u32CpuLoad_Kernel;
+    /** User CPU load (0-100) for last interval. */
+    uint32_t u32CpuLoad_User;
+    /** Nr of threads. */
+    uint32_t u32Threads;
+    /** Nr of processes. */
+    uint32_t u32Processes;
+    /** Nr of handles. */
+    uint32_t u32Handles;
+    /** Memory load (0-100). */
+    uint32_t u32MemoryLoad;
+    /** Page size of guest system. */
+    uint32_t u32PageSize;
+    /** Total physical memory (in 4KB pages). */
+    uint32_t u32PhysMemTotal;
+    /** Available physical memory (in 4KB pages). */
+    uint32_t u32PhysMemAvail;
+    /** Ballooned physical memory (in 4KB pages). */
+    uint32_t u32PhysMemBalloon;
+    /** Total number of committed memory (which is not necessarily in-use) (in 4KB pages). */
+    uint32_t u32MemCommitTotal;
+    /** Total amount of memory used by the kernel (in 4KB pages). */
+    uint32_t u32MemKernelTotal;
+    /** Total amount of paged memory used by the kernel (in 4KB pages). */
+    uint32_t u32MemKernelPaged;
+    /** Total amount of nonpaged memory used by the kernel (in 4KB pages). */
+    uint32_t u32MemKernelNonPaged;
+    /** Total amount of memory used for the system cache (in 4KB pages). */
+    uint32_t u32MemSystemCache;
+    /** Pagefile size (in 4KB pages). */
+    uint32_t u32PageFileSize;
}
+} VBoxGuestStatistics;
+AssertCompileSize(VBoxGuestStatistics, 19*4);
+
+/** @name Guest statistics values (VBoxGuestStatistics::u32StatCaps).
+ * @{ */
+#define VBOX_GUEST_STAT_CPU_LOAD_IDLE   RT_BIT(0)
+#define VBOX_GUEST_STAT_CPU_LOAD_KERNEL RT_BIT(1)
+#define VBOX_GUEST_STAT_CPU_LOAD_USER   RT_BIT(2)
+#define VBOX_GUEST_STAT_THREADS         RT_BIT(3)
+#define VBOX_GUEST_STAT_PROCESSES      RT_BIT(4)
+#define VBOX_GUEST_STAT_HANDLES        RT_BIT(5)
+#define VBOX_GUEST_STAT_MEMORY_LOAD    RT_BIT(6)
+#define VBOX_GUEST_STAT_PHYS_MEM_TOTAL RT_BIT(7)
+#define VBOX_GUEST_STAT_PHYS_MEM_AVAIL RT_BIT(8)
+#define VBOX_GUEST_STAT_PHYS_MEM_BALLOON RT_BIT(9)
+#define VBOX_GUEST_STAT_MEM_COMMIT_TOTAL RT_BIT(10)
+#define VBOX_GUEST_STAT_MEM_KERNEL_TOTAL RT_BIT(11)
+#define VBOX_GUEST_STAT_MEM_KERNEL_PAGED RT_BIT(12)
+#define VBOX_GUEST_STAT_MEM_KERNEL_NONPAGED RT_BIT(13)
+#define VBOX_GUEST_STAT_MEM_SYSTEM_CACHE RT_BIT(14)
+#define VBOX_GUEST_STAT_PAGE_FILE_SIZE RT_BIT(15)
+/** @} */
+
+/** Guest statistics command structure.
+ * @
+ */
+typedef struct {
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** Guest information. */
+    VBoxGuestStatistics guestStats;
+} VMMDevReportGuestStats;
+
+/** Memory balloon change request structure. */
+#define VMMDEV_MAX_MEMORY_BALLOON(PhysMemTotal)   ( (9 * (PhysMemTotal)) / 10 )
+
+/** Poll for ballooning change request.
+ * @
+ */
+typedef struct {
+    VMMDevRequestHeader header;
+    VBoxGuestStatistics guestStats;
+} VMMDevGetMemBalloonChangeRequest;
+ /**< Header. */
+ VMMDevRequestHeader header;
+ /**< Balloon size in megabytes. */
+ uint32_t cBalloonChunks;
+ /**< Guest ram size in megabytes. */
+ uint32_t cPhysMemChunks;
+ /**< Setting this to VMMDEV_EVENT_BALLOON_CHANGE_REQUEST indicates that the
+ * request is a response to that event.
+ * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
+ uint32_t eventAck;
+} VMMDevGetMemBalloonChangeRequest;
+AssertCompileSize(VMMDevGetMemBalloonChangeRequest, 24+12);
+
+
+/**
+ * Change the size of the balloon.
+ * Used by VMMDevReq_ChangeMemBalloon.
+ */
+typedef struct
+{
+ /**< Header. */
+ VMMDevRequestHeader header;
+ /**< The number of pages in the array. */
+ uint32_t cPages;
+ /**< true = inflate, false = deflate. */
+ uint32_t fInflate;
+ /**< Physical address (RTGCPHYS) of each page, variable size. */
+ RTGCPHYS aPhysPage[1];
+} VMMDevChangeMemBalloon;
+AssertCompileSize(VMMDevChangeMemBalloon, 24+16);
+
+
+/**
+ * Guest statistics interval change request structure.
+ * Used by VMMDevReq_GetStatisticsChangeRequest.
+ */
+typedef struct
+{
+ /**< Header. */
+ VMMDevRequestHeader header;
+ /**< The interval in seconds. */
+ uint32_t u32StatInterval;
+ /**< Setting this to VMMDEV_EVENT_STATISTICS_INTERVAL_CHANGE_REQUEST indicates
+ * that the request is a response to that event.
+ * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
+ uint32_t eventAck;
+} VMMDevGetStatisticsChangeRequest;
+AssertCompileSize(VMMDevGetStatisticsChangeRequest, 24+8);
+
+
+/** The size of a string field in the credentials request (including '\0').
+ * @see VMMDevCredentials */
+#define VMMDEV_CREDENTIALS_SZ_SIZE 128
+
+/** Credentials request structure.
+ * 
+ * Used by VMMDevReq_QueryCredentials.
+ */
+typedef struct {
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** IN/OUT: Request flags. */
+    uint32_t u32Flags;
+    /** OUT: User name (UTF-8). */
+    char szUserName[VMMDEV_CREDENTIALS_SZ_SIZE];
+    /** OUT: Password (UTF-8). */
+    char szPassword[VMMDEV_CREDENTIALS_SZ_SIZE];
+    /** OUT: Domain name (UTF-8). */
+    char szDomain[VMMDEV_CREDENTIALS_SZ_SIZE];
+} VMMDevCredentials;
+AssertCompileSize(VMMDevCredentials, 24+4+3*128);
+
+/** @name Credentials request flag (VMMDevCredentials::u32Flags)
+ * @{ */
+/** query from host whether credentials are present */
+#define VMMDEV_CREDENTIALS_QUERYPRESENCE RT_BIT(1)
+/** read credentials from host (can be combined with clear) */
+#define VMMDEV_CREDENTIALS_READ RT_BIT(2)
+/** clear credentials on host (can be combined with read) */
+#define VMMDEV_CREDENTIALS_CLEAR RT_BIT(3)
+/** read credentials for judgement in the guest */
+#define VMMDEV_CREDENTIALS_READJUDGE RT_BIT(8)
+/** clear credentials for judgement on the host */
+#define VMMDEV_CREDENTIALS_CLEARJUDGE RT_BIT(9)
+/** report credentials acceptance by guest */
+#define VMMDEV_CREDENTIALS_JUDGE_OK RT_BIT(10)
+/** report credentials denial by guest */
+#define VMMDEV_CREDENTIALS_JUDGE_DENY RT_BIT(11)
+/** report that no judgement could be made by guest */
+#define VMMDEV_CREDENTIALS_JUDGE_NOJUDGEMENT RT_BIT(12)
+
+/** flag telling the guest that credentials are present */
+define VMMDEV_CREDENTIALS_PRESENT RT_BIT(16)
+/** flag telling guest that local logons should be prohibited */
+define VMMDEV_CREDENTIALS_NOLOCALLOGON RT_BIT(17)
+/** @} */
+
+/** Seamless mode change request structure. */
+/** Used by VMMDevReq_GetSeamlessChangeRequest. */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader header;
+
+    /** New seamless mode. */
+    VMMDevSeamlessMode mode;
+    /** Setting this to VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST indicates
+     * that the request is a response to that event.
+     * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
+    uint32_t eventAck;
+} VMMDevSeamlessChangeRequest;
+AssertCompileSize(VMMDevSeamlessChangeRequest, 24+8);
+AssertCompileMemberOffset(VMMDevSeamlessChangeRequest, eventAck, 24+4);
+
+/** Display change request structure. */
+/** Used by VMMDevReq_GetDisplayChangeRequest. */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader header;
+
+    /** Horizontal pixel resolution (0 = do not change). */
+    uint32_t xres;
+    /** Vertical pixel resolution (0 = do not change). */
+    uint32_t yres;
+    /** Bits per pixel (0 = do not change). */
+    uint32_t bpp;
+    /** Setting this to VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST indicates
+     * that the request is a response to that event.
+     * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
+    uint32_t eventAck;
+} VMMDevDisplayChangeRequest;
+AssertCompileSize(VMMDevDisplayChangeRequest, 24+16);
/**
 * Display change request structure, version 2.
 * *
 * Used by VMMDevReq_GetDisplayChangeRequest2.
 * */
 * typedef struct
 * {
 *     /** Header. */
 *     VMMDevRequestHeader header;
 *     /** Horizontal pixel resolution (0 = do not change). */
 *     uint32_t xres;
 *     /** Vertical pixel resolution (0 = do not change). */
 *     uint32_t yres;
 *     /** Bits per pixel (0 = do not change). */
 *     uint32_t bpp;
 *     /** Setting this to VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST indicates
 *         * that the request is a response to that event.
 *         * (Don’t confuse this with VMMDevReq_AcknowledgeEvents.) */
 *     uint32_t eventAck;
 *     /** 0 for primary display, 1 for the first secondary, etc. */
 *     uint32_t display;
 * } VMMDevDisplayChangeRequest2;
 * AssertCompileSize(VMMDevDisplayChangeRequest2, 24+20);


/>**
 * Display change request structure, version Extended.
 * *
 * Used by VMMDevReq_GetDisplayChangeRequestEx.
 * */
 * typedef struct
 * {
 *     /** Header. */
 *     VMMDevRequestHeader header;
 *     /** Horizontal pixel resolution (0 = do not change). */
 *     uint32_t xres;
 *     /** Vertical pixel resolution (0 = do not change). */
 *     uint32_t yres;
 *     /** Bits per pixel (0 = do not change). */
 *     uint32_t bpp;
 *     /** Setting this to VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST indicates
 *         * that the request is a response to that event.
 *         * (Don’t confuse this with VMMDevReq_AcknowledgeEvents.) */
 *     uint32_t eventAck;
 *     /** 0 for primary display, 1 for the first secondary, etc. */
 *     uint32_t display;
 * } VMMDevDisplayChangeRequest2;
 * AssertCompileSize(VMMDevDisplayChangeRequest2, 24+20);
/** New OriginX of secondary virtual screen */
uint32_t cxOrigin;
/** New OriginY of secondary virtual screen */
uint32_t cyOrigin;
/** Change in origin of the secondary virtual screen is required */
bool fChangeOrigin;
/** secondary virtual screen enabled or disabled */
bool fEnabled;
} VMMDevDisplayChangeRequestEx;

AssertCompileSize(VMMDevDisplayChangeRequestEx, 24+32);

/** Video mode supported request structure. */
/** Used by VMMDevReq_VideoModeSupported. */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** IN: Horizontal pixel resolution. */
    uint32_t width;
    /** IN: Vertical pixel resolution. */
    uint32_t height;
    /** IN: Bits per pixel. */
    uint32_t bpp;
    /** OUT: Support indicator. */
    bool fSupported;
} VMMDevVideoModeSupportedRequest;

AssertCompileSize(VMMDevVideoModeSupportedRequest, 24+16);

/** Video mode supported request structure for a specific display. */
/** Used by VMMDevReq_VideoModeSupported2. */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** IN: The guest display number. */
    uint32_t display;
    /** IN: Horizontal pixel resolution. */
    uint32_t width;
    /** IN: Vertical pixel resolution. */
    uint32_t height;
    /** IN: Bits per pixel. */
    uint32_t bpp;
    /** OUT: Support indicator. */
    bool fSupported;
} VMMDevVideoModeSupportedRequest2;
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** OUT: Height reduction in pixels. */
    uint32_t heightReduction;
} VMMDevGetHeightReductionRequest;

AssertCompileSize(VMMDevGetHeightReductionRequest, 24+4);

/** @name VRDP Experience level (VMMDevVRDPChangeRequest::u32VRDPExperienceLevel) @*/
#define VRDP_EXPERIENCE_LEVEL_ZERO     0 /**< Theming disabled. */
#define VRDP_EXPERIENCE_LEVEL_LOW      1 /**< Full window dragging and desktop wallpaper disabled. */
#define VRDP_EXPERIENCE_LEVEL_MEDIUM   2 /**< Font smoothing, gradients. */
#define VRDP_EXPERIENCE_LEVEL_HIGH     3 /**< Animation effects disabled. */
#define VRDP_EXPERIENCE_LEVEL_FULL     4 /**< Everything enabled. */
+/** @} */
+
+
+/**
+ * VBVA enable request structure.
+ *
+ * Used by VMMDevReq_VideoAccelEnable.
+ */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** 0 - disable, !0 - enable. */
+    uint32_t u32Enable;
+    /** The size of VBVAMEMORY::au8RingBuffer expected by driver.
+     * The host will refuse to enable VBVA if the size is not equal to
+     * VBVA_RING_BUFFER_SIZE.
+     */
+    uint32_t cbRingBuffer;
+    /** Guest initializes the status to 0. Host sets appropriate VBVA_F_STATUS_ flags. */
+    uint32_t fu32Status;
+} VMMDevVideoAccelEnable;
+AssertCompileSize(VMMDevVideoAccelEnable, 24+12);
+
+/** @name VMMDevVideoAccelEnable::fu32Status.
+ * @{ */
+#define VBVA_F_STATUS_ACCEPTED (0x01)
+#define VBVA_F_STATUS_ENABLED  (0x02)
+/** @} */
+
+/**
+ * VBVA flush request structure.
+ *
+ * Used by VMMDevReq_VideoAccelFlush.
+ */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader header;
+} VMMDevVideoAccelFlush;
+AssertCompileSize(VMMDevVideoAccelFlush, 24);
+
+/** @name VMMDevVideoAccelFlush::fu32Status.
+ * @{ */
+#define VBVA_F_STATUS_ACCEPTED (0x01)
+#define VBVA_F_STATUS_ENABLED  (0x02)
+/** @} */
+
+
+/**
+ * VBVA set visible region request structure.
+ *
+ * Used by VMMDevReq_VideoSetVisibleRegion.
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Number of rectangles */
    uint32_t cRect;
    /** Rectangle array.
     * @todo array is spelled aRects[1]. */
    RTRECT Rect;
} VMMDevVideoSetVisibleRegion;

AssertCompileSize(RTRECT, 16);
AssertCompileSize(VMMDevVideoSetVisibleRegion, 24+4+16);

/**
 * CPU event types.
 */

typedef enum
{
    VMMDevCpuStatusType_Invalid = 0,
    VMMDevCpuStatusType_Disable = 1,
    VMMDevCpuStatusType_Enable = 2,
    VMMDevCpuStatusType_SizeHack = 0xffffffff
} VMMDevCpuStatusType;

/**
 * CPU hotplug event status request.
 */

typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Status type */
    VMMDevCpuStatusType enmStatusType;
} VMMDevCpuHotPlugStatusRequest;

AssertCompileSize(VMMDevCpuHotPlugStatusRequest, 24+4);

/**
 * Get the ID of the changed CPU and event type.
 */

typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Event type */
    VMMDevCpuEventType enmEventType;
    /** core id of the CPU changed */
    uint32_t idCpuCore;
+ /** package id of the CPU changed */
+ int32_t idCpuPackage;
+
+ VMMDevGetCpuHotPlugRequest;
+
+ AssertCompileSize(VMMDevGetCpuHotPlugRequest, 24+4+4+4);
+ +
+ +
+/**
+ * Shared region description
+ */
+
+ typedef struct VMMDEVSHAREDREGIONDESC {
+     RTGCPTR64 GCRegionAddr;
+     int32_t cbRegion;
+     int32_t u32Alignment;
+ } VMMDEVSHAREDREGIONDESC;
+
+ AssertCompileSize(VMMDEVSHAREDREGIONDESC, 16);
+ +#define VMMDEVSHAREDREGIONDESC_MAX          32
+ +
+/**
+ * Shared module registration
+ */
+
+ typedef struct {
+     /** Header. */
+     VMMDevRequestHeader header;
+     /** Shared module size. */
+     int32_t cbModule;
+     /** Number of included region descriptors */
+     int32_t cRegions;
+     /** Base address of the shared module. */
+     RTGCPTR64 GCBaseAddr;
+     /** Guest OS type. */
+     VBOXOSFAMILY enmGuestOS;
+     /** Alignment. */
+     int32_t u32Align;
+     /** Module name */
+     char szName[128];
+     /** Module version */
+     char szVersion[16];
+     /** Shared region descriptor(s). */
+     VMMDEVSHAREDREGIONDESC aRegions[1];
+ } VMMDevSharedModuleRegistrationRequest;
+
+ AssertCompileSize(VMMDevSharedModuleRegistrationRequest, 24+4+4+8+4+4+128+16+16);
+
+/**
+ * Shared module unregistration
+
typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** Shared module size. */
    uint32_t cbModule;
    /** Align at 8 byte boundary. */
    uint32_t u32Alignment;
    /** Base address of the shared module. */
    RTGCPTR64 GCBaseAddr;
    /** Module name */
    char szName[128];
    /** Module version */
    char szVersion[16];
} VMMDevSharedModuleUnregistrationRequest;

AssertCompileSize(VMMDevSharedModuleUnregistrationRequest, 24+4+4+8+128+16);

/**
 * Shared module periodic check
 */
typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
} VMMDevSharedModuleCheckRequest;

AssertCompileSize(VMMDevSharedModuleCheckRequest, 24);

/**
 * Paging sharing enabled query
 */
typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** Enabled flag (out) */
    bool fEnabled;
    /** Alignment */
    bool fAlignment[3];
} VMMDevPageSharingStatusRequest;

AssertCompileSize(VMMDevPageSharingStatusRequest, 24+4);

/**
 * Page sharing status query (debug build only)
 */
typedef struct {
{ /* Header. */
+ VMMDevRequestHeader header;
+ /* Page address. */
+ RTGCPtr GCPtrPage;
+ /* Page flags. */
+ uint64_t uPageFlags;
+ /* Shared flag (out) */
+ bool fShared;
+ /* Alignment */
+ bool fAlignment[3];
+ } VMMDevPageIsSharedRequest;
+
+ /**
+ * Session id request structure.
+ *
+ * Used by VMMDevReq_GetSessionId.
+ */
+ typedef struct
+ {
+ /* Header */
+ VMMDevRequestHeader header;
+ /* OUT: unique session id; the id will be different after each start, reset or restore of the VM */
+ uint64_t idSession;
+ } VMMDevReqSessionId;
+ AssertCompileSize(VMMDevReqSessionId, 24+8);
+
+ +/**
+ * Write Core Dump request.
+ *
+ * Used by VMMDevReq_WriteCoreDump.
+ */
+ typedef struct
+ {
+ /* Header. */
+ VMMDevRequestHeader header;
+ /* Flags (reserved, MBZ). */
+ uint32_t fFlags;
+ } VMMDevReqWriteCoreDump;
+ AssertCompileSize(VMMDevReqWriteCoreDump, 24+4);
+
+ +/**
+ * Heart beat check state structure.
+ *  Used by VMMDevReq_HeartbeatConfigure.
+ */
+ typedef struct
+ {
+ /* Header. */
+ VMMDevRequestHeader header;
+ }
+ /** OUT: Guest heartbeat interval in nanosec. */
+ uint64_t cNsInterval;
+ /** Heartbeat check flag. */
+ bool fEnabled;
+ } VMMDevReqHeartbeat;
+ AssertCompileSize(VMMDevReqHeartbeat, 24+12);
+
+
+#ifdef VBOX_WITH_HGCM
+
++/* @name HGCM flags.
+ * @}
+ */
+# define VBOX_HGCM_REQ_DONE RT_BIT_32(VBOX_HGCM_REQ_DONE_BIT)
+# define VBOX_HGCM_REQ_DONE_BIT 0
+# define VBOX_HGCM_REQ_CANCELLED (0x2)
++/* @ } */
+
++/**
+ * HGCM request header.
+ * /
+ typedef struct VMMDevHGCMRequestHeader
+ {
+  /** Request header. */
+  VMMDevRequestHeader header;
+
+  /** HGCM flags. */
+  uint32_t fu32Flags;
+
+  /** Result code. */
+  int32_t result;
+ } VMMDevHGCMRequestHeader;
+ AssertCompileSize(VMMDevHGCMRequestHeader, 24+8);
+
++/**
+ * HGCM connect request structure.
+ * *
+ * Used by VMMDevReq_HGCMConnect.
+ * */
+ typedef struct
+ {
+  /** HGCM request header. */
+  VMMDevHGCMRequestHeader header;
+
+  /** IN: Description of service to connect to. */
+  HGCMServiceLocation loc;
+
+  /** OUT: Description of service to connect to. */
+  HGCMServiceLocation loc;
/** OUT: Client identifier assigned by local instance of HGCM. */
uint32_t u32ClientID;
} VMMDevHGCMConnect;

+ AssertCompileSize(VMMDevHGCMConnect, 32+132+4);
+
+
/**
 * HGCM disconnect request structure.
 *
 + * Used by VMMDevReq_HGCMDisconnect.
 + */
typedef struct
+
 + /** HGCM request header. */
 + VMMDevHGCMRequestHeader header;
 +
 + /** IN: Client identifier. */
 + uint32_t u32ClientID;
 +} VMMDevHGCMDisconnect;
+ AssertCompileSize(VMMDevHGCMDisconnect, 32+4);
+
/**
 * HGCM call request structure.
 *
 * Used by VMMDevReq_HGCMCall, VMMDevReq_HGCMCall32 and VMMDevReq_HGCMCall64.
 *
 */
typedef struct
+
 + /* request header */
 + VMMDevHGCMRequestHeader header;
 +
 + /* IN: Client identifier. */
 + uint32_t u32ClientID;
 + /* IN: Service function number. */
 + uint32_t u32Function;
 + /* IN: Number of parameters. */
 + uint32_t cParms;
 + /* Parameters follow in form: HGCMFunctionParameter aParms[X]; */
 +} VMMDevHGCMCall;
+ AssertCompileSize(VMMDevHGCMCall, 32+12);
+
/** @name Direction of data transfer (HGCMPageListInfo::flags). Bit flags. */
+ @
+ #define VBOX_HGCM_F_PARM_DIRECTION_NONE UINT32_C(0x00000000)
+ #define VBOX_HGCM_F_PARM_DIRECTION_TO_HOST UINT32_C(0x00000001)
+ #define VBOX_HGCM_F_PARM_DIRECTION_FROM_HOST UINT32_C(0x00000002)
+ #define VBOX_HGCM_F_PARM_DIRECTION_BOTH UINT32_C(0x00000003)
+ /** Macro for validating that the specified flags are valid. */
```c
#define VBOX_HGCM_F_PARM_ARE_VALID(fFlags)  
    (   (fFlags) > VBOX_HGCM_F_PARM_DIRECTION_NONE  
    && (fFlags) < VBOX_HGCM_F_PARM_DIRECTION_BOTH  
    )
/** @} */

/** VMMDevHGCMParmType_PageList points to this structure to actually describe the  
* buffer.  
*/
typedef struct
{
    uint32_t flags; /**< VBOX_HGCM_F_PARM_* */
    uint16_t offFirstPage; /**< Offset in the first page where data begins. */
    uint16_t cPages; /**< Number of pages. */
    RTGCPHYS64 aPages[1]; /**< Page addresses. */
} HGCMPageListInfo;
AssertCompileSize(HGCMPageListInfo, 4+2+2+8);

/** Get the pointer to the first parameter of a HGCM call request. */
#define VMMDEV_HGCM_CALL_PARMS(a)   ((HGCMFunctionParameter *)((uint8_t *)(a) + sizeof(VMMDevHGCMCall)))

/** Get the pointer to the first parameter of a 32-bit HGCM call request. */
#define VMMDEV_HGCM_CALL_PARMS32(a) ((HGCMFunctionParameter32 *)((uint8_t *)(a) + sizeof(VMMDevHGCMCall)))

#if defined(VBOX_WITH_64_BITS_GUESTS)
/* Explicit defines for the host code. */
#if defined(VBOX_HGCM_HOST_CODE)
#   define VMMDEV_HGCM_CALL_PARMS32(a) ((HGCMFunctionParameter32 *)((uint8_t *)(a) + sizeof(VMMDevHGCMCall)))
#   define VMMDEV_HGCM_CALL_PARMS64(a) ((HGCMFunctionParameter64 *)((uint8_t *)(a) + sizeof(VMMDevHGCMCall)))
# endif /* VBOX_HGCM_HOST_CODE */
#endif /* VBOX_WITH_64_BITS_GUESTS */

#define VBOX_HGCM_MAX_PARMS 32

/** HGCM cancel request structure.  
* The Cancel request is issued using the same physical memory address as was  
* used for the corresponding initial HGCMCall.  
*/
typedef struct
{
    * HGCM cancel request structure.  
    * The Cancel request is issued using the same physical memory address as was  
    * used for the corresponding initial HGCMCall.  
    * Used by VMMDevReq_HGCMCancel.  
}
/** Header. */
VMMDevHGCMRequestHeader header;
} VMMDevHGCMCancel;
+AssertCompileSize(VMMDevHGCMCancel, 32);
+
+/**
+ * HGCM cancel request structure, version 2.
+ *
+ * Used by VMMDevReq_HGCMCancel2.
+ *
+ * VINF_SUCCESS when cancelled.
+ * VERR_NOT_FOUND if the specified request cannot be found.
+ * VERR_INVALID_PARAMETER if the address is invalid valid.
+ */
typedef struct
+
+ /** Header. */
+ VMMDevRequestHeader header;
+ /** The physical address of the request to cancel. */
+ RTGCPHYS32 physReqToCancel;
+ } VMMDevHGCMCancel2;
+AssertCompileSize(VMMDevHGCMCancel2, 24+4);
+
+#endif /* VBOX_WITH_HGCM */
+
+/**
+ * Inline helper to determine the request size for the given operation.
+ * Returns 0 if the given operation is not handled and/or supported.
+ *
+ * @returns Size.
+ * @param   requestType The VMMDev request type.
+ */
+DECLINLINE(size_t) vmmdevGetRequestSize(VMMDevRequestType requestType)
+
+    switch (requestType)
+    {
+        case VMMDevReq_GetMouseStatus:
+        case VMMDevReq_SetMouseStatus:
+            return sizeof(VMMDevReqMouseStatus);
+        case VMMDevReq_SetPointerShape:
+            return sizeof(VMMDevReqMousePointer);
+        case VMMDevReq_GetHostVersion:
+            return sizeof(VMMDevReqHostVersion);
+        case VMMDevReq_Idle:
+            return sizeof(VMMDevReqIdle);
+        case VMMDevReq_GetHostTime:
+            return sizeof(VMMDevReqHostTime);
+ case VMMDevReq_GetHypervisorInfo:
+ case VMMDevReq_SetHypervisorInfo:
+     return sizeof(VMMDevReqHypervisorInfo);
+ case VMMDevReq_RegisterPatchMemory:
+ case VMMDevReq_DeregisterPatchMemory:
+     return sizeof(VMMDevReqPatchMemory);
+ case VMMDevReq_SetPowerStatus:
+     return sizeof(VMMDevPowerStateRequest);
+ case VMMDevReq_AcknowledgeEvents:
+     return sizeof(VMMDevEvents);
+ case VMMDevReq_ReportGuestInfo:
+     return sizeof(VMMDevReportGuestInfo);
+ case VMMDevReq_ReportGuestInfo2:
+     return sizeof(VMMDevReportGuestInfo2);
+ case VMMDevReq_ReportGuestStatus:
+     return sizeof(VMMDevReportGuestStatus);
+ case VMMDevReq_ReportGuestUserState:
+     return sizeof(VMMDevReportGuestUserState);
+ case VMMDevReq_GetDisplayChangeRequest:
+     return sizeof(VMMDevDisplayChangeRequest);
+ case VMMDevReq_GetDisplayChangeRequest2:
+     return sizeof(VMMDevDisplayChangeRequest2);
+ case VMMDevReq_GetDisplayChangeRequestEx:
+     return sizeof(VMMDevDisplayChangeRequestEx);
+ case VMMDevReq_VideoModeSupported:
+     return sizeof(VMMDevVideoModeSupportedRequest);
+ case VMMDevReq_GetHeightReduction:
+     return sizeof(VMMDevGetHeightReductionRequest);
+ case VMMDevReq_ReportGuestCapabilities:
+     return sizeof(VMMDevReqGuestCapabilities);
+ case VMMDevReq_SetGuestCapabilities:
+     return sizeof(VMMDevReqGuestCapabilities2);
+#ifdef VBOX_WITH_HGCM
+     case VMMDevReq_HGCMConnect:
+     return sizeof(VMMDevHGCMConnect);
+     case VMMDevReq_HGCMDisconnect:
+     return sizeof(VMMDevHGCMConnect);  
+#ifdef VBOX_WITH_64_BITS_GUESTS
+     case VMMDevReq_HGCMDCall32:
+     return sizeof(VMMDevHGCMCall);
+     case VMMDevReq_HGCMDCall64:
+     return sizeof(VMMDevHGCMCall);  
+#else
+     case VMMDevReq_HGCMDCall:
+     return sizeof(VMMDevHGCMCall);  
+#endif /* VBOX_WITH_64_BITS_GUESTS */
+     case VMMDevReq_HGCMCancel:
+     return sizeof(VMMDevHGCMCancel);
+    case VMMDevReq_VideoAccelEnable:
+        return sizeof(VMMDevVideoAccelEnable);
+    case VMMDevReq_VideoAccelFlush:
+        return sizeof(VMMDevVideoAccelFlush);
+    case VMMDevReq_VideoSetVisibleRegion:
+        /* The original protocol didn't consider a guest with NO visible
+         * windows */
+        return sizeof(VMMDevVideoSetVisibleRegion) - sizeof(RTRECT);
+    case VMMDevReq_GetSeamlessChangeRequest:
+        return sizeof(VMMDevSeamlessChangeRequest);
+    case VMMDevReq_QueryCredentials:
+        return sizeof(VMMDevCredentials);
+    case VMMDevReq_ReportGuestStats:
+        return sizeof(VMMDevReportGuestStats);
+    case VMMDevReq_GetMemBalloonChangeRequest:
+        return sizeof(VMMDevGetMemBalloonChangeRequest);
+    case VMMDevReq_GetStatisticsChangeRequest:
+        return sizeof(VMMDevGetStatisticsChangeRequest);
+    case VMMDevReq_ChangeMemBalloon:
+        return sizeof(VMMDevChangeMemBalloon);
+    case VMMDevReq_GetVRDPChangeRequest:
+        return sizeof(VMMDevVRDPChangeRequest);
+    case VMMDevReq_LogString:
+        return sizeof(VMMDevReqLogString);
+    case VMMDevReq_CtlGuestFilterMask:
+        return sizeof(VMMDevCtlGuestFilterMask);
+    case VMMDevReq_GetCpuHotPlugRequest:
+        return sizeof(VMMDevGetCpuHotPlugRequest);
+    case VMMDevReq_SetCpuHotPlugStatus:
+        return sizeof(VMMDevCpuHotPlugStatusRequest);
+    case VMMDevReq_RegisterSharedModule:
+        return sizeof(VMMDevSharedModuleRegistrationRequest);
+    case VMMDevReq_UnregisterSharedModule:
+        return sizeof(VMMDevSharedModuleUnregistrationRequest);
+    case VMMDevReq_CheckSharedModules:
+        return sizeof(VMMDevSharedModuleCheckRequest);
+    case VMMDevReq_GetPageSharingStatus:
+        return sizeof(VMMDevPageSharingStatusRequest);
+    case VMMDevReq_DebugIsPageShared:
+        return sizeof(VMMDevPageIsSharedRequest);
+    case VMMDevReq_GetSessionId:
+        return sizeof(VMMDevReqSessionId);
+    case VMMDevReq_HeartbeatConfigure:
+        return sizeof(VMMDevReqHeartbeat);
+    case VMMDevReq_GuestHeartbeat:
+        return sizeof(VMMDevRequestHeader);
+    default:
break;
+
+
+
+
+
/**
 * Initializes a request structure.
 */
+
+ * @returns VBox status code.
+ * @param req The request structure to initialize.
+ * @param type The request type.
+ */
+DECLINLINE(int) vmmdevInitRequest(VMMDevRequestHeader *req, VMMDevRequestType type)
+
+{ uint32_t requestSize;
+ if (!req)
+    return VERR_INVALID_PARAMETER;
+    requestSize = (uint32_t)vmmdevGetRequestSize(type);
+ if (!requestSize)
+    return VERR_INVALID_PARAMETER;
+ req->size        = requestSize;
+ req->version     = VMMDEV_REQUEST_HEADER_VERSION;
+ req->requestType = type;
+ req->rc          = VERR_GENERAL_FAILURE;
+ req->reserved1   = 0;
+ req->reserved2   = 0;
+ return VINF_SUCCESS;
+}
+
+/** @} */
+
/** @name VBVA ring defines.
 *
 * The VBVA ring buffer is suitable for transferring large (< 2GB) amount of
 * data. For example big bitmaps which do not fit to the buffer.
 */
+
+ * Guest starts writing to the buffer by initializing a record entry in the
+ * aRecords queue. VBVA_F_RECORD_PARTIAL indicates that the record is being
+ * written. As data is written to the ring buffer, the guest increases off32End
+ * for the record.
+ *
+ * The host reads the aRecords on flushes and processes all completed records.
+ * When host encounters situation when only a partial record presents and
+ * cbRecord & ~VBVA_F_RECORD_PARTIAL  >  VBVA_RING_BUFFER_SIZE -
+ * VBVA_RING_BUFFER_THRESHOLD, the host fetched all record data and updates
+ * off32Head. After that on each flush the host continues fetching the data
+ * until the record is completed.
+ *
+ */
+#define VMMDEV_VBVA_RING_BUFFER_SIZE        (_4M - _1K)
+#define VMMDEV_VBVA_RING_BUFFER_THRESHOLD   (4 * _1K)
+
+#define VMMDEV_VBVA_MAX_RECORDS (64)
+/** @} */
+
+/**
+ * VBVA record.
+ */
typedef struct VMMDEVVBVARECORD
+{
+    /** The length of the record. Changed by guest. */
+    uint32_t cbRecord;
+} VMMDEVVBVARECORD;

+if ARCH_BITS >= 32
+
+/**
+ * VBVA memory layout.
+ */
+/* This is a subsection of the VMMDevMemory structure.
+ */
typedef struct VBVAMEMORY
+{
+    /** VBVA_F_MODE_. */
+    uint32_t fu32ModeFlags;
+    /** The offset where the data start in the buffer. */
+    uint32_t off32Data;
+    /** The offset where next data must be placed in the buffer. */
+    uint32_t off32Free;
+    /** The ring buffer for data. */
+    uint8_t  au8RingBuffer[VMMDEV_VBVA_RING_BUFFER_SIZE];
+    /** The queue of record descriptions. */
+    VMMDEVVBVARECORD aRecords[VMMDEV_VBVA_MAX_RECORDS];
+    uint32_t indexRecordFirst;
+    uint32_t indexRecordFree;
+    /** RDP orders supported by the client. The guest reports only them
+     * and falls back to DIRTY rects for not supported ones.
+     */
+    *(1 << VBVA_VRDP_)
+ */
+ uint32_t fu32SupportedOrders;
+
+ } VBVAMEMORY;
+ AssertCompileSize(VBVAMEMORY, 12 + (_4M-_1K) + 4*64 + 12);
+
+ /**
+ * The layout of VMMDEV RAM region that contains information for guest.
+ */
+ typedef struct VMMDevMemory {
+ + /** The size of this structure. */
+ + uint32_t u32Size;
+ + /** The structure version. (VMMDEV_MEMORY_VERSION) */
+ + uint32_t u32Version;
+
+ union {
+ + struct {
+ + /** Flag telling that VMMDev set the IRQ and acknowlegment is required */
+ + bool fHaveEvents;
+ + } V1_04;
+ + }
+ + struct {
+ + /** Pending events flags, set by host. */
+ + uint32_t u32HostEvents;
+ + /** Mask of events the guest wants to see, set by guest. */
+ + uint32_t u32GuestEventMask;
+ + } V1_03;
+ + } V;
+
+ VBVAMEMORY vbvaMemory;
+
+ } VMMDevMemory;
+ AssertCompileSize(VMMDevMemory, 8+8 + (12 + (_4M-_1K) + 4*64 + 12) );
+ AssertCompileMemberOffset(VMMDevMemory, vbvaMemory, 16);
+
+ /** Version of VMMDevMemory structure (VMMDevMemory::u32Version). */
+ #define VMMDEV_MEMORY_VERSION   (1)
+
+ #endif /* ARCH_BITS >= 32 */
+
+ /** @} */
+
+ RT_C_DECLS_END

/** @file
 * Virtual Device for Guest <-> VMM/Host communication, Core Types. (ADD,DEV)
 * 
 * These types are needed by several headers VBoxGuestLib.h and are kept
 * separate to avoid having to include the whole VMMDev.h fun.
 */

/*
 * Copyright (C) 2006-2017 Oracle Corporation
 *
 * This file is part of VirtualBox Open Source Edition (OSE), as
 * available from http://www.virtualbox.org. This file is free software;
 * you can redistribute it and/or modify it under the terms of the GNU
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 * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
 * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
 * 
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 * VirtualBox OSE distribution, in which case the provisions of the
 * CDDL are applicable instead of those of the GPL.
 * 
 * You may elect to license modified versions of this file under the
 * terms and conditions of either the GPL or the CDDL or both.
 */

#endif __VBox_VMMDevCoreTypes_h
#define __VBox_VMMDevCoreTypes_h

#include <iprt/assertcompile.h>
#include <iprt/types.h>
#ifdef __cplusplus
#include <iprt/err.h>
#endif

/** @addtogroup grp_vmmdev
 * @{
 */
+ /* Helpful forward declarations: */
+ #struct VMMDevRequestHeader;
+ #struct VMMDevReqMousePointer;
+ #struct VMMDevMemory;
+
+ +/** @name VMMDev events. */
+ * 
+ * Used mainly by VMMDevReq_AcknowledgeEvents/VMMDevEvents and version 1.3 of
+ * VMMDevMemory.
+ * 
+ * + * @ {
+ * + */
+ */** Host mouse capabilities has been changed. */
+ +#define VMMDEV_EVENT_MOUSE_CAPABILITIES_CHANGED        RT_BIT(0)
+ */** HGCM event. */
+ +#define VMMDEV_EVENT_HGCM                               RT_BIT(1)
+ */** A display change request has been issued. */
+ +#define VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST            RT_BIT(2)
+ */** Credentials are available for judgement. */
+ +#define VMMDEV_EVENT_JUDGE_CREDENTIALS                  RT_BIT(3)
+ */** The guest has been restored. */
+ +#define VMMDEV_EVENT_RESTORED                           RT_BIT(4)
+ */** Seamless mode state changed. */
+ +#define VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST       RT_BIT(5)
+ */** Memory balloon size changed. */
+ +#define VMMDEV_EVENT_BALLOON_CHANGE_REQUEST             RT_BIT(6)
+ */** Statistics interval changed. */
+ +#define VMMDEV_EVENT_STATISTICS_INTERVAL_CHANGE_REQUEST RT_BIT(7)
+ */** VRDP status changed. */
+ +#define VMMDEV_EVENT_VRDP                               RT_BIT(8)
+ */** New mouse position data available. */
+ +#define VMMDEV_EVENT_MOUSE_POSITION_CHANGED             RT_BIT(9)
+ */** CPU hotplug event occurred. */
+ +#define VMMDEV_EVENT_CPU_HOTPLUG                        RT_BIT(10)
+ */** The mask of valid events, for sanity checking. */
+ +#define VMMDEV_EVENT_VALID_EVENT_MASK                  UINT32_C(0x000007ff)
+ */ */* @ } */
+
+ */** @name The ballooning chunk size which VMMDev works at.
+ + * @ {
+ /*
+ +#define VMMDEV_MEMORY_BALLOON_CHUNK_PAGES (_1M/4096)
+ +#define VMMDEV_MEMORY_BALLOON_CHUNK_SIZE
+ (VMMDEV_MEMORY_BALLOON_CHUNK_PAGES*4096)
+ */ */* @ ] */
+ +

---

Open Source Used In 5GaaS Edge AC-4 37185
Seamless mode.

Used by VbglR3SeamlessWaitEvent

@ingroup grp_vmmdev_req

typedef enum
{
    VMMDev_Seamless_Disabled    = 0, /**< normal mode; entire guest desktop displayed. */
    VMMDev_Seamless_Visible_Region = 1, /**< visible region mode; only top-level guest windows displayed. */
    VMMDev_Seamless_Host_Window   = 2, /**< windowed mode; each top-level guest window is represented in a host window. */
    VMMDev_Seamless_SizeHack     = 0x7fffffff
} VMMDevSeamlessMode;

AssertCompileSize(VMMDevSeamlessMode, 4);

CPU event types.

Used by VbglR3CpuHotplugWaitForEvent

@ingroup grp_vmmdev_req

typedef enum
{
    VMMDevCpuEventType_Invalid    = 0,
    VMMDevCpuEventType_None       = 1,
    VMMDevCpuEventType_Plug       = 2,
    VMMDevCpuEventType_Unplug     = 3,
    VMMDevCpuEventType_SizeHack   = 0x7fffffff
} VMMDevCpuEventType;

AssertCompileSize(VMMDevCpuEventType, 4);

@name Guest capability bits.

Used by VMMDevReq_ReportGuestCapabilities and VMMDevReq_SetGuestCapabilities.

@ {
#define VMMDEV_GUEST_SUPPORTS_SEAMLESS        RT_BIT_32(0)
#define VMMDEV_GUEST_SUPPORTS_GUEST_HOST_WINDOW_MAPPING RT_BIT_32(1)
#endif

The guest supports fast activation and deactivation of certain graphical operations
(e.g. resizing & seamless). The legacy VMMDevReq_ReportGuestCapabilities
+ * request sets this automatically, but VMMDevReq_SetGuestCapabilities does
+ * not. */
+#define VMMDEV_GUEST_SUPPORTS_GRAPHICS RT_BIT_32(2)
+/** The mask of valid events, for sanity checking. */
+#define VMMDEV_GUEST_CAPABILITIES_MASK UINT32_C(0x00000007)
+/** @} */
+
+
+/** @} */
+* The guest facility.
+* This needs to be kept in sync with AdditionsFacilityType of the Main API!
+*/
typedef enum
+{
+    VBoxGuestFacilityType_Unknown         = 0,
+    VBoxGuestFacilityType_VBoxGuestDriver = 20,
+    VBoxGuestFacilityType_AutoLogon       = 90, /* VBoxGINA / VBoxCredProv / pam_vbox. */
+    VBoxGuestFacilityType_VBoxService     = 100,
+    VBoxGuestFacilityType_VBoxTrayClient  = 101, /* VBoxTray (Windows), VBoxClient (Linux, Unix). */
+    VBoxGuestFacilityType_Seamless        = 1000,
+    VBoxGuestFacilityType_Graphics        = 1100,
+    VBoxGuestFacilityType_MonitorAttach   = 1101,
+    VBoxGuestFacilityType_All             = 0x7ffffffe,
+    VBoxGuestFacilityType_SizeHack        = 0x7fffffff
+} VBoxGuestFacilityType;
+AssertCompileSize(VBoxGuestFacilityType, 4);
+
+
+/**
+ * The current guest status of a facility.
+ * This needs to be kept in sync with AdditionsFacilityStatus of the Main API!
+ */
+/**
+ * @remarks r=bird: Pretty please, for future types like this, simply do a
+ *    linear allocation without any gaps. This stuff is impossible work
+ *    efficiently with, let alone validate. Applies to the other facility
+ *    enums too.
+ */
typedef enum
+{
+    VBoxGuestFacilityStatus_Inactive    = 0,
+    VBoxGuestFacilityStatus_Paused      = 1,
+    VBoxGuestFacilityStatus_PreInit     = 20,
+    VBoxGuestFacilityStatus_Init        = 30,
+    VBoxGuestFacilityStatus_Active      = 50,
+    VBoxGuestFacilityStatus_Terminating = 100,
+    VBoxGuestFacilityStatus_Terminated  = 101,
+    VBoxGuestFacilityStatus_Failed  = 800,
+    VBoxGuestFacilityStatus_Unknown     = 999,
+ VBoxGuestFacilityStatus_SizeHack = 0x7fffffff
+ AssertCompileSize(VBoxGuestFacilityStatus, 4);
+
+*/
+ * The current status of specific guest user.
+ * This needs to be kept in sync with GuestUserState of the Main API!
+ */
+typedef enum VBoxGuestUserState
+
+    VBoxGuestUserState_Unknown            = 0,
+    VBoxGuestUserState_LoggedIn           = 1,
+    VBoxGuestUserState_LoggedOut          = 2,
+    VBoxGuestUserState_Locked             = 3,
+    VBoxGuestUserState_Unlocked           = 4,
+    VBoxGuestUserState_Disabled           = 5,
+    VBoxGuestUserState_Idle               = 6,
+    VBoxGuestUserState_InUse              = 7,
+    VBoxGuestUserState_Created            = 8,
+    VBoxGuestUserState_Deleted            = 9,
+    VBoxGuestUserState_SessionChanged     = 10,
+    VBoxGuestUserState_CredentialsChanged = 11,
+    VBoxGuestUserState_RoleChanged        = 12,
+    VBoxGuestUserState_GroupAdded         = 13,
+    VBoxGuestUserState_GroupRemoved       = 14,
+    VBoxGuestUserState_Elevated           = 15,
+    VBoxGuestUserState_SizeHack           = 0x7fffffff
+} VBoxGuestUserState;
+AssertCompileSize(VBoxGuestUserState, 4);
+
+*/
+ * HGCM service location types.
+ */
+@ingroup grp_vmmdev_req
+ */
+typedef enum
+
+    VMMDevHGCMLoc_Invalid    = 0,
+    VMMDevHGCMLoc_LocalHost  = 1,
+    VMMDevHGCMLoc_LocalHost_Existing = 2,
+    VMMDevHGCMLoc_SizeHack   = 0x7fffffff
+} HGCMServiceLocationType;
+AssertCompileSize(HGCMServiceLocationType, 4);
+
+*/
+ * HGCM host service location.
+ * @ingroup grp_vmmdev_req
+ */
+ typedef struct
+ {
+    char achName[128]; /**< This is really szName. */
+ } HGCMServiceLocationHost;
+AssertCompileSize(HGCMServiceLocationHost, 128);
+
+/**
+ * HGCM service location.
+ * @ingroup grp_vmmdev_req
+ */
+ typedef struct HGCMSERVICELOCATION
+ {
+    /**< Type of the location. */
+    HGCMServiceLocationType type;
+
+    union
+    {
+        HGCMServiceLocationHost host;
+    } u;
+ } HGCMServiceLocation;
+AssertCompileSize(HGCMServiceLocation, 128 + 4);
+
+/**
+ * HGCM parameter type.
+ */
+ typedef enum
+ {
+    VMMDevHGCMParmType_Invalid = 0,
+    VMMDevHGCMParmType_32bit = 1,
+    VMMDevHGCMParmType_64bit = 2,
+    VMMDevHGCMParmType_PhysAddr = 3, /**< @deprecated Doesn't work, use PageList. */
+    VMMDevHGCMParmType_LinAddr = 4, /**< In and Out */
+    VMMDevHGCMParmType_LinAddr_In = 5, /**< In (read; host<-guest) */
+    VMMDevHGCMParmType_LinAddr_Out = 6, /**< Out (write; host->guest) */
+    VMMDevHGCMParmType_LinAddr_Locked = 7, /**< Locked In and Out */
+    VMMDevHGCMParmType_LinAddr_Locked_In = 8, /**< Locked In (read; host<guest) */
+    VMMDevHGCMParmType_LinAddr_Locked_Out = 9, /**< Locked Out (write; host->guest) */
+    VMMDevHGCMParmType_PageList = 10, /**< Physical addresses of locked pages for a buffer. */
+    VMMDevHGCMParmType_SizeHack = 0x7fffffff
+ } HGCMFunctionParameterType;
+AssertCompileSize(HGCMFunctionParameterType, 4);
+
+/**

---

Open Source Used In 5GaaS Edge AC-4 37189
/* HGCM function parameter, 32-bit client.
 */

/* We force structure dword packing here for hysterical raisins. Saves us 4 bytes, at the cost of
   misaligning the value64 member of every other parameter structure. */

typedef struct
{
    HGCMFunctionParameterType type;
    union
    {
        uint32_t value32;
        uint64_t value64;
        struct
        {
            uint32_t size;
            union
            {
                RTGCPHYS32 physAddr;
                RTGCPTR32 linearAddr;
            } u;
        } Pointer;
        struct
        {
            uint32_t size; /**< Size of the buffer described by the page list. */
            uint32_t offset; /**< Relative to the request header, valid if size != 0. */
        } PageList;
    } u;
} RTGCParameter;

ifdef __cplusplus
    void SetUInt32(uint32_t u32)
    {
        type = VMMDevHGCMParmType_32bit;
        u.value64 = 0; /* init unused bits to 0 */
        u.value32 = u32;
    }

    int GetUInt32(uint32_t RT_FAR *pu32)
    {
        if (type == VMMDevHGCMParmType_32bit)
            *pu32 = u.value32;
        return VINF_SUCCESS;
    }

    void SetUInt64(uint64_t u64)
    {
        type  = VMMDevHGCMParmType_64bit;

+     u.value64 = u64;
+   }
+  
+  + int GetUInt64(uint64_t RT_FAR *pu64)
+  +  {
+  +    if (type == VMMDevHGCMParmType_64bit)
+  +      { 
+  +        *pu64 = u.value64;
+  +        return VINF_SUCCESS;
+  +      }
+  +      return VERR_INVALID_PARAMETER;
+  +  }
+  +  
+  +  void SetPtr(void RT_FAR *pv, uint32_t cb)
+  +  {
+  +    type                    = VMMDevHGCMParmType_LinAddr;
+  +    u.Pointer.size          = cb;
+  +    u.Pointer.u.linearAddr  = (RTGCPTR32)(uintptr_t)pv;
+  +  }
+  +  
+  +# endif /* __cplusplus */
+} HGCMFunctionParameter32;
+  
+  +# pragma pack()
+  +AssertCompileSize(HGCMFunctionParameter32, 4+8);
+  +
+  +  +  */
+  +  +  * HGCM function parameter, 64-bit client.
+  +  +  */
+  +# pragma pack(4)/* We force structure dword packing here for hysterical raisins. Saves us 4 bytes, at the cost of
+  +  +    misaligning the value64, physAddr and linearAddr members of every other parameter structure. */
+  +typedef struct
+  +{
+  +  +    HGCMFunctionParameterType type;
+  +    union
+  +      {
+  +        uint32_t   value32;
+  +        uint64_t   value64;
+  +        struct
+  +          {
+  +            uint32_t size;
+  +            union
+  +              {
+  +                RTGCPHY64 physAddr;
+  +                RTGCPTR64  linearAddr;
+  +              } u;
+  +          } Pointer;
+  +          struct
+  +            {
+  +...
uint32_t size; /**< Size of the buffer described by the page list. */
uint32_t offset; /**< Relative to the request header, valid if size != 0. */

} PageList;

} u;

#ifdef __cplusplus

    void SetUInt32(uint32_t u32)
    {
        type = VMMDevHGCMParmType_32bit;
        u.value64 = 0; /* init unused bits to 0 */
        u.value32 = u32;
    }

    int GetUInt32(uint32_t RT_FAR *pu32)
    {
        if (type == VMMDevHGCMParmType_32bit)
        {
            *pu32 = u.value32;
            return VINF_SUCCESS;
        }
        return VERR_INVALID_PARAMETER;
    }

    void SetUInt64(uint64_t u64)
    {
        type      = VMMDevHGCMParmType_64bit;
        u.value64 = u64;
    }

    int GetUInt64(uint64_t RT_FAR *pu64)
    {
        if (type == VMMDevHGCMParmType_64bit)
        {
            *pu64 = u.value64;
            return VINF_SUCCESS;
        }
        return VERR_INVALID_PARAMETER;
    }

    void SetPtr(void RT_FAR *pv, uint32_t cb)
    {
        type                    = VMMDevHGCMParmType_LinAddr;
        u.Pointer.size          = cb;
        u.Pointer.u.linearAddr  = (uintptr_t)pv;
    }
#endif /* __cplusplus */

} HGCMFunctionParameter64;

#pragma pack()
/* Redefine the structure type for the guest code. */
#if !VBOX_HGCM_HOST_CODE
#if ARCH_BITS == 64
#define HGCMFunctionParameter HGCMFunctionParameter64
#elif ARCH_BITS == 32 || ARCH_BITS == 16
#define HGCMFunctionParameter HGCMFunctionParameter32
#else
error "Unsupported sizeof (void *)"
#endif /* !VBOX_HGCM_HOST_CODE */
#endif /* !VBOX_WITH_64_BITS_GUESTS */

+*/
+ * HGCM function parameter, 32-bit client.
+ *
+ * @todo If this is the same as HGCMFunctionParameter32, why the duplication?
+ */
#pragma pack(4) /* We force structure dword packing here for hysterical raisins. Saves us 4 bytes, at the cost of
misaligning the value64 member of every other parameter structure. */
typedef struct
+
+ HGCMFunctionParameterType type;
+ union
+ {
+     uint32_t  value32;
+     uint64_t  value64;
+     struct
+     {
+         uint32_t size;
+         union
+         {
+             RTGCPHYS32 physAddr;
+             RTGCPTR32  linearAddr;
+         } u;
+     } Pointer;
+     struct
+     {
+         uint32_t size;  /**< Size of the buffer described by the page list. */
+         uint32_t offset; /**< Relative to the request header, valid if size != 0. */
+     } PageList;
+ } u;
#endif __cplusplus
void SetUInt32(uint32_t u32)
int GetUInt32(uint32_t *pu32)
{
    if (type == VMMDevHGCMParmType_32bit)
    {
        *pu32 = u.value32;
        return VINF_SUCCESS;
    }
    return VERR_INVALID_PARAMETER;
}

void SetUInt64(uint64_t u64)
{
    type = VMMDevHGCMParmType_64bit;
    u.value64 = u64;
}

int GetUInt64(uint64_t *pu64)
{
    if (type == VMMDevHGCMParmType_64bit)
    {
        *pu64 = u.value64;
        return VINF_SUCCESS;
    }
    return VERR_INVALID_PARAMETER;
}

void SetPtr(void *pv, uint32_t cb)
{
    type = VMMDevHGCMParmType_LinAddr;
    u.Pointer.size = cb;
    u.Pointer.u.linearAddr = (uintptr_t)pv;
}

#pragma pack()
@@ -0,0 +1,461 @@
+/** @file
+ * VirtualBox - Common C and C++ definition.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU General Public License (GPL) as published by the Free Software Foundation, in version 2 as it comes in the "COPYING" file of the VirtualBox OSE distribution. VirtualBox OSE is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms of the Common Development and Distribution License Version 1.0 (CDDL) only, as it comes in the "COPYING.CDDL" file of the VirtualBox OSE distribution, in which case the provisions of the CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBox_cdefs_h
+#define ___VBox_cdefs_h
+
+#include <iprt/cdefs.h>
+
+/** @def VBOX_WITH_STATISTICS
+ * When defined all statistics will be included in the build.
+ * This is enabled by default in all debug builds.
+ */
+ifndef VBOX_WITH_STATISTICS
+ ifdef DEBUG
+ define VBOX_WITH_STATISTICS
+ endif
+endif
+
+/** @def VBOX_STRICT
+ * Alias for RT_STRICT.
+ */
+#ifdef RT_STRICT
+  +#ndef VBOX_STRICT
+  +# define VBOX_STRICT
+  +# endif
+  +#+
+  +#+
+  */
+  * Shut up DOXYGEN warnings and guide it properly thru the code.
+  */
+  +#ifdef DOXYGEN_RUNNING
+  +#define VBOX_WITH_STATISTICS
+  +#define VBOX_STRICT
+  +#define IN_DBG
+  +#define IN_DIS
+  +#define IN_INTNET_R0
+  +#define IN_INTNET_R3
+  +#define IN_PCIRAW_R0
+  +#define IN_PCIRAW_R3
+  +#define IN_REM_R3
+  +#define IN_SUP_R0
+  +#define IN_SUP_R3
+  +#define IN_SUP_RC
+  +#define IN_SUP_STATIC
+  +#define IN_USBLIB
+  +#define IN_VBOXDDU
+  +#define IN_VMM_RC
+  +#define IN_VMM_R0
+  +#define IN_VMM_R3
+  +#define IN_VMM_STATIC
+  +# endif
+  +
+  +
+  +/*
+  */
+  /** @def VBOXCALL
+  * The standard calling convention for VBOX interfaces.
+  */
+  +#define VBOXCALL  RTCALL
+  +
+  +
+  +/*
+  */
+  /** @def IN_DIS
+  * Used to indicate whether we're inside the same link module as the
+  * disassembler.
+  */
+  */
+  /** @def DISDECL(type)
+ * Disassembly export or import declaration.
+ * @param   type    The return type of the function declaration.
+ */
+#if defined(IN_DIS)
+# ifdef IN_DIS_STATIC
+#  define DISDECL(type)     DECLHIDDEN(type) VBOXCALL
+# else
+#  define DISDECL(type)     DECLEXPORT(type) VBOXCALL
+# endif
+#else
+# define DISDECL(type)      DECLIMPORT(type) VBOXCALL
+#endif

/** @def IN_DBG
  * Used to indicate whether we're inside the same link module as the debugger
  * console, gui, and related things (ring-3).
  */
/** @def DBGDECL(type)
  * Debugger module export or import declaration.
  * Functions declared using this exists only in R3 since the
  * debugger modules is R3 only.
  * @param   type    The return type of the function declaration.
  */
#if defined(IN_DBG_R3) || defined(IN_DBG)
# define DBGDECL(type)      DECLEXPORT(type) VBOXCALL
#else
# define DBGDECL(type)      DECLIMPORT(type) VBOXCALL
#endif

/** @def IN_INTNET_R3
  * Used to indicate whether we're inside the same link module as the Ring-3
  * Internal Networking Service.
  */
/** @def INTNETR3DECL(type)
  * Internal Networking Service export or import declaration.
  * @param   type    The return type of the function declaration.
  */
#ifdef IN_INTNET_R3
# define INTNETR3DECL(type) DECLEXPORT(type) VBOXCALL
#else
# define INTNETR3DECL(type) DECLIMPORT(type) VBOXCALL
#endif

/** @def IN_INTNET_R0
+ * Used to indicate whether we're inside the same link module as the R0
+ * Internal Network Service.
+ */
+/** @def INTNETR0DECL(type)
+ * Internal Networking Service export or import declaration.
+ */
+/** @param type The return type of the function declaration.
+ */
+#ifdef IN_INTNET_R0
+# define INTNETR0DECL(type) DECLEXPORT(type) VBOXCALL
+#else
+# define INTNETR0DECL(type) DECLIMPORT(type) VBOXCALL
+#endif
+

/** @def IN_PCIRAW_R3
+ * Used to indicate whether we're inside the same link module as the Ring-3
+ * PCI passthrough support.
+ */
+/** @def PCIRAWR3DECL(type)
+ * PCI passthrough export or import declaration.
+ */
+/** @param type The return type of the function declaration.
+ */
+#ifdef IN_PCIRAW_R3
+# define PCIRAWR3DECL(type) DECLEXPORT(type) VBOXCALL
+#else
+# define PCIRAWR3DECL(type) DECLIMPORT(type) VBOXCALL
+#endif
+
+/** @def IN_PCIRAW_R0
+ * Used to indicate whether we're inside the same link module as the R0
+ * PCI passthrough support.
+ */
+/** @def PCIRAWR0DECL(type)
+ * PCI passthrough export or import declaration.
+ */
+/** @param type The return type of the function declaration.
+ */
+#ifdef IN_PCIRAW_R0
+# define PCIRAWR0DECL(type) DECLEXPORT(type) VBOXCALL
+#else
+# define PCIRAWR0DECL(type) DECLIMPORT(type) VBOXCALL
+#endif
+
+/** @def IN_REM_R3
+ * Used to indicate whether we're inside the same link module as
+ * the HC Ring-3 Recompiled Execution Manager.
/** @def REMR3DECL(type)
 * Recompiled Execution Manager HC Ring-3 export or import declaration.
 * @param   type    The return type of the function declaration.
 */

#ifdef IN_REM_R3
#define REMR3DECL(type)    DECLEXPORT(type) VBOXCALL
#else
#define REMR3DECL(type)    DECLIMPORT(type) VBOXCALL
#endif

/** @def IN_SUP_R3
 * Used to indicate whether we're inside the same link module as the Ring-3
 * Support Library or not.
 */

/** @def SUPR3DECL(type)
 * Support library export or import declaration.
 * @param   type    The return type of the function declaration.
 */

#ifdef IN_SUP_R3
#ifdef IN_SUP_STATIC
#define SUPR3DECL(type)   DECLHIDDEN(type) VBOXCALL
#else
#define SUPR3DECL(type)   DECLEXPORT(type) VBOXCALL
#endif
#else
#ifdef IN_SUP_STATIC
#define SUPR3DECL(type)   DECLHIDDEN(type) VBOXCALL
#else
#define SUPR3DECL(type)   DECLIMPORT(type) VBOXCALL
#endif
#endif

/** @def IN_SUP_R0
 * Used to indicate whether we're inside the same link module as the Ring-0
 * Support Library or not.
 */

/** @def SUPR0DECL(type)
 * Support library export or import declaration.
 * @param   type    The return type of the function declaration.
 */

#ifdef IN_SUP_R0
#ifdef IN_SUP_STATIC
#define SUPR0DECL(type)   DECLHIDDEN(type) VBOXCALL
#else
#define SUPR0DECL(type)   DECLEXPORT(type) VBOXCALL
#endif
#else
#ifdef IN_SUP_STATIC
#define SUPR0DECL(type)   DECLHIDDEN(type) VBOXCALL
#else
#define SUPR0DECL(type)   DECLIMPORT(type) VBOXCALL
#endif
#endif
```c
#if defined(IN_SUP_STATIC)
#else
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
```

```c
/** @def IN_SUP_RC
 * Used to indicate whether we're inside the same link module as the RC Support Library or not.
 */
/** */
#if defined(IN_SUP_RC)
#else
#endif
#endif
#endif
#endif
#endif
#endif
#endif
```

```c
/** @def SUPR0DECL(type)
 * Support library export or import declaration.
 */
/** */
#if defined(IN_SUP_R0) || defined(IN_SUP_R3) || defined(IN_SUP_RC)
#else
#endif
#endif
#endif
#endif
```

```c
/** @def USBLIB
 * Used to indicate whether we're inside the same link module as the USBLib.
 */
/** */
#if defined(IN_USBLIB)
#else
#endif
#endif
```

```c
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```
+ * @param   type    The return type of the function declaration.
+ */
+ #ifdef IN_RING0
+ ## define USBLIB_DECL(type)  type VBOXCALL
+ #elif defined(IN_USBLIB)
+ ## define USBLIB_DECL(type)  DECLEXPORT(type) VBOXCALL
+ #else
+ ## define USBLIB_DECL(type)  DECLIMPORT(type) VBOXCALL
+ #endif
+ +
+ /*@def IN_VMM_STATIC
+ * Used to indicate that the virtual machine monitor is built or used as a
+ * static library.
+ */
+ /*@def IN_VMM_R3
+ * Used to indicate whether we're inside the same link module as the ring 3 part of the
+ * virtual machine monitor or not.
+ */
+ /*@def VMMR3DECL
+ * Ring-3 VMM export or import declaration.
+ */
+ */
+ #ifdef IN_VMM_R3
+ #ifdef IN_VMM_STATIC
+ # define VMMR3DECL(type)            DECLHIDDEN(type) VBOXCALL
+ #else
+ # define VMMR3DECL(type)            DECLEXPORT(type) VBOXCALL
+ # endif
+ #elif defined(IN_RING3)
+ #ifdef IN_VMM_STATIC
+ # define VMMR3DECL(type)            DECLHIDDEN(type) VBOXCALL
+ #else
+ # define VMMR3DECL(type)            DECLIMPORT(type) VBOXCALL
+ # endif
+ #else
+ # define VMMR3DECL(type)            DECL_INVALID(type)
+ #endif
+ +
+ /*@def IN_VMM_R0
+ * Used to indicate whether we're inside the same link module as the ring-0 part
+ * of the virtual machine monitor or not.
+ */
+ /*@def VMMR0DECL
+ * Ring-0 VMM export or import declaration.
+ */
+ */
| ifdef | define | #ifdef | define | ifdef | define | ifdef | define | ifdef | define |
| + | VMMR0DECL(type) | DECLEXPORT(type) VBOXCALL | + | VMMR0DECL(type) | DECLIMPORT(type) VBOXCALL | + | VMMR0DECL(type) | DECL_INVALID(type) |
| endif | + | /* @def IN_VMM_R0 */ | + * define VMMRCDECL(type) | DECLEXPORT(type) VBOXCALL | + * define VMMRCDECL(type) | DECLIMPORT(type) VBOXCALL | + * define VMMRCDECL(type) | DECL_INVALID(type) |
| endif | + | /* @def IN_VMM_RC */ | + * define VMMRZDECL(type) | DECLEXPORT(type) VBOXCALL | + * define VMMRZDECL(type) | DECLIMPORT(type) VBOXCALL | + * define VMMRZDECL(type) | DECL_INVALID(type) |
| endif | + | /* @def VMMDECL */ | + * define VMMDECL(type) | DECLEXPORT(type) VBOXCALL | + * define VMMDECL(type) | DECLIMPORT(type) VBOXCALL | + * define VMMDECL(type) | DECLIMPORT(type) VBOXCALL |
| endif | + | /* @def VMM_STATIC */ | + * define VMMDECL(type) | DECHIDDEN(type) VBOXCALL | + * define VMMDECL(type) | DECHIDDEN(type) VBOXCALL | + * define VMMDECL(type) | DECHIDDEN(type) VBOXCALL |
| endif | + | /* @def VMM_STATIC */ | + * define VMMDECL(type) | DECHIDDEN(type) VBOXCALL | + * define VMMDECL(type) | DECHIDDEN(type) VBOXCALL | + * define VMMDECL(type) | DECHIDDEN(type) VBOXCALL |
+/** @def VMM_INT_DECL
+ * VMM internal function.
+ * @param type The return type of the function declaration.
+ */
+#if defined(IN_VMM_R3) || defined(IN_VMM_R0) || defined(IN_VMM_RC)
+# define VMM_INTDECL(type) DECLHIDDEN(type) VBOXCALL
+#else
+# define VMM_INTDECL(type) DECL_INVALID(type)
+#endif
+
+/** @def VMMR3_INT_DECL
+ * VMM internal function, ring-3.
+ * @param type The return type of the function declaration.
+ */
+#ifdef IN_VMM_R3
+# define VMMR3_INTDECL(type) DECLHIDDEN(type) VBOXCALL
+#else
+# define VMMR3_INTDECL(type) DECL_INVALID(type)
+#endif
+
+/** @def VMMR0_INT_DECL
+ * VMM internal function, ring-0.
+ * @param type The return type of the function declaration.
+ */
+#ifdef IN_VMM_R0
+# define VMMR0_INTDECL(type) DECLHIDDEN(type) VBOXCALL
+#else
+# define VMMR0_INTDECL(type) DECL_INVALID(type)
+#endif
+
+/** @def VMMRC_INT_DECL
+ * VMM internal function, raw-mode context.
+ * @param type The return type of the function declaration.
+ */
+#ifdef IN_VMM_RC
+# define VMMRC_INTDECL(type) DECLHIDDEN(type) VBOXCALL
+#else
+# define VMMRC_INTDECL(type) DECL_INVALID(type)
+#endif
+
+/** @def VMMRZ_INT_DECL
+ * VMM internal function, ring-0 + raw-mode context.
+ * @param type The return type of the function declaration.
+ */
+#if defined(IN_VMM_RC) || defined(IN_VMM_R0)
+# define VMMRZ_INTDECL(type) DECLHIDDEN(type) VBOXCALL
+#else
+# define VMMRZ_INTDECL(type) DECL_INVALID(type)
/** @def IN_VBOXDDU
 * Used to indicate whether we're inside the VBoxDDU shared object.
 */
/** @def VBOXDDU_DECL(type)
 * VBoxDDU export or import (ring-3).
 * @param   type    The return type of the function declaration.
 */
#define IN_VBOXDDU

#ifdef IN_VBOXDDU

#ifdef IN_VBOXDDU_STATIC

#define VBOXDDU_DECL(type) type
#else

#define VBOXDDU_DECL(type) DECLEXPORT(type) VBOXCALL
#endif
#endif

/** @} */

/** @} */

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/err.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/VBox/err.h
@@ -0,0 +1,2812 @@
/** @file
 * VirtualBox Status Codes.
 */

/*
 * Copyright (C) 2006-2017 Oracle Corporation
 */

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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBox_err_h
+#define ___VBox_err_h
+
+/* SED-START */
+
+/** @defgroup grp_err       VBox Error Codes
+ * @{
+ *
+ +/** Failed to allocate VM memory. */
+#define VERR_NO_VM_MEMORY                   (-1000)
+/** RC is toasted and the VMM should be terminated at once, but no need to
+ * panic about it :-) */
+#define VERR_DONT_PANIC                     (-1001)
+/** Unsupported CPU. */
+#define VERR_UNSUPPORTED_CPU                (-1002)
+/** Unsupported CPU mode. */
+#define VERR_UNSUPPORTED_CPU_MODE           (-1003)
+/** Page not present. */
+#define VERR_PAGE_NOT_PRESENT               (-1004)
+/** Invalid/Corrupted configuration file. */
+#define VERR_CFG_INVALID_FORMAT             (-1005)
+/** No configuration value exists. */
+#define VERR_CFG_NO_VALUE                   (-1006)
+/** Selector not present. */
+#define VERR_SELECTOR_NOT_PRESENT           (-1007)
+/** Not code selector. */
+#define VERR_NOT_CODE_SELECTOR              (-1008)
+/** Not data selector. */
+#define VERR_NOT_DATA_SELECTOR              (-1009)
+/** Out of selector bounds. */
+/* ** Invalid selector. Usually beyond table limits. */
+#define VERR_INVALID_SELECTOR (-1011)
+/* ** Invalid requested privilege level. */
+#define VERR_INVALID_RPL (-1012)
+/* ** PML4 entry not present. */
+#define VERR_PAGE_MAP_LEVEL4_NOT_PRESENT (-1013)
+/* ** Page directory pointer not present. */
+#define VERR_PAGE_DIRECTORY_PTR_NOT_PRESENT (-1014)
+/* ** Raw mode doesn't support SMP. */
+#define VERR_RAW_MODE_INVALID_SMP (-1015)
+/* ** Invalid VM handle. */
+#define VERR_INVALID_VM_HANDLE (-1016)
+/* ** Invalid VM handle. */
+#define VERR_INVALID_VMCPU_HANDLE (-1017)
+/* ** Invalid Virtual CPU ID. */
+#define VERR_INVALID_CPU_ID (-1018)
+/* ** Too many VCPUs. */
+#define VERR_TOO_MANY_CPUS (-1019)
+/* ** The service was disabled on the host. */
+ * Returned by pfInit in VBoxService to indicated a non-fatal error that
+ * should results in the particular service being disabled. */
+#define VERR_SERVICE_DISABLED (-1020)
+/* ** The requested feature is not supported in raw-mode. */
+#define VERR_NOT_SUP_IN_RAW_MODE (-1021)
+/* ** Invalid CPU index. */
+#define VERR_INVALID_CPU_INDEX (-1022)
+/* ** This VirtualBox build does not support raw-mode. */
+#define VERR_RAW_MODE_NOT_SUPPORTED (-1023)
+/* ** Essential fields in the shared VM structure doesn't match the global one. */
+#define VERR_INCONSISTENT_VM_HANDLE (-1024)
+/* } */
+
+@ Execution Monitor/Manager (EM) Status Codes
+ *
+ * The order of the status codes between VINF_EM_FIRST and VINF_EM_LAST
+ * are of vital importance. The lower the number the higher importance
+ * as a scheduling instruction.
+ * @} {
+ */
+/* ** First scheduling related status code. */
+#define VINF_EM_FIRST 1100
+/* ** Indicating that the VM is being terminated and that the execution
+ * shall stop. */
+#define VINF_EM_TERMINATE 1100
+/* ** Hypervisor code was stepped.
+ * EM will first send this to the debugger, and if the issue isn't
+ * resolved there it will enter guru meditation. */
+ define VINF_EM_DBG_HYPER_STEPED 1101
+ /** Hit a breakpoint in the hypervisor code,
+ * EM will first send this to the debugger, and if the issue isn't
+ * resolved there it will enter guru meditation. */
+ define VINF_EM_DBG_HYPER_BREAKPOINT 1102
+ /** Hit a possible assertion in the hypervisor code,
+ * EM will first send this to the debugger, and if the issue isn't
+ * resolved there it will enter guru meditation. */
+ define VINF_EM_DBG_HYPER_ASSERTION 1103
+ /** Generic debug event, suspend the VM for debugging. */
+ define VINF_EM_DBG_EVENT 1104
+ /** Indicating that the VM should be suspended for debugging because
+ * the developer wants to inspect the VM state. */
+ define VINF_EM_DBG_STOP 1105
+ /** Indicating success single stepping and that EM should report that
+ * event to the debugger. */
+ define VINF_EM_DBG_STEPED 1106
+ /** Indicating that a breakpoint was hit and that EM should notify the debugger
+ * and in the event there is no debugger fail fatally. */
+ define VINF_EM_DBG_BREAKPOINT 1107
+ /** Indicating that EM should single step an instruction.
+ * The instruction is stepped in the current execution mode (RAW/REM). */
+ define VINF_EM_DBG_STEP 1108
+ /** Indicating that the VM is being turned off and that the EM should
+ * exit to the VM awaiting the destruction request. */
+ define VINF_EM_OFF 1109
+ /** Indicating that the VM has been suspended and that the thread
+ * should wait for request telling it what to do next. */
+ define VINF_EM_SUSPEND 1110
+ /** Indicating that the VM has been reset and that scheduling goes
+ * back to startup defaults. */
+ define VINF_EM_RESET 1111
+ /** Indicating that the VM has executed a halt instruction and that
+ * the emulation thread should wait for an interrupt before resuming
+ * execution. */
+ define VINF_EM_HALT 1112
+ /** Indicating that the VM has been resumed and that the thread should
+ * start executing. */
+ define VINF_EM_RESUME 1113
+ /** Indicating that we've got an out-of-memory condition and that we need
+ * to take the appropriate actions to deal with this.
+ * @remarks It might seem odd at first that this has lower priority than VINF_EM_HALT,
+ * VINF_EM_SUSPEND, and VINF_EM_RESUME. The reason is that these events are
+ * vital to correctly operating the VM. Also, they can't normally occur together
+ * with an out-of-memory condition, and even if that should happen the condition
+ * will be rediscovered before executing any more code. */
+ define VINF_EM_NO_MEMORY 1114
+/** The fatal variant of VINF_EM_NO_MEMORY. */
+#define VERR_EM_NO_MEMORY (-1114)
+/** Indicating that a rescheduling to recompiled execution.
+ * Typically caused by raw-mode executing code which is difficult/slow
+ * to virtualize rawly.
+ */
+@remarks Important to have a higher priority (lower number) than the other rescheduling status codes. */
+#define VINF_EM_RESCHEDULE_REM 1115
+/** Indicating that a rescheduling to vmx-mode execution.
+ * Typically caused by REM detecting that hardware-accelerated raw-mode execution is possible. */
+#define VINF_EM_RESCHEDULE_HM 1116
+/** Indicating that a rescheduling to raw-mode execution.
+ * Typically caused by REM detecting that raw-mode execution is possible.
+ */
+@remarks Important to have a higher priority (lower number) than VINF_EM_RESCHEDULE. */
+#define VINF_EM_RESCHEDULE_RAW 1117
+/** PARAV call */
+#define VINF_EM_RESCHEDULE_PARAV 1119
+/** Go back into wait for SIPI mode */
+#define VINF_EM_WAIT_SIPI 1120
+/** Last scheduling related status code. (inclusive) */
+#define VINF_EM_LAST 1120
+
+/** Reason for leaving RC: Guest trap which couldn't be handled in RC.
+ * The trap is generally forwarded to the REM and executed there. */
+#define VINF_EM_RAW_GUEST_TRAP 1121
+/** Reason for leaving RC: Interrupted by external interrupt.
+ * The interrupt needed to be handled by the host OS. */
+#define VINF_EM_RAW_INTERRUPT 1122
+/** Reason for leaving RC: A Ring switch was attempted.
+ * Normal cause of action is to execute this in REM. */
+#define VINF_EM_RAW_RING_SWITCH 1123
+/** Reason for leaving RC: A Ring switch was attempted using software interrupt.
+ * Normal cause of action is to execute this in REM. */
+#define VINF_EM_RAW_RING_SWITCH_INT 1124
+/** Reason for leaving RC: A privileged instruction was attempted executed.
+ * Normal cause of action is to execute this in REM. */
+#define VINF_EM_RAW_EXCEPTION_PRIVILEGED 1126
+/** Reason for leaving RZ: Emulate instruction. */
+#define VINF_EM_RAW_EMULATE_INSTR 1127
+/** Reason for leaving RC: Unhandled TSS write.
+ * Recompiler gets control. */
#define VINF_EM_RAW_EMULATE_INSTR_TSS_FAULT 1128
/** Reason for leaving RC: Unhandled LDT write. */
# define VINF_EM_RAW_EMULATE_INSTR_LDT_FAULT 1129
/** Reason for leaving RC: Unhandled IDT write. */
# define VINF_EM_RAW_EMULATE_INSTR_IDT_FAULT 1130
/** Reason for leaving RC: Partly handled GDT write. */
# define VINF_EM_RAW_EMULATE_INSTR_GDT_FAULT 1131
/** Reason for leaving RC: jump inside generated patch jump. */
# define VERR_EM_RAW_PATCH_CONFLICT (-1133)
/** Reason for leaving RZ: Ring-3 operation pending. */
# define VINF_EM_RAW_TO_R3 1135
/** Reason for leaving RZ: Timer pending. */
# define VINF_EM_RAW_TIMER_PENDING 1136
/** Reason for leaving RC: Interrupt pending (guest). */
# define VINF_EM_RAW_INTERRUPT_PENDING 1137
/** Reason for leaving RC: Encountered a stale selector. */
# define VINF_EM_RAW_STALE_SELECTOR 1138
/** Reason for leaving RC: The IRET resuming guest code trapped. */
# define VINF_EM_RAW_IRET_TRAP 1139
/** Reason for leaving RC: Emulate (MM)IO intensive code in the recompiler. */
# define VINF_EM_RAW_EMULATE_IO_BLOCK 1140
/** The interpreter was unable to deal with the instruction at hand. */
# define VINF_EM_RAW_INTERPRETER (-1148)
/** Internal EM error caused by an unknown warning or informational status code. */
# define VINF_EM_RAW_INTERNAL_ERROR (-1149)
/** Pending VM request packet. */
# define VINF_EM_PENDING_REQUEST 1150
/** Start instruction stepping (debug only). */
# define VINF_EM_RAW_EMULATE_DBG_STEP 1151
/** Patch TPR access instruction. */
# define VINF_EM_HM_PATCH_TPR_INSTR 1152
/** Unexpected guest mapping conflict detected. */
# define VINF_EM_RAW_UNEXPECTED_MAPPING_CONFLICT (-1154)
/** Reason for leaving RC: A triple-fault condition. Currently, causes */
/** a guru meditation. */
# define VINF_EM_TRIPLE_FAULT 1155
/** The specified execution engine cannot execute guest code in the current */
/** state. */
# define VINF_EM_RAW_INJECT_TRPM_EVENT 1157
/** Guest tried to trigger a CPU hang. The guest is probably up to no good. */
# define VINF_EM_GUEST_CPU_HANG (-1158)
/** @} */
+/
+
+/** @name Debugging Facility (DBGF) DBGF Status Codes
+ * @}
+ */
+/** The function called requires the caller to be attached as a
+ * debugger to the VM. */
+#define VERR_DBGF_NOT_ATTACHED (-1200)
+/** Someone (including the caller) was already attached as
+ * debugger to the VM. */
+#define VERR_DBGF_ALREADY_ATTACHED (-1201)
+/** Tried to halt a debugger which was already halted.
+ * (This is a warning and not an error.) */
+#define VWRN_DBGF_ALREADY_HALTED 1202
+/** The DBGF has no more free breakpoint slots. */
+#define VERR_DBGF_NO_MORE_BP_SLOTS (-1203)
+/** The DBGF couldn't find the specified breakpoint. */
+#define VERR_DBGF_BP_NOT_FOUND (-1204)
+/** Attempted to enabled a breakpoint which was already enabled. */
+#define VINF_DBGF_BP_ALREADY_ENABLED 1205
+/** Attempted to disabled a breakpoint which was already disabled. */
+#define VINF_DBGF_BP_ALREADY_DISABLED 1206
+/** The breakpoint already exists. */
+#define VINF_DBGF_BP_ALREADY_EXIST 1207
+/** The byte string was not found. */
+#define VERR_DBGF_MEM_NOT_FOUND (-1208)
+/** The OS was not detected. */
+#define VERR_DBGF_OS_NOT_DETCTED (-1209)
+/** The OS was not detected. */
+#define VINF_DBGF_OS_NOT_DETCTED 1209
+/** The specified register was not found. */
+#define VERR_DBGF_REGISTER_NOT_FOUND (-1210)
+/** The value was truncated to fit.
+ * For queries this means that the register is wider than the queried value.
+ * For setters this means that the value is wider than the register. */
+#define VINF_DBGF_TRUNCATED_REGISTER 1211
+/** The value was zero extended to fit.
+ * For queries this means that the register is narrower than the queried value.
+ * For setters this means that the value is narrower than the register. */
+#define VINF_DBGF_ZERO_EXTENDED_REGISTER 1212
+/** The requested type conversion was not supported. */
+#define VERR_DBGF_UNSUPPORTED_CAST (-1213)
+/** The register is read-only and cannot be modified. */
+#define VERR_DBGF_READ_ONLY_REGISTER (-1214)
+/** Internal processing error \#1 in the DBGF register code. */
+#define VERR_DBGF_REG_IPE_1 (-1215)
+/** Internal processing error \#2 in the DBGF register code. */
+#define VERR_DBGF_REG_IPE_2 (-1216)
+/** Unhandled \#DB in hypervisor code. */
+#define VERR_DBGF_HYPER_DB_XCPT (-1217)
+/** Internal processing error \#1 in the DBGF stack code. */
+#define VERR_DBGF_STACK_IPE_1 (-1218)
+/** Internal processing error \#2 in the DBGF stack code. */
+#define VERR_DBGF_STACK_IPE_2 (-1219)
+/** No trace buffer available, please change the VM config. */
+#define VERR_DBGF_NO_TRACE_BUFFER (-1220)
+/** @} */
+
+
+/** @} name Patch Manager (PATM) Status Codes */
+ * @} 
+ * /
+ /** Non fatal Patch Manager analysis phase warning */
+#define VWRN_CONTINUE_ANALYSIS 1400
+ /** Non fatal Patch Manager recompile phase warning (mapped to VWRN_CONTINUE_ANALYSIS). */
+#define VWRN_CONTINUE_RECOMPILE VWRN_CONTINUE_ANALYSIS
+ /** Continue search (mapped to VWRN_CONTINUE_ANALYSIS). */
+#define VWRN_PATM_CONTINUE_SEARCH VWRN_CONTINUE_ANALYSIS
+ /** Patch installation refused (patch too complex or unsupported instructions ) */
+#define VERR_PATCHING_REFUSED (-1401)
+ /** Unable to find patch */
+#define VERR_PATCH_NOT_FOUND (-1402)
+ /** Patch disabled */
+#define VERR_PATCH_DISABLED (-1403)
+ /** Patch enabled */
+#define VWRN_PATCH_ENABLED 1404
+ /** Patch was already disabled */
+#define VERR_PATCH_ALREADY_DISABLED (-1405)
+ /** Patch was already enabled */
+#define VERR_PATCH_ALREADY_ENABLED (-1406)
+ /** Patch was removed. */
+#define VWRN_PATCH_REMOVED 1407
+
+ /** Reason for leaving RC: \#GP with EIP pointing to patch code. */
+#define VINF_PATM_PATCH_TRAP_GP 1408
+ /** First leave RC code. */
+#define VINF_PATM_LEAVE_RC_FIRST VINF_PATM_PATCH_TRAP_GP
+ /** Reason for leaving RC: \#PF with EIP pointing to patch code. */
+#define VINF_PATM_PATCH_TRAP_VF 1409
+ /** Reason for leaving RC: int3 with EIP pointing to patch code. */
+#define VINF_PATM_PATCH_INT3 1410
+ /** Reason for leaving RC: \#PF for monitored patch page. */
+#define VINF_PATM_CHECK_PATCH_PAGE 1411
+ /** Reason for leaving RC: duplicate instruction called at current eip. */
+#define VINF_PATM_DUPLICATE_FUNCTION 1412
+ /** Execute one instruction with the recompiler */
+#define VINF_PATCH_EMULATE_INSTR 1413
+/** Reason for leaving RC: attempt to patch MMIO write. */
+#define VINF_PATM_HC_MMIO_PATCH_WRITE 1414
+/** Reason for leaving RC: attempt to patch MMIO read. */
+#define VINF_PATM_HC_MMIO_PATCH_READ 1415
+/** Reason for leaving RC: pending irq after iret that sets IF. */
+#define VINF_PATM_PENDING_IRQ_AFTER_IRET 1416
+/** Last leave RC code. */
+#define VINF_PATM_LEAVE_RC_LAST VINF_PATM_PENDING_IRQ_AFTER_IRET
+
+/** No conflicts to resolve */
+#define VERR_PATCH_NO_CONFLICT (-1425)
+/** Detected unsafe code for patching */
+#define VERR_PATM_UNSAFE_CODE (-1426)
+/** Terminate search branch */
+#define VWRN_PATCH_END_BRANCH 1427
+/** Already patched */
+#define VERR_PATM_ALREADY_PATCHED (-1428)
+/** Spinlock detection failed. */
+#define VINF_PATM_SPINLOCK_FAILED (1429)
+/** Continue execution after patch trap. */
+#define VINF_PATCH_CONTINUE (1430)
+/** The patch manager is not used because we're using HM and VT-x/AMD-V. */
+#define VERR_PATM_HM_IPE (-1431)
+/** Unexpected trap in patch code. */
+#define VERR_PATM_IPE_TRAP_IN_PATCH_CODE (-1432)
+
+/** @} */
+
+/** @name Code Scanning and Analysis Manager (CSAM) Status Codes */
+ * @{
+ * @}
+
+/** Trap not handled */
+#define VWRN_CSAM_TRAP_NOT_HANDLED 1500
+/** Patch installed */
+#define VWRN_CSAM_INSTRUCTION_PATCHED 1501
+/** Page record not found */
+#define VWRN_CSAM_PAGE_NOT_FOUND 1502
+/** Reason for leaving RC: CSAM wants perform a task in ring-3. */
+#define VINF_CSAM_PENDING_ACTION 1503
+/** The CSAM is not used because we're using HM and VT-x/AMD-V. */
+#define VERR_CSAM_HM_IPE (-1504)
+/** @} */
+
+/** @name Page Monitor/Manager (PGM) Status Codes */
+ * @{
+ * @}

+ * Attempt to create a GC mapping which conflicts with an existing mapping. */
+#define VERR_PGM_MAPPING_CONFLICT (-1600)
+/** The physical handler range has no corresponding RAM range.
+ * If this is MMIO, see todo above the return. If not MMIO, then it's
+ * someone else's fault... */
+#define VERR_PGM_HANDLER_PHYSICAL_NO_RAM_RANGE (-1601)
+/** Attempt to register an access handler for a virtual range of which a part
+ * was already handled. */
+#define VERR_PGM_HANDLER_VIRTUAL_CONFLICT (-1602)
+/** Attempt to register an access handler for a physical range of which a part
+ * was already handled. */
+#define VERR_PGM_HANDLER_PHYSICAL_CONFLICT (-1603)
+/** Invalid page directory specified to PGM. */
+#define VERR_PGM_INVALID_PAGE_DIRECTORY (-1604)
+/** Invalid GC physical address. */
+#define VERR_PGM_INVALID_GC_PHYSICAL_ADDRESS (-1605)
+/** Invalid GC physical range. Usually used when a specified range crosses
+ * a RAM region boundary. */
+#define VERR_PGM_INVALID_GC_PHYSICAL_RANGE (-1606)
+/** Specified access handler was not found. */
+#define VERR_PGM_HANDLER_NOT_FOUND (-1607)
+/** Attempt to register a RAM range of which parts are already
+ * covered by existing RAM ranges. */
+#define VERR_PGM_RAM_CONFLICT (-1608)
+/** Failed to add new mappings because the current mappings are fixed
+ * in guest os memory. */
+#define VERR_PGM_MAPPINGS_FIXED (-1609)
+/** Failed to fix mappings because of a conflict with the intermediate code. */
+#define VERR_PGM_MAPPINGS_FIX_CONFLICT (-1610)
+/** Failed to fix mappings because a mapping rejected the address. */
+#define VERR_PGM_MAPPINGS_FIX_REJECTED (-1611)
+/** Failed to fix mappings because the proposed memory area was too small. */
+#define VERR_PGM_MAPPINGS_FIX_TOO_SMALL (-1612)
+/** Reason for leaving RZ: The urge to syncing CR3. */
+#define VINF_PGM_SYNC_CR3 1613
+/** Page not marked for dirty bit tracking */
+#define VINF_PGM_NO_DIRTY_BIT_TRACKING 1614
+/** Page fault caused by dirty bit tracking; corrected */
+#define VINF_PGM_HANDLED_DIRTY_BIT_FAULT 1615
+/** Go ahead with the default Read/Write operation.
+ * This is returned by a R3 physical or virtual handler when it wants the
+ * PGMPhys[Read|Write] routine do the reading/writing. */
+#define VINF_PGM_HANDLER_DO_DEFAULT 1616
+/** The paging mode of the host is not supported yet. */
+#define VERR_PGM_UNSUPPORTED_HOST_PAGING_MODE (-1617)
+/** The physical guest page is a reserved/MMIO page and does not have any HC
+ * address. */
+** VERR_PGM_PHYS_PAGE_RESERVED: No page directory available for the hypervisor.

+** VERR_PGM_NO_HYPERVISOR_ADDRESS: The shadow page pool was flushed. This means that a global CR3 sync was flagged. Anyone receiving this kind of status will have to get down to a SyncCR3 ASAP. See also VINF_PGM_SYNC_CR3.

+** VERR_PGM_POOL_FLUSHED: The shadow page pool was cleared. This is a error code internal to the shadow page pool, it will be converted to VERR_PGM_POOL.Flushed before leaving the pool code.

+** VINF_PGM_CACHED_PAGE: The returned shadow page is cached.

+** VINF_PGM_GCPHYS_ALIASED: Returned by handler registration, modification and deregistration when the shadow PTs could be updated because the guest page aliased or/and mapped by multiple PTs.

+** VINF_PGM_CHANGE_MODE: PGMCChangeMode() uses this to force a switch to R3 so it can safely deal with a mode switch.

+** VINF_PGM_SYNCPAGE_MODIFIED_PDE: SyncPage modified the PDE. This is an internal status code used to communicate back to the #PF handler that the PDE was (probably) marked not-present and it should restart the instruction.

+** VINF_PGM_GCPHYS_RANGE_CROSSES_BOUNDARY: Conflict between the core memory and the intermediate paging context, try again.

+** VERR_PGM_INTERMEDIATE_PAGING_CONFLICT: The dynamic mapping cache for physical memory failed.

+** VERR_PGM_DYNMAP_FAILED: The auto usage cache for the dynamic mapping set is full.

+** VERR_PGM_DYNMAP_SETERROR: The initialization of the dynamic mapping cache failed.

+** VERR_PGM_DYNMAP_EXPAND_ERROR: The page is unassigned (akin to VERR_PGM_INVALID_GC_PHYSICAL_ADDRESS).

+** VERR_PGM_PHYS_TLB_CATCH_ALL: Catch any access and route it thru PGM.
+#define VINF_PGM_PHYS_TLB_CATCH_WRITE 1635
+/** Catch write access and route it thru PGM. */
+#define VERR_PGM_PHYS_TLB_CATCH_WRITE (-1635)
+/** No CR3 root shadow page table. */
+#define VERR_PGM_NO_CR3_SHADOW_ROOT (-1636)
+/** Trying to free a page with an invalid Page ID. */
+#define VERR_PGM_PHYS_INVALID_PAGE_ID (-1637)
+/** PGMPphysWrite/Read hit a handler in Ring-0 or raw-mode context. */
+#define VERR_PGM_PHYS_WR_HIT_HANDLER (-1638)
+/** Trying to free a page that isn't RAM. */
+#define VERR_PGM_PHYS_NOT_RAM (-1639)
+/** Not ROM page. */
+#define VERR_PGM_PHYS_NOT_ROM (-1640)
+/** Not MMIO page. */
+#define VERR_PGM_PHYS_NOT_MMIO (-1641)
+/** Not MMIO2 page. */
+#define VERR_PGM_PHYS_NOT_MMIO2 (-1642)
+/** Already aliased to a different page. */
+#define VERR_PGM_HANDLER_ALREADY_ALIASED (-1643)
+/** Already aliased to the same page. */
+#define VINF_PGM_HANDLER_ALREADY_ALIASED (1643)
+/** PGM pool flush pending - return to ring 3. */
+#define VINF_PGM_POOL_FLUSH_PENDING (1644)
+/** Unable to use the range for a large page. */
+#define VERR_PGM_INVALID_LARGE_PAGE_RANGE (-1645)
+/** Don't mess around with ballooned pages. */
+#define VERR_PGM_PHYS_PAGE_BALLOONED (-1646)
+/** Internal processing error \#1 in page access handler code. */
+#define VERR_PGM_HANDLER_IPE_1 (-1647)
+
+/** pgmPhysPageMapCommon encountered PGMPAGETYPE_MMIO2_ALIAS_MMIO. */
+#define VERR_PGM_MAP_MMIO2_ALIAS_MMIO (-1651)
+/** Guest mappings are disabled. */
+#define VERR_PGM_MAPPINGS_DISABLED (-1652)
+/** No guest mappings when SMP is enabled. */
+#define VERR_PGM_MAPPINGS_SMP (-1653)
+/** Invalid saved page state. */
+#define VERR_PGM_INVALID_SAVED_PAGE_STATE (-1654)
+/** Encountered an unexpected page type in the saved state. */
+#define VERR_PGM_LOAD_UNEXPECTED_PAGE_TYPE (-1655)
+/** Encountered an unexpected page state in the saved state. */
+#define VERR_PGM_UNEXPECTED_PAGE_STATE (-1656)
+/** Couldn't find MMIO2 range from saved state. */
+#define VERR_PGM_SAVED_MMIO2_RANGE_NOT_FOUND (-1657)
+/** Couldn't find MMIO2 page from saved state. */
+#define VERR_PGM_SAVED_MMIO2_PAGE_NOT_FOUND (-1658)
+/** Couldn't find ROM range from saved state. */
+#define VERR_PGM_SAVED_ROM_RANGE_NOT_FOUND     (-1659)
+/** Couldn't find ROM page from saved state. */
+#define VERR_PGM_SAVED_ROM_PAGE_NOT_FOUND       (-1660)
+/** ROM page mismatch between saved state and the VM. */
+#define VERR_PGM_SAVED_ROM_PAGE_PROT            (-1661)
+/** Unknown saved state record. */
+#define VERR_PGM_SAVED_REC_TYPE                 (-1662)
+/** Internal processing error in the PGM dynmap (r0/rc). */
+#define VERR_PGM_DYNMAP_IPE                     (-1663)
+/** Internal processing error in the PGM handy page allocator. */
+#define VERR_PGM_HANDY_PAGE_IPE                 (-1664)
+/** Failed to map the guest PML4. */
+#define VERR_PGM_PML4_MAPPING                   (-1665)
+/** Failed to obtain a pool page. */
+#define VERR_PGM_POOL_GET_PAGE_FAILED           (-1666)
+/** A PGM function was called in a mode where it isn't supposed to be used. */
+#define VERR_PGM_NOT_USED_IN_MODE               (-1667)
+/** The CR3 address specified memory we don't know about. */
+#define VERR_PGM_INVALID_CR3_ADDR               (-1668)
+/** One or the PDPEs specified memory we don't know about. */
+#define VERR_PGM_INVALID_PDPE_ADDR              (-1669)
+/** Internal processing error in the PGM physical handler code. */
+#define VERR_PGM_PHYS_HANDLER_IPE               (-1670)
+/** Internal processing error \#1 in the PGM physical page mapping code. */
+#define VERR_PGM_PHYS_PAGE_MAP_IPE_1            (-1671)
+/** Internal processing error \#2 in the PGM physical page mapping code. */
+#define VERR_PGM_PHYS_PAGE_MAP_IPE_2            (-1672)
+/** Internal processing error \#3 in the PGM physical page mapping code. */
+#define VERR_PGM_PHYS_PAGE_MAP_IPE_3            (-1673)
+/** Internal processing error \#4 in the PGM physical page mapping code. */
+#define VERR_PGM_PHYS_PAGE_MAP_IPE_4            (-1674)
+/** Too many loops looking for a page to reuse. */
+#define VERR_PGM_POOL_TOO_MANY_LOOPS            (-1675)
+/** Internal processing error related to guest mappings. */
+#define VERR_PGM_MAPPING_IPE                    (-1676)
+/** An attempt was made to grow an already maxed out page pool. */
+#define VERR_PGM_POOL_MAXED_OUT_ALREADY         (-1677)
+/** Internal processing error in the page pool code. */
+#define VERR_PGM_POOL_IPE                       (-1678)
+/** The write monitor is already engaged. */
+#define VERR_PGM_WRITE_MONITOR_ENGAGED          (-1679)
+/** Failed to get a guest page which is expected to be present. */
+#define VERR_PGM_PHYS_PAGE_GET_IPE              (-1680)
+/** We were given a NULL pPage parameter. */
+#define VERR_PGM_PHYS_NULL_PAGE_PARAM           (-1681)
+/** PCI passthru is not supported by this build. */
+#define VERR_PGM_PCI_PASSTHRU_MISCONFIG         (-1682)
/** Too many MMIO2 ranges. */
#define VERR_PGM_TOO_MANY_MMIO2_RANGES (-1683)
/** Internal processing error in the PGM physical page mapping code dealing
 with MMIO2 pages. */
#define VERR_PGM_PHYS_PAGE_MAP_MMIO2_IPE (-1684)
/** Internal processing error in the PGM physical page handling code related to
 MMIO/MMIO2. */
#define VERR_PGM_PHYS_MMIO_EX_IPE (-1685)
/** @} */

/** @} */

/** @name Memory Monitor (MM) Status Codes */
/** @} */

/** Attempt to register a RAM range of which parts are already
 covered by existing RAM ranges. */
#define VERR_MM_RAM_CONFLICT (-1700)
/** Hypervisor memory allocation failed. */
#define VERR_MM_HYPER_NO_MEMORY (-1701)
/** A bad trap type ended up in mmGCRamTrap0eHandler. */
#define VERR_MM_BAD_TRAP_TYPE_IPE (-1702)
/** @} */

/** @name CPU Monitor (CPUM) Status Codes */
/** @} */

/** The caller shall raise an \#GP(0) exception. */
#define VERR_CPUM_RAISE_GP_0 (-1750)
/** Incompatible CPUM configuration. */
#define VERR_CPUM_INCOMPATIBLE_CONFIG (-1751)
/** CPUMR3DisasmInstrCPU unexpectedly failed to determine the hidden
 parts of the CS register. */
#define VERR_CPUM_HIDDEN_CS_LOAD_ERROR (-1752)
/** Couldn't find the end of CPUID sub-leaves. */
#define VERR_CPUM_TOO_MANY_CPUID_SUBLEAVES (-1753)
/** CPUM internal processing error \#1. */
#define VERR_CPUM_IPE_1 (-1754)
/** CPUM internal processing error \#2. */
#define VERR_CPUM_IPE_2 (-1755)
/** The specified CPU cannot be found in the CPU database. */
#define VERR_CPUM_DB_CPU_NOT_FOUND (-1756)
/** Invalid CPUMCPU offset in MSR range. */
#define VERR_CPUM_MSR_BAD_CPUMCPU_OFFSET (-1757)
/** Return to ring-3 to read the MSR there. */
#define VINF_CPUM_R3_MSR_READ (1758)
/** Return to ring-3 to write the MSR there. */
#define VINF_CPUM_R3_MSR_WRITE (1759)
/** Too many CPUID leaves. */
+/** Invalid config value. */
+/** The loaded XSAVE component mask is not compatible with the host CPU
+ * or-and VM config. */
+/** The loaded XSAVE component mask is not valid. */
+/** The loaded XSAVE header is not valid. */
+/** Indicates that we modified the host CR0 (FPU related). */
+@} */
+
+
+/** General saved state file integrity error. */
+/** The specified data unit already exist. */
+/** The specified data unit wasn't found. */
+/** The specified data unit wasn't owned by caller. */
+/** General saved state file integrity error. */
+/** The saved state file magic was not recognized. */
+/** The saved state file version is not supported. */
+/** The saved state file size didn't match the one in the header. */
+/** The CRC of the saved state file did not match. */
+/** The machine uuid field wasn't null. */
+/** Saved state header integrity error. */
+/** Unit header integrity error. */
+/** Invalid unit magic (internal data tag). */
+/** The file contained a data unit which no-one wants. */
+/** Indicates that we modified the host CR0 (FPU related). */
+@} */
+/** Incorrect version numbers in the header. */
+#define VERR_SSM_INTEGRITY_VBOX_VERSION      (-1820)
+/** Footer integrity error. */
+#define VERR_SSM_INTEGRITY_FOOTER           (-1821)
+/** Record header integrity error. */
+#define VERR_SSM_INTEGRITY_REC_HDR          (-1822)
+/** Termination record integrity error. */
+#define VERR_SSM_INTEGRITY_REC_TERM         (-1823)
+/** Termination record CRC mismatch. */
+#define VERR_SSM_INTEGRITY_REC_TERM_CRC     (-1824)
+/** Decompression integrity error. */
+#define VERR_SSM_INTEGRITY_DECOMPRESSION    (-1825)
+/** Saved state directory wintertides error. */
+#define VERR_SSM_INTEGRITY_DIR              (-1826)
+/** The saved state directory magic is wrong. */
+#define VERR_SSM_INTEGRITY_DIR_MAGIC        (-1827)
+
+/** A data unit in the saved state file was defined but didn't any
+ routine for processing it. */
+#define VERR_SSM_NO_LOAD_EXEC               (-1830)
+/** A restore routine attempted to load more data than the unit contained. */
+#define VERR_SSM_LOADED_TOO_MUCH            (-1831)
+/** Not in the correct state for the attempted operation. */
+#define VERR_SSM_INVALID_STATE              (-1832)
+/** Not in the correct state for the attempted operation. */
+#define VERR_SSM_LOADED_TOO_LITTLE          (-1833)
+
+/** Unsupported data unit version.
+ A SSM user returns this if it doesn't know the u32Version. */
+#define VERR_SSM_UNSUPPORTED_DATA_UNIT_VERSION (-1840)
+/** The format of a data unit has changed.
+ A SSM user returns this if it's not able to read the format for
+ other reasons than u32Version. */
+#define VERR_SSM_DATA_UNIT_FORMAT_CHANGED    (-1841)
+/** The CPUID instruction returns different information when loading than when saved.
+ Normally caused by hardware changes on the host, but could also be caused by
+ changes in the BIOS setup. */
+#define VERR_SSM_LOAD_CPUID_MISMATCH         (-1842)
+/** The RAM size differs between the saved state and the VM config. */
+#define VERR_SSM_LOAD_MEMORY_SIZE_MISMATCH   (-1843)
+/** The state doesn't match the VM configuration in one or another way.
+ (There are certain PCI reconfiguration which the OS could potentially
+ do which can cause this problem. Check this out when it happens.) */
+#define VERR_SSM_LOAD_CONFIG_MISMATCH        (-1844)
+/** The virtual clock frequency differs too much.
+ The clock source for the virtual time isn't reliable or the code have changed. */
+#define VERR_SSM_VIRTUAL_CLOCK_HZ            (-1845)
+/** A timeout occurred while waiting for async IDE operations to finish. */
+*/ define VERR_SSM_IDE_ASYNC_TIMEOUT (-1846)
+*/ ** One of the structure magics was wrong. */
+*/ define VERR_SSM_STRUCTURE_MAGIC (-1847)
+*/ ** The data in the saved state doesn't conform to expectations. */
+*/ define VERR_SSM_UNEXPECTED_DATA (-1848)
+*/ ** Trying to read a 64-bit guest physical address into a 32-bit variable. */
+*/ define VERR_SSM_GC_PHYS_OVERFLOW (-1849)
+*/ ** Trying to read a 64-bit guest virtual address into a 32-bit variable. */
+*/ define VERR_SSM_GC_PTR_OVERFLOW (-1850)
+*/ ** Vote for another pass. */
+*/ define VINF_SSM_VOTE_FOR_ANOTHER_PASS 1851
+*/ ** Vote for done tell SSM not to call again until the final pass. */
+*/ define VINF_SSM_VOTE_DONE_DONT_CALL_AGAIN 1852
+*/ ** Vote for giving up. */
+*/ define VERR_SSM_VOTE_FOR_GIVING_UP (-1853)
+*/ ** Don't call again until the final pass. */
+*/ define VINF_SSM_DONT_CALL_AGAIN 1854
+*/ ** Giving up a live snapshot/teleportation attempt because of too many
+ * passes. */
+*/ define VERR_SSM_TOO_MANY_PASSES (-1855)
+*/ ** Giving up a live snapshot/teleportation attempt because the state grew to
+ * big. */
+*/ define VERR_SSM_STATE_GREW_TOO_BIG (-1856)
+*/ ** Giving up a live snapshot attempt because we're low on disk space. */
+*/ define VERR_SSM_LOW_ON_DISK_SPACE (-1857)
+*/ ** The operation was cancelled. */
+*/ define VERR_SSM_CANCELED (-1858)
+*/ ** Nothing that can be cancelled. */
+*/ define VERR_SSM_NO_PENDING_OPERATION (-1859)
+*/ ** The operation has already been cancelled. */
+*/ define VERR_SSM_ALREADY_CANCELED (-1860)
+*/ ** The machine was powered off while saving. */
+*/ define VERR_SSM_LIVEPOWERED_OFF (-1861)
+*/ ** The live snapshot/teleportation operation was aborted because of a guru
+ * meditation. */
+*/ define VERR_SSM_LIVE_GURU_MEDITATION (-1862)
+*/ ** The live snapshot/teleportation operation was aborted because of a fatal
+ * runtime error. */
+*/ define VERR_SSM_LIVE_FATAL_ERROR (-1863)
+*/ ** The VM was suspended before or while saving, don't resume execution. */
+*/ define VINF_SSM_LIVE_SUSPENDED 1864
+*/ ** Complex SSM field fed to SSMR3PutStruct or SSMR3GetStruct. Use the
+ * extended API. */
+*/ define VERR_SSM_FIELD_COMPLEX (-1864)
+*/ ** Invalid size of a SSM field with the specified transformation. */
+*/ define VERR_SSM_FIELD_INVALID_SIZE (-1865)
+*/ ** The specified field is outside the structure. */
+*/ define VERR_SSM_FIELD_OUT_OF_BOUNDS (-1866)
/** The field does not follow immediately the previous one. */
#define VERR_SSM_FIELD_NOT_CONSECUTIVE (-1867)
/** The field contains an invalid callback or transformation index. */
#define VERR_SSM_FIELD_INVALID_CALLBACK (-1868)
/** The field contains an invalid padding size. */
#define VERR_SSM_FIELD_INVALID_PADDING_SIZE (-1869)
/** The field contains a value that is out of range. */
#define VERR_SSM_FIELD_INVALID_VALUE (-1870)
/** Generic stream error. */
#define VERR_SSM_STREAM_ERROR (-1871)
/** SSM did a callback for a pass we didn't expect. */
#define VERR_SSM_UNEXPECTED_PASS (-1872)
/** Someone is trying to skip backwards in the stream... */
#define VERR_SSM_SKIP_BACKWARDS (-1873)
/** Someone is trying to write a memory block which is too big to encode. */
#define VERR_SSM_MEM_TOO_BIG (-1874)
/** Encountered an bad (/unknown) record type. */
#define VERR_SSM_BAD_REC_TYPE (-1875)
/** Internal processing error \#1 in SSM code. */
#define VERR_SSM_IPE_1 (-1876)
/** Internal processing error \#2 in SSM code. */
#define VERR_SSM_IPE_2 (-1877)
/** Internal processing error \#3 in SSM code. */
#define VERR_SSM_IPE_3 (-1878)
/** A field contained an transformation that should only be used when loading
* old states. */
#define VERR_SSM_FIELD_LOAD_ONLY_TRANSFORMATION (-1879)
/** @} */
/** @} */

/** @name Virtual Machine (VM) Status Codes */
#define VERR_VM_ATRESET_NOT_FOUND (-1900)
/** Invalid VM request type. */
#define VERR_VM_REQUEST_INVALID_TYPE (-1901)
/** Invalid VM request state. */
#define VERR_VM_REQUEST_STATE (-1902)
/** Invalid VM request packet. */
#define VERR_VM_REQUEST_INVALID_PACKAGE (-1903)
+/** The status field has not been updated yet as the request is still pending completion. Someone queried the iStatus field before the request has been fully processed. */
+/** The request has been freed, don't read the status now. Someone is reading the iStatus field of a freed request packet. */
+/** A VM api requiring EMT was called from another thread. */
+ Use the VMR3ReqCall() apis to call it! */
+/** The request has been freed, don't read the status now. Someone is reading the iStatus field of a freed request packet. */
+/** The request has been freed, don't read the status now. Someone is reading the iStatus field of a freed request packet. */
+/** The support driver is not installed. On linux, open returned ENOENT. */
+/** The support driver is not accessible. On linux, open returned EPERM. */
+/** Was not able to load the support driver. On linux, open returned ENODEV. */
+/** Was not able to open the support driver. On linux, open returned EPERM. */
+/** Generic open error used when none of the other ones fit. */
+/** The installed support driver doesn't match the version of the user. */
+/** Saving the VM state is temporarily not allowed. Try again later. */
+/** An EMT called an API which cannot be called on such a thread. */
+/** Encountered an unexpected VM state. */
+/** Unexpected unstable VM state. */
+/** Unexpected unstable VM state. */
+/** Too many arguments passed to a VM request / request corruption. */
+/** Fatal EMT wait error. */
+/** The VM request was killed at VM termination. */
+/** @ } */
+
+/** @name VBox Remote Desktop Protocol (VRDP) Status Codes
+ * @}
+ */
+/** Successful completion of operation (mapped to generic iprt status code). */
+#define VINF_VRDP_SUCCESS VINF_SUCCESS
+/** VRDP transport operation timed out (mapped to generic iprt status code). */
+#define VERR_VRDP_TIMEOUT VERR_TIMEOUT
+
+/** Unsupported ISO protocol feature */
+#define VERR_VRDP_ISO_UNSUPPORTED (-2000)
+/** Security (en/decryption) engine error */
+#define VERR_VRDP_SEC_ENGINE_FAIL (-2001)
+/** VRDP protocol violation */
+#define VERR_VRDP_PROTOCOL_ERROR (-2002)
+/** Unsupported VRDP protocol feature */
+#define VERR_VRDP_NOT_SUPPORTED (-2003)
+/** VRDP protocol violation, client sends less data than expected */
+#define VERR_VRDP_INSUFFICIENT_DATA (-2004)
+/** Internal error, VRDP packet is in wrong operation mode */
+#define VERR_VRDP_INVALID_MODE (-2005)
+/** Memory allocation failed */
+#define VERR_VRDP_NO_MEMORY (-2006)
+/** Client has been rejected */
+#define VERR_VRDP_ACCESS_DENIED (-2007)
+/** VRPD receives a packet that is not supported */
+#define VWRN_VRDP_PDU_NOT_SUPPORTED 2008
+/** VRDP script allowed the packet to be processed further */
+#define VINF_VRDP_PROCESS_PDU 2009
+/** VRDP script has completed its task */
+#define VINF_VRDP_OPERATION_COMPLETED 2010
+/** VRDP thread has started OK and will run */
+#define VINF_VRDP_THREAD_STARTED 2011
+/** Framebuffer is resized, terminate send bitmap procedure */
+#define VINF_VRDP_RESIZE_REQUESTED 2012
+/** Output can be enabled for the client. */
+#define VINF_VRDP_OUTPUT_ENABLE 2013
+/** @} */
+
+/** @} */

/** @name Configuration Manager (CFGM) Status Codes */
+ * @{
+ * @}
+
+/** The integer value was too big for the requested representation. */
+#define VERR_CFGM_INTEGER_TOO_BIG (-2100)
+/** Child node was not found. */
+#define VERR_CFGM_CHILD_NOT_FOUND (-2101)
+/** Path to child node was invalid (i.e. empty). */
+#define VERR_CFGM_INVALID_CHILD_PATH (-2102)
+/** Value not found. */
+#define VERR_CFGM_VALUE_NOT_FOUND (-2103)
+/** No parent node specified. */
+#define VERR_CFGM_NO_PARENT (-2104)
/** No node was specified. */
#define VERR_CFGM_NO_NODE    (-2105)
/** The value is not an integer. */
#define VERR_CFGM_NOT_INTEGER(-2106)
/** The value is not a zero terminated character string. */
#define VERR_CFGM_NOT_STRING  (-2107)
/** The value is not a byte string. */
#define VERR_CFGM_NOT_BYTES   (-2108)
/** The specified string / bytes buffer was too small. Specify a larger one and retry. */
#define VERR_CFGM_NOT_ENOUGH_SPACE(-2109)
/** The path of a new node contained slashes or was empty. */
#define VERR_CFGM_INVALID_NODE_PATH(-2160)
/** A new node couldn’t be inserted because one with the same name exists. */
#define VERR_CFGM_NODE_EXISTS  (-2161)
/** A new leaf couldn’t be inserted because one with the same name exists. */
#define VERR_CFGM_LEAF_EXISTS  (-2162)
/** An unknown config value was encountered. */
#define VERR_CFGM_CONFIG_UNKNOWN_VALUE(-2163)
/** An unknown config node (key) was encountered. */
#define VERR_CFGM_CONFIG_UNKNOWN_NODE(-2164)
/** Internal processing error #1 in CFGM. */
#define VERR_CFGM_IPE_1        (-2165)
+** @} */

+** @name Time Manager (TM) Status Codes
+ * @{
+ */
+/** The loaded timer state was incorrect. */
#define VERR_TM_LOAD_STATE    (-2200)
+/** The timer was not in the correct state for the request operation. */
#define VERR_TM_INVALID_STATE (-2201)
+/** The timer was in an unknown state. Corruption or stupid coding error. */
#define VERR_TM_UNKNOWN_STATE (-2202)
+/** The timer was stuck in an unstable state until we grew impatient and returned. */
#define VERR_TM_UNSTABLE_STATE(-2203)
+/** TM requires GIP. */
#define VERR_TM_GIP_REQUIRED  (-2204)
+/** TM does not support the GIP version. */
#define VERR_TM_GIP_VERSION   (-2205)
+/** The GIP update interval is too large. */
#define VERR_TM_GIP_UPDATE_INTERVAL_TOO_BIG(-2206)
+/** The timer has a bad clock enum value, probably corruption. */
#define VERR_TM_TIMER_BAD_CLOCK(-2207)
+/** The timer failed to reach a stable state. */
#define VERR_TM_TIMER_UNSTABLE_STATE(-2208)
+/** Attempt to resume a running TSC. */
#define VERR_TM_TSC Already_TICKING (-2209)
+/** Attempt to pause a paused TSC. */
+#define VERR_TM_TSC_ALREADY_PAUSED (-2210)
+/** Invalid value for cVirtualTicking. */
+#define VERR_TM_VIRTUAL_TICKING_IPE (-2211)
+/** @} */
+
+
+/** @name Recompiled Execution Manager (REM) Status Codes */
+ * @ {
+ * 
+ */
+/** Fatal error in virtual hardware. */
+#define VERR_REM_VIRTUAL_HARDWARE_ERROR (-2300)
+/** Fatal error in the recompiler cpu. */
+#define VERR_REM_VIRTUAL_CPU_ERROR (-2301)
+/** Recompiler execution was interrupted by forced action. */
+#define VINF_REM_INTERRUPTED_FF 2302
+/** Too many similar traps. This is a very useful debug only
+ * check (we don't do double/triple faults in REM). */
+#define VERR_REM_TOO_MANY_TRAPS (-2304)
+/** The REM is out of breakpoint slots. */
+#define VERR_REM_NO_MORE_BP_SLOTS (-2305)
+/** The REM could not find any breakpoint on the specified address. */
+#define VERR_REM_BP_NOT_FOUND (-2306)
+/** @} */
+
+
+/** @name Trap Manager / Monitor (TRPM) Status Codes */
+ * @ {
+ * 
+ */
+/** No active trap. Cannot query or reset a non-existing trap. */
+#define VERR_TRPM_NO_ACTIVE_TRAP (-2400)
+/** Active trap. Cannot assert a new trap when one is already active. */
+#define VERR_TRPM_ACTIVE_TRAP (-2401)
+/** Reason for leaving RC: Guest tried to write to our IDT - fatal.
+ * The VM will be terminated assuming the worst, i.e. that the
+ * guest has read the idtr register. */
+#define VERR_TRPM_SHADOW_IDT_WRITE (-2402)
+/** Reason for leaving RC: Fatal trap in hypervisor. */
+#define VERR_TRPM_DONT_PANIC (-2403)
+/** Reason for leaving RC: Double Fault. */
+#define VERR_TRPM_PANIC (-2404)
+/** The exception was dispatched for raw-mode execution. */
+#define VINF_TRPM_XCPT_DISPATCHED 2405
+/** Bad TRPM_TRAP_IN_OP. */
+#define VERR_TRPM_BAD_TRAP_IN_OP (-2406)
+/** Internal processing error \#1 in TRPM. */
+#define VERR_TRPM_IPE_1 (-2407)
+/** Internal processing error \#2 in TRPM. */
+/** Internal processing error \#3 in TRPM. */
+define VERR_TRPM_IPE_3 (-2409)
+/** Got into a part of TRPM that is not used when HM (VT-x/AMD-V) is enabled. */
+define VERR_TRPM_HM_IPE (-2410)
+/** @} */
+
+/** @name Selector Manager / Monitor (SELM) Status Code */
+ /* @} */
+ /** Reason for leaving RC: Guest tried to write to our GDT - fatal. */
+ /* The VM will be terminated assuming the worst, i.e. that the */
+ /* guest has read the gdtr register. */
+define VERR_SELM_SHADOW_GDT_WRITE (-2500)
+ /** Reason for leaving RC: Guest tried to write to our LDT - fatal. */
+ /* The VM will be terminated assuming the worst, i.e. that the */
+ /* guest has read the ldtr register. */
+define VERR_SELM_SHADOW_LDT_WRITE (-2501)
+ /** Reason for leaving RC: Guest tried to write to our TSS - fatal. */
+ /* The VM will be terminated assuming the worst, i.e. that the */
+ /* guest has read the ltr register. */
+define VERR_SELM_SHADOW_TSS_WRITE (-2502)
+ /** Reason for leaving RC: Sync the GDT table to solve a conflict. */
+define VINF_SELM_SYNC_GDT 2503
+ /** No valid TSS present. */
+define VERR_SELM_NO_TSS (-2504)
+ /** Invalid guest LDT selector. */
+define VERR_SELM_INVALID_LDT (-2505)
+ /** The guest LDT selector is out of bounds. */
+define VERR_SELM_LDT_OUT_OF_BOUNDS (-2506)
+ /** Unknown error while reading the guest GDT during shadow table updating. */
+define VERR_SELM_GDT_READ_ERROR (-2507)
+ /** The guest GDT so full that we cannot find free space for our own */
+ /* selectors. */
+define VERR_SELM_GDT_TOO_FULL (-2508)
+ /** Got into a part of SELM that is not used when HM (VT-x/AMD-V) is enabled. */
+define VERR_SELM_HM_IPE (-2509)
+ /** @} */
+
+/** @name I/O Manager / Monitor (IOM) Status Code */
+ /* @} */
+/** The specified I/O port range was invalid. */
+ /* It was either empty or it was out of bounds. */
+define VERR_IOM_INVALID_IOPORT_RANGE (-2600)
+ /** The specified R0 or RC I/O port range didn't have a corresponding R3 range. */
+ * IOMR3IOPortRegisterR3() must be called first. */
+#define VERR_IOM_NO_R3_IOPORT_RANGE     (-2601)
+/** The specified I/O port range intruded on an existing range. There is
+ a I/O port conflict between two device, or a device tried to register
+ the same range twice. */
+#define VERR_IOM_IOPORT_RANGE_CONFLICT   (-2602)
+/** The I/O port range specified for removal wasn't found or it wasn't contiguous. */
+#define VERR_IOM_IOPORT_RANGE_NOT_FOUND  (-2603)
+/** The specified I/O port range was owned by some other device(s). Both registration
+ and deregistration, but in the first case only RC and R0 ranges. */
+#define VERR_IOM_NOT_IOPORT_RANGE_OWNER  (-2604)
+
+/** The specified MMIO range was invalid.
+ It was either empty or it was out of bounds. */
+#define VERR_IOM_INVALID_MMIO_RANGE      (-2605)
+/** The specified R0 or RC MMIO range didn't have a corresponding R3 range.
+ IOMR3MMIORegisterR3() must be called first. */
+#define VERR_IOM_NO_R3_MMIO_RANGE        (-2606)
+/** The specified MMIO range was owned by some other device(s). Both registration
+ and deregistration, but in the first case only RC and R0 ranges. */
+#define VERR_IOM_NOT_MMIO_RANGE_OWNER    (-2607)
+/** The specified MMIO range intruded on an existing range. There is
+ a MMIO conflict between two device, or a device tried to register
+ the same range twice. */
+#define VERR_IOM_MMIO_RANGE_CONFLICT      (-2608)
+/** The MMIO range specified for removal was not found. */
+#define VERR_IOM_MMIO_RANGE_NOT_FOUND     (-2609)
+/** The MMIO range specified for removal was invalid. The range didn't match
+ quite match a set of existing ranges. It's not possible to remove parts of
+ a MMIO range, only one or more full ranges. */
+#define VERR_IOM_INCOMPLETE_MMIO_RANGE    (-2610)
+/** An invalid I/O port size was specified for a read or write operation. */
+#define VERR_IOM_INVALID_IOPORT_SIZE      (-2611)
+/** The MMIO handler was called for a bogus address! Internal error! */
+#define VERR_IOM_MMIO_HANDLER_BOGUS_CALL  (-2612)
+/** The MMIO handler experienced a problem with the disassembler. */
+#define VERR_IOM_MMIO_HANDLER_DISASM_ERROR(-2613)
+/** The port being read was not present(unused) and IOM shall return ~0 according to size. */
+#define VERR_IOM_IOPORT_UNUSED             (-2614)
+/** Unused MMIO register read, fill with 00. */
+#define VINF_IOM_MMIO_UNUSED_00            2615
+/** Unused MMIO register read, fill with FF. */
+#define VINF_IOM_MMIO_UNUSED_FF            2616
+
+/** Reason for leaving RZ: I/O port read. */
+#define VINF_IOM_R3_IOPORT_READ            2620
+/** Reason for leaving RZ: I/O port write. */
+#define VINF_IOM_R3_IOPORT_WRITE           2621
/** Reason for leaving RZ: Pending I/O port write. Since there is also
 * VMCPU_FF_IOM for this condition, it's ok to drop this status code for
 * some other VINF_EM_XXX statuses. */
+#define VINF_IOM_R3_IOPORT_COMMIT_WRITE 2622
/** Reason for leaving RZ: MMIO read. */
+#define VINF_IOM_R3_MMIO_READ 2623
/** Reason for leaving RZ: MMIO write. */
+#define VINF_IOM_R3_MMIO_WRITE 2624
/** Reason for leaving RZ: MMIO read/write. */
+#define VINF_IOM_R3_MMIO_READ_WRITE 2625
/** Reason for leaving RZ: Pending MMIO write. Since there is also
 * VMCPU_FF_IOM for this condition, it's ok to drop this status code for
 * some other VINF_EM_XXX statuses. */
+#define VINF_IOM_R3_MMIO_COMMIT_WRITE 2626

/** IOMGCIOPortHandler was given an unexpected opcode. */
+#define VERR_IOM_IOPORT_UNKNOWN_OPCODE (-2630)
/** Internal processing error \#1 in the I/O port code. */
+#define VERR_IOM_IOPORT_IPE_1 (-2631)
/** Internal processing error \#2 in the I/O port code. */
+#define VERR_IOM_IOPORT_IPE_2 (-2632)
/** Internal processing error \#3 in the I/O port code. */
+#define VERR_IOM_IOPORT_IPE_3 (-2633)
/** Internal processing error \#1 in the MMIO code. */
+#define VERR_IOM_MMIO_IPE_1 (-2634)
/** Internal processing error \#2 in the MMIO code. */
+#define VERR_IOM_MMIO_IPE_2 (-2635)
/** Internal processing error \#3 in the MMIO code. */
+#define VERR_IOM_MMIO_IPE_3 (-2636)
/** Got into a part of IOM that is not used when HM (VT-x/AMD-V) is enabled. */
+#define VERR_IOM_HM_IPE (-2637)
/** Internal processing error while merging status codes. */
+#define VERR_IOM_FF_STATUS_IPE (-2638)
+/** @} */
+
+/** @} */
+@} */
+
+
+/** @name Virtual Machine Monitor (VMM) Status Codes */
+@ {
+ */
+/** Reason for leaving RZ: Calling host function. */
+#define VINF_VMM_CALL_HOST 2700
+/** Reason for leaving R0: Hit a ring-0 assertion on EMT. */
+#define VINF_VMM_RING0_ASSERTION (-2701)
+/** The hyper CR3 differs between PGM and CPUM. */
+#define VINF_VMM_hyper_CR3_MISMATCH (-2702)
+/** Reason for leaving RZ: Illegal call to ring-3. */
+#define VINF_VMM_RING3_CALL_DISABLED (-2703)
+/** The VMMR0.r0 module version does not match VBoxVMM.dll/so/dylib.
+ * If you just upgraded VirtualBox, please terminate all VMs and make sure
+ * that neither VBoxNetDHCP nor VBoxNetNAT is running. Then try again.
+ * If this error persists, try re-installing VirtualBox. */
+#define VERR_VMM_R0_VERSION_MISMATCH        (-2704)
+/** The VMMRC.rc module version does not match VBoxVMM.dll/so.dylib.
+ * Re-install if you are a user. Developers should make sure the build is
+ * complete or try with a clean build. */
+#define VERR_VMM_RC_VERSION_MISMATCH        (-2705)
+/** VMM set jump error. */
+#define VERR_VMM_SET_JMP_ERROR               (-2706)
+/** VMM set jump stack overflow error. */
+#define VERR_VMM_SET_JMP_STACK_OVERFLOW      (-2707)
+/** VMM set jump resume error. */
+#define VERR_VMM_SET_JMP_ABORTED_RESUME      (-2708)
+/** VMM long jump error. */
+#define VERR_VMM_LONG_JMP_ERROR              (-2709)
+/** Unknown ring-3 call attempted. */
+#define VERR_VMM_UNKNOWN_RING3_CALL          (-2710)
+/** The ring-3 call didn't set an RC. */
+#define VINF_VMM_CALL_TRACER                 (2711)
+/** Internal processing error \#1 in the switcher code. */
+#define VERR_VMM_SWITCHER_IPE_1              (-2712)
+/** Reason for leaving RC: Caller the tracer in ring-0. */
+#define VERR_VMM_WRONG_HM_VMCPU_STATE        (-2713)
+/** Reason for leaving RZ: Unknown call to ring-3. */
+#define VINF_VMM_UNKNOWN_RING3_CALL          (2714)
+/** Attempted to use stub switcher. */
+#define VERR_VMM_SWITCHER_STUB               (-2715)
+/** HM returned in the wrong state. */
+#define VERR_VMM_WRONG_HM_VM_CPU_STATE      (-2716)
+/** SMAP enabled, but the AC flag was found to be clear - check the kernel
+ * log for details. */
+#define VERR_VMM_SMAP_BUT_AC_CLEAR           (-2717)
+/** @} */
+
+/** @name Pluggable Device and Driver Manager (PDM) Status Codes
+ * @} */
+
+/** An invalid LUN specification was given. */
+#define VERR_PDM_NO_SUCH_LUN                 (-2800)
+/** A device encountered an unknown configuration value.
+ * This means that the device is potentially misconfigured and the device
+ * construction or unit attachment failed because of this. */
+#define VERR_PDM_DEVINS_UNKNOWN_CFG_VALUES   (-2801)
+/** The above driver doesn't export a interface required by a driver being
+ * attached to it. Typical misconfiguration problem. */
+#define VERR_PDM_MISSING_INTERFACE_ABOVE     (-2802)
+/** The below driver doesn't export a interface required by the drive + having attached it. Typical misconfiguration problem. */
+#define VERR_PDM_MISSING_INTERFACE_BELOW (-2803)
+/** A device didn't find a required interface with an attached driver.
+ Typical misconfiguration problem. */
+#define VERR_PDM_MISSING_INTERFACE (-2804)
+/** A driver encountered an unknown configuration value.
+ This means that the driver is potentially misconfigured and the driver
+ construction failed because of this. */
+#define VERR_PDM_DRVINS_UNKNOWN_CFG_VALUES (-2805)
+/** The PCI bus assigned to a device didn't have room for it.
+ Either too many devices are configured on the same PCI bus, or there are
+ some internal problem where PDM/PCI doesn't free up slots when unplugging devices. */
+#define VERR_PDM_TOO_PCI_MANY_DEVICES (-2806)
+/** A queue is out of free items, the queueing operation failed. */
+#define VERR_PDM_NO_QUEUE_ITEMS (-2807)
+/** Not possible to attach further drivers to the driver.
+ A driver which doesn't support attachments (below of course) will
+ return this status code if it found that further drivers were configured
+ to be attached to it. */
+#define VERR_PDM_DRVINS_NO_ATTACH (-2808)
+/** Not possible to attach drivers to the device.
+ A device which doesn't support attachments (below of course) will
+ return this status code if it found that drivers were configured
+ to be attached to it. */
+#define VERR_PDM_DEVINS_NO.Attach (-2809)
+/** No attached driver.
+ The PDMDRVHLP::pfnAttach and PDMDEVHLP::pfnDriverAttach will return
+ this error when no driver was configured to be attached. */
+#define VERR_PDM_NO_ATTACHED_DRIVER (-2810)
+/** The media geometry hasn't been set yet, so it cannot be obtained.
+ The caller should then calculate the geometry from the media size. */
+#define VERR_PDM_GEOMETRY_NOT_SET (-2811)
+/** The media translation hasn't been set yet, so it cannot be obtained.
+ The caller should then guess the translation. */
+#define VERR_PDM_TRANSLATION_NOT_SET (-2812)
+/** The media is not mounted, operation requires a mounted media. */
+#define VERR_PDM_MEDIA_NOT_MOUNTED (-2813)
+/** Mount failed because a media was already mounted. Unmount the media
+ and retry the mount. */
+#define VERR_PDM_MEDIA_MOUNTED (-2814)
+/** The media is locked and cannot be unmounted. */
+#define VERR_PDM_MEDIA_LOCKED (-2815)
+/** No 'Type' attribute in the DrvBlock configuration.
+ Misconfiguration. */
+#define VERR_PDM_BLOCK_NO_TYPE (-2816)
+/** The 'Type' attribute in the DrvBlock configuration had an unknown value.
+ Misconfiguration. */
+ #define VERR_PDM_BLOCK_UNKNOWN_TYPE (-2817)
+ /** The 'Translation' attribute in the DrvBlock configuration had an unknown value.
+ * Misconfiguration. */
+ #define VERR_PDM_BLOCK_UNKNOWN_TRANSLATION (-2818)
+ /** The block driver type wasn't supported.
+ * Misconfiguration of the kind you get when attaching a floppy to an IDE controller. */
+ #define VERR_PDM_UNSUPPORTED_BLOCK_TYPE (-2819)
+ /** The block driver type wasn't supported.
+ * Misconfiguration of the kind you get when attaching a floppy to an IDE controller. */
+ #define VERR_PDM_DRIVER_ALREADY_ATTACHED (-2820)
+ /** An attempt on detaching a driver without anyone actually being attached, or
+ * performing any other operation on an attached driver. */
+ #define VERR_PDM_NO_DRIVER_ATTACHED (-2821)
+ /** The configured driver wasn't found.
+ * Either the necessary driver modules wasn't loaded, the name was
+ * misspelled, or it was a misconfiguration. */
+ #define VERR_PDM_DRIVER_NOT_FOUND (-2823)
+ /** The Ring-3 module was already loaded. */
+ #define VINF_PDM_ALREADY_LOADED (2824)
+ /** The name of the module clashed with an existing module. */
+ #define VERR_PDM_MODULE_NAME_CLASH (-2825)
+ /** Couldn't find any export for registration of drivers/devices. */
+ #define VERR_PDM_NO_REGISTRATION_EXPORT (-2826)
+ /** A module name is too long. */
+ #define VERR_PDM_MODULE_NAME_TOO_LONG (-2827)
+ /** Driver name clash. Another driver with the same name as the
+ * one being registered exists. */
+ #define VERR_PDM_DRIVER_NAME_CLASH (-2828)
+ /** The version of the driver registration structure is unknown
+ * to this VBox version. Either mixing incompatible versions or
+ * the structure isn't correctly initialized. */
+ #define VERR_PDM_UNKNOWN_DRVREG_VERSION (-2829)
+ /** Invalid entry in the driver registration structure. */
+ #define VERR_PDM_INVALID_DRIVER_REGISTRATION (-2830)
+ /** Invalid host bit mask. */
+ #define VERR_PDM_INVALID_DRIVER_HOST_BITS (-2831)
+ /** Not possible to detach a driver because the above driver/device
+ * doesn't support it. The above entity doesn't implement the pfndetach call. */
+ #define VERR_PDM_DRIVER_DETACH_NOT_POSSIBLE (-2832)
+ /** No PCI Bus is available to register the device with. This is usually a
+ * misconfiguration or in rare cases a buggy pci device. */
+ #define VERR_PDM_NO_PCI_BUS (-2833)
+ /** The device is not a registered PCI device and thus cannot
+ * perform any PCI operations. The device forgot to register it self. */
+ #define VERR_PDM_NOT_PCI_DEVICE (-2834)
/** The version of the device registration structure is unknown
 * to this VBox version. Either mixing incompatible versions or
 * the structure isn't correctly initialized. */
#define VERR_PDM_UNKNOWN_DEVREG_VERSION (-2835)

/** Invalid entry in the device registration structure. */
#define VERR_PDM_INVALIDDEVICEREGISTRATION (-2836)

/** Invalid host bit mask. */
#define VERR_PDM_INVALIDDEVICEGUESTBITS (-2837)

/** The guest bit mask didn't match the guest being loaded. */
#define VERR_PDM_INVALIDDEVICEHOSTBITS (-2838)

/** Device name clash. Another device with the same name as the
 * one being registered exists. */
#define VERR_PDM_DEVICENAMECLASH (-2839)

/** The device wasn't found. There was no registered device
 * by that name. */
#define VERR_PDM_DEVICENOTFOUND (-2840)

/** The device instance was not found. */
#define VERR_PDMDEVICEINSTANCENOTFOUND (-2841)

/** The device instance have no base interface. */
#define VERR_PDMDEVICEINSTANCENOIBASE (-2842)

/** The device instance have no such logical unit. */
#define VERR_PDMDEVICEINSTANCELUNNOTFOUND (-2843)

/** The driver instance could not be found. */
#define VERR_PDMDRIVERINSTANCENOTFOUND (-2844)

/** Logical Unit was not found. */
#define VERR_PDM_LUN_NOT_FOUND (-2845)

/** The Logical Unit was found, but it had no driver attached to it. */
#define VERR_PDM_NO_DRIVER_ATTACHED_TO_LUN (-2846)

/** The Logical Unit was found, but it had no driver attached to it. */
#define VINF_PDM_NO_DRIVER_ATTACHED_TO_LUN 2846

/** No PIC device instance is registered with the current VM and thus
 * the PIC operation cannot be performed. */
#define VERR_PDM_NO_PIC_INSTANCE (-2847)

/** No APIC device instance is registered with the current VM and thus
 * the APIC operation cannot be performed. */
#define VERR_PDM_NO_APIC_INSTANCE (-2848)

/** No DMAC device instance is registered with the current VM and thus
 * the DMA operation cannot be performed. */
#define VERR_PDM_NO_DMAC_INSTANCE (-2849)

/** No RTC device instance is registered with the current VM and thus
 * the RTC or CMOS operation cannot be performed. */
#define VERR_PDM_NO_RTC_INSTANCE (-2850)

/** Unable to open the host interface due to a sharing violation. */
#define VERR_PDM_HIF_SHARING_VIOLATION (-2851)

/** Unable to open the host interface. */
#define VERR_PDM_HIF_OPEN_FAILED (-2852)

/** The device doesn't support runtime driver attaching. */
#define VINF_PDMDEVREG::pfnAttachcallbackfunctionisNULL (-2853)
+#define VERR_PDM_DEVICE_NO_RT_ATTACH (-2853)
+/** The driver doesn't support runtime driver attaching. */
+#define VERR_PDM_DRIVER_NO_RT_ATTACH (-2854)
+/** Invalid host interface version. */
+#define VERR_PDM_HIF_INVALID_VERSION (-2855)
+
+/** The version of the USB device registration structure is unknown */
+* to this VBox version. Either mixing incompatible versions or
+* the structure isn't correctly initialized. */
+#define VERR_PDM_UNKNOWN_USBREG_VERSION (-2856)
+/** Invalid entry in the device registration structure. */
+#define VERR_PDM_INVALID_USB_REGISTRATION (-2857)
+/** Driver name clash. Another driver with the same name as the
+* one being registered exists. */
+#define VERR_PDM_USB_NAME_CLASH (-2858)
+/** The USB hub is already registered. */
+#define VERR_PDM_USB_HUB_EXISTS (-2859)
+/** Couldn't find any USB hubs to attach the device to. */
+#define VERR_PDM_NO_USB_HUBS (-2860)
+/** Couldn't find any free USB ports to attach the device to. */
+#define VERR_PDM_NO_USB_PORTS (-2861)
+/** Couldn't find the USB Proxy device. Using OSE? */
+#define VERR_PDM_NO_USBPROXY (-2862)
+/** The async completion template is still used. */
+#define VERR_PDM_ASYNC_TEMPLATE_BUSY (-2863)
+/** The async completion task is already suspended. */
+#define VERR_PDM_ASYNC_COMPLETION_ALREADY_SUSPENDED (-2864)
+/** The async completion task is not suspended. */
+#define VERR_PDM_ASYNC_COMPLETION_NOT_SUSPENDED (-2865)
+* The driver properties were invalid, and as a consequence construction
+* failed. Caused my unusable media or similar problems. */
+#define VERR_PDM_DRIVER_INVALID_PROPERTIES (-2866)
+/** Too many instances of a device. */
+#define VERR_PDM_TOO_MANY_DEVICE_INSTANCES (-2867)
+/** Too many instances of a driver. */
+#define VERR_PDM_TOO_MANY_DRIVER_INSTANCES (-2868)
+/** Too many instances of a usb device. */
+#define VERR_PDM_TOO_MANY_USB_DEVICE_INSTANCES (-2869)
+/** The device instance structure version has changed. */
+* If you have upgraded VirtualBox recently, please make sure you have
+* terminated all VMs and upgraded any extension packs. If this error
+* persists, try re-installing VirtualBox. */
+#define VERR_PDM_DEVINS_VERSION_MISMATCH (-2870)
+/** The device helper structure version has changed. */
+* If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_DEVHLPR3_VERSION_MISMATCH (-2871)
+/** The USB device instance structure version has changed.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_USBINS_VERSION_MISMATCH (-2872)
+/** The USB device helper structure version has changed.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_USBHLPR3_VERSION_MISMATCH (-2873)
+/** The driver instance structure version has changed.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_DRVINS_VERSION_MISMATCH (-2874)
+/** The driver helper structure version has changed.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_DRVHLPR3_VERSION_MISMATCH (-2875)
+/** Generic device structure version mismatch.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_DEVICE_VERSION_MISMATCH (-2876)
+/** Generic USB device structure version mismatch.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_USBDEV_VERSION_MISMATCH (-2877)
+/** Generic driver structure version mismatch.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_DRIVER_VERSION_MISMATCH (-2878)
+/** PDMVMMDDevHeapR3ToGCPHys failure. */
+#define VERR_PDM_DEV_HEAP_R3_TO_GCPHYS (-2879)
+/** A legacy device isn't implementing the HPET notification interface. */
+\#define VERR_PDM_HPET_LEGACY_NOTIFY_MISSING (-2880)
+/** Internal processing error in the critical section code. */
+\#define VERR_PDM_CRITSECT_IPE (-2881)
+/** The critical section being deleted was not found. */
+\#define VERR_PDM_CRITSECT_NOT_FOUND (-2882)
+/** A PDMThread API was called by the wrong thread. */
+\#define VERR_PDM_THREAD_INVALID_CALLER (-2883)
+/** Internal processing error \#1 in the PDM Thread code. */
+\#define VERR_PDM_THREAD_IPE_1 (-2884)
+/** Internal processing error \#2 in the PDM Thread code. */
+\#define VERR_PDM_THREAD_IPE_2 (-2885)
+/** Only one PCI function is supported per PDM device. */
+\#define VERR_PDM_ONE_PCI_FUNCTION_PER_DEVICE (-2886)
+/** Bad PCI configuration. */
+\#define VERR_PDM_BAD_PCI_CONFIG (-2887)
+/** Internal processing error # in the PDM device code. */
+\#define VERR_PDM_DEV_IPE_1 (-2888)
+/** Misconfigured driver chain transformation. */
+\#define VERR_PDM_MISCONFIGURED_DRV_TRANSFORMATION (-2889)
+/** The driver is already removed, not more transformations possible (at + * present). */
+\#define VERR_PDM_CANNOT_TRANSFORM_REMOVED_DRIVER (-2890)
+/** The PCI device isn't configured as a busmaster, physical memory access + * rejected. */
+\#define VERR_PDM_NOT_PCI_BUS_MASTER (-2891)
+/** Got into a part of PDM that is not used when HM (VT-x/AMD-V) is enabled. */
+\#define VERR_PDM_HM_IPE (-2892)
+/** The I/O request was canceled. */
+\#define VERR_PDM_MEDIAEX_IOREQ_CANCELED (-2893)
+/** There is not enough room to store the data. */
+\#define VERR_PDM_MEDIAEX_IOBUF_OVERFLOW (-2894)
+/** There is not enough data to satisfy the request. */
+\#define VERR_PDM_MEDIAEX_IOBUF_UNDERRUN (-2895)
+/** The I/O request ID is already existing. */
+\#define VERR_PDM_MEDIAEX_IOREQID_CONFLICT (-2896)
+/** The I/O request ID was not found. */
+\#define VERR_PDM_MEDIAEX_IOREQID_NOT_FOUND (-2897)
+/** The I/O request is in progress. */
+\#define VINF_PDM_MEDIAEX_IOREQ_IN_PROGRESS 2898
+/** The I/O request is in an invalid state for this operation. */
+\#define VERR_PDM_MEDIAEX_IOREQ_INVALID_STATE (-2899)
+/** @} */
+/** Service rejected client connection */
+/** Command address is invalid. */
+/** Service will execute the command in background. */
+/** HGCM could not perform requested operation because of an internal error. */
+/** Invalid HGCM client id. */
+/** The HGCM is saving state. */
+/** Requested service already exists. */
+/** Network Address Translation Driver (DrvNAT) Status Codes */
+/** Failed to find the DNS configured for this machine. */
+/** Failed to convert the specified Guest IP to a binary IP address. */
+/** Failed while setting up a redirector rule. */
+/** There probably is a conflict between the rule and some existing service on the computer. */
+/** The Host Interface Networking init program failed. */
+/** The Host Interface Networking device name is too long. */
+/** The Host Interface Networking name config IOCTL call failed. */
+/** Failed to make the Host Interface Networking handle non-blocking. */
+/** If a Host Interface Networking filehandle was specified it's not allowed to have any init or term programs. */
+/** The Host Interface Networking init program failed. */

+/** @} */
+/** @} */
+/** @} */
+/** The Host Interface Networking terminate program failed. */
+/
+#define VERR_HOSTIF_TERM_FAILED (-3105)
+/** @} */
+
+
+/** @} */
+/
+/
+/
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+/

/** VBox HDD Container (VD) Status Codes */
+* @{
+* /
+* /
+/
+)
+/** Invalid image type. */
+#define VERR_VD_INVALID_TYPE (-3200)
+/** Operation can't be done in current HDD container state. */
+#define VERR_VD_INVALID_STATE (-3201)
+/** Configuration value not found. */
+#define VERR_VD_VALUE_NOT_FOUND (-3202)
+/** Virtual HDD is not opened. */
+#define VERR_VD_NOT_OPENED (-3203)
+/** Requested image is not opened. */
+#define VERR_VD_IMAGE_NOT_FOUND (-3204)
+/** Image is read-only. */
+#define VERR_VD_IMAGE_READ_ONLY (-3205)
+/** Geometry hasn't been set. */
+#define VERR_VD_GEOMETRY_NOT_SET (-3206)
+/** No data for this block in image. */
+#define VERR_VD_BLOCK_FREE (-3207)
+/** Differencing and parent images can't be used together due to UUID. */
+#define VERR_VD_UUID_MISMATCH (-3208)
+/** Asynchronous I/O request finished. */
+#define VINF_VD_ASYNC_IO_FINISHED 3209
+/** Asynchronous I/O is not finished yet. */
+#define VERR_VD_ASYNC_IO_IN_PROGRESS (-3210)
+/** The image is too small or too large for this format. */
+#define VERR_VD_INVALID_SIZE (-3211)
+/** Configuration value is unknown. This indicates misconfiguration. */
+#define VERR_VD_UNKNOWN_CFG_VALUES (-3212)
+/** Interface is unknown. This indicates misconfiguration. */
+#define VERR_VD_UNKNOWN_INTERFACE (-3213)
+/** The DEK for disk encryption is missing. */
+#define VERR_VD_DEK_MISSING (-3214)
+/** The provided password to decrypt the DEK was incorrect. */
+#define VERR_VD_PASSWORD_INCORRECT (-3215)
+/** Generic: Invalid image file header. Use this for plugins. */
+#define VERR_VD_GEN_INVALID_HEADER (-3220)
+/** VDI: Invalid image file header. */
+#define VERR_VD_VDI_INVALID_HEADER (-3230)
+/** VDI: Invalid image file header: invalid signature. */
+#define VERR_VD_VDI_INVALID_SIGNATURE (-3231)
+/** VDI: Invalid image file header: invalid version. */
+#define VERR_VD_VDI_UNSUPPORTED_VERSION (-3232)
+/** Comment string is too long. */
+/** VERR_VD_VDI_COMMENT_TOO_LONG (-3233)
+/** VMDK: Invalid image file header. */
+/** VERR_VD_VMDK_INVALID_HEADER (-3240)
+/** VMDK: Invalid image file header: invalid version. */
+/** VERR_VD_VMDK_UNSUPPORTED_VERSION (-3241)
+/** VMDK: Image property not found. */
+/** VERR_VD_VMDK_VALUE_NOT_FOUND (-3242)
+/** VMDK: Operation can't be done in current image state. */
+/** VERR_VD_VMDK_INVALID_STATE (-3243)
+/** VMDK: Format is invalid/inconsistent. */
+/** VERR_VD_VMDK_INVALID_FORMAT (-3244)
+/** VMDK: Invalid write position. */
+/** VERR_VD_VMDK_INVALID_WRITE (-3245)
+/** iSCSI: Invalid header, i.e. dummy for validity check. */
+/** VERR_VD_ISCSI_INVALID_HEADER (-3250)
+/** iSCSI: Operation can't be done in current image state. */
+/** VERR_VD_ISCSI_INVALID_STATE (-3251)
+/** iSCSI: Invalid device type (not a disk). */
+/** VERR_VD_ISCSI_INVALID_TYPE (-3252)
+/** iSCSI: Initiator secret not decrypted */
+/** VHD: Invalid image file header. */
+/** VERR_VD_VHD_INVALID_HEADER (-3260)
+/** Parallels HDD: Invalid image file header. */
+/** VERR_VD_PARALLELS_INVALID_HEADER (-3265)
+/** DMG: Invalid image file header. */
+/** VERR_VD_DMG_INVALID_HEADER (-3267)
+/** Raw: Invalid image file header. */
+/** VERR_VD_RAW_INVALID_HEADER (-3270)
+/** Raw: Invalid image file type. */
+/** VERR_VD_RAW_INVALID_TYPE (-3271)
+/** The backend needs more metadata before it can continue. */
+/** VERR_VD_NOT_ENOUGH_METADATA (-3272)
+/** Halt the current I/O context until further notification from the backend. */
+/** VERR_VD_IOCTX_HALT (-3273)
+/** The disk has a cache attached already. */
+/** VERR_VD_CACHE_ALREADY_EXISTS (-3274)
+/** There is no cache attached to the disk. */
+/** VERR_VD_CACHE_NOT_FOUND (-3275)
+/** The cache is not up to date with the image. */
+/** VERR_VD_CACHE_NOT_UP_TO_DATE (-3276)
+/** The given range does not meet the required alignment. */
+/** VERR_VD_DISCARD_ALIGNMENT_NOT_MET (-3277)
+/** The discard operation is not supported for this image. */
+/** VERR_VD_DISCARD_NOT_SUPPORTED (-3278)
+/** The image is the correct format but is corrupted. */
+/** VERR_VD_IMAGE_CORRUPTED (-3279)
/** Repairing the image is not supported. */
#define VERR_VD_IMAGE_REPAIR_NOT_SUPPORTED (-3280)

/** Repairing the image is not possible because the corruption is to severe. */
#define VERR_VD_IMAGE_REPAIR_IMPOSSIBLE (-3281)

/** Reading from the image was not possible because the offset is out of the image range. */
+ * This usually indicates that there is a minor corruption in the image meta data. */
#define VINF_VD_READ_OUT_OF_RANGE (-3282)

/** Block read was marked as free in the image and returned as a zero block. */
#define VINF_VD_NEWZEROED_BLOCK 3283

/** @} */

/** @} */

/** VBox Guest Library (VBGL) Status Codes */
+ * @ {
+ * @
+ * Library was not initialized. */
+#define VERR_VBGL_NOT_INITIALIZED (-3300)

+/** Virtual address was not allocated by the library. */
+define VERR_VBGL_INVALID_ADDR (-3301)
+/** IOCtl to VBoxGuest driver failed. */
+define VERR_VBGL_IOCTL_FAILED (-3302)
+/** @} */

+/** @} */

/** VBox USB (VUSB) Status Codes */
+ * @ {
+ * @
+ * No available ports on the hub.
+ * This error is returned when a device is attempted created and/or attached
+ * to a hub which is out of ports. */
+define VERR_VUSB_NO_PORTS (-3400)

+/** The requested operation cannot be performed on a detached USB device. */
+define VERR_VUSB_DEVICE_NOT_ATTACHED (-3401)

+/** Failed to allocate memory for a URB. */
+define VERR_VUSB_NO_URB_MEMORY (-3402)

+/** @} */
+/** General failure during URB queuing. */
+* This will go away when the queueing gets proper status code handling. */
+* #define VERR_VUSB_FAILED_TO_QUEUE_URB   (-3403)
+/** Device creation failed because the USB device name was not found. */
+* #define VERR_VUSB_DEVICE_NAME_NOT_FOUND   (-3404)
+* #define VERR_VUSB_DEVICE_PERMISSION       (-3405)
+* Not permitted to open the USB device.
+* The user doesn't have access to the device in the usbfs, check the mount options. */
+* #define VERR_VUSB_USBFS_PERMISSION         (-3406)
+* The requested operation cannot be performed because the device
+* is currently being reset. */
+* #define VERR_VUSB_DEVICE_IS_RESETTING      (-3407)
+* The requested operation cannot be performed because the device
+* is currently suspended. */
+* #define VERR_VUSB_DEVICE_IS_SUSPENDED      (-3408)
+* Not permitted to open the USB device.
+* The user doesn't have access to the device node, check group memberships. */
+* #define VERR_VUSB_USB_DEVICE_PERMISSION    (-3409)
+* @ }
+
+/** @} */
+
+/** @} * VBox VGA Status Codes
+* @} {
+* /
+* One of the custom modes was incorrect.
+* The format or bit count of the custom mode value is invalid. */
+* #define VERR_VGA_INVALID_CUSTOM_MODE       (-3500)
+* The display connector is resizing. */
+* #define VINF_VGA_RESIZE_IN_PROGRESS         (3501)
+* Unexpected PCI region change during VGA saved state loading. */
+* #define VERR_VGA_UNEXPECTED_PCI_REGION_LOAD_CHANGE  (-3502)
+* @} */
+
+/** @} * Internal Networking Status Codes
+* @} {
+* /
+* The networking interface to filter was not found. */
+* #define VERR_INTNET_FLT_IF_NOT_FOUND        (-3600)
+* The networking interface to filter was busy (used by someone). */
+* #define VERR_INTNET_FLT_IF_BUSY             (-3601)
+* Failed to create or connect to a networking interface filter. */
+* #define VERR_INTNET_FLT_IF_FAILED           (-3602)
+* The network already exists with a different trunk configuration. */
+* #define VERR_INTNET_INCOMPATIBLE_TRUNK      (-3603)
+* The network already exists with a different security profile (restricted / public). */
+* #define VERR_INTNET_INCOMPATIBLE_FLAGS      (-3604)
+* Failed to create a virtual network interface instance. */
+* #define VERR_INTNET_FLT_VNIC_CREATE_FAILED  (-3605)
+/** Failed to retrieve a virtual network interface link ID. */
+#define VERR_INTERNET_FLT_VNIC_LINK_ID_NOT_FOUND (-3606)
+/** Failed to initialize a virtual network interface instance. */
+#define VERR_INTERNET_FLT_VNIC_INIT_FAILED (-3607)
+/** Failed to open a virtual network interface instance. */
+#define VERR_INTERNET_FLT_VNIC_OPEN_FAILED (-3608)
+/** Failed to retrieve underlying (lower mac) link. */
+#define VERR_INTERNET_FLT_LOWER_LINK_INFO_NOT_FOUND (-3609)
+/** Failed to open underlying link instance. */
+#define VERR_INTERNET_FLT_LOWER_LINK_OPEN_FAILED (-3610)
+/** Failed to get underlying link ID. */
+#define VERR_INTERNET_FLT_LOWER_LINK_ID_NOT_FOUND (-3611)
+/** @} */
+
+
+/** @} */
+@name Support Driver Status Codes
+ * @{
+ * 
+ */
+ /** The component factory was not found. */
+#define VERR_SUPDRV_COMPONENT_NOT_FOUND (-3700)
+ /** The component factories do not support the requested interface. */
+#define VERR_SUPDRV_INTERFACE_NOT_SUPPORTED (-3701)
+ /** The service module was not found. */
+#define VERR_SUPDRV_SERVICE_NOT_FOUND (-3702)
+ /** The host kernel is too old. */
+#define VERR_SUPDRV_KERNEL_TOO_OLD_FOR_VTX (-3703)
+ /** Bad VTG magic value. */
+#define VERR_SUPDRV_VTG_MAGIC (-3704)
+ /** Bad VTG bit count value. */
+#define VERR_SUPDRV_VTG_BITS (-3705)
+ /** Bad VTG header - misc. */
+#define VERR_SUPDRV_VTG_BAD_HDR_MISC (-3706)
+ /** Bad VTG header - offset. */
+#define VERR_SUPDRV_VTG_BAD_HDR_OFF (-3707)
+ /** Bad VTG header - offset. */
+#define VERR_SUPDRV_VTG_BAD_HDR_PTR (-3708)
+ /** Bad VTG header - to low value. */
+#define VERR_SUPDRV_VTG_BAD_HDR_TOO_FEW (-3709)
+ /** Bad VTG header - to high value. */
+#define VERR_SUPDRV_VTG_BAD_HDR_TOO_MUCH (-3710)
+ /** Bad VTG header - size value is not a multiple of the structure size. */
+#define VERR_SUPDRV_VTG_BAD_HDR_NOT_MULTIPLE (-3711)
+ /** Bad VTG string table offset. */
+#define VERR_SUPDRV_VTG_STRTAB_OFF (-3712)
+ /** Bad VTG string. */
+#define VERR_SUPDRV_VTG_BAD_STRING (-3713)
+ /** VTG string is too long. */
+#define VERR_SUPDRV_VTG_STRING_TOO_LONG (-3714)
+/** Bad VTG attribute value. */
+#define VERR_SUPDRV_VTG_BAD_ATTR (-3715)
+/** Bad VTG provider descriptor. */
+#define VERR_SUPDRV_VTG_BAD_PROVIDER (-3716)
+/** Bad VTG probe descriptor. */
+#define VERR_SUPDRV_VTG_BAD_PROBE (-3717)
+/** Bad VTG argument list descriptor. */
+#define VERR_SUPDRV_VTG_BAD_ARGLIST (-3718)
+/** Bad VTG probe enabled data. */
+#define VERR_SUPDRV_VTG_BAD_PROBE_ENABLED (-3719)
+/** Bad VTG probe location record. */
+#define VERR_SUPDRV_VTG_BAD_PROBE_LOC (-3720)
+/** The VTG object for the session or image has already been registered. */
+#define VERR_SUPDRV_VTG_ALREADY_REGISTERED (-3721)
+/** A driver may only register one VTG object per session. */
+#define VERR_SUPDRV_VTG_ONLY_ONCE_PER_SESSION (-3722)
+/** A tracer has already been registered. */
+#define VERR_SUPDRV_TRACER_ALREADY_REGISTERED (-3723)
+/** The session has no tracer associated with it. */
+#define VERR_SUPDRV_TRACER_NOT_REGISTERED (-3724)
+/** The tracer has already been opened in this session. */
+#define VERR_SUPDRV_TRACER_ALREADY_OPENED (-3725)
+/** The tracer has not been opened. */
+#define VERR_SUPDRV_TRACER_NOT_OPENED (-3726)
+/** There is no tracer present. */
+#define VERR_SUPDRV_TRACER_NOT_PRESENT (-3727)
+/** The tracer is unloading. */
+#define VERR_SUPDRV_TRACER_UNLOADING (-3728)
+/** Another thread in the session is talking to the tracer. */
+#define VERR_SUPDRV_TRACER_SESSION_BUSY (-3729)
+/** The tracer cannot open itself in the same session. */
+#define VERR_SUPDRV_TRACER_CANNOT_OPEN_SELF (-3730)
+/** Bad argument flags. */
+#define VERR_SUPDRV_TRACER_BAD_ARG_FLAGS (-3731)
+/** The session has reached the max number of (user mode) providers. */
+#define VERR_SUPDRV_TRACER_TOO_MANY_PROVIDERS (-3732)
+/** The tracepoint provider object is too large. */
+#define VERR_SUPDRV_TRACER_TOO_LARGE (-3733)
+/** The probe location array isn't adjacent to the probe enable array. */
+#define VERR_SUPDRV_TRACER_UMOD_NOT_ADJACENT (-3734)
+/** The user mode tracepoint provider has too many probe locations and probes. */
+#define VERR_SUPDRV_TRACER_UMOD_TOO_MANY_PROBES (-3735)
+/** The user mode tracepoint provider string table is too large. */
+#define VERR_SUPDRV_TRACER_UMOD_STRTAB_TOO_BIG (-3736)
+/** The user mode tracepoint provider string table offset is bad. */
+#define VERR_SUPDRV_TRACER_UMOD_STRTAB_OFF_BAD (-3737)
+/** The VM process was denied access to vboxdrv because someone has managed to
+ * open the process or its main thread with too broad access rights. */
+*/ #define VERR_SUPDRV_HARDENING_EVIL_HANDLE (-3738)
+*/ #define VERR_SUPDRV_APIPORT_OPEN_ERROR (-3739)
+*/ #define VERR_SUPDRV_SESSION_PROCESS_ENUM_ERROR (-3740)
+*/ The CSRSS instance associated with the client process could not be
+ * located. */
+*/ #define VERR_SUPDRV_CSRSS_NOT_FOUND (-3741)
+*/ #define VERR_SUPDRV_APIPORT_OPEN_ERROR_TYPE (-3742)
+*/ Failed to measure the TSC delta between two CPUs. */
+*/ #define VERR_SUPDRV_TSC_DELTA_MEASUREMENT_FAILED (-3743)
+*/ Failed to calculate the TSC frequency. */
+*/ #define VERR_SUPDRV_TSC_FREQ_MEASUREMENT_FAILED (-3744)
+*/ Failed to get the delta-adjusted TSC value. */
+*/ #define VERR_SUPDRV_TSC_READ_FAILED (-3745)
+*/ Failed to measure the TSC delta between two CPUs, continue without any
+ * TSC-delta. */
+*/ #define VWRN_SUPDRV_TSC_DELTA_MEASUREMENT_FAILED 3746
+*/ A TSC-delta measurement request is currently being serviced. */
+*/ #define VERR_SUPDRV_TSC_DELTA_MEASUREMENT_BUSY (-3747)
+*/ The process trying to open VBoxDrv is not a budding VM process (1). */
+*/ #define VERR_SUPDRV_NOT_BUDDING_VM_PROCESS_1 (-3748)
+*/ The process trying to open VBoxDrv is not a budding VM process (2). */
+*/ #define VERR_SUPDRV_NOT_BUDDING_VM_PROCESS_2 (-3749)
+ */
+*/ #define VERR_SUPLIB_PATH_NOT_ABSOLUTE (-3750)
+*/ The specified path was not absolute (hardening). */
+*/ #define VERR_SUPLIB_PATH_NOT_ABSOLUTE (-3750)
+*/ The specified path was not clean (hardening). */
+*/ #define VERR_SUPLIB_PATH_TOO_LONG (-3752)
+*/ The specified path is too long (hardening). */
+*/ #define VERR_SUPLIB_PATH_TOO_SHORT (-3753)
+*/ The specified path is too short (hardening). */
+*/ #define VERR_SUPLIB_PATH_TOO_MANY_COMPONENTS (-3754)
+*/ The specified path has too many components (hardening). */
+*/ #define VERR_SUPLIB_PATH_IS_ROOT (-3755)
+*/ Failed to enumerate directory (hardening). */
+*/
+define VERR_SUPLIB_DIR_ENUM_FAILED (-3756)
+/** Failed to stat a file/dir during enumeration (hardening). */
+define VERR_SUPLIB_STAT_ENUM_FAILED (-3757)
+/** Failed to stat a file/dir (hardening). */
+define VERR_SUPLIB_STAT_FAILED (-3758)
+/** Failed to fstat a native handle (hardening). */
+define VERR_SUPLIB_FSTAT_FAILED (-3759)
+/** Found an illegal symbolic link (hardening). */
+define VERR_SUPLIB_SYMLINKS_ARE_NOT_PERMITTED (-3760)
+/** Found something which isn't a file nor a directory (hardening). */
+define VERR_SUPLIB_NOT_DIR_NOT_FILE (-3761)
+/** The specified path is a directory and not a file (hardening). */
+define VERR_SUPLIB_IS_DIRECTORY (-3762)
+/** The specified path is a file and not a directory (hardening). */
+define VERR_SUPLIB_IS_FILE (-3763)
+/** The path is not the same object as the native handle (hardening). */
+define VERR_SUPLIB_NOT_SAME_OBJECT (-3764)
+/** The owner is not root (hardening). */
+define VERR_SUPLIB_OWNER_NOT_ROOT (-3765)
+/** The group is a non-system group and it has write access (hardening). */
+define VERR_SUPLIB_WRITE_NON_SYS_GROUP (-3766)
+/** The file or directory is world writable (hardening). */
+define VERR_SUPLIB_WORLD_WRITABLE (-3767)
+/** The argv[0] of an internal application does not match the executable image + path (hardening). */
+define VERR_SUPLIB_INVALID_ARGV0_INTERNAL (-3768)
+/** The internal application does not reside in the correct place (hardening). */
+define VERR_SUPLIB_INVALID_INTERNAL_APP_DIR (-3769)
+/** Unable to establish trusted of VM process (0). */
+define VERR_SUPLIB_NT_PROCESS_UNTRUSTED_0 (-3770)
+/** Unable to establish trusted of VM process (1). */
+define VERR_SUPLIB_NT_PROCESS_UNTRUSTED_1 (-3771)
+/** Unable to establish trusted of VM process (2). */
+define VERR_SUPLIB_NT_PROCESS_UNTRUSTED_2 (-3772)
+/** Unable to establish trusted of VM process (3). */
+define VERR_SUPLIB_NT_PROCESS_UNTRUSTED_3 (-3773)
+/** Unable to establish trusted of VM process (4). */
+define VERR_SUPLIB_NT_PROCESS_UNTRUSTED_4 (-3774)
+/** Unable to establish trusted of VM process (5). */
+define VERR_SUPLIB_NT_PROCESS_UNTRUSTED_5 (-3775)
+/** Unable to make text memory writeable (hardening). */
+define VERR_SUPLIB_TEXT_NOT_WRITEABLE (-3776)
+/** Unable to seal text memory again to protect against write access (hardening). */
+define VERR_SUPLIB_TEXT_NOT_SEALED (-3777)
+/** Unexpected instruction encountered for which there is no patch strategy + * implemented (hardening). */
+define VERR_SUPLIB_UNEXPECTED_INSTRUCTION (-3778)
+/** @} */
+/
+
+/** @name VBox GMM Status Codes
+ * @
+ */
+#define VERR_GMM_SEED_ME (-3800)
+/** Unable to allocate more pages from the host system. */
+#define VERR_GMM_OUT_OF_MEMORY (-3801)
+/** Hit the global allocation limit. */
+#define VERR_GMM_HIT_GLOBAL_LIMIT (-3802)
+/** If you know there is still sufficient memory available, try raising the limit. */
+#define VERR_GMM_HIT_VM_ACCOUNT_LIMIT (-3803)
+/** Attempt to free more memory than what was previously allocated. */
+#define VERR_GMM_ATTEMPT_TO_FREE_TOO_MUCH (-3804)
+/** Attempted to report too many pages as deflated. */
+#define VERR_GMM_ATTEMPT_TO_DEFLATE_TOO_MUCH (-3805)
+/** The page to be freed or updated was not found. */
+#define VERR_GMM_PAGE_NOT_FOUND (-3806)
+/** The specified shared page was not actually private. */
+#define VERR_GMM_PAGE_NOT_PRIVATE (-3807)
+/** The specified shared page was not actually shared. */
+#define VERR_GMM_PAGE_NOT_SHARED (-3808)
+/** The page to be freed was already freed. */
+#define VERR_GMM_PAGE_ALREADY_FREE (-3809)
+/** The page to be updated or freed was noted owned by the caller. */
+#define VERR_GMM_NOT_PAGE_OWNER (-3810)
+/** The specified chunk was not found. */
+#define VERR_GMM_CHUNK_NOT_FOUND (-3811)
+/** The chunk has already been mapped into the process. */
+#define VERR_GMM_CHUNK_ALREADY_MAPPED (-3812)
+/** The chunk to be unmapped isn't actually mapped into the process. */
+#define VERR_GMM_CHUNK_NOT_MAPPED (-3813)
+/** The chunk has been mapped too many times already (impossible). */
+#define VERR_GMM_TOO_MANY_CHUNK_MAPPINGS (-3814)
+/** The reservation or reservation update was declined - too many VMs, too little memory, and/or too low GMM configuration. */
+#define VERR_GMM_MEMORY_RESERVATION_DECLINED (-3815)
+/** A GMM sanity check failed. */
+#define VERR_GMM_IS_NOT_SANE (-3816)
+/** Inserting a new chunk failed. */
+#define VERR_GMM CHUNK_INSERT (-3817)
+/** Failed to obtain the GMM instance. */
+#define VERR_GMM_INSTANCE (-3818)
+/** Bad mutex semaphore flags. */
+#define VERR_GMM_mtx_FLAGS (-3819)
+/** Internal processing error in the page allocator. */
+#define VERR_GMM_ALLOCS.Pages.IPE (-3820)
+/** Invalid page count given to GMMR3FreePagesPerform. */
+#define VERR_GMM_ACTUAL.Pages.IPE (-3821)
+/** The shared module name is too long. */
+#define VERR_GMM_MODULE_NAME_TOO_LONG (-3822)
+/** The shared module version string is too long. */
+#define VERR_GMM_MODULE_VERSION_TOO_LONG (-3823)
+/** The shared module has too many regions. */
+#define VERR_GMM_TOO_MANY_REGIONS (-3824)
+/** The guest has reported too many modules. */
+#define VERR_GMM_TOO_MANY_PER_VM_MODULES (-3825)
+/** The guest has reported too many modules. */
+#define VERR_GMM_TOO_MANY_GLOBAL_MODULES (-3826)
+/** The shared module is already registered. */
+#define VINF_GMM_SHARED_MODULE_ALREADY_REGISTERED (3827)
+/** The shared module clashed address wise with a previously registered
+ * module. */
+#define VERR_GMM_SHARED_MODULE_ADDRESS_CLASH (-3828)
+/** The shared module was not found. */
+#define VERR_GMM_SHARED_MODULE_NOT_FOUND (-3829)
+/** The size of the shared module was out of range. */
+#define VERR_GMM_BAD_SHARED_MODULE_SIZE (-3830)
+/** The size of the one or more regions in the shared module was out of
+ * range. */
+#define VERR_GMM_SHARED_MODULE_BAD_REGIONS_SIZE (-3831)
+/** @} */
+
+/** @name VBox GVM Status Codes
+ * @{
+ */
+/** The GVM is out of VM handle space. */
+#define VERR_GVM_TOO_MANY_VMS (-3900)
+/** The EMT was not blocked at the time of the call. */
+#define VINF_GVM_NOT_BLOCKED 3901
+/** The EMT was not busy running guest code at the time of the call. */
+#define VINF_GVM_NOT_BUSY_IN_GC 3902
+/** RTThreadYield was called during a GVMMR0SchedPoll call. */
+#define VINF_GVM_YIELDED 3903
+/** @} */
+
+/** @name VBox VMX Status Codes
+ * @{
+ */
+/** VMXON failed; possibly because it was already run before. */
+#define VERR_VMX_VMXON_FAILED (-4000)
+/** Invalid VMCS pointer. */
+/* (Can be OR'ed with VERR_VMX_INVALID_VMCS_FIELD.) */
+#define VERR_VMX_INVALID_VMCS_PTR (-4001)
+/** Invalid VMCS index or write to read-only element. */
+#define VERR_VMX_INVALID_VMCS_FIELD (-4002)
+/** Reserved for future status code that we wish to OR with */
+* VERR_VMX_INVALID_VMCS_PTR and VERR_VMX_INVALID_VMCS_FIELD. */
+#define VERR_VMX_RESERVED (-4003)
+/** Invalid VMXON pointer. */
+#define VERR_VMX_INVALID_VMXON_PTR (-4004)
+/** Unable to start VM execution. */
+#define VERR_VMX_UNABLE_TO_START_VM (-4005)
+/** Unable to switch due to invalid host state. */
+#define VERR_VMX_INVALID_HOST_STATE (-4006)
+/** IA32FEATURE_CONTROL MSR not setup correctly (turn on VMX in the host system BIOS) */
+#define VERR_VMX_ILLEGAL_FEATURE_CONTROL_MSR (-4007)
+/** Invalid CPU mode for VMX execution. */
+#define VERR_VMX_UNSUPPORTED_MODE (-4008)
+/** VMX CPU extension not available */
+#define VERR_VMX_NO_VMX (-4009)
+/** CPU was incorrectly left in VMX root mode; incompatible with VirtualBox */
+#define VERR_VMX_IN_VMX_ROOT_MODE (-4011)
+/** Somebody cleared X86_CR4_VMXE in the CR4 register. */
+#define VERR_VMX_X86_CR4_VMXE_CLEARED (-4012)
+/** Failed to enable and lock VT-x features. */
+#define VERR_VMX_MSR_LOCKING_FAILED (-4013)
+/** Unable to switch due to invalid guest state. */
+#define VERR_VMX_INVALID_GUEST_STATE (-4014)
+/** Unexpected VM exit. */
+#define VERR_VMX_UNEXPECTED_EXIT (-4015)
+/** Unexpected VM exception. */
+#define VERR_VMX_UNEXPECTED_EXCEPTION (-4016)
+/** Unexpected interruption exit type. */
+#define VERR_VMX_UNEXPECTED INTERRUPTION_EXIT_TYPE (-4017)
+/** CPU is not in VMX root mode; unexpected when leaving VMX root mode. */
+#define VERR_VMX_NOT_IN_VMX_ROOT_MODE (-4018)
+/** Undefined VM exit code. */
+#define VERR_VMX_UNDEFINED_EXIT_CODE (-4019)
+/** VMPTRLD failed; possibly because of invalid VMCS launch-state. */
+#define VERR_VMX_VMPTRLD_FAILED (-4021)
+/** Invalid VMCS pointer passed to VMLAUNCH/VMRESUME. */
+#define VERR_VMX_INVALID_VMCS_PTR_TO_START_VM (-4022)
+/** Internal VMX processing error no 1. */
+#define VERR_VMX_IPE_1 (-4023)
+/** Internal VMX processing error no 2. */
+#define VERR_VMX_IPE_2 (-4024)
+/** Internal VMX processing error no 3. */
+#define VERR_VMX_IPE_3 (-4025)
+/** Internal VMX processing error no 4. */
#define VERR_VMX_IPE_4 (-4026)
+/** Internal VMX processing error no 5. */
#define VERR_VMX_IPE_5 (-4027)
+/** VT-x features for all modes (SMX and non-SMX) disabled by the BIOS. */
#define VERR_VMX_MSR_ALL_VMX_DISABLED (-4028)
+/** VT-x features disabled by the BIOS. */
#define VERR_VMX_MSR_VMX_DISABLED (-4029)
+/** VM-Entry Controls internal cache invalid. */
#define VERR_VMX_ENTRY_CTLS_CACHE_INVALID (-4030)
+/** VM-Exit Controls internal cache invalid. */
#define VERR_VMX_EXIT_CTLS_CACHE_INVALID (-4031)
+/** VM-Entry Controls internal cache invalid. */
#define VERR_VMX_PIN_EXEC_CTLS_CACHE_INVALID (-4032)
+/** VM-Execution Primary Processor-based Controls internal cache invalid. */
#define VERR_VMX_PROC_EXEC_CTLS_CACHE_INVALID (-4033)
+/** VM-Execution Secondary Processor-based Controls internal cache invalid. */
#define VERR_VMX_PROC_EXEC2_CTLS_CACHE_INVALID (-4034)
+/** Failed to set VMXON enable bit while enabling VT-x through the MSR. */
#define VERR_VMX_MSR_VMX_ENABLE_FAILED (-4035)
+/** Failed to enable VMXON-in-SMX bit while enabling VT-x through the MSR. */
#define VERR_VMX_MSR_SMX_VMX_ENABLE_FAILED (-4036)
+/** @} */

+/** VBox SVM Status Codes */
+/** @} 

+/** Unable to start VM execution. */
#define VERR_SVM_UNABLE_TO_START_VM (-4050)
+/** AMD-V bit not set in K6_EFER MSR */
#define VERR_SVM_ILLEGAL_EFER_MSR (-4051)
+/** AMD-V CPU extension not available. */
#define VERR_SVM_MISSING_AMD_V (-4052)
+/** AMD-V CPU extension disabled (by BIOS). */
#define VERR_SVM_DISABLED (-4053)
+/** AMD-V CPU extension in-use. */
#define VERR_SVM_IN_USE (-4054)
+/** Invalid pVMCB. */
#define VERR_SVM_INVALID_PVMCB (-4055)
+/** Unexpected SVM exit. */
#define VERR_SVM_UNEXPECTED_EXIT (-4056)
+/** Unexpected SVM exception exit. */
#define VERR_SVM_UNEXPECTED_XCPT_EXIT (-4057)
+/** Unexpected SVM patch type. */
#define VERR_SVM_UNEXPECTED_PATCH_TYPE (-4058)
Unable to start VM execution due to an invalid guest state.

#define VERR_SVM_INVALID_GUEST_STATE (-4059)

Unknown or unrecognized SVM exit.

#define VERR_SVM_UNKNOWN_EXIT (-4060)

Internal SVM processing error no 1.

#define VERR_SVM_IPE_1 (-4061)

Internal SVM processing error no 2.

#define VERR_SVM_IPE_2 (-4062)

Internal SVM processing error no 3.

#define VERR_SVM_IPE_3 (-4063)

Internal SVM processing error no 4.

#define VERR_SVM_IPE_4 (-4064)

Internal SVM processing error no 5.

#define VERR_SVM_IPE_5 (-4065)

The nested-guest VMEXIT processing failed, initiate shutdown.

#define VERR_SVM_VMEXIT_FAILED (-4066)

An operation caused a nested-guest SVM VMEXIT.

#define VINF_SVM_VMEXIT 4067

VMRUN emulation succeeded, ready to immediately enter the nested-guest.

#define VINF_SVM_VMRUN 4068

@end

@name VBox HM Status Codes

#define VERR_HM_UNKNOWN_CPU (-4100)

No CPUID support.

#define VERR_HM_NO_CPUID (-4101)

Host is about to go into suspend mode.

#define VERR_HM_SUSPEND_PENDING (-4102)

Conflicting CFGM values.

#define VERR_HM_CONFIG_MISMATCH (-4103)

Internal processing error in the HM init code.

#define VERR_HM_ALREADY_ENABLED_IPE (-4104)

Unexpected MSR in the auto-load/store area.

#define VERR_HM_UNEXPECTED_LD_ST_MSR (-4105)

No 32-bit to 64-bit switcher in place.

#define VERR_HM_NO_32_TO_64_SWITCHER (-4106)

HMR0Leave was called on the wrong CPU.

#define VERR_HM_WRONG_CPU (-4107)

Internal processing error \#1 in the HM code.

#define VERR_HM_IPE_1 (-4108)

Internal processing error \#2 in the HM code.

#define VERR_HM_IPE_2 (-4109)

Wrong 32/64-bit switcher.

#define VERR_HM_WRONG_SWITCHER (-4110)
+/** Unknown I/O instruction. */
+/#define VERR_HM_UNKNOWN_IO_INSTRUCTION (-4111)
+/** Unsupported CPU feature combination. */
+/#define VERR_HM_UNSUPPORTED_CPU_FEATURE_COMBO (-4112)
+/** Internal processing error \#3 in the HM code. */
+/#define VERR_HM_IPE_3 (-4113)
+/** Internal processing error \#4 in the HM code. */
+/#define VERR_HM_IPE_4 (-4114)
+/** Internal processing error \#5 in the HM code. */
+/#define VERR_HM_IPE_5 (-4115)
+/** Invalid HM64ON32OP value. */
+/#define VERR_HM_INVALID_HM64ON32OP (-4116)
+/** Resume guest execution after injecting a double-fault. */
+/#define VINF_HM_DOUBLE_FAULT 4117
+/** The requested nested-guest VM-exit intercept is not active or not in
 + * nested-guest execution mode. */
+/#define VINF_HM_INTERCEPT_NOT_ACTIVE 4118
+/** @} */
+
+/** @} @name VBox Disassembler Status Codes
+ @{
+ /** Invalid opcode byte(s) */
+/#define VERR_DIS_INVALID_OPCODE (-4200)
+/** Generic failure during disassembly. */
+/#define VERR_DIS_GEN_FAILURE (-4201)
+/** No read callback. */
+/#define VERR_DIS_NO_READ_CALLBACK (-4202)
+/** Invalid Mod/RM. */
+/#define VERR_DIS_INVALID_MODRM (-4203)
+/** Invalid parameter index. */
+/#define VERR_DIS_INVALID_PARAMETER (-4204)
+/** The instruction is too long. */
+/#define VERR_DIS_TOO_LONG_INSTR (-4206)
+/** @} */
+
+/** @} @name VBox Webservice Status Codes
+ @{
+ /** Authentication failed (ISessionManager::logon()) */
+/#define VERR_WEB_NOT_AUTHENTICATED (-4300)
+/** Invalid format of managed object reference */
+/#define VERR_WEB_INVALID_MANAGED_OBJECT_REFERENCE (-4301)
+/** Invalid session ID in managed object reference */
+/#define VERR_WEB_INVALID_SESSION_ID (-4302)
+/** Invalid object ID in managed object reference */
```c
#define VERR_WEB_INVALID_OBJECT_ID (-4303)
/** Unsupported interface for managed object reference */

#define VERR_WEB_UNSUPPORTED_INTERFACE (-4304)
/** @} */

/** @} */

/** VBox PARAV Status Codes */

#define VINF_PARAV_SWITCH_TO_HOST 4400
/** @} */

/** VBox Video HW Acceleration command status */
#define VINF_VHWA_CMD_PENDING 4500
/** @} */

/** VBox COM error codes */
#define VERR_COM_UNEXPECTED (-4600)
/** The base of the VirtualBox COM status codes (the lower value)
 * corresponding 1:1 to VBOX_E_XXX. This is the lowest value. */
#define VERR_COM_VBOX_LOWEST (-4699)
/** Object corresponding to the supplied arguments does not exist. */
#define VERR_COM_OBJECT_NOT_FOUND (VERR_COM_VBOX_LOWEST + 1)
/** Current virtual machine state prevents the operation. */
#define VERR_COM_INVALID_VM_STATE (VERR_COM_VBOX_LOWEST + 2)
/** Virtual machine error occurred attempting the operation. */
#define VERR_COM_VM_ERROR (VERR_COM_VBOX_LOWEST + 3)
/** File not accessible or erroneous file contents. */
#define VERR_COM_FILE_ERROR (VERR_COM_VBOX_LOWEST + 4)
/** IPRT error. */
#define VERR_COM_IPRT_ERROR (VERR_COM_VBOX_LOWEST + 5)
/** Pluggable Device Manager error. */
#define VERR_COM_PDM_ERROR (VERR_COM_VBOX_LOWEST + 6)
/** Current object state prohibits operation. */
#define VINF_COM_INVALID_OBJECT_STATE (VERR_COM_VBOX_LOWEST + 7)
```
+/** Host operating system related error. */
+/** Requested operation is not supported. */
+/** Invalid XML found. */
+/** Current session state prohibits operation. */
+/** Object being in use prohibits operation. */
+/** Requested operation is not supported. */
+/** Returned by callback methods which does not need to be called
+ * again because the client does not actually make use of them. */
+/** Object being in use prohibits operation. */
+/** @} */
+
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+/** @} */
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+/** @} */
+/#define VERR_FAM_OPEN_FAILED (-5000)
+/** FAM failed to add a file to the list to be monitored. */
+/#define VERR_FAM_MONITOR_FILE_FAILED (-5001)
+/** FAM failed to add a directory to the list to be monitored. */
+/#define VERR_FAM_MONITOR_DIRECTORY_FAILED (-5002)
+/** The connection to the FAM daemon was lost. */
+/#define VERR_FAM_CONNECTION_LOST (-5003)
+/** @} */

+/** @name PCI Passtrhough Status Codes
+ * @}
+ */
+/** RamPreAlloc not set.
+ * RAM pre-allocation is currently a requirement for PCI passthrough. */
+/#define VERR_PCI_PASSTHROUGH_NO_RAM_PREALLOC (-5100)
+/** VT-x/AMD-V not active.
+ * PCI passthrough currently works only if VT-x/AMD-V is active. */
+/#define VERR_PCI_PASSTHROUGH_NO_HM (-5101)
+/** Nested paging not active.
+ * PCI passthrough currently works only if nested paging is active. */
+/#define VERR_PCI_PASSTHROUGH_NO_NESTED_PAGING (-5102)
+/** @} */

+/** @name GVMM Status Codes
+ * @}
+ */
+/** Internal error obtaining the GVMM instance. */
+/#define VERR_GVMM_INSTANCE (-5200)
+/** GVMM does not support the range of CPUs present/possible on the host. */
+/#define VERR_GVMM_HOST_CPU_RANGE (-5201)
+/** GVMM ran into some broken IPRT code. */
+/#define VERR_GVMM_BROKEN_IPRT (-5202)
+/** Internal processing error \#1 in the GVMM code. */
+/#define VERR_GVMM_IPE_1 (-5203)
+/** Internal processing error \#2 in the GVMM code. */
+/#define VERR_GVMM_IPE_2 (-5204)
+/** Cannot destroy VM because not all other EMTs have deregistered. */
+/#define VERR_GVMM_NOT_ALL_EMTS_DEREGISTERED (-5205)
+/** @} */

+/** @name IEM Status Codes
+ * @}
+ */
+/** The instruction is not yet implemented by IEM. */
+/#define VERR_IEM_INSTR_NOT_IMPLEMENTED (-5300)
+/** Invalid operand size passed to an IEM function. */
+#define VERR_IEM_INVALID_OPERAND_SIZE (-5301)  
+/** Invalid address mode passed to an IEM function. */
+#define VERR_IEM_INVALID_ADDRESS_MODE (-5302)  
+/** Invalid effective segment register number passed to an IEM function. */
+#define VERR_IEM_INVALID_EFF_SEG (-5303)  
+/** Invalid instruction length passed to an IEM function. */
+#define VERR_IEM_INVALID_INSTR_LENGTH (-5304)  
+/** Internal status code for indicating that a selector isn’t valid (LAR, LSL, VERW). This is not used outside the instruction implementations. */
+#define VINF_IEM_SELECTOR_NOT_OK (5305)  
+/** Restart the current instruction. For testing only. */
+#define VERR_IEM_RESTART_INSTRUCTION (-5389)  
+/** This particular aspect of the instruction is not yet implemented by IEM. */
+#define VERR_IEM_ASPECT_NOT IMPLEMENTED (-5390)  
+/** Internal processing error #1 in the IEM code. */
+#define VERR_IEM_IPE_1 (-5391)  
+/** Internal processing error #2 in the IEM code. */
+#define VERR_IEM_IPE_2 (-5392)  
+/** Internal processing error #3 in the IEM code. */
+#define VERR_IEM_IPE_3 (-5393)  
+/** Internal processing error #4 in the IEM code. */
+#define VERR_IEM_IPE_4 (-5394)  
+/** Internal processing error #5 in the IEM code. */
+#define VERR_IEM_IPE_5 (-5395)  
+/** Internal processing error #6 in the IEM code. */
+#define VERR_IEM_IPE_6 (-5396)  
+/** Internal processing error #7 in the IEM code. */
+#define VERR_IEM_IPE_7 (-5397)  
+/** Internal processing error #8 in the IEM code. */
+#define VERR_IEM_IPE_8 (-5398)  
+/** Internal processing error #9 in the IEM code. */
+#define VERR_IEM_IPE_9 (-5399)  
+/** @} */
+
+
+/** @name DBGC Status Codes */
+/** @{ */
+/** Status that causes DBGC to quit. */
+#define VERR_DBGC_QUIT (-5400)  
+/** Async command pending. */
+#define VWRN_DBGC_CMD_PENDING 5401  
+/** The command has already been registered. */
+#define VWRN_DBGC_ALREADY_REGISTERED 5402  
+/** The command cannot be deregistered because has not been registered. */
+#define VERR_DBGC_COMMANDS_NOT_REGISTERED (-5403)  
+/** Unknown breakpoint. */
+#define VERR_DBGC_BP_NOT_FOUND (-5404)  
+/** The breakpoint already exists. */
#define VERR_DBGC_BP_EXISTS           (-5405) /* The breakpoint has no command. */
#define VINF_DBGC_BP_NO_COMMAND       5406    /* Generic debugger command failure. */
#define VERR_DBGC_COMMAND_FAILED      (-5407) /* Logic bug in the DBGC code. */
#define VERR_DBGC_IPE                 (-5408) /* The lowest parse status code. */
#define VERR_DBGC_PARSE_LOWEST        (-5499) /* Syntax error - too few arguments. */
#define VERR_DBGC_PARSE_TOO_FEW_ARGS  (VERR_DBGC_PARSE_LOWEST + 0) /* Syntax error - too many arguments. */
#define VERR_DBGC_PARSE_TOO_MANY_ARGS (VERR_DBGC_PARSE_LOWEST + 1) /* Syntax error - too many arguments for static storage. */
#define VERR_DBGC_PARSE_ARGUMENT_OVERFLOW (VERR_DBGC_PARSE_LOWEST + 2) /* Syntax error - expected binary operator. */
#define VERR_DBGC_PARSE_EXPECTED_BINARY_OP (VERR_DBGC_PARSE_LOWEST + 3) /* Syntax error - the argument does not allow a range to be specified. */
#define VERR_DBGC_PARSE_NO_RANGE_ALLOWED (VERR_DBGC_PARSE_LOWEST + 5) /* Syntax error - unbalanced quotes. */
#define VERR_DBGC_PARSE_UNBALANCED_QUOTE (VERR_DBGC_PARSE_LOWEST + 6) /* Syntax error - unbalanced parenthesis. */
#define VERR_DBGC_PARSE_UNBALANCED_PARENTHESIS (VERR_DBGC_PARSE_LOWEST + 7) /* Syntax error - an argument or subargument contains nothing useful. */
#define VERR_DBGC_PARSE_EMPTY_ARGUMENT (VERR_DBGC_PARSE_LOWEST + 8) /* Syntax error - invalid operator usage. */
#define VERR_DBGC_PARSE_UNEXPECTED_OPERATOR (VERR_DBGC_PARSE_LOWEST + 9) /* Syntax error - invalid numeric value. */
#define VERR_DBGC_PARSE_INVALID_NUMBER (VERR_DBGC_PARSE_LOWEST + 10) /* Syntax error - numeric overflow. */
#define VERR_DBGC_PARSE_NUMBER_TOO_BIG (VERR_DBGC_PARSE_LOWEST + 11) /* Syntax error - invalid operation attempted. */
#define VERR_DBGC_PARSE_INVALID_OPERATION (VERR_DBGC_PARSE_LOWEST + 12) /* Syntax error - function not found. */
#define VERR_DBGC_PARSE_FUNCTION_NOT_FOUND (VERR_DBGC_PARSE_LOWEST + 13) /* Syntax error - the specified function is not a function. */
#define VERR_DBGC_PARSE_NOT_A_FUNCTION (VERR_DBGC_PARSE_LOWEST + 14) /* Syntax error - out of scratch memory. */
#define VERR_DBGC_PARSE_NO_SCRATCH     (VERR_DBGC_PARSE_LOWEST + 15) /* Syntax error - out of regular heap memory. */
#define VERR_DBGC_PARSE_NO_MEMORY      (VERR_DBGC_PARSE_LOWEST + 16) /* Syntax error - incorrect argument type. */
#define VERR_DBGC_PARSE_INCORRECT_ARG_TYPE (VERR_DBGC_PARSE_LOWEST + 17) /* Syntax error - an undefined variable was referenced. */
#define VERR_DBGC_PARSE_VARIABLE_NOT_FOUND (VERR_DBGC_PARSE_LOWEST + 18) /* Syntax error - a type conversion failed. */
+*/ ** Syntax error - you hit a debugger feature which isn't implemented yet. */
+*/ ** Syntax error - Couldn't satisfy a request for a specific result type. */
+*/ ** Syntax error - Cannot read symbol value, it is a set-only symbol. */
+*/ ** Syntax error - Invalid command name. */
+*/ ** Syntax error - Command not found. */
+*/ ** Syntax error - buggy parser. */
+*/ ** Process Verification Failure: The memory content does not match the image file. */
+*/ ** Process Verification Failure: The memory protection of a image file section does not match what the section header prescribes. */
+*/ ** Process Verification Failure: One of the section in the image file is not mapped into memory. */
+*/ ** Process Verification Failure: One of the section in the image file is not fully mapped into memory. */
+*/ ** Process Verification Failure: Bad file alignment value in image header. */
+*/ ** Process Verification Failure: Bad image base in header. */
+*/ ** Process Verification Failure: Bad image signature. */
+*/ ** Process Verification Failure: Bad image size. */
+*/ ** Process Verification Failure: Bad new-header offset in the MZ header. */
+*/ ** Process Verification Failure: Bad optional header field. */
+*/ ** Process Verification Failure: Bad section alignment value in image header. */
+*/ ** Process Verification Failure: Bad section raw data size. */
/** Process Verification Failure: Bad virtual section address. */
#define VERR_SUP_VP_BAD_SECTION_RVA (-5612)
/** Process Verification Failure: Bad virtual section size. */
#define VERR_SUP_VP_BAD_SECTION_VIRTUAL_SIZE (-5613)
/** Process Verification Failure: Bad size of image header. */
#define VERR_SUP_VP_BAD_SIZE_OF_HEADERS (-5614)
/** Process Verification Failure: The process is being debugged. */
#define VERR_SUP_VP_DEBUGGED (-5615)
/** Process Verification Failure: A DLL was found more than once. */
#define VERR_SUP_VP_DUPLICATE_DLL_MAPPING (-5616)
/** Process Verification Failure: Image section region is too large. */
#define VERR_SUP_VP_EMPTY_REGION_TOO_LARGE (-5617)
/** Process Verification Failure: Executable file name and process image name
 * does not match up. */
#define VERR_SUP_VP_EXE_VS_PROC_NAME_MISMATCH (-5618)
/** Process Verification Failure: Found executable memory allocated in the
 * process. There is only supposed be executable memory associated with
 * image file mappings (DLLs & EXE). */
#define VERR_SUP_VP_FOUND_EXEC_MEMORY (-5619)
/** Process Verification Failure: There is more than one known executable mapped
 * into the process. */
#define VERR_SUP_VP_FOUND_MORE_THAN_ONE_EXE_MAPPING (-5620)
/** Process Verification Failure: Error closing image file handle. */
#define VERR_SUP_VP_IMAGE_FILE_CLOSE_ERROR (-5621)
/** Process Verification Failure: Error opening image file. */
#define VERR_SUP_VP_IMAGE_FILE_OPEN_ERROR (-5622)
/** Process Verification Failure: Error reading image file header. */
#define VERR_SUP_VP_IMAGE_HDR_READ_ERROR (-5623)
/** Process Verification Failure: Image mapping is bogus as the first region
 * has different AllocationBase and BaseAddress values, indicating that a
 * section was unmapped or otherwise tampered with. */
#define VERR_SUP_VP_IMAGE_MAPPING_BASE_ERROR (-5624)
/** Process Verification Failure: Error reading process memory for comparing
 * with disk data. */
#define VERR_SUP_VP_MEMORY_READ_ERROR (-5625)
/** Process Verification Failure: Found no executable mapped into the process
 * address space. */
#define VERR_SUP_VP_NO_FOUND_NO_EXE_MAPPING (-5626)
/** Process Verification Failure: An image mapping failed to report a name. */
#define VERR_SUP_VP_NO_IMAGE_MAPPING_NAME (-5627)
/** Process Verification Failure: No KERNE32.DLL mapping found. This is
 * impossible. */
#define VERR_SUP_VP_NO_KERNEL32_MAPPING (-5628)
/** Process Verification Failure: Error allocating memory. */
#define VERR_SUP_VP_NO_MEMORY (-5629)
/** Process Verification Failure: Error allocating state memory or querying
 * the system32 path. */
#define VERR_SUP_VP_NO_MEMORY_STATE (-5630)
/** Process Verification Failure: No NTDLL.DLL mapping found. This is impossible. */
#define VERR_SUP_VP_NO_NTDLL_MAPPING (-5631)

/** Process Verification Failure: A DLL residing outside System32 was found in the process. */
#define VERR_SUP_VP_NON_SYSTEM32_DLL (-5632)

/** Process Verification Failure: An unknown and unwanted DLL was found loaded into the process. */
#define VERR_SUP_VP_NOT_KNOWN_DLL_OR_EXE (-5633)

/** Process Verification Failure: The name of an image file changes between mapping regions. */
#define VERR_SUP_VP_NT_MAPPING_NAME_CHANGED (-5634)

/** Process Verification Failure: Error querying process name. */
#define VERR_SUP_VP_NT_QI_PROCESS_NM_ERROR (-5635)

/** Process Verification Failure: Error querying thread information. */
#define VERR_SUP_VP_NT_QI_THREAD_ERROR (-5636)

/** Process Verification Failure: Error query virtual memory information. */
#define VERR_SUP_VP_NT_QI_VIRTUAL_MEMORY_ERROR (-5637)

/** Process Verification Failure: Error query virtual memory mapping name. */
#define VERR_SUP_VP_NT_QI_VIRTUAL_MEMORY_NM_ERROR (-5638)

/** Process Verification Failure: Error determining the full path of System32. */
#define VERR_SUP_VP_SYSTEM32_PATH (-5639)

/** Process Verification Failure: The process has more than one thread. */
#define VERR_SUP_VP_THREAD_NOT_ALONE (-5640)

/** Process Verification Failure: The image mapping is too large (\(\geq 2\)GB). */
#define VERR_SUP_VP_TOO_HIGH_REGION_RVA (-5641)

/** Process Verification Failure: The memory region is too large (\(\geq 2\)GB). */
#define VERR_SUP_VP_TOO_LARGE_REGION (-5642)

/** Process Verification Failure: There are too many DLLs loaded. */
#define VERR_SUP_VP_TOO_MANY_DLLS_LOADED (-5643)

/** Process Verification Failure: An image has too many regions. */
#define VERR_SUP_VP_TOO_MANY_IMAGE_REGIONS (-5644)

/** Process Verification Failure: The process has too many virtual memory regions. */
#define VERR_SUP_VP_TOO_MANY_MEMORY_REGIONS (-5645)

/** Process Verification Failure: An image has too many sections. */
#define VERR_SUP_VP_TOO_MANY_SECTIONS (-5646)

/** Process Verification Failure: An image is targeting an unexpected machine/CPU. */
#define VERR_SUP_VP_UNEXPECTED_IMAGE_MACHINE (-5647)

/** Process Verification Failure: Unexpected section protection flag combination. */
#define VERR_SUP_VP_UNEXPECTED_SECTION_FLAGS (-5648)

/** Process Verification Failure: Expected the process and exe to have forced integrity checking enabled (verifying signatures). */
#define VERR_SUP_VP_EXE_MISSING_FORCE_INTEGRITY (-5649)

/** Process Verification Failure: Expected the process and exe to have dynamic
/* base enabled. */
#define VERR_SUP_VP_EXE_MISSING_DYNAMIC_BASE (-5650)
/** Process Verification Failure: Expected the process and exe to advertise
+ * NX compatibility. */
#define VERR_SUP_VP_EXE_MISSING_NX_COMPAT (-5651)
/** Process Verification Failure: The DllCharacteristics of the process
+ * does not match the value in the optional header in the exe file. */
#define VERR_SUP_VP_DLL_CHARACTERISTICS_MISMATCH (-5652)
/** Process Verification Failure: The ImageCharacteristics of the process
+ * does not match the value in the file header in the exe file. */
#define VERR_SUP_VP_IMAGE_CHARACTERISTICS_MISMATCH (-5653)
/** Process Verification Failure: Error querying image information. */
#define VERR_SUP_VP_NT_QI_PROCESS_IMG_INFO_ERROR (-5654)
/** Process Verification Failure: Error querying debug port. */
#define VERR_SUP_VP_NT_QI_PROCESS_DBG_PORT_ERROR (-5655)
/** WinVerifyTrust failed with an unexpected status code when using the
+ * catalog-file approach. */
#define VERR_SUP_VP_WINTRUST_CAT_FAILURE (-5656)
/** The image is required to be signed with the same certificate as the rest
+ * of VirtualBox. */
#define VERR_SUP_VP_NOT_SIGNED_WITH_BUILD_CERT (-5657)
/** Internal processing error: Not build certificate. */
#define VERR_SUP_VP_NOT_BUILD_CERT_IPE (-5658)
/** The image requires to be signed using the kernel-code signing process. */
#define VERR_SUP_VP_NOT_VALID_KERNEL_CODE_SIGNATURE (-5659)
/** Unexpected number of valid paths. */
#define VERR_SUP_VP_UNEXPECTED_VALID_PATH_COUNT (-5660)
/** The image is required to force integrity checks. */
#define VERR_SUP_VP_SIGNATURE_CHECKS_NOT_ENFORCED (-5661)
/** Process Verification Failure: Symantec Endpoint Protection must be
+ * disabled for the VirtualBox VM processes.
+ * http://www.symantec.com/connect/articles/creating-application-control-exclusions-symantec-endpoint-protection-121 */
#define VERR_SUP_VP_SYSFER_DLL (-5662)
/** Process Purification Failure: KERNE32.DLL already mapped into the initial
+ * process (suspended). */
#define VERR_SUP_VP_KERNEL32_ALREADY_MAPPED (-5663)
/** Process Purification Failure: NtFreeVirtualMemory failed on a chunk of
+ * executable memory which shouldn't be present in the process. */
#define VERR_SUP_VP_FREE_VIRTUAL_MEMORY_FAILED (-5664)
/** Process Purification Failure: Both NtUnmapViewOfSetion and
+ * NtProtectVirtualMemory failed to get rid of or passify an non-image
+ * executable mapping. */
#define VERR_SUP_VP_UNMAP_AND_PROTECT_FAILED (-5665)
/** Process Purification Failure: Unknown memory type of executable memory. */
#define VERR_SUP_VP_UNKNOWN_MEM_TYPE (-5666)
/** The image file is not owned by TrustedInstaller it should be. */
#define VERR_SUP_VP_NOTOwned_BY_TRUSTED_INSTALLER (-5667)
/** The image is outside the expected range. */
#define VERR_SUP_VP_IMAGE_TOO_BIG (-5668)
/** Stub process not found so it cannot be revalidated when vboxdrv is opened by
 * the VM process. */
#define VERR_SUP_VP_STUB_NOT_FOUND (-5669)
/** Error opening the stub process for revalidation when vboxdrv is opened by
 * the VM process. */
#define VERR_SUP_VP_STUB_OPEN_ERROR (-5670)
/** Stub process thread not found during revalidation upon vboxdrv opening by
 * the VM process. */
#define VERR_SUP_VP_STUB_THREAD_NOT_FOUND (-5671)
/** Error opening the stub process thread for revalidation when vboxdrv is
 * opened by the VM process. */
#define VERR_SUP_VP_STUB_THREAD_OPEN_ERROR (-5672)
/** Process Purification Failure: NtAllocateVirtualMemory failed to get us
 * suitable replacement memory for a chunk of executable memory that
 * shouldn't be present in our process. (You will only see this message if you
 * got potentially buggy anti-virus software installed.) */
#define VERR_SUP_VP_REPLACE_VIRTUAL_MEMORY_FAILED (-5673)
/** Error getting the file mode. */
#define VERR_SUP_VP_FILE_MODE_ERROR (-5674)
/** Error creating an event semaphore for used with asynchronous reads. */
#define VERR_SUP_VP_CREATE_READ_EVT_SEM_FAILED (-5675)
/** Undesirable module. */
#define VERR_SUP_VP_UNDESIRABLE_MODULE (-5676)

/** @} */

/** @} */

/** VBox Extension Pack Status Codes */
#define VERR_EXTPACK_UNSUPPORTED_HOST_UNINSTALL (-6000)
/** The VirtualBox version is not supported by one of the extension packs.
 * You have probably upgraded VirtualBox recently. Please upgrade the
 * extension packs to versions compatible with this VirtualBox release. */
#define VERR_EXTPACK_VBOX_VERSION_MISMATCH (-6001)

/** @} */

/** VBox Guest Control Status Codes */
#define VERR_GSTCTL_GUEST_ERROR (-6200)

/** @} */

/** @} */
+/** A guest control object has changed its overall status. */
+#define VWRN_GSTCTL_OBJECTSTATE_CHANGED 6220
+/** Guest process is in a wrong state. */
+#define VERR_GSTCTL_PROCESS_WRONG_STATE (-6221)
+/** Started guest process terminated with an exit code <> 0. */
+#define VWRN_GSTCTL_PROCESS_EXIT_CODE 6221
+/** @} */
+
+/** @} */
+
+/** @name GIM Status Codes */
+ * @@
+ * +/** No GIM provider is configured for this VM. */
+#define VERR_GIM_NOT_ENABLED (-6300)
+/** GIM internal processing error \#1. */
+#define VERR_GIM_IPE_1 (-6301)
+/** GIM internal processing error \#2. */
+#define VERR_GIM_IPE_2 (-6302)
+/** GIM internal processing error \#3. */
+#define VERR_GIM_IPE_3 (-6303)
+ /** The GIM provider does not support any paravirtualized TSC. */
+#define VERR_GIM_PVTSC_NOT_AVAILABLE (-6304)
+ /** The guest has not setup use of the paravirtualized TSC. */
+#define VERR_GIM_PVTSC_NOT_ENABLED (-6305)
+ /** Unknown or invalid GIM provider. */
+#define VERR_GIM_INVALID_PROVIDER (-6306)
+ /** GIM generic operation failed. */
+#define VERR_GIM_OPERATION_FAILED (-6307)
+ /** The GIM provider does not support any hypercalls. */
+#define VERR_GIM_HYPERCALLS_NOT_AVAILABLE (-6308)
+ /** The guest has not setup use of the hypercalls. */
+#define VERR_GIM_HYPERCALLS_NOT_ENABLED (-6309)
+ /** The GIM device is not registered with GIM when it ought to be. */
+#define VERR_GIM_DEVICE_NOT_REGISTERED (-6310)
+ /** Hypercall cannot be enabled/performed due to access/permissions/CPL. */
+#define VERR_GIM_HYPERCALL_ACCESS_DENIED (-6311)
+ /** Failed to read to a memory region while performing a hypercall. */
+#define VERR_GIM_HYPERCALL_MEMORY_READ_FAILED (-6312)
+ /** Failed to write to a memory region while performing a hypercall. */
+#define VERR_GIM_HYPERCALL_MEMORY_WRITE_FAILED (-6313)
+ /** Generic hypercall operation failure. */
+#define VERR_GIM_HYPERCALL_FAILED (-6314)
+ /** No debug connection configured. */
+#define VERR_GIM_NO_DEBUG_CONNECTION (-6315)
+ /** Return to ring-3 to perform the hypercall there. */
+#define VINF_GIM_R3_HYPERCALL 6316
+ /** Continuing hypercall at the same RIP, continue guest execution. */
+#define VINF_GIM_HYPERCALL_CONTINUING 6317
+/** Instruction that triggers the hypercall is invalid/unrecognized. */
+#define VERR_GIM_INVALID_HYPERCALL_INSTR (-6318)
+/** @} */
+
+#define VERR_GIM_INVALID_HYPERCALL_INSTR (-6318)
+
+/** @} */

+/** @name Main API Status Codes */
+ * @{ */
+ /** The configuration constructor in main failed due to a COM error. Check */
+ * the release log of the VM for further details. */
+#define VERR_MAIN_CONFIG_CONSTRUCTOR_COM_ERROR (-6400)
+/** The configuration constructor in main failed due to an internal consistency */
+ * error. Consult the release log of the VM for further details. */
+#define VERR_MAIN_CONFIG_CONSTRUCTOR_IPE (-6401)
+/** @} */
+
+/** @name VBox Drag and Drop Status Codes */
+ * @{ */
+ /** Guest side reported an error. */
+#define VERR_GSTDND_GUEST_ERROR (-6500)
+/** @} */
+
+/** @name Audio Status Codes */
+ * @{ */
+ /** Host backend couldn't be initialized. Happen if the audio server is not */
+ * reachable, audio hardware is not available or similar. We should use the */
+ * NULL audio driver. */
+#define VERR_AUDIO_BACKEND_INIT_FAILED (-6600)
+/** No free input streams. */
+#define VERR_AUDIO_NO_FREE_INPUT_STREAMS (-6601)
+/** No free output streams. */
+#define VERR_AUDIO_NO_FREE_OUTPUT_STREAMS (-6602)
+/** Pending stream disable operation in progress. */
+#define VERR_AUDIO_STREAM_PENDING_DISABLE (-6603)
+/** There is more data available. */
+ * This can happen due to a buffer wraparound of a buffer read/write operation. */
+#define VINF_AUDIO_MORE_DATA_AVAILABLE (6604)
+/** @} */
+
+/** @name APIC Status Codes */
+ * @{ */
+ /** No pending interrupt. */
```c
#define VERR_APIC_INTR_NOT_PENDING (-6700)
+/** Pending interrupt is masked by TPR. */
#define VERR_APIC_INTR_MASKED_BY_TPR (-6701)
+/** APIC did not accept the interrupt. */
#define VERR_APIC_INTR_DISCARDED (-6702)
+/** @} */
+
+/* SED-END */
+
+/** @} */
+
+endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/log.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/VBox/log.h
@@ -0,0 +1,1208 @@
+/** @file
+ * VirtualBox - Logging.
+ */
+
+#ifndef ___VBox_log_h
+#define ___VBox_log_h
+
+/* Set the default loggroup.
+ */
```

+ifndef LOG_GROUP
++ define LOG_GROUP LOG_GROUP_DEFAULT
+endif
+
+include <iprt/log.h>
+
+/** @defgroup grp_rt_vbox_log VBox Logging
+ * @ingroup grp_rt_vbox
+ * @}
+ */
+
+/** PC port for debug output */
+define RTLOG_DEBUG_PORT 0x504
+
+/**
+ * VirtualBox Logging Groups.
+ * (Remember to update LOGGROUP_NAMES!)
+ *
+ * @remark It should be pretty obvious, but just to have
+ * mentioned it, the values are sorted alphabetically (using the
+ * english alphabet) except for _DEFAULT which is always first.
+ *
+ * If anyone might be wondering what the alphabet looks like:
+ * A B C D E F G H I J K L M N O P Q R S T U V W X Y Z _
+ */
+typedef enum LOGGROUP
+{
+    /** The default VBox group. */
+    LOG_GROUP_DEFAULT = RTLOGGROUP_FIRST_USER,
+    /** Audio mixer group. */
+    LOG_GROUP_AUDIO_MIXER,
+    /** Audio mixer buffer group. */
+    LOG_GROUP_AUDIO_MIXER_BUFFER,
+    /** Auto-logon group. */
+    LOG_GROUP_AUTOLOGON,
+    /** CFGM group. */
+    LOG_GROUP_CFGM,
+    /** CPUM group. */
+    LOG_GROUP_CPUM,
+    /** CSAM group. */
+    LOG_GROUP_CSAM,
+    /** Debug Console group. */
+    LOG_GROUP_DBGC,
+    /** DBGF group. */
+    LOG_GROUPDBGF,
+    /** DBGF info group. */
+    LOG_GROUPDBGF_INFO,
+ /** The debugger gui. */
+ LOG_GROUP_DBGG,
+ /** Generic Device group. */
+ LOG_GROUP_DEV,
+ /** AC97 Device group. */
+ LOG_GROUP_DEV_AC97,
+ /** ACPI Device group. */
+ LOG_GROUP_DEV_ACPI,
+ /** AHCI Device group. */
+ LOG_GROUP_DEV_AHCI,
+ /** APIC Device group. */
+ LOG_GROUP_DEV_APIC,
+ /** BusLogic SCSI host adapter group. */
+ LOG_GROUP_DEV_BUSLOGIC,
+ /** DMA Controller group. */
+ LOG_GROUP_DEV_DMA,
+ /** Gigabit Ethernet Device group. */
+ LOG_GROUP_DEV_E1000,
+ /** Extensible Firmware Interface Device group. */
+ LOG_GROUP_DEV_EFI,
+ /** USB EHCI Device group. */
+ LOG_GROUP_DEV_EHCI,
+ /** Floppy Controller Device group. */
+ LOG_GROUP_DEV_FDC,
+ /** Guest Interface Manager Device group. */
+ LOG_GROUP_DEV_GIM,
+ /** HDA Device group. */
+ LOG_GROUP_DEV_HDA,
+ /** HDA Codec Device group. */
+ LOG_GROUP_DEV_HDA_CODEC,
+ /** High Precision Event Timer Device group. */
+ LOG_GROUP_DEV_HPET,
+ /** IDE Device group. */
+ LOG_GROUP_DEV_IDE,
+ /** I/O APIC Device group. */
+ LOG_GROUP_DEV_IOAPIC,
+ /** The internal networking IP stack Device group. */
+ LOG_GROUP_DEV_INIP,
+ /** KeyBoard Controller Device group. */
+ LOG_GROUP_DEV_KBD,
+ /** Low Pin Count Device group. */
+ LOG_GROUP_DEV_LPC,
+ /** LsiLogic SCSI controller Device group. */
+ LOG_GROUP_DEV_LSILOGICSCSI,
+ /** NVMe Device group. */
+ LOG_GROUP_DEV_NVME,
+ /** USB OHCI Device group. */
+ LOG_GROUP_DEV_OHCI,
+ /** Parallel Device group */
+ LOG_GROUP_DEV_PARALLEL,
+ /** PC Device group */
+ LOG_GROUP_DEV_PC,
+ /** PC Architecture Device group */
+ LOG_GROUP_DEV_PC_ARCH,
+ /** PC BIOS Device group */
+ LOG_GROUP_DEV_PC_BIOS,
+ /** PCI Device group */
+ LOG_GROUP_DEV_PCI,
+ /** PCI Raw Device group */
+ LOG_GROUP_DEV_PCI_RAW,
+ /** PCNet Device group */
+ LOG_GROUP_DEV_PCNET,
+ /** PIC Device group */
+ LOG_GROUP_DEV_PIC,
+ /** PIT Device group */
+ LOG_GROUP_DEV_PIT,
+ /** RTC Device group */
+ LOG_GROUP_DEV_RTC,
+ /** SB16 Device group */
+ LOG_GROUP_DEV_SB16,
+ /** Serial Device group */
+ LOG_GROUP_DEV_SERIAL,
+ /** System Management Controller Device group */
+ LOG_GROUP_DEV_SMC,
+ /** VGA Device group */
+ LOG_GROUP_DEV_VGA,
+ /** Virtio PCI Device group */
+ LOG_GROUP_DEV_VIRTIO,
+ /** Virtio Network Device group */
+ LOG_GROUP_DEV_VIRTIO_NET,
+ /** VMM Device group */
+ LOG_GROUP_DEV_VMM,
+ /** VMM Device group for backdoor logging */
+ LOG_GROUP_DEV_VMM_BACKDOOR,
+ /** VMM Device group for logging guest backdoor logging to stderr */
+ LOG_GROUP_DEV_VMM_STDERR,
+ /** VMSVGA Device group */
+ LOG_GROUP_DEV_VMSVGA,
+ /** USB xHCI Device group */
+ LOG_GROUP_DEV_XHCI,
+ /** Disassembler group */
+ LOG_GROUP_DIS,
+ /** Generic driver group */
+ LOG_GROUP_DRV,
+ /** ACPI driver group */
+ LOG_GROUP_DRV_ACPI,
+ /** Audio driver group */
+ LOG_GROUP_DRV_AUDIO,
+ /** Block driver group. */
+ LOG_GROUP_DRV_BLOCK,
+ /** Char driver group. */
+ LOG_GROUP_DRV_CHAR,
+ /** Disk integrity driver group. */
+ LOG_GROUP_DRV_DISK_INTEGRITY,
+ /** Video Display driver group. */
+ LOG_GROUP_DRV_DISPLAY,
+ /** Floppy media driver group. */
+ LOG_GROUP_DRV_FLOPPY,
+ /** Host Audio driver group. */
+ LOG_GROUP_DRV_HOST_AUDIO,
+ /** Host Base block driver group. */
+ LOG_GROUP_DRV_HOST_BASE,
+ /** Host DVD block driver group. */
+ LOG_GROUP_DRV_HOST_DVD,
+ /** Host floppy block driver group. */
+ LOG_GROUP_DRV_HOST_FLOPPY,
+ /** Host Parallel Driver group */
+ LOG_GROUP_DRV_HOST_PARALLEL,
+ /** Host Serial Driver Group */
+ LOG_GROUP_DRV_HOST_SERIAL,
+ /** The internal networking transport driver group. */
+ LOG_GROUP_DRV_INTNET,
+ /** ISO (CD/DVD) media driver group. */
+ LOG_GROUP_DRV_ISO,
+ /** Keyboard Queue driver group. */
+ LOG_GROUP_DRV_KBD_QUEUE,
+ /** lwIP IP stack driver group. */
+ LOG_GROUP_DRV_LWIP,
+ /** Video Miniport driver group. */
+ LOG_GROUP_DRV_MINIPORT,
+ /** Mouse driver group. */
+ LOG_GROUP_DRV_MOUSE,
+ /** Mouse Queue driver group. */
+ LOG_GROUP_DRV_MOUSE_QUEUE,
+ /** Named Pipe stream driver group. */
+ LOG_GROUP_DRV_NAMEDPIPE,
+ /** NAT network transport driver group */
+ LOG_GROUP_DRV_NAT,
+ /** Raw image driver group */
+ LOG_GROUP_DRV_RAW_IMAGE,
+ /** SCSI driver group. */
+ LOG_GROUP_DRV_SCSI,
+ /** Host SCSI driver group. */
+ LOG_GROUP_DRV_SCSIHOST,
+ /** TCP socket stream driver group. */
+ LOG_GROUP_DRV_TCP,
+ /** Async transport driver group */
+ LOG_GROUP_DRV_TRANSPORT_ASYNC,
+ /** TUN network transport driver group */
+ LOG_GROUP_DRV_TUN,
+ /** UDP socket stream driver group. */
+ LOG_GROUP_DRV_UDP,
+ /** UDP tunnet network transport driver group. */
+ LOG_GROUP_DRV_UDPTUNNEL,
+ /** USB Proxy driver group. */
+ LOG_GROUP_DRV_USBPROXY,
+ /** VBoxHDD media driver group. */
+ LOG_GROUP_DRV_VBOXHDD,
+ /** VBox HDD container media driver group. */
+ LOG_GROUP_DRV_VD,
+ /** VRDE audio driver group. */
+ LOG_GROUP_DRV_VRDE_AUDIO,
+ /** Virtual Switch transport driver group */
+ LOG_GROUP_DRV_VSWITCH,
+ /** VUSB driver group */
+ LOG_GROUP_DRV_VUSB,
+ /** EM group. */
+ LOG_GROUP_EM,
+ /** FTM group. */
+ LOG_GROUP_FTM,
+ /** GIM group. */
+ LOG_GROUP_GIM,
+ /** GMM group. */
+ LOG_GROUP_GMM,
+ /** Guest control. */
+ LOG_GROUP_GUEST_CONTROL,
+ /** Guest drag’n drop. */
+ LOG_GROUP_GUEST_DND,
+ /** GUI group. */
+ LOG_GROUP_GUI,
+ /** GVMM group. */
+ LOG_GROUP_GVMM,
+ /** HGCM group */
+ LOG_GROUP_HGCM,
+ /** HGSMI group */
+ LOG_GROUP_HGSMI,
+ /** HM group. */
+ LOG_GROUP_HM,
+ /** IEM group. */
+ LOG_GROUP_IEM,
+ /** I/O buffer management group. */
+ LOG_GROUP_IOBUFMGMT,
+ /** IOM group. */
+ LOG_GROUP_IOM,
+ /** XPCOM IPC group. */
+ LOG_GROUP_IPC,
+ /** lwIP group. */
+ LOG_GROUP_LWIP,
+ /** lwIP group, api_lib.c API_LIB_DEBUG */
+ LOG_GROUP_LWIP_API_LIB,
+ /** lwIP group, api_msg.c API_MSG_DEBUG */
+ LOG_GROUP_LWIP_API_MSG,
+ /** lwIP group, etharp.c ETHARP_DEBUG */
+ LOG_GROUP_LWIP_ETHARP,
+ /** lwIP group, icmp.c ICMP_DEBUG */
+ LOG_GROUP_LWIP_ICMP,
+ /** lwIP group, igmp.c IGMP_DEBUG */
+ LOG_GROUP_LWIP_IGMP,
+ /** lwIP group, inet.c INET_DEBUG */
+ LOG_GROUP_LWIP_INET,
+ /** lwIP group, IP_DEBUG (sic!) */
+ LOG_GROUP_LWIP_IP4,
+ /** lwIP group, ip_frag.c IP_REASS_DEBUG (sic!) */
+ LOG_GROUP_LWIP_IP4_REASS,
+ /** lwIP group, IP6_DEBUG */
+ LOG_GROUP_LWIP_IP6,
+ /** lwIP group, mem.c MEM_DEBUG */
+ LOG_GROUP_LWIP_MEM,
+ /** lwIP group, memp.c MEMP_DEBUG */
+ LOG_GROUP_LWIP_MEMP,
+ /** lwIP group, netif.c NETIF_DEBUG */
+ LOG_GROUP_LWIP_NETIF,
+ /** lwIP group, pbuf.c PBUF_DEBUG */
+ LOG_GROUP_LWIP_PBUF,
+ /** lwIP group, raw.c RAW_DEBUG */
+ LOG_GROUP_LWIP_RAW,
+ /** lwIP group, sockets.c SOCKETS_DEBUG */
+ LOG_GROUP_LWIP_SOCKETS,
+ /** lwIP group, SYS_DEBUG */
+ LOG_GROUP_LWIP_SYS,
+ /** lwIP group, TCP_DEBUG */
+ LOG_GROUP_LWIP_TCP,
+ /** lwIP group, tcpip.c TCPIP_DEBUG */
+ LOG_GROUP_LWIP_TCPIP,
+ /** lwIP group, tcp_out.c TCP_OUTPUT_DEBUG */
+ LOG_GROUP_LWIP_TCP_OUTPUT,
+ /** lwIP group, TCP_QLEN_DEBUG */
+ LOG_GROUP_LWIP_TCP_QLEN,
+ /** lwIP group, TCP_RST_DEBUG */
+ LOG_GROUP_LWIP_TCP_RST,
+ /** lwIP group, TCP_RTO_DEBUG (retransmit) */
+ LOG_GROUP_LWIP_TCP_RTO,
+ /** lwIP group, tcp_in.c TCP_WND_DEBUG (window updates) */
+ LOG_GROUP_LWIP_TCP_WND,
+ /** lwIP group, timers.c TIMERS_DEBUG */
+ LOG_GROUP_LWIP_TIMERS,
+ /** lwIP group, udp.c UDP_DEBUG */
+ LOG_GROUP_LWIP_UDP,
+ /** Main group. */
+ LOG_GROUP_MAIN,
+ /** Main group, IAdditionsFacility. */
+ LOG_GROUP_MAIN_ADDITIONSFACTORY,
+ /** Main group, IAdditionsStateChangedEvent. */
+ LOG_GROUP_MAIN_ADDITIONSSTATECHANGEDEVENT,
+ /** Main group, IApliance. */
+ LOG_GROUP_MAIN_APPLIANCE,
+ /** Main group, IAudioAdapter. */
+ LOG_GROUP_MAIN_AUDIOADAPTER,
+ /** Main group, IAudioAdapterChangedEvent. */
+ LOG_GROUP_MAIN_AUDIOADAPTERCHANGEDEVENT,
+ /** Main group, IBandwidthControl. */
+ LOG_GROUP_MAIN_BANDWIDTHCONTROL,
+ /** Main group, IBandwidthGroup. */
+ LOG_GROUP_MAIN_BANDWIDTHGROUP,
+ /** Main group, IBandwidthGroupChangedEvent. */
+ LOG_GROUP_MAIN_BANDWIDTHGROUPCHANGEDEVENT,
+ /** Main group. IBIOSSettings. */
+ LOG_GROUP_MAIN_BIOSSETTINGS,
+ /** Main group, ICanShowWindowEvent. */
+ LOG_GROUP_MAIN_CANSHOWWINDOWEVENT,
+ /** Main group, ICertificate. */
+ LOG_GROUP_MAIN_CERTIFICATE,
+ /** Main group, IClipboardModeChangedEvent. */
+ LOG_GROUP_MAIN_CLIPBOARDMODECHANGEDEVENT,
+ /** Main group, IConsole. */
+ LOG_GROUP_MAIN_CONSOLE,
+ /** Main group. ICPUChangedEvent. */
+ LOG_GROUP_MAIN_CPUCHANGEDEVENT,
+ /** Main group. ICPUExecutionCapChangedEvent. */
+ LOG_GROUP_MAIN_CPUEXECUTIONCAPCHANGEDEVENT,
+ /** Main group. IDHCPServer. */
+ LOG_GROUP_MAIN_DHCPSERVER,
/** Main group, IDirectory. */
LOG_GROUP_MAIN_DIRECTORY,
/** Main group, IDisplay. */
LOG_GROUP_MAIN_DISPLAY,
/** Main group, IDisplaySourceBitmap. */
LOG_GROUP_MAIN_DISPLAYSOURCEBITMAP,
/** Main group, IDnDBase. */
LOG_GROUP_MAIN_DNDBASE,
/** Main group, IDnDModeChangedEvent. */
LOG_GROUP_MAIN_DNDMODECHANGEDEVENT,
/** Main group, IDnDSource. */
LOG_GROUP_MAIN_DNDSOURCE,
/** Main group, IDnDTarget. */
LOG_GROUP_MAIN_DNDTARGET,
/** Main group, IEmulatedUSB. */
LOG_GROUP_MAIN_EMULATEDUSB,
/** Main group, IEvent. */
LOG_GROUP_MAIN_EVENT,
/** Main group, IEventListener. */
LOG_GROUP_MAIN_EVENTLISTENER,
/** Main group, IEventSource. */
LOG_GROUP_MAIN_EVENTSOURCE,
/** Main group, IEventSourceChangedEvent. */
LOG_GROUP_MAIN_EVENTSOURCECHANGEDEVENT,
/** Main group, IExtPack. */
LOG_GROUP_MAIN_EXTPACK,
/** Main group, IExtPackBase. */
LOG_GROUP_MAIN_EXTPACKBASE,
/** Main group, IExtPackFile. */
LOG_GROUP_MAIN_EXTPACKFILE,
/** Main group, IExtPackManager. */
LOG_GROUP_MAIN_EXTPACKMANAGER,
/** Main group, IExtPackPlugIn. */
LOG_GROUP_MAIN_EXTPACKPLUGIN,
/** Main group, IExtraDataCanChangeEvent. */
LOG_GROUP_MAIN_EXTRADATACANCHANGEEVENT,
/** Main group, IExtraDataChangedEvent. */
LOG_GROUP_MAIN_EXTRADATACHANGEDEVENT,
/** Main group, IFile. */
LOG_GROUP_MAIN_FILE,
/** Main group, IFramebuffer. */
LOG_GROUP_MAIN_FRAMEBUFFER,
/** Main group, IFramebufferOverlay. */
LOG_GROUP_MAIN_FRAMEBUFFEROVERLAY,
/** Main group, IFsObjInfo. */
LOG_GROUP_MAIN_FSOBJINFO,
/** Main group, IGuest. */
LOG_GROUP_MAIN_GUEST,
/** Main group, IGuestDirectory. */
+ LOG_GROUP_MAIN_GUESTDIRECTORY,
/** Main group, IGuestDnDSource. */
+ LOG_GROUP_MAIN_GUESTDNDSOURCE,
/** Main group, IGuestDnDTarget. */
+ LOG_GROUP_MAIN_GUESTDNDTARGET,
/** Main group, IGuestErrorInfo. */
+ LOG_GROUP_MAIN_GUESTERRORINFO,
/** Main group, IGuestFile. */
+ LOG_GROUP_MAIN_GUESTFILE,
/** Main group, IGuestFileEvent. */
+ LOG_GROUP_MAIN_GUESTFILEEVENT,
/** Main group, IGuestFileIOEvent. */
+ LOG_GROUP_MAIN_GUESTFILEIOEVENT,
/** Main group, IGuestFileOffsetChangedEvent. */
+ LOG_GROUP_MAIN_GUESTFILEOFFSETCHANGEDEVENT,
/** Main group, IGuestFileReadEvent. */
+ LOG_GROUP_MAIN_GUESTFILEREADEVENT,
/** Main group, IGuestFileRegisteredEvent. */
+ LOG_GROUP_MAIN_GUESTFILEREGISTEREDEVENT,
/** Main group, IGuestFileStateChangedEvent. */
+ LOG_GROUP_MAIN_GUESTFILESTATECHANGEDEVENT,
/** Main group, IGuestFileWriteEvent. */
+ LOG_GROUP_MAIN_GUESTFILEWRITEEVENT,
/** Main group, IGuestFsObjInfo. */
+ LOG_GROUP_MAIN_GUESTFSOBJINFO,
/** Main group, IGuestKeyboardEvent. */
+ LOG_GROUP_MAIN_GUESTKEYBOARDEVENT,
/** Main group, IGuestMonitorChangedEvent. */
+ LOG_GROUP_MAIN_GUESTMONITORCHANGEDEVENT,
/** Main group, IGuestMouseEvent. */
+ LOG_GROUP_MAIN_GUESTMOUSEEVENT,
/** Main group, IGuestMultiTouchEvent. */
+ LOG_GROUP_MAIN_GUESTMULTITOUCEVENT,
/** Main group, IGuestOSType. */
+ LOG_GROUP_MAIN_GUESTOSTYPE,
/** Main group, IGuestProcess. */
+ LOG_GROUP_MAIN_GUESTPROCESS,
/** Main group, IGuestProcessEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSEVENT,
/** Main group, IGuestProcessInputNotifyEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSINPUTNOTIFYEVENT,
/** Main group, IGuestProcessIOEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSIOEVENT,
/** Main group, IGuestProcessOutputEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSOUTPUTEVENT,
/** Main group, IGuestProcessRegisteredEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSREGISTEREDEVENT,
+ /** Main group, IGuestProcessStateChangedEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSSTATECHANGEDEVENT,
+ /** Main group, IGuestPropertyChangedEvent. */
+ LOG_GROUP_MAIN_GUESTPROPERTYCHANGEDEVENT,
+ /** Main group, IGuestScreenInfo. */
+ LOG_GROUP_MAIN_GUESTSCREENINFO,
+ /** Main group, IGuestSession. */
+ LOG_GROUP_MAIN_GUESTSESSION,
+ /** Main group, IGuestSessionEvent. */
+ LOG_GROUP_MAIN_GUESTSESSIONEVENT,
+ /** Main group, IGuestSessionRegisteredEvent. */
+ LOG_GROUP_MAIN_GUESTSESSIONREGISTERDEVENT,
+ /** Main group, IGuestSessionStateChangedEvent. */
+ LOG_GROUP_MAIN_GUESTSESSIONSTATECHANGEDEVENT,
+ /** Main group, IGuestUserStateChangedEvent. */
+ LOG_GROUP_MAIN_GUESTUSERSTATECHANGEDEVENT,
+ /** Main group, IHost. */
+ LOG_GROUP_MAIN_HOST,
+ /** Main group, IHostNameResolutionConfigurationChangeEvent. */
+ LOG_GROUP_MAIN_HOSTNAMERESOLUTIONCONFIGURATIONCHANGEEVENT,
+ /** Main group, IHostNetworkInterface. */
+ LOG_GROUP_MAIN_HOSTNETWORKINTERFACE,
+ /** Main group, IHostPCIDevicePlugEvent. */
+ LOG_GROUP_MAIN_HOSTPCIDEVICEPLUGEVENT,
+ /** Main group, IHostUSBDevice. */
+ LOG_GROUP_MAIN_HOSTUSBDEVICE,
+ /** Main group, IHostUSBDeviceFilter. */
+ LOG_GROUP_MAIN_HOSTUSBDEVICEFILTER,
+ /** Main group, IHostVideoInputDevice. */
+ LOG_GROUP_MAIN_HOSTVIDEOINPUTDEVICE,
+ /** Main group, IInternalMachineControl. */
+ LOG_GROUP_MAIN_INTERNALMACHINECONTROL,
+ /** Main group, IInternalSessionControl. */
+ LOG_GROUP_MAIN_INTERNALSESSIONCONTROL,
+ /** Main group, IKeyboard. */
+ LOG_GROUP_MAIN_KEYBOARD,
+ /** Main group, IKeyboardLedsChangedEvent. */
+ LOG_GROUP_MAIN_KEYBOARDLEDSCHANGEDEVENT,
+ /** Main group, IMachine. */
+ LOG_GROUP_MAIN_MACHINE,
+ /** Main group, IMachineDataChangedEvent. */
+ LOG_GROUP_MAIN_MACHINEDATACHANGEDEVENT,
+ /** Main group, IMachineDebugger. */
+ LOG_GROUP_MAIN_MACHINEDEBUGGER,
+ /** Main group, IMachineEvent. */
+ LOG_GROUP_MAIN_MACHINEEVENT,
+ /** Main group, IMachineRegisteredEvent. */
+ LOG_GROUP_MAIN_MACHINEREGISTERDEVENT,
/** Main group, IMachineStateChangedEvent. */
LOG_GROUP_MAIN_MACHINESTATECHANGEDEVENT,
/** Main group, IMedium. */
LOG_GROUP_MAIN_MEDIUM,
/** Main group, IMediumAttachment. */
LOG_GROUP_MAIN_MEDIUMATTACHMENT,
/** Main group, IMediumChangedEvent. */
LOG_GROUP_MAIN_MEDIUMCHANGEDEVENT,
/** Main group, IMediumConfigChangedEvent. */
LOG_GROUP_MAIN_MEDIUMCONFIGCHANGEDEVENT,
/** Main group, IMediumFormat. */
LOG_GROUP_MAIN_MEDIUMFORMAT,
/** Main group, IMediumRegisteredEvent. */
LOG_GROUP_MAIN_MEDIUMREGISTEREDEVENT,
/** Main group, IMouse. */
LOG_GROUP_MAIN_MOUSE,
/** Main group, IMouseCapabilityChangedEvent. */
LOG_GROUP_MAIN_MOUSECAPABILITYCHANGEDEVENT,
/** Main group, IMousePointerShape. */
LOG_GROUP_MAIN_MOUSEPOINTERSHAPE,
/** Main group, IMousePointerShapeChangedEvent. */
LOG_GROUP_MAIN_MOUSEPOINTERSHAPECHANGEDEVENT,
/** Main group, INATEngine. */
LOG_GROUP_MAIN_NATENGINE,
/** Main group, INATNetwork. */
LOG_GROUP_MAIN_NATNETWORK,
/** Main group, INATNetworkAlterEvent. */
LOG_GROUP_MAIN_NATNETWORKALTEREVENT,
/** Main group, INATNetworkChangedEvent. */
LOG_GROUP_MAIN_NATNETWORKCHANGEDEVENT,
/** Main group, INATNetworkCreationDeletionEvent. */
LOG_GROUP_MAIN_NATNETWORKCREATIONDELETIONEVENT,
/** Main group, INATNetworkPortForwardEvent. */
LOG_GROUP_MAIN_NATNETWORKPORTFORWARDEVENT,
/** Main group, INATNetworkSettingEvent. */
LOG_GROUP_MAIN_NATNETWORKSETTINGEVENT,
/** Main group, INATNetworkStartStopEvent. */
LOG_GROUP_MAIN_NATNETWORKSTARTSTOPEVENT,
/** Main group, INATRedirectEvent. */
LOG_GROUP_MAIN_NATREDIRECTEVENT,
/** Main group, INetworkAdapter. */
LOG_GROUP_MAIN_NETWORKADAPTER,
/** Main group, INetworkAdapterChangedEvent. */
LOG_GROUP_MAIN_NETWORKADAPTERCHANGEDEVENT,
/** Main group, IParallelPort. */
LOG_GROUP_MAIN_PARALLELPORT,
/** Main group, IParallelPortChangedEvent. */
LOG_GROUP_MAIN_PARALLELPORTCHANGEDEVENT,
/## Main group, IPCIAddress.
+ LOG_GROUP_MAIN_PCIADDRESS,
/## Main group, IPCDeviceAttachment.
+ LOG_GROUP_MAIN_PCIEDEVICEATTACHMENT,
/## Main group, IPerformanceCollector.
+ LOG_GROUP_MAIN_PERFORMANCECOLLECTOR,
/## Main group, IPerformanceMetric.
+ LOG_GROUP_MAIN_PERFORMANCEMETRIC,
/## Main group, IProcess.
+ LOG_GROUP_MAIN_PROCESS,
/## Main group, IProgress.
+ LOG_GROUP_MAIN_PROGRESS,
/## Main group, IProgressEvent.
+ LOG_GROUP_MAIN_PROGRESSEVENT,
/## Main group, IProgressPercentageChangedEvent.
+ LOG_GROUP_MAIN_PROGRESSPERCENTAGECHANGEDEVENT,
/## Main group, IProgressTaskCompletedEvent.
+ LOG_GROUP_MAIN_PROGRESSTASKCOMPLETEDEVENT,
/## Main group, IReusableEvent.
+ LOG_GROUP_MAIN_REUSEABLEEVENT,
/## Main group, IRuntimeErrorEvent.
+ LOG_GROUP_MAIN_RUNTIMEEROEREVENT,
/## Main group, ISerialPort.
+ LOG_GROUP_MAIN_SERIALPORT,
/## Main group, ISerialPortChangedEvent.
+ LOG_GROUP_MAIN_SERIALPORTCHANGEDEVENT,
/## Main group, ISession.
+ LOG_GROUP_MAIN_SESSION,
/## Main group, ISessionStateChangedEvent.
+ LOG_GROUP_MAIN_SESSIONSTATECHANGEDEVENT,
/## Main group, ISharedFolder.
+ LOG_GROUP_MAIN_SHAREDFOLDER,
/## Main group, ISharedFolderChangedEvent.
+ LOG_GROUP_MAIN_SHAREDFOLDERCHANGEDEVENT,
/## Main group, IShowWindowEvent.
+ LOG_GROUP_MAIN_SHOWWINDOWEVENT,
/## Main group, ISnapshot.
+ LOG_GROUP_MAIN_SNAPSHOT,
/## Main group, ISnapshotChangedEvent.
+ LOG_GROUP_MAIN_SNAPSHOTCHANGEDEVENT,
/## Main group, ISnapshotDeletedEvent.
+ LOG_GROUP_MAIN_SNAPSHOTDELETEDEVENT,
/## Main group, ISnapshotEvent.
+ LOG_GROUP_MAIN_SNAPSHOTEVENT,
/## Main group, ISnapshotRestoredEvent.
+ LOG_GROUP_MAIN_SNAPSHOTRESTOREDEVENT,
/## Main group, ISnapshotRestoredEvent.
+ LOG_GROUP_MAIN_SNAPSHOTTAKENEVENT,
+ /** Main group, IStateChangedEvent. */
+ LOG_GROUP_MAIN_STATECHANGEDEVENT,
+ /** Main group, IStorageController. */
+ LOG_GROUP_MAIN_STORAGECONTROLLER,
+ /** Main group, IStorageControllerChangedEvent. */
+ LOG_GROUP_MAIN_STORAGECONTROLLERCHANGEDEVENT,
+ /** Main group, IStorageDeviceChangedEvent. */
+ LOG_GROUP_MAIN_STORAGEDEVICECHANGEDEVENT,
+ /** Main group, ISystemProperties. */
+ LOG_GROUP_MAIN_SYSTEMPROPERTIES,
+ /** Main group, IToken. */
+ LOG_GROUP_MAIN_TOKEN,
+ /** Main group, IUnattended. */
+ LOG_GROUP_MAIN_UNATTENDED,
+ /** Main group, IUSBController. */
+ LOG_GROUP_MAIN_USBCONTROLLER,
+ /** Main group, IUSBControllerChangedEvent. */
+ LOG_GROUP_MAIN_USBCONTROLLERCHANGEDEVENT,
+ /** Main group, IUSBDevice. */
+ LOG_GROUP_MAIN_USBDEVICE,
+ /** Main group, IUSBDeviceFilter. */
+ LOG_GROUP_MAIN_USBDEVICEFILTER,
+ /** Main group, IUSBDeviceFilters. */
+ LOG_GROUP_MAIN_USBDEVICEFILTERS,
+ /** Main group, IUSBDeviceStateChangedEvent. */
+ LOG_GROUP_MAIN_USBDEVICESTATECHANGEDEVENT,
+ /** Main group, IUSBProxyBackend. */
+ LOG_GROUP_MAIN_USBPROXYBACKEND,
+ /** Main group, IVBoxSVC. */
+ LOG_GROUP_MAIN_VBOXSVC,
+ /** Main group, IVBoxSVCAvailabilityChangedEvent. */
+ LOG_GROUP_MAIN_VBOXSVC_AVAILABILITYCHANGEDEVENT,
+ /** Main group, IVetoEvent. */
+ LOG_GROUP_MAIN_VETOEVENT,
+ /** Main group, IVFSExplorer. */
+ LOG_GROUP_MAIN_VFSEXPLORER,
+ /** Main group, IVideoCaptureChangedEvent. */
+ LOG_GROUP_MAIN_VIDEOCAPTURECHANGEDEVENT,
+ /** Main group, IVirtualBox. */
+ LOG_GROUP_MAIN_VIRTUALBOX,
+ /** Main group, IVirtualBoxClient. */
+ LOG_GROUP_MAIN_VIRTUALBOXCLIENT,
+ /** Main group, IVirtualBoxSDS. */
+ LOG_GROUP_MAIN_VIRTUALBOXSDS,
+ /** Main group, IVirtualSystemDescription. */
+ LOG_GROUP_MAIN_VIRTUALSYSTEMDESCRIPTION,
+ /** Main group, VMM device interfaces. */
+ LOG_GROUP_MAIN_VMMDEVINTERFACES,
+ /** Main group. IVRDEServer. */
+ LOG_GROUP_MAIN_VRDESERVER,
+ /** Main group. IVRDEServerChangedEvent. */
+ LOG_GROUP_MAIN_VRDESERVERCHANGEDEVENT,
+ /** Main group. IVRDEServerInfo. */
+ LOG_GROUP_MAIN_VRDESERVERINFO,
+ /** Main group. IVRDEServerInfoChangedEvent. */
+ LOG_GROUP_MAIN_VRDESERVERINFOCHANGEDEVENT,
+ /** Misc. group intended for external use only. */
+ LOG_GROUP_MISC,
+ /** MM group. */
+ LOG_GROUP_MM,
+ /** MM group. */
+ LOG_GROUP_MM_HEAP,
+ /** MM group. */
+ LOG_GROUP_MM_HYPER,
+ /** MM Hypervisor Heap group. */
+ LOG_GROUP_MM_HYPER_HEAP,
+ /** MM Physical/Ram group. */
+ LOG_GROUP_MM_PHYS,
+ /** MM Page pool group. */
+ LOG_GROUP_MM_POOL,
+ /** The NAT service group */
+ LOG_GROUP_NAT_SERVICE,
+ /** The network adaptor driver group. */
+ LOG_GROUP_NET_ADP_DRV,
+ /** The network filter driver group. */
+ LOG_GROUP_NET_FLT_DRV,
+ /** The common network service group */
+ LOG_GROUP_NET_SERVICE,
+ /** Network traffic shaper driver group. */
+ LOG_GROUP_NET_SHAPER,
+ /** PATM group. */
+ LOG_GROUP_PATM,
+ /** PDM group. */
+ LOG_GROUP_PDM,
+ /** PDM Async completion group. */
+ LOG_GROUP_PDM_ASYNC_COMPLETION,
+ /** PDM Block cache group. */
+ LOG_GROUP_PDM_BLK_CACHE,
+ /** PDM Device group. */
+ LOG_GROUP_PDM_DEVICE,
+ /** PDM Driver group. */
+ LOG_GROUP_PDM_DRIVER,
+ /** PDM Loader group. */
+ LOG_GROUP_PDM_LDR,
+ /** PDM Loader group. */
+ LOG_GROUP_PDM_QUEUE,
+ /** PGM group. */
+ LOG_GROUP_PGM,
+ /** PGM dynamic mapping group. */
+ LOG_GROUP_PGM_DYNMAP,
+ /** PGM physical group. */
+ LOG_GROUP_PGM_PHYS,
+ /** PGM physical access group. */
+ LOG_GROUP_PGM_PHYS_ACCESS,
+ /** PGM shadow page pool group. */
+ LOG_GROUP_PGM_POOL,
+ /** PGM shared paging group. */
+ LOG_GROUP_PGM_SHARED,
+ /** REM group. */
+ LOG_GROUP_REM,
+ /** REM disassembly handler group. */
+ LOG_GROUP_REM_DISAS,
+ /** REM access handler group. */
+ LOG_GROUP_REM_INITIALIZER,
+ /** REM I/O port access group. */
+ LOG_GROUP_REM_IOPORT,
+ /** REM MMIO access group. */
+ LOG_GROUP_REM_MMIO,
+ /** REM Printf. */
+ LOG_GROUP_REM_PRINTF,
+ /** REM running group. */
+ LOG_GROUP_REM_RUN,
+ /** SELM group. */
+ LOG_GROUP_SELM,
+ /** Shared clipboard host service group. */
+ LOG_GROUP_SHARED_CLIPBOARD,
+ /** Chromium OpenGL host service group. */
+ LOG_GROUP_SHARED_CROPENGL,
+ /** Shared folders host service group. */
+ LOG_GROUP_SHARED_FOLDERS,
+ /** OpenGL host service group. */
+ LOG_GROUP_SHARED_OPENGL,
+ /** The internal networking service group. */
+ LOG_GROUP_SRV_INTNET,
+ /** SSM group. */
+ LOG_GROUP_SSM,
+ /** STAM group. */
+ LOG_GROUP_STAM,
+ /** SUP group. */
+ LOG_GROUP_SUP,
+ /** SUPport driver group. */
+ LOG_GROUP_SUP_DRV,
+ /** TM group. */
+ LOG_GROUP_TM,
+ /** TRPM group. */
+ LOG_GROUP_TRPM,
+ /** USB cardreader group. */
+ LOG_GROUP_USB_CARDREADER,
+ /** USB driver group. */
+ LOG_GROUP_USB_DRV,
+ /** USBFilter group. */
+ LOG_GROUP_USB_FILTER,
+ /** USB keyboard device group. */
+ LOG_GROUP_USB_KBD,
+ /** USB mouse/tablet device group. */
+ LOG_GROUP_USB_MOUSE,
+ /** MSD USB device group. */
+ LOG_GROUP_USB_MSD,
+ /** USB remote support. */
+ LOG_GROUP_USB_REMOTE,
+ /** USB webcam. */
+ LOG_GROUP_USB_WEBCAM,
+ /** VBox Guest Additions Driver (VBoxGuest). */
+ LOG_GROUP_VGDRV,
+ /** VBox Guest Additions Library. */
+ LOG_GROUP_VBGL,
+ /** Generic virtual disk layer. */
+ LOG_GROUP_VD,
+ /** CUE/BIN virtual disk backend. */
+ LOG_GROUP_VD_CUE,
+ /** DMG virtual disk backend. */
+ LOG_GROUP_VD_DMG,
+ /** iSCSI virtual disk backend. */
+ LOG_GROUP_VD_ISCSI,
+ /** Parallels HDD virtual disk backend. */
+ LOG_GROUP_VD_PARALLELS,
+ /** QCOW virtual disk backend. */
+ LOG_GROUP_VD_QCOW,
+ /** QED virtual disk backend. */
+ LOG_GROUP_VD_QED,
+ /** Raw virtual disk backend. */
+ LOG_GROUP_VD_RAW,
+ /** VDI virtual disk backend. */
+ LOG_GROUP_VD_VDI,
+ /** VHD virtual disk backend. */
+ LOG_GROUP_VD_VHD,
+ /** VHDX virtual disk backend. */
+ LOG_GROUP_VD_VHDX,
+ /** VMDK virtual disk backend. */
+ LOG_GROUP_VD_VMDK,
+ /** VM group. */
+ LOG_GROUP_VM,
/** VMM group. */
+ LOG_GROUP_VMM,
+ /** VRDE group */
+ LOG_GROUP_VRDE,
+ /** VRDP group */
+ LOG_GROUP_VRDP,
+ /** VSCSI group */
+ LOG_GROUP_VSCSI,
+ /** Webservice group. */
+ LOG_GROUP_WEBSERVICE
+ } VBOX_LOGGROUP;
+
+
+@def VBOX_LOGGROUP_NAMES
+ * VirtualBox Logging group names.
+ *
+ * Must correspond 100% to LOGGROUP!
+ * Don't forget commas!
+ *
+ * @remark It should be pretty obvious, but just to have
+ * mentioned it, the values are sorted alphabetically (using the
+ * english alphabet) except for _DEFAULT which is always first.
+ *
+ * If anyone might be wondering what the alphabet looks like:
+ * 
+ #define VBOX_LOGGROUP_NAMES
+ |
+ + RT_LOGGROUP_NAMES, \ 
+ + "DEFAULT", \ 
+ + "AUDIO_MIXER", \ 
+ + "AUDIO_MIXER_BUFFER", \ 
+ + "AUTOLOGON", \ 
+ + "CFGM", \ 
+ + "CPUM", \ 
+ + "CSAM", \ 
+ + "DBGC", \ 
+ + "DBGF", \ 
+ + "DBGF_INFO", \ 
+ + "DBGG", \ 
+ + "DEV", \ 
+ + "DEV_AC97", \ 
+ + "DEV_ACPI", \ 
+ + "DEV_AHCI", \ 
+ + "DEV_APIC", \ 
+ + "DEV_BUSLOGIC", \ 
+ + "DEV_DMA", \
+ "DRV_HOST_DVD",
+ "DRV_HOST_FLOPPY",
+ "DRV_HOST_PARALLEL",
+ "DRV_HOST_SERIAL",
+ "DRV_INTNET",
+ "DRV_ISO",
+ "DRV_KBD_QUEUE",
+ "DRV_LWIP",
+ "DRV_MINIPORT",
+ "DRV_MOUSE",
+ "DRV_MOUSE_QUEUE",
+ "DRV_NAMEDPIPE",
+ "DRV_NAT",
+ "DRV_RAW_IMAGE",
+ "DRV_SCSI",
+ "DRV_SCSIHOST",
+ "DRV_TCP",
+ "DRV_TRANSPORT_ASYNC",
+ "DRV_TUN",
+ "DRV_UDP",
+ "DRV_UDPTUNNEL",
+ "DRV_USBPROXY",
+ "DRV_VBOXHDD",
+ "DRV_VD",
+ "DRV_VRDE_AUDIO",
+ "DRV_VSWITCH",
+ "DRV_VUSB",
+ "EM",
+ "FTM",
+ "GIM",
+ "GMM",
+ "GUEST_CONTROL",
+ "GUEST_DND",
+ "GUI",
+ "GVMM",
+ "HGCM",
+ "HGSMI",
+ "HM",
+ "IEM",
+ "IOBUFMGMT",
+ "IOM",
+ "IPC",
+ "LWIP",
+ "LWIP_API_LIB",
+ "LWIP_API_MSG",
+ "LWIP_ETHARP",
+ "LWIP_ICMP",
+ "LWIP_IGMP"
+ "LWIP_INET",  \
+ "LWIP_IP4",  \
+ "LWIP_IP4_REASS",  \
+ "LWIP_IP6",  \
+ "LWIP_MEM",  \
+ "LWIP_MEMP",  \
+ "LWIP_NETIF",  \
+ "LWIP_PBUF",  \
+ "LWIP_RAW",  \
+ "LWIP SOCKETS",  \
+ "LWIP_SYS",  \
+ "LWIP_TCP",  \
+ "LWIP_TCP_CWND", \
+ "LWIP_TCP_CWND",  \
+ "LWIP_TCP CWND",  \
+ "LWIP_TCP FR",  \
+ "LWIP_TCP_INPUT",  \
+ "LWIP_TCP_OUTPUT",  \
+ "LWIP_TCP_QLEN",  \
+ "LWIP_TCP_RST",  \
+ "LWIP_TCP RTO",  \
+ "LWIP_TCP WND",  \
+ "LWIP_TIMERS",  \
+ "LWIP_UDP",  \
+ "MAIN",  \
+ "MAIN ADDITIONS FACILITY", \n+ "MAIN ADDITIONS STATE CHANGE EVENT", \n+ "MAIN APPLIANCE", \n+ "MAIN AUDIO ADAPTER", \n+ "MAIN AUDIO ADAPTER CHANGE EVENT", \n+ "MAIN BANDWIDTH CONTROL", \n+ "MAIN BANDWIDTH GROUP", \n+ "MAIN BANDWIDTH GROUP CHANGE EVENT", \n+ "MAIN BIOS SETTINGS", \n+ "MAIN CAN SHOW WINDOW EVENT", \n+ "MAIN CERTIFICATE", \n+ "MAIN CLIPBOARD MODE CHANGE EVENT", \n+ "MAIN CONSOLE", \n+ "MAIN CPU CHANGE EVENT", \n+ "MAIN CPU EXECUTION CAP CHANGE EVENT", \n+ "MAIN DHCP SERVER", \n+ "MAIN DIRECTORY", \n+ "MAIN DISPLAY", \n+ "MAIN DISPLAY SOURCE BITMAP", \n+ "MAIN DND BASE", \n+ "MAIN DND MODE CHANGE EVENT", \n+ "MAIN DND SOURCE", \n+ "MAIN DND TARGET", \n+ "MAIN EMULATED USB", \n+ "MAIN EMULATED USB",  \
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+ "MAIN EMULATED USB",  \
+ "MAIN EMULATED USB",  

+ "MAIN_EVENT", \
+ "MAIN_EVENTLISTENER", \
+ "MAIN_EVENTSOURCE", \
+ "MAIN_EVENTSOURCECHANGEDEVENT", \
+ "MAIN_EXTPACK", \
+ "MAIN_EXTPACKBASE", \
+ "MAIN_EXTPACKFILE", \
+ "MAIN_EXTPACKMANAGER", \
+ "MAIN_EXTPACKPLUGIN", \
+ "MAIN_EXTRADATACANCHANGETEMPLATE", \
+ "MAIN_EXTRADATACHANGEDEVENT", \
+ "MAIN_FILE", \
+ "MAIN_FRAMEBUFFER", \
+ "MAIN_FRAMEBUFFEROVERLAY", \
+ "MAIN_FSOBJINFO", \
+ "MAIN_GUEST", \
+ "MAIN_GUESTDIRECTORY", \
+ "MAIN_GUESTDNSOURCE", \
+ "MAIN_GUESTDNDSOURCE", \
+ "MAIN_GUESTDNDTARGET", \
+ "MAIN_GUESTERRORINFO", \
+ "MAIN_GUESTFILE", \
+ "MAIN_GUESTFILEEVENT", \
+ "MAIN_GUESTFILEIOEVENT", \
+ "MAIN_GUESTFILEOFFSETCHANGEDEVENT", \
+ "MAIN_GUESTFILEREADEVENT", \
+ "MAIN_GUESTFILEREIGISTERDEVENT", \
+ "MAIN_GUESTFILESTATECHANGEDEVENT", \
+ "MAIN_GUESTFILEWRITEEVENT", \
+ "MAIN_GUESTFSOBJINFO", \
+ "MAIN_GUESTKEYBOARDEVENT", \
+ "MAIN_GUESTMONITORCHANGEDEVENT", \
+ "MAIN_GUESTMOUSEEVENT", \
+ "MAIN_GUESTMULTITOUCHEVENT", \
+ "MAIN_GUESTOSTYPE", \
+ "MAIN_GUESTPROCESS", \
+ "MAIN_GUESTPROCESSEVENT", \
+ "MAIN_GUESTPROCESSINPUTNOTIFYEVENT", \
+ "MAIN_GUESTPROCESSIOEVENT", \
+ "MAIN_GUESTPROCESSOUTPUTEVENT", \
+ "MAIN_GUESTPROCESSREGISTEREDEVENT", \
+ "MAIN_GUESTPROPERTYCHANGEDEVENT", \
+ "MAIN_GUESTSCREENINFO", \
+ "MAIN_GUESTSESSION", \
+ "MAIN_GUESTSESSIONEVENT", \
+ "MAIN_GUESTSESSIONREGISTEREDEVENT", \
+ "MAIN_GUESTSESSIONSTATECHANGEDEVENT", \
+ "MAIN_GUESTUSERSTATECHANGEDEVENT"
+ "MAIN_HOST",
+ "MAIN_HOSTNAMECONFIGURATIONCHANGEDEVENT",
+ "MAIN_HOSTNETWORKINTERFACE",
+ "MAIN_HOSTPCIDEVICEPLUGEVENT",
+ "MAIN_HOSTUSBDEVICE",
+ "MAIN_HOSTUSBDEVICEFILTER",
+ "MAIN_HOSTVIDEOINPUTDEVICE",
+ "MAIN_INTERNALMACHINECONTROL",
+ "MAIN_INTERNALSESSIONCONTROL",
+ "MAIN_KEYBOARD",
+ "MAIN_KEYBOARDLEDSCONFIGURATIONCHANGEDEVENT",
+ "MAIN_MACHINE",
+ "MAIN_MACHINEDATACHANGEDEVENT",
+ "MAIN_MACHINEDEBUGGER",
+ "MAIN_MACHINEEVENT",
+ "MAIN_MACHINEREGISTEREDEVENT",
+ "MAIN_MACHINESTATECHANGEDEVENT",
+ "MAIN_MEDIUM",
+ "MAIN_MEDIUMATTACHMENT",
+ "MAIN_MEDIUCHANGEDEVENT",
+ "MAIN_MEDIUCONFIGCHANGEDEVENT",
+ "MAIN_MEDIUFORMAT",
+ "MAIN_MEDIUREGISTEREDEVENT",
+ "MAIN_MOUSE",
+ "MAIN_MICECAPABILITYCHANGEDEVENT",
+ "MAIN_MICEPOINTERSHAPE",
+ "MAIN_MICEPOINTERSHAPECHANGEDEVENT",
+ "MAIN_NATENGINE",
+ "MAIN_NATNETWORK",
+ "MAIN_NATNETWORKALTEREVENT",
+ "MAIN_NATNETWORKCHANGEDEVENT",
+ "MAIN_NATNETWORKCREATEDEVENT",
+ "MAIN_NATNETWORKPORTFORWARDEVENT",
+ "MAIN_NATNETWORKSETTINGEVENT",
+ "MAIN_NATNETWORKSTARTSTOPEVENT",
+ "MAIN_NATREDIRECTEVENT",
+ "MAIN_NETWORKADAPTER",
+ "MAIN_NETWORKADAPTERCHANGEDEVENT",
+ "MAIN_PARALLELPORT",
+ "MAIN_PARALLELPORTCHANGEDEVENT",
+ "MAIN_PCIADDRESS",
+ "MAIN_PCIDEVICEATTACHMENT",
+ "MAIN_PERFORMANCECOLLECTOR",
+ "MAIN_PERFORMANCEMETRIC",
+ "MAIN_PROCESS",
+ "MAIN_PROGRESS",
+ "MAIN_PROGRESSEVENT",
+ "MAIN_PROGRESSPERCENTAGECHANGEDEVENT"
+ "MAIN_PROGRESSTASKCOMPLETEDEVENT",
+ "MAIN_REUSABLEEVENT",
+ "MAIN_RUNTIMEERROREVENT",
+ "MAIN_SERIALPORT",
+ "MAIN_SERIALPORTCHANGEDEVENT",
+ "MAIN_SESSION",
+ "MAIN_SESSIONSTATECHANGEDEVENT",
+ "MAIN_SHARED_FOLDER",
+ "MAIN_SHARED_FOLDERCHANGEDEVENT",
+ "MAIN_SHOW_WINDOW_EVENT",
+ "MAIN_SNAPSHOT",
+ "MAIN_SNAPSHOTCHANGEDEVENT",
+ "MAIN_SNAPSHOTDELETEDEVENT",
+ "MAIN_SNAPSHOTEVENT",
+ "MAIN_SNAPSHOTRESTOREDEVENT",
+ "MAIN_SNAPSHOTTAKENEVENT",
+ "MAIN_STATECHANGEDEVENT",
+ "MAIN_STORAGE_CONTROLLER",
+ "MAIN_STORAGECONTROLLERCHANGEDEVENT",
+ "MAIN_STORAGEDEVICECHANGEDEVENT",
+ "MAIN_SYSTEM_PROPERTIES",
+ "MAIN_TOKEN",
+ "MAIN_UNATTENDED",
+ "MAIN_USB_CONTROLLER",
+ "MAIN_USBCONTROLLERCHANGEDEVENT",
+ "MAIN_USBDEVICE",
+ "MAIN_USBDEVICEFILTER",
+ "MAIN_USBDEVICEFILTERS",
+ "MAIN_USBDEVICESTATECHANGEDEVENT",
+ "MAIN_USBPROXY_BACKEND",
+ "MAIN_VBOXSVCS",
+ "MAIN_VBOXSVCAVAILABILITYCHANGEDEVENT",
+ "MAIN_VETO_EVENT",
+ "MAIN_VFSEXPLORER",
+ "MAIN_VIDEOCAPTURECHANGEDEVENT",
+ "MAIN_VIRTUAL_BOX",
+ "MAIN_VIRTUALBOXCLIENT",
+ "MAIN_VIRTUALBOXSDS",
+ "MAIN_VIRTUALSYSTEM_DESCRIPTION",
+ "MAIN_VMMDEVINTERFACES",
+ "MAIN_VRDESERVER",
+ "MAIN_VRDESERVERCHANGEDEVENT"
+ "MAIN_VRDESERVERINFO",
+ "MAIN_VRDESERVERINFOCHANGEDEVENT",
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+ "MM_HYPER"
+ "MM_HYPER_HEAP",
+ "MM_PHYS",
+ "MM_POOL",
+ "NAT_SERVICE",
+ "NET_ADP_DRV",
+ "NET_FLT_DRV",
+ "NET_SERVICE",
+ "NET_SHAPER",
+ "PATM",
+ "PDM",
+ "PDM_ASYNC_COMPLETION",
+ "PDM_BLK_CACHE",
+ "PDM_DEVICE",
+ "PDM_DRIVER",
+ "PDM_LDR",
+ "PDM_QUEUE",
+ "PGM",
+ "PGM_DYNMAP",
+ "PGM_PHYS",
+ "PGM_PHYS_ACCESS",
+ "PGM_POOL",
+ "PGM_SHARED",
+ "REM",
+ "REM_DISAS",
+ "REM_HANDLER",
+ "REM_IOPORT",
+ "REM_MMIO",
+ "REM_PRINTF",
+ "REM_RUN",
+ "SELM",
+ "SHARED_CLIPBOARD",
+ "SHARED_CROPENGL",
+ "SHARED_FOLDERS",
+ "SHARED_OPENGL",
+ "SRV_INTNET",
+ "SSM",
+ "STAM",
+ "SUP",
+ "SUP_DRV",
+ "TM",
+ "TRPM",
+ "USB_CARDREADER",
+ "USB_DRV",
+ "USB_FILTER",
+ "USB_KBD",
+ "USB_MOUSE",
+ "USB_MSD",
+ "USB_REMOTE"
+ "USB_WEBCAM", \
+ "VGDRV",  \
+ "VBGL",  \
+ "VD",   \
+ "VD_CUE",  \
+ "VD_DMG",  \
+ "VD_ISCSI",  \
+ "VD_PARALLELS",\ 
+ "VD_QCOW",  \
+ "VD_QED",  \
+ "VD_RAW",  \
+ "VD_VDI",  \
+ "VD_VHD",  \
+ "VD_VHDX",  \
+ "VD_VMDK",  \
+ "VM",  \
+ "VMM",  \
+ "VRDE",  \
+ "VRDP",  \
+ "VSCSI",  \
+ "WEBSERVICE",  \
+]
+
+/** @} */
+#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/ostypes.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/VBox/ostypes.h
@@ -0,0 +1,170 @@
+/** @file
+ * VirtualBox - Global Guest Operating System definition.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ *
+ * The contents of this file may alternatively be used under the terms
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef ___VBox_ostypes_h
+ define ___VBox_ostypes_h
+
+ include <iprt/cdefs.h>
+
+RT_C_DECLS_BEGIN
+
+ /**
+ * Global list of guest operating system types.
+ *
+ * They are grouped into families. A family identifier is always has
+ * mod 0x10000 == 0. New entries can be added, however other components
+ * depend on the values (e.g. the Qt GUI and guest additions) so the
+ * existing values MUST stay the same.
+ *
+ * Note: distinguish between 32 & 64 bits guest OSes by checking bit 8 (mod 0x100)
+ */
+ typedef enum VBOXOSTYPE
+ {,
+ VBOXOSTYPE_Unknown = 0,
+ VBOXOSTYPE_Unknown_x64 = 0x00100,
+ VBOXOSTYPE_DOS = 0x10000,
+ VBOXOSTYPE_Win31 = 0x15000,
+ VBOXOSTYPE_Win9x = 0x20000,
+ VBOXOSTYPE_Win95 = 0x21000,
+ VBOXOSTYPE_Win98 = 0x22000,
+ VBOXOSTYPE_WinMe = 0x23000,
+ VBOXOSTYPE_WinNT = 0x30000,
+ VBOXOSTYPE_WinNT_x64 = 0x30100,
+ VBOXOSTYPE_WinNT4 = 0x31000,
+ VBOXOSTYPE_Win2k = 0x32000,
+ VBOXOSTYPE_Win2k3 = 0x32100,
+ VBOXOSTYPE_Win2k3_x64 = 0x32100,
+ VBOXOSTYPE_WinVista = 0x35000,
+ VBOXOSTYPE_WinVista_x64 = 0x35100,
+ VBOXOSTYPE_Win2k8 = 0x36000,
+ VBOXOSTYPE_Win2k8_x64 = 0x36100,
+ VBOXOSTYPE_Win7 = 0x37000,
+ VBOXOSTYPE_Win7_x64 = 0x37100,
+ VBOXOSTYPE_Win8 = 0x38000,
+ VBOXOSTYPE_Win8_x64 = 0x38100,
+ VBOXOSTYPE_Win2k12_x64  = 0x39100,
+ VBOXOSTYPE_Win81       = 0x3A000,
+ VBOXOSTYPE_Win81_x64   = 0x3A100,
+ VBOXOSTYPE_Win10       = 0x3B000,
+ VBOXOSTYPE_Win10_x64   = 0x3B100,
+ VBOXOSTYPE_Win2k16_x64 = 0x3C100,
+ VBOXOSTYPE_OS2         = 0x40000,
+ VBOXOSTYPE_OS2Warp3    = 0x41000,
+ VBOXOSTYPE_OS2Warp4    = 0x42000,
+ VBOXOSTYPE_OS2Warp45   = 0x43000,
+ VBOXOSTYPE_ECS        = 0x44000,
+ VBOXOSTYPE_OS21x       = 0x48000,
+ VBOXOSTYPE_Linux       = 0x50000,
+ VBOXOSTYPE_Linux_x64   = 0x50100,
+ VBOXOSTYPE_Linux22     = 0x51000,
+ VBOXOSTYPE_Linux24     = 0x52000,
+ VBOXOSTYPE_Linux24_x64 = 0x52100,
+ VBOXOSTYPE_Linux26     = 0x53000,
+ VBOXOSTYPE_Linux26_x64 = 0x53100,
+ VBOXOSTYPE_ArchLinux   = 0x54000,
+ VBOXOSTYPE_ArchLinux_x64 = 0x54100,
+ VBOXOSTYPE_Debian      = 0x55000,
+ VBOXOSTYPE_Debian_x64  = 0x55100,
+ VBOXOSTYPE_OpenSUSE    = 0x56000,
+ VBOXOSTYPE_OpenSUSE_x64 = 0x56100,
+ VBOXOSTYPE_FedoraCore  = 0x57000,
+ VBOXOSTYPE_FedoraCore_x64 = 0x57100,
+ VBOXOSTYPE_Gentoo      = 0x58000,
+ VBOXOSTYPE_Gentoo_x64  = 0x58100,
+ VBOXOSTYPE_Mandriva    = 0x59000,
+ VBOXOSTYPE_Mandriva_x64 = 0x59100,
+ VBOXOSTYPE_RedHat      = 0x5A000,
+ VBOXOSTYPE_RedHat_x64  = 0x5A100,
+ VBOXOSTYPE_Turbolinux  = 0x5B000,
+ VBOXOSTYPE_Turbolinux_x64 = 0x5B100,
+ VBOXOSTYPE_Ubuntu      = 0x5C000,
+ VBOXOSTYPE_Ubuntu_x64  = 0x5C100,
+ VBOXOSTYPE_Xandros     = 0x5D000,
+ VBOXOSTYPE_Xandros_x64 = 0x5D100,
+ VBOXOSTYPE_Oracle      = 0x5E000,
+ VBOXOSTYPE_Oracle_x64  = 0x5E100,
+ VBOXOSTYPE_FreeBSD     = 0x60000,
+ VBOXOSTYPE_FreeBSD_x64 = 0x60100,
+ VBOXOSTYPE_OpenBSD     = 0x61000,
+ VBOXOSTYPE_OpenBSD_x64 = 0x61100,
+ VBOXOSTYPE_NetBSD      = 0x62000,
+ VBOXOSTYPE_NetBSD_x64  = 0x62100,
+ VBOXOSTYPE_Netware     = 0x70000,
+ VBOXOSTYPE_Solaris = 0x80000,
+ VBOXOSTYPE_Solaris_x64 = 0x80100,
+ VBOXOSTYPE_OpenSolaris = 0x81000,
+ VBOXOSTYPE_OpenSolaris_x64 = 0x81100,
+ VBOXOSTYPE_Solaris11_x64 = 0x82100,
+ VBOXOSTYPE_L4 = 0x90000,
+ VBOXOSTYPE_QNX = 0xA0000,
+ VBOXOSTYPE_MacOS = 0xB0000,
+ VBOXOSTYPE_MacOS_x64 = 0xB0100,
+ VBOXOSTYPE_MacOS106 = 0xB2000,
+ VBOXOSTYPE_MacOS106_x64 = 0xB2100,
+ VBOXOSTYPE_MacOS107_x64 = 0xB3100,
+ VBOXOSTYPE_MacOS108_x64 = 0xB4100,
+ VBOXOSTYPE_MacOS109_x64 = 0xB5100,
+ VBOXOSTYPE_MacOS1010_x64 = 0xB6100,
+ VBOXOSTYPE_MacOS1011_x64 = 0xB7100,
+ VBOXOSTYPE_MacOS1012_x64 = 0xB8100,
+ VBOXOSTYPE_MacOS1013_x64 = 0xB9100,
+ VBOXOSTYPE_JRockitVE = 0xC0000,
+ VBOXOSTYPE_Haiku = 0xD0000,
+ VBOXOSTYPE_Haiku_x64 = 0xD0100,
+ VBOXOSTYPE_VBoxBS_x64 = 0xE0100,
+/** The bit number which indicates 64-bit or 32-bit. */
+ #define VBOXOSTYPE_x64_BIT 8
+ /* The mask which indicates 64-bit. */
+ VBOXOSTYPE_x64 = 1 << VBOXOSTYPE_x64_BIT,
+ /* The usual 32-bit hack. */
+ VBOXOSTYPE_32BIT_HACK = 0xffffffff
+
  ] VBOXOSTYPE:
+
+
+ /**
+ * Global list of guest OS families.
+ */
+ +
+ +
+ +
+ +
+ typedef enum VBOXOSFAMILY
+ {
+ + VBOXOSFAMILY_Unknown = 0,
+ + VBOXOSFAMILY_Windows32 = 1,
+ + VBOXOSFAMILY_Windows64 = 2,
+ + VBOXOSFAMILY_Linux32 = 3,
+ + VBOXOSFAMILY_Linux64 = 4,
+ + VBOXOSFAMILY_FreeBSD32 = 5,
+ + VBOXOSFAMILY_FreeBSD64 = 6,
+ + VBOXOSFAMILY_Solaris32 = 7,
+ + VBOXOSFAMILY_Solaris64 = 8,
+ + VBOXOSFAMILY_MacOSX32 = 9,
+ + VBOXOSFAMILY_MacOSX64 = 10,
+ + /* The usual 32-bit hack. */
+ VBOXOSFAMILY_32BIT_HACK = 0xffffffff
+} VBOXOSFAMILY:
+
+{RT_C_DECLS_END
+
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/param.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/VBox/param.h
@@ -0,0 +1,190 @@
+/** @file
+ * VirtualBox Parameter Definitions. (VMM,+
+ *
+ * param.mac is generated from this file by running 'kmk incs' in the root.
+ *
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef ___VBox_param_h
+define ___VBox_param_h
+
+include <iprt/param.h>
+include <iprt/cdefs.h>
+
+/** @defgroup grp_vbox_param VBox Parameter Definition
+ * @{
+ */
+
+/** The maximum number of pages that can be allocated and mapped
+ * by various MM, PGM and SUP APIs. */
+ /* ARCH_BITS == 64
+ # define VBOX_MAX_ALLOC_PAGE_COUNT (_512M / PAGE_SIZE)
+ #else
+ # define VBOX_MAX_ALLOC_PAGE_COUNT (_256M / PAGE_SIZE)
+ #endif
+ 
+ /** @def VBOX_WITH_PAGE_SHARING
+ * Enables the page sharing code.
+ * @remarks This must match GMMR0Init; currently we only support page fusion on
+ * all 64-bit hosts except Mac OS X */
+ #if (   HC_ARCH_BITS == 64          /* ASM-NOINC */ 
+     && (defined(RT_OS_FREEBSD) || defined(RT_OS_LINUX) || defined(RT_OS_SOLARIS) ||
+ defined(RT_OS_WINDOWS)) ) /* ASM-NOINC */
+ || defined(DOXYGEN_RUNNING)        /* ASM-NOINC */
+ # define VBOX_WITH_PAGE_SHARING     /* ASM-NOINC */
+ #endif                              /* ASM-NOINC */
+
+ /** @defgroup   grp_vbox_param_mm  Memory Monitor Parameters
+ * @{
+ */
+
+ /** Initial address of Hypervisor Memory Area. 
+ * MUST BE PAGE TABLE ALIGNED! */
+ #define MM_HYPER_AREA_ADDRESS       UINT32_C(0xa0000000)
+
+ /** The max size of the hypervisor memory area. */
+ #define MM_HYPER_AREA_MAX_SIZE      (40U * _1M) /**< @todo Readjust when floating RAMRANGES have been implemented. Used to be 20 * _1MB */
+
+ /** Maximum number of bytes we can dynamically map into the hypervisor region.
+ * This must be a power of 2 number of pages! */
+ */
+ #define MM_HYPER_DYNAMIC_SIZE       (16U * PAGE_SIZE)
+
+ /** The minimum guest RAM size in bytes. */
+ #define MM_RAM_MIN                 UINT32_C(0x00400000)
+
+ /** The maximum guest RAM size in bytes. */
+ #if HC_ARCH_BITS == 64
+ # define MM_RAM_MAX                 UINT64_C(0x20000000000)
+ #else
+ # define MM_RAM_MAX                 UINT64_C(0x000E0000000)
+ #endif
+
+ /** The minimum guest RAM size in MBs. */
+ #define MM_RAM_MIN_IN_MB            UINT32_C(4)
+
+ /** The maximum guest RAM size in MBs. */
+ #if HC_ARCH_BITS == 64
+ # define MM_RAM_MAX_IN_MB           UINT32_C(2097152)
+ #else
+ # define MM_RAM_MAX_IN_MB           UINT32_C(4)
+ #endif

---

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+#endif
+/** The default size of the below 4GB RAM hole. */
+#define MM_RAM_HOLE_SIZE_DEFAULT (512U * _1M)
+/** The maximum 64-bit MMIO BAR size.
+ * @remarks There isn't really any limit here other than the size of the
+ * tracking structures we need (around 1/256 of the size). */
+#if HC_ARCH_BITS == 64
+#define MM_MMIO_64_MAX _1T
+#else
+#define MM_MMIO_64_MAX (_1G64 * 16)
+#endif
+/** The maximum 32-bit MMIO BAR size. */
+#define MM_MMIO_32_MAX _2G
+
+/** @} */
+
+/** @} */
+
+/** @defgroup grp_vbox_param_pgm Page Manager Parameters */
+*/
+*/
+/** The number of handy pages.
+ * This should be a power of two. */
+#define PGM_HANDY_PAGES 128
+/** The threshold at which allocation of more handy pages is flagged. */
+#define PGM_HANDY_PAGES_SET_FF 32
+/** The threshold at which we will allocate more when in ring-3.
+ * This is must be smaller than both PGM_HANDY_PAGES_SET_FF and
+ * PGM_HANDY_PAGES_MIN. */
+#define PGM_HANDY_PAGES_R3_ALLOC 8
+/** The threshold at which we will allocate more when in ring-0 or raw mode.
+ * The idea is that we should never go below this threshold while in ring-0 or
+ * raw mode because of PGM_HANDY_PAGES_RZ_TO_R3. However, should this happen and
+ * we are actually out of memory, we will have 8 page to get out of whatever
+ * code we're executing.
+ */
+/** This is must be smaller than both PGM_HANDY_PAGES_SET_FF and
+ * PGM_HANDY_PAGES_MIN. */
+#define PGM_HANDY_PAGES_RZ_ALLOC 8
+/** The threshold at which we force return to R3 ASAP.
+ * The idea is that this should be large enough to get out of any code and up to
+ * the main EM loop when we are out of memory.
+ * This must be less or equal to PGM_HANDY_PAGES_MIN. */
+#define PGM_HANDY_PAGES_RZ_TO_R3 24
+/** The minimum number of handy pages (after allocation).
+ * This must be greater or equal to PGM_HANDY_PAGES_SET_FF.
+ * Another name would be PGM_HANDY_PAGES_EXTRA_RESERVATION or _PARANOIA. :-( */
+/** @defgroup grp_vbox_param_vmm  VMM Parameters
+ * @}
+ */
+/** VMM stack size. */
+ifndef RT_OS_DARWIN
+define VMM_STACK_SIZE 16384U
+else
+define VMM_STACK_SIZE 8192U
+endif
+/** Min number of Virtual CPUs. */
+define VMM_MIN_CPU_COUNT 1
+/** Max number of Virtual CPUs. */
+define VMM_MAX_CPU_COUNT 64
+/** @} */
+
+/** @defgroup grp_vbox_pci  PCI Identifiers
+ * @}
+ */
+/** VirtualBox PCI vendor ID. */
+define VBOX_PCI_VENDORID (0x80ee)
+
+/** @name VirtualBox graphics card identifiers
+ * @{ */
+/** VirtualBox PCI vendor ID. */
+define VBOX_VENDORID VBOX_PCI_VENDORID /**< @todo wonderful choice of name! Please squeeze a _VGA_ or something in there, please. */
+define VBOX_DEVICEID (0xbeef) /**< @todo ditto. */
+define VBOX_VESA_VENDORID VBOX_pci_VENDORID
+define VBOX_VESA_DEVICEID (0xbeef)
+/** @} */
+
+/** @name VMMDev PCI card identifiers
+ * @{ */
+/** VirtualBox PCI vendor ID. */
+define VMMDEV_VENDORID VBOX_PCI_VENDORID
+define VMMDEV_DEVICEID (0xc9ee)
+/** @} */
+
+/** @defgroup grp_vbox_param_misc  Misc
+ * @}
+ */
+/** The maximum size of a generic segment offload (GSO) frame. This limit is
/* imposed by the 16-bit frame size in internal networking header. */
#define VBOX_MAX_GSO_SIZE 0xfff0

@end}

@end}
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/types.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/VBox/types.h
@@ -0,0 +1,1082 @@
+/** @file
+ * VirtualBox - Types.
+ */
+*/
+*/
+* Copyright (C) 2006-2017 Oracle Corporation
+* This file is part of VirtualBox Open Source Edition (OSE), as
+* available from http://www.virtualbox.org. This file is free software;
+* you can redistribute it and/or modify it under the terms of the GNU
+* General Public License (GPL) as published by the Free Software
+* Foundation, in version 2 as it comes in the "COPYING" file of the
+* VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+* hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
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+* VirtualBox OSE distribution, in which case the provisions of the
+* CDDL are applicable instead of those of the GPL.
+* You may elect to license modified versions of this file under the
+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+ifndef ___VBox_types_h
+define ___VBox_types_h
+
+include <VBox/cdefs.h>
+include <iprt/types.h>
+
+@defgroup grp_types VBox Basic Types
+ * @}
+ */
/** @defgroup grp_types_both  Common Guest and Host Context Basic Types */
+ @ {
+ */
+
+ /** @defgroup grp_types_hc  Host Context Basic Types */
+ @ {
+ */
+
+ /** @} */
+
+ /** @defgroup grp_types_gc  Guest Context Basic Types */
+ @ {
+ */
+
+ /** @} */
+
/** Pointer to per support driver session data. (The data is a R0 entity and private to the the R0 SUP part. All * other should consider this a sort of handle.) */
typedef R0PTRTYPE(struct SUPDRVSESSION *) PSUPDRVSESSION;
+
/** Event semaphore handle. Ring-0 / ring-3. */
typedef R0PTRTYPE(struct SUPSEMEVENTHANDLE *) SUPSEMEVENT;
+/** Pointer to an event semaphore handle. */
typedef SUPSEMEVENT *PSUPSEMEVENT;
+/** Nil event semaphore handle. */
#define NIL_SUPSEMEVENT ((SUPSEMEVENT)0)
+
/** Multiple release event semaphore handle. Ring-0 / ring-3. */
typedef R0PTRTYPE(struct SUPSEMEVENTMULTIHANDLE *) SUPSEMEVENTMULTI;
+/** Pointer to a multiple release event semaphore handle. */
typedef SUPSEMEVENTMULTI *PSUPSEMEVENTMULTI;
+/** Nil multiple release event semaphore handle. */
#define NIL_SUPSEMEVENTMULTI ((SUPSEMEVENTMULTI)0)
+
/** Pointer to a VM. */
typedef struct VM *PVM;
+/** Pointer to a VM - Ring-0 Ptr. */
typedef R0PTRTYPE(struct VM *) PVMR0;
+/** Pointer to a VM - Ring-3 Ptr. */
typedef R3PTRTYPE(struct VM *) PVMR3;
+/** Pointer to a VM - RC Ptr. */
+typedef RCPTRTYPE(struct VM *) PVMRC;

+/** Pointer to a virtual CPU structure. */
+typedef struct VMCPU * PVMCPU;
+/** Pointer to a const virtual CPU structure. */
+typedef const struct VMCPU * PCVMCPU;
+/** Pointer to a virtual CPU structure - Ring-3 Ptr. */
+typedef R3PTRTYPE(struct VMCPU *) PVMCPUR3;
+/** Pointer to a virtual CPU structure - Ring-0 Ptr. */
+typedef R0PTRTYPE(struct VMCPU *) PVMCPUR0;
+/** Pointer to a virtual CPU structure - RC Ptr. */
+typedef RCPTRTYPE(struct VMCPU *) PVMCPURC;

+N/** Pointer to a ring-0 (global) VM structure. */
+Ntypedef R0PTRTYPE(struct GVM *) PGVM;
+N/** Pointer to a ring-3 (user mode) VM structure. */
+Ntypedef R3PTRTYPE(struct UVM *) PUVM;
+N/** Pointer to a ring-3 (user mode) VMCPU structure. */
+Ntypedef R3PTRTYPE(struct UVMCPU *) PUVMCPU;
+N/** Virtual CPU ID. */
+Ntypedef uint32_t VMCPUID;
+N/** Pointer to a virtual CPU ID. */
+Ntypedef VMCPUID *PVMCPUID;
+N/** Special CPU ID values. Most of these are for request scheduling. */
+N@@
+N\#define VMCPUID_ALL UNT32_C(0xffffffff2)
+N/** All virtual CPUs, descending order. */
+N\#define VMCPUID_ALL_REVERSE UINT32_C(0xffffffff3)
+N/** Any virtual CPU. */
+N/** Intended for scheduling a VM request or some other task. */
+N\#define VMCPUID_ANY UINT32_C(0xffffffff4)
+N/** Any virtual CPU; always queue for future execution. */
+N/** Intended for scheduling a VM request or some other task. */
+N\#define VMCPUID_ANY_QUEUE UINT32_C(0xffffffff5)
+N/** The NIL value. */
+N\#define NIL_VMCPUID UINT32_C(0xfffffffffd)
+N@}
+N/** Virtual CPU set. */
+N/** */
+Ntypedef struct VMCPUSET
+{  
+  /** The bitmap data. */  
+  uint32_t au32Bitmap[8 /*256/32*/];  
+} VMCPUSET;  
+/** Pointer to a Virtual CPU set. */  
+typedef VMCPUSET *PVMCPUSET;  
+/** Pointer to a const Virtual CPU set. */  
+typedef VMCPUSET const *PCVMCPUSET;
+
+
+/**
+ * VM State
+ */
+typedef enum VMSTATE
+{  
+  /** The VM is being created. */  
+  VMSTATE_CREATING = 0,  
+  /** The VM is created. */  
+  VMSTATE_CREATED,  
+  /** The VM state is being loaded from file. */  
+  VMSTATE_LOADING,  
+  /** The VM is being powered on */  
+  VMSTATE_POWERING_ON,  
+  /** The VM is being resumed. */  
+  VMSTATE_RESUMING,  
+  /** The VM is running. */  
+  VMSTATE_RUNNING,  
+  /** Live save: The VM is running and the state is being saved. */  
+  VMSTATE_RUNNING_LS,  
+  /** Fault Tolerance: The VM is running and the state is being synced. */  
+  VMSTATE_RUNNING_FT,  
+  /** The VM is being reset. */  
+  VMSTATE_RESETTING,  
+  /** Live save: The VM is being reset and immediately suspended. */  
+  VMSTATE_RESETTING_LS,  
+  /** The VM is being soft/warm reset. */  
+  VMSTATE_SOFT_RESETTING,  
+  /** Live save: The VM is being soft/warm reset (not suspended afterwards). */  
+  VMSTATE_SOFT_RESETTING_LS,  
+  /** The VM is being suspended. */  
+  VMSTATE_SUSPENDING,  
+  /** Live save: The VM is being suspended during a live save operation, either as  
+   * part of the normal flow or VMR3Reset. */  
+  VMSTATE_SUSPENDING_LS,  
+  /** Live save: The VM is being suspended by VMR3Suspend during live save. */  
+  VMSTATE_SUSPENDING_EXT_LS,  
+  /** The VM is suspended. */  
+  VMSTATE_SUSPENDED,  
+} VMSTATE;
+ /** Live save: The VM has been suspended and is waiting for the live save operation to move on. */
+ VMSTATE_SUSPENDED_LS,
+ /** Live save: The VM has been suspended by VMR3Suspend during a live save. */
+ VMSTATE_SUSPENDED_EXT_LS,
+ /** The VM is suspended and its state is being saved by EMT(0). (See SSM) */
+ VMSTATE_SAVING,
+ /** The VM is being debugged. (See DBGF.) */
+ VMSTATE_DEBUGGING,
+ /** Live save: The VM is being debugged while the live phase is going on. */
+ VMSTATE_DEBUGGING_LS,
+ /** The VM is being powered off. */
+ VMSTATE_POWERING_OFF,
+ /** Live save: The VM is being powered off and the save cancelled. */
+ VMSTATE_POWERING_OFF_LS,
+ /** The VM is switched off, awaiting destruction. */
+ VMSTATE_OFF,
+ /** Live save: Waiting for cancellation and transition to VMSTATE_OFF. */
+ VMSTATE_OFF_LS,
+ /** The VM is powered off because of a fatal error. */
+ VMSTATE_FATAL_ERROR,
+ /** Live save: Waiting for cancellation and transition to FatalError. */
+ VMSTATE_FATAL_ERROR_LS,
+ /** The VM is in guru meditation over a fatal failure. */
+ VMSTATE_GURU_MEDITATION,
+ /** Live save: Waiting for cancellation and transition to GuruMeditation. */
+ VMSTATE_GURU_MEDITATION_LS,
+ /** The VM is screwed because of a failed state loading. */
+ VMSTATE_LOAD_FAILURE,
+ /** The VM is being destroyed. */
+ VMSTATE_DESTROYING,
+ /** Terminated. */
+ VMSTATE_TERMINATED,
+ /** hack forcing the size of the enum to 32-bits. */
+ VMSTATE_MAKE_32BIT_HACK = 0x7fffffff
+ } VMSTATE;
+
+ /** @def VBOXSTRICTRC_STRICT_ENABLED
+ * Indicates that VBOXSTRICTRC is in strict mode. */
+ */
+ #if defined(__cplusplus) \
+ && ARCH_BITS == 64 /* cdecl requires classes and structs as hidden params. */\n+ && !defined(_MSC_VER) /* trouble similar to 32-bit gcc. */\n+ && ( defined(RT_STRICT) \n+ || defined(VBOX STRICT) \n+ || defined(DEBUG) \n+ || defined(DOXYGEN_RUNNING) )
+ #define VBOXSTRICTRC_STRICT_ENABLED 1
+/* We need RTERR STRICT RC. */
+#ifdef VBOXSTRICTRC STRICT ENABLED
+#define RTERR STRICT RC 1
+#endif
+
+/** Strict VirtualBox status code. */
+/**
+ * Strict VirtualBox status code.
+ * This is normally an 32-bit integer and the only purpose of the type is to
+ * highlight the special handling that is required. But in strict build it is a
+ * class that causes compilation and runtime errors for some of the incorrect
+ * handling.
+ */
+#ifdef VBOXSTRICTRC STRICT ENABLED
+struct VBOXSTRICTRC
+
+protected:
+    /** The status code. */
+    int32_t m_rc;
+
+public:
+    /** Default constructor setting the status to VERR IPE UNINITIALIZED STATUS. */
+    VBOXSTRICTRC() 
+#ifdef VERR IPE UNINITIALIZED STATUS
+        : m_rc(VERR IPE UNINITIALIZED STATUS)
+    #else
+        : m_rc(-233 /*VERR IPE UNINITIALIZED STATUS*/)
+    #endif
+
+    /** Constructor for normal integer status codes. */
+    VBOXSTRICTRC(int32_t const rc)
+        : m_rc(rc)
+
+    /** Getter that VBOXSTRICTRC VAL can use. */
+    int32_t getValue() const                        { return m_rc; }
+
+    /** @name Comparison operators
+     * @{ */
+    bool operator==(int32_t rc) const               { return m_rc == rc; }
+    bool operator!=(int32_t rc) const               { return m_rc != rc; }
+    bool operator<=(int32_t rc) const               { return m_rc <= rc; }
+    bool operator>=(int32_t rc) const               { return m_rc >= rc; }
bool operator<(int32_t rc) const { return m_rc < rc; }
bool operator>(int32_t rc) const { return m_rc > rc; }

bool operator==(const VBOXSTRICTRC &rRc) const { return m_rc == rRc.m_rc; }
bool operator!=(const VBOXSTRICTRC &rRc) const { return m_rc != rRc.m_rc; }
bool operator<=(const VBOXSTRICTRC &rRc) const { return m_rc <= rRc.m_rc; }
bool operator>=(const VBOXSTRICTRC &rRc) const { return m_rc >= rRc.m_rc; }
bool operator<(const VBOXSTRICTRC &rRc) const { return m_rc < rRc.m_rc; }
bool operator>(const VBOXSTRICTRC &rRc) const { return m_rc > rRc.m_rc; }

/** @} */

/** Special automatic cast for RT_SUCCESS_NP. */
operator RTErrStrictType2() const { return RTErrStrictType2(m_rc); }

private:
/** @name Constructors that will prevent some of the bad types.
 * @{ */
VBOXSTRICTRC(uint8_t rc) : m_rc(-999) { NOREF(rc); }
VBOXSTRICTRC(uint16_t rc) : m_rc(-999) { NOREF(rc); }
VBOXSTRICTRC(uint32_t rc) : m_rc(-999) { NOREF(rc); }
VBOXSTRICTRC(uint64_t rc) : m_rc(-999) { NOREF(rc); }

VBOXSTRICTRC(int8_t rc)   : m_rc(-999) { NOREF(rc); }
VBOXSTRICTRC(int16_t rc)  : m_rc(-999) { NOREF(rc); }
VBOXSTRICTRC(int64_t rc)  : m_rc(-999) { NOREF(rc); }

/** @} */

#pragma warning(disable:4190)
#endif
#endif
+/
+/** Pointer to a PDM Base Interface. */
typedef struct PDMIBASE *PPDMIBASE;
+/** Pointer to a pointer to a PDM Base Interface. */
typedef PPDMIBASE *PPPDMIBASE;
+
+/** Pointer to a PDM Device Instance. */
typedef struct PDMDEVINS *PPDMDEVINS;
+/** Pointer to a pointer to a PDM Device Instance. */
typedef PPDMDEVINS *PPPDMDEVINS;
+/** R3 pointer to a PDM Device Instance. */
typedef R3PTRTYPE(PPDMDEVINS) PPDMDEVINSR3;
+/** R0 pointer to a PDM Device Instance. */
typedef R0PTRTYPE(PPDMDEVINS) PPDMDEVINSR0;
+/** RC pointer to a PDM Device Instance. */
typedef RCPTRTYPE(PPDMDEVINS) PPDMDEVINSRC;
+
+/** Pointer to a PDM PCI device structure. */
typedef struct PDMPCIDEV *PPDMPCIDEV;
+
+/** Pointer to a PDM USB Device Instance. */
typedef struct PDMUSBINS *PPDMUSBINS;
+/** Pointer to a pointer to a PDM USB Device Instance. */
typedef PPDMUSBINS *PPPDMUSBINS;
+
+/** Pointer to a PDM Driver Instance. */
typedef struct PDMDRVINS *PPDMDRVINS;
+/** Pointer to a pointer to a PDM Driver Instance. */
typedef PPDMDRVINS *PPYPDMDRVINS;
+/** R3 pointer to a PDM Driver Instance. */
typedef R3PTRTYPE(PPDMDRVINS) PPDMDRVINSR3;
+/** R0 pointer to a PDM Driver Instance. */
typedef R0PTRTYPE(PPDMDRVINS) PPDMDRVINSR0;
+/** RC pointer to a PDM Driver Instance. */
typedef RCPTRTYPE(PPDMDRVINS) PPDMDRVINSRC;
+
+/** Pointer to a PDM Service Instance. */
typedef struct PDMSRVINS *PPDMSRVINS;
+/** Pointer to a pointer to a PDM Service Instance. */
typedef PPDMSRVINS *PPYPDMSRVINS;
+
+/** Pointer to a PDM critical section. */
typedef union PDMCRITSECT *PPDMCRITSECT;
+/** Pointer to a const PDM critical section. */
typedef const union PDMCRITSECT *PCPDMCRITSECT;
+
/** Pointer to a PDM read/write critical section. */
typedef union PDMCRITSECTRW *PPDMCRITSECTRW;

/** Pointer to a const PDM read/write critical section. */
typedef union PDMCRITSECTRW const *PCPDMCRITSECTRW;

/** R3 pointer to a timer. */
typedef R3PTRTYPE(struct TMTIMER *) PTMTIMERR3;

/** Pointer to a R3 pointer to a timer. */
typedef PTMTIMERR3 *PPTMTIMERR3;

/** R0 pointer to a timer. */
typedef R0PTRTYPE(struct TMTIMER *) PTMTIMERR0;

/** Pointer to a R3 pointer to a timer. */
typedef PTMTIMERR0 *PPTMTIMERR0;

/** RC pointer to a timer. */
typedef RCPTRTYPE(struct TMTIMER *) PTMTIMERRC;

/** Pointer to a RC pointer to a timer. */
typedef PTMTIMERRC *PPTMTIMERRC;

/** Pointer to a timer. */
typedef CTX_SUFF(PTMTIMER) PTMTIMER;

/** Pointer to a pointer to a timer. */
typedef PTMTIMER *PPTMTIMER;

/** SSM Operation handle. */
typedef struct SSMHANDLE *PSSMHANDLE;

/** Pointer to a const SSM stream method table. */
typedef struct SSMSTRMOPS const *PCSSMSTRMOPS;

/** Pointer to a CPUMCTX. */
typedef struct CPUMCTX *PCPUMCTX;

/** Pointer to a const CPUMCTX. */
typedef const struct CPUMCTX *PCCPUMCTX;

/** Pointer to a CPU context core. */
typedef struct CPUMCTXCORE *PCPUMCTXCORE;

/** Pointer to a const CPU context core. */
typedef const struct CPUMCTXCORE *PCCPUMCTXCORE;

/** Pointer to a selector register. */
typedef struct CPUMSELREG *PCPUMSELREG;

/** Pointer to a const selector register. */
typedef const struct CPUMSELREG *PCCPUMSELREG;

/** Pointer to selector hidden registers. */
typedef struct CPUMSELREG *PCPUMSELREGHID;
/** Pointer to const selector hidden registers. */
+ *  * @deprecated Replaced by PCCPUMSELREG */
+typedef const struct CPUMSELREG *PCCPUMSELREGHID;
+
+/** @} */
+
+/** @} */
+
+/** @defgroup grp_types_idt Interrupt Descriptor Table Entry. */
+ *  * @todo This all belongs in x86.h!
+ *  */
+
+/** @todo VBOXIDT -> VBOXDESCIDT, skip the complex variations. We'll never use them. */
+
+/** IDT Entry, Task Gate view. */
+#pragma pack(1)                         /* paranoia */
+typedef struct VBOXIDTE_TASKGATE
+{
+    /** Reserved. */
+    unsigned    u16Reserved1 : 16;
+    /** Task Segment Selector. */
+    unsigned    u16TSS : 16;
+    /** More reserved. */
+    unsigned    u8Reserved2 : 8;
+    /** Fixed value bit 0 - Set to 1. */
+    unsigned    w1Fixed0 : 1;
+    /** Busy bit. */
+    unsigned    w1Busy : 1;
+    /** Fixed value bit 2 - Set to 1. */
+    unsigned    w1Fixed1 : 1;
+    /** Fixed value bit 3 - Set to 0. */
+    unsigned    w1Fixed2 : 1;
+    /** Fixed value bit 4 - Set to 0. */
+    unsigned    w1Fixed3 : 1;
+    /** Descriptor Privilege level. */
+    unsigned    u2DPL : 2;
+    /** Present flag. */
+    unsigned    w1Present : 1;
+    /** Reserved. */
+    unsigned    u16Reserved3 : 16;
+} VBOXIDTE_TASKGATE;
+#pragma pack()
+/** Pointer to IDT Entry, Task gate view. */
+typedef VBOXIDTE_TASKGATE *PVBOXIDTE_TASKGATE;
+
+/** IDT Entry, Interrupt gate view. */
+#pragma pack(1)                         /* paranoia */
+typedef struct VBOXIDTE_INTERRUPTGATE
```c
+
+    /** Low offset word. */
+    unsigned u16OffsetLow : 16;
+    /** Segment Selector. */
+    unsigned u16SegSel : 16;
+    /** Reserved. */
+    unsigned u5Reserved2 : 5;
+    /** Fixed value bit 0 - Set to 0. */
+    unsigned u1Fixed0 : 1;
+    /** Fixed value bit 1 - Set to 0. */
+    unsigned u1Fixed1 : 1;
+    /** Fixed value bit 2 - Set to 0. */
+    unsigned u1Fixed2 : 1;
+    /** Fixed value bit 3 - Set to 0. */
+    unsigned u1Fixed3 : 1;
+    /** Fixed value bit 4 - Set to 1. */
+    unsigned u1Fixed4 : 1;
+    /** Fixed value bit 5 - Set to 1. */
+    unsigned u1Fixed5 : 1;
+    /** Fixed value bit 6 - Set to 0. */
+    unsigned u1Fixed6 : 1;
+    /** Gate size, 1 = 32 bits, 0 = 16 bits. */
+    unsigned u132BitGate : 1;
+    /** Fixed value bit 5 - Set to 0. */
+    unsigned u1Fixed7 : 1;
+    /** Descriptor Privilege level. */
+    unsigned u2DPL : 2;
+    /** Present flag. */
+    unsigned u1Present : 1;
+    /** High offset word. */
+    unsigned u16OffsetHigh : 16;
+} VBOXIDTE_INTERRUPTGATE;
+} VBOXIDTE_INTERRUPTGATE;
+#pragma pack()
+/** Pointer to IDT Entry, Interrupt gate view. */
typedef VBOXIDTE_INTERRUPTGATE *PVBOXIDTE_INTERRUPTGATE;
+
+/** IDT Entry, Trap Gate view. */
+#pragma pack(1) /* paranoia */
typedef struct VBOXIDTE_TRAPGATE
+
+    /** Low offset word. */
+    unsigned u16OffsetLow : 16;
+    /** Segment Selector. */
+    unsigned u16SegSel : 16;
+    /** Reserved. */
+    unsigned u5Reserved2 : 5;
+    /** Fixed value bit 0 - Set to 0. */
+    unsigned u1Fixed0 : 1;
+    /** Fixed value bit 1 - Set to 0. */
+    unsigned u1Fixed1 : 1;
```
+ /** Fixed value bit 2 - Set to 0. */
+ unsigned u1Fixed2 : 1;
+ /** Fixed value bit 3 - Set to 1. */
+ unsigned u1Fixed3 : 1;
+ /** Fixed value bit 4 - Set to 1. */
+ unsigned u1Fixed4 : 1;
+ /** Fixed value bit 5 - Set to 1. */
+ unsigned u1Fixed5 : 1;
+ /** Gate size, 1 = 32 bits, 0 = 16 bits. */
+ unsigned u132BitGate : 1;
+ /** Fixed value bit 5 - Set to 0. */
+ unsigned u1Fixed6 : 1;
+ /** Descriptor Privilege level. */
+ unsigned u2DPL : 2;
+ /** Present flag. */
+ unsigned u1Present : 1;
+ /** High offset word. */
+ unsigned u16OffsetHigh : 16;
+ } VBOXIDTE_TRAPGATE;
+ #pragma pack()
+ /** Pointer to IDT Entry, Trap Gate view. */
+ typedef VBOXIDTE_TRAPGATE *PVBOXIDTE_TRAPGATE;
+ 
+ /** IDT Entry Generic view. */
+ #pragma pack(1) /* paranoia */
+ typedef struct VBOXIDTE_GENERIC
+ {
+    /** Low offset word. */
+    unsigned u16OffsetLow : 16;
+    /** Segment Selector. */
+    unsigned u16SegSel : 16;
+    /** Reserved. */
+    unsigned u5Reserved : 5;
+    /** IDT Type part one (not used for task gate). */
+    unsigned u3Type1 : 3;
+    /** IDT Type part two. */
+    unsigned u5Type2 : 5;
+    /** Descriptor Privilege level. */
+    unsigned u2DPL : 2;
+    /** Present flag. */
+    unsigned u1Present : 1;
+    /** High offset word. */
+    unsigned u16OffsetHigh : 16;
+ } VBOXIDTE_GENERIC;
+ #pragma pack()
/** IDT Type1 value. (Reserved for task gate!) */
#define VBOX_IDTE_TYPE1 0
/** IDT Type2 value - Task gate. */
#define VBOX_IDTE_TYPE2_TASK 0x5
/** IDT Type2 value - 16 bit interrupt gate. */
#define VBOX_IDTE_TYPE2_INT_16 0x6
/** IDT Type2 value - 32 bit interrupt gate. */
#define VBOX_IDTE_TYPE2_INT_32 0xe
/** IDT Type2 value - 16 bit trap gate. */
#define VBOX_IDTE_TYPE2_TRAP_16 0x7
/** IDT Type2 value - 32 bit trap gate. */
#define VBOX_IDTE_TYPE2_TRAP_32 0xf

/** IDT Entry. */
#pragma pack(1) /* paranoia */
typedef union VBOXIDTE
{
    /** Task gate view. */
    VBOXIDTE_TASKGATE Task;
    /** Trap gate view. */
    VBOXIDTE_TRAPGATE Trap;
    /** Interrupt gate view. */
    VBOXIDTE_INTERRUPTGATE Int;
    /** Generic IDT view. */
    VBOXIDTE_GENERIC Gen;

    /** 8 bit unsigned integer view. */
    uint8_t    au8[8];
    /** 16 bit unsigned integer view. */
    uint16_t   au16[4];
    /** 32 bit unsigned integer view. */
    uint32_t   au32[2];
    /** 64 bit unsigned integer view. */
    uint64_t   au64;
} VBOXIDTE;
#pragma pack()  
/** Pointer to IDT Entry. */
typedef VBOXIDTE *PVBOXIDTE;
/** Pointer to IDT Entry. */
typedef VBOXIDTE const *PCVBOXIDTE;

/** IDT Entry, 64-bit mode, Intertupt gate view. */
#pragma pack(1) /* paranoia */
typedef struct VBOXIDTE64_INTERRUPTGATE
{
    /** Low offset word. */
    unsigned    u16OffsetLow : 16;
    /** Segment Selector. */
    unsigned    u16Selector : 16;
} VBOXIDTE64_INTERRUPTGATE;
+ unsigned u16SegSel : 16;
+ /**< Interrupt Stack Table Index. */
+ unsigned u3Ist : 3;
+ /**< Fixed value bit 0 - Set to 0. */
+ unsigned u1Fixed0 : 1;
+ /**< Fixed value bit 1 - Set to 0. */
+ unsigned u1Fixed1 : 1;
+ /**< Fixed value bit 2 - Set to 0. */
+ unsigned u1Fixed2 : 1;
+ /**< Fixed value bit 3 - Set to 0. */
+ unsigned u1Fixed3 : 1;
+ /**< Fixed value bit 4 - Set to 0. */
+ unsigned u1Fixed4 : 1;
+ /**< Fixed value bit 5 - Set to 0. */
+ unsigned u1Fixed5 : 1;
+ /**< Fixed value bit 6 - Set to 1. */
+ unsigned u1Fixed6 : 1;
+ /**< Fixed value bit 7 - Set to 1. */
+ unsigned u1Fixed7 : 1;
+ /**< Gate size, 1 = 32 bits, 0 = 16 bits. */
+ unsigned u132BitGate : 1;
+ /**< Fixed value bit 5 - Set to 0. */
+ unsigned u1Fixed8 : 1;
+ /**< Descriptor Privilege level. */
+ unsigned u2DPL : 2;
+ /**< Present flag. */
+ unsigned u1Present : 1;
+ /**< High offset word. */
+ unsigned u16OffsetHigh : 16;
+ /**< Offset bits 32..63. */
+ unsigned u32OffsetHigh64;
+ /**< Reserved. */
+ unsigned u32Reserved;
+
+} VBOXIDTE64_INTERRUPTGATE;
+)
+//pragma pack()
+ /**< Pointer to IDT Entry, 64-bit mode, Interrupt gate view. */
+typedef VBOXIDTE64_INTERRUPTGATE *PVBOXIDTE64_INTERRUPTGATE;
+
+ /**< IDT Entry, 64-bit mode, Trap gate view. */
+//pragma pack(1) /* paranoia */
+typedef struct VBOXIDTE64_TRAPGATE
+
+
+{ /*
+ /**< Low offset word. */
+ unsigned u16OffsetLow : 16;
+ /**< Segment Selector. */
+ unsigned u16SegSel : 16;
+ /**< Interrupt Stack Table Index. */
+ unsigned u3Ist : 3;
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+ /** Fixed value bit 0 - Set to 0. */
+ unsigned u1Fixed0 : 1;
+ /** Fixed value bit 1 - Set to 0. */
+ unsigned u1Fixed1 : 1;
+ /** Fixed value bit 2 - Set to 0. */
+ unsigned u1Fixed2 : 1;
+ /** Fixed value bit 3 - Set to 0. */
+ unsigned u1Fixed3 : 1;
+ /** Fixed value bit 4 - Set to 0. */
+ unsigned u1Fixed4 : 1;
+ /** Fixed value bit 5 - Set to 1. */
+ unsigned u1Fixed5 : 1;
+ /** Fixed value bit 6 - Set to 1. */
+ unsigned u1Fixed6 : 1;
+ /** Fixed value bit 7 - Set to 1. */
+ unsigned u1Fixed7 : 1;
+ /** Gate size, 1 = 32 bits, 0 = 16 bits. */
+ unsigned u32BitGate : 1;
+ /** Fixed value bit 5 - Set to 0. */
+ unsigned u1Fixed8 : 1;
+ /** Descriptor Privilege level. */
+ unsigned u2DPL : 2;
+ /** Present flag. */
+ unsigned u1Present : 1;
+ /** High offset word. */
+ unsigned u16OffsetHigh : 16;
+ /** Offset bits 32..63. */
+ unsigned u32OffsetHigh64;
+ /** Reserved. */
+ unsigned u32Reserved;
+
+
+
+} VBOXIDTE64_TRAPGATE;
+
+
+#pragma pack()
+
+
+/** Pointer to IDT Entry, 64-bit mode, Trap gate view. */
+typedef VBOXIDTE64_TRAPGATE *PVBOXIDTE64_TRAPGATE;
+
+
+/** IDT Entry, 64-bit mode, Generic view. */
+#pragma pack(1) /* paranoia *
+
+typedef struct VBOXIDTE64_GENERIC
+
+{
+ /** Low offset word. */
+ unsigned u16OffsetLow : 16;
+ /** Segment Selector. */
+ unsigned u16SegSel : 16;
+ /** Reserved. */
+ unsigned u3Ist : 3;
+ /** Fixed value bit 0 - Set to 0. */
+ unsigned u1Fixed0 : 1;
+ /** Fixed value bit 1 - Set to 0. */
unsigned u1Fixed1 : 1;
/** IDT Type part one (not used for task gate). */
unsigned u3Type1 : 3;
/** IDT Type part two. */
unsigned u5Type2 : 5;
/** Descriptor Privilege level. */
unsigned u2DPL : 2;
/** Present flag. */
unsigned u1Present : 1;
/** High offset word. */
unsigned u16OffsetHigh : 16;
/** Offset bits 32..63. */
unsigned u32OffsetHigh64;
/** Reserved. */
unsigned u32Reserved;
} VBOXIDTE64_GENERIC;
#pragma pack()
/** Pointer to IDT Entry, 64-bit mode, Generic view. */
typedef VBOXIDTE64_GENERIC *PVBOXIDTE64_GENERIC;

/** IDT Entry, 64-bit mode. */
#pragma pack(1)                         /* paranoia */
typedef union VBOXIDTE64
{
    /** Trap gate view. */
    VBOXIDTE64_TRAPGATE Trap;
    /** Interrupt gate view. */
    VBOXIDTE64_INTERRUPTGATE Int;
    /** Generic IDT view. */
    VBOXIDTE64_GENERIC Gen;

    /** 8 bit unsigned integer view. */
    uint8_t au8[16];
    /** 16 bit unsigned integer view. */
    uint16_t au16[8];
    /** 32 bit unsigned integer view. */
    uint32_t au32[4];
    /** 64 bit unsigned integer view. */
    uint64_t au64[2];
} VBOXIDTE64;
#pragma pack()  
/** Pointer to IDT Entry. */
typedef VBOXIDTE64 *PVBOXIDTE64;
/** Pointer to IDT Entry. */
typedef VBOXIDTE64 const *PCVBOXIDTE64;
#pragma pack(1)  
/** IDTR */
typedef struct VBOXIDTR {
    /** Size of the IDT. */
    uint16_t cbIdt;
    /** Address of the IDT. */
    uint64_t pIdt;
} VBOXIDTR, *PVBOXIDTR;

#pragma pack()

/** @} */

/** @def VBOXIDTE_OFFSET */
#define VBOXIDTE_OFFSET(desc) \
    ( ((uint32_t)((desc).Gen.u16OffsetHigh) << 16) \ 
     | ( (desc).Gen.u16OffsetLow ) )

/** @def VBOXIDTE64_OFFSET */
#define VBOXIDTE64_OFFSET(desc) \
    ( ((uint64_t)((desc).Gen.u32OffsetHigh64) << 32) \ 
     | ((uint32_t)((desc).Gen.u16OffsetHigh)   << 16) \ 
     | ( (desc).Gen.u16OffsetLow ) )

#pragma pack(1)
/** GDTR */
typedef struct VBOXGDTR {
    /** Size of the GDT. */
    uint16_t cbGdt;
    /** Address of the GDT. */
    uint64_t pGdt;
} VBOXGDTR;

#pragma pack()
/** Pointer to GDTR. */
typedef VBOXGDTR *PVBOXGDTR;

/** @} */

/** GDTR */
typedef struct VBOXGDTR {
    /** Size of the GDT. */
    uint16_t cbGdt;
    /** Address of the GDT. */
    uint64_t pGdt;
} VBOXGDTR;

#pragma pack()
/** Pointer to GDTR. */
typedef VBOXGDTR *PVBOXGDTR;

/** @} */

/** 32-bit Task Segment used in raw mode. */
/** @todo Move this to SELM! Use X86TSS32 instead. */
#pragma pack(1)
+typeof struct VBOXTSS
+{
+    /** 0x00 - Back link to previous task. (static) */
+    RTSEL   selPrev;
+    uint16_t padding1;
+    /** 0x04 - Ring-0 stack pointer. (static) */
+    uint32_t esp0;
+    /** 0x08 - Ring-0 stack segment. (static) */
+    RTSEL   ss0;
+    uint16_t padding_ss0;
+    /** 0x0c - Ring-1 stack pointer. (static) */
+    uint32_t esp1;
+    /** 0x10 - Ring-1 stack segment. (static) */
+    RTSEL   ss1;
+    uint16_t padding_ss1;
+    /** 0x14 - Ring-2 stack pointer. (static) */
+    uint32_t esp2;
+    /** 0x18 - Ring-2 stack segment. (static) */
+    RTSEL   ss2;
+    uint16_t padding_ss2;
+    /** 0x1c - Page directory for the task. (static) */
+    uint32_t cr3;
+    /** 0x20 - EIP before task switch. */
+    uint32_t eip;
+    /** 0x24 - EFLAGS before task switch. */
+    uint32_t eflags;
+    /** 0x28 - EAX before task switch. */
+    uint32_t eax;
+    /** 0x2c - ECX before task switch. */
+    uint32_t ecx;
+    /** 0x30 - EDX before task switch. */
+    uint32_t edx;
+    /** 0x34 - EBX before task switch. */
+    uint32_t ebx;
+    /** 0x38 - ESP before task switch. */
+    uint32_t esp;
+    /** 0x3c - EBP before task switch. */
+    uint32_t ebp;
+    /** 0x40 - ESI before task switch. */
+    uint32_t esi;
+    /** 0x44 - EDI before task switch. */
+    uint32_t edi;
+    /** 0x48 - ES before task switch. */
+    RTSEL   es;
+    uint16_t padding_es;
+    /** 0x4c - CS before task switch. */
+    RTSEL   cs;
+    uint16_t padding_cs;
\*\* 0x50 - SS before task switch. */
  RTSEL  ss;
+ uint16_t  padding_ss;
\*\* 0x54 - DS before task switch. */
  RTSEL  ds;
+ uint16_t  padding_ds;
\*\* 0x58 - FS before task switch. */
  RTSEL  fs;
+ uint16_t  padding_fs;
\*\* 0x5c - GS before task switch. */
  RTSEL  gs;
+ uint16_t  padding_gs;
\*\* 0x60 - LDTR before task switch. */
  RTSEL  selLdt;
+ uint16_t  padding_ldt;
\*\* 0x64 - Debug trap flag */
+ uint16_t  fDebugTrap;
\*\* 0x66 - Offset relative to the TSS of the start of the I/O Bitmap
* and the end of the interrupt redirection bitmap. */
+ uint16_t  offIoBitmap;
\*\* 0x68 - 32 bytes for the virtual interrupt redirection bitmap. (VME) */
+ uint8_t  IntRedirBitmap[32];
} VBOXTSS;
#pragma pack()
\*\* Pointer to task segment. */
typedef VBOXTSS *PVBOXTSS;
\*\* Pointer to const task segment. */
typedef const VBOXTSS *PCVBOXTSS;
+
+
\*\* Pointer to a callback method table provided by the VM API user. */
typedef struct VMM2USERMETHODS const *PCVMM2USERMETHODS;
+
+
\*\* Data transport buffer (scatter/gather)
*/
typedef struct PDMDATASEG
+
{  
  /** Length of buffer in entry. */
  size_t  cbSeg;
  /** Pointer to the start of the buffer. */
  void   *pvSeg;
} PDMDATASEG;
\*\* Pointer to a data transport segment. */
typedef PDMDATASEG *PPDMDATASEG;
\*\* Pointer to a const data transport segment. */
typedef PDMDATASEG const *PCPDMDATASEG;
/**
 * Forms of generic segment offloading.
 */
typedef enum PDMNETWORKGSOTYPE {
    /** Invalid zero value. */
    PDMNETWORKGSOTYPE_INVALID = 0,
    /** TCP/IPv4 - no CWR/ECE encoding. */
    PDMNETWORKGSOTYPE_IPV4_TCP,
    /** TCP/IPv6 - no CWR/ECE encoding. */
    PDMNETWORKGSOTYPE_IPV6_TCP,
    /** UDP/IPv4. */
    PDMNETWORKGSOTYPE_IPV4_UDP,
    /** UDP/IPv6. */
    PDMNETWORKGSOTYPE_IPV6_UDP,
    /** TCP/IPv6 over IPv4 tunneling - no CWR/ECE encoding. */
    PDMNETWORKGSOTYPE_IPV4_IPV6_TCP,
    /** UDP/IPv6 over IPv4 tunneling. */
    PDMNETWORKGSOTYPE_IPV4_IPV6_UDP,
    /** The end of valid GSO types. */
    PDMNETWORKGSOTYPE_END
} PDMNETWORKGSOTYPE;

/**
 * Generic segment offloading context.
 */
typedef struct PDMNETWORKGSO {
    /** The type of segmentation offloading we're performing (PDMNETWORKGSOTYPE). */
    uint8_t             u8Type;
    /** The total header size. */
    uint8_t             cbHdrsTotal;
} PDMNETWORKGSO;
+/** The max segment size (MSS) to apply. */
+ uint16_t            cbMaxSeg;
+
+ /** Offset of the first header (IPv4 / IPv6). 0 if not not needed. */
+ uint8_t             offHdr1;
+ /** Offset of the second header (TCP / UDP). 0 if not not needed. */
+ uint8_t             offHdr2;
+ /** The header size used for segmentation (equal to offHdr2 in UFO). */
+ uint8_t             cbHdrsSeg;
+ /** Unused. */
+ uint8_t             u8Unused;
+} PDMNETWORKGSO;
+/** Pointer to a GSO context. */
+typedef PDMNETWORKGSO *PPDMNETWORKGSO;
+/** Pointer to a const GSO context. */
+typedef PDMNETWORKGSO const *PCPDMNETWORKGSO;
+
+/
+ /**< The current ROM page protection. */
+ *
+ /**< @remarks This is part of the saved state. */
+ */
+typedef enum PGMROMPROT
+{
+  /**< The customary invalid value. */
+  PGMROMPROT_INVALID = 0,
+  /**< Read from the virgin ROM page, ignore writes. */
+  * Map the virgin page, use write access handler to ignore writes. */
+  PGMROMPROT_READ_ROM_WRITE_IGNORE,
+  /**< Read from the virgin ROM page, write to the shadow RAM. */
+  * Map the virgin page, use write access handler to change the shadow RAM. */
+  PGMROMPROT_READ_ROM_WRITE_RAM,
+  /**< Read from the shadow ROM page, ignore writes. */
+  * Map the shadow page read-only, use write access handler to ignore writes. */
+  PGMROMPROT_READ_RAM_WRITE_IGNORE,
+  /**< Read from the shadow ROM page, ignore writes. */
+  * Map the shadow page read-write, disabled write access handler. */
+  PGMROMPROT_READ_RAM_WRITE_RAM,
+  /**< The end of valid values. */
+  PGMROMPROT_END,
+  /**< The usual 32-bit type size hack. */
+  PGMROMPROT_32BIT_HACK = 0xffffffff
+} PGMROMPROT;
+
+/
+ /**< Page mapping lock. */
typedef struct PGMPAGEMAPLOCK
{
#if defined(IN_RC) || defined(VBOX_WITH_2X_4GB_ADDR_SPACE_IN_R0)
   /** The locked page. */
   void       *pvPage;
   /** Pointer to the CPU that made the mapping. */
   * In ring-0 and raw-mode context we don't intend to ever allow long term
   * locking and this is a way of making sure we're still on the same CPU. */
   PVMCPU      pVCpu;
#else
   /** Pointer to the PGMPAGE and lock type. */
   bit-0 abuse: set=write, clear=read. */
   uintptr_t   uPageAndType;
   /* Read lock type value. */
# define PGMPAGEMAPLOCK_TYPE_READ   ((uintptr_t)0)
# define PGMPAGEMAPLOCK_TYPE_WRITE  ((uintptr_t)1)
# define PGMPAGEMAPLOCK_TYPE_MASK   ((uintptr_t)1)
   /** Pointer to the PGMCHUNKR3MAP. */
   void       *pvMap;
#endif
} PGMPAGEMAPLOCK;

typedef PGMPAGEMAPLOCK *PPGMPAGEMAPLOCK;

/** Pointer to a page mapping lock. */
typedef PGMPAGEMAPLOCK *PPGMPAGEMAPLOCK;

/** Pointer to a info helper callback structure. */
typedef struct DBGINFOHLP *PDBGINFOHLP;

/** Pointer to a const info helper callback structure. */
typedef const struct DBGINFOHLP *PCDBGINFOHLP;

/** Pointer to a const register descriptor. */
typedef struct DBGFREGDESC const *PCDBGFREGDESC;

/** Configuration manager tree node - A key. */
typedef struct CFGMNODE *PCFGMNODE;

/** Configuration manager tree leaf - A value. */
typedef struct CFGMLEAF *PCFGMLEAF;

/** CPU modes. */
typedef enum CPUMMODE
+++ linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/VBox/version.h
@@ -0,0 +1,153 @@
+/** @file
+ * VBox Version Management.
+ */
+@* Copyright (C) 2006-2017 Oracle Corporation

+/** The usual invalid zero entry. */
+CPUMMODE_INVALID = 0,
+/** Real mode. */
+CPUMMODE_REAL,
+/** Protected mode (32-bit). */
+CPUMMODE_PROTECTED,
+/** Long mode (64-bit). */
+CPUMMODE_LONG
+} CPUMMODE;

+/** CPU mode flags (DISSTATE::mode). */
+typedef enum DISCPUMODE
+{
+    DISCPUMODE_INVALID = 0,
+    DISCPUMODE_16BIT,
+    DISCPUMODE_32BIT,
+    DISCPUMODE_64BIT,
+    /** hack forcing the size of the enum to 32-bits. */
+    DISCPUMODE_MAKE_32BIT_HACK = 0x7fffffff
+} DISCPUMODE;

/** Pointer to the disassembler state. */
typedef struct DISSTATE *PDISSTATE;
/** Pointer to a const disassembler state. */
typedef struct DISSTATE const *PCDISSTATE;

/** @deprecated  PDISSTATE and change pCpu and pDisState to pDis. */
typedef PDISSTATE PDISCPUSTATE;
/** @deprecated  PCDISSTATE and change pCpu and pDisState to pDis. */
typedef PCDISSTATE PCDISCPUSTATE;

/** @} */
#endif
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hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
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VirtualBox OSE distribution, in which case the provisions of the
CDDL are applicable instead of those of the GPL.
+ You may elect to license modified versions of this file under the
terms and conditions of either the GPL or the CDDL or both.
+/
+ #ifndef ___VBox_version_h
+#define ___VBox_version_h
+
+/* Product info. */
+#include <product-generated.h>
+#include <version-generated.h>
+
+#ifdef RC_INVOKED
+/* Some versions of RC has trouble with cdefs.h, so we duplicate these two here. */
+# define RT_STR(str)             #str
+# define RT_XSTR(str)            RT_STR(str)
+#else  /* !RC_INVOKED */
+/** Combined version number. */
+# define VBOX_VERSION            (VBOX_VERSION_MAJOR << 16 | VBOX_VERSION_MINOR)
+/** Get minor version from combined version. */
+# define VBOX_GET_VERSION_MINOR(uVer)   ((uVer) & 0xffffffff)
+/** Get major version from combined version. */
+# define VBOX_GET_VERSION_MAJOR(uVer)  ((uVer) >> 16)
+
+/**
+ * Make a full version number.
+ *
+ * The returned number can be used in normal integer comparisons and will yield
+ * the expected results.
+ *
+ * @param uMajor The major version number.
+ * @param uMinor The minor version number.
+ * @param uBuild The build number.
Corporation"
+#define VBOX_RC_PRODUCT_NAME VBOX_PRODUCT
+#define VBOX_RC_PRODUCT_NAME_GA VBOX_PRODUCT " Guest Additions"
+#define VBOX_RC_PRODUCT_NAME_PUEL_EXTPACK VBOX_PRODUCT " Extension Pack"
+#define VBOX_RC_PRODUCT_NAME_DTRACE_EXTPACK VBOX_PRODUCT " VBoxDTrace Extension Pack"
+#define VBOX_RC_PRODUCT_NAME_STR VBOX_RC_PRODUCT_NAME "0"
+#define VBOX_RC_PRODUCT_NAME_GA_STR VBOX_RC_PRODUCT_NAME_GA "0"
+#define VBOX_RC_PRODUCT_NAME_PUEL_EXTPACK_STR VBOX_RC_PRODUCT_NAME_PUEL_EXTPACK "0"
+#define VBOX_RC_PRODUCT_NAME_DTRACE_EXTPACK_STR VBOX_RC_PRODUCT_NAME_DTRACE_EXTPACK "0"
+#define VBOX_RC_PRODUCT_VERSION VBOX_VERSION_MAJOR , VBOX_VERSION_MINOR , VBOX_VERSION_BUILD , VBOX_SVN_REV_MOD_5K
+#define VBOX_RC_FILE_VERSION VBOX_VERSION_MAJOR , VBOX_VERSION_MINOR , VBOX_VERSION_BUILD , VBOX_SVN_REV_MOD_5K
+#ifndef VBOX_VERSION_PRERELEASE
+# define VBOX_RC_PRODUCT_VERSION_STR RT_XSTR(VBOX_VERSION_MAJOR) "." RT_XSTR(VBOX_VERSION_MINOR) "." RT_XSTR(VBOX_VERSION_BUILD) "(" VBOX_VERSION_PRERELEASE ")0"
+# define VBOX_RC_FILE_VERSION_STR RT_XSTR(VBOX_VERSION_MAJOR) "." RT_XSTR(VBOX_VERSION_MINOR) "." RT_XSTR(VBOX_VERSION_BUILD) "(" VBOX_VERSION_PRERELEASE ")0"
+#else
+# define VBOX_RC_PRODUCT_VERSION_STR RT_XSTR(VBOX_VERSION_MAJOR) "." RT_XSTR(VBOX_VERSION_MINOR) "." RT_XSTR(VBOX_VERSION_BUILD) ""
+# define VBOX_RC_FILE_VERSION_STR RT_XSTR(VBOX_VERSION_MAJOR) "." RT_XSTR(VBOX_VERSION_MINOR) "." RT_XSTR(VBOX_VERSION_BUILD) ""
+#endif
+/* Flags and extra strings depending on the build type and who's building. */
+if defined(DEBUG) || defined(LOG_ENABLED) || defined(RT_STRICT) || defined(VBOX_STRICT) || defined(VBOX_WITH_STATISTICS)
+ define VBOX_RC_FILE_FLAGS_DEBUG VS_FF_DEBUG
+else
+ define VBOX_RC_FILE_FLAGS_DEBUG 0
+endif
+if VBOX_VERSION_MINOR >= 51 || defined(VBOX_VERSION_PRERELEASE)
+ define VBOX_RC_FILE_FLAGS_PRERELEASE VS_FF_PRERELEASE
+else
+ define VBOX_RC_FILE_FLAGS_PRERELEASE 0
+endif
+if defined(VBOX_BUILD_SERVER_BUILD) && (VBOX_VERSION_MINOR & 1) == 0
# define VBOX_RC_FILE_FLAGS_BUILD 0
 +# define VBOX_RC_MORE_STRINGS
 +#elif defined(VBOX_BUILD_SERVER_BUILD)
 +# define VBOX_RC_FILE_FLAGS_BUILD VS_FF_SPECIALBUILD
 +# define VBOX_RC_MORE_STRINGS VALUE "SpecialBuild", "r" RT_XSTR(VBOX_SVN_REV) "\0"
 +#else
 +# define VBOX_RC_FILE_FLAGS_BUILD VS_FF_PRIVATEBUILD
 +# ifdef VBOX_PRIVATE_BUILD_DESC
+# define VBOX_RC_MORE_STRINGS VALUE "PrivateBuild", VBOX_PRIVATE_BUILD_DESC "\0"
 +# else
 +# define VBOX_RC_MORE_STRINGS VALUE "PrivateBuild", "r" RT_XSTR(VBOX_SVN_REV) "\0"
 +# endif
 +#endif

#define VBOX_RC_FILE_FLAGS (VBOX_RC_FILE_FLAGS_DEBUG |
 VBOX_RC_FILE_FLAGS_PRERELEASE | VBOX_RC_FILE_FLAGS_BUILD)
+/** @} */
 +
 +
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/assert.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/assert.h
@@ -0,0 +1,63 @@
+/* $Id: assert.h $ */
+/** @file
+ * IPRT - Internal RTAssert header
+ */
+/*
+ * Copyright (C) 2009-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
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+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
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+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+ifndef ___internal_assert_h
+define ___internal_assert_h
+
+include <iprt/types.h>
+
+RT_C_DECLS_BEGIN
+
+ifdef IN_RING0
+
+/**
+ * Print the 1st part of an assert message to whatever native facility is best
+ * fitting.
+ *
+ * @param   pszExpr     Expression. Can be NULL.
+ * @param   uLine       Location line number.
+ * @param   pszFile     Location file name.
+ * @param   pszFunction Location function name.
+ */
+DECLHIDDEN(void) rtR0AssertNativeMsg1(const char *pszExpr, unsigned uLine, const char *pszFile, const char *pszFunction);
+
+/**
+ * Print the 2nd (optional) part of an assert message to whatever native
+ * facility is best fitting.
+ *
+ * @param   fInitial    Whether it's the initial (true) or an additional (false)
+ *                      message.
+ * @param   pszFormat   Printf like format string.
+ * @param   va          Arguments to that string.
+ */
+DECLHIDDEN(void) rtR0AssertNativeMsg2V(bool fInitial, const char *pszFormat, va_list va);
+
+endif
+
+RT_C_DECLS_END
+
+endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/initterm.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/initterm.h
@@ -0,0 +1,53 @@
+/* $Id: initterm.h $ */
+/** @file
+ * IPRT - Initialization & Termination.
+ */
+@
+@ -0.0 +1.53 @@
+/* $Id: initterm.h $ */
+@/ @file
+ * IPRT - Initialization & Termination.
+ */
+
+/*
#ifndef ___internal_initterm_h
#define ___internal_initterm_h

#include <iprt/cdefs.h>

RT_C_DECLS_BEGIN

#ifdef IN_RING0

/**
 * Platform specific initialization.
 * @returns IPRT status code.
 */
DECLHIDDEN(int) rtR0InitNative(void);

/**
 * Platform specific termination.
 */
DECLHIDDEN(void) rtR0TermNative(void);

#endif /* IN_RING0 */

RT_C_DECLS_END

#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/iprt.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/iprt.h
@@ -0,0 +1,204 @@
+/* $Id: iprt.h $ */
+/** @file
+ * IPRT - Internal header for miscellaneous global defs and types.
+ */
+ /*
+ * Copyright (C) 2009-2017 Oracle Corporation
+ */
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+ General Public License (GPL) as published by the Free Software
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+ hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
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+ (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ VirtualBox OSE distribution, in which case the provisions of the
+ CDDL are applicable instead of those of the GPL.
+ */
+ /* You may elect to license modified versions of this file under the
+ terms and conditions of either the GPL or the CDDL or both.
+ */
+ */
+ #ifndef __internal_iprt_h
+ #define __internal_iprt_h
+
+ #include <iprt/cdefs.h>
+ #include <iprt/types.h>
+ */
+ */
+ #if defined(RT_OS_LINUX) \
+ && defined(IN_RING0) \ 
+ && defined(MODULE) \ 
+ && !defined(RT_NO_EXPORT_SYMBOL) 
+ # define bool linux_bool /* see r0drv/linux/the-linux-kernel.h */
+ # include <linux/version.h>
+ # if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 33)
+ # include <generated/autoconf.h>
+ # else
+ # ifndef AUTOCONF_INCLUDED

Open Source Used In 5GaaS Edge AC-4 37325
/** @def RT_MORE_STRICT
 * Enables more assertions in IPRT. */
#if !defined(RT_MORE_STRICT) && (defined(DEBUG) || defined(RT_STRICT) || defined(DOXYGEN_RUNNING)) && !defined(RT_OS_WINDOWS) /**< @todo enable on windows after testing */
#define RT_MORE_STRICT
#endif

/** @def RT_ASSERT_PREEMPT_CPUID_VAR
 * Partner to RT_ASSERT_PREEMPT_CPUID_VAR. Declares and initializes a variable
 * +* idAssertCpu to NIL_RTCPUID if preemption is enabled and to RTMpCpuId if
 * +* disabled. When RT_MORE_STRICT isn't defined it declares an uninitialized
 * +* dummy variable.
 * +*
 * +* Requires iprt/mp.h and iprt/asm.h.
 * +*/
/** @def RT_ASSERT_PREEMPT_CPUID
 * Asserts that we didn't change CPU since RT_ASSERT_PREEMPT_CPUID_VAR if
 * +* preemption is disabled. Will also detect changes in preemption
 * +* disable/enable status. This is a noop when RT_MORE_STRICT isn't defined. */
#if defined RT_MORE_STRICT
#endif
#define RT_ASSERT_PREEMPT_CPUID_VAR()
RTCPUID const idAssertCpu = RTThreadPreemptIsEnabled(NIL_RTTHREAD) ? NIL_RTCPUID : RTMpCpuId();
#define RT_ASSERT_PREEMPT_CPUID()
 do {
    RTCPUID const idAssertCpuNow = RTThreadPreemptIsEnabled(NIL_RTTHREAD) ? NIL_RTCPUID : RTMpCpuId();
    AssertMsg(idAssertCpu == idAssertCpuNow, ("%#x, %#x\n", idAssertCpu, idAssertCpuNow));
 } while (0)
+  +#else
+  +# define RT_ASSERT_PREEMPT_CPUID_VAR() RTCPUID idAssertCpuDummy
+  +# define RT_ASSERT_PREEMPT_CPUID() NOREF(idAssertCpuDummy)
+  +#endif
+  +/*/ @def RT_ASSERT_PREEMPT_CPUID_SPIN_ACQUIRED
+  +  * Extended version of RT_ASSERT_PREEMPT_CPUID for use before
+  +  * RTSpinlockAcquire* returns. This macro works the idCpuOwner and idAssertCpu
+  +  * members of the spinlock instance data. */
+  +#ifdef RT_MORE_STRICT
+  +# define RT_ASSERT_PREEMPT_CPUID_SPIN_ACQUIRED(pThis) \
+  +  do \
+  +  {  \
+  +    RTCPUID const idAssertCpuNow = RTMpCpuId(); \
+  +    AssertMsg(idAssertCpu == idAssertCpuNow || idAssertCpu == NIL_RTCPUID,  ("%#x, %#x\n", \
+  +      idAssertCpu, idAssertCpuNow)); \
+  +    (pThis)->idAssertCpu = idAssertCpu; \ 
+  +    (pThis)->idCpuOwner  = idAssertCpuNow; \ 
+  +  } while (0)
+  +#else
+  +# define RT_ASSERT_PREEMPT_CPUID_SPIN_ACQUIRED(pThis) NOREF(idAssertCpuDummy)
+  +#endif
  +/*/ @def RT_ASSERT_PREEMPT_CPUID_SPIN_RELEASE_VARS
  +  +  * Extended version of RT_ASSERT_PREEMPT_CPUID_VAR for use with
  +  +  * RTSpinlockRelease* returns. */
  +#ifdef RT_MORE_STRICT
  +# define RT_ASSERT_PREEMPT_CPUID_SPIN_RELEASE_VARS() RTCPUID idAssertCpu \
  +#else
  +# define RT_ASSERT_PREEMPT_CPUID_SPIN_RELEASE_VARS() RTCPUID idAssertCpuDummy
  +#endif
  +/*/ @def RT_ASSERT_PREEMPT_CPUID_SPIN_RELEASE
  +  +  * Extended version of RT_ASSERT_PREEMPT_CPUID for use in RTSpinlockRelease*
  +  +  * before calling the native API for releasing the spinlock. It must be
  +  +  * teamed up with RT_ASSERT_PREEMPT_CPUID_SPIN_ACQUIRED. */
  +#ifdef RT_MORE_STRICT
  +# define RT_ASSERT_PREEMPT_CPUID_SPIN_RELEASE(pThis) \
  +  +  do \
  +  +  {  \
  +  +    RTCPUID const idCpuOwner  = (pThis)->idCpuOwner; \ 
  +  +    RTCPUID const idAssertCpuNow = RTMpCpuId(); \ 
  +  +    AssertMsg(idCpuOwner == idAssertCpuNow,  ("%#x, %#x\n", idCpuOwner, idAssertCpuNow)); \
  +  +    (pThis)->idCpuOwner  = NIL_RTCPUID; \ 
  +  +    idAssertCpu = (pThis)->idAssertCpu; \ 
  +  +    (pThis)->idAssertCpu = NIL_RTCPUID; \ 
  +  +  } while (0)
+else
+  define RT_ASSUME_PREEMPT_CPUID_SPIN_RELEASE(pThis) NOREF(idAssertCpuDummy)
+endif
+
+/** @def RT_ASSUME_PREEMPT_CPUID_DISABLE */
+  For use in RTThreadPreemptDisable implementation after having disabled
+  preemption. Requires iprt/mp.h. */
+ifdef RT_MORE_STRICT
+
+  define RT_ASSUME_PREEMPT_CPUID_DISABLE(pStat)
+  
+  do 
+  
+  { 
+  Assert((pStat)->idCpu == NIL_RTCPUID);
+  
+  (pStat)->idCpu = RTMpCpuId();
+  
+  } while (0)
+
+else
+
+  define RT_ASSUME_PREEMPT_CPUID_DISABLE(pStat)
+  
+  Assert((pStat)->idCpu == NIL_RTCPUID)
+
+endif
+
+/** @def RT_ASSUME_PREEMPT_CPUID_RESTORE */
+  For use in RTThreadPreemptRestore implementations before restoring
+  preemption. Requires iprt/mp.h. */
+ifdef RT_MORE_STRICT
+
+  define RT_ASSUME_PREEMPT_CPUID_RESTORE(pStat)
+  
+  do 
+  
+  { 
+  RTCPUID const idAssertCpuNow = RTMpCpuId();
+  
+  AssertMsg((pStat)->idCpu == idAssertCpuNow, "\%#x, \%#x\n", (pStat)->idCpu, idAssertCpuNow);
+  
+  (pStat)->idCpu = NIL_RTCPUID;
+  
+  } while (0)
+
+else
+
+  define RT_ASSUME_PREEMPT_CPUID_RESTORE(pStat) do [ ] while (0)
+
+endif
+
+
+/** @def RT_ASSUME_INTS_ON */
+  For asserts that interrupts are disabled when RT_MORE_STRICT is defined. */
+ifdef RT_MORE_STRICT
+
+  if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+  
+  define RT_ASSUME_INTS_ON() Assert(ASMIntAreEnabled())
+  
+else /* PORTME: Add architecture/platform specific test. */
+  
+  define RT_ASSUME_INTS_ON() Assert(RTThreadPreemptIsEnabled(NIL_RTTHREAD))
+  
+endif
+
+else
+
+  define RT_ASSUME_INTS_ON() do [ ] while (0)
+
+endif
+
+/** @def RT_ASSUME_PREEMPTIBLE
+ * Asserts that preemption hasn't been disabled (using
+ * RTThreadPreemptDisable) when RT_MORE_STRICT is defined. */
+##ifdef RT_MORE_STRICT
+## define RT_ASSERT_PREEMPTIBLE() Assert(RTThreadPreemptIsEnabled(NIL_RTTHREAD))
+##else
+## define RT_ASSERT_PREEMPTIBLE() do {} while (0)
+##endif
+
+RT_C_DECLS_BEGIN
+
+##ifdef RT_OS_OS2
+uint32_t rtR0SemWaitOs2ConvertTimeout(uint32_t fFlags, uint64_t uTimeout);
+##endif
+
+RT_C_DECLS_END
+
+##endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/lockvalidator.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/lockvalidator.h
@@ -0,0 +1,116 @@
+/* $Id: lockvalidator.h $ */
+/** @file
+ * IPRT - Internal RTLockValidator header.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ */
+ifndef ___iprt_internal_lockvalidator_h
+define ___iprt_internal_lockvalidator_h
+
+include <iprt/types.h>
+include <iprt/lockvalidator.h>
+
+RT_C_DECLS_BEGIN
+
+/
+ * Record used only on the lock stack for recording the stack and source
+ * position of a recursive lock acquisition.
+ */
+typedef struct RTLOCKVALRECNEST
+
+ RTLOCKVALRECCORE Core;
+ /** The recursion level at this point in the stack. */
+ uint32_t cRecursion;
+ /** Pointer to the next record on the stack. */
+ PRTLOCKVALRECUNION volatile pDown;
+ /** Pointer to the first recursion. */
+ PRTLOCKVALRECUNION volatile pRec;
+ /** Pointer to the next free record when in the
+ * RTLOCKVALPER THREAD::pFreeNestRecs list. */
+ struct RTLOCKVALRECNEST *pNextFree;
+ /** The source position. */
+ RTLOCKVALSRCPOS SrcPos;
+ } RTLOCKVALRECNEST;
+/** Pointer to a recursion record. */
+typedef RTLOCKVALRECNEST *PRTLOCKVALRECNEST;
+
+
+/**
+ * Record union for simplifying internal processing.
+ */
+typedef union RTLOCKVALRECUNION
+
+ RTLOCKVALRECCORE Core;
+ RTLOCKVALRECEXCL Excl;
+ RTLOCKVALRECSHRD Shared;
+ RTLOCKVALRECSHRDOWN ShrdOwner;
+ RTLOCKVALRECNEST Nest;
+ } RTLOCKVALRECUNION;
+
+
+/**
+ * Per thread data for the lock validator.
+ */
typedef struct RTLOCKVALPERTHREAD {
    /** Where we are blocking. */
    RTLOCKVALSRCPOS                SrcPos;
    /** Top of the lock stack. */
    PRTLOCKVALRECUNION volatile     pStackTop;
    /** List of free recursion (nesting) record. */
    PRTLOCKVALRECNEST               pFreeNestRecs;
    /** What we're blocking on. */
    * The lock validator sets this, RTThreadUnblock clears it. */
    PRTLOCKVALRECNUNION            pRec;
    /** The state in which pRec that goes with pRec. */
    * RTThreadUnblocking uses this to figure out when to clear pRec. */
    RTTHREADSTATE volatile         enmRecState;
    /** The thread is running inside the lock validator. */
    bool                           fInValidator;
    /** Reserved for alignment purposes. */
    bool                           afReserved[3];
    /** Number of registered write locks, mutexes and critsects that this thread owns. */
    int32_t                        cWriteLocks;
    /** Number of registered read locks that this thread owns, nesting included. */
    int32_t                        cReadLocks;
    /** Bitmap indicating which entries are free (set) and allocated (clear). */
    uint32_t                       bmFreeShrdOwners;
    /** Reserved for alignment purposes. */
    uint32_t                       u32Reserved;
    /** Statically allocated shared owner records */
    RTLOCKVALRECSHRDOWN            aShrdOwners[32];
} RTLOCKVALPERTHREAD;

DECLHIDDEN(void)    rtLockValidatorInitPerThread(RTLOCKVALPERTHREAD *pPerThread);
DECLHIDDEN(void)    rtLockValidatorDeletePerThread(RTLOCKVALPERTHREAD *pPerThread);
DECLHIDDEN(void)    rtLockValidatorSerializeDestructEnter(void);
DECLHIDDEN(void)    rtLockValidatorSerializeDestructLeave(void);

RT_C_DECLS_END

#ifndef __IPRT_INTERNAL_MAGIC_H_INCLUDED__
#define __IPRT_INTERNAL_MAGIC_H_INCLUDED__

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/magics.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/magics.h
@@ -0,0 +1,247 @@
+/* $Id: magics.h $ */
+/** @file
+ * IPRT - Internal header defining The Magic Numbers.
+ */
+*/
+*/ file
+*/ IPRT - Internal header defining The Magic Numbers.
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   *
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   */

#ifndef ___internal_magics_h
#define ___internal_magics_h

/** Magic number for RTAIOMGRINT::u32Magic. (Emil Erich Kaestner) */
#define RTAIOMGR_MAGIC UINT32_C(0x18990223)
/** Magic number for RTAIOMGRINTFILE::u32Magic. (Ephraim Kishon) */
#define RTAIOMGRFILE_MAGIC UINT32_C(0x19240823)
/** Magic number for RTDBGMODINT::u32Magic. (Charles Lloyd) */
#define RTDBGAS_MAGIC UINT32_C(0x19380315)
/** Magic number for RTDBGCFGINT::u32Magic. (McCoy Tyner) */
#define RTDBGCFG_MAGIC UINT32_C(0x19381211)
/** Magic number for RTDBGMODINT::u32Magic. (Keith Jarrett) */
#define RTDBGMOD_MAGIC UINT32_C(0x19450508)
/** Magic number for RTDBGMODVTIMG::u32Magic. (Jack DeJohnette) */
#define RTDBGMODVTDBG_MAGIC UINT32_C(0x19420809)
/** Magic number for RTDBGMODVTIMG::u32Magic. (Cecil McBee) */
#define RTDBGMODVTIMG_MAGIC UINT32_C(0x19350419)
/** Magic value for RTDBGKRNLINFOINT::u32Magic. (John Carmack) */
#define RTDBGKRNLINFO_MAGIC UINT32_C(0x19700820)
/** The value of RTDIRINTERNAL::u32Magic. (Michael Ende) */
#define RTDIR_MAGIC UINT32_C(0x19291112)
/** The value of RTDIRINTERNAL::u32Magic after RTDirClose(). */
#define RTDIR_MAGIC_DEAD UINT32_C(0x19950829)
+/** The value of RTDVM_INTERNAL::u32Magic. (Dan Brown) */
+define RTDVM_MAGIC UINT32_C(0x19640622)
+/** The value of RTDVM_INTERNAL::u32Magic after close. */
+define RTDVM_MAGIC_DEAD (¬RTDVM_MAGIC)
+/** The value of RTDVM_VOLUME_INTERNAL::u32Magic. (Daniel Defoe) */
+define RTDVM_VOLUME_MAGIC UINT32_C(0x16591961)
+/** The value of RTDVM_VOLUME_INTERNAL::u32Magic after close. */
+define RTDVM_VOLUME_MAGIC_DEAD UINT32_C(0x17310424)
+a/** The value of RTFILEAIOCTXINT::u32Magic. (Howard Phillips Lovecraft) */
+adefine RTFILEAIOCTX_MAGIC UINT32_C(0x18900820)
+a/** The value of RTFILEAIOCTXINT::u32Magic after RTFileAioCtxDestroy(). */
adefine RTFILEAIOCTX_MAGIC_DEAD UINT32_C(0x19370315)
a/** The value of RTFILEAIOREQINT::u32Magic. (Stephen Edwin King) */
adefine RTFILEAIOREQ_MAGIC UINT32_C(0x19470921)
a/** The value of RTFILEAIOREQINT::u32Magic after RTFileAioReqDestroy(). */
adefine RTFILEAIOREQ_MAGIC_DEAD UINT32_C(0x19370315)
a/** The magic value for RTFILEAIOREQINT::u32Magic. (Brian Blade) */
adefine RTFILEAIOREQ_MAGIC UINT32_C(0x19700725)
a/** Magic number for RTHANDLETABLEINT::u32Magic. (Hitomi Kanehara) */
adefine RTHANDLETABLE_MAGIC UINT32_C(0x19830808)
a/** Magic number for RTHEAPOFFSETINTERNAL::u32Magic. (Neal Town Stephenson) */
adefine RTHEAPOFFSET_MAGIC UINT32_C(0x19591031)
a/** Magic number for RTHEASIMPLEINTERNAL::uMagic. (Kyoichi Katayama) */
adefine RTHEASIMPLE_MAGIC UINT32_C(0x19590105)
a/** The magic value for RTHTTPINTERNAL::u32Magic. (Karl May) */
adefine RTHTTP_MAGIC UINT32_C(0x18420225)
a/** The value of RTHTTPINTERNAL::u32Magic after close. */
adefine RTHTTP_MAGIC_DEAD UINT32_C(0x19120330)
a/** The value of RTINIFILEINT::u32Magic. (Jane Austen) */
adefine RTINIFILE_MAGIC UINT32_C(0x17751216)
a/** The value of RTINIFILEINT::u32Magic after close. */
adefine RTINIFILE_MAGIC_DEAD UINT32_C(0x18170718)
a/** The magic value for RTLDRMODINTERNAL::u32Magic. (Alan Moore) */
adefine RTLDRMOD_MAGIC UINT32_C(0x19531118)
a/** The magic value for RTLOCALIPCSERVER::u32Magic. (Naoki Yamamoto) */
adefine RTLOCALIPCSERVER_MAGIC UINT32_C(0x19600201)
a/** The magic value for RTLOCALIPCSERVER::u32Magic after destruction. */
adefine RTLOCALIPCSERVER_MAGIC DEAD UINT32_C(0x19550812)
a/** The magic value for RTLOCKVALCLASSINT::u32Magic. (Thomas Mann) */
adefine RTLOCKVALCLASS_MAGIC UINT32_C(0x18750605)
a/** The magic value for RTLOCKVALCLASSINT::u32Magic after destruction. */
adefine RTLOCKVALCLASS_MAGIC_DEAD UINT32_C(0x18990422)
a/** The dead magic value for RTLOCKVALRECEXCL::u32Magic. */
#define RTLOCKVALRECEXCL_MAGIC DEAD UINT32_C(0x18990422)
+define RTLOCKVALRECSEXCL_MAGIC_DEAD UINT32_C(0x19770702)
+/** The magic value for RTLOCKVALRECEXCL::u32Magic. (Agnar Mykle) */
+define RTLOCKVALRECEXCL_MAGIC UINT32_C(0x19150808)
+/** The magic value for RTLOCKVALRECEXCL::u32Magic after deletion. */
+define RTLOCKVALRECEXCL_MAGIC_DEAD UINT32_C(0x19940115)
+/** The magic value for RTLOCKVALRECEXCL::u32Magic. (Jens Ingvald Bjoerneboe) */
+define RTLOCKVALRECEXCL_DOWN_MAGIC UINT32_C(0x19150808)
+/** The magic value for RTLOCKVALRECEXCLDOWN::u32Magic after deletion. */
+define RTLOCKVALRECEXCL_DOWN_MAGIC_DEAD UINT32_C(0x19940115)
+/** Magic number for RTMEMCACHEINT::u32Magic. (Joseph Weizenbaum) */
+define RTMEMCACHE_MAGIC UINT32_C(0x19230108)
+/** Dead magic number for RTMEMCACHEINT::u32Magic. */
+define RTMEMCACHE_MAGIC DEAD UINT32_C(0x20080305)
+/** The magic value for RTMEMPOOL::u32Magic. (Jane Austin) */
+define RTMEMPOOL_MAGIC UINT32_C(0x17751216)
+/** The magic value for RTMEMPOOL::u32Magic after RTMemPoolDestroy. */
+define RTMEMPOOL_MAGIC DEAD UINT32_C(0x18170718)
+/** The magic value for heap blocks. (Edgar Allan Poe) */
+define RTMEMHDR_MAGIC UINT32_C(0x18090119)
+/** The magic value for heap blocks after freeing. */
+define RTMEMHDR_MAGIC DEAD UINT32_C(0x18491007)
+/** The value of RTPIPEINTERNAL::u32Magic. (Frank Schaeftz) */
+define RTPIPE_MAGIC UINT32_C(0x19570528)
+/** The value of RTPOLLSETINTERNAL::u32Magic. (Ai Yazawa) */
+define RTPOLLSET_MAGIC UINT32_C(0x19670307)
+/** The value of RTPOLLSETINTERNAL::u32Magic after destruction. */
+define RTPOLLSET_MAGIC DEAD UINT32_C(0x19611210)
+/** The value of RTS3::u32Magic. (Edgar Wallace) */
+define RTS3_MAGIC UINT32_C(0x18750401)
+/** The value of RTS3::u32Magic after RTS3Destroy(). */
+/** The value of RTS3::u32Magic. (Edgar Wallace) */
+define RTS3_MAGIC UINT32_C(0x18750401)
+##define RTS3_MAGIC_DEAD UINT32_C(0x19320210)
+/** Magic for the event semaphore structure. (Neil Gaiman) */
+#define RTSEMEVENT_MAGIC UINT32_C(0x19601110)
+/** Magic for the multiple release event semaphore structure. (Isaac Asimov) */
+#define RTSEMEVENTMULTI_MAGIC UINT32_C(0x19200102)
+/** Dead magic value for multiple release event semaphore structures. */
+#define RTSEMEVENTMULTI_MAGIC_DEAD UINT32_C(0x19920406)
+/** Magic value for RTSEMMutexINTERNAL::u32Magic. (John Ronald Reuel Tolkien) */
+#define RTSEMMUTEX_MAGIC UINT32_C(0x19520311)
+/** Dead magic for the mutex semaphore structure. */
+#define RTSEMMUTEX_MAGIC_DEAD UINT32_C(0x20010511)
+/** Magic for the spinning mutex semaphore structure. (Natsume Soseki) */
+#define RTSEMSPINMUTEX_MAGIC UINT32_C(0x18670209)
+/** Dead magic value for RTSEMSpinMutexINTERNAL::u32Magic. */
+#define RTSEMSPINMUTEX_MAGIC_DEAD UINT32_C(0x19161209)
+/** RTSEMRWINTERNAL::u32Magic value. (Kosuke Fujishima) */
+#define RTSEMRW_MAGIC UINT32_C(0x19640707)
+/** Magic value for RTSPINLOCKINTERNAL::u32Magic. (Terry Pratchett) */
+#define RTSPINLOCK_MAGIC UINT32_C(0x19480428)
+/** Magic value for generic RTSPINLOCKINTERNAL::u32Magic (Georges Prosper Remi). */
+#define RTSPINLOCK_GEN_MAGIC UINT32_C(0x10970522)
+/** Magic value for RTSTRCACHE::u32Magic. (Sir Arthur Charles Clarke) */
+#define RTSTRCACHE_MAGIC UINT32_C(0x19171216)
+/** Magic value for RTSTRCACHE::u32Magic after RTStrCacheDestroy. */
+#define RTSTRCACHE_MAGIC_DEAD UINT32_C(0x20080319)
+/** The value of RTSTREAM::u32Magic for a valid stream. */
+#define RTSTREAM_MAGIC UINT32_C(0xe44e44ee)
+/** Magic value for RTTCPserver::u32Magic. (Jan Garbarek) */
+#define RTTCPSERVER_MAGIC UINT32_C(0x19470304)
+/** Magic value for RTTCPserver::u32Magic. (Harlan Ellison) */
+#define RTUDPSERVER_MAGIC UINT32_C(0x19340527)
+/** The value of RTTAR::u32Magic. (Donald Ervin Knuth) */
+#define RTTAR_MAGIC UINT32_C(0x19380110)
+/** The value of RTTAR::u32Magic after RTTarClose(). */
+#define RTTAR_MAGIC_DEAD ~RTTAR_MAGIC
+/** The value of RTTARFILE::u32Magic. (Abraham Stoker) */
```c
#define RTTARFILE_MAGIC UINT32_C(0x18471108)
#define RTTARFILE_MAGIC_DEAD UINT32_C(0x19120420)
#define RTTESTINT_MAGIC UINT32_C(0x19750113)
#define RTTESTINT_MAGIC_DEAD UINT32_C(0x19360614)
#define RTTHREADCTXHOOKINT_MAGIC UINT32_C(0x19410909)
#define RTTHREADINT_MAGIC UINT32_C(0x18740529)
#define RTTHREADINT_MAGIC_DEAD UINT32_C(0x19030625)
#define RTTHREADINT_MAGIC_DEAD UINT32_C(0x19951022)
#define RTTIMER_MAGIC UINT32_C(0x19370910)
#define RTTIMER_MAGIC DEAD UINT32_C(0x19610715)
#define RTTRACEBUF_MAGIC UINT32_C(0x18990614)
#define RTTRACEBUF_MAGIC_DEAD UINT32_C(0x19720416)
#define RTVFSOBJ_MAGIC UINT32_C(0x18990721)
#define RTVFSOBJ_MAGIC_DEAD UINT32_C(0x19610702)
#define RTVFSDIR_MAGIC UINT32_C(0x19201008)
#define RTVFSDIR_MAGIC_DEAD UINT32_C(0x19860211)
#define RTVFSFILE_MAGIC UINT32_C(0x18120207)
#define RTVFSFILE_MAGIC_DEAD UINT32_C(0x18700609)
#define RTVFSIOSTREAM_MAGIC UINT32_C(0x18990721)
#define RTVFSIOSTREAM_MAGIC_DEAD UINT32_C(0x19610702)
#define RTVFSIOSTREAM_MAGIC_DEAD UINT32_C(0x19401221)
```
/* */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/mem.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/mem.h
@@ -0,0 +1,74 @@
+/* $Id: mem.h $ */
+/** @file
+ * IPRT - Memory Management.
+ */
+
+/*
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+ *
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___internal_mem_h
+#define ___internal_mem_h
+
+#include <iprt/cdefs.h>
+
+RT_C_DECLS_BEGIN
+
+/**
+ * Special allocation method that does not have any IPRT dependencies.
+ *
+ * This is suitable for allocating memory for IPRT heaps, pools, caches, memory
+ * trackers, semaphores and similar that end up in bootstrap dependency hell
+ * otherwise.
+ *
+ * @returns Pointer to the allocated memory, NULL on failure. Must be freed by
calling rtMemBaseFree().
+ * @param cb The number of bytes to allocate.
+ */
+DECLHIDDEN(void *) rtMemBaseAlloc(size_t cb);
+
+/**
+ * Frees memory allocated by rtInitAlloc().
+ *
+ * @param pv What rtInitAlloc() returned.
+ */
+DECLHIDDEN(void) rtMemBaseFree(void *pv);
+
+ifdef IN_RING0
+/* @def RTR0MEM_WITH_EF_APIS
+ * Enables the electric fence APIs.
+ *
+ * Requires working rtR0MemObjNativeProtect implementation, thus the current
+ * OS restrictions.
+ */
+#ifdef RTR0MEM_WITH_EF_APIS
+#define RTR0MEM_WITH_EF_APIS
+endif
+endif
+RT_C_DECLS_END
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/memobj.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/memobj.h
@@ -0,0 +1,483 @@
+/* $Id: memobj.h $ */
+/** @file
+ * IPRT - Ring-0 Memory Objects.
+ */
+ *
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+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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* */
+
+#ifndef ___internal_memobj_h
+#define ___internal_memobj_h
+
+#include <iprt/memobj.h>
+#include <iprt/assert.h>
+#include "internal/magics.h"
+
+RT_C_DECLS_BEGIN
+
+/** @defgroup grp_rt_memobj_int Internals.
+ * @ingroup grp_rt_memobj
+ * @internal
+ * @{ */
+
+/** Ring-0 memory object type.
+ */
+typedef enum RTR0MEMOBJTYPE
+{
+    /** The traditional invalid value. */
+    RTR0MEMOBJTYPE_INVALID = 0,
+
+    /** Primary types (parents)
+     * @name Primary types (parents)
+     * @{ */
+    /** RTR0MemObjAllocPage.
+     * This memory is page aligned and fixed. */
+    RTR0MEMOBJTYPE_PAGE,
+
+    /** RTR0MemObjAllocLow.
+     * This memory is page aligned, fixed and is backed by physical memory below 4GB. */
+    RTR0MEMOBJTYPE_LOW,
+
+    /** RTR0MemObjAllocCont.
+     * This memory is page aligned, fixed and is backed by contiguous physical memory below 4GB. */
+    RTR0MEMOBJTYPE_CONT,
+ /** RTR0MemObjLockKernel, RTR0MemObjLockUser.
+ * This memory is page aligned and fixed. It was locked/pinned/wired down by the API call. */
+ RTR0MEMOBJTYPE_LOCK,
+ /** RTR0MemObjAllocPhys, RTR0MemObjEnterPhys.
+ * This memory is physical memory, page aligned, contiguous and doesn't need to have a mapping. */
+ RTR0MEMOBJTYPE_PHYS,
+ /** RTR0MemObjAllocPhysNC.
+ * This memory is physical memory, page aligned and doesn't need to have a mapping. */
+ RTR0MEMOBJTYPE_PHYS_NC,
+ /** RTR0MemObjReserveKernel, RTR0MemObjReserveUser.
+ * This memory is page aligned and has no backing. */
+ RTR0MEMOBJTYPE_RES_VIRT,
+ /** @} */
+
+ /** @} */
+
+ /** The end of the valid types. Used for sanity checking. */
+ RTR0MEMOBJTYPE_END
+
+ */

+ /*------------------------------------------------------------------*/
+ /** @name RTR0MEMOBJINTERNAL::fFlags */
+ /** Page level protection was changed. */
+ #define RTR0MEMOBJ_FLAGS_PROT_CHANGED RT_BIT_32(0)
+ /*------------------------------------------------------------------*/
+

typedef struct RTR0MEMOBJINTERNAL *PRTR0MEMOBJINTERNAL;
typedef struct RTR0MEMOBJINTERNAL **PPRTR0MEMOBJINTERNAL;

typedef struct RTR0MEMOBJINTERNAL *PRTR0MEMOBJJINTERNAL;
typedef struct RTR0MEMOBJJINTERNAL **PPRTR0MEMOBJJINTERNAL;
+
+ /**
+ * Ring-0 memory object.
+ *
+ * When using the PRTR0MEMOBJJINTERNAL and PPRTR0MEMOBJJINTERNAL types
+ * we get pMem and ppMem variable names.
+ *
+ * When using the RTR0MEMOBJ and PRTR0MEMOBJ types we get MemObj and
+ * pMemObj variable names. We never dereference variables of the RTR0MEMOBJ
+ * type, we always convert it to a PRTR0MEMOBJJECTINTERNAL variable first.
+ */
+ typedef struct RTR0MEMOBJJINTERNAL
+/** Magic number (RTR0MEMOBJ_MAGIC). */
+uint32_t u32Magic;
+/** The size of this structure. */
+uint32_t cbSelf;
+/** The type of allocation. */
+RTR0MEMOBJTYPE enmType;
+/** Flags, RTR0MEMOBJ_FLAGS_. */
+uint32_t fFlags;
+/** The size of the memory allocated, pinned down, or mapped. */
+size_t cb;
+/** The memory address. */
+* What this really is varies with the type.
+* For PAGE, CONT, LOW, RES_VIRT/R0, LOCK/R0 and MAP/R0 it's the ring-0 mapping.
+* For LOCK/R3, RES_VIRT/R3 and MAP/R3 it is the ring-3 mapping.
+* For PHYS this might actually be NULL if there isn't any mapping.
+*/
+void *pv;
+
+/** Object relations. */
+union
+
+{
+    /** This is for tracking child memory handles mapping the
+     * memory described by the primary handle. */
+    struct
+    {
+        /** Number of mappings. */
+        uint32_t cMappingsAllocated;
+        /** Number of mappings in the array. */
+        uint32_t cMappings;
+        /** Pointers to child handles mapping this memory. */
+        PPRTR0MEMOBJINTERNAL papMappings;
+    } Parent;
+
+    /** Pointer to the primary handle. */
+    struct
+    {
+        /** Pointer to the parent. */
+        PRTR0MEMOBJINTERNAL pParent;
+    } Child;
+} uRel;
+
+/** Type specific data for the memory types that requires that. */
+union
+
+{ /*
+  /** RTR0MEMTYPE_PAGE. */
+  struct
+  { /*
+  */

+   unsigned iDummy;
+ } Page;
+
+ /** RTR0MEMTYPE_LOW. */
+ struct
+ {
+   unsigned iDummy;
+ } Low;
+
+ /** RTR0MEMTYPE_CONT. */
+ struct
+ {
+   /** The physical address of the first page. */
+   RTHCPHYS Phys;
+ } Cont;
+
+ /** RTR0MEMTYPE_LOCK_USER. */
+ struct
+ {
+   /** The process that owns the locked memory. */
+   * This is NIL_RTR0PROCESS if it's kernel memory. */
+   RTR0PROCESS R0Process;
+ } Lock;
+
+ /** RTR0MEMTYPE_PHYS. */
+ struct
+ {
+   /** The base address of the physical memory. */
+   RTHCPHYS PhysBase;
+   /** If set this object was created by RTR0MemPhysAlloc, otherwise it was
+   * created by RTR0MemPhysEnter. */
+   bool fAllocated;
+   /** See RTMEM_CACHE_POLICY_XXX constants */
+   uint32_t uCachePolicy;
+ } Phys;
+
+ /** RTR0MEMTYPE_PHYS_NC. */
+ struct
+ {
+   unsigned iDummy;
+ } PhysNC;
+
+ /** RTR0MEMOBJTYPE_RES_VIRT */
+ struct
+ {
+   /** The process that owns the reserved memory. */
+   * This is NIL_RTR0PROCESS if it's kernel memory. */
+   RTR0PROCESS R0Process;
+ } ResVirt;
+
+ /** RTR0MEMOBJTYPE_MAPPING */
+ struct
+ {
+   /**< The process that owns the reserved memory.
+      * This is NIL_RTR0PROCESS if it's kernel memory. */
+   RTR0PROCESS R0Process;
+ } Mapping;
+
+ } RTR0MEMOBJINTERNAL;
+
+/**
+ * Checks if this is mapping or not.
+ *
+ * @returns true if it's a mapping, otherwise false.
+ *
+ * @param pMem The ring-0 memory object handle.
+ *
+ * @see RTR0MemObjIsMapping
+ */
+DECLINLINE(bool) rtR0MemObjIsMapping(PRTR0MEMOBJINTERNAL pMem)
+{
+    switch (pMem->enmType)
+    {
+        case RTR0MEMOBJTYPE_MAPPING:
+            return true;
+        
+        default:
+            return false;
+        
+    }
+
+
+/**
+ * Checks page level protection can be changed on this object.
+ *
+ * @returns true / false.
+ *
+ * @param pMem The ring-0 memory object handle.
+ *
+ * @see RTR0MemObjIsProtectable
+ */
+DECLINLINE(bool) rtR0MemObjIsProtectable(PRTR0MEMOBJINTERNAL pMem)
+{
+    switch (pMem->enmType)
+    {
+        case RTR0MEMOBJTYPE_MAPPING:
+        case RTR0MEMOBJTYPE_PAGE:
+        case RTR0MEMOBJTYPE_LOW:
+        case RTR0MEMOBJTYPE_CONT:
+    return true;
+
+    default:
+        return false;
+
+}  

+/**
+ * Checks if RTR0MEMOBJ::pv is a ring-3 pointer or not.
+ *
+ * @returns true if it’s a object with a ring-3 address, otherwise false.
+ *
+ * @param   pMem The ring-0 memory object handle.
+ */
+DECLINLINE(bool) rtR0MemObjIsRing3(PRTR0MEMOBJINTERNAL pMem)
+{
+  switch (pMem->enmType)
+  {
+      case RTR0MEMOBJTYPE_RES_VIRT:
+          return pMem->u.ResVirt.R0Process != NIL_RTR0PROCESS;
+      case RTR0MEMOBJTYPE_LOCK:
+          return pMem->u.Lock.R0Process != NIL_RTR0PROCESS;
+      case RTR0MEMOBJTYPE_MAPPING:
+          return pMem->u.Mapping.R0Process != NIL_RTR0PROCESS;
+      default:
+          return false;
+  }
+
+}  

+/**
+ * Frees the memory object (but not the handle).
+ * Any OS specific handle resources will be freed by this call.
+ *
+ * @returns IPRT status code. On failure it is assumed that the object remains valid.
+ *
+ * @param   pMem The ring-0 memory object handle to the memory which should be freed.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeFree(PRTR0MEMOBJINTERNAL pMem);
+
+/**
+ * Allocates page aligned virtual kernel memory.
+ *
+ * The memory is taken from a non paged (= fixed physical memory backing) pool.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   ppMem Where to store the ring-0 memory object handle.
+ *
+ * @param   cb Number of bytes to allocate, page aligned.
+ *
+ * @param   fExecutable Flag indicating whether it should be permitted to executed code in the memory object.
DECLHIDDEN(int) rtR0MemObjNativeAllocPage(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, bool fExecutable);
+ *
+/**
+ * Allocates page aligned virtual kernel memory with physical backing below 4GB.
+ *
+ * The physical memory backing the allocation is fixed.
+ *
+ * @returns IPRT status code.
+ * @param ppMem Where to store the ring-0 memory object handle.
+ * @param cb Number of bytes to allocate, page aligned.
+ * @param fExecutable Flag indicating whether it should be permitted to executed code in the memory object.
+ */
DECLHIDDEN(int) rtR0MemObjNativeAllocLow(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, bool fExecutable);
+ *
+/**
+ * Allocates page aligned virtual kernel memory with contiguous physical backing below 4GB.
+ *
+ * The physical memory backing the allocation is fixed.
+ *
+ * @returns IPRT status code.
+ * @param ppMem Where to store the ring-0 memory object handle.
+ * @param cb Number of bytes to allocate, page aligned.
+ * @param fExecutable Flag indicating whether it should be permitted to executed code in the memory object.
+ */
DECLHIDDEN(int) rtR0MemObjNativeAllocCont(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, bool fExecutable);
+ *
+/**
+ * Locks a range of user virtual memory.
+ *
+ * @returns IPRT status code.
+ * @param ppMem Where to store the ring-0 memory object handle.
+ * @param R3Ptr User virtual address, page aligned.
+ * @param cb Number of bytes to lock, page aligned.
+ * @param fAccess The desired access, a combination of RTMEM_PROT_READ
+ * and RTMEM_PROT_WRITE.
+ * @param R0Process The process to lock pages in.
+ */
DECLHIDDEN(int) rtR0MemObjNativeLockUser(PPRTR0MEMOBJINTERNAL ppMem, RTR3PTR R3Ptr, size_t cb, uint32_t fAccess, RTR0PROCESS R0Process);
+ *
+/**
+ * Locks a range of kernel virtual memory.
+ *
+ * @returns IPRT status code.
+ * @param   ppMem           Where to store the ring-0 memory object handle.
+ * @param   pv               Kernel virtual address, page aligned.
+ * @param   cb               Number of bytes to lock, page aligned.
+ * @param   fAccess          The desired access, a combination of RTMEM_PROT_READ
+ *                          and RTMEM_PROT_WRITE.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeLockKernel(PPRTR0MEMOBJINTERNAL ppMem, void *pv, size_t cb, uint32_t fAccess);
+
+/**
+ * Allocates contiguous page aligned physical memory without (necessarily) any
+ * kernel mapping.
+ *
+ * @returns IPRT status code.
+ * @param   ppMem           Where to store the ring-0 memory object handle.
+ * @param   cb              Number of bytes to allocate, page aligned.
+ * @param   PhysHighest     The highest permitable address (inclusive).
+ *                          NIL_RTHCPHYS if any address is acceptable.
+ * @param   uAlignment      The alignment of the reserved memory.
+ *                          Supported values are PAGE_SIZE, _2M, _4M and _1G.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeAllocPhys(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, RTHCPHYS PhysHighest, size_t uAlignment);
+
+/**
+ * Allocates non-contiguous page aligned physical memory without (necessarily) any kernel mapping.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_NOT_SUPPORTED if it's not possible to allocated unmapped
+ *          physical memory on this platform.
+ * @param   ppMem           Where to store the ring-0 memory object handle.
+ * @param   cb              Number of bytes to allocate, page aligned.
+ * @param   PhysHighest     The highest permitable address (inclusive).
+ *                          NIL_RTHCPHYS if any address is acceptable.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeAllocPhysNC(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, RTHCPHYS PhysHighest);
+
+/**
+ * Creates a page aligned, contiguous, physical memory object.
+ *
+ * @returns IPRT status code.
+ * @param   ppMem           Where to store the ring-0 memory object handle.
+ * @param   Phys             The physical address to start at, page aligned.
+ * @param   cb               The size of the object in bytes, page aligned.
+ * @param   uCachePolicy     One of the RTMEM_CACHE_XXX modes.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeEnterPhys(PPRTR0MEMOBJINTERNAL ppMem, RTHCPHYS Phys,
size_t cb, uint32_t uCachePolicy);
+
+/**
+ * Reserves kernel virtual address space.
+ *
+ * @returns IPRT status code.
+ *          Return VERR_NOT_SUPPORTED to indicate that the user should employ fallback strategies.
+ * @param   ppMem           Where to store the ring-0 memory object handle.
+ * @param   pvFixed         Requested address. (void *)-1 means any address. This matches uAlignment if specified.
+ * @param   cb              The number of bytes to reserve, page aligned.
+ * @param   uAlignment      The alignment of the reserved memory; PAGE_SIZE, _2M or _4M.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeReserveKernel(PPRTR0MEMOBJINTERNAL ppMem, void *pvFixed, size_t cb, size_t uAlignment);
+
+/**
+ * Reserves user virtual address space in the current process.
+ *
+ * @returns IPRT status code.
+ * @param   ppMem           Where to store the ring-0 memory object handle.
+ * @param   R3PtrFixed      Requested address. (RTR3PTR)-1 means any address. This matches uAlignment if specified.
+ * @param   cb              The number of bytes to reserve, page aligned.
+ * @param   uAlignment      The alignment of the reserved memory; PAGE_SIZE, _2M or _4M.
+ * @param   R0Process       The process to reserve the memory in.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeReserveUser(PPRTR0MEMOBJINTERNAL ppMem, RTR3PTR R3PtrFixed, size_t cb, size_t uAlignment, RTR0PROCESS R0Process);
+
+/**
+ * Maps a memory object into user virtual address space in the current process.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_NOT_SUPPORTED see RTR0MemObjMapKernelEx.
+ *
+ * @param   ppMem           Where to store the ring-0 memory object handle of the mapping object.
+ * @param   pMemToMap       The object to be map.
+ * @param   pvFixed         Requested address. (void *)-1 means any address. This matches uAlignment if specified.
+ * @param   uAlignment      The alignment of the reserved memory; PAGE_SIZE, _2M or _4M.
+ * @param   fProt           Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
+ * @param   offSub          Where in the object to start mapping. If non-zero
+ *                          the value must be page aligned and cbSub must be
+ *                          non-zero as well.
+ * @param   cbSub           The size of the part of the object to be mapped. If
+ *                          zero the entire object is mapped. The value must be
+ *                          page aligned.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeMapKernelEx(PPRTR0MEMOBJINTERNAL ppMem, RTR0MEMOBJ
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pMemToMap, void *pvFixed, size_t uAlignment,
+                unsigned fProt, size_t offSub, size_t cbSub);
+
+/**
+ * Maps a memory object into user virtual address space in the current process.
+ *
+ * @returns IPRT status code.
+ * @param   ppMem           Where to store the ring-0 memory object handle of the mapping object.
+ * @param   pMemToMap       The object to be map.
+ * @param   R3PtrFixed      Requested address. (RTR3PTR)-1 means any address. This matches uAlignment if specified.
+ * @param   uAlignment      The alignment of the reserved memory; PAGE_SIZE, _2M or _4M.
+ * @param   fProt           Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
+ * @param   R0Process       The process to map the memory into.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeMapUser(PPRTR0MEMOBJINTERNAL ppMem,
PRTR0MEMOBJINTERNAL pMemToMap, RTR3PTR R3PtrFixed, size_t uAlignment, unsigned fProt,
RTR0PROCESS R0Process);
+
+/**
+ * Change the page level protection of one or more pages in a memory object.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_NOT_SUPPORTED see RTR0MemObjProtect.
+ *
+ * @param   pMem            The memory object.
+ * @param   offSub          Offset into the memory object. Page aligned.
+ * @param   cbSub           Number of bytes to change the protection of. Page aligned.
+ * @param   fProt           Combination of RTMEM_PROT_* flags.
+ */
+DECLHIDDEN(int) rtR0MemObjNativeProtect(PRTR0MEMOBJINTERNAL pMem, size_t offSub, size_t cbSub, uint32_t fProt);
+
+/**
+ * Get the physical address of an page in the memory object.
+ *
+ * @returns The physical address.
+ * @returns NIL_RTHCPHYS if the object doesn't contain fixed physical pages.
+ * @returns NIL_RTHCPHYS if the iPage is out of range.
+ * @returns NIL_RTHCPHYS if the object handle isn't valid.
+ * @param   pMem            The ring-0 memory object handle.
+ * @param   iPage           The page number within the object (valid).
+ */
+DECLHIDDEN(RTHCPHYS) rtR0MemObjNativeGetPagePhysAddr(PRTR0MEMOBJINTERNAL pMem, size_t iPage);
+
+DECLHIDDEN(PRTR0MEMOBJINTERNAL) rtR0MemObjNew(size_t cbSelf, RTR0MEMOBJTYPE enmType,
void *pv, size_t cb);
+DECLHIDDEN(void) rtR0MemObjDelete(PRTR0MEMOBJINTERNAL pMem);
+/** @} */
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/process.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/process.h
@@ -0,0 +1,69 @@
+/* $Id: process.h $ */
+/** @file
+ * IPRT - Internal RTProc header.
+ */
+
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+ */
+
+#ifndef ___internal_process_h
+#define ___internal_process_h
+
+#include <iprt/process.h>
+#include <iprt/param.h>
+
+RT_C_DECLS_BEGIN
+
+extern DECLHIDDEN(RTPROCESS)        g_ProcessSelf;
+extern DECLHIDDEN(RTPROCPRIORITY)   g_enmProcessPriority;
+extern DECLHIDDEN(char) g_szrtProcExePath[RTPATH_MAX];
+extern DECLHIDDEN(size_t) g_cchrtProcExePath;
+extern DECLHIDDEN(size_t) g_cchrtProcDir;
+extern DECLHIDDEN(size_t) g_offrtProcName;
+extern DECLHIDDEN(bool volatile) g_frtAtExitCalled;
+
+/**
+ * Validates and sets the process priority.
+ * This will check that all rtThreadNativeSetPriority() will success for all the
+ * thread types when applied to the current thread.
+ *
+ * @returns iprt status code.
+ * @param   enmPriority   The priority to validate and set.
+ * @remark  Located in sched.
+ */
+DECLHIDDEN(int) rtProcNativeSetPriority(RTPROCPRIORITY enmPriority);
+
+/**
+ * Determines the full path to the executable image.
+ *
+ * This is called by rtR3Init.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   pszPath     Pointer to the g_szrtProcExePath buffer.
+ * @param   cchPath     The size of the buffer.
+ */
+DECLHIDDEN(int) rtProcInitExePath(char *pszPath, size_t cchPath);
+
+RT_C_DECLS_END
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/sched.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/sched.h
@@ -0,0 +1,47 @@
+/* $Id: sched.h $ */
+/** @file
+ * IPRT - Internal RTSched header.
+ */
+@ @ -0,0 +1,47 @ @
+/* $Id: sched.h $ */
+/** @file
+ * IPRT - Internal RTSched header.
+ */
+@ @ -0,0 +1,47 @ @
+/* Copyright (C) 2006-2017 Oracle Corporation
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Calculate the scheduling properties for all the threads in the default
process priority, assuming the current thread have the type enmType.

@returns iprt status code.
@returns @param enmType The thread type to be assumed for the current thread.

DECLHIDDEN(int) rtSchedNativeCalcDefaultPriority(RTTHREADTYPE enmType);

/* $Id: string.h $ */
/** @file
 * IPRT - Internal RTStr header.
 * @defgroup internal_string Internal string utilities
 */
/* @file
 * @defgroup internal_string Internal string utilities
 */
/* Copyright (C) 2006-2017 Oracle Corporation
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 * available from http://www.virtualbox.org. This file is free software;
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___internal_string_h
#define ___internal_string_h

#include <iprt/string.h>

RT_C_DECLS_BEGIN

/** @def RTSTR_STRICT
 * Enables strict assertions on bad string encodings.
 */

#ifdef DOXYGEN_RUNNING
#define RTSTR_STRICT
#endif
/*#define RTSTR_STRICT*/

#ifdef RTSTR_STRICT
#define RTStrAssertMsgFailed(msg) AssertMsgFailed(msg)
#define RTStrAssertMsgReturn(expr, msg, rc) AssertMsgReturn(expr, msg, rc)
#else
#define RTStrAssertMsgFailed(msg) do { } while (0)
#define RTStrAssertMsgReturn(expr, msg, rc) do { if (!(expr)) return rc; } while (0)
#endif

DECLHIDDEN(size_t) rtstrFormatRt(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, const char **ppszFormat, va_list *pArgs,  
                                 int cchWidth, int cchPrecision, unsigned fFlags, char chArgSize);

DECLHIDDEN(size_t) rtstrFormatType(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, const char **ppszFormat, va_list *pArgs,  
                                   int cchWidth, int cchPrecision, unsigned fFlags, char chArgSize);

/** Format kernel address into @a pszBuf.
+ * @returns Number of bytes returned.
+ * @param pszBuf The return buffer.
+ * @param cbBuf The buffer size.
+ * @param uPtr The ring-0 pointer value.
+ * @param cchWidth The specified width, -1 if not given.
+ * @param cchPrecision The specified precision.
+ * @param fFlags Format flags, RTSTR_F_XXX.
+ */
+DECLHIDDEN(size_t) rtStrFormatKernelAddress(char *pszBuf, size_t cbBuf, RTR0INTPTR uPtr, signed int cchWidth,
+    signed int cchPrecision, unsigned int fFlags);
+
+/*
+ * Indexes into RTTHREADINT::ahIconvs
+ */
+typedef enum RTSTRICONV
+{
+    /** UTF-8 to the locale codeset (LC_CTYPE). */
+    RTSTRICONV_UTF8_TO_LOCALE = 0,
+    /** The locale codeset (LC_CTYPE) to UTF-8. */
+    RTSTRICONV_LOCALE_TO_UTF8,
+    /** UTF-8 to the filesystem codeset - if different from the locale codeset. */
+    RTSTRICONV_UTF8_TO_FS,
+    /** The filesystem codeset to UTF-8. */
+    RTSTRICONV_FS_TO_UTF8,
+    /** The end of the valid indexes. */
+    RTSTRICONV_END
+} RTSTRICONV;
+
+DECLHIDDEN(int) rtStrConvert(const char *pchInput, size_t cchInput, const char *pszInputCS,
+    char **ppszOutput, size_t cbOutput, const char *pszOutputCS,
+    unsigned cFactor, RTSTRICONV enmCacheIdx);
+DECLHIDDEN(const char *) rtStrGetLocaleCodeset(void);
+DECLHIDDEN(int) rtUtf8Length(const char *psz, size_t cch, size_t *pcuc, size_t *pcchActual);
+
+DECLHIDDEN(int) rtStrToIpAddr6Str(const char *psz, char *pszAddrOut, size_t addrOutSize, char *pszPortOut,
+    size_t portOutSize, bool followRfc);
+
+RT_C_DECLS_END
+
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/internal/thread.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/internal/thread.h
@@ -0,0 +1,290 @@
+/* $Id: thread.h $ */
+/** @file
+ * IPRT - Internal RTThread header.
+ */
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
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+ * available from http://www.virtualbox.org. This file is free software;
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+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___thread_h
+#define ___thread_h
+
+#include <iprt/types.h>
+#include <iprt/thread.h>
+#include <iprt/avl.h>
+#ifdef IN_RING3
+# include <iprt/process.h>
+# include <iprt/critsect.h>
+#endif
+#include "internal/lockvalidator.h"
+#include "internal/magics.h"
+#ifdef RT_WITH_ICONV_CACHE
+# include "internal/string.h"
+#endif
+
+RT_C_DECLS_BEGIN
+

/** Max thread name length. */
#define RTTHREAD_NAME_LEN 16
#if defined(IPRT_WITH_GENERIC_TLS
/** The number of TLS entries for the generic implementation. */
#define RTTHREAD_TLS_ENTRIES 64
#endif

/**
 * Internal representation of a thread.
 */
typedef struct RTTHREADINT
{
  /** Avl node core - the key is the native thread id. */
  AVLPVNODECORE Core;
  /** Magic value (RTTHREADINT_MAGIC). */
  uint32_t u32Magic;
  /** Reference counter. */
  uint32_t volatile cRefs;
  /** The current thread state. */
  RTTHREADSTATE volatile enmState;
  /** Set when really sleeping. */
  bool volatile fReallySleeping;
  /** The thread handle
   * This is not valid until the create function has returned! */
  uintptr_t hThread;
#if defined(RT_OS_WINDOWS) && defined(IN_RING3)
  /** The thread handle
   * This is not valid until the create function has returned! */
  uintptr_t hThread;
#endif
#if defined(RT_OS_LINUX) && defined(IN_RING3)
  /** The thread ID.
   * This is not valid before rtThreadMain has been called by the new thread. */
  pid_t tid;
#endif
#if defined(RT_OS_SOLARIS) && defined(IN_RING0)
  /** Debug thread ID needed for thread_join. */
  uint64_t tid;
#endif
  /** The user event semaphore. */
  RTSEMEVENTMULTI EventUser;
  /** The terminated event semaphore. */
  RTSEMEVENTMULTI EventTerminated;
  /** The thread type. */
  RTTHREADTYPE enmType;
  /** The thread creation flags. (RTTHREADFLAGS) */
  unsigned fFlags;
  /** Internal flags. (RTTHREADINT_FLAGS_ *) */
  uint32_t fIntFlags;
  /** The result code. */
  int rc;
}
+ /** Thread function. */
+ PFNRTTHREAD pfnThread;
+ /** Thread function argument. */
+ void *pvUser;
+ /** Actual stack size. */
+ size_t cbStack;
+#ifdef IN_RING3
+ /** The lock validator data. */
+ RTLOCKVALPERTHREAD LockValidator;
+#endif /* IN_RING3 */
+#ifdef RT_WITH_ICONV_CACHE
+ /** Handle cache for iconv. */
+ * @remarks ASSUMES sizeof(void *) >= sizeof(iconv_t). */
+ void *ahIconvs[RTSTRICONV_END];
+#endif
+#ifdef IPRT_WITH_GENERIC_TLS
+ /** The TLS entries for this thread. */
+ void *apvTlsEntries[RTTHREAD_TLS_ENTRIES];
+#endif
+ /** Thread name. */
+ char szName[RTTHREAD_NAME_LEN];
+] RTTHREADINT;
+ /** Pointer to the internal representation of a thread. */
+ typedef RTTHREADINT *PRTTHREADINT;
+
+ /** @name RTTHREADINT::fIntFlags Masks and Bits. */
+ * @{
+ /** Set if the thread is an alien thread. */
+ * Clear if the thread was created by IPRT. */
+ #define RTTHREADINT_FLAGS_ALIEN RT_BIT(0)
+ /** Set if the thread has terminated. */
+ * Clear if the thread is running. */
+ #define RTTHREADINT_FLAGS_TERMINATED RT_BIT(1)
+ /** This bit is set if the thread is in the AVL tree. */
+ #define RTTHREADINT_FLAG_IN_TREE_BIT 2
+ /* @copydoc RTTHREADINT_FLAG_IN_TREE_BIT */
+ #define RTTHREADINT_FLAG_IN_TREE RT_BIT(RTTHREADINT_FLAG_IN_TREE_BIT)
+ /* Set if it’s the main thread. */
+ #define RTTHREADINT_FLAGS_MAIN RT_BIT(3)
+ * @ } */
+
+ /* Initialize the native part of the thread management. */
+ *
+ /* Generally a TLS entry will be allocated at this point (Ring-3). */
+ *
@returns iprt status code.
+ */
+DECLHIDDEN(int) rtThreadNativeInit(void);
+
+ifdef IN_RING3
+/**
+ * Called when IPRT was first initialized in unobtrusive mode and later changed
+ * to obtrusive.
+ *
+ * This is only applicable in ring-3.
+ */
+DECLHIDDEN(void) rtThreadNativeReInitObtrusive(void);
+#endif
+
+/**
+ * Create a native thread.
+ * This creates the thread as described in pThreadInt and stores the thread id in *pThread.
+ *
+ * @returns iprt status code.
+ * @param   pThreadInt      The thread data structure for the thread.
+ * @param   pNativeThread   Where to store the native thread identifier.
+ */
+DECLHIDDEN(int) rtThreadNativeCreate(PRTTHREADINT pThreadInt, PRTNATIVETHREAD pNativeThread);
+
+/**
+ * Adopts a thread, this is called immediately after allocating the
+ * thread structure.
+ *
+ * @param   pThread     Pointer to the thread structure.
+ */
+DECLHIDDEN(int) rtThreadNativeAdopt(PRTTHREADINT pThread);
+
+/**
+ * Called from rtThreadDestroy so that the TLS entry and any native data in the
+ * thread structure can be cleared.
+ *
+ * @param   pThread     The thread structure.
+ */
+DECLHIDDEN(void) rtThreadNativeDestroy(PRTTHREADINT pThread);
+
+ifdef IN_RING3
+/**
+ * Called to check whether the thread is still alive or not before we start
+ * waiting.
+ *
+ * This is a kludge to deal with windows threads being killed wholesale in
+ * certain process termination scenarios and we don't want to hang the last
+\# endif
+\# endif /* IN_RING3 */
+
+/** thread.cpp */
+DECLCALLBACK(DECLHIDDEN(int)) rtThreadMain(PRTTHREADINT pThread, RTNATIVETHREAD NativeThread, const char *pszThreadName);
+DECLHIDDEN(uint32_t)     rtThreadRelease(PRTTHREADINT pThread);
+DECLHIDDEN(void)         rtThreadTerminate(PRTTHREADINT pThread, int rc);
+DECLHIDDEN(PRTTHREADINT) rtThreadGetByNative(RTNATIVETHREAD NativeThread);
+DECLHIDDEN(PRTTHREADINT) rtThreadGet(RTTHREAD Thread);
+DECLHIDDEN(int)          rtThreadInit(void);
+\#ifdef IN_RING3
+DECLHIDDEN(void)         rtThreadReInitObtrusive(void);
+\#endif
+DECLHIDDEN(void)         rtThreadTerm(void);
+DECLHIDDEN(void)         rtThreadInsert(PRTTHREADINT pThread, RTNATIVETHREAD NativeThread);
+\#ifdef IN_RING3
+DECLHIDDEN(int)          rtThreadDoSetProcPriority(RTPROCPRIORITY enmPriority);
+\#endif /* !IN_RING0 */
+\#ifdef IPRT_WITH_GENERIC_TLS
+DECLHIDDEN(void)         rtThreadClearTlsEntry(RTTLS iTls);
+DECLHIDDEN(void)         rtThreadTlsDestruction(PRTTHREADINT pThread); /* in tls-generic.cpp */
+\#endif
+
+\#ifdef ___iprt_asm_h
+
+/**
+ * Gets the thread state.
+ *
+ * @returns The thread state.
+ * @param   pThread The thread.
+ */
+DECLINLINE(RTTHREADSTATE) rtThreadGetState(PRTTHREADINT pThread)
+{
    return pThread->enmState;
}
+
+/**
+ * Sets the thread state.
+ *
+ * @param   pThread The thread.
+ * @param   enmNewState The new thread state.
+ */
+DECLINLINE(void) rtThreadSetState(PRTTHREADINT pThread, RTTHREADSTATE enmNewState)
+{
    AssertCompile(sizeof(pThread->enmState) == sizeof(uint32_t));
    ASMAtomicWriteU32((uint32_t volatile *)&pThread->enmState, enmNewState);
#ifndef ___iprt_alloca_h
#define ___iprt_alloca_h

#if defined(IN_RC) || defined(IN_RING0_AGNOSTIC)
#error "No alloca() in raw-mode and agnostic ring-0 context as it may have external dependencies like libgcc."
#endif

#else
#include <stdlib.h>
#if !defined(RT_OS_DARWIN) && !defined(RT_OS_FREEBSD) && !defined(RT_OS_NETBSD)
#include <malloc.h>
#endif
#if defined(RT_OS_SOLARIS) || defined(RT_OS_LINUX)
#include <alloca.h>
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/asm-amd64-x86.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/asm-amd64-x86.h
@@ -0,0 +1,3362 @@
+/** @file
+ * IPRT - AMD64 and x86 Specific Assembly Functions.
+ */
+ /*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
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+ * available from http://www.virtualbox.org. This file is free software;
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+ */
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+ ifndef __iprt_asm_amd64_x86_h
#define __iprt_asm_amd64_x86_h
+
+include <iprt/types.h>
+include <iprt/assert.h>
+if !defined(RT_ARCH_AMD64) && !defined(RT_ARCH_X86)
+error "Not on AMD64 or x86"
+endif
+
+if defined(_MSC_VER) && RT_INLINE_ASM_USES_INTRIN
+pragma warning(push)
/* Several incorrect __cplusplus uses. */
#pragma warning(disable:4668)
/* Incorrect __slwpcb prototype. */
#pragma warning(disable:4255)
#include <intrin.h>
#pragma warning(pop)
/* Emit the intrinsics at all optimization levels. */
#pragma intrinsic(_ReadWriteBarrier)
#pragma intrinsic(_cpuid)
#pragma intrinsic(_enable)
#pragma intrinsic(_disable)
#pragma intrinsic(_rdtsc)
#pragma intrinsic(_readmsr)
#pragma intrinsic(_writemsr)
#pragma intrinsic(_outbyte)
#pragma intrinsic(_outbytestring)
#pragma intrinsic(_outword)
#pragma intrinsic(_outwordstring)
#pragma intrinsic(_outdword)
#pragma intrinsic(_outdwordstring)
#pragma intrinsic(_inbyte)
#pragma intrinsic(_inbytestring)
#pragma intrinsic(_inword)
#pragma intrinsic(_inwordstring)
#pragma intrinsic(_indword)
#pragma intrinsic(_indwordstring)
#pragma intrinsic(_invlpg)
#pragma intrinsic(_wbinvd)
#pragma intrinsic(_readcr0)
#pragma intrinsic(_readcr2)
#pragma intrinsic(_readcr3)
#pragma intrinsic(_readcr4)
#pragma intrinsic(_writecr0)
#pragma intrinsic(_writecr3)
#pragma intrinsic(_writecr4)
#pragma intrinsic(_readdr)
#pragma intrinsic(_writedr)
#if RT_INLINE_ASM_USES_INTRIN >= 14
#pragma intrinsic(_readcr8)
#pragma intrinsic(_writecr8)
#endif
#if RT_INLINE_ASM_USES_INTRIN >= 15
#pragma intrinsic(__halt)
#pragma intrinsic(__readeflags)
#pragma intrinsic(__writeeflags)
#pragma intrinsic(__rdtscp)
#endif
/* Include #pragma aux definitions for Watcom C/C++. */
#endif

/** @defgroup grp_rt_asm_amd64_x86  AMD64 and x86 Specific ASM Routines */
/** @ingroup grp_rt_asm */

#pragma pack(1)
/** IDTR */
typedef struct RTIDTR {
    /** Size of the IDT. */
    uint16_t cbIdt;
    /** Address of the IDT. */
#if ARCH_BITS != 64
    uint32_t pIdt;
#else
    uint64_t pIdt;
#endif
} RTIDTR, RT_FAR *PRTIDTR;
#pragma pack()

#pragma pack(1)
/** @internal */
typedef struct RTIDTRALIGNEDINT {
    /** Alignment padding. */
    uint16_t au16Padding[ARCH_BITS == 64 ? 3 : 1];
    /** The IDTR structure. */
    RTIDTR Idtr;
} RTIDTRALIGNEDINT;
#pragma pack()

/** Wrapped RTIDTR for preventing misalignment exceptions. */
typedef union RTIDTRALIGNED {
    ...
/** Try make sure this structure has optimal alignment. */
uint64_t auAlignmentHack[ARCH_BITS == 64 ? 2 : 1];
/** Aligned structure. */
RTIDTRALIGNED s;
}
RTIDTRALIGNED;
+AssertCompileSize(RTIDTRALIGNED, ((ARCH_BITS == 64) + 1) * 8);
/** Pointer to a an RTIDTR alignment wrapper. */
typedef RTIDTRALIGNED RT_FAR *PRIDTRALIGNED;
+#pragma pack(1)
/** GDTR */
typedef struct RTGDTR
{
  /** Size of the GDT. */
  uint16_t cbGdt;
  /** Address of the GDT. */
  #if ARCH_BITS != 64
  uint32_t pGdt;
  #else
  uint64_t pGdt;
  #endif
  #else
  uint64_t pGdt;
  #endif
} RTGDTR, RT_FAR *PRTGDTR;
#pragma pack()

#pragma pack(1)
/** @internal */
typedef struct RTGDTRALIGNEDINT
{
  /** Alignment padding. */
  uint16_t au16Padding[ARCH_BITS == 64 ? 3 : 1];
  /** The GDTR structure. */
  RTGDTR Gdtr;
} RTGDTRALIGNEDINT;
#pragma pack()

/** Wrapped RTGDTR for preventing misalignment exceptions. */
typedef union RTGDTRALIGNED
{
  /** Try make sure this structure has optimal alignment. */
  uint64_t auAlignmentHack[ARCH_BITS == 64 ? 2 : 1];
  /** Aligned structure. */
  RTGDTRALIGNED s;
} RTGDTRALIGNED;
+AssertCompileSize(RTIDTRALIGNED, ((ARCH_BITS == 64) + 1) * 8);
/** Pointer to a an RTGDTR alignment wrapper. */
typedef RTGDTRALIGNED RT_FAR *PRGDTRALIGNED;
/**
 * Gets the content of the IDTR CPU register.
 * @param   pIdtr   Where to store the IDTR contents.
 * @returns IDTR limit.
 */

#if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMGetIDTR(PRTIDTR pIdtr);
#else
DECLINLINE(void) ASMGetIDTR(PRTIDTR pIdtr)
{
  __asm
  {
    mov     rax, [pIdtr]
    sidt    [rax]
  }
}
#endif

#if RT_INLINE_ASM_EXTERNAL
DECLASM(uint16_t) ASMGetIdtrLimit(void);
#else
DECLINLINE(uint16_t) ASMGetIdtrLimit(void)
{
    RTIDTRALIGNED TmpIdtr;
    __asm
    {
      sidt    [TmpIdtr.s.Idtr]
    }
    return TmpIdtr.s.Idtr.cbIdt;
}
#endif

/**
 * Gets the content of the IDTR.LIMIT CPU register.
 * @returns IDTR limit.
 */
### ASMSetIDTR

@returns {void} 
void ASMSetIDTR(const RTIDTR RT_FAR *pIdtr);

Sets the content of the IDTR CPU register.

@returns {void} 

```c
#if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMSetIDTR(const RTIDTR RT_FAR *pIdtr);
#else
DECLINLINE(void) ASMSetIDTR(const RTIDTR RT_FAR *pIdtr)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("lidt %0" : : "m" (*pIdtr));
#else
    __asm
    {
        #ifdef RT_ARCH_AMD64
        mov     rax, [pIdtr]
        lidt    [rax]
        #else
        mov     eax, [pIdtr]
        lidt    [eax]
        #endif
    }
#endif
}
#endif
```

### ASMGetGDTR

@returns {void} 
void ASMGetGDTR(PRTGDTR pGdtr);

Gets the content of the GDTR CPU register.

@returns {void} 

```c
#if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMGetGDTR(PRTGDTR pGdtr);
#else
DECLINLINE(void) ASMGetGDTR(PRTGDTR pGdtr)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("sgdt %0" : "m" (*pGdtr));
#else
    __asm
    {
        #ifdef RT_ARCH_AMD64
        mov     rax, [pGdtr]
        sgdt    [rax]
        #else
        mov     eax, [pGdtr]
        sgdt    [eax]
        #endif
    }
#endif
}
#endif
```
```c
+     mov     eax, [pGdtr]
+     sgdt    [eax]
+     }    +# endif
+     }    +# endif
+     +# endif
+     }
+     +#endif
+     
+     /**
+     * Sets the content of the GDTR CPU register.
+     * @param   pGdtr   Where to load the GDTR contents from
+     */
+     +#if RT_INLINE_ASM_EXTERNAL
+     +DECLASM(void) ASMSetGDTR(const RTGDTR RT_FAR *pGdtr);
+     +#else
+     +DECLINLINE(void) ASMSetGDTR(const RTGDTR RT_FAR *pGdtr)
+     +{
+     +# if RT_INLINE_ASM_GNU_STYLE
+     +    __asm__ __volatile__("lgdt %0" : : "m" (*pGdtr));
+     +# else
+     +    __asm
+     +    {
+     +# ifdef RT_ARCH_AMD64
+     +        mov     rax, [pGdtr]
+     +        lgdt    [rax]
+     +# else
+     +        mov     eax, [pGdtr]
+     +        lgdt    [eax]
+     +# endif
+     +# endif
+     +}
+     +#endif
+     +}
+     +#endif
+     +
+     +
+     +/**
+     + Get the cs register.
+     + @returns cs.
+     */
+     +#if RT_INLINE_ASM_EXTERNAL
+     +DECLASM(RTSEL) ASMGetCS(void);
+     +#else
+     +DECLINLINE(RTSEL) ASMGetCS(void)
+     +{
+     +    RTSEL SelCS;
+     +# if RT_INLINE_ASM_GNU_STYLE
+     +```
+ __asm__ __volatile__("movw  %cs, %0\n" : "=r" (SelCS));
+# else
+ __asm
+ {
+     mov    ax, cs
+     mov    [SelCS], ax
+ }
+# endif
+ return SelCS;
+}
+#endif
+
+/**
+ * Get the DS register.
+ * @returns DS.
+ */
+if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetDS(void);
+#else
+DECLINLINE(RTSEL) ASMGetDS(void)
+{
+    RTSEL SelDS;
+    if RT_INLINE_ASM_GNU_STYLE
+      __asm__ __volatile__("movw  %ds, %0\n" : "=r" (SelDS));
+    else
+      __asm
+      {
+          mov    ax, ds
+          mov    [SelDS], ax
+      }
+    return SelDS;
+}
+#endif
+
+/**
+ * Get the ES register.
+ * @returns ES.
+ */
+if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetES(void);
+#else
+DECLINLINE(RTSEL) ASMGetES(void)
+{
+    RTSEL SelES;
+    if RT_INLINE_ASM_GNU_STYLE
+      __asm__ __volatile__("movw  %es, %0\n" : "=r" (SelES));
+    else
+      __asm
+      {
+          mov    ax, es
+          mov    [SelES], ax
+      }
+    return SelES;
+}
+#endif
+
### ASM Get FS Register

The function `ASMGetFS` is defined to return the FS register. The code snippet demonstrates how to access the FS register using assembly language instructions.

```c
DECLASM(RTSEL) ASMGetFS(void);
```

#### Inline Assembly Functions

- **Get FS Register**: Uses `asm` directive to access the FS register.
- **Get GS Register**: Uses `asm` directive to access the GS register.

```c
DECLINLINE(RTSEL) ASMGetFS(void)
{
    RTSEL SelFS;
    __asm__ __volatile__("movw %%fs, %0
                      : "=r" (SelFS));
    return SelFS;
}
```

```c
DECLASM(RTSEL) ASMGetGS(void);
```

### Error (Put FS Register Value)

```c
DECLASM(RTSEL) ASMSetFS(RTSEL SelFS);
```

#### Example Usage

- **Set FS Register**: Uses `asm` directive to set the FS register.
- **Set GS Register**: Uses `asm` directive to set the GS register.

```c
DECLASM(RTSEL) ASMSetGS(RTSEL SelGS);
```

### Notes

- The `FS` and `GS` registers are used for interrupt handling in the 80x86 processor family.
- The `asm` directive is used to insert assembly language code into C code.
- The `volatile` keyword is used to indicate that the target of the `asm` directive may be changed by a background thread or other source of external events.
- The `return` statement is used to return the register value to the caller.
+ __asm__ __volatile__("movw  %%gs, %0\n\t": "=r" (SelGS));
+ #else
+ __asm
+ {
+ mov  ax, gs
+ mov  [SelGS], ax
+ }
+ #endif
+ return SelGS;
+
+ #endif
+
+ /**
+ * Get the SS register.
+ * @returns SS.
+ */
+ #if RT_INLINE_ASM_EXTERNAL
+ DECLASM(RTSEL) ASMGetSS(void);
+ #else
+ DECLINLINE(RTSEL) ASMGetSS(void)
+ {
+ RTSEL SelSS;
+ # if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("movw  %%ss, %0\n\t": "=r" (SelSS));
+ #else
+ __asm
+ {
+ mov  ax, ss
+ mov  [SelSS], ax
+ }
+ #endif
+ return SelSS;
+ }
+ #endif
+
+ /**
+ * Get the TR register.
+ * @returns TR.
+ */
+ #if RT_INLINE_ASM_EXTERNAL
+ DECLASM(RTSEL) ASMGetTR(void);
+ #else
+ DECLINLINE(RTSEL) ASMGetTR(void)
+ {
+ RTSEL SelTR;
+ # if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("movw  %%tr, %0\n\t": "=r" (SelTR));
+ #else
+ __asm
+ {
+ mov  ax, tr
+ mov  [SelTR], ax
+ }
+ #endif
+ return SelTR;
+ }
+ #endif
+
+ __asm__ __volatile__("str %w0\n\t" : "=r" (SelTR));
+# else
+ __asm
+ {
+
str ax
+
mov [SelTR], ax
+ }
+# endif
+ return SelTR;
+}
+#endif
+
+
+/**
+ * Get the LDTR register.
+ * @returns LDTR.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetLDTR(void);
+#else
+DECLINLINE(RTSEL) ASMGetLDTR(void)
+{
+ RTSEL SelLDTR;
+# if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("sldt %w0\n\t" : "=r" (SelLDTR));
+# else
+ __asm
+ {
+
sldt ax
+
mov [SelLDTR], ax
+ }
+# endif
+ return SelLDTR;
+}
+#endif
+
+
+/**
+ * Get the access rights for the segment selector.
+*
+ * @returns The access rights on success or UINT32_MAX on failure.
+ * @param uSel
The selector value.
+*
+ * @remarks Using UINT32_MAX for failure is chosen because valid access rights
+*
always have bits 0:7 as 0 (on both Intel & AMD).
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(uint32_t) ASMGetSegAttr(uint32_t uSel);

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#else
DECLINLINE(uint32_t) ASMGetSegAttr(uint32_t uSel)
{
    uint32_t uAttr;
    /* LAR only accesses 16-bit of the source operand, but eax for the
     * destination operand is required for getting the full 32-bit access rights. */
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("lar %1, %%eax
                        
                        "jz done%=
                        "movl $0xffffffff, %%eax
                        "done%=:\n                        "movl %%eax, %0\n                        
                        :"=r" (uAttr)
                        
                        : "r" (uSel)
                        
                        : "cc", "%eax"");
#else
    __asm__
    {
        lar eax, [uSel]
        jz done
        mov eax, 0xffffffff
        done:
        mov [uAttr], eax
    }
#endif
    return uAttr;
}
#endif

/**
 * Get the [RE]FLAGS register.
 * @returns [RE]FLAGS.
 */
#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
DECLASM(RTCCUINTREG) ASMGetFlags(void);
#else
DECLINLINE(RTCCUINTREG) ASMGetFlags(void)
{
    RTCCUINTREG uFlags;
#if RT_INLINE_ASM_GNU_STYLE
    ifdef RT_ARCH_AMD64
        __asm__ __volatile__("pushfq\n                        
                        "popq  %0\n                        
                        :"=r" (uFlags));
    #else
        __asm__ __volatile__("pushfl\n                        
                        "popl  %0\n
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+   : "=r" (uFlags));
+endif
+elif RT_INLINE_ASM_USES_INTRIN >= 15
+  uFlags = __readeflags();
+else
+  __asm
+  {
+    # ifdef RT_ARCH_AMD64
+    pushfq
+    pop [uFlags]
+    # else
+    pushfd
+    pop [uFlags]
+    # endif
+  }
+  return uFlags;
+}
+#endif
+
+/**
+ * Set the [RE]FLAGS register.
+ * @param   uFlags      The new [RE]FLAGS value.
+ */
+if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+DECLASM(void) ASMSetFlags(RTCCUINTREG uFlags);
+else
+DECLINLINE(void) ASMSetFlags(RTCCUINTREG uFlags)
+{
+  #if RT_INLINE_ASM_GNU_STYLE
+    # ifdef RT_ARCH_AMD64
+      __asm__ __volatile__("pushq %0\n\t"
+                         "popfq\n\t"
+                         : : "g" (uFlags));
+    # else
+      __asm__ __volatile__("pushl %0\n\t"
+                            "popfl\n\t"
+                            : : "g" (uFlags));
+    # endif
+    #elif RT_INLINE_ASM_USES_INTRIN >= 15
+      __writeeflags(uFlags);
+    # else
+      __asm
+      {
+        # ifdef RT_ARCH_AMD64
+          push [uFlags]
+          popfpq
+        # else
+          pushfd
+          pop [uFlags]
+        # endif
+      }
+  
+  #endif
+}
### else
+    push    [uFlags]
+    popfd
### endif
+ }
### endif
+
+/**
+ * Modifies the [RE]FLAGS register.
+ * @returns Original value.
+ * @param   fAndEfl   Flags to keep (applied first).
+ * @param   fOrEfl    Flags to be set.
+ */
+#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+DECLASM(RTCCUINTREG) ASMChangeFlags(RTCCUINTREG fAndEfl, RTCCUINTREG fOrEfl);
+#else
+DECLINLINE(RTCCUINTREG) ASMChangeFlags(RTCCUINTREG fAndEfl, RTCCUINTREG fOrEfl)
+{
+    RTCCUINTREG fOldEfl;
+    #if RT_INLINE_ASM_GNU_STYLE
+    # ifdef RT_ARCH_AMD64
+        __asm__ __volatile__("pushfq\n
"movq (%esp), %0\n"andq %0, %1\n"orq %3, %1\n"movl %1, (%esp)\n"popfq\n"
+            : "=&r" (fOldEfl),
+                  =r" (fAndEfl)
+            : "l" (fAndEfl),
+                "rn" (fOrEfl) );
+    #else
+        __asm__ __volatile__("pushfl\n
"movl (%esp), %0\n"andl %1, (%esp)\n"orl %2, (%esp)\n"popfl\n"
+            : "=&r" (fOldEfl)
+        : "m" (fAndEfl),
+            "rn" (fOrEfl) );
+    #endif
+    #elif RT_INLINE_ASM_USES_INTRIN >= 15
+        fOldEfl = __readeflags();
+        __writeeflags((fOldEfl & fAndEfl) | fOrEfl);
+    #else

---

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# endif
+
+   __asm
+   {
+   # ifdef RT_ARCH_AMD64
+       mov     rdx, [fAndEfl]
+       mov     rcx, [fOrEfl]
+       pushfq
+       mov     rax, [rsp]
+       and     rdx, rax
+       or      rdx, rcx
+       mov     [rsp], rdx
+       popfq
+       mov     [fOldEfl], rax
+   # else
+       mov     edx, [fAndEfl]
+       mov     ecx, [fOrEfl]
+       pushfd
+       mov     eax, [esp]
+       and     edx, eax
+       or      edx, ecx
+       mov     [esp], edx
+       popfd
+       mov     [fOldEfl], eax
+   # endif
+   }
+   #endif
+   return fOldEfl;
+
+#endif
+
+/**
+ * Modifies the [RE]FLAGS register by ORing in one or more flags.
+ * @returns Original value.
+ * @param   fOrEfl      The flags to be set (ORed in).
+ */
+if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+DECLASM(RTCCUINTREG) ASMAddFlags(RTCCUINTREG fOrEfl);
+else
+DECLINLINE(RTCCUINTREG) ASMAddFlags(RTCCUINTREG fOrEfl)
+
+RTCUINTREG fOldEfl;
+if RT_INLINE_ASM_GNU_STYLE
+# ifdef RT_ARCH_AMD64
+   __asm__ __volatile__("pushfq\n"
+           "movq (%rsp), %0\n"
+           "orq  %1, (%rsp)\n"
+           "popfq\n"
+           ":=\&r" (fOldEfl)
Else __asm__ __volatile__("pushf
	" + "movl (%esp), %0
	" + "orl %1, (%esp)\n\t" + "popfl\n\t" + ";"=&r" (fOldEfl) + ":"rm" (fOrEfl) );
#else
#  ifdef RT_ARCH_AMD64
    mov     rcx, [fOrEfl]
    pushfq
    mov     rdx, [rsp]
    or      [.esp], rcx
    popfq
    mov     [fOldEfl], rax
#  else
    mov     ecx, [fOrEfl]
    pushfd
    mov     edx, [esp]
    or      [esp], ecx
    popfd
    mov     [fOldEfl], eax
#  endif
#else
    __asm
    {
    }
#endif
#else
    __asm
    {
    }
#endif
#endif

/**
 * Modifies the [RE]FLAGS register by AND'ing out one or more flags.
 * @returns Original value.
 * @param   fAndEfl      The flags to keep.
 */
#ifdef RT_ARCH_AMD64 && RT_INLINE_ASM_USES_INTRIN < 15
DECLASM(RTCCUINTREG) ASMClearFlags(RTCCUINTREG fAndEfl);
#else
DECLINLINE(RTCCUINTREG) ASMClearFlags(RTCCUINTREG fAndEfl)
{
    RTCCUINTREG fOldEfl;
*/
### if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("pushfq\n"
+    "movq (%%rsp), %0\n"
+    "andq %1, (%%rsp)\n"
+    "popfq\n"
+    : "=&r" (fOldEfl)
+    : "rm" (fAndEfl));
### else
+ __asm__ __volatile__("pushfl\n"
+    "movl (%%esp), %0\n"
+    "andl %1, (%%esp)\n"
+    "popfl\n"
+    : "=&r" (fOldEfl)
+    : "rm" (fAndEfl));
### endif
### elseif RT_INLINE_ASM_USES_INTRIN >= 15
+ fOldEfl = __readeflags();
+ __writeeflags(fOldEfl & fAndEfl);
### else
+ __asm
+ {
+    # ifdef RT_ARCH_AMD64
+        mov     rdx, [fAndEfl]
+        pushfq
+        mov     rdx, [rsp]
+        and     [rsp], rdx
+        popfq
+        mov     [fOldEfl], rax
+    # else
+        mov     edx, [fAndEfl]
+        pushfd
+        mov     edx, [esp]
+        and     [esp], edx
+        popfd
+        mov     [fOldEfl], eax
+    # endif
+ }
+ #endif
+ return fOldEfl;
+}
###endif
+
+
+++
+ * Gets the content of the CPU timestamp counter register.
+ *
+ * @returns TSC.

---

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+ */
+ if RT_INLINE_ASM_EXTERNAL &amp; !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(uint64_t) ASMReadTSC(void);
+ else
+ DECLINLINE(uint64_t) ASMReadTSC(void)
+ {
+ RTUINT64 u;
+ if RT_INLINE_ASM_EXTERNAL &amp; RT_INLINE_ASM_USES_INTRIN < 15
+ DECLASM(uint64_t) ASMReadTscWithAux(uint32_t RT_FAR *puAux);
+ else
+ DECLINLINE(uint64_t) ASMReadTscWithAux(uint32_t RT_FAR *puAux)
+ {
+ RTUINT64 u;
+ if RT_INLINE_ASM_EXTERNAL &amp; !RT_INLINE_ASM_USES_INTRIN
+ if RT_INLINE_ASM_EXTERNAL &amp; !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(uint64_t) ASMReadTSC(void);
+ else
+ DECLINLINE(uint64_t) ASMReadTSC(void)
+ {
+ RTUINT64 u;
+ if RT_INLINE_ASM_EXTERNAL &amp; RT_INLINE_ASM_USES_INTRIN < 15
+ DECLASM(uint64_t) ASMReadTscWithAux(uint32_t RT_FAR *puAux);
+ else
+ DECLINLINE(uint64_t) ASMReadTscWithAux(uint32_t RT_FAR *puAux)
Open Source Used In 5GaaS Edge AC-4 37381

```c
    
    + { 
    +    rdtscp 
    +    mov  [u.s.Lo], eax 
    +    mov  [u.s.Hi], edx 
    +    mov  eax, [puAux] 
    +    mov  [eax], ecx 
    +    } 
    +# endif 
    +# endif 
    + return u.u; 
    +} 
    +#endif 
    + 
    + 
    +/*
    + * Performs the cpuid instruction returning all registers.
    + */
    + * @param uOperator CPUID operation (eax).
    + * @param pvEAX Where to store eax.
    + * @param pvEBX Where to store ebx.
    + * @param pvECX Where to store ecx.
    + * @param pvEDX Where to store edx.
    + * @remark We're using void pointers to ease the use of special bitfield structures and such.
    + */
    +#if RT_INLINE_ASMEXTERNAL &amp;amp; !RT_INLINE_ASM_USES_INTRIN
    +DECLASM(void) ASMCpuId(uint32_t uOperator, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void
    +RT_FAR *pvECX, void RT_FAR *pvEDX);
    +#else
    +DECLINLINE(void) ASMCpuId(uint32_t uOperator, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void
    +RT_FAR *pvECX, void RT_FAR *pvEDX)
    +{
    +# if RT_INLINE_ASM_GNU_STYLE
    +#ifdef RT_ARCH_AMD64
    +    RTCCUINTREG uRAX, uRBX, uRCX, uRDX;
    +    __asm__ __volatile__ (
    +        "cpuid\n"
    +            : "a" (uRAX),
    +            "b" (uRBX),
    +            "c" (uRCX),
    +            "d" (uRDX)
    +     : "0" (uOperator), "2" (0));
    +    *(uint32_t RT_FAR *)pvEAX = (uint32_t)uRAX;
    +    *(uint32_t RT_FAR *)pvEBX = (uint32_t)uRBX;
    +    *(uint32_t RT_FAR *)pvECX = (uint32_t)uRCX;
    +    *(uint32_t RT_FAR *)pvEDX = (uint32_t)uRDX;
    +# else
    +    __asm__ __volatile__ ("xchgl %%%ebx, %1\n"
    +        "cpuid\n"
    +        "xchgl %%%ebx, %1\n"
    ```
typedef struct {
    uint32_t uOperator;
    uint32_t uIdxECX;
    uint32_t *pvEAX;
    uint32_t *pvEBX;
    uint32_t *pvECX;
    uint32_t *pvEDX;
} cpuInfo;

void __cpuid(cpuInfo *info,
            uint32_t uOperator, uint32_t uIdxECX, uint32_t *pvEAX, uint32_t *pvEBX, uint32_t *pvECX, uint32_t *pvEDX);
+ * @param   pvECX   Where to store ecx.
+ * @param   pvEDX   Where to store edx.
+ * @remark  We're using void pointers to ease the use of special bitfield structures and such.
+ */
+#if RT_INLINE_ASM_EXTERNAL || RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMCpuId_Idx_ECX(uint32_t uOperator, uint32_t uIdxECX, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void RT_FAR *pvECX, void RT_FAR *pvEDX);
+#else
+DECLINLINE(void) ASMCpuId_Idx_ECX(uint32_t uOperator, uint32_t uIdxECX, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void RT_FAR *pvECX, void RT_FAR *pvEDX)
+
+{  
+  # if RT_INLINE_ASM_GNU_STYLE
+      
+      __asm__ ("cpuid\n"
+        : "a" (uRAX),
+        "b" (uRBX),
+        "c" (uRCX),
+        "d" (uRDX)
+        : "0" (uOperator),
+        "2" (uIdxECX));
+      
+      *(uint32_t RT_FAR *)pvEAX = (uint32_t)uRAX;
+      *(uint32_t RT_FAR *)pvEBX = (uint32_t)uRBX;
+      *(uint32_t RT_FAR *)pvECX = (uint32_t)uRCX;
+      *(uint32_t RT_FAR *)pvEDX = (uint32_t)uRDX;
+    
+  # elif RT_INLINE_ASM_USES_INTRIN
+    int aInfo[4];
+    __cpuidex(aInfo, uOperator, uIdxECX);
+    *(uint32_t RT_FAR *)pvEAX = aInfo[0];
+    *(uint32_t RT_FAR *)pvEBX = aInfo[1];
+    *(uint32_t RT_FAR *)pvECX = aInfo[2];
+    *(uint32_t RT_FAR *)pvEDX = aInfo[3];
+  
+  # else
+    uint32_t    uEAX;
+    uint32_t    uEBX;

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+ uint32_t uECX;
+ uint32_t uEDX;
+ __asm
+ {
+     push ebx
+     mov eax, [uOperator]
+     mov ecx, [uIdxECX]
+     cpuid
+     mov [uEAX], eax
+     mov [uEBX], ebx
+     mov [uECX], ecx
+     mov [uEDX], edx
+     pop ebx
+ }
+ *(uint32_t RT_FAR *)pvEAX = uEAX;
+ *(uint32_t RT_FAR *)pvEBX = uEBX;
+ *(uint32_t RT_FAR *)pvECX = uECX;
+ *(uint32_t RT_FAR *)pvEDX = uEDX;
+ } #endif
+ 
+ /**
+ * CPUID variant that initializes all 4 registers before the CPUID instruction.
+ *
+ * @returns The EAX result value.
+ * @param   uOperator   CPUID operation (eax).
+ * @param   uInitEBX    The value to assign EBX prior to the CPUID instruction.
+ * @param   uInitECX    The value to assign ECX prior to the CPUID instruction.
+ * @param   uInitEDX    The value to assign EDX prior to the CPUID instruction.
+ * @param   pvEAX       Where to store eax. Optional.
+ * @param   pvEBX       Where to store ebx. Optional.
+ * @param   pvECX       Where to store ecx. Optional.
+ * @param   pvEDX       Where to store edx. Optional.
+ */
+ DECLASM(uint32_t) ASMCpuIdExSlow(uint32_t uOperator, uint32_t uInitEBX, uint32_t uInitECX, uint32_t uInitEDX,
+                                 void RT_FAR *pvEAX, void RT_FAR *pvEBX, void RT_FAR *pvECX, void RT_FAR *pvEDX);
+
+ /**
+ * Performs the cpuid instruction returning ecx and edx.
+ *
+ * @param   uOperator   CPUID operation (eax).
+ * @param   pvECX       Where to store ecx.
+ * @param   pvEDX       Where to store edx.
+ */
@remark We're using void pointers to ease the use of special bitfield structures and such.
+
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMCpuId_ECX_EDX(uint32_t uOperator, void RT_FAR *pvECX, void RT_FAR *pvEDX);
+else
+DECLINLINE(void) ASMCpuId_ECX_EDX(uint32_t uOperator, void RT_FAR *pvECX, void RT_FAR
+*pvEDX)
+{
+    uint32_t uEBX;
+    ASMCpuId(uOperator, &uOperator, &uEBX, pvECX, pvEDX);
+}
+endif
+
+/**
+ * Performs the cpuid instruction returning eax.
+ *
+ * @param   uOperator   CPUID operation (eax).
+ * @returns EAX after cpuid operation.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMCpuId_EAX(uint32_t uOperator);
+else
+DECLINLINE(uint32_t) ASMCpuId_EAX(uint32_t uOperator)
+{
+    RTCCUINTREG xAX;
+#if RT_INLINE_ASM_GNU_STYLE
+    if (defined(PIC) || defined(__PIC__)) && defined(__i386__)
+        \asm{cpuid\n*}
+        \asm{~ax \(\text{\textbf{0}}\) \text{\textbf{rbx}}, \text{\textbf{rcx}}, \text{\textbf{rdx}}\)};
+    else
+        \asm{cpuid\n*}
+        \asm{~ax \(\text{\textbf{0}}\) \text{\textbf{rbx}}, \text{\textbf{rcx}}, \text{\textbf{rdx}}\)};
+    endif
+    int aInfo[4];
+ __cpuid(aInfo, uOperator);
+ xAX = aInfo[0];
+
+ +# else
+ + __asm
+ + { 
+ + push ebx
+ + mov eax, [uOperator]
+ + cpuid
+ + mov [xAX], eax
+ + pop ebx
+ + } 
+ +# endif
+ + return (uint32_t)xAX;
+ +}
+ +#endif
+
+
+/**
+ * Performs the cpuid instruction returning ebx.
+ *
+ * @param uOperator CPUID operation (eax).
+ * @returns EBX after cpuid operation.
+ */
+ 
+ if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(uint32_t) ASMCpuId_EBX(uint32_t uOperator);
+ #else
+ DECLINLINE(uint32_t) ASMCpuId_EBX(uint32_t uOperator)
+ {
+ RTCCUINTREG xBX;
+ # if RT_INLINE_ASM_GNU_STYLE
+ #ifdef RT_ARCH_AMD64
+ RTCCUINTREG uSpill;
+ __asm__ ("cpuid"
+ : "=a" (uSpill),
+ "=b" (xBX)
+ : "0" (uOperator)
+ : "rdx", "rcx");
+ #elif (defined(PIC) || defined(__PIC__)) && defined(__i386__)
+ __asm__ ("push  %%ebx
+ \t" "=a" (uOperator),
+ "=d" (xBX)
+ : "0" (uOperator)
+ : "ecx");
+ #else
+ڠ
# Perform the CPUID instruction returning ecx.

```c
DECLASM(uint32_t) ASMCpuId_ECX(uint32_t uOperator);
```

```c
DECLINLINE(uint32_t) ASMCpuId_ECX(uint32_t uOperator)
{
    RTCCUINTREG xCX;
    // If RT_INLINE_ASM_GNU_STYLE
    // ifdef RT_ARCH_AMD64
    // RTCCUINTREG uSpill;
    __asm__ ("cpuid"
           : "=a" (uSpill),
             "=c" (xCX)
           : "0" (uOperator)
           : "rbx", "rdx";)
    // else
    // __asm
    // {
    //     push    ebx
    //     mov     eax, [uOperator]
    //     cpuid
    //     mov     [xBX], ebx
    //     pop     ebx
    // }
    return (uint32_t)xBX;
}
```

/* Performs the CPUID instruction returning ecx. */

/* @param uOperator CPUID operation (eax). */

/* @returns ECX after CPUID operation. */

/*
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMCpuId_ECX(uint32_t uOperator);
#else
DECLINLINE(uint32_t) ASMCpuId_ECX(uint32_t uOperator)
{
    RTCCUINTREG xCX;
    // if RT_INLINE_ASM_GNU_STYLE
    // ifdef RT_ARCH_AMD64
    // RTCCUINTREG uSpill;
    __asm__ ("cpuid"
           : "=a" (uSpill),
             "=c" (xCX)
           : "0" (uOperator)
           : "rbx", "rdx";)
    // else
    // __asm
    // {
    //     push    ebx
    //     mov     eax, [uOperator]
    //     cpuid
    //     mov     [xBX], ebx
    //     pop     ebx
    // }
    return (uint32_t)xBX;
}
#endif
*/
```c
+ __asm__ ("push %ebx\n"
+ "cpuid\n"
+ "pop %ebx\n"
+ : "a" (uOperator),
+ "c" (xCX)
+ : "0" (uOperator)
+ : "edx");
+# else
+ __asm__ ("cpuid"
+ : "a" (uOperator),
+ "c" (xCX)
+ : "0" (uOperator)
+ : "ebx", "edx");
+
+### endif
+
+### elif RT_INLINE_ASM_USES_INTRIN
+    int aInfo[4];
+    __cpuid(aInfo, uOperator);
+    xCX = aInfo[2];
+
+### else
+    __asm
+    {
+        push    ebx
+        mov     eax, [uOperator]
+        cpuid
+        mov     [xCX], ecx
+        pop     ebx
+    }
+### endif
+    return (uint32_t)xCX;
+}
+###endif
+
+/**
+ * Performs the cpuid instruction returning edx.
+ *
+ * @param   uOperator   CPUID operation (eax).
+ * @returns EDX after cpuid operation.
+ */
+###if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMCpuId_EDX(uint32_t uOperator);
+###else
+DECLINLINE(uint32_t) ASMCpuId_EDX(uint32_t uOperator)
+{
+    RTCCUINTREG xDX;
+```
/* if RT_INLINE_ASM_GNU_STYLE
   ifdef RT_ARCH_AMD64
  RTCUCINTREG uSpill;
   __asm__ ("cpuid"
       : "=a" (uSpill),
      "=d" (xDX)
       : "0" (uOperator)
       : "rbx", "rcx");
   #elif (defined(PIC) || defined(__PIC__)) && defined(__i386__)
   __asm__ ("push %ebx
    cpuid
    pop %ebx"
        : "=a" (uOperator),
       "=d" (xDX)
         : "0" (uOperator)
         : "ecx");
   #else
   __asm__ ("cpuid"
       : "=a" (uOperator),
      "=d" (xDX)
       : "0" (uOperator)
       : "ebx", "ecx");
   #endif
   +
   +
   endif
   endif
   else
   __asm__ ("cpuid"
       : "=a" (uOperator),
      "=d" (xDX)
       : "0" (uOperator)
       : "ebx", "ecx");
   endif
   endif
   endif
   endif
   int aInfo[4];
   __cpuid(aInfo, uOperator);
   xDX = aInfo[3];
   +
   else
   __asm
   {
     push ebx
     mov eax, [uOperator]
     cpuid
     mov [xDX], edx
     pop ebx
   }
   endif
   return (uint32_t)xDX;
   +}
   endif
   +
   +
   **
   * Checks if the current CPU supports CPUID.
   *
   * @returns true if CPUID is supported.
+ * /
+#ifdef __WATCOMC__
+DECLASM(bool) ASMHasCpuId(void);
+#else
+DECLINLINE(bool) ASMHasCpuId(void)
+{
+#ifdef RT_ARCH_AMD64
+  return true; /* ASSUME that all amd64 compatible CPUs have cpuid. */
+#else /* !RT_ARCH_AMD64 */
+  bool fRet = false;
+#if RT_INLINE_ASM_GNU_STYLE
+  uint32_t u1;
+  uint32_t u2;
+  __asm__ ("pushf\n")
+  "pop  %1\n"
+  "mov  %1, %2\n"
+  "xorl $0x200000, %1\n"
+  "push %1\n"
+  "popf\n"
+  "pushf\n"
+  "pop %1\n"
+  "cmpl %1, %2\n"
+  "setne %0\n"
+  "push %2\n"
+  "popf\n"
+  : ":=m" (fRet), ":=r" (u1), ":=r" (u2));
+#else
+  __asm
+  {
+    pushfd
+    pop  eax
+    mov  ebx, eax
+    xor  eax, 0200000h
+    push  eax
+    popfd
+    pushfd
+    pop  eax
+    cmp  eax, ebx
+    setne fRet
+    push  ebx
+    popfd
+  }
+#endif
+  return fRet;
+#endif /* !RT_ARCH_AMD64 */
+}
+#endif
+/**
+ * Gets the APIC ID of the current CPU.
+ *
+ * @returns the APIC ID.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint8_t) ASMGetApicId(void);
+else
+DECLINLINE(uint8_t) ASMGetApicId(void)
+{
+  RTCCUINTREG xBX;
+  #if RT_INLINE_ASM_GNU_STYLE
+  ifdef RT_ARCH_AMD64
+  RTCCUINTREG uSpill;
+  __asm__ __volatile__ ("cpuid"
+                   : "a" (uSpill),
+                   "b" (xBX)
+                   : "0" (1)
+                   : "rcx", "rdx");
+  #elif (defined(PIC) || defined(__PIC__)) && defined(__i386__)
+  RTCCUINTREG uSpill;
+  __asm__ __volatile__ ("mov %%ebx,%1
+                      cpuid\n"
+                     : "a" (uSpill),
+                     "xchg %ebx,%1\n"
+                    : "=a" (uSpill),
+                    "=rm" (xBX)
+                    : "0" (1)
+                    : "ecx", "edx");
+  #else
+  RTCCUINTREG uSpill;
+  __asm__ __volatile__ ("cpuid"
+                      : "a" (uSpill),
+                      "=b" (xBX)
+                      : "0" (1)
+                      : "ecx", "edx");
+  #endif
+  __asm
+  {
+    push    ebx
+    mov     eax, 1
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```c
    cpuid
    mov [xBX], ebx
    pop ebx
    }
    # endif
    return (uint8_t)(xBX >> 24);
    }
    #endif
    
    /**
    * Tests if it a genuine Intel CPU based on the ASMCpuId(0) output.
    *
    * @returns true/false.
    * @param   uEBX    EBX return from ASMCpuId(0)
    * @param   uECX    ECX return from ASMCpuId(0)
    * @param   uEDX    EDX return from ASMCpuId(0)
    * /
    DECLINLINE(bool) ASMIsIntelCpuEx(uint32_t uEBX, uint32_t uECX, uint32_t uEDX)
    {
    return uEBX == UINT32_C(0x756e6547)
    && uECX == UINT32_C(0x6c65746e)
    && uEDX == UINT32_C(0x49656e69);
    }
    
    /**
    * Tests if this is a genuine Intel CPU.
    *
    * @returns true/false.
    * @remarks ASSUMES that cpuid is supported by the CPU.
    * /
    DECLINLINE(bool) ASMIsIntelCpu(void)
    {
    uint32_t uEAX, uEBX, uECX, uEDX;
    ASMCpuId(0, &uEAX, &uEBX, &uECX, &uEDX);
    return ASMIsIntelCpuEx(uEBX, uECX, uEDX);
    }
    
    /**
    * Tests if it an authentic AMD CPU based on the ASMCpuId(0) output.
    *
    * @returns true/false.
    * @param   uEBX    EBX return from ASMCpuId(0)
    * @param   uECX    ECX return from ASMCpuId(0)
    * @param   uEDX    EDX return from ASMCpuId(0)
    * /
    DECLINLINE(bool) ASMIsAMDCCpu(void)
    {
```
DECLINLINE(bool) ASMIsAmdCpuEx(uint32_t uEBX, uint32_t uECX, uint32_t uEDX)
{
    return uEBX == UINT32_C(0x68747541)
        && uECX == UINT32_C(0x444d4163)
        && uEDX == UINT32_C(0x69746e65);
}

/**
 * Tests if this is an authentic AMD CPU.
 * @returns true/false.
 * @remarks ASSUMES that cpuid is supported by the CPU.
 */
DECLINLINE(bool) ASMIsAmdCpu(void)
{
    uint32_t uEAX, uEBX, uECX, uEDX;
    ASMCpuId(0, &uEAX, &uEBX, &uECX, &uEDX);
    return ASMIsAmdCpuEx(uEBX, uECX, uEDX);
}

/**
 * Tests if it a centaur hauling VIA CPU based on the ASMCpuId(0) output.
 * @returns true/false.
 * @param   uEBX    EBX return from ASMCpuId(0).
 * @param   uECX    ECX return from ASMCpuId(0).
 * @param   uEDX    EDX return from ASMCpuId(0).
 */
DECLINLINE(bool) ASMIsViaCentaurCpuEx(uint32_t uEBX, uint32_t uECX, uint32_t uEDX)
{
    return uEBX == UINT32_C(0x746e6543)
        && uECX == UINT32_C(0x736c7561)
        && uEDX == UINT32_C(0x48727561);
}

/**
 * Tests if this is a centaur hauling VIA CPU.
 * @returns true/false.
 * @remarks ASSUMES that cpuid is supported by the CPU.
 */
DECLINLINE(bool) ASMIsViaCentaurCpu(void)
{
    uint32_t uEAX, uEBX, uECX, uEDX;
    ASMCpuId(0, &uEAX, &uEBX, &uECX, &uEDX);
+ return ASMLsViaCentaurCpuEx(uEBX, uECX, uEDX);
+}
+
+/**
+ * Checks whether ASMCpuId_EAX(0x00000000) indicates a valid range.
+ * @returns true/false.
+ * @param   uEAX    The EAX value of CPUID leaf 0x00000000.
+ * @note    This only succeeds if there are at least two leaves in the range.
+ * @remarks The upper range limit is just some half reasonable value we've picked out of thin air.
+ */
+DECLINLINE(bool) ASMIsValidStdRange(uint32_t uEAX)
+{
+    return uEAX >= UINT32_C(0x00000001) && uEAX <= UINT32_C(0x000fffff);
+}
+
+/**
+ * Checks whether ASMCpuId_EAX(0x80000000) indicates a valid range.
+ * This only succeeds if there are at least two leaves in the range.
+ * @returns true/false.
+ * @param   uEAX    The EAX value of CPUID leaf 0x80000000.
+ * @note    This only succeeds if there are at least two leaves in the range.
+ * @remarks The upper range limit is just some half reasonable value we've picked out of thin air.
+ */
+DECLINLINE(bool) ASMIsValidExtRange(uint32_t uEAX)
+{
+    return uEAX >= UINT32_C(0x80000001) && uEAX <= UINT32_C(0x800fffff);
+}
+
+/**
+ * Extracts the CPU family from ASMCpuId(1) or ASMCpuId(0x80000001)
+ * @returns Family.
+ * @param   uEAX    EAX return from ASMCpuId(1) or ASMCpuId(0x80000001).
+ */
+DECLINLINE(uint32_t) ASMGetCpuFamily(uint32_t uEAX)
+{
+    return ((uEAX >> 8) & 0xf) == 0xf
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+    ? ((uEAX >> 20) & 0x7f) + 0xf
+    : (uEAX >> 8) & 0xf);
+}
+
+
+/**
+ * Extracts the CPU model from ASMCpuId(1) or ASMCpuId(0x80000001), Intel variant.
+ *
+ * @returns Model.
+ * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
+ */
+DECLINLINE(uint32_t) ASMGetCpuModelIntel(uint32_t uEAX)
+{
+    return ((uEAX >> 8) & 0xf) == 0xf || (((uEAX >> 8) & 0xf) == 0x6) /* family! */
+         ? ((uEAX >> 4) & 0xf) | ((uEAX >> 12) & 0xf0)
+         : ((uEAX >> 4) & 0xf);
+}
+
+
+/**
+ * Extracts the CPU model from ASMCpuId(1) or ASMCpuId(0x80000001), AMD variant.
+ *
+ * @returns Model.
+ * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
+ */
+DECLINLINE(uint32_t) ASMGetCpuModelAMD(uint32_t uEAX)
+{
+    return ((uEAX >> 8) & 0xf) == 0xf
+         ? ((uEAX >> 4) & 0xf) | ((uEAX >> 12) & 0xf0)
+         : ((uEAX >> 4) & 0xf);
+}
+
+
+/**
+ * Extracts the CPU model from ASMCpuId(1) or ASMCpuId(0x80000001)
+ *
+ * @returns Model.
+ * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
+ * @param   fIntel  Whether it’s an intel CPU. Use ASMIsIntelCpuEx() or ASMIsIntelCpu().
+ */
+DECLINLINE(uint32_t) ASMGetCpuModel(uint32_t uEAX, bool fIntel)
+{
+    return ((uEAX >> 8) & 0xf) == 0xf || ((uEAX >> 8) & 0xf) == 0x6 && fIntel /* family! */
+         ? ((uEAX >> 4) & 0xf) | ((uEAX >> 12) & 0xf0)
+         : ((uEAX >> 4) & 0xf);
/**
 * Extracts the CPU stepping from ASMCpuId(1) or ASMCpuId(0x80000001)
 *
 * @returns Model.
 * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
 */
DECLINLINE(uint32_t) ASMGetCpuStepping(uint32_t uEAX)
{
    return uEAX & 0xf;
}

/**
 * Get cr0.
 * @returns cr0.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(RTCCUINTXREG) ASMGetCR0(void);
#else
DECLINLINE(RTCCUINTXREG) ASMGetCR0(void)
{
    RTCCUINTXREG uCR0;
    #if RT_INLINE_ASM_USES_INTRIN
    uCR0 = __readcr0();
    
    # elsif RT_INLINE_ASM_GNU_STYLE
    if RT_ARCH_AMD64
        __asm__ __volatile__ ("movq  %%cr0, %0" : "=r" (uCR0));
    else
        __asm__ __volatile__ ("movl  %%cr0, %0" : "=r" (uCR0));
    # endif
    
    # else
    __asm__
        { 
        # ifdef RT_ARCH_AMD64
            mov     rax, cr0
            mov     [uCR0], rax
        # else
            mov     eax, cr0
            mov     [uCR0], eax
        # endif
        }
    
    # endif
    return uCR0;
}
#endif
Sets the CR0 register.

@returns cr2.

Get cr2.

If RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN

If RT_INLINE_ASM_USES_INTRIN

Get cr2.
ifdef RT_ARCH_AMD64
+ __asm__ __volatile__("movq  %%cr2, %0\n" :="r" (uCR2));
+ else
+ __asm__ __volatile__("movl  %%cr2, %0\n" :="r" (uCR2));
+ endif
+ else
+ __asm
+ {
+ ifdef RT_ARCH_AMD64
+      mov     rax, cr2
+      mov     [uCR2], rax
+ +     mov     eax, cr2
+      mov     [uCR2], eax
+ #  endif
+     return uCR2;
+ }
+ }#endif
+
+**
+ * Sets the CR2 register.
+ * @param   uCR2 The new CR0 value.
+ */
+ ifdef RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMSetCR2(RTCCUINTXREG uCR2);
+else
+DECLINLINE(void) ASMSetCR2(RTCCUINTXREG uCR2)
+{
+ # if RT_INLINE_ASM_GNU_STYLE
+ # ifdef RT_ARCH_AMD64
+      __asm__ __volatile__("movq %0, %%cr2\n" :: "r" (uCR2));
+ # else
+      __asm__ __volatile__("movl %0, %%cr2\n" :: "r" (uCR2));
+ # endif
+ # else
+      __asm
+      {
+ # ifdef RT_ARCH_AMD64
+          mov     rax, [uCR2]
+          mov     cr2, rax
+ # else
+          mov     eax, [uCR2]
+          mov     cr2, eax
+ # endif
+     }
+ #endif
+ +} Open Source Used In 5GaaS Edge AC-4 37398
/**
 * Get cr3.
 * @returns cr3.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(RTCCUINTXREG) ASMGetCR3(void);
#else
DECLINLINE(RTCCUINTXREG) ASMGetCR3(void)
{
    RTCCUINTXREG uCR3;
    /* if RT_INLINE_ASM_USES_INTRIN
    + uCR3 = __readcr3();
    +
    +# elif RT_INLINE_ASM_GNU_STYLE
    +# ifdef RT_ARCH_AMD64
    + __asm__ __volatile__"movq  %%cr3, %0" : "=r" (uCR3));
    +# else
    + __asm__ __volatile__"movl  %%cr3, %0" : "=r" (uCR3));
    +# endif
    +# else
    + __asm
    + {
    +# ifdef RT_ARCH_AMD64
    +     mov     rax, cr3
    +# else
    +     mov     eax, cr3
    +     mov     [uCR3], eax
    +# endif
    + }
    +# endif
    + return uCR3;
+}
#endif

/**
 * Sets the CR3 register.
 *
 * @param   uCR3    New CR3 value.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMSetCR3(RTCCUINTXREG uCR3);
+*/
+if RT_INLINE_ASMEXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetCR3(RTCCUINTXREG uCR3);
### #else
### #elif RT_INLINE_ASM_GNU_STYLE
### #ifdef RT_ARCH_AMD64
+ __asm__ __volatile__("movq %0, %cr3\n\t": "r" (uCR3));
### #else
+ __asm__ __volatile__("movl %0, %cr3\n\t": "r" (uCR3));
### #endif
### #endif

### endif
+ __asm
+ {
### #ifdef RT_ARCH_AMD64
+ mov rax, [uCR3]
+ mov cr3, rax
### #else
+ mov eax, [uCR3]
+ mov cr3, eax
### #endif
+ }
### endif
+
+
+/**
+ * Reloads the CR3 register.
+ */
+### if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMReloadCR3(void);
### else
+DECLINLINE(void) ASMReloadCR3(void)
+{
### if RT_INLINE_ASM_USES_INTRIN
+ __writecr3(__readcr3());
### #elif RT_INLINE_ASM_GNU_STYLE
+ RTCCUINTXREG u;
### #ifdef RT_ARCH_AMD64
+ __asm__ __volatile__("movq %cr3, %0\n\t"
+ "movq %0, %cr3\n\t"
+ : "=r" (u));
### #else
+ __asm__ __volatile__("movl %cr3, %0\n\t"
+ "movl %0, %cr3\n\t"
+ : "r" (u));
### #endif
+ RTCCUINTXREG u;
### #ifdef RT_ARCH_AMD64
+ __asm__ __volatile__("movq %cr3, %0\n\t"
+ "movq %0, %cr3\n\t"
+ : "=r" (u));
### #else
+ __asm__ __volatile__("movl %cr3, %0\n\t"
+ "movl %0, %cr3\n\t"
+       : ":=r" (u));
+# endif
+# else
+  __asm
+  {
+# ifdef RT_ARCH_AMD64
+    mov rax, cr3
+    mov cr3, rax
+# else
+    mov eax, cr3
+    mov cr3, eax
+# endif
+  }
+# endif
+}
+#endif
+
+/**
+ * Get cr4.
+ * @returns cr4.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetCR4(void);
+#else
+DECLINLINE(RTCCUINTXREG) ASMGetCR4(void)
+{
+    RTCCUINTXREG uCR4;
+    #if RT_INLINE_ASM_USES_INTRIN
+        uCR4 = __readcr4();
+    +#elif RT_INLINE_ASM_GNU_STYLE
+        #ifdef RT_ARCH_AMD64
+            __asm__ __volatile__("movq  %%cr4, %0	
*" : ":" (uCR4));
+        +#else
+            __asm__ __volatile__("movl  %%cr4, %0	
*" : ":" (uCR4));
+        +#endif
+    +#else
+        __asm
+        {
+            #ifdef RT_ARCH_AMD64
+                mov rax, cr4
+                mov [uCR4], rax
+            +#else
+                push eax /* just in case */
+                /*mov   eax, cr4*/
+                _emit   0x0f
+                _emit   0x20
+            +#endif
```c
+ _emit 0xe0
+ mov [uCR4], eax
+ pop eax
+# endif
+ }
+# endif
+ return uCR4;
+
+}
+#endif
+
+
+/**
+ * Sets the CR4 register.
+ *
+ * @param   uCR4    New CR4 value.
+ */
+ if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetCR4(RTCCUINTXREG uCR4);
+#else
+DECLINLINE(void) ASMSetCR4(RTCCUINTXREG uCR4)
+
+ if RT_INLINE_ASM_USES_INTRIN
+   __writecr4(uCR4);
+
+ else
+   __asm__ __volatile__("movq %0, %cr4\n\t" : "r" (uCR4));
+#endif
+ else
+   __asm__ __volatile__("movl %0, %cr4\n\t" : "r" (uCR4));
+
+ elif RT_INLINE_ASM_GNU_STYLE
+ if RT_ARCH_AMD64
+   __asm__ __volatile__("movq %0, %cr4\n\t" : "r" (uCR4));
+ #else
+   __asm__ __volatile__("movl %0, %cr4\n\t" : "r" (uCR4));
+ endif
+ #endif
+ else
+   __asm
+   {
+   # ifdef RT_ARCH_AMD64
+     mov     rax, [uCR4]
+     mov     cr4, rax
+   #else
+     mov     eax, [uCR4]
+     _emit   0x0F
+     _emit   0x22
+     _emit   0xE0        /* mov     cr4, eax */
+   #endif
+   }
+   #else
+   }
+ }\n+ #endif
+ +
+ +
```
+/**
+ * Get cr8.
+ + @returns cr8.
+ * @remark The lock prefix hack for access from non-64-bit modes is NOT used and 0 is returned.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetCR8(void);
+#else
+DECLINLINE(RTCCUINTXREG) ASMGetCR8(void)
+{
+  +# ifdef RT_ARCH_AMD64
+  + RTCCUINTXREG uCR8;
+  +# if RT_INLINE_ASM_USES_INTRIN
+  + uCR8 = __readcr8();
+  +
+  +# elif RT_INLINE_ASM_GNU_STYLE
+  + __asm__ __volatile__("movq %%cr8, %0\n" : ="r" (uCR8));
+  +# else
+  + __asm
+  +   { moved
+  +   mov rax, cr8
+  +   mov [uCR8], rax
+  +   } endasm
+  +# endif
+  + return uCR8;
+  +# else /* !RT_ARCH_AMD64 */
+  + return 0;
+  +# endif /* !RT_ARCH_AMD64 */
+}
+#endif
+
+/**
+ * Get XCR0 (eXtended feature Control Register 0).
+ * @returns xcr0.
+ */
+DECLASM(uint64_t) ASMGetXcr0(void);
+
+/**
+ * Sets the XCR0 register.
+ * @param uXcr0 The new XCR0 value.
+ */
+DECLASM(void) ASMSetXcr0(uint64_t uXcr0);
+
+/**
+ * Save extended CPU state.
+ * @param pXStateArea Where to save the state.
+ */
+ * @param   fComponents Which state components to save.
+ */
+DECLASM(void) ASMXSave(struct X86XSAVEAREA RT_FAR *pXStateArea, uint64_t fComponents);
+
+/**
+ * Loads extended CPU state.
+ * @param   pXStateArea Where to load the state from.
+ * @param   fComponents Which state components to load.
+ */
+DECLASM(void) ASMXRstor(struct X86XSAVEAREA const RT_FAR *pXStateArea, uint64_t fComponents);
+
+struct X86FXSTATE;
+/**
+ * Save FPU and SSE CPU state.
+ * @param   pXStateArea Where to save the state.
+ */
+DECLASM(void) ASMFxSave(struct X86FXSTATE RT_FAR *pXStateArea);
+
+/**
+ * Load FPU and SSE CPU state.
+ * @param   pXStateArea Where to load the state from.
+ */
+DECLASM(void) ASMFxRstor(struct X86FXSTATE const RT_FAR *pXStateArea);
+
+/**
+ * Enables interrupts (EFLAGS.IF).
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMIntEnable(void);
+#else
+DECLINLINE(void) ASMIntEnable(void)
+{
+    #if RT_INLINE_ASM_GNU_STYLE
+        __asm("sti\n");
+    #elif RT_INLINE_ASM_USES_INTRIN
+        _enable();
+    #else
+        __asm sti
+    #endif
+}
+#endif
+/**
+ * Disables interrupts (!EFLAGS.IF).
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMIntDisable(void);
+else
+DECLINLINE(void) ASMIntDisable(void)
+
++ if RT_INLINE_ASM_GNU_STYLE
+  __asm("cli\n");
++ else RT_INLINE_ASM_USES_INTRIN
+  __disable();
++ else
+  __asm cli
++ endif
+
+/**
+ * Disables interrupts and returns previous xFLAGS.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTREG) ASMIntDisableFlags(void);
+else
+DECLINLINE(RTCCUINTREG) ASMIntDisableFlags(void)
+
+ RTCCUINTREG xFlags;
++ if RT_INLINE_ASM_GNU_STYLE
++ ifdef RT_ARCH_AMD64
+  __asm volatile("pushfq\n\t"
+            "cli\n\t"
+            "popq %0\n\t"
+            : "=r" (xFlags));
++ else
+  __asm volatile("pushfl\n\t"
+            "cli\n\t"
+            "popl %0\n\t"
+            : "=r" (xFlags));
++ endif
++ elseif RT_INLINE_ASM_USES_INTRIN && !defined(RT_ARCH_X86)
+  xFlags = ASMGetFlags();
+  __disable();
++ else
+  __asm {
+    pushfd
+    cli
+    pop [xFlags]
+  }
++ endif
+  return xFlags;
+*/
+ * Are interrupts enabled?
+ *
+ * @returns true / false.
+ */
+DECLINLINE(bool) ASMIntAreEnabled(void)
+{
+    RTCCUINTREG uFlags = ASMGetFlags();
+    return uFlags & 0x200 /* X86_EFL_IF */ ? true : false;
+}
+
+*/
+ * Halts the CPU until interrupted.
+ */
+﻿#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 14
+DECLASM(void) ASMHalt(void);
+#else
+DECLINLINE(void) ASMHalt(void)
+{
+    if RT_INLINE_ASM_GNU_STYLE
+    asm volatile("hlt\\n");
+    elseif RT_INLINE_ASM_USES_INTRIN
+    __halt();
+    else
+    asm {
+        hlt
+    }
+    endif
+}
+endif
+
+*/
+ * Reads a machine specific register.
+ *
+ * @returns Register content.
+ * @param uRegister Register to read.
+ */
+$('#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint64_t) ASMRdMsr(uint32_t uRegister);
+else
+DECLINLINE(uint64_t) ASMRdMsr(uint32_t uRegister)
+{
RTUINT64U u;
+# if RT_INLINE_ASM_GNU_STYLE
+ __asm__ volatile("rdmsr\n\t"
+ : "=a" (u.s.Lo),
+          "=d" (u.s.Hi)
+ : "c" (uRegister));
+
+# elif RT_INLINE_ASM_USES_INTRIN
+ u.u = __readmsr(uRegister);
+
+# else
+ __asm
+ {
+    mov    ecx, [uRegister]
+    rdmsr
+    mov    [u.s.Lo], eax
+    mov    [u.s.Hi], edx
+ }
+# endif
+
+ return u.u;
+
+}
+#endif
+
+/**
+ * Writes a machine specific register.
+ *
+ * @returns Register content.
+ * @param   uRegister   Register to write to.
+ * @param   u64Val      Value to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMWrMsr(uint32_t uRegister, uint64_t u64Val);
+#else
+DECLINLINE(void) ASMWrMsr(uint32_t uRegister, uint64_t u64Val)
+{
+    RTUINT64U u;
+
+    u.u = u64Val;
+# if RT_INLINE_ASM_GNU_STYLE
+ __asm__ volatile("wrmsr\n\t"
+ : "a" (u.s.Lo),
+          "d" (u.s.Hi),
+          "c" (uRegister));
+
+# elif RT_INLINE_ASM_USES_INTRIN
+ __writemsr(uRegister, u.u);
+    __asm
+ { }
+}
+/**
+ * Writes a machine specific register.
+ *
+ * @returns Register content.
+ * @param   uRegister   Register to write to.
+ * @param   u64Val      Value to write.
+ */
+}
/* Reads a machine specific register, extended version (for AMD). */
/* @returns Register content. */
/* @param uRegister Register to read. */
/* @param uXDI RDI/EDI value. */
#if RT_INLINE_ASM_EXTERNAL
DECLASM(uint64_t) ASMRdMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI);
#else
DECLINLINE(uint64_t) ASMRdMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI)
{
    RTUINT64U u;
    #if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("rdmsr\n"
                        : "=a" (u.s.Lo),
                           "=d" (u.s.Hi)
                         : "c" (uRegister),
                           "D" (uXDI));
    
    return u.u;
}#else
    __asm
    {
        mov     ecx, [uRegister]
        xchg    edi, [uXDI]
        rdmsr
        mov     [u.s.Lo], eax
        mov     [u.s.Hi], edx
        xchg    edi, [uXDI]
    }
#endif
#else
    __asm
    {
        mov     ecx, [uRegister]
        mov     edx, [u.s.Hi]
        mov     eax, [u.s.Lo]
        wrmsr
    }
#endif

+ /* if RT_INLINE_ASM_EXTERNAL */
+ DECLASM(uint64_t) ASMRdMsrEx(uRegister, RTCCUINTXREG uXDI);
+**
+* Writes a machine specific register, extended version (for AMD).
+*
+* @returns Register content.
+* @param uRegister Register to write to.
+* @param uXDI RDI/EDI value.
+* @param u64Val Value to write.
+*/
+if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMWrMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI, uint64_t u64Val);
+else
+DECLINLINE(void) ASMWrMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI, uint64_t u64Val)
+{
+    RTUINT64U u;
+
+    u.u = u64Val;
+    #if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("wrmsr
+                         ::"a" (u.s.Lo),
+                         "d" (u.s.Hi),
+                         "c" (uRegister),
+                         "D" (uXDI));
+    +#else
+        __asm
+        {
+            mov     ecx, [uRegister]
+            xchg    edi, [uXDI]
+            mov     edx, [u.s.Hi]
+            mov     eax, [u.s.Lo]
+            wrmsr
+            xchg    edi, [uXDI]
+        }
+    +#endif
+}
+#endif
+*/
+
+**
+* Reads low part of a machine specific register.
+*
+* @returns Register content.
+* @param uRegister Register to read.
+*/
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMRdMsr_Low(uint32_t uRegister);
#endif

DECLINLINE(uint32_t) ASMRdMsr_Low(uint32_t uRegister)
{
    uint32_t u32;
    if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("rdmsr\n";
            :="a" (u32)
            :"c" (uRegister)
            :"edx");
    else
        u32 = (uint32_t)__readmsr(uRegister);
    
    __asm
    {
        mov     ecx, [uRegister]
        rdmsr
        mov     [u32], eax
    }
#else
    uint32_t    u32;
    if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("rdmsr\n";
            :="d" (u32)
            :"c" (uRegister)
            :"eax");
    else
        RT_INLINE_ASM_USES_INTRIN

    #endif

    return u32;

} // ASMRdMsr_Low

/**
 * Reads high part of a machine specific register.
 * @returns Register content.
 * @param   uRegister   Register to read.
 */
#ifdef RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMRdMsr_High(uint32_t uRegister);
#else
DECLINLINE(uint32_t) ASMRdMsr_High(uint32_t uRegister)
{
    uint32_t    u32;
    if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("rdmsr\n";
            :="d" (u32)
            :"c" (uRegister)
            :"eax");
    else
        RT_INLINE_ASM_USES_INTRIN
#endif

    return u32;

/* End of asm_rmt.c */

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```c
+ u32 = (uint32_t)(__readmsr(uRegister) >> 32);
+
+## else
+  __asm
+  {
+    mov   ecx, [uRegister]
+    rdmsr
+    mov   [u32], edx
+  }
+## endif
+
+  return u32;
+
+}
+##endif
+
+
+/**
+ * Gets dr0.
+ *
+ * @returns dr0.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetDR0(void);
+else
+DECLINLINE(RTCCUINTXREG) ASMGetDR0(void)
+{
+  RTCCUINTXREG uDR0;
+  if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+    uDR0 = __readdr(0);
+  else
+    #ifdef RT_ARCH_AMD64
+      __asm__ __volatile__("movq  %dr0, %0\n\t": "=r" (uDR0));
+    #else
+      __asm__ __volatile__("movl  %dr0, %0\n\t": "=r" (uDR0));
+    #endif
+  endif
+  else
+    {
+      ifdef RT_ARCH_AMD64
+        mov   rax, dr0
+        mov   [uDR0], rax
+      else
+        mov   eax, dr0
+        mov   [uDR0], eax
+      endif
+      return uDR0;
+    }
+  }
+```
+} + #endif
+
+ + */
+ * Gets dr1.
+ *
+ * @returns dr1.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+#DECLASM(RTCCUINTXREG) ASMGetDR1(void);
+#else
+#DECLINLINE(RTCCUINTXREG) ASMGetDR1(void)
+{
+    RTCCUINTXREG uDR1;
+    RTCCUINTXREG uDR1;
+    if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("movl   %0,ldr1"
+    : "=r" (uDR1));
+    } else
+    __asm__ __volatile__("movq   %0,dr1"
+    : "=r" (uDR1));
+    } else
+    __asm
+    {
+    # ifdef RT_ARCH_AMD64
+    mov     rax, dr1
+    } else
+    mov     eax, dr1
+    mov     [uDR1], eax
+    } endif
+    } endif
+    return uDR1;
+ }}
+ endif
+
+ + */
+ * Gets dr2.
+ *
+ * @returns dr2.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+#DECLASM(RTCCUINTXREG) ASMGetDR2(void);
+#else

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DECLINLINE(RTCCUINTXREG) ASMGetDR2(void)
+
    RTCCUINTXREG uDR2;
    #if RT_INLINE_ASM_USES_INTRIN
    uDR2 = __readdr(2);
    #elif RT_INLINE_ASM_GNU_STYLE
    __asm
        {
        #ifdef RT_ARCH_AMD64
            mov     rax, dr2
            mov     [uDR2], rax
        #else
            mov     eax, dr2
            mov     [uDR2], eax
        #endif
        }
    #endif
    return uDR2;
}

DECLASM(RTCCUINTXREG) ASMGetDR3(void);
#else
DECLINLINE(RTCCUINTXREG) ASMGetDR3(void)
+
    RTCCUINTXREG uDR3;
    #if RT_INLINE_ASM_USES_INTRIN
    uDR3 = __readdr(3);
    #elif RT_INLINE_ASM_GNU_STYLE
    __asm
        {
        #ifdef RT_ARCH_AMD64
            mov     rax, dr3
            mov     [uDR3], rax
        #else
            mov     eax, dr3
            mov     [uDR3], eax
        #endif
        }
    #endif
    return uDR3;
+ }  
+ #endif
+ 
+ */
+ * Reads and clears DR6.
+ *
+ * @returns DR6.
+ */
+\#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetAndClearDR6(void);
+\#else
+DECLINLINE(RTCCUINTXREG) ASMGetAndClearDR6(void)
+{  
+ RTCCUINTXREG uDR6;
+\# if RT_INLINE_ASM_USES_INTRIN
+    uDR6 = __readdr(6);
+\# endif
+\# else
+ RTCCUINTXREG uNewValue = 0xffff0ff0U; /* 31-16 and 4-11 are 1's, 12 and 63-31 are zero. */
+\# endif
+\# ifdef RT_ARCH_AMD64
+ \#asm volatile("
movq  %%dr6, %0
	"movq  %1, %%dr6
+   : "=r" (uDR6)
+   : "r" (uNewValue));
+\# endif
+\# else
+ \#asm volatile("movl  %%dr6, %0
	"movl  %1, %%dr6
+   : "=r" (uDR6)
+   : "r" (uNewValue));
+\# endif
+\# endif
+\# else
+ \#asm
+ {  
+ \# ifdef RT_ARCH_AMD64
+      mov     rax, dr6
+      mov     [uDR6], rax
+      mov     rcx, rax
+      mov     ecx, 0xffff0ff0h; /* 31-16 and 4-11 are 1's, 12 and 63-31 are zero. */
+      mov     dr6, rcx
+\# else
+      mov     eax, dr6
+      mov     [uDR6], eax
+      mov     ecx, 0xffff0ff0h; /* 31-16 and 4-11 are 1's, 12 is zero. */
+      mov     dr6, ecx
+\# endif
+   }  
+\# endif
+ return uDR6;
+}
+#endif
+
+
+/**
+ * Gets dr7.
+*
+ * @returns dr7.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetDR7(void);
+#else
+DECLINLINE(RTCCUINTXREG) ASMGetDR7(void)
+{
+ RTCCUINTXREG uDR7;
+# if RT_INLINE_ASM_USES_INTRIN
+ uDR7 = __readdr(7);
+# elif RT_INLINE_ASM_GNU_STYLE
+# ifdef RT_ARCH_AMD64
+ __asm__ __volatile__("movq %%dr7, %0\n\t" : "=r" (uDR7));
+# else
+ __asm__ __volatile__("movl %%dr7, %0\n\t" : "=r" (uDR7));
+# endif
+# else
+ __asm
+ {
+# ifdef RT_ARCH_AMD64
+
mov rax, dr7
+
mov [uDR7], rax
+# else
+
mov eax, dr7
+
mov [uDR7], eax
+# endif
+ }
+# endif
+ return uDR7;
+}
+#endif
+
+
+/**
+ * Sets dr0.
+*
+ * @param uDRVal Debug register value to write
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetDR0(RTCCUINTXREG uDRVal);

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DECLINLINE(void) ASMSetDR0(RTCCUINTXREG uDRVal)
{
  if (RT_INLINE_ASM_USES_INTRIN
      __writedr(0, uDRVal);
  else if (RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("movq %0, %%dr0\n\t" : : "r" (uDRVal));
  else
    __asm__ __volatile__("movl %0, %%dr0\n\t" : : "r" (uDRVal));
}

+ * Sets dr1.
+ *
+ * @param uDRVal Debug register value to write
+ */
+if (RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetDR1(RTCCUINTXREG uDRVal);
+} else
+DECLINLINE(void) ASMSetDR1(RTCCUINTXREG uDRVal)
+
+  if (RT_INLINE_ASM_USES_INTRIN
      __writedr(1, uDRVal);
  else if (RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("movq %0, %%dr1\n\t" : : "r" (uDRVal));
  else
    __asm__ __volatile__("movl %0, %%dr1\n\t" : : "r" (uDRVal));
}
```c
/**
 * Sets dr2.
 * *
 * @param   uDRVal   Debug register value to write
 * */

#ifndef RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMSetDR2(RTCCUINTXREG uDRVal);
#else
DECLINLINE(void) ASMSetDR2(RTCCUINTXREG uDRVal)
{
    __writedr(2, uDRVal);
}
#else RT_INLINE_ASM_USES_INTRIN
    __asm__ __volatile__("movq  %0, %%dr2\n\t" : : "r" (uDRVal));
#else RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("movl   %0, %%dr2\n\t" : : "r" (uDRVal));
#endif
#else
    __asm__
    {
        __writedr(2, uDRVal);
    }
#endif
*/

```
/* Sets dr3.
 * @param   uDRVal   Debug register value to write
 */
#if RT_INLINE_ASMEXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetDR3(RTCCUINTXREG uDRVal);
 +#else
 +DECLINLINE(void) ASMSetDR3(RTCCUINTXREG uDRVal)
 +{
 +    __writedr(3, uDRVal);
 +    __asm__ __volatile__("movq  %0, %%dr3\n\t" : : "r" (uDRVal));
 +} if RT_INLINE_ASM_USES_INTRIN
 +__asm__ __volatile__("movl %0, %%dr3\n\t" : : "r" (uDRVal));
 +} endif
 +}
 +endif
 +
 +/* Sets dr6.
 * @param   uDRVal   Debug register value to write
 */
#if RT_INLINE_ASMEXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetDR6(RTCCUINTXREG uDRVal);
 +#else
 +DECLINLINE(void) ASMSetDR6(RTCCUINTXREG uDRVal)
 +{
 +    __writedr(6, uDRVal);
 +    __asm__ __volatile__("movq  %0, %%dr6\n\t" : : "r" (uDRVal));
### else
+
+    __asm__ __volatile__("movl %0, %%dr6\n\t": "r" (uDRVal));
### endif
+
### else
+    __asm
+    {
### ifdef RT_ARCH_AMD64
+        mov     rax, [uDRVal]
+        mov     dr6, rax
### else
+        mov     eax, [uDRVal]
+        mov     dr6, eax
### endif
+    }
### endif
+
+/**
+ * Sets dr7.
+ *
+ * @param   uDRVal  Debug register value to write
+ */
###if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetDR7(RTCCUINTXREG uDRVal);
###else
+DECLINLINE(void) ASMSetDR7(RTCCUINTXREG uDRVal)
+{
### if RT_INLINE_ASM_USES_INTRIN
+    __writedr(7, uDRVal);
### elif RT_INLINE_ASM_GNU_STYLE
### ifdef RT_ARCH_AMD64
+    __asm__ __volatile__("movq %0, %%dr7\n\t": "r" (uDRVal));
### else
+    __asm__ __volatile__("movl %0, %%dr7\n\t": "r" (uDRVal));
### endif
### else
+    __asm
+    {
### ifdef RT_ARCH_AMD64
+        mov     rax, [uDRVal]
+        mov     dr7, rax
### else
+        mov     eax, [uDRVal]
+        mov     dr7, eax
### endif
+    }
### endif

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/**
 * Writes a 8-bit unsigned integer to an I/O port, ordered.
 * 
 * @param   Port    I/O port to write to.
 * @param   u8      8-bit integer to write.
 * */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutU8(RTIOPORT Port, uint8_t u8);
#else
DECLINLINE(void) ASMOutU8(RTIOPORT Port, uint8_t u8)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("outb %b1, %w0\n"
        :: "Nd" (Port),
        "a" (u8));
#else
    __asm
    {
        mov     dx, [Port]
        mov     al, [u8]
        out     dx, al
    }
#endif
}
#endif

/**
 * Reads a 8-bit unsigned integer from an I/O port, ordered.
 * 
 * @returns 8-bit integer.
 * @param   Port    I/O port to read from.
 * */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint8_t) ASMInU8(RTIOPORT Port);
#else
DECLINLINE(uint8_t) ASMInU8(RTIOPORT Port)
{
    uint8_t u8;

```c
// if RT_INLINE_ASM_GNU_STYLE
+ ___asm____volatile__("inb %w1, %b0\n\t"
+ : "a" (u8)
+ : "Nd" (Port));
+
++ elsif RT_INLINE_ASM_USES_INTRIN
+ u8 = __inbyte(Port);
+
++ else
+ ___asm
+ {
+   mov   dx, [Port]
+   in    al, dx
+   mov   [u8], al
+ }
++ endif
+ return u8;
+}
++endif
+
+/**
+ * Writes a 16-bit unsigned integer to an I/O port, ordered.
+ *
+ * @param   Port    I/O port to write to.
+ * @param   u16     16-bit integer to write.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutU16(RTIOPORT Port, uint16_t u16);
+else
DECLINLINE(void) ASMOutU16(RTIOPORT Port, uint16_t u16)
+{  
++ if RT_INLINE_ASM_GNU_STYLE
+ ___asm____volatile__("outw %w1, %w0\n\t"
+ :: "Nd" (Port),
+ "a" (u16));
+
++ elsif RT_INLINE_ASM_USES_INTRIN
+ __outword(Port, u16);
+
++ else
+ ___asm
+ {
+   mov   dx, [Port]
+   mov   ax, [u16]
+   out   dx, ax
+ }
++ endif
```
+ */
+ * Reads a 16-bit unsigned integer from an I/O port, ordered.
+ * @returns 16-bit integer.
+ * @param Port I/O port to read from.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint16_t) ASMInU16(RTIOPORT Port);
+#else
+DECLINLINE(uint16_t) ASMInU16(RTIOPORT Port)
+{
+    uint16_t u16;
+# if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("inw %w1, %w0\n"
+            : "=a" (u16)
+            : "Nd" (Port));
+    
+# elif RT_INLINE_ASM_USES_INTRIN
+        u16 = __inword(Port);
+    
+# else
+        __asm
+        {
+            mov     dx, [Port]
+            in      ax, dx
+            mov     [u16], ax
+        }
+# endif
+    return u16;
+}
+#endif
+
+/**
+ * Writes a 32-bit unsigned integer to an I/O port, ordered.
+ * @param Port I/O port to write to.
+ * @param u32 32-bit integer to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMOutU32(RTIOPORT Port, uint32_t u32);
+#else
+DECLINLINE(void) ASMOutU32(RTIOPORT Port, uint32_t u32)
+{
+    
+    
+    
+    
+}
### if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("outl %1, %w0\n"
  : "Nd" (Port),
  : "a" (u32));
+
### endif

### elif RT_INLINE_ASM_USES_INTRIN
+ __outdword(Port, u32);
+
### else
+ __asm
+ {
+    mov dx, [Port]
+    mov eax, [u32]
+    out dx, eax
+  }
+### endif
+
### endif

/**
 * Reads a 32-bit unsigned integer from an I/O port, ordered.
 * @returns 32-bit integer.
 * @param   Port    I/O port to read from.
 */
### if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMInU32(RTIOPORT Port);
### else
DECLINLINE(uint32_t) ASMInU32(RTIOPORT Port)
{
    uint32_t u32;
### if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("inl %w1, %0\n"
  : "=a" (u32)
  : "Nd" (Port));
+
### elif RT_INLINE_ASM_USES_INTRIN
    u32 = __indword(Port);
+
### else
+ __asm
+ {
+    mov dx, [Port]
+    in eax, dx
+    mov [u32], eax
+  }
+### endif

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+    return u32;
+} }
+#endif
+
+
+/**
+ * Writes a string of 8-bit unsigned integer items to an I/O port, ordered.
+ *
+ * @param   Port     I/O port to write to.
+ * @param   pau8     Pointer to the string buffer.
+ * @param   c        The number of items to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMOutStrU8(RTIOPORT Port, uint8_t const RT_FAR *pau8, size_t c);
+#else
+DECLINLINE(void) ASMOutStrU8(RTIOPORT Port, uint8_t const RT_FAR *pau8, size_t c)
+{
+    #if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("rep; outsb
	" +S" (pau8),
+     "+c" (c)
+     : "d" (Port));
+     
+    #elif RT_INLINE_ASM_USES_INTRIN
+        __outbytestring(Port, (unsigned char RT_FAR *)pau8, (unsigned long)c);
+    
+    #else
+        __asm
+        {
+            mov     dx, [Port]
+            mov     ecx, [c]
+            mov     eax, [pau8]
+            xchg    esi, eax
+            rep outsb
+            xchg    esi, eax
+    }
+    #endif
+}
+#endif
+
+
+/**
+ * Reads a string of 8-bit unsigned integer items from an I/O port, ordered.
+ *
+ * @param   Port     I/O port to read from.
+ * @param   pau8     Pointer to the string buffer (output).
+ * @param   c        The number of items to read.
+ */
#<if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN>
DECLASM(void) ASMInStrU8(RTIOPORT Port, uint8_t RT_FAR *pau8, size_t c);
#else
DECLINLINE(void) ASMInStrU8(RTIOPORT Port, uint8_t RT_FAR *pau8, size_t c)
{# if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("rep; insb
        : "+D" (pau8),
        "+c" (c)
        : "d" (Port));
    __asm
    {
        mov     dx, [Port]
        mov     ecx, [c]
        mov     eax, [pau8]
        xchg    edi, eax
        rep insb
        xchg    edi, eax
    }
#else
    __asm string(Port, pau8, (unsigned long)c);
#endif
#endif

/**
 * Writes a string of 16-bit unsigned integer items to an I/O port, ordered.
 *
 * @param   Port    I/O port to write to.
 * @param   pau16   Pointer to the string buffer.
 * @param   c       The number of items to write.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutStrU16(RTIOPORT Port, uint16_t const RT_FAR *pau16, size_t c);
#else
DECLINLINE(void) ASMOutStrU16(RTIOPORT Port, uint16_t const RT_FAR *pau16, size_t c)
{# if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("rep; outsw
        : "+S" (pau16),
        "+c" (c)
        : "d" (Port));
#else
    __asm
    {
        mov     dx, [Port]
        mov     ecx, [c]
        mov     eax, [pau16]
        xchg    edi, eax
        rep insb
        xchg    edi, eax
    }
#endif
#endif

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+ __outwordstring(Port, (unsigned short RT_FAR *)pau16, (unsigned long)c);
+ +# else
+ + __asm
+ + {
+ +    mov    dx, [Port]
+ +    mov    ecx, [c]
+ +    mov    eax, [pau16]
+ +    xchg   esi, eax
+ +    rep outsw
+ +    xchg   esi, eax
+ + }
+ +# endif
+ +}
+ +#endif
+ +
+ +/**
+ * Reads a string of 16-bit unsigned integer items from an I/O port, ordered.
+ * 
+ * @param   Port    I/O port to read from.
+ * @param   pau16   Pointer to the string buffer (output).
+ * @param   c       The number of items to read.
+ */
+ +#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+ #DECLASM(void) ASMInStrU16(RTIOPORT Port, uint16_t RT_FAR *pau16, size_t c);
+ +#else
+ #DECLINLINE(void) ASMInStrU16(RTIOPORT Port, uint16_t RT_FAR *pau16, size_t c)
+ #if RT_INLINE_ASM_GNU_STYLE
+     __asm__ __volatile__("rep; insw
+         : "+D" (pau16),
+         "+c" (c)
+         : "d" (Port));
+ +# elif RT_INLINE_ASM_USES_INTRIN
+ +__inwordstring(Port, pau16, (unsigned long)c);
+ + +# else
+ + __asm
+ + {
+ +    mov    dx, [Port]
+ +    mov    ecx, [c]
+ +    mov    eax, [pau16]
+ +    xchg   edi, eax
+ +    rep insw
+ +    xchg   edi, eax
+ + }
/**
 * Writes a string of 32-bit unsigned integer items to an I/O port, ordered.
 * 
 * @param Port I/O port to write to.
 * @param pau32 Pointer to the string buffer.
 * @param c The number of items to write.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutStrU32(RTIOPORT Port, uint32_t const RT_FAR *pau32, size_t c);
#else
DECLINLINE(void) ASMOutStrU32(RTIOPORT Port, uint32_t const RT_FAR *pau32, size_t c)
{
    #if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("rep; outsl
	"
                         : "+S" (pau32),
                           "+c" (c)
                         : "d" (Port));
    
    #elif RT_INLINE_ASM_USES_INTRIN
        __outdwordstring(Port, (unsigned long RT_FAR *)pau32, (unsigned long)c);
    
    # else
        __asm
        {
            mov     dx, [Port]
            mov     ecx, [c]
            mov     eax, [pau32]
            xchg    esi, eax
            rep outsd
            xchg    esi, eax
        }
    # endif

    #endif

    #endif

    +
*/

/**
 * Reads a string of 32-bit unsigned integer items from an I/O port, ordered.
 * 
 * @param Port I/O port to read from.
 * @param pau32 Pointer to the string buffer (output).
 * @param c The number of items to read.
 */
**Invalidation of Page**

- **Purpose:** Invalidate a page at a given address.
- **Function Signature:**
  ```c
  void ASMInvalidatePage(RTCCUINTXREG uPtr);
  ```

**Asm Definitions**

- **ASMLinkU32()**
  ```c
  #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
  DECLASM(void) ASMInStrU32(RTIOPORT Port, uint32_t RT_FAR *pau32, size_t c);
  #else
  DECLINLINE(void) ASMInStrU32(RTIOPORT Port, uint32_t RT_FAR *pau32, size_t c)
  {
    # if RT_INLINE_ASM_GNU_STYLE
      __asm__ __volatile__("rep; insl\n	"
                          : "+D" (pau32),
                            "+c" (c)
                          : "d" (Port));
    #elif RT_INLINE_ASM_USES_INTRIN
      __indwordstring(Port, (unsigned long RT_FAR *)pau32, (unsigned long)c);
    #else
      __asm
      {
        mov     dx, [Port]
        mov     ecx, [c]
        mov     eax, [pau32]
        xchg    edi, eax
        rep insd
        xchg    edi, eax
      }
    # endif
  #endif
  #endif
  ```

- **ASMLinkU64()**
  ```c
  #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
  DECLASM(void) ASMInvalidatePage(RTCCUINTXREG uPtr);
  #else
  DECLINLINE(void) ASMInvalidatePage(RTCCUINTXREG uPtr)
  {
    # if RT_INLINE_ASM_USES_INTRIN
      __invlpg((void RT_FAR *)uPtr);
    # elif RT_INLINE_ASM_GNU_STYLE
      __asm__ __volatile__("invlpg %0\n	"
                          : : "m" (*(uint8_t RT_FAR *)(uintptr_t)uPtr));
    # else
      __asm
      {
        mov     edx, [uPtr]
        mov     ecx, [c]
        mov     eax, [pau32]
        xchg    edi, eax
        rep insd
        xchg    edi, eax
      }
    # endif
  #endif
  ```

**Notes:**

- The code is designed to handle page invalidation at runtime.
- The `#if` and `#elif` conditions are used to choose the appropriate assembly function based on the `RT_INLINE_ASM_EXTERNAL` and `RT_INLINE_ASM_USES_INTRIN` macros.
- The `__asm` block contains assembly instructions to perform the page invalidation.
- The `if` and `else` blocks handle different assembly styles for different architectures.
```c
/* Write back the internal caches and invalidate them. */

#include "asm.h"

DECLASM(void) ASMWriteBackAndInvalidateCaches(void);
#endif

DECLINLINE(void) ASMWriteBackAndInvalidateCaches(void)
{
    if (RT_INLINE_ASM_GNU_STYLE)
        __asm__ __volatile__("wbinvd");
    else
    {
        wbinvd
    }
}
#endif

/* Invalidate internal and (perhaps) external caches without first
flushing dirty cache lines. Use with extreme care. */

#include "asm.h"

DECLASM(void) ASMInvalidateInternalCaches(void);
#endif

DECLINLINE(void) ASMInvalidateInternalCaches(void)
{
    if (RT_INLINE_ASM_GNU_STYLE)
        __asm__ __volatile__("invd");
    else
    {
        invd
    }
}
#endif
```
+ __asm
+ {
+   invd
+ }
+} #endif
+/**
+ * Memory load/store fence, waits for any pending writes and reads to complete.
+ * Requires the X86_CPUID_FEATURE_EDX_SSE2 CPUID bit set.
+ */
+DECLINLINE(void) ASMMemoryFenceSSE2(void)
+{
+#if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__ (".byte 0x0f,0xae,0xf0\n\t");
+#elif RT_INLINE_ASM_USES_INTRIN
+    _mm_mfence();
+#else
+    __asm
+    {
+        _emit   0x0f
+        _emit   0xae
+        _emit   0xf0
+    }
+#endif
+}
+/**
+ * Memory store fence, waits for any writes to complete.
+ * Requires the X86_CPUID_FEATURE_EDX_SSE CPUID bit set.
+ */
+DECLINLINE(void) ASMWriteFenceSSE(void)
+{
+#if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__ (".byte 0x0f,0xae,0xf8\n\t");
+#elif RT_INLINE_ASM_USES_INTRIN
+    _mm_sfence();
+#else
+    __asm
+    {
+        _emit   0x0f
+        _emit   0xae
+        _emit   0xf8
+    }
+#endif
+}
+ /**
 + * Memory load fence, waits for any pending reads to complete.
 + * Requires the X86_CPUID_FEATURE_EDX_SSE2 CPUID bit set.
 + */
 +
 +DECLINLINE(void) ASMReadFenceSSE2(void)
 +{
 +#if RT_INLINE_ASM_GNU_STYLE
 +    __asm__ __volatile__ (".byte 0x0f,0xae,0xe8\n"");
 +#elif RT_INLINE_ASM_USES_INTRIN
 +    _mm_lfence();
 +#else
 +    __asm
 +    {
 +        _emit   0x0f
 +        _emit   0xae
 +        _emit   0xe8
 +    }
 +#endif
 +}
 +
 +#if !defined(_MSC_VER) || !defined(RT_ARCH_AMD64)
 +
 +/*
 + * Clear the AC bit in the EFLAGS register.
 + * Requires the X86_CPUID_STEXT_FEATURE_EBX_SMAP CPUID bit set.
 + * Requires to be executed in R0.
 + */
 +
 +DECLINLINE(void) ASMClearAC(void)
 +{
 +#if RT_INLINE_ASM_GNU_STYLE
 +    __asm__ __volatile__ (".byte 0x0f,0x01,0xca\n"");
 +#else
 +    __asm
 +    {
 +        _emit   0x0f
 +        _emit   0x01
 +        _emit   0xca
 +    }
 +#endif
 +}
 +
 +/*
 + * Set the AC bit in the EFLAGS register.
 + * Requires the X86_CPUID_STEXT_FEATURE_EBX_SMAP CPUID bit set.
 + */
+- Requires to be executed in R0.
+- */
+DECLINLINE(void) ASMSetAC(void)
+{
+    +#if RT_INLINE_ASM_GNU_STYLE
+      __asm__ __volatile__ (".byte 0x0f,0x01,0xcb\n\t");
+    +#else
+      __asm
+      {
+        _emit   0x0f
+        _emit   0x01
+        _emit   0xcb
+      }
+    +#endif
+}
+    +#endif /* !_MSC_VER) || !RT_ARCH_AMD64 */
+    */ @} */
+    +#endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/asm-math.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/asm-math.h
@@ -0,0 +1,438 @@
+/** @file
+ * IPRT - Assembly Routines for Optimizing some Integers Math Operations.
+ */
+/** *
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+/** *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+/** *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+/** *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+ ifndef __iprt_asm_math_h
+ define __iprt_asm_math_h
+ + include <iprt/types.h>
+ + if defined(_MSC_VER) && RT_INLINE_ASM_USES_INTRIN
+ pragma warning(push)
+ pragma warning(disable:4668) /* Several incorrect __cplusplus uses. */
+ pragma warning(disable:4255) /* Incorrect __slwpcb prototype. */
+ include <intrin.h>
+ pragma warning(pop)
+ /* Emit the intrinsics at all optimization levels. */
+ pragma intrinsic(__emul)
+ pragma intrinsic(__emulu)
+ ifdef RT_ARCH_AMD64
+ pragma intrinsic(_mul128)
+ pragma intrinsic(_umul128)
+ endif
+ endif
+
+ /** @defgroup grp_rt_asm_math Integer Math Optimizations
+ * @ingroup grp_rt_asm
+ * @{ */
+ + /**
+ * Multiplies two unsigned 32-bit values returning an unsigned 64-bit result.
+ * @returns u32F1 * u32F2.
+ */
+ + ifdef RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_X86)
+ DECLASM(uint64_t) ASMMult2xU32RetU64(uint32_t u32F1, uint32_t u32F2);
+ else
+ DECLINLINE(uint64_t) ASMMult2xU32RetU64(uint32_t u32F1, uint32_t u32F2)
+ { 
+ __asm

```c
+ mov edx, [u32F1]
+ mov eax, [u32F2]
+ mul edx
+ mov DWORD PTR [u64], eax
+ mov DWORD PTR [u64 + 4], edx
+
+ }  
+ /* endif
+ return u64;
+ */
+ #else /* generic: */
+ return (uint64_t)u32F1 * u32F2;
+ /* endif
+ }  
+ */
+ /**
+ * Multiplies two signed 32-bit values returning a signed 64-bit result.
+ *
+ * @returns u32F1 * u32F2.
+ */
+ #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_X86)
+ DECLASM(int64_t) ASMMult2xS32RetS64(int32_t i32F1, int32_t i32F2);
+ #else
+ DECLINLINE(int64_t) ASMMult2xS32RetS64(int32_t i32F1, int32_t i32F2)
+ {
+ # ifdef RT_ARCH_X86
+     int64_t i64;
+     #if RT_INLINE_ASM_GNU_STYLE
+         __asm__ __volatile__("imull %%edx"
+                         : "=A" (i64)
+                         : "a" (i32F2), "d" (i32F1));
+     #elif RT_INLINE_ASM_USES_INTRIN
+         i64 = __emul(i32F1, i32F2);
+     #else
+         __asm
+         {
+             mov edx, [i32F1]
+             mov eax, [i32F2]
+             imul edx
+             mov DWORD PTR [i64], eax
+             mov DWORD PTR [i64 + 4], edx
+         }
+     #endif
+     return i64;
+ #} /* else */
+ #endif
+ #endif
+
+
+ */
+ #endif
+ */
+ #endif
+ */
```

---

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#ifndef
+
+#if ARCH_BITS == 64
+DECLINLINE(uint64_t) ASMMult2xU64Ret2xU64(uint64_t u64F1, uint64_t u64F2, uint64_t *pu64ProdHi)
+{
+  # if defined(RT_ARCH_AMD64) && (RT_INLINE_ASM_GNU_STYLE || RT_INLINE_ASM_USES_INTRIN)
+    #if RT_INLINE_ASM_GNU_STYLE
+      uint64_t u64Low, u64High;
+      __asm__ __volatile__("mulq %%rdx"
+                       : "=a" (u64Low), "=d" (u64High)
+                       : "0" (u64F1), "1" (u64F2));
+      *pu64ProdHi = u64High;
+      return u64Low;
+    #elif RT_INLINE_ASM_USES_INTRIN
+      return _umul128(u64F1, u64F2, pu64ProdHi);
+    #else
+      #error "hmm"
+    #endif
+  #else /* generic: */
+    RTUINT128U Prod;
+    RTUINT64U  Tmp1;
+    uint64_t   u64Tmp;
+    RTUINT64U  F1, F2;
+      F1.u = u64F1;
+      F2.u = u64F2;
+      Prod.s.Lo = ASMMult2xU32RetU64(F1.s.Lo, F2.s.Lo);
+      Tmp1.u = ASMMult2xU32RetU64(F1.s.Hi, F2.s.Lo);
+      u64Tmp = (uint64_t)Prod.DWords.dw1 + Tmp1.s.Lo;
+      Prod.DWords.dw1 = (uint32_t)u64Tmp;
+      Prod.s.Hi = Tmp1.s.Hi;
+      Prod.s.Hi += u64Tmp >> 32; /* carry */
+      Tmp1.u = ASMMult2xU32RetU64(F1.s.Lo, F2.s.Hi);
+      u64Tmp = (uint64_t)Prod.DWords.dw1 + Tmp1.s.Lo;
+      return pu64ProdHi = u64High;
+      return u64Low;
+  #endif
+}
+  */
+  */
+  */
+  */
+  */
+  */
+  */

---

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Prod.DWords.dw1 = (uint32_t)u64Tmp;
+ u64Tmp >>= 32; /* carry */
+ u64Tmp += Prod.DWords.dw2;
+ Prod.DWords.dw2 = (uint32_t)u64Tmp;
+ Prod.DWords.dw3 += u64Tmp >> 32; /* carry */
+
+ Prod.s.Hi += ASMMult2xU32RetU64(F1.s.Hi, F2.s.Hi);
+ *pu64ProdHi = Prod.s.Hi;
+ return Prod.s.Lo;
+}  
+}  
+
+/**
+ * Divides a 64-bit unsigned by a 32-bit unsigned returning an unsigned 32-bit result.
+ * @returns u64 / u32.
+ */
+if RT_INLINE_ASM_EXTERNAL && defined(RT_ARCH_X86)
+DECLASM(uint32_t) ASMDivU64ByU32RetU32(uint64_t u64, uint32_t u32);
+}  
+else
+DECLINLINE(uint32_t) ASMDivU64ByU32RetU32(uint64_t u64, uint32_t u32)
+{  
+   #ifdef RT_ARCH_X86
+      if RT_INLINE_ASM_GNU_STYLE
+         RTCCUINTREG uDummy;
+      __asm__ __volatile__("divl %3"
+      : "=a" (u32), "=d"(uDummy)
+      : "A" (u64), "r" (u32));
+      else
+         __asm
+         {  
+             mov     eax, dword ptr [u64]
+             mov     edx, dword ptr [u64 + 4]
+             mov     ecx, [u32]
+             div     ecx
+             mov     [u32], eax
+         }
+   endif  
+   return u32;
+}  
+else /* generic: */
+   return (uint32_t)(u64 / u32);
+}  
+}  
+#endif
+}
/**
 * Divides a 64-bit signed by a 32-bit signed returning a signed 32-bit result.
 * @returns u64 / u32.
 */
#if RT_INLINE_ASM_EXTERNAL && defined(RT_ARCH_X86)
DECLASM(int32_t) ASMDivS64ByS32RetS32(int64_t i64, int32_t i32);
#else
DECLINLINE(int32_t) ASMDivS64ByS32RetS32(int64_t i64, int32_t i32)
{
    __asm
    {
        mov     eax, dword ptr [i64]
        mov     edx, dword ptr [i64 + 4]
        mov     ecx, [i32]
        idiv    ecx
        mov     [i32], eax
    }
    return i32;
#else  /* generic: */
    return (int32_t)(i64 / i32);
#endif

/**
 * Performs 64-bit unsigned by a 32-bit unsigned division with a 32-bit unsigned result,
 * returning the rest.
 * @returns u64 % u32.
 * @remarks It is important that the result is <= UINT32_MAX or we'll overflow and crash.
 */
#if RT_INLINE_ASM_EXTERNAL && defined(RT_ARCH_X86)
DECLASM(uint32_t) ASMModU64ByU32RetU32(uint64_t u64, uint32_t u32);
#else
DECLINLINE(uint32_t) ASMModU64ByU32RetU32(uint64_t u64, uint32_t u32)
# ifdef RT_ARCH_X86
# if RT_INLINE_ASM_GNU_STYLE
    RTCCUINTREG uDummy;
    __asm volatile("divl %3"
                    : "=a" (uDummy), "=d"(u32)
                    : "A" (u64), "r" (u32));
# else
    __asm
    {
        mov     eax, dword ptr [u64]
        mov     edx, dword ptr [u64 + 4]
        mov     ecx, [u32]
        div     ecx
        mov     [u32], edx
    }
# endif
    return u32;
# else /* generic: */
    return (uint32_t)(u64 % u32);
# endif

/**
 * Performs 64-bit signed by a 32-bit signed division with a 32-bit signed result,
 * returning the rest.
 *
 * @returns u64 % u32.
 *
 * @remarks It is important that the result is <= UINT32_MAX or we'll overflow and crash.
 * @*/
#if RT_INLINE_ASM_EXTERNAL && defined(RT_ARCH_X86)
DECLASM(int32_t) ASMModS64ByS32RetS32(int64_t i64, int32_t i32);
#else
DECLINLINE(int32_t) ASMModS64ByS32RetS32(int64_t i64, int32_t i32)
{
    __asm
    {
        mov     eax, dword ptr [i64]
        mov     edx, dword ptr [i64 + 4]
        mov     ecx, [i32]
        div     ecx
        mov     [i32], edx
    }
    return i32;
}
#endif

```c
+    mov     edx, dword ptr [i64 + 4]
+    mov     ecx, [i32]
+    idiv    ecx
+    mov     [i32], edx
+  }
+  #endif
+  return i32;
+  #else  /* generic: */
+  return (int32_t)(i64 % i32);
+  #endif
+  }
+  #endif
+
+  /**
+  * Multiple a 32-bit by a 32-bit integer and divide the result by a 32-bit integer
+  * using a 64 bit intermediate result.
+  *
+  * @returns (u32A * u32B) / u32C.
+  * @param   u32A    The 32-bit value (A).
+  * @param   u32B    The 32-bit value to multiple by A.
+  * @param   u32C    The 32-bit value to divide A*B by.
+  *
+  * @remarks Architecture specific.
+  * @remarks Make sure the result won’t ever exceed 32-bit, because hardware
+  *          exception may be raised if it does.
+  * @remarks On x86 this may be used to avoid dragging in 64-bit builtin
+  *          arithmetics functions.
+  */
+  
+  #if RT_INLINE_ASM_EXTERNAL && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
+  DECLASM(uint32_t) ASMMultU32ByU32DivByU32(uint32_t u32A, uint32_t u32B, uint32_t u32C);
+  #else
+  DECLINLINE(uint32_t) ASMMultU32ByU32DivByU32(uint32_t u32A, uint32_t u32B, uint32_t u32C)
+  {
+    # if RT_INLINE_ASM_GNU_STYLE && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
+      uint32_t u32Result, u32Spill;
+      __asm__ __volatile__("mull %2\n\t"
+            "divl %3\n\t"
+            : "=&a" (u32Result),
+            : "r" (u32B),
+            : "r" (u32C),
+            "0" (u32A));
+      return u32Result;
+    # else
+      return (uint32_t)((((uint64_t)u32A * u32B) / u32C);
+    # endif
+  }
+```
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+*#ifdef
+*
+*/
+* Multiple a 64-bit by a 32-bit integer and divide the result by a 32-bit integer
+* using a 96 bit intermediate result.
+*
+*@returns (u64A * u32B) / u32C.
+*@param u64A The 64-bit value.
+*@param u32B The 32-bit value to multiple by A.
+*@param u32C The 32-bit value to divide A*B by.
+*
+*@remarks Architecture specific.
+*@remarks Make sure the result won’t ever exceed 64-bit, because hardware
+* exception may be raised if it does.
+*@remarks On x86 this may be used to avoid dragging in 64-bit builtin
+* arithmetics function.
+*/
+*#if RT_INLINE_ASM_EXTERNAL || !defined(__GNUC__) || (!defined(RT_ARCH_AMD64) &&
+* !defined(RT_ARCH_X86))
+DECLASM(uint64_t) ASMMultU64ByU32DivByU32(uint64_t u64A, uint32_t u32B, uint32_t u32C);
+*/
+*#else
+DECLINLINE(uint64_t) ASMMultU64ByU32DivByU32(uint64_t u64A, uint32_t u32B, uint32_t u32C)
+{
+ if RT_INLINE_ASM_GNU_STYLE
+## ifdef RT_ARCH_AMD64
+ uint64_t u64Result, u64Spill;
+ __asm__ __volatile__("mulq %2\n\t"
+ "divq %3\n\t"
+ : "=a" (u64Result),
+ "=d" (u64Spill)
+ : "r" ((uint64_t)u32B),
+ "r" ((uint64_t)u32C),
+ "0" (u64A));
+ return u64Result;
+## else
+ uint32_t u32Dummy;
+ uint64_t u64Result;
+ __asm__ __volatile__("mull %%ecx       \
+ xchg %%eax,%%esi       \
+ xchg %%edx,%%edi       \
+ mull %%edx       \
+ : eax = u64Lo.lo = (u64A.lo * u32B).lo,
+ edx = u64Lo.hi = (u64A.lo * u32B).hi */
+ : eax = u64A.hi */
+ : edi = u64Low.hi
+ edx = u32C */
+ : ecx = u32C
+ edx = u32B */
+ : eax = u64Hi.lo = (u64A.hi * u32B).lo,
+ edx = u64Hi.hi = (u64A.hi * u32B).hi */

"addl %edi, %eax \"u64Hi.lo += u64Lo.hi */
+ "adc1 $0, %edx \"u64Hi.hi += carry */
+ "divl %ecx \"eax = u64Hi / u32C
+ edx = u64Hi % u32C */
+ "movl %eax, %edi \"edi = u64Result.hi = u64Hi / u32C */
+ "movl %esi, %eax \"eax = u64Lo.lo */
+ "divl %ecx \"u64Result.lo */
+ "movl %edi, %edx \"u64Result.hi */
+ : \"=A\"(u64Result), \"=c\"(u32Dummy),
+ \"=S\"(u32Dummy), \"=D\"(u32Dummy)
+ : \"a\"((uint32_t)u64A),
+ "S"((uint32_t)(u64A >> 32)),
+ \"c\"(u32B),
+ \"D\"(u32C));
+ return u64Result;
+## endif
+## else
+ RTUINT64U u;
+ uint64_t u64Lo = (uint64_t)(u64A & 0xffffffff) * u32B;
+ uint64_t u64Hi = (uint64_t)(u64A >> 32) * u32B;
+ u64Hi += (u64Lo >> 32);
+ u.s.Hi = (uint32_t)(u64Hi / u32C);
+ u.s.Lo = (uint32_t)((((u64Hi % u32C) << 32) + (u64Lo & 0xffffffff)) / u32C);
+ return u.u;
+# endif
+}
+#endif
+
+/** @} */ */
+#endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/asm.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/asm.h
@@ -0,0 +1,5621 @@
+/** @file
+ * IPRT - Assembly Functions.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
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+ * General Public License (GPL) as published by the Free Software
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#ifndef ___iprt_asm_h
#define ___iprt_asm_h

#include <iprt/cdefs.h>
#include <iprt/types.h>
#include <iprt/assert.h>

/** @def RT_INLINE_ASM_USES_INTRIN
 * Defined as 1 if we're using a _MSC_VER 1400.
 * Otherwise defined as 0.
 */

/* Solaris 10 header ugliness */
#endif

#if defined(_MSC_VER) && RT_INLINE_ASM_USES_INTRIN
#pragma warning(push)
#pragma warning(disable:4668) /* Several incorrect __cplusplus uses. */
#pragma warning(disable:4255) /* Incorrect __slwpcb prototype. */
#pragma include <intrin.h>
#pragma warning(pop)

#pragma warning(disable:4255)
#pragma intrinsic(_ReadWriteBarrier)
#pragma intrinsic(__cpuid)
#pragma intrinsic(__stosd)
#pragma intrinsic(__stosw)
#pragma intrinsic(__stosb)
#pragma intrinsic(_BitScanForward)
#pragma intrinsic(_BitScanReverse)
#pragma intrinsic(_bittest)
#pragma intrinsic(_bittestandset)
#pragma intrinsic(_bittestandreset)
#pragma intrinsic(_bittestandcomplement)
#pragma intrinsic(_byteswap_ushort)
#pragma intrinsic(_byteswap_ulong)
#pragma intrinsic(_interlockedbittestandreset)
+## pragma intrinsic(_interlockedbittestandreset)
+## pragma intrinsic(_InterlockedAnd)
+## pragma intrinsic(_InterlockedOr)
+## pragma intrinsic(_InterlockedIncrement)
+## pragma intrinsic(_InterlockedDecrement)
+## pragma intrinsic(_InterlockedExchange)
+## pragma intrinsic(_InterlockedExchangeAdd)
+## pragma intrinsic(_InterlockedCompareExchange)
+## pragma intrinsic(_InterlockedCompareExchange64)
+## pragma intrinsic(_rotl)
+## pragma intrinsic(_rotr)
+## pragma intrinsic(_rotl64)
+## pragma intrinsic(_rotr64)
+## ifdef RT_ARCH_AMD64
+## pragma intrinsic(__stosq)
+## pragma intrinsic(_byteswap_uint64)
+## pragma intrinsic(_InterlockedExchange64)
+## pragma intrinsic(_InterlockedExchangeAdd64)
+## pragma intrinsic(_InterlockedAnd64)
+## pragma intrinsic(_InterlockedOr64)
+## pragma intrinsic(_InterlockedIncrement64)
+## pragma intrinsic(_InterlockedDecrement64)
+## endif
+##endif
+
+/*
+ * Include #pragma aux definitions for Watcom C/C++.
+ */
+##if defined(__WATCOMC__) && ARCH_BITS == 16 && defined(RT_ARCH_X86)
+## include "asm-watcom-x86-16.h"
+##elif defined(__WATCOMC__) && ARCH_BITS == 32 && defined(RT_ARCH_X86)
+## include "asm-watcom-x86-32.h"
+##endif
+
+/** @defgroup grp_rt_asm    ASM - Assembly Routines
+ * @ingroup grp_rt
+ *
+ * @remarks The difference between ordered and unordered atomic operations are that
+ *          the former will complete outstanding reads and writes before continuing
+ *          while the latter doesn't make any promises about the order. Ordered
+ *          operations doesn't, it seems, make any 100% promise wrt to whether
+ *          the operation will complete before any subsequent memory access.
+ *          (please, correct if wrong.)
+ *
+ *          ASMAAtomicSomething operations are all ordered, while ASMAAtomicUoSomething
+ *          are unordered (note the Uo).
+ * @remarks Some remarks about __volatile__: Without this keyword gcc is allowed to reorder
+ * or even optimize assembler instructions away. For instance, in the following code
+ * the second rdmsr instruction is optimized away because gcc treats that instruction
+ * as deterministic:
+ *
+ * @code
+ * static inline uint64_t rdmsr_low(int idx)
+ * {
+ *   uint32_t low;
+ *   __asm__ ("rdmsr": "a"(low): "c"(idx): "edx");
+ * }
+ * ...
+ * uint32_t msr1 = rdmsr_low(1);
+ * foo(msr1);
+ * msr1 = rdmsr_low(1);
+ * bar(msr1);
+ * @endcode
+
+ * The input parameter of rdmsr_low is the same for both calls and therefore gcc will
+ * use the result of the first call as input parameter for bar() as well. For rdmsr this
+ * is not acceptable as this instruction is _not_ deterministic. This applies to reading
+ * machine status information in general.
+
+ * @}
+ */
+
+ /** @def RT_INLINE_ASM_GCC_4_3_X_X86
+ * Used to work around some 4.3.x register allocation issues in this version of
+ * the compiler. So far this workaround is still required for 4.4 and 4.5 but
+ * definitely not for 5.x */
+#if (RT_GNUC_PREREQ(4, 3) && !RT_GNUC_PREREQ(5, 0) && defined(__i386__))
+ define RT_INLINE_ASM_GCC_4_3_X_X86 1
+#else
+ define RT_INLINE_ASM_GCC_4_3_X_X86 0
+endif
+
+/** @def RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
+ * i686-apple-darwin9-gcc-4.0.1 (GCC) 4.0.1 (Apple Inc. build 5493) screws up
+ * RTSemRWRequestWrite semsemrw-lockless-generic.cpp in release builds. PIC
+ * mode, x86.
+ *
+ * Some gcc 4.3.x versions may have register allocation issues with cmpxchg8b
+ * when in PIC mode on x86.
+ */
+#ifndef RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
+# if defined(DOXYGEN_RUNNING) || defined(__WATCOMC__) /* Watcom has trouble with the expression
+/* */
+# define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 1
+if defined(_MSC_VER) /* Visual C++ has trouble too, but it'll only tell us when C4688 is enabled. */
++ define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 0
+if ( (defined(PIC) || defined(__PIC__)) \
++ && defined(RT_ARCH_X86) \
++ && ( RT_INLINE_ASM_GCC_4_3_X_X86 \ 
++ || defined(RT_OS_DARWIN)) )
++ define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 1
++ else
++ define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 0
++ endif
++#endif
++
++/** @def ASMReturnAddress
++ * Gets the return address of the current (or calling if you like) function or method.
++ */
++ifdef _MSC_VER
++ ifdef __cplusplus
extern "C"
++ _ReturnAddress(void);
++ pragma intrinsic(_ReturnAddress)
++ define ASMReturnAddress() _ReturnAddress()
++endif __cplusplus
++endif _MSC_VER
++
++/** Compiler memory barrier.
++ * Ensure that the compiler does not use any cached (register/tmp stack) memory
++ * values or any outstanding writes when returning from this function.
++ * This function must be used if non-volatile data is modified by a
++ * device or the VMM. Typical cases are port access, MMIO access,
++ * trapping instruction, etc.
++ */
++ifdef RT_INLINE_ASM_GNU_STYLE
++ define ASMCompilerBarrier() do { __asm__ __volatile__("" : : : "memory"); } while (0)
++endif RT_INLINE_ASM_GNU_STYLE
++ifdef RT_INLINE_ASM_USES_INTRIN
++ define ASMCompilerBarrier() do { __ReadWriteBarrier(); } while (0)
++endif RT_INLINE_ASM_USES_INTRIN
+\#elif defined(__WATCOMC__) +\#else /* 2003 should have _ReadWriteBarrier() but I guess we’re at 2002 level then... */ +\#define INLINE(void) ASMCompilerBarrier(void) +{ + __asm
 + { + } +} +\#endif + + +/+** @def ASMBreakpoint + * Debugger Breakpoint. + * @deprecated Use RT_BREAKPOINT instead. + * @internal + */ +\#define ASMBreakpoint() RT_BREAKPOINT() + + +/+** + * Spinloop hint for platforms that have these, empty function on the other + * platforms. + * + * x86 & AMD64: The PAUSE variant of NOP for helping hyperthreaded CPUs detecting + * spin locks. + */ +\#if RT_INLINE_ASM_EXTERNAL && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)) +\#else +\#endif +\#if RT_INLINE_ASM_EXTERNAL && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)) +\#else +\#endif +\#if RT_INLINE_ASM_EXTERNAL && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)) +\#else +\#endif +\#if RT_INLINE_ASM_EXTERNAL && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)) +\#else +\#endif
/**
 * Atomically Exchange an unsigned 8-bit value, ordered.
 *
 * @returns Current *pu8 value
 * @param   pu8  Pointer to the 8-bit variable to update.
 * @param   u8   The 8-bit value to assign to *pu8.
 */

#if RT_INLINE_ASM_EXTERNAL
DECLASM(uint8_t) ASMAtomicXchgU8(volatile uint8_t RT_FAR *pu8, uint8_t u8);
#else
DECLINLINE(uint8_t) ASMAtomicXchgU8(volatile uint8_t RT_FAR *pu8, uint8_t u8)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("xchgb %0, %1\n"
                         : "=m" (*pu8),
                           "=q" (u8) /* =r - busted on g++ (GCC) 3.4.4 20050721 (Red Hat 3.4.4-2) */
                         : "1" (u8),
                           "m" (*pu8));
#else
    __asm
    {
#  ifdef RT_ARCH_AMD64
        mov     rdx, [pu8]
        mov     al, [u8]
        xchg    [rdx], al
        mov     [u8], al
#  else
        mov     edx, [pu8]
        mov     al, [u8]
        xchg    [edx], al
        mov     [u8], al
#  endif
    }
# endif
    return u8;
#endif
}

/**
 * Atomically Exchange a signed 8-bit value, ordered.
 *
 * @returns Current *pi8 value
 * @param   pi8  Pointer to the 8-bit variable to update.
 * @param   i8   The 8-bit value to assign to *pi8.
 */

DECLINLINE(int8_t) ASMAtomicXchgS8(volatile int8_t RT_FAR *pi8, int8_t i8)
+ return (int8_t)ASMAtomicXchgU8((volatile uint8_t RT_FAR *)pi8, (uint8_t)i8);
+
+
+/**
+ * Atomically Exchange a bool value, ordered.
+ *
+ * @returns Current *pf value
+ * @param   pf      Pointer to the 8-bit variable to update.
+ * @param   f       The 8-bit value to assign to *pi8.
+ */
+#ifndef _MSC_VER
+    return !!ASMAtomicXchgU8((volatile uint8_t RT_FAR *)pf, (uint8_t)f);
+#else
+    return (bool)ASMAtomicXchgU8((volatile uint8_t RT_FAR *)pf, (uint8_t)f);
+#endif
+
+/**
+ * Atomically Exchange an unsigned 16-bit value, ordered.
+ *
+ * @returns Current *pu16 value
+ * @param   pu16    Pointer to the 16-bit variable to update.
+ * @param   u16     The 16-bit value to assign to *pu16.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(uint16_t) ASMAtomicXchgU16(volatile uint16_t RT_FAR *pu16, uint16_t u16);
+#else
+DECLINLINE(uint16_t) ASMAtomicXchgU16(volatile uint16_t RT_FAR *pu16, uint16_t u16)
+{
+    __asm__ __volatile__("xchgw %0, %1\n"
+      : "=m" (*pu16),
+          "=r" (u16)
+      : "1" (u16),
+          "m" (*pu16));
+} #else
+    __asm__
+    {
+        mov     rdx, [pu16]
+        mov     ax, [u16]
+        xchg    [rdx], ax
+        mov     [u16], ax
+    } #endif
+}
+    mov    edx, [pu16]
+    mov    ax, [u16]
+    xchg   [edx], ax
+    mov    [u16], ax
+#  endif
+  }
+# endif
+  return u16;
+}
+#endif
+
+
+/**
+ * Atomically Exchange a signed 16-bit value, ordered.
+ *
+ * @returns Current *pu16 value
+ * @param   pi16    Pointer to the 16-bit variable to update.
+ * @param   i16     The 16-bit value to assign to *pi16.
+ */
+DECLINLINE(int16_t) ASMAtomicXchgS16(volatile int16_t RT_FAR *pi16, int16_t i16)
+{
+    return (int16_t)ASMAtomicXchgU16((volatile uint16_t RT_FAR *)pi16, (uint16_t)i16);
+}
+
+
+/**
+ * Atomically Exchange an unsigned 32-bit value, ordered.
+ *
+ * @returns Current *pu32 value
+ * @param   pu32    Pointer to the 32-bit variable to update.
+ * @param   u32     The 32-bit value to assign to *pu32.
+ *
+ * @remarks Does not work on 286 and earlier.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMAtomicXchgU32(volatile uint32_t RT_FAR *pu32, uint32_t u32);
+#else
+DECLINLINE(uint32_t) ASMAtomicXchgU32(volatile uint32_t RT_FAR *pu32, uint32_t u32)
+{
+  #if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__
+    { 
+      __asm__ __volatile__
+        { 
+          "xchgl %0, %1\n" 
+          : "=m" (*pu32), 
+            =r" (u32) 
+          : "1" (u32),
+            "m" (*pu32));
+      
+    #elif RT_INLINE_ASM_USES_INTRIN
+      u32 = _InterlockedExchange((long RT_FAR *)pu32, u32);
+    
+    #endif
+    }
# else
    __asm
    {
    # ifdef RT_ARCH_AMD64
        mov     rdx, [pu32]
        mov     eax, u32
        xchg    [rdx], eax
        mov     [u32], eax
    # else
        mov     edx, [pu32]
        mov     eax, u32
        xchg    [edx], eax
        mov     [u32], eax
    # endif
    }
    # endif
    return u32;
    }
    #endif
    
/**
 * Atomically Exchange a signed 32-bit value, ordered.
 *
 * @returns Current *pu32 value
 * @param   pi32    Pointer to the 32-bit variable to update.
 * @param   i32     The 32-bit value to assign to *pi32.
 * @returns Current *pu32 value
 * @param   pi32    Pointer to the 32-bit variable to update.
 * @param   i32     The 32-bit value to assign to *pi32.
 */
DECLINLINE(int32_t) ASMAtomicXchgS32(volatile int32_t RT_FAR *pi32, int32_t i32)
{
    return (int32_t)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)pi32, (uint32_t)i32);
}

/**
 * Atomically Exchange an unsigned 64-bit value, ordered.
 *
 * @returns Current *pu64 value
 * @param   pu64    Pointer to the 64-bit variable to update.
 * @param   u64     The 64-bit value to assign to *pu64.
 * @returns Current *pu64 value
 * @param   pu64    Pointer to the 64-bit variable to update.
 * @param   u64     The 64-bit value to assign to *pu64.
 */
#if (RT_INLINE_ASMEXTERNAL && !RT_INLINE_ASM_USES_INTRIN) 
|| RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
DECLASM(uint64_t) ASMAtomicXchgU64(volatile uint64_t RT_FAR *pu64, uint64_t u64);
#else
+DECLINLINE(uint64_t) ASMAtomicXchgU64(volatile uint64_t RT_FAR *pu64, uint64_t u64)
+
+\# if defined(RT_ARCH_AMD64)
+\# if RT_INLINE_ASM_USES_INTRIN
  + u64 = _InterlockedExchange64((__int64 *)pu64, u64);
+\+\# else
+\+__asm__
+\+{
+\+  \# if defined(RT_ARCH_AMD64)
+\+    if RT_INLINE_ASM_USES_INTRIN
+\+      u64 = _InterlockedExchange64((__int64 *)pu64, u64);
+\+  \+\# else
+\+    __asm
+\+      {
+\+        mov     rdx, [pu64]
+\+        mov     rax, [u64]
+\+        xchg    [rdx], rax
+\+        mov     [u64], rax
+\+      }
+\+  \# endif
+\+\# else /* !RT_ARCH_AMD64 */
+\+  if RT_INLINE_ASM_GNU_STYLE
+\+    if defined(PIC) || defined(__PIC__)
+\+      uint32_t u32EBX = (uint32_t)u64;
+\+      __asm__
+\+        {
+\+          \"lock; cmpxchg8b %.5\n\t"
+\+          "jnz 1\n\t"
+\+          "movl %3, %%ebx\n\t"
+\+          /*\"xchg1 %%esi, %5\n\t"*/
+\+          : "=A" (u64),
+\+          ":m" (*pu64)
+\+          :":0" (*pu64),
+\+          ":m" ( u32EBX ),
+\+          ":c" ((uint32_t)(u64 >> 32 ) ),
+\+          ":S" (pu64);
+\+\+\# else /* !PIC */
+\+  __asm__
+\+    {
+\+      "lock; cmpxchg8b %.1\n\t"
+\+      "jnz 1\n\t"
+\+      : "=A" (u64),
+\+      ":m" (*pu64)
+\+      :":0" (*pu64),
+\+      ":b" ((uint32_t)u64 ),
+\+      ":c" ((uint32_t)(u64 >> 32 ) );
+\+\# endif
+  }
+    __asm
+    {
+        mov     ebx, dword ptr [u64]
+        mov     ecx, dword ptr [u64 + 4]
+        mov     edi, pu64
+        mov     eax, dword ptr [edi]
+        mov     edx, dword ptr [edi + 4]
+    retry:
+        lock cmpxchg8b [edi]
+        jnz retry
+        mov     dword ptr [u64], eax
+        mov     dword ptr [u64 + 4], edx
+    }
+    +# endif
+  +# endif /* !RT_ARCH_AMD64 */
+  } return u64;
+}  +#endif
+
+/**
+ * Atomically Exchange an signed 64-bit value, ordered.
+ * @returns Current *pi64 value
+ * @param   pi64    Pointer to the 64-bit variable to update.
+ * @param   i64     The 64-bit value to assign to *pi64.
+ */
+DECLINLINE(int64_t) ASMAtomicXchgS64(volatile int64_t RT_FAR *pi64, int64_t i64)
+{
+    return (int64_t)ASMAtomicXchgU64((volatile uint64_t RT_FAR *)pi64, (uint64_t)i64);
+
+/**
+ * Atomically Exchange a pointer value, ordered.
+ * @returns Current *ppv value
+ * @param   ppv    Pointer to the pointer variable to update.
+ * @param   pv     The pointer value to assign to *ppv.
+ */
+DECLINLINE(void RT_FAR *) ASMAtomicXchgPtr(void RT_FAR * volatile RT_FAR *ppv, const void RT_FAR *pv)
+{
+    +#if ARCH_BITS == 32 || ARCH_BITS == 16
+    return (void RT_FAR *)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)ppv, (uint32_t)pv);
+    +#elif ARCH_BITS == 64
+ return (void RT_FAR *)ASMAtomicXchgU64((volatile uint64_t RT_FAR *)ppv, (uint64_t)pv);
+#else
+## error "ARCH_BITS is bogus"
+#endif
+
+*/
+ * Convenience macro for avoiding the annoying casting with ASMAtomicXchgPtr.
+ *
+ * @returns Current *pv value
+ * @param   ppv     Pointer to the pointer variable to update.
+ * @param   pv      The pointer value to assign to *ppv.
+ * @param   Type    The type of *ppv, sans volatile.
+ */
+#ifndef __GNUC__
+# define ASMAtomicXchgPtrT(ppv, pv, Type) \ 
+ __extension__ \ 
+ ({\ 
+   __typeof__((*(ppv)) volatile * const ppvTypeChecked = (ppv); \ 
+   Type const pvTypeChecked = (pv); \ 
+   Type pvTypeCheckedRet = (__typeof__((*(ppv))) ASMAtomicXchgPtr((void * volatile *)ppvTypeChecked, (void *)pvTypeChecked); \ 
+   pvTypeCheckedRet; \ 
+ })
+#else
+## define ASMAtomicXchgPtrT(ppv, pv, Type) \ 
+ (Type)ASMAtomicXchgPtr((void RT_FAR * volatile RT_FAR *)(ppv), (void RT_FAR *)(pv))
+#endif
+
+*/
+ * Atomically Exchange a raw-mode context pointer value, ordered.
+ *
+ * @returns Current *ppv value
+ * @param   ppvRC   Pointer to the pointer variable to update.
+ * @param   pvRC    The pointer value to assign to *ppv.
+ */
+DECLINLINE(RTRCPTR) ASMAtomicXchgRCPtr(RTRCPTR volatile RT_FAR *ppvRC, RTRCPTR pvRC) +{
+   return (RTRCPTR)ASMAtomicXchgU32((uint32_t volatile RT_FAR *)(void RT_FAR *)(uint32_t)pvRC);
+}
+
+*/
+ * Atomically Exchange a ring-0 pointer value, ordered.
DECLINLINE(RTR0PTR) ASMAtomicXchgR0Ptr(RTR0PTR volatile RT_FAR *ppvR0, RTR0PTR pvR0)
{
#if R0_ARCH_BITS == 32 || ARCH_BITS == 16
    return (RTR0PTR)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppvR0,
        (uint32_t)pvR0);
#elif R0_ARCH_BITS == 64
    return (RTR0PTR)ASMAtomicXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppvR0,
        (uint64_t)pvR0);
#else
    # error "R0_ARCH_BITS is bogus"
#endif
}

DECLINLINE(RTR3PTR) ASMAtomicXchgR3Ptr(RTR3PTR volatile RT_FAR *ppvR3, RTR3PTR pvR3)
{
#if R3_ARCH_BITS == 32 || ARCH_BITS == 16
    return (RTR3PTR)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppvR3,
        (uint32_t)pvR3);
#elif R3_ARCH_BITS == 64
    return (RTR3PTR)ASMAtomicXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppvR3,
        (uint64_t)pvR3);
#else
    # error "R3_ARCH_BITS is bogus"
#endif
}

#define ASMAtomicXchgHandle

DECLINLINE(RTR0PTR) ASMAtomicXchgHandle

DECLINLINE(RTR3PTR) ASMAtomicXchgHandle

/** @def ASMAtomicXchgHandle
 + * Atomically Exchange a typical IPRT handle value, ordered.
 + *
 + * @returns Current *pu value
 + * @param   puR0   Pointer to the pointer variable to update.
 + * @param   pvR0   The pointer value to assign to *pu.
 + */

DECLINLINE(RTR0PTR) ASMAtomicXchgHandle

DECLINLINE(RTR3PTR) ASMAtomicXchgHandle

/** @def ASMAtomicXchgHandle
 + * Atomically Exchange a typical IPRT handle value, ordered.
 + *
 + * @returns Current *pu value
 + * @param   puR0   Pointer to the pointer variable to update.
 + * @param   pvR0   The pointer value to assign to *pu.
 + */

DECLINLINE(RTR0PTR) ASMAtomicXchgHandle

DECLINLINE(RTR3PTR) ASMAtomicXchgHandle

/** @def ASMAtomicXchgHandle
 + * Atomically Exchange a typical IPRT handle value, ordered.
 + *
 + * @returns Current *pu value
 + * @param   puR0   Pointer to the pointer variable to update.
 + * @param   pvR0   The pointer value to assign to *pu.
 + */

DECLINLINE(RTR0PTR) ASMAtomicXchgHandle

DECLINLINE(RTR3PTR) ASMAtomicXchgHandle

/** @def ASMAtomicXchgHandle
 + * Atomically Exchange a typical IPRT handle value, ordered.
 + *
 + * @returns Current *pu value
 + * @param   puR0   Pointer to the pointer variable to update.
 + * @param   pvR0   The pointer value to assign to *pu.
 + */
/*
+ #if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+ # define ASMAtomicXchgHandle(ph, hNew, phRes) \\
+   do { \\
+       AssertCompile(sizeof(*(ph)) == sizeof(uint32_t)); \\
+       AssertCompile(sizeof(*(phRes)) == sizeof(uint32_t)); \\
+       *(uint32_t RT_FAR *)(phRes) = ASMAtomicXchgU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)(hNew)); \\
+   } while (0)
+ #elif HC_ARCH_BITS == 64
+ # define ASMAtomicXchgHandle(ph, hNew, phRes) \\
+   do { \\
+       AssertCompile(sizeof(*(ph)) == sizeof(uint64_t)); \\
+       AssertCompile(sizeof(*(phRes)) == sizeof(uint64_t)); \\
+       *(uint64_t RT_FAR *)(phRes) = ASMAtomicXchgU64((uint64_t volatile RT_FAR *)(ph), (const uint64_t)(hNew)); \\
+   } while (0)
+ #else
+ # error HC_ARCH_BITS
+ #endif
+ */
+ /**
+ * Atomically Exchange a value which size might differ
+ * between platforms or compilers, ordered.
+ */
+ #define ASMAtomicXchgSize(pu, uNew) \\
+   do { \\
+        switch (sizeof(*(pu))) { \\
+            case 1: ASMAtomicXchgU8((volatile uint8_t RT_FAR *)(void RT_FAR *)(pu), (uint8_t)(uNew)); break; \\
+            case 2: ASMAtomicXchgU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); break; \\
+            case 4: ASMAtomicXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; \\
+            case 8: ASMAtomicXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; \\
+            default: AssertMsgFailed("ASMAtomicXchgSize: size %d is not supported\n", sizeof(*(pu))); \\
+        } \\
+   } while (0)
+ */
+ /**
+ * Atomically Exchange a value which size might differ
+ * between platforms or compilers, ordered.
+ */
```c
+ * @param   pu      Pointer to the variable to update.
+ * @param   uNew    The value to assign to *pu.
+ * @param   puRes   Where to store the current *pu value.
+ */
+#define ASMAtomicXchgSizeCorrect(pu, uNew, puRes) \
+ do { \
+     switch (sizeof(*(pu))) { \
+         case 1: *(uint8_t RT_FAR *)(puRes) = ASMAtomicXchgU8((volatile uint8_t RT_FAR *>(void RT_FAR \ 
+                     *)(pu), (uint8_t)(uNew)); break; \
+         case 2: *(uint16_t RT_FAR *)(puRes) = ASMAtomicXchgU16((volatile uint16_t RT_FAR *>(void RT_FAR \ 
+                     *)(pu), (uint16_t)(uNew)); break; \
+         case 4: *(uint32_t RT_FAR *)(puRes) = ASMAtomicXchgU32((volatile uint32_t RT_FAR *>(void RT_FAR \ 
+                     *)(pu), (uint32_t)(uNew)); break; \
+         case 8: *(uint64_t RT_FAR *)(puRes) = ASMAtomicXchgU64((volatile uint64_t RT_FAR *>(void RT_FAR \ 
+                     *)(pu), (uint64_t)(uNew)); break; \
+         default: AssertMsgFailed("ASMAtomicXchgSize: size %d is not supported\n", sizeof(*(pu))); \
+     } \
+ } while (0)
+ 
+ /**
+ * Atomically Compare and Exchange an unsigned 8-bit value, ordered.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu8         Pointer to the value to update.
+ * @param   u8New       The new value to assigned to *pu8.
+ * @param   u8Old       The old value to *pu8 compare with.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL || !RT_INLINE_ASM_GNU_STYLE
+DECLASM(bool) ASMAtomicCmpXchgU8(volatile uint8_t RT_FAR *pu8, const uint8_t u8New, const uint8_t 
+                                   u8Old);
+#else
+DECLINLINE(bool) ASMAtomicCmpXchgU8(volatile uint8_t RT_FAR *pu8, const uint8_t u8New, uint8_t 
+                                       u8Old)
+
+    uint8_t u8Ret;
+    __asm__ __volatile__("lock; cmpxchgb %3, %0\n\t"
+                         : "=m" (*pu8), 
+                         : "qm" (u8Ret),
+                         : "a" (u8Old)
+                         : "q" (u8New),
```

+ "2" (u8Old),
+ "m" (*pu8));
+ return (bool)u8Ret;
+}
+#endif
+
+/**
+ * Atomically Compare and Exchange a signed 8-bit value, ordered.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pi8         Pointer to the value to update.
+ * @param   i8New       The new value to assigned to *pi8.
+ * @param   i8Old       The old value to *pi8 compare with.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(bool) ASMAtomicCmpXchgS8(volatile int8_t RT_FAR *pi8, const int8_t i8New, const int8_t i8Old)
+{
+    return ASMAtomicCmpXchgU8((volatile uint8_t RT_FAR *)pi8, (const uint8_t)i8New, (const uint8_t)i8Old);
+}
+
+/**
+ * Atomically Compare and Exchange a bool value, ordered.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pf          Pointer to the value to update.
+ * @param   fNew        The new value to assigned to *pf.
+ * @param   fOld        The old value to *pf compare with.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(bool) ASMAtomicCmpXchgBool(volatile bool RT_FAR *pf, const bool fNew, const bool fOld)
+{
+    return ASMAtomicCmpXchgU8((volatile uint8_t RT_FAR *)pf, (const uint8_t)fNew, (const uint8_t)fOld);
+}
@returns false if xchg wasn't done.
+ *
+ @param pu32 Pointer to the value to update.
+ @param u32New The new value to assigned to *pu32.
+ @param u32Old The old value to *pu32 compare with.
+ *
+ @remarks x86: Requires a 486 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMAtomicCmpXchgU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, const uint32_t u32Old);
+#else
+DECLINLINE(bool) ASMAtomicCmpXchgU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, uint32_t u32Old)
+{
+  
+  __asm__ __volatile__("lock; cmpxchgl %3, %0
	"                         ":=m" (*pu32),
  	"=qm" (u8Ret),
  	"=a" (u32Old)
  	:"r" (u32New),
  	:"2" (u32Old),
  	:"m" (*pu32));
+  return (bool)u8Ret;
+}
+
+#endif
+#if RT_INLINE_ASM_GNU_STYLE
+  uint8_t u8Ret;
+  __asm volatile("lock; cmpxchgl %3, %0
	" 
  : "=m" (*pu32),
  	"=qm" (u8Ret),
  	"=a" (u32Old)
  	:"r" (u32New),
  	:"2" (u32Old),
  	:"m" (*pu32));
+  return (bool)u8Ret;
+
+  
+else
+  uint32_t u32Ret;
+  __asm
+  {
+    #ifdef RT_ARCH_AMD64
+      mov     rdx, [pu32]
+    #else
+      mov     edx, [pu32]
+    #endif
+    mov     edx, [pu32]
+    #ifdef RT_ARCH_AMD64
+      lock cmpxchg [rdx], ecx
+    #else
+      lock cmpxchg [edx], ecx
+    #endif
+    setz al
+    movzx eax, al
+}
+else
+  
+    #ifdef RT_ARCH_AMD64
+      mov     edx, [pu32]
+    #else
+      mov     ecx, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_ARCH_AMD64
+      mov     eax, [pu32]
+    #else
+      mov     eax, [pu32]
+    #endif
+    #ifdef RT_AR
Add the following code to the mesh: "Atomically Compare and Exchange a signed 32-bit value, ordered."

```c
DECLINLINE(bool) ASMAtomicCmpXchgS32(volatile int32_t RT_FAR *pi32, const int32_t i32New, const int32_t i32Old)
```

Add the following code to the mesh: "Atomically Compare and exchange an unsigned 64-bit value, ordered."

```c
# ifdef (RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN) || RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
#else
DECLINLINE(bool) ASMAtomicCmpXchgU64(volatile uint64_t RT_FAR *pu64, uint64_t u64New, uint64_t u64Old)
```

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+ return (uint64_t)_InterlockedCompareExchange64((__int64 RT_FAR *)pu64, u64New, u64Old) == u64Old;
+
+# elif defined(RT_ARCH_AMD64)
+#  if RT_INLINE_ASM_GNU_STYLE
+    uint8_t u8Ret;
+    __asm__ __volatile__("lock; cmpxchgq %3, %0\n\t"
+      :"=m" (*pu64),
+      ":=qm" (u8Ret),
+      ":=a" (u64Old)
+      : "r" (u64New),
+      ":2" (u64Old),
+      ":m" (*pu64));
+    return (bool)u8Ret;
+#  else
+    bool fRet;
+    __asm
+    {
+        mov     rdx, [pu32]
+        mov     rax, [u64Old]
+        mov     rcx, [u64New]
+        lock cmpxchg [rdx], rcx
+        setz    al
+        mov     [fRet], al
+    }
+    return fRet;
+#  endif
+# else /* !RT_ARCH_AMD64 */
+    uint32_t u32Ret;
+    if RT_INLINE_ASM_GNU_STYLE
+    #if RT_GNUC_PREREQ(4, 3)
+        #else
+        ++
+        "+m" (*pu64)
+        ++
+        "A" (u64Old),
+        "m" ( u32EBX ),
+        ++
+        "c" ( (uint32_t)(u64New >> 32) ),
+    #endif
+    else /* !RT_INLINE_ASM_GNU_STYLE */
+        ++
+        "lock; cmpxchg8b (%6)\n\t"
+        ++
+        ":=m" (*pu64)
+        ++
+        "movl %4, %%ebx\n\t"
+        ++
+        "movzbl %%%al, %%%eax\n\t"
+        ++
+        ":=a" (u32Ret),
+        ++
+        "=d" (u32Spill),
+    #endif /* !RT_INLINE_ASM_GNU_STYLE */
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```c
#   else /* !PIC */
    uint32_t u32Spill;
    __asm__ __volatile__("lock; cmpxchg8b %2\n\t"
                             "setz  %al\n\t"
                             "movzbl %al, %eax\n\t"
                             : "=a" (u32Ret),
                             "=d" (u32Spill),
                             "+m" (*pu64)
                             : "A" (u64Old),
                             "b" ( (uint32_t)u64New ),
                             "c" ( (uint32_t)(u64New >> 32) ));
#   endif
    return (bool)u32Ret;
#  else
    __asm
    {
        mov     ebx, dword ptr [u64New]
        mov     ecx, dword ptr [u64New + 4]
        mov     edi, [pu64]
        mov     eax, dword ptr [u64Old]
        mov     edx, dword ptr [u64Old + 4]
        lock cmpxchg8b [edi]
        setz    al
        movzx   eax, al
        mov     dword ptr [u32Ret], eax
    }
    return !!u32Ret;
#  endif
#endif

/**
 * Atomically Compare and exchange a signed 64-bit value, ordered.
 *
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 *
 * @param   pi64    Pointer to the 64-bit variable to update.
 * @param   i64     The 64-bit value to assign to *pu64.
 * @param   i64Old  The value to compare with.
 *
 * @remarks x86: Requires a Pentium or later.
 */
DECLINLINE(bool) ASMAtomicCmpXchgS64(volatile int64_t RT_FAR *pi64, const int64_t i64, const int64_t i64Old)
```
/**
 * Atomically Compare and Exchange a pointer value, ordered.
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 * @param ppv Pointer to the value to update.
 * @param pvNew The new value to assigned to *ppv.
 * @param pvOld The old value to *ppv compare with.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(bool) ASMAtomicCmpXchgPtrVoid(void RT_FAR * volatile RT_FAR *ppv, const void RT_FAR *
pvNew, const void RT_FAR *pvOld)
{
#if ARCH_BITS == 32 || ARCH_BITS == 16
    return ASMAtomicCmpXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv, (uint32_t)pvNew,
                                (uint32_t)pvOld);
#elif ARCH_BITS == 64
    return ASMAtomicCmpXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv, (uint64_t)pvNew,
                                (uint64_t)pvOld);
#else
# error "ARCH_BITS is bogus"
#endif
}
```c
+    ({
+        __typeof__(*(ppv)) volatile * const ppvTypeChecked = (ppv); \
+        __typeof__(*(ppv))            const pvNewTypeChecked = (pvNew); \
+        __typeof__(*(ppv))            const pvOldTypeChecked = (pvOld); \
+        bool fMacroRet = ASMAtomicCmpXchgPtrVoid((void * volatile *)ppvTypeChecked, \
+                                      (void *)pvNewTypeChecked, (void *)pvOldTypeChecked); \
+        fMacroRet; \
+    })
+#else
+    #define ASMAtomicCmpXchgPtr(ppv, pvNew, pvOld) \ 
+        ASMAtomicCmpXchgPtrVoid((void RT_FAR * volatile RT_FAR *)(ppv), (void RT_FAR *)(pvNew), (void RT_FAR *)(pvOld))
+#endif
+
+/** @def ASMAtomicCmpXchgHandle
+ * Atomically Compare and Exchange a typical IPRT handle value, ordered.
+ * @param   ph          Pointer to the value to update.
+ * @param   hNew        The new value to assigned to *pu.
+ * @param   hOld        The old value to *pu compare with.
+ * @param   fRc         Where to store the result.
+ * @remarks This doesn’t currently work for all handles (like RTFILE).
+ * @remarks x86: Requires a 486 or later.
+ */
+if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+    #define ASMAtomicCmpXchgHandle(ph, hNew, hOld, fRc) \ 
+        do { \ 
+            AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \ 
+            (fRc) = ASMAtomicCmpXchgU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)(hNew), (const uint32_t)(hOld)); \ 
+        } while (0)
+elif HC_ARCH_BITS == 64
+    #define ASMAtomicCmpXchgHandle(ph, hNew, hOld, fRc) \ 
+        do { \ 
+            AssertCompile(sizeof(*ph) == sizeof(uint64_t)); \ 
+            (fRc) = ASMAtomicCmpXchgU64((uint64_t volatile RT_FAR *)(ph), (const uint64_t)(hNew), (const uint64_t)(hOld)); \ 
+        } while (0)
+else
+    #error HC_ARCH_BITS
+#endif
+
+/** @def ASMAtomicCmpXchgSize
+ * Atomically Compare and Exchange a value which size might differ
+ * between platforms or compilers, ordered.
+ */
```
+ * @param   pu          Pointer to the value to update.
+ * @param   uNew        The new value to assigned to *pu.
+ * @param   uOld        The old value to *pu compare with.
+ * @param   fRc         Where to store the result.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#define ASMAtomicCmpXchgSize(pu, uNew, uOld, fRc) \
+ do { \
+     switch (sizeof(*pu)) { \
+         case 4: (fRc) = ASMAtomicCmpXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), \
+             (uint32_t)(uNew), (uint32_t)(uOld)); \
+             break; \
+         case 8: (fRc) = ASMAtomicCmpXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), \
+             (uint64_t)(uNew), (uint64_t)(uOld)); \
+             break; \
+         default: AssertMsgFailed("ASMAtomicCmpXchgSize: size %d is not supported\n", sizeof(*pu))); \
+             (fRc) = false; \
+             break; \
+     } \
+ } while (0)
+
+/**
+ * Atomically Compare and Exchange an unsigned 32-bit value, additionally
+ * passes back old value, ordered.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu32        Pointer to the value to update.
+ * @param   u32New      The new value to assigned to *pu32.
+ * @param   u32Old      The old value to *pu32 compare with.
+ * @param   pu32Old     Pointer store the old value at.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMAtomicCmpXchgExU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, const \
+                uint32_t u32Old, uint32_t RT_FAR *pu32Old);
+#else
+DECLINLINE(bool) ASMAtomicCmpXchgExU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, \
+                const uint32_t u32Old, uint32_t RT_FAR *pu32Old)
+{
+ # if RT_INLINE_ASM_GNU_STYLE
+     uint8_t u8Ret;
+     __asm__ __volatile__("lock; cmpxchgl %3, %0\n"");
+ # else
+     __asm__ __volatile__("lock; cmpxchgl %3, %0\n");
+ #endif
+ return (u8Ret); \
+ }
+#endif

+ "setz %1\n\nt"
+ : "=m" (*pu32),
+ "=qm" (u8Ret),
+ "=a" (*pu32Old)
+ : "r" (u32New),
+ "a" (u32Old),
+ "m" (*pu32));
+ return (bool)u8Ret;
+
+#elif RT_INLINE_ASM_USES_INTRIN
+ return (*pu32Old = InterlockedCompareExchange((long RT_FAR *)pu32, u32New, u32Old)) == u32Old;
+
+#elif else
+ uint32_t u32Ret;
+ __asm
+ { /* #ifdef RT_ARCH_AMD64 */
+ mov rdx, [pu32]
+ /* #else */
+ mov edx, [pu32]
+ /* #endif */
+ mov eax, [u32Old]
+ mov ecx, [u32New]
+ /* #ifdef RT_ARCH_AMD64 */
+ lock cmpxchg [rdx], ecx
+ mov rdx, [pu32Old]
+ mov [rdx], eax
+ /* #else */
+ lock cmpxchg [edx], ecx
+ mov edx, [pu32Old]
+ mov [edx], eax
+ /* #endif */
+ setz al
+ movzx eax, al
+ mov [u32Ret], eax
+ } return !!u32Ret;
+} /* #endif */
+
+/* Atomically Compare and Exchange a signed 32-bit value, additionally
+ * passes back old value, ordered.
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.*/
### Atomic Compare and Exchange

**Function:**

```c
DECLINLINE(bool) ASMAtomicCmpXchgExS32(volatile int32_t RT_FAR *pi32, const int32_t i32New, const int32_t i32Old, int32_t RT_FAR *pi32Old)
```

**Synopsis:**

Atomically compare and exchange a signed 32-bit value.

**Parameters:**

- `pi32`: Pointer to the value to update.
- `i32New`: The new value to assigned to `pi32`.
- `i32Old`: The old value to `pi32` compared with.
- `pi32Old`: Pointer store the old value at.

**Remarks:**

- x86: Requires a 486 or later.

**Function:**

```c
DECLINLINE(bool) ASMAtomicCmpXchgExU64(volatile uint64_t RT_FAR *pu64, const uint64_t u64New, const uint64_t u64Old, uint64_t RT_FAR *pu64Old)
```

**Synopsis:**

Atomically compare and exchange an unsigned 64-bit value.

**Parameters:**

- `pu64`: Pointer to the 64-bit variable to update.
- `u64New`: The 64-bit value to assign to `pu64`.
- `u64Old`: The value to compare with.
- `pu64Old`: Pointer store the old value at.

**Remarks:**

- x86: Requires a Pentium or later.
    += "=a" (*pu64Old)
    += : "r" (u64New),
    += "a" (u64Old),
    += "m" (*pu64));
    return (bool)u8Ret;
  +# else
  +# bool fRet;
  +# __asm
  + {
  +    mov rdx, [pu32]
  +    mov rax, [u64Old]
  +    mov rcx, [u64New]
  +    lock cmpxchg [rdx], rcx
  +    mov rdx, [pu64Old]
  +    mov [rdx], rax
  +    setz al
  +    mov [fRet], al
  +  }
  + return fRet;
  +# endif
  +# else /* !RT_ARCH_AMD64 */
  +# if RT_INLINE_ASM_GNU_STYLE
  +#   if defined(PIC) || defined(__PIC__)
  +     /* NB: this code uses a memory clobber description, because the clean
  +        * solution with an output value for *pu64 makes gcc run out of registers.
  +        * This will cause suboptimal code, and anyone with a better solution is
  +        * welcome to improve this. */
  +     __asm__ __volatile__("xchgl %%ebx, %1
          lock; cmpxchg8b %3
          xchgl %%ebx, %1
          : "=A" (u64Ret)
          : "DS" ((uint32_t)u64New),
            "c" ((uint32_t)(u64New >> 32)),
            "m" (*pu64),
            "0" (u64Old)
          : "memory" );
  +#   else /* !PIC */
  +     __asm__ __volatile__("lock; cmpxchg8b %4\n"
          : ":A" (u64Ret),
            ":m" (*pu64)
          : "b" ((uint32_t)u64New),
            ":c" ((uint32_t)(u64New >> 32)),
            ":m" (*pu64),
            ":0" (u64Old));
  +# endif
  + *pu64Old = u64Ret;
  + return u64Ret == u64Old;
```c
#define   else
uint32_t u32Ret;

{ __asm
    mov     ebx, dword ptr [u64New]
    mov     ecx, dword ptr [u64New + 4]
    mov     edi, [pu64]
    mov     eax, dword ptr [u64Old]
    mov     edx, dword ptr [u64Old + 4]
    lock cmpxchg8b [edi]
    mov     ebx, [pu64Old]
    mov     [ebx], eax
    movzx   al
    movzx   eax, al
    add     ebx, 4
    mov     [ebx], edx
    mov     dword ptr [u32Ret], eax

    return !!u32Ret;
}
#endif
#endif /* !RT_ARCH_AMD64 */
}

/** @def ASMAtomicCmpXchgExHandle
 * Atomically Compare and Exchange a typical IPRT handle value, ordered.
 */
DECLINLINE(bool) ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)pi64, (uint64_t)i64, (uint64_t)i64Old, (uint64_t)RT_FAR *, uint64_t i64)
{

return ASMAtomicCmpXchgExS64((volatile int64_t RT_FAR *)pi64, (int64_t)i64, (int64_t)i64Old, int64_t RT_FAR *, int64_t i64)

/** @def ASMAtomicCmpXchgExHandle
 * Atomically Compare and Exchange a typical IPRT handle value, ordered.
 */
```

---

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+ * 
+ * @param ph Pointer to the value to update.
+ * @param hNew The new value to assigned to *pu.
+ * @param hOld The old value to *pu compare with.
+ * @param fRc Where to store the result.
+ * @param phOldVal Pointer to where to store the old value.
+ *
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ */
+
+ if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+ define ASMAtomicCmpXchgExHandle(ph, hNew, hOld, fRc, phOldVal) \
+ do { \n+    AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \n+    AssertCompile(sizeof(*phOldVal) == sizeof(uint32_t)); \n+    (fRc) = ASMAtomicCmpXchgExU32((volatile uint32_t RT_FAR *)(pu), (uint32_t)(uNew), (uint32_t)(uOld), \
+      (uint32_t RT_FAR *)(puOldVal)); \n+  } while (0)
+#else
+if HC_ARCH_BITS == 64
+define ASMAtomicCmpXchgExHandle(ph, hNew, hOld, fRc, phOldVal) \
+ do { \n+    AssertCompile(sizeof(*ph) == sizeof(uint64_t)); \n+    AssertCompile(sizeof(*phOldVal) == sizeof(uint64_t)); \n+    (fRc) = ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)(pu), (uint64_t)(uNew), (uint64_t)(uOld), \
+      (uint64_t RT_FAR *)(puOldVal)); \n+  } while (0)
+#else
+error HC_ARCH_BITS
+#endif
+
+/** @def ASMAtomicCmpXchgExSize
+ * Atomically Compare and Exchange a value which size might differ 
+ * between platforms or compilers. Additionally passes back old value.
+ */
+
+ * @param pu Pointer to the value to update.
+ * @param uNew The new value to assigned to *pu.
+ * @param uOld The old value to *pu compare with.
+ * @param fRc Where to store the result.
+ * @param puOldVal Pointer to where to store the old value.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+
+define ASMAtomicCmpXchgExSize(pu, uNew, uOld, fRc, puOldVal) \
+ do { \n+    switch (sizeof(*pu)) { \n+      case 4: (fRc) = ASMAtomicCmpXchgExU32((volatile uint32_t RT_FAR *)(pu), (uint32_t)(uNew), (uint32_t)(uOld), (uint32_t RT_FAR *)(puOldVal)); \n+        break; \n+  }
case 8: (fRc) = ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)(void RT_FAR *)[pu],
(uint64_t)[uNew], (uint64_t)[uOld], (uint64_t RT_FAR *)[uOldVal]); \ 
  break; \ 
default: AssertMsgFailed("ASMAtomicCmpXchgSize: size %d is not supported\n", sizeof(*[pu])); \ 
  (fRc) = false; \ 
  (uOldVal) = 0; \ 
  break; \ 
} \ 
} while (0)
+
+
+/**
+ * Atomically Compare and Exchange a pointer value, additionally
+ * passing back old value, ordered.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   ppv         Pointer to the value to update.
+ * @param   pvNew       The new value to assigned to *ppv.
+ * @param   pvOld       The old value to *ppv compare with.
+ * @param   ppvOld      Pointer store the old value at.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(bool) ASMAtomicCmpXchgExPtrVoid(void RT_FAR * volatile RT_FAR *ppv, const void RT_FAR *pvNew, const void RT_FAR *pvOld,
+                                           void RT_FAR * RT_FAR *ppvOld)
+{
+  #if ARCH_BITS == 32 || ARCH_BITS == 16
+    return ASMAtomicCmpXchgExU32((volatile uint32_t RT_FAR *)(void RT_FAR *)[ppv], (uint32_t)[pvNew],
+                               (uint32_t)[pvOld], (uint32_t RT_FAR *)[ppvOld]);
+  #elif ARCH_BITS == 64
+    return ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)(void RT_FAR *)[ppv], (uint64_t)[pvNew],
+                                  (uint64_t)[pvOld], (uint64_t RT_FAR *)[ppvOld]);
+  #else
+    #error "ARCH_BITS is bogus"
+  +#endif
+}
+ * @param   ppv         Pointer to the value to update.
+ * @param   pvNew       The new value to assigned to *ppv.
+ * @param   pvOld       The old value to *ppv compare with.
+ * @param   ppvOld      Pointer store the old value at.
+ *
+ * @remarks This is relatively type safe on GCC platforms.
+ * @remarks x86: Requires a 486 or later.
+ */
+#ifdef __GNUC__
+# define ASMAtomicCmpXchgExPtr(ppv, pvNew, pvOld, ppvOld) \
+    __extension__ \
+    ({
+        __typeof__(*(ppv)) volatile * const ppvTypeChecked    = (ppv); \
+        __typeof__(*(ppv))            const pvNewTypeChecked  = (pvNew); \
+        __typeof__(*(ppv))            const pvOldTypeChecked  = (pvOld); \
+        __typeof__(*(ppv)) *          const ppvOldTypeChecked = (ppvOld); \
+        bool fMacroRet = ASMAtomicCmpXchgExPtrVoid((void * volatile *)ppvTypeChecked, \
+                                                    (void *)pvNewTypeChecked, (void *)pvOldTypeChecked, \
+                                                    (void **)ppvOldTypeChecked); \
+        fMacroRet; \
+    })
+#else
+# define ASMAtomicCmpXchgExPtr(ppv, pvNew, pvOld, ppvOld) \
+    ASMAtomicCmpXchgExPtrVoid((void RT_FAR * volatile RT_FAR *)(ppv), (void RT_FAR *)(pvNew), (void RT_FAR *)(pvOld), (void RT_FAR * RT_FAR *)(ppvOld))
+#endif

/**
 * Virtualization unfriendly serializing instruction, always exits.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMSerializeInstructionCpuId(void);
#else
DECLINLINE(void) ASMSerializeInstructionCpuId(void)
{
#if RT_INLINE_ASM_GNU_STYLE
    RTCCUINTREG xAX = 0;
    #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
        #if defined(__GNUC__) && defined(__i386__)
            "pushb %ebx\n\n            "cpuid\n            "popb %ebx\n            "=a" (xAX)
            "0" (xAX)
            "rbx", "rcx", "rdx", "memory”;
        #elif defined(_PIC__) && defined(__i386__)
            "push %\ebx\n            "cpuid\n            "pop %\ebx\n            "=a" (xAX)
#endif
#endif
}
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+    : "0" (xAX)
+    : "ecx", "edx", "memory");
+
++  else
+  __asm__ __volatile__ ("cpuid"
+                     : "=a" (xAX)
+                     : "0" (xAX)
+                     : "ebx", "ecx", "edx", "memory");
++  endif
+
++  elif RT_INLINE_ASM_USES_INTRIN
+  int aInfo[4];
+  _ReadWriteBarrier();
+  __cpuid(aInfo, 0);
+
++  else
+  __asm
+  {
+    push   ebx
+    xor    eax, eax
+    cpuid
+    pop    ebx
+  }
++  endif
+
++  */
+  * Virtualization friendly serializing instruction, though more expensive.
+ */
++  if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMSerializeInstructionIRet(void);
++else
+DECLINLINE(void) ASMSerializeInstructionIRet(void)
+{
++  if RT_INLINE_ASM_GNU_STYLE
++    ifdef RT_ARCH_AMD64
+      __asm__ __volatile__ ("movq  %%rsp,%%r10\n"
+                     "subq  $128, %%rsp\n" /*redzone*/
+                     "movq  %%ss, %%eax\n"
+                     "pushq  %%rax\n"
+                     "pushq  %%r10\n"
+                     "pushfq\n"
+                     "movl  %%cs, %%eax\n"
+                     "pushq  %%rax\n"
+                     "leaq  1f(%%rip), %%rax\n"
+                     "pushq  %%rax\n"
+                     "iretq\n"
+                     "1:\n"
+      
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+    else
+      _ReadWriteBarrier();
+      __cpuid(aInfo, 0);
+      __asm__ __volatile__ ("cpuid"
+                           : "=a" (xAX)
+                           : "0" (xAX)
+                           : "ebx", "ecx", "edx", "memory");
+      __asm__ __volatile__ ("movq  %%r10, %%rax\n"
+                            "subq  $128, %%rsp\n"
+                            "movq  %%cs, %%eax\n"
+                            "pushq  %%rax\n"
+                            "pushfq\n"
+                            "movl  1f(%%rip), %%cs\n"
+                            "iretq\n"
+                            "1:\n"
+      
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+      else
+        int aInfo[4];
+        _ReadWriteBarrier();
+        __cpuid(aInfo, 0);
+        __asm
+        {
+          push   ebx
+          xor    eax, eax
+          cpuid
+          pop    ebx
+        }
+    endif
+  endif
+  
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+  */

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+    ; "rax", "r10", "memory");
+  else
+    __asm volatile ("pushfl"
+                   "pushl %cs"
+                   "pushl $1f"
+                   "iretl"
+                   "1:\"memory");
+  endif
+
+  else
+    __asm
+    {
+      pushfd
+      push    cs
+      push    la_ret
+      iretd
+      la_ret:
+    }
+  endif
+
+  //!
+  // Virtualization friendlier serializing instruction, may still cause exits.
+  */
+  #if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+  DECLASM(void) ASMSerializeInstructionRdTscp(void);
+  #else
+  DECLINLINE(void) ASMSerializeInstructionRdTscp(void)
+  {
+    /* rdtscp is not supported by ancient linux build VM of course :-( */
+    __asm
+    {
+      __asm volatile ("rdtscp\" :: "rax", "rdx", "rcx"); */
+      __asm volatile (".byte 0x0f,0x01,0xf9\" :: "rax", "rdx", "rcx", "memory");
+    }
+  }
+  #endif
+
+  #if RT_INLINE_ASM_GNU_STYLE
+  /* rdtscp is not supported by ancient linux build VM of course :-( */
+  #ifdef RT_ARCH_AMD64
+  __asm volatile ("rdtscp\" :: "rax", "rdx", "rcx"); */
+  __asm volatile (".byte 0x0f,0x01,0xf9\" :: "rax", "rdx", "rcx", "memory");
+  #else
+  __asm volatile ("rdtscp\" :: "eax", "edx", "ecx"); */
+  __asm volatile (".byte 0x0f,0x01,0xf9\" :: "eax", "edx", "ecx", "memory");
+  #endif
+  #else
+  #if RT_INLINE_ASM_USES_INTRIN >= 15
+    uint32_t ulgnore;
+    _ReadWriteBarrier();
+    (void)__rdtscp(&ulgnore);
+    (void)ulgnore;
+  else
+    __asm
+ { 
  rdtscp 
+ }
+# endif
+# endif
+}
+#endif
+
+/**
+ * Serialize Instruction.
+ */
+#if (defined(RT_ARCH_X86) && ARCH_BITS == 16) || defined(IN_GUEST)
+# define ASMSerializeInstruction() ASMSerializeInstructionIRet()
+#else
+# define ASMSerializeInstruction() ASMSerializeInstructionCpuId()
+#endif
+
+/**
+ * Memory fence, waits for any pending writes and reads to complete.
+ */
+DECLINLINE(void) ASMMemoryFence(void)
+{
+    /** @todo use mfence? check if all cpus we care for support it. */
+#if ARCH_BITS == 16
+    uint16_t volatile u16;
+    ASMAtomicXchgU16(&u16, 0);
+#else
+    uint32_t volatile u32;
+    ASMAtomicXchgU32(&u32, 0);
+#endif
+}
+
+/**
+ * Write fence, waits for any pending writes to complete.
+ */
+DECLINLINE(void) ASMWriteFence(void)
+{
+    /** @todo use sfence? check if all cpus we care for support it. */
+    ASMMemoryFence();
+}
+
+/**
+ * Read fence, waits for any pending reads to complete.
+ */
DECLINLINE(void) ASMReadFence(void)
{
    /** @todo use lfence? check if all cpus we care for support it. */
    ASMMemoryFence();
}

DECLINLINE(uint8_t) ASMAtomicReadU8(volatile uint8_t RT_FAR *pu8)
{
    ASMMemoryFence();
    return *pu8;    /* byte reads are atomic on x86 */
}

DECLINLINE(uint8_t) ASMAtomicUoReadU8(volatile uint8_t RT_FAR *pu8)
{
    return *pu8;    /* byte reads are atomic on x86 */
}

DECLINLINE(int8_t) ASMAtomicReadS8(volatile int8_t RT_FAR *pi8)
{
    ASMMemoryFence();
    return *pi8;    /* byte reads are atomic on x86 */
}

DECLINLINE(int8_t) ASMAtomicUoReadS8(volatile int8_t RT_FAR *pi8)
{
    return *pi8;    /* byte reads are atomic on x86 */
}
+ * @returns Current *pi8 value
+ * @param pi8 Pointer to the 8-bit variable to read.
+ */
+DECLINLINE(int8_t) ASMAtomicUoReadS8(volatile int8_t RT_FAR *pi8)
+{
+    return *pi8; /* byte reads are atomic on x86 */
+}
+
+/**
+ * Atomically reads an unsigned 16-bit value, ordered.
+ *
+ * @returns Current *pu16 value
+ * @param pu16 Pointer to the 16-bit variable to read.
+ */
+DECLINLINE(uint16_t) ASMAtomicReadU16(volatile uint16_t RT_FAR *pu16)
+{
+    ASMMemoryFence();
+    Assert(!((uintptr_t)pu16 & 1));
+    return *pu16;
+}
+
+/**
+ * Atomically reads an unsigned 16-bit value, unordered.
+ *
+ * @returns Current *pu16 value
+ * @param pu16 Pointer to the 16-bit variable to read.
+ */
+DECLINLINE(uint16_t) ASMAtomicUoReadU16(volatile uint16_t RT_FAR *pu16)
+{
+    Assert(!((uintptr_t)pu16 & 1));
+    return *pu16;
+}
+
+/**
+ * Atomically reads a signed 16-bit value, ordered.
+ *
+ * @returns Current *pi16 value
+ * @param pi16 Pointer to the 16-bit variable to read.
+ */
+DECLINLINE(int16_t) ASMAtomicReadS16(volatile int16_t RT_FAR *pi16)
+{
+    ASMMemoryFence();
+    Assert(!((uintptr_t)pi16 & 1));
+    return *pi16;
+}
/**
 * Atomically reads a signed 16-bit value, unordered.
 * @returns Current *pi16 value
 * @param  pi16 Pointer to the 16-bit variable to read.
 */
DECLINLINE(int16_t) ASMAtomicUoReadS16(volatile int16_t RT_FAR *pi16)
{
    Assert(!((uintptr_t)pi16 & 1));
    return *pi16;
}

/**
 * Atomically reads an unsigned 32-bit value, ordered.
 * @returns Current *pu32 value
 * @param  pu32 Pointer to the 32-bit variable to read.
 */
DECLINLINE(uint32_t) ASMAtomicReadU32(volatile uint32_t RT_FAR *pu32)
{
    ASMMemoryFence();
    Assert(!((uintptr_t)pu32 & 3));
#if ARCH_BITS == 16
    AssertFailed(); /**< @todo 16-bit */
#endif
    return *pu32;
}

/**
 * Atomically reads an unsigned 32-bit value, unordered.
 * @returns Current *pu32 value
 * @param  pu32 Pointer to the 32-bit variable to read.
 */
DECLINLINE(uint32_t) ASMAtomicUoReadU32(volatile uint32_t RT_FAR *pu32)
{
    Assert(!((uintptr_t)pu32 & 3));
#if ARCH_BITS == 16
    AssertFailed(); /**< @todo 16-bit */
#endif
    return *pu32;
}
/**
 * Atomically reads a signed 32-bit value, ordered.
 * @returns Current *pi32 value
 * @param   pi32   Pointer to the 32-bit variable to read.
 */
DECLINLINE(int32_t) ASMAtomicReadS32(volatile int32_t RT_FAR *pi32)
{
    ASMMemoryFence();
    Assert(!(uintptr_t)pi32 & 3);
#if ARCH_BITS == 16
    AssertFailed(); /**< todo 16-bit */
#endif
    return *pi32;
}

/**
 * Atomically reads a signed 32-bit value, unordered.
 * @returns Current *pi32 value
 * @param   pi32   Pointer to the 32-bit variable to read.
 */
DECLINLINE(int32_t) ASMAtomicUoReadS32(volatile int32_t RT_FAR *pi32)
{
    Assert(!(uintptr_t)pi32 & 3);
#if ARCH_BITS == 16
    AssertFailed(); /**< todo 16-bit */
#endif
    return *pi32;
}

/**
 * Atomically reads an unsigned 64-bit value, ordered.
 * @returns Current *pu64 value
 * @param   pu64   Pointer to the 64-bit variable to read.
 * @remarks This may fault if the memory is read-only!
 * @remarks x86: Requires a Pentium or later.
 */
#if (RT_INLINE_ASM_EXTERNAL && !defined(RT_ARCH_AMD64)) \
|| RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
DECLASM(uint64_t) ASMAtomicReadU64(volatile uint64_t RT_FAR *pu64);
#else
DECLINLINE(uint64_t) ASMAtomicReadU64(volatile uint64_t RT_FAR *pu64)

#ifdef RT_ARCH_AMD64
    Assert(!((uintptr_t)pu64 & 7));
/*#  if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__(  "mfence
	"                           "movq %1, %0\n\t"
                           : "=r" (u64)
                           : "m" (*pu64));
#  else
    __asm
    {
        mfence
        mov     rdx, [pu64]
        mov     rax, [rdx]
        mov     [u64], rax
    }
#  endif*/
    ASMMemoryFence();
    u64 = *pu64;
# else /* !RT_ARCH_AMD64 */
/*#  if RT_INLINE_ASM_GNU_STYLE
#   if defined(PIC) || defined(__PIC__)
    uint32_t u32EBX = 0;
    Assert(!((uintptr_t)pu64 & 7));
    __asm__ __volatile__("xchgl \%ebx, %3\n\t"                           "lock; cmpxchg8b (\%5)\n\t"                           "movl %3, \%ebx\n\t"
                           : "=A" (u64),
#    if RT_GNUC_PREREQ(4, 3)
                           "+m" (*pu64)
#    else
                           "=m" (*pu64)
#    endif
                           : "0" (0ULL),
                           "m" (u32EBX),
                           "c" (0),
                           "S" (pu64));
#   else /* !PIC */
    __asm__ __volatile__("lock; cmpxchg8b %1\n\t"                           : "=A" (u64),
                           "+m" (*pu64)
                           : "0" (0ULL),
                           "b" (0),
                           "c" (0));
#   endif
#  else /* !RT_INLINE_ASM_GNU_STYLE */
/*#  if defined(PIC) || defined(__PIC__)
    uint32_t u32EBX = 0;
    Assert(!((uintptr_t)pu64 & 7));
#    if RT_GNUC_PREREQ(4, 3)
    "+m" (*pu64)
#    else
    "=m" (*pu64)
#    endif
    : "0" (0ULL),
    "m" (u32EBX),
    "c" (0),
    "S" (pu64));
#  else /* !PIC */
    __asm__ __volatile__("lock; cmpxchg8b %1\n\t"                           : "=A" (u64),
                           "+m" (*pu64)
                           : "0" (0ULL),
                           "b" (0),
                           "c" (0));
#  endif
#  else
    Assert(!((uintptr_t)pu64 & 7));
*/
# Atomic reference

### Description

This function atomically reads an unsigned 64-bit value, unordered.

- **Returns**: Current `pu64` value
- **Param**: `pu64` — Pointer to the 64-bit variable to read.

### Requirements

- Requires a Pentium or later.
- May fault if the memory is read-only!

### Implementation

```c
DECLASM(uint64_t) ASMAtomicUoReadU64(volatile uint64_t RT_FAR *pu64);
```

```asm
    __asm
    {
        xor  eax, eax
        xor  edx, edx
        mov  edi, pu64
        xor  ecx, ecx
        xor  ebx, ebx
        lock cmpxchg8b [edi]
        mov  dword ptr [u64], eax
        mov  dword ptr [u64 + 4], edx
    }
```

```c
    return u64;
```

### Notes

- Atomically reads an unsigned 64-bit value, unordered.
- May fault if the memory is read-only!
- Requires a Pentium or later.

---

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+    return u64;
+}
+#endif
+
+/**
+ * Atomically reads a signed 64-bit value, ordered.
+ *
+ * @returns Current *pi64 value
+ * @param   pi64    Pointer to the 64-bit variable to read.
+ *                 The memory pointed to must be writable.
+ *
+ * @remarks This may fault if the memory is read-only!
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(int64_t) ASMAtomicReadS64(volatile int64_t RT_FAR *pi64)
+{
+    return (int64_t)ASMAtomicReadU64((volatile uint64_t RT_FAR *)pi64);
+}
+
+/**
+ * Atomically reads a signed 64-bit value, unordered.
+ *
+ * @returns Current *pi64 value
+ * @param   pi64    Pointer to the 64-bit variable to read.
+ *                 The memory pointed to must be writable.
+ *
+ * @remarks This will fault if the memory is read-only!
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(int64_t) ASMAtomicUoReadS64(volatile int64_t RT_FAR *pi64)
+{
+    return (int64_t)ASMAtomicUoReadU64((volatile uint64_t RT_FAR *)pi64);
+}
+
+/**
+ * Atomically reads a size_t value, ordered.
+ *
+ * @returns Current *pcb value
+ * @param   pcb     Pointer to the size_t variable to read.
+ */
+DECLINLINE(size_t) ASMAtomicReadZ(size_t volatile RT_FAR *pcb)
+{
+    #if ARCH_BITS == 64
+        return ASMAtomicReadU64((uint64_t volatile RT_FAR *)pcb);
+    #elif ARCH_BITS == 32
+        return ASMAtomicReadU64((uint64_t volatile RT_FAR *)pcb);
+    #endif
+}
+ return ASMAtomicReadU32((uint32_t volatile RT_FAR *)pcb);
+\#elif ARCH_BITS == 16
+    AssertCompileSize(size_t, 2);
+ return ASMAtomicReadU16((uint16_t volatile RT_FAR *)pcb);
+\#else
+\# error "Unsupported ARCH_BITS value"
+\#endif
+
+/**
+ * Atomically reads a size_t value, unordered.
+ *
+ * @returns Current *pcb value
+ * @param   pcb     Pointer to the size_t variable to read.
+ */
+#DECLINLINE(size_t) ASMAtomicUoReadZ(size_t volatile RT_FAR *pcb)
+#{ 
+#\if ARCH_BITS == 64 \# ARCH_BITS == 16
+    return ASMAtomicUoReadU64((uint64_t volatile RT_FAR *)pcb);
+#elif ARCH_BITS == 32
+    return ASMAtomicUoReadU32((uint32_t volatile RT_FAR *)pcb);
+#elif ARCH_BITS == 16
+    AssertCompileSize(size_t, 2);
+    return ASMAtomicUoReadU16((uint16_t volatile RT_FAR *)pcb);
+#else
+# error "Unsupported ARCH_BITS value"
+#\endif
+#}
+
+/**
+ * Atomically reads a pointer value, ordered.
+ *
+ * @returns Current *pv value
+ * @param   ppv     Pointer to the pointer variable to read.
+ *
+ * @remarks Please use ASMAtomicReadPtrT, it provides better type safety and
+ *          requires less typing (no casts).
+ */
+#DECLINLINE(void RT_FAR *) ASMAtomicReadPtr(void RT_FAR * volatile RT_FAR *ppv)
+#{ 
+#\if ARCH_BITS == 32 \# ARCH_BITS == 16
+    return (void RT_FAR *)ASMAtomicReadU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv);
+#elif ARCH_BITS == 64
+    return (void RT_FAR *)ASMAtomicReadU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv);
+#else
+# error "ARCH_BITS is bogus"

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+*/
+* Convenience macro for avoiding the annoying casting with ASMAAtomicReadPtr.
+*
+* @returns Current *pv value
+* @param ppv Pointer to the pointer variable to read.
+* @param Type The type of *ppv, sans volatile.
+*/
+ifndef __GNUC__
+define ASMAAtomicReadPtrT(ppv, Type) \
+{ \%extension\
+  __typeof__(*(ppv)) volatile *ppvTypeChecked = (ppv); \%
+  Type pvTypeChecked = (__typeof__(*(ppv))) ASMAAtomicReadPtr((void * volatile *)ppvTypeChecked); \%
+  pvTypeChecked; \%}
+endif
+define ASMAAtomicReadPtrT(ppv, Type) \
+  (Type)ASMAAtomicReadPtr((void RT_FAR * volatile RT_FAR *)(ppv))
+endif
+*/
+* Atomically reads a pointer value, unordered.
+*
+* @returns Current *pv value
+* @param ppv Pointer to the pointer variable to read.
+*
+* @remarks Please use ASMAAtomicUoReadPtrT, it provides better type safety and
+* requires less typing (no casts).
+*/
+DECLINLINE(void RT_FAR *) ASMAAtomicUoReadPtr(void RT_FAR * volatile RT_FAR *(ppv))
+{ \%
+if ARCH_BITS == 32 || ARCH_BITS == 16
+  return (void RT_FAR *)ASMAAtomicUoReadU32((volatile uint32_t RT_FAR *>(void RT_FAR *)ppv);
+elif ARCH_BITS == 64
+  return (void RT_FAR *)ASMAAtomicUoReadU64((volatile uint64_t RT_FAR *>(void RT_FAR *)ppv);
+else
+  #error ”ARCH_BITS is bogus”
+endif
+}
+ * @returns Current *pv value
+ * @param ppv Pointer to the pointer variable to read.
+ * @param Type The type of *ppv, sans volatile.
+ */
+#ifdef __GNUC__
+ #define ASMAtomicUoReadPtrT(ppv, Type) 
+ (\
+ {\
+ __typeof__(*(ppv)) volatile * const ppvTypeChecked = (ppv); \
+ Type pvTypeChecked = (__typeof__(*(ppv))) ASMAtomicUoReadPtr((void * volatile *)ppvTypeChecked); \
+ pvTypeChecked; \
+ })
+ #endif
+ +#define ASMAtomicUoReadPtrT(ppv, Type) 
+ ASMAAtomicUoReadPtr((void RT_FAR * volatile RT_FAR *)(ppv))
+ +#endif
+ +/**
+ * Atomically reads a boolean value, ordered.
+ * @returns Current *pf value
+ * @param pf Pointer to the boolean variable to read.
+ */
+ DECLINLINE(bool) ASMAtomicReadBool(volatile bool RT_FAR *pf)
+ {
+ ASMMemoryFence();
+ return *pf; /* byte reads are atomic on x86 */
+ }
+ +/**
+ * Atomically reads a boolean value, unordered.
+ * @returns Current *pf value
+ * @param pf Pointer to the boolean variable to read.
+ */
+ DECLINLINE(bool) ASMAAtomicUoReadBool(volatile bool RT_FAR *pf)
+ {
+ return *pf; /* byte reads are atomic on x86 */
+ }
+ +/**
+ * Atomically read a typical IPRT handle value, ordered.
+ * @returns Current *pf value
+ * @param ph Pointer to the handle variable to read.
+ */
+ DECLINLINE(bool) ASMAtomicReadBool(volatile bool RT_FAR *pf)
+ {
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ */
+#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+# define ASMAAtomicReadHandle(ph, phRes) \n+ do { \n+   AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \n+   AssertCompile(sizeof(*phRes) == sizeof(uint32_t)); \n+   *(uint32_t RT_FAR *)(phRes) = ASMAAtomicReadU32((uint32_t volatile RT_FAR *)(ph)); \n+ } while (0)
+#elif HC_ARCH_BITS == 64
+# define ASMAAtomicReadHandle(ph, phRes) \n+ do { \n+   AssertCompile(sizeof(*ph) == sizeof(uint64_t)); \n+   AssertCompile(sizeof(*phRes) == sizeof(uint64_t)); \n+   *(uint64_t RT_FAR *)(phRes) = ASMAAtomicReadU64((uint64_t volatile RT_FAR *)(ph)); \n+ } while (0)
+#else
+*/
+ * Atomically read a typical IPRT handle value, unordered.
+ *
+ * @param ph Pointer to the handle variable to read.
+ * @param phRes Where to store the result.
+ *
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ */
+#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+# define ASMAAtomicUoReadHandle(ph, phRes) \n+ do { \n+   AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \n+   AssertCompile(sizeof(*phRes) == sizeof(uint32_t)); \n+   *(uint32_t RT_FAR *)(phRes) = ASMAAtomicUoReadU32((uint32_t volatile RT_FAR *)(ph)); \n+ } while (0)
+#elif HC_ARCH_BITS == 64
+# define ASMAAtomicUoReadHandle(ph, phRes) \n+ do { \n+   AssertCompile(sizeof(*ph) == sizeof(uint64_t)); \n+   AssertCompile(sizeof(*phRes) == sizeof(uint64_t)); \n+   *(uint64_t RT_FAR *)(phRes) = ASMAAtomicUoReadU64((uint64_t volatile RT_FAR *)(ph)); \n+ } while (0)
+#else
+*/
+ #else
+*/
+ #error HC_ARCH_BITS
+*/
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+ /*
+ /* Atomically read a value which size might differ
+ * between platforms or compilers, ordered.
+ *
+ * @param   pu      Pointer to the variable to read.
+ * @param   puRes   Where to store the result.
+ */
+#define ASMAtomicReadSize(pu, puRes) \
+ do { \
+   switch (sizeof(*pu)) { \
+   case 1: *(uint8_t RT_FAR *)(puRes) = ASMAtomicReadU8((volatile uint8_t RT_FAR *)(void RT_FAR *)pu); break; \
+   case 2: *(uint16_t RT_FAR *)(puRes) = ASMAtomicReadU16((volatile uint16_t RT_FAR *)(void RT_FAR *)pu); break; \
+   case 4: *(uint32_t RT_FAR *)(puRes) = ASMAtomicReadU32((volatile uint32_t RT_FAR *)(void RT_FAR *)pu); break; \
+   case 8: *(uint64_t RT_FAR *)(puRes) = ASMAtomicReadU64((volatile uint64_t RT_FAR *)(void RT_FAR *)pu); break; \
+   default: AssertMsgFailed("ASMAtomicReadSize: size %d is not supported\n", sizeof(*pu)); \
+   } \
+ } while (0)
+
+
+/**
+ * Atomically read a value which size might differ
+ * between platforms or compilers, unordered.
+ *
+ * @param   pu      Pointer to the variable to read.
+ * @param   puRes   Where to store the result.
+ */
+#define ASMAtomicUoReadSize(pu, puRes) \
+ do { \
+   switch (sizeof(*pu)) { \
+   case 1: *(uint8_t RT_FAR *)(puRes) = ASMAtomicUoReadU8((volatile uint8_t RT_FAR *)(void RT_FAR *)pu); break; \
+   case 2: *(uint16_t RT_FAR *)(puRes) = ASMAtomicUoReadU16((volatile uint16_t RT_FAR *)(void RT_FAR *)pu); break; \
+   case 4: *(uint32_t RT_FAR *)(puRes) = ASMAtomicUoReadU32((volatile uint32_t RT_FAR *)(void RT_FAR *)pu); break; \
+   case 8: *(uint64_t RT_FAR *)(puRes) = ASMAtomicUoReadU64((volatile uint64_t RT_FAR *)(void RT_FAR *)pu); break; \
+   default: AssertMsgFailed("ASMAtomicReadSize: size %d is not supported\n", sizeof(*pu)); \
+   } \
+ } while (0)
+
+/**
+ * Atomically writes an unsigned 8-bit value, ordered.
+ *
+ * @param pu8 Pointer to the 8-bit variable.
+ * @param u8 The 8-bit value to assign to *pu8.
+ */
DECLINLINE(void) ASMAtomicWriteU8(volatile uint8_t RT_FAR *pu8, uint8_t u8)
+{
+    ASMAtomicXchgU8(pu8, u8);
+}
+
+
+/**
+ * Atomically writes an unsigned 8-bit value, unordered.
+ *
+ * @param pu8 Pointer to the 8-bit variable.
+ * @param u8 The 8-bit value to assign to *pu8.
+ */
DECLINLINE(void) ASMAtomicUoWriteU8(volatile uint8_t RT_FAR *pu8, uint8_t u8)
+{
+    *pu8 = u8;    /* byte writes are atomic on x86 */
+}
+
+
+/**
+ * Atomically writes a signed 8-bit value, ordered.
+ *
+ * @param pi8 Pointer to the 8-bit variable to read.
+ * @param i8 The 8-bit value to assign to *pi8.
+ */
DECLINLINE(void) ASMAtomicWriteS8(volatile int8_t RT_FAR *pi8, int8_t i8)
+{
+    ASMAtomicXchgS8(pi8, i8);
+}
+
+
+/**
+ * Atomically writes a signed 8-bit value, unordered.
+ *
+ * @param pi8 Pointer to the 8-bit variable to write.
+ * @param i8 The 8-bit value to assign to *pi8.
+ */
DECLINLINE(void) ASMAtomicUoWriteS8(volatile int8_t RT_FAR *pi8, int8_t i8)
+{
+    *pi8 = i8;    /* byte writes are atomic on x86 */
+}
++*/
+ * Atomically writes an unsigned 16-bit value, ordered.
+ *
+ * @param pu16 Pointer to the 16-bit variable to write.
+ * @param u16 The 16-bit value to assign to *pu16.
+ */
+DECLINLINE(void) ASMAtomicWriteU16(volatile uint16_t RT_FAR *pu16, uint16_t u16)
+{
+    ASMAtomicXchgU16(pu16, u16);
+}
+
+/**
+ * Atomically writes an unsigned 16-bit value, unordered.
+ *
+ * @param pu16 Pointer to the 16-bit variable to write.
+ * @param u16 The 16-bit value to assign to *pu16.
+ */
+DECLINLINE(void) ASMAtomicUoWriteU16(volatile uint16_t RT_FAR *pu16, uint16_t u16)
+{
+    Assert(!((uintptr_t)pu16 & 1));
+    *pu16 = u16;
+}
+
+/**
+ * Atomically writes a signed 16-bit value, ordered.
+ *
+ * @param pi16 Pointer to the 16-bit variable to write.
+ * @param i16 The 16-bit value to assign to *pi16.
+ */
+DECLINLINE(void) ASMAtomicWriteS16(volatile int16_t RT_FAR *pi16, int16_t i16)
+{
+    ASMAtomicXchgS16(pi16, i16);
+}
+
+/**
+ * Atomically writes a signed 16-bit value, unordered.
+ *
+ * @param pi16 Pointer to the 16-bit variable to write.
+ * @param i16 The 16-bit value to assign to *pi16.
+ */
+DECLINLINE(void) ASMAtomicUoWriteS16(volatile int16_t RT_FAR *pi16, int16_t i16)
+{
+    Assert(!((uintptr_t)pi16 & 1));
+    *pi16 = i16;
+}
+ /**
+ * Atomically writes an unsigned 32-bit value, ordered.
+ *
+ * @param   pu32   Pointer to the 32-bit variable to write.
+ * @param   u32    The 32-bit value to assign to *pu32.
+ */
+DECLINLINE(void) ASMAtomicWriteU32(volatile uint32_t RT_FAR *pu32, uint32_t u32)
+{
+    ASMAtomicXchgU32(pu32, u32);
+
+/**
+ * Atomically writes an unsigned 32-bit value, unordered.
+ *
+ * @param   pu32   Pointer to the 32-bit variable to write.
+ * @param   u32    The 32-bit value to assign to *pu32.
+ */
+DECLINLINE(void) ASMAtomicUoWriteU32(volatile uint32_t RT_FAR *pu32, uint32_t u32)
+{
+    Assert(!((uintptr_t)pu32 & 3));
+    if ARCH_BITS >= 32
+        *pu32 = u32;
+    else
+        ASMAtomicXchgU32(pu32, u32);
+}
+
+/**
+ * Atomically writes a signed 32-bit value, ordered.
+ *
+ * @param   pi32   Pointer to the 32-bit variable to write.
+ * @param   i32    The 32-bit value to assign to *pi32.
+ */
+DECLINLINE(void) ASMAtomicWriteS32(volatile int32_t RT_FAR *pi32, int32_t i32)
+{
+    ASMAtomicXchgS32(pi32, i32);
+
+/**
+ * Atomically writes a signed 32-bit value, unordered.
+ *
+ * @param   pi32   Pointer to the 32-bit variable to write.
+ * @param   i32    The 32-bit value to assign to *pi32.
+ */
+DECLINLINE(void) ASMAtomicUoWriteS32 volatile int32_t RT_FAR *pi32, int32_t i32) 
+{ 
+    Assert(!((uintptr_t)pi32 & 3));
+    #if ARCH_BITS >= 32
+        *pi32 = i32;
+    #else
+        ASMAtomicXchgS32(pi32, i32);
+    #endif
+}
+
+/**
+ * Atomically writes an unsigned 64-bit value, ordered.
+ *
+ * @param   pu64    Pointer to the 64-bit variable to write.
+ * @param   u64     The 64-bit value to assign to *pu64.
+ */
+DECLINLINE(void) ASMAtomicWriteU64 volatile uint64_t RT_FAR *pu64, uint64_t u64)
+{ 
+    ASMAtomicXchgU64(pu64, u64);
+}
+
+/**
+ * Atomically writes a signed 64-bit value, ordered.
+ *
+ * @param   pi64    Pointer to the 64-bit variable to write.
+ * @param   i64     The 64-bit value to assign to *pi64.
+ */
+DECLINLINE(void) ASMAtomicWriteS64 volatile int64_t RT_FAR *pi64, int64_t i64) 
+{ 
+    Assert(!((uintptr_t)pi64 & 7));
+    #if ARCH_BITS == 64
+        *pi64 = i64;
+    #else
+        ASMAtomicXchgU64(pi64, u64);
+    #endif
+}
+ ASAAtomicXchgS64(pi64, i64);
+
+
+/**
+ * Atomically writes a signed 64-bit value, unordered.
+ *
+ * @param   pi64    Pointer to the 64-bit variable to write.
+ * @param   i64     The 64-bit value to assign to *pi64.
+ */
+DECLINLINE(void) ASAAtomicUoWriteS64(volatile int64_t RT_FAR *pi64, int64_t i64)
+{
+    Assert(!((uintptr_t)pi64 & 7));
+    *pi64 = i64;
+}

+/**
+ * Atomically writes a size_t value, ordered.
+ *
+ * @returns nothing.
+ * @param   pcb     Pointer to the size_t variable to write.
+ * @param   cb      The value to assign to *pcb.
+ */
+DECLINLINE(void) ASAAtomicWriteZ(volatile size_t RT_FAR *pcb, size_t cb)
+{
+    #if ARCH_BITS == 64
+        ASAAtomicWriteU64((uint64_t volatile *)pcb, cb);
+    #elif ARCH_BITS == 32
+        ASAAtomicWriteU32((uint32_t volatile *)pcb, cb);
+    #elif ARCH_BITS == 16
+        AssertCompileSize(size_t, 2);
+        ASAAtomicWriteU16((uint16_t volatile *)pcb, cb);
+    #else
+        #error "Unsupported ARCH_BITS value"
+    #endif
+}

+/**
+ * Atomically writes a boolean value, unordered.
+ *
+ * @param   pf      Pointer to the boolean variable to write.
+ * @param   f       The boolean value to assign to *pf.
+ */
DECLINLINE(void) ASMAtomicWriteBool(volatile bool RT_FAR *pf, bool f)
{
    ASMAtomicWriteU8((uint8_t volatile RT_FAR *)pf, f);
}

DECLINLINE(void) ASMAtomicUoWriteBool(volatile bool RT_FAR *pf, bool f)
{
    *pf = f;  /* byte writes are atomic on x86 */
}

DECLINLINE(void) ASMAtomicWritePtrVoid(void RT_FAR * volatile RT_FAR *ppv, const void *pv)
{
#if ARCH_BITS == 32 || ARCH_BITS == 16
    ASMAtomicWriteU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv, (uint32_t)pv);
#elif ARCH_BITS == 64
    ASMAtomicWriteU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv, (uint64_t)pv);
#else
    #error "ARCH_BITS is bogus"
#endif
}

DECLINLINE(void) ASMAtomicWriteNullPtr(volatile RT_FAR * volatile RT_FAR *ppv)
{
    ASMAtomicWriteNullPtr or you'll land in trouble.
    *
    * @param ppv Pointer to the pointer variable to write.
    * @param pv The pointer value to assign to *ppv.
    */

#ifdef __GNUC__

#endif

#ifndef __GNUC__

#endif
+\# define ASMAtomicWritePtr(ppv, pv)\
+  do \
+  { \
+      __typeof__(*(ppv)) volatile RT_FAR * const ppvTypeChecked = (ppv); \
+      __typeof__(*(ppv)) const pvTypeChecked = (pv); \
+      \
+      AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *)); \
+      AssertCompile(sizeof(pv) == sizeof(void RT_FAR *)); \
+      \
+      ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppvTypeChecked), (void RT_FAR *)(pvTypeChecked)); \
+  } while (0)
+\#else
+\# define ASMAtomicWritePtr(ppv, pv)\
+  do \
+  { \
+      AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *)); \
+      AssertCompile(sizeof(pv) == sizeof(void RT_FAR *)); \
+      \
+      ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppv), (void RT_FAR *)(pv)); \
+  } while (0)
+\#endif
+
+\*/
+ * Atomically sets a pointer to NULL, ordered.
+ *
+ * @param ppv Pointer to the pointer variable that should be set to NULL.
+ *
+ * @remarks This is relatively type safe on GCC platforms.
+ */
+\#ifdef __GNUC__
+\# define ASMAtomicWriteNullPtr(ppv)\
+  do \
+  { \
+      __typeof__(*(ppv)) * const ppvTypeChecked = (ppv); \
+      AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *)); \
+      Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
+      \
+      ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppvTypeChecked), NULL); \
+  } while (0)
+\#else
+\# define ASMAtomicWriteNullPtr(ppv)\
+  do \
+  { \
+      AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *)); \
+      Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
+      \
+      ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppv), NULL); \

ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *) (ppv), NULL); \
} while (0)

+ #endif
+
+
+/**
+ * Atomically writes a pointer value, unordered.
+ *
+ * @returns Current *pv value
+ * @param   ppv     Pointer to the pointer variable.
+ * @param   pv      The pointer value to assign to *ppv. If NULL use
+ *                  ASMAtomicUoWriteNullPtr or you'll land in trouble.
+ *
+ * @remarks This is relatively type safe on GCC platforms when @a pv isn't
+ *          NULL.
+ */
+ */
+ #ifdef __GNUC__
+ # define ASMAtomicUoWritePtr(ppv, pv) \
+ do \
+ { \
+       __typeof__((*ppv)) volatile * const ppvTypeChecked = (ppv); \
+       __typeof__((*ppv))            const pvTypeChecked  = (pv); \
+       \
+       AssertCompile(sizeof(*ppv) == sizeof(void *)); \
+       AssertCompile(sizeof(pv) == sizeof(void *)); \
+       Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
+       \
+       *(ppvTypeChecked) = pvTypeChecked; \
+ } while (0)
+ #else
+ #define ASMAtomicUoWritePtr(ppv, pv) \
+ do \
+ { \
+       AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *)); \
+       AssertCompile(sizeof(pv) == sizeof(void RT_FAR *)); \
+       Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
+       *(ppv) = pv; \
+ } while (0)
+ #endif
+
+/**
+ * Atomically sets a pointer to NULL, unordered.
+ *
+ * @param   ppv     Pointer to the pointer variable that should be set to NULL.
+ *
+ * @remarks This is relatively type safe on GCC platforms.
+ */
+
```c
#ifdef __GNUC__
#define ASMAtomicUoWriteNullPtr(ppv) \
    do \
    { \
        __typeof__(*(ppv)) volatile * const ppvTypeChecked = (ppv); \
        AssertCompile(sizeof(*ppv) == sizeof(void *)); \
        Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
        *(ppvTypeChecked) = NULL; \
    } while (0)
#else
#define ASMAtomicUoWriteNullPtr(ppv) \
    do \
    { \
        AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *)); \
        Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
        *(ppv) = NULL; \
    } while (0)
#endif

 /**<
 * Atomically write a typical IPRT handle value, ordered.
 *
 * @param   ph      Pointer to the variable to update.
 * @param   hNew    The value to assign to *ph.
 *
 * @remarks This doesn't currently work for all handles (like RTFILE).
 */
#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
#define ASMAtomicWriteHandle(ph, hNew) \
    do { \
        AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \
        ASMAtomicWriteU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)(hNew)); \
    } while (0)
#elif HC_ARCH_BITS == 64
#define ASMAtomicWriteHandle(ph, hNew) \
    do { \
        AssertCompile(sizeof(*ph) == sizeof(uint64_t)); \
        ASMAtomicWriteU64((uint64_t volatile RT_FAR *)(ph), (const uint64_t)(hNew)); \
    } while (0)
#else
#error HC_ARCH_BITS
#endif

 /**<
 * Atomically write a typical IPRT handle value, unordered.
 *
 * @param   ph      Pointer to the variable to update.
 * @param   hNew    The value to assign to *ph.
 *
 * @remarks This doesn't currently work for all handles (like RTFILE).
 */
```
+ * @param ph Pointer to the variable to update.
+ * @param hNew The value to assign to *ph.
+ *
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ */
+
+ #if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+ #define ASMAtomicUoWriteHandle(ph, hNew) \
+ do { \
+ 
+        AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \
+        ASMAtomicUoWriteU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)hNew); \
+    } while (0)
+ #else
+ #error HC_ARCH_BITS
+ #endif
+
+ /**
+ * Atomically write a value which size might differ
+ * between platforms or compilers, ordered.
+ *
+ * @param pu Pointer to the variable to update.
+ * @param uNew The value to assign to *pu.
+ */
+ 
+ #define ASMAtomicWriteSize(pu, uNew) \
+ do { \
+ 
+        switch (sizeof(*pu)) { \
+            case 1: ASMAtomicWriteU8( (volatile uint8_t RT_FAR *)(void RT_FAR *)(pu), (uint8_t)(uNew)); \n+                break; \
+            case 2: ASMAtomicWriteU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); \n+                break; \
+            case 4: ASMAtomicWriteU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); \n+                break; \
+            case 8: ASMAtomicWriteU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); \n+                break; \
+            default: AssertMsgFailed("ASMAtomicWriteSize: size %d is not supported\n", sizeof(*pu)); \n+                } \n+        } while (0)
+ */
+
+ /**
+ * Atomically write a value which size might differ
+ * between platforms or compilers, unordered.
+ */
/**
 * @param pu Pointer to the variable to update.
 * @param uNew The value to assign to *pu.
 */
+#define ASMAtomicUoWriteSize(pu, uNew) \ 
+  do { \ 
+      switch (sizeof(*pu)) { \ 
+        case 1: ASMAtomicUoWriteU8((volatile uint8_t RT_FAR *)(void RT_FAR *)(pu), (uint8_t)(uNew)); break; \ 
+        case 2: ASMAtomicUoWriteU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); break; \ 
+        case 4: ASMAtomicUoWriteU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; \ 
+        case 8: ASMAtomicUoWriteU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; \ 
+        default: AssertMsgFailed("ASMAtomicWriteSize: size %d is not supported\n", sizeof(*pu)); \ 
+      } \ 
+  } while (0)  
+
+/**
 * Atomically exchanges and adds to a 16-bit value, ordered.
 * @returns The old value.
 * @param pu16 Pointer to the value.
 * @param u16 Number to add.
 * @remarks Currently not implemented, just to make 16-bit code happy.
 * @remarks x86: Requires a 486 or later.
 */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint16_t) ASMAtomicAddU16(uint16_t volatile RT_FAR *pu16, uint32_t u16);
+#else
+DECLINLINE(uint32_t) ASMAtomicAddU16(uint16_t volatile RT_FAR *pu16, uint32_t u16)
+{
+  #if RT_INLINE_ASM_USES_INTRIN
++
+  * @returns The old value.
+  * @param pu Pointer to the value.
+  * @param u32 Number to add.
+  * @remarks x86: Requires a 486 or later.
+  */
+  +#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
++
+  DECLASM(uint32_t) ASMAtomicAddU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
+  +#else
++
+  DECLINLINE(uint32_t) ASMAtomicAddU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
+  {  
+    #if RT_INLINE_ASM_USES_INTRIN
++
+  */
+  #endif
+  
+  #endif
+  
+  #endif

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+ u32 = _InterlockedExchangeAdd((long RT_FAR *)pu32, u32);
+ return u32;
+
+## elif RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("lock; xaddl %0, %1\n"
+ : "=r" (u32),
+    ":=m" (*pu32)
+    ":0" (u32),
+    ":m" (*pu32)
+    ":memory");
+ return u32;
+## else
+ __asm
+ {
+    mov eax, [u32]
+   懂事 RT_ARCH_AMD64
+    mov rdx, [pu32]
+    lock xadd [rdx], eax
+   懂事
+    mov edx, [pu32]
+    lock xadd [edx], eax
+   懂事
+    mov [u32], eax
+ }
+ return u32;
+## endif
+}
+##endif
+
+/**
+ * Atomically exchanges and adds to a signed 32-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param   pi32        Pointer to the value.
+ * @param   i32         Number to add.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(int32_t) ASMAtomicAddS32(int32_t volatile RT_FAR *pi32, int32_t i32)
+{
+    return (int32_t)ASMAtomicAddU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)i32);
+}
+
+/**
+ * Atomically exchanges and adds to a 64-bit value, ordered.
+ *
### \#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint64_t) ASMAtomicAddU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
###
DECLINLINE(uint64_t) ASMAtomicAddU64(uint64_t volatile RT_FAR *pu64, uint64_t u64) {
###
# if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
    u64 = _InterlockedExchangeAdd64((__int64 RT_FAR *)pu64, u64);
    return u64;
###
# elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
    __asm__ __volatile__("lock; xaddq %0, %1\n\t"  
                          : =r" (u64),
                             =m" (*pu64)
                          : "0" (u64),
                             "m" (*pu64)
                          : "memory");
    return u64;
###
# else
    uint64_t u64Old;
    for (;;)
    {
        uint64_t u64New;
        u64Old = ASMAtomicUoReadU64(pu64);
        u64New = u64Old + u64;
        if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
            break;
        ASMNopPause();
    }
    return u64Old;
###
}  
###
}
###
}$/**
* Atomically exchanges and adds to a signed 64-bit value, ordered.
* 
* @returns The old value.
* 
* @param pi64 Pointer to the value.
* 
* @param i64 Number to add.
* 
* @remarks x86: Requires a Pentium or later.
+ *DECLINLINE(int64_t) ASMAtomicAddS64(int64_t volatile RT_FAR *pi64, int64_t i64) 
+{ 
  return (int64_t)ASMAtomicAddU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)i64); 
+} 
+ 
+/**
+ * Atomically exchanges and adds to a size_t value, ordered.
+ * @returns The old value.
+ * @param pcb Pointer to the size_t value.
+ * @param cb Number to add.
+ */
+DECLINLINE(size_t) ASMAtomicAddZ(size_t volatile RT_FAR *pcb, size_t cb) 
+{ 
#if ARCH_BITS == 64
  AssertCompileSize(size_t, 8); 
  return ASMAtomicAddU64((uint64_t volatile RT_FAR *)(void RT_FAR *)(pcb), cb); 
#elif ARCH_BITS == 32
  AssertCompileSize(size_t, 4); 
  return ASMAtomicAddU32((uint32_t volatile RT_FAR *)(void RT_FAR *)(pcb), cb); 
#elif ARCH_BITS == 16
  AssertCompileSize(size_t, 2); 
  return ASMAtomicAddU16((uint16_t volatile RT_FAR *)(void RT_FAR *)(pcb), cb); 
#else
  #error "Unsupported ARCH_BITS value"
#endif
+} 
+ 
+/**
+ * Atomically exchanges and adds a value which size might differ between
+ * platforms or compilers, ordered.
+ *
+ * @param pu Pointer to the variable to update.
+ * @param uNew The value to add to *pu.
+ * @param puOld Where to store the old value.
+ */
+#define ASMAtomicAddSize(pu, uNew, puOld) \
+    do { 
+        switch (sizeof(*pu)) { 
+            case 4: *(uint32_t  *)(puOld) = ASMAtomicAddU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; 
+            case 8: *(uint64_t  *)(puOld) = ASMAtomicAddU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; 
+            default: AssertMsgFailed("ASMAtomicAddSize: size %d is not supported\n", sizeof(*pu)); \n+            } 
+    } \n
/**
 * Atomically exchanges and subtracts to an unsigned 16-bit value, ordered.
 * @returns The old value.
 * @param pu16 Pointer to the value.
 * @param u16 Number to subtract.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(uint16_t) ASMAtomicSubU16(uint16_t volatile RT_FAR *pu16, uint32_t u16)
{
    return ASMAtomicAddU16(pu16, (uint16_t)-(int16_t)u16);
}

/**
 * Atomically exchanges and subtracts to a signed 16-bit value, ordered.
 * @returns The old value.
 * @param pi16 Pointer to the value.
 * @param i16 Number to subtract.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(int16_t) ASMAtomicSubS16(int16_t volatile RT_FAR *pi16, int16_t i16)
{
    return (int16_t)ASMAtomicAddU16((uint16_t volatile RT_FAR *)pi16, (uint16_t)-i16);
}

/**
 * Atomically exchanges and subtracts to an unsigned 32-bit value, ordered.
 * @returns The old value.
 * @param pu32 Pointer to the value.
 * @param u32 Number to subtract.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(uint32_t) ASMAtomicSubU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
{
    return ASMAtomicAddU32(pu32, (uint32_t)-(int32_t)u32);
}
Atomically exchanges and subtracts to a signed 32-bit value, ordered.

@returns The old value.

@param pi32 Pointer to the value.

@param i32 Number to subtract.

@remarks x86: Requires a 486 or later.

DECLINLINE(int32_t) ASMAtomicSubS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    return (int32_t)ASMAtomicAddU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)-i32);
}

Atomically exchanges and subtracts to an unsigned 64-bit value, ordered.

@returns The old value.

@param pu64 Pointer to the value.

@param u64 Number to subtract.

@remarks x86: Requires a Pentium or later.

DECLINLINE(uint64_t) ASMAtomicSubU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
{
    return ASMAtomicAddU64(pu64, (uint64_t)-(int64_t)u64);
}

Atomically exchanges and subtracts to a signed 64-bit value, ordered.

@returns The old value.

@param pi64 Pointer to the value.

@param i64 Number to subtract.

@remarks x86: Requires a Pentium or later.

DECLINLINE(int64_t) ASMAtomicSubS64(int64_t volatile RT_FAR *pi64, int64_t i64)
{
    return (int64_t)ASMAtomicAddU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)-i64);
}

Atomically exchanges and subtracts to a size_t value, ordered.
+ * @returns The old value.
+ * @param pcb Pointer to the size_t value.
+ * @param cb Number to subtract.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(size_t) ASMAtomicSubZ(size_t volatile RT_FAR *pcb, size_t cb)
+{
+    #if ARCH_BITS == 64
+        return ASMAtomicSubU64((uint64_t volatile RT_FAR *)pcb, cb);
+    #elif ARCH_BITS == 32
+        return ASMAtomicSubU32((uint32_t volatile RT_FAR *)pcb, cb);
+    #elif ARCH_BITS == 16
+        AssertCompileSize(size_t, 2);
+        return ASMAtomicSubU16((uint16_t volatile RT_FAR *)pcb, cb);
+    #else
+        #error "Unsupported ARCH_BITS value"
+    #endif
+}
+/**
+ * Atomically exchanges and subtracts a value which size might differ between
+ * platforms or compilers, ordered.
+ *
+ * @param pu Pointer to the variable to update.
+ * @param uNew The value to subtract to *pu.
+ * @param puOld Where to store the old value.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#define ASMAtomicSubSize(pu, uNew, puOld) \
+    do { \
+        switch (sizeof(*pu)) { \
+            case 4: *(uint32_t RT_FAR *)(puOld) = ASMAtomicSubU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; \
+            case 8: *(uint64_t RT_FAR *)(puOld) = ASMAtomicSubU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; \
+            default: AssertMsgFailed("ASMAtomicSubSize: size %d is not supported\n", sizeof(*pu)); \
+        } \
+    } while (0)
+/**
+ * Atomically increment a 16-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pu16        Pointer to the value to increment.
+ * @remarks Not implemented. Just to make 16-bit code happy.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLASM(uint16_t) ASMAtomicIncU16(uint16_t volatile RT_FAR *pu16);
+
+/**
+ * Atomically increment a 32-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pu32        Pointer to the value to increment.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMAtomicIncU32(uint32_t volatile RT_FAR *pu32);
+#else
+DECLINLINE(uint32_t) ASMAtomicIncU32(uint32_t volatile RT_FAR *pu32)
+{
+    uint32_t u32;
+    #if RT_INLINE_ASM_USES_INTRIN
+        u32 = _InterlockedIncrement((long RT_FAR *)pu32);
+        return u32;
+    
+    #elif RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("lock; xaddl %0, %1\n"
+                            :=r" (u32),
+                              :=m" (*pu32)
+                            :"0" (1),
+                            :"m" (*pu32)
+                            :"memory");
+        return u32+1;
+    #else
+        __asm
+        {
+            mov     eax, 1
+            #ifdef RT_ARCH_AMD64
+            mov     rdx, [pu32]
+            lock     xadd [rdx], eax
+            #else
+            mov     edx, [pu32]
+            lock     xadd [edx], eax
+            #endif
+            mov     u32, eax
+        }
+    #endif
+}
+
return u32+1;
} #endif
#endif

/**
 * Atomically increment a signed 32-bit value, ordered.
 * @returns The new value.
 * @param   pi32        Pointer to the value to increment.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(int32_t) ASMAtomicIncS32(int32_t volatile RT_FAR *pi32)
{
    return (int32_t)ASMAtomicIncU32((uint32_t volatile RT_FAR *)pi32);
}

/**
 * Atomically increment a 64-bit value, ordered.
 * @returns The new value.
 * @param   pu64        Pointer to the value to increment.
 * @remarks x86: Requires a Pentium or later.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint64_t) ASMAtomicIncU64(uint64_t volatile RT_FAR *pu64);
#else
DECLINLINE(uint64_t) ASMAtomicIncU64(uint64_t volatile RT_FAR *pu64)
{
    if RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
        uint64_t u64;
        u64 = _InterlockedIncrement64((__int64 RT_FAR *)pu64);
        return u64;
    else
        __asm__ __volatile__("lock; xaddq %0, %1

    : "=r" (u64),
    : "=m" (*pu64)
    : "0" (1),
    : "m" (*pu64)
    : "memory");
    return u64 + 1;

#else
+    return ASMAtomicAddU64(pu64, 1) + 1;
+  
+} 
+  
+}  
+/**
+ * Atomically increment a signed 64-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pi64    Pointer to the value to increment.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(int64_t) ASMAtomicIncS64(int64_t volatile RT_FAR *pi64)
+{
+    return (int64_t)ASMAtomicIncU64((uint64_t volatile RT_FAR *)pi64);
+}  
+  
+}  
+/**
+ * Atomically increment a size_t value, ordered.
+ *
+ * @returns The new value.
+ * @param   pcb    Pointer to the value to increment.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(int64_t) ASMAtomicIncZ(size_t volatile RT_FAR *pcb)
+{
+    #if ARCH_BITS == 64
+        return ASMAtomicIncU64((uint64_t volatile RT_FAR *)pcb);
+    #elif ARCH_BITS == 32
+        return ASMAtomicIncU32((uint32_t volatile RT_FAR *)pcb);
+    #elif ARCH_BITS == 16
+        return ASMAtomicIncU16((uint16_t volatile RT_FAR *)pcb);
+    #else
+        #error "Unsupported ARCH_BITS value"
+    +#endif
+}  
+  
+}  
+/**
+ * Atomically decrement an unsigned 32-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pu16    Pointer to the value to decrement.
/* @remarks Not implemented. Just to make 16-bit code happy. */
+ DECLASM(uint32_t) ASMAtomicDecU16(uint16_t volatile RT_FAR *pu16);
+
+/**
+ * Atomically decrement an unsigned 32-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param pu32 Pointer to the value to decrement.
+ */
+/*
+ * @remarks x86: Requires a 486 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMAtomicDecU32(uint32_t volatile RT_FAR *pu32);
+#else
+DECLINLINE(uint32_t) ASMAtomicDecU32(uint32_t volatile RT_FAR *pu32)
+{
+    uint32_t u32;
+    #if RT_INLINE_ASM_USES_INTRIN
+        u32 = _InterlockedDecrement((long RT_FAR *)pu32);
+        return u32;
+    
+    #elif RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("lock; xaddl %0, %1\n\t" 
+                : "=r" (u32),
+                "=m" (*pu32) 
+                : "0" (-1),
+                "m" (*pu32) 
+                : "memory");
+        return u32-1;
+    #else
+        #endif
+    
+    __asm
+    {
+        mov     eax, -1
+    }
+    #ifdef RT_ARCH_AMD64
+        mov     rdx, [pu32]
+        lock xadd [rdx], eax
+    #else
+        mov     edx, [pu32]
+        lock xadd [edx], eax
+    #endif
+    }
+    return u32-1;
+    #endif
+ */
/**
 * Atomically decrement a signed 32-bit value, ordered.
 * @returns The new value.
 * @param   pi32        Pointer to the value to decrement.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(int32_t) ASMAtomicDecS32(int32_t volatile RT_FAR *pi32)
{
    return (int32_t)ASMAtomicDecU32((uint32_t volatile RT_FAR *)pi32);
}

/**
 * Atomically decrement an unsigned 64-bit value, ordered.
 * @returns The new value.
 * @param   pu64        Pointer to the value to decrement.
 * @remarks x86: Requires a Pentium or later.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint64_t) ASMAtomicDecU64(uint64_t volatile RT_FAR *pu64);
#else
DECLINLINE(uint64_t) ASMAtomicDecU64(uint64_t volatile RT_FAR *pu64)
{
#if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
    uint64_t u64 = _InterlockedDecrement64((__int64 volatile RT_FAR *)pu64);
    return u64;
#else
    return ASMAtomicAddU64(pu64, UINT64_MAX) - 1;
#endif
}

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+#endif
+
+/**
+ * Atomically decrement a signed 64-bit value, ordered.
+ *
+ * @returns The new value.
+ *
+ * @param pi64 Pointer to the value to decrement.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(int64_t) ASMAtomicDecS64(int64_t volatile RT_FAR *pi64)
+{
+    return (int64_t)ASMAtomicDecU64((uint64_t volatile RT_FAR *)pi64);
+}
+
+/**
+ * Atomically decrement a size_t value, ordered.
+ *
+ * @returns The new value.
+ *
+ * @param pcb Pointer to the value to decrement.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(int64_t) ASMAtomicDecZ(size_t volatile RT_FAR *pcb)
+{
+    #if ARCH_BITS == 64
+        return ASMAtomicDecU64((uint64_t volatile RT_FAR *)pcb);
+    #elif ARCH_BITS == 32
+        return ASMAtomicDecU32((uint32_t volatile RT_FAR *)pcb);
+    #elif ARCH_BITS == 16
+        return ASMAtomicDecU16((uint16_t volatile RT_FAR *)pcb);
+    #else
+        #error "Unsupported ARCH_BITS value"
+    +#endif
+}
+
+/**
+ * Atomically Or an unsigned 32-bit value, ordered.
+ *
+ * @param pu32 Pointer to the pointer variable to OR u32 with.
+ *
+ * @param u32 The value to OR *pu32 with.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN

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DECLASM(void) ASMAtomicOrU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
#else
DECLINLINE(void) ASMAtomicOrU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
{
    #if RT_INLINE_ASM_USES_INTRIN
        _InterlockedOr((long volatile RT_FAR *)pu32, (long)u32);
    
    #elif RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("lock; orl %1, %0
                              : "=m" (*pu32)
                              : "ir" (u32),
                                "m" (*pu32));
    #else
        __asm
        {
            mov     eax, [u32]
        # ifdef RT_ARCH_AMD64
            mov     rdx, [pu32]
            lock    or [rdx], eax
        # else
            mov     edx, [pu32]
            lock    or [edx], eax
        # endif
        }
    #endif
}

/**
 * Atomically Or a signed 32-bit value, ordered.
 *
 * @param   pi32   Pointer to the pointer variable to OR u32 with.
 * @param   i32    The value to OR *pu32 with.
 *
 * @remarks x86: Requires a 386 or later.
 */
DECLINLINE(void) ASMAtomicOrS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    ASMAtomicOrU32((uint32_t volatile RT_FAR *)pi32, i32);
}

/**
 * Atomically Or an unsigned 64-bit value, ordered.
 *
 * @param   pu64   Pointer to the pointer variable to OR u64 with.
 * @param   u64    The value to OR *pu64 with.
 */
+ * @remarks x86: Requires a Pentium or later.
+ */
+\#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMAtomicOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
+\#else
+DECLINLINE(void) ASMAtomicOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
+{
+    if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
+    + _InterlockedOr64((__int64 volatile RT_FAR *)pu64, (__int64)u64);
+    +
+    +\#elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
+    + __asm__ __volatile__("lock; orq %1, %q0\nt"
+        + : "=m" (*pu64)
+        + : "r" (u64),
+        + "m" (*pu64));
+    +\#else
+    + for (;;)
+    + { uint64_t u64Old = ASMAtomicUoReadU64(pu64);
+    +     uint64_t u64New = u64Old | u64;
+    +     if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
+    +         break;
+    +     ASMNopPause();
+    + }
+    +\#endif
+}\}
+\#endif
+
+/**
+ * Atomically Or a signed 64-bit value, ordered.
+ * @param   pi64   Pointer to the pointer variable to OR u64 with.
+ * @param   i64    The value to OR *pu64 with.
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(void) ASMAtomicOrS64(int64_t volatile RT_FAR *pi64, int64_t i64)
+{
+    ASMAtomicOrU64((uint64_t volatile RT_FAR *)pi64, i64);
+}
+
+/**
+ * Atomically And an unsigned 32-bit value, ordered.
+ * @param   pu32   Pointer to the pointer variable to AND u32 with.
+ */
@param   u32    The value to AND *pu32 with.
+ *
+ @param   v86: Requires a 386 or later.
+ */
+ if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(VOID) ASMAtomicAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
+ else
+ DECLINLINE(VOID) ASMAtomicAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
+ {
+     __asm__ __volatile__("lock; andl %1, %0\n\t"
+         : "=m" (*pu32)
+         : "ir" (u32),
+         "m" (*pu32));
+ }  
+ elif RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("lock; andl %1, %0\n\t"
+     : "=m" (*pu32)
+     : "ir" (u32),
+     "m" (*pu32));
+ else
+     __asm__
+     {
+         mov eax, [u32]
+     }
+ }  
+ endelse
+ ) 
+ endlining

+ Atomically And a signed 32-bit value, ordered.
+ *
+ * @param   pi32   Pointer to the pointer variable to AND i32 with.
+ * @param   i32    The value to AND *pi32 with.
+ *
+ @param   v86: Requires a 386 or later.
+ */
+ DECLINLINE(VOID) ASMAtomicAndS32(int32_t volatile RT_FAR *pi32, int32_t i32)
+ {
+     ASMAtomicAndU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)i32);
+ }
+ +
+ +
+/**
+ * Atomically And an unsigned 64-bit value, ordered.
+ *
+ * @param pu64 Pointer to the pointer variable to AND u64 with.
+ * @param u64 The value to AND *pu64 with.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMAtomicAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
+#else
+DECLINLINE(void) ASMAtomicAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
+{
+# if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
+    _InterlockedAnd64((__int64 volatile RT_FAR *)pu64, u64);
+    #elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
+        __asm__ __volatile__("lock; andq %1, %0\n	"
+                         : "=m" (*pu64)
+                         : "r" (u64),
+                           "m" (*pu64));
+    #else
+        for (;;)
+        {
+            uint64_t u64Old = ASMAtomicUoReadU64(pu64);
+            uint64_t u64New = u64Old & u64;
+            if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
+                break;
+            ASMNopPause();
+        }
+    #endif
+}#endif
+
+/**
+ * Atomically And a signed 64-bit value, ordered.
+ *
+ * @param pi64 Pointer to the pointer variable to AND i64 with.
+ * @param i64 The value to AND *pi64 with.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(void) ASMAtomicAndS64(int64_t volatile RT_FAR *pi64, int64_t i64)
+{
+    ASMAtomicAndU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)i64);
+}
### Atomically OR an unsigned 32-bit value, unordered but interrupt safe

**@param** `pu32` Pointer to the pointer variable to OR u32 with.

**@param** `u32` The value to OR *pu32 with.

**@remarks** x86: Requires a 386 or later.

```c
#if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMAtomicUoOrU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
#else
DECLINLINE(void) ASMAtomicUoOrU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
{
    __asm__ __volatile__("orl %1, %0
        : "m" (*pu32)
        : "ir" (u32),
        "m" (*pu32));
}#endif
#endif
```

### Atomically OR a signed 32-bit value, unordered

**@param** `pi32` Pointer to the pointer variable to OR u32 with.

**@param** `i32` The value to OR *pu32 with.

**@remarks** x86: Requires a 386 or later.

```c
DECLINLINE(void) ASMAtomicUoOrS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    ASMAtomicUoOrU32((uint32_t volatile RT_FAR *)pi32, i32);
}
```
Atomically OR an unsigned 64-bit value, unordered.

@param   pu64   Pointer to the pointer variable to OR u64 with.
@param   u64    The value to OR *pu64 with.
@remarks x86: Requires a Pentium or later.

#if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMAtomicUoOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
#else
DECLINLINE(void) ASMAtomicUoOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
{
#if RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
    __asm__ __volatile__("orq %1, %q0\n	"
                         : "=m" (*pu64)
                         : "r" (u64),
                           "m" (*pu64));
#else
    for (;;)
    {
        uint64_t u64Old = ASMAtomicUoReadU64(pu64);
        uint64_t u64New = u64Old | u64;
        if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
            break;
        ASMNopPause();
    }
#endif
}
#endif

Atomically Or a signed 64-bit value, unordered.

@param   pi64   Pointer to the pointer variable to OR i64 with.
@param   i64    The value to OR *pu64 with.
@remarks x86: Requires a Pentium or later.

DECLINLINE(void) ASMAtomicUoOrS64(int64_t volatile RT_FAR *pi64, int64_t i64)
{
    ASMAtomicUoOrU64((uint64_t volatile RT_FAR *)pi64, i64);
}
/**
 * Atomically And an unsigned 32-bit value, unordered.
 * 
 * @param   pu32   Pointer to the pointer variable to AND u32 with.
 * @param   u32    The value to AND *pu32 with.
 * 
 * @remarks x86: Requires a 386 or later.
 * */
#if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMAtomicUoAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
#else
DECLINLINE(void) ASMAtomicUoAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("andl %1, %0
	" : "=m" (*pu32)
        : "ir" (u32),
           "m" (*pu32));
#else
    __asm
    {
        mov     eax, [u32]
#  ifdef RT_ARCH_AMD64
        mov     rdx, [pu32]
        and     [rdx], eax
#  else
        mov     edx, [pu32]
        and     [edx], eax
#  endif
    }
#endif
}
#endif

/**
 * Atomically And a signed 32-bit value, unordered.
 * 
 * @param   pi32   Pointer to the pointer variable to AND i32 with.
 * @param   i32    The value to AND *pi32 with.
 * 
 * @remarks x86: Requires a 386 or later.
 * */
DECLINLINE(void) ASMAtomicUoAndS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    ASMAtomicUoAndU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)i32);
}
/**
 * Atomically And an unsigned 64-bit value, unordered.
 * @param   pu64   Pointer to the pointer variable to AND u64 with.
 * @param   u64    The value to AND *pu64 with.
 * @remarks x86: Requires a Pentium or later.
 */

#if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMAtomicUoAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
#else
DECLINLINE(void) ASMAtomicUoAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
{
# if RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
    __asm__ __volatile__("andq %1, %0\n	" 
                              : "=m" (*pu64)
                              : "r" (u64),
                              "m" (*pu64));
# else
    for (;;)
    {
        uint64_t u64Old = ASMAtomicUoReadU64(pu64);
        uint64_t u64New = u64Old & u64;
        if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
            break;
        ASMNopPause();
    }
# endif
}
#endif

/**
 * Atomically And a signed 64-bit value, unordered.
 * @param   pi64   Pointer to the pointer variable to AND i64 with.
 * @param   i64    The value to AND *pi64 with.
 * @remarks x86: Requires a Pentium or later.
 */

DECLINLINE(void) ASMAtomicUoAndS64(int64_t volatile RT_FAR *pi64, int64_t i64)
{
    ASMAtomicUoAndU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)i64);
}

/**
 * Atomically And a signed 64-bit value, unordered.
 * @param   pi64   Pointer to the pointer variable to AND i64 with.
 * @param   i64    The value to AND *pi64 with.
 * @remarks x86: Requires a Pentium or later.
 */

DECLINLINE(void) ASMAtomicUoAndS64(int64_t volatile RT_FAR *pi64, int64_t i64)
Atomically increment an unsigned 32-bit value, unordered.
@returns the new value.
@param pu32 Pointer to the variable to increment.
@remarks x86: Requires a 486 or later.

#if RT_INLINE_ASM_EXTERNAL
DECLASM(uint32_t) ASMAtomicUoIncU32(uint32_t volatile RT_FAR *pu32);
#else
DECLINLINE(uint32_t) ASMAtomicUoIncU32(uint32_t volatile RT_FAR *pu32)
{
    uint32_t u32;
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("xaddl %0, %1\n"
        : "=r" (u32),
        : "=m" (*pu32)
        : "0" (1),
        : "m" (*pu32)
        : "memory");
    return u32 + 1;
#else
    __asm
    {
        mov     eax, 1
#if defined RT_ARCH_AMD64
        mov     rdx, [pu32]
        xadd    [rdx], eax
#else
        mov     edx, [pu32]
        xadd    [edx], eax
#endif
        mov     u32, eax
    }
    return u32 + 1;
#endif
}
#endif

Atomically decrement an unsigned 32-bit value, unordered.
@returns the new value.
@param pu32 Pointer to the variable to decrement.
@remarks x86: Requires a 486 or later.

#if RT_INLINE_ASM_EXTERNAL
DECLASM(uint32_t) ASMAtomicUoDecU32(uint32_t volatile RT_FAR *pu32);
#else
DECLINLINE(uint32_t) ASMAtomicUoDecU32(uint32_t volatile RT_FAR *pu32)
{
    uint32_t u32;
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("xaddl %0, %1\n"
        : "=r" (u32),
        : "=m" (*pu32)
        : "0" (1),
        : "m" (*pu32)
        : "memory");
    return u32 + 1;
#else
    __asm
    {
        mov     eax, 1
#if defined RT_ARCH_AMD64
        mov     rdx, [pu32]
        xadd    [rdx], eax
#else
        mov     edx, [pu32]
        xadd    [edx], eax
#endif
        mov     u32, eax
    }
    return u32 + 1;
#endif
}
#endif
+ if RT_INLINE_ASM_EXTERNAL
+ #define ASMAtomicUoDecU32(uint32_t volatile RT_FAR *pu32);
+ else
+ #define ASMAtomicUoDecU32(uint32_t volatile RT_FAR *pu32)
+ {
+     uint32_t u32;
+     if RT_INLINE_ASM_GNU_STYLE
+     __asm__ __volatile__("lock; xaddl %0, %1\n\t"
+             : "r" (u32),
+               "=m" (*pu32)
+             : "0" (-1),
+               "m" (*pu32)
+             : "memory");
+     return u32 - 1;
+ } else
+     __asm__
+     {
+         mov eax, -1
+     ifdef RT_ARCH_AMD64
+         mov rdx, [pu32]
+         xadd [rdx], eax
+     else
+         mov edx, [pu32]
+         xadd [edx], eax
+     endif
+     mov u32, eax
+     }
+     return u32 - 1;
+ } endif
+ +#endif
+ +
+ /** @def RT_ASM_PAGE_SIZE
+ * We try avoid dragging in iprt/param.h here.
+ * @internal
+ */
+ if defined(RT_ARCH_SPARC64)
+ #define RT_ASM_PAGE_SIZE 0x2000
+ if defined(PAGE_SIZE) && !defined(NTINCLUDED)
+ if PAGE_SIZE != 0x2000
+ error "PAGE_SIZE is not 0x2000!"
+ endif
+ endif
+ else
+ #define RT_ASM_PAGE_SIZE 0x1000
+ if defined(PAGE_SIZE) && !defined(NTINCLUDED)
+ if PAGE_SIZE != 0x1000
+
### error "PAGE_SIZE is not 0x1000!"
### endif
### endif
### endif
+
+/**
+ * Zeros a 4K memory page.
+ *
+ * @param   pv  Pointer to the memory block. This must be page aligned.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMMemZeroPage(volatile void *pv);
+else
+DECLINLINE(void) ASMMemZeroPage(volatile void *pv)
+
+if RT_INLINE_ASM_USES_INTRIN
+if RT_ARCH_AMD64
+__stosq((unsigned __int64 *)pv, 0, RT_ASM_PAGE_SIZE / 8);
+else
+__stosd((unsigned long *)pv, 0, RT_ASM_PAGE_SIZE / 4);
+endif
+
+elif RT_INLINE_ASM_GNU_STYLE
+RTCCUINTREG uDummy;
+if RT_ARCH_AMD64
+__asm__("rep stosq" 
+"=D" (pv),
+"=c" (uDummy)
+"0" (pv),
+"c" (RT_ASM_PAGE_SIZE >> 3),
+"a" (0)
+"memory");
+else
+__asm__("rep stosl" 
+"=D" (pv),
+"=c" (uDummy)
+"0" (pv),
+"c" (RT_ASM_PAGE_SIZE >> 2),
+"a" (0)
+"memory");
+endif
+else
+__asm
+
+if RT_ARCH_AMD64
+xor rax, rax
+mov ecx, 0200h
+mov rdi, [pv]
### Declaring the Function

```c
DECLASM(void) ASMMemZero32(volatile void RT_FAR *pv, size_t cb);
```

### If RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN

```c
DECLINLINE(void) ASMMemZero32(volatile void RT_FAR *pv, size_t cb)
{
    #if RT_INLINE_ASM_USES_INTRIN
        __stosq((unsigned __int64 RT_FAR *)pv, 0, cb / 8);
    #else
        __stosd((unsigned long RT_FAR *)pv, 0, cb / 4);
    #endif
    __asm
    {
        xor     eax, eax
        mov     ecx, 0400h
        mov     edi, [pv]
        rep     stosd
    }
}
```

### If RT_INLINE_ASM_GNU_STYLE

```c
__asm__ __volatile__("rep stosl"
    : ":D" (pv),
    : ":c" (cb)
    : "0" (pv),
    : "1" (cb >> 2),
    : "a" (0)
    : "memory");
```

### Else

```c
__asm
{
    xor eax, eax
    if (!((cb & 7))
        __stosq((unsigned __int64 RT_FAR *)pv, 0, cb / 8);
    else
        __stosd((unsigned long RT_FAR *)pv, 0, cb / 4);
    __asm
    {
        xor eax, eax
        mov ecx, [cb]
        shr rcx, 2
        mov rdi, [pv]
    }
```
+    mov     ecx, [cb]
+    shr     ecx, 2
+    mov     edi, [pv]
+    rep stosl
+    }  
+}  
+}
+}
+/*
+ * Fills a memory block with a 32-bit aligned size.
+ *
+ * @param   pv  Pointer to the memory block.
+ * @param   cb  Number of bytes in the block. This MUST be aligned on 32-bit!
+ * @param   u32 The value to fill with.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32);
+#else
+DECLINLINE(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32)
+{  
+    __asm
+    {  
+    }  
+}  
+}  
+/*
+ * Fills a memory block with a 32-bit aligned size.
+ *
+ * @param   pv  Pointer to the memory block.
+ * @param   cb  Number of bytes in the block. This MUST be aligned on 32-bit!
+ * @param   u32 The value to fill with.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32);
+#else
+DECLINLINE(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32)
+{  
+    __asm
+    {  
+    }  
+}  
+}  
+/*
+ * Fills a memory block with a 32-bit aligned size.
+ *
+ * @param   pv  Pointer to the memory block.
+ * @param   cb  Number of bytes in the block. This MUST be aligned on 32-bit!
+ * @param   u32 The value to fill with.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32);
+#else
+DECLINLINE(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32)
+{  
+    __asm
+    {  
+    }  
+}  
+}  
+/*
+ * Fills a memory block with a 32-bit aligned size.
+ *
+ * @param   pv  Pointer to the memory block.
+ * @param   cb  Number of bytes in the block. This MUST be aligned on 32-bit!
+ * @param   u32 The value to fill with.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32);
+#else
+DECLINLINE(void) ASMMemFill32(volatile void RT_FAR *pv, size_t cb, uint32_t u32)
+{  
+    __asm
+    {  
+    }  
+}  
+}
```c
## Checks if a memory block is all zeros.
## @returns Pointer to the first non-zero byte.
## @returns NULL if all zero.
## @param pv Pointer to the memory block.
## @param cb Number of bytes in the block.
## @todo Fix name, it is a predicate function but it's not returning boolean!

#define !defined(RDESKTOP) && (!defined(RT_OS_LINUX) || !defined(__KERNEL__))

DECLASM(void RT_FAR *) ASMMemFirstNonZero(void const RT_FAR *pv, size_t cb);

DECLINLINE(void RT_FAR *) ASMMemFirstNonZero(void const RT_FAR *pv, size_t cb)
{
    uint8_t const *pb = (uint8_t const RT_FAR *)pv;
    for (; cb; cb--, pb++)
        if (RT_LIKELY(*pb == 0))
            else
                return (void RT_FAR *)pb;
    return NULL;
}

## Checks if a memory block is all zeros.
## @returns true if zero, false if not.
## @param pv Pointer to the memory block.
## @param cb Number of bytes in the block.

ASMMemFirstNonZero
```
DECLINLINE(bool) ASMMemIsZero(void const RT_FAR *pv, size_t cb)
{
    return ASMMemFirstNonZero(pv, cb) == NULL;
}

/**
 * Checks if a memory page is all zeros.
 * @returns true / false.
 * @param   pvPage      Pointer to the page. Must be aligned on 16 byte boundary
 */
DECLINLINE(bool) ASMMemIsZeroPage(void const RT_FAR *pvPage)
{
#if 0 /*RT_INLINE_ASM_GNU_STYLE - this is actually slower... */
    union { RTCCUINTREG r; bool f; } uAX;
    RTCCUINTREG xCX, xDI;
    Assert(!((uintptr_t)pvPage & 15));
    __asm__ __volatile__("repe; \\
#if RT_ARCH_AMD64
                         "scasq
	"\n#else
                         "scasl
	"\n#endif
                         "setnc %%al\n	" \\
# ifdef RT_ARCH_AMD64
                         "0" (RT_ASM_PAGE_SIZE/8),
#else
                         "0" (RT_ASM_PAGE_SIZE/4),
#endif
                           : "=&c" (xCX),
                           "=&D" (xDI),
                           "=&a" (uAX.r)
                           : "mr" (pvPage),
                           "scasq\n\t"
# ifdef RT_ARCH_AMD64
                       "0" (RT_ASM_PAGE_SIZE/8),
#else
                       "0" (RT_ASM_PAGE_SIZE/4),
#endif
                           : "l" (pvPage),
                           "2" (0));
    return uAX.f;
#else
    uintptr_t const RT_FAR *puPtr = (uintptr_t const RT_FAR *)pvPage;
    size_t size_t cLeft = RT_ASM_PAGE_SIZE / sizeof(uintptr_t) / 8;
    Assert(!(uintptr_t(pvPage & 15));
    for (; ;)
    {
        if (puPtr[0]) return false;
        if (puPtr[4]) return false;
    }
#endif
    return false;
}
+   if (puPtr[2])   return false;
+   if (puPtr[6])   return false;
+   if (puPtr[1])   return false;
+   if (puPtr[5])   return false;
+   if (puPtr[3])   return false;
+   if (puPtr[7])   return false;
+   if (!--cLeft)
+       return true;
+   puPtr += 8;
+ }
+## endif
+
+/**
+ * Checks if a memory block is filled with the specified byte, returning the
+ * first mismatch.
+ *
+ * This is sort of an inverted memchr.
+ *
+ * @returns Pointer to the byte which doesn't equal u8.
+ * @returns NULL if all equal to u8.
+ *
+ * @param   pv      Pointer to the memory block.
+ * @param   cb      Number of bytes in the block.
+ * @param   u8      The value it's supposed to be filled with.
+ *
+ * @remarks No alignment requirements.
+ */
+##if    (!defined(RT_OS_LINUX) || !defined(_KERNEL__))
+    && (!defined(RT_OS_FREEBSD) || !defined(_KERNEL))
+DECLASM(void *) ASMMemFirstMismatchingU8(void const RT_FAR *pv, size_t cb, uint8_t u8);
+##else
+DECLINLINE(void *) ASMMemFirstMismatchingU8(void const RT_FAR *pv, size_t cb, uint8_t u8)
+
+##endif

+{ 
+   uint8_t const *pb = (uint8_t const RT_FAR *)pv;
+   for (; cb; cb--, pb++)
+      if (RT_LIKELY(*pb == u8))
+         { /* likely */ }
+      else
+          return (void *)pb;
+ return NULL;
+} 
+##endif
/**
 * Checks if a memory block is filled with the specified byte.
 * @returns true if all matching, false if not.
 * @param   pv      Pointer to the memory block.
 * @param   cb      Number of bytes in the block.
 * @param   u8      The value it's supposed to be filled with.
 * @returns No alignment requirements.
 */
DECLINLINE(bool) ASMMemIsAllU8(void const RT_FAR *pv, size_t cb, uint8_t u8)
{
    return ASMMemFirstMismatchingU8(pv, cb, u8) == NULL;
}

/**
 * Checks if a memory block is filled with the specified 32-bit value.
 * This is a sort of inverted memchr.
 * @returns Pointer to the first value which doesn't equal u32.
 * @returns NULL if all equal to u32.
 * @param   pv      Pointer to the memory block.
 * @param   cb      Number of bytes in the block. This MUST be aligned on 32-bit!
 * @param   u32     The value it's supposed to be filled with.
 */
DECLINLINE(uint32_t RT_FAR *) ASMMemFirstMismatchingU32(void const RT_FAR *pv, size_t cb, uint32_t u32)
{
    uint32_t const RT_FAR *pu32 = (uint32_t const RT_FAR *)pv;
    for (; cb; cb -= 4, pu32++)
        if (RT_LIKELY(*pu32 == u32))
            { /* likely */ }
        else
            return (uint32_t RT_FAR *)pu32;
    return NULL;
}

/**
 * Probes a byte pointer for read access.
 * @returns
 */
While the function will not fault if the byte is not read accessible, the idea is to do this in a safe place like before acquiring locks and such like.

Also, this function guarantees that an eager compiler is not going to optimize the probing away.

@param pvByte Pointer to the byte.

#if RT_INLINE_ASM_EXTERNAL
 DECLASM(uint8_t) ASMProbeReadByte(const void RT_FAR *pvByte);
#else
 DECLINLINE(uint8_t) ASMProbeReadByte(const void RT_FAR *pvByte)
{
    /** @todo verify that the compiler actually doesn't optimize this away. (intel & gcc) */
    uint8_t u8;
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("movb (%1), %0
        : "=r" (u8)
        : "r" (pvByte));
#else
    __asm
    {
        # ifdef RT_ARCH_AMD64
            mov    rax, [pvByte]
        # else
            mov    eax, [pvByte]
        # endif
        mov    al, [eax]
    }
    mov    [u8], al
#endif
    return u8;
#endif

/**
 * Probes a buffer for read access page by page.
 * While the function will fault if the buffer is not fully read accessible, the idea is to do this in a safe place like before acquiring locks and such like.
 * Also, this function guarantees that an eager compiler is not going to optimize the probing away.
 */
@param pvBuf Pointer to the buffer.
+ * @param cbBuf The size of the buffer in bytes. Must be >= 1.
+ */
+DECLINLINE(void) ASMProbeReadBuffer(const void RT_FAR *pvBuf, size_t cbBuf)
+{
+    /** @todo verify that the compiler actually doesn't optimize this away. (intel & gcc) */
+    /* the first byte */
+    const uint8_t RT_FAR *pu8 = (const uint8_t RT_FAR *)pvBuf;
+    ASMProbeReadByte(pu8);
+    /* the pages in between pages. */
+    while (cbBuf > RT_ASM_PAGE_SIZE)
+    {
+        ASMProbeReadByte(pu8);
+        cbBuf -= RT_ASM_PAGE_SIZE;
+        pu8   += RT_ASM_PAGE_SIZE;
+    }
+    /* the last byte */
+    ASMProbeReadByte(pu8 + cbBuf - 1);
+}
+
+/** @defgroup grp_inline_bits Bit Operations
+ * @@
+ */
+/**
+ * Sets a bit in a bitmap.
+ *
+ * @param pvBitmap Pointer to the bitmap. This should be 32-bit aligned.
+ * @param iBit The bit to set.
+ *
+ * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ * However, doing so will yield better performance as well as avoiding
+ * traps accessing the last bits in the bitmap.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(void) ASMBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+    _bittestandset((long RT_FAR *)pvBitmap, iBit);
+}
+#endif
+DECLINLINE(void) ASMBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{ // GNU
+    __asm__ __volatile__ "btsl %1, %0"}
+ "=m" (*(volatile long RT_FAR *)pvBitmap)
+ "Ir" (iBit),
+ "m" (*(volatile long RT_FAR *)pvBitmap)
+ "memory");
+# else
+ __asm
+ {
+ #ifdef RT_ARCH_AMD64
+ mov     rax, [pvBitmap]
+ mov     edx, [iBit]
+ bts     [rax], edx
+ #else
+ mov     eax, [pvBitmap]
+ mov     edx, [iBit]
+ bts     [eax], edx
++ endif
+ }
++ endif
+ }
+#endif
+
+ /**
+ * Atomically sets a bit in a bitmap, ordered.
+ *
+ * @param   pvBitmap    Pointer to the bitmap. Must be 32-bit aligned, otherwise
+ *                      the memory access isn't atomic!
+ * @param   iBit        The bit to set.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+ #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(void) ASMAtomicBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
+ #else
+ DECLINLINE(void) ASMAtomicBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit)
+ {
+    AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+ #if RT_INLINE_ASM_USES_INTRIN
+    _interlockedbittestandset((long RT_FAR *)pvBitmap, iBit);
+ #else
+    __asm
+    {
+        mov     eax, [pvBitmap]
+        mov     edx, [iBit]
+        bts     [eax], edx
+    }
+    __asm__ __volatile__("lock; btsl %1, %0"
+                         : "=m" (*(volatile long *)pvBitmap)
+                         : "Ir" (iBit),
+                           "m" (*(volatile long *)pvBitmap)
+                         : "memory");
+ #else
+ __asm
+ {
+    mov     eax, [pvBitmap]
+    mov     edx, [iBit]
+    bts     [eax], edx
+    __asm__ __volatile__("lock; btsl %1, %0"
+                         : "=m" (*(volatile long *)pvBitmap)
+                         : "Ir" (iBit),
+                           "m" (*(volatile long *)pvBitmap)
+                         : "memory");
+ #endif
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [iBit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*(volatile long *)pvBitmap)
+                       : "memory");
+  __asm
+  {
+      mov     eax, [pvBitmap]
+      mov     edx, [i Bit]
+      bts     [eax], edx
+  }
+  __asm__ __volatile__("lock; btsl %1, %0"
+                       : "=m" (*(volatile long *)pvBitmap)
+                       : "Ir" (iBit),
+                         "m" (*
+ #ifdef RT_ARCH_AMD64
+     mov     rax, [pvBitmap]
+     mov     edx, [iBit]
+     lock bts [rax], edx
+ #else
+     mov     eax, [pvBitmap]
+     mov     edx, [iBit]
+     lock bts [eax], edx
+ #endif
+ }
+ #endif
+ #endif
+
+/**
+ * Clears a bit in a bitmap.
+ *
+ * @param   pvBitmap    Pointer to the bitmap.
+ * @param   iBit        The bit to clear.
+ *
+ * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ *          However, doing so will yield better performance as well as avoiding
+ *          traps accessing the last bits in the bitmap.
+ */
+#endif
+
+#elif RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMBitClear(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(void) ASMBitClear(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+    #if RT_INLINE_ASM_USES_INTRIN
+        _bittestandreset((long RT_FAR *)pvBitmap, iBit);
+    #elif RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("btrl %1, %0"
+          : "=m" (*(volatile long RT_FAR *)pvBitmap)
+          : "Ir" (iBit),
+          : "memory");
+    #else
+    __asm__
+    {
+        # ifdef RT_ARCH_AMD64
+            mov     rax, [pvBitmap]
+            mov     edx, [iBit]
+            btr     [rax], edx
+        #else
+            mov     eax, [pvBitmap]
+            mov     edx, [iBit]
+            btr     [eax], edx
+        #endif
+        }
+}
+ mov edx, [iBit]
+ btr [eax], edx
+#endif
+}
+endif
+
+/**
+ * Atomically clears a bit in a bitmap, ordered.
+ *
+ * @param   pvBitmap    Pointer to the bitmap. Must be 32-bit aligned, otherwise
+ *                      the memory access isn't atomic!
+ * @param   iBit        The bit to toggle set.
+ *
+ * @remarks No memory barrier, take care on smp.
+ * @remarks x86: Requires a 386 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMAtomicBitClear(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(void) ASMAtomicBitClear(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+    AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+    __asm__ __volatile__("lock; btrl %1, %0"
+                         : "=m" (*(volatile long RT_FAR *)pvBitmap)
+                         : "Ir" (iBit),
+                         "m" (*(volatile long RT_FAR *)pvBitmap)
+                         : "memory");
+}#else
+    __asm__ __volatile__("lock; btrl %1, %0"
+                         : "=m" (*(volatile long RT_FAR *)pvBitmap)
+                         : "Ir" (iBit),
+                         "m" (*(volatile long RT_FAR *)pvBitmap)
+                         : "memory");
+}
+endif
+}
+endif
+
/**
 * Toggles a bit in a bitmap.
 */

/**
 * @param   pvBitmap   Pointer to the bitmap.
 * @param   iBit       The bit to toggle.
 *
 * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
 *          However, doing so will yield better performance as well as avoiding
 *          traps accessing the last bits in the bitmap.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);
#else
DECLINLINE(void) ASMBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
{
# if RT_INLINE_ASM_USES_INTRIN
    _bittestandcomplement((long RT_FAR *)pvBitmap, iBit);
# elif RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("btcl %1, %0"
                         : "=m" (*(volatile long *)pvBitmap)
                         : "Ir" (iBit),
                           "m" (*(volatile long *)pvBitmap)
                         : "memory");
# else
    __asm
    {
# ifdef RT_ARCH_AMD64
        mov     rax, [pvBitmap]
        mov     edx, [iBit]
        btc     [rax], edx
# else
        mov     eax, [pvBitmap]
        mov     edx, [iBit]
        btc     [eax], edx
# endif
    }
# endif
}
#endif

/**
 * Atomically toggles a bit in a bitmap, ordered.
 */

/**
 * @param   pvBitmap   Pointer to the bitmap. Must be 32-bit aligned, otherwise
 *                     the memory access isn't atomic!
 * @param   iBit       The bit to test and set.
 */
+ * @remarks x86: Requires a 386 or later.
+ */
+If RT_INLINE_ASM_EXTERNAL
+DECLAREASM(void) ASMAtomicBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);
+else
+DECLINLINE(void) ASMAtomicBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
+
+    + AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+    +# if RT_INLINE_ASM_GNU_STYLE
+    +  __asm__ __volatile__("lock; btcl %1, %0"
+    +    : ".m" (*((volatile long RT_FAR *)pvBitmap)
+    +    : "Ir" (iBit),
+    +    ".m" (*((volatile long RT_FAR *)pvBitmap)
+    +    : "memory");
+    +# else
+    +  __asm
+    +  {
+    +# ifdef RT_ARCH_AMD64
+    +      mov     rax, [pvBitmap]
+    +      mov     edx, [iBit]
+    +      lock btc [rax], edx
+    +# else
+    +      mov     eax, [pvBitmap]
+    +      mov     edx, [iBit]
+    +      lock btc [eax], edx
+    +# endif
+    +  }
+    +# endif
+  }
+  +#endif
+}
+召asm
+ +
+ +
+ ** Tests and sets a bit in a bitmap.
+ *
+ + @returns true if the bit was set.
+ + @returns false if the bit was clear.
+ *
+ + @param pvBitmap Pointer to the bitmap.
+ + @param iBit The bit to test and set.
+ *
+ + @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ + However, doing so will yield better performance as well as avoiding
+ + traps accessing the last bits in the bitmap.
+ */
+ If RT_INLINE_ASM_EXTERNAL & !RT_INLINE_ASM_USES_INTRIN
+DECLAREASM(bool) ASMBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
DECLINLINE(bool) ASMBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit) {
    union { bool f; uint32_t u32; uint8_t u8; } rc;
    #if RT_INLINE_ASM_USES_INTRIN
    rc.u8 = _bittestandset((long RT_FAR *)pvBitmap, iBit);
    #elif RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("btsl %2, %1\n\t" 
                         "setc %b0\n\t" 
                         "andl $1, %0\n\t" 
                         : "=q" (rc.u32),
                           "=m" (*(volatile long RT_FAR *)pvBitmap)
                         : "Ir" (iBit),
                           "m" (*(volatile long RT_FAR *)pvBitmap)
                         : "memory");
    #else
    __asm
    {
        mov     edx, [iBit]
        #ifdef RT_ARCH_AMD64
        mov     rax, [pvBitmap]
        bts     [rax], edx
        #else
        mov     eax, [pvBitmap]
        bts     [eax], edx
        #endif
        setc    al
        and     eax, 1
        mov     [rc.u32], eax
    }
    #endif
    return rc.f;
}#endif

/**
 * Atomically tests and sets a bit in a bitmap, ordered.
 * @returns true if the bit was set.
 * @returns false if the bit was clear.
 * @param   pvBitmap    Pointer to the bitmap. Must be 32-bit aligned, otherwise
 *                      the memory access isn’t atomic!
 * @param   iBit        The bit to set.
 * @returns
 */
/*#if RT_INLINE_ASM_EXTERNAL &amp;&amp; !RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMAtomicBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
+*/
+DECLINLINE(bool) ASMAtomicBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit) +{
+    union { bool f; uint32_t u32; uint8_t u8; } rc;
+    AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+    if RT_INLINE_ASM_USES_INTRIN
+        rc.u8 = _interlockedbittestandset((long RT_FAR *)pvBitmap, iBit);
+    else if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("lock; btsl %2, %1\n\t" +
+            "setc %b0\n\t" +
+            "andl $1, %0\n\t" +
+            ":=q" (rc.u32),
+            ":=m" *(volatile long RT_FAR *)pvBitmap)
+    else
+        __asm
+        {
+            mov     edx, [iBit]
+            ifdef RT_ARCH_AMD64
+                mov     rax, [pvBitmap]
+                lock bts [rax], edx
+            else
+                mov     eax, [pvBitmap]
+                lock bts [eax], edx
+            endif
+        }
+        setc    al
+        and     eax, 1
+        mov     [rc.u32], eax
+    }
+    return rc.f;
+}
+*/

+/**
+ * Tests and clears a bit in a bitmap.
+ *
+ * @returns true if the bit was set.
+ * @returns false if the bit was clear.
+ *
+ * @param pvBitmap Pointer to the bitmap.
+ * @param iBit The bit to test and clear.
+ */

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+ * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ * However, doing so will yield better performance as well as avoiding
+ * traps accessing the last bits in the bitmap.
+ */
+@if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMBitTestAndClear(volatile void RT_FAR *pvBitmap, int32_t iBit);
+@else
+DECLINLINE(bool) ASMBitTestAndClear(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+  union { bool f; uint32_t u32; uint8_t u8; } rc;
+  if RT_INLINE_ASM_USES_INTRIN
+    rc.u8 = _bittestandreset((long RT_FAR *)pvBitmap, iBit);
+  +#elif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("btrl %2, %1
+                         "setc %b0
+                         "andl $1, %0
+                         : "=q" (rc.u32),
+                         : "Ir" (iBit),
+                         : "memory");
+  +#else
+    __asm__
+    {
+      mov     edx, [iBit]
+      mov     rax, [pvBitmap]
+      btr     [rax], edx
+      setc    al
+      and     eax, 1
+      mov     [rc.u32], eax
+    }
+  }
+@endcode
+ret rc.f;
+}
+@endcode
+ Atomically tests and clears a bit in a bitmap, ordered.
+ * @returns true if the bit was set.
+ * @returns false if the bit was clear.
+ *
+ * @param pvBitmap Pointer to the bitmap. Must be 32-bit aligned, otherwise
+ * the memory access isn't atomic!
+ *
+ * @param iBit The bit to test and clear.
+ *
+ * @remarks No memory barrier, take care on smp.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMAtomicBitTestAndClear(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(bool) ASMAtomicBitTestAndClear(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+    union { bool f; uint32_t u32; uint8_t u8; } rc;
+    AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+# if RT_INLINE_ASM_USES_INTRIN
+rc.u8 = _interlockedbittestandreset((long RT_FAR *)pvBitmap, iBit);
+    __asm__ __volatile__("lock; btrl %2, %1
+                         "setc %b0
+                         "andl $1, %0
+                         : "=q" (rc.u32),
+                           "=m" (*(volatile long RT_FAR *)pvBitmap)
+                         : "Ir" (iBit),
+                           "m" (*(volatile long RT_FAR *)pvBitmap)
+                         : "memory");
+# else
+    __asm
+    {
+        mov     edx, [iBit]
+        ifdef RT_ARCH_AMD64
+        mov     rax, [pvBitmap]
+        lock btr [rax], edx
+        endif
+        mov     eax, [pvBitmap]
+        lock btr [eax], edx
+    }
+    setc    al
+    and     eax, 1
+    mov     [rc.u32], eax
+}
+    return rc.f;
+}
+#endif
+
/**
 * Tests and toggles a bit in a bitmap.
 *
 * @returns true if the bit was set.
 * @returns false if the bit was clear.
 *
 * @param   pvBitmap    Pointer to the bitmap.
 * @param   iBit        The bit to test and toggle.
 *
 * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
 *          However, doing so will yield better performance as well as avoiding
 *          traps accessing the last bits in the bitmap.
 */

#define RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN

DECLASM(bool) ASMBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);

#else

DECLINLINE(bool) ASMBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
{
    union { bool f; uint32_t u32; uint8_t u8; } rc;
# if RT_INLINE_ASM_USES_INTRIN
    rc.u8 = _bittestandcomplement((long RT_FAR *)pvBitmap, iBit);
# elif RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("btcl %2, %1
        setc %b0\nl\n        andl $1, %0\nl\n        "="q" (rc.u32),
        ":="m" (*(volatile long RT_FAR *)pvBitmap)
        : "Ir" (iBit),
        : "memory");
# else
    __asm
    {
        mov   edx, [iBit]
# ifdef RT_ARCH_AMD64
        mov   rax, [pvBitmap]
        btc   [rax], edx
# else
        mov   eax, [pvBitmap]
        btc   [eax], edx
# endif
        setc  al
        and   eax, 1
        mov   [rc.u32], eax
    }
# endif


return rc.f;
+
#endif
+
+
+/**
+ * Atomically tests and toggles a bit in a bitmap, ordered.
+ *
+ * @returns true if the bit was set.
+ * @returns false if the bit was clear.
+ *
+ * @param   pvBitmap Pointer to the bitmap. Must be 32-bit aligned, otherwise
+ * the memory access isn't atomic!
+ * @param   iBit The bit to test and toggle.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+}

+if RT_INLINE_ASM_EXTERNAL
+DECLASM(bool) ASMAtomicBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);
+else
+DECLINLINE(bool) ASMAtomicBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
+
+{
+union { bool f; uint32_t u32; uint8_t u8; } rc;
+AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+
+if RT_INLINE_ASM_GNU_STYLE
+  __asm__ __volatile__ ("lock; btcl %2, %1
	setc %b0
	andl $1, %0
	:
	":=q" (rc.u32),
+  ":m" (*(volatile long RT_FAR *)pvBitmap)
+  ":Ir" (iBit),
+  ":m" (*(volatile long RT_FAR *)pvBitmap)
+  ":memory" );
+# else
+  __asm
+  {
+    mov     edx, [iBit]
+  # ifdef RT_ARCH_AMD64
+    mov     rax, [pvBitmap]
+    lock btc [rax], edx
+  # else
+    mov     eax, [pvBitmap]
+    lock btc [eax], edx
+  # endif
+    setc    al
+    and     eax, 1
+    mov     [rc.u32], eax
+  }
+}
DECLASM(bool) ASMBitTest(const volatile void RT_FAR *pvBitmap, int32_t iBit);

DECLINLINE(bool) ASMBitTest(const volatile void RT_FAR *pvBitmap, int32_t iBit)
{
    union { bool f; uint32_t u32; uint8_t u8; } rc;
    if RT_INLINE_ASM_USES_INTRIN
        rc.u32 = _bittest((long *)pvBitmap, iBit);
    else
        __asm__ __volatile__("btl %2, %1\n	"     "setc %b0\n	"     "andl $1, %0\n	"     : "q" (rc.u32)
            : "m" ((const volatile long *)pvBitmap),
               "Ir" (iBit)
            : "memory");
    __asm__
    {    mov   edx, [iBit]
    }  
    mov   eax, [pvBitmap]
    bt    [eax], edx
    __asm__
    {
        mov   edx, [iBit]
        mov   edx, [pvBitmap]
        bt    [eax], edx
    }
and eax, 1
mov [rc.u32], eax
}
#endif
return rc.f;
}
#endif

/**
 * Clears a bit range within a bitmap.
 *
 * @param   pvBitmap    Pointer to the bitmap.
 * @param   iBitStart   The First bit to clear.
 * @param   iBitEnd     The first bit not to clear.
 * */
DECLINLINE(void) ASMBitClearRange(volatile void RT_FAR *pvBitmap, int32_t iBitStart, int32_t iBitEnd)
{
    if (iBitStart < iBitEnd)
    {
        volatile uint32_t RT_FAR *pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitStart >> 5);
        int32_t iStart = iBitStart & ~31;
        int32_t iEnd = iBitEnd & ~31;
        if (iStart == iEnd)
            *pu32 &= ((UINT32_C(1) << (iBitStart & 31)) - 1) | ~((UINT32_C(1) << (iBitEnd & 31)) - 1);
        else
        {
            /* bits in first dword. */
            if (iBitStart & 31)
            {
                *pu32 &= (UINT32_C(1) << (iBitStart & 31)) - 1;
                pu32++;
                iBitStart = iStart + 32;
            }
            /* whole dword. */
            if (iBitStart != iEnd)
                ASMMemZero32(pu32, (iEnd - iBitStart) >> 3);
            /* bits in last dword. */
            if (iBitEnd & 31)
            {
                pu32 = (volatile uint32_t *)pvBitmap + (iBitEnd >> 5);
                *pu32 &= ~((UINT32_C(1) << (iBitEnd & 31)) - 1);
            }
        }
    }
}
/**
 * Sets a bit range within a bitmap.
 *
 * @param   pvBitmap    Pointer to the bitmap.
 * @param   iBitStart   The First bit to set.
 * @param   iBitEnd     The first bit not to set.
 */

DECLINLINE(void) ASMBitSetRange(volatile void RT_FAR *pvBitmap, int32_t iBitStart, int32_t iBitEnd)
{
    if (iBitStart < iBitEnd)
    {
        volatile uint32_t RT_FAR *pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitStart >> 5);
        int32_t iStart = iBitStart & ~31;
        int32_t iEnd   = iBitEnd   & ~31;
        if (iStart == iEnd)
            *pu32 |= ((UINT32_C(1) << (iBitEnd - iBitStart)) - 1) << (iBitStart & 31);
        else
        {
            /* bits in first dword. */
            if (iBitStart & 31)
            {
                *pu32 |= ~((UINT32_C(1) << (iBitStart & 31)) - 1);
                pu32++;
                iBitStart = iStart + 32;
            }
            /* whole dword. */
            if (iBitStart != iEnd)
                ASMMemFill32(pu32, (iEnd - iBitStart) >> 3, ~UINT32_C(0));
            /* bits in last dword. */
            if (iBitEnd & 31)
            {
                pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitEnd >> 5);
                *pu32 |= (UINT32_C(1) << (iBitEnd & 31)) - 1;
            }
        }
    }
    /* whole dword. */
    if (iBitStart != iEnd)
        ASMMemFill32(pu32, (iEnd - iBitStart) >> 3, ~UINT32_C(0));
    /* bits in last dword. */
    if (iBitEnd & 31)
    {
        pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitEnd >> 5);
        *pu32 |= (UINT32_C(1) << (iBitEnd & 31)) - 1;
    }
}

/**
 * Finds the first clear bit in a bitmap.
 *
 * @returns Index of the first zero bit.
 * @returns -1 if no clear bit was found.
 */
+ * @param   pvBitmap    Pointer to the bitmap.
+ * @param   cBits       The number of bits in the bitmap. Multiple of 32.
+ */
+\#if RT_INLINE_ASM_EXTERNAL
+DECLASM(int32_t) ASMBitFirstClear(const volatile void RT_FAR *pvBitmap, uint32_t cBits);
+\#else
+DECLINLINE(int32_t) ASMBitFirstClear(const volatile void RT_FAR *pvBitmap, uint32_t cBits)
+{
+    if (cBits)
+    {
+        int32_t iBit;
+        \#if RT_INLINE_ASM_GNU_STYLE
+        RTCCUINTREG uEAX, uECX, uEDI;
+        cBits = RT_ALIGN_32(cBits, 32);
+        __asm__ __volatile__("repe; scasl
+                          je    1f
+                          \# if RT_ARCH_AMD64
+                          lea   -4(%%rdi), %%rdi
+                          xorl  (%%rdi), %%eax
+                          subq  %5, %%rdi
+                          \# else
+                          lea   -4(%%edi), %%edi
+                          xorl  (%%edi), %%eax
+                          subl  %5, %%edi
+                          \# endif
+                          shll  $3, %%edi
+                          bsfl  %%eax, %%edx
+                          addl  %%edi, %%edx
+                          1:	
+                          : "=d" (iBit),
+                          "=\&c" (uECX),
+                          "=\&D" (uEDI),
+                          "=\&a" (uEAX)
+                          : '0' (0xffffffff),
+                          "mr" (pvBitmap),
+                          "1" (cBits >> 5),
+                          "2" (pvBitmap),
+                          "3" (0xffffffff));
+        \# else
+        cBits = RT_ALIGN_32(cBits, 32);
+        __asm
+        { 
+            \# ifdef RT_ARCH_AMD64
+            mov     rdi, [pvBitmap]
+            mov     rbx, rdi
+            \# else
+            mov     edi, [pvBitmap]
+            mov     ebx, edi
+            \}
### Find the next clear bit in a bitmap

```plaintext
/**
 * Finds the next clear bit in a bitmap.
 * @returns Index of the first zero bit.
 * @returns -1 if no clear bit was found.
 * @param   pvBitmap    Pointer to the bitmap.
 * @param   cBits       The number of bits in the bitmap. Multiple of 32.
 * @param   iBitPrev    The bit returned from the last search.
 *                      The search will start at iBitPrev + 1.
 * @returns Index of the first zero bit.
 * @returns -1 if no clear bit was found.
 * @param   pvBitmap    Pointer to the bitmap.
 * @param   cBits       The number of bits in the bitmap. Multiple of 32.
 * @param   iBitPrev    The bit returned from the last search.
 *                      The search will start at iBitPrev + 1.
 */

DECLASM(int) ASMBitNextClear(const volatile void RT_FAR *pvBitmap, uint32_t cBits, uint32_t iBitPrev);
```

```plaintext
const volatile uint32_t RT_FAR *pau32Bitmap = (const volatile uint32_t RT_FAR *)pvBitmap;
int iBit = ++iBitPrev & 31;
```
if (iBit) {
    /* Inspect the 32-bit word containing the unaligned bit. */
    uint32_t u32 = ~pau32Bitmap[iBitPrev / 32] >> iBit;

#if RT_INLINE_ASM_USES_INTRIN
    unsigned long ulBit = 0;
    if (_BitScanForward(&ulBit, u32))
        return ulBit + iBitPrev;
#else
    #if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("bsf %1, %0
          "jnz 1f
          "movl $-1, %0
        1:
          : "r" (iBit)
          : "r" (u32));
    #else
        __asm
        {
            mov     edx, [u32]
            bsf     eax, edx
            jnz     done
            mov     eax, 0xffffffff
        done:
            mov     [iBit], eax
        }
    #endif
#else
    /* Skip ahead and see if there is anything left to search. */
    iBitPrev |= 31;
    iBitPrev++;
    if (cBits <= (uint32_t)iBitPrev)
        return -1;
#endif

    /* 32-bit aligned search, let ASMBitFirstClear do the dirty work. */
    iBit = ASMBitFirstClear(&pau32Bitmap[iBitPrev / 32], cBits - iBitPrev);
    if (iBit >= 0)
iBit += iBitPrev;
return iBit;
#endif
/**
 * Finds the first set bit in a bitmap.
 * @returns Index of the first set bit.
 * @returns -1 if no clear bit was found.
 * @param   pvBitmap    Pointer to the bitmap.
 * @param   cBits       The number of bits in the bitmap. Multiple of 32.
 */
#if RT_INLINE_ASM_EXTERNAL
DECLASM(int32_t) ASMBitFirstSet(const volatile void RT_FAR *pvBitmap, uint32_t cBits);
#else
DECLINLINE(int32_t) ASMBitFirstSet(const volatile void RT_FAR *pvBitmap, uint32_t cBits)
{
    if (cBits)
    {
        int32_t iBit;
        # if RT_INLINE_ASM_GNU_STYLE
        RTCCUINTREG uEAX, uECX, uEDI;
        cBits = RT_ALIGN_32(cBits, 32);
        __asm__ __volatile__("repe; scasl
		je    1f
		"
#  ifdef RT_ARCH_AMD64
		"lea   -4(%%rdi), %%rdi
		movl  (%%rdi), %%eax
		subq  %5, %%rdi
	"
#  else
		"lea   -4(%%edi), %%edi
		movl  (%%edi), %%eax
		subl  %5, %%edi
	"
#  endif
		shll  $3, %%edi
		bsfl  %%eax, %%edx
		addl  %%edi, %%edx
		1:	
" :=d" (iBit),
" :=c" (uECX),
" :=D" (uEDI),
" :=a" (uEAX)
: "0" (0xffffffff),
"mr" (pvBitmap),
"1" (cBits >> 5),
"2" (pvBitmap),
+ "3" (0));
+# else
+  cBits = RT_ALIGN_32(cBits, 32);
+  __asm
+  {
+# ifdef RT_ARCH_AMD64
+    mov rdi, [pvBitmap]
+    mov rbx, rdi
+# else
+    mov edi, [pvBitmap]
+    mov ebx, edi
+# endif
+    mov edx, 0xffffffff
+    xor eax, eax
+    mov ecx, [cBits]
+    shr ecx, 5
+    repe scasd
+    je done
+# ifdef RT_ARCH_AMD64
+    lea rdi, [rdi - 4]
+    mov eax, [rdi]
+    sub rdi, rbx
+# else
+    lea edi, [edi - 4]
+    mov eax, [edi]
+    sub edi, ebx
+# endif
+    shl edi, 3
+    bsf edx, eax
+    add edx, edi
+    done:
+    mov [iBit], edx
+  }
+# endif
+  return iBit;
+}
+ return -1;
+

/**
  * Finds the next set bit in a bitmap.
  *
  * @returns Index of the next set bit.
  * @returns -1 if no set bit was found.
  * @param pvBitmap Pointer to the bitmap.
  * @param cBits The number of bits in the bitmap. Multiple of 32.
+ * @param   iBitPrev    The bit returned from the last search.
+ *                      The search will start at iBitPrev + 1.
+ */
+#else
+DECLASM(int) ASMBitNextSet(const volatile void RT_FAR *pvBitmap, uint32_t cBits, uint32_t iBitPrev);
+#endif
+DECLINLINE(int) ASMBitNextSet(const volatile void RT_FAR *pvBitmap, uint32_t cBits, uint32_t iBitPrev)
+{ 
+    const volatile uint32_t RT_FAR *pau32Bitmap = (const volatile uint32_t RT_FAR *)pvBitmap;
+    int                             iBit = ++iBitPrev & 31;
+    if (iBit)
+    { 
+        /*
+         * Inspect the 32-bit word containing the unaligned bit.
+         */
+        uint32_t u32 = pau32Bitmap[iBitPrev / 32] >> iBit;
+        
+# if RT_INLINE_ASM_USES_INTRIN
+        unsigned long ulBit = 0;
+        if (_BitScanForward(&ulBit, u32))
+            return ulBit + iBitPrev;
+# else
+#  if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("bsf %1, %0\n	" 
                              "jnz 1f\n	" 
                              "movl $-1, %0\n	" 
                              : "=r" (iBit) 
                              : "r" (u32));
+#  else
+        __asm
+        { 
            mov     edx, [u32]
            bsf     eax, edx
            jnz     done
            mov     eax, 0ffffffffh
            done:
            mov     [iBit], eax
        }
+        # endif
+        if (iBit >= 0)
+            return iBit + iBitPrev;
+    
+    
+    /*
+     * Skip ahead and see if there is anything left to search.
+     */
+    iBitPrev |= 31;
iBitPrev++;
    if (cBits <= (uint32_t)iBitPrev)
        return -1;
  }

  /*
   * 32-bit aligned search, let ASMBitFirstClear do the dirty work.
   */
  iBit = ASMBitFirstSet(&pau32Bitmap[iBitPrev / 32], cBits - iBitPrev);
  if (iBit >= 0)
    iBit += iBitPrev;
  return iBit;
}  
#endif

/**
 * Finds the first bit which is set in the given 32-bit integer.
 * Bits are numbered from 1 (least significant) to 32.
 *
 * @returns index [1..32] of the first set bit.
 * @returns 0 if all bits are cleared.
 * @param   u32     Integer to search for set bits.
 * @remarks Similar to ffs() in BSD.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitFirstSetU32(uint32_t u32);
#else
DECLINLINE(unsigned) ASMBitFirstSetU32(uint32_t u32)
{
#if RT_INLINE_ASM_USES_INTRIN
    unsigned long iBit;
    if (_BitScanForward(&iBit, u32))
        iBit++;
    else
        iBit = 0;
#else

#endif

#endif
uint32_t iBit;
_asm
{
    bsf    eax, [u32]
    jnz    found
    xor    eax, eax
    jmp    done
found:
    inc    eax
    mov    [iBit], eax
}

/*
 * Finds the first bit which is set in the given 32-bit integer.
 * Bits are numbered from 1 (least significant) to 32.
 * @returns index [1..32] of the first set bit.
 * @returns 0 if all bits are cleared.
 * @param   i32     Integer to search for set bits.
 * @remark  Similar to ffs() in BSD.
 */
DECLINLINE(unsigned) ASMBitFirstSetS32(int32_t i32)
{
    return ASMBitFirstSetU32((uint32_t)i32);
}

/*
 * Finds the first bit which is set in the given 64-bit integer.
 * Bits are numbered from 1 (least significant) to 64.
 * @returns index [1..64] of the first set bit.
 * @returns 0 if all bits are cleared.
 * @param   u64     Integer to search for set bits.
 * @remark  Similar to ffs() in BSD.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitFirstSetU64(uint64_t u64);
#else
DECLINLINE(unsigned) ASMBitFirstSetU64(uint64_t u64)
{
### RT_INLINE_ASM_USES_INTRIN

```c
+ if (ARCH_BITS == 64)
+   iBit++;
+ else
+   iBit = 0;
+}
+}
```

### RT_INLINE_ASM_GNU_STYLE & ARCH_BITS == 64

```c
+ uint64_t iBit;
+ __asm__ __volatile__ (
+   "bsfq %1, %0\n\n"
+   "jnz  1f\n\n"
+   "xorl %k0, %k0\n\n"
+   "jmp  2f\n\n"
+   "1:\n\n"
+   "incl %k0\n"
+   "2:\n\n"
+   :
+   : "r" (iBit)
+   : "rm" (u64));
+}
```

### else

```c
+ unsigned iBit = ASMBitFirstSetU32((uint32_t)u64);
+ if (!iBit)
+ {
+   iBit = ASMBitFirstSetU32((uint32_t)(u64 >> 32));
+   if (iBit)
+     iBit += 32;
+ }
+}
```

---

```c
/* Finds the first bit which is set in the given 16-bit integer. */
/* Bits are numbered from 1 (least significant) to 16. */
/* @returns index [1..16] of the first set bit. */
/* @returns 0 if all bits are cleared. */
/* @param   u16   Integer to search for set bits. */```
/**
 * Finds the last bit which is set in the given 32-bit integer.
 * Bits are numbered from 1 (least significant) to 32.
 *
 * @returns index [1..32] of the last set bit.
 * @returns 0 if all bits are cleared.
 * @param   u32     Integer to search for set bits.
 * @remark  Similar to fls() in BSD.
 * @*/

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(unsigned) ASMBitLastSetU32(uint32_t u32);
#else
DECLINLINE(unsigned) ASMBitLastSetU32(uint32_t u32)
{
    #if RT_INLINE_ASM_USESINTRIN
        unsigned long iBit;
        if (_BitScanReverse(&iBit, u32))
            iBit++;
        else
            iBit = 0;
    #elif RT_INLINE_ASM_GNU_STYLE
        uint32_t iBit;
        __asm__ __volatile__("bsrl %1, %0
             
             jnz   1f
             
             xorl %0, %0
             
             jmp  2f
         1:
             incl %0
         2:
             ",
             =r" (iBit)
             =rm" (u32));
    #else
        uint32_t iBit;
        _asm
        {
            bsr     eax, \[u32
             
             jnz   1f
             
             xorl %0, %0
             
             jmp  2f
         1:
             incl %0
         2:
             
             : "=r" (iBit)
             : "rm" (u32));
    #endif
    
    unsigned long iBit;
    if (_BitScanReverse(&iBit, u32))
        iBit++;
    else
        iBit = 0;
    
    elsif RT_INLINE_ASM_GNU_STYLE
        uint32_t iBit;
        __asm__ __volatile__("bsrl %1, %0
             
             jnz   1f
             
             xorl %0, %0
             
             jmp  2f
         1:
             incl %0
         2:
             
             : "=r" (iBit)
             : "rm" (u32));
    #endif
jnz found
xor eax, eax
jmp done
found:
inc eax
done:
    mov [iBit], eax
}
#else
    return iBit;
}
#endif
/**
 * Finds the last bit which is set in the given 32-bit integer.
 * Bits are numbered from 1 (least significant) to 32.
 * @returns index [1..32] of the last set bit.
 * @returns 0 if all bits are cleared.
 * @param i32 Integer to search for set bits.
 * @remark Similar to fls() in BSD.
 * */
DECLINLINE(unsigned) ASMBitLastSetS32(int32_t i32)
{
    return ASMBitLastSetU32((uint32_t)i32);
}/**
 * Finds the last bit which is set in the given 64-bit integer.
 * Bits are numbered from 1 (least significant) to 64.
 * @returns index [1..64] of the last set bit.
 * @returns 0 if all bits are cleared.
 * @param u64 Integer to search for set bits.
 * @remark Similar to fls() in BSD.
 * */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitLastSetU64(uint64_t u64);
#else
DECLINLINE(unsigned) ASMBitLastSetU64(uint64_t u64)
{
    #if RT_INLINE_ASM_USES_INTRIN
    unsigned long iBit;
    #if ARCH_BITS == 64
    if (_BitScanReverse64(&iBit, u64)
+    iBit++; 
+  else
+  +    iBit = 0;
+  +#  else
+  +    if (_BitScanReverse(&iBit, (uint32_t)(u64 >> 32)))
+  +      iBit += 33;
+  +    else if (_BitScanReverse(&iBit, (uint32_t)u64))
+  +      iBit++;
+  +  else
+  +    iBit = 0;
+  +#  endif
+  +#  elif RT_INLINE_ASM_GNU_STYLE && ARCH_BITS == 64
+  +  uint64_t iBit;
+  +  __asm__ __volatile__("bsrq %1, %0\n"
+  +     "jnz  1f\n"
+  +     "xorl %k0, %k0\n"
+  +     "jmp  2f\n"
+  +     "1:\n"
+  +     "incl %k0\n"
+  +     "2:\n"
+  +     : "=r" (iBit)
+  +     : "rm" (u64));
+  +#  else
+  +  unsigned iBit = ASMBitLastSetU32((uint32_t)(u64 >> 32));
+  +  if (iBit)
+  +    iBit += 32;
+  +  else
+  +    iBit = ASMBitLastSetU32((uint32_t)u64);
+  +#endif
+  + return (unsigned)iBit;
+  +}
+  +#endif
+  +
+  +/*
+  + * Finds the last bit which is set in the given 16-bit integer.
+  + *
+  + * Bits are numbered from 1 (least significant) to 16.
+  + *
+  + * @returns index [1..16] of the last set bit.
+  + * @returns 0 if all bits are cleared.
+  + * @param u16 Integer to search for set bits.
+  + * @remarks For 16-bit bs3kit code.
+  + */
+  +#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+  +DECLASM(unsigned) ASMBitLastSetU16(uint16_t u16);
+  +#else
+  +DECLINLINE(unsigned) ASMBitLastSetU16(uint16_t u16)
+{  
+    return ASMBitLastSetU32((uint32_t)u16);  
+}  
+#endif  
+  
+/**  
+ * Reverse the byte order of the given 16-bit integer.  
+ *  
+ * @returns Revert  
+ * @param   u16     16-bit integer value.  
+ */  
+  
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN  
+DECLASM(uint16_t) ASMByteSwapU16(uint16_t u16);  
+#else  
+DECLINLINE(uint16_t) ASMByteSwapU16(uint16_t u16)  
+{  
+  # if RT_INLINE_ASM_USES_INTRIN  
+    u16 = _byteswap_ushort(u16);  
+  # elif RT_INLINE_ASM_GNU_STYLE  
+    __asm__ ("rorw $8, %0" : "=r" (u16) : "0" (u16));  
+  # else  
+    _asm  
+    {  
+      mov     ax, [u16]  
+      ror     ax, 8  
+      mov     [u16], ax  
+    }  
+  # endif  
+  
+  return u16;  
+}  
+#endif  
+  
+/**  
+ * Reverse the byte order of the given 32-bit integer.  
+ *  
+ * @returns Revert  
+ * @param   u32     32-bit integer value.  
+ */  
+  
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN  
+DECLASM(uint32_t) ASMByteSwapU32(uint32_t u32);  
+#else  
+DECLINLINE(uint32_t) ASMByteSwapU32(uint32_t u32)  
+{  
+  # if RT_INLINE_ASM_USES_INTRIN  
+    u32 = _byteswap_ulong(u32);  
+  # elif RT_INLINE_ASM_GNU_STYLE  
+    __asm__ ("rorw $24, %0" : "=r" (u32) : "0" (u32));  
+  # else  
+    _asm  
+    {  
+      mov     eax, [u32]  
+      ror     eax, 16  
+      mov     [u32], eax  
+    }  
+  # endif  
+  
+  return u32;  
+}  
+#endif
### Reverse Byte Order

```c
DECLINLINE(uint64_t) ASMByteSwapU64(uint64_t u64)
{
    #if defined(RT_ARCH_AMD64) && RT_INLINE_ASM_USES_INTRIN
        u64 = _byteswap_uint64(u64);
    #else
        u64 = (uint64_t)ASMByteSwapU32((uint32_t)u64) << 32
            | (uint64_t)ASMByteSwapU32((uint32_t)(u64 >> 32));
    #endif
    return u64;
}
```

### Rotate Left

```c
DECLASM(uint32_t) ASMRotateLeftU32(uint32_t u32, unsigned cShift);
```
return u32;
#elif
    cShift &= 31;
    return (u32 << cShift) | (u32 >> (32 - cShift));
#endif
}
#endif

/**
 * Rotate 32-bit unsigned value to the right by @a cShift.
 *
 * @returns Rotated value.
 * @param   u32 The value to rotate.
 * @param   cShift How many bits to rotate by.
 */
#ifdef __WATCOMC__
DECLASM(uint32_t) ASMRotateRightU32(uint32_t u32, unsigned cShift);
#else
DECLINLINE(uint32_t) ASMRotateRightU32(uint32_t u32, uint32_t cShift)
{
#if RT_INLINE_ASM_USES_INTRIN
    return _rotr(u32, cShift);
#elif RT_INLINE_ASM_GNU_STYLE && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
    __asm__ __volatile__("rorl %b1, %0" : "=g" (u32) : "Ic" (cShift), "0" (u32));
    return u32;
#else
    cShift &= 31;
    return (u32 >> cShift) | (u32 << (32 - cShift));
#endif
}
#endif

/**
 * Rotate 64-bit unsigned value to the left by @a cShift.
 *
 * @returns Rotated value.
 * @param   u64 The value to rotate.
 * @param   cShift How many bits to rotate by.
 */
DECLINLINE(uint64_t) ASMRotateLeftU64(uint64_t u64, uint32_t cShift)
{
#if RT_INLINE_ASM_USES_INTRIN
    return _rotl64(u64, cShift);
#elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
    __asm__ __volatile__("rolq %b1, %0" : "=g" (u64) : "Jc" (cShift), "0" (u64));
    return u64;
#else
    cShift &= 31;
    return (u64 >> cShift) | (u64 << (64 - cShift));
#endif
}
###elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_X86)
+ uint32_t uSpill;
+ __asm__ __volatile__("testb $0x20, %c\n\t" /* if (cShift >= 0x20) { swap(u64.hi, u64lo); cShift -= 0x20; */
+ "jz 1\n\t"
+ "xchgl %eax, %edx\n\t"
+ "1:\n\t"
+ "andb $0x1f, %c\n\t" /* if (cShift & 0x1f) { */
+ "jz 2\n\t"
+ "movl %edx, %2\n\t" /* save the hi value in %3. */
+ "shldl %c1,%eax, %edx\n\t" /* shift the hi value left, feeding MSBits from the low value. */
+ "shldl %c1,%2,%eax\n\t" /* shift the lo value left, feeding MSBits from the saved hi value. */
+ "2:\n\t" /* } */ */
+ : ":=A" (u64), ":=c" (cShift), ":=r" (uSpill)
+ : ":0" (u64),
+ ":1" (cShift));
+ return u64;
+#endif
+
+ cShift &= 63;
+ return (u64 << cShift) | (u64 >> (64 - cShift));
+}endif
+}
"movl   %edx, %2\n"    /*  save the hi value in %3. */
"shrdl  %c1,%eax,%edx\n"  /*  shift the hi value right, feeding LSBits from the low value. */
"shrdl  %c1,2,%eax\n"    /*  shift the lo value right, feeding LSBits from the saved hi value. */
"2:\n"     /* } */
:"=A" (u64), "=c" (cShift), "=r" (uSpill)
:"0" (u64),
:"1" (cShift));
+    return u64;
+#else
+    cShift &= 63;
+    return (u64 >> cShift) | (u64 << (64 - cShift));
+#else
+    cShift &= 63;
++return (u64 >> cShift) | (u64 << (64 - cShift));
+#endif
++
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/assert.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/assert.h
@@ -0,0 +1,2671 @@
+/** @file
+ * IPRT - Assertions.
+ */
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+/*
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+/*
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+/*
+ * You may elect to license modified versions of this file under the
+ */
/* terms and conditions of either the GPL or the CDDL or both.*/
#
+ifndef ___iprt_assert_h
+define ___iprt_assert_h
+
+include <iprt/cdefs.h>
+include <iprt/types.h>
+include <iprt/stdarg.h>
+include <iprt/assertcompile.h>
+
+** @defgroup grp_rt_assert Assert - Assertions
+ * @ingroup grp_rt
+ *
+ * Assertions are generally used to check preconditions and other
+ * assumptions. Sometimes it is also used to catch odd errors or errors
+ * that one would like to inspect in the debugger. They should not be
+ * used for errors that happen frequently.
+ *
+ * IPRT provides a host of assertion macros, so many that it can be a bit
+ * overwhelming at first. Don't despair, there is a system (surprise).
+ *
+ * First there are four families of assertions:
+ *  - Assert        - The normal strict build only assertions.
+ *  - AssertLogRel  - Calls LogRel() in non-strict builds, otherwise like Assert.
+ *  - AssertRelease - Triggers in all builds.
+ *  - AssertFatal   - Triggers in all builds and cannot be continued.
+ *
+ * Then there are variations wrt to argument list and behavior on failure:
+ *  - Msg           - Custom RTStrPrintf-like message with the assertion message.
+ *  - Return        - Return the specific rc on failure.
+ *  - ReturnVoid    - Return (void) on failure.
+ *  - Break         - Break (out of switch/loop) on failure.
+ *  - Stmt          - Execute the specified statement(s) on failure.
+ *  - RC            - Assert RT_SUCCESS.
+ *  - RCSuccess     - Assert VINF_SUCCESS.
+ *
+ * @remarks As you might have noticed, the macros don't follow the
+ * coding guidelines wrt to macros supposedly being all uppercase
+ * and underscored. For various reasons they don't, and nobody
+ * has complained yet. Wonder why... ;-)  
+ *
+ * @remarks Each project has its own specific guidelines on how to use
+ * assertions, so the above is just trying to give you the general idea
+ * from the IPRT point of view.
+ *
+ */
+RT_C_DECLS_BEGIN
+
+/**
+ * The 1st part of an assert message.
+ *
+ * @param   pszExpr     Expression. Can be NULL.
+ * @param   uLine       Location line number.
+ * @param   pszFile     Location file name.
+ * @param   pszFunction Location function name.
+ */
+RTDECL(void)    RTAssertMsg1(const char *pszExpr, unsigned uLine, const char *pszFile, const char *pszFunction);
+/**
+ * Weak version of RTAssertMsg1 that can be overridden locally in a module to
+ * modify, redirect or otherwise mess with the assertion output.
+ *
+ * @copydoc RTAssertMsg1
+ */
+RTDECL(void)    RTAssertMsg1Weak(const char *pszExpr, unsigned uLine, const char *pszFile, const char *pszFunction);
+
+/**
+ * The 2nd (optional) part of an assert message.
+ *
+ * @param   pszFormat   Printf like format string.
+ * @param   ...         Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+/**
+ * Weak version of RTAssertMsg2 that forwards to RTAssertMsg2WeakV.
+ *
+ * There is not need to override this, check out RTAssertMsg2WeakV instead!
+ *
+ * @copydoc RTAssertMsg2
+ */
+RTDECL(void)    RTAssertMsg2Weak(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * The 2nd (optional) part of an assert message.
+ *
+ * @param   pszFormat   Printf like format string.
+ * @param   va          Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2V(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+/**
+ * Weak version of RTAssertMsg2V that can be overridden locally in a module to
+ * modify, redirect or otherwise mess with the assertion output.
+ */
+
+ * @copydoc RTAssertMsg2V
+ */
+RTDECL(void)    RTAssertMsg2WeakV(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+ *
+/**
+ * Additional information which should be appended to the 2nd part of an
+ * assertion message.
+ *
+ * @param   pszFormat   Printf like format string.
+ * @param   va          Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2Add(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+/**
+ * Weak version of RTAssertMsg2Add that forwards to RTAssertMsg2AddWeakV.
+ *
+ * There is not need to override this, check out RTAssertMsg2AddWeakV instead!
+ *
+ * @copydoc RTAssertMsg2Add
+ */
+RTDECL(void)    RTAssertMsg2AddWeak(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+/**
+ * Additional information which should be appended to the 2nd part of an
+ * assertion message.
+ *
+ * @param   pszFormat   Printf like format string.
+ * @param   va          Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2AddV(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+/**
+ * Weak version of RTAssertMsg2AddV that can be overridden locally in a module
+ * to modify, redirect or otherwise mess with the assertion output.
+ *
+ * @copydoc RTAssertMsg2AddV
+ */
+RTDECL(void)    RTAssertMsg2AddWeakV(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+
+#ifdef IN_RING0
+/**
+ * Panics the system as the result of a fail assertion.
+ */
+RTR0DECL(void)  RTR0AssertPanicSystem(void);
+#endif /* IN_RING0 */
+/**
+ * Overridable function that decides whether assertions executes the panic
+ * (breakpoint) or not.
+ *
+ * The generic implementation will return true.
+ *
+ * @returns true if the breakpoint should be hit, false if it should be ignored.
+ *
+ * @remark The RTDECL() makes this a bit difficult to override on Windows. So,
+ * you'll have to use RTASSERT_HAVE_SHOULD_PANIC or
+ * RTASSERT_HAVE_SHOULD_PANIC_PRIVATE there to control the kind of
+ * prototype.
+ */
+#if !defined(RTASSERT_HAVE_SHOULD_PANIC) &&
!defined(RTASSERT_HAVE_SHOULD_PANIC_PRIVATE)
+RTDECL(bool) RTAssertShouldPanic(void);
+#elif defined(RTASSERT_HAVE_SHOULD_PANIC_PRIVATE)
+bool RTAssertShouldPanic(void);
+#else
+DECLEXPORT(bool) RTCALL RTAssertShouldPanic(void);
+#endif

+ **
+ * Controls whether the assertions should be quiet or noisy (default).
+ *
+ * @returns The old setting.
+ * @param   fQuiet The new setting.
+ */
+RTDECL(bool) RTAssertSetQuiet(bool fQuiet);
+
+ **
+ * Are assertions quiet or noisy?
+ *
+ * @returns True if they are quiet, false if noisy.
+ */
+RTDECL(bool) RTAssertAreQuiet(void);
+
+ **
+ * Makes the assertions panic (default) or not.
+ *
+ * @returns The old setting.
+ * @param   fPanic The new setting.
+ */
+RTDECL(bool) RTAssertSetMayPanic(bool fPanic);
+
+ **
+ * Can assertion panic.
+ *
+ * @returns True if they can, false if not.
+ */
+/** @name Globals for crash analysis
+ * @remarks This is the full potential set, it
+ * @}
+ */
+/** The last assert message, 1st part. */
+extern RTDATADECL(char)                     g_szRTAssertMsg1[1024];
+/** The last assert message, 2nd part. */
+extern RTDATADECL(char)                     g_szRTAssertMsg2[4096];
+/** The last assert message, expression. */
+extern RTDATADECL(const char * volatile)    g_pszRTAssertExpr;
+/** The last assert message, file name. */
+extern RTDATADECL(const char * volatile)    g_pszRTAssertFile;
+/** The last assert message, line number. */
+extern RTDATADECL(uint32_t volatile)        g_u32RTAssertLine;
+/** The last assert message, function name. */
+extern RTDATADECL(const char * volatile)    g_pszRTAssertFunction;
+/** @} */
+
+RT_C_DECLS_END
+
+/** @def RTAssertDebugBreak()
+ * Debugger breakpoint instruction.
+ *
+ * @remarks This macro does not depend on RT STRICT.
+ */
+#define RTAssertDebugBreak()    do { RT_BREAKPOINT(); } while (0)
+
+
+/** @name Assertions
+ * These assertions will only trigger when RT STRICT is defined. When it is
+ * undefined they will all be no-ops and generate no code.
+ * @}
+ */
+
+/** @def RTASSERT_QUIET
+ * This can be defined to shut up the messages for a file where this would be
+ * problematic because the message printing code path passes thru it.
+ * @internal */
+#ifdef DOXYGEN_RUNNING
+# define RTASSERT_QUIET
+#endif
+/*@def RTAssertDoPanic
+ * Raises an assertion panic appropriate to the current context.
+ * @remarks This macro does not depend on RT_STRICT.
+ */
+endif
+
+/** @def AssertBreakpoint()
+ * Assertion Breakpoint.
+ * @deprecated Use RTAssertPanic or RTAssertDebugBreak instead.
+ */
+ifdef RT_STRICT
+endif
+
+/** @def RTAssertPanic()
+ * If RT_STRICT is defined this macro will invoke RTAssertDoPanic if
+ * RTAssertShouldPanic returns true. If RT_STRICT isn't defined it won't do any
+ * thing.
+ */
+endif
+
+/** @def Assert
+ * Assert that an expression is true. If false, hit breakpoint.
+ * @param   expr    Expression which should be true.
+ */
+ifdef RT_STRICT
+endif

RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
RTAssertPanic(); \
} \
} while (0)
#endif
#define Assert(expr)     do { } while (0)
#endif
/** @def AssertStmt 
 * Assert that an expression is true. If false, hit breakpoint and execute the 
 * @param   expr  Expression which should be true.
 * @return stmt  Statement to execute on failure.
 */
#ifdef RT_STRICT
#define AssertStmt(expr, stmt)  \
    do { \
        if (RT_LIKELY(!!(expr))) \
        { /* likely */ } \
        else \
        { \
            RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
            RTAssertPanic(); \
            stmt; \
        } \
    } while (0)
#else
#define AssertStmt(expr, stmt)  \
    do { \
        if (RT_LIKELY(!!(expr))) \
        { /* likely */ } \
        else \
        { stmt; \
        } \
    } while (0)
#endif
/** @def AssertReturn 
 * Assert that an expression is true and returns if it isn't. 
 * In RT_STRICT mode it will hit a breakpoint before returning.
 * @param   expr  Expression which should be true.
 */

+ * @param  rc      What is to be presented to return.
+ */
+#endif  
+define AssertReturn(expr, rc) \ 
+    do { 
+        if (RT_LIKELY(!(expr))) \ 
+            { /* likely */ } \ 
+        else 
+        { 
+            RTAssertMsg1Weak(expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \ 
+            RTAssertPanic(); \ 
+            return (rc); \ 
+        } \ 
+    } while (0)
+
+/** @def AssertReturnStmt 
+ * Assert that an expression is true, if it isn't execute the given statement 
+ * and return rc.
+ * 
+ * In RT_STRICT mode it will hit a breakpoint before executing the statement and 
+ * returning.
+ * 
+ * @param   expr    Expression which should be true.
+ * @param   stmt    Statement to execute before returning on failure.
+ * @param   rc      What is to be presented to return.
+ */
+#endif  
+define AssertReturnStmt(expr, stmt, rc) \ 
+    do { 
+        if (RT_LIKELY(!(expr))) \ 
+            { /* likely */ } \ 
+        else 
+        { 
+            RTAssertMsg1Weak(expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+            RTAssertPanic(); 
+            stmt; 
+            return (rc); 
+        } \ 
+    } while (0)
+
+*/
+ } while (0)
+ +#else
+ +# define AssertReturnStmt(expr, stmt, rc) \n+ + do { \n+ + if (RT_LIKELY(!(!expr))) \n+ + { /* likely */ } \n+ + else \n+ + { \n+ + stmt; \n+ + return (rc); \n+ + } \n+ + } while (0)
+ +#endif
+ +/** @def AssertReturnStmt
+ * Assert that an expression is true and returns if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ */
+ +/** @def AssertReturnVoid
+ * Assert that an expression is true and returns if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ */
+ +/** @def AssertReturnVoidStmt
+ * Assert that an expression is true, if it isn't execute the given statement
+ * and return.
+ */
+ +/** @def AssertReturnVoid
+ * Assert that an expression is true and returns if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ */
+ +/** @def AssertReturnVoidStmt
+ * Assert that an expression is true, if it isn't execute the given statement
+ * and return.
+ */
+ +/** @def AssertReturnVoid
+ * Assert that an expression is true and returns if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ * @param expr Expression which should be true.
+ * @param stmt Statement to execute before returning on failure.
+ */
+#ifdef RT_STRICT
+## define AssertReturnVoidStmt(expr, stmt) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else \
+ { \
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+ RTAssertPanic(); \
+ stmt; \
+ return; \
+ } \
+ } while (0)
+##else
+## define AssertReturnVoidStmt(expr, stmt) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else \
+ { \
+ stmt; \
+ return; \
+ } \
+ } while (0)
+##endif
+
+ +*/
+@def AssertBreak
+ * Assert that an expression is true and breaks if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before breaking.
+ */
+@param expr Expression which should be true.
+ */
+#ifdef RT_STRICT
+## define AssertBreak(expr) \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else if (1) \
+ { \
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+ RTAssertPanic(); \
+ break; \
+ } else \
+ break
+*/# else
+ */# define AssertBreak(expr) \ + if (RT_LIKELY(!(expr))) \ + { /* likely */ } \ + else \ + break
+*/
+
+ */# define AssertContinue
+ */# define AssertBreakStmt
+ */# define AssertContinue(expr) \ + if (RT_LIKELY(!(expr))) \ + { /* likely */ } \ + else \ + AssertBreakStmt(expr, \ + RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ + RTAssertPanic(); \ + continue; \ + } else do {} while (0)
+*/
+
+ */# define AssertContinue(expr) \ + if (RT_LIKELY(!(expr))) \ + { /* likely */ } \ + else \ + continue
+*/
+
+ */# define RT_STRICT
+ */# define AssertContinue(expr) \ + if (RT_LIKELY(!(expr))) \ + { /* likely */ } \ + else if (1) \ + { \ + RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ + RTAssertPanic(); \ + continue; \ + } else do {} while (0)
+*/
+
+ */# ifdef RT_STRICT
+ */# define AssertContinue(expr) \ + if (RT_LIKELY(!(expr))) \ + { /* likely */ } \ + else if (1) \ + { \ + RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ + RTAssertPanic(); \ + continue; \ + } else do {} while (0)
+*/
+
+ */# ifndef RT_STRICT
+ */# define AssertContinue(expr) \ + if (RT_LIKELY(!(expr))) \ + { /* likely */ } \ + else 
+ continue
+*/
+
+ */# define AssertBreakStmt
+ */# define AssertContinue(expr) \ + if (RT_LIKELY(!(expr))) \ + { /* likely */ } \ + else if (1) \ + { \ + RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ + RTAssertPanic(); \ + stmt; \
+*/

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+ break; \n+ } else do { } while (0)
+#else
+// define AssertBreakStmt(expr, stmt) \n+ if (RT_LIKELY(!(expr))) \n+ { /* likely */ } \n+ else if (1) \n+ { \n+ stmt; \n+ break; \n+ } else do { } while (0)
+#endif
+
+/** @def AssertMsg
+ * Assert that an expression is true. If it's not print message and hit breakpoint.
+ * @param   expr    Expression which should be true.
+ * @param   a       printf argument list (in parenthesis).
+ */
+#ifdef RT_STRICT
+// define AssertMsg(expr, a) \n+ do { \
+ if (RT_LIKELY(!(expr))) \n+ { /* likely */ } \n+ else \n+ { \n+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \n+ RTAssertMsg2Weak a; \n+ RTAssertPanic(); \n+ } \n+ } while (0)
+#else
+// define AssertMsg(expr, a) do { } while (0)
+#endif
+
+/** @def AssertMsgStmt
+ * Assert that an expression is true. If it's not print message and hit breakpoint and execute the statement.
+ * @param   expr    Expression which should be true.
+ * @param   a       printf argument list (in parenthesis).
+ * @param   stmt    Statement to execute in case of a failed assertion.
+ */
+#ifdef RT_STRICT
+// define AssertMsgStmt(expr, a, stmt) \

do { 
    if (RT_LIKELY(!expr)) 
    { /* likely */ } 
else 
    { 
        RTAssertMsg1Weak(expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
        RTAssertMsg2Weak a; 
        RTAssertPanic(); 
        stmt; 
    } 
} while (0)

/** @def AssertMsgStmt(expr, a, stmt) */
  
  do { 
    if (RT_LIKELY(!expr)) 
    { /* likely */ } 
else 
    { 
        stmt; 
    } 
} while (0)

/** @def AssertMsgReturn */
  
  if (RT_LIKELY(!expr)) 
  { /* likely */ } 
else 
  { 
      RTAssertMsg1Weak(expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
      RTAssertMsg2Weak a; 
      RTAssertPanic(); 
      return (rc); 
  } 
} while (0)

#ifdef RT_STRICT
#define AssertMsgReturn(expr, a, rc) 
  
  if (RT_LIKELY(!expr)) 
  { /* likely */ } 
else 
  { 
      RTAssertMsg1Weak(expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); 
      RTAssertMsg2Weak a; 
      RTAssertPanic(); 
      return (rc); 
  } 
} while (0)
#else
#define AssertMsgReturn(expr, a, rc) 
  
  if (RT_LIKELY(!expr)) 
  { /* likely */ } 
else 
  { 
      RTAssertMsg1Weak(expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
      RTAssertMsg2Weak a; 
      RTAssertPanic(); 
      return (rc); 
  } 
} while (0)
#endif
if (RT_LIKELY(!(expr)))
{ /* likely */ }
else
  return (rc);
} while (0)
#endif

/** @def AssertMsgReturnStmt
 * Assert that an expression is true, if it isn't execute the statement and
 * return.
 * In RT_STRICT mode it will hit a breakpoint before returning.
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 * @param   stmt    Statement to execute before returning in case of a failed
 *                  assertion.
 * @param   rc      What is to be presented to return.
 */
#ifdef RT_STRICT
#define AssertMsgReturnStmt(expr, a, stmt, rc)  
  do { 
    if (RT_LIKELY(!(expr))) 
    { /* likely */ } 
    else 
    { 
      RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
      RTAssertMsg2Weak a; 
      RTAssertPanic(); 
      stmt; 
      return (rc); 
    } 
  } while (0)
#else
#define AssertMsgReturnStmt(expr, a, stmt, rc) 
  do { 
    if (RT_LIKELY(!(expr))) 
    { /* likely */ } 
    else 
    { 
      stmt; 
      return (rc); 
    } 
  } while (0)
#endif

/** @def AssertMsgReturnVoid
 * Assert that an expression is true and returns if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ */
+#ifdef RT_STRICT
+# define AssertMsgReturnVoid(expr, a) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \ 
+ else \
+ { \
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \ 
+ RTAssertMsg2Weak a; \ 
+ RTAssertPanic(); \ 
+ return; \ 
+ } \ 
+ } while (0)
+#else
+# define AssertMsgReturnVoid(expr, a) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \ 
+ else \ 
+ return; \ 
+ } while (0)
+#endif
+
+/** @def AssertMsgReturnVoidStmt
+ * Assert that an expression is true, if it isn’t execute the statement and
+ * return.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute before return in case of a failed assertion.
+ */
+#ifdef RT_STRICT
+# define AssertMsgReturnVoidStmt(expr, a, stmt) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \ 
+ else \ 
+ { \
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+ RTAssertMsg2Weak a; \
+ RTAssertStmt(expr, __LINE__, __FILE__, __PRETTY_FUNCTION__, stmt); \
+ return; \
+ } \ 
+ } while (0)
+#endif

### AssertMsgReturnVoidStmt(expr, a, stmt)

```c
#define AssertMsgReturnVoidStmt(expr, a, stmt)
    do {
        if (RT_LIKELY(!!(expr)))
        { /* likely */ } 
        else
        {
            stmt;
            return;
        }
    } while (0)
```

### AssertMsgBreak(expr, a)

```c
#ifdef RT_STRICT
#define AssertMsgBreak(expr, a) 
    if (RT_LIKELY(!!(expr))) 
    { /* likely */ } 
    else if (1)
    {  
        RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
        RTAssertMsg2Weak a; 
        RTAssertPanic(); 
        break;
    } else
    break
#else
#define AssertMsgBreak(expr, a) 
    if (RT_LIKELY(!!(expr))) 
    { /* likely */ } 
    else 
    break
#endif
```

### AssertMsgBreakStmt(expr, a)

```c
/* Assert that an expression is true and breaks if it isn't. */
/* In RT_STRICT mode it will hit a breakpoint before returning. */
/* @param expr Expression which should be true. */
/* @param a printf argument list (in parenthesis). */
```
In RT STRICT mode it will hit a breakpoint before doing break.

+ * In RT STRICT mode it will hit a breakpoint before doing break.
+ *
+ * @param  expr Expression which should be true.
+ * @param  a printf argument list (in parenthesis).
+ * @param  stmt Statement to execute before break in case of a failed assertion.
+ */

#ifdef RT STRICT
  # define AssertMsgBreakStmt(expr, a, stmt) \
    if (RT_LIKELY(!!(expr))) \
    { /* likely */ } \
    else if (1) \
    { \
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
    RTAssertMsg2Weak a; \
    RTAssertPanic(); \
    stmt; \
    break; \
    } else \
    break
#else
  # define AssertMsgBreakStmt(expr, a, stmt) \
    if (RT_LIKELY(!!(expr))) \
    { /* likely */ } \
    else if (1) \
    { \
    stmt; \
    break; \
    } else \
    break
#endif

/** @def AssertFailed
 * An assertion failed, hit breakpoint.
 */

#ifdef RT STRICT
  # define AssertFailed()  \
    do { \
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
    RTAssertPanic(); \
    } while (0)
#else
  # define AssertFailed()  do { } while (0)
#endif

/** @def AssertFailedStmt
 * An assertion failed, hit breakpoint and execute statement.
 */
+ifndef RT_STRICT
+ define AssertFailedStmt(stmt) \ 
  + do { \ 
  +    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION
  _PRETTY_FUNCTION__); \ 
  +    RTAssertPanic(); \ 
  +    stmt; \ 
  + } while (0)
+else
+ define AssertFailedStmt(stmt) do { stmt; } while (0)
+endif
+
+/** @def AssertFailedReturn
+ * An assertion failed, hit breakpoint (RT_STRICT mode only) and return.
+ *
+ * @param   rc      The rc to return.
+ */
+ifndef RT_STRICT
+ define AssertFailedReturn(rc) \ 
  + do { \ 
  +    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
  +    RTAssertPanic(); \ 
  +    return (rc); \ 
  + } while (0)
+else
+ define AssertFailedReturn(rc) \ 
  + do { \ 
  +    return (rc); \ 
  + } while (0)
+endif
+
+/** @def AssertFailedReturnStmt
+ * An assertion failed, hit breakpoint (RT_STRICT mode only), execute a
+ * statement and return a value.
+ *
+ * @param   stmt    The statement to execute before returning.
+ * @param   rc      The value to return.
+ */
+ifndef RT_STRICT
+ define AssertFailedReturnStmt(stmt, rc) \ 
  + do { \ 
  +    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
  +    RTAssertPanic(); \ 
  +    stmt; \ 
  +    return (rc); \ 
  + } while (0)
+else
+ define AssertFailedReturnStmt(stmt, rc) \ 

+  do { \
+    stmt; \
+    return (rc); \
+  } while (0)
+  #endif
+
+/** @def AssertFailedReturnVoid
+ * An assertion failed, hit breakpoint (RT_STRICT mode only) and return.
+ */
+#endif
+
+/** @def AssertFailedReturnVoidStmt
+ * An assertion failed, hit breakpoint (RT_STRICT mode only), execute a
+ * statement and return.
+ *
+ * @param stmt The statement to execute before returning.
+ */
+#endif
+
+/** @def AssertFailedBreak
+ * An assertion failed, hit breakpoint (RT_STRICT mode only) and break.
```c
#ifdef RT_STRICT
#define AssertFailedBreak()  
  if (1) {
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertPanic(); 
    break; 
  } else 
  break
#else
#define AssertFailedBreak()  
  if (1) 
    break; 
  else 
    break
#endif

/** @def AssertFailedBreakStmt 
 * An assertion failed, hit breakpoint (RT_STRICT mode only), execute 
 * the given statement and break. 
 * 
 * @param   stmt    Statement to execute before break. 
 */
#ifdef RT_STRICT
#define AssertFailedBreakStmt(stmt)  
  if (1) {
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertPanic(); 
    stmt; 
  } else 
  break
#else
#define AssertFailedBreakStmt(stmt)  
  if (1) {
    stmt; 
  } else 
  break
#endif

/** @def AssertMsgFailed 
 * An assertion failed print a message and a hit breakpoint. 
 * 
 * @param   a   printf argument list (in parenthesis). 
 */
#ifdef RT_STRICT
#define AssertMsgFailed(a)  
  if (1) {
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertPanic(); 
    printf(a); 
  } else 
  printf(a)
#else
#define AssertMsgFailed(a)  
  if (1) {
    printf(a); 
  } else 
  printf(a)
#endif
#endif
```

---

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+* define AssertMsgFailed(a) \ 
+  do { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
+    RTAssertMsg2Weak a; \
+    RTAssertPanic(); \
+  } while (0) 
+*/
+
+/* * An assertion failed, hit breakpoint with message (RT_STRICT mode only) and return. 
+ * 
+ * @param a printf argument list (in parenthesis). 
+ * @param rc What is to be presented to return. 
+ */
+ifdef RT_STRICT
+define AssertMsgFailedReturn(a, rc) \ 
+  do { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+    RTAssertMsg2Weak a; \
+    RTAssertPanic(); \
+    return (rc); \
+  } while (0) 
+else
+define AssertMsgFailedReturn(a, rc) \ 
+  do { \
+    return (rc); \
+  } while (0) 
+endif
+
+/* * An assertion failed, hit breakpoint with message (RT_STRICT mode only) and return. 
+ * 
+ * @param a printf argument list (in parenthesis). 
+ */
+ifdef RT_STRICT
+define AssertMsgFailedReturnVoid(a) \ 
+  do { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+    RTAssertMsg2Weak a; \
+    RTAssertPanic(); \
+    return; \
+  } while (0) 
+else
+define AssertMsgFailedReturnVoid(a) \ 
+  do { \
+  
}
```c
    return; \
  } while (0)
#endif
+
+
+/* @def AssertMsgFailedBreak
+ * An assertion failed, hit breakpoint with message (RT_STRICT mode only) and break.
+ *
+ * @param a printf argument list (in parenthesis).
+ */
+#ifdef RT_STRICT
+  # define AssertMsgFailedBreak(a) \n+    if (1) { \n+      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+      RTAssertMsg2Weak a; \n+      RTAssertPanic(); \n+      break; \n+    } else \n+    break
+#else
+  # define AssertMsgFailedBreak(a) \n+    if (1) \n+      break; \n+    else \n+    break
+#endif
+
+/* @def AssertMsgFailedBreakStmt
+ * An assertion failed, hit breakpoint (RT_STRICT mode only), execute
+ * the given statement and break.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute before break.
+ */
+#ifdef RT_STRICT
+  # define AssertMsgFailedBreakStmt(a, stmt) \n+    if (1) { \n+      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+      RTAssertMsg2Weak a; \n+      RTAssertPanic(); \n+      stmt; \n+      break; \n+    } else \n+    break
+#else
+  # define AssertMsgFailedBreakStmt(a, stmt) \n+    if (1) { \n+      stmt; \
```
break;
} else {
    break
#endif
+
+/** @} */
+
+/** @name Release Log Assertions
+ * These assertions will work like normal strict assertion when RT_STRICT is
defined and LogRel statements when RT_STRICT is undefined. Typically used for
things which shouldn't go wrong, but when it does you'd like to know one way
or the other.
+ */
+ * @ }
+ */
+
+/** @def RTAssertLogRelMsg1
+ * RTAssertMsg1Weak (strict builds) / LogRel wrapper (non-strict).
+ */
+ifdef RT_STRICT
+define RTAssertLogRelMsg1(pszExpr, iLine, pszFile, pszFunction) 
+ RTAssertMsg1Weak(pszExpr, iLine, pszFile, pszFunction)
#else
+define RTAssertLogRelMsg1(pszExpr, iLine, pszFile, pszFunction) 
+ LogRel("AssertLogRel %s(%d) %s: %s\n",
+ (pszFile), (iLine), (pszFunction), (pszExpr) )
#endif
+
+/** @def RTAssertLogRelMsg2
+ * RTAssertMsg2Weak (strict builds) / LogRel wrapper (non-strict).
+ */
+ifdef RT_STRICT
+define RTAssertLogRelMsg2(a)  RTAssertMsg2Weak a
#else
+define RTAssertLogRelMsg2(a)  LogRel(a)
#endif
+
+/** @def AssertLogRel
+ * Assert that an expression is true.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+ * @param expr Expression which should be true.
+ */
+#define AssertLogRel(expr) 
+    do { 
+    

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if (RT_LIKELY(!(expr)))
{ /* likely */ }
else
{
   RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
   RTAssertPanic();
}
} while (0)

/** @def AssertLogRelReturn
 * Assert that an expression is true, return `rc` if it isn't.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 */
/** @param expr Expression which should be true.
 * @param rc What is to be presented to return.
 */
#define AssertLogRelReturn(expr, rc) 
   do { 
      if (RT_LIKELY(!(expr)))
      { /* likely */ }
      else 
      { 
         RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
         RTAssertPanic();
         return (rc);
      } 
   } while (0)

/** @def AssertLogRelReturnVoid
 * Assert that an expression is true, return void if it isn't.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 */
/** @param expr Expression which should be true.
 */
#define AssertLogRelReturnVoid(expr) 
   do { 
      if (RT_LIKELY(!(expr)))
      { /* likely */ }
      else 
      { 
         RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
         RTAssertPanic();
         return;
      } 
   } while (0)

/** @def AssertLogRelBreak
 * Assert that an expression is true, break if it isn't.
Strict builds will hit a breakpoint, non-strict will only do LogRel.

```
#define AssertLogRelBreak(expr) 
    if (RT_LIKELY(!!(expr))) 
    { /* likely */ } 
    else if (1) 
    { 
        RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
        RTAssertPanic(); 
        break; 
    } 
    else 
    { break 
      
      
      */** @def AssertLogRelBreakStmt 
      * Assert that an expression is true, execute \a stmt and break if it isn't. 
      * Strict builds will hit a breakpoint, non-strict will only do LogRel. 
      * 
      + * @param   expr   Expression which should be true. 
      + * @param   stmt   Statement to execute before break in case of a failed assertion. 
      + */
      
      
      + */** @def AssertLogRelMsg 
      * Assert that an expression is true. 
      * Strict builds will hit a breakpoint, non-strict will only do LogRel. 
      + * 
      + * @param   expr   Expression which should be true. 
      + * @param   a      printf argument list (in parenthesis). 
      + */
      
      + do { 
      
      
      
      
```
/** @def AssertLogRelMsgStmt
 * Assert that an expression is true, execute \a stmt and break if it isn't
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 *
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 * @param   stmt    Statement to execute in case of a failed assertion.
 */

#define AssertLogRelMsgStmt(expr, a, stmt) \
    do { \
        if (RT_LIKELY(!!(expr))) \
        { /* likely */ } \
        else\n        { \
            RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
            RTAssertLogRelMsg2(a); \
            RTAssertPanic(); \
            stmt; \
        } \
    } while (0)

/** @def AssertLogRelMsgReturn
 * Assert that an expression is true, return \a rc if it isn't.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 *
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 * @param   rc      What is to be presented to return.
 */

#define AssertLogRelMsgReturn(expr, a, rc) \
    do { \
        if (RT_LIKELY(!!(expr))) \
        { /* likely */ } \
        else\n        { \
            RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
            RTAssertLogRelMsg2(a); \
            RTAssertPanic(); \
            return (rc); \
        } \
    } while (0)
+/** @def AssertLogRelMsgReturnStmt
+ * Assert that an expression is true, execute @a stmt and return @a rcRet if it
+ * isn't.
+ *
+ * @param   expr    Expression which should be true.
+ * @param   a       printf argument list (in parenthesis).
+ * @param   stmt    Statement to execute before returning in case of a failed
+ *                  assertion.
+ * @param   rcRet   What is to be presented to return.
+ */
+#define AssertLogRelMsgReturnStmt(expr, a, stmt, rcRet) \ 
+    do { \ 
+        if (RT_LIKELY(!!(expr))) \ 
+        { /* likely */ } \ 
+        else\ 
+        { \ 
+            RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
+            RTAssertLogRelMsg2(a); \ 
+            RTAssertPanic(); \ 
+            stmt; \ 
+            return (rcRet); \ 
+        } \ 
+    } while (0) \ 
+
+/** @def AssertLogRelMsgReturnVoid
+ * Assert that an expression is true, return (void) if it isn't.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param   expr    Expression which should be true.
+ * @param   a       printf argument list (in parenthesis).
+ */
+#define AssertLogRelMsgReturnVoid(expr, a) \ 
+    do { \ 
+        if (RT_LIKELY(!!(expr))) \ 
+        { /* likely */ } \ 
+        else\ 
+        { \ 
+            RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
+            RTAssertLogRelMsg2(a); \ 
+            RTAssertPanic(); \ 
+            return; \ 
+        } \ 
+    } while (0) \ 
+
+/** @def AssertLogRelMsgBreak
+ * Assert that an expression is true, break if it isn't.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ * + @param expr Expression which should be true.
+ * + @param a printf argument list (in parenthesis).
+ */
+#define AssertLogRelMsgBreak(expr, a) 
+ if (RT_LIKELY(!!(expr))) 
+ { /* likely */ } 
+ else if (1) 
+ { 
+    RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+    RTAssertLogRelMsg2(a); 
+    RTAssertPanic(); 
+    break; 
+ } 
+ else 
+    break
+
+ /**< * Assert that an expression is true, execute `a stmt and break if it isn't. */
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+#define AssertLogRelMsgBreakStmt(expr, a, stmt) 
+ if (RT_LIKELY(!!(expr))) 
+ { /* likely */ } 
+ else if (1) 
+ { 
+    RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+    RTAssertLogRelMsg2(a); 
+    RTAssertPanic(); 
+    stmt; 
+    break; 
+ } else 
+    break
+
+ /**< * An assertion failed. */
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel. */
+#define AssertLogRelFailed() 
+ do { 
+    RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+    RTAssertPanic(); 
+ } while (0)
+/** @def AssertLogRelFailedReturn
+ * An assertion failed.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param   rc    What is to be presented to return.
+ */
+#define AssertLogRelFailedReturn(rc)  
+  do { 
+    RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+    RTAssertPanic(); 
+    return (rc); 
+  } while (0)
+
+/** @def AssertLogRelFailedReturnVoid
+ * An assertion failed, hit a breakpoint and return.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+#define AssertLogRelFailedReturnVoid()  
+  do { 
+    RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+    RTAssertPanic(); 
+    return; 
+  } while (0)
+
+/** @def AssertLogRelFailedBreak
+ * An assertion failed, break.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+#define AssertLogRelFailedBreak()  
+  if (1) 
+  { 
+    RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+    RTAssertPanic(); 
+    break; 
+  } else 
+  break
+
+/** @def AssertLogRelFailedBreakStmt
+ * An assertion failed, execute \a stmt and break.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param   stmt    Statement to execute before break.
+ */
+#define AssertLogRelFailedBreakStmt(stmt)  
+  if (1) 
+  { 
+    RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+    RTAssertPanic(); 
+    stmt;
+    break; 
+  }
+ stmt; \n+ break; \n+ } else \n+ break
+
+ /** @def AssertLogRelMsgFailed
+ * An assertion failed.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ */
+#define AssertLogRelMsgFailed(a) \
+ do { \n+ RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+ RTAssertLogRelMsg2(a); \n+ RTAssertPanic(); \n+ } while (0)
+
+ /** @def AssertLogRelMsgFailedStmt
+ * An assertion failed, execute @a stmt.
+ *
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel. The
+ * statement will be executed in regardless of build type.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute after raising/logging the assertion.
+ */
+#define AssertLogRelMsgFailedStmt(a, stmt) \
+ do { \n+ RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+ RTAssertLogRelMsg2(a); \n+ RTAssertPanic(); \n+ stmt; \n+ } while (0)
+
+ /** @def AssertLogRelMsgFailedReturn
+ * An assertion failed, return @a rc.
+ *
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param rc What is to be presented to return.
+ */
+#define AssertLogRelMsgFailedReturn(a, rc) \
+ do { \n+ RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+ RTAssertLogRelMsg2(a); \n+ RTAssertPanic(); \n+ return (rc); \
+ return (rc);
+ } while (0)
+
+ /** @def AssertLogRelMsgFailedReturnStmt
+ * An assertion failed, execute @a stmt and return @a rc.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute before returning in case of a failed
+ *   assertion.
+ * @param rc What is to be presented to return.
+ */
+#define AssertLogRelMsgFailedReturnStmt(a, stmt, rc)  
   do { 
       RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);  
       RTAssertLogRelMsg2(a);  
       RTAssertPanic();  
       stmt;  
       return (rc);  
   } while (0)
+
+ /** @def AssertLogRelMsgFailedReturnVoid
+ * An assertion failed, return void.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ */
+#define AssertLogRelMsgFailedReturnVoid(a)  
   do { 
       RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);  
       RTAssertLogRelMsg2(a);  
       RTAssertPanic();  
       return;  
   } while (0)
+
+ /** @def AssertLogRelMsgFailedReturnVoidStmt
+ * An assertion failed, execute @a stmt and return void.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute before returning in case of a failed
+ *   assertion.
+ */
+#define AssertLogRelMsgFailedReturnVoidStmt(a, stmt)  
   do { 
       RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);  
       RTAssertLogRelMsg2(a);  
       RTAssertPanic();  
       stmt;  
   } while (0)
/** @def AssertLogRelMsgFailedBreak
 * An assertion failed, break.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 * @param a printf argument list (in parenthesis).
 */
#define AssertLogRelMsgFailedBreak(a)  
    if (1)  
    {  
        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);  
        RTAssertLogRelMsg2(a);  
        RTAssertPanic();  
        break;  
    } else  
    break

/** @def AssertLogRelMsgFailedBreakStmt
 * An assertion failed, execute a stmt and break.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 * @param a printf argument list (in parenthesis).
 * @param stmt Statement to execute before break.
 */
#define AssertLogRelMsgFailedBreakStmt(a, stmt)  
    if (1)  
    {  
        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);  
        RTAssertLogRelMsg2(a);  
        RTAssertPanic();  
        stmt;  
        break;  
    } else  
    break

/** @} */
/** @name Release Assertions
 * These assertions are always enabled.
 */
/** @def RTAssertReleasePanic()
* Invokes RTAssertShouldPanic and RTAssertDoPanic.

* It might seem odd that RTAssertShouldPanic is necessary when its result isn't
  checked, but it's done since RTAssertShouldPanic is overrideable and might be
  used to bail out before taking down the system (the VMMR0 case).

+#define RTAssertReleasePanic()   do { RTAssertShouldPanic(); RTAssertDoPanic(); } while (0)
+  
+/** @def AssertRelease
+  * Assert that an expression is true. If it's not hit a breakpoint.
+  *
+  * @param   expr    Expression which should be true.
+  */
+#define AssertRelease(expr)  
+  do { 
+      if (RT_LIKELY(!!(expr))) 
+      { /* likely */ } 
+      else 
+      { 
+         RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); 
+         RTAssertReleasePanic(); 
+      } 
+  } while (0)
+  
+/** @def AssertReleaseReturn
+  * Assert that an expression is true, hit a breakpoint and return if it isn't.
+  *
+  * @param   expr    Expression which should be true.
+  * @param   rc      What is to be presented to return.
+  */
+#define AssertReleaseReturn(expr, rc)  
+  do { 
+      if (RT_LIKELY(!!(expr))) 
+      { /* likely */ } 
+      else 
+      { 
+         RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+         RTAssertReleasePanic(); 
+         return (rc); 
+      } 
+  } while (0)
+  
+/** @def AssertReleaseReturnVoid
+  * Assert that an expression is true, hit a breakpoint and return if it isn't.
+  *
+  * @param   expr    Expression which should be true.
```c
#define AssertReleaseReturnVoid(expr)  
  do { 
    if (RT_LIKELY(!!(expr))) 
    { /* likely */ } 
    else 
    { 
      RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
      RTAssertReleasePanic(); 
      return; 
    } while (0) 
  
  + /* Assert that an expression is true, hit a breakpoint and break if it isn't. 
  + */ 
#define AssertReleaseBreak(expr)  
  if (RT_LIKELY(!!(expr))) 
  { /* likely */ } 
  else if (1) 
  { 
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertReleasePanic(); 
    break; 
  } else 
  break 

#define AssertReleaseBreakStmt(expr, stmt)  
  if (RT_LIKELY(!!(expr))) 
  { /* likely */ } 
  else if (1) 
  { 
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertReleasePanic(); 
    stmt; 
    break; 
  } else 
  break
```
/** @def AssertReleaseMsg
 * Assert that an expression is true, print the message and hit a breakpoint if it isn't.
 * @param expr Expression which should be true.
 * @param a printf argument list (in parenthesis).
 */
#define AssertReleaseMsg(expr, a)  
  do { 
      if (RT_LIKELY(!!(expr))) 
      { /* likely */ } 
      else 
      { 
        RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
        RTAssertMsg2Weak a; 
        RTAssertReleasePanic(); 
      } 
  } while (0)

/** @def AssertReleaseMsgReturn
 * Assert that an expression is true, print the message and hit a breakpoint and return if it isn't.
 * @param expr Expression which should be true.
 * @param a printf argument list (in parenthesis).
 * @param rc What is to be presented to return.
 */
#define AssertReleaseMsgReturn(expr, a, rc)  
  do { 
      if (RT_LIKELY(!!(expr))) 
      { /* likely */ } 
      else 
      { 
        RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
        RTAssertMsg2Weak a; 
        RTAssertReleasePanic(); 
        return (rc); 
      } 
  } while (0)

/** @def AssertReleaseMsgReturnVoid
 * Assert that an expression is true, print the message and hit a breakpoint and return if it isn't.
 * @param expr Expression which should be true.
 * @param a printf argument list (in parenthesis).
 */
#define AssertReleaseMsgReturnVoid(expr, a)  
  do { 
      if (RT_LIKELY(!!(expr))) 
      { /* likely */ } 
      else 
      { 
        RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
        RTAssertMsg2Weak a; 
        RTAssertReleasePanic(); 
        return (); 
      } 
  } while (0)
{ /* likely */ } \nelse \n { \n  RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n  RTAssertMsg2Weak a; \n  RTAssertReleasePanic(); \n  return; \n } \n } while (0) \n
/** @def AssertReleaseMsgBreak 
 * Assert that an expression is true, print the message and hit a breakpoint and break if it isn't. 
 * @param   expr    Expression which should be true. 
 * @param   a       printf argument list (in parenthesis). 
 */ 
#define AssertReleaseMsgBreak(expr, a)  
    if (RT_LIKELY(!!(expr))) 
    { /* likely */ } 
    else if (1) 
    { 
      RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
      RTAssertMsg2Weak a; 
      RTAssertReleasePanic(); 
      break; 
    } else 
    { 
      break 
  
  /** @def AssertReleaseMsgBreakStmt 
  * Assert that an expression is true, print the message and hit a breakpoint and break if it isn't. 
  * @param   expr    Expression which should be true. 
  * @param   a       printf argument list (in parenthesis). 
  * @param   stmt    Statement to execute before break in case of a failed assertion. 
  */ 
#define AssertReleaseMsgBreakStmt(expr, a, stmt)  
    if (RT_LIKELY(!!(expr))) 
    { /* likely */ } 
    else if (1) 
    { 
      RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
      RTAssertMsg2Weak a; 
      RTAssertReleasePanic(); 
      stmt; 
      break; 
    } else 
    { 
      break
```c
/** @def AssertReleaseFailed
 * An assertion failed, hit a breakpoint.
 */
#define AssertReleaseFailed()  
    do { 
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertReleasePanic(); 
} while (0) 

/** @def AssertReleaseFailedReturn
 * An assertion failed, hit a breakpoint and return.
 */
#define AssertReleaseFailedReturn(rc)  
    do { 
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertReleasePanic(); 
    return (rc); 
} while (0) 

/** @def AssertReleaseFailedReturnVoid
 * An assertion failed, hit a breakpoint and return.
 */
#define AssertReleaseFailedReturnVoid()  
    do { 
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertReleasePanic(); 
    return; 
} while (0) 

/** @def AssertReleaseFailedBreak
 * An assertion failed, hit a breakpoint and break.
 */
#define AssertReleaseFailedBreak()  
    if (1) { 
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    RTAssertReleasePanic(); 
    break; 
} else { 
    break 

/** @def AssertReleaseFailedBreakStmt
 * An assertion failed, hit a breakpoint and break.
 */
#define AssertReleaseFailedBreakStmt
```
+ * @param stmt Statement to execute before break.
+ */
+#define AssertReleaseFailedBreakStmt(stmt) \ 
   if (1) { \ 
      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
      RTAssertReleasePanic(); \ 
      stmt; \ 
      break; \ 
   } else \ 
   break
+
+
+/** @def AssertReleaseMsgFailed
+ * An assertion failed, print a message and hit a breakpoint.
+ */
+#define AssertReleaseMsgFailed(a)  \ 
   do { \ 
      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \ 
      RTAssertMsg2Weak a; \ 
      RTAssertReleasePanic(); \ 
   } while (0)
+
+/** @def AssertReleaseMsgFailedReturn
+ * An assertion failed, print a message, hit a breakpoint and return.
+ */
+#define AssertReleaseMsgFailedReturn(a, rc)  \ 
   do { \ 
      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
      RTAssertMsg2Weak a; \ 
      RTAssertReleasePanic(); \ 
      return (rc); \ 
   } while (0)
+
+/** @def AssertReleaseMsgFailedReturnVoid
+ * An assertion failed, print a message, hit a breakpoint and return.
+ */
+#define AssertReleaseMsgFailedReturnVoid(a)  \ 
   do { \ 
      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
      RTAssertMsg2Weak a; \
   } while (0)
```c
+    } while (0)
+
+  +/** @def AssertReleaseMsgFailedBreak
+  +  * An assertion failed, print a message, hit a breakpoint and break.
+  +  *
+  +  +  * @param   a   printf argument list (in parenthesis).
+  +  */
+  +#define AssertReleaseMsgFailedBreak(a) 
+  +    if (1) { 
+  +      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+  +      RTAssertMsg2Weak a; 
+  +      RTAssertReleasePanic(); 
+  +      break; 
+  +    } else 
+  +    break
+
+  +/** @def AssertReleaseMsgFailedBreakStmt
+  +  * An assertion failed, print a message, hit a breakpoint and break.
+  +  *
+  +  +  * @param   a   printf argument list (in parenthesis).
+  +  +  * @param   stmt    Statement to execute before break.
+  +  */
+  +#define AssertReleaseMsgFailedBreakStmt(a, stmt) 
+  +    if (1) { 
+  +      RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+  +      RTAssertMsg2Weak a; 
+  +      RTAssertReleasePanic(); 
+  +      stmt; 
+  +      break; 
+  +    } else 
+  +    break
+
+  +/** @ } */
+  +
+  +
+  +/** @name Fatal Assertions
+  +  * These are similar to release assertions except that you cannot ignore them in
+  +  * any way, they will loop for ever if RTAssertDoPanic returns.
+  +  *
+  +  +  * @def AssertFatal
+  +  * Assert that an expression is true. If it's not hit a breakpoint (for ever).
```
+ * @param   expr    Expression which should be true.
+ */
+#define AssertFatal(expr)  
+ do { \ 
+ if (RT_LIKELY(!!(expr))) \ 
+ { /* likely */ } \ 
+ else \ 
+ for (;;) \ 
+ { \ 
+   RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
+   RTAssertReleasePanic(); \ 
+ } \ 
+ } while (0)
+
+/** @def AssertFatalMsg 
+ * Assert that an expression is true, print the message and hit a breakpoint (for ever) if it isn't.
+ * 
+ * @param   expr    Expression which should be true.
+ * @param   a       printf argument list (in parenthesis).
+ */
+#define AssertFatalMsg(expr, a)  
+ do { \ 
+ if (RT_LIKELY(!!(expr))) \ 
+ { /* likely */ } \ 
+ else \ 
+ for (;;) \ 
+ { \ 
+   RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
+   RTAssertMsg2Weak a; \ 
+   RTAssertReleasePanic(); \ 
+ } \ 
+ } while (0)
+
+/** @def AssertFatalFailed 
+ * An assertion failed, hit a breakpoint (for ever).
+ */
+#define AssertFatalFailed()  
+ do { \ 
+ for (;;) \ 
+ { \ 
+   RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \ 
+   RTAssertReleasePanic(); \ 
+ } \ 
+ } while (0)
+
+/** @def AssertFatalMsgFailed
+ * An assertion failed, print a message and hit a breakpoint (for ever).
+*
+ * @param a printf argument list (in parenthesis).
+ */
+#define AssertFatalMsgFailed(a) \
+ do { \
+
for (;;) \
+
{\
+
RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION
__PRETTY_FUNCTION__); \
+
RTAssertMsg2Weak a; \
+
RTAssertReleasePanic(); \
+
}\
+ } while (0)
+
+/** @} */
+
+
+
+/** @name Convenience Assertions Macros
+ * @{
+ */
+
+/** @def AssertRC
+ * Asserts a iprt status code successful.
+*
+ * On failure it will print info about the rc and hit a breakpoint.
+*
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRC(rc)
AssertMsgRC(rc, ("%Rra\n", (rc)))
+
+/** @def AssertRCStmt
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and execute
+ * @a stmt if it isn't.
+*
+ * @param rc
iprt status code.
+ * @param stmt Statement to execute before returning in case of a failed
+*
assertion.
+ * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCStmt(rc, stmt) AssertMsgRCStmt(rc, ("%Rra\n", (rc)), stmt)
+
+/** @def AssertRCReturn
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and return if it isn't.
+*
+ * @param rc
iprt status code.

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+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCReturn(rc, rcRet)   AssertMsgRCReturn(rc, ("%Rra\n", (rc)), rcRet)
+
+/** @def AssertRCReturnStmt
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only), execute
+ * @a stmt and returns @a rcRet if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   stmt    Statement to execute before returning in case of a failed
+ *                  assertion.
+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCReturnStmt(rc, stmt, rcRet) AssertMsgRCReturnStmt(rc, ("%Rra\n", (rc)), stmt, rcRet)
+
+/** @def AssertRCReturnVoid
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and return if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCReturnVoid(rc)      AssertMsgRCReturnVoid(rc, ("%Rra\n", (rc)))
+
+/** @def AssertRCReturnVoidStmt
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only), and
+ * execute the given statement/return if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   stmt    Statement to execute before returning on failure.
+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCReturnVoidStmt(rc, stmt) AssertMsgRCReturnVoidStmt(rc, ("%Rra\n", (rc)), stmt)
+
+/** @def AssertRCBreak
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and break if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCBreak(rc)           AssertMsgRCBreak(rc, ("%Rra\n", (rc)))
+
+/** @def AssertRCBreakStmt
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and break if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ * @remark rc is referenced multiple times. In release mode is NOREF(‘)ed.
+ */
+#define AssertRCBreakStmt(rc, stmt) AssertMsgRCBreakStmt(rc, ("%RA\n", (rc)), stmt)
+
+/** @def AssertMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * It prints a custom message and hits a breakpoint on FAILURE.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times. In release mode is NOREF(‘)ed.
+ */
+#define AssertMsgRC(rc, msg) \
+ do { AssertMsg(RT_SUCCESS_NP(rc), msg); NOREF(rc); } while (0)
+
+/** @def AssertMsgRCStmt
+ * Asserts a iprt status code successful, bitch (RT STRICT mode only) and
+ * execute @a stmt if it isn’t.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @param stmt Statement to execute before returning in case of a failed
+ *    assertion.
+ * @remark rc is referenced multiple times. In release mode is NOREF(‘)ed.
+ */
+#define AssertMsgRCStmt(rc, msg, stmt) \
+ do { AssertMsgStmt(RT_SUCCESS_NP(rc), msg, stmt); NOREF(rc); } while (0)
+
+/** @def AssertMsgRCReturn
+ * Asserts a iprt status code successful, bitch (RT STRICT mode only) and return
+ * @a rcRet if it isn’t.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times. In release mode is NOREF(‘)ed.
+ */
+#define AssertMsgRCReturn(rc, msg, rcRet) \
+ do { AssertMsgReturn(RT_SUCCESS_NP(rc), msg, rcRet); NOREF(rc); } while (0)
+
+/** @def AssertMsgRCReturnStmt
+ * Asserts a iprt status code successful, bitch (RT STRICT mode only), execute
+ * @a stmt and return @a rcRet if it isn’t.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @param stmt Statement to execute before returning in case of a failed
+ * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+ 
+ #define AssertMsgRCBreakStmt(rc, msg, stmt) 
+ + if (1) { AssertMsgBreakStmt(RT_SUCCESS_NP(rc), msg, stmt); NOREF(rc); } else do {} while (0)
+ + */
+ + ** @def AssertRCSuccess
+ + * Asserts an iprt status code equals VINF_SUCCESS.
+ + *
+ + * On failure it will print info about the rc and hit a breakpoint.
+ + *
+ + * @param rc iprt status code.
+ + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ + */
+ +#define AssertRCSuccess(rc) do { AssertMsg((rc) == VINF_SUCCESS, ("%Ra\n", (rc))); NOREF(rc);
+ + }
+ + */
+ + ** @def AssertRCSuccessReturn
+ + * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and return if it isn’t.
+ + *
+ + * @param rc iprt status code.
+ + * @param rcRet What is to be presented to return.
+ + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ + */
+ +#define AssertRCSuccessReturn(rc, rcRet) AssertMsgReturn((rc) == VINF_SUCCESS, ("%Ra\n", (rc)), rcRet)
+ + */
+ + ** @def AssertRCSuccessReturnVoid
+ + * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and return if it isn’t.
+ + *
+ + * @param rc iprt status code.
+ + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ + */
+ +#define AssertRCSuccessReturnVoid(rc) AssertMsgReturnVoid((rc) == VINF_SUCCESS, ("%Ra\n", (rc)))
+ + */
+ + ** @def AssertRCSuccessBreak
+ + * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and break if it isn’t.
+ + *
+ + * @param rc iprt status code.
+ + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ + */
+ +#define AssertRCSuccessBreak(rc) AssertMsgBreak((rc) == VINF_SUCCESS, ("%Ra\n", (rc)))
+ + */
+ + ** @def AssertRCSuccessBreakStmt
+ + * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and break if it isn’t.
+ + *
+ + * @param rc iprt status code.
+ + * @param stmt Statement to execute before break in case of a failed assertion.
+ + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ + */
+\#define AssertRCSuccessBreakStmt(rc, stmt) AssertMsgBreakStmt((rc) == VINF_SUCCESS, (\"%Ra\n\", (rc)), stmt)
+
+/** @def AssertLogRelRC
+ * Asserts a iprt status code successful.
+ *
+ * @param rc  iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+\#define AssertLogRelRC(rc) AssertLogRelMsgRC((rc) == VINF_SUCCESS, (\"%R\n\", (rc)))
+
+/** @def AssertLogRelRCReturn
+ * Asserts a iprt status code successful, returning \a rc if it isn't.
+ *
+ * @param rc      iprt status code.
+ * @param rcRet   What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+\#define AssertLogRelRCReturn(rc, rcRet) AssertLogRelMsgRCReturn((rc) == VINF_SUCCESS, (\"%R\n\", (rc)), rcRet)
+
+/** @def AssertLogRelRCReturnStmt
+ * Asserts a iprt status code successful, executing \a stmt and returning \a rc
+ * if it isn't.
+ *
+ * @param rc      iprt status code.
+ * @param stmt    Statement to execute before returning in case of a failed assertion.
+ * @param rcRet   What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+\#define AssertLogRelRCReturnStmt(rc, stmt, rcRet) AssertLogRelMsgRCReturnStmt((rc) == VINF_SUCCESS, (\"%R\n\", (rc)), stmt, rcRet)
+
+/** @def AssertLogRelRCReturnVoid
+ * Asserts a iprt status code successful, returning (void) if it isn't.
+ *
+ * @param rc      iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+\#define AssertLogRelRCReturnVoid(rc) AssertLogRelMsgRCReturnVoid((rc) == VINF_SUCCESS, (\"%R\n\", (rc)))
+
+/** @def AssertLogRelRCBreak
+ * Asserts a iprt status code successful, breaking if it isn't.
+ *
+ * @param rc      iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+\#define AssertLogRelRCBreak(rc) AssertLogRelMsgRCBreak(rc, ("%Ra\n", (rc)))
+
+/** @def AssertLogRelRCBreakStmt
+ * Asserts a iprt status code successful, execute \a statement and break if it isn't.
+ *
+ * @param rc   iprt status code.
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ * @remark rc is referenced multiple times.
+ */
+
+/** @def AssertLogRelMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * @param rc   iprt status code.
+ * @param msg  printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+
+/** @def AssertLogRelMsgRCReturn
+ * Asserts a iprt status code successful.
+ *
+ * @param rc   iprt status code.
+ * @param msg  printf argument list (in parenthesis).
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+
+/** @def AssertLogRelMsgRCReturnStmt
+ * Asserts a iprt status code successful, execute \a stmt and return on failure.
+ *
+ * @param rc   iprt status code.
+ * @param msg  printf argument list (in parenthesis).
+ * @param stmt Statement to execute before returning in case of a failed assertion.
+ *
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+
+/** @def AssertLogRelMsgRCReturnVoid
+ * Asserts a iprt status code successful.
+ *
+ * @param rc   iprt status code.
+ */
+ * @param   msg   printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+
+#define AssertLogRelMsgRCReturnVoid(rc, msg) AssertLogRelMsgReturnVoid(RT_SUCCESS_NP(rc), msg)
+
+/** @def AssertLogRelMsgRCBreak
+ * Asserts a iprt status code successful.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg   printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+
+#define AssertLogRelMsgRCBreak(rc, msg) AssertLogRelMsgBreak(RT_SUCCESS(rc), msg)
+
+/** @def AssertLogRelMsgRCBreakStmt
+ * Asserts a iprt status code successful, execute \a stmt and break if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg   printf argument list (in parenthesis).
+ * @param   stmt   Statement to execute before break in case of a failed assertion.
+ * @remark rc is referenced multiple times.
+ */
+
+#define AssertLogRelMsgRCBreakStmt(rc, msg, stmt) AssertLogRelMsgBreakStmt(RT_SUCCESS_NP(rc), msg, stmt)
+
+/** @def AssertLogRelRCSuccess
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc      iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+
+#define AssertLogRelRCSuccess(rc) AssertLogRelMsg((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+
+/** @def AssertLogRelRCSuccessReturn
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc      iprt status code.
+ * @param   rcRet   What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+
+#define AssertLogRelRCSuccessReturn(rc, rcRet) AssertLogRelMsgReturn((rc) == VINF_SUCCESS, ("%Rra\n", (rc)), rcRet)
+
+/** @def AssertLogRelRCSuccessReturnVoid
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc      iprt status code.
+ * @remark rc is referenced multiple times.
+ */
```c
+ */
+ #define AssertLogRelRCSuccessReturnVoid(rc)   AssertLogRelMsgReturnVoid((rc) == VINF_SUCCESS, (
"%Rra
", (rc)))
+ */
+ /** @def AssertLogRelRCSuccessBreak
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc      iprt status code.
+ * @remark  rc is referenced multiple times.
+ */
+ #define AssertLogRelRCSuccessBreak(rc)          AssertLogRelMsgBreak((rc) == VINF_SUCCESS, (
"%Rra
", (rc)))
+ */
+ /** @def AssertLogRelRCSuccessBreakStmt
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc      iprt status code.
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ * @remark  rc is referenced multiple times.
+ */
+ #define AssertLogRelRCSuccessBreakStmt(rc, stmt) AssertLogRelMsgBreakStmt((rc) == VINF_SUCCESS, (
"%Rra
", (rc)), stmt)
+ */
+ /** @def AssertReleaseRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param   rc  iprt status code.
+ * @remark  rc is referenced multiple times.
+ */
+ #define AssertReleaseRC(rc)                 AssertReleaseMsgRC(rc, (
"%Rra\n", (rc)))
+ */
+ /** @def AssertReleaseRCReturn
+ * Asserts a iprt status code successful, returning if it isn't.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param   rc      iprt status code.
+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times.
+ */
+ #define AssertReleaseRCReturn(rc, rcRet)    AssertReleaseMsgRCReturn(rc, (
"%Rra\n", (rc)), rcRet)
+ */
+ /** @def AssertReleaseRCReturnVoid
+ * Asserts a iprt status code successful, returning if it isn't.
+ */
```
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param   rc    iprt status code.
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertReleaseRCReturnVoid(rc)       AssertReleaseMsgRCReturnVoid(rc, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseRCBreak
+ * Asserts a iprt status code successful, breaking if it isn't.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally breaking the current statement if the breakpoint is somehow ignored.
+ *
+ * @param   rc    iprt status code.
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertReleaseRCBreak(rc)            AssertReleaseMsgRCBreak(rc, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseRCBreakStmt
+ * Asserts a iprt status code successful, break if it isn't.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally the break statement will be issued if the breakpoint is somehow ignored.
+ *
+ * @param   rc    iprt status code.
+ * @param   stmt Statement to execute before break in case of a failed assertion.
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertReleaseRCBreakStmt(rc, stmt)  AssertReleaseMsgRCBreakStmt(rc, ("%Rra\n", (rc)), stmt)
+
+/** @def AssertReleaseMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed and a breakpoint is hit.
+ *
+ * @param   rc    iprt status code.
+ * @param   msg   printf argument list (in parenthesis).
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRC(rc, msg)         AssertReleaseMsg(RT_SUCCESS_NP(rc), msg)
+
+/** @def AssertReleaseMsgRCReturn
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * returning from the function if the breakpoint is somehow ignored.
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+
#define AssertReleaseMsgRCReturn(rc, msg, rcRet) AssertReleaseMsgReturn(RT_SUCCESS_NP(rc), msg, rcRet)
+
+/** @def AssertReleaseMsgRCReturnVoid
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRCReturnVoid(rc, msg) AssertReleaseMsgReturnVoid(RT_SUCCESS_NP(rc), msg)
+
+/** @def AssertReleaseMsgRCBreak
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * breaking the current status if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRCBreak(rc, msg) AssertReleaseMsgBreak(RT_SUCCESS(rc), msg)
+
+/** @def AssertReleaseMsgRCBreakStmt
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * the break statement is issued if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRCBreakStmt(rc, msg, stmt) AssertReleaseMsgBreakStmt(RT_SUCCESS_NP(rc), msg, stmt)
+
+/** @def AssertReleaseRCSuccess

+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccess(rc) AssertReleaseMsg((rc) == VINF_SUCCESS, (%Rra\n", (rc)))
+
+/** @def AssertReleaseRCSuccessReturn
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccessReturn(rc, rcRet) AssertReleaseMsgReturn((rc) == VINF_SUCCESS, (%Rra\n", (rc)), rcRet)
+
+/** @def AssertReleaseRCSuccessReturnVoid
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccessReturnVoid(rc) AssertReleaseMsgReturnVoid((rc) == VINF_SUCCESS, (%Rra\n", (rc)))
+
+/** @def AssertReleaseRCSuccessBreak
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally breaking the current statement if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccessBreak(rc) AssertReleaseMsgBreak((rc) == VINF_SUCCESS, (%Rra\n", (rc)))
+
+/** @def AssertReleaseRCSuccessBreakStmt
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally the break statement will be issued if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccessBreakStmt(rc, stmt)    AssertReleaseMsgBreakStmt((rc) == VINF_SUCCESS, (
"%Rra\n", (rc)), stmt)
+
+/** @def AssertFatalRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertFatalRC(rc)               AssertFatalMsgRC(rc, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed and a breakpoint is hit.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRC(rc, msg)     AssertFatalMsg(RT_SUCCESS_NP(rc), msg)
+
+/** @def AssertFatalRCSuccess
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertFatalRCSuccess(rc)        AssertFatalMsg((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+
+/** @def AssertPtr
+ * Asserts that a pointer is valid.
+ *
+ * @param pv The pointer.
+ */
+ */
+ #define AssertPtr(pv) AssertMsg(VALID_PTR(pv), ("%p\n", (pv)))
+ */
+ /** @def AssertPtrReturn
+ * Asserts that a pointer is valid.
+ *
+ * @param pv The pointer.
+ * @param rcRet What is to be presented to return.
+ */
+ #define AssertPtrReturn(pv, rcRet) AssertMsgReturn(VALID_PTR(pv), ("%p\n", (pv)), rcRet)
+ */
+ /** @def AssertPtrReturnVoid
+ * Asserts that a pointer is valid.
+ *
+ * @param pv The pointer.
+ */
+ #define AssertPtrReturnVoid(pv) AssertMsgReturnVoid(VALID_PTR(pv), ("%p\n", (pv)))
+ */
+ /** @def AssertPtrBreak
+ * Asserts that a pointer is valid.
+ *
+ * @param pv The pointer.
+ */
+ #define AssertPtrBreak(pv) AssertMsgBreak(VALID_PTR(pv), ("%p\n", (pv)))
+ */
+ /** @def AssertPtrBreakStmt
+ * Asserts that a pointer is valid.
+ *
+ * @param pv The pointer.
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ */
+ #define AssertPtrBreakStmt(pv, stmt) AssertMsgBreakStmt(VALID_PTR(pv), ("%p\n", (pv)), stmt)
+ */
+ /** @def AssertPtrNull
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param pv The pointer.
+ */
+ #define AssertPtrNull(pv) AssertMsg(VALID_PTR(pv) || (pv) == NULL, ("%p\n", (pv)))
+ */
+ /** @def AssertPtrNullReturn
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param pv The pointer.
+ * @param rcRet What is to be presented to return.
+ */
+ #define AssertPtrNullReturn(pv, rcRet) AssertMsgReturn(VALID_PTR(pv) || (pv) == NULL, ("%p\n", (pv)), rcRet)

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+/** @def AssertPtrNullReturnVoid
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param   pv      The pointer.
+ */
+#define AssertPtrNullReturnVoid(pv)     AssertMsgReturnVoid(VALID_PTR(pv) || (pv) == NULL, (%p
, (pv)))
+
+/** @def AssertPtrNullBreak
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param   pv      The pointer.
+ */
+#define AssertPtrNullBreak(pv)          AssertMsgBreak(VALID_PTR(pv) || (pv) == NULL, (%p
, (pv)))
+
+/** @def AssertPtrNullBreakStmt
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param   pv      The pointer.
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ */
+#define AssertPtrNullBreakStmt(pv, stmt) AssertMsgBreakStmt(VALID_PTR(pv) || (pv) == NULL, (%p
, (pv)), stmt)
+
+/** @def AssertGCPhys32
+ * Asserts that the high dword of a physical address is zero
+ *
+ * @param   GCPhys  The address (RTGCPHYS).
+ */
+#define AssertGCPhys32(GCPhys)          AssertMsg(VALID_PHYS32(GCPhys), (%RGp
, (RTGCPHYS)(GCPhys)))
+
+/** @def AssertGCPtr32
+ * Asserts that the high dword of a physical address is zero
+ *
+ * @param   GCPtr   The address (RTGCPtr).
+ */
+#if GC_ARCH_BITS == 32
+# define AssertGCPtr32(GCPtr)         do [ ] while (0)
+#else
+# define AssertGCPtr32(GCPtr)        AssertMsg(!((GCPtr) & UINT64_C(0xffffffff00000000)), (%RGv
, GCPtr))
+#endif
+
+/** @def AssertForEach
+ * Equivalent to Assert for each value of the variable from the starting
+ * value to the finishing one.
+ * @param var Name of the counter variable.
+ * @param vartype Type of the counter variable.
+ * @param first Lowest inclusive value of the counter variable.
+ * This must be free from side effects.
+ * @param end Highest exclusive value of the counter variable.
+ * This must be free from side effects.
+ * @param expr Expression which should be true for each value of @a var.
+ */
+#define AssertForEach(var, vartype, first, end, expr) \
+ do { \
+     vartype var; \
+     Assert((first) == (first) && (end) == (end)); /* partial check for side effects */ \
+     for (var = (first); var < (end); var++) \
+         AssertMsg(expr, ("%s = %#RX64 (%RI64)", #var, (uint64_t)var, (int64_t)var)); \
+ } while (0)
+
+/** @} */
+/** @} */
+
+#ifndef RT_OS_WINDOWS
+/** @def AssertNtStatus
+ * Asserts that the NT_SUCCESS() returns true for the given NTSTATUS value.
+ */
+# define AssertNtStatus(a_rcNt) \
+ do { AssertMsg(NT_SUCCESS(a_rcNt), ("%#x\n", (a_rcNt))); NOREF(a_rcNt); } while (0)
+
+/** @def AssertNtStatusSuccess
+ * Asserts that the given NTSTATUS value equals STATUS_SUCCESS.
+ */
+# define AssertNtStatusSuccess(a_rcNt) \
+ do { AssertMsg((a_rcNt) == STATUS_SUCCESS, ("%#x\n", (a_rcNt))); NOREF(a_rcNt); } while (0)
+
+#endif /* RT_OS_WINDOWS */
+ */
+/** @} */
+/** @} */
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/assertcompile.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/assertcompile.h
@@ -0,0 +1,236 @@
/+/** @file
+ * IPRT - Compile Time Assertions.
+ */
+ +
+/**
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+ *
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef __iprt_assertcompile_h
+define __iprt_assertcompile_h
+
#include <iprt/cdefs.h>
+
/** @defgroup grp_rt_assert_compile Compile time assertions
 */
+@ingroup grp_rt
+
* These assertions are used to check structure sizes, member/size alignments
* and similar compile time expressions.
+
* As you might have noticed, the AssertCompile macros don't follow the
* coding guidelines wrt to macros supposedly being all uppercase and
* underscored. For various reasons they don't, and nobody has
* complained yet.
+
*/
+
*/**
* RTASSERTTYPE is the type the AssertCompile() macro redefines.
It has no other function and shouldn't be used.

Visual C++ uses this.

+*/
typedef int RTASSERTTYPE[1];
+
+/**
+ * RTASSERTVAR is the type the AssertCompile() macro redefines.
+ * It has no other function and shouldn't be used.
+ * GCC uses this.
+ */
+ifdef __GNUC__
+RT_C_DECLS_BEGIN
+endif
+extern int RTASSERTVAR[1];
+ifdef __GNUC__
+RT_C_DECLS_END
+endif
+
+/** @def RTASSERT_HAVE_STATIC_ASSERT
+ * Indicates that the compiler implements static_assert(expr, msg).
+ */
+ifdef _MSC_VER
+ifdef __GNUC__
+RT_C_DECLS_BEGIN
+endif
+endif
+ifdef __GNUC__
+RT_C_DECLS_END
+endif
+
+ifdef DOXYGEN_RUNNING
+define RTASSERT_HAVE_STATIC_ASSERT
+endif
+
+/** @def AssertCompileNS
+ * Asserts that a compile-time expression is true. If it's not break the build.
+ * This differs from AssertCompile in that it accepts some more expressions
+ * than what C++0x allows - NS = Non-standard.
+ */
+ifdef __GNUC__
+define AssertCompileNS(expr)  extern int RTASSERTVAR[1] __attribute__((__unused__)),
+endif
RTASSERTVAR[(expr) ? 1 : 0] __attribute__((__unused__))
+#elif defined(__IBMC__) || defined(__IBMPP__)
+# define AssertCompileNS(expr) extern int RTASSERTVAR[(expr) ? 1 : 0]
+#else
+# define AssertCompileNS(expr) typedef int RTASSERTTYPE[(expr) ? 1 : 0]
+#endif
+
+/** @def AssertCompile
+ * Asserts that a C++0x compile-time expression is true. If it's not break the
+ * build.
+ * @param expr Expression which should be true.
+ */
+#ifdef RTASSERT_HAVE_STATIC_ASSERT
+# define AssertCompile(expr)    static_assert(!!(expr), #expr)
+#else
+# define AssertCompile(expr)    AssertCompileNS(expr)
+#endif
+
+/** @def RTASSERT_OFFSET_OF()
+ * A offsetof() macro suitable for compile time assertions.
+ * Both GCC v4 and VisualAge for C++ v3.08 has trouble using RT_OFFSETOF.
+ */
+#if defined(__GNUC__)
+  #if __GNUC__ >= 4
+    # define RTASSERT_OFFSET_OF(a_Type, a_Member)  __builtin_offsetof(a_Type, a_Member)
+  #else
+    # define RTASSERT_OFFSET_OF(a_Type, a_Member)  RT_OFFSETOF(a_Type, a_Member)
+  #endif
+#elif (defined(__IBMC__) || defined(__IBMCPP__)) && defined(RT_OS_OS2)
+    # define RTASSERT_OFFSET_OF(a_Type, a_Member)   __offsetof(a_Type, a_Member)
+#elif (defined(__WATCOMC__) && defined(__cplusplus))
+    # define RTASSERT_OFFSET_OF(a_Type, a_Member)   __offsetof(a_Type, a_Member)
+#else
+    # define RTASSERT_OFFSET_OF(a_Type, a_Member)   RT_OFFSETOF(a_Type, a_Member)
+  #endif
+
+/** @def AssertCompileSize
+ * Asserts a size at compile.
+ * @param type The type.
+ * @param size The expected type size.
+ */
+#define AssertCompileSize(type, size) \
+    AssertCompile(sizeof(type) == (size)) \
+    AssertCompile(sizeof(type) == (size))
+
+/** @def AssertCompileSizeAlignment
+ * Asserts a size alignment at compile.
+ * @param type The type.
+ * @param   align   The size alignment to assert.
+ */
+#define AssertCompileSizeAlignment(type, align) \ 
+   AssertCompile(!(sizeof(type) & ((align) - 1)))
+
+/** @def AssertCompileMemberSize
+ * Asserts a member offset alignment at compile.
+ * @param   type    The type.
+ * @param   member  The member.
+ * @param   size    The member size to assert.
+ */
+#define AssertCompileMemberSize(type, member, size) \ 
+   AssertCompile(RT_SIZEOFMEMB(type, member) == (size))
+
+/** @def AssertCompileMemberSizeAlignment
+ * Asserts a member size alignment at compile.
+ * @param   type    The type.
+ * @param   member  The member.
+ * @param   align   The member size alignment to assert.
+ */
+#define AssertCompileMemberSizeAlignment(type, member, align) \ 
+   AssertCompile((RT_SIZEOFMEMB(type, member) & ((align) - 1)))
+
+/** @def AssertCompileMemberAlignment
+ * Asserts a member offset alignment at compile.
+ * @param   type    The type.
+ * @param   member  The member.
+ */
+#define AssertCompileMemberAlignment(type, member, align) \ 
+   AssertCompile((RTASSERT_OFFSET_OF(type, member) & ((align) - 1)))
+
+/** @def AssertCompileMemberOffset
+ * Asserts an offset of a structure member at compile.
+ * @param   type    The type.
+ * @param   member  The member.
+ * @param   off     The expected offset.
+ */
+#define AssertCompileMemberOffset(type, member, off) \ 
+   AssertCompile(RTASSERT_OFFSET_OF(type, member) == (off))
+
+/** @def AssertCompile2MemberOffsets
+ * Asserts that two (sub-structure) members in union have the same offset.
+ * @param   type    The type.
+ * @param   member1 The first member.
+ * @param   member2 The second member.
+ */
+#define AssertCompile2MemberOffsets(type, member1, member2) \
+ AssertCompile(RTASSERT_OFFSET_OF(type, member1) == RTASSERT_OFFSET_OF(type, member2))
+
+/** @def AssertCompileAdjacentMembers
+ * Asserts that two structure members are adjacent.
+ * @param   type    The type.
+ * @param   member1 The first member.
+ * @param   member2 The second member.
+ */
+#define AssertCompileAdjacentMembers(type, member1, member2) \
+    AssertCompile(RTASSERT_OFFSET_OF(type, member1) == RTASSERT_OFFSET_OF(type, member2))
+
+/** @def AssertCompileMembersAtSameOffset
+ * Asserts that members of two different structures are at the same offset.
+ * @param   type1   The first type.
+ * @param   member1 The first member.
+ * @param   type2   The second type.
+ * @param   member2 The second member.
+ */
+#define AssertCompileMembersAtSameOffset(type1, member1, type2, member2) \ 
+    AssertCompile(RTASSERT_OFFSET_OF(type1, member1) == RTASSERT_OFFSET_OF(type2, member2))
+
+/** @def AssertCompileMembersSameSize
+ * Asserts that members of two different structures have the same size.
+ * @param   type1   The first type.
+ * @param   member1 The first member.
+ * @param   type2   The second type.
+ * @param   member2 The second member.
+ */
+#define AssertCompileMembersSameSize(type1, member1, type2, member2) \ 
+    AssertCompile(RT_SIZEOFMEMB(type1, member1) == RT_SIZEOFMEMB(type2, member2))
+
+/** @def AssertCompileMembersSameSizeAndOffset
+ * Asserts that members of two different structures have the same size and are
+ * at the same offset.
+ * @param   type1   The first type.
+ * @param   member1 The first member.
+ * @param   type2   The second type.
+ * @param   member2 The second member.
+ */
+#define AssertCompileMembersSameSizeAndOffset(type1, member1, type2, member2) \ 
+    AssertCompile(RT_SIZEOFMEMB(type1, member1) == RT_SIZEOFMEMB(type2, member2)) \
+        && RT_ASSERT_OFFSET_OF(type1, member1) == RT_ASSERT_OFFSET_OF(type2, member2))
+
+/** @} */
+
+#endif
/** @file
 * IPRT - AVL Trees.
 */

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 */

#ifndef ___iprt_avl_h
#define ___iprt_avl_h

#include <iprt/cdefs.h>
#include <iprt/types.h>

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_avl    RTAvl - AVL Trees
 * @ingroup grp_rt
 * @@*/

/** AVL tree of void pointers.
 * @@*/

#endif
**AVL key type**

```c
+ * AVL key type
+ */
+typedef void * AVLPVKEY;
+
+/**
+ * AVL Core node.
+ */
+typedef struct _AVLPVNodeCore
+
+   AVLPVKEY                Key;        /** Key value. */
+   struct _AVLPVNodeCore  *pLeft;      /** Pointer to left leaf node. */
+   struct _AVLPVNodeCore  *pRight;     /** Pointer to right leaf node. */
+   unsigned char           uchHeight;  /** Height of this tree: max(height(left), height(right)) + 1 */
+
+/** A tree with void pointer keys. */
+typedef PAVLPVNODECORE     AVLPVTREE;
+
+/** Pointer to a tree with void pointer keys. */
+typedef PPAVLPVNODECORE    PAVLPVTREE;
+
+/** Callback function for AVLPVDoWithAll().
+ */
+typedef DECLCALLBACK(int) AVLPVCALLBACK(PAVLPVTREE, void);
+
+/** Pointer to callback function for AVLPVDoWithAll(). */
+typedef AVLPVCALLBACK *PAVLPVCALLBACK;
+
+/** @} */
+
+/** AVL tree of unsigned long. */
+/** @} */
+}
+/**
+ * AVL key type
+ */
+typedef unsigned long   AVLULKEY;
+
+/**
+ * AVL Core node.
+ */
+typedef struct _AVLULNodeCore 
+{ 
+    AVLULKEY                Key;        /** Key value. */
+    struct _AVLULNodeCore  *pLeft;      /** Pointer to left leaf node. */
+    struct _AVLULNodeCore  *pRight;     /** Pointer to right leaf node. */
+    unsigned char           uchHeight;  /** Height of this tree: max(height(left), height(right)) + 1 */
+} AVLULNODECORE, *PAVLULNODECORE, **PPAVLULNODECORE;
+
+/** Callback function for AVLULDoWithAll().
+ * @returns IPRT status codes. */
+typedef DECLCALLBACK(int) AVLULCALLBACK(PAVLULNODECORE, void*);
+/** Pointer to callback function for AVLULDoWithAll(). */
+typedef AVLULCALLBACK *PAVLULCALLBACK;
+
+/** @} */
+
+/** AVL tree of void pointer ranges.
+ * @} */
+/**
typedef void *AVLRPVKEY;

/**
 * AVL Core node.
 */
typedef struct AVLRPVNodeCore
{
    AVLRPVKEY Key; /**< First key value in the range (inclusive). */
    AVLRPVKEY KeyLast; /**< Last key value in the range (inclusive). */
    struct AVLRPVNodeCore *pLeft; /**< Pointer to left leaf node. */
    struct AVLRPVNodeCore *pRight; /**< Pointer to right leaf node. */
    unsigned char uchHeight; /**< Height of this tree: max(height(left), height(right)) + 1 */
} AVLRPVNODECORE, *PAVLRPVNODECORE, **PPAVLRPVNODECORE;

/** A tree with void pointer keys. */
typedef PAVLRPVNODECORE AVLRPVTREE;
/** Pointer to a tree with void pointer keys. */
typedef PPAVLRPVNODECORE PAVLRPVTREE;

/** Callback function for AVLPVDoWithAll().
 * @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLRPVCALLBACK(PAVLRPVNODECORE, void *);
/** Pointer to callback function for AVLPVDoWithAll(). */
typedef AVLRPVCALLBACK *PAVLRPVCALLBACK;

/** @} */
/** AVL tree of uint32_t */
+ * @} *
+ */
+ /** AVL key type. */
typedef uint32_t AVLU32KEY;
+
/** AVL Core node. */
typedef struct _AVLU32NodeCore {
+    struct _AVLU32NodeCore *pLeft; /**< Pointer to left leaf node. */
+    struct _AVLU32NodeCore *pRight; /**< Pointer to right leaf node. */
+    AVLU32KEY Key; /**< Key value. */
+    unsigned char uchHeight; /**< Height of this tree: max(height(left), height(right)) + 1 */
+} AVLU32NODECORE, *PAVLU32NODECORE, **PPAVLU32NODECORE;
+
/** A tree with void pointer keys. */
typedef PAVLU32NODECORE AVLU32TREE;
+/** Pointer to a tree with void pointer keys. */
typedef PPAVLU32NODECORE PAVLU32TREE;
+
/** Callback function for AVLU32DoWithAll() & AVLU32Destroy(). */
+ * @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLU32CALLBACK(PAVLU32NODECORE, void*);
+/** Pointer to callback function for AVLU32DoWithAll() & AVLU32Destroy(). */
typedef AVLU32CALLBACK *PAVLU32CALLBACK;
+
/** Functions. */
+ */
+RTDECL(bool) RTAvlU32Insert(PAVLU32TREE pTree, PAVLU32NODECORE pNode);
+RTDECL(PAVLU32NODECORE) RTAvlU32Remove(PAVLU32TREE pTree, AVLU32KEY Key);
+RTDECL(PAVLU32NODECORE) RTAvlU32Get(PAVLU32TREE pTree, AVLU32KEY Key);
+RTDECL(PAVLU32NODECORE) RTAvlU32GetBestFit(PAVLU32TREE pTree, AVLU32KEY Key, bool fAbove);
+RTDECL(PAVLU32NODECORE) RTAvlU32RemoveBestFit(PAVLU32TREE pTree, AVLU32KEY Key, bool fAbove);
+RTDECL(int) RTAvlU32DoWithAll(PAVLU32TREE pTree, int fFromLeft, PAVLU32CALLBACK pfnCallBack, void *pvParam);
+RTDECL(int) RTAvlU32Destroy(PAVLU32TREE pTree, PAVLU32CALLBACK pfnCallBack, void *pvParam);
+
/** */
+ * AVL uint32_t type for the relative offset pointer scheme. */
+ */
+typedef int32_t     AVLOU32;
+typedef uint32_t     AVLOU32KEY;
+/**
+ * AVL Core node.
+ */
typedef struct _AVLOU32NodeCore
+{
+    /** Key value. */
+    AVLOU32KEY          Key;
+    /** Offset to the left leaf node, relative to this field. */
+    AVLOU32             pLeft;
+    /** Offset to the right leaf node, relative to this field. */
+    AVLOU32             pRight;
+    /** Height of this tree: max(height(left), height(right)) + 1 */
+    unsigned char       uchHeight;
+} AVLOU32NODECORE, *PAVLOU32NODECORE;

+/** A offset base tree with uint32_t keys. */
typedef AVLOU32         AVLOU32TREE;
+ /** Pointer to an offset base tree with uint32_t keys. */
typedef AVLOU32TREE    *PAVLOU32TREE;
+
+/** Pointer to an internal tree pointer.
+ * In this case it's a pointer to a relative offset. */
typedef AVLOU32TREE    *PPAVLOU32NODECORE;
+
+/** Callback function for RTAvloU32DoWithAll().
+ * @returns IPRT status codes. */
typedef DECLCALLBACK(int)   AVLOU32CALLBACK(PAVLOU32NODECORE pNode, void *pvUser);
+/** Pointer to callback function for RTAvloU32DoWithAll(). */
typedef AVLOU32CALLBACK *PAVLOU32CALLBACK;

+RTDECL(bool)                  RTAvloU32Insert(PAVLOU32TREE pTree, PAVLOU32NODECORE pNode);
+RTDECL(PAVLOU32NODECORE)      RTAvloU32Remove(PAVLOU32TREE pTree, AVLOU32KEY Key);
+RTDECL(PAVLOU32NODECORE)      RTAvloU32Get(PAVLOU32TREE pTree, AVLOU32KEY Key);
+RTDECL(int)                   RTAvloU32DoWithAll(PAVLOU32TREE pTree, int fFromLeft,
+PVLOU3232CALLBACK pfnCallBack, void *pvParam);}
+RTDECL(PAVLOU32NODECORE)      RTAvloU32GetBestFit(PAVLOU32TREE ppTree, AVLOU32KEY Key,
+bool fAbove);
+RTDECL(PAVLOU32NODECORE)      RTAvloU32RemoveBestFit(PAVLOU32TREE ppTree, AVLOU32KEY Key,
+bool fAbove);
+RTDECL(int)                   RTAvloU32Destroy(PAVLOU32TREE pTree, PAVLOU3232CALLBACK pfnCallBack,
+void *pvParam);
+
+/** @} */
AVL tree of uint32_t, list duplicates.

typedef uint32_t    AVLLU32KEY;

typedef struct _AVLLU32NodeCore
{
    AVLLU32KEY                  Key;        /**< Key value. */
    unsigned char               uchHeight;  /**< Height of this tree: max(height(left), height(right)) + 1 */
    struct _AVLLU32NodeCore    *pLeft;      /**< Pointer to left leaf node. */
    struct _AVLLU32NodeCore    *pRight;     /**< Pointer to right leaf node. */
    struct _AVLLU32NodeCore    *pList;      /**< Pointer to next node with the same key. */
} AVLLU32NODECORE, *PAVLLU32NODECORE, **PPAVLLU32NODECORE;

Callback function for RTAvllU32DoWithAll() & RTAvllU32Destroy().

typedef DECLCALLBACK(int) AVLLU32CALLBACK(PAVLLU32NODECORE, void*);

Pointer to callback function for RTAvllU32DoWithAll() & RTAvllU32Destroy().

typedef AVLLU32CALLBACK *PAVLLU32CALLBACK;

AVL tree of uint64_t ranges.
typedef uint64_t AVLRU64KEY;

typedef struct AVLRU64NodeCore
{
    AVLRU64KEY       Key;        /**< First key value in the range (inclusive). */
    AVLRU64KEY       KeyLast;    /**< Last key value in the range (inclusive). */
    struct AVLRU64NodeCore  *pLeft;      /**< Pointer to left leaf node. */
    struct AVLRU64NodeCore  *pRight;     /**< Pointer to right leaf node. */
    unsigned char            uchHeight;  /**< Height of this tree: max(height(left), height(right)) + 1 */
} AVLRU64NODECORE, *PAVLRU64NODECORE, **PPAVLRU64NODECORE;

typedef PAVLRU64NODECORE    AVLRU64TREE;
typedef PPAVLRU64NODECORE   PAVLRU64TREE;

typedef DECLCALLBACK(int) AVLRU64CALLBACK(PAVLRU64NODECORE, void *);

RTDECL(int)              RTAvlrU64Insert(PAVLRU64TREE ppTree, PAVLRU64NODECORE pNode);
RTDECL(PAVLRU64NODECORE) RTAvlrU64Remove(PAVLRU64TREE ppTree, AVLRU64KEY Key);
RTDECL(PAVLRU64NODECORE) RTAvlrU64Get(PAVLRU64TREE ppTree, AVLRU64KEY Key);
RTDECL(PAVLRU64NODECORE) RTAvlrU64RangeGet(PAVLRU64TREE ppTree, AVLRU64KEY Key);
RTDECL(PAVLRU64NODECORE) RTAvlrU64RangeRemove(PAVLRU64TREE ppTree, AVLRU64KEY Key);
RTDECL(PAVLRU64NODECORE) RTAvlrU64GetBestFit(PAVLRU64TREE ppTree, AVLRU64KEY Key, bool fAbove);
RTDECL(PAVLRU64NODECORE) RTAvlrU64RemoveBestFit(PAVLRU64TREE ppTree, AVLRU64KEY Key, bool fAbove);
RTDECL(int)              RTAvlrU64DoWithAll(PAVLRU64TREE ppTree, int fFromLeft, PAVLRU64CALLBACK pfnCallBack, void *pvParam);
RTDECL(int)              RTAvlrU64Destroy(PAVLRU64TREE ppTree, PAVLRU64CALLBACK pfnCallBack, void *pvParam);
AVL tree of RTGCPHYSeS - using relative offsets internally.

AVL 'pointer' type for the relative offset pointer scheme.

typedef int32_t AVLOGCPHYS;

AVL Core node.

typedef struct _AVLOGCPhysNodeCore {
    RTGCPHYS Key;
    AVLOGCPHYS pLeft;
    AVLOGCPHYS pRight;
    unsigned char uchHeight;
    unsigned char Padding[7];
} AVLOGCPHYSNODECORE, *PAVLOGCPHYSNODECORE;

A offset base tree with uint32_t keys.

typedef AVLOGCPHYS AVLOGCPHYSTREE;

Pointer to an offset base tree with uint32_t keys.

typedef AVLOGCPHYSTREE *PAVLOGCPHYSTREE;

Pointer to an internal tree pointer.

In this case it's a pointer to a relative offset.

typedef AVLOGCPHYSTREE *PPAVLOGCPHYSNODECORE;

Callback function for RTAvloGCPhysDoWithAll() and RTAvloGCPhysDestroy().

@returns IPRT status codes.

typedef DECLCALLBACK(int) AVLOGCPHYSCALLBACK(PAVLOGCPHYSNODECORE pNode, void *pvUser);

Pointer to callback function for RTAvloGCPhysDoWithAll() and RTAvloGCPhysDestroy().

Typedef AVLOGCPHYSCALLBACK *PAVLOGCPHYSCALLBACK;

RTDECL(bool) RTAvloGCPhysInsert(PAVLOGCPHYSTREE pTree, PAVLOGCPHYSNODECORE
pNode);
+RTDECL(PAVLOGCPHYSNODECORE) RTAvloGCPhysRemove(PAVLOGCPHYSTREE pTree,
RTGCPHYS Key);
+RTDECL(PAVLOGCPHYSNODECORE) RTAvloGCPhysGet(PAVLOGCPHYSTREE pTree,
RTGCPHYS Key);
+RTDECL(int) RTAvloGCPhysDoWithAll(PAVLOGCPHYSTREE pTree, int fFromLeft,
PAVLOGCPHYSCALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLOGCPHYSNODECORE) RTAvloGCPhysGetBestFit(PAVLOGCPHYSTREE ppTree,
RTGCPHYS Key, bool fAbove);
+RTDECL(PAVLOGCPHYSNODECORE) RTAvloGCPhysRemoveBestFit(PAVLOGCPHYSTREE ppTree,
RTGCPHYS Key, bool fAbove);
+RTDECL(int) RTAvloGCPhysDestroy(PAVLOGCPHYSTREE pTree,
PAVLOGCPHYSCALLBACK pfnCallBack, void *pvParam);
+
+/** @} */
+
+/** AVL tree of RTGCPHYS ranges - using relative offsets internally.
+* @} */
+
+/**
+* AVL 'pointer' type for the relative offset pointer scheme.
+* */
+typedef int32_t AVLROGCPHYS;
+
+/**
+* AVL Core node.
+* */
+typedef struct _AVLROGCPHYSNODECORE
+
+/** First key value in the range (inclusive). */
+RTGCPHYS Key;
+/** Last key value in the range (inclusive). */
+RTGCPHYS KeyLast;
+/** Offset to the left leaf node, relative to this field. */
+AVLROGCPHYS pLeft;
+/** Offset to the right leaf node, relative to this field. */
+AVLROGCPHYS pRight;
+/** Height of this tree: max(height(left), height(right)) + 1 */
+unsigned char uchHeight;
+/** Padding */
+unsigned char Padding[7];
+] AVLROGCPHYSNODECORE, *PAVLROGCPHYSNODECORE;
+
+/** A offset base tree with uint32_t keys. */
+typedef AVLROGCPHYS AVLROGCPHYSTREE;
+/** Pointer to an offset base tree with uint32_t keys. */
typedef AVLROGCPHYSTREE *PAVLROGCPHYSTREE;

/** Pointer to an internal tree pointer. */
/** In this case it's a pointer to a relative offset. */
typedef AVLROGCPHYSTREE *PPAVLROGCPHYSNODECORE;

/** Callback function for RTAvlroGCPhysDoWithAll() and RTAvlroGCPhysDestroy(). */
/** @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLROGCPHYSCALLBACK(PAVLROGCPHYSNODECORE pNode, void *pvUser);

/** Pointer to callback function for RTAvlroGCPhysDoWithAll() and RTAvlroGCPhysDestroy(). */
typedef AVLROGCPHYSCALLBACK *PAVLROGCPHYSCALLBACK;

RTDECL(bool) RTAvlroGCPhysInsert(PAVLROGCPHYSTREE pTree, PAVLROGCPHYSNODECORE pNode);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysRemove(PAVLROGCPHYSTREE pTree, RTGCPHYS Key);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysGet(PAVLROGCPHYSTREE pTree, RTGCPHYS Key);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysRangeGet(PAVLROGCPHYSTREE pTree, RTGCPHYS Key);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysRangeRemove(PAVLROGCPHYSTREE pTree, RTGCPHYS Key);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysGetBestFit(PAVLROGCPHYSTREE ppTree, RTGCPHYS Key, bool fAbove);
RTDECL(int) RTAvlroGCPhysDoWithAll(PAVLROGCPHYSTREE pTree, int fFromLeft, AVLROGCPHYSCALLBACK pfnCallBack, void *pvParam);
RTDECL(int) RTAvlroGCPhysDestroy(PAVLROGCPHYSTREE pTree, AVLROGCPHYSCALLBACK pfnCallBack, void *pvParam);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysGetRoot(PAVLROGCPHYSTREE pTree);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysGetLeft(PAVLROGCPHYSNODECORE pNode);
RTDECL(PAVLROGCPHYSNODECORE) RTAvlroGCPhysGetRight(PAVLROGCPHYSNODECORE pNode);

/** @} */

/** AVL tree of RTGCPTRs. */
/** @} */
+ RTGCPRTR Key;
+ /* Pointer to the left node. */
+ struct _AVLOGCPtrNodeCore *pLeft;
+ /* Pointer to the right node. */
+ struct _AVLOGCPtrNodeCore *pRight;
+ /* Height of this tree: max(height(left), height(right)) + 1 */
+ unsigned char uchHeight;
+ } AVLGCPTRNODECORE, *PAVLGCPTRNODECORE, **PPAVLGCPTRNODECORE;
+
+ /** A tree of RTGCPRTR keys. */
typedef PAVLGCPTRNODECORE AVLGCPTRTREE;
+ /** Pointer to a tree of RTGCPRTR keys. */
typedef PPAVLGCPTRNODECORE PAVLGCPTRTREE;
+
+ /** Callback function for RTAvlGCPtrDoWithAll().
+ * @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLGCPTRCALLBACK(PAVLGCPTRNODECORE pNode, void *pvUser);
+ /** Pointer to callback function for RTAvlGCPtrDoWithAll(). */
typedef AVLGCPTRCALLBACK *PAVLGCPTRCALLBACK;
+
+ RTDECL(bool) RTAvlGCPtrInsert(PAVLGCPTRTREE pTree, PAVLGCPTRNODECORE pNode);
+ RTDECL(PAVLGCPTRNODECORE) RTAvlGCPtrRemove(PAVLGCPTRTREE pTree, RTGCPRTR Key);
+ RTDECL(PAVLGCPTRNODECORE) RTAvlGCPtrGet(PAVLGCPTRTREE pTree, RTGCPRTR Key);
+ RTDECL(int) RTAvlGCPtrDoWithAll(PAVLGCPTRTREE pTree, int fFromLeft,
+ PAVLGCPTRCALLBACK pfnCallBack, void *pvParam);
+ RTDECL(PAVLGCPTRNODECORE) RTAvlGCPtrGetBestFit(PAVLGCPTRTREE ppTree, RTGCPRTR Key,
+ bool fAbove);
+ RTDECL(PAVLGCPTRNODECORE) RTAvlGCPtrRemoveBestFit(PAVLGCPTRTREE ppTree, RTGCPRTR Key,
+ bool fAbove);
+ RTDECL(int) RTAvlGCPtrDestroy(PAVLGCPTRTREE pTree, PAVLGCPTRCALLBACK
+ pfnCallBack, void *pvParam);
+
+ /** @} */
+
+ /** AVL tree of RTGCPRTRs - using relative offsets internally.
+ * @} */
+
+ /** AVL 'pointer' type for the relative offset pointer scheme.
+ * @} */
typedef int32_t AVLOGCPTR;
+
+ */
+ * AVL Core node.
+ */
typedef struct _AVLOGCPtrNodeCore
+{  /** Key value. */  RTGCPTR Key;  /** Offset to the left leaf node, relative to this field. */  AVLOGCPTR pLeft;  /** Offset to the right leaf node, relative to this field. */  AVLOGCPTR pRight;  /** Height of this tree: \( \max(\text{height(left)}, \text{height(right)}) + 1 \) */  unsigned char uchHeight;  unsigned char padding[GC_ARCH_BITS == 64 ? 7 : 3];} AVLOGCPTRNODECORE, *PAVLOGCPTRNODECORE;

+/** A offset base tree with uint32_t keys. */
typedef AVLOGCPTR AVLOGCPTRTREE;
+/** Pointer to an offset base tree with uint32_t keys. */
typedef AVLOGCPTRTREE *PAVLOGCPTRTREE;
+
+/** Pointer to an internal tree pointer.  
* In this case it's a pointer to a relative offset. */
typedef AVLOGCPTRTREE *PPAVLOGCPTRNODECORE;
+
+/** Callback function for RTAvloGCPtrDoWithAll().  
* @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLOGCPTRCALLBACK(PAVLOGCPTRNODECORE pNode, void *pvUser);
+/** Pointer to callback function for RTAvloGCPtrDoWithAll(). */
typedef AVLOGCPTRCALLBACK *PAVLOGCPTRCALLBACK;
+
+RTDECL(bool) RTAvloGCPtrInsert(PAVLOGCPTRTREE pTree, PAVLOGCPTRNODECORE pNode);
+RTDECL(PAVLOGCPTRNODECORE) RTAvloGCPtrRemove(PAVLOGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(PAVLOGCPTRNODECORE) RTAvloGCPtrGet(PAVLOGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(int) RTAvloGCPtrDoWithAll(PAVLOGCPTRTREE pTree, int fFromLeft, PAVLOGCPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLOGCPTRNODECORE) RTAvloGCPtrGetBestFit(PAVLOGCPTRTREE ppTree, RTGCPTR Key, bool fAbove);
+RTDECL(PAVLOGCPTRNODECORE) RTAvloGCPtrRemoveBestFit(PAVLOGCPTRTREE ppTree, RTGCPTR Key, bool fAbove);
+RTDECL(int) RTAvloGCPtrDestroy(PAVLOGCPTRTREE pTree, PAVLOGCPTRCALLBACK pfnCallBack, void *pvParam);
+
+/** @} */
+
+/** AVL tree of RTGCPTR ranges. */
+* @
+*/
/**
 * AVL Core node.
 */
typedef struct _AVLRGCPtrNodeCore
{
    /** First key value in the range (inclusive). */
    RTGCPTR Key;
    /** Last key value in the range (inclusive). */
    RTGCPTR KeyLast;
    /** Offset to the left leaf node, relative to this field. */
    struct _AVLRGCPtrNodeCore *pLeft;
    /** Offset to the right leaf node, relative to this field. */
    struct _AVLRGCPtrNodeCore *pRight;
    /** Height of this tree: max(height(left), height(right)) + 1 */
    unsigned char uchHeight;
} AVLRGCPTRNODECORE, *PAVLRGCPTRNODECORE;

/** A offset base tree with RTGCPTR keys. */
typedef PAVLRGCPTRNODECORE AVLRGCPTRTREE;
/** Pointer to an offset base tree with RTGCPTR keys. */
typedef AVLRGCPTRTREE *PAVLRGCPTRTREE;

/** Pointer to an internal tree pointer.
 * In this case it's a pointer to a relative offset. */
typedef AVLRGCPTRTREE *PPAVLRGCPTRNODECORE;

/** Callback function for RTAvlrGCPtrDoWithAll() and RTAvlrGCPtrDestroy().
 * @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLRGCPTRCALLBACK(PAVLRGCPTRNODECORE pNode, void *pvUser);
/** Pointer to callback function for RTAvlrGCPtrDoWithAll() and RTAvlrGCPtrDestroy(). */
typedef AVLRGCPTRCALLBACK *PAVLRGCPTRCALLBACK;

RTDECL(bool) RTAvlrGCPtrInsert( PAVLRGCPTRTREE pTree, PAVLRGCPTRNODECORE pNode);
RTDECL(PAVLRGCPTRNODECORE) RTAvlrGCPtrRemove( PAVLRGCPTRTREE pTree, RTGCPTR Key);
RTDECL(PAVLRGCPTRNODECORE) RTAvlrGCPtrGet( PAVLRGCPTRTREE pTree, RTGCPTR Key);
RTDECL(PAVLRGCPTRNODECORE) RTAvlrGCPtrGetBestFit( PAVLRGCPTRTREE pTree, RTGCPTR Key, bool fAbove);
RTDECL(PAVLRGCPTRNODECORE) RTAvlrGCPtrRangeGet( PAVLRGCPTRTREE pTree, RTGCPTR Key);
RTDECL(PAVLRGCPTRNODECORE) RTAvlrGCPtrRangeRemove( PAVLRGCPTRTREE pTree, RTGCPTR Key);
RTDECL(int) RTAvlrGCPtrDoWithAll( PAVLRGCPTRTREE pTree, int fFromLeft, PAVLRGCPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(int) RTAvlrGCPtrDestroy( PAVLROGCPTRTREE pTree, AVLROGCPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlrGCPtrGetRoot( PAVLROGCPTRTREE pTree);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlrGCPtrGetLeft( PAVLROGCPTRNODECORE pNode);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlrGCPtrGetRight( PAVLROGCPTRNODECORE pNode);
+
+/** @} */
+
+/** AVL tree of RTGCPtr ranges - using relative offsets internally. */
+ * @} 
+ * /
+ +/**
+ * AVL 'pointer' type for the relative offset pointer scheme.
+ * */
++typedef int32_t AVLROGCPTR;
+
+/**
+ * AVL Core node.
+ */
++typedef struct _AVLROGCPtrNodeCore {
+    /** First key value in the range (inclusive). */
+    RTGCPTR Key;
+    /** Last key value in the range (inclusive). */
+    RTGCPTR KeyLast;
+    /** Offset to the left leaf node, relative to this field. */
+    AVLROGCPTR pLeft;
+    /** Offset to the right leaf node, relative to this field. */
+    AVLROGCPTR pRight;
+    /** Height of this tree: max(height(left), height(right)) + 1 */
+    unsigned char uchHeight;
+    unsigned char padding[GC_ARCH_BITS == 64 ? 7 : 7];
+} AVLROGCPTRNODECORE, *PAVLROGCPTRNODECORE;
+
+/** A offset base tree with uint32_t keys. */
+typedef AVLROGCPTR AVLROGCPTRTREE;
+/** Pointer to an offset base tree with uint32_t keys. */
+typedef AVLROGCPTRTREE *PAVLROGCPTRTREE;
+
+/** Pointer to an internal tree pointer.
+ * In this case it's a pointer to a relative offset. */
+typedef AVLROGCPTRTREE *PPAVLROGCPTRNODECORE;
+
+/** Callback function for RTAvlrGCPtrDoWithAll() and RTAvlrGCPtrDestroy(). */
+* @returns IPRT status codes. */
+typedef DECLCALLBACK(int) AVLROGCPTRCALLBACK(PAVLROGCPTRNODECORE pNode, void
*pvUser);
+/** Pointer to callback function for RTAvlroGCPtrDoWithAll() and RTAvlroGCPtrDestroy(). */
+typedef AVLROGCPTRCALLBACK *PAVLROGCPTRCALLBACK;
+
+RTDECL(bool) RTAvlroGCPtrInsert(PAVLROGCPTRTREE pTree, PAVLROGCPTRNODECORE pNode);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrRemove(PAVLROGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrGet(PAVLROGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrGetBestFit(PAVLROGCPTRTREE ppTree, RTGCPTR Key, bool fAbove);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrRangeGet(PAVLROGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrRangeRemove(PAVLROGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(int) RTAvlroGCPtrDoWithAll(PAVLROGCPTRTREE pTree, int fFromLeft, PAVLROGCPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(int) RTAvlroGCPtrDestroy(PAVLROGCPTRTREE pTree, PAVLROGCPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrGetRoot(PAVLROGCPTRTREE pTree);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrGetLeft(PAVLROGCPTRNODECORE pNode);
+RTDECL(PAVLROGCPTRNODECORE) RTAvlroGCPtrGetRight(PAVLROGCPTRNODECORE pNode);
+
+/** @} */
+
+/** AVL tree of RTGCPTR ranges (overlapping supported) - using relative offsets internally.
+ * @} */
+
+/** AVL 'pointer' type for the relative offset pointer scheme.
+ * @} */
+
+typedef int32_t AVLROOGCPTR;
+
+/**
+ * AVL Core node.
+ */
+
+typedef struct _AVLROOGCPtrNodeCore
+
+{
+    /** First key value in the range (inclusive). */
+    RTGCPTR Key;
+    /** Last key value in the range (inclusive). */
+    RTGCPTR KeyLast;
+    /** Offset to the left leaf node, relative to this field. */
+    AVLROOGCPTR pLeft;
+    /** Offset to the right leaf node, relative to this field. */
+    AVLROOGCPTR pRight;
+}
+ AVLROOGCPTR pRight;
+ /* Pointer to the list of string with the same key. Don't touch. */
+ AVLROOGCPTR pList;
+ /* Height of this tree: max(height(left), height(right)) + 1 */
+ unsigned char uchHeight;
+ } AVLROOGCPTRNODECORE, *PAVLROOGCPTRNODECORE;
+
+/** A offset base tree with uint32_t keys. */
+typedef AVLROOGCPTR AVLROOGCPTRTREE;
+/** Pointer to an offset base tree with uint32_t keys. */
+typedef AVLROOGCPTRTREE *PAVLROOGCPTRTREE;
+
+/** Pointer to an internal tree pointer.
+ * In this case it's a pointer to a relative offset. */
+typedef AVLROOGCPTRTREE *PPAVLROOGCPTRNODECORE;
+
+/** Callback function for RTAvlrooGCPtrDoWithAll() and RTAvlrooGCPtrDestroy().
+ * @returns IPRT status codes. */
+typedef DECLCALLBACK(int) AVLROOGCPTRCALLBACK(PAVLROOGCPTRNODECORE pNode, void *pvUser);
+/** Pointer to callback function for RTAvlrooGCPtrDoWithAll() and RTAvlrooGCPtrDestroy(). */
+typedef AVLROOGCPTRCALLBACK *PAVLROOGCPTRCALLBACK;
+
+RTDECL(bool) RTAvlrooGCPtrInsert(PAVLROOGCPTRTREE pTree, PAVLROOGCPTRNODECORE pNode);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrRemove(PAVLROOGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrGet(PAVLROOGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrGetBestFit(PAVLROOGCPTRTREE ppTree, RTGCPTR Key, bool fAbove);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrRangeGet(PAVLROOGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrRangeRemove(PAVLROOGCPTRTREE pTree, RTGCPTR Key);
+RTDECL(int) RTAvlrooGCPtrDoWithAll(PAVLROOGCPTRTREE pTree, int fFromLeft, PAVLROOGCPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(int) RTAvlrooGCPtrDestroy(PAVLROOGCPTRTREE pTree, PAVLROOGCPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrGetRoot(PAVLROOGCPTRTREE pTree);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrGetLeft(PAVLROOGCPTRNODECORE pNode);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrGetRight(PAVLROOGCPTRNODECORE pNode);
+RTDECL(PAVLROOGCPTRNODECORE) RTAvlrooGCPtrGetNextEqual(PAVLROOGCPTRNODECORE pNode);
+
+/* @} */
/** AVL tree of RTUINTPTR.
+ * @}
+ */
+
+/** AVL RTUINTPTR node core.
+ */
typedef struct _AVLUIntPtrNodeCore
+{
+   /** Key value. */
+   RTUINTPTR Key;
+   /** Offset to the left leaf node, relative to this field. */
+   struct _AVLUIntPtrNodeCore *pLeft;
+   /** Offset to the right leaf node, relative to this field. */
+   struct _AVLUIntPtrNodeCore *pRight;
+   /** Height of this tree: max(height(left), height(right)) + 1 */
+   unsigned char uchHeight;
+} AVLUINTPTRNODECORE;

/** Pointer to a RTUINTPTR AVL node core. */
typedef AVLUINTPTRNODECORE *PAVLUINTPTRNODECORE;

/** A pointer based tree with RTUINTPTR keys. */
typedef PAVLUINTPTRNODECORE AVLUINTPTRTREE;

/** Pointer to an offset base tree with RTUINTPTR keys. */
typedef AVLUINTPTRTREE *PAVLUINTPTRTREE;

/** Pointer to an internal tree pointer.
+ * In this case it's a pointer to a pointer. */
typedef AVLUINTPTRTREE *PPAVLUINTPTRNODECORE;

/** Callback function for RTAvlUIntPtrDoWithAll() and RTAvlUIntPtrDestroy().
+ * @returns IPRT status codes. */
typedef DECLCALLBACK(int)    AVLUINTPTRCALLBACK(PAVLUINTPTRNODECORE pNode, void *pvUser);

/** Pointer to callback function for RTAvlUIntPtrDoWithAll() and RTAvlUIntPtrDestroy(). */
typedef AVLUINTPTRCALLBACK *PAVLUINTPTRCALLBACK;

RTDECL(bool)                    RTAvlUIntPtrInsert(    PAVLUINTPTRTREE pTree, PAVLUINTPTRNODECORE pNode);
RTDECL(PAVLUINTPTRNODECORE)     RTAvlUIntPtrRemove(    PAVLUINTPTRTREE pTree, RTUINTPTR Key);
RTDECL(PAVLUINTPTRTREE)         RTAvlUIntPtrGet(    PAVLUINTPTRTREE pTree, RTUINTPTR Key);
RTDECL(PAVLUINTPTRNODECORE)     RTAvlUIntPtrGetBestFit(PAVLUINTPTRTREE pTree, RTUINTPTR Key, bool fAbove);
RTDECL(int)                     RTAvlUIntPtrDoWithAll( PAVLUINTPTRTREE pTree, int fFromLeft, PAVLUINTPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(int) RTAvlUIntPtrDestroy( PAVLUINTPTRTREE pTree, PAVLUINTPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLUINTPTRNODECORE) RTAvlUIntPtrGetRoot( PAVLUINTPTRTREE pTree);
+RTDECL(PAVLUINTPTRNODECORE) RTAvlUIntPtrGetLeft( PAVLUINTPTRNODECORE pNode);
+RTDECL(PAVLUINTPTRNODECORE) RTAvlUIntPtrGetRight( PAVLUINTPTRNODECORE pNode);
+
+/** @} */
+
+/** AVL tree of RUINTPTR ranges.
+ * @{
+ *
+
+/** AVL RTUINTPTR range node core.
+ */
+typeof struct _AVLRUINTPtrNodeCore
+
+ /** First key value in the range (inclusive). */
+ RTUINTPTR Key;
+ /** Last key value in the range (inclusive). */
+ RTUINTPTR KeyLast;
+ /** Offset to the left leaf node, relative to this field. */
+ struct _AVLRUINTPtrNodeCore *pLeft;
+ /** Offset to the right leaf node, relative to this field. */
+ struct _AVLRUINTPtrNodeCore *pRight;
+ /** Height of this tree: max(height(left), height(right)) + 1 */
+ unsigned char uchHeight;
+
+ } AVLRUINTPTRNODECORE;
+
+/** Pointer to an AVL RTUINTPTR range node code. */
+typeof AVLRUINTPTRNODECORE *PAVLUINTPTRNODECORE;
+
+/** A pointer based tree with RTUINTPTR ranges. */
+typeof AVLRUINTPTRNODECORE AVLRUINTPTRTREE;
+
+/** Pointer to a pointer based tree with RTUINTPTR ranges. */
+typeof AVLRUINTPTRTREE *PAVLUINTPTRTREE;
+
+/** Pointer to an internal tree pointer.
+ * In this case it's a pointer to a pointer. */
+typeof AVLRUINTPTRTREE *PPAVLRUINTPTRNODECORE;
+
+/** Callback function for RTAvlrUIntPtrDoWithAll() and RTAvlrUIntPtrDestroy().
+ * @returns IPRT status codes. */
+typeof DECLCALLBACK(int) AVLRUINTPTRCALLBACK(PAVLUINTPTRNODECORE pNode, void *pvUser);
+
+/** Pointer to callback function for RTAvlrUIntPtrDoWithAll() and RTAvlrUIntPtrDestroy(). */
+typeof AVLRUINTPTRCALLBACK *PAVLUINTPTRCALLBACK;
+RTDECL(bool)    RTAvlrUIntPtrInsert(  PAVLRUINTPTRTREE pTree,
PAVLRUINTPTRNODECORE pNode);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrRemove(  PAVLRUINTPTRTREE pTree,
RTUINTPTR Key);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrGet(  PAVLRUINTPTRTREE pTree,
RTUINTPTR Key);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrGetBestFit( PAVLRUINTPTRTREE pTree,
RTUINTPTR Key, bool fAbove);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrRangeGet(  PAVLRUINTPTRTREE pTree,
RTUINTPTR Key);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrRangeRemove(PAVLRUINTPTRTREE pTree,
RTUINTPTR Key);
+RTDECL(int)    RTAvlrUIntPtrDoWithAll(  PAVLRUINTPTRTREE pTree, int fFromLeft,
PAVLRUINTPTRCALLBACK pfnCallBack, void *pvParam);
+RTDECL(int)    RTAvlrUIntPtrDestroy(  PAVLRUINTPTRTREE pTree,
PAVLRUINTPTRCALLBACK pfCallBack, void *pvParam);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrGetRoot(  PAVLRUINTPTRTREE pTree);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrGetLeft(  PAVLRUINTPTRNODECORE pNode);
+RTDECL(PAVLRUINTPTRNODECORE) RTAvlrUIntPtrGetRight( PAVLRUINTPTRNODECORE pNode);

/** @} */

/** AVL tree of RTHCPHYSes - using relative offsets internally. */
+ * @}
+ */
+ AVLOHCPHYS;
+ */
+ * AVL Core node.
+ */
typedef struct _AVLOHCPHysNodeCore
+
+ /* Key value. */
+ RTHCPHYS    Key;
+ /* Offset to the left leaf node, relative to this field. */
+ AVLOHCPHYS    pLeft;
+ /* Offset to the right leaf node, relative to this field. */
+ AVLOHCPHYS    pRight;
+ /* Height of this tree: max(height(left), height(right)) + 1 */
+ unsigned char    uchHeight;
+/#if HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64
+ unsigned char    Padding[7];/* Alignment padding. */
+/#endif
+} AVLOHCPHYSNODECORE, *PAVLOHCPHYSNODECORE;
+
+/** A offset base tree with uint32_t keys. */
+typedef AVLOHCPHYS AVLOHCPHYSTREE;
+/** Pointer to an offset base tree with uint32_t keys. */
+typedef AVLOHCPHYSTREE *PAVLOHCPHYSTREE;
+
+/** Pointer to an internal tree pointer.
+ * In this case it’s a pointer to a relative offset. */
+typedef AVLOHCPHYSTREE *PPAVLOHCPHYSNODECORE;
+
+/** Callback function for RTAvloHCPhysDoWithAll() and RTAvloHCPhysDestroy().
+ * @returns IPRT status codes. */
+typedef DECLCALLBACK(int) AVLOHCPHYSCALLBACK(PAVLOHCPHYSNODECORE pNode, void *
+ *pvUser);
+/** Pointer to callback function for RTAvloHCPhysDoWithAll() and RTAvloHCPhysDestroy(). */
+typedef AVLOHCPHYSCALLBACK *PAVLOHCPHYSCALLBACK;
+
+RTDECL(bool) RTAvloHCPhysInsert(PAVLOHCPHYSTREE pTree, PAVLOHCPHYSNODECORE pNode);
+RTDECL(PAVLOHCPHYSNODECORE) RTAvloHCPhysRemove(PAVLOHCPHYSTREE pTree,
+ RTHCPHYS Key);
+RTDECL(PAVLOHCPHYSNODECORE) RTAvloHCPhysGet(PAVLOHCPHYSTREE pTree, RTHCPHYS
+ Key);
+RTDECL(int) RTAvloHCPhysDoWithAll(PAVLOHCPHYSTREE pTree, int fFromLeft,
+ PAVLOHCPHYSCALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLOHCPHYSNODECORE) RTAvloHCPhysGetBestFit(PAVLOHCPHYSTREE ppTree,
+ RTHCPHYS Key, bool fAbove);
+RTDECL(PAVLOHCPHYSNODECORE) RTAvloHCPhysRemoveBestFit(PAVLOHCPHYSTREE ppTree,
+ RTHCPHYS Key, bool fAbove);
+RTDECL(int) RTAvloHCPhysDestroy(PAVLOHCPHYSTREE pTree,
+ PAVLOHCPHYSCALLBACK pfnCallBack, void *pvParam);
+
+/** @} */
+
+/** AVL tree of RTIOPORTs - using relative offsets internally.
+ * @} */
+*
+
+/** AVL 'pointer' type for the relative offset pointer scheme.
+ */
+typedef int32_t AVLOIOPORTPTR;
+
+/** *
+ * AVL Core node.
typedef struct _AVLOIOPortNodeCore {
    /** Offset to the left leaf node, relative to this field. */
    AVLOIOPORTPTR pLeft;
    /** Offset to the right leaf node, relative to this field. */
    AVLOIOPORTPTR pRight;
    /** Key value. */
    RTIOPORT Key;
    /** Height of this tree: max(height(left), height(right)) + 1 */
    unsigned char uchHeight;
} AVLOIOPORTNODECORE, *PAVLOIOPORTNODECORE;

AVLOIOPORTPTR AVLOIOPORTTREE;

PAVLOIOPORTTREE *PAVLOIOPORTTREE;

AVLOIOPORTTREE *PPAVLOIOPORTNODECORE;

DECLCALLBACK(int) AVLOIOPORTCALLBACK(PAVLOIOPORTNODECORE pNode, void *pvUser);

APAVLOIOPORTCALLBACK;

RTDECL(bool) RTAvloIOPortInsert(PAVLOIOPORTTREE pTree, PAVLOIOPORTNODECORE pNode);
RTDECL(PAVLOIOPORTNODECORE) RTAvloIOPortRemove(PAVLOIOPORTTREE pTree, RTIOPORT Key);
RTDECL(PAVLOIOPORTNODECORE) RTAvloIOPortGet(PAVLOIOPORTTREE pTree, RTIOPORT Key);
RTDECL(int) RTAvloIOPortDoWithAll(PAVLOIOPORTTREE pTree, int fFromLeft, PAVLOIOPORTCALLBACK pfnCallback, void *pvParam);
RTDECL(PAVLOIOPORTNODECORE) RTAvloIOPortGetBestFit(PAVLOIOPORTTREE ppTree, RTIOPORT Key, bool fAbove);
RTDECL(PAVLOIOPORTNODECORE) RTAvloIOPortRemoveBestFit(PAVLOIOPORTTREE ppTree, RTIOPORT Key, bool fAbove);
RTDECL(int) RTAvloIOPortDestroy(PAVLOIOPORTTREE ppTree, PAVLOIOPORTCALLBACK pfnCallback, void *pvParam);

AVL tree of RTIOPORT ranges - using relative offsets internally.

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/** AVL 'pointer' type for the relative offset pointer scheme. */

typedef int32_t AVLROIOPORTPTR;

/** AVL Core node. */

typedef struct _AVLROIOPortNodeCore
{
    /** First key value in the range (inclusive). */
    RTIOPORT Key;
    /** Last key value in the range (inclusive). */
    RTIOPORT KeyLast;
    /** Offset to the left leaf node, relative to this field. */
    AVLROIOPORTPTR pLeft;
    /** Offset to the right leaf node, relative to this field. */
    AVLROIOPORTPTR pRight;
    /** Height of this tree: max(height(left), height(right)) + 1 */
    unsigned char uchHeight;
} AVLROIOPORTNODECORE, *PAVLROIOPORTNODECORE;

/** A offset base tree with uint32_t keys. */
typedef AVLROIOPORTPTR AVLROIOPORTTREE;

/** Pointer to an offset base tree with uint32_t keys. */
typedef AVLROIOPORTTREE *PAVLROIOPORTTREE;

/** Pointer to an internal tree pointer. In this case it's a pointer to a relative offset. */
typedef AVLROIOPORTTREE *PAVLROIOPORTNODECORE;

/** Callback function for RTAvlroiOPortDoWithAll() and RTAvlroiOPortDestroy(). */
@returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLROIOPORTCALLBACK(PPAVLROIOPORTNODECORE pNode, void *pvUser);

/** Pointer to callback function for RTAvlroiOPortDoWithAll() and RTAvlroiOPortDestroy(). */
typedef AVLROIOPORTCALLBACK *PAVLROIOPORTCALLBACK;

RTDECL(bool) RTAvlroiOPortInsert(PAVLROIOPORTTREE pTree, PAVLROIOPORTNODECORE pNode);
RTDECL(PAVLROIOPORTNODECORE) RTAvlroiOPortRemove(PAVLROIOPORTTREE pTree, RTIOPORT Key);
RTDECL(PAVLROIOPORTNODECORE) RTAvlroiOPortGet(PAVLROIOPORTTREE pTree, RTIOPORT Key);
RTDECL(PAVLROIOPORTNODECORE) RTAvlroiOPortRangeGet(PAVLROIOPORTTREE pTree, RTIOPORT Key);
+RTDECL(PAVLROIOPORTNODECORE)   RTAvlroiOPortRangeRemove(PAVLROIOPORTTREE pTree, RTIOPORT Key);
+RTDECL(int)                    RTAvlroiOPortDoWithAll(PAVLROIOPORTTREE pTree, int fFromLeft, PAVLROIOPORTCALLBACK pfnCallBack, void *pvParam);
+RTDECL(int)                    RTAvlroiOPortDestroy(PAVLROIOPORTTREE pTree, PAVLROIOPORTCALLBACK pfnCallBack, void *pvParam);
+
+/** @} */
+
+/** AVL tree of RTHCPHYSes. */
+ * @ { 
+ */
+ + **
+  * AVL 'pointer' type for the relative offset pointer scheme.
+ */
+ typedef struct _AVLHCPhysNodeCore *AVLHCPHYSPTR;
+ 
+ /**
+ * AVL Core node.
+ */
+ typedef struct _AVLHCPhysNodeCore
+ {
+  /** Offset to the left leaf node, relative to this field. */
+  AVLHCPHYSPTR        pLeft;
+  /** Offset to the right leaf node, relative to this field. */
+  AVLHCPHYSPTR        pRight;
+  /** Key value. */
+  RTHCPHYS            Key;
+  /** Height of this tree: max(height(left), height(right)) + 1 */
+  unsigned char       uchHeight;
+ } AVLHCPHYSNODECORE, *PAVLHCPHYSNODECORE;
+
+ /** A offset base tree with RTHCPHYS keys. */
+ typedef AVLHCPHYSPTR      AVLHCPHYSTREE;
+ /** Pointer to an offset base tree with RTHCPHYS keys. */
+ typedef AVLHCPHYSTREE    *PAVLHCPHYSTREE;
+
+ /** Pointer to an internal tree pointer.
+ * In this case it's a pointer to a relative offset. */
+ typedef AVLHCPHYSTREE    *PPAVLHCPHYSTREE;
+
+ /** Callback function for RTAvlHCPhysDoWithAll() and RTAvlHCPhysDestroy(). */
+ * returns IPRT status codes. */
+ typedef DECLCALLBACK(int)   AVLHCPHYSCALLBACK(PAVLHCPHYSNODECORE pNode, void *pvUser);
+ /** Pointer to callback function for RTAvlHCPhysDoWithAll() and RTAvlHCPhysDestroy(). */
typedef AVLHCPSYNODENODECORE *PAVLHCPHYSNODECORE;
+
+RTDECL(bool) RTAvlHCPHysInsert(PAVLHCPHYSTREE pTree, PAVLHCPHYSNODECORE pNode);
+RTDECL(PAVLHCPHYSNODECORE) RTAvlHCPHysRemove(PAVLHCPHYSTREE pTree, RTGCPHYS Key);
+RTDECL(PAVLHCPHYSNODECORE) RTAvlHCPHysGet(PAVLHCPHYSTREE pTree, RTGCPHYS Key);
+RTDECL(int) RTAvlHCPHysDoWithAll(PAVLHCPHYSTREE pTree, int fFromLeft, PAVLHCPHYSNODECALLBACK pfnCallBack, void *pvParam);
+RTDECL(PAVLHCPHYSNODECORE) RTAvlHCPHysGetBestFit(PAVLHCPHYSTREE ppTree, RTGCPHYS Key, bool fAbove);
+RTDECL(PAVLHCPHYSNODECORE) RTAvlHCPHysRemoveBestFit(PAVLHCPHYSTREE ppTree, RTGCPHYS Key, bool fAbove);
+RTDECL(int) RTAvlHCPHysDestroy(PAVLHCPHYSTREE pTree, PAVLHCPHYSNODECALLBACK pfnCallBack, void *pvParam);
+
+/** @} */
+
+/** AVL tree of RTGCPHYSes.
+ * @{
+ *
+ */
+
+/** AVL 'pointer' type for the relative offset pointer scheme.
+ *
+ */
+typedef struct _AVLGCPhysNodeCore AVLGCPHYSPTR;
+
+/** AVL Core node.
+ *
+ */
typedef struct _AVLGCPhysNodeCore
+{
+    /** Offset to the left leaf node, relative to this field. */
+    AVLGCPHYSPTR pLeft;
+    /** Offset to the right leaf node, relative to this field. */
+    AVLGCPHYSPTR pRight;
+    /** Key value. */
+    RTGCPHYS Key;
+    /** Height of this tree: max(height(left), height(right)) + 1 */
+    unsigned char uchHeight;
+} AVLGCPHYSNODECORE, *PAVLGCPHYSNODECORE;
+
+/** A offset base tree with RTGCPHYS keys. */
typedef AVLGCPHYSPTR AVLGCPHYSTREE;
+/** Pointer to an offset base tree with RTGCPHYS keys. */
typedef AVLGCPHYSTREE *PAVLGCPHYSTREE;
+
+/** Pointer to an internal tree pointer.
typedef AVLGCYPHYSTREE *PPAVLGCPHYSNODECORE;

/** Callback function for RTAvlGCPhysDoWithAll() and RTAvlGCPhysDestroy(). */
+ * @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLGCPHYSCALLBACK(PAVLGCPHYSNODECORE pNode, void *pvUser);
+ /** Pointer to callback function for RTAvlGCPhysDoWithAll() and RTAvlGCPhysDestroy(). */
typedef AVLGCPHYSCALLBACK *PAVLGCPHYSCALLBACK;

RTDECL(bool) RTAvlGCPhysInsert(PAVLGCPHYSTREE pTree, PAVLGCPHYSNODECORE pNode);
RTDECL(PAVLGCPHYSNODECORE) RTAvlGCPhysRemove(PAVLGCPHYSTREE pTree, RTGCPHYS Key);
RTDECL(PAVLGCPHYSNODECORE) RTAvlGCPhysGet(PAVLGCPHYSTREE pTree, RTGCPHYS Key);
RTDECL(int) RTAvlGCPhysDoWithAll(PAVLGCPHYSTREE pTree, int fFromLeft, AVLGCPHYSCALLBACK fnCallBack, void *pvParam);
RTDECL(PAVLGCPHYSNODECORE) RTAvlGCPhysGetBestFit(PAVLGCPHYSTREE ppTree, RTGCPHYS Key, bool fAbove);
RTDECL(PAVLGCPHYSNODECORE) RTAvlGCPhysRemoveBestFit(PAVLGCPHYSTREE ppTree, RTGCPHYS Key, bool fAbove);
RTDECL(int) RTAvlGCPhysDestroy(PAVLGCPHYSTREE pTree, AVLGCPHYSCALLBACK fnnCallBack, void *pvParam);

/** @} */

/** AVL tree of RTFOFF ranges. */
+ * @ { */
+ +
+ /** */
+ +
+ /** */
+ + *
+ + AVL Core node.
+ */
+ typedef struct _AVLRFOFFNodeCore
+ {
+ /** First key value in the range (inclusive). */
+ RTFOFF Key;
+ /** Last key value in the range (inclusive). */
+ RTFOFF KeyLast;
+ /** Offset to the left leaf node, relative to this field. */
+ struct _AVLRFOFFNodeCore *pLeft;
+ /** Offset to the right leaf node, relative to this field. */
+ struct _AVLRFOFFNodeCore *pRight;
+ /** Height of this tree: max(height(left), height(right)) + 1 */
+ unsigned char uchHeight;
+ } AVLRFOFFNODECORE, *PAVLRFOFFNODECORE;
+}
/** A pointer based tree with RTFOFF ranges. */
typedef PAVLRFOFFNODECORE AVLRF OFFSETRE;
/** Pointer to a pointer based tree with RTFOFF ranges. */
typedef AVLRF OFFSETTREE *PAVLRFOFFNODECORE;
+
/** Pointer to an internal tree pointer.
 * In this case it's a pointer to a relative offset. */
typedef AVLRF OFFSETTREE *PPAVLRFOFFNODECORE;
+
/** Callback function for RTAvlrGCPtrDoWithAll() and RTAvlrGCPtrDestroy().
 * @returns IPRT status codes. */
typedef DECLCALLBACK(int) AVLRF OFFSETCALLBACK(PAVLRFOFFNODECORE pNode, void *pvUser);
/** Pointer to callback function for RTAvlrGCPtrDoWithAll() and RTAvlrGCPtrDestroy(). */
typedef AVLRF OFFSETCALLBACK *PAVLRFOFFCALLBACK;
+
RTDECL(bool) RTAvlrFileOffsetInsert( PAVLRFOFFTREE pTree, PAVLRFOFFNODECORE pNode);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetRemove( PAVLRFOFFTREE pTree, RTFOFF Key);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetGet( PAVLRFOFFTREE pTree, RTFOFF Key);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetGetBestFit( PAVLRFOFFTREE pTree, RTFOFF Key, bool fAbove);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetRangeGet( PAVLRFOFFTREE pTree, RTFOFF Key);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetRangeRemove( PAVLRFOFFTREE pTree, RTFOFF Key);
RTDECL(int) RTAvlrFileOffsetDoWithAll( PAVLRFOFFTREE pTree, int fFromLeft, PAVLRFOFFCALLBACK pfnCallBack, void *pvParam);
RTDECL(int) RTAvlrFileOffsetDestroy( PAVLRFOFFTREE pTree, PAVLRFOFFCALLBACK pfnCallBack, void *pvParam);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetGetRoot( PAVLRFOFFTREE pTree);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetGetLeft( PAVLRFOFFNODECORE pNode);
RTDECL(PAVLRFOFFNODECORE) RTAvlrFileOffsetGetRight( PAVLRFOFFNODECORE pNode);
+
/** @} */
+
/** @} */

RT_C_DECLS_END

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/cdefs.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/cdefs.h
@@ -0,0 +1,3867 @@
/** @file
 * IPRT - Common C and C++ definitions.
 */
/*
 * Copyright (C) 2006-2017 Oracle Corporation
 * *
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 * *
 * The contents of this file may alternatively be used under the terms of the Common Development and Distribution License Version 1.0 (CDDL) only, as it comes in the "COPYING.CDDL" file of the VirtualBox OSE distribution, in which case the provisions of the CDDL are applicable instead of those of the GPL.
 * *
 * You may elect to license modified versions of this file under the terms and conditions of either the GPL or the CDDL or both.
 * */

#ifdef __iprt_cdefs_h
#define __iprt_cdefs_h

+
+/** @defgroup grp_rt_cdefs  IPRT Common Definitions and Macros
+ * @{
+ */
+
+/** @def RT_C_DECLS_BEGIN
+ * Used to start a block of function declarations which are shared between C and C++ program.
+ */
+
+/** @def RT_C_DECLS_END
+ * Used to end a block of function declarations which are shared between C and C++ program.
+ */
+
+#if defined(__cplusplus)
+# define RT_C_DECLS_BEGIN extern "C" {
+# define RT_C_DECLS_END   }
+#else
+# define RT_C_DECLS_BEGIN
+# define RT_C_DECLS_END
+#endif
+
#else cplusplus
+endif
+
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/*
+ * Shut up DOXYGEN warnings and guide it properly thru the code.
+ */
#ifdef DOXYGEN_RUNNING
/** @def RT_ARCH_X86
 * Indicates that we're compiling for the X86 architecture.
 */

/** @def RT_ARCH_AMD64
 * Indicates that we're compiling for the AMD64 architecture.
 */

/** @def RT_ARCH_SPARC
 * Indicates that we're compiling for the SPARC V8 architecture (32-bit).
 */
#endif /* DOXYGEN_RUNNING */
+
+/** @def RT_ARCH_X86
 + * Indicates that we're compiling for the X86 architecture.
 + */
+
+/** @def RT_ARCH_AMD64
 + * Indicates that we're compiling for the AMD64 architecture.
 + */
+
+/** @def RT_ARCH_SPARC
 + * Indicates that we're compiling for the SPARC V8 architecture (32-bit).
+ */
+
+/** @def RT_ARCH_SPARC64
+ * Indicates that we're compiling for the SPARC V9 architecture (64-bit).
+ */
+#if !defined(RT_ARCH_X86) \
+ && !defined(RT_ARCH_AMD64) \
+ && !defined(RT_ARCH_SPARC) \
+ && !defined(RT_ARCH_SPARC64) \
+ && !defined(RT_ARCH_ARM) 
+## if defined(_amd64__) || defined(_x86_64__) || defined(_M_X64) || defined(__AMD64__) 
+## define RT_ARCH_AMD64 
+## elif defined(_i386__) || defined(_M_IA32) || defined(__X86__) 
+## define RT_ARCH_X86 
+## elif defined(__sparcv9) 
+## define RT_ARCH_SPARC64 
+## elif defined(__sparc__) 
+## define RT_ARCH_SPARC 
+## elif defined(__arm__) || defined(__arm32__) 
+## define RT_ARCH_ARM 
+## else /* PORTME: append test for new archs. */
+## error "Check what predefined macros your compiler uses to indicate architecture."
+## endif
+/* PORTME: append new archs checks. */
+#elif defined(RT_ARCH_X86) && defined(RT_ARCH_AMD64) 
+## error "Both RT_ARCH_X86 and RT_ARCH_AMD64 cannot be defined at the same time!"
+#elif defined(RT_ARCH_X86) && defined(RT_ARCH_SPARC) 
+## error "Both RT_ARCH_X86 and RT_ARCH_SPARC cannot be defined at the same time!"
+#elif defined(RT_ARCH_X86) && defined(RT_ARCH_SPARC64) 
+## error "Both RT_ARCH_X86 and RT_ARCH_SPARC64 cannot be defined at the same time!"
+#elif defined(RT_ARCH_AMD64) && defined(RT_ARCH_SPARC) 
+## error "Both RT_ARCH_AMD64 and RT_ARCH_SPARC cannot be defined at the same time!"
+#elif defined(RT_ARCH_AMD64) && defined(RT_ARCH_SPARC64) 
+## error "Both RT_ARCH_AMD64 and RT_ARCH_SPARC64 cannot be defined at the same time!"
+#elif defined(RT_ARCH_SPARC) && defined(RT_ARCH_SPARC64) 
+## error "Both RT_ARCH_SPARC and RT_ARCH_SPARC64 cannot be defined at the same time!"
+#elif defined(RT_ARCH_ARM) && defined(RT_ARCH_AMD64) 
+## error "Both RT_ARCH_ARM and RT_ARCH_AMD64 cannot be defined at the same time!"
+#elif defined(RT_ARCH_ARM) && defined(RT_ARCH_X86) 
+## error "Both RT_ARCH_ARM and RT_ARCH_X86 cannot be defined at the same time!"
+#elif defined(RT_ARCH_ARM) && defined(RT_ARCH_SPARC) 
+## error "Both RT_ARCH_ARM and RT_ARCH_SPARC cannot be defined at the same time!"
+## endif
+
+/* Final check (PORTME). */
 +#if (defined(RT_ARCH_X86) != 0) \

+  + (defined(RT_ARCH_AMD64) != 0) \n+  + (defined(RT_ARCH_SPARC) != 0) \n+  + (defined(RT_ARCH_SPARC64) != 0) \n+  + (defined(RT_ARCH_ARM) != 0) \n+  + != 1
+  +# error "Exactly one RT_ARCH_XXX macro shall be defined"
+  +#endif
+  +/** @def RT_GNUC_PREREQ
+  + * Shorter than fiddling with __GNUC__ and __GNUC_MINOR__.
+  + * @param   a_MinMajor      Minimum major version
+  + * @param   a_MinMinor      The minor version number part.
+  + */
+  +#define RT_GNUC_PREREQ(a_MinMajor, a_MinMinor)      RT_GNUC_PREREQ_EX(a_MinMajor,
+  + a_MinMinor, 0)
+  +/** @def RT_GNUC_PREREQ_EX
+  + * Simplified way of checking __GNUC__ and __GNUC_MINOR__ regardless of actual
+  + * compiler used, returns @a a_OtherRet for other compilers.
+  + * @param   a_MinMajor      Minimum major version
+  + * @param   a_MinMinor      The minor version number part.
+  + * @param   a_OtherRet      What to return for non-GCC compilers.
+  + */
+  +#if defined(__GNUC__) && defined(__GNUC_MINOR__)
+  +# define RT_GNUC_PREREQ_EX(a_MinMajor, a_MinMinor, a_OtherRet) \
+  +    ((__GNUC__ << 16) + __GNUC_MINOR__ >= ((a_MinMajor) << 16) + (a_MinMinor))
+  +#else
+  +# define RT_GNUC_PREREQ_EX(a_MinMajor, a_MinMinor, a_OtherRet) (a_OtherRet)
+  +#endif
+  +/** @def RT_MSC_PREREQ
+  + * Convenient way of checking _MSC_VER regardless of actual compiler used
+  + * (returns false if not MSC).
+  + * @param   a_MinVer        Preferably a RT_MSC_VER_XXX value.
+  + */
+  +#define RT_MSC_PREREQ(a_MinVer)                     RT_MSC_PREREQ_EX(a_MinVer, 0)
+  +/** @def RT_MSC_PREREQ_EX
+  + * Convenient way of checking _MSC_VER regardless of actual compiler used,
+  + * returns @a a_OtherRet for other compilers.
+  + * @param   a_MinVer        Preferably a RT_MSC_VER_XXX value.
+  + * @param   a_OtherRet      What to return for non-MSC compilers.
+  + */
+  +#if defined(_MSC_VER)
+  +# define RT_MSC_PREREQ_EX(a_MinVer, a_OtherRet) ( (_MSC_VER) >= (a_MinVer) )
+  +#else
# define RT_MSC_PREREQ_EX(a_MinVer, a_OtherRet) (a_OtherRet)
#endif

/** @name RT_MSC_VER_XXX - _MSC_VER values to use with RT_MSC_PREREQ.
 * @remarks The VCxxx values are derived from the CRT DLLs shipping with the
 *          compilers.
 */
#define RT_MSC_VER_VC50     (1100)              /**< Visual C++ 5.0. */
#define RT_MSC_VER_VC60     (1200)              /**< Visual C++ 6.0. */
#define RT_MSC_VER_VC70     (1300)              /**< Visual C++ 7.0. */
#define RT_MSC_VER_VC70     (1300)              /**< Visual C++ 7.0. */
#define RT_MSC_VER_VS2003   (1310)              /**< Visual Studio 2003, aka Visual C++ 7.1. */
#define RT_MSC_VER_VS2005   (1400)              /**< Visual Studio 2005. */
#define RT_MSC_VER_VC80     RT_MSC_VER_VS2005   /**< Visual C++ 8.0, aka Visual Studio 2008. */
#define RT_MSC_VER_VS2008   (1500)              /**< Visual Studio 2008. */
#define RT_MSC_VER_VS2010   (1600)              /**< Visual Studio 2010. */
#define RT_MSC_VER_VC100    RT_MSC_VER_VS2010   /**< Visual C++ 10.0, aka Visual Studio 2010. */
#define RT_MSC_VER_VS2012   (1700)              /**< Visual Studio 2012. */
#define RT_MSC_VER_VC110    RT_MSC_VER_VS2012   /**< Visual C++ 11.0, aka Visual Studio 2012. */
#define RT_MSC_VER_VS2013   (1800)              /**< Visual Studio 2013. */
#define RT_MSC_VER_VC120    RT_MSC_VER_VS2013   /**< Visual C++ 12.0, aka Visual Studio 2013. */
#define RT_MSC_VER_VS2015   (1900)              /**< Visual Studio 2015. */
#define RT_MSC_VER_VC140    RT_MSC_VER_VS2015   /**< Visual C++ 14.0, aka Visual Studio 2015. */

/** @} */

/** @def RT_CLANG_PREREQ
 * Shorter than fiddling with __clang_major__ and __clang_minor__.
 */
#define RT_CLANG_PREREQ(a_MinMajor, a_MinMinor) RT_CLANG_PREREQ_EX(a_MinMajor, a_MinMinor, 0)
#define RT_CLANG_PREREQ_EX(a_MinMajor, a_MinMinor, a_OtherRet) ((a_MinMajor) << 16) + (a_MinMinor)

/** @def RT_CLANG_PREREQ_EX
 * Simplified way of checking __clang_major__ and __clang_minor__ regardless of
 * actual compiler used, returns @a a_OtherRet for other compilers.
 */
#define RT_CLANG_PREREQ_EX(a_MinMajor, a_MinMinor, a_OtherRet) ((a_MinMajor) << 16) + (a_MinMinor)

/** @} */

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+/** @def __X86__
+ * Indicates that we're compiling for the X86 architecture.
+ */
+
+/** @def __AMD64__
+ * Indicates that we're compiling for the AMD64 architecture.
+ */
+
+#if !defined(__X86__) && !defined(__AMD64__) && (defined(RT_ARCH_AMD64) ||
#   defined(RT_ARCH_X86))
+## if defined(RT_ARCH_AMD64)
+## define __AMD64__
+## elif defined(RT_ARCH_X86)
+## define __X86__
+## else
+## error "Check what predefined macros your compiler uses to indicate architecture."
+## endif
+##elif defined(__X86__) && !defined(RT_ARCH_X86)
+## error "__X86__ without RT_ARCH_X86!"
+##elif defined(__AMD64__) && !defined(RT_ARCH_AMD64)
+## error "__AMD64__ without RT_ARCH_AMD64!"
+##endif
+
+/** @def RT_BIG_ENDIAN
+ * Defined if the architecture is big endian. */
+/** @def RT_LITTLE_ENDIAN
+ * Defined if the architecture is little endian. */
+
+#if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86) || defined(RT_ARCH_ARM)
+# define RT_LITTLE_ENDIAN
+#elif defined(RT_ARCH_SPARC) || defined(RT_ARCH_SPARC64)
+# define RT_BIG_ENDIAN
+#else
+## error "PORTME: architecture endianess"
+## endif
+##if defined(RT_BIG_ENDIAN) && defined(RT_LITTLE_ENDIAN)
+## error "Both RT_BIG_ENDIAN and RT_LITTLE_ENDIAN are defined"
+##endif
+
+/** @def IN_RING0
+ * Used to indicate that we're compiling code which is running
+ * in Ring-0 Host Context.
+ */
+ /** @def IN_RING3
+ * Used to indicate that we're compiling code which is running
+ * in Ring-3 Host Context.
+ */
+
+/** @def IN_RC
+ * Used to indicate that we're compiling code which is running
+ * in the Raw-mode Context (implies R0).
+ */
+#+if !defined(IN_RING3) && !defined(IN_RING0) && !defined(IN_RC) && !defined(IN_RC)
+## error "You must define which context the compiled code should run in; IN_RING3, IN_RING0 or IN_RC"
+##endif
+#+if (defined(IN_RING3) && (defined(IN_RING0) || defined(IN_RC)) ) \
+ || (defined(IN_RING0) && (defined(IN_RING3) || defined(IN_RC)) ) \
+ || (defined(IN_RC) && (defined(IN_RING3) || defined(IN_RING0)) )
+## error "Only one of the IN_RING3, IN_RING0, IN_RC defines should be defined."
+##endif
+
+/** @def ARCH_BITS
+ * Defines the bit count of the current context.
+ */
+#+if !defined(ARCH_BITS) || defined(DOXYGEN_RUNNING)
+## if defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC64)
+## define ARCH_BITS 64
+## else
+## define ARCH_BITS 32
+## endif
+## endif
+
+/* ARCH_BITS validation (PORTME). */
+#+if ARCH_BITS == 64
+ #if defined(RT_ARCH_X86) || defined(RT_ARCH_SPARC) || defined(RT_ARCH_ARM)
+ # error "ARCH_BITS=64 but non-64-bit RT_ARCH_XXX defined."
+ #endif
+ #if !defined(RT_ARCH_AMD64) && !defined(RT_ARCH_SPARC64)
+ # error "ARCH_BITS=64 but no 64-bit RT_ARCH_XXX defined."
+ #endif
+##elif ARCH_BITS == 32
+ #if defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC64)
+ # error "ARCH_BITS=32 but non-32-bit RT_ARCH_XXX defined."
+ #endif
+##else
+##endif

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+ #endif
+
+#elif ARCH_BITS == 16
+ #if defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC) || defined(RT_ARCH_SPARC64) || defined(RT_ARCH_ARM)
+ # error "ARCH_BITS=16 but non-16-bit RT_ARCH_XX defined."
+ #endif
+ #if !defined(RT_ARCH_X86)
+ # error "ARCH_BITS=16 but RT_ARCH_X86 isn't defined."
+ #endif
+
+#else
+ #error "Unsupported ARCH_BITS value!"
+ #endif
+
/** @def HC_ARCH_BITS
+ * Defines the host architecture bit count.
+ */
+!defined(HC_ARCH_BITS) || defined(DOXYGEN_RUNNING)
+ ifndef IN_RC
+ # define HC_ARCH_BITS ARCH_BITS
+ else
+ # define HC_ARCH_BITS 32
+ # endif
+ #endif
+
/** @def GC_ARCH_BITS
+ * Defines the guest architecture bit count.
+ */
+!defined(GC_ARCH_BITS) && !defined(DOXYGEN_RUNNING)
+ ifdef VBOX_WITH_64_BITS_GUESTS
+ # define GC_ARCH_BITS  64
+ else
+ # define GC_ARCH_BITS  32
+ # endif
+ #endif
+
/** @def R3_ARCH_BITS
+ * Defines the host ring-3 architecture bit count.
+ */
+!defined(R3_ARCH_BITS) || defined(DOXYGEN_RUNNING)
+ ifdef IN_RING3
+ # define R3_ARCH_BITS ARCH_BITS
+ else
+ # define R3_ARCH_BITS HC_ARCH_BITS
+ # endif
+ #endif
/** @def R0_ARCH_BITS
 * Defines the host ring-0 architecture bit count.
 */
#if !defined(R0_ARCH_BITS) || defined(DOXYGEN_RUNNING)
#endif

/** @def GC_ARCH_BITS
 * Defines the guest architecture bit count.
 */
#if !defined(GC_ARCH_BITS) || defined(DOXYGEN_RUNNING)
#endif

/** @name RT_OPSYS_XXX - Operative System Identifiers. 
 * These are the value that the RT_OPSYS #define can take. @{ 
 */
/** Unknown OS. */
#define RT_OPSYS_UNKNOWN    0
/** OS Agnostic. */
#define RT_OPSYS_AGNOSTIC   1
/** Darwin - aka Mac OS X. */
#define RT_OPSYS_DARWIN     2
/** DragonFly BSD. */
#define RT_OPSYS_DRAGONFLY  3
/** DOS. */
#define RT_OPSYS_DOS        4
/** FreeBSD. */
#define RT_OPSYS_FREEBSD    5
/** Haiku. */
#define RT_OPSYS_HAIKU      6
/** Linux. */
#define RT_OPSYS_LINUX      7
/** L4. */
#define RT_OPSYS_L4         8
/** Minix. */
#define RT_OPSYS_MINIX      9
/** NetBSD. */
+** Netware. */
+#define RT_OPSYS_NETWARE  12
+** NT (native). */
+#define RT_OPSYS_NT  13
+** OpenBSD. */
+#define RT_OPSYS_OPENBSD  14
+** OS/2. */
+#define RT_OPSYS_OS2  15
+** Plan 9. */
+#define RT_OPSYS_PLAN9  16
+** QNX. */
+#define RT_OPSYS_QNX  17
+** Solaris. */
+#define RT_OPSYS_SOLARIS  18
+** UEFI. */
+#define RT_OPSYS_UEFI  19
+** Windows. */
+#define RT_OPSYS_WINDOWS  20
+** The max RT_OPSYS_XXX value (exclusive). */
+#define RT_OPSYS_MAX  21
+** @} */
+
+*/ @def RT_OPSYS
+ * Indicates which OS we're targeting. It's a #define with is
+ * assigned one of the RT_OPSYS_XXX defines above.
+ *
+ * So to test if we're on FreeBSD do the following:
+ * @code
+ *  #if RT_OPSYS == RT_OPSYS_FREEBSD
+ *  some_funky_freebsd_specific_stuff();
+ *  #endif
+ * @endcode
+ */
+
+/*
+ * Set RT_OPSYS_XXX according to RT_OS_XXX.
+ *
+ * Search:  #define RT_OPSYS_([A-Z0-9]+).*
+ * Replace: # elif defined(RT_OS_\1)# define RT_OPSYS RT_OPSYS_\1
+ */
+#ifndef RT_OPSYS
+  #if defined(RT_OS_UNKNOWN) || defined(DOXYGEN_RUNNING)
+  # define RT_OPSYS RT_OPSYS_UNKNOWN
+  #elif defined(RT_OS_AGNOSTIC)
+  # define RT_OPSYS RT_OPSYS_AGNOSTIC
+  #elif defined(RT_OS_DARWIN)
+  # define RT_OPSYS RT_OPSYS_DARWIN
+  #endif
 +# elif defined(RT_OS_DRAGONFLY)
 +# define RT_OPSYS RT_OPSYS_DRAGONFLY
 +# elif defined(RT_OS_DOS)
 +# define RT_OPSYS RT_OPSYS_DOS
 +# elif defined(RT_OS_FREEBSD)
 +# define RT_OPSYS RT_OPSYS_FREEBSD
 +# elif defined(RT_OS_HAIKU)
 +# define RT_OPSYS RT_OPSYS_HAIKU
 +# elif defined(RT_OS_LINUX)
 +# define RT_OPSYS RT_OPSYS_LINUX
 +# elif defined(RT_OS_L4)
 +# define RT_OPSYS RT_OPSYS_L4
 +# elif defined(RT_OS_MINIX)
 +# define RT_OPSYS RT_OPSYS_MINIX
 +# elif defined(RT_OS_NETBSD)
 +# define RT_OPSYS RT_OPSYS_NETBSD
 +# elif defined(RT_OS_NETWARE)
 +# define RT_OPSYS RT_OPSYS_NETWARE
 +# elif defined(RT_OS_NT)
 +# define RT_OPSYS RT_OPSYS_NT
 +# elif defined(RT_OS_OPENBSD)
 +# define RT_OPSYS RT_OPSYS_OPENBSD
 +# elif defined(RT_OS_OS2)
 +# define RT_OPSYS RT_OPSYS_OS2
 +# elif defined(RT_OS_PLAN9)
 +# define RT_OPSYS RT_OPSYS_PLAN9
 +# elif defined(RT_OS_QNX)
 +# define RT_OPSYS RT_OPSYS_QNX
 +# elif defined(RT_OS_SOLARIS)
 +# define RT_OPSYS RT_OPSYS_SOLARIS
 +# elif defined(RT_OS_UEFI)
 +# define RT_OPSYS RT_OPSYS_UEFI
 +# elif defined(RT_OS_WINDOWS)
 +# define RT_OPSYS RT_OPSYS_WINDOWS
 +# endif
 +#endif
+
+/*
+ * Guess RT_OPSYS based on compiler predefined macros.
+ */
+#ifndef RT_OPSYS
+if defined(__APPLE__)
+# define RT_OPSYS RT_OPSYS_DARWIN
+#elif defined(__DragonFly__)
+# define RT_OPSYS RT_OPSYS_DRAGONFLY
+#elif defined(__FreeBSD__) /*??*/
+# define RT_OPSYS RT_OPSYS_FREEBSD
+#elif defined(__gnu_linux__)
+## define RT_OPSYS  RT_OPSYS_LINUX
+## define(__NetBSD__) */??*/
+## define RT_OPSYS  RT_OPSYS_NETBSD
+## define(__OpenBSD__) */??*/
+## define RT_OPSYS  RT_OPSYS_OPENBSD
+## define(_OS2__)
+## define RT_OPSYS  RT_OPSYS_OS2
+## define(_sun__) || defined(__SunOS__) || defined(__Sun) || defined(__SunOS)
+## define RT_OPSYS  RT_OPSYS_SOLARIS
+## define(_WIN32) || defined(WIN64)
+## define RT_OPSYS  RT_OPSYS_WINDOWS
+## define(MSDOS) || defined(MSDOS) || defined(DOS16RM) /* OW+MSC || MSC || DMC */
+## define RT_OPSYS  RT_OPSYS_DOS
+## else
+## error "Port Me"
+## endif
+##endif
+
+##if RT_OPSYS < RT_OPSYS_UNKNOWN || RT_OPSYS >= RT_OPSYS_MAX
+## error "Invalid RT_OPSYS value."
+##endif
+
+ * Do some consistency checks.
+ *
+ * Search:  #define RT_OPSYS_([A-Z0-9]+).*
+ * Replace:  #:if defined(RT_OPSYS \1) && RT_OPSYS != RT_OPSYS \1
+ # error RT_OPSYS vs RT_OPSYS
+ endif
+ */
+##if defined(RT_OPSYS_UNKNOWN) && RT_OPSYS != RT_OPSYS_UNKNOWN
+## error RT_OPSYS vs RT_OPSYS_UNKNOWN
+##endif
+##if defined(RT_OPSYS_AGNOSTIC) && RT_OPSYS != RT_OPSYS_AGNOSTIC
+## error RT_OPSYS vs RT_OPSYS_AGNOSTIC
+##endif
+##if defined(RT_OPSYS_DARWIN) && RT_OPSYS != RT_OPSYS_DARWIN
+## error RT_OPSYS vs RT_OPSYS_DARWIN
+##endif
+##if defined(RT_OPSYS_DRAGONFLY) && RT_OPSYS != RT_OPSYS_DRAGONFLY
+## error RT_OPSYS vs RT_OPSYS_DRAGONFLY
+##endif
+##if defined(RT_OPSYS_DOS) && RT_OPSYS != RT_OPSYS_DOS
+## error RT_OPSYS vs RT_OPSYS_DOS
+##endif
+##if defined(RT_OPSYS_FREEBSD) && RT_OPSYS != RT_OPSYS_FREEBSD
+## error RT_OPSYS vs RT_OPSYS_FREEBSD
+##endif
+##if defined(RT_OPSYS_HAIKU) && RT_OPSYS != RT_OPSYS_HAIKU

++ error RT_OPSYS vs RT_OS_HAIKU
+endif
++ if defined(RT_OS_LINUX) && RT_OPSYS != RT_OPSYS_LINUX
++ error RT_OPSYS vs RT_OS_LINUX
+endif
++ if defined(RT_OS_L4) && RT_OPSYS != RT_OPSYS_L4
++ error RT_OPSYS vs RT_OS_L4
+endif
++ if defined(RT_OS_MINIX) && RT_OPSYS != RT_OPSYS_MINIX
++ error RT_OPSYS vs RT_OS_MINIX
+endif
++ if defined(RT_OS_NETBSD) && RT_OPSYS != RT_OPSYS_NETBSD
++ error RT_OPSYS vs RT_OS_NETBSD
+endif
++ if defined(RT_OS_NETWARE) && RT_OPSYS != RT_OPSYS_NETWARE
++ error RT_OPSYS vs RT_OS_NETWARE
+endif
++ if defined(RT_OS_NT) && RT_OPSYS != RT_OPSYS_NT
++ error RT_OPSYS vs RT_OS_NT
+endif
++ if defined(RT_OS_OPENBSD) && RT_OPSYS != RT_OPSYS_OPENBSD
++ error RT_OPSYS vs RT_OS_OPENBSD
+endif
++ if defined(RT_OS_OS2) && RT_OPSYS != RT_OPSYS_OS2
++ error RT_OPSYS vs RT_OS_OS2
+endif
++ if defined(RT_OS_PLAN9) && RT_OPSYS != RT_OPSYS_PLAN9
++ error RT_OPSYS vs RT_OS_PLAN9
+endif
++ if defined(RT_OS_QNX) && RT_OPSYS != RT_OPSYS_QNX
++ error RT_OPSYS vs RT_OS_QNX
+endif
++ if defined(RT_OS_SOLARIS) && RT_OPSYS != RT_OPSYS_SOLARIS
++ error RT_OPSYS vs RT_OS_SOLARIS
+endif
++ if defined(RT_OS_UEFI) && RT_OPSYS != RT_OPSYS_UEFI
++ error RT_OPSYS vs RT_OS_UEFI
+endif
++ if defined(RT_OS_WINDOWS) && RT_OPSYS != RT_OPSYS_WINDOWS
++ error RT_OPSYS vs RT_OS_WINDOWS
+endif
+
+/*
+ * Make sure the RT_OS_XXX macro is defined.
+ *
+ * Search:  #define RT_OPSYS_[[:A-Z0-9\-]]+. *
+ * Replace: #elif RT_OPSYS == RT_OPSYS_"\\\"\n# ifndef RT_OS_"\\\"\n# define RT_OS_"\\\"\n# endif
+if RT_OPSYS == RT_OPSYS_UNKNOWN
+ifndef RT_OS_UNKNOWN
+ define RT_OS_UNKNOWN
+ endif
+elif RT_OPSYS == RT_OPSYS_AGNOSTIC
+ifndef RT_OS_AGNOSTIC
+ define RT_OS_AGNOSTIC
+ endif
+elif RT_OPSYS == RT_OPSYS_DARWIN
+ifndef RT_OS_DARWIN
+ define RT_OS_DARWIN
+ endif
+elif RT_OPSYS == RT_OPSYS_DRAGONFLY
+ifndef RT_OS_DRAGONFLY
+ define RT_OS_DRAGONFLY
+ endif
+elif RT_OPSYS == RT_OPSYS_DOS
+ifndef RT_OS_DOS
+ define RT_OS_DOS
+ endif
+elif RT_OPSYS == RT_OPSYS_FREEBSD
+ifndef RT_OS_FREEBSD
+ define RT_OS_FREEBSD
+ endif
+elif RT_OPSYS == RT_OPSYS_HAIKU
+ifndef RT_OS_HAIKU
+ define RT_OS_HAIKU
+ endif
+elif RT_OPSYS == RT_OPSYS_LINUX
+ifndef RT_OS_LINUX
+ define RT_OS_LINUX
+ endif
+elif RT_OPSYS == RT_OPSYS_L4
+ifndef RT_OS_L4
+ define RT_OS_L4
+ endif
+elif RT_OPSYS == RT_OPSYS_MINIX
+ifndef RT_OS_MINIX
+ define RT_OS_MINIX
+ endif
+elif RT_OPSYS == RT_OPSYS_NETBSD
+ifndef RT_OS_NETBSD
+ define RT_OS_NETBSD
+ endif
+elif RT_OPSYS == RT_OPSYS_NETWARE
+ifndef RT_OS_NETWARE
+ define RT_OS_NETWARE
+ endif
### RT_OPSYS_USES_DOS_PATHS

Checks whether the given OpSys uses DOS-style paths or not.

By DOS-style paths we include drive lettering and UNC paths.

@returns true / false

@param a_OpSys The RT_OPSYS_XXX value to check, will be reference multiple times.

#define RT_OPSYS_USES_DOS_PATHS(a_OpSys) \
(   (a_OpSys) == RT_OPSYS_WINDOWS \
+   (a_OpSys) == RT_OPSYS_QNX \
+   (a_OpSys) == RT_OPSYS_OPENBSD \
+   (a_OpSys) == RT_OPSYS_OS2 \
+   (a_OpSys) == RT_OPSYS_PLAN9 \
+   (a_OpSys) == RT_OPSYS_SOLARIS \
+   (a_OpSys) == RT_OPSYS_UEFI \
+   else \
+   #error "Bad RT_OPSYS value."
)
+ || (a_OpSys) == RT_OPSYS_OS2 \n+ || (a_OpSys) == RT_OPSYS_DOS )
+
+/** @def CTXTYPE
+ * Declare a type differently in GC, R3 and R0.
+ *
+ * @param   GCType  The GC type.
+ * @param   R3Type  The R3 type.
+ * @param   R0Type  The R0 type.
+ * @remark  For pointers used only in one context use RCPTRTYPE(), R3R0PTRTYPE(), R3PTRTYPE() or R0PTRTYPE().
+ */
+#ifdef IN_RC
+# define CTXTYPE(GCType, R3Type, R0Type)  GCType
+#elif defined(IN_RING3)
+# define CTXTYPE(GCType, R3Type, R0Type)  R3Type
+#else
+# define CTXTYPE(GCType, R3Type, R0Type)  R0Type
+#endif
+
+/** @def RCPTRTYPE
+ * Declare a pointer which is used in the raw mode context but appears in structure(s) used by
+ * both HC and RC. The main purpose is to make sure structures have the same
+ * size when built for different architectures.
+ *
+ * @param   RCType  The RC type.
+ */
+#define RCPTRTYPE(RCType)       CTXTYPE(RCType, RTRCPTR, RTRCPTR)
+
+/** @def R3R0PTRTYPE
+ * Declare a pointer which is used in HC, is explicitly valid in ring 3 and 0,
+ * but appears in structure(s) used by both HC and GC. The main purpose is to
+ * make sure structures have the same size when built for different architectures.
+ *
+ * @param   R3R0Type  The R3R0 type.
+ * @remark  This used to be called HCPTRTYPE.
+ */
+#define R3R0PTRTYPE(R3R0Type)   CTXTYPE(RTHCPTR, R3R0Type, R3R0Type)
+
+/** @def R3PTRTYPE
+ * Declare a pointer which is used in R3 but appears in structure(s) used by
+ * both HC and GC. The main purpose is to make sure structures have the same
+ * size when built for different architectures.
+ *
+ * @param   R3Type  The R3 type.
+ */
+\#define R3PTRTYPE(R3Type) CTXTYPE(RTHCUINTPTR, R3Type, RTHCUINTPTR)
+
+/** @def R0PTRTYPE
+ * Declare a pointer which is used in R0 but appears in structure(s) used by
+ * both HC and GC. The main purpose is to make sure structures have the same
+ * size when built for different architectures.
+ *
+ * @param R0Type The R0 type.
+ */
+\#define R0PTRTYPE(R0Type) CTXTYPE(RTHCUINTPTR, RTHCUINTPTR, R0Type)
+
+/** @def CTXSUFF
+ * Adds the suffix of the current context to the passed in
+ * identifier name. The suffix is HC or GC.
+ *
+ * @param var Identifier name.
+ * @deprecated Use CTX_SUFF. Do NOT use this for new code.
+ */
+\#ifdef IN_RC
+\ # define CTXSUFF(var) var##GC
+\ # define OTHERCTXSUFF(var) var##HC
+\else
+\ # define CTXSUFF(var) var##HC
+\ # define OTHERCTXSUFF(var) var##GC
+\endif
+
+/** @def CTXALLSUFF
+ * Adds the suffix of the current context to the passed in
+ * identifier name. The suffix is R3, R0 or GC.
+ *
+ * @param var Identifier name.
+ * @deprecated Use CTX_SUFF. Do NOT use this for new code.
+ */
+\#ifdef IN_RC
+## define CTXALLSUFF(var) var##GC
+## define OTHERCTXSUFF(var) var##HC
+\else
+## define CTXALLSUFF(var) var##HC
+## define OTHERCTXSUFF(var) var##GC
+##endif
+
+/** @def CTXALLSUFF
+ * Adds the suffix of the current context to the passed in
+ * identifier name. The suffix is R3, R0 or GC.
+ *
+ * @param var Identifier name.
+ * @deprecated Use CTX_SUFF. Do NOT use this for new code.
+ */
+\#ifdef IN_RC
+## define CTXALLSUFF(var) var##GC
+## define other defined(IN_RING0)
+## define CTXALLSUFF(var) var##R0
+\else
+# define CTXALLSUFF(var)    var##R3
+#endif
+
+/** @def CTX_SUFF
+ * Adds the suffix of the current context to the passed in
+ * identifier name. The suffix is R3, R0 or RC.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param   var     Identifier name.
+ *
+ * @remark  This will replace CTXALLSUFF and CTXSUFFIX before long.
+ */
+IFDEF IN_RC
+# define CTX_SUFF(var)    var##RC
+ENDIF
+IFDEF IN_RING0
+# define CTX_SUFF(var)    var##R0
+ELSE
+# define CTX_SUFF(var)    var##R3
+ENDIF
+
+/** @def CTX_SUFF_Z
+ * Adds the suffix of the current context to the passed in
+ * identifier name, combining RC and R0 into RZ.
+ * The suffix thus is R3 or RZ.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param   var     Identifier name.
+ *
+ * @remark  This will replace CTXALLSUFF and CTXSUFFIX before long.
+ */
+IFDEF IN_RING3
+# define CTX_SUFF_Z(var)    var##R3
+ELSE
+# define CTX_SUFF_Z(var)    var##RZ
+ENDIF
+
+/** @def CTXMID
+ * Adds the current context as a middle name of an identifier name
+ * The middle name is HC or GC.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param   first   First name.
+ * @param   last    Surname.
+ */
+/** @def OTHERCTXMID
+ * Adds the other context as a middle name of an identifier name
+ * The middle name is HC or GC.
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param first  First name.
+ * @param last  Surname.
+ * @deprecated use CTX_MID or CTX_MID_Z
+ */
+#ifdef IN_RC
+## define CTXMID(first, last)        first##GC##last
+## define OTHERCTXMID(first, last)  first##HC##last
+##else
+## define CTXMID(first, last)        first##HC##last
+## define OTHERCTXMID(first, last)  first##GC##last
+##endif
+
+/** @def CTXALLMID
+ * Adds the current context as a middle name of an identifier name.
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param first  First name.
+ * @param last  Surname.
+ * @deprecated use CTX_MID or CTX_MID_Z
+ */
+#ifdef IN_RC
+## define CTXALLMID(first, last)     first##GC##last
+#elif defined(IN_RING0)
+## define CTXALLMID(first, last)     first##R0##last
+##else
+## define CTXALLMID(first, last)     first##R3##last
+##endif
+
+/** @def CTX_MID
+ * Adds the current context as a middle name of an identifier name.
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param first  First name.
+ * @param last  Surname.
+ */
+#ifdef IN_RC
+## define CTX_MID(first, last)       first##RC##last
+#elif defined(IN_RING0)
+## define CTX_MID(first, last)       first##R0##last
+##else
+## define CTX_MID(first, last)       first##R3##last
+##endif
+
+/** @def CTX_MID_Z
+ * Adds the current context as a middle name of an identifier name, combining RC
+ * and R0 into RZ.
+ * The middle name thus is either R3 or RZ.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ *
+ */
+ +#ifdef IN_RING3
+ +# define CTX_MID_Z(first, last)     first##R3##last
+ +#else
+ +# define CTX_MID_Z(first, last)     first##RZ##last
+ +#endif
+ *
+ /** @def R3STRING
+ * A macro which in GC and R0 will return a dummy string while in R3 it will return
+ * the parameter.
+ *
+ * This is typically used to wrap description strings in structures shared
+ * between R3, R0 and/or GC. The intention is to avoid the \#ifdef IN_RING3 mess.
+ *
+ */
+ +#ifdef IN_RING3
+ +# define R3STRING(pR3String)    (pR3String)
+ +#else
+ +# define R3STRING(pR3String)    ("<R3_STRING>")
+ +#endif
+ *
+ /** @def R0STRING
+ * A macro which in GC and R3 will return a dummy string while in R0 it will return
+ * the parameter.
+ *
+ * This is typically used to wrap description strings in structures shared
+ * between R3, R0 and/or GC. The intention is to avoid the \#ifdef IN_RING0 mess.
+ *
+ */
+ +#ifdef IN_RING0
+ +# define R0STRING(pR0String)    (pR0String)
+ +#else
+ +# define R0STRING(pR0String)    ("<R0_STRING>")
+ +#endif
+ *
+ /** @def RCSTRING
A macro which in R3 and R0 will return a dummy string while in RC it will return the parameter.

This is typically used to wrap description strings in structures shared between R3, R0 and/or RC. The intention is to avoid the \#ifdef IN_RC mess.

@param pRCString The RC string. Only referenced in RC.

@see R3STRING, R0STRING

@def RCSTRING(pRCString) (pRCString)

@def RT_NOTHING
A macro that expands to nothing.
This is primarily intended as a dummy argument for macros to avoid the undefined behavior passing empty arguments to an macro (ISO C90 and C++98, gcc v4.4 warns about it).

@def RT_GCC_EXTENSION
Macro for shutting up GCC warnings about using language extensions. */

@def RT_GCC_NO_WARN_DEPRECATED_BEGIN
Used to start a block of code where GCC should not warn about deprecated declarations. */

@def RT_GCC_NO_WARN_DEPRECATED_END
Used to end a block of code where GCC should not warn about deprecated declarations. */
/** @def RT_GCC_NO_WARN_CONVERSION_BEGIN
 * Used to start a block of code where GCC should not warn about implicit
 * conversions that may alter a value. */
+#if RT_GNUC_PREREQ(4, 6)
+  # define RT_GCC_NO_WARN_CONVERSION_BEGIN
+  _Pragma("GCC diagnostic push")
+  _Pragma("GCC diagnostic ignored \"-Wconversion\"")
+/** @def RT_GCC_NO_WARN_CONVERSION_END
 * Used to end a block of code where GCC should not warn about implicit
 * conversions that may alter a value. */
+  # define RT_GCC_NO_WARN_CONVERSION_END
+  _Pragma("GCC diagnostic pop")
+#else
+  # define RT_GCC_NO_WARN_CONVERSION_BEGIN
+  # define RT_GCC_NO_WARN_CONVERSION_END
+  #endif
+
/** @def RT_COMPILER_GROKS_64BIT_BITFIELDS
 * Macro that is defined if the compiler understands 64-bit bitfields. */
+  #if !defined(RT_OS_OS2) || (!defined(__IBMC__) && !defined(__IBMCPP__))
+    # if !defined(__WATCOMC__) /* watcom compiler doesn't grok it either. */
+    # define RT_COMPILER_GROKS_64BIT_BITFIELDS
+  # endif
+  #endif
+
/** @def RT_COMPILER_WITH_80BIT_LONG_DOUBLE
 * Macro that is defined if the compiler implements long double as the
 * IEEE extended precision floating. */
+  #if (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)) && !defined(RT_O
+ * and the semicolon in function prototypes (and implementation if C++).
+ *
+ * @remarks May not work on C++ methods, mainly intended for C-style APIs.
+ *
+ * @remarks The use of the noexcept attribute with GCC is because old compilers
+ * (4.1.1, 32-bit) leaking the noexcept into global space or something
+ * when used with RTDECL or similar. Using this forces use to have two
+ * macros, as the noexcept attribute is not for the function definition.
+ */
+#ifdef RT_EXCEPTIONS_ENABLED
+# ifdef __GNUC__
+#  if RT_GNUC_PREREQ(3, 3)
+#   define RT_NO_THROW_PROTO __attribute__((__nothrow__))
+#  else
+#   define RT_NO_THROW_PROTO
+#  endif
+# endif
+# else
+# define RT_NO_THROW_PROTO
+# endif
+/** @def RT_NO_THROW_DEF
+ * The counterpart to RT_NO_THROW_PROTO that is added to the function
+ * definition.
+ */
+#if defined(RT_EXCEPTIONS_ENABLED) && !defined(__GNUC__)
+# define RT_NO_THROW_DEF RT_NO_THROW_PROTO
+#else
+# define RT_NO_THROW_DEF
+#endif
+/** @def RT_THROW
+ * How to express that a method or function throws a type of exceptions. Some
+ * compilers does not want this kind of information and will warning about it.
+ * @param   type    The type exception.
+ */
+#ifdef RT_EXCEPTIONS_ENABLED
+# if RT_MSC_PREREQ_EX(RT_MSC_VER_VC71, 0)
+#   define RT_THROW(type)
+#elif RT_GNUC_PREREQ(7, 0)
+    define RT_THROW(type)
+#else
+    define RT_THROW(type)
+endif
+
+/** @def RT_FALL_THROUGH
+ * Tell the compiler that we're falling through to the next case in a switch.
+ * @sa RT_FALL_THRU */
+#if RT_GNUC_PREREQ(7, 0)
+    define RT_FALL_THROUGH() __attribute__((fallthrough))
+#else
+    define RT_FALL_THROUGH() (void)0
+#endif
+/** @def RT_FALL_THRU
+ * Tell the compiler that we're falling thru to the next case in a switch.
+ * @sa RT_FALL_THROUGH */
+define RT_FALL_THRU() RT_FALL_THROUGH()
+
+/** @def RT_IPRT_FORMAT_ATTR
+ * Identifies a function taking an IPRT format string.
+ * @param   a_iFmt  The index (1-based) of the format string argument.
+ * @param   a_iArgs The index (1-based) of the first format argument, use 0 for
+ *                  va_list.
+ * @param   a_iArgs The index (1-based) of the first format argument, use 0 for
+ *                  va_list.
+ */
+#if defined(__GNUC__) && defined(WITH_IPRT_FORMAT_ATTRIBUTE)
+    define RT_IPRT_FORMAT_ATTR(a_iFmt, a_iArgs) __attribute__((__iprt_format__(a_iFmt, a_iArgs)))
+#else
+    define RT_IPRT_FORMAT_ATTR(a_iFmt, a_iArgs)
+#endif
+
+/** @def RT_IPRT_FORMAT_ATTR_MAYBE_NULL
+ * Identifies a function taking an IPRT format string, NULL is allowed.
+ * @param   a_iFmt  The index (1-based) of the format string argument.
+ * @param   a_iArgs The index (1-based) of the first format argument, use 0 for
+ *                  va_list.
+ */
+#if defined(__GNUC__) && defined(WITH_IPRT_FORMAT_ATTRIBUTE)
+    define RT_IPRT_FORMAT_ATTR_MAYBE_NULL(a_iFmt, a_iArgs) __attribute__((__iprt_format__maybe_null__(a_iFmt, a_iArgs)))
+#else
+    define RT_IPRT_FORMAT_ATTR_MAYBE_NULL(a_iFmt, a_iArgs)
+#endif
/** @def RT_GCC_SUPPORTS_VISIBILITY_HIDDEN
 * Indicates that the "hidden" visibility attribute can be used (GCC) */
#if defined(__GNUC__)
 # if __GNUC__ >= 4 && !defined(RT_OS_OS2) && !defined(RT_OS_WINDOWS)
 #define RT_GCC_SUPPORTS_VISIBILITY_HIDDEN
 #endif
#endif

/** @def RT_COMPILER_SUPPORTS_VA_ARGS
 * If the defined, the compiler supports the variadic macro feature (...,__VA_ARGS__). */
#if defined(_MSC_VER)
 # if _MSC_VER >= 1600 /* Visual C++ v10.0 / 2010 */
 #define RT_COMPILER_SUPPORTS_VA_ARGS
 #endif
#elif defined(__GNUC__)
 #if __GNUC__ >= 3 /* not entirely sure when this was added */
 #define RT_COMPILER_SUPPORTS_VA_ARGS
 #endif
#endif

/** @def RTCALL
 * The standard calling convention for the Runtime interfaces.
 * @remarks The regparm(0) in the X86/GNUC variant deals with -mregparm=x use in
 * the linux kernel and potentially elsewhere (3rd party).
 * */
#if defined(_MSC_VER) || defined(__WATCOMC__)
 #define RTCALL                  __cdecl
#elif defined(RT_OS_OS2)
 #define RTCALL                 __cdecl
#elif defined(__GNUC__) && defined(RT_ARCH_X86)
 #define RTCALL                 __attribute__((__cdecl__,__regparm__(0)))
#else
 #define RTCALL
#endif

/** @def DECLEXPORT
 * How to declare an exported function.
 * @param   type    The return type of the function declaration.
 * */
#if defined(_MSC_VER) || defined(RT_OS_OS2)
 #define DECLEXPORT(type)       __declspec(dllexport) type
#elif defined(RT_USE_VISIBILITY_DEFAULT)
 #define DECLEXPORT(type)      __attribute__((visibility("default"))) type
#else
 #define DECLEXPORT(type)    type
#endif
### @def DECLEXPORT

* How to declare an exported function.

* @param type The return type of the function declaration.

*/

### @def DECLIMPORT

* How to declare an imported function.

* @param type The return type of the function declaration.

*/

### @def DECLHIDDEN

* How to declare a non-exported function or variable.

* @param type The return type of the function or the data type of the variable.

*/

### @def DECL_HIDDEN_CONST

* Workaround for g++ warnings when applying the hidden attribute to a const

* definition. Use DECLHIDDEN for the declaration.

* @param a_Type The return type of the function or the data type of

the variable.

*/

### @def DECL_INVALID

* How to declare a function not available for linking in the current context.

* The purpose is to create compile or like time errors when used. This isn't

* possible on all platforms.

* @param type The return type of the function.

*/

### @def DECL_INVALID_CONST

* How to declare a function not available for linking in the current context.

* The purpose is to create compile or like time errors when used. This isn't

* possible on all platforms.

* @param type The return type of the function.

*/
+/#endif
+
+/** @def DECLASM
+ * How to declare an internal assembly function.
+ * @param   type    The return type of the function declaration.
+ * @endcode
+*/
+#ifdef __cplusplus
+# define DECLASM(type)           extern "C" type RTCALL
+#else
+# define DECLASM(type)           type RTCALL
+#endif
+
+/** @def DECLASMTYPE
+ * How to declare an internal assembly function type.
+ * @param   type    The return type of the function.
+ * @endcode
+*/
+#define DECLASMTYPE(type)       type RTCALL
+
+/** @def DECL_NO_RETURN
+ * How to declare a function which does not return.
+ * @note This macro can be combined with other macros, for example
+ * @endcode
+ * @endcode
+ * EMR3DECL(DECL_NO_RETURN(void)) foo(void);
+ * @endcode
+ */
+#ifdef _MSC_VER
+# define DECL_NO_RETURN(type)   __declspec(noreturn) type
+#elif defined(__GNUC__)
+# define DECL_NO_RETURN(type)   __attribute__((noreturn)) type
+#else
+# define DECL_NO_RETURN(type)   type
+#endif
+/** @deprecated Use DECL_NO_RETURN instead. */
+#define DECLNORETURN(type) DECL_NO_RETURN(type)
+
+/** @def DECL_RETURNS_TWICE
+ * How to declare a function which may return more than once.
+ * @note This macro can be combined with other macros, for example
+ * @endcode
+ * EMR3DECL(DECL_RETURNS_TWICE(void)) MySetJmp(void);
+ * @endcode
+ */
+#if RT_GNUC_PREREQ(4, 1)
+# define DECL_RETURNS_TWICE(type)  __attribute__((returns_twice)) type
+# else
+# define DECL_RETURNS_TWICE(type)   type
+#endif
+/** @def DECLWEAK
+ * How to declare a variable which is not necessarily resolved at
+ * runtime.
+ * @note This macro can be combined with other macros, for example
+ * @code
+ * EMR3DECL(DECLWEAK(int)) foo;
+ * @endcode
+ */
+ +#if defined(__GNUC__)
+ # define DECLWEAK(type)         type __attribute__((weak))
+ #else
+ # define DECLWEAK(type)         type
+ +#endif
+
+/** @def DECLCALLBACK
+ * How to declare a call back function type.
+ * @param   type    The return type of the function declaration.
+ */
+ #define DECLCALLBACK(type)      type RT_FAR_CODE RTCALL
+
+/** @def DECLCALLBACKPTR
+ * How to declare a call back function pointer.
+ * @param   type    The return type of the function declaration.
+ * @param   name    The name of the variable member.
+ */
+ #if defined(__IBMC__) || defined(__IBMCPP__)
+ # define DECLCALLBACKPTR(type, name)    type (* RTCALL name)
+ #else
+ # define DECLCALLBACKPTR(type, name)    type (RT_FAR_CODE RTCALL * name)
+ +#endif
+
+/** @def DECLCALLBACKMEMBER
+ * How to declare an call back function pointer member.
+ * @param   type    The return type of the function declaration.
+ * @param   name    The name of the struct/union/class member.
+ */
+ #if defined(__IBMC__) || defined(__IBMCPP__)
+ # define DECLCALLBACKMEMBER(type, name) type (* RTCALL name)
+ #else
+ # define DECLCALLBACKMEMBER(type, name) type (RT_FAR_CODE RTCALL * name)
+ +#endif
+
+/** @def DECLR3CALLBACKMEMBER
+ * How to declare an call back function pointer member - R3 Ptr.
+ * @param   type    The return type of the function declaration.
+ * @param   name    The name of the struct/union/class member.
+ */
+ #if defined(__IBMC__) || defined(__IBMCPP__)
+ # define DECLR3CALLBACKMEMBER(type, name) type (* RTCALL name)
+ #else
+ # define DECLR3CALLBACKMEMBER(type, name) type (RT_FAR_CODE RTCALL * name)
+ +#endif
+
+ifdef IN_RING3
+ define DECLR3DCALLBACKMEMBER(type, name, args) DECLCALLBACKMEMBER(type, name) args
+else
+ define DECLR3DCALLBACKMEMBER(type, name, args) RTR3PTR name
+endif
+
+/** @def DECLR3DCALLBACKMEMBER
+ * How to declare an call back function pointer member - RC Ptr.
+ * @param   type    The return type of the function declaration.
+ * @param   name    The name of the struct/union/class member.
+ * @param   args    The argument list enclosed in parentheses.
+ */
+ifdef IN_RC
+ define DECLR3DCALLBACKMEMBER(type, name, args) DECLCALLBACKMEMBER(type, name) args
+else
+ define DECLR3DCALLBACKMEMBER(type, name, args) RTR3PTR name
+endif
+
+/** @def DECLR0DCALLBACKMEMBER
+ * How to declare an call back function pointer member - R0 Ptr.
+ * @param   type    The return type of the function declaration.
+ * @param   name    The name of the struct/union/class member.
+ * @param   args    The argument list enclosed in parentheses.
+ */
+ifdef IN_RING0
+ define DECLR0DCALLBACKMEMBER(type, name, args) DECLCALLBACKMEMBER(type, name) args
+else
+ define DECLR0DCALLBACKMEMBER(type, name, args) RTR0PTR name
+endif
+
+/** @def DECLINLINE
+ * How to declare a function as inline.
+ * @param   type    The return type of the function declaration.
+ * @remarks Don't use this macro on C++ methods.
+ */
+ifdef __GNUC__
+ define DECLINLINE(type) static __inline__ type
+elif defined(__cplusplus)
+ define DECLINLINE(type) static inline type
+elif defined(_MSC_VER)
+ define DECLINLINE(type) static _inline type
+elif defined(__IBMC__)
+ define DECLINLINE(type) _Inline type
+else
+ define DECLINLINE(type) inline type
+endif
+
+ifdef __GNUC__
+ define DECLINLINE(type) static __inline__ type
+elif defined(__cplusplus)
+ define DECLINLINE(type) static inline type
+elif defined(MSC_VER)
+ define DECLINLINE(type) static _inline type
+elif defined(__IBMC__)
+ define DECLINLINE(type) _Inline type
+else
+ define DECLINLINE(type) inline type
+endif
+
+
/*@
def DECL_FORCE_INLINE
+ * How to declare a function as inline and try convince the compiler to always
+ * inline it regardless of optimization switches.
+ * @param  type The return type of the function declaration.
+ * @remarks Use sparsely and with care. Don't use this macro on C++ methods.
+ */
+#ifdef __GNUC__
+# define DECL_FORCE_INLINE(type) __attribute__((__always_inline__)) DECLINLINE(type)
+#elif defined(_MSC_VER)
+# define DECL_FORCE_INLINE(type) __forceinline type
+#else
+# define DECL_FORCE_INLINE(type) DECLINLINE(type)
+#endif
+
/*@
def DECL_NO_INLINE
+ * How to declare a function telling the compiler not to inline it.
+ * @param  scope The function scope, static or RT NOTHING.
+ * @param  type The return type of the function declaration.
+ * @remarks Don't use this macro on C++ methods.
+ */
+#ifdef __GNUC__
+# define DECL_NO_INLINE(scope,type) __attribute__((__noinline__)) scope type
+#elif defined(_MSC_VER)
+# define DECL_NO_INLINE(scope,type) __declspec(noinline) scope type
+#else
+# define DECL_NO_INLINE(scope,type) scope type
+#endif
+
/*@
def IN_RT_STATIC
+ * Used to indicate whether we're linking against a static IPRT
+ * or not.
+ *
+ * The IPRT symbols will be declared as hidden (if supported). Note that this
+ * define has no effect without also setting one of the IN_RT_R0, IN_RT_R3 or
+ * IN_RT_RC indicators.
+ */
+
/*@
def IN_RT_R0
+ * Used to indicate whether we're inside the same link module as the host
+ * context ring-0 Runtime Library.
+ */
+/*@
def RTR0DECL(type)
+ * Runtime Library host context ring-0 export or import declaration.
+ * @param  type The return type of the function declaration.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+ifdef IN_RT_R0
+  if define IN_RT_STATIC
+     define RTR0DECL(type) DECLHIDDEN(type) RTCALL
+   else
+     define RTR0DECL(type) DECLEXPORT(type) RTCALL
+   endif
+else
+endif
+*/ * @def IN_RT_R3
+ * Used to indicate whether we're inside the same link module as the host
+ * context ring-3 Runtime Library.
+ */
+*/ * @def RTR3DECL(type)
+ * Runtime Library host context ring-3 export or import declaration.
+ * @param type The return type of the function declaration.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+endif
+ifdef IN_RT_R3
+  if define IN_RT_STATIC
+     define RTR3DECL(type) DECLHIDDEN(type) RTCALL
+   else
+     define RTR3DECL(type) DECLEXPORT(type) RTCALL
+   endif
+else
+endif
+*/ * @def IN_RT_RC
+ * Used to indicate whether we're inside the same link module as the raw-mode
+ * context (RC) runtime library.
+ */
+*/ * @def RTRCDECL(type)
+ * Runtime Library raw-mode context export or import declaration.
+ * @param type The return type of the function declaration.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+endif
+ifdef IN_RT_RC
+  if define IN_RT_STATIC
+     define RTRCDECL(type) DECLHIDDEN(type) RTCALL
+   else
+     define RTRCDECL(type) DECLEXPORT(type) RTCALL
+   endif
+else
+endif
+@def RTDECL(type)
+ * Runtime Library export or import declaration.
+ * Functions declared using this macro exists in all contexts.
+ * @param type The return type of the function declaration.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+ifdef(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
+else
+endif
+else
+endif

+@def RTDATADECL(type)
+ * Runtime Library export or import declaration.
+ * Data declared using this macro exists in all contexts.
+ * @param type The data type.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+ifdef(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
+else
+endif
+endif
+endif

+@def RT_DECL_DATA_CONST(type)
+ * Definition of a const variable. See DECL_HIDDEN_CONST.
+ * @param type The const data type.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+ifdef(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
+else
+endif
+endif
+endif
+endif
+endif
/** @def RT_DECL_CLASS
 * Declares an class living in the runtime.
 * @remarks This is only used inside IPRT. Other APIs need to define their own
 * XXXX_DECL macros for dealing with import/export/static visibility.
 */
#if defined(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
# ifdef IN_RT_STATIC
#  define RT_DECL_CLASS
# else
#  define RT_DECL_CLASS     DECLCLASS
# endif
#else
# define RT_DECL_CLASS      DECLIMPORT_CLASS
#endif

/** @def RT_NOCRT
 * Symbol name wrapper for the No-CRT bits.
 * @
 * In order to coexist in the same process as other CRTs, we need to
 * decorate the symbols such that they don't conflict the ones in the
 * other CRTs. The result of such conflicts / duplicate symbols can
 * confuse the dynamic loader on Unix like systems.
 * @
 * Define RT_WITHOUT_NOCRT_WRAPPERS to drop the wrapping.
 * Define RT_WITHOUT_NOCRT_WRAPPER_ALIASES to drop the aliases to the
 * wrapped names.
 * @
 */
#ifndef RT_WITHOUT_NOCRT_WRAPPERS
# define RT_NOCRT(name) nocrt_ ## name
# define RT_NOCRT_STR(name) "nocrt_" #name
#else
# define RT_NOCRT(name) name
# define RT_NOCRT_STR(name) #name
#endif

/** @def RT_LIKELY
 * Give the compiler a hint that an expression is very likely to hold true.
 * @
 * Some compilers support explicit branch prediction so that the CPU backend
 * can hint the processor and also so that code blocks can be reordered such
that the predicted path sees a more linear flow, thus improving cache
behaviour, etc.

IPRT provides the macros RT_LIKELY() and RT_UNLIKELY() as a way to utilize
this compiler feature when present.

A few notes about the usage:
- Generally, order your code use RT_LIKELY() instead of RT_UNLIKELY().
- Generally, use RT_UNLIKELY() with error condition checks (unless you
  have some strong reason to do otherwise, in which case document it),
and/or RT_LIKELY() with success condition checks, assuming you want
to optimize for the success path.
- Other than that, if you don’t know the likelihood of a test succeeding
from empirical or other ‘hard’ evidence, don’t make predictions unless
you happen to be a Dirk Gently character.
- These macros are meant to be used in places that get executed a lot. It
is wasteful to make predictions in code that is executed rarely (e.g.
at subsystem initialization time) as the basic block reordering that this
affects can often generate larger code.
- Note that RT_SUCCESS() and RT_FAILURE() already makes use of RT_LIKELY()
and RT_UNLIKELY(). Should you wish for prediction free status checks,
use the RT_SUCCESS_NP() and RT_FAILURE_NP() macros instead.

@returns the boolean result of the expression.
@param expr The expression that's very likely to be true.
@see RT_UNLIKELY

Give the compiler a hint that an expression is highly unlikely to hold true.

See the usage instructions give in the RT_LIKELY() docs.

@returns the boolean result of the expression.
@param expr The expression that's very unlikely to be true.
@see RT_LIKELY

@deprecated Please use RT_LIKELY() instead wherever possible! That gives us
a better chance of the windows compilers to generate favorable code
too. The belief is that the compiler will by default assume the
if-case is more likely than the else-case.

#endif __GNUC__
/** @def RT_EXPAND_2
 * Helper for RT_EXPAND. */
#define RT_EXPAND_2(a_Expr)     a_Expr
/** @def RT_EXPAND
 * Returns the expanded expression.
 * @param   a_Expr              The expression to expand. */
#define RT_EXPAND(a_Expr)       RT_EXPAND_2(a_Expr)

/** @def RT_XSTR
 * Returns the expanded argument as a string.
 * @param   str     Argument to expand and stringify. */
#define RT_XSTR(str)            RT_STR(str)

/** @def RT_LSTR_2
 * Helper for RT_LSTR that gets the expanded @a str.
 * @param   str     String literal to prefix with 'L'. */
#define RT_LSTR_2(str)          L##str
/** @def RT_LSTR
 * Returns the expanded argument with a L string prefix.
 * @param   str     String literal to . */
#define RT_LSTR(str)            RT_LSTR_2(str)

/** @def RT_UNPACK_CALL
 * Unpacks the an argument list inside an extra set of parenthesis and turns it
 * into a call to @a a_Fn.
 * @param   a_Fn        Function/macro to call.
 * @param   a_Args      Parameter list in parenthesis.
+ */
+ #define RT_UNPACK_CALL(a_Fn, a_Args) a_Fn a_Args
+
+ #if defined(RT_COMPILER_SUPPORTS_VA_ARGS) || defined(DOXYGEN_RUNNING)
+
+ /** @def RT_UNPACK_CALL
+ * Returns the arguments without parenthesis.
+ *
+ * @param   ...         Parameter list in parenthesis.
+ * @returns Requires RT_COMPILER_SUPPORTS_VA_ARGS.
+ */
+ 
+ #define RT_UNPACK_ARGS(...) __VA_ARGS__
+
+ /** @def RT_COUNT_VA_ARGS_HLP
+ * Helper for RT_COUNT_VA_ARGS that picks out the argument count from
+ * RT_COUNT_VA_ARGS_REV_SEQ. */
+ 
+ #define RT_COUNT_VA_ARGS_HLP( 
+   c69, c68, c67, c66, c65, c64, c63, c62, c61, c60, 
+   c59, c58, c57, c56, c55, c54, c53, c52, c51, c50, 
+   c49, c48, c47, c46, c45, c44, c43, c42, c41, c40, 
+   c39, c38, c37, c36, c35, c34, c33, c32, c31, c30, 
+   c29, c28, c27, c26, c25, c24, c23, c22, c21, c20, 
+   c19, c18, c17, c16, c15, c14, c13, c12, c11, c10, 
+   c9,  c8,  c7,  c6,  c5,  c4,  c3,  c2,  c1, cArgs, ...) cArgs
+
+ /** Argument count sequence. */
+ 
+ #define RT_COUNT_VA_ARGS_REV_SEQ
+   69,  68,  67,  66,  65,  64,  63,  62,  61,  60, 
+   59,  58,  57,  56,  55,  54,  53,  52,  51,  50, 
+   49,  48,  47,  46,  45,  44,  43,  42,  41,  40, 
+   39,  38,  37,  36,  35,  34,  33,  32,  31,  30, 
+   29,  28,  27,  26,  25,  24,  23,  22,  21,  20, 
+   19,  18,  17,  16,  15,  14,  13,  12,  11,  10, 
+    9,   8,   7,   6,   5,   4,   3,   2,   1,  0
+
+ /** This is for zero arguments. At least Visual C++ requires it. */
+ 
+ #define RT_COUNT_VA_ARGS_PREFIX_RT_NOTHING RT_COUNT_VA_ARGS_REV_SEQ
+
+ /** @returns Number of arguments in the ellipsis
+ * @param   ...         Arguments to count.
+ */
+ 
+ #define RT_COUNT_VA_ARGS(...) RT_COUNT_VA_ARGS_PREFIX_RT_NOTHING RT_COUNT_VA_ARGS_REV_SEQ
+
+ /* Counts the number of arguments given to the variadic macro. */
+ +
+ * Max is 69.
+ +
+ * @returns Number of arguments in the ellipsis
+ * @param   ...         Arguments to count.
+ */
+ 
+ #define RT_COUNT_VA_ARGS(...) RT_COUNT_VA_ARGS_HLP( RT_UNPACK_CALL( RT_COUNT_VA_ARGS_HLP, (RT_COUNT_VA_ARGS_PREFIX_RT_NOTHING, RT_UNPACK_CALL( RT_COUNT_VA_ARGS_HLP, (RT_COUNT_VA_ARGS_PREFIX_RT_NOTHING, RT_UNPACK_CALL( RT_COUNT_VA_ARGS_HLP, (RT_COUNT_VA_ARGS_PREFIX_RT_NOTHING, RT_COUNT_VA_ARGS_REV_SEQ))) ) ) ) )

+  */ RT_COMPILER_SUPPORTS_VA_ARGS */
+  *
+  /** @def RT_CONCAT
+   * Concatenate the expanded arguments without any extra spaces in between.
+   * @param a The first part.
+   * @param b The second part.
+   */
+  
+  #define RT_CONCAT(a,b) RT_CONCAT_HLP(a,b)
+  /** RT_CONCAT helper, don’t use. */
+  #define RT_CONCAT_HLP(a,b) a##b
+
+  /** @def RT_CONCAT3
+   * Concatenate the expanded arguments without any extra spaces in between.
+   * @param a The 1st part.
+   * @param b The 2nd part.
+   * @param c The 3rd part.
+   */
+  
+  #define RT_CONCAT3(a,b,c) RT_CONCAT3_HLP(a,b,c)
+  /** RT_CONCAT3 helper, don’t use. */
+  #define RT_CONCAT3_HLP(a,b,c) a##b##c
+
+  /** @def RT_CONCAT4
+   * Concatenate the expanded arguments without any extra spaces in between.
+   * @param a The 1st part.
+   * @param b The 2nd part.
+   * @param c The 3rd part.
+   * @param d The 4th part.
+   */
+  
+  #define RT_CONCAT4(a,b,c,d) RT_CONCAT4_HLP(a,b,c,d)
+  /** RT_CONCAT4 helper, don’t use. */
+  #define RT_CONCAT4_HLP(a,b,c,d) a##b##c##d
+
+  /** @def RT_CONCAT5
+   * Concatenate the expanded arguments without any extra spaces in between.
+   * @param a The 1st part.
+   * @param b The 2nd part.
+   * @param c The 3rd part.
+   * @param d The 4th part.
+   * @param e The 5th part.
+   */
+  
+  #define RT_CONCAT5(a,b,c,d,e) RT_CONCAT5_HLP(a,b,c,d,e)
+  /** RT_CONCAT5 helper, don’t use. */
+\#define RT_CONCAT5_HLP(a,b,c,d,e)     a##b##c##d##e
+
+/** @def RT_CONCAT6
+ * Concatenate the expanded arguments without any extra spaces in between.
+ *
+ * @param a The 1st part.
+ * @param b The 2nd part.
+ * @param c The 3rd part.
+ * @param d The 4th part.
+ * @param e The 5th part.
+ * @param f The 6th part.
+ */
+\#define RT_CONCAT6(a,b,c,d,e,f)       RT_CONCAT6_HLP(a,b,c,d,e,f)
+/** RT_CONCAT6 helper, don't use. */
+\#define RT_CONCAT6_HLP(a,b,c,d,e,f)   a##b##c##d##e##f
+
+/** @def RT_CONCAT7
+ * Concatenate the expanded arguments without any extra spaces in between.
+ *
+ * @param a The 1st part.
+ * @param b The 2nd part.
+ * @param c The 3rd part.
+ * @param d The 4th part.
+ * @param e The 5th part.
+ * @param f The 6th part.
+ * @param g The 7th part.
+ */
+\#define RT_CONCAT7(a,b,c,d,e,f,g)       RT_CONCAT7_HLP(a,b,c,d,e,f,g)
+/** RT_CONCAT7 helper, don't use. */
+\#define RT_CONCAT7_HLP(a,b,c,d,e,f,g)   a##b##c##d##e##f##g
+
+/** @def RT_CONCAT8
+ * Concatenate the expanded arguments without any extra spaces in between.
+ *
+ * @param a The 1st part.
+ * @param b The 2nd part.
+ * @param c The 3rd part.
+ * @param d The 4th part.
+ * @param e The 5th part.
+ * @param f The 6th part.
+ * @param g The 7th part.
+ * @param h The 8th part.
+ */
+\#define RT_CONCAT8(a,b,c,d,e,f,g,h)     RT_CONCAT8_HLP(a,b,c,d,e,f,g,h)
+/** RT_CONCAT8 helper, don't use. */
+\#define RT_CONCAT8_HLP(a,b,c,d,e,f,g,h) a##b##c##d##e##f##g##h
+
+/** @def RT_CONCAT9
* Concatenate the expanded arguments without any extra spaces in between.

* @param a the 1st part.
* @param b the 2nd part.
* @param c the 3rd part.
* @param d the 4th part.
* @param e the 5th part.
* @param f the 6th part.
* @param g the 7th part.
* @param h the 8th part.
* @param i the 9th part.
*/

#define RT_CONCAT9(a,b,c,d,e,f,g,h,i)   RT_CONCAT9_HLP(a,b,c,d,e,f,g,h,i)
/** RT_CONCAT9 helper, don't use. */
#define RT_CONCAT9_HLP(a,b,c,d,e,f,g,h,i) a##b##c##d##e##f##g##h##i
+
+/**
+ * String constant tuple - string constant, strlen(string constant).
+ *
+ * @param a_szConst String constant.
+ * @sa RTSTRTUPLE
+ */
#define RT_STR_TUPLE(a_szConst)  a_szConst, (sizeof(a_szConst) - 1)
+
+/**
+ * Macro for using in switch statements that turns constants into strings.
+ *
+ * @param a_Const The constant (not string).
+ */
#define RT_CASE_RET_STR(a_Const)     case a_Const: return #a_Const
+
+/** @def RT_BIT
+ * Convert a bit number into an integer bitmask (unsigned).
+ * @param bit The bit number.
+ */
#define RT_BIT(bit)                             ( 1U << (bit) )
+
+/** @def RT_BIT_32
+ * Convert a bit number into a 32-bit bitmask (unsigned).
+ * @param bit The bit number.
+ */
#define RT_BIT_32(bit)                          ( UINT32_C(1) << (bit) )
+
+/** @def RT_BIT_64
+ * Convert a bit number into a 64-bit bitmask (unsigned).
+ * @param bit The bit number.
+ */
```c
#ifndef RT_BIT_64
#define RT_BIT_64(bit)                          ( UINT64_C(1) << (bit) )
#endif

#define RT_BF_GET(a_uValue, a_FieldNm)          ( ((a_uValue) >> RT_CONCAT(a_FieldNm,_SHIFT)) &
                                              RT_BF_ZMASK(a_FieldNm) )

#define RT_BF_SET(a_uValue, a_FieldNm, a_uFieldValue) ( RT_BF_CLEAR(a_uValue, a_FieldNm) |
                                                  RT_BF_MAKE(a_FieldNm, a_uFieldValue) )

#define RT_BF_CLEAR(a_uValue, a_FieldNm, a_uFieldValue) ( RT_BF_CLEAR(a_uValue, a_FieldNm) |
                                                  RT_BF_MAKE(a_FieldNm, a_uFieldValue) )
```

**@def RT_BF_GET**

* Gets the value of a bit field in an integer value.

* This requires a couple of macros to be defined for the field:

  * - `\<a_FieldNm\>_SHIFT`: The shift count to get to the field.
  * - `\<a_FieldNm\>_MASK`: The field mask.

* @returns The bit field value.

* @param  `a_uValue`: The integer value containing the field.

* @param  `a_FieldNm`: The field name prefix for getting at the `_SHIFT` and `_MASK` macros.

* @sa  `#RT_BF_CLEAR, #RT_BF_SET, #RT_BF_MAKE, #RT_BF_ZMASK`

**@def RT_BF_SET**

* Sets the given bit field in the integer value.

* This requires a couple of macros to be defined for the field:

  * - `\<a_FieldNm\>_SHIFT`: The shift count to get to the field.
  * - `\<a_FieldNm\>_MASK`: The field mask. Must have the same type as the integer value!!

* @returns Integer value with bit field set to `a_uFieldValue`.

* @param  `a_uValue`: The integer value containing the field.

* @param  `a_FieldNm`: The field name prefix for getting at the `_SHIFT` and `_MASK` macros.

* @param  `a_uFieldValue`: The new field value.

* @sa  `#RT_BF_GET, #RT_BF_CLEAR, #RT_BF_MAKE, #RT_BF_ZMASK`

**@def RT_BF_CLEAR**

* Clears the given bit field in the integer value.

* This requires a couple of macros to be defined for the field:

  * - `\<a_FieldNm\>_SHIFT`: The shift count to get to the field.
  * - `\<a_FieldNm\>_MASK`: The field mask. Must have the same type as the integer value!!

* @returns Integer value with bit field set to zero.

* @param  `a_uValue`: The integer value containing the field.
+ * @param  a_FieldNm  The field name prefix for getting at the _SHIFT and
+ *                 _MASK macros.
+ * @sa      #RT_BF_GET, #RT_BF_SET, #RT_BF_MAKE, #RT_BF_ZMASK
+ */
+#define RT_BF_CLEAR(a_uValue, a_FieldNm)        ( (a_uValue) & ~RT_CONCAT(a_FieldNm,_MASK) )
+
+/** @def RT_BF_MAKE
+ * Shifts and masks a bit field value into position in the integer value.
+ *
+ * This requires a couple of macros to be defined for the field:
+ * - \(<a\_FieldNm\>\>_SHIFT: The shift count to get to the field.
+ * - \(<a\_FieldNm\>\>_MASK: The field mask.
+ *
+ * @param  a_FieldNm  The field name prefix for getting at the _SHIFT and
+ *                 _MASK macros.
+ * @param  a_uFieldValue  The field value that should be masked and shifted
+ *                        into position.
+ * @sa      #RT_BF_GET, #RT_BF_SET, #RT_BF_CLEAR, #RT_BF_ZMASK
+ */
+#define RT_BF_MAKE(a_FieldNm, a_uFieldValue)    ( ((a_uFieldValue) & RT_BF_ZMASK(a_FieldNm) ) <<
RT_CONCAT(a_FieldNm,_SHIFT) )
+
+/** @def RT_BF_ZMASK
+ * Helper for getting the field mask shifted to bit position zero.
+ *
+ * @param  a_FieldNm  The field name prefix for getting at the _SHIFT and
+ *                 _MASK macros.
+ * @sa      #RT_BF_GET, #RT_BF_SET, #RT_BF_CLEAR, #RT_BF_MAKE
+ */
+#define RT_BF_ZMASK(a_FieldNm)                  ( RT_CONCAT(a_FieldNm,_MASK) >>
RT_CONCAT(a_FieldNm,_SHIFT) )
+
+/** Bit field compile time check helper
+ * @internal */
+#define RT_BF_CHECK_DO_XOR_MASK(a_uLeft, a_RightPrefix, a_FieldNm)  ((a_uLeft) ^
RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK))
+/** Bit field compile time check helper
+ * @internal */
+#define RT_BF_CHECK_DO_OR_MASK(a_uLeft, a_RightPrefix, a_FieldNm)   ((a_uLeft) |
RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK))
+/** Bit field compile time check helper
+ * @internal */
+#define RT_BF_CHECK_DO_1ST_MASK_BIT(a_uLeft, a_RightPrefix, a_FieldNm)  
    ((a_uLeft) && ( (RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK) >>
RT_CONCAT3(a_RightPrefix,
    a_FieldNm, _SHIFT)) & 1U ) )
+/** Used to check that a bit field mask does not start too early.
+ * @internal */
+#define RT_BF_CHECK_DO_MASK_START(a_uLeft, a_RightPrefix, a_FieldNm) 

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+ (a_uLeft)
+ && (RT_CONCAT3(a_RightPrefix, a_FieldNm, _SHIFT) == 0
+ || ( ((RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK) >> RT_CONCAT3(a_RightPrefix, a_FieldNm, _SHIFT)) & 1U) << RT_CONCAT3(a_RightPrefix, a_FieldNm, _SHIFT)) /* => single bit mask, correct type */
+ - 1U) /* => mask of all bits below the field */
+ & RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK) == 0 ) )
+/** @name Bit field compile time check recursion workers.
+ * @internal
+ * @{  */
+#define RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1) 
+ a_DoThis(a_uLeft, a_RightPrefix, f1)
+#define RT_BF_CHECK_DO_2(a_DoThis, a_uLeft, a_RightPrefix, f1, f2) 
+ RT_BF_CHECK_DO_1(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2)
+#define RT_BF_CHECK_DO_3(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3) 
+ RT_BF_CHECK_DO_2(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3)
+#define RT_BF_CHECK_DO_4(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4) 
+ RT_BF_CHECK_DO_3(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4)
+#define RT_BF_CHECK_DO_5(a_DoThis, a_uLeft, a_RIGHTPREFIX, f1, f2, f3, f4, f5) 
+ RT_BF_CHECK_DO_4(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5)
+#define RT_BF_CHECK_DO_6(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6) 
+ RT_BF_CHECK_DO_5(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6)
+#define RT_BF_CHECK_DO_7(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7) 
+ RT_BF_CHECK_DO_6(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7)
+#define RT_BF_CHECK_DO_8(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8) 
+ RT_BF_CHECK_DO_7(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8)
+#define RT_BF_CHECK_DO_9(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9) 
+ RT_BF_CHECK_DO_8(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9)
+#define RT_BF_CHECK_DO_10(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10) 
+ RT_BF_CHECK_DO_9(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10)
+#define RT_BF_CHECK_DO_11(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11) 
+ RT_BF_CHECK_DO_10(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11)
+#define RT_BF_CHECK_DO_12(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6,
f7, f8, f9, f10, f11, f12) 
+ RT_BF_CHECK_DO_11(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12) 
+define RT_BF_CHECK_DO_13(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13) 
+ RT_BF_CHECK_DO_12(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13) 
+define RT_BF_CHECK_DO_14(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14) 
+define RT_BF_CHECK_DO_15(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15) 
+ RT_BF_CHECK_DO_14(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16) 
+define RT_BF_CHECK_DO_16(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16) 
+ RT_BF_CHECK_DO_15(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16) 
+define RT_BF_CHECK_DO_17(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17) 
+ RT_BF_CHECK_DO_16(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18) 
+define RT_BF_CHECK_DO_18(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18) 
+ RT_BF_CHECK_DO_17(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18) 
+define RT_BF_CHECK_DO_19(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19) 
+ RT_BF_CHECK_DO_18(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19) 
+define RT_BF_CHECK_DO_20(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20) 
+ RT_BF_CHECK_DO_19(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20) 
+define RT_BF_CHECK_DO_21(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21) 
+ RT_BF_CHECK_DO_20(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21) 
+define RT_BF_CHECK_DO_22(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22) 
+ RT_BF_CHECK_DO_21(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22) 
+define RT_BF_CHECK_DO_23(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23) 
+ RT_BF_CHECK_DO_22(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23) 
+define RT_BF_CHECK_DO_24(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6,
#define RT_BF_CHECK_DO_23(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24) 
+ RT_BF_CHECK_DO_24(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25) 
+ RT_BF_CHECK_DO_25(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25) 
+ RT_BF_CHECK_DO_26(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26) 
+ RT_BF_CHECK_DO_27(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27) 
+ RT_BF_CHECK_DO_28(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28) 
+ RT_BF_CHECK_DO_29(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29) 
+ RT_BF_CHECK_DO_30(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30) 
+ RT_BF_CHECK_DO_31(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31) 
+ RT_BF_CHECK_DO_32(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32) 
+ RT_BF_CHECK_DO_33(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33) 
+ RT_BF_CHECK_DO_34(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34) 
+ RT_BF_CHECK_DO_35(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35) 
+ RT_BF_CHECK_DO_36(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36)
+define RT_BF_CHECK_DO_34(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34)
  + RT_BF_CHECK_DO_33(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34)
+define RT_BF_CHECK_DO_35(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35)
  + RT_BF_CHECK_DO_34(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35)
+define RT_BF_CHECK_DO_36(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36)
  + RT_BF_CHECK_DO_35(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36)
+define RT_BF_CHECK_DO_37(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37)
  + RT_BF_CHECK_DO_36(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37)
+define RT_BF_CHECK_DO_38(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37)
  + RT_BF_CHECK_DO_37(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38)
+define RT_BF_CHECK_DO_39(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38)
  + RT_BF_CHECK_DO_38(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39)
+define RT_BF_CHECK_DO_40(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39)
  + RT_BF_CHECK_DO_39(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39)
+define RT_BF_CHECK_DO_41(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40)
  + RT_BF_CHECK_DO_40(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40)
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#define RT_BF_CHECK_DO_42(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42) 
+ RT_BF_CHECK_DO_41(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42) 
#define RT_BF_CHECK_DO_43(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42) 
+ RT_BF_CHECK_DO_42(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42) 
#define RT_BF_CHECK_DO_44(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43) 
+ RT_BF_CHECK_DO_43(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43) 
#define RT_BF_CHECK_DO_45(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44) 
+ RT_BF_CHECK_DO_44(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44) 
#define RT_BF_CHECK_DO_46(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45) 
+ RT_BF_CHECK_DO_45(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46) 
#define RT_BF_CHECK_DO_47(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47) 
+ RT_BF_CHECK_DO_46(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48) 
#define RT_BF_CHECK_DO_48(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49) 
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#define RT_BF_CHECK_DO_50(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50) 
+ RT_BF_CHECK_DO_49(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix), f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50) 
+ #define RT_BF_CHECK_DO_51(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50) 
+ #define RT_BF_CHECK_DO_52(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51) 
+ #define RT_BF_CHECK_DO_53(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52) 
+ #define RT_BF_CHECK_DO_54(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53) 
+ #define RT_BF_CHECK_DO_55(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54) 
+ #define RT_BF_CHECK_DO_56(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55) 
+ #define RT_BF_CHECK_DO_57(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56) 
+ #define RT_BF_CHECK_DO_58(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57) 
+ #define RT_BF_CHECK_DO_59(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58) 
+ #define RT_BF_CHECK_DO_60(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59)
#define RT_BF_CHECK_DO_57(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57) 
+ RT_BF_CHECK_DO_56(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57) 
+ RT_BF_CHECK_DO_57(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57) 
+ RT_BF_CHECK_DO_58(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58) 
+ RT_BF_CHECK_DO_59(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59) 
+ RT_BF_CHECK_DO_60(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60) 
+ RT_BF_CHECK_DO_61(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60) 
+ RT_BF_CHECK_DO_62(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60, f61) 
+ RT_BF_CHECK_DO_63(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60, f61, f62)
f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60, f61, f62, f63) 
+ RT_BF_CHECK_DO_62(a_DoThis,RT_BF_CHECK_DO_1(a_DoThis,a_uLeft,a_RightPrefix,f1), a_RightPrefix,f2,f3,f4,f5,f6,f7,f8,f9,f10,f11,f12,f13,f14,f15,f16,f17,f18,f19,f20,f21,f22,f23,f24,f25,f26,f27,f28,f29,f30,f31,f32,f33,f34,f35,f36,f37,f38,f39,f40,f41,f42,f43,f44,f45,f46,f47,f48,f49,f50,f51,f52,f53,f54,f55,f56,f57,f58,f59,f60,f61,f62,f63) 
+##define RT_BF_CHECK_DO_64(a_DoThis,a_uLeft,a_RightPrefix,f1,f2,f3,f4,f5,f6,f7,f8,f9,f10,f11,f12,f13,f14,f15,f16,f17,f18,f19,f20,f21,f22,f23,f24,f25,f26,f27,f28,f29,f30,f31,f32,f33,f34,f35,f36,f37,f38,f39,f40,f41,f42,f43,f44,f45,f46,f47,f48,f49,f50,f51,f52,f53,f54,f55,f56,f57,f58,f59,f60,f61,f62,f63,f64) 
+/** @} */
+
+/** @def RT_BF_ASSERT_COMPILE_CHECKS
+ * Emits a series of AssertCompile statements checking that the bit-field
+ * declarations doesn't overlap, has holes, and generally makes some sense.
+ * 
+ * This requires variadic macros because its too much to type otherwise.
+ */
+*/
+##if defined(RT_COMPILER_SUPPORTS_VA_ARGS) || defined(DOXYGEN_RUNNING)
+##define RT_BF_ASSERT_COMPILE_CHECKS(a_Prefix,a_uZero,a_uCovered,a_Fields)\
+ AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_OR_MASK,a_uZero,a_Prefix,RT_UNPACK_ARGS a_Fields) == a_uCovered);\
+ AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_XOR_MASK,a_uCovered,a_Prefix,RT_UNPACK_ARGS a_Fields) == 0);\
+ AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_1ST_MASK_BIT,true,a_Prefix,RT_UNPACK_ARGS a_Fields) == true);\
+ AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_MASK_START,true,a_Prefix,RT_UNPACK_ARGS a_Fields) == true)\
+/** Bit field compile time check helper
+ * @internal */
+##else
+ AssertCompile(RT_BF_CHECK_DO_N(a_DoThis,a_uLeft,a_RightPrefix,...))\
+ RT_UNPACK_CALL(RT_CONCAT(RT_BF_CHECK_DO_,RT_EXPAND(RT_COUNT_VA_ARGS(__VA_ARGS__))),a_DoThis,a_uLeft,a_RightPrefix,___VA_ARGS___))
+##endif
+*/
+/** @def RT_ALIGN
+ * Align macro.
+ * @param u Value to align.
+ * @param uAlignment The alignment. Power of two!
+ * @remark Be extremely careful when using this macro with type which sizeof != sizeof int.
+ * When possible use any of the other RT_ALIGN_* macros. And when that's not
+ * possible, make 101% sure that uAlignment is specified with a right sized type.
+ *
+ * Specifying an unsigned 32-bit alignment constant with a 64-bit value will give
+ * you a 32-bit return value!
+ *
+ * In short: Don't use this macro. Use RT_ALIGN_T() instead.
+ */
+#define RT_ALIGN(u, uAlignment)                 ( ((u) + ((uAlignment) - 1)) & ~((uAlignment) - 1) )
+
+/** @def RT_ALIGN_T
+ * Align macro.
+ * @param   u       Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ * @param   type    Integer type to use while aligning.
+ * @remark  This macro is the preferred alignment macro, it doesn't have any of the pitfalls RT_ALIGN has.
+ */
+#define RT_ALIGN_T(u, uAlignment, type)         ( ((type)(u) + ((uAlignment) - 1)) & ~(type)((uAlignment) - 1) )
+
+/** @def RT_ALIGN_32
+ * Align macro for a 32-bit value.
+ * @param   u32    Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ */
+#define RT_ALIGN_32(u32, uAlignment)            RT_ALIGN_T(u32, uAlignment, uint32_t)
+
+/** @def RT_ALIGN_64
+ * Align macro for a 64-bit value.
+ * @param   u64    Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ */
+#define RT_ALIGN_64(u64, uAlignment)            RT_ALIGN_T(u64, uAlignment, uint64_t)
+
+/** @def RT_ALIGN_Z
+ * Align macro for size_t.
+ * @param   cb    Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ */
+#define RT_ALIGN_Z(cb, uAlignment)              RT_ALIGN_T(cb, uAlignment, size_t)
+
+/** @def RT_ALIGN_P
+ * Align macro for pointers.
+ * @param   pv    Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ */
+#define RT_ALIGN_P(pv, uAlignment)              RT_ALIGN_PT(pv, uAlignment, void *)
+
/** @def RT_ALIGN_PT
+ * Align macro for pointers with type cast.
+ * @param   u           Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ * @param   CastType    The type to cast the result to.
+ */
+#define RT_ALIGN_PT(u, uAlignment, CastType)    ( (CastType)RT_ALIGN_T(u, uAlignment, uintptr_t) )
+
+/** @def RT_ALIGN_R3PT
+ * Align macro for ring-3 pointers with type cast.
+ * @param   u           Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ * @param   CastType    The type to cast the result to.
+ */
+#define RT_ALIGN_R3PT(u, uAlignment, CastType)  ( (CastType)RT_ALIGN_T(u, uAlignment, RTR3UINTPTR) )
+
+/** @def RT_ALIGN_R0PT
+ * Align macro for ring-0 pointers with type cast.
+ * @param   u           Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ * @param   CastType    The type to cast the result to.
+ */
+#define RT_ALIGN_R0PT(u, uAlignment, CastType)  ( (CastType)RT_ALIGN_T(u, uAlignment, RTR0UINTPTR) )
+
+/** @def RT_ALIGN_GCPT
+ * Align macro for GC pointers with type cast.
+ * @param   u           Value to align.
+ * @param   uAlignment  The alignment. Power of two!
+ * @param   CastType    The type to cast the result to.
+ */
+#define RT_ALIGN_GCPT(u, uAlignment, CastType)  ( (CastType)RT_ALIGN_T(u, uAlignment, RTGCUINTPTR) )
+
+/** @def RT_OFFSETOF
+ * Our own special offsetof() variant, returns a signed result.
+ * This differs from the usual offsetof() in that it's not relying on builtin
+ * compiler stuff and thus can use variables in arrays the structure may
+ * contain. This is useful to determine the sizes of structures ending
+ * with a variable length field. For gcc >= 4.4 see @bugref{7775}.
+ * @returns offset into the structure of the specified member. signed.
+ * @param   type    Structure type.
+ * @param   member Member.
+ */
```c
+#if defined(__cplusplus) && RT_GNUC_PREREQ(4, 4)
+  define RT_OFFSETOF(type, member)          ((int)(uintptr_t)&((type*)0x1000)->member) - 0x1000
+  else
+  define RT_OFFSETOF(type, member)          ((int)(uintptr_t)&((type*)0->member))
+  endif
+
+/** @def RT_UOFFSETOF
+ * Our own special offsetof() variant, returns an unsigned result.
+ * This differs from the usual offsetof() in that it's not relying on built-in
+ * compiler stuff and thus can use variables in arrays the structure may
+ * contain. This is useful to determine the sizes of structures ending
+ * with a variable length field. For gcc &gt;= 4.4 see @bugref{7775}.
+ * @returns offset into the structure of the specified member. unsigned.
+ * @param   type    Structure type.
+ * @param   member  Member.
+ */
+if defined(__cplusplus) && RT_GNUC_PREREQ(4, 4)
+define RT_UOFFSETOF(type, member)         ((uintptr_t)&((type*)0x1000)->member) - 0x1000
+else
+define RT_UOFFSETOF(type, member)         ((uintptr_t)&((type*)0)->member)
+endif
+
+/** @def RT_OFFSETOF_ADD
+ * RT_OFFSETOF with an addend.
+ * @returns offset into the structure of the specified member. signed.
+ * @param   type    Structure type.
+ * @param   member  Member.
+ * @param   addend  The addend to add to the offset.
+ */
+#define RT_OFFSETOF_ADD(type, member, addend)    ((int)RT_UOFFSETOF_ADD(type, member, addend))
+
+/** @def RT_UOFFSETOF_ADD
+ * RT_UOFFSETOF with an addend.
+ * @returns offset into the structure of the specified member. signed.
+ * @param   type    Structure type.
+ * @param   member  Member.
+ * @param   addend  The addend to add to the offset.
+ */
+#define RT_UOFFSETOF_ADD(type, member, addend)  ((uintptr_t)&((type*)((uintptr_t)(addend))->member))
+
+/** @def RT_SIZEOFMEMB
+ * Get the size of a structure member.
+ */
```

Open Source Used In 5GaaS Edge AC-4 37701
/* @returns size of the structure member. */
#define RT_SIZEOFMEMB(type, member)    ( sizeof(((type *)(void *)0)->member) )

/* @returns offset of the first byte following a structure/union member. */
#define RT_UOFFSET_AFTER(a_Type, a_Member)      ( RT_UOFFSETOF(a_Type, a_Member) +
RT_SIZEOFMEMB(a_Type, a_Member) )

/* Convert a pointer to a structure member into a pointer to the structure. */
#define RT_FROM_MEMBER(pMem, Type, Member)      ( (Type *) ((uint8_t *)(void *)(pMem) -
RT_UOFFSETOF(Type, Member)) )

/* Same as RT_FROM_MEMBER except it avoids the annoying g++ warnings about invalid access to non-static data member of NULL object. */
#define RT_FROM_CPP_MEMBER(pMem, Type, Member)        ( (Type *) ((uintptr_t)(pMem) - (uintptr_t)&((Type *)0x1000)->Member + 0x1000U) )

/* Calculates the number of elements in a statically sized array. */
#define RT_ELEMENTS( array )   ( (sizeof(array)) / (sizeof((array)[0])) )

/* Calculate the offset of the first byte following a structure/union member. */
#define RT_UOFFSET_AFTER(a_Type, a_Member)      ( RT_UOFFSETOF(a_Type, a_Member) +
RT_SIZEOFMEMB(a_Type, a_Member) )

/* Convert a pointer to a structure member into a pointer to the structure. */
#define RT_FROM_MEMBER(pMem, Type, Member)      ( (Type *) ((uint8_t *)(void *)(pMem) -
RT_UOFFSETOF(Type, Member)) )

/* Same as RT_FROM_MEMBER except it avoids the annoying g++ warnings about invalid access to non-static data member of NULL object. */
#define RT_FROM_CPP_MEMBER(pMem, Type, Member)        ( (Type *) ((uintptr_t)(pMem) - (uintptr_t)&((Type *)0x1000)->Member + 0x1000U) )

/* Calculates the number of elements in a statically sized array. */
#define RT_ELEMENTS( array )   ( (sizeof(array)) / (sizeof((array)[0])) )

Open Source Used In 5GaaS Edge AC-4  37702
+ * @returns Element count.
+ * @param   aArray    Array in question.
+ */
+ #define RT_ELEMENTS(aArray)                     ( sizeof(aArray) / sizeof((aArray)[0]) )
+ +/** @def RT_FLEXIBLE_ARRAY
+ * What to up inside the square brackets when declaring a structure member
+ * with a flexible size.
+ *
+ * @note    Use RT_UOFFSETOF() to calculate the structure size.
+ *
+ * @note    Never to a sizeof() on the structure or member!
+ *
+ * @note    The member must be the last one.
+ *
+ * @note    GCC does not permit using this in a union. So, for unions you must
+ *          use RT_FLEXIBLE_ARRAY_IN_UNION instead.
+ *
+ * @note    GCC does not permit using this in nested structures, where as MSC
+ *          does. So, use RT_FLEXIBLE_ARRAY_NESTED for that.
+ *
+ * @sa      RT_FLEXIBLE_ARRAY_NESTED, RT_FLEXIBLE_ARRAY_IN_UNION
+ */
+ +#if RT_MSC_PREREQ(RT_MSC_VER_VS2005) /** @todo Probably much much earlier. */ 
+ || (defined(__cplusplus) && RT_GNUC_PREREQ(6, 1) && !RT_GNUC_PREREQ(7, 0)) /* gcc-7 warns again */
+ || defined(__WATCOMC__) /* openwatcom 1.9 supports it, we don't care about older atm. */
+ || RT_CLANG_PREREQ_EX(3, 4, 0) /* Only tested clang v3.4, support is probably older. */
+ +# define RT_FLEXIBLE_ARRAY
+ +#if defined(__cplusplus) && defined(_MSC_VER)
+ #pragma warning(disable:4200) /* -wd4200 does not work with VS2010 */
+ +# endif
+ +#elif defined(__STDC_VERSION__)
+ +# if __STDC_VERSION__ >= 1999901L
+ +# define RT_FLEXIBLE_ARRAY
+ +# else
+ +# define RT_FLEXIBLE_ARRAY 1
+ +# endif
+ +#else
+ +# define RT_FLEXIBLE_ARRAY 1
+ +#endif
+ +/** @def RT_FLEXIBLE_ARRAY_NESTED
+ * Variant of RT_FLEXIBLE_ARRAY for use in structures that are nested.
+ *
+ * GCC only allow the use of flexible array member in the top structure, whereas
+ * MSC is less strict and let you do struct { struct { char szName[]; } s; };
+ *
@note See notes for RT_FLEXIBLE_ARRAY.

GCC does not permit using this in a union. So, for unions you must use RT_FLEXIBLE_ARRAY_IN_NESTED_UNION instead.

@sa RT_FLEXIBLE_ARRAY, RT_FLEXIBLE_ARRAY_IN_NESTED_UNION

#ifdef _MSC_VER
#define RT_FLEXIBLE_ARRAY_NESTED RT_FLEXIBLE_ARRAY
#else
#define RT_FLEXIBLE_ARRAY_NESTED 1
#endif

/** @def RT_FLEXIBLE_ARRAY_IN_UNION
 * The union version of RT_FLEXIBLE_ARRAY.
 *
 * @remarks GCC does not support flexible array members in unions, 6.1.x actively checks for this. Visual C++ 2010 seems happy with it.
 *
 * @note See notes for RT_FLEXIBLE_ARRAY.
 *
 * @sa RT_FLEXIBLE_ARRAY, RT_FLEXIBLE_ARRAY_IN_NESTED_UNION
 */
#ifdef _MSC_VER
#define RT_FLEXIBLE_ARRAY_IN_UNION RT_FLEXIBLE_ARRAY
#else
#define RT_FLEXIBLE_ARRAY_IN_UNION 1
#endif

/** @def RT_FLEXIBLE_ARRAY_IN_NESTED_UNION
 * The union version of RT_FLEXIBLE_ARRAY_NESTED.
 *
 * @note See notes for RT_FLEXIBLE_ARRAY.
 *
 * @sa RT_FLEXIBLE_ARRAY, RT_FLEXIBLE_ARRAY_IN_NESTED_UNION
 */
#ifdef _MSC_VER
#define RT_FLEXIBLE_ARRAY_IN_NESTED_UNION RT_FLEXIBLE_ARRAY_NESTED
#else
#define RT_FLEXIBLE_ARRAY_IN_NESTED_UNION 1
#endif

/** @def RT_UNION_NM
 * For compilers (like DTrace) that does not grok nameless unions, we have a little hack to make them palatable.
 */
/** @def RT_STRUCT_NM
 * For compilers (like DTrace) that does not grok nameless structs (it is
+ * non-standard C++), we have a little hack to make them palatable.
+ */
+#ifdef IPRT_WITHOUT_NAMED_UNIONS_AND_STRUCTS
+# define RT_UNION_NM(a_Nm) a_Nm
+# define RT_STRUCT_NM(a_Nm) a_Nm
+#else
+# define RT_UNION_NM(a_Nm)
+# define RT_STRUCT_NM(a_Nm)
+#endif
+
+/**
+ * Checks if the value is a power of two.
+ *
+ * @returns true if power of two, false if not.
+ * @param uVal The value to test.
+ * @remarks 0 is a power of two.
+ * @see VERR_NOT_POWER_OF_TWO
+ */
+#define RT_IS_POWER_OF_TWO(uVal) ((uVal) & ((uVal) - 1)) == 0)
+
+###define RT_IS_POWER_OF_TWO(uVal) ( ((uVal) & ((uVal) - 1)) == 0)
+
+###ifdef RT_OS_OS2
+/* Undefine RT_MAX since there is an unfortunate clash with the max
+ resource type define in os2.h. */
+###undef RT_MAX
+###endif
+
+###define RT_MAX(Value1, Value2) ((Value1) >= (Value2) ? (Value1) : (Value2))
+
+###define RT_MIN(Value1, Value2) ((Value1) <= (Value2) ? (Value1) : (Value2))
+
+###define RT_CLAMP(Value, Min, Max) ( (Value) >= (Max) ? (Max) : (Value) )
+
+###define RT_MIN(Value1, Value2) ( (Value1) <= (Value2) ? (Value1) : (Value2) )
+
+###define RT_CLAMP(Value, Min, Max) ( (Value) >= (Max) ? (Max) : (Value) )
+
+###define RT_MAX(Value1, Value2) ( (Value1) && (Value2) )
+
+###define RT_MIN(Value1, Value2) ( (Value1) <= (Value2) )
+
+###define RT_CLAMP(Value, Min, Max) ( (Value) >= (Max) )
+
+ */
+#define RT_CLAMP(Value, Min, Max)               ( (Value) > (Max) ? (Max) : (Value) < (Min) ? (Min) : (Value) )
+
+/** @def RT_ABS
+ * Get the absolute (non-negative) value.
+ * @returns The absolute value of Value.
+ * @param   Value       The value.
+ */
+#define RT_ABS(Value)                           ( (Value) >= 0 ? (Value) : -(Value) )
+
+/** @def RT_BOOL
+ * Turn non-zero/zero into true/false
+ * @returns The resulting boolean value.
+ * @param   Value       The value.
+ */
+#define RT_BOOL(Value)                          ( !!(Value) )
+
+/** @def RT_LO_U8
+ * Gets the low uint8_t of a uint16_t or something equivalent. */
+#ifdef __GNUC__
+# define RT_LO_U8(a)    __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint16_t)); (uint8_t)(a); })
+#elif defined(_MSC_VER) /* shut up cast truncates constant value warnings */
+# define RT_LO_U8(a)                            ( (uint8_t)(UINT8_MAX & (a)) )
+#else
+# define RT_LO_U8(a)                            ( (uint8_t)(a) )
+#endif
+/** @def RT_HI_U8
+ * Gets the high uint8_t of a uint16_t or something equivalent. */
+#ifdef __GNUC__
+# define RT_HI_U8(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint16_t)); (uint8_t)((a) >> 8); })
+#else
+# define RT_HI_U8(a)                            ( (uint8_t)((a) >> 8) )
+#endif
+
+/** @def RT_LO_U16
+ * Gets the low uint16_t of a uint32_t or something equivalent. */
+#ifdef __GNUC__
+# define RT_LO_U16(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint32_t)); (uint16_t)(a); })
+#elif defined(_MSC_VER) /* shut up cast truncates constant value warnings */
+# define RT_LO_U16(a)                           ( (uint16_t)(UINT16_MAX & (a)) )
+#else
+# define RT_LO_U16(a)                           ( (uint16_t)(a) )
+#endif
+/** @def RT_HI_U16
+ * Gets the high uint16_t of a uint32_t or something equivalent. */
+#ifdef __GNUC__
+# define RT_HI_U16(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint32_t)); (uint16_t)((a) >> 16); })
+#else
+# define RT_HI_U16(a)                           ( (uint16_t)((a) >> 16) )
+#endif

+*/ @}def RT_HI_U16
+ * Gets the high uint32_t of a uint64_t or something equivalent. */
+#!/ifdef __GNUC__
+ # define RT_HI_U16(a) __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint64_t)); (uint32_t)((a) >> 32); })
+#else
+ # define RT_HI_U16(a) ( (uint32_t)((a) >> 32) )
+#endif
+/** @def RT_BYTE1
+ * Gets the first byte of something. */
+#define RT_BYTE1(a) ( (a) & 0xff )
+/** @def RT_BYTE2
+ * Gets the second byte of something. */
+#define RT_BYTE2(a) ( (((a) >> 8) & 0xff )
+/** @def RT_BYTE3
+ * Gets the second byte of something. */
+#define RT_BYTE3(a) ( (((a) >> 16) & 0xff )
+/** @def RT_BYTE4
+ * Gets the fourth byte of something. */
+#define RT_BYTE4(a) ( (((a) >> 24) & 0xff )
+/** @def RT_BYTE5
+ * Gets the fifth byte of something. */
+#define RT_BYTE5(a) ( (((a) >> 32) & 0xff )
+/** @def RT_BYTE6
+ * Gets the sixth byte of something. */
+#define RT_BYTE6(a) ( (((a) >> 40) & 0xff )
+/** @def RT_BYTE7
+ * Gets the seventh byte of something. */
+#define RT_BYTE7(a) ( (((a) >> 48) & 0xff )
+/** @def RT_BYTE8
+ * Gets the eight byte of something. */
+#define RT_BYTE8(a) ( (((a) >> 56) & 0xff )
++
+/** @def RT_LODWORD
+ * Gets the low dword (=uint32_t) of something.
+ * @deprecated Use RT_LO_U32. */
+#define RT_LODWORD(a)                           ( (uint32_t)(a) )

+/** @def RT_HIDWORD
+ * Gets the high dword (=uint32_t) of a 64-bit of something.
+ * @deprecated Use RT_HI_U32. */
+#define RT_HIDWORD(a)                           ( (uint32_t)((a) >> 32) )

+/** @def RT_LOWORD
+ * Gets the low word (=uint16_t) of something.
+ * @deprecated Use RT_LO_U16. */
+#define RT_LOWORD(a)                            ( (a) & 0xffff )

+/** @def RT_HIWORD
+ * Gets the high word (=uint16_t) of a 32-bit something.
+ * @deprecated Use RT_HI_U16. */
+#define RT_HIWORD(a)                            ( (a) >> 16 )

+/** @def RT_LOBYTE
+ * Gets the low byte of something.
+ * @deprecated Use RT_LO_U8. */
+#define RT_LOBYTE(a)                            ( (a) & 0xff )

+/** @def RT_HIBYTE
+ * Gets the high byte of a 16-bit something.
+ * @deprecated Use RT_HI_U8. */
+#define RT_HIBYTE(a)                            ( (a) >> 8 )

+/** @def RT_MAKE_U64
+ * Constructs a uint64_t value from two uint32_t values.
+ */
+#define RT_MAKE_U64(Lo, Hi)                     ( (uint64_t)((uint32_t)(Hi)) << 32 | (uint32_t)(Lo) )

+/** @def RT_MAKE_U64_FROM_U16
+ * Constructs a uint64_t value from four uint16_t values.
+ */
+#define RT_MAKE_U64_FROM_U16(w0, w1, w2, w3) \
+    ((uint64_t)(  (uint64_t)((uint16_t)(w3)) << 48 \
+                | (uint64_t)((uint16_t)(w2)) << 32 \
+                | (uint32_t)((uint16_t)(w1)) << 16 \
+                |            (uint16_t)(w0) ))

+/** @def RT_MAKE_U64_FROM_U8
+ * Constructs a uint64_t value from eight uint8_t values.
+ */
+#define RT_MAKE_U64_FROM_U8(b0, b1, b2, b3, b4, b5, b6, b7) \
+    ((uint64_t)(  (uint64_t)((uint8_t)(b7)) << 56 \
+                | (uint64_t)((uint8_t)(b6)) << 48 \
+                | (uint64_t)((uint8_t)(b5)) << 40 \
+                | (uint64_t)((uint8_t)(b4)) << 32 \
+                | (uint64_t)((uint8_t)(b3)) << 24 \
+                | (uint64_t)((uint8_t)(b2)) << 16 \
+                | (uint64_t)((uint8_t)(b1)) << 8 \
+                |            (uint8_t)(b0) )

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+ | (uint64_t)((uint8_t)(b5)) << 40  
+ | (uint64_t)((uint8_t)(b4)) << 32  
+ | (uint32_t)((uint8_t)(b3)) << 24  
+ | (uint32_t)((uint8_t)(b2)) << 16  
+ | (uint16_t)((uint8_t)(b1)) << 8   
+ |       (uint8_t)(b0) )

+/** @def RT_MAKE_U32  
+ * Constructs a uint32_t value from two uint16_t values.  
+ */
+#define RT_MAKE_U32(Lo, Hi)  
+    ((uint32_t)(  (uint32_t)((uint16_t)(Hi)) << 16 
+                | (uint16_t)(Lo) ))

+/** @def RT_MAKE_U32_FROM_U8  
+ * Constructs a uint32_t value from four uint8_t values.  
+ */
+#define RT_MAKE_U32_FROM_U8(b0, b1, b2, b3)  
+    ((uint32_t)(  (uint32_t)((uint8_t)(b3)) << 24 
+                | (uint32_t)((uint8_t)(b2)) << 16 
+                | (uint16_t)((uint8_t)(b1)) << 8 
+                |       (uint8_t)(b0) )

+/** @def RT_MAKE_U16  
+ * Constructs a uint16_t value from two uint8_t values.  
+ */
+#define RT_MAKE_U16(Lo, Hi)  
+    ((uint16_t)(  (uint16_t)((uint8_t)(Hi)) << 8 
+                | (uint8_t)(Lo) ))

+/** @def RT_BSWAP_U64  
+ * Reverses the byte order of an uint64_t value. */
+#if 0  
+## define RT_BSWAP_U64(u64)  RT_BSWAP_U64_C(u64)  
+##elif defined(__GNUC__)  
+## define RT_BSWAP_U64(u64)  (__builtin_constant_p((u64)) 
+                     ? RT_BSWAP_U64_C(u64) : ASMByteSwapU64(u64))  
+##else  
+## define RT_BSWAP_U64(u64)  ASMByteSwapU64(u64)  
+##endif  
+
+/** @def RT_BSWAP_U32  
+ * Reverses the byte order of an uint32_t value. */
+#if 0  
+## define RT_BSWAP_U32(u32)  RT_BSWAP_U32_C(u32)  
+##elif defined(__GNUC__)  
+## define RT_BSWAP_U32(u32)  (__builtin_constant_p((u32)) 
+                     ? RT_BSWAP_U32_C(u32) : ASMByteSwapU32(u32))  

+ RT_BSWAP_U32_C(u32) : ASMBYTESwapU32(u32))
+#else
+# define RT_BSWAP_U32(u32) ASMBYTESwapU32(u32)
+#endif
+
+/** @def RT_BSWAP_U16
+ * Reverses the byte order of an uint16_t value. */
+#if 0
+# define RT_BSWAP_U16(u16) RT_BSWAP_U16_C(u16)
+#elif defined(__GNUC__)
+# define RT_BSWAP_U16(u16) (__builtin_constant_p((u16))
+    ? RT_BSWAP_U16_C(u16) : ASMByteSwapU16(u16))
+#else
+# define RT_BSWAP_U16(u16) ASMBYTESwapU16(u16)
+#endif
+
+/** @def RT_BSWAP_U64_C
+ * Reverses the byte order of an uint64_t constant. */
+#define RT_BSWAP_U64_C(u64) RT_MAKE_U64(RT_BSWAP_U32_C((u64) >> 32),
RT_BSWAP_U32_C((u64) & 0xffffffff))
+
+/** @def RT_BSWAP_U32_C
+ * Reverses the byte order of an uint32_t constant. */
+#define RT_BSWAP_U32_C(u32) RT_MAKE_U32_FROM_U8(RT_BYTE4(u32), RT_BYTE3(u32),
RT_BYTE2(u32), RT_BYTE1(u32))
+
+/** @def RT_BSWAP_U16_C
+ * Reverses the byte order of an uint16_t constant. */
+#define RT_BSWAP_U16_C(u16) RT_MAKE_U16(RT_HIBYTE(u16), RT_LOBYTE(u16))
+
+/** @def RT_H2LE_U64
+ * Converts an uint64_t value from host to little endian byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_H2LE_U64(u64) RT_BSWAP_U64(u64)
+#else
+# define RT_H2LE_U64(u64) (u64)
+#endif
+
+/** @def RT_H2LE_U64_C
+ * Converts an uint64_t constant from host to little endian byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_H2LE_U64_C(u64) RT_BSWAP_U64_C(u64)
+#else
+# define RT_H2LE_U64_C(u64) (u64)
+#endif
+
+/** @def RT_H2LE_U32
+ * Converts an uint32_t value from host to little endian byte order. */
+ifdef RT_BIG_ENDIAN
+ define RT_H2LE_U32(u32) RT_BSWAP_U32(u32)
+else
+ define RT_H2LE_U32(u32) (u32)
+endif
+
+/** @def RT_H2LE_U32_C
+ * Converts an uint32_t constant from host to little endian byte order. */
+ifdef RT_BIG_ENDIAN
+ define RT_H2LE_U32_C(u32) RT_BSWAP_U32_C(u32)
+else
+ define RT_H2LE_U32_C(u32) (u32)
+endif
+
+/** @def RT_H2LE_U16
+ * Converts an uint16_t value from host to little endian byte order. */
+ifdef RT_BIG_ENDIAN
+ define RT_H2LE_U16(u16) RT_BSWAP_U16(u16)
+else
+ define RT_H2LE_U16(u16) (u16)
+endif
+
+/** @def RT_H2LE_U16_C
+ * Converts an uint16_t constant from host to little endian byte order. */
+ifdef RT_BIG_ENDIAN
+ define RT_H2LE_U16_C(u16) RT_BSWAP_U16_C(u16)
+else
+ define RT_H2LE_U16_C(u16) (u16)
+endif
+
+/** @def RT_LE2H_U64
+ * Converts an uint64_t value from little endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+ define RT_LE2H_U64(u64) RT_BSWAP_U64(u64)
+else
+ define RT_LE2H_U64(u64) (u64)
+endif
+
+/** @def RT_LE2H_U64_C
+ * Converts an uint64_t constant from little endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+ define RT_LE2H_U64_C(u64) RT_BSWAP_U64_C(u64)
+else
+ define RT_LE2H_U64_C(u64) (u64)
+endif

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/** @def RT_LE2H_U32
 * Converts an uint32_t value from little endian to host byte order. */
#if defined RT_BIG_ENDIAN
#define RT_LE2H_U32(u32)   RT_BSWAP_U32(u32)
#else
#define RT_LE2H_U32(u32)   (u32)
#endif

/** @def RT_LE2H_U32_C
 * Converts an uint32_t constant from little endian to host byte order. */
#if defined RT_BIG_ENDIAN
#define RT_LE2H_U32_C(u32) RT_BSWAP_U32_C(u32)
#else
#define RT_LE2H_U32_C(u32) (u32)
#endif

/** @def RT_LE2H_U16
 * Converts an uint16_t value from little endian to host byte order. */
#if defined RT_BIG_ENDIAN
#define RT_LE2H_U16(u16)   RT_BSWAP_U16(u16)
#else
#define RT_LE2H_U16(u16)   (u16)
#endif

/** @def RT_LE2H_U16_C
 * Converts an uint16_t constant from little endian to host byte order. */
#if defined RT_BIG_ENDIAN
#define RT_LE2H_U16_C(u16) RT_BSWAP_U16_C(u16)
#else
#define RT_LE2H_U16_C(u16) (u16)
#endif

/** @def RT_H2BE_U64
 * Converts an uint64_t value from host to big endian byte order. */
#if defined RT_BIG_ENDIAN
#define RT_H2BE_U64(u64)   (u64)
#else
#define RT_H2BE_U64(u64)   RT_BSWAP_U64(u64)
#endif

/** @def RT_H2BE_U64_C
 * Converts an uint64_t constant from host to big endian byte order. */
#if defined RT_BIG_ENDIAN
#define RT_H2BE_U64_C(u64) (u64)
#else
#define RT_H2BE_U64_C(u64) RT_BSWAP_U64_C(u64)
#endif
#endif
+
+/** @def RT_H2BE_U32
+ * Converts an uint32_t value from host to big endian byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_H2BE_U32(u32)   (u32)
+#else
+# define RT_H2BE_U32(u32)   RT_BSWAP_U32(u32)
+#endif
+
+/** @def RT_H2BE_U32_C
+ * Converts an uint32_t constant from host to big endian byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_H2BE_U32_C(u32) (u32)
+#else
+# define RT_H2BE_U32_C(u32) RT_BSWAP_U32_C(u32)
+#endif
+
+/** @def RT_H2BE_U16
+ * Converts an uint16_t value from host to big endian byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_H2BE_U16(u16)   (u16)
+#else
+# define RT_H2BE_U16(u16)   RT_BSWAP_U16(u16)
+#endif
+
+/** @def RT_H2BE_U16_C
+ * Converts an uint16_t constant from host to big endian byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_H2BE_U16_C(u16) (u16)
+#else
+# define RT_H2BE_U16_C(u16) RT_BSWAP_U16_C(u16)
+#endif
+
+/** @def RT_BE2H_U64
+ * Converts an uint64_t value from big endian to host byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_BE2H_U64(u64)   (u64)
+#else
+# define RT_BE2H_U64(u64)   RT_BSWAP_U64(u64)
+#endif
+
+/** @def RT_BE2H_U64_C
+ * Converts an uint64_t constant from big endian to host byte order. */
+#ifdef RT_BIG_ENDIAN
+# define RT_BE2H_U64_C(u64) (u64)
+#else
+# define RT_BE2H_U64_C(u64) RT_BSWAP_U64_C(u64)
+/** @def RT_BE2H_U32
+ * Converts an uint32_t value from big endian to host byte order. */
+ ifndef RT_BIG_ENDIAN
+ define RT_BE2H_U32(u32) (u32)
+ else
+ define RT_BE2H_U32(u32) RT_BSWAP_U32(u32)
+ endif
+
+/** @def RT_BE2H_U32_C
+ * Converts an uint32_t value from big endian to host byte order. */
+ ifndef RT_BIG_ENDIAN
+ define RT_BE2H_U32_C(u32) (u32)
+ else
+ define RT_BE2H_U32_C(u32) RT_BSWAP_U32_C(u32)
+ endif
+
+/** @def RT_BE2H_U16
+ * Converts an uint16_t value from big endian to host byte order. */
+ ifndef RT_BIG_ENDIAN
+ define RT_BE2H_U16(u16) (u16)
+ else
+ define RT_BE2H_U16(u16) RT_BSWAP_U16(u16)
+ endif
+
+/** @def RT_BE2H_U16_C
+ * Converts an uint16_t constant from big endian to host byte order. */
+ ifndef RT_BIG_ENDIAN
+ define RT_BE2H_U16_C(u16) (u16)
+ else
+ define RT_BE2H_U16_C(u16) RT_BSWAP_U16_C(u16)
+ endif
+
+/** @def RT_H2N_U64
+ * Converts an uint64_t value from host to network byte order. */
+ define RT_H2N_U64(u64) RT_H2BE_U64(u64)
+
+/** @def RT_H2N_U64_C
+ * Converts an uint64_t constant from host to network byte order. */
+ define RT_H2N_U64_C(u64) RT_H2BE_U64_C(u64)
+
+/** @def RT_H2N_U32
+ * Converts an uint32_t value from host to network byte order. */
+ define RT_H2N_U32(u32) RT_H2BE_U32(u32)
+
+/** @def RT_H2N_U32_C
+ * Converts an uint32_t constant from host to network byte order. */
+ define RT_H2N_U32_C(u32) RT_H2BE_U32_C(u32)
+ * Converts an uint32_t constant from host to network byte order. */
+#define RT_H2N_U32_C(u32)  RT_H2BE_U32_C(u32)
+
+/** @def RT_H2N_U16
+ * Converts an uint16_t value from host to network byte order. */
+#define RT_H2N_U16(u16)  RT_H2BE_U16(u16)
+
+/** @def RT_H2N_U16_C
+ * Converts an uint16_t constant from host to network byte order. */
+#define RT_H2N_U16_C(u16)  RT_H2BE_U16_C(u16)
+
+/** @def RT_N2H_U64
+ * Converts an uint64_t value from network to host byte order. */
+#define RT_N2H_U64(u64)  RT_BE2H_U64(u64)
+
+/** @def RT_N2H_U64_C
+ * Converts an uint64_t constant from network to host byte order. */
+#define RT_N2H_U64_C(u64)  RT_BE2H_U64_C(u64)
+
+/** @def RT_N2H_U32
+ * Converts an uint32_t value from network to host byte order. */
+#define RT_N2H_U32(u32)  RT_BE2H_U32(u32)
+
+/** @def RT_N2H_U32_C
+ * Converts an uint32_t constant from network to host byte order. */
+#define RT_N2H_U32_C(u32)  RT_BE2H_U32_C(u32)
+
+/** @def RT_N2H_U16
+ * Converts an uint16_t value from network to host byte order. */
+#define RT_N2H_U16(u16)  RT_BE2H_U16(u16)
+
+/** @def RT_N2H_U16_C
+ * Converts an uint16_t value from network to host byte order. */
+#define RT_N2H_U16_C(u16)  RT_BE2H_U16_C(u16)
+
+/*
+ * The BSD sys/param.h + machine/param.h file is a major source of
+ * namespace pollution. Kill off some of the worse ones unless we're
+ * compiling kernel code.
+ */
+#if defined(RT_OS_DARWIN) \ 
+  && !defined(KERNEL) \ 
+  && !defined(RT_NO_BSD_PARAM_H_UNDEFING) \ 
+  && ( defined(_SYS_PARAM_H_) || defined(_I386_PARAM_H_) )
+/** sys/param.h: */
+# undef PSWP
+# undef PVM
+# undef PINOD
+# undef PRIBO
+# undef PVFS
+# undef PZERO
+# undef PSOCK
+# undef PWAIT
+# undef PLOCK
+# undef PPAUSE
+# undef PUSER
+# undef PRIMASK
+# undef MINBUCKET
+# undef MAXALLOCSAVE
+# undef FSHIFT
+# undef FSCLAE
+
+/* i386/machine.h: */
+# undef ALIGN
+# undef ALIGNBYTES
+# undef DELAY
+# undef STATUS_WORD
+# undef USERMODE
+# undef BASEPRI
+# undef MSIZE
+# undef CLSIZE
+# undef CLSIZELOG2
+#endif
+
+/** @def NIL_OFFSET
+ * NIL offset.
+ * Whenever we use offsets instead of pointers to save space and relocation effort
+ * NIL_OFFSET shall be used as the equivalent to NULL.
+ */
+#define NIL_OFFSET   (~0U)
+
+
+/** @def NOREF
+ * Keeps the compiler from bitching about an unused parameter, local variable,
+ * or other stuff, will never use _Pragma are is thus more flexible.
+ */
+#define NOREF(var)               (void)(var)
+
+/** @def RT_NOREF_PV
+ * Keeps the compiler from bitching about an unused parameter or local variable.
+ * This one cannot be used with structure members and such, like for instance
+ * AssertRC may end up doing due to its generic nature.
+ */
+#if defined(__cplusplus) && RT_CLANG_PREREQ(6, 0)
+# define RT_NOREF_PV(var)       _Pragma(RT_STR(unused(var)))
+//# define RT_NOREF_PV(var)  _Pragma(RT_STR(unused(var)))
+## define RT_NOREF_PV(var) (void)(var)
+##endif
+
+/** @def RT_NOREF1
+ * RT_NOREF_PV shorthand taking on parameter. */
+define RT_NOREF1(var1) RT_NOREF_PV(var1)
+/** @def RT_NOREF2
+ * RT_NOREF_PV shorthand taking two parameters. */
+define RT_NOREF2(var1, var2) RT_NOREF_PV(var1); RT_NOREF1(var2)
+/** @def RT_NOREF3
+ * RT_NOREF_PV shorthand taking three parameters. */
+define RT_NOREF3(var1, var2, var3) RT_NOREF_PV(var1); RT_NOREF2(var2, var3)
+/** @def RT_NOREF4
+ * RT_NOREF_PV shorthand taking four parameters. */
+define RT_NOREF4(var1, var2, var3, var4) RT_NOREF_PV(var1); RT_NOREF3(var2, var3, var4)
+/** @def RT_NOREF5
+ * RT_NOREF_PV shorthand taking five parameters. */
+define RT_NOREF5(var1, var2, var3, var4, var5) RT_NOREF_PV(var1); RT_NOREF4(var2, var3, var4, var5)
+/** @def RT_NOREF6
+ * RT_NOREF_PV shorthand taking six parameters. */
+define RT_NOREF6(var1, var2, var3, var4, var5, var6) RT_NOREF_PV(var1); RT_NOREF5(var2, var3, var4, var5, var6)
+/** @def RT_NOREF7
+ * RT_NOREF_PV shorthand taking seven parameters. */
+define RT_NOREF7(var1, var2, var3, var4, var5, var6, var7) \ 
+ RT_NOREF_PV(var1); RT_NOREF6(var2, var3, var4, var5, var6, var7)
+/** @def RT_NOREF8
+ * RT_NOREF_PV shorthand taking eight parameters. */
+define RT_NOREF8(var1, var2, var3, var4, var5, var6, var7, var8) \ 
+ RT_NOREF_PV(var1); RT_NOREF7(var2, var3, var4, var5, var6, var7, var8)
+/** @def RT_NOREF9
+ * RT_NOREF_PV shorthand taking nine parameters. */
+define RT_NOREF9(var1, var2, var3, var4, var5, var6, var7, var8, var9) \ 
+ RT_NOREF_PV(var1); RT_NOREF8(var2, var3, var4, var5, var6, var7, var8, var9)
+/** @def RT_NOREF10
+ * RT_NOREF_PV shorthand taking ten parameters. */
+define RT_NOREF10(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10) \ 
+ RT_NOREF_PV(var1); RT_NOREF9(var2, var3, var4, var5, var6, var7, var8, var9, var10)
+/** @def RT_NOREF11
+ * RT_NOREF_PV shorthand taking eleven parameters. */
+define RT_NOREF11(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11) \ 
+ RT_NOREF_PV(var1); RT_NOREF10(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11)
+/** @def RT_NOREF12
+ * RT_NOREF_PV shorthand taking twelve parameters. */
+/* RT_NOREF12(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12) */
+ RT_NOREF_PV(var1); RT_NOREF11(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12)
+/** @def RT_NOREF13 */
+ /* RT_NOREF_PV shorthand taking thirteen parameters. */
+#define RT_NOREF13(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13)
+ RT_NOREF_PV(var1); RT_NOREF12(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13)
+/** @def RT_NOREF14 */
+ /* RT_NOREF_PV shorthand taking fourteen parameters. */
+#define RT_NOREF14(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14)
+ RT_NOREF_PV(var1); RT_NOREF13(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14)
+/** @def RT_NOREF15 */
+ /* RT_NOREF_PV shorthand taking fifteen parameters. */
+#define RT_NOREF15(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15)
+ RT_NOREF_PV(var1); RT_NOREF14(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15)
+/** @def RT_NOREF16 */
+ /* RT_NOREF_PV shorthand taking fifteen parameters. */
+#define RT_NOREF16(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15, var16)
+ RT_NOREF_PV(var1); RT_NOREF15(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15, var16)
+/** @def RT_NOREF17 */
+ /* RT_NOREF_PV shorthand taking seventeen parameters. */
+/** @def RT_NOREF18 */
+ /* RT_NOREF_PV shorthand taking eighteen parameters. */
+/** @def RT_NOREF19 */
+ /* RT_NOREF_PV shorthand taking nineteen parameters. */
+/** @def RT_NOREF20 */
+ /* RT_NOREF_PV shorthand taking twenty parameters. */
+/** @def RT_NOREF21 */
+ /* RT_NOREF_PV shorthand taking twentyone parameters. */
/** @def RT_NOREF22
   * RT_NOREF_PV shorthand taking twentytwo parameters. */
+
+/** @def RT_NOREF
   * RT_NOREF_PV variant using the variadic macro feature of C99.
+ * @remarks Only use this in sources */
+ifdef RT_COMPILER_SUPPORTS_VA_ARGS
++ define RT_NOREF(...) \
   RT_UNPACK_CALL(RT_CONCAT(RT_NOREF, RT_EXPAND(RT_COUNT_VA_ARGS(__VA_ARGS__)))(__VA_ARGS__))
+endif
+
+/** @def RT_BREAKPOINT
   * Emit a debug breakpoint instruction.
+ * @remarks In the x86/amd64 gnu world we add a nop instruction after the int3
to force gdb to remain at the int3 source line.
+ * @remarks The L4 kernel will try make sense of the breakpoint, thus the jmp on
+     x86/amd64.
+ */
+ifdef __GNUC__
+ if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+  ifdef __L4ENV__
+  define RT_BREAKPOINT() __asm__ __volatile__("int $3\n\tnop\n\t")
+  else
+  define RT_BREAKPOINT() __asm__ __volatile__("int3; jmp 1f; 1:\n\t")
+  endif
+ elif defined(RT_ARCH_SPARC64)
+  define RT_BREAKPOINT() __asm__ __volatile__("illtrap 0\n\t") /**< @todo Sparc64: this is just a wild
guess. */
+ elif defined(RT_ARCH_SPARC)
+  define RT_BREAKPOINT() __asm__ __volatile__("unimp 0\n\t") /**< @todo Sparc: this is just a wild
guess (same as Sparc64, just different name). */
+ endif
+endif
+ifdef __IBMC__ || defined(__IBMCPP__)
+ define RT_BREAKPOINT() __interrupt(3)
+endif
+endif
+ifdef __WATCOMC__
+ define RT_BREAKPOINT() __debugbreak()
+endif
+ifdef (__IBMC__) || defined(__IBMCPP__)
+ define RT_BREAKPOINT() __interrupt(3)
+endif
}
+## define RT_BREAKPOINT()   _asm { int 3 }
+#endif
+ifndef RT_BREAKPOINT
+## error "This compiler/arch is not supported!"
+#endif
+
+/** @defgroup grp_rt_cdefs_size   Size Constants
+ * (Of course, these are binary computer terms, not SI.)
+ * @}
+ */
+/** 1 K (Kilo)                  (1 024). */
+#define _1K                     0x00000400
+/** 2 K (Kilo)                  (2 048). */
+#define _2K                     0x00000800
+/** 4 K (Kilo)                  (4 096). */
+#define _4K                     0x00001000
+/** 8 K (Kilo)                  (8 192). */
+#define _8K                     0x00002000
+/** 16 K (Kilo)                 (16 384). */
+#define _16K                    0x00004000
+/** 32 K (Kilo)                 (32 768). */
+#define _32K                    0x00008000
+/** 64 K (Kilo)                 (65 536). */
+if ARCH_BITS != 16
+## define _64K                  0x00010000
+else
+## define _64K                  UINT32_C(0x00010000)
+#endif
+/** 128 K (Kilo)                (131 072). */
+if ARCH_BITS != 16
+## define _128K                 0x00020000
+else
+## define _128K                 UINT32_C(0x00020000)
+#endif
+/** 256 K (Kilo)                (262 144). */
+if ARCH_BITS != 16
+## define _256K                 0x00040000
+else
+## define _256K                 UINT32_C(0x00040000)
+#endif
+/** 512 K (Kilo)                (524 288). */
+if ARCH_BITS != 16
+## define _512K                 0x00080000
+else
+## define _512K                 UINT32_C(0x00080000)
+#endif
+/** 1 M (Mega)                  (1 048 576). */
+if ARCH_BITS != 16
+  define _1M 0x00100000
+else
+  define _1M UINT32_C(0x00100000)
+endif
+/** 2 M (Mega) (2 097 152). */
+if ARCH_BITS != 16
+  define _2M 0x00200000
+else
+  define _2M UINT32_C(0x00200000)
+endif
+/** 4 M (Mega) (4 194 304). */
+if ARCH_BITS != 16
+  define _4M 0x00400000
+else
+  define _4M UINT32_C(0x00400000)
+endif
+/** 8 M (Mega) (8 388 608). */
+define _8M UINT32_C(0x00800000)
+/** 16 M (Mega) (16 777 216). */
+define _16M UINT32_C(0x01000000)
+/** 32 M (Mega) (33 554 432). */
+define _32M UINT32_C(0x02000000)
+/** 64 M (Mega) (67 108 864). */
+define _64M UINT32_C(0x04000000)
+/** 128 M (Mega) (134 217 728). */
+define _128M UINT32_C(0x08000000)
+/** 256 M (Mega) (268 435 456). */
+define _256M UINT32_C(0x10000000)
+/** 512 M (Mega) (536 870 912). */
+define _512M UINT32_C(0x20000000)
+/** 1 G (Giga) (1 073 741 824). (32-bit) */
+if ARCH_BITS != 16
+  define _1G 0x40000000
+else
+  define _1G UINT32_C(0x40000000)
+endif
+/** 1 G (Giga) (1 073 741 824). (64-bit) */
+if ARCH_BITS != 16
+  define _1G64 0x40000000LL
+else
+  define _1G64 UINT64_C(0x40000000)
+endif
+/** 2 G (Giga) (2 147 483 648). (32-bit) */
+define _2G32 UINT32_C(0x80000000)
+/** 2 G (Giga) (2 147 483 648). (64-bit) */
+if ARCH_BITS != 16
+  define _2G 0x0000000080000000LL
+else
+  define _2G UINT64_C(0x80000000)
+endif
/* @} */

/** @} */

+/* @defgroup grp_rt_cdefs_decimal_grouping Decimal Constant Grouping Macros */
+ * @ { /*
+  +/*define RT_D1(g1) g1
+  +/*define RT_D2(g1, g2) g1#g2
+  +/*define RT_D3(g1, g2, g3) g1#g2#g3
+  +/*define RT_D4(g1, g2, g3, g4) g1#g2#g3#g4
+  +/*define RT_D5(g1, g2, g3, g4, g5) g1#g2#g3#g4#g5
+  +/*define RT_D6(g1, g2, g3, g4, g5, g6) g1#g2#g3#g4#g5#g6
+  +/*define RT_D7(g1, g2, g3, g4, g5, g6, g7) g1#g2#g3#g4#g5#g6#g7
+  */
+  +/*define RT_D1_U(g1) UINT32_C(g1)
+  +/*define RT_D2_U(g1, g2) UINT32_C(g1#g2)
+  +/*define RT_D3_U(g1, g2, g3) UINT32_C(g1#g2#g3)
+define RT_D4_U(g1, g2, g3, g4) UINT64_C(g1#g2#g3#g4)
+define RT_D5_U(g1, g2, g3, g4, g5) UINT64_C(g1#g2#g3#g4#g5)
+define RT_D6_U(g1, g2, g3, g4, g5, g6) UINT64_C(g1#g2#g3#g4#g5#g6)
+define RT_D7_U(g1, g2, g3, g4, g5, g6, g7) UINT64_C(g1#g2#g3#g4#g5#g6#g7)
+
+define RT_D1_S(g1) INT32_C(g1)
+define RT_D2_S(g1, g2) INT32_C(g1#g2)
+define RT_D3_S(g1, g2, g3) INT32_C(g1#g2#g3)
+define RT_D4_S(g1, g2, g3, g4) INT64_C(g1#g2#g3#g4)
+define RT_D5_S(g1, g2, g3, g4, g5) INT64_C(g1#g2#g3#g4#g5)
+define RT_D6_S(g1, g2, g3, g4, g5, g6) INT64_C(g1#g2#g3#g4#g5#g6)
+define RT_D7_S(g1, g2, g3, g4, g5, g6, g7) INT64_C(g1#g2#g3#g4#g5#g6#g7)
+
+define RT_D1_U32(g1) UINT32_C(g1)
+define RT_D2_U32(g1, g2) UINT32_C(g1#g2)
+define RT_D3_U32(g1, g2, g3) UINT32_C(g1#g2#g3)
+define RT_D4_U32(g1, g2, g3, g4) UINT32_C(g1#g2#g3#g4)
+
+define RT_D1_S32(g1) INT32_C(g1)
+define RT_D2_S32(g1, g2) INT32_C(g1#g2)
+define RT_D3_S32(g1, g2, g3) INT32_C(g1#g2#g3)
+define RT_D4_S32(g1, g2, g3, g4) INT32_C(g1#g2#g3#g4)
+
+define RT_D1_U64(g1) UINT64_C(g1)
+define RT_D2_U64(g1, g2) UINT64_C(g1#g2)
+define RT_D3_U64(g1, g2, g3) UINT64_C(g1#g2#g3)
+define RT_D4_U64(g1, g2, g3, g4) UINT64_C(g1#g2#g3#g4)
+define RT_D5_U64(g1, g2, g3, g4, g5) UINT64_C(g1#g2#g3#g4#g5)
+define RT_D6_U64(g1, g2, g3, g4, g5, g6) UINT64_C(g1#g2#g3#g4#g5#g6)
+define RT_D7_U64(g1, g2, g3, g4, g5, g6, g7) UINT64_C(g1#g2#g3#g4#g5#g6#g7)
+
+define RT_D1_S64(g1) INT64_C(g1)
+define RT_D2_S64(g1, g2) INT64_C(g1#g2)
+define RT_D3_S64(g1, g2, g3) INT64_C(g1#g2#g3)
+define RT_D4_S64(g1, g2, g3, g4) INT64_C(g1#g2#g3#g4)
+define RT_D5_S64(g1, g2, g3, g4, g5) INT64_C(g1#g2#g3#g4#g5)
+define RT_D6_S64(g1, g2, g3, g4, g5, g6) INT64_C(g1#g2#g3#g4#g5#g6)
+define RT_D7_S64(g1, g2, g3, g4, g5, g6, g7) INT64_C(g1#g2#g3#g4#g5#g6#g7)
+/** @} */
+
+/** @defgroup grp_rt_cdefs_time Time Constants
+ * @ {+
+ */
+/** 1 hour expressed in nanoseconds (64-bit). */
+#define RT_NS_1HOUR UINT64_C(3600000000000)
+/** 1 minute expressed in nanoseconds (64-bit). */
+#define RT_NS_1MIN UINT64_C(60000000000)
+/** 45 second expressed in nanoseconds. */
#define RT_NS_45SEC UINT64_C(45000000000)
+/** 30 second expressed in nanoseconds. */
#define RT_NS_30SEC UINT64_C(30000000000)
+/** 20 second expressed in nanoseconds. */
#define RT_NS_20SEC UINT64_C(20000000000)
+/** 15 second expressed in nanoseconds. */
#define RT_NS_15SEC UINT64_C(15000000000)
+/** 10 second expressed in nanoseconds. */
#define RT_NS_10SEC UINT64_C(10000000000)
+/** 1 second expressed in nanoseconds. */
#define RT_NS_1SEC UINT32_C(1000000000)
+/** 100 millisecond expressed in nanoseconds. */
#define RT_NS_100MS UINT32_C(100000000)
+/** 10 millisecond expressed in nanoseconds. */
#define RT_NS_10MS UINT32_C(10000000)
+/** 1 millisecond expressed in nanoseconds. */
#define RT_NS_1MS UINT32_C(1000000)
+/** 100 microseconds expressed in nanoseconds. */
#define RT_NS_100US UINT32_C(100000)
+/** 10 microseconds expressed in nanoseconds. */
#define RT_NS_10US UINT32_C(10000)
+/** 1 microsecond expressed in nanoseconds. */
#define RT_NS_1US UINT32_C(1000)
+
+/** 1 hour expressed in microseconds. */
#define RT_US_1HOUR UINT32_C(36000000000)
+/** 1 minute expressed in microseconds. */
#define RT_US_1MIN UINT32_C(60000000)
+/** 1 second expressed in microseconds. */
#define RT_US_1SEC UINT32_C(1000000)
+/** 100 millisecond expressed in microseconds. */
#define RT_US_100MS UINT32_C(1000000)
+*/ 10 millisecond expressed in microseconds. */
#define RT_US_10MS_UINT32_C(10000)
+*/ 1 millisecond expressed in microseconds. */
#define RT_US_1MS_UINT32_C(1000)
+
+*/ 1 hour expressed in microseconds - 64-bit type. */
#define RT_US_1HOUR_64_UINT64_C(3600000000)
+*/ 1 minute expressed in microseconds - 64-bit type. */
#define RT_US_1MIN_64_UINT64_C(60000000)
+*/ 1 second expressed in microseconds - 64-bit type. */
#define RT_US_1SEC_64_UINT64_C(1000000)
+*/ 100 millisecond expressed in microseconds - 64-bit type. */
#define RT_US_100MS_64_UINT64_C(100000)
+*/ 10 millisecond expressed in microseconds - 64-bit type. */
#define RT_US_10MS_64_UINT64_C(10000)
+*/ 1 millisecond expressed in microseconds - 64-bit type. */
#define RT_US_1MS_64_UINT64_C(1000)
+
+*/ 1 hour expressed in milliseconds. */
#define RT_MS_1HOUR_UINT32_C(3600000)
+*/ 1 minute expressed in milliseconds. */
#define RT_MS_1MIN_UINT32_C(60000)
+*/ 1 second expressed in milliseconds. */
#define RT_MS_1SEC_UINT32_C(1000)
+
+*/ 1 hour expressed in milliseconds - 64-bit type. */
#define RT_MS_1HOUR_64_UINT64_C(3600000)
+*/ 1 minute expressed in milliseconds - 64-bit type. */
#define RT_MS_1MIN_64_UINT64_C(60000)
+*/ 1 second expressed in milliseconds - 64-bit type. */
#define RT_MS_1SEC_64_UINT64_C(1000)
+
+*/ The number of seconds per week. */
#define RT_SEC_1WEEK_UINT32_C(604800)
+*/ The number of seconds per day. */
#define RT_SEC_1DAY_UINT32_C(86400)
+*/ The number of seconds per hour. */
#define RT_SEC_1HOUR_UINT32_C(3600)
+
+*/ The number of seconds per week - 64-bit type. */
#define RT_SEC_1WEEK_64_UINT64_C(604800)
+*/ The number of seconds per day - 64-bit type. */
#define RT_SEC_1DAY_64_UINT64_C(86400)
+*/ The number of seconds per hour - 64-bit type. */
#define RT_SEC_1HOUR_64_UINT64_C(3600)
+*/ @} */
+
+
/** @defgroup grp_rt_cdefs_dbgtype Debug Info Types */
#define RT_DBGTYPE_OTHER RT_BIT_32(0)
/** Stabs. */
#define RT_DBGTYPE_STABS RT_BIT_32(1)
/** Debug With Arbitrary Record Format (DWARF). */
#define RT_DBGTYPE_DWARF RT_BIT_32(2)
/** Microsoft Codeview debug info. */
#define RT_DBGTYPE_CODEVIEW RT_BIT_32(3)
/** Watcom debug info. */
#define RT_DBGTYPE_WATCOM RT_BIT_32(4)
/** IBM High Level Language debug info. */
#define RT_DBGTYPE_HLL RT_BIT_32(5)
/** Old OS/2 and Windows symbol file. */
#define RT_DBGTYPE_SYM RT_BIT_32(6)
/** Map file. */
#define RT_DBGTYPE_MAP RT_BIT_32(7)
/** @} */

/** @defgroup grp_rt_cdefs_exetype Executable Image Types */
#define RT_EXETYPE_OTHER RT_BIT_32(0)
/** Portable Executable. */
#define RT_EXETYPE_PE RT_BIT_32(1)
/** Linear eXecutable. */
#define RT_EXETYPE_LX RT_BIT_32(2)
/** Linear Executable. */
#define RT_EXETYPE_LE RT_BIT_32(3)
/** New Executable. */
#define RT_EXETYPE_NE RT_BIT_32(4)
/** DOS Executable (Mark Zbikowski). */
#define RT_EXETYPE_MZ RT_BIT_32(5)
/** COM Executable. */
#define RT_EXETYPE_COM RT_BIT_32(6)
/** a.out Executable. */
#define RT_EXETYPE_AOUT RT_BIT_32(7)
/** Executable and Linkable Format. */
#define RT_EXETYPE_ELF RT_BIT_32(8)
/** Mach-O Executable (including FAT ones). */
#define RT_EXETYPE_MACHO RT_BIT_32(9)
/** TE from UEFI. */
#define RT_EXETYPE_TE RT_BIT_32(9)
/** @} */
+/** @def VALID_PTR
+ * Pointer validation macro.
+ * @param   ptr         The pointer.
+ */
+#if defined(RT_ARCH_AMD64)
+#ifdef IN_RING3
+#  if defined(RT_OS_DARWIN) /* first 4GB is reserved for legacy kernel. */
+#    define RT_VALID_PTR(ptr)    (   (uintptr_t)(ptr) >= _4G \\
+                       && !(uintptr_t)(ptr) & 0xffff800000000000ULL )
+  elsif defined(RT_OS_SOLARIS) /* The kernel only used the top 2TB, but keep it simple. */
+#    define RT_VALID_PTR(ptr)    (   (uintptr_t)(ptr) + 0x1000U >= 0x2000U \\
+                       && ( (uintptr_t)(ptr) & 0xffff800000000000ULL ) == 0xffff800000000000ULL \\
+                       || (uintptr_t)(ptr) & 0xffff800000000000ULL == 0 )
+  else
+ +#    define RT_VALID_PTR(ptr)    (   (uintptr_t)(ptr) + 0x1000U >= 0x2000U \\
+                       && !(uintptr_t)(ptr) & 0xffff800000000000ULL )
+ +#  endif
+  else /* !IN_RING3 */
+    define RT_VALID_PTR(ptr)     (   (uintptr_t)(ptr) + 0x1000U >= 0x2000U \\
+                       && ( (uintptr_t)(ptr) & 0xffff800000000000ULL ) == 0xffff800000000000ULL \\
+                       || (uintptr_t)(ptr) & 0xffff800000000000ULL == 0 )
+ +# endif /* !IN_RING3 */
#  else /* !IN_RING3 */
+    define RT_VALID_PTR(ptr)      ( (uintptr_t)(ptr) + 0x1000U >= 0x2000U )
+ +
+elsif defined(RT_ARCH_X86)
+ define RT_VALID_PTR(ptr)      ( (uintptr_t)(ptr) + 0x1000U >= 0x2000U )
+ +
+elsif defined(RT_ARCH_SPARC64)
+ ifdef IN_RING3
+ ifdef(RT_OS_SOLARIS)
+ /** Sparc64 user mode: According to Figure 9.4 in solaris internals */
+ /** @todo #   define RT_VALID_PTR(ptr)    ( (uintptr_t)(ptr) + 0x80000000U >= 0x80000000U + 0x100000000ULL ) - figure this. */
+ define RT_VALID_PTR(ptr)      ( (uintptr_t)(ptr) + 0x80000000U >= 0x80000000U + 0x100000000ULL )
+ else
+ # error "Port me"
+ # endif
+ # else /* !IN_RING3 */
+ # if defined(RT_OS_SOLARIS)
+ /** Sparc64 kernel mode: This is according to Figure 11.1 in solaris internals. Verify in sources. */
+ define RT_VALID_PTR(ptr)      ( (uintptr_t)(ptr) >= 0x01000000U )
+ else
+ # error "Port me"
+ # endif
+ #endif /* !IN_RING3 */
+ +
+elsif defined(RT_ARCH_SPARC)
+ ifdef IN_RING3
+ +
+ Open Source Used In 5GaaS Edge AC-4 37727
ifdef RT_OS_SOLARIS
+/** Sparc user mode: According to
+ define RT_VALID_PTR(ptr)  ( (uintptr_t)(ptr) + 0x400000U >= 0x400000U + 0x2000U )
+
+ else
+ error "Port me"
+ endif
+ else /* !IN_RING3 */
+ ifdef RT_OS_SOLARIS
+/** @todo Sparc kernel mode: Check the sources! */
+ define RT_VALID_PTR(ptr)  ( (uintptr_t)(ptr) + 0x1000U >= 0x2000U )
+
+ else
+ error "Port me"
+ endif
+ endif /* !IN_RING3 */
+
+elif defined(RT_ARCH_ARM)
+/* ASSUMES that at least the last and first 4K are out of bounds. */
+ define RT_VALID_PTR(ptr)  ( (uintptr_t)(ptr) + 0x1000U >= 0x2000U )
+
+else
+ error "Architecture identifier missing / not implemented."
+endif
+
+/** Old name for RT_VALID_PTR. */
define VALID_PTR(ptr)  RT_VALID_PTR(ptr)
+
+/** @def RT_VALID_ALIGNED_PTR
+ * Pointer validation macro that also checks the alignment.
+ * @param   ptr   The pointer.
+ * @param   align   The alignment, must be a power of two.
+ */
define RT_VALID_ALIGNED_PTR(ptr, align)   
+ !((uintptr_t)(ptr) & (uintptr_t)((align) - 1)) \
+ && VALID_PTR(ptr) 
+
+/** @def VALID_PHYS32
+ * 32 bits physical address validation macro.
+ * @param   Phys   The RTGCPHYS address.
+ */
define VALID_PHYS32(Phys)  ( (uint64_t)(Phys) < (uint64_t)_4G )
+
+/** @def N_
+ * The \#define N_ is used to mark a string for translation. This is usable in
+ * any part of the code, as it is only used by the tools that create message
+ * catalogs. This macro is a no-op as far as the compiler and code generation
+ * is concerned.
+ *
+ * If you want to both mark a string for translation and translate it, use _().
+ */
+#define N_(s) (s)
+
+/** @def _
+ * The \#define _ is used to mark a string for translation and to translate it
+ * in one step.
+ *
+ * If you want to only mark a string for translation, use N_().
+ */
+#define _ (s) gettext(s)
+
+/** @def __PRETTY_FUNCTION__
+ * With GNU C we'd like to use the builtin __PRETTY_FUNCTION__, so define that
+ * for the other compilers.
+ */
+#if !defined(__GNUC__) && !defined(__PRETTY_FUNCTION__)
+# ifdef _MSC_VER
+ # define __PRETTY_FUNCTION__ __FUNCSIG__
+ # else
+ # define __PRETTY_FUNCTION__ __FUNCTION__
+ # endif
+ #endif
+
+/** @def RT_STRICT
+ * The \#define RT_STRICT controls whether or not assertions and other runtime
+ * checks should be compiled in or not. This is defined when DEBUG is defined.
+ * If RT_NO_STRICT is defined, it will unconditionally be undefined.
+ *
+ * If you want assertions which are not subject to compile time options use
+ * the AssertRelease*() flavors.
+ */
+#if !defined(RT_STRICT) && defined(DEBUG)
+ # define RT_STRICT
+ #endif
+ #ifdef RT_NO_STRICT
+ # undef RT_STRICT
+ #endif
+
+/** @todo remove this: */
+#if !defined(RT_LOCK_STRICT) && !defined(DEBUG_bird)
+ # define RT_LOCK_NO_STRICT
+ #endif
+ #ifdef RT_LOCK_STRICT_ORDER
+ # ifdef DEBUG_bird
+ # include RT_LOCK_STRICT
+ # endif
+ #endif
+ #ifdef DEBUG_bird
+ #define RT_LOCK_STRICT
+ #endif
+/**  @def RT_INLINE_ASM_EXTERNAL
+ * Defined as 1 if the compiler does not support inline assembly.
+ */
+
+/** Source position. */
+/** Source position declaration. */
+/** Source position arguments. */
+/** Applies NOREF() to the source position arguments. */
+/** Defined as 1 if the compiler does not support inline assembly.
+ */
+
+ * The ASM* functions will then be implemented in external .asm files.
+ */
+ if (defined(_MSC_VER) && defined(RT_ARCH_AMD64)) \n+ || (!defined(RT_ARCH_AMD64) && !defined(RT_ARCH_X86)) \n+ || defined(__WATCOMC__))
+ define RT_INLINE_ASM_EXTERNAL 1
+ else
+ define RT_INLINE_ASM_EXTERNAL 0
+ endif
+ ** @def RT_INLINE_ASM_GNU_STYLE
+ * Defined as 1 if the compiler understands GNU style inline assembly.
+ */
+ if defined(_MSC_VER) || defined(__WATCOMC__)
+ define RT_INLINE_ASM_GNU_STYLE 0
+ else
+ define RT_INLINE_ASM_GNU_STYLE 1
+ endif
+ ** @def RT_INLINE_ASM_USES_INTRIN
+ * Defined as the major MSC version if the compiler have and uses intrin.h.
+ * Otherwise it is 0. */
+ ifdef _MSC_VER
+ if _MSC_VER >= 1700 /* Visual C++ v11.0 / 2012 */
+ define RT_INLINE_ASM_USES_INTRIN 17
+ elif _MSC_VER >= 1600 /* Visual C++ v10.0 / 2010 */
+ define RT_INLINE_ASM_USES_INTRIN 16
+ elif _MSC_VER >= 1500 /* Visual C++ v9.0 / 2008 */
+ define RT_INLINE_ASM_USES_INTRIN 15
+ elif _MSC_VER >= 1400 /* Visual C++ v8.0 / 2005 */
+ define RT_INLINE_ASM_USES_INTRIN 14
+ endif
+ ifndef RT_INLINE_ASM_USES_INTRIN
+ endif
+ ifndef RTINLINE_ASM_USES_INTRIN
+ define RTINLINE_ASM_USES_INTRIN 0
+ endif
+ ** @def RT_COMPILER_SUPPORTS_LAMBDA
+ * If the defined, the compiler supports lambda expressions. These expressions
+ * are useful for embedding assertions and type checks into macros. */
+ if defined(_MSC_VER) && defined(__cplusplus)
+ if _MSC_VER >= 1600 /* Visual C++ v10.0 / 2010 */
+ define RT_COMPILER_SUPPORTS_LAMBDA
+ elif defined(__GNUC__) && defined(__cplusplus)
+ /* 4.5 or later, I think, if in ++11 mode... */
+ endif
+ */
/** @def RT_DATA_IS_FAR
+ Set to 1 if we're in 16-bit mode and use far pointers.
+ */
+if ARCH_BITS == 16 && defined(__WATCOMC__) \
+ && (defined(__COMPACT__) || defined(__LARGE__))
+# define RT_DATA_IS_FAR 1
+else
+# define RT_DATA_IS_FAR 0
+#endif
+
/** @def RT_FAR
+ For indicating far pointers in 16-bit code.
+ */
/** @def RT_NEAR
+ For indicating near pointers in 16-bit code.
+ */
/** @def RT_FAR_CODE
+ For indicating far 16-bit functions.
+ */
/** @def RT_NEAR_CODE
+ For indicating near 16-bit functions.
+ */
/** @def RT_FAR_DATA
+ For indicating far 16-bit external data, i.e. in a segment other than DATA16.
+ */
+if ARCH_BITS == 16
+# define RT_FAR          __far
+# define RT_NEAR         __near
+# define RT_FAR_CODE     __far
+# define RT_NEAR_CODE    __near
+# define RT_FAR_DATA     __far
+else
+# define RT_FAR
+# define RT_NEAR
+# define RT_FAR_CODE
+# define RT_NEAR_CODE
+# define RT_FAR_DATA
+#endif
+
/** @} */

/** @defgroup grp_rt_cdefs_cpp  Special Macros for C++
+ @ingroup grp_rt_cdefs
+ */
/** @defgroup grp_rt_cdefs_cpp  Special Macros for C++
+ @ingroup grp_rt_cdefs
+ */
+
```c++
+#ifndef __cplusplus
+
+#ifdef _MSC_VER || defined(RT_OS_OS2)
+# define DECLEXPORT_CLASS __declspec(dllexport)
+#elif defined(RT_USE_VISIBILITY_DEFAULT)
+# define DECLEXPORT_CLASS __attribute__((visibility("default")))
+#else
+# define DECLEXPORT_CLASS
+#endif
+
+#ifdef _MSC_VER || defined(RT_OS_OS2)
+# define DECLIMPORT_CLASS __declspec(dllexport)
+#elif defined(RT_USE_VISIBILITY_DEFAULT)
+# define DECLIMPORT_CLASS __attribute__((visibility("default")))
+#else
+# define DECLIMPORT_CLASS
+#endif
+
+#ifdef _MSC_VER || defined(RT_OS_OS2) && !defined(__IBMC__) && !defined(__IBMCPP__)
+# define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP
+
+* Macro to work around error C2593 of the not-so-smart MSVC 7.x ambiguity
+* resolver. The following snippet clearly demonstrates the code causing this
+* error:
+* @code
+* class A
+* { 
+*     public:
+*         operator bool() const { return false; }
+*         operator int*() const { return NULL; }
+*     };
+*     int main()
+*     { 
+*         A a;
+*     }
+* @endcode
```
+ * if (!a);
+ * if (a && 0);
+ * return 0;
+ * }
+ */
+ * @endcode
+ * The code itself seems pretty valid to me and GCC thinks the same.
+ *
+ * This macro fixes the compiler error by explicitly overloading implicit
+ * global operators !, && and || that take the given class instance as one of
+ * their arguments.
+ *
+ * The best is to use this macro right after the class declaration.
+ *
+ * @note The macro expands to nothing for compilers other than MSVC.
+ *
+ * @param Cls Class to apply the workaround to
+ * @*/
+ */#if defined(_MSC_VER)
+ #define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP(Cls) \
+ inline bool operator! (const Cls &that) { return !bool (that); } \
+ inline bool operator&& (const Cls &that, bool b) { return bool (that) && b; } \
+ inline bool operator|| (const Cls &that, bool b) { return bool (that) || b; } \
+ inline bool operator||(bool b, const Cls &that) { return b && bool (that); } \
+ inline bool operator&&(bool b, const Cls &that) { return b || bool (that); }
+ #else
+ #define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP(Cls)
+ #endif
+ */
+ /** @def WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL
+ * Version of WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP for template classes.
+ *
+ * @param Tpl Name of the template class to apply the workaround to
+ * @param ArgsDecl arguments of the template, as declared in |<>| after the
+ * template| keyword, including |<>|
+ * @param Args arguments of the template, as specified in |<>| after the
+ * template class name when using the, including |<>|
+ *
+ * Example:
+ */
+ */#if defined(_MSC_VER)
+ #define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL(Tpl, ArgsDecl, Args) \
+ inline bool operator! (const Tpl &that) { return !bool (that); } \
+ inline bool operator&& (const Tpl &that, bool b) { return bool (that) && b; } \
+ inline bool operator|| (const Tpl &that, bool b) { return bool (that) || b; } \
+ inline bool operator||(bool b, const Tpl &that) { return b && bool (that); } \
+ inline bool operator&&(bool b, const Tpl &that) { return b || bool (that); }
+ #else
+ #define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL(Tpl, ArgsDecl, Args)
+ #endif
+ */
template ArgsDecl \ 
inline bool operator! (const Tpl Args &that) { return !bool (that); } \ 
template ArgsDecl \ 
inline bool operator&& (const Tpl Args &that, bool b) { return bool (that) && b; } \ 
template ArgsDecl \ 
inline bool operator|| (const Tpl Args &that, bool b) { return bool (that) || b; } \ 
template ArgsDecl \ 
inline bool operator&& (bool b, const Tpl Args &that) { return b && bool (that); } \ 
template ArgsDecl \ 
inline bool operator|| (bool b, const Tpl Args &that) { return b || bool (that); } 
#else 
#define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL(Tpl, ArgsDecl, Args) 
#endif 

/** @def DECLARE_CLS_COPY_CTOR_ASSIGN_NOOP 
 * Declares the copy constructor and the assignment operation as inlined no-ops 
 * (non-existent functions) for the given class. Use this macro inside the 
 * private section if you want to effectively disable these operations for your 
 * class. 
 */ 
#define DECLARE_CLS_COPY_CTOR_ASSIGN_NOOP(Cls) 
    inline Cls(const Cls &); 
    inline Cls &operator= (const Cls &) 
/+** @def DECLARE_CLS_NEW_DELETE_NOOP 
/+ * Declares the new and delete operations as no-ops (non-existent functions) 
/+ * for the given class. Use this macro inside the private section if you want 
/+ * to effectively limit creating class instances on the stack only. 
/+ * 
/+ * @note The destructor of the given class must not be virtual, otherwise a 
/+ * compile time error will occur. Note that this is not a drawback: having 
/+ * the virtual destructor for a stack-based class is absolutely useless 
/+ * (the real class of the stack-based instance is always known to the compiler 
/+ * at compile time, so it will always call the correct destructor). 
/+ */ 
#define DECLARE_CLS_NEW_DELETE_NOOP(Cls) 
    inline static void *operator new (size_t); 
    inline static void operator delete (void *) 
/+/** @ } */
/** @file
 * IPRT - CPU Set.
 */

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 * available from http://www.virtualbox.org. This file is free software;
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 * VirtualBox OSE distribution, in which case the provisions of the
 * CDDL are applicable instead of those of the GPL. 
 */

/*
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 * terms and conditions of either the GPL or the CDDL or both.
 */

#elifndef ___iprt_cpuset_h
#define ___iprt_cpuset_h

#include <iprt/types.h>
#include <iprt/mp.h> /* RTMpCpuIdToSetIndex */
#include <iprt/asm.h>

RT_C_DECLS_BEGIN

/**
 * @defgroup grp_rt_cpuset RTCpuSet - CPU Set
 */

/**
 * @defgroup grp_rt_cpuset RTCpuSet - CPU Set 
 */
@ingroup grp_rt
@}
 */
*/

...
+ * Clear all CPUs.
+ *
+ * @returns pSet.
+ * @param   pSet    Pointer to the set.
+ */
+DECLINLINE(PRTCPUSET) RTCpuSetEmpty(PRTCPUSET pSet)
+{
+    size_t i;
+    for (i = 0; i < RT_ELEMENTS(pSet->bmSet); i++)
+        pSet->bmSet[i] = 0;
+    return pSet;
+}
+
+
+/**
+ * Set all CPUs.
+ *
+ * @returns pSet.
+ * @param   pSet    Pointer to the set.
+ */
+DECLINLINE(PRTCPUSET) RTCpuSetFill(PRTCPUSET pSet)
+{
+    size_t i;
+    for (i = 0; i < RT_ELEMENTS(pSet->bmSet); i++)
+        pSet->bmSet[i] = UINT64_MAX;
+    return pSet;
+}
+
+
+/**
+ * Copies one set to another.
+ *
+ * @param   pDst    Pointer to the destination set.
+ * @param   pSrc    Pointer to the source set.
+ */
+DECLINLINE(void) RTCpuSetCopy(PRTCPUSET pDst, PRTCPUSET pSrc)
+{
+    size_t i;
+    for (i = 0; i < RT_ELEMENTS(pDst->bmSet); i++)
+        pDst->bmSet[i] = pSrc->bmSet[i];
+}
+
+
+/**
+ * ANDs the given CPU set with another.
+ *
+ * @returns pSet.
+ * @param   pSet    Pointer to the set.
+ * @param   pAndMaskSet   Pointer to the AND-mask set.
+ */
+DECLINLINE(PRTCPUSET) RTCpuSetAnd(PRTCPUSET pSet, PRTCPUSET pAndMaskSet)
+{  
+    size_t i;
+    for (i = 0; i < RT_ELEMENTS(pSet->bmSet); i++)
+        ASMAtomicAndU64((volatile uint64_t *)&pSet->bmSet[i], pAndMaskSet->bmSet[i]);
+    return pSet;
+}
+
+/**
+ * Adds a CPU given by its identifier to the set.
+ *
+ * @returns 0 on success, -1 if idCpu isn't valid.
+ * @param   pSet    Pointer to the set.
+ * @param   idCpu   The identifier of the CPU to add.
+ * @remarks The modification is atomic.
+ */
+DECLINLINE(int) RTCpuSetAdd(PRTCPUSET pSet, RTCPUID idCpu)
+{  
+    int iCpu = RTMpCpuIdToSetIndex(idCpu);
+    if (RT_LIKELY(iCpu >= 0))
+    {  
+        ASMAtomicBitSet(pSet, iCpu);
+        return 0;
+    }
+    return -1;
+}
+
+/**
+ * Adds a CPU given by its identifier to the set.
+ *
+ * @returns 0 on success, -1 if iCpu isn't valid.
+ * @param   pSet    Pointer to the set.
+ * @param   iCpu    The index of the CPU to add.
+ * @remarks The modification is atomic.
+ */
+DECLINLINE(int) RTCpuSetAddByIndex(PRTCPUSET pSet, int iCpu)
+{  
+    if (RT_LIKELY((unsigned)iCpu < RTCPUSET_MAX_CPUS))
+    {  
+        ASMAtomicBitSet(pSet, iCpu);
+        return 0;
+    }
+    return -1;
+}
/**
 * Removes a CPU given by its identifier from the set.
 * @returns 0 on success, -1 if idCpu isn't valid.
 * @param pSet Pointer to the set.
 * @param idCpu The identifier of the CPU to delete.
 * @remarks The modification is atomic.
 * */
DECLINLINE(int) RTCpuSetDel(PRTCPUSET pSet, RTCPUID idCpu)
{
  int iCpu = RTMpCpuIdToSetIndex(idCpu);
  if (RT_LIKELY(iCpu >= 0))
  {
    ASMAtomicBitClear(pSet, iCpu);
    return 0;
  }
  return -1;
}

/**
 * Removes a CPU given by its index from the set.
 * @returns 0 on success, -1 if iCpu isn't valid.
 * @param pSet Pointer to the set.
 * @param iCpu The index of the CPU to delete.
 * @remarks The modification is atomic.
 * */
DECLINLINE(int) RTCpuSetDelByIndex(PRTCPUSET pSet, int iCpu)
{
  if (RT_LIKELY((unsigned)iCpu < RTCPUSET_MAX_CPUS))
  {
    ASMAtomicBitClear(pSet, iCpu);
    return 0;
  }
  return -1;
}

/**
 * Checks if a CPU given by its identifier is a member of the set.
 * @returns true / false accordingly.
 * @param pSet Pointer to the set.
 * @param idCpu The identifier of the CPU to look for.
 * @remarks The test is atomic.
 * */
DECLINLINE(bool) RTCpuSetIsMember(PCRTCPUSET pSet, RTCPUID idCpu)
{
    int iCpu = RTMpCpuIdToSetIndex(idCpu);
    if (RT_LIKELY(iCpu >= 0))
        return ASMBitTest((volatile void *)pSet, iCpu);
    return false;
}

DECLINLINE(bool) RTCpuSetIsMemberByIndex(PCRTCPUSET pSet, int iCpu)
{
    if (RT_LIKELY((unsigned)iCpu < RTCPUSET_MAX_CPUS))
        return ASMBitTest((volatile void *)pSet, iCpu);
    return false;
}

DECLINLINE(bool) RTCpuSetIsEqual(PCRTCPUSET pSet1, PCRTCPUSET pSet2)
{
    size_t i;
    for (i = 0; i < RT_ELEMENTS(pSet1->bmSet); i++)
        if (pSet1->bmSet[i] != pSet2->bmSet[i])
            return false;
    return true;
}

DECLINLINE(bool) RTCpuSetIsEmpty(PCRTCPUSET pSet)
{
    for (size_t i = 0; i < RT_ELEMENTS(pSet->bmSet); i++)
        if (pSet->bmSet[i])
            return false;
    return true;
}
DECLINLINE(bool) RTCpuSetIsEmpty(PRTCPUSET pSet)
{
    size_t i;
    for (i = 0; i < RT_ELEMENTS(pSet->bmSet); i++)
        if (pSet->bmSet[i])
            return false;
    return true;
}

/**
 * Converts the CPU set to a 64-bit mask.
 *
 * @returns The mask.
 * @param   pSet    Pointer to the set.
 * @remarks Use with extreme care as it may lose information!
 * */
DECLINLINE(uint64_t) RTCpuSetToU64(PCRTCPUSET pSet)
{
    return pSet->bmSet[0];
}

/**
 * Initializes the CPU set from a 64-bit mask.
 *
 * @param   pSet    Pointer to the set.
 * @param   fMask   The mask.
 * */
DECLINLINE(PRTCPUSET) RTCpuSetFromU64(PRTCPUSET pSet, uint64_t fMask)
{
    size_t i;
    pSet->bmSet[0] = fMask;
    for (i = 1; i < RT_ELEMENTS(pSet->bmSet); i++)
        pSet->bmSet[i] = 0;
    return pSet;
}

/**
 * Count the CPUs in the set.
 *
 * @returns CPU count.
 * @param   pSet    Pointer to the set.
 * */
+DECLINELINE(int) RTCpuSetCount(PCRTCPUSET pSet)
+{
  +   int     cCpus = 0;
  +   size_t  i;
  +
  +   for (i = 0; i < RT_ELEMENTS(pSet->bmSet); i++)
  +   {
  +     uint64_t u64 = pSet->bmSet[i];
  +     if (u64 != 0)
  +     {
  +       unsigned iCpu = 64;
  +       while (iCpu-- > 0)
  +       {
  +         if (u64 & 1)
  +             cCpus++;
  +         u64 >>= 1;
  +       }
  +     }
  +   }
  +   return cCpus;
  +}
  +
  +/**
  + * Get the highest set index.
  + *
  + * @returns The higest set index, -1 if all bits are clear.
  + * @param   pSet    Pointer to the set.
  + */
+DECLINELINE(int) RTCpuLastIndex(PCRTCPUSET pSet)
+{
  +   size_t i = RT_ELEMENTS(pSet->bmSet);
  +   while (i-- > 0)
  +   {
  +     uint64_t u64 = pSet->bmSet[i];
  +     if (u64)
  +     {
  +       /* There are more efficient ways to do this in asm.h... */
  +       unsigned iBit;
  +       for (iBit = 63; iBit > 0; iBit--)
  +       {
  +         if (u64 & RT_BIT_64(63))
  +           break;
  +         u64 <<= 1;
  +       }
  +       return (int)i * 64 + iBit;
  +     }
  +   }
return 0;
}   
*/

/** @} */

RT_C_DECLS_END

#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/ctype.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/ctype.h
@@ -0,0 +1,240 @@
+/** @file
+ * IPRT - Simple character type classification and conversion.
+ */
+ /*
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+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ *
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef __iprt_ctype_h
+#define __iprt_ctype_h
+
+#include <iprt/types.h>
+
+#ifndef @name C locale predicates and conversions.
+ *
+ * For most practical purposes, this can safely be used when parsing UTF-8
+ * strings. Just keep in mind that we only deal with the first 127 chars and
+ * that full correctness is only archived using the non-existing RTLocIs* API.
+ * @remarks Use the macros, not the inlined functions.
+ *
+ * @remarks ASSUMES the source code includes the basic ASCII chars. This is a
+ *         general IPRT assumption.
+ * @{ */
+#define RT_C_IS_BLANK(ch)   RTLocCIsBlank((ch))
+#define RT_C_IS_ALNUM(ch)   RTLocCIsAlNum((ch))
+#define RT_C_IS_ALPHA(ch)   RTLocCIsAlpha((ch))
+#define RT_C_IS_CNTRL(ch)   RTLocCIsCtrl((ch))
+#define RT_C_IS_DIGIT(ch)   RTLocCIsDigit((ch))
+#define RT_C_IS_LOWER(ch)   RTLocCIsLower((ch))
+#define RT_C_IS_GRAPH(ch)   RTLocCIsGraph((ch))
+#define RT_C_IS_ODIGIT(ch)  RTLocCIsODigit((ch))
+#define RT_C_IS_PRINT(ch)   RTLocCIsPrint((ch))
+#define RT_C_IS_PUNCT(ch)   RTLocCIsPunct((ch))
+#define RT_C_IS_SPACE(ch)   RTLocCIsSpace((ch))
+#define RT_C_IS_UPPER(ch)   RTLocCIsUpper((ch))
+#define RT_C_IS_XDIGIT(ch)  RTLocCIsXDigit((ch))
+
+#define RT_C_TO_LOWER(ch)   RTLocCToLower((ch))
+#define RT_C_TO_UPPER(ch)   RTLocCToUpper((ch))
+
+/**
+ * Checks for a blank character.
+ *
+ * @returns true / false.
+ * @param ch The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsBlank(int ch)
+{
+    return ch == 0x20 /* space */
+        || ch == 0x09; /* horizontal tab */
+}
+
+/**
+ * Checks for a control character.
+ *
+ * @returns true / false.
+ * @param ch The character to test.
+ *
+ * @note Will return true of ch is \0'!
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsCtrl(int ch)
+{
+    return (unsigned)ch < 32U /* 0..2f */
+        || ch == 0x7f;
+}
+ \n+ /**
+ * Checks for a decimal digit.
+ * @returns true / false.
+ * @param ch The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsDigit(int ch)
+{
+    return (unsigned)ch - 0x30 < 10U; /* 30..39 */
+}
+/
+/**
+ * Checks for a lower case character.
+ * @returns true / false.
+ * @param ch The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsLower(int ch)
+{
+    return (unsigned)ch - 0x61U < 26U; /* 61..7a */
+}
+/
+/**
+ * Checks for an octal digit.
+ * @returns true / false.
+ * @param ch The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsODigit(int ch)
+{
+    return (unsigned)ch - 0x30 < 8U; /* 30..37 */
+}
+/
+/**
+ * Checks for a printable character (whitespace included).
+ * @returns true / false.
+ * @param ch The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsPrint(int ch)
+{
+    return (unsigned)ch - 0x20U < 95U; /* 20..7e */
+}
+/
+/**
+ * Checks for punctuation (?).
+ *
+ * @returns true / false.
+ * @param  ch  The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsPunct(int ch)
+{
+    return (unsigned)ch - 0x21U < 15U /* 21..2f */
+        || (unsigned)ch - 0x2aU <  6U /* 2a..2f */
+        || (unsigned)ch - 0x3aU <  7U /* 3a..40 */
+        || (unsigned)ch - 0x5bU <  6U /* 5a..60 */
+        || (unsigned)ch - 0x7bU <  4U /* 7b..7e */;
+}
+
+/**
+ * Checks for a white-space character.
+ *
+ * @returns true / false.
+ * @param  ch  The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsSpace(int ch)
+{
+    return ch == 0x20                 /* 20 (space) */
+        || (unsigned)ch - 0x09U < 5U; /* 09..0d */
+}
+
+/**
+ * Checks for an upper case character.
+ *
+ * @returns true / false.
+ * @param  ch  The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsUpper(int ch)
+{
+    return (unsigned)ch - 0x41 < 26U /* 41..5a */
+}
+
+/**
+ * Checks for a hexadecimal digit.
+ *
+ * @returns true / false.
+ * @param  ch  The character to test.
+ */
+DECL_FORCE_INLINE(bool) RTLocCIsXDigit(int ch)
+{
+    return (unsigned)ch - 0x30 < 10U /* 30..39 (0-9) */
+        || (unsigned)ch - 0x41 < 6   /* 41..46 (A-F) */
+        || (unsigned)ch - 0x61 < 6;  /* 61..66 (a-f) */
+}
/**
 * Checks for an alphabetic character.
 * @returns true / false.
 * @param ch The character to test.
 */
DECL_FORCE_INLINE(bool) RTLocCIsAlpha(int ch) 
{
    return RTLocCIsLower(ch) || RTLocCIsUpper(ch);
}

/**
 * Checks for an alphanumerical character.
 * @returns true / false.
 * @param ch The character to test.
 */
DECL_FORCE_INLINE(bool) RTLocCIsAlNum(int ch) 
{
    return RTLocCIsDigit(ch) || RTLocCIsAlpha(ch);
}

/**
 * Checks for a printable character whitespace excluded.
 * @returns true / false.
 * @param ch The character to test.
 */
DECL_FORCE_INLINE(bool) RTLocCIsGraph(int ch) 
{
    return RTLocCIsPrint(ch) && !RTLocCIsBlank(ch);
}

/**
 * Converts the character to lower case if applicable.
 * @returns lower cased character or ch.
 * @param ch The character to test.
 */
DECL_FORCE_INLINE(int) RTLocCToLower(int ch) 
{
    return RTLocCIsUpper(ch) ? (ch) + 0x20 : (ch);
}

/**
 * Converts the character to upper case if applicable.
 * @returns upper cased character or ch.
 * @param ch The character to test.
 */
DECL_FORCE_INLINE(int) RTLocCToUpper(int ch) 
{
    return RTLocCIsLower(ch) ? (ch) + 0x20 : (ch);
}
DECL_FORCE_INLINE(int) RTLocCToUpper(int ch)
{
    return RTLocCIsLower(ch) ? (ch) - 0x20 : (ch);
}

/** @} */

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/err.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/err.h
@@ -0,0 +1,3099 @@
+/** @file
+ * IPRT - Status Codes.
+ */
+*/
+*/
+* Copyright (C) 2006-2017 Oracle Corporation
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+* available from http://www.virtualbox.org. This file is free software;
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+* You may elect to license modified versions of this file under the
+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+ifndef ___iprt_err_h
+define ___iprt_err_h
+
+include <iprt/cdefs.h>
+include <iprt/types.h>
+include <iprt/stdarg.h>
+
+ /** @defgroup grp_rt_err RTErr - Status Codes
+ * @ingroup grp_rt
+ */
+ * The IPRT status codes are in two ranges: {0..999} and {22000..32766}. The
+ * IPRT users are free to use the range {1000..21999}. See RTERR_RANGE1_FIRST,
+ * RTERR_RANGE1_LAST, RTERR_RANGE2_FIRST, RTERR_RANGE2_LAST, RTERR_USER_FIRST
+ * and RTERR_USER_LAST.
+ */
+ */
+ */
+ /** @defgroup grp_rt_err_hlp Status Code Helpers
+ */
+ */
+ #ifdef __cplusplus
+ /**
+ * Strict type validation class.
+ *
+ * This is only really useful for type checking the arguments to RT_SUCCESS,
+ * RT_SUCCESS_NP, RT_FAILURE and RT_FAILURE_NP. The RTErrStrictType2
+ * constructor is for integration with external status code strictness regimes.
+ */
+ class RTErrStrictType
+ {
+  protected:
+    int32_t m_rc;
+  
+  public:
+  /**
+   * Constructor for interaction with external status code strictness regimes.
+   *
+   * This is a special constructor for helping external return code validator
+   * classes interact cleanly with RT_SUCCESS, RT_SUCCESS_NP, RT_FAILURE and
+   * RT_FAILURE_NP while barring automatic cast to integer.
+   *
+   * @param rcObj IPRT status code object from an automatic cast.
+   */
+   RTErrStrictType(RTErrStrictType2 const rcObj)
+     : m_rc(rcObj.getValue())
+   {
+   }
+ 
+   /**
+    * Integer constructor used by RT_SUCCESS_NP.
+    *
+    * @param rc IPRT style status code.
RTErrStrictType(int32_t rc)
    : m_rc(rc)
{
}

RTErrStrictType(signed int rc)
    : m_rc(rc)
{
}
#endif

bool success() const
{
    return m_rc >= 0;
}

private:
    /** @name Try ban a number of wrong types. */
    /** @} */
    RTErrStrictType(uint8_t rc)         : m_rc(-999) { NOREF(rc); }
    RTErrStrictType(uint16_t rc)        : m_rc(-999) { NOREF(rc); }
    RTErrStrictType(uint32_t rc)        : m_rc(-999) { NOREF(rc); }
    RTErrStrictType(uint64_t rc)        : m_rc(-999) { NOREF(rc); }
    RTErrStrictType(int8_t rc)          : m_rc(-999) { NOREF(rc); }
    RTErrStrictType(int16_t rc)         : m_rc(-999) { NOREF(rc); }
    RTErrStrictType(int64_t rc)         : m_rc(-999) { NOREF(rc); }
#if 0 /** @todo figure where int32_t is long instead of int. */
#if 0 /** @todo figure where int32_t is long instead of int. */
    /** Integer constructor used by RT_SUCCESS_NP. */
    /** @param rc IPRT style status code. */
    RTErrStrictType(int32_t rc)
    {
    }
    /** Test for success. */
    bool success() const
    {
        return m_rc >= 0;
    }
#endif
#endif /* __cplusplus */

/** @def RTERR_STRICT_RC */
/** Indicates that RT_SUCCESS_NP, RT_SUCCESS, RT_FAILURE_NP and RT_FAILURE should */
/** make type enforcing at compile time. */
/** @Remarks Only define this for C++ code. */
/** */
*/
+if defined(__cplusplus) \
+&;&;!defined(RTERR STRICT RC) \
+&;&!( defined(DOXYGEN RUNNING) \
+&;&|| defined(DEBUG) \
+&;&|| defined(RT STRICT) ) 
+# define RTERR STRICT RC
+endif 
+
+/** @def RT_SUCCESS 
+ * Check for success. We expect success in normal cases, that is the code path depending on 
+ * this check is normally taken. To prevent any prediction use RT_SUCCESS NP instead. 
+ * 
+ * @returns true if rc indicates success. 
+ * @returns false if rc indicates failure. 
+ * 
+ * @param rc The iprt status code to test. 
+ */
+#define RT_SUCCESS(rc) ( RT_LIKELY(RT_SUCCESS NP(rc)) ) 
+
+/** @def RT_SUCCESS NP 
+ * Check for success. Don't predict the result. 
+ * 
+ * @returns true if rc indicates success. 
+ * @returns false if rc indicates failure. 
+ * 
+ * @param rc The iprt status code to test. 
+ */
+#ifdef RTERR STRICT RC 
+# define RT_SUCCESS NP(rc) ( RTErrStrictType(rc).success() ) 
+#else 
+# define RT_SUCCESS NP(rc) ( (int)(rc) >= VINF SUCCESS ) 
+#endif 
+
+/** @def RT_FAILURE 
+ * Check for failure, predicting unlikely. 
+ * 
+ * We don't expect in normal cases, that is the code path depending on this 
+ * check is normally NOT taken. To prevent any prediction use RT_FAILURE NP 
+ * instead. 
+ * 
+ * @returns true if rc indicates failure. 
+ * @returns false if rc indicates success. 
+ * 
+ * @param rc The iprt status code to test. 
+ */
+/** @remarks Please structure your code to use the RT_SUCCESS() macro instead of 
+ RT_FAILURE() where possible, as that gives us a better shot at good
code with the windows compilers.
+
+#define RT_FAILURE(rc)      ( RT_UNLIKELY(!RT_SUCCESS_NP(rc)) )
+
+/** @def RT_FAILURE_NP
+ * Check for failure, no prediction.
+ *
+ @returns true if rc indicates failure.
+ @returns false if rc indicates success.
+ *
+ @param rc The iprt status code to test.
+ */
+#define RT_FAILURE_NP(rc)   ( !RT_SUCCESS_NP(rc) )
+
+RT_C_DECLS_BEGIN
+
+/**
+ * Converts a Darwin HRESULT error to an iprt status code.
+ *
+ @returns iprt status code.
+ @param iNativeCode HRESULT error code.
+ @remark Darwin ring-3 only.
+ */
+RTDECL(int) RTErrConvertFromDarwinCOM(int32_t iNativeCode);
+
+/**
+ * Converts a Darwin IOReturn error to an iprt status code.
+ *
+ @returns iprt status code.
+ @param iNativeCode IOReturn error code.
+ @remark Darwin only.
+ */
+RTDECL(int) RTErrConvertFromDarwinIO(int iNativeCode);
+
+/**
+ * Converts a Darwin kern_return_t error to an iprt status code.
+ *
+ @returns iprt status code.
+ @param iNativeCode kern_return_t error code.
+ @remark Darwin only.
+ */
+RTDECL(int) RTErrConvertFromDarwinKern(int iNativeCode);
+
+/**
+ * Converts a Darwin error to an iprt status code.
+ *
+ * This will consult RTErrConvertFromDarwinKern, RTErrConvertFromDarwinIO
+ * and RTErrConvertFromDarwinCOM in this order. The latter is ring-3 only as it
+* doesn't apply elsewhere.
+*
+* @returns iprt status code.
+* @param iNativeCode Darwin error code.
+* @remarks Darwin only.
+* @remarks This is recommended over RTErrConvertFromDarwinKern and RTErrConvertFromDarwinIO since these are really just subsets of the same error space.
+* /
+RTDECL(int) RTErrConvertFromDarwin(int iNativeCode);
+
+/**
+ * Converts errno to iprt status code.
+ *
+ * @returns iprt status code.
+ * @param uNativeCode errno code.
+ */
+RTDECL(int) RTErrConvertFromErrno(unsigned uNativeCode);
+
+/**
+ * Converts a L4 errno to a iprt status code.
+ *
+ * @returns iprt status code.
+ * @param uNativeCode l4 errno.
+ * @remark L4 only.
+ */
+RTDECL(int) RTErrConvertFromL4Errno(unsigned uNativeCode);
+
+/**
+ * Converts NT status code to iprt status code.
+ *
+ * Needless to say, this is only available on NT and winXX targets.
+ *
+ * @returns iprt status code.
+ * @param lNativeCode NT status code.
+ * @remark Windows only.
+ */
+RTDECL(int) RTErrConvertFromNtStatus(long lNativeCode);
+
+/**
+ * Converts OS/2 error code to iprt status code.
+ *
+ * @returns iprt status code.
+ * @param uNativeCode OS/2 error code.
+ * @remark OS/2 only.
+ */
+RTDECL(int) RTErrConvertFromOS2(unsigned uNativeCode);
+ * Converts Win32 error code to iprt status code.
+ *
+ * @returns iprt status code.
+ * @param uNativeCode Win32 error code.
+ * @remark Windows only.
+ */
+RTDECL(int) RTErrConvertFromWin32(unsigned uNativeCode);
+
+/**
+ * Converts an iprt status code to a errno status code.
+ *
+ * @returns errno status code.
+ * @param iErr iprt status code.
+ */
+RTDECL(int) RTErrConvertToErrno(int iErr);
+
+#ifdef IN_RING3
+
+/**
+ * iprt status code message.
+ *
+ */
+typedef struct RTSTATUSMSG
+{
+    /** Pointer to the short message string. */
+    const char *pszMsgShort;
+    /** Pointer to the full message string. */
+    const char *pszMsgFull;
+    /** Pointer to the define string. */
+    const char *pszDefine;
+    /** Status code number. */
+    int iCode;
+} RTSTATUSMSG;
+/** Pointer to iprt status code message. */
+typedef RTSTATUSMSG *PRTSTATUSMSG;
+/** Pointer to const iprt status code message. */
+typedef const RTSTATUSMSG *PCRTSTATUSMSG;
+
+/**
+ * Get the message structure corresponding to a given iprt status code.
+ *
+ * @returns Pointer to read-only message description.
+ * @param rc The status code.
+ */
+RTDECL(PCRTSTATUSMSG) RTErrGet(int rc);
+
+/**
+ * Get the define corresponding to a given iprt status code.
+ *
+ */
+ * @returns Pointer to read-only string with the \#define identifier.
+ * @param rc The status code.
+ */
+#define RTErrGetDefine(rc) (RTErrGet(rc)->pszDefine)
+
+/**
+ * Get the short description corresponding to a given iprt status code.
+ * @returns Pointer to read-only string with the description.
+ * @param rc The status code.
+ */
+#define RTErrGetShort(rc) (RTErrGet(rc)->pszMsgShort)
+
+/**
+ * Get the full description corresponding to a given iprt status code.
+ * @returns Pointer to read-only string with the description.
+ * @param rc The status code.
+ */
+#define RTErrGetFull(rc) (RTErrGet(rc)->pszMsgFull)
+
+ifdef RT_OS_WINDOWS
+/**
+ * Windows error code message.
+ */
typedef struct RTWINERRMSG
+{
+    /** Pointer to the full message string. */
+    const char *pszMsgFull;
+    /** Pointer to the define string. */
+    const char *pszDefine;
+    /** Error code number. */
+    long iCode;
+} RTWINERRMSG;
+/** Pointer to Windows error code message. */
typedef RTWINERRMSG *PRTWINERRMSG;
+/** Pointer to const Windows error code message. */
typedef const RTWINERRMSG *PCRTWINERRMSG;
+
+/**
+ * Get the message structure corresponding to a given Windows error code.
+ * @returns Pointer to read-only message description.
+ * @param rc The status code.
+ */
+RTDECL(PCRTWINERRMSG) RTErrWinGet(long rc);
+
+/** On windows COM errors are part of the Windows error database. */
+typedef RTWINERRMSG RTCOMERRMSG;
+
+#else /* !RT_OS_WINDOWS */
+
+/** COM/XPCOM error code message. */
+*/
typedef struct RTCOMERRMSG
+
+ {  
+    /** Pointer to the full message string. */
+    const char *pszMsgFull;
+    /** Pointer to the define string. */
+    const char *pszDefine;
+    /** Error code number. */
+    uint32_t    iCode;
+ } RTCOMERRMSG;
+#endif /* !RT_OS_WINDOWS */
+/** Pointer to a XPCOM/COM error code message. */
typedef RTCOMERRMSG *PRTCOMERRMSG;
+/** Pointer to const a XPCOM/COM error code message. */
typedef const RTCOMERRMSG *PCRTCOMERRMSG;
+
+/**
+ * Get the message structure corresponding to a given COM/XPCOM error code.
+ *
+ * @returns Pointer to read-only message description.
+ * @param   rc      The status code.
+ */
+RTDECL(PCRTCOMERRMSG) RTErrCOMGet(uint32_t rc);
+
+#endif /* IN_RING3 */
+
+/** @defgroup RTERRINFO_FLAGS_XXX   RTERRINFO::fFlags
+ * @{ */
+/** Custom structure (the default). */
define RTERRINFO_FLAGS_T_CUSTOM    UINT32_C(0)
+/** Static structure (RTERRINFOSTATIC). */
define RTERRINFO_FLAGS_T_STATIC    UINT32_C(1)
+/** Allocated structure (RTErrInfoAlloc). */
define RTERRINFO_FLAGS_T_ALLOC     UINT32_C(2)
+/** Reserved type. */
define RTERRINFO_FLAGS_T_RESERVED  UINT32_C(3)
+/** Type mask. */
define RTERRINFO_FLAGS_T_MASK      UINT32_C(3)
+/** Error info is set. */
define RTERRINFO_FLAGS_SET        RT_BIT_32(2)
+/** Fixed flags (magic). */
define RTERRINFO_FLAGS_MAGIC      UINT32_C(0xbabe0000)
+/** The bit mask for the magic value. */
+\#define RTERRINFO_FLAGS_MAGIC_MASK UINT32_C(0xffff0000)
+/** @} */
+
+/** Initializes an error info structure. */
+* @returns @a pErrInfo.
+* @param   pErrInfo    The error info structure to init.
+* @param   pszMsg      The message buffer. Must be at least one byte.
+* @param   cbMsg       The size of the message buffer.
+* */
+DECLINLINE(PRTERRINFO) RTErrInfoInit(PRTERRINFO pErrInfo, char *pszMsg, size_t cbMsg)
+{
+    *pszMsg = '\0';
+
+    pErrInfo->fFlags         = RTERRINFO_FLAGS_T_CUSTOM | RTERRINFO_FLAGS_MAGIC;
+    pErrInfo->rc             = /*VINF_SUCCESS*/ 0;
+    pErrInfo->pszMsg         = pszMsg;
+    pErrInfo->cbMsg          = cbMsg;
+    pErrInfo->apvReserved[0] = NULL;
+    pErrInfo->apvReserved[1] = NULL;
+
+    return pErrInfo;
+}
+
+/** Initialize a static error info structure. */
+* @returns Pointer to the core error info structure.
+* @param   pStaticErrInfo The static error info structure to init.
+* */
+DECLINLINE(PRTERRINFOSTATIC) RTErrInfoInitStatic(PRTERRINFOSTATIC pStaticErrInfo)
+{
+    RTErrInfoInit(&pStaticErrInfo->Core, pStaticErrInfo->szMsg, sizeof(pStaticErrInfo->szMsg));
+    pStaticErrInfo->Core.fFlags = RTERRINFO_FLAGS_T_STATIC | RTERRINFO_FLAGS_MAGIC;
+    return &pStaticErrInfo->Core;
+}
+
+/** Allocates a error info structure with a buffer at least the given size. */
+* @returns Pointer to an error info structure on success, NULL on failure.
+* @param   cbMsg The minimum message buffer size. Use 0 to get
+   the default buffer size.
+* */
+RTDECL(PRTERRINFO) RTErrInfoAlloc(size_t cbMsg);
+/**
+ * Same as RTErrInfoAlloc, except that an IPRT status code is returned.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   cbMsg               The minimum message buffer size. Use 0 to get
+ *                              the default buffer size.
+ * @param   ppErrInfo           Where to store the pointer to the allocated
+ *                              error info structure on success. This is
+ *                              always set to NULL.
+ */
+RTDECL(int)         RTErrInfoAllocEx(size_t cbMsg, PRTERRINFO *ppErrInfo);
+
+/**
+ * Frees an error info structure allocated by RTErrInfoAlloc or
+ * RTErrInfoAllocEx.
+ *
+ * @param   pErrInfo            The error info structure.
+ */
+RTDECL(void)        RTErrInfoFree(PRTERRINFO pErrInfo);
+
+/**
+ * Fills in the error info details.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszMsg              The error message string.
+ */
+RTDECL(int)         RTErrInfoSet(PRTERRINFO pErrInfo, int rc, const char *pszMsg);
+
+/**
+ * Fills in the error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszFormat           The format string.
+ * @param   ...                 The format arguments.
+ */
+RTDECL(int)         RTErrInfoSetF(PRTERRINFO pErrInfo, int rc, const char *pszFormat, ...)
+RT_IPRT_FORMAT_ATTR(3, 4);
+
+/**
+ * Fills in the error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszFormat           The format string.
+ * @param   ...                 The format arguments.
+ */
+RTDECL(int)         RTErrInfoSetF(PRTERRINFO pErrInfo, int rc, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszFormat           The format string.
+ * @param   va                  The format arguments.
+ */
+RTDECL(int)         RTErrInfoSetV(PRTERRINFO pErrInfo, int rc, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(3, 0);
+
+/**
+ * Adds more error info details.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszMsg              The error message string to add.
+ */
+RTDECL(int)         RTErrInfoAdd(PRTERRINFO pErrInfo, int rc, const char *pszMsg);
+
+/**
+ * Adds more error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszFormat           The format string to add.
+ * @param   ...                 The format arguments.
+ */
+RTDECL(int)         RTErrInfoAddF(PRTERRINFO pErrInfo, int rc, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);
+
+/**
+ * Adds more error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszFormat           The format string to add.
+ * @param   va                  The format arguments.
+ */
+RTDECL(int)         RTErrInfoAddV(PRTERRINFO pErrInfo, int rc, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(3, 0);
+/** @name RTERRINFO_LOG_F_XXX
+ * @{ */
+/** Both debug and release log. */
+//define RTERRINFO_LOG_F_RELEASE RT_BIT_32(0)
+/** @} */
+
+/**
+ * Fills in the error info details.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszMsg              The error message string.
+ */
+RTDECL(int)         RTErrInfoLogAndSet(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
+const char *pszMsg);
+
+/**
+ * Fills in the error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszFormat           The format string.
+ * @param   ...                 The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndSetF(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
+const char *pszFormat, ...)
+RT_IPRT_FORMAT_ATTR(5, 6);
+
+/**
+ * Fills in the error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszFormat           The format string.
+ * @param   va                  The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndSetV(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
+const char *pszFormat, ...)
const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(5, 0);
+
+/**
+ * Adds more error info details.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszMsg              The error message string to add.
+ */
+RTDECL(int)         RTErrInfoLogAndAdd(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
const char *pszMsg);
+
+/**
+ * Adds more error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszFormat           The format string to add.
+ * @param   ...                 The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndAddF(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(5, 6);
+
+/**
+ * Adds more error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszFormat           The format string to add.
+ * @param   va                  The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndAddV(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(5, 0);
+
+/** @name Macros wrapping the RTErrInfoLog* functions.
+ * @{ */

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```c
#define RTERRINFO_LOG_SET(  a_pErrInfo, a_rc, a_pszMsg)             RTErrInfoLogAndSet( a_pErrInfo, a_rc, LOG_GROUP, 0, a_pszMsg)
#define RTERRINFO_LOG_SET_V(a_pErrInfo, a_rc, a_pszMsg, a_va)       RTErrInfoLogAndSetV(a_pErrInfo, a_rc, LOG_GROUP, 0, a_pszMsg, a_va)
#define RTERRINFO_LOG_ADD(  a_pErrInfo, a_rc, a_pszMsg)             RTErrInfoLogAndAdd( a_pErrInfo, a_rc, LOG_GROUP, 0, a_pszMsg)
#define RTERRINFO_LOG_ADD_V(a_pErrInfo, a_rc, a_pszMsg, a_va)       RTErrInfoLogAndAddV(a_pErrInfo, a_rc, LOG_GROUP, 0, a_pszMsg, a_va)
#if defined RT_COMPILER_SUPPORTS_VA_ARGS
#define RTERRINFO_LOG_ADD_F(a_pErrInfo, a_rc, ...)                 RTErrInfoLogAndAddF(a_pErrInfo, a_rc, LOG_GROUP, 0, __VA_ARGS__)
#define RTERRINFO_LOG_SET_F(a_pErrInfo, a_rc, ...)                 RTErrInfoLogAndSetF(a_pErrInfo, a_rc, LOG_GROUP, 0, __VA_ARGS__)
#else
#define RTERRINFO_LOG_ADD_F                                    RTErrInfoAddF
#define RTERRINFO_LOG_SET_F                                    RTErrInfoSetF
#endif
/** @} */

/** Checks if the error info is set. */
/** @returns true if set, false if not. */
/** @param   pErrInfo            The error info structure. NULL is OK. */
DECLINLINE(bool)    RTErrInfoIsSet(PCRTERRINFO pErrInfo)
{
    if (!pErrInfo)
        return false;
    return (pErrInfo->fFlags & (RTERRINFO_FLAGS_MAGIC_MASK | RTERRINFO_FLAGS_SET))
        == (RTERRINFO_FLAGS_MAGIC | RTERRINFO_FLAGS_SET);
}*/
```
+/**
+ * Clears the error info structure.
+ */
+DECLINLINE(void)    RTErrInfoClear(PRTERRINFO pErrInfo)
+{
+    if (pErrInfo)
+    {
+        pErrInfo->fFlags &= ~RTERRINFO_FLAGS_SET;
+        pErrInfo->rc    = /*VINF_SUCCESS*/0;
+        *pErrInfo->pszMsg = '\0';
+    }
+}
+
+/**
+ * Storage for error variables.
+ */
+/*@remarks Do NOT touch the members! They are platform specific and what's
+ * where may change at any time!
+ */
+typedef union RTERRVARS
+{
+    int8_t  ai8Vars[32];
+    int16_t ai16Vars[16];
+    int32_t ai32Vars[8];
+    int64_t ai64Vars[4];
+} RTERRVARS;
+/** Pointer to an error variable storage union. */
+typedef RTERRVARS *PRTERRVARS;
+/** Pointer to a const error variable storage union. */
+typedef RTERRVARS const *PCRTERRVARS;
+
+/**
+ * Saves the error variables.
+ */
+/*@returns @a pVars.
+ * @param   pVars       The variable storage union.
+ */
+RTDECL(PRTERRVARS) RTErrVarsSave(PRTERRVARS pVars);
+
+/**
+ * Restores the error variables.
+ */
+/*@param   pVars       The variable storage union.
+ */
+RTDECL( void) RTErrVarsRestore(PCRTERRVARS pVars);
+/**
+ * Checks if the first variable set equals the second.
+ * @returns true if they are equal, false if not.
+ * @param pVars1 The first variable storage union.
+ * @param pVars2 The second variable storage union.
+ */
+RTDECL(bool) RTErrVarsAreEqual(PCRTERRVARS pVars1, PCRTERRVARS pVars2);
+
+/**
+ * Checks if the (live) error variables have changed since we saved them.
+ * @returns @c true if they have changed, @c false if not.
+ * @param pVars The saved variables to compare the current state against.
+ */
+RTDECL(bool) RTErrVarsHaveChanged(PCRTERRVARS pVars);
+
+RT_C_DECLS_END
+
+/** @} */
+
+/** @name Status Code Ranges
+ * @{ */
+/** The first status code in the primary IPRT range. */
+#define RTERR_RANGE1_FIRST                  0
+/** The last status code in the primary IPRT range. */
+#define RTERR_RANGE1_LAST                   999
+
+/** The first status code in the secondary IPRT range. */
+#define RTERR_RANGE2_FIRST                  22000
+/** The last status code in the secondary IPRT range. */
+#define RTERR_RANGE2_LAST                   32766
+
+/** The first status code in the user range. */
+#define RTERR_USER_FIRST                    1000
+/** The last status code in the user range. */
+#define RTERR_USER_LAST                     21999
+/** @} */
+
+/** SED-START */
+
+/** @name Misc. Status Codes
+ * @{ */
+/** Success. */

+#define VINF_SUCCESS 0
+
+/** General failure - DON'T USE THIS!!! */
+#define VERR_GENERAL_FAILURE (-1)
+/** Invalid parameter. */
+#define VERR_INVALID_PARAMETER (-2)
+/** Invalid parameter. */
+#define VWRN_INVALID_PARAMETER 2
+/** Invalid magic or cookie. */
+#define VINF_INVALID_MAGIC (-3)
+/** Invalid magic or cookie. */
+#define VWRN_INVALID_MAGIC 3
+/** Invalid loader handle. */
+#define VINF_INVALID_HANDLE (-4)
+/** Invalid loader handle. */
+#define VWRN_INVALID_HANDLE 4
+/** Failed to lock the address range. */
+#define VINF_LOCK_FAILED (-5)
+/** Invalid memory pointer. */
+#define VINF_INVALID_POINTER (-6)
+/** Failed to patch the IDT. */
+#define VINF_IDT_FAILED (-7)
+/** Memory allocation failed. */
+#define VINF_NO_MEMORY (-8)
+/** Already loaded. */
+#define VINF_ALREADY_LOADED (-9)
+/** Permission denied. */
+#define VINF_PERMISSION_DENIED (-10)
+/** Permission denied. */
+#define VINF_PERMISSION_DENIED 10
+/** Version mismatch. */
+#define VINF_VERSION_MISMATCH (-11)
+/** The request function is not implemented. */
+#define VINF_NOT_IMPLEMENTED (-12)
+/** Invalid flags was given. */
+#define VINF_INVALID_FLAGS (-13)
+
+/** Not equal. */
+#define VINF_NOT_EQUAL (-18)
+/** The specified path does not point at a symbolic link. */
+#define VINF_NOT_SYMLINK (-19)
+/** Failed to allocate temporary memory. */
+#define VINF_NO_TMP_MEMORY (-20)
+/** Invalid file mode mask (RTFMODE). */
+#define VINF_INVALID_FMODE (-21)
+/** Incorrect call order. */
+#define VINF_WRONG_ORDER (-22)
+/** There is no TLS (thread local storage) available for storing the current thread. */
+define VERR_NO_TLS_FOR_SELF       (-23)
+/** Failed to set the TLS (thread local storage) entry which points to our thread structure. */
+define VERR_FAILED_TO_SET_SELF_TLS (-24)
+/** Not able to allocate contiguous memory. */
+define VERR_NO_CONT_MEMORY        (-26)
+/** No memory available for page table or page directory. */
+define VERR_NO_PAGE_MEMORY        (-27)
+/** Already initialized. */
+define VINF_ALREADY_INITIALIZED    28
+/** The specified thread is dead. */
+define VERR_THREAD_IS_DEAD        (-29)
+/** The specified thread is not waitable. */
+define VERR_THREAD_NOT_WAITABLE   (-30)
+/** Pagetable not present. */
+define VERR_PAGE_TABLE_NOT_PRESENT (-31)
+/** Invalid context. */
+ * Typically an API was used by the wrong thread. */
+define VERR_INVALID_CONTEXT       (-32)
+/** The per process timer is busy. */
+define VERR_TIMER_BUSY            (-33)
+/** Address conflict. */
+define VERR_ADDRESS_CONFLICT      (-34)
+/** Unresolved (unknown) host platform error. */
+define VERR_UNRESOLVED_ERROR      (-35)
+/** Invalid function. */
+define VERR_INVALID_FUNCTION      (-36)
+/** Not supported. */
+define VERR_NOT_SUPPORTED         (-37)
+/** Not supported. */
+define VINF_NOT_SUPPORTED         37
+/** Access denied. */
+define VERR_ACCESS_DENIED         (-38)
+/** Call interrupted. */
+define VERR_INTERRUPTED           (-39)
+/** Call interrupted. */
+define VINF_INTERRUPTED           39
+/** Timeout. */
+define VERR_TIMEOUT               (-40)
+/** Timeout. */
+define VINF_TIMEOUT               40
+/** Buffer too small to save result. */
+define VERR_BUFFER_OVERFLOW       (-41)
+/** Buffer too small to save result. */
+define VINF_BUFFER_OVERFLOW       41
+/** Data size overflow. */
+define VERR_TOO_MUCH_DATA         (-42)
+/** Max threads number reached. */
+define VERR_MAX_THRDS_REACHED     (-43)
+/** Max process number reached. */
+define VERR_MAX_PROCS_REACHED (-44)
+/** The recipient process has refused the signal. */
+define VERR_SIGNAL_REFUSED (-45)
+/** A signal is already pending. */
+define VERR_SIGNAL_PENDING (-46)
+/** The signal being posted is not correct. */
+define VERR_SIGNAL_INVALID (-47)
+/** The state changed. */
+ * This is a generic error message and needs a context to make sense. */
+define VERR_STATE_CHANGED (-48)
+/** Warning, the state changed. */
+ * This is a generic error message and needs a context to make sense. */
+define VWRN_STATE_CHANGED 48
+/** Error while parsing UUID string */
+define VERR_INVALID_UUID_FORMAT (-49)
+/** The specified process was not found. */
+define VERR_PROCESS_NOT_FOUND (-50)
+/** The process specified to a non-block wait had not exited. */
+define VERR_PROCESS_RUNNING (-51)
+/** Retry the operation. */
+define VERR_TRY_AGAIN (-52)
+/** Retry the operation. */
+define VINF_TRY_AGAIN 52
+/** Generic parse error. */
+define VERR_PARSE_ERROR (-53)
+/** Value out of range. */
+define VERR_OUT_OF_RANGE (-54)
+/** A numeric conversion encountered a value which was too big for the target. */
+define VERR_NUMBER_TOO_BIG (-55)
+/** A numeric conversion encountered a value which was too big for the target. */
+define VWRN_NUMBER_TOO_BIG 55
+/** The number begin converted (string) contained no digits. */
+define VERR_NO_DIGITS (-56)
+/** The number begin converted (string) contained no digits. */
+define VWRN_NO_DIGITS 56
+/** Encountered a '-' during conversion to an unsigned value. */
+define VERR_NEGATIVE_UNSIGNED (-57)
+/** Encountered a '-' during conversion to an unsigned value. */
+define VWRN_NEGATIVE_UNSIGNED 57
+/** Error while characters translation (unicode and so). */
+define VERR_NO_TRANSLATION (-58)
+/** Error while characters translation (unicode and so). */
+define VWRN_NO_TRANSLATION 58
+/** Encountered unicode code point which is reserved for use as endian indicator (0xffff or 0xfffe). */
+define VERR_CODE_POINT_ENDIAN_INDICATOR (-59)
+/** Encountered unicode code point in the surrogate range (0xd800 to 0xdf7f). */
+define VERR_CODE_POINT_SURROGATE (-60)
+/** A string claiming to be UTF-8 is incorrectly encoded. */
+#define VERR_INVALID_UTF8_ENCODING (-61)
+/** A string claiming to be in UTF-16 is incorrectly encoded. */
+#define VERR_INVALID_UTF16_ENCODING (-62)
+/** Encountered a unicode code point which cannot be represented as UTF-16. */
+#define VERR_CANT_RECODE_AS_UTF16 (-63)
+/** Got an out of memory condition trying to allocate a string. */
+#define VERR_NO_STR_MEMORY (-64)
+/** Got an out of memory condition trying to allocate a UTF-16 (/UCS-2) string. */
+#define VERR_NO_UTF16_MEMORY (-65)
+/** Get an out of memory condition trying to allocate a code point array. */
+#define VERR_NO_CODE_POINT_MEMORY (-66)
+/** Can't free the memory because it's used in mapping. */
+#define VERR_MEMORY_BUSY (-67)
+/** The timer can't be started because it's already active. */
+#define VERR_TIMER_ACTIVE (-68)
+/** The timer can't be stopped because it's already suspended. */
+#define VERR_TIMER_SUSPENDED (-69)
+/** The operation was cancelled by the user (copy) or another thread (local ipc). */
+#define VERR_CANCELLED (-70)
+/** Failed to initialize a memory object. */
+ * Exactly what this means is OS specific. */
+#define VERR_MEMOBJ_INIT_FAILED (-71)
+/** Out of memory condition when allocating memory with low physical backing. */
+#define VERR_NO_LOW_MEMORY (-72)
+/** Out of memory condition when allocating physical memory (without mapping). */
+#define VERR_NO_PHYS_MEMORY (-73)
+/** The address (virtual or physical) is too big. */
+#define VERR_ADDRESS_TOO_BIG (-74)
+/** Failed to map a memory object. */
+#define VERR_MAP_FAILED (-75)
+/** Trailing characters. */
+#define VERR_TRAILING_CHARS (-76)
+/** Trailing characters. */
+#define VWRN_TRAILING_CHARS 76
+/** Trailing spaces. */
+#define VERR_TRAILING_SPACES (-77)
+/** Trailing spaces. */
+#define VWRN_TRAILING_SPACES 77
+/** Generic not found error. */
+#define VERR_NOT_FOUND (-78)
+/** Generic not found warning. */
+#define VWRN_NOT_FOUND 78
+/** Generic invalid state error. */
+#define VERR_INVALID_STATE (-79)
+/** Generic invalid state warning. */
+#define VWRN_INVALID_STATE 79
+/** Generic out of resources error. */
+#define VERR_OUT_OF_RESOURCES (-80)
+/** Generic out of resources warning. */
+define VWRN_OUT_OF_RESOURCES 80
+/** No more handles available, too many open handles. */
+define VERR_NO_MORE_HANDLES (-81)
+/** Preemption is disabled. */
+ * The requested operation can only be performed when preemption is enabled. */
+define VERR_PREEMPT_DISABLED (-82)
+/** End of string. */
+define VERR_END_OF_STRING (-83)
+/** End of string. */
+define VINF_END_OF_STRING 83
+/** A page count is out of range. */
+define VERR_PAGE_COUNT_OUT_OF_RANGE (-84)
+/** Generic object destroyed status. */
+define VERR_OBJECT_DESTROYED (-85)
+/** Generic object was destroyed by the call status. */
+define VINF_OBJECT_DESTROYED 85
+/** Generic dangling objects status. */
+define VERR_DANGLING_OBJECTS (-86)
+/** Generic dangling objects status. */
+define VWRN_DANGLING_OBJECTS 86
+/** Invalid Base64 encoding. */
+define VERR_INVALID_BASE64_ENCODING (-87)
+/** Return instigated by a callback or similar. */
+define VERR_CALLBACK_RETURN (-88)
+/** Return instigated by a callback or similar. */
+define VINF_CALLBACK_RETURN 88
+/** Authentication failure. */
+define VERR_AUTHENTICATION_FAILURE (-89)
+/** Not a power of two. */
+define VERR_NOT_POWER_OF_TWO (-90)
+/** Status code, typically given as a parameter, that isn't supposed to be used. */
+define VERR_IGNORED (-91)
+/** Concurrent access to the object is not allowed. */
+define VERR_CONCURRENT_ACCESS (-92)
+/** The caller does not have a reference to the object. */
+ * This status is used when two threads is caught sharing the same object
+ * reference. */
+define VERR_CALLER_NO_REFERENCE (-93)
+/** Generic no change error. */
+define VERR_NO_CHANGE (-95)
+/** Generic no change info. */
+define VINF_NO_CHANGE 95
+/** Out of memory condition when allocating executable memory. */
+define VERR_NO_EXEC_MEMORY (-96)
+/** The alignment is not supported. */
+define VERR_UNSUPPORTED_ALIGNMENT (-97)
/* The alignment is not really supported, however we got lucky with this allocation. */
#define VINF_UNSUPPORTED_ALIGNMENT 97
/* Duplicate something. */
#define VERR_DUPPLICATE (-98)
/* Something is missing. */
#define VERR_MISSING (-99)
/* An unexpected (unknown) exception was caught. */
#define VERR_UNEXPECTED_EXCEPTION (-22400)
/* Buffer underflow. */
#define VERR_BUFFER_UNDERFLOW (-22401)
/* Buffer underflow. */
#define VINF_BUFFER_UNDERFLOW 22401
/* Uneven input. */
#define VERR_UNEVEN_INPUT (-22402)
/* Something is not available or not working properly. */
#define VERR_NOT_AVAILABLE (-22403)
/* The RTPROC_FLAGS_DETACHED flag isn't supported. */
#define VERR_PROC_DETACH_NOT_SUPPORTED (-22404)
/* An account is restricted in a certain way. */
#define VERR_ACCOUNT_RESTRICTED (-22405)
/* An account is restricted in a certain way. */
#define VINF_ACCOUNT_RESTRICTED 22405
/* Not able satisfy all the requirements of the request. */
#define VERR_UNABLE_TO_SATISFY_REQUIREMENTS (-22406)
/* Not able satisfy all the requirements of the request. */
#define VWRN_UNABLE_TO_SATISFY_REQUIREMENTS 22406
/* The requested allocation is too big. */
#define VERR_ALLOCATION_TOO_BIG (-22407)
/* Mismatch. */
#define VERR_MISMATCH (-22408)
/* Wrong type. */
#define VERR_WRONG_TYPE (-22409)
/* This indicates that the process does not have sufficient privileges to perform the operation. */
#define VERR_PRIVILEGE_NOT_HELD (-22410)
/* Process does not have the trusted code base (TCB) privilege needed for user authentication or/and process creation as a given user. TCB is also called 'Act as part of the operating system'. */
#define VERR_PROC_TCB_PRIV_NOT_HELD (-22411)
/* Process does not have the assign primary token (APT) privilege needed for creating process as a given user. APT is also called 'Replace a process level token'. */
#define VERR_PROC_APT_PRIV_NOT_HELD (-22412)
/* Process does not have the increase quota (IQ) privilege needed for creating a process as a given user. IQ is also called 'Increase quotas'. */
#define VERR_PROC_IQ_PRIV_NOT_HELD (-22413)
/* The system has too many CPUs. */
```c
#define VERR_MP_TOO_MANY_CPUS (-22414)
+
+
+@ name Common File/Disk/Pipe/etc Status Codes
+ * @ {
+ * /
+/** Unresolved (unknown) file i/o error. */
+#define VERR_FILE_IO_ERROR (-100)
+/** File/Device open failed. */
+#define VERR_OPEN_FAILED (-101)
+/** File not found. */
+#define VERR_FILE_NOT_FOUND (-102)
+/** Path not found. */
+#define VERR_PATH_NOT_FOUND (-103)
+/** Invalid (malformed) file/path name. */
+#define VERR_INVALID_NAME (-104)
+/** The object in question already exists. */
+#define VERR_ALREADY_EXISTS (-105)
+/** The object in question already exists. */
+#define VWRN_ALREADY_EXISTS 105
+/** Too many open files. */
+#define VERR_TOO_MANY_OPEN_FILES (-106)
+/** Seek error. */
+#define VERR_SEEK (-107)
+/** Seek below file start. */
+#define VERR_NEGATIVE_SEEK (-108)
+/** Trying to seek on device. */
+#define VERR_SEEK_ON_DEVICE (-109)
+/** Reached the end of the file. */
+#define VERR_EOF (-110)
+/** Reached the end of the file. */
+#define VINF_EOF 110
+/** Generic file read error. */
+#define VERR_READ_ERROR (-111)
+/** Generic file write error. */
+#define VERR_WRITE_ERROR (-112)
+/** Write protect error. */
+#define VERR_WRITE_PROTECT (-113)
+/** Sharing violation, file is being used by another process. */
+#define VERR_SHARING_VIOLATION (-114)
+/** Unable to lock a region of a file. */
+#define VERR_FILE_LOCK_FAILED (-115)
+/** File access error, another process has locked a portion of the file. */
+#define VERR_FILE_LOCK_VIOLATION (-116)
+/** File or directory can't be created. */
+#define VERR_CANT_CREATE (-117)
+/** Directory can't be deleted. */
```
+** VERR_CANT_DELETE_DIRECTORY (-118)
+** Can't move file to another disk. */
+** VERR_NOT_SAME_DEVICE (-119)
+** The filename or extension is too long. */
+** VERR_FILENAME_TOO_LONG (-120)
+** Media not present in drive. */
+** VERR_MEDIA_NOT_PRESENT (-121)
+** Can't unlock - region was not locked. */
+** VERR_FILE_NOT_LOCKED (-123)
+** Unrecoverable error: lock was lost. */
+** VERR_FILE_LOCK_LOST (-124)
+** Can't delete directory with files. */
+** VERR_DIR_NOT_EMPTY (-125)
+** A directory operation was attempted on a non-directory object. */
+** VERR_NOT_A_DIRECTORY (-126)
+** A non-directory operation was attempted on a directory object. */
+** VERR_IS_A_DIRECTORY (-127)
+** Tried to grow a file beyond the limit imposed by the process or the filesystem. */
+** VERR_FILE_TOO_BIG (-128)
+** No pending request the aio context has to wait for completion. */
+** VERR_FILE_AIO_NO_REQUEST (-129)
+** The request could not be canceled or prepared for another transfer
+** because it is still in progress. */
+** VERR_FILE_AIO_IN_PROGRESS (-130)
+** The request could not be canceled because it already completed. */
+** VERR_FILE_AIO_COMPLETED (-131)
+** The I/O context couldn't be destroyed because there are still pending requests. */
+** VERR_FILE_AIO_BUSY (-132)
+** The requests couldn't be submitted because that would exceed the capacity of the context. */
+** VERR_FILE_AIO_LIMIT_EXCEEDED (-133)
+** The request was canceled. */
+** VERR_FILE_AIO_CANCELED (-134)
+** The request wasn't submitted so it can't be canceled. */
+** VERR_FILE_AIO_NOT_SUBMITTED (-135)
+** A request was not prepared and thus could not be submitted. */
+** VERR_FILE_AIO_NOT_PREPARED (-136)
+** Not all requests could be submitted due to resource shortage. */
+** VERR_FILE_AIO_INSUFFICIENT_RESSOURCES (-137)
+** Device or resource is busy. */
+** VERR_RESOURCE_BUSY (-138)
+** A file operation was attempted on a non-file object. */
+** VERR_NOT_A_FILE (-139)
+** A non-file operation was attempted on a file object. */
+** VERR_IS_A_FILE (-140)
+** Unexpected filesystem object type. */
+** VERR_UNEXPECTED_FS_OBJ_TYPE (-141)
/** A path does not start with a root specification. */
#define VERR_PATH_DOES_NOT_START_WITH_ROOT (-142)
/** A path is relative, expected an absolute path. */
#define VERR_PATH_IS_RELATIVE (-143)
/** A path is not relative (start with root), expected an relative path. */
#define VERR_PATH_IS_NOT_RELATIVE (-144)
/** Zero length path. */
#define VERR_PATH_ZERO_LENGTH (-145)
/** There are not enough events available on the host to create the I/O context. */
#define VERR_FILE_AIO_INSUFFICIENT_EVENTS (-146)
+/** @} */
+
+
+/** @name Generic Filesystem I/O Status Codes
+ { */
+ /** Unresolved (unknown) disk i/o error. */
+#define VERR_DISK_IO_ERROR (-150)
+/** Invalid drive number. */
+#define VERR_INVALID_DRIVE (-151)
+/** Disk is full. */
+#define VERR_DISK_FULL (-152)
+/** Disk was changed. */
+#define VERR_DISK_CHANGE (-153)
+/** Drive is locked. */
+#define VERR_DRIVE_LOCKED (-154)
+/** The specified disk or diskette cannot be accessed. */
+#define VERR_DISK_INVALID_FORMAT (-155)
+/** Too many symbolic links. */
+#define VERR_TOO_MANY_SYMLINKS (-156)
+/** The OS does not support setting the time stamps on a symbolic link. */
+#define VERR_NS_SYMLINK_SET_TIME (-157)
+/** The OS does not support changing the owner of a symbolic link. */
+#define VERR_NS_SYMLINK_CHANGE_OWNER (-158)
+/** Symbolic link not allowed. */
+#define VERR_SYMLINK_NOT_ALLOWED (-159)
+/** @} */
+
+
+/** @name Generic Directory Enumeration Status Codes
+ { */
+ /** Unresolved (unknown) search error. */
+#define VERR_SEARCH_ERROR (-200)
+/** No more files found. */
+#define VERR_NO_MORE_FILES (-201)
+/** No more search handles available. */
+define VERR_NO_MORE_SEARCH_HANDLES    (-202)
+/** RTDirReadEx() failed to retrieve the extra data which was requested. */
+define VWRN_NO_DIRENT_INFO    203
+/** @ */ */
+
+
+/** @name Internal Processing Errors */
+ * @ {
+ * */
+/** Internal error - this should never happen. */
+define VERR_INTERNAL_ERROR    (-225)
+/** Internal error no. 2. */
+define VERR_INTERNAL_ERROR_2    (-226)
+/** Internal error no. 3. */
+define VERR_INTERNAL_ERROR_3    (-227)
+/** Internal error no. 4. */
+define VERR_INTERNAL_ERROR_4    (-228)
+/** Internal error no. 5. */
+define VERR_INTERNAL_ERROR_5    (-229)
+
+/** Internal error: Unexpected status code. */
+define VERR_IPE_UNEXPECTED_STATUS    (-230)
+
+/** Internal error: Unexpected status code. */
+define VERR_IPE_UNEXPECTED_INFO_STATUS    (-231)
+
+/** Internal error: Unexpected status code. */
+define VERR_IPE_UNEXPECTED_ERROR_STATUS    (-232)
+
+/** Internal error: Uninitialized status code. */
+@remarks This is used by value elsewhere. */
+define VERR_IPE_UNINITIALIZED_STATUS    (-233)
+
+/** Internal error: Supposedly unreachable default case in a switch. */
+define VERR_IPE_NOT_REACHED_DEFAULT_CASE    (-234)
+/** @ */ */
+
+/** @name Generic Device I/O Status Codes */
+ * @ {
+ * */
+/** Unresolved (unknown) device i/o error. */
+define VERR_DEV_IO_ERROR    (-250)
+
+/** Device i/o: Bad unit. */
+define VERR_IO_BAD_UNIT    (-251)
+
+/** Device i/o: Not ready. */
+define VERR_IO_NOT_READY    (-252)
+
+/** Device i/o: Bad command. */
+define VERR_IO_BAD_COMMAND    (-253)
+
+/** Device i/o: CRC error. */
+define VERR_IO_CRC    (-254)
+
+/** Device i/o: Bad length. */
+define VERR_IO_BAD_LENGTH    (-255)
/** Device i/o: Sector not found. */
#define VERR_IO_SECTOR_NOT_FOUND (-256)
/** Device i/o: General failure. */
#define VERR_IO_GEN_FAILURE (-257)
/** @} */

/** @} */
/** Generic Pipe I/O Status Codes */
/** @} */
#define VERR_PIPE_IO_ERROR (-300)
/** Broken pipe. */
#define VERR_BROKEN_PIPE (-301)
/** Bad pipe. */
#define VERR_BAD_PIPE (-302)
/** Pipe is busy. */
#define VERR_PIPE_BUSY (-303)
/** No data in pipe. */
#define VERR_NO_DATA (-304)
/** Pipe is not connected. */
#define VERR_PIPE_NOT_CONNECTED (-305)
/** More data available in pipe. */
#define VERR_MORE_DATA (-306)
/** Expected read pipe, got a write pipe instead. */
#define VERR_PIPE_NOT_READ (-307)
/** Expected write pipe, got a read pipe instead. */
#define VERR_PIPE_NOT_WRITE (-308)
/** @} */

/** @} */
/** Generic Semaphores Status Codes */
/** @} */
#define VERR_SEM_ERROR (-350)
/** Too many semaphores. */
#define VERR_TOO_MANY_SEMAPHORES (-351)
/** Exclusive semaphore is owned by another process. */
#define VERR_EXCL_SEM_ALREADY_OWNED (-352)
/** The semaphore is set and cannot be closed. */
#define VERR_SEM_IS_SET (-353)
/** The semaphore cannot be set again. */
#define VERR_TOO_MANY_SEM_REQUESTS (-354)
/** The semaphore has been opened too many times. */
#define VERR_TOO_MANY_OPENS (-356)
/** The maximum posts for the event semaphore has been reached. */
#define VERR_TOO_MANY_POSTS (-357)
/** The event semaphore has already been posted. */
#define VERR_ALREADY_POSTED (-358)
/** The event semaphore has already been reset. */
#define VERR_ALREADY_RESET (-359)
/** The semaphore is in use. */
#define VERR_SEM_BUSY (-360)
/** The previous ownership of this semaphore has ended. */
#define VERR_SEM_OWNER_DIED (-361)
/** Failed to open semaphore by name - not found. */
#define VERR_SEM_NOT_FOUND (-362)
/** Semaphore destroyed while waiting. */
#define VERR_SEM_DESTROYED (-363)
/** Nested ownership requests are not permitted for this semaphore type. */
#define VERR_SEM_NESTED (-364)
/** The release call only release a semaphore nesting, i.e. the caller is still * holding the semaphore. */
#define VINF_SEM_NESTED (364)
/** Deadlock detected. */
#define VERR_DEADLOCK (-365)
/** Ping-Pong listen or speak out of turn error. */
#define VERR_SEM_OUT_OF_TURN (-366)
/** Tried to take a semaphore in a bad context. */
#define VERR_SEM_BAD_CONTEXT (-367)
/** Don't spin for the semaphore, but it is safe to try grab it. */
#define VINF_SEM_BAD_CONTEXT (367)
/** Wrong locking order detected. */
#define VERR_SEM_LV_WRONG_ORDER (-368)
/** Wrong release order detected. */
#define VERR_SEM_LV WRONG_RELEASE_ORDER (-369)
/** Attempt to recursively enter a non-recursive lock. */
#define VERR_SEM_LV_NESTED (-370)
/** Invalid parameters passed to the lock validator. */
#define VERR_SEM_LV_INVALID_PARAMETER (-371)
/** The lock validator detected a deadlock. */
#define VERR_SEM_LV DEADLOCK (-372)
/** The lock validator detected an existing deadlock. */
#define VERR_SEM_LVEXISTING_DEADLOCK (-373)
/** Not the lock owner according our records. */
#define VERR_SEM_LV NOT_OWNER (-374)
/** An illegal lock upgrade was attempted. */
#define VERR_SEM_LV ILLEGAL_UPGRADE (-375)
/** The thread is not a valid signaller of the event. */
#define VERR_SEM_LV NOT_SIGNALLER (-376)
/** Internal error in the lock validator or related components. */
#define VERR_SEM_LVINTERNAL_ERROR (-377)
+/** @} */
+
+
+/** @name Generic Network I/O Status Codes */
+ * @{
+ *
+ /** Unresolved (unknown) network error. */
+ #define VERR_NET_IO_ERROR (-400)
+ /** The network is busy or is out of resources. */
+ #define VERR_NET_OUT_OF_RESOURCES (-401)
+ /** Net host name not found. */
+ #define VERR_NET_HOST_NOT_FOUND (-402)
+ /** Network path not found. */
+ #define VERR_NET_PATH_NOT_FOUND (-403)
+ /** General network printing error. */
+ #define VERR_NET_PRINT_ERROR (-404)
+ /** The machine is not on the network. */
+ #define VERR_NET_NO_NETWORK (-405)
+ /** Name is not unique on the network. */
+ #define VERR_NET_NOT_UNIQUE_NAME (-406)
+
+ /* These are BSD networking error codes - numbers correspond, don't mess! */
+ /** Operation in progress. */
+ #define VERR_NET_IN_PROGRESS (-436)
+ /** Operation already in progress. */
+ #define VERR_NET_ALREADY_IN_PROGRESS (-437)
+ /** Attempted socket operation with a non-socket handle. */
+ /** (This includes closed handles.) */
+ #define VERR_NET_NOT_SOCKET (-438)
+ /** Destination address required. */
+ #define VERR_NET_DEST_ADDRESS_REQUIRED (-439)
+ /** Message too long. */
+ #define VERR_NET_MSG_SIZE (-440)
+ /** Protocol wrong type for socket. */
+ #define VERR_NET_PROTOCOL_TYPE (-441)
+ /** Protocol not available. */
+ #define VERR_NET_PROTOCOL_NOT_AVAILABLE (-442)
+ /** Protocol not supported. */
+ #define VERR_NET_PROTOCOL_NOT_SUPPORTED (-443)
+ /** Socket type not supported. */
+ #define VERR_NET_SOCKET_TYPE_NOT_SUPPORTED (-444)
+ /** Operation not supported. */
+ #define VERR_NET_OPERATION_NOT_SUPPORTED (-445)
+ /** Protocol family not supported. */
+ #define VERR_NET_PROTOCOL_FAMILY_NOT_SUPPORTED (-446)
+ /** Address family not supported by protocol family. */
+ #define VERR_NET_ADDRESS_FAMILY_NOT_SUPPORTED (-447)
+ /** Address already in use. */
+/**
+ * @name TCP Status Codes
+ */
+ /**
+ * Stop the TCP server. */
+ #define VERR_TCP_SERVER_STOP (-500)
+ /**
+ * The server was stopped. */
+ #define VINF_TCP_SERVER_STOP 500
+ /**
+ * The TCP server was shut down using RTTcpServerShutdown. */
```c
#define VERR_TCP_SERVER_SHUTDOWN (-501)
+/** The TCP server was destroyed. */
#define VERR_TCP_SERVER_DESTROYED (-502)
+/** The TCP server has no client associated with it. */
#define VINF_TCP_SERVER_NO_CLIENT 503
+/** @} */
+
+
+/** @name UDP Status Codes
+ * @{
+ */
+/** Stop the UDP server. */
+#define VERR_UDP_SERVER_STOP (-520)
+/** The server was stopped. */
+#define VINF_UDP_SERVER_STOP 520
+/** The UDP server was shut down using RTUdpServerShutdown. */
+#define VERR_UDP_SERVER_SHUTDOWN (-521)
+/** The UDP server was destroyed. */
+#define VERR_UDP_SERVER_DESTROYED (-522)
+/** The UDP server has no client associated with it. */
+#define VINF_UDP_SERVER_NO_CLIENT 523
+/** @} */
+
+
+/** @name L4 Specific Status Codes
+ * @{
+ */
+/** Invalid offset in an L4 dataspace */
+#define VERR_L4_INVALID_DS_OFFSET (-550)
+/** IPC error */
+#define VERR_IPC (-551)
+/** Item already used */
+#define VERRRESOURCE_IN_USE (-552)
+/** Source/destination not found */
+#define VERR_IPC_PROCESS_NOT_FOUND (-553)
+/** Receive timeout */
+#define VERR_IPC_RECEIVE_TIMEOUT (-554)
+/** Send timeout */
+#define VERR_IPC_SEND_TIMEOUT (-555)
+/** Receive cancelled */
+#define VERR_IPC_RECEIVE_CANCELLED (-556)
+/** Send cancelled */
+#define VERR_IPC_SEND_CANCELLED (-557)
+/** Receive aborted */
+#define VERR_IPC_RECEIVE_ABORTED (-558)
+/** Send aborted */
+#define VERR_IPC_SEND_ABORTED (-559)
+/** Couldn't map pages during receive */
```
+/** The iprt loader recognized a PE image, but doesn't support loading it. */
+#define VERR_PE_EXE_NOT_SUPPORTED  (-602)
+/** The iprt loader recognized a LX image, but doesn't support loading it. */
+#define VERR_LX_EXE_NOT_SUPPORTED  (-603)
+/** The iprt loader recognized a LE image, but doesn't support loading it. */
+#define VERR_LE_EXE_NOT_SUPPORTED  (-604)
+/** The iprt loader recognized a NE image, but doesn't support loading it. */
+#define VERR_NE_EXE_NOT_SUPPORTED  (-605)
+/** The iprt loader recognized a MZ image, but doesn't support loading it. */
+#define VERR_MZ_EXE_NOT_SUPPORTED  (-606)
+/** The iprt loader recognized an a.out image, but doesn't support loading it. */
+#define VERR_AOUT_EXE_NOT_SUPPORTED (-607)
+/** Bad executable. */
+#define VERR_BAD_EXE_FORMAT  (-608)
+/** Symbol (export) not found. */
+#define VERR_SYMBOL_NOT_FOUND  (-609)
+/** Module not found. */
+#define VERR_MODULE_NOT_FOUND  (-610)
+/** The loader resolved an external symbol to an address too big for the image format. */
+#define VERR_SYMBOL_VALUE_TOO_BIG  (-611)
+/** The image is too big. */
+#define VERR_IMAGE_TOO_BIG  (-612)
+/** The image base address is too high for this image type. */
+#define VERR_IMAGE_BASE_TOO_HIGH  (-614)
+/** Mismatching architecture. */
+#define VERR_LDR_ARCH_MISMATCH                  (-615)  
+/** Mismatch between IPRT and native loader. */
+#define VERR_LDR_MISMATCH_NATIVE                (-616)  
+/** Failed to resolve an imported (external) symbol. */
+#define VERR_LDR_IMPORTED_SYMBOL_NOT_FOUND      (-617)  
+/** Generic loader failure. */
+#define VERR_LDR_GENERAL_FAILURE                (-618)  
+/** Code signing error. */
+#define VERR_LDR_IMAGE_HASH                     (-619)  
+/** The PE loader encountered delayed imports, a feature which hasn't been implemented yet. */
+#define VERR_LDRPE_DELAY_IMPORT                 (-620)  
+/** The PE loader encountered a malformed certificate. */
+#define VERR_LDRPE_CERT_MALFORMED               (-621)  
+/** The PE loader encountered a certificate with an unsupported type or structure revision. */
+#define VERR_LDRPE_CERT_UNSUPPORTED             (-622)  
+/** The PE loader doesn't know how to deal with the global pointer data directory entry yet. */
+#define VERR_LDRPE_GLOBALPTR                    (-623)  
+/** The PE loader doesn't support the TLS data directory yet. */
+#define VERR_LDRPE_TLS                          (-624)  
+/** The PE loader doesn't grok the COM descriptor data directory entry. */
+#define VERR_LDRPE_COM_DESCRIPTOR               (-625)  
+/** The PE loader encountered an unknown load config directory/header size. */
+#define VERR_LDRPE_LOAD_CONFIG_SIZE             (-626)  
+/** The PE loader encountered a lock prefix table, a feature which hasn't been implemented yet. */
+#define VERR_LDRPE_LOCK_PREFIX_TABLE            (-627)  
+/** The PE loader encountered some Guard CF stuff in the load config. */
+#define VERR_LDRPE_GUARD_CF_STUFF               (-628)  
+/** The ELF loader doesn't handle foreign endianness. */
+#define VERR_LDRELF_ODD_ENDIAN                  (-630)  
+/** The ELF image is 'dynamic', the ELF loader can only deal with 'relocatable' images at present. */
+#define VERR_LDRELF_DYN                         (-631)  
+/** The ELF image is 'executable', the ELF loader can only deal with 'relocatable' images at present. */
+#define VERR_LDRELF_EXEC                        (-632)  
+/** The ELF image was created for an unsupported target machine type. */
+#define VERR_LDRELF_MACHINE                     (-633)  
+/** The ELF version is not supported. */
+#define VERR_LDRELF_VERSION                     (-634)  
+/** The ELF loader cannot handle multiple SYMTAB sections. */
+#define VERR_LDRELF_MULTIPLE_SYMTABS            (-635)  
+/** The ELF loader encountered a relocation type which is not implemented. */
+#define VERR_LDRELF_RELOCATION_NOT_SUPPORTED    (-636)  
+/** The ELF loader encountered a bad symbol index. */
+#define VERR_LDRELF_INVALID_SYMBOL_INDEX        (-637)  
+/** The ELF loader encountered an invalid symbol name offset. */
+#define VERR_LDRELF_INVALID_SYMBOL_NAME_OFFSET  (-638)  
+/** The ELF loader encountered an invalid relocation offset. */
+#define VERR_LDRELF_INVALID_RELOCATION_OFFSET   (-639)  
+/** The ELF loader didn't find the symbol/string table for the image. */
+/** VERR_LDRELF_NO_SYMBOL_OR_NO_STRING_TABS (-640)
+/** Invalid link address. */
+/** VERR_LDR_INVALID_LINK_ADDRESS (-647)
+/** Invalid image relative virtual address. */
+/** VERR_LDR_INVALID_RVA (-648)
+/** Invalid segment:offset address. */
+/** VERR_LDR_INVALID_SEG_OFFSET (-649)
+/** @} */
+
+/** @name Debug Info Reader Status Codes.
+  *
+  * @}
+*/
+/** The module contains no line number information. */
+/** VERR_DBG_NO_LINE_NUMBERS (-650)
+/** The module contains no symbol information. */
+/** VERR_DBG_NO_SYMBOLS (-651)
+/** The specified segment:offset address was invalid. Typically an attempt at
+  * addressing outside the segment boundary. */
+/** VERR_DBG_INVALID_ADDRESS (-652)
+/** Invalid segment index. */
+/** VERR_DBG_INVALID_SEGMENT_INDEX (-653)
+/** Invalid segment offset. */
+/** VERR_DBG_INVALID_SEGMENT_OFFSET (-654)
+/** Invalid image relative virtual address. */
+/** VERR_DBG_INVALID_RVA (-655)
+/** Invalid image relative virtual address. */
+/** VERR_DBG_SPECIAL_SEGMENT (-656)
+/** Address conflict within a module/segment.
+  * Attempted to add a segment, symbol or line number that fully or partially
+  * overlaps with an existing one. */
+/** VERR_DBG_ADDRESS_CONFLICT (-657)
+/** Duplicate symbol within the module.
+  * Attempted to add a symbol which name already exists within the module. */
+/** VERR_DBG_DUPLICATE_SYMBOL (-658)
+/** The segment index specified when adding a new segment is already in use. */
+/** VERR_DBG_SEGMENT_INDEX_CONFLICT (-659)
+/** No line number was found for the specified address/ordinal/whatever. */
+/** VERR_DBG_LINE_NOT_FOUND (-660)
+/** The length of the symbol name is out of range.
+  * This means it is an empty string or that it's greater or equal to
+  * RTDBG_SYMBOL_NAME_LENGTH. */
+/** VERR_DBG_SYMBOL_NAME_OUT_OF_RANGE (-661)
+/** The length of the file name is out of range.
+  * This means it is an empty string or that it's greater or equal to
+  * RTDBG_FILE_NAME_LENGTH. */
+/** VERR_DBG_FILE_NAME_OUT_OF_RANGE (-662)
+/** The length of the segment name is out of range.
+  * This means it is an empty string or that it is greater or equal to
+ * RTDBG_SEGMENT_NAME_LENGTH. */
+ */** The specified address range wraps around. */
+ */define VERR_DBG_SEGMENT_NAME_OUT_OF_RANGE (-663)
+ */
+ */define VERR_DBG_ADDRESS_WRAP (-664)
+ */
+ */define VERR_DBG_NOT_NM_MAP_FILE (-665)
+ */** The file is not a valid NM map file. */
+ */
+ */define VERR_DBG_NOT_LINUX_KALLSYMS (-666)
+ */** No debug module interpreter matching the debug info. */
+ */
+ */define VERR_DBG_NO_MATCHING_INTERPRETER (-667)
+ */** Bad DWARF line number header. */
+ */
+ */define VERR_DWARF_BAD_LINE_NUMBER_HEADER (-668)
+ */** Unexpected end of DWARF unit. */
+ */
+ */define VERR_DWARF_UNEXPECTED_END (-669)
+ */** DWARF LEB value overflows the decoder type. */
+ */
+ */define VERR_DWARF_LEB_OVERFLOW (-670)
+ */** Bad DWARF extended line number opcode. */
+ */
+ */define VERR_DWARF_BAD_LNE (-671)
+ */** Bad DWARF string. */
+ */
+ */define VERR_DWARF_BAD_STRING (-672)
+ */** Bad DWARF position. */
+ */
+ */define VERR_DWARF_BAD_POS (-673)
+ */** Bad DWARF info. */
+ */
+ */define VERR_DWARF_BAD_INFO (-674)
+ */** Bad DWARF abbreviation data. */
+ */
+ */define VERR_DWARF_BAD_ABBREV (-675)
+ */** A DWARF abbreviation was not found. */
+ */
+ */define VERR_DWARF_ABBREV_NOT_FOUND (-676)
+ */** Encountered an unknown attribute form. */
+ */
+ */define VERR_DWARF_UNKNOWN_FORM (-677)
+ */** Encountered an unexpected attribute form. */
+ */
+ */define VERR_DWARF_UNEXPECTED_FORM (-678)
+ */** Unfinished code. */
+ */
+ */define VERR_DWARF_TODO (-679)
+ */** Unknown location opcode. */
+ */
+ */define VERR_DWARF_UNKNOWN_LOC_OPCODE (-680)
+ */** Expression stack overflow. */
+ */
+ */define VERR_DWARF_STACK_OVERFLOW (-681)
+ */** Expression stack underflow. */
+ */
+ */define VERR_DWARF_STACK_UNDERFLOW (-682)
+ */** Internal processing error in the DWARF code. */
+ */
+ */define VERR_DWARF_IPE (-683)
+ */** Invalid configuration property value. */
+ */
+ */define VERR_DBG_CFG_INVALID_VALUE (-684)
+ */** Not an integer property. */
+ */
+ */define VERR_DBG_CFG_NOT_UINT_PROP (-685)
+ */** Deferred loading of information failed. */
+ */
+ */define VERR_DBG_DEFERRED_LOAD_FAILED (-686)
+/** Unfinished debug info reader code. */
+#define VERR_DBG_TODO (-687)
+/** Found file, but it didn't match the search criteria. */
+#define VERR_DBG_FILE_MISMATCH (-688)
+/** Internal processing error in the debug module reader code. */
+#define VERR_DBG_MOD_IPE (-689)
+/** The symbol size was adjusted while adding it. */
+#define VINF_DBG_ADJUSTED_SYM_SIZE 690
+/** Unable to parse the CodeView debug information. */
+#define VERR_CV_BAD_FORMAT (-691)
+/** Unfinished CodeView debug information feature. */
+#define VERR_CV_TODO (-692)
+/** Internal processing error the CodeView debug information reader. */
+#define VERR_CV_IPE (-693)
+/** @} */
+
+/** @name Request Packet Status Codes. */
+/** @} */
+/** Invalid RT request type. */
+ /** For the RTReqAlloc() case, the caller just specified an illegal enmType. For
+ all the other occurrences it means indicates corruption, broken logic, or stupid
+ interface user. */
+#define VERR_RT_REQUEST_INVALID_TYPE (-700)
+/** Invalid RT request state. */
+ /** The state of the request packet was not the expected and accepted one(s). Either
+ the interface user screwed up, or we've got corruption/broken logic. */
+#define VERR_RT_REQUEST_STATE (-701)
+/** Invalid RT request packet. */
+ /** One or more of the RT controlled packet members didn't contain the correct
+ values. Some thing's broken. */
+#define VERR_RT_REQUEST_INVALID_PACKAGE (-702)
+/** The status field has not been updated yet as the request is still
+ pending completion. Someone queried the iStatus field before the request
+ has been fully processed. */
+#define VERR_RT_REQUEST_STATUS_STILL_PENDING (-703)
+/** The request has been freed, don't read the status now. */
+ /** Someone is reading the iStatus field of a freed request packet. */
+#define VERR_RT_REQUEST_STATUS_FREED (-704)
+/** @} */
+
+/** @} */
+/** @name Environment Status Code */
+/** @} */
+/** The specified environment variable was not found. (RTEnvGetEx) */
+#define VERR_ENV_VAR_NOT_FOUND (-750)
+/** The specified environment variable was not found. (RTEnvUnsetEx) */
+#define VINF_ENV_VAR_NOT_FOUND (750)

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/** Unable to translate all the variables in the default environment due to codeset issues (LANG / LC_ALL / LC_CTYPE). */
#define VWRN_ENV_NOT_FULLY_TRANSLATED 751
/** Invalid environment variable name. */
#define VERR_ENV_INVALID_VAR_NAME -752
/** The environment variable is an unset record. */
#define VINF_ENV_VAR_UNSET 753
/** The environment variable has been recorded as being unset. */
#define VERR_ENV_VAR_UNSET -753
/** @} */

/** @name Multiprocessor Status Codes. */
/** The specified cpu is offline. */
#define VERR_CPU_OFFLINE -800
/** The specified cpu was not found. */
#define VERR_CPU_NOT_FOUND -801
/** Not all of the requested CPUs showed up in the PFNRTMPWORKER. */
#define VERR_NOT_ALL_CPUS_SHOWED -802
/** Internal processing error in the RTMp code. */
#define VERR_CPU_IPE_1 -803
/** @} */

/** @name RTGetOpt status codes */
/** RTGetOpt: Command line option not recognized. */
#define VERR_GETOPT_UNKNOWN_OPTION -825
/** RTGetOpt: Command line option needs argument. */
#define VERR_GETOPT_REQUIRED_ARGUMENT_MISSING -826
/** RTGetOpt: Command line option has argument with bad format. */
#define VERR_GETOPT_INVALID_ARGUMENT_FORMAT -827
/** RTGetOpt: Not an option. */
#define VINF_GETOPT_NOT_OPTION 828
/** RTGetOpt: Command line option needs an index. */
#define VERR_GETOPT_INDEX_MISSING -829
/** @} */

/** @name RTCache status codes */
/** RTCache: cache is full. */
#define VERR_CACHE_FULL -850
/** RTCache: cache is empty. */
#define VERR_CACHE_EMPTY -851
/** @} */

/** @name RTMemCache status codes */
/** RTCache: cache is full. */
#define VERR_CACHE_FULL -850
/** RTCache: cache is empty. */
#define VERR_CACHE_EMPTY -851
/** @} */
+/** Reached the max cache size. */
+\#define VERR_MEM_CACHE_MAX_SIZE (-855)
+/** @} */
+
+/** Access denied error. */
+\#define VERR_S3_ACCESS_DENIED (-875)
+/** The bucket/key wasn't found. */
+\#define VERR_S3_NOT_FOUND (-876)
+/** Bucket already exists. */
+\#define VERR_S3_BUCKET_ALREADY_EXISTS (-877)
+/** Can't delete bucket with keys. */
+\#define VERR_S3_BUCKET_NOT_EMPTY (-878)
+/** The current operation was canceled. */
+\#define VERR_S3_CANCELED (-879)
+/** @} */
+
+/** @name RTS3 status codes */
+ /** @} */
+\#define VERR_HTTP_INIT_FAILED (-885)
+ /** The server has not found anything matching the URI given. */
+\#define VERR_HTTP_NOT_FOUND (-886)
+ /** The request is for something forbidden. Authorization will not help. */
+\#define VERR_HTTP_ACCESS_DENIED (-887)
+ /** The server did not understand the request due to bad syntax. */
+\#define VERR_HTTP_BAD_REQUEST (-888)
+ /** Couldn't connect to the server (proxy?). */
+\#define VERR_HTTP_COULDNT_CONNECT (-889)
+ /** SSL connection error. */
+\#define VERR_HTTP_SSL_CONNECT_ERROR (-890)
+ /** CAcert is missing or has the wrong format. */
+\#define VERR_HTTP_CACERT_WRONG_FORMAT (-891)
+ /** Certificate cannot be authenticated with the given CA certificates. */
+\#define VERR_HTTP_CACERT_CANNOT_AUTHENTICATE (-892)
+ /** The current HTTP request was forcefully aborted */
+\#define VERR_HTTP_ABORTED (-893)
+ /** Request was redirected. */
+\#define VERR_HTTP_REDIRECTED (-894)
+ /** Proxy couldn't be resolved. */
+\#define VERR_HTTP_PROXY_NOT_FOUND (-895)
+ /** The remote host couldn't be resolved. */
+\#define VERR_HTTP_HOST_NOT_FOUND (-896)
+ /** Unexpected cURL error configure the proxy. */
+\#define VERR_HTTP_CURL_PROXY_CONFIG (-897)
+ /** Generic CURL error. */
+\#define VERR_HTTP_CURL_ERROR (-899)
+/** @} */
+
+/** @name RTManifest status codes */
+ * @ { */
+/** A digest type used in the manifest file isn't supported. */
+#define VERR_MANIFEST_UNSUPPORTED_DIGEST_TYPE   (-900)
+/** An entry in the manifest file couldn't be interpreted correctly. */
+#define VERR_MANIFEST_WRONG_FILE_FORMAT         (-901)
+/** A digest doesn't match the corresponding file. */
+#define VERR_MANIFEST_DIGEST_MISMATCH           (-902)
+/** The file list doesn't match to the content of the manifest file. */
+#define VERR_MANIFEST_FILE_MISMATCH             (-903)
+/** The specified attribute (name) was not found in the manifest. */
+#define VERR_MANIFEST_ATTR_NOT_FOUND            (-904)
+/** The attribute type did not match. */
+#define VERR_MANIFEST_ATTR_TYPE_MISMATCH        (-905)
+/** No attribute of the specified types was found. */
+#define VERR_MANIFEST_ATTR_TYPE_NOT_FOUND       (-906)
+/** @} */
+
+/** @name RTTar status codes */
+ * @ { */
+/** The checksum of a tar header record doesn't match. */
+#define VERR_TAR_CHKSUM_MISMATCH                (-925)
+/** The tar end of file record was read. */
+#define VERR_TAR_END_OF_FILE                    (-926)
+/** The tar file ended unexpectedly. */
+#define VERR_TAR_UNEXPECTED_EOS                 (-927)
+/** The tar termination records was encountered without reaching the end of
+ * the input stream. */
+#define VERR_TAR_EOS_MORE_INPUT                 (-928)
+/** A number tar header field was malformed. */
+#define VERR_TAR_BAD_NUM_FIELD                  (-929)
+/** A numeric tar header field was not terminated correctly. */
+#define VERR_TAR_BAD_NUM_FIELD_TERM             (-930)
+/** A number tar header field was encoded using base-256 which this
+ * tar implementation currently does not support. */
+#define VERR_TAR_BASE_256_NOT_SUPPORTED         (-931)
+/** A number tar header field yielded a value too large for the internal
+ * variable of the tar interpreter. */
+#define VERR_TAR_NUM_VALUE_TOO_LARGE            (-932)
+/** The combined minor and major device number type is too small to hold the
+ * value stored in the tar header. */
+#define VERR_TAR_DEV_VALUE_TOO_LARGE            (-933)
+/** The mode field in a tar header is bad. */
+#define VERR_TAR_BAD_MODE_FIELD                 (-934)
+/** The mode field should not include the type. */
+#define VERR_TAR_MODE_WITH_TYPE                 (-935)
+/** The size field should be zero for links and symlinks. */
+define VERR_TAR_SIZE_NOT_ZERO (-936)
+/** Encountered an unknown type flag. */
+define VERR_TAR_UNKNOWN_TYPE_FLAG (-937)
+/** The tar header is all zeros. */
+define VERR_TAR_ZERO_HEADER (-938)
+/** Not a uniform standard tape v0.0 archive header. */
+define VERR_TAR_NOT_USTAR_V00 (-939)
+/** The name is empty. */
+define VERR_TAR_EMPTY_NAME (-940)
+/** A non-directory entry has a name ending with a slash. */
+define VERR_TAR_NON_DIR_ENDS_WITH_SLASH (-941)
+/** Encountered an unsupported portable archive exchange (pax) header. */
+define VERR_TAR_UNSUPPORTED_PAX_TYPE (-942)
+/** Encountered an unsupported Solaris Tar extension. */
+define VERR_TAR_UNSUPPORTED_SOLARIS_HDR_TYPE (-943)
+/** Encountered an unsupported GNU Tar extension. */
+define VERR_TAR_UNSUPPORTED_GNU_HDR_TYPE (-944)
+/** Malformed checksum field in the tar header. */
+define VERR_TAR_BAD_CHKSUM_FIELD (-945)
+/** Malformed checksum field in the tar header. */
+define VERR_TAR_MALFORMED_GNU_LONGXXXX (-946)
+/** Too long name or link string. */
+define VERR_TAR_NAME_TOO_LONG (-947)
+/** A directory entry in the archive. */
+define VINF_TAR_DIR_PATH (948)
+/** @} */
+
+/** @} RTPoll status codes */
+ * @ { */
+/** The handle is not pollable. */
+define VERR_POLL_HANDLE_NOT_POLLABLE (-950)
+/** The handle ID is already present in the poll set. */
+define VERR_POLL_HANDLE_ID_EXISTS (-951)
+/** The handle ID was not found in the set. */
+define VINF_TAR_DIR_PATH (-952)
+/** The poll set is full. */
+define VERR_POLL_SET_IS_FULL (-953)
+/** @} */
+
+/** @} Pkzip status codes */
+ * @ { */
+/** No end of central directory record found. */
+define VERR_PKZIP_NO_EOCB (-960)
+/** Too long name string. */
+define VERR_PKZIP_NAME_TOO_LONG (-961)
+/** Local file header corrupt. */
+define VERR_PKZIP_BAD_LF_HEADER (-962)
+/** Central directory file header corrupt. */
+#define VERR_PKZIP_BAD_CDF_HEADER (-963)
+/** Encountered an unknown type flag. */
+#define VERR_PKZIP_UNKNOWN_TYPE_FLAG (-964)
+/** Found a ZIP64 Extra Information Field in a ZIP32 file. */
+define VERR_PKZIP_ZIP64EX_IN_ZIP32 (-965)
+
+
+/** @name RTZip status codes */
+ * @ { */
+/** Generic zip error. */
+define VERR_ZIP_ERROR (-22000)
+/** The compressed data was corrupted. */
+define VERR_ZIP_CORRUPTED (-22001)
+/** Ran out of memory while compressing or uncompressing. */
+define VERR_ZIP_NO_MEMORY (-22002)
+/** The compression format version is unsupported. */
+define VERR_ZIP_UNSUPPORTED_VERSION (-22003)
+/** The compression method is unsupported. */
+define VERR_ZIP_UNSUPPORTED_METHOD (-22004)
+/** The compressed data started with a bad header. */
+define VERR_ZIP_BAD_HEADER (-22005)
+/** @ } */
+
+/** @name RTVfs status codes */
+ * @ { */
+/** The VFS chain specification does not have a valid prefix. */
+define VERR_VFS_CHAIN_NO_PREFIX (-22100)
+/** The VFS chain specification is empty. */
+define VERR_VFS_CHAIN_EMPTY (-22101)
+/** Expected an element. */
+define VERR_VFS_CHAIN_EXPECTED_ELEMENT (-22102)
+/** The VFS object type is not known. */
+define VERR_VFS_CHAIN_UNKNOWN_TYPE (-22103)
+/** Expected a left parentheses. */
+define VERR_VFS_CHAIN_EXPECTED_LEFT_PARENTHESES (-22104)
+/** Expected a right parentheses. */
+define VERR_VFS_CHAIN_EXPECTED_RIGHT_PARENTHESES (-22105)
+/** Expected a provider name. */
+define VERR_VFS_CHAINEXPECTED_PROVIDER_NAME (-22106)
+/** Expected an element separator (| or :). */
+define VERR_VFS_CHAINEXPECTED_SEPARATOR (-22107)
+/** Leading element separator not permitted. */
+define VERR_VFS_CHAIN_LEADING_SEPARATOR (-22108)
+/** Trailing element separator not permitted. */
+define VERR_VFS_CHAIN_TRAILING_SEPARATOR (-22109)
+/** The provider is only allowed as the first element. */
+define VERR_VFS_CHAIN_MUST_BE_FIRST_ELEMENT (-22110)
# The provider cannot be the first element. */
#define VERR_VFS_CHAIN_CANNOT_BE_FIRST_ELEMENT (-22111)

/* VFS object cast failed. */
#define VERR_VFS_CHAIN_CAST_FAILED (-22112)

/* Internal error in the VFS chain code. */
#define VERR_VFS_CHAIN_IPE (-22113)

/* VFS chain element provider not found. */
#define VERR_VFS_CHAIN_PROVIDER_NOT_FOUND (-22114)

/* VFS chain does not terminate with the desired object type. */
#define VERR_VFS_CHAIN_FINAL_TYPE_MISMATCH (-22115)

/* VFS chain element takes no arguments. */
#define VERR_VFS_CHAIN_NO_ARGS (-22116)

/* VFS chain element takes exactly one argument. */
#define VERR_VFS_CHAIN_ONE_ARG (-22117)

/* VFS chain element expected at most one argument. */
#define VERR_VFS_CHAIN_AT_MOST_ONE_ARG (-22118)

/* VFS chain element expected at least one argument. */
#define VERR_VFS_CHAIN_AT_LEAST_ONE_ARG (-22119)

/* VFS chain element takes exactly two arguments. */
#define VERR_VFS_CHAIN_TWO_ARGS (-22120)

/* VFS chain element expected at least two arguments. */
#define VERR_VFS_CHAIN_AT_LEAST_TWO_ARGS (-22121)

/* VFS chain element expected at most two arguments. */
#define VERR_VFS_CHAIN_AT_MOST_TWO_ARGS (-22122)

/* VFS chain element takes exactly three arguments. */
#define VERR_VFS_CHAIN_THREE_ARGS (-22123)

/* VFS chain element expected at least three arguments. */
#define VERR_VFS_CHAIN_AT_LEAST_THREE_ARGS (-22124)

/* VFS chain element expected at most three arguments. */
#define VERR_VFS_CHAIN_AT_MOST_THREE_ARGS (-22125)

/* VFS chain element takes exactly four arguments. */
#define VERR_VFS_CHAIN_FOUR_ARGS (-22126)

/* VFS chain element expected at least four arguments. */
#define VERR_VFS_CHAIN_AT_LEAST_FOUR_ARGS (-22127)

/* VFS chain element expected at most four arguments. */
#define VERR_VFS_CHAIN_AT_MOST_FOUR_ARGS (-22128)

/* VFS chain element takes exactly five arguments. */
#define VERR_VFS_CHAIN_FIVE_ARGS (-22129)

/* VFS chain element expected at least five arguments. */
#define VERR_VFS_CHAIN_AT_LEAST_FIVE_ARGS (-22130)

/* VFS chain element expected at most five arguments. */
#define VERR_VFS_CHAIN_AT_MOST_FIVE_ARGS (-22131)

/* VFS chain element takes exactly six arguments. */
#define VERR_VFS_CHAIN_SIX_ARGS (-22132)

/* VFS chain element expected at least six arguments. */
#define VERR_VFS_CHAIN_AT_LEAST_SIX_ARGS (-22133)

/* VFS chain element expected at most six arguments. */
#define VERR_VFS_CHAIN_AT_MOST_SIX_ARGS (-22134)
+/** VFS chain element expected at most six arguments. */
+#define VERR_VFS_CHAIN_TOO_FEW_ARGS (-22135)
+/** VFS chain element expected at most six arguments. */
+#define VERR_VFS_CHAIN_TOO_MANY_ARGS (-22136)
+/** VFS chain element expected non-empty argument. */
+#define VERR_VFS_CHAIN_EMPTY_ARG (-22137)
+/** Invalid argument to VFS chain element. */
+#define VERR_VFS_CHAIN_INVALID_ARGUMENT (-22138)
+/** VFS chain element only provides file and I/O stream (ios) objects. */
+#define VERR_VFS_CHAIN_ONLY_FILE_OR_IOS (-22139)
+/** VFS chain element only provides I/O stream (ios) objects. */
+#define VERR_VFS_CHAIN_ONLY_IOS (-22140)
+/** VFS chain element only provides directory (dir) objects. */
+#define VERR_VFS_CHAIN_ONLY_DIR (-22141)
+/** VFS chain element only provides file system stream (fss) objects. */
+#define VERR_VFS_CHAIN_ONLY_FSS (-22142)
+/** VFS chain element only provides file system (vfs) objects. */
+#define VERR_VFS_CHAIN_ONLY_VFS (-22143)
+/** VFS chain element only provides file, I/O stream (ios), or
+ * directory (dir) objects. */
+#define VERR_VFS_CHAIN_ONLY_FILE_OR_IOS_OR_DIR (-22144)
+/** VFS chain element only provides file, I/O stream (ios), or
+ * directory (dir) objects. */
+#define VERR_VFS_CHAIN_ONLY_DIR_OR_VFS (-22145)
+/** VFS chain element takes a file object as input. */
+#define VERR_VFS_CHAIN_TAKES_FILE (-22146)
+/** VFS chain element takes a file or I/O stream (ios) object as input. */
+#define VERR_VFS_CHAIN_TAKES_FILE_OR_IOS (-22147)
+/** VFS chain element takes a directory (dir) object as input. */
+#define VERR_VFS_CHAIN_TAKES_DIR (-22148)
+/** VFS chain element takes a file system stream (fss) object as input. */
+#define VERR_VFS_CHAIN_TAKES_FSS (-22149)
+/** VFS chain element takes a file system (vfs) object as input. */
+#define VERR_VFS_CHAIN_TAKES_VFS (-22150)
+/** VFS chain element takes a directory (dir) or file system (vfs)
+ * object as input. */
+#define VERR_VFS_CHAIN_TAKES_DIR_OR_VFS (-22151)
+/** VFS chain element takes a directory (dir), file system stream (fss),
+ * or file system (vfs) object as input. */
+#define VERR_VFS_CHAIN_TAKES_DIR_OR_FSS_OR_VFS (-22152)
+/** VFS chain element only provides a read-only I/O stream, while the chain
+ * requires write access. */
+#define VERR_VFS_CHAIN_READ_ONLY_IOS (-22153)
+/** VFS chain element only provides a read-only I/O stream, while the chain
+ * read access. */
+#define VERR_VFS_CHAIN_WRITE_ONLY_IOS (-22154)
+/** VFS chain only has a single element and it is just a path, need to be
+ * treated as a normal file system request. */
```c
#define VERR_VFS_CHAIN_PATH_ONLY                    (-22155)
/** VFS chain element preceding the final path needs to be a directory, file
 + * system or file system stream. */
#define VERR_VFS_CHAIN_TYPE_MISMATCH_PATH_ONLY      (-22156)
/** VFS chain doesn't end with a path only element. */
#define VERR_VFS_CHAIN_NOT_PATH_ONLY                (-22157)
/** The path only element at the end of the VFS chain is too short to make out
 + * the parent directory. */
#define VERR_VFS_CHAIN_TOO_SHORT_FOR_PARENT         (-22158)
/** @} */

/** @name RTDvm status codes
 + * @} */

#define VERR_DVM_MAP_EMPTY                          (-22200)
/** The volume map doesn't contain any valid volume. */
#define VERR_DVM_MAP_NO_VOLUME                      (-22201)
/** @} */

/** @name Logger status codes
 + * @{ */

#define VERR_LOG_REVISION_MISMATCH                  (-22300)
/** @} */

/* see above, 22400..22499 is used for misc codes! */

/** @name Logger status codes
 + * @{ */

#define VERR_SYS_CANNOT_POWER_OFF                   (-22500)
/** Power off is not supported by the hardware or the OS. */
#define VINF_SYS_MAY_POWER_OFF                      (22501)
/** The halt action was requested, but the OS may actually power
 + * off the machine. */
#define VERR_SYS_SHUTDOWN_FAILED                    (-22502)
/** Shutdown failed. */
/** @} */

/** @name Filesystem status codes
 + * @{ */

#define VERR_FILESYSTEM_CORRUPT                     (-22600)
/** @} */

/** @name RTZipXar status codes.
 + * @{ */

#define VERR_XAR_WRONG_MAGIC                        (-22700)
/** @} */
```
+/** Bad header size. */
#define VERR_XAR_BAD_HDR_SIZE (-22701)
+/** Unsupported version. */
#define VERR_XAR_UNSUPPORTED_VERSION (-22702)
+/** Unsupported hashing function. */
#define VERR_XAR_UNSUPPORTED_HASH_FUNCTION (-22703)
+/** The table of content (TOC) is too small and therefore can't be valid. */
#define VERR_XAR_TOC_TOO_SMALL (-22704)
+/** The table of content (TOC) is too big. */
#define VERR_XAR_TOC_TOO_BIG (-22705)
+/** The compressed table of content is too big. */
#define VERR_XAR_TOC_TOO_BIG_COMPRESSED (-22706)
+/** The uncompressed table of content size in the header didn't match what
+ * ZLib returned. */
#define VERR_XAR_TOC_UNCOMP_SIZE_MISMATCH (-22707)
+/** The table of content string length didn't match the size specified in the
+ * header. */
#define VERR_XAR_TOC_STRLEN_MISMATCH (-22708)
+/** The table of content isn't valid UTF-8. */
#define VERR_XAR_TOC_UTF8_ENCODING (-22709)
+/** XML error while parsing the table of content. */
#define VERR_XAR_TOC_XML_PARSE_ERROR (-22710)
+/** The table of content XML document does not have a toc element. */
#define VERR_XML_TOC_ELEMENT_MISSING (-22711)
+/** The XAR table of content digest doesn't match. */
#define VERR_XAR_TOC_DIGEST_MISMATCH (-22712)
+/** The hash function in the header doesn't match the one in the table of
+ * content. */
#define VERR_XAR_HASH_FUNCTION_MISMATCH (-22713)
+/** Bad digest length encountered in the table of content. */
#define VERR_XAR_BAD_DIGEST_LENGTH (-22714)
+/** The order of elements in the XAR file does not lend it self to expansion
+ * from an I/O stream. */
#define VERR_XAR_NOT_STREAMABLE_ELEMENT_ORDER (-22715)
+/** Missing offset element in table of content sub-element. */
#define VERR_XAR_MISSING_OFFSET_ELEMENT (-22716)
+/** Bad offset element in table of content sub-element. */
#define VERR_XAR_BAD_OFFSET_ELEMENT (-22717)
+/** Missing size element in table of content sub-element. */
#define VERR_XAR_MISSING_SIZE_ELEMENT (-22718)
+/** Bad size element in table of content sub-element. */
#define VERR_XAR_BAD_SIZE_ELEMENT (-22719)
+/** Missing length element in table of content sub-element. */
#define VERR_XAR_BAD_SIZE_ELEMENT (-22720)
+/** Bad length element in table of content sub-element. */
+/#define VERR_XAR_BAD_LENGTH_ELEMENT (-22723)
+/** Bad file element in XAR table of content. */
+/#define VERR_XAR_BAD_FILE_ELEMENT (-22724)
+/** Missing data element for XAR file. */
+/#define VERR_XAR_MISSING_DATA_ELEMENT (-22725)
+/** Unknown XAR file type value. */
+/#define VERR_XAR_UNKNOWN_FILE_TYPE (-22726)
+/** Missing encoding element for XAR stream. */
+/#define VERR_XAR_NO_ENCODING (-22727)
+/** Bad timestamp for XAR file. */
+/#define VERR_XAR_BAD_FILE_TIMESTAMP (-22728)
+/** Bad file mode for XAR file. */
+/#define VERR_XAR_BAD_FILE_MODE (-22729)
+/** Bad file user id for XAR file. */
+/#define VERR_XAR_BAD_FILE_UID (-22730)
+/** Bad file group id for XAR file. */
+/#define VERR_XAR_BAD_FILE_GID (-22731)
+/** Bad file inode device number for XAR file. */
+/#define VERR_XAR_BAD_FILE_DEVICE_NO (-22732)
+/** Bad file inode number for XAR file. */
+/#define VERR_XAR_BAD_FILE_INODE (-22733)
+/** Invalid name for XAR file. */
+/#define VERR_XAR_INVALID_FILE_NAME (-22734)
+/** The message digest of the extracted data does not match the one supplied. */
+/#define VERR_XAR_EXTRACTED_HASH_MISMATCH (-22735)
+/** The extracted data has exceeded the expected size. */
+/#define VERR_XAR_EXTRACTED_SIZE_EXCEEDED (-22736)
+/** The message digest of the archived data does not match the one supplied. */
+/#define VERR_XAR_ARCHIVED_HASH_MISMATCH (-22737)
+/** The decompressor completed without using all the input data. */
+/#define VERR_XAR_UNUSED_ARCHIVED_DATA (-22738)
+/** Expected the archived and extracted XAR data sizes to be the same for
+ expected uncompressed data. */
+/#define VERR_XAR_ARCHIVED_AND_EXTRACTED_SIZES_MISMATCH (-22739)
+/** @]*) */
+
+/** Error reading a certificate in PEM format from BIO. */
+/#define VERR_X509_READING_CERT_FROM_BIO (-23100)
+/** Error extracting a public key from the certificate. */
+/#define VERR_X509_EXTRACT_PUBKEY_FROM_CERT (-23101)
+/** Error extracting RSA from the public key. */
+/#define VERR_X509_EXTRACT_RSA_FROM_PUBLIC_KEY (-23102)
+/** Signature verification failed. */
+/#define VERR_X509_RSA_VERIFICATION_FAILURE (-23103)
+/** Basic constraints were not found. */
+#define VERR_X509_NO_BASIC_CONSTRAINTS (-23104)
+/** Error getting extensions from the certificate. */
+#define VERR_X509_GETTING_EXTENSION_FROM_CERT (-23105)
+/** Error getting a data from the extension. */
+#define VERR_X509_GETTING_DATA_FROM_EXTENSION (-23106)
+/** Error formatting an extension. */
+#define VERR_X509_PRINT_EXTENSION_TO_BIO (-23107)
+/** X509 certificate verification error. */
+#define VERR_X509_CERTIFICATE_VERIFICATION_FAILURE (-23108)
+/** X509 certificate isn’t self signed. */
+#define VERR_X509_NOT_SELFSIGNED_CERTIFICATE (-23109)
+/** Warning X509 certificate isn’t self signed. */
+#define VINF_X509_NOT_SELFSIGNED_CERTIFICATE 23109
+/** @} */
+
+/** @name RTAsn1 status codes */
+ * @} */
+#define VERR_ASN1_ERROR (-22800)
+/** Encountered an ASN.1 string type that is not supported. */
+#define VERR_ASN1_STRING_TYPE_NOT_IMPLEMENTED (-22801)
+/** Invalid ASN.1 UTF-8 STRING encoding. */
+#define VERR_ASN1_INVALID_UTF8_STRING_ENCODING (-22802)
+/** Invalid ASN.1 NUMERIC STRING encoding. */
+#define VERR_ASN1_INVALID_NUMERIC_STRING_ENCODING (-22803)
+/** Invalid ASN.1 PRINTABLE STRING encoding. */
+#define VERR_ASN1_INVALID_PRINTABLE_STRING_ENCODING (-22804)
+/** Invalid ASN.1 T61/TELETEX STRING encoding. */
+#define VERR_ASN1_INVALID_T61_STRING_ENCODING (-22805)
+/** Invalid ASN.1 VIDEOTEX STRING encoding. */
+#define VERR_ASN1_INVALID_VIDEOTEX_STRING_ENCODING (-22806)
+/** Invalid ASN.1 IA5 STRING encoding. */
+#define VERR_ASN1_INVALID_IA5_STRING_ENCODING (-22807)
+/** Invalid ASN.1 GRAPHIC STRING encoding. */
+#define VERR_ASN1_INVALID_GRAPHIC_STRING_ENCODING (-22808)
+/** Invalid ASN.1 ISO-646/VISIBLE STRING encoding. */
+#define VERR_ASN1_INVALID_VISIBLE_STRING_ENCODING (-22809)
+/** Invalid ASN.1 GENERAL STRING encoding. */
+#define VERR_ASN1_INVALID_GENERAL_STRING_ENCODING (-22810)
+/** Invalid ASN.1 UNIVERSAL STRING encoding. */
+#define VERR_ASN1_INVALID_UNIVERSAL_STRING_ENCODING (-22811)
+/** Invalid ASN.1 BMP STRING encoding. */
+#define VERR_ASN1_INVALID_BMP_STRING_ENCODING (-22812)
+/** Invalid ASN.1 OBJECT IDENTIFIER encoding. */
+#define VERR_ASN1_INVALID_OBJID_ENCODING (-22813)
+/** A component value of an ASN.1 OBJECT IDENTIFIER is too big for our */
+ * internal representation (32-bits). */
+/** Constructed string is not according to the encoding rules. */
+/** Unexpected ASN.1 tag encountered while decoding. */
+/** Unexpected ASN.1 tag class/flag encountered while decoding. */
+/** ASN.1 bit string object is out of bounds. */
+/** Bad ASN.1 time object. */
+/** Failed to normalize ASN.1 time object. */
+/** Normalization of ASN.1 time object didn't work out. */
+/** Invalid ASN.1 UTC TIME encoding. */
+/** Invalid ASN.1 GENERALIZED TIME encoding. */
+/** Invalid ASN.1 BOOLEAN encoding. */
+/** Invalid ASN.1 NULL encoding. */
+/** Invalid ASN.1 BIT STRING encoding. */
+/** Unimplemented ASN.1 tag reached the RTAsn1DynType code. */
+/** Unexpected ASN.1 fake/dummy object. */
+/** ASN.1 object is too long. */
+/** Expected primitive ASN.1 object. */
+/** Expected valid data pointer for ASN.1 object. */
+/** The ASN.1 encoding is too deeply nested for the decoder. */
+/** Generic unexpected object ID error. */
+/** ANS.1 internal error 1. */
+/** ANS.1 internal error 2. */
+/** ANS.1 internal error 3. */
+/** ANS.1 internal error 4. */
+define VERR ASN1_INTERNAL_ERROR_4 (-22898)
+/** ANSI internal error 5. */
+define VERR ASN1_INTERNAL_ERROR_5 (-22899)
+/** @} */

+/** @} More RTLdr status codes. */
+* @ { */
+/** Image Verification Failure: No Authenticode Signature. */
+define VERR LDRVI NOT SIGNED (-22900)
+/** Image Verification Warning: No Authenticode Signature, but on whitelist. */
+define VINF LDRVI NOT SIGNED (22900)
+/** Image Verification Failure: Error reading image headers. */
+define VERR LDRVI READ ERROR HDR (-22901)
+/** Image Verification Failure: Error reading section headers. */
+define VERR LDRVI READ ERROR SHDRS (-22902)
+/** Image Verification Failure: Error reading authenticode signature data. */
+define VERR LDRVI READ ERROR SIGNATURE (-22903)
+/** Image Verification Failure: Error reading file for hashing. */
+define VERR LDRVI READ ERROR HASH (-22904)
+/** Image Verification Failure: Error determining the file length. */
+define VERR LDRVI FILE LENGTH ERROR (-22905)
+/** Image Verification Failure: Error allocating memory for state data. */
+define VERR LDRVI NO MEMORY STATE (-22906)
+/** Image Verification Failure: Error allocating memory for authenticode signature data. */
+define VERR LDRVI NO MEMORY SIGNATURE (-22907)
+/** Image Verification Failure: Error allocating memory for section headers. */
+define VERR LDRVI NO MEMORY SHDRS (-22908)
+/** Image Verification Failure: Authenticode parsing output. */
+define VERR LDRVI NO MEMORY PARSE OUTPUT (-22909)
+/** Image Verification Failure: Invalid security directory entry. */
+define VERR LDRVI INVALID SECURITY DIR ENTRY (-22910)
+/** Image Verification Failure: */
+define VERR LDRVI BAD CERT HDR LENGTH (-22911)
+/** Image Verification Failure: */
+define VERR LDRVI BAD CERT HDR REVISION (-22912)
+/** Image Verification Failure: */
+define VERR LDRVI BAD CERT HDR TYPE (-22913)
+/** Image Verification Failure: More than one certificate table entry. */
+define VERR LDRVI BAD CERT MULTIPLE (-22914)

+/** Image Verification Failure: */
+define VERR LDRVI BAD MZ OFFSET (-22915)
+/** Image Verification Failure: Invalid section count. */
+define VERR LDRVI INVALID SECTION_COUNT (-22916)
+/** Image Verification Failure: Raw data offsets and sizes are out of range. */
+define VERR LDRVI SECTION_RAW_DATA_VALUES (-22917)
+/** Optional header magic and target machine does not match. */
#define VERR_LDRVI_MACHINE_OPT_HDR_MAGIC_MISMATCH (-22918)
+/** Unsupported image target architecture. */
+#define VERR_LDRVI_UNSUPPORTED_ARCH (-22919)
+
+/** Image Verification Failure: Internal error in signature parser. */
+#define VERR_LDRVI_PARSE_IPE (-22921)
+/** Generic BER parse error. Will be refined later. */
+#define VERR_LDRVI_PARSE_BER_ERROR (-22922)
+
+/** Expected the signed data content to be the object ID of
+ * SpcIndirectDataContent, found something else instead. */
+#define VERR_LDRVIEXPECTED_INDIRECT_DATA_CONTENT_OID (-22923)
+/** Page hash table size overflow. */
+#define VERR_LDRVI_PAGE_HASH_TAB_SIZE_OVERFLOW (-22924)
+/** Page hash table is too long (covers signature data, i.e. itself). */
+#define VERR_LDRVI_PAGE_HASH_TAB_TOO_LONG (-22925)
+/** The page hash table is not strictly ordered by offset. */
+#define VERR_LDRVI_PAGE_HASH_TAB_NOT_STRICTLY_SORTED (-22926)
+/** The page hash table hashes data outside the defined and implicit sections. */
+#define VERR_PAGE_HASH_TAB_HASES_NON_SECTION_DATA (-22927)
+/** Page hash mismatch. */
+#define VERR_LDRVI_PAGE_HASH_MISMATCH (-22928)
+/** Image hash mismatch. */
+#define VERR_LDRVI_IMAGE_HASH_MISMATCH (-22929)
+
+/** Cannot resolve symbol because it's a forwarder. */
+#define VERR_LDR_FORWARDER (-22950)
+/** The symbol is not a forwarder. */
+#define VERR_LDR_NOT_FORWARDER (-22951)
+/** Malformed forwarder entry. */
+#define VERR_LDR_BAD_FORWARDER (-22952)
+/** Too long forwarder chain or there is a loop. */
+#define VERR_LDR_FORWARDER_CHAIN_TOO_LONG (-22953)
+/** Support for forwarders has not been implemented. */
+#define VERR_LDR_FORWARDERS_NOT_SUPPORTED (-22954)
+/** @} */
+
+/** @name RTCrX509 status codes. */
+/** @ { */
+/** Generic X.509 error. */
+#define VERR_CR_X509_GENERIC_ERROR (-23000)
+/** Internal error in the X.509 code. */
+#define VERR_CR_X509_INTERNAL_ERROR (-23001)
+/** Internal error in the X.509 certificate path building and verification */
+/** code. */
+#define VERR_CR_X509_CERTPATHS_INTERNAL_ERROR (-23002)
+/** Path not verified yet. */
+#define VERR_CR_X509_NOT_VERIFIED (-23003)
+/** The certificate path has no trust anchor. */
+/** Unknown X.509 certificate signature algorithm. */
+/** Certificate signature algorithm mismatch. */
+/** The signature algorithm in the to-be-signed certificate part does not match + * the one associated with the signature. */
+/** Certificate extensions requires certificate version 3 or later. */
+/** Unique issuer and subject IDs require version certificate 2. */
+/** Certificate serial number length is out of bounds. */
+/** Unsupported X.509 certificate version. */
+/** Public key is too small. */
+/** Invalid string tag for a X.509 name object. */
+/** Empty string in X.509 name object. */
+/** Non-string object inside X.509 name object. */
+/** Empty set inside X.509 name. */
+/** Empty sub-string set inside X.509 name. */
+/** The NotBefore and NotAfter values of an X.509 Validity object seems to + * have been swapped around. */
+/** Duplicate certificate extension. */
+/** Missing relative distinguished name map entry. */
+/** Certificate path validator: No trusted certificate paths. */
+/** Certificate path validator: No valid certificate policy. */
+/** Certificate path validator: Unknown critical certificate extension. */
+/** Certificate path validator: Intermediate certificate is missing the + * KeyCertSign usage flag. */
+/** Certificate path validator: Hit the max certificate path length before + * reaching trust anchor. */
/** Certificate path validator: Intermediate certificate is not marked as a * certificate authority (CA). */
#define VERR_CR_X509_CPV_NOT_CA_CERT (-23026)
/** Certificate path validator: Intermediate certificate is not a version 3 * certificate. */
#define VERR_CR_X509_CPV_NOT_V3_CERT (-23027)
/** Certificate path validator: Invalid policy mapping (to/from anyPolicy). */
#define VERR_CR_X509_CPV_INVALID_POLICY_MAPPING (-23028)
/** Certificate path validator: Name constraints permits no names. */
#define VERR_CR_X509_CPV_NO_PERMITTED_NAMES (-23029)
/** Certificate path validator: Name constraints does not permits the * certificate name. */
#define VERR_CR_X509_CPV_NAME_NOT_PERMITTED (-23030)
/** Certificate path validator: Name constraints does not permits the * alternative certificate name. */
#define VERR_CR_X509_CPV_ALT_NAME_NOT_PERMITTED (-23031)
/** Certificate path validator: Intermediate certificate subject does not * match child issuer property. */
#define VERR_CR_X509_CPV_ISSUER_MISMATCH (-23032)
/** Certificate path validator: The certificate is not valid at the * specified time. */
#define VERR_CR_X509_CPV_NOT_VALID_AT_TIME (-23033)
/** Certificate path validator: Unexpected choice found in general subtree * object (name constraints). */
#define VERR_CR_X509_CPV_UNEXP_GENERAL_SUBTREE_CHOICE (-23034)
/** Certificate path validator: Unexpected minimum value found in general * subtree object (name constraints). */
#define VERR_CR_X509_CPV_UNEXP_GENERAL_SUBTREE_MIN (-23035)
/** Certificate path validator: Unexpected maximum value found in * general subtree object (name constraints). */
#define VERR_CR_X509_CPV_UNEXP_GENERAL_SUBTREE_MAX (-23036)
/** Certificate path builder: Encountered bad certificate context. */
#define VERR_CR_X509_CPV_OSSL_D2I_FAILED (-23037)
/** @name RTCrPkcs7 status codes. */
#define VERR_CR_PKCS7_GENERIC_ERROR (-23300)
/** Signed data verification failed because there are zero signer infos. */
#define VERR_CR_PKCS7_NO_SIGNER_INFOS (-23301)
/** Signed data certificate not found. */
#define VERR_CR_PKCS7_SIGNED_DATA_CERT_NOT_FOUND (-23302)
/** Signed data verification failed due to key usage issues. */
#define VERR_CR_PKCS7_KEY_USAGE_MISMATCH (-23303)
/** Signed data verification failed because of missing (or duplicate)
+ * authenticated content-type attribute. */
+ */** Signed data verification failed because of the authenticated content-type
+ * attribute did not match. */
+ */** Signed data verification failed because of a malformed authenticated
+ * content-type attribute. */
+ */** Signed data verification failed because of missing (or duplicate)
+ * authenticated message-digest attribute. */
+ */** Signed data verification failed because the authenticated message-digest
+ * attribute did not match. */
+ */** Signed data verification failed because of a malformed authenticated
+ * message-digest attribute. */
+ */** Signature verification failed. */
+ */** Internal PKCS #7 error. */
+ ** OpenSSL d2i_PKS7 failed. */
+ */** OpenSSL PKCS #7 verification failed. */
+ */** Digest algorithm parameters are not supported by the PKCS #7 code. */
+ */** The digest algorithm of a signer info entry was not found in the list of
+ * digest algorithms in the signed data. */
+ */** The PKCS #7 content is not signed data. */
+ */** No digest algorithms listed in PKCS #7 signed data. */
+ */** Too many digest algorithms used by PKCS #7 signed data. This is an
+ * internal limitation of the code that aims at saving kernel stack space. */
+ */** Error creating digest algorithm calculator. */
+ */** Error while calculating a digest for a PKCS #7 verification operation. */
+ */** Unsupported PKCS #7 signed data version. */
+ */** PKCS #7 signed data has no digest algorithms listed. */
+ */** Unknown digest algorithm used by PKCS #7 object. */
+ */** Expected PKCS #7 object to ship at least one certificate. */
/+** @name RTCrSpc status codes. */
+ * @ { */
+/** Generic SPC error. */
+/** SPC requires there to be exactly one SignerInfo entry. */
+/** There shall be exactly one digest algorithm to go with the single */
+ * SignerInfo entry required by SPC. */
+/** The digest algorithm in the SignerInfo does not match the one in the */
+ * indirect data. */
+/** The digest algorithm in the indirect data was not found in the list of */
+ * digest algorithms in the signed data structure. */
+/** The digest algorithm is not known to us. */
+/** The indirect data digest size does not match the digest algorithm. */
+/** Expected PE image data inside indirect data object. */
+/** Internal SPC error: The PE image data is missing. */
+/** Bad SPC object moniker UUID field. */
+/** Unknown SPC object moniker UUID. */
+/** SPC error: Bad object moniker choice value. */
+/** Internal SPC error: Bad object moniker data pointer. */
+/** Multiple PE image page hash tables. */
+/**
+/** Unknown SPC PE image attribute. */
+#define VERR_CR_SPC_PEIMAGE_UNKNOWN_ATTRIBUTE (-23414)
+/** URL not expected in SPC PE image data. */
+#define VERR_CR_SPC_PEIMAGE_URL_UNEXPECTED (-23415)
+/** PE image data without any valid content was not expected. */
+#define VERR_CR_SPC_PEIMAGE_NO_CONTENT (-23416)
+/** @} */
+
+/** @name RTCrPkix status codes. */
+* @} */
+/** Generic PKCS \#7 error. */
+#define VERR_CR_PKIX_GENERIC_ERROR (-23500)
+/** Parameters was presented to a signature schema that does not take any. */
+#define VERR_CR_PKIX_SIGNATURE_TAKES_NO_PARAMETERS (-23501)
+/** Unknown hash digest type. */
+#define VERR_CR_PKIX_UNKNOWN_DIGEST_TYPE (-23502)
+/** Internal error. */
+#define VERR_CR_PKIX_INTERNAL_ERROR (-23503)
+/** The hash is too long for the key used when signing/verifying. */
+#define VERR_CR_PKIX_HASH_TOO_LONG_FOR_KEY (-23504)
+/** The signature is too long for the scratch buffer. */
+#define VERR_CR_PKIX_SIGNATURE_TOO_LONG (-23505)
+/** The signature is greater than or equal to the key. */
+#define VERR_CR_PKIX_SIGNATURE_GE_KEY (-23506)
+/** The signature is negative. */
+#define VERR_CR_PKIX_SIGNATURE_NEGATIVE (-23507)
+/** PKIX signature no does not match up to the current data. */
+#define VERR_CR_PKIX_SIGNATURE_MISMATCH (-23508)
+/** PKIX cipher algorithm parameters are not implemented. */
+#define VERR_CR_PKIX_CIPHER_ALGO_PARAMS_NOT_IMPL (-23509)
+/** Cipher algorithm is not known to us. */
+#define VERR_CR_PKIX_CIPHER_ALGO_NOT_KNOWN (-23510)
+/** PKIX cipher algorithm is not known to OpenSSL. */
+#define VERR_CR_PKIX_OSSL_CIPHER_ALGO_NOT_KNOWN (-23511)
+/** PKIX cipher algorithm is not known to OpenSSL EVP API. */
+#define VERR_CR_PKIX_OSSL_CIPHER_ALGO_NOT_KNOWN_EVP (-23512)
+/** OpenSSL failed to init PKIX cipher algorithm context. */
+#define VERR_CR_PKIX_OSSL_CIPHER_ALGO_INIT_FAILED (-23513)
+/** Final OpenSSL PKIX verification failed. */
+#define VERR_CR_PKIX_OSSL_VERIFY_FINAL_FAILED (-23514)
+/** OpenSSL failed to decode the public key. */
+#define VERR_CR_PKIX_OSSL_VERIFY_PUBLIC_KEY_FAILED (-23515)
+/** The EVP_PKEN_TYPE API in OpenSSL failed. */
+#define VERR_CR_PKIX_OSSL_EVP_PKEN_TYPE_ERROR (-23516)
+/** @} */
+
/** @name RTCrStore status codes. */
+#define VERR_CR_STORE_GENERIC_ERROR (-23700)
/** Generic store error. */

/** @name RTCrRsa status codes. */
+#define VERR_CR_RSA_GENERIC_ERROR (-23900)
/** Generic RSA error. */

/** @name RTBigNum status codes. */
+#define VERR_BIGNUM_SENSITIVE_INPUT (-24000)
/** Sensitive input requires the result(s) to be initialized as sensitive. */
+#define VERR_BIGNUM_DIV_BY_ZERO (-24001)
/** Attempt to divide by zero. */
+#define VERR_BIGNUM_NEGATIVE_EXPONENT (-24002)
/** Negative exponent makes no sense to integer math. */

/** @name RTCrDigest status codes. */
+#define VERR_CR_DIGEST_OSSL_DIGEST_INIT_ERROR (-24200)
/** OpenSSL failed to initialize the digest algorithm context. */
+#define VERR_CR_DIGEST_OSSL_DIGEST_CTX_COPY_ERROR (-24201)
/** OpenSSL failed to clone the digest algorithm context. */

/** @name RTPath status codes. */
+#define VERR_PATH_MATCH_UNKNOWN_VARIABLE (-24400)
/** Unknown glob variable. */
+#define VERR_PATH_MATCH_VARIABLE_MUST_BE_FIRST (-24401)
/** The specified glob variable must be first in the pattern. */
+#define VERR_PATH_GLOB_UNKNOWN_CHAR_CLASS (-24403)
/** Hit unimplemented glob pattern matching feature. */

/** @name RTUri status codes. */
+#define VERR_URI_EMPTY (-24600)
/** The URI is empty */
+#define VERR_URI_EMPTY (-24600)
/** The URI is too short to be a valid URI. */
+/** Invalid scheme. */
+#define VERR_URI_INVALID_SCHEME (-24602)
+/** Invalid port number. */
+#define VERR_URI_INVALID_PORT_NUMBER (-24603)
+/** Invalid escape sequence. */
+#define VERR_URI_INVALID_ESCAPE_SEQ (-24604)
+/** Escape URI char decodes as zero (the C string terminator). */
+#define VERR_URI_ESCAPED_ZERO (-24605)
+/** Escaped URI characters does not decode to valid UTF-8. */
+#define VERR_URI_ESCAPED_CHARS_NOT_VALID_UTF8 (-24606)
+/** Escaped URI character is not a valid UTF-8 lead byte. */
+#define VERR_URI_INVALID_ESCAPED_UTF8_LEAD_BYTE (-24607)
+/** Escaped URI character sequence with invalid UTF-8 continuation byte. */
+#define VERR_URI_INVALID_ESCAPED_UTF8_CONTINUATION_BYTE (-24608)
+/** Missing UTF-8 continuation in escaped URI character sequence. */
+#define VERR_URI_MISSING_UTF8_CONTINUATION_BYTE (-24609)
+/** Expected URI using the 'file:' scheme. */
+#define VERR_URI_NOT_FILE_SCHEME (-24610)
+/** @} */
+
+/** @name RTJson status codes. */
+* @ { */
+/** The called method does not work with the value type of the given JSON value. */
+#define VERR_JSON_VALUE_INVALID_TYPE (-24700)
+/** The iterator reached the end. */
+#define VERR_JSON_ITERATOR_END (-24701)
+/** The JSON document is malformed. */
+#define VERR_JSON_MALFORMED (-24702)
+/** @} */
+
+/** @name RTVfs status codes. */
+* @ { */
+/** Unknown file system format. */
+#define VERR_VFS_UNKNOWN_FORMAT (-24800)
+/** Found bogus values in the file system. */
+#define VERR_VFS_BOGUS_FORMAT (-24801)
+/** Found bogus offset in the file system. */
+#define VERR_VFS_BOGUS_OFFSET (-24802)
+/** Unsupported file system format. */
+#define VERR_VFS_UNSUPPORTED_FORMAT (-24803)
+/** @} */
+
+/** @name RTFsIsoMaker status codes. */
+* @ { */
+/** No validation entry in the boot catalog. */
+#define VERR_ISOMK_BOOT_CAT_NO_VALIDATION_ENTRY (-25000)
+/** No default entry in the boot catalog. */
+/** Internal ISO maker error: Inconsistency producing trans.tbl file. */
+/** Internal ISO maker error: Read file data problem #1. */
+/** Internal ISO maker error: Read file data problem #2. */
+/** Internal ISO maker error: Read file data problem #3. */
+/** Internal ISO maker error: Finalization problem #1. */
+/** Requested to import an unknown ISO format. */
+/** Too many volume descriptors in the import ISO. */
+/** Import ISO contains a bad volume descriptor header. */
+/** Import ISO contains more than one primary volume descriptor. */
+/** Import ISO contains more than one el torito descriptor. */
+/** Import ISO contains more than one joliet volume descriptor. */
+/** Import ISO starts with supplementary volume descriptor before any primary ones. */
+/** Import ISO contains an unsupported primary volume descriptor version. */
+/** Import ISO contains a bad primary volume descriptor. */
+/** Import ISO contains an unsupported supplementary volume descriptor version. */
+/** Import ISO uses a logical block size other than 2KB. */
+/** Import ISO uses invalid volume sequence number. */
+/** Import ISO has different volume space sizes of primary and supplementary volume descriptors. */
+/** Import ISO has different volume set sizes of primary and supplementary volume descriptors. */
+/** Import ISO contains a bad root directory record. */
+#define VERR_ISOMK_IMPORT_BAD_ROOT_DIR_REC (-25116)
+/** Import ISO contains a zero sized root directory. */
+#define VERR_ISOMK_IMPORT_ZERO_SIZED_ROOT_DIR (-25117)
+/** Import ISO contains a root directory with a mismatching volume sequence number. */
+#define VERR_ISOMK_IMPORT_ROOT_VOLUME_SEQ_NO (-25118)
+/** Import ISO contains a root directory with an out of bounds data extent. */
+#define VERR_ISOMK_IMPORT_ROOT_DIR_EXTENT_OUT_OF_BOUNDS (-25119)
+/** Import ISO contains a root directory with a bad record length. */
+#define VERR_ISOMK_IMPORT_BAD_ROOT_DIR_REC_LENGTH (-25120)
+/** Import ISO contains a root directory without the directory flag set. */
+#define VERR_ISOMK_IMPORT_ROOT_DIR_WITHOUT_DIR_FLAG (-25121)
+/** Import ISO contains a root directory with multiple extents. */
+#define VERR_ISOMK_IMPORT_ROOT_DIR_IS_MULTI_EXTENT (-25122)
+/** Import ISO contains a too deep directory subtree. */
+#define VERR_ISOMK_IMPORT_TOO_DEEP_DIR_TREE (-25123)
+/** Import ISO contains a bad directory record. */
+#define VERR_ISOMK_IMPORT_BAD_DIR_REC (-25124)
+/** Import ISO contains a directory record with a mismatching volume sequence number. */
+#define VERR_ISOMK_IMPORT_DIR_REC_VOLUME_SEQ_NO (-25125)
+/** Import ISO contains a directory record with an extent that is out of bounds. */
+#define VERR_ISOMK_IMPORT_DIR_REC_EXTENT_OUT_OF_BOUNDS (-25126)
+/** Import ISO contains a directory with a bad record length. */
+#define VERR_ISOMK_IMPORT_BAD_DIR_REC_LENGTH (-25127)
+/** Import ISO contains a '.' or '..' directory record with a bad name length. */
+#define VERR_ISOMK_IMPORT_DOT_DIR_REC_BAD_NAME_LENGTH (-25128)
+/** Import ISO contains a '.' or '..' directory record with a bad name. */
+#define VERR_ISOMK_IMPORT_DOT_DIR_REC_BAD_NAME (-25129)
+/** Import ISO contains a directory with a more than one extent, that's currently not supported. */
+#define VERR_ISOMK_IMPORT_DIR_WITH_MORE_EXTENTS (-25130)
+/** Import ISO contains a multi-extent directory record that differs significantly from first record. */
+#define VERR_ISOMK_IMPORT_MISMATCHING_MULTI_EXTENT_REC (-25131)
+/** Import ISO contains a non-final multi-extent directory record with a size that isn't block aligned. */
+#define VERR_ISOMK_IMPORT_MISALIGNED_MULTI_EXTENT (-25132)
+/** Import ISO contains a non-contiguous multi-extent data, this is currently not supported. */
+#define VERR_ISOMK_IMPORT_NON_CONTIGUOUS_MULTI_EXTENT (-25133)
+/** The boot catalog block in the import ISO is out of bounds. */
+#define VERR_ISOMK_IMPORT_BOOT_CAT_BAD_OUT_OF_BOUNDS (-25140)
+/** The boot catalog block in the import ISO has an incorrect validation
+ * header ID. */
+ */
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+ @} */
+ /*
*+ @ { */ *
+/** Descriptor tag is all zeros. */
+/** Unsupported descriptor tag version. */
+/** Bad descriptor tag checksum. */
+/** Descriptor tag sector number mismatch. */
+/** Descriptor CRC mismatch. */
+/** Insufficient data to check descriptor CRC. */
+/** Unexpected/unknown/bad descriptor in volume descriptor sequence. */
+/** Too many primary volume descriptors. */
+/** Too many logical volume descriptors. */
+/** Too many partition descriptors. */
+/** The logical volume descriptor has a too big partition map. */
+/** No primary volume descriptors found. */
+/** No logical volume descriptors found. */
+/** No partition descriptors found. */
+/** Multiple primary volume descriptors found, we can only deal with one. */
+/** Multiple logical volume descriptors found, we can only deal with one. */
+/** Too many partition maps in the logical volume descriptor. */
+/** Malformed partition map table in the logical volume descriptor. */
+/** Unable to find partition descriptor for a partition map table entry. */
+/** Partition mapping table is shorter than described. */
+/** Unknown partition map entry type. */
+/** Unknown partition ID found in the partition map table. */
+/** Support for virtual partitions as not yet been implemented. */
+/** Support for sparrable partitions as not yet implemented. */
/** Internal processing error \#2. */
#define VERR_ISOFS_IPE_2 (-25392)
/** Internal processing error \#3. */
#define VERR_ISOFS_IPE_3 (-25393)
/** Internal processing error \#4. */
#define VERR_ISOFS_IPE_4 (-25394)
/** Internal processing error \#5. */
#define VERR_ISOFS_IPE_5 (-25395)
+
/** @} */
+
/** @} */
+
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/errno.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/errno.h
@@ -0,0 +1,320 @@
+/** @file
+ * IPRT - errno.h wrapper.
+ */
+/*
+ * Copyright (C) 2012-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ *
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+ */
+
+ifndef __iprt_errno_h__
+#define __iprt_errno_h__

Open Source Used In 5GaaS Edge AC-4 37813
+ ifndef IPRT_NO_CRT
+ #if defined(RT_OS_DARWIN) && defined(KERNEL)
+ # include <sys/errno.h>
+ #elif defined(RT_OS_LINUX) && defined(__KERNEL__)
+ # include <linux/errno.h>
+ #elif defined(RT_OS_FREEBSD) && defined(_KERNEL_)
+ # include <sys/errno.h>
+ #elif defined(RT_OS_NETBSD) && defined(_KERNEL_)
+ # include <sys/errno.h>
+ #else
+ # include <errno.h>
+ endif
+ endif

+ ifndef EPERM
+ # define EPERM                  (1)
+ endif

+ ifndef RT_ERRNO_OS_BSD
+ # define RT_ERRNO_OS_BSD
+ endif

+ ifndef RT_ERRNO_OS_SYSV_HARDCORE
+ # define RT_ERRNO_OS_SYSV_HARDCORE /* ?? */
+ endif

+ /* The relatively similar part. */
+ ifndef EPERM
+ # define EPERM
+ endif

+ ifdef IPRT_NO_CRT
+ # if defined(RT_OS_DARWIN) && defined(KERNEL)
+ # include <sys/errno.h>
+ #elif defined(RT_OS_LINUX) && defined(__KERNEL__)
+ # include <linux/errno.h>
+ #elif defined(RT_OS_FREEBSD) && defined(_KERNEL_)
+ # include <sys/errno.h>
+ #elif defined(RT_OS_NETBSD) && defined(_KERNEL_)
+ # include <sys/errno.h>
+ #else
+ # include <errno.h>
+ endif
+ endif

+ #ifndef IPRT_NO_CRT
+ # if defined(RT_OS_DARWIN) && defined(KERNEL)
+ # include <sys/errno.h>
+ #elif defined(RT_OS_LINUX) && defined(__KERNEL__)
+ # include <linux/errno.h>
+ #elif defined(RT_OS_FREEBSD) && defined(_KERNEL_)
+ # include <sys/errno.h>
+ #elif defined(RT_OS_NETBSD) && defined(_KERNEL_)
+ # include <sys/errno.h>
+ #else
+ # include <errno.h>
+ endif
+ endif

+ ifndef EPERM
+ # define EPERM                  (1)
+ endif
```c
+#ifndef ENOENT
+# define ENOENT                 (2)
+#endif

+#ifndef ESRCH
+# define ESRCH                  (3)
+#endif

+#ifndef EINTR
+# define EINTR                  (4)
+#endif

+#ifndef EIO
+# define EIO                    (5)
+#endif

+#ifndef ENXIO
+# define ENXIO                  (6)
+#endif

+#ifndef E2BIG
+# define E2BIG                  (7)
+#endif

+#ifndef ENOEXEC
+# define ENOEXEC                (8)
+#endif

+#ifndef EBADF
+# define EBADF                  (9)
+#endif

+#ifndef ECHILD
+# define ECHILD                 (10)
+#endif

+#ifndef EAGAIN
+# if defined(RT_ERRNO_OS_BSD)
  +# define EAGAIN                (35)
+# else
  +# define EAGAIN                (11)
+# endif
+#endif

+#ifndef EWOULDBLOCK
+# define EWOULDBLOCK            EAGAIN
+#endif

+#ifndef EDEADLK
+# if defined(RT_ERRNO_OS_BSD)
  +# define EDEADLK              (11)
  +# elif defined(RT_OS_LINUX)
    +# define EDEADLK             (35)
    +# elif defined(RT_OS_WINDOWS)
      +# define EDEADLK            (36)
      +# else
        +# define EDEADLK          (45)
    +# endif
  +# endif
+#endif
```
```c
#ifndef EDEADLOCK
#define EDEADLOCK EDEADLK
#endif

#ifndef ENOMEM
#define ENOMEM (12)
#endif

#ifndef EACCES
#define EACCES (13)
#endif

#ifndef EFAULT
#define EFAULT (14)
#endif

#ifndef ENOTBLK
#define ENOTBLK (15)
#endif

#ifndef EBUSY
#define EBUSY (16)
#endif

#ifndef EEXIST
#define EEXIST (17)
#endif

#ifndef EXDEV
#define EXDEV (18)
#endif

#ifndef ENODEV
#define ENODEV (19)
#endif

#ifndef ENOTDIR
#define ENOTDIR (20)
#endif

#ifndef EISDIR
#define EISDIR (21)
#endif

#ifndef EINVAL
#defineEINVAL (22)
#endif

#ifndef ENFILE
#define ENFILE (23)
#endif

#ifndef EMFILE
#define EMFILE (24)
#endif

#ifndef ENOTTY
#define ENOTTY (25)
#endif

#ifndef ETXTBSY
#define ETXTBSY (26)
#endif
```
```c
#ifndef EFBIG
#define EFBIG                  (27)
#endif

#ifndef ENOSPC
#define ENOSPC                 (28)
#endif

#ifndef ESPIPE
#define ESPIPE                 (29)
#endif

#ifndef EROFS
#define EROFS                  (30)
#endif

#ifndef EMLINK
#define EMLINK                 (31)
#endif

#ifndef EPIPE
#define EPIPE                  (32)
#endif

#ifndef EDOM
#define EDOM                   (33)
#endif

#ifndef ERANGE
#define ERANGE                 (34)
#endif

#ifndef ENOMSG
#define ENOMSG                (35)
#endif

#ifndef EIDRM
#define EIDRM                 (90)
#endif
```

The file contains definitions for various error codes used in Open Source for 5GaaS Edge AC-4. The comments indicate the specific operating systems each definition applies to.
+ if defined(RT_OS_WINDOWS)
+ define EIDRM (600)
+ else
+ define EIDRM (36)
+ endif
++endif
+ifndef EINPROGRESS
+ if defined(RT_ERRNO_OS_BSD)
+ define EINPROGRESS (36)
+ endif
+endif
+ifndef ENAMETOOLONG
+ if defined(RT_ERRNO_OS_BSD)
+ define ENAMETOOLONG (63)
+ endif
+endif
+ifndef ECHRNG
+ if defined(RT_ERRNO_OS_SYSV_HARDCORE)
+ define ECHRNG (37)
+ else
+ define ECHRNG (599)
+ endif
+endif
+ifndef ENOLCK
+ if defined(RT_ERRNO_OS_BSD)
+ define ENOLCK (77)
+ endif
+endif
+ifndef EALREADY
+ if defined(RT_ERRNO_OS_BSD)
+ define EALREADY (37)
+ endif
+endif

+## define EALREADY (149)
+## endif
+##endif
+
+/** @todo errno constants {37..44}. */
+
+/** 45 - also EDEADLK on Solaris, EL2NSYNC on Linux. */
+%ifndef ENOTSUP
+%if defined(RT_ERRNO_OS_BSD)
+%  define ENOTSUP (45)
+%elif defined(RT_OS_LINUX)
+%  define ENOTSUP (95)
+%else
+%  define ENOTSUP (48)
+%endif
+%endif
+%ifndef EOPNOTSUPP
+%if defined(RT_ERRNO_OS_BSD)
+%  define EOPNOTSUPP ENOTSUP
+%elif defined(RT_OS_LINUX)
+%  define EOPNOTSUPP ENOTSUP
+%else
+%  define EOPNOTSUPP (122)
+%endif
+%endif
+
+/** @todo errno constants {46..74}. */
+
+/** 75 - note that Solaris has constant with value 75. */
+%ifndef EOVERFLOW
+%if defined(RT_OS_OPENBSD)
+%  define EOVERFLOW (87)
+%elif defined(RT_ERRNO_OS_BSD)
+%  define EOVERFLOW (84)
+%elif defined(RT_OS_LINUX)
+%  define EOVERFLOW (75)
+%else
+%  define EOVERFLOW (79)
+%endif
+%endif
+%ifndef EPROGMISMATCH
+%if defined(RT_ERRNO_OS_BSD)
+%  define EPROGMISMATCH (75)
+%else
+%  define EPROGMISMATCH (598)
+%endif
+%endif
+

/** @todo errno constants {76..}. */
+
+
+#endif
.... linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/heap.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/heap.h
@@ -0,0 +1,356 @@
+/** @file
+ * IPRT - Heap Implementations
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_heap_h
+#define ___iprt_heap_h
+
+/*
+ * @defgroup grp_rt_heap
+ * @ingroup grp_rt
+ */
+
+#include <iprt/cdefs.h>
+#include <iprt/types.h>
+
+RT_C_DECLS_BEGIN
+
/** @defgroup grp_rt_heap_simple RTHeapSimple - Simple Heap
 */
+/* @defgroup grp_rt_heap_simple
 */

+ *\/
+
+/**
+/  * Initializes the heap.
+ */
+  * @returns IPRT status code.
+  */
+  * @param  pHeap Where to store the heap anchor block on success.
+  */
+  * @param  pvMemory Pointer to the heap memory.
+  */
+  * @param  cbMemory The size of the heap memory.
+  */
+RTDECL(int) RTHeapSimpleInit(PRTHEAPSIMPLE pHeap, void *pvMemory, size_t cbMemory);
+
+/**
+/  * Merge two simple heaps into one.
+ */
+  * The requirement is of course that they next two each other memory wise.
+ */
+  * @returns IPRT status code.
+  */
+  * @param  pHeap Where to store the handle to the merged heap on success.
+  */
+  * @param  Heap1 Handle to the first heap.
+  */
+  * @param  Heap2 Handle to the second heap.
+  */
+  * @remark This API isn't implemented yet.
+ */
+RTDECL(int) RTHeapSimpleMerge(PRTHEAPSIMPLE pHeap, RTHEAPSIMPLE Heap1, RTHEAPSIMPLE Heap2);
+
+/**
+/  * Relocater the heap internal structures after copying it to a new location.
+ */
+  * This can be used when loading a saved heap.
+ */
+  * @returns IPRT status code.
+  */
+  * @param  hHeap Heap handle that has already been adjusted by to the new
+  * location. That is to say, when calling
+  */
+  * RTHeapSimpleInit, the caller must note the offset of the
+  */
+  * returned heap handle into the heap memory. This offset
+  */
+  * must be used when calculating the handle value for the
+  */
+  * new location. The offset may in some cases not be zero!
+  */
+  * @param  offDelta The delta between the new and old location, i.e. what
+  * should be added to the internal pointers.
+ */
+RTDECL(int) RTHeapSimpleRelocate(RTHEAPSIMPLE hHeap, uintptr_t offDelta);
+
+/**
+/  * Allocates memory from the specified simple heap.
+ */
+  * @returns Pointer to the allocated memory block on success.
+  */
+  * @returns NULL if the request cannot be satisfied. (A VERR_NO_MEMORY condition.)
+ * @param Heap The heap to allocate the memory on.
+ * @param cb The requested heap block size.
+ * @param cbAlignment The requested heap block alignment. Pass 0 for default alignment.
+ * Must be a power of 2.
+ */
+RTDECL(void *) RTHeapSimpleAlloc(RTHEAPSIMPLE Heap, size_t cb, size_t cbAlignment);
+
+/**
+ * Allocates zeroed memory from the specified simple heap.
+ *
+ * @returns Pointer to the allocated memory block on success.
+ * @returns NULL if the request cannot be satisfied. (A VERR_NO_MEMORY condition.)
+ *
+ * @param Heap The heap to allocate the memory on.
+ * @param cb The requested heap block size.
+ * @param cbAlignment The requested heap block alignment. Pass 0 for default alignment.
+ * Must be a power of 2.
+ */
+RTDECL(void *) RTHeapSimpleAllocZ(RTHEAPSIMPLE Heap, size_t cb, size_t cbAlignment);
+
+/**
+ * Reallocates / Allocates / Frees a heap block.
+ *
+ * @param Heap The heap. This is optional and will only be used for strict assertions.
+ * @param pv The heap block returned by RTHeapSimple. If NULL it behaves like RTHeapSimpleAlloc().
+ * @param cbNew The new size of the heap block. If NULL it behaves like RTHeapSimpleFree().
+ * @param cbAlignment The requested heap block alignment. Pass 0 for default alignment.
+ * Must be a power of 2.
+ * @remark This API isn't implemented yet.
+ */
+RTDECL(void *) RTHeapSimpleRealloc(RTHEAPSIMPLE Heap, void *pv, size_t cbNew, size_t cbAlignment);
+
+/**
+ * Reallocates / Allocates / Frees a heap block, zeroing any new bits.
+ *
+ * @param Heap The heap. This is optional and will only be used for strict assertions.
+ * @param pv The heap block returned by RTHeapSimple. If NULL it behaves like RTHeapSimpleAlloc().
+ * @param cbNew The new size of the heap block. If NULL it behaves like RTHeapSimpleFree().
+ * @param cbAlignment The requested heap block alignment. Pass 0 for default alignment.
+ * Must be a power of 2.
+ * @remark This API isn't implemented yet.
+ */
+RTDECL(void *) RTHeapSimpleReallocZ(RTHEAPSIMPLE Heap, void *pv, size_t cbNew, size_t cbAlignment);
+
+ * Frees memory allocated from a simple heap.
+ * @param Heap The heap. This is optional and will only be used for strict assertions.
+ * @param pv The heap block returned by RTHeapSimple
+ */
+RTDECL(void) RTHeapSimpleFree(RTHEAPSIMPLE Heap, void *pv);
+
+/**
+ * Gets the size of the specified heap block.
+ *
+ * @returns The actual size of the heap block.
+ * @returns 0 if `pv` is NULL or it doesn't point to a valid heap block. An invalid `pv`
+ * can also cause traps or trigger assertions.
+ * @param Heap The heap. This is optional and will only be used for strict assertions.
+ * @param pv The heap block returned by RTHeapSimple
+ */
+RTDECL(size_t) RTHeapSimpleSize(RTHEAPSIMPLE Heap, void *pv);
+
+/**
+ * Gets the size of the heap.
+ *
+ * This size includes all the internal heap structures. So, even if the heap is
+ * empty the RTHeapSimpleGetFreeSize() will never reach the heap size returned
+ * by this function.
+ *
+ * @returns The heap size.
+ * @returns 0 if heap was safely detected as being bad.
+ * @param Heap The heap.
+ */
+RTDECL(size_t) RTHeapSimpleGetHeapSize(RTHEAPSIMPLE Heap);
+
+/**
+ * Returns the sum of all free heap blocks.
+ *
+ * This is the amount of memory you can theoretically allocate
+ * if you do allocations exactly matching the free blocks.
+ *
+ * @returns The size of the free blocks.
+ * @returns 0 if heap was safely detected as being bad.
+ * @param Heap The heap.
+ */
+RTDECL(size_t) RTHeapSimpleGetFreeSize(RTHEAPSIMPLE Heap);
+
+/**
+ * Printf like callback function for RTHeapSimpleDump.
+ * @param pszFormat IPRT format string.
+ * @param ... Format arguments.
+ */
+typedef DECLCALLBACK(void) FNRTHEAPSIMPLEPRINTF(const char *pszFormat, ...)

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RT_IPRT_FORMAT_ATTR(1, 2);
+/** Pointer to a FNRTHEAPSIMPLEPRINTF function. */
+typedef FNRTHEAPSIMPLEPRINTF *PFNRTHEAPSIMPLEPRINTF;
+
+/**
+ * Dumps the hypervisor heap.
+ *
+ * @param   Heap        The heap handle.
+ * @param   pfnPrintf   Printf like function that groks IPRT formatting.
+ */
+RTDECL(void) RTHeapSimpleDump(RTHEAPSIMPLE Heap, PFNRTHEAPSIMPLEPRINTF pfnPrintf);
+
+/** @} */
+
+/** @defgroup grp_rt_heap_offset    RTHeapOffset - Offset Based Heap
+ *
+ This is a variation on the simple heap that doesn't use pointers internally
+ and therefore can be saved and restored without any extra effort.
+ *
+ *
+ * Initializes the heap.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   phHeap      Where to store the heap anchor block on success.
+ * @param   pvMemory    Pointer to the heap memory.
+ * @param   cbMemory    The size of the heap memory.
+ */
+RTDECL(int) RTHeapOffsetInit(PRTHEAPOFFSET phHeap, void *pvMemory, size_t cbMemory);
+
+/**
+ * Merge two simple heaps into one.
+ *
+ * The requirement is of course that they next two each other memory wise.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   phHeap      Where to store the handle to the merged heap on success.
+ * @param   hHeap1      Handle to the first heap.
+ * @param   hHeap2      Handle to the second heap.
+ *
+ * @remark  This API isn't implemented yet.
+ */
+RTDECL(int) RTHeapOffsetMerge(PRTHEAPOFFSET phHeap, RTHEAPOFFSET hHeap1, RTHEAPOFFSET hHeap2);
/**
 * Allocates memory from the specified simple heap.
 * @returns Pointer to the allocated memory block on success.
 * @returns NULL if the request cannot be satisfied. (A VERR_NO_MEMORY condition.)
 * @param   hHeap       The heap to allocate the memory on.
 * @param   cb          The requested heap block size.
 * @param   cbAlignment The requested heap block alignment. Pass 0 for default alignment.
 *                      Must be a power of 2.
 * @returns Pointer to the allocated memory block on success.
 * @returns NULL if the request cannot be satisfied. (A VERR_NO_MEMORY condition.)
 * @param   hHeap       The heap to allocate the memory on.
 * @param   cb          The requested heap block size.
 * @param   cbAlignment The requested heap block alignment. Pass 0 for default alignment.
 *                      Must be a power of 2.
 * @remark  This API isn't implemented yet.
 * @param   hHeap       The heap handle. This is optional and will only be used
 *                      for strict assertions.
 * @param   pv          The heap block returned by RTHeapOffset. If NULL it
 *                      behaves like RTHeapOffsetAlloc().
 * @param   cbNew       The new size of the heap block. If NULL it behaves like
 *                      RTHeapOffsetFree().
 * @param   cbAlignment The requested heap block alignment. Pass 0 for default
 *                      alignment. Must be a power of 2.
 * @return This API isn't implemented yet.
 * @param   hHeap       The heap handle. This is optional and will only be used
 *                      for strict assertions.
 * @param   pv          The heap block returned by RTHeapOffset. If NULL it
 *                      behaves like RTHeapOffsetAllocZ().
 */
+ * @param cbNew The new size of the heap block. If NULL it behaves like
+ * RTHeapOffsetFree().
+ * @param cbAlignment The requested heap block alignment. Pass 0 for default
+ * alignment. Must be a power of 2.
+ * @remark This API isn't implemented yet.
+ */
+RTDECL(void *) RTHeapOffsetReallocZ(RTHEAPOFFSET hHeap, void *pv, size_t cbNew, size_t cbAlignment);
+
+/**
+ * Frees memory allocated from a simple heap.
+ *
+ * @param hHeap The heap handle. This is optional and will only be used
+ * for strict assertions.
+ * @param pv The heap block returned by RTHeapOffset
+ */
+RTDECL(void) RTHeapOffsetFree(RTHEAPOFFSET hHeap, void *pv);
+
+/**
+ * Gets the size of the specified heap block.
+ *
+ * @returns The actual size of the heap block.
+ * @returns 0 if 'a pv is NULL or it doesn't point to a valid heap block. An
+ * invalid 'a pv can also cause traps or trigger assertions.
+ *
+ * @param hHeap The heap handle. This is optional and will only be used
+ * for strict assertions.
+ * @param pv The heap block returned by RTHeapOffset
+ */
+RTDECL(size_t) RTHeapOffsetSize(RTHEAPOFFSET hHeap, void *pv);
+
+/**
+ * Gets the size of the heap.
+ *
+ * This size includes all the internal heap structures. So, even if the heap is
+ * empty the RTHeapOffsetGetFreeSize() will never reach the heap size returned
+ * by this function.
+ *
+ * @returns The heap size.
+ * @returns 0 if heap was safely detected as being bad.
+ * @param hHeap The heap handle.
+ */
+RTDECL(size_t) RTHeapOffsetGetHeapSize(RTHEAPOFFSET hHeap);
+
+/**
+ * Returns the sum of all free heap blocks.
+ *
+ * This is the amount of memory you can theoretically allocate
+ * if you do allocations exactly matching the free blocks.
+ *
+ * @returns The size of the free blocks.
+ * @returns 0 if heap was safely detected as being bad.
+ * @param hHeap The heap handle.
+ */
+RTDECL(size_t) RTHeapOffsetGetFreeSize(RTHEAPOFFSET hHeap);
+
+/**
+ * Printf like callbaclk function for RTHeapOffsetDump.
+ * @param pszFormat IPRT format string.
+ * @param ... Format arguments.
+ */
+typedef DECLCALLBACK(void) FNRTHEAPOFFSETPRINTF(const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(1, 2);
+/** Pointer to a FNRTHEAPOFFSETPRINTF function. */
+typedef FNRTHEAPOFFSETPRINTF *PFNRTHEAPOFFSETPRINTF;
+
+/**
+ * Dumps the hypervisor heap.
+ *
+ * @param hHeap The heap handle.
+ * @param pfnPrintf Printf like function that groks IPRT formatting.
+ */
+RTDECL(void) RTHeapOffsetDump(RTHEAPOFFSET hHeap, PFNRTHEAPOFFSETPRINTF pfnPrintf);
+
+/** @} */
+/** @} */
+RT_C_DECLS_END
+
+endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/initterm.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/initterm.h
@@ -0,0 +1,263 @@
+/** @file
+ * IPRT - Runtime Init/Term.
+ */
+/*
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ #ifndef ___iprt_initterm_h
+ #define ___iprt_initterm_h
+
+ #include <iprt/cdefs.h>
+ #include <iprt/types.h>
+
+ RT_C_DECLS_BEGIN
+
+ /** @defgroup grp_rt    IPRT C/C++ APIs
+ * @{
+ *
+ /** @defgroup grp_rt_initterm  RTInit/RTTerm - Initialization and Termination
+ *
+ * APIs for initializing and terminating the IPRT, optionally it can also
+ * convert input arguments to UTF-8 (in ring-3).
+ *
+ * @sa RTOnce, RTOnceEx.
+ *
+ * @
+ *
+ +#ifdef IN_RING3
+ +/** @name RTR3Init flags (RTR3INIT_XXX).
+ +* @{
+ +** Try initialize SUPlib. */
+ +#define RTR3INIT_FLAGS_SUPLIB       RT_BIT(0)
+ +/** Initializing IPRT from a DLL. */
+ +#define RTR3INIT_FLAGS_DLL          RT_BIT(1)
+ +/** We are sharing a process space, so we need to behave. */
+ +#define RTR3INIT_FLAGS_UNOBTRUSIVE  RT_BIT(2)
+ +/** The caller ensures that the argument bector is UTF-8. */
+ +#define RTR3INIT_FLAGS_UTF8_ARGV    RT_BIT(3)
+ +/** Indicates that this is a standalone application without any additional
+ * shared libraries in the application directory. Mainly windows loader mess. */
+ */
/ **@name RTR3InitEx version**
/** @} */
/** @name RTR3InitEx version **@

* Version 1.*

#define RTR3INIT_VER_1 UINT32_C(1)

#define RTR3INIT_VER_CUR RTR3INIT_VER_1
/** @} */

+ * Initializes the runtime library.
 + *
 + * @returns iprt status code.
 + * @param fFlags Flags, see RTR3INIT_XXX.
 + */
RTR3DECL(int) RTR3InitExeNoArguments(uint32_t fFlags);

+ * Initializes the runtime library.
 *
 + * @param cArgs Pointer to the argument count.
 + * @param ppapszArgs Pointer to the argument vector pointer.
 + * @param fFlags Flags, see RTR3INIT_XXX.
 + */
RTR3DECL(int) RTR3InitExe(int cArgs, char ***ppapszArgs, uint32_t fFlags);

+ * Initializes the runtime library.
 *
 + * @param cArgs Pointer to the argument count.
 + */
RTR3DECL(int) RTR3InitDll(uint32_t fFlags);

+ * Initializes the runtime library and possibly also SUPLib too.
 + *
 + * Avoid this interface, it's not considered stable.
 + *
 + * @returns IPRT status code.
 + * @param iVersion The interface version. Must be 0 atm.
 + * @param fFlags Flags, see RTR3INIT_XXX.
 + * @param cArgs Pointer to the argument count.
 + * @param ppapszArgs Pointer to the argument vector pointer. NULL allowed if @a cArgs is 0.
#ifdef IN_RC
/**
 * Initializes the raw-mode context runtime library.
 *
 * @returns iprt status code.
 *
 * @param   u64ProgramStartNanoTS  The startup timestamp.
 * @*/
RTRCDECL(int) RTRCInit(uint64_t u64ProgramStartNanoTS);

/**
 * Terminates the raw-mode context runtime library.
 *
 * @*/
RTRCDECL(void) RTRCTerm(void);
#endif

/**
 * Termination reason.
 *
 * @*/
typedef enum RTTERMREASON
{
    /** Normal exit. iStatus contains the exit code. */
    RTTERMREASON_EXIT = 1,
    /** Any abnormal exit. iStatus is 0 and has no meaning. */
    RTTERMREASON_ABEND,
    /** Killed by a signal. The iStatus contains the signal number. */
    RTTERMREASON_SIGNAL,
    /** The IPRT module is being unloaded. iStatus is 0 and has no meaning. */
    RTTERMREASON_UNLOAD
} RTTERMREASON;

#define RTTERMREASON_IS_LAZY_CLEANUP_OK(enmReason)  ((enmReason) !=
RTTERMREASON_UNLOAD)

/**
 * IPRT termination callback function.
 *
 * @param   enmReason           The cause of the termination.
 * @param   iStatus             The meaning of this depends on enmReason.
 * @param   pvUser              User argument passed to RTTermRegisterCallback.
 */
+*/
+typedef DECLCALLBACK(void) FNRTTERMCALLBACK(RTTERMREASON enmReason, int32_t iStatus, void *pvUser);
+/** Pointer to an IPRT termination callback function. */
+typedef FNRTTERMCALLBACK *PFNRTTERMCALLBACK;
+
+/**
+ * Registers a termination callback.
+ *
+ * This is intended for performing clean up during IPRT termination. Frequently
+ * paired with lazy initialization thru RTOnce.
+ *
+ * The callbacks are called in LIFO order.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   pfnCallback         The callback function.
+ * @param   pvUser              The user argument for the callback.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   pfnCallback         The callback function.
+ * @param   pvUser              The user argument for the callback.
+ *
+ * @returns VINF_SUCCESS if found, VERR_NOT_FOUND if the callback/pvUser pair
+ * wasn't found.
+ *
+ * @param   pfnCallback         The callback function.
+ * @param   pvUser              The user argument for the callback.
+ */
+RTDECL(int) RTTermRegisterCallback(PFNRTTERMCALLBACK pfnCallback, void *pvUser);
+
+/**
+ * Deregister a termination callback.
+ *
+ * @returns VINF_SUCCESS if found, VERR_NOT_FOUND if the callback/pvUser pair
+ *
+ * @param   pfnCallback         The callback function.
+ * @param   pvUser              The user argument for the callback.
+ */
+RTDECL(int) RTTermDeregisterCallback(PFNRTTERMCALLBACK pfnCallback, void *pvUser);
+
+/**
+ * Runs the termination callback queue.
+ *
+ * Normally called by an internal IPRT termination function, but may also be
+ * called by external code immediately prior to terminating IPRT if it is in a
+ * better position to state the termination reason and/or status.
+ *
+ * @param enmReason The reason why it's called.
+ * @param iStatus The associated exit status or signal number.
+ */
+RTDECL(void) RTTermRunCallbacks(RTTERMREASON enmReason, int32_t iStatus);
+
+/** @} */
++RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/latin1.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/latin1.h
@@ -0,0 +1,392 @@
+/** @file
+ * IPRT - String Manipulation, Latin-1 (ISO-8859-1) encoding.
+ */
+
+#ifndef ___iprt_latin1_h
+#define ___iprt_latin1_h
+
#include <iprt/string.h>
+
RT_C_DECLS_BEGIN
+/** @defgroup rt_str_latin1 Latin-1 (ISO-8859-1) String Manipulation + * @ingroup grp_rt_str + * Deals with Latin-1 encoded strings. + * + @warning Make sure to name all variables dealing with Latin-1 strings + * such that there is no way to mistake them for normal UTF-8 strings. + * There may be severe security issues resulting from mistaking Latin-1 + * for UTF-8! + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ + */ +/** + * Get the unicode code point at the given string position. + * + @returns unicode code point. + * + @returns RTUNICP_INVALID if the encoding is invalid. + * + @param   pszLatin1 The Latin-1 string. + */ +DECLINLINE(RTUNICP) RTLatin1GetCp(const char *pszLatin1) +{ +    return *(const unsigned char *)pszLatin1; +} + +/** + * Get the unicode code point at the given string position. + * + @returns iprt status code. + * + @param   ppszLatin1 Pointer to the string pointer. This will be updated to + * point to the char following the current code point. This + * is advanced one character forward on failure. + * + @param   pCp Where to store the code point. RTUNICP_INVALID is stored + * here on failure. + */ +DECLINLINE(int) RTLatin1GetCpEx(const char **ppszLatin1, PRTUNICP pCp) +{ +    const unsigned char uch = **(const unsigned char **)ppszLatin1; +    (*ppszLatin1)++; +    *pCp = uch; +    return VINF_SUCCESS; +} + +/** + * Get the unicode code point at the given string position for a string of a + * given maximum length.
+ * @returns iprt status code.
+ * @retval  VERR_END_OF_STRING if *pcch is 0. *pCp is set to RTUNICP_INVALID.
+ *
+ * @param   ppszLatin1  Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point.
+ * @param   pcchLatin1  Pointer to the maximum string length. This will be
+ * decremented by the size of the code point found.
+ * @param   pCp         Where to store the code point.
+ * RTUNICP_INVALID is stored here on failure.
+ */
+DECLINLINE(int) RTLatin1GetCpNEx(const char **ppszLatin1, size_t *pcchLatin1, PRTUNICP pCp)
+{
+    if (RT_LIKELY(*pcchLatin1 != 0))
+    {
+        const unsigned char uch = **(const unsigned char **)ppszLatin1;
+        (*ppszLatin1)++;
+        (*pcchLatin1)--;  
+        *pCp = uch;
+        return VINF_SUCCESS;
+    }
+    *pCp = RTUNICP_INVALID;
+    return VERR_END_OF_STRING;
+}
+/**
+ * Get the Latin-1 size in characters of a given Unicode code point.
+ *
+ * The code point is expected to be a valid Unicode one, but not necessarily in
+ * the range supported by Latin-1.
+ *
+ * @returns the size in characters, or zero if there is no Latin-1 encoding
+ */
+DECLINLINE(size_t) RTLatin1CpSize(RTUNICP CodePoint)
+{
+    if (CodePoint < 0x100)
+        return 1;
+    return 0;
+}
+/**
+ * Put the unicode code point at the given string position
+ * and return the pointer to the char following it.
+ *
+ * This function will not consider anything at or following the
+ * buffer area pointed to by psz. It is therefore not suitable for
+ * inserting code points into a string, only appending/overwriting.
+ *
@returns pointer to the char following the written code point.
+ @param pszLatin1 The string.
+ @param CodePoint The code point to write.
+ This should not be RTUNICP_INVALID or any other character out of the Latin-1 range.
+
+DECLINLINE(char *) RTLatin1PutCp(char *pszLatin1, RTUNICP CodePoint)
+{
+    AssertReturn(CodePoint < 0x100, NULL);
+    *pszLatin1++ = (unsigned char)CodePoint;
+    return pszLatin1;
+}
+
+ /**
+ * Skips ahead, past the current code point.
+ *
+ * @returns Pointer to the char after the current code point.
+ * @param pszLatin1 Pointer to the current code point.
+ * @remark This will not move the next valid code point, only past the current one.
+ */
+DECLINLINE(char *) RTLatin1NextCp(const char *pszLatin1)
+{
+    pszLatin1++;
+    return (char *)pszLatin1;
+}
+
+ /**
+ * Skips back to the previous code point.
+ *
+ * @returns Pointer to the char before the current code point.
+ * @returns pszLatin1Start on failure.
+ * @param pszLatin1Start Pointer to the start of the string.
+ * @param pszLatin1 Pointer to the current code point.
+ */
+DECLINLINE(char *) RTLatin1PrevCp(const char *pszLatin1Start, const char *pszLatin1)
+{
+    if (((uintptr_t)pszLatin1 > (uintptr_t)pszLatin1Start)
+    {
+        pszLatin1--;
+        return (char *)pszLatin1;
+    }
+    return (char *)pszLatin1Start;
+}
+
+ /**
+ * Translate a Latin1 string into a UTF-8 allocating the result buffer (default
+ * tag).
+ */
+ * @returns iprt status code.
+ * @param   pszLatin1       Latin1 string to convert.
+ * @param   ppszString      Receives pointer of allocated UTF-8 string on
+ *                          success, and is always set to NULL on failure.
+ *                          The returned pointer must be freed using RTStrFree().
+ */
+#define RTLatin1ToUtf8Ex(pszLatin1, cchLatin1, ppsz, cch, pcch) \
RTLatin1ToUtf8ExTag((pszLatin1), (cchLatin1), (ppsz), (cch), (pcch), RTSTR_TAG)

+ ** Translates Latin1 to UTF-8 using buffer provided by the caller or a fittingly sized buffer allocated by the function (custom tag).
+ *
+ * @returns iprt status code.
+ * @param pszLatin1 The Latin1 string to convert.
+ * @param cchLatin1 The number of Latin1 characters to translate from pwszString. The translation will stop when reaching cchLatin1 or the terminator ('\0'). Use RTSTR_MAX to translate the entire string.
+ * @param ppsz If cch is non-zero, this must either be pointing to a pointer to a buffer of the specified size, or pointer to a NULL pointer. If *ppsz is NULL or cch is zero a buffer of at least cch chars will be allocated to hold the translated string. If a buffer was requested it must be freed using RTStrFree().
+ * @param cch The buffer size in chars (the type). This includes the terminator.
+ * @param pcch Where to store the length of the translated string, excluding the terminator. (Optional)
+ * This may be set under some error conditions, however, only for VERR_BUFFER_OVERFLOW and VERR_NO_STR_MEMORY will it contain a valid string length that can be used to resize the buffer.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTLatin1ToUtf8ExTag(const char *pszLatin1, size_t cchLatin1, char **ppsz, size_t cch, size_t *pcch, const char *pszTag);
+
+ /**
+ * Calculates the length of the Latin-1 string in UTF-8 chars (bytes).
+ * The primary purpose of this function is to help allocate buffers for RTLatin1ToUtf8() of the correct size. For most other purposes RTLatin1ToUtf8Ex() should be used.
+ *
+ * @returns Number of chars (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param pszLatin1 The Latin-1 string.
+ */
+RTDECL(size_t) RTLatin1CalcUtf8Len(const char *pszLatin1);
+ * Calculates the length of the Latin-1 string in UTF-8 chars (bytes).
+ *
+ * @returns iprt status code.
+ * @param pszLatin1 The Latin-1 string.
+ * @param cchLatin1 The max string length. Use RTSTR_MAX to process the
+ *                  entire string.
+ * @param pcch Where to store the string length (in bytes). Optional.
+ *            This is undefined on failure.
+ */
+RTDECL(int) RTLatin1CalcUtf8LenEx(const char *pszLatin1, size_t cchLatin1, size_t *pcch);
+
+/**
+ * Calculates the length of the Latin-1 (ISO-8859-1) string in RTUTF16 items.
+ *
+ * @returns Number of RTUTF16 items.
+ * @param pszLatin1 The Latin-1 string.
+ */
+RTDECL(size_t) RTLatin1CalcUtf16Len(const char *pszLatin1);
+
+/**
+ * Calculates the length of the Latin-1 (ISO-8859-1) string in RTUTF16 items.
+ *
+ * @returns iprt status code.
+ * @param pszLatin1 The Latin-1 string.
+ * @param cchLatin1 The max string length. Use RTSTR_MAX to process the
+ *                  entire string.
+ * @param pcwc Where to store the string length. Optional.
+ *            This is undefined on failure.
+ */
+RTDECL(int) RTLatin1CalcUtf16LenEx(const char *pszLatin1, size_t cchLatin1, size_t *pcwc);
+
+/**
+ * Translate a Latin-1 (ISO-8859-1) string into a UTF-16 allocating the result
+ * buffer (default tag).
+ *
+ * @returns iprt status code.
+ * @param pszLatin1 The Latin-1 string to convert.
+ * @param ppwszString Receives pointer to the allocated UTF-16 string. The
+ *                    returned string must be freed using RTUtf16Free().
+ */
+#define RTLatin1ToUtf16(pszLatin1, ppwszString)     RTLatin1ToUtf16Tag((pszLatin1), (ppwszString), RTSTR_TAG)
+
+/**
+ * Translate a Latin-1 (ISO-8859-1) string into a UTF-16 allocating the result
+ * buffer (custom tag).
+ *
+ * @returns iprt status code.
+ * @param pszLatin1 The Latin-1 string to convert.
+ * @param ppwszString Receives pointer to the allocated UTF-16 string. The returned string must be freed using RTUtf16Free().
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+ RTDECL(int) RTLatin1ToUtf16Tag(const char *pszLatin1, PRTUTF16 *ppwszString, const char *pszTag);
+
+/**
+ * Translates pszLatin1 from Latin-1 (ISO-8859-1) to UTF-16, allocating the result buffer if requested (default tag).
+ *
+ * @returns iprt status code.
+ * @param pszLatin1 The Latin-1 string to convert.
+ * @param ppwszString Receives pointer to the allocated UTF-16 string. The returned string must be freed using RTUtf16Free().
+ */
+ #define RTLatin1ToUtf16ExTag(pszLatin1, ppwszString, const char *pszTag)
+
+/**
+ * Translates pszLatin1 from Latin-1 (ISO-8859-1) to UTF-16, allocating the result buffer if requested.
+ *
+ * @returns iprt status code.
+ * @param pszLatin1 The Latin-1 string to convert.
+ * @param cchLatin1 The maximum size in chars (the type) to convert. The conversion stops when it reaches cchLatin1 or the string terminator (\\0). Use RTSTR_MAX to translate the entire string.
+ * @param ppwsz If cwc is non-zero, this must either be pointing to pointer to a buffer of the specified size, or pointer to a NULL pointer.
+ * @param cwc The buffer size in RTUTF16s. This includes the terminator.
+ * @param pcwc Where to store the length of the translated string, excluding the terminator. (Optional)
+ */
+ #define RTLatin1ToUtf16Ex(pszLatin1, cchLatin1, ppwsz, cwc, pcwc) \\
+ RTLatin1ToUtf16ExTag((pszLatin1), (cchLatin1), (ppwsz), (cwc), (pcwc), RTSTR_TAG)
+ +
to pointer to a buffer of the specified size, or
pointer to a NULL pointer.
If *ppwsz is NULL or cwc is zero a buffer of at
least cwc items will be allocated to hold the
translated string. If a buffer was requested it
must be freed using RTUtf16Free().
+ @param  cwc                 The buffer size in RTUTF16s. This includes the
terminator.
+ @param  pcwc                Where to store the length of the translated string,
excluding the terminator. (Optional)
+ This may be set under some error conditions,
however, only for VERR_BUFFER_OVERFLOW and
VERR_NO_STR_MEMORY will it contain a valid string
length that can be used to resize the buffer.
+ @param  pszTag             Allocation tag used for statistics and such.
+/
+RTDECL(int) RTLatin1ToUtf16ExTag(const char *pszLatin1, size_t cchLatin1,
PRTUTF16 *ppwsz, size_t cwc, size_t *pcwc, const char *pszTag);
+
+/** @} */
+RT_C_DECLS_END
+/** @} */
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/list.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/list.h
@@ -0,0 +1,534 @@
/** @file
 * IPRT - Generic Doubly Linked List.
 */
+/* Copyright (C) 2010-2017 Oracle Corporation
 + This file is part of VirtualBox Open Source Edition (OSE), as
 + available from http://www.virtualbox.org. This file is free software;
 + you can redistribute it and/or modify it under the terms of the GNU
 + General Public License (GPL) as published by the Free Software
 + Foundation, in version 2 as it comes in the "COPYING" file of the
 + VirtualBox OSE distribution. VirtualBox OSE is distributed in the
 + hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
 + The contents of this file may alternatively be used under the terms
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+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef ___iprt_list_h
+ define ___iprt_list_h
+
+ include <iprt/types.h>
+
+/** @defgroup grp_rt_list  RTList - Generic Doubly Linked List
+ * @ingroup grp_rt
+ *
+ * The list implementation is circular without any type wise distinction between
+ * the list and its nodes. This can be confusing since the list head usually
+ * resides in a different structure than the nodes, so care must be taken when
+ * walking the list.
+ *
+ * @}
+ */
+
+RT_C_DECLS_BEGIN
+
+/**
+ * A list node of a doubly linked list.
+ */
typedef struct RTLISTNODE
+{
+    /** Pointer to the next list node. */
+    struct RTLISTNODE *pNext;
+    /** Pointer to the previous list node. */
+    struct RTLISTNODE *pPrev;
+} RTLISTNODE;

 */
typedef RTLISTNODE RTLISTANCHOR;
+/** Pointer to a doubly linked list anchor. */
typedef RTLISTANCHOR *PRTLISTANCHOR;
+/** Pointer to a const doubly linked list anchor. */
typedef RTLISTANCHOR const *PCRTLISTANCHOR;
+
+/** Version of RTLISTNODE for holding a ring-3 only list in data which gets
+ * shared between multiple contexts */
+#if defined(IN_RING3)
typedef RTLISTNODE RTLISTNODER3;
#else
typedef struct { RTR3PTR aOffLimits[2]; } RTLISTNODER3;
+#endif
+/** Version of RTLISTANCHOR for holding a ring-3 only list in data which gets
+ * shared between multiple contexts */
typedef RTLISTNODER3 RTLISTANCHORR3;
+
+/**
+ * Initialize a list.
+ *
+ * @param   pList               Pointer to an unitialised list.
+ */
+DECLINLINE(void) RTListInit(PRTLISTNODE pList)
+{
+    pList->pNext = pList;
+    pList->pPrev = pList;
+
+/**
+ * Append a node to the end of the list.
+ *
+ * @param   pList               The list to append the node to.
+ * @param   pNode               The node to append.
+ */
+DECLINLINE(void) RTListAppend(PRTLISTNODE pList, PRTLISTNODE pNode)
+{
+    pList->pPrev->pNext = pNode;
+    pNode->pNext        = pList;
+    pList->pPrev        = pNode;
+
+/**
+ * Add a node as the first element of the list.
+ *
+ * @param   pList               The list to prepend the node to.
+ * @param   pNode               The node to prepend.
+ */
+DECLINLINE(void) RTListPrepend(PRTLISTNODE pList, PRTLISTNODE pNode)
+DECLINLINE(void) RTListPrepend(PRTLISTNODE pList, PRTLISTNODE pNode)
+{
+    pList->pNext->pPrev = pNode;
+    pNode->pNext = pList->pNext;
+    pNode->pPrev = pList;
+    pList->pNext = pNode;
+}
+
+/**
+ * Inserts a node after the specified one.
+ *
+ * @param   pCurNode            The current node.
+ * @param   pNewNode            The node to insert.
+ */
+DECLINLINE(void) RTListNodeInsertAfter(PRTLISTNODE pCurNode, PRTLISTNODE pNewNode)
+{
+    RTListPrepend(pCurNode, pNewNode);
+}
+
+/**
+ * Inserts a node before the specified one.
+ *
+ * @param   pCurNode            The current node.
+ * @param   pNewNode            The node to insert.
+ */
+DECLINLINE(void) RTListNodeInsertBefore(PRTLISTNODE pCurNode, PRTLISTNODE pNewNode)
+{
+    RTListAppend(pCurNode, pNewNode);
+}
+
+/**
+ * Remove a node from a list.
+ *
+ * @param   pNode               The node to remove.
+ */
+DECLINLINE(void) RTListNodeRemove(PRTLISTNODE pNode)
+{
+    PRTLISTNODE pPrev = pNode->pPrev;
+    PRTLISTNODE pNext = pNode->pNext;
+    
+    pPrev->pNext = pNext;
+    pNext->pPrev = pPrev;
+    /* poison */
+    pNode->pNext = NULL;
+    pNode->pPrev = NULL;
+}
/**
 * Remove a node from a list, returns value.
 *
 * @returns pNode
 * @param pNode The node to remove.
 */
DECLINLINE(PRTLISTNODE) RTListNodeRemoveRet(PRTLISTNODE pNode)
{
    PRTLISTNODE pPrev = pNode->pPrev;
    PRTLISTNODE pNext = pNode->pNext;

    pPrev->pNext = pNext;
    pNext->pPrev = pPrev;

    /* poison */
    pNode->pNext = NULL;
    pNode->pPrev = NULL;

    return pNode;
}

/**
 * Checks if a node is the last element in the list.
 *
 * @retval true if the node is the last element in the list.
 * @retval false otherwise
 *
 * @param pList The list.
 * @param pNode The node to check.
 */
#define RTListNodeIsLast(pList, pNode)  ((pNode)->pNext == (pList))

/**
 * Checks if a node is the first element in the list.
 *
 * @retval true if the node is the first element in the list.
 * @retval false otherwise.
 *
 * @param pList The list.
 * @param pNode The node to check.
 */
#define RTListNodeIsFirst(pList, pNode) ((pNode)->pPrev == (pList))

/**
 * Checks if a type converted node is actually the dummy element (@a pList).
 */
+ * @retval true if the node is the dummy element in the list.
+ * @retval false otherwise.
+ *
+ * @param pList The list.
+ * @param pNode The node structure to check. Typically
+ * something obtained from RTListNodeGetNext() or
+ * RTListNodeGetPrev(). This is NOT a PRTLSTNODE
+ * but something that contains a RTLISTNODE member!
+ * @param Type Structure the list node is a member of.
+ * @param Member The list node member.
+ */
+#define RTListNodeIsDummy(pList, pNode, Type, Member) \
+ ( (pNode) == RT_FROM_MEMBER((pList), Type, Member) )
+/** @copydoc RTListNodeIsDummy */
+#define RTListNodeIsDummyCpp(pList, pNode, Type, Member) \
+ ( (pNode) == RT_FROM_CPP_MEMBER((pList), Type, Member) )
+
+/**
+ * Checks if a list is empty.
+ *
+ * @retval true if the list is empty.
+ * @retval false otherwise.
+ *
+ * @param pList The list to check.
+ */
+#define RTListIsEmpty(pList)            ((pList)->pPrev == (pList))
+/**
+ * Returns the next node in the list.
+ *
+ * @returns The next node.
+ *
+ * @param pCurNode The current node.
+ * @param Type Structure the list node is a member of.
+ * @param Member The list node member.
+ */
+#define RTListNodeGetNext(pCurNode, Type, Member) \
+ RT_FROM_MEMBER((pCurNode)->pNext, Type, Member)
+/** @copydoc RTListNodeGetNext */
+#define RTListNodeGetNextCpp(pCurNode, Type, Member) \
+ RT_FROM_CPP_MEMBER((pCurNode)->pNext, Type, Member)
+
+/**
+ * Returns the previous node in the list.
+ *
+ * @returns The previous node.
+ *
+ * @param pCurNode The current node.
+ * @param   Type                Structure the list node is a member of.
+ * @param   Member              The list node member.
+ */
+#define RTListNodeGetPrev(pCurNode, Type, Member) \  
+  RT_FROM_MEMBER((pCurNode)->pPrev, Type, Member)
+/** @copydoc RTListNodeGetPrev */
+#define RTListNodeGetPrevCpp(pCurNode, Type, Member) \  
+  RT_FROM_CPP_MEMBER((pCurNode)->pPrev, Type, Member)
+
+/**
+ * Returns the first element in the list (checks for empty list).
+ *
+ * @returns Pointer to the first list element, or NULL if empty list.
+ *
+ * @param   pList               List to get the first element from.
+ * @param   Type                Structure the list node is a member of.
+ * @param   Member              The list node member.
+ */
+#define RTListGetFirst(pList, Type, Member) \  
+  (!RTListIsEmpty(pList) ? RTListNodeGetNext(pList, Type, Member) : NULL)
+/** @copydoc RTListGetFirst */
+#define RTListGetFirstCpp(pList, Type, Member) \  
+  (!RTListIsEmpty(pList) ? RTListNodeGetNextCpp(pList, Type, Member) : NULL)
+
+/**
+ * Returns the last element in the list (checks for empty list).
+ *
+ * @returns Pointer to the last list element, or NULL if empty list.
+ *
+ * @param   pList               List to get the last element from.
+ * @param   Type                Structure the list node is a member of.
+ * @param   Member              The list node member.
+ */
+#define RTListGetLast(pList, Type, Member) \  
+  (!RTListIsEmpty(pList) ? RTListNodeGetPrev(pList, Type, Member) : NULL)
+/** @copydoc RTListGetLast */
+#define RTListGetLastCpp(pList, Type, Member) \  
+  (!RTListIsEmpty(pList) ? RTListNodeGetPrevCpp(pList, Type, Member) : NULL)
+
+/**
+ * Returns the next node in the list or NULL if the end has been reached.
+ *
+ * @returns The next node, or NULL if end of list.
+ *
+ * @param   pList               The list @a pCurNode is linked on.
+ * @param   pCurNode            The current node, of type @a Type.
+ * @param   Type                Structure the list node is a member of.
+ * @param   Member              The list node member.
+ */
+ #define RTListGetNext(pList, pCurNode, Type, Member)  
+  ( (pCurNode)->Member.pNext != (pList) ? RT_FROM_MEMBER((pCurNode)->Member.pNext, Type,  
+      Member) : NULL )
+/** @copydoc RTListGetNext */
+ #define RTListGetNextCpp(pList, pCurNode, Type, Member)  
+  ( (pCurNode)->Member.pNext != (pList) ? RT_FROM_CPP_MEMBER((pCurNode)->Member.pNext, Type,  
+      Member) : NULL )
+
+ /**
+  * Returns the previous node in the list or NULL if the start has been reached.
+  *
+  * @returns The previous node, or NULL if end of list.
+  *
+  *
+  * @param   pList               The list @a pCurNode is linked on.
+  * @param   pCurNode            The current node, of type @a Type.
+  * @param   Type                Structure the list node is a member of.
+  * @param   Member              The list node member.
+  */
+ #define RTListGetPrev(pList, pCurNode, Type, Member)  
+  ( (pCurNode)->Member.pPrev != (pList) ? RT_FROM_MEMBER((pCurNode)->Member.pPrev, Type,  
+      Member) : NULL )
+/** @copydoc RTListGetPrev */
+ #define RTListGetPrevCpp(pList, pCurNode, Type, Member)  
+  ( (pCurNode)->Member.pPrev != (pList) ? RT_FROM_CPP_MEMBER((pCurNode)->Member.pPrev, Type,  
+      Member) : NULL )
+
+ /**
+  * Removes and returns the first element in the list (checks for empty list).
+  *
+  * @returns Pointer to the first list element, or NULL if empty list.
+  *
+  *
+  * @param   pList               List to get the first element from.
+  * @param   Type                Structure the list node is a member of.
+  * @param   Member              The list node member.
+  */
+ #define RTListRemoveFirst(pList, Type, Member)  
+  (!RTListIsEmpty(pList) ? RT_FROM_MEMBER(RTListNodeRemoveRet((pList)->pNext), Type, Member) :  
+      NULL )
+/** @copydoc RTListRemoveFirst */
+ #define RTListRemoveFirstCpp(pList, Type, Member)  
+  (!RTListIsEmpty(pList) ? RT_FROM_CPP_MEMBER(RTListNodeRemoveRet((pList)->pNext), Type, Member) :  
+      NULL )
+
+ /**
+  * Removes and returns the last element in the list (checks for empty list).
+  *
+  * @returns The previous node, or NULL if end of list.
+  */
+ * @returns Pointer to the last list element, or NULL if empty list.
+ *
+ * @returns Pointer to the last list element, or NULL if empty list.
+ *
+ * @param pList List to get the last element from.
+ * @param Type Structure the list node is a member of.
+ * @param Member The list node member.
+ */
#define RTListRemoveLast(pList, Type, Member) \
    (!RTListIsEmpty(pList) ? RT_FROM_MEMBER(RTListNodeRemoveRet((pList)->pPrev), Type, Member) : NULL)
+/** @copydoc RTListRemoveLast */
#define RTListRemoveLastCpp(pList, Type, Member) \
    (!RTListIsEmpty(pList) ? RT_FROM_CPP_MEMBER(RTListNodeRemoveRet((pList)->pPrev), Type, Member) : NULL)
+/**
+ * Removes and returns the next node in the list or NULL if the end has been
+ * reached.
+ *
+ * @returns The next node, or NULL if end of list.
+ *
+ * @param pList The list @a pCurNode is linked on.
+ * @param pCurNode The current node, of type @a Type.
+ * @param Type Structure the list node is a member of.
+ * @param Member The list node member.
+ */
#define RTListRemoveNext(pList, pCurNode, Type, Member) \
    ( (pCurNode)->Member.pNext != (pList) ? RT_FROM_MEMBER(RTListNodeRemoveRet((pCurNode)-\nMember.pNext), Type, Member) : NULL )
+/** @copydoc RTListRemoveNext */
#define RTListRemoveNextCpp(pList, pCurNode, Type, Member) \
    ( (pCurNode)->Member.pNext != (pList) ? RT_FROM_CPP_MEMBER(RTListNodeRemoveRet((pCurNode)-\nMember.pNext), Type, Member) : NULL )
+/**
+ * Removes and returns the previous node in the list or NULL if the start has
+ * been reached.
+ *
+ * @returns The previous node, or NULL if end of list.
+ *
+ * @param pList The list @a pCurNode is linked on.
+ * @param pCurNode The current node, of type @a Type.
+ * @param Type Structure the list node is a member of.
+ * @param Member The list node member.
+ */
#define RTListRemovePrev(pList, pCurNode, Type, Member) \
    ( (pCurNode)->Member.pNext != (pList) ? RT_FROM_MEMBER(RTListNodeRemoveRet((pCurNode)-\nMember.pPrev), Type, Member) : NULL )
+/** @copydoc RTListRemovePrev */
+\#define RTListRemovePrevCpp(pList, pCurNode, Type, Member) \
+   ( (pCurNode)->Member.pNext != (pList) ? RT_FROM_CPP_MEMBER(RTListNodeRemoveRet((pCurNode)>
>Member.pPrev), Type, Member) : NULL )
+
+
+/**
+ * Enumerate the list in head to tail order.
+ *
+ * @param   pList       List to enumerate.
+ * @param   pIterator   The iterator variable name.
+ * @param   Type        Structure the list node is a member of.
+ * @param   Member      The list node member name.
+ */
+\#define RTListForEach(pList, pIterator, Type, Member) \
+    for (pIterator = RTListNodeGetNext(pList, Type, Member); \
+         !RTListNodeIsDummy(pList, pIterator, Type, Member); \
+         pIterator = RT_FROM_MEMBER((pIterator)->Member.pNext, Type, Member) )
+/** @copydoc RTListForEach */
+\#define RTListForEachCpp(pList, pIterator, Type, Member) \
+    for (pIterator = RTListNodeGetNextCpp(pList, Type, Member); \
+         !RTListNodeIsDummyCpp(pList, pIterator, Type, Member); \
+         pIterator = RT_FROM_CPP_MEMBER((pIterator)->Member.pNext, Type, Member) )
+
+
+/**
+ * Enumerate the list in head to tail order, safe against removal of the
+ * current node.
+ *
+ * @param   pList       List to enumerate.
+ * @param   pIterator   The iterator variable name.
+ * @param   pIterNext   The name of the variable saving the pointer to
+ *                       the next element.
+ * @param   Type        Structure the list node is a member of.
+ * @param   Member      The list node member name.
+ */
+\#define RTListForEachSafe(pList, pIterator, pIterNext, Type, Member) \
+    for (pIterator = RTListNodeGetNext(pList, Type, Member), \
+         pIterNext = RT_FROM_MEMBER((pIterator)->Member.pNext, Type, Member); \
+         !RTListNodeIsDummy(pList, pIterator, Type, Member); \
+         pIterator = pIterNext, \
+         pIterNext = RT_FROM_MEMBER((pIterator)->Member.pNext, Type, Member) )
+/** @copydoc RTListForEachSafe */
+\#define RTListForEachSafeCpp(pList, pIterator, pIterNext, Type, Member) \
+    for (pIterator = RTListNodeGetNextCpp(pList, Type, Member), \
+         pIterNext = RT_FROM_CPP_MEMBER((pIterator)->Member.pNext, Type, Member); \
+         !RTListNodeIsDummyCpp(pList, pIterator, Type, Member); \
+         pIterator = pIterNext, \
+         pIterNext = RT_FROM_CPP_MEMBER((pIterator)->Member.pNext, Type, Member) )
+ /**
+ * Enumerate the list in reverse order (tail to head).
+ *
+ * @param   pList               List to enumerate.
+ * @param   pIterator           The iterator variable name.
+ * @param   Type                Structure the list node is a member of.
+ * @param   Member              The list node member name.
+ */
+#define RTListForEachReverse(pList, pIterator, Type, Member)  
+ for (pIterator = RTListNodeGetPrev(pList, Type, Member);  
+     !RTListNodeIsDummy(pList, pIterator, Type, Member);  
+     pIterator = RT_FROM_MEMBER((pIterator)->Member.pPrev, Type, Member) )  
+/** @copydoc RTListForEachReverse */
+#define RTListForEachReverseCpp(pList, pIterator, Type, Member)  
+ for (pIterator = RTListNodeGetPrevCpp(pList, Type, Member);  
+     !RTListNodeIsDummyCpp(pList, pIterator, Type, Member);  
+     pIterator = RT_FROM_CPP_MEMBER((pIterator)->Member.pPrev, Type, Member) )  
+
+
+/**
+ * Enumerate the list in reverse order (tail to head).
+ *
+ * @param   pList               List to enumerate.
+ * @param   pIterator           The iterator variable name.
+ * @param   pIterPrev           The name of the variable saving the pointer to
+ *                              the previous element.
+ * @param   Type                Structure the list node is a member of.
+ * @param   Member              The list node member name.
+ */
+#define RTListForEachReverseSafe(pList, pIterator, pIterPrev, Type, Member)  
+ for (pIterator = RTListNodeGetPrev(pList, Type, Member),  
+      pIterPrev = RT_FROM_MEMBER((pIterator)->Member.pPrev, Type, Member);  
+     !RTListNodeIsDummy(pList, pIterator, Type, Member);  
+     pIterator = pIterPrev,  
+     pIterPrev = RT_FROM_MEMBER((pIterator)->Member.pPrev, Type, Member) )  
+/** @copydoc RTListForEachReverseSafe */
+#define RTListForEachReverseSafeCpp(pList, pIterator, pIterPrev, Type, Member)  
+ for (pIterator = RTListNodeGetPrevCpp(pList, Type, Member),  
+      pIterPrev = RT_FROM_CPP_MEMBER((pIterator)->Member.pPrev, Type, Member);  
+     !RTListNodeIsDummyCpp(pList, pIterator, Type, Member);  
+     pIterator = pIterPrev,  
+     pIterPrev = RT_FROM_CPP_MEMBER((pIterator)->Member.pPrev, Type, Member) )  
+
+
+/**
+ * Move the given list to a new list header.
/** * List concatenation. */
/** *
@returns nothing.
@returns nothing.
@param pListDst The destination list.
@param pListSrc The source list to concatenate.
*/
DECLINLINE(void) RTListConcatenate(PRTLISTANCHOR pListDst, PRTLISTANCHOR pListSrc)
{
    if (!RTListIsEmpty(pListSrc))
    {
        PRTLISTNODE pFirst = pListSrc->pNext;
        PRTLISTNODE pLast = pListSrc->pPrev;
        pListDst->pPrev->pNext = pFirst;
        pFirst->pPrev          = pListDst->pPrev;
        pLast->pNext           = pListDst;
        pListDst->pPrev        = pLast;
        /* Finally remove the elements from the source list */
        RTListInit(pListSrc);
    }
}
### Configuration file

---
**@file**
**IPRT - Lock Validator.**
***/

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**+
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
**+
**#ifndef ___iprt_lockvalidator_h**
**#define ___iprt_lockvalidator_h**

**+**
**+
+@include <iprt/cdefs.h>
+@include <iprt/types.h>
+@include <iprt/assert.h>
+@include <iprt/thread.h>
+@include <iprt/stdarg.h>

**+

+/** @defgroup grp_rtlockval RTLockValidator - Lock Validator**
+ @ingroup grp_rt
+ @{}
+ */

**+RT_C_DECLS_BEGIN**

**+

+/** @internal */
typedef union RTLOCKVALRECUNION *PRTLOCKVALRECUNION;

/** Source position. */
typedef struct RTLOCKVALSRCPOS
{
    /** The file where the lock was taken. */
    R3R0PTRTYPE(const char * volatile) pszFile;
    /** The function where the lock was taken. */
    R3R0PTRTYPE(const char * volatile) pszFunction;
    /** Some ID indicating where the lock was taken, typically an address. */
    RTHCUINTPTR volatile uId;
    /** The line number in the file. */
    uint32_t volatile uLine;
#if HC_ARCH_BITS == 64
    uint32_t u32Padding; /**< Alignment padding. */
#endif
} RTLOCKVALSRCPOS;

AssertCompileSize(RTLOCKVALSRCPOS, HC_ARCH_BITS == 32 ? 16 : 32);

/** @def RTLOCKVALSRCPOS_INIT
 * Initializer for a RTLOCKVALSRCPOS variable.
 *
 * @param pszFile The file name. Optional (NULL).
 * @param uLine The line number in that file. Optional (0).
 * @param pszFunction The function. Optional (NULL).
 * @param uId Some location ID, normally the return address.
 * @param
 * Optional (NULL).
 */

#define RTLOCKVALSRCPOS_INIT(pszFile, uLine, pszFunction, uId) 
    { (pszFile), (pszFunction), (uId), (uLine) }

#define RTLOCKVALSRCPOS_INIT_DEBUG_API()  
    RTLOCKVALSRCPOS_INIT(pszFile, iLine, pszFunction, uId)

#define RTLOCKVALSRCPOS_INIT_NORMAL_API  
    RTLOCKVALSRCPOS_INIT(pszFile, iLine, pszFunction, uId)

+/** @def RTLOCKVALSRCPOS_INIT_DEBUG_API
 * Initializer for a RTLOCKVALSRCPOS variable in a typicial debug API
 * variant. Assumes RT_SRC_POS_DECL and RTHCUINTPTR uId as arguments.
 */

#define RTLOCKVALSRCPOS_INIT_DEBUG_API() 
    RTLOCKVALSRCPOS_INIT(pszFile, iLine, pszFunction, uId)

+/** @def RTLOCKVALSRCPOS_INIT_NORMAL_API
 * Initializer for a RTLOCKVALSRCPOS variable in a normal API
+ * variant. Assumes iprt/asm.h is included.
+ */
+ 
+ #define RTLOCKVALSRCPOS_INIT_NORMAL_API()
+ RTLOCKVALSRCPOS_INIT(__FILE__, __LINE__, __PRETTY_FUNCTION__, (uintptr_t)ASMReturnAddress())
+ 
+ /** @def RTLOCKVALSRCPOS_INIT_POS_NO_ID
+ * Initializer for a RTLOCKVALSRCPOS variable when no @c uId is present.
+ * Assumes iprt/asm.h is included.
+ */
+ 
+ #define RTLOCKVALSRCPOS_INIT_POS_NO_ID()
+ RTLOCKVALSRCPOS_INIT(pszFile, iLine, pszFunction, (uintptr_t)ASMReturnAddress())
+ 
+ /**
+ * Lock validator record core.
+ */
+ 
+ typedef struct RTLOCKVALRECORE
+ {
+ /** The magic value indicating the record type. */
+     uint32_t volatile u32Magic;
+ } RTLOCKVALRECCORE;
+ /** Pointer to a lock validator record core. */
+ typedef RTLOCKVALRECCORE *PRTLOCKVALRECCORE;
+ /** Pointer to a const lock validator record core. */
+ typedef RTLOCKVALRECCORE const *PCRTLOCKVALRECCORE;
+ 
+ /**
+ * Record recording the exclusive ownership of a lock.
+ */
+ 
+ /** This is typically part of the per-lock data structure when compiling with
+ * the lock validator.
+ */
+ 
+ typedef struct RTLOCKVALRECSEXCL
+ {
+ /** Record core with RTLOCKVALRECSEXCL_MAGIC as the magic value. */
+     RTLOCKVALRECCORE Core;
+ /** Whether it's enabled or not. */
+     bool fEnabled;
+ /** Reserved. */
+     bool afReserved[3];
+ /** Source position where the lock was taken. */
+     RTLOCKVALSRCPOS      SrcPos;
+ /** The current owner thread. */
+     RTTHREAD volatile    hThread;
+ /** Pointer to the lock record below us. Only accessed by the owner. */
+     R3R0PTRTYPE(PRTLOCKVALRECCUNION) pDown;
+ /** Recursion count */
+ uint32_t cRecursion;
+ /** The lock sub-class. */
+ uint32_t volatile uSubClass;
+ /** The lock class. */
+ RTLOCKVALCLASS hClass;
+ /** Pointer to the lock. */
+ RTHCPTR hLock;
+ /** Pointer to the next sibling record. */
+ /* This is used to find the read side of a read-write lock. */
+ R3R0PTRTYPE(PRTLOCKVALRECUNION) pSibling;
+ /** The lock name. */
+ * @remarks The bytes beyond 32 are for better size alignment and can be taken and used for other purposes if it becomes necessary. */
+ char szName[32 + (HC_ARCH_BITS == 32 ? 12 : 8)];
+
+ RTLOCKVALRECEXCL;
+
+ AssertCompileSize(RTLOCKVALRECEXCL, HC_ARCH_BITS == 32 ? 0x60 : 0x80);
+ /* The pointer type is defined in iprt/types.h. */
+
+ /** For recording the one ownership share. */
+ */
+ typedef struct RTLOCKVALRECSHRDOWN
+
+ { /*
+     /** Record core with RTLOCKVALRECSHRDOWN_MAGIC as the magic value. */
+     RTLOCKVALRECCORE Core;
+     /** Recursion count */
+     uint16_t cRecursion;
+     /** Static (true) or dynamic (false) allocated record. */
+     bool fStaticAlloc;
+     /** Reserved. */
+     bool fReserved;
+     /** The current owner thread. */
+     RTTHREAD volatile hThread;
+     /** Pointer to the lock record below us. Only accessed by the owner. */
+     R3R0PTRTYPE(PRTLOCKVALRECSHRDOWN) pDown;
+     /** Pointer back to the shared record. */
+     R3R0PTRTYPE(PRTLOCKVALRECSHRD) pSharedRec;
+     #if HC_ARCH_BITS == 32
+     /** Reserved. */
+     RTHCPTR pvReserved;
+     #endif
+     /** Source position where the lock was taken. */
+     RTLOCKVALSRCPOS SrcPos;
+ } RTLOCKVALRECSHRDOWN;
+
+ AssertCompileSize(RTLOCKVALRECSHRDOWN, HC_ARCH_BITS == 32 ? 24 + 16 : 32 + 32);
+ /* Pointer to a RTLOCKVALRECSHRDOWN. */
+ typedef RTLOCKVALRECSHRDOWN *PRTLOCKVALRECSHRDOWN;
/**
 * Record recording the shared ownership of a lock.
 * This is typically part of the per-lock data structure when compiling with
 * the lock validator.
 */
typedef struct RTLOCKVALRECSHRD
{
    /** Record core with RTLOCKVALRECSHRD_MAGIC as the magic value. */
    RTLOCKVALRECCORE Core;
    /** The lock sub-class. */
    uint32_t volatile uSubClass;
    /** The lock class. */
    RTLOCKVALCLASS hClass;
    /** Pointer to the lock. */
    RTHCPTR hLock;
    /** Pointer to the next sibling record. */
    /** This is used to find the write side of a read-write lock. */
    R3R0PTRTYPE(PRTLOCKVALRECUNION) pSibling;
    /** The number of entries in the table. */
    * Updated before inserting and after removal. */
    uint32_t volatile cEntries;
    /** The index of the last entry (approximately). */
    uint32_t volatile iLastEntry;
    /** The max table size. */
    uint32_t volatile cAllocated;
    /** Set if the table is being reallocated, clear if not. */
    /** This is used together with rtlockValidatorSerializeDetectionEnter to make
    * sure there is exactly one thread doing the reallocation and that nobody is
    * using the table at that point. */
    bool volatile fReallocating;
    /** Whether it's enabled or not. */
    bool fEnabled;
    /** Set if event semaphore signaller, clear if read-write semaphore. */
    bool fSignaller;
    /** Alignment padding. */
    bool fPadding;
    /** Pointer to a table containing pointers to records of all the owners. */
    R3R0PTRTYPE(PRTLOCKVALRECSHRDOWN volatile *) papOwners;
    /** The lock name. */
    /** @remarks The bytes beyond 32 are for better size alignment and can be
    * taken and used for other purposes if it becomes necessary. */
    char szName[32 + (HC_ARCH_BITS == 32 ? 8 : 8)];
} RTLOCKVALRECSHRD;

AssertCompileSize(RTLOCKVALRECSHRD, HC_ARCH_BITS == 32 ? 0x50 : 0x60);
+ /
+ */
+ * Makes the two records siblings.
+ *
+ * @returns VINF_SUCCESS on success, VERR_SEM_LV_INVALID_PARAMETER if either of
+ * the records are invalid.
+ *
+ * @param   pRec1 Record 1.
+ * @param   pRec2 Record 2.
+ */
+RTDECL(int) RTLockValidatorRecMakeSiblings(PRTLOCKVALRECCORE pRec1, PRTLOCKVALRECCORE pRec2);
+
+/**
+ * Initialize a lock validator record.
+ *
+ * Use RTLockValidatorRecExclDelete to deinitialize it.
+ *
+ * @param   pRec The record.
+ * @param   hClass The class (no reference consumed). If NIL, the
+ *                 no lock order validation will be performed on
+ *                 this lock.
+ * @param   uSubClass The sub-class. This is used to define lock
+ *                     order inside the same class. If you don't know,
+ *                     then pass RTLOCKVAL_SUB_CLASS_NONE.
+ * @param   hLock The lock handle.
+ * @param   fEnabled Pass @c false to explicitly disable lock
+ *                    validation, otherwise @c true.
+ * @param   pszNameFmt Name format string for the lock validator,
+ *                      optional (NULL). Max length is 32 bytes.
+ * @param   ... Format string arguments.
+ */
+RTDECL(void) RTLockValidatorRecExclInit(PRTLOCKVALRECEXCL pRec, RTLOCKVALCLASS hClass,
+                                         uint32_t uSubClass, void *hLock,
+                                         bool fEnabled, const char *pszNameFmt, ...)
RT_IPRT_FORMAT_ATTR_MAYBE_NULL(6, 7);
+/**
+ * Initialize a lock validator record.
+ *
+ * Use RTLockValidatorRecExclDelete to deinitialize it.
+ *
+ * @param   pRec The record.
+ * @param   hClass The class (no reference consumed). If NIL, the
+ *                 no lock order validation will be performed on
+ *                 this lock.
+ * @param   uSubClass The sub-class. This is used to define lock
+ *                     order inside the same class. If you don't know,
+ *                     then pass RTLOCKVAL_SUB_CLASS_NONE.
+ * @param hLock The lock handle.
+ * @param fEnabled Pass @c false to explicitly disable lock
+ * validation, otherwise @c true.
+ * @param pszNameFmt Name format string for the lock validator,
+ * optional (NULL). Max length is 32 bytes.
+ * @param va Format string arguments.
+ */
+RTDECL(void) RTLockValidatorRecExclInitV(PRTLOCKVALRECEXCL pRec, RTLOCKVALCLASS hClass,
                                      uint32_t uSubClass, void *hLock,
                                      bool fEnabled, const char *pszNameFmt, va_list va)
RT_IPRT_FORMAT_ATTR_MAYBE_NULL(6, 0);
+/**
+ * Uninitialize a lock validator record previously initialized by
+ * RTLockRecValidatorInit.
+ *
+ * @param pRec The record. Must be valid.
+ */
+RTDECL(void) RTLockValidatorRecExclDelete(PRTLOCKVALRECEXCL pRec);
+
+/**
+ * Create and initialize a lock validator record.
+ *
+ * Use RTLockValidatorRecExclDestroy to deinitialize and destroy the returned
+ * record.
+ *
+ * @return VINF_SUCCESS or VERR_NO_MEMORY.
+ * @param ppRec Where to return the record pointer.
+ * @param hClass The class (no reference consumed). If NIL, the
+ * no lock order validation will be performed on
+ * this lock.
+ * @param uSubClass The sub-class. This is used to define lock
+ * order inside the same class. If you don't know,
+ * then pass RTLOCKVAL_SUB_CLASS_NONE.
+ * @param hLock The lock handle.
+ * @param fEnabled Pass @c false to explicitly disable lock
+ * validation, otherwise @c true.
+ * @param pszNameFmt Name format string for the lock validator,
+ * optional (NULL). Max length is 32 bytes.
+ * @param ... Format string arguments.
+ */
+RTDECL(int)  RTLockValidatorRecExclCreate(PRTLOCKVALRECEXCL *ppRec, RTLOCKVALCLASS
                                        hClass, uint32_t uSubClass, void *hLock,
                                        bool fEnabled, const char *pszNameFmt, ...)
RT_IPRT_FORMAT_ATTR_MAYBE_NULL(6, 7);
Use RTLockValidatorRecExclDestroy to deinitialize and destroy the returned record.

* @return VINF_SUCCESS or VERR_NO_MEMORY.
* @param ppRec Where to return the record pointer.
* @param hClass The class (no reference consumed). If NIL, the no lock order validation will be performed on this lock.
* @param uSubClass The sub-class. This is used to define lock order inside the same class. If you don't know, then pass RTLOCKVAL_SUB_CLASS_NONE.
* @param hLock The lock handle.
* @param fEnabled Pass @c false to explicitly disable lock validation, otherwise @c true.
* @param pszNameFmt Name format string for the lock validator, optional (NULL). Max length is 32 bytes.
* @param va Format string arguments.

+RTDECL(int) RTLockValidatorRecExclCreateV(PRTLOCKVALRECEXCL *ppRec, RTLOCKVALCLASS hClass, uint32_t uSubClass, void *hLock,
+                                           bool fEnabled, const char *pszNameFmt, va_list va)
+/**
+ * Deinitialize and destroy a record created by RTLockValidatorRecExclCreate.
+ *
+ +RTDECL(void) RTLockValidatorRecExclDestroy(PRTLOCKVALRECEXCL *ppRec);
+/**
+ * Sets the sub-class of the record.
+ *
+ +RTDECL(uint32_t) RTLockValidatorRecExclSetSubClass(PRTLOCKVALRECEXCL pRec, uint32_t uSubClass);
+/**
+ * Record the specified thread as lock owner and increment the write lock count.

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+ * This function is typically called after acquiring the lock. It accounts for
+ * recursions so it can be used instead of RTLockValidatorRecExclRecursion. Use
+ * RTLockValidatorRecExclReleaseOwner to reverse the effect.
+ *
+ * @param   pRec                The validator record.
+ * @param   hThreadSelf         The handle of the calling thread. If not known,
+ *   pass NIL_RTTHREAD and we'll figure it out.
+ * @param   pSrcPos             The source position of the lock operation.
+ * @param   fFirstRecursion     Set if it is the first recursion, clear if not
+ *   sure.
+ */
+RTDECL(void) RTLockValidatorRecExclSetOwner(PRTLOCKVALRECEXCL pRec, RTTHREAD hThreadSelf,
+                                           PCRTLOCKVALSRCPOS pSrcPos, bool fFirstRecursion);
+
+/**
+ * Check the exit order and release (unset) the ownership.
+ *
+ * This is called by routines implementing releasing an exclusive lock,
+ * typically before getting down to the final lock releasing. Can be used for
+ * recursive releasing instead of RTLockValidatorRecExclUnwind.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_SEM_LV_WRONG_RELEASE_ORDER if the order is wrong. Will have
+ *          done all necessary whining and breakpointing before returning.
+ * @retval  VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.
+ *
+ * @param   pRec                The validator record.
+ * @param   fFinalRecursion     Set if it's the final recursion, clear if not
+ *                               sure.
+ */
+RTDECL(int) RTLockValidatorRecExclReleaseOwner(PRTLOCKVALRECEXCL pRec, bool fFinalRecursion);
+
+/**
+ * Clear the lock ownership and decrement the write lock count.
+ *
+ * This is only for special cases where we wish to drop lock validation
+ * recording. See RTLockValidatorRecExclCheckAndRelease.
+ *
+ * @param   pRec                The validator record.
+ */
+RTDECL(void) RTLockValidatorRecExclReleaseOwnerUnchecked(PRTLOCKVALRECEXCL pRec);
+
+/**
+ * Checks and records a lock recursion.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_SEM_LV_NESTED if the semaphore class forbids recursion. Gone

+ *          thru the motions.
+ * @retval  VERR_SEM_LV_WRONG_ORDER if the locking order is wrong. Gone thru
+ *          the motions.
+ * @retval  VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.
+ *
+ * @param   pRec                The validator record.
+ * @param   pSrcPos             The source position of the lock operation.
+ */
+RTDECL(int) RTLockValidatorRecExclRecursion(PRTLOCKVALRECEXCL pRec, PCRTLOCKVALSRCPOS pSrcPos);
+
+/**
+ * Checks and records a lock unwind (releasing one recursion).
+ *
+ * @param   pRec                The validator record.
+ */
+RTDECL(int) RTLockValidatorRecExclUnwind(PRTLOCKVALRECEXCL pRec);
+
+/**
+ * Checks and records a mixed recursion.
+ *
+ * An example of a mixed recursion is a writer requesting read access to a
+ * SemRW.
+ *
+ * @param   pRec                The validator record it to accounted it to.
+ * @param   pRecMixed           The validator record it came in on.
+ * @param   pSrcPos             The source position of the lock operation.
+ */
+RTDECL(int) RTLockValidatorRecExclRecursionMixed(PRTLOCKVALRECEXCL pRec,
+PRTECORE pRecMixed, PCRTLOCKVALSRCPOS pSrcPos);
Checks and records the unwinding of a mixed recursion.

This should be coupled with called to RTLockValidatorRecExclRecursionMixed.

@retval VINF_SUCCESS on success.
@retval VERR_SEM_LV_WRONG_RELEASE_ORDER if the release order is wrong. Gone thru the motions.
@retval VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.

@param pRec The validator record it was accounted to.
@param pRecMixed The validator record it came in on.

RTDECL(int) RTLockValidatorRecExclUnwindMixed(PRTLOCKVALRECEXCL pRec, PRTLOCKVALRECCORE pRecMixed);

Check the exclusive locking order.

This is called by routines implementing exclusive lock acquisition.

@retval VINF_SUCCESS on success.
@retval VERR_SEM_LV_WRONG_ORDER if the order is wrong. Will have done all necessary whining and breakpointing before returning.
@retval VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.

@param pRec The validator record.
@param hThreadSelf The handle of the calling thread. If not known, pass NIL_RTTHREAD and we'll figure it out.
@param pSrcPos The source position of the lock operation.
@param cMillies The timeout, in milliseconds.

RTDECL(int) RTLockValidatorRecExclCheckOrder(PRTLOCKVALRECEXCL pRec, RTTHREAD hThreadSelf, PCRTLOCKVALSRCPOS pSrcPos, RTMSINTERVAL cMillies);

Do deadlock detection before blocking on exclusive access to a lock and change the thread state.

@retval VINF_SUCCESS - thread is in the specified sleep state.
@retval VERR_SEM_LV_DEADLOCK if blocking would deadlock. Gone thru the motions.
@retval VERR_SEM_LV_NESTED if the semaphore isn't recursive and hThread is already the owner. Gone thru the motions.
@retval VERR_SEM_LV_ILLEGAL_UPGRADE if it's a deadlock on the same lock.
The caller must handle any legal upgrades without invoking this function (for now).
@retval VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.
+ * @param   pRec                The validator record we're blocking on.
+ * @param   hThreadSelf         The current thread. Shall not be NIL_RTTHREAD!
+ * @param   pSrcPos             The source position of the lock operation.
+ * @param   fRecursiveOk        Whether it's ok to recurse.
+ * @param   cMillies            The timeout, in milliseconds.
+ * @param   enmSleepState       The sleep state to enter on successful return.
+ * @param   fReallySleeping     Is it really going to sleep now or not. Use
+ *                              false before calls to other IPRT synchronization
+ *                              methods.
+ */
+ RTDECL(int) RTLockValidatorRecExclCheckBlocking(PRTLOCKVALRECEXCL pRec, RTTHREAD hThreadSelf,
+                                                PCRTLOCKVALSRCPOS pSrcPos, bool fRecursiveOk, RTMSINTERVAL cMillies,
+                                                RTTHREADSTATE enmSleepState, bool fReallySleeping);
+
+/**
+ * RTLockValidatorRecExclCheckOrder and RTLockValidatorRecExclCheckBlocking
+ * baked into one call.
+ *
+ * @returns Any of the statuses returned by the two APIs.
+ *
+ * @param   pRec                The validator record.
+ * @param   hThreadSelf         The current thread. Shall not be NIL_RTTHREAD!
+ * @param   pSrcPos             The source position of the lock operation.
+ * @param   fRecursiveOk        Whether it's ok to recurse.
+ * @param   cMillies            The timeout, in milliseconds.
+ * @param   enmSleepState       The sleep state to enter on successful return.
+ * @param   fReallySleeping     Is it really going to sleep now or not. Use
+ *                              false before calls to other IPRT synchronization
+ *                              methods.
+ */
+ RTDECL(int) RTLockValidatorRecExclCheckOrderAndBlocking(PRTLOCKVALRECEXCL pRec, RTTHREAD hThreadSelf,
+                                                PCRTLOCKVALSRCPOS pSrcPos, bool fRecursiveOk, RTMSINTERVAL cMillies,
+                                                RTTHREADSTATE enmSleepState, bool fReallySleeping);
+
+/**
+ * Initialize a lock validator record for a shared lock.
+ *
+ * Use RTLockValidatorRecSharedDelete to deinitialize it.
+ *
+ * @param   pRec                  The shared lock record.
+ * @param   hClass                 The class (no reference consumed). If NIL, the
+ *                                 no lock order validation will be performed on
+ *                                 this lock.
+ * @param   uSubClass             The sub-class. This is used to define lock

+ * order inside the same class. If you don't know,
+ * then pass RTLOCKVAL_SUB_CLASS_NONE.
+ * @param hLock      The lock handle.
+ * @param fSignaller Set if event semaphore signaller logic should be
+ * applied to this record, clear if read-write
+ * @param fEnabled   Pass @c false to explicitly disable lock
+ * validation, otherwise @c true.
+ * @param pszNameFmt Name format string for the lock validator,
+ * optional (NULL). Max length is 32 bytes.
+ * @param ...       Format string arguments.
+ */

+RTDECL(void) RTLockValidatorRecSharedInit(PRTLOCKVALRECSHRD pRec, RTLOCKVALCLASS hClass,
                                           uint32_t uSubClass,
                                           void *hLock, bool fSignaller, bool fEnabled,
                                           const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(7, 8);

+/**
+ * Initialize a lock validator record for a shared lock.
+ *
+ * @param pRec    The shared lock record.
+ * @param hClass  The class (no reference consumed). If NIL, the
+ *                 no lock order validation will be performed on
+ *                 this lock.
+ * @param uSubClass The sub-class. This is used to define lock
+ * order inside the same class. If you don't know,
+ * then pass RTLOCKVAL_SUB_CLASS_NONE.
+ * @param hLock   The lock handle.
+ * @param fSignaller Set if event semaphore signaller logic should be
+ * applied to this record, clear if read-write
+ * @param fEnabled Pass @c false to explicitly disable lock
+ * validation, otherwise @c true.
+ * @param pszNameFmt Name format string for the lock validator,
+ * optional (NULL). Max length is 32 bytes.
+ * @param va      Format string arguments.
+ */

+RTDECL(void) RTLockValidatorRecSharedInitV(PRTLOCKVALRECSHRD pRec, RTLOCKVALCLASS hClass,
                                            uint32_t uSubClass,
                                            void *hLock, bool fSignaller, bool fEnabled,
                                            const char *pszNameFmt, va_list va) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(7, 0);

+/**
+ * Uninitialize a lock validator record previously initialized by
+ * RTLockValidatorRecSharedInit.
+ */
+ * @param   pRec                The shared lock record. Must be valid.
+ */
+RTDECL(void) RTLockValidatorRecSharedDelete(PTLLOCKVALRECSHRD pRec);
+
+/**
+ * Create and initialize a lock validator record for a shared lock.
+ *
+ * Use RTLockValidatorRecSharedDestroy to deinitialize and destroy the returned
+ * record.
+ *
+ * @returns IPRT status code.
+ * @param   ppRec               Where to return the record pointer.
+ * @param   hClass              The class (no reference consumed). If NIL, the
+ *                               no lock order validation will be performed on
+ *                               this lock.
+ * @param   uSubClass           The sub-class. This is used to define lock
+ *                               order inside the same class. If you don't know,
+ *                               then pass RTLOCKVAL_SUB_CLASS_NONE.
+ * @param   pvLock              The lock handle or address.
+ * @param   fSignaller          Set if event semaphore signaller logic should be
+ *                               applied to this record, clear if read-write
+ *                               semaphore logic should be used.
+ * @param   fEnabled            Pass @c false to explicitly disable lock
+ *                               validation, otherwise @c true.
+ * @param   pszNameFmt          Name format string for the lock validator,
+ *                               optional (NULL). Max length is 32 bytes.
+ * @param   ...                 Format string arguments.
+ */
+RTDECL(int) RTLockValidatorRecSharedCreate(PTLLOCKVALRECSHRD *ppRec, RTLOCKVALCLASS
+                                           hClass, uint32_t uSubClass,
+                                           void *pvLock, bool fSignaller, bool fEnabled,
+                                           const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(7, 8);
+
+/**
+ * Create and initialize a lock validator record for a shared lock.
+ *
+ * Use RTLockValidatorRecSharedDestroy to deinitialize and destroy the returned
+ * record.
+ *
+ * @returns IPRT status code.
+ * @param   ppRec               Where to return the record pointer.
+ * @param   hClass              The class (no reference consumed). If NIL, the
+ *                               no lock order validation will be performed on
+ *                               this lock.
+ * @param   uSubClass           The sub-class. This is used to define lock
+ *                               order inside the same class. If you don't know,
+ *                               then pass RTLOCKVAL_SUB_CLASS_NONE.
+ * @param   pvLock              The lock handle or address.
+ * @param   fSignaller          Set if event semaphore signaller logic should be
+ *                                  applied to this record, clear if read-write
+ * @param   fEnabled            Pass @c false to explicitly disable lock
+ *                                  validation, otherwise @c true.
+ * @param   pszNameFmt          Name format string for the lock validator,
+ *                                  optional (NULL). Max length is 32 bytes.
+ * @param   va                  Format string arguments.
+ */
+RTDECL(int) RTLockValidatorRecSharedCreateV(PRTLOCKVALRECSHRD *ppRec, RTLOCKVALCLASS hClass, uint32_t uSubClass,
+       void *pvLock, bool fSignaller, bool fEnabled,
+       const char *pszNameFmt, va_list va) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(7, 0);
+
+/**
+ * Deinitialize and destroy a record created by RTLockValidatorRecSharedCreate.
+ *
+ * @param   ppRec               Pointer to the record pointer. Will be set to
+ *                                  NULL.
+ */
+RTDECL(void) RTLockValidatorRecSharedDestroy(PRTLOCKVALRECSHRD *ppRec);
+
+/**
+ * Sets the sub-class of the record.
+ *
+ * It is recommended to try make sure that nobody is using this class while
+ * changing the value.
+ *
+ * @returns The old sub-class. RTLOCKVAL_SUB_CLASS_INVALID is returns if the
+ *          lock validator isn't compiled in or either of the parameters are
+ *          invalid.
+ *
+ * @param   pRec                The validator record.
+ * @param   uSubClass           The new sub-class value.
+ */
+RTDECL(uint32_t) RTLockValidatorRecSharedSetSubClass(PRTLOCKVALRECSHRD pRec, uint32_t uSubClass);
+
+/**
+ * Check the shared locking order.
+ *
+ * This is called by routines implementing shared lock acquisition.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_SEM_LV_WRONG_ORDER if the order is wrong. Will have done all
+ *         necessary whining and breakpointing before returning.
+ * @retval  VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.
- @param pRec The validator record.
  - @param hThreadSelf The handle of the calling thread. If not known, pass NIL_RTTHREAD and we'll figure it out.
  - @param pSrcPos The source position of the lock operation.
  - @param cMillies Intended sleep time in milliseconds.

+ RTDECL(int) RTLockValidatorRecSharedCheckOrder(PRTLOCKVALRECSHRD pRec, RTTHREAD hThreadSelf,
+ PCRTLOCKVALSRCPOS pSrcPos, RTMSINTERVAL cMillies);

+ * Do deadlock detection before blocking on shared access to a lock and change
  + the thread state.
  + *
  + @retval VINF_SUCCESS - thread is in the specified sleep state.
  + @retval VERR_SEM_LV_DEADLOCK if blocking would deadlock. Gone thru the
    + motions.
  + @retval VERR_SEM_LV_NESTED if the semaphore isn't recursive and hThread is
    + already the owner. Gone thru the motions.
  + @retval VERR_SEM_LV_ILLEGAL_UPGRADE if it's a deadlock on the same lock.
    + The caller must handle any legal upgrades without invoking this
      + function (for now).
  + @retval VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.
  + *
  + @param pRec The validator record we're blocking on.
  + @param hThreadSelf The current thread. Shall not be NIL_RTTHREAD!
  + @param pSrcPos The source position of the lock operation.
  + @param fRecursiveOk Whether it's ok to recurse.
  + @param cMillies Intended sleep time in milliseconds.
  + @param enmSleepState The sleep state to enter on successful return.
  + @param fReallySleeping Is it really going to sleep now or not. Use
    + false before calls to other IPRT synchronization
    + methods.

+ RTDECL(int) RTLockValidatorRecSharedCheckBlocking(PRTLOCKVALRECSHRD pRec, RTTHREAD hThreadSelf,
+ PCRTLOCKVALSRCPOS pSrcPos, bool fRecursiveOk, RTMSINTERVAL cMillies,
+ RTTHREADSTATE enmSleepState, bool fReallySleeping);

+ * baked into one call.
  + *
  + @returns Any of the statuses returned by the two APIs.
  + @param pRec The validator record.
  + @param hThreadSelf The current thread. Shall not be NIL_RTTHREAD!
+   * @param   pSrcPos             The source position of the lock operation.
+   * @param   fRecursiveOk        Whether it's ok to recurse.
+   * @param   cMillis             Intended sleep time in milliseconds.
+   * @param   enmSleepState       The sleep state to enter on successful return.
+   * @param   fReallySleeping     Is it really going to sleep now or not. Use
+   *     false before calls to other IPRT synchronization
+   *     methods.
+   */
+RTDECL(int) RTLockValidatorRecSharedCheckOrderAndBlocking(PRTLOCKVALRECSHRD pRec,
+                                                          RTTHREAD hThreadSelf,
+                                                          PCRTLOCKVALSRCPOS pSrcPos, bool fRecursiveOk, RTMSINTERVAL
cMillies,
+                                                          RTTHREADSTATE enmSleepState, bool fReallySleeping);
+
+/**
+   * Removes all current owners and makes hThread the only owner.
+   *
+   + @param   pRec             The validator record.
+   + @param   hThread          The thread handle of the owner. NIL_RTTHREAD is
+                              an alias for the current thread.
+   + @param   pSrcPos          The source position of the lock operation.
+   */
+RTDECL(void) RTLockValidatorRecSharedResetOwner(PRTLOCKVALRECSHRD pRec, RTTHREAD
+                                                         hThread, PCRTLOCKVALSRCPOS pSrcPos);
+
+/***
+   * Adds an owner to a shared locking record.
+   *
+   * Takes recursion into account. This function is typically called after
+   * acquiring the lock in shared mode.
+   *
+   + @param   pRec             The validator record.
+   + @param   hThread          The thread handle of the owner. NIL_RTTHREAD is
+                              an alias for the current thread.
+   + @param   pSrcPos          The source position of the lock operation.
+   */
+RTDECL(void) RTLockValidatorRecSharedAddOwner(PRTLOCKVALRECSHRD pRec, RTTHREAD
+                                                      hThread, PCRTLOCKVALSRCPOS pSrcPos);
+
+/***
+   * Removes an owner from a shared locking record.
+   *
+   * Takes recursion into account. This function is typically called before
+   * releasing the lock.
+   *
+   + @param   pRec             The validator record.
+   + @param   hThread          The thread handle of the owner. NIL_RTTHREAD is
+                              an alias for the current thread.
+RTDECL(void) RTLockValidatorRecSharedRemoveOwner(PRTLOCKVALRECSHRD pRec, RTTHREAD hThread);

+**
+ * Checks if the specified thread is one of the owners.
+ *
+ * @returns true if it is, false if not.
+ *
+ * @param pRec The validator record.
+ * @param hThread The thread handle of the owner. NIL_RTTHREAD is
+ * an alias for the current thread.
+ */
+RTDECL(bool) RTLockValidatorRecSharedIsOwner(PRTLOCKVALRECSHRD pRec, RTTHREAD hThread);

+**
+ * Check the exit order and release (unset) the shared ownership.
+ *
+ * This is called by routines implementing releasing the read/write lock.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_SEM_LV_WRONG_RELEASE_ORDER if the order is wrong. Will have
+ * done all necessary whining and breakpointing before returning.
+ * @retval VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.
+ *
+ * @param pRec The validator record.
+ * @param hThreadSelf The handle of the calling thread. NIL_RTTHREAD
+ * is an alias for the current thread.
+ */
+RTDECL(int) RTLockValidatorRecSharedCheckAndRelease(PRTLOCKVALRECSHRD pRec, RTTHREAD hThreadSelf);

+**
+ * Check the signaller of an event.
+ *
+ * This is called by routines implementing releasing the event semaphore (both
+ * kinds).
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_SEM_LV_NOT_SIGNALLER if the thread is not in the record. Will
+ * have done all necessary whining and breakpointing before returning.
+ * @retval VERR_SEM_LV_INVALID_PARAMETER if the input is invalid.
+ *
+ * @param pRec The validator record.
+ * @param hThreadSelf The handle of the calling thread. NIL_RTTHREAD
+ * is an alias for the current thread.
+ */
+RTDECL(int) RTLockValidatorRecSharedCheckSignaller(PRTLOCKVALRECSHRD pRec, RTTHREAD hThreadSelf);
hThreadSelf);
+
+/**
+ * Gets the number of write locks and critical sections the specified 
+ * thread owns.
+ *
+ * This number does not include any nested lock/critical entries.
+ *
+ * Note that it probably will return 0 for non-strict builds since 
+ * release builds doesn't do unnecessary diagnostic counting like this.
+ *
+ * @returns Number of locks on success (0+) and VERR_INVALID_HANDLER on failure
+ * @param   Thread          The thread we're inquiring about.
+ * @remarks Will only work for strict builds.
+ */
+RTDECL(int32_t) RTLockValidatorWriteLockGetCount(RTTHREAD Thread);
+
+/**
+ * Works the THREADINT::cWriteLocks member, mostly internal.
+ *
+ * @param   Thread      The current thread.
+ */
+RTDECL(void) RTLockValidatorWriteLockInc(RTTHREAD Thread);
+
+/**
+ * Works the THREADINT::cWriteLocks member, mostly internal.
+ *
+ * @param   Thread      The current thread.
+ */
+RTDECL(void) RTLockValidatorWriteLockDec(RTTHREAD Thread);
+
+/**
+ * Gets the number of read locks the specified thread owns.
+ *
+ * Note that nesting read lock entry will be included in the 
+ * total sum. And that it probably will return 0 for non-strict 
+ * builds since release builds doesn't do unnecessary diagnostic 
+ * counting like this.
+ *
+ * @returns Number of read locks on success (0+) and VERR_INVALID_HANDLER on failure
+ * @param   Thread          The thread we're inquiring about.
+ */
+RTDECL(int32_t) RTLockValidatorReadLockGetCount(RTTHREAD Thread);
+
+/**
+ * Works the THREADINT::cReadLocks member.
+ *
+ * @param   Thread      The current thread.
RTDECL(void) RTLockValidatorReadLockInc(RTTHREAD Thread);  
+/**  
+ * Works the THREADINT::cReadLocks member.  
+ */  
RTDECL(void) RTLockValidatorReadLockDec(RTTHREAD Thread);  
+/**  
+ * Query which lock the specified thread is waiting on.  
+ */  
RTDECL(void *) RTLockValidatorQueryBlocking(RTTHREAD hThread);  
+/**  
+ * Checks if the thread is running in the lock validator after it has entered a  
+ * block state.  
+ */  
RTDECL(bool) RTLockValidatorIsBlockedThreadInValidator(RTTHREAD hThread);  
+/**  
+ * Checks if the calling thread is holding a lock in the specified class.  
+ */  
RTDECL(bool) RTLockValidatorHoldsLocksInClass(RTTHREAD hCurrentThread, RTLOCKVALCLASS hClass);  
+/**  
+ * Checks if the calling thread is holding a lock in the specified sub-class.  
+ */
+ * @param   hClass              The class.
+ * @param   uSubClass           The new sub-class value.
+ */
+RTDECL(bool) RTLockValidatorHoldsLocksInSubClass(RTTHREAD hCurrentThread, RTLOCKVALCLASS hClass, uint32_t uSubClass);
+
+/**
+ * Creates a new lock validator class, all properties specified.
+ *
+ * @returns IPRT status code
+ * @param   phClass             Where to return the class handle.
+ * @param   pSrcPos             The source position of the create call.
+ * @param   fAutodidact         Whether the class should be allowed to teach
+ *   itself new locking order rules (true), or if the
+ *   user will teach it all it needs to know (false).
+ * @param   fRecursionOk        Whether to allow lock recursion or not.
+ * @param   fStrictReleaseOrder Enforce strict lock release order or not.
+ * @param   cMsMinDeadlock      Used to raise the sleep interval at which
+ *   deadlock detection kicks in. Minimum is 1 ms,
+ *   while RT_INDEFINITE_WAIT will disable it.
+ * @param   cMsMinOrder         Used to raise the sleep interval at which lock
+ *   order validation kicks in. Minimum is 1 ms,
+ *   while RT_INDEFINITE_WAIT will disable it.
+ * @param   pszNameFmt          Class name format string, optional (NULL). Max
+ *   length is 32 bytes.
+ * @param   ...                 Format string arguments.
+ *
+ * @remarks The properties can be modified after creation by the
+ *          RTLockValidatorClassSet* methods.
+ */
+RTDECL(int) RTLockValidatorClassCreateEx(PRTLOCKVALCLASS phClass, PCRTLOCKVALSRCPOS pSrcPos,
+                                      bool fAutodidact, bool fRecursionOk, bool fStrictReleaseOrder,
+                                      RTMSINTERVAL cMsMinDeadlock, RTMSINTERVAL cMsMinOrder,
+                                      const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(8, 9);
+
+/**
+ * Creates a new lock validator class, all properties specified.
+ *
+ * @returns IPRT status code
+ * @param   phClass             Where to return the class handle.
+ * @param   pSrcPos             The source position of the create call.
+ * @param   fAutodidact         Whether the class should be allowed to teach
+ *   itself new locking order rules (true), or if the
+ *   user will teach it all it needs to know (false).
+ * @param   fRecursionOk        Whether to allow lock recursion or not.
+ * @param   fStrictReleaseOrder Enforce strict lock release order or not.
+ * @param   cMsMinDeadlock      Used to raise the sleep interval at which
deadlock detection kicks in. Minimum is 1 ms,
+ * while RT_INDEFINITE_WAIT will disable it.
+ * @param   cMsMinOrder         Used to raise the sleep interval at which lock
order validation kicks in. Minimum is 1 ms,
+ * while RT_INDEFINITE_WAIT will disable it.
+ * @param   pszNameFmt          Class name format string, optional (NULL). Max
+ * length is 32 bytes.
+ * @param   va                  Format string arguments.
+ *
+ * @returns IPRT status code
+ * @param   phClass             Where to return the class handle.
+ * @param   fAutodidact         Whether the class should be allowed to teach
+ * itself new locking order rules (true), or if the
+ * user will teach it all it needs to know (false).
+ * @param   SRC_POS             The source position where call is being made from.
+ * Use RT_SRC_POS when possible. Optional.
+ * @param   pszNameFmt          Class name format string, optional (NULL). Max
+ * length is 32 bytes.
+ * @param   va                  Format string arguments.
+ */
+RTDECL(int) RTLockValidatorClassCreateExV(PRTLOCKVALCLASS phClass, PCRTLOCKVALSRCPOS pSrcPos,
   bool fAutodidact, bool fRecursionOk, bool fStrictReleaseOrder,
   RTMSINTERVAL cMsMinDeadlock, RTMSINTERVAL cMsMinOrder,
   const char *pszNameFmt, va_list va) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(8, 0);
+
+/**
+ * Creates a new lock validator class.
+ *
+ * @returns Class handle with a reference that is automatically consumed by the
+ * first retainer. NIL_RTCLOCKVALCLASS if we run into trouble.
+ */
+RTDECL(int) RTLockValidatorClassCreate(PRTLOCKVALCLASS phClass, bool fAutodidact,
   RT_SRC_POS_DECL,
   const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(6, 7);
+ * @param SRC_POS The source position where call is being made from.
+ * Use RT_SRC_POS when possible. Optional.
+ * @param pszNameFmt Class name format string, optional (NULL). Max
+ * length is 32 bytes.
+ * @param ... Format string arguments.
+ */
+RTDECL(RTLOCKVALCLASS) RTLockValidatorClassCreateUnique(RT_SRC_POS_DECL,
    const char *pszNameFmt, ... RT_IPRT_FORMAT_ATTR_MAYBE_NULL(4, 5);
+
+/**
+ * Finds a class for the specified source position.
+ *
+ * @returns A handle to the class (not retained!) or NIL_RTLOCKVALCLASS.
+ * @param pSrcPos The source position.
+ */
+RTDECL(RTLOCKVALCLASS) RTLockValidatorClassFindForSrcPos(PRTLOCKVALSRCPOS pSrcPos);
+
+/**
+ * Finds or creates a class given the source position.
+ *
+ * @returns Class handle (not retained!) or NIL_RTLOCKVALCLASS.
+ * @param SRC_POS The source position where call is being made from.
+ * Use RT_SRC_POS when possible. Optional.
+ * @param pszNameFmt Class name format string, optional (NULL). Max
+ * length is 32 bytes.
+ * @param ... Format string arguments.
+ */
+RTDECL(RTLOCKVALCLASS) RTLockValidatorClassForSrcPos(RT_SRC_POS_DECL,
    const char *pszNameFmt, ... RT_IPRT_FORMAT_ATTR_MAYBE_NULL(4, 5);
+
+/**
+ * Retains a reference to a lock validator class.
+ *
+ * @returns New reference count; UINT32_MAX if the handle is invalid.
+ * @param hClass Handle to the class.
+ */
+RTDECL(uint32_t) RTLockValidatorClassRetain(RTLOCKVALCLASS hClass);
+
+/**
+ * Releases a reference to a lock validator class.
+ *
+ * @returns New reference count. 0 if hClass is NIL_RTLOCKVALCLASS. UINT32_MAX
+ * if the handle is invalid.
+ * @param hClass Handle to the class.
+ */
+RTDECL(uint32_t) RTLockValidatorClassRelease(RTLOCKVALCLASS hClass);
/**
 * Teaches the class @a hClass that locks in the class @a hPriorClass can be
 * held when taking a lock of class @a hClass
 * 
 * @returns IPRT status.
 * @param   hClass              Handle to the pupil class.
 * @param   hPriorClass         Handle to the class that can be held prior to
 *                              taking a lock in the pupil class. (No reference
 *                              is consumed.)
 */

+RTDECL(int) RTLockValidatorClassAddPriorClass(RTLOCKVALCLASS hClass, RTLOCKVALCLASS
    hPriorClass);
+
+/**
 * Enables or disables the strict release order enforcing.
 * 
 * @returns IPRT status.
 * @param   hClass              Handle to the class to change.
 * @param   fEnabled            Enable it (true) or disable it (false).
 */

+RTDECL(int) RTLockValidatorClassEnforceStrictReleaseOrder(RTLOCKVALCLASS hClass, bool
    fEnabled);
+
+/**
 * Enables / disables the lock validator for new locks.
 * 
 * @returns The old setting.
 * @param   fEnabled    The new setting.
 */

+RTDECL(bool) RTLockValidatorSetEnabled(bool fEnabled);
+
+/**
 * Is the lock validator enabled?
 * 
 * @returns True if enabled, false if not.
 */

+RTDECL(bool) RTLockValidatorIsEnabled(void);
+
+/**
 * Controls whether the lock validator should be quiet or noisy (default).
 * 
 * @returns The old setting.
 * @param   fQuiet            The new setting.
 */

+RTDECL(bool) RTLockValidatorSetQuiet(bool fQuiet);
+
+/**
 * Is the lock validator quiet or noisy?
+ * @returns True if it is quiet, false if noisy.
+ */
+RTDECL(bool) RTLockValidatorIsQuiet(void);
+
+/** *
+ * Makes the lock validator panic (default) or not.
+ *
+ * @returns The old setting.
+ * @param   fPanic  The new setting.
+ */
+RTDECL(bool) RTLockValidatorSetMayPanic(bool fPanic);
+
+/** *
+ * Can the lock validator cause panic.
+ *
+ * @returns True if it can, false if not.
+ */
+RTDECL(bool) RTLockValidatorMayPanic(void);
+
+RT_C_DECLS_END
+
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/log.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/log.h
@@ -0,0 +1,2568 @@
+/** @file
+ * IPRT - Logging.
+ */
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/log.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/log.h
@@ -0,0 +1,2568 @@
+/** @file
+ * IPRT - Logging.
+ */
+
+*/
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*/

#ifndef __iprt_log_h
#define __iprt_log_h

#include <iprt/cdefs.h>
#include <iprt/types.h>
#include <iprt/stdarg.h>

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_log    RTLog - Logging
 * @ingroup grp_rt
 * @{
 */

/** IPRT Logging Groups.
 * (Remember to update RT_LOGGROUP_NAMES!)
 *
 * @remark It should be pretty obvious, but just to have
 * mentioned it, the values are sorted alphabetically (using the
 * english alphabet) except for _DEFAULT which is always first.
 *
 * If anyone might be wondering what the alphabet looks like:
 * a b c d e f g h i j k l m n o p q r s t u v w x y z
 */
typedef enum RTLOGGROUP
{
    /**< Default logging group. */
    RTLOGGROUP_DEFAULT,
    RTLOGGROUP_CRYPTO,
    RTLOGGROUP_DBG,
    RTLOGGROUP_DBG_DWARF,
    RTLOGGROUP_DIR,
    RTLOGGROUP_FILE,
    RTLOGGROUP_FS,
    RTLOGGROUP_HTTP,
    RTLOGGROUP_LDR,
    RTLOGGROUP_PATH,
    RTLOGGROUP_PROCESS,
    RTLOGGROUP_SYMLINK,
    RTLOGROUP_THREAD,
+ RTLOGGROUP_TIME,
+ RTLOGGROUP_TIMER,
+ RTLOGGROUP_LOCALIPC,
+ RTLOGGROUP_VFS,
+ RTLOGGROUP_ZIP = 31,
+ RTLOGGROUP_FIRST_USER = 32
+ } RTLOGGROUP;
+
+ /** @def RT_LOGGROUP_NAMES
+ * IPRT Logging group names.
+ *
+ * Must correspond 100% to RTLOGGROUP!
+ * Don't forget commas!
+ *
+ * @remark It should be pretty obvious, but just to have
+ * mentioned it, the values are sorted alphabetically (using the
+ * english alphabet) except for _DEFAULT which is always first.
+ *
+ * If anyone might be wondering what the alphabet looks like:
+ * a b c d e f g h i j k l m n o p q r s t u v w x y z
+ */
+#define RT_LOGGROUP_NAMES \ 
+ "DEFAULT", \ 
+ "RT_CRYPTO", \ 
+ "RT_DBG", \ 
+ "RT_DBG_DWARF", \ 
+ "RT_DIR", \ 
+ "RT_FILE", \ 
+ "RT_FS", \ 
+ "RT_HTTP", \ 
+ "RT_LDR", \ 
+ "RT_PATH", \ 
+ "RT_PROCESS", \ 
+ "RT_SYMLINK", \ 
+ "RT_THREAD", \ 
+ "RT_TIME", \ 
+ "RT_TIMER", \ 
+ "RT_LOCALIPC", \ 
+ "RT_VFS", \ 
+ "RT_17", \ 
+ "RT_18", \ 
+ "RT_19", \ 
+ "RT_20", \ 
+ "RT_21", \ 
+ "RT_22", \ 
+ "RT_23", \ 
+ "RT_24", \ 
+ "RT_25", \
+ "RT_26",
+ "RT_27",
+ "RT_28",
+ "RT_29",
+ "RT_30",
+ "RT_ZIP"
+
+
+/** @def LOG_GROUP
+ * Active logging group.
+ */
+#ifndef LOG_GROUP
+# define LOG_GROUP          RTLOGGROUP_DEFAULT
+#endif
+
+/** @def LOG_FN_FMT
+ * You can use this to specify your desired way of printing __PRETTY_FUNCTION__
+ * if you dislike the default one.
+ */
+#ifndef LOG_FN_FMT
+# define LOG_FN_FMT "%Rfn"
+#endif
+
+/** @def LOG_INSTANCE
+ * error "LOG_INSTANCE is no longer supported."
+ */
+#ifdef LOG_INSTANCE
+#error "LOG_INSTANCE is no longer supported."
+#endif
+
+/** @def LOG_REL_INSTANCE
+ * error "LOG_REL_INSTANCE is no longer supported."
+ */
+#ifdef LOG_REL_INSTANCE
+#error "LOG_REL_INSTANCE is no longer supported."
+#endif
+
+/** Logger structure. */
+#ifdef IN_RC
+typedef struct RTLOGGERRC RTLOGGER;
+#else
+typedef struct RTLOGGER RTLOGGER;
+#endif
+
+/** Pointer to logger structure. */
+typedef RTLOGGER *PRTLOGGER;
+
+/** Pointer to const logger structure. */
+typedef const RTLOGGER *PCRTLOGGER;
+
+/** Guest context logger structure. */
+typedef struct RTLOGGERRC RTLOGGERRC;
+
+/** Pointer to guest context logger structure. */
+typedef RTLOGGERRC *PRTLOGGERRC;
+
+/** Pointer to const guest context logger structure. */
+typedef const RTLOGGERRC *PCRTLOGGERRC;
/**
 * Logger phase.
 * *
 * Used for signalling the log header/footer callback what to do.
 */
typedef enum RTLOGPHASE
{
    /** Begin of the logging. */
    RTLOGPHASE_BEGIN = 0,
    /** End of the logging. */
    RTLOGPHASE_END,
    /** Before rotating the log file. */
    RTLOGPHASE_PREROTATE,
    /** After rotating the log file. */
    RTLOGPHASE_POSTROTATE,
    /** 32-bit type blow up hack. */
    RTLOGPHASE_32BIT_HACK = 0x7fffffff
} RTLOGPHASE;

/** Logger function. *
 * @param   pszFormat   Format string.
 * @param   ...         Optional arguments as specified in the format string.
 */
typedef DECLCALLBACK(void) FNRTLOGGER(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
/** Pointer to logger function. */
typedef FNRTLOGGER *PFNRTLOGGER;

/** Flush function. *
 * @param   pLogger     Pointer to the logger instance which is to be flushed.
 */
typedef DECLCALLBACK(void) FNRTLOGFLUSH(PRTLOGGER pLogger);
/** Pointer to flush function. */
typedef FNRTLOGFLUSH *PFNRTLOGFLUSH;

/** Flush function. *
 * @param   pLogger     Pointer to the logger instance which is to be flushed.
 */
 typedef DECLCALLBACK(void) FNRTLOGFLUSHGC(PRTLOGGERRC pLogger);
/** Pointer to flush function. */
+typedef RCPTRTYPE(FNRTLOGFLUSHGC *) PFNRTLOGFLUSHGC;
+
+/**
+ * Header/footer message callback.
+ *
+ * @param   pLogger     Pointer to the logger instance.
+ * @param   pszFormat   Format string.
+ * @param   ...         Optional arguments specified in the format string.
+ */
+typedef DECLCALLBACK(void) FNRTLOGPHASEMSG(PRTLOGGER pLogger, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(2, 3);
+/** Pointer to header/footer message callback function. */
+typedef FNRTLOGPHASEMSG *PFNRTLOGPHASEMSG;
+
+/**
+ * Log file header/footer callback.
+ *
+ * @param   pLogger         Pointer to the logger instance.
+ * @param   enmLogPhase     Indicates at what time the callback is invoked.
+ * @param   pfnLogPhaseMsg  Callback for writing the header/footer (RTLogPrintf
+ *                          and others are out of bounds).
+ */
+typedef DECLCALLBACK(void) FNRTLOGPHASE(PRTLOGGER pLogger, RTLOGPHASE enmLogPhase,
PFNRTLOGPHASEMSG pfnLogPhaseMsg);
+/** Pointer to log header/footer callback function. */
+typedef FNRTLOGPHASE *PFNRTLOGPHASE;
+
+/**
+ * Custom log prefix callback.
+ *
+ *
+ * @returns The number of chars written.
+ *
+ * @param   pLogger     Pointer to the logger instance.
+ * @param   pchBuf      Output buffer pointer.
+ * @param   cchBuf      The size of the output buffer.
+ * @param   pvUser      The user argument.
+ */
+typedef DECLCALLBACK(size_t) FNRTLOGPREFIX(PRTLOGGER pLogger, char *pchBuf, size_t cchBuf,
void *pvUser);
+/** Pointer to prefix callback function. */
+typedef FNRTLOGPREFIX *PFNRTLOGPREFIX;
+
+/**
+ * Logger instance structure for raw-mode context (RC).
+ */
+ struct RTLOGGERRC
+ {
+  /** Pointer to temporary scratch buffer. */
+  char                    achScratch[32768];
+  /** Current scratch buffer position. */
+  uint32_t                offScratch;
+  /** This is set if a prefix is pending. */
+  bool                    fpPendingPrefix;
+  bool                    afAlignment[3];
+  /** Pointer to the logger function. */
+  * This is actually pointer to a wrapper which will push a pointer to
+  * instance pointer onto the stack before jumping to the real logger function.
+  * A very unfortunate hack to work around the missing variadic macro support in C++. */
+  RCPTRTYPE(PFNRTLOGGER)  pfnLogger;
+  /** Pointer to the flush function. */
+  PFNRTLOGFLUSHGC         pfnFlush;
+  /** Magic number (RTLOGGERRC_MAGIC). */
+  uint32_t                u32Magic;
+  /** Logger instance flags - RTLOGFLAGS. */
+  uint32_t                fFlags;
+  /** Number of groups in the afGroups member. */
+  uint32_t                cGroups;
+  /** Group flags array - RTLOGGRPFLAGS. */
+  * This member have variable length and may extend way beyond
+  * the declared size of 1 entry. */
+  uint32_t                afGroups[1];
+};
+
+/** RTLOGGERRC::u32Magic value. (John Rogers Searle) */
+#define RTLOGGERRC_MAGIC    0x19320731
+
+#ifndef IN_RC
+
+ /** Pointer to internal logger bits. */
+ typedef struct RTLOGGERINTERNAL *PRTLOGGERINTERNAL;
+
+/**
+ * Logger instance structure.
+ */
+ struct RTLOGGER
+ {
+  /** Pointer to temporary scratch buffer. */
+  * This is used to format the log messages. */
+  char                    achScratch[49152];
+}
/** Current scratch buffer position. */
+ uint32_t offScratch;
/** Magic number. */
+ uint32_t u32Magic;
/** Logger instance flags - RTLOGFLAGS. */
+ uint32_t fFlags;
/** Destination flags - RTLOGDEST. */
+ uint32_t fDestFlags;
/** Pointer to the internal bits of the logger. */
+ * (The memory is allocated in the same block as RTLOGGER.) */
+ PRTLOGGERINTERNAL pInt;
/** Pointer to the logger function (used in non-C99 mode only). */
+ *
+ * This is actually pointer to a wrapper which will push a pointer to the
+ * instance pointer onto the stack before jumping to the real logger function.
+ * A very unfortunate hack to work around the missing variadic macro
+ * support in older C++/C standards. (The memory is allocated using
+ * RTMemExecAlloc(), except for agnostic R0 code.) */
+ PFNRTLOGGER pfnLogger;
/** Number of groups in the afGroups and papszGroups members. */
+ uint32_t cGroups;
/** Group flags array - RTLOGGRPFLAGS. */
+ * This member have variable length and may extend way beyond
+ * the declared size of 1 entry. */
+ uint32_t afGroups[1];
+);
+
+/** RTLOGGER::u32Magic value. (Avram Noam Chomsky) */
+# define RTLOGGER_MAGIC UINT32_C(0x19281207)
+
+#endif /* !IN_RC */
+
+/**
 * Logger flags.
 */
typedef enum RTLOGFLAGS
+
+/** The logger instance is disabled for normal output. */
+ RTLOGFLAGS_DISABLED = 0x00000001,
+ /** The logger instance is using buffered output. */
+ RTLOGFLAGS_BUFFERED = 0x00000002,
+ /** The logger instance expands LF to CR/LF. */
+ RTLOGFLAGS_USECRLF = 0x00000010,
+ /** Append to the log destination where applicable. */
+ RTLOGFLAGS_APPEND = 0x00000020,
+ /** Show relative timestamps with PREFIX_TSC and PREFIX_TS */
+ RTLOGFLAGS_REL_TS = 0x00000040,
/** Show decimal timestamps with PREFIX_TSC and PREFIX_TS */
+ RTLOGFLAGS_DECIMAL_TS = 0x00000080,
+ /**< Open the file in write through mode. */
+ RTLOGFLAGS_WRITE_THROUGH = 0x00000100,
+ /**< Flush the file to disk when flushing the buffer. */
+ RTLOGFLAGS_FLUSH = 0x00000200,
+ /**< Restrict the number of log entries per group. */
+ RTLOGFLAGS_RESTRICT_GROUPS = 0x00000400,
+ /**< New lines should be prefixed with the write and read lock counts. */
+ RTLOGFLAGS_PREFIX_LOCK_COUNTS = 0x00008000,
+ /**< New lines should be prefixed with the CPU id (ApicID on intel/amd). */
+ RTLOGFLAGS_PREFIX_CPUID = 0x00010000,
+ /**< New lines should be prefixed with the native process id. */
+ RTLOGFLAGS_PREFIX_PID = 0x00020000,
+ /**< New lines should be prefixed with group flag number causing the output. */
+ RTLOGFLAGS_PREFIX_FLAG_NO = 0x00040000,
+ /**< New lines should be prefixed with group flag name causing the output. */
+ RTLOGFLAGS_PREFIX_FLAG = 0x00080000,
+ /**< New lines should be prefixed with group number. */
+ RTLOGFLAGS_PREFIX_GROUP_NO = 0x00100000,
+ /**< New lines should be prefixed with group name. */
+ RTLOGFLAGS_PREFIX_GROUP = 0x00200000,
+ /**< New lines should be prefixed with the native thread id. */
+ RTLOGFLAGS_PREFIX_TID = 0x00400000,
+ /**< New lines should be prefixed with thread name. */
+ RTLOGFLAGS_PREFIX_THREAD = 0x00800000,
+ /**< New lines should be prefixed with data from a custom callback. */
+ RTLOGFLAGS_PREFIX_CUSTOM = 0x01000000,
+ /**< New lines should be prefixed with formatted timestamp since program start. */
+ RTLOGFLAGS_PREFIX_TIME_PROG = 0x04000000,
+ /**< New lines should be prefixed with formatted timestamp (UCT). */
+ RTLOGFLAGS_PREFIX_TIME = 0x08000000,
+ /**< New lines should be prefixed with milliseconds since program start. */
+ RTLOGFLAGS_PREFIX_MS_PROG = 0x10000000,
+ /**< New lines should be prefixed with timestamp. */
+ RTLOGFLAGS_PREFIX_TSC = 0x20000000,
+ /**< New lines should be prefixed with timestamp. */
+ RTLOGFLAGS_PREFIX_TS = 0x40000000,
+ /**< The prefix mask. */
+ RTLOGFLAGS_PREFIX_MASK = 0x7dff8000
+ } RTLOGFLAGS;
+
+ /**< Logger per group flags. */
+ */
+ @Remarks We only use the lower 16 bits here. We'll be combining it with the
+ group number in a few places.
+ */
/** Logger destination types and flags. */
+ typedef enum RTLOGDEST
+ {
+    /** Log to file. */
+    RTLOGDEST_FILE = 0x0001,
+    /** Log to stdout. */
+    RTLOGDEST_STDOUT = 0x0002,
+    /** Log to stderr. */
+    RTLOGDEST_STDERR = 0x0004,
+    /** Log to syslog. */
+    RTLOGDEST_SYSLOG = 0x0008,
+    /** Log to console. */
+    RTLOGDEST_CONSOLE = 0x0010,
+    /** Log to pipe. */
+    RTLOGDEST_PIPE = 0x0020,
+    /** Log to null. */
+    RTLOGDEST_NULL = 0x0040,
+    /** Log to null. */
+    RTLOGDEST_FILE_APPEND = 0x0080,
+    /** Log to stdout. */
+    RTLOGDEST_STDOUT_APPEND = 0x0100,
+    /** Log to stderr. */
+    RTLOGDEST_STDERR_APPEND = 0x0200,
+    /** Log to syslog. */
+    RTLOGDEST_SYSLOG_APPEND = 0x0400,
+    /** Log to console. */
+    RTLOGDEST_CONSOLE_APPEND = 0x0800,
+    /** Log to pipe. */
+    RTLOGDEST_PIPE_APPEND = 0x1000,
+    /** Log to null. */
+    RTLOGDEST_NULL_APPEND = 0x2000,
+    /** Log to null. */
+    RTLOGDEST_FILE_TRUNCATE = 0x4000,
+    /** Log to stdout. */
+    RTLOGDEST_STDOUT_TRUNCATE = 0x8000,
+    /** Log to stderr. */
+    RTLOGDEST_STDERR_TRUNCATE = 0x10000,
+    /** Log to syslog. */
+    RTLOGDEST_SYSLOG_TRUNCATE = 0x20000,
+    /** Log to console. */
+    RTLOGDEST_CONSOLE_TRUNCATE = 0x40000,
+    /** Log to pipe. */
+    RTLOGDEST_PIPE_TRUNCATE = 0x80000,
+    /** Log to null. */
+    RTLOGDEST_NULL_TRUNCATE = 0x100000
+} RTLOGDEST;
+ RTLOGDEST.Stdout = 0x00000002,
+ /** Log to stderr. */
+ RTLOGDEST.Stderr = 0x00000004,
+ /** Log to debugger (win32 only). */
+ RTLOGDEST.Debugger = 0x00000008,
+ /** Log to com port. */
+ RTLOGDEST.Com = 0x00000010,
+ /** Log a memory ring buffer. */
+ RTLOGDEST.RingBuf = 0x00000020,
+ /** Open files with no deny (share read, write, delete) on Windows. */
+ RTLOGDEST.F_No_Deny = 0x00010000,
+ /** Delay opening the log file, logging to the buffer untill */
+ * RTLogClearFileDelayFlag is called. */
+ RTLOGDEST.F_Delay_File = 0x00020000,
+ /** Just a dummy flag to be used when no other flag applies. */
+ RTLOGDEST.Dummy = 0x20000000,
+ /** Log to a user defined output stream. */
+ RTLOGDEST.User = 0x40000000
+
+
+RTDECL(void) RTLogPrintfEx(void *pvInstance, unsigned fFlags, unsigned iGroup,
+                           const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(4, 5);
+
+
+ifdef DOXYGEN_RUNNING
+## define LOG_DISABLED
+## define LOG_ENABLED
+## define LOG_ENABLE_FLOW
+endif
+
+/** @def LOG_DISABLED
+ * Use this compile time define to disable all logging macros. It can
+ * be overridden for each of the logging macros by the LOG_ENABLE*
+ * compile time defines.
+ */
+
+/** @def LOG_ENABLED
+ * Use this compile time define to enable logging when not in debug mode
+ * or LOG_DISABLED is set.
+ * This will enabled Log() only.
+ */
+
+/** @def LOG_ENABLE_FLOW
+ * Use this compile time define to enable flow logging when not in
+ * debug mode or LOG_DISABLED is defined.
+ * This will enable LogFlow() only.
+ */
/* Determine whether logging is enabled and forcefully normalize the indicators. */
#if (defined(DEBUG) || defined(LOG_ENABLED)) && !defined(LOG_DISABLED)
  #undef LOG_DISABLED
  #define LOG_ENABLED
#else
  #undef LOG_ENABLED
  #define LOG_DISABLED
#endif

/** @def LOG_USE_C99
 * Governs the use of variadic macros. */
#ifndef LOG_USE_C99
  #if defined(RT_ARCH_AMD64) || defined(RT_OS_DARWIN) || defined(RT_ARCH_SPARC) ||
    defined(RT_ARCH_SPARC64)
    #define LOG_USE_C99
  #endif
#endif

/** @name Macros for checking whether a log level is enabled. * @*/
/** @def LogIsItEnabled
 * Checks whether the specified logging group is enabled or not. */
#ifdef LOG_ENABLED
  #define LogIsItEnabled(a_fFlags, a_iGroup) ( RTLogDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup))
      != NULL )
#else
  #define LogIsItEnabled(a_fFlags, a_iGroup) (false)
#endif

/** @def LogIsEnabled
 * Checks whether level 1 logging is enabled. */
#define LogIsEnabled() LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP)

/** @def LogIs2Enabled
 * Checks whether level 2 logging is enabled. */
#define LogIs2Enabled() LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP)
+/** @def LogIs3Enabled
+ * Checks whether level 3 logging is enabled.
+ */
+#define LogIs3Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP)
+
+/** @def LogIs4Enabled
+ * Checks whether level 4 logging is enabled.
+ */
+#define LogIs4Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP)
+
+/** @def LogIs5Enabled
+ * Checks whether level 5 logging is enabled.
+ */
+#define LogIs5Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP)
+
+/** @def LogIs6Enabled
+ * Checks whether level 6 logging is enabled.
+ */
+#define LogIs6Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP)
+
+/** @def LogIs7Enabled
+ * Checks whether level 7 logging is enabled.
+ */
+#define LogIs7Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP)
+
+/** @def LogIs8Enabled
+ * Checks whether level 8 logging is enabled.
+ */
+#define LogIs8Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP)
+
+/** @def LogIs9Enabled
+ * Checks whether level 9 logging is enabled.
+ */
+#define LogIs9Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP)
+
+/** @def LogIs10Enabled
+ * Checks whether level 10 logging is enabled.
+ */
+#define LogIs10Enabled()    LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP)
+
+/** @def LogIs11Enabled
+ * Checks whether level 11 logging is enabled.
+ */
+#define LogIs11Enabled()    LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP)
+
+/** @def LogIs12Enabled
+ * Checks whether level 12 logging is enabled.
+ */
+/* @def LogIsEnabled
+ * Checks whether execution flow logging is enabled.
+ */
+#define LogIsEnabled() LogIsItEnabled(RTLOGGRPFLAGS_FLOW, LOG_GROUP)
+
+/* @def LogIsWarnEnabled
+ * Checks whether execution flow logging is enabled.
+ */
+#define LogIsWarnEnabled() LogIsItEnabled(RTLOGGRPFLAGS_WARN, LOG_GROUP)
+
+/* @def LogIt
+ * Write to specific logger if group enabled.
+ */
+#ifdef LOG_ENABLED
+#ifdef LOG_USE_C99
+# define _LogRemoveParentheseis(...) __VA_ARGS__
+# define _LogIt(a_fFlags, a_iGroup, ...) \ 
+ do \ 
+ { \ 
+ register PRTLOGGER LogIt_pLogger = RTLogDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \ 
+ if (RT_LIKELY(!LogIt_pLogger)) \ 
+ { /* likely */ } \ 
+ else \ 
+ { RTLogLoggerEx(LogIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \ 
+ } while (0)
+# define LogIt(a_fFlags, a_iGroup, fmtargs) _LogIt(a_fFlags, a_iGroup, _LogRemoveParentheseis fmtargs)
+# define LogItAlways(a_fFlags, a_iGroup, ...) RTLogLoggerEx(NULL, a_fFlags, UINT32_MAX, __VA_ARGS__)
+# define LogItAlways(a_fFlags, a_iGroup, fmtargs) _LogItAlways(a_fFlags, a_iGroup, _LogRemoveParentheseis fmtargs)
+ /*@todo invent a flag or something for skipping the group check so we can pass iGroup. LogItAlways. */
+# else
+# define LogIt(a_fFlags, a_iGroup, fmtargs) \ 
+ do \ 
+ { \ 
+ register PRTLOGGER LogIt_pLogger = RTLogDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \ 
+ if (RT_LIKELY(!LogIt_pLogger)) \ 
+ { /* likely */ } \ 
+ else \ 
+ { \ 
+ LogIt_pLogger->pfnLogger fmtargs; \ 
+ } \ 
+ } while (0)
+## define LogItAlways(a_fFlags, a_iGroup, fmtargs) \ 
+   do \ 
+   { \ 
+       register PRTLOGGER LogIt_pLogger = RTLogDefaultInstanceEx(RT_MAKE_U32(0, UINT16_MAX)); \ 
+       if (LogIt_pLogger) \ 
+           LogIt_pLogger->pfnLogger fmtargs; \ 
+   } while (0) 
+## endif 
+else 
+## define LogIt(a_fFlags, a_iGroup, fmtargs) do { } while (0) 
+## define LogItAlways(a_fFlags, a_iGroup, fmtargs) do { } while (0) 
+## define _LogRemoveParentheses(...) __VA_ARGS__ 
+## define _LogIt(a_fFlags, a_iGroup, ...) do { } while (0) 
+## define _LogItAlways(a_fFlags, a_iGroup, ...) do { } while (0) 
+## endif 
+endif 
+ 
+/** @name Basic logging macros 
+ * @{ */ 
+/** @def LogAlways 
+ * Level 1 logging that works regardless of the group settings. 
+ */ 
+#define LogAlways(a) LogItAlways(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, a) 
+ 
+/** @def Log 
+ * Level 1 logging. 
+ */ 
+#define Log(a) LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, a) 
+ 
+/** @def Log2 
+ * Level 2 logging. 
+ */ 
+#define Log2(a) LogIt(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP, a) 
+ 
+/** @def Log3 
+ * Level 3 logging. 
+ */ 
+#define Log3(a) LogIt(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, a) 
+ 
+/** @def Log4 
+ * Level 4 logging. 
+ */ 
+#define Log4(a) LogIt(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP, a) 
+ 
+/** @def Log5 
+ * Level 5 logging.
/* */
+#define Log5(a) LogIt(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP, a)
+
+/** @def Log6 */
+ * Level 6 logging.
+ */
+#define Log6(a) LogIt(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP, a)
+
+/** @def Log7 */
+ * Level 7 logging.
+ */
+#define Log7(a) LogIt(RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP, a)
+
+/** @def Log8 */
+ * Level 8 logging.
+ */
+#define Log8(a) LogIt(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP, a)
+
+/** @def Log9 */
+ * Level 9 logging.
+ */
+#define Log9(a) LogIt(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, a)
+
+/** @def Log10 */
+ * Level 10 logging.
+ */
+#define Log10(a) LogIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, a)
+
+/** @def Log11 */
+ * Level 11 logging.
+ */
+#define Log11(a) LogIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, a)
+
+/** @def Log12 */
+ * Level 12 logging.
+ */
+#define Log12(a) LogIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, a)
+
+/** @def LogFlow */
+ * Logging of execution flow.
+ */
+#define LogFlow(a) LogIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, a)
+
+/** @def LogWarn */
+ * Logging of warnings.
+ */
+#define LogWarn(a) LogIt(RTLOGGRPFLAGS_WARN, LOG_GROUP, a)
+/** @} */
/** @name Logging macros prefixing the current function name. */
/** @def LogFunc
 * Level 1 logging inside C/C++ functions.
 * Prepends the given log message with the function name followed by a
 * semicolon and space.
 * @param   a   Log message in format <tt>("string\n", [ args])</tt>.
 */
#ifdef LOG_USE_C99
#define LogFunc(a)   _LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, LOG_FN_FMT ": %M",
 RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
#else
#define LogFunc(a)   do { Log((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__));
 Log(a); } while (0)
#endif

/** @def Log2Func
 * Level 2 logging inside C/C++ functions.
 * Prepends the given log message with the function name followed by a
 * semicolon and space.
 * @param   a   Log message in format <tt>("string\n", [ args])</tt>.
 */
#ifdef LOG_USE_C99
#define Log2Func(a)  _LogIt(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP, LOG_FN_FMT ": %M",
 RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
#else
#define Log2Func(a)  do { Log2((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__));
 Log2(a); } while (0)
#endif

/** @def Log3Func
 * Level 3 logging inside C/C++ functions.
 * Prepends the given log message with the function name followed by a
 * semicolon and space.
 * @param   a   Log message in format <tt>("string\n", [ args])</tt>.
 */
#ifdef LOG_USE_C99
#define Log3Func(a)  _LogIt(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, LOG_FN_FMT ": %M",
 RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
#else
+/* define Log3Func(a) do { Log3((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); Log3(a); } while (0)
+#endif
+
+/** @def Log4Func
+ * Level 4 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format <tt>("string\n" [, args])</tt>.
+ */
+/#ifdef LOG_USE_C99
+/* define Log4Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+/* define Log4Func(a) do { Log4((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); Log4(a); } while (0)
+#endif
+
+/** @def Log5Func
+ * Level 5 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format <tt>("string\n" [, args])</tt>.
+ */
+/#ifdef LOG_USE_C99
+/* define Log5Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+/* define Log5Func(a) do { Log5((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); Log5(a); } while (0)
+#endif
+
+/** @def Log6Func
+ * Level 6 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format <tt>("string\n" [, args])</tt>.
+ */
+/#ifdef LOG_USE_C99
+/* define Log6Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+/* define Log6Func(a) do { Log6((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); Log6(a); } while (0)
+#endif
+* # define Log9Func(a) do { Log9((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__); Log9(a); } while (0)
+* #endif
+* +** @def Log10Func
+* +* Level 10 logging inside C/C++ functions.
+* +* +* Prepends the given log message with the function name followed by a
+* +* semicolon and space.
+* +* +* @param a Log message in format <tt>("string\[n" [, args])</tt>.
+* +*/
+* +#ifdef LOG_USE_C99
+* +# define Log10Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+* +#else
+* +# define Log10Func(a) do { Log10((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__));
+* Log10(a); } while (0)
+* +#endif
+* +* +** @def Log11Func
+* +* Level 11 logging inside C/C++ functions.
+* +* +* Prepends the given log message with the function name followed by a
+* +* semicolon and space.
+* +* +* @param a Log message in format <tt>("string\[n" [, args])</tt>.
+* +*/
+* +#ifdef LOG_USE_C99
+* +# define Log11Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+* +#else
+* +# define Log11Func(a) do { Log11((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__));
+* Log11(a); } while (0)
+* +#endif
+* +* +** @def Log12Func
+* +* Level 12 logging inside C/C++ functions.
+* +* +* Prepends the given log message with the function name followed by a
+* +* semicolon and space.
+* +* +* @param a Log message in format <tt>("string\[n" [, args])</tt>.
+* +*/
+* +#ifdef LOG_USE_C99
+* +# define Log12Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, LOG_FN_FMT "", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+* +#else
+* +# define Log12Func(a) do { Log12((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__));
+* Log12(a); } while (0)
+* +#endif
/** @def Log12Func(a) do { Log12((LOG_FN_FMT ", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); Log12(a); } while (0)
+*/
+@def LogFlowFunc
+* Macro to log the execution flow inside C/C++ functions.
+*
+* Prepends the given log message with the function name followed by
+* a semicolon and space.
+*
+* @param a Log message in format <tt>("string\n" [, args])</tt>
+* /
+ifdef LOG_USE_C99
+* define LogFlowFunc(a) \
+ _LogIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheseis a )
+else
+* define LogFlowFunc(a) \
+ do { LogFlow((LOG_FN_FMT ", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); LogFlow(a); } while (0)
+endif
+
+/** @def LogWarnFunc
+* Macro to log a warning inside C/C++ functions.
+*
+* Prepends the given log message with the function name followed by
+* a semicolon and space.
+*
+* @param a Log message in format <tt>("string\n" [, args])</tt>
+* /
+ifdef LOG_USE_C99
+* define LogWarnFunc(a) \
+ _LogIt(RTLOGGRPFLAGS_WARN, LOG_GROUP, LOG_FN_FMT ": %M", __PRETTY_FUNCTION__, _LogRemoveParentheseis a )
+else
+* define LogWarnFunc(a) \
+ do { LogFlow((LOG_FN_FMT ", __PRETTY_FUNCTION__)); LogFlow(a); } while (0)
+endif
+
+/** @def LogThisFunc
+* Level 1 logging inside a C++ non-static method, with object pointer and
+* method name prefixed to the given message.
+* @param a Log message in format <tt>("string\n" [, args])</tt>.
+*/
+@name Logging macros prefixing the this pointer value and method name.
+@ { */
+ @}
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+ /*
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+ ifndef LOG_USE_C99
+ # define Log8ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define Log8ThisFunc(a) do { Log8("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log8(a); } while (0)
+ endif
+ /** @def Log9ThisFunc
+ * Level 9 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+ ifndef LOG_USE_C99
+ # define Log9ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define Log9ThisFunc(a) do { Log9("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log9(a); } while (0)
+ endif
+ /** @def Log10ThisFunc
+ * Level 10 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+ ifndef LOG_USE_C99
+ # define Log10ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define Log10ThisFunc(a) do { Log10("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log10(a); } while (0)
+ endif
+ /** @def Log11ThisFunc
+ * Level 11 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+ ifndef LOG_USE_C99
+ # define Log11ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define Log11ThisFunc(a) do { Log11("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log11(a); } while (0)
+ endif
+ #endif
+ endif
+ ifndef LOG_USE_C99
+ # define Log8ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define Log8ThisFunc(a) do { Log8("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log8(a); } while (0)
+ endif
+ /** @def Log9ThisFunc
+ * Level 9 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+ ifndef LOG_USE_C99
+ # define Log9ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define Log9ThisFunc(a) do { Log9("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log9(a); } while (0)
+ endif
+ /** @def Log10ThisFunc
+ * Level 10 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+ ifndef LOG_USE_C99
+ # define Log10ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define Log10ThisFunc(a) do { Log10("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log10(a); } while (0)
+ endif
+ /** @def Log11ThisFunc
+ * Level 11 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+ ifndef LOG_USE_C99
+ # define Log11ThisFunc(a) \n+   _LogIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this,
```c
/** @} */

+/** @def Log11ThisFunc
+ * Level 11 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param a Log message in format "string\n" [], args]\</tt>.
+ */
+#ifdef LOG_USE_C99
+# define Log11ThisFunc(a) do { Log11(("%p " LOG_FN_FMT ",", this, __PRETTY_FUNCTION__); Log11(a); } while (0)
+#endif
+
+/** @def Log12ThisFunc
+ * Level 12 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param a Log message in format "string\n" [], args]\</tt>.
+ */
+#ifdef LOG_USE_C99
+# define Log12ThisFunc(a) \
+    _LogIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, "%p " LOG_FN_FMT ": %M", this, \ 
+__PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+# define Log12ThisFunc(a) do { Log12(("%p " LOG_FN_FMT ",", this, __PRETTY_FUNCTION__); Log12(a); } while (0)
+#endif
+
+/** @def LogFlowThisFunc
+ * Flow level logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param a Log message in format "string\n" [], args]\</tt>.
+ */
+#ifdef LOG_USE_C99
+# define LogFlowThisFunc(a) \
+    _LogIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, "%p " LOG_FN_FMT ": %M", this, \ 
+__PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+# define LogFlowThisFunc(a) do { LogFlow(("%p " LOG_FN_FMT ",", this, __PRETTY_FUNCTION__); LogFlow(a); } while (0)
+#endif
+
+/** @def LogWarnThisFunc
+ * Warning level logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param a Log message in format "string\n" [], args]\</tt>.
+ */
+#ifdef LOG_USE_C99
+# define LogWarnThisFunc(a) \
+    _LogIt(RTLOGGRPFLAGS_WARN, LOG_GROUP, "%p " LOG_FN_FMT ": %M", this, \ 
+__PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+# define LogWarnThisFunc(a) do { LogWarn(("%p " LOG_FN_FMT ",", this, __PRETTY_FUNCTION__); LogWarn(a); } while (0)
+#endif
+*/
```
/** @name Misc Logging Macros 
 * @{ */

/** @def Log1Warning 
 * The same as Log(), but prepends a \"WARNING! \" string to the message. 
 * @param a Custom log message in format \"string\n [ , args]\". 
 */
#if defined(LOG_USE_C99)
#define Log1Warning(a)     _LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, \"WARNING! %M\", _LogRemoveParenthesesis a )
#else
#define Log1Warning(a)     do { Log((\"WARNING! \") ); Log(a); } while (0)
#endif

/** @def Log1WarningFunc 
 * The same as LogWarning(), but prepends the log message with the function name. 
 * @param a Log message in format \"string\n [ , args]\". 
 */
#if defined(LOG_USE_C99)
#define Log1WarningFunc(a) \
    _LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, LOG_FN_FMT \": WARNING! \", __PRETTY_FUNCTION__, _LogRemoveParenthesesis a )
#else
#define Log1WarningFunc(a) \
    do { Log((LOG_FN_FMT \": WARNING! ", __PRETTY_FUNCTION__)); Log(a); } while (0)
#endif

/** @def Log1WarningThisFunc 
 * The same as LogWarningFunc() but for class functions (methods): the resulting 
 * log line is additionally prepended with a hex value of \[this\] pointer. 
 * @param a Log message in format \"string\n [ , args]\". 
 */
#if defined(LOG_USE_C99)
#define Log1WarningThisFunc(a) \
    _LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, \{%p\} {LOG_FN_FMT \": WARNING! \", __PRETTY_FUNCTION__}, _LogRemoveParenthesesis a )
#else
#define Log1WarningThisFunc(a) \
    do { Log((\{%p\} LOG_FN_FMT \": WARNING! ", this, __PRETTY_FUNCTION__)); Log(a); } while (0)
#endif

/** Shortcut to LogFlowFunc (\"ENTER\n\")], marks the beginnig of the function. */
```c
#define LogFlowFuncEnter()      LogFlowFunc("ENTER\n")
+
 /** Shortcut to [LogFlowFunc ("LEAVE\n")], marks the end of the function. */
#define LogFlowFuncLeave()      LogFlowFunc("LEAVE\n")
+
 /** Shortcut to [LogFlowFunc ("LEAVE: %Rrc\n")], marks the end of the function. */
#define LogFlowFuncLeaveRC(rc)  LogFlowFunc("LEAVE: %Rrc\n", (rc))
+
 /** Shortcut to [LogFlowThisFunc ("ENTER\n")], marks the beginning of the function. */
#define LogFlowThisFuncEnter()  LogFlowThisFunc("ENTER\n")
+
 /** Shortcut to [LogFlowThisFunc ("LEAVE\n")], marks the end of the function. */
#define LogFlowThisFuncLeave()  LogFlowThisFunc("LEAVE\n")
+
 /** @def LogObjRefCnt 
 * Helper macro to print the current reference count of the given COM object 
 * @param pObj Pointer to the object in question (must be a pointer to an 
 * IUnknown subclass or simply define COM-style AddRef() and 
 * Release() methods) 
 */
#define LogObjRefCnt(pObj) 
  do { 
    if (LogIsFlowEnabled()) 
    { 
      int cRefsForLog = (pObj)->AddRef(); 
      LogFlow((#pObj "{%p}.refCnt=%d\n", (pObj), cRefsForLog - 1)); 
      (pObj)->Release(); 
    } 
  } while (0)
+/
+ @name Passing Function Call Position When Logging.
+ */
+ @param pObj Pointer to the object in question (must be a pointer to an 
+ IUnknown subclass or simply define COM-style AddRef() and 
+ Release() methods) 
+ */
+ @} */
+
+ /** @name Passing Function Call Position When Logging. */
+ * This is a little bit ugly as we have to omit the comma before the 
+ * position parameters so that we don't incur any overhead in non-logging 
+ * builds (!defined(LOG_ENABLED)).
+ */
+ @ { */
+/** Source position for passing to a function call. */
+#ifdef LOG_ENABLED
+# define RTLOG_COMMA_SRC_POS  , __FILE__, __LINE__, __PRETTY_FUNCTION__
+#else
+# define RTLOG_COMMA_SRC_POS  RT_NOTHING
```
```c
#ifdef LOG_ENABLED
+# define RTLOG_COMMA_SRC_POS_DECL , const char *pszFile, unsigned iLine, const char *pszFunction
+#else
+# define RTLOG_COMMA_SRC_POS_DECL RT_NOTHING
+#endif
+/** Source position arguments. */
+#ifdef LOG_ENABLED
+# define RTLOG_COMMA_SRC_POS_ARGS , pszFile, iLine, pszFunction
+#else
+# define RTLOG_COMMA_SRC_POS_ARGS RT_NOTHING
+#endif
+/** Applies NOREF() to the source position arguments. */
+#ifdef LOG_ENABLED
+# define RTLOG_SRC_POS_NOREF() do { NOREF(pszFile); NOREF(iLine); NOREF(pszFunction); } while (0)
+#else
+# define RTLOG_SRC_POS_NOREF() do { } while (0)
+#endif
+/*/ Release Logging
+ * @}
+ +
+/** @name Release Logging
+ + @{
+ + */
+ +
+ #ifdef DOXYGEN_RUNNING
+ +# define RTLOG_REL_DISABLED
+ +# define RTLOG_REL_ENABLED
+ +#endif
+ +
+ +*/ @def RTLOG_REL_DISABLED
+ + * Use this compile time define to disable all release logging
+ + * macros.
+ + */
+ +
+ +*/ @def RTLOG_REL_ENABLED
+ + * Use this compile time define to override RTLOG_REL_DISABLE.
+ + */
+ +
+ +*/
+ + * Determine whether release logging is enabled and forcefully normalize the indicators.
+ + */
+ +#if !defined(RTLOG_REL_DISABLED) || defined(RTLOG_REL_ENABLED)
+ +# undef RTLOG_REL_DISABLED
+ +# undef RTLOG_REL_ENABLED
```
+# define RTLOG_REL_ENABLED
+#else
+# undef RTLOG_REL_ENABLED
+# undef RTLOG_REL_DISABLED
+# define RTLOG_REL_DISABLED
+#endif
+
+/** @name Macros for checking whether a release log level is enabled. */
+* @{ */
+/** @def LogRelIsItEnabled */
+* Checks whether the specified release logging group is enabled or not. */
+* */
+###define LogRelIsItEnabled(a_fFlags, a_iGroup) ( RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)) != NULL ) */
+*/
+/** @def LogRelIsEnabled */
+* Checks whether level 1 release logging is enabled. */
+*/
+###define LogRelIsEnabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP) */
+*/
+/** @def LogRelIs2Enabled */
+* Checks whether level 2 release logging is enabled. */
+*/
+###define LogRelIs2Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP) */
+*/
+/** @def LogRelIs3Enabled */
+* Checks whether level 3 release logging is enabled. */
+*/
+###define LogRelIs3Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP) */
+*/
+/** @def LogRelIs4Enabled */
+* Checks whether level 4 release logging is enabled. */
+*/
+###define LogRelIs4Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP) */
+*/
+/** @def LogRelIs5Enabled */
+* Checks whether level 5 release logging is enabled. */
+*/
+###define LogRelIs5Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP) */
+*/
+/** @def LogRelIs6Enabled */
+* Checks whether level 6 release logging is enabled. */
+*/
+###define LogRelIs6Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP) */
+*/
+/** @def LogRelIs7Enabled */
+* Checks whether level 7 release logging is enabled. */
+*/
# define LogRelIs7Enabled()     LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP)
+/**  *
+ * Checks whether level 8 release logging is enabled.
+ */
+# define LogRelIs8Enabled()     LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP)
+/**  *
+ * Checks whether level 9 release logging is enabled.
+ */
+# define LogRelIs9Enabled()     LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP)
+/**  *
+ * Checks whether level 10 release logging is enabled.
+ */
+# define LogRelIs10Enabled()    LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP)
+/**  *
+ * Checks whether level 11 release logging is enabled.
+ */
+# define LogRelIs11Enabled()    LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP)
+/**  *
+ * Checks whether level 12 release logging is enabled.
+ */
+# define LogRelIs12Enabled()    LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP)
+/**  *
+ * Checks whether execution flow release logging is enabled.
+ */
+# define LogRelIsFlowEnabled()  LogRelIsItEnabled(RTLOGGRPFLAGS_FLOW, LOG_GROUP)
+/**  *
+ * Checks whether warning level release logging is enabled.
+ */
+# define LogRelIsWarnEnabled()  LogRelIsItEnabled(RTLOGGRPFLAGS_FLOW, LOG_GROUP)
+/**  }
+
+/**  *
+ * Write to specific logger if group enabled.
+ */
+# define LogRelIt
+/**  *
+ * Write to specific logger if group enabled, assuming it likely it is enabled.
+ */
+# define LogRelItLikely
+/**  *
+ * Write to specific logger if group enabled and at least a_cMax messages
+ * have hit the log. Uses a static variable to count.
+ */
+# define LogRelMaxIt
+
#ifdef RTLOG_REL_ENABLED
 +#+
 +#+# if defined(LOG_USE_C99)
 +#+ +#+# define _LogRelRemoveParentheses(...)
 +#+ +#+# define _LogRelIt(a_fFlags, a_iGroup, ...
 +#+ +#+  do \n +#+ +#+  { \n +#+ Blasio
 +#+ Blasio PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \n Blasio +#+ Blasio if (RT_LIKELY(!LogRelIt_pLogger)) \n Blasio Blasio { /* likely */ } \n Blasio Blasio else \n Blasio Blasio RTLogLoggerEx(LogRelIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \n Blasio Blasio _LogIt(a_fFlags, a_iGroup, __VA_ARGS__); \n Blasio Blasio } while (0)
 +#+ +#+# define LogRelIt(a_fFlags, a_iGroup, fmtargs) \n Blasio +#+ Blasio _LogRelIt(a_fFlags, a_iGroup, _LogRelRemoveParentheses fmtargs)
 +#+ +#+# define _LogRelItLikely(a_fFlags, a_iGroup, ...) \n Blasio Blasio do \n Blasio Blasio { \n Blasio Blasio PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \n Blasio Blasio if (LogRelIt_pLogger) \n Blasio Blasio RTLogLoggerEx(LogRelIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \n Blasio Blasio _LogIt(a_fFlags, a_iGroup, __VA_ARGS__); \n Blasio Blasio } while (0)
 +#+ +#+# define LogRelItLikely(a_fFlags, a_iGroup, fmtargs) \n Blasio Blasio _LogRelItLikely(a_fFlags, a_iGroup, _LogRelRemoveParentheses fmtargs)
 +#+ +#+# define _LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, ...) \n Blasio Blasio do \n Blasio Blasio { \n Blasio Blasio PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \n Blasio Blasio if (LogRelIt_pLogger) \n Blasio Blasio static uint32_t s_LogRelMaxIt_cLogged = 0; \n Blasio Blasio if (s_LogRelMaxIt_cLogged < (a_cMax)) \n Blasio Blasio { \n Blasio Blasio s_LogRelMaxIt_cLogged++; \n Blasio Blasio RTLogLoggerEx(LogRelIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \n Blasio Blasio } \n Blasio Blasio _LogIt(a_fFlags, a_iGroup, __VA_ARGS__); \n Blasio Blasio } while (0)
 +#+ +#+# define LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, fmtargs) \n Blasio Blasio _LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, _LogRelRemoveParentheses fmtargs)
 +#+ +#+# define LogRelItLikely(a_fFlags, a_iGroup, fmtargs)
do \
+ { \
+   PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \
+   if (LogRelIt_pLogger) \
+     { \
+       LogRelIt_pLogger->pfnLogger fmtargs; \
+     } \
+   LogIt(a_fFlags, a_iGroup, fmtargs); \
+ } while (0)

#define LogRelIt(a_fFlags, a_iGroup, fmtargs) \
   do \
   { \
       PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \
       if (RT_LIKELY(!LogRelIt_pLogger)) \
       { /* likely */ } \
       else \
       { \
           LogRelIt_pLogger->pfnLogger fmtargs; \
       } \
   } \
+   LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, fmtargs); \
+ } while (0)

#define LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, fmtargs) \
   do \
   { \
       PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \
       if (LogRelIt_pLogger) \
       { \
           static uint32_t s_LogRelMaxIt_cLogged = 0; \
           if (s_LogRelMaxIt_cLogged < (a_cMax)) \
           { \
               s_LogRelMaxIt_cLogged++; \
               LogRelIt_pLogger->pfnLogger fmtargs; \
           } \
       } \
   } \
+   LogIt(a_fFlags, a_iGroup, fmtargs); \
+ } while (0)

#if defined(LOG_USE_C99)
#define LogRelRemoveParentheseis(...) __VA_ARGS__
#endif /* !RTLOG_REL_ENABLED */

#define LogRelIt(a_fFlags, a_iGroup, fmtargs) do { } while (0)
#define LogRelItLikely(a_fFlags, a_iGroup, fmtargs) do { } while (0)
#define LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, fmtargs) do { } while (0)
#if defined(LOG_USE_C99)
#define _LogRelRemoveParentheseis(...) __VA_ARGS__
#endif /* !RTLOG_REL_ENABLED */
/* @name Basic release logging macros */

/* @def LogRel */

/** @def LogRel1 */

/** @def LogRel2 */

/** @def LogRel3 */

/** @def LogRel4 */

/** @def LogRel5 */

/** @def LogRel6 */

/** @def LogRel7 */

/** @def LogRel8 */

/** @def LogRel9 */
+ * Level 9 release logging.
+ */
+#define LogRel9(a) LogRelIt(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, a) +
+/** @def LogRel10
+ * Level 10 release logging.
+ */
+#define LogRel10(a) LogRelIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, a) +
+/** @def LogRel11
+ * Level 11 release logging.
+ */
+#define LogRel11(a) LogRelIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, a) +
+/** @def LogRel12
+ * Level 12 release logging.
+ */
+#define LogRel12(a) LogRelIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, a) +
+/** @def LogRelFlow
+ * Logging of execution flow.
+ */
+#define LogRelFlow(a) LogRelIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, a) +
+/** @def LogRelWarn
+ * Warning level release logging.
+ */
+#define LogRelWarn(a) LogRelIt(RTLOGGRPFLAGS_WARN, LOG_GROUP, a) +
+/** @} */
+
+
+/** @name Basic release logging macros with local max
+ * @{ */
+/** @def LogRelMax
+ * Level 1 release logging with a max number of log entries.
+ */
+#define LogRelMax(a_cMax, a) LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, a) +
+/** @def LogRelMax2
+ * Level 2 release logging with a max number of log entries.
+ */
+#define LogRelMax2(a_cMax, a) LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP, a) +
+/** @def LogRelMax3
+ * Level 3 release logging with a max number of log entries.
+ */
+#define LogRelMax3(a_cMax, a) LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, a)
+ /** @def LogRelMax4
+ * Level 4 release logging with a max number of log entries.
+ */
+#define LogRelMax4(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP, a)
+
+/** @def LogRelMax5
+ * Level 5 release logging with a max number of log entries.
+ */
+#define LogRelMax5(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP, a)
+
+/** @def LogRelMax6
+ * Level 6 release logging with a max number of log entries.
+ */
+#define LogRelMax6(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP, a)
+
+/** @def LogRelMax7
+ * Level 7 release logging with a max number of log entries.
+ */
+#define LogRelMax7(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP, a)
+
+/** @def LogRelMax8
+ * Level 8 release logging with a max number of log entries.
+ */
+#define LogRelMax8(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP, a)
+
+/** @def LogRelMax9
+ * Level 9 release logging with a max number of log entries.
+ */
+#define LogRelMax9(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, a)
+
+/** @def LogRelMax10
+ * Level 10 release logging with a max number of log entries.
+ */
+#define LogRelMax10(a_cMax, a)      LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, a)
+
+/** @def LogRelMax11
+ * Level 11 release logging with a max number of log entries.
+ */
+#define LogRelMax11(a_cMax, a)      LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, a)
+
+/** @def LogRelMax12
+ * Level 12 release logging with a max number of log entries.
+ */
+#define LogRelMax12(a_cMax, a)      LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, a)
+/** @def LogRelMaxFlow
+ * Logging of execution flow with a max number of log entries.
+ */
+#define LogRelMaxFlow(a_cMax, a) 
+LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_FLOW, LOG_GROUP, a)
+/** @} */
+
+/** @name Release logging macros prefixing the current function name.
+ * @{ */
+
+/** @def LogRelFunc
+ * Release logging. Prepends the given log message with the function name
+ * followed by a semicolon and space.
+ */
+#ifdef LOG_USE_C99
+# define LogRelFunc(a) \n+ _LogRelItLikely(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, LOG_FN_FMT ": %M", 
+RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParenthesesis a )
+#else
+# define LogRelFunc(a) do { LogRel((LOG_FN_FMT ": ", __PRETTY_FUNCTION__)); LogRel(a); } while (0)
+#endif
+
+/** @def LogRelFlowFunc
+ * Release logging. Macro to log the execution flow inside C/C++ functions.
+ */
+#ifdef LOG_USE_C99
+# define LogRelFlowFunc(a) _LogRelIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, LOG_FN_FMT ": %M", 
+__PRETTY_FUNCTION__, _LogRemoveParenthesesis a )
+#else
+# define LogRelFlowFunc(a) do { LogRelFlow((LOG_FN_FMT ": ", __PRETTY_FUNCTION__); LogRelFlow(a); } while (0)
+#endif
+
+/** @def LogRelMaxFunc
+ * Release logging. Prepends the given log message with the function name
+ * followed by a semicolon and space.
+ */
+#ifdef LOG_USE_C99
+# define LogRelMaxFunc(a_cMax, a) \n+ _LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, LOG_FN_FMT ": %M", 
+__PRETTY_FUNCTION__, _LogRemoveParenthesesis a )
+endif
/** @def LogRelMaxFunc
 * Release logging. Macro to log the execution flow inside C/C++ functions.
 * Prepends the given log message with the function name followed by 
 * a semicolon and space.
 * @param   a_cMax  Max number of times this should hit the log.
 * @param   a       Log message in format "string
" [args]\</itt>.
 */

/** @} */

/** @name Release Logging macros prefixing the this pointer value and method name. */

/** @def LogRelThisFunc
 * The same as LogRelFunc but for class functions (methods): the resulting log 
 * line is additionally prepended with a hex value of |this| pointer.
 */

/** @def LogRelMaxThisFunc
 * The same as LogRelFunc but for class functions (methods): the resulting log 
 * line is additionally prepended with a hex value of |this| pointer.
 * @param   a_cMax  Max number of times this should hit the log.
 */

+/** @else
+   do { LogRelMax(a_cMax, (LOG_FN_FMT ": ", __PRETTY_FUNCTION__)); LogRelMax(a_cMax, a); } 
+   while (0)
+   #endif
+
+/** @def LogRelMaxFlowFunc
+ * Release logging. Macro to log the execution flow inside C/C++ functions.
+ * Prepends the given log message with the function name followed by 
+ * a semicolon and space.
+ * @param   a_cMax  Max number of times this should hit the log.
+ * @param   a       Log message in format \</itt>"string
" [args]\</itt>.
+ */

+/*
+#ifdef LOG_USE_C99
+   #define LogRelMaxFlowFunc(a_cMax, a) 
+   _LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_FLOW, LOG_GROUP, LOG_FN_FMT ": %M", 
+ __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#endif
+
+  do { LogRelMaxFlow(a_cMax, (LOG_FN_FMT ": ", __PRETTY_FUNCTION__)); LogRelMax(a_cMax, a); } 
  while (0)
+  #endif
+
+/** @} */

+/** @name Release Logging macros prefixing the this pointer value and method name. */

+/** @def LogRelThisFunc
+ * The same as LogRelFunc but for class functions (methods): the resulting log 
+ * line is additionally prepended with a hex value of |this| pointer.
+ */

+/** @def LogRelMaxThisFunc
+ * The same as LogRelFunc but for class functions (methods): the resulting log 
+ * line is additionally prepended with a hex value of |this| pointer.
+ * @param   a_cMax  Max number of times this should hit the log.
+ * @param   a       Log message in format <tt>("string\n" [, args])</tt>
+ */
+ #ifdef LOG_USE_C99
+ # define LogRelMaxThisFunc(a_cMax, a)  
+    _LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define LogRelMaxThisFunc(a_cMax, a)  
+    do { LogRelMax(a_cMax, "{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); LogRelMax(a_cMax, a); } while (0)
+ #endif
+ 
+ /** @def LogRelFlowThisFunc
+ * The same as LogRelFlowFunc but for class functions (methods): the resulting
+ * log line is additionally prepended with a hex value of [this] pointer.
+ */
+ #ifdef LOG_USE_C99
+ # define LogRelFlowThisFunc(a)  
+    _LogRelIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+ #else
+ # define LogRelFlowThisFunc(a) do { LogRelFlow("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); LogRelFlow(a); } while (0)
+ #endif
+ 
+ /** Shortcut to |LogRelFlowFunc("ENTER\n")|, marks the beginnig of the function. */
+ #define LogRelFlowFuncEnter() LogRelFlowFunc("ENTER\n")
+ 
+ /** Shortcut to |LogRelFlowFunc("LEAVE\n")|, marks the end of the function. */
+ #define LogRelFlowFuncLeave() LogRelFlowFunc("LEAVE\n")
+ 
+ /** Shortcut to |LogRelFlowFunc("LEAVE: %Rrc\n")|, marks the end of the function. */
+ #define LogRelFlowFuncLeaveRC(rc) LogRelFlowFunc("LEAVE: %Rrc\n", (rc))
+ 
+ /** Shortcut to |LogRelFlowThisFunc("ENTER\n")|, marks the beginnig of the function. */
+ #define LogRelFlowThisFuncEnter() LogRelFlowThisFunc("ENTER\n")
+ 
+ /** Shortcut to |LogRelFlowThisFunc("LEAVE\n")|, marks the end of the function. */
+ #define LogRelFlowThisFuncLeave() LogRelFlowThisFunc("LEAVE\n")
+ 
+ /** @} */
+ 
+ #ifndef IN_RC
+ */
+ * Sets the default release logger instance.
+ */
+ Open Source Used In 5GaaS Edge AC-4 37914
+ * @returns The old default instance.
+ * @param  pLogger   The new default release logger instance.
+ */
+RTDECL(PRTLOGGER) RTLogRelSetDefaultInstance(PRTLOGGER pLogger);
+#endif /* !IN_RC */
+
+/**
+ * Gets the default release logger instance.
+ *
+ * @returns Pointer to default release logger instance if available, otherwise NULL.
+ */
+RTDECL(PRTLOGGER) RTLogRelGetDefaultInstance(void);
+
+/**
+ * Gets the default release logger instance.
+ *
+ * @returns Pointer to default release logger instance if available, otherwise NULL.
+ * @param  fFlagsAndGroup  The flags in the lower 16 bits, the group number in
+ *                         the high 16 bits.
+ */
+RTDECL(PRTLOGGER) RTLogRelGetDefaultInstanceEx(uint32_t fFlagsAndGroup);
+
+/**
+ * Write to a logger instance, defaulting to the release one.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param  pLogger     Pointer to logger instance.
+ * @param  fFlags      The logging flags.
+ * @param  iGroup      The group.
+ *                      The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ *                      only for internal usage!
+ * @param  pszFormat   Format string.
+ * @param  ...         Format arguments.
+ * @remark  This is a worker function for LogRelIt.
+ */
+RTDECL(void) RTLogRelLogger(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup,
+                           const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(4, 5);
+
+/**
+ * Write to a logger instance, defaulting to the release one.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param  pLogger     Pointer to logger instance. If NULL the default release instance is attempted.
+ * @param  fFlags      The logging flags.
+ * @param   iGroup      The group.
+ *                      The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ *                      only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   args        Format arguments.
+ */
+RTDECL(void) RTLogRelLoggerV(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup,
+ const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(4, 0);
+
+/**
+ * printf like function for writing to the default release log.
+ */
+RTDECL(void) RTLogRelPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * vprintf like function for writing to the default release log.
+ */
+RTDECL(void) RTLogRelPrintfV(const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(1, 0);
+
+/**
+ * Changes the buffering setting of the default release logger.
+ */
+RTDECL(bool) RTLogRelSetBuffering(bool fBuffered);
+
+/** @} */

/** @name COM port logging
 * {
 */

#ifdef DOXYGEN_RUNNING

+ * @param   iGroup      The group.
+ * The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ * only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   args        Format arguments.
+ */
+RTDECL(void) RTLogRelLoggerV(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup,
+ const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(4, 0);
+
+/**
+ * printf like function for writing to the default release log.
+ */
+RTDECL(void) RTLogRelPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * vprintf like function for writing to the default release log.
+ */
+RTDECL(void) RTLogRelPrintfV(const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(1, 0);
+
+/**
+ * Changes the buffering setting of the default release logger.
+ */
+RTDECL(bool) RTLogRelSetBuffering(bool fBuffered);
+
+/** @} */

#endif

Open Source Used In 5GaaS Edge AC-4  37916
+ ndef LOG_TO_COM
+ ndef LOG_NO_COM
+endif
+
+/** @def LOG_TO_COM
 + * Redirects the normal logging macros to the serial versions.
 + */
+
+/** @def LOG_NO_COM
 + * Disables all LogCom* macros.
 + */
+
+/** @def LogCom
 + * Generic logging to serial port.
 + */
+if defined(LOG_ENABLED) && !defined(LOG_NO_COM)
+ ndef LogCom(a) RTLogComPrintf a
+else
+ ndef LogCom(a) do [ ] while (0)
+endif
+
+/** @def LogComFlow
 + * Logging to serial port of execution flow.
 + */
+if defined(LOG_ENABLED) && defined(LOG_ENABLE_FLOW) && !defined(LOG_NO_COM)
+ ndef LogComFlow(a) RTLogComPrintf a
+else
+ ndef LogComFlow(a) do [ ] while (0)
+endif
+
+ifdef LOG_TO_COM
+ndef Log
+ ndef Log(a) LogCom(a)
+ndef LogFlow
+ ndef LogFlow(a) LogComFlow(a)
+endif
+
+/** @name Backdoor Logging
 + */
+
+/** @name Backdoor Logging
 + */
+
+ifdef DOXYGEN_RUNNING
+ndef DOXYGEN_RUNNING
+endif

Open Source Used In 5GaaS Edge AC-4 37917
+/** @def LOG_TO_BACKDOOR
+ * Redirects the normal logging macros to the backdoor versions.
+ */
+
+/** @def LOG_NO_BACKDOOR
+ * Disables all LogBackdoor* macros.
+ */
+
+/** @def LogBackdoor
+ * Generic logging to the VBox backdoor via port I/O.
+ */
+#if defined(LOG_ENABLED) && !defined(LOG_NO_BACKDOOR)
+# define LogBackdoor(a)     RTLogBackdoorPrintf a
+#else
+# define LogBackdoor(a)     do { } while (0)
+#endif
+
+/** @def LogBackdoorFlow
+ * Logging of execution flow messages to the backdoor I/O port.
+ */
+#if defined(LOG_ENABLED) && !defined(LOG_NO_BACKDOOR)
+# define LogBackdoorFlow(a) RTLogBackdoorPrintf a
+#else
+# define LogBackdoorFlow(a) do { } while (0)
+#endif
+
+/** @def LogRelBackdoor
+ * Release logging to the VBox backdoor via port I/O.
+ */
+#if !defined(LOG_NO_BACKDOOR)
+# define LogRelBackdoor(a)  RTLogBackdoorPrintf a
+#else
+# define LogRelBackdoor(a)  do { } while (0)
+#endif
+
+#ifdef LOG_TO_BACKDOOR
+# undef Log
+# define Log(a)         LogBackdoor(a)
+# undef LogFlow
+# define LogFlow(a)     LogBackdoorFlow(a)
+# undef LogRel
+# define LogRel(a)      LogRelBackdoor(a)
+# if defined(LOG_USE_C99)
+#  undef _LogIt
+# define _LogIt(a_iFlags, a_iGroup, ...) LogBackdoor(__VA_ARGS__)
+# endif
+#endif
+

+/** @} */
+
+/**
+ * Gets the default logger instance, creating it if necessary.
+ *
+ * @returns Pointer to default logger instance if available, otherwise NULL.
+ */
+RTDECL(PRTLOGGER)   RTLogDefaultInstance(void);
+
+/**
+ * Gets the logger instance if enabled, creating it if necessary.
+ *
+ * @returns Pointer to default logger instance, if group has the specified
+ * flags enabled. Otherwise NULL is returned.
+ * @param   fFlagsAndGroup The flags in the lower 16 bits, the group number in
+ *                          the high 16 bits.
+ */
+RTDECL(PRTLOGGER)   RTLogDefaultInstanceEx(uint32_t fFlagsAndGroup);
+
+/**
+ * Gets the default logger instance.
+ *
+ * @returns Pointer to default logger instance if available, otherwise NULL.
+ */
+RTDECL(PRTLOGGER)   RTLogGetDefaultInstance(void);
+
+/**
+ * Gets the default logger instance if enabled.
+ *
+ * @returns Pointer to default logger instance, if group has the specified
+ * flags enabled. Otherwise NULL is returned.
+ * @param   fFlagsAndGroup The flags in the lower 16 bits, the group number in
+ *                          the high 16 bits.
+ */
+RTDECL(PRTLOGGER)   RTLogGetDefaultInstanceEx(uint32_t fFlagsAndGroup);
+
+#ifndef IN_RC
+/**
+ * Sets the default logger instance.
+ *
+ * @returns The old default instance.
+ * @param   pLogger     The new default logger instance.
+ */
+RTDECL(PRTLOGGER)   RTLogSetDefaultInstance(PRTLOGGER pLogger);
+#endif /* !IN_RC */
+ ifdef IN_RING0
+ /**
+  * Changes the default logger instance for the current thread.
+  *
+  * @returns IPRT status code.
+  * @param   pLogger     The logger instance. Pass NULL for deregistration.
+  * @param   uKey        Associated key for cleanup purposes. If pLogger is NULL,
+  *                      all instances with this key will be deregistered. So in
+  *                      order to only deregister the instance associated with the
+  *                      current thread use 0.
+  */
+ RTDECL(int)         RTLogSetDefaultInstanceThread(PRTLOGGER pLogger, uintptr_t uKey);
+ #endif /* IN_RING0 */
+
+ #ifndef IN_RC
+ /**
+  * Creates the default logger instance for a iprt users.
+  *
+  * Any user of the logging features will need to implement
+  * this or use the generic dummy.
+  *
+  * @returns Pointer to the logger instance.
+  */
+ RTDECL(PRTLOGGER) RTLogDefaultInit(void);
+
+ */
+ RTDECL(int) RTLogCreate(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings,
+       const char *pszEnvVarBase, unsigned cGroups, const char * const * ppszGroups,
+       uint32_t fDestFlags, const char *pszFilenameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(8, 9);
+
+/**
+ * Create a logger instance.
+ *
+ * @returns iprt status code.
+ *
+ * @param   ppLogger            Where to store the logger instance.
+ * @param   fFlags              Logger instance flags, a combination of the
+ *                               RTLOGFLAGS_* values.
+ * @param   pszGroupSettings    The initial group settings.
+ * @param   pszEnvVarBase       Base name for the environment variables for
+ *                               this instance.
+ * @param   cGroups             Number of groups in the array.
+ * @param   papszGroups         Pointer to array of groups. This must stick
+ *                               around for the life of the logger instance.
+ * @param   fDestFlags          The destination flags. RTLOGDEST_FILE is ORed
+ *                               if pszFilenameFmt specified.
+ * @param   pfnPhase            Callback function for starting logging and for
+ *                               ending or starting a new file for log history
+ *                               rotation. NULL is OK.
+ * @param   cHistory            Number of old log files to keep when performing
+ *                               log history rotation. 0 means no history.
+ * @param   cbHistoryFileMax    Maximum size of log file when performing
+ *                               history rotation. 0 means no size limit.
+ * @param   cSecsHistoryTimeSlot Maximum time interval per log file when
+ *                               performing history rotation, in seconds.
+ *                               0 means time limit.
+ * @param   pErrInfo            Where to return extended error information.
+ *                               Optional.
+ * @param   pszFilenameFmt      Log filename format string. Standard RTStrFormat().
+ * @param   ...                  Format arguments.
+ */
+RTDECL(int) RTLogCreateEx(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings,
+                         const char *pszEnvVarBase, unsigned cGroups, const char * const * ppszGroups,
+                         uint32_t fDestFlags, PFNRTLOGPHASE pfnPhase, uint32_t cHistory,
+                         uint64_t cbHistoryFileMax, uint32_t cSecsHistoryTimeSlot, PRTErrInfo pErrInfo,
+                         const char *pszFilenameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(13, 14);
+
+/**
+ * Create a logger instance.
+ *
+ * @returns iprt status code.
+ *
+ * @param   ppLogger            Where to store the logger instance.
+ * @param   fFlags              Logger instance flags, a combination of the
RTDECL(int) RTLogCreateExV(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings,
                            const char *pszEnvVarBase, unsigned cGroups, const char * const * papszGroups,
                            uint32_t fDestFlags, PFNRTLOGPHASE pfnPhase, uint32_t cHistory,
                            uint64_t cbHistoryFileMax, uint32_t cSecsHistoryTimeSlot, PRTERRINFO pErrInfo,
                            const char *pszFilenameFmt, va_list args) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(13, 0);

RTDECL(int) RTLogCreateForR0(PRTLOGGER pLogger, size_t cbLogger, RTR0PTR pLoggerR0Ptr, RTR0PTR pfnLoggerR0Ptr, RTR0PTR pfnFlushR0Ptr,
                              uint32_t fFlags, uint32_t fDestFlags);

+ * @param pszGroupSettings The initial group settings.
+ * @param pszEnvVarBase Base name for the environment variables for this instance.
+ * @param cGroups Number of groups in the array.
+ * @param papszGroups Pointer to array of groups. This must stick around for the life of the logger instance.
+ * @param fDestFlags The destination flags. RTLOGDEST_FILE is ORed if pszFilenameFmt specified.
+ * @param pfnPhase Callback function for starting logging and for ending or starting a new file for log history rotation.
+ * @param cHistory Number of old log files to keep when performing log history rotation. 0 means no history.
+ * @param cbHistoryFileMax Maximum size of log file when performing history rotation. 0 means no size limit.
+ * @param cSecsHistoryTimeSlot Maximum time interval per log file when performing history rotation, in seconds. 0 means no time limit.
+ * @param pErrInfo Where to return extended error information. Optional.
+ * @param pszFilenameFmt Log filename format string. Standard RTStrFormat().
+ * @param args Format arguments.
+ */
+RTDECL(int) RTLLogCreateExV(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings,
                              const char *pszEnvVarBase, unsigned cGroups, const char * const * papszGroups,
                              uint32_t fDestFlags, PFNRTLOGPHASE pfnPhase, uint32_t cHistory,
                              uint64_t cbHistoryFileMax, uint32_t cSecsHistoryTimeSlot, PRTR0PTR pErrInfo,
                              const char *pszFilenameFmt, va_list args) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(13, 0);
+/**
+ * Create a logger instance for singled threaded ring-0 usage.
+ *
+ * @returns iprt status code.
+ *
+ * @param pLogger Where to create the logger instance.
+ *
+ * @param cbLogger The amount of memory available for the logger instance.
+ *
+ * @param pLoggerR0Ptr The ring-0 address corresponding to @a pLogger.
+ *
+ * @param pfnLoggerR0Ptr Pointer to logger wrapper function.
+ *
+ * @param pfnFlushR0Ptr Pointer to flush function.
+ *
+ * @param fFlags Logger instance flags, a combination of the RTLOGFLAGS_ * values.
+ *
+ * @param fDestFlags The destination flags.
+ */
+RTDECL(int) RTLLogCreateForR0(PRTLOGGER pLogger, size_t cbLogger,
                                RTR0PTR pLoggerR0Ptr, RTR0PTR pfnLoggerR0Ptr, RTR0PTR pfnFlushR0Ptr,
                                uint32_t fFlags, uint32_t fDestFlags);
/**
 * Calculates the minimum size of a ring-0 logger instance.
 *
 * @returns The minimum size.
 * @param cGroups The number of groups.
 * @param fFlags Relevant flags.
 */
RTDECL(size_t) RTLogCalcSizeForR0(uint32_t cGroups, uint32_t fFlags);
+
/**
 * Destroys a logger instance.
 *
 * The instance is flushed and all output destinations closed (where applicable).
 *
 * @returns iprt status code.
 * @param pLogger The logger instance which close destroyed. NULL is fine.
 */
RTDECL(int) RTLogDestroy(PRTLOGGER pLogger);
+
/**
 * Create a logger instance clone for RC usage.
 *
 * @returns iprt status code.
 *
 * @param pLogger The logger instance to be cloned.
 * @param pLoggerRC Where to create the RC logger instance.
 * @param cbLoggerRC Amount of memory allocated to for the RC logger instance clone.
 * @param pfnLoggerRCPtr Pointer to logger wrapper function for this instance (RC Ptr).
 * @param pfnFlushRCPtr Pointer to flush function (RC Ptr).
 * @param fFlags Logger instance flags, a combination of the RTLOGFLAGS_* values.
 */
RTDECL(int) RTLogCloneRC(PRTLOGGER pLogger, PRTLOGGERRC pLoggerRC, size_t cbLoggerRC,
                         RTRCPTR pfnLoggerRCPtr, RTRCPTR pfnFlushRCPtr, uint32_t fFlags);
+
/**
 * Flushes a RC logger instance to a R3 logger.
 *
 * @returns iprt status code.
 * @param pLogger The R3 logger instance to flush pLoggerRC to. If NULL the default logger is used.
 * @param pLoggerRC The RC logger instance to flush.
 */
RTDECL(void) RTLogFlushRC(PRTLOGGER pLogger, PRTLOGGERRC pLoggerRC);
+
/**
 * Flushes the buffer in one logger instance onto another logger.
 */
+ * + * @returns iprt status code.
+ *
+ * @param pSrcLogger The logger instance to flush.
+ * @param pDstLogger The logger instance to flush onto.
+ *
+ * If NULL the default logger will be used.
+ */
+RTDECL(void) RTLogFlushToLogger(PRTLOGGER pSrcLogger, PRTLOGGER pDstLogger);
+
+/**
+ * Flushes a R0 logger instance to a R3 logger.
+ *
+ * @returns iprt status code.
+ * @param pSrcLogger The logger instance to flush.
+ * @param pDstLogger The logger instance to flush onto. If NULL the default logger is used.
+ */
+RTDECL(void) RTLogFlushR0(PRTLOGGER pSrcLogger, PRTLOGGER pDstLogger);
+
+/**
+ * Sets the custom prefix callback.
+ *
+ * @returns IPRT status code.
+ * @param pLogger The logger instance.
+ * @param pfnCallback The callback.
+ * @param pvUser The user argument for the callback.
+ */
+RTDECL(int) RTLogSetCustomPrefixCallback(PRTLOGGER pLogger, PFNRTLOGPREFIX pfnCallback, void *pvUser);
+
+/**
+ * Same as RTLogSetCustomPrefixCallback for loggers created by RTLogCreateForR0.
+ *
+ * @returns IPRT status code.
+ * @param pLogger The logger instance.
+ * @param pfnCallback The callback.
+ * @param pvUser The user argument for the callback.
+ */
+RTDECL(int) RTLogSetCustomPrefixCallbackForR0(PRTLOGGER pLogger, RTR0PTR pfnCallbackR0Ptr, RTR0PTR pvUserR0Ptr);
+
+/**
+ * Copies the group settings and flags from logger instance to another.
+ *
+ * @returns IPRT status code.
+ * @param pSrcLogger The logger instance to flush.
+ * @param pDstLogger The destination logger instance.
/**
 * @param   pDstLoggerR0Ptr The ring-0 address corresponding to @a pDstLogger.
 * @param   pSrcLogger      The source logger instance. If NULL the default one is used.
 * @param   fFlagsOr        OR mask for the flags.
 * @param   fFlagsAnd       AND mask for the flags.
 */
RTDECL(int) RTLogCopyGroupsAndFlagsForR0(PRTLOGGER pDstLogger, RTR0PTR pDstLoggerR0Ptr,
                                         PCRTLOGGER pSrcLogger, uint32_t fFlagsOr, uint32_t fFlagsAnd);

/**
 * Get the current log group settings as a string.
 * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
 */
RTDECL(int) RTLogGetGroupSettings(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf);

/**
 * Updates the group settings for the logger instance using the specified
 * @returns iprt status code.
 *          Failures can safely be ignored.
 */
RTDECL(int) RTLogGroupSettings(PRTLOGGER pLogger, const char *pszValue);

/**
 * Updates the flags for the logger instance using the specified
 * @returns iprt status code.
 *          Failures can safely be ignored.
 */
RTDECL(int) RTLogFlags(PRTLOGGER pLogger, const char *pszValue);

/**
 * Changes the buffering setting of the specified logger.
 * @returns The old state.
 */
+ * @param   pLogger         The logger instance (NULL is an alias for the
default logger).
+ * @param   fBuffered       The new state.
+ */
+RTDECL(bool) RTLogSetBuffering(PRTLOGGER pLogger, bool fBuffered);
+
+/**
+ * Sets the max number of entries per group.
+ *
+ * @returns Old restriction.
+ *
+ * @param   pLogger             The logger instance (NULL is an alias for the
default logger).
+ * @param   cMaxEntriesPerGroup The max number of entries per group.
+ *
+ * @remarks Lowering the limit of an active logger may quietly mute groups.
+ * Raising it may reactive already muted groups.
+ */
+RTDECL(uint32_t) RTLogSetGroupLimit(PRTLOGGER pLogger, uint32_t cMaxEntriesPerGroup);
+
+ifndef IN_RC
+/**
+ * Get the current log flags as a string.
+ *
+ * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
+ *
+ * @param   pLogger             Logger instance (NULL for default logger).
+ * @param   pszBuf              The output buffer.
+ * @param   cchBuf              The size of the output buffer. Must be greater
+ * than zero.
+ */
+RTDECL(int) RTLogGetFlags(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf);
+
+/**
+ * Updates the logger destination using the specified string.
+ *
+ * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
+ *
+ * @param   pLogger             Logger instance (NULL for default logger).
+ * @param   pszValue            The value to parse.
+ */
+RTDECL(int) RTLogDestinations(PRTLOGGER pLogger, char const *pszValue);
+
+/**
+ * Clear the file delay flag if set, opening the destination and flushing.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   pLogger             Logger instance (NULL for default logger).
+ * @param   pszValue            The value to parse.
+ * @param   pErrInfo            Where to return extended error info. Optional.
+ /**
+ RTDECL(int) RTLogClearFileDelayFlag(PRTLOGGER pLogger, PRTERRINFO pErrInfo);
+ */
+ /**
+ * Get the current log destinations as a string.
+ *
+ * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
+ * @param   pLogger             Logger instance (NULL for default logger).
+ * @param   pszBuf              The output buffer.
+ * @param   cchBuf              The size of the output buffer. Must be greater
+ *                              than 0.
+ */
+ RTDECL(int) RTLogGetDestinations(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf);
+ #endif /* !IN_RC */
+ */
+ /**
+ * Flushes the specified logger.
+ *
+ * @param   pLogger     The logger instance to flush.
+ *                      If NULL the default instance is used. The default instance
+ *                      will not be initialized by this call.
+ */
+ RTDECL(void) RTLogFlush(PRTLOGGER pLogger);
+ */
+ /**
+ * Write to a logger instance.
+ *
+ * @param   pLogger     Pointer to logger instance.
+ * @param   pvCallerRet Ignored.
+ * @param   pszFormat   Format string.
+ * @param   ...         Format arguments.
+ */
+ RTDECL(void) RTLogLogger(PRTLOGGER pLogger, void *pvCallerRet, const char *pszFormat, ...)
+ RT_IPRT_FORMAT_ATTR(3, 4);
+ */
+ /**
+ * Write to a logger instance.
+ *
+ * @param   pLogger     Pointer to logger instance.
+ * @param   pszFormat   Format string.
+ * @param   args        Format arguments.
+ */
+ RTDECL(void) RTLogLoggerV(PRTLOGGER pLogger, const char *pszFormat, va_list args)
+ RT_IPRT_FORMAT_ATTR(3, 0);
+ */
+ /**
+ * Write to a logger instance.
+ */
+ RTDECL(void) RTLogLogger(PRTLOGGER pLogger, const char *pszFormat, va_list args)
+ RT_IPRT_FORMAT_ATTR(3, 0);
This function will check whether the instance, group and flags makes up a logging kind which is currently enabled before writing anything to the log.

@param pLogger Pointer to logger instance. If NULL the default logger instance will be attempted.
@param fFlags The logging flags.
@param iGroup The group.
The value ~0U is reserved for compatibility with RTLogLogger[V] and is only for internal usage!
@param pszFormat Format string.
@remark This is a worker function of LogIt.

RTDECL(void) RTLogLoggerEx(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(4, 5);

Write to a logger instance.

This function will check whether the instance, group and flags makes up a logging kind which is currently enabled before writing anything to the log.

@param pLogger Pointer to logger instance. If NULL the default logger instance will be attempted.
@param fFlags The logging flags.
@param iGroup The group.
The value ~0U is reserved for compatibility with RTLogLogger[V] and is only for internal usage!
@param pszFormat Format string.
@remark This is a worker function of LogIt.

RTDECL(void) RTLogLoggerExV(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup, const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(4, 0);

printf like function for writing to the default log.

Printf like format string.
Optional arguments as specified in pszFormat.

The API doesn't support formatting of floating point numbers at the moment.

vprintf like function for writing to the default log.

Printf like format string.
Optional arguments as specified in pszFormat.
+ * @remark The API doesn’t support formatting of floating point numbers at the moment.
+ */
+RTDECL(void) RTLogPrintfV(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+
+/**
+ * Dumper vprintf-like function outputting to a logger.
+ *
+ * @param pvUser Pointer to the logger instance to use, NULL for default instance.
+ * @param pszFormat Format string.
+ * @param va Format arguments.
+ */
+RTDECL(void) RTLogDumpPrintfV(void *pvUser, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(2, 0);
+
+#ifndef DECLARED_FNRTSTROUTPUT /* duplicated in iprt/string.h */
+#define DECLARED_FNRTSTROUTPUT
+/**
+ * Output callback.
+ *
+ * @returns number of bytes written.
+ * @param pvArg User argument.
+ * @param pachChars Pointer to an array of utf-8 characters.
+ * @param cbChars Number of bytes in the character array pointed to by pachChars.
+ */
typedef DECLCALLBACK(size_t) FNRTSTROUTPUT(void *pvArg, const char *pachChars, size_t cbChars);
+### Pointer to callback function. */
typedef FNRTSTROUTPUT *PFNRTSTROUTPUT;
+endif
+
+/**
+ * Partial vsprintf worker implementation.
+ *
+ * @returns number of bytes formatted.
+ * @param pfnOutput Output worker.
+ * @param pszFormat Format string.
+ * @param args Argument list.
+ */
+RTDECL(size_t) RTLogFormatV(PFNRTSTROUTPUT pfnOutput, void *pvArg, const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(3, 0);
+
+*/
+* Write log buffer to COM port.
+*
+ * @param   pach        Pointer to the buffer to write.
+ * @param   cb          Number of bytes to write.
+ */
+RTDECL(void) RTLogWriteCom(const char *pach, size_t cb);
+
+/**
+ * Prints a formatted string to the serial port used for logging.
+ *
+ * @returns Number of bytes written.
+ * @param   pszFormat   Format string.
+ * @param   ...         Optional arguments specified in the format string.
+ */
+RTDECL(size_t) RTLogComPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * Prints a formatted string to the serial port used for logging.
+ *
+ * @returns Number of bytes written.
+ * @param   pszFormat   Format string.
+ * @param   args        Optional arguments specified in the format string.
+ */
+RTDECL(size_t)  RTLogComPrintfV(const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(1, 0);
+
+if 0 /* not implemented yet */
+
+/** Indicates that the semaphores shall be used to notify the other
+ * part about buffer changes. */
+#define LOGHOOKBUFFER_FLAGS_SEMAPHORED      1
+
+/**
+ * Log Hook Buffer.
+ * Use to communicate between the logger and a log consumer.
+ */
+typedef struct RTLOGHOOKBUFFER
+{
+    /** Write pointer. */
+    volatile void          *pvWrite;
+    /** Read pointer. */
+    volatile void          *pvRead;
+    /** Buffer start. */
+    void                   *pvStart;
+    /** Buffer end (exclusive). */
+    void                   *pvEnd;
+    /** Signaling semaphore used by the writer to wait on a full buffer.
+     * Only used when indicated in flags. */
+    void                   *pvSemWriter;
+    /** Signaling semaphore used by the read to wait on an empty buffer.
+  * Only used when indicated in flags. */
+  void          *pvSemReader;
+  /** Buffer flags. Current reserved and set to zero. */
+  volatile unsigned   fFlags;
+} RTLOGHOOKBUFFER;
+/** Pointer to a log hook buffer. */
+typedef RTLOGHOOKBUFFER *PRTLOGHOOKBUFFER;
+
+/**
+ * Register a logging hook.
+ *
+ * This type of logging hooks are expecting different threads acting
+ * producer and consumer. They share a circular buffer which have two
+ * pointers one for each end. When the buffer is full there are two
+ * alternatives (indicated by a buffer flag), either wait for the
+ * consumer to get it's job done, or to write a generic message saying
+ * buffer overflow.
+ *
+ * Since the waiting would need a signal semaphore, we'll skip that for now.
+ *
+ * @returns iprt status code.
+ * @param   pBuffer     Pointer to a logger hook buffer.
+ */
+RTDECL(int)     RTLogRegisterHook(PRTLOGGER pLogger, PRTLOGHOOKBUFFER pBuffer);
+
+/**
+ * Deregister a logging hook registered with RTLogRegisterHook().
+ *
+ * @returns iprt status code.
+ * @param   pBuffer     Pointer to a logger hook buffer.
+ */
+RTDECL(int)     RTLogDeregisterHook(PRTLOGGER pLogger, PRTLOGHOOKBUFFER pBuffer);
+#endif /* not implemented yet */
+
+/**
+ * Write log buffer to a debugger (RTLOGDEST_DEBUGGER).
+ *
+ * @param   pach        What to write.
+ * @param   cb          How much to write.
+ * @remark  When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteDebugger(const char *pach, size_t cb);
+ * Write log buffer to a user defined output stream (RTLOGDEST_USER).
+ *
+ * @param   pach        What to write.
+ * @param   cb          How much to write.
+ * @remark  When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteUser(const char *pach, size_t cb);
+
+/**
+ * Write log buffer to stdout (RTLOGDEST_STDOUT).
+ *
+ * @param   pach        What to write.
+ * @param   cb          How much to write.
+ * @remark  When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteStdOut(const char *pach, size_t cb);
+
+/**
+ * Write log buffer to stdout (RTLOGDEST_STDERR).
+ *
+ * @param   pach        What to write.
+ * @param   cb          How much to write.
+ * @remark  When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteStdErr(const char *pach, size_t cb);
+
+#ifdef VBOX
+
+/**
+ * Prints a formatted string to the backdoor port.
+ *
+ * @returns Number of bytes written.
+ * @param   pszFormat   Format string.
+ * @param   ...         Optional arguments specified in the format string.
+ */
+RTDECL(size_t) RTLogBackdoorPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * Prints a formatted string to the backdoor port.
+ *
+ * @returns Number of bytes written.
+ * @param   pszFormat   Format string.
+ * @param   args        Optional arguments specified in the format string.
+ */
+RTDECL(size_t)  RTLogBackdoorPrintfV(const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(1,
0);
+
+#endif /* VBOX */
/** @} */
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/mangling.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/mangling.h
@@ -0,0 +1,3709 @@
+/** @file
+ * IPRT - Symbol Mangling.
+ *
+ * This header is used to mangle public IPRT symbol to make it possible to have
+ * several IPRT version loaded into one symbol space at the same time. To
+ * enable symbol mangling you create a header which the compiler includes for
+ * every compilation unit (check out the -include option of gcc). Your header
+ * will define RT_MANGLER(name) and then include this header to set up the
+ * actual mappings.
+ */
+/
+
+/*
 * Copyright (C) 2011-2017 Oracle Corporation
 *
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 * available from http://www.virtualbox.org. This file is free software;
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 * CDDL are applicable instead of those of the GPL.
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 * terms and conditions of either the GPL or the CDDL or both.
 */
/
+
+#ifndef ___iprt_mangling_h
+#define ___iprt_mangling_h
+
+#ifndef RT_MANGLER
+#error "RT_MANGLER is not defined."
+#endif


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*/
/* Stable functions (alphabetical order):
*/

#ifndef DOXYGEN_RUNNING

/** @def RT_WITH_MANGLING
 * Indicates that we're mangling symbols. */

#define RT_WITH_MANGLING

/* ASM*/:

grep -h DECLASM include/iprt/asm.h include/iprt/asm-amd64-x86.h
+ | kmk_sed -e 's/^DECLASM.{[^}]*}. */([^}]*). */(ASM[^}]*)([^}]*). */ define \1 :RT_MANGLER(\1\1)\1\1# define \1\1_EndProc
RT_MANGLER(RT_MANGLER(ASMAddFlags))
+ awk -F: '{ printf("%-55s %s\n", $1, $2);}'
+ | sort
+ | awk -F: '{ printf("%-55s %s\n", $1, $2);}'
+
+/*
+ ASM*/:
+ grep -h DECLASM include/iprt/asm.h include/iprt/asm-amd64-x86.h
+ | kmk_sed -e 's/^DECLASM.{[^}]*}. */([^}]*). */(ASM[^}]*)([^}]*). */ define \1 :RT_MANGLER(\1\1)\1\1# define \1\1_EndProc
RT_MANGLER(RT_MANGLER(ASMAddFlags))
+ awk -F: '{ printf("%-55s %s\n", $1, $2);}'
+/*
+ */
RT_MANGLER(ASMAtomicCmpXchgExU64_EndProc)
+## define ASMAtomicCmpXchgU32
+## define ASMAtomicCmpXchgU32_EndProc
+## define ASMAtomicCmpXchgU64
+## define ASMAtomicCmpXchgU64_EndProc
+## define ASMAtomicCmpXchgU8
+## define ASMAtomicCmpXchgU8_EndProc
+## define ASMAtomicDecU16
+## define ASMAtomicDecU16_EndProc
+## define ASMAtomicDecU32
+## define ASMAtomicDecU32_EndProc
+## define ASMAtomicDecU64
+## define ASMAtomicDecU64_EndProc
+## define ASMAtomicIncU16
+## define ASMAtomicIncU16_EndProc
+## define ASMAtomicIncU32
+## define ASMAtomicIncU32_EndProc
+## define ASMAtomicIncU64
+## define ASMAtomicIncU64_EndProc
+## define ASMAtomicOrU32
+## define ASMAtomicOrU32_EndProc
+## define ASMAtomicOrU64
+## define ASMAtomicOrU64_EndProc
+## define ASMAtomicReadU64
+## define ASMAtomicReadU64_EndProc
+## define ASMAtomicUoAndU32
+## define ASMAtomicUoAndU32_EndProc
+## define ASMAtomicUoAndU64
+## define ASMAtomicUoAndU64_EndProc
+## define ASMAtomicUoIncU32
+## define ASMAtomicUoIncU32_EndProc
+## define ASMAtomicUoOrU32
+## define ASMAtomicUoOrU64
+## define ASMAtomicUoOrU64_EndProc
+## define ASMAtomicUoReadU64
+## define ASMAtomicUoReadU64_EndProc
+## define ASMAtomicXchgU16
+## define ASMAtomicXchgU16_EndProc
+## define ASMAtomicXchgU32
+## define ASMAtomicXchgU32_EndProc
+## define ASMAtomicXchgU64
+## define ASMAtomicXchgU64_EndProc
+## define ASMAtomicXchgU8
+## define ASMAtomicXchgU8_EndProc
+## define ASMBitClear

RT_MANGLER(ASMAAtomicCmpXchgU32)
RT_MANGLER(ASMAAtomicCmpXchgU32_EndProc)
RT_MANGLER(ASMAAtomicCmpXchgU64)
RT_MANGLER(ASMAAtomicCmpXchgU64_EndProc)
RT_MANGLER(ASMAAtomicCmpXchgU8)
RT_MANGLER(ASMAAtomicCmpXchgU8_EndProc)
RT_MANGLER(ASMAAtomicDecU16)
RT_MANGLER(ASMAAtomicDecU16_EndProc)
RT_MANGLER(ASMAAtomicDecU32)
RT_MANGLER(ASMAAtomicDecU32_EndProc)
RT_MANGLER(ASMAAtomicDecU64)
RT_MANGLER(ASMAAtomicDecU64_EndProc)
RT_MANGLER(ASMAAtomicIncU16)
RT_MANGLER(ASMAAtomicIncU16_EndProc)
RT_MANGLER(ASMAAtomicIncU32)
RT_MANGLER(ASMAAtomicIncU32_EndProc)
RT_MANGLER(ASMAAtomicIncU64)
RT_MANGLER(ASMAAtomicIncU64_EndProc)
RT_MANGLER(ASMAAtomicOrU32)
RT_MANGLER(ASMAAtomicOrU32_EndProc)
RT_MANGLER(ASMAAtomicOrU64)
RT_MANGLER(ASMAAtomicOrU64_EndProc)
RT_MANGLER(ASMAAtomicReadU64)
RT_MANGLER(ASMAAtomicReadU64_EndProc)
RT_MANGLER(ASMAAtomicUoAndU32)
RT_MANGLER(ASMAAtomicUoAndU32_EndProc)
RT_MANGLER(ASMAAtomicUoAndU64)
RT_MANGLER(ASMAAtomicUoAndU64_EndProc)
RT_MANGLER(ASMAAtomicUoIncU32)
RT_MANGLER(ASMAAtomicUoIncU32_EndProc)
RT_MANGLER(ASMAAtomicUoOrU32)
RT_MANGLER(ASMAAtomicUoOrU32_EndProc)
RT_MANGLER(ASMAAtomicUoOrU64)
RT_MANGLER(ASMAAtomicUoOrU64_EndProc)
RT_MANGLER(ASMAAtomicUoReadU64)
RT_MANGLER(ASMAAtomicUoReadU64_EndProc)
RT_MANGLER(ASMAAtomicXchgU16)
RT_MANGLER(ASMAAtomicXchgU16_EndProc)
RT_MANGLER(ASMAAtomicXchgU32)
RT_MANGLER(ASMAAtomicXchgU32_EndProc)
RT_MANGLER(ASMAAtomicXchgU64)
RT_MANGLER(ASMAAtomicXchgU64_EndProc)
RT_MANGLER(ASMAAtomicXchgU8)
RT_MANGLER(ASMAAtomicXchgU8_EndProc)
RT_MANGLER(ASMBitClear)
# define ASMBitClear_EndProc  RT_MANGLER(ASMBitClear_EndProc)
# define ASMBitFirstClear  RT_MANGLER(ASMBitFirstClear)
# define ASMBitFirstClear_EndProc  RT_MANGLER(ASMBitFirstClear_EndProc)
# define ASMBitFirstSet  RT_MANGLER(ASMBitFirstSet)
# define ASMBitFirstSet_EndProc  RT_MANGLER(ASMBitFirstSet_EndProc)
# define ASMBitFirstSetU16  RT_MANGLER(ASMBitFirstSetU16)
# define ASMBitFirstSetU16_EndProc  RT_MANGLER(ASMBitFirstSetU16_EndProc)
# define ASMBitFirstSetU32  RT_MANGLER(ASMBitFirstSetU32)
# define ASMBitFirstSetU32_EndProc  RT_MANGLER(ASMBitFirstSetU32_EndProc)
# define ASMBitFirstSetU64  RT_MANGLER(ASMBitFirstSetU64)
# define ASMBitFirstSetU64_EndProc  RT_MANGLER(ASMBitFirstSetU64_EndProc)
# define ASMBitLastSetU16  RT_MANGLER(ASMBitLastSetU16)
# define ASMBitLastSetU16_EndProc  RT_MANGLER(ASMBitLastSetU16_EndProc)
# define ASMBitLastSetU32  RT_MANGLER(ASMBitLastSetU32)
# define ASMBitLastSetU32_EndProc  RT_MANGLER(ASMBitLastSetU32_EndProc)
# define ASMBitLastSetU64  RT_MANGLER(ASMBitLastSetU64)
# define ASMBitLastSetU64_EndProc  RT_MANGLER(ASMBitLastSetU64_EndProc)
# define ASMBitNextClear  RT_MANGLER(ASMBitNextClear)
# define ASMBitNextClear_EndProc  RT_MANGLER(ASMBitNextClear_EndProc)
# define ASMBitNextSet  RT_MANGLER(ASMBitNextSet)
# define ASMBitNextSet_EndProc  RT_MANGLER(ASMBitNextSet_EndProc)
# define ASMBitSet  RT_MANGLER(ASMBitSet)
# define ASMBitSet_EndProc  RT_MANGLER(ASMBitSet_EndProc)
# define ASMBitTest  RT_MANGLER(ASMBitTest)
# define ASMBitTest_EndProc  RT_MANGLER(ASMBitTest_EndProc)
# define ASMBitTestAndClear  RT_MANGLER(ASMBitTestAndClear)
# define ASMBitTestAndClear_EndProc  RT_MANGLER(ASMBitTestAndClear_EndProc)
# define ASMBitTestAndSet  RT_MANGLER(ASMBitTestAndSet)
# define ASMBitTestAndSet_EndProc  RT_MANGLER(ASMBitTestAndSet_EndProc)
# define ASMBitTestAndToggle  RT_MANGLER(ASMBitTestAndToggle)
# define ASMBitTestAndToggle_EndProc  RT_MANGLER(ASMBitTestAndToggle_EndProc)
# define ASMBitToggle  RT_MANGLER(ASMBitToggle)
# define ASMBitToggle_EndProc  RT_MANGLER(ASMBitToggle_EndProc)
# define ASMBitSwapU16  RT_MANGLER(ASMBitSwapU16)
# define ASMBitSwapU16_EndProc  RT_MANGLER(ASMBitSwapU16_EndProc)
# define ASMBitSwapU32  RT_MANGLER(ASMBitSwapU32)
# define ASMBitSwapU32_EndProc  RT_MANGLER(ASMBitSwapU32_EndProc)
# define ASMClearFlags  RT_MANGLER(ASMClearFlags)
# define ASMClearFlags_EndProc  RT_MANGLER(ASMClearFlags_EndProc)
# define ASMCpuId  RT_MANGLER(ASMCpuId)
# define ASMCpuId_EAX  RT_MANGLER(ASMCpuId_EAX)
# define ASMCpuId_EAX_EndProc  RT_MANGLER(ASMCpuId_EAX_EndProc)
# define ASMCpuId_EBX  RT_MANGLER(ASMCpuId_EBX)
# define ASMCpuId_EBX_EndProc  RT_MANGLER(ASMCpuId_EBX_EndProc)
# define ASMCpuId_ECX  RT_MANGLER(ASMCpuId_ECX)
# define ASMCpuId_ECX_EDX  RT_MANGLER(ASMCpuId_ECX_EDX)
+# define ASM_CpuId_EDX_EndProc                       RT_MANGLER(ASM_CpuId_EDX_EndProc)
+# define ASM_CpuId_EndProc                          RT_MANGLER(ASM_CpuId_EndProc)
+# define ASM_CpuId_IDX_EDX_EndProc                  RT_MANGLER(ASM_CpuId_IDX_EDX_EndProc)
+# define ASM_CpuIdExSlow_EndProc                   RT_MANGLER(ASM_CpuIdExSlow_EndProc)
+# define ASM_GetAndClearDR6_EndProc                RT_MANGLER(ASM_GetAndClearDR6_EndProc)
+# define ASM_GetApicId_EndProc                     RT_MANGLER(ASM_GetApicId_EndProc)
+# define ASM_GetCR0_EndProc                        RT_MANGLER(ASM_GetCR0_EndProc)
+# define ASM_GetCR2_EndProc                        RT_MANGLER(ASM_GetCR2_EndProc)
+# define ASM_GetCR3_EndProc                        RT_MANGLER(ASM_GetCR3_EndProc)
+# define ASM_GetCR3_EndProc                        RT_MANGLER(ASM_GetCR3_EndProc)
+# define ASM_GetCR4_EndProc                        RT_MANGLER(ASM_GetCR4_EndProc)
+# define ASM_GetCR8_EndProc                        RT_MANGLER(ASM_GetCR8_EndProc)
+# define ASM_GetCS_EndProc                         RT_MANGLER(ASM_GetCS_EndProc)
+# define ASM_GetDR0_EndProc                        RT_MANGLER(ASM_GetDR0_EndProc)
+# define ASM_GetDR1_EndProc                        RT_MANGLER(ASM_GetDR1_EndProc)
+# define ASM_GetDR2_EndProc                        RT_MANGLER(ASM_GetDR2_EndProc)
+# define ASM_GetDR3_EndProc                        RT_MANGLER(ASM_GetDR3_EndProc)
+# define ASM_GetDR6_EndProc                        RT_MANGLER(ASM_GetDR6_EndProc)
+# define ASM_GetDR7_EndProc                        RT_MANGLER(ASM_GetDR7_EndProc)
+# define ASM_GetDS_EndProc                         RT_MANGLER(ASM_GetDS_EndProc)
+# define ASM_GetES_EndProc                         RT_MANGLER(ASM_GetES_EndProc)
+# define ASM_GetFlags_EndProc                     RT_MANGLER(ASM_GetFlags_EndProc)
+# define ASM_GetFS_EndProc                         RT_MANGLER(ASM_GetFS_EndProc)
+# define ASM_GetGDTR_EndProc                      RT_MANGLER(ASM_GetGDTR_EndProc)
+# define ASM_GetGS                                   RT_MANGLER(ASM_GetGS)
RT_MANGLER(ASMMemFirstMismatchingU32_EndProc)
+## define ASMMemIsZero
+## define ASMMemIsZero_EndProc
+## define ASMMemIsAllU8
+## define ASMMemIsAllU8_EndProc
+## define ASMMemZero32
+## define ASMMemZero32_EndProc
+## define ASMMemZeroPage
+## define ASMMemZeroPage_EndProc
+## define ASMNopPause
+## define ASMNopPause_EndProc
+## define ASMOutStrU16
+## define ASMOutStrU16_EndProc
+## define ASMOutStrU32
+## define ASMOutStrU32_EndProc
+## define ASMOutStrU8
+## define ASMOutStrU8_EndProc
+## define ASMOutU16
+## define ASMOutU16_EndProc
+## define ASMOutU32
+## define ASMOutU32_EndProc
+## define ASMOutU8
+## define ASMProbeReadByte
+## define ASMProbeReadByte_EndProc
+## define ASMRdMsr
+## define ASMRdMsr_EndProc
+## define ASMRdMsr_High
+## define ASMRdMsr_High_EndProc
+## define ASMRdMsr_Low
+## define ASMRdMsr_Low_EndProc
+## define ASMRdMsrEx
+## define ASMRdMsrEx_EndProc
+## define ASMReadTSC
+## define ASMReadTSC_EndProc
+## define ASMReadTscWithAux
+## define ASMReadTscWithAux_EndProc
+## define ASMRotateLeftU32
+## define ASMRotateLeftU32_EndProc
+## define ASMRotateRightU32
+## define ASMRotateRightU32_EndProc
+## define ASMSerializeInstructionCpuId
+## define ASMSerializeInstructionCpuId_EndProc
+## define ASMSerializeInstructionIRet
+## define ASMSerializeInstructionIRet_EndProc

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+# define RTAssertMayPanic               RT_MANGLER(RTAssertMayPanic)
+# define RTAssertMsg1                   RT_MANGLER(RTAssertMsg1)
+# define RTAssertMsg1Weak               RT_MANGLER(RTAssertMsg1Weak)
+# define RTAssertMsg2                   RT_MANGLER(RTAssertMsg2)
+# define RTAssertMsg2Add                RT_MANGLER(RTAssertMsg2Add)
+# define RTAssertMsg2AddV               RT_MANGLER(RTAssertMsg2AddV)
+# define RTAssertMsg2AddWeak            RT_MANGLER(RTAssertMsg2AddWeak)
+# define RTAssertMsg2AddWeakV           RT_MANGLER(RTAssertMsg2AddWeakV)
+# define RTAssertMsg2V                   RT_MANGLER(RTAssertMsg2V)
+# define RTAssertMsg2Weak               RT_MANGLER(RTAssertMsg2Weak)
+# define RTAssertMsg2WeakV              RT_MANGLER(RTAssertMsg2WeakV)
+# define RTAssertSetMayPanic            RT_MANGLER(RTAssertSetMayPanic)
+# define RTAssertSetQuiet               RT_MANGLER(RTAssertSetQuiet)
+# define RTAssertShouldPanic            RT_MANGLER(RTAssertShouldPanic)
+# define RTAvlGCPhtDestroy             RT_MANGLER(RTAvlGCPhtDestroy)
+# define RTAvlGCPhtDoWithAll            RT_MANGLER(RTAvlGCPhtDoWithAll)
+# define RTAvlGCPhtGet                  RT_MANGLER(RTAvlGCPhtGet)
+# define RTAvlGCPhtGetBestFit           RT_MANGLER(RTAvlGCPhtGetBestFit)
+# define RTAvlGCPhtInsert               RT_MANGLER(RTAvlGCPhtInsert)
+# define RTAvlGCPhtRemove               RT_MANGLER(RTAvlGCPhtRemove)
+# define RTAvlGCPhtRemoveBestFit        RT_MANGLER(RTAvlGCPhtRemoveBestFit)
+# define RTAvlHCPhysDestroy             RT_MANGLER(RTAvlHCPhysDestroy)
+# define RTAvlHCPhysDoWithAll           RT_MANGLER(RTAvlHCPhysDoWithAll)
+# define RTAvlHCPhysGet                 RT_MANGLER(RTAvlHCPhysGet)
+# define RTAvlHCPhysGetBestFit          RT_MANGLER(RTAvlHCPhysGetBestFit)
+# define RTAvlHCPhysInsert              RT_MANGLER(RTAvlHCPhysInsert)
+# define RTAvlHCPhysRemove              RT_MANGLER(RTAvlHCPhysRemove)
+# define RTAvlHCPhysRemoveBestFit       RT_MANGLER(RTAvlHCPhysRemoveBestFit)
+# define RTAvlHUC32Destroy              RT_MANGLER(RTAvlHUC32Destroy)
+# define RTAvlHUC32DoWithAll            RT_MANGLER(RTAvlHUC32DoWithAll)
+# define RTAvlHUC32Get                  RT_MANGLER(RTAvlHUC32Get)
+# define RTAvlHUC32GetBestFit           RT_MANGLER(RTAvlHUC32GetBestFit)
+# define RTAvlHUC32Insert               RT_MANGLER(RTAvlHUC32Insert)
+# define RTAvlHUC32Remove               RT_MANGLER(RTAvlHUC32Remove)
+# define RTAvlHUC32RemoveBestFit        RT_MANGLER(RTAvlHUC32RemoveBestFit)
+# define RTAvlHUC32RemoveNode           RT_MANGLER(RTAvlHUC32RemoveNode)
+# define RTAvloGCPhtDestroy             RT_MANGLER(RTAvloGCPhtDestroy)
+# define RTAvloGCPhtDoWithAll           RT_MANGLER(RTAvloGCPhtDoWithAll)
+# define RTAvloGCPhtGet                 RT_MANGLER(RTAvloGCPhtGet)
+# define RTAvloGCPhtGetBestFit          RT_MANGLER(RTAvloGCPhtGetBestFit)
+# define RTAvloGCPhtInsert              RT_MANGLER(RTAvloGCPhtInsert)
```c
#define RTAvlrGCPtrDestroy RT_MANGLER(RTAvlrGCPtrDestroy)
#define RTAvlrGCPtrDoWithAll RT_MANGLER(RTAvlrGCPtrDoWithAll)
#define RTAvlrGCPtrGet RT_MANGLER(RTAvlrGCPtrGet)
#define RTAvlrGCPtrGetBestFit RT_MANGLER(RTAvlrGCPtrGetBestFit)
#define RTAvlrGCPtrGetLeft RT_MANGLER(RTAvlrGCPtrGetLeft)
#define RTAvlrGCPtrGetRight RT_MANGLER(RTAvlrGCPtrGetRight)
#define RTAvlrGCPtrGetRoot RT_MANGLER(RTAvlrGCPtrGetRoot)
#define RTAvlrGCPtrInsert RT_MANGLER(RTAvlrGCPtrInsert)
#define RTAvlrGCPtrRangeGet RT_MANGLER(RTAvlrGCPtrRangeGet)
#define RTAvlrGCPtrRangeRemove RT_MANGLER(RTAvlrGCPtrRangeRemove)
#define RTAvlrGCPtrRemove RT_MANGLER(RTAvlrGCPtrRemove)
#define RTAvlrGCPhysDestroy RT_MANGLER(RTAvlrGCPhysDestroy)
#define RTAvlrGCPhysDoWithAll RT_MANGLER(RTAvlrGCPhysDoWithAll)
#define RTAvlrGCPhysGet RT_MANGLER(RTAvlrGCPhysGet)
#define RTAvlrGCPhysGetBestFit RT_MANGLER(RTAvlrGCPhysGetBestFit)
#define RTAvlrGCPhysGetLeft RT_MANGLER(RTAvlrGCPhysGetLeft)
#define RTAvlrGCPhysGetRight RT_MANGLER(RTAvlrGCPhysGetRight)
#define RTAvlrGCPhysGetRoot RT_MANGLER(RTAvlrGCPhysGetRoot)
#define RTAvlrGCPhysInsert RT_MANGLER(RTAvlrGCPhysInsert)
#define RTAvlrGCPhysRangeGet RT_MANGLER(RTAvlrGCPhysRangeGet)
#define RTAvlrGCPhysRangeRemove RT_MANGLER(RTAvlrGCPhysRangeRemove)
#define RTAvlrGCPhysRemove RT_MANGLER(RTAvlrGCPhysRemove)
#define RTAvlrGCPtrDestroy RT_MANGLER(RTAvlrGCPtrDestroy)
#define RTAvlrGCPtrDoWithAll RT_MANGLER(RTAvlrGCPtrDoWithAll)
#define RTAvlrGCPtrGet RT_MANGLER(RTAvlrGCPtrGet)
#define RTAvlrGCPtrGetBestFit RT_MANGLER(RTAvlrGCPtrGetBestFit)
#define RTAvlrGCPtrGetLeft RT_MANGLER(RTAvlrGCPtrGetLeft)
#define RTAvlrGCPtrGetRight RT_MANGLER(RTAvlrGCPtrGetRight)
#define RTAvlrGCPtrGetRoot RT_MANGLER(RTAvlrGCPtrGetRoot)
#define RTAvlrGCPtrInsert RT_MANGLER(RTAvlrGCPtrInsert)
#define RTAvlrGCPtrRangeGet RT_MANGLER(RTAvlrGCPtrRangeGet)
#define RTAvlrGCPtrRangeRemove RT_MANGLER(RTAvlrGCPtrRangeRemove)
#define RTAvlrGCPtrRemove RT_MANGLER(RTAvlrGCPtrRemove)
#define RTAvlrGCPhysDestroy RT_MANGLER(RTAvlrGCPhysDestroy)
#define RTAvlrGCPhysDoWithAll RT_MANGLER(RTAvlrGCPhysDoWithAll)
#define RTAvlrGCPhysGet RT_MANGLER(RTAvlrGCPhysGet)
#define RTAvlrGCPhysGetBestFit RT_MANGLER(RTAvlrGCPhysGetBestFit)
#define RTAvlrGCPhysGetLeft RT_MANGLER(RTAvlrGCPhysGetLeft)
#define RTAvlrGCPhysGetRight RT_MANGLER(RTAvlrGCPhysGetRight)
#define RTAvlrGCPhysGetRoot RT_MANGLER(RTAvlrGCPhysGetRoot)
#define RTAvlrGCPhysInsert RT_MANGLER(RTAvlrGCPhysInsert)
#define RTAvlrGCPhysRangeGet RT_MANGLER(RTAvlrGCPhysRangeGet)
#define RTAvlrGCPhysRangeRemove RT_MANGLER(RTAvlrGCPhysRangeRemove)
#define RTAvlrGCPhysRemove RT_MANGLER(RTAvlrGCPhysRemove)
#define RTAvlrGCPtrDestroy RT_MANGLER(RTAvlrGCPtrDestroy)
#define RTAvlrGCPtrDoWithAll RT_MANGLER(RTAvlrGCPtrDoWithAll)
#define RTAvlrGCPtrGet RT_MANGLER(RTAvlrGCPtrGet)
#define RTAvlrGCPtrGetBestFit RT_MANGLER(RTAvlrGCPtrGetBestFit)
#define RTAvlrGCPtrGetLeft RT_MANGLER(RTAvlrGCPtrGetLeft)
#define RTAvlrGCPtrGetRight RT_MANGLER(RTAvlrGCPtrGetRight)
#define RTAvlrGCPtrGetRoot RT_MANGLER(RTAvlrGCPtrGetRoot)
#define RTAvlrGCPhysDestroy RT_MANGLER(RTAvlrGCPhysDestroy)
#define RTAvlrGCPhysDoWithAll RT_MANGLER(RTAvlrGCPhysDoWithAll)
#define RTAvlrGCPhysGet RT_MANGLER(RTAvlrGCPhysGet)
#define RTAvlrGCPhysGetBestFit RT_MANGLER(RTAvlrGCPhysGetBestFit)
#define RTAvlrGCPhysGetLeft RT_MANGLER(RTAvlrGCPhysGetLeft)
#define RTAvlrGCPhysGetRight RT_MANGLER(RTAvlrGCPhysGetRight)
#define RTAvlrGCPhysGetRoot RT_MANGLER(RTAvlrGCPhysGetRoot)
#define RTAvlrGCPhysInsert RT_MANGLER(RTAvlrGCPhysInsert)
#define RTAvlrGCPhysRangeGet RT_MANGLER(RTAvlrGCPhysRangeGet)
#define RTAvlrGCPhysRangeRemove RT_MANGLER(RTAvlrGCPhysRangeRemove)
#define RTAvlrGCPhysRemove RT_MANGLER(RTAvlrGCPhysRemove)
#define RTAvlrGCPtrDestroy RT_MANGLER(RTAvlrGCPtrDestroy)
#define RTAvlrGCPtrDoWithAll RT_MANGLER(RTAvlrGCPtrDoWithAll)
#define RTAvlrGCPtrGet RT_MANGLER(RTAvlrGCPtrGet)
#define RTAvlrGCPtrGetBestFit RT_MANGLER(RTAvlrGCPtrGetBestFit)
#define RTAvlrGCPtrGetLeft RT_MANGLER(RTAvlrGCPtrGetLeft)
#define RTAvlrGCPtrGetNextEqual RT_MANGLER(RTAvlrGCPtrGetNextEqual)
#define RTAvlrGCPtrGetRight RT_MANGLER(RTAvlrGCPtrGetRight)
#define RTAvlrGCPtrGetRoot RT_MANGLER(RTAvlrGCPtrGetRoot)
```
+#define RTAvlUIntPtrRemove RT_MANGLER(RTAvlUIntPtrRemove)
+define RTAvlULDestroy RT_MANGLER(RTAvlULDestroy)
+## define RTAvlULDoWithAll RT_MANGLER(RTAvlULDoWithAll)
+## define RTAvlULGet RT_MANGLER(RTAvlULGet)
+## define RTAvlULInsert RT_MANGLER(RTAvlULInsert)
+## define RTAvlULRemove RT_MANGLER(RTAvlULRemove)
+## define RTAvlULRemoveBestFit RT_MANGLER(RTAvlULRemoveBestFit)
+## define RTBase64Decode RT_MANGLER(RTBase64Decode)
+## define RTBase64DecodeEx RT_MANGLER(RTBase64DecodeEx)
+## define RTBase64DecodedSize RT_MANGLER(RTBase64DecodedSize)
+## define RTBase64DecodedSizeEx RT_MANGLER(RTBase64DecodedSizeEx)
+## define RTBase64Encode RT_MANGLER(RTBase64Encode)
+## define RTBase64EncodedLength RT_MANGLER(RTBase64EncodedLength)
+## define RTBldCfgCompiler RT_MANGLER(RTBldCfgCompiler)
+## define RTBldCfgRevision RT_MANGLER(RTBldCfgRevision)
+## define RTBldCfgRevisionStr RT_MANGLER(RTBldCfgRevisionStr)
+## define RTBldCfgTarget RT_MANGLER(RTBldCfgTarget)
+## define RTBldCfgTargetArch RT_MANGLER(RTBldCfgTargetArch)
+## define RTBldCfgTargetDotArch RT_MANGLER(RTBldCfgTargetDotArch)
+## define RTBldCfgType RT_MANGLER(RTBldCfgType)
+## define RTBldCfgVersion RT_MANGLER(RTBldCfgVersion)
+## define RTBldCfgVersionBuild RT_MANGLER(RTBldCfgVersionBuild)
+## define RTBldCfgVersionMajor RT_MANGLER(RTBldCfgVersionMajor)
+## define RTBldCfgVersionMinor RT_MANGLER(RTBldCfgVersionMinor)
+## define RTCdromOpen RT_MANGLER(RTCdromOpen)
+## define RTCdromRetain RT_MANGLER(RTCdromRetain)
+## define RTCdromRelease RT_MANGLER(RTCdromRelease)
+## define RTCdromQueryMountPoint RT_MANGLER(RTCdromQueryMountPoint)
+## define RTCdromUnmount RT_MANGLER(RTCdromUnmount)
+## define RTCdromEject RT_MANGLER(RTCdromEject)
+## define RTCdromLock RT_MANGLER(RTCdromLock)
+## define RTCdromUnlock RT_MANGLER(RTCdromUnlock)
+## define RTCdromCount RT_MANGLER(RTCdromCount)
+## define RTCdromOrdinalToName RT_MANGLER(RTCdromOrdinalToName)
+## define RTCdromOpenByOrdinal RT_MANGLER(RTCdromOpenByOrdinal)
+## define RTCdirStrToIPv4 RT_MANGLER(RTCdirStrToIPv4)
+## define RTCircBufAcquireReadBlock RT_MANGLER(RTCircBufAcquireReadBlock)
+## define RTCircBufAcquireWriteBlock RT_MANGLER(RTCircBufAcquireWriteBlock)
+## define RTCircBufCreate RT_MANGLER(RTCircBufCreate)
+## define RTCircBufDestroy RT_MANGLER(RTCircBufDestroy)
+## define RTCircBufFree RT_MANGLER(RTCircBufFree)
+## define RTCircBufIsReading RT_MANGLER(RTCircBufIsReading)
+## define RTCircBufIsWriting RT_MANGLER(RTCircBufIsWriting)
+## define RTCircBufOffsetRead RT_MANGLER(RTCircBufOffsetRead)
+## define RTCircBufOffsetWrite RT_MANGLER(RTCircBufOffsetWrite)
+## define RTCircBufReleaseReadBlock RT_MANGLER(RTCircBufReleaseReadBlock)
+## define RTCircBufReleaseWriteBlock RT_MANGLER(RTCircBufReleaseWriteBlock)
+# define RTCircBufReset RT_MANGLE(RTCircBufReset)
+# define RTCircBufSize RT_MANGLE(RTCircBufSize)
+# define RTCircBufUsed RT_MANGLE(RTCircBufUsed)
+# define RTCoreDumperDisable RT_MANGLE(RTCoreDumperDisable) /* solaris */
+# define RTCoreDumperSetup RT_MANGLE(RTCoreDumperSetup) /* solaris */
+# define RTCoreDumperTakeDump RT_MANGLE(RTCoreDumperTakeDump) /* solaris */
+# define RTCritSectDelete RT_MANGLE(RTCritSectDelete)
+# define RTCritSectEnter RT_MANGLE(RTCritSectEnter)
+# define RTCritSectEnterDebug RT_MANGLE(RTCritSectEnterDebug)
+# define RTCritSectEnterMultiple RT_MANGLE(RTCritSectEnterMultiple)
+# define RTCritSectEnterMultipleDebug RT_MANGLE(RTCritSectEnterMultipleDebug)
+# define RTCritSectInit RT_MANGLE(RTCritSectInit)
+# define RTCritSectInitEx RT_MANGLE(RTCritSectInitEx)
+# define RTCritSectLeave RT_MANGLE(RTCritSectLeave)
+# define RTCritSectLeaveMultiple RT_MANGLE(RTCritSectLeaveMultiple)
+# define RTCritSectSetSubClass RT_MANGLE(RTCritSectSetSubClass)
+# define RTCritSectTryEnter RT_MANGLE(RTCritSectTryEnter)
+# define RTCritSectTryEnterDebug RT_MANGLE(RTCritSectTryEnterDebug)
+# define RTCritSectRwDelete RT_MANGLE(RTCritSectRwDelete)
+# define RTCritSectRwEnterExcl RT_MANGLE(RTCritSectRwEnterExcl)
+# define RTCritSectRwEnterExclDebug RT_MANGLE(RTCritSectRwEnterExclDebug)
+# define RTCritSectRwEnterShared RT_MANGLE(RTCritSectRwEnterShared)
+# define RTCritSectRwEnterSharedDebug RT_MANGLE(RTCritSectRwEnterSharedDebug)
+# define RTCritSectRwGetSize RT_MANGLE(RTCritSectRwGetSize)
+# define RTCritSectRwGetSizeRecursion RT_MANGLE(RTCritSectRwGetSizeRecursion)
+# define RTCritSectRwGetSizeWriteRecursion RT_MANGLE(RTCritSectRwGetSizeWriteRecursion)
+# define RTCritSectRwGetWriteRecursion RT_MANGLE(RTCritSectRwGetWriteRecursion)
+# define RTCritSectRwInit RT_MANGLE(RTCritSectRwInit)
# define RTCritSectRwInitEx RT_MANGLER(RTCritSectRwInitEx)
# define RTCritSectRwIsReadOwner RT_MANGLER(RTCritSectRwIsReadOwner)
# define RTCritSectRwIsWriteOwner RT_MANGLER(RTCritSectRwIsWriteOwner)
# define RTCritSectRwLeaveExcl RT_MANGLER(RTCritSectRwLeaveExcl)
# define RTCritSectRwLeaveShared RT_MANGLER(RTCritSectRwLeaveShared)
# define RTCritSectRwSetSubClass RT_MANGLER(RTCritSectRwSetSubClass)
# define RTCritSectRwTryEnterExcl RT_MANGLER(RTCritSectRwTryEnterExcl)
# define RTCritSectRwTryEnterExclDebug RT_MANGLER(RTCritSectRwTryEnterExclDebug)
# define RTCritSectRwTryEnterShared RT_MANGLER(RTCritSectRwTryEnterShared)
# define RTCritSectRwTryEnterSharedDebug RT_MANGLER(RTCritSectRwTryEnterSharedDebug)
# define RTDbgAsCreate RT_MANGLER(RTDbgAsCreate)
# define RTDbgAsCreateF RT_MANGLER(RTDbgAsCreateF)
# define RTDbgAsCreateV RT_MANGLER(RTDbgAsCreateV)
# define RTDbgAsFirstAddr RT_MANGLER(RTDbgAsFirstAddr)
# define RTDbgAsLastAddr RT_MANGLER(RTDbgAsLastAddr)
# define RTDbgAsLineAdd RT_MANGLER(RTDbgAsLineAdd)
# define RTDbgAsLineByAddr RT_MANGLER(RTDbgAsLineByAddr)
# define RTDbgAsLineByAddrA RT_MANGLER(RTDbgAsLineByAddrA)
# define RTDbgAsLockExcl RT_MANGLER(RTDbgAsLockExcl)
# define RTDbgAsModuleByAddr RT_MANGLER(RTDbgAsModuleByAddr)
# define RTDbgAsModuleByIndex RT_MANGLER(RTDbgAsModuleByIndex)
# define RTDbgAsModuleByName RT_MANGLER(RTDbgAsModuleByName)
# define RTDbgAsModuleCount RT_MANGLER(RTDbgAsModuleCount)
# define RTDbgAsModuleLink RT_MANGLER(RTDbgAsModuleLink)
# define RTDbgAsModuleLinkSeg RT_MANGLER(RTDbgAsModuleLinkSeg)
# define RTDbgAsModuleQueryMapByIndex RT_MANGLER(RTDbgAsModuleQueryMapByIndex)
# define RTDbgAsModuleUnlink RT_MANGLER(RTDbgAsModuleUnlink)
# define RTDbgAsModuleUnlinkByAddr RT_MANGLER(RTDbgAsModuleUnlinkByAddr)
# define RTDbgAsName RT_MANGLER(RTDbgAsName)
# define RTDbgAsRelease RT_MANGLER(RTDbgAsRelease)
# define RTDbgAsRetain RT_MANGLER(RTDbgAsRetain)
# define RTDbgAsSymbolAdd RT_MANGLER(RTDbgAsSymbolAdd)
# define RTDbgAsSymbolByAddr RT_MANGLER(RTDbgAsSymbolByAddr)
# define RTDbgAsSymbolByAddrA RT_MANGLER(RTDbgAsSymbolByAddrA)
# define RTDbgAsSymbolByName RT_MANGLER(RTDbgAsSymbolByName)
# define RTDbgAsSymbolByNameA RT_MANGLER(RTDbgAsSymbolByNameA)
# define RTDbgAsUnlockExcl RT_MANGLER(RTDbgAsUnlockExcl)
# define RTDbgCfgCreate RT_MANGLER(RTDbgCfgCreate)
# define RTDbgCfgRetain RT_MANGLER(RTDbgCfgRetain)
# define RTDbgCfgRelease RT_MANGLER(RTDbgCfgRelease)
# define RTDbgCfgChangeString RT_MANGLER(RTDbgCfgChangeString)
# define RTDbgCfgChangeUInt RT_MANGLER(RTDbgCfgChangeUInt)
# define RTDbgCfgQueryString RT_MANGLER(RTDbgCfgQueryString)
# define RTDbgCfgQueryUInt RT_MANGLER(RTDbgCfgQueryUInt)
# define RTDbgCfgOpenDbg RT_MANGLER(RTDbgCfgOpenDbg)
# define RTDbgCfgOpenDsymBundle RT_MANGLER(RTDbgCfgOpenDsymBundle)
# define RTDbgCfgOpenMachOImage RT_MANGLER(RTDbgCfgOpenMachOImage)
# define RTDbgCfgOpenDwo RT_MANGLER(RTDbgCfgOpenDwo)
+# define RTDbgSymbolDup
+define RTDbgSymbolFree
+# define RTDirClose
+define RTDirCreate
+# define RTDirCreateFullPath
+# define RTDirCreateTemp
+# define RTDirCreateTempSecure
+# define RTDirCreateUniqueNumbered
+# define RTDirEntryIsStdDotLink
+# define RTDirEntryExIsStdDotLink
+# define RTDirExists
+define RTDirFlush
+# define RTDirFlushParent
+# define RTDirIsValid
+define RTDirOpen
+# define RTDirOpenFiltered
+# define RTDirQueryInfo
+# define RTDirQueryUnknownType
+# define RTDirQueryUnknownTypeEx
+# define RTDirRead
+define RTDirReadEx
+# define RTDirReadExA
+define RTDirReadExAFree
+define RTDirRemove
+# define RTDirRemoveRecursive
+define RTDirRename
+define RTDirSetTimes
+# define RTDirRelFileOpen
+# define RTDirRelDirOpen
+# define RTDirRelDirOpenFiltered
+# define RTDirRelDirCreate
+# define RTDirRelDirRemove
+# define RTDirRelPathQueryInfo
+# define RTDirRelPathSetMode
+# define RTDirRelPathSetTimes
+# define RTDirRelPathSetOwner
+# define RTDirRelPathRename
+# define RTDirRelPathUnlink
+# define RTDirRelSymlinkCreate
+# define RTDirRelSymlinkRead
+# define RVfsDirOpenDir
+define RVfsDirFromRTDir
+define RVfsDirOpenNormal
+# define RTDvmCreate
+# define RTDvmCreateFromVfsFile
+define RTDvmRetain
+define RTDvmRelease
+define RTDvmMapOpen

RT_MANGLER(RTDbgSymbolDup)
RT_MANGLER(RTDbgSymbolFree)
RT_MANGLER(RTDirClose)
RT_MANGLER(RTDirCreate)
RT_MANGLER(RTDirCreateFullPath)
RT_MANGLER(RTDirCreateTemp)
RT_MANGLER(RTDirCreateTempSecure)
RT_MANGLER(RTDirCreateUniqueNumbered)
RT_MANGLER(RTDirEntryIsStdDotLink)
RT_MANGLER(RTDirEntryExIsStdDotLink)
RT_MANGLER(RTDirExists)
RT_MANGLER(RTDirFlush)
RT_MANGLER(RTDirFlushParent)
RT_MANGLER(RTDirIsValid)
RT_MANGLER(RTDirOpen)
RT_MANGLER(RTDirOpenFiltered)
RT_MANGLER(RTDirQueryInfo)
RT_MANGLER(RTDirQueryUnknownType)
RT_MANGLER(RTDirQueryUnknownTypeEx)
RT_MANGLER(RTDirRead)
RT_MANGLER(RTDirReadEx)
RT_MANGLER(RTDirReadExA)
RT_MANGLER(RTDirReadExAFree)
RT_MANGLER(RTDirRemove)
RT_MANGLER(RTDirRemoveRecursive)
RT_MANGLER(RTDirRename)
RT_MANGLER(RTDirSetTimes)
RT_MANGLER(RTDirRelFileOpen)
RT_MANGLER(RTDirRelDirOpen)
RT_MANGLER(RTDirRelDirOpenFiltered)
RT_MANGLER(RTDirRelDirCreate)
RT_MANGLER(RTDirRelDirRemove)
RT_MANGLER(RTDirRelPathQueryInfo)
RT_MANGLER(RTDirRelPathSetMode)
RT_MANGLER(RTDirRelPathSetTimes)
RT_MANGLER(RTDirRelPathSetOwner)
RT_MANGLER(RTDirRelPathRename)
RT_MANGLER(RTDirRelPathUnlink)
RT_MANGLER(RTDirRelSymlinkCreate)
RT_MANGLER(RTDirRelSymlinkRead)
RT_MANGLER(RTVfsDirOpenDir)
RT_MANGLER(RTVfsDirFromRTDir)
RT_MANGLER(RTVfsDirOpenNormal)
RT_MANGLER(RTDvmCreate)
RT_MANGLER(RTDvmCreateFromVfsFile)
RT_MANGLER(RTDvmRetain)
RT_MANGLER(RTDvmRelease)
RT_MANGLER(RTDvmMapOpen)
+ define RTFileToNative
+ define RTFileUnlock
+ define RTFileWrite
+ define RTFileWriteAt
+ define RTFilesystemVfsFromFile
+ define RTFsIsCaseSensitive
+ define RTFsQueryProperties
+ define RTFsQuerySerial
+ define RTFsQuerySizes
+ define RTFsQueryType
+ define RTFsTypeName
+ define RTFsFatVolOpen
+ define RTFsFatVolFormat
+ define RTFsFatVolFormat144
+ define RTFsIso9660VolOpen
+ define RTFsIsoMakerCreate
+ define RTFsIsoMakerRetain
+ define RTFsIsoMakerRelease
+ define RTFsIsoMakerBootCatSetFile
+ define RTFsIsoMakerBootCatSetValidationEntry
+ define RTFsIsoMakerBootCatSetSectionEntry
+ define RTFsIsoMakerBootCatSetSectionHeaderEntry
+ define RTFsIsoMakerQueryObjIdxForBootCatalog
+ define RTFsIsoMakerGetIso9660Level
+ define RTFsIsoMakerSetImagePadding
+ define RTFsIsoMakerSetIso9660Level
+ define RTFsIsoMakerSetJolietUcs2Level
+ define RTFsIsoMakerSetRockRidgeLevel
+ define RTFsIsoMakerSetJolietRockRidgeLevel
+ define RTFsIsoMakerSetAttribInheritStyle
+ define RTFsIsoMakerSetDefaultDirMode
+ define RTFsIsoMakerSetDefaultFileMode
+ define RTFsIsoMakerSetForcedDirMode
+ define RTFsIsoMakerSetForcedFileMode
+ define RTFsIsoMakerSetPathGroupId
+ define RTFsIsoMakerSetPathMode
+ define RTFsIsoMakerSetPathOwnerld
+ define RTFsIsoMakerSetSysAreaContent
+ define RTFsIsoMakerSetStringProp
+ define RTFsIsoMakerGetObjIdxForPath
+ define RTFsIsoMakerObjEnableBootInfoTablePatching
+ define RTFsIsoMakerObjQueryDataSize
+ define RTFsIsoMakerObjRemove
+# define RTFsIsoMakerObjSetPath                     RT_MANGLER(RTFsIsoMakerObjSetPath)
+# define RTFsIsoMakerObjSetNameAndParent          RT_MANGLER(RTFsIsoMakerObjSetNameAndParent)
+# define RTFsIsoMakerObjSetRockName              RT_MANGLER(RTFsIsoMakerObjSetRockName)
+# define RTFsIsoMakerAddUnnamedDir               RT_MANGLER(RTFsIsoMakerAddUnnamedDir)
+# define RTFsIsoMakerAddDir                      RT_MANGLER(RTFsIsoMakerAddDir)
+# define RTFsIsoMakerAddFileWithSrcPath          RT_MANGLER(RTFsIsoMakerAddFileWithSrcPath)
+# define RTFsIsoMakerAddFileWithVfsFile          RT_MANGLER(RTFsIsoMakerAddFileWithVfsFile)
+# define RTFsIsoMakerAddUnnamedFileWithSrcPath   RT_MANGLER(RTFsIsoMakerAddUnnamedFileWithSrcPath)
+# define RTFsIsoMakerAddUnnamedFileWithVfsFile   RT_MANGLER(RTFsIsoMakerAddUnnamedFileWithVfsFile)
+# define RTFsIsoMakerAddUnnamedFileWithCommonSrc RT_MANGLER(RTFsIsoMakerAddUnnamedFileWithCommonSrc)
+# define RTFsIsoMakerAddSymlink                  RT_MANGLER(RTFsIsoMakerAddSymlink)
+# define RTFsIsoMakerAddUnnamedSymlink           RT_MANGLER(RTFsIsoMakerAddUnnamedSymlink)
+# define RTFsIsoMakerAddCommonSourceFile         RT_MANGLER(RTFsIsoMakerAddCommonSourceFile)
+# define RTFsIsoMakerImport                      RT_MANGLER(RTFsIsoMakerImport)
+# define RTFsIsoMakerFinalize                    RT_MANGLER(RTFsIsoMakerFinalize)
+# define RTFsIsoMakerCreateVfsOutputFile         RT_MANGLER(RTFsIsoMakerCreateVfsOutputFile)
+# define RTFsIsoMakerCmd                         RT_MANGLER(RTFsIsoMakerCmd)
+# define RTFsIsoMakerCmdEx                       RT_MANGLER(RTFsIsoMakerCmdEx)
+# define RTGetOpt                               RT_MANGLER(RTGetOpt)
+# define RTGetOptArgvFree                       RT_MANGLER(RTGetOptArgvFree)
+# define RTGetOptArgvFreeEx                      RT_MANGLER(RTGetOptArgvFreeEx)
+# define RTGetOptArgvFromString                 RT_MANGLER(RTGetOptArgvFromString)
+# define RTGetOptArgvToUtf16String               RT_MANGLER(RTGetOptArgvToUtf16String)
+# define RTGetOptFetchValue                     RT_MANGLER(RTGetOptFetchValue)
+# define RTGetOptInit                            RT_MANGLER(RTGetOptInit)
+# define RTGetOptNonOptionArrayPtr              RT_MANGLER(RTGetOptNonOptionArrayPtr)
+# define RTGetOptFormatError                    RT_MANGLER(RTGetOptFormatError)
+# define RTGetOptPrintError                     RT_MANGLER(RTGetOptPrintError)
+# define RTHandleClose                           RT_MANGLER(RTHandleClose)
+# define RTHandleGetStandard                    RT_MANGLER(RTHandleGetStandard)
+# define RTHandleTableAlloc                     RT_MANGLER(RTHandleTableAlloc)
+# define RTHandleTableAllocWithCtx             RT_MANGLER(RTHandleTableAllocWithCtx)
+# define RTHandleTableCreate                    RT_MANGLER(RTHandleTableCreate)
+# define RTHandleTableCreateEx                  RT_MANGLER(RTHandleTableCreateEx)
+# define RTHandleTableDestroy                   RT_MANGLER(RTHandleTableDestroy)
+# define RTHandleTableFree                      RT_MANGLER(RTHandleTableFree)
+# define RTHandleTableFreeWithCtx               RT_MANGLER(RTHandleTableFreeWithCtx)
+# define RTHandleTableLookup                    RT_MANGLER(RTHandleTableLookup)
+# define RTHandleTableLookupWithCtx            RT_MANGLER(RTHandleTableLookupWithCtx)
+# define RTHeapOffsetAlloc                      RT_MANGLER(RTHeapOffsetAlloc)
+# define RTHeapOffsetAllocZ                     RT_MANGLER(RTHeapOffsetAllocZ)
+# define RTHeapOffsetDump                       RT_MANGLER(RTHeapOffsetDump)
+# define RTHeapOffsetFree                       RT_MANGLER(RTHeapOffsetFree)
+## define RTLocalIpcSessionQueryUserId RT_MANGLER(RTLocalIpcSessionQueryUserId)
+## define RTLocalIpcSessionQueryGroupId RT_MANGLER(RTLocalIpcSessionQueryGroupId)
+## define RTLocaleQueryLocaleName RT_MANGLER(RTLocaleQueryLocaleName)
+## define RTLocaleQueryNormalizedBaseLocaleName RT_MANGLER(RTLocaleQueryNormalizedBaseLocaleName)
+## define RTLocaleQueryUserCountryCode RT_MANGLER(RTLocaleQueryUserCountryCode)
+## define RTLockValidatorClassAddPriorClass RT_MANGLER(RTLockValidatorClassAddPriorClass)
+## define RTLockValidatorClassCreate RT_MANGLER(RTLockValidatorClassCreate)
+## define RTLockValidatorClassCreateEx RT_MANGLER(RTLockValidatorClassCreateEx)
+## define RTLockValidatorClassCreateExV RT_MANGLER(RTLockValidatorClassCreateExV)
+## define RTLockValidatorClassCreateUnique RT_MANGLER(RTLockValidatorClassCreateUnique)
+## define RTLockValidatorClassEnforceStrictReleaseOrder RT_MANGLER(RTLockValidatorClassEnforceStrictReleaseOrder)
+## define RTLockValidatorClassFindForSrcPos RT_MANGLER(RTLockValidatorClassFindForSrcPos)
+## define RTLockValidatorClassForSrcPos RT_MANGLER(RTLockValidatorClassForSrcPos)
+## define RTLockValidatorClassRelease RT_MANGLER(RTLockValidatorClassRelease)
+## define RTLockValidatorClassRetain RT_MANGLER(RTLockValidatorClassRetain)
+## define RTLockValidatorHoldsLocksInClass RT_MANGLER(RTLockValidatorHoldsLocksInClass)
+## define RTLockValidatorHoldsLocksInSubClass RT_MANGLER(RTLockValidatorHoldsLocksInSubClass)
+## define RTLockValidatorIsBlockedThreadInValidator RT_MANGLER(RTLockValidatorIsBlockedThreadInValidator)
+## define RTLockValidatorIsEnabled RT_MANGLER(RTLockValidatorIsEnabled)
+## define RTLockValidatorIsQuiet RT_MANGLER(RTLockValidatorIsQuiet)
+## define RTLockValidatorMayPanic RT_MANGLER(RTLockValidatorMayPanic)
+## define RTLockValidatorQueryBlocking RT_MANGLER(RTLockValidatorQueryBlocking)
+## define RTLockValidatorReadLockDec RT_MANGLER(RTLockValidatorReadLockDec)
+## define RTLockValidatorReadLockGetCount RT_MANGLER(RTLockValidatorReadLockGetCount)
+## define RTLockValidatorReadLockInc RT_MANGLER(RTLockValidatorReadLockInc)
+## define RTLockValidatorRecExclCheckBlocking RT_MANGLER(RTLockValidatorRecExclCheckBlocking)
+## define RTLockValidatorRecExclCheckOrder RT_MANGLER(RTLockValidatorRecExclCheckOrder)
+## define RTLockValidatorRecExclCheckOrderAndBlocking RT_MANGLER(RTLockValidatorRecExclCheckOrderAndBlocking)
+## define RTLockValidatorRecExclCreate RT_MANGLER(RTLockValidatorRecExclCreate)
+## define RTLockValidatorRecExclCreateV RT_MANGLER(RTLockValidatorRecExclCreateV)
+## define RTLockValidatorRecExclDelete RT_MANGLER(RTLockValidatorRecExclDelete)
+## define RTLockValidatorRecExclDestroy RT_MANGLER(RTLockValidatorRecExclDestroy)
+## define RTLockValidatorRecExclInit RT_MANGLER(RTLockValidatorRecExclInit)
+## define RTLockValidatorRecExclInitV RT_MANGLER(RTLockValidatorRecExclInitV)
+## define RTLockValidatorRecExclRecursion RT_MANGLER(RTLockValidatorRecExclRecursion)
+## define RTLockValidatorRecExclRecursionMixed RT_MANGLER(RTLockValidatorRecExclRecursionMixed)
+## define RTLockValidatorRecExclReleaseOwner RT_MANGLER(RTLockValidatorRecExclReleaseOwner)
+## define RTLockValidatorRecExclReleaseOwnerUnchecked RT_MANGLER(RTLockValidatorRecExclReleaseOwnerUnchecked)
+## define RTLockValidatorRecExclSetOwner RT_MANGLER(RTLockValidatorRecExclSetOwner)
// define RTLockValidatorRecExclSetSubClass RT_MANGLER(RTLockValidatorRecExclSetSubClass)
// define RTLockValidatorRecExclUnwind RT_MANGLER(RTLockValidatorRecExclUnwind)
// define RTLockValidatorRecExclUnwindMixed RT_MANGLER(RTLockValidatorRecExclUnwindMixed)
// define RTLockValidatorRecMakeSiblings RT_MANGLER(RTLockValidatorRecMakeSiblings)

// define RTLockValidatorRecSharedAddOwner RT_MANGLER(RTLockValidatorRecSharedAddOwner)
// define RTLockValidatorRecSharedCheckAndRelease RT_MANGLER(RTLockValidatorRecSharedCheckAndRelease)
// define RTLockValidatorRecSharedCheckBlocking RT_MANGLER(RTLockValidatorRecSharedCheckBlocking)
// define RTLockValidatorRecSharedCheckOrder RT_MANGLER(RTLockValidatorRecSharedCheckOrder)

// define RTLockValidatorRecSharedCheckSignaller RT_MANGLER(RTLockValidatorRecSharedCheckSignaller)
// define RTLockValidatorRecSharedCreate RT_MANGLER(RTLockValidatorRecSharedCreate)
// define RTLockValidatorRecSharedCreateV RT_MANGLER(RTLockValidatorRecSharedCreateV)
// define RTLockValidatorRecSharedDelete RT_MANGLER(RTLockValidatorRecSharedDelete)
// define RTLockValidatorRecSharedDestroy RT_MANGLER(RTLockValidatorRecSharedDestroy)
// define RTLockValidatorRecSharedInit RT_MANGLER(RTLockValidatorRecSharedInit)
// define RTLockValidatorRecSharedInitV RT_MANGLER(RTLockValidatorRecSharedInitV)
// define RTLockValidatorRecSharedIsOwner RT_MANGLER(RTLockValidatorRecSharedIsOwner)
// define RTLockValidatorRecSharedRemoveOwner RT_MANGLER(RTLockValidatorRecSharedRemoveOwner)
// define RTLockValidatorRecSharedResetOwner RT_MANGLER(RTLockValidatorRecSharedResetOwner)

// define RTLockValidatorRecSharedSetSubClass RT_MANGLER(RTLockValidatorRecSharedSetSubClass)
// define RTLockValidatorSetEnabled RT_MANGLER(RTLockValidatorSetEnabled)
// define RTLockValidatorSetMayPanic RT_MANGLER(RTLockValidatorSetMayPanic)
// define RTLockValidatorSetQuiet RT_MANGLER(RTLockValidatorSetQuiet)

// define RTLockValidatorWriteLockDec RT_MANGLER(RTLockValidatorWriteLockDec)
// define RTLockValidatorWriteLockGetCount RT_MANGLER(RTLockValidatorWriteLockGetCount)
// define RTLockValidatorWriteLockInc RT_MANGLER(RTLockValidatorWriteLockInc)

// define RTLogBackdoorPrintf RT_MANGLER(RTLogBackdoorPrintf) /* r0drv-guest */
// define RTLogBackdoorPrintfV RT_MANGLER(RTLogBackdoorPrintfV) /* r0drv-guest */
// define RTLogCalcSizeForR0 RT_MANGLER(RTLogCalcSizeForR0)
// define RTLogClearFileDelayFlag RT_MANGLER(RTLogClearFileDelayFlag)

// define RTLogCloneRC RT_MANGLER(RTLogCloneRC)
// define RTLogComPrintf RT_MANGLER(RTLogComPrintf)
// define RTLogComPrintfV RT_MANGLER(RTLogComPrintfV)

// define RTLogCopyGroupsAndFlagsForR0 RT_MANGLER(RTLogCopyGroupsAndFlagsForR0)
// define RTLogCreate RT_MANGLER(RTLogCreate)
// define RTLogCreateEx RT_MANGLER(RTLogCreateEx)
// define RTLogCreateExV RT_MANGLER(RTLogCreateExV)
// define RTLogCreateForR0 RT_MANGLER(RTLogCreateForR0)
```c
+# define RTMemDupTag                                    RT_MANGLER(RTMemDupTag)
+# define RTMemEfAlloc                                   RT_MANGLER(RTMemEfAlloc)
+# define RTMemEfAllocNP                                 RT_MANGLER(RTMemEfAllocNP)
+# define RTMemEfAllocVar                                RT_MANGLER(RTMemEfAllocVar)
+# define RTMemEfAllocZ                                 RT_MANGLER(RTMemEfAllocZ)
+# define RTMemEfAllocZNP                                RT_MANGLER(RTMemEfAllocZNP)
+# define RTMemEfAllocZVar                               RT_MANGLER(RTMemEfAllocZVar)
+# define RTMemEfAllocZVarNP                             RT_MANGLER(RTMemEfAllocZVarNP)
+# define RTMemEfDup                                    RT_MANGLER(RTMemEfDup)
+# define RTMemEfDupEx                                   RT_MANGLER(RTMemEfDupEx)
+# define RTMemEfDupExNP                                 RT_MANGLER(RTMemEfDupExNP)
+# define RTMemEfDupNP                                   RT_MANGLER(RTMemEfDupNP)
+# define RTMemEfFree                                    RT_MANGLER(RTMemEfFree)
+# define RTMemEfFreeNP                                  RT_MANGLER(RTMemEfFreeNP)
+# define RTMemEfRealloc                                 RT_MANGLER(RTMemEfRealloc)
+# define RTMemEfReallocNP                               RT_MANGLER(RTMemEfReallocNP)
+# define RTMemEfTmpAlloc                                RT_MANGLER(RTMemEfTmpAlloc)
+# define RTMemEfTmpAllocNP                              RT_MANGLER(RTMemEfTmpAllocNP)
+# define RTMemEfTmpAllocZ                               RT_MANGLER(RTMemEfTmpAllocZ)
+# define RTMemEfTmpAllocZNP                             RT_MANGLER(RTMemEfTmpAllocZNP)
+# define RTMemEfTmpFree                                 RT_MANGLER(RTMemEfTmpFree)
+# define RTMemEfTmpFreeNP                               RT_MANGLER(RTMemEfTmpFreeNP)
+# define RTMemExecAllocTag                              RT_MANGLER(RTMemExecAllocTag)
+# define RTMemExecFree                                  RT_MANGLER(RTMemExecFree)
+# define RTMemFree                                      RT_MANGLER(RTMemFree)
+# define RTMemFreeEx                                    RT_MANGLER(RTMemFreeEx)
+# define RTMemLockedAllocExTag                          RT_MANGLER(RTMemLockedAllocExTag)
+# define RTMemLockedAllocZExTag                         RT_MANGLER(RTMemLockedAllocZExTag)
+# define RTMemLockedAllocTag                            RT_MANGLER(RTMemLockedAllocTag)
+# define RTMemLockedAllocZTag                           RT_MANGLER(RTMemLockedAllocZTag)
+# define RTMemLockedFree                                RT_MANGLER(RTMemLockedFree)
+# define RTMemPageAllocTag                              RT_MANGLER(RTMemPageAllocTag)
+# define RTMemPageAllocZTag                             RT_MANGLER(RTMemPageAllocZTag)
+# define RTMemPageFree                                  RT_MANGLER(RTMemPageFree)
+# define RTMemPoolAlloc                                 RT_MANGLER(RTMemPoolAlloc)
+# define RTMemPoolAllocZ                                RT_MANGLER(RTMemPoolAllocZ)
+# define RTMemPoolCreate                                RT_MANGLER(RTMemPoolCreate)
+# define RTMemPoolDestroy                               RT_MANGLER(RTMemPoolDestroy)
+# define RTMemPoolDup                                   RT_MANGLER(RTMemPoolDup)
+# define RTMemPoolDupEx                                 RT_MANGLER(RTMemPoolDupEx)
+# define RTMemPoolFree                                  RT_MANGLER(RTMemPoolFree)
+# define RTMemPoolRealloc                               RT_MANGLER(RTMemPoolRealloc)
+# define RTMemPoolRefCount                              RT_MANGLER(RTMemPoolRefCount)
+# define RTMemPoolRelease                               RT_MANGLER(RTMemPoolRelease)
+# define RTMemPoolRetain                                RT_MANGLER(RTMemPoolRetain)
+# define RTMemProtect                                   RT_MANGLER(RTMemProtect)
+# define RTMemReallocTag                                RT_MANGLER(RTMemReallocTag)
```
# define RTMpOnPair                                  RT_MANGLER(RTMpOnPair)         /* r0drv */
# define RTMpOnPairIsConcurrentExecSupported         RT_MANGLER(RTMpOnPairIsConcurrentExecSupported) /* r0drv */
# define RTMpOnSpecific                              RT_MANGLER(RTMpOnSpecific)     /* r0drv */
# define RTMpPokeCpu                                  RT_MANGLER(RTMpPokeCpu)        /* r0drv */
# define RTMpSetIndexFromCpuGroupMember              RT_MANGLER(RTMpSetIndexFromCpuGroupMember)
# define RTMsgError                                  RT_MANGLER(RTMsgError)
# define RTMsgErrorExit                              RT_MANGLER(RTMsgErrorExit)
# define RTMsgErrorExitV                             RT_MANGLER(RTMsgErrorExitV)
# define RTMsgErrorExitFailure                       RT_MANGLER(RTMsgErrorExitFailure)
# define RTMsgErrorExitFailureV                      RT_MANGLER(RTMsgErrorExitFailureV)
# define RTMsgErrorRc                                RT_MANGLER(RTMsgErrorRc)
# define RTMsgErrorRcV                               RT_MANGLER(RTMsgErrorRcV)
# define RTMsgErrorV                                 RT_MANGLER(RTMsgErrorV)
# define RTMsgInitFailure                            RT_MANGLER(RTMsgInitFailure)
# define RTMsgSetProgName                            RT_MANGLER(RTMsgSetProgName)
# define RTMsgWarning                                RT_MANGLER(RTMsgWarning)
# define RTMsgWarningV                               RT_MANGLER(RTMsgWarningV)
# define RTMsgRefEntryPrintStringTable               RT_MANGLER(RTMsgRefEntryPrintStringTable)
# define RTMsgRefEntrySynopsisEx                     RT_MANGLER(RTMsgRefEntrySynopsisEx)
# define RTMsgRefEntrySynopsis                        RT_MANGLER(RTMsgRefEntrySynopsis)
# define RTMsgRefEntryHelpEx                         RT_MANGLER(RTMsgRefEntryHelpEx)
# define RTMsgRefEntryHelp                            RT_MANGLER(RTMsgRefEntryHelp)
# define RTNetIPv4AddDataChecksum                    RT_MANGLER(RTNetIPv4AddDataChecksum)
# define RTNetIPv4AddTCPChecksum                     RT_MANGLER(RTNetIPv4AddTCPChecksum)
# define RTNetIPv4AddUDPChecksum                     RT_MANGLER(RTNetIPv4AddUDPChecksum)
# define RTNetIPv4FinalizeChecksum                   RT_MANGLER(RTNetIPv4FinalizeChecksum)
# define RTNetIPv4HdrChecksum                        RT_MANGLER(RTNetIPv4HdrChecksum)
# define RTNetIPv4IsDHCPValid                        RT_MANGLER(RTNetIPv4IsDHCPValid)
# define RTNetIPv4IsHdrValid                         RT_MANGLER(RTNetIPv4IsHdrValid)
# define RTNetIPv4IsTCPSizeValid                     RT_MANGLER(RTNetIPv4IsTCPSizeValid)
# define RTNetIPv4IsTCPValid                         RT_MANGLER(RTNetIPv4IsTCPValid)
# define RTNetIPv4IsUDPSizeValid                     RT_MANGLER(RTNetIPv4IsUDPSizeValid)
# define RTNetIPv4IsUDPValid                         RT_MANGLER(RTNetIPv4IsUDPValid)
# define RTNetIPv4PseudoChecksum                     RT_MANGLER(RTNetIPv4PseudoChecksum)
# define RTNetIPv4PseudoChecksumBits                 RT_MANGLER(RTNetIPv4PseudoChecksumBits)
# define RTNetIPv4TCPChecksum                        RT_MANGLER(RTNetIPv4TCPChecksum)
# define RTNetIPv4UDPChecksum                        RT_MANGLER(RTNetIPv4UDPChecksum)
# define RTNetIPv6PseudoChecksum                     RT_MANGLER(RTNetIPv6PseudoChecksum)
# define RTNetIPv6PseudoChecksumBits                 RT_MANGLER(RTNetIPv6PseudoChecksumBits)
# define RTNetIPv6PseudoChecksumEx                    RT_MANGLER(RTNetIPv6PseudoChecksumEx)
# define RTNetMaskToPrefixIPv4                       RT_MANGLER(RTNetMaskToPrefixIPv4)
# define RTNetPrefixToMaskIPv4                       RT_MANGLER(RTNetPrefixToMaskIPv4)
# define RTNetTCPChecksum                            RT_MANGLER(RTNetTCPChecksum)
# define RTNetUDPChecksum                            RT_MANGLER(RTNetUDPChecksum)
+ define RTPathParse  
+ define RTPathParsedReassemble  
+ define RTPathParseSimple  
+ define RTPathQueryInfo  
+ define RTPathQueryInfoEx  
+ define RTPathReal  
+ define RTPathRealDup  
+ define RTPathRename  
+ define RTPathRmCmd  
+ define RTPathSetCurrent  
+ define RTPathSetMode  
+ define RTPathSetOwner  
+ define RTPathSetOwnerEx  
+ define RTPathSetTimes  
+ define RTPathSetTimesEx  
+ define RTPathSharedLibs  
+ define RTPathSkipRootSpec  
+ define RTPathSplit  
+ define RTPathSplitATag  
+ define RTPathSplitFree  
+ define RTPathSplitReassemble  
+ define RTPathStartsWith  
+ define RTPathStartsWithRoot  
+ define RTPathStripSuffix  
+ define RTPathStripFilename  
+ define RTPathTemp  
+ define RTPathTraverseList  
+ define RTPathUnlink  
+ define RTPathUserDocuments  
+ define RTPathUserHome  
+ define RTPipeClose  
+ define RTPipeCreate  
+ define RTPipeFlush  
+ define RTPipeFromNative  
+ define RTPipeQueryInfo  
+ define RTPipeQueryReadable  
+ define RTPipeRead  
+ define RTPipeReadBlocking  
+ define RTPipeSelectOne  
+ define RTPipeToNative  
+ define RTPipeWrite  
+ define RTPipeWriteBlocking  
+ define RTPoll  
+ define RTPollNoResume  
+ define RTPollSetAdd  
+ define RTPollSetCreate  
+ define RTPollSetDestroy

RT_MANGLE(RTPathParse)  
RT_MANGLE(RTPathParsedReassemble)  
RT_MANGLE(RTPathParseSimple)  
RT_MANGLE(RTPathQueryInfo)  
RT_MANGLE(RTPathQueryInfoEx)  
RT_MANGLE(RTPathReal)  
RT_MANGLE(RTPathRealDup)  
RT_MANGLE(RTPathRename)  
RT_MANGLE(RTPathRmCmd)  
RT_MANGLE(RTPathSetCurrent)  
RT_MANGLE(RTPathSetMode)  
RT_MANGLE(RTPathSetOwner)  
RT_MANGLE(RTPathSetOwnerEx)  
RT_MANGLE(RTPathSetTimes)  
RT_MANGLE(RTPathSetTimesEx)  
RT_MANGLE(RTPathSharedLibs)  
RT_MANGLE(RTPathSkipRootSpec)  
RT_MANGLE(RTPathSplit)  
RT_MANGLE(RTPathSplitATag)  
RT_MANGLE(RTPathSplitFree)  
RT_MANGLE(RTPathSplitReassemble)  
RT_MANGLE(RTPathStartsWith)  
RT_MANGLE(RTPathStartsWithRoot)  
RT_MANGLE(RTPathStripSuffix)  
RT_MANGLE(RTPathStripFilename)  
RT_MANGLE(RTPathTemp)  
RT_MANGLE(RTPathTraverseList)  
RT_MANGLE(RTPathUnlink)  
RT_MANGLE(RTPathUserDocuments)  
RT_MANGLE(RTPathUserHome)  
RT_MANGLE(RTPipeClose)  
RT_MANGLE(RTPipeCreate)  
RT_MANGLE(RTPipeFlush)  
RT_MANGLE(RTPipeFromNative)  
RT_MANGLE(RTPipeQueryInfo)  
RT_MANGLE(RTPipeQueryReadable)  
RT_MANGLE(RTPipeRead)  
RT_MANGLE(RTPipeReadBlocking)  
RT_MANGLE(RTPipeSelectOne)  
RT_MANGLE(RTPipeToNative)  
RT_MANGLE(RTPipeWrite)  
RT_MANGLE(RTPipeWriteBlocking)  
RT_MANGLE(RTPoll)  
RT_MANGLE(RTPollNoResume)  
RT_MANGLE(RTPollSetAdd)  
RT_MANGLE(RTPollSetCreate)  
RT_MANGLE(RTPollSetDestroy)
+\# define RTR0MemObjAllocPageTag                         RT_MANGER(RTR0MemObjAllocPageTag) /* r0drv */
+\# define RTR0MemObjAllocPhysExTag                      RT_MANGER(RTR0MemObjAllocPhysExTag) /*
+\# define RTR0MemObjAllocPhysNCTag                     RT_MANGER(RTR0MemObjAllocPhysNCTag) /*
+\# define RTR0MemObjAllocPhysTag                       RT_MANGER(RTR0MemObjAllocPhysTag) /* r0drv */
+\# define RTR0MemObjEnterPhysTag                       RT_MANGER(RTR0MemObjEnterPhysTag) /* r0drv */
+\# define RTR0MemObjFree                                RT_MANGER(RTR0MemObjFree) /* r0drv */
+\# define RTR0MemObjGetPagePhysAddr                     RT_MANGER(RTR0MemObjGetPagePhysAddr) /*
+\# define RTR0MemObjIsMapping                          RT_MANGER(RTR0MemObjIsMapping) /* r0drv */
+\# define RTR0MemObjLockKernelTag                      RT_MANGER(RTR0MemObjLockKernelTag) /* r0drv */
+\# define RTR0MemObjLockUserTag                        RT_MANGER(RTR0MemObjLockUserTag) /* r0drv */
+\# define RTR0MemObjMapKernelExTag                     RT_MANGER(RTR0MemObjMapKernelExTag) /*
+\# define RTR0MemObjMapKernelTag                       RT_MANGER(RTR0MemObjMapKernelTag) /* r0drv */
+\# define RTR0MemObjMapUserTag                         RT_MANGER(RTR0MemObjMapUserTag) /* r0drv */
+\# define RTR0ProcHandleSelf                           RT_MANGER(RTR0ProcHandleSelf) /* r0drv */
+\# define RTR0Term                                     RT_MANGER(RTR0Term) /* r0drv */
+\# define RTR0TermForced                               RT_MANGER(RTR0TermForced) /* r0drv */
+\# define RTR3InitDll                                  RT_MANGER(RTR3InitDll)
+\# define RTR3InitExe                                  RT_MANGER(RTR3InitExe)
+\# define RTR3InitExeNoArguments                      RT_MANGER(RTR3InitExeNoArguments)
+\# define RTR3InitEx                                   RT_MANGER(RTR3InitEx)
+\# define RTR3InitIsInitialized                       RT_MANGER(RTR3InitIsInitialized)
+\# define RTR3InitIsUnobtrusive                       RT_MANGER(RTR3InitIsUnobtrusive)
+\# define rtR3MemAlloc                                 RT_MANGER(rtR3MemAlloc)
+\# define rtR3MemFree                                  RT_MANGER(rtR3MemFree)
+\# define rtR3MemRealloc                               RT_MANGER(rtR3MemRealloc)
+\# define RTRCInit                                     RT_MANGER(RTRCInit)
+\# define RTRCTerm                                    RT_MANGER(RTRCTerm)
+\# define RTRandAdvBytes                              RT_MANGER(RTRandAdvBytes)
+\# define RTRandAdvCreateParkMiller                   RT_MANGER(RTRandAdvCreateParkMiller)
+\# define RTRandAdvCreateSystemFaster                 RT_MANGER(RTRandAdvCreateSystemFaster)
+\# define RTRandAdvCreateSystemTruer                  RT_MANGER(RTRandAdvCreateSystemTruer)
+\# define RTRandAdvDestroy                            RT_MANGER(RTRandAdvDestroy)
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```c
+# define RTRandAdvRestoreState                    RT_MANGLER(RTRandAdvRestoreState)
+# define RTRandAdvS32                             RT_MANGLER(RTRandAdvS32)
+# define RTRandAdvS32Ex                           RT_MANGLER(RTRandAdvS32Ex)
+# define RTRandAdvS64                             RT_MANGLER(RTRandAdvS64)
+# define RTRandAdvS64Ex                           RT_MANGLER(RTRandAdvS64Ex)
+# define RTRandAdvSaveState                      RT_MANGLER(RTRandAdvSaveState)
+# define RTRandAdvSeed                            RT_MANGLER(RTRandAdvSeed)
+# define RTRandAdvU32                             RT_MANGLER(RTRandAdvU32)
+# define RTRandAdvU32Ex                           RT_MANGLER(RTRandAdvU32Ex)
+# define RTRandAdvU64                             RT_MANGLER(RTRandAdvU64)
+# define RTRandAdvU64Ex                           RT_MANGLER(RTRandAdvU64Ex)
+# define RTRandBytes                              RT_MANGLER(RTRandBytes)
+# define RTRandS32                                RT_MANGLER(RTRandS32)
+# define RTRandS32Ex                              RT_MANGLER(RTRandS32Ex)
+# define RTRandS64                                RT_MANGLER(RTRandS64)
+# define RTRandS64Ex                              RT_MANGLER(RTRandS64Ex)
+# define RTRandU32                                RT_MANGLER(RTRandU32)
+# define RTRandU32Ex                              RT_MANGLER(RTRandU32Ex)
+# define RTRandU64                                RT_MANGLER(RTRandU64)
+# define RTRandU64Ex                              RT_MANGLER(RTRandU64Ex)
+# define RTReqPoolAlloc                           RT_MANGLER(RTReqPoolAlloc)
+# define RTReqPoolCallEx                          RT_MANGLER(RTReqPoolCallEx)
+# define RTReqPoolCallExV                         RT_MANGLER(RTReqPoolCallExV)
+# define RTReqPoolCallWait                        RT_MANGLER(RTReqPoolCallWait)
+# define RTReqPoolCallNoWait                      RT_MANGLER(RTReqPoolCallNoWait)
+# define RTReqPoolCallVoidWait                    RT_MANGLER(RTReqPoolCallVoidWait)
+# define RTReqPoolCallVoidNoWait                  RT_MANGLER(RTReqPoolCallVoidNoWait)
+# define RTReqPoolCreate                          RT_MANGLER(RTReqPoolCreate)
+# define RTReqPoolGetCfgVar                       RT_MANGLER(RTReqPoolGetCfgVar)
+# define RTReqPoolGetStat                         RT_MANGLER(RTReqPoolGetStat)
+# define RTReqPoolRetain                          RT_MANGLER(RTReqPoolRetain)
+# define RTReqPoolRelease                         RT_MANGLER(RTReqPoolRelease)
+# define RTReqPoolSetCfgVar                       RT_MANGLER(RTReqPoolSetCfgVar)
+# define RTReqQueueAlloc                          RT_MANGLER(RTReqQueueAlloc)
+# define RTReqQueueCall                           RT_MANGLER(RTReqQueueCall)
+# define RTReqQueueCallEx                         RT_MANGLER(RTReqQueueCallEx)
+# define RTReqQueueCallIV                         RT_MANGLER(RTReqQueueCallIV)
+# define RTReqQueueCallVoid                       RT_MANGLER(RTReqQueueCallVoid)
+# define RTReqQueueCreate                         RT_MANGLER(RTReqQueueCreate)
+# define RTReqQueueDestroy                        RT_MANGLER(RTReqQueueDestroy)
+# define RTReqQueueIsBusy                         RT_MANGLER(RTReqQueueIsBusy)
+# define RTReqQueueProcess                        RT_MANGLER(RTReqQueueProcess)
+# define RTReqSubmit                              RT_MANGLER(RTReqSubmit)
+# define RTReqRelease                             RT_MANGLER(RTReqRelease)
+# define RTReqRetain                              RT_MANGLER(RTReqRetain)
+# define RTReqWait                                RT_MANGLER(RTReqWait)
+# define RTReqGetStatus                           RT_MANGLER(RTReqGetStatus)
+# define RTS3BucketsDestroy                       RT_MANGLER(RTS3BucketsDestroy)
```
# define RTSgBufCmpEx
# define RTSgBufCopy
# define RTSgBufCopyFromBuf
# define RTSgBufCopyToBuf
# define RTSgBufInit
# define RTSgBufIsZero
# define RTSgBufReset
# define RTSgBufSegArrayCreate
# define RTSgBufSet
# define RTSgBufGetNextSegment
# define RTSha1
# define RTSha1Check
# define RTSha1Digest
# define RTSha1DigestFromFile
# define RTSha1Final
# define RTSha1FromString
# define RTSha1Init
# define RTSha1ToString
# define RTSha1Update
# define RTSha224
# define RTSha224Check
# define RTSha224Final
# define RTSha224FromString
# define RTSha224Init
# define RTSha224ToString
# define RTSha224Update
# define RTSha224Digest
# define RTSha224DigestFromFile
# define RTSha256
# define RTSha256Check
# define RTSha256Final
# define RTSha256FromString
# define RTSha256Init
# define RTSha256ToString
# define RTSha256Update
# define RTSha256Digest
# define RTSha256DigestFromFile
# define RTSha384
# define RTSha384Check
# define RTSha384Final
# define RTSha384FromString
# define RTSha384Init
# define RTSha384ToString
# define RTSha384Update
# define RTSha512
# define RTSha512Check
# define RTSha512Final
# define RTSha512FromString
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```c
+ # define RTSha512Init
+ # define RTSha512ToString
+ # define RTSha512Update
+ # define RTSha512t224
+ # define RTSha512t224Check
+ # define RTSha512t224Final
+ # define RTSha512t224FromString
+ # define RTSha512t224Init
+ # define RTSha512t224ToString
+ # define RTSha512t224Update
+ # define RTSha512t256
+ # define RTSha512t256Check
+ # define RTSha512t256Final
+ # define RTSha512t256FromString
+ # define RTSha512t256Init
+ # define RTSha512t256ToString
+ # define RTSha512t256Update
+ # define RTSha512t256

+ # define RTSha512t256

+ # define RTSocketClose
+ # define RTSocketFromNative
+ # define RTSocketQueryAddressStr
+ # define RTSocketGetLocalAddress
+ # define RTSocketGetPeerAddress
+ # define RTSocketParseInetAddress
+ # define RTSocketRead
+ # define RTSocketReadFrom
+ # define RTSocketReleaseNB
+ # define RTSocketRetain
+ # define RTSocketSelectOne
+ # define RTSocketSelectOneEx
+ # define RTSocketSetInheritance
+ # define RTSocketSgWrite
+ # define RTSocketSgWriteL
+ # define RTSocketSgWriteLNB
+ # define RTSocketSgWriteLV
+ # define RTSocketSgWriteLNVB
+ # define RTSocketSgWriteNB
+ # define RTSocketShutdown
+ # define RTSocketToNative
+ # define RTSocketWrite
+ # define RTSocketWriteNB
+ # define RTSocketWriteTo
+ # define RTSocketWriteToNB
+ # define RTSortApvIsSorted
+ # define RTSortApvShell
+ # define RTSortIsSorted
+ # define RTSpinlockAcquire
```
+# define RTSpinlockAcquireNoInts
+# define RTSpinlockCreate
+# define RTSpinlockDestroy
+# define RTSpinlockRelease
+# define RTStrAAppendExNVTag
+# define RTStrAAppendNTag
+# define RTStrAAppendTag
+# define RTStrAllocExTag
+# define RTStrAllocTag
+# define RTStrAPrintf2VTag
+# define RTStrAPrintfVTag
+# define RTStrATruncateTag
+# define RTStrCacheCreate
+# define RTStrCacheDestroy
+# define RTStrCacheEnter
+# define RTStrCacheEnterLower
+# define RTStrCacheEnterLowerN
+# define RTStrCacheGetStats
+# define RTStrCacheIsRealImpl
+# define RTStrCacheLength
+# define RTStrCacheRelease
+# define RTStrCacheRetain
+# define RTStrCalcLatin1Len
+# define RTStrCalcLatin1LenEx
+# define RTStrCalcUtf16Len
+# define RTStrCalcUtf16LenEx
+# define RTStrCat
+# define RTStrCatEx
+# define RTStrCatP
+# define RTStrCatPEx
+# define RTStrCmp
+# define RTStrConvertHexBytes
+# define RTStrCopy
+# define RTStrCopyEx
+# define RTStrCopyP
+# define RTStrCopyPEx
+# define RTStrCurrentCPToUtf8Tag
+# define RTStrDupExTag
+# define RTStrDupNTag
+# define RTStrDupTag
+# define RTStrFormat
+# define RTStrFormatNumber
+# define RTStrFormatR80
+# define RTStrFormatR80u2
+# define RTStrFormatTypeDeregister
+# define RTStrFormatTypeRegister
+# define RTStrFormatTypeSetUser

RT_MANGLER(RTSpinlockAcquireNoInts)
RT_MANGLER(RTSpinlockCreate)
RT_MANGLER(RTSpinlockDestroy)
RT_MANGLER(RTSpinlockRelease)
RT_MANGLER(RTStrAAppendExNVTag)
RT_MANGLER(RTStrAAppendNTag)
RT_MANGLER(RTStrAAppendTag)
RT_MANGLER(RTStrAllocExTag)
RT_MANGLER(RTStrAllocTag)
RT_MANGLER(RTStrAPrintf2VTag)
RT_MANGLER(RTStrAPrintfVTag)
RT_MANGLER(RTStrATruncateTag)
RT_MANGLER(RTStrCacheCreate)
RT_MANGLER(RTStrCacheDestroy)
RT_MANGLER(RTStrCacheEnter)
RT_MANGLER(RTStrCacheEnterLower)
RT_MANGLER(RTStrCacheEnterLowerN)
RT_MANGLER(RTStrCacheGetStats)
RT_MANGLER(RTStrCacheIsRealImpl)
RT_MANGLER(RTStrCacheLength)
RT_MANGLER(RTStrCacheRelease)
RT_MANGLER(RTStrCacheRetain)
RT_MANGLER(RTStrCalcLatin1Len)
RT_MANGLER(RTStrCalcLatin1LenEx)
RT_MANGLER(RTStrCalcUtf16Len)
RT_MANGLER(RTStrCalcUtf16LenEx)
RT_MANGLER(RTStrCat)
RT_MANGLER(RTStrCatEx)
RT_MANGLER(RTStrCatP)
RT_MANGLER(RTStrCatPEx)
RT_MANGLER(RTStrCmp)
RT_MANGLER(RTStrConvertHexBytes)
RT_MANGLER(RTStrCopy)
RT_MANGLER(RTStrCopyEx)
RT_MANGLER(RTStrCopyP)
RT_MANGLER(RTStrCopyPEx)
RT_MANGLER(RTStrCurrentCPToUtf8Tag)
RT_MANGLER(RTStrDupExTag)
RT_MANGLER(RTStrDupNTag)
RT_MANGLER(RTStrDupTag)
RT_MANGLER(RTStrFormat)
RT_MANGLER(RTStrFormatNumber)
RT_MANGLER(RTStrFormatR80)
RT_MANGLER(RTStrFormatR80u2)
RT_MANGLER(RTStrFormatTypeDeregister)
RT_MANGLER(RTStrFormatTypeRegister)
RT_MANGLER(RTStrFormatTypeSetUser)
```c
#ifdef RTStrFormatU128
    RT_MANGLER(RTStrFormatU128)
#endif
#ifdef RTStrFormatU256
    RT_MANGLER(RTStrFormatU256)
#endif
#ifdef RTStrFormatU512
    RT_MANGLER(RTStrFormatU512)
#endif
#ifdef RTStrFormatU16
    RT_MANGLER(RTStrFormatU16)
#endif
#ifdef RTStrFormatU32
    RT_MANGLER(RTStrFormatU32)
#endif
#ifdef RTStrFormatU64
    RT_MANGLER(RTStrFormatU64)
#endif
#ifdef RTStrFormatU8
    RT_MANGLER(RTStrFormatU8)
#endif
#ifdef RTStrFormatV
    RT_MANGLER(RTStrFormatV)
#endif
#ifdef RTStrFree
    RT_MANGLER(RTStrFree)
#endif
#ifdef RTStrGetCpExInternal
    RT_MANGLER(RTStrGetCpExInternal)
#endif
#ifdef RTStrGetCpInternal
    RT_MANGLER(RTStrGetCpInternal)
#endif
#ifdef RTStrGetCpNExInternal
    RT_MANGLER(RTStrGetCpNExInternal)
#endif
#ifdef RTStrHash1
    RT_MANGLER(RTStrHash1)
#endif
#ifdef RTStrHash1ExN
    RT_MANGLER(RTStrHash1ExN)
#endif
#ifdef RTStrHash1ExNV
    RT_MANGLER(RTStrHash1ExNV)
#endif
#ifdef RTStrHash1N
    RT_MANGLER(RTStrHash1N)
#endif
#ifdef RTStrICmp
    RT_MANGLER(RTStrICmp)
#endif
#ifdef RTStrICmpAscii
    RT_MANGLER(RTStrICmpAscii)
#endif
#ifdef RTStrIStartsWith
    RT_MANGLER(RTStrIStartsWith)
#endif
#ifdef RTStrIStr
    RT_MANGLER(RTStrIStr)
#endif
#ifdef RTStrIsCaseFoldable
    RT_MANGLER(RTStrIsCaseFoldable)
#endif
#ifdef RTStrIsLowerCased
    RT_MANGLER(RTStrIsLowerCased)
#endif
#ifdef RTStrIsUpperCased
    RT_MANGLER(RTStrIsUpperCased)
#endif
#ifdef RTStrIsValidEncoding
    RT_MANGLER(RTStrIsValidEncoding)
#endif
#ifdef RTStrmClearError
    RT_MANGLER(RTStrmClearError)
#endif
#ifdef RTStrmClose
    RT_MANGLER(RTStrmClose)
#endif
#ifdef RTStrmError
    RT_MANGLER(RTStrmError)
#endif
#ifdef RTStrmFlush
    RT_MANGLER(RTStrmFlush)
#endif
#ifdef RTStrmGetCh
    RT_MANGLER(RTStrmGetCh)
#endif
#ifdef RTStrmGetLine
    RT_MANGLER(RTStrmGetLine)
#endif
#ifdef RTStrmOpen
    RT_MANGLER(RTStrmOpen)
#endif
#ifdef RTStrmOpenF
    RT_MANGLER(RTStrmOpenF)
#endif
#ifdef RTStrmOpenFV
    RT_MANGLER(RTStrmOpenFV)
#endif
#ifdef RTStrmPrintf
    RT_MANGLER(RTStrmPrintf)
#endif
#ifdef RTStrmPrintfV
    RT_MANGLER(RTStrmPrintfV)
#endif
#ifdef RTStrmDumpPrintfV
    RT_MANGLER(RTStrmDumpPrintfV)
#endif
#ifdef RTStrmPutCh
    RT_MANGLER(RTStrmPutCh)
#endif
#ifdef RTStrmPutStr
    RT_MANGLER(RTStrmPutStr)
#endif
#ifdef RTStrmReadEx
    RT_MANGLER(RTStrmReadEx)
#endif
#ifdef RTStrmRewind
    RT_MANGLER(RTStrmRewind)
#endif
#ifdef RTStrmSetMode
    RT_MANGLER(RTStrmSetMode)
#endif
#ifdef RTStrmWriteEx
    RT_MANGLER(RTStrmWriteEx)
#endif
#ifdef RTStrmIsTerminal
    RT_MANGLER(RTStrmIsTerminal)
#endif
#ifdef RTStrmInputGetEchoChars
    RT_MANGLER(RTStrmInputGetEchoChars)
#endif
#ifdef RTStrmInputSetEchoChars
    RT_MANGLER(RTStrmInputSetEchoChars)
#endif
#ifdef RTStrmQueryTerminalWidth
    RT_MANGLER(RTStrmQueryTerminalWidth)
#endif
#ifdef RTStrNCmp
    RT_MANGLER(RTStrNCmp)
#endif
#ifdef RTStrNICmp
    RT_MANGLER(RTStrNICmp)
#endif
```
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```c
+# define RTTestIFailedRcV
+define RTTestIFailedV
+# define RTTestIFailureDetails
+# define RTTestIFailureDetailsV
+# define RTTestInitAndCreate
+# define RTTestInitExAndCreate
+# define RTTestIPassed
+# define RTTestIPassedV
+# define RTTestIPrintf
+# define RTTestIPrintfV
+# define RTTestIRestoreAssertions
+# define RTTestISub
+# define RTTestISubDone
+# define RTTestISubF
+# define RTTestISubV
+# define RTTestIValue
+# define RTTestIValueF
+# define RTTestIValueV
+# define RTTestPassed
+# define RTTestPassedV
+# define RTTestPrintf
+# define RTTestPrintfNl
+# define RTTestPrintfNlV
+# define RTTestPrintfV
+# define RTTestRestoreAssertions
+# define RTTestSetDefault
+# define RTTestSkipAndDestroy
+# define RTTestSkipAndDestroyV
+# define RTTestSkipped
+# define RTTestSkippedV
+# define RTTestSub
+# define RTTestSubDone
+# define RTTestSubErrorCount
+# define RTTestSubF
+# define RTTestSubV
+# define RTTestSummaryAndDestroy
+# define RTTestValue
+# define RTTestValueF
+# define RTTestValueV
+# define RTThreadAdopt
+# define RTThreadBlocking
+# define RTThreadCreate
+# define RTThreadCreateF
+# define RTThreadCreateV
+# define RTThreadCtxHookIsEnabled
+# define RTThreadCtxHookCreate
+# define RTThreadCtxHookDisable
+# define RTThreadCtxHookDestroy
```

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RT_MANGLER(RTTimeNanoTSLFenceAsync_EndProc)
+# define RTTimeNanoTSLFenceAsyncUseApicId
RT_MANGLER(RTTimeNanoTSLFenceAsyncUseApicId)
+# define RTTimeNanoTSLFenceAsyncUseApicId_EndProc
RT_MANGLER(RTTimeNanoTSLFenceAsyncUseApicId_EndProc)
+# define RTTimeNanoTSLFenceAsyncUseRdtscp
RT_MANGLER(RTTimeNanoTSLFenceAsyncUseRdtscp)
+# define RTTimeNanoTSLFenceAsyncUseRdtscp_EndProc
RT_MANGLER(RTTimeNanoTSLFenceAsyncUseRdtscp_EndProc)
+# define RTTimeNanoTSLFenceAsyncUseRdtscpGroupChNumCl
RT_MANGLER(RTTimeNanoTSLFenceAsyncUseRdtscpGroupChNumCl)
+# define RTTimeNanoTSLFenceAsyncUseRdtscpGroupChNumCl_EndProc
RT_MANGLER(RTTimeNanoTSLFenceAsyncUseRdtscpGroupChNumCl_EndProc)
+# define RTTimeNanoTSLFenceSyncInvarNoDelta
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarNoDelta)
+# define RTTimeNanoTSLFenceSyncInvarNoDelta_EndProc
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarNoDelta_EndProc)
+# define RTTimeNanoTSLFenceSyncInvarWithDelta
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDelta)
+# define RTTimeNanoTSLFenceSyncInvarWithDelta_EndProc
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDelta_EndProc)
+# define RTTimeNanoTSLFenceSyncInvarWithDeltaUseApicId
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseApicId)
+# define RTTimeNanoTSLFenceSyncInvarWithDeltaUseApicId_EndProc
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseApicId_EndProc)
+# define RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp)
+# define RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp_EndProc
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp_EndProc)
+# define RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim)
+# define RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim_EndProc
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim_EndProc)
+# define RTTimeNormalize
RT_MANGLER(RTTimeNormalize)
+# define RTTimeNow
RT_MANGLER(RTTimeNow)
+# define RTTimeProgramMicroTS
RT_MANGLER(RTTimeProgramMicroTS)
+# define RTTimeProgramMilliTS
RT_MANGLER(RTTimeProgramMilliTS)
+# define RTTimeProgramNanoTS
RT_MANGLER(RTTimeProgramNanoTS)
+# define RTTimeProgramSecTS
RT_MANGLER(RTTimeProgramSecTS)
+# define RTTimeProgramStartNanoTS
RT_MANGLER(RTTimeProgramStartNanoTS)
+# define RTimerCanDoHighResolution
RT_MANGLER(RTimerCanDoHighResolution)
+# define RTimerChangeInterval
RT_MANGLER(RTimerChangeInterval)
+# define RTimerCreate
RT_MANGLER(RTimerCreate)
+# define RTimerCreateEx
RT_MANGLER(RTimerCreateEx)
#define RTTraceBufEnumEntries
#define RTTraceBufGetEntryCount
#define RTTraceBufGetEntrySize
#define RTTraceBufRelease
#define RTTraceBufRetain
#define RTTraceGetDefaultBuf
#define RTTraceSetDefaultBuf
#define RTUdpCreateClientSocket
#define RTUdpCreateClientSocketEx
#define RTUdpServerCreate
#define RTUdpServerCreateEx
#define RTUdpServerDestroy
#define RTUdpServerListen
#define RTUdpServerShutdown
#define RTUdpRead
#define RTUdpWrite
#define RTUniFree
#define RTUriCreate
#define RTUriCreateEx
#define RTUriCreateFile
#define RTUriCreateFileEx
#define RTUriCreatePath
#define RTUriCreatePathEx
#define RTUriParse
#define RTUriParsedAuthority
#define RTUriParsedAuthorityHost
#define RTUriParsedAuthorityPassword
#define RTUriParsedAuthorityPort
#define RTUriParsedAuthorityUsername
#define RTUriParsedFragment
#define RTUriParsedPath
#define RTUriParsedScheme
#define RTUriParsedQuery
#define RTUriIsSchemeMatch
#define RTUtf16AllocTag
#define RTUtf16ReallocTag
#define RTUtf16CalcLatin1Len
#define RTUtf16CalcLatin1LenEx
#define RTUtf16CalcUtf8Len
#define RTUtf16CalcUtf8LenEx
#define RTUtf16BigCalcUtf8Len
#define RTUtf16BigCalcUtf8LenEx
#define RTUtf16LittleCalcUtf8Len
#define RTUtf16LittleCalcUtf8LenEx
#define RTUtf16Cmp
#define RTUtf16CmpAscii
#define RTUtf16CmpUtf8
#define RTUtf16DupExTag
#define RTUtf16DupTag
#define RTUtf16Free
+# define RTVfsChainSpecCheckAndSetup          RT_MANGLER(RTVfsChainSpecCheckAndSetup)
+# define RTVfsChainSpecFree                  RT_MANGLER(RTVfsChainSpecFree)
+# define RTVfsChainSpecParse                 RT_MANGLER(RTVfsChainSpecParse)
+# define RTVfsChainSplitOffFinalPath         RT_MANGLER(RTVfsChainSplitOffFinalPath)
+# define RTVfsChainValidateOpenFileOrIoStream
RT_MANGLER(RTVfsChainValidateOpenFileOrIoStream)
+# define RTVfsDirRelease                     RT_MANGLER(RTVfsDirRelease)
+# define RTVfsDirRetain                      RT_MANGLER(RTVfsDirRetain)
+# define RTVfsDirRetainDebug                 RT_MANGLER(RTVfsDirRetainDebug)
+# define RTVfsDirOpen                        RT_MANGLER(RTVfsDirOpen)
+# define RTVfsDirOpenDir                     RT_MANGLER(RTVfsDirOpenDir)
+# define RTVfsDirCreateDir                   RT_MANGLER(RTVfsDirCreateDir)
+# define RTVfsDirOpenFile                    RT_MANGLER(RTVfsDirOpenFile)
+# define RTVfsDirOpenFileAsIoStream          RT_MANGLER(RTVfsDirOpenFileAsIoStream)
+# define RTVfsDirQueryPathInfo               RT_MANGLER(RTVfsDirQueryPathInfo)
+# define RTVfsDirRemoveDir                   RT_MANGLER(RTVfsDirRemoveDir)
+# define RTVfsFileFlush                      RT_MANGLER(RTVfsFileFlush)
+# define RTVfsFileFromBuffer                 RT_MANGLER(RTVfsFileFromBuffer)
+# define RTVfsFileFromRTFile                 RT_MANGLER(RTVfsFileFromRTFile)
+# define RTVfsFileGetOpenFlags               RT_MANGLER(RTVfsFileGetOpenFlags)
+# define RTVfsFileGetSize                    RT_MANGLER(RTVfsFileGetSize)
+# define RTVfsFileOpen                       RT_MANGLER(RTVfsFileOpen)
+# define RTVfsFileOpenDir                    RT_MANGLER(RTVfsFileOpenDir)
+# define RTVfsFileOpenFile                   RT_MANGLER(RTVfsFileOpenFile)
+# define RTVfsFileOpenNormal                 RT_MANGLER(RTVfsFileOpenNormal)
+# define RTVfsFilePoll                       RT_MANGLER(RTVfsFilePoll)
+# define RTVfsFileQueryInfo                  RT_MANGLER(RTVfsFileQueryInfo)
+# define RTVfsFileRead                       RT_MANGLER(RTVfsFileRead)
+# define RTVfsFileReadAt                     RT_MANGLER(RTVfsFileReadAt)
+# define RTVfsFileRelease                    RT_MANGLER(RTVfsFileRelease)
+# define RTVfsFileRetain                     RT_MANGLER(RTVfsFileRetain)
+# define RTVfsFileRetainDebug                RT_MANGLER(RTVfsFileRetainDebug)
+# define RTVfsFileSeek                       RT_MANGLER(RTVfsFileSeek)
+# define RTVfsFileSgRead                     RT_MANGLER(RTVfsFileSgRead)
+# define RTVfsFileSgWrite                    RT_MANGLER(RTVfsFileSgWrite)
+# define RTVfsFileTell                       RT_MANGLER(RTVfsFileTell)
+# define RTVfsFileToIoStream                 RT_MANGLER(RTVfsFileToIoStream)
+# define RTVfsFileWrite                      RT_MANGLER(RTVfsFileWrite)
+# define RTVfsFileWriteAt                    RT_MANGLER(RTVfsFileWriteAt)
+# define RTVfsFsStreamToPrivate              RT_MANGLER(RTVfsFsStreamToPrivate)
+# define RTVfsFsStrmAdd                      RT_MANGLER(RTVfsFsStrmAdd)
+# define RTVfsFsStrmEnd                      RT_MANGLER(RTVfsFsStrmEnd)
+# define RTVfsFsStrmNext                     RT_MANGLER(RTVfsFsStrmNext)
+# define RTVfsFsStrmPushFile                 RT_MANGLER(RTVfsFsStrmPushFile)
+# define RTVfsFsStrmQueryInfo                RT_MANGLER(RTVfsFsStrmQueryInfo)
+# define RTVfsFsStrmRelease                  RT_MANGLER(RTVfsFsStrmRelease)
+# define RTVfsFsStrmRetain                   RT_MANGLER(RTVfsFsStrmRetain)
+# define RTVfsFsStrmRetainDebug              RT_MANGLER(RTVfsFsStrmRetainDebug)
+# define RTVfsFsStrmToDir                    RT_MANGLER(RTVfsFsStrmToDir)
+# define RTVfsFsStrmToNormalDir
+ define RTVfsFsStrmToDirUndo
+ define RTVfsIoStreamToPrivate
+ define RTVfsIoStreamFlush
+ define RTVfsIoStreamFromBuffer
+ define RTVfsIoStreamFromRTFile
+ define RTVfsIoStreamFromRTPipe
+ define RTVfsIoStreamFromStdHandle
+ define RTVfsIoStreamGetOpenFlags
+ define RTVfsIoStreamsAtEnd
+ define RTVfsIoStreamOpenNormal
+ define RTVfsIoStreamPoll
+ define RTVfsIoStreamQueryInfo
+ define RTVfsIoStreamRead
+ define RTVfsIoStreamReadAt
+ define RTVfsIoStreamReadAll
+ define RTVfsIoStreamRelease
+ define RTVfsIoStreamRetain
+ define RTVfsIoStreamRetainDebug
+ define RTVfsIoStreamSgRead
+ define RTVfsIoStreamSgWrite
+ define RTVfsIoStreamSkip
+ define RTVfsIoStreamTell
+ define RTVfsIoStreamToFile
+ define RTVfsIoStreamValidateUtf8Encoding
+ define RTVfsIoStreamWrite
+ define RTVfsIoStreamWriteAt
+ define RTVfsIoStreamZeroFill
+ define RTVfsLockAcquireReadSlow
+ define RTVfsLockAcquireWriteSlow
+ define RTVfsLockRelease
+ define RTVfsLockReleaseReadSlow
+ define RTVfsLockReleaseWriteSlow
+ define RTVfsLockRetain
+ define RTVfsLockRetainDebug
+ define RTVfsMemFileCreate
+ define RTVfsMemIoStreamCreate
+ define RTVfsMemorizeIoStreamAsFile
+ define RTVfsNew
+ define RTVfsNewBaseObj
+ define RTVfsNewDir
+ define RTVfsNewFile
+ define RTVfsNewFsStream
+ define RTVfsNewIoStream
+ define RTVfsNewSymlink
+ define RTVfsObjFromDir

RT_MANGLER(RTVfsFsStrmToNormalDir)
RT_MANGLER(RTVfsFsStrmToDirUndo)
RT_MANGLER(RTVfsIoStreamToPrivate)
RT_MANGLER(RTVfsIoStreamFlush)
RT_MANGLER(RTVfsIoStreamFromBuffer)
RT_MANGLER(RTVfsIoStreamFromRTFile)
RT_MANGLER(RTVfsIoStreamFromRTPipe)
RT_MANGLER(RTVfsIoStreamFromStdHandle)
RT_MANGLER(RTVfsIoStreamGetOpenFlags)
RT_MANGLER(RTVfsIoStreamsAtEnd)
RT_MANGLER(RTVfsIoStreamOpenNormal)
RT_MANGLER(RTVfsIoStreamPoll)
RT_MANGLER(RTVfsIoStreamQueryInfo)
RT_MANGLER(RTVfsIoStreamRead)
RT_MANGLER(RTVfsIoStreamReadAt)
RT_MANGLER(RTVfsIoStreamReadAll)
RT_MANGLER(RTVfsIoStreamRelease)
RT_MANGLER(RTVfsIoStreamRetain)
RT_MANGLER(RTVfsIoStreamRetainDebug)
RT_MANGLER(RTVfsIoStreamSgRead)
RT_MANGLER(RTVfsIoStreamSgWrite)
RT_MANGLER(RTVfsIoStreamSkip)
RT_MANGLER(RTVfsIoStreamTell)
RT_MANGLER(RTVfsIoStreamToFile)
RT_MANGLER(RTVfsIoStreamValidateUtf8Encoding)
RT_MANGLER(RTVfsIoStreamWrite)
RT_MANGLER(RTVfsIoStreamWriteAt)
RT_MANGLER(RTVfsIoStreamZeroFill)
RT_MANGLER(RTVfsLockAcquireReadSlow)
RT_MANGLER(RTVfsLockAcquireWriteSlow)
RT_MANGLER(RTVfsLockRelease)
RT_MANGLER(RTVfsLockReleaseReadSlow)
RT_MANGLER(RTVfsLockReleaseWriteSlow)
RT_MANGLER(RTVfsLockRetain)
RT_MANGLER(RTVfsLockRetainDebug)
RT_MANGLER(RTVfsMemFileCreate)
RT_MANGLER(RTVfsMemIoStreamCreate)
RT_MANGLER(RTVfsMemorizeIoStreamAsFile)
RT_MANGLER(RTVfsNew)
RT_MANGLER(RTVfsNewBaseObj)
RT_MANGLER(RTVfsNewDir)
RT_MANGLER(RTVfsNewFile)
RT_MANGLER(RTVfsNewFsStream)
RT_MANGLER(RTVfsNewIoStream)
RT_MANGLER(RTVfsNewSymlink)
RT_MANGLER(RTVfsObjFromDir)
+ # define RTVfsObjFromFile  RT_MANGLER(RTVfsObjFromFile)
+ # define RTVfsObjFromFsStream  RT_MANGLER(RTVfsObjFromFsStream)
+ # define RTVfsObjFromIoStream  RT_MANGLER(RTVfsObjFromIoStream)
+ # define RTVfsObjFromSymlink  RT_MANGLER(RTVfsObjFromSymlink)
+ # define RTVfsObjFromVfs  RT_MANGLER(RTVfsObjFromVfs)
+ # define RTVfsObjQueryInfo  RT_MANGLER(RTVfsObjQueryInfo)
+ # define RTVfsObjRelease  RT_MANGLER(RTVfsObjRelease)
+ # define RTVfsObjRetain  RT_MANGLER(RTVfsObjRetain)
+ # define RTVfsObjRetainDebug  RT_MANGLER(RTVfsObjRetainDebug)
+ # define RTVfsObjToDir  RT_MANGLER(RTVfsObjToDir)
+ # define RTVfsObjToFile  RT_MANGLER(RTVfsObjToFile)
+ # define RTVfsObjToFsStream  RT_MANGLER(RTVfsObjToFsStream)
+ # define RTVfsObjToIoStream  RT_MANGLER(RTVfsObjToIoStream)
+ # define RTVfsObjToSymlink  RT_MANGLER(RTVfsObjToSymlink)
+ # define RTVfsObjToVfs  RT_MANGLER(RTVfsObjToVfs)
+ # define RTVfsParsePath  RT_MANGLER(RTVfsParsePath)
+ # define RTVfsParsePathA  RT_MANGLER(RTVfsParsePathA)
+ # define RTVfsParsePathAppend  RT_MANGLER(RTVfsParsePathAppend)
+ # define RTVfsParsePathFree  RT_MANGLER(RTVfsParsePathFree)
+ # define RTVfsRelease  RT_MANGLER(RTVfsRelease)
+ # define RTVfsOpenRoot  RT_MANGLER(RTVfsOpenRoot)
+ # define RTVfsQuerPathInfo  RT_MANGLER(RTVfsQueryPathInfo)
+ # define RTVfsRetain  RT_MANGLER(RTVfsRetain)
+ # define RTVfsRetainDebug  RT_MANGLER(RTVfsRetainDebug)
+ # define RTVfsSymlinkQueryInfo  RT_MANGLER(RTVfsSymlinkQueryInfo)
+ # define RTVfsSymlinkRead  RT_MANGLER(RTVfsSymlinkRead)
+ # define RTVfsSymlinkRelease  RT_MANGLER(RTVfsSymlinkRelease)
+ # define RTVfsSymlinkRetain  RT_MANGLER(RTVfsSymlinkRetain)
+ # define RTVfsSymlinkRetainDebug  RT_MANGLER(RTVfsSymlinkRetainDebug)
+ # define RTVfsSymlinkSetMode  RT_MANGLER(RTVfsSymlinkSetMode)
+ # define RTVfsSymlinkSetOwner  RT_MANGLER(RTVfsSymlinkSetOwner)
+ # define RTVfsSymlinkSetTimes  RT_MANGLER(RTVfsSymlinkSetTimes)
+ # define RTVfsUtilDummyPollOne  RT_MANGLER(RTVfsUtilDummyPollOne)
+ # define RTVfsUtilPumpIoStreams  RT_MANGLER(RTVfsUtilPumpIoStreams)
+ # define RTVfsCreateProgressForFile  RT_MANGLER(RTVfsCreateProgressForFile)
+ # define RTVfsCreateProgressForIoStream  RT_MANGLER(RTVfsCreateProgressForIoStream)
+ # define RTVfsCreateReadAheadForFile  RT_MANGLER(RTVfsCreateReadAheadForFile)
+ # define RTVfsCreateReadAheadForIoStream  RT_MANGLER(RTVfsCreateReadAheadForIoStream)
+ # define RTZipBlockCompress  RT_MANGLER(RTZipBlockCompress)
+ # define RTZipBlockDecompress  RT_MANGLER(RTZipBlockDecompress)
+ # define RTZipCompCreate  RT_MANGLER(RTZipCompCreate)
+ # define RTZipCompDestroy  RT_MANGLER(RTZipCompDestroy)
+ # define RTZipCompFinish  RT_MANGLER(RTZipCompFinish)
+ # define RTZipComp  RT_MANGLER(RTZipComp)
+ # define RTZipDecompCreate  RT_MANGLER(RTZipDecompCreate)
+ # define RTZipDecompDestroy  RT_MANGLER(RTZipDecompDestroy)
+ # define RTZipDecompress  RT_MANGLER(RTZipDecompress)
+ # define RTZipGzipCompressIoStream  RT_MANGLER(RTZipGzipCompressIoStream)
+# define RTAsn1CursorGetContextTagNCursor RT_MANGLER(RTAsn1CursorGetContextTagNCursor)
+# define RTAsn1CursorGetCore RT_MANGLER(RTAsn1CursorGetCore)
+# define RTAsn1CursorGetDynType RT_MANGLER(RTAsn1CursorGetDynType)
+# define RTAsn1CursorGetIa5String RT_MANGLER(RTAsn1CursorGetIa5String)
+# define RTAsn1CursorGetInteger RT_MANGLER(RTAsn1CursorGetInteger)
+# define RTAsn1CursorGetNull RT_MANGLER(RTAsn1CursorGetNull)
+# define RTAsn1CursorGetObjId RT_MANGLER(RTAsn1CursorGetObjId)
+# define RTAsn1CursorGetOctetString RT_MANGLER(RTAsn1CursorGetOctetString)
+# define RTAsn1CursorGetSequenceCursor RT_MANGLER(RTAsn1CursorGetSequenceCursor)
+# define RTAsn1CursorGetSetCursor RT_MANGLER(RTAsn1CursorGetSetCursor)
+# define RTAsn1CursorGetString RT_MANGLER(RTAsn1CursorGetString)
+# define RTAsn1CursorGetTime RT_MANGLER(RTAsn1CursorGetTime)
+# define RTAsn1CursorGetUtf8String RT_MANGLER(RTAsn1CursorGetUtf8String)
+# define RTAsn1CursorInitAllocation RT_MANGLER(RTAsn1CursorInitAllocation)
+# define RTAsn1CursorInitArrayAllocation RT_MANGLER(RTAsn1CursorInitArrayAllocation)
+# define RTAsn1CursorInitPrimary RT_MANGLER(RTAsn1CursorInitPrimary)
+# define RTAsn1CursorInitSubFromCore RT_MANGLER(RTAsn1CursorInitSubFromCore)
+# define RTAsn1CursorIsNextEx RT_MANGLER(RTAsn1CursorIsNextEx)
+# define RTAsn1CursorMatchTagClassFlagsEx RT_MANGLER(RTAsn1CursorMatchTagClassFlagsEx)
+# define RTAsn1CursorPeek RT_MANGLER(RTAsn1CursorPeek)
+# define RTAsn1CursorReadHdr RT_MANGLER(RTAsn1CursorReadHdr)
+# define RTAsn1CursorSetInfo RT_MANGLER(RTAsn1CursorSetInfo)
+# define RTAsn1CursorSetInfoV RT_MANGLER(RTAsn1CursorSetInfoV)
+# define RTAsn1Dump RT_MANGLER(RTAsn1Dump)
+# define RTAsn1QueryObjIdName RT_MANGLER(RTAsn1QueryObjIdName)
+# define RTAsn1EncodePrepare RT_MANGLER(RTAsn1EncodePrepare)
+# define RTAsn1EncodeRecalcHdrSize RT_MANGLER(RTAsn1EncodeRecalcHdrSize)
+# define RTAsn1EncodeToBuffer RT_MANGLER(RTAsn1EncodeToBuffer)
+# define RTAsn1EncodeWrite RT_MANGLER(RTAsn1EncodeWrite)
+# define RTAsn1EncodeWriteHeader RT_MANGLER(RTAsn1EncodeWriteHeader)
+# define RTAsn1BitString_CheckSanity RT_MANGLER(RTAsn1BitString_CheckSanity)
+# define RTAsn1BitString_Clone RT_MANGLER(RTAsn1BitString_Clone)
+# define RTAsn1BitString_Compare RT_MANGLER(RTAsn1BitString_Compare)
+# define RTAsn1BitString_Delete RT_MANGLER(RTAsn1BitString_Delete)
+# define RTAsn1BitString_Enum RT_MANGLER(RTAsn1BitString_Enum)
+# define RTAsn1BitString_GetAsUInt64 RT_MANGLER(RTAsn1BitString_GetAsUInt64)
+# define RTAsn1BitString_Init RT_MANGLER(RTAsn1BitString_Init)
+# define RTAsn1SeqOfBitStrings_CheckSanity RT_MANGLER(RTAsn1SeqOfBitStrings_CheckSanity)
+# define RTAsn1SeqOfBitStrings_Clone RT_MANGLER(RTAsn1SeqOfBitStrings_Clone)
+# define RTAsn1SeqOfBitStrings_Compare RT_MANGLER(RTAsn1SeqOfBitStrings_Compare)
+# define RTAsn1SeqOfBitStrings_Delete RT_MANGLER(RTAsn1SeqOfBitStrings_Delete)
+# define RTAsn1SeqOfBitStrings_Enum RT_MANGLER(RTAsn1SeqOfBitStrings_Enum)
+# define RTAsn1SeqOfBitStrings_Init RT_MANGLER(RTAsn1SeqOfBitStrings_Init)
+# define RTAsn1SetOfBitStrings_CheckSanity RT_MANGLER(RTAsn1SetOfBitStrings_CheckSanity)
+# define RTAsn1SetOfBitStrings_Clone RT_MANGLER(RTAsn1SetOfBitStrings_Clone)
+# define RTAsn1SetOfBitStrings_Compare RT_MANGLER(RTAsn1SetOfBitStrings_Compare)
+# define RTAsn1SetOfBitStrings_Delete RT_MANGLER(RTAsn1SetOfBitStrings_Delete)
+# define RTAsn1SetOfBitStrings_Enum RT_MANGLER(RTAsn1SetOfBitStrings_Enum)
### Define RTASN1Null_CheckSanity
RT_MANGLER(RTASN1Null_CheckSanity)

### Define RTASN1Null_Clone
RT_MANGLER(RTASN1Null_Clone)

### Define RTASN1Null_Compare
RT_MANGLER(RTASN1Null_Compare)

### Define RTASN1Null_Delete
RT_MANGLER(RTASN1Null_Delete)

### Define RTASN1Null_Init
RT_MANGLER(RTASN1Null_Init)

### Define RTASN1Null_DecodeAsn1
RT_MANGLER(RTASN1Null_DecodeAsn1)

### Define RTASN1ObjIdCountComponents
RT_MANGLER(RTASN1ObjIdCountComponents)

### Define RTASN1ObjIdGetComponentsAsUInt32
RT_MANGLER(RTASN1ObjIdGetComponentsAsUInt32)

### Define RTASN1ObjIdLastComponentsAsUInt32
RT_MANGLER(RTASN1ObjIdGetComponentsAsUInt32)

### Define RTASN1ObjId_CheckSanity
RT_MANGLER(RTASN1ObjId_CheckSanity)

### Define RTASN1ObjId_Clone
RT_MANGLER(RTASN1ObjId_Clone)

### Define RTASN1ObjId_Compare
RT_MANGLER(RTASN1ObjId_Compare)

### Define RTASN1ObjId_CompareWithString
RT_MANGLER(RTASN1ObjId_CompareWithString)

### Define RTASN1ObjId_Delete
RT_MANGLER(RTASN1ObjId_Delete)

### Define RTASN1ObjId_Enum
RT_MANGLER(RTASN1ObjId_Enum)

### Define RTASN1ObjId_Init
RT_MANGLER(RTASN1ObjId_Init)

### Define RTASN1ObjId_InitFromString
RT_MANGLER(RTASN1ObjId_InitFromString)

### Define RTASN1ObjId_StartsWith
RT_MANGLER(RTASN1ObjId_StartsWith)

### Define RTASN1SeqOfObjIds_CheckSanity
RT_MANGLER(RTASN1SeqOfObjIds_CheckSanity)

### Define RTASN1SeqOfObjIds_Clone
RT_MANGLER(RTASN1SeqOfObjIds_Clone)

### Define RTASN1SeqOfObjIds_Compare
RT_MANGLER(RTASN1SeqOfObjIds_Compare)

### Define RTASN1SeqOfObjIds_Delete
RT_MANGLER(RTASN1SeqOfObjIds_Delete)

### Define RTASN1SeqOfObjIds_Enum
RT_MANGLER(RTASN1SeqOfObjIds_Enum)

### Define RTASN1SeqOfObjIds_Init
RT_MANGLER(RTASN1SeqOfObjIds_Init)

### Define RTASN1SeqOfObjIds_InitFrom
RT_MANGLER(RTASN1SeqOfObjIds_InitFrom)

### Define RTASN1SeqOfObjIds_Initialize
RT_MANGLER(RTASN1SeqOfObjIds_Initialize)

### Define RTASN1SeqOfObjIds_InitFrom
RT_MANGLER(RTASN1SeqOfObjIds_InitFrom)

### Define RTASN1SetOfObjIds_CheckSanity
RT_MANGLER(RTASN1SetOfObjIds_CheckSanity)

### Define RTASN1SetOfObjIds_Clone
RT_MANGLER(RTASN1SetOfObjIds_Clone)

### Define RTASN1SetOfObjIds_Compare
RT_MANGLER(RTASN1SetOfObjIds_Compare)

### Define RTASN1SetOfObjIds_Delete
RT_MANGLER(RTASN1SetOfObjIds_Delete)

### Define RTASN1SetOfObjIds_Enum
RT_MANGLER(RTASN1SetOfObjIds_Enum)

### Define RTASN1SetOfObjIds_Init
RT_MANGLER(RTASN1SetOfObjIds_Init)

### Define RTASN1SeqOfObjIdSeqs_CheckSanity
RT_MANGLER(RTASN1SeqOfObjIdSeqs_CheckSanity)

### Define RTASN1SeqOfObjIdSeqs_Clone
RT_MANGLER(RTASN1SeqOfObjIdSeqs_Clone)

### Define RTASN1SeqOfObjIdSeqs_Compare
RT_MANGLER(RTASN1SeqOfObjIdSeqs_Compare)

### Define RTASN1SeqOfObjIdSeqs_DecodeAsn1
RT_MANGLER(RTASN1SeqOfObjIdSeqs_DecodeAsn1)

### Define RTASN1SeqOfObjIdSeqs_Delete
RT_MANGLER(RTASN1SeqOfObjIdSeqs_Delete)

### Define RTASN1SeqOfObjIdSeqs_Enum
RT_MANGLER(RTASN1SeqOfObjIdSeqs_Enum)

### Define RTASN1SeqOfObjIdSeqs_Init
RT_MANGLER(RTASN1SeqOfObjIdSeqs_Init)

### Define RTASN1SetOfObjIdSeqs_CheckSanity
RT_MANGLER(RTASN1SetOfObjIdSeqs_CheckSanity)

### Define RTASN1SetOfObjIdSeqs_Clone
RT_MANGLER(RTASN1SetOfObjIdSeqs_Clone)

### Define RTASN1SetOfObjIdSeqs_Compare
RT_MANGLER(RTASN1SetOfObjIdSeqs_Compare)

### Define RTASN1SetOfObjIdSeqs_Delete
RT_MANGLER(RTASN1SetOfObjIdSeqs_Delete)

### Define RTASN1SetOfObjIdSeqs_Enum
RT_MANGLER(RTASN1SetOfObjIdSeqs_Enum)

### Define RTASN1SetOfObjIdSeqs_Init
RT_MANGLER(RTASN1SetOfObjIdSeqs_Init)

### Define RTASN1ObjId_DecodeAsn1
RT_MANGLER(RTASN1ObjId_DecodeAsn1)

### Define RTASN1SeqOfObjIdSeqs_DecodeAsn1
RT_MANGLER(RTASN1SeqOfObjIdSeqs_DecodeAsn1)
+ # define RTAsn1SetOfObjIds_DecodeAsn1 RT_MANGLER(RTAsn1SetOfObjIds_DecodeAsn1)
+ # define RTAsn1OctetString_CheckSanity RT_MANGLER(RTAsn1OctetString_CheckSanity)
+ # define RTAsn1OctetString_Clone RT_MANGLER(RTAsn1OctetString_Clone)
+ # define RTAsn1OctetString_Compare RT_MANGLER(RTAsn1OctetString_Compare)
+ # define RTAsn1OctetString_Delete RT_MANGLER(RTAsn1OctetString_Delete)
+ # define RTAsn1OctetString_Enum RT_MANGLER(RTAsn1OctetString_Enum)
+ # define RTAsn1OctetString_Init RT_MANGLER(RTAsn1OctetString_Init)
+ # define RTAsn1SeqOfOctetStrings_CheckSanity
RT_MANGLER(RTAsn1SeqOfOctetStrings_CheckSanity)
+ # define RTAsn1SeqOfOctetStrings_Clone RT_MANGLER(RTAsn1SeqOfOctetStrings_Clone)
+ # define RTAsn1SeqOfOctetStrings_Compare RT_MANGLER(RTAsn1SeqOfOctetStrings_Compare)
+ # define RTAsn1SeqOfOctetStrings_Delete RT_MANGLER(RTAsn1SeqOfOctetStrings_Delete)
+ # define RTAsn1SeqOfOctetStrings_Enum RT_MANGLER(RTAsn1SeqOfOctetStrings_Enum)
+ # define RTAsn1SeqOfOctetStrings_Init RT_MANGLER(RTAsn1SeqOfOctetStrings_Init)
+ # define RTAsn1SetOfOctetStrings_CheckSanity
RT_MANGLER(RTAsn1SetOfOctetStrings_CheckSanity)
+ # define RTAsn1SetOfOctetStrings_Clone RT_MANGLER(RTAsn1SetOfOctetStrings_Clone)
+ # define RTAsn1SetOfOctetStrings_Compare RT_MANGLER(RTAsn1SetOfOctetStrings_Compare)
+ # define RTAsn1SetOfOctetStrings_Delete RT_MANGLER(RTAsn1SetOfOctetStrings_Delete)
+ # define RTAsn1SetOfOctetStrings_Enum RT_MANGLER(RTAsn1SetOfOctetStrings_Enum)
+ # define RTAsn1OctetString_DecodeAsn1 RT_MANGLER(RTAsn1OctetString_DecodeAsn1)
+ # define RTAsn1SeqOfOctetStrings_DecodeAsn1 RT_MANGLER(RTAsn1SeqOfOctetStrings_DecodeAsn1)
+ # define RTAsn1SetOfOctetStrings_DecodeAsn1 RT_MANGLER(RTAsn1SetOfOctetStrings_DecodeAsn1)
+ # define RTAsn1BmpString_CheckSanity RT_MANGLER(RTAsn1BmpString_CheckSanity)
+ # define RTAsn1BmpString_Clone RT_MANGLER(RTAsn1BmpString_Clone)
+ # define RTAsn1BmpString_Compare RT_MANGLER(RTAsn1BmpString_Compare)
+ # define RTAsn1BmpString_Delete RT_MANGLER(RTAsn1BmpString_Delete)
+ # define RTAsn1BmpString_Enum RT_MANGLER(RTAsn1BmpString_Enum)
+ # define RTAsn1BmpString_Init RT_MANGLER(RTAsn1BmpString_Init)
+ # define RTAsn1GeneralString_CheckSanity RT_MANGLER(RTAsn1GeneralString_CheckSanity)
+ # define RTAsn1GeneralString_Clone RT_MANGLER(RTAsn1GeneralString_Clone)
+ # define RTAsn1GeneralString_Compare RT_MANGLER(RTAsn1GeneralString_Compare)
+ # define RTAsn1GeneralString_Delete RT_MANGLER(RTAsn1GeneralString_Delete)
+ # define RTAsn1GeneralString_Enum RT_MANGLER(RTAsn1GeneralString_Enum)
+ # define RTAsn1GeneralString_Init RT_MANGLER(RTAsn1GeneralString_Init)
+ # define RTAsn1GraphicString_CheckSanity RT_MANGLER(RTAsn1GraphicString_CheckSanity)
+ # define RTAsn1GraphicString_Clone RT_MANGLER(RTAsn1GraphicString_Clone)
+ # define RTAsn1GraphicString_Compare RT_MANGLER(RTAsn1GraphicString_Compare)
+ # define RTAsn1GraphicString_Delete RT_MANGLER(RTAsn1GraphicString_Delete)
+ # define RTAsn1GraphicString_Enum RT_MANGLER(RTAsn1GraphicString_Enum)
+ # define RTAsn1GraphicString_Init RT_MANGLER(RTAsn1GraphicString_Init)
+ # define RTAsn1Ia5String_CheckSanity RT_MANGLER(RTAsn1Ia5String_CheckSanity)
+ # define RTAsn1Ia5String_Clone RT_MANGLER(RTAsn1Ia5String_Clone)
+ # define RTAsn1Ia5String_Compare RT_MANGLER(RTAsn1Ia5String_Compare)
+ # define RTAsn1Ia5String_Delete RT_MANGLER(RTAsn1Ia5String_Delete)
+# define RTAsn1Time_Clone          RT_MANGLER(RTAsn1Time_Clone)
+# define RTAsn1Time_Compare        RT_MANGLER(RTAsn1Time_Compare)
+# define RTAsn1Time_CompareWithTimeSpec RT_MANGLER(RTAsn1Time_CompareWithTimeSpec)
+# define RTAsn1Time_Delete         RT_MANGLER(RTAsn1Time_Delete)
+# define RTAsn1Time_Enum           RT_MANGLER(RTAsn1Time_Enum)
+# define RTAsn1Time_Init           RT_MANGLER(RTAsn1Time_Init)
+# define RTAsn1UtcTime_CheckSanity RT_MANGLER(RTAsn1UtcTime_CheckSanity)
+# define RTAsn1UtcTime_Clone       RT_MANGLER(RTAsn1UtcTime_Clone)
+# define RTAsn1UtcTime_Compare     RT_MANGLER(RTAsn1UtcTime_Compare)
+# define RTAsn1UtcTime_Delete      RT_MANGLER(RTAsn1UtcTime_Delete)
+# define RTAsn1UtcTime_Enum        RT_MANGLER(RTAsn1UtcTime_Enum)
+# define RTAsn1UtcTime_Init        RT_MANGLER(RTAsn1UtcTime_Init)
+# define RTAsn1GeneralizedTime_DecodeAsn1
RT_MANGLER(RTAsn1GeneralizedTime_DecodeAsn1)
+# define RTAsn1SeqOfTimes_DecodeAsn1 RT_MANGLER(RTAsn1SeqOfTimes_DecodeAsn1)
+# define RTAsn1SetOfTimes_DecodeAsn1 RT_MANGLER(RTAsn1SetOfTimes_DecodeAsn1)
+# define RTAsn1Time_DecodeAsn1     RT_MANGLER(RTAsn1Time_DecodeAsn1)
+# define RTAsn1UtcTime_DecodeAsn1  RT_MANGLER(RTAsn1UtcTime_DecodeAsn1)
+# define RTMd2                      RT_MANGLER(RTMd2)
+# define RTMd2Final                 RT_MANGLER(RTMd2Final)
+# define RTMd2Init                  RT_MANGLER(RTMd2Init)
+# define RTMd2Update                RT_MANGLER(RTMd2Update)
+# define RTMd2FromString            RT_MANGLER(RTMd2FromString)
+# define RTMd2ToString              RT_MANGLER(RTMd2ToString)
+# define RTCrDigestClone           RT_MANGLER(RTCrDigestClone)
+# define RTCrDigestCreate           RT_MANGLER(RTCrDigestCreate)
+# define RTCrDigestFinal            RT_MANGLER(RTCrDigestFinal)
+# define RTCrDigestGetConsumedSize  RT_MANGLER(RTCrDigestGetConsumedSize)
+# define RTCrDigestGetHash          RT_MANGLER(RTCrDigestGetHash)
+# define RTCrDigestGetHashSize      RT_MANGLER(RTCrDigestGetHashSize)
+# define RTCrDigestGetType          RT_MANGLER(RTCrDigestGetType)
+# define RTCrDigestGetAlgorithmOid  RT_MANGLER(RTCrDigestGetAlgorithmOid)
+# define RTCrDigestGetAlgorithmOidToName RT_MANGLER(RTCrDigestGetAlgorithmOidToName)
+# define RTCrDigestIsFinalized      RT_MANGLER(RTCrDigestIsFinalized)
+# define RTCrDigestMatch            RT_MANGLER(RTCrDigestMatch)
+# define RTCrDigestRelease          RT_MANGLER(RTCrDigestRelease)
+# define RTCrDigestReset            RT_MANGLER(RTCrDigestReset)
+# define RTCrDigestRetain           RT_MANGLER(RTCrDigestRetain)
+# define RTCrDigestUpdate           RT_MANGLER(RTCrDigestUpdate)
+# define RTCrDigestUpdateFromVfsFile RT_MANGLER(RTCrDigestUpdateFromVfsFile)
+# define RTCrDigestCreateByObjId    RT_MANGLER(RTCrDigestCreateByObjId)
+# define RTCrDigestCreateByObjIdString RT_MANGLER(RTCrDigestCreateByObjIdString)
+# define RTCrDigestCreateByType     RT_MANGLER(RTCrDigestCreateByType)
+# define RTCrDigestFindByObjId      RT_MANGLER(RTCrDigestFindByObjId)
+# define RTCrDigestFindByObjIdString RT_MANGLER(RTCrDigestFindByObjIdString)
+# define RTCrDigestFindByType       RT_MANGLER(RTCrDigestFindByType)
+# define RTCrDigestTypeToAlgorithmOid RT_MANGLER(RTCrDigestTypeToAlgorithmOid)
+# define RTCrDigestTypeToName       RT_MANGLER(RTCrDigestTypeToName)
+# define RTCrDigestTypeToHashSize                    RT_MANGLER(RTCrDigestTypeToHashSize)
+# define RTCrRsDigestInfo_DecodeAsn1                 RT_MANGLER(RTCrRsDigestInfo_DecodeAsn1)
+# define RTCrRsOtherPrimeInfo_DecodeAsn1            RT_MANGLER(RTCrRsOtherPrimeInfo_DecodeAsn1)
+# define RTCrRsOtherPrimeInfos_DecodeAsn1           RT_MANGLER(RTCrRsOtherPrimeInfos_DecodeAsn1)
+# define RTCrRsPrivateKey_DecodeAsn1                RT_MANGLER(RTCrRsPrivateKey_DecodeAsn1)
+# define RTCrRsPublicKey_DecodeAsn1                 RT_MANGLER(RTCrRsPublicKey_DecodeAsn1)
+# define RTCrRsDigestInfo_Compare                    RT_MANGLER(RTCrRsDigestInfo_Compare)
+# define RTCrRsDigestInfo_Delete                     RT_MANGLER(RTCrRsDigestInfo_Delete)
+# define RTCrRsDigestInfo_Enum                       RT_MANGLER(RTCrRsDigestInfo_Enum)
+# define RTCrRsOtherPrimeInfo_Compare                RT_MANGLER(RTCrRsOtherPrimeInfo_Compare)
+# define RTCrRsOtherPrimeInfo_Delete                 RT_MANGLER(RTCrRsOtherPrimeInfo_Delete)
+# define RTCrRsOtherPrimeInfo_Enum                   RT_MANGLER(RTCrRsOtherPrimeInfo_Enum)
+# define RTCrRsOtherPrimeInfos_Compare               RT_MANGLER(RTCrRsOtherPrimeInfos_Compare)
+# define RTCrRsOtherPrimeInfos_Delete                RT_MANGLER(RTCrRsOtherPrimeInfos_Delete)
+# define RTCrRsOtherPrimeInfos_Enum                  RT_MANGLER(RTCrRsOtherPrimeInfos_Enum)
+# define RTCrRsPrivateKey_Compare                    RT_MANGLER(RTCrRsPrivateKey_Compare)
+# define RTCrRsPrivateKey_Delete                     RT_MANGLER(RTCrRsPrivateKey_Delete)
+# define RTCrRsPrivateKey_Enum                       RT_MANGLER(RTCrRsPrivateKey_Enum)
+# define RTCrRsPublicKey_Compare                     RT_MANGLER(RTCrRsPublicKey_Compare)
+# define RTCrRsPublicKey_Delete                      RT_MANGLER(RTCrRsPublicKey_Delete)
+# define RTCrRsPublicKey_Enum                        RT_MANGLER(RTCrRsPublicKey_Enum)
+# define RTCrRsDigestInfo_Clone                      RT_MANGLER(RTCrRsDigestInfo_Clone)
+# define RTCrRsDigestInfo_Init                       RT_MANGLER(RTCrRsDigestInfo_Init)
+# define RTCrRsOtherPrimeInfo_Clone                  RT_MANGLER(RTCrRsOtherPrimeInfo_Clone)
+# define RTCrRsOtherPrimeInfo_Init                   RT_MANGLER(RTCrRsOtherPrimeInfo_Init)
+# define RTCrRsOtherPrimeInfos_Clone                 RT_MANGLER(RTCrRsOtherPrimeInfos_Clone)
+# define RTCrRsOtherPrimeInfos_Init                  RT_MANGLER(RTCrRsOtherPrimeInfos_Init)
+# define RTCrRsPrivateKey_Clone                      RT_MANGLER(RTCrRsPrivateKey_Clone)
+# define RTCrRsPrivateKey_Init                       RT_MANGLER(RTCrRsPrivateKey_Init)
+# define RTCrRsPublicKey_Clone                      RT_MANGLER(RTCrRsPublicKey_Clone)
+# define RTCrRsPublicKey_Init                        RT_MANGLER(RTCrRsPublicKey_Init)
+# define RTCrRsDigestInfo_CheckSanity                RT_MANGLER(RTCrRsDigestInfo_CheckSanity)
+# define RTCrRsOtherPrimeInfo_CheckSanity            RT_MANGLER(RTCrRsOtherPrimeInfo_CheckSanity)
+# define RTCrRsOtherPrimeInfos_CheckSanity          RT_MANGLER(RTCrRsOtherPrimeInfos_CheckSanity)
+# define RTCrRsPrivateKey_CheckSanity                RT_MANGLER(RTCrRsPrivateKey_CheckSanity)
+# define RTCrRsPublicKeys_CheckSanity                RT_MANGLER(RTCrRsPublicKeys_CheckSanity)
+# define RTCrPemFindFirstSectionInContent            RT_MANGLER(RTCrPemFindFirstSectionInContent)
+# define RTCrPemParseContent                         RT_MANGLER(RTCrPemParseContent)
+# define RTCrPemReadFile                              RT_MANGLER(RTCrPemReadFile)
+# define RTCrPck7Attribute_DecodeAsn1                 RT_MANGLER(RTCrPck7Attribute_DecodeAsn1)
+# define RTCrPck7Attributes_DecodeAsn1                RT_MANGLER(RTCrPck7Attributes_DecodeAsn1)
+# define RTCrPck7ContentInfo_DecodeAsn1               RT_MANGLER(RTCrPck7ContentInfo_DecodeAsn1)
+# define RTCrPck7DigestInfo_DecodeAsn1                RT_MANGLER(RTCrPck7DigestInfo_DecodeAsn1)
+# define RTCrPck7IssuerAndSerialNumber_DecodeAsn1     RT_MANGLER(RTCrPck7IssuerAndSerialNumber_DecodeAsn1)
RT_MANGLER(RTCrPkcs7SetOfSignedData_Compare)
+# define RTCrPkcs7SetOfSignedData_DecodeAsn1
RT_MANGLER(RTCrPkcs7SetOfSignedData_DecodeAsn1)
+# define RTCrPkcs7SetOfSignedData_Delete RT_MANGLER(RTCrPkcs7SetOfSignedData_Delete)
+# define RTCrPkcs7SetOfSignedData_Enum RT_MANGLER(RTCrPkcs7SetOfSignedData_Enum)
+# define RTCrPkcs7SetOfSignedData_Init RT_MANGLER(RTCrPkcs7SetOfSignedData_Init)
+# define RTCrPkixSignatureCreateByObjId RT_MANGLER(RTCrPkixSignatureCreateByObjId)
+# define RTCrPkixSignatureCreateByObjIdString
RT_MANGLER(RTCrPkixSignatureCreateByObjIdString)
+# define RTCrPkixSignatureCreate RT_MANGLER(RTCrPkixSignatureCreate)
+# define RTCrPkixSignatureRelease RT_MANGLER(RTCrPkixSignatureRelease)
+# define RTCrPkixSignatureRetain RT_MANGLER(RTCrPkixSignatureRetain)
+# define RTCrPkixSignatureSign RT_MANGLER(RTCrPkixSignatureSign)
+# define RTCrPkixSignatureVerify RT_MANGLER(RTCrPkixSignatureVerify)
+# define RTCrPkixSignatureVerifyBitString RT_MANGLER(RTCrPkixSignatureVerifyBitString)
+# define RTCrPkixSignatureVerifyOctetString RT_MANGLER(RTCrPkixSignatureVerifyOctetString)
+# define RTCrPkixGetCiperOidFromSignatureAlgorithm
RT_MANGLER(RTCrPkixGetCiperOidFromSignatureAlgorithm)
+# define RTCrPkixPubKeyVerifySignature RT_MANGLER(RTCrPkixPubKeyVerifySignature)
+# define RTCrPkixPubKeyVerifySignedDigest RT_MANGLER(RTCrPkixPubKeyVerifySignedDigest)
+# define RTCrSpcAttributeTypeAndOptionalValue_DecodeAsn1
RT_MANGLER(RTCrSpcAttributeTypeAndOptionalValue_DecodeAsn1)
+# define RTCrSpcIndirectDataContent_DecodeAsn1
RT_MANGLER(RTCrSpcIndirectDataContent_DecodeAsn1)
+# define RTCrSpcLink_DecodeAsn1
RT_MANGLER(RTCrSpcLink_DecodeAsn1)
+# define RTCrSpcPeImageData_DecodeAsn1
RT_MANGLER(RTCrSpcPeImageData_DecodeAsn1)
+# define RTCrSpcSerializedObjectAttribute_DecodeAsn1
RT_MANGLER(RTCrSpcSerializedObjectAttribute_DecodeAsn1)
+# define RTCrSpcSerializedObjectAttributes_DecodeAsn1
RT_MANGLER(RTCrSpcSerializedObjectAttributes_DecodeAsn1)
+# define RTCrSpcSerializedObject_DecodeAsn1
RT_MANGLER(RTCrSpcSerializedObject_DecodeAsn1)
+# define RTCrSpcSerializedPageHashes_DecodeAsn1
RT_MANGLER(RTCrSpcSerializedPageHashes_DecodeAsn1)
+# define RTCrSpcString_DecodeAsn1
RT_MANGLER(RTCrSpcString_DecodeAsn1)
+# define RTCrSpcAttributeTypeAndOptionalValue_Compare
RT_MANGLER(RTCrSpcAttributeTypeAndOptionalValue_Compare)
+# define RTCrSpcAttributeTypeAndOptionalValue_Delete
RT_MANGLER(RTCrSpcAttributeTypeAndOptionalValue_Delete)
+# define RTCrSpcAttributeTypeAndOptionalValue_Enum
RT_MANGLER(RTCrSpcAttributeTypeAndOptionalValue_Enum)
+# define RTCrSpcIndirectDataContent_Compare
RT_MANGLER(RTCrSpcIndirectDataContent_Compare)
+# define RTCrSpcIndirectDataContent_Delete
RT_MANGLER(RTCrSpcIndirectDataContent_Delete)
+# define RTCrSpcIndirectDataContent_Enum
RT_MANGLER(RTCrSpcIndirectDataContent_Enum)
+# define RTCrSpcIndirectDataContent_GetPeImageObjAttrib
RT_MANGLER(RTCrSpcIndirectDataContent_GetPeImageObjAttrib)
+# define RTCrSpcLink_Compare
RT_MANGLER(RTCrSpcLink_Compare)
++ define RTCrSpcLink_Delete RT_MANGLER(RTCrSpcLink_Delete)
++ define RTCrSpcLink_Enum RT_MANGLER(RTCrSpcLink_Enum)
++ define RTCrSpcPeImageData_Compare RT_MANGLER(RTCrSpcPeImageData_Compare)
++ define RTCrSpcPeImageData_Delete RT_MANGLER(RTCrSpcPeImageData_Delete)
++ define RTCrSpcPeImageData_Enum RT_MANGLER(RTCrSpcPeImageData_Enum)
++ define RTCrSpcSerializedObjectAttribute_Compare
RT_MANGLER(RTCrSpcSerializedObjectAttribute_Compare)
++ define RTCrSpcSerializedObjectAttribute_Delete
RT_MANGLER(RTCrSpcSerializedObjectAttribute_Delete)
++ define RTCrSpcSerializedObjectAttribute_Enum
RT_MANGLER(RTCrSpcSerializedObjectAttribute_Enum)
++ define RTCrSpcSerializedObjectAttributes_Compare
RT_MANGLER(RTCrSpcSerializedObjectAttributes_Compare)
++ define RTCrSpcSerializedObjectAttributes_Delete
RT_MANGLER(RTCrSpcSerializedObjectAttributes_Delete)
++ define RTCrSpcSerializedObjectAttributes_Enum
RT_MANGLER(RTCrSpcSerializedObjectAttributes_Enum)
++ define RTCrSpcSerializedObject_Compare
RT_MANGLER(RTCrSpcSerializedObject_Compare)
++ define RTCrSpcSerializedObject_Delete
RT_MANGLER(RTCrSpcSerializedObject_Delete)
++ define RTCrSpcSerializedObject_Enum
RT_MANGLER(RTCrSpcSerializedObject_Enum)
++ define RTCrSpcSerializedPageHashes_Compare
RT_MANGLER(RTCrSpcSerializedPageHashes_Compare)
++ define RTCrSpcSerializedPageHashes_Delete
RT_MANGLER(RTCrSpcSerializedPageHashes_Delete)
++ define RTCrSpcSerializedPageHashes_Enum
RT_MANGLER(RTCrSpcSerializedPageHashes_Enum)
++ define RTCrSpcString_Compare
RT_MANGLER(RTCrSpcString_Compare)
++ define RTCrSpcString_Delete
RT_MANGLER(RTCrSpcString_Delete)
++ define RTCrSpcString_Enum
RT_MANGLER(RTCrSpcString_Enum)
++ define RTCrSpcAttributeTypeAndOptionalValue_Clone
RT_MANGLER(RTCrSpcAttributeTypeAndOptionalValue_Clone)
++ define RTCrSpcAttributeTypeAndOptionalValue_Init
RT_MANGLER(RTCrSpcAttributeTypeAndOptionalValue_Init)
++ define RTCrSpcIndirectDataContent_Clone
RT_MANGLER(RTCrSpcIndirectDataContent_Clone)
++ define RTCrSpcIndirectDataContent_Init
RT_MANGLER(RTCrSpcIndirectDataContent_Init)
++ define RTCrSpcLink_Clone
RT_MANGLER(RTCrSpcLink_Clone)
++ define RTCrSpcLink_Init
RT_MANGLER(RTCrSpcLink_Init)
++ define RTCrSpcPeImageData_Clone
RT_MANGLER(RTCrSpcPeImageData_Clone)
++ define RTCrSpcPeImageData_Init
RT_MANGLER(RTCrSpcPeImageData_Init)
++ define RTCrSpcSerializedObjectAttribute_Clone
RT_MANGLER(RTCrSpcSerializedObjectAttribute_Clone)
++ define RTCrSpcSerializedObjectAttribute_Init
RT_MANGLER(RTCrSpcSerializedObjectAttribute_Init)
++ define RTCrSpcSerializedObjectAttributes_Clone
RT_MANGLER(RTCrSpcSerializedObjectAttributes_Clone)
++ define RTCrSpcSerializedObjectAttributes_Init
RT_MANGLER(RTCrSpcSerializedObjectAttributes_Init)
++ define RTCrSpcSerializedObject_Clone
RT_MANGLER(RTCrSpcSerializedObject_Clone)
++ define RTCrSpcSerializedObject_Init
RT_MANGLER(RTCrSpcSerializedObject_Init)
++ define RTCrSpcSerializedPageHashes_Clone
RT_MANGLER(RTCrSpcSerializedPageHashes_Clone)
RT_MANGLER(RTCrX509NameConstraints_DecodeAsn1)
+# define RTCrX509Name_DecodeAsn1                  RT_MANGLER(RTCrX509Name_DecodeAsn1)
+# define RTCrX509OldAuthorityKeyIdentifier_DecodeAsn1
RT_MANGLER(RTCrX509OldAuthorityKeyIdentifier_DecodeAsn1)
+# define RTCrX509OtherName_DecodeAsn1            RT_MANGLER(RTCrX509OtherName_DecodeAsn1)
+# define RTCrX509PolicyConstraints_DecodeAsn1
RT_MANGLER(RTCrX509PolicyConstraints_DecodeAsn1)
+# define RTCrX509PolicyInformation_DecodeAsn1
RT_MANGLER(RTCrX509PolicyInformation_DecodeAsn1)
+# define RTCrX509PolicyMapping_DecodeAsn1
RT_MANGLER(RTCrX509PolicyMapping_DecodeAsn1)
+# define RTCrX509PolicyMappings_DecodeAsn1
RT_MANGLER(RTCrX509PolicyMappings_DecodeAsn1)
+# define RTCrX509PolicyQualifierInfo_DecodeAsn1
RT_MANGLER(RTCrX509PolicyQualifierInfo_DecodeAsn1)
+# define RTCrX509PolicyQualifierInfos_DecodeAsn1
RT_MANGLER(RTCrX509PolicyQualifierInfos_DecodeAsn1)
+# define RTCrX509SubjectPublicKeyInfo_DecodeAsn1
RT_MANGLER(RTCrX509SubjectPublicKeyInfo_DecodeAsn1)
+# define RTCrX509TbsCertificate_DecodeAsn1        RT_MANGLER(RTCrX509TbsCertificate_DecodeAsn1)
+# define RTCrX509Validity_DecodeAsn1             RT_MANGLER(RTCrX509Validity_DecodeAsn1)
+# define RTCrX509CertPathsBuild                  RT_MANGLER(RTCrX509CertPathsBuild)
+# define RTCrX509CertPathsCreate                 RT_MANGLER(RTCrX509CertPathsCreate)
+# define RTCrX509CertPathsCreateEx               RT_MANGLER(RTCrX509CertPathsCreateEx)
+# define RTCrX509CertPathsDumpAll                RT_MANGLER(RTCrX509CertPathsDumpAll)
+# define RTCrX509CertPathsDumpOne                RT_MANGLER(RTCrX509CertPathsDumpOne)
+# define RTCrX509CertPathsGetPathCount           RT_MANGLER(RTCrX509CertPathsGetPathCount)
+# define RTCrX509CertPathsGetPathLength          RT_MANGLER(RTCrX509CertPathsGetPathLength)
+# define RTCrX509CertPathsGetPathNodeCert        RT_MANGLER(RTCrX509CertPathsGetPathNodeCert)
+# define RTCrX509CertPathsGetPathVerifyResult    RT_MANGLER(RTCrX509CertPathsGetPathVerifyResult)
+# define RTCrX509CertPathsQueryPathInfo          RT_MANGLER(RTCrX509CertPathsQueryPathInfo)
+# define RTCrX509CertPathsRelease                RT_MANGLER(RTCrX509CertPathsRelease)
+# define RTCrX509CertPathsRetain                 RT_MANGLER(RTCrX509CertPathsRetain)
+# define RTCrX509CertPathsSetTrustedStore        RT_MANGLER(RTCrX509CertPathsSetTrustedStore)
+# define RTCrX509CertPathsSetUntrustedArray      RT_MANGLER(RTCrX509CertPathsSetUntrustedArray)
+# define RTCrX509CertPathsSetUntrustedSet        RT_MANGLER(RTCrX509CertPathsSetUntrustedSet)
+# define RTCrX509CertPathsSetValidTime           RT_MANGLER(RTCrX509CertPathsSetValidTime)
+# define RTCrX509CertPathsSetValidTimeSpec       RT_MANGLER(RTCrX509CertPathsSetValidTimeSpec)
+# define RTCrX509AlgorithmIdentifier_Compare     RT_MANGLER(RTCrX509AlgorithmIdentifier_Compare)
RT_MANGLER(RTCrX509AlgorithmIdentifier_Compare)
 +# define RTCrX509AlgorithmIdentifier_CompareDigestAndEncryptedDigest
RT_MANGLER(RTCrX509AlgorithmIdentifier_CompareDigestAndEncryptedDigest)
 +# define RTCrX509AlgorithmIdentifier_CompareDigestOidAndEncryptedDigestOid
RT_MANGLER(RTCrX509AlgorithmIdentifier_CompareDigestOidAndEncryptedDigestOid)
 +# define RTCrX509AlgorithmIdentifier_CompareWithString
RT_MANGLER(RTCrX509AlgorithmIdentifier_CompareWithString)
 +# define RTCrX509AlgorithmIdentifier_Delete             RT_MANGLER(RTCrX509AlgorithmIdentifier_Delete)
 +# define RTCrX509AlgorithmIdentifier_Enum               RT_MANGLER(RTCrX509AlgorithmIdentifier_Enum)
 +# define RTCrX509AlgorithmIdentifier_QueryDigestSize
RT_MANGLER(RTCrX509AlgorithmIdentifier_QueryDigestSize)
 +# define RTCrX509AlgorithmIdentifier_QueryDigestType
RT_MANGLER(RTCrX509AlgorithmIdentifier_QueryDigestType)
 +# define RTCrX509AlgorithmIdentifiers_Compare
RT_MANGLER(RTCrX509AlgorithmIdentifiers_Compare)
 +# define RTCrX509AlgorithmIdentifiers_Delete            RT_MANGLER(RTCrX509AlgorithmIdentifiers_Delete)
 +# define RTCrX509AlgorithmIdentifiers_Enum              RT_MANGLER(RTCrX509AlgorithmIdentifiers_Enum)
 +# define RTCrX509AttributeTypeAndValue_Compare
RT_MANGLER(RTCrX509AttributeTypeAndValue_Compare)
 +# define RTCrX509AttributeTypeAndValue_Delete
RT_MANGLER(RTCrX509AttributeTypeAndValue_Delete)
 +# define RTCrX509AttributeTypeAndValue_Equals
RT_MANGLER(RTCrX509AttributeTypeAndValue_Equals)
 +# define RTCrX509AttributeTypeAndValues_Compare
RT_MANGLER(RTCrX509AttributeTypeAndValues_Compare)
 +# define RTCrX509AttributeTypeAndValues_Delete
RT_MANGLER(RTCrX509AttributeTypeAndValues_Delete)
 +# define RTCrX509AttributeTypeAndValues_Equals
RT_MANGLER(RTCrX509AttributeTypeAndValues_Equals)
 +# define RTCrX509AuthorityKeyIdentifier_Compare
RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Compare)
 +# define RTCrX509AuthorityKeyIdentifier_Delete
RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Delete)
 +# define RTCrX509AuthorityKeyIdentifier_Equals
RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Equals)
 +# define RTCrX509AuthorityKeyIdentifier_Equals
RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Equals)
 +# define RTCrX509BasicConstraints_Compare               RT_MANGLER(RTCrX509BasicConstraints_Compare)
 +# define RTCrX509BasicConstraints_Delete                RT_MANGLER(RTCrX509BasicConstraints_Delete)
 +# define RTCrX509BasicConstraints_Equals
RT_MANGLER(RTCrX509BasicConstraints_Equals)
 +# define RTCrX509CertificatePolicies_Equals            RT_MANGLER(RTCrX509CertificatePolicies_Equals)
 +# define RTCrX509Certificate_Compare                    RT_MANGLER(RTCrX509Certificate_Compare)
 +# define RTCrX509Certificate_Delete                     RT_MANGLER(RTCrX509Certificate_Delete)
 +# define RTCrX509Certificate_Equals
RT_MANGLER(RTCrX509Certificate_Equals)
 +# define RTCrX509Certificate_IsSigned
RT_MANGLER(RTCrX509Certificate_IsSigned)
 +# define RTCrX509Certificate_MatchIssuerAndSerialNumber
RT_MANGLER(RTCrX509Certificate_MatchIssuerAndSerialNumber)
 +# define RTCrX509Certificate_MatchSubjectOrAltSubjectByRfc5280

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RT_MANGLE(RTCrX509Certificate_MatchSubjectOrAltSubjectByRfc5280)
+# define RTCrX509Certificates_Compare RT_MANGLE(RTCrX509Certificates_Compare)
+# define RTCrX509Certificates_Delete RT_MANGLE(RTCrX509Certificates_Delete)
+# define RTCrX509Certificates_Enum RT_MANGLE(RTCrX509Certificates_Enum)
+# define RTCrX509Certificates_FindByIssuerAndSerialNumber RT_MANGLE(RTCrX509Certificates_FindByIssuerAndSerialNumber)
+# define RTCrX509Extension_Compare RT_MANGLE(RTCrX509Extension_Compare)
+# define RTCrX509Extension_Delete RT_MANGLE(RTCrX509Extension_Delete)
+# define RTCrX509Extension_Enum RT_MANGLE(RTCrX509Extension_Enum)
+# define RTCrX509Extensions_Compare RT_MANGLE(RTCrX509Extensions_Compare)
+# define RTCrX509Extensions_Delete RT_MANGLE(RTCrX509Extensions_Delete)
+# define RTCrX509Extensions_Enum RT_MANGLE(RTCrX509Extensions_Enum)
+# define RTCrX509GeneralName_Compare RT_MANGLE(RTCrX509GeneralName_Compare)
+# define RTCrX509GeneralName_ConstraintMatch RT_MANGLE(RTCrX509GeneralName_ConstraintMatch)
+# define RTCrX509GeneralName_Delete RT_MANGLE(RTCrX509GeneralName_Delete)
+# define RTCrX509GeneralName_Enum RT_MANGLE(RTCrX509GeneralName_Enum)
+# define RTCrX509GeneralNames_Compare RT_MANGLE(RTCrX509GeneralNames_Compare)
+# define RTCrX509GeneralNames_Delete RT_MANGLE(RTCrX509GeneralNames_Delete)
+# define RTCrX509GeneralNames_Enum RT_MANGLE(RTCrX509GeneralNames_Enum)
+# define RTCrX509GeneralSubtree_Compare RT_MANGLE(RTCrX509GeneralSubtree_Compare)
+# define RTCrX509GeneralSubtree_ConstraintMatch RT_MANGLE(RTCrX509GeneralSubtree_ConstraintMatch)
+# define RTCrX509GeneralSubtree_Delete RT_MANGLE(RTCrX509GeneralSubtree_Delete)
+# define RTCrX509GeneralSubtree_Enum RT_MANGLE(RTCrX509GeneralSubtree_Enum)
+# define RTCrX509GeneralSubtrees_Compare RT_MANGLE(RTCrX509GeneralSubtrees_Compare)
+# define RTCrX509GeneralSubtrees_Delete RT_MANGLE(RTCrX509GeneralSubtrees_Delete)
+# define RTCrX509GeneralSubtrees_Enum RT_MANGLE(RTCrX509GeneralSubtrees_Enum)
+# define RTCrX509NameConstraints_Compare RT_MANGLE(RTCrX509NameConstraints_Compare)
+# define RTCrX509NameConstraints_Delete RT_MANGLE(RTCrX509NameConstraints_Delete)
+# define RTCrX509NameConstraints_Enum RT_MANGLE(RTCrX509NameConstraints_Enum)
+# define RTCrX509Name_Compare RT_MANGLE(RTCrX509Name_Compare)
+# define RTCrX509Name_ConstraintMatch RT_MANGLE(RTCrX509Name_ConstraintMatch)
+# define RTCrX509Name_Delete RT_MANGLE(RTCrX509Name_Delete)
+# define RTCrX509Name_Enum RT_MANGLE(RTCrX509Name_Enum)
+# define RTCrX509Name_FormatAsString RT_MANGLE(RTCrX509Name_FormatAsString)
+# define RTCrX509Name_MatchByRfc5280 RT_MANGLE(RTCrX509Name_MatchByRfc5280)
+# define RTCrX509Name_MatchWithString RT_MANGLE(RTCrX509Name_MatchWithString)
+# define RTCrX509Name_GetShortRdn RT_MANGLE(RTCrX509Name_GetShortRdn)
+# define RTCrX509OldAuthorityKeyIdentifier_Compare RT_MANGLE(RTCrX509OldAuthorityKeyIdentifier_Compare)
+# define RTCrX509OldAuthorityKeyIdentifier_Delete RT_MANGLE(RTCrX509OldAuthorityKeyIdentifier_Delete)
+# define RTCrX509OldAuthorityKeyIdentifier_Enum RT_MANGLE(RTCrX509OldAuthorityKeyIdentifier_Enum)
+# define RTCrX509OtherName_Compare RT_MANGLE(RTCrX509OtherName_Compare)
+# define RTCrX509OtherName_Delete RT_MANGLE(RTCrX509OtherName_Delete)
+# define RTCrX509OtherName_Enum RT_MANGLE(RTCrX509OtherName_Enum)
/* # define RTCrX509AttributeTypeAndValues_Clone
   RT_MANGLER(RTCrX509AttributeTypeAndValues_Clone)
*/
/* # define RTCrX509AttributeTypeAndValues_Init
   RT_MANGLER(RTCrX509AttributeTypeAndValues_Init)
*/
/* # define RTCrX509AuthorityKeyIdentifier_Clone
   RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Clone)
*/
/* # define RTCrX509AuthorityKeyIdentifier_Init
   RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Init)
*/
/* # define RTCrX509BasicConstraints_Clone
   RT_MANGLER(RTCrX509BasicConstraints_Clone)
*/
/* # define RTCrX509BasicConstraints_Init
   RT_MANGLER(RTCrX509BasicConstraints_Init)
*/
/* # define RTCrX509CertificatePolicies_Clone
   RT_MANGLER(RTCrX509CertificatePolicies_Clone)
*/
/* # define RTCrX509CertificatePolicies_Init
   RT_MANGLER(RTCrX509CertificatePolicies_Init)
*/
/* # define RTCrX509Certificate_Clone
   RT_MANGLER(RTCrX509Certificate_Clone)
*/
/* # define RTCrX509Certificate_Init
   RT_MANGLER(RTCrX509Certificate_Init)
*/
/* # define RTCrX509Certificates_Clone
   RT_MANGLER(RTCrX509Certificates_Clone)
*/
/* # define RTCrX509Certificates_Init
   RT_MANGLER(RTCrX509Certificates_Init)
*/
/* # define RTCrX509Extension_Clone
   RT_MANGLER(RTCrX509Extension_Clone)
*/
/* # define RTCrX509Extension_Init
   RT_MANGLER(RTCrX509Extension_Init)
*/
/* # define RTCrX509Extensions_Clone
   RT_MANGLER(RTCrX509Extensions_Clone)
*/
/* # define RTCrX509Extensions_Init
   RT_MANGLER(RTCrX509Extensions_Init)
*/
/* # define RTCrX509GeneralName_Clone
   RT_MANGLER(RTCrX509GeneralName_Clone)
*/
/* # define RTCrX509GeneralName_Init
   RT_MANGLER(RTCrX509GeneralName_Init)
*/
/* # define RTCrX509GeneralNames_Clone
   RT_MANGLER(RTCrX509GeneralNames_Clone)
*/
/* # define RTCrX509GeneralNames_Init
   RT_MANGLER(RTCrX509GeneralNames_Init)
*/
/* # define RTCrX509GeneralSubtree_Clone
   RT_MANGLER(RTCrX509GeneralSubtree_Clone)
*/
/* # define RTCrX509GeneralSubtree_Init
   RT_MANGLER(RTCrX509GeneralSubtree_Init)
*/
/* # define RTCrX509GeneralSubtrees_Clone
   RT_MANGLER(RTCrX509GeneralSubtrees_Clone)
*/
/* # define RTCrX509GeneralSubtrees_Init
   RT_MANGLER(RTCrX509GeneralSubtrees_Init)
*/
/* # define RTCrX509NameConstraints_Clone
   RT_MANGLER(RTCrX509NameConstraints_Clone)
*/
/* # define RTCrX509NameConstraints_Init
   RT_MANGLER(RTCrX509NameConstraints_Init)
*/
/* # define RTCrX509Name_RecodeAsUtf8
   RT_MANGLER(RTCrX509Name_RecodeAsUtf8)
*/
/* # define RTCrX509OldAuthorityKeyIdentifier_Clone
   RT_MANGLER(RTCrX509OldAuthorityKeyIdentifier_Clone)
*/
/* # define RTCrX509OldAuthorityKeyIdentifier_Init
   RT_MANGLER(RTCrX509OldAuthorityKeyIdentifier_Init)
*/
/* # define RTCrX509OtherName_Clone
   RT_MANGLER(RTCrX509OtherName_Clone)
*/
/* # define RTCrX509OtherName_Init
   RT_MANGLER(RTCrX509OtherName_Init)
*/
/* # define RTCrX509PolicyConstraints_Clone
   RT_MANGLER(RTCrX509PolicyConstraints_Clone)
*/
/* # define RTCrX509PolicyConstraints_Init
   RT_MANGLER(RTCrX509PolicyConstraints_Init)
*/
/* # define RTCrX509PolicyInformation_Clone
   RT_MANGLER(RTCrX509PolicyInformation_Clone)
*/
/* # define RTCrX509PolicyInformation_Init
   RT_MANGLER(RTCrX509PolicyInformation_Init)
*/
/* # define RTCrX509PolicyMapping_Clone
   RT_MANGLER(RTCrX509PolicyMapping_Clone)
*/
/* # define RTCrX509PolicyMapping_Init
   RT_MANGLER(RTCrX509PolicyMapping_Init)
*/
/* # define RTCrX509PolicyMappings_Clone
   RT_MANGLER(RTCrX509PolicyMappings_Clone)
*/
/* # define RTCrX509PolicyMappings_Init
   RT_MANGLER(RTCrX509PolicyMappings_Init)
*/
/* # define RTCrX509PolicyQualifierInfo_Clone
   RT_MANGLER(RTCrX509PolicyQualifierInfo_Clone)
*/
/* # define RTCrX509PolicyQualifierInfo_Init
   RT_MANGLER(RTCrX509PolicyQualifierInfo_Init)
+ define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+ define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+ define RTCrX509SubjectPublicKeyInfo_CheckSanity
RT_MANGLER(RTCrX509SubjectPublicKeyInfo_CheckSanity)
+ define RTCrX509TbsCertificate_CheckSanity
RT_MANGLER(RTCrX509TbsCertificate_CheckSanity)
+ define RTCrX509Validity_CheckSanity
RT_MANGLER(RTCrX509Validity_CheckSanity)
+ define RTCrX509Certificate_VerifySignature
RT_MANGLER(RTCrX509Certificate_VerifySignature)
+ define RTCrX509Certificate_VerifySignatureSelfSigned
RT_MANGLER(RTCrX509Certificate_VerifySignatureSelfSigned)
+ define RTCrTafCertPathControls_DecodeAsn1
RT_MANGLER(RTCrTafCertPathControls_DecodeAsn1)
+ define RTCrTafTrustAnchorChoice_DecodeAsn1
RT_MANGLER(RTCrTafTrustAnchorChoice_DecodeAsn1)
+ define RTCrTafTrustAnchorInfo_DecodeAsn1
RT_MANGLER(RTCrTafTrustAnchorInfo_DecodeAsn1)
+ define RTCrTafTrustAnchorList_DecodeAsn1
RT_MANGLER(RTCrTafTrustAnchorList_DecodeAsn1)
+ define RTCrTafCertPathControls_Compare
RT_MANGLER(RTCrTafCertPathControls_Compare)
+ define RTCrTafCertPathControls_Delete
RT_MANGLER(RTCrTafCertPathControls_Delete)
+ define RTCrTafCertPathControls_Enum
RT_MANGLER(RTCrTafCertPathControls_Enum)
+ define RTCrTafTrustAnchorChoice_Compare
RT_MANGLER(RTCrTafTrustAnchorChoice_Compare)
+ define RTCrTafTrustAnchorChoice_Delete
RT_MANGLER(RTCrTafTrustAnchorChoice_Delete)
+ define RTCrTafTrustAnchorChoice_Enum
RT_MANGLER(RTCrTafTrustAnchorChoice_Enum)
+ define RTCrTafTrustAnchorInfo_Compare
RT_MANGLER(RTCrTafTrustAnchorInfo_Compare)
+ define RTCrTafTrustAnchorInfo_Delete
RT_MANGLER(RTCrTafTrustAnchorInfo_Delete)
+ define RTCrTafTrustAnchorInfo_Enum
RT_MANGLER(RTCrTafTrustAnchorInfo_Enum)
+ define RTCrTafTrustAnchorList_Compare
RT_MANGLER(RTCrTafTrustAnchorList_Compare)
+ define RTCrTafTrustAnchorList_Delete
RT_MANGLER(RTCrTafTrustAnchorList_Delete)
+ define RTCrTafTrustAnchorList_Enum
RT_MANGLER(RTCrTafTrustAnchorList_Enum)
+ define RTCrTafCertPathControls_Clone
RT_MANGLER(RTCrTafCertPathControls_Clone)
+ define RTCrTafCertPathControls_Init
RT_MANGLER(RTCrTafCertPathControls_Init)
+ define RTCrTafTrustAnchorChoice_Clone
RT_MANGLER(RTCrTafTrustAnchorChoice_Clone)
+ define RTCrTafTrustAnchorChoice_Init
RT_MANGLER(RTCrTafTrustAnchorChoice_Init)
+ define RTCrTafTrustAnchorInfo_Clone
RT_MANGLER(RTCrTafTrustAnchorInfo_Clone)
+ define RTCrTafTrustAnchorInfo_Init
RT_MANGLER(RTCrTafTrustAnchorInfo_Init)
+ define RTCrTafTrustAnchorList_Clone
RT_MANGLER(RTCrTafTrustAnchorList_Clone)
+ define RTCrTafTrustAnchorList_Init
RT_MANGLER(RTCrTafTrustAnchorList_Init)
+ define RTCrTafCertPathControls_CheckSanity
RT_MANGLER(RTCrTafCertPathControls_CheckSanity)
+ define RTCrTafTrustAnchorChoice_CheckSanity
RT_MANGLER(RTCrTafTrustAnchorChoice_CheckSanity)
+ define RTCrTafTrustAnchorInfo_CheckSanity
RT_MANGLER(RTCrTafTrustAnchorInfo_CheckSanity)
+ define RTCrTafTrustAnchorList_CheckSanity
RT_MANGLER(RTCrTafTrustAnchorList_CheckSanity)
+ define RTCrTspAccuracy_CheckSanity
RT_MANGLER(RTCrTspAccuracy_CheckSanity)
+ define RTCrTspAccuracy_Clone
RT_MANGLER(RTCrTspAccuracy_Clone)
# define RTCrStoreCertAddWantedFromFishingExpedition
RT_MANGLER(RTCrStoreCertAddWantedFromFishingExpedition)

# define RTCrStoreCertCheckWanted
RT_MANGLER(RTCrStoreCertCheckWanted)

# define RTCrStoreCertExportAsPem
RT_MANGLER(RTCrStoreCertExportAsPem)

# define RTErrInfoAdd
RT_MANGLER(RTErrInfoAdd)

# define RTErrInfoAddF
RT_MANGLER(RTErrInfoAddF)

# define RTErrInfoAddV
RT_MANGLER(RTErrInfoAddV)

# define RTLdrHashImage
RT_MANGLER(RTLdrHashImage)

# define RTLdrOpenWithReader
RT_MANGLER(RTLdrOpenWithReader)

# define RTLdrQueryPropEx
RT_MANGLER(RTLdrQueryPropEx)

# define RTLdrVerifySignature
RT_MANGLER(RTLdrVerifySignature)

# define RTBigNumAdd
RT_MANGLER(RTBigNumAdd)

# define RTBigNumAssign
RT_MANGLER(RTBigNumAssign)

# define RTBigNumBitWidth
RT_MANGLER(RTBigNumBitWidth)

# define RTBigNumByteWidth
RT_MANGLER(RTBigNumByteWidth)

# define RTBigNumClone
RT_MANGLER(RTBigNumClone)

# define RTBigNumCompare
RT_MANGLER(RTBigNumCompare)

# define RTBigNumCompareWithS64
RT_MANGLER(RTBigNumCompareWithS64)

# define RTBigNumCompareWithU64
RT_MANGLER(RTBigNumCompareWithU64)

# define RTBigNumDestroy
RT_MANGLER(RTBigNumDestroy)

# define RTBigNumDivide
RT_MANGLER(RTBigNumDivide)

# define RTBigNumDivideKnuth
RT_MANGLER(RTBigNumDivideKnuth)

# define RTBigNumDivideLong
RT_MANGLER(RTBigNumDivideLong)

# define RTBigNumExponentiate
RT_MANGLER(RTBigNumExponentiate)

# define RTBigNumInit
RT_MANGLER(RTBigNumInit)

# define RTBigNumInitZero
RT_MANGLER(RTBigNumInitZero)

# define RTBigNumModExp
RT_MANGLER(RTBigNumModExp)

# define RTBigNumModulo
RT_MANGLER(RTBigNumModulo)

# define RTBigNumMultiply
RT_MANGLER(RTBigNumMultiply)

# define RTBigNumNegate
RT_MANGLER(RTBigNumNegate)

# define RTBigNumNegateThis
RT_MANGLER(RTBigNumNegateThis)

# define RTBigNumShiftLeft
RT_MANGLER(RTBigNumShiftLeft)

# define RTBigNumShiftRight
RT_MANGLER(RTBigNumShiftRight)

# define RTBigNumSubtract
RT_MANGLER(RTBigNumSubtract)

# define RTBigNumToBytesBigEndian
RT_MANGLER(RTBigNumToBytesBigEndian)

# define RTUInt128MulByU64
RT_MANGLER(RTUInt128MulByU64)

# define RTUtf16Copy
RT_MANGLER(RTUtf16Copy)

# define RTUtf16CopyAscii
RT_MANGLER(RTUtf16CopyAscii)

# define RTUtf16Cat
RT_MANGLER(RTUtf16Cat)

# define RTUtf16CatAscii
RT_MANGLER(RTUtf16CatAscii)

# define RTUtf16End
RT_MANGLER(RTUtf16End)

# define RTUtf16ICmpAscii
RT_MANGLER(RTUtf16ICmpAscii)

# define RTUtf16NLen
RT_MANGLER(RTUtf16NLen)

# define RTUtf16NLenEx
RT_MANGLER(RTUtf16NLenEx)

# define RTUtf16PrintHexBytes
RT_MANGLER(RTUtf16PrintHexBytes)

# define RTMemSaferAllocZExTag
RT_MANGLER(RTMemSaferAllocZExTag)
/* Stable variables (alphabetical order): */

/* os2 win solaris */
+# define g_aRTUniFlagsRanges
+RT_MANGLER(g_aRTUniFlagsRanges)
+# define g_aRTUniLowerRanges
+RT_MANGLER(g_aRTUniLowerRanges)
+# define g_aRTUniUpperRanges
+RT_MANGLER(g_aRTUniUpperRanges)
+# define g_fRTAlignmentChecks
+RT_MANGLER(g_fRTAlignmentChecks)
+# define g_hKrnlDbgInfo
+RT_MANGLER(g_hKrnlDbgInfo) /* solaris */
+# define g_pStdErr
+RT_MANGLER(g_pStdErr)
+# define g_pStdIn
+RT_MANGLER(g_pStdIn)
+# define g_pStdOut
+RT_MANGLER(g_pStdOut)
+# define g_pszRTAssertExpr
+RT_MANGLER(g_pszRTAssertExpr)
+# define g_pszRTAssertFile
+RT_MANGLER(g_pszRTAssertFile)
+# define g_pszRTAssertFunction
+RT_MANGLER(g_pszRTAssertFunction)
+# define g_szRTAssertMsg1
+RT_MANGLER(g_szRTAssertMsg1)
+# define g_szRTAssertMsg2
+RT_MANGLER(g_szRTAssertMsg2)
+# define g_u32RTAssertLine
+RT_MANGLER(g_u32RTAssertLine)
+
+/* sort/merge into the above later: */
+# define g_RTAsn1Time_Vtable
+RT_MANGLER(g_RTAsn1Time_Vtable)
+# define g_RTAsn1String_Vtable
+RT_MANGLER(g_RTAsn1String_Vtable)
+# define g_RTAsn1OctetString_Vtable
+RT_MANGLER(g_RTAsn1OctetString_Vtable)
+# define g_RTAsn1ObjId_Vtable
+RT_MANGLER(g_RTAsn1ObjId_Vtable)
+# define g_RTAsn1Null_Vtable
+RT_MANGLER(g_RTAsn1Null_Vtable)
+# define g_RTAsn1Integer_Vtable
+RT_MANGLER(g_RTAsn1Integer_Vtable)
+# define g_RTAsn1Core_Vtable
+RT_MANGLER(g_RTAsn1Core_Vtable)
+# define g_RTAsn1Boolean_Vtable
+RT_MANGLER(g_RTAsn1Boolean_Vtable)
+# define g_RTAsn1BitString_Vtable
+RT_MANGLER(g_RTAsn1BitString_Vtable)
+# define g_RTAsn1DefaultAllocator
+RT_MANGLER(g_RTAsn1DefaultAllocator)
+# define g_RTAsn1EFenceAllocator
+RT_MANGLER(g_RTAsn1EFenceAllocator)
+# define g_aRTCrX509CertificateMarkers
+RT_MANGLER(g_aRTCrX509CertificateMarkers)
+# define g_cRTCrX509CertificateMarkers
+RT_MANGLER(g_cRTCrX509CertificateMarkers)
+
+if 0 /* Disabled for now as I'm not sure the assembler supports mangling yet. */
+# define g_abRTZeroPage
+RT_MANGLER(g_abRTZeroPage)
+# define g_abRTZero4K
+RT_MANGLER(g_abRTZero4K)
+# define g_abRTZero8K
+RT_MANGLER(g_abRTZero8K)
+# define g_abRTZero16K
+RT_MANGLER(g_abRTZero16K)
+# define g_abRTZero32K
+RT_MANGLER(g_abRTZero32K)
+# define g_abRTZero64K
+RT_MANGLER(g_abRTZero64K)
+
endif
+
+
+/*
 + * Unstable functions (alphabetical order):
 + */
+/**
+ * todo the list is incomplete! See the .def files + libraries. */
+ +
+ +
+/*
 + * Unstable variables (alphabetical order):
+ */
+ /* none */
+
+#endif /* !DOXYGEN_RUNNING */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/mem.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/mem.h
@@ -0,0 +1,987 @@
+/** @file
+ * IPRT - Memory Management and Manipulation.
+ */
+
+#ifndef ___iprt_mem_h
+#define ___iprt_mem_h

+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+/* This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+/* The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+/* You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_mem_h
+#define ___iprt_mem_h

+#+#+include <iprt/cdefs.h>
+#+#+include <iprt/types.h>

+#+#+ifndef IN_RC
+#+#+error "There are no RTMem APIs available Guest Context!"
+#+#+endif

+
+/** @defgroup grp_rt_mem RTMem - Memory Management and Manipulation
+ * @ingroup grp_rt
+ * @{
+ */
+
+RT_C_DECLS_BEGIN
+
+/** @def RTMEM_ALIGNMENT
+ * The alignment of the memory blocks returned by RTMemAlloc(), RTMemAllocZ(),
+ * RTMemRealloc(), RTMemTmpAlloc() and RTMemTmpAllocZ() for allocations greater
+ * than RTMEM_ALIGNMENT.
+ */
+/** @def RTMEM_TAG
+ * The default allocation tag used by the RTMem allocation APIs.
+ */
+/** @name Allocate temporary memory.
+ * @{ */
+/** Allocates temporary memory with default tag.
+ */
+/** Temporary memory blocks are used for not too large memory blocks which
+ * are believed not to stick around for too long. Using this API instead
+ * of RTMemAlloc() not only gives the heap manager room for optimization
+ * but makes the code easier to read.
+ */
+/** @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
+#define RTMemTmpAlloc(cb) RTMemTmpAllocTag((cb), RTMEM_TAG)
+
+/**
+ * Allocates temporary memory with custom tag.
+ *
+ * Temporary memory blocks are used for not too large memory blocks which
+ * are believed not to stick around for too long. Using this API instead
+ * of RTMemAlloc() not only gives the heap manager room for optimization
+ * but makes the code easier to read.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemTmpAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Allocates zero'd temporary memory with default tag.
+ *
+ * Same as RTMemTmpAlloc() but the memory will be zero'd.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
 +#define RTMemTmpAllocZ(cb) RTMemTmpAllocZTag((cb), RTMEM_TAG)
+
+/**
+ * Allocates zero'd temporary memory with custom tag.
+ *
+ * Same as RTMemTmpAlloc() but the memory will be zero'd.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemTmpAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Free temporary memory.
+ *
+ * @param pv Pointer to memory block.
+ */
+RTDECL(void) RTMemTmpFree(void *pv) RT_NO_THROW_PROTO;
+
+/** @} */
+
+/**
+ * Allocates memory with default tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
+#define RTMemAlloc(cb) RTMemAllocTag((cb), RTMEM_TAG)
+
+/**
+ * Allocates memory with custom tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Allocates zero'd memory with default tag.
+ *
+ * Instead of memset(pv, 0, sizeof()) use this when you want zero'd
+ * memory. This keeps the code smaller and the heap can skip the memset
+ * in about 0.42% of calls :-).
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
+#define RTMemAllocZ(cb) RTMemAllocZTag((cb), RTMEM_TAG)
+
+/**
+ * Allocates zero'd memory with custom tag.
+ *
+ * Instead of memset(pv, 0, sizeof()) use this when you want zero'd
+ * memory. This keeps the code smaller and the heap can skip the memset
+ * in about 0.42% of calls :-).
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
/* RTDECL(void *) RTMemAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
 * +
 * +  * Wrapper around RTMemAlloc for automatically aligning variable sized
 * +  * allocations so that the various electric fence heaps works correctly.
 * + *
 * +  * @returns See RTMemAlloc.
 * +  * @param cbUnaligned The unaligned size.
 * + */
+#define RTMemAllocVar(cbUnaligned)      RTMemAllocVarTag((cbUnaligned), RTMEM_TAG)
 +
+/**
 * +  * Wrapper around RTMemAllocTag for automatically aligning variable sized
 * +  * allocations so that the various electric fence heaps works correctly.
 * + *
 * +  * @returns See RTMemAlloc.
 * +  * @param cbUnaligned The unaligned size.
 * +  * @param pszTag Allocation tag used for statistics and such.
 * + */
+RTDECL(void *) RTMemAllocVarTag(size_t cbUnaligned, const char *pszTag) RT_NO_THROW_PROTO;
 +
+/**
 * +  * Wrapper around RTMemAllocZ for automatically aligning variable sized
 * +  * allocations so that the various electric fence heaps works correctly.
 * + *
 * +  * @returns See RTMemAllocZ.
 * +  * @param cbUnaligned The unaligned size.
 * + */
+#define RTMemAllocZVar(cbUnaligned)     RTMemAllocZVarTag((cbUnaligned), RTMEM_TAG)
 +
+/**
 * +  * Wrapper around RTMemAllocZTag for automatically aligning variable sized
 * +  * allocations so that the various electric fence heaps works correctly.
 * + *
 * +  * @returns See RTMemAllocZ.
 * +  * @param cbUnaligned The unaligned size.
 * +  * @param pszTag Allocation tag used for statistics and such.
 * + */
+RTDECL(void *) RTMemAllocZVarTag(size_t cbUnaligned, const char *pszTag) RT_NO_THROWPROTO;
 +
+/**
 * +  * Duplicates a chunk of memory into a new heap block (default tag).
 * + *
 * +  * @returns New heap block with the duplicate data.
 * +  * @returns NULL if we're out of memory.
 * +  * @param pvSrc The memory to duplicate.
 * +  * @param cb The amount of memory to duplicate.
#define RTMemDup(pvSrc, cb)             RTMemDupTag((pvSrc), (cb), RTMEM_TAG)
+
+/**
+ * Duplicates a chunk of memory into a new heap block (custom tag).
+ *
+ * @returns New heap block with the duplicate data.
+ * @returns NULL if we're out of memory.
+ * @param   pvSrc   The memory to duplicate.
+ * @param   cb      The amount of memory to duplicate.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemDupTag(const void *pvSrc, size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Duplicates a chunk of memory into a new heap block with some additional
+ * zeroed memory (default tag).
+ *
+ * @returns New heap block with the duplicate data.
+ * @returns NULL if we're out of memory.
+ * @param   pvSrc   The memory to duplicate.
+ * @param   cb       The amount of memory to duplicate.
+ * @param   cbExtra  The amount of extra memory to allocate and zero.
+ */
+#define RTMemDupEx(pvSrc, cb, cbExtra)   RTMemDupExTag((pvSrc), (cb), (cbExtra), RTMEM_TAG)
+
+/**
+ * Duplicates a chunk of memory into a new heap block with some additional
+ * zeroed memory (default tag).
+ *
+ * @returns New heap block with the duplicate data.
+ * @returns NULL if we're out of memory.
+ * @param   pvSrc   The memory to duplicate.
+ * @param   cb       The amount of memory to duplicate.
+ * @param   cbExtra  The amount of extra memory to allocate and zero.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemDupExTag(const void *pvSrc, size_t cb, size_t cbExtra, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Reallocates memory with default tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param   pvOld   The memory block to reallocate.
+ * @param   cbNew   The new block size (in bytes).
+ */
+\#define RTMemRealloc(pvOld, cbNew) RTMemReallocTag((pvOld), (cbNew), RTMEM_TAG)
+
+/**
+ * Reallocates memory with custom tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param pvOld The memory block to reallocate.
+ * @param cbNew The new block size (in bytes).
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemReallocTag(void *pvOld, size_t cbNew, const char *pszTag)
RT_NO_THROW_PROTO;
+
+/**
+ * Frees memory.
+ *
+ * @param pv Pointer to memory block.
+ */
+RTDECL(void) RTMemFree(void *pv) RT_NO_THROW_PROTO;
+
+/** @name RTR0MemAllocEx and RTR0MemAllocExTag flags. */
+/** The returned memory should be zeroed. */
+\#define RTMEMALLOCEX_FLAGS_ZEROED RT_BIT(0)
+/** It must be load code into the returned memory block and execute it. */
+\#define RTMEMALLOCEX_FLAGS_EXEC RT_BIT(1)
+/** Allocation from any context. Will return VERR_NOT_SUPPORTED if not supported. */
+\#define RTMEMALLOCEX_FLAGS_ANY_CTX_ALLOC RT_BIT(2)
+/** Allocate the memory such that it can be freed from any context. Will return VERR_NOT_SUPPORTED if not supported. */
+\#define RTMEMALLOCEX_FLAGS_ANY_CTX_FREE RT_BIT(3)
+/** Allocate and free from any context. Will return VERR_NOT_SUPPORTED if not supported. */
+\#define RTMEMALLOCEX_FLAGS_ANY_CTX (RTMEMALLOCEX_FLAGS_ANY_CTX_ALLOC | RTMEMALLOCEX_FLAGS_ANY_CTX_FREE)
+/** Reachable by 16-bit address. Will return VERR_NOT_SUPPORTED if not supported. */
+\#define RTMEMALLOCEX_FLAGS_16BIT_REACH RT_BIT(4)
+/** Reachable by 32-bit address. Will return VERR_NOT_SUPPORTED if not supported. */
+\#define RTMEMALLOCEX_FLAGS_32BIT_REACH RT_BIT(5)
+/** Mask of valid flags. */
+\#define RTMEMALLOCEX_FLAGS_VALID_MASK UINT32_C(0x0000003F)
+/** Mask of valid flags for ring-0. */
### RTMEMALLOCEX_FLAGS_VALID_MASK_R0

```c
#define RTMEMALLOCEX_FLAGS_VALID_MASK_R0 UINT32_C(0x0000000f)
```

```c
+/** @} */
+*/
+ * Extended heap allocation API, default tag.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_NO_MEMORY if we're out of memory.
+ * @retval VERR_NO_EXEC_MEMORY if we're out of executable memory.
+ * @retval VERR_NOT_SUPPORTED if any of the specified flags are unsupported.
+ *
+ * @param cb The amount of memory to allocate.
+ * @param cbAlignment The alignment requirements. Use 0 to indicate
+ *  default alignment.
+ * @param fFlags A combination of the RTMEMALLOCEX_FLAGS_XXX
+ *  defines.
+ * @param ppv Where to return the memory.
+ */
```

```c
#define RTMemAllocEx(cb, cbAlignment, fFlags, ppv) RTMemAllocExTag((cb), (cbAlignment), (fFlags), RTMEM_TAG, (ppv))
```

#### RTMemAllocExTag

```c
+/**
+ * Extended heap allocation API, custom tag.
+ * Depending on the implementation, using this function may add extra overhead,
+ * so use the simpler APIs where ever possible.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_NO_MEMORY if we're out of memory.
+ * @retval VERR_NO_EXEC_MEMORY if we're out of executable memory.
+ * @retval VERR_NOT_SUPPORTED if any of the specified flags are unsupported.
+ *
+ * @param cb The amount of memory to allocate.
+ * @param cbAlignment The alignment requirements. Use 0 to indicate
+ *  default alignment.
+ * @param fFlags A combination of the RTMEMALLOCEX_FLAGS_XXX
+ *  defines.
+ * @param pszTag The tag.
+ * @param ppv Where to return the memory.
+ */
```

```c
RTDECL(int) RTMemAllocExTag(size_t cb, size_t cbAlignment, uint32_t fFlags, const char *pszTag, void **ppv) RT_NO_THROW_PROTO;
```

### RTM_FREE

```c
+/**
+ * For freeing memory allocated by RTMemAllocEx or RTMemAllocExTag.
+ *
+ * @param pv What to free, NULL is fine.
+ * @param cb The amount of allocated memory.
+ */
```
+ */
+RTDECL(void) RTMemFreeEx(void *pv, size_t cb) RT_NO_THROWPROTO;
+
+
+/
+ * Allocates memory which may contain code (default tag).
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocate.
+ */
+#define RTMemExecAlloc(cb)              RTMemExecAllocTag((cb), RTMEM_TAG)
+
+/
+ * Allocates memory which may contain code (custom tag).
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *)  RTMemExecAllocTag(size_t cb, const char *pszTag) RT_NO_THROWPROTO;
+
+/
+ * Free executable/read/write memory allocated by RTMemExecAlloc().
+ *
+ * @param pv Pointer to memory block.
+ * @param cb The allocation size.
+ */
+RTDECL(void)    RTMemExecFree(void *pv, size_t cb) RT_NO_THROWPROTO;
+
+/
+ * Donate read+write+execute memory to the exec heap.
+ *
+ * This API is specific to AMD64 and Linux/GNU. A kernel module that desires to
+ * use RTMemExecAlloc on AMD64 Linux/GNU will have to donate some statically
+ * allocated memory in the module if it wishes for GCC generated code to work.
+ * GCC can only generate modules that work in the address range ~2GB to ~0
+ * currently.
+ *
+ * The API only accept one single donation.
+ *
+ * @returns IPRT status code.
+ * @param pvMemory Pointer to the memory block.
+ * @param cb The size of the memory block.
+ */
RTR0DECL(int) RTR0MemExecDonate(void *pvMemory, size_t cb) RT_NO_THROW_PROTO;
#endif /* R0+AMD64+LINUX */

/**
 * Allocate page aligned memory with default tag.
 *
 * @returns Pointer to the allocated memory.
 * @returns NULL if we're out of memory.
 * @param cb Size of the memory block. Will be rounded up to page size.
 */
#define RTMemPageAlloc(cb)              RTMemPageAllocTag((cb), RTMEM_TAG)

/**
 * Allocate page aligned memory with custom tag.
 *
 * @returns Pointer to the allocated memory.
 * @returns NULL if we're out of memory.
 * @param cb Size of the memory block. Will be rounded up to page size.
 * @param pszTag Allocation tag used for statistics and such.
 */
RTDECL(void *) RTMemPageAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/**
 * Allocate zero'd page aligned memory with default tag.
 *
 * @returns Pointer to the allocated memory.
 * @returns NULL if we're out of memory.
 * @param cb Size of the memory block. Will be rounded up to page size.
 */
#define RTMemPageAllocZ(cb)             RTMemPageAllocZTag((cb), RTMEM_TAG)

/**
 * Allocate zero'd page aligned memory with custom tag.
 *
 * @returns Pointer to the allocated memory.
 * @returns NULL if we're out of memory.
 * @param cb Size of the memory block. Will be rounded up to page size.
 * @param pszTag Allocation tag used for statistics and such.
 */
RTDECL(void *) RTMemPageAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/**
 * Free a memory block allocated with RTMemPageAlloc() or RTMemPageAllocZ().
 *
 * @param pv Pointer to the block as it was returned by the allocation function.
 * @param cb The allocation size. Will be rounded up to page size.
 * @param pv NULL will be ignored.
 * @param cb Ignored if @a pv is NULL.
 */
RTDECL(void) RTMemPageFree(void *pv, size_t cb) RT_NO_THROW_PROTO;

/** Page level protection flags for RTMemProtect().
 */
+ * @{
+ */
+/** No access at all. */
#define RTMEM_PROT_NONE   0
+/** Read access. */
#define RTMEM_PROT_READ   1
+/** Write access. */
#define RTMEM_PROT_WRITE  2
+/** Execute access. */
#define RTMEM_PROT_EXEC   4
+/** @} */
+
+/**
 * Change the page level protection of a memory region.
 * @returns iprt status code.
 * @param pv          Start of the region. Will be rounded down to nearest page boundary.
 * @param cb          Size of the region. Will be rounded up to the nearest page boundary.
 * @param fProtect    The new protection, a combination of the RTMEM_PROT_* defines.
 */
RTDECL(int) RTMemProtect(void *pv, size_t cb, unsigned fProtect) RT_NO_THROW_PROTO;

/**
 * Goes thru some pains to make sure the specified memory block is thoroughly
 * scrambled.
 */
RTDECL(void) RTMemWipeThoroughly(void *pv, size_t cb, size_t cMinPasses) RT_NO_THROW_PROTO;

#ifdef IN_RING0

/**
 * Allocates physical contiguous memory (below 4GB).
 * The allocation is page aligned and the content is undefined.
 * @returns Pointer to the memory block. This is page aligned.
 * @param pPhys   Where to store the physical address.
 * @param cb      The allocation size in bytes. This is always
 *                rounded up to PAGE_SIZE.
 */
RTR0DECL(void *) RTMemContAlloc(PRTCCPHYS pPhys, size_t cb) RT_NO_THROW_PROTO;
#endif IN_RING0

+/**
+ * Frees memory allocated using RTMemContAlloc().
+ *
+ @param   pv      Pointer to return from RTMemContAlloc().
+ @param   cb      The cb parameter passed to RTMemContAlloc().
+ */
+RTR0DECL(void) RTMemContFree(void *pv, size_t cb) RT_NO_THROW_PROTO;
+
+/**
+ * Copy memory from an user mode buffer into a kernel buffer.
+ *
+ @retval VINF_SUCCESS on success.
+ @retval VERR_ACCESS_DENIED on error.
+ *
+ @param   pvDst   The kernel mode destination address.
+ @param   R3PtrSrc The user mode source address.
+ @param   cb      The number of bytes to copy.
+ */
+RTR0DECL(int) RTR0MemUserCopyFrom(void *pvDst, RTR3PTR R3PtrSrc, size_t cb);
+
+/**
+ * Copy memory from a kernel buffer into a user mode one.
+ *
+ @retval VINF_SUCCESS on success.
+ @retval VERR_ACCESS_DENIED on error.
+ *
+ @param   R3PtrDst The user mode destination address.
+ @param   pvSrc    The kernel mode source address.
+ @param   cb      The number of bytes to copy.
+ */
+RTR0DECL(int) RTR0MemUserCopyTo(RTR3PTR R3PtrDst, void const *pvSrc, size_t cb);
+
+/**
+ * Tests if the specified address is in the user addressable range.
+ *
+ @returns true if it’s in the user addressable range. false if not.
+ *
+ @param   R3Ptr   The user mode pointer to test.
+ *
+ @remarks Some systems may have overlapping kernel and user address ranges.
+ *
+ One prominent example of this is the x86 version of Mac OS X. Use
+ RTR0MemAreKrnlAndUsrDifferent() to check.
+ */
+RTR0DECL(bool) RTR0MemUserIsValidAddr(RTR3PTR R3Ptr);
/**
 * Tests if the specified address is in the kernel mode range.
 *
 * This function does not check whether the memory at that address is accessible
 * or anything of that sort, only if the address itself is in the kernel mode
 * range.
 *
 * @returns true if it's in the kernel range. false if not.
 * @param pv The alleged kernel mode pointer.
 *
 * @remarks Some systems may have overlapping kernel and user address ranges.
 * One prominent example of this is the x86 version of Mac OS X. Use
 * RTR0MemAreKrnlAndUsrDifferent() to check.
 */
RTR0DECL(bool) RTR0MemKernelIsValidAddr(void *pv);

/**
 * Are user mode and kernel mode address ranges distinctly different.
 *
 * This determines whether RTR0MemKernelIsValidAddr and RTR0MemUserIsValidAddr
 * can be used for deciding whether some arbitrary address is a user mode or a
 * kernel mode one.
 *
 * @returns true if they are, false if not.
 */
RTR0DECL(bool) RTR0MemAreKrnlAndUsrDifferent(void);

/**
 * Copy memory from an potentially unsafe kernel mode location and into a safe
 * (kernel) buffer.
 *
 * @retval VINF_SUCCESS on success.
 * @retval VERR_ACCESS_DENIED on error.
 * @retval VERR_NOT_SUPPORTED if not (yet) supported.
 *
 * @param pvDst The destination address (safe).
 * @param pvSrc The source address (potentially unsafe).
 * @param cb The number of bytes to copy.
 */
RTR0DECL(int) RTR0MemKernelCopyFrom(void *pvDst, void const *pvSrc, size_t cb);

/**
 * Copy from a safe (kernel) buffer and to a potentially unsafe kernel mode
 * location.
 *
 * @retval VINF_SUCCESS on success.
 * @retval VERR_ACCESS_DENIED on error.
+ @retval  VERR_NOT_SUPPORTED if not (yet) supported.
+ *
+ @param  pvDst   The destination address (potentially unsafe).
+ @param  pvSrc   The source address (safe).
+ @param  cb      The number of bytes to copy.
+ */
RTR0DECL(int) RTR0MemKernelCopyTo(void *pvDst, void const *pvSrc, size_t cb);
+
#ifndef /* IN_RING0 */
+
/** @name Electrical Fence Version of some APIs.
+ */
+
+/**
+ * Same as RTMemTmpAllocTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param   cb      Size in bytes of the memory block to allocate.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ * @param   SRC_POS The source position where call is being made from.
+ * @param   RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfTmpAlloc(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemTmpAllocZTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param   cb      Size in bytes of the memory block to allocate.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ * @param   SRC_POS The source position where call is being made from. Use
+ * @param   RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfTmpAllocZ(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemTmpFree() except that it's for fenced memory.
+ *
+ * @param  pv      Pointer to memory block.
+ * @param  SRC_POS The source position where call is being made from. Use
+ * @param   RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void)  RTMemEfTmpFree(void *pv, RT_SRC_POS_DECL) RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory. Free with RTMemEfFree().
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAlloc(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocZTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAllocZ(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocVarTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory. Free with RTMemEfFree().
+ * @returns NULL on failure.
+ * @param cbUnaligned Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAllocVar(size_t cbUnaligned, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocZVarTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cbUnaligned Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+ * @param   SRC_POS The source position where call is being made from. Use
+ *            RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *) RTMemEfAllocZVar(size_t cbUnaligned, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemReallocTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param   pvOld   The memory block to reallocate.
+ * @param   cbNew   The new block size (in bytes).
+ * @param   pszTag  Allocation tag used for statistics and such.
+ * @param   SRC_POS The source position where call is being made from. Use
+ *            RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *) RTMemEfRealloc(void *pvOld, size_t cbNew, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Free memory allocated by any of the RTMemEf* allocators.
+ *
+ * @param   pv      Pointer to memory block.
+ * @param   SRC_POS The source position where call is being made from. Use
+ *            RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void)    RTMemEfFree(void *pv, RT_SRC_POS_DECL) RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemDupTag() except that it's fenced.
+ *
+ * @returns New heap block with the duplicate data.
+ * @returns NULL if we're out of memory.
+ * @param   pvSrc   The memory to duplicate.
+ * @param   cb      The amount of memory to duplicate.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ * @param   SRC_POS The source position where call is being made from. Use
+ *            RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *) RTMemEfDup(const void *pvSrc, size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROWPROTO;
+
+/**
+ * Same as RTMemEfDupExTag except that it's fenced.
+ *
+ * @returns New heap block with the duplicate data.
+ * @returns NULL if we're out of memory.
+ */
+RTDECL(void *) RTMemEfDupEx(const void *pvSrc, size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+ * @param pvSrc The memory to duplicate.
+ * @param cbSrc The amount of memory to duplicate.
+ * @param cbExtra The amount of extra memory to allocate and zero.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ * @param RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *) RTMemEfDupEx(const void *pvSrc, size_t cbSrc, size_t cbExtra, const char *pszTag,
RT_SRC_POS_DECL) RT_NO_THROW_PROTO;
+
+/** @def RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF
+ * Define RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF to enable electric fence new and
+ * delete operators for classes which uses the RTMEMEF_NEW_AND_DELETE_OPERATORS
+ * macro.
+ */
+/** @def RTMEMEF_NEW_AND_DELETE_OPERATORS
+ * Defines the electric fence new and delete operators for a class when
+ * RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF is define.
+ */
+/** @def RTMEMEF_NEW_AND_DELETE_OPERATORS_IOKIT
+ * Defines the electric fence new and delete operators for an IOKit class when
+ * RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF is define.
+ */
+/** This differs from RTMEMEF_NEW_AND_DELETE_OPERATORS in that the memory we
+ * allocate is initialized to zero. It is also assuming we don't have nothrow
+ * variants and exceptions, so fewer variations.
+ */
+#if defined(RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF) &&
!defined(RTMEM_NO_WRAP_SOME_NEW_AND_DELETE_TO_EF)
+#if defined(RT_EXCEPTIONS_ENABLED)
#  define RTMEMEF_NEW_AND_DELETE_OPERATORS() \
        void *operator new(size_t cb) RT_THROW(std::bad_alloc) \
        { \
            void *pv = RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
            if (RT_LIKELY(pv)) \
                return pv; \
            throw std::bad_alloc(); \
            } \
        void *operator new(size_t cb, const std::nothrow_t &nothrow_constant) RT_NO_THROW_DEF \
        { \
            NOREF(nothrow_constant); \n            return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
            } \
        void *operator new[](size_t cb) RT_THROW(std::bad_alloc) \
        { \
            void *pv = RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
            if (RT_LIKELY(pv)) \
                return pv; \
            return pv; \
        }
throw std::bad_alloc();
} \
}

void *operator new[](size_t cb, const std::nothrow_t &nothrow_constant) RT_NO_THROW_DEF \
{ \
    NOREF(nothrow_constant); \
    return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
} \

void operator delete(void *pv) RT_NO_THROW_DEF \
{ \
    RTMemEfFree(pv, RT_SRC_POS); \
} \

void operator delete[](void *pv) RT_NO_THROW_DEF \
{ \
    RTMemEfFree(pv, RT_SRC_POS); \
} \

void operator delete[](void *pv, const std::nothrow_t &nothrow_constant) RT_NO_THROW_DEF \
{ \
    NOREF(nothrow_constant); \
    RTMemEfFree(pv, RT_SRC_POS); \
} \

typedef int UsingElectricNewAndDeleteOperators
#endif

#define RTMEMEF_NEW_AND_DELETE_OPERATORS() \
    void *operator new(size_t cb) \
    { \
        return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
    } \
    void *operator new(size_t cb, const std::nothrow_t &nothrow_constant) \
    { \
        NOREF(nothrow_constant); \
        return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
    } \
    void *operator new[](size_t cb) \
    { \
        return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
    } \
    void *operator new[](size_t cb, const std::nothrow_t &nothrow_constant) \
    { \
        NOREF(nothrow_constant); \
        return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); \
    }
void operator delete(void *pv) \
{
    RTMemEfFree(pv, RT_SRC_POS); \
}

void operator delete(void *pv, const std::nothrow_t &nothrow_constant) \
{
    NOREF(nothrow_constant); \
    RTMemEfFree(pv, RT_SRC_POS); \
}

void operator delete[](void *pv) \
{
    RTMemEfFree(pv, RT_SRC_POS); \
}

void operator delete[](void *pv, const std::nothrow_t &nothrow_constant) \
{
    NOREF(nothrow_constant); \
    RTMemEfFree(pv, RT_SRC_POS); \
}

typedef int UsingElectricNewAndDeleteOperators
}# endif

#define RTR0MEMEF_NEW_AND_DELETE_OPERATORS_IOKIT() \
    void *operator new(size_t cb) \
    { \
        return RTMemEfAllocZ(cb, RTMEM_TAG, RT_SRC_POS); \
    } \
    void *operator new[](size_t cb) \
    { \
        return RTMemEfAllocZ(cb, RTMEM_TAG, RT_SRC_POS); \
    } \
    void operator delete(void *pv) \
    { \
        RTMemEfFree(pv, RT_SRC_POS); \
    } \
    void operator delete[](void *pv) \
    { \
        RTMemEfFree(pv, RT_SRC_POS); \
    }

typedef int UsingElectricNewAndDeleteOperators
#endif

#define RTMEMEF_NEW_AND_DELETE_OPERATORS() \
    typedef int UsingDefaultNewAndDeleteOperators
#define RTR0MEMEF_NEW_AND_DELETE_OPERATORS_IOKIT() \
    typedef int UsingDefaultNewAndDeleteOperators
#endif
```c
#ifdef DOXYGEN_RUNNING
#endif

/** @def RTMEM_WRAP_TO_EF_APIS
 * Define RTMEM_WRAP_TO_EF_APIS to wrap RTMem APIs to RTMemEf APIs.
 */
#if defined(RT_MEM_WRAP_TO_EF_APIS) && !defined(RT_MEM_NO_WRAP_TO_EF_APIS) 
 && ( defined(IN_RING3) || ( defined(IN_RING0) && !defined(IN_RING0_AGNOSTIC) && 
 (defined(RT_OS_DARWIN)) || 0 ) )
#endif

/**
 * Fenced drop-in replacement for RTMemTmpAllocTag.
 * @copydoc RTMemTmpAllocTag
 */
RTDECL(void *)  RTMemEfTmpAllocNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/**
 * Fenced drop-in replacement for RTMemTmpAllocZTag.
 * @copydoc RTMemTmpAllocZTag
 */
RTDECL(void *)  RTMemEfTmpAllocZNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/**
 * Fenced drop-in replacement for RTMemTmpFreeTag.
 * @copydoc RTMemTmpFree
 */
RTDECL(void)    RTMemEfTmpFreeNP(void *pv) RT_NO_THROW_PROTO;
```

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/**
 * Fenced drop-in replacement for RTMemAllocTag.
 * @copydoc RTMemAllocTag
 */
RTDECL(void *)  RTMemEfAllocNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
/**
 * Fenced drop-in replacement for RTMemAllocZTag.
 * @copydoc RTMemAllocZTag
 */
RTDECL(void *)  RTMemEfAllocZNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
/**
 * Fenced drop-in replacement for RTMemAllocVarTag
 * @copydoc RTMemAllocVarTag
 */
RTDECL(void *)  RTMemEfAllocVarNP(size_t cbUnaligned, const char *pszTag) RT_NO_THROW_PROTO;
+
/**
 * Fenced drop-in replacement for RTMemAllocZVarTag.
 * @copydoc RTMemAllocZVarTag
 */
RTDECL(void *)  RTMemEfAllocZVarNP(size_t cbUnaligned, const char *pszTag) RT_NO_THROW_PROTO;
+
/**
 * Fenced drop-in replacement for RTMemReallocTag.
 * @copydoc RTMemReallocTag
 */
RTDECL(void *)  RTMemEfReallocNP(void *pvOld, size_t cbNew, const char *pszTag)
RT_NO_THROW_PROTO;
+
/**
 * Fenced drop-in replacement for RTMemFree.
 * @copydoc RTMemFree
 */
RTDECL(void)    RTMemEfFreeNP(void *pv) RT_NO_THROW_PROTO;
+
/**
 * Fenced drop-in replacement for RTMemDupExTag.
 * @copydoc RTMemDupExTag
 */
RTDECL(void *)  RTMemEfDupNP(const void *pvSrc, size_t cb, const char *pszTag)
RT_NO_THROW_PROTO;
+RTDECL(void *) RTMemEfDupExNP(const void *pvSrc, size_t cbSrc, size_t cbExtra, const char *pszTag)
RT_NO_THROW_PROTO;
+
+/** @} */
+
+RT_C_DECLS_END
+
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/memobj.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/memobj.h
@@ -0,0 +1,629 @@
+/** @file
+ * IPRT - Memory Objects (Ring-0).
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ *
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef __iprt_memobj_h
+ define __iprt_memobj_h
+
+include <iprt/cdefs.h>
+include <iprt/types.h>
+
+RT_C_DECLS_BEGIN
+
/** @defgroup grp_rt_memobj     RTMemObj - Memory Object Manipulation (Ring-0)
+ * @ingroup grp_rt
+ *@
+
+/** @def RTMEM_TAG
+ * The default allocation tag used by the RTMem allocation APIs.
+ *
+ * When not defined before the inclusion of iprt/memobj.h or iprt/mem.h, this
+ * will default to the pointer to the current file name. The memory API will
+ * make of use of this as pointer to a volatile but read-only string.
+ */
+#ifndef RTMEM_TAG
+## define RTMEM_TAG (__FILE__)
+#endif
+
+ifdef IN_RING0
+
+/**
+ * Checks if this is mapping or not.
+ *
+ * @returns true if it's a mapping, otherwise false.
+ * @param   MemObj  The ring-0 memory object handle.
+ */
+RTR0DECL(bool) RTR0MemObjIsMapping(RTR0MEMOBJ MemObj);
+
+/**
+ * Gets the address of a ring-0 memory object.
+ *
+ * @returns The address of the memory object.
+ * @returns NULL if the handle is invalid (asserts in strict builds) or if there isn't any mapping.
+ * @param   MemObj  The ring-0 memory object handle.
+ */
+RTR0DECL(void *) RTR0MemObjAddress(RTR0MEMOBJ MemObj);
+
+/**
+ * Gets the ring-3 address of a ring-0 memory object.
+ *
+ * This only applies to ring-0 memory object with ring-3 mappings of some kind, i.e.
+ * locked user memory, reserved user address space and user mappings. This API should
+ * not be used on any other objects.
+ *
+ * @returns The address of the memory object.
+ * @returns NIL_RTR3PTR if the handle is invalid or if it's not an object with a ring-3 mapping.
+ * @param   MemObj  The ring-0 memory object handle.
+ */
+RTR0DECL(RTR3PTR) RTR0MemObjAddressR3(RTR0MEMOBJ MemObj);
+ /**
+ * Gets the size of a ring-0 memory object.
+ *
+ * The returned value may differ from the one specified to the API creating the
+ * object because of alignment adjustments. The minimal alignment currently
+ * employed by any API is PAGE_SIZE, so the result can safely be shifted by
+ * PAGE_SHIFT to calculate a page count.
+ *
+ * @returns The object size.
+ * @returns 0 if the handle is invalid (asserts in strict builds) or if there isn't any mapping.
+ * @param   MemObj The ring-0 memory object handle.
+ */
+ RTR0DECL(size_t) RTR0MemObjSize(RTR0MEMOBJ MemObj);
+
+ /**
+ * Get the physical address of an page in the memory object.
+ *
+ * @returns The physical address.
+ * @returns NIL_RTHCPHYS if the object doesn't contain fixed physical pages.
+ * @returns NIL_RTHCPHYS if the iPage is out of range.
+ * @returns NIL_RTHCPHYS if the object handle isn't valid.
+ * @param   MemObj The ring-0 memory object handle.
+ * @param   iPage The page number within the object.
+ */
+ RTR0DECL(RTHCPHYS) RTR0MemObjGetPagePhysAddr(RTR0MEMOBJ MemObj, size_t iPage);
+
+ /**
+ * Frees a ring-0 memory object.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_INVALID_HANDLE if
+ * @param   MemObj          The ring-0 memory object to be freed. NULL is accepted.
+ * @param   fFreeMappings   Whether or not to free mappings of the object.
+ */
+ RTR0DECL(int) RTR0MemObjFree(RTR0MEMOBJ MemObj, bool fFreeMappings);
+
+ /**
+ * Allocates page aligned virtual kernel memory (default tag).
+ *
+ * The memory is taken from a non paged (= fixed physical memory backing) pool.
+ *
+ * @returns IPRT status code.
+ * @param   pMemObj         Where to store the ring-0 memory object handle.
+ * @param   cb              Number of bytes to allocate. This is rounded up to nearest page.
+ * @param   fExecutable     Flag indicating whether it should be permitted to executed code in the memory object.
+ */
+#define RTR0MemObjAllocPage(pMemObj, cb, fExecutable) \

/**
 * Allocates page aligned virtual kernel memory (custom tag).
 *
 * The memory is taken from a non paged (= fixed physical memory backing) pool.
 *
 * @returns IPRT status code.
 * @param   pMemObj         Where to store the ring-0 memory object handle.
 * @param   cb              Number of bytes to allocate. This is rounded up to nearest page.
 * @param   fExecutable     Flag indicating whether it should be permitted to executed code in the memory object.
 * @param   pszTag          Allocation tag used for statistics and such.
 */
RTR0DECL(int) RTR0MemObjAllocPageTag(PRTR0MEMOBJ pMemObj, size_t cb, bool fExecutable, const char *pszTag);

/**
 * Allocates page aligned virtual kernel memory with physical backing below 4GB
 * (default tag).
 *
 * The physical memory backing the allocation is fixed.
 *
 * @returns IPRT status code.
 * @param   pMemObj         Where to store the ring-0 memory object handle.
 * @param   cb              Number of bytes to allocate. This is rounded up to nearest page.
 * @param   fExecutable     Flag indicating whether it should be permitted to executed code in the memory object.
 */
#define RTR0MemObjAllocLow(pMemObj, cb, fExecutable) \
    RTR0MemObjAllocLowTag((pMemObj), (cb), (fExecutable), RTMEM_TAG)

/**
 * Allocates page aligned virtual kernel memory with physical backing below 4GB
 * (custom tag).
 *
 * The physical memory backing the allocation is fixed.
 *
 * @returns IPRT status code.
 * @param   pMemObj         Where to store the ring-0 memory object handle.
 * @param   cb              Number of bytes to allocate. This is rounded up to nearest page.
 * @param   fExecutable     Flag indicating whether it should be permitted to executed code in the memory object.
 * @param   pszTag          Allocation tag used for statistics and such.
 */
RTR0DECL(int) RTR0MemObjAllocLowTag(PRTR0MEMOBJ pMemObj, size_t cb, bool fExecutable, const char *pszTag);

/**
 * Allocates page aligned virtual kernel memory with contiguous physical backing
 * below 4GB (default tag).
 *
 * @returns IPRT status code.
 * @param   pMemObj         Where to store the ring-0 memory object handle.
 * @param   cb              Number of bytes to allocate. This is rounded up to nearest page.
 * @param   fExecutable     Flag indicating whether it should be permitted to executed code in the memory object.
 * @param   pszTag          Allocation tag used for statistics and such.
 */
RTR0DECL(int) RTR0MemObjAllocTag(PRTR0MEMOBJ pMemObj, size_t cb, bool fExecutable, const char *pszTag);
The physical memory backing the allocation is fixed.

@returns IPRT status code.

@param pMemObj Where to store the ring-0 memory object handle.

@param cb Number of bytes to allocate. This is rounded up to nearest page.

@param fExecutable Flag indicating whether it should be permitted to executed code in the memory object.

RTR0MemObjAllocContTag((pMemObj), (cb), (fExecutable), RTMEM_TAG)

Allocates page aligned virtual kernel memory with contiguous physical backing below 4GB (custom tag).

The physical memory backing the allocation is fixed.

@returns IPRT status code.

@param pMemObj Where to store the ring-0 memory object handle.

@param cb Number of bytes to allocate. This is rounded up to nearest page.

@param fExecutable Flag indicating whether it should be permitted to executed code in the memory object.

@param pszTag Allocation tag used for statistics and such.

RTR0Decl(int) RTR0MemObjAllocContTag(PRTR0MEMOBJ pMemObj, size_t cb, bool fExecutable, const char *pszTag);

Locks a range of user virtual memory (default tag).

@returns IPRT status code.

@param pMemObj Where to store the ring-0 memory object handle.

@param R3Ptr User virtual address. This is rounded down to a page boundary.

@param cb Number of bytes to lock. This is rounded up to nearest page boundary.

@param fAccess The desired access, a combination of RTMEM_PROT_READ and RTMEM_PROT_WRITE.

@param R0Process The process to lock pages in. NIL_R0PROCESS is an alias for the current one.

RTR0MemGetAddressR3() and RTR0MemGetAddress() will return the rounded down address.

Linux: This API requires that the memory begin locked is in a memory mapping that is not required in any forked off child process. This is not intended as permanent restriction, feel free to help out lifting it.
+* RTR0MemObjLockUserTag(pMemObj, pv, cb, fAccess, R0Process, RTMEM_TAG) \ 
+  * Locks a range of kernel virtual memory (custom tag).
+  *
+  * @returns IPRT status code.
+  * @param   pMemObj Where to store the ring-0 memory object handle.
+  * @param   pv Kernel virtual address. This is rounded down to a page boundary.
+  * @param   cb Number of bytes to lock. This is rounded up to nearest page boundary.
+  * @param   fAccess The desired access, a combination of RTMEM_PROT_READ and RTMEM_PROT_WRITE.
+  * @param   R0Process The process to lock pages in. NIL_R0PROCESS is an alias for the current one.
+  * @param   pszTag Allocation tag used for statistics and such.
+  *
+  * @remark RTR0MemGetAddress() and RTR0MemGetAddress() will return the rounded down address.
+  *
+  * @remark Linux: This API requires that the memory begin locked is in a memory mapping that is not required in any forked off child process. This is not intended as permanent restriction, feel free to help out lifting it.
+  */
+RTR0DECL(int) RTR0MemObjLockUserTag(PRTR0MEMOBJ pMemObj, RTR3PTR pv, size_t cb, uint32_t fAccess, RTR0PROCESS R0Process, const char *pszTag);
+
+/**
+  * Locks a range of kernel virtual memory (default tag).
+  *
+  * @returns IPRT status code.
+  * @param   pMemObj Where to store the ring-0 memory object handle.
+  * @param   pv Kernel virtual address. This is rounded down to a page boundary.
+  * @param   cb Number of bytes to lock. This is rounded up to nearest page boundary.
+  * @param   fAccess The desired access, a combination of RTMEM_PROT_READ and RTMEM_PROT_WRITE.
+  *
+  * @remark RTR0MemGetAddress() will return the rounded down address.
+  */
+#define RTR0MemObjLockKernel(pMemObj, pv, cb, fAccess) \ 
+  RTR0MemObjLockKernelTag((pMemObj), (pv), (cb), (fAccess), (R0Process), RTMEM_TAG) \ 
+/**
+  * Locks a range of kernel virtual memory (custom tag).
+  *
+ * @returns IPRT status code.
+ * @param pMemObj Where to store the ring-0 memory object handle.
+ * @param pv Kernel virtual address. This is rounded down to a page boundary.
+ * @param cb Number of bytes to lock. This is rounded up to nearest page boundary.
+ * @param fAccess The desired access, a combination of RTMEM_PROT_READ and RTMEM_PROT_WRITE.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+ * @remark RTR0MemGetAddress() will return the rounded down address.
+ */
int RTR0MemObjLockKernelTag(PRTR0MEMOBJ pMemObj, void *pv, size_t cb, uint32_t fAccess, const char *pszTag);

#define RTR0MemObjAllocPhys(pMemObj, cb, PhysHighest) \
  RTR0MemObjAllocPhysTag((pMemObj), (cb), (PhysHighest), RTMEM_TAG)

+ * Allocates contiguous page aligned physical memory without (necessarily) any kernel mapping (default tag).
+ */
int RTR0MemObjAllocPhysTag(PRTR0MEMOBJ pMemObj, size_t cb, RTHCPHYS PhysHighest, const char *pszTag);

+ * Allocates contiguous physical memory without (necessarily) any kernel mapping (default tag).
+ */
int RTR0MemObjAllocPhysTag(PRTR0MEMOBJ pMemObj, size_t cb, RTHCPHYS PhysHighest, const char *pszTag);
Pass NIL_RTHCPHYS if any address is acceptable.

@returns IPRT status code.
@retval VERR_NOT_SUPPORTED if it’s not possible to allocated unmapped physical memory on this platform. The caller should expect this error and have a fallback strategy for it.
@returns IPRT status code.
@retval VERR_NOT_SUPPORTED if it's not possible to allocated unmapped physical memory on this platform. The caller should expect this error and have a fallback strategy for it.

Where to store the ring-0 memory object handle.
Number of bytes to allocate. This is rounded up to nearest page.
The highest permitable address (inclusive).
The alignment of the reserved memory.
Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M, _4M and _1G.
Allocation tag used for statistics and such.
Where to store the ring-0 memory object handle.
Number of bytes to allocate. This is rounded up to nearest page.
The highest permitable address (inclusive).
Pass NIL_RTHCPHYS if any address is acceptable.
Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M, _4M and _1G.
This API is for allocating huge amounts of pages and will return VERR_NOT_SUPPORTED if this cannot be implemented in a satisfactory manner.

@returns IPRT status code.

@retval VERR_NOT_SUPPORTED if it's not possible to allocated unmapped physical memory on this platform. The caller should expect this error and have a fallback strategy for it.

@param pMemObj Where to store the ring-0 memory object handle.

@param cb Number of bytes to allocate. This is rounded up to nearest page.

@param PhysHighest The highest permitable address (inclusive).

@param pszTag Allocation tag used for statistics and such.

RTR0DECL(int) RTR0MemObjAllocPhysNCTag(PRTR0MEMOBJ pMemObj, size_t cb, RTHCPHYS PhysHighest, const char *pszTag);

Memory cache policy for RTR0MemObjEnterPhys.

@ { }

Default caching policy -- don't care. */
#define RTMEM_CACHE_POLICY_DONT_CARE UINT32_C(0)

/* MMIO caching policy -- uncachable. */
#define RTMEM_CACHE_POLICY_MMIO UINT32_C(1)

@ ] */

Creates a page aligned, contiguous, physical memory object (default tag).

No physical memory is allocated, we trust you do know what you're doing.

@returns IPRT status code.

@param pMemObj Where to store the ring-0 memory object handle.

@param Phys The physical address to start at. This is rounded down to the nearest page boundary.

@param cb The size of the object in bytes. This is rounded up to nearest page boundary.

@param uCachePolicy One of the RTMEM_CACHE_XXX modes.

@define RTR0MemObjEnterPhys(pMemObj, Phys, cb, uCachePolicy) \ RTR0MemObjEnterPhysTag((pMemObj), (Phys), (cb), (uCachePolicy), RTMEM_TAG)

Creates a page aligned, contiguous, physical memory object (custom tag).

No physical memory is allocated, we trust you do know what you're doing.

@returns IPRT status code.
+ * @param pMemObj Where to store the ring-0 memory object handle.
+ * @param Phys The physical address to start at. This is rounded down to the
+ * nearest page boundary.
+ * @param cb The size of the object in bytes. This is rounded up to nearest page boundary.
+ * @param uCachePolicy One of the RTMEM_CACHE_XXX modes.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTR0DECL(int) RTR0MemObjEnterPhysTag(PRTR0MEMOBJ pMemObj, RTHCPHYS Phys, size_t cb,
+uint32_t uCachePolicy, const char *pszTag);
+
+/**
+ * Reserves kernel virtual address space (default tag).
+ *
+ * If this function fails with VERR_NOT_SUPPORTED, the idea is that you
+ * can use RTR0MemObjEnterPhys() + RTR0MemObjMapKernel() as a fallback if
+ * you have a safe physical address range to make use of...
+ *
+ * @returns IPRT status code.
+ * @param pMemObj Where to store the ring-0 memory object handle.
+ * @param pvFixed Requested address. (void *)-1 means any address. This must match the alignment.
+ * @param cb The number of bytes to reserve. This is rounded up to nearest page.
+ * @param uAlignment The alignment of the reserved memory.
+ * Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M and _4M.
+ */
+
+RTR0DECL(int) RTR0MemObjReserveKernelTag(PRTR0MEMOBJ pMemObj, void *pvFixed, size_t cb,
+size_t uAlignment, const char *pszTag);
+
+/**
+ * Reserves kernel virtual address space (custom tag).
+ *
+ * If this function fails with VERR_NOT_SUPPORTED, the idea is that you
+ * can use RTR0MemObjEnterPhys() + RTR0MemObjMapKernel() as a fallback if
+ * you have a safe physical address range to make use of...
+ *
+ * @returns IPRT status code.
+ * @param pMemObj Where to store the ring-0 memory object handle.
+ * @param pvFixed Requested address. (void *)-1 means any address. This must match the alignment.
+ * @param cb The number of bytes to reserve. This is rounded up to nearest page.
+ * @param uAlignment The alignment of the reserved memory.
+ * Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M and _4M.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+
+RTR0DECL(int) RTR0MemObjReserveKernelTag(PRTR0MEMOBJ pMemObj, void *pvFixed, size_t cb,
+size_t uAlignment, const char *pszTag);
+
+/**
+ * Reserves user virtual address space in the current process (default tag).
+ *
+ * @returns IPRT status code.
+ * @param  pMemObj   Where to store the ring-0 memory object handle.
+ * @param  R3PtrFixed Requested address. (RTR3PTR)-1 means any address. This must match the alignment.
+ * @param  cb        The number of bytes to reserve. This is rounded up to nearest PAGE_SIZE.
+ * @param  uAlignment The alignment of the reserved memory.
+ * @param  R0Process The process to reserve the memory in. NIL_R0PROCESS is an alias for the current one.
+ */
+ #define RTR0MemObjReserveUser(pMemObj, R3PtrFixed, cb, uAlignment, R0Process) \
+    RTR0MemObjReserveUserTag((pMemObj), (R3PtrFixed), (cb), (uAlignment), (R0Process), RTMEM_TAG)
+
+/**
+ * Reserves user virtual address space in the current process (custom tag).
+ *
+ * @returns IPRT status code.
+ * @param  pMemObj   Where to store the ring-0 memory object handle.
+ * @param  R3PtrFixed Requested address. (RTR3PTR)-1 means any address. This must match the alignment.
+ * @param  cb        The number of bytes to reserve. This is rounded up to nearest PAGE_SIZE.
+ * @param  uAlignment The alignment of the reserved memory.
+ * @param  R0Process The process to reserve the memory in. NIL_R0PROCESS is an alias for the current one.
+ * @param  pszTag    Allocation tag used for statistics and such.
+ */
+ RTR0DECL(int) RTR0MemObjReserveUserTag(PRTR0MEMOBJ pMemObj, RTR3PTR R3PtrFixed, size_t cb, 
+                                        size_t uAlignment, RT0PROCESS R0Process, const char *pszTag);
+
+/**
+ * Maps a memory object into kernel virtual address space (default tag).
+ *
+ * @returns IPRT status code.
+ * @param  pMemObj   Where to store the ring-0 memory object handle of the mapping object.
+ * @param  MemObjToMap The object to be map.
+ * @param  pvFixed   Requested address. (void *)-1 means any address. This must match the alignment.
+ * @param  uAlignment The alignment of the reserved memory.
+ * @param  fProt     Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
+ */
+ #define RTR0MemObjMapKernel(pMemObj, MemObjToMap, pvFixed, uAlignment, fProt) \
+    RTR0MemObjMapKernelTag((pMemObj), (MemObjToMap), (pvFixed), (uAlignment), (fProt), RTMEM_TAG)
+
+/**

---
+ * Maps a memory object into kernel virtual address space (custom tag).
+ *
+ * This is the same as calling RTR0MemObjMapKernelEx with cbSub and offSub set to zero.
+ *
+ * @returns IPRT status code.
+ * @param   pMemObj Where to store the ring-0 memory object handle of the mapping object.
+ * @param   MemObjToMap The object to be map.
+ * @param   pvFixed Requested address, (void *)-1 means any address. This must match the alignment.
+ * @param   uAlignment The alignment of the reserved memory.
+ * Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M and _4M.
+ * @param   fProt Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
+ * @param   pszTag Allocation tag used for statistics and such.
+ */
+RTR0DECL(int) RTR0MemObjMapKernelTag(PRTR0MEMOBJ pMemObj, RTR0MEMOBJ MemObjToMap,
                                   void *pvFixed,
                                   size_t uAlignment, unsigned fProt, const char *pszTag);
+
+/**
+ * Maps a memory object into kernel virtual address space (default tag).
+ *
+ * The ability to map subsections of the object into kernel space is currently not implemented on all platforms. All/Most of platforms supports mapping the whole object into kernel space.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_NOT_SUPPORTED if it's not possible to map a subsection of a memory object on this platform. When you hit this, try implement it.
+ *
+ * @param   pMemObj Where to store the ring-0 memory object handle of the mapping object.
+ * @param   MemObjToMap The object to be map.
+ * @param   pvFixed Requested address, (void *)-1 means any address. This must match the alignment.
+ * @param   uAlignment The alignment of the reserved memory.
+ * Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M and _4M.
+ * @param   fProt Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
+ * @param   offSub Where in the object to start mapping. If non-zero the value must be page aligned and cbSub must be non-zero as well.
+ * @param   cbSub The size of the part of the object to be mapped. If zero the entire object is mapped. The value must be page aligned.
+ */
+#define RTR0MemObjMapKernelEx(pMemObj, MemObjToMap, pvFixed, uAlignment, fProt, offSub, cbSub) RTR0MemObjMapKernelExTag((pMemObj), (MemObjToMap), (pvFixed), (uAlignment), (fProt), (offSub), (cbSub), RTMEM_TAG)
The ability to map subsections of the object into kernel space is currently not implemented on all platforms. All/Most of platforms supports mapping the whole object into kernel space.

@returns IPRT status code.

@retval VERR_NOT_SUPPORTED if it's not possible to map a subsection of a memory object on this platform. When you hit this, try implement it.

@params
pMemObj Where to store the ring-0 memory object handle of the mapping object.
MemObjToMap The object to be map.
 pvFixed Requested address. (void *)-1 means any address. This must match the alignment.
 uAlignment The alignment of the reserved memory.
 fProt Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
 offSub Where in the object to start mapping. If non-zero the value must be page aligned and cbSub must be non-zero as well.
 cbSub The size of the part of the object to be mapped. If zero the entire object is mapped. The value must be page aligned.
 pszTag Allocation tag used for statistics and such.

+*/

Maps a memory object into user virtual address space in the current process (default tag).

+*/

@returns IPRT status code.

@params
pMemObj Where to store the ring-0 memory object handle of the mapping object.
MemObjToMap The object to be map.
 R3PtrFixed Requested address. (RTR3PTR)-1 means any address. This must match the alignment.
 uAlignment The alignment of the reserved memory.
 Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M and _4M.
 fProt Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
 R0Process The process to map the memory into. NIL_R0PROCESS is an alias for the current one.
+*/

Maps a memory object into user virtual address space in the current process (custom tag).

+*/
+ * @returns IPRT status code.
+ * @param pMemObj Where to store the ring-0 memory object handle of the mapping object.
+ * @param MemObjToMap The object to be map.
+ * @param R3PtrFixed Requested address. (RTR3PTR)-1 means any address. This must match the alignment.
+ * @param uAlignment The alignment of the reserved memory.
+ * Supported values are 0 (alias for PAGE_SIZE), PAGE_SIZE, _2M and _4M.
+ * @param fProt Combination of RTMEM_PROT_* flags (except RTMEM_PROT_NONE).
+ * @param R0Process The process to map the memory into. NIL_R0PROCESS is an alias for the current one.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTR0DECL(int) RTR0MemObjMapUserTag(PRTR0MEMOBJ pMemObj, RTR0MEMOBJ MemObjToMap, RTR3PTR R3PtrFixed, size_t uAlignment, unsigned fProt, RTR0PROCESS R0Process, const char *pszTag);
+
+/**
+ * Change the page level protection of one or more pages in a memory object.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_NOT_SUPPORTED if the OS doesn't provide any way to manipulate page level protection. The call
+ *    must handle this status code gracefully. (Note that it may also occur if the implementation is missing, in which case
+ *    just go ahead and implement it.)
+ *
+ * @param hMemObj Memory object handle.
+ * @param offSub Offset into the memory object. Must be page aligned.
+ * @param cbSub Number of bytes to change the protection of. Must be page aligned.
+ * @param fProt Combination of RTMEM_PROT_* flags.
+ */
+RTR0DECL(int) RTR0MemObjProtect(RTR0MEMOBJ hMemObj, size_t offSub, size_t cbSub, uint32_t fProt);
+
+/** @} */
+
+RT_C_DECLS_END
+
+#endif
+
/** @} */
+
+RT_C_DECLS_END
+
+}
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#ifndef ___iprt_mp_h
#define ___iprt_mp_h

#include <iprt/cdefs.h>
#include <iprt/types.h>

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_mp RTMp - Multiprocessor
 * @ingroup grp_rt
 * @{
 */

/**
 * Gets the identifier of the CPU executing the call.
 *
 * When called from a system mode where scheduling is active, like ring-3 or kernel mode with interrupts enabled on some systems, no assumptions should be made about the current CPU when the call returns.
 *
 * @returns CPU Id.
 */

RTDECL(RTCPUID) RTMpCpuId(void);

/**
 * Get the CPU set index of the CPU executing the call.
 *
 * Same scheduling warnings as for RTMpCpuId().
 */

+*
+ *
+ * @returns CPU set index.
+ */
+RTDECL(int) RTMpCurSetIndex(void);
+
+/**
+ * Get the CPU set index and identifier of the CPU executing the call.
+ *
+ * Same scheduling warnings as for RTMpCpuId().
+ *
+ * @returns CPU set index.
+ * @param   pidCpu Where to return the CPU identifier. (not optional)
+ */
+RTDECL(int) RTMpCurSetIndexAndId(PRTCPUID pidCpu);
+
+/**
+ * Converts a CPU identifier to a CPU set index.
+ *
+ * This may or may not validate the presence of the CPU.
+ *
+ * @returns The CPU set index on success, -1 on failure.
+ * @param   idCpu The identifier of the CPU.
+ */
+RTDECL(int) RTMpCpuIdToSetIndex(RTCPUID idCpu);
+
+/**
+ * Converts a CPU set index to a CPU identifier.
+ *
+ * This may or may not validate the presence of the CPU, so, use
+ * RTMpIsCpuPossible for that.
+ *
+ * @returns The corresponding CPU identifier, NIL_RTCPUID on failure.
+ * @param   iCpu The CPU set index.
+ */
+RTDECL(RTCPUID) RTMpCpuIdFromSetIndex(int iCpu);
+
+/**
+ * Translates an NT process group member to a CPU set index.
+ *
+ * @returns CPU set index, -1 if not valid.
+ * @param   idxGroup The CPU group.
+ * @param   idxMember The CPU group member number.
+ *
+ * @remarks Only available on Windows.
+ */
+RTDECL(int) RTMpSetIndexFromCpuGroupMember(uint32_t idxGroup, uint32_t idxMember);
+ * Gets the member numbers for a CPU group.
+ *
+ * @returns Maximum number of group members.
+ * @param   idxGroup        The CPU group.
+ * @param   pcActive        Where to return the number of active members.
+ *
+ * @remarks Only available on Windows.
+ */
+RTDECL(uint32_t) RTMpGetCpuGroupCounts(uint32_t idxGroup, uint32_t *pcActive);
+
+/**
+ * Get the maximum number of CPU groups.
+ *
+ * @returns Maximum number of CPU groups.
+ *
+ * @remarks Only available on Windows.
+ */
+RTDECL(uint32_t) RTMpGetMaxCpuGroupCount(void);
+
+/**
+ * Gets the max CPU identifier (inclusive).
+ *
+ * Intended for brute force enumerations, but use with
+ * care as it may be expensive.
+ *
+ * @returns The current higest CPU identifier value.
+ */
+RTDECL(RTCPUID) RTMpGetMaxCpuId(void);
+
+/**
+ * Gets the size of a CPU array that is indexed by CPU set index.
+ *
+ * This takes both online, offline and hot-plugged cpus into account.
+ *
+ * @returns Number of elements.
+ *
+ * @remarks Use RTMpCpuIdToSetIndex to convert a RTCPUID into an array index.
+ */
+RTDECL(uint32_t) RTMpGetArraySize(void);
+
+/**
+ * Checks if a CPU exists in the system or may possibly be hotplugged later.
+ *
+ * @returns true/false accordingly.
+ * @param   idCpu       The identifier of the CPU.
+ */
+RTDECL(bool) RTMpIsCpuPossible(RTCPUID idCpu);
/**
 * Gets set of the CPUs present in the system plus any that may
 * possibly be hotplugged later.
 * @returns pSet.
 * @param   pSet    Where to put the set.
 */
+RTDECL(PRTCPUSET) RTMpGetSet(PRTCPUSET pSet);
+
 /**<
 * Get the count of CPUs present in the system plus any that may
 * possibly be hotplugged later.
 * @returns The count.
 * @remarks Don't use this for CPU array sizing, use RTMpGetArraySize instead.
 */
+RTDECL(RTCPUID) RTMpGetCount(void);
+
 /**<
 * Get the count of physical CPU cores present in the system plus any that may
 * possibly be hotplugged later.
 * @returns The number of cores.
 */
+RTDECL(RTCPUID) RTMpGetCoreCount(void);
+
 /**<
 * Gets set of the CPUs present that are currently online.
 * @returns pSet.
 * @param   pSet    Where to put the set.
 */
+RTDECL(PRTCPUSET) RTMpGetOnlineSet(PRTCPUSET pSet);
+
 /**<
 * Get the count of CPUs that are currently online.
 * @return The count.
 */
+RTDECL(RTCPUID) RTMpGetOnlineCount(void);
+
 /**<
 * Get the count of physical CPU cores in the system with one or more online
 * threads.
 * @returns The number of online cores.
 */
+RTDECL(RTCPUID) RTMpGetOnlineCoreCount(void);
+ /**<
+ * Checks if a CPU is online or not.
+ */
+ @returns true/false accordingly.
+ @param idCpu The identifier of the CPU.
+ */
+RTDECL(bool) RTMpIsCpuOnline(RTCPUID idCpu);
+
+ /**<
+ * Gets set of the CPUs present in the system.
+ */
+ @returns pSet.
+ @param pSet Where to put the set.
+ */
+RTDECL(PRTCPUSET) RTMpGetPresentSet(PRTCPUSET pSet);
+
+ /**<
+ * Get the count of CPUs that are present in the system.
+ */
+ @return The count.
+ */
+RTDECL(RTCPUID) RTMpGetPresentCount(void);
+
+ /**<
+ * Get the count of physical CPU cores present in the system.
+ */
+ @returns The number of cores.
+ */
+RTDECL(RTCPUID) RTMpGetPresentCoreCount(void);
+
+ /**<
+ * Checks if a CPU is present in the system.
+ */
+ @returns true/false accordingly.
+ @param idCpu The identifier of the CPU.
+ */
+RTDECL(bool) RTMpIsCpuPresent(RTCPUID idCpu);
+
+ /**<
+ * Get the current frequency of a CPU.
+ */
+ @return The frequency as MHz. 0 if the CPU is offline
+ or the information is not available.
* @param idCpu The identifier of the CPU.
+ */
+RTDECL(uint32_t) RTMpGetCurFrequency(RTCPUID idCpu);
+
+/**
+ * Get the maximum frequency of a CPU.
+ *
+ * The CPU must be online.
+ *
+ * @returns The frequency as MHz. 0 if the CPU is offline
+ * or the information is not available.
+ * @param idCpu The identifier of the CPU.
+ */
+RTDECL(uint32_t) RTMpGetMaxFrequency(RTCPUID idCpu);
+
+/**
+ * Get the CPU description string.
+ *
+ * The CPU must be online.
+ *
+ * @returns IPRT status code.
+ * @param idCpu The identifier of the CPU. NIL_RTCPUID can be used to
+ * indicate the current CPU.
+ * @param pszBuf The output buffer.
+ * @param cbBuf The size of the output buffer.
+ */
+RTDECL(int) RTMpGetDescription(RTCPUID idCpu, char *pszBuf, size_t cbBuf);
+
+/*
+ifdef IN_RING0
+
+/**
+ * Check if there's work (DPCs on Windows) pending on the current CPU.
+ *
+ * @return true if there's pending work on the current CPU, false otherwise.
+ */
+RTDECL(bool) RTMpIsCpuWorkPending(void);
+
+/**
+ * Worker function passed to RTMpOnAll, RTMpOnOthers and RTMpOnSpecific that
+ * is to be called on the target cpus.
+ *
+ * @param idCpu The identifier for the CPU the function is called on.
+ * @param pvUser1 The 1st user argument.
+ * @param pvUser2 The 2nd user argument.
+ */
typedef DECLCALLBACK(void) FNRTMPWORKER(RTCPUID idCpu, void *pvUser1, void *pvUser2);
/** Pointer to a FNRTMPWORKER. */
typedef FNRTMPWORKER *PFNRTMPWORKER;

/** @name RTMPON_F_XXX - RTMpOn flags. */
* @{
* @argument RTMPON_F_WHATEVER_EXEC  0
* The caller doesn't care if pfnWorker is executed at the same time on the
* specified CPUs or not, as long as it gets executed. */
#define RTMPON_F_WHATEVER_EXEC 0

/** The caller insists on pfnWorker being executed more or less concurrently
* on the specified CPUs. */
#define RTMPON_F_CONCURRENT_EXEC RT_BIT_32(1)

/** Mask of valid bits. */
#define RTMPON_F_VALID_MASK UINT32_C(0x00000001)
* @} */

/** Checks if the RTMpOnAll() is safe with regards to all threads executing
* concurrently.
* If for instance, the RTMpOnAll() is implemented in a way where the threads
* might cause a classic deadlock, it is considered -not- concurrent safe.
* Windows currently is one such platform where it isn't safe.
* @returns true if RTMpOnAll() is concurrent safe, false otherwise.
*/
RTDECL(bool) RTMpOnAllIsConcurrentSafe(void);

/** Executes a function on each (online) CPU in the system.
* @returns IPRT status code.
* @retval  VINF_SUCCESS on success.
* @retval  VERR_NOT_SUPPORTED if this kind of operation isn't supported by the system.
* @param   pfnWorker       The worker function.
* @param   pvUser1         The first user argument for the worker.
* @param   pvUser2         The second user argument for the worker.
* @remarks The execution isn't in any way guaranteed to be simultaneous,
* it might even be serial (cpu by cpu).
*/
RTDECL(int) RTMpOnAll(PFNRTMPWORKER pfnWorker, void *pvUser1, void *pvUser2);

/** Executes a function on all other (online) CPUs in the system.
* The caller must disable preemption prior to calling this API if the outcome
* is to make any sense. But do *not* disable interrupts.
+ @returns IPRT status code.
+ @retval VINF_SUCCESS on success.
+ @retval VERR_NOT_SUPPORTED if this kind of operation isn't supported by the system.
+ 
+ @param pfnWorker The worker function.
+ @param pvUser1 The first user argument for the worker.
+ @param pvUser2 The second user argument for the worker.
+ 
+ @returns IPRT status code.
+ @retval VINF_SUCCESS on success.
+ @retval VERR_NOT_SUPPORTED if this kind of operation isn't supported by the system.
+ @retval VERR_CPU_OFFLINE if the CPU is offline.
+ @retval VERR_CPU_NOT_FOUND if the CPU wasn't found.
+ 
+ @param idCpu The id of the CPU.
+ @param pfnWorker The worker function.
+ @param pvUser1 The first user argument for the worker.
+ @param pvUser2 The second user argument for the worker.
+ 
+ @returns IPRT status code.
+ @retval VINF_SUCCESS on success.
+ @retval VERR_NOT_SUPPORTED if this kind of operation isn't supported by the system or if the specified modifier flag isn't supported.
+ @retval VERR_CPU_OFFLINE if one or more of the CPUs are offline (see remarks).
+ @retval VERR_CPU_NOT_FOUND if on or both of the CPUs weren't found.
+ @retval VERR_NOT_ALL_CPUS_SHOWED if one of the CPUs didn't show.
+ 
+ @param idCpu1 The id of the first CPU.
+ @param idCpu2 The id of the second CPU.
+ @param fFlags Combination of RTMPON_F_XXX flags.
+ @param pfnWorker The worker function.
+ @param pvUser1 The first user argument for the worker.
+ * @param pvUser2 The second user argument for the worker.
+ *
+ * @remarks There is a possible race between one (or both) of the CPUs going
+ * offline while setting up the call. The worker function must take
+ * this into account.
+ */
+RTDECL(int) RTMpOnPair(RTCPUID idCpu1, RTCPUID idCpu2, uint32_t fFlags, PFNRTMPWORKER
pfnWorker, void *pvUser1, void *pvUser2);
+
+/**
+ * Indicates whether RTMpOnPair supports running the pfnWorker concurrently on
+ * both CPUs using RTMPON_F_CONCURRENT_EXEC.
+ *
+ * @returns true if supported, false if not.
+ */
+RTDECL(bool) RTMpOnPairIsConcurrentExecSupported(void);
+
+/**
+ * Pokes the specified CPU.
+ *
+ * This should cause the execution on the CPU to be interrupted and forcing it
+ * to enter kernel context. It is optimized version of a RTMpOnSpecific call
+ * with a worker which returns immediately.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_NOT_SUPPORTED if this kind of operation isn't supported by the
+ * system. The caller must not automatically assume that this API works
+ * when any of the RTMpOn* APIs works. This is because not all systems
+ * supports unicast MP events and this API will not be implemented as a
+ * broadcast.
+ * @retval VERR_CPU_OFFLINE if the CPU is offline.
+ * @retval VERR_CPU_NOT_FOUND if the CPU wasn't found.
+ *
+ * @param idCpu The id of the CPU to poke.
+ */
+RTDECL(int) RTMpPokeCpu(RTCPUID idCpu);
+
+/**
+ * MP event, see FNRTMPNOTIFICATION.
+ */
+typedef enum RTMPEVENT
+{*
+    /** The CPU goes online. */
+    RTMPEVENT_ONLINE = 1,
+    /** The CPU goes offline. */
+    RTMPEVENT_OFFLINE
+};
+} RTMPEVENT;
+
+/**
+ * Notification callback.
+ *
+ * The context this is called in differs a bit from platform to platform, so be
+ * careful while in here.
+ *
+ * On Windows we're running with IRQL=PASSIVE_LEVEL (reschedulable) according to
+ * the KeRegisterProcessorChangeCallback documentation - unrestricted API
+ * access. Probably not being called on the onlined/offlined CPU...
+ *
+ * On Solaris we're holding the cpu_lock, IPL/SPL/PIL is not yet known, however
+ * we will most likely -not- be firing on the CPU going offline/online.
+ *
+ * On Linux it looks like we're called with preemption enabled on any CPU and
+ * not necessarily on the CPU going offline/online.
+ *
+ * There is no callbacks for darwin at the moment, due to lack of suitable KPI.
+ *
+ * @param   idCpu       The CPU this applies to.
+ * @param   enmEvent    The event.
+ * @param   pvUser      The user argument.
+ */
+typedef DECLCALLBACK(void) FNRTMPNOTIFICATION(RTMPEVENT enmEvent, RTCPUID idCpu, void
+ *pvUser);
+/** Pointer to a FNRTMPNOTIFICATION(). */
typedef FNRTMPNOTIFICATION *PFNRTMPNOTIFICATION;
+
+/**
+ * Registers a notification callback for cpu events.
+ *
+ * On platforms which doesn't do cpu offline/online events this API
+ * will just be a no-op that pretends to work.
+ *
+ * @todo We'll be adding a flag to this soon to indicate whether the callback should be called on all
+ * CPUs that are currently online while it's being registered. This is to help avoid some race
+ * conditions (we'll hopefully be able to implement this on linux, solaris/win is no issue).
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_NO_MEMORY if a registration record cannot be allocated.
+ * @retval  VERR_ALREADY_EXISTS if the pfnCallback and pvUser already exist
+ * in the callback list.
+ *
+ * @param   pfnCallback     The callback.
+ * @param   pvUser          The user argument to the callback function.
+ */
+RTDECL(int) RTMpNotificationRegister(PFNRTMPNOTIFICATION pfnCallback, void *pvUser);
+
+/** *
+ * This deregisters a notification callback registered via RTMpNotificationRegister().
+ *
+ * The pfnCallback and pvUser arguments must be identical to the registration call
+ * of we won't find the right entry.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_NOT_FOUND if no matching entry was found.
+ *
+ * @param   pfnCallback     The callback.
+ * @param   pvUser          The user argument to the callback function.
+ */
+RTDECL(int) RTMpNotificationDeregister(PFNRTMPNOTIFICATION pfnCallback, void *pvUser);
+
+RT_C_DECLS_END
+
@end if /* IN_RING0 */
+
+/** @} */
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/net.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/net.h
@@ -0,0 +1,1010 @@
+/** @file
+ * IPRT - Network Protocols.
+ */
+
+#endif /* END_DECLS */
+
+/* Copyright (C) 2008-2017 Oracle Corporation
+ *
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#define __iprt_net_h
#include <iprt/cdefs.h>
#include <iprt/types.h>
#include <iprt/assert.h>

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_net     RTNet - Network Protocols
 * @ingroup grp_rt
 * @{
 */

/** Converts an stringified Ethernet MAC address into the RTMAC representation.
 * @param   pszAddr         The address string to convert.
 * @param   pMacAddr        Where to store the result.
 */
RTDECL(int) RTNetStrToMacAddr(const char *pszAddr, PRTMAC pMacAddr);

/** IPv4 address. */
typedef RTUINT32U RTNETADDRIPV4;
AssertCompileSize(RTNETADDRIPV4, 4);
/** Pointer to a IPv4 address. */
typedef RTNETADDRIPV4 *PRTNETADDRIPV4;
/** Pointer to a const IPv4 address. */
typedef RTNETADDRIPV4 const *PCRTNETADDRIPV4;

/** Tests if the given string is an IPv4 address. */
RTDECL(bool) RTNETADDRIPV4_Avalid(const char *pszAddr);

RT_C_DECLS_END

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+ */
+RTDECL(bool) RTNetIsIPv4AddrStr(const char *pcszAddr);
+
+/**
+ * Tests if the given string is a wildcard IPv4 address.
+ *
+ * @returns boolean.
+ * @param   pcszAddr        String which may be an IPv4 address.
+ */
+RTDECL(bool) RTNetStrIsIPv4AddrAny(const char *pcszAddr);
+
+/**
+ * Parses dotted-decimal IPv4 address into RTNETADDRIPV4 representation.
+ *
+ * @returns VINF_SUCCESS on success, VERR_INVALID_PARAMETER on
+ *          failure.
+ *
+ * @param   pcszAddr        The value to convert.
+ * @param   ppszNext        Where to store the pointer to the first char
+ *                            following the address. (Optional)
+ * @param   pAddr           Where to store the result.
+ */
+RTDECL(int) RTNetStrToIPv4AddrEx(const char *pcszAddr, PRTNETADDRIPV4 pAddr, char **ppszNext);
+
+/**
+ * Parses dotted-decimal IPv4 address into RTNETADDRIPV4 representation.
+ * Leading and trailing whitespace is ignored.
+ *
+ * @returns VINF_SUCCESS on success, VERR_INVALID_PARAMETER on
+ *          failure.
+ *
+ * @param   pcszAddr        The value to convert.
+ * @param   pAddr           Where to store the result.
+ */
+RTDECL(int) RTNetStrToIPv4Addr(const char *pcszAddr, PRTNETADDRIPV4 pAddr);
+
+/**
+ * Verifies that RTNETADDRIPV4 is a valid contiguous netmask and
+ * computes its prefix length.
+ *
+ * @returns VINF_SUCCESS on success, VERR_INVALID_PARAMETER on
+ *          failure.
+ *
+ * @param   pMask           The netmask to verify and convert.
+ * @param   piPrefix        Where to store the prefix length. (Optional)
+ */
+RTDECL(int) RTNetMaskToPrefixIPv4(PCRTNETADDRIPV4 pMask, int *piPrefix);
/**
 * Computes netmask corresponding to the prefix length.
 *
 * @returns VINF_SUCCESS on success, VERR_INVALID_PARAMETER on
 *          failure.
 *
 * @param   iPrefix         The prefix to convert.
 * @param   pMask           Where to store the netmask.
 */
RTDECL(int) RTNetPrefixToMaskIPv4(int iPrefix, PRTNETADDRIPV4 pMask);

/** IPv6 address. */
typedef RTUINT128U RTNETADDRIPV6;
AssertCompileSize(RTNETADDRIPV6, 16);
/** Pointer to a IPv6 address. */
typedef RTNETADDRIPV6 *PRTNETADDRIPV6;
/** Pointer to a const IPv6 address. */
typedef RTNETADDRIPV6 const *PCRTNETADDRIPV6;

/** Tests if the given string is a valid IPv6 address. */
RTDECL(bool) RTNetIsIPv6AddrStr(const char *pszAddress);

/** Tests if the given string is a wildcard IPv6 address. */
RTDECL(bool) RTNetStrIsIPv6AddrAny(const char *pszAddress);

/** Parses IPv6 address into RTNETADDRIPV6 representation. */
RTDECL(int) RTNetStrToAddrIPv6(const char *pszAddr, PRTNETADDRIPV6 pAddr);
+ *\ /
+ RTDECL(int) RTNetStrToIPv6AddrEx(const char *pcszAddr, PRTNETADDRIPV6 pAddr, char **ppszNext);
+ 
+ /**
+ * Parses IPv6 address into RTNETADDRIPV6 representation.
+ * Leading and trailing whitespace is ignored.
+ *
+ * @returns VINF_SUCCESS on success, VERR_INVALID_PARAMETER on
+ * failure.
+ *
+ * @param pcszAddr The value to convert.
+ * @param ppszZone Where to store the pointer to the first char
+ * of the zone id. NULL is stored if there is
+ * no zone id.
+ * @param pAddr Where to store the result.
+ */
+ RTDECL(int) RTNetStrToIPv6Addr(const char *pcszAddr, PRTNETADDRIPV6 pAddr, char **ppszZone);
+
+ /**
+ * Verifies that RTNETADDRIPV6 is a valid contiguous netmask and
+ * computes its prefix length.
+ *
+ * @returns VINF_SUCCESS on success, VERR_INVALID_PARAMETER on
+ * failure.
+ *
+ * @param pMask The netmask to verify and convert.
+ * @param piPrefix Where to store the prefix length. (Optional)
+ */
+ RTDECL(int) RTNetMaskToPrefixIPv6(PCRTNETADDRIPV6 pMask, int *piPrefix);
+
+ /**
+ * Computes netmask corresponding to the prefix length.
+ *
+ * @returns VINF_SUCCESS on success, VERR_INVALID_PARAMETER on
+ * failure.
+ *
+ * @param iPrefix The prefix to convert.
+ * @param pMask Where to store the netmask.
+ */
+ RTDECL(int) RTNetPrefixToMaskIPv6(int iPrefix, PRTNETADDRIPV6 pMask);
+
+ /**
+ * IPX address.
+ */
+ #pragma pack(1)
+ typedef struct RTNETADDRIPX
+ {
+
+ /** The network ID. */
+ uint32_t Network;
+ /** The node ID. (Defaults to the MAC address apparently.) */
+ RTMAC Node;
+ } RTNETADDRIPX;
+#pragma pack()
+AssertCompileSize(RTNETADDRIPX, 4+6);
+/** Pointer to an IPX address. */
+typedef RTNETADDRIPX *PRTNETADDRIPX;
+/** Pointer to a const IPX address. */
+typedef RTNETADDRIPX const *PCRTNETADDRIPX;
+
+/**
+ * Network address union.
+ *
+ * @remarks The size of this structure may change in the future.
+ */
+typedef union RTNETADDRU
+{
+    /** 64-bit view. */
+    uint64_t au64[2];
+    /** 32-bit view. */
+    uint32_t au32[4];
+    /** 16-bit view. */
+    uint16_t au16[8];
+    /** 8-bit view. */
+    uint8_t  au8[16];
+    /** IPv4 view. */
+    RTNETADDRIPV4 IPv4;
+    /** IPv6 view. */
+    RTNETADDRIPV6 IPv6;
+    /** IPX view. */
+    RTNETADDRIPX Ipx;
+    /** MAC address view. */
+    RTMAC Mac;
+} RTNETADDRU;
+AssertCompileSize(RTNETADDRU, 16);
+/** Pointer to an address union. */
+typedef RTNETADDRU *PRTNETADDRU;
+/** Pointer to a const address union. */
+typedef RTNETADDRU const *PCRTNETADDRU;
+
+/**
+ * Network address type.
+ *
+ * @remarks The value assignments may change in the future.
typedef enum RTNETADDRTYPE
{
    /** The invalid 0 entry. */
    RTNETADDRTYPE_INVALID = 0,
    /** IP version 4. */
    RTNETADDRTYPE_IPV4,
    /** IP version 6. */
    RTNETADDRTYPE_IPV6,
    /** IPX. */
    RTNETADDRTYPE_IPX,
    /** MAC address. */
    RTNETADDRTYPE_MAC,
    /** The end of the valid values. */
    RTNETADDRTYPE_END,
    /** The usual 32-bit hack. */
    RTNETADDRTYPE_32_BIT_HACK = 0x7fffffff
} RTNETADDRTYPE;

/** Pointer to a network address type. */
typedef RTNETADDRTYPE *PRTNETADDRTYPE;

/** Pointer to a const network address type. */
typedef RTNETADDRTYPE const *PCRTNETADDRTYPE;

/** Network address. */
typedef struct RTNETADDR
{
    /** The address union. */
    RTNETADDRU uAddr;
    /** Indicates which view of @a u that is valid. */
    RTNETADDRTYPE enmType;
    /** The port number for IPv4 and IPv6 addresses. This is set to */
    /** RTNETADDR::uPort if not applicable. */
    uint32_t uPort;
} RTNETADDR;

/** Pointer to a network address. */
typedef RTNETADDR *PRTNETADDR;

/** Pointer to a const network address. */
typedef RTNETADDR const *PCRTNETADDR;

/** The not applicable value of RTNETADDR::uPort value use to inid. */
#define RTNETADDR_PORT_NA       UINT32_MAX

/** Ethernet header. */
#pragma pack(1)
typedef struct RTNETETHERHDR
{
 + RTMAC       DstMac;
 + RTMAC       SrcMac;
 + /**< Ethernet frame type or frame size, depending on the kind of ethernet.
 + * This is big endian on the wire. */
 + uint16_t    EtherType;
 +} RTNETETHERHDR;
#pragma pack()

AssertCompileSize(RTNETETHERHDR, 14);

/* Pointer to an ethernet header. */
typedef RTNETETHERHDR *PRTNETETHERHDR;

/* Pointer to a const ethernet header. */
typedef RTNETETHERHDR const *PCRTNETETHERHDR;

/** @name EtherType (RTNETETHERHDR::EtherType)
 * @{ */
#define RTNET_ETHERTYPE_IPV4    UINT16_C(0x0800)
#define RTNET_ETHERTYPE_ARP     UINT16_C(0x0806)
#define RTNET_ETHERTYPE_IPV6    UINT16_C(0x86dd)
#define RTNET_ETHERTYPE_VLAN    UINT16_C(0x8100)
#define RTNET_ETHERTYPE_IPX_1   UINT16_C(0x8037)
#define RTNET_ETHERTYPE_IPX_2   UINT16_C(0x8137)
#define RTNET_ETHERTYPE_IPX_3   UINT16_C(0x8138)
/** @} */

/* IPv4 header.
 * All is bigendian on the wire.
 * */
#pragma pack(1)
typedef struct RTNETIPV4
{
#ifdef RT_BIG_ENDIAN
    unsigned int    ip_v : 4;
    unsigned int    ip_hl : 4;
    unsigned int    ip_tos : 8;
    unsigned int    ip_len : 16;
#else
    /** 00:0 - Header length given as a 32-bit word count. */
    unsigned int    ip_hl : 4;
    /** 00:4 - Header version. */
    unsigned int    ip_v : 4;
    /** 01 - Type of service. */
    unsigned int    ip_tos : 8;
#endif
}
+ /** 02 - Total length (header + data). */
+ unsigned int ip_len : 16;
+#endif
+ /** 04 - Packet idenficiation. */
+ uint16_t ip_id;
+ /** 06 - Offset if fragmented. */
+ uint16_t ip_off;
+ /** 08 - Time to live. */
+ uint8_t ip_ttl;
+ /** 09 - Protocol. */
+ uint8_t ip_p;
+ /** 0a - Header check sum. */
+ uint16_t ip_sum;
+ /** 0c - Source address. */
+ RTNETADDRIPV4 ip_src;
+ /** 10 - Destination address. */
+ RTNETADDRIPV4 ip_dst;
+ /** 14 - Options (optional). */
+ uint32_t ip_options[1];
+ } RTNETIPV4;
+
+ AssertCompileSize(RTNETIPV4, 6 * 4);
+ /** Pointer to a IPv4 header. */
+ typedef RTNETIPV4 *PRTNETIPV4;
+ /** Pointer to a const IPv4 header. */
+ typedef RTNETIPV4 const *PCRTNETIPV4;
+
+ /** The minimum IPv4 header length (in bytes).
+ * Up to and including RTNETIPV4::ip_dst. */
+ #define RTNETIPV4_MIN_LEN   (20)
+
+ /** @name IPv4 Protocol Numbers
+ * @{ */
+ /** IPv4: ICMP */
+ #define RTNETIPV4_PROT_ICMP     (1)
+ /** IPv4: TCP */
+ #define RTNETIPV4_PROT_TCP      (6)
+ /** IPv4: UDP */
+ #define RTNETIPV4_PROT_UDP      (17)
+ /** @ } */
+
+ /** @name Common IPv4 Port Assignments
+ * @{
+ /** Boostrap Protocol / DHCP) Server. */
+ #define RTNETIPV4_PORT_BOOTPS   (67)
+ /** Boostrap Protocol / DHCP) Client. */
+#define RTNETIPV4_PORT_BOOTPC   (68)
+/** @} */
+/** @name IPv4 Flags */
+/** IPv4: Don't fragment */
+/** IPv4: More fragments */
+/** @} */

+RTDECL(uint16_t) RTNetIPv4HdrChecksum(PCRTNETIPV4 pIpHdr);
+RTDECL(bool)     RTNetIPv4IsHdrValid(PCRTNETIPV4 pIpHdr, size_t cbHdrMax, size_t cbPktMax, bool fChecksum);
+RTDECL(uint32_t) RTNetIPv4PseudoChecksum(PCRTNETIPV4 pIpHdr);
+RTDECL(uint32_t) RTNetIPv4PseudoChecksumBits(RTNETADDRIPV4 SrcAddr, RTNETADDRIPV4 DstAddr,
+uint8_t bProtocol, uint16_t cbPkt);
+RTDECL(uint32_t) RTNetIPv4AddDataChecksum(void const *pvData, size_t cbData, uint32_t u32Sum, bool *pfOdd);
+RTDECL(uint16_t) RTNetIPv4FinalizeChecksum(uint32_t u32Sum);

+/**
+ * IPv6 header.
+ * All is bigendian on the wire.
+ */
+#pragma pack(1)
+typedef struct RTNETIPV6
+
+    /** Version (4 bits), Traffic Class (8 bits) and Flow Lable (20 bits). @todo this is probably mislabeled - ip6_flow vs. ip6_vfc, fix later. */
+    uint32_t        ip6_vfc;
+    /** 04 - Payload length, including extension headers. */
+    uint16_t        ip6_plen;
+    /** 06 - Next header type (RTNETIPV4_PROT_XXX). */
+    uint8_t         ip6_nxt;
+    /** 07 - Hop limit. */
+    uint8_t         ip6_hlim;
+    /** xx - Source address. */
+    RTNETADDRIPV6   ip6_src;
+    /** xx - Destination address. */
+    RTNETADDRIPV6   ip6_dst;
+} RTNETIPV6;
+#pragma pack()
typedef RTNETIPV6 const *PCRTNETIPV6;

/** The minimum IPv6 header length (in bytes).
 * Up to and including RTNETIPV6::ip6_dst. */
#define RTNETIPV6_MIN_LEN                           (40)
#define RTNETIPV6_ICMPV6_ND_WITH_LLA_OPT_MIN_LEN    (32)

RTDECL(uint32_t) RTNetIPv6PseudoChecksum(PCRTNETIPV6 pIpHdr);
RTDECL(uint32_t) RTNetIPv6PseudoChecksumEx(PCRTNETIPV6 plpHdr, uint8_t bProtocol, uint16_t cbPkt);
RTDECL(uint32_t) RTNetIPv6PseudoChecksumBits(PCRTNETADDRIPV6 pSrcAddr, PCRTNETADDRIPV6 pDstAddr,
                                 uint8_t bProtocol, uint16_t cbPkt);

/** UDP header. */
#pragma pack(1)
typedef struct RTNETUDP
{+
   /** The source port. */
   uint16_t    uh_sport;
   /** The destination port. */
   uint16_t    uh_dport;
   /** The length of the UDP header and associated data. */
   uint16_t    uh_ulen;
   /** The checksum of the pseudo header, the UDP header and the data. */
   uint16_t    uh_sum;
} RTNETUDP;
#pragma pack()
AssertCompileSize(RTNETUDP, 8);
/** Pointer to an UDP header. */
typedef RTNETUDP *PRTNETUDP;
/** Pointer to a const UDP header. */
typedef RTNETUDP const *PCRTNETUDP;

/** The minimum UDP packet length (in bytes). (RTNETUDP::uh_ulen) */
#define RTNETUDP_MIN_LEN   (8)

RTDECL(uint16_t) RTNetUDPChecksum(uint32_t u32Sum, PCRTNETUDP pUdpHdr);
RTDECL(uint32_t) RTNetIPv4AddUDPChecksum(PCRTNETUDP pUdpHdr, uint32_t u32Sum);
RTDECL(uint16_t) RTNetIPv4UDPChecksum(PCRTNETIPV4 pIpHdr, PCRTNETUDP pUdpHdr, void const *pvData);
RTDECL(bool)     RTNetIPv4IsUDPSizeValid(PCRTNETIPV4 pIpHdr, PCRTNETUDP pUdpHdr, size_t cbPktMax);
RTDECL(bool)     RTNetIPv4IsUDPValid(PCRTNETIPV4 pIpHdr, PCRTNETUDP pUdpHdr, void const *pvData, size_t cbPktMax, bool fChecksum);

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/** IPv4 BOOTP / DHCP packet. */
#pragma pack(1)
typedef struct RTNETBOOTP
{
    /** 00 - The packet opcode (RTNETBOOTP_OP_ * ). */
    uint8_t         bp_op;
    /** 01 - Hardware address type. Same as RTNETARPHDR:: ar_htype. */
    uint8_t         bp_htype;
    /** 02 - Hardware address length. */
    uint8_t         bp_hlen;
    /** 03 - Gateway hops. */
    uint8_t         bp_hops;
    /** 04 - Transaction ID. */
    uint32_t        bp_xid;
    /** 08 - Seconds since boot started. */
    uint16_t        bp_secs;
    /** 0a - Unused (BOOTP) / Flags (DHCP) (RTNET_DHCP_FLAGS_ * ). */
    uint16_t        bp_flags;
    /** 0c - Client IPv4 address. */
    RTNETADDRIPV4   bp_ciaddr;
    /** 10 - Your IPv4 address. */
    RTNETADDRIPV4   bp_yiaddr;
    /** 14 - Server IPv4 address. */
    RTNETADDRIPV4   bp_siaddr;
    /** 18 - Gateway IPv4 address. */
    RTNETADDRIPV4   bp_giaddr;
    /** 1c - Client hardware address. */
    union
    {
        uint8_t     ao8[16];
        RTMAC       Mac;
    }               bp_chaddr;
    /** 2c - Server name. */
    uint8_t         bp_sname[64];
    /** 6c - File name / more DHCP options. */
    uint8_t         bp_file[128];
    /** cc - Vendor specific area (BOOTP) / Options (DHCP). */
    * @remark This is really 312 bytes in the DHCP version. */
    union
    {
        uint8_t     ao8[128];
        struct DHCP
        {
            /** cc - The DHCP cookie (RTNET_DHCP_COOKIE). */
            uint32_t    dhcp_cookie;
        }
    }
    /** ec - The DHCP cookie (RTNET_DHCP_COOKIE). */
    uint32_t    dhcp_cookie;


+ /* f0 - The DHCP options. */
+     uint8_t   dhcp_opts[124];
+ }               Dhcp;
+ }               bp_vend;
+
+} RTNETBOOTP;
+#pragma pack()
+AssertCompileSize(RTNETBOOTP, 0xec + 128);
+/** Pointer to a BOOTP / DHCP packet. */
typedef RTNETBOOTP *PRTNETBOOTP;
+/** Pointer to a const BOOTP / DHCP packet. */
typedef RTNETBOOTP const *PCRTNETBOOTP;
+
+/** Minimum BOOTP packet length. For quick validation, no standard thing really. */
+#define RTNETBOOTP_MIN_LEN 0xec
+/** Minimum DHCP packet length. For quick validation, no standard thing really. */
+#define RTNETBOOTP_DHCP_MIN_LEN 0xf1
+
+/** The normal size of the a DHCP packet (i.e. a RTNETBOOTP).
+ * Same as RTNET_DHCP_OPT_SIZE, just expressed differently. */
+#define RTNET_DHCP_NORMAL_SIZE (0xec + 4 + RTNET_DHCP_OPT_SIZE)
+/** The normal size of RTNETBOOTP::bp_vend::Dhcp::dhcp_opts. */
+#define RTNET_DHCP_OPT_SIZE (312 - 4)
+
+/** @name BOOTP packet opcode values
+ * @{ */
+#define RTNETBOOTP_OP_REQUEST       1
+#define RTNETBOOTP_OP_REPLY         2
+/** @} */
+
+/** @name DHCP flags (RTNETBOOTP::bp_flags)
+ * @{ */
+#define RTNET_DHCP_FLAGS_NO_BROADCAST   UINT16_C(0x8000) /**< @todo check test!!! */
+/** @} */
+
+/** The DHCP cookie (network endian). */
+#define RTNET_DHCP_COOKIE UINT32_C(0x63825363)
+
+/**
+ * An IPv4 DHCP option header.
+ */
typedef struct RTNETDHCPOPT
+{
+    /* 00 - The DHCP option. */
+    uint8_t   dhcp_opt;
+    /* 01 - The data length (excluding this header). */
+    uint8_t   dhcp_len;
+    /* 02 - The option data follows here, optional and of variable length. */
+}
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+} RTNETDHCPOPT;
+AssertCompileSize(RTNETDHCPOPT, 2);
+/** Pointer to a DHCP option header. */
+typedef RTNETDHCPOPT *PRTNETDHCPOPT;
+/** Pointer to a const DHCP option header. */
+typedef RTNETDHCPOPT const *PCRTNETDHCPOPT;
+
+/** @name DHCP options */
+* @{ */
+/** 1 byte padding, this has no dhcp_len field. */
+#define RTNET_DHCP_OPT_PAD 0
+
+/** The subnet mask. */
+#define RTNET_DHCP_OPT_SUBNET_MASK 1
+/** The time offset. */
+#define RTNET_DHCP_OPT_TIME_OFFSET 2
+/** The routers for the subnet. */
+#define RTNET_DHCP_OPT_ROUTERS 3
+/** Domain Name Server. */
+#define RTNET_DHCP_OPT_DNS 6
+/** Host name. */
+#define RTNET_DHCP_OPT_HOST_NAME 12
+/** Domain name. */
+#define RTNET_DHCP_OPT_DOMAIN_NAME 15
+
+/** The requested address. */
+#define RTNET_DHCP_OPT_REQ_ADDR 50
+/** The lease time in seconds. */
+#define RTNET_DHCP_OPT_LEASE_TIME 51
+/** Option overload. */
+/** Indicates that the bp_file and/or bp_sname holds contains DHCP options. */
+#define RTNET_DHCP_OPT_OPTION_OVERLOAD 52
+/** Have a 8-bit message type value as data, see RTNET_DHCP_MT_. */
+#define RTNET_DHCP_OPT_MSG_TYPE 53
+/** Server ID. */
+#define RTNET_DHCP_OPT_SERVER_ID 54
+/** Parameter request list. */
+#define RTNET_DHCP_OPT_PARAM_REQ_LIST 55
+/** The maximum DHCP message size a client is willing to accept. */
+#define RTNET_DHCP_OPT_MAX_DHCP_MSG_SIZE 57
+/** Client ID. */
+#define RTNET_DHCP_OPT_CLIENT_ID 61
+/** TFTP server name. */
+#define RTNET_DHCP_OPT_TFTP_SERVER_NAME 66
+/** Bootfile name. */
+#define RTNET_DHCP_OPT_BOOTFILE_NAME 67
+
+/** Marks the end of the DHCP options, this has no dhcp_len field. */
+\#define RTNET_DHCP_OPT_END 255
+/** @} */

+/** @} */
+/** @name DHCP Message Types (option 53)
+ * @{ */
+\#define RTNET_DHCP_MT_DISCOVER 1
+\#define RTNET_DHCP_MT_OFFER 2
+\#define RTNET_DHCP_MT_REQUEST 3
+\#define RTNET_DHCP_MT_DECLINE 4
+\#define RTNET_DHCP_MT_ACK 5
+\#define RTNET_DHCP_MT_NACK 6
+\#define RTNET_DHCP_MT_RELEASE 7
+\#define RTNET_DHCP_MT_INFORM 8
+/** @} */

+/** @} */
+/** @name DHCP Flags
+ * @{ */
+\#define RTNET_DHCP_FLAG_BROADCAST 0x8000
+/** @} */

+RTDECL(bool) RTNetIPv4IsDHCPValid(PCRTNETUDP pUdpHdr, PCRTNETBOOTP pDhcp, size_t cbDhcp, uint8_t *pMsgType);
+
+
+/** *
+ * IPv4 DHCP packet.
+ * @deprecated Use RTNETBOOTP.
+ */
+\#pragma pack(1)
+typedef struct RTNETDHCP
+{
+    /** 00 - The packet opcode. */
+    uint8_t         Op;
+    /** Hardware address type. */
+    uint8_t         HType;
+    /** Hardware address length. */
+    uint8_t         HLen;
+    uint8_t         Hops;
+    uint32_t        XID;
+    uint16_t        Secs;
+    uint16_t        Flags;
+    /** Client IPv4 address. */
+    RTNETADDRIPV4   CIAddr;
+    /** Your IPv4 address. */
+    RTNETADDRIPV4   YIAddr;
+    /** Server IPv4 address. */
+    RTNETADDRIPV4   SIAddr;
+    /** Gateway IPv4 address. */
+}
```c
    +    /** Client hardware address. */
+    uint8_t         CHAddr[16];
+    /** Server name. */
+    uint8_t         SName[64];
+    uint8_t         File[128];
+    uint8_t         abMagic[4];
+    uint8_t         DhcpOpt;
+    uint8_t         DhcpLen; /* 1 */
+    uint8_t         DhcpReq;
+    uint8_t         abOptions[57];
+} RTNETDHCP;
+#pragma pack()
+/** @todo AssertCompileSize(RTNETDHCP, ); */
+/** Pointer to a DHCP packet. */
+typedef RTNETDHCP *PRTNETDHCP;
+/** Pointer to a const DHCP packet. */
+typedef RTNETDHCP const *PCRTNETDHCP;
+
+/**
+ * TCP packet.
+ */
+#pragma pack(1)
+typedef struct RTNETTCP
+{
+    /** 00 - The source port. */
+    uint16_t        th_sport;
+    /** 02 - The destination port. */
+    uint16_t        th_dport;
+    /** 04 - The sequence number. */
+    uint32_t        th_seq;
+    /** 08 - The acknowledgement number. */
+    uint32_t        th_ack;
+    #ifdef RT_BIG_ENDIAN
+    unsigned int    th_win : 16;
+    unsigned int    th_flags : 8;
+    unsigned int    th_off : 4;
+    unsigned int    th_x2 : 4;
+    #else
+    /** 0c:0 - Reserved. */
+    unsigned int    th_x2 : 4;
+    /** 0c:4 - The data offset given as a dword count from the start of this header. */
+    unsigned int    th_off : 4;
+    /** 0d - flags. */
+    unsigned int    th_flags : 8;
+    /** 0e - The window. */
+    unsigned int    th_win : 16;
```
typedef struct RTNETTCP
{
    /** 10 - The checksum of the pseudo header, the TCP header and the data. */
    uint16_t    th_sum;
    /** 12 - The urgent pointer. */
    uint16_t    th_urp;
    /* (options follows here and then the data (aka text).) */
} RTNETTCP;
#pragma pack()
#endif

/** Pointer to a TCP packet. */
typedef RTNETTCP *PRTNETTCP;
/** Pointer to a const TCP packet. */
typedef RTNETTCP const *PCRTNETTCP;

/** The minimum TCP header length (in bytes). (RTNETTCP::th_off * 4) */
#define RTNETTCP_MIN_LEN    (20)

/** @name TCP flags (RTNETTCP::th_flags) */
#define RTNETTCP_F_FIN      0x01
#define RTNETTCP_F_SYN      0x02
#define RTNETTCP_F_RST      0x04
#define RTNETTCP_F_PSH      0x08
#define RTNETTCP_F_ACK      0x10
#define RTNETTCP_F_URG      0x20
#define RTNETTCP_F_ECE      0x40
#define RTNETTCP_F_CWR      0x80
/** @} */

RTDECL(uint16_t) RTNetTCPChecksum(uint32_t u32Sum, PCRTNETTCP pTcpHdr, void const *pvData, size_t cbData);
RTDECL(uint32_t) RTNetIPv4AddTCPChecksum(PCRTNETTCP pTcpHdr, uint32_t u32Sum);
RTDECL(uint16_t) RTNetIPv4TCPChecksum(PCRTNETIPV4 pIpHdr, PCRTNETTCP pTcpHdr, void const *pvData);
RTDECL(bool)     RTNetIPv4IsTCPSizeValid(PCRTNETIPV4 pIpHdr, PCRTNETTCP pTcpHdr, size_t cbHdrMax, size_t cbPktMax, bool fChecksum);
RTDECL(bool)     RTNetIPv4IsTCPValid(PCRTNETIPV4 pIpHdr, PCRTNETTCP pTcpHdr, size_t cbHdrMax, void const *pvData,
                                     size_t cbPktMax, bool fChecksum);

/** IPv4 ICMP packet header. */
#pragma pack(1)
typedef struct RTNETICMPV4HDR
{
    /** 00 - The ICMP message type. */
} RTNETICMPV4HDR
#pragma pack(1)
uint8_t icmp_type;
/* 01 - Type specific code that further qualifies the message. */
uint8_t icmp_code;
/* 02 - Checksum of the ICMP message. */
uint16_t icmp_cksum;
} RTNETICMPV4HDR;
#pragma pack()
+AssertCompileSize(RTNETICMPV4HDR, 4);
+/** Pointer to an ICMP packet header. */
+typedef RTNETICMPV4HDR *PRTNETICMPV4HDR;
+/** Pointer to a const ICMP packet header. */
+typedef RTNETICMPV4HDR const *PCRTNETICMPV4HDR;
+
+/** @name ICMP (v4) message types. */
+* @{ */
+#define RTNETICMPV4_TYPE_ECHO_REPLY     0
+#define RTNETICMPV4_TYPE_ECHO_REQUEST   8
+#define RTNETICMPV4_TYPE_TRACEROUTE     30
+/** @} */
+
+/** @ * IPv4 ICMP ECHO Reply & Request packet. */
+*/
+#pragma pack(1)
+typedef struct RTNETICMPV4ECHO
+{*
+  /** 00 - The ICMP header. */
+  RTNETICMPV4HDR Hdr;
+  /** 04 - The identifier to help the requestor match up the reply. */
+  * Can be 0. Typically fixed value. */
+  uint16_t icmp_id;
+  /** 06 - The sequence number to help the requestor match up the reply. */
+  * Can be 0. Typically incrementing between requests. */
+  uint16_t icmp_seq;
+  /** 08 - Variable length data that is to be returned unmodified in the reply. */
+  uint8_t icmp_data[1];
+} RTNETICMPV4ECHO;
+#pragma pack()
+AssertCompileSize(RTNETICMPV4ECHO, 9);
+/** Pointer to an ICMP ECHO packet. */
+typedef RTNETICMPV4ECHO *PRTNETICMPV4ECHO;
+/** Pointer to a const ICMP ECHO packet. */
+typedef RTNETICMPV4ECHO const *PCRTNETICMPV4ECHO;
+
+/** *
+  * IPv4 ICMP TRACEROUTE packet. */
+* This is an reply to an IP packet with the traceroute option set.
+ */
```c
#pragma pack(1)
+
typedef struct RTNETICMPV4TRACEROUTE
+{
+    /**< 00 - The ICMP header. */
+    RTNETICMPV4HDR Hdr;
+    /**< 04 - Identifier copied from the traceroute option's ID number. */
+    uint16_t icmp_id;
+    /**< 06 - Unused. (Possibly an icmp_seq?) */
+    uint16_t icmp_void;
+    /**< 08 - Outbound hop count. From the IP packet causing this message. */
+    uint16_t icmp_ohc;
+    /**< 0a - Return hop count. From the IP packet causing this message. */
+    uint16_t icmp_rhc;
+    /**< 0c - Output link speed, 0 if not known. */
+    uint32_t icmp_speed;
+    /**< 10 - Output link MTU, 0 if not known. */
+    uint32_t icmp_mtu;
+} RTNETICMPV4TRACEROUTE;
+
#pragma pack() 
+AssertCompileSize(RTNETICMPV4TRACEROUTE, 20);
+
/** Pointer to an ICMP TRACEROUTE packet. */
typedef RTNETICMPV4TRACEROUTE *PRTNETICMPV4TRACEROUTE;
/** Pointer to a const ICMP TRACEROUTE packet. */
typedef RTNETICMPV4TRACEROUTE const *PCRTNETICMPV4TRACEROUTE;
+
/** @todo add more ICMPv4 as needed. */
+
/**
 * IPv4 ICMP union packet.
 */
typedef union RTNETICMPV4
{ RTNETICMPV4HDR Hdr;
  RTNETICMPV4ECHO Echo;
  RTNETICMPV4TRACEROUTE Traceroute;
} RTNETICMPV4;
/** Pointer to an ICMP union packet. */
typedef RTNETICMPV4 *PRTNETICMPV4;
/** Pointer to a const ICMP union packet. */
typedef RTNETICMPV4 const *PCRTNETICMPV4;
+
/**
 * IPv6 ICMP packet header.
 */
#pragma pack(1)
+typedef struct RTNETICMPV6HDR
+{
```

---

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/** 00 - The ICMPv6 message type. */
+ uint8_t     icmp6_type;
/** 01 - Type specific code that further qualifies the message. */
+ uint8_t     icmp6_code;
/** 02 - Checksum of the ICMPv6 message. */
+ uint16_t    icmp6_cksum;
} RTNETICMPV6HDR;
#pragma pack()
+AssertCompileSize(RTNETICMPV6HDR, 4);
+/** Pointer to an ICMPv6 packet header. */
+typedef RTNETICMPV6HDR *PRTNETICMPV6HDR;
+/** Pointer to a const ICMP packet header. */
+typedef RTNETICMPV6HDR const *PCRTNETICMPV6HDR;
+
+define RTNETIPV6_PROT_ICMPV6       (58)
+
+/** @name Internet Control Message Protocol version 6 (ICMPv6) message types.
+ * @{ */
+define RTNETIPV6_ICMP_TYPE_RS      133
+define RTNETIPV6_ICMP_TYPE_RA      134
+define RTNETIPV6_ICMP_TYPE_NS      135
+define RTNETIPV6_ICMP_TYPE_NA      136
+define RTNETIPV6_ICMP_TYPE_RDR     137
+/** @} */
+
+/** @name Neighbor Discovery option types
+ * @{ */
+define RTNETIPV6_ICMP_ND_SLLA_OPT  (1)
+define RTNETIPV6_ICMP_ND_TLLA_OPT  (2)
+/** @} */
+
+/** ICMPv6 ND Source/Target Link Layer Address option */
+#pragma pack(1)
+typedef struct RTNETNDP_LLA_OPT
+{
+    uint8_t type;
+    uint8_t len;
+    RTMAC lla;
+} RTNETNDP_LLA_OPT;
+#pragma pack()
+
+AssertCompileSize(RTNETNDP_LLA_OPT, 1+1+6);
+
+typedef RTNETNDP_LLA_OPT *PRTNETNDP_LLA_OPT;
+typedef RTNETNDP_LLA_OPT const *PCRTNETNDP_LLA_OPT;
+
+/** ICMPv6 ND Neighbor Solicitation */
+#pragma pack(1)
typedef struct RTNETNDP  
{  
    /** 00 - The ICMPv6 header. */
    RTNETICMPV6HDR Hdr;
    /** 04 - reserved */
    uint32_t reserved;
    /** 08 - target address */
    RTNETADDRIPV6 target_address;
} RTNETNDP;
#pragma pack()
AssertCompileSize(RTNETNDP, 4+4+16);

typedef RTNETNDP *PRTNETNDP;

typedef RTNETNDP const *PCRTNETNDP;

/** Pointer to a NDP ND packet. */

/** Pointer to a const NDP NS packet. */

/** Pointer to an ethernet ARP header. */

#define RTNET_ARP_ETHER UINT16_C(1)

/** ARP hardware type - ethernet. */

#define RTNET_ARPOP_REQUEST UINT16_C(1) /**< Request hardware address given a protocol address (ARP). */
#define RTNET_ARPOP_REPLY UINT16_C(2)
#define RTNET_ARPOP_REVREQUEST UINT16_C(3) /**< Request protocol address given a hardware address (RARP). */
#define RTNET_ARPOP_REVREPLY UINT16_C(4)
#define RTNET_ARPOP_INVREQUEST UINT16_C(8) /**< Inverse ARP. */
#define RTNET_ARPOP_INVREPLY UINT16_C(9)

/** Check if an ARP operation is a request or not. */
#define RTNET_ARPOP_IS_REQUEST(Op) ((Op) & 1)
/** Check if an ARP operation is a reply or not. */
#define RTNET_ARPOP_IS_REPLY(Op) (!RTNET_ARPOP_IS_REQUEST(Op))
/** @} */

/** Ethernet IPv4 + 6-byte MAC ARP request packet. */
#pragma pack(1)
typedef struct RTNETARPIPV4 {
    /** ARP header. */
    RTNETARPHDR  Hdr;
    /** The sender hardware address. */
    RTMAC      ar_sha;
    /** The sender protocol address. */
    RTNETADDRIPV4 ar_spa;
    /** The target hardware address. */
    RTMAC      ar_tha;
    /** The target protocol address. */
    RTNETADDRIPV4 ar_tpa;
} RTNETARPIPV4;
#pragma pack()
+ * IPRT / No-CRT - Our own limits header.
+ */
+ *
+ /*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef ___iprt_nocrt_limits_h
+ #define ___iprt_nocrt_limits_h
+
+ #include <iprt/types.h>
+
+ #define CHAR_BIT 8
+ #define SCHAR_MAX 0x7f
+ #define SCHAR_MIN (-0x7f - 1)
+ #define UCHAR_MAX 0xff
+
+ if 1 /* ASSUMES: signed char */
+ #define CHAR_MAX SCHAR_MAX
+ #define CHAR_MIN SCHAR_MIN
+ else
+ #define CHAR_MAX UCHAR_MAX
+ #define CHAR_MIN 0
+ endif
+
+ #define WORD_BIT 16
+ #define USHRT_MAX 0xffff
+ #define SHRT_MAX 0x7fff
+ #define SHRT_MIN (-0x7fff - 1)
+
+ /* ASSUMES 32-bit int */
+ #define UINT_MAX 0xffffffffU
+#define INT_MAX 0x7fffffff
+define INT_MIN (-0x7fffffff - 1)
+
+if defined(RT_ARCH_X86) || defined(RT_OS_WINDOWS) || defined(RT_ARCH_SPARC)
+define LONG_BIT 32
+define ULONG_MAX 0xffffffffU
+define LONG_MAX 0x7fffffff
+define LONG_MIN (-0x7fffffff - 1)
+elif defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC64)
+define LONG_BIT 64
+define ULONG_MAX UINT64_C(0xffffffffffffffff)
+define LONG_MAX INT64_C(0x7fffffffffffffff)
+define LONG_MIN (INT64_C(-0x7fffffffffffffff) - 1)
+else
+error "PORTME"
+endif
+
+define LLONG_BIT 64
+define ULLONG_MAX UINT64_C(0xffffffffffffffff)
+define LLONG_MAX INT64_C(0x7fffffffffffffff)
+define LLONG_MIN (INT64_C(-0x7fffffffffffffff) - 1)
+
+if ARCH_BITS == 32
+define SIZE_T_MAX 0xffffffffU
+define SSIZE_MAX 0x7fffffff
+elif ARCH_BITS == 64
+define SIZE_T_MAX UINT64_C(0xffffffffffffffff)
+define SSIZE_MAX INT64_C(0x7fffffffffffffff)
+else
+error "huh?"
+endif
+
/*define OFF_MAX __OFF_MAX
#define OFF_MIN __OFF_MIN*/
+
+endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/param.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/param.h
@@ @-0.0 +1,131 @@
 */ @file
+ * IPRT - Parameter Definitions.
+ */
+
+ * Copyright (C) 2006-2017 Oracle Corporation
+
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/* @todo Much of the PAGE_* stuff here is obsolete and highly risky to have around.
   As for component configs (MM_*), either we gather all in here or we move those bits away! */

/* @defgroup grp_rt_param System Parameter Definitions
   @ingroup grp_rt_cdefs
   @*/

/* Undefine PAGE_SIZE and PAGE_SHIFT to avoid unnecessary noise when clashing with system headers. Include system headers before / after iprt depending on which you wish to take precedence. */
#undef PAGE_SIZE
#undef PAGE_SHIFT

/* Undefine PAGE_OFFSET_MASK to avoid the conflict with the-linux-kernel.h */
#undef PAGE_OFFSET_MASK

/* i386 Page size. */
#if defined(RT_ARCH_SPARC64)
#define PAGE_SIZE 8192
#else
#define PAGE_SIZE 4096
#endif

/* i386 Page shift. */
+ * This is used to convert between size (in bytes) and page count.
+ */
+ #if defined(RT_ARCH_SPARC64)
+ # define PAGE_SHIFT 13
+ #else
+ # define PAGE_SHIFT 12
+ #endif
+
+ /**
+ * i386 Page offset mask.
+ *
+ * Do NOT one-complement this for whatever purpose. You may get a 32-bit const when you want a 64-bit one.
+ * Use PAGE_BASE_MASK, PAGE_BASE_GC_MASK, PAGE_BASE_HC_MASK, PAGE_ADDRESS() or X86_PTE_PAE_PG_MASK.
+ */
+ #if defined(RT_ARCH_SPARC64)
+ # define PAGE_OFFSET_MASK 0x1fff
+ #else
+ # define PAGE_OFFSET_MASK 0xfff
+ #endif
+
+ /**
+ * Page address mask for the guest context POINTERS.
+ * @remark Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ */
+ #define PAGE_BASE_GC_MASK (~(RTGCUINTPTR)PAGE_OFFSET_MASK)
+
+ /**
+ * Page address mask for the host context POINTERS.
+ * @remark Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ */
+ #define PAGE_BASE_HC_MASK (~(RTHCUINTPTR)PAGE_OFFSET_MASK)
+
+ /**
+ * Page address mask for the both context POINTERS.
+ *
+ * Be careful when using this since it may be a size too big!
+ * @remark Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ */
+ #define PAGE_BASE_MASK (~(RTUINTPTR)PAGE_OFFSET_MASK)
+
+ /**
+ * Get the page aligned address of a POINTER in the CURRENT context.
+ *
+ * @returns Page aligned address (it's an uintptr_t).
+ * @param pv The virtual address to align.
+ * @remarks Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ * @remarks This only works with POINTERS in the current context.
+ * Do NOT use on guest address or physical address!
+ */
+#define PAGE_ADDRESS(pv)    ((uintptr_t)(pv) & ~(uintptr_t)PAGE_OFFSET_MASK)
+
+/**
+ * Get the page aligned address of a physical address
+ *
+ * @returns Page aligned address (it's an RTHCPHYS or RTGCPHYS).
+ * @param   Phys   The physical address to align.
+ */
+#define PHYS_PAGE_ADDRESS(Phys) ((Phys) & X86_PTE_PAE_PG_MASK)
+
+/**
+ * Host max path (the reasonable value).
+ * @remarks defined both by iprt/param.h and iprt/path.h.
+ */
+#ifndef !defined(__iprt_path_h) || defined(DOXYGEN_RUNNING)
+# define RTPATH_MAX         (4096 + 4)    /* (PATH_MAX + 1) on linux w/ some alignment */
+#endif
+
+/** @] */ *
+
+
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/path.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/path.h
@@ -0,0 +1,1490 @@
+/** @file
+ * IPRT - Path Manipulation.
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+
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+ * CDDL are applicable instead of those of the GPL.
+ * 
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef _iprt_path_h
+ define _iprt_path_h
+
+ include <iprt/cdefs.h>
+ include <iprt/types.h>
+ ifdef IN_RING3
+ include <iprt/fs.h>
+ endif
+
+ RT_C_DECLS_BEGIN
+
+ /** @defgroup grp_rt_path RTPath - Path Manipulation
+ * @ingroup grp_rt
+ * @{ */
+
+ /** @def RTPATH_MAX
+ * Host max path (the reasonable value).
+ * @remarks defined both by iprt/param.h and iprt/path.h.
+ */
+ ifndef RTPATH_MAX
+ define RTPATH_MAX (4096 + 4) /* (PATH_MAX + 1) on linux w/ some alignment */
+ endif
+
+ /** @def RTPATH_TAG
+ * The default allocation tag used by the RTPath allocation APIs.
+ */
+ ifndef RTPATH_TAG
+ define RTPATH_TAG (__FILE__)
+ endif
+
+ /** @name RTPATH_F_XXX - Generic flags for APIs working on the file system.
+ * @{ */

---

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+/** Last component: Work on the link. */
+/*#define RTPATH_F_ON_LINK      RT_BIT_32(0)
+/** Last component: Follow if link. */
+/*#define RTPATH_F_FOLLOW_LINK   RT_BIT_32(1)
+/** Don't allow symbolic links as part of the path.
+ * @remarks this flag is currently not implemented and will be ignored. */
+/*#define RTPATH_F_NO_SYMLINKS   RT_BIT_32(2)
+/** @} */
+
+/** Validates a flags parameter containing RTPATH_F_*.
+ * @remarks The parameters will be referenced multiple times. */
+/*#define RTPATH_F_IS_VALID(a_fFlags, a_fIgnore) \
+    (    ((a_fFlags) & ~(uint32_t)((a_fIgnore) | RTPATH_F_NO_SYMLINKS)) == RTPATH_F_ON_LINK \
+    || ((a_fFlags) & ~(uint32_t)((a_fIgnore) | RTPATH_F_NO_SYMLINKS)) == RTPATH_F_FOLLOW_LINK ) 
+
+/** @} */
+
+/** Validates a flags parameter containing RTPATH_F_*.
+ * @remarks The parameters will be referenced multiple times. */
+/*#define RTPATH_F_IS_VALID(a_fFlags, a_fIgnore) \
+      (   ((a_fFlags) & ~((uint32_t)(a_fIgnore) | RTPATH_STR_F_STYLE_MASK | RTPATH_STR_F_MIDDLE))
+          == 0 \n+       && ((a_fFlags) & RTPATH_STR_F_STYLE_MASK) != RTPATH_STR_F_STYLE_RESERVED \n+
+
+/** Validates a flags parameter containing RTPATH_F_*.
+ * @remarks The parameters will be referenced multiple times. */
+/*#define RTPATH_STR_F_IS_VALID(a_fFlags, a_fIgnore) \
+    (    ((a_fFlags) & ~(uint32_t)((a_fIgnore) | RTPATH_STR_F_STYLE_MASK | RTPATH_STR_F_MIDDLE))
+    == 0 \n+    || ((a_fFlags) & RTPATH_STR_F_STYLE_MASK) != RTPATH_STR_F_STYLE_RESERVED \n+
+/** @} */

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+ && ((a_fFlags) & RTPATH_STR_F_RESERVED_MASK) == 0 )
+
+
+/** @def RTPATH_STYLE
+ * The host path style. This is set to RTPATH_STR_F_STYLE_DOS,
+ * RTPATH_STR_F_STYLE_UNIX, or other future styles. */
+#if defined(RT_OS_OS2) || defined(RT_OS_WINDOWS)
+# define RTPATH_STYLE RTPATH_STR_F_STYLE_DOS
+#else
+# define RTPATH_STYLE RTPATH_STR_F_STYLE_UNIX
+#endif
+
+/** @def RTPATH_SLASH
+ * The preferred slash character.
+ *
+ * @remark IPRT will always accept unix slashes. So, normally you would
+ * never have to use this define.
+ */
+#if RTPATH_STYLE == RTPATH_STR_F_STYLE_DOS
+# define RTPATH_SLASH '\'
+#elif RTPATH_STYLE == RTPATH_STR_F_STYLE_UNIX
+# define RTPATH_SLASH '/'
+#else
+# error "Unsupported RTPATH_STYLE value."
+#endif
+
+/** @def RTPATH_DELIMITER
+ @deprecated Use '/'! */
+#define RTPATH_DELIMITER RTPATH_SLASH
+
+
+/** @def RTPATH_SLASH_STR
+ * The preferred slash character as a string, handy for concatenations
+ * with other strings.
+ *
+ * @remark IPRT will always accept unix slashes. So, normally you would
+ * never have to use this define.
+ */
+#if RTPATH_STYLE == RTPATH_STR_F_STYLE_DOS
+# define RTPATH_SLASH_STR "\\"
+#elif RTPATH_STYLE == RTPATH_STR_F_STYLE_UNIX
+# define RTPATH_SLASH_STR "/"
+#else
+# error "Unsupported RTPATH_STYLE value."
+#endif
+
/* Checks if a character is a slash.
+ */
+ * @returns true if it's a slash and false if not.
+ * @returns @param a_ch Char to check.
+ */
+#if RTPATH_STYLE == RTPATH_STR_F_STYLE_DOS
+# define RTPATH_IS_SLASH(a_ch)   ( (a_ch) == '\' || (a_ch) == '/' )
+#elif RTPATH_STYLE == RTPATH_STR_F_STYLE_UNIX
+# define RTPATH_IS_SLASH(a_ch)   ( (a_ch) == '/' )
+#else
+#error "Unsupported RTPATH_STYLE value."
+#endif
+/** RTPPATH_IS_VOLSEP
+ * Checks if a character marks the end of the volume specification.
+ *
+ * @remark This is sufficient for the drive letter concept on PC.
+ * However it might be insufficient on other platforms
+ * and even on PC a UNC volume spec won't be detected this way.
+ * Use the RTPath<too be created>() instead.
+ *
+ * @returns true if it is and false if it isn't.
+ * @returns @param a_ch Char to check.
+ */
+#if RTPATH_STYLE == RTPATH_STR_F_STYLE_DOS
+# define RTPATH_IS_VOLSEP(a_ch)   ( (a_ch) == ':' )
+#elif RTPATH_STYLE == RTPATH_STR_F_STYLE_UNIX
+# define RTPATH_IS_VOLSEP(a_ch)   (false)
+#else
+#error "Unsupported RTPATH_STYLE value."
+#endif
+/** RTPPATH_IS_SEP
+ * Checks if a character is path component separator
+ *
+ * @returns true if it is and false if it isn't.
+ * @returns @param a_ch Char to check.
+ */
+#define RTPPATH_IS_SEP(a_ch)     ( RTPPATH_IS_SLASH(a_ch) || RTPPATH_IS_VOLSEP(a_ch) )
+/** RTPPATH_EXISTS
+ * Checks if the path exists.
+ *
+ * Symbolic links will all be attempted resolved and broken links means false.
+ */
Open Source Used In 5GaaS Edge AC-4  38092

+ *
+ * @returns true if it exists and false if it doesn't.
+ * @param pszPath The path to check.
+ */
+RTDECL(bool) RTPathExists(const char *pszPath);
+
+/**
+ * Checks if the path exists.
+ *
+ * @returns true if it exists and false if it doesn't.
+ * @param pszPath The path to check.
+ * @param fFlags RTPATH_F_ON_LINK or RTPATH_F_FOLLOW_LINK.
+ */
+RTDECL(bool) RTPathExistsEx(const char *pszPath, uint32_t fFlags);
+
+/**
+ * Sets the current working directory of the process.
+ *
+ * @returns IPRT status code.
+ * @param pszPath The path to the new working directory.
+ */
+RTDECL(int) RTPathSetCurrent(const char *pszPath);
+
+/**
+ * Gets the current working directory of the process.
+ *
+ * @returns IPRT status code.
+ * @param pszPath Where to store the path.
+ * @param cchPath The size of the buffer pszPath points to.
+ */
+RTDECL(int) RTPathGetCurrent(char *pszPath, size_t cchPath);
+
+/**
+ * Gets the current working directory on the specified drive.
+ *
+ * On systems without drive letters, the root slash will be returned.
+ *
+ * @returns IPRT status code.
+ * @param chDrive The drive we're querying the driver letter on.
+ * @param pszPath Where to store the working directory path.
+ * @param cbPath The size of the buffer pszPath points to.
+ */
+RTDECL(int) RTPathGetCurrentOnDrive(char chDrive, char *pszPath, size_t cbPath);
+
+ /**
+ * Gets the current working drive of the process.
+ *
+ * Normally drive letter and colon will be returned, never trailing a root
+ * slash. If the current directory is on a UNC share, the root of the share
+ * will be returned. On systems without drive letters, an empty string is
+ * returned for consistency.
+ *
+ * @returns IPRT status code.
+ * @param   pszPath         Where to store the working drive or UNC root.
+ * @param   cbPath          The size of the buffer pszPath points to.
+ */
+RTDECL(int) RTPathGetCurrentDrive(char *pszPath, size_t cbPath);
+
+/**
+* Get the real path (no symlinks, no . or .. components), must exist.
+ *
+ * @returns iprt status code.
+ * @param   pszPath         The path to resolve.
+ * @param   pszRealPath     Where to store the real path.
+ * @param   cchRealPath     Size of the buffer.
+ */
+RTDECL(int) RTPathReal(const char *pszPath, char *pszRealPath, size_t cchRealPath);
+
+/**
+* Same as RTPathReal only the result is RTStrDup()ed.
+ *
+ * @returns Pointer to real path. Use RTStrFree() to free this string.
+ * @returns NULL if RTPathReal() or RTStrDup() fails.
+ * @param   pszPath         The path to resolve.
+ */
+RTDECL(char *) RTPathRealDup(const char *pszPath);
+
+/**
+* Get the absolute path (starts from root, no . or .. components), doesn't have
+* to exist. Note that this method is designed to never perform actual file
+* system access, therefore symlinks are not resolved.
+ *
+ * @returns iprt status code.
+ * @param   pszPath         The path to resolve.
+ * @param   pszAbsPath      Where to store the absolute path.
+ * @param   cchAbsPath      Size of the buffer.
+ */
+RTDECL(int) RTPathAbs(const char *pszPath, char *pszAbsPath, size_t cchAbsPath);
+
+/**
+* Same as RTPathAbs only the result is RTStrDup()ed.
+ *
+ * @returns Pointer to the absolute path. Use RTStrFree() to free this string.
+ * @returns NULL if RTPathAbs() or RTStrDup() fails.
+ * @param   pszPath         The path to resolve.
+ */
+RTDECL(char *) RTPathAbsDup(const char *pszPath);
+
+/**
+ * Get the absolute path (no symlinks, no . or .. components), assuming the
+ * given base path as the current directory. The resulting path doesn't have
+ * to exist.
+ *
+ * @returns iprt status code.
+ * @param   pszBase         The base path to act like a current directory.
+ *                          When NULL, the actual cwd is used (i.e. the call
+ *                          is equivalent to RTPathAbs(pszPath, ...).
+ * @param   pszPath         The path to resolve.
+ * @param   pszAbsPath      Where to store the absolute path.
+ * @param   cchAbsPath      Size of the buffer.
+ */
+RTDECL(int) RTPathAbsEx(const char *pszBase, const char *pszPath, char *pszAbsPath, size_t cchAbsPath);
+
+/**
+ * Same as RTPathAbsEx only the result is RTStrDup(ed).
+ *
+ * @returns Pointer to the absolute path. Use RTStrFree() to free this string.
+ * @returns NULL if RTPathAbsEx() or RTStrDup() fails.
+ * @param   pszBase         The base path to act like a current directory.
+ *                          When NULL, the actual cwd is used (i.e. the call
+ *                          is equivalent to RTPathAbs(pszPath, ...).
+ * @param   pszPath         The path to resolve.
+ */
+RTDECL(char *) RTPathAbsExDup(const char *pszBase, const char *pszPath);
+
+/**
+ * Strips the filename from a path. Truncates the given string in-place by overwriting the
+ * last path separator character with a null byte in a platform-neutral way.
+ *
+ * @param   pszPath     Path from which filename should be extracted, will be truncated.
+ *                      If the string contains no path separator, it will be changed to a "." string.
+ */
+RTDECL(void) RTPathStripFilename(char *pszPath);
+
+/**
+ * Strips the last suffix from a path.
+ *
+ * @param   pszPath     Path which suffix should be stripped.
+ */
+RTDECL(void) RTPathStripSuffix(char *pszPath);
+
+/**
+ * Strips the trailing slashes of a path name.
+ *
+ * @param   pszPath     
+ */
+ * Won't strip root slashes.
+ *
+ * @returns The new length of pszPath.
+ * @param pszPath Path to strip.
+ */
+RTDECL(size_t) RTPathStripTrailingSlash(char *pszPath);
+
+/**
+ * Skips the root specification, if present.
+ *
+ * @return Pointer to the first char after the root specification. This can be
+ * pointing to the terminator, if the path is only a root
+ *
+ * @param pszPath The path to skip ahead in.
+ */
+RTDECL(char *) RTPathSkipRootSpec(const char *pszPath);
+
+/**
+ * Ensures that the path has a trailing path separator such that file names can
+ * be appended without further work.
+ *
+ * This can be helpful when preparing for efficiently combining a directory path
+ * with the filenames returned by RTDirRead. The return value gives you the
+ * position at which you copy the RTDIRENTRY::szName to construct a valid path
+ * to it.
+ *
+ * @returns The length of the path, 0 on buffer overflow.
+ * @param pszPath The path.
+ * @param cbPath The length of the path buffer @a pszPath points to.
+ */
+RTDECL(size_t) RTPathEnsureTrailingSeparator(char *pszPath, size_t cbPath);
+
+/**
+ * Changes all the slashes in the specified path to DOS style.
+ *
+ * Unless @a fForce is set, nothing will be done when on a UNIX flavored system
+ * since paths wont work with DOS style slashes there.
+ *
+ * @returns @a pszPath.
+ * @param pszPath The path to modify.
+ * @param fForce Whether to force the conversion on non-DOS OSes.
+ */
+RTDECL(char *) RTPathChangeToDosSlashes(char *pszPath, bool fForce);
+
+/**
+ * Changes all the slashes in the specified path to unix style.
+ *
+ * Unless @a fForce is set, nothing will be done when on a UNIX flavored system
+ *
since paths won't work with DOS style slashes there.
+*
+* @returns @a pszPath.
+* @param pszPath The path to modify.
+* @param fForce Whether to force the conversion on non-DOS OSes.
+*/
+RTDECL(char *) RTPathChangeToUnixSlashes(char *pszPath, bool fForce);
+
+/**
+ * Simple parsing of the path.
+ *
+ * It figures the length of the directory component, the offset of
+ * the file name and the location of the suffix dot.
+ *
+ * @returns The path length.
+ *
+ * @param pszPath Path to find filename in.
+ * @param pcchDir Where to put the length of the directory component. If
+ * no directory, this will be 0. Optional.
+ * @param poffName Where to store the filename offset.
+ * If empty string or if it's ending with a slash this
+ * will be set to -1. Optional.
+ * @param poffSuff Where to store the suffix offset (the last dot).
+ * If empty string or if it's ending with a slash this
+ * will be set to -1. Optional.
+ */
+RTDECL(size_t) RTPathParseSimple(const char *pszPath, size_t *pcchDir, ssize_t *poffName, ssize_t *poffSuff);
+
+/**
+ * Finds the filename in a path.
+ *
+ * @returns Pointer to filename within pszPath.
+ * @returns NULL if no filename (i.e. empty string or ends with a slash).
+ *
+ * @param pszPath Path to find filename in.
+ */
+RTDECL(char *) RTPathFilename(const char *pszPath);
+
+/**
+ * Finds the filename in a path, extended version.
+ *
+ * @returns Pointer to filename within pszPath.
+ * @returns NULL if no filename (i.e. empty string or ends with a slash).
+ *
+ * @param pszPath Path to find filename in.
+ * @param fFlags RTPATH_STR_F_STYLE_XXX. Other RTPATH_STR_F_XXX flags
+ * will be ignored.
+ */
+RTDECL(char *) RTPathFilenameEx(const char *pszPath, uint32_t fFlags);
/**
 * Finds the suffix part of in a path (last dot and onwards).
 * @returns Pointer to suffix within pszPath.
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
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 * @param   pszPath     Path to find suffix in.
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 * @param   pszPath     Path to find suffix in.
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 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
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 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 * @returns
 * @returns NULL if no suffix
 * @param   pszPath     Path to find suffix in.
 */
RTDECL(char *) RTPathSuffix(const char *pszPath);

/** Checks if a path has an extension / suffix.
 * @returns true if extension / suffix present.
 * @returns false if no extension / suffix.
 * @param   pszPath     Path to check.
 */
RTDECL(bool) RTPathHasSuffix(const char *pszPath);

/** Same thing, different name.  */
#define RTPathHasExt RTPathHasSuffix

/** Checks if a path includes more than a filename.
 * @returns true if path present.
 * @returns false if no path.
 * @param   pszPath     Path to check.
 */
RTDECL(bool) RTPathHasPath(const char *pszPath);

/** Misspelled, don't use.  */
#define RTPathHavePath RTPathHasPath

/** Checks if the path starts with a root specifier or not.
 * @returns @c true if it starts with root, @c false if not.
 * @param   pszPath     Path to check.
 */
RTDECL(bool) RTPathStartsWithRoot(const char *pszPath);

/** Counts the components in the specified path.
 */
An empty string has zero components. A lone root slash is considered have one. The paths "/init" and "/bin/" are considered having two components. An UNC share specifier like "\\myserver\share" will be considered as one single component.

@returns The number of path components.
@param pszPath The path to parse.
*/
+RTDECL(size_t) RTPathCountComponents(const char *pszPath);
+
+/**
+ Copies the specified number of path components from @a pszSrc and into @a pszDst.
+ @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW. In the latter case the buffer is not touched.
+ @param pszDst The destination buffer.
+ @param cbDst The size of the destination buffer.
+ @param pszSrc The source path.
+ @param cComponents The number of components to copy from @a pszSrc.
+ */
+RTDECL(int) RTPathCopyComponents(char *pszDst, size_t cbDst, const char *pszSrc, size_t cComponents);
+
+/** @name Path properties returned by RTPathParse and RTPathSplit.
+ @{ */
+
+/** Indicates that there is a filename.
+ @note This is not set for lone root specifications (RTPATH_PROP_UNC,
+ RTPATH_PROP_ROOT_SLASH, or RTPATH_PROP_VOLUME) or the final component had a trailing slash (RTPATH_PROP_DIR_SLASH). */
+#define RTPATH_PROP_FILENAME UINT16_C(0x0001)
+/** Indicates that a directory was specified using a trailing slash.
+ @note The slash is not counted into the last component. However, it is counted into cchPath. */
+#define RTPATH_PROP_DIR_SLASH UINT16_C(0x0002)
+
+/** The filename has a suffix (extension). */
+#define RTPATH_PROP_SUFFIX UINT16_C(0x0004)
+/** Indicates that this is an UNC path (Windows and OS/2 only).
+ @note RTPathParse, RTPathSplit and friends does not consider the 'Resource' as part of the UNC root specifier. Thus the root specs for the above examples
+ * would be `//ComputerName/` or `//Namespace/`.
+ *
+ * Please note that `//something` is not a UNC path, there must be a slash
+ * following the computer or namespace.
+ */
+#define RTPATH_PROP_UNC UINT16_C(0x0010)
+/** A root slash was specified (unix style root).
+ * (While the path must relative if not set, this being set doesn't make it
+ * absolute.)
+ *
+ * This will be set in the following examples: `/' , '/bin', 'C:/', 'C:/Windows',
+ * `'/./', '/./PhysicalDisk0', '//example.org/', and `//example.org/share'.
+ *
+ * It will not be set for the following examples: `.' , 'bin/ls', 'C:', and
+ * 'C:Windows'.
+ */
+#define RTPATH_PROP_ROOT_SLASH UINT16_C(0x0020)
+/** A volume is specified (Windows, DOS and OS/2).
+ * For examples: `C:', `C:/`, and `A:/AutoExec.bat'. */
+#define RTPATH_PROP_VOLUME UINT16_C(0x0040)
+/** The path is absolute, i.e. has a root specifier (root-slash,
+ * volume or UNC) and contains no winding `..` bits, though it may contain
+ * unnecessary slashes (RTPATH_PROP_EXTRA_SLASHES) and `.` components
+ * (RTPATH_PROP_DOT_REFS).
+ *
+ * On systems without volumes and UNC (unix style) it will be set for `/',
+ * `'/bin/ls', and `'/bin//ls', but not for `bin/ls', `/bin/./usr/bin/env',
+ * `'/./bin/ls' or `'/.'.
+ *
+ * On systems with volumes, it will be set for `C:/', `C:/Windows', and
+ * `C:/Windows/', but not for `C:', `C:Windows', or `C:/Windows/..boot.ini'.
+ *
+ * On systems with UNC paths, it will be set for `//localhost/',
+ * `//localhost/CS', `//localhost/CS/Windows/System32', `//localhost/...', and
+ * `//localhost/CS//AutoExec.bat', but not for
+ * `//localhost/CS/Windows/..AutoExec.bat'.
+ *
+ * @note For the RTPATH_ABS definition, this flag needs to be set while both
+ * RTPATH_PROP_EXTRA_SLASHES and RTPATH_PROP_DOT_REFS must be cleared.
+ */
+#define RTPATH_PROP_ABSOLUTE UINT16_C(0x0100)
+/** Relative path. Inverse of RTPATH_PROP_ABSOLUTE. */
+#define RTPATH_PROP_RELATIVE UINT16_C(0x0200)
+/** The path contains unnecessary slashes. Meaning, that if */
+#define RTPATH_PROP_EXTRA_SLASHES UINT16_C(0x0400)
+/** The path contains references to the special `.' (dot) directory link. */
+#define RTPATH_PROP_DOT_REFS UINT16_C(0x0800)
+/** The path contains references to the special `..' (dot) directory link.
### RTPATH_PROP_DOTDOT_REFS

```c
#define RTPATH_PROP_DOTDOT_REFS UINT16_C(0x1000)
```

### RTPATH_PROP_FIRST_NEEDS_NO_SLASH

```c
#define RTPATH_PROP_FIRST_NEEDS_NO_SLASH(a_fProps) \
    RT_BOOL( (a_fProps) & (RTPATH_PROP_ROOT_SLASH | RTPATH_PROP_VOLUME | 
    RTPATH_PROP_UNC) )
```

### RTPATH_PROP_HAS_ROOT_SPEC

```c
#define RTPATH_PROP_HAS_ROOT_SPEC(a_fProps) \
    RT_BOOL( (a_fProps) & (RTPATH_PROP_ROOT_SLASH | RTPATH_PROP_VOLUME | 
    RTPATH_PROP_UNC) )
```

### RTPATHPARSED

```c
typedef struct RTPATHPARSED
{
    /** Number of path components. *
    * This will always be set on VERR_BUFFER_OVERFLOW returns from RTPathParsed
    * so the caller can calculate the required buffer size. */
    uint16_t    cComps;
    /** Path property flags, RTPATH_PROP_XXX */
    uint16_t    fProps;
    /** On success this is the length of the described path, i.e. sum of all
    * component lengths and necessary separators. */
    uint16_t    cchPath;
    /** Reserved for future use. */
    uint16_t    u16Reserved;
    /** The offset of the filename suffix, offset of the NUL char if none. */
    uint16_t    offSuffix;
    /** The length of the suffix. */
};
```
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+ uint16_t  cchSuffix;
+ /**< Array of component descriptors (variable size).
+    * @note Don't try figure the end of the input path by adding up off and cch
+    *       of the last component. If RTPATH_PROP_DIR_SLASH is set, there may
+    *       be one or more trailing slashes that are unaccounted for! */
+    struct
+    {  
+       /**< The offset of the component. */
+       uint16_t  off;
+       /**< The length of the component. */
+       uint16_t  cch;
+    } aComps[1];
+} RTPATHPARSED;
+ /**< Pointer to to a parsed path result. */
typedef RTPATHPARSED *PRTPATHPARSED;
+ /**< Pointer to to a const parsed path result. */
typedef RTPATHPARSED *PCRTPATHPARSED;
+
+ +
+ /**
+  * Parses the path.
+  *
+  * @returns IPRT status code.
+  * @retval  VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
+  * @retval  VERR_INVALID_PARAMETER if cbOutput is less than the RTPATHPARSED
+  *        structure. No output. (asserted)
+  * @retval  VERR_BUFFER_OVERFLOW there are more components in the path than
+  *        there is space in aComps. The required amount of space can be
+  *        determined from the pParsed->cComps:
+  *        @code
+  *            RT_OFFSETOF(RTPATHPARSED, aComps[pParsed->cComps])
+  *        @endcode
+  * @retval  VERR_PATH_ZERO_LENGTH if the path is empty.
+  *
+  * @param   pszPath             The path to parse.
+  * @param   pParsed             Where to store the details of the parsed path.
+  * @param   cbParsed            The size of the buffer. Must be at least the
+  *                               size of RTPATHPARSED.
+  * @param   fFlags              Combination of RTPATH_STR_F_XXX flags.
+  * @sa      RTPathSplit, RTPathSplitA.
+  */
+RTDECL(int) RTPathParse(const char *pszPath, PRTPATHPARSED pParsed, size_t cbParsed, uint32_t fFlags);
+ /**
+  * Reassembles a path parsed by RTPathParse.
+  *
+  * This will be more useful as more APIs manipulating the RTPATHPARSED output
+ * are added.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_BUFFER_OVERFLOW if @a cbDstPath is less than or equal to
+ * RTPATHPARSED::cchPath.
+ *
+ * @param pszSrcPath          The source path.
+ * @param pParsed             The parser output for @a pszSrcPath.
+ * @param fFlags              Combination of RTPATH_STR_F_STYLE_XXX.
+ * Most users will pass 0.
+ * @param pszDstPath          Pointer to the buffer where the path is to be
+ * reassembled.
+ * @param cbDstPath           The size of the output buffer.
+ */
+
+RTDECL(int) RTPathParsedReassemble(const char *pszSrcPath, PRTPATHPARSED pParsed, uint32_t fFlags,
+                                        char *pszDstPath, size_t cbDstPath);
+
+/**
+ * Output buffer for RTPathSplit and RTPathSplitA.
+ */
+
typsdef struct RTPATHSPLIT
+{
+    /** Number of path components.
+     * This will always be set on VERR_BUFFER_OVERFLOW returns from RTPathParsed
+     * so the caller can calculate the required buffer size. */
+    uint16_t    cComps;
+    /** Path property flags, RTPATH_PROP_XXX */
+    uint16_t    fProps;
+    /** On success this is the length of the described path, i.e. sum of all
+     * component lengths and necessary separators.
+     * Do NOT use this to index in the source path in case it contains
+     * unnecessary slashes that RTPathSplit has ignored here. */
+    uint16_t    cchPath;
+    /** Reserved (internal use). */
+    uint16_t    u16Reserved;
+    /** The amount of memory used (on success) or required (on
+     * VERR_BUFFER_OVERFLOW) of this structure and it's strings. */
+    uint32_t    cbNeeded;
+    /** Pointer to the filename suffix (the dot), if any. Points to the NUL
+     * character of the last component if none or if RTPATH_PROP_DIR_SLASH is
+     * present. */
+    const char *pszSuffix;
+    /** Array of component strings (variable size). */
+    char       *apszComps[1];
+ } RTPATHSPLIT;
+/** Pointer to a split path buffer. */
typsdef RTPATHSPLIT *PRTPATHSPLIT;
/** Pointer to a const split path buffer. */
typedef RTPATHSPLIT const *PCRTPATHSPLIT;

/**
 * Splits the path into individual component strings, carved from user supplied
 * the given buffer block.
 * @returns IPRT status code.
 * @retval  VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
 * @retval  VERR_INVALID_PARAMETER if cbOutput is less than the RTPATHSPLIT
 * structure. No output. (asserted)
 * @retval  VERR_BUFFER_OVERFLOW there are more components in the path than
 * determined from the pParsed->cComps:
 * @code
 *   RT_OFFSETOF(RTPATHPARSED, aComps[pParsed->cComps])
 * @endcode
 * @retval  VERR_PATH_ZERO_LENGTH if the path is empty.
 * @retval  VERR_FILENAME_TOO_LONG if the filename is too long (close to 64 KB).
 * @param   pszPath             The path to parse.
 * @param   pSplit              Where to store the details of the parsed path.
 * @param   cbSplit             The size of the buffer pointed to by @a pSplit
 * (variable sized array at the end). Must be at
 * least the size of RTPATHSPLIT.
 * @param   fFlags              Combination of RTPATH_STR_F_XXX flags.
 * Most users will pass 0.
 * @sa      RTPathSplitA, RTPathParse.
 */
RTDECL(int) RTPathSplit(const char *pszPath, PRTPATHSPLIT pSplit, size_t cbSplit, uint32_t fFlags);

/**
 * Splits the path into individual component strings, allocating the buffer on
 * the default thread heap.
 * @returns IPRT status code.
 * @retval  VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
 * @retval  VERR_PATH_ZERO_LENGTH if the path is empty.
 * @param   pszPath             The path to parse.
 * @param   ppSplit             Where to return the pointer to the output on
 * success. This must be freed by calling
 * RTPPathSplitFree().
 * @param   fFlags              Combination of RTPATH_STR_F_XXX flags.
 * Most users will pass 0.
 * @sa      RTPPathSplitFree, RTPPathSplit, RTPathParse.
 */
+RTDECL(int) RTPPathSplit(const char *pszPath, PRTPATHSPLIT pSplit, size_t cbSplit, uint32_t fFlags);
/**
 * Splits the path into individual component strings, allocating the buffer on
 * the default thread heap.
 *
 * @returns IPRT status code.
 * @retval  VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
 * @retval  VERR_PATH_ZERO_LENGTH if the path is empty.
 *
 * @param   pszPath             The path to parse.
 * @param   ppSplit             Where to return the pointer to the output on
 *                              success. This must be freed by calling
 *                              RPathSplitFree().
 * @param   fFlags              Combination of RTPATH_STR_F_XXX flags.
 *                              Most users will pass 0.
 * @param   pszTag              Allocation tag used for statistics and such.
 * @sa      RPathSplitFree, RPathSplit, RPathParse.
 */
RTDECL(int) RPathSplitATag(const char *pszPath, PRTPATHSPLIT *ppSplit, uint32_t fFlags, const char *pszTag);

/**
 * Frees buffer returned by RPathSplitA.
 *
 * @param   pSplit              What RPathSplitA returned.
 * @sa      RPathSplitA
 */
RTDECL(void) RPathSplitFree(PRTPATHSPLIT pSplit);

/**
 * Reassembles a path parsed by RPathSplit.
 *
 * This will be more useful as more APIs manipulating the RTPATHSPLIT output are
 * added.
 *
 * @returns IPRT status code.
 * @retval  VERR_BUFFER_OVERFLOW if @a cbDstPath is less than or equal to
 *          RTPATHSPLIT::cchPath.
 *
 * @param   pSplit              A split path (see RPathSplit, RPathSplitA).
 * @param   fFlags              Combination of RTPATH_STR_F_STYLE_XXX.
 *                              Most users will pass 0.
 * @param   pszDstPath          Pointer to the buffer where the path is to be
 *                              reassembled.
 * @param   cbDstPath           The size of the output buffer.
 */
RTDECL(int) RPathSplitReassemble(PRTPATHSPLIT pSplit, uint32_t fFlags, char *pszDstPath, size_t
cbDstPath);
+
+/**
+ * Checks if the two paths leads to the file system object.
+ *
+ * If the objects exist, we'll query attributes for them. If that's not
+ * conclusive (some OSes) or one of them doesn't exist, we'll use a combination
+ * of RTPathAbs and RTPathCompare to determine the result.
+ *
+ * @returns true, false, or VERR_FILENAME_TOO_LONG.
+ * @param   pszPath1            The first path.
+ * @param   pszPath2            The second path.
+ */
+RTDECL(int) RTPathIsSame(const char *pszPath1, const char *pszPath2);
+
+/**
+ * Compares two paths.
+ *
+ * The comparison takes platform-dependent details into account,
+ * such as:
+ * <ul>
+ * <li>On DOS-like platforms, both separator chars (\| and /) are considered
+ *     to be equal.
+ * <li>On platforms with case-insensitive file systems, mismatching characters
+ *     are uppercased and compared again.
+ * </ul>
+ *
+ * @returns @< 0 if the first path less than the second path.
+ * @returns 0 if the first path identical to the second path.
+ * @returns @> 0 if the first path greater than the second path.
+ *
+ * @param   pszPath1    Path to compare (must be an absolute path).
+ * @param   pszPath2    Path to compare (must be an absolute path).
+ *
+ * @remarks File system details are currently ignored. This means that you won't
+ * get case-insensitive compares on unix systems when a path goes into a
+ * case-insensitive filesystem like FAT, HPFS, HFS, NTFS, JFS, or
+ * similar. For NT, OS/2 and similar you'll won't get case-sensitive
+ * compares on a case-sensitive file system.
+ */
+RTDECL(int) RTPathCompare(const char *pszPath1, const char *pszPath2);
+
+/**
+ * Checks if a path starts with the given parent path.
+ *
+ * This means that either the path and the parent path matches completely, or
+ * that the path is to some file or directory residing in the tree given by the
The path comparison takes platform-dependent details into account, see RTPathCompare() for details.

returns true when pszPath starts with pszParentPath (or when they are identical), or false otherwise.

The path comparison takes platform-dependent details into account, see RTPathCompare() for details.

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The path comparison takes platform-dependent details into account, see RTPathCompare() for details.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the result is too big to fit within
+ *    cbPathDst bytes. No changes has been made.
+ * @retval VERR_INVALID_PARAMETER if the string pointed to by pszPath is longer
+ *    than cbPathDst-1 bytes (failed to find terminator). Asserted.
+ *
+ * @param   pszPath         The path to append pszAppend to. This serves as both
+ *                          input and output. This can be empty, in which case
+ *                          pszAppend is just copied over.
+ * @param   cbPathDst       The size of the buffer pszPath points to, terminator
+ *                          included. This should NOT be strlen(pszPath).
+ * @param   pszAppend       The partial path to append to pszPath. This can be
+ *                          NULL, in which case nothing is done.
+ * @param   cchAppendMax    The maximum number or characters to take from @a
+ *                          pszAppend. RTSTR_MAX is fine.
+ *
+ * @remarks On OS/2, Window and similar systems, concatenating a drive letter
+ *          specifier with a slash prefixed path will result in an absolute
+ *          path. Meaning, RTPathAppend(strcpy(szBuf, "C:"), sizeof(szBuf),
+ *          "/bar") will result in "C:/bar". (This follows directly from the
+ *          behavior when pszPath is empty.)
+ *
+ *          On the other hand, when joining a drive letter specifier with a
+ *          partial path that does not start with a slash, the result is not an
+ *          absolute path. Meaning, RTPathAppend(strcpy(szBuf, "C:"),
+ *          sizeof(szBuf), "bar") will result in "C:bar".
+ */
+RTDECL(int) RTPathAppendEx(char *pszPath, size_t cbPathDst, const char *pszAppend, size_t cchAppendMax);
+
+/** *
+ * Like RTPathAppend, but with the base path as a separate argument instead of
+ * the path buffer.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the result is too big to fit within
+ *    cbPathDst bytes.
+ * @retval VERR_INVALID_PARAMETER if the string pointed to by pszPath is longer
+ *    than cbPathDst-1 bytes (failed to find terminator). Asserted.
+ *
+ * @param   pszPathDst      Where to store the resulting path.
+ * @param   cbPathDst       The size of the buffer pszPathDst points to,
+ *                          terminator included.
+ * @param   pszPathSrc      The base path to copy into @a pszPathDst before
+ *                          appending @a pszAppend.
+ * @param   pszAppend       The partial path to append to pszPathSrc. This can
+ *                          be NULL, in which case nothing is done.
+ */
+RTDECL(int) RTPathJoin(char *pszPathDst, size_t cbPathDst, const char *pszPathSrc,
+        const char *pszAppend);
+
+/**
+ * Same as RTPathJoin, except that the output buffer is allocated.
+ *
+ * @returns Buffer containing the joined up path, call RTStrFree to free. NULL
+ * on allocation failure.
+ * @param   pszPathSrc      The base path to copy into @a pszPathDst before
+ *                          appending @a pszAppend.
+ * @param   pszAppend       The partial path to append to pszPathSrc. This can
+ *                          be NULL, in which case nothing is done.
+ *
+ */
+RTDECL(char *) RTPathJoinA(const char *pszPathSrc, const char *pszAppend);
+
+/**
+ * Extended version of RTPathJoin, both inputs can be specified as substrings.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the result is too big to fit within
+ *          cbPathDst bytes.
+ * @retval  VERR_INVALID_PARAMETER if the string pointed to by pszPath is longer
+ *          than cbPathDst-1 bytes (failed to find terminator). Asserted.
+ *
+ * @param   pszPathDst      Where to store the resulting path.
+ * @param   cbPathDst       The size of the buffer pszPathDst points to,
+ *                          terminator included.
+ * @param   pszPathSrc      The base path to copy into @a pszPathDst before
+ *                          appending @a pszAppend.
+ * @param   cchPathSrcMax   The maximum number of bytes to copy from @a
+ *                          pszPathSrc. RTSTR_MAX is find.
+ * @param   pszAppend       The partial path to append to pszPathSrc. This can
+ *                          be NULL, in which case nothing is done.
+ * @param   cchAppendMax    The maximum number of bytes to copy from @a
+ *                          pszAppend. RTSTR_MAX is find.
+ *
+ */
+RTDECL(int) RTPathJoinEx(char *pszPathDst, size_t cbPathDst,
+                         const char *pszPathSrc, size_t cchPathSrcMax,
+                         const char *pszAppend, size_t cchAppendMax);
+
+/**
+ * Callback for RTPathTraverseList that's called for each element.
+ *
+ * @returns IPRT style status code. Return VERR_TRYAGAIN to continue, any other
+ * value will abort the traversing and be returned to the caller.
+ *
+ * @param   pchPath         Pointer to the start of the current path. This is not null terminated.
+ * @param   cchPath         The length of the path.
+ * @param   pvUser1         The first user parameter.
+ * @param   pvUser2         The second user parameter.
+ */
+typedef DECLCALLBACK(int) FNRTPATHTRAVERSER(char const *pchPath, size_t cchPath, void *pvUser1, void *pvUser2);
+/** Pointer to a FNRTPATHTRAVERSER. */
+typedef FNRTPATHTRAVERSER *PFNRTPATHTRAVERSER;
+
+/**
+ * Traverses a string that can contain multiple paths separated by a special character.
+ *
+ * @returns IPRT style status code from the callback or VERR_END_OF_STRING if the callback returned VERR_TRY_AGAIN for all paths in the string.
+ *
+ * @param   pszPathList     The string to traverse.
+ * @param   chSep           The separator character. Using the null terminator is fine, but the result will simply be that there will only be one callback for the entire string (save any leading white space).
+ * @param   pfnCallback     The callback.
+ * @param   pvUser1         First user argument for the callback.
+ * @param   pvUser2         Second user argument for the callback.
+ */
+RTDECL(int) RTPathTraverseList(const char *pszPathList, char chSep, PFNRTPATHTRAVERSER pfnCallback, void *pvUser1, void *pvUser2);
+
+/**
+ * Calculate a relative path between the two given paths.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the result is too big to fit within cbPathDst bytes.
+ * @retval  VERR_NOT_SUPPORTED if both paths start with different volume specifiers.
+ * @param   pszPathDst      Where to store the resulting path.
+ * @param   cbPathDst       The size of the buffer pszPathDst points to, terminator included.
+ * @param   pszPathFrom     The path to start from creating the relative path.
+ * @param   pszPathTo       The path to reach with the created relative path.
+ */
+RTDECL(int) RTPathCalcRelative(char *pszPathDst, size_t cbPathDst, const char *pszPathFrom, const char *pszPathTo);
+  
+  +#ifdef IN_RING3
+  
+  /*********************************************************************/
+  +  * Gets the path to the directory containing the executable.
+  +  *
+  +  * @returns iprt status code.
+  +  * @param   pszPath     Buffer where to store the path.
+  +  * @param   cchPath     Buffer size in bytes.
+  +  */
+  
+  RTDECL(int) RTPathExecDir(char *pszPath, size_t cchPath);
+  
+  /*********************************************************************/
+  +  * Gets the user home directory.
+  +  *
+  +  * @returns iprt status code.
+  +  * @param   pszPath     Buffer where to store the path.
+  +  * @param   cchPath     Buffer size in bytes.
+  +  */
+  
+  RTDECL(int) RTPathUserHome(char *pszPath, size_t cchPath);
+  
+  /*********************************************************************/
+  +  * Gets the user documents directory.
+  +  *
+  +  * The returned path isn't guaranteed to exist.
+  +  *
+  +  * @returns iprt status code.
+  +  * @param   pszPath     Buffer where to store the path.
+  +  * @param   cchPath     Buffer size in bytes.
+  +  */
+  
+  RTDECL(int) RTPathUserDocuments(char *pszPath, size_t cchPath);
+  
+  /*********************************************************************/
+  +  * Gets the directory of shared libraries.
+  +  *
+  +  * This is not the same as RTPathAppPrivateArch() as Linux depends all shared
+  +  * libraries in a common global directory where ld.so can find them.
+  +  *
+  +  * Linux:   /usr/lib
+  +  * Solaris:  /opt/@@<application@>/@@<arch>@ or something
+  +  * Windows: @@<program files directory@>/@@<application@>
+  +  * Old path: same as RTPathExecDir()
+  +  *
+  +  * @returns iprt status code.
+  +  * @param   pszPath     Buffer where to store the path.
+  +  * @param   cchPath     Buffer size in bytes.
+  +  */
+  
+  RTDECL(int) RTPathSharedLibs(char *pszPath, size_t cchPath);
/**
 * Gets the directory for architecture-independent application data, for
 * example NLS files, module sources, ...
 * *
 * Linux:  /usr/shared/@<application@>
 * Solaris: /opt/@<application@>
 * Windows: @<program files directory@>/@<application@>
 * Old path: same as RTPathExecDir()
 * *
 * @returns iprt status code.
 * @param   pszPath     Buffer where to store the path.
 * @param   cchPath     Buffer size in bytes.
 * */
RTDECL(int) RTPathAppPrivateNoArch(char *pszPath, size_t cchPath);

/**
 * Gets the directory for architecture-dependent application data, for
 * example modules which can be loaded at runtime.
 * *
 * Linux:  /usr/lib/@<application@>
 * Solaris: /opt/@<application@>/@<arch>@ or something
 * Windows: @<program files directory@>/@<application@>
 * Old path: same as RTPathExecDir()
 * *
 * @returns iprt status code.
 * @param   pszPath     Buffer where to store the path.
 * @param   cchPath     Buffer size in bytes.
 * */
RTDECL(int) RTPathAppPrivateArch(char *pszPath, size_t cchPath);

/**
 * Gets the toplevel directory for architecture-dependent application data.
 * *
 * This differs from RTPathAppPrivateArch on Solaris only where it will work
 * around the /opt/@<application@>/amd64 and /opt/@<application@>/i386 multi
 * architecture installation style.
 * *
 * Linux:  /usr/lib/@<application@>
 * Solaris: /opt/@<application@>
 * Windows: @<program files directory@>/@<application@>
 * Old path: same as RTPathExecDir()
 * *
 * @returns iprt status code.
 * @param   pszPath     Buffer where to store the path.
 * @param   cchPath     Buffer size in bytes.
 * */
RTDECL(int) RTPathAppPrivateArchTop(char *pszPath, size_t cchPath);
+\/**
+ * Gets the directory for documentation.
+ *
+ * Linux: /usr/share/doc/@<application>@
+ * Solaris: /opt/@<application>@
+ * Windows: @<program files directory>/@<application>@
+ * Old path: same as RTPathExecDir()
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Buffer where to store the path.
+ * @param   cchPath     Buffer size in bytes.
+ */
+RTDECL(int) RTPathAppDocs(char *pszPath, size_t cchPath);
+
+/**
+ * Gets the temporary directory path.
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Buffer where to store the path.
+ * @param   cchPath     Buffer size in bytes.
+ */
+RTDECL(int) RTPathTemp(char *pszPath, size_t cchPath);
+
+/**
+ * RTPathGlobl result entry.
+ */
+typedef struct RTPATHGLOBENTRY
+
+{  /**< List entry. */
+    struct RTPATHGLOBENTRY *pNext;
+    /**< RTDIRENTRYTYPE value. */
+    uint8_t uType;
+    /**< Unused explicit padding. */
+    uint8_t bUnused;
+    /**< The length of the path. */
+    uint16_t cchPath;
+    /**< The path to the file (variable length). */
+    char szPath[1];
+} RTPATHGLOBENTRY;
+/** Pointer to a GLOB result entry. */
+typedef RTPATHGLOBENTRY *PRTPATHGLOBENTRY;
+/** Pointer to a const GLOB result entry. */
+typedef RTPATHGLOBENTRY const *PCRTPATHGLOBENTRY;
+/** Pointer to a GLOB result entry pointer. */
+typedef PCRTPATHGLOBENTRY *PPCRTPATHGLOBENTRY;
### RTPATHGLOB_F_XXX - RTPathGlob flags

- RTPATHGLOB_F_IGNORE_CASE: `RT_BIT_32(0)` (Case insensitive)
- RTPATHGLOB_F_NO_VARIABLES: `RT_BIT_32(1)` (Do not expand `${EnvOrSpecialVariable}` in the pattern)
- RTPATHGLOB_F_NO_TILDE: `RT_BIT_32(2)` (Do not interpret a leading tilde as a home directory reference)
- RTPATHGLOB_F_FIRST_ONLY: `RT_BIT_32(3)` (Only return the first match)
- RTPATHGLOB_F_ONLY_DIRS: `RT_BIT_32(4)` (Only match directories, implied if pattern ends with slash)
- RTPATHGLOB_F_NO_DIRS: `RT_BIT_32(5)` (Do not match directories)
- RTPATHGLOB_F_NO_STARSTAR: `RT_BIT_32(6)` (Disables the `**` wildcard pattern for matching zero or more subdirs)
- RTPATHGLOB_F_MASK: `UINT32_C(0x0000007f)` (Mask of valid flags)

### RTPathGlob

```c
RTDECL(int) RTPathGlob(const char *pszPattern, uint32_t fFlags, PPCRTPATHGLOBENTRY ppHead, uint32_t *pcResults);
```

### RTPathGlobFree

```c
RTDECL(void) RTPathGlobFree(PCRTPATHGLOBENTRY pHead);
```

### Notes

- This API will resolve NOT symbolic links in the last component (just like `unix lstat()`).
+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS if the object exists, information returned.
+ * @retval VERR_PATH_NOT_FOUND if any but the last component in the specified
+ * path was not found or was not a directory.
+ * @retval VERR_FILE_NOT_FOUND if the object does not exist (but path to the
+ * parent directory exists).
+ *
+ * @param pszPath Path to the file system object.
+ * @param pObjInfo Object information structure to be filled on successful
+ * return.
+ * @param enmAdditionalAttribs Which set of additional attributes to request.
+ * Use RTFSOBJATTRADD NOTHING if this doesn't matter.
+ */
+RTR3DECL(int) RTPathQueryInfo(const char *pszPath, PRTFSOBJINFO pObjInfo, RTFSOBJATTRADD
+enmAdditionalAttribs);
+
+/**
+ * Query information about a file system object.
+ *
+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS if the object exists, information returned.
+ * @retval VERR_PATH_NOT_FOUND if any but the last component in the specified
+ * path was not found or was not a directory.
+ * @retval VERR_FILE_NOT_FOUND if the object does not exist (but path to the
+ * parent directory exists).
+ *
+ * @param pszPath Path to the file system object.
+ * @param pObjInfo Object information structure to be filled on successful return.
+ * @param enmAdditionalAttribs Which set of additional attributes to request.
+ * Use RTFSOBJATTRADD NOTHING if this doesn't matter.
+ *
+ * @param fFlags RTPATH_F_ON_LINK or RTPATH_F_FOLLOW_LINK.
+ */
+RTR3DECL(int) RTPathQueryInfoEx(const char *pszPath, PRTFSOBJINFO pObjInfo, RTFSOBJATTRADD
+enmAdditionalAttribs, uint32_t fFlags);
+
+/**
+ * Changes the mode flags of a file system object.
+ *
+ * The API requires at least one of the mode flag sets (Unix/Dos) to
+ * be set. The type is ignored.
+ *
+ * This API will resolve symbolic links in the last component since
+ * mode isn't important for symbolic links.
+ *
+ * @returns iprt status code.
+ @param pszPath Path to the file system object.
+ @param fMode The new file mode, see @ref grp_rt_fs for details.
+ */
+RTR3DECL(int) RTPathSetMode(const char *pszPath, RTFMODE fMode);
+
+/**
+ * Gets the mode flags of a file system object.
+ *
+ * @returns iprt status code.
+ * @param pszPath Path to the file system object.
+ * @param pfMode Where to store the file mode, see @ref grp_rt_fs for details.
+ *
+ * @remark This is wrapper around RTPathQueryInfoEx(RTPATH_F_FOLLOW_LINK) and
+ *          exists to complement RTPathSetMode().
+ */
+RTR3DECL(int) RTPathGetMode(const char *pszPath, PRTFMODE pfMode);
+
+/**
+ * Changes one or more of the timestamps associated of file system object.
+ *
+ * This API will not resolve symbolic links in the last component (just
+ * like unix lutimes()).
+ *
+ * @returns iprt status code.
+ * @param pszPath             Path to the file system object.
+ * @param pAccessTime         Pointer to the new access time.
+ * @param pModificationTime   Pointer to the new modification time.
+ * @param pChangeTime         Pointer to the new change time. NULL if not to be changed.
+ * @param pBirthTime          Pointer to the new time of birth. NULL if not to be changed.
+ *
+ * @remark The file system might not implement all these time attributes,
+ *         the API will ignore the ones which aren't supported.
+ *
+ * @remark The file system might not implement the time resolution
+ *         employed by this interface, the time will be chopped to fit.
+ *
+ * @remark The file system may update the change time even if it's
+ *         not specified.
+ *
+ * @remark POSIX can only set Access & Modification and will always set both.
+ */
+RTR3DECL(int) RTPathSetTimes(const char *pszPath, PCRTTIMESPEC pAccessTime, PCRTTIMESPEC pModificationTime,
+                             PCRTTIMESPEC pChangeTime, PCRTTIMESPEC pBirthTime);
+ * @returns iprt status code.
+ * @param pszPath Path to the file system object.
+ * @param pAccessTime Pointer to the new access time.
+ * @param pModificationTime Pointer to the new modification time.
+ * @param pChangeTime Pointer to the new change time. NULL if not to be changed.
+ * @param pBirthTime Pointer to the new time of birth. NULL if not to be changed.
+ * @param fFlags RTPATH_F_ON_LINK or RTPATH_F_FOLLOW_LINK.
+ *
+ * The file system might not implement all these time attributes,
+ * the API will ignore the ones which aren't supported.
+ *
+ * The file system might not implement the time resolution
+ * employed by this interface, the time will be chopped to fit.
+ *
+ * The file system may update the change time even if it's
+ * not specified.
+ *
+ * POSIX can only set Access & Modification and will always set both.
+ */
+RTR3DECL(int) RTPathSetTimesEx(const char *pszPath, PCRTTIMESPEC pAccessTime, PCRTTIMESPEC
+ pModificationTime, PCRTTIMESPEC pChangeTime, PCRTTIMESPEC pBirthTime, uint32_t fFlags);
+
+/**
+ * Gets one or more of the timestamps associated of file system object.
+ *
+ * @returns iprt status code.
+ * @param pszPath Path to the file system object.
+ * @param pAccessTime Where to store the access time. NULL is ok.
+ * @param pModificationTime Where to store the modification time. NULL is ok.
+ * @param pChangeTime Where to store the change time. NULL is ok.
+ * @param pBirthTime Where to store the creation time. NULL is ok.
+ *
+ * This is wrapper around RTPathQueryInfo() and exists to complement
+ * RTPathSetTimes(). If the last component is a symbolic link, it will
+ * not be resolved.
+ */
+RTR3DECL(int) RTPathGetTimes(const char *pszPath, PRTTIMESPEC pAccessTime, PRTTIMESPEC
+ pModificationTime,
+ PRTTIMESPEC pChangeTime, PRTTIMESPEC pBirthTime);
+
+/**
+ * Changes the owner and/or group of a file system object.
+ *
+ * This API will not resolve symbolic links in the last component (just
+ * like unix lchown()).
+ *
+ * @returns iprt status code.
+ * @param pszPath  Path to the file system object.
+ * @param uid The new file owner user id. Pass NIL_RTUID to leave this unchanged.
+ * @param gid The new group id. Pass NIL_RTGUID to leave this unchanged.
+ */
+RTR3DECL(int) RTPathSetOwner(const char *pszPath, uint32_t uid, uint32_t gid);
+
+/**
+ * Changes the owner and/or group of a file system object.
+ *
+ * @returns iprt status code.
+ * @param pszPath  Path to the file system object.
+ * @param uid The new file owner user id. Pass NIL_RTUID to leave this unchanged.
+ * @param gid The new group id. Pass NIL_RTGID to leave this unchanged.
+ * @param fFlags RTPATH_F_ON_LINK or RTPATH_F_FOLLOW_LINK.
+ */
+RTR3DECL(int) RTPathSetOwnerEx(const char *pszPath, uint32_t uid, uint32_t gid, uint32_t fFlags);
+
+/**
+ * Gets the owner and/or group of a file system object.
+ *
+ * @returns iprt status code.
+ * @param pszPath  Path to the file system object.
+ * @param pUid Where to store the owner user id. NULL is ok.
+ * @param pGid Where to store the group id. NULL is ok.
+ *
+ * @remark This is wrapper around RTPathQueryInfo() and exists to complement RTPathGetOwner(). If the last component is a symbolic link, it will not be resolved.
+ */
+RTR3DECL(int) RTPathGetOwner(const char *pszPath, uint32_t *pUid, uint32_t *pGid);
+
+/** @name RTPathRename, RTDirRename & RTFileRename flags.
+ * @{ */
+/** Do not replace anything. */
+#define RTPATHRENAME_FLAGS_NO_REPLACE UINT32_C(0)
+/** This will replace attempt any target which isn't a directory. */
+#define RTPATHRENAME_FLAGS_REPLACE RT_BIT(0)
+/** Don't allow symbolic links as part of the path. */
+#define RTPATHRENAME_FLAGS_NO_SYMLINKS RT_BIT(1)
+/** @ } */
+
+ * Renames a path within a filesystem.
+ *
+ * This will rename symbolic links. If RTPATHRENAME_FLAGS_REPLACE is used and
+ * pszDst is a symbolic link, it will be replaced and not its target.
+ *
+ * @returns IPRT status code.
+ * @param   pszSrc      The source path.
+ * @param   pszDst      The destination path.
+ * @param   fRename     Rename flags, RTPATHRENAME_FLAGS_.*.
+ */
+RTR3DECL(int) RTPathRename(const char *pszSrc,  const char *pszDst, unsigned fRename);
+
+/** @name RTPathUnlink flags.
+ * @{ */
+/** Don't allow symbolic links as part of the path.
+ * @remarks this flag is currently not implemented and will be ignored. */
+#define RTPATHUNLINK_FLAGS_NO_SYMLINKS  RT_BIT(0)
+/** @} */
+
+/** Removes the last component of the path.
+ *
+ * @returns IPRT status code.
+ * @param   pszPath     The path.
+ * @param   fUnlink     Unlink flags, RTPATHUNLINK_FLAGS_.*.
+ */
+RTR3DECL(int) RTPathUnlink(const char *pszPath, uint32_t fUnlink);
+
+/**
+ * A /bin/rm tool.
+ *
+ * @returns Program exit code.
+ *
+ * @param   cArgs               The number of arguments.
+ * @param   papszArgs           The argument vector. (Note that this may be
+ *                               reordered, so the memory must be writable.)
+ */
+RTDECL(RTEXITCODE) RTPathRmCmd(unsigned cArgs, char **papszArgs);
+
+#endif /* IN_RING3 */
+
+/** @} */
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/power.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/power.h
@@ -0,0 +1,112 @@
+/** @file
+ * IPRT - Power management.
+ */
+
+/**
+ * Copyright (C) 2008-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef ___iprt_power_h
+define ___iprt_power_h
+
+include <iprt/cdefs.h>
+include <iprt/types.h>
+
+RT_C_DECLS_BEGIN
+
+/** @defgroup grp_rt_power RTPower - Power management
+ * @ingroup grp_rt
+ * @
+ */
+
+ifndef IN_RING0
+
+/**
+ * MP event, see FNRTPOWERNOTIFICATION.
+ */
+typedef enum RTPOWEVENT
+{
+ /** The system will go into suspend mode. */
+ RTPOWEREVENT_SUSPEND = 1,
+ /** The system has resumed. */
+ RTPOWEREVENT_RESUME
+ } RTPOWEREVENT;
+
+ /**
+ * Notification callback.
+ *
+ * The context this is called in differs a bit from platform to
+ * platform, so be careful while in here.
+ *
+ * @param   enmEvent    The event.
+ * @param   pvUser      The user argument.
+ */
+ typedef DECLCALLBACK(void) FNRTPOWERNOTIFICATION(RTPOWEREVENT enmEvent, void *pvUser);
+ /** Pointer to a FNRTPOWERNOTIFICATION(). */
+ typedef FNRTPOWERNOTIFICATION *PFNRTPOWERNOTIFICATION;
+
+ /**
+ * Registers a notification callback for power events.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_NO_MEMORY if a registration record cannot be allocated.
+ * @retval  VERR_ALREADY_EXISTS if the pfnCallback and pvUser already exist
+ *          in the callback list.
+ *
+ * @param   pfnCallback     The callback.
+ * @param   pvUser          The user argument to the callback function.
+ */
+ RTDECL(int) RTPowerNotificationRegister(PFNRTPOWERNOTIFICATION pfnCallback, void *pvUser);
+
+ /**
+ * This deregisters a notification callback registered via RTPowerNotificationRegister().
+ *
+ * The pfnCallback and pvUser arguments must be identical to the registration call
+ * of we won’t find the right entry.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_NOT_FOUND if no matching entry was found.
+ *
+ * @param   pfnCallback     The callback.
+ * @param   pvUser          The user argument to the callback function.
+ */
+ RTDECL(int) RTPowerNotificationDeregister(PFNRTPOWERNOTIFICATION pfnCallback, void *pvUser);
This calls all registered power management callback handlers registered via RTPowerNotificationRegister().

@returns IPRt status code.

@retval VINF_SUCCESS on success.

@param enmEvent Power Management event

RTDECL(int) RTPowerSignalEvent(RTPOWEREVENT enmEvent);

@end

---
```c
#define __iprt_process_h
+
+\#include \<iprt/cdefs.h\>
+\#include \<iprt/types.h\>
+
+RT_C_DECLS_BEGIN
+
+/** \defgroup grp_rt_process    RTProc - Process Management
+ * \ingroup grp_rt
+ * @}{
+ */
+
+/**
+ * Process priority.
+ *
+ * The process priority is used to select how scheduling properties
+ * are assigned to the different thread types (see THREADTYPE).
+ *
+ * In addition to using the policy assigned to the process at startup (DEFAULT)
+ * it is possible to change the process priority at runtime. This allows for
+ * a GUI, resource manager or admin to adjust the general priority of a task
+ * without upsetting the fine-tuned priority of the threads within.
+ */
+typedef enum RTPROCPRIORITY
+{
+    /** Invalid priority. */
+    RTPROCPRIORITY_INVALID = 0,
+    /** Default priority.
+     * Derive the scheduling policy from the priority of the RTR3Init()
+     * and RTProcSetPriority() callers and the rights the process have
+     * to alter its own priority.
+     */
+    RTPROCPRIORITY_DEFAULT,
+    /** Flat priority.
+     * Assumes a scheduling policy which puts the process at the default priority
+     * and with all thread at the same priority.
+     */
+    RTPROCPRIORITY_FLAT,
+    /** Low priority.
+     * Assumes a scheduling policy which puts the process mostly below the
+     * default priority of the host OS.
+     */
+    RTPROCPRIORITY_LOW,
+    /** Normal priority.
+     * Assume a scheduling policy which shares the CPU resources fairly with
+     * other processes running with the default priority of the host OS.
+     */
+} 
```
+ RTPROCPRIORITY_NORMAL,
+ /**< High priority.
+  * Assumes a scheduling policy which puts the task above the default
+  * priority of the host OS. This policy might easily cause other tasks
+  * in the system to starve.
+  */
+ RTPROCPRIORITY_HIGH,
+ /**< Last priority, used for validation. */
+ RTPROCPRIORITY_LAST
+} RTPROCPRIORITY;

+/**
+ * Get the current process identifier.
+ *
+ * @returns Process identifier.
+ */
+RTDECL(RTPROCESS) RTProcSelf(void);
+
+##ifdef IN_RING0
+/**
+ * Get the current process handle.
+ *
+ * @returns Ring-0 process handle.
+ */
+RTR0DECL(RTR0PROCESS) RTR0ProcHandleSelf(void);
+##endif
+
+##ifdef IN_RING3
+
+/**
+ * Attempts to alter the priority of the current process.
+ *
+ * @returns iprt status code.
+ * @param enmPriority The new priority.
+ */
+RTR3DECL(int) RTProcSetPriority(RTPROCPRIORITY enmPriority);
+
+/**
+ * Gets the current priority of this process.
+ *
+ * @returns The priority (see RTPROCPRIORITY).
+ */
+RTR3DECL(RTPROCPRIORITY) RTProcGetPriority(void);
+##*/
+ * Create a child process.
+ *
+ * @returns iprt status code.
+ * @param   pszExec     Executable image to use to create the child process.
+ * @param   papszArgs   Pointer to an array of arguments to the child. The array terminated by an entry containing
+ *                      NULL.
+ * @param   Env         Handle to the environment block for the child.
+ * @param   fFlags      Flags, one of the RTPROC_FLAGS_* defines.
+ * @param   pProcess    Where to store the process identifier on successful return.
+ *                      The content is not changed on failure. NULL is allowed.
+ */
+RTR3DECL(int)   RTProcCreate(const char *pszExec, const char * const *papszArgs, RTENV Env, unsigned
+   fFlags, PRTPROCESS pProcess);
+
+
+/**
+ * Create a child process.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   pszExec     Executable image to use to create the child process.
+ * @param   papszArgs   Pointer to an array of arguments to the child. The
+ *                      array terminated by an entry containing NULL.
+ * @param   hEnv        Handle to the environment block for the child. Pass
+ *                      RTENV_DEFAULT to use the environment of the current
+ *                      process.
+ * @param   fFlags      Flags, one of the RTPROC_FLAGS_* defines.
+ * @param   phStdIn     The standard in handle to assign the new process. Pass
+ *                      NULL to use the same as the current process. If the
+ *                      handle is NIL, we'll close the standard input of the
+ *                      guest.
+ * @param   phStdOut    The standard out handle to assign the new process. Pass
+ *                      NULL to use the same as the current process. If the
+ *                      handle is NIL, we'll close the standard output of the
+ *                      guest.
+ * @param   phStdErr    The standard error handle to assign the new process. Pass
+ *                      NULL to use the same as the current process. If the
+ *                      handle is NIL, we'll close the standard error of the
+ *                      guest.
+ * @param   pszAsUser   User to run the process as. Pass NULL to use the same
+ *                      user as the current process.
+ *                      Windows: Use user\@domain (UPN, User Principal Name)
+ *                      format to specify a domain.
+ * @param   pszPassword Password to use to authenticate @a pszAsUser. Must be
+ *                      NULL wif pszAsUser is NULL. Whether this is actually
+ *                      used or not depends on the platform.
+ * @param   phProcess   Where to store the process handle on successful return.
+ *                      The content is not changed on failure. NULL is allowed.
The handles does not have to be created as inheritable, but it doesn't hurt if they are as it may avoid race conditions on some platforms.

The as-user feature isn't supported/implemented on all platforms and will cause a-yet-to-be-determined-error-status on these.

RTR3DECL(int) RTProcCreateEx(const char *pszExec, const char * const *papszArgs, RTENV hEnv, uint32_t fFlags,
   PCRTHANDLE phStdIn, PCRTHANDLE phStdOut, PCRTHANDLE phStdErr, const char *pszAsUser,
   const char *pszPassword, PRTPROCESS phProcess);

/** @name RTProcCreate and RTProcCreateEx flags
 * @{ */
/** Detach the child process from the parents process tree and process group,
 * session or/and console (depends on the platform what's done applicable).
 */
#define RTPROC_FLAGS_DETACHED RT_BIT(0)
/** Don't show the started process.
 * This is a Windows (and maybe OS/2) concept, do not use on other platforms. */
#define RTPROC_FLAGS_HIDDEN RT_BIT(1)
/** Use special code path for starting child processes from a service (daemon).
 * This is a windows concept for dealing with the so called "Session 0"
 * isolation which was introduced with Windows Vista. Do not use on other
 * platforms. */
#define RTPROC_FLAGS_SERVICE RT_BIT(2)
/** Suppress changing the process contract id for the child process
 * on Solaris. Without this flag the contract id is always changed, as that's
 * the more frequently used case. */
#define RTPROC_FLAGS_SAME_CONTRACT RT_BIT(3)
/** Load user profile data when executing a process.
 * This redefines the meaning of RTENV_DEFAULT to the profile environment.
 * @remarks On non-windows platforms, the resulting environment maybe very
 * different from what you see in your shell. Among other reasons,
 * we cannot run shell profile scripts which typically sets up the
 * environment. */
#define RTPROC_FLAGS_PROFILE RT_BIT(4)
/** Create process without a console window.
 * This is a Windows (and OS/2) concept, do not use on other platforms. */
#define RTPROC_FLAGS_NO_WINDOW RT_BIT(5)
/** Search the PATH for the executable. */
#define RTPROC_FLAGS_SEARCH_PATH RT_BIT(6)
/** Don't quote and escape arguments on Windows and similar platforms where a
 * command line is passed to the child process instead of an argument vector,
* just join up argv with a space between each. Ignored on platforms
* passing argument the vector. */
+#define RTPROC_FLAGS_UNQUOTED_ARGS RT_BIT(7)
+/** Consider hEnv an environment change record to be applied to RTENV_DEFAULT.
+ If hEnv is RTENV_DEFAULT, the flag has no effect. */
+#define RTPROC_FLAGS_ENV_CHANGE_RECORD RT_BIT(8)
+/** Valid flag mask. */
+#define RTPROC_FLAGS_VALID_MASK UINT32_C(0x1ff)
+
+
+ * Process exit reason.
+ */
+typedef enum RTPROCEXITREASON
+
+
+
+ * Process exit status.
+ */
+typedef struct RTPROCSTATUS
+
+
+
+ * Flags for RTProcWait().
+ */
+@ { */
+/* Block indefinitely waiting for the process to exit. */
+#define RTPROCWAIT_FLAGS_BLOCK 0
+/* Don't block, just check if the process have exited. */
+#define RTPROCWAIT_FLAGS_NOBLOCK 1
+@ } */
+}
+/**
+ * Waits for a process, resumes on interruption.
+ *
+ * @returns VINF_SUCCESS when the status code for the process was collected and
+ * put in *pProcStatus.
+ * @returns VERR_PROCESS_NOT_FOUND if the specified process wasn't found.
+ * @returns VERR_PROCESS_RUNNING when the RTPROCWAIT_FLAGS_NOBLOCK and the
+ * process haven't exited yet.
+ *
+ * @param   Process         The process to wait for.
+ * @param   fFlags          The wait flags, any of the RTPROCWAIT_FLAGS_\#defines.
+ * @param   pProcStatus     Where to store the exit status on success.
+ *                          Optional.
+ */
+RTR3DECL(int) RTProcWait(RTPROCESS Process, unsigned fFlags, PRTPROCSTATUS pProcStatus);
+
+/**
+ * Waits for a process, returns on interruption.
+ *
+ * @returns VINF_SUCCESS when the status code for the process was collected and
+ * put in *pProcStatus.
+ * @returns VERR_PROCESS_NOT_FOUND if the specified process wasn't found.
+ * @returns VERR_PROCESS_RUNNING when the RTPROCWAIT_FLAGS_NOBLOCK and the
+ * process haven't exited yet.
+ * @returns VERR_INTERRUPTED when the wait was interrupted by the arrival of a
+ * signal or other async event.
+ *
+ * @param   Process         The process to wait for.
+ * @param   fFlags          The wait flags, any of the RTPROCWAIT_FLAGS_\#defines.
+ * @param   pProcStatus     Where to store the exit status on success.
+ *                          Optional.
+ */
+RTR3DECL(int) RTProcWaitNoResume(RTPROCESS Process, unsigned fFlags, PRTPROCSTATUS pProcStatus);
+
+/**
+ * Terminates (kills) a running process.
+ *
+ * @returns IPRT status code.
+ * @param   Process         The process to terminate.
+ */
+RTR3DECL(int) RTProcTerminate(RTPROCESS Process);
+
+/**
+ * Gets the processor affinity mask of the current process.
+ *
+ * @returns The affinity mask.
+ */
+RTR3DECL(uint64_t) RTProcGetAffinityMask(void);
+
+/**
+ * Gets the short process name.
+ *
+ * @returns Pointer to read-only name string.
+ */
+RTR3DECL(const char *) RTProcShortName(void);
+
+/**
+ * Gets the path to the executable image of the current process.
+ *
+ * @returns pszExecPath on success. NULL on buffer overflow or other errors.
+ *
+ * @param   pszExecPath   Where to store the path.
+ * @param   cbExecPath    The size of the buffer.
+ */
+RTR3DECL(char *) RTProcGetExecutablePath(char *pszExecPath, size_t cbExecPath);
+
+/**
+ * Daemonize the current process, making it a background process.
+ *
+ * The way this work is that it will spawn a detached / backgrounded /
+ * daemoned / call-it-what-you-want process that isn't a direct child of the
+ * current process. The spawned will have the same arguments a the caller,
+ * except that the @a pszDaemonizedOpt is appended to prevent that the new
+ * process calls this API again.
+ *
+ * The new process will have the standard handles directed to/from the
+ * bitbucket.
+ *
+ * @returns IPRT status code. On success it is normal for the caller to exit
+ * the process by returning from main().
+ *
+ * @param   papszArgs   The argument vector of the calling process.
+ * @param   pszDaemonizedOpt The daemonized option. This is appended to the
+ * end of the parameter list of the daemoned process.
+ */
+RTR3DECL(int) RTProcDaemonize(const char * const *papszArgs, const char *pszDaemonizedOpt);
+
+/**
+ * Daemonize the current process, making it a background process. The current
+ * process will exit if daemonizing is successful.
+ *
+ * @returns IPRT status code. On success it will only return in the child
+ * process, the parent will exit. On failure, it will return in the
+ * parent process and no child has been spawned.
+ * @param   fNoChDir   Pass false to change working directory to "/".
+ * @param   fNoClose   Pass false to redirect standard file streams to the null device.
+ * @param   pszPidfile Path to a file to write the process id of the daemon
+ *                    process to. Daemonizing will fail if this file already
+ *                    exists or cannot be written. May be NULL.
+ */
+RTR3DECL(int) RTProcDaemonizeUsingFork(bool fNoChDir, bool fNoClose, const char *pszPidfile);
+
+/**
+ * Check if the given process is running on the system.
+ *
+ * This check is case sensitive on most systems, except for Windows, OS/2 and
+ * Darwin.
+ *
+ * @returns true if the process is running & false otherwise.
+ *
+ * @param   pszName     Process name to search for. If no path is given only the
+ *                      filename part of the running process set will be
+ *                      matched. If a path is specified, the full path will be
+ *                      matched.
+ */
+RTR3DECL(bool) RTProcIsRunningByName(const char *pszName);
+
+/**
+ * Queries the parent process ID.
+ *
+ * @returns IPRT status code
+ *
+ * @param   hProcess     The process to query the parent of.
+ * @param   phParent     Where to return the parent process ID.
+ */
+RTR3DECL(int) RTProcQueryParent(RTPROCESS hProcess, PRTPROCESS phParent);
+
+/**
+ * Query the username of the given process.
+ *
+ * @returns IPRT status code.
+ *
+ * @retval VERR_BUFFER_OVERFLOW if the given buffer size is too small for the username.
+ *
+ * @param   hProcess     The process handle to query the username for.
+ * @param   pszUser      Where to store the user name on success.
+ * @param   cbUser       The size of the user name buffer.
+ * @param   pcbUser      Where to store the username length on success
+ *                      or the required buffer size if VERR_BUFFER_OVERFLOW
+ *                      is returned.
+ */
+RTR3DECL(int) RTProcQueryUsername(RTPROCESS hProcess, char *pszUser, size_t cbUser, size_t *pcbUser);
+ * Query the username of the given process allocating the string for the username.
+ *
+ * @returns IPRT status code.
+ * @param hProcess The process handle to query the username for.
+ * @param ppszUser Where to store the pointer to the string containing
+ * the username on success. Free with RTStrFree().
+ */
+RTR3DECL(int) RTProcQueryUsernameA(RTPROCESS hProcess, char **ppszUser);
+
+#endif /* IN_RING3 */
+
+/** @} */
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/semaphore.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/semaphore.h
@@ -0,0 +1,1409 @@
+/** @file
+ * IPRT - Semaphore.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef __iprt_semaphore_h
+ define __iprt_semaphore_h
+
```c
#include <iprt/cdefs.h>
#include <iprt/types.h>
#if defined(RT_LOCK_STRICT_ORDER) && defined(IN_RING3)
#include <iprt/lockvalidator.h>
#endif

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_sems RTSem - Semaphores *
 * This module implements all kinds of event and mutex semaphores; in addition
 * to these, IPRT implements "critical sections", which are fast recursive
 * mutexes (see @ref grp_rt_critsect ). C++ users may find @ref grp_rt_cpp_lock
 * interesting.
 */
/** @ingroup grp_rt */

/** @name Generic Semaphore Wait Flags. *
 * @remarks Exactly one of RTSEMWAIT_FLAGS_RELATIVE and
 *          RTSEMWAIT_FLAGS_ABSOLUTE must be set, unless
 *          RTSEMWAIT_FLAGS_INDEFINITE is used.
 *          Exactly one of RTSEMWAIT_FLAGS_NANOSECS and
 *          RTSEMWAIT_FLAGS_MILLISECS must be set, unless
 *          RTSEMWAIT_FLAGS_INDEFINITE is used.
 *          Exactly one of RTSEMWAIT_FLAGS_RESUME and RTSEMWAIT_FLAGS_NORESUME
 *          must be set.
 *          The interruptible vs resume stuff is ring-0 vs ring-3 semantics.
 */
/** @ { */

/** The timeout is relative. */
#define RTSEMWAIT_FLAGS_RELATIVE            RT_BIT_32(0)
/** The timeout is absolute. */
#define RTSEMWAIT_FLAGS_ABSOLUTE            RT_BIT_32(1)
/** The timeout is specified in nanoseconds. */
#define RTSEMWAIT_FLAGS_NANOSECS            RT_BIT_32(2)
/** The timeout is specified in milliseconds. */
#define RTSEMWAIT_FLAGS_MILLISECS           RT_BIT_32(3)
/** Indefinite wait. */
#define RTSEMWAIT_FLAGS_INDEFINITE          RT_BIT_32(4)
```
/** Mask covering the time related bits. */
#define RTSEMWAIT_FLAGS_TIME_MASK UINT32_C(0x0000001f)

/** Interruptible wait. */
#define RTSEMWAIT_FLAGS_INTERRUPTIBLE RT_BIT_32(5)

/** No automatic resume, same as interruptible. */
#define RTSEMWAIT_FLAGS_NORESUME RTSEMWAIT_FLAGS_INTERRUPTIBLE

/** Uninterruptible wait. */
#define RTSEMWAIT_FLAGS_UNINTERRUPTIBLE RT_BIT_32(6)

/** Resume on interrupt, same as uninterruptible. */
#define RTSEMWAIT_FLAGS_RESUME RTSEMWAIT_FLAGS_UNINTERRUPTIBLE

/** Macro for validate the flags. */
#define RTSEMWAIT_FLAGS_ARE_VALID(fFlags) 
+ (   !((fFlags) & UINT32_C(0xffffff80)) 
+    && ( ((fFlags) & RTSEMWAIT_FLAGS_INDEFINITE) 
+    ? ( ((fFlags) & UINT32_C(0x20)) ^ (((fFlags) >> 1) & UINT32_C(0x20)) ) == UINT32_C(0x20) 
+    : ( ((fFlags) & UINT32_C(0x25)) ^ (((fFlags) >> 1) & UINT32_C(0x25)) ) == UINT32_C(0x25) ))
+/** @} */

/** @} */

/** @defgroup grp_rt_sems_event RTSemEvent - Single Release Event Semaphores */
+ *
+ * Event semaphores can be used for inter-thread communication when one thread
+ * wants to notify another thread that something happened. A thread can block
+ * ("wait") on an event semaphore until it is signalled by another thread; see
+ * RTSemEventCreate, RTSemEventSignal and RTSemEventWait.
+ *
+ * @param phEventSem Where to store the handle to the newly created
+ * event semaphore.
+ */
+RTDECL(int) RTSemEventCreate(PRTSEMEVENT phEventSem);
+
+/** *
+ * Create an event semaphore.
+ *
+ * @returns iprt status code.
+ * @param phEventSem Where to store the handle to the newly created
+ * event semaphore.
+ */
+RTDECL(int) RTSemEventCreate(PRTSEMEVENT phEventSem);
+ * @param hClass The class (no reference consumed).  Since we
don’t do order checks on event semaphores, the
use of the class is limited to controlling the
timeout threshold for deadlock detection.
+ * @param pszNameFmt Name format string for the lock validator,
optional (NULL).  Max length is 32 bytes.
+ * @param ... Format string arguments.
+ */
+RTDECL(int) RTSemEventCreateEx(PRTSEMEVENT phEventSem, uint32_t fFlags, RTLOCKVALCLASS hClass,
  const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(4, 5);

/** @name RTSemMutexCreateEx flags
 * @{ */
/** Disables lock validation. */
#define RTSEMEVENT_FLAGS_NO_LOCK_VAL UINT32_C(0x00000001)
/** Bootstrap hack for use with certain memory allocator locks only! */
#define RTSEMEVENT_FLAGS_BOOTSTRAP_HACK UINT32_C(0x00000004)
/** @} */

/** Destroy an event semaphore.
 * @returns iprt status code.
 * @param hEventSem Handle of the event semaphore.  NIL_RTSEMEVENT
  is quietly ignored (VINF_SUCCESS).
 */
+RTDECL(int) RTSemEventDestroy(RTSEMEVENT hEventSem);

/** Signal an event semaphore.
 * @returns iprt status code.
 * @param hEventSem The event semaphore to signal.
 * @remarks ring-0: This works when preemption is disabled.  However it is
  system specific whether it works in interrupt context or with
  interrupts disabled.
 */
+RTDECL(int) RTSemEventSignal(RTSEMEVENT hEventSem);

/** Wait for the event semaphore to be signaled, resume on interruption.
 */
+ * This function will resume if the wait is interrupted by an async system event
+ * (like a unix signal) or similar.
+ *
+ * @returns iprt status code.
+ *          Will not return VERR_INTERRUPTED.
+ * @param   hEventSem           The event semaphore to wait on.
+ * @param   cMillies            Number of milliseconds to wait.
+ */
+RTDECL(int)  RTSemEventWait(RTSEMEVENT hEventSem, RTMSINTERVAL cMillies);
+
+/**
+ * Wait for the event semaphore to be signaled, return on interruption.
+ *
+ * This function will not resume the wait if interrupted.
+ *
+ * @returns iprt status code.
+ * @param   hEventSem           The event semaphore to wait on.
+ * @param   cMillies            Number of milliseconds to wait.
+ */
+RTDECL(int)  RTSemEventWaitNoResume(RTSEMEVENT hEventSem, RTMSINTERVAL cMillies);
+
+/**
+ * Extended API for waiting on an event semaphore to be signaled.
+ *
+ * @returns IPRT status code.
+ * @param   hEventSem           The event semaphore to wait on.
+ * @param   fFlags              Combination of RTSEMWAIT_FLAGS_XXX.
+ * @param   uTimeout            The timeout, ignored if
+ *                              RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ *                              Whether this is absolute or relative,
+ *                              milliseconds or nanoseconds depends on the @a
+ *                              fFlags value. Do not pass RT_INDEFINITE_WAIT
+ *                              here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
+ */
+RTDECL(int)  RTSemEventWaitEx(RTSEMEVENT hEventSem, uint32_t fFlags, uint64_t uTimeout);
+
+/**
+ * Debug version of RTSemEventWaitEx that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemEventWaitEx.
+ * @param   hEventSem           The event semaphore to wait on.
+ * @param   fFlags              See RTSemEventWaitEx.
+ * @param   uTimeout            See RTSemEventWaitEx.
+ * @param   uld                 Some kind of locking location ID. Typically a
+ *                              return address up the stack. Optional (0).
+ * @param   SRC_POS             The source position where call is being made
+ *                              from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int) RTSemEventWaitExDebug(RTSEMEVENT hEventSem, uint32_t fFlags, uint64_t uTimeout,
+                                   RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
+/**
+ * Gets the best timeout resolution that RTSemEventWaitEx can do.
+ *
+ * @returns The resolution in nanoseconds.
+ */
+RTDECL(uint32_t) RTSemEventGetResolution(void);
+
+/**
+ * Sets the signaller thread to one specific thread.
+ *
+ * This is only used for validating usage and deadlock detection. When used
+ * after calls to RTSemEventAddSignaller, the specified thread will be the only
+ * signalling thread.
+ *
+ * @param   hEventSem       The event semaphore.
+ * @param   hThread         The thread that will signal it. Pass
+ *                          NIL_RTTHREAD to indicate that there is no
+ *                          special signalling thread.
+ */
+RTDECL(void) RTSemEventSetSignaller(RTSEMEVENT hEventSem, RTTHREAD hThread);
+
+/**
+ * To add more signalling threads.
+ *
+ * First call RTSemEventSetSignaller then add further threads with this.
+ *
+ * @param   hEventSem       The event semaphore.
+ * @param   hThread         The thread that will signal it. NIL_RTTHREAD is
+ *                          not accepted.
+ */
+RTDECL(void) RTSemEventAddSignaller(RTSEMEVENT hEventSem, RTTHREAD hThread);
+
+/**
+ * To remove a signalling thread.
+ *
+ * Reverts work done by RTSemEventAddSignaller and RTSemEventSetSignaller.
+ *
+ * @param   hEventSem       The event semaphore.
+ * @param   hThread         A previously added thread.
+ */
+RTDECL(void) RTSemEventRemoveSignaller(RTSEMEVENT hEventSem, RTTHREAD hThread);
+
+/** @} */
+
/** @defgroup grp_rt_sems_event_multi RTSemEventMulti - Multiple Release Event Semaphores 
  
  +* A variant of @ref grp_rt_sems_event where all threads will be unblocked when 
  +* signalling the semaphore. 
  +* 
  +* @} */ 
+*/ 
+*/

+* Creates a multiple release event semaphore. 
+* 
+* @returns iprt status code. 
+* @param phEventMultiSem Where to store the handle to the newly created 
+* multiple release event semaphore. 
+*/ 
+RTDECL(int) RTSemEventMultiCreate(PRTSEMEVENTMULTI phEventMultiSem); 
+
+/** 
+ * Creates a multiple release event semaphore.
+ * 
+ * @returns iprt status code.
+ * @param phEventMultiSem Where to store the handle to the newly created 
+ * multiple release event semaphore.
+ */
+RTDECL(int) RTSemEventMultiCreateEx(PRTSEMEVENTMULTI phEventMultiSem, 
+                                     uint32_t fFlags, RTLOCKVALCLASS hClass, 
+                                     const char *pszNameFmt, ...); 
+
+/** @name RTSemMutexCreateEx flags 
+ * @{ */ 
+/** Disables lock validation. */ 
+#define RTSEMEVENTMULTI_FLAGS_NO_LOCK_VAL UINT32_C(0x00000001) 
+/** @} */ 
+
+/** 
+ * Destroy an event multi semaphore. 
+ * 
+ * @returns iprt status code. 
+ * @param hEventMultiSem The multiple release event semaphore. NIL is 
+ * quietly ignored (VINF_SUCCESS). 
+ */
+RTDECL(int) RTSemEventMultiDestroy(RTSEMEVENTMULTI hEventMultiSem);
+
+/**
+ * Signal an event multi semaphore.
+ *
+ * @returns iprt status code.
+ * @param   hEventMultiSem   The multiple release event semaphore.
+ *
+ * @remarks ring-0: This works when preemption is disabled. However it is
+ * system specific whether it works in interrupt context or with
+ * interrupts disabled.
+ */
+RTDECL(int) RTSemEventMultiSignal(RTSEMEVENTMULTI hEventMultiSem);
+
+/**
+ * Resets an event multi semaphore to non-signaled state.
+ *
+ * @returns iprt status code.
+ * @param   hEventMultiSem   The multiple release event semaphore.
+ */
+RTDECL(int) RTSemEventMultiReset(RTSEMEVENTMULTI hEventMultiSem);
+
+/**
+ * Wait for the event multi semaphore to be signaled, resume on interruption.
+ *
+ * This function will resume if the wait is interrupted by an async
+ * system event (like a unix signal) or similar.
+ *
+ * @returns iprt status code.
+ * Will not return VERR_INTERRUPTED.
+ * @param   hEventMultiSem   The multiple release event semaphore.
+ * @param   cMillies         Number of milliseconds to wait.
+ */
+RTDECL(int) RTSemEventMultiWait(RTSEMEVENTMULTI hEventMultiSem, RTMSINTERVAL cMillies);
+
+/**
+ * Wait for the event multi semaphore to be signaled, return on interruption.
+ *
+ * This function will not resume the wait if interrupted.
+ *
+ * @returns iprt status code.
+ * @param   hEventMultiSem   The multiple release event semaphore.
+ * @param   cMillies         Number of milliseconds to wait.
+ * @todo    Rename to RTSemEventMultiWaitIntr since it is mainly for
+ *          ring-0 consumption.
+ */
+RTDECL(int) RTSemEventMultiWaitNoResume(RTSEMEVENTMULTI hEventMultiSem, RTMSINTERVAL cMillies);
/* Extended API for waiting on an event semaphore to be signaled. */

/* @returns IPRT status code. */

/* @param hEventMultiSem The multiple release event semaphore to wait on. */

/* @param fFlags Combination of the RTSEMWAIT_FLAGS_XXX. */

/* @param uTimeout The timeout, ignored if RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags. */

/* Whether this is absolute or relative. */

/* milliseconds or nanoseconds depends on the @a fFlags value. Do not pass RT_INDEFINITE_WAIT here, use RTSEMWAIT_FLAGS_INDEFINITE instead. */

+RTDECL(int)  RTSemEventMultiWaitEx(RTSEMEVENTMULTI hEventMultiSem, uint32_t fFlags, uint64_t uTimeout);

+ RTDECL(int)  RTSemEventMultiWaitExDebug(RTSEMEVENTMULTI hEventMultiSem, uint32_t fFlags, uint64_t uTimeout, RTHCUINTPTR uId, RT_SRC_POS_DECL);

+RTDECL(uint32_t) RTSemEventMultiGetResolution(void);

+RTDECL(uint32_t) RTSemEventMultiGetResolution(void);

+ RTPDECL(uint32 t) RTSemEventMultiGetResolution(void);

+ * Sets the signaller thread to one specific thread. */

+ * This is only used for validating usage and deadlock detection. When used after calls to RTSemEventAddSignaller, the specified thread will be the only signalling thread.
+ * @param   hEventMultiSem  The multiple release event semaphore.
+ * @param   hThread         The thread that will signal it. Pass NIL_RTTHREAD to indicate that there is no special signalling thread.
+ */
+RTDECL(void) RTSemEventMultiSetSignaller(RTSEMEVENTMULTI hEventMultiSem, RTTHREAD hThread);
+
+/**
+ * To add more signalling threads.
+ *
+ * First call RTSemEventSetSignaller then add further threads with this.
+ *
+ * @param   hEventMultiSem  The multiple release event semaphore.
+ * @param   hThread         The thread that will signal it. NIL_RTTHREAD is not accepted.
+ */
+RTDECL(void) RTSemEventMultiAddSignaller(RTSEMEVENTMULTI hEventMultiSem, RTTHREAD hThread);
+
+/**
+ * To remove a signalling thread.
+ *
+ * Reverts work done by RTSemEventAddSignaller and RTSemEventSetSignaller.
+ *
+ * @param   hEventMultiSem  The multiple release event semaphore.
+ * @param   hThread         A previously added thread.
+ */
+RTDECL(void) RTSemEventMultiRemoveSignaller(RTSEMEVENTMULTI hEventMultiSem, RTTHREAD hThread);
+
+/** @} */
+
+/** @defgroup grp_rt_sems_mutex RTSemMutex - Mutex semaphores.
+ *
+ * Mutex semaphores protect a section of code or data to which access must be exclusive. Only one thread can hold access to a critical section at one time. See RTSemMutexCreate, RTSemMutexRequest and RTSemMutexRelease.
+ *
+ * @remarks These are less efficient than "fast mutexes" and "critical sections", which IPR-T implements as well; see @ref grp_rt_sems_fast_mutex and @ref grp_rt_critsect .
+ *
+ * @} */
+
+/** @defgroup grp_rt_sems_mutex RTSemMutex - Mutex semaphores.
+ *
+ * Mutex semaphores protect a section of code or data to which access must be exclusive. Only one thread can hold access to a critical section at one time. See RTSemMutexCreate, RTSemMutexRequest and RTSemMutexRelease.
+ *
+ * @remarks These are less efficient than "fast mutexes" and "critical sections", which IPR-T implements as well; see @ref grp_rt_sems_fast_mutex and @ref grp_rt_critsect .
+ *
+ * @} */
+
+/**
+ * Create a mutex semaphore.
+ *
+ * @returns iprt status code.
+ * @param  phMutexSem Where to store the mutex semaphore handle.
+ */
+RTDECL(int) RTSemMutexCreate(PRTSEMMUTEX phMutexSem);
+
+/**
+ * Creates a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param  phMutexSem Where to store the handle to the newly created
+ *          mutex semaphore.
+ * @param  fFlags Flags, any combination of the
+ *              RTSEMMUTEX_FLAGS_XXX #defines.
+ * @param  hClass The class (no reference consumed). If NIL, no
+ *                lock order validation will be performed on this
+ *                lock.
+ * @param  uSubClass The sub-class. This is used to define lock
+ *                    order within a class. RTLOCKVAL_SUB_CLASS_NONE
+ *                    is the recommended value here.
+ * @param  pszNameFmt Name format string for the lock validator,
+ *                    optional (NULL). Max length is 32 bytes.
+ * @param  ... Format string arguments.
+ */
+RTDECL(int) RTSemMutexCreateEx(PRTSEMMUTEX phMutexSem, uint32_t fFlags, RTLOCKVALCLASS
+                              hClass, uint32_t uSubClass,
+                              const char *pszNameFmt, ...)
+                    RT_IPRT_FORMAT_ATTR_MAYBE_NULL(5, 6);
+
+/** @name RTSemMutexCreateEx flags
+ * @{ */
+/** Disables lock validation. */
+#define RTSEMMUTEX_FLAGS_NO_LOCK_VAL    UINT32_C(0x00000001)
+/** @} */
+
+/**
+ * Destroy a mutex semaphore.
+ *
+ * @returns iprt status code.
+ * @param  hMutexSem The mutex semaphore to destroy. NIL is quietly
+ *                  ignored (VINF_SUCCESS).
+ */
+RTDECL(int) RTSemMutexDestroy(RTSEMMUTEX hMutexSem);
+
+/** *
+ * Changes the lock validator sub-class of the mutex semaphore.
+ *
+ */
/* It is recommended to try make sure that nobody is using this semaphore while
 * changing the value.
 */

/* @returns The old sub-class. RTLOCKVAL_SUB_CLASS_INVALID is returns if the
 * lock validator isn't compiled in or either of the parameters are
 * invalid.
 */

/* @param hMutexSem The handle to the mutex semaphore.
 * @param uSubClass The new sub-class value.
 */

/**
 * Request ownership of a mutex semaphore, resume on interruption.
 *
 * This function will resume if the wait is interrupted by an async
 * system event (like a unix signal) or similar.
 *
 * The same thread may request a mutex semaphore multiple times,
 * a nested counter is kept to make sure it's released on the right
 * RTSemMutexRelease() call.
 *
 * @returns iprt status code.
 * @param hMutexSem The mutex semaphore to request ownership over.
 * @param cMillies The number of milliseconds to wait.
 */

/**
 * Debug version of RTSemMutexRequest that tracks the location.
 *
 * @returns iprt status code.
 */

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```c
+ * @param   hMutexSem   The mutex semaphore to request ownership over.
+ * @param   cMillies    The number of milliseconds to wait.
+ * @param   uld         Some kind of locking location ID. Typically a
+ *                      return address up the stack. Optional (0).
+ * @param   SRC_POS     The source position where call is being made
+ *                      from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int)  RTSemMutexRequestDebug(RTSEMMUTEX hMutexSem, RTMSINTERVAL cMillies,
RTHCUINTPTR uld, RT_SRC_POS_DECL);
+
+/**
+ * Debug version of RTSemMutexRequestNoResume that tracks the location.
+ *
+ * @returns iprt status code.
+ * @param   hMutexSem   The mutex semaphore to request ownership over.
+ * @param   cMillies    The number of milliseconds to wait.
+ * @param   uld         Some kind of locking location ID. Typically a
+ *                      return address up the stack. Optional (0).
+ * @param   SRC_POS     The source position where call is being made
+ *                      from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int)  RTSemMutexRequestNoResumeDebug(RTSEMMUTEX hMutexSem, RTMSINTERVAL
cMillies, RTHCUINTPTR uld, RT_SRC_POSDECL);
+
+/**
+ * Request ownership of a mutex semaphore, extended edition.
+ *
+ * The same thread may request a mutex semaphore multiple times,
+ * a nested counter is kept to make sure it's released on the right
+ * RTSemMutexRelease() call.
+ *
+ * @returns iprt status code.
+ * @param   hMutexSem   The mutex semaphore to request ownership over.
+ * @param   fFlags      Combination of the RTSEMWAIT_FLAGS_XXX.
+ * @param   uTimeout    The timeout, ignored if
+ *                      RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ *                      Whether this is absolute or relative,
+ *                      milliseconds or nanoseconds depends on the @a
+ *                      fFlags value. Do not pass RT_INDEFINITE_WAIT
+ *                      here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
+ */
+RTDECL(int)  RTSemMutexRequestEx(RTSEMMUTEX hMutexSem, uint32_t fFlags, uint64_t uTimeout);
+
+/**
+ * Debug version of RTSemMutexRequestEx that tracks the location.
+ *
+ * @returns iprt status code.
+ * @param   hMutexSem   The mutex semaphore to request ownership over.
```
@param fFlags See RTSemMutexRequestEx.
+ * @param uTimeout See RTSemMutexRequestEx.
+ * @param uId Some kind of locking location ID. Typically a return address up the stack. Optional (0).
+ * @param SRC_POS The source position where call is being made from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int) RTSemMutexRequestExDebug(RTSEMMUTEX hMutexSem, uint32_t fFlags, uint64_t uTimeout,
+                                      RTHCUINTPTR uId, RT_SRC_POS_DECL);

+ */
+RTDECL(int) RTSemMutexRelease(RTSEMMUTEX hMutexSem);

+ */
+RTDECL(bool) RTSemMutexIsOwned(RTSEMMUTEX hMutexSem);

+ */
+#if defined(RT_STRICT) && !defined(RTSEMMUTEX_WITHOUT_REMAPPING) &&
+  !defined(RT_WITH_MANGLING)
+  #ifdef ___iprt_asm_h
+  # define RTSemMutexRequest(hMutexSem, cMillies)            RTSemMutexRequestDebug((hMutexSem),
+  (cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+  # define RTSemMutexRequestNoResume(hMutexSem, cMillies)
+  RTSemMutexRequestNoResumeDebug((hMutexSem), (cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+  # define RTSemMutexRequestEx(hMutexSem, fFlags, uTimeout)  RTSemMutexRequestExDebug((hMutexSem),
+  (fFlags), (uTimeout), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+  # else
+  # define RTSemMutexRequest(hMutexSem, cMillies)            RTSemMutexRequestDebug((hMutexSem),
+  (cMillies), 0, RT_SRC_POS)
+  # define RTSemMutexRequestNoResume(hMutexSem, cMillies)
+  RTSemMutexRequestNoResumeDebug((hMutexSem), (cMillies), 0, RT_SRC_POS)
+  # define RTSemMutexRequestEx(hMutexSem, fFlags, uTimeout)  RTSemMutexRequestExDebug((hMutexSem),
+  (fFlags), (uTimeout), 0, RT_SRC_POS)
+ # endif
+ #endif
+
/* Strict lock order: Automatically classify locks by init location. */

#if defined(RT_LOCK STRICT_ORDER) && defined(IN_RING3) &&
!defined(RTSEMMUTEX WITHOUT REMAPPING) && !defined(RT WITH MANGLING)
#define RTSemMutexCreate(phMutexSem) \
    RTSemMutexCreateEx((phMutexSem), 0 /*fFlags*/, \
    RTLockValidatorClassForSrcPos(RT_SRC_POS, NULL), \
    RTLOCKVAL_SUB_CLASS NONE, NULL)
#endif

/** @} */

/** @defgroup grp_rt_sems_fast_mutex RTSemFastMutex - Fast Mutex Semaphores 
 * Fast mutexes work like regular mutexes in that they allow only a single 
 * thread access to a critical piece of code or data. As opposed to mutexes, 
 * they require no syscall if the fast mutex is not held (like critical 
 * sections). Unlike critical sections however, they are *not* recursive. 
 * @remarks The fast mutexes has sideeffects on IRQL on Windows hosts. So use 
 * with care and test on windows with driver verifier. 
 * @*/

/** Create a fast mutex semaphore. 
 * @returns iprt status code. 
 * @param phFastMtx Where to store the handle to the newly created 
 * fast mutex semaphore. 
 * @remarks Fast mutex semaphores are not recursive. 
 */
RTDECL(int)  RTSemFastMutexCreate(PRTSEMFASTMUTEX phFastMtx);

/** Destroy a fast mutex semaphore. 
 * @returns iprt status code. 
 * @param hFastMtx Handle to the fast mutex semaphore. NIL is 
 * quietly ignored (VINF_SUCCESS). 
 */
RTDECL(int)  RTSemFastMutexDestroy(RTSEMFASTMUTEX hFastMtx);

/** Request ownership of a fast mutex semaphore. 
 * @*/

/* The same thread may request a mutex semaphore multiple times,
a nested counter is kept to make sure it’s released on the right
RTSemMutexRelease() call.

+ * @returns iprt status code.
+ * @param   hFastMtx      Handle to the fast mutex semaphore.
+ */
RTDECL(int)  RTSemFastMutexRequest(RTSEMFASTMUTEX hFastMtx);
+
+/**
+ * Release the ownership of a fast mutex semaphore.
+ *
+ * @returns iprt status code.
+ * @param   hFastMtx      Handle to the fast mutex semaphore. It goes
+ * without saying the the calling thread must own
+ * it.
+ */
RTDECL(int)  RTSemFastMutexRelease(RTSEMFASTMUTEX hFastMtx);
+/** @} */
+
/** @defgroup grp_rt_sems_spin_mutex RTSemSpinMutex - Spinning Mutex Semaphores
* @{ */
+
/** Creates a spinning mutex semaphore.
+ * @returns iprt status code.
+ * @retval  VERR_INVALID_PARAMETER on invalid flags.
+ * @retval  VERR_NO_MEMORY if out of memory for the semaphore structure and
+ * handle.
+ * @param   phSpinMtx   Where to return the handle to the create semaphore.
+ * @param   fFlags      Flags, see RTSEMSPINMUTEX_FLAGS_XXX.
+ */
RTDECL(int) RTSemSpinMutexCreate(PRTSEMSPINMUTEX phSpinMtx, uint32_t fFlags);
+/** @name RTSemSpinMutexCreate flags.
* @{ */
+/** Always take the semaphore in a IRQ safe way.
+ * (In plain words: always disable interrupts.) */
+#define RTSEMSPINMUTEX_FLAGS_IRQ_SAFE       RT_BIT_32(0)
+/** Mask of valid flags. */
+#define RTSEMSPINMUTEX_FLAGS_VALID_MASK     UINT32_C(0x00000001)
/**< @} */
+
+/**
+ * Destroys a spinning mutex semaphore.
+ *
+ * @returns iprt status code.
+ * @retval  VERR_INVALID_HANDLE (or crash) if the handle is invalid. (NIL will
+ * not cause this status.)
+ *
+ * @param   hSpinMtx    The semaphore handle. NIL_RTSEMSPINMUTEX is ignored
+ * quietly (VINF_SUCCESS).
+ */
+RTDECL(int) RTSemSpinMutexDestroy(RTSEMSPINMUTEX hSpinMtx);
+
+/**
+ * Request the spinning mutex semaphore.
+ *
+ * This may block if the context we're called in allows this. If not it will
+ * spin. If called in an interrupt context, we will only spin if the current
+ * owner isn't interrupted. Also, on some systems it is not always possible to
+ * wake up blocking threads in all contexts, so, which will either be indicated
+ * by returning VERR_SEM_BAD_CONTEXT or by temporarily switching the semaphore
+ * into pure spinlock state.
+ *
+ * Preemption will be disabled upon return. IRQs may also be disabled.
+ *
+ * @returns iprt status code.
+ * @retval  VERR_SEM_BAD_CONTEXT if the context it's called in isn't suitable
+ * for releasing it if someone is sleeping on it.
+ * @retval  VERR_SEM_DESTROYED if destroyed.
+ * @retval  VERR_SEM_NESTED if held by the caller. Asserted.
+ * @retval  VERR_INVALID_HANDLE if the handle is invalid. Asserted
+ *
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexRequest(RTSEMSPINMUTEX hSpinMtx);
+
+/**
+ * Like RTSemSpinMutexRequest but it won't block or spin if the semaphore is
+ * held by someone else.
+ *
+ * @returns iprt status code.
+ * @retval  VERR_SEM_BUSY if held by someone else.
+ * @retval  VERR_SEM_DESTROYED if destroyed.
+ * @retval  VERR_SEM_NESTED if held by the caller. Asserted.
+ * @retval  VERR_INVALID_HANDLE if the handle is invalid. Asserted
+ *
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexTryRequest(RTSEMSPINMUTEX hSpinMtx);
+ */**
+ * Releases the semaphore previously acquired by RTSemSpinMutexRequest or
+ * RTSemSpinMutexTryRequest.
+ *
+ * @returns iprt status code.
+ * @retval  VERR_SEM_DESTROYED if destroyed.
+ * @retval  VERR_NOT_OWNER if not owner. Asserted.
+ * @retval  VERR_INVALID_HANDLE if the handle is invalid. Asserted.
+ *
+ * @param   hSpinMtx  The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexRelease(RTSEMSPINMUTEX hSpinMtx);
+ */** @} */
+
+/** @defgroup grp_rt_sem_rw             RTSemRW - Read / Write Semaphores
+ *
+ * Read/write semaphores are a fancier version of mutexes in that they grant
+ * read access to the protected data to several threads at the same time but
+ * allow only one writer at a time. This can make code scale better at the
+ * expense of slightly more overhead in mutex management.
+ *
+ * @defgroup grp_rt_sem_rw             RTSemRW - Read / Write Semaphores
+ */
+ */*
+ * Creates a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param   phRWSem   Where to store the handle to the newly created
+ *                   RW semaphore.
+ */
+RTDECL(int)   RTSemRWCreate(PRTSEMRW phRWSem);
+ */**
+ * Creates a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param   phRWSem   Where to store the handle to the newly created
+ *                   RW semaphore.
+ * @param   fFlags    Flags, any combination of the RTSEMRW_FLAGS_XXX
+ *                   #defines.
+ * @param   hClass    The class (no reference consumed). If NIL, no
+ *                     lock order validation will be performed on this
+ *                     lock.
+ * @param   uSubClass           The sub-class. This is used to define lock
+ *                              order within a class. RTLOCKVAL_SUB_CLASS_NONE
+ *                              is the recommended value here.
+ * @param   pszNameFmt          Name format string for the lock validator,
+ *                              optional (NULL). Max length is 32 bytes.
+ * @param   ...                 Format string arguments.
+ */
+RTDECL(int)   RTSemRWCreateEx(PRTSEMRW phRWSem, uint32_t fFlags, RTLOCKVALCLASS hClass,
+                              uint32_t uSubClass,
+                              const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(5, 6);
+
/** @name RTSemRWCreateEx flags
 * @{ */
/** Disables lock validation. */
#define RTSEMRW_FLAGS_NO_LOCK_VAL   UINT32_C(0x00000001)
/** @} */
+
/** Destroys a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param   hRWSem              Handle to the read/write semaphore. NIL is
+ *                              quietly ignored (VINF_SUCCESS).
+ */
+RTDECL(int)   RTSemRWDestroy(RTSEMRW hRWSem);
+
/** Changes the lock validator sub-class of the read/write semaphore.
+ *
+ * It is recommended to try make sure that nobody is using this semaphore while
+ * changing the value.
+ *
+ * @returns The old sub-class. RTLOCKVAL_SUB_CLASS_INVALID is returns if the
+ * lock validator isn't compiled in or either of the parameters are
+ * invalid.
+ * @param   hRWSem              Handle to the read/write semaphore.
+ * @param   uSubClass           The new sub-class value.
+ */
+RTDECL(uint32_t) RTSemRWSetSubClass(RTSEMRW hRWSem, uint32_t uSubClass);
+
/**
+ * Request read access to a read/write semaphore, resume on interruption
+ *
+ * @returns iprt status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_INTERRUPT if the wait was interrupted.
+ * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ */
+ * @param   hRWSem Handle to the read/write semaphore.
+ * @param   cMillies The number of milliseconds to wait.
+ */
+RTDECL(int)   RTSemRWRequestRead(RTSEMRW hRWSem, RTMSINTERVAL cMillies);
+
+/**
+ * Request read access to a read/write semaphore, return on interruption
+ *
+ * @returns iprt status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_INTERRUPT if the wait was interrupted.
+ * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param   hRWSem Handle to the read/write semaphore.
+ * @param   cMillies The number of milliseconds to wait.
+ */
+RTDECL(int)   RTSemRWRequestReadNoResume(RTSEMRW hRWSem, RTMSINTERVAL cMillies);
+
+/**
+ * Debug version of RTSemRWRequestRead that tracks the location.
+ *
+ * @returns iprt status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_INTERRUPT if the wait was interrupted.
+ * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param   hRWSem Handle to the read/write semaphore.
+ * @param   cMillies The number of milliseconds to wait.
+ * @param   uId Some kind of locking location ID. Typically a return address up the stack. Optional (0).
+ * @param   SRC_POS The source position where call is being made from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int)   RTSemRWRequestReadDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies, RTHCUINTPTR uId, RT_SRC_POSDECL);
+
+/**
+ * Debug version of RTSemRWRequestWriteNoResume that tracks the location.
+ *
+ * @returns iprt status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_INTERRUPT if the wait was interrupted.
+ * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param   hRWSem Handle to the read/write semaphore.
+ * @param   cMillies The number of milliseconds to wait.
+ * @param   uId Some kind of locking location ID. Typically a return address up the stack. Optional (0).
+ * @param   SRC_POS             The source position where call is being made
+ *                              from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int)   RTSemRWRequestReadNoResumeDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies,
RTHCUINTPTR uId, RT_SRC_POSDECL);
+
+/**
+ * Request read access to a read/write semaphore, extended edition.
+ *
+ + * @returns iprt status code.
+ + * @retval  VINF_SUCCESS on success.
+ + * @retval  VERR_INTERRUPT if the wait was interrupted.
+ + * @retval  VERR_TIMEOUT if the wait timed out.
+ + * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ + * @param   hRWSem              Handle to the read/write semaphore.
+ + * @param   fFlags              Combination of the RTSEMWAIT_FLAGS_XXX.
+ + * @param   uTimeout            The timeout, ignored if
+ + *                              RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ + * Whether this is absolute or relative,
+ + * milliseconds or nanoseconds depends on the @a
+ + * fFlags value. Do not pass RT_INDEFINITE_WAIT
+ + * here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
+ */
+RTDECL(int)   RTSemRWRequestReadEx(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout);
+
+
+/**
+ * Debug version of RTSemRWRequestReadEx that tracks the location.
+ *
+ + * @returns iprt status code.
+ + * @retval  VINF_SUCCESS on success.
+ + * @retval  VERR_INTERRUPT if the wait was interrupted.
+ + * @retval  VERR_TIMEOUT if the wait timed out.
+ + * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ + * @param   hRWSem              Handle to the read/write semaphore.
+ + * @param   fFlags              See RTSemRWRequestReadEx.
+ + * @param   uTimeout            See RTSemRWRequestReadEx.
+ + * @param   uId                 Some kind of locking location ID. Typically a
+ + *                              return address up the stack. Optional (0).
+ + * @param   SRC_POS             The source position where call is being made
+ + *                              from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int)   RTSemRWRequestReadExDebug(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout,
RTHCUINTPTR uId, RT_SRC_POSDECL);
+ * Release read access to a read/write semaphore.
+ *
+ * @returns iprt status code.
+ *
+ * @param   hRWSem Handle to the read/write semaphore. It goes
+ * without saying that caller must own read
+ * privileges to the semaphore.
+ */
++RTDECL(int)   RTSemRWReleaseRead(RTSEMRW hRWSem);
+
+/**
+ * Request write access to a read/write semaphore, resume on interruption.
+ *
+ * @returns iprt status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_DEADLOCK if the caller owned the read lock.
+ * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param   hRWSem Handle to the read/write semaphore.
+ * @param   cMillies The number of milliseconds to wait.
+ */
++RTDECL(int)   RTSemRWRequestWrite(RTSEMRW hRWSem, RTMSINTERVAL cMillies);
+
+/**
+ * Request write access to a read/write semaphore, return on interruption.
+ *
+ * @returns iprt status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_INTERRUPT if the wait was interrupted.
+ * @retval  VERR_DEADLOCK if the caller owned the read lock.
+ * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param   hRWSem Handle to the read/write semaphore.
+ * @param   cMillies The number of milliseconds to wait.
+ */
++RTDECL(int)   RTSemRWRequestWriteNoResume(RTSEMRW hRWSem, RTMSINTERVAL cMillies);
+
+/**
+ * Debug version of RTSemRWRequestWrite that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemRWRequestWrite.
+ *
+ * @param   hRWSem Handle to the read/write semaphore.
+ * @param   cMillies The number of milliseconds to wait.
+ * @param   uld Some kind of locking location ID. Typically a
+ *            return address up the stack. Optional (0).
+ * @param   SRC_POS The source position where call is being made
+ *            from. Use RT_SRC_POS when possible. Optional.
+ */
++RTDECL(int)   RTSemRWRequestWriteDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies,
RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
+/**
+ * Debug version of RTSemRWRequestWriteNoResume that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemRWRequestWriteNoResume.
+ * @param   hRWSem              Handle to the read/write semaphore.
+ * @param   cMillies            The number of milliseconds to wait.
+ * @param   uId                 Some kind of locking location ID. Typically a
+ *                              return address up the stack. Optional (0).
+ * @param   SRC_POS             The source position where call is being made
+ *                              from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int)  RTSemRWRequestWriteNoResumeDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies,
+RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
+/**
+ * Request write access to a read/write semaphore, extended edition.
+ *
+ * @returns iprt status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_INTERRUPTED if the wait was interrupted.
+ * @retval  VERR_TIMEOUT if the wait timed out.
+ * @retval  VERR_DEADLOCK if the caller owned the read lock. Do not depend on
+ *          this as it is implementation specific.
+ * @retval  VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param   hRWSem              Handle to the read/write semaphore.
+ * @param   fFlags              Combination of the RTSEMWAIT_FLAGS_XXX.
+ * @param   uTimeout            The timeout, ignored if
+ *                              RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ *                              Whether this is absolute or relative,
+ *                              milliseconds or nanoseconds depends on the @a
+ *                              fFlags value. Do not pass RT_INDEFINITE_WAIT
+ *                              here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
+ */
+RTDECL(int)   RTSemRWRequestWriteEx(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout);
+
+/**
+ * Debug version of RTSemRWRequestWriteEx that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemRWRequestWriteEx.
+ * @param   hRWSem              Handle to the read/write semaphore.
+ * @param   fFlags              See RTSemRWRequestWriteEx.
+ * @param   uTimeout            See RTSemRWRequestWriteEx.
+ * @param   uId                 Some kind of locking location ID. Typically a
+ *                              return address up the stack. Optional (0).
+ * @param   SRC_POS             The source position where call is being made
RTDECL(int) RTSemRWRequestWriteExDebug(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout, RTHCUINTPTR uld, RT_SRC_POS_DECL);

Release write access to a read/write semaphore.

@returns iprt status code.
@param hRWSem Handle to the read/write semaphore. Goes without saying that caller must have write access to the semaphore.

RTDECL(int) RTSemRWReleaseWrite(RTSEMRW hRWSem);

Checks if the caller is the exclusive semaphore owner.

@returns true / false according.
@param hRWSem Handle to the read/write semaphore.

RTDECL(bool) RTSemRWIsWriteOwner(RTSEMRW hRWSem);

Checks if the caller is one of the read owners of the semaphore.

@returns true if reader, false if not.
@param hRWSem Handle to the read/write semaphore.
@param fWannaHear What you'd like to hear when lock validation is not available. (For avoiding asserting all over the place.)

RTDECL(bool) RTSemRWIsReadOwner(RTSEMRW hRWSem, bool fWannaHear);

Gets the write recursion count.

@returns The write recursion count (0 if bad semaphore handle).
+ * @param   hRWSem Handle to the read/write semaphore.
+ */
+RTDECL(uint32_t) RTSemRWGetWriteRecursion(RTSEMRW hRWSem);
+
+/**
+ * Gets the read recursion count of the current writer.
+ *
+ * @returns The read recursion count (0 if bad semaphore handle).
+ */
+RTDECL(uint32_t) RTSemRWGetWriterReadRecursion(RTSEMRW hRWSem);
+
+/**
+ * Gets the current number of reads.
+ *
+ * This includes all read recursions, so it might be higher than the number of
+ * read owners. It does not include reads done by the current writer.
+ *
+ * @returns The read count (0 if bad semaphore handle).
+ */
+RTDECL(uint32_t) RTSemRWGetReadCount(RTSEMRW hRWSem);
+
+/* Strict build: Remap the four request calls to the debug versions. */
+#if defined(RT_STRICT) && !defined(RTSEMRW_WITHOUT_REMAPPING) &&
!defined(RT_WITH_MANGLING)
+# ifdef ___iprt_asm_h
+# define RTSemRWRequestRead(hRWSem, cMillies)              RTSemRWRequestReadDebug((hRWSem),
(cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+# define RTSemRWRequestReadNoResume(hRWSem, cMillies) RTSemRWRequestReadNoResumeDebug((hRWSem),
(cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+# define RTSemRWRequestWrite(hRWSem, cMillies)             RTSemRWRequestWriteDebug((hRWSem),
(cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+# define RTSemRWRequestWriteNoResume(hRWSem, cMillies) RTSemRWRequestWriteNoResumeDebug((hRWSem),
(cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+# define RTSemRWRequestWriteEx(hRWSem, fFlags, uTimeout) RTSemRWRequestWriteExDebug((hRWSem), (fFlags),
(uTimeout), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+# define RTSemRWRequestWriteNoResumeEx(hRWSem, fFlags, uTimeout) RTSemRWRequestWriteNoResumeExDebug((hRWSem),
(fFlags), (uTimeout), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+# define RTSemRWRequestRead(hRWSem, cMillies) RTSemRWRequestReadDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestReadNoResume(hRWSem, cMillies) RTSemRWRequestReadNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWrite(hRWSem, cMillies) RTSemRWRequestWriteDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWriteNoResume(hRWSem, cMillies) RTSemRWRequestWriteNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWriteEx(hRWSem, fFlags, uTimeout) RTSemRWRequestWriteExDebug((hRWSem), (fFlags),
(uTimeout), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+# define RTSemRWRequestWriteNoResumeEx(hRWSem, fFlags, uTimeout) RTSemRWRequestWriteNoResumeExDebug((hRWSem),
(fFlags), (uTimeout), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
#elif defined(RT_STRICT)
+# define RTSemRWRequestRead(hRWSem, cMillies) RTSemRWRequestReadDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestReadNoResume(hRWSem, cMillies) RTSemRWRequestReadNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWrite(hRWSem, cMillies) RTSemRWRequestWriteDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWriteNoResume(hRWSem, cMillies) RTSemRWRequestWriteNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
#elif defined(RT_WITH_MANGLING)
+# define RTSemRWRequestRead(hRWSem, cMillies) RTSemRWRequestReadDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestReadNoResume(hRWSem, cMillies) RTSemRWRequestReadNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWrite(hRWSem, cMillies) RTSemRWRequestWriteDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWriteNoResume(hRWSem, cMillies) RTSemRWRequestWriteNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
#elif defined(RT_WITHOUT_REMAPPING)
+# define RTSemRWRequestRead(hRWSem, cMillies) RTSemRWRequestReadDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestReadNoResume(hRWSem, cMillies) RTSemRWRequestReadNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWrite(hRWSem, cMillies) RTSemRWRequestWriteDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWriteNoResume(hRWSem, cMillies) RTSemRWRequestWriteNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
#else
+# define RTSemRWRequestRead(hRWSem, cMillies) RTSemRWRequestReadDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestReadNoResume(hRWSem, cMillies) RTSemRWRequestReadNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWrite(hRWSem, cMillies) RTSemRWRequestWriteDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
+# define RTSemRWRequestWriteNoResume(hRWSem, cMillies) RTSemRWRequestWriteNoResumeDebug((hRWSem),
(cMillies), 0, RT_SRC_POS)
#endif
c

---

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/* Strict lock order: Automatically classify locks by init location. */
#if defined(RT_LOCK_STRICT_ORDER) && defined(IN_RING3) &&
!defined(RTSEMRW_WITHOUT_REMAPPING) && !defined(RT_WITH_MANGLING)
#define RTSemRWCreate(phSemRW) \
   RTSemRWCreateEx((phSemRW), 0 /*fFlags*/, \
                    RTLockValidatorClassForSrcPos(RT_SRC_POS, NULL), \
                    RTLOCKVAL_SUB_CLASS_NONE, NULL)
#endif

/** @} */

/** @defgroup grp_rt_sems_pingpong RTSemPingPong - Ping-Pong Construct */
*
* Serialization of a two way communication.
*
* @{ */
/**
* Ping-pong speaker
* */
typedef enum RTPINGPONGSPEAKER
{
   /** Not initialized. */
   RTPINGPONGSPEAKER_UNINITIALIZE = 0,
   /** Ping is speaking, Pong is waiting. */
   RTPINGPONGSPEAKER_PING,
   /** Pong is signaled, Ping is waiting. */
   RTPINGPONGSPEAKER_PONG_SIGNALED,
   /** Pong is speaking, Ping is waiting. */
   RTPINGPONGSPEAKER_PONG,
   /** Ping is signaled, Pong is waiting. */
   RTPINGPONGSPEAKER_PING_SIGNALED,
   /** Hack to ensure that it's at least 32-bits wide. */
   RTPINGPONGSPEAKER_HACK = 0x7fffffff
} RTPINGPONGSPEAKER;

/**
* Ping-Pong construct.
* */
/**
* Two threads, one saying Ping and the other saying Pong. The construct
* makes sure they don't speak out of turn and that they can wait and poll
* on the conversation.
*/
typedef struct RTPINGPONG
{
    /** The semaphore the Ping thread waits on. */
    RTSEMEVENT Ping;
    /** The semaphore the Pong thread waits on. */
    RTSEMEVENT Pong;
    /** The current speaker. */
    volatile RTPINGPONGSPEAKER enmSpeaker;
#if HC_ARCH_BITS == 64
    /** Padding the structure to become a multiple of sizeof(RTHCPTR). */
    uint32_t u32Padding;
#endif
} RTPINGPONG;
/** Pointer to Ping-Pong construct. */
typedef RTPINGPONG *PRTPINGPONG;

/**
 * Init a Ping-Pong construct.
 *
 * @returns iprt status code.
 * @param   pPP         Pointer to the ping-pong structure which needs initialization.
 *
 */
RTDECL(int) RTSemPingPongInit(PRTPINGPONG pPP);

/**
 * Deletes a Ping-Pong construct.
 *
 * @returns iprt status code.
 * @param   pPP         Pointer to the ping-pong structure which is to be destroyed.
 *                      (I.e. put into uninitialized state.)
 *
 */
RTDECL(int) RTSemPingPongDelete(PRTPINGPONG pPP);

/**
 * Signals the pong thread in a ping-pong construct. (I.e. sends ping.)
 * This is called by the ping thread.
 *
 * @returns iprt status code.
 * @param   pPP         Pointer to the ping-pong structure to ping.
 *
 */
RTDECL(int) RTSemPing(PRTPINGPONG pPP);

/**
 * Signals the ping thread in a ping-pong construct. (I.e. sends pong.)
 * This is called by the pong thread.
 *
 * @returns iprt status code.
 */
+ * @param   pPP         Pointer to the ping-pong structure to pong.
+ */
+RTDECL(int) RTSemPong(PRTPINGPONG pPP);
+
+/**
+ * Wait function for the ping thread.
+ *
+ * @returns iprt status code.
+ * Will not return VERR_INTERRUPTED.
+ * @param   pPP         Pointer to the ping-pong structure to wait on.
+ * @param   cMillies    Number of milliseconds to wait.
+ */
+RTDECL(int) RTSemPingWait(PRTPINGPONG pPP, RTMSINTERVAL cMillies);
+
+/**
+ * Wait function for the pong thread.
+ *
+ * @returns iprt status code.
+ * Will not return VERR_INTERRUPTED.
+ * @param   pPP         Pointer to the ping-pong structure to wait on.
+ * @param   cMillies    Number of milliseconds to wait.
+ */
+RTDECL(int) RTSemPongWait(PRTPINGPONG pPP, RTMSINTERVAL cMillies);
+
+/**
+ * Checks if the pong thread is speaking.
+ *
+ * @returns true / false.
+ * @param   pPP         Pointer to the ping-pong structure.
+ * @remark  This is NOT the same as !RTSemPongIsSpeaker().
+ */
+DECLINLINE(bool) RTSemPingIsSpeaker(PRTPINGPONG pPP)
+{  
+    RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
+    return enmSpeaker == RTPINGPONGSPEAKER_PING;
+}
+
+/**
+ * Checks if the pong thread is speaking.
+ *
+ * @returns true / false.
+ * @param   pPP         Pointer to the ping-pong structure.
+ * @remark  This is NOT the same as !RTSemPingIsSpeaker().
+ */
+DECLINLINE(bool) RTSemPongIsSpeaker(PRTPINGPONG pPP)
+{  
+    RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
+    return enmSpeaker == RTPINGPONGSPEAKER_PING;
+}
+
RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
return enmSpeaker == RTPINGPONGSPEAKER_PONG;
}

/**
 * Checks whether the ping thread should wait.
 * @returns true / false.
 * @param   pPP         Pointer to the ping-pong structure.
 * @remark  This is NOT the same as !RTSemPingShouldWait().
 */
DECLINLINE(bool) RTSemPingShouldWait(PRTPINGPONG pPP)
{
    RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
    return enmSpeaker == RTPINGPONGSPEAKER_PONG
        || enmSpeaker == RTPINGPONGSPEAKER_PONG_SIGNALED
        || enmSpeaker == RTPINGPONGSPEAKER_PING_SIGNALED;
}

/**
 * Checks whether the pong thread should wait.
 * @returns true / false.
 * @param   pPP         Pointer to the ping-pong structure.
 * @remark  This is NOT the same as !RTSemPingShouldWait().
 */
DECLINLINE(bool) RTSemPongShouldWait(PRTPINGPONG pPP)
{
    RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
    return enmSpeaker == RTPINGPONGSPEAKER_PING
        || enmSpeaker == RTPINGPONGSPEAKER_PING_SIGNALED
        || enmSpeaker == RTPINGPONGSPEAKER_PONG_SIGNALED;
}

/** @} */

/** @defgroup grp_rt_sems_xroads    RTSemXRoads - Crossroads */

/**
 * The crossroads semaphore is intended to prevent two classes of incompatible
 * events from occurring simultaneously, like south/north bound traffic and
 * west/east bound traffic at a 4-way junction.
 */
/**
 * In order to simplify the implementation, the current flow is always
given priority. So, it won't work at all well when busy!
 */
/* @remarks "XRoads" is used as a name because it is briefer than "crossroads"
   and it slightly stresses that is a 4 way crossing to the users of
   American English.
 */

/**
 * Creates a crossroads semaphore.
 *
 * @returns IPRT status code.
 *
 * @param   phXRoads            Where to return the handle to the newly created
crossroads semaphore.
 */
+RTDECL(int) RTSemXRoadsCreate(PRTSEMXROADS phXRoads);
+
+/**
 * Destroys a crossroads semaphore.
 *
 * @returns IPRT status code.
 *
 * @param   hXRoads             Handle to the crossroads semaphore that is to be
destroyed. NIL_RTSEMXROADS is quietly ignored
 *                               (VINF_SUCCESS).
 */
+RTDECL(int) RTSemXRoadsDestroy(RTSEMXROADS hXRoads);
+
+/**
 * Enter the crossroads from the south or north.
 *
 * @returns IPRT status code.
 *
 * @param   hXRoads             Handle to the crossroads semaphore.
 */
+RTDECL(int) RTSemXRoadsNSEnter(RTSEMXROADS hXRoads);
+
+/**
 * Leave the crossroads to the north or south.
 *
 * @returns IPRT status code.
 *
 * @param   hXRoads             Handle to the crossroads semaphore.
 */
+RTDECL(int) RTSemXRoadsNSLeave(RTSEMXROADS hXRoads);
Leave the crossroads from the east or west.

(Coupled with RTSemXRoadsEWLeave.)

@returns IPRT status code.

@param   hXRoads Handle to the crossroads semaphore.

RTDECL(int) RTSemXRoadsEWEnter(RTSEMXROADS hXRoads);

Leave the crossroads to the west or east.

(Coupled with RTSemXRoadsEWEnter.)

@returns IPRT status code.

@param   hXRoads Handle to the crossroads semaphore.

RTDECL(int) RTSemXRoadsEWLeave(RTSEMXROADS hXRoads);

@end
@end

---

** @file
** IPRT - Spinlocks.
**
**
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```
#ifndef ___iprt_spinlock_h
#define ___iprt_spinlock_h

#include <iprt/cdefs.h>
#include <iprt/types.h>

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_spinlock   RTSpinlock - Spinlocks
 * @ingroup grp_rt
 * @{
 * @defgroup RTSPINLOCK_FLAGS_XXX
 * @{
 * Disable interrupts when taking the spinlock, making it interrupt safe
 * (sans NMI of course).
 * This is generally the safest option, though it isn't really required unless
 * the data being protect is also accessed from interrupt handler context. */
#define RTSPINLOCK_FLAGS_INTERRUPT_SAFE     RT_BIT(1)
/** No need to disable interrupts, the protect code/data is not used by interrupt handlers. */
#define RTSPINLOCK_FLAGS_INTERRUPT_UNSAFE   RT_BIT(2)
/** @}  */

/** Creates a spinlock. */
RTDECL(int)  RTSpinlockCreate(PRTSPINLOCK pSpinlock, uint32_t fFlags, const char *pszName);

/** @} */

RTDECL(int) RTSpinlockCreate(PRTSPINLOCK pSpinlock, uint32_t fFlags, const char *pszName);

/** @} */
```

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+ * @returns iprt status code.
+ * @param   Spinlock Spinlock returned by RTSpinlockCreate().
+ */
+RTDECL(int)  RTSpinlockDestroy(RTSPINLOCK Spinlock);
+
+/**
+ * Acquires the spinlock.
+ *
+ * @param   Spinlock The spinlock to acquire.
+ */
+RTDECL(void) RTSpinlockAcquire(RTSPINLOCK Spinlock);
+
+/**
+ * Releases the spinlock.
+ *
+ * @param   Spinlock The spinlock to acquire.
+ */
+RTDECL(void) RTSpinlockRelease(RTSPINLOCK Spinlock);
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/stdarg.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/stdarg.h
@@ -0,0 +1,59 @@
+/** @file
+ * IPRT - stdarg.h wrapper.
+ */
+/
+ */ 
+ @ ] */
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/stdarg.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/stdarg.h
@@ -0,0 +1,59 @@
+/** @file
+ * IPRT - stdarg.h wrapper.
+ */
+/
+ */
+
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+ */
+
+#ifndef ___iprt_stdarg_h
+#define ___iprt_stdarg_h
+
+#ifdef IPRT_NO_CRT
+# include <iprt/types.h>
+# include <iprt/nocrt/compiler/compiler.h>
+#else
+# include <iprt/cdefs.h>
+# if defined(RT_OS_FREEBSD) && defined(_KERNEL)
+#  include <machine/stdarg.h>
+# elif defined(RT_OS_NETBSD) && defined(_KERNEL)
+#  include <sys/stdarg.h>
+# elif defined(RT_OS_SOLARIS) && defined(_KERNEL) && defined(__GNUC__)
+#  include <sys/stdarg.h>
+# # if __GNUC__ >= 4 /* System headers refers to __builtin_stdarg_start. */
+# define __builtin_stdarg_start __builtin_va_start
+# # endif
+# else
+# include <stdarg.h>
+# endif
#endif

/*
 * Older MSC versions doesn't implement va_copy. Newer (12.0+?) ones does
 * implement it like below, but for now it's easier to continue like for the
 * older ones so we can more easily handle R0, RC and other weird contexts.
 */

#if !defined(va_copy) || defined(_MSC_VER)
#undef va_copy
#define va_copy(dst, src) do { (dst) = (src); } while (0) /** @todo check AMD64 */
#endif

#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/stdint.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/stdint.h
@@ -0,0 +1,284 @@
+/** @file
+ * IPRT - stdint.h wrapper (for backlevel compilers like MSC).
+ */
+*/
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef __iprt_stdint_h
+#define __iprt_stdint_h
+
+#include <iprt/cdefs.h>
+
+#ifdef __STDC_CONSTANT_MACROS
+# define __STDC_CONSTANT_MACROS
+#endif
+#ifndef __STDC_LIMIT_MACROS
+# define __STDC_LIMIT_MACROS
+#endif
+#ifdef _MSC_VER
+# pragma warning(push)
+# pragma warning(disable:4668)

+/*
 * Use the stdint.h on systems that have one.
 */
+if (!defined(RT_OS_LINUX) && defined(__KERNEL__)) \
+ & & !defined(RT_OS_FREEBSD) && defined(__KERNEL__)) \
+ & & !defined(RT_OS_NETBSD) && defined(__KERNEL__)) \
+ & & RT_MSC_PREREQ_EX(RT_MSC_VER_VS2010, 1 /*non-msc*/) \
+ & & !defined(__IBMC__) \n+ & & !defined(__IBMCPP__) \n+ & & !defined(IPRT_NO_CRT) \n+ & & !defined(IPRT_DONT_USE_SYSTEM_STDINT_H) \n+ & & !defined(DOXYGEN_RUNNING)
+
+#ifndef __STDC_CONSTANT_MACROS
+# define __STDC_CONSTANT_MACROS
+#endif
+#ifndef __STDC_LIMIT_MACROS
+# define __STDC_LIMIT_MACROS
+#endif
+#ifdef _MSC_VER
+# pragma warning(push)
+# pragma warning(disable:4668)
/* Kludge to fix the incorrect 32-bit constant macros in
 * Kernel.framework/Headers/stdin.h. uint32_t and int32_t are
 * int not long as these macros use, which is significant when
 * targeting AMD64. (10a222)
 */
#define INT32_C(Value)    (Value)
#define UINT32_C(Value)   (Value ## U)

#include <sys/stdint.h>

#elif defined(RT_OS_NETBSD) && defined(_KERNEL)

#else /* No system stdint.h */

/* Define the types we use.
 * The linux kernel defines all these in linux/types.h, so skip it.
 */
#endif
/* Simplify the [u]int64_t type detection mess. */
# undef IPRT_STDINT_USE_STRUCT_FOR_64_BIT_TYPES
#if defined(__IBMCPP__) || defined(__IBMC__)
    #if __IBMCPP__ < 350 && (defined(__WINDOWS__) || defined(__AIX) || defined(__OS2__))
    # define IPRT_STDINT_USE_STRUCT_FOR_64_BIT_TYPES
    # endif
#endif
#if defined(_MSC_VER)
    #if !defined(_INT64_T_DECLARED) && !defined(_INT64_T)
        typedef signed _int64 int64_t;
    # endif
#endif

/* x-bit types */
#if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86) || defined(RT_ARCH_SPARC) || defined(RT_ARCH_SPARC64)
    #if !defined(_INT8_T_DECLARED) && !defined(_INT8_T)
        typedef signed char int8_t;
    # endif
    #if !defined(_UINT8_T_DECLARED) && !defined(_UINT8_T)
        typedef unsigned char uint8_t;
    # endif
    #if !defined(_INT16_T_DECLARED) && !defined(_INT16_T)
        typedef signed short int16_t;
    # endif
    #if !defined(_UINT16_T_DECLARED) && !defined(_UINT16_T)
        typedef unsigned short uint16_t;
    # endif
    #if ARCH_BITS != 16
    #elif defined(_INT32_T_DECLARED) && !defined(_INT32_T)
        typedef signed int int32_t;
    # else
        typedef signed long int32_t;
    # endif
#endif
#if defined(_MSC_VER)
    #if !defined(_INT64_T_DECLARED) && !defined(_INT64_T)
        typedef signed _int64 int64_t;
    # endif
#endif
```c
typedef unsigned _int64 uint64_t;
#endif
#elif defined(__WATCOMC__)
#if !defined(_INT64_T_DECLARED) && !defined(_INT64_T)
typedef signed __int64 int64_t;
#endif
#if !defined(_UINT64_T_DECLARED) && !defined(_UINT64_T)
typedef unsigned __int64 uint64_t;
#endif
#else /* Use long long for 64-bit types */
#if !defined(_INT64_T_DECLARED) && !defined(_INT64_T)
typedef signed long long int64_t;
#endif
#if !defined(_UINT64_T_DECLARED) && !defined(_UINT64_T)
typedef unsigned long long uint64_t;
#endif
#endif
#endif /* !linux kernel or stuff */

/* max integer types */
#if !defined(_INTMAX_T_DECLARED) && !defined(_INTMAX_T)
typedef int64_t intmax_t;
#endif
#if !defined(_UINTMAX_T_DECLARED) && !defined(_UINTMAX_T)
typedef uint64_t uintmax_t;
#endif
#if !defined(_INTPTRL_T_DECLARED) && !defined(_INTPTRL_T)
typedef signed long intptr_t;
#endif
```
typedef unsigned long       uintptr_t;
#endif

typedef int64_t             intptr_t;
#endif
#ifdef (_INTPTR_T_DECLARED) && !defined(_INTPTR_T)
typedef uint64_t            uintptr_t;
#endif
#ifdef (_INTPTR_T_DECLARED) && _INTPTR_T
typedef uint64_t            intptr_t;
#endif
#if !defined(_UINTPTR_T_DECLARED) && !defined(_UINTPTR_T)
#endif /* !_MSC_VER */
#endif /* no system stdint.h */

#ifdef INT8_C
|| !defined(INT16_C)
|| !defined(INT32_C)
|| !defined(INT64_C)
|| !defined(INTMAX_C)
|| !defined(UINT8_C)
|| !defined(UINT16_C)
|| !defined(UINT32_C)
|| !defined(UINT64_C)
|| !defined(UINTMAX_C)

#define INT8_C(Value)      (Value)
#define INT16_C(Value)     (Value)
#define UINT8_C(Value)     (Value)
#define UINT16_C(Value)    (Value)
#define INT32_C(Value)    (Value)
#define UINT32_C(Value)   (Value)
#define INT64_C(Value)    (Value)
#define UINT64_C(Value)   (Value)
#define INTMAX_C(Value)    (Value)

#if ARCH_BITS != 16
#define INT32_C(Value)    (Value)
#define UINT32_C(Value)   (Value)
#define INT64_C(Value)    (Value)
#define UINT64_C(Value)   (Value)
#endif

#define INTMAX_C(Value)    INT64_C(Value)

/* Make sure the [U]INTx_C(c) macros are present.
 * For In C++ source the system stdint.h may have skipped these if it was
 * included before we managed to define __STDC_CONSTANT_MACROS. (Kludge alert!)
 */

 ifdef INT8_C
|| !defined(INT16_C)
|| !defined(INT32_C)
|| !defined(INT64_C)
|| !defined(INTMAX_C)
|| !defined(UINT8_C)
|| !defined(UINT16_C)
|| !defined(UINT32_C)
|| !defined(UINT64_C)
|| !defined(UINTMAX_C)

#define INT8_C(Value)      (Value)
#define INT16_C(Value)     (Value)
#define UINT8_C(Value)     (Value)
#define UINT16_C(Value)    (Value)
#define INT32_C(Value)    (Value)
#define UINT32_C(Value)   (Value)
#define INT64_C(Value)    (Value)
#define UINT64_C(Value)   (Value)
#define INTMAX_C(Value)    (Value)

#if ARCH_BITS != 16
#define INT32_C(Value)    (Value)
#define UINT32_C(Value)   (Value)
#define INT64_C(Value)    (Value)
#define UINT64_C(Value)   (Value)
#endif

#define INTMAX_C(Value)    INT64_C(Value)
+/*
 + * Make sure the INTx_MIN and [U]INTx_MAX macros are present.
 + * For In C++ source the system stdint.h may have skipped these if it was
 + * included before we managed to define __STDC_LIMIT_MACROS. (Kludge alert!)
 + */
+if !defined(INT8_MIN) \
+ || !defined(INT16_MIN) \
+ || !defined(INT32_MIN) \
+ || !defined(INT64_MIN) \
+ || !defined(INT8_MAX) \
+ || !defined(INT16_MAX) \
+ || !defined(INT32_MAX) \
+ || !defined(INT64_MAX) \
+ || !defined(UINT8_MAX) \
+ || !defined(UINT16_MAX) \
+ || !defined(UINT32_MAX) \
+ || !defined(UINT64_MAX)
+define INT8_MIN           (INT8_C(-0x7f)                - 1)
+define INT16_MIN          (INT16_C(-0x7fff)             - 1)
+define INT32_MIN          (INT32_C(-0x7fffffff)         - 1)
+define INT64_MIN          (INT64_C(-0x7fffffffffffffff) - 1)
+define INT8_MAX           INT8_C(0x7f)
+define INT16_MAX          INT16_C(0x7fff)
+define INT32_MAX          INT32_C(0x7fffffff)
+define INT64_MAX          INT64_C(0x7fffffffffffffff)
+define UINT8_MAX          UINT8_C(0xff)
+define UINT16_MAX         UINT16_C(0xffff)
+define UINT32_MAX         UINT32_C(0xffffffff)
+define UINT64_MAX         UINT64_C(0xffffffffffffffff)
+}
+define INTMAX_MIN         INT64_MIN
+define INTMAX_MAX         INT64_MAX
+define UINTMAX_MAX        UINT64_MAX
+endif
+endif
+
--- linux-4.15.0.org/ubuntuvboxguest/include/iprt/string.h
++ linux-4.15.0/ubuntuvboxguest/include/iprt/string.h
@@ -0,0 +1,3243 @@
/** @file
 * IPRT - String Manipulation.
 */
++
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_string_h
+#define ___iprt_string_h
+
+#include <iprt/cdefs.h>
+#include <iprt/types.h>
+#include <iprt/assert.h>
+#include <iprt/stdarg.h>
+#include <iprt/err.h> /* for VINF_SUCCESS */
+/* defined(RT_OS_LINUX) && defined(__KERNEL__) */
+/* no C++ hacks ('new' etc) here anymore! */
+#include <linux/string.h>
+
+#elif defined(IN_XF86_MODULE) && !defined(NO_ANSIC)
+ RT_C_DECLS_BEGIN
+ include "xf86_ansic.h"
+ RT_C_DECLS_END
+
+#elif defined(RT_OS_FREEBSD) && defined(_KERNEL)
+ RT_C_DECLS_BEGIN
+ include <sys/libkern.h>
+ RT_C_DECLS_END
+
+#elif defined(RT_OS_NETBSD) && defined(_KERNEL)
+ RT_C_DECLS_BEGIN
+ include <lib/libkern/libkern.h>
+ RT_C_DECLS_END
+
+#elif defined(RT_OS_SOLARIS) && defined(_KERNEL)
+  /*
+   * Same case as with FreeBSD kernel:
+   * The string.h stuff clashes with sys/system.h
+   * ffs = find first set bit.
+   */
+  +# define ffs ffs_string_h
+  +# include <string.h>
+  +# undef ffs
+  +# undef strpbrk
+  +
+  +#else
+  +# include <string.h>
+  +#endif
+  +/* For the time being: */
+  +#include <iprt/utf16.h>
+  +#include <iprt/latin1.h>
+  +
+  +/*
+   * Supply prototypes for standard string functions provided by
+   * IPRT instead of the operating environment.
+   */
+  +#if defined(RT_OS_DARWIN) && defined(KERNEL)
+  +RT_C_DECLS_BEGIN
+  +void *memchr(const void *pv, int ch, size_t cb);
+  +char *strpbrk(const char *pszStr, const char *pszChars);
+  +RT_C_DECLS_END
+  +#endif
+  +
+  +#if defined(RT_OS_FREEBSD) && defined(_KERNEL)
+  +RT_C_DECLS_BEGIN
+  +char *strpbrk(const char *pszStr, const char *pszChars);
+  +RT_C_DECLS_END
+  +#endif
+  +
+  +#if defined(RT_OS_NETBSD) && defined(_KERNEL)
+  +RT_C_DECLS_BEGIN
+  +char *strpbrk(const char *pszStr, const char *pszChars);
+  +RT_C_DECLS_END
+  +#endif
+  +
+  +#if (!defined(RT_OS_LINUX) || !defined(_GNU_SOURCE)) && !defined(RT_OS_FREEBSD) &&
+  +#defined(RT_OS_NETBSD)
+  +RT_C_DECLS_BEGIN
+  +void *memrchr(const char *pv, int ch, size_t cb);
+  +RT_C_DECLS_END
+  +#endif
/** @def RT_USE_RTC_3629  
 * When defined the UTF-8 range will stop at 0x10ffff. If not defined, the  
 * range stops at 0x7fffffff.  
 * @remarks Must be defined both when building and using the IPRT.  */
#endif

/**  
 * Byte zero the specified object.  
 *  
 * This will use sizeof(Obj) to figure the size and will call memset, bzero  
 * or some compiler intrinsic to perform the actual zeroing.  
 *  
 * @param   Obj     The object to zero. Make sure to dereference pointers.  
 * @param   cb  The number of bytes to clear. Please, don't pass 0.  
 * @remarks Because the macro may use memset it has been placed in string.h  
 * instead of cdefs.h to avoid build issues because someone forgot  
 * to include this header.  
 *  
 * @ingroup grp_rt_str     RTStr - String Manipulation  
 * Mostly UTF-8 related helpers where the standard string functions won't do.  
 */
#define RT.ZERO(Obj)        RT.BZERO(&(Obj), sizeof(Obj))

#define RT.BZERO(pv, cb)    do { memset((pv), 0, cb); } while (0)
+ * @ingroup grp_rt
+ * @
+ *
+ * The maximum string length.
+ */
+#define RTSTR_MAX       (~(size_t)0)
+
+/** @def RTSTR_TAG
+ * The default allocation tag used by the RTStr allocation APIs.
+ *
+ * When not defined before the inclusion of iprt/string.h, this will default to
+ * the pointer to the current file name. The string API will make of use of
+ * this as pointer to a volatile but read-only string.
+ */
+###if !defined(RTSTR_TAG) || defined(DOXYGEN_RUNNING)
+### define RTSTR_TAG     (__FILE__)  
+###endif
+
+###ifdef IN_RING3
+
+/**
+ * Allocates tmp buffer with default tag, translates pszString from UTF8 to
+ * current codepage.
+ *
+ * @returns iprt status code.
+ *
+ * @param   ppszString      Receives pointer of allocated native CP string.
+ *                          The returned pointer must be freed using RTStrFree().
+ * @param   pszString       UTF-8 string to convert.
+ */
+###define RTStrUtf8ToCurrentCP(ppszString, pszString)     RTStrUtf8ToCurrentCPTag((ppszString), (pszString), RTSTR_TAG)
+
+/**
+ * Allocates tmp buffer with custom tag, translates pszString from UTF8 to
+ * current codepage.
+ *
+ * @returns iprt status code.
+ *
+ * @param   ppszString      Receives pointer of allocated native CP string.
+ *                          The returned pointer must be freed using RTStrFree(), const char *pszTag
+ * @param   pszString       UTF-8 string to convert.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTR3DECL(int) RTStrUtf8ToCurrentCPTag(char **ppszString, const char *pszString, const char *pszTag);
+
+/**
+ * Allocates tmp buffer, translates pszString from current codepage to UTF-8.
+ *
+ * @returns iprt status code.
+ * @param ppszString Receives pointer of allocated UTF-8 string.
+ * The returned pointer must be freed using RTStrFree().
+ * @param pszString Native string to convert.
+ */
+#define RTStrCurrentCPToUtf8(ppszString, pszString) RTStrCurrentCPToUtf8Tag((ppszString), (pszString), RTSTR_TAG)
+
+/**
+ * Allocates tmp buffer, translates pszString from current codepage to UTF-8.
+ *
+ * @returns iprt status code.
+ *
+ * @param ppszString Receives pointer of allocated UTF-8 string.
+ * The returned pointer must be freed using RTStrFree().
+ * @param pszString Native string to convert.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTR3DECL(int) RTStrCurrentCPToUtf8Tag(char **ppszString, const char *pszString, const char *pszTag);
+
+endif /* IN_RING3 */
+
+/**
+ * Free string allocated by any of the non-UCS-2 string functions.
+ *
+ * @returns iprt status code.
+ *
+ * @param pszString Pointer to buffer with string to free.
+ * NULL is accepted.
+ */
+RTDECL(void) RTStrFree(char *pszString);
+
+/**
+ * Allocates a new copy of the given UTF-8 string (default tag).
+ *
+ * @returns Pointer to the allocated UTF-8 string.
+ * @param pszString UTF-8 string to duplicate.
+ */
+#define RTStrDup(pszString) RTStrDupTag((pszString), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the given UTF-8 string (custom tag).
+ */
@returns Pointer to the allocated UTF-8 string.
+ @param pszString UTF-8 string to duplicate.
+ @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(char *) RTStrDupTag(const char *pszString, const char *pszTag);
+
+/**
+ * Allocates a new copy of the given UTF-8 string (default tag).
+ *
+ * @returns iprt status code.
+ * @param ppszString Receives pointer of the allocated UTF-8 string.
+ * The returned pointer must be freed using RTStrFree().
+ * @param pszString UTF-8 string to duplicate.
+ */
+#define RTStrDupEx(ppszString, pszString)   RTStrDupExTag((ppszString), (pszString), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the given UTF-8 string (custom tag).
+ *
+ * @returns iprt status code.
+ * @param ppszString Receives pointer of the allocated UTF-8 string.
+ * The returned pointer must be freed using RTStrFree().
+ * @param pszString UTF-8 string to duplicate.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int)  RTStrDupExTag(char **ppszString, const char *pszString, const char *pszTag);
+
+/**
+ * Allocates a new copy of the given UTF-8 substring (default tag).
+ *
+ * @returns Pointer to the allocated UTF-8 substring.
+ * @param pszString UTF-8 string to duplicate.
+ * The max number of chars to duplicate, not counting
+ * the terminator.
+ */
+#define RTStrDupN(pszString, cchMax)        RTStrDupNTag((pszString), (cchMax), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the given UTF-8 substring (custom tag).
+ *
+ * @returns Pointer to the allocated UTF-8 substring.
+ * @param pszString UTF-8 string to duplicate.
+ * The max number of chars to duplicate, not counting
+ * the terminator.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(char *) RTStrDupNTag(const char *pszString, size_t cchMax, const char *pszTag);
+/**
+ * Appends a string onto an existing IPRT allocated string (default tag).
+ */
+ @retval VINF_SUCCESS
+ @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ remains unchanged.
+ *
+ @param ppsz Pointer to the string pointer. The string
+ pointer must either be NULL or point to a string
+ returned by an IPRT string API. (In/Out)
+ @param pszAppend The string to append. NULL and empty strings
+ are quietly ignored.
+ */
+
+#define RTStrAAppend(ppsz, pszAppend)   RTStrAAppendTag((ppsz), (pszAppend), RTSTR_TAG)
+
+/**
+ * Appends a string onto an existing IPRT allocated string (custom tag).
+ */
+ @retval VINF_SUCCESS
+ @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ remains unchanged.
+ *
+ @param ppsz Pointer to the string pointer. The string
+ pointer must either be NULL or point to a string
+ returned by an IPRT string API. (In/Out)
+ @param pszAppend The string to append. NULL and empty strings
+ are quietly ignored.
+ @param pszTag Allocation tag used for statistics and such.
+ */
+
+RTDECL(int) RTStrAAppendTag(char **ppsz, const char *pszAppend, const char *pszTag);
+
+/**
+ * Appends N bytes from a strings onto an existing IPRT allocated string
+ * (default tag).
+ */
+ @retval VINF_SUCCESS
+ @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ remains unchanged.
+ *
+ @param ppsz Pointer to the string pointer. The string
+ pointer must either be NULL or point to a string
+ returned by an IPRT string API. (In/Out)
+ @param pszAppend The string to append. Can be NULL if cchAppend
+ is NULL.
+ @param cchAppend The number of chars (not code points) to append
+ from pszAppend. Must not be more than
+ @a pszAppend contains, except for the special
+ value RTSTR_MAX that can be used to indicate all
+ of @a pszAppend without having to strlen it.
+ */
+#define RTStrAAppendN(ppsz, pszAppend, cchAppend) RTStrAAppendNTag((ppsz), (pszAppend), (cchAppend), RTSTR_TAG)
+
+/**
+ * Appends N bytes from a strings onto an existing IPRT allocated string (custom
+ * tag).
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ * pointer must either be NULL or point to a string
+ * returned by an IPRT string API. (In/Out)
+ * @param   pszAppend           The string to append. Can be NULL if cchAppend
+ * is NULL.
+ * @param   cchAppend           The number of chars (not code points) to append
+ * from pszAppend. Must not be more than
+ * @a pszAppend contains, except for the special
+ * value RTSTR_MAX that can be used to indicate all
+ * of @a pszAppend without having to strlen it.
+ * @param   pszTag              Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrAAppendNTag(char **ppsz, const char *pszAppend, size_t cchAppend, const char *pszTag);
+
+/**
+ * Appends one or more strings onto an existing IPRT allocated string.
+ *
+ * This is a very flexible and efficient alternative to using RTStrAPrintf to
+ * combine several strings together.
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ * pointer must either be NULL or point to a string
+ * returned by an IPRT string API. (In/Out)
+ * @param   cPairs              The number of string / length pairs in the
+ * @a va.
+ * @param va                   List of string (const char *) and length
+ * (size_t) pairs. The strings will be appended to
+ * the string in the first argument.
+ */
+#define RTStrAAppendExNV(ppsz, cPairs, va) RTStrAAppendExNVTag((ppsz), (cPairs), (va), RTSTR_TAG)
+/**
+ * Appends one or more strings onto an existing IPRT allocated string.
+ *
+ * This is a very flexible and efficient alternative to using RTStrAPrintf to
+ * combine several strings together.
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ *                                pointer must either be NULL or point to a string
+ *                                returned by an IPRT string API. (In/Out)
+ * @param   cPairs              The number of string / length pairs in the
+ *                                ellipsis.
+ * @param   va                  List of string (const char *) and length
+ *                                (size_t) pairs. The strings will be appended to
+ *                                the string in the first argument.
+ * @param   pszTag              Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrAAppendExNVTag(char **ppsz, size_t cPairs, va_list va, const char *pszTag);
+
+/**
+ * Appends one or more strings onto an existing IPRT allocated string
+ * (untagged).
+ *
+ * This is a very flexible and efficient alternative to using RTStrAPrintf to
+ * combine several strings together.
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ *                                pointer must either be NULL or point to a string
+ *                                returned by an IPRT string API. (In/Out)
+ * @param   cPairs              The number of string / length pairs in the
+ *                                ellipsis.
+ * @param   ...                 List of string (const char *) and length
+ *                                (size_t) pairs. The strings will be appended to
+ *                                the string in the first argument.
+ */
+DECLINLINE(int) RTStrAAppendExN(char **ppsz, size_t cPairs, ...) {
+    int     rc;
+    va_list va;
+    va_start(va, cPairs);
+    rc = RTStrAAppendExNVTag(ppsz, cPairs, va, RTSTR_TAG);
+}
+ va_end(va);
+ return rc;
+
+/**
+ * Appends one or more strings onto an existing IPRT allocated string (custom
+ * tag).
+ * This is a very flexible and efficient alternative to using RTStrAPrintf to
+ * combine several strings together.
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ *                              pointer must either be NULL or point to a string
+ *                              returned by an IPRT string API. (In/Out)
+ * @param   pszTag              Allocation tag used for statistics and such.
+ * @param   cPairs              The number of string / length pairs in the
+ *                              ellipsis.
+ * @param   ...                 List of string (const char *) and length
+ *                              (size_t) pairs. The strings will be appended to
+ *                              the string in the first argument.
+ */
+DECLINLINE(int) RTStrAAppendExNTag(char **ppsz, const char *pszTag, size_t cPairs, ...)
+{
+    int     rc;
+    va_list va;
+    va_start(va, cPairs);
+    rc = RTStrAAppendExNVTag(ppsz, cPairs, va, pszTag);
+    va_end(va);
+    return rc;
+}
+
+/**
+ * Truncates an IPRT allocated string (default tag).
+ *
+ * @retval  VINF_SUCCESS.
+ * @retval  VERR_OUT_OF_RANGE if cchNew is too long. Nothing is done.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ *                              pointer can be NULL if @a cchNew is 0, no change
+ *                              is made then. If we actually reallocate the
+ *                              string, the string pointer might be changed by
+ *                              this call. (In/Out)
+ *
+ * @param   cchNew              The new string length (excluding the
+ *                              terminator). The string must be at least this
+ * long or we’ll return VERR_OUT_OF_RANGE and
+ * assert on you.
+ */
+#define RTStrATruncate(ppsz, cchNew)    RTStrATruncateTag((ppsz), (cchNew), RTSTR_TAG)
+
+/**
+ * Truncates an IPRT allocated string.
+ *
+ * @retval  VINF_SUCCESS.
+ * @retval  VERR_OUT_OF_RANGE if @a cchNew is too long. Nothing is done.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ *                              pointer can be NULL if @a cchNew is 0, no change
+ *                              is made then. If we actually reallocate the
+ *                              string, the string pointer might be changed by
+ *                              this call. (In/Out)
+ * @param   cchNew              The new string length (excluding the
+ *                              terminator). The string must be at least this
+ *                              long or we’ll return VERR_OUT_OF_RANGE and
+ *                              assert on you.
+ * @param   pszTag              Allocation tag used for statistics and such.
+ */
+ */
+RTDECL(int) RTStrATruncateTag(char **ppsz, size_t cchNew, const char *pszTag);
+
+/**
+ * Allocates memory for string storage (default tag).
+ *
+ * You should normally not use this function, except if there is some very
+ * custom string handling you need doing that isn't covered by any of the other
+ * APIs.
+ *
+ * @returns Pointer to the allocated string. The first byte is always set
+ * to the string terminator char, the contents of the remainder of the
+ * memory is undefined. The string must be freed by calling RTStrFree.
+ *
+ * NULL is returned if the allocation failed. Please translate this to
+ * VERR_NO_STR_MEMORY and not VERR_NO_MEMORY. Also consider
+ * RTStrAllocEx if an IPRT status code is required.
+ *
+ * @param   cb                  How many bytes to allocate. If this is zero, we
+ * will allocate a terminator byte anyway.
+ */
+#define RTStrAlloc(cb)                  RTStrAllocTag((cb), RTSTR_TAG)
+
+/**
+ * Allocates memory for string storage (custom tag).
+ *
+ * You should normally not use this function, except if there is some very
custom string handling you need doing that isn't covered by any of the other APIs.

Returns Pointer to the allocated string. The first byte is always set to the string terminator char, the contents of the remainder of the memory is undefined. The string must be freed by calling RTStrFree.

NULL is returned if the allocation failed. Please translate this to VERR_NO_STR_MEMORY and not VERR_NO_MEMORY. Also consider RTStrAllocEx if an IPRT status code is required.

@returns Pointer to the allocated string. The first byte is always set to the string terminator char, the contents of the remainder of the memory is undefined. The string must be freed by calling RTStrFree.

RTStrAllocTag(size_t cb, const char *pszTag);

Allocates memory for string storage, with status code (default tag).

You should normally not use this function, except if there is some very custom string handling you need doing that isn't covered by any of the other APIs.

VINF_SUCCESS
VERR_NO_STR_MEMORY

Where to return the allocated string. This will be set to NULL on failure. On success, the returned memory will always start with a terminator char so that it is considered a valid C string, the contents of rest of the memory is undefined.

How many bytes to allocate. If this is zero, we will allocate a terminator byte anyway.

Defines RTStrAllocEx( pp manipulating it is considered an error.

Allocates memory for string storage, with status code (custom tag).

You should normally not use this function, except if there is some very custom string handling you need doing that isn't covered by any of the other APIs.

VINF_SUCCESS
VERR_NO_STR_MEMORY

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@param ppsz Where to return the allocated string. This will be set to NULL on failure. On success, the returned memory will always start with a terminator char so that it is considered a valid C string, the contents of rest of the memory is undefined.

@param cb How many bytes to allocate. If this is zero, we will allocate a terminator byte anyway.

@param pszTag Allocation tag used for statistics and such.

+RTOSDECL(int) RTStrAllocExTag(char **ppsz, size_t cb, const char *pszTag);

+ Reallocation and freeing are inverse operations.
+ + * You should normally not have use this function, except perhaps to truncate a really long string you've got from some IPRT string API, but then you should use RTStrATruncate.
+ + * @returns VINF_SUCCESS.
+ + * @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz remains unchanged.

+ * @param ppsz Pointer to the string variable containing the input and output string.
+ * When not freeing the string, the result will always have the last byte set to the terminator character so that when used for string truncation the result will be a valid C string (your job to keep it a valid UTF-8 string).
+ * When the input string is NULL and we're supposed to reallocate, the returned string will also have the first byte set to the terminator char so it will be a valid C string.

+ * @param cbNew When @a cbNew is zero, we'll behave like RTStrFree and @a *ppsz will be set to NULL.
+ * When not zero, this will be the new size of the memory backing the string, i.e. it includes the terminator char.

+#define RTStrRealloc(ppsz, cbNew) RTStrReallocTag((ppsz), (cbNew), RTSTR_TAG)

+ Reallocates the specified string (custom tag).
You should normally not have use this function, except perhaps to truncate a really long string you've got from some IPRT string API, but then you should use RTStrATruncate.

* @returns VINF_SUCCESS.
* @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz remains unchanged.

* @param  ppsz Pointer to the string variable containing the input and output string.
*          When not freeing the string, the result will always have the last byte set to the terminator character so that when used for string truncation the result will be a valid C string (your job to keep it a valid UTF-8 string).
*          When the input string is NULL and we're supposed to reallocate, the returned string will also have the first byte set to the terminator char so it will be a valid C string.
* @param  cbNew When @a cbNew is zero, we'll behave like RTStrFree and @a *ppsz will be set to NULL.
*          When not zero, this will be the new size of the memory backing the string, i.e. it includes the terminator char.
* @param  pszTag Allocation tag used for statistics and such.
*
+RTDECL(int) RTStrReallocTag(char **ppsz, size_t cbNew, const char *pszTag);
+
+Validates the UTF-8 encoding of the string.
* @returns iprt status code.
* @param  psz The string.
*
+RTDECL(int) RTStrValidateEncoding(const char *psz);
+/**
+@name Flags for RTStrValidateEncodingEx and RTUtf16ValidateEncodingEx
+* @{
+* VERR_BUFFER_OVERFLOW will be returned if the check fails. */
+#define RTSTR_VALIDATE_ENCODING_ZERO_TERMINATED RT_BIT_32(0)
+/** Check that the string is exactly the given length.
+ If it terminates early, VERR_BUFFER_UNDERFLOW will be returned. When used
+ together with RTSTR_VALIDATE_ENCODING_ZERO_TERMINATED, the given length must
+ include the terminator or VERR_BUFFER_OVERFLOW will be returned. */
+#define RTSTR_VALIDATE_ENCODING_EXACT_LENGTH RT_BIT_32(1)
+/** @} */
+
+/**
+ * Validates the UTF-8 encoding of the string.
+ *
+ * @returns iprt status code.
+ * @param   psz         The string.
+ * @param   cch         The max string length (/ size). Use RTSTR_MAX to
+ *                      process the entire string.
+ * @param   fFlags      Combination of RTSTR_VALIDATE_ENCODING_XXX flags.
+ */
+RTDECL(int) RTStrValidateEncodingEx(const char *psz, size_t cch, uint32_t fFlags);
+
+/**
+ * Checks if the UTF-8 encoding is valid.
+ *
+ * @returns true / false.
+ * @param   psz         The string.
+ */
+RTDECL(bool) RTStrIsValidEncoding(const char *psz);
+
+/**
+ * Purge all bad UTF-8 encoding in the string, replacing it with '?'.
+ *
+ * @returns The number of bad characters (0 if nothing was done).
+ * @param   psz         The string to purge.
+ */
+RTDECL(size_t) RTStrPurgeEncoding(char *psz);
+
+/**
+ * Sanitizes a (valid) UTF-8 string by replacing all characters outside a white
+ * list in-place by an ASCII replacement character.
+ *
+ * @returns The number of code points replaced. In the case of an incorrectly
+ * encoded string -1 will be returned, and the string is not completely
+ * processed. In the case of puszValidPairs having an odd number of
+ * code points, -1 will be also return but without any modification to
+ * the string.
+ * @param   psz         The string to sanitise.
+ * @param   puszValidPairs A zero-terminated array of pairs of Unicode points.
+ * Each pair is the start and end point of a range,
+ * and the union of these ranges forms the white list.
+ * @param   chReplacement  The ASCII replacement character.
+ */
+RTDECL(ssize_t) RTStrPurgeComplementSet(char *psz, PCRTUNICP puszValidPairs, char chReplacement);
+
+/**
+ * Gets the number of code points the string is made up of, excluding
+ * the terminator.
+ *
+ * @returns Number of code points (RTUNICP).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param   psz         The string.
+ */
+RTDECL(size_t) RTStrUniLen(const char *psz);
+
+/**
+ * Gets the number of code points the string is made up of, excluding
+ * the terminator.
+ *
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param   psz         The string.
+ * @param   cch         The max string length. Use RTSTR_MAX to process the entire string.
+ * @param   pcuc        Where to store the code point count.
+ *                      This is undefined on failure.
+ */
+RTDECL(int) RTStrUniLenEx(const char *psz, size_t cch, size_t *pcuc);
+
+/**
+ * Translate a UTF-8 string into an unicode string (i.e. RTUNICPs), allocating the string buffer.
+ *
+ * @returns iprt status code.
+ * @param   pszString       UTF-8 string to convert.
+ * @param   ppUniString     Receives pointer to the allocated unicode string.
+ *                          The returned string must be freed using RTUniFree().
+ */
+RTDECL(int) RTStrToUni(const char *pszString, PRTUNICP *ppUniString);
+
+/**
+ * Translates pszString from UTF-8 to an array of code points, allocating the result
+ * array if requested.
+ *
+ * @returns iprt status code.
+ * @param   pszString       UTF-8 string to convert.
+ * @param   cchString       The maximum size in chars (the type) to convert. The conversion stop
+ *                          when it reaches cchString or the string terminator ('\0').
+ */
Use RTSTR_MAX to translate the entire string.

@param ppaCps If cCps is non-zero, this must either be pointing to pointer to
a buffer of the specified size, or pointer to a NULL pointer.
If *ppusz is NULL or cCps is zero a buffer of at least cCps items
will be allocated to hold the translated string.
If a buffer was requested it must be freed using RTUtf16Free().

@param cCps The number of code points in the unicode string. This includes the terminator.
@param pcCps Where to store the length of the translated string,
excluding the terminator. (Optional)

This may be set under some error conditions,
however, only for VERR_BUFFER_OVERFLOW and
VERR_NO_STR_MEMORY will it contain a valid string
length that can be used to resize the buffer.

*/*/  

+RTDECL(int) RTStrToUniEx(const char *pszString, size_t cchString, PRTUNICP *ppaCps, size_t cCps, size_t *pcCps);
+
+**
+ * Calculates the length of the string in RTUTF16 items.
+ *
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings will be rejected. The primary purpose of this function is to
+ * help allocate buffers for RTStrToUtf16Ex of the correct size. For most
+ * other purposes RTStrCalcUtf16LenEx() should be used.
+ *
+ * @returns Number of RTUTF16 items.
+ * @returns 0 if the string was incorrectly encoded.
+ * @param psz The string.
+*/),
+RTDECL(size_t) RTStrCalcUtf16Len(const char *psz);
+
+/**
+ * Calculates the length of the string in RTUTF16 items.
+ *
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param psz The string.
+ * @param cch The max string length. Use RTSTR_MAX to process the entire string.
+ * @param pcwc Where to store the string length. Optional.
+ * @returns This is undefined on failure.
+ */  
+RTDECL(int) RTStrCalcUtf16LenEx(const char *psz, size_t cch, size_t *pcwc);
+
+**
+ * Translate a UTF-8 string into a UTF-16 allocating the result buffer (default
+ * tag).
+ *
+ * @returns iprt status code.
+ * @param pszString UTF-8 string to convert.
+ * @param ppwszString Receives pointer to the allocated UTF-16 string.
+ * The returned string must be freed using RTUtf16Free().
+ */
+#define RTStrToUtf16(pszString, ppwszString) RTStrToUtf16Tag((pszString), (ppwszString), RTSTR_TAG)
+
+/**
+ * Translate a UTF-8 string into a UTF-16 allocating the result buffer (custom
+ * tag).
+ *
+ * This differs from RTStrToUtf16 in that it always produces a
+ * big-endian string.
+ *
+ * @returns iprt status code.
+ * @param pszString UTF-8 string to convert.
+ * @param ppwszString Receives pointer to the allocated UTF-16 string.
+ * The returned string must be freed using RTUtf16Free().
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrToUtf16Tag(const char *pszString, PRTUTF16 *ppwszString, const char *pszTag);
+
+/**
+ * Translate a UTF-8 string into a UTF-16BE allocating the result buffer
+ * (default tag).
+ *
+ * This differs from RTStrToUtf16Tag in that it always produces a
+ * big-endian string.
+ *
+ * @returns iprt status code.
+ * @param pszString UTF-8 string to convert.
+ * @param ppwszString Receives pointer to the allocated UTF-16BE string.
+ * The returned string must be freed using RTUtf16Free().
+ */
+#define RTStrToUtf16Big(pszString, ppwszString) RTStrToUtf16BigTag((pszString), (ppwszString), RTSTR_TAG)
+
+/**
+ * Translate a UTF-8 string into a UTF-16BE allocating the result buffer (custom
+ * tag).
+ *
+ * @returns iprt status code.
+ * @param pszString UTF-8 string to convert.
+ * @param ppwszString Receives pointer to the allocated UTF-16BE string.
+ * The returned string must be freed using RTUtf16Free().
+ * @param pszTag Allocation tag used for statistics and such.
+ RTDECL(int) RTStrToUtf16BigTag(const char *pszString, PRTUTF16 *ppwszString, const char *pszTag);
+
+/**
+ * Translates pszString from UTF-8 to UTF-16, allocating the result buffer if requested.
+ *
+ * @returns iprt status code.
+ *
+ * @param pszString UTF-8 string to convert.
+ *
+ * @param cchString The maximum size in chars (the type) to convert. The conversion stop
+ * when it reaches cchString or the string terminator ('\0').
+ *
+ * Use RTSTR_MAX to translate the entire string.
+ *
+ * @param ppwsz If cwc is non-zero, this must either be pointing to pointer to
+ * a buffer of the specified size, or pointer to a NULL pointer.
+ *
+ * If *ppwsz is NULL or cwc is zero a buffer of at least cwc items
+ * will be allocated to hold the translated string.
+ *
+ * If a buffer was requested it must be freed using RTUtf16Free().
+ *
+ * @param cwc The buffer size in RTUTF16s. This includes the terminator.
+ *
+ * @param pcwc Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ *
+ * however, only for VERR_BUFFER_OVERFLOW and
+ *
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ */
+#define RTStrToUtf16ExTag(pszString, cchString, ppwsz, cwc, pcwc) \
    RTStrToUtf16ExTag((pszString), (cchString), (ppwsz), (cwc), (pcwc), RTSTR_MAX) \
+
+/**
+ * Translates pszString from UTF-8 to UTF-16, allocating the result buffer if
+ * requested (custom tag).
+ *
+ * @returns iprt status code.
+ *
+ * @param pszString UTF-8 string to convert.
+ *
+ * @param cchString The maximum size in chars (the type) to convert. The conversion stop
+ * when it reaches cchString or the string terminator ('\0').
+ *
+ * Use RTSTR_MAX to translate the entire string.
+ *
+ * @param ppwsz If cwc is non-zero, this must either be pointing to pointer to
+ * a buffer of the specified size, or pointer to a NULL pointer.
+ *
+ * If *ppwsz is NULL or cwc is zero a buffer of at least cwc items
+ * will be allocated to hold the translated string.
+ *
+ * If a buffer was requested it must be freed using RTUtf16Free().
+ *
+ * @param cwc The buffer size in RTUTF16s. This includes the terminator.
+ *
+ * @param pcwc Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ *
+ * however, only for VERR_BUFFER_OVERFLOW and
VERR_NO_STR_MEMORY will it contain a valid string length that can be used to resize the buffer.

Allocation tag used for statistics and such.

Translates pszString from UTF-8 to UTF-16BE, allocating the result buffer if requested.

This differs from RTStrToUtf16Ex in that it always produces a big-endian string.

returns iprt status code.

UTF-8 string to convert.

The maximum size in chars (the type) to convert. The conversion stop when it reaches cchString or the string terminator ('\0').

Use RTSTR_MAX to translate the entire string.

If cwc is non-zero, this must either be pointing to pointer to a buffer of the specified size, or pointer to a NULL pointer.

If *ppwsz is NULL or cwc is zero a buffer of at least cwc items will be allocated to hold the translated string.

If a buffer was requested it must be freed using RTUtf16Free().

The buffer size in RTUTF16s. This includes the terminator.

Where to store the length of the translated string, excluding the terminator. (Optional)

This may be set under some error conditions, however, only for VERR_BUFFER_OVERFLOW and VERR_NO_STR_MEMORY will it contain a valid string length that can be used to resize the buffer.

Translates pszString from UTF-8 to UTF-16BE, allocating the result buffer if requested (custom tag).

This differs from RTStrToUtf16ExTag in that it always produces a big-endian string.

returns iprt status code.

UTF-8 string to convert.

The maximum size in chars (the type) to convert. The conversion stop when it reaches cchString or the string terminator ('\0').

Use RTSTR_MAX to translate the entire string.
+ * @param   ppwsz       If cwc is non-zero, this must either be pointing to pointer to
+ *                      a buffer of the specified size, or pointer to a NULL pointer.
+ *                      If *ppwsz is NULL or cwc is zero a buffer of at least cwc items
+ *                      will be allocated to hold the translated string.
+ *                      If a buffer was requested it must be freed using RTUtf16Free().
+ * @param   cwc         The buffer size in RTUTF16s. This includes the terminator.
+ * @param   pcwc        Where to store the length of the translated string,
+ *                      excluding the terminator. (Optional)
+ *                      This may be set under some error conditions,
+ *                      however, only for VERR_BUFFER_OVERFLOW and
+ *                      VERR_NO_STR_MEMORY will it contain a valid string
+ *                      length that can be used to resize the buffer.
+ * @param   pszTag      Allocation tag used for statistics and such.
+ */

+RTDECL(int)  RTStrToUtf16BigExTag(const char *pszString, size_t cchString,
+                                  PRTUTF16 *ppwsz, size_t cwc, size_t *pcwc, const char *pszTag);

+/**
+ * Calculates the length of the string in Latin-1 characters.
+ *
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings as well as string with codepoints outside the latin-1 range will be
+ * rejected. The primary purpose of this function is to help allocate buffers
+ * for RTStrToLatin1Ex of the correct size. For most other purposes
+ * RTStrCalcLatin1LenEx() should be used.
+ *
+ * @returns Number of Latin-1 characters.
+ * @returns 0 if the string was incorrectly encoded.
+ * @param   psz       The string.
+ */
+RTDECL(size_t) RTStrCalcLatin1Len(const char *psz);

+/**
+ * Calculates the length of the string in Latin-1 characters.
+ *
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings as well as string with codepoints outside the latin-1 range will be
+ * rejected.
+ *
+ * @returns iprt status code.
+ * @param   psz       The string.
+ * @param   cch       The max string length. Use RTSTR_MAX to process the
+ *                    entire string.
+ * @param   pcch      Where to store the string length. Optional.
+ * @returns This is undefined on failure.
+ */
RTDECL(int) RTStrCalcLatin1LenEx(const char *psz, size_t cch, size_t *pcch);
+
+/**
+ * Translate a UTF-8 string into a Latin-1 allocating the result buffer (default
+ * tag).
+ *
+ * @returns iprt status code.
+ *
+ * @param   pszString       UTF-8 string to convert.
+ * @param   ppszString      Receives pointer to the allocated Latin-1 string.
+ *
+ * The returned string must be freed using RTStrFree().
+ */
+#define RTStrToLatin1(pszString, ppszString)    RTStrToLatin1Tag((pszString), (ppszString), RTSTR_TAG)
+
+/**
+ * Translate a UTF-8 string into a Latin-1 allocating the result buffer (custom
+ * tag).
+ *
+ * @returns iprt status code.
+ *
+ * @param   pszString       UTF-8 string to convert.
+ * @param   ppszString      Receives pointer to the allocated Latin-1 string.
+ *
+ * The returned string must be freed using RTStrFree().
+ *
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrToLatin1Tag(const char *pszString, char **ppszString, const char *pszTag);
+
+/**
+ * Translates pszString from UTF-8 to Latin-1, allocating the result buffer if requested.
+ *
+ * @returns iprt status code.
+ *
+ * @param   pszString       UTF-8 string to convert.
+ * @param   cchString       The maximum size in chars (the type) to convert.
+ *
+ * The conversion stop when it reaches cchString or
+ * the string terminator (\0'). Use RTSTR_MAX to
+ * translate the entire string.
+ *
+ * @param   ppsz             If cch is non-zero, this must either be pointing to
+ * pointer to a buffer of the specified size, or
+ * pointer to a NULL pointer. If *ppsz is NULL or cch
+ * is zero a buffer of at least cch items will be
+ * allocated to hold the translated string. If a
+ * buffer was requested it must be freed using
+ * RTStrFree().
+ *
+ * @param   cch             The buffer size in bytes. This includes the
+ * terminator.
+ *
+ * @param   pcch            Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
VERR_NO_STR_MEMORY will it contain a valid string
length that can be used to resize the buffer.

#define RTStrToLatin1ExTag(pszString, cchString, ppsz, cch, pcch) \ RTStrToLatin1Ex((pszString), (cchString), ((ppsz), (cch), (pcch)), RTSTR_TAG)

/**
 * Translates pszString from UTF-8 to Latin1, allocating the result buffer if
 * requested (custom tag).
 *
 * @returns returns iprt status code.
 * @param   pszString UTF-8 string to convert.
 * @param   cchString The maximum size in chars (the type) to convert.
 * @param   ppsz      If cch is non-zero, this must either be pointing to
 *                    pointer to a buffer of the specified size, or
 *                    pointer to a NULL pointer. If *ppsz is NULL or cch
 *                    is zero a buffer of at least cch chars will be
 *                    allocated to hold the translated string. If a
 *                    buffer was requested it must be freed using
 *                    RTStrFree().
 * @param   cch       The buffer size in bytes. This includes the
 *                    terminator.
 * @param   pcch      Where to store the length of the translated string,
 *                    excluding the terminator. (Optional)
 * @param   pszTag    Allocation tag used for statistics and such.
 */
+RTDECL(int) RTStrToLatin1ExTag(const char *pszString, size_t cchString, char **ppsz, size_t cch, size_t *pcch, const char *pszTag);

/**
 * Get the unicode code point at the given string position.
 * @returns unicode code point.
 * @returns RTUNICP_INVALID if the encoding is invalid.
 * @param   psz The string.
 */
+RTDECL(RTUNICP) RTStrGetCpInternal(const char *psz);

/**
 * Get the unicode code point at the given string position.
+ * @returns iprt status code
+ * @returns VERR_INVALID_UTF8_ENCODING if the encoding is invalid.
+ * @param   ppsz   The string cursor.
+ * This is advanced one character forward on failure.
+ * @param   pCp   Where to store the unicode code point.
+ * Stores RTUNICP_INVALID if the encoding is invalid.
+ */
+RTDECL(int) RTStrGetCpExInternal(const char **ppsz, PRTUNICP pCp);
+
+/**
+ * Get the unicode code point at the given string position for a string of a
+ * given length.
+ *
+ * @returns iprt status code
+ * @retval  VERR_INVALID_UTF8_ENCODING if the encoding is invalid.
+ * @retval  VERR_END_OF_STRING if *pcch is 0. *pCp is set to RTUNICP_INVALID.
+ *
+ * @param   ppsz   The string.
+ * @param   pcch   Pointer to the length of the string. This will be
+ * decremented by the size of the code point.
+ * @param   pCp   Where to store the unicode code point.
+ * Stores RTUNICP_INVALID if the encoding is invalid.
+ */
+RTDECL(int) RTStrGetCpNExInternal(const char **ppsz, size_t *pcch, PRTUNICP pCp);
+
+/**
+ * Put the unicode code point at the given string position
+ * and return the pointer to the char following it.
+ *
+ * @returns pointer to the char following the written code point.
+ * @param   psz   The string.
+ * @param   CodePoint   The code point to write.
+ * This should not be RTUNICP_INVALID or any other
+ * character out of the UTF-8 range.
+ *
+ * @remark  This is a worker function for RTStrPutCp().
+ */
+RTDECL(char *) RTStrPutCpInternal(char *psz, RTUNICP CodePoint);
+
+/**
+ * Get the unicode code point at the given string position.
+ *
@returns unicode code point.
+ @returns RTUNICP_INVALID if the encoding is invalid.
+ @param psz The string.
+ *
+ @remark We optimize this operation by using an inline function for
+ the most frequent and simplest sequence, the rest is
+ handled by RTStrGetCpInternal().
+ */
DECLINLINE(RTUNICP) RTStrGetCp(const char *psz)
{
    const unsigned char uch = *(const unsigned char *)psz;
    if (!(uch & RT_BIT(7))
        return uch;
    return RTStrGetCpInternal(psz);
}

/**
 * Get the unicode code point at the given string position.
 *
 * @returns iprt status code.
 * @param ppsz Pointer to the string pointer. This will be updated to
 * point to the char following the current code point.
 * @param pCp Where to store the code point.
 * RTUNICP_INVALID is stored here on failure.
 *
 * @remark We optimize this operation by using an inline function for
 * the most frequent and simplest sequence, the rest is
 * handled by RTStrGetCpExInternal().
 * */
DECLINLINE(int) RTStrGetCpEx(const char **ppsz, PRTUNICP pCp)
{
    const unsigned char uch = **(const unsigned char **)ppsz;
    if (!(uch & RT_BIT(7))
        {*ppsz}++;
        *pCp = uch;
        return VINF_SUCCESS;
    }
    return RTStrGetCpExInternal(ppsz, pCp);
}

/**
 * Get the unicode code point at the given string position for a string of a
 * given maximum length.
 *
 * @returns iprt status code.
 * @retval VERR_INVALID_UTF8_ENCODING if the encoding is invalid.
 */
+ * @retval VERR_END_OF_STRING if *pcch is 0. *pCp is set to RTUNICP_INVALID.
+ *
+ * @param   ppsz        Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point.
+ * @param   pcch        Pointer to the maximum string length. This will be
+ * decremented by the size of the code point found.
+ * @param   pCp         Where to store the code point.
+ * RTUNICP_INVALID is stored here on failure.
+ *
+ * @remark  We optimize this operation by using an inline function for
+ * the most frequent and simplest sequence, the rest is
+ * handled by RTStrGetCpNExInternal().
+ */
+DECLINLINE(int) RTStrGetCpNEx(const char **ppsz, size_t *pcch, PRTUNICP pCp)
+{
+    if (RT_LIKELY(*pcch != 0))
+    {
+        const unsigned char uch = **(const unsigned char **)ppsz;
+        if (!(uch & RT_BIT(7))
+        {
+            (*ppsz)++;
+            (*pcch)--;
+            *pCp = uch;
+            return VINF_SUCCESS;
+        }
+    }
+    return RTStrGetCpNExInternal(ppsz, pcch, pCp);
+}
+
+/**
+ * Get the UTF-8 size in characters of a given Unicode code point.
+ *
+ * The code point is expected to be a valid Unicode one, but not necessarily in
+ * the range supported by UTF-8.
+ *
+ * @returns The number of chars (bytes) required to encode the code point, or
+ * zero if there is no UTF-8 encoding.
+ * @param   CodePoint       The unicode code point.
+ */
+DECLINLINE(size_t) RTStrCpSize(RTUNICP CodePoint)
+{
+    if (CodePoint < 0x00000080)
+        return 1;
+    if (CodePoint < 0x00000800)
+        return 2;
+    if (CodePoint < 0x00010000)
+        return 3;
+#ifdef RT_USE_RTC_3629

if (CodePoint < 0x00011000)
    return 4;
#else
    if (CodePoint < 0x00200000)
        return 4;
    if (CodePoint < 0x04000000)
        return 5;
    if (CodePoint < 0x7fffffff)
        return 6;
#endif
    return 0;
}

/**
 * Put the unicode code point at the given string position
 * and return the pointer to the char following it.
 *
 * This function will not consider anything at or following the
 * buffer area pointed to by psz. It is therefore not suitable for
 * inserting code points into a string, only appending/overwriting.
 *
 * @returns pointer to the char following the written code point.
 * @param   psz         The string.
 * @param   CodePoint   The code point to write.
 *                      This should not be RTUNICP_INVALID or any other
 *                      character out of the UTF-8 range.
 *
 * @remark  We optimize this operation by using an inline function for
 *          the most frequent and simplest sequence, the rest is
 *          handled by RTStrPutCpInternal().
 */
DECLINLINE(char *) RTStrPutCp(char *psz, RTUNICP CodePoint)
{
    if (CodePoint < 0x80)
    {
        *psz++ = (unsigned char)CodePoint;
        return psz;
    }
    return RTStrPutCpInternal(psz, CodePoint);
}

/**
 * Skips ahead, past the current code point.
 *
 * @returns Pointer to the char after the current code point.
 * @param   psz     Pointer to the current code point.
 *
 * @remark  This will not move the next valid code point, only past the current one.
 */
+DECLINLINE(char *) RTStrNextCp(const char *psz)
+
+    RTUNICP Cp;
+    RTStrGetCpEx(&psz, &Cp);
+    return (char *)psz;
+
+/**
+ * Skips back to the previous code point.
+ *
+ * @returns Pointer to the char before the current code point.
+ * @returns pszStart on failure.
+ * @param   pszStart    Pointer to the start of the string.
+ * @param   psz         Pointer to the current code point.
+ */
+RTDECL(char *) RTStrPrevCp(const char *pszStart, const char *psz);
+
+/** @page pg_rt_str_format  The IPRT Format Strings
+ *
+ * IPRT implements most of the commonly used format types and flags with the
+ * exception of floating point which is completely missing. In addition IPRT
+ * provides a number of IPRT specific format types for the IPRT typedefs and
+ * other useful things. Note that several of these extensions are similar to
+ * \%p and doesn't care much if you try add formatting flags/width/precision.
+ *
+ * Group 0a, The commonly used format types:
+ *
+ * - %s  - Takes a pointer to a zero terminated string (UTF-8) and
+ *   prints it with the optionally adjustment (width, -) and
+ *   length restriction (precision).
+ * - %ls - Same as %s except that the input is UTF-16 (output UTF-8).
+ * - %Ls - Same as %s except that the input is UCS-32 (output UTF-8).
+ * - %S  - Same as %s, used to convert to current codeset but this is
+ *   now done by the streams code. Deprecated, use %s.
+ * - %IS - Ditto. Deprecated, use %ls.
+ * - %LS - Ditto. Deprecated, use %Ls.
+ * - %C  - Takes a char and prints it.
+ * - %d  - Takes a signed integer and prints it as decimal. Thousand
+ *   separator (\'), zero padding (0), adjustment (+-), width,
+ *   precision
+ * - %i  - Same as %d.
+ * - %u  - Takes an unsigned integer and prints it as decimal. Thousand
+ *   separator (\'), zero padding (0), adjustment (+-), width,
+ *   precision
+ * - %x  - Takes an unsigned integer and prints it as lowercased
+ *   hexadecimal. The special hash (#) flag causes a '0x'
+ *   prefixed to be printed. Zero padding (0), adjustment (+-),
width, precision.
- %X - Same as \%x except that it is uppercased.
- % o - Takes an unsigned (?) integer and prints it as octal. Zero
      padding (0), adjustment (+), width, precision.
- %p - Takes a pointer (void technically) and prints it. Zero
      padding (0), adjustment (+), width, precision.

The \%d, \%i, \%u, \%x, \%X and \%o format types support the following
argument type specifiers:
- %ll - long long (uint64_t).
- %L - long long (uint64_t).
- %l - long (uint32_t, uint64_t)
- %h - short (int16_t).
- %hh - char (int8_t).
- %H - char (int8_t).
- %z - size_t.
- %j - intmax_t (int64_t).
- %t - ptrdiff_t.
The type in parentheses is typical sizes, however when printing those types
you are better off using the special group 2 format types below (%RX32 and
+ such).

Group 0b, IPRT format tricks:
- %M - Replaces the format string, takes a string pointer.
- %N - Nested formatting, takes a pointer to a format string
      followed by the pointer to a va_list variable. The va_list
      variable will not be modified and the caller must do va_end()
      on it. Make sure the va_list variable is NOT in a parameter
      list or some gcc versions/targets may get it all wrong.

Group 1, the basic runtime typedefs (excluding those which obviously are
+ pointer):
- %RTbool - Takes a bool value and prints 'true', 'false', or '!%d '!.
- %RTfile - Takes a #RTFILE value.
- %RTmode - Takes a #RTFMODE value.
- %RToff - Takes a #RTOFF value.
- %RTfp16 - Takes a #RTFAR16 value.
- %RTfp32 - Takes a #RTFAR32 value.
- %RTfp64 - Takes a #RTFAR64 value.
- %RTgid - Takes a #RTGID value.
- %RTino - Takes a #RTINODE value.
- %RTmac - Takes a #PCRTMAC pointer.
- %RTnaddr - Takes a #PCRTNETADDR value.
+ * - %RTnaipv4 - Takes a #RTNETADDRIPV4 value.
+ * - %RTnaipv6 - Takes a #PCRTNETADDRIPV6 value.
+ * - %RTnthrd - Takes a #RTNATIVETHREAD value.
+ * - %RTnthrd - Takes a #RTNATIVETHREAD value.
+ * - %RTproc - Takes a #RTPROCESS value.
+ * - %RTptr - Takes a #RTINTPTR or #RTUINTPTR value (but not void *).
+ * - %RTreg - Takes a #RTCCUINTREG value.
+ * - %RTsel - Takes a #RTSEL value.
+ * - %RTsem - Takes a #RTSEMEVENT, #RTSEMEVENTMULTI, #RTSEMMUTEX, #RTSEMFASTMUTEX, or #RTSEMRW value.
+ * - %RTsock - Takes a #RTSOCKET value.
+ * - %RTthrd - Takes a #RTHREAD value.
+ * - %RTuid - Takes a #RTUID value.
+ * - %RTuint - Takes a #RTUINT value.
+ * - %RTunicp - Takes a #RTUNICP value.
+ * - %RTutf16 - Takes a #RTUTF16 value.
+ * - %RTuuid - Takes a #PCRTUUID and will print the UUID as a string.
+ * - %RTxuint - Takes a #RTUINT or #RTINT value, formatting it as hex.
+ * - %RGi - Takes a #RTGCINT value.
+ * - %RGp - Takes a #RTGCINTPTR value.
+ * - %RGr - Takes a #RTGCUINTREG value.
+ * - %RGu - Takes a #RTGCUINT value.
+ * - %RGv - Takes a #RTGCPTOR, #RTGCINTPTR or #RTGCUINTPTR value.
+ * - %RGx - Takes a #RTGCUINT or #RTGCINT value, formatting it as hex.
+ * - %RHi - Takes a #RTHCINT value.
+ * - %RHp - Takes a #RTHCPHY value.
+ * - %RHr - Takes a #RTHCUINTREG value.
+ * - %RHu - Takes a #RTHCUINT value.
+ * - %RHv - Takes a #RTHCPTR, #RTHCINTPTR or #RTHCUINTPTR value.
+ * - %RHx - Takes a #RTHCUINT or #RTHCINT value, formatting it as hex.
+ * - %RRv - Takes a #RTRCPTR, #RTRCINTPTR or #RTRCUINTPTR value.
+ * - %RCi - Takes a #RTINT value.
+ * - %RCp - Takes a #RTCCPHY value.
+ * - %RCr - Takes a #RTCCUINTREG value.
+ * - %RCu - Takes a #RTUINT value.
+ * - %RCv - Takes a #intptr_t, #uintptr_t, void * value.
+ * - %RCx - Takes a #RTUINT or #RTINT value, formatting it as hex.
+ *
+ *
+ * Group 2, the generic integer types which are prefered over relying on what
+ * bit-count a 'long', 'short', or 'long long' has on a platform. This are
+ * highly prefered for the [u]intXX_t kind of types:
+ * - %RI[8|16|32|64] - Signed integer value of the specified bit count.
+ * - %RU[8|16|32|64] - Unsigned integer value of the specified bit count.
+ * - %RX[8|16|32|64] - Hexadecimal integer value of the specified bit count.
+ *
+ *
+ * Group 3, hex dumpers and other complex stuff which requires more than simple
+ * formatting:
+ *   - \%Rhxd - Takes a pointer to the memory which is to be dumped in typical
+ *             hex format. Use the precision to specify the length, and the width to
+ *             set the number of bytes per line. Default width and precision is 16.
+ *   - \%RhxD - Same as \%Rhxd, except that it skips duplicate lines.
+ *   - \%Rhxs - Takes a pointer to the memory to be displayed as a hex string,
+ *             i.e. a series of space separated bytes formatted as two digit hex value.
+ *             Use the precision to specify the length. Default length is 16 bytes.
+ *             The width, if specified, is ignored.
+ *   - \%Rrc  - Takes an integer iprt status code as argument. Will insert the
+ *             status code define corresponding to the iprt status code.
+ *   - \%Rrs  - Takes an integer iprt status code as argument. Will insert the
+ *             short description of the specified status code.
+ *   - \%Rrf  - Takes an integer iprt status code as argument. Will insert the
+ *             full description of the specified status code.
+ *   - \%Rra  - Takes an integer iprt status code as argument. Will insert the
+ *             status code define + full description.
+ *   - \%Rwc  - Takes a long Windows error code as argument. Will insert the status
+ *             code define corresponding to the Windows error code.
+ *   - \%Rwf  - Takes a long Windows error code as argument. Will insert the
+ *             full description of the specified status code.
+ *   - \%Rwa  - Takes a long Windows error code as argument. Will insert the
+ *             error code define + full description.
+ *   - \%Rhrc - Takes a COM/XPCOM status code as argument. Will insert the status
+ *             code define corresponding to the Windows error code.
+ *   - \%Rhra - Takes a COM/XPCOM error code as argument. Will insert the
+ *             error code define + full description.
+ *   - \%Rfn  - Pretty printing of a function or method. It drops the
+ *             return code and parameter list.
+ *   - \%Rbn  - Prints the base name. For dropping the path in
+ *             order to save space when printing a path name.
+ *   - \%Rbs  - Same as \%ls except inlut is big endian UTF-16.
+ *             On other platforms, \%Rw? simply prints the argument in a form of 0xXXXXXXXX.
+ *   + Group 4, structure dumpers:
+ *     - \%RDtimespec - Takes a PCRTTIMESPEC.
+ *   + Group 5, XML / HTML escapers:
+ *     - \%RMas - Takes a string pointer (const char *) and outputs
+ *                  it as an attribute value with the proper escaping.
This typically ends up in double quotes.

- `%-RMes` - Takes a string pointer (const char *) and outputs it as an element with the necessary escaping.

Group 6, CPU Architecture Register dumpers:

- `%-RAX86[reg]` - Takes a 64-bit register value if the register is 64-bit or smaller. Check the code wrt which registers are implemented.

```
#ifndef DECLARED_FNRTSTROUTPUT
#define DECLARED_FNRTSTROUTPUT
/**
 * Output callback.
 *
 * @returns number of bytes written.
 * @param   pvArg       User argument.
 * @param   pachChars   Pointer to an array of utf-8 characters.
 * @param   cbChars     Number of bytes in the character array pointed to by pachChars.
 */
typedef DECLCALLBACK(size_t) FNRTSTROUTPUT(void *pvArg, const char *pachChars, size_t cbChars);
/** Pointer to callback function. */
typedef FNRTSTROUTPUT *PFNRTSTROUTPUT;
#endif
```

/** @name Format flag.
 * These are used by RTStrFormat extensions and RTStrFormatNumber, mind that not all flags makes sense to both of the functions.
 */
#define RTSTR_F_CAPITAL         0x0001
#define RTSTR_F_LEFT            0x0002
#define RTSTR_F_ZEROPAD         0x0004
#define RTSTR_F_SPECIAL         0x0008
#define RTSTR_F_VALSIGNED       0x0010
#define RTSTR_F_PLUS            0x0020
#define RTSTR_F_BLANK           0x0040
#define RTSTR_F_WIDTH           0x0080
#define RTSTR_F_PRECISION       0x0100
#define RTSTR_F_THOUSAND_SEP    0x0200
#define RTSTR_F_OBFUSCATE_PTR   0x0400
#define RTSTR_F_BIT_MASK        0xf800
#define RTSTR_F_8BIT            0x0800
#define RTSTR_F_16BIT           0x1000
#define RTSTR_F_32BIT           0x2000
#define RTSTR_F_64BIT           0x4000
```c
#define RTSTR_F_128BIT      0x8000
+#define RTSTR_GET_BIT_FLAG
+  * Gets the bit flag for the specified type.
+ */
+#define RTSTR_GET_BIT_FLAG(type) \n+  ( sizeof(type) * 8 == 32 ? RTSTR_F_32BIT \n+  : sizeof(type) * 8 == 64 ? RTSTR_F_64BIT \n+  : sizeof(type) * 8 == 16 ? RTSTR_F_16BIT \n+  : sizeof(type) * 8 == 8  ? RTSTR_F_8BIT \n+  : sizeof(type) * 8 == 128 ? RTSTR_F_128BIT \n+  : 0)
+  *
+  *
+/**
+ * Callback to format non-standard format specifiers.
+ *
+ * @returns The number of bytes formatted.
+ * @param pvArg Formatter argument.
+ * @param pfnOutput Pointer to output function.
+ * @param pvArgOutput Argument for the output function.
+ * @param ppszFormat Pointer to the format string pointer. Advance this till the char
+ * after the format specifier.
+ * @param pArgs Pointer to the argument list. Use this to fetch the arguments.
+ * @param cchWidth Format Width. -1 if not specified.
+ * @param cchPrecision Format Precision. -1 if not specified.
+ * @param fFlags Flags (RTSTR_NTFS_*).
+ * @param chArgSize The argument size specifier, 'l' or 'L'.
+ */
typedef DECLCALLBACK(size_t) FNSTRFORMAT(void *pvArg, PFNRTSTROUTPUT pfnOutput, void *
pvArgOutput,
+                      const char **ppszFormat, va_list *pArgs, int cchWidth,
+                      int cchPrecision, unsigned fFlags, char chArgSize);
+/** Pointer to a FNSTRFORMAT() function. */
typedef FNSTRFORMAT *PFNSTRFORMAT;
+  *
+/**
+ * Partial implementation of a printf like formatter.
+ * It doesn't do everything correct, and there is no floating point support.
+ * However, it supports custom formats by the means of a format callback.
+ *
+ * @returns number of bytes formatted.
+ * @param pfnOutput Output worker.
+ * Called in two ways. Normally with a string and its length.
+ * For termination, it's called with NULL for string, 0 for length.
+ * @param pvArgOutput Argument to the output worker.
```
+ * @param   pfnFormat   Custom format worker.
+ * @param   pvArgFormat Argument to the format worker.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   InArgs      Argument list.
+ */
+RTDECL(size_t) RTStrFormatV(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, PFNSTRFORMAT pfnFormat, void *pvArgFormat, const char *pszFormat, va_list InArgs) RT_IPRT_FORMAT_ATTR(5, 0);
+
+/**
+ * Partial implementation of a printf like formatter.
+ *
+ * It doesn't do everything correct, and there is no floating point support.
+ * However, it supports custom formats by the means of a format callback.
+ *
+ * @returns number of bytes formatted.
+ * @param   pfnOutput   Output worker.
+ *                      Called in two ways. Normally with a string and its length.
+ *                      For termination, it's called with NULL for string, 0 for length.
+ * @param   pvArgOutput Argument to the output worker.
+ * @param   pfnFormat   Custom format worker.
+ * @param   pvArgFormat Argument to the format worker.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   ...         Argument list.
+ */
+RTDECL(size_t) RTStrFormat(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, PFNSTRFORMAT pfnFormat, void *pvArgFormat, const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(5, 6);
+
+/**
+ * Formats an integer number according to the parameters.
+ *
+ * @returns Length of the formatted number.
+ * @param   psz             Pointer to output string buffer of sufficient size.
+ * @param   u64Value        Value to format.
+ * @param   uiBase          Number representation base.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ */
+RTDECL(int) RTStrFormatNumber(char *psz, uint64_t u64Value, unsigned int uiBase, signed int cchWidth, signed int cchPrecision, unsigned int fFlags);
+
+/**
+ * Formats an unsigned 8-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ */
+RTDECL(int) RTStrFormatU8Number(char *psz, uint8_t u8Value, unsigned int uiBase, signed int cchWidth, signed int cchPrecision, unsigned int fFlags);
+ * @param pszBuf  The output buffer.
+ * @param cbBuf   The size of the output buffer.
+ * @param u8Value The value to format.
+ * @param uiBase  Number representation base.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags  Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU8(char *pszBuf, size_t cbBuf, uint8_t u8Value, unsigned int uiBase,
+                               signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 16-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ *
+ * @param pszBuf  The output buffer.
+ * @param cbBuf   The size of the output buffer.
+ * @param u16Value The value to format.
+ * @param uiBase  Number representation base.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags  Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU16(char *pszBuf, size_t cbBuf, uint16_t u16Value, unsigned int uiBase,
+                                signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 32-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ *
+ * @param pszBuf  The output buffer.
+ * @param cbBuf   The size of the output buffer.
+ * @param u32Value The value to format.
+ * @param uiBase  Number representation base.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags  Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU32(char *pszBuf, size_t cbBuf, uint32_t u32Value, unsigned int uiBase,
+                                signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 64-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ *
+ * @param pszBuf  The output buffer.
+ * @param cbBuf   The size of the output buffer.
+ * @param u64Value The value to format.
+ */
+ * @param   uiBase          Number representation base.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU64(char *pszBuf, size_t cbBuf, uint64_t u64Value, unsigned int uiBase,
+                                 signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+RTDECL(ssize_t) RTStrFormatU128(char *pszBuf, size_t cbBuf, PCRTUINT128U pu128Value, unsigned int
+                                 uiBase,
+                                 signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+RTDECL(ssize_t) RTStrFormatU256(char *pszBuf, size_t cbBuf, PCRTUINT256U pu256Value, unsigned int
+                                 uiBase,
+                                 signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+RTDECL(ssize_t) RTStrFormatU512(char *pszBuf, size_t cbBuf, PCRTUINT512U pu512Value, unsigned int
+                                 uiBase,
+                                 signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+ * @param pszBuf  The output buffer.
+ * @param cbBuf   The size of the output buffer.
+ * @param pu512Value The value to format.
+ * @param uiBase  Number representation base.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags  Flags, RTSTR_F_XXX.
+ * @remarks The current implementation is limited to base 16 and doesn't do
+ *          width or precision and probably ignores few flags too.
+ */
+RTDECL(ssize_t) RTStrFormatU512(char *pszBuf, size_t cbBuf, PCRTUINT512U pu512Value, unsigned int
+uiBase,
+     signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an 80-bit extended floating point number.
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param pszBuf  The output buffer.
+ * @param cbBuf   The size of the output buffer.
+ * @param pr80Value The value to format.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags  Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatR80(char *pszBuf, size_t cbBuf, PCRTFLOAT80U pr80Value, signed int
+cchWidth,
+     signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an 80-bit extended floating point number, version 2.
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param pszBuf  The output buffer.
+ * @param cbBuf   The size of the output buffer.
+ * @param pr80Value The value to format.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags  Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatR80u2(char *pszBuf, size_t cbBuf, PCRTFLOAT80U2 pr80Value, signed int
+cchWidth,
+     signed int cchPrecision, uint32_t fFlags);
+ * Callback for formatting a type.
+ * This is registered using the RTStrFormatTypeRegister function and will
+ * be called during string formatting to handle the specified %R[type].
+ * The argument for this format type is assumed to be a pointer and it's
+ * passed in the @a pvValue argument.
+ *
+ * @returns Length of the formatted output.
+ * @param   pfnOutput       Output worker.
+ * @param   pvArgOutput     Argument to the output worker.
+ * @param   pszType         The type name.
+ * @param   pvValue         The argument value.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags (NTFS_*).
+ * @param   pvUser          The user argument.
+ */
+ typedef DECLCALLBACK (size_t) FNRTSTRFORMATTYPE (PFNRTSTROUTPUT pfnOutput, void *
+                                               pvArgOutput,
+                                               const char *pszType, void const *pvValue,
+                                               int cchWidth, int cchPrecision, unsigned fFlags,
+                                               void *pvUser);
+ /** Pointer to a FNRTSTRFORMATTYPE. */
+ typedef FNRTSTRFORMATTYPE *PFNRTSTRFORMATTYPE;
+
+ /*
+ * Register a format handler for a type.
+ *
+ * The format handler is used to handle '%R[type]' format types, where the argument
+ * in the vector is a pointer value (a bit restrictive, but keeps it simple).
+ *
+ * The caller must ensure that no other thread will be making use of any of
+ * the dynamic formatting type facilities simultaneously with this call.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_ALREADY_EXISTS if the type has already been registered.
+ * @retval  VERR_TOO_MANY_OPEN_FILES if all the type slots has been allocated already.
+ *
+ * @param   pszType         The type name.
+ * @param   pfnHandler      The handler address. See FNRTSTRFORMATTYPE for details.
+ * @param   pvUser          The user argument to pass to the handler. See RTStrFormatTypeSetUser
+ *                          for how to update this later.
+ */
+ RTDECL (int) RTStrFormatTypeRegister (const char *pszType, PFNRTSTRFORMATTYPE pfnHandler, void *
+                                               pvUser);
+ +
+/**
+ * Deregisters a format type.
+ */
+ * The caller must ensure that no other thread will be making use of any of
+ * the dynamic formatting type facilities simultaneously with this call.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_FILE_NOT_FOUND if not found.
+ *
+ * @param   pszType     The type to deregister.
+ */
+RTDECL(int) RTStrFormatTypeDeregister(const char *pszType);
+
+/**
+ * Sets the user argument for a type.
+ */
+ * This can be used if a user argument needs relocating in GC.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_FILE_NOT_FOUND if not found.
+ *
+ * @param   pszType     The type to update.
+ * @param   pvUser      The new user argument value.
+ */
+RTDECL(int) RTStrFormatTypeSetUser(const char *pszType, void *pvUser);
+
+/**
+ * String printf.
+ */
+ * The length of the returned string (in pszBuffer) excluding the
+ * terminator.
+ *
+ * @param   pszBuffer   Output buffer.
+ * @param   cchBuffer   Size of the output buffer.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   args        The format argument.
+ *
+ * @deprecated Use RTStrPrintf2V! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintfV(char *pszBuffer, size_t cchBuffer, const char *pszFormat, va_list args)
+RT_IPRT_FORMAT_ATTR(3, 0);
+
+/**
+ * String printf.
+ */
+ * The length of the returned string (in pszBuffer) excluding the
+ *          terminator.
+ * @param   pszBuffer   Output buffer.
+ * @param   cchBuffer   Size of the output buffer.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   ...         The format argument.
+ *
+ * @deprecated Use RTStrPrintf2! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintf(char *pszBuffer, size_t cchBuffer, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);
+
+/**
+ * String printf with custom formatting.
+ *
+ * @returns The length of the returned string (in pszBuffer) excluding the
+ *          terminator.
+ * @param   pfnFormat   Pointer to handler function for the custom formats.
+ * @param   pvArg       Argument to the pfnFormat function.
+ * @param   pszBuffer   Output buffer.
+ * @param   cchBuffer   Size of the output buffer.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   args        The format argument.
+ *
+ * @deprecated Use RTStrPrintf2ExV! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintfExV(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cchBuffer,
+                              const char *pszFormat, va_list args)  RT_IPRT_FORMAT_ATTR(5, 0);
+
+/**
+ * String printf with custom formatting.
+ *
+ * @returns The length of the returned string (in pszBuffer) excluding the
+ *          terminator.
+ * @param   pfnFormat   Pointer to handler function for the custom formats.
+ * @param   pvArg       Argument to the pfnFormat function.
+ * @param   pszBuffer   Output buffer.
+ * @param   cchBuffer   Size of the output buffer.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   ...         The format argument.
+ *
+ * @deprecated Use RTStrPrintf2Ex! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintfEx(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cchBuffer,
+                              const char *pszFormat, va_list args)  RT_IPRT_FORMAT_ATTR(5, 6);
+}
@returns On success, positive count of formatted character excluding the
terminator. On buffer overflow, negative number giving the required
buffer size (including terminator char).

@param pszBuffer Output buffer.
@param cbBuffer Size of the output buffer.
@param pszFormat Pointer to the format string, @see pg_rt_str_format.
@param args The format argument.

RTDECL(ssize_t) RTStrPrintf2V(char *pszBuffer, size_t cbBuffer, const char *pszFormat, va_list args)

+ String printf, version 2.

@param pszBuffer Output buffer.
@param cbBuffer Size of the output buffer.
@param pszFormat Pointer to the format string, @see pg_rt_str_format.
@param ... The format argument.

RTDECL(ssize_t) RTStrPrintf2(char *pszBuffer, size_t cbBuffer, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);

+ String printf with custom formatting, version 2.

@param pfnFormat Pointer to handler function for the custom formats.
@param pvArg Argument to the pfnFormat function.
@param pszBuffer Output buffer.
@param cbBuffer Size of the output buffer.
@param pszFormat Pointer to the format string, @see pg_rt_str_format.
@param args The format argument.

RTDECL(ssize_t) RTStrPrintf2ExV(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cbBuffer,
                                const char *pszFormat, va_list args)  RT_IPRT_FORMAT_ATTR(5, 0);

+ String printf with custom formatting, version 2.
+ * @returns On success, positive count of formatted character excluding the
+ *          terminator. On buffer overflow, negative number giving the required
+ *          buffer size (including terminator char).
+ *
+ + * @param   pfnFormat   Pointer to handler function for the custom formats.
+ * @param   pvArg       Argument to the pfnFormat function.
+ * @param   pszBuffer   Output buffer.
+ * @param   chBuffer   Size of the output buffer.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   ...        The format argument.
+ */
+RTDECL(ssize_t) RTStrPrintf2Ex(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cbBuffer,
+                                const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(5, 6);
+
+/**
+ * Allocating string printf (default tag).
+ *
+ * @returns The length of the string in the returned *ppszBuffer excluding the
+ *          terminator.
+ * @returns -1 on failure.
+ * @param   ppszBuffer  Where to store the pointer to the allocated output buffer.
+ *                      The buffer should be freed using RTStrFree().
+ * The buffer should be freed using RTStrFree().
+ * On failure *ppszBuffer will be set to NULL.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   args        The format argument.
+ */
+#define RTStrAPrintfV(ppszBuffer, pszFormat, args)      RTStrAPrintfVTag((ppszBuffer), (pszFormat), (args),
+RTSTR_TAG)
+
+/**
+ * Allocating string printf (custom tag).
+ *
+ * @returns The length of the string in the returned *ppszBuffer excluding the
+ *          terminator.
+ * @returns -1 on failure.
+ * @param   ppszBuffer  Where to store the pointer to the allocated output buffer.
+ * The buffer should be freed using RTStrFree().
+ * On failure *ppszBuffer will be set to NULL.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   args        The format argument.
+ * @param   pszTag      Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrAPrintfVTag(char **ppszBuffer, const char *pszFormat, va_list args, const char *pszTag)
RT_IPRT_FORMAT_ATTR(2, 0);
+
+/**
+ * Allocating string printf.
+ *
+ @returns The length of the string in the returned *ppszBuffer excluding the
+ terminator.
+ @returns -1 on failure.
+ @param ppszBuffer Where to store the pointer to the allocated output buffer.
+ The buffer should be freed using RTStrFree().
+ @param pszFormat Pointer to the format string, @see pg_rt_str_format.
+ @param ... The format argument.
+ */
+DECLINLINE(int) RT_IPRT_FORMAT_ATTR(2, 3) RTStrAPrintf(char **ppszBuffer, const char *pszFormat, ...)
+
+ int cbRet;
+ va_list va;
+ va_start(va, pszFormat);
+ cbRet = RTStrAPrintfVTag(ppszBuffer, pszFormat, va, RTSTR_TAG);
+ va_end(va);
+ return cbRet;
+
+/**
+ Allocating string printf (custom tag).
+ */
+DECLINLINE(int) RT_IPRT_FORMAT_ATTR(3, 4) RTStrAPrintfTag(char **ppszBuffer, const char *pszTag, const char *pszFormat, ...)
+
+ int cbRet;
+ va_list va;
+ va_start(va, pszFormat);
+ cbRet = RTStrAPrintfVTag(ppszBuffer, pszFormat, va, pszTag);
+ va_end(va);
+ return cbRet;
+
+/**
+ Allocating string printf, version 2.
+ */
+DECLINLINE(int) RT_IPRT_FORMAT_ATTR(3, 4) RTStrAPrintfTag(char **ppszBuffer, const char *pszTag, const char *pszFormat, ...)
+}
+ * memory.
+ * @param pszFormat  Pointer to the format string, @see pg_rt_str_format.
+ * @param args       The format argument.
+ */
#define RTStrAPrintf2V(pszFormat, args)  RTStrAPrintf2VTag((pszFormat), (args), RTSTR_TAG)
+
+/**
+ * Allocating string printf, version 2.
+ *
+ * @returns Formatted string. Use RTStrFree() to free it. NULL when out of
+ * memory.
+ * @param pszFormat  Pointer to the format string, @see pg_rt_str_format.
+ * @param args       The format argument.
+ * @param pszTag     Allocation tag used for statistics and such.
+ */
+RTDECL(char *) RTStrAPrintf2VTag(const char *pszFormat, va_list args, const char *pszTag)
RT_IPRT_FORMAT_ATTR(1, 0);
+
+/**
+ * Allocating string printf, version 2 (default tag).
+ *
+ * @returns Formatted string. Use RTStrFree() to free it. NULL when out of
+ * memory.
+ * @param pszFormat  Pointer to the format string, @see pg_rt_str_format.
+ * @param ...        The format argument.
+ */
+DECLINLINE(char *) RT_IPRT_FORMAT_ATTR(1, 2) RTStrAPrintf2(const char *pszFormat, ...)
{
    char   *pszRet;
    va_list va;
    va_start(va, pszFormat);
    pszRet = RTStrAPrintf2VTag(pszFormat, va, RTSTR_TAG);
    va_end(va);
    return pszRet;
+
+/**
+ * Allocating string printf, version 2 (custom tag).
+ *
+ * @returns Formatted string. Use RTStrFree() to free it. NULL when out of
+ * memory.
+ * @param pszTag     Allocation tag used for statistics and such.
+ * @param pszFormat  Pointer to the format string, @see pg_rt_str_format.
+ * @param ...        The format argument.
+ */
+DECLINLINE(char *) RT_IPRT_FORMAT_ATTR(2, 3) RTStrAPrintf2Tag(const char *pszTag, const char
pszFormat, ...)
{
char *pszRet;
va_list va;
va_start(va, pszFormat);
pszRet = RTStrAPrintf2VTag(pszFormat, va, pszTag);
va_end(va);
return pszRet;
}

/**
 * Strips blankspaces from both ends of the string.
 *
 * @returns Pointer to first non-blank char in the string.
 * @param   psz     The string to strip.
 */
+RTDECL(char *) RTStrStrip(char *psz);
+
+/**
 * Strips blankspaces from the start of the string.
 *
 * @returns Pointer to first non-blank char in the string.
 * @param   psz     The string to strip.
 */
+RTDECL(char *) RTStrStripL(const char *psz);
+
+/**
 * Strips blankspaces from the end of the string.
 *
 * @returns psz.
 * @param   psz     The string to strip.
 */
+RTDECL(char *) RTStrStripR(char *psz);
+
+/**
 * String copy with overflow handling.
 *
 * @retval  VINF_SUCCESS on success.
 * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
 *          buffer will contain as much of the string as it can hold, fully
 *          terminated.
 *
 * @param   pszDst              The destination buffer.
 * @param   cbDst               The size of the destination buffer (in bytes).
 * @param   pszSrc              The source string. NULL is not OK.
 */
+RTDECL(int) RTStrCopy(char *pszDst, size_t cbDst, const char *pszSrc);
+
+/**
 * String copy with overflow handling.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ */
+RTDECL(int) RTStrCopyEx(char *pszDst, size_t cbDst, const char *pszSrc, size_t cchSrcMax);
+
+/**
+ * String copy with overflow handling and buffer advancing.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ */
+RTDECL(int) RTStrCopyP(char **ppszDst, size_t *pcbDst, const char *pszSrc);
+
+/**
+ * String copy with overflow handling.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ */
+RTDECL(int) RTStrCopy(char *pszDst, size_t cbDst, const char *pszSrc, size_t cchSrcMax);
+ * the buffer pointer.
+ * @param pszSrc The source string. NULL is not OK.
+ * @param cchSrcMax The maximum number of chars (not code points) to
+ * copy from the source string, not counting the
+ * terminator as usual.
+ */
+RTDECL(int) RTStrCopyPEx(char **ppszDst, size_t *pcbDst, const char *pszSrc, size_t cchSrcMax);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ *
+ * @param pszDst The destination buffer.
+ * @param cbDst The size of the destination buffer (in bytes).
+ * @param pszSrc The source string. NULL is not OK.
+ */
+RTDECL(int) RTStrCat(char *pszDst, size_t cbDst, const char *pszSrc);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ *
+ * @param pszDst The destination buffer.
+ * @param cbDst The size of the destination buffer (in bytes).
+ * @param pszSrc The source string. NULL is not OK.
+ * @param cchSrcMax The maximum number of chars (not code points) to
+ * copy from the source string, not counting the
+ * terminator as usual.
+ */
+RTDECL(int) RTStrCatEx(char *pszDst, size_t cbDst, const char *pszSrc, size_t cchSrcMax);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ *
+ * @param ppszDst Pointer to the destination buffer pointer.
/*
 * This will be advanced to the end of the copied
 * bytes (points at the terminator). This is also
 * updated on overflow.
 */
+ @param pcbDst Pointer to the destination buffer size
+ * variable. This will be updated in accord with
+ * the buffer pointer.
+ @param pszSrc The source string. NULL is not OK.
+ */
+RTDECL(int) RTStrCatP(char **ppszDst, size_t *pcbDst, const char *pszSrc);
+
+/**
+ * String concatenation with overflow handling and buffer advancing.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ *
+ * @param ppszDst Pointer to the destination buffer pointer.
+ * This will be advanced to the end of the copied
+ * bytes (points at the terminator). This is also
+ * updated on overflow.
+ * @param pcbDst Pointer to the destination buffer size
+ * variable. This will be updated in accord with
+ * the buffer pointer.
+ * @param pszSrc The source string. NULL is not OK.
+ * @param cchSrcMax The maximum number of chars (not code points) to
+ * copy from the source string, not counting the
+ * terminator as usual.
+ */
+RTDECL(int) RTStrCatPEx(char **ppszDst, size_t *pcbDst, const char *pszSrc, size_t cchSrcMax);
+
+/**
+ * Performs a case sensitive string compare between two UTF-8 strings.
+ *
+ * Encoding errors are ignored by the current implementation. So, the only
+ * difference between this and the CRT strcmp function is the handling of
+ * NULL arguments.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param psz1 First UTF-8 string. Null is allowed.
+ * @param psz2 Second UTF-8 string. Null is allowed.
+ */
+RTDECL(int) RTStrCmp(const char *psz1, const char *psz2);
+ * Performs a case sensitive string compare between two UTF-8 strings, given
+ * a maximum string length.
+ *
+ * Encoding errors are ignored by the current implementation. So, the only
+ * difference between this and the CRT strcmp function is the handling of
+ * NULL arguments.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param   psz1        First UTF-8 string. Null is allowed.
+ * @param   psz2        Second UTF-8 string. Null is allowed.
+ * @param   cchMax      The maximum string length
+ */
+RTDECL(int) RTStrNCmp(const char *psz1, const char *psz2, size_t cchMax);
+
+**
+ * Performs a case insensitive string compare between two UTF-8 strings.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * The result is the difference between the mismatching codepoints after they
+ * both have been lower cased.
+ *
+ * If the string encoding is invalid the function will assert (strict builds)
+ * and use RTStrCmp for the remainder of the string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param   psz1        First UTF-8 string. Null is allowed.
+ * @param   psz2        Second UTF-8 string. Null is allowed.
+ */
+RTDECL(int) RTStrICmp(const char *psz1, const char *psz2);
+
+**
+ * Performs a case insensitive string compare between two UTF-8 strings, given a
+ * maximum string length.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * The result is the difference between the mismatching codepoints after they
+ * both have been lower cased.
+ *
+ * If the string encoding is invalid the function will assert (strict builds)
+ * and use RTStrCmp for the remainder of the string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ @param   psz1        First UTF-8 string. Null is allowed.
+ @param   psz2        Second UTF-8 string. Null is allowed.
+ @param   cchMax      Maximum string length
+ */
+RTDECL(int) RTStrNICmp(const char *psz1, const char *psz2, size_t cchMax);
+
+/**
+ * Performs a case insensitive string compare between a UTF-8 string and a 7-bit ASCII string.
+ *
+ * This is potentially faster than RTStrICmp and drags in less dependencies. It is really handy for hardcoded inputs.
+ *
+ * If the string encoding is invalid the function will assert (strict builds)
+ * and use RTStrCmp for the remainder of the string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ @param   psz1        First UTF-8 string. Null is allowed.
+ @param   psz2        Second string, 7-bit ASCII. Null is allowed.
+ @sa      RTUtf16ICmpAscii
+ */
+RTDECL(int) RTStrICmpAscii(const char *psz1, const char *psz2);
+
+/**
+ * Checks whether @a pszString starts with @a pszStart.
+ *
+ * @returns true / false.
+ *
+ @param   pszString   The string to check.
+ @param   pszStart    The start string to check for.
+ */
+RTDECL(int) RTStrStartsWith(const char *pszString, const char *pszStart);
+
+/**
+ * Checks whether @a pszString starts with @a pszStart, case insensitive.
+ *
+ * @returns true / false.
+ *
+ @param   pszString   The string to check.
+ @param   pszStart    The start string to check for.
+ */
+RTDECL(int) RTStrIStartsWith(const char *pszString, const char *pszStart);
+/**
+ * Locates a case sensitive substring.
+ *
+ * If any of the two strings are NULL, then NULL is returned. If the needle is
+ * an empty string, then the haystack is returned (i.e. matches anything).
+ *
+ * @returns Pointer to the first occurrence of the substring if found, NULL if
+ *          not.
+ *
+ * @param   pszHaystack The string to search.
+ * @param   pszNeedle   The substring to search for.
+ *
+ * @remarks The difference between this and strstr is the handling of NULL
+ *          pointers.
+ */
+RTDECL(char *) RTStrStr(const char *pszHaystack, const char *pszNeedle);
+
+/**
+ * Locates a case insensitive substring.
+ *
+ * If any of the two strings are NULL, then NULL is returned. If the needle is
+ * an empty string, then the haystack is returned (i.e. matches anything).
+ *
+ * @returns Pointer to the first occurrence of the substring if found, NULL if
+ *          not.
+ *
+ * @param   pszHaystack The string to search.
+ * @param   pszNeedle   The substring to search for.
+ *
+ */
+RTDECL(char *) RTStrIStr(const char *pszHaystack, const char *pszNeedle);
+
+/**
+ * Converts the string to lower case.
+ *
+ * @returns Pointer to the converted string.
+ *
+ * @param   psz The string to convert.
+ */
+RTDECL(char *) RTStrToLower(char *psz);
+
+/**
+ * Converts the string to upper case.
+ *
+ * @returns Pointer to the converted string.
+ *
+ * @param   psz The string to convert.
+ */
+RTDECL(char *) RTStrToUpper(char *psz);
/**
 * Checks if the string is case foldable, i.e. whether it would change if
 * subject to RTStrToLower or RTStrToUpper.
 */
@returns true / false
@param psz The string in question.
*/
+RTDECL(bool) RTStrIsCaseFoldable(const char *psz);

/**
 * Checks if the string is upper cased (no lower case chars in it).
 */
@returns true / false
@param psz The string in question.
*/
+RTDECL(bool) RTStrIsUpperCased(const char *psz);

/**
 * Checks if the string is lower cased (no upper case chars in it).
 */
@returns true / false
@param psz The string in question.
*/
+RTDECL(bool) RTStrIsLowerCased(const char *psz);

/**
 * Find the length of a zero-terminated byte string, given
 * a max string length.
 */
@returns The string length or cbMax. The returned length does not include
 * the zero terminator if it was found.
 @param pszString The string.
 @param cchMax The max string length.
*/
+RTDECL(size_t) RTStrNLen(const char *pszString, size_t cchMax);

/**
 * Find the length of a zero-terminated byte string, given
 * a max string length.
 */
@returns IPRT status code.
@retval VINF_SUCCESS if the string has a length less than cchMax.
+ @retval  VERR_BUFFER_OVERFLOW if the end of the string wasn't found before cchMax was reached.
+ *
+ @param  pszString   The string.
+ @param  cchMax      The max string length.
+ @param  pcch        Where to store the string length excluding the terminator. This is set to cchMax if the terminator isn't found.
+ */
+RTDECL(int) RTStrNLenEx(const char *pszString, size_t cchMax, size_t *pcch);
+
+RT_C_DECLS_END
+
/** The maximum size argument of a memchr call. */
#define RTSTR_MEMCHR_MAX            ((~(size_t)0 >> 1) - 15)
+
/** Find the zero terminator in a string with a limited length. */
+ * @returns Pointer to the zero terminator.
+ * @returns NULL if the zero terminator was not found.
+
+ @param  pszString   The string.
+ @param  cchMax      The max string length. RTSTR_MAX is fine.
+ */
#if defined(__cplusplus) && !defined(DOXYGEN_RUNNING)
DECLINLINE(char const *) RTStrEnd(char const *pszString, size_t cchMax)
{
    /* Avoid potential issues with memchr seen in glibc.
     * See sysdeps/x86_64/memchr.S in glibc versions older than 2.11 */
    while (cchMax > RTSTR_MEMCHR_MAX)
    {
        char const *pszRet = (char const *)memchr(pszString, '\0', RTSTR_MEMCHR_MAX);
        if (RT_LIKELY(pszRet))
            return pszRet;
        pszString += RTSTR_MEMCHR_MAX;
        cchMax    -= RTSTR_MEMCHR_MAX;
    }
    return (char const *)memchr(pszString, '\0', cchMax);
}
+
DECLINLINE(char *) RTStrEnd(char *pszString, size_t cchMax)
#else
DECLINLINE(char *) RTStrEnd(const char *pszString, size_t cchMax)
#endif
{
    /* Avoid potential issues with memchr seen in glibc.
     * See sysdeps/x86_64/memchr.S in glibc versions older than 2.11 */
+}
while (cchMax > RTSTR_MEMCHR_MAX)
+
+    char *pszRet = (char *)memchr(pszString, '\0', RTSTR_MEMCHR_MAX);
+    if (RT_LIKELY(pszRet))
+        return pszRet;
+    pszString += RTSTR_MEMCHR_MAX;
+    cchMax -= RTSTR_MEMCHR_MAX;
+ }
+ return (char *)memchr(pszString, '\0', cchMax);
+
+RT_C_DECLS_BEGIN
+
+/**
+ * Finds the offset at which a simple character first occurs in a string.
+ *
+ * @returns The offset of the first occurrence or the terminator offset.
+ * @param   pszHaystack The string to search.
+ * @param   chNeedle   The character to search for.
+ */
+DECLINLINE(size_t) RTStrOffCharOrTerm(const char *pszHaystack, char chNeedle)
+
+{  
+    const char *psz = pszHaystack;
+    char ch;
+    while (   (ch = *psz) != chNeedle
+           && ch != '\0')
+        psz++;
+    return psz - pszHaystack;
+}
+
+
+/**
+ * Matches a simple string pattern.
+ *
+ * @returns true if the string matches the pattern, otherwise false.
+ *
+ * @param  pszPattern   The pattern. Special chars are '*' and '?', where the
+ *                     asterisk matches zero or more characters and question
+ *                     mark matches exactly one character.
+ * @param  pszString    The string to match against the pattern.
+ */
+RTDECL(bool) RTStrSimplePatternMatch(const char *pszPattern, const char *pszString);
+
+/**
+ * Matches a simple string pattern, neither which needs to be zero terminated.
+ *
+ * This is identical to RTStrSimplePatternMatch except that you can optionally
+ * specify the length of both the pattern and the string. The function will
+ * stop when it hits a string terminator or either of the lengths.
+ *
+ * @returns true if the string matches the pattern, otherwise false.
+ *
+ * @param pszPattern The pattern. Special chars are '*' and '?', where the
+ *       asterisk matches zero or more characters and question
+ *       mark matches exactly one character.
+ * @param cchPattern The pattern length. Pass RTSTR_MAX if you don't know the
+ *       length and wish to stop at the string terminator.
+ * @param pszString The string to match against the pattern.
+ * @param cchString The string length. Pass RTSTR_MAX if you don't know the
+ *       length and wish to match up to the string terminator.
+ */
+RTDECL(bool) RTStrSimplePatternNMatch(const char *pszPattern, size_t cchPattern,
+                                      const char *pszString, size_t cchString);
+
+/**
+ * Matches multiple patterns against a string.
+ *
+ * The patterns are separated by the pipe character (|).
+ *
+ * @returns true if the string matches the pattern, otherwise false.
+ *
+ * @param pszPatterns The patterns.
+ * @param cchPatterns The lengths of the patterns to use. Pass RTSTR_MAX to
+ *       stop at the terminator.
+ * @param pszString The string to match against the pattern.
+ * @param cchString The string length. Pass RTSTR_MAX stop stop at the
+ *       terminator.
+ * @param poffPattern Offset into the patterns string of the pattern that
+ *       matched. If no match, this will be set to RTSTR_MAX.
+ *       This is optional, NULL is fine.
+ */
+RTDECL(bool) RTStrSimplePatternMultiMatch(const char *pszPatterns, size_t cchPatterns,
+                                          const char *pszString, size_t cchString,
+                                          size_t *poffPattern);
+
+/**
+ * Compares two version strings RTStrICmp fashion.
+ *
+ * The version string is split up into sections at punctuation, spaces,
+ * underscores, dashes and plus signs. The sections are then split up into
+ * numeric and string sub-sections. Finally, the sub-sections are compared
+ * in a numeric or case insensitive fashion depending on what they are.
+ *
+ * The following strings are considered to be equal: "1.0.0", "1.00.0", "1.0",
+ * "1". These aren't: "1.0.0r993", "1.0", "1.0r993", "1.0_Beta3", "1.1"
@returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param pszVer1 First version string to compare.
+ * @param pszVer2 Second version string to compare first version with.
+ */
+RTDECL(int) RTStrVersionCompare(const char *pszVer1, const char *pszVer2);
+
+/** @defgroup rt_str_conv String To/From Number Conversions
+ * @} */
+
+/**
+ * Converts a string representation of a number to a 64-bit unsigned number.
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ * @param   pszValue Pointer to the string value.
+ * @param   ppszNext Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase The base of the representation used.
+ *          If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu64 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt64Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint64_t *pu64);
+
+/**
+ * Converts a string representation of a number to a 64-bit unsigned number, making sure the full string is converted.
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_TRAILING_CHARS
+ * @param   pszValue Pointer to the string value.
+ * @param   uBase The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pu64 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt64Full(const char *pszValue, unsigned uBase, uint64_t *pu64);
+
+/**
+ * Converts a string representation of a number to a 64-bit unsigned number.
+ * The base is guessed.
+ *
+ * @returns 64-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param pszValue Pointer to the string value.
+ */
+RTDECL(uint64_t) RTStrToUInt64(const char *pszValue);
+
+/** *
+ * Converts a string representation of a number to a 32-bit unsigned number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_NEGATIVE_UNSIGNED
+ * @retval VWRN_TRAILING_CHARS
+ * @retval VWRN_TRAILING_SPACES
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ *
+ * @param pszValue Pointer to the string value.
+ * @param ppszNext Where to store the pointer to the first char following the number. (Optional)
+ * @param uBase The base of the representation used.
+ *          If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pu32 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt32Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint32_t *pu32);
+
+/**
+ * Converts a string representation of a number to a 32-bit unsigned number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_NEGATIVE_UNSIGNED
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ * @retval VERR_TRAILING_SPACES
+ * @retval VERR_TRAILING_CHARS
+ *
+ * @param pszValue  Pointer to the string value.
+ * @param uBase     The base of the representation used.
+ * @returns 32-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param pszValue  Pointer to the string value.
+ */
+RTDECL(uint32_t) RTStrToUInt32(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 16-bit unsigned number,
+ * making sure the full string is converted.
+ * @returns iprt status code.
+ * @returns VWRN_NUMBER_TOO_BIG
+ * @returns VWRN_NEGATIVE_UNSIGNED
+ * @returns VINF_SUCCESS
+ * @returns VERR_NO_DIGITS
+ * @returns VERR_TRAILING_SPACES
+ /*
+ * @param pszValue  Pointer to the string value.
+ * @param ppszNext  Where to store the pointer to the first char following the number. (Optional)
+ * @param uBase     The base of the representation used.
+ * @returns iprt status code.
+ * @returns VWRN_NUMBER_TOO_BIG
+ * @returns VWRN_NEGATIVE_UNSIGNED
+ * @returns VINF_SUCCESS
+ * @returns VERR_NO_DIGITS
+ * @returns VERR_TRAILING_SPACES
+ * @returns VERR_TRAILING_SPACES
+ * @retval  VERR_TRAILING_CHARS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ *          If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu16        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt16Full(const char *pszValue, unsigned uBase, uint16_t *pu16);
+
+/**
+ * Converts a string representation of a number to a 16-bit unsigned number.
+ * The base is guessed.
+ *
+ * @returns 16-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param  pszValue    Pointer to the string value.
+ */
+RTDECL(uint16_t) RTStrToUInt16(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 8-bit unsigned number.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @param   pszValue    Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ *          If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu8         Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt8Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint8_t *pu8);
+
+/**
+ * Converts a string representation of a number to a 8-bit unsigned number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_TRAILING_CHARS
+ *
+ * @param   pszValue   Pointer to the string value.
+ * @param   uBase      The base of the representation used.
+ *                     If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu8        Where to store the converted number. (optional)
+ */
+ RTDECL(int) RTStrToUInt8Full(const char *pszValue, unsigned uBase, uint8_t *pu8);
+
+ /**
+ * Converts a string representation of a number to a 8-bit unsigned number.
+ * The base is guessed.
+ *
+ * @returns 8-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param   pszValue   Pointer to the string value.
+ */
+ RTDECL(uint8_t) RTStrToUInt8(const char *pszValue);
+
+ /**
+ * Converts a string representation of a number to a 64-bit signed number.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param   pszValue   Pointer to the string value.
+ * @param   ppszNext   Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase      The base of the representation used.
+ *                     If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pi64       Where to store the converted number. (optional)
+ */
+ RTDECL(int) RTStrToInt64Ex(const char *pszValue, char **ppszNext, unsigned uBase, int64_t *pi64);
+
+ /**
+ * Converts a string representation of a number to a 64-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VINF_SUCCESS
+ */

RTDECL(int) RTStrToInt64Full(const char *pszValue, unsigned uBase, int64_t *pi64);

Converts a string representation of a number to a 64-bit signed number.

Returns 64-bit signed number on success.

Returns 0 on failure.

@returns 64-bit signed number on success.

@returns 0 on failure.

@returns VWRN_NUMBER_TOO_BIG
@returns VWRN_TRAILING_CHARS
@returns VWRN_TRAILING_SPACES
@returns VINF_SUCCESS
@returns VERR_NO_DIGITS

@returns iprt status code.

Warnings are used to indicate conversion problems.

@returns VWRN_NUMBER_TOO_BIG
@returns VWRN_TRAILING_CHARS
@returns VWRN_TRAILING_SPACES
@returns VINF_SUCCESS
@returns VERR_NO_DIGITS

@returns iprt status code.

Warnings are used to indicate conversion problems.

@returns VWRN_NUMBER_TOO_BIG
@returns VINF_SUCCESS
+ @retval  VERR_TRAILING_CHARS
+ @retval  VERR_TRAILING_SPACES
+ @retval  VERR_NO_DIGITS
+ *
+ @param  pszValue  Pointer to the string value.
+ @param  uBase     The base of the representation used.
+ *     If 0 the function will look for known prefixes before defaulting to 10.
+ @param  pi32      Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt32Full(const char *pszValue, unsigned uBase, int32_t *pi32);
+
+/**
+ * Converts a string representation of a number to a 32-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 32-bit signed number on success.
+ * @returns 0 on failure.
+ * @param  pszValue  Pointer to the string value.
+ */
+RTDECL(int32_t) RTStrToInt32(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param  pszValue  Pointer to the string value.
+ * @param  ppszNext  Where to store the pointer to the first char following the number. (Optional)
+ * @param  uBase     The base of the representation used.
+ *     If 0 the function will look for known prefixes before defaulting to 10.
+ * @param  pi16      Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt16Ex(const char *pszValue, char **ppszNext, unsigned uBase, int16_t *pi16);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VINF_SUCCESS
/* @retval VERR_TRAILING_CHARS
   @retval VERR_TRAILING_SPACES
   @retval VERR_NO_DIGITS
   *
   * @param   pszValue    Pointer to the string value.
   * @param   uBase       The base of the representation used.
   *                     If 0 the function will look for known prefixes before defaulting to 10.
   * @param   pi16        Where to store the converted number. (optional)
   */
+RTDECL(int) RTStrToInt16Full(const char *pszValue, unsigned uBase, int16_t *pi16);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 16-bit signed number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(int16_t) RTStrToInt16(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 8-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_TRAILING_CHARS
+ * @retval VWRN_TRAILING_SPACES
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ * @param   pszValue    Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ *                     If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pi8         Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt8Ex(const char *pszValue, char **ppszNext, unsigned uBase, int8_t *pi8);
+
+/**
+ * Converts a string representation of a number to a 8-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VINF_SUCCESS
+ * @retval  VERR_TRAILING_CHARS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ *                     If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pi8         Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt8Full(const char *pszValue, unsigned uBase, int8_t *pi8);
+
+/
+* Converts a string representation of a number to a 8-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 8-bit signed number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(int8_t) RTStrToInt8(const char *pszValue);
+
+/
+* Formats a buffer stream as hex bytes.
+ *
+ * The default is no separating spaces or line breaks or anything.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_INVALID_POINTER if any of the pointers are wrong.
+ * @retval  VERR_BUFFER_OVERFLOW if the buffer is insufficient to hold the bytes.
+ *
+ * @param   pszBuf      Output string buffer.
+ * @param   cbBuf       The size of the output buffer.
+ * @param   pv          Pointer to the bytes to stringify.
+ * @param   cb          The number of bytes to stringify.
+ * @param   fFlags      Combination of RTSTRPRINTHEXBYTES_F_XXX values.
+ * @sa      RTUtf16PrintHexBytes.
+ */
+RTDECL(int) RTStrPrintHexBytes(char *pszBuf, size_t cbBuf, void const *pv, size_t cb, uint32_t fFlags);
+
+/
+* Upper case hex digits, the default is lower case. */
+#define RTSTRPRINTHEXBYTES_F_UPPER      RT_BIT(0)
+/* Add a space between each group. */
+#define RTSTRPRINTHEXBYTES_F_SEP_SPACE  RT_BIT(1)
+/* Add a colon between each group. */
+#define RTSTRPRINTHEXBYTES_F_SEP_COLON  RT_BIT(2)
+@} */
+

 */
 */ * Converts a string of hex bytes back into binary data. */
 */ */ * @returns IPRT status code. */
 */ * @retval  VERR_INVALID_POINTER if any of the pointers are wrong. */
 */ * @retval  VERR_BUFFER_OVERFLOW if the string contains too many hex bytes. */
 */ * @retval  VERR_BUFFER_UNDERFLOW if there aren't enough hex bytes to fill up */
 */ * the output buffer. */
 */ * @retval  VERR_UNEVEN_INPUT if the input contains a half byte. */
 */ * @retval  VERR_NO_DIGITS */
 */ * @retval  VWRN_TRAILING_CHARS */
 */ * @retval  VWRN_TRAILING_SPACES */
 */ */ */
 */ * @param   pszHex      The string containing the hex bytes. */
 */ * @param   pv          Output buffer. */
 */ * @param   cb          The size of the output buffer. */
 */ * @param   fFlags      Must be zero, reserved for future use. */
 */ */
 */ RTDECL(int) RTStrConvertHexBytes(char const *pszHex, void *pv, size_t cb, uint32_t fFlags);
 */
 */ */ @} */
 */
 */ */ @defgroup rt_str_space  Unique String Space */
 */ */ {
 */ */ @ { */
 */ */
 */ */ * Pointer to a string name space container node core. */
 */ */ typedef struct RTSTRSPACECORE *PRTSTRSPACECORE;
 */ */
 */ */ * Pointer to a pointer to a string name space container node core. */
 */ */ typedef PRTSTRSPACECORE *PPRTSTRSPACECORE;
 */ */
 */ */
 */ */ * String name space container node core. */
 */ */
 */ */ typedef struct RTSTRSPACECORE
 */ */ {
 */ */    /** Hash key. Don't touch. */
 */ */     uint32_t        Key;
 */ */    /** Pointer to the left leaf node. Don't touch. */
 */ */     PRTSTRSPACECORE pLeft;
 */ */    /** Pointer to the left right node. Don't touch. */
 */ */     PRTSTRSPACECORE pRight;
 */ */    /** Pointer to the list of string with the same key. Don't touch. */
 */ */     PRTSTRSPACECORE pList;
 */ */    /** Height of this tree: max(height(left), height(right)) + 1. Don't touch */
 */ /*     unsigned char    uchHeight;
 */ */    /** The string length. Read only! */
 */ */  }
+ size_t cchString;
+ /** Pointer to the string. Read only! */
+ const char *pszString;
+ } RTSTRSPACECORE;
+
+/** String space. (Initialize with NULL.) */
typedef PRTSTRSPACECORE RTSTRSPACE;
+/** Pointer to a string space. */
typedef PPRTSTRSPACECORE PRTSTRSPACE;
+
+/**
+ * Inserts a string into a unique string space.
+ *
+ * @returns true on success.
+ * @returns false if the string collided with an existing string.
+ * @param pStrSpace The space to insert it into.
+ * @param pStr The string node.
+ */
+RTDECL(bool) RTStrSpaceInsert(PRTSTRSPACE pStrSpace, PRTSTRSPACECORE pStr);
+
+/**
+ * Removes a string from a unique string space.
+ *
+ * @returns Pointer to the removed string node.
+ * @returns NULL if the string was not found in the string space.
+ * @param pStrSpace The space to remove it from.
+ * @param pszString The string to remove.
+ */
+RTDECL(PRTSTRSPACECORE) RTStrSpaceRemove(PRTSTRSPACE pStrSpace, const char *pszString);
+
+/**
+ * Gets a string from a unique string space.
+ *
+ * @returns Pointer to the string node.
+ * @returns NULL if the string was not found in the string space.
+ * @param pStrSpace The space to get it from.
+ * @param pszString The string to get.
+ */
+RTDECL(PRTSTRSPACECORE) RTStrSpaceGet(PRTSTRSPACE pStrSpace, const char *pszString);
/* @param cchMax The max string length to evaluate. Passing
  RTSTR_MAX is ok and makes it behave just like
  RTStrSpaceGet.
  */
RTDECL(PRTSTRSPACECORE) RTStrSpaceGetN(PRTSTRSPACE pStrSpace, const char *pszString, size_t
  cchMax);
+
+/**
+ * Callback function for RTStrSpaceEnumerate() and RTStrSpaceDestroy().
+ *
+ * @returns 0 on continue.
+ * @returns Non-zero to aborts the operation.
+ * @returns pStr The string node
+ * @returns pvUser The user specified argument.
+ */
typedef DECLCALLBACK( int ) FNRTSTRSPACECALLBACK(PRTSTRSPACECORE pStr, void *pvUser);
+/** Pointer to callback function for RTStrSpaceEnumerate() and RTStrSpaceDestroy(). */
typedef FNRTSTRSPACECALLBACK *PFNRTSTRSPACECALLBACK;
+
+/**
+ * Destroys the string space.
+ *
+ * The caller supplies a callback which will be called for each of the string
+ * nodes in for freeing their memory and other resources.
+ *
+ * @returns 0 or what ever non-zero return value pfnCallback returned
+ * when aborting the destruction.
+ * @param pStrSpace The space to destroy.
+ * @param pfnCallback The callback.
+ * @param pvUser The user argument.
+ */
RTDECL(int) RTStrSpaceDestroy(PRTSTRSPACE pStrSpace, PFNRTSTRSPACECALLBACK pfnCallback,
  void *pvUser);
+
+/**
+ * Enumerates the string space.
+ * The caller supplies a callback which will be called for each of
+ * the string nodes.
+ *
+ * @returns 0 or what ever non-zero return value pfnCallback returned
+ * when aborting the destruction.
+ * @param pStrSpace The space to enumerate.
+ * @param pfnCallback The callback.
+ * @param pvUser The user argument.
+ */
RTDECL(int) RTStrSpaceEnumerate(PRTSTRSPACE pStrSpace, PFNRTSTRSPACECALLBACK pfnCallback,
  void *pvUser);
/** @} */

/**
 * @{

/** Sting hashing
 *
 * Hashes the given string using algorithm \#1.
 *
 * @returns String hash.
 * @param   pszString       The string to hash.
 */

RTDECL(uint32_t) RTStrHash1(const char *pszString);

/**
 * Hashes the given string using algorithm \#1.
 *
 * @returns String hash.
 * @param   pszString       The string to hash.
 * @param   cchString       The max length to hash. Hashing will stop if the
 *                         terminator character is encountered first. Passing
 *                         RTSTR_MAX is fine.
 */

RTDECL(uint32_t) RTStrHash1N(const char *pszString, size_t cchString);

/** Hashes the given strings as if they were concatenated using algorithm \#1.
 *
 * @returns String hash.
 * @param   cPairs          The number of string / length pairs in the
 *                         ellipsis.
 * @param   ...             List of string (const char *) and length
 *                         (size_t) pairs. Passing RTSTR_MAX as the size is
 *                         fine.
 */

RTDECL(uint32_t) RTStrHash1ExN(size_t cPairs, ...);

/** Hashes the given strings as if they were concatenated using algorithm \#1.
 *
 * @returns String hash.
 * @param   cPairs          The number of string / length pairs in the @a va.
 * @param   va              List of string (const char *) and length
 *                         (size_t) pairs. Passing RTSTR_MAX as the size is
 *                         fine.
 */

RTDECL(uint32_t) RTStrHash1ExNV(size_t cPairs, va_list va);
/** @} */
+
+/** @} */
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/thread.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/thread.h
@@ -0,0 +1,943 @@
+/** @file
+ * IPRT - Threads.
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+
+/ * This file is part of VirtualBox Open Source Edition (OSE), as
+/ * available from http://www.virtualbox.org. This file is free software;
+/ * you can redistribute it and/or modify it under the terms of the GNU
+/ * General Public License (GPL) as published by the Free Software
+/ * Foundation, in version 2 as it comes in the "COPYING" file of the
+/ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+/ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+/ */
+
+/ * The contents of this file may alternatively be used under the terms
+/ * of the Common Development and Distribution License Version 1.0
+/ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+/ * VirtualBox OSE distribution, in which case the provisions of the
+/ * CDDL are applicable instead of those of the GPL.
+/ */
+
+/ * You may elect to license modified versions of this file under the
+/ * terms and conditions of either the GPL or the CDDL or both.
+/ */
+
+  
+#ifndef ___iprt_thread_h
+  
define ___iprt_thread_h
+
+include <iprt/cdefs.h>
+include <iprt/types.h>
+include <iprt/stdarg.h>
+
+RT_C_DECLS_BEGIN
+
+/** @defgroup grp_rt_thread   RTThread - Thread Management
+ * @ingroup grp_rt
typedef enum RTTHREADSTATE 
{ 
    /** The usual invalid 0 value. */
    RTTHREADSTATE_INVALID = 0,
    /** The thread is being initialized. */
    RTTHREADSTATE_INITIALIZING,
    /** The thread has terminated */
    RTTHREADSTATE_TERMINATED,
    /** Probably running. */
    RTTHREADSTATE_RUNNING,
    /** Waiting on a critical section. */
    RTTHREADSTATE_CRITSECT,
    /** Waiting on a event semaphore. */
    RTTHREADSTATE_EVENT,
    /** Waiting on a event multiple wakeup semaphore. */
    RTTHREADSTATE_EVENT_MULTI,
    /** Waiting on a fast mutex. */
    RTTHREADSTATE_FAST_MUTEX,
    /** Waiting on a mutex. */
    RTTHREADSTATE_MUTEX,
    /** Waiting on a read write semaphore, read (shared) access. */
    RTTHREADSTATE_RW_READ,
    /** Waiting on a read write semaphore, write (exclusive) access. */
    RTTHREADSTATE_RW_WRITE,
    /** The thread is sleeping. */
    RTTHREADSTATE_SLEEP,
    /** Waiting on a spin mutex. */
    RTTHREADSTATE_SPIN_MUTEX,
    /** End of the thread states. */
    RTTHREADSTATE_END,
    /** The usual 32-bit size hack. */
    RTTHREADSTATE_32BIT_HACK = 0x7fffffff
} RTTHREADSTATE;

/** Checks if a thread state indicates that the thread is sleeping. */
#define RTTHREAD_IS_SLEEPING(enmState) ((enmState) >= RTTHREADSTATE_CRITSECT)

/** Thread types. Besides identifying the purpose of the thread, the thread type is
+ * used to select the scheduling properties.
+ *
+ * The types in are placed in a rough order of ascending priority.
+ */
+ typedef enum RTTHREADTYPE
+ {
+     /** Invalid type. */
+     RTTHREADTYPE_INVALID = 0,
+     /** Infrequent poller thread.
+     * This type of thread will sleep for the most of the time, and do
+     * infrequent polls on resources at 0.5 sec or higher intervals.
+     */
+     RTTHREADTYPE_INFREQUENT_POLLER,
+     /** Main heavy worker thread.
+     * Thread of this type is driving asynchronous tasks in the Main
+     * API which takes a long time and might involve a bit of CPU. Like
+     * for instance creating a fixed sized VDI.
+     */
+     RTTHREADTYPE_MAIN_HEAVY_WORKER,
+     /** The emulation thread type.
+     * While being a thread with very high workload it still is vital
+     * that it gets scheduled frequently. When possible all other thread
+     * types except DEFAULT and GUI should interrupt this one ASAP when
+     * they become ready.
+     */
+     RTTHREADTYPE_EMULATION,
+     /** The default thread type.
+     * Since it doesn't say much about the purpose of the thread
+     * nothing special is normally done to the scheduling. This type
+     * should be avoided.
+     * The main thread is registered with default type during RTR3Init()
+     * and that's what the default process priority is derived from.
+     */
+     RTTHREADTYPE_DEFAULT,
+     /** The GUI thread type
+     * The GUI normally have a low workload but is frequently scheduled
+     * to handle events. When possible the scheduler should not leave
+     * threads of this kind waiting for too long (~50ms).
+     */
+     RTTHREADTYPE_GUI,
+     /** Main worker thread.
+     * Thread of this type is driving asynchronous tasks in the Main API.
+     * In most cases this means little work an a lot of waiting.
+     */
+     RTTHREADTYPE_MAIN_WORKER,
+     /** VRDP I/O thread.
+     * These threads are I/O threads in the RDP server will hang around
+     * waiting for data, process it and pass it on.
+ */
+ */
+ RTTHREADTYPE_VRDP_IO,
+ /** The debugger type.
+ * Threads involved in servicing the debugger. It must remain
+ * responsive even when things are running wild in.
+ */
+ RTTHREADTYPE_DEBUGGER,
+ /** Message pump thread.
+ * Thread pumping messages from one thread/process to another
+ * thread/process. The workload is very small, most of the time
+ * it's blocked waiting for messages to be produced or processed.
+ * This type of thread will be favored after I/O threads.
+ */
+ RTTHREADTYPE_MSG_PUMP,
+ /** The I/O thread type.
+ * Doing I/O means shuffling data, waiting for request to arrive and
+ * for them to complete. The thread should be favored when competing
+ * with any other threads except timer threads.
+ */
+ RTTHREADTYPE_IO,
+ /** The timer thread type.
+ * A timer thread is mostly waiting for the timer to tick
+ * and then perform a little bit of work. Accuracy is important here,
+ * so the thread should be favoured over all threads. If premention can
+ * be configured at thread level, it could be made very short.
+ */
+ RTTHREADTYPE_TIMER,
+ /** Only used for validation. */
+ RTTHREADTYPE_END
+ } RTTHREADTYPE;
+
+ #ifndef IN_RC
+
+ /**
+ * Checks if the IPRT thread component has been initialized.
+ * This is used to avoid calling into RTThread before the runtime has been
+ * initialized.
+ *
+ @returns @c true if it's initialized, @c false if not.
+ */
+ RTDECL(bool) RTThreadIsInitialized(void);
+
+ /**
+ * Get the thread handle of the current thread.
+ *
+ @returns Thread handle.
+ */
+ */
+RTDECL(RTTHREAD) RTThreadSelf(void);
+
+/**
+ * Get the native thread handle of the current thread.
+ *
+ * @returns Native thread handle.
+ */
+RTDECL(RTNATIVETHREAD) RTThreadNativeSelf(void);
+
+/**
+ * Millisecond granular sleep function.
+ *
+ * @returns VINF_SUCCESS on success.
+ * @returns VERR_INTERRUPTED if a signal or other asynchronous stuff happened
+ * which interrupt the peaceful sleep.
+ * @param cMillies Number of milliseconds to sleep.
+ * 0 milliseconds means yielding the timeslice - deprecated!
+ * @remark See RTThreadNanoSleep() for sleeping for smaller periods of time.
+ */
+RTDECL(int) RTThreadSleep(RTMSINTERVAL cMillies);
+
+/**
+ * Millisecond granular sleep function, no logger calls.
+ *
+ * Same as RTThreadSleep, except it will never call into the IPRT logger. It
+ * can therefore safely be used in places where the logger is off limits, like
+ * at termination or init time. The electric fence heap is one consumer of
+ * this API.
+ *
+ * @returns VINF_SUCCESS on success.
+ * @returns VERR_INTERRUPTED if a signal or other asynchronous stuff happened
+ * which interrupt the peaceful sleep.
+ * @param cMillies Number of milliseconds to sleep.
+ * 0 milliseconds means yielding the timeslice - deprecated!
+ */
+RTDECL(int) RTThreadSleepNoLog(RTMSINTERVAL cMillies);
+
+/**
+ * Yields the CPU.
+ *
+ * @returns true if we yielded.
+ * @returns false if it's probable that we didn't yield.
+ */
+RTDECL(bool) RTThreadYield(void);
+
/**
 * Thread function.
 *
 * @returns 0 on success.
 * @param   ThreadSelf  Thread handle to this thread.
 * @param   pvUser      User argument.
 * @*/
typedef DECLCALLBACK(int) FNRTTHREAD(RTTHREAD ThreadSelf, void *pvUser);
/** Pointer to a FNRTTHREAD(). */
typedef FNRTTHREAD *PFNRTTHREAD;

/**
 * Thread creation flags.
 * @*/
typedef enum RTTHREADFLAGS
{
    /** This flag is used to keep the thread structure around so it can
     * be waited on after termination.  @sa RTThreadWait and
     * RTThreadWaitNoResume. Not required for RTThreadUserWait and friends!
     */
    RTTHREADFLAGS_WAITABLE = RT_BIT(0),
    /** The bit number corresponding to the RTTHREADFLAGS_WAITABLE mask. */
    RTTHREADFLAGS_WAITABLE_BIT = 0,

    /** Mask of valid flags, use for validation. */
    RTTHREADFLAGS_MASK = RT_BIT(0)
} RTTHREADFLAGS;

/**
 * Create a new thread.
 *
 * @returns iprt status code.
 * @param   pThread     Where to store the thread handle to the new thread. (optional)
 * @param   pfnThread   The thread function.
 * @param   pvUser      User argument.
 * @param   cbStack     The size of the stack for the new thread.
 *                      Use 0 for the default stack size.
 * @param   enmType     The thread type. Used for deciding scheduling attributes
 *                      of the thread.
 * @param   fFlags      Flags of the RTTHREADFLAGS type (ORed together).
 * @param   pszName     Thread name.
 * @*/
RTDECL(int) RTThreadCreate(PRTTHREAD pThread, PFNRTTHREAD pfnThread, void *pvUser, size_t cbStack,
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+ RTTHREADTYPE enmType, unsigned fFlags, const char *pszName);
+ #ifndef RT_OS_LINUX /* XXX crashes genksyms at least on 32-bit Linux hosts */
+ /** @copydoc RTThreadCreate */
+ typedef DECLCALLBACKPTR(int, PFNRTTHREADCREATE)(PRTTHREAD pThread, PFNRTTHREAD pfnThread, void *pvUser, size_t cbStack,
+ RTTHREADTYPE enmType, unsigned fFlags, const char *pszName);
+ #endif
+ +/**
+ * Create a new thread.
+ *
+ * Same as RTThreadCreate except the name is given in the RTStrPrintfV form.
+ *
+ * @returns iprt status code.
+ * @param   pThread     See RTThreadCreate.
+ * @param   pfnThread   See RTThreadCreate.
+ * @param   pvUser      See RTThreadCreate.
+ * @param   cbStack     See RTThreadCreate.
+ * @param   enmType     See RTThreadCreate.
+ * @param   fFlags      See RTThreadCreate.
+ * @param   pszName     Thread name format.
+ * @param   va          Format arguments.
+ */
+RTDECL(int) RTThreadCreateV(PRTTHREAD pThread, PFNRTTHREAD pfnThread, void *pvUser, size_t cbStack,
+ RTTHREADTYPE enmType, uint32_t fFlags, const char *pszNameFmt, va_list va)
+RT_IPRT_FORMAT_ATTR(7, 0);
+
+/**
+ * Create a new thread.
+ *
+ * Same as RTThreadCreate except the name is given in the RTStrPrintf form.
+ *
+ * @returns iprt status code.
+ * @param   pThread     See RTThreadCreate.
+ * @param   pfnThread   See RTThreadCreate.
+ * @param   pvUser      See RTThreadCreate.
+ * @param   cbStack     See RTThreadCreate.
+ * @param   enmType     See RTThreadCreate.
+ * @param   fFlags      See RTThreadCreate.
+ * @param   pszName     Thread name format.
+ * @param   ...         Format arguments.
+ */
+RTDECL(int) RTThreadCreateF(PRTTHREAD pThread, PFNRTTHREAD pfnThread, void *pvUser, size_t cbStack,
+ RTTHREADTYPE enmType, uint32_t fFlags, const char *pszNameFmt, va_list va)
+RT_IPRT_FORMAT_ATTR(7, 8);
/**
 * Gets the native thread id of a IPRT thread.
 * @returns The native thread id.
 * @param   Thread   The IPRT thread.
 */
RTDECL(RTNATIVETHREAD) RTThreadGetNative(RTTHREAD Thread);

/**
 * Gets the IPRT thread of a native thread.
 * @returns The IPRT thread handle
 * @returns NIL_RTTHREAD if not a thread known to IPRT.
 * @param   NativeThread        The native thread handle/id.
 */
RTDECL(RTTHREAD) RTThreadFromNative(RTNATIVETHREAD NativeThread);

/**
 * Changes the type of the specified thread.
 * @returns iprt status code.
 * @param   Thread   The thread which type should be changed.
 * @param   enmType   The new thread type.
 * @remark  In Ring-0 it only works if Thread == RTThreadSelf().
 */
RTDECL(int) RTThreadSetType(RTTHREAD Thread, RTTHREADTYPE enmType);

/**
 * Wait for the thread to terminate, resume on interruption.
 * @returns     iprt status code.
 *              Will not return VERR_INTERRUPTED.
 * @param       Thread          The thread to wait for.
 * @param       cMillies        The number of milliseconds to wait. Use RT_INDEFINITE_WAIT for
 *                              an indefinite wait.
 * @param       prc             Where to store the return code of the thread. Optional.
 */
RTDECL(int) RTThreadWait(RTTHREAD Thread, RTMSINTERVAL cMillies, int *prc);

/**
 * Wait for the thread to terminate, return on interruption.
 * @returns     iprt status code.
 * @param       Thread          The thread to wait for.
 * @param       cMillies        The number of milliseconds to wait. Use RT_INDEFINITE_WAIT for
 *                              an indefinite wait.
 * @param       prc             Where to store the return code of the thread. Optional.
 */
```c
+ /**
+ RTDECL(int) RTThreadWaitNoResume(RTTHREAD Thread, RTMSINTERVAL cMillies, int *prc);
+ */
+ /**
+ * Gets the name of the current thread thread.
+ *
+ * @returns Pointer to readonly name string.
+ * @returns NULL on failure.
+ */
+ RTDECL(const char *) RTThreadSelfName(void);
+ */
+ /**
+ * Gets the name of a thread.
+ *
+ * @returns Pointer to readonly name string.
+ * @returns NULL on failure.
+ * @param Thread Thread handle of the thread to query the name of.
+ */
+ RTDECL(const char *) RTThreadGetName(RTTHREAD Thread);
+ */
+ /**
+ * Gets the type of the specified thread.
+ *
+ * @returns The thread type.
+ * @returns RTTHREADTYPE_INVALID if the thread handle is invalid.
+ * @param Thread The thread in question.
+ */
+ RTDECL(RTTHREADTYPE) RTThreadGetType(RTTHREAD Thread);
+ */
+ /**
+ * Sets the name of a thread.
+ *
+ * @returns iprt status code.
+ * @param Thread Thread handle of the thread to query the name of.
+ * @param pszName The thread name.
+ */
+ RTDECL(int) RTThreadSetName(RTTHREAD Thread, const char *pszName);
+ */
+ /**
+ * Checks if the specified thread is the main thread.
+ *
+ * @returns true if it is, false if it isn't.
+ * @param hThread The thread handle.
+ */
+ RTDECL(bool) RTThreadIsMain(RTTHREAD hThread);
+ */
+ /**
```
+ * Checks if the calling thread is known to IPRT.
+ *
+ * @returns @c true if it is, @c false if it isn't.
+ */
+RTDECL(bool) RTThreadIsSelfKnown(void);
+
+/**
+ * Checks if the calling thread is know to IPRT and is alive.
+ *
+ * @returns @c true if it is, @c false if it isn't.
+ */
+RTDECL(bool) RTThreadIsSelfAlive(void);
+
+/**
+ * Checks if the calling thread is known to IPRT.
+ *
+ * @returns @c true if it is, @c false if it isn't.
+ */
+RTDECL(bool) RTThreadIsOperational(void);
+
+/**
+ * Signal the user event.
+ *
+ * @returns iprt status code.
+ */
+RTDECL(int) RTThreadUserSignal(RTTHREAD Thread);
+
+/**
+ * Wait for the user event.
+ *
+ * @returns iprt status code.
+ * @param Thread The thread to wait for.
+ * @param cMillis The number of milliseconds to wait. Use RT_INDEFINITE_WAIT for an indefinite wait.
+ */
+RTDECL(int) RTThreadUserWait(RTTHREAD Thread, RTMSINTERVAL cMillis);
+
+/**
+ * Wait for the user event, return on interruption.
+ *
+ * @returns iprt status code.
+ * @param Thread The thread to wait for.
+ * @param cMillis The number of milliseconds to wait. Use RT_INDEFINITE_WAIT for an indefinite wait.
+ */
+RTDECL(int) RTThreadUserWaitNoResume(RTTHREAD Thread, RTMSINTERVAL cMillis);
Reset the user event.

RTDECL(int) RTThreadUserReset(RTTHREAD Thread);
+
+/**
+ * Pokes the thread.
+ *
+ * This will signal the thread, attempting to interrupt whatever it's currently
+ * doing. This is *NOT* implemented on all platforms and may cause unresolved
+ * symbols during linking or VERR_NOT_IMPLEMENTED at runtime.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   hThread             The thread to poke. This must not be the
+ *                              calling thread.
+ */
RTDECL(int) RTThreadPoke(RTTHREAD hThread);
+
#if defined(IN_RING0)
+
+/**
+ * Check if preemption is currently enabled or not for the current thread.
+ *
+ * This may return true even on systems where preemption isn't
+ * possible. In that case, it means no call to RTThreadPreemptDisable
+ * has been made and interrupts are still enabled.
+ *
+ * @returns true if preemption is enabled, false if preemption is disabled.
+ *
+ * @param   hThread             Must be NIL_RTTHREAD for now.
+ */
RTDECL(bool) RTThreadPreemptIsEnabled(RTTHREAD hThread);
+
+/**
+ * Check if preemption is pending for the current thread.
+ *
+ * This function should be called regularly when executing larger portions of
+ * code with preemption disabled.
+ *
+ * @returns true if pending, false if not.
+ *
+ * @param   hThread             Must be NIL_RTTHREAD for now.
+ */
RTDECL(bool) RTThreadPreemptIsPending(RTTHREAD hThread);
+
+/**
+ * Is RTThreadPreemptIsPending reliable?
@returns true if reliable, false if not.

/**
 * Is preemption possible on this system.
 * @returns true if possible, false if not.
 */

 RTDECL(bool) RTThreadPreemptIsPossible(void);

 /**
 * Preemption state saved by RTThreadPreemptDisable and used by
 * RTThreadPreemptRestore to restore the previous state.
 */

 typedef struct RTTHREADPREEMPTSTATE
 {
  /** In debug builds this will be used to check for cpu migration. */
  RTCPUID       idCpu;
  #ifdef RT_OS_WINDOWS
   /** The old IRQL. Don't touch! */
   unsigned char   uchOldIrql;
   /** Reserved. MBZ. */
   uint8_t         bReserved1;
   /** Reserved. MBZ. */
   uint8_t         bReserved2;
   /** Reserved. MBZ. */
   uint8_t         bReserved3;
  #endif
  #ifdef RT_OS_HAIKU
    /** The cpu_state. Don't touch! */
    uint32_t        uOldCpuState;
  #else
    /** Reserved. MBZ. */
    uint32_t        u32Reserved;
  #endif
  #define RTTHREADPREEMPTSTATE_INITIALIZER { NIL_RTCPUID, 255, 0, 0, 0 }
  
  #ifdef RT_OS_SOLARIS
    /** The Old PIL. Don't touch! */
    uint32_t        uOldPil;
  #else
    /** Reserved. MBZ. */
    uint32_t        u32Reserved;
  #endif
  #define RTTHREADPREEMPTSTATE_INITIALIZER { NIL_RTCPUID, UINT32_MAX }

  #ifdef RT_OS_SOLARIS
    /** The Old PIL. Don't touch! */
    uint32_t        uOldPil;
  #else
    /** Reserved. MBZ. */
    uint32_t        u32Reserved;
  #endif
  
  #define RTTHREADPREEMPTSTATE_INITIALIZER { NIL_RTCPUID, 0 }
  
  #ifdef RT_OS_HAIKU
    /** The cpu_state. Don't touch! */
    uint32_t        uOldCpuState;
  #else
    /** Reserved. MBZ. */
    uint32_t        u32Reserved;
  #endif
  
  #define RTTHREADPREEMPTSTATE_INITIALIZER { NIL_RTCPUID, 0 }

  #ifdef RT_OS_SOLARIS
    /** The Old PIL. Don't touch! */
    uint32_t        uOldPil;
  #else
    /** Reserved. MBZ. */
    uint32_t        u32Reserved;
  #endif

  #define RTTHREADPREEMPTSTATE_INITIALIZER { NIL_RTCPUID, UINT32_MAX }

  #endif
  
  #endif

  /** Pointer to a preemption state. */
  typedef RTTHREADPREEMPTSTATE *PRTTHREADPREEMPTSTATE;

  /**
   * Pointer to a preemption state.
   */
  typedef RTTHREADPREEMPTSTATE *PRTTHREADPREEMPTSTATE;
  
 + /**
   +*/

+ * Disable preemption.
+ *
+ * A call to this function must be matched by exactly one call to
+ * RTThreadPreemptRestore().
+ *
+ * @param   pState              Where to store the preemption state.
+ */
+RTDECL(void) RTThreadPreemptDisable(PRTTHREADPREEMPTSTATE pState);
+
+/**
+ * Restores the preemption state, undoing a previous call to
+ * RTThreadPreemptDisable.
+ *
+ * A call to this function must be matching a previous call to
+ * RTThreadPreemptDisable.
+ *
+ * @param  pState               The state return by RTThreadPreemptDisable.
+ */
+RTDECL(void) RTThreadPreemptRestore(PRTTHREADPREEMPTSTATE pState);
+
+/**
+ * Check if the thread is executing in interrupt context.
+ *
+ * @returns true if in interrupt context, false if not.
+ * @param       hThread         Must be NIL_RTTHREAD for now.
+ */
+RTDECL(bool) RTThreadIsInInterrupt(RTTHREAD hThread);
+
+/**
+ * Thread context switching events.
+ */
+typedef enum RTTHREADCTXEVENT
+{
+    /** This thread is being scheduled out on the current CPU (includes preemption,
+     * waiting, sleep and whatever else may trigger scheduling). */
+    RTTHREADCTXEVENT_OUT = 0,
+    /** This thread is being scheduled in on the current CPU and will resume
+     * execution. */
+    RTTHREADCTXEVENT_IN,
+    /** The usual 32-bit size hack. */
+    RTTHREADCTXEVENT_32BIT_HACK = 0x7fffffff
+} RTTHREADCTXEVENT;
+
+/**
+ * Thread context switching hook callback.
+ *
+ * This hook function is called when a thread is scheduled and preempted. Check
+ @a enmEvent to see which it is. Since the function is being called from
+ hooks inside the scheduler, it is limited what you can do from this function.
+ Do NOT acquire locks, sleep or yield the thread for instance. IRQ safe
+ spinlocks are fine though.
+ *
+ @returns IPRT status code.
+ @param   enmEvent   The thread-context event. Please quietly ignore unknown
+ events, we may add more (thread exit, ++) later.
+ @param   pvUser     User argument.
+ */
typedef DECLCALLBACK(void) FNRTTHREADCTXHOOK(RTTHREADCTXEVENT enmEvent, void *
*pvUser);
+/** Pointer to a context switching hook. */
typedef FNRTTHREADCTXHOOK *PFNRTTHREADCTXHOOK;
+
+/**
+ * Initializes a thread context switching hook for the current thread.
+ *
+ * The hook is created as disabled, use RTThreadCtxHookEnable to enable it.
+ *
+ @returns IPRT status code.
+ @param   phCtxHook   Where to store the hook handle.
+ @param   fFlags      Reserved for future extensions, must be zero.
+ @param   pfnCallback Pointer to a the hook function (callback) that
+ * should be called for all context switching events
+ * involving the current thread.
+ @param   pvUser      User argument that will be passed to @a pfnCallback.
+ @returns IPRT status code.
+ @param   hCtxHook    The context hook handle. NIL_RTTHREADCTXHOOK is
+ ignored and the function will return VINF_SUCCESS.
+ @remarks Preemption must be enabled.
+ */
+RTDECL(int) RTThreadCtxHookCreate(PRTTHREADCTXHOOK phCtxHook, uint32_t fFlags,
*PFNRTTHREADCTXHOOK pfnCallback, void *pvUser);
+
+/**
+ * Destroys a thread context switching hook.
+ *
+ * Caller must make sure the hook is disabled before the final reference is
+ * released. Recommended to call this on the owning thread, otherwise the
+ * memory backing it may on some systems only be released when the thread
+ * terminates.
+ *
+ @returns IPRT status code.
+ @param   hCtxHook    The context hook handle. NIL_RTTHREADCTXHOOK is
+ ignored and the function will return VINF_SUCCESS.
+ @remarks Preemption must be enabled.
+ @remarks Do not call from FNRTTHREADCTXHOOK.
+ */
+RTDECL(int) RTThreadCtxHookDestroy(RTTHREADCTXHOOK hCtxHook);
/* Enables the context switching hooks for the current thread. */
RTDECL(int) RTThreadCtxHookEnable(RTTHREADCTXHOOK hCtxHook);

/* Disables the thread context switching hook for the current thread. */
RTDECL(int) RTThreadCtxHookDisable(RTTHREADCTXHOOK hCtxHook);

/* Is the thread context switching hook enabled? */
RTDECL(bool) RTThreadCtxHookIsEnabled(RTTHREADCTXHOOK hCtxHook);

/* Adopts a non-IPRT thread. */
RTDECL(int) RTAdoptNonIPRTThread(RTTHREADFLAGS enmType, RTTHREADFLAGS fFlags, const char *pszName, RTTHREAD **pThread);

# ifdef IN_RING3
/**
 * Adopts a non-IPRT thread.
 * @returns IPRT status code.
 * @param   enmType         The thread type.
 * @param   fFlags          The thread flags. RTTHREADFLAGS_WAITABLE is not currently allowed.
 * @param   pszName         The thread name. Optional
 * @param   pThread         Where to store the thread handle. Optional.
 */
RTDECL(int) RTAdoptNonIPRTThread(RTTHREADFLAGS enmType, RTTHREADFLAGS fFlags, const char *pszName, RTTHREAD **pThread);
#endif /* IN_RING3 */

#endif /* IN_RING0 */
+ */
+RTDECL(int) RTThreadAdopt(RTTHREADTYPE enmType, unsigned fFlags, const char *pszName, PRTTHREAD pThread);
+
+/**
+ * Get the thread handle of the current thread, automatically adopting alien
+ * threads.
+ *
+ * @returns Thread handle.
+ */
+RTDECL(RTTHREAD) RTThreadSelfAutoAdopt(void);
+
+/**
+ * Gets the affinity mask of the current thread.
+ *
+ * @returns IPRT status code.
+ * @param pCpuSet Where to return the CPU affinity set of the calling
+ * thread.
+ */
+RTR3DECL(int) RTThreadGetAffinity(PRTCPUSET pCpuSet);
+
+/**
+ * Sets the affinity mask of the current thread.
+ *
+ * @returns iprt status code.
+ * @param pCpuSet The set of CPUs this thread can run on. NULL means
+ * all CPUs.
+ */
+RTR3DECL(int) RTThreadSetAffinity(PCRTCPUSET pCpuSet);
+
+/**
+ * Binds the thread to one specific CPU.
+ *
+ * @returns iprt status code.
+ * @param idCpu The ID of the CPU to bind this thread to. Use
+ * NIL_RTCPUID to unbind it.
+ */
+RTR3DECL(int) RTThreadSetAffinityToCpu(RTCPUID idCpu);
+
+/**
+ * Unblocks a thread.
+ *
+ * This function is paired with RTThreadBlocking and RTThreadBlockingDebug.
+ *
+ * @param hThread The current thread.
+ * @param enmCurState The current state, used to check for nested blocking.
+ * The new state will be running.
+ */
+RTDECL(void) RTThreadUnblocked(RTTHREAD hThread, RTTHREADSTATE enmCurState);
+/**
+ * Change the thread state to blocking.
+ *
+ * @param   hThread         The current thread.
+ * @param   enmState        The sleep state.
+ * @param   fReallySleeping Really going to sleep now. Use false before calls
+ *                          to other IPRT synchronization methods.
+ */
+RTDECL(void) RTThreadBlocking(RTTHREAD hThread, RTTHREADSTATE enmState, bool fReallySleeping);
+/**
+ * Get the current thread state.
+ *
+ * A thread that is reported as sleeping may actually still be running inside
+ * the lock validator or/and in the code of some other IPRT synchronization
+ * primitive. Use RTThreadGetReallySleeping
+ *
+ * @returns The thread state.
+ */
+RTDECL(RTTHREADSTATE) RTThreadGetState(RTTHREAD hThread);
+/**
+ * Checks if the thread is really sleeping or not.
+ *
+ * @returns RTTHREADSTATE_RUNNING if not really sleeping, otherwise the state it
+ *          is sleeping in.
+ */
+RTDECL(RTTHREADSTATE) RTThreadGetReallySleeping(RTTHREAD hThread);
+/**
+ * Translate a thread state into a string.
+ *
+ * @returns Pointer to a read-only string containing the state name.
+ */
+RTDECL(const char *) RTThreadStateName(RTTHREADSTATE enmState);
+/**
+ * Native thread states returned by RTThreadNativeState.
+ */
+typedef enum RTTHREADNATIVESTATE
+{ /* Invalid thread handle. */
+ RTTHREADNATIVESTATE_INVALID = 0,
+ /** Unable to determine the thread state. */
+ RTTHREADNATIVESTATE_UNKNOWN,
+ /** The thread is running. */
+ RTTHREADNATIVESTATE_RUNNING,
+ /** The thread is blocked. */
+ RTTHREADNATIVESTATE_BLOCKED,
+ /** The thread is suspended/stopped. */
+ RTTHREADNATIVESTATE_SUSPENDED,
+ /** The thread has terminated. */
+ RTTHREADNATIVESTATE_TERMINATED,
+ /** Make sure it’s a 32-bit type. */
+ RTTHREADNATIVESTATE_32BIT_HACK = 0x7fffffff
+ } RTTHREADNATIVESTATE;
+
+ /*
+ * Get the native state of a thread.
+ *
+ * @returns Native state.
+ * @param   hThread             The thread handle.
+ *
+ * @remarks Not yet implemented on all systems, so have a backup plan for
+ *          RTTHREADNATIVESTATE_UNKNOWN.
+ */
+ RTDECL(RTTHREADNATIVESTATE) RTThreadGetNativeState(RTTHREAD hThread);
+
+ /**
+ * Get the execution times of the specified thread
+ *
+ * @returns IPRT status code.
+ * @param   pKernelTime         Kernel execution time in ms (out)
+ * @param   pUserTime           User execution time in ms (out)
+ *
+ */
+ RTR3DECL(int) RTThreadGetExecutionTimeMilli(uint64_t *pKernelTime, uint64_t *pUserTime);
+
+ /** @name Thread Local Storage
+ * @{
+ *
+ * Thread termination callback for destroying a non-zero TLS entry.
+ *
+ * @remarks It is not permitable to use any RTTls APIs at this time. Doing so
+ * may lead to endless loops, crashes, and other bad stuff.
+ *
+ * @param   pvValue     The current value.
+ *
+ * @} */
+ */
+ /*
+ * Thread termination callback for destroying a non-zero TLS entry.
+ *
+ * @remarks It is not permitable to use any RTTls APIs at this time. Doing so
+ * may lead to endless loops, crashes, and other bad stuff.
+ *
+ * @param   pvValue     The current value.
typedef DECLCALLBACK(void) FNRTTLSDTOR(void *pvValue);
/** Pointer to a FNRTTLSDTOR. */
typedef FNRTTLSDTOR *PFNRTTLSDTOR;

/** Allocates a TLS entry (index). */

* Example code:
+ @code
+ RTTLS g_iTls = NIL_RTTLS;
+
+ RTTlsSet(g_iTls, pMyData);
+
+ PMYDATA pMyData = (PMYDATA)RTTlsGet(g_iTls);
+
+ @endcode
*
* @returns the index of the allocated TLS entry.
* @returns NIL_RTTLS on failure.
+*/
+RTR3DECL(RTTLS) RTTlsAlloc(void);

/** Variant of RTTlsAlloc that returns a status code. */
* @returns IPRT status code.
* @retval VERR_NOT_SUPPORTED if pfnDestructor is non-NULL and the platform doesn't support this feature.
+*/
+RTR3DECL(int) RTTlsAllocEx(PRTTLS piTls, PFNRTTLSDTOR pfnDestructor);
/**
 * Frees a TLS entry.
 *
 * @returns IPRT status code.
 * @param   iTls        The index of the TLS entry.
 */
RTR3DECL(int) RTTlsFree(RTTLS iTls);

/**
 * Get the (thread-local) value stored in a TLS entry.
 *
 * @returns value in given TLS entry.
 * @retval  NULL if RTTlsSet() has not yet been called on this thread, or if the
 *         TLS index is invalid.
 *
 * @param   iTls        The index of the TLS entry.
 */
RTR3DECL(void *) RTTlsGet(RTTLS iTls);

/**
 * Get the value stored in a TLS entry.
 *
 * @returns IPRT status code.
 * @param   iTls        The index of the TLS entry.
 * @param   ppvValue    Where to store the value. The value will be NULL if
 *                      RTTlsSet has not yet been called on this thread.
 */
RTR3DECL(int) RTTlsGetEx(RTTLS iTls, void **ppvValue);

/**
 * Set the value stored in an allocated TLS entry.
 *
 * @returns IPRT status.
 * @param   iTls        The index of the TLS entry.
 * @param   pvValue     The value to store.
 *
 * @remarks Note that NULL is considered a special value.
 */
RTR3DECL(int) RTTlsSet(RTTLS iTls, void *pvValue);

/** @} */

# endif /* IN_RING3 */
# endif /* !IN_RC */

/** @} */

RT_C_DECLS_END
/* @defgroup grp_rt_time   RTTime - Time
 * @ingroup grp_rt
 * @{
 */

/** Time Specification.
 * Use the inline RTTimeSpecGet/Set to operate on structure this so we
 * can easily change the representation if required later.
+ * The current representation is in nanoseconds relative to the unix epoch
+ * (1970-01-01 00:00:00 UTC). This gives us an approximate span from
+ * 1678 to 2262 without sacrificing the resolution offered by the various
+ * host OSes (BSD & LINUX 1ns, NT 100ns).
+ */
+typedef struct RTTIMESPEC
+{
+    /**< Nanoseconds since epoch.
+     * The name is intentionally too long to be comfortable to use because you should be
+     * using inline helpers! */
+    int64_t i64NanosecondsRelativeToUnixEpoch;
+} RTTIMESPEC;
+
+/** @name RTTIMESPEC methods
+ * @{ */
+
+/**
+ * Gets the time as nanoseconds relative to the unix epoch.
+ *
+ */
+DECLINLINE(int64_t) RTTimeSpecGetNano(PCRTTIMESPEC pTime)
+{
+    return pTime->i64NanosecondsRelativeToUnixEpoch;
+}
+
+/**
+ * Sets the time give by nanoseconds relative to the unix epoch.
+ *
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetNano(PRTTIMESPEC pTime, int64_t i64Nano)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch = i64Nano;
+    return pTime;
+}
+
+/**
+ * Gets the time as microseconds relative to the unix epoch.
+ *
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetNano(PRTTIMESPEC pTime, int64_t i64Nano)
+ * @param pTime   The time spec to interpret.
+ */
+DECLINLINE(int64_t) RTTimeSpecGetMicro(PCRTTIMESPEC pTime)
+{
  + return pTime->i64NanosecondsRelativeToUnixEpoch / RT_NS_1US;
+}
+
+/**
+ * Sets the time given by microseconds relative to the unix epoch.
+ *
+ * @returns pTime.
+ *
+ * @param pTime   The time spec to modify.
+ * @param i64Micro The new time in microsecond.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetMicro(PRTTIMESPEC pTime, int64_t i64Micro)
+{
  + pTime->i64NanosecondsRelativeToUnixEpoch = i64Micro * RT_NS_1US;
  + return pTime;
+}
+
+/**
+ * Gets the time as milliseconds relative to the unix epoch.
+ *
+ * @returns milliseconds relative to unix epoch.
+ * @param pTime   The time spec to interpret.
+ */
+DECLINLINE(int64_t) RTTimeSpecGetMilli(PCRTTIMESPEC pTime)
+{
  + return pTime->i64NanosecondsRelativeToUnixEpoch / RT_NS_1MS;
+}
+
+/**
+ * Sets the time given by milliseconds relative to the unix epoch.
+ *
+ * @returns pTime.
+ *
+ * @param pTime   The time spec to modify.
+ * @param i64Milli The new time in milliseconds.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetMilli(PRTTIMESPEC pTime, int64_t i64Milli)
+{
  + pTime->i64NanosecondsRelativeToUnixEpoch = i64Milli * RT_NS_1MS;
  + return pTime;
+}
/**
 * Gets the time as seconds relative to the unix epoch.
 * @returns seconds relative to unix epoch.
 * @param pTime The time spec to interpret.
 */
DECLINLINE(int64_t) RTTimeSpecGetSeconds(PCRTTIMESPEC pTime)
{
    return pTime->i64NanosecondsRelativeToUnixEpoch / RT_NS_1SEC;
}

/**
 * Sets the time given by seconds relative to the unix epoch.
 * @returns pTime.
 * @param pTime The time spec to modify.
 * @param i64Seconds The new time in seconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecSetSeconds(PRTTIMESPEC pTime, int64_t i64Seconds)
{
    pTime->i64NanosecondsRelativeToUnixEpoch = i64Seconds * RT_NS_1SEC;
    return pTime;
}

/**
 * Makes the time spec absolute like abs() does (i.e. a positive value).
 * @returns pTime.
 * @param pTime The time spec to modify.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecAbsolute(PRTTIMESPEC pTime)
{
    if (pTime->i64NanosecondsRelativeToUnixEpoch < 0)
        pTime->i64NanosecondsRelativeToUnixEpoch = -pTime->i64NanosecondsRelativeToUnixEpoch;
    return pTime;
}

/**
 * Negates the time.
 * @returns pTime.
 * @param pTime The time spec to modify.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecNegate(PRTTIMESPEC pTime)
{
/**
 * Adds a time period to the time.
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   pTimeAdd    The time spec to add to pTime.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecAdd(PRTTIMESPEC pTime, PCRTTIMESPEC pTimeAdd)
{
    pTime->i64NanosecondsRelativeToUnixEpoch += pTimeAdd->i64NanosecondsRelativeToUnixEpoch;
    return pTime;
}

/**
 * Adds a time period give as nanoseconds from the time.
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Nano     The time period in nanoseconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecAddNano(PRTTIMESPEC pTime, int64_t i64Nano)
{
    pTime->i64NanosecondsRelativeToUnixEpoch += i64Nano;
    return pTime;
}

/**
 * Adds a time period give as microseconds from the time.
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Micro    The time period in microseconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecAddMicro(PRTTIMESPEC pTime, int64_t i64Micro)
{
    pTime->i64NanosecondsRelativeToUnixEpoch += i64Micro * RT_NS_1US;
    return pTime;
}
+ * Adds a time period give as milliseconds from the time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   i64Milli    The time period in milliseconds.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecAddMilli(PRTTIMESPEC pTime, int64_t i64Milli)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch += i64Milli * RT_NS_1MS;
+    return pTime;
+}
+
+
+/**
+ * Adds a time period give as seconds from the time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   i64Seconds  The time period in seconds.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecAddSeconds(PRTTIMESPEC pTime, int64_t i64Seconds)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch += i64Seconds * RT_NS_1SEC;
+    return pTime;
+}
+
+
+/**
+ * Subtracts a time period from the time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   pTimeSub    The time spec to subtract from pTime.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSub(PRTTIMESPEC pTime, PCRTTIMESPEC pTimeSub)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch -= pTimeSub->i64NanosecondsRelativeToUnixEpoch;
+    return pTime;
+}
+
+
+/**
+ * Subtracts a time period give as nanoseconds from the time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   i64Nano     The time period in nanoseconds.
+ */
DECLINLINE(PRTTIMESPEC) RTTimeSpecSubNano(PRTTIMESPEC pTime, int64_t i64Nano)
{
    pTime->i64NanosecondsRelativeToUnixEpoch -= i64Nano;
    return pTime;
}

/**
 * Subtracts a time period given as microseconds from the time.
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Micro    The time period in microseconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecSubMicro(PRTTIMESPEC pTime, int64_t i64Micro)
{
    pTime->i64NanosecondsRelativeToUnixEpoch -= i64Micro * RT_NS_1US;
    return pTime;
}

/**
 * Subtracts a time period given as milliseconds from the time.
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Milli    The time period in milliseconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecSubMilli(PRTTIMESPEC pTime, int64_t i64Milli)
{
    pTime->i64NanosecondsRelativeToUnixEpoch -= i64Milli * RT_NS_1MS;
    return pTime;
}

/**
 * Subtracts a time period given as seconds from the time.
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Seconds  The time period in seconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecSubSeconds(PRTTIMESPEC pTime, int64_t i64Seconds)
{
    pTime->i64NanosecondsRelativeToUnixEpoch -= i64Seconds * RT_NS_1SEC;
    return pTime;
}
/**
 * Gives the time in seconds and nanoseconds.
 * 
 * @returns pTime.
 * @param   pTime       The time spec to interpret.
 * @param   *pi32Seconds Where to store the time period in seconds.
 * @param   *pi32Nano    Where to store the time period in nanoseconds.
 */
DECLINLINE(void) RTTimeSpecGetSecondsAndNano(PRTTIMESPEC pTime, int32_t *pi32Seconds, int32_t *pi32Nano)
{
    int64_t i64 = RTTimeSpecGetNano(pTime);
    int32_t i32Nano = (int32_t)(i64 % RT_NS_1SEC);
    i64 /= RT_NS_1SEC;
    if (i32Nano < 0)
    {
        i32Nano += RT_NS_1SEC;
        i64--;
    }
    *pi32Seconds = (int32_t)i64;
    *pi32Nano    = i32Nano;
}

/* PORTME: Add struct timeval guard macro here. */
#if defined(RTTIME_INCL_TIMEVAL) || defined(_STRUCT_TIMEVAL) || defined(_SYS__TIMEVAL_H_) || defined(_SYS_TIME_H) || defined(_TIMEVAL) || defined(_LINUX_TIME_H) || (defined(RT_OS_NETBSD) && defined(_SYS_TIME_H_))
/**
 * Gets the time as POSIX timeval.
 * 
 * @returns pTime.
 * @param   pTime       The time spec to interpret.
 * @param   pTimeval    Where to store the time as POSIX timeval.
 */
DECLINLINE(struct timeval *) RTTimeSpecGetTimeval(PCRTTIMESPEC pTime, struct timeval *pTimeval)
{
    int64_t i64 = RTTimeSpecGetMicro(pTime);
    int32_t i32Micro = (int32_t)(i64 % RT_US_1SEC);
    i64 /= RT_US_1SEC;
    if (i32Micro < 0)
    {
        i32Micro += RT_US_1SEC;
        i64--;
    }
    pTimeval->tv_sec = (time_t)i64;
    pTimeval->tv_usec = i32Micro;
+ return pTimeval;
+}
+
+/**
+ * Sets the time as POSIX timeval.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   pTimeval    Pointer to the POSIX timeval struct with the new time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetTimeval(PRTTIMESPEC pTime, const struct timeval *pTimeval)
+{
+    return RTTimeSpecAddMicro(RTTimeSpecSetSeconds(pTime, pTimeval->tv_sec), pTimeval->tv_usec);
+}
+#endif /* various ways of detecting struct timeval */
+
+/* PORTME: Add struct timespec guard macro here. */
+#if defined(RTTIME_INCL_TIMESPEC) || defined(_STRUCT_TIMESPEC) || defined(_SYS__TIMESPEC_H_)
+    || defined(TIMEVAL_TO_TIMESPEC) || defined(_TIMESPEC) 
+    || (defined(RT_OS_NETBSD) && defined(_SYS_TIME_H_))
+/**
+ * Gets the time as POSIX timespec.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to interpret.
+ * @param   pTimespec   Where to store the time as POSIX timespec.
+ */
+DECLINLINE(struct timespec *) RTTimeSpecGetTimespec(PCRTTIMESPEC pTime, struct timespec *pTimespec)
+{
+    int64_t i64 = RTTimeSpecGetNano(pTime);
+    int32_t _i32Nano = (int32_t)(i64 % RT_NS_1SEC);
+    i64 /= RT_NS_1SEC;
+    if (_i32Nano < 0)
+    {
+        _i32Nano += RT_NS_1SEC;
+        i64--;
+    }
+    pTimespec->tv_sec = (time_t)i64;
+    pTimespec->tv_nsec = _i32Nano;
+    return pTimespec;
+}
+/**
+ * Sets the time as POSIX timespec.
+ *
+ * @returns pTime.
+ * @param  pTime   The time spec to modify.
+ * @param  pTimespec   Pointer to the POSIX timespec struct with the new time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetTimespec(PRTTIMESPEC pTime, const struct timespec *pTimespec)
+{
+    return RTTimeSpecAddNano(RTTimeSpecSetSeconds(pTime, pTimespec->tv_sec), pTimespec->tv_nsec);
+}
+#endif /* various ways of detecting struct timespec */
+
+/** The offset of the unix epoch and the base for NT time (in 100ns units).
+ * Nt time starts at 1601-01-01 00:00:00. */
+#define RTTIME_NT_TIME_OFFSET_UNIX      (116444736000000000LL)
+
+/**
+ * Gets the time as NT time.
+ *
+ * @returns Nt time.
+ * @param   pTime       The time spec to interpret.
+ */
+DECLINLINE(uint64_t) RTTimeSpecGetNtTime(PCRTTIMESPEC pTime)
+{
+    return pTime->i64NanosecondsRelativeToUnixEpoch / 100
+        + RTTIME_NT_TIME_OFFSET_UNIX;
+}
+
+/**
+ * Sets the time given by Nt time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   u64NtTime   The new time in Nt time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetNtTime(PRTTIMESPEC pTime, uint64_t u64NtTime)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch =
+        ((uint64_t)u64NtTime - RTTIME_NT_TIME_OFFSET_UNIX) * 100;
+    return pTime;
+}
+}
+
+ifdef _FILETIME_
+#define _FILETIME_
+ * Gets the time as NT file time.
+ *
+ * @returns pFileTime.
+ * @param   pTime       The time spec to interpret.
+ * @param   pFileTime   Pointer to NT filetime structure.
+ */
+DECLINLINE(PFILETIME) RTTimeSpecGetNtFileTime(PCRTTIMESPEC pTime, PFILETIME pFileTime)
+{
+    *((uint64_t *)pFileTime) = RTTimeSpecGetNtTime(pTime);
+    return pFileTime;
+}
+
+/**
+ * Sets the time as NT file time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   pFileTime   Where to store the time as Nt file time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetNtFileTime(PRTTIMESPEC pTime, const FILETIME *pFileTime)
+{
+    return RTTimeSpecSetNtTime(pTime, *(const uint64_t *)pFileTime);
+}
+#endif
+
+/** The offset to the start of DOS time.
+ * DOS time starts 1980-01-01 00:00:00. */
+#define RTTIME_OFFSET_DOS_TIME          (315532800000000000LL)
+
+/**
+ * Gets the time as seconds relative to the start of dos time.
+ *
+ * @returns seconds relative to the start of dos time.
+ * @param   pTime       The time spec to interpret.
+ */
+DECLINLINE(int64_t) RTTimeSpecGetDosSeconds(PCRTTIMESPEC pTime)
+{
+    return (pTime->i64NanosecondsRelativeToUnixEpoch - RTTIME_OFFSET_DOS_TIME) / RT_NS_1SEC;
+}
+
+/**
+ * Sets the time given by seconds relative to the start of dos time.
+ *
+ * @param   pTime       The time spec to modify.
+ * @param   i64NanosecondsRelativeToUnixEpoch   The number of nanoseconds relative to dos time.
+ */
+DECLINLINE(int64_t) RTTimeSpecSetDosSeconds(PCRTTIMESPEC pTime, int64_t i64NanosecondsRelativeToUnixEpoch)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch = i64NanosecondsRelativeToUnixEpoch;
+    return RTTimeSpecGetDosSeconds(pTime);
+}

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+ * @returns pTime.
+ * @param pTime The time spec to modify.
+ * @param i64Seconds The new time in seconds relative to the start of dos time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetDosSeconds(PRTTIMESPEC pTime, int64_t i64Seconds)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch = i64Seconds * RT_NS_1SEC
+    + RTTIME_OFFSET_DOS_TIME;
+    return pTime;
+}
+
+/**
+ * Compare two time specs.
+ *
+ * @returns true they are equal.
+ * @returns false they are not equal.
+ * @param pTime1 The 1st time spec.
+ * @param pTime2 The 2nd time spec.
+ */
+DECLINLINE(bool) RTTimeSpecIsEqual(PCRTTIMESPEC pTime1, PCRTTIMESPEC pTime2)
+{
+    return pTime1->i64NanosecondsRelativeToUnixEpoch == pTime2->i64NanosecondsRelativeToUnixEpoch;
+}
+
+/**
+ * Compare two time specs.
+ *
+ * @returns 0 if equal, -1 if @a pLeft is smaller, 1 if @a pLeft is larger.
+ * @returns false they are not equal.
+ * @param pLeft The 1st time spec.
+ * @param pRight The 2nd time spec.
+ */
+DECLINLINE(int) RTTimeSpecCompare(PCRTTIMESPEC pLeft, PCRTTIMESPEC pRight)
+{
+    if (pLeft->i64NanosecondsRelativeToUnixEpoch == pRight->i64NanosecondsRelativeToUnixEpoch)
+        return 0;
+    return pLeft->i64NanosecondsRelativeToUnixEpoch < pRight->i64NanosecondsRelativeToUnixEpoch ? -1 : 1;
+}
+
+/**
+ * Converts a time spec to a ISO date string.
+ *
+ * @returns psz on success.
+ * @returns NULL on buffer underflow.
+ * @param pTime The time spec.
+ * @param   psz         Where to store the string.
+ * @param   cb          The size of the buffer.
+ */
+RTDECL(char *) RTTimeSpecToString(PCRTTIMESPEC pTime, char *psz, size_t cb);
+
+/**
+ * Attempts to convert an ISO date string to a time structure.
+ *
+ * We're a little forgiving with zero padding, unspecified parts, and leading
+ * and trailing spaces.
+ *
+ * @retval  pTime on success,
+ * @retval  NULL on failure.
+ * @param   pTime       The time spec.
+ * @param   pszString   The ISO date string to convert.
+ */
+RTDECL(PRTTIMESPEC) RTTimeSpecFromString(PRTTIMESPEC pTime, const char *pszString);
+
+/** @} */
+
+/** Exploded time. 
+ */
+#pragma pack(1)
+typedef struct RTTIME
+{
+    /** The year number. */
+    int32_t     i32Year;
+    /** The month of the year (1-12). January is 1. */
+    uint8_t     u8Month;
+    /** The day of the week (0-6). Monday is 0. */
+    uint8_t     u8WeekDay;
+    /** The day of the year (1-366). January the 1st is 1. */
+    uint16_t    u16YearDay;
+    /** The day of the month (1-31). */
+    uint8_t     u8MonthDay;
+    /** Hour of the day (0-23). */
+    uint8_t     u8Hour;
+    /** The minute of the hour (0-59). */
+    uint8_t     u8Minute;
+    /** The second of the minute (0-60). */
+    (u32Nanosecond / 1000000) */
+    uint8_t     u8Second;
+    /** The nanoseconds of the second (0-999999999). */
+    uint32_t    u32Nanosecond;
+    /** Flags, of the RTTIME_FLAGS_* \#defines. */
+    uint32_t    fFlags;
+}
/** UCT time offset in minutes (-840-840).
+  * @remarks The implementation of RTTimeLocal* isn't quite there yet, so this might not be 100% correct. */
+  int32_t     offUTC;
+} RTTIME;
+#pragma pack()
+/** Pointer to a exploded time structure. */
+typedef RTTIME *PRTTIME;
+/** Pointer to a const exploded time structure. */
+typedef const RTTIME *PCRTTIME;
+
+/** @name RTTIME::fFlags values. */
+* @} */
+/** Set if the time is UTC. If clear the time local time. */
+#define RTTIME_FLAGS_TYPE_MASK      3
+/** the time is UTC time. */
+#define RTTIME_FLAGS_TYPE_UTC       2
+/** The time is local time. */
+#define RTTIME_FLAGS_TYPE_LOCAL     3
+
+/** Set if the time is local and daylight saving time is in effect. */
+* Not bit is not valid if RTTIME_FLAGS_NO_DST_DATA is set. */
+#define RTTIME_FLAGS_DST            RT_BIT(4)
+/** Set if the time is local and there is no data available on daylight saving time. */
+#define RTTIME_FLAGS_NO_DST_DATA    RT_BIT(5)
+/** Set if the year is a leap year. */
+* This is mutual exclusiv with RTTIME_FLAGS_COMMON_YEAR. */
+#define RTTIME_FLAGS_LEAP_YEAR      RT_BIT(6)
+/** Set if the year is a common year. */
+* This is mutual exclusiv with RTTIME_FLAGS_LEAP_YEAR. */
+#define RTTIME_FLAGS_COMMON_YEAR    RT_BIT(7)
+/** The mask of valid flags. */
+#define RTTIME_FLAGS_MASK           UINT32_C(0xff)
+*/ */ @} */
+
+/**
+ * Gets the current system time (UTC).
+ *
+ * @returns pTime.
+ * @param pTime    Where to store the time.
+ */
+RTDECL(PRTTIMESPEC) RTTimeNow(PRTTIMESPEC pTime);
+
+/**
+ * Sets the system time.
+ *
+ * @returns IPRT status code
+ * @param pTime    The new system time (UTC).
+ *
+ * @remarks This will usually fail because changing the wall time is usually
+ * requires extra privileges.
+ */
+RTDECL(int) RTTimeSet(PCRTTIMESPEC pTime);
+
+/**
+ * Explodes a time spec (UTC).
+ *
+ * @returns pTime.
+ * @param   pTime       Where to store the exploded time.
+ * @param   pTimeSpec   The time spec to exploded.
+ */
+RTDECL(PRTTIME) RTTimeExplode(PRTTIME pTime, PCRTTIMESPEC pTimeSpec);
+
+/**
+ * Implodes exploded time to a time spec (UTC).
+ *
+ * @returns pTime on success.
+ * @returns NULL if the pTime data is invalid.
+ * @param   pTimeSpec   Where to store the imploded UTC time.
+ *                      If pTime specifies a time which outside the range, maximum or
+ *                      minimum values will be returned.
+ * @param   pTime       Pointer to the exploded time to implode.
+ *                      The fields u8Month, u8WeekDay and u8MonthDay are not used,
+ *                      and all the other fields are expected to be within their
+ *                      bounds. Use RTTimeNormalize() to calculate u16YearDay and
+ *                      normalize the ranges of the fields.
+ */
+RTDECL(PRTTIMESPEC) RTTimeImplode(PRTTIMESPEC pTimeSpec, PCRTTIME pTime);
+
+/**
+ * Normalizes the fields of a time structure.
+ *
+ * It is possible to calculate year-day from month/day and vice
+ * versa. If you adjust any of of these, make sure to zero the
+ * other so you make it clear which of the fields to use. If
+ * it's ambiguous, the year-day field is used (and you get
+ * assertions in debug builds).
+ *
+ * All the time fields and the year-day or month/day fields will
+ * be adjusted for overflows. (Since all fields are unsigned, there
+ * is no underflows.) It is possible to exploit this for simple
+ * date math, though the recommended way of doing that to implode
+ * the time into a timespec and do the math on that.
+ *
+ * @returns pTime on success.
+ * @returns NULL if the data is invalid.
+ * + * @param pTime The time structure to normalize.
+ * + * @remarks This function doesn't work with local time, only with UTC time.
+ */
+RTDECL(PRTTIME) RTTimeNormalize(PRTTIME pTime);
+
+/**
+ * Gets the current local system time.
+ *
+ * @returns pTime.
+ * @param pTime Where to store the local time.
+ */
+RTDECL(PRTTIMESPEC) RTTimeLocalNow(PRTTIMESPEC pTime);
+
+/**
+ * Gets the delta between UTC and local time.
+ *
+ * @returns Returns the nanosecond delta between UTC and local time.
+ */
+RTDECL(int64_t) RTTimeLocalDeltaNano(void);
+
+/**
+ * Explodes a time spec to the localized timezone.
+ *
+ * @returns pTime.
+ * @param pTime Where to store the exploded time.
+ * @param pTimeSpec The time spec to exploded (UTC).
+ */
+RTDECL(PRTTIME) RTTimeLocalExplode(PRTTIME pTime, PCRTTIMESPEC pTimeSpec);
+
+/**
+ * Normalizes the fields of a time structure containing local time.
+ *
+ * @returns pTime on success.
+ * @returns NULL if the data is invalid.
+ * @param pTime The time structure to normalize.
+ */
+RTDECL(PRTTIME) RTTimeLocalNormalize(PRTTIME pTime);
+ * Converts a time spec to a ISO date string.
+ *
+ * @returns psz on success.
+ * @returns NULL on buffer underflow.
+ * @param   pTime       The time. Caller should've normalized this.
+ * @param   psz         Where to store the string.
+ * @param   cb          The size of the buffer.
+ */
+RTDECL(char *) RTTimeToString(PCRTTIME pTime, char *psz, size_t cb);
+
+/**
+ * Attempts to convert an ISO date string to a time structure.
+ *
+ * We're a little forgiving with zero padding, unspecified parts, and leading
+ * and trailing spaces.
+ *
+ * @returns true if it's a leap year.
+ * @returns false if it's a common year.
+ * @param   i32Year     The year in question.
+ */
+RTDECL(bool) RTTimeIsLeapYear(int32_t i32Year);
+
+/**
+ * Compares two normalized time structures.
+ *
+ * @retval  0 if equal.
+ * @retval  -1 if @a pLeft is earlier than @a pRight.
+ * @retval  1 if @a pRight is earlier than @a pLeft.
+ *
+ * @param   pLeft       The left side time.  NULL is accepted.
+ * @param   pRight      The right side time.  NULL is accepted.
+ * @note    A NULL time is considered smaller than anything else.  If both are
+ *          NULL, they are considered equal.
+ */
+RTDECL(int) RTTimeCompare(PCRTTIME pLeft, PCRTTIME pRight);
+ * Gets the current nanosecond timestamp.
+ *
+ * @returns nanosecond timestamp.
+ */
+RTDECL(uint64_t) RTTimeNanoTS(void);
+
+/**
+ * Gets the current millisecond timestamp.
+ *
+ * @returns millisecond timestamp.
+ */
+RTDECL(uint64_t) RTTimeMilliTS(void);
+
+/**
+ * Debugging the time api.
+ *
+ * @returns the number of 1ns steps which has been applied by RTTimeNanoTS().
+ */
+RTDECL(uint32_t) RTTimeDbgSteps(void);
+
+/**
+ * Debugging the time api.
+ *
+ * @returns the number of times the TSC interval expired RTTimeNanoTS().
+ */
+RTDECL(uint32_t) RTTimeDbgExpired(void);
+
+/**
+ * Debugging the time api.
+ *
+ * @returns the number of bad previous values encountered by RTTimeNanoTS().
+ */
+RTDECL(uint32_t) RTTimeDbgBad(void);
+
+/**
+ * Debugging the time api.
+ *
+ * @returns the number of update races in RTTimeNanoTS().
+ */
+RTDECL(uint32_t) RTTimeDbgRaces(void);
+
+/** @name RTTimeNanoTS GIP worker functions, for TM.
+ * @{ */
+/** Pointer to a RTTIMENANOTSDATA structure. */
+typedef struct RTTIMENANOTSDATA *PRTTIMENANOTSDATA;
+
+/** Nanosecond timestamp data.
+ * This is used to keep track of statistics and callback so IPRT
+ * and TM (VirtualBox) can share code.
+ *
+ * @remark Keep this in sync with the assembly version in timesupA.asm.
+ */
typedef struct RTTIMENANOTSDATA
+
+ /** Where the previous timestamp is stored.
+ * This is maintained to ensure that time doesn't go backwards or anything. */
+ uint64_t volatile *pu64Prev;
+
+ /**
+ * Helper function that's used by the assembly routines when something goes bust.
+ *
+ * @param   pData           Pointer to this structure.
+ * @param   u64NanoTS       The calculated nano ts.
+ * @param   u64DeltaPrev    The delta relative to the previously returned timestamp.
+ * @param   u64PrevNanoTS   The previously returned timestamp (as it was read it).
+ */
+ DECLCALLBACKMEMBER(void, pfnBad)(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS, uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS);
+
+ /**
+ * Callback for when rediscovery is required.
+ *
+ * @returns Nanosecond timestamp.
+ * @param   pData           Pointer to this structure.
+ */
+ DECLCALLBACKMEMBER(uint64_t, pfnRediscover)(PRTTIMENANOTSDATA pData);
+
+ /**
+ * Callback for when some CPU index related stuff goes wrong.
+ *
+ * @returns Nanosecond timestamp.
+ * @param   pData           Pointer to this structure.
+ * @param   idApic          The APIC ID if available, otherwise (UINT16_MAX-1).
+ * @param   iCpuSet         The CPU set index if available, otherwise
+ *                        (UINT16_MAX-1).
+ * @param   iGipCpu         The GIP CPU array index if available, otherwise
+ *                        (UINT16_MAX-1).
+ */
+ DECLCALLBACKMEMBER(uint64_t, pfnBadCpuIndex)(PRTTIMENANOTSDATA pData, uint16_t idApic, uint16_t iCpuSet, uint16_t iGipCpu);
+
+ /** Number of 1ns steps because of overshooting the period. */
+ uint32_t c1nsSteps;
+ /** The number of times the interval expired (overflow). */
+ uint32_t    cExpired;
+ /**< Number of "bad" previous values. */
+ uint32_t    cBadPrev;
+ /**< The number of update races. */
+ uint32_t    cUpdateRaces;
+} RTTIMENANOTSDATA;
+
+#ifndef IN_RING3
+/**
+ * The Ring-3 layout of the RTTIMENANOTSDATA structure.
+ */
+typedef struct RTTIMENANOTSDATAR3
+{
+    R3PTRTYPE(uint64_t volatile *) pu64Prev;
+    DECLR3CALLBACKMEMBER(void, pfnBad,(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS,
uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS));
+    DECLR3CALLBACKMEMBER(uint64_t, pfnRediscover,(PRTTIMENANOTSDATA pData));
+    DECLR3CALLBACKMEMBER(uint64_t, pfnBadCpuIndex,(PRTTIMENANOTSDATA pData, uint16_t
idApic, uint16_t iCpuSet, uint16_t iGipCpu));
+    uint32_t    c1nsSteps;
+    uint32_t    cExpired;
+    uint32_t    cBadPrev;
+    uint32_t    cUpdateRaces;
+} RTTIMENANOTSDATAR3;
+} else
+#ifndef IN_RING0
+/**
+ * The Ring-3 layout of the RTTIMENANOTSDATA structure.
+ */
+typedef struct RTTIMENANOTSDATAR0
+{
+    R0PTRTYPE(uint64_t volatile *) pu64Prev;
+    DECLR0CALLBACKMEMBER(void, pfnBad,(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS,
uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS));
+    DECLR0CALLBACKMEMBER(uint64_t, pfnRediscover,(PRTTIMENANOTSDATA pData));
+    DECLR0CALLBACKMEMBER(uint64_t, pfnBadCpuIndex,(PRTTIMENANOTSDATA pData, uint16_t
idApic, uint16_t iCpuSet, uint16_t iGipCpu));
+    uint32_t    c1nsSteps;
+    uint32_t    cExpired;
+    uint32_t    cBadPrev;
+    uint32_t    cUpdateRaces;
+} RTTIMENANOTSDATAR0;
+} else
+#endif

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/* The RC layout of the RTTIMENANOTSDATA structure. */
typedef struct RTTIMENANOTSDATARC {
    RCPTRTYPE(uint64_t volatile *) pu64Prev;
    DECLRCCALLBACKMEMBER(void, pfnBad,(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS, uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS));
    DECLRCCALLBACKMEMBER(uint64_t, pfnRediscover,(PRTTIMENANOTSDATA pData));
    DECLRCCALLBACKMEMBER(uint64_t, pfnBadCpuIndex,(PRTTIMENANOTSDATA pData, uint16_t idApic, uint16_t iCpuSet, uint16_t iGipCpu));
    uint32_t c1nsSteps;
    uint32_t cExpired;
    uint32_t cBadPrev;
    uint32_t cUpdateRaces;
} RTTIMENANOTSDATARC;
#endif

/** Internal RTTimeNanoTS worker (assembly). */
typedef DECLCALLBACK(uint64_t) FNTIMENANOTSINTERNAL(PRTTIMENANOTSDATA pData);
/** Pointer to an internal RTTimeNanoTS worker (assembly). */
typedef FNTIMENANOTSINTERNAL *PFNTIMENANOTSINTERNAL;
RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarNoDelta(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarNoDelta(PRTTIMENANOTSDATA pData);
#ifdef IN_RING3
RTDECL(uint64_t) RTTimeNanoTSLegacyAsyncUseApicId(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLegacyAsyncUseRdtscp(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLegacyAsyncUseRdtscpGroupChNumCl(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDeltaUseApicId(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDeltaUseRdtscp(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDeltaUseIdtrLim(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceAsyncUseApicId(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceAsyncUseRdtscp(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceAsyncUseRdtscpGroupChNumCl(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDeltaUseApicId(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim(PRTTIMENANOTSDATA pData);
#else
RTDECL(uint64_t) RTTimeNanoTSLegacyAsync(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDelta(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceAsync(PRTTIMENANOTSDATA pData);
RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDelta(PRTTIMENANOTSDATA pData);
#endif

+#endif
+
+/** @} */
+
+
/**
 * Gets the current nanosecond timestamp.
 *
 * This differs from RTTimeNanoTS in that it will use system APIs and not do any
 * resolution or performance optimizations.
 *
 * @returns nanosecond timestamp.
 */
+RTDECL(uint64_t) RTTimeSystemNanoTS(void);
+
+/**
 * Gets the current millisecond timestamp.
 *
 * This differs from RTTimeNanoTS in that it will use system APIs and not do any
 * resolution or performance optimizations.
 *
 * @returns millisecond timestamp.
 */
+RTDECL(uint64_t) RTTimeSystemMilliTS(void);
+
+/**
 * Get the nanosecond timestamp relative to program startup.
 *
 * @returns Timestamp relative to program startup.
 */
+RTDECL(uint64_t) RTTimeProgramNanoTS(void);
+
+/**
 * Get the microsecond timestamp relative to program startup.
 *
 * @returns Timestamp relative to program startup.
 */
+RTDECL(uint64_t) RTTimeProgramMicroTS(void);
+
+/**
 * Get the millisecond timestamp relative to program startup.
 *
 * @returns Timestamp relative to program startup.
 */
+RTDECL(uint64_t) RTTimeProgramMilliTS(void);
+
+/**
 * Get the second timestamp relative to program startup.
 *
 * @returns Timestamp relative to program startup.
 */
+RTDECL(uint64_t) RTTimeProgramMilliTS(void);
/** 
 * @returns Timestamp relative to program startup. 
 */
+RTDECL(uint32_t) RTTimeProgramSecTS(void);
+
+/** 
 * Get the RTTimeNanoTS() of when the program started. 
 */
+RTDECL(uint64_t) RTTimeProgramStartNanoTS(void);
+
+/** 
 * Time zone information. 
 */
+* 
typedef struct RTTIMEZONEINFO
+
+{ 
+   /**< Unix time zone name (continent/country[/city]). */
+   const char *pszUnixName;
+   /**< Windows time zone name. */
+   const char *pszWindowsName;
+   /**< The length of the unix time zone name. */
+   uint8_t cchUnixName;
+   /**< The length of the windows time zone name. */
+   uint8_t cchWindowsName;
+   /**< The length of the unix time zone name. */
+   uint32_t idxWindows;
+   /**< Closest matching windows time zone index. */
+   uint32_t idxWindows;
+ } RTTIMEZONEINFO;
+
/** Pointer to time zone info. */
typedef RTTIMEZONEINFO const *PCRTTIMEZONEINFO;
+
+/** @returns Program startup timestamp. 
*/
+* 

+/** Indicates golden mapping entry for a windows time zone name. */
+define RTTIMEZONEINFO_F_GOLDEN RT_BIT_32(0)
+/** @} */
+
+ /**
+ * Looks up static time zone information by unix name.
+ *
+ * @returns Pointer to info entry if found, NULL if not.
+ * @param pszName The unix zone name (TZ).
+ */
+RTDECL(PCRTTIMEZONEINFO) RTTimeZoneGetInfoByUnixName(const char *pszName);
+
+ /**
+ * Looks up static time zone information by window name.
+ *
+ * @returns Pointer to info entry if found, NULL if not.
+ * @param pszName The windows zone name (reg key).
+ */
+RTDECL(PCRTTIMEZONEINFO) RTTimeZoneGetInfoByWindowsName(const char *pszName);
+
+ /**
+ * Looks up static time zone information by windows index.
+ *
+ * @returns Pointer to info entry if found, NULL if not.
+ * @param idxZone The windows timezone index.
+ */
+RTDECL(PCRTTIMEZONEINFO) RTTimeZoneGetInfoByWindowsIndex(uint32_t idxZone);
+
+ /**
+ * Get the current time zone (TZ).
+ *
+ * @returns IPRT status code.
+ * @param pszName Where to return the time zone name.
+ * @param cbName The size of the name buffer.
+ */
+RTDECL(int) RTTimeZoneGetCurrent(char *pszName, size_t cbName);
+
+ /** @} */
+
+RT_C_DECLS_END
+
+endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/timer.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/timer.h
@@ -0,0 +1,387 @@
+/** @file
+ * IPRT - Timer.
+ */
#ifndef ___iprt_timer_h
#define ___iprt_timer_h

#include <iprt/cdefs.h>
#include <iprt/types.h>

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_timer      RTTimer - Timer
 * The IPRT timer API provides a simple abstraction of recurring and one-shot callback timers.
 * Because of the great variation in the native APIs and the quality of
 * the service delivered by those native APIs, the timers are operated
 * on at best effort basis.
 * All the ring-3 implementations are naturally at the mercy of the scheduler,
 * which means that the callback rate might vary quite a bit and we might skip
 * ticks. Many systems have a restriction that a process can only have one
 * timer. IPRT currently makes no efforts at multiplexing timers in those kind
 * of situations and will simply fail if you try to create more than one timer.
 * Things are generally better in ring-0. The implementations will use interrupt
 * time callbacks wherever available, and if not, resort to a high priority
 */

+/#ifndef __iprt_timer_h
+/#define __iprt_timer_h
+
+/#include <iprt/cdefs.h>
+/#include <iprt/types.h>
+
+RT_C_DECLS_BEGIN
+
+/** @defgroup grp_rt_timer    RTTimer - Timer
 + *
 + * The IPRT timer API provides a simple abstraction of recurring and one-shot callback timers.
 + *
 + * Because of the great variation in the native APIs and the quality of
 + * the service delivered by those native APIs, the timers are operated
 + * on at best effort basis.
 + *
 + * All the ring-3 implementations are naturally at the mercy of the scheduler,
 + * which means that the callback rate might vary quite a bit and we might skip
 + * ticks. Many systems have a restriction that a process can only have one
 + * timer. IPRT currently makes no efforts at multiplexing timers in those kind
 + * of situations and will simply fail if you try to create more than one timer.
 + *
 + * Things are generally better in ring-0. The implementations will use interrupt
 + * time callbacks wherever available, and if not, resort to a high priority
 */

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+ * kernel thread.
+ *
+ * @ingroup grp_rt
+ * @}  
+ + ***/ Timer handle. */
+ typedef struct RTTIMER *PRTTIMER;
+ + ***/
+ * Timer callback function.
+ *
+ * The context this call is made in varies with different platforms and
+ * kernel / user mode IPRT.
+ *
+ * In kernel mode a timer callback should not waste time, it shouldn't
+ * waste stack and it should be prepared that some APIs might not work
+ * correctly because of weird OS restrictions in this context that we
+ * haven't discovered and avoided yet. Please fix those APIs so they
+ * at least avoid panics and weird behaviour.
+ *
+ * @param pTimer Timer handle.
+ * @param pvUser User argument.
+ * @param iTick The current timer tick. This is always 1 on the first
+ * callback after the timer was started. For omni timers
+ * this will be 1 when a cpu comes back online.
+ * */
+ typedef DECLCALLBACK(void) FNRT_TIMER(PRTTIMER pTimer, void *pvUser, uint64_t iTick);
+ ***/ Pointer to FNRT_TIMER() function. */
+ typedef FNRT_TIMER *PFN_RT_TIMER;
+ + ***/
+ * Create a recurring timer.
+ *
+ * @returns iprt status code.
+ * @param ppTimer Where to store the timer handle.
+ * @param uMillisInterval Milliseconds between the timer ticks.
+ * This is rounded up to the system granularity.
+ * @param pfnTimer Callback function which shall be scheduled for execution
+ * on every timer tick.
+ * @param pvUser User argument for the callback.
+ * @see RTTimerCreateEx, RTTimerStart, RTTimerStop, RTTimerChangeInterval,
+ * RTTimerDestroy, RTTimerGetSystemGranularity
+ */
+ RTDECL(int) RTTimerCreate(PRTTIMER *ppTimer, unsigned uMillisInterval, PFN_RT_TIMER pfnTimer, void *pvUser);
+/**
+ * Create a suspended timer.
+ *
+ * @returns iprt status code.
+ * @retval VERR_NOT_SUPPORTED if an unsupported flag was specified.
+ * @retval VERR_CPU_NOT_FOUND if the specified CPU
+ *
+ * @param   ppTimer             Where to store the timer handle.
+ * @param   u64NanoInterval     The interval between timer ticks specified in nanoseconds if it's
+ *                              a recurring timer. This is rounded to the fit the system timer granularity.
+ *                              For one shot timers, pass 0.
+ * @param   fFlags              Timer flags.
+ * @param   pfnTimer            Callback function which shall be scheduled for execution
+ *                              on every timer tick.
+ * @param   pvUser              User argument for the callback.
+ * @see     RTTimerStart, RTTimerStop, RTTimerChangeInterval, RTTimerDestroy,
+ *          RTTimerGetSystemGranularity, RTTimerCanDoHighResolution
+ */
+RTDECL(int) RTTimerCreateEx(PRTTIMER *ppTimer, uint64_t u64NanoInterval, uint32_t fFlags,
                                          PFNRTTIMER pfnTimer, void *pvUser);
+
+/** @name RTTimerCreateEx flags
+ * @{ */
+/** Any CPU is fine. (Must be 0.) */
+#define RTTIMER_FLAGS_CPU_ANY       UINT32_C(0)
+/** One specific CPU */
+#define RTTIMER_FLAGS_CPU_SPECIFIC  RT_BIT(16)
+/** Omni timer, run on all online CPUs. */
+/** The timer callback isn't necessarily running at the time same time on each CPU. */
+#define RTTIMER_FLAGS_CPU_ALL       ( RTTIMER_FLAGS_CPU_SPECIFIC |
+                                     RTTIMER_FLAGS_CPU_MASK )
+/** CPU mask. */
+#define RTTIMER_FLAGS_CPU_MASK      UINT32_C(0xffff)
+/** Desire a high resolution timer that works with RTTimerChangeInterval and
+ * isn't subject to RTTimerGetSystemGranularity rounding. */
+/** This is quietly ignored if the feature isn't supported. */
+#define RTTIMER_FLAGS_HIGH_RES      RT_BIT(17)
+/** Convert a CPU set index (0-based) to RTTimerCreateEx flags. */
+/** This will automatically OR in the RTTIMER_FLAGS_CPU_SPECIFIC flag. */
+#define RTTIMER_FLAGS_CPU(iCpu)     ( (iCpu) | RTTIMER_FLAGS_CPU_SPECIFIC )
+/** Macro that validates the flags. */
+#define RTTIMER_FLAGS_ARE_VALID(fFlags) \
+  ( !(fFlags) & ~(fFlags & RTTIMER_FLAGS_CPU_SPECIFIC ? UINT32_C(0xffff) :
                UINT32_C(0x30000))))
+/** @} */
+/**
+ * Stops and destroys a running timer.
+ *
+ * @returns iprt status code.
+ * @retval VERR_INVALID_CONTEXT if executing at the wrong IRQL (windows), PIL
+ * (solaris), or similar. Portable code does not destroy timers with
+ * preemption (or interrupts) disabled.
+ * @param pTimer Timer to stop and destroy. NULL is ok.
+ */
+RTDECL(int) RTTimerDestroy(PRTTIMER pTimer);
+
+/**
+ * Starts a suspended timer.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_INVALID_HANDLE if pTimer isn't valid.
+ * @retval VERR_TIMER_ACTIVE if the timer isn't suspended.
+ * @retval VERR_CPU_OFFLINE if the CPU the timer was created to run on is not
+ * online (this include the case where it's not present in the
+ * system).
+ *
+ * @param pTimer The timer to activate.
+ * @param u64First The RTTimeSystemNanoTS() for when the timer should start
+ * firing (relative). If 0 is specified, the timer will
+ * fire ASAP.
+ * @remarks When RTTimerCanDoHighResolution returns true, this API is
+ * callable with preemption disabled in ring-0.
+ * @see RTTimerStop
+ */
+RTDECL(int) RTTimerStart(PRTTIMER pTimer, uint64_t u64First);
+
+/**
+ * Stops an active timer.
+ *
+ * @todo May return while the timer callback function is being services on
+ * some platforms (ring-0 Windows, ring-0 linux). This needs to be
+ * addressed at some point...
+ *
+ * @returns IPRT status code.
+ * @retval VERR_INVALID_HANDLE if pTimer isn't valid.
+ * @retval VERR_TIMER_SUSPENDED if the timer isn't active.
+ * @retval VERR_NOT_SUPPORTED if the IPRT implementation doesn't support
+ * stopping a timer.
+ *
+ * @param pTimer The timer to suspend.
+ * @remarks Can be called from the timer callback function to stop it.
+ * @see RTTimerStart
+ */
+RTDECL(int) RTTimerStop(PRTTIMER pTimer);
+/**
+ * Changes the interval of a periodic timer.
+ *
+ * If the timer is active, it is implementation dependent whether the change
+ * takes place immediately or after the next tick. To get defined behavior,
+ * stop the timer before calling this API.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_INVALID_HANDLE if pTimer isn't valid.
+ * @retval  VERR_NOT_SUPPORTED if not supported.
+ * @retval  VERR_INVALID_STATE if not a periodic timer.
+ *
+ * @param   pTimer              The timer to activate.
+ * @param   u64NanoInterval     The interval between timer ticks specified in
+ *                              nanoseconds. This is rounded to the fit the
+ *                              system timer granularity.
+ * @remarks Callable from the timer callback. Callable with preemption
+ *          disabled in ring-0.
+ */
+RTDECL(int) RTTimerChangeInterval(PRTTIMER pTimer, uint64_t u64NanoInterval);
+
+/**
+ * Gets the (current) timer granularity of the system.
+ *
+ * @returns The timer granularity of the system in nanoseconds.
+ * @see     RTTimerRequestSystemGranularity
+ */
+RTDECL(uint32_t) RTTimerGetSystemGranularity(void);
+
+/**
+ * Requests a specific system timer granularity.
+ *
+ * Successful calls to this API must be coupled with the exact same number of
+ * calls to RTTimerReleaseSystemGranularity() in order to undo any changes made.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_NOT_SUPPORTED if the requested value isn't supported by the host platform
+ *          or if the host platform doesn't support modifying the system timer granularity.
+ * @retval  VERR_PERMISSION_DENIED if the caller doesn't have the necessary privilege to
+ *          modify the system timer granularity.
+ *
+ * @param   u32Request      The requested system timer granularity in nanoseconds.
+ * @param   pu32Granted     Where to store the granted system granularity. This is the value
+ *                          that should be passed to RTTimerReleaseSystemGranularity(). It
+ *                          is what RTTimerGetSystemGranularity() would return immediately
+ *                          after the change was made.
+ */
@see RTTimerReleaseSystemGranularity, RTTimerGetSystemGranularity

RTDECL(int) RTTimerRequestSystemGranularity(uint32_t u32Request, uint32_t *pu32Granted);

RTDECL(int) RTTimerReleaseSystemGranularity(uint32_t u32Granted);

RTDECL(bool) RTTimerCanDoHighResolution(void);

RTDECL(void) RTTimerCallbackLR(int hTimerLR, void *pvUser, int iTick);

@see FNRTTIMER

+ typedef DECLCALLBACK(void) FNRTTIMERLR(RTTIMERLR hTimerLR, void *pvUser, uint64_t iTick);
+/** Pointer to FNRTTIMER() function. */
+typedef FNRTTIMERLR *PFNRTTIMERLR;
+
+/**
+ * Create a recurring low resolution timer.
+ *
+ * @returns iprt status code.
+ * @param   phTimerLR           Where to store the timer handle.
+ * @param   uMilliesInterval   Milliseconds between the timer ticks, at least 100 ms.
+ * If higher resolution is required use the other API.
+ * @param   pfnTimer            Callback function which shall be scheduled for execution
+ * on every timer tick.
+ * @param   pvUser              User argument for the callback.
+ * @see     RTTimerLRCreate, RTTimerLRDestroy, RTTimerLRStop
+ */
+RTDECL(int) RTTimerLRCreate(PRTTIMERLR phTimerLR, uint32_t uMilliesInterval, PFNRTTIMERLR pfnTimer, void *pvUser);
+
+/**
+ * Create a suspended low resolution timer.
+ *
+ * @returns iprt status code.
+ * @retval  VERR_NOT_SUPPORTED if an unsupported flag was specified.
+ * @param   phTimerLR           Where to store the timer handle.
+ * @param   u64NanoInterval     The interval between timer ticks specified in nanoseconds if it's a recurring timer, the minimum for is 100000000 ns.
+ * For one shot timers, pass 0.
+ * @param   fFlags              Timer flags. Same as RTTimerCreateEx.
+ * @param   pfnTimer            Callback function which shall be scheduled for execution
+ * on every timer tick.
+ * @param   pvUser              User argument for the callback.
+ * @see     RTTimerLRStart, RTTimerLRStop, RTTimerLRDestroy
+ */
+RTDECL(int) RTTimerLRCreateEx(PRTTIMERLR phTimerLR, uint64_t u64NanoInterval, uint32_t fFlags, PFNRTTIMERLR pfnTimer, void *pvUser);
+
+/**
+ * Stops and destroys a running low resolution timer.
+ *
+ * @returns iprt status code.
+ * @param   hTimerLR            The low resolution timer to stop and destroy.
+ * NIL_RTTIMERLR is accepted.
+ */
+RTDECL(int) RTTimerLRDestroy(RTTIMERLR hTimerLR);
+/**
+ * Starts a low resolution timer.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_INVALID_HANDLE if pTimer isn't valid.
+ * @retval  VERR_TIMER_ACTIVE if the timer isn't suspended.
+ *
+ * @param   hTimerLR            The low resolution timer to activate.
+ * @param   u64First            The RTTimeSystemNanoTS() for when the timer should start
+ *                              firing (relative), the minimum is 100000000 ns.
+ *                              If 0 is specified, the timer will fire ASAP.
+ * @see     RTTimerLRStop
+ */
+RTDECL(int) RTTimerLRStart(RTTIMERLR hTimerLR, uint64_t u64First);
+
+/**
+ * Stops an active low resolution timer.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_INVALID_HANDLE if pTimer isn't valid.
+ * @retval  VERR_TIMER_SUSPENDED if the timer isn't active.
+ * @retval  VERR_NOT_SUPPORTED if the IPRT implementation doesn't support stopping a timer.
+ *
+ * @param   hTimerLR            The low resolution timer to suspend.
+ * @see     RTTimerLRStart
+ */
+RTDECL(int) RTTimerLRStop(RTTIMERLR hTimerLR);
+
+/**
+ * Changes the interval of a low resolution timer.
+ *
+ * If the timer is active, the next tick will occure immediately just like with
+ * RTTimerLRStart() when u64First parameter is zero.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_INVALID_HANDLE if pTimer isn't valid.
+ * @retval  VERR_NOT_SUPPORTED if not supported.
+ *
+ * @param   hTimerLR            The low resolution timer to update.
+ * @param   u64NanoInterval     The interval between timer ticks specified in
+ *                              nanoseconds. This is rounded to the fit the
+ *                              system timer granularity.
+ * @remarks Callable from the timer callback.
+ */
+RTDECL(int) RTTimerLRChangeInterval(RTTIMERLR hTimerLR, uint64_t u64NanoInterval);
+ * Kludge for xfree86 modules: size_t and other types are redefined.
+ */
+RT_C_DECLS_BEGIN
+# include "xf86_ansic.h"
+# undef NULL
+RT_C_DECLS_END
+
+*/
+* Kludge for the darwin kernel:
+* stddef.h is missing IIRC.
+*/
+# ifndef _PTRDIFF_T
+# define _PTRDIFF_T
+ typedef __darwin_ptrdiff_t ptrdiff_t;
+# endif
+# include <sys/types.h>
+
+*/
+* Kludge for compiling 32-bit code on a 64-bit FreeBSD:
+* FreeBSD declares uint64_t and int64_t wrong (long unsigned and long int
+* though they need to be long long unsigned and long long int). These
+* defines conflict with our declaration in stdint.h. Adding the defines
+* below omits the definitions in the system header.
+*/
+# include <stdint.h>
+# define _UINT64_T_DECLARED
+# define _INT64_T_DECLARED
+# define _UINTPTR_T_DECLARED
/* Kludge for NetBSD-6.x where the definition of bool in
   * <sys/types.h> does not check for C++.
   */
#if defined(__cplusplus) && defined(bool)
#   undef bool
#   undef true
#   undef false
#endif

/* Kludge for NetBSD-6.x where <sys/types.h> does not define
   * ptdiff_t for the kernel code. Note that we don't worry about
   * redefinition in <stddef.h> since that header doesn't exist for
   * _KERNEL code.
   */
#if defined(_BSD_PTRDIFF_T_
    typedef _BSD_PTRDIFF_T_ ptrdiff_t;
#endif

/* Kludge for the linux kernel:
   * 1. sys/types.h doesn't mix with the kernel.
   * 2. Starting with 2.6.19, linux/types.h typedefs bool and linux/stddef.h
      declares false and true as enum values.
   * 3. Starting with 2.6.24, linux/types.h typedefs uintptr_t.
   * We work around these issues here and nowhere else.
   */
#if defined(__cplusplus)
    typedef bool _Bool;
#   define bool linux_bool
#   define true linux_true
#   define false linux_false
#   define uintptr_t linux_uintptr_t
#endif

/* if LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,33)
   */
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,33)
#   include <generated/autoconf.h>
#else

ifndef AUTOCONF_INCLUDED
+ include <linux/autoconf.h>
+ endif
+ endif
+ include <linux/compiler.h>
+ if defined(__cplusplus)
+ /*
+ * Starting with 3.3, <linux/compiler-gcc.h> appends 'notrace' (which
+ * expands to __attribute__((no_instrument_function))) to inline,
+ * __inline and __inline_. Revert that.
+ */
+ undef inline
+ undef __inline__
+ define inline inline
+ define __inline__ __inline__
+ undef __inline__
+ define __inline__ inline
+ endif
+ include <linux/types.h>
+ include <linux/stddef.h>
+ /*
+ * Starting with 3.4, <linux/stddef.h> defines NULL as '((void*)0)' which
+ * does not work for C++ code.
+ */
+ undef NULL
+ undef uintptr_t
+ ifndef __GNUC__
+ if !RT_GNUC_PREREQ(4, 1)
+ /*
+ * <linux/compiler-gcc[3,4].h> does
+ * #define __inline__ __inline__ __attribute__((always_inline))
+ * in some older Linux kernels. Forcing inlining will fail for some RTStrA*
+ * functions with gcc <= 4.0 due to passing variable argument lists.
+ */
+ undef __inline__
+ define __inline__ __inline__
+ endif
+ endif
+ undef false
+ undef true
+ undef bool
+ else
+ include <stdin.h>
+ include <sys/types.h>
+ endif
+ /* Define any types missing from sys/types.h on windows. */
ifndef __cplusplus
#define NULL 0
#else
#define NULL ((void*)0)
#endif

#ifndef NULL
ifdef __cplusplus
#define NULL 0
#else
#define NULL ((void*)0)
#endif
endif

/** @defgroup grp_rt_types IPRT Base Types
 * @@
 */

ifdef __GNUC__
/** @todo wchar_t on GNUC */
#endif

ifdef __GNUC__
if defined(__IBMCPP__) && defined(RT_OS_OS2)
typedef uint8_t bool;
elseif defined(RT_OS_LINUX) && (__GNUC__ < 3)
typedef uint8_t bool;
endif

ifdef __GNUC__
ifdef __cplusplus
@end
endif
endif
endif
+typedef _Bool bool;
+#else endif
+#elif defined(RT_OS_NETBSD)
+#  if !defined(_KERNEL)
+    /*
+     * For the kernel code <stdbool.h> is not available, but bool is
+     * provided by <sys/types.h> included above.
+     */
+     typedef _Bool bool;
+  #endif
+  #else
+    if (defined(RT_OS_DARWIN) || defined(RT_OS_HAIKU)) && (defined(_STDBOOL_H) || defined(__STDBOOL_H))
+      #undef bool
+  endif
+#else
+  #ifndef true
+   #define true  (1)
+  #endif
+  #ifndef false
+   #define false (0)
+  #endif
+#endif
+
+/**
+ * 128-bit unsigned integer.
+ */

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+#if defined(__GNUC__) && defined(RT_ARCH_AMD64)
+typedef __uint128_t uint128_t;
+#else
+typedef struct uint128_s
+
+## ifdef RT_BIG_ENDIAN
+    uint64_t    Hi;
+    uint64_t    Lo;
+## else
+    uint64_t    Lo;
+    uint64_t    Hi;
+## endif
+
+} uint128_t;
+#endif
+
+* 128-bit signed integer.
+ */
+#if defined(__GNUC__) && defined(RT_ARCH_AMD64)
+typedef __int128_t int128_t;
+#else
+typedef struct int128_s
+
+## ifdef RT_BIG_ENDIAN
+    int64_t     Hi;
+    uint64_t    Lo;
+## else
+    uint64_t    Lo;
+    int64_t     Hi;
+## endif
+
+} int128_t;
+#endif
+
+* 16-bit unsigned integer union.
+ */
+typedef union RTUINT16U
+
+## natural view. */
+    uint16_t    u;
+    
+## 16-bit view. */
+    uint16_t    au16[1];
+    
+## 8-bit view. */
+    uint8_t    au8[2];
+    
+## 16-bit hi/lo view. */
typedef struct
{
    uint8_t Hi;
    uint8_t Lo;
} RTUINT16U;

/** Pointer to a 16-bit unsigned integer union. */
typedef RTUINT16U RT_FAR *PRTUINT16U;

/** Pointer to a const 32-bit unsigned integer union. */
typedef const RTUINT16U RT_FAR *PCRTUINT16U;

/** 32-bit unsigned integer union. */
typedef union RTUINT32U
{
    /* natural view. */
    uint32_t u;
    /* Hi/Low view. */
    struct
    {
        /* big endian */
        uint16_t Hi;
        uint16_t Lo;
        /* little endian */
        uint16_t Lo;
        uint16_t Hi;
    } s;
    /* word view. */
    struct
    {
        /* big endian */
        uint16_t w1;
        uint16_t w0;
        /* little endian */
        uint16_t w0;
        uint16_t w1;
    } Words;
    /* 32-bit view. */
}
+ uint32_t  au32[1];
+ /** 16-bit view. */
+ uint16_t  au16[2];
+ /** 8-bit view. */
+ uint8_t   au8[4];
+ } RTUINT32U;
+/** Pointer to a 32-bit unsigned integer union. */
+typedef RTUINT32U RT_FAR *PRTUINT32U;
+/** Pointer to a const 32-bit unsigned integer union. */
+typedef const RTUINT32U RT_FAR *PCRTUINT32U;
+
+
+/**
+ * 64-bit unsigned integer union.
+ */
+typedef union RTUINT64U
+{
+    /** Natural view. */
+    uint64_t    u;
+    /** Hi/Low view. */
+    struct
+    {
+      #ifdef RT_BIG_ENDIAN
+        uint32_t    Hi;
+        uint32_t    Lo;
+      #else
+        uint32_t    Lo;
+        uint32_t    Hi;
+      #endif
+    } s;
+    /** Double-Word view. */
+    struct
+    {
+      #ifdef RT_BIG_ENDIAN
+        uint32_t    dw1;
+        uint32_t    dw0;
+      #else
+        uint32_t    dw0;
+        uint32_t    dw1;
+      #endif
+    } DWords;
+    /** Word view. */
+    struct
+    {
+      #ifdef RT_BIG_ENDIAN
+        uint16_t    w3;
+        uint16_t    w2;
+        uint16_t    w1;
+      #endif
+    } w;
+    { /* Hi/Low view. */
+        #ifdef RT_BIG_ENDIAN
+            uint64_t Hi;
+            uint64_t Lo;
+        #else
+            uint64_t Lo;
+            uint64_t Hi;
+        #endif
+        } s;
+    }
+    /** Natural view. */
+    uint128_t u;
+}
+/** Pointer to a 64-bit unsigned integer union. */
+typedef RTUINT64U RT_FAR *PRTUINT64U;
+/** Pointer to a const 64-bit unsigned integer union. */
+typedef const RTUINT64U RT_FAR *PCRTUINT64U;
+
+/** 128-bit unsigned integer union. */
+#pragma pack(1)
+typedef union RTUINT128U
+{ /* Hi/Low view. */
+    #ifdef RT_BIG_ENDIAN
+        uint64_t Hi;
+        uint64_t Lo;
+    #else
+        uint64_t Lo;
+        uint64_t Hi;
+    #endif
+    } s;
+    /** Natural view. */
+    uint128_t u;
/* Quad-Word view. */
struct {
#ifdef RT_BIG_ENDIAN
    uint64_t    qw1;
    uint64_t    qw0;
#else
    uint64_t    qw0;
    uint64_t    qw1;
#endif
} QWords;

/* Double-Word view. */
struct {
#ifdef RT_BIG_ENDIAN
    uint32_t    dw3;
    uint32_t    dw2;
    uint32_t    dw1;
    uint32_t    dw0;
#else
    uint32_t    dw0;
    uint32_t    dw1;
    uint32_t    dw2;
    uint32_t    dw3;
#endif
} DWords;

/* Word view. */
struct {
#ifdef RT_BIG_ENDIAN
    uint16_t    w7;
    uint16_t    w6;
    uint16_t    w5;
    uint16_t    w4;
    uint16_t    w3;
    uint16_t    w2;
    uint16_t    w1;
    uint16_t    w0;
#else
    uint16_t    w0;
    uint16_t    w1;
    uint16_t    w2;
    uint16_t    w3;
    uint16_t    w4;
    uint16_t    w5;
    uint16_t    w6;
    uint16_t    w7;
#endif
}
```c
+ } Words;
+
+ /** 64-bit view. */
+ uint64_t    au64[2];
+ /** 32-bit view. */
+ uint32_t    au32[4];
+ /** 16-bit view. */
+ uint16_t    au16[8];
+ /** 8-bit view. */
+ uint8_t     au8[16];
+} RTUINT128U;
+#pragma pack()
+/** Pointer to a 128-bit unsigned integer union. */
+typedef RTUINT128U RT_FAR *PRTUINT128U;
+/** Pointer to a const 128-bit unsigned integer union. */
+typedef const RTUINT128U RT_FAR *PCRTUINT128U;
+
+/** @def RTUINT128_INIT
+ * Portable RTUINT128U initializer. */
+ifdef RT_BIG_ENDIAN
+## define RTUINT128_INIT(a_Hi, a_Lo) { { a_Hi, a_Lo } }
+##else
+## define RTUINT128_INIT(a_Hi, a_Lo) { { a_Lo, a_Hi } }
+##endif
+
+/** @def RTUINT128_INIT_C
+ * Portable RTUINT128U initializer for 64-bit constants. */
+ifdef RT_BIG_ENDIAN
+## define RTUINT128_INIT_C(a_Hi, a_Lo) { { UINT64_C(a_Hi), UINT64_C(a_Lo) } }
+##else
+## define RTUINT128_INIT_C(a_Hi, a_Lo) { { UINT64_C(a_Lo), UINT64_C(a_Hi) } }
+##endif
+
+/**
+ * 256-bit unsigned integer union.
+ */
+###pragma pack(1)
+typedef union RTUINT256U
+{
+    /** Quad-Word view (first as it's used by RTUINT256_INIT). */
+    struct
+    {
+        /**
+         * 256-bit unsigned integer union.
+         */
+        ###pragma pack(1)
+        typedef union RTUINT256U
+        {
+            /**
+             * Quad-Word view (first as it's used by RTUINT256_INIT). */
+            struct
+            {
+                /**
+                 * 256-bit unsigned integer union.
+                 */
+                ###pragma pack(1)
+```
+    } QWords;
+    /** Double-Word view. */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint32_t    dw7;
+            uint32_t    dw6;
+            uint32_t    dw5;
+            uint32_t    dw4;
+            uint32_t    dw3;
+            uint32_t    dw2;
+            uint32_t    dw1;
+            uint32_t    dw0;
+        #else
+            uint32_t    dw0;
+            uint32_t    dw1;
+            uint32_t    dw2;
+            uint32_t    dw3;
+            uint32_t    dw4;
+            uint32_t    dw5;
+            uint32_t    dw6;
+            uint32_t    dw7;
+        #endif
+    } DWords;
+    /** Word view. */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint16_t    w15;
+            uint16_t    w14;
+            uint16_t    w13;
+            uint16_t    w12;
+            uint16_t    w11;
+            uint16_t    w10;
+            uint16_t    w9;
+            uint16_t    w8;
+            uint16_t    w7;
+            uint16_t    w6;
+            uint16_t    w5;
+            uint16_t    w4;
+            uint16_t    w3;
+            uint16_t    w2;
+        #else
+            uint16_t    w2;
+            uint16_t    w3;
+            uint16_t    w4;
+            uint16_t    w5;
+            uint16_t    w6;
+            uint16_t    w7;
+            uint16_t    w8;
+            uint16_t    w9;
+            uint16_t    w10;
+            uint16_t    w11;
+            uint16_t    w12;
+            uint16_t    w13;
+            uint16_t    w14;
+            uint16_t    w15;
+        #endif
+    } Ws;
+    uint16_t  w1;
+    uint16_t  w0;
+  } Words;
+
+  /** Double-Quad-Word view. */
+  struct
+  {
+    #ifdef RT_BIG_ENDIAN
+      RTUINT128U  dqw1;
+      RTUINT128U  dqw0;
+    #else
+      RTUINT128U  dqw0;
+      RTUINT128U  dqw1;
+    #endif
+  } DQWords;
+
+  /** 128-bit view. */
+  RTUINT128U  au128[2];
+  /** 64-bit view. */
+  uint64_t    au64[4];
+  /** 32-bit view. */
+  uint32_t    au32[8];
+  /** 16-bit view. */
+  uint16_t    au16[16];
+  /** 8-bit view. */
+  uint8_t     au8[32];
+  } RTUINT256U;
+  #pragma pack()
+
+  /** Pointer to a 256-bit unsigned integer union. */
+  typedef RTUINT256U RT_FAR *PRTUINT256U;
/** Pointer to a const 256-bit unsigned integer union. */
typedef const RTUINT256U RT_FAR *PCRTUINT256U;

/** @def RTUINT256_INIT
 * Portable RTUINT256U initializer. */
#endif
#define RT_BIG_ENDIAN
#define RTUINT256_INIT(a_Qw3, a_Qw2, a_Qw1, a_Qw0)   { { a_Qw3, a_Qw2, a_Qw1, a_Qw0 } }
#else
#define RTUINT256_INIT(a_Qw3, a_Qw2, a_Qw1, a_Qw0)   { { a_Qw0, a_Qw1, a_Qw2, a_Qw3 } }
#endif

/** @def RTUINT256_INIT_C
 * Portable RTUINT256U initializer for 64-bit constants. */
#define RTUINT256_INIT_C(a_Qw3, a_Qw2, a_Qw1, a_Qw0)  
  RTUINT256_INIT(UINT64_C(a_Qw3), UINT64_C(a_Qw2), UINT64_C(a_Qw1), UINT64_C(a_Qw0))
+
+
/**
 * 512-bit unsigned integer union.
 */
#pragma pack(1)
typedef union RTUINT512U
{
  /** Quad-Word view (first as it's used by RTUINT512_INIT). */
  struct
  {
    /** @ifdef RT_BIG_ENDIAN
    +   uint64_t qw7;
    +   uint64_t qw6;
    +   uint64_t qw5;
    +   uint64_t qw4;
    +   uint64_t qw3;
    +   uint64_t qw2;
    +   uint64_t qw1;
    +   uint64_t qw0;
    */
    QWords;
    
    /** @else
    +   uint64_t qw0;
    +   uint64_t qw1;
    +   uint64_t qw2;
    +   uint64_t qw3;
    +   uint64_t qw4;
    +   uint64_t qw5;
    +   uint64_t qw6;
    +   uint64_t qw7;
    */
    endif
  }
  QWords;
  
  /** Double-Word view. */
  struct
```c
{ #ifdef RT_BIG_ENDIAN
    uint32_t    dw15;
    uint32_t    dw14;
    uint32_t    dw13;
    uint32_t    dw12;
    uint32_t    dw11;
    uint32_t    dw10;
    uint32_t    dw9;
    uint32_t    dw8;
    uint32_t    dw7;
    uint32_t    dw6;
    uint32_t    dw5;
    uint32_t    dw4;
    uint32_t    dw3;
    uint32_t    dw2;
    uint32_t    dw1;
    uint32_t    dw0;
#else
    uint32_t    dw0;
    uint32_t    dw1;
    uint32_t    dw2;
    uint32_t    dw3;
    uint32_t    dw4;
    uint32_t    dw5;
    uint32_t    dw6;
    uint32_t    dw7;
    uint32_t    dw8;
    uint32_t    dw9;
    uint32_t    dw10;
    uint32_t    dw11;
    uint32_t    dw12;
    uint32_t    dw13;
    uint32_t    dw14;
    uint32_t    dw15;
#endif
} DWords;
/** Word view. */
struct
{ #ifdef RT_BIG_ENDIAN
    uint16_t    w31;
    uint16_t    w30;
    uint16_t    w29;
    uint16_t    w28;
    uint16_t    w27;
    uint16_t    w26;
    uint16_t    w25;
#else
    uint16_t    w31;
    uint16_t    w29;
    uint16_t    w28;
    uint16_t    w27;
    uint16_t    w26;
    uint16_t    w25;
#endif
} Words;
```
+  uint16_t   w24;
+  uint16_t   w23;
+  uint16_t   w22;
+  uint16_t   w21;
+  uint16_t   w20;
+  uint16_t   w19;
+  uint16_t   w18;
+  uint16_t   w17;
+  uint16_t   w16;
+  uint16_t   w15;
+  uint16_t   w14;
+  uint16_t   w13;
+  uint16_t   w12;
+  uint16_t   w11;
+  uint16_t   w10;
+  uint16_t   w9;
+  uint16_t   w8;
+  uint16_t   w7;
+  uint16_t   w6;
+  uint16_t   w5;
+  uint16_t   w4;
+  uint16_t   w3;
+  uint16_t   w2;
+  uint16_t   w1;
+  uint16_t   w0;
+#else
+  uint16_t   w0;
+  uint16_t   w1;
+  uint16_t   w2;
+  uint16_t   w3;
+  uint16_t   w4;
+  uint16_t   w5;
+  uint16_t   w6;
+  uint16_t   w7;
+  uint16_t   w8;
+  uint16_t   w9;
+  uint16_t   w10;
+  uint16_t   w11;
+  uint16_t   w12;
+  uint16_t   w13;
+  uint16_t   w14;
+  uint16_t   w15;
+  uint16_t   w16;
+  uint16_t   w17;
+  uint16_t   w18;
+  uint16_t   w19;
+  uint16_t   w20;
+  uint16_t   w21;
+    struct
+    {
+        uint16_t    w22;
+        uint16_t    w23;
+        uint16_t    w24;
+        uint16_t    w25;
+        uint16_t    w26;
+        uint16_t    w27;
+        uint16_t    w28;
+        uint16_t    w29;
+        uint16_t    w30;
+        uint16_t    w31;
+    } Words;
+
+    /** Double-Quad-Word view. */
+    struct
+    {
+        RTUINT128U  dqw3;
+        RTUINT128U  dqw2;
+        RTUINT128U  dqw1;
+        RTUINT128U  dqw0;
+    } DQWords;
+
+    /** Octo-Word view. */
+    struct
+    {
+        RTUINT256U  ow3;
+        RTUINT256U  ow2;
+        RTUINT256U  ow1;
+        RTUINT256U  ow0;
+    } OWords;
+
+    /** 256-bit view. */
+    RTUINT256U  au256[2];
+    /** 128-bit view. */
+ RTUINT512U au128[4];
+ /**< 64-bit view. */
+ uint64_t au64[8];
+ /**< 32-bit view. */
+ uint32_t au32[16];
+ /**< 16-bit view. */
+ uint16_t au16[32];
+ /**< 8-bit view. */
+ uint8_t au8[64];
+} RTUINT512U;
+#pragma pack()
+/** Pointer to a 512-bit unsigned integer union. */
typedef RTUINT512U RT_FAR *PRTUINT512U;
+/** Pointer to a const 512-bit unsigned integer union. */
typedef const RTUINT512U RT_FAR *PCRTUINT512U;
+
+/** @def RTUINT512_INIT
+ * Portable RTUINT512U initializer. */
+ NDEBUG RT_BIG_ENDIAN
+# define RTUINT512_INIT(a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0) 
+ { { a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0 } } 
+#else
+# define RTUINT512_INIT(a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0) 
+ { { a_Qw0, a_Qw1, a_Qw2, a_Qw3, a_Qw4, a_Qw5, a_Qw6, a_Qw7 } } 
+#endif
+
+/** @def RTUINT512_INIT_C
+ * Portable RTUINT512U initializer for 64-bit constants. */
+ NDEBUG RT_BIG_ENDIAN
+define RTUINT512_INIT_C(a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0) 
+ { uint64_t C(a_Qw7), UINT64_C(a_Qw6), UINT64_C(a_Qw5), UINT64_C(a_Qw4), 
+ UINT64_C(a_Qw3), UINT64_C(a_Qw2), UINT64_C(a_Qw1), UINT64_C(a_Qw0)) 
+
+/**
+ * Double precision floating point format (64-bit).
+ */
typedef union RTFLOAT64U 
+{ 
+if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86) 
+ /**< Double view. */
+ double rd;
+#endif
+ /**< Format using regular bitfields. */
+ struct 
+ { 
+# ifdef RT_BIG_ENDIAN 
+ /**< The sign indicator. */
+ uint32_t tSign : 1;
/** The exponent (offseted by 1023). */
uint32_t uExponent : 11;
/** The fraction, bits 32 thru 51. */
uint32_t u20FractionHigh : 20;
/** The fraction, bits 0 thru 31. */
uint32_t u32FractionLow;
#ifdef RT_COMPILER_GROKS_64BIT_BITFIELDS
/** Format using 64-bit bitfields. */
RT_GCC_EXTENSION struct
{  
  /** The sign indicator. */
  uint64_t fSign : 1;
  /** The exponent (offseted by 1023). */
  uint64_t uExponent : 11;
  /** The fraction. */
  uint64_t uFraction : 52;
} s64;
#else
/** The fraction, bits 0 thru 31. */
uint32_t u32FractionLow;
/** The fraction, bits 32 thru 51. */
uint32_t u20FractionHigh : 20;
/** The exponent (offseted by 1023). */
uint32_t uExponent : 11;
/** The sign indicator. */
uint32_t fSign : 1;
#endif
} s;

#ifdef RT_COMPILER_GROKS_64BIT_BITFIELDS
/** Format using 64-bit bitfields. */
RT_GCC_EXTENSION struct
{  
  /** The sign indicator. */
  uint64_t fSign : 1;
  /** The exponent (offseted by 1023). */
  uint64_t uExponent : 11;
  /** The fraction. */
  uint64_t uFraction : 52;
} s64;
#else
/** The fraction, bits 0 thru 31. */
uint32_t u32FractionLow;
/** The fraction, bits 32 thru 51. */
uint32_t u20FractionHigh : 20;
/** The exponent (offseted by 1023). */
uint32_t uExponent : 11;
/** The sign indicator. */
uint32_t fSign : 1;
#endif
} s64;
#endif RT_BIG_ENDIAN
/** The sign indicator. */
RT_GCC_EXTENSION uint64_t fSign : 1;
/** The exponent (offseted by 1023). */
RT_GCC_EXTENSION uint64_t uExponent : 11;
/** The fraction. */
RT_GCC_EXTENSION uint64_t uFraction : 52;
#endif
/** The fraction. */
RT_GCC_EXTENSION uint64_t uFraction : 52;
/** The exponent (offseted by 1023). */
RT_GCC_EXTENSION uint64_t uExponent : 11;
/** The sign indicator. */
RT_GCC_EXTENSION uint64_t fSign : 1;
#endif
} s64;
#endif
/** 64-bit view. */
uint64_t au64[1];
/** 32-bit view. */
uint32_t au32[2];
/** 16-bit view. */
uint16_t au16[4];
/** 8-bit view. */
uint8_t au8[8];
+} RTFLOAT64U;
+/** Pointer to a double precision floating point format union. */
+typedef RTFLOAT64U RT_FAR *PRTFLOAT64U;
+/** Pointer to a const double precision floating point format union. */
+typedef const RTFLOAT64U RT_FAR *PCRTFLOAT64U;
+
+
+#if !defined(__IBMCPP__) && !defined(__IBM__) && !defined(__IBMC__)
+
+/** Extended Double precision floating point format (80-bit). */
+*/
+#pragma pack(1)
+typedef union RTFLOAT80U
+{
+    /** Format using bitfields. */
+    RT_GCC_EXTENSION struct
+    {
+      /** The sign indicator. */
+      RT_GCC_EXTENSION uint16_t   fSign : 1;
+      /** The exponent (offseted by 16383). */
+      RT_GCC_EXTENSION uint16_t   uExponent : 15;
+      /** The mantissa. */
+      uint64_t                    u64Mantissa;
+    } s;
+
+    /** 64-bit view. */
+    uint64_t    au64[1];
+    /** 32-bit view. */
+    uint32_t    au32[2];
+    /** 16-bit view. */
+    uint16_t    au16[5];
+    /** 8-bit view. */
+    uint8_t     au8[10];
+} RTFLOAT80U;
+#pragma pack()
+/** Pointer to a extended precision floating point format union. */
+typedef RTFLOAT80U RT_FAR *PRTFLOAT80U;
+/** Pointer to a const extended precision floating point format union. */
+typedef const RTFLOAT80U RT_FAR *PCRTFLOAT80U;
+
+
+/**
+ * A variant of RTFLOAT80U that may be larger than 80-bits depending on how the
+ * compiler implements long double.
+ */
+#pragma pack(1)
+typedef union RTFLOAT80U2
+{
+    /** Long double view. */
+    long double lrd;
+    /** Format using bitfields. */
+    RT_GCC_EXTENSION struct
+    {
+        /** The sign indicator. */
+        RT_GCC_EXTENSION uint16_t fSign : 1;
+        /** The exponent (offseted by 16383). */
+        RT_GCC_EXTENSION uint16_t uExponent : 15;
+        /** The mantissa. */
+        uint64_t u64Mantissa;
+    } s;
+    /** Bitfield exposing the J bit and the fraction. */
+    RT_GCC_EXTENSION struct
+    {
+        /** The sign indicator. */
+        RT_GCC_EXTENSION uint16_t fSign : 1;
+        /** The exponent (offseted by 16383). */
+        RT_GCC_EXTENSION uint16_t uExponent : 15;
+        /** The sign indicator. */
+        RT_GCC_EXTENSION uint16_t fSign : 1;
+    } s;
+} s;
+
+/** Bitfield exposing the J bit and the fraction. */
+RT_GCC_EXTENSION struct
+{
+    /** The sign indicator. */
+    RT_GCC_EXTENSION uint16_t fSign : 1;
+    /** The exponent (offseted by 16383). */
+    RT_GCC_EXTENSION uint16_t uExponent : 15;
+    /** The J bit, aka the integer bit. */
+    uint32_t fInteger;
+    /** The fraction, bits 32 thru 62. */
+    uint32_t u31FractionHigh : 31;
+    /** The fraction, bits 0 thru 31. */
+    uint32_t u32FractionLow : 32;
+ /* The fraction, bits 0 thru 31. */
+ uint32_t u32FractionLow : 32;
+ /* The fraction, bits 32 thru 62. */
+ uint32_t u31FractionHigh : 31;
+ /* The J bit, aka the integer bit. */
+ uint32_t fInteger;
+ /* The exponent (offseted by 16383). */
+ RT_GCC_EXTENSION uint16_t uExponent : 15;
+ /* The sign indicator. */
+ RT_GCC_EXTENSION uint16_t fSign : 1;
+#endif
+ } sj;
+
+#ifdef RT_COMPILER_GROKS_64BIT_BITFIELDS
+ /* 64-bit bitfields exposing the J bit and the fraction. */
+ RT_GCC_EXTENSION struct {
+     /* The sign indicator. */
+     RT_GCC_EXTENSION uint16_t fSign : 1;
+     /* The exponent (offseted by 16383). */
+     RT_GCC_EXTENSION uint16_t uExponent : 15;
+     /* The J bit, aka the integer bit. */
+     RT_GCC_EXTENSION uint64_t fInteger : 1;
+     /* The fraction. */
+     RT_GCC_EXTENSION uint64_t u63Fraction : 63;
+ } sj64;
+#endif
+
+    /* 64-bit view. */
+    uint64_t au64[1];
+ /* 32-bit view. */
+    uint32_t au32[2];
+ /* 16-bit view. */
+    uint16_t au16[5];
+ /* 8-bit view. */
+    uint8_t au8[10];
typedef RTFLOAT80U2 RT_FAR *PRTFLOAT80U2;
/** Pointer to a extended precision floating point format union, 2nd
+ * variant. */
typedef const RTFLOAT80U2 RT_FAR *PCRTFLOAT80U2;

#ifndef uint16_t bitfields doesn’t work */
+
+
/** Generic function type.
+ * @see PFNRT
+ */
typedef DECLCALLBACK(void) FNRT(void);
+
/** Generic function pointer.
+ * With -pedantic, gcc-4 complains when casting a function to a data object, for
+ * example:
+ *
+ * @code
+ * void foo(void)
+ * {
+ * }
+ *
+ * void *bar = (void *)foo;
+ * @endcode
+ *
+ * The compiler would warn with "ISO C++ forbids casting between
+ * pointer-to-function and pointer-to-object". The purpose of this warning is
+ * not to bother the programmer but to point out that he is probably doing
+ * something dangerous, assigning a pointer to executable code to a data object.
+ */
typedef FNRT *PFNRT;
+
/** Millisecond interval. */
typedef uint32_t RTMSINTERVAL;
/** Pointer to a millisecond interval. */
typedef RTMSINTERVAL RT_FAR *PRTMSINTERVAL;
/** Pointer to a const millisecond interval. */
typedef const RTMSINTERVAL RT_FAR *PCRTMSINTERVAL;
+
/** Pointer to a time spec structure. */
typedef struct RTTIMESPEC RT_FAR *PRTTIMESPEC;
/** Pointer to a const time spec structure. */
typedef const struct RTTIMESPEC RT_FAR *PCRTTIMESPEC;
+
/** @defgroup grp_rt_types_both Common Guest and Host Context Basic Types */

/** Signed integer which can contain both GC and HC pointers. */
#if (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
    typedef int32_t RTINTPTR;
#elif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
    typedef int64_t RTINTPTR;
#else
    #error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif

/** Pointer to signed integer which can contain both GC and HC pointers. */
typedef RTINTPTR RT_FAR *PRTINTPTR;

/** Pointer const to signed integer which can contain both GC and HC pointers. */
typedef const RTINTPTR RT_FAR *PCRTINTPTR;

/** The maximum value the RTINTPTR type can hold. */
#if (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
    #define RTINTPTR_MAX INT32_MAX
#elif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
    #define RTINTPTR_MAX INT64_MAX
#else
    #error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif

/** The minimum value the RTINTPTR type can hold. */
#if (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
    #define RTINTPTR_MIN INT32_MIN
#elif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
    #define RTINTPTR_MIN INT64_MIN
#else
    #error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif

/** Unsigned integer which can contain both GC and HC pointers. */
#if (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
    typedef uint32_t RTUINTPTR;
#elif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
    typedef uint64_t RTUINTPTR;
#else
    #error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif

/** Pointer to unsigned integer which can contain both GC and HC pointers. */

typedef RTUINTPTR RT_FAR *PRTUINTPTR;
+/** Pointer const to unsigned integer which can contain both GC and HC pointers. */
+typedef const RTUINTPTR RT_FAR *PCRTUINTPTR;
+/** The maximum value the RTUINTPTR type can hold. */
+if (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
+define RTUINTPTR_MAX UINT32_MAX
+elif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
+define RTUINTPTR_MAX UINT64_MAX
+else
+error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
+endif
+
+/** Signed integer. */
typedef int32_t RTINT;
+/** Pointer to signed integer. */
typedef RTINT RT_FAR *PRTINT;
+/** Pointer to const signed integer. */
typedef const RTINT RT_FAR *PCRTINT;
+
+/** Unsigned integer. */
typedef uint32_t RTUINT;
+/** Pointer to unsigned integer. */
typedef RTUINT RT_FAR *PRTUINT;
+/** Pointer to const unsigned integer. */
typedef const RTUINT RT_FAR *PCRTUINT;
+
+/** A file offset / size (off_t). */
typedef int64_t RTFOFF;
+/** Pointer to a file offset / size. */
typedef RTFOFF RT_FAR *PRTFOFF;
+/** The max value for RTFOFF. */
define RTFOFF_MAX INT64_MAX
+/** The min value for RTFOFF. */
define RTFOFF_MIN INT64_MIN
+
+/** File mode (see iprt/fs.h). */
typedef uint32_t RTMODE;
+/** Pointer to file mode. */
typedef RTMODE RT_FAR *PRTMODE;
+
+/** Device unix number. */
typedef uint32_t RTDEV;
+/** Pointer to a device unix number. */
typedef RTDEV RT_FAR *PRTDEV;
+
+@name RTDEV Macros
+* @ { */
+/**
+ * Our makedev macro.
+ * @returns RTDEV
+ * @param  uMajor The major device number.
+ * @param  uMinor The minor device number.
+ */
+#define RTDEV_MAKE(uMajor, uMinor)      ((RTDEV)( ((RTDEV)(uMajor) << 24) | (uMinor & UINT32_C(0x00ffffff)) ))
+/**
+ * Get the major device node number from an RTDEV type.
+ * @returns The major device number of @a uDev
+ * @param  uDev The device number.
+ */
+#define RTDEV_MAJOR(uDev)               ((uDev) >> 24)
+/**
+ * Get the minor device node number from an RTDEV type.
+ * @returns The minor device number of @a uDev
+ * @param  uDev The device number.
+ */
+#define RTDEV_MINOR(uDev)               ((uDev) & UINT32_C(0x00ffffff))
+/** @} */
+
+/** i-node number. */
typedef uint64_t                RTINODE;
+/** Pointer to a i-node number. */
typedef RTINODE         RT_FAR *PRTINODE;
+
+/** User id. */
typedef uint32_t                RTUID;
+/** Pointer to a user id. */
typedef RTUID           RT_FAR *PRTUID;
+/** NIL user id.
+ * @todo check this for portability! */
+#define NIL_RTUID               (~(RTUID)0)
+
+/** Group id. */
typedef uint32_t                RTGID;
+/** Pointer to a group id. */
typedef RTGID           RT_FAR *PRTGID;
+/** NIL group id.
+ * @todo check this for portability! */
+#define NIL_RTGID               (~(RTGID)0)
+
+/** I/O Port. */
typedef uint16_t                RTIOPORT;
+/** Pointer to I/O Port. */
typedef RTIOPORT        RT_FAR *PRTIOPORT;
+/** Pointer to const I/O Port. */
typedef const RTIOPORT RT_FAR *PCRTIOPORT;
+
+/** Selector. */
typedef uint16_t RTSEL;
+/** Pointer to selector. */
typedef RTSEL RT_FAR *PRTSEL;
+/** Pointer to const selector. */
typedef const RTSEL RT_FAR *PCRTSEL;
+/** Max selector value. */
#define RTSEL_MAX UINT16_MAX
+
+/** Far 16-bit pointer. */
#pragma pack(1)
typedef struct RTFAR16
+
\{
    uint16_t off;
    RTSEL sel;
\} RTFAR16;
#pragma pack()
+/** Pointer to Far 16-bit pointer. */
typedef RTFAR16 RT_FAR *PRTFAR16;
+/** Pointer to const Far 16-bit pointer. */
typedef const RTFAR16 RT_FAR *PCRTFAR16;
+
+/** Far 32-bit pointer. */
#pragma pack(1)
typedef struct RTFAR32
+
\{
    uint32_t off;
    RTSEL sel;
\} RTFAR32;
#pragma pack()
+/** Pointer to Far 32-bit pointer. */
typedef RTFAR32 RT_FAR *PRTFAR32;
+/** Pointer to const Far 32-bit pointer. */
typedef const RTFAR32 RT_FAR *PCRTFAR32;
+
+/** Far 64-bit pointer. */
#pragma pack(1)
typedef struct RTFAR64
+
\{
    uint64_t off;
    RTSEL sel;
\} RTFAR64;
#pragma pack()
+/** Pointer to Far 64-bit pointer. */
typedef RTFAR64 RT_FAR *PRTFAR64;
+/** Pointer to const Far 64-bit pointer. */
typedef const RTFAR64 RT_FAR *PCRTFAR64;
+
+/** @} */
+
+/** @defgroup grp_rt_types_hc  Host Context Basic Types
+ * @{
+ */
+
+/** HC Natural signed integer.
+ * @deprecated silly type. */
typedef int32_t RTHCINT;
+/** Pointer to HC Natural signed integer.
+ * @deprecated silly type. */
typedef RTHCINT RT_FAR *PRTHCINT;
+/** Pointer to const HC Natural signed integer.
+ * @deprecated silly type. */
typedef const RTHCINT RT_FAR *PCRTHCINT;
+
+/** HC Natural unsigned integer.
+ * @deprecated silly type. */
typedef uint32_t RTHCUINT;
+/** Pointer to HC Natural unsigned integer.
+ * @deprecated silly type. */
typedef RTHCUINT RT_FAR *PRTHCUINT;
+/** Pointer to const HC Natural unsigned integer.
+ * @deprecated silly type. */
typedef const RTHCUINT RT_FAR *PCRTHCUINT;
+
+/** Signed integer which can contain a HC pointer. */
#if HC_ARCH_BITS == 32 || HC_ARCH_BITS == 16
typedef int32_t RTHCINTPTR;
#elif HC_ARCH_BITS == 64
typedef int64_t RTHCINTPTR;
#else
#error Unsupported HC_ARCH_BITS value.
#endif
+/** Pointer to signed integer which can contain a HC pointer. */
typedef RTHCINTPTR RT_FAR *PRTHCINTPTR;
+/** Pointer to const signed integer which can contain a HC pointer. */
typedef const RTHCINTPTR RT_FAR *PCRTHCINTPTR;
+/** Max RTHCINTPTR value. */
#if HC_ARCH_BITS == 32
#define RTHCINTPTR_MAX INT32_MAX
#elif HC_ARCH_BITS == 64
#define RTHCINTPTR_MAX INT64_MAX
#else

+# define RTHCINTPTR_MAX     INT16_MAX
+#endif
+/** Min RTHCINTPTR value. */
+##if HC_ARCH_BITS == 32
+## define RTHCINTPTR_MIN     INT32_MIN
+##elif HC_ARCH_BITS == 64
+## define RTHCINTPTR_MIN     INT64_MIN
+##else
+## define RTHCINTPTR_MIN     INT16_MIN
+##endif
+/** Signed integer which can contain a HC ring-3 pointer. */
+##if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
+typedef int32_t                RTR3INTPTR;
+##elif R3_ARCH_BITS == 64
+typedef int64_t                RTR3INTPTR;
+##else
+## error Unsupported R3_ARCH_BITS value.
+##endif
+/** Pointer to signed integer which can contain a HC ring-3 pointer. */
+typedef RTR3INTPTR     RT_FAR *PRTR3INTPTR;
+/** Pointer to const signed integer which can contain a HC ring-3 pointer. */
+typedef const RTR3INTPTR RT_FAR *PCRTR3INTPTR;
+/** Max RTR3INTPTR value. */
+##if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
+## define RTR3INTPTR_MAX     INT32_MAX
+##else
+## define RTR3INTPTR_MAX     INT64_MAX
+##endif
+/** Min RTR3INTPTR value. */
+##if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
+## define RTR3INTPTR_MIN     INT32_MIN
+##else
+## define RTR3INTPTR_MIN     INT64_MIN
+##endif
+/** Signed integer which can contain a HC ring-0 pointer. */
+##if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+typedef int32_t                RTR0INTPTR;
+##elif R0_ARCH_BITS == 64
+typedef int64_t                RTR0INTPTR;
+##else
+## error Unsupported R0_ARCH_BITS value.
+##endif
+/** Pointer to signed integer which can contain a HC ring-0 pointer. */
+typedef RTR0INTPTR     RT_FAR *PRTR0INTPTR;
+/** Pointer to const signed integer which can contain a HC ring-0 pointer. */
+typedef const RTR0INTPTR RT_FAR *PCRTR0INTPTR;
+/** Max RTR0INTPTR value. */
+if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+  define RTR0INTPTR_MAX INT32_MAX
+else
+  define RTR0INTPTR_MAX INT64_MAX
+endif
+/** Min RTHCINTPTR value. */
+if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+  define RTR0INTPTR_MIN INT32_MIN
+else
+  define RTR0INTPTR_MIN INT64_MIN
+endif
+
+/** Unsigned integer which can contain a HC pointer. */
+if HC_ARCH_BITS == 32 || HC_ARCH_BITS == 16
+typedef uint32_t RTHCUINTPTR;
+elif HC_ARCH_BITS == 64
+typedef uint64_t RTHCUINTPTR;
+else
+  error Unsupported HC_ARCH_BITS value.
+endif
+/** Pointer to unsigned integer which can contain a HC pointer. */
+typedef RTHCUINTPTR RT_FAR *PRTHCUINTPTR;
+/** Pointer to unsigned integer which can contain a HC pointer. */
+typedef const RTHCUINTPTR RT_FAR *PCRTHCUINTPTR;
+/** Max RTHCUINTTPR value. */
+if HC_ARCH_BITS == 32 || HC_ARCH_BITS == 16
+  define RTHCUINTPTR_MAX UINT32_MAX
+else
+  define RTHCUINTPTR_MAX UINT64_MAX
+endif
+
+/** Unsigned integer which can contain a HC ring-3 pointer. */
+if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
+typedef uint32_t RTR3UINTPTR;
+elif R3_ARCH_BITS == 64
+typedef uint64_t RTR3UINTPTR;
+else
+  error Unsupported R3_ARCH_BITS value.
+endif
+/** Pointer to unsigned integer which can contain a HC ring-3 pointer. */
+typedef RTR3UINTPTR RT_FAR *PRTR3UINTPTR;
+/** Pointer to unsigned integer which can contain a HC ring-3 pointer. */
+typedef const RTR3UINTPTR RT_FAR *PCRTR3UINTPTR;
+/** Max RTHCINTTPR value. */
+if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
+  define RTR3UINTPTR_MAX UINT32_MAX
+else
+  define RTR3UINTPTR_MAX UINT64_MAX
+endif
```c
+#define RTR0UINTPTR_MAX        UINT64_MAX
+#endif
+
+/** Unsigned integer which can contain a HC ring-0 pointer. */
+#if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+typedef uint32_t                RTR0UINTPTR;
+#elif R0_ARCH_BITS == 64
+typedef uint64_t                RTR0UINTPTR;
+#else
+# error Unsupported R0_ARCH_BITS value.
+#endif
+#define RTR0UINTPTR_MAX        UINT32_MAX
+
+/** Pointer to unsigned integer which can contain a HC ring-0 pointer. */
+typedef RTR0UINTPTR             RT_FAR *PRTR0UINTPTR;
+/** Pointer to const unsigned integer which can contain a HC ring-0 pointer. */
+typedef const RTR0UINTPTR     RT_FAR *PCRTR0UINTPTR;
+/** Max RTR0UINTTPR value. */
+#if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+#define RTR0UINTPTR_MAX        UINT32_MAX
+#elif R0_ARCH_BITS == 64
+#define RTR0UINTPTR_MAX        UINT64_MAX
+#else
+# error Unsupported R0_ARCH_BITS value.
+#endif
+
+/** Host Physical Memory Address. */
+typedef uint64_t                RTHCPHYS;
+/** Pointer to Host Physical Memory Address. */
+typedef RTHCPHYS        RT_FAR *PRTHCPHYS;
+/** Pointer to const Host Physical Memory Address. */
+typedef const RTHCPHYS  RT_FAR *PCRTHCPHYS;
+#define NIL_RTHCPHYS            (~(RTHCPHYS)0)
+/** HC pointer. */
+#ifndef IN_RC
+typedef void            RT_FAR *RTHCPTR;
+#else
+typedef RTHCUINTPTR             RTHCPTR;
+#endif
+/** Pointer to HC pointer. */
+typedef RTHCPTR         RT_FAR *PRTHCPTR;
```
/* Pointer to const HC pointer. */
typedef const RTHCPTR *PCRTHCPTR;

/* @def NIL_RTHCPTR *
* NIL HC pointer.
+ */
#define NIL_RTHCPTR ((RTHCPTR)0)

/* Max RTHCPTR value. */
#define RTHCPTR_MAX ((RTHCPTR)RTHCUINTPTR_MAX)

/* HC ring-3 pointer. */
#ifdef IN_RING3
typedef void RT_FAR *RTR3PTR;
#else
typedef RTR3UINTPTR RTR3PTR;
#endif

/* Pointer to HC ring-3 pointer. */
typedef RTR3PTR RT_FAR *PRTR3PTR;

/* Pointer to const HC ring-3 pointer. */
typedef const RTR3PTR *PCRTR3PTR;

/* @def NIL_RTR3PTR *
* NIL HC ring-3 pointer.
+ */
#ifndef IN_RING3
#define NIL_RTR3PTR ((RTR3PTR)0)
#else
#define NIL_RTR3PTR (NULL)
#endif

/* Max RTR3PTR value. */
#define RTR3PTR_MAX ((RTR3PTR)RTR3UINTPTR_MAX)

/* HC ring-0 pointer. */
#ifdef IN_RING0
typedef void RT_FAR *RTR0PTR;
#else
typedef RTR0UINTPTR RTR0PTR;
#endif

/* Pointer to HC ring-0 pointer. */
typedef RTR0PTR RT_FAR *PRTR0PTR;

/* Pointer to const HC ring-0 pointer. */
typedef const RTR0PTR *PCRTR0PTR;

/* @def NIL_RTR0PTR *
* NIL HC ring-0 pointer.
+ */
#ifndef IN_RING0
#define NIL_RTR0PTR ((RTR0PTR)0)
#else
#define NIL_RTR0PTR (NULL)
#endif
+#ifdef
+/** Max RTR3PTR value. */
+#define RTR0PTR_MAX ((RTR0PTR)RTR0UINTPTR_MAX)
+
+#else

+/** Unsigned integer register in the host context. */
+if HC_ARCH_BITS == 32
+typedef uint32_t RTHCUINTREG;
+elif HC_ARCH_BITS == 64
+typedef uint64_t RTHCUINTREG;
+elif HC_ARCH_BITS == 16
+typedef uint16_t RTHCUINTREG;
+else
+## error "Unsupported HC_ARCH_BITS!"
+endif

+/** Pointer to an unsigned integer register in the host context. */
+typedef RTHCUINTREG RT_FAR *PRTHCUINTREG;

+/** Pointer to a const unsigned integer register in the host context. */
+typedef const RTHCUINTREG RT_FAR *PCRTHCUINTREG;
+
+/** Unsigned integer register in the host ring-3 context. */
+if R3_ARCH_BITS == 32
+typedef uint32_t RTR3UINTREG;
+elif R3_ARCH_BITS == 64
+typedef uint64_t RTR3UINTREG;
+elif R3_ARCH_BITS == 16
+typedef uint16_t RTR3UINTREG;
+else
+## error "Unsupported R3_ARCH_BITS!"
+endif

+/** Pointer to an unsigned integer register in the host ring-3 context. */
+typedef RTR3UINTREG RT_FAR *PRTR3UINTREG;

+/** Pointer to a const unsigned integer register in the host ring-3 context. */
+typedef const RTR3UINTREG RT_FAR *PCRTR3UINTREG;
+
+/** Unsigned integer register in the host ring-3 context. */
+if R0_ARCH_BITS == 32
+typedef uint32_t RTR0UINTREG;
+elif R0_ARCH_BITS == 64
+typedef uint64_t RTR0UINTREG;
+elif R0_ARCH_BITS == 16
+typedef uint16_t RTR0UINTREG;
+else
+## error "Unsupported R3_ARCH_BITS!"
+endif

+/** Pointer to an unsigned integer register in the host ring-3 context. */
+typedef RTR0UINTREG RT_FAR *PRTR0UINTREG;

+/** Pointer to a const unsigned integer register in the host ring-3 context. */
+typedef const RTR0UINTREG RT_FAR *PCRTR0UINTREG;
+
+/** @} */
+
+
+/** @} */
+
+@defgroup grp_rt_types_gc Guest Context Basic Types
+
+ * @} 
+
+ /**< Natural signed integer in the GC.
+ */
+ *
+@deprecated silly type. */
+#if GC_ARCH_BITS == 32
+typedef int32_t                 RTGCINT;
+#elif GC_ARCH_BITS == 64 /**< @todo this isn't right, natural int is 32-bit, see RTHCINT. */
+typedef int64_t                 RTGCINT;
+#endif

+ /**< Pointer to natural signed integer in GC.
+ */
+ *
+@deprecated silly type. */
+typedef RTGCINT RT_FAR *PRTGCINT;
+
+ /**< Pointer to const natural signed integer in GC.
+ */
+ *
+@deprecated silly type. */
+typedef const RTGCINT   RT_FAR *PCRTGCINT;

+ /**< Natural unsigned integer in the GC.
+ */
+ *
+@deprecated silly type. */
+#if GC_ARCH_BITS == 32
+typedef uint32_t                RTGCUINT;
+#elif GC_ARCH_BITS == 64 /**< @todo this isn't right, natural int is 32-bit, see RTHCUINT. */
+typedef uint64_t                RTGCUINT;
+#endif

+ /**< Pointer to natural unsigned integer in GC.
+ */
+ *
+@deprecated silly type. */
+typedef RTGCUINT        RT_FAR *PRTGCUINT;
+
+ /**< Pointer to const natural unsigned integer in GC.
+ */
+ *
+@deprecated silly type. */
+typedef const RTGCUINT  RT_FAR *PCRTGCUINT;

+ /**< Signed integer which can contain a GC pointer. */
+ /**< @} */
+ *
+@deprecated silly type. */
+#if GC_ARCH_BITS == 32
+typedef int32_t                 RTGCINTPTR;
+#elif GC_ARCH_BITS == 64
+typedef int64_t                 RTGCINTPTR;
+#endif

+ /**< Pointer to signed integer which can contain a GC pointer. */
+ /**< @} */
+ *
+@deprecated silly type. */
+typedef RTGCINTPTR      RT_FAR *PRTGCINTPTR;
+
+ /**< Pointer to const signed integer which can contain a GC pointer. */
+ /**< @} */
+ *
+@deprecated silly type. */
+typedef const RTGCINTPTR RT_FAR *PCRTGCINTPTR;
/** Unsigned integer which can contain a GC pointer. */
#if GC_ARCH_BITS == 32
typedef uint32_t RTGCUINTPTR;
#elif GC_ARCH_BITS == 64
typedef uint64_t RTGCUINTPTR;
#else
#error Unsupported GC_ARCH_BITS value.
#endif
/** Pointer to unsigned integer which can contain a GC pointer. */
typedef RTGCUINTPTR RT_FAR *PRTGCUINTPTR;
/** Pointer to unsigned integer which can contain a GC pointer. */
typedef const RTGCUINTPTR RT_FAR *PCRTGCUINTPTR;

/** Unsigned integer which can contain a 32 bits GC pointer. */
typedef uint32_t RTGCUINTPTR32;
/** Pointer to unsigned integer which can contain a 32 bits GC pointer. */
typedef RTGCUINTPTR32 RT_FAR *PRTGCUINTPTR32;
/** Pointer to unsigned integer which can contain a 32 bits GC pointer. */
typedef const RTGCUINTPTR32 RT_FAR *PCRTGCUINTPTR32;

/** Unsigned integer which can contain a 64 bits GC pointer. */
typedef uint64_t RTGCUINTPTR64;
/** Pointer to unsigned integer which can contain a 64 bits GC pointer. */
typedef RTGCUINTPTR64 RT_FAR *PRTGCUINTPTR64;
/** Pointer to unsigned integer which can contain a 64 bits GC pointer. */
typedef const RTGCUINTPTR64 RT_FAR *PCRTGCUINTPTR64;

/** Guest Physical Memory Address. */
typedef uint64_t RTGCPHYS;
/** Pointer to Guest Physical Memory Address. */
typedef RTGCPHYS RT_FAR *PRTGCPHYS;
/** Pointer to const Guest Physical Memory Address. */
typedef const RTGCPHYS RT_FAR *PCRTGCPHYS;
/** @def NIL_RTGCPHYS */
#define NIL_RTGCPHYS (~(RTGCPHYS)0U)
/** Max guest physical memory address value. */
#define RTGCPHYS_MAX UINT64_MAX

/** Guest Physical Memory Address; limited to 32 bits. */
typedef uint32_t RTGCPHYS32;
/** Pointer to Guest Physical Memory Address. */
typedef RTGCPHYS32 RT_FAR *PRTGCPHYS32;
+/** Pointer to const Guest Physical Memory Address. */
+typedef const RTGCPHYS32 RT_FAR *PCRTGCPHYS32;
+/** @def NIL_RTGCPHYS32
+ * NIL_GC Physical Address.
+ * NIL_RTGCPHYS32 is used to signal an invalid physical address, similar
+ * to the NULL pointer. Note that this value may actually be valid in
+ * some contexts.
+ */
+#define NIL_RTGCPHYS32 (~(RTGCPHYS32)0)
+
+/** Guest Physical Memory Address; limited to 64 bits. */
+typedef uint64_t RTGCPHYS64;
+/** Pointer to Guest Physical Memory Address. */
+typedef RTGCPHYS64 RT_FAR *PRTGCPHYS64;
+/** Pointer to const Guest Physical Memory Address. */
+typedef const RTGCPHYS64 RT_FAR *PCRTGCPHYS64;
+/** @def NIL_RTGCPHYS64
+ * NIL_GC Physical Address.
+ * NIL_RTGCPHYS64 is used to signal an invalid physical address, similar
+ * to the NULL pointer. Note that this value may actually be valid in
+ * some contexts.
+ */
+#define NIL_RTGCPHYS64 (~(RTGCPHYS64)0)
+
+/** Guest context pointer, 32 bits.
+ * Keep in mind that this type is an unsigned integer in
+ * HC and void pointer in GC.
+ */
+typedef RTGCUINTPTR32 RTGCPTR32;
+/** Pointer to a guest context pointer. */
+typedef RTGCPTR32 RT_FAR *PRTGCPTR32;
+/** Pointer to a const guest context pointer. */
+typedef const RTGCPTR32 RT_FAR *PCRTGCPTR32;
+/** @def NIL_RTGCPTR32
+ * NIL_GC pointer.
+ */
+#define NIL_RTGCPTR32 ((RTGCPTR32)0)
+
+/** Guest context pointer, 64 bits.
+ */
+typedef RTGCUINTPTR64 RTGCPTR64;
+/** Pointer to a guest context pointer. */
+typedef RTGCPTR64 RT_FAR *PRTGCPTR64;
+/** Pointer to a const guest context pointer. */
+typedef const RTGCPTR64 RT_FAR *PCRTGCPTR64;
+/** @def NIL_RTGCPTR64
+ * NIL_GC pointer.
+ */

+ */
+ */
+#define NIL_RTGCPTR64 ((RTGCMPTR64)0)
+ */
+/** Guest context pointer.
+ * Keep in mind that this type is an unsigned integer in
+ * HC and void pointer in GC.
+ */
+ /*
+#if GC_ARCH_BITS == 64
+typedef RTGCMPTR64 RTGCMPTR;
+/** Pointer to a guest context pointer. */
+typedef PRTGCMPTR64 PRTGCMPTR;
+/** Pointer to a const guest context pointer. */
+typedef PCRTGCMPTR64 PCRTGCMPTR;
+/** @def NIL_RTGCPTR
+ * NIL GC pointer.
+ */
+ */
+#define NIL_RTGCMPTR NIL_RTGCPTR64
+/** Max RTGCPTR value. */
+#define RTGCPTR_MAX UINT64_MAX
+#elif GC_ARCH_BITS == 32
+typedef RTGCMPTR32 RTGCMPTR;
+/** Pointer to a guest context pointer. */
+typedef PRTGCMPTR32 PRTGCMPTR;
+/** Pointer to a const guest context pointer. */
+typedef PCRTGCMPTR32 PCRTGCMPTR;
+/** @def NIL_RTGCPTR
+ * NIL GC pointer.
+ */
+ */
+#define NIL_RTGCMPTR NIL_RTGCPTR32
+/** Max RTGCPTR value. */
+#define RTGCPTR_MAX UINT32_MAX
+#else
+#endif
+/** Unsigned integer register in the guest context. */
+typedef uint32_t RTGCUINTREG32;
+/** Pointer to an unsigned integer register in the guest context. */
+typedef RTGCUINTREG32 RT_FAR *PRTGCUINTREG32;
+/** Pointer to a const unsigned integer register in the guest context. */
+typedef const RTGCUINTREG32 RT_FAR *PCRTGCUINTREG32;
+}
+typedef uint64_t RTGCUINTREG64;
+/** Pointer to an unsigned integer register in the guest context. */
+typedef RTGCUINTREG64 RT_FAR *PRTGCUINTREG64;
+/** Pointer to a const unsigned integer register in the guest context. */
+typedef const RTGCUINTREG64 RT_FAR *PCRTGCUINTREG64;
+#if GC_ARCH_BITS == 64
+typedef RTGCUINTREG64 RTGCUINTREG;
+#elif GC_ARCH_BITS == 32
+typedef RTGCUINTREG32 RTGCUINTREG;
+#else
+## error "Unsupported GC_ARCH_BITS!"
+endif
+/** Pointer to an unsigned integer register in the guest context. */
+typedef RTGCUINTREG RT_FAR *PRTGCUINTREG;
+/** Pointer to a const unsigned integer register in the guest context. */
+typedef const RTGCUINTREG RT_FAR *PCRTGCUINTREG;
+
+/** @} */
+
+/** @} */
+@defgroup grp_rt_types_rc Raw mode Context Basic Types
+  */
+
+/** Raw mode context pointer; a 32 bits guest context pointer.
+ * Keep in mind that this type is an unsigned integer in
+ * HC and void pointer in RC.
+ */
+ifdef IN_RC
+typedef void            RT_FAR *RTRCPTR;
+else
+typedef uint32_t                RTRCPTR;
+endif
+/** Pointer to a raw mode context pointer. */
+typedef RTRCPTR RT_FAR *PRTRCPTR;
+/** Pointer to a const raw mode context pointer. */
+typedef const RTRCPTR RT_FAR *PCRTRCPTR;
+@def NIL_RTGCPTR
+  * NIL RC pointer.
+ */
+ifdef IN_RC
+## define NIL_RTGCPTR ((RTRCPTR)(0)
+else
+## define NIL_RTGCPTR (NULL)
+endif
+@def RTRCPTR_MAX
+  * The maximum value a RTRCPTR can have. Mostly used as INVALID value.
+ */
+##define RTRCPTR_MAX ((RTRCPTR)UINT32_MAX)
+
+/** Raw mode context pointer, unsigned integer variant. */
+typedef int32_t        RTRCINTPTR;
+@def RTRCUINTPTR_MAX
+  * The maximum value a RTRCUINPTR can have.
+
+ */
#define RTRCINTPTR_MAX ((RTRCINTPTR)UINT32_MAX)
+/** Raw mode context pointer, signed integer variant. */
typedef uint32_t RTRCINTPTR;
+/** @def RTRCINTPTR_MIN
  * The minimum value a RTRCINPTR can have.
  */
#define RTRCINTPTR_MIN ((RTRCINTPTR)INT32_MIN)
/** @def RTRCINTPTR_MAX
  * The maximum value a RTRCINPTR can have.
  */
#define RTRCINTPTR_MAX ((RTRCINTPTR)INT32_MAX)
+ */
+@}

/** @} */

/** @defgroup grp_rt_types_cc  Current Context Basic Types */
/** @} */

/** Current Context Physical Memory Address. */
#ifdef IN_RC
typedef RTGCPHYS RTCCPHYS;
#else
typedef RTHCPHYS RTCCPHYS;
#endif
/** Pointer to Current Context Physical Memory Address. */
typedef RTCCPHYS RT_FAR *PRTCCPHYS;
/** Pointer to const Current Context Physical Memory Address. */
typedef const RTCCPHYS RT_FAR *PCRTCCPHYS;
/** @def NIL_RTCCPHYS
  * NIL CC Physical Address.
  * NIL_RTCCPHYS is used to signal an invalid physical address, similar
  * to the NULL pointer.
  */
#ifdef IN_RC
#define NIL_RTCCPHYS NIL_RTGCPHYS
#else
#define NIL_RTCCPHYS NIL_RTHCPHYS
#endif
/** Unsigned integer register in the current context. */
#if ARCH_BITS == 32
typedef uint32_t RTCCUINTREG;
#elif ARCHBITS == 64
typedef uint64_t RTCCUINTREG;
#else
#endif
+typedef uint16_t                RTCCUINTREG;
+#else
+  +# error "Unsupported ARCH_BITS!"
+  +#endif
+/** Pointer to an unsigned integer register in the current context. */
+typedef RTCCUINTREG    RT_FAR *PRTCCUINTREG;
+/** Pointer to a const unsigned integer register in the current context. */
+typedef RTCCUINTREG const RT_FAR *PCRRTCCUINTREG;
+
+/** Signed integer register in the current context. */
+#if ARCH_BITS == 32
+typedef int32_t                RTCCINTREG;
+#elif ARCH_BITS == 64
+typedef int64_t                RTCCINTREG;
+#elif ARCH_BITS == 16
+typedef int16_t                RTCCINTREG;
+#endif
+/** Pointer to a signed integer register in the current context. */
+typedef RTCCINTREG      RT_FAR *PRTCCINTREG;
+/** Pointer to a const signed integer register in the current context. */
+typedef RTCCINTREG const RT_FAR *PCRRTCCINTREG;
+
+/** Unsigned integer register in the current context.
+ * @remarks This is for dealing with EAX in 16-bit mode. */
+#if ARCH_BITS == 16 && defined(RT_ARCH_X86)
+typedef uint32_t                RTCCUINTXREG;
+#else
+typedef RTCCUINTREG             RTCCUINTXREG;
+#endif
+/** Pointer to an unsigned integer register in the current context. */
+typedef RTCCUINTXREG     RT_FAR *PRTCCUINTXREG;
+/** Pointer to a const unsigned integer register in the current context. */
+typedef RTCCUINTXREG const RT_FAR *PCRRTCCUINTXREG;
+
+/** Signed integer extended register in the current context.
+ * @remarks This is for dealing with EAX in 16-bit mode. */
+#if ARCH_BITS == 16 && defined(RT_ARCH_X86)
+typedef int32_t                RTCCINTXREG;
+#else
+typedef RTCCINTREG              RTCCINTXREG;
+#endif
+/** Pointer to a signed integer extended register in the current context. */
+typedef RTCCINTXREG     RT_FAR *PRTCCINTXREG;
+/** Pointer to a const signed integer extended register in the current context. */
+typedef RTCCINTXREG const RT_FAR *PCRRTCCINTXREG;
+
+/** @def RTCCUINTREG_C
+ * Defines a constant of RTCCUINTREG type.
+ * @param a_Value   Constant value */
+/** @def RTCCUINTREG_MAX
+ * Max value that RTCCUINTREG can hold. */
+/** @def RTCCUINTREG_FMT
+ * Generic IPRT format specifier for RTCCUINTREG. */
+/** @def RTCCUINTREG_XFMT
+ * Defines a constant of RTCCINTREG type.
+ * @param a_Value   Constant value */
+/** @def RTCCINTREG_MAX
+ * Max value that RTCCINTREG can hold. */
+/** @def RTCCINTREG_MIN
+ * Min value that RTCCINTREG can hold. */
+/** @def RTCCINTREG_FMT
+ * Generic IPRT format specifier for RTCCINTREG, hexadecimal. */
+#if ARCH_BITS == 32
+# define RTCCUINTREG_C(a_Value)     UINT32_C(a_Value)
+# define RTCCUINTREG_MAX            UINT32_MAX
+# define RTCCUINTREG_FMT            "RU32"
+# define RTCCUINTREG_XFMT           "RX32"
+# define RTCCINTREG_C(a_Value)      INT32_C(a_Value)
+# define RTCCINTREG_MAX             INT32_MAX
+# define RTCCINTREG_MIN             INT32_MIN
+# define RTCCINTREG_FMT             "RI32"
+# define RTCCINTREG_XFMT            "RX32"
+#elif ARCH_BITS == 64
+# define RTCCUINTREG_C(a_Value)     UINT64_C(a_Value)
+# define RTCCUINTREG_MAX            UINT64_MAX
+# define RTCCUINTREG_FMT            "RU64"
+# define RTCCUINTREG_XFMT           "RX64"
+# define RTCCINTREG_C(a_Value)      INT64_C(a_Value)
+# define RTCCINTREG_MAX             INT64_MAX
+# define RTCCINTREG_MIN             INT64_MIN
+# define RTCCINTREG_FMT             "RI64"
+# define RTCCINTREG_XFMT            "RX64"
+#elif ARCH_BITS == 16
+# define RTCCUINTREG_C(a_Value)     UINT16_C(a_Value)
+# define RTCCUINTREG_MAX            UINT16_MAX
+# define RTCCUINTREG_FMT            "RU16"
+# define RTCCUINTREG_XFMT           "RX16"
+# define RTCCINTREG_C(a_Value)      INT16_C(a_Value)
+# define RTCCINTREG_MAX             INT16_MAX
+# define RTCCINTREG_MIN             INT16_MIN
+# define RTCCINTREG_FMT             "RI16"
+# define RTCCINTREG_XFMT            "RX16"
+#else
```c
+# error "Unsupported ARCH_BITS!"
+endif
+/** @def RTCCUINTXREG_C
+ * Defines a constant of RTCCUINTXREG type.
+ * @param a_Value   Constant value */
+/** @def RTCCUINTXREG_MAX
+ * Max value that RTCCUINTXREG can hold. */
+/** @def RTCCUINTXREG_FMT
+ * Generic IPRT format specifier for RTCCUINTXREG. */
+/** @def RTCCUINTXREG_XFMT
+ * Generic IPRT format specifier for RTCCUINTXREG, hexadecimal. */
+/** @def RTCCINTXREG_C
+ * Defines a constant of RTCCINTXREG type.
+ * @param a_Value   Constant value */
+/** @def RTCCINTXREG_MAX
+ * Max value that RTCCINTXREG can hold. */
+/** @def RTCCINTXREG_MIN
+ * Min value that RTCCINTXREG can hold. */
+/** @def RTCCINTXREG_FMT
+ * Generic IPRT format specifier for RTCCINTXREG. */
+/** @def RTCCINTXREG_XFMT
+ * Generic IPRT format specifier for RTCCINTXREG, hexadecimal. */
+if ARCH_BITS == 16 && defined(RT_ARCH_X86)
+define RTCCUINTXREG_C(a_Value) UINT32_C(a_Value)
+define RTCCUINTXREG_MAX UINT32_MAX
+define RTCCUINTXREG_FMT "RU32"
+define RTCCUINTXREG_XFMT "RX32"
+define RTCCINTXREG_C(a_Value) INT32_C(a_Value)
+define RTCCINTXREG_MAX INT32_MAX
+define RTCCINTXREG_MIN INT32_MIN
+define RTCCINTXREG_FMT "RI32"
+define RTCCINTXREG_XFMT "RX32"
+else
+define RTCCUINTXREG_C(a_Value) RTCCINTREG_C(a_Value)
+define RTCCUINTXREG_MAX RTCCINTREG_MAX
+define RTCCUINTXREG_FMT RTCCINTREG_FMT
+define RTCCUINTXREG_XFMT RTCCINTREG_XFMT
+define RTCCINTXREG_C(a_Value) RTCCINTREG_C(a_Value)
+define RTCCINTXREG_MAX RTCCINTREG_MAX
+define RTCCINTXREG_MIN RTCCINTREG_MIN
+define RTCCINTXREG_FMT RTCCINTREG_FMT
+define RTCCINTXREG_XFMT RTCCINTREG_XFMT
+endif
+/** @} */
+/** Pointer to a big integer number. */
```

+typedef struct RTBIGNUM RT_FAR *PRTBIGNUM;
+/** Pointer to a const big integer number. */
+typedef struct RTBIGNUM const RT_FAR *PCRTBIGNUM;
+
+/** Pointer to a critical section. */
+typedef struct RTCRITSECT RT_FAR *PRTCRITSECT;
+/** Pointer to a const critical section. */
+typedef const struct RTCRITSECT RT_FAR *PCRTCRITSECT;
+
+/** Pointer to a read/write critical section. */
+typedef struct RTCRITSECTRW RT_FAR *PRTCRITSECTRW;
+/** Pointer to a const read/write critical section. */
+typedef const struct RTCRITSECTRW RT_FAR *PCRTCRITSECTRW;
+
+/** Condition variable handle. */
+typedef R3PTRTYPE(struct RTCONDVARINTERNAL RT_FAR *) RTCONDVAR;
+/** Pointer to a condition variable handle. */
+typedef RTCONDVAR RT_FAR *PRTCONDVAR;
+/** Nil condition variable handle. */
+#define NIL_RTCONDVAR 0
+
+/** Cryptographic (certificate) store handle. */
+typedef R3R0PTRTYPE(struct RTCRSTOREINT RT_FAR *) RTCRSTORE;
+/** Pointer to a Cryptographic (certificate) store handle. */
+typedef RTCRSTORE RT_FAR *PRTCRSTORE;
+/** Nil Cryptographic (certificate) store handle. */
+#define NIL_RTCRSTORE 0
+
+/** Pointer to a const (store) certificate context. */
+typedef struct RTCRCERTCTX const RT_FAR *PCRTCRCERTCTX;
+
+/** Cryptographic message digest handle. */
+typedef R3R0PTRTYPE(struct RTCRDIGESTINT RT_FAR *) RTCRDIGEST;
+/** Pointer to a cryptographic message digest handle. */
+typedef RTCRDIGEST RT_FAR *PRTCRDIGEST;
+/** NIL cryptographic message digest handle. */
+#define NIL_RTCRDIGEST (0)
+
+/** Public key encryption schema handle. */
+typedef R3R0PTRTYPE(struct RTCRPKIXENCRYPTIONINT RT_FAR *) RTCRPKIXENCRYPTION;
+/** Pointer to a public key encryption schema handle. */
+typedef RTCRPKIXENCRYPTION RT_FAR *PRTCRPKIXENCRYPTION;
+/** NIL public key encryption schema handle */
+#define NIL_RTCRPKIXENCRYPTION (0)
+
+/** Public key signature schema handle. */
+typedef R3R0PTRTYPE(struct RTCRPKIXSIGNATUREINT RT_FAR *) RTCRPKIXSIGNATURE;
+/** Pointer to a public key signature schema handle. */
+typedef RTCRPKIXSIGNATURE RT_FAR *PRTCRIPTKIXSIGNATURE;
+/** NIL public key signature schema handle */
+#define NIL_RTCRPKIXSIGNATURE (0)
+
+/** X.509 certificate paths builder & validator handle. */
+typedef R3R0PTRTYPE(struct RTCRX509CERTPATHSINT RT_FAR *) RTCRX509CERTPATHS;
+/** Pointer to a certificate paths builder & validator handle. */
+typedef RTCRX509CERTPATHS RT_FAR *PRTCRX509CERTPATHS;
+/** Nil certificate paths builder & validator handle. */
+#define NIL_RTCRX509CERTPATHS 0
+
+/** Directory handle. */
+typedef struct RTDIRINTERNAL *RTDIR;
+/** Pointer to directory handle. */
+typedef RTDIR *PRTDIR;
+/** NIL directory handle. */
+#define NIL_RTDIR ((RTDIR)0)
+
+/** File handle. */
+typedef R3R0PTRTYPE(struct RTFILEINT RT_FAR *) RTFILE;
+/** Pointer to file handle. */
+typedef RTFILE RT_FAR *PRTFILE;
+/** Nil file handle. */
+#define NIL_RTFILE ((RTFILE)-(RTHCINTPTR)0)
+
+/** Async I/O request handle. */
+typedef R3PTRTYPE(struct RTFILEAIOREQINTERNAL RT_FAR *) RTFILEAIOREQ;
+/** Pointer to an async I/O request handle. */
+typedef RTFILEAIOREQ RT_FAR *PRTFILEAIOREQ;
+/** Nil request handle. */
+#define NIL_RTFILEAIOREQ 0
+
+/** Async I/O completion context handle. */
+typedef R3PTRTYPE(struct RTFILEAIOCTXINTERNAL RT_FAR *) RTFILEAIOCTX;
+/** Pointer to an async I/O completion context handle. */
+typedef RTFILEAIOCTX RT_FAR *PRTFILEAIOCTX;
+/** Nil context handle. */
+#define NIL_RTFILEAIOCTX 0
+
+/** ISO image maker handle. */
+typedef struct RTFSISOMAKERINT RT_FAR *RTFSISOMAKER;
+/** Pointer to an ISO image maker handle. */
+typedef RTFSISOMAKER RT_FAR *PRTFSISOMAKER;
+/** NIL ISO maker handle. */
+#define NIL_RTFSISOMAKER ((RTFSISOMAKER)0)
+/** INI-file handle. */
+typedef struct RTINIFILEINT RT_FAR *RTINIFILE;
+/** Pointer to an INI-file handle. */
+typedef RTINIFILE RT_FAR *PRTINIFILE;
+/** NIL INI-file handle. */
+#define NIL_RTINIFILE ((RTINIFILE)0)
+
+/** Loader module handle. */
+typedef R3R0PTRTYPE(struct RTLDRMODINTERNAL RT_FAR *) RTLDRMOD;
+/** Pointer to a loader module handle. */
+typedef RTLDRMOD RT_FAR *PRTLDRMOD;
+/** Nil loader module handle. */
+#define NIL_RTLDRMOD 0
+
+/** Lock validator class handle. */
+typedef R3R0PTRTYPE(struct RTLOCKVALCLASSINT RT_FAR *) RTLOCKVALCLASS;
+/** Pointer to a lock validator class handle. */
+typedef RTLOCKVALCLASS RT_FAR *PRTLOCKVALCLASS;
+/** Nil lock validator class handle. */
+#define NIL_RTLOCKVALCLASS ((RTLOCKVALCLASS)0)
+
+/** Ring-0 memory object handle. */
+typedef R0PTRTYPE(struct RTR0MEMOBJINTERNAL RT_FAR *) RTR0MEMOBJ;
+/** Pointer to a Ring-0 memory object handle. */
+typedef RTR0MEMOBJ RT_FAR *PRTR0MEMOBJ;
+/** Nil ring-0 memory object handle. */
+#define NIL_RTR0MEMOBJ 0
+
+/** Native thread handle. */
+typedef RTHCUINTPTR RTNATIVETHREAD;
+/** Pointer to an native thread handle. */
+typedef RTNATIVETHREAD RT_FAR *PRTNATIVETHREAD;
+/** Nil native thread handle. */
+#define NIL_RTNATIVETHREAD (~(RTNATIVETHREAD)0)
+
+/** Pipe handle. */
+typedef R3R0PTRTYPE(struct RTPipeINTERNAL RT_FAR *) RTPipe;
+/** Pointer to a pipe handle. */
+typedef RTPipe RT_FAR *PRTPIPE;
+/** Nil pipe handle. */
+@remarks This is not 0 because of UNIX and OS/2 handle values. Take care! */
+#define NIL_RTPipe ((RTPipe)RTHCUINTPTR_MAX)
+
+@typedef RTPOLLSET
+/** Poll set handle. */
+typedef R3R0PTRTYPE(struct RTPollSetINTERNAL RT_FAR *) RTPollSet;
+/** Pointer to a poll set handle. */
+typedef RTPollSet RT_FAR *PRTPollSet;
+/** Nil poll set handle. */
+#define NIL_RTPOLLSET ((RTPOLLSET)0)
+
+/** Process identifier. */
+typedef uint32_t RTPROCESS;
+/** Pointer to a process identifier. */
+typedef RTPROCESS RT_FAR *PRTPROCESS;
+/** Nil process identifier. */
+#define NIL_RTPROCESS (~(RTPROCESS)0)
+
+/** Process ring-0 handle. */
+typedef RTR0UINTPTR RTR0PROCESS;
+/** Pointer to a ring-0 process handle. */
+typedef RTR0PROCESS RT_FAR *PRTR0PROCESS;
+/** Nil ring-0 process handle. */
+#define NIL_RTR0PROCESS (~(RTR0PROCESS)0)
+
+/** Event Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMEVENTINTERNAL RT_FAR *) RTSEMEVENT;
+/** Pointer to an event semaphore handle. */
+typedef RTSEMEVENT RT_FAR *PRTSEMEVENT;
+/** Nil event semaphore handle. */
+#define NIL_RTSEMEVENT 0
+
+/** Event Multiple Release Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMEVENTMULTIINTERNAL RT_FAR *) RTSEMEVENTMULTI;
+/** Pointer to an event multiple release semaphore handle. */
+typedef RTSEMEVENTMULTI RT_FAR *PRTSEMEVENTMULTI;
+/** Nil multiple release event semaphore handle. */
+#define NIL_RTSEMEVENTMULTI 0
+
+/** Fast mutex Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMMUTEXINTERNAL RT_FAR *) RTSEMMUTEX;
+/** Pointer to a fast mutex semaphore handle. */
+typedef RTSEMMUTEX RT_FAR *PRTSEMMUTEX;
+/** Nil fast mutex semaphore handle. */
+#define NIL_RTSEMMUTEX 0
+
+/** Mutex Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMMUTEXINTERNAL RT_FAR *) RTSEMMUTEX;
+/** Pointer to a mutex semaphore handle. */
+typedef RTSEMMUTEX RT_FAR *PRTSEMMUTEX;
+/** Nil mutex semaphore handle. */
+#define NIL_RTSEMMUTEX 0
+/** @typedef RTSEMSPINMUTEX
+ * Spinning mutex Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMSPINMUTEXINTERNAL RT_FAR *) RTSEMSPINMUTEX;
+/** Pointer to a spinning mutex semaphore handle. */
+typedef RTSEMSPINMUTEX RT_FAR *PRTSEMSPINMUTEX;
+/** Nil spinning mutex semaphore handle. */
+#define NIL_RTSEMSPINMUTEX 0
+
+/** @typedef RTSEMRW
+ * Read/Write Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMRWINTERNAL RT_FAR *) RTSEMRW;
+/** Pointer to a read/write semaphore handle. */
+typedef RTSEMRW RT_FAR *PRTSEMRW;
+/** Nil read/write semaphore handle. */
+#define NIL_RTSEMRW 0
+
+/** @typedef RTSEMXROADS
+ * Crossroads semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMXROADSINTERNAL RT_FAR *) RTSEMXROADS;
+/** Pointer to a crossroads semaphore handle. */
+typedef RTSEMXROADS RT_FAR *PRTSEMXROADS;
+/** Nil crossroads semaphore handle. */
+#define NIL_RTSEMXROADS ((RTSEMXROADS)0)
+
+/** Spinlock handle. */
+typedef R3R0PTRTYPE(struct RTSPINLOCKINTERNAL RT_FAR *) RTSPINLOCK;
+/** Pointer to a spinlock handle. */
+typedef RTSPINLOCK RT_FAR *PRTSPINLOCK;
+/** Nil spinlock handle. */
+#define NIL_RTSPINLOCK 0
+
+/** Socket handle. */
+typedef R3R0PTRTYPE(struct RTSOCKETINT RT_FAR *) RTSOCKET;
+/** Pointer to socket handle. */
+typedef RTSOCKET RT_FAR *PRTSOCKET;
+/** Nil socket handle. */
+#define NIL_RTSOCKET ((RTSOCKET)0)
+
+/** Pointer to a RTTCPSERVER handle. */
+typedef struct RTTCPSERVER RT_FAR *PRTTCPSERVER;
+/** Pointer to a RTTCPSERVER handle. */
+typedef PRTTCPSERVER RT_FAR *PPRTTCPSERVER;
+/** Nil RTTCPSERVER handle. */
+#define NIL_RTTCPSERVER ((PRTTCPSERVER)0)
+
+/** Pointer to a RTUDPSERVER handle. */
+typedef struct RTUDPSERVER RT_FAR *PRTUDPSERVER;
+/** Pointer to a RTUDPSERVER handle. */
+typedef PRTUDPSERVER RT_FAR *PRTUDPSERVER;
+/** Nil RTUDPSERVER handle. */
+#define NIL_RTUDPSERVER ((PRTUDPSERVER)(0))
+
+/** Thread handle. */
+typedef R3R0PTRTYPE(struct RTTHREADINT RT_FAR *) RTTHREAD;
+/** Pointer to thread handle. */
+typedef RTTHREAD RT_FAR *PRTTHREAD;
+/** Nil thread handle. */
+#define NIL_RTTHREAD 0
+
+/** Thread context switching hook handle. */
+typedef R0PTRTYPE(struct RTTHREADCTXHOOKINT RT_FAR *) RTTHREADCTXHOOK;
+/** Pointer to Thread context switching hook handle. */
+typedef RTTHREADCTXHOOK RT_FAR *PRTTHREADCTXHOOK;
+/** Nil Thread context switching hook handle. */
+#define NIL_RTTHREADCTXHOOK ((RTTHREADCTXHOOK)(0))
+
+/** A TLS index. */
+typedef RTHCINTPTR RTTLS;
+/** Pointer to a TLS index. */
+typedef RTTLS RT_FAR *PRTTLS;
+/** Pointer to a const TLS index. */
+typedef RTTLS const RT_FAR *PCRTTLS;
+/** NIL TLS index value. */
+#define NIL_RTTLS ((RTTLS)(-1))
+
+/** Trace buffer handle.
  + * @remarks This is not a R3/R0 type like most other handles!
  + */
+typedef struct RTTRACEBUFINT RT_FAR *RTTRACEBUF;
+/** Pointer to a trace buffer handle. */
+typedef RTTRACEBUF RT_FAR *PRTTRACEBUF;
+/** Nil trace buffer handle. */
+#define NIL_RTTRACEBUF ((RTTRACEBUF)(0))
+/** The handle of the default trace buffer.
  + * This can be used with any of the RTTraceBufAdd APIs. */
+#define RTTRACEBUF_DEFAULT ((RTTRACEBUF)(-2))
+
+/** Handle to a simple heap. */
+typedef R3R0PTRTYPE(struct RTHEAPSIMPLEINTERNAL RT_FAR *) RTHEAPSIMPLE;
+/** Pointer to a handle to a simple heap. */
+typedef RTHEAPSIMPLE RT_FAR *PRTHEAPSIMPLE;
+/** NIL simple heap handle. */
+#define NIL_RTHEAPSIMPLE ((RTHEAPSIMPLE)(0))
+
+/** Handle to an offset based heap. */
+/**
typedef R3R0PTRTYPE(struct RTHEAPOFFSETINTERNAL RT_FAR *) RTHEAPOFFSET;
/** Pointer to a handle to an offset based heap. */

typedef RTHEAPOFFSET RT_FAR *PRTHEAPOFFSET;
/** NIL offset based heap handle. */

#define NIL_RTHEAPOFFSET ((RTHEAPOFFSET)0)

/** Handle to an environment block. */
typedef R3PTRTYPE(struct RTENVINTERNAL RT_FAR *) RTENV;
/** Pointer to a handle to an environment block. */

typedef RTENV RT_FAR *PRTENV;
/** NIL simple heap handle. */

#define NIL_RTENV ((RTENV)0)

/** A CPU identifier. */
/** @remarks This doesn’t have to correspond to the APIC ID (intel/amd). Nor
does it have to correspond to the bits in the affinity mask, at
least not until we’ve sorted out Windows NT. */

typedef uint32_t RTCPUID;
/** Pointer to a CPU identifier. */

typedef RTCPUID RT_FAR *PRTCPUID;
/** Pointer to a const CPU identifier. */

typedef RTCPUID const RT_FAR *PCRTCPUID;
/** Nil CPU Id. */

#define NIL_RTCPUID ((RTCPUID)~0)

/** The maximum number of CPUs a set can contain and IPRT is able
to reference. (Should be max of support arch/platforms.) */
/** @remarks Must be a multiple of 64 (see RTCPUSET). */

#if defined(RT_ARCH_X86) || defined(RT_ARCH_AMD64)
#define RTCPUSET_MAX_CPUS 256
#elif defined(RT_ARCH_SPARC) || defined(RT_ARCH_SPARC64)
#define RTCPUSET_MAX_CPUS 1024
#else
#endif
/** A CPU set. */
/** @note Treat this as an opaque type and always use RTCpuSet* for
manipulating it. */

typedef struct RTCPUSET {
    /** The bitmap. */
    uint64_t bmSet[RTCPUSET_MAX_CPUS / 64];
} RTCPUSET;
/** Pointer to a CPU set. */

typedef RTCPUSET RT_FAR *PRTCPUSET;
/** Pointer to a const CPU set. */

typedef RTCPUSET const RT_FAR *PCRTCPUSET;

#pragma mark
/** A handle table handle. */
typedef R3R0PTRTYPE(struct RTHANDLETABLEINT RT_FAR *) RTHANDLETABLE;

/** A pointer to a handle table handle. */
typedef RTHANDLETABLE RT_FAR *PRTHANDLETABLE;

/** @def NIL_RTHANDLETABLE
NIL handle table handle. */
#define NIL_RTHANDLETABLE ((RTHANDLETABLE)0)

/** A handle to a low resolution timer. */
typedef R3R0PTRTYPE(struct RTTIMERLRINT RT_FAR *) RTTIMERLR;

/** A pointer to a low resolution timer handle. */
typedef RTTIMERLR RT_FAR *PRTTIMERLR;

/** @def NIL_RTTIMERLR
NIL low resolution timer handle value. */
#define NIL_RTTIMERLR ((RTTIMERLR)0)

/** Handle to a random number generator. */
typedef R3R0PTRTYPE(struct RTRANDINT RT_FAR *) RTRAND;

/** Pointer to a random number generator handle. */
typedef RTRAND RT_FAR *PRTRAND;

/** NIL random number generator handle value. */
#define NIL_RTRAND ((RTRAND)0)

/** Debug address space handle. */
typedef R3R0PTRTYPE(struct RTDBGASINT RT_FAR *) RTDBGAS;

/** Pointer to a debug address space handle. */
typedef RTDBGAS RT_FAR *PRTDBGAS;

/** NIL debug address space handle. */
#define NIL_RTDBGAS ((RTDBGAS)0)

/** Debug module handle. */
typedef R3R0PTRTYPE(struct RTDBGMODINT RT_FAR *) RTDBGMOD;

/** Pointer to a debug module handle. */
typedef RTDBGMOD RT_FAR *PRTDBGMOD;

/** NIL debug module handle. */
#define NIL_RTDBGMOD ((RTDBGMOD)0)

/** Manifest handle. */
typedef struct RTMANIFESTINT RT_FAR *RTMANIFEST;

/** Pointer to a manifest handle. */
typedef RTMANIFEST RT_FAR *PRTMANIFEST;

/** NIL manifest handle. */
#define NIL_RTMANIFEST ((RTMANIFEST)~(uintptr_t)0)

/** Memory pool handle. */
typedef R3R0PTRTYPE(struct RTMEMPOOLINT RT_FAR *) RTMEMPOOL;

/** Pointer to a memory pool handle. */
typedef RTMEMPOOL RT_FAR *PRTMEMPOOL;
/** NIL memory pool handle. */
#define NIL_RTMEMPOOL ((RTMEMPOOL)0)
/** The default memory pool handle. */
#define RTMEMPOOL_DEFAULT ((RTMEMPOOL)-2)

/** String cache handle. */
typedef R3R0PTRTYPE(struct RTSTRCACHEINT RT_FAR *) RTSTRCACHE;
/** Pointer to a string cache handle. */
typedef RTSTRCACHE RT_FAR *PRTSTRCACHE;
/** NIL string cache handle. */
#define NIL_RTSTRCACHE  ((RTSTRCACHE)0)
/** The default string cache handle. */
#define RTSTRCACHE_DEFAULT ((RTSTRCACHE)-2)

/** Virtual Filesystem handle. */
typedef struct RTVFSINTERNAL RT_FAR *RTVFS;
/** Pointer to a VFS handle. */
typedef RTVFS RT_FAR *PRTVFS;
/** A NIL VFS handle. */
#define NIL_RTVFS ((RTVFS)-(uintptr_t)0)

/** Virtual Filesystem base object handle. */
typedef struct RTVFSOBJINTERNAL RT_FAR *RTVFSOBJ;
/** Pointer to a VFS base object handle. */
typedef RTVFSOBJ RT_FAR *PRTVFSOBJ;
/** A NIL VFS base object handle. */
#define NIL_RTVFSOBJ ((RTVFSOBJ)-(uintptr_t)0)

/** Virtual Filesystem directory handle. */
typedef struct RTVFSDIRINTERNAL RT_FAR *RTVFSDIR;
/** Pointer to a VFS directory handle. */
typedef RTVFSDIR RT_FAR *PRTVFSDIR;
/** A NIL VFS directory handle. */
#define NIL_RTVFSDIR ((RTVFSDIR)-(uintptr_t)0)

/** Virtual Filesystem filesystem stream handle. */
typedef struct RTVFSFSSTREAMINTERNAL RT_FAR *RTVFSFSSTREAM;
/** Pointer to a VFS filesystem stream handle. */
typedef RTVFSFSSTREAM RT_FAR *PRTVFSFSSTREAM;
/** A NIL VFS filesystem stream handle. */
#define NIL_RTVFSFSSTREAM ((RTVFSFSSTREAM)-(uintptr_t)0)

/** Virtual Filesystem I/O stream handle. */
typedef struct RTVFSIOSTREAMINTERNAL RT_FAR *RTVFSIOSTREAM;
/** Pointer to a VFS I/O stream handle. */
typedef RTVFSIOSTREAM RT_FAR *PRTVFSIOSTREAM;
/** A NIL VFS I/O stream handle. */
#define NIL_RTVFSIOSTREAM          ((RTVFSIOSTREAM)~(uintptr_t)0)
+
+/** Virtual Filesystem file handle. */
typedef struct RTVFSFILEINTERNAL       RT_FAR *RTVFSFILE;
+/** Pointer to a VFS file handle. */
typedef RTVFSFILE                    RT_FAR *PRTVFSFILE;
+/** A NIL VFS file handle. */
#define NIL_RTVFSFILE                   ((RTVFSFILE)~(uintptr_t)0)
+
+/** Virtual Filesystem symbolic link handle. */
typedef struct RTVFSSYMLINKINTERNAL     RT_FAR *RTVFSSYMLINK;
+/** Pointer to a VFS symbolic link handle. */
typedef RTVFSSYMLINK                  RT_FAR *PRTVFSSYMLINK;
+/** A NIL VFS symbolic link handle. */
#define NIL_RTVFSSYMLINK                 ((RTVFSSYMLINK)~(uintptr_t)0)
+
+/** Async I/O manager handle. */
typedef struct RTAIOMGRINT               RT_FAR *RTAIOMGR;
+/** Pointer to an async I/O manager handle. */
typedef RTAIOMGR                       RT_FAR *PRTAIOMGR;
+/** A NIL async I/O manager handle. */
#define NIL_RTAIOMGR                     ((RTAIOMGR)~(uintptr_t)0)
+
+/** Async I/O manager file handle. */
typedef struct RTAIOMGRFILEINT            RT_FAR *RTAIOMGRFILE;
+/** Pointer to an async I/O manager file handle. */
typedef RTAIOMGRFILE                    RT_FAR *PRTAIOMGRFILE;
+/** A NIL async I/O manager file handle. */
#define NIL_RTAIOMGRFILE                  ((RTAIOMGRFILE)~(uintptr_t)0)
+
+/** Kernel module information record handle. */
typedef struct RTKRNLMODINFOINT          RT_FAR *RTKRNLMODINFO;
+/** Pointer to a kernel information record handle. */
typedef RTKRNLMODINFO                   RT_FAR *PRTKRNLMODINFO;
+/** A NIL kernel module information record handle. */
#define NIL_RTKRNLMODINFO                 ((RTKRNLMODINFO)~(uintptr_t0));
+
+/** Handle type. */
+/*
+ * This is usually used together with RTHANDLEUNION.
+ */
typedef enum RTHANDLETYPE
+{
+    /** The invalid zero value. */
+    RTHANDLETYPE_INVALID = 0,
+    /** File handle. */
+    RTHANDLETYPE_FILE,
+ /** Pipe handle */
+ RTHANDLETYPE_PIPE,
+ /** Socket handle. */
+ RTHANDLETYPE_SOCKET,
+ /** Thread handle. */
+ RTHANDLETYPE_THREAD,
+ /** The end of the valid values. */
+ RTHANDLETYPE_END,
+ /** The 32-bit type blow up. */
+ RTHANDLETYPE_32BIT_HACK = 0x7fffffff
+ } RTHANDLETYPE;
+ /** Pointer to a handle type. */
+ typedef RTHANDLETYPE RT_FAR *PRTHANDLETYPE;
+
+ /** Handle union. */
+ *
+ * This is usually used together with RTHANDLETYPE or as RTHANDLE.
+ */
+ typedef union RTHANDLEUNION
+ {
+    RTFILE          hFile;              /**< File handle. */
+    RTPIPE          hPipe;              /**< Pipe handle. */
+    RTSOCKET        hSocket;            /**< Socket handle. */
+    RTTHREAD        hThread;            /**< Thread handle. */
+    /**< Generic integer handle value. */
+    RTHCUINTPTR     uInt;
+ } RTHANDLEUNION;
+ /** Pointer to a handle union. */
+ typedef RTHANDLEUNION RT_FAR *PRTHANDLEUNION;
+ /** Pointer to a const handle union. */
+ typedef RTHANDLEUNION const RT_FAR *PCRTHANDLEUNION;
+
+ /** Generic handle. */
+ *
+ typedef struct RTHANDLE
+ {
+    /**< The handle type. */
+    RTHANDLETYPE enmType;
+    /**< The handle value. */
+    RTHANDLEUNION u;
+ } RTHANDLE;
+ /** Pointer to a generic handle. */
+ typedef RTHANDLE RT_FAR *PRTHANDLE;
+ /** Pointer to a const generic handle. */
typedef RTHANDLE const RT_FAR *PCRTHANDLE;
+
+
/**
 * Standard handles.
 *
/**
 * @remarks These have the correct file descriptor values for unixy systems and
 * can be used directly in code specific to those platforms.
 */
+
typedef enum RTHANDLESTD
+
+
/** Invalide standard handle. */
+ RTHANDLESTD_INVALID = -1,
+ /** The standard input handle. */
+ RTHANDLESTD_INPUT = 0,
+ /** The standard output handle. */
+ RTHANDLESTD_OUTPUT,
+ /** The standard error handle. */
+ RTHANDLESTD_ERROR,
+ /** The typical 32-bit type hack. */
+ RTHANDLESTD_32BIT_HACK = 0x7fffffff
+

/** Error info. */
+
/** See RTErrInfo*. */
+
typedef struct RTERRINFO
+
+
/** Flags, see RTERRINFO_FLAGS_XXX. */
+ uint32_t fFlags;
+ /** The status code. */
+ int32_t rc;
+ /** The size of the message */
+ size_t cbMsg;
+ /** The error buffer. */
+ char *pszMsg;
+ /** Reserved for future use. */
+ void *apvReserved[2];
+
+ RTERRINFO;
+
/** Pointer to an error info structure. */
+
typedef RTERRINFO RT_FAR *PRTERRINFO;
+
/** Pointer to a const error info structure. */
+
typedef RTERRINFO const RT_FAR *PCRTERRINFO;
+

/* * Static error info structure, see RTErrInfoInitStatic. */

typedef struct RTERRINFOSTATIC {
    /** The core error info. */
    RTERRINFO Core;
    /** The static message buffer. */
    char szMsg[3072];
} RTERRINFOSTATIC;

/** Pointer to an error info buffer. */
typedef RTERRINFOSTATIC RT_FAR *PRTERRINFOSTATIC;

/** Pointer to a const static error info buffer. */
typedef RTERRINFOSTATIC const RT_FAR *PCRTERRINFOSTATIC;

/** static error info structure, see RTErrInfoInitStatic. */
typedef struct RTERRINFOSTATIC {
    /** The core error info. */
    RTERRINFO Core;
    /** The static message buffer. */
    char szMsg[3072];
} RTERRINFOSTATIC;

/** Pointer to a error info buffer. */
typedef RTERRINFOSTATIC RT_FAR *PRTERRINFOSTATIC;

/** Pointer to a const static error info buffer. */
typedef RTERRINFOSTATIC const RT_FAR *PCRTERRINFOSTATIC;

/** UUID data type. */

/** See RTUuid*. */

/** @remarks IPRt defines that the first three integers in the Gen struct interpretation are in little endian representation. This is different to many other UUID implementation, and requires conversion if you need to achieve consistent results. */
typedef union RTUUID {
    /** 8-bit view. */
    uint8_t au8[16];
    /** 16-bit view. */
    uint16_t au16[8];
    /** 32-bit view. */
    uint32_t au32[4];
    /** 64-bit view. */
    uint64_t au64[2];
    /** The way the UUID is declared by the DCE specification. */
    struct {
        uint32_t u32TimeLow;
        uint16_t u16TimeMid;
        uint16_t u16TimeHiAndVersion;
        uint8_t u8ClockSeqHiAndReserved;
        uint8_t u8ClockSeqLow;
        uint8_t au8Node[6];
    } Gen;
} RTUUID;

/** Pointer to UUID data. */
typedef RTUUID RT_FAR *PRTUUID;
/** Pointer to readonly UUID data. */
typedef const RTUUID RT_FAR *PCRTUUID;

/** Initializes a RTUUID structure with all zeros (RTUidIsNull() true). */
#define RTUUID_INITIALIZE_NULL  { { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 } }

/** UUID string maximum length. */
#define RTUUID_STR_LENGTH 37

/** Compression handle. */
typedef struct RTZIPCOMP RT_FAR *PRTZIPCOMP;

/** Decompressor handle. */
typedef struct RTZIPDECOMP RT_FAR *PRTZIPDECOMP;

/** Unicode Code Point. */
typedef uint32_t RTUNICP;

/** Pointer to an Unicode Code Point. */
typedef RTUNICP RT_FAR *PRTUNICP;

/** Pointer to a const Unicode Code Point. */
typedef const RTUNICP RT_FAR *PCRTUNICP;

#define RTUNICP_MAX ~(RTUNICP)0
#define RTUNICP_INVALID UINT32_C(0xfffffffe)

/** UTF-16 character. */
typedef uint16_t RTUTF16;

/** Pointer to a UTF-16 character. */
typedef RTUTF16 RT_FAR *PRTUTF16;

/** Pointer to a const UTF-16 character. */
typedef const RTUTF16 RT_FAR *PCRTUTF16;
+ * String tuple to go with the RT_STR_TUPLE macro.
+ */
+typedef struct RTSTRTUPLE
+{
+   /** The string. */
+   const char *psz;
+   /** The string length. */
+   size_t      cch;
+} RTSTRTUPLE;
+/** Pointer to a string tuple. */
+typedef RTSTRTUPLE RT_FAR *PRTSTRTUPLE;
+/** Pointer to a const string tuple. */
+typedef RTSTRTUPLE const RT_FAR *PCRTSTRTUPLE;
+
+/**
+ * Wait for ever if we have to.
+ */
+#define RT_INDEFINITE_WAIT (~0U)
+
+/**
+ * Generic process callback.
+ *
+ * @returns VBox status code. Failure will cancel the operation.
+ * @param   uPercentage     The percentage of the operation which has been completed.
+ * @param   pvUser          The user specified argument.
+ */
+typedef DECLCALLBACK(int) FNRTPROGRESS(unsigned uPrecentage, void *pvUser);
+/** Pointer to a generic progress callback function, FNRTPROCESS(). */
+typedef FNRTPROGRESS *PFNRTPROGRESS;
+
+/**
+ * Generic vprintf-like callback function for dumpers.
+ *
+ * @param   pvUser          User argument.
+ * @param   pszFormat       The format string.
+ * @param   va              Arguments for the format string.
+ */
+typedef DECLCALLBACK(void) FNRTDUMPPRINTFV(void *pvUser, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(2, 0);
+/** Pointer to a generic printf-like function for dumping. */
+typedef FNRTDUMPPRINTFV *PFNRTDUMPPRINTFV;
+
+/**
+ * A point in a two dimentional coordinate system.
+ */
+typedef struct RTPOINT
/**
 * Rectangle data type, double point.
 */

typedef struct RTRECT
{
    /** left X coordinate. */
    int32_t xLeft;
    /** top Y coordinate. */
    int32_t yTop;
    /** right X coordinate. (exclusive) */
    int32_t xRight;
    /** bottom Y coordinate. (exclusive) */
    int32_t yBottom;
} RTRECT;

/** Pointer to a double point rectangle. */
typedef RTRECT RT_FAR *PRTRECT;

/** Pointer to a const double point rectangle. */
typedef const RTRECT RT_FAR *PCRTRECT;

/**
 * Rectangle data type, point + size.
 */

typedef struct RTRECT2
{
    /** X coordinate.
     * Unless stated otherwise, this is the top left corner. */
    int32_t x;
    /** Y coordinate.
     * Unless stated otherwise, this is the top left corner. */
    int32_t y;
    /** The width.
     * Unless stated otherwise, this is to the right of (x,y) and will not
     * be a negative number. */
    int32_t cx;
    /** The height. */
} RTRECT2;

/** Pointer to a point. */
typedef RTPOINT RT_FAR *PRTPOINT;

/** Pointer to a const point. */
typedef const RTPOINT RT_FAR *PCRTPOINT;
+  * Unless stated otherwise, this is down from (x,y) and will not be a
+  * negative number. */
+ int32_t  cy;
+ } RTRECT2;
+/** Pointer to a point + size rectangle. */
+typedef RTRECT2 RT_FAR *PRTRECT2;
+/** Pointer to a const point + size rectangle. */
+typedef const RTRECT2 RT_FAR *PCRTRECT2;
+
+
+/**
+ * The size of a rectangle.
+ */
+typedef struct RTRECTSIZE
+
+{   /**< The width (along the x-axis). */
+     uint32_t  cx;
+     /**< The height (along the y-axis). */
+     uint32_t  cy;
+ } RTRECTSIZE;
+/** Pointer to a rectangle size. */
+typedef RTRECTSIZE RT_FAR *PRTRECTSIZE;
+/** Pointer to a const rectangle size. */
+typedef const RTRECTSIZE RT_FAR *PCRTRECTSIZE;
+
+
+/**
+ * Ethernet MAC address.
+ */
+ /**< The first 24 bits make up the Organisationally Unique Identifier (OUI),
+ * where the first bit (little endian) indicates multicast (set) / unicast,
+ * and the second bit indicates locally (set) / global administered. If all
+ * bits are set, it's a broadcast.
+ */
+typedef union RTMAC
+
+{   /**< @todo add a bitfield view of this stuff. */
+     /**< 8-bit view. */
+     uint8_t  au8[6];
+     /**< 16-bit view. */
+     uint16_t au16[3];
+ } RTMAC;
+/** Pointer to a MAC address. */
+typedef RTMAC RT_FAR *PRTMAC;
+/** Pointer to a readonly MAC address. */
+typedef const RTMAC RT_FAR *PCRTMAC;
/** Pointer to a lock validator record. */
typedef struct RTLOCKVALRECEXCL RT_FAR *PRTLOCKVALRECEXCL;
/** Pointer to a record of one ownership share. */
typedef struct RTLOCKVALRECSHRD RT_FAR *PRTLOCKVALRECSHRD;
/** Pointer to a lock validator source position. */
typedef struct RTLOCKVALSRCPOS RT_FAR *PRTLOCKVALSRCPOS;
/** Pointer to a const lock validator source position. */
typedef struct RTLOCKVALSRCPOS const RT_FAR *PCRTLOCKVALSRCPOS;

/** @name   Special sub-class values. */
* The range 16..UINT32_MAX is available to the user, the range 0..15 is reserved for the lock validator. In the user range the locks can only be taking in ascending order.
* @ { */
/** Invalid value. */
define RTLOCKVAL_SUB_CLASS_INVALID   UINT32_C(0)
/** Not allowed to be taken with any other locks in the same class. */
* This is the recommended value. */
define RTLOCKVAL_SUB_CLASS_NONE      UINT32_C(1)
/** Any order is allowed within the class. */
define RTLOCKVAL_SUB_CLASS_ANY       UINT32_C(2)
/** The first user value. */
define RTLOCKVAL_SUB_CLASS_USER      UINT32_C(16)
* @} */

/** Digest types. */
typedef enum RTDIGESTTYPE {
/** Invalid digest value. */
RTDIGESTTYPE_INVALID = 0,
/** Unknown digest type. */
RTDIGESTTYPE_UNKNOWN,
/** CRC32 checksum. */
RTDIGESTTYPE_CRC32,
/** CRC64 checksum. */
RTDIGESTTYPE_CRC64,
/** MD2 checksum (unsafe!). */
RTDIGESTTYPE_MD2,
/** MD4 checksum (unsafe!!). */
RTDIGESTTYPE_MD4,
/** MD5 checksum (unsafe!). */
+ RTDIGESTTYPE_MD5,
+ /**< SHA-1 checksum (unsafe!). */
+ RTDIGESTTYPE_SHA1,
+ /**< SHA-224 checksum. */
+ RTDIGESTTYPE_SHA224,
+ /**< SHA-256 checksum. */
+ RTDIGESTTYPE_SHA256,
+ /**< SHA-384 checksum. */
+ RTDIGESTTYPE_SHA384,
+ /**< SHA-512 checksum. */
+ RTDIGESTTYPE_SHA512,
+ /**< SHA-512/224 checksum. */
+ RTDIGESTTYPE_SHA512T224,
+ /**< SHA-512/256 checksum. */
+ RTDIGESTTYPE_SHA512T256,
+ /**< End of valid types. */
+ RTDIGESTTYPE_END,
+ /**< Usual 32-bit type blowup. */
+ RTDIGESTTYPE_32BIT_HACK = 0x7fffffff
+ } RTDIGESTTYPE;

+/**
+ * Process exit codes.
+ */
+typedef enum RTEXITCODE
+
+ /**< Success. */
+ RTEXITCODE_SUCCESS = 0,
+ /**< General failure. */
+ RTEXITCODE_FAILURE = 1,
+ /**< Invalid arguments. */
+ RTEXITCODE_SYNTAX = 2,
+ /**< Initialization failure (usually IPRT, but could be used for other components as well). */
+ RTEXITCODE_INIT = 3,
+ /**< Test skipped. */
+ RTEXITCODE_SKIPPED = 4,
+ /**< The end of valid exit codes. */
+ RTEXITCODE_END,
+ /**< The usual 32-bit type hack. */
+ RTEXITCODE_32BIT_HACK = 0x7fffffff
+ } RTEXITCODE;

+/**
+ * Range descriptor.
+ */
+typedef struct RTRANGE
+

/** Start offset. */
uint64_t    offStart;
/** Range size. */
size_t      cbRange;
} RTRANGE;
/** Pointer to a range descriptor. */
typedef RTRANGE RT_FAR *PRTRANGE;
/** Pointer to a readonly range descriptor. */
typedef const RTRANGE RT_FAR *PCRTRANGE;

/** Pointer to a pointer union. */
typedef union RTPTRUNION
{
/** Pointer into the void. */
void            RT_FAR *pv;
/** As a signed integer. */
intptr_t                i;
/** As an unsigned integer. */
intptr_t                u;
/** Pointer to char value. */
char            RT_FAR *pch;
/** Pointer to char value. */
unsigned char   RT_FAR *puch;
/** Pointer to a int value. */
int             RT_FAR *pi;
/** Pointer to a unsigned int value. */
unsigned int    RT_FAR *pu;
/** Pointer to a long value. */
long            RT_FAR *pl;
/** Pointer to a long value. */
unsigned long   RT_FAR *pul;
/** Pointer to a 8-bit unsigned value. */
uint8_t         RT_FAR *pu8;
/** Pointer to a 16-bit unsigned value. */
uint16_t        RT_FAR *pu16;
/** Pointer to a 32-bit unsigned value. */
uint32_t        RT_FAR *pu32;
/** Pointer to a 64-bit unsigned value. */
uint64_t        RT_FAR *pu64;
/** Pointer to a UTF-16 character. */
PRTUTF16                pwc;
/** Pointer to a UUID character. */
PRTUUID                 pUuid;
} RTPTRUNION;
/** Pointer to a pointer union. */
```c
+typedef RTPTRUNION RT_FAR *PRTPTRUNION;
+
+/**
+ * Generic const pointer union.
+ */
+typedef union RTCPTRUNION
+{
+    /** Pointer into the void. */
+    void const RT_FAR *pv;
+    /** As a signed integer. */
+    intptr_t i;
+    /** As an unsigned integer. */
+    intptr_t u;
+    /** Pointer to char value. */
+    char const RT_FAR *pch;
+    /** Pointer to char value. */
+    unsigned char const RT_FAR *puch;
+    /** Pointer to a int value. */
+    int const RT_FAR *pi;
+    /** Pointer to a unsigned int value. */
+    unsigned int const RT_FAR *pu;
+    /** Pointer to a long value. */
+    long const RT_FAR *pl;
+    /** Pointer to a long value. */
+    unsigned long const RT_FAR *pul;
+    /** Pointer to a 8-bit unsigned value. */
+    uint8_t const RT_FAR *pu8;
+    /** Pointer to a 16-bit unsigned value. */
+    uint16_t const RT_FAR *pu16;
+    /** Pointer to a 32-bit unsigned value. */
+    uint32_t const RT_FAR *pu32;
+    /** Pointer to a 64-bit unsigned value. */
+    uint64_t const RT_FAR *pu64;
+    /** Pointer to a UTF-16 character. */
+    PCRTUTF16 pwc;
+    /** Pointer to a UUID character. */
+    PCRTUUID pUuid;
+} RTCPTRUNION;

+/**
+ * Pointer to a const pointer union.
+ */
+typedef RTCPTRUNION RT_FAR *PRTC PTRUNION;
+
+/**
+ * Generic volatile pointer union.
+ */
+typedef union RTVPTRUNION
+{
+    /** Pointer into the void. */
+    void volatile RT_FAR *pv;
+```
/** As a signed integer. */
    intptr_t                i;
/** As an unsigned integer. */
    intptr_t                u;
/** Pointer to char value. */
    char volatile RT_FAR *pch;
/** Pointer to char value. */
    unsigned char volatile RT_FAR *puch;
/** Pointer to an int value. */
    int volatile   RT_FAR *pi;
/** Pointer to a unsigned int value. */
    unsigned int volatile RT_FAR *pu;
/** Pointer to a long value. */
    long volatile RT_FAR *pl;
/** Pointer to a long value. */
    unsigned long volatile RT_FAR *pul;
/** Pointer to a 8-bit unsigned value. */
    uint8_t volatile RT_FAR *pu8;
/** Pointer to a 16-bit unsigned value. */
    uint16_t volatile RT_FAR *pu16;
/** Pointer to a 32-bit unsigned value. */
    uint32_t volatile RT_FAR *pu32;
/** Pointer to a 64-bit unsigned value. */
    uint64_t volatile RT_FAR *pu64;
/** Pointer to a UTF-16 character. */
    RTUTF16 volatile RT_FAR *pwc;
/** Pointer to a UUID character. */
    RTUUID volatile  RT_FAR *pUuid;
} RTVPTRUNION;
/** Pointer to a const pointer union. */
typedef RTVPTRUNION RT_FAR *PRTVPTRUNION;

/** Generic const volatile pointer union. */
typedef union RTCVPTRUNION
{ /* Pointer into the void. */
    void const volatile RT_FAR *pv;
/** As a signed integer. */
    intptr_t                i;
/** As an unsigned integer. */
    intptr_t                u;
/** Pointer to char value. */
    char const volatile RT_FAR *pch;
/** Pointer to char value. */
    unsigned char const volatile RT_FAR *puch;
/** Pointer to a int value. */
    int const volatile   RT_FAR *pi;
/** Pointer to a unsigned int value. */
    unsigned int const volatile RT_FAR *pu;
/** Pointer to a long value. */
    long const volatile RT_FAR *pl;
/** Pointer to a long value. */
    unsigned long const volatile RT_FAR *pul;
/** Pointer to a 8-bit unsigned value. */
    uint8_t const volatile RT_FAR *pu8;
/** Pointer to a 16-bit unsigned value. */
    uint16_t const volatile RT_FAR *pu16;
/** Pointer to a 32-bit unsigned value. */
    uint32_t const volatile RT_FAR *pu32;
/** Pointer to a 64-bit unsigned value. */
    uint64_t const volatile RT_FAR *pu64;
/** Pointer to a UTF-16 character. */
    RTUTF16 const volatile RT_FAR *pwc;
/** Pointer to a UUID character. */
    RTUUID const volatile  RT_FAR *pUuid;
} RTCVPTRUNION;
int const volatile    RT_FAR *pi;
/** Pointer to a unsigned int value. */
unsigned int const volatile    RT_FAR *pu;
/** Pointer to a long value. */
long const volatile          RT_FAR *pl;
/** Pointer to a long value. */
unsigned long const volatile  RT_FAR *pul;
/** Pointer to a 8-bit unsigned value. */
uint8_t const volatile        RT_FAR *pu8;
/** Pointer to a 16-bit unsigned value. */
uint16_t const volatile       RT_FAR *pu16;
/** Pointer to a 32-bit unsigned value. */
uint32_t const volatile       RT_FAR *pu32;
/** Pointer to a 64-bit unsigned value. */
uint64_t const volatile       RT_FAR *pu64;
/** Pointer to a UTF-16 character. */
RTUTF16 const volatile        RT_FAR *pwc;
/** Pointer to a UUID character. */
RTUUID const volatile         RT_FAR *pUuid;
} RTCVPTRUNION;
/** Pointer to a const pointer union. */
typedef RTCVPTRUNION RT_FAR *PRTCVPTRUNION;

#ifdef __cplusplus
/**
 * Strict type validation helper class.
 *
 * See RTErrStrictType and RT_SUCCESS_NP.
 */
class RTErrStrictType2
{
protected:
/** The status code. */
int32_t m_rc;

public:
/**
 * Constructor.
 *
 * @param rc IPRT style status code.
 */
RTErrStrictType2(int32_t rc) : m_rc(rc)
{
}

/**
 * Get the status code.
```c
+ * @returns IPRT style status code.
+ */
+ int32_t getValue() const
+ { 
+     return m_rc;
+ }
+};
+#endif /* __cplusplus */
/** @} */

#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/uint64.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/uint64.h
@@ -0,0 +1,1330 @@
+/** @file
+ * IPRT - RTUINT64U methods for old 32-bit and 16-bit compilers.
+ */
+
+/**
+ * Copyright (C) 2011-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef __iprt_uint64_h
+define __iprt_uint64_h
+
+include <iprt/cdefs.h>
+include <iprt/types.h>
+include <iprt/asm.h>
+
+RT_C_DECLS_BEGIN
```
/** @defgroup grp_rt_uint64 RTUInt64 - 64-bit Unsigned Integer Methods for ancient compilers
 * @ingroup grp_rt
 */

/**
 * Test if a 128-bit unsigned integer value is zero.
 *
 * @returns true if they are, false if they aren't.
 * @param   pValue   The input and output value.
 */
DECLINLINE(bool) RTUInt64IsZero(PRTUINT64U pValue)
{
#if ARCH_BITS >= 32
    return pValue->s.Lo == 0
        && pValue->s.Hi == 0;
#else
    return pValue->Words.w0 == 0
        && pValue->Words.w1 == 0
        && pValue->Words.w2 == 0
        && pValue->Words.w3 == 0;
#endif
}

/**
 * Set a 128-bit unsigned integer value to zero.
 *
 * @returns pResult
 * @param   pResult   The result variable.
 */
DECLINLINE(PRTUINT64U) RTUInt64SetZero(PRTUINT64U pResult)
{
#if ARCH_BITS >= 32
    pResult->s.Hi = 0;
    pResult->s.Lo = 0;
#else
    pResult->Words.w0 = 0;
    pResult->Words.w1 = 0;
    pResult->Words.w2 = 0;
    pResult->Words.w3 = 0;
#endif
    return pResult;
}
/**
 * Set a 32-bit unsigned integer value to the maximum value.
 * @returns pResult
 * @param pResult The result variable.
 */
DECLINLINE(PRTUINT64U) RTUInt64SetMax(PRTUINT64U pResult)
{
#if ARCH_BITS >= 32
  pResult->s.Hi = UINT32_MAX;
  pResult->s.Lo = UINT32_MAX;
#else
  pResult->Words.w0 = UINT16_MAX;
  pResult->Words.w1 = UINT16_MAX;
  pResult->Words.w2 = UINT16_MAX;
  pResult->Words.w3 = UINT16_MAX;
#endif
  return pResult;
}

/**
 * Adds two 64-bit unsigned integer values.
 * @returns pResult
 * @param pResult The result variable.
 * @param pValue1 The first value.
 * @param pValue2 The second value.
 */
DECLINLINE(PRTUINT64U) RTUInt64Add(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
  pResult->s.Hi = pValue1->s.Hi + pValue2->s.Hi;
  pResult->s.Lo = pValue1->s.Lo + pValue2->s.Lo;
  if (pResult->s.Lo < pValue1->s.Lo)
    pResult->s.Hi++;
  return pResult;
}

/**
 * Adds a 64-bit and a 32-bit unsigned integer values.
 * @returns pResult
 * @param pResult The result variable.
 * @param pValue1 The first value.
 */
DECLINLINE(PRTUINT64U) RTUInt64Add64(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+ * @param uValue2 The second value, 32-bit.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AddU32(PRTUINT64U pResult, PCRTUINT64U pValue1, uint32_t uValue2)
+{
+    pResult->s.Hi = pValue1->s.Hi;
+    pResult->s.Lo = pValue1->s.Lo + uValue2;
+    if (pResult->s.Lo < pValue1->s.Lo)
+        pResult->s.Hi++;
+    return pResult;
+}
+
+/**
+ * Subtracts a 64-bit unsigned integer value from another.
+ */
+ * @returns pResult
+ * @param pResult The result variable.
+ * @param pValue1 The minuend value.
+ * @param pValue2 The subtrahend value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64Sub(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    pResult->s.Lo = pValue1->s.Lo - pValue2->s.Lo;
+    pResult->s.Hi = pValue1->s.Hi - pValue2->s.Hi;
+    if (pResult->s.Lo > pValue1->s.Lo)
+        pResult->s.Hi--;
+    return pResult;
+}
+
+/**
+ * Multiplies two 64-bit unsigned integer values.
+ */
+ * @returns pResult
+ * @param pResult The result variable.
+ * @param pValue1 The first value.
+ * @param pValue2 The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64Mul(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    RTUINT32U uTmp;
+    /* multiply all words in v1 by v2.w0. */
+    pResult->s.Lo = (uint32_t)pValue1->Words.w0 * pValue2->Words.w0;
+    }
/* multiply w0, w1 & w2 in v1 by v2.w1. */
  uTmp.u = (uint32_t)pValue1->Words.w0 * pValue2->Words.w1;
  pResult->Words.w1 += uTmp.Words.w1;
  if (pResult->Words.w1 < uTmp.Words.w0)
      if (pResult->Words.w2++ == UINT16_MAX)
          pResult->Words.w3++;

  pResult->s.Hi += (uint32_t)pValue1->Words.w2 * pValue2->Words.w0;
  pResult->Words.w3 += pValue1->Words.w3 * pValue2->Words.w0;

  /* multiply w0, w1 & w2 in v1 by v2.w2. */
  pResult->s.Hi += (uint32_t)pValue1->Words.w0 * pValue2->Words.w2;
  pResult->Words.w3 += pValue1->Words.w1 * pValue2->Words.w2;

  /* multiply w0 in v1 by v2.w3. */
  pResult->Words.w3 += pValue1->Words.w0 * pValue2->Words.w3;

  return pResult;
}
```c
+ uint16_t const uHiValue2 = (uint16_t)(uValue2 >> 16);
+ RTUINT32U uTmp;
+
+ /* multiply all words in v1 by uLoValue1. */
+ pResult->s.Lo = (uint32_t)pValue1->Words.w0 * uLoValue2;
+
+ uTmp.u = (uint32_t)pValue1->Words.w1 * uLoValue2;
+ pResult->Words.w3 = 0;
+ pResult->Words.w2 = uTmp.Words.w1;
+ pResult->Words.w1 += uTmp.Words.w0;
+ if (pResult->Words.w1 < uTmp.Words.w0)
+     if (pResult->Words.w2++ == UINT16_MAX)
+         pResult->Words.w3++;
+
+ pResult->s.Hi += (uint32_t)pValue1->Words.w2 * uLoValue2;
+ pResult->Words.w3 += pValue1->Words.w3 * uLoValue2;
+
+ /* multiply w0, w1 & w2 in v1 by uHiValue2. */
+ uTmp.u = (uint32_t)pValue1->Words.w0 * uHiValue2;
+ pResult->Words.w1 += uTmp.Words.w0;
+ if (pResult->Words.w1 < uTmp.Words.w0)
+     if (pResult->Words.w2++ == UINT16_MAX)
+         pResult->Words.w3++;
+
+ pResult->Words.w2 += uTmp.Words.w1;
+ if (pResult->Words.w2 < uTmp.Words.w1)
+     pResult->Words.w3++;
+
+ pResult->s.Hi += (uint32_t)pValue1->Words.w1 * uHiValue2;
+ pResult->Words.w3 += pValue1->Words.w2 * uHiValue2;
+
+ return pResult;
+}
+
+/**
+ * Multiplies two 32-bit unsigned integer values with 64-bit precision.
+ *
+ * @returns pResult
+ * @param pResult The result variable.
+ * @param uValue1 The first value, 32-bit.
+ * @param uValue2 The second value, 32-bit.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64MulU32ByU32(PRTUINT64U pResult, uint32_t uValue1, uint32_t uValue2)
+{
+    uint16_t const uLoValue1 = (uint16_t)uValue1;
+    uint16_t const uHiValue1 = (uint16_t)(uValue1 >> 16);
```
uint16_t const uLoValue2 = (uint16_t)uValue2;
uint16_t const uHiValue2 = (uint16_t)(uValue2 >> 16);
RTUINT32U uTmp;

/* Multiply uLoValue1 and uHiValue1 by uLoValue2. */
pResult->s.Lo = (uint32_t)uLoValue1 * uLoValue2;

uTmp.u = (uint32_t)uHiValue1 * uLoValue2;
pResult->Words.w3 = 0;
pResult->Words.w2 = uTmp.Words.w1;
pResult->Words.w1 += uTmp.Words.w0;
if (pResult->Words.w1 < uTmp.Words.w0)
    if (pResult->Words.w2++ == UINT16_MAX)
        pResult->Words.w3++;

/* Multiply uLoValue1 and uHiValue1 by uHiValue2. */

uTmp.u = (uint32_t)uLoValue1 * uHiValue2;
pResult->Words.w1 += uTmp.Words.w0;
if (pResult->Words.w1 < uTmp.Words.w0)
    if (pResult->Words.w2++ == UINT16_MAX)
        pResult->Words.w3++;

pResult->s.Hi += (uint32_t)uHiValue1 * uHiValue2;
return pResult;
}

DECLINLINE(PRTUINT64U) RTUInt64DivRem(PRTUINT64U pQuotient, PRTUINT64U pRemainder, PCRTUINT64U pValue1, PCRTUINT64U pValue2);

DECLINLINE(PRTUINT64U) RTUInt64Div(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2) {
    RTUINT64U Ignored;
    return RTUInt64DivRem(pResult, &Ignored, pValue1, pValue2);
}

+DECLINLINE(PRTUINT64U) RTUInt64DivRem(PRTUINT64U pQuotient, PRTUINT64U pRemainder, PCRTUINT64U pValue1, PCRTUINT64U pValue2);
+/**
+ * Divides a 64-bit unsigned integer value by another.
+ *
+ * @returns pResult
+ * @param pResult The result variable.
+ * @param pValue1 The dividend value.
+ * @param pValue2 The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64Div(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2) {
+    RTUINT64U Ignored;
+    return RTUInt64DivRem(pResult, &Ignored, pValue1, pValue2);
+}
/**
 * Divides a 64-bit unsigned integer value by another, returning the remainder.
 */
DECLINLINE(PRTUINT64U) RTUInt64Mod(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2) {
    RTUINT64U Ignored;
    RTUInt64DivRem(&Ignored, pResult, pValue1, pValue2);
    return pResult;
}

/**
 * Bitwise AND of two 64-bit unsigned integer values.
 */
DECLINLINE(PRTUINT64U) RTUInt64And(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2) {
    pResult->s.Hi = pValue1->s.Hi & pValue2->s.Hi;
    pResult->s.Lo = pValue1->s.Lo & pValue2->s.Lo;
    return pResult;
}

/**
 * Bitwise OR of two 64-bit unsigned integer values.
 */
DECLINLINE(PRTUINT64U) RTUInt64Or(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2) {
    pResult->s.Hi = pValue1->s.Hi | pValue2->s.Hi;
pResult->s.Lo = pValue1->s.Lo | pValue2->s.Lo;
return pResult;
+
+
+/**
+ * Bitwise XOR of two 64-bit unsigned integer values.
+ *
+ * @returns pResult
+ * @param   pResult             The result variable.
+ * @param   pValue1             The first value.
+ * @param   pValue2             The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64Xor(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    pResult->s.Hi = pValue1->s.Hi ^ pValue2->s.Hi;
+    pResult->s.Lo = pValue1->s.Lo ^ pValue2->s.Lo;
+    return pResult;
+}
+
+/**
+ * Shifts a 64-bit unsigned integer value @a cBits to the left.
+ *
+ * @returns pResult
+ * @param   pResult             The result variable.
+ * @param   pValue               The value to shift.
+ * @param   cBits               The number of bits to shift it.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64ShiftLeft(PRTUINT64U pResult, PCRTUINT64U pValue, int cBits)
+{
+    cBits &= 63;
+    if (cBits < 32)
+    {
+        pResult->s.Lo = pValue->s.Lo << cBits;
+        pResult->s.Hi = (pValue->s.Hi << cBits) | (pValue->s.Lo >> (32 - cBits));
+    }
+    else
+    {
+        pResult->s.Lo = 0;
+        pResult->s.Hi = pValue->s.Lo << (cBits - 32);
+    }
+    return pResult;
+}
+ * Shifts a 64-bit unsigned integer value @a cBits to the right.
+ *
+ * @returns pResult
+ * @param  pResult The result variable.
+ * @param  pValue The value to shift.
+ * @param  cBits The number of bits to shift it.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64ShiftRight(PRTUINT64U pResult, PCRTUINT64U pValue, int cBits)
+{
+    cBits &= 63;
+    if (cBits < 32)
+    {
+        pResult->s.Hi = pValue->s.Hi >> cBits;
+        pResult->s.Lo = (pValue->s.Lo >> cBits) | (pValue->s.Hi << (32 - cBits));
+    }
+    else
+    {
+        pResult->s.Hi = 0;
+        pResult->s.Lo = pValue->s.Hi >> (cBits - 32);
+    }
+    return pResult;
+}
+
+/**
+ * Boolean not (result 0 or 1).
+ *
+ * @returns pResult.
+ * @param  pResult The result variable.
+ * @param  pValue The value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64BooleanNot(PRTUINT64U pResult, PCRTUINT64U pValue)
+{
+    pResult->s.Lo = pValue->s.Lo || pValue->s.Hi ? 0 : 1;
+    pResult->s.Hi = 0;
+    return pResult;
+}
+
+/**
+ * Bitwise not (flips each bit of the 64 bits).
+ *
+ * @returns pResult.
+ * @param  pResult The result variable.
+ * @param  pValue The value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64BitwiseNot(PRTUINT64U pResult, PCRTUINT64U pValue)
# Assigns one 64-bit unsigned integer value to another.

@returns pResult
@returns pValue
@returns pValueResult
@returns pValueResult

DECLINLINE(PRTUINT64U) RTUInt64Assign(PRTUINT64U pResult, PCRTUINT64U pValue)
{
  if ARCH_BITS >= 32
    pResult->s.Hi = pValue->s.Hi;
    pResult->s.Lo = pValue->s.Lo;
  else
    pResult->Words.w0 = pValue->Words.w0;
    pResult->Words.w1 = pValue->Words.w1;
    pResult->Words.w2 = pValue->Words.w2;
    pResult->Words.w3 = pValue->Words.w3;
  endif
  return pResult;
}

DECLINLINE(PRTUINT64U) RTUInt64AssignBoolean(PRTUINT64U pValueResult, bool fValue)
{
  if ARCH_BITS >= 32
    pValueResult->s.Lo = fValue;
    pValueResult->s.Hi = 0;
  else
    pValueResult->Words.w0 = fValue;
    pValueResult->Words.w1 = 0;
    pValueResult->Words.w2 = 0;
    pValueResult->Words.w3 = 0;
  endif
  return pValueResult;
}
+/**
+ * Assigns a 8-bit unsigned integer value to 64-bit unsigned integer.
+ *
+ * @returns pValueResult
+ * @param pValueResult The result variable.
+ * @param u8Value The 8-bit unsigned integer value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignU8(PRTUINT64U pValueResult, uint8_t u8Value)
+{
+    if ARCH_BITS >= 32
+        pValueResult->s.Lo = u8Value;
+        pValueResult->s.Hi = 0;
+    else
+        pValueResult->Words.w0 = u8Value;
+        pValueResult->Words.w1 = 0;
+        pValueResult->Words.w2 = 0;
+        pValueResult->Words.w3 = 0;
+    #endif
+    return pValueResult;
+}
+
+/**
+ * Assigns a 16-bit unsigned integer value to 64-bit unsigned integer.
+ *
+ * @returns pValueResult
+ * @param pValueResult The result variable.
+ * @param u16Value The 16-bit unsigned integer value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignU16(PRTUINT64U pValueResult, uint16_t u16Value)
+{
+    if ARCH_BITS >= 32
+        pValueResult->s.Lo = u16Value;
+        pValueResult->s.Hi = 0;
+    else
+        pValueResult->Words.w0 = u16Value;
+        pValueResult->Words.w1 = 0;
+        pValueResult->Words.w2 = 0;
+        pValueResult->Words.w3 = 0;
+    #endif
+    return pValueResult;
+}
+
+/**
+ * Assigns a 32-bit unsigned integer value to 64-bit unsigned integer.
```c
+ * @returns pValueResult
+ * @param pValueResult The result variable.
+ * @param u32Value The 32-bit unsigned integer value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignU32(PRTUINT64U pValueResult, uint32_t u32Value)
+{
+    #if ARCH_BITS >= 32
+        pValueResult->s.Lo = u32Value;
+        pValueResult->s.Hi = 0;
+    #else
+        pValueResult->Words.w0 = (uint16_t)u32Value;
+        pValueResult->Words.w1 = u32Value >> 16;
+        pValueResult->Words.w2 = 0;
+        pValueResult->Words.w3 = 0;
+    #endif
+    return pValueResult;
+}
+
+/**
+ * Adds two 64-bit unsigned integer values, storing the result in the first.
+ * @returns pValue1Result.
+ * @param pValue1Result The first value and result.
+ * @param pValue2 The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignAdd(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    uint32_t const uTmp = pValue1Result->s.Lo;
+    pValue1Result->s.Lo += pValue2->s.Lo;
+    if (pValue1Result->s.Lo < uTmp)
+        pValue1Result->s.Hi++;
+    pValue1Result->s.Hi += pValue2->s.Hi;
+    return pValue1Result;
+}
+
+/**
+ * Subtracts two 64-bit unsigned integer values, storing the result in the first.
+ * @returns pValue1Result.
+ * @param pValue1Result The minuend value and result.
+ * @param pValue2 The subtrahend value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignSub(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
```
+    uint32_t const uTmp = pValue1Result->s.Lo;
+    pValue1Result->s.Lo -= pValue2->s.Lo;
+    if (pValue1Result->s.Lo > uTmp)
+        pValue1Result->s.Hi--;
+    pValue1Result->s.Hi -= pValue2->s.Hi;
+    return pValue1Result;
+}
+
+/**
+ * Multiplies two 64-bit unsigned integer values, storing the result in the
+ * first.
+ *
+ * @returns pValue1Result.
+ * @param   pValue1Result   The first value and result.
+ * @param   pValue2         The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignMul(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    RTUINT64U Result;
+    RTUInt64Mul(&Result, pValue1Result, pValue2);
+    *pValue1Result = Result;
+    return pValue1Result;
+}
+
+/**
+ * Divides a 64-bit unsigned integer value by another, storing the result in
+ * the first.
+ *
+ * @returns pValue1Result.
+ * @param   pValue1Result   The dividend value and result.
+ * @param   pValue2         The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignDiv(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    RTUINT64U Result;
+    RTUINT64U Ignored;
+    RTUInt64DivRem(&Result, &Ignored, pValue1Result, pValue2);
+    *pValue1Result = Result;
+    return pValue1Result;
+}
+
+/**
+ * Divides a 64-bit unsigned integer value by another, storing the remainder in
+ * the first.
+ *
@returns pValue1Result.
+ @param pValue1Result The dividend value and result (remainder).
+ @param pValue2 The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignMod(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+
+ RTUINT64U Ignored;
+ RTUINT64U Result;
+ RTUInt64DivRem(&Ignored, &Result, pValue1Result, pValue2);
+ *pValue1Result = Result;
+ return pValue1Result;
+
+
+/**
+ * Performs a bitwise AND of two 64-bit unsigned integer values and assigned
+ * the result to the first one.
+ *
+ @returns pValue1Result.
+ @param pValue1Result The first value and result.
+ @param pValue2 The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignAnd(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+
+if ARCH_BITS >= 32
+    pValue1Result->s.Hi &= pValue2->s.Hi;
+    pValue1Result->s.Lo &= pValue2->s.Lo;
+else
+    pValue1Result->Words.w0 &= pValue2->Words.w0;
+    pValue1Result->Words.w1 &= pValue2->Words.w1;
+    pValue1Result->Words.w2 &= pValue2->Words.w2;
+    pValue1Result->Words.w3 &= pValue2->Words.w3;
+endif
+ return pValue1Result;
+
+
+/**
+ * Performs a bitwise AND of a 64-bit unsigned integer value and a mask made
+ * up of the first N bits, assigning the result to the the 64-bit value.
+ *
+ @returns pValueResult.
+ @param pValueResult The value and result.
+ @param cBits The number of bits to AND (counting from the first
+ *    bit).
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignAndNFirstBits(PRTUINT64U pValueResult, unsigned cBits)
+{
if (cBits <= 32)
{
    if (cBits != 32)
        pValueResult->s.Lo &= (RT_BIT_32(cBits) - 1);
    pValueResult->s.Hi = 0;
}
else if (cBits < 64)
    pValueResult->s.Hi &= (RT_BIT_32(cBits - 32) - 1);
return pValueResult;

/**
 * Performs a bitwise OR of two 64-bit unsigned integer values and assigned
 * the result to the first one.
 *
 * @returns pValueResult.
 * @param   pValueResult   The first value and result.
 * @param   pValue2         The second value.
 * @*/
DECLINLINE(PRTUINT64U) RTUInt64AssignOr(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
{
#if ARCH_BITS >= 32
    pValue1Result->s.Hi |= pValue2->s.Hi;
    pValue1Result->s.Lo |= pValue2->s.Lo;
#else
    pValue1Result->Words.w0 |= pValue2->Words.w0;
    pValue1Result->Words.w1 |= pValue2->Words.w1;
    pValue1Result->Words.w2 |= pValue2->Words.w2;
    pValue1Result->Words.w3 |= pValue2->Words.w3;
#endif
    return pValue1Result;

/**
 * ORs in a bit and assign the result to the input value.
 *
 * @returns pValueResult.
 * @param   pValue1Result   The first value and result.
 * @param   iBit            The bit to set (0 based).
 * @*/
DECLINLINE(PRTUINT64U) RTUInt64AssignOrBit(PRTUINT64U pValue1Result, unsigned iBit)
{
#if ARCH_BITS >= 32
    if (iBit >= 32)
        pValue1Result->s.Hi |= RT_BIT_32(iBit - 32);
#else
    pValue1Result->Words.w0 |= RT_BIT_32(iBit - 32);
#endif
    return pValue1Result;
+ pValue1Result->s.Lo |= RT_BIT_32(iBit);
+#else
+ if (iBit >= 32)
+ {  
+     if (iBit >= 48)
+         pValue1Result->Words.w3 |= UINT16_C(1) << (iBit - 48);
+     else
+         pValue1Result->Words.w2 |= UINT16_C(1) << (iBit - 32);
+     }
+ else
+ {  
+     if (iBit >= 16)
+         pValue1Result->Words.w1 |= UINT16_C(1) << (iBit - 16);
+     else
+         pValue1Result->Words.w0 |= UINT16_C(1) << (iBit);
+ }
+#endif
+ return pValue1Result;
+
+
+/**
+ * Performs a bitwise XOR of two 64-bit unsigned integer values and assigned
+ * the result to the first one.
+ *
+ * @returns pValue1Result.
+ * @param   pValue1Result   The first value and result.
+ * @param   pValue2         The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignXor(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    if ARCH_BITS >= 32
+    {  
+        pValue1Result->s.Hi ^= pValue2->s.Hi;
+        pValue1Result->s.Lo ^= pValue2->s.Lo;
+    }
+ else
+    {  
+        pValue1Result->Words.w0 ^= pValue2->Words.w0;
+        pValue1Result->Words.w1 ^= pValue2->Words.w1;
+        pValue1Result->Words.w2 ^= pValue2->Words.w2;
+        pValue1Result->Words.w3 ^= pValue2->Words.w3;
+    }
+    return pValue1Result;
+}
+ * @returns pValueResult.
+ * @param pValueResult The first value and result.
+ * @param cBits The number of bits to shift.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignShiftLeft(PRTUINT64U pValueResult, int cBits)
+{
+    RTUINT64U const InVal = *pValueResult;
+    if (cBits > 0)
+    {
+        /* (left shift) */
+        cBits &= 31;
+        if (cBits >= 32)
+        {
+            pValueResult->s.Lo  = 0;
+            pValueResult->s.Hi  = InVal.s.Lo << (cBits - 32);
+        }
+        else
+        {
+            pValueResult->s.Hi  = InVal.s.Hi << cBits;
+            pValueResult->s.Hi |= InVal.s.Lo >> (32 - cBits);
+            pValueResult->s.Lo  = InVal.s.Lo << cBits;
+        }
+    }
+    else if (cBits < 0)
+    {
+        /* (right shift) */
+        cBits = -cBits;
+        cBits &= 31;
+        if (cBits >= 32)
+        {
+            pValueResult->s.Hi  = 0;
+            pValueResult->s.Lo  = InVal.s.Hi >> (cBits - 32);
+        }
+        else
+        {
+            pValueResult->s.Lo  = InVal.s.Lo >> cBits;
+            pValueResult->s.Lo |= InVal.s.Hi << (32 - cBits);
+            pValueResult->s.Hi  = InVal.s.Hi >> cBits;
+        }
+    }
+    return pValueResult;
+}
+
+/**
+ * Performs a bitwise left shift on a 64-bit unsigned integer value, assigning
+ * the result to it.
+ */
DECLINLINE(PRTUINT64U) RTUInt64AssignShiftRight(PRTUINT64U pValueResult, int cBits)
{
    return RTUInt64AssignShiftLeft(pValueResult, -cBits);
}

DECLINLINE(PRTUINT64U) RTUInt64AssignBitwiseNot(PRTUINT64U pValueResult)
{
#if ARCH_BITS >= 32
    pValueResult->s.Hi = ~pValueResult->s.Hi;
    pValueResult->s.Lo = ~pValueResult->s.Lo;
#else
    pValueResult->Words.w0 = ~pValueResult->Words.w0;
    pValueResult->Words.w1 = ~pValueResult->Words.w1;
    pValueResult->Words.w2 = ~pValueResult->Words.w2;
    pValueResult->Words.w3 = ~pValueResult->Words.w3;
#endif
    return pValueResult;
}

DECLINLINE(PRTUINT64U) RTUInt64AssignBooleanNot(PRTUINT64U pValueResult)
{
    return RTUInt64AssignBoolean(pValueResult, RTUInt64IsZero(pValueResult));
}

DECLINLINE(PRTUINT64U) RTUInt64NoComparison(PRTUINT64U pValueResult)
+ * @retval  0 if equal.
+ * @retval  -1 if the first value is smaller than the second.
+ * @retval  1 if the first value is larger than the second.
+ *
+ * @param   pValue1             The first value.
+ * @param   pValue2             The second value.
+ */
DECLINLINE(int) RTUInt64Compare(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
#if ARCH_BITS >= 32
    if (pValue1->s.Hi != pValue2->s.Hi)
        return pValue1->s.Hi > pValue2->s.Hi ? 1 : -1;
    if (pValue1->s.Lo != pValue2->s.Lo)
        return pValue1->s.Lo > pValue2->s.Lo ? 1 : -1;
    return 0;
#else
    if (pValue1->Words.w3 != pValue2->Words.w3)
        return pValue1->Words.w3 > pValue2->Words.w3 ? 1 : -1;
    if (pValue1->Words.w2 != pValue2->Words.w2)
        return pValue1->Words.w2 > pValue2->Words.w2 ? 1 : -1;
    if (pValue1->Words.w1 != pValue2->Words.w1)
        return pValue1->Words.w1 > pValue2->Words.w1 ? 1 : -1;
    if (pValue1->Words.w0 != pValue2->Words.w0)
        return pValue1->Words.w0 > pValue2->Words.w0 ? 1 : -1;
    return 0;
#endif
}

/**
 * Tests if a 64-bit unsigned integer value is smaller than another.
 *
 * @returns true if the first value is smaller, false if not.
 *
 * @param   pValue1             The first value.
 * @param   pValue2             The second value.
 */
DECLINLINE(bool) RTUInt64IsSmaller(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
#if ARCH_BITS >= 32
    return pValue1->s.Hi < pValue2->s.Hi
        || (   pValue1->s.Hi == pValue2->s.Hi
            && pValue1->s.Lo  < pValue2->s.Lo);
#else
    return pValue1->Words.w3 < pValue2->Words.w3
        || (   pValue1->Words.w3 == pValue2->Words.w3
            && (   pValue1->Words.w2  < pValue2->Words.w2
                || (   pValue1->Words.w2 == pValue2->Words.w2

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+
+    && ( pValue1->Words.w1 < pValue2->Words.w1
+          || ( pValue1->Words.w1 == pValue2->Words.w1
+                 && pValue1->Words.w0 < pValue2->Words.w0)))));
+#endif
+
+
+/**
+ * Tests if a 32-bit unsigned integer value is larger than another.
+ *
+ * @returns true if the first value is larger, false if not.
+ * @param   pValue1             The first value.
+ * @param   pValue2             The second value.
+ *
+ * DECLINLINE(bool) RTUInt64IsLarger(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    #if ARCH_BITS >= 32
+        return pValue1->s.Hi > pValue2->s.Hi
+            || (   pValue1->s.Hi == pValue2->s.Hi
+                        && pValue1->s.Lo  > pValue2->s.Lo);
+    #else
+        return pValue1->Words.w3 > pValue2->Words.w3
+            || (   pValue1->Words.w3 == pValue2->Words.w3
+                        && (   pValue1->Words.w2  > pValue2->Words.w2
+                               || (   pValue1->Words.w2 == pValue2->Words.w2
+                                               && (   pValue1->Words.w1  > pValue2->Words.w1
+                                                       || (   pValue1->Words.w1 == pValue2->Words.w1
+                                                               && pValue1->Words.w0  > pValue2->Words.w0)))))
+            #endif
+    }
+
+
+/**
+ * Tests if a 64-bit unsigned integer value is larger or equal than another.
+ *
+ * @returns true if the first value is larger or equal, false if not.
+ * @param   pValue1             The first value.
+ * @param   pValue2             The second value.
+ *
+ * DECLINLINE(bool) RTUInt64IsLargerOrEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    #if ARCH_BITS >= 32
+        return pValue1->s.Hi > pValue2->s.Hi
+            || (   pValue1->s.Hi == pValue2->s.Hi
+                        && pValue1->s.Lo >= pValue2->s.Lo);
+    #else
+        return pValue1->Words.w3 > pValue2->Words.w3
+            || (   pValue1->Words.w3 == pValue2->Words.w3
+                        && (   pValue1->Words.w2  > pValue2->Words.w2
+                                || (   pValue1->Words.w2 == pValue2->Words.w2
+                                               && (   pValue1->Words.w1  > pValue2->Words.w1
+                                                                   || (   pValue1->Words.w1 == pValue2->Words.w1
+                                                                           && pValue1->Words.w0  > pValue2->Words.w0)))));
+    #endif
+    }
+}
+   & & ( pValue1->Words.w2 > pValue2->Words.w2
+   || ( pValue1->Words.w2 == pValue2->Words.w2
+   & & ( pValue1->Words.w1 > pValue2->Words.w1
+   || ( pValue1->Words.w1 == pValue2->Words.w1
+   & & pValue1->Words.w0 >= pValue2->Words.w0));
+acenf
+ )
+
+
+/**
+ * Tests if two 64-bit unsigned integer values not equal.
+ *
+ * @returns true if equal, false if not equal.
+ *
+ * @param pValue1 The first value.
+ * @param pValue2 The second value.
+ */
+DECLINLINE(bool) RTUInt64IsEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    #if ARCH_BITS >= 32
+    return pValue1->s.Hi == pValue2->s.Hi
+    && pValue1->s.Lo == pValue2->s.Lo;
+    #else
+    return pValue1->Words.w0 == pValue2->Words.w0
+    && pValue1->Words.w1 == pValue2->Words.w1
+    && pValue1->Words.w2 == pValue2->Words.w2
+    && pValue1->Words.w3 == pValue2->Words.w3;
+    +#endif
+ }
+
+
+/**
+ * Tests if two 64-bit unsigned integer values are not equal.
+ *
+ * @returns true if not equal, false if equal.
+ *
+ * @param pValue1 The first value.
+ * @param pValue2 The second value.
+ */
+DECLINLINE(bool) RTUInt64IsNotEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    return !RTUInt64IsEqual(pValue1, pValue2);
+ }
+
+
+/**
+ * Sets a bit in a 64-bit unsigned integer type.
+ *
+ * @returns pValueResult.
+ * @param pValueResult The input and output value.
+ */
### RTUInt64BitSet

```c
DECLINLINE(PRTUINT64U) RTUInt64BitSet(PRTUINT64U pValueResult, unsigned iBit)
{
    if (iBit < 32)
    {
        #if ARCH_BITS >= 32
            pValueResult->s.Lo |= RT_BIT_32(iBit);
        #else
            if (iBit < 16)
                pValueResult->Words.w0 |= UINT16_C(1) << iBit;
            else
                pValueResult->Words.w1 |= UINT16_C(1) << (iBit - 32);
        #endif
    }
    else if (iBit < 64)
    {
        #if ARCH_BITS >= 32
            pValueResult->s.Hi |= RT_BIT_32(iBit - 32);
        #else
            if (iBit < 48)
                pValueResult->Words.w2 |= UINT16_C(1) << (iBit - 64);
            else
                pValueResult->Words.w3 |= UINT16_C(1) << (iBit - 96);
        #endif
    }
    return pValueResult;
}
```

### RTUInt64BitClear

```c
DECLINLINE(PRTUINT64U) RTUInt64BitClear(PRTUINT64U pValueResult, unsigned iBit)
{
    if (iBit < 32)
    {
        #if ARCH_BITS >= 32
            pValueResult->s.Lo &= ~RT_BIT_32(iBit);
        #else
            if (iBit < 48)
                pValueResult->Words.w0 &= ~(UINT16_C(1) << iBit);
            else
                pValueResult->Words.w1 &= ~(UINT16_C(1) << (iBit - 32));
        #endif
    }
    else if (iBit < 64)
    {
        #if ARCH_BITS >= 32
            pValueResult->s.Hi &= ~RT_BIT_32(iBit - 32);
        #else
            if (iBit < 48)
                pValueResult->Words.w2 &= ~(UINT16_C(1) << (iBit - 64));
            else
                pValueResult->Words.w3 &= ~(UINT16_C(1) << (iBit - 96));
        #endif
    }
    return pValueResult;
}
```
+    } 
+  } 
+  */
+  */
+  /* Tests if a bit in a 64-bit unsigned integer value is set. */
+  */
+DECLINLINE(bool) RTUInt64BitTest(PRTUINT64U pValueResult, unsigned iBit) 
+{ 
+  bool fRc;
+  if (iBit < 32) 
+  { 
+    */
+    */
+    */
+    */
+    */
+    */
+    * Tests if a bit in a 64-bit unsigned integer value is set.
+    */
+    */
+    * @returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    */
+    */
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
+    */
+    */
+    * @param   iBit            The bit to test.
+    */
+    */
+    * Returns pValueResult.
+    */
+    */
+    * @param   pValueResult    The input and output value.
```c
+    } else
+    fRc = false;
+} return fRc;
+
+/**
+ * Set a range of bits a 64-bit unsigned integer value.
+ *
+ * @returns pValueResult.
+ * @param   pValueResult    The input and output value.
+ * @param   iFirstBit       The first bit to test.
+ * @param   cBits           The number of bits to set.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64BitSetRange(PRTUINT64U pValueResult, unsigned iFirstBit, unsigned cBits)
+{
+    /* bounds check & fix. */
+    if (iFirstBit < 64)
+    {
+        if (iFirstBit + cBits > 64)
+            cBits = 64 - iFirstBit;
+        
+#if ARCH_BITS >= 32
+        if (iFirstBit + cBits < 32)
+            pValueResult->s.Lo |= (RT_BIT_32(cBits) - 1) << iFirstBit;
+        else if (iFirstBit + cBits < 64 && iFirstBit >= 32)
+            pValueResult->s.Hi |= (RT_BIT_32(cBits) - 1) << (iFirstBit - 32);
+        else
+            while (cBits-- > 0)
+                RTUInt64BitSet(pValueResult, iFirstBit);
+    }
+    return pValueResult;
+}
+```
/**
 * Test if all the bits of a 64-bit unsigned integer value are set.
 * @returns true if they are, false if they aren't.
 * @param   pValue   The input and output value.
 */
DECLINLINE(bool) RTUInt64BitAreAllSet(PRTUINT64U pValue)
{
#if ARCH_BITS >= 32
    return pValue->s.Hi == UINT32_MAX
        && pValue->s.Lo == UINT32_MAX;
#else
    return pValue->Words.w0 == UINT16_MAX
        && pValue->Words.w1 == UINT16_MAX
        && pValue->Words.w2 == UINT16_MAX
        && pValue->Words.w3 == UINT16_MAX;
#endif
}

/**
 * Test if all the bits of a 64-bit unsigned integer value are clear.
 * @returns true if they are, false if they aren't.
 * @param   pValue   The input and output value.
 */
DECLINLINE(bool) RTUInt64BitAreAllClear(PRTUINT64U pValue)
{
    return RTUInt64IsZero(pValue);
}

DECLINLINE(unsigned) RTUInt64BitCount(PCRTUINT64U pValue)
{
    unsigned cBits;
    if (pValue->s.Hi != 0)
    {
#if ARCH_BITS >= 32
        cBits = 32 + ASMBitLastSetU32(pValue->s.Hi);
#else
        if (pValue->Words.w3)
            cBits = 48 + ASMBitLastSetU16(pValue->Words.w3);
        else
            cBits = 32 + ASMBitLastSetU16(pValue->Words.w2);
#endif
    }
    else
    {
        cBits = 0;
    }
    return cBits;
}
+if ARCH_BITS >= 32
+ cBits = ASMBitLastSetU32(pValue->s.Lo);
+else
+ if (pValue->Words.w1)
+ cBits = 16 + ASMBitLastSetU16(pValue->Words.w1);
+ else
+ cBits = 0 + ASMBitLastSetU16(pValue->Words.w0);
+#endif
+
+ return cBits;
+
+/**
+ * Divides a 64-bit unsigned integer value by another, returning both quotient
+ * and remainder.
+ *
+ * @returns pQuotient, NULL if pValue2 is 0.
+ * @param   pQuotient           Where to return the quotient.
+ * @param   pRemainder          Where to return the remainder.
+ * @param   pValue1             The dividend value.
+ * @param   pValue2             The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64DivRem(PRTUINT64U pQuotient, PRTUINT64U pRemainder,
+PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+ int iDiff;
+
+ /*
+ * Sort out all the special cases first.
+ */
+ /* Divide by zero or 1? */
+ if (!pValue2->s.Hi)
+ {
+ if (!pValue2->s.Lo)
+ return NULL;
+
+ if (pValue2->s.Lo == 1)
+ {
+ RTUInt64SetZero(pRemainder);
+ *pQuotient = *pValue1;
+ return pQuotient;
+ }
+ }/* todo RTUInt64DivModByU32 */
+ }
+
+ /* Dividend is smaller? */
+ iDiff = RTUInt64Compare(pValue1, pValue2);
    if (iDiff < 0)
    {  
        *pRemainder = *pValue1;
        RTUInt64SetZero(pQuotient);
    }

    /* The values are equal? */
    else if (iDiff == 0)
    {  
        RTUInt64SetZero(pRemainder);
        RTUInt64AssignU8(pQuotient, 1);
    }

    else
    {  
        /* Prepare. */
        unsigned iBitAdder = RTUInt64BitCount(pValue1) - RTUInt64BitCount(pValue2);
        RTUINT64U NormDivisor = *pValue2;
        if (iBitAdder)
        {  
            RTUInt64ShiftLeft(&NormDivisor, pValue2, iBitAdder);
            if (RTUInt64IsLarger(&NormDivisor, pValue1))
            {  
                RTUInt64AssignShiftRight(&NormDivisor, 1);
                iBitAdder--;
            }
        }
        else
            NormDivisor = *pValue2;

        RTUInt64SetZero(pQuotient);
        *pRemainder = *pValue1;

        /*
         * Do the division.
         */
        if (RTUInt64IsLargerOrEqual(pRemainder, pValue2))
        {  
            for (;;)
            {  
                if (RTUInt64IsLargerOrEqual(pRemainder, &NormDivisor))
                {  
                    RTUInt64AssignSub(pRemainder, &NormDivisor);
                    RTUInt64AssignOrBit(pQuotient, iBitAdder);
                }

                if (RTUInt64IsSmaller(pRemainder, pValue2))
                    break;
+RTUInt64AssignShiftRight(&NormDivisor, 1);
+iBitAdder--;
+
+}
+}
+}
+ return pQuotient;
+
+}
+
+/** @} */
+
+RT_C_DECLS_END
+
+endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/uni.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/uni.h
@@ -0,0 +1,478 @@
+/** @file
+ * IPRT - Unicode Code Points.
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef ___iprt_uni_h
+#define ___iprt_uni_h
+
+/*@defgroup grp_rt_uni  RTUniCp - Unicode Code Points
+ */
+@ingroup grp_rt
/** @def RTUNI_USE_WCTYPE
 * Define RTUNI_USE_WCTYPE to not use the IPRT unicode data but the
 * data which the C runtime library provides. */
#ifdef DOXYGEN_RUNNING
#define RTUNI_USE_WCTYPE
#endif
#include <iprt/types.h>
#ifdef RTUNI_USE_WCTYPE
#include <wctype.h>
#endif

RT_C_DECLS_BEGIN

#ifndef RTUNI_USE_WCTYPE

/**
 * A unicode flags range.
 * @internal
 */
typedef struct RTUNIFLAGSRANGE
{
    /** The first code point of the range. */
    RTUNICP BeginCP;
    /** The last + 1 code point of the range. */
    RTUNICP EndCP;
    /** Pointer to the array of case folded code points. */
    const uint8_t *pafFlags;
} RTUNIFLAGSRANGE;
/** Pointer to a flags range.
 * @internal */
typedef RTUNIFLAGSRANGE *PRTUNIFLAGSRANGE;
/** Pointer to a const flags range.
 * @internal */
typedef const RTUNIFLAGSRANGE *PCRTUNIFLAGSRANGE;

/**
 * A unicode case folded range.
 * @internal
 */
typedef struct RTUNICASERANGE
{
    /** The first code point of the range. */
    RTUNICP BeginCP;
+ /** The last + 1 code point of the range. */
+ RTUNICP   EndCP;
+ /** Pointer to the array of case folded code points. */
+ PCRTUNICP  paFoldedCPs;
} RTUNICASERANGE;
+ /** Pointer to a case folded range. */
+ * @internal */
+ typedef RTUNICASERANGE *PRTUNICASERANGE;
+ /** Pointer to a const case folded range. */
+ * @internal */
+ typedef const RTUNICASERANGE *PCRTUNICASERANGE;
+
+ /** @name Unicode Code Point Flags. */
+ * @internal */
+ +#define RTUNI_UPPER            RT_BIT(0)
+ +#define RTUNI_LOWER            RT_BIT(1)
+ +#define RTUNI_ALPHA            RT_BIT(2)
+ +#define RTUNI_XDIGIT           RT_BIT(3)
+ +#define RTUNI_D DIGIT          RT_BIT(4)
+ +#define RTUNI_WSPACE           RT_BIT(5)
+ /*#define RTUNI_BSPACE          RT_BIT(6) - later */
+ /* When set, the codepoint requires further checking wrt NFC and NFD */
+ /* normalization. I.e. set when either of QC_NFD and QC_NFC are not Y. */
+ +#define RTUNI_QC_NFX           RT_BIT(7)
+ /* @} */
+ 
+ /** Array of flags ranges. */
+ * @internal */
+ 
+ extern RTDATADECL(const RTUNIFLAGSRANGE) g_aRTUniFlagsRanges[];
+
+ /** */
+ * Gets the flags for a unicode code point. */
+ * @returns The flag mask. (RTUNI_*) */
+ * @param CodePoint The unicode code point. */
+ * @internal */
+ */
+ +DECLINLINE(RTUNICP) rtUniCpFlags(RTUNICP CodePoint)
+ +{ +
+ PCRTUNIFLAGSRANGE pCur = &g_aRTUniFlagsRanges[0];
+ do +
+ + if (pCur->EndCP > CodePoint)
+ + {
if (pCur->BeginCP <= CodePoint)
    return pCur->pafFlags[CodePoint - pCur->BeginCP];
    break;
    }
    pCur++;
} while (pCur->EndCP != RTUNICP_MAX);
    return 0;
}

/**
 * Checks if a unicode code point is upper case.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsUpper(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_UPPER) != 0;
}

/**
 * Checks if a unicode code point is lower case.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsLower(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_LOWER) != 0;
}

/**
 * Checks if a unicode code point is case foldable.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsFoldable(RTUNICP CodePoint)
{
    /* Right enough. */
    return (rtUniCpFlags(CodePoint) & (RTUNI_LOWER | RTUNI_UPPER)) != 0;
}

/**
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsFoldable(RTUNICP CodePoint)
{
    /* Right enough. */
    return (rtUniCpFlags(CodePoint) & (RTUNI_LOWER | RTUNI_UPPER)) != 0;
}
/**
 * Checks if a unicode code point is alphabetic.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsAlphabetic(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_ALPHA) != 0;
}

/**
 * Checks if a unicode code point is a decimal digit.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsDecDigit(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_DDIGIT) != 0;
}

/**
 * Checks if a unicode code point is a hexadecimal digit.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsHexDigit(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_XDIGIT) != 0;
}

/**
 * Checks if a unicode code point is white space.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsWhiteSpace(RTUNICP CodePoint)
DECLINLINE(bool) RTUniCpIsSpace(RTUNICP CodePoint)
+
+ return (rtUniCpFlags(CodePoint) & RTUNI_WSPACE) != 0;
+
+}
+
+
+/**
+ * Array of uppercase ranges.
+ * @internal
+ */
+extern RTDATADECL(const RTUNICASERANGE) g_aRTUniUpperRanges[];
+
+/**
+ * Array of lowercase ranges.
+ * @internal
+ */
+extern RTDATADECL(const RTUNICASERANGE) g_aRTUniLowerRanges[];
+
+/**
+ * Folds a unicode code point using the specified range array.
+ * @returns Folded code point.
+ * @param   CodePoint       The unicode code point to fold.
+ * @param   pCur            The case folding range to use.
+ */
+DECLINLINE(RTUNICP) rtUniCpFold(RTUNICP CodePoint, PCRTUNICASERANGE pCur)
+
+
+do
+{
+    if (pCur->EndCP > CodePoint)
+    {
+        if (pCur->BeginCP <= CodePoint)
+            CodePoint = pCur->paFoldedCPs[CodePoint - pCur->BeginCP];
+        break;
+    }
+    pCur++;
+} while (pCur->EndCP != RTUNICP_MAX);
+ return CodePoint;
+
+
+
+/**
+ * Folds a unicode code point to upper case.
+ * @returns Folded code point.
+ * @param   CodePoint       The unicode code point to fold.
/**
 * Folds a unicode code point to lower case.
 * @returns Folded code point.
 * @param   CodePoint       The unicode code point to fold.
 */
DECLINLINE(RTUNICP) RTUniCpToUpper(RTUNICP CodePoint)
{
    return rtUniCpFold(CodePoint, &g_aRTUniUpperRanges[0]);
}

/**
 * Checks if a unicode code point is upper case.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param   CodePoint       The code point.
 */
DECLINLINE(bool) RTUniCpIsUpper(RTUNICP CodePoint)
{
    return !!iswupper(CodePoint);
}

/**
 * Checks if a unicode code point is lower case.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param   CodePoint       The code point.
 */
DECLINLINE(bool) RTUniCpIsLower(RTUNICP CodePoint)
{
    return !!iswlower(CodePoint);
}
/**
 * Checks if a unicode code point is case foldable.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsFoldable(RTUNICP CodePoint) {
    /* Right enough. */
    return iswupper(CodePoint) || iswlower(CodePoint);
}

/**
 * Checks if a unicode code point is alphabetic.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsAlphabetic(RTUNICP CodePoint) {
    return !!iswalpha(CodePoint);
}

/**
 * Checks if a unicode code point is a decimal digit.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsDecDigit(RTUNICP CodePoint) {
    return !!iswdigit(CodePoint);
}

/**
 * Checks if a unicode code point is a hexadecimal digit.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsHexDigit(RTUNICP CodePoint)
/**
 * Checks if a unicode code point is white space.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsSpace(RTUNICP CodePoint)
{
    return !!iswspace(CodePoint);
}

/**
 * Folds a unicode code point to upper case.
 * @returns Folded code point.
 * @param CodePoint The unicode code point to fold.
 */
DECLINLINE(RTUNICP) RTUniCpToUpper(RTUNICP CodePoint)
{
    return towupper(CodePoint);
}

/**
 * Folds a unicode code point to lower case.
 * @returns Folded code point.
 * @param CodePoint The unicode code point to fold.
 */
DECLINLINE(RTUNICP) RTUniCpToLower(RTUNICP CodePoint)
{
    return towlower(CodePoint);
}

#endif /* RTUNI_USE_WCTYPE */
+ * @param   pusz       The string to free.
+ */
+RTDECL(void) RTUniFree(PRTUNICP pusz);
+
+/**
+ * Checks if a code point valid.
+ *
+ * Any code point (defined or not) within the 17 unicode planes (0 thru 16),
+ * except surrogates will be considered valid code points by this function.
+ *
+ * @returns true if in range, false if not.
+ * @param   CodePoint   The unicode code point to validate.
+ */
+DECLINLINE(bool) RTUniCpIsValid(RTUNICP CodePoint)
+{
+    return CodePoint <= 0x00d7ff
+        || (   CodePoint <= 0x10ffff
+            && CodePoint >= 0x00e000);
+}
+
+/**
+ * Checks if the given code point is in the BMP range.
+ *
+ * Surrogates are not considered in the BMP range by this function.
+ *
+ * @returns true if in BMP, false if not.
+ * @param   CodePoint   The unicode code point to consider.
+ */
+DECLINLINE(bool) RTUniCpIsBMP(RTUNICP CodePoint)
+{
+    return CodePoint <= 0xd7ff
+        || (   CodePoint <= 0xffff
+            && CodePoint >= 0xe000);
+}
+
+/**
+ * Folds a unicode code point to lower case.
+ *
+ * @returns Folded code point.
+ * @param   CodePoint   The unicode code point to fold.
+ */
+DECLINLINE(size_t) RTUniCpCalcUtf8Len(RTUNICP CodePoint)
+{  
+    if (CodePoint < 0x80)
+        return 1;
+ returnType 2
+     + (CodePoint >= 0x00000800)
+     + (CodePoint >= 0x00010000)
+     + (CodePoint >= 0x00020000)
+     + (CodePoint >= 0x00040000)
+     + (CodePoint >= 0x80000000) /* illegal */;
+ }
+
+
+RT_C_DECLS_END
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/utf16.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/utf16.h
@@ -0,0 +1,1332 @@
+/** @file
+ * IPRT - String Manipulation, UTF-16 encoding.
+ */
+
+#ifdef __iprt_utf16_h
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
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+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_utf16_h
+#define ___iprt_utf16_h
+
+#include <iprt/string.h>
# @defgroup rt_str_utf16  UTF-16 String Manipulation
# @ingroup grp_rt_str
# @}
#
# @/**
# * Allocates memory for UTF-16 string storage (default tag).
# * You should normally not use this function, except if there is some very
# * custom string handling you need doing that isn't covered by any of the other
# * APIs.
# * @returns Pointer to the allocated UTF-16 string. The first wide char is
# * always set to the string terminator char, the contents of the
# * remainder of the memory is undefined. The string must be freed by
# * calling RTUtf16Free.
# * NULL is returned if the allocation failed. Please translate this to
# * VERR_NO_UTF16_MEMORY and not VERR_NO_MEMORY. Also consider
# * RTUtf16AllocEx if an IPRT status code is required.
# * @param   cb                  How many bytes to allocate, will be rounded up
to a multiple of two. If this is zero, we will
allocate a terminator wide char anyway.
*/
#define RTUtf16Alloc(cb)                    RTUtf16AllocTag((cb), RTSTR_TAG)

# @/**
# * Allocates memory for UTF-16 string storage (custom tag).
# * You should normally not use this function, except if there is some very
# * custom string handling you need doing that isn't covered by any of the other
# * APIs.
# * @returns Pointer to the allocated UTF-16 string. The first wide char is
# * always set to the string terminator char, the contents of the
# * remainder of the memory is undefined. The string must be freed by
# * calling RTUtf16Free.
# * NULL is returned if the allocation failed. Please translate this to
# * VERR_NO_UTF16_MEMORY and not VERR_NO_MEMORY. Also consider
# * RTUtf16AllocExTag if an IPRT status code is required.
# * @param   cb                  How many bytes to allocate, will be rounded up

to a multiple of two. If this is zero, we will allocate a terminator wide char anyway.

Allocation tag used for statistics and such.

/*
RTDECL(PRTUTF16) RTUtf16AllocTag(size_t cb, const char *pszTag);
+
+* 
+* Reallocates the specified UTF-16 string (default tag).
+*
+* You should normally not use this function, except if there is some very
+* custom string handling you need doing that isn't covered by any of the other
+* APIs.
+*
+* @returns VINF_SUCCESS.
+* @retval  VERR_NO_UTF16_MEMORY if we failed to reallocate the string. @a
+*          *ppwsz remains unchanged.
+*
+* @param   ppwsz               Pointer to the string variable containing the
+*                              input and output string.
+*
+* When not freeing the string, the result will
+* always have the last RTUTF16 set to the
+* terminator character so that when used for
+* string truncation the result will be a valid
+* C-style string (your job to keep it a valid
+* UTF-16 string).
+*
+* When the input string is NULL and we're supposed
+* to reallocate, the returned string will also
+* have the first RTUTF16 set to the terminator
+* char so it will be a valid C-style string.
+*
+* @param   cbNew               When @a cbNew is zero, we'll behave like
+*                              RTUtf16Free and @a *ppwsz will be set to NULL.
+*
+* When not zero, this will be rounded up to a
+* multiple of two, and used as the new size of the
+* memory backing the string, i.e. it includes the
+* terminator (RTUTF16) char.
+*/
+#define RTUtf16Realloc(ppwsz, cbNew)    RTUtf16ReallocTag((ppwsz), (cbNew), RTSTR_TAG)
+
+* Reallocates the specified UTF-16 string (custom tag).
+*
+* You should normally not use this function, except if there is some very
+* custom string handling you need doing that isn't covered by any of the other
+* APIs.
+ * @returns VINF_SUCCESS.
+ * @retval  VERR_NO_UTF16_MEMORY if we failed to reallocate the string, @a
+ *           *ppwsz remains unchanged.
+ *
+ * @param   ppwsz               Pointer to the string variable containing the
+ *                              input and output string.
+ *
+ * When not freeing the string, the result will
+ * always have the last RTUTF16 set to the
+ * terminator character so that when used for
+ * string truncation the result will be a valid
+ * C-style string (your job to keep it a valid
+ *
+ * When the input string is NULL and we're supposed
+ * to reallocate, the returned string will also
+ * have the first RTUTF16 set to the terminator
+ * char so it will be a valid C-style string.
+ *
+ * @param   cbNew               When @a cbNew is zero, we'll behave like
+ *                              RTUtf16Free and @a *ppwsz will be set to NULL.
+ *
+ * When not zero, this will be rounded up to a
+ * multiple of two, and used as the new size of the
+ * memory backing the string, i.e. it includes the
+ * terminator (RTUTF16) char.
+ *
+ * @param   pszTag              Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTUtf16ReallocTag(PRTUTF16 *ppwsz, size_t cbNew, const char *pszTag);
+
+/**
+ * Free a UTF-16 string allocated by RTStrToUtf16(), RTStrToUtf16Ex(),
+ * RTLatin1ToUtf16(), RTLatin1ToUtf16Ex(), RTUtf16Dup() or RTUtf16DupEx().
+ *
+ * @returns iprt status code.
+ *
+ */
+RTDECL(void)  RTUtf16Free(PRTUTF16 pwszString);
+
+/**
+ * Allocates a new copy of the specified UTF-16 string (default tag).
+ *
+ * @returns Pointer to the allocated string copy. Use RTUtf16Free() to free it.
+ *
+ */
+RTDECL(void)  RTUtf16Dup(PRTUTF16 pwszString);
*

---

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+#define RTUtf16Dup(pwszString)  RTUtf16DupTag((pwszString), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the specified UTF-16 string (custom tag).
+ *
+ * @returns Pointer to the allocated string copy. Use RTUtf16Free() to free it.
+ * @returns NULL when out of memory.
+ * @param  pwszString  UTF-16 string to duplicate.
+ * @param  pszTag      Allocation tag used for statistics and such.
+ * @remark  This function will not make any attempt to validate the encoding.
+ */
+RTDECL(PRTUTF16) RTUtf16DupTag(PCRTUTF16 pwszString, const char *pszTag);
+
+/**
+ * Allocates a new copy of the specified UTF-16 string (default tag).
+ *
+ * @returns iprt status code.
+ * @param  ppwszString  Receives pointer of the allocated UTF-16 string.
+ *                   The returned pointer must be freed using RTUtf16Free().
+ * @param  pwszString  UTF-16 string to duplicate.
+ * @param  cwcExtra    Number of extra RTUTF16 items to allocate.
+ * @remark  This function will not make any attempt to validate the encoding.
+ */
+#define RTUtf16DupEx(ppwszString, pwszString, cwcExtra)  
+    RTUtf16DupExTag((ppwszString), (pwszString), (cwcExtra), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the specified UTF-16 string (custom tag).
+ *
+ * @returns iprt status code.
+ * @param  ppwszString  Receives pointer of the allocated UTF-16 string.
+ *                   The returned pointer must be freed using RTUtf16Free().
+ * @param  pwszString  UTF-16 string to duplicate.
+ * @param  cwcExtra    Number of extra RTUTF16 items to allocate.
+ * @param  pszTag      Allocation tag used for statistics and such.
+ * @remark  This function will not make any attempt to validate the encoding.
+ */
+RTDECL(int) RTUtf16DupExTag(PRTUTF16 *ppwszString, PCRTUTF16 pwszString, size_t cwcExtra, const 
+    char *pszTag);
+
+/**
+ * Returns the length of a UTF-16 string in UTF-16 characters
+ * without trailing '\0'.
+ *
+ * Surrogate pairs counts as two UTF-16 characters here. Use RTUtf16CpCnt()
+ * to get the exact number of code points in the string.
+ *
+ * @returns The number of RTUTF16 items in the string.
+ * @param   pwszString  Pointer the UTF-16 string.
+ * @remark  This function will not make any attempt to validate the encoding.
+ */
+RTDECL(size_t) RTUtf16Len(PCRTUTF16 pwszString);
+
+/**
+ * Find the length of a zero-terminated byte string, given a max string length.
+ *
+ * @returns The string length or cbMax. The returned length does not include
+ *          the zero terminator if it was found.
+ *
+ * @param   pwszString  The string.
+ * @param   cwcMax      The max string length in RTUTF16s.
+ * @sa      RTUtf16NLenEx, RTStrNLen.
+ */
+RTDECL(size_t) RTUtf16NLen(PCRTUTF16 pwszString, size_t cwcMax);
+
+/**
+ * Find the length of a zero-terminated byte string, given
+ * a max string length.
+ *
+ * @returns IPRT status code.
+ *
+ * @retval  VINF_SUCCESS if the string has a length less than cchMax.
+ * @retval  VERR_BUFFER_OVERFLOW if the end of the string wasn't found
+ *          before cwcMax was reached.
+ *
+ * @param   pwszString  The string.
+ * @param   cwcMax      The max string length in RTUTF16s.
+ * @param   pcwc        Where to store the string length excluding the
+ *                      terminator. This is set to cwcMax if the terminator
+ *                      isn't found.
+ * @sa      RTUtf16NLen, RTStrNLenEx.
+ */
+RTDECL(int) RTUtf16NLenEx(PCRTUTF16 pwszString, size_t cwcMax, size_t *pcwc);
+
+/**
+ * Find the zero terminator in a string with a limited length.
+ *
+ * @returns Pointer to the zero terminator.
+ * @returns NULL if the zero terminator was not found.
+ *
+ * @param   pwszString  The string.
+ * @param   cwcMax      The max string length. RTSTR_MAX is fine.
+ */
+RTDECL(PCRTUTF16) RTUtf16End(PCRTUTF16 pwszString, size_t cwcMax);
+
+/**
+ * Strips blankspaces from both ends of the string.
+RTDECL(int) RTUtf16CopyAscii(PRTUTF16 pwszDst, size_t cwcDst, const char *pszSrc);
+
+/**
+ * String copy with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small.  The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pszSrc              The source string.  NULL is not OK.
+ * @param   cwcSrcMax           The maximum number of chars (not code points) to
+ *                              copy from the source string, not counting the
+ *                              terminator as usual.
+ */
+RTDECL(int) RTUtf16CopyEx(PRTUTF16 pwszDst, size_t cwcDst, PCRTUTF16 pwszSrc, size_t cwcSrcMax);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small.  The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pwszSrc              The source string.  NULL is not OK.
+ */
+RTDECL(int) RTUtf16Cat(PRTUTF16 pwszDst, size_t cwcDst, PCRTUTF16 pwszSrc);
+
+/**
+ * String concatenation with overflow handling, ASCII source.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small.  The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pszSrc              The source string, pure ASCII.  NULL is not OK.
+ */
+RTDECL(int) RTUtf16CatAscii(PRTUTF16 pwszDst, size_t cwcDst, const char *pszSrc);
+ * String concatenation with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ * buffer will contain as much of the string as it can hold, fully
+ * terminated.
+ *
+ * @param   pwszDst     The destination buffer.
+ * @param   cwcDst      The size of the destination buffer in RTUTF16s.
+ * @param   pwszSrc     The source string. NULL is not OK.
+ * @param   cwcSrcMax   The maximum number of UTF-16 chars (not code
+ *                      points) to copy from the source string, not
+ *                      counting the terminator as usual.
+ */
+RTDECL(int) RTUtf16CatEx(PRTUTF16 pwszDst, size_t cwcDst, PCRTUTF16 pwszSrc, size_t cwcSrcMax);
+
+/**
+ * Performs a case sensitive string compare between two UTF-16 strings.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second UTF-16 string. Null is allowed.
+ */
+RTDECL(int) RTUtf16Cmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case sensitive string compare between an UTF-16 string and a pure
+ * ASCII string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   psz2        Second string, pure ASCII. Null is allowed.
+ */
+RTDECL(int) RTUtf16CmpAscii(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case sensitive string compare between an UTF-16 string and a UTF-8
+ * string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   psz2        Second string, UTF-8. Null is allowed.
+ * @remarks NULL and empty strings are treated equally.
+ */
+RTDECL(int) RTUtf16CmpUtf8(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case insensitive string compare between two UTF-16 strings.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second UTF-16 string. Null is allowed.
+ */
+RTDECL(int) RTUtf16ICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case insensitive string compare between two big endian UTF-16
+ * strings.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First big endian UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second big endian UTF-16 string. Null is allowed.
+ */
+RTDECL(int) RTUtf16BigICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case insensitive string compare between an UTF-16 string and a
+ * UTF-8 string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   psz2        Second string, UTF-8. Null is allowed.
+ * @remarks NULL and empty strings are treated equally.
+ */
+RTDECL(int) RTUtf16ICmpUtf8(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case insensitive string compare between an UTF-16 string and a
+ * pure ASCII string.
+ *
+ Since this compare only takes cares about the first 128 codepoints in
+ * unicode, no tables are needed and there aren’t any real complications.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   psz2        Second string, pure ASCII. Null is allowed.
+ */
+
+RTDECL(int) RTUtf16ICmpAscii(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case insensitive string compare between two UTF-16 strings
+ * using the current locale of the process (if applicable).
+ *
+ This differs from RTUtf16ICmp() in that it will try, if a locale with the
+ * required data is available, to do a correct case-insensitive compare. It
+ * follows that it is more complex and thereby likely to be more expensive.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second UTF-16 string. Null is allowed.
+ */
+
+RTDECL(int) RTUtf16ICmpLocaleICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case insensitive string compare between two UTF-16 strings,
+ * stopping after N characters.
+ *
+ This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second UTF-16 string. Null is allowed.
+ * @param   cwcMax      Maximum number of characters to compare.
+ */
+RTDECL(int) RTUtf16NICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2, size_t cwcMax);
+
+/**
+ * Performs a case insensitive string compare between two big endian UTF-16
+ * strings, stopping after N characters.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param   pwsz1       First big endian UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second big endian UTF-16 string. Null is allowed.
+ * @param   cwcMax      Maximum number of characters to compare.
+ */
+RTDECL(int) RTUtf16BigNICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2, size_t cwcMax);
+
+/**
+ * Performs a case insensitive string compare between a UTF-16 string and a pure
+ * ASCII string, stopping after N characters.
+ *
+ * Since this compare only takes cares about the first 128 codepoints in
+ * unicode, no tables are needed and there aren't any real complications.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param   pwsz1       The UTF-16 first string. Null is allowed.
+ * @param   psz2        The pure ASCII second string. Null is allowed.
+ * @param   cwcMax      Maximum number of UTF-16 characters to compare.
+ */
+RTDECL(int) RTUtf16NICmpAscii(PCRTUTF16 pwsz1, const char *psz2, size_t cwcMax);
+
+/**
+ * Folds a UTF-16 string to lowercase.
+ *
+ * This is a very simple folding; is uses the simple lowercase
+ * code point, it is not related to any locale just the most common
+ * lowercase codepoint setup by the unicode specs, and it will not
+ * create new surrogate pairs or remove existing ones.
+ *
+ * @returns Pointer to the passed in string.
+ * @param   pwsz       The string to fold.
+ */
+RTDECL(PRTUTF16) RTUtf16ToLower(PRTUTF16 pwsz);
/**
 * Folds a UTF-16 string to uppercase.
 * 
 * This is a very simple folding; it uses the simple uppercase code point, it is not related to any locale just the most common uppercase codepoint setup by the unicode specs, and it will not create new surrogate pairs or remove existing ones.
 * 
 * @returns Pointer to the passed in string.
 * @param   pwsz      The string to fold.
 */
RTDECL(PRTUTF16) RTUtf16ToUpper(PRTUTF16 pwsz);

/**
 * Validates the UTF-16 encoding of the string.
 * 
 * @returns iprt status code.
 * @param   pwsz      The string.
 */
RTDECL(int) RTUtf16ValidateEncoding(PCRTUTF16 pwsz);

/**
 * Validates the UTF-16 encoding of the string.
 * 
 * @returns iprt status code.
 * @param   pwsz      The string.
 * @param   cwc       The max string length (/ size) in UTF-16 units. Use
 *                    RTSTR_MAX to process the entire string.
 * @param   fFlags    Combination of RTSTR_VALIDATE_ENCODING_XXX flags.
 */
RTDECL(int) RTUtf16ValidateEncodingEx(PCRTUTF16 pwsz, size_t cwc, uint32_t fFlags);

/**
 * Checks if the UTF-16 encoding is valid.
 * 
 * @returns true / false.
 * @param   pwsz      The string.
 */
RTDECL(bool) RTUtf16IsValidEncoding(PCRTUTF16 pwsz);

/**
 * Sanitise a (valid) UTF-16 string by replacing all characters outside a white
 * list in-place by an ASCII replacement character.
 * 
 * Surrogate paris will be replaced by two chars.
 * 
 * @returns The number of code points replaced. In the case of an incorrectly
```
+ * encoded string -1 will be returned, and the string is not completely
+ * processed. In the case of puszValidPairs having an odd number of
+ * code points, -1 will be also return but without any modification to
+ * the string.
+ * @param  pwsz The string to sanitise.
+ * @param  puszValidPairs A zero-terminated array of pairs of Unicode points.
+ * Each pair is the start and end point of a range,
+ * and the union of these ranges forms the white list.
+ * @param  chReplacement The ASCII replacement character.
+ * @sa  RTStrPurgeComplementSet
+ */
+RTDECL(ssize_t) RTUtf16PurgeComplementSet(PRTUTF16 pwsz, PCRTUNICP puszValidPairs, char
chReplacement);
+
+
+/**
+ * Translate a UTF-16 string into a UTF-8 allocating the result buffer (default
+ * tag).
+ *
+ * @returns iprt status code.
+ * @param  pwszString UTF-16 string to convert.
+ * @param  ppszString Receives pointer of allocated UTF-8 string on
+ * success, and is always set to NULL on failure.
+ * The returned pointer must be freed using RTStrFree().
+ */
+#define RTUtf16ToUtf8(pwszString, ppszString) RTUtf16ToUtf8Tag((pwszString), (ppszString),
RTSTR_TAG)
+
+/**
+ * Translate a UTF-16BE string into a UTF-8 allocating the result buffer
+ * (default tag).
+ *
+ * This differs from RTUtf16ToUtf8 in that the input is always a
+ * big-endian string.
+ *
+ * @returns iprt status code.
+ * @param    pwszString    UTF-16BE string to convert.
+ * @param    ppszString    Receives pointer of allocated UTF-8 string on
+ *                        success, and is always set to NULL on failure.
+ *                        The returned pointer must be freed using RTStrFree().
+ */
+#define RTUtf16BigToUtf8(pwszString, ppszString)    RTUtf16BigToUtf8Tag((pwszString), (ppszString), RTSTR_TAG)
+
+/**
+ * Translate a UTF-16BE string into a UTF-8 allocating the result buffer.
+ *
+ * This differs from RTUtf16ToUtf8Tag in that the input is always a
+ * big-endian string.
+ *
+ * @returns iprt status code.
+ * @param    pwszString    UTF-16BE string to convert.
+ * @param    ppszString    Receives pointer of allocated UTF-8 string on
+ *                        success, and is always set to NULL on failure.
+ * @param    pszTag        Allocation tag used for statistics and such.
+ */
+RTDECL(int)  RTUtf16BigToUtf8Tag(PCRTUTF16 pwszString, char **ppszString, const char *pszTag);
+
+/**
+ * Translate a UTF-16LE string into a UTF-8 allocating the result buffer
+ * (default tag).
+ *
+ * This differs from RTUtf16ToUtf8 in that the input is always a
+ * little-endian string.
+ *
+ * @returns iprt status code.
+ * @param    pwszString    UTF-16LE string to convert.
+ * @param    ppszString    Receives pointer of allocated UTF-8 string on
+ *                        success, and is always set to NULL on failure.
+ */
+#define RTUtf16LittleToUtf8(pwszString, ppszString)  RTUtf16LittleToUtf8Tag((pwszString), (ppszString), RTSTR_TAG)
+
+/**
+ * Translate a UTF-16LE string into a UTF-8 allocating the result buffer.
+ *
+ * This differs from RTUtf16ToUtf8Tag in that the input is always a
+ * little-endian string.
+ *
+ * @returns iprt status code.
+ * @param    pwszString    UTF-16LE string to convert.
+ * @param    ppszString    Receives pointer of allocated UTF-8 string on
+ *                        success, and is always set to NULL on failure.
+ */
success, and is always set to NULL on failure.
+ * The returned pointer must be freed using RTStrFree().
+ */

+RTDECL(int)  RTUtf16LittleToUtf8Tag(PCRTUTF16 pwszString, char **ppszString, const char *pszTag);
+
+
+/**
+ * Translates UTF-16 to UTF-8 using buffer provided by the caller or a fittingly
+ * sized buffer allocated by the function (default tag).
+ *
+ @returns iprt status code.
+ @param   pwszString     The UTF-16 string to convert.
+ @param   cwcString      The number of RTUTF16 items to translate from pwszString.
+ * Use RTSTR_MAX to translate the entire string.
+ * If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ * will be allocated to hold the translated string.
+ * If a buffer was requested it must be freed using RTStrFree().
+ @param   ppsz            If cch is non-zero, this must either be pointing to a pointer to
+ * a buffer of the specified size, or pointer to a NULL pointer.
+ * If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ * will be allocated to hold the translated string.
+ * If a buffer was requested it must be freed using RTStrFree().
+ @param   cch             The buffer size in chars (the type). This includes the terminator.
+ @param   pcch            Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ */
+#define RTUtf16ToUtf8Ex(pwszString, cwcString, ppsz, cch, pcch) \
  RTUtf16ToUtf8ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG)
+
+/**
+ * Translates UTF-16 to UTF-8 using buffer provided by the caller or a fittingly
+ * sized buffer allocated by the function (custom tag).
+ *
+ @returns iprt status code.
+ @param   pwszString     The UTF-16 string to convert.
+ @param   cwcString      The number of RTUTF16 items to translate from pwszString.
+ * Use RTSTR_MAX to translate the entire string.
+ * If cch is non-zero, this must either be pointing to a pointer to
+ * a buffer of the specified size, or pointer to a NULL pointer.
+ * If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ * will be allocated to hold the translated string.
+ * If a buffer was requested it must be freed using RTStrFree().
+ @param   ppsz            The UTF-16 string to convert.
+ * @param pcch Where to store the length of the translated string, excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions, however, only for VERR_BUFFER_OVERFLOW and VERR_NO_STR_MEMORY will it contain a valid string length that can be used to resize the buffer.
+ *
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+ */
+ RTDECL(int) RTUtf16ToUtf8ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch, size_t *pcch, const char *pszTag);
+
+/**
+ * Translates UTF-16BE to UTF-8 using buffer provided by the caller or a fittingly sized buffer allocated by the function (default tag).
+ *
+ * This differs from RTUtf16ToUtf8Ex in that the input is always a big-endian string.
+ *
+ * @returns iprt status code.
+ * @param pwszString The UTF-16BE string to convert.
+ * @param cwcString The number of RTUTF16 items to translate from pwszString.
+ * The translation will stop when reaching cwcString or the terminator ('\0').
+ * Use RTSTR_MAX to translate the entire string.
+ * @param ppsz If cch is non-zero, this must either be pointing to a pointer to a buffer of the specified size, or pointer to a NULL pointer.
+ * If *ppsz is NULL or cch is zero a buffer of at least cch chars will be allocated to hold the translated string.
+ * If a buffer was requested it must be freed using RTStrFree().
+ * @param cch The buffer size in chars (the type). This includes the terminator.
+ * @param pcch Where to store the length of the translated string, excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions, however, only for VERR_BUFFER_OVERFLOW and VERR_NO_STR_MEMORY will it contain a valid string length that can be used to resize the buffer.
+ */
+#define RTUtf16BigToUtf8Ex(pwszString, cwcString, ppsz, cch, pcch) \
+ RTUtf16BigToUtf8ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG)
+
+/**
+ * Translates UTF-16BE to UTF-8 using buffer provided by the caller or a fittingly sized buffer allocated by the function (custom tag).
+ *
+ * This differs from RTUtf16ToUtf8Ex in that the input is always a big-endian string.
+ *
RTDECL(int) RTUtf16BigToUtf8ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch, size_t *pcch, const char *pszTag);

RTDECL(int) RTUtf16BigToUtf8Ex(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch, size_t *pcch, const char *pszTag);

+ @returns iprt status code.
+ @param  pwszString The UTF-16BE string to convert.
+ @param  cwcString The number of RTUTF16 items to translate from pwszString.
  The translation will stop when reaching cwcString or the terminator ('\0').
  Use RTSTR_MAX to translate the entire string.
+ @param  ppsz If cch is non-zero, this must either be pointing to a pointer to 
  a buffer of the specified size, or pointer to a NULL pointer.
  If *ppsz is NULL or cch is zero a buffer of at least cch chars 
  will be allocated to hold the translated string.
  If a buffer was requested it must be freed using RTStrFree().
+ @param  cch The buffer size in chars (the type). This includes the terminator.
+ @param  pcch Where to store the length of the translated string,
  excluding the terminator. (Optional)
+ This may be set under some error conditions,
  however, only for VERR_BUFFER_OVERFLOW and 
  VERR_NO_STR_MEMORY will it contain a valid string 
  length that can be used to resize the buffer.
+ @param  pszTag Allocation tag used for statistics and such.
+/
+RTDECL(int) RTUtf16BigToUtf8ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch, size_t *pcch, const char *pszTag);
+
+/**
+ Translates UTF-16LE to UTF-8 using buffer provided by the caller or a 
+ fittingly sized buffer allocated by the function (default tag).
+ This differs from RTUtf16ToUtf8Ex in that the input is always a 
+ little-endian string.
+ @returns iprt status code.
+ @param  pwszString The UTF-16LE string to convert.
+ @param  cwcString The number of RTUTF16 items to translate from pwszString.
  The translation will stop when reaching cwcString or the terminator ('\0').
  Use RTSTR_MAX to translate the entire string.
+ @param  ppsz If cch is non-zero, this must either be pointing to a pointer to 
  a buffer of the specified size, or pointer to a NULL pointer.
  If *ppsz is NULL or cch is zero a buffer of at least cch chars 
  will be allocated to hold the translated string.
  If a buffer was requested it must be freed using RTStrFree().
+ @param  cch The buffer size in chars (the type). This includes the terminator.
+ @param  pcch Where to store the length of the translated string,
  excluding the terminator. (Optional)
+ This may be set under some error conditions,
  however, only for VERR_BUFFER_OVERFLOW and 
  VERR_NO_STR_MEMORY will it contain a valid string 
  length that can be used to resize the buffer.
+ */
+#define RTUtf16LittleToUtf8Ex(pwszString, cwcString, ppsz, cch, pcch) \
  RTUtf16LittleToUtf8ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG) \
+
+/**
+ * Translates UTF-16LE to UTF-8 using buffer provided by the caller or a
+ * fittingly sized buffer allocated by the function (custom tag).
+ *
+ * This differs from RTUtf16ToUtf8ExTag in that the input is always a
+ * little-endian string.
+ *
+ * @returns iprt status code.
+ * @param   pwszString      The UTF-16LE string to convert.
+ * @param   cwcString       The number of RTUTF16 items to translate from pwszString.
+ *                          The translation will stop when reaching cwcString or the terminator ('\0').
+ * @param   ppsz            If cch is non-zero, this must either be pointing to a pointer to
+ *                          a buffer of the specified size, or pointer to a NULL pointer.
+ *                          If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ *                          will be allocated to hold the translated string.
+ *                          If a buffer was requested it must be freed using RTStrFree().
+ * @param   cch             The buffer size in chars (the type). This includes the terminator.
+ *                          excluding the terminator. (Optional)
+ * @param   pcch            Where to store the length of the translated string,
+ *                          This may be set under some error conditions,
+ *                          however, only for VERR_BUFFER_OVERFLOW and
+ *                          VERR_NO_STR_MEMORY will it contain a valid string
+ *                          length that can be used to resize the buffer.
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTUtf16LittleToUtf8ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch,
                                       size_t *pcch, const char *pszTag);
+
+/**
+ * Calculates the length of the UTF-16 string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16
+ * strings will be rejected. The primary purpose of this function is to
+ * help allocate buffers for RTUtf16ToUtf8() of the correct size. For most
+ * other purposes RTUtf16ToUtf8Ex() should be used.
+ *
+ * @returns Number of char (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param   pwsz      The UTF-16 string.
+ */
+RTDECL(size_t) RTUtf16CalcUtf8Len(PCRTUTF16 pwsz);
+/**
+ * Calculates the length of the UTF-16BE string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16BE
+ * strings will be rejected. The primary purpose of this function is to
+ * help allocate buffers for RTUtf16BigToUtf8Ex() of the correct size. For most
+ * other purposes RTUtf16BigToUtf8Ex() should be used.
+ *
+ * @returns Number of char (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param   pwsz The UTF-16BE string.
+ */
+RTDECL(size_t) RTUtf16BigCalcUtf8Len(PCRTUTF16 pwsz);
+
+/**
+ * Calculates the length of the UTF-16LE string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16LE
+ * strings will be rejected. The primary purpose of this function is to
+ * help allocate buffers for RTUtf16LittleToUtf8() of the correct size. For most
+ * other purposes RTUtf16LittleToUtf8Ex() should be used.
+ *
+ * @returns Number of char (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param   pwsz The UTF-16LE string.
+ */
+RTDECL(size_t) RTUtf16LittleCalcUtf8Len(PCRTUTF16 pwsz);
+
+/**
+ * Calculates the length of the UTF-16 string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param   pwsz The string.
+ * @param   cwc The max string length. Use RTSTR_MAX to process the entire string.
+ * @param   pcch Where to store the string length (in bytes). Optional.
+ * This is undefined on failure.
+ */
+RTDECL(int) RTUtf16CalcUtf8LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+/**
+ * Calculates the length of the UTF-16BE string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16BE
+ * strings will be rejected.
+ */
+ * @returns iprt status code.
+ * @param  pwsz         The string.
+ * @param  cwc          The max string length. Use RTSTR_MAX to process the entire string.
+ * @param  pcch         Where to store the string length (in bytes). Optional.
+ *                     This is undefined on failure.
+ */
+RTDECL(int) RTUtf16BigCalcUtf8LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+/**
+ * Calculates the length of the UTF-16LE string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16LE
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param  pwsz         The string.
+ * @param  cwc          The max string length. Use RTSTR_MAX to process the entire string.
+ * @param  pcch         Where to store the string length (in bytes). Optional.
+ *                     This is undefined on failure.
+ */
+RTDECL(int) RTUtf16LittleCalcUtf8LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+/**
+ * Translate a UTF-16 string into a Latin-1 (ISO-8859-1) allocating the result
+ * buffer (default tag).
+ *
+ * @returns iprt status code.
+ * @param  pwszString   UTF-16 string to convert.
+ * @param  ppszString   Receives pointer of allocated Latin1 string on
+ *                      success, and is always set to NULL on failure.
+ *                      The returned pointer must be freed using RTStrFree().
+ */
+#define RTUtf16ToLatin1(pwszString, ppszString)     RTUtf16ToLatin1Tag((pwszString), (ppszString), RTSTR_TAG)
+
+/**
+ * Translate a UTF-16 string into a Latin-1 (ISO-8859-1) allocating the result
+ * buffer (custom tag).
+ *
+ * @returns iprt status code.
+ * @param  pwszString   UTF-16 string to convert.
+ * @param  ppszString   Receives pointer of allocated Latin1 string on
+ *                      success, and is always set to NULL on failure.
+ *                      The returned pointer must be freed using RTStrFree().
+ * @param  pszTag       Allocation tag used for statistics and such.
+ */
+RTDECL(int)  RTUtf16ToLatin1Tag(PCRTUTF16 pwszString, char **ppszString, const char *pszTag);
/**
 * Translates UTF-16 to Latin-1 (ISO-8859-1) using buffer provided by the caller
 * or a fittingly sized buffer allocated by the function (default tag).
 * @returns iprt status code.
 * @param   pwszString  The UTF-16 string to convert.
 * @param   cwcString   The number of RTUTF16 items to translate from pwszString. The translation will stop when reaching cwcString or the terminator ('\0'). Use RTSTR_MAX to translate the entire string.
 * @param   ppsz         Pointer to the pointer to the Latin-1 string. The buffer can optionally be preallocated by the caller.
 * @param   cch          The buffer size in chars (the type). This includes the terminator.
 * @param   pcch         Where to store the length of the translated string, excluding the terminator. (Optional)
 *                        This may be set under some error conditions, however, only for VERR_BUFFER_OVERFLOW and VERR_NO_STR_MEMORY will it contain a valid string length that can be used to resize the buffer.
 */
#define RTUtf16ToLatin1Ex(pwszString, cwcString, ppsz, cch, pcch) RTUtf16ToLatin1ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG)
to translate the entire string.

@param   ppsz            Pointer to the pointer to the Latin-1 string. The buffer can optionally be preallocated by the caller.

If cch is zero, *ppsz is undefined.

If cch is non-zero and *ppsz is not NULL, then this will be used as the output buffer.
 VERR_BUFFER_OVERFLOW will be returned if this is insufficient.

If cch is zero or *ppsz is NULL, then a buffer of sufficient size is allocated. cch can be used to specify a minimum size of this buffer. Use RTUtf16Free() to free the result.

@param   cch             The buffer size in chars (the type). This includes the terminator.

@param   pcch            Where to store the length of the translated string, excluding the terminator. (Optional)

This may be set under some error conditions, however, only for VERR_BUFFER_OVERFLOW and VERR_NO_STR_MEMORY will it contain a valid string length that can be used to resize the buffer.

@param   pszTag          Allocation tag used for statistics and such.

Calculates the length of the UTF-16 string in Latin-1 (ISO-8859-1) chars.

This function will validate the string, and incorrectly encoded UTF-16 strings will be rejected. The primary purpose of this function is to help allocate buffers for RTUtf16ToLatin1() of the correct size. For most other purposes RTUtf16ToLatin1Ex() should be used.

@returns Number of char (bytes).

@returns 0 if the string was incorrectly encoded.

@returns The UTF-16 string.

Calculates the length of the UTF-16 string in Latin-1 (ISO-8859-1) chars.

This function will validate the string, and incorrectly encoded UTF-16
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param   pwsz   The string.
+ * @param   cwc    The max string length. Use RTSTR_MAX to process the
+ *                 entire string.
+ * @param   pcch   Where to store the string length (in bytes). Optional.
+ *                 This is undefined on failure.
+ */
+
+RTDECL(int) RTUtf16CalcLatin1LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+RTDECL(RTUNICP) RTUtf16GetCpInternal(PCRTUTF16 pwsz);
+
+RTDECL(int) RTUtf16GetCpExInternal(PCRTUTF16 *ppwsz, PRTUNICP pCp);
+
+RTDECL(int) RTUtf16BigGetCpExInternal(PCRTUTF16 *ppwsz, PRTUNICP pCp);
/**
* Put the unicode code point at the given string position
* and return the pointer to the char following it.
* This function will not consider anything at or following the
* buffer area pointed to by pwsz. It is therefore not suitable for
* inserting code points into a string, only appending/overwriting.
* @returns pointer to the char following the written code point.
* @param   pwsz        The string.
* @param   CodePoint   The code point to write.
*                      This should not be RTUNICP_INVALID or any other
*                      character out of the UTF-16 range.
* @remark  This is an internal worker for RTUtf16GetCpEx().
*/
RTDECL(PRTUTF16) RTUtf16PutCpInternal(PRTUTF16 pwsz, RTUNICP CodePoint);

/**
* Get the unicode code point at the given string position.
* @returns unicode code point.
* @returns RTUNICP_INVALID if the encoding is invalid.
* @param   pwsz        The string.
* @remark  We optimize this operation by using an inline function for
*          everything which isn't a surrogate pair or an endian indicator.
*/
DECLINLINE(RTUNICP) RTUtf16GetCp(PCRTUTF16 pwsz)
{
    const RTUTF16 wc = *pwsz;
    if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe))
        return wc;
    return RTUtf16GetCpInternal(pwsz);
}

/**
* Get the unicode code point at the given string position.
* @returns iprt status code.
* @param   ppwsz       Pointer to the string pointer. This will be updated to
*                      point to the char following the current code point.
* @param   pCp         Where to store the code point.
*                      RTUNICP_INVALID is stored here on failure.
* @remark  We optimize this operation by using an inline function for
*          everything which isn't a surrogate pair or and endian indicator.
*/
DECLINLINE(int) RTUtf16GetCpEx(PCRTUTF16 *ppwsz, PRTUNICP pCp) {
    const RTUTF16 wc = **ppwsz;
    if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe)) {
        (*ppwsz)++;
        *pCp = wc;
        return VINF_SUCCESS;
    }
    return RTUtf16GetCpExInternal(ppwsz, pCp);
}

DECLINLINE(int) RTUtf16BigGetCpEx(PCRTUTF16 *ppwsz, PRTUNICP pCp) {
    #ifdef RT_BIG_ENDIAN
    return RTUtf16GetCpEx(ppwsz, pCp);
    #else
        #ifdef ___iprt_asm_h
            const RTUTF16 wc = RT_BE2H_U16(**ppwsz);
            if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe)) {
                (*ppwsz)++;
                *pCp = wc;
                return VINF_SUCCESS;
            }
        #endif
        return RTUtf16BigGetCpExInternal(ppwsz, pCp);
    #endif
}

DECLINLINE(int) RTUtf16BigGetCpExInternal(PCRTUTF16 ppwsz, PRTUNICP pCp) {
    // Get the unicode code point at the given string position, big endian version.
    // @returns iprt status code.
    // @param   ppwsz       Pointer to the string pointer. This will be updated to
    //                      point to the char following the current code point.
    // @param   pCp         Where to store the code point.
    //                      RTUNICP_INVALID is stored here on failure.
    // @remark  We optimize this operation by using an inline function for
    //          everything which isn't a surrogate pair or and endian indicator.
    // */
    return RTUtf16BigGetCpExInternal(ppwsz, pCp);
}

#ifndef RT_BIG_ENDIAN
    #ifdef ___iprt_asm_h
        const RTUTF16 wc = RT_BE2H_U16(**ppwsz);
        if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe)) {
            (*ppwsz)++;
            *pCp = wc;
            return VINF_SUCCESS;
        }
    #endif
    return RTUtf16BigGetCpExInternal(ppwsz, pCp);
#endif

#ifndef ___iprt_asm_h
    const RTUTF16 wc = **ppwsz;
    if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe)) {
        (*ppwsz)++;
        *pCp = wc;
        return VINF_SUCCESS;
    }
    return RTUtf16BigGetCpExInternal(ppwsz, pCp);
#endif

#ifndef ___iprt_asm_h
    const RTUTF16 wc = RT_BE2H_U16(**ppwsz);
    if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe)) {
        (*ppwsz)++;
        *pCp = wc;
        return VINF_SUCCESS;
    }
    return RTUtf16BigGetCpExInternal(ppwsz, pCp);
#endif

#ifndef ___iprt_asm_h
    #endif
#endif
#endif

#ifndef ___iprt_asm_h
    #endif
#endif
#endif

#ifndef ___iprt_asm_h
    const RTUTF16 wc = **ppwsz;
    if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe)) {
        (*ppwsz)++;
        *pCp = wc;
        return VINF_SUCCESS;
    }
    return RTUtf16BigGetCpExInternal(ppwsz, pCp);
#endif

#ifndef ___iprt_asm_h
    #endif
#endif
#endif

return RTUtf16BigGetCpExInternal(ppwsz, pCp);
#endif

/* Put the unicode code point at the given string position
   * and return the pointer to the char following it.
   *
   * This function will not consider anything at or following the
   * buffer area pointed to by pwsz. It is therefore not suitable for
+ * inserting code points into a string, only appending/overwriting.
+ *
+ * @returns pointer to the char following the written code point.
+ * @param  pwsz The string.
+ * @param  CodePoint The code point to write.
+ *                  This should not be RTUNICP_INVALID or any other
+ *                  character out of the UTF-16 range.
+ *
+ * @remark We optimize this operation by using an inline function for
+ *        everything which isn’t a surrogate pair or and endian indicator.
+ */
+DECLINLINE(PRTUTF16) RTUtf16PutCp(PRTUTF16 pwsz, RTUNICP CodePoint)
+{
+    if (CodePoint < 0xd800 || (CodePoint > 0xd800 && CodePoint < 0xfffe))
+    {
+        *pwsz++ = (RTUTF16)CodePoint;
+        return pwsz;
+    }
+    return RTUtf16PutCpInternal(pwsz, CodePoint);
+}
+
+/**
+ * Skips ahead, past the current code point.
+ *
+ * @returns Pointer to the char after the current code point.
+ * @param  pwsz Pointer to the current code point.
+ */
+DECLINLINE(PRTUTF16) RTUtf16NextCp(PCRTUTF16 pwsz)
+{
+    RTUNICP Cp;
+    RTUtf16GetCpEx(&pwsz, &Cp);
+    return (PRTUTF16)pwsz;
+}
+
+/**
+ * Skips backwards, to the previous code point.
+ *
+ * @returns Pointer to the char after the current code point.
+ * @param  pwszStart Pointer to the start of the string.
+ * @param  pwsz Pointer to the current code point.
+ */
+RTDECL(PRTUTF16) RTUtf16PrevCp(PCRTUTF16 pwszStart, PCRTUTF16 pwsz);
+
+/**
+ * Checks if the UTF-16 char is the high surrogate char (i.e.
+ * the 1st char in the pair).
@returns true if it is.
@returns false if it isn't.
@param wc The character to investigate.
*/
DECLINLINE(bool) RTUtf16IsHighSurrogate(RTUTF16 wc)
{
    return wc >= 0xd800 && wc <= 0xdbff;
}

/**
 * Checks if the UTF-16 char is the low surrogate char (i.e.
 * the 2nd char in the pair).
 *
 * @returns true if it is.
 * @returns false if it isn't.
 * @param wc The character to investigate.
 */
DECLINLINE(bool) RTUtf16IsLowSurrogate(RTUTF16 wc)
{
    return wc >= 0xdc00 && wc <= 0xdfff;
}

/**
 * Checks if the two UTF-16 chars form a valid surrogate pair.
 *
 * @returns true if they do.
 * @returns false if they doesn't.
 * @param wcHigh The high (1st) character.
 * @param wcLow The low (2nd) character.
 */
DECLINLINE(bool) RTUtf16IsSurrogatePair(RTUTF16 wcHigh, RTUTF16 wcLow)
{
    return RTUtf16IsHighSurrogate(wcHigh)
        && RTUtf16IsLowSurrogate(wcLow);
}

/**
 * Formats a buffer stream as hex bytes.
 *
 * The default is no separating spaces or line breaks or anything.
 *
 * @returns IPRT status code.
 * @retval VERR_INVALID_POINTER if any of the pointers are wrong.
 * @retval VERR_BUFFER_OVERFLOW if the buffer is insufficient to hold the bytes.
 * @param pwszBuf Output string buffer.
 */
RTDECL(int) RTUtf16PrintHexBytes(PRTUTF16 pwszBuf, size_t cwcBuf, void const *pv, size_t cb, uint32_t fFlags);

+/** @} */
+
+RT_C_DECLS_END
+
+*/

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/x86.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/x86.h
@@ -0,0 +1,4301 @@
+/** @file
+ * IPRT - X86 and AMD64 Structures and Definitions.
+ *
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/include/iprt/x86.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/include/iprt/x86.h
 @@ -0,0 +1,4301 @@
+/** @file
+ * IPRT - X86 and AMD64 Structures and Definitions.
+ *
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+#endif

+/* This file is part of VirtualBox Open Source Edition (OSE), as
+ available from http://www.virtualbox.org. This file is free software;
+ you can redistribute it and/or modify it under the terms of the GNU
+ General Public License (GPL) as published by the Free Software
+ Foundation, in version 2 as it comes in the "COPYING" file of the
+ VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+
+*/
+ifndef ___iprt_x86_h
+define ___iprt_x86_h
+
+ifndef VBOX_FOR_DTRACE_LIB
+ include <iprt/types.h>
+ #include <iprt/assert.h>
+#else
+ #pragma D depends_on library vbox-types.d
+#endif
+
+/* Workaround for Solaris sys/regset.h defining CS, DS */
+ifndef RT_OS_SOLARIS
+ undef CS
+ undef DS
+ endif
+
+/** @defgroup grp_rt_x86   x86 Types and Definitions
+ * @ingroup grp_rt
+ * @
++
+ifndef VBOX_FOR_DTRACE_LIB
+/**
+ * EFLAGS Bits.
+ */
+typedef struct X86EFLAGSBITS
+{
+ /** Bit 0 - CF - Carry flag - Status flag. */
+ unsigned   u1CF : 1;
+ /** Bit 1 - 1 - Reserved flag. */
+ unsigned   u1Reserved0 : 1;
+ /** Bit 2 - PF - Parity flag - Status flag. */
+ unsigned   u1PF : 1;
+ /** Bit 3 - 0 - Reserved flag. */
+ unsigned   u1Reserved1 : 1;
+ /** Bit 4 - AF - Auxiliary carry flag - Status flag. */
+ unsigned   u1AF : 1;
+ /** Bit 5 - 0 - Reserved flag. */
+ unsigned   u1Reserved2 : 1;
+ /** Bit 6 - ZF - Zero flag - Status flag. */
+ unsigned   u1ZF : 1;
+ /** Bit 7 - SF - Signed flag - Status flag. */
+ unsigned   u1SF : 1;
+ /** Bit 8 - TF - Trap flag - System flag. */
+ unsigned   u1TF : 1;
+ /** Bit 9 - IF - Interrupt flag - System flag. */
+ unsigned   u1IF : 1;
+ /** Bit 10 - DF - Direction flag - Control flag. */
+}
+ unsigned u1DF : 1;
+ /**< Bit 11 - OF - Overflow flag - Status flag. */
+ unsigned u1OF : 1;
+ /**< Bit 12-13 - IOPL - I/O privilege level flag - System flag. */
+ unsigned u2IOPL : 2;
+ /**< Bit 14 - NT - Nested task flag - System flag. */
+ unsigned u1NT : 1;
+ /**< Bit 15 - 0 - Reserved flag. */
+ unsigned u1Reserved3 : 1;
+ /**< Bit 16 - RF - Resume flag - System flag. */
+ unsigned u1RF : 1;
+ /**< Bit 17 - VM - Virtual 8086 mode - System flag. */
+ unsigned u1VM : 1;
+ /**< Bit 18 - AC - Alignment check flag - System flag. Works with CR0.AM. */
+ unsigned u1AC : 1;
+ /**< Bit 19 - VIF - Virtual interrupt flag - System flag. */
+ unsigned u1VIF : 1;
+ /**< Bit 20 - VIP - Virtual interrupt pending flag - System flag. */
+ unsigned u1VIP : 1;
+ /**< Bit 21 - ID - CPUID flag - System flag. If this responds to flipping CPUID is supported. */
+ unsigned u1ID : 1;
+ /**< Bit 22-31 - 0 - Reserved flag. */
+ unsigned u10Reserved4 : 10;
+ } X86EFLAGSBITS;
+ /**< Pointer to EFLAGS bits. */
+ typedef X86EFLAGSBITS *PX86EFLAGSBITS;
+ /**< Pointer to const EFLAGS bits. */
+ typedef const X86EFLAGSBITS *PCX86EFLAGSBITS;
+ #endif /* !VBOX_FOR_DTRACE_LIB */
+ */
+ */ EFLAGS.
+ */
+ */
+ typedef union X86EFLAGS
+ {/** The plain unsigned view. */
+ uint32_t u;
+ #ifndef VBOX_FOR_DTRACE_LIB
+ /**< The bitfield view. */
+ X86EFLAGSBITS Bits;
+ #endif
+ /**< The 8-bit view. */
+ uint8_t au8[4];
+ /**< The 16-bit view. */
+ uint16_t au16[2];
+ /**< The 32-bit view. */
+ uint32_t au32[1];
+ /**< The 32-bit view. */
+ }
+ uint32_t u32;
+ } X86EFLAGS;
+/** Pointer to EFLAGS. */
+typedef X86EFLAGS *PX86EFLAGS;
+/** Pointer to const EFLAGS. */
+typedef const X86EFLAGS *PCX86EFLAGS;
+
+/**
+ * RFLAGS (32 upper bits are reserved).
+ */
+typedef union X86RFLAGS
+
+  /** The plain unsigned view. */
+  uint64_t u;
+  #ifndef VBOX_FOR_DTRACE_LIB
+  /** The bitfield view. */
+  X86EFLAGSBITS Bits;
+  #endif
+  /** The 8-bit view. */
+  uint8_t au8[8];
+  /** The 16-bit view. */
+  uint16_t au16[4];
+  /** The 32-bit view. */
+  uint32_t au32[2];
+  /** The 64-bit view. */
+  uint64_t au64[1];
+  /** The 64-bit view. */
+  uint64_t u64;
+ } X86RFLAGS;
+/** Pointer to RFLAGS. */
+typedef X86RFLAGS *PX86RFLAGS;
+/** Pointer to const RFLAGS. */
+typedef const X86RFLAGS *PCX86RFLAGS;
+
+/** @name EFLAGS
+ * @
+ */
+#define X86_EFL_CF         RT_BIT_32(0)
+#define X86_EFL_CF_BIT     0
+/** Bit 0 - CF - Carry flag - Status flag. */
+/** Bit 1 - Reserved, reads as 1. */
+#define X86_EFL_1          RT_BIT_32(1)
+/** Bit 2 - PF - Parity flag - Status flag. */
+#define X86_EFL_PF         RT_BIT_32(2)
+/** Bit 4 - AF - Auxiliary carry flag - Status flag. */
+#define X86_EFL_AF         RT_BIT_32(4)
+#define X86_EFL_AF_BIT    4
+/** Bit 6 - ZF - Zero flag - Status flag. */
+#define X86_EFL_ZF    RT_BIT_32(6)
+/** Bit 7 - SF - Signed flag - Status flag. */
+#define X86_EFL_SF    RT_BIT_32(7)
+/** Bit 8 - TF - Trap flag - System flag. */
+define X86_EFL_TF    RT_BIT_32(8)
+/** Bit 9 - IF - Interrupt flag - System flag. */
+define X86_EFL_IF    RT_BIT_32(9)
+/** Bit 10 - DF - Direction flag - Control flag. */
+define X86_EFL_DF    RT_BIT_32(10)
+/** Bit 11 - OF - Overflow flag - Status flag. */
+define X86_EFL_OF    RT_BIT_32(11)
+define X86_EFL_OF_BIT 11
+/** Bit 12-13 - IOPL - I/O privilege level flag - System flag. */
+define X86_EFL_IOPL  (RT_BIT_32(12) | RT_BIT_32(13))
+/** Bit 14 - NT - Nested task flag - System flag. */
+define X86_EFL_NT    RT_BIT_32(14)
+/** Bit 16 - RF - Resume flag - System flag. */
+define X86_EFL_RF    RT_BIT_32(16)
+/** Bit 17 - VM - Virtual 8086 mode - System flag. */
+define X86_EFL_VM    RT_BIT_32(17)
+/** Bit 18 - AC - Alignment check flag - System flag. Works with CR0.AM. */
+define X86_EFL_AC    RT_BIT_32(18)
+/** Bit 19 - VIF - Virtual interrupt flag - System flag. */
+define X86_EFL_VIF   RT_BIT_32(19)
+/** Bit 20 - VIP - Virtual interrupt pending flag - System flag. */
+define X86_EFL_VIP   RT_BIT_32(20)
+/** Bit 21 - ID - CPUID flag - System flag. If this responds to flipping CPUID is supported. */
+define X86_EFL_ID    RT_BIT_32(21)
+/** All live bits. */
+define X86_EFL_LIVE_MASK UINT32_C(0x003f7fd5)
+/** Read as 1 bits. */
+define X86_EFL_RA1_MASK RT_BIT_32(1)
+/** IOPL shift. */
+define X86_EFL_IOPL_SHIFT 12
+/** The IOPL level from the flags. */
+define X86_EFL_GET_IOPL(efl) (((efl) >> X86_EFL_IOPL_SHIFT) & 3)
+/** Bits restored by popf */
+define X86_EFL_POPF_BITS  ( X86_EFL_CF | X86_EFL_PF | X86_EFL_AF | X86_EFL_ZF | X86_EFL_SF | X86_EFL_TF | X86_EFL_IF \ + | X86_EFL_DF | X86_EFL_OF | X86_EFL_IOPL | X86_EFL_NT | X86_EFL_AC | X86_EFL_ID )
+/** Bits restored by popf */
+define X86_EFL_POPF_BITS_386  ( X86_EFL_CF | X86_EFL_PF | X86_EFL_AF | X86_EFL_ZF | X86_EFL_SF | X86_EFL_TF | X86_EFL_IF \ + | X86_EFL_DF | X86_EFL_OF | X86_EFL_IOPL | X86_EFL_NT )
+/** The status bits commonly updated by arithmetic instructions. */
+\#define X86_EFL_STATUS_BITS ( X86_EFL_CF | X86_EFL_PF | X86_EFL_AF | X86_EFL_ZF | X86_EFL_SF | X86_EFL_OF )
+/** @} */
+
+
+/** CPUID Feature information - ECX. */
+ * CPUID query with EAX=1.
+ */
+\#ifndef VBOX_FOR_DTRACE_LIB
+typedef struct X86CPUIDFEATECX
+{
+    /** Bit 0 - SSE3 - Supports SSE3 or not. */
+    unsigned u1SSE3 : 1;
+    /** Bit 1 - PCLMULQDQ. */
+    unsigned u1PCLMULQDQ : 1;
+    /** Bit 2 - DS Area 64-bit layout. */
+    unsigned u1DTE64 : 1;
+    /** Bit 3 - MONITOR - Supports MONITOR/MWAIT. */
+    unsigned u1Monitor : 1;
+    /** Bit 4 - CPL-DS - CPL Qualified Debug Store. */
+    unsigned u1CPLDS : 1;
+    /** Bit 5 - VMX - Virtual Machine Technology. */
+    unsigned u1VMX : 1;
+    /** Bit 6 - SMX: Safer Mode Extensions. */
+    unsigned u1SMX : 1;
+    /** Bit 7 - EST - Enh. SpeedStep Tech. */
+    unsigned u1EST : 1;
+    /** Bit 8 - TM2 - Terminal Monitor 2. */
+    unsigned u1TM2 : 1;
+    /** Bit 9 - SSSE3 - Supplemental Streaming SIMD Extensions 3. */
+    unsigned u1SSSE3 : 1;
+    /** Bit 10 - CNTX-ID - L1 Context ID. */
+    unsigned u1CNTXID : 1;
+    /** Bit 11 - Reserved. */
+    unsigned u1Reserved1 : 1;
+    /** Bit 12 - FMA. */
+    unsigned u1FMA : 1;
+    /** Bit 13 - CX16 - CMPXCHG16B. */
+    unsigned u1CX16 : 1;
+    /** Bit 14 - xTPR Update Control. Processor supports changing IA32_MISC_ENABLES[bit 23]. */
+    unsigned u1TPRUpdate : 1;
+    /** Bit 15 - PDCM - Perf/Debug Capability MSR. */
+    unsigned u1PDCM : 1;
+    /** Bit 16 - Reserved. */
+    unsigned u1Reserved2 : 1;
+    /** Bit 17 - PCID - Process-context identifiers. */
+    unsigned u1PCID : 1;
+ /** Bit 18 - Direct Cache Access. */
+ unsigned u1DCA : 1;
+ /** Bit 19 - SSE4_1 - Supports SSE4_1 or not. */
+ unsigned u1SSE4_1 : 1;
+ /** Bit 20 - SSE4_2 - Supports SSE4_2 or not. */
+ unsigned u1SSE4_2 : 1;
+ /** Bit 21 - x2APIC. */
+ unsigned u1x2APIC : 1;
+ /** Bit 22 - MOVBE - Supports MOVBE. */
+ unsigned u1MOVBE : 1;
+ /** Bit 23 - POPCNT - Supports POPCNT. */
+ unsigned u1POPCNT : 1;
+ /** Bit 24 - TSC-Deadline. */
+ unsigned u1TSCDEADLINE : 1;
+ /** Bit 25 - AES. */
+ unsigned u1AES : 1;
+ /** Bit 26 - XSAVE - Supports XSAVE. */
+ unsigned u1XSAVE : 1;
+ /** Bit 27 - OSXSAVE - Supports OSXSAVE. */
+ unsigned u1OSXSAVE : 1;
+ /** Bit 28 - AVX - Supports AVX instruction extensions. */
+ unsigned u1AVX : 1;
+ /** Bit 29 - F16C - Supports 16-bit floating point conversion instructions. */
+ unsigned u1F16C : 1;
+ /** Bit 30 - RDRAND - Supports RDRAND. */
+ unsigned u1RDRAND : 1;
+ /** Bit 31 - Hypervisor present (we're a guest). */
+ unsigned u1HVP : 1;
+] X86CPUIDFEATECX;
+ #else /* VBOX_FOR_DTRACE_LIB */
+ typedef uint32_t X86CPUIDFEATECX;
+ #endif /* VBOX_FOR_DTRACE_LIB */
+ /** Pointer to CPUID Feature Information - ECX. */
+ typedef X86CPUIDFEATECX *PX86CPUIDFEATECX;
+ /** Pointer to const CPUID Feature Information - ECX. */
+ typedef const X86CPUIDFEATECX *PCX86CPUIDFEATECX;
+ */
+ /** CPUID Feature Information - EDX. */
+ * CPUID query with EAX=1.
+ */
+ */
+ #ifdef VBOX_FOR_DTRACE_LIB /* DTrace different (brain-dead from a C pov) bitfield implementation */
+ typedef struct X86CPUIDFEATEDX
+ { 
+ /** Bit 0 - FPU - x87 FPU on Chip. */
+ unsigned u1FPU : 1;
+ /** Bit 1 - VME - Virtual 8086 Mode Enhancements. */
+ unsigned u1VME : 1;
/** Bit 2 - DE - Debugging extensions. */
unsigned  u1DE : 1;
/** Bit 3 - PSE - Page Size Extension. */
unsigned  u1PSE : 1;
/** Bit 4 - TSC - Time Stamp Counter. */
unsigned  u1TSC : 1;
/** Bit 5 - MSR - Model Specific Registers RDMSR and WRMSR Instructions. */
unsigned  u1MSR : 1;
/** Bit 6 - PAE - Physical Address Extension. */
unsigned  u1PAE : 1;
/** Bit 7 - MCE - Machine Check Exception. */
unsigned  u1MCE : 1;
/** Bit 8 - CX8 - CMPXCHG8B instruction. */
unsigned  u1CX8 : 1;
/** Bit 9 - APIC - APIC On-Chip. */
unsigned  u1APIC : 1;
/** Bit 10 - Reserved. */
unsigned  u1Reserved1 : 1;
/** Bit 11 - SEP - SYSENTER and SYSEXIT. */
unsigned  u1SEP : 1;
/** Bit 12 - MTRR - Memory Type Range Registers. */
unsigned  u1MTRR : 1;
/** Bit 13 - PGE - PTE Global Bit. */
unsigned  u1PGE : 1;
/** Bit 14 - MCA - Machine Check Architecture. */
unsigned  u1MCA : 1;
/** Bit 15 - CMOV - Conditional Move Instructions. */
unsigned  u1CMOV : 1;
/** Bit 16 - PAT - Page Attribute Table. */
unsigned  u1PAT : 1;
/** Bit 17 - PSE-36 - 36-bit Page Size Extension. */
unsigned  u1PSE36 : 1;
/** Bit 18 - PSN - Processor Serial Number. */
unsigned  u1PSN : 1;
/** Bit 19 - CLFSH - CLFLUSH Instruction. */
unsigned  u1CLFSH : 1;
/** Bit 20 - Reserved. */
unsigned  u1Reserved2 : 1;
/** Bit 21 - DS - Debug Store. */
unsigned  u1DS : 1;
/** Bit 22 - ACPI - Thermal Monitor and Software Controlled Clock Facilities. */
unsigned  u1ACPI : 1;
/** Bit 23 - MMX - Intel MMX Technology. */
unsigned  u1MMX : 1;
/** Bit 24 - FXSR - FXSAVE and FXRSTOR Instructions. */
unsigned  u1FXSR : 1;
/** Bit 25 - SSE - SSE Support. */
unsigned  u1SSE : 1;
+ /** Bit 26 - SSE2 - SSE2 Support. */
+ unsigned u1SSE2 : 1;
+ /** Bit 27 - SS - Self Snoop. */
+ unsigned u1SS : 1;
+ /** Bit 28 - HTT - Hyper-Threading Technology. */
+ unsigned u1HTT : 1;
+ /** Bit 29 - TM - Thermal Monitor. */
+ unsigned u1TM : 1;
+ /** Bit 30 - Reserved - */
+ unsigned u1Reserved3 : 1;
+ /** Bit 31 - PBE - Pending Break Enabled. */
+ unsigned u1PBE : 1;
+ } X86CPUIDFEATEDX;
+#else /* VBOX_FOR_DTRACE_LIB */
+typedef uint32_t X86CPUIDFEATEDX;
+#endif /* VBOX_FOR_DTRACE_LIB */
+/** Pointer to CPUID Feature Information - EDX. */
+typedef X86CPUIDFEATEDX *PX86CPUIDFEATEDX;
+/** Pointer to const CPUID Feature Information - EDX. */
+typedef const X86CPUIDFEATEDX *PCX86CPUIDFEATEDX;
+
+/** @name CPUID Vendor information. */
+* CPUID query with EAX=0.
+* @ {
+*/
+  #define X86_CPUID_VENDOR_INTEL_EBX      0x756e6547      /* Intel */
+  #define X86_CPUID_VENDOR_INTEL_ECX      0x6c65746e      /* Intel */
+  #define X86_CPUID_VENDOR_INTEL_EDX      0x49656e69      /* Intel */
+
+  #define X86_CPUID_VENDOR_AMD_EBX        0x68747541      /* Auth */
+  #define X86_CPUID_VENDOR_AMD_ECX        0x444d4163      /* AMD */
+  #define X86_CPUID_VENDOR_AMD_EDX        0x69746e65      /* Enti */
+
+  #define X86_CPUID_VENDOR_VIA_EBX        0x746e6543      /* Cent */
+  #define X86_CPUID_VENDOR_VIA_ECX        0x736c7561      /* Via */
+  #define X86_CPUID_VENDOR_VIA_EDX        0x48727561      /* Via */
+  */
+  @} */
+
+/** @name CPUID Feature information. */
+* CPUID query with EAX=1.
+* @ {
+*/
+  /** ECX Bit 0 - SSE3 - Supports SSE3 or not. */
+  #define X86_CPUID_FEATURE ECX_SSE3 RT_BIT_32(0)
+  /** ECX Bit 1 - PCLMUL - PCLMULQDQ support (for AES-GCM). */
+  #define X86_CPUID_FEATURE ECX_PCLMUL RT_BIT_32(1)
+  /** ECX Bit 2 - DTES64 - DS Area 64-bit Layout. */
+##define X86_CPUID_FEATURE_ECX_DTES64    RT_BIT_32(2)
+/** ECX Bit 3 - MONITOR - Supports MONITOR/MWAIT. */
+##define X86_CPUID_FEATURE_ECX_MONITOR   RT_BIT_32(3)
+/** ECX Bit 4 - CPL-DS - CPL Qualified Debug Store. */
+##define X86_CPUID_FEATURE_ECX_CPLDS     RT_BIT_32(4)
+/** ECX Bit 5 - VMX - Virtual Machine Technology. */
+##define X86_CPUID_FEATURE_ECX_VMX      RT_BIT_32(5)
+/** ECX Bit 6 - SMX - Safer Mode Extensions. */
+##define X86_CPUID_FEATURE_ECX_SMX      RT_BIT_32(6)
+/** ECX Bit 7 - EST - Enh. SpeedStep Tech. */
+##define X86_CPUID_FEATURE_ECX_EST      RT_BIT_32(7)
+/** ECX Bit 8 - TM2 - Terminal Monitor 2. */
+##define X86_CPUID_FEATURE_ECX_TM2      RT_BIT_32(8)
+/** ECX Bit 9 - SSSE3 - Supplemental Streaming SIMD Extensions 3. */
+##define X86_CPUID_FEATURE_ECX_SSSE3    RT_BIT_32(9)
+/** ECX Bit 10 - CNTX-ID - L1 Context ID. */
+##define X86_CPUID_FEATURE_ECX_CNTXID   RT_BIT_32(10)
+/** ECX Bit 11 - SDBG - Sillicon debug interface (IA32_DEBUG_INTERFACE MSR). */
+ See figure 3-6 and table 3-10, in intel Vol. 2A. from 2015-01-01. */
+##define X86_CPUID_FEATURE_ECX_SDBG     RT_BIT_32(11)
+/** ECX Bit 12 - FMA. */
+##define X86_CPUID_FEATURE_ECX_FMA      RT_BIT_32(12)
+/** ECX Bit 13 - CX16 - CMPXCHG16B. */
+##define X86_CPUID_FEATURE_ECX_CX16     RT_BIT_32(13)
+/** ECX Bit 17 - PCID - Process-context identifiers. */
+##define X86_CPUID_FEATURE_ECX_PCID     RT_BIT_32(17)
+/** ECX Bit 18 - DCA - Direct Cache Access. */
+##define X86_CPUID_FEATURE_ECX_DCA      RT_BIT_32(18)
+/** ECX Bit 19 - SSE4_1 - Supports SSE4_1 or not. */
+##define X86_CPUID_FEATURE_ECX_SSE4_1   RT_BIT_32(19)
+/** ECX Bit 20 - SSE4_2 - Supports SSE4_2 or not. */
+##define X86_CPUID_FEATURE_ECX_SSE4_2   RT_BIT_32(20)
+/** ECX Bit 21 - x2APIC support. */
+##define X86_CPUID_FEATURE_ECX_X2APIC   RT_BIT_32(21)
+/** ECX Bit 22 - MOVBE instruction. */
+##define X86_CPUID_FEATURE_ECX_MOVBE    RT_BIT_32(22)
+/** ECX Bit 23 - POPCNT instruction. */
+##define X86_CPUID_FEATURE_ECX_POPCNT   RT_BIT_32(23)
+/** ECX Bit 24 - TSC-Deadline. */
+##define X86_CPUID_FEATURE_ECX_TSCDEADL RT_BIT_32(24)
+/** ECX Bit 25 - AES instructions. */
+##define X86_CPUID_FEATURE_ECX_AES      RT_BIT_32(25)
+/** ECX Bit 26 - XSAVE instruction. */
+##define X86_CPUID_FEATURE_ECX_XSAVE    RT_BIT_32(26)
+/** ECX Bit 27 - Copy of CR4.OSXSAVE. */
+define X86_CPUID_FEATURE_ECX_OSXSAVE RT_BIT_32(27)
+/** ECX Bit 28 - AVX. */
+define X86_CPUID_FEATURE_ECX_AVX RT_BIT_32(28)
+/** ECX Bit 29 - F16C - Half-precision convert instruction support. */
+define X86_CPUID_FEATURE_ECX_F16C RT_BIT_32(29)
+/** ECX Bit 30 - RDRAND instruction. */
+define X86_CPUID_FEATURE_ECX_RDRAND RT_BIT_32(30)
+/** ECX Bit 31 - Hypervisor Present (software only). */
+define X86_CPUID_FEATURE_ECX_HVP RT_BIT_32(31)
+
+/** Bit 0 - FPU - x87 FPU on Chip. */
+define X86_CPUID_FEATURE_EDX_FPU RT_BIT_32(0)
+/** Bit 1 - VME - Virtual 8086 Mode Enhancements. */
+define X86_CPUID_FEATURE_EDX_VME RT_BIT_32(1)
+/** Bit 2 - DE - Debugging extensions. */
+define X86_CPUID_FEATURE_EDX_DE RT_BIT_32(2)
+/** Bit 3 - PSE - Page Size Extension. */
+define X86_CPUID_FEATURE_EDX_PSE RT_BIT_32(3)
+define X86_CPUID_FEATURE_EDX_PSE_BIT 3 /**< Bit number for X86_CPUID_FEATURE_EDX_PSE. */
+/** Bit 4 - TSC - Time Stamp Counter. */
+define X86_CPUID_FEATURE_EDX_TSC RT_BIT_32(4)
+/** Bit 5 - MSR - Model Specific Registers RDMSR and WRMSR Instructions. */
+define X86_CPUID_FEATURE_EDX_MSR RT_BIT_32(5)
+/** Bit 6 - PAE - Physical Address Extension. */
+define X86_CPUID_FEATURE_EDX_PAE RT_BIT_32(6)
+define X86_CPUID_FEATURE_EDX_PAE_BIT 6 /**< Bit number for X86_CPUID_FEATURE_EDX_PAE. */
+/** Bit 7 - MCE - Machine Check Exception. */
+define X86_CPUIDFEATURE_EDX_MCE RT_BIT_32(7)
+/** Bit 8 - CX8 - CMPXCHG8B instruction. */
+define X86_CPUIDFEATURE_EDX_CX8 RT_BIT_32(8)
+/** Bit 9 - APIC - APIC On-Chip. */
+define X86_CPUIDFEATURE_EDX_APIC RT_BIT_32(9)
+/** Bit 11 - SEP - SYSENTER and SYSEXIT Present. */
+define X86_CPUIDFEATURE_EDX_SEP RT_BIT_32(11)
+/** Bit 12 - MTRR - Memory Type Range Registers. */
+define X86_CPUIDFEATURE_EDX_MTRR RT_BIT_32(12)
+/** Bit 13 - PGE - PTE Global Bit. */
+define X86_CPUIDFEATURE_EDX_PGE RT_BIT_32(13)
+/** Bit 14 - MCA - Machine Check Architecture. */
+define X86_CPUIDFEATURE_EDX_MCA RT_BIT_32(14)
+/** Bit 15 - CMOV - Conditional Move Instructions. */
+define X86_CPUIDFEATURE_EDX_CMOV RT_BIT_32(15)
+/** Bit 16 - PAT - Page Attribute Table. */
+define X86_CPUIDFEATURE_EDX_PAT RT_BIT_32(16)
/** Bit 17 - PSE-36 - 36-bit Page Size Extension. */
#define X86_CPUID_FEATURE_EDX_PSE36     RT_BIT_32(17)
/** Bit 18 - PSN - Processor Serial Number. */
#define X86_CPUID_FEATURE_EDX_PSN       RT_BIT_32(18)
/** Bit 19 - CLFSH - CLFLUSH Instruction. */
#define X86_CPUID_FEATURE_EDX_CLFSH     RT_BIT_32(19)
/** Bit 21 - DS - Debug Store. */
#define X86_CPUID_FEATURE_EDX_DS        RT_BIT_32(21)
/** Bit 22 - ACPI - Thermal Monitor and Software Controlled Clock Facilities. */
#define X86_CPUID_FEATURE_EDX ACPI      RT_BIT_32(22)
/** Bit 23 - MMX - Intel MMX Technology. */
#define X86_CPUID_FEATURE_EDX_MMX       RT_BIT_32(23)
/** Bit 25 - SSE - SSE Support. */
#define X86_CPUID_FEATURE_EDX SSE        RT_BIT_32(25)
/** Bit 26 - SSE2 - SSE2 Support. */
#define X86_CPUID_FEATURE_EDX SSE2      RT_BIT_32(26)
/** Bit 27 - SS - Self Snoop. */
#define X86_CPUID_FEATURE_EDX SS        RT_BIT_32(27)
/** Bit 28 - HTT - Hyper-Threading Technology. */
#define X86_CPUID_FEATURE_EDX HTT       RT_BIT_32(28)
/** Bit 29 - TM - Therm. Monitor. */
#define X86_CPUID_FEATURE_EDX TM        RT_BIT_32(29)
/** Bit 31 - PBE - Pending Break Enabled. */
#define X86_CPUID_FEATURE_EDX PBE       RT_BIT_32(31)

/** @} */

/** ECX Bit 0 - MWAITEXT - Supports mwait/monitor extensions or not. */
#define X86_CPUID_MWAIT_ECX_EXT            RT_BIT_32(0)
/** ECX Bit 1 - MWAITBREAK - Break mwait for external interrupt even if EFLAGS.IF=0. */
#define X86_CPUID_MWAIT_ECX_BREAKIRQIF0    RT_BIT_32(1)

/** @} */

/** EBX Bit 0 - FSGSBASE - Supports RDFSBASE/RDGSBASE/WRFSBASE/WRGSBASE. */
#define X86_CPUID_STEXT_FEATURE_EBX_FSGSBASE          RT_BIT_32(0)
/** EBX Bit 1 - TSCADJUST - Supports MSR_IA32 TSC_ADJUST. */
#define X86_CPUID_STEXT_FEATURE_EBX_TSC_ADJUST        RT_BIT_32(1)
/** EBX Bit 2 - SGX - Supports Software Guard Extensions. */
+define X86_CPUID_STEXT_FEATURE_EBX_SGX RT_BIT_32(2)
+/** EBX Bit 3 - BMI1 - Advanced Bit Manipulation extension 1. */
+define X86_CPUID_STEXT_FEATURE_EBX_BMI1 RT_BIT_32(3)
+/** EBX Bit 4 - HLE - Hardware Lock Elision. */
+define X86_CPUID_STEXT_FEATURE_EBX_HLE RT_BIT_32(4)
+/** EBX Bit 5 - AVX2 - Advanced Vector Extensions 2. */
+define X86_CPUID_STEXT_FEATURE_EBX_AVX2 RT_BIT_32(5)
+/** EBX Bit 6 - FDP_EXCPTN_ONLY - FPU data pointer only updated on exceptions if set. */
+define X86_CPUID_STEXT_FEATURE_EBX_FDP_EXCPTN_ONLY RT_BIT_32(6)
+/** EBX Bit 7 - SMIP - Supervisor Mode Execution Prevention. */
+define X86_CPUID_STEXT_FEATURE_EBX_SMIP RT_BIT_32(7)
+/** EBX Bit 8 - BMI2 - Advanced Bit Manipulation extension 2. */
+define X86_CPUID_STEXT_FEATURE_EBX_BMI2 RT_BIT_32(8)
+/** EBX Bit 9 - ERMS - Supports Enhanced REP MOVSB/STOSB. */
+define X86_CPUID_STEXT_FEATURE_EBX_ERMS RT_BIT_32(9)
+/** EBX Bit 10 - INVPCID - Supports INVPCID. */
+define X86_CPUID_STEXT_FEATURE_EBX_INVPCID RT_BIT_32(10)
+/** EBX Bit 11 - RTM - Supports Restricted Transactional Memory. */
+define X86_CPUID_STEXT_FEATURE_EBX_RTM RT_BIT_32(11)
+/** EBX Bit 12 - PQM - Supports Platform Quality of Service Monitoring. */
+define X86_CPUID_STEXT_FEATURE_EBX_PQM RT_BIT_32(12)
+/** EBX Bit 13 - DEPFSU_CS_DS - Deprecated FPU CS, FPU DS values if set. */
+define X86_CPUID_STEXT_FEATURE_EBX_DEPFSU_CS_DS RT_BIT_32(13)
+/** EBX Bit 14 - MPE - Supports Intel Memory Protection Extensions. */
+define X86_CPUID_STEXT_FEATURE_EBX_MPE RT_BIT_32(14)
+/** EBX Bit 15 - PQE - Supports Platform Quality of Service Enforcement. */
+define X86_CPUID_STEXT_FEATURE_EBX_PQE RT_BIT_32(15)
+/** EBX Bit 16 - AVX512F - Supports AVX512F. */
+define X86_CPUID_STEXT_FEATURE_EBX_AVX512F RT_BIT_32(16)
+/** EBX Bit 18 - RDSEED - Supports RDSEED. */
+define X86_CPUID_STEXT_FEATURE_EBX_RDSEED RT_BIT_32(18)
+/** EBX Bit 19 - ADX - Supports ADCX/ADOX. */
+define X86_CPUID_STEXT_FEATURE_EBX_ADX RT_BIT_32(19)
+/** EBX Bit 20 - SMAP - Supports Supervisor Mode Access Prevention. */
+define X86_CPUID_STEXT_FEATURE_EBX_SMAP RT_BIT_32(20)
+/** EBX Bit 23 - CLFLUSHOPT - Supports CLFLUSHOPT (Cache Line Flush). */
+define X86_CPUID_STEXT_FEATURE_EBX_CLFLUSHOPT RT_BIT_32(23)
+/** EBX Bit 25 - INTEL_PT - Supports Intel Processor Trace. */
+define X86_CPUID_STEXT_FEATURE_EBX_INTEL_PT RT_BIT_32(25)
+/** EBX Bit 26 - AVX512PF - Supports AVX512PF. */
+define X86_CPUID_STEXT_FEATURE_EBX_AVX512PF RT_BIT_32(26)
+/** EBX Bit 27 - AVX512ER - Supports AVX512ER. */
+define X86_CPUID_STEXT_FEATURE_EBX_AVX512ER RT_BIT_32(27)
+/** EBX Bit 28 - AVX512CD - Supports AVX512CD. */
+define X86_CPUID_STEXT_FEATURE_EBX_AVX512CD RT_BIT_32(28)
+/** EBX Bit 29 - SHA - Supports Secure Hash Algorithm extensions. */
+define X86_CPUID_STEXT_FEATURE_EBX_SHA RT_BIT_32(29)
/** ECX Bit 0 - PREFETCHWT1 - Supports the PREFETCHWT1 instruction. */
#define X86_CPUID_STEXT_FEATURE_ECX_PREFETCHWT1 RT_BIT_32(0)
/** ECX Bit 2 - UIMP - Supports user mode instruction prevention. */
#define X86_CPUID_STEXT_FEATURE_ECX_UIMP RT_BIT_32(2)
/** ECX Bit 3 - PKU - Supports protection keys for user-mode pages. */
#define X86_CPUID_STEXT_FEATURE_ECX_PKU RT_BIT_32(3)
/** ECX Bit 4 - OSPKE - Protection keys for user mode pages enabled. */
#define X86_CPUID_STEXT_FEATURE_ECX_OSPKE RT_BIT_32(4)
/** ECX Bits 17-21 - MAWAU - Value used by BNDLDX and BNDSTX. */
#define X86_CPUID_STEXT_FEATURE_ECX_MAWAU UINT32_C(0x003e0000)
/** ECX Bit 22 - RDPID - Support pread process ID. */
#define X86_CPUID_STEXT_FEATURE_ECX_RDPID RT_BIT_32(2)
/** ECX Bit 23 - SGX_LC - Supports SGX launch configuration. */
#define X86_CPUID_STEXT_FEATURE_ECX_SGX_LC RT_BIT_32(30)

/** EDX Bit 26 - IBRS & IBPB - Supports the IBRS flag in IA32_SPEC_CTRL and IBPB command in IA32_PRED_CMD. */
#define X86_CPUID_STEXT_FEATURE_EDX_IBRS_IBPB RT_BIT_32(26)
/** EDX Bit 27 - IBRS & IBPB - Supports the STIBP flag in IA32_SPEC_CTRL. */
#define X86_CPUID_STEXT_FEATURE_EDX_STIBP RT_BIT_32(27)

/** EDX Bit 29 - ARCHCAP - Supports the IA32_ARCH_CAPABILITIES MSR. */
#define X86_CPUID_STEXT_FEATURE_EDX_ARCHCAP RT_BIT_32(29)

/** @} */

/** @} */

/** @name CPUID Extended Feature information. */
/** CPUID query with EAX=0x80000001. */
/** @} */

/** ECX Bit 0 - LAHF/SAHF support in 64-bit mode. */
#define X86_CPUID_EXT_FEATURE_ECX_LAHF_SAHF RT_BIT_32(0)

/** EDX Bit 11 - SYSCALL/SYSRET. */
#define X86_CPUID_EXT_FEATURE_EDX_SYSCALL RT_BIT_32(11)

/** EDX Bit 20 - No-Execute/Execute-Disable. */
#define X86_CPUID_EXT_FEATURE_EDX_NX RT_BIT_32(20)

/** EDX Bit 26 - 1 GB large page. */
#define X86_CPUID_EXT_FEATURE_EDX_PAGE1GB RT_BIT_32(26)

/** EDX Bit 27 - RDTSCP. */
#define X86_CPUID_EXT_FEATURE_EDX_RDTSCP RT_BIT_32(27)

/** EDX Bit 29 - AMD Long Mode/Intel-64 Instructions. */
#define X86_CPUID_EXT_FEATURE_EDX_LONG_MODE RT_BIT_32(29)

/** @} */

/** @} */

/** @name CPUID AMD Feature information. */
/** CPUID query with EAX=0x80000001. */
/** @} */
+ * @} 
+ */
+/** Bit 0 - FPU - x87 FPU on Chip. */
+#define X86_CPUID_AMD_FEATURE_EDX_FPU RT_BIT_32(0)
+/** Bit 1 - VME - Virtual 8086 Mode Enhancements. */
+#define X86_CPUID_AMD_FEATURE_EDX_VME RT_BIT_32(1)
+/** Bit 2 - DE - Debugging extensions. */
+#define X86_CPUID_AMD_FEATURE_EDX_DE RT_BIT_32(2)
+/** Bit 3 - PSE - Page Size Extension. */
+#define X86_CPUID_AMD_FEATURE_EDX_PSE RT_BIT_32(3)
+/** Bit 4 - TSC - Time Stamp Counter. */
+#define X86_CPUID_AMD_FEATURE_EDX_TSC RT_BIT_32(4)
+/** Bit 5 - MSR - K86 Model Specific Registers RDMSR and WRMSR Instructions. */
+#define X86_CPUID_AMD_FEATURE_EDX_MSR RT_BIT_32(5)
+/** Bit 6 - PAE - Physical Address Extension. */
+#define X86_CPUID_AMD_FEATURE_EDX_PAE RT_BIT_32(6)
+/** Bit 7 - MCE - Machine Check Exception. */
+#define X86_CPUID_AMD_FEATURE_EDX_MCE RT_BIT_32(7)
+/** Bit 8 - CX8 - CMPXCHG8B instruction. */
+#define X86_CPUID_AMD_FEATURE_EDX_CX8 RT_BIT_32(8)
+/** Bit 9 - APIC - APIC On-Chip. */
+#define X86_CPUID_AMD_FEATURE_EDX_APIC RT_BIT_32(9)
+/** Bit 12 - MTRR - Memory Type Range Registers. */
+#define X86_CPUID_AMD_FEATURE_EDX_MTRR RT_BIT_32(12)
+/** Bit 13 - PGE - PTE Global Bit. */
+#define X86_CPUID_AMD_FEATURE_EDX_PGE RT_BIT_32(13)
+/** Bit 14 - MCA - Machine Check Architecture. */
+#define X86_CPUID_AMD_FEATURE_EDX_MCA RT_BIT_32(14)
+/** Bit 15 - CMOV - Conditional Move Instructions. */
+#define X86_CPUID_AMD_FEATURE_EDX_CMov RT_BIT_32(15)
+/** Bit 16 - PAT - Page Attribute Table. */
+#define X86_CPUID_AMD_FEATURE_EDX_PAT RT_BIT_32(16)
+/** Bit 17 - PSE-36 - 36-bit Page Size Extension. */
+#define X86_CPUID_AMD_FEATURE_EDX_PSE36 RT_BIT_32(17)
+/** Bit 22 - AXMMX - AMD Extensions to MMX Instructions. */
+#define X86_CPUID_AMD_FEATURE_EDX_AXMMX RT_BIT_32(22)
+/** Bit 23 - MMX - Intel MMX Technology. */
+#define X86_CPUID_AMD_FEATURE_EDX_MMX RT_BIT_32(23)
+/** Bit 24 - FXSR - FXSAVE and FXRSTOR Instructions. */
+#define X86_CPUID_AMD_FEATURE_EDX_FXSR RT_BIT_32(24)
+/** Bit 25 - FFXSR - AMD fast FXSAVE and FXRSTOR Instructions. */
+#define X86_CPUID_AMD_FEATURE_EDX_FFXSR RT_BIT_32(25)
+/** Bit 30 - 3DNOWEXT - AMD Extensions to 3DNOW. */
+#define X86_CPUID_AMD_FEATURE_EDX_3DNOW_EX RT_BIT_32(30)
+/** Bit 31 - 3DNOW - AMD 3DNOW. */
+#define X86_CPUID_AMD_FEATURE_EDX_3DNOW RT_BIT_32(31)
+
+/** Bit 1 - CmpLegacy - Core multi-processing legacy mode. */
+/** Bit 2 - SVM - AMD VM extensions. */
+/** Bit 3 - EXTAPIC - AMD extended APIC registers starting at 0x400. */
+/** Bit 4 - CR8L - AMD LOCK MOV CR0 means MOV CR8. */
+/** Bit 5 - ABM - AMD Advanced bit manipulation. LZCNT instruction support. */
+/** Bit 6 - SSE4A - AMD EXTRQ, INSERTQ, MOVNTSS, and MOVNTSD instruction support. */
+/** Bit 7 - MISALIGNSS - AMD Misaligned SSE mode. */
+/** Bit 8 - 3DNOWPRF - AMD PREFETCH and PREFETCHW instruction support. */
+/** Bit 9 - OSVW - AMD OS visible workaround. */
+/** Bit 10 - IBS - Instruct based sampling. */
+/** Bit 11 - XOP - Extended operation support (see APM6). */
+/** Bit 12 - SKINIT - AMD SKINIT: SKINIT, STGI, and DEV support. */
+/** Bit 13 - WDT - AMD Watchdog timer support. */
+/** Bit 15 - LWP - Lightweight profiling support. */
+/** Bit 16 - FMA4 - Four operand FMA instruction support. */
+/** Bit 19 - NodeId - Indicates support for
  * MSR_C001_100C[NodeId,NodesPerProcessr]. */
+/** Bit 21 - TBM - Trailing bit manipulation instruction support. */
+/** Bit 22 - TopologyExtensions -. */
+/** Bit 0 - TS - Temperature Sensor. */
+/** Bit 1 - FID - Frequency ID Control. */
+/** Bit 2 - VID - Voltage ID Control. */
```c
#define X86_CPUID_AMD_ADVPOWER_EDX_VID RT_BIT_32(2)
+/** Bit 3 - TTP - THERMTRIP. */
#define X86_CPUID_AMD_ADVPOWER_EDX_TTP RT_BIT_32(3)
+/** Bit 4 - TM - Hardware Thermal Control. */
#define X86_CPUID_AMD_ADVPOWER_EDX_TM RT_BIT_32(4)
+/** Bit 5 - STC - Software Thermal Control. */
#define X86_CPUID_AMD_ADVPOWER_EDX_STC RT_BIT_32(5)
+/** Bit 6 - MC - 100 Mhz Multiplier Control. */
#define X86_CPUID_AMD_ADVPOWER_EDX_MC RT_BIT_32(6)
+/** Bit 7 - HWPSTATE - Hardware P-State Control. */
#define X86_CPUID_AMD_ADVPOWER_EDX_HWPSTATE RT_BIT_32(7)
+/** Bit 8 - TSCINVAR - TSC Invariant. */
#define X86_CPUID_AMD_ADVPOWER_EDX_TSCINVAR RT_BIT_32(8)
+/** Bit 9 - CPB - TSC Invariant. */
#define X86_CPUID_AMD_ADVPOWER_EDX_CPB RT_BIT_32(9)
+/** Bit 10 - EffFreqRO - MPERF/APERF. */
#define X86_CPUID_AMD_ADVPOWER_EDX_EFRO RT_BIT_32(10)
+/** Bit 11 - PFI - Processor feedback interface (see EAX). */
#define X86_CPUID_AMD_ADVPOWER_EDX_PFI RT_BIT_32(11)
+/** Bit 12 - PA - Processor accumulator (MSR c001_007a). */
#define X86_CPUID_AMD_ADVPOWER_EDX_PA RT_BIT_32(12)
+/** @ } */ */
+
+
+/** @name CPUID AMD extended feature extensions ID (EBX). */
+ * CPUID query with EAX=0x80000008.
+ * @ {
+ * @ {
+ */
+/** Bit 0 - CLZERO - Clear zero instruction. */
#define X86_CPUID_AMD_EFEID_EBX_CLZERO RT_BIT_32(0)
+/** Bit 1 - IRPerf - Instructions retired count support. */
#define X86_CPUID_AMD_EFEID_EBX_IRPERF RT_BIT_32(1)
+/** Bit 2 - XSaveErPtr - Always XSAVE* and XRSTR* error pointers. */
#define X86_CPUID_AMD_EFEID_EBX_XSAVE_ER_PTR RT_BIT_32(2)
+/** AMD pipeline length: 9 feature bits ;-) */
+/** Bit 12 - IBPB - Supports the IBPB command in IA32_PRED_CMD. */
#define X86_CPUID_AMD_EFEID_EBX_IBPB RT_BIT_32(12)
+/** @ } */ */
+
+
+/** @name CPUID AMD SVM Feature information. */
+ * CPUID query with EAX=0x8000000a.
+ * @ {
+ * @ {
+ */
+/** Bit 0 - NP - Nested Paging supported. */
#define X86_CPUID_SVM_FEATURE_EDX_NESTED_PAGING RT_BIT(0)
+/** Bit 1 - LbrVirt - Support for saving five debug MSRs. */
#define X86_CPUID_SVM_FEATURE_EDX_LBR_VIRT RT_BIT(1)
```
+/** Bit 2 - SVML - SVM locking bit supported. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_SVM_LOCK RT_BIT(2)
+/** Bit 3 - NRIPS - Saving the next instruction pointer is supported. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_NRIP_SAVE RT_BIT(3)
+/** Bit 4 - TscRateMsr - Support for MSR TSC ratio. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_TSC_RATE_MSR RT_BIT(4)
+/** Bit 5 - VmcbClean - Support VMCB clean bits. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_VMCB_CLEAN RT_BIT(5)
+/** Bit 6 - FlushByAsid - Indicate TLB flushing for current ASID only, and that
+ * VMCB.TLB_Control is supported. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_FLUSH_BY_ASID RT_BIT(6)
+/** Bit 7 - DecodeAssist - Indicate decode assist is supported. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_DECODE_ASSIST RT_BIT(7)
+/** Bit 10 - PauseFilter - Indicates support for the PAUSE intercept filter. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_PAUSE_FILTER_RT_BIT(10)
+/** Bit 12 - PauseFilterThreshold - Indicates support for the PAUSE
+ * intercept filter cycle count threshold. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_PAUSE_FILTER_THRESHOLD RT_BIT(12)
+/** Bit 13 - AVIC - Advanced Virtual Interrupt Controller. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_AVIC RT_BIT(13)
+/** Bit 15 - V_VMSAVE_VMLOAD - Supports virtualized VMSAVE/VMLOAD. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_VIRT_VMSAVE_VMLOAD RT_BIT(15)
+/** Bit 16 - V_VMSAVE_VMLOAD - Supports virtualized GIF. */
+*/
+#define X86_CPUID_SVM_FEATURE_EDX_VGIF RT_BIT(16)
+/** @} */
+
+@

+* @name CR0
+* @remarks The 286 (MSW), 386 and 486 ignores attempts at setting
+* reserved flags.
+* @} */
+/** Bit 0 - PE - Protection Enabled */
+*/
+#define X86_CR0_PE RT_BIT_32(0)
+*/
+#define X86_CR0_PROTECTION_ENABLE RT_BIT_32(0)
+/** Bit 1 - MP - Monitor Coprocessor */
+*/
+#define X86_CR0_MP RT_BIT_32(1)
+*/
+#define X86_CR0_MONITOR_COPROCESSOR RT_BIT_32(1)
+/** Bit 2 - EM - Emulation. */
+*/
+#define X86_CR0_EM RT_BIT_32(2)
+*/
+#define X86_CR0_EMULATE_FPU RT_BIT_32(2)
+/** Bit 3 - TS - Task Switch. */
+*/
+#define X86_CR0_TS RT_BIT_32(3)
+*/
+#define X86_CR0_TASK_SWITCH RT_BIT_32(3)
+/** Bit 4 - ET - Extension flag. (386, 'hardcoded' to 1 on 486+) */
+*/
+#define X86_CR0_ET RT_BIT_32(4)
+*/
+#define X86_CR0_EXTENSION_TYPE RT_BIT_32(4)
+/** Bit 5 - NE - Numeric error (486+). */
+*/
+#define X86_CR0_NE RT_BIT_32(5)
```c
#define X86_CR0_NUMERIC_ERROR      RT_BIT_32(5)
+/** Bit 16 - WP - Write Protect (486+). */
#define X86_CR0_WP               RT_BIT_32(16)
+/** Bit 18 - AM - Alignment Mask (486+). */
#define X86_CR0_AM               RT_BIT_32(18)
+/** Bit 16 - WP - Write Protect (486+). */
#define X86_CR0_WRITE_PROTECT    RT_BIT_32(16)
+/** Bit 18 - AM - Alignment Mask (486+). */
#define X86_CR0_ALIGMENT_MASK    RT_BIT_32(18)
+/** Bit 29 - NW - Not Write-though (486+). */
#define X86_CR0_NW               RT_BIT_32(29)
+/** Bit 30 - WP - Cache Disable (486+). */
#define X86_CR0_CD               RT_BIT_32(30)
+/** Bit 31 - PG - Paging. */
#define X86_CR0_PG               RT_BIT_32(31)
+/** @ } */ */
+
+/** @name CR3
+ * @ { */
+/** Bit 3 - PWT - Page-level Writes Transparent. */
+#define X86_CR3_PWT            RT_BIT_32(3)
+/** Bit 4 - PCD - Page-level Cache Disable. */
+#define X86_CR3_PCD            RT_BIT_32(4)
+/** Bits 12-31 - - Page directory page number. */
+#define X86_CR3_PAGE_MASK      (0xffffffff)
+/** Bits 5-31 - - PAE Page directory page number. */
+#define X86_CR3_PAE_PAGE_MASK  (0xffffffff)
+/** Bits 12-51 - - AMD64 Page directory page number. */
+#define X86_CR3_AMD64_PAGE_MASK UINT64_C(0x0000000000000000)
+/** @ } */ */
+
+/** @name CR4
+ * @ { */
+/** Bit 0 - VME - Virtual-8086 Mode Extensions. */
+#define X86_CR4_VME            RT_BIT_32(0)
+/** Bit 1 - PVI - Protected-Mode Virtual Interrupts. */
+#define X86_CR4_PVI            RT_BIT_32(1)
+/** Bit 2 - TSD - Time Stamp Disable. */
+#define X86_CR4_TSD            RT_BIT_32(2)
+/** Bit 3 - DE - Debugging Extensions. */
+#define X86_CR4_DE             RT_BIT_32(3)
+/** Bit 4 - PSE - Page Size Extension. */
+#define X86_CR4_PSE            RT_BIT_32(4)
+/** Bit 5 - PAE - Physical Address Extension. */
+#define X86_CR4_PAE            RT_BIT_32(5)
```
/** Bit 6 - MCE - Machine-Check Enable. */
#define X86_CR4_MCE               RT_BIT_32(6)
/** Bit 7 - PGE - Page Global Enable. */
#define X86_CR4_PGE               RT_BIT_32(7)
/** Bit 8 - PCE - Performance-Monitoring Counter Enable. */
#define X86_CR4_PCE               RT_BIT_32(8)
/** Bit 9 - OSFXSR - Operating System Support for FXSAVE and FXRSTORE instructions. */
#define X86_CR4_OSFXR              RT_BIT_32(9)
/** Bit 10 - OSXMMEEXCPT - Operating System Support for Unmasked SIMD Floating-Point Exceptions. */
#define X86_CR4_OSMXMMEEXCPT       RT_BIT_32(10)
/** Bit 13 - VMXE - VMX mode is enabled. */
#define X86_CR4_VMXE               RT_BIT_32(13)
/** Bit 14 - SMXE - Safer Mode Extensions Enabled. */
#define X86_CR4_SMXE               RT_BIT_32(14)
/** Bit 16 - FSGSBASE - Read/write FSGSBASE instructions Enable. */
#define X86_CR4_FSGSBASE           RT_BIT_32(16)
/** Bit 17 - PCIDE - Process-Context Identifiers Enabled. */
#define X86_CR4_PCIDE              RT_BIT_32(17)
/** Bit 18 - OSXSAVE - Operating System Support for XSAVE and processor extended states. */
#define X86_CR4_OSXSAVE            RT_BIT_32(18)
/** Bit 20 - SMEP - Supervisor-mode Execution Prevention enabled. */
#define X86_CR4_SMEP               RT_BIT_32(20)
/** Bit 21 - SMAP - Supervisor-mode Access Prevention enabled. */
#define X86_CR4_SMAP               RT_BIT_32(21)
/** Bit 22 - PKE - Protection Key Enable. */
#define X86_CR4_PKE                RT_BIT_32(22)
/** @} */

/** @name DR6 */
/** Bit 0 - B0 - Breakpoint 0 condition detected. */
#define X86_DR6_B0                 RT_BIT_32(0)
/** Bit 1 - B1 - Breakpoint 1 condition detected. */
#define X86_DR6_B1                 RT_BIT_32(1)
/** Bit 2 - B2 - Breakpoint 2 condition detected. */
#define X86_DR6_B2                 RT_BIT_32(2)
/** Bit 3 - B3 - Breakpoint 3 condition detected. */
#define X86_DR6_B3                 RT_BIT_32(3)
/** Mask of all the Bx bits. */
#define X86_DR6_B_MASK             UINT64_C(0x0000000f)
/** Bit 13 - BD - Debug register access detected. Corresponds to the X86_DR7_GD bit. */
#define X86_DR6_BD                 RT_BIT_32(13)
/** Bit 14 - BS - Single step */
#define X86_DR6_BS                 RT_BIT_32(14)
/** Bit 15 - BT - Task switch. (TSS T bit.) */
#define X86_DR6_BT                 RT_BIT_32(15)
+/** Value of DR6 after powerup/reset. */
+*/
+/** Bits which must be 1s in DR6. */
+/** Bits which must be 0s in DR6. */
+/** Bits which must be 0s on writes to DR6. */
+/** @} */
+
+/** Get the DR6.BX bit for a the given breakpoint. */
+/** @} */
+/** @} */

+* @name DR7
+
+*/
+/** Bit 0 - L0 - Local breakpoint enable. Cleared on task switch. */
+/** Bit 1 - G0 - Global breakpoint enable. Not cleared on task switch. */
+/** Bit 2 - L1 - Local breakpoint enable. Cleared on task switch. */
+/** Bit 3 - G1 - Global breakpoint enable. Not cleared on task switch. */
+/** Bit 4 - L2 - Local breakpoint enable. Cleared on task switch. */
+/** Bit 5 - G2 - Global breakpoint enable. Not cleared on task switch. */
+/** Bit 6 - L3 - Local breakpoint enable. Cleared on task switch. */
+/** Bit 7 - G3 - Global breakpoint enable. Not cleared on task switch. */
+/** Bit 8 - LE - Local breakpoint exact. (Not supported (read ignored) by P6 and later.) */
+/** Bit 9 - GE - Local breakpoint exact. (Not supported (read ignored) by P6 and later.) */
+
+/** L0, L1, L2, and L3. */
+
+/** Interrupt redirection on Pentium. When set, the in
+ * Circuit Emulator (ICE) will break emulation on breakpoints and stuff.
+ * May cause CPU hang if enabled without ICE attached when the ICEBP/INT1
+ * instruction is executed.
+ * @see http://www.rcollins.org/secrets/DR7.html */
+/**
+/** Bit 13 - GD - General detect enable. Enables emulators to get exceptions when
+ * any DR register is accessed. */
+#define X86_DR7_GD RT_BIT_32(13)
+/** Bit 14 - TR1 (ICE) - Code discontinuity trace for use with ICE on
+ * Pentium. */
+#define X86_DR7_ICE_TR1 RT_BIT_32(14)
+/** Bit 15 - TR2 (ICE) - Controls unknown ICE trace feature of the pentium. */
+#define X86_DR7_ICE_TR2 RT_BIT_32(15)
+/** Bit 16 & 17 - R/W0 - Read write field 0. Values X86_DR7_RW_*. */
+#define X86_DR7_RW0_MASK (3 << 16)
+/** Bit 18 & 19 - LEN0 - Length field 0. Values X86_DR7_LEN_*. */
+#define X86_DR7_LEN0_MASK (3 << 18)
+/** Bit 20 & 21 - R/W1 - Read write field 0. Values X86_DR7_RW_*. */
+#define X86_DR7_RW1_MASK (3 << 20)
+/** Bit 22 & 23 - LEN1 - Length field 0. Values X86_DR7_LEN_*. */
+#define X86_DR7_LEN1_MASK (3 << 22)
+/** Bit 24 & 25 - R/W2 - Read write field 0. Values X86_DR7_RW_*. */
+#define X86_DR7_RW2_MASK (3 << 24)
+/** Bit 26 & 27 - LEN2 - Length field 0. Values X86_DR7_LEN_*. */
+#define X86_DR7_LEN2_MASK (3 << 26)
+/** Bit 28 & 29 - R/W3 - Read write field 0. Values X86_DR7_RW_*. */
+#define X86_DR7_RW3_MASK (3 << 28)
+/** Bit 30 & 31 - LEN3 - Length field 0. Values X86_DR7_LEN_*. */
+#define X86_DR7_LEN3_MASK (3 << 30)
+
+/** Bits which reads as 1s. */
+#define X86_DR7_RA1_MASK RT_BIT_32(10)
+/** Bits which reads as zeros. These are related to ICE (bits 12, 14, 15). */
+#define X86_DR7_RAZ_MASK UINT64_C(0x0000d800)
+/** Bits which must be 0s when writing to DR7. */
+#define X86_DR7_MBZ_MASK UINT64_C(0xffffffff00000000)
+
+/** Calcs the L bit of Nth breakpoint.
+ * @param iBp The breakpoint number [0..3].
+ */
+#define X86_DR7_L(iBp) ( UINT32_C(1) << (iBp * 2) )
+
+/** Calcs the G bit of Nth breakpoint.
+ * @param iBp The breakpoint number [0..3].
+ */
+#define X86_DR7_G(iBp) ( UINT32_C(1) << (iBp * 2 + 1) )
+
+/** Calcs the L and G bits of Nth breakpoint.
+ * @param iBp The breakpoint number [0..3].
+ */
+#define X86_DR7_L_G(iBp) ( UINT32_C(3) << (iBp * 2) )
+
+/** @name Read/Write values. */

+*/ @ { */
+/** Break on instruction fetch only. */
+#define X86_DR7_RW_EO 0U
+/** Break on write only. */
+#define X86_DR7_RW_WO 1U
+/** Break on I/O read/write. This is only defined if CR4.DE is set. */
+#define X86_DR7_RW_IO 2U
+/** Break on read or write (but not instruction fetches). */
+#define X86_DR7_RW_RW 3U
+/** @} */
+
+/** Shifts a X86_DR7_RW_* value to its right place.
+ * @param   iBp     The breakpoint number [0..3].
+ * @param   fRw     One of the X86_DR7_RW_* value.
+ */
+#define X86_DR7_RW(iBp, fRw) ((fRw) << ((iBp) * 4 + 16))
+
+/** Fetch the R/Wx bits for a given breakpoint (so it can be compared with
+ * one of the X86_DR7_RW_XXX constants).
+ *
+ * @returns X86_DR7_RW_XXX
+ * @param   uDR7    DR7 value
+ * @param   iBp     The breakpoint number [0..3].
+ */
+#define X86_DR7_GET_RW(uDR7, iBp) ((uDR7) >> ((iBp) * 4 + 16) & UINT32_C(3))
+
+/** R/W0, R/W1, R/W2, and R/W3. */
+#define X86_DR7_RW_ALL_MASKS UINT32_C(0x33330000)
+
+#ifndef VBOX_FOR_DTRACE_LIB
+/** Checks if there are any I/O breakpoint types configured in the RW
+ * registers. Does NOT check if these are enabled, sorry. */
+#define X86_DR7_ANY_RW_IO(uDR7) \
+ ( ((UINT32_C(0x22220000) & (uDR7)) >> 1) & ~(uDR7) )
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x33330000))) == 0);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x22220000))) == 1);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x32320000))) == 1);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x23230000))) == 1);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x00000000))) == 0);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x00010000))) == 0);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x00020000))) == 1);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x00030000))) == 0);
+AssertCompile(X86_DR7_ANY_RW_IO(UINT32_C(0x00040000))) == 0);
+#endif /* !VBOX_FOR_DTRACE_LIB */
+
+/** @name Length values.
+ * @{ */
+  
+    +/* Shifts a X86_DR7_LEN_* value to its right place. */
+    +/* @param iBp The breakpoint number [0..3]. */
+    +/* @param cb One of the X86_DR7_LEN_* values. */
+    +*/
+    +#define X86_DR7_LEN(iBp, cb)                ( (cb) << ((iBp) * 4 + 18) )
+    +*/
+    +/* Fetch the breakpoint length bits from the DR7 value. */
+    +/* @param uDR7 DR7 value */
+    +/* @param iBp The breakpoint number [0..3]. */
+    +*/
+    +#define X86_DR7_GET_LEN(uDR7, iBp)          ( ( (uDR7) >> ((iBp) * 4 + 18) ) & UINT32_C(0x3) )
+    +*/
+    +/* Mask used to check if any breakpoints are enabled. */
+    +#define X86_DR7_ENABLED_MASK                UINT32_C(0x000000ff)
+    +
+    +/* LEN0, LEN1, LEN2, and LEN3. */
+    +#define X86_DR7_LEN_ALL_MASKS               UINT32_C(0xcccc0000)
+    +/* R/W0, R/W1, R/W2, R/W3, LEN0, LEN1, LEN2, and LEN3. */
+    +#define X86_DR7_RW_LEN_ALL_MASKS            UINT32_C(0xffff0000)
+    +/* Value of DR7 after powerup/reset. */
+    +#define X86_DR7_INIT_VAL                    0x400
+    +/* @} */
+    +/** Machine Specific Registers */
+    +/* @} */
+    +/* */
+    +/* Machine check address register (P5). */
+    +#define MSR_P5_MC_ADDR                      UINT32_C(0x00000000)
+    +/* Machine check type register (P5). */
+    +#define MSR_P5_MC_TYPE                      UINT32_C(0x00000000)
+    +/* Time Stamp Counter. */
+    +#define MSR_IA32_TSC                        0x10
+    +#define MSR_IA32_CESR                       UINT32_C(0x00000011)
+    +#define MSR_IA32_CTR0                       UINT32_C(0x00000012)
+    +#define MSR_IA32_CTR1                       UINT32_C(0x00000013)
+    +
+    +#define MSR_IA32_PLATFORM_ID                0x17
+    +
+    +#ifndef MSR_IA32_APICBASE /* qemu cpu.h kludge */
+    +# define MSR_IA32_APICBASE                  0x1b
+    +*/
+    +/** @} */
+/** Local APIC enabled. */
+# define MSR_IA32_APICBASE_EN RT_BIT_64(11)
+/** X2APIC enabled (requires the EN bit to be set). */
+# define MSR_IA32_APICBASE_EXTD RT_BIT_64(10)
+/** The processor is the boot strap processor (BSP). */
+# define MSR_IA32_APICBASE_BSP RT_BIT_64(8)
+/** Minimum base address mask, consult CPUID leaf 0x80000008 for the actual
+ * width. */
+# define MSR_IA32_APICBASE_BASE_MIN UINT64_C(0x0000000ffffff000)
+/** The default physical base address of the APIC. */
+# define MSR_IA32_APICBASE_ADDR UINT64_C(0x00000000fee00000)
+/** Gets the physical base address from the MSR. */
+# define MSR_IA32_APICBASE_GET_ADDR(a_Msr) ((a_Msr) & X86_PAGE_4K_BASE_MASK)
+#endif
+
+/** Undocumented intel MSR for reporting thread and core counts.
+ * Judging from the XNU sources, it seems to be introduced in Nehalem. The
+ * first 16 bits is the thread count. The next 16 bits the core count, except
+ * on Westmere where it seems it’s only the next 4 bits for some reason. */
+#define MSR_CORE_THREAD_COUNT 0x35
+
+/** CPU Feature control. */
+#define MSR_IA32_FEATURE_CONTROL 0x3A
+#define MSR_IA32_FEATURE_CONTROL_LOCK RT_BIT_32(0)
+#define MSR_IA32_FEATURE_CONTROL_SMX_VMXON RT_BIT_32(1)
+#define MSR_IA32_FEATURE_CONTROL_VMXON RT_BIT_32(2)
+
+/** Per-processor TSC adjust MSR. */
+#define MSR_IA32_TSC_ADJUST 0x3B
+
+/** Spectre control register.
+ * Logical processor scope. Reset value 0, unaffected by SIPI & INIT. */
+#define MSR_IA32_SPEC_CTRL 0x48
+/** IBRS - Indirect branch restricted speculation. */
+#define MSR_IA32_SPEC_CTRL_F_IBRS RT_BIT_32(0)
+/** STIBP - Single thread indirect branch predictors. */
+#define MSR_IA32_SPEC_CTRL_F_STIBP RT_BIT_32(1)
+
+/** Prediction command register.
+ * Write only, logical processor scope, no state since write only. */
+#define MSR_IA32_PRED_CMD 0x49
+/** IBPB - Indirect branch prediction barrier when written as 1. */
+#define MSR_IA32_PRED_CMD_F_IBPB RT_BIT_32(0)
+
+/** BIOS update trigger (microcode update). */
+#define MSR_IA32_BIOS_UPDT_TRIG 0x79
+
+/** BIOS update signature (microcode). */
+\#define MSR_IA32_BIOS_SIGN_ID 0x8B
+
+/** SMM monitor control. */
+\#define MSR_IA32_SMM_MONITOR_CTL 0x9B
+
+/** General performance counter no. 0. */
+\#define MSR_IA32_PMC0 0xC1
+/** General performance counter no. 1. */
+\#define MSR_IA32_PMC1 0xC2
+/** General performance counter no. 2. */
+\#define MSR_IA32_PMC2 0xC3
+/** General performance counter no. 3. */
+\#define MSR_IA32_PMC3 0xC4
+
+/** Nehalem power control. */
+\#define MSR_IA32_PLATFORM_INFO 0xCE
+
+/** Get FSB clock status (Intel-specific). */
+\#define MSR_IA32_FSB_CLOCK_STS 0xCD
+
+/** C-State configuration control. Intel specific: Nehalem, Sandy Bridge. */
+\#define MSR_PKG_CST_CONFIG_CONTROL UINT32_C(0x000000e2)
+
+/** C0 Maximum Frequency Clock Count */
+\#define MSR_IA32_MPERF 0xE7
+/** C0 Actual Frequency Clock Count */
+\#define MSR_IA32_APERF 0xE8
+
+/** MTRR Capabilities. */
+\#define MSR_IA32_MTRR_CAP 0xFE
+
+/** Architecture capabilities (bugfixes).
+ * @note May move */
+\#define MSR_IA32_ARCH_CAPABILITIES UINT32_C(0x10a)
+/** CPU is no subject to spectre problems. */
+\#define MSR_IA32_ARCH_CAP_F_SPECTRE_FIX RT_BIT_32(0)
+/** CPU has better IBRS and you can leave it on all the time. */
+\#define MSR_IA32_ARCH_CAP_F_BETTER_IBRS RT_BIT_32(1)
+
+/** Cache control/info. */
+\#define MSR_BBL_CR_CTL3 UINT32_C(0x11e)
+
+ifndef MSR_IA32_SYSENTER_CS /* qemu cpu.h kludge */
+/** SYSENTER_CS - the R0 CS, indirectly giving R0 SS, R3 CS and R3 DS.
+ * R0 SS == CS + 8
+ * R3 CS == CS + 16
+ * R3 SS == CS + 24
+ */
+/** Machine Check Global Capabilities Register. */
+#define MSR_IA32_MCG_CAP 0x179
+/** Machine Check Global Status Register. */
+#define MSR_IA32_MCG_STATUS 0x17A
+/** Machine Check Global Control Register. */
+#define MSR_IA32_MCG_CTRL 0x17B
+
+/** Page Attribute Table. */
+#define MSR_IA32_CR_PAT 0x277
+
+/** Performance counter MSRs. (Intel only) */
+#define MSR_IA32_PERFEVTSEL0 0x186
+#define MSR_IA32_PERFEVTSEL1 0x187
+/** Flexible ratio, seems to be undocumented, used by XNU (tsc.c).
+ * The 16th bit whether flex ratio is being used, in which case bits 15:8
+ * holds a ratio that Apple takes for TSC granularity.
+ */
+ * @note This MSR conflicts the P4 MSR_MCG_R12 register. */
+#define MSR_FLEX_RATIO 0x194
+/** Performance state value and starting with Intel core more.
+ * Apple uses the >=core features to determine TSC granularity on older CPUs. */
+#define MSR_IA32_PERF_STATUS 0x198
+#define MSR_IA32_PERF_CTL 0x199
+#define MSR_IA32_THERM_STATUS 0x19c
+
+/** Enable misc. processor features (R/W). */
+#define MSR_IA32_MISC_ENABLE 0x1A0
+/** Enable fast-strings feature (for REP MOVES and REP STORS). */
+#define MSR_IA32_MISC_ENABLE_FAST_STRINGS RT_BIT_64(0)
+/** Automatic Thermal Control Circuit Enable (R/W). */
+#define MSR_IA32_MISC_ENABLE_TCC RT_BIT_64(3)
+/** Performance Monitoring Available (R). */
+#define MSR_IA32_MISC_ENABLE_PERF_MON RT_BIT_64(7)
+/** Branch Trace Storage Unavailable (R/O). */
+#define MSR_IA32_MISC_ENABLE_BTS_UNAVAIL RT_BIT_64(11)
+/** Precise Event Based Sampling (PEBS) Unavailable (R/O). */
+#define MSR_IA32_MISC_ENABLE_PEBS_UNAVAIL RT_BIT_64(12)
+/** Enhanced Intel SpeedStep Technology Enable (R/W). */
+#define MSR_IA32_MISC_ENABLE_SST_ENABLE RT_BIT_64(16)
+/** If MONITOR/MWAIT is supported (R/W). */
+#define MSR_IA32_MISC_ENABLE_MONITOR RT_BIT_64(18)
/** Limit CPUID Maxval to 3 leafs (R/W). */
#define MSR_IA32_MISC_ENABLE_LIMIT_CPUID RT_BIT_64(22)
/** When set to 1, xTPR messages are disabled (R/W). */
#define MSR_IA32_MISC_ENABLE_XTPR_MSG_DISABLE RT_BIT_64(23)
/** When set to 1, the Execute Disable Bit feature (XD Bit) is disabled (R/W). */
#define MSR_IA32_MISC_ENABLE_XD_DISABLE RT_BIT_64(34)

/** Trace/Profile Resource Control (R/W) */
#define MSR_IA32_DEBUGCTL UINT32_C(0x000001d9)

/** The number (0..3 or 0..15) of the last branch record register on P4 and
 * related Xeons. */
#define MSR_P4_LASTBRANCH_TOS UINT32_C(0x0000001d)

/** @name Last branch registers for P4 and Xeon, models 0 thru 2.
 * @{ */
#define MSR_P4_LASTBRANCH_0 UINT32_C(0x0000001db)
#define MSR_P4_LASTBRANCH_1 UINT32_C(0x0000001dc)
#define MSR_P4_LASTBRANCH_2 UINT32_C(0x0000001dd)
#define MSR_P4_LASTBRANCH_3 UINT32_C(0x0000001de)
/** @} */

/** Fixed range MTRRs.
 * @{ */
#define IA32_MTRR_PHYSBASE0 0x200
#define IA32_MTRR_PHYSMASK0 0x201
#define IA32_MTRR_PHYSBASE1 0x202
#define IA32_MTRR_PHYSMASK1 0x203
#define IA32_MTRR_PHYSBASE2 0x204
#define IA32_MTRR_PHYSMASK2 0x205
#define IA32_MTRR_PHYSBASE3 0x206
#define IA32_MTRR_PHYSMASK3 0x207
#define IA32_MTRR_PHYSBASE4 0x208
#define IA32_MTRR_PHYSMASK4 0x209
#define IA32_MTRR_PHYSBASE5 0x20a
#define IA32_MTRR_PHYSMASK5 0x20b
#define IA32_MTRR_PHYSBASE6 0x20c
#define IA32_MTRR_PHYSMASK6 0x20d
#define IA32_MTRR_PHYSBASE7 0x20e
#define IA32_MTRR_PHYSMASK7 0x20f
#define IA32_MTRR_PHYSBASE8 0x210
#define IA32_MTRR_PHYSMASK8 0x211
#define IA32_MTRR_PHYSBASE9 0x212
#define IA32_MTRR_PHYSMASK9 0x213
/** @} */
+##define IA32_MTRR_FIX4K_C8000 0x269
+##define IA32_MTRR_FIX4K_D0000 0x26a
+##define IA32_MTRR_FIX4K_D8000 0x26b
+##define IA32_MTRR_FIX4K_E0000 0x26c
+##define IA32_MTRR_FIX4K_E8000 0x26d
+##define IA32_MTRR_FIX4K_F0000 0x26e
+##define IA32_MTRR_FIX4K_F8000 0x26f
+/** @} */ */
+
+/** MTRR Default Range. */
+##define MSR_IA32_MTRR_DEF_TYPE 0x2FF
+
+/** Global performance counter control facilities (Intel only). */
+##define MSR_IA32_PERF_GLOBAL_STATUS 0x38E
+##define MSR_IA32_PERF_GLOBAL_CTRL 0x38F
+##define MSR_IA32_PERF_GLOBAL_OVF_CTRL 0x390
+
+/** Precise Event Based sampling (Intel only). */
+##define MSR_IA32_PEBS_ENABLE 0x3F1
+
+##define MSR_IA32_MC0_CTL 0x400
+##define MSR_IA32_MC0_STATUS 0x401
+
+/** Basic VMX information. */
+##define MSR_IA32_VMX_BASIC_INFO 0x480
+/** Allowed settings for pin-based VM execution controls */
+##define MSR_IA32_VMX_PINBASED_CTLS 0x481
+/** Allowed settings for proc-based VM execution controls */
+##define MSR_IA32_VMX_PROCBASED_CTLS 0x482
+/** Allowed settings for the VMX exit controls. */
+##define MSR_IA32_VMX_EXIT_CTLS 0x483
+/** Allowed settings for the VMX entry controls. */
+##define MSR_IA32_VMX_ENTRY_CTLS 0x484
+/** Misc VMX info. */
+##define MSR_IA32_VMX_MISC 0x485
+/** Fixed cleared bits in CR0. */
+##define MSR_IA32_VMX_CR0_FIXED0 0x486
+/** Fixed set bits in CR0. */
+##define MSR_IA32_VMX_CR0_FIXED1 0x487
+/** Fixed cleared bits in CR4. */
+##define MSR_IA32_VMX_CR4_FIXED0 0x488
+/** Fixed set bits in CR4. */
+##define MSR_IA32_VMX_CR4_FIXED1 0x489
+/** Information for enumerating fields in the VMCS. */
+##define MSR_IA32_VMX_VMCS_ENUM 0x48A
+/** Allowed settings for the VM-functions controls. */
+##define MSR_IA32_VMX_VMFUNC 0x491
+/** Allowed settings for secondary proc-based VM execution controls */
+##define MSR_IA32_VMX_PROCBASED_CTLS2 0x48B
+/** EPT capabilities. */
+##define MSR_IA32_VMX_EPT_VPID_CAP 0x48C
+/** Allowed settings of all pin-based VM execution controls. */
+##define MSR_IA32_VMX_TRUE_PINBASED_CTLS 0x48D
+/** Allowed settings of all proc-based VM execution controls. */
+##define MSR_IA32_VMX_TRUE_PROCBASED_CTLS 0x48E
+/** Allowed settings of all VMX exit controls. */
+##define MSR_IA32_VMX_TRUE_EXIT_CTLS 0x48F
+/** Allowed settings of all VMX entry controls. */
+##define MSR_IA32_VMX_TRUE_ENTRY_CTLS 0x490
+
+/** DS Save Area (R/W). */
+##define MSR_IA32_DS_AREA 0x600
+/** Running Average Power Limit (RAPL) power units. */
+##define MSR_RAPL_POWER_UNIT 0x606
+
+/** X2APIC MSR range start. */
+##define MSR_IA32_X2APIC_START 0x800
+/** X2APIC MSR - APIC ID Register. */
+##define MSR_IA32_X2APIC_ID 0x802
+/** X2APIC MSR - APIC Version Register. */
+##define MSR_IA32_X2APIC_VERSION 0x803
+/** X2APIC MSR - Task Priority Register. */
+##define MSR_IA32_X2APIC_TPR 0x808
+/** X2APIC MSR - Processor Priority register. */
+##define MSR_IA32_X2APIC_PPR 0x80A
+/** X2APIC MSR - End Of Interrupt register. */
+##define MSR_IA32_X2APIC_EOI 0x80B
+/** X2APIC MSR - Logical Destination Register. */
+##define MSR_IA32_X2APIC_LDR 0x80D
+/** X2APIC MSR - Spurious Interrupt Vector Register. */
+##define MSR_IA32_X2APIC_SVR 0x80F
+/** X2APIC MSR - In-service Register (bits 31:0). */
+##define MSR_IA32_X2APIC_ISR0 0x810
+/** X2APIC MSR - In-service Register (bits 63:32). */
+##define MSR_IA32_X2APIC_ISR1 0x811
+/** X2APIC MSR - In-service Register (bits 95:64). */
+##define MSR_IA32_X2APIC_ISR2 0x812
+/** X2APIC MSR - In-service Register (bits 127:96). */
+##define MSR_IA32_X2APIC_ISR3 0x813
+/** X2APIC MSR - In-service Register (bits 159:128). */
+##define MSR_IA32_X2APIC_ISR4 0x814
+/** X2APIC MSR - In-service Register (bits 191:160). */
+##define MSR_IA32_X2APIC_ISR5 0x815
+/** X2APIC MSR - In-service Register (bits 223:192). */
+##define MSR_IA32_X2APIC_ISR6 0x816
+/** X2APIC MSR - In-service Register (bits 255:224). */
#define MSR_IA32_X2APIC_ISR7 0x817
+/* X2APIC MSR - Trigger Mode Register (bits 31:0). */
+#define MSR_IA32_X2APIC_TMR0 0x818
+/* X2APIC MSR - Trigger Mode Register (bits 63:32). */
+#define MSR_IA32_X2APIC_TMR1 0x819
+/* X2APIC MSR - Trigger Mode Register (bits 95:64). */
+#define MSR_IA32_X2APIC_TMR2 0x81A
+/* X2APIC MSR - Trigger Mode Register (bits 127:96). */
+#define MSR_IA32_X2APIC_TMR3 0x81B
+/* X2APIC MSR - Trigger Mode Register (bits 159:128). */
+#define MSR_IA32_X2APIC_TMR4 0x81C
+/* X2APIC MSR - Trigger Mode Register (bits 191:160). */
+#define MSR_IA32_X2APIC_TMR5 0x81D
+/* X2APIC MSR - Trigger Mode Register (bits 223:192). */
+#define MSR_IA32_X2APIC_TMR6 0x81E
+/* X2APIC MSR - Trigger Mode Register (bits 255:224). */
+#define MSR_IA32_X2APIC_TMR7 0x81F
+/* X2APIC MSR - Interrupt Request Register (bits 31:0). */
+#define MSR_IA32_X2APIC_IRR0 0x820
+/* X2APIC MSR - Interrupt Request Register (bits 63:32). */
+#define MSR_IA32_X2APIC_IRR1 0x821
+/* X2APIC MSR - Interrupt Request Register (bits 95:64). */
+#define MSR_IA32_X2APIC_IRR2 0x822
+/* X2APIC MSR - Interrupt Request Register (bits 127:96). */
+#define MSR_IA32_X2APIC_IRR3 0x823
+/* X2APIC MSR - Interrupt Request Register (bits 159:128). */
+#define MSR_IA32_X2APIC_IRR4 0x824
+/* X2APIC MSR - Interrupt Request Register (bits 191:160). */
+#define MSR_IA32_X2APIC_IRR5 0x825
+/* X2APIC MSR - Interrupt Request Register (bits 223:192). */
+#define MSR_IA32_X2APIC_IRR6 0x826
+/* X2APIC MSR - Interrupt Request Register (bits 255:224). */
+#define MSR_IA32_X2APIC_IRR7 0x827
+/* X2APIC MSR - Error Status Register. */
+#define MSR_IA32_X2APIC_ESR 0x828
+/* X2APIC MSR - LVT CMCI Register. */
+#define MSR_IA32_X2APIC_LVT_CMCI 0x82F
+/* X2APIC MSR - Interrupt Command Register. */
+#define MSR_IA32_X2APIC_ICR 0x830
+/* X2APIC MSR - LVT Timer Register. */
+#define MSR_IA32_X2APIC_LVT_TIMER 0x832
+/* X2APIC MSR - LVT Thermal Sensor Register. */
+#define MSR_IA32_X2APIC_LVT_THERMAL 0x833
+/* X2APIC MSR - LVT Performance Counter Register. */
+#define MSR_IA32_X2APIC_LVT_PERF 0x834
+/* X2APIC MSR - LVT LINT0 Register. */
+#define MSR_IA32_X2APIC_LVT_LINT0 0x835
+/* X2APIC MSR - LVT LINT1 Register. */
#define MSR_IA32_X2APIC_LVT_LINT1 0x836
+/** X2APIC MSR - LVT Error Register. */
+#define MSR_IA32_X2APIC_LVT_ERROR 0x837
+/** X2APIC MSR - Timer Initial Count Register. */
+#define MSR_IA32_X2APIC_TIMER_ICR 0x838
+/** X2APIC MSR - Timer Current Count Register. */
+#define MSR_IA32_X2APIC_TIMER_CCR 0x839
+/** X2APIC MSR - Self IPI. */
+#define MSR_IA32_X2APIC_SELF_IPI 0x83F
+/** X2APIC MSR range end. */
+#define MSR_IA32_X2APIC_END 0xBFF
+/** X2APIC MSR - LVT start range. */
+#define MSR_IA32_X2APIC_LVT_START MSR_IA32_X2APIC_TIMER
+/** X2APIC MSR - LVT end range (inclusive). */
+#define MSR_IA32_X2APIC_LVT_END MSR_IA32_X2APIC_LVT_ERROR
+
+/** K6 EFER - Extended Feature Enable Register. */
+#define MSR_K6_EFER UINT32_C(0xc0000080)
+/** @todo document EFER */
+/** Bit 0 - SCE - System call extensions (SYSCALL / SYSRET). (R/W) */
+#define MSR_K6_EFER_SCE RT_BIT_32(0)
+/** Bit 8 - LME - Long mode enabled. (R/W) */
+#define MSR_K6_EFER_LME RT_BIT_32(8)
+/** Bit 10 - LMA - Long mode active. (R) */
+#define MSR_K6_EFER_LMA RT_BIT_32(10)
+/** Bit 11 - NXE - No-Execute Page Protection Enabled. (R/W) */
+#define MSR_K6_EFER_NXE RT_BIT_32(11)
+#define MSR_K6_EFER_BIT_NXE 11 /**< Bit number of MSR_K6_EFER_NXE */
+/** Bit 12 - SVME - Secure VM Extension Enabled. (R/W) */
+#define MSR_K6_EFER_SVME RT_BIT_32(12)
+/** Bit 13 - LMSLE - Long Mode Segment Limit Enable. (R/W?) */
+#define MSR_K6_EFER_LMSLE RT_BIT_32(13)
+/** Bit 14 - FFXSR - Fast FXSAVE / FXRSTOR (skip XMM*). (R/W) */
+#define MSR_K6_EFER_FFXSR RT_BIT_32(14)
+/** Bit 15 - TCE - Translation Cache Extension. (R/W) */
+#define MSR_K6_EFER_TCE RT_BIT_32(15)
+/** K6 STAR - SYSCALL/RET targets. */
+#define MSR_K6_STAR UINT32_C(0xc0000081)
+/** Shift value for getting the SYSRET CS and SS value. */
+#define MSR_K6_STAR_SYSRET_CS_SS_SHIFT 48
+/** Shift value for getting the SYSCALL CS and SS value. */
+#define MSR_K6_STAR_SYSCALL_CS_SS_SHIFT 32
+/** Selector mask for use after shifting. */
+#define MSR_K6_STAR_SEL_MASK UINT32_C(0xffffffff)
+/** The mask which give the SYSCALL EIP. */
+#define MSR_K6_STAR_SYSCALL_EIP_MASK UINT32_C(0xffffffff)
+/** K6 WHCR - Write Handling Control Register. */
+#define MSR_K6_WHCR UINT32_C(0xc0000082)
+/** K6 UWCCR - UC/WC Cacheability Control Register. */
+#define MSR_K6_UWCCR UINT32_C(0xc0000085)
+/** K6 PSOR - Processor State Observability Register. */
+#define MSR_K6_PSOR UINT32_C(0xc0000087)
+/** K6 PFIR - Page Flush/Invalidate Register. */
+#define MSR_K6_PFIR UINT32_C(0xc0000088)
+
+/** Performance counter MSRs. (AMD only) */
+#define MSR_K7_EVNTSEL0 UINT32_C(0xc0010000)
+#define MSR_K7_EVNTSEL1 UINT32_C(0xc0010001)
+#define MSR_K7_EVNTSEL2 UINT32_C(0xc0010002)
+#define MSR_K7_EVNTSEL3 UINT32_C(0xc0010003)
+#define MSR_K7_PERFCTR0 UINT32_C(0xc0010004)
+#define MSR_K7_PERFCTR1 UINT32_C(0xc0010005)
+#define MSR_K7_PERFCTR2 UINT32_C(0xc0010006)
+#define MSR_K7_PERFCTR3 UINT32_C(0xc0010007)
+
+/** K8 LSTAR - Long mode SYSCALL target (RIP). */
+#define MSR_K8_LSTAR UINT32_C(0xc0000082)
+/** K8 CSTAR - Compatibility mode SYSCALL target (RIP). */
+#define MSR_K8_CSTAR UINT32_C(0xc0000083)
+/** K8 SF_MASK - SYSCALL flag mask. (aka SFMASK) */
+#define MSR_K8_SF_MASK UINT32_C(0xc0000084)
+/** K8 FS.base - The 64-bit base FS register. */
+#define MSR_K8_FS_BASE UINT32_C(0xc0000100)
+/** K8 GS.base - The 64-bit base GS register. */
+#define MSR_K8_GS_BASE UINT32_C(0xc0000101)
+/** K8 KernelGSbase - Used with SWAPGS. */
+#define MSR_K8_KERNEL_GS_BASE UINT32_C(0xc0000102)
+/** K8 TSC_AUX - Used with RDTSCP. */
+#define MSR_K8_TSC_AUX UINT32_C(0xc0000103)
+#define MSR_K8_SYSCFG UINT32_C(0xc0001000)
+#define MSR_K8_HWCR UINT32_C(0xc00010015)
+#define MSR_K8_IORRBASE0 UINT32_C(0xc00010016)
+#define MSR_K8_IORRMASK0 UINT32_C(0xc00010017)
+#define MSR_K8_IORRBASE1 UINT32_C(0xc00010018)
+#define MSR_K8_IORRMASK1 UINT32_C(0xc00010019)
+#define MSR_K8_TOP_MEM1 UINT32_C(0xc0010001a)
+#define MSR_K8_TOP_MEM2 UINT32_C(0xc0010010)
+/** North bridge config? See BIOS & Kernel dev guides for
* details. */
+#define MSR_K8_NB_CFG UINT32_C(0xc0001001f)
+
+/** Hypertransport interrupt pending register.
+ * "BIOS and Kernel Developer's Guide for AMD NPT Family 0Fh Processors" */
+#define MSR_K8_INT_PENDING UINT32_C(0xc0010055)
+/** SVM Control. */
+#define MSR_K8_VM_CR UINT32_C(0xc0010114)
+/** Disables HDT (Hardware Debug Tool) and certain internal debug features. */
+#define MSR_K8_VM_CR_DPD RT_BIT_32(0)
+/** If set, non-intercepted INIT signals are converted to #SX exceptions. */
+#define MSR_K8_VM_CR_R_INIT RT_BIT_32(1)
+/** Disables A20 masking. */
+#define MSR_K8_VM_CR_DIS_A20M RT_BIT_32(2)
+/** Lock bit for this MSR controlling bits 3 (LOCK) and 4 (SVMDIS). */
+#define MSR_K8_VM_CR_LOCK RT_BIT_32(3)
+/** SVM disable. When set, writes to EFER.SVME are treated as MBZ. When clear, EFER.SVME can be written normally. */
+#define MSR_K8_VM_CR_SVM_DISABLE RT_BIT_32(4)
+
+/** @} */
+
+/** @} */
+/** Page Table / Directory / Directory Pointers / L4. */
+/** @} */
+
+/** PAE page table/page directory/pdpt/l4/l5 entry as an unsigned integer. */
+typedef uint64_t X86PGPAEUINT;
+/** Pointer to a PAE page table/page directory/pdpt/l4/l5 entry as an unsigned integer. */
+typedef X86PGPAEUINT *PX86PGPAEUINT;
+/** Pointer to an const page table/page directory/pdpt/l4/l5 entry as an unsigned integer. */
+typedef X86PGPAEUINT const *PCX86PGPAEUINT;
+
+/** Number of entries in a 32-bit PT/PD. */
+#define X86_PG_ENTRIES 1024
+
+/** PAE page table/page directory/pdpt/l4/l5 entry as an unsigned integer. */
+typedef uint64_t X86PGPAEUINT;
+/** Pointer to a PAE page table/page directory/pdpt/l4/l5 entry as an unsigned integer. */
+typedef X86PGPAEUINT *PX86PGPAEUINT;
+/** Pointer to an const PAE page table/page directory/pdpt/l4/l5 entry as an unsigned integer. */
+typedef X86PGPAEUINT const *PCX86PGPAEUINT;
+
/** Number of entries in a PAE PT/PD. */
#define X86_PG_PAE_ENTRIES                  512

/** Number of entries in a PAE PDPT. */
#define X86_PG_PAE_PDPE_ENTRIES             4

/** Number of entries in an AMD64 PT/PD/PDPT/L4/L5. */
#define X86_PG_AMD64_ENTRIES                X86_PG_PAE_ENTRIES

/** Number of entries in an AMD64 PDPT. */
/* Just for complementing X86_PG_PAE_PDPE_ENTRIES, using X86_PG_AMD64_ENTRIES for this is fine too. */
#define X86_PG_AMD64_PDPE_ENTRIES           X86_PG_AMD64_ENTRIES

/** The size of a default page. */
#define X86_PAGE_SIZE                       X86_PAGE_4K_SIZE

/** The page shift of a default page. */
#define X86_PAGE_SHIFT                      X86_PAGE_4K_SHIFT

/** The default page offset mask. */
#define X86_PAGE_OFFSET_MASK                X86_PAGE_4K_OFFSET_MASK

/** The default page base mask for virtual addresses. */
#define X86_PAGE_BASE_MASK                  X86_PAGE_4K_BASE_MASK

/** The default page base mask for virtual addresses - 32bit version. */
#define X86_PAGE_BASE_MASK_32               X86_PAGE_4K_BASE_MASK_32

/** The size of a 4KB page. */
#define X86_PAGE_4K_SIZE                    _4K

/** The page shift of a 4KB page. */
#define X86_PAGE_4K_SHIFT                   12

/** The 4KB page offset mask. */
#define X86_PAGE_4K_OFFSET_MASK             0xfff

/** The 4KB page base mask for virtual addresses. */
#define X86_PAGE_4K_BASE_MASK               0xfffffffffffff000ULL

/** The 4KB page base mask for virtual addresses - 32bit version. */
#define X86_PAGE_4K_BASE_MASK_32            0xfffff000U

/** The size of a 2MB page. */
#define X86_PAGE_2M_SIZE                    _2M

/** The page shift of a 2MB page. */
#define X86_PAGE_2M_SHIFT                   21

/** The 2MB page offset mask. */
#define X86_PAGE_2M_OFFSET_MASK             0x001fffff

/** The 2MB page base mask for virtual addresses. */
#define X86_PAGE_2M_BASE_MASK               0xfffffffffffffff0000ULL

/** The 2MB page base mask for virtual addresses - 32bit version. */
#define X86_PAGE_2M_BASE_MASK_32            0xffe00000U

/** The size of a 4MB page. */
#define X86_PAGE_4M_SIZE                    _4M

/** The page shift of a 4MB page. */
#define X86_PAGE_4M_SHIFT 22
+#define X86_PAGE_4M_OFFSET_MASK 0x003fffff
+#define X86_PAGE_4M_BASE_MASK 0xffffffffffc00000ULL
+#define X86_PAGE_4M_BASE_MASK_32 0xffc00000U

/** The 4MB page offset mask. */
/** The 4MB page base mask for virtual addresses. */
/** The 4MB page base mask for virtual addresses - 32bit version. */

/* Check if the given address is canonical. */

#define X86_IS_CANONICAL(a_u64Addr) ((uint64_t)(a_u64Addr) + UINT64_C(0x800000000000) <
    UINT64_C(0x1000000000000))

/** @name Page Table Entry */
@@
/** Bit 0 - P - Present bit. */
+#define X86_PTE_BIT_P 0
+#define X86_PTE_BIT_RW 1
+#define X86_PTE_BIT_US 2
+#define X86_PTE_BIT_PWT 3
+#define X86_PTE_BIT_PCD 4
+#define X86_PTE_BIT_A 5
+#define X86_PTE_BIT_D 6
+#define X86_PTE_BIT_PAT 7
+#define X86_PTE_BIT_G 8
+#define X86_PTE_PAE_BIT_NX 63

/** Bits 63 - NX - PAE/LM - No execution flag. */

+** Bit 0 - P - Present bit mask. */
+#define X86_PTE_P  RT_BIT_32(0)
+#define X86_PTE_RW  RT_BIT_32(1)
+#define X86_PTE_US  RT_BIT_32(2)
+#define X86_PTE_PWT  RT_BIT_32(3)
+#define X86_PTE_PAE_BIT_NX 63

+ ** Bit 0 - P - Present bit mask. */
+ ** Bit 1 - R/W - Read (clear) / Write (set) bit mask. */
+ ** Bit 2 - U/S - User (set) / Supervisor (clear) bit mask. */
+ ** Bit 3 - PWT - Page level write thru bit mask. */
+ ** Bit 4 - PCD - Page level cache disable bit mask. */
#define X86_PTE_PCD          RT_BIT_32(4)
+#define X86_PTE_A           RT_BIT_32(5)
+#define X86_PTE_D           RT_BIT_32(6)
+#define X86_PTE_PAT         RT_BIT_32(7)
+#define X86_PTE_G           RT_BIT_32(8)
+
+#define Bits 9-11 - Available for use to system software. */
+#define X86_PTE_AVL_MASK    (RT_BIT_32(9) | RT_BIT_32(10) | RT_BIT_32(11))
+
+#define X86_PTE_PG_MASK     ( 0xfffff000 )
+
+#define Bits 12-31 - Physical Page number of the next level. */
+#define X86_PTE_PAE_PG_MASK (UINT64_C(0x0000000000000000))
+
+#define Bits 63 - NX - PAE/LM - No execution flag. */
+#define X86_PTE_PAE_NX      RT_BIT_64(63)
+
+#define Bits 62-52 - PAE - MBZ bits when NX is active. */
+#define X86_PTE_PAE_MBZ_MASK_NX UINT64_C(0x0000000000000000)
+
+#define Bits 63-52 - PAE - MBZ bits when no NX. */
+#define X86_PTE_PAE_MBZ_MASK_NO_NX UINT64_C(0x8000000000000000)
+
+#define Bits 63 - LM - MBZ bits when NX is active. */
+#define X86_PTE_LM_MBZ_MASK_NX UINT64_C(0x0000000000000000)
+
+#define Bits 63 - LM - MBZ bits when no NX. */
+#define X86_PTE_LM_MBZ_MASK_NO_NX UINT64_C(0x8000000000000000)
+
+/**
+ * Page table entry.
+ */
+typedef struct X86PTEBITS
+-{
+   /** Flags whether(=1) or not the page is present. */
+   uint32_t u1Present : 1;
+   /** Read(=0) / Write(=1) flag. */
+   uint32_t u1Write : 1;
+   /** User(=1) / Supervisor (=0) flag. */
+   uint32_t u1User : 1;
+   /** Write Thru flag. If PAT enabled, bit 0 of the index. */
+   uint32_t u1WriteThru : 1;
+   /** Cache disabled flag. If PAT enabled, bit 1 of the index. */
+   uint32_t u1CacheDisable : 1;
+   /** Accessed flag.
+    * Indicates that the page have been read or written to. */
+   uint32_t u1Accessed : 1;
+   /** Dirty flag.
+    * Indicates that the page has been written to. */
+ uint32_t u1Dirty : 1;
+ /**< Reserved / If PAT enabled, bit 2 of the index. */
+ uint32_t u1PAT : 1;
+ /**< Global flag. (Ignored in all but final level.) */
+ uint32_t u1Global : 1;
+ /**< Available for use to system software. */
+ uint32_t u3Available : 3;
+ /**< Physical Page number of the next level. */
+ uint32_t u20PageNo : 20;
+
+} X86PTEBITS;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PTEBITS, 4);
+#endif
+/** Pointer to a page table entry. */
+typedef X86PTEBITS *PX86PTEBITS;
+/** Pointer to a const page table entry. */
+typedef const X86PTEBITS *PCX86PTEBITS;
+
+/**
+ * Page table entry.
+ */
+typedef union X86PTE
+
+ { /*
+ + /**< Unsigned integer view */
+ + X86PGUINT u;
+ + /**< Bit field view. */
+ + X86PTEBITS n;
+ + /**< 32-bit view. */
+ + uint32_t uu32[1];
+ + /**< 16-bit view. */
+ + uint16_t uu16[2];
+ + /**< 8-bit view. */
+ + uint8_t uu8[4];
+ } X86PTE;
+#endif
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PTE, 4);
+#endif
+/** Pointer to a page table entry. */
+typedef X86PTE *PX86PTE;
+/** Pointer to a const page table entry. */
+typedef const X86PTE *PCX86PTE;
+
+/**
+ * PAE page table entry.
+ */
+typedef struct X86PTEPAEBITS
+
+ { /*
+ + /**< 8-bit view. */
+ + uint8_t u8;
+ + /**< 16-bit view. */
+ + uint16_t u16B[2];
+ + /**< 32-bit view. */
+ + uint32_t u32;
+ } X86PTEPAEBITS;
+#endif
```c
/* Flags whether (=1) or not the page is present. */
uint32_t u1Present : 1;
/* Read(=0) / Write(=1) flag. */
uint32_t u1Write : 1;
/* User(=1) / Supervisor(=0) flag. */
uint32_t u1User : 1;
/* Write Thru flag. If PAT enabled, bit 0 of the index. */
uint32_t u1WriteThru : 1;
/* Cache disabled flag. If PAT enabled, bit 1 of the index. */
uint32_t u1CacheDisable : 1;
/* Accessed flag. */
* Indicates that the page have been read or written to. */
uint32_t u1Accessed : 1;
/* Dirty flag. */
* Indicates that the page has been written to. */
uint32_t u1Dirty : 1;
/* Reserved / If PAT enabled, bit 2 of the index. */
uint32_t u1PAT : 1;
/* Global flag. (Ignored in all but final level.) */
uint32_t u1Global : 1;
/* Available for use to system software. */
uint32_t u3Available : 3;
/* Physical Page number of the next level - Low Part. Don't use this. */
uint32_t u20PageNoLow : 20;
/* Physical Page number of the next level - High Part. Don't use this. */
uint32_t u20PageNoHigh : 20;
/* MBZ bits */
uint32_t u11Reserved : 11;
/* No Execute flag. */
uint32_t u1NoExecute : 1;
}
```

+ /** 32-bit view. */
+ uint32_t    au32[2];
+ /** 16-bit view. */
+ uint16_t    au16[4];
+ /** 8-bit view. */
+ uint8_t     au8[8];
+ } X86PTEPAE;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PTEPAE, 8);
+#endif
+/** Pointer to a PAE page table entry. */
typedef X86PTEPAE *PX86PTEPAE;
+/** Pointer to a const PAE page table entry. */
typedef const X86PTEPAE *PCX86PTEPAE;
+/** @} */
+
+/**
+ * Page table.
+ */
typedef struct X86PT
+{  /* PTE Array. */
+   X86PTE     a[X86_PG_ENTRIES];
+ } X86PT;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PT, 4096);
+#endif
+/** Pointer to a page table. */
typedef X86PT *PX86PT;
+/** Pointer to a const page table. */
typedef const X86PT *PCX86PT;
+
+/** The page shift to get the PT index. */
+#define X86_PT_SHIFT                        12
+/** The PT index mask (apply to a shifted page address). */
+#define X86_PT_MASK                         0x3ff
+
+
+/**
+ * Page directory.
+ */
typedef struct X86PTPAE
+{  /* PTE Array. */
+   X86PTEPAE a[X86_PG_PAE_ENTRIES];
+ } X86PTPAE;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PTPAE, 4096);
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```c
+#ifndef
+/** Pointer to a page table. */
+typedef X86PTPAE *PX86PTPAE;
+/** Pointer to a const page table. */
+typedef const X86PTPAE *PCX86PTPAE;
+
+/** The page shift to get the PA PTE index. */
+#define X86_PT_PAE_SHIFT 12
+/** The PAE PT index mask (apply to a shifted page address). */
+#define X86_PT_PAE_MASK 0x1ff
+
+
+/** @name 4KB Page Directory Entry */
+  * @}
+  */
+/** Bit 0 - P - Present bit. */
+#define X86_PDE_P RT_BIT_32(0)
+/** Bit 1 - R/W - Read (clear) / Write (set) bit. */
+#define X86_PDE_RW RT_BIT_32(1)
+/** Bit 2 - U/S - User (set) / Supervisor (clear) bit. */
+#define X86_PDE_US RT_BIT_32(2)
+/** Bit 3 - PWT - Page level write thru bit. */
+#define X86_PDE_PWT RT_BIT_32(3)
+/** Bit 4 - PCD - Page level cache disable bit. */
+#define X86_PDE_PCD RT_BIT_32(4)
+/** Bit 5 - A - Access bit. */
+#define X86_PDE_A RT_BIT_32(5)
+/** Bit 7 - PS - Page size attribute. */
+  * Clear mean 4KB pages, set means large pages (2/4MB). */
+#define X86_PDE_PS RT_BIT_32(7)
+/** Bits 9-11 - - Available for use to system software. */
+#define X86_PDE_AVL_MASK (RT_BIT_32(9) | RT_BIT_32(10) | RT_BIT_32(11))
+/** Bits 12-31 - - Physical Page number of the next level. */
+#define X86_PDE_PG_MASK (0xfffff000)
+/** Bits 12-51 - - PAE - Physical Page number of the next level. */
+#define X86_PDE_PAE_PG_MASK (UINT64_C(0x000ffffffffff000))
+/** Bits 63 - NX - PAE/LM - No execution flag. */
+#define X86_PDE_PAE_NX RT_BIT_64(63)
+/** Bits 62-52, 7 - - PAE - MBZ bits when NX is active. */
+#define X86_PDE_PAE_MBZ_MASK_NX UINT64_C(0x7ff0000000000080)
+/** Bits 62-52, 7 - - PAE - MBZ bits when no NX. */
+#define X86_PDE_PAE_MBZ_MASK_NO_NX UINT64_C(0xfff0000000000080)
+/** Bit 7 - - LM - MBZ bits when NX is active. */
+#define X86_PDE_LM_MBZ_MASK_NX UINT64_C(0x8000000000000080)
+/** Bits 63, 7 - - LM - MBZ bits when no NX. */
+#define X86_PDE_LM_MBZ_MASK_NO_NX UINT64_C(0x8000000000000080)
+```
/**
 * Page directory entry.
 */
typedef struct X86PDEBITS
{
    /** Flags whether (=1) or not the page is present. */
    uint32_t u1Present : 1;
    /** Read (=0) / Write (=1) flag. */
    uint32_t u1Write : 1;
    /** User (=1) / Supervisor (=0) flag. */
    uint32_t u1User : 1;
    /** Write Thru flag. If PAT enabled, bit 0 of the index. */
    uint32_t u1WriteThru : 1;
    /** Cache disabled flag. If PAT enabled, bit 1 of the index. */
    uint32_t u1CacheDisable : 1;
    /** Accessed flag. */
    * Indicates that the page has been read or written to. */
    uint32_t u1Accessed : 1;
    /** Reserved / Ignored (dirty bit). */
    uint32_t u1Reserved0 : 1;
    /** Size bit if PSE is enabled - in any event it's 0. */
    uint32_t u1Size : 1;
    /** Reserved / Ignored (global bit). */
    uint32_t u1Reserved1 : 1;
    /** Available for use to system software. */
    uint32_t u3Available : 3;
    /** Physical Page number of the next level. */
    uint32_t u20PageNo : 20;
} X86PDEBITS;
#endif VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PDEBITS, 4);
#endif
/**
 * PAE page directory entry.
 */
typedef X86PDEBITS *PX86PDEBITS;
/**
 * Pointer to a const page directory entry.
 */
typedef const X86PDEBITS *PCX86PDEBITS;

/**
 * PAE page directory entry.
 */
typedef struct X86PDEPAEBITS
{
    /** Flags whether (=1) or not the page is present. */
    uint32_t u1Present : 1;
    /** Read (=0) / Write (=1) flag. */
    uint32_t u1Write : 1;
    /** User (=1) / Supervisor (=0) flag. */
    uint32_t u1User : 1;
    /** Write Thru flag. If PAT enabled, bit 0 of the index. */
    uint32_t u1WriteThru : 1;
    /** Cache disabled flag. If PAT enabled, bit 1 of the index. */
    uint32_t u1CacheDisable : 1;
    /** Accessed flag. */
    * Indicates that the page has been read or written to. */
    uint32_t u1Accessed : 1;
    /** Reserved / Ignored (dirty bit). */
    uint32_t u1Reserved0 : 1;
    /** Size bit if PSE is enabled - in any event it's 0. */
    uint32_t u1Size : 1;
    /** Reserved / Ignored (global bit). */
    uint32_t u1Reserved1 : 1;
    /** Available for use to system software. */
    uint32_t u3Available : 3;
    /** Physical Page number of the next level. */
    uint32_t u20PageNo : 20;
} X86PDEPAEBITS;
+ uint32_t    u1User : 1;
+ /**< Write Thru flag. If PAT enabled, bit 0 of the index. */
+ uint32_t    u1WriteThru : 1;
+ /**< Cache disabled flag. If PAT enabled, bit 1 of the index. */
+ uint32_t    u1CacheDisable : 1;
+ /**< Accessed flag.
+ * Indicates that the page has been read or written to. */
+ uint32_t    u1Accessed : 1;
+ /**< Reserved / Ignored (dirty bit). */
+ uint32_t    u1Reserved0 : 1;
+ /**< Size bit if PSE is enabled - in any event it's 0. */
+ uint32_t    u1Size : 1;
+ /**< Reserved / Ignored (global bit). */
+ uint32_t    u1Reserved1 : 1;
+ /**< Available for use to system software. */
+ uint32_t    u3Available : 3;
+ /**< Physical Page number of the next level - Low Part. Don't use! */
+ uint32_t    u20PageNoLow : 20;
+ /**< Physical Page number of the next level - High Part. Don't use! */
+ uint32_t    u20PageNoHigh : 20;
+ /**< MBZ bits */
+ uint32_t    u1Reserved : 11;
+ /**< No Execute flag. */
+ uint32_t    u1NoExecute : 1;
+
+} X86PDEPAEBITS;

#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PDEPAEBITS, 8);
@endif
+
+/** Pointer to a page directory entry. */
+typedef X86PDEPAEBITS *PX86PDEPAEBITS;
+/** Pointer to a const page directory entry. */
+typedef const X86PDEPAEBITS *PCX86PDEPAEBITS;
+
+/** @} */
+
+/** @name 2/4MB Page Directory Entry */
+/** @} */
+
+/** Bit 0 - P - Present bit. */
+define X86_PDE4M_P RT_BIT_32(0)
+/** Bit 1 - R/W - Read (clear) / Write (set) bit. */
+define X86_PDE4M_RW RT_BIT_32(1)
+/** Bit 2 - U/S - User (set) / Supervisor (clear) bit. */
+define X86_PDE4M_US RT_BIT_32(2)
+/** Bit 3 - PWT - Page level write thru bit. */
+define X86_PDE4M_PWT RT_BIT_32(3)
+/** Bit 4 - PCD - Page level cache disable bit. */
+#define X86_PDE4M_PCD  RT_BIT_32(4)
+/** Bit 5 - A - Access bit. */
+#define X86_PDE4M_A  RT_BIT_32(5)
+/** Bit 6 - D - Dirty bit. */
+#define X86_PDE4M_D  RT_BIT_32(6)
+/** Bit 7 - PS - Page size attribute. Clear mean 4KB pages, set means large pages (2/4MB). */
+#define X86_PDE4M_PS  RT_BIT_32(7)
+/** Bit 8 - G - Global flag. */
+#define X86_PDE4M_G  RT_BIT_32(8)
+/** Bits 9-11 - AVL - Available for use to system software. */
+#define X86_PDE4M_AVL (RT_BIT_32(9) | RT_BIT_32(10) | RT_BIT_32(11))
+/** Bit 12 - PAT - Page Attribute Table index bit. Reserved and 0 if not supported. */
+#define X86_PDE4M_PAT  RT_BIT_32(12)
+/** Shift to get from X86_PTE_PAT to X86_PDE4M_PAT. */
+#define X86_PDE4M_PAT_SHIFT (12 - 7)
+/** Bits 22-31 - Physical Page number. */
+#define X86_PDE4M_PG_MASK  ( 0xffc00000 )
+/** Bits 20-13 - Physical Page number high part (32-39 bits). AMD64 hack. */
+#define X86_PDE4M_PG_HIGH_MASK  ( 0x001fe000 )
+/** The number of bits to the high part of the page number. */
+#define X86_PDE4M_PG_HIGH_SHIFT 19
+/** Bit 21 - MBZ bits for AMD CPUs, no PSE36. */
+#define X86_PDE4M_MBZ_MASK  RT_BIT_32(21)
+/** Bits 21-51 - PAE/LM - Physical Page number. */
+/** (Bits 40-51 (long mode) & bits 36-51 (pae legacy) are reserved according to the Intel docs; AMD allows for more.) */
+#define X86_PDE2M_PAE_PG_MASK UINT64_C(0x000fffffffe00000)
+/** Bits 63 - NX - PAE/LM - No execution flag. */
+#define X86_PDE2M_PAE_NX  RT_BIT_64(63)
+/** Bits 62-52, 20-13 - PAE - MBZ bits when NX is active. */
+#define X86_PDE2M_PAE_MBZ_MASK_NX UINT64_C(0x7ff00000001fe000)
+/** Bits 63-52, 20-13 - PAE - MBZ bits when no NX. */
+#define X86_PDE2M_PAE_MBZ_MASK_NO_NX UINT64_C(0xffff0000001fe000)
+/** Bits 20-13 - LM - MBZ bits when NX is active. */
+#define X86_PDE2M_LM_MBZ_MASK_NX UINT64_C(0x00000000001fe000)
+/** Bits 63, 20-13 - LM - MBZ bits when no NX. */
+#define X86_PDE2M_LM_MBZ_MASK_NO_NX UINT64_C(0x80000000001fe000)
+
+/**
+ * 4MB page directory entry.
+ */
+typedef struct X86PDE4MBITS
+{
+    /** Flags whether(=1) or not the page is present. */
+    uint32_t  u1Present : 1;
+    /** Read(=0) / Write(=1) flag. */
+    uint32_t  u1Write : 1;
+}
/** User(=1) / Supervisor (=0) flag. */
uint32_t u1User : 1;
/** Write Thru flag. If PAT enabled, bit 0 of the index. */
uint32_t u1WriteThru : 1;
/** Cache disabled flag. If PAT enabled, bit 1 of the index. */
uint32_t u1CacheDisable : 1;
/** Accessed flag. */
* Indicates that the page have been read or written to. */
uint32_t u1Accessed : 1;
/** Dirty flag. */
* Indicates that the page has been written to. */
uint32_t u1Dirty : 1;
/** Page size flag - always 1 for 4MB entries. */
uint32_t u1Size : 1;
/** Global flag. */
uint32_t u1Global : 1;
/** Available for use to system software. */
uint32_t u3Available : 3;
/** Reserved / If PAT enabled, bit 2 of the index. */
uint32_t u1PAT : 1;
/** Bits 32-39 of the page number on AMD64. */
* This AMD64 hack allows accessing 40bits of physical memory without PAE. */
uint32_t u8PageNoHigh : 8;
/** Reserved. */
uint32_t u1Reserved : 1;
/** Physical Page number of the page. */
uint32_t u10PageNo : 10;
} X86PDE4MBITS;
#ifndef VBOX_FOR_DTRACE_LIB
AssertCompileSize(X86PDE4MBITS, 4);
#endif
/** Pointer to a page table entry. */
typedef X86PDE4MBITS *PX86PDE4MBITS;
/** Pointer to a const page table entry. */
typedef const X86PDE4MBITS *PCX86PDE4MBITS;
/** 2MB PAE page directory entry. */
typedef struct X86PDE2MPAEBITS
{ /* Flags whether(=1) or not the page is present. */
    uint32_t u1Present : 1;
    /** Read(=0) / Write(=1) flag. */
    uint32_t u1Write : 1;
    /** User(1) / Supervisor(0) flag. */
    uint32_t u1User : 1;
} X86PDE2MPAEBITS;
+ /** Write Thru flag. If PAT enabled, bit 0 of the index. */
+  uint32_t u1WriteThru : 1;
+ /** Cache disabled flag. If PAT enabled, bit 1 of the index. */
+  uint32_t u1CacheDisable : 1;
+ /** Accessed flag. */
+  uint32_t u1Accessed : 1;
+ /** Dirty flag. */
+  uint32_t u1Dirty : 1;
+ /** Page size flag - always 1 for 2MB entries. */
+  uint32_t u1Size : 1;
+ /** Global flag. */
+  uint32_t u1Global : 1;
+ /** Available for use to system software. */
+  uint32_t u3Available : 3;
+ /** Reserved / If PAT enabled, bit 2 of the index. */
+  uint32_t u1PAT : 1;
+ /** Reserved. */
+  uint32_t u9Reserved : 9;
+ /** Physical Page number of the next level - Low part. Don't use! */
+  uint32_t u10PageNoLow : 10;
+ /** Physical Page number of the next level - High part. Don't use! */
+  uint32_t u20PageNoHigh : 20;
+ /** MBZ bits */
+  uint32_t u11Reserved : 11;
+ /** No Execute flag. */
+  uint32_t u1NoExecute : 1;
+ ] X86PDE2MPAEBITS;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PDE2MPAEBITS, 8);
+#endif
+/** Pointer to a 2MB PAE page table entry. */
+typedef X86PDE2MPAEBITS *PX86PDE2MPAEBITS;
+/** Pointer to a 2MB PAE page table entry. */
+typedef const X86PDE2MPAEBITS *PCX86PDE2MPAEBITS;
+
+ /** @} */
+
+ /** Page directory entry. */
+ */
+ typedef union X86PDE
+
+{[ 
+ /** Unsigned integer view. */
+  X86PGUINT u;
+ /** Normal view. */
+  X86PDEBITS n;
+ /** 4MB view (big). */
+ X86PDE4MBITS  b;
+ /** 8 bit unsigned integer view. */
+ uint8_t  au8[4];
+ /** 16 bit unsigned integer view. */
+ uint16_t au16[2];
+ /** 32 bit unsigned integer view. */
+ uint32_t au32[1];
+ } X86PDE;
+ ifndef VBOX_FOR_DTRACE_LIB
+ AssertCompileSize(X86PDE, 4);
+ #endif
+/** Pointer to a page directory entry. */
+typedef X86PDE *PX86PDE;
+/** Pointer to a const page directory entry. */
+typedef const X86PDE *PCX86PDE;
+
+/**
+ * PAE page directory entry.
+ */
+typedef union X86PDEPAE
+
+  /** Unsigned integer view. */
+  X86PGPAEUINT  u;
+  /** Normal view. */
+  X86PDEPAEBITS n;
+  /** 2MB page view (big). */
+  X86PDE2MPAEBITS b;
+  /** 8 bit unsigned integer view. */
+  uint8_t  au8[8];
+  /** 16 bit unsigned integer view. */
+  uint16_t au16[4];
+  /** 32 bit unsigned integer view. */
+  uint32_t au32[2];
+ } X86PDEPAE;
+ ifndef VBOX_FOR_DTRACE_LIB
+ AssertCompileSize(X86PDEPAE, 8);
+ #endif
+/** Pointer to a page directory entry. */
+typedef X86PDEPAE *PX86PDEPAE;
+/** Pointer to a const page directory entry. */
+typedef const X86PDEPAE *PCX86PDEPAE;
+
+/**
+ * Page directory.
+ */
+typedef struct X86PD
+
+ /** PDE Array. */
+ X86PDE    a[X86_PG_ENTRIES];
+ } X86PD;
+ #ifndef VBOX_FOR_DTRACE_LIB
+ AssertCompileSize(X86PD, 4096);
+ #endif
+ /** Pointer to a page directory. */
+ typedef X86PD *PX86PD;
+ /** Pointer to a const page directory. */
+ typedef const X86PD *PCX86PD;
+
+ /** The page shift to get the PD index. */
+ #define X86_PD_SHIFT                        22
+ /** The PD index mask (apply to a shifted page address). */
+ #define X86_PD_MASK                         0x3ff
+
+ /**
+ * PAE page directory.
+ */
+ typedef struct X86PDPAE
+ {
+     /** PDE Array. */
+     X86PDEPAE   a[X86_PG_PAE_ENTRIES];
+ } X86PDPAE;
+ #ifndef VBOX_FOR_DTRACE_LIB
+ AssertCompileSize(X86PDPAE, 4096);
+ #endif
+ /** Pointer to a PAE page directory. */
+ typedef X86PDPAE *PX86PDPAE;
+ /** Pointer to a const PAE page directory. */
+ typedef const X86PDPAE *PCX86PDPAE;
+
+ /** The page shift to get the PAE PD index. */
+ #define X86_PD_PAE_SHIFT                    21
+ /** The PAE PD index mask (apply to a shifted page address). */
+ #define X86_PD_PAE_MASK                     0x1ff
+
+ /** @name Page Directory Pointer Table Entry (PAE)
+ * @} */
+ */
+ /** Bit 0 - P - Present bit. */
+ #define X86_PDPE_P                          RT_BIT_32(0)
+ /** Bit 1 - R/W - Read (clear) / Write (set) bit. Long Mode only. */
+ #define X86_PDPE_RW                         RT_BIT_32(1)
+ /** Bit 2 - U/S - User (set) / Supervisor (clear) bit. Long Mode only. */
+ #define X86_PDPE_US                         RT_BIT_32(2)
/* Bit 3 - PWT - Page level write thru bit. */
#define X86_PDPE_PWT RT_BIT_32(3)
/* Bit 4 - PCD - Page level cache disable bit. */
#define X86_PDPE_PCD RT_BIT_32(4)
/* Bit 5 - A - Access bit. Long Mode only. */
#define X86_PDPE_A RT_BIT_32(5)
/* Bit 7 - PS - Page size (1GB). Long Mode only. */
#define X86_PDPE_LM_PS RT_BIT_32(7)
/* Bits 9-11 - Available for use to system software. */
#define X86_PDPE_AVL_MASK (RT_BIT_32(9) | RT_BIT_32(10) | RT_BIT_32(11))
/* Bits 12-51 - PAE - Physical Page number of the next level. */
#define X86_PDPE_PG_MASK UINT64_C(0x0000000000000000)
/* Bits 63-52, 8-5, 2-1 - PAE - MBZ bits (NX is long mode only). */
#define X86_PDPE_PAE_MBZ_MASK UINT64_C(0xffffffff00000001)
/* Bits 63 - NX - LM - No execution flag. Long Mode only. */
#define X86_PDPE_LM_NX RT_BIT_64(63)
/* Bits 8, 7 - LM - MBZ bits when NX is active. */
#define X86_PDPE_LM_MBZ_MASK_NX UINT64_C(0x0000000000000180)
/* Bits 63, 8, 7 - LM - MBZ bits when no NX. */
#define X86_PDPE_LM_MBZ_MASK_NO_NX UINT64_C(0x8000000000000180)
/* Bits 29-13 - LM - MBZ bits for 1GB page entry when NX is active. */
#define X86_PDPE1G_LM_MBZ_MASK_NX UINT64_C(0x00000003fffe000)
/* Bits 63, 29-13 - LM - MBZ bits for 1GB page entry when no NX. */
#define X86_PDPE1G_LM_MBZ_MASK_NO_NX UINT64_C(0x80000003fffe000)

/* Page directory pointer table entry. */
typedef struct X86PDPEBITS
{
    /* Flags whether(=1) or not the page is present. */
    uint32_t u1Present : 1;
    /* Chunk of reserved bits. */
    uint32_t u2Reserved : 2;
    /* Write Thru flag. If PAT enabled, bit 0 of the index. */
    uint32_t u1WriteThru : 1;
    /* Cache disabled flag. If PAT enabled, bit 1 of the index. */
    uint32_t u1CacheDisable : 1;
    /* Chunk of reserved bits. */
    uint32_t u4Reserved : 4;
    /* Available for use to system software. */
    uint32_t u3Available : 3;
    /* Physical Page number of the next level - Low Part. Don't use! */
    uint32_t u20PageNoLow : 20;
    /* Physical Page number of the next level - High Part. Don't use! */
    uint32_t u20PageNoHigh : 20;
    /* MBZ bits */
}
+ uint32_t u12Reserved : 12;
+} X86PDPEBITS;
+#ifndef VBOX_FOR_DTRACE_LIB
+#AssertCompileSize(X86PDPEBITS, 8);
+#endif
+/** Pointer to a page directory pointer table entry. */
+typedef X86PDPEBITS *PX86PTPEBITS;
+/** Pointer to a const page directory pointer table entry. */
+typedef const X86PDPEBITS *PCX86PTPEBITS;
+
+/**
+ * Page directory pointer table entry. AMD64 version
+ */
+typedef struct X86PDPEAMD64BITS
+
+{
+    /** Flags whether(=1) or not the page is present. */
+    uint32_t u1Present : 1;
+    /** Read(=0) / Write(=1) flag. */
+    uint32_t u1Write : 1;
+    /** User(=1) / Supervisor (=0) flag. */
+    uint32_t u1User : 1;
+    /** Write Thru flag. If PAT enabled, bit 0 of the index. */
+    uint32_t u1WriteThru : 1;
+    /** Cache disabled flag. If PAT enabled, bit 1 of the index. */
+    uint32_t u1CacheDisable : 1;
+    /** Accessed flag. */
+    * Indicates that the page have been read or written to. */
+    uint32_t u1Accessed : 1;
+    /** Chunk of reserved bits. */
+    uint32_t u3Reserved : 3;
+    /** Available for use to system software. */
+    uint32_t u3Available : 3;
+    /** Physical Page number of the next level - Low Part. Don't use! */
+    uint32_t u20PageNoLow : 20;
+    /** Physical Page number of the next level - High Part. Don't use! */
+    uint32_t u20PageNoHigh : 20;
+    /** MBZ bits */
+    uint32_t u11Reserved : 11;
+    /** No Execute flag. */
+    uint32_t u1NoExecute : 1;
+} X86PDPEAMD64BITS;
+#ifndef VBOX_FOR_DTRACE_LIB
+#AssertCompileSize(X86PDPEAMD64BITS, 8);
+#endif
+/** Pointer to a page directory pointer table entry. */
+typedef X86PDPEAMD64BITS *PX86PDPEAMD64BITS;
+/** Pointer to a const page directory pointer table entry. */
+typedef const X86PDPEAMD64BITS *PCX86PDPEAMD64BITS;
/*
 * Page directory pointer table entry for 1GB page. (AMD64 only)
 */
typedef struct X86PDPE1GB
{
    /** 0: Flags whether(=1) or not the page is present. */
    uint32_t u1Present : 1;
    /** 1: Read(=0) / Write(=1) flag. */
    uint32_t u1Write : 1;
    /** 2: User(=1) / Supervisor (=0) flag. */
    uint32_t u1User : 1;
    /** 3: Write Thru flag. If PAT enabled, bit 0 of the index. */
    uint32_t u1WriteThru : 1;
    /** 4: Cache disabled flag. If PAT enabled, bit 1 of the index. */
    uint32_t u1CacheDisable : 1;
    /** 5: Accessed flag. */
    uint32_t u1Accessed : 1;
    /** 6: Dirty flag for 1GB pages. */
    uint32_t u1Dirty : 1;
    /** 7: Indicates 1GB page if set. */
    uint32_t u1Size : 1;
    /** 8: Global 1GB page. */
    uint32_t u1Global: 1;
    /** 9-11: Available for use to system software. */
    uint32_t u3Available : 3;
    /** 12: PAT bit for 1GB page. */
    uint32_t u1PAT : 1;
    /** 13-29: MBZ bits. */
    uint32_t u17Reserved : 17;
    /** 30-31: Physical page number - Low Part. Don't use! */
    uint32_t u2PageNoLow : 2;
    /** 32-51: Physical Page number of the next level - High Part. Don't use! */
    uint32_t u20PageNoHigh : 20;
    /** 52-62: MBZ bits */
    uint32_t u11Reserved : 11;
    /** 63: No Execute flag. */
    uint32_t u1NoExecute : 1;
} X86PDPE1GB;
#endif
/** Pointer to a page directory pointer table entry for a 1GB page. */
typedef X86PDPE1GB *PX86PDPE1GB;
/** Pointer to a const page directory pointer table entry for a 1GB page. */
typedef const X86PDPE1GB *PCX86PDPE1GB;
/**
 * Page directory pointer table entry.
 */
typedef union X86PDPE
{
    /** Unsigned integer view. */
    X86PGPAEUINT u;
    /** Normal view. */
    X86PDPEBITS n;
    /** AMD64 view. */
    X86PDPEAMD64BITs lm;
    /** AMD64 big view. */
    X86PDPE1GB b;
    /** 8 bit unsigned integer view. */
    uint8_t au8[8];
    /** 16 bit unsigned integer view. */
    uint16_t au16[4];
    /** 32 bit unsigned integer view. */
    uint32_t au32[2];
} X86PDPE;

#ifndef VBOX_FOR_DTRACE_LIB
AssertCompileSize(X86PDPE, 8);
#endif

/** Pointer to a page directory pointer table entry. */
typedef X86PDPE *PX86PDPE;

/** Pointer to a const page directory pointer table entry. */
typedef const X86PDPE *PCX86PDPE;

/** The page shift to get the PDPT index. */
#define X86_PDPT_SHIFT             30
/** The PDPT index mask (apply to a shifted page address). (32 bits PAE) */
+#define X86_PDPT_MASK_PAE 0x3
+/** The PDPT index mask (apply to a shifted page address). (64 bits PAE)/
+#define X86_PDPT_MASK_AMD64 0x1ff
+
+/** @} */
+
+/** @} */
+/** Page Map Level-4 Entry (Long Mode PAE) */
+* @{
+ /**<*/
+/** Bit 0 - P - Present bit. */
+#define X86_PML4E_P RT_BIT_32(0)
+ /**<*/
+/** Bit 1 - R/W - Read (clear) / Write (set) bit. */
+#define X86_PML4E_RW RT_BIT_32(1)
+ /**<*/
+/** Bit 2 - U/S - User (set) / Supervisor (clear) bit. */
+#define X86_PML4E_US RT_BIT_32(2)
+ /**<*/
+/** Bit 3 - PWT - Page level write thru bit. */
+#define X86_PML4E_PWT RT_BIT_32(3)
+ /**<*/
+/** Bit 4 - PCD - Page level cache disable bit. */
+#define X86_PML4E_PCD RT_BIT_32(4)
+ /**<*/
+/** Bit 5 - A - Access bit. */
+#define X86_PML4E_A RT_BIT_32(5)
+ /**<*/
+/** Bits 9-11 - Available for use to system software. */
+#define X86_PML4E_AVL_MASK (RT_BIT_32(9) | RT_BIT_32(10) | RT_BIT_32(11))
+ /**<*/
+/** Bits 12-51 - PAE - Physical Page number of the next level. */
+#define X86_PML4E_PG_MASK UINT64_C(0x000ffffffffff000)
+ /**<*/
+/** Bits 8, 7 - MBZ bits when NX is active. */
+#define X86_PML4E_MBZ_MASK_NX UINT64_C(0x0000000000000000)
+ /**<*/
+/** Bits 63, 7 - MBZ bits when no NX. */
+#define X86_PML4E_MBZ_MASK_NO_NX UINT64_C(0x8000000000000000)
+ /**<*/
+/** Bits 63 - NX - PAE - No execution flag. */
+#define X86_PML4E_NX RT_BIT_64(63)
+
+
+/**
+ * Page Map Level-4 Entry
+ */
+
typedef struct X86PML4EBITS
+
+{
+ /**<*/
+ /**< Flags whether(=1) or not the page is present. */
+ uint32_t u1Present : 1;
+ /**<*/
+ /**< Read(=0) / Write(=1) flag. */
+ uint32_t u1Write : 1;
+ /**<*/
+ /**< User(=1) / Supervisor (=0) flag. */
+ uint32_t u1User : 1;
+ /**<*/
+ /**< Write Thru flag. If PAT enabled, bit 0 of the index. */
+ uint32_t u1WriteThru : 1;
+ /**<*/
+ /**< Cache disabled flag. If PAT enabled, bit 1 of the index. */
+ uint32_t u1CacheDisable : 1;
+}
/** Accessed flag. */
+ uint32_t u1Accessed : 1;
/** Chunk of reserved bits. */
+ uint32_t u3Reserved : 3;
/** Available for use to system software. */
+ uint32_t u3Available : 3;
/** Physical Page number of the next level - Low Part. Don't use! */
+ uint32_t u20PageNoLow : 20;
/** Physical Page number of the next level - High Part. Don't use! */
+ uint32_t u20PageNoHigh : 20;
/** MBZ bits */
+ uint32_t u11Reserved : 11;
/** No Execute flag. */
+ uint32_t u1NoExecute : 1;
} X86PML4EBITS;
#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PML4EBITS, 8);
#endif
/** Pointer to a page map level-4 entry. */
typedef X86PML4EBITS *PX86PML4EBITS;
/** Pointer to a const page map level-4 entry. */
typedef const X86PML4EBITS *PCX86PML4EBITS;
+
/**
 * Page Map Level-4 Entry.
 */
typedef union X86PML4E
+
+ /** Unsigned integer view. */
+ X86PGPAEUINT u;
+ /** Normal view. */
+ X86PML4EBITS n;
+ /** 8 bit unsigned integer view. */
+ uint8_t au8[8];
+ /** 16 bit unsigned integer view. */
+ uint16_t au16[4];
+ /** 32 bit unsigned integer view. */
+ uint32_t au32[2];
} X86PML4E;
#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86PML4E, 8);
#endif
/** Pointer to a page map level-4 entry. */
typedef X86PML4E *PX86PML4E;
/** Pointer to a const page map level-4 entry. */
typedef const X86PML4E *PCX86PML4E;
+
/**
 * Page Map Level-4.
 */
typedef struct X86PML4 {
    /** PDE Array. */
    X86PML4E a[X86_PG_PAE_ENTRIES];
} X86PML4;

#ifndef VBOX_FOR_DTRACE_LIB
AssertCompileSize(X86PML4, 4096);
#endif
/** Pointer to a page map level-4. */
typedef X86PML4 *PX86PML4;
/** Pointer to a const page map level-4. */
typedef const X86PML4 *PCX86PML4;

/**
 * The page shift to get the PML4 index.
 */
#define X86_PML4_SHIFT 39
/** The PML4 index mask (apply to a shifted page address). */
#define X86_PML4_MASK 0x1ff

/** @} */
/** @} */

/**
 * Intel PCID invalidation types.
 */
/**
 * Individual address invalidation.
 */
#define X86_INVPCID_TYPE_INDV_ADDR 0
/** Single-context invalidation. */
#define X86_INVPCID_TYPE_SINGLE_CONTEXT 1
/** All-context including globals invalidation. */
#define X86_INVPCID_TYPE_ALL_CONTEXT_INCL_GLOBAL 2
/** All-context excluding globals invalidation. */
#define X86_INVPCID_TYPE_ALLCONTEXT_EXCL_GLOBAL 3
/** The maximum valid invalidation type value. */
#define X86_INVPCID_TYPE_MAX_VALID X86_INVPCID_TYPE_ALL_CONTEXT_EXCL_GLOBAL

/** 32-bit protected mode FSTENV image. */
typedef struct X86FSTENV32P {
    uint16_t FCW;
    uint16_t padding1;
typedef struct X86FSTENV32P {
    uint16_t FSW;
    uint16_t padding2;
    uint16_t FTW;
    uint16_t padding3;
    uint32_t FPUIP;
    uint16_t FPUCS;
    uint16_t FOP;
    uint32_t FPUDP;
    uint16_t FPUDS;
    uint16_t padding4;
} X86FSTENV32P;

/** Pointer to a 32-bit protected mode FSTENV image. */
typedef X86FSTENV32P *PX86FSTENV32P;

/** Pointer to a const 32-bit protected mode FSTENV image. */
typedef X86FSTENV32P const *PCX86FSTENV32P;

/** 80-bit MMX/FPU register type. */
typedef struct X86FPUMMX {
    uint8_t reg[10];
} X86FPUMMX;

#ifndef VBOX_FOR_DTRACE_LIB
AssertCompileSize(X86FPUMMX, 10);
#endif

/** Pointer to a 80-bit MMX/FPU register type. */
typedef X86FPUMMX *PX86FPUMMX;

/** Pointer to a const 80-bit MMX/FPU register type. */
typedef const X86FPUMMX *PCX86FPUMMX;

/** FPU (x87) register. */
typedef union X86FPUREG {
    /** MMX view. */
    uint64_t mmx;
    /** FPU view - todo. */
    X86FPUMMX fpu;
    /** Extended precision floating point view. */
    RTFLOAT80U r80;
    /** Extended precision floating point view v2 */
    RTFLOAT80U2 r80Ex;
    /** 8-bit view. */
    uint8_t    au8[16];
    /** 16-bit view. */
    uint16_t   au16[8];
    /** 32-bit view. */
} X86FPUREG;
+ uint8_t  au8[32];
+ /** 16-bit view. */
+ uint16_t  au16[16];
+ /** 32-bit view. */
+ uint32_t  au32[8];
+ /** 64-bit view. */
+ uint64_t  au64[4];
+ /** 128-bit view. (yeah, very helpful) */
+ uint128_t au128[2];
+ /** XMM sub register view. */
+ X86XMMREG aXmm[2];
+ } X86YMMREG;
+/*ifndef VBOX_FOR_DTRACE_LIB
+ * Pointer to an YMM register state. */
+typedef X86YMMREG *PX86YMMREG;
+/** Pointer to a const YMM register state. */
+typedef X86YMMREG const *PCX86YMMREG;
+ +
+/**
+ * ZMM register union.
+ */
+typedef union X86ZMMREG
+{+
+ /** 8-bit view. */
+ uint8_t  au8[64];
+ /** 16-bit view. */
+ uint16_t  au16[32];
+ /** 32-bit view. */
+ uint32_t  au32[16];
+ /** 64-bit view. */
+ uint64_t  au64[8];
+ /** 128-bit view. (yeah, very helpful) */
+ uint128_t au128[4];
+ /** XMM sub register view. */
+ X86XMMREG aXmm[4];
+ /** YMM sub register view. */
+ X86YMMREG aYmm[2];
+ } X86ZMMREG;
+/*ifndef VBOX_FOR_DTRACE_LIB
+ * Pointer to an ZMM register state. */
+typedef X86ZMMREG *PX86ZMMREG;
+/** Pointer to a const ZMM register state. */
+typedef X86ZMMREG const *PCX86ZMMREG;
+ +
+/**
+ * 32-bit FPU state (aka FSAVE/FRSTOR Memory Region).
+ * @todo verify this...
+ */
+#pragma pack(1)
+typedef struct X86FPUSTATE
+{
+  /** 0x00 - Control word. */
+  uint16_t FCW;
+  /** 0x02 - Alignment word */
+  uint16_t Dummy1;
+  /** 0x04 - Status word. */
+  uint16_t FSW;
+  /** 0x06 - Alignment word */
+  uint16_t Dummy2;
+  /** 0x08 - Tag word */
+  uint16_t FTW;
+  /** 0x0a - Alignment word */
+  uint16_t Dummy3;
+  /** 0x0c - Instruction pointer. */
+  uint32_t FPUIP;
+  /** 0x10 - Code selector. */
+  uint16_t CS;
+  /** 0x12 - Opcode. */
+  uint16_t FOP;
+  /** 0x14 - FOO. */
+  uint32_t FPUOO;
+  /** 0x18 - FOS. */
+  uint32_t FPUOS;
+  /** 0x1c - FPU register. */
+  X86FPUREG regs[8];
+} X86FPUSTATE;
+#pragma pack()
+/** Pointer to a FPU state. */
+typedef X86FPUSTATE *PX86FPUSTATE;
+/** Pointer to a const FPU state. */
+typedef const X86FPUSTATE *PCX86FPUSTATE;
+
+/**
+ * FPU Extended state (aka FXSAVE/FXRSTORE Memory Region).
+ */
+#pragma pack(1)
+typedef struct X86FXSTATE
+{
+  /** 0x00 - Control word. */
+  uint16_t FCW;
+ /** 0x02 - Status word. */
+ uint16_t FSW;
+ /** 0x04 - Tag word. (The upper byte is always zero.) */
+ uint16_t FTW;
+ /** 0x06 - Opcode. */
+ uint16_t FOP;
+ /** 0x08 - Instruction pointer. */
+ uint32_t FPUIP;
+ /** 0x0c - Code selector. */
+ uint16_t CS;
+ /** 0x04 - Data pointer. */
+ uint16_t RSrvd1;
+ /** 0x10 - Data segment */
+ uint16_t DS;
+ /** 0x14 - Data segment */
+ uint32_t FPUDP;
+ /** 0x18 - Data segment */
+ uint32_t DS;
+ /** 0x1e */
+ uint16_t RSrvd2;
+ /** 0x20 - FPU registers. */
+ X86FPUREG aRegs[8];
+ /** 0xA0 - XMM registers - 8 registers in 32 bits mode, 16 in long mode. */
+ X86XMMREG aXMM[16];
+ /* - offset 416 */
+ uint32_t au32RsrvdRest[(464 - 416) / sizeof(uint32_t)];
+ /* - offset 464 - Software usable reserved bits. */
+ uint32_t au32RsrvdForSoftware[(512 - 464) / sizeof(uint32_t)];
+ } X86FXSTATE;
+
+ #pragma pack()
+ /** Pointer to a FPU Extended state. */
typedef X86FXSTATE *PX86FXSTATE;
+ /** Pointer to a const FPU Extended state. */
typedef const X86FXSTATE *PCX86FXSTATE;
+
+ /** Offset for software usable reserved bits (464:511) where we store a 32-bit magic. Don't forget to update x86.mac if you change this! */
+ #define X86_OFF FXSTATE_RSVD 0x1d0
+ /** The 32-bit magic used to recognize if this a 32-bit FPU state. Don't forget to update x86.mac if you change this! */
+ #define X86 FXSTATE_RSVD_32BIT_MAGIC 0x32b3232b
+ ifndef VBOX_FOR_DTRACE_LIB
+ #assertCompileSize(X86FXSTATE, 512);
+ #assertCompileMemberOffset(X86FXSTATE, au32RsrvdForSoftware, X86_OFF FXSTATE_RSVD);
+ #endif
+ +
+/** @name FPU status word flags. *
+ * @{ */
+/** Exception Flag: Invalid operation. */
+#define X86_FSW_IE RT_BIT_32(0)
+/** Exception Flag: Denormalized operand. */
+#define X86_FSW_DE RT_BIT_32(1)
+/** Exception Flag: Zero divide. */
+#define X86_FSW_ZE RT_BIT_32(2)
+/** Exception Flag: Overflow. */
+#define X86_FSW_OE RT_BIT_32(3)
+/** Exception Flag: Underflow. */
+#define X86_FSW_UE RT_BIT_32(4)
+/** Exception Flag: Precision. */
+#define X86_FSW_PE RT_BIT_32(5)
+/** Stack fault. */
+#define X86_FSW_SF RT_BIT_32(6)
+/** Error summary status. */
+#define X86_FSW_ES RT_BIT_32(7)
+/** Mask of exceptions flags, excluding the summary bit. */
+#define X86_FSW_XCPT_MASK UINT16_C(0x007f)
+/** Mask of exceptions flags, including the summary bit. */
+#define X86_FSW_XCPT_ES_MASK UINT16_C(0x00ff)
+/** Condition code 0. */
+#define X86_FSW_C0 RT_BIT_32(8)
+/** Condition code 1. */
+#define X86_FSW_C1 RT_BIT_32(9)
+/** Condition code 2. */
+#define X86_FSW_C2 RT_BIT_32(10)
+/** Top of the stack mask. */
+#define X86_FSW_TOP_MASK UINT16_C(0x3800)
+/** TOP shift value. */
+#define X86_FSW_TOP_SHIFT 11
+/** Mask for getting TOP value after shifting it right. */
+#define X86_FSW_TOP_SMASK UINT16_C(0x0007)
+/** Get the TOP value. */
+#define X86_FSW_TOP_GET(a_uFsw) (((a_uFsw) >> X86_FSW_TOP_SHIFT) & X86_FSW_TOP_SMASK)
+/** Condition code 3. */
+#define X86_FSW_C3 RT_BIT_32(14)
+/** Mask of exceptions flags, including the summary bit. */
+#define X86_FSW_C_MASK UINT16_C(0x4700)
+/** FPU busy. */
+#define X86_FSW_B RT_BIT_32(15)
+/** @ } */
+
+
+/** @name FPU control word flags. *
+ * @{ */
+/** Exception Mask: Invalid operation. */
#define X86_FCW_IM   RT_BIT_32(0)
/** Exception Mask: Denormalized operand. */
#define X86_FCW_DM   RT_BIT_32(1)
/** Exception Mask: Zero divide. */
#define X86_FCW_ZM   RT_BIT_32(2)
/** Exception Mask: Overflow. */
#define X86_FCW_OM   RT_BIT_32(3)
/** Exception Mask: Underflow. */
#define X86_FCW_UM   RT_BIT_32(4)
/** Exception Mask: Precision. */
#define X86_FCW_PM   RT_BIT_32(5)
/** Mask all exceptions, the value typically loaded (by for instance fninit).
+ * @remarks This includes reserved bit 6. */
#define X86_FCW_MASK_ALL  UINT16_C(0x007f)
/** Mask all exceptions. Same as X86_FSW_XCPT_MASK. */
#define X86_FCW_XCPT_MASK  UINT16_C(0x003f)
/** Precision control mask. */
#define X86_FCW_PC_MASK   UINT16_C(0x0300)
/** Precision control: 24-bit. */
#define X86_FCW_PC_24  UINT16_C(0x0000)
/** Precision control: Reserved. */
#define X86_FCW_PC_RSVD  UINT16_C(0x0100)
/** Precision control: 53-bit. */
#define X86_FCW_PC_53  UINT16_C(0x0200)
/** Precision control: 64-bit. */
#define X86_FCW_PC_64  UINT16_C(0x0300)
/** Rounding control mask. */
#define X86_FCW_RC_MASK  UINT16_C(0x0c00)
/** Rounding control: To nearest. */
#define X86_FCW_RC_NEAREST  UINT16_C(0x0000)
/** Rounding control: Down. */
#define X86_FCW_RC_DOWN  UINT16_C(0x0400)
/** Rounding control: Up. */
#define X86_FCW_RC_UP  UINT16_C(0x0800)
/** Rounding control: Towards zero. */
#define X86_FCW_RC_ZERO  UINT16_C(0x0c00)
/** Bits which should be zero, apparently. */
#define X86_FCW_ZERO_MASK  UINT16_C(0xf080)
/** @} */

/** @name SSE MXCSR */
/** Exception Flag: Invalid operation. */
#define X86_MXCSR_IE  RT_BIT_32(0)
/** Exception Flag: Denormalized operand. */
#define X86_MXCSR_DE  RT_BIT_32(1)
/** Exception Flag: Zero divide. */
#define X86_MXCSR_ZE  RT_BIT_32(2)
/** Exception Flag: Overflow. */
#define X86_MXCSR_OE RT_BIT_32(3)

/** Exception Flag: Underflow. */
#define X86_MXCSR_UE RT_BIT_32(4)

/** Exception Flag: Precision. */
#define X86_MXCSR_PE RT_BIT_32(5)
+
/** Denormals are zero. */
#define X86_MXCSR_DAZ RT_BIT_32(6)
+
/** Exception Mask: Invalid operation. */
#define X86_MXCSR_IM RT_BIT_32(7)

/** Exception Mask: Denormalized operand. */
#define X86_MXCSR_DM RT_BIT_32(8)

/** Exception Mask: Zero divide. */
#define X86_MXCSR_ZM RT_BIT_32(9)

/** Exception Mask: Overflow. */
#define X86_MXCSR_OM RT_BIT_32(10)

/** Exception Mask: Underflow. */
#define X86_MXCSR_UM RT_BIT_32(11)

/** Exception Mask: Precision. */
#define X86_MXCSR_PM RT_BIT_32(12)
+
/** Rounding control mask. */
#define X86_MXCSR_RC_MASK UINT16_C(0x6000)

/** Rounding control: To nearest. */
#define X86_MXCSR_RC_NEAREST UINT16_C(0x0000)

/** Rounding control: Down. */
#define X86_MXCSR_RC_DOWN UINT16_C(0x2000)

/** Rounding control: Up. */
#define X86_MXCSR_RC_UP UINT16_C(0x4000)

/** Rounding control: Towards zero. */
#define X86_MXCSR_RC_ZERO UINT16_C(0x6000)
+
/** Flush-to-zero for masked underflow. */
#define X86_MXCSR_FZ RT_BIT_32(15)
+
/** Misaligned Exception Mask (AMD MISALIGNSSE). */
#define X86_MXCSR_MM RT_BIT_32(17)
+/** @} */
+
/**
 * XSAVE header.
 */
typedef struct X86XSAVEHDR
{
    /** XTATE_BV - Bitmap indicating whether a component is in the state. */
    uint64_t        bmXState;
};
+ /** XCOMP_BC - Bitmap used by instructions applying structure compaction. */
+     uint64_t        bmXComp;
+ /** Reserved for furture extensions, probably MBZ. */
+     uint64_t        au64Reserved[6];
+ } X86XSAVEHDR;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86XSAVEHDR, 64);
+#endif
+/** Pointer to an XSAVE header. */
typedef X86XSAVEHDR *PX86XSAVEHDR;
+/** Pointer to a const XSAVE header. */
typedef X86XSAVEHDR const *PCX86XSAVEHDR;
+
+/**
+ * The high 128-bit YMM register state (XSAVE_C_YMM).
+ * (The lower 128-bits being in X86FXSTATE.)
+ */
typedef struct X86XSAVEYMMHI
+
+ {  /**< 16 registers in 64-bit mode, 8 in 32-bit mode. */
+     X86XMMREG        aYmmHi[16];
+ } X86XSAVEYMMHI;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86XSAVEYMMHI, 256);
+#endif
+/** Pointer to a high 128-bit YMM register state. */
typedef X86XSAVEYMMHI *PX86XSAVEYMMHI;
+/** Pointer to a const high 128-bit YMM register state. */
typedef X86XSAVEYMMHI const *PCX86XSAVEYMMHI;
+
+/**
+ * Intel MPX bound registers state (XSAVE_C_BNDREGS).
+ */
typedef struct X86XSAVEBNDREGS
+
+ { /**< Array of registers (BND0...BND3). */
+     struct
+     {  /**< Lower bound. */
+         uint64_t        uLowerBound;
+     /**< Upper bound. */
+         uint64_t        uUpperBound;
+     } aRegs[4];
+ } X86XSAVEBNDREGS;
+#ifndef VBOX_FOR_DTRACE_LIB
+AssertCompileSize(X86XSAVEBNDREGS, 64);
+#endif
/* Pointer to a MPX bound register state. */
typedef X86XSAVEBNDREGS *PX86XSAVEBNDREGS;

/* Pointer to a const MPX bound register state. */
typedef X86XSAVEBNDREGS const *PCX86XSAVEBNDREGS;

+/** Pointer to a MPX bound register state (XSAVE_C_BNDCSR). */
+ */
typedef struct X86XSAVEBNDCFG
+
+   uint64_t fConfig;
+   uint64_t fStatus;
+ } X86XSAVEBNDCFG;
#endif

+/** Pointer to a const MPX bound config and status register state. */
+ */
typedef X86XSAVEBNDCFG *PX86XSAVEBNDCFG;
+/** Pointer to a const MPX bound config and status register state. */
+ typedef X86XSAVEBNDCFG *PCX86XSAVEBNDCFG;

+/** AVX-512 opmask state (XSAVE_C_OPMASK). */
+ */
typedef struct X86XSAVEOPMASK
+
+   /** The K0..K7 values. */
+   uint64_t aKRegs[8];
+ } X86XSAVEOPMASK;
#endif

+/** Pointer to a AVX-512 opmask state. */
+ */
typedef X86XSAVEOPMASK *PX86XSAVEOPMASK;
+/** Pointer to a const AVX-512 opmask state. */
+ typedef X86XSAVEOPMASK const *PCX86XSAVEOPMASK;

+/**
+ * ZMM0-15 upper 256 bits introduced in AVX-512 (XSAVE_C_ZMM_HI256).
+ */
typedef struct X86XSAVEZMMHI256
+
+   /** Upper 256-bits of ZMM0-15. */
+   X86YMMREG aHi256Regs[16];
+ } X86XSAVEZMMHI256;
#endif

+AssertCompileSize(X86XSAVEZMMHI256, 512);

#endif
/** Pointer to a state comprising the upper 256-bits of ZMM0-15. */
typedef X86XSAVEZMMHI256 *PX86XSAVEZMMHI256;

/** Pointer to a const state comprising the upper 256-bits of ZMM0-15. */
typedef X86XSAVEZMMHI256 const *PCX86XSAVEZMMHI256;

/** Pointer to a state comprising ZMM16-32. */
typedef X86XSAVEZMM16HI *PX86XSAVEZMM16HI;

/** Pointer to a const state comprising ZMM16-32. */
typedef X86XSAVEZMM16HI const *PCX86XSAVEZMM16HI;

/** Pointer to a state comprising ZMM16-31 register state introduced in AVX-512 (XSAVE_C_ZMM_16HI). */
typedef struct X86XSAVEZMM16HI
{
    /** ZMM16 thru ZMM31. */
    X86ZMMREG aRegs[16];
} X86XSAVEZMM16HI;

#ifndef VBOX_FOR_DTRACE_LIB
AssertCompileSize(X86XSAVEZMM16HI, 1024);
#endif

/** Pointer to a state comprising ZMM16-32. */
typedef X86XSAVEZMM16HI *PX86XSAVEZMM16HI;

/** Pointer to a const state comprising ZMM16-32. */
typedef X86XSAVEZMM16HI const *PCX86XSAVEZMM16HI;

/** AMD Light weight profiling state (XSAVE_C_LWP). */

/** We probably won't play with this as AMD seems to be dropping from their "zen" processor micro architecture. */
typedef struct X86XSAVELWP
{
    /** Details when needed. */
    uint64_t auLater[128/8];
} X86XSAVELWP;

#ifndef VBOX_FOR_DTRACE_LIB
AssertCompileSize(X86XSAVELWP, 128);
#endif

/** x86 FPU/SSE/AVX/XXXX state. */

/** Please bump DBGFCORE_FMT_VERSION by 1 in dbgcorefmt.h if you make any changes to this structure. */
typedef struct X86XSAVEAREA
{
    /** The x87 and SSE region (or legacy region if you like). */
    X86FXSTATE x87;
    /** The XSAVE header. */
+ X86XSAVEHDR  Hdr;
+ /* Beyond the header, there isn’t really a fixed layout, but we can
+ generally assume the YMM (AVX) register extensions are present and
+ follows immediately. */
+ union
+ {
+     /** The high 128-bit AVX registers for easy access by IEM.
+     * @note This ASSUMES they will always be here... */
+     X86XSAVEYMMHI YmmHi;
+
+     /** This is a typical layout on intel CPUs (good for debuggers). */
+     struct
+     {
+         X86XSAVEYMMHI YmmHi;
+         X86XSAVEBNDREGS BndRegs;
+         X86XSAVEBNDCFG BndCfg;
+         uint8_t abFudgeToMatchDocs[0xB0];
+         X86XSAVEOPMASK Opmask;
+         X86XSAVEZMMHI256 ZmmHi256;
+         X86XSAVEZMM16HI Zmm16Hi;
+     } Intel;
+
+     /** This is a typical layout on AMD Bulldozer type CPUs (good for debuggers). */
+     struct
+     {
+         X86XSAVEYMMHI YmmHi;
+         X86XSAVELWP Lwp;
+     } AmdBd;
+
+     /** To enabling static deployments that have a reasonable chance of working for
+     * the next 3-6 CPU generations without running short on space, we allocate a
+     * lot of extra space here, making the structure a round 8KB in size. This
+     * leaves us 7616 bytes for extended state. The skylake xeons are likely to use
+     * 2112 of these, leaving us with 5504 bytes for future Intel generations. */
+     uint8_t ab[8192 - 512 - 64];
+ } u;
+} X86XSAVEAREA;
+
+ifndef VBOX_FOR_DTRACE_LIB
+    +AssertCompileSize(X86XSAVEAREA, 8192);
+    +AssertCompileMemberSize(X86XSAVEAREA, u.Intel, 0x840 /*2112 => total 0xa80 (2688) */);
+    +AssertCompileMemberOffset(X86XSAVEAREA, Hdr,
+             0x200);
+    +AssertCompileMemberOffset(X86XSAVEAREA, u.Intel.YmmHi,
+             0x240);
+    +AssertCompileMemberOffset(X86XSAVEAREA, u.Intel.BndRegs,
+             0x340);
+    +AssertCompileMemberOffset(X86XSAVEAREA, u.Intel.BndCfg,
+             0x380);
+    +AssertCompileMemberOffset(X86XSAVEAREA, u.Intel.Opmask,
+             0x440 /* 1088 */);
+    +AssertCompileMemberOffset(X86XSAVEAREA, u.Intel.ZmmHi256,
+             0x480 /* 1152 */);
+    +AssertCompileMemberOffset(X86XSAVEAREA, u.Intel.Zmm16Hi,
+             0x680 /* 1664 */);
+endif

---

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/** Pointer to a XSAVE area. */
typedef X86XSAVEAREA *PX86XSAVEAREA;
/** Pointer to a const XSAVE area. */
typedef X86XSAVEAREA const *PCX86XSAVEAREA;

/** @name XSAVE_C_XXX - XSAVE State Components Bits (XCR0). */
* @} */
/** Bit 0 - x87 - Legacy FPU state (bit number) */
#define XSAVE_C_X87_BIT 0
/** Bit 0 - x87 - Legacy FPU state. */
#define XSAVE_C_X87 RT_BIT_64(XSAVE_C_X87_BIT)
/** Bit 1 - SSE - 128-bit SSE state (bit number). */
#define XSAVE_C_SSE_BIT 1
/** Bit 1 - SSE - 128-bit SSE state. */
#define XSAVE_C_SSE RT_BIT_64(XSAVE_C_SSE_BIT)
/** Bit 2 - YMM_Hi128 - Upper 128 bits of YMM0-15 (AVX) (bit number). */
#define XSAVE_C_YMM_BIT 2
/** Bit 2 - YMM_Hi128 - Upper 128 bits of YMM0-15 (AVX). */
#define XSAVE_C_YMM RT_BIT_64(XSAVE_C_YMM_BIT)
/** Bit 3 - BNDREGS - MPX bound register state (bit number). */
#define XSAVE_C_BNDREGS_BIT 3
/** Bit 3 - BNDREGS - MPX bound register state. */
#define XSAVE_C_BNDREGS RT_BIT_64(XSAVE_C_BNDREGS_BIT)
/** Bit 4 - BNDCSR - MPX bound config and status state (bit number). */
#define XSAVE_C_BNDCSR_BIT 4
/** Bit 4 - BNDCSR - MPX bound config and status state. */
#define XSAVE_C_BNDCSR RT_BIT_64(XSAVE_C_BNDCSR_BIT)
/** Bit 5 - Opmask - opmask state (bit number). */
#define XSAVE_C_OPMASK_BIT 5
/** Bit 5 - Opmask - opmask state. */
#define XSAVE_C_OPMASK RT_BIT_64(XSAVE_C_OPMASK_BIT)
/** Bit 6 - ZMM_Hi256 - Upper 256 bits of ZMM0-15 (AVX-512) (bit number). */
#define XSAVE_C_ZMM_HI256_BIT 6
/** Bit 6 - ZMM_Hi256 - Upper 256 bits of ZMM0-15 (AVX-512). */
#define XSAVE_C_ZMM_HI256 RT_BIT_64(XSAVE_C_ZMM_HI256_BIT)
/** Bit 7 - Hi16_ZMM - 512-bits ZMM16-31 state (AVX-512) (bit number). */
#define XSAVE_C_ZMM_16HI_BIT 7
/** Bit 7 - Hi16_ZMM - 512-bits ZMM16-31 state (AVX-512). */
#define XSAVE_C_ZMM_16HI RT_BIT_64(XSAVE_C_ZMM_16HI_BIT)
/** Bit 9 - PKRU - Protection-key state (bit number). */
#define XSAVE_C_PKRU_BIT 9
/** Bit 9 - PKRU - Protection-key state. */
#define XSAVE_C_PKRU RT_BIT_64(XSAVE_C_PKRU_BIT)
/** Bit 62 - LWP - Lightweight Profiling (AMD) (bit number). */
#define XSAVE_C_LWP_BIT 62
/** Bit 62 - LWP - Lightweight Profiling (AMD). */
#define XSAVE_C_LWP RT BIT_64(XSAVE_C_LWP_BIT)
+/** Bit 63 - X - Reserved (MBZ) for extending XCR0 (bit number). */
+#define XSAVE_C_X_BIT 63
+/** Bit 63 - X - Reserved (MBZ) for extending XCR0 (AMD). */
+#define XSAVE_C_X RT_BIT_64(XSAVE_C_X_BIT)
+/** @} */
+
+
+/** @} */
@
+ * @name Selector Descriptor
+ * @{
+ *
+ */
+
+ifndef VBOX_FOR_DTRACE_LIB
+/**
+ * Descriptor attributes (as seen by VT-x).
+ */
+typedef struct X86DESCATTRBITS
+{
+  /** 00 - Segment Type. */
+  unsigned  u4Type : 4;
+  /** 04 - Descriptor Type. System(=0) or code/data selector */
+  unsigned  u1DescType : 1;
+  /** 05 - Descriptor Privilege level. */
+  unsigned  u2Dpl : 2;
+  /** 07 - Flags selector present(=1) or not. */
+  unsigned  u1Present : 1;
+  /** 08 - Segment limit 16-19. */
+  unsigned  u4LimitHigh : 4;
+  /** 0c - Available for system software. */
+  unsigned  u1Available : 1;
+  /** 0d - 32 bits mode: Reserved - 0, long mode: Long Attribute Bit. */
+  unsigned  u1Long : 1;
+  /** 0e - This flags meaning depends on the segment type. Try make sense out
+   * of the intel manual yourself. */
+  unsigned  u1DefBig : 1;
+  /** 0f - Granularity of the limit. If set 4KB granularity is used, if
+   * clear byte. */
+  unsigned  u1Granularity : 1;
+  /** 10 - “Unusable” selector, special Intel (VT-x only?) bit. */
+  unsigned  u1Unusable : 1;
+} X86DESCATTRBITS;
+endif /* !VBOX_FOR_DTRACE_LIB */
+/** @} */
@
+* @name X86DESCATTR masks
+* @{
+* #define X86DESCATTR_TYPE UINT32_C(0x0000000f)
+* #define X86DESCATTR_DT UINT32_C(0x00000010)
+* #define X86DESCATTR_DPL UINT32_C(0x00000060)

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```c
#define X86DESCATTR_DPL_SHIFT 5 /**< Shift count for the DPL value. */
#define X86DESCATTR_P UINT32_C(0x00000080)
#define X86DESCATTR_LIMIT_HIGH UINT32_C(0x00000000)
#define X86DESCATTR_AVL UINT32_C(0x00000f00)
#define X86DESCATTR_L UINT32_C(0x00000000)
#define X86DESCATTR_D UINT32_C(0x00000000)
#define X86DESCATTR_G UINT32_C(0x00000000)
#define X86DESCATTR_UNUSABLE UINT32_C(0x00000000)
/** @} */

#pragma pack(1)
 typedef union X86DESCATTR
 { }
  /**< Unsigned integer view. */
   uint32_t u;
 ifndef VBOX_FOR_DTRACE_LIB
 /**< Normal view. */
   X86DESCATTRBITS n;
 endif
 } X86DESCATTR;
#pragma pack()
 /**< Pointer to descriptor attributes. */
 typedef X86DESCATTR *PX86DESCATTR;
 /**< Pointer to const descriptor attributes. */
 typedef const X86DESCATTR *PCX86DESCATTR;

 ifndef VBOX_FOR_DTRACE_LIB

 /**< Generic descriptor table entry */
#pragma pack(1)
 typedef struct X86DESCGENERIC
 { }
  /**< 00 - Limit - Low word. */
   unsigned u16LimitLow : 16;
  /**< 10 - Base address - low word. Don't try set this to 24 because MSC is doing stupid things then. */
   unsigned u16BaseLow : 16;
  /**< 20 - Base address - first 8 bits of high word. */
   unsigned u8BaseHigh1 : 8;
  /**< 28 - Segment Type. */
   unsigned u4Type : 4;
  /**< 2c - Descriptor Type. System(=0) or code/data selector */
   unsigned u1DescType : 1;
  /**< 2d - Descriptor Privilege level. */
   unsigned u2Dpl : 2;
  /**< 2f - Flags selector present(=1) or not. */
```
+ unsigned u1Present : 1;
+ /** 30 - Segment limit 16-19. */
+ unsigned u4LimitHigh : 4;
+ /** 34 - Available for system software. */
+ unsigned u8Available : 1;
+ /** 35 - 32 bits mode: Reserved - 0, long mode: Long Attribute Bit. */
+ unsigned u8Long : 1;
+ /** 36 - This flag's meaning depends on the segment type. Try to make sense out
+ * of the Intel manual yourself. */
+ unsigned u8DefBig : 1;
+ /** 37 - Granularity of the limit. If set 4KB granularity is used, if
+ * clear byte. */
+ unsigned u1Granularity : 1;
+ /** 38 - Base address - highest 8 bits. */
+ unsigned u8BaseHigh2 : 8;
+
+ X86DESCGENERIC;
+ #pragma pack()
+ /** Pointer to a generic descriptor entry. */
+ typedef X86DESCGENERIC *PX86DESCGENERIC;
+ /** Pointer to a const generic descriptor entry. */
+ typedef const X86DESCGENERIC *PCX86DESCGENERIC;
+
+ /* @} */
+ #define X86DESCGENERIC_BIT_OFF_LIMIT_LOW        (0)   /**< Bit offset of
X86DESCGENERIC::u16LimitLow. */
+ #define X86DESCGENERIC_BIT_OFF_BASE_LOW         (16)  /**< Bit offset of
X86DESCGENERIC::u16BaseLow. */
+ #define X86DESCGENERIC_BIT_OFF_BASE_HIGH1       (32)  /**< Bit offset of
X86DESCGENERIC::u8BaseHigh1. */
+ #define X86DESCGENERIC_BIT_OFF_TYPE             (40)  /**< Bit offset of X86DESCGENERIC::u4Type. */
+ #define X86DESCGENERIC_BIT_OFF_DESC_TYPE        (44)  /**< Bit offset of
X86DESCGENERIC::u1DescType. */
+ #define X86DESCGENERIC_BIT_OFF_DPL              (45)  /**< Bit offset of X86DESCGENERIC::u2Dpl. */
+ #define X86DESCGENERIC_BIT_OFF_PRESENT          (47)  /**< Bit offset of
X86DESCGENERIC::u1Present. */
+ #define X86DESCGENERIC_BIT_OFF_LIMIT_HIGH       (48)  /**< Bit offset of
X86DESCGENERIC::u4LimitHigh. */
+ #define X86DESCGENERIC_BIT_OFF_AVAILABLE        (52)  /**< Bit offset of
X86DESCGENERIC::u1Available. */
+ #define X86DESCGENERIC_BIT_OFF_LONG             (53)  /**< Bit offset of X86DESCGENERIC::u1Long. */
+ #define X86DESCGENERIC_BIT_OFF_DEF_BIG          (54)  /**< Bit offset of X86DESCGENERIC::u1DefBig. */
+ #define X86DESCGENERIC_BIT_OFF_GRANULARITY      (55)  /**< Bit offset of
X86DESCGENERIC::u1Granularity. */
+ #define X86DESCGENERIC_BIT_OFF_BASE_HIGH2      (56)  /**< Bit offset of
X86DESCGENERIC::u8BaseHigh2. */
+/** @name LAR mask
+ * @{
+#define X86LAR_F_TYPE            UINT16_C(    0x0f00)
+#define X86LAR_F_DT              UINT16_C(    0x1000)
+#define X86LAR_F_DPL             UINT16_C(    0x6000)
+#define X86LAR_F_DPL_SHIFT       13 /**< Shift count for the DPL value. */
+#define X86LAR_F_F               UINT16_C(    0x8000)
+#define X86LAR_F_AVL             UINT32_C(0x00100000)
+#define X86LAR_F_L               UINT32_C(0x00200000)
+#define X86LAR_F_D               UINT32_C(0x00400000)
+#define X86LAR_F_G               UINT32_C(0x00800000)
+/** @} */
+
+/**
+ * Call-, Interrupt-, Trap- or Task-gate descriptor (legacy).
+ */
+typedef struct X86DESCGATE
+{
+    /**< 00 - Target code segment offset - Low word.
+     * Ignored if task-gate. */
+    unsigned    u16OffsetLow : 16;
+    /**< 10 - Target code segment selector for call-, interrupt- and trap-gates,
+     * TSS selector if task-gate.
+     */
+    unsigned    u16Sel : 16;
+    /**< 20 - Number of parameters for a call-gate.
+     * Ignored if interrupt-, trap- or task-gate. */
+    unsigned    u5ParmCount : 5;
+    /**< 25 - Reserved / ignored.
+     */
+    unsigned    u3Reserved : 3;
+    /**< 28 - Segment Type. */
+    unsigned    u4Type : 4;
+    /**< 2c - Descriptor Type (0 = system). */
+    unsigned    u1DescType : 1;
+    /**< 2d - Descriptor Privilege level. */
+    unsigned    u2Dpl : 2;
+    /**< 2f - Flags selector present(=1) or not. */
+    unsigned    u1Present : 1;
+    /**< 30 - Target code segment offset - High word.
+     * Ignored if task-gate. */
+    unsigned    u16OffsetHigh : 16;
+} X86DESCGATE;
+/** Pointer to a Call-, Interrupt-, Trap- or Task-gate descriptor entry. */
+typedef X86DESCGATE *PX86DESCGATE;
+/** Pointer to a const Call-, Interrupt-, Trap- or Task-gate descriptor entry. */
+typedef const X86DESCGATE *PCX86DESCGATE;
### Descriptor table entry.

```c
#pragma pack(1)
typedef union X86DESC {
    /** Generic descriptor view. */
    X86DESCGENERIC Gen;
    /** Gate descriptor view. */
    X86DESCGATE Gate;
}

/** Pointer to descriptor table entry. */
typedef X86DESC *PX86DESC;

/** Pointer to const descriptor table entry. */
typedef const X86DESC *PCX86DESC;

/** @def X86DESC_BASE */
uint64_t X86DESC_BASE(a_pDesc) /*ASM-NOINC*/
        ( (uint32_t)((a_pDesc)->Gen.u8BaseHigh2) << 24)
        | ( (a_pDesc)->Gen.u8BaseHigh1 << 16)
        | ( (a_pDesc)->Gen.u16BaseLow )

/** @def X86DESC_LIMIT */
uint64_t X86DESC_LIMIT(a_pDesc) /*ASM-NOINC*/
        ( (a_pDesc)->Gen.u8BaseHigh2) << 24)
        | ( (a_pDesc)->Gen.u8BaseHigh1 << 16)
        | ( (a_pDesc)->Gen.u16BaseLow )
```

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+ ( ((uint32_t)((a_pDesc)->Gen.u4LimitHigh) << 16) \n+ | ( (a_pDesc)->Gen.u16LimitLow ) )
+
+/** @def X86DESC_LIMIT_G
+ * Return the limit of a descriptor with the granularity bit taken into account.
+ * @returns Selector limit (uint32_t).
+ * @param   a_pDesc     Pointer to the descriptor.
+ */
+#define X86DESC_LIMIT_G(a_pDesc) /*ASM-NOINC*/ 
+ ( (a_pDesc)->Gen.u1Granularity 
+ ? (((uint32_t)(a_pDesc)->Gen.u4LimitHigh) << 16) | (a_pDesc)->Gen.u16LimitLow) << 12 ) | 
+ UINT32_C(0xfff) 
+ :     ((uint32_t)(a_pDesc)->Gen.u4LimitHigh) << 16) | (a_pDesc)->Gen.u16LimitLow 
+ )
+
+/** @def X86DESC_GET_HID_ATTR
+ * Get the descriptor attributes for the hidden register.
+ */
+#define X86DESC_GET_HID_ATTR(a_pDesc) /*ASM-NOINC*/ 
+ ( ((a_pDesc)->u >> (16+16+8)) & UINT32_C(0xf0ff) ) /** @todo do we have a define for 0xf0ff? */
+
+#ifndef VBOX_FOR_DTRACE_LIB
+
+/**
+ * 64 bits generic descriptor table entry
+ * Note: most of these bits have no meaning in long mode.
+ */
+#pragma pack(1)
+typedef struct X86DESC64GENERIC
+{
+  /** Limit - Low word - *IGNORED*. */
+  uint32_t     u16LimitLow : 16;
+  /** Base address - low word. - *IGNORED* 
+     * Don't try set this to 24 because MSC is doing stupid things then. */
+  uint32_t     u16BaseLow : 16;
+  /** Base address - first 8 bits of high word. - *IGNORED* */
+  uint32_t     u8BaseHigh1 : 8;
+  /** Segment Type. */
+  uint32_t     u4Type : 4;
+  /** Descriptor Type. System(=0) or code/data selector */
+  uint32_t     u1DescType : 1;
+  /** Descriptor Privilege level. */
+  uint32_t     u2Dpl : 2;
+  /** Flags selector present(=1) or not. */
+  uint32_t     u1Present : 1;
+  /** Segment limit 16-19. - *IGNORED* */
+  uint32_t     u4LimitHigh : 4;
+  /** Available for system software. - *IGNORED* */
+}
+ uint32_t    u1Available : 1;
+ /** Long mode flag. */
+ uint32_t    u1Long : 1;
+ /** This flags meaning depends on the segment type. Try make sense out
+ * of the intel manual yourself. */
+ uint32_t    u1DefBig : 1;
+ /** Granularity of the limit. If set 4KB granularity is used, if
+ * clear byte. - *IGNORED* */
+ uint32_t    u1Granularity : 1;
+ /** Base address - highest 8 bits. - *IGNORED* */
+ uint32_t    u8BaseHigh2 : 8;
+ /** Base address - bits 63-32. */
+ uint32_t    u32BaseHigh3 : 32;
+ uint32_t    u8Reserved : 8;
+ uint32_t    u5Zeros : 5;
+ uint32_t    u19Reserved : 19;
+ } X86DESC64GENERIC;
+#pragma pack()
+/** Pointer to a generic descriptor entry. */
+typedef X86DESC64GENERIC *PX86DESC64GENERIC;
+/** Pointer to a const generic descriptor entry. */
+typedef const X86DESC64GENERIC *PCX86DESC64GENERIC;
+
+/** System descriptor table entry (64 bits)
+ *
+ * @remarks This is, save a couple of comments, identical to X86DESC64GENERIC...
+ */
+#pragma pack(1)
+typedef struct X86DESC64SYSTEM
+{
+  /** Limit - Low word. */
+  uint32_t    u16LimitLow : 16;
+  /** Base address - low word.
+  * Don't try set this to 24 because MSC is doing stupid things then. */
+  uint32_t    u16BaseLow : 16;
+  /** Base address - first 8 bits of high word. */
+  uint32_t    u8BaseHigh1 : 8;
+  /** Segment Type. */
+  uint32_t    u4Type : 4;
+  /** Descriptor Type. System(=0) or code/data selector */
+  uint32_t    u1DescType : 1;
+  /** Descriptor Privilege level. */
+  uint32_t    u2Dpl : 2;
+  /** Flags selector present(=1) or not. */
+  uint32_t    u1Present : 1;
+  /** Segment limit 16-19. */
+  uint32_t    u4LimitHigh : 4;
+ /** Available for system software. */
+ uint32_t    u1Available     : 1;
+ /** Reserved - 0. */
+ uint32_t    u1Reserved      : 1;
+ /** This flags meaning depends on the segment type. Try make sense out
+ * of the intel manual yourself. */
+ uint32_t    u1DefBig        : 1;
+ /** Granularity of the limit. If set 4KB granularity is used, if
+ * clear byte. */
+ uint32_t    u1Granularity   : 1;
+ /** Base address - bits 31-24. */
+ uint32_t    u8BaseHigh2     : 8;
+ /** Base address - bits 63-32. */
+ uint32_t    u32BaseHigh3    : 32;
+ uint32_t    u8Reserved      : 8;
+ uint32_t    u5Zeros         : 5;
+ uint32_t    u19Reserved     : 19;
+ } X86DESC64SYSTEM;
+#pragma pack()
+/** Pointer to a system descriptor entry. */
+typedef X86DESC64SYSTEM *PX86DESC64SYSTEM;
+/** Pointer to a const system descriptor entry. */
+typedef const X86DESC64SYSTEM *PCX86DESC64SYSTEM;
+
+/** Call-, Interrupt-, Trap- or Task-gate descriptor (64-bit).
+ */
+typedef struct X86DESC64GATE
+{
+    /** Target code segment offset - Low word. */
+    uint32_t    u16OffsetLow : 16;
+    /** Target code segment selector. */
+    uint32_t    u16Sel : 16;
+    /** Interrupt stack table for interrupt- and trap-gates.
+     * Ignored by call-gates. */
+    uint32_t    u3IST : 3;
+    /** Reserved / ignored. */
+    uint32_t    u5Reserved : 5;
+    /** Segment Type. */
+    uint32_t    u4Type : 4;
+    /** Descriptor Type (0 = system). */
+    uint32_t    u1DescType : 1;
+    /** Descriptor Privilege level. */
+    uint32_t    u2Dpl : 2;
+    /** Flags selector present(=1) or not. */
+    uint32_t    u1Present : 1;
+    /** Target code segment offset - High word.
+     * Ignored if task-gate. */
+} X86DESC64GATE;
typedef union X86DESC64 {
    /** Generic descriptor view. */
    X86DESC64GENERIC    Gen;
    /** System descriptor view. */
    X86DESC64SYSTEM     System;
    /** Gate descriptor view. */
    X86DESC64GATE       Gate;
    /** 8 bit unsigned integer view. */
    uint8_t             au8[16];
    /** 16 bit unsigned integer view. */
    uint16_t            au16[8];
    /** 32 bit unsigned integer view. */
    uint32_t            au32[4];
    /** 64 bit unsigned integer view. */
    uint64_t            au64[2];
} X86DESC64;

AssertCompileSize(X86DESC64, 16);
#pragma pack()
+/** @def X86DESC64_BASE
+ * Return the base of a 64-bit descriptor.
+ */
+#define X86DESC64_BASE(a_pDesc) ASM-NOINC/* \
+ ( ((uint64_t)((a_pDesc)->Gen.u32BaseHigh3) << 32) \
+ | ( (uint32_t)((a_pDesc)->Gen.u8BaseHigh2) << 24) \
+ | ( (a_pDesc)->Gen.u8BaseHigh1 << 16) \
+ | ( (a_pDesc)->Gen.u16BaseLow ) ) 
+
+
+/** @name Host system descriptor table entry - Use with care!
+ */
+@{ */
+/** Host system descriptor table entry. */
+#if HC_ARCH_BITS == 64
+typedef X86DESC64 X86DESCHC;
+#else
+typedef X86DESC X86DESCHC;
+#endif
+/** Pointer to a host system descriptor table entry. */
+#if HC_ARCH_BITS == 64
+typedef PX86DESC64 PX86DESCHC;
+#else
+typedef PX86DESC PX86DESCHC;
+#endif
+/** Pointer to a const host system descriptor table entry. */
+#if HC_ARCH_BITS == 64
+typedef PCX86DESC64 PCX86DESCHC;
+#else
+typedef PCX86DESC PCX86DESCHC;
+#endif
+@ } */
+
+
+/** @name Selector Descriptor Types. */
+@{ */
+
+/** @name Non-System Selector Types. */
+@{ */
+/** Code(=set)/Data(=clear) bit. */
+#define X86_SEL_TYPE_CODE                   8
+/** Memory(=set)/System(=clear) bit. */
+#define X86_SEL_TYPE_MEMORY                 RT_BIT_32(4)
+/** Accessed bit. */
+#define X86_SEL_TYPE_ACCESSED               1
+/** Expand down bit (for data selectors only). */
+/* Conforming bit (for code selectors only). */
+define X86_SEL_TYPE_CONF 4
+/* Write bit (for data selectors only). */
+define X86_SEL_TYPE_WRITE 2
+/* Read bit (for code selectors only). */
+define X86_SEL_TYPE_READ 2
+/* The bit number of the code segment read bit (relative to u4Type). */
+define X86_SEL_TYPE_READ_BIT 1
+
+/* Read only selector type. */
+define X86_SEL_TYPE_RO 0
+/* Accessed read only selector type. */
+define X86_SEL_TYPE_RO_ACC (0 | X86_SEL_TYPE_ACCESSED)
+/* Read write selector type. */
+define X86_SEL_TYPE_RW 2
+/* Accessed read write selector type. */
+define X86_SEL_TYPE_RW_ACC (2 | X86_SEL_TYPE_ACCESSED)
+/* Expand down read only selector type. */
+define X86_SEL_TYPE_RO_DOWN 4
+/* Accessed expand down read only selector type. */
+define X86_SEL_TYPE_RO_DOWN_ACC (4 | X86_SEL_TYPE_ACCESSED)
+/* Expand down read write selector type. */
+define X86_SEL_TYPE_RW_DOWN 6
+/* Accessed expand down read write selector type. */
+define X86_SEL_TYPE_RW_DOWN_ACC (6 | X86_SEL_TYPE_ACCESSED)
+/* Execute only selector type. */
+define X86_SEL_TYPE_EO (0 | X86_SEL_TYPE_CODE)
+/* Accessed execute only selector type. */
+define X86_SEL_TYPE_EO_ACC (0 | X86_SEL_TYPE_CODE | X86_SEL_TYPE_ACCESSED)
+/* Execute and read selector type. */
+define X86_SEL_TYPE_ER (2 | X86_SEL_TYPE_CODE)
+/* Accessed execute and read selector type. */
+define X86_SEL_TYPE_ER_ACC (2 | X86_SEL_TYPE_CODE | X86_SEL_TYPE_ACCESSED)
+/* Conforming execute only selector type. */
+define X86_SEL_TYPE_EO_CONF (4 | X86_SEL_TYPE_CODE)
+/* Accessed Conforming execute only selector type. */
+define X86_SEL_TYPE_EO_CONF_ACC (4 | X86_SEL_TYPE_CODE | X86_SEL_TYPE_ACCESSED)
+/* Conforming execute and write selector type. */
+define X86_SEL_TYPE_ER_CONF (6 | X86_SEL_TYPE_CODE)
+/* Accessed Conforming execute and write selector type. */
+define X86_SEL_TYPE_ER_CONF_ACC (6 | X86_SEL_TYPE_CODE | X86_SEL_TYPE_ACCESSED)
+/* @} */
+
+/** @} */
+
+/** @name System Selector Types. */
+/* @} */
+/** The TSS busy bit mask. */
+#define X86_SEL_TYPE_SYS_TSS_BUSY_MASK 2
+
+/** Undefined system selector type. */
+#define X86_SEL_TYPE_SYS_UNDEFINED 0
+/** 286 TSS selector. */
+#define X86_SEL_TYPE_SYS_286_TSS_AVAIL 1
+/** LDT selector. */
+#define X86_SEL_TYPE_SYS_LDT 2
+/** 286 TSS selector - Busy. */
+#define X86_SEL_TYPE_SYS_286_TSS_BUSY 3
+/** Callgate selector. */
+#define X86_SEL_TYPE_SYS_286_CALL_GATE 4
+/** Taskgate selector. */
+#define X86_SEL_TYPE_SYS_TASK_GATE 5
+/** 286 Interrupt gate selector. */
+#define X86_SEL_TYPE_SYS_286_INT_GATE 6
+/** Trapgate selector. */
+#define X86_SEL_TYPE_SYS_286_TRAP_GATE 7
+/** Undefined system selector. */
+#define X86_SEL_TYPE_SYS_UNDEFINED2 8
+/** 386 TSS selector. */
+#define X86_SEL_TYPE_SYS_386_TSS_AVAIL 9
+/** Undefined system selector. */
+#define X86_SEL_TYPE_SYS_UNDEFINED3 0xA
+/** 386 TSS selector - Busy. */
+#define X86_SEL_TYPE_SYS_386_TSS_BUSY 0xB
+/** Callgate selector. */
+#define X86_SEL_TYPE_SYS_386_CALL_GATE 0xC
+/** 386 Interruptgate selector. */
+#define X86_SEL_TYPE_SYS_386_INT_GATE 0xD
+/** Trapgate selector. */
+#define X86_SEL_TYPE_SYS_386_TRAP_GATE 0xE
+/** @} */
+
+/** @name AMD64 System Selector Types. */
+/** @} */
+/** LDT selector. */
+#define AMD64_SEL_TYPE_SYS_LDT 2
+/** TSS selector - Busy. */
+#define AMD64_SEL_TYPE_SYS_TSS_AVAIL 9
+/** TSS selector - Busy. */
+#define AMD64_SEL_TYPE_SYS_TSS_BUSY 0xB
+/** Callgate selector. */
+#define AMD64_SEL_TYPE_SYS_CALL_GATE 0xC
+/** Interruptgate selector. */
+#define AMD64_SEL_TYPE_SYS_INT_GATE 0xE
+/** Trapgate selector. */
+\#define AMD64_SEL_TYPE_SYS_TRAP_GATE 0xF
+/** @} */
+
+/** @} */
+
+/** @name Descriptor Table Entry Flag Masks.
+ * These are for the 2nd 32-bit word of a descriptor.
+ * @} */
+/** Bits 8-11 - TYPE - Descriptor type mask. */
+\#define X86_DESC_TYPE_MASK (RT_BIT_32(8) | RT_BIT_32(9) | RT_BIT_32(10) | RT_BIT_32(11))
+/** Bit 12 - S - System (=0) or Code/Data (=1). */
+\#define X86_DESC_S RT_BIT_32(12)
+/** Bits 13-14 - DPL - Descriptor Privilege Level. */
+\#define X86_DESC_DPL (RT_BIT_32(13) | RT_BIT_32(14))
+/** Bit 15 - P - Present. */
+\#define X86_DESC_P RT_BIT_32(15)
+/** Bit 20 - AVL - Available for system software. */
+\#define X86_DESC_AVL RT_BIT_32(20)
+/** Bit 22 - DB - Default operation size. 0 = 16 bit, 1 = 32 bit. */
+\#define X86_DESC_DB RT_BIT_32(22)
+/** Bit 23 - G - Granularity of the limit. If set 4KB granularity is
+ * used, if clear byte. */
+\#define X86_DESC_G RT_BIT_32(23)
+/** @} */
+
+/** @} */
+
+/** @name Task Segments.
+ * @} */
+
+/** The minimum TSS descriptor limit for 286 tasks. */
+\#define X86_SEL_TYPE_SYS_286_TSS_LIMIT_MIN 0x2b
+
+/** The minimum TSS descriptor segment limit for 386 tasks. */
+\#define X86_SEL_TYPE_SYS_386_TSS_LIMIT_MIN 0x67
+/** 16-bit Task Segment (TSS). */
+ *}
+#pragma pack(1)
+typedef struct X86TSS16
+{
+    /** Back link to previous task. (static) */
+    RTSEL       selPrev;
+    /** Ring-0 stack pointer. (static) */
+    uint16_t    sp0;
+    /** Ring-0 stack segment. (static) */
+    RTSEL       ss0;
+    /** Ring-1 stack pointer. (static) */
+    uint16_t    sp1;
+    /** Ring-1 stack segment. (static) */
+    RTSEL       ss1;
+    /** Ring-2 stack pointer. (static) */
+    uint16_t    sp2;
+    /** Ring-2 stack segment. (static) */
+    RTSEL       ss2;
+    /** IP before task switch. */
+    uint16_t    ip;
+    /** FLAGS before task switch. */
+    uint16_t    flags;
+    /** AX before task switch. */
+    uint16_t    ax;
+    /** CX before task switch. */
+    uint16_t    cx;
+    /** DX before task switch. */
+    uint16_t    dx;
+    /** BX before task switch. */
+    uint16_t    bx;
+    /** SP before task switch. */
+    uint16_t    sp;
+    /** BP before task switch. */
+    uint16_t    bp;
+    /** SI before task switch. */
+    uint16_t    si;
+    /** DI before task switch. */
+    uint16_t    di;
+    /** ES before task switch. */
+    RTSEL       es;
+    /** CS before task switch. */
+    RTSEL       cs;
+    /** SS before task switch. */
+    RTSEL       ss;
+    /** DS before task switch. */
+    RTSEL       ds;
+    /** LDTR before task switch. */
+    RTSEL       selLdt;
+} X86TSS16;
+ifndef VBOX_FOR_DTRACE_LIB
+assertCompileSize(X86TSS16, X86_SEL_TYPE_SYS_286_TSS_LIMIT_MIN + 1);
+endif
+#pragma pack()
+/** Pointer to a 16-bit task segment. */
+typedef X86TSS16 *PX86TSS16;
+/** Pointer to a const 16-bit task segment. */
+typedef const X86TSS16 *PCX86TSS16;
+
+/**
+ * 32-bit Task Segment (TSS).
+ */
+#pragma pack(1)
+typedef struct X86TSS32
+{
+    /** Back link to previous task. (static) */
+    RTSEL      selPrev;
+    uint16_t   padding1;
+    /** Ring-0 stack pointer. (static) */
+    uint32_t   esp0;
+    /** Ring-0 stack segment. (static) */
+    RTSEL      ss0;
+    uint16_t   padding_ss0;
+    /** Ring-1 stack pointer. (static) */
+    uint32_t   esp1;
+    /** Ring-1 stack segment. (static) */
+    RTSEL      ss1;
+    uint16_t   padding_ss1;
+    /** Ring-2 stack pointer. (static) */
+    uint32_t   esp2;
+    /** Ring-2 stack segment. (static) */
+    RTSEL      ss2;
+    uint16_t   padding_ss2;
+    /** Page directory for the task. (static) */
+    uint32_t   cr3;
+    /** EIP before task switch. */
+    uint32_t   eip;
+    /** EFLAGS before task switch. */
+    uint32_t   eflags;
+    /** EAX before task switch. */
+    uint32_t   eax;
+    /** ECX before task switch. */
+    uint32_t   ecx;
+    /** EDX before task switch. */
+    uint32_t   edx;
+    /** EBX before task switch. */
+    uint32_t   ebx;

```c
/** ESP before task switch. */
+ uint32_t    esp;
+ /** EBP before task switch. */
+ uint32_t    ebp;
+ /** ESI before task switch. */
+ uint32_t    esi;
+ /** EDI before task switch. */
+ uint32_t    edi;
+ /** ES before task switch. */
+ RTSEL       es;
+ uint16_t    padding_es;
+ /** CS before task switch. */
+ RTSEL       cs;
+ uint16_t    padding_cs;
+ /** SS before task switch. */
+ RTSEL       ss;
+ uint16_t    padding_ss;
+ /** DS before task switch. */
+ RTSEL       ds;
+ uint16_t    padding_ds;
+ /** FS before task switch. */
+ RTSEL       fs;
+ uint16_t    padding_fs;
+ /** GS before task switch. */
+ RTSEL       gs;
+ uint16_t    padding_gs;
+ /** LDTR before task switch. */
+ RTSEL       selLdt;
+ uint16_t    padding_ldt;
+ /** Debug trap flag */
+ uint16_t    fDebugTrap;
+ /** Offset relative to the TSS of the start of the I/O Bitmap */
+ * and the end of the interrupt redirection bitmap. */
+ uint16_t    offIoBitmap;
+ } X86TSS32;  
#pragma pack()  
+ /** Pointer to task segment. */
+ typedef X86TSS32 *PX86TSS32;  
+ /** Pointer to const task segment. */
+ typedef const X86TSS32 *PCX86TSS32;  
+#ifndef VBOX_FOR_DTRACE_LIB  
+ AssertCompileSize(X86TSS32, X86_SEL_TYPE_SYS_386_TSS_LIMIT_MIN + 1);  
+ AssertCompileMemberOffset(X86TSS32, cr3, 28);  
+ AssertCompileMemberOffset(X86TSS32, offIoBitmap, 102);  
+#endif  
+  
+ /**  
+ * 64-bit Task segment.  
+ */
```
```c
#pragma pack(1)
typedef struct X86TSS64
{
    /**< Reserved. */
    uint32_t u32Reserved;
    /**< Ring-0 stack pointer. (static) */
    uint64_t rsp0;
    /**< Ring-1 stack pointer. (static) */
    uint64_t rsp1;
    /**< Ring-2 stack pointer. (static) */
    uint64_t rsp2;
    /**< Reserved. */
    uint32_t u32Reserved2[2];
    /**< IST */
    uint64_t ist1;
    uint64_t ist2;
    uint64_t ist3;
    uint64_t ist4;
    uint64_t ist5;
    uint64_t ist6;
    uint64_t ist7;
    /**< Reserved. */
    uint16_t u16Reserved[5];
    /**< Offset relative to the TSS of the start of the I/O Bitmap
    and the end of the interrupt redirection bitmap. */
    uint16_t offIoBitmap;
} X86TSS64;
#pragma pack()
/** Pointer to a 64-bit task segment. */
typedef X86TSS64 *PX86TSS64;
/** Pointer to a const 64-bit task segment. */
typedef const X86TSS64 *PCX86TSS64;
#ifndef VBOX_FOR_DTRACE_LIB
AssertCompileSize(X86TSS64, X86_SEL_TYPE_SYS_386_TSS_LIMIT_MIN + 1);
#endif
/** @} */
/** @} */
/** @name Selectors. */
/** @} */
/** The shift used to convert a selector from and to index an index (C). */
/** @} */
#define X86_SEL_SHIFT 3
```
+ /**
+ * The mask used to mask off the table indicator and RPL of an selector.
+ */
+#define X86_SEL_MASK            0xfff8U
+
+/**
+ * The mask used to mask off the RPL of an selector.
+ * This is suitable for checking for NULL selectors.
+ */
+#define X86_SEL_MASK_OFF_RPL    0xfffcU
+
+/**
+ * The bit indicating that a selector is in the LDT and not in the GDT.
+ */
+#define X86_SEL_LDT             0x0004U
+
+/**
+ * The bit mask for getting the RPL of a selector.
+ */
+#define X86_SEL_RPL             0x0003U
+
+/**
+ * The mask covering both RPL and LDT.
+ * This is incidentally the same as sizeof(X86DESC) - 1, so good for limit
+ * checks.
+ */
+#define X86_SEL_RPL_LDT         0x0007U
+
+/** @] */
+
+/**
+ * x86 Exceptions/Faults/Traps.
+ */
+typedef enum X86XCPT
+{
+    /** \#DE - Divide error. */
+    X86_XCPT_DE = 0x00,
+    /** \#DB - Debug event (single step, DRx, ..) */
+    X86_XCPT_DB = 0x01,
+    /** NMI - Non-Maskable Interrupt */
+    X86_XCPT_NMI = 0x02,
+    /** \#BP - Breakpoint (INT3). */
+    X86_XCPT_BP = 0x03,
+    /** \#OF - Overflow (INTO). */
+    X86_XCPT_OF = 0x04,
+    /** \#BR - Bound range exceeded (BOUND). */
+}
+ X86_XCPT_BR = 0x05,
+ /**< \#UD - Undefined opcode. */
+ X86_XCPT_UD = 0x06,
+ /**< \#NM - Device not available (math coprocessor device). */
+ X86_XCPT_NM = 0x07,
+ /**< \#DF - Double fault. */
+ X86_XCPT_DF = 0x08,
+ /**< ??? - Coprocessor segment overrun (obsolete). */
+ X86_XCPT_CO_SEG_OVERRUN = 0x09,
+ /**< \#TS - Taskswitch (TSS). */
+ X86_XCPT_TS = 0x0a,
+ /**< \#NP - Segment no present. */
+ X86_XCPT_NP = 0x0b,
+ /**< \#SS - Stack segment fault. */
+ X86_XCPT_SS = 0x0c,
+ /**< \#GP - General protection fault. */
+ X86_XCPT_gp = 0x0d,
+ /**< \#PF - Page fault. */
+ X86_XCPT_PF = 0x0e,
+ /**< 0x0f is reserved (to avoid conflict with spurious interrupts in BIOS setup). */
+ /**< \#MF - Math fault (FPU). */
+ X86_XCPT_MF = 0x10,
+ /**< \#AC - Alignment check. */
+ X86_XCPT_AC = 0x11,
+ /**< \#MC - Machine check. */
+ X86_XCPT_MC = 0x12,
+ /**< \#XF - SIMD Floating-Pointer Exception. */
+ X86_XCPT_XF = 0x13,
+ /**< \#VE - Virtualization Exception. */
+ X86_XCPT_VE = 0x14,
+ /**< \#SX - Security Exception. */
+ X86_XCPT_SX = 0x1e
+ } X86XCPT;
+ /**< Pointer to a x86 exception code. */
typedef X86XCPT *PX86XCPT;
+ /**< Pointer to a const x86 exception code. */
typedef const X86XCPT *PCX86XCPT;
+ /**< The last valid (currently reserved) exception value. */
#define X86_XCPT_LAST 0x1f
+
+ /**< @name Trap Error Codes */
+ /**< External indicator. */
+#define X86_TRAP_ERR_EXTERNAL 1
+ /**< IDT indicator. */
+#define X86_TRAP_ERR_IDT 2

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+/** Descriptor table indicator - If set LDT, if clear GDT. */
+#define X86_TRAP_ERR_TI 4
+/** Mask for getting the selector. */
+#define X86_TRAP_ERR_SEL_MASK 0xff8
+/** Shift for getting the selector table index (C type index). */
+#define X86_TRAP_ERR_SEL_SHIFT 3
+/** @} */
+
+
+#define X86_TRAP_ERR_SEL_MASK 0xfff8
+/** Shift for getting the selector table index (C type index). */
+#define X86_TRAP_ERR_SEL_SHIFT 3
+/** @} */
+
+/** Descriptor table indicator - If set LDT, if clear GDT. */
+#define X86_TRAP_ERR_TI 4
+/** Mask for getting the selector. */
+#define X86_TRAP_ERR_SEL_MASK 0xff8
+/** Shift for getting the selector table index (C type index). */
+#define X86_TRAP_ERR_SEL_SHIFT 3
+/** @} */
+
+/** Bit 0 - P - Not present (clear) or page level protection (set) fault. */
+#define X86_TRAP_PF_P RT_BIT_32(0)
+/** Bit 1 - R/W - Read (clear) or write (set) access. */
+#define X86_TRAP_PF_RW RT_BIT_32(1)
+/** Bit 2 - U/S - CPU executing in user mode (set) or supervisor mode (clear). */
+#define X86_TRAP_PF_US RT_BIT_32(2)
+/** Bit 3 - RSVD- Reserved bit violation (set), i.e. reserved bit was set to 1. */
+#define X86_TRAP_PF_RSVD RT_BIT_32(3)
+/** Bit 4 - I/D - Instruction fetch (set) / Data access (clear) - PAE + NXE. */
+#define X86_TRAP_PF_ID RT_BIT_32(4)
+/** Bit 5 - PK - Protection-key violation (AMD64 mode only). */
+#define X86_TRAP_PF_PK RT_BIT_32(5)
+/** @} */
+
+#pragma pack(1)
+/**
 * 16-bit IDTR.
 */
+/**
+typedef struct X86IDTR16
+{
+ /** Offset. */
+ uint16_t offSel;
+ /** Selector. */
+ uint16_t uSel;
+ } X86IDTR16, *PX86IDTR16;
+#pragma pack()
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ifndef VBOX_FOR_DTRACE_LIB
+ uint32_t uAddr;
+else
+ uint16_t au16Addr[2];
+endif
+} X86XDTR32, *PX86XDTR32;
#pragma pack()
+
#pragma pack(1)
/**
 * 64-bit IDTR/GDTR.
 */
typedef struct X86XDTR64
+
+/** Size of the descriptor table. */
+ uint16_t cb;
+ /** Address of the descriptor table. */
+ifndef VBOX_FOR_DTRACE_LIB
+ uint64_t uAddr;
+else
+ uint16_t au16Addr[4];
+endif
+} X86XDTR64, *PX86XDTR64;
#pragma pack()
+
/** @name ModR/M
 * @{ */
#define X86_MODRM_RM_MASK UINT8_C(0x07)
#define X86_MODRM_REG_MASK UINT8_C(0x38)
#define X86_MODRM_REG_SMASK UINT8_C(0x07)
#define X86_MODRM_REG_SHIFT 3
#define X86_MODRM_MOD_MASK UINT8_C(0xc0)
#define X86_MODRM_MOD_SMASK UINT8_C(0x03)
#define X86_MODRM_MOD_SHIFT 6
 ifndef VBOX_FOR_DTRACE_LIB
+AssertCompile((X86_MODRM_RM_MASK | X86_MODRM_REG_MASK | X86_MODRM_MOD_MASK) == 0xff);
+AssertCompile((X86_MODRM_REG_MASK >> X86_MODRM_REG_SHIFT) ==
 X86_MODRM_REG_SMASK);
+AssertCompile((X86_MODRM_MOD_MASK >> X86_MODRM_MOD_SHIFT) ==
 X86_MODRM_MOD_SMASK);
+/** @def X86_MODRM_MAKE
 * @param   a_Mod       The mod value (0..3).
 * @param   a_Reg       The register value (0..7).
 * @param   a_RegMem    The register or memory value (0..7). */
#define X86_MODRM_MAKE(a_Mod, a_Reg, a_RegMem) (((a_Mod) << X86_MODRM_MOD_SHIFT) |
 ((a_Reg) << X86_MODRM_REG_SHIFT) | (a_RegMem))
+#endif
+/** @} */
+
+/** @name SIB */
+  * @{ */
+#define X86_SIB_BASE_MASK     UINT8_C(0x07)
+#define X86_SIB_INDEX_MASK    UINT8_C(0x38)
+#define X86_SIB_INDEX_SMASK   UINT8_C(0x07)
+#define X86_SIB_INDEX_SHIFT   3
+#define X86_SIB_SCALE_MASK    UINT8_C(0xc0)
+#define X86_SIB_SCALE_SMASK   UINT8_C(0x03)
+#define X86_SIB_SCALE_SHIFT   6
+%ifndef VBOX_FOR_DTRACE_LIB
+AssertCompile((X86_SIB_BASE_MASK | X86_SIB_INDEX_MASK | X86_SIB_SCALE_MASK) == 0xff);
+AssertCompile((X86_SIB_INDEX_MASK >> X86_SIB_INDEX_SHIFT) == X86_SIB_INDEX_SMASK);
+AssertCompile((X86_SIB_SCALE_MASK >> X86_SIB_SCALE_SHIFT) == X86_SIB_SCALE_SMASK);
+%endif
+/** @} */
+
+/** @name General register indexes */
+  * @{ */
+#define X86_GREG_xAX            0
+#define X86_GREG_xCX            1
+#define X86_GREG_xDX            2
+#define X86_GREG_xBX            3
+#define X86_GREG_xSP            4
+#define X86_GREG_xBP            5
+#define X86_GREG_xSI            6
+#define X86_GREG_xDI            7
+#define X86_GREG_x8             8
+#define X86_GREG_x9             9
+#define X86_GREG_x10            10
+#define X86_GREG_x11            11
+#define X86_GREG_x12            12
+#define X86_GREG_x13            13
+#define X86_GREG_x14            14
+#define X86_GREG_x15            15
+/** @} */
+
+/** @name X86_SREG_XXX - Segment register indexes. */
+  * @{ */
+#define X86_SREG_ES             0
+#define X86_SREG_CS             1
+#define X86_SREG_SS             2
+#define X86_SREG_DS             3
+#define X86_SREG_FS             4
+#define X86_SREG_WS             5
/** Segment register count. */
#define X86_SREG_COUNT 6
+
+
/** @name X86_OP_XXX - Prefixes
 * @{ */
#define X86_OP_PRF_CS UINT8_C(0x2e)
#define X86_OP_PRF_SS UINT8_C(0x36)
#define X86_OP_PRF_DS UINT8_C(0x3e)
#define X86_OP_PRF_ES UINT8_C(0x26)
#define X86_OP_PRF_FS UINT8_C(0x64)
#define X86_OP_PRF_GS UINT8_C(0x65)
#define X86_OP_PRF_SIZE_OP UINT8_C(0x66)
#define X86_OP_PRF_SIZE_ADDR UINT8_C(0x67)
#define X86_OP_PRF_LOCK UINT8_C(0xf0)
#define X86_OP_PRF_REPZ UINT8_C(0xf3)
#define X86_OP_PRF_REPNZ UINT8_C(0xf2)
#define X86_OP_REX_B UINT8_C(0x41)
#define X86_OP_REX_X UINT8_C(0x42)
#define X86_OP_REX_R UINT8_C(0x44)
#define X86_OP_REX_W UINT8_C(0x48)
/** @} */
+
+
/** @} */
+
#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/product-generated.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/product-generated.h
@@ -0,0 +1,10 @@
+#ifndef ___product_generated_h___
+#define ___product_generated_h___
+
+#define VBOX_VENDOR "Oracle Corporation"
+#define VBOX_VENDOR_SHORT "Oracle"
+#define VBOX_PRODUCT "Oracle VM VirtualBox"
+#define VBOX_BUILD_PUBLISHER "_Ubuntu"
+#define VBOX_C_YEAR "2018"
+
#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/alloc-r0drv.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/alloc-r0drv.c
@@ -0,0 +1,437 @@
/* $Id: alloc-r0drv.cpp $ */
/** @file
 * IPRT - Memory Allocation, Ring-0 Driver.
 */
+*
+/
+ /*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ * ...
+ */
+ 
+ /*******************************************************************************************
+ **************************************
+ *   Header Files                                                                                                                 *
+ **************************************
+ /*******************************************************************************************
+ */
+ 
+ #define RTMEM_NO_WRAP_TO_EF_APIS
+ 
+ #include <iprt/mem.h>
+ #include "internal/iprt.h"
+ 
+ #if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+ # include <iprt/asm-amd64-x86.h>
+ #endif
+ #include <iprt/assert.h>
+ #ifdef RT_MORE_STRICT
+ # include <iprt/mp.h>
+ #endif
+ 
+ #include <iprt/thread.h>
+ #include "r0drv/alloc-r0drv.h"
+ 
+ /*******************************************************************************************
+ **************************************
+ *   Defined Constants And Macros                                                                                                 *
+ **************************************
+ /*******************************************************************************************
+ */
+
#ifdef RT_STRICT
# define RTR0MEM_STRICT
#endif

#ifdef RTR0MEM_STRICT
# define RTR0MEM_FENCE_EXTRA 16
#else
# define RTR0MEM_FENCE_EXTRA 0
#endif

/*******************************************************************************************
**************************************
*   Global Variables
********************************************************************************************
*************************************
#ifdef RTR0MEM_STRICT
/** Fence data. */
static uint8_t const g_abFence[RTR0MEM_FENCE_EXTRA] =
{
    0x77, 0x88, 0x66, 0x99, 0x55, 0xaa, 0x44, 0xbb,
    0x33, 0xcc, 0x22, 0xdd, 0x11, 0xee, 0x00, 0xff
};
#endif

/** Wrapper around rtR0MemAllocEx. */
/** @returns Pointer to the allocated memory block header. */
/** @param cb The number of bytes to allocate (sans header). */
/** @param fFlags The allocation flags. */
DECLINLINE(PRTMEMHDR) rtR0MemAlloc(size_t cb, uint32_t fFlags)
{
PRTMEMHDR pHdr;
int rc = rtR0MemAllocEx(cb, fFlags, &pHdr);
if (RT_FAILURE(rc))
    return NULL;
return pHdr;
}

RTDECL(void *) RTMemTmpAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_DEF
{
    return RTMemAllocTag(cb, pszTag);
+RT_EXPORT_SYMBOL(RTMemTmpAllocTag);
+
+
+RTDECL(void *) RTMemTmpAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_DEF
+{
+    return RTMemAllocZTag(cb, pszTag);
+}
+RT_EXPORT_SYMBOL(RTMemTmpAllocZTag);
+
+
+RTDECL(void)    RTMemTmpFree(void *pv) RT_NO_THROW_DEF
+{
+    return RTMemFree(pv);
+}
+RT_EXPORT_SYMBOL(RTMemTmpFree);
+
+
+
+RTDECL(void *) RTMemAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_DEF
+{
+    PRTMEMHDR pHdr;
+    RT_ASSERT_INTS_ON();
+    RT_NOREF_PV(pszTag);
+
+    pHdr = rtR0MemAlloc(cb + RTR0MEM_FENCE_EXTRA, 0);
+    if (pHdr)
+    {
+        #ifdef RTR0MEM_STRICT
+            pHdr->cbReq = (uint32_t)cb; Assert(pHdr->cbReq == cb);
+            memcpy((uint8_t *)(pHdr + 1) + cb, &g_abFence[0], RTR0MEM_FENCE_EXTRA);
+        #endif
+        return pHdr + 1;
+    }
+    return NULL;
+}
+RT_EXPORT_SYMBOL(RTMemAllocTag);
+
+
+RTDECL(void *) RTMemAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_DEF
+{
+    PRTMEMHDR pHdr;
+    RT_ASSERT_INTS_ON();
+    RT_NOREF_PV(pszTag);
+
+    pHdr = rtR0MemAlloc(cb + RTR0MEM_FENCE_EXTRA, RTMEMHDR_FLAG_ZEROED);
+if (pHdr)
+{
+    #ifdef RTR0MEM STRICT
+        pHdr->cbReq = (uint32_t)cb; Assert(pHdr->cbReq == cb);
+        memcpy((uint8_t *)(pHdr + 1) + cb, &g_abFence[0], RTR0MEM FENCE EXTRA);
+        return memset(pHdr + 1, 0, cb);
+    #else
+        return memset(pHdr + 1, 0, pHdr->cb);
+    #endif
+    return NULL;
+}
+RT_EXPORT_SYMBOL(RTMemAllocZTag);
+
+RTDECL(void *) RTMemAllocVarTag(size_t cbUnaligned, const char *pszTag)
+{
+    size_t cbAligned;
+    if (cbUnaligned >= 16)
+        cbAligned = RT_ALIGN_Z(cbUnaligned, 16);
+    else
+        cbAligned = RT_ALIGN_Z(cbUnaligned, sizeof(void *));
+    return RTMemAllocTag(cbAligned, pszTag);
+}
+RT_EXPORT_SYMBOL(RTMemAllocVarTag);
+
+RTDECL(void *) RTMemAllocZVarTag(size_t cbUnaligned, const char *pszTag)
+{
+    size_t cbAligned;
+    if (cbUnaligned >= 16)
+        cbAligned = RT ALIGN Z(cbUnaligned, 16);
+    else
+        cbAligned = RT_ALIGN_Z(cbUnaligned, sizeof(void *));
+    return RTMemAllocZTag(cbAligned, pszTag);
+}
+RT_EXPORT_SYMBOL(RTMemAllocZVarTag);
+
+RTDECL(void *) RTMemReallocTag(void *pvOld, size_t cbNew, const char *pszTag) RT_NO_THROW_DEF
+{
+    PRTMEMHDR pHdrOld;
+    /* Free. */
+    if (!cbNew && pvOld)
+    {
+        RTMemFree(pvOld);
+        return NULL;
+    }
+    pHdrOld = RTMemAllocTag(RT_ALIGN_Z(pvOld, sizeof(void *)), pszTag);
+    /* Invalidate. */
+    if (pvOld)
+        pHdrOld->cbReq = (uint32_t)cb; Assert(pHdrOld->cbReq == cb);
+        memcpy((uint8_t *)(pHdrOld + 1) + cb, &g_abFence[0], RTR0MEM FENCE EXTRA);
+    return (void *)((uint8_t *)pVOld - sizeof(void *)) + sizeof(void *);
+}
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else
    AssertMsgFailed("pHdrOld->u32Magic=%RX32 pvOld=%p cbNew=%#zx\n", pHdrOld->u32Magic, pvOld, cbNew));
    return NULL;
}

RT_EXPORT_SYMBOL(RTMemReallocTag);

RTDECL(void) RTMemFree(void *pv) RT_NO_THROW_DEF
+
{
    PRTMEMHDR pHdr;
    RT_ASSERT_INTS_ON();
    if (!pv)
        return;
    pHdr = (PRTMEMHDR)pv - 1;
    if (pHdr->u32Magic == RTMEMHDR_MAGIC)
    {
        Assert(!(pHdr->fFlags & RTMEMHDR_FLAG_ALLOC_EX));
        Assert(!(pHdr->fFlags & RTMEMHDR_FLAG_EXEC));
        #ifdef RTR0MEM_STRICT
        AssertReleaseMsg(!memcmp((uint8_t *)(pHdr + 1) + pHdr->cbReq, &g_abFence[0], RTR0MEM_FENCE_EXTRA),
                         "pHdr=%p pv=%p cbReq=%u cb=%u fFlags=%#x\n" f"fence:    %.*Rhxs expected: %.*Rhxs\n",
                         pHdr, pv, pHdr->cbReq, pHdr->cb, pHdr->fFlags,
                         RTR0MEM_FENCE_EXTRA, (uint8_t *)(pHdr + 1) + pHdr->cbReq,
                         RTR0MEM_FENCE_EXTRA, &g_abFence[0]);
        #endif
        rtR0MemFree(pHdr);
    }
    else
        AssertMsgFailed("pHdr->u32Magic=%RX32 pv=%p\n", pHdr->u32Magic, pv);
}

RT_EXPORT_SYMBOL(RTMemFree);

RTDECL(void *) RTMemExecAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_DEF
+
{
    PRTMEMHDR pHdr;
+ifdef RT_OS_SOLARIS /** @todo figure out why */
+    RT_ASSERT_INTS_ON();
+else
+    RT_ASSERT_PREEMPTIBLE();
+endif
+    RT_NOREF_PV(pszTag);
+
+    pHdr = rtR0MemAlloc(cb + RTR0MEM_FENCE_EXTRA, RTMEMHDR_FLAG_EXEC);
+    if (pHdr)
+    {
+        +#ifdef RTR0MEM STRICT
+            pHdr->cbReq = (uint32_t)cb; Assert(pHdr->cbReq == cb);
+            memcpy((uint8_t *)(pHdr + 1) + cb, &g_abFence[0], RTR0MEM_FENCE_EXTRA);
+        +#endif
+            return pHdr + 1;
+        }
+        return NULL;
+    }
+    RT_EXPORT_SYMBOL(RTMemExecAllocTag);
+
+    +RTEDECL(void) RTMemExecFree(void *pv, size_t cb) RT_NO_THROW_DEF
+{    PRTMEMHDR pHdr;
+    RT_ASSERT_INTS_ON();
+    RT_NOREF_PV(cb);
+
+    if (!pv)
+        return;
+    pHdr = (PRTMEMHDR)pv - 1;
+    if (pHdr->u32Magic == RTMEMHDR_MAGIC)
+    {
+        Assert(!(pHdr->fFlags & RTMEMHDR_FLAG_ALLOC_EX));
+        +#ifdef RTR0MEM STRICT
+            AssertReleaseMsg(!memcmp((uint8_t *)(pHdr + 1) + pHdr->cbReq, &g_abFence[0],
+                           RTR0MEM_FENCE_EXTRA),
+                           ("pHdr=%p pv=%p cbReq=%u cb=%u fFlags=%#x\n"
+                           "fence:    %.*Rhxs\n"
+                           "expected: %.*Rhxs\n",
+                           pHdr, pv, pHdr->cbReq, pHdr->cb, pHdr->fFlags,
+                           RTR0MEM_FENCE_EXTRA, (uint8_t *)(pHdr + 1),
+                           RTR0MEM_FENCE_EXTRA, &g_abFence[0]));
+        +#endif
+            rtR0MemFree(pHdr);
+        }
+        else
+            AssertMsgFailed("pHdr->u32Magic=%RX32 pv=%p\n", pHdr->u32Magic, pv));
# RTDECL(int) RTMemAllocExTag(size_t cb, size_t cbAlignment, uint32_t fFlags, const char *pszTag, void **ppv) RT_NO_THROW_DEF
#
+ uint32_t fHdrFlags = RTMEMHDR_FLAGALLOC_EX;
+ PRTMEMHDR pHdr;
+ int rc;
+ RT_NOREF_PV(pszTag);
+
+ RT_ASSERT_PREEMPT_CPUID_VAR();
+ if (!(fFlags & RTMEMALLOCEX_FLAGSANY_CTXALLOC))
+    RT_ASSERT_INTSON();
+
+ /*
+ * Fake up some alignment support.
+ */
+ AssertMsgReturn(cbAlignment <= sizeof(void *), ("%zu (%#x)n", cbAlignment, cbAlignment),
            VERR_UNSUPPORTED_ALIGNMENT);
+ if (cb < cbAlignment)
+    cb = cbAlignment;
+
+ /*
+ * Validate and convert flags.
+ */
+ AssertMsgReturn(!(fFlags & ~RTMEMALLOCEX_FLAGSMASK_R0), ("%#x\n", fFlags),
            VERR_INVALID_PARAMETER);
+ if (fFlags & RTMEMALLOCEX_FLAGSMEMZEROED)
+    fHdrFlags |= RTMEMHDR_FLAGZEROED;
+ if (fFlags & RTMEMALLOCEX_FLAGSEXEC)
+    fHdrFlags |= RTMEMHDR_FLAGEXEC;
+ if (fFlags & RTMEMALLOCEX_FLAGSANY_CTXALLOC)
+    fHdrFlags |= RTMEMHDR_FLAGANY_CTXALLOC;
+ if (fFlags & RTMEMALLOCEX_FLAGSANY_CTXFREE)
+    fHdrFlags |= RTMEMHDR_FLAGANY_CTXFREE;
+
+ /*
+ * Do the allocation.
+ */
+ rc = rtR0MemAllocEx(cb + RTR0MEM_FENCE_EXTRA, fHdrFlags, &pHdr);
+ if (RT_SUCCESS(rc))
+  {
+    void *pv;
+    
+  

Assert(pHdr->cbReq == cb + RTR0MEM_FENCE_EXTRA);
Assert((pHdr->fFlags & fFlags) == fFlags);

/*
 * Calc user pointer, initialize the memory if requested, and if
 * memory strictness is enable set up the fence.
 */
pv = pHdr + 1;
*ppv = pv;
if (fFlags & RTMEMHDR_FLAG_ZEROED)
    memset(pv, 0, pHdr->cb);

#ifdef RTR0MEM_STRICT
    pHdr->cbReq = (uint32_t)cb;
    memcpy((uint8_t *)(pv + cb) + &g_abFence[0], RTR0MEM_FENCE_EXTRA);
#endif

#else if (rc == VERR_NO_MEMORY && (fFlags & RTMEMALLOCEX_FLAGS_EXEC))
    rc = VERR_NO_EXEC_MEMORY;
+
    RT_ASSERT_PREEMPT_CPUID();
    return rc;
#
#RT_EXPORT_SYMBOL(RTMemAllocExTag);
+
+RTDECL(void) RTMemFreeEx(void *pv, size_t cb) RT_NO_THROW_DEF
+{
    PRTMEMHDR pHdr;
    RT_NOREF_PV(cb);
+
+    if (!pv)
+        return;
+
+    AssertPtr(pv);
+    pHdr = (PRTMEMHDR)pv - 1;
+    if (pHdr->u32Magic == RTMEMHDR_MAGIC)
+    {
+        RT_ASSERT_PREEMPT_CPUID_VAR();
+        Assert(pHdr->fFlags & RTMEMHDR_FLAG_ALLOC_EX);
+        if (!(pHdr->fFlags & RTMEMHDR_FLAG_ANY_CTX_FREE))
+            RT_ASSERT_INTS_ON();
+        AssertMsg(pHdr->cbReq == cb, ("cbReq=%zu cb=%zu\n", pHdr->cb, cb));
+    }
+    if (!pHdr)
+        return;
+
+    AssertPtr(pv);
+    pHdr = (PRTMEMHDR)pv - 1;
+    if (pHdr->u32Magic == RTMEMHDR_MAGIC)
+    {
+        RT_ASSERT_PREEMPT_CPUID_VAR();
+        Assert(pHdr->fFlags & RTMEMHDR_FLAG_ALLOC_EX);
+        if (!!(pHdr->fFlags & RTMEMHDR_FLAG_ANY_CTX_FREE))
+            RT_ASSERT_INTS_ON();
+        AssertMsg(pHdr->cbReq == cb, ("cbReq=%zu cb=%zu\n", pHdr->cb, cb));
+    }

#endif RTR0MEM_STRICT
+    AssertReleaseMsg(!memcmp((uint8_t *)(uint8_t *)(pHdr + cb) + cbReq, &g_abFence[0], RTR0MEM_FENCE_EXTRA),

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"pHdr=%p pv=%p cbReq=%u cb=%u fFlags=%#x\n"
"fence: %.Rhxs\n"
"expected: %.Rhxs\n",
phdr, pv, pHdr->cbReq, pHdr->cb, pHdr->fFlags,
RTR0MEM_FENCE_EXTRA, (uint8_t *)(pHdr + 1) + pHdr->cbReq,
RTR0MEM_FENCE_EXTRA, &g_abFence[0]);

rtR0MemFree(pHdr);
RT_ASSERT_PREEMPT_CPUID();
    }
else
    AssertMsgFailed("pHdr->u32Magic=%RX32 pv=%p\n", pHdr->u32Magic, pv);
+
} +
+RT_EXPORT_SYMBOL(RTMemFreeEx);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/alloc-r0drv.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/alloc-r0drv.h
@@ -0,0 +1,101 @@
+/* $Id: alloc-r0drv.h $ */
+/** @file
+ * IPRT - Memory Allocation, Ring-0 Driver.
+ */
+
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+
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+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+#ifndef ___r0drv_alloc_r0drv_h
+#define ___r0drv_alloc_r0drv_h

+/#ifndef r0drv_alloc_r0drv_h
+#define r0drv_alloc_r0drv_h
+
+/#include <iprt/cdefs.h>
```c
#include <iprt/types.h>
#include <iprt/mem.h>
#include "internal/magics.h"

+RT_C_DECLS_BEGIN
+
+/**
+ * Header which heading all memory blocks.
+ */
typedef struct RTMEMHDR
+
+ /** Magic (RTMEMHDR_MAGIC). */
+ uint32_t u32Magic;
+ /** Block flags (RTMEMHDR_FLAG_*). */
+ uint32_t fFlags;
+ /** The actual size of the block, header not included. */
+ uint32_t cb;
+ /** The requested allocation size. */
+ uint32_t cbReq;
+ } RTMEMHDR, *PRTMEMHDR;
+
+/** @name RTMEMHDR::fFlags.
+ * @{ */
+ /** Clear the allocated memory. */
+#define RTMEMHDR_FLAG_ZEROED RT_BIT(0)
+ /** Executable flag. */
+#define RTMEMHDR_FLAG_EXEC RT_BIT(1)
+ /** Use allocation method suitable for any context. */
+#define RTMEMHDR_FLAG_ANY_CTX_ALLOC RT_BIT(2)
+ /** Use allocation method which allow for freeing in any context. */
+#define RTMEMHDR_FLAG_ANY_CTX_FREE RT_BIT(3)
+ /** Both alloc and free in any context (or we're just darn lazy). */
+#define RTMEMHDR_FLAG_ANY_CTX (RTMEMHDR_FLAG_ANY_CTX_ALLOC | RTMEMHDR_FLAG_ANY_CTX_FREE)
+ /** Indicate that it was allocated by rtR0MemAllocExTag. */
+#define RTMEMHDR_FLAG_ALLOC_EX RT_BIT(4)
+#ifdef RT_OS_LINUX
+ /** Linux: Allocated using vm_area hacks. */
+# define RTMEMHDR_FLAG_EXEC_VM_AREA RT_BIT(29)
+ /** Linux: Allocated from the special heap for executable memory. */
+# define RTMEMHDR_FLAG_EXEC_HEAP RT_BIT(30)
+ /** Linux: Allocated by kmalloc() instead of vmalloc(). */
+# define RTMEMHDR_FLAG_KMALLOC RT_BIT(31)
+#endif
+ /** @} */
+ }
+ ```
/**
 * Heap allocation back end for ring-0.
 *
 * @returns IPRT status code. VERR_NO_MEMORY suffices for RTMEMHDR_FLAG_EXEC,
 *          the caller will change it to VERR_NO_EXEC_MEMORY when appropriate.
 *
 * @param   cb          The amount of memory requested by the user. This does
 *                      not include the header.
 * @param   fFlags      The allocation flags and more. These should be
 *                      assigned to RTMEMHDR::fFlags together with any flags
 *                      the backend might be using.
 * @param   ppHdr       Where to return the memory header on success.
 */
DECLHIDDEN(int)     rtR0MemAllocEx(size_t cb, uint32_t fFlags, PRTMEMHDR *ppHdr);

/**
 * Free memory allocated by rtR0MemAllocEx.
 *
 * @param   pHdr       The memory block to free. (Never NULL.)
 */
DECLHIDDEN(void)    rtR0MemFree(PRTMEMHDR pHdr);

RT_C_DECLS_END
You may elect to license modified versions of this file under the terms and conditions of either the GPL or the CDDL or both.

ifdef RT_OS_WINDOWS
# include "../nt/the-nt-kernel.h"
endif
#include "internal/iprt.h"
#include <iprt/semaphore.h>
#include <iprt/asm.h>
#include <iprt/asm-amd64-x86.h>
#include <iprt/assert.h>
#include <iprt.err.h>
#include <iprt/mem.h>
#include <iprt/thread.h>
#include "internal/magics.h"

/*******************************************************************************************
**************************************
*   Structures and Typedefs
********************************************************************************************

** Saved state information.
*/

typedef struct RTSEMSPINMUTEXSTATE
{
  /** Saved flags register. */
  RTCCUINTREG fSavedFlags;
  /** Preemption state. */
  RTTHREADPREEMPTSTATE PreemptState;
  /** Whether to spin or sleep. */
  bool fSpin;
  /** Whether the flags have been saved. */
  bool fValidFlags;
} RTSEMSPINMUTEXSTATE;
*/
typedef struct RTSEMSPINMUTEXINTERNAL
{
    /** Magic value (RTSEMSPINMUTEX_MAGIC)
     * RTCRITSECT_MAGIC is the value of an initialized & operational section. */
    uint32_t volatile       u32Magic;
    /** Flags. This is a combination of RTSEMSPINMUTEX_FLAGS_XXX and
     * RTSEMSPINMUTEX_INT_FLAGS_XXX. */
    uint32_t volatile       fFlags;
    /** The owner thread.
     * This is NIL if the semaphore is not owned by anyone. */
    RTNATIVETHREAD volatile hOwner;
    /** Number of threads that are fighting for the lock. */
    int32_t volatile        cLockers;
    /** The semaphore to block on. */
    RTSEMEVENT              hEventSem;
    /** Saved state information of the owner.
     * This will be restored by RTSemSpinRelease. */
    RTSEMSPINMUTEXSTATE     SavedState;
} RTSEMSPINMUTEXINTERNAL;

/*******************************************************************************
**************************************
*   Defined Constants And Macros                                                                                                 *
**************************************/
/*#define RTSEMSPINMUTEX_INT_FLAGS_MUST*/

/** Validates the handle, returning if invalid. */
#define RTSEMSPINMUTEX_VALIDATE_RETURN(pThis) \
    do \
    { \
        uint32_t u32Magic; \ 
        AssertPtr(pThis); \ 
        u32Magic = (pThis)->u32Magic; \ 
        if (u32Magic != RTSEMSPINMUTEX_MAGIC) \ 
        { \ 
            AssertMsgFailed("u32Magic=%#x pThis=%p\n", u32Magic, pThis); \ 
            return u32Magic == RTSEMSPINMUTEX_MAGIC_DEAD ? VERR_SEM_DESTROYED : 
           VERR_INVALID_HANDLE; \ 
        } \ 
    } while (0)

RTDECL(int) RTSemSpinMutexCreate(PRTSEMSPINMUTEX phSpinMtx, uint32_t fFlags)
{
    RTSEMSPINMUTEXINTERNAL *pThis;
int rc;

AssertReturn(!(fFlags & ~RTSEMSPINMUTEX_FLAGS_VALID_MASK), VERR_INVALID_PARAMETER);
AssertPtr(phSpinMtx);

/*
 * Allocate and initialize the structure.
 */
 pThis = (RTSEMSPINMUTEXINTERNAL *)RTMemAllocZ(sizeof(*pThis));
 if (!pThis)
     return VERR_NO_MEMORY;
 pThis->u32Magic   = RTSEMSPINMUTEX_MAGIC;
 pThis->fFlags     = fFlags;
 pThis->hOwner     = NIL_RTNATIVETHREAD;
 pThis->cLockers   = 0;
 rc = RTSemEventCreateEx(&pThis->hEventSem, RTSEMEVENT_FLAGS_NO_LOCK_VAL, NIL_RTLOCKVALCLASS, NULL);
 if (RT_SUCCESS(rc))
     {  
 *phSpinMtx = pThis;
     return VINF_SUCCESS;
     }

RTMemFree(pThis);
return rc;
}

RT_EXPORT_SYMBOL(RTSemSpinMutexCreate);

/**
 * Helper for RTSemSpinMutexTryRequest and RTSemSpinMutexRequest.
 *
 * This will check the current context and see if it's usui
 *
 * @returns VINF_SUCCESS or VERR_SEM_BAD_CONTEXT.
 * @param   pState      Output structure.
 */
static int rtSemSpinMutexEnter(RTSEMSPINMUTEXSTATE *pState, RTSEMSPINMUTEXINTERNAL *pThis)
{
#ifndef RT_OS_WINDOWS
    RTTHREADPREEMPTSTATE const StateInit = RTTHREADPREEMPTSTATE_INITIALIZER;
#endif
    int rc  = VINF_SUCCESS;

    /** @todo Later #1: When entering in interrupt context and we're not able to
     * wake up threads from it, we could try switch the lock into pure
     */
+static int rtSemSpinMutexEnter(RTSEMSPINMUTEXSTATE *pState, RTSEMSPINMUTEXINTERNAL *pThis)
+{  
 *ifndef RT_OS_WINDOWS
 + RTTHREADPREEMPTSTATE const StateInit = RTTHREADPREEMPTSTATE_INITIALIZER;
 +#endif
 + int rc = VINF_SUCCESS;
 +
 + /* @todo Later #1: When entering in interrupt context and we're not able to
 +   * wake up threads from it, we could try switch the lock into pure
 +   */

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spinlock mode. This would require that there are no other threads
  currently waiting on it and that the RTSEMSPINMUTEX_FLAGS_IRQ_SAFE flag is set.

Later #2: Similarly, it is possible to turn on the RTSEMSPINMUTEX_FLAGS_IRQ_SAFE at run time if we manage to grab the semaphore ownership at interrupt time. We might want to try delay the RTSEMSPINMUTEX_FLAGS_IRQ_SAFE even, since we're fine if we get it...

```c
#ifdef RT_OS_WINDOWS
  /*
   * NT: IRQL <= DISPATCH_LEVEL for waking up threads; IRQL < DISPATCH_LEVEL for sleeping.
   */
  pState->PreemptState.uchOldIrql = KeGetCurrentIrql();
  if (pState->PreemptState.uchOldIrql > DISPATCH_LEVEL)
      return VERR_SEM_BAD_CONTEXT;
  
  if (pState->PreemptState.uchOldIrql >= DISPATCH_LEVEL)
      pState->fSpin = true;
  else
  {
      pState->fSpin = false;
      KeRaiseIrql(DISPATCH_LEVEL, &pState->PreemptState.uchOldIrql);
      Assert(pState->PreemptState.uchOldIrql < DISPATCH_LEVEL);
  }

#elif defined(RT_OS_SOLARIS)
  /*
   * Solaris: RTSemEventSignal will do bad stuff on S10 if interrupts are disabled.
   */
  if (!ASMIntAreEnabled())
      return VERR_SEM_BAD_CONTEXT;
  
  pState->fSpin = !RTThreadPreemptIsEnabled(NIL_RTTHREAD);
  if (RTThreadIsInInterrupt(NIL_RTTHREAD))
  {
      if (!(pThis->fFlags & RTSEMSPINMUTEX_FLAGS_IRQ_SAFE))
          rc = VINF_SEM_BAD_CONTEXT; /* Try, but owner might be interrupted. */
      pState->fSpin = true;
  }
  pState->PreemptState = StateInit;
  RTThreadPreemptDisable(&pState->PreemptState);

#elif defined(RT_OS_LINUX) || defined(RT_OS_OS2)
  /*
   * OSes on which RTSemEventSignal can be called from any context.
   */
```
pState->fSpin = !RTThreadPreemptIsEnabled(NIL_RTTHREAD);
if (RTThreadIsInInterrupt(NIL_RTTHREAD))
{
    if (!(pThis->fFlags & RTSEMSPINMUTEX_FLAGS_IRQ_SAFE))
        rc = VINF_SEM_BAD_CONTEXT; /* Try, but owner might be interrupted. */
    pState->fSpin = true;
    pState->PreemptState = StateInit;
    RTThreadPreemptDisable(&pState->PreemptState);
    
    if (RTThreadIsInInterrupt(NIL_RTTHREAD)
        || !ASMIntAreEnabled())
        return VERR_SEM_BAD_CONTEXT;
    pState->fSpin = !RTThreadPreemptIsEnabled(NIL_RTTHREAD);
    pState->PreemptState = StateInit;
    RTThreadPreemptDisable(&pState->PreemptState);
#endif

    pState->fValidFlags = !!(pThis->fFlags & RTSEMSPINMUTEX_FLAGS_IRQ_SAFE);
    if (pState->fValidFlags)
        pState->fSavedFlags = ASMIntDisableFlags();
    else
        pState->fSavedFlags = 0;

    return rc;
}

/**
 * Helper for RTSemSpinMutexTryRequest, RTSemSpinMutexRequest and
 * RTSemSpinMutexRelease.
 * @param  pState
 */
DECL_FORCE_INLINE(void) rtSemSpinMutexLeave(RTSEMSPINMUTEXSTATE *pState)
{
    /* Restore the interrupt flag. */
if (pState->fValidFlags)
    ASMSetFlags(pState->fSavedFlags);

#ifdef RT_OS_WINDOWS
    
    * NT: Lower the IRQL if we raised it.
    */
    if (pState->PreemptState.uchOldIrql < DISPATCH_LEVEL)
        KeLowerIrql(pState->PreemptState.uchOldIrql);
#else
    
    * Default: Restore preemption.
    */
    RTThreadPreemptRestore(&pState->PreemptState);
#endif

+RTDECL(int) RTSemSpinMutexTryRequest(RTSEMSPINMUTEX hSpinMtx)
+{  
    RTSEMSPINMUTEXINTERNAL *pThis = hSpinMtx;
    RTNATIVETHREAD hSelf = RTThreadNativeSelf();
    RTSEMSPINMUTEXSTATE State;
    bool fRc;
    int rc;

    Assert(hSelf != NIL_RTNATIVETHREAD);
    RTSEMSPINMUTEX_VALIDATE_RETURN(pThis);

    * Check context, disable preemption and save flags if necessary.
    */
    rc = rtSemSpinMutexEnter(&State, pThis);
    if (RT_FAILURE(rc))
        return rc;

    * Try take the ownership.
    */
    ASMAtomicCmpXchgHandle(&pThis->hOwner, hSelf, NIL_RTNATIVETHREAD, fRc);
    if (!fRc)
    {
        /* Busy, too bad. Check for attempts at nested access. */
        rc = VERR_SEM_BUSY;
        if (RT_UNLIKELY(pThis->hOwner == hSelf))
        {
            AssertMsgFailed("%p attempt at nested access\n");
        }
+ rc = VERR_SEM_NESTED;
+ }
+ rtSemSpinMutexLeave(&State);
+ return rc;
+ }
+
+ /*
+ * We're the semaphore owner.
+ */
+ ASMAtomicIncS32(&pThis->cLockers);
+ pThis->SavedState = State;
+ return VINF_SUCCESS;
+
RT_EXPORT_SYMBOL(RTSemSpinMutexTryRequest);
+
+
RTDECL(int) RTSemSpinMutexRequest(RTSEMSPINMUTEX hSpinMtx)
+{
+ RTSEMSPINMUTEXINTERNAL *pThis = hSpinMtx;
+ RTNATIVETHREAD hSelf = RTThreadNativeSelf();
+ RTSEMSPINMUTEXSTATE State;
+ bool fRc;
+ int rc;
+
+ Assert(hSelf != NIL_RTNATIVETHREAD);
+ RTEMSSEMSPINMUTEX_VALIDATE_RETURN(pThis);
+
+ /*
+ * Check context, disable preemption and save flags if necessary.
+ */
+ rc = rtSemSpinMutexEnter(&State, pThis);
+ if (RT_FAILURE(rc))
+     return rc;
+
+ /*
+ * Try take the ownership.
+ */
+ ASMAtomicIncS32(&pThis->cLockers);
+ ASMAtomicCmpXchgHandle(&pThis->hOwner, hSelf, NIL_RTNATIVETHREAD, fRc);
+ if (!fRc)
+ {
+     uint32_t cSpins;
+
+     /*
+     * It's busy. Check if it's an attempt at nested access.
+     */
+     if (RT_UNLIKELY(pThis->hOwner == hSelf))
rtSemSpinMutexLeave(&State);
return VERR_SEM_NESTED;

/*
 * Return if we're in interrupt context and the semaphore isn't
 * configure to be interrupt safe.
 */
if (rc == VINF_SEM_BAD_CONTEXT)
{
    rtSemSpinMutexLeave(&State);
    return VERR_SEM_BAD_CONTEXT;
}

/*
 * Ok, we have to wait.
 */
if (State.fSpin)
{
    for (cSpins = 0; ; cSpins++)
    {
        ASMAtomicCmpXchgHandle(&pThis->hOwner, hSelf, NIL_RTNATIVETHREAD, fRc);
        if (fRc)
            break;
        ASMNopPause();
        if (RT_UNLIKELY(pThis->u32Magic != RTSEMSPINMUTEX_MAGIC))
        {
            rtSemSpinMutexLeave(&State);
            return VERR_SEM_DESTROYED;
        }

        /*
         * "Yield" once in a while. This may lower our IRQL/PIL which
         * may preemting us, and it will certainly stop the hammering
         * of hOwner for a little while.
         */
        if ((cSpins & 0x7f) == 0x1f)
        {
            rtSemSpinMutexLeave(&State);
            rtSemSpinMutexEnter(&State, pThis);
            Assert(State.fSpin);
        }
    }
}

else
{

for (cSpins = 0; cSpins++)
{
    ASMAtomicCmpXchgHandle(&pThis->hOwner, hSelf, NIL_RTNATIVETHREAD, fRc);
    if (!fRc)
        break;
    ASMNopPause();
    if (RT_UNLIKELY(pThis->u32Magic != RTSEMSPINMUTEX_MAGIC))
    {
        rtSemSpinMutexLeave(&State);
        return VERR_SEM_DESTROYED;
    }
    if ((cSpins & 15) == 15) /* spin a bit before going sleep (again). */
    {
        rtSemSpinMutexLeave(&State);
        rc = RTSemEventWait(pThis->hEventSem, RT_INDEFINITE_WAIT);
        ASMCompilerBarrier();
        if (RT_SUCCESS(rc))
            AssertReturn(pThis->u32Magic == RTSEMSPINMUTEX_MAGIC, VERR_SEM_DESTROYED);
        else if (rc == VERR_INTERRUPTED)
            AssertRC(rc); /* shouldn't happen */
        else
        {
            AssertRC(rc);
            return rc;
        }
        rc = rtSemSpinMutexEnter(&State, pThis);
        AssertRCReturn(rc, rc);
        Assert(!State.fSpin);
    }
}
/*
 * We're the semaphore owner.
 */
pThis->SavedState = State;
Assert(pThis->hOwner == hSelf);
return VINF_SUCCESS;
}
RTSEMSPINMUTEXINTERNAL *pThis = hSpinMtx;
RTNATIVETHREAD hSelf = RTThreadNativeSelf();
uint32_t cLockers;
RTSEMSPINMUTEXSTATE State;
bool fRc;

Assert(hSelf != NIL_RTNATIVETHREAD);
RTSEMSPINMUTEX_VALIDATE_RETURN(pThis);

/*
 * Get the saved state and try release the semaphore.
 */
State = pThis->SavedState;
ASMCompilerBarrier();
ASMAtomicCmpXchgHandle(&pThis->hOwner, NIL_RTNATIVETHREAD, hSelf, fRc);
AssertMsgReturn(fRc,
                    ("hOwner=%p hSelf=%p cLockers=%d\n", pThis->hOwner, hSelf, pThis->cLockers),
                    VERR_NOT_OWNER);

cLockers = ASMAtomicDecS32(&pThis->cLockers);
rtSemSpinMutexLeave(&State);
if (cLockers > 0)
{
    int rc = RTSemEventSignal(pThis->hEventSem);
    AssertReleaseMsg(RT_SUCCESS(rc), ("RTSemEventSignal -> %Rrc\n", rc));
}
return VINF_SUCCESS;

RT_EXPORT_SYMBOL(RTSemSpinMutexRelease);

RTDECL(int) RTSemSpinMutexDestroy(RTSEMSPINMUTEX hSpinMtx)
{ RTSEMSPINMUTEXINTERNAL *pThis;
RTSEMEVENT hEventSem;
int rc;

if (hSpinMtx == NIL_RTSEMSPINMUTEX)
    return VINF_SUCCESS;
pThis = hSpinMtx;
RTSEMSPINMUTEX_VALIDATE_RETURN(pThis);

/* No destruction races allowed! */
AssertMsg(  pThis->cLockers == 0
            && pThis->hOwner == NIL_RTNATIVETHREAD,
            ("pThis=%p cLockers=%d hOwner=%p\n", pThis, pThis->cLockers, pThis->hOwner));

/*
Invalidate the structure, free the mutex and free the structure.

```
+     */
+     ASMAtomicWriteU32(&pThis->u32Magic, RTSEMSPINMUTEX_MAGIC_DEAD);
+     hEventSem        = pThis->hEventSem;
+     pThis->hEventSem = NIL_RTSEMEVENT;
+     rc = RTSemEventDestroy(hEventSem); AssertRC(rc);
+
+     RTMemFree(pThis);
+     return rc;
+}
```

RT_EXPORT_SYMBOL(RTSemSpinMutexDestroy);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/initterm-r0drv.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/initterm-r0drv.c
@@ -0,0 +1,164 @@
+/** $Id: initterm-r0drv.cpp $ */
+/** @file
+ * IPRT - Initialization & Termination, R0 Driver, Common.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#include <iprt/initterm.h>
#include "internal/iprt.h"
+
#include <iprt/asm.h>
+#include <iprt/assert.h>
+#include <iprt/err.h>
+#include <iprt/mp.h>
+#include <iprt/thread.h>
+#ifndef IN_GUEST /* play safe for now */
+# include "r0drv/mp-r0drv.h"
+# include "r0drv/power-r0drv.h"
+#endif
+
+#include "internal/initterm.h"
+#include "internal/mem.h"
+#include "internal/thread.h"
+
+/*******************************************************************************************
+**************************************
+*   Global Variables                                                                                                             *
+********************************************************************************************
+** Count of current IPRT users.
+ * In ring-0 several drivers / kmods / kexts / wossnames may share the
+ * same runtime code. So, we need to keep count in order not to terminate
+ * it prematurely. */
+static int32_t volatile g_crtR0Users = 0;
+
+/**
+ * Initializes the ring-0 driver runtime library.
+ * @returns iprt status code.
+ * @param   fReserved       Flags reserved for the future.
+ */
+RTR0DECL(int) RTR0Init(unsigned fReserved)
+{
+    int rc;
+    uint32_t cNewUsers;
+    Assert(fReserved == 0); RT_NOREF_PV(fReserved);
+#ifndef RT_OS_SOLARIS       /* On Solaris our thread preemption information is only obtained in
+    RT_ASSERT_PREEMPTIBLE();
+    RT_ASSERT_PREEMPTIBLE();
+#endif
+
+    /* The first user initializes it.
+    * We rely on the module loader to ensure that there are no
+ * initialization races should two modules share the IPRT.
+ */
+ cNewUsers = ASMAtomicIncS32(&g_crtR0Users);
+ if (cNewUsers != 1)
+  {
+    if (cNewUsers > 1)
+      return VINF_SUCCESS;
+    ASMAtomicDecS32(&g_crtR0Users);
+    return VERR_INTERNAL_ERROR_3;
+  }
+
+  rc = rtR0InitNative();
+  if (RT_SUCCESS(rc))
+  {
+    +#ifdef RTR0MEM_WITH_EF_APIS
+    rtR0MemEfInit();
+    +#endif
+    rc = rtThreadInit();
+    if (RT_SUCCESS(rc))
+    {
+      +#ifndef IN_GUEST /* play safe for now */
+      rc = rtR0MpNotificationInit();
+      if (RT_SUCCESS(rc))
+      {
+        rc = rtR0PowerNotificationInit();
+        if (RT_SUCCESS(rc))
+          return rc;
+        rtR0MpNotificationTerm();
+      }
+      +#else
+      if (RT_SUCCESS(rc))
+        return rc;
+      +#endif
+      rtThreadTerm();
+    }
+    +#ifdef RTR0MEM_WITH_EF_APIS
+    rtR0MemEfTerm();
+    +#endif
+    rtR0TermNative();
+  }
+  return rc;
+}  
+RT_EXPORT_SYMBOL(RTR0Init);
+
+
+static void rtR0Term(void)
+{
+  rtThreadTerm();
+}
+ifndef IN_GUEST /* play safe for now */
+    rtR0PowerNotificationTerm();
+    rtR0MpNotificationTerm();
+endif
+#ifdef RTR0MEM_WITH_EF_APIs
+    rtR0MemEfTerm();
+#endif
+    rtR0TermNative();
+
+/*
+ * Terminates the ring-0 driver runtime library.
+ */
+RTR0DECL(void) RTR0Term(void)
+{
+    int32_t cNewUsers;
+    RT_ASSERT_PREEMPTIBLE();
+    cNewUsers = ASMAtomicDecS32(&g_crtR0Users);
+    Assert(cNewUsers >= 0);
+    if (cNewUsers == 0)
+        rtR0Term();
+    else if (cNewUsers < 0)
+        ASMAtomicIncS32(&g_crtR0Users);
+}
+RT_EXPORT_SYMBOL(RTR0Term);
+
+/* Note! Should *not* be exported since it's only for static linking. */
+RTR0DECL(void) RTR0TermForced(void)
+{
+    RT_ASSERT_PREEMPTIBLE();
+    AssertMsg(g_crtR0Users == 1, ("%d
", g_crtR0Users));
+    ASMAtomicWriteS32(&g_crtR0Users, 0);
+    rtR0Term();
+}

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/RTLogWriteDebugger-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/RTLogWriteDebugger-r0drv-linux.c
@@ -0,0 +1,43 @@
+/* $Id: RTLogWriteDebugger-r0drv-linux.c $ */
+/** @file
+ * IPRT - Log To Debugger, Ring-0 Driver, Linux.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
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+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************************
+++ Header Files                                                                                   
*******************************************************************************************/

#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/log.h>

RTDECL(void) RTLogWriteDebugger(const char *pch, size_t cb)
{
    IPRT_LINUX_SAVE_EFL_AC();
    printk("%.*s", (int)cb, pch);
    IPRT_LINUX_RESTORE_EFL_AC();
}

--- linux-4.15.0.org/ubuntu/vbox/vboxguest/r0drv/linux/alloc-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/alloc-r0drv-linux.c
@@ -0,0 +1,501 @@
+/* $Id: alloc-r0drv-linux.c $ */
+/** @file
+ * IPRT - Memory Allocation, Ring-0 Driver, Linux.
+ */
+*/
/*
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 *
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 * you can redistribute it and/or modify it under the terms of the GNU
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 * CDDL are applicable instead of those of the GPL.
 *
 * You may elect to license modified versions of this file under the
 * terms and conditions of either the GPL or the CDDL or both.
 *
 **********************************************************
 * Header Files
 **********************************************************
 */ #include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/mem.h>

#include <iprt/assert.h>
#include <iprt/err.h>
#include "r0drv/alloc-r0drv.h"

#if (defined(RT_ARCH_AMD64) || defined(DOXYGEN_RUNNING)) &&
!defined(RTMEMALLOC_EXEC_HEAP)

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 23)
/**
 * Starting with 2.6.23 we can use __get_vm_area and map_vm_area to allocate
 * memory in the module range. This is preferrable to the exec heap below.
 */
#else
#define RTMEMALLOC_EXEC_VM_AREA
#endif
#endif

/* We need memory in the module range (~2GB to ~0) this can only be obtained
 thru APIs that are not exported (see module_alloc()).
+ * So, we'll have to create a quick and dirty heap here using BSS memory.
+ * Very annoying and it's going to restrict us!
+ */
+# define RTMEMALLOC_EXEC_HEAP
+# endif
+#endif
+
+#ifdef RTMEMALLOC_EXEC_HEAP
+# include <iprt/heap.h>
+# include <iprt/spinlock.h>
+# include <iprt/err.h>
+#endif
+
+/**
 * Extended header used for headers marked with RTMEMHDR_FLAG_EXEC_VM_AREA.
 * 
 * This is used with allocating executable memory, for things like generated
 * code and loaded modules.
 */
typedef struct RTMEMLNXHDREX
{
    /** The VM area for this allocation. */
    struct vm_struct   *pVmArea;
    void               *pvDummy;
    /** The header we present to the generic API. */
    RTMEMHDR            Hdr;
} RTMEMLNXHDREX;

AssertCompileSize(RTMEMLNXHDREX, 32);
/** Pointer to an extended memory header. */
typedef RTMEMLNXHDREX *PRTMEMLNXHDREX;

+/**
 * The heap.
 */
+static RTHEAPSIMPLE g_HeapExec = NIL_RTHEAPSIMPLE;
+/** Spinlock protecting the heap. */
+static RTSPINLOCK g_HeapExecSpinlock = NIL_RTSPINLOCK;
+#endif
+
+/**
+ * API for cleaning up the heap spinlock on IPRT termination.
+ * This is as RTMemExecDonate specific to AMD64 Linux/GNU.
+ */
+DECLHIDDEN(void) rtR0MemExecCleanup(void)
+{
+    #ifdef RTMEMALLOC_EXEC_HEAP
+        RTSpinlockDestroy(g_HeapExecSpinlock);
+        g_HeapExecSpinlock = NIL_RTSPINLOCK;
+    #endif
+}
+
+/**
+ * Donate read+write+execute memory to the exec heap.
+ *
+ * This API is specific to AMD64 and Linux/GNU. A kernel module that desires to
+ * use RTMemExecAlloc on AMD64 Linux/GNU will have to donate some statically
+ * allocated memory in the module if it wishes for GCC generated code to work.
+ * GCC can only generate modules that work in the address range ~2GB to ~0
+ * currently.
+ *
+ * The API only accept one single donation.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_NOT_SUPPORTED if the code isn't enabled.
+ * @param   pvMemory    Pointer to the memory block.
+ * @param   cb          The size of the memory block.
+ */
+RTR0DECL(int) RTR0MemExecDonate(void *pvMemory, size_t cb)
+{
+    #ifdef RTMEMALLOC_EXEC_HEAP
+        int rc;
+        AssertReturn(g_HeapExec == NIL_RTHEAPSIMPLE, VERR_WRONG_ORDER);
+        rc = RTSpinlockCreate(&g_HeapExecSpinlock, RTSPINLOCK_FLAGS_INTERRUPT_SAFE,
+                             "RTMemExecDonate");
+        if (RT_SUCCESS(rc))
+            { rc = RTHEapSimpleInit(&g_HeapExec, pvMemory, cb);
+            if (RT_FAILURE(rc))
+                rtR0MemExecCleanup();
+    #endif
+}
return rc;
#endif
}  
RT_EXPORT_SYMBOL(RTR0MemExecDonate);

#ifdef RTMEMALLOC_EXEC_VM_AREA
/**
 * Allocate executable kernel memory in the module range.
 *
 * @returns Pointer to a allocation header success. NULL on failure.
 *
 * @param cb The size the user requested.
 */
static PRTMEMHDR rtR0MemAllocExecVmArea(size_t cb)
{
    size_t const cbAlloc = RT_ALIGN_Z(sizeof(RTMEMLNXHDREX) + cb, PAGE_SIZE);
    size_t const cPages = cbAlloc >> PAGE_SHIFT;
    struct page **papPages;
    struct vm_struct *pVmArea;
    size_t iPage;

    pVmArea = __get_vm_area(cbAlloc, VM_ALLOC, MODULES_VADDR, MODULES_END);
    if (!pVmArea)
        return NULL;
    pVmArea->nr_pages = 0;    /* paranoia? */
    pVmArea->pages    = NULL; /* paranoia? */

    papPages = (struct page **)kmalloc(cPages * sizeof(papPages[0]), GFP_KERNEL | __GFP_NOWARN);
    if (!papPages)
    {
        vunmap(pVmArea->addr);
        return NULL;
    }

    for (iPage = 0; iPage < cPages; iPage++)
    {
        papPages[iPage] = alloc_page(GFP_KERNEL | __GFP_HIGHMEM | __GFP_NOWARN);
        if (!papPages[iPage])
            break;
    }
    if (iPage == cPages)
/*
 * Map the pages.
 * 
 * Not entirely sure we really need to set nr_pages and pages here, but
 * they provide a very convenient place for storing something we need
 * in the free function, if nothing else...
 */

#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 17, 0)
    struct page **papPagesIterator = papPages;
#endif
    pVmArea->nr_pages = cPages;
    pVmArea->pages = papPages;
    if (!map_vm_area(pVmArea, PAGE_KERNEL_EXEC,
#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 17, 0)
                           &papPagesIterator
#else
                           papPages
#endif
                           ))
    {
        PRTMEMLNXHDREX pHdrEx = (PRTMEMLNXHDREX)pVmArea->addr;
        pHdrEx->pVmArea = pVmArea;
        pHdrEx->pvDummy = NULL;
        return &pHdrEx->Hdr;
    }
    /* bail out */
#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 17, 0)
    pVmArea->nr_pages = papPagesIterator - papPages;
#endif
    vunmap(pVmArea->addr);
    while (iPage-- > 0)
        __free_page(papPages[iPage]);
    kfree(papPages);
    return NULL;
#endif /* RTMEMALLOC_EXEC_VM_AREA */

/**
 * OS specific allocation function.
 */
DECLHIDDEN(int) rtR0MemAllocEx(size_t cb, uint32_t fFlags, PRTMEMHDR *ppHdr)
{
    PRTMEMHDR pHdr;
/* Allocate. */
if (fFlags & RTMEMHDR_FLAG_EXEC)
{
    if (fFlags & RTMEMHDR_FLAG_ANY_CTX)
        return VERR_NOT_SUPPORTED;

#if defined(RT_ARCH_AMD64)
# ifdef RTMEMALLOC_EXEC_HEAP
    if (g_HeapExec != NIL_RTHEAPSIMPLE)
        { 
        RTSpinlockAcquire(g_HeapExecSpinlock);
        pHdr = (PRTMEMHDR)RTHeapSimpleAlloc(g_HeapExec, cb + sizeof(*pHdr), 0);
        RTSpinlockRelease(g_HeapExecSpinlock);
        fFlags |= RTMEMHDR_FLAG_EXEC_HEAP;
        }
    else
        pHdr = NULL;

#if defined(RTMEMALLOC_EXEC_VM_AREA)
    pHdr = rtR0MemAllocExecVmArea(cb);
    fFlags |= RTMEMHDR_FLAG_EXEC_VM_AREA;
#endif /* !RTMEMALLOC_EXEC_HEAP */

#else /* !RTMEMALLOC_EXEC_HEAP */
    pHdr = (PRTMEMHDR)__vmalloc(cb + sizeof(*pHdr), GFP_KERNEL | __GFP_HIGHMEM | __GFP_NOWARN, MY_PAGE_KERNEL_EXEC);
#endif /* !RTMEMALLOC_EXEC_HEAP */

#else /* PAGE_KERNEL_EXEC */
    pHdr = (PRTMEMHDR)__vmalloc(cb + sizeof(*pHdr), GFP_KERNEL | __GFP_HIGHMEM | __GFP_NOWARN, MY_PAGE_KERNEL_EXEC);
#endif /* !RTMEMALLOC_EXEC_HEAP */

else /* !RTMEMALLOC_EXEC_HEAP */
    if (cb <= PAGE_SIZE*16 - sizeof(*pHdr))
        cb <= PAGE_SIZE*16 - sizeof(*pHdr)
    else
        cb <= PAGE_SIZE

    if (fFlags & RTMEMHDR_FLAG_ANY_CTX)

...
+  
+  {  
+    fFlags |= RTMEMHDR_FLAG_KMALLOC;  
+    pHdr = kmalloc(cb + sizeof(*pHdr),  
+                  (fFlags & RTMEMHDR_FLAG_ANY_CTX_ALLOC) ? (GFP_ATOMIC | __GFP_NOWARN)  
+                  : (GFP_KERNEL | __GFP_NOWARN));  
+    if (RT_UNLIKELY(  
+                    !pHdr  
+                    && cb > PAGE_SIZE  
+                    && !(fFlags & RTMEMHDR_FLAG_ANY_CTX) ))  
+      {  
+        fFlags &= ~RTMEMHDR_FLAG_KMALLOC;  
+        pHdr = vmalloc(cb + sizeof(*pHdr));  
+      }  
+    else  
+      {  
+        pHdr = vmalloc(cb + sizeof(*pHdr));  
+      }  
+    if (RT_UNLIKELY(!pHdr))  
+      {  
+        IPRT_LINUX_RESTORE_EFL_AC();  
+        return VERR_NO_MEMORY;  
+      }  
+    /*  
+     * Initialize.  
+     */  
+    pHdr->u32Magic = RTMEMHDR_MAGIC;  
+    pHdr->fFlags = fFlags;  
+    pHdr->cb = cb;  
+    pHdr->cbReq = cb;  
+    +  
+    +  
+    +    +  
+    +  
+    +  
+    +    +  
+    +  
+    +#ifdef RTMEMALLOC_EXEC_HEAP
else if (pHdr->fFlags & RTMEMHDR_FLAG_EXEC_HEAP)
{
    RTSpinlockAcquire(g_HeapExecSpinlock);
    RTHeapSimpleFree(g_HeapExec, pHdr);
    RTSpinlockRelease(g_HeapExecSpinlock);
}
#endif
#endif RTMEMALLOC_EXEC_VM_AREA
else if (pHdr->fFlags & RTMEMHDR_FLAG_EXEC_VM_AREA)
{
    PRTMEMLNXHDREX pHdrEx    = RT_FROM_MEMBER(pHdr, RTMEMLNXHDREX, Hdr);
    size_t     iPagen     = pHdrEx->pVmArea->nr_pages;
    struct page  **papPages  = pHdrEx->pVmArea->pages;
    void          *pvMapping = pHdrEx->pVmArea->addr;

    vunmap(pvMapping);

    while (iPage-- > 0)
    {
        __free_page(papPages[iPage]);
        kfree(papPages);
    }
#endif
else
    vfree(pHdr);

IPRT_LINUX_RESTORE_EFL_AC();
}

/**
 * Compute order. Some functions allocate 2^order pages.
 *
 * @returns order.
 * @param   cPages      Number of pages.
 */
static int CalcPowerOf2Order(unsigned long cPages)
{
    int             iOrder;
    unsigned long   cTmp;

    for (iOrder = 0, cTmp = cPages; cTmp >>= 1; ++iOrder)
        ;
    if (cPages & ~(1 << iOrder))
        ++iOrder;
    return iOrder;
}
+/**
+ * Allocates physical contiguous memory (below 4GB).
+ * The allocation is page aligned and the content is undefined.
+ *
+ * @returns Pointer to the memory block. This is page aligned.
+ * @param  pPhys  Where to store the physical address.
+ * @param  cb     The allocation size in bytes. This is always
+ *               rounded up to PAGE_SIZE.
+ */
+RTR0DECL(void *) RTMemContAlloc(PRTCCPHYS pPhys, size_t cb)
+
+ int     cOrder;
+ unsigned cPages;
+ struct page *paPages;
+ void    *pvRet;
+ IPRT_LINUX_SAVE_EFL_AC();
+
+ /*
+ * validate input.
+ */
+ Assert(VALID_PTR(pPhys));
+ Assert(cb > 0);
+
+ /*
+ * Allocate page pointer array.
+ */
+ cb = RT_ALIGN_Z(cb, PAGE_SIZE);
+ cPages = cb >> PAGE_SHIFT;
+ cOrder = CalcPowerOf2Order(cPages);
+#if (defined(RT_ARCH_AMD64) || defined(CONFIG_X86_PAE)) && defined(GFP_DMA32)
+ /* ZONE_DMA32: 0-4GB */
+ paPages = alloc_pages(GFP_DMA32 | __GFP_NOWARN, cOrder);
+ if (!paPages)
+     if (paPages)
+ #endif
+ #ifdef RT_ARCH_AMD64
+ /* ZONE_DMA; 0-16MB */
+ paPages = alloc_pages(GFP_DMA | __GFP_NOWARN, cOrder);
+ #else
+ /* ZONE_NORMAL; 0-896MB */
+ paPages = alloc_pages(GFP_USER | __GFP_NOWARN, cOrder);
+ #endif
+ if (paPages)
+ {
+ /*
+ * Reserve the pages and mark them executable.
+ */
+ /*
unsigned iPage;
for (iPage = 0; iPage < cPages; iPage++)
{
    Assert(!PageHighMem(&paPages[iPage]));
    if (iPage + 1 < cPages)
    {
        AssertMsg((uintptr_t)phys_to_virt(page_to_phys(&paPages[iPage])) + PAGE_SIZE
            == (uintptr_t)phys_to_virt(page_to_phys(&paPages[iPage + 1]))
            && page_to_phys(&paPages[iPage]) + PAGE_SIZE
            == page_to_phys(&paPages[iPage + 1]),
            ("iPage=%i cPages=%u [0]=%#llx,%p [1]=%#llx,%p\n", iPage, cPages,
             (long long)page_to_phys(&paPages[iPage]), phys_to_virt(page_to_phys(&paPages[iPage])),
             (long long)page_to_phys(&paPages[iPage + 1]), phys_to_virt(page_to_phys(&paPages[iPage + 1]))));
    }
    SetPageReserved(&paPages[iPage]);
    /*if LINUX_VERSION_CODE > KERNEL_VERSION(2, 4, 20) /**< @todo find the exact kernel where change_page_attr was introduced. */
    MY_SET_PAGES_EXEC(&paPages[iPage], 1);
    */
}
*pPhys = page_to_phys(paPages);
pvRet = phys_to_virt(page_to_phys(paPages));
}
else
    pvRet = NULL;

IPRT_LINUX_RESTORE_EFL_AC();
return pvRet;

/* Frees memory allocated using RTMemContAlloc().
 *
 *@param pv Pointer to return from RTMemContAlloc().
 *@param cb The cb parameter passed to RTMemContAlloc().
 */
RTR0DECL(void) RTMemContFree(void *pv, size_t cb)
{
    if (pv)
    {
        int cOrder;
        unsigned cPages;
        unsigned iPage;
        struct page *paPages;

```
IPRT_LINUX_SAVE_EFL_AC();

/* validate */
AssertMsg(!((uintptr_t)pv & PAGE_OFFSET_MASK), ("pv=%p\n", pv));
Assert(cb > 0);

/* calc order and get pages */
cb = RT_ALIGN_Z(cb, PAGE_SIZE);
cPages = cb >> PAGE_SHIFT;
cOrder = CalcPowerOf2Order(cPages);
paPages = virt_to_page(pv);

/* Restore page attributes freeing the pages. */
for (iPage = 0; iPage < cPages; iPage++)
{
    ClearPageReserved(&paPages[iPage]);
#if LINUX_VERSION_CODE > KERNEL_VERSION(2, 4, 20) /** @todo find the exact kernel where change_page_attr was introduced. */
    MY_SET_PAGES_NOEXEC(&paPages[iPage], 1);
#endif
}
__free_pages(paPages, cOrder);
IPRT_LINUX_RESTORE_EFL_AC();

RT_EXPORT_SYMBOL(RTMemContFree);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/assert-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/assert-r0drv-linux.c
@@ -0,0 +1,74 @@
+/* $Id: assert-r0drv-linux.c $ */
+/** @file
+ * IPRT - Assertion Workers, Ring-0 Drivers, Linux.
+ */
+/
+/
+/* Copyright (C) 2007-2017 Oracle Corporation
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
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+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ /*******************************************************************************************
+ **************************************
+ *   Header Files                                                                                                                 *
+ *******************************************************************************************/
+
+#include "the-linux-kernel.h"
+#include "internal/iprt.h"
+
+#include <iprt/assert.h>
+#include <iprt/log.h>
+#include <iprt/string.h>
+#include <iprt/stdarg.h>
+#include <iprt/asm.h>
+
+#include "internal/assert.h"
+
+
+DECLHIDDEN(void) rtR0AssertNativeMsg1(const char *pszExpr, unsigned uLine, const char *pszFile, const char *pszFunction)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+    printk(KERN_EMERG "
!!Assertion Failed!!
"Expression: %s
"Location  : %s(%d) %s
",
+           pszExpr, pszFile, uLine, pszFunction);
+    IPRT_LINUX_RESTORE_EFL_AC();
+
+}

+DECLHIDDEN(void) rtR0AssertNativeMsg2V(bool fInitial, const char *pszFormat, va_list va)
+{
+    char szMsg[256];
+    IPRT_LINUX_SAVE_EFL_AC();
+    RTStrPrintfV(szMsg, sizeof(szMsg) - 1, pszFormat, va);
+    szMsg[sizeof(szMsg) - 1] = '\0';
+}
+ printk(KERN_EMERG "\%s", szMsg);
+ NOREF(Initial);
+ IPRT_LINUX_RESTORE_EFL_AC();
+
+RTR0DECL(void) RTR0AssertPanicSystem(void)
+
+ panic("%s%s", g_szRTAssertMsg1, g_szRTAssertMsg2);
+
+RT_EXPORT_SYMBOL(RTR0AssertPanicSystem);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/initterm-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/initterm-r0drv-linux.c
@@ -0,0 +1,137 @@
+/* $Id: initterm-r0drv-linux.c $ */
+/** @file
+ * IPRT - Initialization & Termination, R0 Driver, Linux.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+/* This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+/* The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+/* You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/**/
```c
#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/err.h>
#include <iprt/assert.h>
#include "internal/initterm.h"

 /*******************************************************************************************
 **************************************
 +* Global Variables
 +*******************************************************************************************
 ** The IPRT work queue. */
 +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
 +static struct workqueue_struct *g_prtR0LnxWorkQueue;
 +#else
 +static DECLARE_TASK_QUEUE(g_rtR0LnxWorkQueue);
 +#endif

 /*******************************************************************************************
 **************************************
 +* Internal Functions
 +*******************************************************************************************
 /* in alloc-r0drv0-linux.c */
 +DECLHIDDEN(void) rtR0MemExecCleanup(void);
 +
 +
 +/#**
 +# Pushes an item onto the IPRT work queue.
 +/**
 + #param pWork The work item.
 + #param pfnWorker The callback function. It will be called back
 + #with @a pWork as argument.
 +#/**
 +DECLHIDDEN(void) rtR0LnxWorkqueuePush(RTR0LNXWORKQUEUEITEM *pWork, void (*pfnWorker)(RTR0LNXWORKQUEUEITEM *))
 +{
 +    IPRT_LINUX_SAVE_EFL_AC();
 +
 +    if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
 +    if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 20)
 +       INIT_WORK(pWork, pfnWorker);
 +    else
 +       INIT_WORK(pWork, pfnWorker, pWork);
 +    endif
 +    queue_work(g_prtR0LnxWorkQueue, pWork);
 ```
+  INIT_TQUEUE(pWork, (void (*)(void *))pfnWorker, pWork);
+  queue_task(pWork, &g_rtR0LnxWorkQueue);
+  
+  +    INIT_TQUEUE(pWork, (void (*)(void *))pfnWorker, pWork);
+  +    queue_task(pWork, &g_rtR0LnxWorkQueue);
+  +#endif
+  +  +  IPRT_LINUX_RESTORE_EFL_AC();
+  +}
+  +  +/**
+  +  * Flushes all items in the IPRT work queue.
+  +  *
+  +  * @remarks This is mostly for 2.4.x compatibility. Must not be called from
+  +  * atomic contexts or with unnecessary locks held.
+  +  */
+  +DECLHIDDEN(void) rtR0LnxWorkqueueFlush(void)
+  +{
+  +  IPRT_LINUX_SAVE_EFL_AC();
+  +  +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
+  +  if (LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41))
+  +  flush_workqueue(g_prtR0LnxWorkQueue);
+  +  +#else
+  +  run_task_queue(&g_rtR0LnxWorkQueue);
+  +  +#endif
+  +  +  IPRT_LINUX_RESTORE_EFL_AC();
+  +}
+  +  +
+  +DECLHIDDEN(int) rtR0InitNative(void)
+  +{
+  +  int rc = VINF_SUCCESS;
+  +  IPRT_LINUX_SAVE_EFL_AC();
+  +  +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
+  +  if (LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41))
+  +  g_prtR0LnxWorkQueue = create_workqueue("iprt-VBoxWQueue");
+  +  +#else
+  +  g_prtR0LnxWorkQueue = create_workqueue("iprt-VBoxQ");
+  +  +#endif
+  +  if (!g_prtR0LnxWorkQueue)
+  +  rc = VERR_NO_MEMORY;
+  +  +#endif
+  +  +  IPRT_LINUX_RESTORE_EFL_AC();
+  +  return rc;
+  +}
DECLHIDDEN(void) rtR0TermNative(void)
{
    IPRT_LINUX_SAVE_EFL_AC();

    rtR0LnxWorkqueueFlush();
    if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
        destroy_workqueue(g_prtR0LnxWorkQueue);
    g_prtR0LnxWorkQueue = NULL;
#endif

    rtR0MemExecCleanup();

    IPRT_LINUX_RESTORE_EFL_AC();
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/memobj-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/memobj-r0drv-linux.c
@@ -0,0 +1,1767 @@
/* $Id: memobj-r0drv-linux.c $ */
/** @file
 * IPRT - Ring-0 Memory Objects, Linux.
 */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
*/

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

-------------------------------------------------------------------
/* Header Files */

#include "the-linux-kernel.h"
+
#include <iprt/memobj.h>
#include <iprt/alloc.h>
#include <iprt/assert.h>
#include <iprt/log.h>
#include <iprt/process.h>
#include <iprt/string.h>
#include "internal/memobj.h"
+
="/*******************************************************************************************/

/* Defined Constants And Macros */

"early 2.6 kernels" */
#ifndef PAGE_SHARED_EXEC
#define PAGE_SHARED_EXEC PAGE_SHARED
#endif
#ifndef PAGE_READONLY_EXEC
#define PAGE_READONLY_EXEC PAGE_READONLY
#endif

"2.6.29+ kernels don’t work with remap_pfn_range() anymore because
* track_pfn_vma_new() is apparently not defined for non-RAM pages.
* It should be safe to use vm_insert_page() older kernels as well.
" */
#ifndef LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 23)
#define VBOX_USE_INSERT_PAGE
#endif
#ifndef defined(CONFIG_X86_PAE) \ 
  || ( defined(HAVE_26_STYLE_REMAP_PAGE_RANGE) \ 
      && ( LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0) \ 
          && LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 11))))
#define VBOX_USE_PAE_HACK
#endif
+
="/*******************************************************************************************/

/* Structures and Typedefs */

"structures and typedefs" */
+/**
+ * The Darwin version of the memory object structure.
+ */
+typedef struct RTR0MEMOBJLNX
+{
+   /**< The core structure. */
+   RTR0MEMOBJINTERNAL Core;
+   /**< Set if the allocation is contiguous.
+     * This means it has to be given back as one chunk. */
+   bool fContiguous;
+   /**< Set if we've vmap'ed the memory into ring-0. */
+   bool fMappedToRing0;
+   /**< The pages in the apPages array. */
+   size_t cPages;
+   /**< Array of struct page pointers. (variable size) */
+   struct page *apPages[1];
+} RTR0MEMOBJLNX, *PRTR0MEMOBJLNX;
+
+static void rtR0MemObjLinuxFreePages(PRTR0MEMOBJLNX pMemLnx);
+
+/**
+ * Helper that converts from a RTR0PROCESS handle to a linux task.
+ *
+ * @returns The corresponding Linux task.
+ * @param   R0Process   IPRT ring-0 process handle.
+ */
+static struct task_struct *rtR0ProcessToLinuxTask(RTR0PROCESS R0Process)
+{
+    /**< @todo fix rtR0ProcessToLinuxTask!! */
+    /**< @todo many (all?) callers currently assume that we return 'current'! */
+    return R0Process == RTR0ProcHandleSelf() ? current : NULL;
+}
+
+/**
+ * Compute order. Some functions allocate 2^order pages.
+ *
+ * @returns order.
+ * @param   cPages      Number of pages.
+ */
+static int rtR0MemObjLinuxOrder(size_t cPages)
+{
+    int iOrder;
+    size_t cTmp;
+    
+    for (iOrder = 0, cTmp = cPages; cTmp >>= 1; ++iOrder)
+    if (cPages & ~((size_t)1 << iOrder))
+        ++iOrder;
+    
+    return iOrder;
+}
+
+/**
+ * Converts from RTMEM_PROT_* to Linux PAGE_*.
+ * @returns Linux page protection constant.
+ * @param   fProt       The IPRT protection mask.
+ * @param   fKernel     Whether it applies to kernel or user space.
+ */
+static pgprot_t rt0MemObjLinuxConvertProt(unsigned fProt, bool fKernel)
+{
+    switch (fProt)
+    {
+        default:
+            AssertMsgFailed(("%#x %d\n", fProt, fKernel));
+        case RTMEM_PROT_NONE:
+            return PAGE_NONE;
+        case RTMEM_PROT_READ:
+            return fKernel ? PAGE_KERNEL_RO : PAGE_READONLY;
+        case RTMEM_PROT_WRITE:
+        case RTMEM_PROT_WRITE | RTMEM_PROT_READ:
+            return fKernel ? PAGE_KERNEL : PAGE_SHARED;
+        case RTMEM_PROT_EXEC:
+        case RTMEM_PROT_EXEC | RTMEM_PROT_READ:
+            #if defined(RT_ARCH_X86) || defined(RT_ARCH_AMD64)
+                if (fKernel)
+                {
+                    pgprot_t fPg = MY_PAGE_KERNEL_EXEC;
+                    pgprot_val(fPg) &= ~_PAGE_RW;
+                    return fPg;
+                }
+                return PAGE_READONLY_EXEC;
+            #else
+                return fKernel ? MY_PAGE_KERNEL_EXEC : PAGE_READONLY_EXEC;
+            #endif
+        case RTMEM_PROT_WRITE | RTMEM_PROT_EXEC:
+        case RTMEM_PROT_WRITE | RTMEM_PROT_EXEC | RTMEM_PROT_READ:
+            return fKernel ? MY_PAGE_KERNEL_EXEC : PAGE_SHARED_EXEC;
Worker for rtR0MemObjNativeReserveUser and rtR0MemObjNativeMapUser that creates
an empty user space mapping.

We acquire the mmap_sem of the task!

@returns Pointer to the mapping.
( void *)-1 on failure.

@param R3PtrFixed ( RTR3PTR)-1 if anywhere, otherwise a specific location.
@param cb The size of the mapping.
@param uAlignment The alignment of the mapping.
@param pTask The Linux task to create this mapping in.
@param fProt The RTMEM_PROT_* mask.

static void *rtR0MemObjLinuxDoMmap(RTR3PTR R3PtrFixed, size_t cb, size_t uAlignment, struct task_struct *pTask, unsigned fProt)
{
    unsigned fLnxProt;
    unsigned long ulAddr;

    Assert(pTask == current); /* do_mmap */
    RT_NOREF_PV(pTask);

    /* Convert from IPRT protection to mman.h PROT_ and call do_mmap. */
    fProt &= (RTMEM_PROT_NONE | RTMEM_PROT_READ | RTMEM_PROT_WRITE | RTMEM_PROT_EXEC);
    if (fProt == RTMEM_PROT_NONE)
        fLnxProt = PROT_NONE;
    else
    {
        fLnxProt = 0;
        if (fProt & RTMEM_PROT_READ)
            fLnxProt |= PROT_READ;
        if (fProt & RTMEM_PROT_WRITE)
            fLnxProt |= PROT_WRITE;
        if (fProt & RTMEM_PROT_EXEC)
            fLnxProt |= PROT_EXEC;
    }

    if (R3PtrFixed != ( RTR3PTR)-1)
    {
        if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 5, 0)
+ ulAddr = vm_mmap(NULL, R3PtrFixed, cb, fLnxProt, MAP_SHARED | MAP_ANONYMOUS | MAP_FIXED, 0);
+ #else
+     down_write(&pTask->mm->mmap_sem);
+     ulAddr = do_mmap(NULL, R3PtrFixed, cb, fLnxProt, MAP_SHARED | MAP_ANONYMOUS | MAP_FIXED, 0);
+     up_write(&pTask->mm->mmap_sem);
+ #endif
+ }}
+ else
+ { #if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 5, 0)
+     ulAddr = vm_mmap(NULL, 0, cb, fLnxProt, MAP_SHARED | MAP_ANONYMOUS, 0);
+ #else
+     down_write(&pTask->mm->mmap_sem);
+     ulAddr = do_mmap(NULL, 0, cb, fLnxProt, MAP_SHARED | MAP_ANONYMOUS, 0);
+     up_write(&pTask->mm->mmap_sem);
+ #endif
+     if (    !(ulAddr & ~PAGE_MASK)
+         && (ulAddr & (uAlignment - 1)))
+     { /* @todo implement uAlignment properly... We'll probably need to make some dummy mappings to fill
+         * up alignment gaps. This is of course complicated by fragmentation (which we might have cause
+         * ourselves) and further by there being two mmap strategies (top / bottom). */
+         /* For now, just ignore uAlignment requirements... */
+     } + }
+ else
+ if (ulAddr & ~PAGE_MASK) /* ~PAGE_MASK == PAGE_OFFSET_MASK */
+     return (void *)-1;
+ return (void *)ulAddr; + }
+ + + + 
+ /**
+ * Worker that destroys a user space mapping.
+ * Undoes what rtR0MemObjLinuxDoMmap did.
+ *
+ * We acquire the mmap_sem of the task!
+ *
+ * @param   pv          The ring-3 mapping.
+ * @param   cb          The size of the mapping.
+ * @param   pTask       The Linux task to destroy this mapping in.
+ */
+ static void rtR0MemObjLinuxDoMunmap(void *pv, size_t cb, struct task_struct *pTask) + {
+ #if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 5, 0)
Assert(pTask == current); RT_NOREF_PV(pTask);
vm_munmap((unsigned long)pv, cb);
+\#elif defined(USE_RHEL4_MUNMAP)
+    down_write(&pTask->mm->mmap_sem);
+    do_munmap(pTask->mm, (unsigned long)pv, cb, 0); /* should it be 1 or 0? */
+    up_write(&pTask->mm->mmap_sem);
+\#else
+    down_write(&pTask->mm->mmap_sem);
+    do_munmap(pTask->mm, (unsigned long)pv, cb);
+    up_write(&pTask->mm->mmap_sem);
+\#endif
+
+\*/
+ * Internal worker that allocates physical pages and creates the memory object for them.
+ *
+ * @returns IPRT status code.
+ * @param   ppMemLnx   Where to store the memory object pointer.
+ * @param   enmType    The object type.
+ * @param   cb         The number of bytes to allocate.
+ * @param   uAlignment The alignment of the physical memory.
+ * Only valid if fContiguous == true, ignored otherwise.
+ * @param   fFlagsLnx  The page allocation flags (GPFs).
+ * @param   fContiguous Whether the allocation must be contiguous.
+ * @param   rcNoMem    What to return when we're out of pages.
+ *
+*/
+static int rtR0MemObjLinuxAllocPages(PRTR0MEMOBJLNX *ppMemLnx, RTR0MEMOBJTYPE enmType,
    size_t cb,
+    size_t uAlignment, unsigned fFlagsLnx, bool fContiguous, int rcNoMem)
+{
+    size_t          iPage;
+    size_t const    cPages = cb >> PAGE_SHIFT;
+    struct page    *paPages;
+
+    /*
+     * Allocate a memory object structure that's large enough to contain
+     * the page pointer array.
+     */
+    PRTR0MEMOBJLNX  pMemLnx =
(PRTR0MEMOBJLNX)rtR0MemObjNew(RT_OFFSETOF(RTR0MEMOBJLNX, apPages[cPages]), enmType,
    NULL, cb);
+    if (!pMemLnx)
+        return VERR_NO_MEMORY;
+    pMemLnx->cPages = cPages;
+
+    if (cPages > 255)
+    {
ifdef __GFP_REPEAT
+     /* Try hard to allocate the memory, but the allocation attempt might fail. */
+     ifFlagsLnx |= __GFP_REPEAT;
#endif
ifdef __GFP_NOMEMALLOC
+     /* Introduced with Linux 2.6.12: Don't use emergency reserves */
+     ifFlagsLnx |= __GFP_NOMEMALLOC;
#endif
}
 /* Allocate the pages.
 * For small allocations we'll try contiguous first and then fall back on page by page.
 */
# ifndef LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 22)
+     if ( fContiguous
t +       || cb <= PAGE_SIZE * 2)
+     {
+ # ifdef VBOX_USE_INSERT_PAGE
+         paPages = alloc_pages(fFlagsLnx | __GFP_COMP | __GFP_NOWARN, rtR0MemObjLinuxOrder(cPages));
+ # else
+         paPages = alloc_pages(fFlagsLnx | __GFP_NOWARN, rtR0MemObjLinuxOrder(cPages));
+ # endif
+     }
+     else if (fContiguous)
+     {
+         rtR0MemObjDelete(&pMemLnx->Core);
+         return rcNoMem;
+     }
+     else
+     {
+         for (iPage = 0; iPage < cPages; iPage++)
+         pMemLnx->apPages[iPage] = &paPages[iPage];
+     }
+     else if (!fContiguous)
+     {
+         for (iPage = 0; iPage < cPages; iPage++)
+         {
+             pMemLnx->apPages[iPage] = alloc_page(fFlagsLnx | __GFP_NOWARN);
+             if (RT_UNLIKELY(!pMemLnx->apPages[iPage]))
+             {
+                 while (iPage-- > 0)
+                     __free_page(pMemLnx->apPages[iPage]);
+                 rtR0MemObjDelete(&pMemLnx->Core);
+                 return rcNoMem;
+             }
+         }
+     }
+ }
+ } 
+ } 
+ }
+
+ +#else /* < 2.4.22 */
+ + /* @todo figure out why we didn't allocate page-by-page on 2.4.21 and older... */
+ + paPages = alloc_pages(fFlagsLnx, rtR0MemObjLinuxOrder(cPages));
+ + if (!paPages)
+ + { 
+ +     rtR0MemObjDelete(&pMemLnx->Core);
+ +     return rcNoMem;
+ + } 
+ + for (iPage = 0; iPage < cPages; iPage++)
+ + {
+ +     pMemLnx->apPages[iPage] = &paPages[iPage];
+ +     MY_SET_PAGES_EXEC(pMemLnx->apPages[iPage], 1);
+ +     if (PageHighMem(pMemLnx->apPages[iPage]))
+ +         BUG();
+ + }
+ + fContiguous = true;
+ +#endif /* < 2.4.22 */
+ + pMemLnx->fContiguous = fContiguous;
+ +
+ +#if LINUX_VERSION_CODE < KERNEL_VERSION(4, 5, 0)
+ + /*
+ * Reserve the pages.
+ * *
+ * Linux >= 4.5 with CONFIG_DEBUG_VM panics when setting PG_reserved on compound
+ * pages. According to Michal Hocko this shouldn't be necessary anyway because
+ * as pages which are not on the LRU list are never evictable.
+ * */
+ + for (iPage = 0; iPage < cPages; iPage++)
+ +     SetPageReserved(pMemLnx->apPages[iPage]);
+ +#endif
+ +
+ + /*
+ * Note that the physical address of memory allocated with alloc_pages(flags, order)
+ * is always 2^(PAGE_SHIFT+order)-aligned.
+ */
+ + if ( fContiguous
+ +     && uAlignment > PAGE_SIZE)
+ + { 
+ +     /*
+     * Check for alignment constraints. The physical address of memory allocated with
+     * alloc_pages(flags, order) is always 2^(PAGE_SHIFT+order)-aligned.
+     */
+ +     if (RT_UNLIKELY(page_to_phys(pMemLnx->apPages[0]) & (uAlignment - 1)))
+ + { 

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/*
 * This should never happen!
 */
printk("rtR0MemObjLinuxAllocPages(cb=0x%lx, uAlignment=0x%lx): alloc_pages(..., %d) returned
physical memory at 0x%lx!
",
(unsigned long)cb, (unsigned long)uAlignment, rtR0MemObjLinuxOrder(cPages), (unsigned
long)page_to_phys(pMemLnx->apPages[0]));
rtR0MemObjLinuxFreePages(pMemLnx);
return rcNoMem;
}

*ppMemLnx = pMemLnx;
return VINF_SUCCESS;
}

/**
 * Frees the physical pages allocated by the rtR0MemObjLinuxAllocPages() call.
 */
*
@param pMemLnx The object which physical pages should be freed.
* /
static void rtR0MemObjLinuxFreePages(PRTR0MEMOBJLNX pMemLnx)
{
    size_t iPage = pMemLnx->cPages;
    if (iPage > 0)
    {
        /* Restore the page flags.
        */
        while (iPage-- > 0)
        {
            /* See SetPageReserved() in rtR0MemObjLinuxAllocPages()
            */
            ClearPageReserved(pMemLnx->apPages[iPage]);
#endif
            MY_SET_PAGES_NOEXEC(pMemLnx->apPages[iPage]);
        }
#endif
        /* Free the pages.
        */
    }
    /* Free the pages.
    */
}
/*
+ if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 22)
+ if (!pMemLnx->fContiguous)
+ {
+     iPage = pMemLnx->cPages;
+     while (iPage-- > 0)
+         __free_page(pMemLnx->apPages[iPage]);
+ }
+ else
+     __free_pages(pMemLnx->apPages[0], rtR0MemObjLinuxOrder(pMemLnx->cPages));
+ pMemLnx->cPages = 0;
+ }
+}
+}
+*/
+ * Maps the allocation into ring-0.
+ *
+ * This will update the RTR0MEMOBJLNX::Core.pv and RTR0MEMOBJ::fMappedToRing0 members.
+ *
+ * Contiguous mappings that isn't in 'high' memory will already be mapped into kernel
+ * space, so we'll use that mapping if possible. If execute access is required, we'll
+ * play safe and do our own mapping.
+ *
+ * @returns IPRT status code.
+ * @param   pMemLnx     The linux memory object to map.
+ * @param   fExecutable Whether execute access is required.
+ */
+static int rtR0MemObjLinuxVMap(PRTR0MEMOBJLNX pMemLnx, bool fExecutable)
+{
+    int re = VINF_SUCCESS;
+    /*
+     * Choose mapping strategy.
+     */
+    bool fMustMap = fExecutable
+        || !pMemLnx->fContiguous;
+    if (!fMustMap)
+    {
+        size_t iPage = pMemLnx->cPages;
+        while (iPage-- > 0)
+            if (PageHighMem(pMemLnx->apPages[iPage]))
+                break;
+    }
+    fMustMap = true;
+ } 
+ + Assert(!pMemLnx->Core.pv); 
+ + Assert(!pMemLnx->fMappedToRing0); 
+ + if (fMustMap) 
+ + { 
+ + /*
+ + * Use vmap - 2.4.22 and later.
+ + */
+ +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 22)
+ + pgprot_t fPg;
+ + pgprot_val(fPg) = _PAGE_PRESENT | _PAGE_RW;
+ +# ifdef _PAGE_NX
+ + if (!fExecutable)
+ + pgprot_val(fPg) |= _PAGE_NX;
+ +# endif
+ + pMemLnx->Core.pv = vmap(&pMemLnx->apPages[0], pMemLnx->cPages, VM_MAP, fPg);
+ +# endif VM_MAP
+ + pMemLnx->Core.pv = vmap(&pMemLnx->apPages[0], pMemLnx->cPages, VM_ALLOC, fPg);
+ +# else
+ + pMemLnx->Core.pv = phys_to_virt(page_to_phys(pMemLnx->apPages[0]));
+ + else
+ + rc = VERR_MAP_FAILED;
+ +#else /* < 2.4.22 */
+ + rc = VERR_NOT_SUPPORTED;
+ +#endif
+ + }
+ + else
+ + { 
+ + /*
+ + * Use the kernel RAM mapping.
+ + */
+ + pMemLnx->Core.pv = phys_to_virt(page_to_phys(pMemLnx->apPages[0]));
+ + Assert(pMemLnx->Core.pv);
+ + }
+ + return rc;
+ +}
+ +
+ + /*
+ * Undoes what rtR0MemObjLinuxVMap() did.
+ */
+ + @param pMemLnx The linux memory object.
+ static void rtR0MemObjLinuxVUnmap(PRTR0MEMOBJLNX pMemLnx)
+ {
+  +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 22)
+    if (pMemLnx->fMappedToRing0)
+    {
+      Assert(pMemLnx->Core.pv);
+      vunmap(pMemLnx->Core.pv);
+      pMemLnx->fMappedToRing0 = false;
+    }
+  +#else /* < 2.4.22 */
+    Assert(!pMemLnx->fMappedToRing0);
+  +#endif
+  pMemLnx->Core.pv = NULL;
+  }
+
+DECLHIDDEN(int) rtR0MemObjNativeFree(RTR0MEMOBJ pMem)
+{
+  IPRT_LINUX_SAVE_EFL_AC();
+  PRTR0MEMOBJLNX pMemLnx = (PRTR0MEMOBJLNX)pMem;
+  
+  /*
+   * Release any memory that we've allocated or locked.
+   */
+  switch (pMemLnx->Core.enmType)
+  {
+    case RTR0MEMOBJTYPE_LOW:
+    case RTR0MEMOBJTYPE_PAGE:
+    case RTR0MEMOBJTYPE_CONT:
+    case RTR0MEMOBJTYPE_PHYS:
+    case RTR0MEMOBJTYPE_PHYS_NC:
+      rtR0MemObjLinuxVUnmap(pMemLnx);
+      rtR0MemObjLinuxFreePages(pMemLnx);
+      break;
+    
+    case RTR0MEMOBJTYPE_LOCK:
+      if (pMemLnx->Core.u.Lock.R0Process != NIL_RTR0PROCESS)
+      {
+        struct task_struct *pTask = rtR0ProcessToLinuxTask(pMemLnx->Core.u.Lock.R0Process);
+        size_t iPage;
+        Assert(pTask);
+        if (pTask && pTask->mm)
+          down_read(&pTask->mm->mmap_sem);
+        iPage = pMemLnx->cPages;
+        while (iPage-- > 0)
+        {
+          /*
+           */
+        }
+      }
+  }
+}
+ if (!PageReserved(pMemLnx->apPages[iPage]))
    SetPageDirty(pMemLnx->apPages[iPage]);
+if (LINUX_VERSION_CODE >= KERNEL_VERSION(4, 6, 0))
    put_page(pMemLnx->apPages[iPage]);
+else
    page_cache_release(pMemLnx->apPages[iPage]);
+endif
+
+    if (pTask && pTask->mm)
        up_read(&pTask->mm->mmap_sem);
    }
+ /* else: kernel memory - nothing to do here. */
+ break;
+
+ case RTR0MEMOBJTYPE_RES_VIRT:
+    Assert(pMemLnx->Core.pv);
+    if (pMemLnx->Core.u.ResVirt.R0Process != NIL_RTR0PROCESS)
+    {
+        struct task_struct *pTask = rtR0ProcessToLinuxTask(pMemLnx->Core.u.Lock.R0Process);
+        Assert(pTask);
+        if (pTask && pTask->mm)
+            rtR0MemObjLinuxDoMunmap(pMemLnx->Core.pv, pMemLnx->Core.cb, pTask);
+    }
+    else
+    {
+        vunmap(pMemLnx->Core.pv);
+
+        Assert(pMemLnx->cPages == 1 && pMemLnx->apPages[0] != NULL);
+        __free_page(pMemLnx->apPages[0]);
+        pMemLnx->apPages[0] = NULL;
+        pMemLnx->cPages = 0;
+    }
+    pMemLnx->Core.pv = NULL;
+    break;
+
+ case RTR0MEMOBJTYPE_MAPPING:
+    Assert(pMemLnx->cPages == 0); Assert(pMemLnx->Core.pv);
+    if (pMemLnx->Core.u.ResVirt.R0Process != NIL_RTR0PROCESS)
+    {
+        struct task_struct *pTask = rtR0ProcessToLinuxTask(pMemLnx->Core.u.Lock.R0Process);
+        Assert(pTask);
+        if (pTask && pTask->mm)
+            rtR0MemObjLinuxDoMunmap(pMemLnx->Core.pv, pMemLnx->Core.cb, pTask);
+    }
+    else
+        vunmap(pMemLnx->Core.pv);
+    pMemLnx->Core.pv = NULL;
+
break;
+
+
default:
+
AssertMsgFailed(("enmType=%d\n", pMemLnx->Core.enmType));
+
return VERR_INTERNAL_ERROR;
+ }
+ IPRT_LINUX_RESTORE_EFL_ONLY_AC();
+ return VINF_SUCCESS;
+}
+
+
+DECLHIDDEN(int) rtR0MemObjNativeAllocPage(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, bool
fExecutable)
+{
+ IPRT_LINUX_SAVE_EFL_AC();
+ PRTR0MEMOBJLNX pMemLnx;
+ int rc;
+
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 22)
+ rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_PAGE, cb, PAGE_SIZE,
GFP_HIGHUSER,
+
false /* non-contiguous */, VERR_NO_MEMORY);
+#else
+ rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_PAGE, cb, PAGE_SIZE, GFP_USER,
+
false /* non-contiguous */, VERR_NO_MEMORY);
+#endif
+ if (RT_SUCCESS(rc))
+ {
+
rc = rtR0MemObjLinuxVMap(pMemLnx, fExecutable);
+
if (RT_SUCCESS(rc))
+
{
+
*ppMem = &pMemLnx->Core;
+
IPRT_LINUX_RESTORE_EFL_AC();
+
return rc;
+
}
+
+
rtR0MemObjLinuxFreePages(pMemLnx);
+
rtR0MemObjDelete(&pMemLnx->Core);
+ }
+
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return rc;
+}
+
+
+DECLHIDDEN(int) rtR0MemObjNativeAllocLow(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, bool
fExecutable)
+{

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+ IPRT_LINUX_SAVE_EFL_AC();
+ PRTR0MEMOBJLNX pMemLnx;
+ int rc;
+
+ /* Try to avoid GFP_DMA. GFP_DMA32 was introduced with Linux 2.6.15. */
+#if (defined(RT_ARCH_AMD64) || defined(CONFIG_X86_PAE)) && defined(GFP_DMA32)
+ /* ZONE_DMA32: 0-4GB */
+ + rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_LOW, cb, PAGE_SIZE, GFP_DMA32, 
+ +   false /* non-contiguous */, VERR_NO_LOW_MEMORY);
+ + if (RT_FAILURE(rc))
+ +#endif
+ +#ifdef RT_ARCH_AMD64
+ + /* ZONE_DMA: 0-16MB */
+ + rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_LOW, cb, PAGE_SIZE, GFP_DMA, 
+ +   false /* non-contiguous */, VERR_NO_LOW_MEMORY);
+ +#else
+ +# ifdef CONFIG_X86_PAE
+ + # endif
+ + /* ZONE_NORMAL: 0-896MB */
+ + rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_LOW, cb, PAGE_SIZE, GFP_USER, 
+ +   false /* non-contiguous */, VERR_NO_LOW_MEMORY);
+ +#endif
+ + if (RT_SUCCESS(rc))
+ + {
+ +   rc = rtR0MemObjLinuxVMap(pMemLnx, fExecutable);
+ +   if (RT_SUCCESS(rc))
+ +   {
+ +     *ppMem = &pMemLnx->Core;
+ +     IPRT_LINUX_RESTORE_EFL_AC();
+ +     return rc;
+ +   }
+ +   rtR0MemObjLinuxFreePages(pMemLnx);
+ +   rtR0MemObjDelete(&pMemLnx->Core);
+ +   }
+ +   IPRT_LINUX_RESTORE_EFL_AC();
+ + return rc;
+ +}
+ +
+ + DECLHIDDEN(int) rtR0MemObjNativeAllocCont(PPRTR0MEMOBJINTERNAL ppMem, size_t cb, bool fExecutable)
+ {
+ + IPRT_LINUX_SAVE_EFL_AC();
+ +
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+ PRTR0MEMOBJLNX pMemLnx;
+ int rc;
+
+ +#if (defined(RT_ARCH_AMD64) || defined(CONFIG_X86_PAE)) && defined(GFP_DMA32)
+ /* ZONE_DMA32: 0-4GB */
+ rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_CONT, cb, PAGE_SIZE, GFP_DMA32,
+    true /* contiguous */, VERR_NO_CONT_MEMORY);
+ if (RT_FAILURE(rc))
+ +#endif
+ICTURE DEBUGRT_ARCH_AMD64
+ /* ZONE_DMA: 0-16MB */
+ rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_CONT, cb, PAGE_SIZE, GFP_DMA,
+    true /* contiguous */, VERR_NO_CONT_MEMORY);
+ +#else
+ /* ZONE_NORMAL (32-bit hosts): 0-896MB */
+ rc = rtR0MemObjLinuxAllocPages(&pMemLnx, RTR0MEMOBJTYPE_CONT, cb, PAGE_SIZE, GFP_USER,
+    true /* contiguous */, VERR_NO_CONT_MEMORY);
+ +#endif
+ if (RT_SUCCESS(rc))
+ {
+    rc = rtR0MemObjLinuxVMap(pMemLnx, fExecutable);
+    if (RT_SUCCESS(rc))
+    {
+        size_t iPage = pMemLnx->cPages;
+        while (iPage-- > 0)
+            Assert(page_to_phys(pMemLnx->apPages[iPage]) < _4G);
+        pMemLnx->Core.u.Cont.Phys = page_to_phys(pMemLnx->apPages[0]);
+        *ppMem = &pMemLnx->Core;
+        IPRT_LINUX_RESTORE_EFL_AC();
+        return rc;
+    }
+    rtR0MemObjLinuxFreePages(pMemLnx);
+    rtR0MemObjDelete(&pMemLnx->Core);
+ }
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return rc;
+}

+ * Worker for rtR0MemObjLinuxAllocPhysSub that tries one allocation strategy.
@returns IPRT status code.
+ * @param ppMemLnx Where to
+ * @param enmType The object type.
+ * @param cb The size of the allocation.
+ * @param uAlignment The alignment of the physical memory.
+ * @param PhysHighest See rtR0MemObjNativeAllocPhys.
+ * @param fGfp The Linux GFP flags to use for the allocation.
+ */
+static int rtR0MemObjLinuxAllocPhysSub2(PPRTR0MEMOBJINTERNAL ppMem, RTR0MEMOBJTYPE enmType,
+    size_t cb, size_t uAlignment, RTHCPHYS PhysHighest, unsigned fGfp)
+{
+    PRTR0MEMOBJLNX pMemLnx;
+    int rc;
+
+    rc = rtR0MemObjLinuxAllocPages(&pMemLnx, enmType, cb, uAlignment, fGfp,
+        enmType == RTR0MEMOBJTYPE_PHYS /* contiguous / non-contiguous */,
+        VERR_NO_PHYS_MEMORY);
+    if (RT_FAILURE(rc))
+        return rc;
+
+    /*
+     * Check the addresses if necessary. (Can be optimized a bit for PHYS.)
+     */
+    if (PhysHighest != NIL_RTHCPHYS)
+    {
+        size_t iPage = pMemLnx->cPages;
+        while (iPage-- > 0)
+            if (page_to_phys(pMemLnx->apPages[iPage]) > PhysHighest)
+                rtR0MemObjLinuxFreePages(pMemLnx);
+    }
+    if (enmType == RTR0MEMOBJTYPE_PHYS)
+    {
+        pMemLnx->Core.u.Phys.PhysBase = page_to_phys(pMemLnx->apPages[0]);
+        pMemLnx->Core.u.Phys.fAllocated = true;
+    }
+    *ppMem = &pMemLnx->Core;
+    return rc;
+ * Worker for rtR0MemObjNativeAllocPhys and rtR0MemObjNativeAllocPhysNC.
+ * @returns IPRT status code.
+ * @param   ppMem       Where to store the memory object pointer on success.
+ * @param   enmType     The object type.
+ * @param   cb          The size of the allocation.
+ * @param   uAlignment  The alignment of the physical memory.
+ * Only valid for enmType == RTR0MEMOBJTYPE_PHYS, ignored otherwise.
+ * @param   PhysHighest See rtR0MemObjNativeAllocPhys.
+ */
+static int rtR0MemObjLinuxAllocPhysSub(PPRTR0MEMOBJINTERNAL ppMem, RTR0MEMOBJTYPE
+                                         enmType,
+                                         size_t cb, size_t uAlignment, RTHCPHYS PhysHighest)
+{
+    int rc;
+    IPRT_LINUX_SAVE_EFL_AC();
+
+    /*
+     * There are two clear cases and that's the <=16MB and anything-goes ones.
+     * When the physical address limit is somewhere in-between those two we'll
+     * just have to try, starting with HIGHUSER and working our way thru the
+     * different types, hoping we'll get lucky.
+     *
+     * We should probably move this physical address restriction logic up to
+     * the page alloc function as it would be more efficient there. But since
+     * we don't expect this to be a performance issue just yet it can wait.
+     */
+    if (PhysHighest == NIL_RTHCPHYS)
+        /* ZONE_HIGHMEM: the whole physical memory */
+        rc = rtR0MemObjLinuxAllocPhysSub2(ppMem, enmType, cb, uAlignment, PhysHighest,
+                                           GFP_HIGHUSER);
+    else if (PhysHighest <= _1M * 16)
+        /* ZONE_DMA: 0-16MB */
+        rc = rtR0MemObjLinuxAllocPhysSub2(ppMem, enmType, cb, uAlignment, PhysHighest,
+                                           GFP_DMA);
+    else
+    {
+        rc = VERR_NO_MEMORY;
+        if (RT_FAILURE(rc))
+            /* ZONE_HIGHMEM: the whole physical memory */
+            rc = rtR0MemObjLinuxAllocPhysSub2(ppMem, enmType, cb, uAlignment, PhysHighest,
+                                               GFP_HIGHUSER);
+        if (RT_FAILURE(rc))
+            /* ZONE_NORMAL: 0-896MB */
+            rc = rtR0MemObjLinuxAllocPhysSub2(ppMem, enmType, cb, uAlignment, PhysHighest,
+                                               GFP_USER);
+if defined GFP_DMA32
+    if (RT_FAILURE(rc))
+        /* ZONE_DMA32: 0-4GB */
+        rc = rtR0MemObjLinuxAllocPhysSub2(ppMem, enmType, cb, uAlignment, PhysHighest, GFP_DMA32);
+    #endif
+    if (RT_FAILURE(rc))
+        /* ZONE_DMA: 0-16MB */
+        rc = rtR0MemObjLinuxAllocPhysSub2(ppMem, enmType, cb, uAlignment, PhysHighest, GFP_DMA);
+    }
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return rc;
+}
+
+/**
+ * Translates a kernel virtual address to a linux page structure by walking the
+ * page tables.
+ *
+ @note We do assume that the page tables will not change as we are walking
+ * them. This assumption is rather forced by the fact that I could not
+ * immediately see any way of preventing this from happening. So, we
+ * take some extra care when accessing them.
+ *
+ * Because of this, we don't want to use this function on memory where
+ * attribute changes to nearby pages is likely to cause large pages to
+ * be used or split up. So, don't use this for the linear mapping of
+ * physical memory.
+ *
+ * @returns Pointer to the page structure or NULL if it could not be found.
+ * @param   pv The kernel virtual address.
+ */
+static struct page *rtR0MemObjLinuxVirtToPage(void *pv)
+{
+    unsigned long   ulAddr = (unsigned long)pv;
+    unsigned long   pfn;
+    struct page    *pPage;
+    pte_t          *pEntry;
+    union
+    {
+        pgd_t       Global;
+        #if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 12, 0)
+            p4d_t       Four;
+        #endif
+        #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 11)
+            pud_t       Upper;
+        #endif
+        pmd_t       Middle;
+        pte_t       Entry;
+    }
     } u;

     /* Should this happen in a situation this code will be called in?  And if
     * so, can it change under our feet?  See also
     * "Documentation/vm/active_mm.txt" in the kernel sources. */
     if (RT_UNLIKELY(!(current->active_mm))
     return NULL;
     u.Global = *pgd_offset(current->active_mm, ulAddr);
     if (RT_UNLIKELY(pgd_none(u.Global)))
     return NULL;
     #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 11)
     # if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 12, 0)
     u.Four = *p4d_offset(&u.Global, ulAddr);
     if (RT_UNLIKELY(p4d_none(u.Four)))
     return NULL;
     if (p4d_large(u.Four))
     {  
     pPage = p4d_page(u.Four);
     AssertReturn(pPage, NULL);
     pfn = page_to_pfn(pPage);  /* doing the safe way... */
     AssertCompile(P4D_SHIFT - PAGE_SHIFT < 31);
     pfn += (ulAddr >> PAGE_SHIFT) & ((UINT32_C(1) << (P4D_SHIFT - PAGE_SHIFT)) - 1);
     return pfn_to_page(pfn);
     }  
     u.Upper = *pud_offset(&u.Global, ulAddr);
     #else /* < 4.12 */
     u.Upper = *pud_offset(&u.Global, ulAddr);
     #endif /* < 4.12 */
     #endif
     if (RT_UNLIKELY(pud_none(u.Upper)))
     return NULL;
     #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 25)
     if (pud_large(u.Upper))
     {
     pPage = pud_page(u.Upper);
     AssertReturn(pPage, NULL);
     pfn = page_to_pfn(pPage);  /* doing the safe way... */
     pfn += (ulAddr >> PAGE_SHIFT) & ((UINT32_C(1) << (PUD_SHIFT - PAGE_SHIFT)) - 1);
     return pfn_to_page(pfn);
     }  
     #endif
     #endif
     else /* < 2.6.11 */
     u.Middle = *pmd_offset(&u.Upper, ulAddr);
     #else /* < 2.6.11 */
     u.Middle = *pmd_offset(&u.Global, ulAddr);
     #endif /* < 2.6.11 */
     if (RT_UNLIKELY(pmd_none(u.Middle)))
     return NULL;
     #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
     if (pmd_large(u.Middle))
     }
{
    pPage = pmu_page(u.Middle);
    AssertReturn(pPage, NULL);
    pfn = page_to_pfn(pPage); /* doing the safe way... */
    pfn += (uAddr >> PAGE_SHIFT) & ((UINT32_C(1) << (PMD_SHIFT - PAGE_SHIFT)) - 1);
    return pfn_to_page(pfn);
}
#endif

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 5) || defined(pte_offset_map) /* As usual, RHEL 3 had pte_offset_map earlier. */
    pEntry = pte_offset_map(&u.Middle, uAddr);
#else
    pEntry = pte_offset(&u.Middle, uAddr);
#endif
    if (RT_UNLIKELY(!pEntry))
        return NULL;
    u.Entry = *pEntry;
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 5) || defined(pte_offset_map)
    pte_unmap(pEntry);
#endif
    if (RT_UNLIKELY(!pte_present(u.Entry)))
        return NULL;
    return pte_page(u.Entry);
}

DECLHIDDEN(int) rtR0MemObjNativeAllocPhys(PPRTR0MEMOBJINTERNAL ppMem, size_t cb,
RTHCPHYS PhysHighest, size_t uAlignment)
{
    return rtR0MemObjLinuxAllocPhysSub(ppMem, RTR0MEMOBJTYPE_PHYS, cb, uAlignment, PhysHighest);
}

DECLHIDDEN(int) rtR0MemObjNativeAllocPhysNC(PPRTR0MEMOBJINTERNAL ppMem, size_t cb,
RTHCPHYS PhysHighest)
{
    return rtR0MemObjLinuxAllocPhysSub(ppMem, RTR0MEMOBJTYPE_PHYS_NC, cb, PAGE_SIZE, PhysHighest);
}

DECLHIDDEN(int) rtR0MemObjNativeEnterPhys(PPRTR0MEMOBJINTERNAL ppMem, RTHCPHYS Phys,
size_t cb, uint32_t uCachePolicy)
{
    IPRT_LINUX_SAVE_EFL_AC();
}
+ /*
+ * All we need to do here is to validate that we can use
+ * ioremap on the specified address (32/64-bit dma_addr_t).
+ */
+ PRTR0MEMOBJLNX  pMemLnx;
+ dma_addr_t      PhysAddr = Phys;
+ AssertMsgReturn(PhysAddr == Phys, ("%#llx\n", (unsigned long long)Phys), VERR_ADDRESS_TOO_BIG);
+ pMemLnx = (PRTR0MEMOBJLNX)rtR0MemObjNew(sizeof(*pMemLnx), RTR0MEMOBJTYPE_PHYS, NULL, cb);
+ if (!pMemLnx)
+ {
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return VERR_NO_MEMORY;
+ }
+ pMemLnx->Core.u.Phys.PhysBase = PhysAddr;
+ pMemLnx->Core.u.Phys.fAllocated = false;
+ pMemLnx->Core.u.Phys.uCachePolicy = uCachePolicy;
+ Assert(!pMemLnx->cPages);
+ *ppMem = &pMemLnx->Core;
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return VINF_SUCCESS;
+}
+
+ /* openSUSE Leap 42.3 detection :-/ */
+#if    LINUX_VERSION_CODE >= KERNEL_VERSION(4, 4, 0) \
+    && LINUX_VERSION_CODE <  KERNEL_VERSION(4, 6, 0) \
+    && defined(FAULT_FLAG_REMOTE)
+# define GET_USER_PAGES_API     KERNEL_VERSION(4, 10, 0) /* no typo! */
+#else
+  /* define GET_USER_PAGES_API     LINUX_VERSION_CODE */
+#endif
+DECLHIDDEN(int) rtR0MemObjNativeLockUser(PPRTR0MEMOBJINTERNAL ppMem, RTR3PTR R3Ptr,
+size_t cb, uint32_t fAccess, RTR0PROCESS R0Process)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+    const int cPages = cb >> PAGE_SHIFT;
+    struct task_struct *pTask = rtR0ProcessToLinuxTask(R0Process);
+    struct vm_area_struct **papVMAs;
+    PRTR0MEMOBJLNX pMemLnx;
+    int             rc      = VERR_NO_MEMORY;
+    int  const      fWrite  = fAccess & RTMEM_PROT_WRITE ? 1 : 0;
+    /*
+    * Check for valid task and size overflows.
+    */
if (!pTask)
    return VERR_NOT_SUPPORTED;
if (((size_t)cPages << PAGE_SHIFT) != cb)
    return VERR_OUT_OF_RANGE;

/*
 * Allocate the memory object and a temporary buffer for the VMAs.
 */
pMemLnx = (PRTR0MEMOBJLNX)rtR0MemObjNew(RT_OFFSETOF(RTR0MEMOBJLNX, apPages[cPages]), RTR0MEMOBJTYPE_LOCK, (void *)R3Ptr, cb);
if (!pMemLnx)
{
    IPRT_LINUX_RESTORE_EFL_AC();
    return VERR_NO_MEMORY;
}

papVMAs = (struct vm_area_struct **)RTMemAlloc(sizeof(*papVMAs) * cPages);
if (papVMAs)
{
    down_read(&pTask->mm->mmap_sem);

    /*
     * Get user pages.
     */
#if GET_USER_PAGES_API >= KERNEL_VERSION(4, 6, 0)
    if (R0Process == RTR0ProcHandleSelf())
        rc = get_user_pages(R3Ptr,                  /* Where from. */
                            cPages,                 /* How many pages. */
#if GET_USER_PAGES_API >= KERNEL_VERSION(4, 9, 0)
                            fWrite ? FOLL_WRITE |   /* Write to memory. */
                                    FOLL_FORCE     /* force write access. */
                                       : 0,             /* Write to memory. */
#else
                            fWrite,                 /* Write to memory. */
                            fWrite,                 /* force write access. */
#endif
                            &pMemLnx->apPages[0],   /* Page array. */
                            papVMAs);               /* vmas */
    /*
     * Actually this should not happen at the moment as call this function
     * only for our own process.
     */
#elif GET_USER_PAGES_API >= KERNEL_VERSION(4, 9, 0)
    fWrite,                 /* Write to memory. */
    fWrite,                 /* force write access. */
#endif
    &pMemLnx->apPages[0]. /* Page array. */
    papVMAs);            /* vmas */
}
else
    rc = get_user_pages_remote(
        pTask,                 /* Task for fault accounting. */
        pTask->mm,               /* Whose pages. */
        R3Ptr,                  /* Where from. */
        cPages,                 /* How many pages. */
}
```c
+    if GET_USER_PAGES_API >= KERNEL_VERSION(4, 9, 0)
+        fWrite ? FOLL_WRITE | /* Write to memory. */
+        FOLL_FORCE /* force write access. */
+        : 0, /* Write to memory. */
+    #else
+    fWrite, /* Write to memory. */
+    fWrite, /* force write access. */
+    #endif
+    +
+    -
+    if GET_USER_PAGES_API >= KERNEL_VERSION(4, 10, 0)
+        , NULL /* locked */
+    #endif
+    +
+    else /* GET_USER_PAGES_API < KERNEL_VERSION(4, 6, 0) */
+        rc = get_user_pages(pTask, /* Task for fault accounting. */
+            pTask->mm, /* Whose pages. */
+            R3Ptr, /* Where from. */
+            cPages, /* How many pages. */
+        #if GET_USER_PAGES_API >= KERNEL_VERSION(4, 9, 0)
+            fWrite ? FOLL_WRITE | /* Write to memory. */
+            FOLL_FORCE /* force write access. */
+            : 0, /* Write to memory. */
+        #else
+        fWrite, /* Write to memory. */
+        fWrite, /* force write access. */
+        #endif
+        +
+        -
+        if (rc == cPages)
+        +
+        /
+        *
+        * Flush dcache (required?), protect against fork and_really_pin the page
+        +
+        * table entries. get_user_pages() will protect against swapping out the
+        +
+        * pages but it will NOT protect against removing page table entries. This
+        +
+        * can be achieved with
+        +
+        * - using mlock / mmap(..., MAP_LOCKED, ...) from userland. This requires
+        +
+        * an appropriate limit set up with setrlimit(..., RLIMIT_MEMLOCK, ...).
+        +
+        * Usually Linux distributions support only a limited size of locked pages
+        +
+        * (e.g. 32KB).
+        +
+        * - setting the PageReserved bit (as we do in rtR0MemObjLinuxAllocPages() or
+        +
+        * by
+        +
+        * - setting the VM_LOCKED flag. This is the same as doing mlock() without
+        +
+        * a range check.
+        +
+        *
+        */
+        */
+        @todo The Linux fork() protection will require more work if this API
+        * is to be used for anything but locking VM pages. */
```
+\[
+\text{while (rc-- > 0)} \\
+\text{ }
+\text{flush_dcache_page(pMemLnx->apPages[rc]);} \\
+\text{papVMAs[rc]->vm_flags |= (VM_DONTCOPY | VM_LOCKED);} \\
+\text{]
+\]}

+\text{up_read(&pTask->mm->mmap_sem);}
+
+\text{RTMemFree(papVMAs);}
+
+\text{pMemLnx->Core.u.Lock.R0Process = R0Process;}
+\text{pMemLnx->cPages = cPages;}
+\text{Assert(!pMemLnx->fMappedToRing0);}
+\text{*ppMem = &pMemLnx->Core;}
+\text{IPRT_LINUX_RESTORE_EFL_AC();}
+\text{return VINF_SUCCESS;}
+
+\text{/*}
+\text{* Failed - we need to unlock any pages that we succeeded to lock.}
+\text*/
+\text{*/}
+\text{while (rc-- > 0)}
+\text{ }
+\text{if (!PageReserved(pMemLnx->apPages[rc])))}
+\text{SetPageDirty(pMemLnx->apPages[rc]);}
+\text{#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 6, 0)}
+\text{ put_page(pMemLnx->apPages[rc]);}
+\text{#else}
+\text{ page_cache_release(pMemLnx->apPages[rc]);}
+\text{#endif}
+\text{up_read(&pTask->mm->mmap_sem);}
+
+\text{RTMemFree(papVMAs);}
+\text{rc = VERR_LOCK_FAILED;}
+
+\text{rtR0MemObjDelete(&pMemLnx->Core);}
+\text{IPRT_LINUX_RESTORE_EFL_AC();}
+\text{return rc;}
+
+\text{DECLHIDDEN(int) rtR0MemObjNativeLockKernel(PPRTR0MEMOBJINTERNAL ppMem, void *pv, size_t cb, uint32_t fAccess)}
+\text{+\}

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IPRT_LINUX_SAVE_EFL_AC();
void    *pvLast = (uint8_t *)pv + cb - 1;
size_t const cPages = cb >> PAGE_SHIFT;
PRTR0MEMOBJLNX pMemLnx;
bool     fLinearMapping;
int      rc;
uint8_t  *pbPage;
size_t   iPage;
NOREF(fAccess);

if (   !RTR0MemKernelIsValidAddr(pv)
    || !RTR0MemKernelIsValidAddr(pv + cb))
    return VERR_INVALID_PARAMETER;

/*
 * The lower part of the kernel memory has a linear mapping between
 * physical and virtual addresses. So we take a short cut here. This is
 * assumed to be the cleanest way to handle those addresses (and the code
 * is well tested, though the test for determining it is not very nice).
 * If we ever decide it isn't we can still remove it.
 */
#if 0
    fLinearMapping = (unsigned long)pvLast < VMALLOC_START;
#else
    fLinearMapping = (unsigned long)pv     >= (unsigned long)__va(0)
                  && (unsigned long)pvLast <  (unsigned long)high_memory;
#endif

/*
 * Allocate the memory object.
 */
pMemLnx = (PRTR0MEMOBJLNX)rtR0MemObjNew(RT_OFFSETOF(RTR0MEMOBJLNX, apPages[cPages]), RTR0MEMOBJTYPE_LOCK, pv, cb);
if (!pMemLnx)
{
    IPRT_LINUX_RESTORE_EFL_AC();
    return VERR_NO_MEMORY;
}

/*
 * Gather the pages.
 * We ASSUME all kernel pages are non-swappable and non-movable.
 */
rc = VINF_SUCCESS;
pbPage = (uint8_t *)pvLast;
iPage = cPages;
if (!fLinearMapping)
{

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while (iPage-- > 0)
{
    struct page *pPage = rtR0MemObjLinuxVirtToPage(pbPage);
    if (RT_UNLIKELY(!pPage))
        {
            rc = VERR_LOCK_FAILED;
            break;
        }
    pMemLnx->apPages[iPage] = pPage;
    pbPage -= PAGE_SIZE;
}
else
{
    while (iPage-- > 0)
    {
        pMemLnx->apPages[iPage] = virt_to_page(pbPage);
        pbPage -= PAGE_SIZE;
    }
    if (RT_SUCCESS(rc))
    {
        /*
         * Complete the memory object and return.
         */
        pMemLnx->Core.u.Lock.R0Process = NIL_RTR0PROCESS;
        pMemLnx->cPages = cPages;
        Assert(!pMemLnx->fMappedToRing0);
        *ppMem = &pMemLnx->Core;
        IPRT_LINUX_RESTORE_EFL_AC();
        return VINF_SUCCESS;
    }
    rtR0MemObjDelete(&pMemLnx->Core);
    IPRT_LINUX_RESTORE_EFL_AC();
    return rc;
}

DECLHIDDEN(int) rtR0MemObjNativeReserveKernel(PPRTR0MEMOBJINTERNAL ppMem, void *pvFixed,
size_t cb, size_t uAlignment)
{
#ifdef LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 22)
    IPRT_LINUX_SAVE_EFL_AC();
    const size_t cPages = cb >> PAGE_SHIFT;
    struct page *pDummyPage;
    struct page **papPages;
#endif

/* check for unsupported stuff. */
AssertMsgReturn(pvFixed == (void *)-1, ("%p\n", pvFixed), VERR_NOT_SUPPORTED);
if (uAlignment > PAGE_SIZE)
    return VERR_NOT_SUPPORTED;

/* Allocate a dummy page and create a page pointer array for vmap such that
the dummy page is mapped all over the reserved area.
*/

pDummyPage = alloc_page(GFP_HIGHUSER | __GFP_NOWARN);
if (pDummyPage)
{
papPages = RTMemAlloc(sizeof(*papPages) * cPages);
if (papPages)
{
    void *pv;
    size_t iPage = cPages;
    while (iPage-- > 0)
        papPages[iPage] = pDummyPage;

#ifdef VM_MAP
    pv = vmap(papPages, cPages, VM_MAP, PAGE_KERNEL_RO);
#else
    pv = vmap(papPages, cPages, VM_ALLOC, PAGE_KERNEL_RO);
#endif
    RTMemFree(papPages);
    if (pv)
    {
        PRTR0MEMOBJLNX pMemLnx = (PRTR0MEMOBJLNX)rtR0MemObjNew(sizeof(*pMemLnx),
RTR0MEMOBJTYPE_RES_VIRT, pv, cb);
        if (pMemLnx)
        {
            pMemLnx->Core.u.ResVirt.R0Process = NIL_RTR0PROCESS;
            pMemLnx->cPages = 1;
            pMemLnx->apPages[0] = pDummyPage;
            *ppMem = &pMemLnx->Core;
            IPRT_LINUX_RESTORE_EFL_AC();
            return VINF_SUCCESS;
        }
        vunmap(pv);
    }
    __free_page(pDummyPage);
}

#ifdef < 2.4.22

#else

*/
/*
 * Could probably use ioremap here, but the caller is in a better position than us
 * to select some safe physical memory.
 */
return VERR_NOT_SUPPORTED;
#endif

DECLHIDDEN(int) rtR0MemObjNativeReserveUser(PPRTR0MEMOBJINTERNAL ppMem, RTR3PTR R3PtrFixed, size_t cb, size_t uAlignment, RTR0PROCESS R0Process)
{
  IPRT_LINUX_SAVE_EFL_AC();
  PRTR0MEMOBJLNX   pMemLnx;
  void            *pv;
  struct task_struct *pTask = rtR0ProcessToLinuxTask(R0Process);
  if (!pTask)
      return VERR_NOT_SUPPORTED;

  /* Check that the specified alignment is supported.
  */
  if (uAlignment > PAGE_SIZE)
      return VERR_NOT_SUPPORTED;

  /* Let rtR0MemObjLinuxDoMmap do the difficult bits.
  */
  pv = rtR0MemObjLinuxDoMmap(R3PtrFixed, cb, uAlignment, pTask, RTMEM_PROT_NONE);
  if (pv == (void *)-1)
  {
    IPRT_LINUX_RESTORE_EFL_AC();
    return VINF_NO_MEMORY;
  }

  pMemLnx = (PRTR0MEMOBJLNX)rtR0MemObjNew(sizeof(*pMemLnx),
                                          RTR0MEMOBJTYPE_RES_VIRT, pv, cb);
  if (!pMemLnx)
  {
    rtR0MemObjLinuxDoMunmap(pv, cb, pTask);
    IPRT_LINUX_RESTORE_EFL_AC();
    return VINF_NO_MEMORY;
  }

  pMemLnx->Core.u.ResVirt.R0Process = R0Process;
  *ppMem = &pMemLnx->Core;
  IPRT_LINUX_RESTORE_EFL_AC();
  return VINF_SUCCESS;
DECLHIDDEN(int) rtR0MemObjNativeMapKernel(PPRTR0MEMOBJINTERNAL ppMem, RTR0MEMOBJ pMemToMap,
    void *pvFixed, size_t uAlignment,
    unsigned fProt, size_t offSub, size_t cbSub)
+
+ int rc = VERR_NO_MEMORY;
+ PRTR0MEMOBJLNX pMemLnxToMap = (PRTR0MEMOBJLNX)pMemToMap;
+ PRTR0MEMOBJLNX pMemLnx;
+ IPRT_LINUX_SAVE_EFL_AC();
+
+ /* Fail if requested to do something we can’t. */
+ AssertMsgReturn(!offSub &amp;) cbSub, (“%#x %#x’n”, offSub, cbSub), VERR_NOT_SUPPORTED);
+ AssertMsgReturn(pvFixed == (void *)-1, (“%p’n”, pvFixed), VERR_NOT_SUPPORTED);
+ if (uAlignment &gt; PAGE_SIZE)
+ return VERR_NOT_SUPPORTED;
+
+ /*
+ * Create the IPRT memory object.
+ */
+ pMemLnx = (PRTR0MEMOBJLNX)rtR0MemObjNew(sizeof(*pMemLnx),
RTR0MEMOBJTYPE_MAPPING, NULL, pMemLnxToMap-&gt;Core.cb);
+ if (pMemLnx)
+ {
+ if (pMemLnxToMap-&gt;cPages
+ {
+#if LINUX_VERSION_CODE &gt;= KERNEL_VERSION(2, 4, 22)
+ /*
+ * Use vmap - 2.4.22 and later.
+ */
+ pgprot_t fPg = rtR0MemObjLinuxConvertProt(fProt, true /* kernel */);
+# ifdef VM_MAP
+ pMemLnx-&gt;Core.pv = vmap(&amp;pMemLnxToMap-&gt;apPages[0], pMemLnxToMap-&gt;cPages, VM_MAP, 
fpG);  
+# endif VM_MAP
+ else
+ pMemLnx-&gt;Core.pv = vmap(&amp;pMemLnxToMap-&gt;apPages[0], pMemLnxToMap-&gt;cPages, VM_ALLOC, 
fpG);
+# endif
+ if (pMemLnx-&gt;Core.pv)
+ {
+ pMemLnx-&gt;fMappedToRing0 = true;
+ rc = VINF_SUCCESS;
+ }
+ else
+ rc = VERR_MAP_FAILED;
+}
/* Only option here is to share mappings if possible and forget about fProt.
 */
if (rtR0MemObjIsRing3(pMemToMap))
    rc = VERR_NOT_SUPPORTED;
else
{
    rc = VINF_SUCCESS;
    if (!pMemLnxToMap->Core.pv)
        rc = rtR0MemObjLinuxVMap(pMemLnxToMap, !!(fProt & RTMEM_PROT_EXEC));
    if (RT_SUCCESS(rc))
        {
            Assert(pMemLnxToMap->Core.pv);
            pMemLnx->Core.pv = pMemLnxToMap->Core.pv;
        }
    }
#endif
else
{
    /* MMIO / physical memory.
     */
    Assert(pMemLnxToMap->Core.enmType == RTR0MEMOBJTYPE_PHYS && !pMemLnxToMap->Core.u.Phys.fAllocated);
    pMemLnx->Core.pv = pMemLnxToMap->Core.u.Phys.uCachePolicy == RTMEM_CACHE_POLICY_MMIO
        ? ioremap_nocache(pMemLnxToMap->Core.u.Phys.PhysBase, pMemLnxToMap->Core.cb)
        : ioremap(pMemLnxToMap->Core.u.Phys.PhysBase, pMemLnxToMap->Core.cb);
    if (pMemLnx->Core.pv)
        {  
            /** @todo fix protection. */
            rc = VINF_SUCCESS;
        }
    }
    if (RT_SUCCESS(rc))
    {
        pMemLnx->Core.u.Mapping.R0Process = NIL_RTR0PROCESS;
        *ppMem = &pMemLnx->Core;
        IPRT_LINUX_RESTORE_EFL_AC();
        return VINF_SUCCESS;
    }
    rtR0MemObjDelete(&pMemLnx->Core);
}

IPRT_LINUX_RESTORE_EFL_AC();
return rc;
+} +
+
+#endif VBOX_USE_PAE_HACK
+/**
+ * Replace the PFN of a PTE with the address of the actual page.
+ *
+ * The caller maps a reserved dummy page at the address with the desired access
+ * and flags.
+ *
+ * This hack is required for older Linux kernels which don't provide
+ * remap_pfn_range().
+ *
+ * @returns 0 on success, -ENOMEM on failure.
+ * @param   mm          The memory context.
+ * @param   ulAddr      The mapping address.
+ * @param   Phys        The physical address of the page to map.
+ */
+static int rtR0MemObjLinuxFixPte(struct mm_struct *mm, unsigned long ulAddr, RTHCPHYS Phys) +{
+    int rc = -ENOMEM;
+    pgd_t *pgd;
+
+    spin_lock(&mm->page_table_lock);
+
+    pgd = pgd_offset(mm, ulAddr);
+    if (!pgd_none(*pgd) && !pgd_bad(*pgd))
+    {
+        pmd_t *pmd = pmd_offset(pgd, ulAddr);
+        if (!pmd_none(*pmd))
+        {
+            pte_t *ptep = pte_offset_map(pmd, ulAddr);
+            if (ptep)
+            {
+                pte_t pte = *ptep;
+                pte.pte_high &= 0xfff00000;
+                pte.pte_high |= ((Phys >> 32) & 0x000fffff);
+                pte.pte_low  &= 0x00000fff;
+                pte.pte_low  |= (Phys & 0xfffff000);
+                set_pte(ptep, pte);
+                pte_unmap(ptep);
+                rc = 0;
+            }
+        }
+    }
+    spin_unlock(&mm->page_table_lock);
+    return rc;
DECLHIDDEN(int) rtR0MemObjNativeMapUser(PPRTR0MEMOBJINTERNAL ppMem, RTR0MEMOBJ pMemToMap, RTR3PTR R3PtrFixed,
+   size_t uAlignment, unsigned fProt, RTR0PROCESS R0Process)
+
+ struct task_struct *pTask = rtR0ProcessToLinuxTask(R0Process);
+ PRTR0MEMOBJLNX pMemLnxToMap = (PRTR0MEMOBJLNX)pMemToMap;
+ int rc = VERR_NO_MEMORY;
+ PRTR0MEMOBJLNX pMemLnx;
+ if (!pTask)
+     return VERR_NOT_SUPPORTED;
+ if (uAlignment > PAGE_SIZE)
+     return VERR_NOT_SUPPORTED;
+
+ struct page *pDummyPage;
+ RTHCPHYS DummyPhys;
+}
+
/*
 * Check for restrictions.
 */
+ if (!pTask)
+     return VERR_NOT_SUPPORTED;
+ if (uAlignment > PAGE_SIZE)
+     return VERR_NOT_SUPPORTED;
+
+ #ifdef VBOX_USE_PAE_HACK
+ #endif
+
+ struct task_struct *pTask = rtR0ProcessToLinuxTask(R0Process);
+ PRTR0MEMOBJLNX pMemLnxToMap = (PRTR0MEMOBJLNX)pMemToMap;
+ int rc = VERR_NO_MEMORY;
+ PRTR0MEMOBJLNX pMemLnx;
+ if (!pTask)
+     return VERR_NOT_SUPPORTED;
+ if (uAlignment > PAGE_SIZE)
+     return VERR_NOT_SUPPORTED;
+
+ #ifdef VBOX_USE_PAE_HACK
+ #endif
+
+ struct page *pDummyPage;
+ RTHCPHYS DummyPhys;
+}
Allocate user space mapping.

void *
pv;

pv = rtR0MemObjLinuxDoMmap(R3PtrFixed, pMemLnxToMap->Core.cb, uAlignment, pTask, fProt);

if (pv != (void *)-1)
{
    /*
     * Map page by page into the mmap area.
     * This is generic, paranoid and not very efficient.
     */
    pgprot_t fPg = rtR0MemObjLinuxConvertProt(fProt, false /* user */);
    unsigned long ulAddrCur = (unsigned long)pv;
    const size_t cPages = pMemLnxToMap->Core.cb >> PAGE_SHIFT;
    size_t iPage;

    down_write(&pTask->mm->mmap_sem);

    rc = VINF_SUCCESS;
    if (pMemLnxToMap->cPages)
    {
        for (iPage = 0; iPage < cPages; iPage++, ulAddrCur += PAGE_SIZE)
        {
            #if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 11)
                RTHCPHYS Phys = page_to_phys(pMemLnxToMap->apPages[iPage]);
            #endif
            #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0) || defined(HAVE_26_STYLE_REMAP_PAGE_RANGE)
                struct vm_area_struct *vma = find_vma(pTask->mm, ulAddrCur); /* this is probably the same for all
                the pages... */
            #endif
            AssertBreakStmt(vma, rc = VERR_INTERNAL_ERROR);
            #endif
            rc = remap_pfn_range(vma, Phys, page_to_pfn(pMemLnxToMap->apPages[iPage]), PAGE_SIZE, fPg);
        }
    }

    if (pMemLnxToMap->cPages)
    {
        /* Thes flags help making 100% sure some bad stuff wont happen (swap, core, ++).
         * See remap_pfn_range() in mm/memory.c */
        #if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 7, 0)
            vma->vm_flags |= VM_DONTEXPAND | VM_DONTDUMP;
        #else
            vma->vm_flags |= VM_RESERVED;
        #endif
    }
    else
    {
        vma->vm_flags |= VM_RESERVED;
    }
}
elif defined(VBOX_USE_PAE_HACK)
    +    rc = remap_page_range(vma, ulAddrCur, DummyPhys, PAGE_SIZE, fPg);
    +    if (rc)
    +        rc = rtR0MemObjLinuxFixPte(pTask->mm, ulAddrCur, Phys);
  
else /* 2.4 */
    +    rc = remap_page_range(vma, ulAddrCur, Phys, PAGE_SIZE, fPg);
  
#endif

    +    if (rc)
    +        
    +            rc = VERR_NO_MEMORY;
    +            break;
    +        
    +    
    +} 

else
    +    
    +    RTHCPHYS Phys;
    +    if (pMemLnxToMap->Core.enmType == RTR0MEMOBJTYPE_PHYS)
    +        Phys = pMemLnxToMap->Core.u.Phys.PhysBase;
    +    else if (pMemLnxToMap->Core.enmType == RTR0MEMOBJTYPE_CONT)
    +        Phys = pMemLnxToMap->Core.u.Cont.Phys;
    +    else
    +        AssertMsgFailed("%d
", pMemLnxToMap->Core.enmType);
    +        Phys = NIL_RTHCPHYS;
    +    }
    +    if (Phys != NIL_RTHCPHYS)
    +        
    +            for (iPage = 0; iPage < cPages; iPage++, ulAddrCur += PAGE_SIZE, Phys += PAGE_SIZE)
    +            
    +            if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0) ||
    +               defined(HAVE_26_STYLE_REMAP_PAGE_RANGE)
    +                struct vm_area_struct *vma = find_vma(pTask->mm, ulAddrCur); /* this is probably the same for all the pages... */
    +                AssertBreakStmt(vma, rc = VERR_INTERNAL_ERROR);
    +            
    +    
    +    
    +    AssertBreakStmt(Phys < _4G, rc = VERR_NO_MEMORY);
    +
    +
    +    
    +    rc = remap_page_range(vma, ulAddrCur, DummyPhys, PAGE_SIZE, fPg);
  
#else defined(VBOX_USE_PAE_HACK)
    +    rc = remap_page_range(vma, ulAddrCur, DummyPhys, PAGE_SIZE, fPg);
#endif
+if (!rc)
  rc = r0MemObjLinuxFixPte(pTask->mm, ulAddrCur, Phys);
+#elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0) ||
defined(HAVE_26_STYLE_REMAP_PAGE_RANGE)
  rc = remap_page_range(vma, ulAddrCur, Phys, PAGE_SIZE, fPg);
+#else /* 2.4 */
  rc = remap_page_range(ulAddrCur, Phys, PAGE_SIZE, fPg);
+#endif
  + if (rc)
  + {  
  +   rc = VERR_NO_MEMORY;
  +   break;
  +  }
  + }
  + }  
  +
+###ifdef CONFIG_NUMA_BALANCING
+### if LINUX_VERSION_CODE < KERNEL_VERSION(3, 13, 0)
+### ifdef RHEL_RELEASE_CODE
+### if RHEL_RELEASE_CODE < RHEL_RELEASE_VERSION(7, 0)
+### define VBOX_NUMA_HACK_OLD
+### endif
+### endif
+### endif
+### ifdef RT_OS_X86
+### ifdef VBOX_NUMA_HACK_OLD
+  pTask->mm->numa_next_reset = jiffies + 0x7fffffffUL;
+### endif
+  pTask->mm->numa_next_scan = jiffies + 0x7fffffffUL;
+### else
+### ifdef VBOX_NUMA_HACK_OLD
+  pTask->mm->numa_next_reset = jiffies + 0x7fffffffUL;
+### endif
+  pTask->mm->numa_next_scan = jiffies + 0x7fffffffUL;
+### endif
+ endforeach CONFIG_NUMA_BALANCING */
+  + up_write(&pTask->mm->mmap_sem);
+  + if (RT_SUCCESS(rc))
+  + {
+###ifdef VBOX_USE_PAE_HACK

Open Source Used In 5GaaS Edge AC-4 38591
+   __free_page(pDummyPage);
+}  
+  pMemLnx->Core.pv = pv;
+  pMemLnx->Core.u.Mapping.R0Process = R0Process;
+  *ppMem = &pMemLnx->Core;
+  IPRT_LINUX_RESTORE_EFL_AC();
+  return VINF_SUCCESS;
+
+}  
+/*
+ * Bail out.
+ */
+  rtR0MemObjLinuxDoMunmap(pv, pMemLnxToMap->Core.cb, pTask);
+}  
+  rtR0MemObjDelete(&pMemLnx->Core);
+
+#ifdef VBOX_USE_PAE_HACK
+  __free_page(pDummyPage);
+#endif
+
  IPRT_LINUX_RESTORE_EFL_AC();  
  return rc;
+
+}
+
+DECLHIDDEN(int) rtR0MemObjNativeProtect(PRTR0MEMOBJINTERNAL pMem, size_t offSub, size_t cbSub, uint32_t fProt)
+{
+  NOREF(pMem);
+  NOREF(offSub);
+  NOREF(cbSub);
+  NOREF(fProt);
+  return VERR_NOT_SUPPORTED;
+}
+
+DECLHIDDEN(RTHCPHYS) rtR0MemObjNativeGetPagePhysAddr(PRTR0MEMOBJINTERNAL pMem, size_t iPage)
+{
+  PRTR0MEMOBJLNX  pMemLnx = (PRTR0MEMOBJLNX)pMem;
+  if (pMemLnx->cPages)
+    return page_to_phys(pMemLnx->apPages[iPage]);
+  switch (pMemLnx->Core.enmType)
+    {
+      case RTR0MEMOBJTYPE_CONT:
+        return pMemLnx->Core.u.Cont.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_LNX:
+        return pMemLnx->Core.u.Lnx.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_PAGED:
+        return pMemLnx->Core.u.Paged.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_POOL_LNX:
+        return pMemLnx->Core.u.PoolLnx.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_POOL_PAGED:
+        return pMemLnx->Core.u.PoolPaged.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_POOL_POOL:
+        return pMemLnx->Core.u.PoolPool.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_SCALABLE:
+        return pMemLnx->Core.u.Scalable.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_SLAVE:
+        return pMemLnx->Core.uSlave.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_VM:
+        return pMemLnx->Core.u.VM.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_VMSPOOL:
+        return pMemLnx->Core.u.VMSPool.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_VMSPOOL_BK:
+        return pMemLnx->Core.u.VMSPoolBk.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_VMSPOOL_MISC:
+        return pMemLnx->Core.u.VMSPoolMisc.Phys  + (iPage << PAGE_SHIFT);
+      
+      case RTR0MEMOBJTYPE_VMSPOOL_VMSPOOL:
+        return pMemLnx->Core.u.VMSPoolVMSpool.Phys  + (iPage << PAGE_SHIFT);
+      
+      default:
+        return VERR_HTTP_ERROR;
+    }
case RTR0MEMOBJTYPE_PHYS:
    return pMemLnx->Core.u.Phys.PhysBase + (iPage << PAGE_SHIFT);

/* the parent knows */

case RTR0MEMOBJTYPE_MAPPING:
    return rtR0MemObjNativeGetPagePhysAddr(pMemLnx->Core.uRel.Child.pParent, iPage);

/* cPages > 0 */

case RTR0MEMOBJTYPE_LOW:
    case RTR0MEMOBJTYPE_LOCK:
    case RTR0MEMOBJTYPE_PHYS_NC:
    case RTR0MEMOBJTYPE_PAGE:
    default:
        AssertMsgFailed("%d
", pMemLnx->Core.enmType);
        /* fall thru */

    case RTR0MEMOBJTYPE_RES_VIRT:
        return NIL_RTHCPHYS;

    }
RTR0DECL(int) RTR0MemUserCopyFrom(void *pvDst, RTR3PTR R3PtrSrc, size_t cb)
{
    IPRT_LINUX_SAVE_EFL_AC();
    if (RT_LIKELY(copy_from_user(pvDst, (void *)R3PtrSrc, cb) == 0))
    {
        IPRT_LINUX_RESTORE_EFL_AC();
        return VINF_SUCCESS;
    }
    IPRT_LINUX_RESTORE_EFL_AC();
    return VERR_ACCESS_DENIED;
}
RT_EXPORT_SYMBOL(RTR0MemUserCopyFrom);

RTR0DECL(int) RTR0MemUserCopyTo(RTR3PTR R3PtrDst, void const *pvSrc, size_t cb)
{
    IPRT_LINUX_SAVE_EFL_AC();
    if (RT_LIKELY(copy_to_user((void *)R3PtrDst, pvSrc, cb) == 0))
    {
        IPRT_LINUX_RESTORE_EFL_AC();
        return VINF_SUCCESS;
    }
    IPRT_LINUX_RESTORE_EFL_AC();
    return VERR_ACCESS_DENIED;
}
RT_EXPORT_SYMBOL(RTR0MemUserCopyTo);

RTR0DECL(bool) RTR0MemUserIsValidAddr(RTR3PTR R3Ptr)
{
    IPRT_LINUX_SAVE_EFL_AC();
    bool fRc = access_ok(VERIFY_READ, (void *)R3Ptr, 1);
    IPRT_LINUX_RESTORE_EFL_AC();
    return fRc;
}

/* terms and conditions of either the GPL or the CDDL or both.
*/
IPRT_LINUX_RESTORE_EFL_AC();
return fRc;
+
+RT_EXPORT_SYMBOL(RTR0MemUserIsValidAddr);
+
+RTR0DECL(bool) RTR0MemKernelIsValidAddr(void *pv)
+{
+    /* Couldn't find a straight forward way of doing this... */
+    #if defined(RT_ARCH_X86) && defined(CONFIG_X86_HIGH_ENTRY)
+        return true; /* ?? */
+    #elif defined(RT_ARCH_X86) || defined(RT_ARCH_AMD64)
+        return (uintptr_t)pv >= PAGE_OFFSET;
+    #else
+        # error "PORT ME"
+        return !access_ok(VERIFY_READ, pv, 1);
+    #endif
+}
+RT_EXPORT_SYMBOL(RTR0MemKernelIsValidAddr);
+
+RTR0DECL(bool) RTR0MemAreKrnlAndUsrDifferent(void)
+{
+    #if defined(RT_ARCH_X86) && defined(CONFIG_X86_HIGH_ENTRY) /* ?? */
+        return false;
+    #else
+        return true;
+    #endif
+}
+RT_EXPORT_SYMBOL(RTR0MemAreKrnlAndUsrDifferent);
+
/* Treats both source and destination as unsafe buffers. */
+static int rtR0MemKernelCopyLnxWorker(void *pvDst, void const *pvSrc, size_t cb)
+{
+    #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 55)
+        /* _ASM_EXTABLE was introduced in 2.6.25 from what I can tell. Using #ifndef here since it has to be a macro and you never know what someone might have backported to an earlier kernel release. */
+        #ifdef _ASM_EXTABLE
+            if ARCH_BITS == 32
+                define _ASM_EXTABLE(a_Instr, a_Resume) \n+                ".section __ex_table,"a"\n+                ".balign 4\n+                ".long   " #a_Instr \n+                ".long   " #a_Resume \n+                
+            /* .section __ex_table,\na\n+            ".balign 4\n+            ".long   " #a_Instr \n+            ".long   " #a_Resume \n+            */
+        #endif
+    #endif
+}
".previous\n"
#else
#define _ASM_EXTABLE(a_Instr, a_Resume) 
".section __ex_table,"a"
".balign 8\n"
".quad  "#a_Instr \n"
".quad  "#a_Resume \n"
".previous\n"
#endif
#endif /* !_ASM_EXTABLE */

int rc;
IPRT_LINUX_SAVE_EFL_AC(); /* paranoia */
if (!cb)
    return VINF_SUCCESS;
    __asm__ __volatile__ ("cld\n"
                          "1:\n"
                          "rep; movsb\n"
                          "2:\n"
                          ".section .fixup,"ax\n"
                          "3:\n"
                          "movl %4, %0\n"
                          ".previous\n"
                          __ASM_EXTABLE(1b, 3b) 
                          : "=r" (rc),
                          "=D" (pvDst),
                          "=S" (pvSrc),
                          "=c" (cb)
                          : "i" (VERR_ACCESS_DENIED),
                          "0" (VINF_SUCCESS),
                          "1" (pvDst),
                          "2" (pvSrc),
                          "3" (cb)
                          : "memory");
IPRT_LINUX_RESTORE_EFL_AC();
return rc;
#else
    return VERR_NOT_SUPPORTED;
#endif
}

RTR0DECL(int) RTR0MemKernelCopyFrom(void *pvDst, void const *pvSrc, size_t cb)
{
    return rtR0MemKernelCopyLnxWorker(pvDst, pvSrc, cb);
}
RT_EXPORT_SYMBOL(RTR0MemKernelCopyFrom);
RTR0DECL(int) RTR0MemKernelCopyTo(void *pvDst, void const *pvSrc, size_t cb)
{
    return rtR0MemKernelCopyLnxWorker(pvDst, pvSrc, cb);
}

RT_EXPORT_SYMBOL(RTR0MemKernelCopyTo);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/mp-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/mp-r0drv-linux.c
@@ -0,0 +1,598 @@
/* $Id: mp-r0drv-linux.c $ */
/** @file
 * IPRT - Multiprocessor, Ring-0 Driver, Linux.
 * */
+
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+ *
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+ */
+
+/*******************************************************************************************
**************************************
*   Header Files                                                                                                                 *
********************************************************************************************
*************************************/
#include "the-linux-kernel.h"
#include "internal/iprt.h"
+
#include <iprt/mp.h>
#include <iprt/cputset.h>
#include <iprt/err.h>
```c
#include <iprt/asm.h>
#include <iprt/thread.h>
#include "r0drv/mp-r0drv.h"
+
+ ifdef nr_cpumask_bits
+ # define VBOX_NR_CPUMASK_BITS nr_cpumask_bits
+ #else
+ # define VBOX_NR_CPUMASK_BITS NR_CPUS
+ #endif
+
+ RTDECL(RTCPUID) RTMpCpuId(void)
+ {
+     return smp_processor_id();
+ }
+ RT_EXPORT_SYMBOL(RTMpCpuId);
+
+ RTDECL(int) RTMpCurSetIndex(void)
+ {
+     return smp_processor_id();
+ }
+ RT_EXPORT_SYMBOL(RTMpCurSetIndex);
+
+ RTDECL(int) RTMpCurSetIndexAndId(PRTCPUID pidCpu)
+ {
+     return *pidCpu = smp_processor_id();
+ }
+ RT_EXPORT_SYMBOL(RTMpCurSetIndexAndId);
+
+ RTDECL(int) RTMpCpuIdToSetIndex(RTCPUID idCpu)
+ {
+     return idCpu < RTCPUSET_MAX_CPUS && idCpu < VBOX_NR_CPUMASK_BITS ? (int)idCpu : -1;
+ }
+ RT_EXPORT_SYMBOL(RTMpCpuIdToSetIndex);
+
+ RTDECL(RTCPUID) RTMpCpuIdFromSetIndex(int iCpu)
+ {
+     return iCpu < VBOX_NR_CPUMASK_BITS ? (RTCPUID)iCpu : NIL_RTCPUID;
+ }
+ RT_EXPORT_SYMBOL(RTMpCpuIdFromSetIndex);
+
+ RTDECL(RTCPUID) RTMpGetMaxCpuId(void)
+ {
+     return VBOX_NR_CPUMASK_BITS - 1; //???
```
+RT_EXPORT_SYMBOL(RTMpGetMaxCpuId);
+
+RTDECL(bool) RTMpIsCpuPossible(RTCPUID idCpu)
+{
+    #if defined(CONFIG_SMP)
+        if (RT_UNLIKELY(idCpu >= VBOX_NR_CPUMASK_BITS))
+            return false;
+
+    #if defined(cpu_possible)
+        return cpu_possible(idCpu);
+    #else /* < 2.5.29 */
+        return idCpu < (RTCPUID)smp_num_cpus;
+    #endif
+    #else
+        return idCpu == RTMpCpuId();
+    #endif
+}
+RT_EXPORT_SYMBOL(RTMpIsCpuPossible);
+
+RTDECL(PRTCPUSET) RTMpGetSet(PRTCPUSET pSet)
+{
+    RTCPUID idCpu;
+
+    RTCpuSetEmpty(pSet);
+    idCpu = RTMpGetMaxCpuId();
+    do
+    {
+        if (RTMpIsCpuPossible(idCpu))
+            RTCpuSetAdd(pSet, idCpu);
+    } while (idCpu-- > 0);
+    return pSet;
+}
+RT_EXPORT_SYMBOL(RTMpGetSet);
+
+RTDECL(RTCPUID) RTMpGetCount(void)
+{
+    #ifdef CONFIG_SMP
+        #if defined(CONFIG_HOTPLUG_CPU) /* introduced & uses cpu_present */
+            return num_present_cpus();
+        #elif defined(num_possible_cpus)
+            return num_possible_cpus();
+        #elif LINUX_VERSION_CODE < KERNEL_VERSION(2, 5, 0)
+            return smp_num_cpus;
+        #else
+            #endif
+        #endif
+    #else
+        #endif
+    #endif
+ RTCPUSET Set;
+ RTMpGetSet(&Set);
+ return RTCpuSetCount(&Set);
+#endif
+#else
+ return 1;
+#endif
+
+RT_EXPORT_SYMBOL(RTMpGetCount);
+
+RTDECL(bool) RTMpIsCpuOnline(RTCPUID idCpu) {
+    if (RT_UNLIKELY(idCpu >= VBOX_NR_CPUMASK_BITS))
+        return false;
+    bool cpu_online;  
+    return cpu_online_map & RT_BIT_64(idCpu);
+} /* 2.4: */
+
+RT_EXPORT_SYMBOL(RTMpIsCpuOnline);
+
+RTDECL(PRTCPUSET) RTMpGetOnlineSet(PRTCPUSET pSet) {
+    RTCPUID idCpu;
+    RTCpuSetEmpty(pSet);
+    do{
+        if (RTMpIsCpuOnline(idCpu))
+            RTCpuSetAdd(pSet, idCpu);
+    } while (idCpu-- > 0);
+} /* 2.4: */
+
+RT_EXPORT_SYMBOL(RTMpGetOnlineSet);
+RTDECL(RTCPUID) RTMpGetOnlineCount(void)
+{
+  +#ifdef CONFIG_SMP
+  +# if defined(num_online_cpus)
+  +    return num_online_cpus();
+  +# else
+  +    RTCPUSEt Set;
+  +    RTMpGetOnlineSet(&Set);
+  +    return RTCpuSetCount(&Set);
+  +# endif
+  +#else
+  +    return 1;
+  +#endif
+}
+RT_EXPORT_SYMBOL(RTMpGetOnlineCount);
+
+RTDECL(bool) RTMpIsCpuWorkPending(void)
+{
+  /** @todo (not used on non-Windows platforms yet). */
+  +    return false;
+  +}
+RT_EXPORT_SYMBOL(RTMpIsCpuWorkPending);
+
+/**
+ * Wrapper between the native linux per-cpu callbacks and PFNRTWORKER.
+ * @param   pvInfo      Pointer to the RTMPARGS package.
+ */
+static void rtmpLinuxWrapper(void *pvInfo)
+{
+  PRTMPARGS pArgs = (PRTMPARGS)pvInfo;
+  ASMAtomicIncU32(&pArgs->cHits);
+  pArgs->pfnWorker(RTMpCpuId(), pArgs->pvUser1, pArgs->pvUser2);
+}
+
+/**
+ * Wrapper between the native linux per-cpu callbacks and PFNRTWORKER, does hit
+ * increment after calling the worker.
+ * @param   pvInfo      Pointer to the RTMPARGS package.
+ */
+static void rtmpLinuxWrapperPostInc(void *pvInfo)
+{
+  PRTMPARGS pArgs = (PRTMPARGS)pvInfo;
+
+ pArgs->pfnWorker(RTMPpCpuId(), pArgs->pvUser1, pArgs->pvUser2);
+ ASMAtomicIncU32(&pArgs->cHits);
+
+/**
+ * Wrapper between the native linux all-cpu callbacks and PFNRTWORKER.
+ *
+ * @param   pvInfo      Pointer to the RTMPARGS package.
+ */
+static void rtmpLinuxAllWrapper(void *pvInfo)
+{
+    PRTMPARGS  pArgs      = (PRTMPARGS)pvInfo;
+    PRTCPUSET  pWorkerSet = pArgs->pWorkerSet;
+    RTCPUID    idCpu      = RTMpCpuId();
+    Assert(!RTThreadPreemptIsEnabled(NIL_RTTHREAD));
+    if (RTCpuSetIsMember(pWorkerSet, idCpu))
+    {
+        pArgs->pfnWorker(idCpu, pArgs->pvUser1, pArgs->pvUser2);
+        RTCpuSetDel(pWorkerSet, idCpu);
+    }
+}
+
+RTDECL(int) RTMpOnAll(PFNRTMPWORKER pfnWorker, void *pvUser1, void *pvUser2)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+    int rc;
+    RTMPARGS Args;
+    RTCPUSET OnlineSet;
+    RTCPUID idCpu;
+    uint32_t cLoops;
+    RTTHREADPREEMPTSTATE PreemptState = RTTHREADPREEMPTSTATE_INITIALIZER;
+    Args.pfnWorker  = pfnWorker;
+    Args.pvUser1    = pvUser1;
+    Args.pvUser2    = pvUser2;
+    Args.idCpu      = NIL_RTCPUID;
+    Args.cHits      = 0;
+    RTThreadPreemptDisable(&PreemptState);
+    RTMpGetOnlineSet(&OnlineSet);
+    Args.pWorkerSet = &OnlineSet;
+    idCpu = RTMpCpuId();
+    if (RTCpuSetCount(&OnlineSet) > 1)
+ { /* Fire the function on all other CPUs without waiting for completion. */
+    #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
+        rc = smp_call_function(rtmpLinuxAllWrapper, &Args, 0 /* wait */);
+    #else
+        rc = smp_call_function(rtmpLinuxAllWrapper, &Args, 0 /* retry */, 0 /* wait */);
+    #endif
+    Assert(!rc); NOREF(rc);
+ }
+
+ /* Fire the function on this CPU. */
+ Args.pfnWorker(idCpu, Args.pvUser1, Args.pvUser2);
+ RTCpuSetDel(Args.pWorkerSet, idCpu);
+
+ /* Wait for all of them finish. */
+ cLoops = 64000;
+ while (!RTCpuSetIsEmpty(Args.pWorkerSet))
+ { /* Periodically check if any CPU in the wait set has gone offline, if so update the wait set. */
+     if (!cLoops--)
+     { /*cLoops--*/
+         RTCPUSET OnlineSetNow;
+         RTMpGetOnlineSet(&OnlineSetNow);
+         RTCpuSetAnd(Args.pWorkerSet, &OnlineSetNow);
+         cLoops = 64000;
+     }
+     ASMnopPause();
+ }
+
+ RTThreadPreemptRestore(&PreemptState);
+ IPRT_LINUX_SAVE_EFL_AC();
+ return VINF_SUCCESS;
+} +RT_EXPORT_SYMBOL(RTMpOnAll);
+
+ +RTDECL(int) RTMpOnOthers(PFNRTMPWORKER pfnWorker, void *pvUser1, void *pvUser2)
+{ /*IPRT_LINUX_SAVE_EFL_AC();
+     int rc;
+     RTMPARGS Args;
+     RTTHREADPREEMPTSTATE PreemptState = RTTHREADPREEMPTSTATE_INITIALIZER;
+     Args.pfnWorker = pfnWorker;
+     Args.pvUser1 = pvUser1;
+     Args.pvUser2 = pvUser2;
Args.idCpu = NIL_RTCPUID;
Args.cHits = 0;

RTThreadPreemptDisable(&PreemptState);
#endif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
rc = smp_call_function(rtmpLinuxWrapper, &Args, 1 /* wait */);
#else /* older kernels */
rc = smp_call_function(rtmpLinuxWrapper, &Args, 0 /* retry */, 1 /* wait */);
#endif /* older kernels */
RTThreadPreemptRestore(&PreemptState);

Assert(rc == 0); NOREF(rc);
IPRT_LINUX_RESTORE_EFL_AC();
return VINF_SUCCESS;
}

RT_EXPORT_SYMBOL(RTMpOnOthers);

#endif LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 27)
/**
 * Wrapper between the native linux per-cpu callbacks and PFNRTWORKER
 * employed by RTMpOnPair on older kernels that lacks smp_call_function_many.
 */
static void rtMpLinuxOnPairWrapper(void *pvInfo)
{
PRTMPARGS pArgs = (PRTMPARGS)pvInfo;
RTCPUID idCpu = RTMpCpuId();

if (   idCpu == pArgs->idCpu
    || idCpu == pArgs->idCpu2)
{
    pArgs->pfnWorker(idCpu, pArgs->pvUser1, pArgs->pvUser2);
    ASMAtomicIncU32(&pArgs->cHits);
}
}
#endif

RTDECL(int) RTMpOnPair(RTCPUID idCpu1, RTCPUID idCpu2, uint32_t fFlags, PFNRTMPWORKER pfnWorker, void *pvUser1, void *pvUser2)
{
IPRT_LINUX_SAVE_EFL_AC();
int rc;
RTTHREADPREEMPTSTATE PreemptState = RTTHREADPREEMPTSTATE_INITIALIZER;

AssertReturn(idCpu1 != idCpu2, VERR_INVALID_PARAMETER);
AssertReturn(!(fFlags & RTMPON_F_VALID_MASK), VERR_INVALID_FLAGS);

/*
 * Check that both CPUs are online before doing the broadcast call.
*/
RTThreadPreemptDisable(&PreemptState);
if (   RTMpIsCpuOnline(idCpu1)
    && RTMpIsCpuOnline(idCpu2))
{
    /*
     * Use the smp_call_function variant taking a cpu mask where available,
     * falling back on broadcast with filter. Slight snag if one of the
     * CPUs is the one we're running on, we must do the call and the post
     * call wait ourselves.
     */
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 28)
    /* 2.6.28 introduces CONFIG_CPUMASK_OFFSTACK */
    cpumask_var_t DstCpuMask;
#else LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
    cpumask_t   DstCpuMask;
#endif
    RTCPUID     idCpuSelf = RTMpCpuId();
    bool const  fCallSelf = idCpuSelf == idCpu1 || idCpuSelf == idCpu2;
    RTMPARGS    Args;
    Args.pfnWorker = pfnWorker;
    Args.pvUser1 = pvUser1;
    Args.pvUser2 = pvUser2;
    Args.idCpu   = idCpu1;
    Args.idCpu2  = idCpu2;
    Args.cHits   = 0;

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 30)
    if (!zalloc_cpumask_var(&DstCpuMask, GFP_KERNEL))
        return VERR_NO_MEMORY;
    cpumask_set_cpu(idCpu1, DstCpuMask);
    cpumask_set_cpu(idCpu2, DstCpuMask);
#else LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 28)
    if (!alloc_cpumask_var(&DstCpuMask, GFP_KERNEL))
        return VERR_NO_MEMORY;
    cpumask_clear(DstCpuMask);
    cpumask_set_cpu(idCpu1, DstCpuMask);
    cpumask_set_cpu(idCpu2, DstCpuMask);
#endif

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
    cpus_clear(DstCpuMask);
    cpu_set(idCpu1, DstCpuMask);
    cpu_set(idCpu2, DstCpuMask);
#endif

+### if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 28)
+  smp_call_function_many(DstCpuMask, rtmpLinuxWrapperPostInc, &Args, !fCallSelf /* wait */);
+  rc = 0;
+### else LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
+  rc = smp_call_function_mask(DstCpuMask, rtmpLinuxWrapperPostInc, &Args, !fCallSelf /* wait */);
+### else older kernels */
+  rc = smp_call_function(rtMpLinuxOnPairWrapper, &Args, 0 /* retry */, !fCallSelf /* wait */);
+### endif /* older kernels */
+  Assert(rc == 0);
+
+  /* Call ourselves if necessary and wait for the other party to be done. */
+  if (fCallSelf)
+  {
+      uint32_t cLoops = 0;
+      rtmpLinuxWrapper(&Args);
+      while (ASMAtomicReadU32(&Args.cHits) < 2)
+      {
+          if ((cLoops & 0x1ff) == 0 && !RTMpIsCpuOnline(idCpuSelf == idCpu1 ? idCpu2 : idCpu1))
+              break;
+          cLoops++;
+          ASMNopPause();
+      }
+  }
+
+  Assert(Args.cHits <= 2);
+  if (Args.cHits == 2)
+      rc = VINF_SUCCESS;
+  else if (Args.cHits == 1)
+      rc = VERR_NOT_ALL_CPUS_SHOVED;
+  else if (Args.cHits == 0)
+      rc = VERR_CPU_OFFLINE;
+  else
+      rc = VERR_CPU_IPE_1;
+
+### if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 28)
+  free_cpumask_var(DstCpuMask);
+### endif
+  }
+/*
+  * A CPU must be present to be considered just offline.
+  */
+  else if (  RTMpIsCpuPresent(idCpu1)
+          && RTMpIsCpuPresent(idCpu2))
+      rc = VERR_CPU_OFFLINE;
+  else
+      rc = VERR_CPU_NOT_FOUND;
+  RTThreadPreemptRestore(&PreemptState);
+  IPRT_LINUX_RESTORE_EFL_AC();
+ return rc;
+}
+RT_EXPORT_SYMBOL(RTMpOnPair);
+
+
+RTDECL(bool) RTMpOnPairIsConcurrentExecSupported(void)
+{
+    return true;
+}
+RT_EXPORT_SYMBOL(RTMpOnPairIsConcurrentExecSupported);
+
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 19)
+/**
+ * Wrapper between the native linux per-cpu callbacks and PFNRTWORKER
+ * employed by RTMpOnSpecific on older kernels that lacks smp_call_function_single.
+ *
+ * @param   pvInfo      Pointer to the RTMPARGS package.
+ */
+static void rtmpOnSpecificLinuxWrapper(void *pvInfo)
+{
+    PRTMPARGS pArgs = (PRTMPARGS)pvInfo;
+    RTCPUID idCpu = RTMpCpuId();
+    
+    if (idCpu == pArgs->idCpu)
+    {
+        pArgs->pfnWorker(idCpu, pArgs->pvUser1, pArgs->pvUser2);
+        ASMAtomicIncU32(&pArgs->cHits);
+    }
+}
+#endif
+
+RTDECL(int) RTMpOnSpecific(RTCPUID idCpu, PFNRTMPWORKER pfnWorker, void *pvUser1, void *
+pvUser2)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+    int rc;
+    RTMPARGS Args;
+    
+    RTTHREADPREEMPTSTATE PreemptState = RTTHREADPREEMPTSTATE_INITIALIZER;
+    Args.pfnWorker = pfnWorker;
+    Args.pvUser1 = pvUser1;
+    Args.pvUser2 = pvUser2;
+    Args.idCpu = idCpu;
+    Args.cHits = 0;
+    
+    if (!RTMpIsCpuPossible(idCpu))
return VERR_CPU_NOT_FOUND;
+
+ RTThreadPreemptDisable(&PreemptState);
+ if (idCpu != RTMpCpuId())
+ {
+   if (RTMpIsCpuOnline(idCpu))
+     {
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
+       rc = smp_call_function_single(idCpu, rtmpLinuxWrapper, &Args, 1 /* wait */);
+#elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 19)
+       rc = smp_call_function_single(idCpu, rtmpLinuxWrapper, &Args, 0 /* retry */, 1 /* wait */);
+#else /* older kernels */
+       rc = smp_call_function(rtmpOnSpecificLinuxWrapper, &Args, 0 /* retry */, 1 /* wait */);
+#endif /* older kernels */
+     
+     rc = VINF_SUCCESS;
+   }
+   else
+     {
+       rtmpLinuxWrapper(&Args);
+       rc = VINF_SUCCESS;
+     }
+   
+   return VINF_SUCCESS;
+ }
+ 
+ else
+ {
+   NOREF(rc);
+   IPRT_LINUX_RESTORE_EFL_AC();
+   return rc;
+ }
+
+ RT_EXPORT_SYMBOL(RTMpOnSpecific);
+
+ +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 19)
+/**
+ * Dummy callback used by RTMpPokeCpu.
+ *
+ * @param pvInfo Ignored.
+ */
+static void rtmpLinuxPokeCpuCallback(void *pvInfo)
+{
+  NOREF(pvInfo);
+}
+ +#endif
+ +
+RTDECL(int) RTMpPokeCpu(RTCPUID idCpu)
{%if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 19)%}
    int rc;
    IPRT_LINUX_SAVE_EFL_AC();
+
    if (!RTMpIsCpuPossible(idCpu))
        return VERR_CPU_NOT_FOUND;
    if (!RTMpIsCpuOnline(idCpu))
        return VERR_CPU_OFFLINE;
+
    if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
    rc = smp_call_function_single(idCpu, rtmpLinuxPokeCpuCallback, NULL, 0 /* wait */);
+    rc = smp_call_function_single(idCpu, rtmpLinuxPokeCpuCallback, NULL, 0 /* retry */); 0 /* wait */);
+    /* older kernels */
+    error oops
+    endif /* older kernels */
+    NOREF(rc);
+    Assert(rc == 0);
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return VINF_SUCCESS;
+
+    else /* older kernels */
+    /* no unicast here? */
+    return VERR_NOT_SUPPORTED;
+    endif /* older kernels */
+
RT_EXPORT_SYMBOL(RTMpPokeCpu);
+
+
+RTDECL(bool) RTMpOnAllIsConcurrentSafe(void)
+{*
+    return true;
+}
+RT_EXPORT_SYMBOL(RTMpOnAllIsConcurrentSafe);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/mpnotification-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/mpnotification-r0drv-linux.c
@@ -0,0 +1,248 @@
+/* $Id: mpnotification-r0drv-linux.c $ */
+/** @file
+ * IPRT - Multiprocessor Event Notifications, Ring-0 Driver, Linux.
+ */
+@* @file
+ * IPRT - Multiprocessor Event Notifications, Ring-0 Driver, Linux.
+ */
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+ */
+
+#ifndef LINUX_VERSION_CODE >= KERNEL_VERSION(4, 10, 0)
+static enum cpuhp_state g_rtR0MpOnline;
+*/
+/*
 * Linux 4.10 completely removed CPU notifiers. So let's switch to CPU hotplug
 * notification.
 */
+static int rtR0MpNotificationLinuxOnline(unsigned int cpu)
+{
    RTCPUID idCpu = RTMpCpuIdFromSetIndex(cpu);
    rtMpNotificationDoCallbacks(RTMPEVENT_ONLINE, idCpu);
    return 0;
}
*/
+static int rtR0MpNotificationLinuxOffline(unsigned int cpu)
+{
+    RTCPUID idCpu = RTMpCpuIdFromSetIndex(cpu);
+    rtMpNotificationDoCallbacks(RTMPEVENT_OFFLINE, idCpu);
+    return 0;
+}
+
+DECLHIDDEN(int) rtR0MpNotificationNativeInit(void)
+{
+    int rc;
+    IPRT_LINUX_SAVE_EFL_AC();
+    rc = cpuhp_setup_state_nocalls(CPUHP_AP_ONLINE_DYN, "vboxdrv:online",
+                                   rtR0MpNotificationLinuxOnline, rtR0MpNotificationLinuxOffline);
+    IPRT_LINUX_RESTORE_EFL_AC();
+    /*
+     * cpuhp_setup_state_nocalls() returns a positive state number for
+     * CPUHP_AP_ONLINE_DYN or -ENOSPC if there is no free slot available
+     * (see cpuhp_reserve_state / definition of CPUHP_AP_ONLINE_DYN).
+     */
+    AssertMsgReturn(rc > 0, ("%d\n", rc), RTErrConvertFromErrno(rc));
+    g_rtR0MpOnline = rc;
+    return VINF_SUCCESS;
+}
+
+DECLHIDDEN(void) rtR0MpNotificationNativeTerm(void)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+    cpuhp_remove_state_nocalls(g_rtR0MpOnline);
+    IPRT_LINUX_RESTORE_EFL_AC();
+}
+
+#elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 71) && defined(CONFIG_SMP)
+
+static int rtMpNotificationLinuxCallback(struct notifier_block *pNotifierBlock, unsigned long ulNativeEvent, void *
+                                        pvCpu);
+/
+* The notifier block we use for registering the callback.
+*/
+static struct notifier_block g_NotifierBlock =
+{
+    .notifier_call = rtMpNotificationLinuxCallback,
+    .next = NULL,
+    .priority = 0
+};
+
+#ifdef CPU_DOWN_FAILED

---

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/**
 * The set of CPUs we've seen going offline recently.
 */
static RTCPUSET g_MpPendingOfflineSet;

/**
 * The native callback.
 *
 * @returns NOTIFY_DONE.
 * @param pNotifierBlock  Pointer to g_NotifierBlock.
 * @param ulNativeEvent   The native event.
 * @param pvCpu           The cpu id cast into a pointer value.
 * @remarks This can fire with preemption enabled and on any CPU.
 */
static int rtMpNotificationLinuxCallback(struct notifier_block *pNotifierBlock, unsigned long ulNativeEvent, void *pvCpu)
{
    bool fProcessEvent = false;
    RTCPUID idCpu      = (uintptr_t)pvCpu;
    NOREF(pNotifierBlock);

    /* Note that redhat/CentOS ported _some_ of the FROZEN macros
    * back to their 2.6.18-92.1.10.el5 kernel but actually don't
    * use them. Thus we have to test for both CPU_TASKS_FROZEN and
    * the individual event variants.
    */
    switch (ulNativeEvent)
    {
        /* Pick up online events or failures to go offline.
        * Ignore failure events for CPUs we didn't see go offline.
        */
        # ifdef CPU_DOWN_FAILED
        case CPU_DOWN_FAILED:
        case CPU_DOWN_FAILED_FROZEN:
        # endif
        case CPU_ONLINE:
        # if defined(CPU_TASKS_FROZEN) && defined(CPU_ONLINE_FROZEN)
        case CPU_ONLINE_FROZEN:
        # endif
        /* fall thru */
```c
#if defined(CPU_DOWN_FAILED)
    RTCpuSetDel(&g_MpPendingOfflineSet, idCpu);
#endif

    ifProcessEvent = true;
    break;

#elif CPU_DOWN_FAILED
    RTCpuSetAdd(&g_MpPendingOfflineSet, idCpu);
#endif

    fProcessEvent = true;
    break;

    fProcessEvent = false;
    break;

    switch (ulNativeEvent)
    {
        /*
         * Pick the earliest possible offline event.
         * The only important thing here is that we get the event and that
         * it's exactly one.
         */
        case CPU_DOWN_PREPARE:
            fProcessEvent = true;
        #ifdef CPU_DOWN_PREPARE
            case CPU_DOWN_PREPARE:
                fProcessEvent = true;
            #endif
            break;
        #endif
        case CPU_ONLINE:
            rtMpNotificationDoCallbacks(RTMPEVENT_ONLINE, idCpu);
            break;
        #ifdef CPU_DOWN_FAILED
            RTCpuSetAdd(&g_MpPendingOfflineSet, idCpu);
        #endif
        case CPU_DOWN_FAILED:
            rtMpNotificationDoCallbacks(RTMPEVENT_ONLINE, idCpu);
            break;
        #endif
        case CPU_ONLINE:
            rtMpNotificationDoCallbacks(RTMPEVENT_ONLINE, idCpu);
            break;
        #endif
    }
```

+
+# ifdef CPU_DOWN_PREPARE
+
case CPU_DOWN_PREPARE:
+# if defined(CPU_TASKS_FROZEN) && defined(CPU_DOWN_PREPARE_FROZEN)
+
case CPU_DOWN_PREPARE_FROZEN:
+# endif
+
rtMpNotificationDoCallbacks(RTMPEVENT_OFFLINE, idCpu);
+
break;
+# endif
+ }
+
+ return NOTIFY_DONE;
+}
+
+
+DECLHIDDEN(int) rtR0MpNotificationNativeInit(void)
+{
+ int rc;
+ IPRT_LINUX_SAVE_EFL_AC();
+
+# ifdef CPU_DOWN_FAILED
+ RTCpuSetEmpty(&g_MpPendingOfflineSet);
+# endif
+
+ rc = register_cpu_notifier(&g_NotifierBlock);
+ IPRT_LINUX_RESTORE_EFL_AC();
+ AssertMsgReturn(!rc, ("%d\n", rc), RTErrConvertFromErrno(rc));
+ return VINF_SUCCESS;
+}
+
+
+DECLHIDDEN(void) rtR0MpNotificationNativeTerm(void)
+{
+ IPRT_LINUX_SAVE_EFL_AC();
+ unregister_cpu_notifier(&g_NotifierBlock);
+ IPRT_LINUX_RESTORE_EFL_AC();
+}
+
+#else /* Not supported / Not needed */
+
+DECLHIDDEN(int) rtR0MpNotificationNativeInit(void)
+{
+ return VINF_SUCCESS;
+}
+
+DECLHIDDEN(void) rtR0MpNotificationNativeTerm(void)
+{
+}

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/* $Id: process-r0drv-linux.c $ */
/** @file
 * IPRT - Process, Ring-0 Driver, Linux.
 */

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/*******************************************************************************************
**************************************
*   Header Files                                                                  *
*******************************************************************************************/

#include "the-linux-kernel.h"
#include "internal/iprt.h"

#include <iprt/process.h>

RTDECL(RTPROCESS) RTProcSelf(void)
{
    return (RTPROCESS)current->tgid;
}
+RT_EXPORT_SYMBOL(RTProcSelf);
+
+RTR0DECL(RTR0PROCESS) RTR0ProcHandleSelf(void)
+{
+    return (RTR0PROCESS)current->tgid;
+}
+RT_EXPORT_SYMBOL(RTR0ProcHandleSelf);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/semevent-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/semevent-r0drv-linux.c
@@ -0,0 +1,279 @@
+/* $Id: semevent-r0drv-linux.c $ */
+/** @file
+ * IPRT - Single Release Event Semaphores, Ring-0 Driver, Linux.
+ */
+/**
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+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+/*******************************************************************************************
+**************************************
+*   Header Files                                                                                                                 *
+********************************************************************************************
+***************************************************************************/
+#define RTSEMEVENT_WITHOUT_REMAPPING
+  
+  /*************************************************************************}
+  #define RTSEMEVENT_WITHOUT_REMAPPING
+  #include "the-linux-kernel.h"
+  #include "internal/iprt.h"
+  #include <iprt/semaphore.h>
#include <iprt/asm.h>
#include <iprt/assert.h>
#include <iprt/err.h>
#include <iprt/lockvalidator.h>
#include <iprt/mem.h>

#include "waitqueue-r0drv-linux.h"
#include "internal/magics.h"

/*******************************************************************************************
**************************************
+*   Structures and Typedefs                                                                                                      *
+********************************************************************************************
****
+*        *
+*        *
+*  Structures and Typedefs                                                                                                      *
+*        *
+*        *
+***********************************************************************/

/* Linux event semaphore. */

+*/
+typedef struct RTSEMEVENTINTERNAL
+
+    /** Magic value (RTSEMEVENT_MAGIC). */
+    uint32_t volatile   u32Magic;
+    /** The object status - !0 when signaled and 0 when reset. */
+    uint32_t volatile   fState;
+    /** Reference counter. */
+    uint32_t volatile   cRefs;
+    /** The wait queue. */
+    wait_queue_head_t   Head;
+} RTSEMEVENTINTERNAL, *PRTSEMEVENTINTERNAL;

RTDECL(int)  RTSemEventCreate(PRTSEMEVENT phEventSem)
{
    return RTSemEventCreateEx(phEventSem, 0 /*fFlags*/, NIL_RTLOCKVALCLASS, NULL);
}

+RTDECL(int)  RTSemEventCreateEx(PRTSEMEVENT phEventSem, uint32_t fFlags, RTLOCKVALCLASS
hClass, const char *pszNameFmt, ...)
{
    PRTSEMEVENTINTERNAL pThis;
    IPRT_LINUX_SAVE_EFL_AC();
    RT_NOREF_PV(hClass); RT_NOREF_PV(pszNameFmt);
    +
    + AssertReturn(!((fFlags & ~(RTSEMEVENT_FLAGS_NO_LOCK_VAL | RTSEMEVENT_FLAGS_BOOTSTRAP_HACK)) | VERR_INVALID_PARAMETER);
Assert(!(fFlags & RTSEMEVENT_FLAGS_BOOTSTRAP_HACK) || (fFlags & RTSEMEVENT_FLAGS_NO_LOCK_VAL));
+
+    pThis = (PRTSEMEVENTINTERNAL)RTMemAlloc(sizeof(*pThis));
+    if (!pThis)
+        return VERR_NO_MEMORY;
+
+    pThis->u32Magic = RTSEMEVENT_MAGIC;
+    pThis->fState   = 0;
+    pThis->cRefs    = 1;
+    init_waitqueue_head(&pThis->Head);
+
+    *phEventSem = pThis;
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return VINF_SUCCESS;
+
+RT_EXPORT_SYMBOL(RTSemEventCreate);
+
+/**
+ * Retains a reference to the event semaphore.
+ * 
+ * @param   pThis       The event semaphore.
+ */
+DECLINLINE(void) rtR0SemEventLnxRetain(PRTSEMEVENTINTERNAL pThis)
+{
+    uint32_t cRefs = ASMAtomicIncU32(&pThis->cRefs);
+    Assert(cRefs < 100000); NOREF(cRefs);
+}
+
+/**
+ * Releases a reference to the event semaphore.
+ * 
+ * @param   pThis       The event semaphore.
+ */
+DECLINLINE(void) rtR0SemEventLnxRelease(PRTSEMEVENTINTERNAL pThis)
+{
+    if (RT_UNLIKELY(ASMAtomicDecU32(&pThis->cRefs) == 0))
+        RTMemFree(pThis);
+}
+
+RTDECL(int)  RTSemEventDestroy(RTSEMEVENT hEventSem)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+    /*
+ * Validate input.
+ */
+ PRTSEMEVENTINTERNAL pThis = hEventSem;
+ if (pThis == NIL_RTSEMEVENT)
+    return VINF_SUCCESS;
+ AssertMsgReturn(pThis->u32Magic == RTSEMEVENT_MAGIC, ("pThis->u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);
+ Assert(pThis->cRefs > 0);
+
+ /*
+ * Invalidate it and signal the object just in case.
+ */
+ ASMAtomicWriteU32(&(pThis->u32Magic, ~RTSEMEVENT_MAGIC);
+ ASMAtomicWriteU32(&(pThis->fState, 0);
+ Assert(!waitqueue_active(&pThis->Head));
+ wake_up_all(&pThis->Head);
+ rTR0SemEventLnxRelease(pThis);
+
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return VINF_SUCCESS;
+
+}  }
+RT_EXPORT_SYMBOL(RTSemEventDestroy);
+
+RTDECL(int)  RTSemEventSignal(RTSEMEVENT hEventSem)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+
+    /*
+     * Validate input.
+     */
+    PRTSEMEVENTINTERNAL pThis = (PRTSEMEVENTINTERNAL)hEventSem;
+    AssertPtrReturn(pThis, VERR_INVALID_HANDLE);
+    AssertMsgReturn(pThis->u32Magic == RTSEMEVENT_MAGIC, ("pThis->u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);
+    rTR0SemEventLnxRetain(pThis);
+
+    /*
+     * Signal the event object.
+     */
+    ASMAtomicWriteU32(&pThis->fState, 1);
+    wake_up(&pThis->Head);
+
+    rTR0SemEventLnxRelease(pThis);
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return VINF_SUCCESS;
+
+}  }
+RT_EXPORT_SYMBOL(RTSemEventSignal);
+
+
+/**
+ * Worker for RTSemEventWaitEx and RTSemEventWaitExDebug.
+*
+ * @returns VBox status code.
+ * @param pThis
The event semaphore.
+ * @param fFlags
See RTSemEventWaitEx.
+ * @param uTimeout
See RTSemEventWaitEx.
+ * @param pSrcPos
The source code position of the wait.
+ */
+static int rtR0SemEventLnxWait(PRTSEMEVENTINTERNAL pThis, uint32_t fFlags, uint64_t uTimeout,
+
PCRTLOCKVALSRCPOS pSrcPos)
+{
+ int rc;
+ RT_NOREF_PV(pSrcPos);
+
+ /*
+ * Validate the input.
+ */
+ AssertPtrReturn(pThis, VERR_INVALID_PARAMETER);
+ AssertMsgReturn(pThis->u32Magic == RTSEMEVENT_MAGIC, ("%p u32Magic=%RX32\n", pThis, pThis>u32Magic), VERR_INVALID_PARAMETER);
+ AssertReturn(RTSEMWAIT_FLAGS_ARE_VALID(fFlags), VERR_INVALID_PARAMETER);
+ rtR0SemEventLnxRetain(pThis);
+
+ /*
+ * Try grab the event without setting up the wait.
+ */
+ if ( 1 /** @todo check if there are someone waiting already - waitqueue_active, but then what do we do below?
*/
+
&& ASMAtomicCmpXchgU32(&pThis->fState, 0, 1))
+
rc = VINF_SUCCESS;
+ else
+ {
+
/*
+
* We have to wait.
+
*/
+
IPRT_LINUX_SAVE_EFL_AC();
+
RTR0SEMLNXWAIT Wait;
+
rc = rtR0SemLnxWaitInit(&Wait, fFlags, uTimeout, &pThis->Head);
+
if (RT_SUCCESS(rc))
+
{
+
IPRT_DEBUG_SEMS_STATE(pThis, 'E');
+
for (;;)
+
{
+
/* The destruction test. */
+
if (RT_UNLIKELY(pThis->u32Magic != RTSEMEVENT_MAGIC))

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+ rtR0SemLnxWaitPrepare(&Wait);
+ }
+ /* Check the exit conditions. */
+ if (RT_UNLIKELY(pThis->u32Magic != RTSEMEVENT_MAGIC))
+     rc = VERR_SEM_DESTROYED;
+ else if (ASMAtomicCmpXchgU32(&pThis->fState, 0, 1))
+     rc = VINF_SUCCESS;
+ else if (rtR0SemLnxWaitHasTimedOut(&Wait))
+     rc = VERR_TIMEOUT;
+ else if (rtR0SemLnxWaitWasInterrupted(&Wait))
+     rc = VERR_INTERRUPTED;
+ else
+ {
+     /* Do the wait and then recheck the conditions. */
+     rtR0SemLnxWaitDoIt(&Wait);
+     continue;
+ }
+ break;
+ }
+
+ rtR0SemLnxWaitDelete(&Wait);
+ IPRT_DEBUG_SEMS_STATE_RC(pThis, 'E', rc);
+ } + IPRT_LINUX_RESTORE_EFL_AC();
+ }
+ rtR0SemEventLnxRelease(pThis);
+ return rc;
+
+ +RTDECL(int) RTSemEventWaitEx(RTSEMEVENT hEventSem, uint32_t fFlags, uint64_t uTimeout)
+ {
+ #ifndef RTSEMEVENT STRICT
+     return rtR0SemEventLnxWait(hEventSem, fFlags, uTimeout, NULL);
+ #else
+     RTLOCKVALSRCPOS SrcPos = RTLOCKVALSRCPOS_INIT_NORMAL_API();
+     return rtR0SemEventLnxWait(hEventSem, fFlags, uTimeout, &SrcPos);
+ #endif
+ } +RT_EXPORT_SYMBOL(RTSemEventWaitEx);
+ RTHCUINTPTR uld, RT_SRC_POS_DECL)
+{
+   RTLOCKVALSRCPOS SrcPos = RTLOCKVALSRCPOS_INIT_DEBUG_API();
+   return rtR0SemEventLnxWait(hEventSem, fFlags, uTimeout, &SrcPos);
+}
+RT_EXPORT_SYMBOL(RTSemEventWaitExDebug);
+
+RTDECL(uint32_t) RTSemEventGetResolution(void)
+{
+   return rtR0SemLnxWaitGetResolution();
+}
+RT_EXPORT_SYMBOL(RTSemEventGetResolution);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/semeventmulti-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/semeventmulti-r0drv-linux.c
@@ -0,0 +1,344 @@
+/* $Id: semeventmulti-r0drv-linux.c $ */
+/** @file
+ * IPRT - Multiple Release Event Semaphores, Ring-0 Driver, Linux.
+ */
+*
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+* You may elect to license modified versions of this file under the
+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+*******************************************************************************************
**************************************
*   Header Files                                                                                                                 *
********************************************************************************************
#define RTSEMEVENTMULTI_WITHOUT_REMAPPING
#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/sema.h>
#include <iprt/assert.h>
#include <iprt/asm.h>
#include <iprt/err.h>
#include <iprt/mem.h>
#include <iprt/lockvalidator.h>
#include "waitqueue-r0drv-linux.h"
#include "internal/magics.h"

/*******************************************************************************************
**************************************
*   Defined Constants And Macros                                                                                                 *
********************************************************************************************
************************************

/** @name fStateAndGen values
 * @{ */
/** The state bit number. */
#define RTSEMEVENTMULTI_LNX_STATE_BIT        0
/** The state mask. */
#define RTSEMEVENTMULTI_LNX_STATE_MASK       RT_BIT_32(RTSEMEVENTMULTI_LNX_STATE_BIT)
/** The generation mask. */
#define RTSEMEVENTMULTI_LNX_GEN_MASK         ~RTSEMEVENTMULTI_LNX_STATE_MASK
/** The generation shift. */
#define RTSEMEVENTMULTI_LNX_GEN_SHIFT        1
/** The initial variable value. */
#define RTSEMEVENTMULTI_LNX_STATE_GEN_INIT   UINT32_C(0xfffffffc)
/** @} */

/*******************************************************************************************
**************************************
*   Structures and Typedefs                                                                                                      *
********************************************************************************************
************************************

/**
 * Linux event semaphore.
 * */
typedef struct RTSEMEVENTMULTIINTERNAL
{
    /** Magic value (RTSEMEVENTMULTI_MAGIC). */
+ uint32_t volatile u32Magic;
+ /** The object state bit and generation counter. */
+ * The generation counter is incremented every time the object is
+ * signalled. */
+ uint32_t volatile fStateAndGen;
+ /** Reference counter. */
+ uint32_t volatile cRefs;
+ /** The wait queue. */
+ wait_queue_head_t Head;
+
+ RTDECL(int) RTSemEventMultiCreate(PRTSEMEVENTMULTI phEventMultiSem)
+ {
+    return RTSemEventMultiCreateEx(phEventMultiSem, 0 /*fFlags*/, NIL_RTLOCKVALCLASS, NULL);
+ }
+
+ RTDECL(int) RTSemEventMultiCreateEx(PRTSEMEVENTMULTI phEventMultiSem, uint32_t fFlags,
+                                     RTLOCKVALCLASS hClass,
+                                     const char *pszNameFmt, ...)
+ {
+    PRTSEMEVENTMULTIINTERNAL pThis;
+    IPRT_LINUX_SAVE_EFL_AC();
+    RT_NOREF_PV(hClass); RT_NOREF_PV(pszNameFmt);
+    AssertReturn(!(fFlags & ~RTSEMEVENTMULTI_FLAGS_NO_LOCK_VAL), VERR_INVALID_PARAMETER);
+    pThis = (PRTSEMEVENTMULTIINTERNAL)RTMemAlloc(sizeof(*pThis));
+    if (pThis)
+    {
+        pThis->u32Magic     = RTSEMEVENTMULTI_MAGIC;
+        pThis->fStateAndGen = RTSEMEVENTMULTI_STATE.Gen_INIT;
+        pThis->cRefs        = 1;
+        init_waitqueue_head(&pThis->Head);
+        *phEventMultiSem = pThis;
+        IPRT_LINUX_RESTORE_EFL_AC();
+        return VINF_SUCCESS;
+    }
+    return VERR_NO_MEMORY;
+}
+
+/**
+ * Retain a reference to the semaphore.
+*
+ * @param pThis
The semaphore.
+ */
+DECLINLINE(void) rtR0SemEventMultiLnxRetain(PRTSEMEVENTMULTIINTERNAL pThis)
+{
+ uint32_t cRefs = ASMAtomicIncU32(&pThis->cRefs);
+ NOREF(cRefs);
+ Assert(cRefs && cRefs < 100000);
+}
+
+
+/**
+ * Release a reference, destroy the thing if necessary.
+*
+ * @param pThis
The semaphore.
+ */
+DECLINLINE(void) rtR0SemEventMultiLnxRelease(PRTSEMEVENTMULTIINTERNAL pThis)
+{
+ if (RT_UNLIKELY(ASMAtomicDecU32(&pThis->cRefs) == 0))
+ {
+
Assert(pThis->u32Magic != RTSEMEVENTMULTI_MAGIC);
+
RTMemFree(pThis);
+ }
+}
+
+
+RTDECL(int) RTSemEventMultiDestroy(RTSEMEVENTMULTI hEventMultiSem)
+{
+ IPRT_LINUX_SAVE_EFL_AC();
+
+ /*
+ * Validate input.
+ */
+ PRTSEMEVENTMULTIINTERNAL pThis = (PRTSEMEVENTMULTIINTERNAL)hEventMultiSem;
+ if (pThis == NIL_RTSEMEVENTMULTI)
+
return VINF_SUCCESS;
+ AssertPtrReturn(pThis, VERR_INVALID_PARAMETER);
+ AssertMsgReturn(pThis->u32Magic == RTSEMEVENTMULTI_MAGIC, ("%p u32Magic=%RX32\n", pThis,
pThis->u32Magic), VERR_INVALID_PARAMETER);
+ Assert(pThis->cRefs > 0);
+
+ /*
+ * Invalidate it and signal the object just in case.
+ */
+ ASMAtomicWriteU32(&pThis->u32Magic, ~RTSEMEVENTMULTI_MAGIC);

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+ ASMAtomicAndU32(&pThis->fStateAndGen, RTSEMEVENTMULTILNX_GEN_MASK);
+ Assert(!waitqueue_active(&pThis->Head));
+ wake_up_all(&pThis->Head);
+ rtR0SemEventMultiLnxRelease(pThis);
+
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return VINF_SUCCESS;
+}
+RT_EXPORT_SYMBOL(RTSemEventMultiDestroy);
+
+
+RTDECL(int) RTSemEventMultiSignal(RTSEMEVENTMULTI hEventMultiSem)
+{
+ IPRT_LINUX_SAVE_EFL_AC();
+ uint32_t fNew;
+ uint32_t fOld;
+
+ /*
+ * Validate input.
+ */
+ PRTSEMEVENTMULTIINTERNAL pThis = (PRTSEMEVENTMULTIINTERNAL)hEventMultiSem;
+ if (!pThis)
+
return VERR_INVALID_PARAMETER;
+ AssertPtrReturn(pThis, VERR_INVALID_PARAMETER);
+ AssertMsgReturn(pThis->u32Magic == RTSEMEVENTMULTI_MAGIC, ("%p u32Magic=%RX32\n", pThis,
pThis->u32Magic), VERR_INVALID_PARAMETER);
+ rtR0SemEventMultiLnxRetain(pThis);
+
+ /*
+ * Signal the event object. The cause of the paranoia here is racing to try
+ * deal with racing RTSemEventMultiSignal calls (should probably be
+ * forbidden, but it's relatively easy to handle).
+ */
+ do
+ {
+
fNew = fOld = ASMAtomicUoReadU32(&pThis->fStateAndGen);
+
fNew += 1 << RTSEMEVENTMULTILNX_GEN_SHIFT;
+
fNew |= RTSEMEVENTMULTILNX_STATE_MASK;
+ }
+ while (!ASMAtomicCmpXchgU32(&pThis->fStateAndGen, fNew, fOld));
+
+ wake_up_all(&pThis->Head);
+
+ rtR0SemEventMultiLnxRelease(pThis);
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return VINF_SUCCESS;
+}
+RT_EXPORT_SYMBOL(RTSemEventMultiSignal);

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+RTDECL(int) RTSemEventMultiReset(RTSEMEVENTMULTI hEventMultiSem)
+{
+    /*
+     * Validate input.
+     */
+    RTSEMEVENTMULTIINTERNAL pThis = (RTSEMEVENTMULTIINTERNAL)hEventMultiSem;
+    if (!pThis)
+        return VERR_INVALID_PARAMETER;
+    AssertPtrReturn(pThis, VERR_INVALID_PARAMETER);
+    AssertMsgReturn(pThis->u32Magic == RTSEMEVENTMULTI_MAGIC, ("%p u32Magic=%RX32\n", pThis, pThis->u32Magic), VERR_INVALID_PARAMETER);
+    rtR0SemEventMultiLnxRetain(pThis);
+    /*
+     * Reset it.
+     */
+    ASMAtomicAndU32(&pThis->fStateAndGen, ~RTSEMEVENTMULTILNX_STATE_MASK);
+    rtR0SemEventMultiLnxRelease(pThis);
+    return VINF_SUCCESS;
+}
+RT_EXPORT_SYMBOL(RTSemEventMultiReset);
+
+
+/**
+ * Worker for RTSemEventMultiWaitEx and RTSemEventMultiWaitExDebug.
+ *
+ * @returns VBox status code.
+ * @param   pThis           The event semaphore.
+ * @param   fFlags          See RTSemEventMultiWaitEx.
+ * @param   uTimeout        See RTSemEventMultiWaitEx.
+ * @param   pSrcPos         The source code position of the wait.
+ */
+static int rtR0SemEventMultiLnxWait(PRTSEMEVENTMULTIINTERNAL pThis, uint32_t fFlags, uint64_t uTimeout,
+                                    PCRTLOCKVALSRCPOS pSrcPos)
+{
+    uint32_t    fOrgStateAndGen;
+    int         rc;
+    RT_NOREF_PV(pSrcPos);
+    /*
+     * Validate the input.
+     */
+    AssertPtrReturn(pThis, VERR_INVALID_PARAMETER);
+    AssertMsgReturn(pThis->u32Magic == RTSEMEVENTMULTI_MAGIC, ("%p u32Magic=%RX32\n", pThis, pThis->u32Magic), VERR_INVALID_PARAMETER);
pThis->u32Magic), VERR_INVALID_PARAMETER);
+    AssertReturn(RTSEMWAIT_FLAGS_ARE_VALID(fFlags), VERR_INVALID_PARAMETER);
+    rtR0SemEventMultiLnxRetain(pThis);
+
+ /*
+ * Is the event already signalled or do we have to wait?
+ */
+ fOrgStateAndGen = ASMAtomicUoReadU32(&pThis->fStateAndGen);
+ if (fOrgStateAndGen & RTSEMEVENTMULTILNX_STATE_MASK)
+     rc = VINF_SUCCESS;
+ else
+     {
+     /* We have to wait.
+     */
+     RTR0SEMLNXWAIT Wait;
+     IPRT_LINUX_SAVE_EFL_AC();
+     rc = rtR0SemLnxWaitInit(&Wait, fFlags, uTimeout, &pThis->Head);
+     if (RT_SUCCESS(rc))
+     {
+         IPRT_DEBUG_SEMS_STATE(pThis, 'E');
+         for (;;)
+         {
+             /* The destruction test. */
+             if (RT_UNLIKELY(pThis->u32Magic != RTSEMEVENTMULTI_MAGIC))
+                 rc = VERR_SEM_DESTROYED;
+             else
+             {
+                 rtR0SemLnxWaitPrepare(&Wait);
+                 /* Check the exit conditions. */
+                 if (RT_UNLIKELY(pThis->u32Magic != RTSEMEVENTMULTI_MAGIC))
+                     rc = VERR_SEM_DESTROYED;
+                 else if (ASMAtomicUoReadU32(&pThis->fStateAndGen) != fOrgStateAndGen)
+                     rc = VINF_SUCCESS;
+                 else if (rtR0SemLnxWaitHasTimedOut(&Wait))
+                     rc = VERR_TIMEOUT;
+                 else if (rtR0SemLnxWaitWasInterrupted(&Wait))
+                     rc = VERR_INTERRUPTED;
+                 else
+                 {
+                     /* Do the wait and then recheck the conditions. */
+                     rtR0SemLnxWaitDoIt(&Wait);
+                     continue;
+                 }
+                 break;
+             } break;
+         }
+     }
rtR0SemLnxWaitDelete(&Wait);
IPRT_DEBUG_SEMS_STATE_RC(pThis, 'E', rc);
IPRT_LINUX_RESTORE_EFL_AC();

rtR0SemEventMultiLnxRelease(pThis);
return rc;

RTDECL(int) RTSemEventMultiWaitEx(RTSEMEVENTMULTI hEventMultiSem, uint32_t fFlags, uint64_t uTimeout)
{
#ifndef RTSEMEVENT STRICT
return rtR0SemEventMultiLnxWait(hEventMultiSem, fFlags, uTimeout, NULL);
#else
RTLOCKVALSRCPOS SrcPos = RTLOCKVALSRCPOS_INIT_NORMAL_API();
return rtR0SemEventMultiLnxWait(hEventMultiSem, fFlags, uTimeout, &SrcPos);
#endif
}
RT_EXPORT_SYMBOL(RTSemEventMultiWaitEx);

RTDECL(int) RTSemEventMultiWaitExDebug(RTSEMEVENTMULTI hEventMultiSem, uint32_t fFlags, uint64_t uTimeout,
                                        RTHCUINTPTR uId, RT_SRC_POS_DECL)
{
    RTLOCKVALSRCPOS SrcPos = RTLOCKVALSRCPOS_INIT_DEBUG_API();
    return rtR0SemEventMultiLnxWait(hEventMultiSem, fFlags, uTimeout, &SrcPos);
}
RT_EXPORT_SYMBOL(RTSemEventMultiWaitExDebug);

RTDECL(uint32_t) RTSemEventMultiGetResolution(void)
{
    return rtR0SemLnxWaitGetResolution();
}
RT_EXPORT_SYMBOL(RTSemEventMultiGetResolution);

--- linux-4.15.0.org/ubuntu/vbox/vboxguest/r0drv/linux/semfastmutex-r0drv-linux.c
+++/ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/semfastmutex-r0drv-linux.c
@@ -0,0 +1,157 @@
+/* $Id: semfastmutex-r0drv-linux.c $ */
+/** @file
+ * IPRT - Fast Mutex Semaphores, Ring-0 Driver, Linux.
+ */
/*
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 * terms and conditions of either the GPL or the CDDL or both.
 * */

#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/semaphore.h>
#include <iprt/alloc.h>
#include <iprt/assert.h>
#include <iprt/asm.h>
#include <iprt/err.h>
#if defined(RT_STRICT) || defined(IPRT_DEBUG_SEMS)
#include <iprt/thread.h>
#endif
#include "internal/magics.h"

/*
 * Structures and Typedefs
 */
/* Wrapper for the linux semaphore structure. */
typedef struct RTSEMFASTMUTEXINTERNAL {
    /** Magic value (RTSEMFASTMUTEX_MAGIC). */
    uint32_t u32Magic;
    /** the linux semaphore. */
    struct semaphore Semaphore;
    /** For check. */
    RTNATIVETHREAD volatile Owner;
} RTSEMFASTMUTEXINTERNAL, *PRTSEMFASTMUTEXINTERNAL;

RTDECL(int) RTSemFastMutexCreate(PRTSEMFASTMUTEX phFastMtx)
{
    IPRT_LINUX_SAVE_EFL_AC();
    PRTSEMFASTMUTEXINTERNAL pThis;
    pThis = (PRTSEMFASTMUTEXINTERNAL)RTMemAlloc(sizeof(*pThis));
    if (!pThis)
        return VERR_NO_MEMORY;
    pThis->u32Magic = RTSEMFASTMUTEX_MAGIC;
    sema_init(&pThis->Semaphore, 1);
    *phFastMtx = pThis;
    IPRT_LINUX_RESTORE_EFL_AC();
    return VINF_SUCCESS;
}

RTDECL(int) RTSemFastMutexDestroy(RTSEMFASTMUTEX hFastMtx)
{
    /* Validate. */
    *phFastMtx = pThis;
    IPRT_LINUX_RESTORE_EFL_AC();
    return VINF_SUCCESS;
}
RTDECL(int) RTSemFastMutexRequest(RTSEMFASTMUTEX hFastMtx)
{
    IPRT_LINUX_SAVE_EFL_AC();

    /* Validate. */
    PRTSEMFASTMUTEXINTERNAL pThis = hFastMtx;
    AssertPtrReturn(pThis, VERR_INVALID_HANDLE);
    AssertMsgReturn(pThis->u32Magic == RTSEMFASTMUTEX_MAGIC, ("u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);

    IPRT_DEBUG_SEMS_STATE(pThis, 'd');
    down(&pThis->Semaphore);
#if defined(RT_STRICT) || defined(IPRT_DEBUG_SEMS)
    IPRT_DEBUG_SEMS_STATE(pThis, 'o');
    AssertRelease(pThis->Owner == NIL_RTNATIVETHREAD);
    ASMAtomicUoWriteSize(&pThis->Owner, RTThreadNativeSelf());
#endif

    IPRT_LINUX_RESTORE_EFL_ONLY_AC();
    return VINF_SUCCESS;
}

RT_EXPORT_SYMBOL(RTSemFastMutexRequest);

RTDECL(int) RTSemFastMutexRelease(RTSEMFASTMUTEX hFastMtx)
{
    IPRT_LINUX_SAVE_EFL_AC();

    /* Validate. */
    PRTSEMFASTMUTEXINTERNAL pThis = hFastMtx;
    AssertPtrReturn(pThis, VERR_INVALID_HANDLE);
    AssertMsgReturn(pThis->u32Magic == RTSEMFASTMUTEX_MAGIC, ("u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);

    IPRT_LINUX_RESTORE_EFL_ONLY_AC();
    return VINF_SUCCESS;
}

RT_EXPORT_SYMBOL(RTSemFastMutexRelease);
AssertPtrReturn(pThis, VERR_INVALID_HANDLE);
AssertMsgReturn(pThis->u32Magic == RTSEMFASTMUTEX_MAGIC, ("u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);

#if defined(RT STRICT) || defined(IPRT_DEBUG_SEMS)
    AssertRelease(pThis->Owner == RTThreadNativeSelf());
    ASMAtomicUoWriteSize(&pThis->Owner, NIL_RTNATIVETHREAD);
#endif
    up(&pThis->Semaphore);
    IPRT_DEBUG_SEMS_STATE(pThis, 'u');
    + IPRT_LINUX_RESTORE_EFL_ONLY_AC();
    + return VINF_SUCCESS;
{
+RT_EXPORT_SYMBOL(RTSemFastMutexRelease);
+
--- linux-4.15.0.org/ubuntu/vbox/vboxguest/r0drv/linux/semmutex-r0drv-linux.c
+++ linux-4.15.0.org/ubuntu/vbox/vboxguest/r0drv/linux/semmutex-r0drv-linux.c
@@ -0,0 +1,421 @@
+/* $Id: semmutex-r0drv-linux.c $ */
+/** @file
+ * IPRT - Mutex Semaphores, Ring-0 Driver, Linux.
+ */
+
+*/ @file
+ * IPRT - Mutex Semaphores, Ring-0 Driver, Linux.
+ */
+
+ */
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ */
+ */
#define RTSEMMUTEX_WITHOUT_REMAPPING
#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/semaphore.h>
+
#include <iprt/assert.h>
#include <iprt/asm.h>
#include <iprt/mem.h>
#include <iprt/err.h>
#include <iprt/list.h>
+
#include "internal/magics.h"
+
+
/*.infinity*/

typedef struct RTSEMMUTEXLNXWAITER
{
    /** The list entry. */
    RTLISTNODE ListEntry;
    /** The waiting task. */
    struct task_struct *pTask;
    /** Why did we wake up? */
    enum
    {
        /** Wakeup to take the semaphore. */
        RTSEMMUTEXLNXWAITER_WAKEUP,
        /** Mutex is being destroyed. */
        RTSEMMUTEXLNXWAITER_DESTROYED,
        /** Some other reason. */
        RTSEMMUTEXLNXWAITER_OTHER
    } volatile enmReason;
} RTSEMMUTEXLNXWAITER, *PRTSEMMUTEXLNXWAITER;

/**
 * Wrapper for the linux semaphore structure.
 */
typedef struct RTSEMMUTEXINTERNAL
{
    /** Magic value (RTSEMMUTEX_MAGIC). */
    uint32_t u32Magic;
    /** The number of recursions. */
    */
+ uint32_t  cRecursions;
+ /**< The list of waiting threads. */
+ RTLISTANCHOR  WaiterList;
+ /**< The current owner, NULL if none. */
+ struct task_struct  *pOwnerTask;
+ /**< The number of references to this piece of memory. This is used to
+ * prevent it from being kicked from underneath us while waiting. */
+ uint32_t volatile  cRefs;
+ /**< The spinlock protecting the members and falling asleep. */
+ spinlock_t  Spinlock;
+
+ RTDECL(int) RTSemMutexCreate(PRTSEMMUTEX phMtx)
+ {
+    int rc = VINF_SUCCESS;
+    IPRT_LINUX_SAVE_EFL_AC();
+    
+    /*
+     * Allocate.
+     */
+    PRTSEMMUTEXINTERNAL pThis;
+    pThis = (PRTEMMUTEXINTERNAL)RTMemAlloc(sizeof(*pThis));
+    if (pThis)
+    {
+        /*
+         * Initialize.
+         */
+        pThis->u32Magic = RTSEMMUTEX_MAGIC;
+        pThis->cRecursions = 0;
+        pThis->pOwnerTask = NULL;
+        pThis->cRefs = 1;
+        RTListInit(&pThis->WaiterList);
+        spin_lock_init(&pThis->Spinlock);
+        
+        *phMtx = pThis;
+    }
+    else
+    rc = VERR_NO_MEMORY;
+    
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return rc;
+}
+RT_EXPORT_SYMBOL(RTSemMutexCreate);
+
+RTDECL(int) RTSemMutexDestroy(RTSEMMUTEX hMtx)
+{
PRTSEMMUTEXINTERNAL  pThis = hMtx;
PRTSEMMUTEXLNXWAITER  pCur;
unsigned long         fSavedIrq;

/* Validate. */
if (pThis == NIL_RTSEMMUTEX)
    return VINF_SUCCESS;
AssertPtrReturn(pThis, VERR_INVALID_HANDLE);
AssertMsgReturn(pThis->u32Magic == RTSEMMUTEX_MAGIC, ("u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);

/* Kill it, kick waiters and release it. */
AssertReturn(ASMAtomicCmpXchgU32(&pThis->u32Magic, RTSEMMUTEX_MAGIC_DEAD, RTSEMMUTEX_MAGIC), VERR_INVALID_HANDLE);

IPRT_LINUX_SAVE_EFL_AC();

spin_lock_irqsave(&pThis->Spinlock, fSavedIrq);
RTListForEach(&pThis->WaiterList, pCur, RTSEMMUTEXLNXWAITER, ListEntry)
{
    pCur->enmReason = RTSEMMUTEXLNXWAITER_DESTROYED;
    wake_up_process(pCur->pTask);
}

if (ASMAtomicDecU32(&pThis->cRefs) != 0)
    spin_unlock_irqrestore(&pThis->Spinlock, fSavedIrq);
else
{
    spin_unlock_irqrestore(&pThis->Spinlock, fSavedIrq);
    RTMemFree(pThis);
}

IPRT_LINUX_RESTORE_EFL_AC();

return VINF_SUCCESS;
}+RT_EXPORT_SYMBOL(RTSemMutexDestroy);

/* Worker for rtSemMutexLinuxRequest that handles the case where we go to sleep. */
++*
+ @returns VINF_SUCCESS, VERR_INTERRUPTED, VERR_TIMEOUT or VERR_SEM_DESTROYED.
+ * Returns without owning the spinlock.
+ * @param   pThis           The mutex instance.
+ * @param   cMillis         The timeout.
+ * @param   fInterruptible  The wait type.
+ * @param   fSavedIrq       The saved IRQ flags.
+ */
+static int rtSemMutexLinuxRequestSleep(PRTSEMMUTEXINTERNAL pThis, RTMSINTERVAL cMillis,
+                                       bool fInterruptible, unsigned long fSavedIrq)
+{
+    struct task_struct *pSelf    = current;
+    int                 rc       = VERR_TIMEOUT;
+    long                lTimeout = cMillis == RT_INDEFINITE_WAIT ? MAX_SCHEDULE_TIMEOUT :
+                                  msecs_to_jiffies(cMillis);
+    RTSEMMUTEXLNXWAITER Waiter;
+
+    IPRT_DEBUG_SEMS_STATE(pThis, 'm');
+
+    /*
+     * Grab a reference to the mutex and add ourselves to the waiter list.
+     */
+    ASMAtomicIncU32(&pThis->cRefs);
+    Waiter.pTask     = pSelf;
+    Waiter.enmReason = RTSEMMUTEXLNXWAITER_OTHER;
+    RTListAppend(&pThis->WaiterList, &Waiter.ListEntry);
+
+    /*
+     * Do the waiting.
+     */
+    for (;;)
+    {
+        /* Check signal and timeout conditions. */
+        if (    fInterruptible
+               &&  signal_pending(pSelf))
+        {
+            rc = VERR_INTERRUPTED;
+            break;
+        }
+        if (!lTimeout)
+            break;
+        /* Go to sleep. */
+        set_current_state(fInterruptible ? TASK_INTERRUPTIBLE : TASK_UNINTERRUPTIBLE);
+        spin_unlock_irq(&pThis->Spinlock);
+        lTimeout = schedule_timeout(lTimeout);
+        spin_lock_irq(&pThis->Spinlock);
+    }
set_current_state(TASK_RUNNING);

/* Did someone wake us up? */
if (Waiter.enmReason == RTSEMMUTEXLNXWAITER_WAKEUP)
{
    Assert(pThis->cRecursions == 0);
    pThis->cRecursions = 1;
    pThis->pOwnerTask  = pSelf;
    rc = VINF_SUCCESS;
    break;
}

/* Is the mutex being destroyed? */
if (RT_UNLIKELY(   Waiter.enmReason == RTSEMMUTEXLNXWAITER_DESTROYED
                        || pThis->u32Magic != RTSEMMUTEX_MAGIC))
{
    rc = VERR_SEM_DESTROYED;
    break;
}

/* Unlink ourself from the waiter list, dereference the mutex and exit the
lock. We might have to free the mutex if it was the destroyed.
*/
RTListNodeRemove(&Waiter.ListEntry);
IPRT_DEBUG_SEMS_STATE_RC(pThis, 'M', rc);

if (RT_LIKELY(ASMAtomicDecU32(&pThis->cRefs) != 0))
    spin_unlock_irqrestore(&pThis->Spinlock, fSavedIrq);
else
{
    Assert(RT_FAILURE_NP(rc));
    spin_unlock_irqrestore(&pThis->Spinlock, fSavedIrq);
    RTMemFree(pThis);
}
return rc;

/**
 * Internal worker.
 */
DECLINLINE(int) rtSemMutexLinuxRequest(RTSEMMUTEX hMutexSem, RTMSINTERVAL cMillies, bool fInterruptible)
{
    PRTSEMMUTEXINTERNAL pThis = hMutexSem;
    struct task_struct *pSelf = current;
unsigned long fSavedIrq;
int rc;
IPRT_LINUX_SAVE_EFL_AC();

/* Validate. */
AssertPtrReturn(pThis, VERR_INVALID_HANDLE);
AssertMsgReturn(pThis->u32Magic == RTSEMMUTEX_MAGIC,("u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);
Assert(pThis->cRefs >= 1);

/* Lock it and check if it’s a recursion. */
spin_lock_irqsave(&pThis->Spinlock, fSavedIrq);
if (pThis->pOwnerTask == pSelf)
{
    pThis->cRecursions++;
    Assert(pThis->cRecursions > 1);
    Assert(pThis->cRecursions < 256);
    rc = VINF_SUCCESS;
}
/* Not a recursion, maybe it’s not owned by anyone then? */
else if (pThis->pOwnerTask == NULL && RTListIsEmpty(&pThis->WaiterList))
{
    Assert(pThis->cRecursions == 0);
    pThis->cRecursions = 1;
    pThis->pOwnerTask = pSelf;
    rc = VINF_SUCCESS;
}
/* Was it a polling call? */
else if (cMillies == 0)
rc = VERR_TIMEOUT;
/* No, so go to sleep. */
else
{
    rc = rtSemMutexLinuxRequestSleep(pThis, cMillies, fInterruptible, fSavedIrq);
    IPRT_LINUX_RESTORE_EFL_ONLY_AC();
    return rc;
}
+ IPRT_DEBUG_SEMS_STATE_RC(pThis, 'M', rc);
+ spin_unlock_irqrestore(&pThis->Spinlock, fSavedIrq);
+ IPRT_LINUX_RESTORE_EFL_ONLY_AC();
+ return rc;
+
+RTDECL(int) RTSemMutexRequest(RTSEMMUTEX hMutexSem, RTMSINTERVAL cMillies)
+{
+    return rtSemMutexLinuxRequest(hMutexSem, cMillies, false /*fInterruptible*/);
+
+} 
+RT_EXPORT_SYMBOL(RTSemMutexRequest);
+
+RTDECL(int) RTSemMutexRequestDebug(RTSEMMUTEX hMutexSem, RTMSINTERVAL cMillies, RTHCUINTPTR uId, RT_SRC_POS_DECL)
+{
+    RT_NOREF_PV(uId); RT_SRC_POS_NOREF();
+    return RTSemMutexRequest(hMutexSem, cMillies);
+
+} 
+RT_EXPORT_SYMBOL(RTSemMutexRequestDebug);
+
+RTDECL(int) RTSemMutexRequestNoResume(RTSEMMUTEX hMutexSem, RTMSINTERVAL cMillies)
+{
+    return rtSemMutexLinuxRequest(hMutexSem, cMillies, true /*fInterruptible*/);
+
+} 
+RT_EXPORT_SYMBOL(RTSemMutexRequestNoResume);
+
+RTDECL(int) RTSemMutexRequestNoResumeDebug(RTSEMMUTEX hMutexSem, RTMSINTERVAL cMillies, RTHCUINTPTR uId, RT_SRC_POS_DECL)
+{
+    RT_NOREF_PV(uId); RT_SRC_POS_NOREF();
+    return RTSemMutexRequestNoResume(hMutexSem, cMillies);
+
+} 
+RT_EXPORT_SYMBOL(RTSemMutexRequestNoResumeDebug);
+
+RTDECL(int) RTSemMutexRelease(RTSEMMUTEX hMtx)
+{
+    PRTSEMMUTEXINTERNAL pThis = hMtx;
+    struct task_struct *pSelf = current;
+    unsigned long fSavedIrq;
+    int rc;
+    IPRT_LINUX_SAVE_EFL_AC();
+

/* Validate. */
ASSERT_PTR_RETURN(pThis, VERR_INVALID_HANDLE);
ASSERT_MSG_RETURN(pThis->u32Magic == RTSEMMUTEX_MAGIC, (
    "%u32Magic=0x%RX32 pThis=0x%p
", pThis->u32Magic, pThis), VERR_INVALID_HANDLE);

/* Take the lock and release one recursion. */
spin_lock_irqsave(&pThis->Spinlock, fSavedIrq);
if (pThis->pOwnerTask == pSelf)
{
    ASSERT(pThis->cRecursions > 0);
    if (pThis->cRecursions == 0)
    {
        pThis->pOwnerTask = NULL;
        /* anyone to wake up? */
        if (!RTListIsEmpty(&pThis->WaiterList))
        {
            PRTSEMMUTEXLNXWAITER pWaiter = RTListGetFirst(&pThis->WaiterList,
RTSEMMUTEXLNXWAITER, ListEntry);
            pWaiter->enmReason = RTSEMMUTEXLNXWAITER_WAKEUP;
            wake_up_process(pWaiter->pTask);
        }
        IPRT_DEBUG_SEMS_STATE(pThis, 'u');
        rc = VINF_SUCCESS;
    }
}
else
{
    rc = VERR_NOT_OWNER;
}
spin_unlock_irqrestore(&pThis->Spinlock, fSavedIrq);

ASSERTRC(rc);
IPRT_LINUX_RESTORE_EFL_AC();
return rc;

RTDECL(bool) RTSemMutexIsOwned(RTSEMMUTEX hMutexSem)
{
PRTSEMMUTEXINTERNAL pThis = hMutexSem;
unsigned long fSavedIrq;
bool fOwned;
IPRT_LINUX_SAVE_EFL_AC();

...
/* Validate. */
AssertPtrReturn(pThis, false);
AssertMsgReturn(pThis->u32Magic == RTSEMMUTEX_MAGIC, ("u32Magic=%RX32 pThis=%p\n", pThis->u32Magic, pThis), false);
Assert(pThis->cRefs >= 1);

/* Take the lock and release one recursion. */
sp
spin_lock_irqsave(&pThis->Spinlock, fSavedIrq);
fOwned = pThis->pOwnerTask != NULL;
spin_unlock_irqrestore(&pThis->Spinlock, fSavedIrq);
IPRT_LINUX_RESTORE_EFL_AC();
return fOwned;
+
+RT_EXPORT_SYMBOL(RTSemMutexIsOwned);
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/spinlock-r0drv-linux.c
+++ linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/spinlock-r0drv-linux.c
@@ -0,0 +1,186 @@
/* $Id: spinlock-r0drv-linux.c $ */
/** @file
 * IPRT - Spinlocks, Ring-0 Driver, Linux.
 */
+
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#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/spinlock.h>

#include <iprt/asm.h>
#if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
#include <iprt/asm-amd64-x86.h>
#endif
#include <iprt/assert.h>
#include <iprt/err.h>
#include <iprt/mem.h>
#include <iprt/mp.h>
#include <iprt/thread.h>
#include "internal/magics.h"

/**
 * Wrapper for the spinlock_t structure.
 */
typedef struct RTSPINLOCKINTERNAL {
    /** Spinlock magic value (RTSPINLOCK_MAGIC). */
    uint32_t volatile u32Magic;
    /** The spinlock creation flags. */
    uint32_t fFlags;
    /** The saved interrupt flag. */
    unsigned long volatile fIntSaved;
    /** The linux spinlock structure. */
    spinlock_t Spinlock;
#if define RT_MORE_STRICT
    /** The idAssertCpu variable before acquiring the lock for asserting after
     * releasing the spinlock. */
    RTCPUID volatile idAssertCpu;
#endif
    /** The CPU that owns the lock. */
}
RTCPUID volatile idCpuOwner;
#endif

RTDECL(int) RTSpinlockCreate(PRTSPINLOCK pSpinlock, uint32_t fFlags, const char *pszName)
{
    IPRT_LINUX_SAVE_EFL_AC();
    PRTSPINLOCKINTERNAL pThis;
    AssertReturn(fFlags == RTSPINLOCK_FLAGS_INTERRUPT_SAFE || fFlags ==
                 RTSPINLOCK_FLAGS_INTERRUPTUnsafe, VERR_INVALID_PARAMETER);
    RT_NOREF_PV(pszName);

    /*
     * Allocate.
     */
    Assert(sizeof(RTSPINLOCKINTERNAL) > sizeof(void *));
    pThis = (PRTSPINLOCKINTERNAL)RTMemAlloc(sizeof(*pThis));
    if (!pThis)
        return VERR_NO_MEMORY;
    /*
     * Initialize and return.
     */
    pThis->u32Magic     = RTSPINLOCK_MAGIC;
    pThis->fFlags       = fFlags;
    pThis->fIntSaved    = 0;
    #ifdef RT_MORE_STRICT
    pThis->idCpuOwner   = NIL_RTCPUID;
    pThis->idAssertCpu  = NIL_RTCPUID;
    #endif
    spin_lock_init(&pThis->Spinlock);
    *pSpinlock = pThis;
    IPRT_LINUX_RESTORE_EFL_AC();
    return VINF_SUCCESS;
}
RT_EXPORT_SYMBOL(RTSpinlockCreate);

RTDECL(int) RTSpinlockDestroy(RTSPINLOCK Spinlock)
{
    /*
     * Validate input.
     */
    PRTSPINLOCKINTERNAL pThis = (PRTSPINLOCKINTERNAL)Spinlock;
    if (!pThis)
return VERR_INVALID_PARAMETER;
    if (pThis->u32Magic != RTSPINLOCK_MAGIC)
    {
        AssertMsgFailed("Invalid spinlock %p magic=%#x\n", pThis, pThis->u32Magic);
        return VERR_INVALID_PARAMETER;
    }

    ASMAtomicIncU32(&pThis->u32Magic);
    RTMemFree(pThis);
    return VINF_SUCCESS;
}

RT_EXPORT_SYMBOL(RTSpinlockDestroy);

RTDECL(void) RTSpinlockAcquire(RTSPINLOCK Spinlock)
{
    PRTSPINLOCKINTERNAL pThis = (PRTSPINLOCKINTERNAL)Spinlock;
    IPRT_LINUX_SAVE_EFL_AC();
    RT_ASSERT_PREEMPT_CPUID_VAR();
    AssertMsg(pThis && pThis->u32Magic == RTSPINLOCK_MAGIC,
              ("pThis=%p u32Magic=%08x\n", pThis, pThis ? (int)pThis->u32Magic : 0));
    #ifdef CONFIG_PROVE_LOCKING
    lockdep_off();
    #endif
    if (pThis->fFlags & RTSPINLOCK_FLAGS_INTERRUPT_SAFE)
    {
        unsigned long fIntSaved;
        spin_lock_irqsave(&pThis->Spinlock, fIntSaved);
        pThis->fIntSaved = fIntSaved;
    }
    else
        spin_lock(&pThis->Spinlock);
    #ifdef CONFIG_PROVE_LOCKING
    lockdep_on();
    #endif
    IPRT_LINUX_RESTORE_EFL_ONLY_AC();
    RT_ASSERT_PREEMPT_CPUID_SPIN_ACQUIRED(pThis);
}

RT_EXPORT_SYMBOL(RTSpinlockAccquire);

RTDECL(void) RTSpinlockRelease(RTSPINLOCK Spinlock)
{
    PRTSPINLOCKINTERNAL pThis = (PRTSPINLOCKINTERNAL)Spinlock;
    IPRT_LINUX_SAVE_EFL_AC();
    RT_ASSERT_PREEMPT_CPUID_SPIN_ACQUIRED(pThis);
    }

RT_EXPORT_SYMBOL(RTSpinlockRelease);
AssertMsg(pThis && pThis->u32Magic == RTSPINLOCK_MAGIC,
    ("pThis=%p u32Magic=%08x\n", pThis, pThis ? (int)pThis->u32Magic : 0));
RT_ASSERT_PREEMPT_CPUID_SPIN_RELEASE(pThis);
+
#endif CONFIG_PROVE_LOCKING
+    lockdep_off();
+#endif
+    if (pThis->fFlags & RTSPINLOCK_FLAGS_INTERRUPT_SAFE)
+    {
+        unsigned long fIntSaved = pThis->fIntSaved;
+        pThis->fIntSaved = 0;
+        spin_unlock_irqrestore(&pThis->Spinlock, fIntSaved);
+    }
+    else
+        spin_unlock(&pThis->Spinlock);
+#endif CONFIG_PROVE_LOCKING
+    lockdep_on();
+}  
+IPRT_LINUX_RESTORE_EFL_ONLY_AC();
+RT_ASSERT_PREEMPT_CPUID();
+
+RT_EXPORT_SYMBOL(RTSpinlockRelease);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/string.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/string.h
@@ -0,0 +1,57 @@
+/* $Id: string.h $ */
+/** @file
+ * IPRT - wrapper for the linux kernel asm/string.h.
+ */
+/** @file
+ * IPRT - wrapper for the linux kernel asm/string.h.
+ */
+/**
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/* Linux 2.6.19 C++ nightmare */
#define bool bool_type
#define true true_type
#define false false_type
#define _Bool int
#define bool_type_r0drv_string_h__
#define bool
#define true
#define false
#define bool_type_r0drv_string_h__
#endif
#include <linux/types.h>
#include <linux/string.h>
#ifndef bool_type_r0drv_string_h__
#undef bool
define bool
#define false
#define bool_type_r0drv_string_h__
#endif
char *strpbrk(const char *pszStr, const char *pszChars)
#define defined(_THROW) + __THROW
#endif
+ ;
+ +RT_C_DECLS_END
+ +#endif
+ +--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/the-linux-kernel.h
+ || linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/the-linux-kernel.h
+ @ @ -0.0 +1,452 @@
+ /* SId: the-linux-kernel1.h */
+ /* @file
+ * IPRT - Include all necessary headers for the Linux kernel.
+ */
+ /*
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+ */
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#include <iprt/types.h> to install the bool wrappers.
Then use the linux bool type for all the stuff include here.

#include <linux/version.h>
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 33)
#include <generated/autoconf.h>
#else
#ifndef AUTOCONF_INCLUDED
#include <linux/autoconf.h>
#endif
#endif
#include <linux/autoconf.h>
else
#endif
#include <linux/autoconf.h>
#endif
#include <linux/autoconf.h>
#endif
#include <linux/autoconf.h>

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+## if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 9, 0)
+## include <linux/sched/rt.h>
+##endif
+## if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+## include <linux/sched/signal.h>
+##endif
+## if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 7)
+## include <linux/jiffies.h>
+##endif
+## if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 16)
+## include <linux/ktime.h>
+## include <linux/hrtimer.h>
+##endif
+##include <linux/wait.h>
+## if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 71)
+## include <linux/cpu.h>
+## include <linux/notifier.h>
+##endif
+/* For the basic additions module */
+##include <linux/pci.h>
+##include <linux/delay.h>
+##include <linux/interrupt.h>
+##include <linux/completion.h>
+##include <linux/compiler.h>
+##ifndef HAVE_UNLOCKED_IOCTL /* linux/fs.h defines this */
+## include <linux/smp_lock.h>
+##endif
+/* For the shared folders module */
+##include <linux/vmalloc.h>
+##define wchar_t linux_wchar_t
+##include <linux/nls.h>
+##undef wchar_t
+##include <asm/mman.h>
+##include <asm/io.h>
+##include <asm/uaccess.h>
+##include <asm/div64.h>
+
+/* For thread-context hooks. */
+##if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 18) &&
defined(CONFIG_PREEMPT_NOTIFIERS)
+## include <linux/preempt.h>
+##endif
+
+/* for workqueue / task queues. */
+##if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
+## include <linux/workqueue.h>
+##else

---

Open Source Used In 5GaaS Edge AC-4 38650
```c
#include <linux/tqueue.h>
#endif

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
#include <linux/kthread.h>
#endif

/* for cr4_init_shadow() / cpu_tlbstate. */
#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 20, 0)
#include <asm/tlbflush.h>
#endif

/* for set_pages_x() */
#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 12, 0)
#include <asm/set_memory.h>
#endif

/* for cr4_init_shadow() / cpu_tlbstate. */
#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 7, 0)
#include <asm/smap.h>
#else
static inline void clac(void) { }
static inline void stac(void) { }
#endif

#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
ifndef page_to_pfn
#define page_to_pfn(page) ((page) - mem_map)
#endif
#endif

#ifndef DEFINE_WAIT
#define DEFINE_WAIT(name) DECLARE_WAITQUEUE(name, current)
#endif

#ifndef __GFP_NOWARN
#define __GFP_NOWARN 0
#endif

/* 2.4 / early 2.6 compatibility wrappers */
#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 7)
#endif
#endif

/* 2.4 / early 2.6 compatibility wrappers */
#endif
#endif

/* 2.4 / early 2.6 compatibility wrappers */
#endif
#endif
```
KERNEL_VERSION(2, 6, 0)
+
+DECLINLINE(unsigned int) jiffies_to_msecs(unsigned long cJiffies)
+
+  +# if HZ <= 1000 && !(1000 % HZ)
+  + return (1000 / HZ) * cJiffies;
+  +# elif HZ > 1000 && !(HZ % 1000)
+  + return (cJiffies + (HZ / 1000) - 1) / (HZ / 1000);
+  +# else
+  + return (cJiffies * 1000) / HZ;
+  +# endif
+
+DECLINLINE(unsigned long) msecs_to_jiffies(unsigned int cMillies)
+
+  +# if HZ > 1000
+  + if (cMillies > jiffies_to_msecs(MAX_JIFFY_OFFSET))
+  +   return MAX_JIFFY_OFFSET;
+  +# endif
+  +# if HZ <= 1000 && !(1000 % HZ)
+  + return (cMillies + (1000 / HZ) - 1) / (1000 / HZ);
+  +# elif HZ > 1000 && !(HZ % 1000)
+  + return cMillies * (HZ / 1000);
+  +# else
+  + return (cMillies * HZ + 999) / 1000;
+  +# endif
+
+  +# endif /* < 2.4.29 || >= 2.6.0 */
+
+  +#endif /* < 2.6.7 */
+
+  */
+  * 2.4 compatibility wrappers
+  */
+  */
+  +#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+  +
+  +# define prepare_to_wait(q, wait, state)
+  +  do { \
+  +    add_wait_queue(q, wait); \
+  +    set_current_state(state); \
+  +  } while (0)
+
+  +# define after_wait(wait)
+  +  do { \
+  +    list_del_init(&(wait)->task_list); \
+  +  } while (0)
+
```c
+# define finish_wait(q, wait) \
  do { \
    set_current_state(TASK_RUNNING); \
    remove_wait_queue(q, wait); \
  } while (0)
+
+/* else */ >= 2.6.0 */
+
+# define after_wait(wait) do { } while (0)
+
+endif /* >= 2.6.0 */
+
+/* @def TICK_NSEC
 + * The time between ticks in nsec */
+ifndef TICK_NSEC
+# define TICK_NSEC (1000000000UL / HZ)
+endif
+
+/*
 + * This sucks soooo badly on x86! Why don't they export __PAGE_KERNEL_EXEC so PAGE_KERNEL_EXEC
 + * would be usable?
 + */
+if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 8) && defined(RT_ARCH_AMD64)
+# define MY_PAGE_KERNEL_EXEC PAGE_KERNEL_EXEC
+elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 8) && defined(PAGE_KERNEL_EXEC) &&
+defined(CONFIG_X86_PAE)
+# ifdef __PAGE_KERNEL_EXEC
+ /* >= 2.6.27 */
+# define MY_PAGE_KERNEL_EXEC __pgprot(boot_cpu_has(X86_FEATURE_PGE) ?
 + __PAGE_KERNEL_EXEC | _PAGE_GLOBAL : __PAGE_KERNEL_EXEC)
+# else
+# define MY_PAGE_KERNEL_EXEC __pgprot(boot_cpu_has(X86_FEATURE_PGE) ?
 + __PAGE_KERNEL_EXEC | _PAGE_GLOBAL : _PAGE_KERNEL_EXEC)
+# endif
+else
+# define MY_PAGE_KERNEL_EXEC PAGE_KERNEL
+#endif
+
+/*
 + * The redhat hack section.
 + */
+ /* - The current hacks are for 2.4.21-15.EL only.
 + */
+ifndef NO_REDHAT_HACKS
+/* accounting. */
+if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+ifdef VM_ACCOUNT
+# define USE_RHEL4_MUNMAP
```
/* backported remap_page_range. */
#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
  #include <asm/tlb.h>
#if !LBV
/* probably not good enough... */
#define HAVE_26_STYLE_REMAP_PAGE_RANGE 1
#endif
#endif
#endif

#ifndef RT_ARCH_AMD64
/* In 2.6.9-22.ELsmp we have to call change_page_attr() twice when changing
  the page attributes from PAGE_KERNEL to something else, because there appears
  to be a bug in one of the many patches that redhat applied.
  It should be safe to do this on less buggy linux kernels too. :-) 
 */
#define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) 
  do { 
    if (pgprot_val(prot) != pgprot_val(PAGE_KERNEL)) 
      change_page_attr(pPages, cPages, prot); 
    change_page_attr(pPages, cPages, prot); 
  } while (0)
#endif /* !RT_ARCH_AMD64 */
#endif /* !NO_REDHAT_HACKS */

#ifndef MY_CHANGE_PAGE_ATTR
#define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) change_page_attr(pPages, cPages, prot)
#endif

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 25)
#define MY_SET_PAGES_EXEC(pPages, cPages)    set_pages_x(pPages, cPages)
#define MY_SET_PAGES_NOEXEC(pPages, cPages)  set_pages_nx(pPages, cPages)
#else
#define MY_SET_PAGES_EXEC(pPages, cPages) 
  do { 
    if (pgprot_val(MY_PAGE_KERNEL_EXEC) != pgprot_val(PAGE_KERNEL)) 
            MY_CHANGE_PAGE_ATTR(pPages, cPages, MY_PAGE_KERNEL_EXEC); 
  } while (0)
#endif

+#ifdef RT_ARCH_AMD64
/* @todo This is a cheap hack, but it'll get around that 'else BUG();' in__change_page_attr(). */
#define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) 
  do { 
    change_page_attr(pPages, cPages, PAGE_KERNEL_NOCACHE); 
    change_page_attr(pPages, cPages, prot); 
  } while (0)
#endif /* !RT_ARCH_AMD64 */

+#ifdef RT_ARCH_AMD64
/* @todo This is a cheap hack, but it'll get around that 'else BUG();' in
   __change_page_attr(). */
#define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) change_page_attr(pPages, cPages, prot)
#endif
```c
+# define MY_SET_PAGES_NOEXEC(pPages, cPages) \
+ do { \ 
+ if (pgprot_val(MY_PAGE_KERNEL_EXEC) != pgprot_val(PAGE_KERNEL)) \ 
+     MY_CHANGE_PAGE_ATTR(pPages, cPages, PAGE_KERNEL); \ 
+ } while (0)
+
+ /* Define ONE_MSEC_IN_JIFFIES */
+ /* The number of jiffies that make up 1 millisecond. Must be at least 1 */
+ ifdef HZ <= 1000
+ # define ONE_MSEC_IN_JIFFIES 1
+ elif !(HZ % 1000)
+ # define ONE_MSEC_IN_JIFFIES (HZ / 1000)
+ else
+ # define ONE_MSEC_IN_JIFFIES ((HZ + 999) / 1000)
+ endif
+#error "HZ is not a multiple of 1000, the GIP stuff won't work right!"
+
+ /* Stop using the linux bool type. */
+ #undef bool
+
+ ifdef RT_GNUC_PREREQ(4, 6)
+ # pragma GCC diagnostic pop
+ #endif
+
+ /* There are post-2.6.24 kernels (confusingly with unchanged version number)
+ * which eliminate macros which were marked as deprecated. */
+ ifdef __attribute_used__
+ #define __attribute_used__ __used
+ #endif
+
+ /* Hack for shortening pointers on linux so we can stuff more stuff into the
+ * task_struct::comm field. This is used by the semaphore code but put here
+ * because we don't have any better place atm. Don't use outside IPRT, please.
+ */
+ ifdef RT_ARCH_AMD64
+ # define IPRT_DEBUG_SEMS_ADDRESS(addr)  ((long)(addr) & (long)~UINT64_C(0xffffffff00000000)) 
+ #else
+ # define IPRT_DEBUG_SEMS_ADDRESS(addr)  ( (long)(addr) )
+ #endif
+ 
+ /* Puts semaphore info into the task_struct::comm field if IPRT_DEBUG_SEMS is
```
+ * defined.
+ */
+#ifdef IPRT_DEBUG_SEMS
+## define IPRT_DEBUG_SEMS_STATE(pThis, chState) \ 
+    snprintf(current->comm, sizeof(current->comm), "%c%lx", (chState),
IPRT_DEBUG_SEMS_ADDRESS(pThis));
+##else
+## define IPRT_DEBUG_SEMS_STATE(pThis, chState) do {} while (0)
+##endif
+
+/**
+ * Puts semaphore info into the task_struct::comm field if IPRT_DEBUG_SEMS is
+ * defined.
+ */
+#ifdef IPRT_DEBUG_SEMS
+## define IPRT_DEBUG_SEMS_STATE_RC(pThis, chState, rc) \ 
+    snprintf(current->comm, sizeof(current->comm), "%c%lx:%d", (chState),
IPRT_DEBUG_SEMS_ADDRESS(pThis), rc);
+##else
+## define IPRT_DEBUG_SEMS_STATE_RC(pThis, chState, rc) do {} while (0)
+##endif
+
+/** @name Macros for preserving EFLAGS.AC on 3.19+/amd64 paranoid.
+ * The AMD 64 switch_to in macro in arch/x86/include/asm/switch_to.h stopped
+ * restoring flags.
+ */
+if defined(CONFIG_X86_SMAP) || defined(RT_STRICT) || defined(IPRT_WITH_EFLAGS_AC_PRESERVING)
+## include <iprt/asm-amd64-x86.h>
+## define IPRT_X86_EFL_AC RT_BIT(18)
+## define IPRT_LINUX_SAVE_EFL_AC() RTCCUINTREG fSavedEfl = ASMGetFlags()
+## define IPRT_LINUX_RESTORE_EFL_AC() ASMSetFlags(fSavedEfl)
+## define IPRT_LINUX_RESTORE_EFL_ONLY_AC() ASMChangeFlags(~IPRT_X86_EFL_AC, fSavedEfl & IPRT_X86_EFL_AC)
+##else
+## define IPRT_LINUX_SAVE_EFL_AC() do {} while (0)
+## define IPRT_LINUX_RESTORE_EFL_AC() do {} while (0)
+## define IPRT_LINUX_RESTORE_EFL_ONLY_AC() do {} while (0)
+##endif
+/** @} */
+
+/*
+ * There are some conflicting defines in iprt/param.h, sort them out here.
+ */
+#ifndef ___iprt_param_h
+## define PAGE_SIZE
+## undef PAGE_OFFSET_MASK
+## include <iprt/param.h>

+*/
+/* Some global indicator macros.
+*/
+/** @def IPRT_LINUX_HAS_HRTIMER */
+/* Whether the kernel support high resolution timers (Linux kernel versions 2.6.28 and later (hrtimer_add_expires_ns() & schedule_hrtimer). */
+## define IPRT_LINUX_HAS_HRTIMER
+endif
+
+#+
+/* Workqueue stuff, see initterm-r0drv-linux.c.
+*/
+## if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
typedef struct work_struct RTR0LNXWORKQUEUEITEM;
+## else
+typedef struct tq_struct RTR0LNXWORKQUEUEITEM;
+## endif
+DECLHIDDEN(void) rtR0LnxWorkqueuePush(RTR0LNXWORKQUEUEITEM *pWork, void (*pfnWorker)(RTR0LNXWORKQUEUEITEM *));
+DECLHIDDEN(void) rtR0LnxWorkqueueFlush(void);
+
+endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/thread-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/thread-r0drv-linux.c
@@ -0,0 +1,236 @@
+/* $Id: thread-r0drv-linux.c $ */
+/** @file
+ * IPRT - Threads, Ring-0 Driver, Linux.
+ */
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ */
+
+ /*******************************************************************************************
+ * Header Files
+ *******************************************************************************************
+#include "the-linux-kernel.h"
+#include "internal/iprt.h"
+#include <iprt/thread.h>
+
+#include <iprt/asm.h>
+#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 5, 28) || defined(CONFIG_X86_SMAP)
+ # include <iprt/asm-amd64-x86.h>
+#endif
+ +#include <iprt/assert.h>
+ +#include <iprt/err.h>
+ +#include <iprt/mp.h>
+
+ /*******************************************************************************************
+ * Global Variables
+ *******************************************************************************************
+ ifndef CONFIG_PREEMPT
+ /** Per-cpu preemption counters. */
+ +static int32_t volatile g_acPreemptDisabled[NR_CPUS];
+ +#endif
+
+RTDECL(RTNATIVETHREAD) RTThreadNativeSelf(void)
+{
+  return (RTNATIVETHREAD)current;
+}
+RT_EXPORT_SYMBOL(RTThreadNativeSelf);
+
+static int rtR0ThreadLnxSleepCommon(RTMSINTERVAL cMillies)
+{
+  IPRT_LINUX_SAVE_EFL_AC();
+  long cJiffies = msecs_to_jiffies(cMillies);
+  /*
set_current_state(TASK_INTERRUPTIBLE);
    cJiffies = schedule_timeout(cJiffies);
    IPRT_LINUX_RESTORE_EFL_AC();
    if (!cJiffies)
        return VINF_SUCCESS;
    return VERR_INTERRUPTED;
+
+
+RTDECL(int) RTThreadSleep(RTMSINTERVAL cMillies)
+{
+    return rtR0ThreadLnxSleepCommon(cMillies);
+}
+RT_EXPORT_SYMBOL(RTThreadSleep);
+
+
+RTDECL(int) RTThreadSleepNoLog(RTMSINTERVAL cMillies)
+{
+    return rtR0ThreadLnxSleepCommon(cMillies);
+}
+RT_EXPORT_SYMBOL(RTThreadSleepNoLog);
+
+
+RTDECL(bool) RTThreadYield(void)
+{
+    IPRT_LINUX_SAVE_EFL_AC();
+    #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 20)
+        yield();
+    +#else
+        /* @todo r=ramshankar: Can we use cond_resched() instead? */
+        set_current_state(TASK_RUNNING);
+        sys_sched_yield();
+        schedule();
+    +#endif
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return true;
+}
+RT_EXPORT_SYMBOL(RTThreadYield);
+
+
+RTDECL(bool) RTThreadPreemptIsEnabled(RTTHREAD hThread)
+{
+    #ifdef CONFIG_PREEMPT
+        Assert(hThread == NIL_RTTHREAD); RT_NOREF_PV(hThread);
+    +#ifdef preemptible
+        return preemptible();
+    +#else
+        return preempt_count() == 0 && !in_atomic() && !irqs_disabled();
+    +#endif
+    }
+  int32_t c;
+  Assert(hThread == NIL_RTTHREAD);
+  c = g_acPreemptDisabled[smp_processor_id()];
+  AssertMsg(c >= 0 && c < 32, ("%d\n", c));
+  if (c != 0)
+    return false;
+  if (in_atomic())
+    return false;
+  if (irqs_disabled())
+    return false;
+  if (!ASMIntAreEnabled())
+    return false;
+  return true;
+
+RTDECL(bool) RTThreadPreemptIsPending(RTTHREAD hThread)
+{
+  Assert(hThread == NIL_RTTHREAD); RT_NOREF_PV(hThread);
+  if (LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 4))
+    return !!test_tsk_thread_flag(current, TIF_NEED_RESCHED);
+  else
+    return current->need_resched != 0;
+  return current->need_resched != 0;
+}
+RT_EXPORT_SYMBOL(RTThreadPreemptIsPending);
+
+RTDECL(bool) RTThreadPreemptIsPendingTrusty(void)
+{ /* yes, RTThreadPreemptIsPending is reliable. */
+  return RTThreadPreemptIsPendingTrusty();
+}
+RT_EXPORT_SYMBOL(RTThreadPreemptIsPendingTrusty);
+ return true;
+
+RT_EXPORT_SYMBOL(RTThreadPreemptIsPendingTrusty);
+
+
+RTDECL(bool) RTThreadPreemptIsPossible(void)
+{
+    /** @todo r=ramshankar: What about CONFIG_PREEMPT_VOLUNTARY? That can preempt
+     * too but does so in voluntarily in explicit preemption points. */
+    #ifdef CONFIG_PREEMPT
+        return true; /* yes, kernel preemption is possible. */
+    #else
+        return false; /* no kernel preemption */
+    #endif
+}
+RT_EXPORT_SYMBOL(RTThreadPreemptIsPossible);
+
+
+RTDECL(void) RTThreadPreemptDisable(PRTTHREADPREEMPTSTATE pState)
+{
+    #ifdef CONFIG_PREEMPT
+        AssertPtr(pState);
+        Assert(pState->u32Reserved == 0);
+        pState->u32Reserved = 42;
+        /* This ASSUMES that CONFIG_PREEMPT_COUNT is always defined with CONFIG_PREEMPT. */
+        preempt_disable();
+        RT_ASSERT_PREEMPT_CPUID_DISABLE(pState);
+    #else /* !CONFIG_PREEMPT */
+        int32_t c;
+        AssertPtr(pState);
+        Assert(pState->u32Reserved == 0);
+        
+        /* Do our own accounting. */
+        c = ASMAtomicIncS32(&g_acPreemptDisabled[smp_processor_id()]);
+        AssertMsg(c > 0 && c < 32, ("%d\n", c));
+        pState->u32Reserved = c;
+        RT_ASSERT_PREEMPT_CPUID_DISABLE(pState);
+    #endif
+}
+RT_EXPORT_SYMBOL(RTThreadPreemptDisable);
+
+
+RTDECL(void) RTThreadPreemptRestore(PRTTHREADPREEMPTSTATE pState)
+{
+    #ifdef CONFIG_PREEMPT
+        IPRT_LINUX_SAVE_EFL_AC(); /* paranoia */
+        AssertPtr(pState);
+    #endif CONFIG_PREEMPT
+    + IPRT_LINUX_SAVE_EFL_AC(); /* paranoia */
+    + AssertPtr(pState);
+ Assert(pState->u32Reserved == 42);
+ RT_ASSERT_PREEMPT_CPUID_RESTORE(pState);
+ preempt_enable();
+ IPRT_LINUX_RESTORE_EFL_ONLY_AC(); /* paranoia */
+
+#else
+ int32_t volatile *pc;
+ AssertPtr(pState);
+ AssertMsg(pState->u32Reserved > 0 && pState->u32Reserved < 32, ("%d\n", pState->u32Reserved));
+ RT_ASSERT_PREEMPT_CPUID_RESTORE(pState);
+
+ /* Do our own accounting. */
+ pc = &g_acPreemptDisabled[smp_processor_id()];
+ AssertMsg(pState->u32Reserved == (uint32_t)*pc, ("u32Reserved=%d *pc=%d \n", pState->u32Reserved, *pc));
+ASMAtomicUoWriteS32(pc, pState->u32Reserved - 1);
+#endif
+ pState->u32Reserved = 0;
+
+RT_EXPORT_SYMBOL(RTThreadPreemptRestore);
+
+
+RTDECL(bool) RTThreadIsInInterrupt(RTTHREAD hThread)
+{
+ Assert(hThread == NIL_RTTHREAD); NOREF(hThread);
+    return in_interrupt() != 0;
+}
+RT_EXPORT_SYMBOL(RTThreadIsInInterrupt);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/thread2-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/thread2-r0drv-linux.c
@@ -0,0 +1,162 @@
+/* $Id: thread2-r0drv-linux.c $ */
+/** @file
+ * IPRT - Threads (Part 2), Ring-0 Driver, Linux.
+ */
+ *
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
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```c
#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/assert.h>
#include <iprt/thread.h>
#include <iprt/err.h>
#include "internal/thread.h"

RTDECL(RTTHREAD) RTThreadSelf(void)
{
    return rtThreadGetByNative((RTNATIVETHREAD)current);
}

DECLHIDDEN(int) rtThreadNativeInit(void)
{
    return VINF_SUCCESS;
}

DECLHIDDEN(int) rtThreadNativeSetPriority(PRTTHREADINT pThread, RTTHREADTYPE enmType)
{
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 11)
    /* See comment near MAX_RT_Prio in linux/sched.h for details on sched_priority. */
    int                 iSchedClass = SCHED_NORMAL;
    struct sched_param  Param       = { .sched_priority = MAX_PRIO - 1 };
    switch (enmType)
    {
        case RTTHREADTYPE_INFREQUENT_POLLER:
            Param
```
+ Param.sched_priority = MAX_RT_PRIO + 5;
+ break;
+
+ case RTTHREADTYPE_EMULATION:
+     Param.sched_priority = MAX_RT_PRIO + 4;
+     break;
+
+ case RTTHREADTYPE_DEFAULT:
+     Param.sched_priority = MAX_RT_PRIO + 3;
+     break;
+
+ case RTTHREADTYPE_MSG_PUMP:
+     Param.sched_priority = MAX_RT_PRIO + 2;
+     break;
+
+ case RTTHREADTYPE_IO:
+     iSchedClass = SCHED_FIFO;
+     Param.sched_priority = MAX_RT_PRIO - 1;
+     break;
+
+ case RTTHREADTYPE_TIMER:
+     iSchedClass = SCHED_FIFO;
+     Param.sched_priority = 1; /* not 0 just in case */
+     break;
+
+ default:
+     AssertMsgFailed(("enmType=%d\n", enmType));
+     return VERR_INVALID_PARAMETER;
+ }
+
+ sched_setscheduler(current, iSchedClass, &Param);
+#else
+    RT_NOREF_PV(enmType);
+#endif
+    RT_NOREF_PV(pThread);
+
+    return VINF_SUCCESS;
+
+}
+
+DECLHIDDEN(int) rtThreadNativeAdopt(PRTTHREADINT pThread)
+{ RT_NOREF_PV(pThread);
+    return VINF_SUCCESS;
+}
+
+DECLHIDDEN(void) rtThreadNativeWaitKludge(PRTTHREADINT pThread)
/** @todo fix RTThreadWait/RTR0Term race on linux. */
RTThreadSleep(1); NOREF(pThread);

DECLHIDDEN(void) rtThreadNativeDestroy(PRTTHREADINT pThread)
{
    NOREF(pThread);
}

#ifdef LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 4)
/**
 * Native kernel thread wrapper function.
 * This will forward to rtThreadMain and do termination upon return.
 *
 * @param pvArg Pointer to the argument package.
 */
static int rtThreadNativeMain(void *pvArg)
{
    PRTTHREADINT pThread = (PRTTHREADINT)pvArg;
    rtThreadMain(pThread, (RTNATIVETHREAD)current, &pThread->szName[0]);
    return 0;
}
#endif

DECLHIDDEN(int) rtThreadNativeCreate(PRTTHREADINT pThreadInt, RTNATIVETHREAD pNativeThread)
{
#ifdef LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 4)
    struct task_struct *NativeThread;
    IPRT_LINUX_SAVE_EFL_AC();
    RT_ASSERT_PREEMPTIBLE();
    NativeThread = kthread_run(rtThreadNativeMain, pThreadInt, "iprt-%s", pThreadInt->szName)
    if (!IS_ERR(NativeThread))
        *pNativeThread = (RTNATIVETHREAD)NativeThread;
        IPRT_LINUX_RESTORE_EFL_AC();
        return VINF_SUCCESS;
    IPRT_LINUX_RESTORE_EFL_AC();
#else
    struct task_struct *NativeThread;
    IPRT_LINUX_SAVE_EFL_AC();
    RT_ASSERT_PREEMPTIBLE();
    NativeThread = kthread_run(rtThreadNativeMain, pThreadInt, "iprt-%s", pThreadInt->szName);
#define LOG_GROUP RTLOGGROUP_TIME
#include "the-linux-kernel.h"
#include "internal/iprt.h"
#include <iprt/time.h>
#include <iprt/asm.h>
DECLINLINE(uint64_t) rtTimeGetSystemNanoTS(void)
{
    if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 16) /* This must match timer-r0drv-linux.c! */
    {
        /* Use ktime_get_ts, this is also what clock_gettime(CLOCK_MONOTONIC,) is using.
         * struct timespec Ts;
         * ktime_get_ts(&Ts);
         * u64 = Ts.tv_sec * RT_NS_1SEC_64 + Ts.tv_nsec;
         * return u64;
         */
        uint64_t u64;
        struct timespec Ts;
        ktime_get_ts(&Ts);
        u64 = Ts.tv_sec * RT_NS_1SEC_64 + Ts.tv_nsec;
        return u64;
    }
    else /* < 2.5.60 */
    {
        if BITS_PER_LONG >= 64
        {
            uint64_t u64 = jiffies;
            ifdef INITIAL_JIFFIES
                u64 += INITIAL_JIFFIES;
            endif
            u64 *= TICK_NSEC;
            return u64;
        }
        else /* 32 bit jiffies */
        {
            We'll have to try track jiffy rollovers here or we'll be
            in trouble every time it flips.
            /*
             * The high dword of the s_u64Last is the rollover count, the
             * low dword is the previous jiffies. Updating is done by
             * atomic compare & exchange of course.
            */
        }
    }
}
static uint64_t volatile s_u64Last = 0;
uint64_t u64;
for (;;)
{
    uint64_t u64NewLast;
    int32_t iDelta;
    uint32_t cRollovers;
    uint32_t u32LastJiffies;

    /* sample the values */
    unsigned long ulNow = jiffies;
    uint64_t u64Last = s_u64Last;
    if (ulNow != jiffies)
        continue; /* try again */
    #ifdef INITIAL_JIFFIES
    ulNow += INITIAL_JIFFIES
    #endif /* try again */
    u32LastJiffies = (uint32_t)u64Last;
    cRollovers = u64Last >> 32;

    /* Check for rollover and update the static last value.
    */
    iDelta = ulNow - u32LastJiffies;
    if (iDelta < 0)
    {
        cRollovers++;
        u64NewLast = RT_MAKE_U64(ulNow, cRollovers);
        if (!ASMAtomicCmpXchgU64(&s_u64Last, u64NewLast, u64Last))
            continue; /* race, try again */
    }
    else
    {
        u64NewLast = RT_MAKE_U64(ulNow, cRollovers);
        ASMAtomicCmpXchgU64(&s_u64Last, u64NewLast, u64Last);
    }

    /* calculate the return value */
    u64 = ulNow;
    u64 *= TICK_NSEC;
    u64 += cRollovers * (_4G * TICK_NSEC);
    break;
+ } 
+ return u64;
+ } */ 32 bit jiffies */
+ */ < 2.5.60 */
+
+ 
+RTDECL(uint64_t) RTTimeNanoTS(void)
+{ 
+ return rtTimeGetSystemNanoTS();
+ } 
+RT_EXPORT_SYMBOL(RTTimeNanoTS);
+ 
+ 
+RTDECL(uint64_t) RTTimeMilliTS(void)
+{ 
+ return rtTimeGetSystemNanoTS() / RT_NS_1MS;
+ } 
+RT_EXPORT_SYMBOL(RTTimeMilliTS);
+ 
+ 
+RTDECL(uint64_t) RTTimeSystemNanoTS(void)
+{ 
+ return rtTimeGetSystemNanoTS();
+ } 
+RT_EXPORT_SYMBOL(RTTimeSystemNanoTS);
+ 
+ 
+RTDECL(uint64_t) RTTimeSystemMilliTS(void)
+{ 
+ return rtTimeGetSystemNanoTS() / RT_NS_1MS;
+ } 
+RT_EXPORT_SYMBOL(RTTimeSystemMilliTS);
+ 
+ 
+RTDECL(PRTTIMESPEC) RTTimeNow(PRTTIMESPEC pTime)
+{ 
+ IPRT_LINUX_SAVE_EFL_AC();
+ if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 16)
+ struct timespec Ts;
+ ktime_get_real_ts(&Ts);
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return RTTimeSpecSetTimespec(pTime, &Ts);
+ 
+ } */ < 2.6.16 */
+ struct timeval Tv;
+ do_gettimeofday(&Tv);
IPRT_LINUX_RESTORE_EFL_AC();
return RTTimeSpecSetTimeval(pTime, &Tv);
#endif
}   
RT_EXPORT_SYMBOL(RTTimeNow);

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/timer-r0drv-linux.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/timer-r0drv-linux.c
@@ -0,0 +1,1693 @@
+/* $Id: timer-r0drv-linux.c $ */
+/** @file
+ * IPRT - Timers, Ring-0 Driver, Linux.
+ */
+ *
+ */
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+ *
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+ *
+ /******************************************************************************************
+ **************************************
+ *   Header Files
+ *******************************************************************************************/

*/
"the-linux-kernel.h"
"internal/iprt.h"
+
"<iprt/timer.h>
"<iprt/time.h>
"<iprt/mp.h>
"<iprt/cpuset.h>
+/#include <iprt/spinlock.h>
+/#include <iprt/err.h>
+/#include <iprt/asm.h>
+/#include <iprt/assert.h>
+/#include <iprt/alloc.h>
+
+/#include "internal/magics.h"
+
+/** @def RTTIMER_LINUX_WITH_HRTIMER
+ * Whether to use high resolution timers. */
+/#if !defined(RTTIMER_LINUX_WITH_HRTIMER) \ 
+    && defined(IPRT_LINUX_HAS_HRTIMER)
+## define RTTIMER_LINUX_WITH_HRTIMER
+##endif
+
+/#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 31)
+## define mod_timer_pinned mod_timer
+## define HRTIMER_MODE_ABS_ABS_PINNED HRTIMER_MODE_ABS
+##endif
+
+/**
+ * Timer state machine.
+ *
+ * This is used to try handle the issues with MP events and
+ * timers that runs on all CPUs. It's relatively nasty :-/
+ */
+typedef enum RTTIMERLNXSTATE
+
+    /** Stopped. */
+    RTTIMERLNXSTATE_STOPPED = 0,
+    /** Transient state; next ACTIVE. */
+    RTTIMERLNXSTATE_STARTING,
+    /** Transient state; next ACTIVE. (not really necessary) */
+    RTTIMERLNXSTATE_MP_STARTING,
+    /** Active. */
+    RTTIMERLNXSTATE_ACTIVE,
+    /** Active and in callback; next ACTIVE, STOPPED or CALLBACK_DESTROYING. */
+    RTTIMERLNXSTATE_CALLBACK,
+    /** Stopped while in the callback; next STOPPED. */
+    RT_TIMERLNXSTATE_CB_STOPPING,
+    /** Restarted while in the callback; next ACTIVE, STOPPED, DESTROYING. */
+    RT_TIMERLNXSTATE_CB_RESTARTING,
/** The callback shall destroy the timer; next STOPPED. */
+ RTTIMERLNXSTATE_CB_DESTROYING,
+ /** Transient state; next STOPPED. */
+ RTTIMERLNXSTATE_STOPPING,
+ /** Transient state; next STOPPED. */
+ RTTIMERLNXSTATE_MP_STOPPING,
+ /** The usual 32-bit hack. */
+ RTTIMERLNXSTATE_32BIT_HACK = 0x7fffffff
+ } RTTIMERLNXSTATE;

+ typeof struct RTTIMERLNXSUBTIMER
+
+ /** Timer specific data. */
+ union
+ {
+ +#if defined(RTTIMER_LINUX_WITH_HRTIMER)
+ /** High resolution timer. */
+ struct
+ {
+ /** The linux timer structure. */
+ struct hrtimer LnxTimer;
+ #endif
+ /** Standard timer. */
+ struct
+ {
+ /** The linux timer structure. */
+ struct timer_list LnxTimer;
+ /** The start of the current run (ns). */
+ * This is used to calculate when the timer ought to fire the next time. */
+ uint64_t u64NextTS;
+ /** The u64NextTS in jiffies. */
+ unsigned long ulNextJiffies;
+ /** Set when starting or changing the timer so that u64StartTs */
+ * and u64NextTS gets reinitialized (eliminating some jitter). */
+ bool volatile fFirstAfterChg;
+ } Std;
+ } u;
+ /** The current tick number. */
+ uint64_t iTick;
+ /** Restart the single shot timer at this specific time. */
+ * Used when a single shot timer is restarted from the callback. */
+ uint64_t volatile uNsRestartAt;
+ /** Pointer to the parent timer. */
+ PRTTIMER pParent;
+ /** The current sub-timer state. */
+ RTTIMERLNXSTATE volatile enmState;
+ } RTTIMERLNXSUBTIMER;
+ /** Pointer to a linux sub-timer. */
+ typedef RTTIMERLNXSUBTIMER *PRTTIMERLNXSUBTIMER;
+
+ /** The internal representation of an Linux timer handle. */
+ typedef struct RTTIMER
+
+ {  
+    /** Magic. */
+    uint32_t volatile u32Magic;
+    /** Spinlock synchronizing the fSuspended and MP event handling. */
+    RTSPINLOCK hSpinlock;
+    /** Flag indicating that the timer is suspended. */
+    bool volatile fSuspended;
+    /** Whether the timer must run on one specific CPU or not. */
+    bool fSpecificCpu;
+    /** Whether it is a high resolution timer or a standard one. */
+    bool fHighRes;
+    /** The id of the CPU it must run on if fSpecificCpu is set. */
+    RTCPUID idCpu;
+    /** The number of CPUs this timer should run on. */
+    RTCPUID cCpus;
+    /** Callback. */
+    PFnRTTIMER pfnTimer;
+    /** User argument. */
+    void *pvUser;
+    /** The timer interval. 0 if one-shot. */
+    uint64_t volatile u64NanoInterval;
+    /** This is set to the number of jiffies between ticks if the interval is 
+     * an exact number of jiffies. (Standard timers only.) */
+    unsigned long volatile cJiffies;
+    /** The change interval spinlock for standard timers only. */
+    spinlock_t ChgIntLock;
+    /** Workqueue item for delayed destruction. */
+    RTR0LNXWORKQUEUEITEM DtorWorkqueueItem;
+    /** Sub-timers. */
+     * Normally there is just one, but for RTTIMER_FLAGS_CPU_ALL this will contain
+     * an entry for all possible cpus. In that case the index will be the same as
+     * for the RTCpuSet. */
+    RTTIMERLNXSUBTIMER aSubTimers[1];
+ } RTTIMER;
+
+ /**<
+     * A rtTimerLinuxStartOnCpu and rtTimerLinuxStartOnCpu argument package.
+ */
+typedef struct RTTIMERLINUXSTARTONCPUARGS
+{
+    /** The current time (RTTimeSystemNanoTS). */
+    uint64_t                u64Now;
+    /** When to start firing (delta). */
+    uint64_t                u64First;
+ } RTTIMERLINUXSTARTONCPUARGS;
+ /**< Pointer to a rtTimerLinuxStartOnCpu argument package. */
+typedef RTTIMERLINUXSTARTONCPUARGS *PRTTIMERLINUXSTARTONCPUARGS;
+
+ /*******************************************************************************************
+ **************************************
+ *   Internal Functions 
+ *******************************************************************************************
+ */
+#ifdef CONFIG_SMP
+static DECLCALLBACK(void) rtTimerLinuxMpEvent(RTMPEVENT enmEvent, RTCPUID idCpu, void *
pvUser);
+#endif
+
+/#if 0
+#define DEBUG_HACKING
+#include <iprt/string.h>
+/#include <iprt/asm-amd64-x86.h>
+static void myLogBackdoorPrintf(const char *pszFormat, ...)
+{
+    char        szTmp[256];
+    va_list     args;
+    size_t      cb;
+
+    cb = RTStrPrintf(szTmp, sizeof(szTmp) - 10, "%d: ", RTMpCpuId());
+    va_start(args, pszFormat);
+    cb += RTStrPrintfV(&szTmp[cb], sizeof(szTmp) - cb, pszFormat, args);
+    va_end(args);
+
+    ASMOOutStrU8(0x504, (uint8_t *)&szTmp[0], cb);
+}
/**
 * Sets the state.
 */
DECLINLINE(void) rtTimerLnxSetState(RTTIMERLNXSTATE volatile *penmState, RTTIMERLNXSTATE enmNewState)
{
    if(0)
    {
        RTTIMERLNX_LOG(("set %d -> %d\n", *penmState, enmNewState));
    } else {
        ASMAtomicWriteU32((uint32_t volatile *)penmState, enmNewState);
    }
}

/**
 * Sets the state if it has a certain value.
 *
 * @return true if xchg was done.
 * @return false if xchg wasn't done.
 */
#ifdef DEBUG_HACKING
#define rtTimerLnxCmpXchgState(penmState, enmNewState, enmCurState)
rtTimerLnxCmpXchgStateDebug(penmState, enmNewState, enmCurState, __LINE__)
static bool rtTimerLnxCmpXchgStateDebug(RTTIMERLNXSTATE volatile *penmState, RTTIMERLNXSTATE enmNewState, RTTIMERLNXSTATE enmCurState, uint32_t uLine)
{
    RTTIMERLNXSTATE enmOldState = enmCurState;
    bool fRc = ASMAtomicCmpXchgExU32((uint32_t volatile *)penmState, enmNewState, enmCurState, (uint32_t *)&enmOldState);
    RTTIMERLNX_LOG(("cxg %d -> %d - %d at %u\n", enmOldState, enmNewState, fRc, uLine));
    return fRc;
}
#else
DECLINLINE(bool) rtTimerLnxCmpXchgState(RTTIMERLNXSTATE volatile *penmState, RTTIMERLNXSTATE enmNewState, RTTIMERLNXSTATE enmCurState, uint32_t uLine)
{
    RTTIMERLNXSTATE enmOldState = enmCurState;
    bool fRc = ASMAtomicCmpXchgExU32((uint32_t volatile *)penmState, enmNewState, enmCurState, (uint32_t *)&enmOldState);
    RTTIMERLNX_LOG(("cxg %d -> %d - %d at %u\n", enmOldState, enmNewState, fRc, uLine));
    return fRc;
}
#endif

/**
 * Other miscellaneous stuff...
 */
+* #define RTAssertMsg1Weak(pszExpr, uLine, pszFile, pszFunction) \
+  myLogBackdoorPrintf("!!Guest Assertion failed!!\n%s(%d) %s\n\n", uLine, pszFile, pszFunction, (pszExpr))
+* #define RTAssertMsg2Weak myLogBackdoorPrintf
+* #define RTTIMERLNX_LOG(a)          myLogBackdoorPrintf a
+* */
+* #else
+* #define RTTIMERLNX_LOG(a)          do {} while (0)
+* */
+*/
+* #elif DEBUG_HACKING
+  RTTIMERLNX_LOG(("set %d -> %d\n", penmState, enmNewState));
+*/
+*DECLINLINE(void) rtTimerLnxSetState(RTTIMERLNXSTATE volatile *penmState, RTTIMERLNXSTATE enmNewState)
+{ 
+  RTTIMERLNX_LOG(("set %d -> %d\n", penmState, enmNewState));
+} 
+ 
+* */
+* #if DEBUG_HACKING
+  RTTIMERLNX_LOG(("cxg %d -> %d - %d at %u\n", enmOldState, enmNewState, fRc, uLine));
+ */
+* DECLINLINE(bool) rtTimerLnxCmpXchgState(RTTIMERLNXSTATE volatile *penmState, RTTIMERLNXSTATE enmNewState, RTTIMERLNXSTATE enmCurState, uint32_t uLine)
+{ 
+  RTTIMERLNXSTATE enmOldState = enmCurState;
+  bool fRc = ASMAtomicCmpXchgExU32((uint32_t volatile *)penmState, enmNewState, enmCurState, (uint32_t *)&enmOldState);
+  RTTIMERLNX_LOG(("cxg %d -> %d - %d at %u\n", enmOldState, enmNewState, fRc, uLine));
+  return fRc;
+} 
+* */
+* #else
+* DECLINLINE(bool) rtTimerLnxCmpXchgState(RTTIMERLNXSTATE volatile *penmState, RTTIMERLNXSTATE enmNewState, RTTIMERLNXSTATE enmCurState, uint32_t uLine)
+{ 
+  RTTIMERLNXSTATE enmOldState = enmCurState;
+  bool fRc = ASMAtomicCmpXchgExU32((uint32_t volatile *)penmState, enmNewState, enmCurState, (uint32_t *)&enmOldState);
+  RTTIMERLNX_LOG(("cxg %d -> %d - %d at %u\n", enmOldState, enmNewState, fRc, uLine));
+  return fRc;
+} 
+* */
/**
 * Gets the state.
 */
DECLINLINE(RTTIMERLNXSTATE) rtTimerLnxGetState(RTTIMERLNXSTATE volatile *penmState)
{
    return (RTTIMERLNXSTATE)ASMAtomicUoReadU32((uint32_t volatile *)penmState);
}

#ifdef RTTIMER_LINUX_WITH_HRTIMER
/**
 * Converts a nano second time stamp to ktime_t.
 *
 * ASSUMES RTTimeSystemNanoTS() is implemented using ktime_get_ts().
 *
 * @returns ktime_t.
 * @param   cNanoSecs   Nanoseconds.
 */
DECLINLINE(ktime_t) rtTimerLnxNanoToKt(uint64_t cNanoSecs)
{
    /* With some luck the compiler optimizes the division out of this... (Bet it doesn't.) */
    return ktime_set(cNanoSecs / 1000000000, cNanoSecs % 1000000000);
}

/**
 * Converts ktime_t to a nano second time stamp.
 *
 * ASSUMES RTTimeSystemNanoTS() is implemented using ktime_get_ts().
 *
 * @returns nano second time stamp.
 * @param   Kt          ktime_t.
 */
DECLINLINE(uint64_t) rtTimerLnxKtToNano(ktime_t Kt)
{
    return ktime_to_ns(Kt);
}
#endif /* RTTIMER_LINUX_WITH_HRTIMER */

/**
 * Converts a nano second interval to jiffies.
 *
 * @returns Jiffies.
 * @param   cNanoSecs   Nanoseconds.
 */

DECLINLINE(unsigned long) rtTimerLnxNanoToJiffies(uint64_t cNanoSecs)
+
+/* this can be made even better... */
+ if (cNanoSecs > (uint64_t)TICK_NSEC * MAX_JIFFY_OFFSET)
+     return MAX_JIFFY_OFFSET;
+## if ARCH_BITS == 32
+ if (RT_LIKELY(cNanoSecs <= UINT32_MAX))
+     return ((uint32_t)cNanoSecs + (TICK_NSEC-1)) / TICK_NSEC;
+## endif
+ return (cNanoSecs + (TICK_NSEC-1)) / TICK_NSEC;
+
+/**
+ * Starts a sub-timer (RTTimerStart).
+ *
+ * @param   pSubTimer   The sub-timer to start.
+ * @param   u64Now      The current timestamp (RTTimeSystemNanoTS()).
+ * @param   u64First    The interval from u64Now to the first time the timer should fire.
+ * @param   fPinned     true = timer pinned to a specific CPU,
+ *                      false = timer can migrate between CPUs
+ * @param   fHighRes    Whether the user requested a high resolution timer or not.
+ * @param   enmOldState The old timer state.
+ */
+static void rtTimerLnxStartSubTimer(PRTTIMERLNXSUBTIMER pSubTimer, uint64_t u64Now, uint64_t u64First,
+                                    bool fPinned, bool fHighRes)
+{
+    /* Calc when it should start firing. */
+    uint64_t u64NextTS = u64Now + u64First;
+    if (!fHighRes)
+        pSubTimer->u.Std.u64NextTS = u64NextTS;
+    RTTIMERLNX_LOG(\"startsubtimer \%p\n\", pSubTimer->pParent));
+    pSubTimer->iTick = 0;
+}
+/*
+ * Calc when it should start firing.
+ */
+uint64_t u64NextTS = u64Now + u64First;
+ if (!fHighRes)
+    pSubTimer->u.Std.u64NextTS = u64NextTS;
+ RTTIMERLNX_LOG("startsubtimer %p\n", pSubTimer->pParent));
+ pSubTimer->iTick = 0;
+
+##ifdef RTTIMER_LINUX_WITH_HRTIMER
+ if (fHighRes)
+    hrtimer_start(&pSubTimer->u.Hr.LnxTimer, rtTimerLnxNanoToKt(u64NextTS),
+                  fPinned ? HRTIMER_MODE_ABS_PINNED : HRTIMER_MODE_ABS);
+ else
+##endif
+ {unsigned long cJiffies = !u64First ? 0 : rtTimerLnxNanoToJiffies(u64First);
+ pSubTimer->u.Std.ulNextJiffies = jiffies + cJiffies;
+ pSubTimer->u.Std.fFirstAfterChg = true;
ifdef CONFIG_SMP
+    if (fPinned)
+    {
+        if (LINUX_VERSION_CODE >= KERNEL_VERSION(4, 8, 0))
+            mod_timer(&pSubTimer->u.Std.LnxTimer, pSubTimer->u.Std.ulNextJiffies);
+        else
+            mod_timer_pinned(&pSubTimer->u.Std.LnxTimer, pSubTimer->u.Std.ulNextJiffies);
+    }
+    else
+        mod_timer(&pSubTimer->u.Std.LnxTimer, pSubTimer->u.Std.ulNextJiffies);
+endif

    /* Be a bit careful here since we could be racing the callback. */
    if (!rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE,
        RTTIMERLNXSTATE_STARTING))
        rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE,
            RTTIMERLNXSTATE_MP_STARTING);
+
+    /* Be a bit careful here since we could be racing the callback. */
+    if (!rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE,
+        RTTIMERLNXSTATE_STARTING))
+        rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE,
+            RTTIMERLNXSTATE_MP_STARTING);
+
+    /* Stops a sub-timer (RTTimerStart and rtTimerLinuxMpEvent()). */
+    *
+    /* The caller has already changed the state, so we will not be in a callback
+       situation wrt to the calling thread. */
+    *
+    @param pSubTimer The sub-timer.
+    @param fHighRes Whether the user requested a high resolution timer or not.
+ */
+static void rtTimerLnxStopSubTimer(PRTTIMERLNXSUBTIMER pSubTimer, bool fHighRes)
+{
+    RTTIMERLNX_LOG("stoptimer %p %d\n", pSubTimer->pParent, fHighRes);
+    #ifdef RTTIMER_LINUX_WITH_HRTIMER
+        if (fHighRes)
+        {
+            /* There is no equivalent to del_timer in the hrtimer API,
+               hrtimer_cancel() == del_timer_sync(). Just like the WARN_ON in
+               del_timer_sync() asserts, waiting for a timer callback to complete
+               is deadlock prone, so don't do it. */
+            int rc = hrtimer_try_to_cancel(&pSubTimer->u.Hr.LnxTimer);
+            if (rc < 0)
+            {
+                hrtimer_start(&pSubTimer->u.Hr.LnxTimer, ktime_set(KTIME_SEC_MAX, 0),
                    HRTIMER_MODE_ABS);
+                hrtimer_try_to_cancel(&pSubTimer->u.Hr.LnxTimer);
+            }
+        }
+    #endif
+ } } #endif
+ del_timer(&pSubTimer->u.Std.LnxTimer);
+
+ rtTimerLnxsetState(&pSubTimer->enmState, RTTIMERLNXSTATE_STOPPED);
+
+ +*/
+ * Used by RTTimerDestroy and rtTimerLnxCallbackDestroy to do the actual work.
+ *
+ * @param pTimer The timer in question.
+ */
+static void rtTimerLnxDestroyIt(PRTTIMER pTimer)
+{ 
+ RTSPINLOCK hSpinlock = pTimer->hSpinlock;
+ RTCPUID iCpu;
+ Assert(pTimer->fSuspended);
+ RTTIMERLNX_LOG(\"destroyit %p\n\", pTimer));
+ 
+ /*
+ * Remove the MP notifications first because it\'ll reduce the risk of
+ * us overtaking any MP event that might theoretically be racing us here.
+ */
+ */
+#ifdef CONFIG_SMP
+ if ( pTimer->cCpus > 1
+     && hSpinlock != NIL_RTSPINLOCK)
+ { 
+     int rc = RTMpNotificationDeregister(rtTimerLinuxMpEvent, pTimer);
+     AssertRC(rc);
+ } 
+#endif /* CONFIG_SMP */
+
+ /*
+ * Invalidate the handle.
+ */
+ ASMAtomicWriteU32(&pTimer->u32Magic, ~RTTIMER_MAGIC);
+
+ /*
+ * Make sure all timers have stopped executing since we\'re stopping them in
+ * an asynchronous manner up in rtTimerLnxStopSubTimer.
+ */
+ iCpu = pTimer->cCpus;
+ while (iCpu-- > 0)
+ { 
++#ifdef RTTIMER_LINUX_WITH_HRTIMER
+ if (pTimer->fHighRes
hrtimer_cancel(&pTimer->aSubTimers[iCpu].u.Hr.LnxTimer);
else
#endif
  del_timer_sync(&pTimer->aSubTimers[iCpu].u.Std.LnxTimer);
  }
  
  /*
  * Finally, free the resources.
  */
  */
  RTMemFreeEx(pTimer, RT_OFFSETOF(RTTIMER, aSubTimers[pTimer->cCpus]));
  if (hSpinlock != NIL_RTSPINLOCK)
    RTSpinlockDestroy(hSpinlock);
}

/**
 * Workqueue callback (no DECLCALLBACK!) for deferred destruction.
 */
static void rtTimerLnxDestroyDeferred(RTR0LNXWORKQUEUEITEM *pWork)
{
    PRTTIMER pTimer = RT_FROM_MEMBER(pWork, RTTIMER, DtorWorkqueueItem);
    rtTimerLnxDestroyIt(pTimer);
}

/**
 * Called when the timer was destroyed by the callback function.
 */
static void rtTimerLnxCallbackDestroy(PRTTIMER pTimer, PRTTIMERLNXSUBTIMER pSubTimer)
{
    /*
    * If it's an omni timer, the last dude does the destroying.
    */
    if (pTimer->cCpus > 1)
    {
        uint32_t iCpu = pTimer->cCpus;
        RTSpinlockAcquire(pTimer->hSpinlock);
        Assert(pSubTimer->enmState == RTTIMERLNXSTATE_CALLBACK_DESTROYING);
        rtTimerLnxSetState(&pSubTimer->enmState, RTTIMERLNXSTATE_STOPPED);
        rtTimerLnxCallbackDestroy(pTimer, pSubTimer);
    }
}
while (iCpu-- > 0)
    if (rtTimerLnxGetState(&pTimer->aSubTimers[iCpu].enmState) != RTTIMERLNXSTATE_STOPPED)
        {
            RTSpinlockRelease(pTimer->hSpinlock);
            return;
        }

    RTSpinlockRelease(pTimer->hSpinlock);
}

/*
 * Destroying a timer from the callback is unsafe since the callout code
 * might be touching the timer structure upon return (hrtimer does!). So,
 * we have to defer the actual destruction to the IRPT workqueue.
 * */
rtR0LnxWorkqueuePush(&pTimer->DtorWorkqueueItem, rtTimerLnxDestroyDeferred);
}

#ifdef CONFIG_SMP
/**
 * Deal with a sub-timer that has migrated.
 *
 * @param   pTimer          The timer.
 * @param   pSubTimer       The sub-timer.
 */
static void rtTimerLnxCallbackHandleMigration(PRTTIMER pTimer, PRTTIMERLNXSUBTIMER pSubTimer)
{
    RTTIMERLNXSTATE enmState;
    if (pTimer->cCpus > 1)
        RTSpinlockAcquire(pTimer->hSpinlock);

    do
    {
        enmState = rtTimerLnxGetState(&pSubTimer->enmState);
        switch (enmState)
        {
            case RTTIMERLNXSTATE_STOPPING:
            case RTTIMERLNXSTATE_MP_STOPPING:
                enmState = RTTIMERLNXSTATE_STOPPED;
            case RTTIMERLNXSTATE_STOPPED:
                break;
            case RTTIMERLNXSTATE_STARTING:
            case RTTIMERLNXSTATE_MP_STARTING:
            case RTTIMERLNXSTATE_ACTIVE:

            default:
                AssertMsgFailed("%d\n", enmState);
        }
    }
+  case RTTIMERLNXSTATE_CALLBACK:
+  case RTTIMERLNXSTATE_CB_STOPPING:
+  case RTTIMERLNXSTATE_CB_RESTARTING:
+      if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_STOPPED, enmState))
+          enmState = RTTIMERLNXSTATE_STOPPED;
+  break;
+
+  case RTTIMERLNXSTATE_CB_DESTROYING:
+  {
+      if (pTimer->cCpus > 1)
+          RTSpinlockRelease(pTimer->hSpinlock);
+
+          rtTimerLnxCallbackDestroy(pTimer, pSubTimer);
+          return;
+      }
+  } while (enmState != RTTIMERLNXSTATE_STOPPED);
+
+  if (pTimer->cCpus > 1)
+      RTSpinlockRelease(pTimer->hSpinlock);
+
*/
+/**
+ * The slow path of rtTimerLnxChangeToCallbackState.
+ *
+ * @returns true if changed successfully, false if not.
+ * @param   pSubTimer       The sub-timer.
+ *
+ */
+static bool rtTimerLnxChangeToCallbackStateSlow(PRTTIMERLNXSUBTIMER pSubTimer)
+{
+  for (;;)
+  {
+      RTTIMERLNXSTATE enmState = rtTimerLnxGetState(&pSubTimer->enmState);
+      switch (enmState)
+      {
+          case RTTIMERLNXSTATE_ACTIVE:
+          case RTTIMERLNXSTATE_STARTING:
+          case RTTIMERLNXSTATE_MP_STARTING:
+              if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_CALLBACK, enmState))
+                  return true;
+              break;
+          case RTTIMERLNXSTATE_CALLBACK:
+          case RTTIMERLNXSTATE_CB_STOPPING:
+          case RTTIMERLNXSTATE_CB_RESTARTING:
+             case RTTIMERLNXSTATE_CB_DESTROYING:
+                 AssertMsgFailed("%d\n", enmState);
+             default:
+                 return false;
+         }
+     ASMNopPause();
+ }
+
+/**
+ * Tries to change the sub-timer state to 'callback'.
+ *
+ * @returns true if changed successfully, false if not.
+ * @param   pSubTimer       The sub-timer.
+ */
+DECLINLINE(bool) rtTimerLnxChangeToCallbackState(PRTTIMERLNXSUBTIMER pSubTimer)
+{
+    if (RT_LIKELY(rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_CALLBACK,
+RTTIMERLNXSTATE_ACTIVE)))
+        return true;
+    return rtTimerLnxChangeToCallbackStateSlow(pSubTimer);
+}
+
+
+#ifdef RTTIMER_LINUX_WITH_HRTIMER
+/**
+ * Timer callback function for high resolution timers.
+ *
+ * @returns HRTIMER_NORESTART or HRTIMER_RESTART depending on whether it's a
+ *          one-shot or interval timer.
+ * @param   pHrTimer    Pointer to the sub-timer structure.
+ */
+static enum hrtimer_restart rtTimerLinuxHrCallback(struct hrtimer *pHrTimer)
+{
+    PRTTIMERLNXSUBTIMER     pSubTimer = RT_FROM_MEMBER(pHrTimer, RTTIMERLNXSUBTIMER,
+u.Hr.LnxTimer);
+    PRTTIMER                pTimer    = pSubTimer->pParent;
+
+    RTTIMERLNX_LOG(("hrcallback %p\n", pTimer));
+    if (RT_UNLIKELY(!rtTimerLnxChangeToCallbackState(pSubTimer)))
+        return HRTIMER_NORESTART;
+
+#endif CONFIG_SMP
+/*
+ * Check for unwanted migration.
+ */
if (pTimer->fAllCpus || pTimer->fSpecificCpu)
{
    RTCPUID idCpu = RTMpCpuId();
    if (RT_UNLIKELY(pTimer->fAllCpus
        ? (RTCPUID)(pSubTimer - &pTimer->aSubTimers[0]) != idCpu
        : pTimer->idCpu != idCpu))
    {
        rtTimerLnxCallbackHandleMigration(pTimer, pSubTimer);
        return HRTIMER_NORESTART;
    }
}
#endif

if (pTimer->u64NanoInterval)
{
    /*
     * Periodic timer, run it and update the native timer afterwards so
     * we can handle RTTimerStop and RTTimerChangeInterval from the
     * callback as well as a racing control thread.
     */
    pTimer->pfnTimer(pTimer, pTimer->pvUser, ++pSubTimer->iTick);
    hrtimer_add_expires_ns(&pSubTimer->u.Hr.LnxTimer, ASMAtomicReadU64(&pTimer->u64NanoInterval));
    if (RT_LIKELY(rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE, RTTIMERLNXSTATE_CALLBACK)))
        return HRTIMER_RESTART;
    }
else
{
    /*
     * One shot timer (no omni), stop it before dispatching it.
     * Allow RTTimerStart as well as RTTimerDestroy to be called from
     * the callback.
     */
    ASMAtomicWriteBool(&pTimer->fSuspended, true);
    pTimer->pfnTimer(pTimer, pTimer->pvUser, ++pSubTimer->iTick);
    if (RT_LIKELY(rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE, RTTIMERLNXSTATE_CALLBACK)))
        return HRTIMER_RESTART;
}

/*
 * Some state change occurred while we were in the callback routine.
 */
for (;;)
{
    RTTIMERLNXSTATE enmState = rtTimerLnxGetState(&pSubTimer->enmState);
    switch (enmState)
void rtTimerLnxCallbackDestroy(void *pTimer, void *pSubTimer);
return HRTIMER_NORESTART;
+
+ case RTTIMERLNXSTATE_CB_DESTROYING:
+ rtTimerLnxCallbackDestroy(pTimer, pSubTimer);
+ return HRTIMER_NORESTART;
+}

+ case RTTIMERLNXSTATE_CB_STOPPING:
+ if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_STOPPED, RTTIMERLNXSTATE_CB_STOPPING))
+ return HRTIMER_NORESTART;
+ break;
+
+ case RTTIMERLNXSTATE_CB_RESTARTING:
+ if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE, RTTIMERLNXSTATE_CB_RESTARTING))
+ {
+ pSubTimer->iTick = 0;
+ hrtimer_set_expires(&pSubTimer->u.Hr.LnxTimer, rtTimerLnxNanoToKt(pSubTimer->uNsRestartAt));
+ return HRTIMER_RESTART;
+ }
+ break;
+
+ default:
+ AssertMsgFailed("%d", enmState);
+ return HRTIMER_NORESTART;
+ }
+
+ }="#endif /* RTTIMER_LINUX_WITH_HRTIMER */
+
+ +#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 15, 0)
+ /**
+ * Timer callback function for standard timers.
+ *
+ * @param   pLnxTimer   Pointer to the Linux timer structure.
+ */
+ static void rtTimerLinuxStdCallback(struct timer_list *pLnxTimer)
+ {
+ PRTTIMERLNXSUBTIMER pSubTimer = from_timer(pSubTimer, pLnxTimer, u.Std.LnxTimer);
+ #else
+ /**
+ * Timer callback function for standard timers.
+ *
+ * @param   ulUser      Address of the sub-timer structure.
+ */
+ static void rtTimerLinuxStdCallback(unsigned long ulUser)
    PRTTIMERLNXSUBTIMER pSubTimer = (PRTTIMERLNXSUBTIMER)ulUser;
#endif
    PRTTIMER            pTimer    = pSubTimer->pParent;

    RTTIMERLNX_LOG(("stdcallback \%p\n", pTimer));
    if (RT_UNLIKELY(!rtTimerLnxChangeToCallbackState(pSubTimer)))
        return;

    ifdef CONFIG_SMP
    /*
    * Check for unwanted migration.
    */
    if (pTimer->fAllCpus || pTimer->fSpecificCpu)
        {
            RTCPUID idCpu = RTMpCpuId();
            if (RT_UNLIKELY(  pTimer->fAllCpus
                ? (RTCPUID)(pSubTimer - &pTimer->aSubTimers[0]) != idCpu
                : pTimer->idCpu != idCpu))
                {
                    rtTimerLnxCallbackHandleMigration(pTimer, pSubTimer);
                    return;
                }
        }
    endif

    if (pTimer->u64NanoInterval)
        {
            /*
             * Interval timer, calculate the next timeout.
             *
             * The first time around, we'll re-adjust the u.Std.u64NextTS to
             * try prevent some jittering if we were started at a bad time.
             */
            const uint64_t  iTick = ++pSubTimer->iTick;
            uint64_t        u64NanoInterval;
            unsigned long   cJiffies;
            unsigned long   flFlags;

            spin_lock_irqsave(&pTimer->ChgIntLock, flFlags);
            u64NanoInterval = pTimer->u64NanoInterval;
            cJiffies        = pTimer->cJiffies;
            if (RT_UNLIKELY(pSubTimer->u.Std.fFirstAfterChg))
                {
                    pSubTimer->u.Std.fFirstAfterChg = false;
                    pSubTimer->u.Std.u64NextTS     = RTTimeSystemNanoTS();
                    pSubTimer->u.Std.ulNextJiffies = jiffies;
                }
        }
spin_unlock_irqrestore(&pTimer->ChgIntLock, flFlags);

pSubTimer->u.Std.u64NextTS += u64NanoInterval;
if (cJiffies)
{
    pSubTimer->u.Std.u64NextJiffies += cJiffies;
    /* Prevent overflows when the jiffies counter wraps around.
    * Special thanks to Ken Preslan for helping debugging! */
    while (time_before(pSubTimer->u.Std.u64NextJiffies, jiffies))
    {
        pSubTimer->u.Std.u64NextJiffies += cJiffies;
        pSubTimer->u.Std.u64NextTS += u64NanoInterval;
    }
}
else
{
    const uint64_t u64NanoTS = RTTimeSystemNanoTS();
    while (pSubTimer->u.Std.u64NextTS < u64NanoTS)
    {
        pSubTimer->u.Std.u64NextTS += u64NanoInterval;
        pSubTimer->u.Std.u64NextJiffies = jiffies + rtTimerLnxNanoToJiffies(pSubTimer->u.Std.u64NextTS - u64NanoTS);
    }
    /*
     * Run the timer and re-arm it unless the state changed
     * We must re-arm it afterwards as we're not in a position to undo this
     * operation if for instance someone stopped or destroyed us while we
     * were in the callback. (Linux takes care of any races here.)
     */
    pTimer->pfnTimer(pTimer, pTimer->pvUser, iTick);
    if (RT_LIKELY(rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE, RTTIMERLNXSTATE_CALLBACK)))
    {
    #ifdef CONFIG_SMP
        if (pTimer->fSpecificCpu || pTimer->fAllCpus)
        {
            # if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 8, 0)
                mod_timer(&pSubTimer->u.Std.LnxTimer, pSubTimer->u.Std.ulNextJiffies);
            #else
                mod_timer_pinned(&pSubTimer->u.Std.LnxTimer, pSubTimer->u.Std.ulNextJiffies);
            #endif
        }
        else
            mod_timer_pinned(&pSubTimer->u.Std.LnxTimer, pSubTimer->u.Std.ulNextJiffies);
    #endif
    } else
    
    #endif
}
    mod_timer(&pSubTimer->u.Std.LnxTimer, pSubTimer->u.Std.ulNextJiffies);
    return;
  }
}

/*
 * One shot timer, stop it before dispatching it.
 * Allow RTTimerStart as well as RTTimerDestroy to be called from
 * the callback.
 */
ASMAtomicWriteBool(&pTimer->fSuspended, true);
pTimer->pfnTimer(pTimer, pTimer->pvUser, ++pSubTimer->iTick);
if (RT_LIKELY(rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_STOPPED,
RTTIMERLNXSTATE_CALLBACK)))
  return;
}

/*
 * Some state change occurred while we were in the callback routine.
 */
for (;;) {
    RTTIMERLNXSTATE enmState = rtTimerLnxGetState(&pSubTimer->enmState);
    switch (enmState) {
        case RTTIMERLNXSTATE_CB_DESTROYING:
            rtTimerLnxCallbackDestroy(pTimer, pSubTimer);
            return;
        case RTTIMERLNXSTATE_CB_STOPPING:
            if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_STOPPED,
RTTIMERLNXSTATE_CB_STOPPING))
                return;
            break;
        case RTTIMERLNXSTATE_CB_RESTARTING:
            if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_ACTIVE,
RTTIMERLNXSTATE_CB_RESTARTING))
                break;
        case RTTIMERLNXSTATE_CB_CONTINUING:
            break;
        default:
            break;
    }
    uint64_t u64NanoTS;
    uint64_t u64NextTS;
    unsigned long flFlags;

    spin_lock_irqsave(&pTimer->ChgIntLock, flFlags);
    u64NextTS = u64NextTS;
    u64NextTS = RTTimeSystemNanoTS();
    pSubTimer->iTick = 0;
static int rtTimerLnxOmniStart(PRTTIMER pTimer, PRTTIMERLINUXSTARTONCPUARGS pArgs)
{
    RTCPUID iCpu;
    RTCPUSET OnlineSet;
    RTCPUSET OnlineSet2;
    int rc2;

    /* Prepare all the sub-timers for the startup and then flag the timer
    * as a whole as non-suspended, make sure we get them all before
    * clearing fSuspended as the MP handler will be waiting on this
    * should something happen while we're looping.
    */
    RTSpinlockAcquire(pTimer->hSpinlock);

    /* Just make it a omni timer restriction that no stop/start races are allowed. */
    for (iCpu = 0; iCpu < pTimer->cCpus; iCpu++)
        if (rtTimerLnxGetState(&pTimer->aSubTimers[iCpu].enmState) != RTTIMERLNXSTATE_STOPPED)
            RTSpinlockRelease(pTimer->hSpinlock);
            return VERR_TIMER_BUSY;

    do
    {
        RTMpGetOnlineSet(&OnlineSet);
        for (iCpu = 0; iCpu < pTimer->cCpus; iCpu++)
        {
            Assert(pTimer->aSubTimers[iCpu].enmState != RTTIMERLNXSTATE_MP_STOPPING);
            rtTimerLnxSetState(&pTimer->aSubTimers[iCpu].enmState,
                               RTCpuSetIsMember(&OnlineSet, iCpu)
                               ? RTTIMERLNXSTATE_STARTING
                               : RTTIMERLNXSTATE_STOPPED);
        }
    } while (!RTCpuSetIsEqual(&OnlineSet, RTMpGetOnlineSet(&OnlineSet2)));

    ASMAtomicWriteBool(&pTimer->fSuspended, false);

    RTSpinlockRelease(pTimer->hSpinlock);

    return VERR_TIMER_BUSY;
}
RTSpinlockRelease(pTimer->hSpinlock);

/*
 * Start them (can't find any exported function that allows me to
 * do this without the cross calls).
 */
pArgs->u64Now = RTTimeSystemNanoTS();
rc2 = RTMpOnAll(rtTimerLnxStartAllOnCpu, pTimer, pArgs);
AssertRC(rc2); /* screw this if it fails. */

/*
 * Reset the sub-timers who didn't start up (ALL CPUs case).
 */
RTSpinlockAcquire(pTimer->hSpinlock);

for (iCpu = 0; iCpu < pTimer->cCpus; iCpu++)
    if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[iCpu].enmState, RTTIMERLNXSTATE_STOPPED, RTTIMERLNXSTATE_STARTING))
        {
            /** @todo very odd case for a rainy day. Cpus that temporarily went offline while
             * we were between calls needs to nudged as the MP handler will ignore events for
             * them because of the STARTING state. This is an extremely unlikely case - not that
             * that means anything in my experience... ;-) */
            RTTIMERLNX_LOG("what!? iCpu=%u -> didn't start\n", iCpu);
        }

RTSpinlockRelease(pTimer->hSpinlock);

return VINF_SUCCESS;
}

RTTimerLnxOmniStop(PRTTIMER pTimer, bool fForDestroy)
{
    bool            fActiveCallbacks = false;
    RTCPUID         iCpu;
    RTTIMERLNXSTATE enmState;

    /*
     * Worker for RTTimerStop() that takes care of the ugly SMP bits.
     */
    /*
     * @returns true if there was any active callbacks, false if not.
     * @param pTimer The timer (valid).
     * @param fForDestroy Whether this is for RTTimerDestroy or not.
     */
    static bool rtTimerLnxOmniStop(PRTTIMER pTimer, bool fForDestroy)
    {
        bool fActiveCallbacks = false;
        RTCPUID  iCpu;
        RTTIMERLNXSTATE enmState;

        /*
         * Mark the timer as suspended and flag all timers as stopping, except
for those being stopped by an MP event.
+
*/
+ RTSpinlockAcquire(pTimer->hSpinlock);
+
+ ASMAAtomicWriteBool(&pTimer->fSuspended, true);
+ for (iCpu = 0; iCpu < pTimer->cCpus; iCpu++)
+ {
+     for (;;)
+     {
+         enmState = rtTimerLnxGetState(&pTimer->aSubTimers[iCpu].enmState);
+         if (enmState == RTTIMERLNXSTATE_STOPPED
+             || enmState == RTTIMERLNXSTATE_MP_STOPPING)
+             break;
+         if (enmState == RTTIMERLNXSTATE_CALLBACK
+             || enmState == RTTIMERLNXSTATE_CB_STOPPING
+             || enmState == RTTIMERLNXSTATE_CB_RESTARTING)
+         {
+             Assert(enmState != RTTIMERLNXSTATE_CB_STOPPING || fForDestroy);
+             if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[iCpu].enmState,
+                !fForDestroy ? RTTIMERLNXSTATE_CB_STOPPING :
+                RTTIMERLNXSTATE_CB_DESTROYING,
+                enmState))
+             {
+                 fActiveCallbacks = true;
+                 break;
+             }
+         }
+         else
+         {
+             Assert(enmState == RTTIMERLNXSTATE_ACTIVE);
+             if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[iCpu].enmState,
+                RTTIMERLNXSTATE_STOPPING, enmState))
+                 break;
+         }
+         ASMNopPause();
+     }
+     RTSpinlockRelease(pTimer->hSpinlock);
+ 
+ /*
+ * Do the actual stopping. Fortunately, this doesn't require any IPIs.
+ * Unfortunately it cannot be done synchronously.
+ */
+ for (iCpu = 0; iCpu < pTimer->cCpus; iCpu++)
+     if (rtTimerLnxGetState(&pTimer->aSubTimers[iCpu].enmState) == RTTIMERLNXSTATE_STOPPING)
+         rtTimerLnxStopSubTimer(&pTimer->aSubTimers[iCpu], pTimer->fHighRes);
+ return fActiveCallbacks;
+
+/**
+ * Per-cpu callback function (RTMpOnSpecific) used by rtTimerLinuxMpEvent()
+ * to start a sub-timer on a cpu that just have come online.
+ */
+ * @param idCpu The current CPU.
+ * @param pvUser1 Pointer to the timer.
+ * @param pvUser2 Pointer to the argument structure.
+ */
+static DECLCALLBACK(void) rtTimerLinuxMpStartOnCpu(RTCPUID idCpu, void *pvUser1, void *pvUser2)
++{  
+ PRTTIMERLINUXSTARTONCPUARGS pArgs = (PRTTIMERLINUXSTARTONCPUARGS)pvUser2;
+ PRTTIMER pTimer = (PRTTIMER)pvUser1;
+ RTSPINLOCK hSpinlock;
+ Assert(idCpu < pTimer->cCpus);
+  
+  /* We have to be kind of careful here as we might be racing RTTimerStop
+  * (and/or RTTimerDestroy, thus the paranoia.
+  */
+  hSpinlock = pTimer->hSpinlock;
+  if ( hSpinlock != NIL_RTSPINLOCK
+      && pTimer->u32Magic == RTTIMER_MAGIC)
+  {  
+      RTSpinlockAcquire(hSpinlock);
+      if ( !ASMAtomicUoReadBool(&pTimer->fSuspended)
+          && pTimer->u32Magic == RTTIMER_MAGIC)
+      {  
+          /* We're sane and the timer is not suspended yet. */
+          PRTTIMERLNXSUBTIMER pSubTimer = &pTimer->aSubTimers[idCpu];
+          if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_MP_STARTING,
+                                    RTTIMERLNXSTATE_STOPPED))
+              rtTimerLnxStartSubTimer(pSubTimer, pArgs->u64Now, pArgs->u64First, true /*fPinned*/, pTimer->fHighRes);
+      }
+  }  
+  RTSpinlockRelease(hSpinlock);
+  }
+  
+/**
+ * MP event notification callback.
+ */
+ @param enmEvent The event.
+ @param idCpu The cpu it applies to.
+ @param pvUser The timer.
+ */
+static DECLCALLBACK(void) rtTimerLinuxMpEvent(RTMPEVENT enmEvent, RTCPUID idCpu, void *pvUser)
+{
+    PRTTIMER            pTimer    = (PRTTIMER)pvUser;
+    PRTTIMERLNXSUBTIMER pSubTimer = &pTimer->aSubTimers[idCpu];
+    RTSPINLOCK          hSpinlock;
+    Assert(idCpu < pTimer->cCpus);
+    /*
+     * Some initial paranoia.
+     */
+    if (pTimer->u32Magic != RTTIMER_MAGIC)
+        return;
+    hSpinlock = pTimer->hSpinlock;
+    if (hSpinlock == NIL_RTSPINLOCK)
+        return;
+    RTSpinlockAcquire(hSpinlock);
+    /* Is it active? */
+    if (  !ASMAtomicUoReadBool(&pTimer->fSuspended)
+        && pTimer->u32Magic == RTTIMER_MAGIC)
+    {
+        switch (enmEvent)
+        {
+            /*
+             * Try do it without leaving the spin lock, but if we have to, retake it
+             * when we're on the right cpu.
+             */
+            case RTMPEVENT_ONLINE:
+                if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_MP_STARTING,
+                    RTTIMERLNXSTATE_STOPPED))
+                    {  
+                        RTTIMERLINUXSTARTONCPUARGS Args;
+                        Args.u64Now = RTTimeSystemNanoTS();
+                        Args.u64First = 0;
+                        if (RTMpCpuId() == idCpu)
+                            rtTimerLnxStartSubTimer(pSubTimer, Args.u64Now, Args.u64First, true /*fPinned*/, pTimer->fHighRes);
+                        else
+                            {  
+                                rtTimerLnxSetState(&pSubTimer->enmState, RTTIMERLNXSTATE_STOPPED); /* we'll recheck
it. */
+        RTSpinlockRelease(hSpinlock);
+        
+        RTMpOnSpecific(idCpu, rtTimerLinuxMpStartOnCpu, pTimer, &Args);
+        return; /* we've left the spinlock */
+    }
+    }
+    break;
+
+    /*
+    * The CPU is (going) offline, make sure the sub-timer is stopped.
+    *
+    * Linux will migrate it to a different CPU, but we don't want this. The
+    * timer function is checking for this.
+    */
+    case RTMPEVENT_OFFLINE:
+    {
+        RTTIMERLNXSTATE enmState;
+        while ( (enmState = rtTimerLnxGetState(&pSubTimer->enmState)) ==
+            RTTIMERLNXSTATE_ACTIVE
+            || enmState == RTTIMERLNXSTATE_CALLBACK
+            || enmState == RTTIMERLNXSTATE_CB_RESTARTING)
+            {
+                if (enmState == RTTIMERLNXSTATE_ACTIVE)
+                    {
+                        if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_MP_STOPPING,
+                            RTTIMERLNXSTATE_ACTIVE))
+                            {
+                                RTSpinlockRelease(hSpinlock);
+                                
+                                rtTimerLnxStopSubTimer(pSubTimer, pTimer->fHighRes);
+                                return; /* we've left the spinlock */
+                            }
+                    }
+                    else if (rtTimerLnxCmpXchgState(&pSubTimer->enmState, RTTIMERLNXSTATE_CB_STOPPING,
+                        RTTIMERLNXSTATE_ACTIVE))
+                        break;
+                    /* State not stable, try again. */
+                    ASMnopPause();
+                    }
+                    break;
+    }
+    }
+    RTSpinlockRelease(hSpinlock);
+}
callback function use by RTTimerStart via RTMpOnSpecific to start a timer
* running on a specific CPU.
* *
* @param idCpu The current CPU.
* @param pvUser1 Pointer to the timer.
* @param pvUser2 Pointer to the argument structure.
* *
+static DECLCALLBACK(void) rtTimerLnxStartOnSpecificCpu(RTCPID idCpu, void *pvUser1, void
*pvUser2)
+
+ PRRTTIMERLINUXSTARTONCPUARGS pArgs = (PRRTTIMERLINUXSTARTONCPUARGS)pvUser2;
+ PRRTIMER pTimer = (PRRTIMER)pvUser1;
+ RT_NOREF_PV(idCpu);
+ rtTimerLnxStartSubTimer(&pTimer->aSubTimers[0], pArgs->u64Now, pArgs->u64First, true /*fPinned*/,
pTimer->fHighRes);
+
+RTDECL(int) RTTimerStart(PRTTIMER pTimer, uint64_t u64First)
+
+ RTTIMERLINUXSTARTONCPUARGS Args;
+ int rc2;
+ IPRT_LINUX_SAVE_EFL_AC();
+
+ /*
+ * Validate.
+ */
+ AssertPtrReturn(pTimer, VERR_INVALID_HANDLE);
+ AssertReturn((pTimer->u32Magic == RTTIMER_MAGIC, VERR_INVALID_HANDLE);
+
+ if (!ASMAtomicUoReadBool(&pTimer->fSuspended))
+ return VERR_TIMER_ACTIVE;
+ RTTIMERLNX_LOG("start %p cCpus=%d\n", pTimer, pTimer->cCpus);
+
+ Args.u64First = u64First;
+ if defined CONFIG_SMP
+
+ /*
+ * Omni timer?
+ */
+ if (pTimer->fAllCpus)
+ {
+ rc2 = rtTimerLnxOmniStart(pTimer, &Args);
+ IPRT_LINUX_RESTORE_EFL_AC();
    return rc2;
+
+#endif
+
+    /*
+     * Simple timer - Pretty straight forward if it wasn't for restarting.
+     */
+    Args.u64Now = RTTimeSystemNanoTS();
+    ASMAAtomicWriteU64(&pTimer->aSubTimers[0].uNsRestartAt, Args.u64Now + u64First);
+    for (;;)
+    {
+        RTTIMERLNXSTATE enmState = rtTimerLnxGetState(&pTimer->aSubTimers[0].enmState);
+        switch (enmState)
+        {
+            case RTTIMERLNXSTATE_STOPPED:
+                if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[0].enmState, RTTIMERLNXSTATE_STARTING, RTTIMERLNXSTATE_STOPPED))
+                {
+                    ASMAAtomicWriteBool(&pTimer->fSuspended, false);
+                    if (!pTimer->fSpecificCpu)
+                        rtTimerLnxStartSubTimer(&pTimer->aSubTimers[0], Args.u64Now, Args.u64First,
+                                false /*fPinned*/, pTimer->fHighRes);
+                    else
+                    {
+                        rc2 = RTMpOnSpecific(pTimer->idCpu, rtTimerLnxStartOnSpecificCpu, pTimer, &Args);
+                        if (RT_FAILURE(rc2))
+                        {
+                            /* Suspend it, the cpu id is probably invalid or offline. */
+                            ASMAAtomicWriteBool(&pTimer->fSuspended, true);
+                            rtTimerLnxSetState(&pTimer->aSubTimers[0].enmState, RTTIMERLNXSTATE_STOPPED);
+                            return rc2;
+                        }
+                    }
+                    IPRT_LINUX_RESTORE_EFL_AC();
+                    return VINF_SUCCESS;
+                }
+                break;
+            case RTTIMERLNXSTATE_CALLBACK:
+            case RTTIMERLNXSTATE_CB_STOPPING:
+                if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[0].enmState, RTTIMERLNXSTATE_CB_RESTARTING, enmState))
+                {
+                    ASMAAtomicWriteBool(&pTimer->fSuspended, false);
+                    IPRT_LINUX_RESTORE_EFL_AC();
+                    return VINF_SUCCESS;
+                }
+                break;
+            case RTTIMERLNXSTATE_CALLBACK:
+            case RTTIMERLNXSTATE_CB_STOPPING:
+                if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[0].enmState, RTTIMERLNXSTATE_CB_RESTARTING, enmState))
+                {
+                    ASMAAtomicWriteBool(&pTimer->fSuspended, false);
+                    IPRT_LINUX_RESTORE_EFL_AC();
+                    return VINF_SUCCESS;
+                }
+                break;
+        }
default:
  AssertMsgFailed("%d\n", enmState);
  IPRT_LINUX_RESTORE_EFL_AC();
  return VERR_INTERNAL_ERROR_4;
}
ASMNopPause();
}
+RT_EXPORT_SYMBOL(RTTimerStart);
+
+
+/**
 * Common worker for RTTimerStop and RTTimerDestroy.
 + *
 * @returns true if there was any active callbacks, false if not.
 * @param   pTimer              The timer to stop.
 * @param   fForDestroy         Whether it's RTTimerDestroy calling or not.
 * @*/
+static bool rtTimerLnxStop(PRTTIMER pTimer, bool fForDestroy)
+{
  RTTIMERLNX_LOG(("lnxstop %p %d\n", pTimer, fForDestroy));
  +#ifdef CONFIG_SMP
  + /*
  + * Omni timer?
  + */
  + if (pTimer->fAllCpus)
  +     return rtTimerLnxOmniStop(pTimer, fForDestroy);
  +#endif
  +
  +  /* Simple timer.
  + */
  +  ASMAtomicWriteBool(&pTimer->fSuspended, true);
  +  for (;;)
  +  {
  +    RTTIMERLNXSTATE enmState = rtTimerLnxGetState(&pTimer->aSubTimers[0].enmState);
  +    switch (enmState)
  +    {
  +      case RTTIMERLNXSTATE_ACTIVE:
  +        if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[0].enmState,
RTTIMERLNXSTATE_STOPPING, RTTIMERLNXSTATE_ACTIVE))
  +          {
  +            rtTimerLnxStopSubTimer(&pTimer->aSubTimers[0], pTimer->fHighRes);
  +            return false;
  +          }
  +    }
  +  break;
  +}
case RTTIMERLNXSTATE_CALLBACK:
+case RTTIMERLNXSTATE_CB_RESTARTING:
+case RTTIMERLNXSTATE_CB_STOPPING:
+    Assert(enmState != RTTIMERLNXSTATE_CB_STOPPING || fForDestroy);
+    if (rtTimerLnxCmpXchgState(&pTimer->aSubTimers[0].enmState,
+                               !fForDestroy ? RTTIMERLNXSTATE_CB_STOPPING :
+                                              RTTIMERLNXSTATE_CB_DESTROYING,
+                               enmState))
+        return true;
+    break;
+
+case RTTIMERLNXSTATE_STOPPED:
+    return VINF_SUCCESS;
+
+case RTTIMERLNXSTATE_CB_DESTROYING:
+    AssertMsgFailed(("enmState=%d pTimer=%p\n", enmState, pTimer));
+    return true;
+
+default:
+case RTTIMERLNXSTATE_STARTING:
+case RTTIMERLNXSTATE_MP_STARTING:
+case RTTIMERLNXSTATE_STOPPING:
+case RTTIMERLNXSTATE_MP_STOPPING:
+    AssertMsgFailed(("enmState=%d pTimer=%p\n", enmState, pTimer));
+    return false;
+}
+
+/* State not stable, try again. */
+ASMNopPause();
+
+RTDECL(int) RTTimerStop(PRTTIMER pTimer)
+
+{  
+    /* Validate.  
+     */  
+    IPRT_LINUX_SAVE_EFL_AC();  
+    AssertPtrReturn(pTimer, VERR_INVALID_HANDLE);  
+    AssertReturn(pTimer->u32Magic == RTTIMER_MAGIC, VERR_INVALID_HANDLE);  
+    RTTIMERLNX_LOG(("stop %p\n", pTimer));  
+    if (ASMAtomicUoReadBool(&pTimer->fSuspended))  
+        return VERR_TIMER_SUSPENDED;  
+    rtTimerLnxStop(pTimer, false /*!fForDestroy*/);  
+    +
+    +
+    +
+
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IPRT_LINUX_RESTORE_EFL_AC();
return VINF_SUCCESS;
+
+RT_EXPORT_SYMBOL(RTTimerStop);
+
+
+RTDECL(int) RTTimerChangeInterval(PRTTIMER pTimer, uint64_t u64NanoInterval)
+
+
+
+IPRT_LINUX_SAVE_EFL_AC();
+
+/*
+ * Validate.
+ */
+ AssertPtrReturn(pTimer, VERR_INVALID_HANDLE);
+ AssertReturn(pTimer->u32Magic == RTTIMER_MAGIC, VERR_INVALID_HANDLE);
+ AssertReturn(u64NanoInterval, VERR_INVALID_PARAMETER);
+ AssertReturn(u64NanoInterval < UINT64_MAX / 8, VERR_INVALID_PARAMETER);
+ AssertReturn(pTimer->u64NanoInterval, VERR_INVALID_STATE);
+ RTTIMERLNX_LOG(\"change %p %llu\", pTimer, u64NanoInterval);
+
+ ndef RTTIMER_LINUX_WITH_HRTIMER
+ */
+   * For the high resolution timers it is easy since we don't care so much
+   * about when it is applied to the sub-timers.
+   */
+ if (pTimer->fHighRes)
+ {
+    ASMAtomicWriteU64(&pTimer->u64NanoInterval, u64NanoInterval);
+    IPRT_LINUX_RESTORE_EFL_AC();
+    return VINF_SUCCESS;
+ }
+}
+ ndef if
+
+/*
+ * Standard timers have a bit more complicated way of calculating
+ * their interval and such. So, forget omni timers for now.
+ */
+ if (pTimer->cCpus > 1)
+   return VERR_NOT_SUPPORTED;
+
+ cJiffies = u64NanoInterval / RTTimerGetSystemGranularity();
+ if (cJiffies * RTTimerGetSystemGranularity() != u64NanoInterval)
+   cJiffies = 0;
+
+ spin_lock_irqsave(&pTimer->ChgIntLock, flFlags);
+ pTimer->aSubTimers[0].u.Std.fFirstAfterChg = true;
+ pTimer->cJiffies = cJiffies;
+ ASMAtomicWriteU64(&pTimer->u64NanoInterval, u64NanoInterval);
+ spin_unlock_irqrestore(&pTimer->ChgIntLock, flFlags);
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return VINF_SUCCESS;
+
+RT_EXPORT_SYMBOL(RTTimerChangeInterval);
+
+
+RTDECL(int) RTTimerDestroy(PRTTIMER pTimer)
+{
+    bool fCanDestroy;
+    IPRT_LINUX_SAVE_EFL_AC();
+    /*
+     * Validate. It's ok to pass NULL pointer.
+     */
+    if (pTimer == /*NIL_RTTIMER*/ NULL)
+        return VINF_SUCCESS;
+    AssertPtrReturn(pTimer, VERR_INVALID_HANDLE);
+    AssertReturn(pTimer->u32Magic == RTTIMER_MAGIC, VERR_INVALID_HANDLE);
+    RTTIMERLNX_LOG(("destroy %p
", pTimer));
+/** @todo We should invalidate the magic here! */
+    /*
+     * Stop the timer if it's still active, then destroy it if we can.
+     */
+    if (!ASMAtomicUoReadBool(&pTimer->fSuspended))
+        fCanDestroy = rtTimerLnxStop(pTimer, true /*fForDestroy*/);
+    else
+    {
+        uint32_t iCpu = pTimer->cCpus;
+        if (pTimer->cCpus > 1)
+            RTSpinlockAcquire(pTimer->hSpinlock);
+        fCanDestroy = true;
+        while (iCpu-- > 0)
+        {
+            for (;;)
+            {
+                RTTIMERLNXSTATE enmState = rtTimerLnxGetState(&pTimer->aSubTimers[iCpu].enmState);
+                switch (enmState)
+                {
+                    case RTTIMERLNXSTATE_CALLBACK:
+                    case RTTIMERLNXSTATE_CB_RESTARTING:
+                    case RTTIMERLNXSTATE_CB_STOPPING:
+                        if (!rtTimerLnxCmpXchgState(&pTimer->aSubTimers[iCpu].enmState, RTTIMERLNXSTATE_CB_DESTROYING, enmState))
+                            break;
+                }
+            }
+        }
+    }
+    return fCanDestroy;
+}
continue;
fCanDestroy = false;
break;

case RTTIMERLNXSTATE_CB_DESTROYING:
    AssertMsgFailed("%d\n", enmState);
fCanDestroy = false;
break;
default:
    break;
}
break;
}

if (pTimer->cCpus > 1)
    RTSpinlockRelease(pTimer->hSpinlock);
}

if (fCanDestroy)
{
    /* For paranoid reasons, defer actually destroying the semaphore when
     * in atomic or interrupt context. */
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 32)
    if (in_atomic() || in_interrupt())
#else
    if (in_interrupt())
#endif
    if (in_interrupt())
#endif
    rtROlndxWorkqueuePush(&pTimer->DtorWorkqueueItem, rtTimerLnxDestroyDeferred);
    else
    rtTimerLnxDestroyIt(pTimer);
}

IPRT_LINUX_RESTORE_EFL_AC();
return VINF_SUCCESS;
}
rt0LnxWorkqueueFlush(); /* for 2.4 */
*ppTimer = NULL;

/*
 * Validate flags.
 */
if (!RTTIMER_FLAGS_ARE_VALID(fFlags)) {
  IPRT_LINUX_RESTORE_EFL_AC();
  return VERR_INVALID_PARAMETER;
}
if (    (fFlags & RTTIMER_FLAGS_CPU_SPECIFIC)
    &&  (fFlags & RTTIMER_FLAGS_CPU_ALL) != RTTIMER_FLAGS_CPU_ALL
    &&  !RTMpIsCpuPossible(RTMpCpuIdFromSetIndex(fFlags & RTTIMER_FLAGS_CPU_MASK))) {
  IPRT_LINUX_RESTORE_EFL_AC();
  return VERR_CPU_NOT_FOUND;
}

/* Allocate the timer handler.
 */
cCpus = 1;
#if defined CONFIG_SMP
    if ((fFlags & RTTIMER_FLAGS_CPU_ALL) == RTTIMER_FLAGS_CPU_ALL)
    {
        cCpus = RTMpGetMaxCpuId() + 1;
        Assert(cCpus <= RTCPUSET_MAX_CPUS); /* On linux we have a 1:1 relationship between cpuid and set
index. */
        AssertReturnStmt(u64NanoInterval, IPRT_LINUX_RESTORE_EFL_AC(),
VERR_NOT_IMPLEMENTED); /* We don't implement single shot on all cpus, sorry. */
    }
#endif

rc = RTMemAllocEx(RT_OFFSETOF(RTTIMER, aSubTimers[cCpus]), 0,
RTMEMALLOCEX_FLAGS_ZEROED | RTMEMALLOCEX_FLAGS_ANY_CTX_FREE, (void **)&pTimer);
if (RT_FAILURE(rc)) {
  IPRT_LINUX_RESTORE_EFL_AC();
  return rc;
}

/*
 * Initialize it.
 */
pTimer->u32Magic        = RTTIMER_MAGIC;
pTimer->hSpinlock       = NIL_RTSPINLOCK;
+    pTimer->fSuspended = true;
+    pTimer->fHighRes = !!((fFlags & RTTIMER_FLAGS_HIGH_RES);
+#ifdef CONFIG_SMP
+    pTimer->fSpecificCpu = ((fFlags & RTTIMER_FLAGS_CPU_SPECIFIC) && (fFlags & RTTIMER_FLAGS_CPU_ALL)) != RTTIMER_FLAGS_CPU_ALL;
+    pTimer->fAllCpus = ((fFlags & RTTIMER_FLAGS_CPU_ALL) == RTTIMER_FLAGS_CPU_ALL;
+    pTimer->idCpu = pTimer->fSpecificCpu
+        ? RTMpCpuIdFromSetIndex(fFlags & RTTIMER_FLAGS_CPU_MASK)
+        : NIL_RTCPUID;
+#else
+    pTimer->fSpecificCpu = !!((fFlags & RTTIMER_FLAGS_CPU_SPECIFIC);
+    pTimer->idCpu = RTMpCpuId();
+#endif
+    pTimer->cCpus = cCpus;
+    pTimer->pfnTimer = pfnTimer;
+    pTimer->pvUser = pvUser;
+    pTimer->u64NanoInterval = u64NanoInterval;
+    pTimer->cJiffies = u64NanoInterval / RTTimerGetSystemGranularity();
+    if (pTimer->cJiffies * RTTimerGetSystemGranularity() != u64NanoInterval)
+        pTimer->cJiffies = 0;
+    spin_lock_init(&pTimer->ChgIntLock);
+
+    for (iCpu = 0; iCpu < cCpus; iCpu++)
+    {
+        if (pTimer->fHighRes)
+            { hrtimer_init(&pTimer->aSubTimers[iCpu].u.Hr.LnxTimer, CLOCK_MONOTONIC, HRTIMER_MODE_ABS);
+                pTimer->aSubTimers[iCpu].u.Hr.LnxTimer.function = rtTimerLinuxHrCallback;
+            }
+        else
+        {#ifdef RTTIMER_LINUX_WITH_HRTIMER
+            timer_setup(&pTimer->aSubTimers[iCpu].u.Std.LnxTimer, rtTimerLinuxStdCallback, TIMER_PINNED);
+            init_timer_pinned(&pTimer->aSubTimers[iCpu].u.Std.LnxTimer);
+            pTimer->aSubTimers[iCpu].u.Std.LnxTimer.data = (unsigned long)&pTimer->aSubTimers[iCpu];
+            pTimer->aSubTimers[iCpu].u.Std.LnxTimer.function = rtTimerLinuxStdCallback;
+        }
+    }
+#endif
+    if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 15, 0)
+        timer_setup(&pTimer->aSubTimers[iCpu].u.Std.LnxTimer, rtTimerLinuxStdCallback, TIMER_PINNED);
+    else if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 8, 0)
+        init_timer_pinned(&pTimer->aSubTimers[iCpu].u.Std.LnxTimer);
+    else
+        init_timer(&pTimer->aSubTimers[iCpu].u.Std.LnxTimer);
+#endif
+#if LINUX_VERSION_CODE < KERNEL_VERSION(4, 15, 0)
+    pTimer->aSubTimers[iCpu].u.Std.LnxTimer.data = (unsigned long)&pTimer->aSubTimers[iCpu];
+    pTimer->aSubTimers[iCpu].u.Std.LnxTimer.function = rtTimerLinuxStdCallback;
+    pTimer->aSubTimers[iCpu].u.Std.LnxTimer.expires = jiffies;
+    pTimer->aSubTimers[iCpu].u.Std.u64NextTS = 0;
+    }
+ pTimer->aSubTimers[iCpu].iTick = 0;
+ pTimer->aSubTimers[iCpu].pParent = pTimer;
+ pTimer->aSubTimers[iCpu].enmState = RTTIMERLNXSTATE_STOPPED;
+ }
+
+#ifdef CONFIG_SMP
+ /*
+ * If this is running on ALL cpus, we'll have to register a callback
+ * for MP events (so timers can be started/stopped on cpus going
+ * online/offline). We also create the spinlock for synchronizing
+ * stop/start/mp-event.
+ */
+ if (cCpus > 1)
+ {
+ int rc = RTSpinlockCreate(&pTimer->hSpinlock, RTSPINLOCK_FLAGS_INTERRUPT_SAFE,
+ "RTTimerLnx");
+ if (RT_SUCCESS(rc))
+ rc = RTMpNotificationRegister(rtTimerLinuxMpEvent, pTimer);
+ else
+ pTimer->hSpinlock = NIL_RTSPINLOCK;
+ if (RT_FAILURE(rc))
+ {
+ RTTimerDestroy(pTimer);
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return rc;
+ }
+ }
+ +#endif /* CONFIG_SMP */
+
+ RTTIMERLNX_LOG("create %p hires=%d fFlags=%#x cCpus=%u\n", pTimer, pTimer->fHighRes, fFlags,
cCpus);
+ *ppTimer = pTimer;
+ IPRT_LINUX_RESTORE_EFL_AC();
+ return VINF_SUCCESS;
+
+RTDECL(uint32_t) RTTimerGetSystemGranularity(void)
+{
+#if 0 /** @todo Not sure if this is what we want or not... Add new API for
+ * querying the resolution of the high res timers? */
+ struct timespec Ts;
+ int rc;
+ IPRT_LINUX_SAVE_EFL_AC();
+ rc = hrtimer_get_res(CLOCK_MONOTONIC, &Ts);
+ IPRT_LINUX_RESTORE_EFL_AC();
+ if (!rc)
+ {   Assert(!Ts.tv_sec);   return Ts.tv_nsec; + }   #endif
+ return RT_NS_1SEC / HZ; /* ns */ +}   +RT_EXPORT_SYMBOL(RTTimerGetSystemGranularity);
++
++ +RTDECL(int) RTTimerRequestSystemGranularity(uint32_t u32Request, uint32_t *pu32Granted)
++{   + RT_NOREF_PV(u32Request); RT_NOREF_PV(*pu32Granted);   + return VERR_NOT_SUPPORTED;
++}
+RT_EXPORT_SYMBOL(RTTimerRequestSystemGranularity);
++
++ +RTDECL(int) RTTimerReleaseSystemGranularity(uint32_t u32Granted)
++{   + RT_NOREF_PV(u32Granted);
++
++}
+RT_EXPORT_SYMBOL(RTTimerReleaseSystemGranularity);
++
++ +RTDECL(bool) RTTimerCanDoHighResolution(void)
++{   +#ifdef RTTIMER_LINUX_WITH_HRTIMER   + return true;
++
++
++
++
++
++
++#endif
++}
+RT_EXPORT_SYMBOL(RTTimerCanDoHighResolution);
++
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/linux/waitqueue-r0drv-linux.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/linux/waitqueue-r0drv-linux.h
@@ -0,0 +1,290 @@
/* $Id: waitqueue-r0drv-linux.h $ */
/** @file
 * IPRT - Linux Ring-0 Driver Helpers for Abstracting Wait Queues,
 * @ */
**/ @file
 + * Copyright (C) 2006-2017 Oracle Corporation
 + *
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+ */
+
+#ifndef ___r0drv_linux_waitqueue_r0drv_linux_h
+#define ___r0drv_linux_waitqueue_r0drv_linux_h

+##include "the-linux-kernel.h"
+
+##include <iprt/asm-math.h>
+##include <iprt/err.h>
+##include <iprt/string.h>
+##include <iprt/time.h>
+
+/** The resolution (nanoseconds) specified when using
+ * schedule_hrtimeout_range. */
+##define RTR0SEMLNXWAIT_RESOLUTION 50000
+
+/**
+ * Kernel mode Linux wait state structure.
+ */
+##typedef struct RTR0SEMLNXWAIT
+{
+  /** The wait queue entry. */
+  ##if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 13, 0)
+    wait_queue_entry_t WaitQE;
+  ##else
+    wait_queue_t WaitQE;
+  ##endif
+  /** The absolute timeout given as nano seconds since the start of the
+   * monotonic clock. */
+  uint64_t uNsAbsTimeout;
+  /** The timeout in nano seconds relative to the start of the wait. */
+
```c
+ uint64_t       cNsRelTimeout;
+ /**< The native timeout value. */
+ union
+ {
+#ifdef IPRT_LINUX_HAS_HRTIMER
+     /**< The timeout when fHighRes is true. Absolute, so no updating. */
+     ktime_t     KtTimeout;
+#endif
+     /**< The timeout when fHighRes is false. Updated after waiting. */
+     long       lTimeout;
+ } u;
+ /**< Set if we use high resolution timeouts. */
+ bool            fHighRes;
+ /**< Set if it's an indefinite wait. */
+ bool            fIndefinite;
+ /**< Set if we've already timed out. */
+   * Set by rtR0SemLnxWaitDoIt and read by rtR0SemLnxWaitHasTimedOut. */
+ bool            fTimedOut;
+ /**< TASK_INTERRUPTIBLE or TASK_UNINTERRUPTIBLE. */
+ int             iWaitState;
+ /**< The wait queue. */
+ wait_queue_head_t *pWaitQueue;
+ } RTR0SEMLNXWAIT;
+ /**< Pointer to a linux wait state. */
typedef RTR0SEMLNXWAIT *PRTR0SEMLNXWAIT;
+
+/**
+ * Initializes a wait.
+ *
+ * The caller MUST check the wait condition BEFORE calling this function or the
+ * timeout logic will be flawed.
+ *
+ * @returns VINF_SUCCESS or VERR_TIMEOUT.
+ * @param   pWait               The wait structure.
+ * @param   fFlags              The wait flags.
+ * @param   uTimeout            The timeout.
+ * @param   pWaitQueue          The wait queue head.
+ */
+DECLINLINE(int) rtR0SemLnxWaitInit(PRTR0SEMLNXWAIT pWait, uint32_t fFlags, uint64_t uTimeout,
+                                  wait_queue_head_t *pWaitQueue)
+{
+    /**< Process the flags and timeout. */
+    if(!(fFlags & RTSEMWAIT_FLAGS_INDEFINITE))
+    {
+        /**< @todo optimize: millisecs -> nanosecs -> millisecc -> jiffies */
```
+ if (fFlags & RTSEMWAIT_FLAGS_MILLISECS)
+    uTimeout = uTimeout < UINT64_MAX / RT_US_1SEC * RT_US_1SEC
+        ? uTimeout * RT_US_1SEC
+        : UINT64_MAX;
+ if (uTimeout == UINT64_MAX)
+    fFlags |= RTSEMWAIT_FLAGS_INDEFINITE;
+ else
+    {
+        uint64_t u64Now;
+        if (fFlags & RTSEMWAIT_FLAGS_RELATIVE)
+            {
+                if (uTimeout == 0)
+                    return VERR_TIMEOUT;
+                u64Now = RTTimeSystemNanoTS();
+                pWait->cNsRelTimeout = uTimeout;
+                pWait->uNsAbsTimeout = u64Now + uTimeout;
+                if (pWait->uNsAbsTimeout < u64Now) /* overflow */
+                    fFlags |= RTSEMWAIT_FLAGS_INDEFINITE;
+              }
+          else
+            {
+                u64Now = RTTimeSystemNanoTS();
+                if (u64Now >= uTimeout)
+                    return VERR_TIMEOUT;
+                pWait->cNsRelTimeout = uTimeout - u64Now;
+                pWait->uNsAbsTimeout = uTimeout;
+            }
+        }
+    }
+    if (!(fFlags & RTSEMWAIT_FLAGS_INDEFINITE))
+    {
+        pWait->fIndefinite = false;
+        if (   (fFlags & (RTSEMWAIT_FLAGS_NANOSECS | RTSEMWAIT_FLAGS_ABSOLUTE))
+            || pWait->cNsRelTimeout < RT_NS_1SEC / HZ * 4)
+            pWait->fHighRes = true;
+        else if (BITS_PER_LONG < 64)
+            if ( KTIME_SEC_MAX <= LONG_MAX
+                && pWait->uNsAbsTimeout >= KTIME_SEC_MAX * RT_NS_1SEC / HZ * 4)
+                pWait->u.KtTimeout = ns_to_ktime(pWait->uNsAbsTimeout);
+        }
+    }
else
+
+    {
+        uint64_t cJiffies = ASMMultU64ByU32DivByU32(pWait->cNsRelTimeout, HZ, RT_NS_1SEC);
+        if (cJiffies >= MAX_JIFFY_OFFSET)
+            fFlags |= RTSEMWAIT_FLAGS_INDEFINITE;
+        else
+            {
+                pWait->u.lTimeout   = (long)cJiffies;
+                pWait->fHighRes     = false;
+            }
+    }
+    }
+
+    if (fFlags & RTSEMWAIT_FLAGS_INDEFINITE)
+    {
+        pWait->fIndefinite  = true;
+        pWait->fHighRes     = false;
+        pWait->uNsAbsTimeout = UINT64_MAX;
+        pWait->cNsRelTimeout = UINT64_MAX;
+        pWait->u.lTimeout    = LONG_MAX;
+    }
+
+    pWait->fTimedOut   = false;
+
+    /*
+     * Initialize the wait queue related bits.
+     */
+    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 39)
+        init_wait((&pWait->WaitQE));
+    +#else
+        RT_ZERO(pWait->WaitQE);
+        init_waitqueue_entry((&pWait->WaitQE), current);
+    +#endif
+    pWait->pWaitQueue = pWaitQueue;
+    pWait->iWaitState = fFlags & RTSEMWAIT_FLAGS_INTERRUPTIBLE
+                       ? TASK_INTERRUPTIBLE : TASK_UNINTERRUPTIBLE;
+
+    return VINF_SUCCESS;
+}
+ * @param   pWait               The wait structure.
+ */
+DECLINLINE(void) rtR0SemLnxWaitPrepare(PRTR0SEMLNXWAIT pWait)
+{
+ /* Make everything thru schedule*() atomic scheduling wise. (Is this correct?) */
+ prepare_to_wait(pWait->pWaitQueue, &pWait->WaitQE, pWait->iWaitState);
+}
+
+/**
+ * Do the actual wait.
+ + * @param   pWait               The wait structure.
+ + */
+DECLINLINE(void) rtR0SemLnxWaitDoIt(PRTR0SEMLNXWAIT pWait)
+{
+ if (pWait->fIndefinite)
+    schedule();
+#ifdef IPRT_LINUX_HAS_HRTIMER
+    else if (pWait->fHighRes)
+    {
+        int rc = schedule_hrtimeout_range(&pWait->u.KtTimeout, HRTIMER_MODE_ABS,
+            RTR0SEMLNXWAIT_RESOLUTION);
+        if (!rc)
+            pWait->fTimedOut = true;
+    }
+#endif
+    else
+    {
+        pWait->u.lTimeout = schedule_timeout(pWait->u.lTimeout);
+        if (pWait->u.lTimeout <= 0)
+            pWait->fTimedOut = true;
+    }
+    after_wait((&pWait->WaitQE));
+}
+
+/**
+ * Checks if a linux wait was interrupted.
+ + * @returns true / false
+ + * @param   pWait               The wait structure.
+ + * @remarks This shall be called before the first rtR0SemLnxWaitDoIt().
+ + */
+DECLINLINE(bool) rtR0SemLnxWaitWasInterrupted(PRTR0SEMLNXWAIT pWait)
+{
+    return pWait->iWaitState == TASK_INTERRUPTIBLE
+        && signal_pending(current);
/** Checks if a linux wait has timed out.
 * @returns true / false
 * @param pWait The wait structure.
 */
DECLINLINE(bool) rtR0SemLnxWaitHasTimedOut(PRTR0SEMLNXWAIT pWait)
{
    return pWait->fTimedOut;
}

/** Deletes a linux wait.
 * @param pWait The wait structure.
 */
DECLINLINE(void) rtR0SemLnxWaitDelete(PRTR0SEMLNXWAIT pWait)
{
    finish_wait(pWait->pWaitQueue, &pWait->WaitQE);
}

/** Gets the max resolution of the timeout machinery.
 * @returns Resolution specified in nanoseconds.
 */
DECLINLINE(uint32_t) rtR0SemLnxWaitGetResolution(void)
{
#ifdef IPRT_LINUX_HAS_HRTIMER
    return RTR0SEMLNXWAIT_RESOLUTION;
#else
    return RT_NS_1SEC / HZ; /* ns */
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/memobj-r0drv.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/memobj-r0drv.c
@@ -0,0 +1,808 @@
/* $Id: memobj-r0drv.cpp $ */
/** @file
 * IPRT - Ring-0 Memory Objects, Common Code.
+ */
+
+/*
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#define LOG_GROUP RTLOGGROUP_DEFAULT /// @todo RTLOGGROUP_MEM
+#define RTMEM_NO_WRAP_TO_EF_APIS /* circular dependency otherwise. */
+
+#include <iprt/memobj.h>
+#include "internal/iprt.h"
+
+#include <iprt/alloc.h>
+#include <iprt/asm.h>
+#include <iprt/assert.h>
+#include <iprt/err.h>
+#include <iprt/log.h>
+#include <iprt/mp.h>
+#include <iprt/param.h>
+#include <iprt/process.h>
+#include <iprt/thread.h>
+
+#include "internal/memobj.h"
+
+/#*
+ * Internal function for allocating a new memory object.
+ *
+ * @returns The allocated and initialized handle.
+ * @param cbSelf The size of the memory object handle. 0 mean default size.
+ * @param enmType The memory object type.
+ * @param pv The memory object mapping.
+ * @param cb The size of the memory object.
+ */
+ DECLHIDDEN(PRTR0MEMOBJINTERNAL) rtR0MemObjNew(size_t cbSelf, RTR0MEMOBJTYPE enmType, void *pv, size_t cb)
+ {
+    PRTR0MEMOBJINTERNAL pNew;
+ +    /* validate the size */
+ +    if (!cbSelf)
+ +        cbSelf = sizeof(*pNew);
+ +        Assert(cbSelf >= sizeof(*pNew));
+ +        Assert((uint32_t)cbSelf == (uint32_t)cbSelf);
+ +        AssertMsg(RT_ALIGN_Z(cb, PAGE_SIZE) == cb, ("%#zx", cb));
+ +        +
+ +        + /*
+ + + * Allocate and initialize the object.
+ + + */
+ +        + pNew = (PRTR0MEMOBJINTERNAL)RTMemAllocZ(cbSelf);
+ +        + if (pNew)
+ +            {
+ +                pNew->u32Magic = RTR0MEMOBJ_MAGIC;
+ +                pNew->cbSelf = (uint32_t)cbSelf;
+ +                pNew->enmType = enmType;
+ +                pNew->fFlags = 0;
+ +                pNew->cb = cb;
+ +                pNew->pv = pv;
+ +            }
+ +            +
+ +            return pNew;
+ +        +
+ +    +
+ + 
+ +    +/***
+ +    + * Deletes an incomplete memory object.
+ +    + *
+ +    + * This is for cleaning up after failures during object creation.
+ +    + *
+ +    + * @param pMem The incomplete memory object to delete.
+ +    + */
+ + DECLHIDDEN(void) rtR0MemObjDelete(PRTR0MEMOBJINTERNAL pMem)
+ + {
+ +    + if (pMem)
+ +        +
+ +        +
+ +        +

ASMAtomicUoWriteU32(&pMem->u32Magic, ~RTR0MEMOBJ_MAGIC);
pMem->enmType = RTR0MEMOBJTYPE_END;
RTMemFree(pMem);
}
+
+
+/**
+ * Links a mapping object to a primary object.
+ *
+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS on success.
+ * @retval VINF_NO_MEMORY if we couldn't expand the mapping array of the parent.
+ * @param pParent  The parent (primary) memory object.
+ * @param pChild   The child (mapping) memory object.
+ */
+static int rtR0MemObjLink(PRTR0MEMOBJINTERNAL pParent, PRTR0MEMOBJINTERNAL pChild)
+{
+    uint32_t i;
+
+    /* sanity */
+    Assert(rtR0MemObjIsMapping(pChild));
+    Assert(!rtR0MemObjIsMapping(pParent));
+
+    /* expand the array? */
+    i = pParent->uRel.Parent.cMappings;
+    if (i >= pParent->uRel.Parent.cMappingsAllocated)
+    {
+        void *pv = RTMemRealloc(pParent->uRel.Parent.papMappings,
+                                (i + 32) * sizeof(pParent->uRel.Parent.papMappings[0]));
+        if (!pv)
+            return VINF_NO_MEMORY;
+        pParent->uRel.Parent.papMappings = (PPRTR0MEMOBJINTERNAL)pv;
+        pParent->uRel.Parent.cMappingsAllocated = i + 32;
+        Assert(i == pParent->uRel.Parent.cMappings);
+    }
+
+    /* do the linking. */
+    pParent->uRel.Parent.cMappings++;
+
+    return VINF_SUCCESS;
+}
+
+
+/**
+ * Checks if this is mapping or not.
+ */

---

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+ * @returns true if it's a mapping, otherwise false.
+ * @param MemObj The ring-0 memory object handle.
+ */
+RTR0DECL(bool) RTR0MemObjIsMapping(RTR0MEMOBJ MemObj)
+
+ /* Validate the object handle. */
+ PRTR0MEMOBJINTERNAL pMem;
+ AssertPtrReturn(MemObj, false);
+ pMem = (PRTR0MEMOBJINTERNAL)MemObj;
+ AssertMsgReturn(pMem->u32Magic == RTR0MEMOBJ_MAGIC, (%p: %#x
", pMem, pMem->u32Magic), false);
+ AssertMsgReturn(pMem->enmType > RTR0MEMOBJTYPE_INVALID && pMem->enmType <
RTR0MEMOBJTYPE_END, (%p: %d
", pMem, pMem->enmType), false);
+ + /* hand it on to the inlined worker. */
+ return rtR0MemObjIsMapping(pMem);
+
+RT_EXPORT_SYMBOL(RTR0MemObjIsMapping);
+
+
+/***
+ * Gets the address of a ring-0 memory object.
+ *
+ * @returns The address of the memory object.
+ * @returns NULL if the handle is invalid (asserts in strict builds) or if there isn't any mapping.
+ * @param MemObj The ring-0 memory object handle.
+ */
+RTR0DECL(void *) RTR0MemObjAddress(RTR0MEMOBJ MemObj)
+
+ /* Validate the object handle. */
+ PRTR0MEMOBJINTERNAL pMem;
+ if (RT_UNLIKELY(MemObj == NIL_RTR0MEMOBJ))
+ return NULL;
+ AssertPtrReturn(MemObj, NULL);
+ pMem = (PRTR0MEMOBJINTERNAL)MemObj;
+ AssertMsgReturn(pMem->u32Magic == RTR0MEMOBJ_MAGIC, (%p: %#x
", pMem, pMem->u32Magic), NULL);
+ AssertMsgReturn(pMem->enmType > RTR0MEMOBJTYPE_INVALID && pMem->enmType <
RTR0MEMOBJTYPE_END, (%p: %d
", pMem, pMem->enmType), NULL);
+ + /* return the mapping address. */
+ return pMem->pv;
+
+RT_EXPORT_SYMBOL(RTR0MemObjAddress);
+ * Gets the ring-3 address of a ring-0 memory object.
+ *
+ * This only applies to ring-0 memory object with ring-3 mappings of some kind, i.e.
+ * locked user memory, reserved user address space and user mappings. This API should
+ * not be used on any other objects.
+ *
+ * @returns The address of the memory object.
+ * @returns NIL_RTR3PTR if the handle is invalid or if it's not an object with a ring-3 mapping.
+ * Strict builds will assert in both cases.
+ *
+ * @param MemObj The ring-0 memory object handle.
+ */
+RTR0DECL(RTR3PTR) RTR0MemObjAddressR3(RTR0MEMOBJ MemObj)
+{
+    PRTR0MEMOBJINTERNAL pMem;
+
+    /* Validate the object handle. */
+    if (RT_UNLIKELY(MemObj == NIL_RTR0MEMOBJ))
+        return NIL_RTR3PTR;
+    AssertPtrReturn(MemObj, NIL_RTR3PTR);
+    pMem = (PRTR0MEMOBJINTERNAL)MemObj;
+    AssertMsgReturn(pMem->u32Magic == RTR0MEMOBJ_MAGIC, ("%p: %#x\n", pMem, pMem->u32Magic), NIL_RTR3PTR);
+    AssertMsgReturn(pMem->enmType > RTR0MEMOBJTYPE_INVALID && pMem->enmType <
+                    RTR0MEMOBJTYPE_END, ("%p: %d\n", pMem, pMem->enmType), NIL_RTR3PTR);
+    if (RT_UNLIKELY(    (   pMem->enmType != RTR0MEMOBJTYPE_MAPPING
+                              || pMem->u.Mapping.R0Process == NIL_RTR0PROCESS)
+                    &&  (   pMem->enmType != RTR0MEMOBJTYPE_LOCK
+                              || pMem->u.Lock.R0Process == NIL_RTR0PROCESS)
+                    &&  (   pMem->enmType != RTR0MEMOBJTYPE_PHYS_NC
+                              || pMem->u.Lock.R0Process == NIL_RTR0PROCESS)
+                    &&  (   pMem->enmType != RTR0MEMOBJTYPE_RES_VIRT
+                              || pMem->u.ResVirt.R0Process == NIL_RTR0PROCESS)))
+        return NIL_RTR3PTR;
+
+    /* return the mapping address. */
+    return (RTR3PTR)pMem->pv;
+
+} /*RT_EXPORT_SYMBOL(RTR0MemObjAddressR3);*/
+
+/**
+ * Gets the size of a ring-0 memory object.
+ *
+ * The returned value may differ from the one specified to the API creating the
+ * object because of alignment adjustments. The minimal alignment currently
+ * employed by any API is PAGE_SIZE, so the result can safely be shifted by
+ * PAGE_SHIFT to calculate a page count.
+ */
+ @returns The object size.
+ @returns 0 if the handle is invalid (asserts in strict builds) or if there isn’t any mapping.
+ @param MemObj The ring-0 memory object handle.
+ */
+RTR0DECL(size_t) RTR0MemObjSize(RTR0MEMOBJ MemObj)
+{
+    PRTR0MEMOBJINTERNAL pMem;
+
+    /* Validate the object handle. */
+    if (RT_UNLIKELY(MemObj == NIL_RTR0MEMOBJ))
+        return 0;
+    AssertPtrReturn(MemObj, 0);
+    pMem = (PRTR0MEMOBJINTERNAL)MemObj;
+    AssertMsgReturn(pMem->u32Magic == RTR0MEMOBJ_MAGIC, ("%p: %#x\n", pMem, pMem->u32Magic), 0);
+    AssertMsgReturn(pMem->enmType > RTR0MEMOBJTYPE_INVALID && pMem->enmType < RTR0MEMOBJTYPE_END, ("%p: %d\n", pMem, pMem->enmType), 0);
+    AssertMsg(RT_ALIGN_Z(pMem->cb, PAGE_SIZE) == pMem->cb, ("%#zx\n", pMem->cb));
+
+    /* return the size. */
+    return pMem->cb;
+}
+RT_EXPORT_SYMBOL(RTR0MemObjSize);
+
+/***
+ * Get the physical address of an page in the memory object.
+ *
+ * @returns The physical address.
+ * @returns NIL_RTHCPHYS if the object doesn’t contain fixed physical pages.
+ * @returns NIL_RTHCPHYS if the iPage is out of range.
+ * @returns NIL_RTHCPHYS if the object handle isn’t valid.
+ * @param MemObj The ring-0 memory object handle.
+ * @param iPage The page number within the object.
+ */
+/* Work around gcc bug 55940 */
+#if defined(__GNUC__) && defined(RT_ARCH_X86) && (__GNUC__ * 100 + __GNUC_MINOR__) == 407
+    __attribute__((__optimize__ ("no-shrink-wrap")))
+#endif
+RTR0DECL(RTHCPHYS) RTR0MemObjGetPagePhysAddr(RTR0MEMOBJ MemObj, size_t iPage)
+{
+    /* Validate the object handle. */
+    PRTR0MEMOBJINTERNAL pMem;
+    size_t cPages;
+    AssertPtrReturn(MemObj, NIL_RTHCPHYS);
+    pMem = (PRTR0MEMOBJINTERNAL)MemObj;
+    AssertReturn(pMem->u32Magic == RTR0MEMOBJ_MAGIC, NIL_RTHCPHYS);
+    AssertReturn(pMem->enmType > RTR0MEMOBJTYPE_INVALID && pMem->enmType <
RTR0MEMOBJTYPE_END, NIL_RTHCPhys);
+    AssertMsgReturn(pMem->u32Magic == RTR0MEMOBJ_MAGIC, ("%p: %#x\n", pMem, pMem->u32Magic),
    NIL_RTHCPhys);
+    AssertMsgReturn(pMem->enmType > RTR0MEMOBJTYPE_INVALID && pMem->enmType <
    RTR0MEMOBJTYPE_END, ("%p: %d\n", pMem, pMem->enmType), NIL_RTHCPhys);
+    cPages = (pMem->cb >> PAGE_SHIFT);
+    if (iPage >= cPages)
+    {
+        /* permit: while (RTR0MemObjGetPagePhysAddr(pMem, iPage++) != NIL_RTHCPhys) {} */
+        if (iPage == cPages)
+            return NIL_RTHCPhys;
+        AssertReturn(iPage < (pMem->cb >> PAGE_SHIFT), NIL_RTHCPhys);
+    }
+    +    /*
+    +    */
+    +    /* We know the address of physically contiguous allocations and mappings.
+    +    */
+    +    if (pMem->enmType == RTR0MEMOBJTYPE_CONT)
+    return pMem->u.Cont.Phys + iPage * PAGE_SIZE;
+    +    if (pMem->enmType == RTR0MEMOBJTYPE_PHYS)
+    return pMem->u.Phys.PhysBase + iPage * PAGE_SIZE;
+    +    /*
+    +    */
+    +    /* Do the job.
+    +    */
+    +    return rtR0MemObjNativeGetPagePhysAddr(pMem, iPage);
+} +RT_EXPORT_SYMBOL(RTR0MemObjGetPagePhysAddr);

RTR0DECL(int) RTR0MemObjFree(RTR0MEMOBJ MemObj, bool fFreeMappings)
+{
+    /*
+    */
+    return rtR0MemObjNativeGetPagePhysAddr(pMem, iPage);
+}
+RT_EXPORT_SYMBOL(RTR0MemObjGetPagePhysAddr);

+/**
+ * Frees a ring-0 memory object.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS if
+ * @param   MemObj          The ring-0 memory object to be freed. NULL is accepted.
+ * @param   fFreeMappings   Whether or not to free mappings of the object.
+ */
+RTR0DECL(int) RTR0MemObjFree(RTR0MEMOBJ MemObj, bool fFreeMappings)
+{
+    /*
+    */
+    PRTR0MEMOBJINTERNAL pMem;
+    int rc;
+    +
+    if (MemObj == NIL_RTR0MEMOBJ)
+        return VINF_SUCCESS;
AssertPtrReturn(MemObj, VERR_INVALID_HANDLE);

pMem = (PRTR0MEMOBJINTERNAL)MemObj;

AssertReturn(pMem->u32Magic == RTR0MEMOBJ_MAGIC, VERR_INVALID_HANDLE);

AssertReturn(pMem->enmType > RTR0MEMOBJTYPE_INVALID && pMem->enmType <
RTR0MEMOBJTYPE_END, VERR_INVALID_HANDLE);

RT_ASSERT_PREEMPTIBLE();

/*
 * Deal with mappings according to fFreeMappings.
 */

if ( !rtR0MemObjIsMapping(pMem)
    && pMem->uRel.Parent.cMappings > 0)
{
    /* fail if not requested to free mappings. */
    if (!fFreeMappings)
        return VERR_MEMORY_BUSY;

    while (pMem->uRel.Parent.cMappings > 0)
    {
        PRTR0MEMOBJINTERNAL pChild = pMem->uRel.Parent.papMappings[--pMem-
        >uRel.Parent.cMappings];

        /* sanity checks. */
        AssertPtr(pChild);
        AssertFatal(pChild->u32Magic == RTR0MEMOBJ_MAGIC);
        AssertFatal(pChild->enmType > RTR0MEMOBJTYPE_INVALID && pChild->enmType <
RTR0MEMOBJTYPE_END);
        AssertFatal(rtR0MemObjIsMapping(pChild));

        /* free the mapping. */
        rc = rtR0MemObjNativeFree(pChild);
        if (RT_FAILURE(rc))
        {
            Log("RTR0MemObjFree: failed to free mapping %p: %p %#zx; rc=%Rrc", pChild, pChild->pv,
pChild->cb, rc);
            return rc;
        }
    }

    /* Free this object.
 */
    rc = rtR0MemObjNativeFree(pMem);
    if (RT_SUCCESS(rc))
/*
* Ok, it was freed just fine. Now, if it's a mapping we'll have to remove it from the parent.
*/
if (rtR0MemObjIsMapping(pMem)) {
    PRTR0MEMOBJINTERNAL pParent = pMem->uRel.Child.pParent;
    uint32_t i;

    /* sanity checks */
    AssertPtr(pParent);
    AssertFatal(pParent->u32Magic == RTR0MEMOBJ_MAGIC);
    AssertFatal(pParent->enmType > RTR0MEMOBJTYPE_INVALID && pParent->enmType <
                RTR0MEMOBJTYPE_END);
    AssertFatal(!rtR0MemObjIsMapping(pParent));
    AssertFatal(pParent->uRel.Parent.cMappings > 0);
    AssertPtr(pParent->uRel.Parent.papMappings);

    /* locate and remove from the array of mappings. */
    i = pParent->uRel.Parent.cMappings;
    while (i-- > 0) {
        if (pParent->uRel.Parent.papMappings[i] == pMem) {
            break;
        }
    }

    Assert(i != UINT32_MAX);
}
else
    Assert(pMem->uRel.Parent.cMappings == 0);

/*
* Finally, destroy the handle.
*/
pMem->u32Magic++;
pMem->enmType = RTR0MEMOBJTYPE_END;
if (!rtR0MemObjIsMapping(pMem))
    RTMemReset(pMem->uRel.Parent.papMappings);
RTMemReset(pMem);
}
else
    Log(("RTR0MemObjFree: failed to free %p: %d %p %#zx; rc=%Rrc\n",
        pMem, pMem->enmType, pMem->pv, pMem->cb, rc));
    return rc;
}
RTR0DECL(int) RTR0MemObjAllocPageTag(PRTR0MEMOBJ pMemObj, size_t cb, bool fExecutable, const char *pszTag)
+
+    /* sanity checks. */
+    const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;
+    AssertReturn(cb > 0, VERR_INVALID_PARAMETER);
+    AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+    RT_ASSERT_PREEMPTIBLE();
+
+    RT_NOREF_PV(pszTag);
+
+    /* do the allocation. */
+    return rtR0MemObjNativeAllocPage(pMemObj, cbAligned, fExecutable);
+
+} +RT_EXPORT_SYMBOL(RTR0MemObjAllocPageTag);
+
+
RTR0DECL(int) RTR0MemObjAllocLowTag(PRTR0MEMOBJ pMemObj, size_t cb, bool fExecutable, const char *pszTag)
+
+    /* sanity checks. */
+    const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;
+    AssertReturn(cb > 0, VERR_INVALID_PARAMETER);
+    AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+    RT_ASSERT_PREEMPTIBLE();
+
+    RT_NOREF_PV(pszTag);
+
+    /* do the allocation. */
+    return rtR0MemObjNativeAllocLow(pMemObj, cbAligned, fExecutable);
+
+} +RT_EXPORT_SYMBOL(RTR0MemObjAllocLowTag);
+
+
RTR0DECL(int) RTR0MemObjAllocContTag(PRTR0MEMOBJ pMemObj, size_t cb, bool fExecutable, const char *pszTag)
+
+    /* sanity checks. */
+    const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;

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+ AssertReturn(cb > 0, VERR_INVALID_PARAMETER);
+ AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+ RT_ASSERT_PREEMPTIBLE();
+
+ RT_NOREF_PV(pszTag);
+
+ /* do the allocation. */
+ return rtR0MemObjNativeAllocCont(pMemObj, cbAligned, fExecutable);
+
+ +RT_EXPORT_SYMBOL(RTR0MemObjAllocContTag);
+
+ +RTR0DECL(int) RTR0MemObjLockUserTag(PRTR0MEMOBJ pMemObj, RTR3PTR R3Ptr, size_t cb,
+ +                                          uint32_t fAccess, RTR0PROCESS R0Process, const char *pszTag)
+ +{
+    /* sanity checks. */
+    const size_t cbAligned = RT_ALIGN_Z(cb + (R3Ptr & PAGE_OFFSET_MASK), PAGE_SIZE);
+    RTR3PTR const R3PtrAligned = (R3Ptr & ~(RTR3PTR)PAGE_OFFSET_MASK);
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;
+    AssertReturn(cb > 0, VERR_INVALID_PARAMETER);
+    AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+    if (R0Process == NIL_RTR0PROCESS)
+        R0Process = RTR0ProcHandleSelf();
+    AssertReturn(!(fAccess & ~(RTMEM_PROT_READ | RTMEM_PROT_WRITE)),
+                  VERR_INVALID_PARAMETER);
+    AssertReturn(fAccess, VERR_INVALID_PARAMETER);
+    RT_ASSERT_PREEMPTIBLE();
+
+    RT_NOREF_PV(pszTag);
+
+    /* do the locking. */
+    return rtR0MemObjNativeLockUser(pMemObj, R3PtrAligned, cbAligned, fAccess, R0Process);
+    
+} +RT_EXPORT_SYMBOL(RTR0MemObjLockUserTag);
+
+ +RTR0DECL(int) RTR0MemObjLockKernelTag(PRTR0MEMOBJ pMemObj, void *pv, size_t cb, uint32_t fAccess, const char *pszTag)
+ +{
+    /* sanity checks. */
+    const size_t cbAligned = RT_ALIGN_Z(cb + ((uintptr_t)pv & PAGE_OFFSET_MASK), PAGE_SIZE);
+    void * const pvAligned = (void *)((uintptr_t)pv & ~(uintptr_t)PAGE_OFFSET_MASK);
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;
+    AssertReturn(cb > 0, VERR_INVALID_PARAMETER);
+    AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+    AssertPtrReturn(pvAligned, VERR_INVALID_POINTER);

AssertReturn(!(fAccess & ~(RTMEM_PROT_READ | RTMEM_PROT_WRITE)), VERR_INVALID_PARAMETER);  
AssertReturn(fAccess, VERR_INVALID_PARAMETER);  
RT_ASSERT_PREEMPTIBLE();  
RT_NOREF_PV(pszTag);  
/* do the allocation. */  
return rtR0MemObjNativeLockKernel(pMemObj, pvAligned, cbAligned, fAccess);  
}  
+RT_EXPORT_SYMBOL(RTR0MemObjLockKernelTag);  
+  
+RTR0DECL(int) RTR0MemObjAllocPhysTag(PRTR0MEMOBJ pMemObj, size_t cb, RTHCPHYS PhysHighest, const char *pszTag)  
+{  
  /* sanity checks. */  
  const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);  
  AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);  
  *pMemObj = NIL_RTR0MEMOBJ;  
  AssertReturn(cb > 0, VERR_INVALID_PARAMETER);  
  AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);  
  AssertReturn(PhysHighest >= cb, VERR_INVALID_PARAMETER);  
  RT_ASSERT_PREEMPTIBLE();  
  RT_NOREF_PV(pszTag);  
  /* do the allocation. */  
  return rtR0MemObjNativeAllocPhys(pMemObj, cbAligned, PhysHighest, PAGE_SIZE /* page aligned */);  
}  
+RT_EXPORT_SYMBOL(RTR0MemObjAllocPhysTag);  
+  
+RTR0DECL(int) RTR0MemObjAllocPhysExTag(PRTR0MEMOBJ pMemObj, size_t cb, RTHCPHYS PhysHighest, size_t uAlignment, const char *pszTag)  
+{  
  /* sanity checks. */  
  const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);  
  AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);  
  *pMemObj = NIL_RTR0MEMOBJ;  
  AssertReturn(cb > 0, VERR_INVALID_PARAMETER);  
  AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);  
  AssertReturn(PhysHighest >= cb, VERR_INVALID_PARAMETER);  
  if (uAlignment == 0)  
    uAlignment = PAGE_SIZE;  
  AssertReturn(uAlignment == PAGE_SIZE,  
    uAlignment == _2M  
    uAlignment == _4M)
+     uAlignment == _1G,
+  VERR_INVALID_PARAMETER);  
+  if HC_ARCH_BITS == 32  
+    /* Memory allocated in this way is typically mapped into kernel space as well; simply  
+       don't allow this on 32 bits hosts as the kernel space is too crowded already. */  
+    if (uAlignment != PAGE_SIZE)  
+      return VERR_NOT_SUPPORTED;  
+#endif
+  RT_ASSERT_PREEMPTIBLE();  
+  RT_NOREF_PV(pszTag);  
+  /* do the allocation. */  
+  return rtR0MemObjNativeAllocPhys(pMemObj, cbAligned, PhysHighest, uAlignment);  
+}  
+RT_EXPORT_SYMBOL(RTR0MemObjAllocPhysExTag);  
+  
+RTR0DECL(int) RTR0MemObjAllocPhysNCTag(PRTR0MEMOBJ pMemObj, size_t cb, RTHCPHYS PhysHighest, const char *pszTag)  
+{  
+  /* sanity checks. */  
+  const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);  
+  AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);  
+  *pMemObj = NIL_RTR0MEMOBJ;  
+  AssertReturn(cb > 0, VERR_INVALID_PARAMETER);  
+  AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);  
+  AssertReturn(PhysHighest >= cb, VERR_INVALID_PARAMETER);  
+  RT_ASSERT_PREEMPTIBLE();  
+  RT_NOREF_PV(pszTag);  
+  /* do the allocation. */  
+  return rtR0MemObjNativeAllocPhysNC(pMemObj, cbAligned, PhysHighest);  
+}  
+RT_EXPORT_SYMBOL(RTR0MemObjAllocPhysNCTag);  
+  
+RTR0DECL(int) RTR0MemObjEnterPhysTag(PRTR0MEMOBJ pMemObj, RTHCPHYS Phys, size_t cb, uint32_t uCachePolicy, const char *pszTag)  
+{  
+  /* sanity checks. */  
+  const size_t cbAligned = RT_ALIGN_Z(cb + (Phys & PAGE_OFFSET_MASK), PAGE_SIZE);  
+  const RTHCPHYS PhysAligned = Phys & ~(RTHCPHYS)PAGE_OFFSET_MASK;  
+  AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);  
+  *pMemObj = NIL_RTR0MEMOBJ;  
+  AssertReturn(cb > 0, VERR_INVALID_PARAMETER);  
+  AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+    AssertReturn(Phys != NIL_RTHCPHYS, VERR_INVALID_PARAMETER);
+    AssertReturn( uCachePolicy == RTMEM_CACHE_POLICY_DONT_CARE
+                  || uCachePolicy == RTMEM_CACHE_POLICY_MMIO,
+                  VERR_INVALID_PARAMETER);
+    RT_ASSERT_PREEMPTIBLE();
+
+    RT_NOREF_PV(pszTag);
+
+    /* do the allocation. */
+    return rtR0MemObjNativeEnterPhys(pMemObj, PhysAligned, cbAligned, uCachePolicy);
+}
+RT_EXPORT_SYMBOL(RTR0MemObjEnterPhysTag);
+
+
+RTR0DECL(int) RTR0MemObjReserveKernelTag(PRTR0MEMOBJ pMemObj, void *pvFixed, size_t cb, size_t uAlignment, const char *pszTag)
+{
+    /* sanity checks. */
+    const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;
+    if (uAlignment == 0)
+        uAlignment = PAGE_SIZE;
+    AssertReturn(uAlignment == PAGE_SIZE || uAlignment == _2M || uAlignment == _4M,
+                  VERR_INVALID_PARAMETER);
+    AssertReturn(cb > 0, VERR_INVALID_PARAMETER);
+    AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+    if (pvFixed != (void *)-1)
+        AssertReturn(!((uintptr_t)pvFixed & (uAlignment - 1)), VERR_INVALID_PARAMETER);
+    RT_ASSERT_PREEMPTIBLE();
+
+    RT_NOREF_PV(pszTag);
+
+    /* do the reservation. */
+    return rtR0MemObjNativeReserveKernel(pMemObj, pvFixed, cbAligned, uAlignment);
+}
+RT_EXPORT_SYMBOL(RTR0MemObjReserveKernelTag);
+
+
+RTR0DECL(int) RTR0MemObjReserveUserTag(PRTR0MEMOBJ pMemObj, RTR3PTR R3PtrFixed, size_t cb,
+                                        size_t uAlignment, RTR0PROCESS R0Process, const char *pszTag)
+{
+    /* sanity checks. */
+    const size_t cbAligned = RT_ALIGN_Z(cb, PAGE_SIZE);
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;
+    if (uAlignment == 0)
+        uAlignment = PAGE_SIZE;
+ AssertReturn(uAlignment == PAGE_SIZE || uAlignment == _2M || uAlignment == _4M, VERR_INVALID_PARAMETER);
+ AssertReturn(cb > 0, VERR_INVALID_PARAMETER);
+ AssertReturn(cb <= cbAligned, VERR_INVALID_PARAMETER);
+ if (R3PtrFixed != (RTR3PTR)-1)
   + AssertReturn(!(R3PtrFixed & (uAlignment - 1)), VERR_INVALID_PARAMETER);
+ if (R0Process == NIL_RTR0PROCESS)
   + R0Process = RTR0ProcHandleSelf();
+ RT_ASSERT_PREEMPTIBLE();
+
+ RT_NOREF_PV(pszTag);
+
+ /* do the reservation. */
+ return rtR0MemObjNativeReserveUser(pMemObj, R3PtrFixed, cbAligned, uAlignment, R0Process);
+}
+RT_EXPORT_SYMBOL(RTR0MemObjReserveUserTag);
+
+RTR0DECL(int) RTR0MemObjMapKernelTag(PRTR0MEMOBJ pMemObj, RTR0MEMOBJ MemObjToMap, void *pvFixed,
+                                     size_t uAlignment, unsigned fProt, const char *pszTag)
+{
+    return RTR0MemObjMapKernelExTag(pMemObj, MemObjToMap, pvFixed, uAlignment, fProt, 0, 0, pszTag);
+}
+RT_EXPORT_SYMBOL(RTR0MemObjMapKernelTag);
+
+RTR0DECL(int) RTR0MemObjMapKernelExTag(PRTR0MEMOBJ pMemObj, RTR0MEMOBJ MemObjToMap, void *pvFixed, size_t uAlignment,
+                                       unsigned fProt, size_t offSub, size_t cbSub, const char *pszTag)
+{
+    PRTR0MEMOBJINTERNAL pMemToMap;
+    PRTR0MEMOBJINTERNAL pNew;
+    int                 rc;
+
+    /* sanity checks. */
+    AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
+    *pMemObj = NIL_RTR0MEMOBJ;
+    AssertPtrReturn(MemObjToMap, VERR_INVALID_HANDLE);
+    pMemToMap = (PRTR0MEMOBJINTERNAL)MemObjToMap;
+    AssertReturn(pMemToMap->u32Magic == RTR0MEMOBJ_MAGIC, VERR_INVALID_HANDLE);
+    AssertReturn(pMemToMap->enmType > RTR0MEMOBJTYPE_INVALID && pMemToMap->enmType < RTR0MEMOBJTYPE_END, VERR_INVALID_HANDLE);
+    AssertReturn(!rtR0MemObjIsMapping(pMemToMap), VERR_INVALID_PARAMETER);
+    AssertReturn(pMemToMap->enmType != RTR0MEMOBJTYPE_RES_VIRT, VERR_INVALID_PARAMETER);
+    if (uAlignment == 0)
+        uAlignment = PAGE_SIZE;
RT_ASSERT_PREEMPTIBLE();

/* adjust the request to simplify the native code. */
if (offSub == 0 && cbSub == pMemToMap->cb)
    cbSub = 0;

/* do the mapping. */
rc = rtROMemObjNativeMapKernel(&pNew, pMemToMap, pvFixed, uAlignment, fProt, offSub, cbSub);
if (RT_SUCCESS(rc))
    {
        /* link it. */
        rc = rtROMemObjLink(pMemToMap, pNew);
        if (RT_SUCCESS(rc))
            {*pMemObj = pNew;
            } else
                { /* damn, out of memory. bail out. */
                    int rc2 = rtROMemObjNativeFree(pNew);
                    AssertRC(rc2);
                    pNew->u32Magic++;
                    pNew->enmType = RTR0MEMOBJTYPE_END;
                    RTMemFree(pNew);
                }
        } return rc;
    +RT_EXPORT_SYMBOL(RTR0MemObjMapKernelExTag);

+RTR0DECL(int) RTR0MemObjMapUserTag(PRTR0MEMOBJ pMemObj, RTR0MEMOBJ MemObjToMap, RTR3PTR R3PtrFixed,
    +size_t uAlignment, unsigned fProt, RTR0PROCESS R0Process, const char *pszTag)
/* sanity checks. */
PRTR0MEMOBJINTERNAL pMemToMap;
PRTR0MEMOBJINTERNAL pNew;
int rc;

AssertPtrReturn(pMemObj, VERR_INVALID_POINTER);
pMemToMap = (PRTR0MEMOBJINTERNAL)MemObjToMap;
*pMemObj = NIL_RTR0MEMOBJ;

AssertPtrReturn(MemObjToMap, VERR_INVALID_HANDLE);

AssertReturn(pMemToMap->u32Magic == RTR0MEMOBJ_MAGIC, VERR_INVALID_HANDLE);

AssertReturn(pMemToMap->enmType > RTR0MEMOBJTYPE_INVALID && pMemToMap->enmType <
RTR0MEMOBJTYPE_END, VERR_INVALID_HANDLE);

AssertReturn(!rtR0MemObjIsMapping(pMemToMap), VERR_INVALID_PARAMETER);

AssertReturn(pMemToMap->enmType != RTR0MEMOBJTYPE_RES_VIRT,
VERR_INVALID_PARAMETER);

if (uAlignment == 0)
    uAlignment = PAGE_SIZE;

AssertReturn(uAlignment == PAGE_SIZE || uAlignment == _2M || uAlignment == _4M,
VERR_INVALID_PARAMETER);

if (R3PtrFixed != (RTR3PTR)-1)
    AssertReturn(!(R3PtrFixed & (uAlignment - 1)), VERR_INVALID_PARAMETER);

AssertReturn(fProt != RTMEM_PROT_NONE, VERR_INVALID_PARAMETER);

AssertReturn(!(fProt & ~(RTMEM_PROT_READ | RTMEM_PROT_WRITE | RTMEM_PROT_EXEC)),
VERR_INVALID_PARAMETER);

if (R0Process == NIL_RTR0PROCESS)
    R0Process = RTR0ProcHandleSelf();

RT_ASSERT_PREEMPTIBLE();

RT_NOREF_PV(pszTag);

/* do the mapping. */
rc = rtR0MemObjNativeMapUser(&pNew, pMemToMap, R3PtrFixed, uAlignment, fProt, R0Process);
if (RT_SUCCESS(rc))
    { /* link it. */
        rc = rtR0MemObjLink(pMemToMap, pNew);
        if (RT_SUCCESS(rc))
            *pMemObj = pNew;
        else
            { /* damn, out of memory. bail out. */
                int rc2 = rtR0MemObjNativeFree(pNew);
                AssertRC(rc2);

                pNew->u32Magic++;

                pNew->enmType = RTR0MEMOBJTYPE_END;

                RTMemFree(pNew);
            }
    }
}
+ return rc;
+
+} /* sanity checks */
+ pMemObj = (PRTR0MEMOBJINTERNAL)hMemObj;
+ AssertPtrReturn(pMemObj, VERR_INVALID_HANDLE);
+ AssertReturn(pMemObj->u32Magic == RTR0MEMOBJ_MAGIC, VERR_INVALID_HANDLE);
+ AssertReturn(pMemObj->enmType > RTR0MEMOBJTYPE_INVALID && pMemObj->enmType <
RTR0MEMOBJTYPE_END, VERR_INVALID_HANDLE);
+ AssertReturn(rtR0MemObjIsProtectable(pMemObj), VERR_INVALID_PARAMETER);
+ AssertReturn(!(offSub & PAGE_OFFSET_MASK), VERR_INVALID_PARAMETER);
+ AssertReturn(offSub < pMemObj->cb, VERR_INVALID_PARAMETER);
+ AssertReturn(!(cbSub & PAGE.Offset_MASK), VERR_INVALID_PARAMETER);
+ AssertReturn(cbSub <= pMemObj->cb, VERR_INVALID_PARAMETER);
+ AssertReturn(offSub + cbSub <= pMemObj->cb, VERR_INVALID_PARAMETER);
+ AssertReturn(!(fProt & ~((RTMEM_PROT_NONE | RTMEM_PROT_READ | RTMEM_PROT_WRITE |
RTMEM_PROT_EXEC)), VERR_INVALID_PARAMETER);
+ RT_ASSERT_PREEMPTIBLE();
+
+ /* do the job */
+ rc = rtR0MemObjNativeProtect(pMemObj, offSub, cbSub, fProt);
+ if (RT_SUCCESS(rc))
+     pMemObj->fFlags |= RTR0MEMOBJ_FLAGS_PROT_CHANGED; /* record it */
+
+ return rc;
+
+} /* RTR0DECL(int) RTR0MemObjProtect(RTR0MEMOBJ hMemObj, size_t offSub, size_t cbSub, uint32_t fProt) */
+

--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/mp-r0drv.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/mp-r0drv.h
@@ -0,0 +1,82 @@
+/* $Id: mp-r0drv.h $ */
+/** @file
+ * IPRT - Multiprocessor, Ring-0 Driver, Internal Header.
+ */
+/
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */

+#ifndef ___r0drv_mp_r0drv_h
+#define ___r0drv_mp_r0drv_h
+
+#include <iprt/mp.h>
+
+RT_C_DECLS_BEGIN
+
+/**
+ * MP callback
+ *
+ */
+typedef DECLCALLBACK(void) FNMPWORKER(RTCPUID idCpu, void *pvUser1, void *pvUser2);
+/** Pointer to a FNMPWORKER(). */
+typedef FNMPWORKER *PFNMPWORKER;
+
+/**
+ * RTMpOn* argument packet used by the host specific callback
+ * wrapper functions.
+ */
+typedef struct RTMPARGS 
+{ 
+    PFNMPWORKER pfnWorker;
+    void      *pvUser1;
+    void      *pvUser2;
+    RTCPUID    idCpu;
+    RTCPUID    idCpu2;
+    uint32_t   volatile cHits;
+}
+
+ifdef RT_OS_WINDOWS
+ /** Turns out that KeFlushQueuedDpcs doesn't necessarily wait till all
+ * callbacks are done. So, do reference counting to make sure we don't free
+ * this structure before all CPUs have completely handled their requests. */
+ int32_t volatile cRefs;
+#endif
+#ifdef RT_OS_LINUX
+  PRTCPUSET pWorkerSet;
+#endif
+} RTMPARGS;
+/** Pointer to a RTMpOn* argument packet. */
+typedef RTMPARGS *PRTMPARGS;
+
+/* Called from initterm-r0drv.cpp: */
+DECLHIDDEN(int) rtR0MpNotificationInit(void);
+DECLHIDDEN(void) rtR0MpNotificationTerm(void);
+
+/* The following is only relevant when using mpnotification-r0drv.cpp: */
+DECLHIDDEN(int) rtR0MpNotificationNativeInit(void);
+DECLHIDDEN(void) rtR0MpNotificationNativeTerm(void);
+DECLHIDDEN(void) rtMpNotificationDoCallbacks(RTMPEVENT enmEvent, RTCPUID idCpu);
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/mpnotification-r0drv.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/mpnotification-r0drv.c
@@ -0,0 +1,322 @@
+/* $Id: mpnotification-r0drv.c $ */
+/** @file
+ * IPRT - Multiprocessor, Ring-0 Driver, Event Notifications.
+ */
+/*
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+ *
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terms and conditions of either the GPL or the CDDL or both.

/*
 */

/********************************************************
******/

Header Files

/********************************************************
******/

#include <iprt/mp.h>
#include "internal/iprt.h"
+#include <iprt/asm.h>
+#include <iprt/asm-amd64-x86.h>
+#include <iprt/err.h>
+#include <iprt/mem.h>
+#include <iprt/spinlock.h>
+#include <iprt/string.h>
+#include "r0drv/mp-r0drv.h"
+

/********************************************************
******/

 Structures and Typedefs

/********************************************************
******/

typedef struct RTMPNOTIFYREG
{
    /** Pointer to the next record. */
    struct RTMPNOTIFYREG *volatile pNext;
    /** The callback. */
    PFNRTMPNOTIFICATION pfnCallback;
    /** The user argument. */
    void *pvUser;
    /** Bit mask indicating whether we've done this callback or not. */
    uint8_t bmDone[sizeof(void *)];
} RTMPNOTIFYREG;
/** Pointer to a registration record. */
typedef RTMPNOTIFYREG *PRTMPNOTIFYREG;

/**
 * Global Variables

 **/ The spinlock protecting the list. */
static RTSPINLOCK volatile g_hRTMpNotifySpinLock = NIL_RTSPINLOCK;
/** List of callbacks, in registration order. */
static PRTMPNOTIFYREG volatile g_pRTMpCallbackHead = NULL;
/** The current done bit. */
static uint32_t volatile g_iRTMpDoneBit;
/** The list generation.
 * This is increased whenever the list has been modified. The callback routine
 * make use of this to avoid having restart at the list head after each callback. */
static uint32_t volatile g_iRTMpGeneration;

/** This is called by the native code.
 *
 * @param   idCpu           The CPU id the event applies to.
 * @param   enmEvent        The event.
 */
DECLHIDDEN(void) rtMpNotificationDoCallbacks(RTMPEVENT enmEvent, RTCPUID idCpu)
{
    PRTMPNOTIFYREG  pCur;
    RTSPINLOCK      hSpinlock;

    /*
     * This is a little bit tricky as we cannot be holding the spinlock
     * while calling the callback. This means that the list might change
     * while we're walking it, and that multiple events might be running
     * concurrently (depending on the OS).
     *
     * So, the first measure is to employ a 32-bitmask for each
     * record where we'll use a bit that rotates for each call to
     * this function to indicate which records that has been
     * processed. This will take care of both changes to the list
     * and a reasonable amount of concurrent events.
     *
     * In order to avoid having to restart the list walks for every
     * callback we make, we'll make use a list generation number that is

+ * incremented everytime the list is changed. So, if it remains
+ * unchanged over a callback we can safely continue the iteration.
+ */
+ uint32_t iDone = ASMAAtomicIncU32(&g_iRTMpDoneBit);
+ iDone %= RT_SIZEOFMEMB(RTMPNOTIFYREG, bmDone) * 8;
+ 
+ hSpinlock = g_hRTMpNotifySpinLock;
+ if (hSpinlock == NIL_RTSPINLOCK)
+     return;
+ 
+ /* Clear the bit. */
+ for (pCur = g_pRTMpCallbackHead; pCur; pCur = pCur->pNext)
+     ASMAAtomicBitClear(&pCur->bmDone[0], iDone);
+ 
+ /* Iterate the records and perform the callbacks. */
+ do
+     { 
+         uint32_t const iGeneration = ASMAAtomicUoReadU32(&g_iRTMpGeneration);
+         
+         pCur = g_pRTMpCallbackHead;
+         while (pCur)
+             { 
+                 if (!ASMAtomicBitTestAndSet(&pCur->bmDone[0], iDone))
+                     { 
+                         PFNRTMPNOTIFICATION pfnCallback = pCur->pfnCallback;
+                         void *pvUser = pCur->pvUser;
+                         pCur = pCur->pNext;
+                         RTSpinlockRelease(g_hRTMpNotifySpinLock);
+                         
+                         pfnCallback(enmEvent, idCpu, pvUser);
+                         
+                         /* carefully require the lock here, see RTR0MpNotificationTerm(). */
+                         hSpinlock = g_hRTMpNotifySpinLock;
+                         if (hSpinlock == NIL_RTSPINLOCK)
+                             return;
+                         RTSpinlockAcquire(hSpinlock);
+                         if (ASMAtomicUoReadU32(&g_iRTMpGeneration) != iGeneration)
+                             break;
+                     }
+                     else
+                         pCur = pCur->pNext;
+             }
+     } while (pCur);
+ 
+ RTSpinlockRelease(hSpinlock);
+RTDECL(int) RTMpNotificationRegister(PFNRTMPNOTIFICATION pfnCallback, void *pvUser)
+
    PRTMPNOTIFYREG  pCur;
    PRTMPNOTIFYREG  pNew;

    /*
    * Validation.
    */
    AssertPtrReturn(pfnCallback, VERR_INVALID_POINTER);
    AssertReturn(g_hRTMpNotifySpinLock != NIL_RTSPINLOCK, VERR_WRONG_ORDER);
    RT_ASSERT_PREEMPTIBLE();

    RTSpinlockAcquire(g_hRTMpNotifySpinLock);
    for (pCur = g_pRTMpCallbackHead; pCur; pCur = pCur->pNext)
        if (    pCur->pvUser == pvUser
            &&  pCur->pfnCallback == pfnCallback)
            break;
    RTSpinlockRelease(g_hRTMpNotifySpinLock);
    AssertMsgReturn(!pCur, (“pCur=%p pfnCallback=%p pvUser=%p
”, pCur, pfnCallback, pvUser),
VERR_ALREADY_EXISTS);

    /*
    * Allocate a new record and attempt to insert it.
    */
    pNew = (PRTMPNOTIFYREG)RTMemAlloc(sizeof(*pNew));
    if (!pNew)
        return VERR_NO_MEMORY;

    pNew->pNext = NULL;
    pNew->pfnCallback = pfnCallback;
    pNew->pvUser = pvUser;
    memset(&pNew->bmDone[0], 0xff, sizeof(pNew->bmDone));
    RTSpinlockAcquire(g_hRTMpNotifySpinLock);

    pCur = g_pRTMpCallbackHead;
    if (!pCur)
        g_pRTMpCallbackHead = pNew;
    else
        {
            for (pCur = g_pRTMpCallbackHead; ; pCur = pCur->pNext)
                if (    pCur->pvUser == pvUser
                    &&  pCur->pfnCallback == pfnCallback)
                    break;
            else if (!pCur->pNext)
            {


pCur->pNext = pNew;
    pCur = NULL;
    break;
  }
}

ASMAtomicIncU32(&g_iRTMpGeneration);
RTSpinlockRelease(g_hRTMpNotifySpinLock);
/* duplicate? */
if (pCur)
{
    RTMemFree(pCur);
    AssertMsgFailedReturn("pCur=%p pfnCallback=%p pvUser=%p\n", pCur, pfnCallback, pvUser), VERR_ALREADY_EXISTS);
}

return VINF_SUCCESS;
}

RTDECL(int) RTMpNotificationDeregister(PFNRTMPNOTIFICATION pfnCallback, void *pvUser)
{
    PRTMPNOTIFYREG  pPrev;
    PRTMPNOTIFYREG  pCur;

    /*
    * Validation.
    */
    AssertPtrReturn(pfnCallback, VERR_INVALID_POINTER);
    AssertReturn(g_hRTMpNotifySpinLock != NIL_RTSPINLOCK, VERR_WRONG_ORDER);
    RT_ASSERT_INTS_ON();

    /*
    * Find and unlink the record from the list.
    */
    RTSpinlockAcquire(g_hRTMpNotifySpinLock);
    pPrev = NULL;
    for (pCur = g_pRTMpCallbackHead; pCur; pCur = pCur->pNext)
    {
        if (    pCur->pvUser == pvUser
            &&  pCur->pfnCallback == pfnCallback)
            break;
        pPrev = pCur;
    }
    if (pCur)
{  
if (pPrev)
    pPrev->pNext = pCur->pNext;
else
    g_pRTMpCallbackHead = pCur->pNext;
    ASMAtomicIncU32(&g_iRTMpGeneration);
}
RTSpinlockRelease(g_hRTMpNotifySpinLock);

if (!pCur)
    return VERR_NOT_FOUND;

/*
 * Invalidate and free the record.
 */
pCur->pNext = NULL;
pCur->pfnCallback = NULL;
RTMemFree(pCur);

return VINF_SUCCESS;
}
+RT_EXPORT_SYMBOL(RTMpNotificationDeregister);
+
+DECLHIDDEN(int) rtR0MpNotificationInit(void)
{  
int rc = RTSpinlockCreate((PRTSPINLOCK)&g_hRTMpNotifySpinLock,
RTSPINLOCK_FLAGS_INTERRUPT_SAFE, "RTR0Mp");
+    if (RT_SUCCESS(rc))
+    {
+        rc = rtR0MpNotificationNativeInit();
+        if (RT_SUCCESS(rc))
+            return rc;
+        RTSpinlockDestroy(g_hRTMpNotifySpinLock);
+        g_hRTMpNotifySpinLock = NIL_RTSPINLOCK;
+    }
+    return rc;
+}
+
+DECLHIDDEN(void) rtR0MpNotificationTerm(void)
{  
PRTMPNOTIFYREG  pHead;
RTSPINLOCK     hSpinlock = g_hRTMpNotifySpinLock;
+    AssertReturnVoid(hSpinlock != NIL_RTSPINLOCK);
+    rtR0MpNotificationNativeTerm();
+ /* pick up the list and the spinlock. */
+    RTSpinlockAcquire(hSpinlock);
+    ASMAtomicWriteHandle(&g_hRTMpNotifySpinLock, NIL_RTSPINLOCK);
+    pHead = g_pRTMpCallbackHead;
+    g_pRTMpCallbackHead = NULL;
+    ASMAtomicIncU32(&g_iRTMpGeneration);
+    RTSpinlockRelease(hSpinlock);
+
+ /* free the list. */
+ while (pHead)
+ {
+     PRTMPNOTIFYREG pFree = pHead;
+     pHead = pHead->pNext;
+
+     pFree->pNext = NULL;
+     pFree->pfnCallback = NULL;
+     RTMemFree(pFree);
+ }
+
+ RTSpinlockDestroy(hSpinlock);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/power-r0drv.h
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/power-r0drv.h
@@ -0,0 +1,41 @@
+/* $Id: power-r0drv.h $ */
+/** @file
+ * IPRT - Power Management, Ring-0 Driver, Internal Header.
+ */
+
+/* Copyright (C) 2008-2017 Oracle Corporation
+ *
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+ * CDDL are applicable instead of those of the GPL.
+ */
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef ___r0drv_powermgt_r0drv_h
+ #define ___r0drv_powermgt_r0drv_h
+
+ #include <iprt/power.h>
+
+ RT_C_DECLS_BEGIN
+
+ /* Called from initterm-r0drv.cpp: */
+ DECLHIDDEN(int) rtR0PowerNotificationInit(void);
+ DECLHIDDEN(void) rtR0PowerNotificationTerm(void);
+
+ RT_C_DECLS_END
+
+ endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/r0drv/powernotification-r0drv.c
+++ linux-4.15.0/ubuntu/vbox/vboxguest/r0drv/powernotification-r0drv.c
@@ -0,0 +1,318 @@
+ /* $Id: powernotification-r0drv.c $ */
+ /** @file
+ * IPRT - Power Management, Ring-0 Driver, Event Notifications.
+ */
+
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+ 
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
/**
 * Notification registration record tracking
 * RTPowerRegisterNotification() calls.
 */

typedef struct RTPOWERNOTIFYREG
{
    /** Pointer to the next record. */
    struct RTPOWERNOTIFYREG *volatile pNext;
    /** The callback. */
    PFNRTPOWERNOTIFICATION pfnCallback;
    /** The user argument. */
    void *pvUser;
    /** Bit mask indicating whether we’ve done this callback or not. */
    uint8_t bmDone[sizeof(void *)];
} RTPowerNotifyReg;
### Global Variables

**The spinlock protecting the list.**

```c
static RTSPINLOCK volatile g_hRTPowerNotifySpinLock = NIL_RTSPINLOCK;
```

**List of callbacks, in registration order.**

```c
static PRTPOWERNOTIFYREG volatile g_pRTPowerCallbackHead = NULL;
```

**The current done bit.**

```c
static uint32_t volatile g_iRTPowerDoneBit;
```

**The list generation.**

+ This is increased whenever the list has been modified. The callback routine make use of this to avoid having restart at the list head after each callback.

```c
static uint32_t volatile g_iRTPowerGeneration;
```

```c
RTDECL(int) RTPowerSignalEvent(RTPOWEREVENT enmEvent)
{
    PRTPOWERNOTIFYREG pCur;
    RTSPINLOCK hSpinlock;

    /* This is a little bit tricky as we cannot be holding the spinlock while calling the callback. This means that the list might change while we're walking it, and that multiple events might be running concurrently (depending on the OS).
    + So, the first measure is to employ a 32-bitmask for each record where we'll use a bit that rotates for each call to this function to indicate which records that has been processed. This will take care of both changes to the list and a reasonable amount of concurrent events.
    + In order to avoid having to restart the list walks for every callback we make, we'll make use a list generation number that is incremented everytime the list is changed. So, if it remains unchanged over a callback we can safely continue the iteration.
    */
    uint32_t iDone = ASMAtomicIncU32(&g_iRTPowerDoneBit);
    iDone %= RT_SIZEOFMEMB(RTPOWERNOTIFYREG, bmDone) * 8;

    hSpinlock = g_hRTPowerNotifySpinLock;
    if (hSpinlock == NIL_RTSPINLOCK)
        return VERR_ACCESS_DENIED;
    RTSpinlockAcquire(hSpinlock);
```
/* Clear the bit. */
for (pCur = g_pRTPowerCallbackHead; pCur; pCur = pCur->pNext)
    ASMAtomicBitClear(&pCur->bmDone[0], iDone);

/* Iterate the records and perform the callbacks. */
do {
    uint32_t const iGeneration = ASMAtomicUoReadU32(&g_iRTPowerGeneration);
    pCur = g_pRTPowerCallbackHead;
    while (pCur)
    {
        if (!ASMAtomicBitTestAndSet(&pCur->bmDone[0], iDone))
            {
                PFNRTPOWERNOTIFICATION pfnCallback = pCur->pfnCallback;
                void *pvUser = pCur->pvUser;
                pCur = pCur->pNext;
                RTSpinlockRelease(g_hRTPowerNotifySpinLock);
                pfnCallback(enmEvent, pvUser);
                /* carefully require the lock here, see RTR0MpNotificationTerm(). */
                hSpinlock = g_hRTPowerNotifySpinLock;
                if (hSpinlock == NIL_RTSPINLOCK)
                    return VERR_ACCESS_DENIED;
                RTSpinlockAcquire(hSpinlock);
                if (ASMAtomicUoReadU32(&g_iRTPowerGeneration) != iGeneration)
                    break;
            }
        else
            pCur = pCur->pNext;
    }
} while (pCur);

RTSpinlockRelease(hSpinlock);
return VINF_SUCCESS;

RT_EXPORT_SYMBOL(RTPowerSignalEvent);

RTDECL(int) RTPowerNotificationRegister(PFNRTPOWERNOTIFICATION pfnCallback, void *pvUser)
{
    PRTPOWERNOTIFYREG pCur;
    PRTPOWERNOTIFYREG pNew;

    /* Validation.
    */
+ AssertPtrReturn(pfnCallback, VERR_INVALID_POINTER);
+ AssertReturn(g_hRTPowerNotifySpinLock != NIL_RTSPINLOCK, VERR_WRONG_ORDER);
+ RT_ASSERT_PREEMPTIBLE();
+
+ RTSpinlockAcquire(g_hRTPowerNotifySpinLock);
+ for (pCur = g_pRTPowerCallbackHead; pCur; pCur = pCur->pNext)
+   if (    pCur->pvUser == pvUser
+       &&  pCur->pfnCallback == pfnCallback)
+     break;
+ RTSpinlockRelease(g_hRTPowerNotifySpinLock);
+ AssertMsgReturn(!pCur, (“pCur=%p pfnCallback=%p pvUser=%p
”, pCur, pfnCallback, pvUser), VERR_ALREADY_EXISTS);
+
+ /*
+ * Allocate a new record and attempt to insert it.
+ */
+ pNew = (PRTPOWERNOTIFYREG)RTMemAlloc(sizeof(*pNew));
+ if (!pNew)
+   return VERR_NO_MEMORY;
+
+ pNew->pNext = NULL;
+ pNew->pfnCallback = pfnCallback;
+ pNew->pvUser = pvUser;
+ memset(&pNew->bmDone[0], 0xff, sizeof(pNew->bmDone));
+
+ RTSpinlockAcquire(g_hRTPowerNotifySpinLock);
+ pCur = g_pRTPowerCallbackHead;
+ if (!pCur)
+   g_pRTPowerCallbackHead = pNew;
+ else
+ {  
+   for (pCur = g_pRTPowerCallbackHead; ; pCur = pCur->pNext)
+     if (    pCur->pvUser == pvUser
+         &&  pCur->pfnCallback == pfnCallback)
+       break;
+     else if (!pCur->pNext)
+       {  
+         pCur->pNext = pNew;
+         pCur = NULL;
+         break;
+       }
+   }
+
+ ASMAtomicIncU32(&g_iRTPowerGeneration);
+
+ RTSpinlockRelease(g_hRTPowerNotifySpinLock);
if (pCur) {
    RTMemFree(pCur);
    AssertMsgFailedReturn("pCur=%p pfnCallback=%p pvUser=%p\n", pCur, pfnCallback, pvUser), VERR_ALREADY_EXISTS);
}
return VINF_SUCCESS;

RTDECL(int) RTPowerNotificationDeregister(PFNRTPOWERNOTIFICATION pfnCallback, void *pvUser)
{
    PRTPOWERNOTIFYREG   pPrev;
    PRTPOWERNOTIFYREG   pCur;

    /* Validation.
     */
    AssertPtrReturn(pfnCallback, VERR_INVALID_POINTER);
    AssertReturn(g_hRTPowerNotifySpinLock != NIL_RTSPINLOCK, VERR_WRONG_ORDER);
    RT_ASSERT_INTS_ON();

    /* Find and unlink the record from the list.
     */
    RTSpinlockAcquire(g_hRTPowerNotifySpinLock);
    pPrev = NULL;
    for (pCur = g_pRTPowerCallbackHead; pCur; pCur = pCur->pNext)
    {
        if (    pCur->pvUser == pvUser
            &&  pCur->pfnCallback == pfnCallback)
            break;
        pPrev = pCur;
    }
    if (pCur)
    {
        if (pPrev)
            pPrev->pNext = pCur->pNext;
        else
            g_pRTPowerCallbackHead = pCur->pNext;
        ASMAtomicIncU32(&g_iRTPowerGeneration);
    }
    RTSpinlockRelease(g_hRTPowerNotifySpinLock);
    if (!pCur)
return VERR_NOT_FOUND;
/
*/
pCur->pNext = NULL;
pCur->pfnCallback = NULL;
RTMemFree(pCur);
return VINF_SUCCESS;
}
+RT_EXPORT_SYMBOL(RTPowerNotificationDeregister);
+
+DECLHIDDEN(int) rtR0PowerNotificationInit(void)
+
+
+DECLHIDDEN(void) rtR0PowerNotificationTerm(void)
+
+PRTPOWERNOTIFYREG pHead;
+RTSPINLOCK hSpinlock = g_hRTPowerNotifySpinLock;
+AssertReturnVoid(hSpinlock != NIL_RTSPINLOCK);
+/
*/ @todo OS specific init here */
+ return rc;
+#if 0
+RTSpinlockDestroy(g_hRTPowerNotifySpinLock);
+g_hRTPowerNotifySpinLock = NIL_RTSPINLOCK;
+#endif
+
+
+DECLHIDDEN(void) rtR0PowerNotificationTerm(void)
+
+PRTPOWERNOTIFYREG pHead;
+RTSPINLOCK hSpinlock = g_hRTPowerNotifySpinLock;
+AssertReturnVoid(hSpinlock != NIL_RTSPINLOCK);
+
+ /* pick up the list and the spinlock. */
+RTSpinlockAcquire(hSpinlock);
+ASMAtomicWriteHandle(&g_hRTPowerNotifySpinLock, NIL_RTSPINLOCK);
+pHead = g_pRTPowerCallbackHead;
+g_pRTPowerCallbackHead = NULL;
+ASMAtomicIncU32(&g_iRTPowerGeneration);
+RTSpinlockRelease(hSpinlock);
+
+ /* free the list. */
```c
while (pHead)
{
    PRTPWERNOTIFYREG pFree = pHead;
    pHead = pHead->pNext;

    pFree->pNext = NULL;
    pFree->pfnCallback = NULL;
    RTMemFree(pFree);
}

RTSpinlockDestroy(hSpinlock);
```

---

```
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/revision-generated.h
+++ linux-4.15.0.orig/ubuntu/vbox/vboxguest/revision-generated.h
@@ -0,0 +1 @
+#define VBOX_SVN_REV 120774
--- linux-4.15.0.orig/ubuntu/vbox/vboxguest/version-generated.h
+++ linux-4.15.0.orig/ubuntu/vbox/vboxguest/version-generated.h
@@ -0,0 +1,13 @
+#ifndef ___version_generated_h___
+#define ___version_generated_h___
+#define VBOX_VERSION_MAJOR 5
+#define VBOX_VERSION_MINOR 2
+#define VBOX_VERSION_BUILD 8
+#define VBOX_VERSION_STRING_RAW "5.2.8"
+#define VBOX_VERSION_STRING "5.2.8_KernelUbuntu"
+#define VBOX_API_VERSION_STRING "5_2"
+
+#define VBOX_PRIVATE_BUILD_DESC "Private build by buildd"
+
+#endif
```
+# available from http://www.virtualbox.org. This file is free software;
+# you can redistribute it and/or modify it under the terms of the GNU
+# General Public License (GPL) as published by the Free Software
+# Foundation, in version 2 as it comes in the "COPYING" file of the
+# VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+# hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+#
+# Linux kbuild sets this to our source directory if we are called from there
+obj ?= $(CURDIR)
+include $(obj)/Makefile.include.header
+
+MOD_NAME = vboxsf
+MOD_OBJS =
+vfsmod.o \n+dirops.o \n+Inkops.o \n+regops.o \n+utils.o \n+VBoxGuestR0LibHGCM.o \n+VBoxGuestR0LibIdc.o \n+VBoxGuestR0LibIdc-unix.o \n+VBoxGuestR0LibSharedFolders.o
+ifeq ($(BUILD_TARGET_ARCH),x86)
+MOD_OBJS +=
+divi3.o \n+moddi3.o \n+udivi3.o \n+udivmoddi4.o \n+umoddi3.o \n+qdivrem.o
+endif
+
+MOD_INCL = \n+ $(addprefix -I$(KBUILD_EXTMOD),/ /include /r0drv/linux) \n+ $(addprefix -I$(KBUILD_EXTMOD)/vboxsf,/ /include /r0drv/linux) \n+
+ifeq ($(wildcard $(KBUILD_EXTMOD)/vboxsf),)
+ MANGLING := $(KBUILD_EXTMOD)/vboxsf/include/VBox/VBoxGuestMangling.h
+else
+ MANGLING := $(KBUILD_EXTMOD)/include/VBox/VBoxGuestMangling.h
+endif
+
+MOD_DEFS = -DRT_OS_LINUX -DIN_RING0 -DIN_RT_R0 \n+ -DIN_SUP_R0 -DVBOX -DVBOX_WITH_HGCM -DIN_MODULE -DIN_GUEST_R0
+# our module does not export any symbol
+MOD_DEFS += -DRT_NO_EXPORT_SYMBOL
+ifeq ($(BUILD_TARGET_ARCH),amd64)
+ MOD_DEFS += -DRT_ARCH_AMD64 -DVBOX_WITH_64_BITS_GUESTS
+else
+ MOD_DEFS += -DRT_ARCH_X86
+endif
+
+ifeq ($(KERN_VERSION), 24)
+ MOD_CFLAGS =
+else
+ MOD_CFLAGS = -Wno-declaration-after-statement -fshort-wchar -include $(MANGLING) -fno-pie
+
+# special hack for Fedora Core 6 2.6.18 (fc6), rhel5 2.6.18 (el5),
+# ClarkConnect 4.3 (cc4) and ClarkConnect 5 (v5)
+ ifeq ($(KERNELRELEASE),)
+ MOD_EXTRA += $(foreach inc,\$(KERN_INCL),
+ $\$(if $\$(wildcard \$(inc)/\$(inc)/utsrelease.h),
+ $\$(if $\$(shell grep "2.6.18.*fc6.*" \$(inc)/\$(inc)/utsrelease.h; 
+ grep "2.6.18.*el5.*" \$(inc)/\$(inc)/utsrelease.h; 
+ grep "2.6.18.*v5.*" \$(inc)/\$(inc)/utsrelease.h; 
+ grep "2.6.18.*cc4.*" \$(inc)/\$(inc)/utsrelease.h),
+ -DKERNEL_FC6,))
+ else
+ MOD_EXTRA += $(if $\$(shell echo "\$(KERNELRELEASE)"|grep '2.6.18.*fc6.*');
+ echo "\$(KERNELRELEASE)"|grep '2.6.18.*el5.*';
+ echo "\$(KERNELRELEASE)"|grep '2.6.18.*v5.*';
+ echo "\$(KERNELRELEASE)"|grep '2.6.18.*cc4.*'),
+ -DKERNEL_FC6,)
+endif
+endif
+
+MOD_CLEAN = . linux r0drv r0drv/linux
+
+include $(obj)/Makefile.include.footer
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/Makefile.include.footer
+++ linux-4.15.0/ubuntu/vbox/vboxsf/Makefile.include.footer
@@ -0,0 +1,112 @@
+# $Id: Makefile.include.footer $
+## @file
+## VirtualBox Guest Additions kernel module Makefile, common parts.
+##
+## See Makefile.include.header for details of how to use this.
+##
+## Copyright (C) 2006-2017 Oracle Corporation
+##
+## This file is part of VirtualBox Open Source Edition (OSE), as
+## available from http://www.virtualbox.org. This file is free software;
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+# Foundation, in version 2 as it comes in the "COPYING" file of the
+# VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+# hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+#
+# override is required by the Debian guys
+override MODULE = $(MOD_NAME)
+OBS   = $(MOD_OBJS)
+
+KBUILD_VERBOSE ?= 1
+LINUX_VERBOSE = $(if $(KBUILD_VERBOSE),1,)
+
+# Compiler options
+#
+ifndef INCL
+ INCL   := $(addprefix -I,$(KERN_INCL) $(EXTRA_INCL))
+ ifndef KBUILD_EXTMOD
+  KBUILD_EXTMOD := $(shell pwd)
+ endif
+ INCL   += $(MOD_INCL)
+ export INCL
+endif
+
+KFLAGS   := -D__KERNEL__ -DMODULE $(MOD_DEFS)
+ifeq ($(BUILD_TYPE),debug)
+ KFLAGS  += -DDEBUG -DDEBUG_$(subst $(subst _, ,_,)_,_,$(USERNAME)) -
+DDEBUG_USERNAME=$(subst $(subst _, ,_,)_,_,$(USERNAME))
+endif
+
+ifeq ($(KERN_VERSION), 24)
+
+## 2.4
+##
+
+## Note: while 2.4 kernels could also do "proper" builds from kbuild, the make
+## script needed to support it was somewhat different from 2.6. Since this
+## script works and 2.4 is not a moving target we will not try do do things the
+## "proper" way.
+
+ifeq ($(BUILD_TARGET_ARCH),amd64)
+ KFLAGS  += -mcmodel=kernel
+endif
+
+CFLAGS := -O2 -DVBOX_LINUX_2_4 $(MOD_CFLAGS) $(INCL) $(KFLAGS) $(MOD_EXTRA)
+$(KDEBUG)
+MODULE_EXT := o
+
+## 2.4 Module linking
+$ (MODULE).o: $(OBJS)
+$ (LD) -o $@ -r $(OBJS)
+
+.PHONY: $(MODULE)
+all: $(MODULE)
+$ (MODULE): $(MODULE).o
+
+install: $(MODULE)
+@mkdir -p $(MODULE_DIR); \ 
+install -m 0644 -o root -g root $(MODULE).$(MODULE_EXT) $(MODULE_DIR); \ 
+PATH="$(PATH):/bin:/sbin" depmod -a;
+
+clean:
+for f in $(sort $(dir $(OBJS))): do rm -f $$f/*.o $$f/*.cmd $$f/*.flags; done
+rm -rf .$(MOD_NAME)* .tmp_ver* $(MOD_NAME).* Modules.symvers modules.order
+
+else # ! $(KERN_VERSION), 24
+##
+## 2.6 and later
+##
+
+MODULE_EXT := ko
+
+$ (MODULE)-y := $(OBJS)
+
+# build defs
+EXTRA_CFLAGS += $(MOD_CFLAGS) $(INCL) $(KFLAGS) $(MOD_EXTRA) $(KDEBUG)
+
+.PHONY: $(MODULE)
+all: $(MODULE)
+
+obj-m += $(MODULE).o
+
+JOBS := $(shell (getconf _NPROCESSORS_ONLN || grep -Ec '^processor|^CPU[0-9]' /proc/cpuinfo) 2>/dev/null)
+ifeq ($(JOBS),0)
+  JOBS := 1
+endif
+
+## OL/UEK: disable module signing for external modules -- we don't have any private key
+$ (MODULE):
+$ (MAKE) V=$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
+SRCROOT=$(CURDIR) $(if $(JOBS),-j$(JOBS),) modules
+
+install: $(MODULE)
+$ (MAKE) V=$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
+SRCROOT=$(CURDIR) INSTALL_MOD_PATH=$(INSTALL_MOD_PATH) INSTALL_MOD_DIR=$(INSTALL_MOD_DIR) modules_install
+modules_install: install
+
clean:
+$(MAKE) V=$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
SRCROOT=$(CURDIR) clean
+
.PHONY: $(MODULE) install modules_install clean
+endif
--- linux-4.15.0.org/ubuntu/vbox/vboxsf/Makefile.include.header
+++ linux-4.15.0/ubuntu/vbox/vboxsf/Makefile.include.header
@@ -0,0 +1,158 @@
+# $Id: Makefile.include.header $
+### @file
+# VirtualBox Guest Additions kernel module Makefile, common parts.
+#
+# (For 2.6.x, the main file must be called 'Makefile')
+#
+#
+# Copyright (C) 2006-2017 Oracle Corporation
+#
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+# available from http://www.virtualbox.org. This file is free software;
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+# Foundation, in version 2 as it comes in the "COPYING" file of the
+# VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+# hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+#
+#
+# Testing:
+# * Building with KERN_DIR set uses the value specified and
+#   the default value for the unspecified one if any.
+#
+# These file should be included by the Makefiles for any kernel modules we
+# build as part of the Guest Additions. The intended way of doing this is as
+# follows:
+#
+# # Linux kbuild sets this to our source directory if we are called from
+# # there
+# obj := $(CURDIR)
+# include $(obj)/Makefile.include.header
+# MOD_NAME = <name of the module to be built, without extension>
+# MOD_OBJS = <list of object files which should be included>
+# MOD_DEFS = <any additional defines which this module needs>
+# MOD_INCL = <any additional include paths which this module needs>
MOD_CFLAGS = <any additional CFLAGS which this module needs>
#
include $(obj)/Makefile.include.footer
#
The kmk kBuild define KBUILD_TARGET_ARCH is available.
#
+
#
First, figure out which architecture we're targeting and the build type.
(We have to support basic cross building (ARCH=x86|x86_64).)
While at it, warn about BUILD_* vars found to help with user problems.
+
ifeq ($(filter-out x86_64 amd64 AMD64,$(shell dpkg-architecture -qDEB_HOST_GNU_CPU))),
+ BUILD_TARGET_ARCH_DEF := amd64
+else
+ BUILD_TARGET_ARCH_DEF := x86
+endif
+ifneq ($(filter-out amd64 x86,$(BUILD_TARGET_ARCH)),)
+ $(warning Ignoring unknown BUILD_TARGET_ARCH value '$(BUILD_TARGET_ARCH)'.)
+ BUILD_TARGET_ARCH :=
+endif
+ifeq ($(BUILD_TARGET_ARCH),)
+ ifeq ($(ARCH),x86_64)
+  BUILD_TARGET_ARCH := amd64
+ else
+  ifeq ($(ARCH),i386)
+   BUILD_TARGET_ARCH := x86
+  else
+   BUILD_TARGET_ARCH := $(BUILD_TARGET_ARCH_DEF)
+ endif
+ endif
+else
+ ifeq ($(BUILD_TARGET_ARCH),$(BUILD_TARGET_ARCH_DEF))
+ $(warning Using BUILD_TARGET_ARCH='$(BUILD_TARGET_ARCH)' from the $(origin BUILD_TARGET_ARCH)).
+ endif
+endif
+
+ifeq ($(filter-out release profile debug strict,$(BUILD_TYPE)),)
+ $(warning Ignoring unknown BUILD_TYPE value '$(BUILD_TYPE)'.)
+ BUILD_TYPE :=
+endif
+ifneq ($(BUILD_TYPE),)
+ BUILD_TYPE := release
+else
+ ifneq ($(BUILD_TYPE),release)
+ $(warning Using BUILD_TYPE='$(BUILD_TYPE)' from the $(origin BUILD_TYPE)).
+ endif
+endif

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+endif
+ifeq ($USERNAME),
+USERNAME := noname
+endif
+
+ifeq ($(KERNELRELEASE),)
+
+ifeq ($(KERNELRELEASE),)
+
+# building from this directory
+
+#
+
+# kernel base directory
+ifdef KERN_DIR
+ifndef KERN_VER
+ifeq ($(filter %/build,$(KERN_DIR)),)
+$(error The variable KERN_DIR must be a kernel build folder and end with /build without a trailing slash, or KERN_VER must be set)
+endif
+endif
+
+ifndef KERN_VER
+ifdef KERN_DIR
+KERN_VER = $(notdir $(patsubst %/build,.,$(KERN_DIR)))
+ifeq ($(shell expr $(KERN_VER) : '[0-9]*.[0-9]*.[0-9]*'),0)
+$(error The kernel build folder path must end in <version>/build, or the variable KERN_VER must be set)
+endif
+endif
+endif
+
+else # neq($(KERNELRELEASE),)
+
+# building from kbuild (make -C <kernel_directory> M=`pwd`)
+
+# guess kernel version (24 or 26)
+ifeq $(shell if echo "2\4.\" /lib/modules/$(KERN_VER)/build/include/linux/version.h > /dev/null 2>&1; then echo yes; fi),yes)
+KERN_VERSION := 24
+else
+KERN_VERSION := 26
+endif
+
+else # neq($(KERNELRELEASE),)
+
+# guess kernel major version (24 or later)
+ifeq $(shell if grep '2\4.' /lib/modules/$(KERN_VER)/build/include/linux/version.h > /dev/null 2>&1; then echo yes; fi),yes)
+KERN_VERSION := 24
+else
+KERN_VERSION := 26
+endif
+
+else # neq($(KERNELRELEASE),)
+
+ifeq ($(shell if echo "$(VERSION).$(PATCHLEVEL)." | grep '2\4.' > /dev/null; then echo yes; fi),yes)
+KERN_VERSION := 24

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+ else
+ KERN_VERSION := 26
+ endif
+
+ KERN_VER := $(KERNELRELEASE)
+
+endif # neq($(KERNELRELEASE),)
+
+## Kernel build folder
+KERN_DIR := $(srctree)
+ifeq ($$(shell if test -d $$KERN_DIR; then echo yes; fi),yes)
+ $(error Error: unable to find the headers of the Linux kernel to build against. \n+ Specify KERN_VER=<version> (currently $$KERN_VER)) and run Make again)
+endif
+
+## Kernel include folder
+KERN_INCL := $(KERN_DIR)/include
+
+## module install folder
+INSTALL_MOD_DIR ?= misc
+MODULE_DIR := $(INSTALL_MOD_PATH)/lib/modules/$(KERN_VER)/$(INSTALL_MOD_DIR)
+
+# debug - show guesses.
+ifdef DEBUG
+$$(warning dbg: INSTALL_MOD_PATH = $(INSTALL_MOD_PATH))
+$$(warning dbg: INSTALL_MOD_DIR  = $(INSTALL_MOD_DIR))
+$$(warning dbg: KERN_DIR         = $(KERN_DIR))
+$$(warning dbg: KERN_INCL        = $(KERN_INCL))
+$$(warning dbg: KERN_VERSION     = $(KERN_VERSION))
+$$(warning dbg: MODULE_DIR       = $(MODULE_DIR))
+endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/VBoxGuestR0LibHGCM.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/VBoxGuestR0LibHGCM.c
@@ -0,0 +1,228 @@
+/* $Id: VBoxGuestR0LibHGCM.cpp $ */
+/** @file
+ * VBoxGuestLib - Host-Guest Communication Manager, ring-0 client drivers.
+ * These public functions can be only used by other drivers. They all
+ * do an IOCTL to VBoxGuest via IDC.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ */
+/* This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
#include "VBoxGuestR0LibInternal.h"

#include <iprt/assert.h>
#include <iprt/semaphore.h>
#include <iprt/string.h>

#ifdef VBGL_VBOXGUEST
#error "This file shouldn't be part of the VBoxGuestR0LibBase library that is linked into VBoxGuest. It's client code."
#endif

/**
 * Fast heap for HGCM handles data.
 * @}
 */
+static RTSEMFASTMUTEX  g_hMtxHGCMHandleData;
+static struct VBGLHGCMHANDLEDATA  g_aHGCMHandleData[64];
+/** @} */
+
+
+/**
+ * Initializes the HGCM VBGL bits.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInit(void)
+{
+    AssertReturn(g_hMtxHGCMHandleData == NIL_RTSEMFASTMUTEX, VINF_ALREADY_INITIALIZED);
+    return RTSemFastMutexCreate(&g_hMtxHGCMHandleData);
+}
+
+/**
+ * Initializes the HGCM VBGL bits.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMTerminate(void)
+{
+    RTSemFastMutexDestroy(g_hMtxHGCMHandleData);
+    g_hMtxHGCMHandleData = NIL_RTSEMFASTMUTEX;
+    return VINF_SUCCESS;
+}
+
+DECLINLINE(int) vbglR0HandleHeapEnter(void)
+{
+    int rc = RTSemFastMutexRequest(g_hMtxHGCMHandleData);
+    VBGL_HGCM_ASSERT_MSG(RT_SUCCESS(rc), ("Failed to request handle heap mutex, rc = %Rrc\n", rc));
+    return rc;
+}
+
+DECLINLINE(void) vbglR0HandleHeapLeave(void)
+{
+    RTSemFastMutexRelease(g_hMtxHGCMHandleData);
+}
+
+struct VBGLHGCMHANDLEDATA *vbglR0HGCMHandleAlloc(void)
+{
+    struct VBGLHGCMHANDLEDATA *p = NULL;
+    int rc = vbglR0HandleHeapEnter();
+    if (RT_SUCCESS(rc))
    + {  
    +     uint32_t i;  
    +  
    +     /* Simple linear search in array. This will be called not so often, only connect/disconnect. */  
    +     /** @todo bitmap for faster search and other obvious optimizations. */  
    +     for (i = 0; i < RT_ELEMENTS(g_aHGCMHandleData); i++)  
    +     {  
    +         if (!g_aHGCMHandleData[i].fAllocated)  
    +         {  
    +             p = &g_aHGCMHandleData[i];  
    +             p->fAllocated = 1;  
    +             break;  
    +         }  
    +     }  
    +     vbglR0HandleHeapLeave();  
    +  
    +     VBGL_HGCM_ASSERT_MSG(p != NULL, ("Not enough HGCM handles.\n");  
    + }  
    + return p;  
+}  
+ 
+void vbglR0HGCMHandleFree(struct VBGLHGCMHANDLEDATA *pHandle)  
+{  
+    if (pHandle)  
+    {  
+        int rc = vbglR0HandleHeapEnter();  
+        if (RT_SUCCESS(rc))  
+        {  
+            VBGL_HGCM_ASSERT_MSG(pHandle->fAllocated, ("Freeing not allocated handle\n");  
+            
+            RT_ZERO(*pHandle);  
+            vbglR0HandleHeapLeave();  
+        }  
+    }  
+}  
+ 
+DECLR0VBGL(int) VbglR0HGCMConnect(VBGLHGCMHANDLE *pHandle, const char *pszServiceName,  
+HGCMCLIENTID *pidClient)  
+{  
+    int rc;  
+    if (pHandle && pszServiceName && pidClient)  
+    {  
+        struct VBGLHGCMHANDLEDATA *pHandleData = vbglR0HGCMHandleAlloc();  
+        if (pHandleData)  
+        {  
+            rc = VbglR0IdcOpen(&pHandleData->IdcHandle,  
+                VBGL_IOC_VERSION /*uReqVersion*/,  
+}
VBGL_IOC_VERSION & UINT32_C(0xffff0000) /*uMinVersion*/,
NULL /*puSessionVersion*/, NULL /*puDriverVersion*/, NULL /*uDriverRevision*/;

if (RT_SUCCESS(rc))
{
    VBGLIOCHGCMDCONNECT Info;
    RT_ZERO(Info);
    VBGLREQHDR_INIT(&InfoHdr, HGCM_CONNECT);
    Info.u.In.Loc.type = VMMDevHGCMLoc_LocalHost_Existing;
    rc = RTStrCopy(Info.u.In.Loc.u.host.achName, sizeof(Info.u.In.Loc.u.host.achName), pszServiceName);
    if (RT_SUCCESS(rc))
    {
        rc = VbglR0IdcCall(&pHandleData->IdcHandle, VBGL_IOCTL_HGCM_CONNECT, &Info.Hdr,
sizeof(Info));
        if (RT_SUCCESS(rc))
        {
            *pidClient = Info.u.Out.idClient;
            *pHandle = pHandleData;
            return rc;
        }
    }
    VbglR0IdcClose(&pHandleData->IdcHandle);
}
else
    rc = VERR_NO_MEMORY;
else
    rc = VERR_INVALID_PARAMETER;
return rc;
}

DECLR0VBGL(int) VbglR0HGCMDisconnect(VBGLHGCMHANDLE handle, HGCMCLIENTID idClient)
{
    int rc;
    VBGLIOCHGCMDDISCONNECT Info;
    RT_ZERO(Info);
    VBGLREQHDR_INIT(&InfoHdr, HGCM_DISCONNECT);
    Info.u.In.idClient = idClient;
    rc = VbglR0IdcCall(&handle->IdcHandle, VBGL_IOCTL_HGCM_DISCONNECT, &Info.Hdr, sizeof(Info));
    VbglR0IdcClose(&handle->IdcHandle);
    vbgIR0HGCMHandleFree(handle);
    }
DECLR0VBGL(int) VbgIR0HGCMCallRaw(VBGLHGCMHANDLE handle, PVBGLIOCHGCMCALL pData, uint32_t cbData)
+
+ VBGL_HGCM_ASSERT_MSG(cbData >= sizeof(VBGLIOCHGCMCALL) + pData->cParms * sizeof(HGCMFunctionParameter),
+    ("cbData = %d, cParms = %d (calculated size %d)\n", cbData, pData->cParms,
+                             sizeof(VBGLIOCHGCMCALL) + pData->cParms * sizeof(VBGLIOCHGCMCALL));
+
+ return VbgIR0IdcCallRaw(&handle->IdcHandle, VBGL_IOCTL_HGCM_CALL(cbData), &pData->Hdr, cbData);
+
+DECLR0VBGL(int) VbgIR0HGCMCall(VBGLHGCMHANDLE handle, PVBGLIOCHGCMCALL pData, uint32_t cbData)
+
+    int rc = VbgIR0HGCMCallRaw(handle, pData, cbData);
+    if (RT_SUCCESS(rc))
+        rc = pData->Hdr.rc;
+    return rc;
+
+DECLR0VBGL(int) VbgIR0HGCMCallUserDataRaw(VBGLHGCMHANDLE handle, PVBGLIOCHGCMCALL pData, uint32_t cbData)
+
+ VBGL_HGCM_ASSERT_MSG(cbData >= sizeof(VBGLIOCHGCMCALL) + pData->cParms * sizeof(HGCMFunctionParameter),
+    ("cbData = %d, cParms = %d (calculated size %d)\n", cbData, pData->cParms,
+                             sizeof(VBGLIOCHGCMCALL) + pData->cParms * sizeof(VBGLIOCHGCMCALL));
+
+ return VbgIR0IdcCallRaw(&handle->IdcHandle, VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA(cbData), &pData->Hdr, cbData);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/VBoxGuestR0LibIdc-unix.c
+++ linux-4.15.0.orig/ubuntu/vbox/vboxsf/VBoxGuestR0LibIdc-unix.c
@@ -0,0 +1,60 @@
+/* $Id: VBoxGuestR0LibIdc-unix.cpp $ */
+/** @file
+ * VBoxGuestLib - Ring-0 Support Library for VBoxGuest, IDC, UNIX-like OSes.
+ */
+@
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+ *
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+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ /*******************************************************************************************/
+ /* Header Files */
+ /*******************************************************************************************/
+#include "VBoxGuestR0LibInternal.h"
+
+int VBOXCALL vbglR0IdcNativeOpen(PVBGLIDCHANDLE pHandle, PVBGLIOCIDCCONNECT pReq)
+{
+  RT_NOREF(pHandle);
+  return VBoxGuestIDC(NULL /*pvSession*/, VBGL_IOCTL_IDC_CONNECT, &pReq->Hdr, sizeof(*pReq));
+}
+
+int VBOXCALL vbglR0IdcNativeClose(PVBGLIDCHANDLE pHandle, PVBGLIOCIDCDISCONNECT pReq)
+{
+  return VBoxGuestIDC(pHandle->s.pvSession, VBGL_IOCTL_IDC_DISCONNECT, &pReq->Hdr,
+                     sizeof(*pReq));
+}
+
+/** *
+ * Makes an IDC call, returning only the I/O control status code.
+ */
+ * @returns VBox status code (the I/O control failure status).
+ * @param pHandle The IDC handle.
+ * @param uReq The request number.
+ * @param pReqHdr The request header.
+ * @param cbReq The request size.
DECLR0VBGL(int) VbgIR0IdcCallRaw(PVBGLIDCHANDLE pHandle, uintptr_t uReq, PVBGLREQHDR pReqHdr, uint32_t cbReq)
{    return VBoxGuestIDC(pHandle->s.pvSession, uReq, pReqHdr, cbReq);
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/VBoxGuestR0LibIdc.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/VBoxGuestR0LibIdc.c
@@ -0,0 +1,201 @@
/* $Id: VBoxGuestR0LibIdc.cpp $ */
/** @file
 * VBoxGuestLib - Ring-0 Support Library for VBoxGuest, IDC.
 */
+
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+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+#ifdef VBGL_VBOXGUEST
+
+******************************************************************************
+**************************************
+*   Header Files                                                                 *
+******************************************************************************
+
+#include "VBoxGuestR0LibInternal.h"
+#include <VBox/err.h>
+#include <VBox/VBoxGuest.h>
+/#include <iprt/asm.h>*/
+
+##ifdef VBGL_VBOXGUEST
+# error "This file shouldn't be part of the VBoxGuestR0LibBase library that is linked into VBoxGuest. It's client code."
+#endif
+
+/******************************************************************************
+ * Global Variables
+ ******************************************************************************/
+static PVBGLIDCHANDLE volatile g_pMainHandle = NULL; /* static*/
+
+ /* Opens the IDC interface of the support driver. */
+/* This will perform basic version negotiations and fail if the minimum requirements aren't met. */
+@returns VBox status code.
+@param pHandle The handle structure (output).
+@param uReqVersion The requested version. Pass 0 for default.
+@param uMinVersion The minimum required version. Pass 0 for default.
+@param puSessionVersion Where to store the session version. Optional.
+@param puDriverVersion Where to store the session version. Optional.
+@param puDriverRevision Where to store the SVN revision of the driver. Optional.
+*/
+DECLR0VBGL(int) VbglR0IdcOpen(PVBGLIDCHANDLE pHandle, uint32_t uReqVersion, uint32_t uMinVersion,
+                              uint32_t *puSessionVersion, uint32_t *puDriverVersion, uint32_t *puDriverRevision)
+{ unsigned uDefaultMinVersion;
+  VBGLIOCIDCCONNECT Req;
+  int rc;
+
+  /* Validate and set failure return values. */
+  */
+  AssertPtrReturn(pHandle, VERR_INVALID_POINTER);
+  pHandle->s.pvSession = NULL;
+  AssertPtrNullReturn(puSessionVersion, VERR_INVALID_POINTER);
+  if (puSessionVersion)
+    *puSessionVersion = 0;
+  AssertPtrNullReturn(puDriverVersion, VERR_INVALID_POINTER);
+  if (puDriverVersion)
*puDriverVersion = 0;
+ AssertPtrNullReturn(puDriverRevision, VERR_INVALID_POINTER);
+ if (puDriverRevision)
+   *puDriverRevision = 0;
+
+ AssertReturn((uMinVersion | uMinVersion & UINT32_C(0xffff0000)) == (VBGL_IOC_VERSION &
+ UINT32_C(0xffff0000)), VERR_INVALID_PARAMETER);
+ AssertReturn((uReqVersion | uReqVersion & UINT32_C(0xffff0000)) == (VBGL_IOC_VERSION &
+ UINT32_C(0xffff0000)), VERR_INVALID_PARAMETER);
+
+ /*
+ * Handle default version input and enforce minimum requirements made
+ * by this library.
+ *
+ * The clients will pass defaults (0), and only in the case that some
+ * special API feature was just added will they set an actual version.
+ * So, this is the place where can easily enforce a minimum IDC version
+ * on bugs and similar. It corresponds a bit to what SUPR3Init is
+ * responsible for.
+ */
+ uDefaultMinVersion = VBGL_IOC_VERSION & UINT32_C(0xffff0000);
+ if (!uMinVersion || uMinVersion < uDefaultMinVersion)
+   uMinVersion = uDefaultMinVersion;
+ if (!uReqVersion || uReqVersion < uDefaultMinVersion)
+   uReqVersion = uDefaultMinVersion;
+
+ /*
+ * Setup the connect request packet and call the OS specific function.
+ */
+ VBGLREQHDR_INIT(&Req.Hdr, IDC_CONNECT);
+ Req.u.In.u32MagicCookie = VBGL_IOCTL_IDC_CONNECT_MAGIC_COOKIE;
+ Req.u.In.uMinVersion = uMinVersion;
+ Req.u.In.uReqVersion = uReqVersion;
+ Req.u.In.uReserved = 0;
+ rc = vbglR0IdcNativeOpen(pHandle, &Req);
+ if (RT_SUCCESS(rc))
+   rc = Req.Hdr.rc;
+ if (RT_SUCCESS(rc))
+ {
+   pHandle->s.pvSession = Req.u.Out.pvSession;
+   if (puSessionVersion)
+     *puSessionVersion = Req.u.Out.uSessionVersion;
+   if (puDriverVersion)
+     *puDriverVersion = Req.u.Out.uDriverVersion;
+   if (puDriverRevision)
+     *puDriverRevision = Req.u.Out.uDriverRevision;
+ }
/*
 * We don't really trust anyone, make sure the returned
 * session and version values actually makes sense.
 */

if (RT_VALID_PTR(Req.u.Out.pvSession) && Req.u.Out.uSessionVersion >= uMinVersion && (Req.u.Out.uSessionVersion & UINT32_C(0xffff0000)) == (VBGL_IOC_VERSION & UINT32_C(0xffff0000)))
{
    /*ASMAtomicCmpXchgPtr(&g_pMainHandle, pHandle, NULL);*/
    return rc;
}

AssertMsgFailed(("pSession=%p uSessionVersion=0x%x (r%u)\n", Req.u.Out.pvSession, Req.u.Out.uSessionVersion, Req.u.Out.uDriverRevision));
rc = VERR_VERSION_MISMATCH;
VbglR0IdcClose(pHandle);

return rc;
}

/**
 * Closes a IDC connection established by VbglR0IdcOpen.
 *
 * @returns VBox status code.
 * @param   pHandle     The IDC handle.
 */
DECLR0VBGL(int) VbglR0IdcClose(PVBGLIDCHANDLE pHandle)
{
    VBGLIOCIDCDISCONNECT Req;
    int rc;

    /*
    * Catch closed handles and check that the session is valid.
    */
    AssertPtrReturn(pHandle, VERR_INVALID_POINTER);
    if (!pHandle->s.pvSession)
        return VERR_INVALID_HANDLE;
    AssertPtrReturn(pHandle->s.pvSession, VERR_INVALID_HANDLE);

    /*
    * Create the request and hand it to the OS specific code.
    */
    VBGLREQHDR_INIT(&Req.Hdr, IDC_DISCONNECT);
    Req.u.In.pvSession = pHandle->s.pvSession;
    rc = vbglR0IdcNativeClose(pHandle, &Req);
if (RT_SUCCESS(rc))
    rc = Req.Hdr.rc;
if (RT_SUCCESS(rc))
{
    pHandle->s.pvSession = NULL;
    /*ASMAtomicCmpXchgPtr(&g_pMainHandle, NULL, pHandle);*/
}
return rc;

/**
 * Makes an IDC call, returning the request status.
 * @returns VBox status code. Request status if the I/O control succeeds,
 * otherwise the I/O control failure status.
 * @param   pHandle             The IDC handle.
 * @param   uReq                The request number.
 * @param   pReqHdr             The request header.
 * @param   cbReq               The request size.
 */
DECLR0VBGL(int) VbglR0IdcCall(PVBGLIDCHANDLE pHandle, uintptr_t uReq, PVBGLREQHDR pReqHdr,
                             uint32_t cbReq)
{
    int rc = VbglR0IdcCallRaw(pHandle, uReq, pReqHdr, cbReq);
    if (RT_SUCCESS(rc))
        rc = pReqHdr->rc;
    return rc;
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/VBoxGuestR0LibInternal.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/VBoxGuestR0LibInternal.h
@@ -0,0 +1,203 @@
+/* $Id: VBoxGuestR0LibInternal.h $ */
+/** @file
+ * VBoxGuestLibR0 - Internal header.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ */
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+ * CDDL are applicable instead of those of the GPL.
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBoxGuestLib_VBoxGuestR0LibInternal_h
+#define ___VBoxGuestLib_VBoxGuestR0LibInternal_h
+
+/*
 * Define the private IDC handle structure before we include the VBoxGuestLib.h header.
 */
+
+#include <iprt/types.h>
+#include <iprt/assert.h>
+RT_C_DECLS_BEGIN
+
+# ifndef VBGL_VBOXGUEST
/**
 * The hidden part of VBGLIDCHANDLE.
 */
+# define VBGLIDCHANDLEPRIVATE_DECLARED 1
# endif
+
+/*
 */
+/* include <VBox/VMMDev.h>
+*/
+include <VBox/VBoxGuestLib.h>
+
+#ifdef VBGLIDCHANDLEPRIVATE_DECLARED

```c
/*
 * The hidden part of VBGLIDCHANDLE.
 */

struct VBGLIDCHANDLEPRIVATE
{
+ /*
 * Pointer to the session handle. */
+ void *pvSession;
+ /*
 * Pointer to the NT device object. */
+ PDEVICE_OBJECT pDeviceObject;
+ /*
 * Pointer to the NT file object. */
+ PFILE_OBJECT pFileObject;
+ /*
 * LDI device handle to keep the device attached. */
+ ldi_handle_t hDev;
+}
+
+/*
 */
+
+/*
 */
```
+AssertCompile(RT_SIZEOFMEMB(VBGLIDCHANDLE, apvPadding) >= sizeof(struct
VBGLIDCHANDLEPRIVATE));
+
+ /* Native IDC functions. */
+ */
+int VBOXCALL vbglR0IdcNativeOpen(PVBGLIDCHANDLE pHandle, PVBGLIOCIDCCONNECT pReq);
+int VBOXCALL vbglR0IdcNativeClose(PVBGLIDCHANDLE pHandle, PVBGLIOCIDCDISCONNECT pReq);
+
+ /* Deprecated logging macro */
+ */
+include <VBox/log.h>
++ifdef RT_OS_WINDOWS /**< @todo dprintf() -> Log() */
++if (defined(DEBUG) && !defined(NO_LOGGING)) || defined(LOG_ENABLED)
++ define dprintf(a) RTLogBackdoorPrintf a
++ else
++ define dprintf(a) do {} while (0)
++ endif
++else
++ define dprintf(a) Log(a)
++endif
+
+ /* Lazy bird: OS/2 doesn't currently implement the RTSemMutex API in ring-0, so
+ * use a fast mutex instead. Unlike Windows, the OS/2 implementation
+ * doesn't have any nasty side effects on IRQL-like context properties, so the
+ * fast mutexes on OS/2 are identical to normal mutexes except for the
+ * timeout aspec. Fortunately we don't need timeouts here.
+ */
++ifdef RT_OS_OS2
++ define VBGLDATA_USE_FAST_MUTEX
++endif
+
+struct _VBGLPHYSHEAPBLOCK;
+typedef struct _VBGLPHYSHEAPBLOCK VBGLPHYSHEAPBLOCK;
+struct _VBGLPHYSHEAPCHUNK;
+typedef struct _VBGLPHYSHEAPCHUNK VBGLPHYSHEAPCHUNK;
+
+ifndef VBGL_VBOXGUEST
+struct VBGLHGCMHANDLEDATA
+{
+    uint32_t fAllocated;
+    VBGLIDCHANDLE IdcHandle;
+};
#ifdef
+
+enum VbgLibStatus
+{
+    VbgStatusNotInitialized = 0,
+    VbgStatusInitializing,
+    VbgStatusReady
+};
+
+/**
+ * Global VBGL ring-0 data.
+ * Lives in VbgIR0Init.cpp.
+ */
typedef struct VBGLDATA
+{
+    enum VbgLibStatus status;
+
+    RTIOPORT portVMMDev;
+
+    VMMDevMemory *pVMMDevMemory;
+
+    /**
+     * Physical memory heap data.
+     * @}
+     */
+
+    VBGLPHYSHEAPBLOCK *pFreeBlocksHead;
+    VBGLPHYSHEAPBLOCK *pAllocBlocksHead;
+    VBGLPHYSHEAPCHUNK *pChunkHead;
+
+    RTSEMFASTMUTEX mutexHeap;
+    /** @}
+     */
+
+    /**
+     * The host version data.
+     */
+    VMMDevReqHostVersion hostVersion;
+
+
+#ifndef VBGL_VBOXGUEST
+    /** The IDC handle. This is used for talking to the main driver. */
+    VBGLIDCHANDLE IdcHandle;
+    /** Mutex used to serialize IDC setup. */
+    RTSEMFASTMUTEX hMtxIdcSetup;
+    ifdef VBGLDATA_USE_FAST_MUTEX
+    else
+    RTSEMFASTMUTEX hMtxIdcSetup;
+# endif

+#else
+ } VBGLDATA;
+ +
+extern VBGLDATA g_vbgldata;
+ +/
+ * Internal macro for checking whether we can pass physical page lists to the
+ * host.
+ *
+ * ASSUMES that vbglIR0Enter has been called already.
+ *
+ * @param   a_fLocked       For the windows shared folders workarounds.
+ *
+ * @remarks Disabled the PageList feature for locked memory on Windows,
+ * because a new MDL is created by VBGL to get the page addresses
+ * and the pages from the MDL are marked as dirty when they should not.
+ */
+#if defined(RT_OS_WINDOWS)
+ # define VBGLR0_CAN_USE_PHYS_PAGE_LIST(a_fLocked) \ 
+ ( !(a_fLocked) && (g_vbgldata.hostVersion.features & VMMDEV_HVF_HGCM_PHYS_PAGE_LIST) )
+#else
+ # define VBGLR0_CAN_USE_PHYS_PAGE_LIST(a_fLocked) \ 
+ ( !(g_vbgldata.hostVersion.features & VMMDEV_HVF_HGCM_PHYS_PAGE_LIST) )
+#endif
+
+int vbglR0Enter (void);
+
+ifdef VBOX_WITH_HGCM
+struct VBGLHGCMHANDLEDATA  *vbglR0HGCMHandleAlloc(void);
+void                        vbglR0HGCMHandleFree(struct VBGLHGCMHANDLEDATA *pHandle);
+endif /* VBOX_WITH_HGCM */
+
+ifndef VBGL_VBOXGUEST
+/
+ * Get the IDC handle to the main VBoxGuest driver.
+ * @returns VERR_TRY_AGAIN if the main driver has not yet been loaded.
+ */
+int VBOXCALL vbglR0QueryIdcHandle(PVBGLIDCHANDLE *ppIdcHandle);
+endif
+
+RT_C_DECLS_END
+
+endif /* !___VBoxGuestLib_VBoxGuestR0LibInternal_h */
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/VBoxGuestR0LibSharedFolders.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/VBoxGuestR0LibSharedFolders.c
@@ -0,0 +1,683 @@
/** $Id: VBoxGuestR0LibSharedFolders.c $ */
/** @file */
/** VBoxGuestR0LibSharedFolders - Ring 0 Shared Folders calls. */
/** */
/** Copyright (C) 2006-2017 Oracle Corporation */
/** */
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/** */
/** You may elect to license modified versions of this file under the */
/** terms and conditions of either the GPL or the CDDL or both. */
/** */
/** /*************************************************************** */
/** Header Files */
/** *************************************************************** */
#define LOG_GROUP LOG_GROUP_SHARED_FOLDERS
#include "VBoxGuestR0LibInternal.h"
#include <VBox/GuestLibSharedFolders.h>
#include <VBox/log.h>
#include <iprt/time.h>
#include <iprt/mem.h>
#include <iprt/path.h>
#include <iprt/string.h>

#ifdef VBGL_VBOXGUEST
#error "This file shouldn't be part of the VBoxGuestR0LibBase library that is linked into VBoxGuest. It's client code."
#endif

/*************************************************************** */
**************************************
+* Defined Constants And Macros
*
+********************************************************************************************
*************************************/
+#define SHFL_CPARMS_SET_UTF8 0
+#define SHFL_CPARMS_SET_SYMLINKS 0
+
+#define VBOX_INIT_CALL(a, b, c) \
+ LogFunc(("%s, idClient=%d\n", "SHFL_FN_" # b, (c)->idClient)); \
+ VBGL_HGCM_HDR_INIT(a, (c)->idClient, SHFL_FN_##b, SHFL_CPARMS_##b); \
+ (a)->fInterruptible = false /* Currently we do like nfs with -o hard (default). */
+
+#define VBOX_INIT_CALL_EX(a, b, c, a_cbReq) \
+ LogFunc(("%s, idClient=%d\n", "SHFL_FN_" # b, (c)->idClient)); \
+ VBGL_HGCM_HDR_INIT_EX(a, (c)->idClient, SHFL_FN_##b, SHFL_CPARMS_##b, a_cbReq); \
+ (a)->fInterruptible = false /* Currently we do like nfs with -o hard (default). */
+
+
+
+/** @todo We only need HGCM, not physical memory, so other guests should also
+*
switch to calling vbglR0HGCMInit() and vbglR0HGCMTerminate() instead
+*
of VbglR0SfInit() and VbglR0SfTerm(). */
+#ifndef RT_OS_LINUX
+DECLVBGL(int) VbglR0SfInit(void)
+{
+ return VbglR0InitClient();
+}
+
+DECLVBGL(void) VbglR0SfTerm(void)
+{
+ VbglR0TerminateClient();
+}
+#endif
+
+DECLVBGL(int) VbglR0SfConnect(PVBGLSFCLIENT pClient)
+{
+ int rc = VbglR0HGCMConnect(&pClient->handle, "VBoxSharedFolders", &pClient->idClient);
+ if (RT_SUCCESS(rc))
+
LogFunc(("idClient=%d\n", pClient->idClient));
+ else
+
LogFunc(("VbglR0HGCMConnect failed -> rc=%Rrc\n", rc));
+ return rc;
+}
+
+DECLVBGL(void) VbglR0SfDisconnect(PVBGLSFCLIENT pClient)
+{
+ int rc;
+ LogFunc(("u32ClientID=%d\n", pClient->idClient));

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+ if (pClient->handle == NULL)
+     return; /* not connected */
+
+ rc = VbgIR0HCMDisconnect(pClient->handle, pClient->idClient);
+ NOREF(rc);
+ /* Log("VBOXSF: VbgIR0SfDisconnect: VbgIR0HCMDisconnect -> %\#x\n", rc); */
+ pClient->idClient = 0;
+ pClient->handle = NULL;
+ return;
+
+DECLVBGL(int) VbgIR0SfQueryMappings(PVBGLSFCLIENT pClient, SHFLMAPPING paMappings[],
uint32_t *pcMappings)
+
+ int rc;
+ VBoxSFQueryMappings data;
+
+ VBOX_INIT_CALL(&data.callInfo, QUERY_MAPPINGS, pClient);
+
+ data.flags.type = VMMDevHGCParmType_32bit;
+ data.flags.u.value32 = SHFL_MF_UCS2;
+
+ data.numberOfMappings.type = VMMDevHGCParmType_32bit;
+ data.numberOfMappings.u.value32 = *pcMappings;
+
+ data.mappings.type = VMMDevHGCParmType_LinAddr;
+ data.mappings.u.Pointer.size = sizeof(SHFLMAPPING) * *pcMappings;
+ data.mappings.u.Pointer.u.linearAddr = (uintptr_t)&paMappings[0];
+
+ /* Log("VBOXSF: in ifs difference %d
", (char *)&data.flags.type - (char *)&data.callInfo.cParms); */
+ rc = VbgIR0HCMDcall(pClient->handle, &data.callInfo, sizeof(data));
+ /* Log("VBOXSF: VbgIR0SfQueryMappings: VbgIR0HCMDcall rc = %\#x, result = %\#x\n", rc,
+ data.callInfo.result); */
+ if (RT_SUCCESS(rc))
+     *pcMappings = data.numberOfMappings.u.value32;
+
+ return rc;
+
+DECLVBGL(int) VbgIR0SfQueryMapName(PVBGLSFCLIENT pClient, SHFLROOT root, SHFLSTRING
*pString, uint32_t size)
+
+ int rc;
+ VBoxSFQueryMapName data;
+
+ VBOX_INIT_CALL(&data.callInfo, QUERY_MAP_NAME, pClient);
+
+ data.root.type = VMMDevHGCParmType_32bit;
+ data.root.u.value32 = root;
+
+ data.name.type = VMMDevHGCMParmType_LinAddr;
+ data.name.u.Pointer.size = size;
+ data.name.u.Pointer.u.linearAddr = (uintptr_t)pString;
+
+ rc = VbgIR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
+/* Log(("VBOXSF: VbgIR0SfQueryMapName: VbgIR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+ return rc;
+
+DECLVBGL(int) VbgIR0SfMapFolder(PVBGLSFCIENT pClient, PSHFLSTRING szFolderName, PVBGLSFMAP pMap)
+{
+    int rc;
+    VBoxSFMapFolder data;
+
+    VBOX_INIT_CALL(&data.callInfo, MAP_FOLDER, pClient);
+
+    data.path.type = VMMDevHGCMParmType_LinAddr;
+    data.path.u.Pointer.size = ShflStringSizeOfBuffer(szFolderName);
+    data.path.u.Pointer.u.linearAddr = (uintptr_t)szFolderName;
+
+    data.root.type = VMMDevHGCMParmType_32bit;
+    data.root.u.value32 = 0;
+
+    data.delimiter.type = VMMDevHGCMParmType_32bit;
+    data.delimiter.u.value32 = RTPATH_DELIMITER;
+
+    data.fCaseSensitive.type = VMMDevHGCMParmType_32bit;
+    data.fCaseSensitive.u.value32 = RTPATH_DELIMITER;
+    data.fCaseSensitive.u.value32 = RTPATH_DELIMITER;
+
+    rc = VbgIR0HGCMCallRaw(pClient->handle, &data.callInfo, sizeof(data));
+    if (RT_SUCCESS(rc))
+    {
+        pMap->root = data.root.u.value32;
+        rc = data.callInfo.Hdr.rc;
+    }
+    return rc;
+}
+DECLVBGL(int) VbglR0SfUnmapFolder(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap)
+

+ int rc;
+ VBoxSFUnmapFolder data;
+
+ VBox_INIT_CALL(&data.callInfo, UNMAP_FOLDER, pClient);
+
+ data.root.type = VMMDevHGCParmType_32bit;
+ data.root.u.value32 = pMap->root;
+
+ rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
+/
+ * Log("VBOXSF: VbglR0SfUnmapFolder: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc);
+ return rc;
+
+
+DECLVBGL(int) VbglR0SfCreate(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING pParsedPath, PSHFLCREATEPARMS pCreateParms)
+
+ /*
+ * @todo copy buffers to physical or mapped memory.
+ */
+
+ int rc;
+ VBoxSFCreate data;
+
+ VBox_INIT_CALL(&data.callInfo, CREATE, pClient);
+
+ data.root.type = VMMDevHGCParmType_32bit;
+ data.root.u.value32 = pMap->root;
+
+ data.path.type = VMMDevHGCParmType_LinAddr;
+ data.path.u.Pointer.size = ShflStringSizeOfBuffer (pParsedPath);
+ data.path.u.Pointer.u.linearAddr = (uintptr_t)pParsedPath;
+
+ data.parms.type = VMMDevHGCParmType_LinAddr;
+ data.parms.u.Pointer.size = sizeof(SHFLCREATEPARMS);
+ data.parms.u.Pointer.u.linearAddr = (uintptr_t)pCreateParms;
+
+ rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
+*/
+ * Log("VBOXSF: VbglR0SfCreate: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc);
+ return rc;
+
+
+DECLVBGL(int) VbglR0SfClose(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE Handle)
+
+ int rc;
+ VBoxSFClose data;
+
+ VBox_INIT_CALL(&data.callInfo, CLOSE, pClient);
data.root.type = VMMDevHGCMParmType_32bit;
data.root.u.value32 = pMap->root;

data.handle.type = VMMDevHGCMParmType_64bit;
data.handle.u.value64 = Handle;

rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
/* Log(("VBOXSF: VbglR0SfClose: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
return rc;
}

DECLVBGL(int) VbglR0SfRemove(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING pParsedPath, uint32_t flags)
{
    int rc = VINF_SUCCESS;
    VBoxSFRemove data;

    VBOX_INIT_CALL(&data.callInfo, REMOVE, pClient);

    data.root.type = VMMDevHGCMParmType_32bit;
data.root.u.value32 = pMap->root;

    data.path.type = VMMDevHGCMParmType_LinAddr_In;
data.path.u.Pointer.size = ShflStringSizeOfBuffer(pParsedPath);
data.path.u.Pointer.u.linearAddr = (uintptr_t)pParsedPath;

    data.flags.type = VMMDevHGCMParmType_32bit;
data.flags.u.value32 = flags;

rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
/* Log(("VBOXSF: VbglR0SfClose: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
return rc;
}

DECLVBGL(int) VbglR0SfRename(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING pSrcPath, PSHFLSTRING pDestPath, uint32_t flags)
{
    int rc;
    VBoxSFRename data;

    VBOX_INIT_CALL(&data.callInfo, RENAME, pClient);

    data.root.type = VMMDevHGCMParmType_32bit;
data.root.u.value32 = pMap->root;

    data.path.type = VMMDevHGCMParmType_LinAddr_In;
data.path.u.Pointer.size = ShflStringSizeOfBuffer(pSrcPath);
data.path.u.Pointer.u.linearAddr = (uintptr_t)pSrcPath;

data.flags.type = VMMDevHGCMParmType_32bit;
data.flags.u.value32 = flags;

rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
/* Log(("VBOXSF: VbglR0SfClose: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
return rc;
}
+ data.src.type = VMMDevHGCMParmType_LinAddr_In;
+ data.src.u.Pointer.size = ShflStringSizeOfBuffer(pSrcPath);
+ data.src.u.Pointer.u.linearAddr = (uintptr_t)pSrcPath;
+
+ data.dest.type = VMMDevHGCMParmType_LinAddr_In;
+ data.dest.u(Pointer.size = ShflStringSizeOfBuffer(pDestPath);
+ data.dest.u(Pointer.u.linearAddr = (uintptr_t)pDestPath;
+
+ data.flags.type = VMMDevHGCMParmType_32bit;
+ data.flags.u.value32 = flags;
+
+ rc = VbglIR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
+ /* Log("VBOXSF: VbglIR0SfRename: VbglIR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+ return rc;
+
+ /**
+ * VbglIR0SfRead
+ * @brief Read a file
+ * @param pClient The client handle
+ * @param pMap The map handle
+ * @param hFile The file handle
+ * @param offset The offset to read from
+ * @param pcbBuffer The buffer to read into
+ * @param pBuffer The buffer address
+ * @param fLocked True if locked
+ * @return The return code
+ */
+ + DECLVBGL(int) VbglR0SfRead(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile,
+ + uint64_t offset, uint32_t *pcbBuffer, uint8_t *pBuffer, bool fLocked)
+ +{
+ + int rc;
+ + VBoxSFRead data;
+ +
+ + VBOX_INIT_CALL(&data.callInfo, READ, pClient);
+ +
+ + data.root.type = VMMDevHGCMParmType_32bit;
+ + data.root.u.value32 = pMap->root;
+ +
+ + data.handle.type = VMMDevHGCMParmType_64bit;
+ + data.handle.u.value64 = hFile;
+ + data.offset.type = VMMDevHGCMParmType_64bit;
+ + data.offset.u.value64 = offset;
+ + data.cb.type = VMMDevHGCMParmType_32bit;
+ + data.cb.u.value32 = *pcbBuffer;
+ + data.buffer.type = (fLocked) ? VMMDevHGCMParmType_LinAddr_Locked_Out :
+ VMMDevHGCMParmType_LinAddr_Out;
+ + data.buffer.u.Pointer.size = *pcbBuffer;
+ + data.buffer.u.Pointer.u.linearAddr = (uintptr_t)pBuffer;
+ +
+ + rc = VbglIR0HGCMCallRaw(pClient->handle, &data.callInfo, sizeof(data));
+ + /* Log("VBOXSF: VbglIR0SfRead: VbglIR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+ + if (RT_SUCCESS(rc))
+ + {
+ + rc = data.callInfo.Hdr.rc;
+ + *pcbBuffer = data.cb.u.value32;
+ + }
+ + return rc;
+ +}
DECLVBGL(int) VbglR0SfReadPageList(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer,
    uint32_t offFirstPage, uint16_t cPages, RTGCPHYS64 *paPages)
{
    uint32_t cbToRead = *pcbBuffer;
    uint32_t cbData = (uint32_t)(sizeof(VBoxSFRead) + RT_UOFFSETOF(HGCMPageListInfo, aPages[cPages]));
    VBoxSFRead *pData = (VBoxSFRead *)RTMemTmpAlloc(cbData);
    HGCMPageListInfo *pPgLst = (HGCMPageListInfo *)(pData + 1);
    int rc;

    if (RT_UNLIKELY(!pData))
        return VERR_NO_TMP_MEMORY;

    VBOX_INIT_CALL_EX(&pData->callInfo, READ, pClient, cbData);

    pData->root.type = VMMDevHGCMParmType_32bit;
    pData->root.u.value32 = pMap->root;

    pData->handle.type = VMMDevHGCMParmType_64bit;
    pData->handle.u.value64 = hFile;
    pData->offset.type = VMMDevHGCMParmType_64bit;
    pData->offset.u.value64 = offset;
    pData->cb.type = VMMDevHGCMParmType_32bit;
    pData->cb.u.value32 = cbToRead;
    pData->buffer.type = VMMDevHGCMParmType_PageList;
    pData->buffer.u.PageList.size = cbToRead;
    pData->buffer.u.PageList.offset = sizeof(VBoxSFRead);

    pPgLst->flags = VBOX_HGCM_F_PARM_DIRECTION_FROM_HOST;
    pPgLst->offFirstPage = offFirstPage;
    pPgLst->cPages = cPages;
    for (int iPage = 0; iPage < cPages; iPage++)
        pPgLst->aPages[iPage] = paPages[iPage];

    rc = VbglIR0HGCMCallRaw(pClient->handle, &pData->callInfo, cbData);
    if (RT_SUCCESS(rc))
        rc = pData->callInfo.Hdr.rc;
    *pcbBuffer = pData->cb.u.value32;
    RTMemTmpFree(pData);
    return rc;
DECLVBGL(int) VbglR0SfWrite(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer, uint8_t *pBuffer, bool fLocked)
+
+ int rc;
+ VBoxSFWrite data;
+ + VBOX_INIT_CALL(&data.callInfo, WRITE, pClient);
+ + data.root.type = VMMDevHGCMParmType_32bit;
+ + data.root.u.value32 = pMap->root;
+ + data.handle.type = VMMDevHGCMParmType_64bit;
+ + data.handle.u.value64 = hFile;
+ + data.offset.type = VMMDevHGCMParmType_64bit;
+ + data.offset.u.value64 = offset;
+ + data.cb.type = VMMDevHGCMParmType_32bit;
+ + data.cb.u.value32 = *pcbBuffer;
+ + data.buffer.type = fLocked ? VMMDevHGCMParmType_LinAddr_Locked_In : VMMDevHGCMParmType_LinAddr_In;
+ + data.buffer.u.Pointer.size = *pcbBuffer;
+ + data.buffer.u.Pointer.u.linearAddr = (uintptr_t)pBuffer;
+ + rc = VbglR0HGCMCallRaw(pClient->handle, &data.callInfo, sizeof(data));
+ /* Log(("VBOXSF: VbglR0SfWrite: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+ if (RT_SUCCESS(rc))
+ {
+   rc = data.callInfo.Hdr.rc;
+   *pcbBuffer = data.cb.u.value32;
+ }
+ return rc;
+ +
+DECLVBGL(int) VbglR0SfWritePhysCont(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer, RTCCPHYS PhysBuffer)
+{
+   uint32_t cbToWrite = *pcbBuffer;
+   uint32_t cPages = RT_ALIGN_32((PhysBuffer & PAGE_OFFSET_MASK) + cbToWrite, PAGE_SIZE) >> PAGE_SHIFT;
+   uint32_t cbData = (uint32_t)(sizeof(VBoxSFWrite) + RT_UOFFSETOF(HGCMPageListInfo, aPages[cPages]));
+   VBoxSFWrite *pData = (VBoxSFWrite *)RTMemTmpAlloc(cbData);
+   HGCMPageListInfo *pPgLst = (HGCMPageListInfo *)(pData + 1);
+   uint32_t iPage;
+   int rc;
if (RT_UNLIKELY(!pData))
    return VERR_NO_TMP_MEMORY;

VBOX_INIT_CALL_EX(&pData->callInfo, WRITE, pClient, cbData);

pData->root.type = VMMDevHGCMParmType_32bit;
pData->root.u.value32 = pMap->root;

pData->handle.type = VMMDevHGCMParmType_64bit;
pData->handle.u.value64 = hFile;

pData->offset.type = VMMDevHGCMParmType_64bit;
pData->offset.u.value64 = offset;

pData->cb.type = VMMDevHGCMParmType_32bit;
pData->cb.u.value32 = cbToWrite;

pData->buffer.type = VMMDevHGCMParmType_PageList;
pData->buffer.u.PageList.size = cbToWrite;
pData->buffer.u.PageList.offset = sizeof(VBoxSFWrite);

pPgLst->flags = VBOX_HGCM_F_PARM_DIRECTION_TO_HOST;
pPgLst->offFirstPage = (uint16_t)(PhysBuffer & PAGE_OFFSET_MASK);
pPgLst->cPages = cPages;

PhysBuffer &= ~(RTCCPHYS)PAGE_OFFSET_MASK;
for (iPage = 0; iPage < cPages; iPage++, PhysBuffer += PAGE_SIZE)
    pPgLst->aPages[iPage] = PhysBuffer;

rc = VbgIR0HGCMCallRaw(pClient->handle, &pData->callInfo, cbData);
/* Log(("VBOXSF: VbgIR0SfWritePhysCont: VbgIR0HGCMCall rc = %#x, result = %#x\n", rc,
data.callInfo.Hdr.rc)); */
if (RT_SUCCESS(rc))
{
    rc = pData->callInfo.Hdr.rc;
    *pcbBuffer = pData->cb.u.value32;
}

RTMemTmpFree(pData);
return rc;

DECLVBGL(int) VbglR0SfWritePageList(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint16_t offFirstPage, uint16_t cPages, RTGCPHYS64 *paPages)
{
    uint32_t            cbToWrite = *pcbBuffer;
    uint32_t            cbData    = (uint32_t)(sizeof(VBoxSFWrite) + RT_UOFFSET(HGCMPageListInfo, aPages[cPages]));
    VBoxSFWrite        *pData     = (VBoxSFWrite *)((HGCMPageListInfo *)((uint16_t)RTMemTmpAlloc(cbData) + sizeof(VBoxSFWrite) + RT_UOFFSETOF(HGCMPageListInfo, aPages[cPages]));
    HGCMPageListInfo   *pPgLst    = (HGCMPageListInfo *)((uint16_t)RTMemTmpAlloc(cbData) + sizeof(VBoxSFWrite) + RT_UOFFSETOF(HGCMPageListInfo, aPages[cPages]));
    +VBoxSFWrite        *pData     = (VBoxSFWrite *)RTMemTmpAlloc(cbData);
    +HGCMPageListInfo   *pPgLst    = (HGCMPageListInfo *)(pData + 1);
uint16_t iPage;
int rc;

if (RT_UNLIKELY(!pData))
    return VERR_NO_TMP_MEMORY;

VBOX_INIT_CALL_EX(&pData->callInfo, WRITE, pClient, cbData);

pData->root.type = VMMDevHGCMParmType_32bit;
pData->root.u.value32 = pMap->root;

pData->handle.type = VMMDevHGCMParmType_64bit;
pData->handle.u.value64 = hFile;
pData->offset.type = VMMDevHGCMParmType_64bit;
pData->offset.u.value64 = offset;
pData->cb.type = VMMDevHGCMParmType_32bit;
pData->cb.u.value32 = cbToWrite;
pData->buffer.type = VMMDevHGCMParmType_PageList;
pData->buffer.u.PageList.size = cbToWrite;
pData->buffer.u.PageList.offset = sizeof(VBoxSFWrite);

pPgLst->flags = VBOX_HGCM_F_PARM_DIRECTION_TO_HOST;
pPgLst->offFirstPage = offFirstPage;
pPgLst->cPages = cPages;
for (iPage = 0; iPage < cPages; iPage++)
    pPgLst->aPages[iPage] = paPages[iPage];

rc = VbglR0HGCMCallRaw(pClient->handle, &pData->callInfo, cbData);
/* Log(("VBOXSF: VbglR0SfWritePageList: VbglR0HGCMCall rc = %#x, result = %#x\n", rc,
data.callInfo.Hdr.rc)); */
if (RT_SUCCESS(rc))
    rc = pData->callInfo.Hdr.rc;
    *pcbBuffer = pData->cb.u.value32;
}

RTMemTmpFree(pData);
return rc;

DECLVBGL(int) VbglR0SfFlush(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile)
{
    int rc;
    VBoxSFFlush data;
    VBOX_INIT_CALL(&data.callInfo, FLUSH, pClient);
    data.root.type = VMMDevHGCMParmType_32bit;
+ data.root.u.value32 = pMap->root;
+
+ data.handle.type = VMMDevHGCMParmType_64bit;
+ data.handle.u.value64 = hFile;
+
+ rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
+/* Log(("VBOXSF: VbglR0SfFlush: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+ return rc;
+
+
+DECLVBGL(int) VbglR0SfDirInfo(
+ PVBGLSFCLIENT pClient,
+ PVBGLSFMAP pMap,
+ SHFLHANDLE hFile,
+ PSHFLSTRING ParsedPath,
+ uint32_t flags,
+ uint32_t index,
+ uint32_t pcbBuffer,
+ PSHFLDIRINFO pBuffer,
+ uint32_t pcFiles)
+
+{ int rc;
  VBoxSFList data;

  + VBOX_INIT_CALL(&data.callInfo, LIST, pClient);
  +
  + data.root.type = VMMDevHGCMParmType_32bit;
  + data.root.u.value32 = pMap->root;
  +
  + data.handle.type = VMMDevHGCMParmType_64bit;
  + data.handle.u.value64 = hFile;
  +
  + data.flags.type = VMMDevHGCMParmType_32bit;
  + data.flags.u.value32 = flags;
  +
  + data.cb.type = VMMDevHGCMParmType_32bit;
  + data.cb.u.value32 = *pcbBuffer;
  +
  + data.path.type = VMMDevHGCMParmType_LinAddr_In;
  + data.path.u.Pointer.size = ParsedPath ? ShflStringSizeOfBuffer(ParsedPath) : 0;
  + data.path.u.Pointer.u.linearAddr = (uintptr_t) ParsedPath;
  +
  + data.buffer.type = VMMDevHGCMParmType_LinAddr_Out;
  + data.buffer.u.Pointer.size = *pcbBuffer;
  +
  + data.resumePoint.type = VMMDevHGCMParmType_32bit;
  + data.resumePoint.u.value32 = index;
  +
  + data.cFiles.type = VMMDevHGCMParmType_32bit;
  + data.cFiles.u.value32 = 0; /* out parameters only */
+
+ rc = VbgIR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
+ /* Log(("VBOXSF: VbgIR0SfDirInfo: rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+ *pcbBuffer = data.cb.u.value32;
+ *pcFiles = data.cFiles.u.value32;
+ return rc;
+
+
+DECLVBGL(int) VbglR0SfFsInfo(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile,
+                             uint32_t flags, uint32_t *pcbBuffer, PSHFLDIRINFO pBuffer)
+{
+    int rc;
+    VBoxSFInformation data;
+
+    VBOX_INIT_CALL(&data.callInfo, INFORMATION, pClient);
+
+    data.root.type = VMMDevHGCMParmType_32bit;
+    data.root.u.value32 = pMap->root;
+
+    data.handle.type = VMMDevHGCMParmType_64bit;
+    data.handle.u.value64 = hFile;
+    data.flags.type = VMMDevHGCMParmType_32bit;
+    data.flags.u.value32 = flags;
+    data.cb.type = VMMDevHGCMParmType_32bit;
+    data.cb.u.value32 = *pcbBuffer;
+    data.info.type = VMMDevHGCMParmType_LinAddr;
+    data.info.u.Pointer.size = *pcbBuffer;
+    data.info.u.Pointer.u.linearAddr = (uintptr_t)pBuffer;
+
+    rc = VbgIR0HGCMCallRaw(pClient->handle, &data.callInfo, sizeof(data));
+    /* Log(("VBOXSF: VbgIR0SfFsInfo: VbgIR0HGCMCall rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+    if (RT_SUCCESS(rc))
+    {
+        rc = data.callInfo.Hdr.rc;
+        *pcbBuffer = data.cb.u.value32;
+    }
+    return rc;
+
+
+DECLVBGL(int) VbglR0SfLock(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile,
+                                 uint64_t offset, uint64_t cbSize, uint32_t fLock)
+{
+    int rc;
+    VBoxSFLock data;
+
+    VBOX_INIT_CALL(&data.callInfo, LOCK, pClient);
+
+    data.root.type = VMMDevHGCMParmType_32bit;
+ data.root.u.value32 = pMap->root;
+ data.handle.type = VMMDevHGCMParmType_64bit;
+ data.handle.u.value64 = hFile;
+ data.offset.type = VMMDevHGCMParmType_64bit;
+ data.offset.u.value64 = offset;
+ data.length.type = VMMDevHGCMParmType_64bit;
+ data.length.u.value64 = cbSize;
+ data.flags.type = VMMDevHGCMParmType_32bit;
+ data.flags.u.value32 = fLock;
+ rc = VbgIR0HGMCALL(pClient->handle, &data.callInfo, sizeof(data));
+ /* Log("VBOXSF: VbgIR0SfLock: VbgIR0HGMCALL rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+ return rc;
+
+ DECLVBGL(int) VbgIR0SfSetUtf8(PVBGLSFCLIENT pClient)
+ {
+   int rc;
+   VBGLOCHGCMCALL callInfo;
+   VBOX_INIT_CALL(&callInfo, SET_UTF8, pClient);
+   rc = VbgIR0HGMCALL(pClient->handle, &callInfo, sizeof(callInfo));
+   /* Log("VBOXSF: VbgIR0SfSetUtf8: VbgIR0HGMCALL rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+   return rc;
+ }
+
+ DECLVBGL(int) VbgIR0SfReadLink(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING pParsedPath, uint32_t cbBuffer, uint8_t *pBuffer)
+ {
+   int rc;
+   VBoxSFReadLink data;
+   VBOX_INIT_CALL(&data.callInfo, READLINK, pClient);
+   data.root.type = VMMDevHGCMParmType_32bit;
+   data.root.u.value32 = pMap->root;
+   data.path.type = VMMDevHGCMParmType_LinAddr_In;
+   data.path.u.Pointer.size = ShflStringSizeOfBuffer (pParsedPath);
+   data.path.u(Pointer.u.linearAddr = (uintptr_t)pParsedPath;
+   data.buffer.type = VMMDevHGCMParmType_LinAddr_Out;
+   data.buffer.u.Pointer.size = cbBuffer;
+   data.buffer.u(Pointer.u.linearAddr = (uintptr_t)pBuffer;
+   /* Log("VBOXSF: VBoxSFReadLink: VBoxSFReadLink rc = %#x, result = %#x\n", rc, data.callInfo.Hdr.rc)); */
+   return rc;
+ }
rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
/* Log("VBOXSF: VbglR0SfReadLink: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, 
data.callInfo.Hdr.rc)); */
return rc;
}

DECLVBGL(int) VbglR0SfSymlink(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING
pNewPath, PSHFLSTRING pOldPath,
    PSHFLFSOBJINFO pBuffer)
{
    int rc;
    VBoxSFSymlink data;

    VBOX_INIT_CALL(&data.callInfo, SYMLINK, pClient);

    data.root.type                      = VMMDevHGCMParmType_32bit;
    data.root.u.value32                 = pMap->root;

    data.newPath.type                   = VMMDevHGCMParmType_LinAddr_In;
    data.newPath.u.Pointer.size         = ShflStringSizeOfBuffer (pNewPath);
    data.newPath.u.Pointer.u.linearAddr = (uintptr_t)pNewPath;

    data.oldPath.type                   = VMMDevHGCMParmType_LinAddr_In;
    data.oldPath.u.Pointer.size         = ShflStringSizeOfBuffer (pOldPath);
    data.oldPath.u.Pointer.u.linearAddr = (uintptr_t)pOldPath;

    data.info.type                      = VMMDevHGCMParmType_LinAddr_Out;
    data.info.u.Pointer.size            = sizeof(SHFLFSOBJINFO);
    data.info.u.Pointer.u.linearAddr    = (uintptr_t)pBuffer;

    rc = VbglR0HGCMCall(pClient->handle, &data.callInfo, sizeof(data));
/* Log("VBOXSF: VbglR0SfSymlink: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, 
data.callInfo.Hdr.rc)); */
return rc;
}

DECLVBGL(int) VbglR0SfSetSymlinks(PVBGLSFCLIENT pClient)
{
    int rc;
    VBGLIOCHGCMCALL callInfo;

    VBOX_INIT_CALL(&callInfo, SET_SYMLINKS, pClient);

    rc = VbglR0HGCMCall(pClient->handle, &callInfo, sizeof(callInfo));
/* Log("VBOXSF: VbglR0SfSetSymlinks: VbglR0HGCMCall rc = %#x, result = %#x\n", rc, 
data.callInfo.Hdr.rc)); */
return rc;
}
--- linux-4.15.0.org/ubuntu/vbox/vboxsf/dirops.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/dirops.c
@@ -0,0 +1,902 @@
+/** @file
+ *
+ * vboxsf -- VirtualBox Guest Additions for Linux:
+ * Directory inode and file operations
+ */
+
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+
+#include "vfsmod.h"
+
+/**
+ * Open a directory. Read the complete content into a buffer.
+ *
+ * @param inode     inode
+ * @param file      file
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_dir_open(struct inode *inode, struct file *file)
+{
+    int rc;
+    int err;
+    struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
+    struct sf_dir_info *sf_d;
+    struct sf_inode_info *sf_i = GET_INODE_INFO(inode);
+    SHFLCREATEPARMS params;
+
+    TRACE();
+    BUG_ON(!sf_g);
+    BUG_ON(!sf_i);
+
+    if (file->private_data)
+    {
+        LogFunc(("sf_dir_open() called on already opened directory "%s\n",
+                 sf_i->path->String.utf8));
+        return 0;
+    }
+ sf_d = sf_dir_info_alloc();
+ if (!sf_d)
+ {
+     LogRelFunc("could not allocate directory info for ",
+                 sf_i->path->String.utf8);
+     return -ENOMEM;
+ }
+ RT_ZERO(params);
+ params.Handle = SHFL_HANDLE_NIL;
+ params.CreateFlags = 0
+     | SHFL_CF_DIRECTORY
+     | SHFL_CF_ACT_OPEN_IF_EXISTS
+     | SHFL_CF_ACT_FAIL_IF_NEW
+     | SHFL_CF_ACCESS_READ
+     ;
+ LogFunc("sf_dir_open(): calling VbglR0SfCreate, folder %s, flags %#x
",
          sf_i->path->String.utf8, params.CreateFlags));
+ rc = VbglR0SfCreate(&client_handle, &sf_g->map, sf_i->path, &params);
+ if (RT_SUCCESS(rc))
+ {
+     if (params.Result == SHFL_FILE_EXISTS)
+     {
+         err = sf_dir_read_all(sf_g, sf_i, sf_d, params.Handle);
+         if (!err)
+             file->private_data = sf_d;
+     }
+     else
+         err = -ENOENT;
+     rc = VbglR0SfClose(&client_handle, &sf_g->map, params.Handle);
+     if (RT_FAILURE(rc))
+         LogFunc("sf_dir_open(): VbglR0SfClose(%s) after err=%d failed rc=%R",
+                 sf_i->path->String.utf8, err, rc));
+ }
+ else
+     err = -EPERM;
+
+ if (err)
+     sf_dir_info_free(sf_d);
+
+ return err;
/**
 * This is called when reference count of [file] goes to zero. Notify
 * the host that it can free whatever is associated with this directory
 * and deallocate our own internal buffers
 *
 * @param inode   inode
 * @param file    file
 * returns 0 on success, Linux error code otherwise
 */
static int sf_dir_release(struct inode *inode, struct file *file)
{
    TRACE();

    if (file->private_data)
        sf_dir_info_free(file->private_data);

    return 0;
}

/**
 * Translate RTFMODE into DT_xxx (in conjunction to rtDirType())
 * @param fMode    file mode
 * returns d_type
 */
static int sf_get_d_type(RTFMODE fMode)
{
    int d_type;
    switch (fMode & RTFS_TYPE_MASK)
    {
        case RTFS_TYPE_FIFO:    d_type = DT_FIFO;        break;
        case RTFS_TYPE_DEV_CHAR: d_type = DT_CHR;        break;
        case RTFS_TYPE_DIRECTORY: d_type = DT_DIR;        break;
        case RTFS_TYPE_DEV_BLOCK: d_type = DT_BLK;        break;
        case RTFS_TYPE_FILE:     d_type = DT_REG;         break;
        case RTFS_TYPE_SYMLINK:  d_type = DT_LNK;         break;
        case RTFS_TYPE_SOCKET:   d_type = DT_SOCK;        break;
        case RTFS_TYPE_WHITEOUT: d_type = DT_WHT;         break;
        default:                 d_type = DT_UNKNOWN;      break;
    }
    return d_type;
}

/**
 * Extract element ([dir]->f_pos) from the directory [dir] into [d_name].
 *
 * @returns 0 for success, 1 for end reached, Linux error code otherwise.
 */
static int sf_getdent(struct file *dir, char d_name[NAME_MAX], int *d_type)
{  
  loff_t cur;
  struct sf_glob_info *sf_g;
  struct sf_dir_info *sf_d;
  struct sf_inode_info *sf_i;
  struct inode *inode;
  struct list_head *pos, *list;
  
  TRACE();
  
  inode = GET_F_DENTRY(dir)->d_inode;
  sf_i = GET_INODE_INFO(inode);
  sf_g = GET_GLOB_INFO(inode->i_sb);
  sf_d = dir->private_data;
  
  BUG_ON(!sf_g);
  BUG_ON(!sf_d);
  BUG_ON(!sf_i);
  
  if (sf_i->force_reread)
  {
    int rc;
    int err;
    SHFLCREATEPARMS params;
    
    RT_ZERO(params);
    params.Handle = SHFL_HANDLE_NIL;
    params.CreateFlags = 0
    | SHFL_CF_DIRECTORY
    | SHFL_CF_ACT_OPEN_IF_EXISTS
    | SHFL_CF_ACT_FAIL_IF_NEW
    | SHFL_CF_ACCESS_READ
    ;
    
    LogFunc("sf_getdent: calling VbglR0SfCreate, folder %s, flags %#x\n",
            sf_i->path->String.utf8, params.CreateFlags);
    rc = VbglR0SfCreate(&client_handle, &sf_g->map, sf_i->path, &params);
    if (RT_FAILURE(rc))
    {
      LogFunc("VbglR0SfCreate(%s) failed rc=%Rrc\n",
                 sf_i->path->String.utf8, rc);
      return -EPERM;
    }
    
    if (params.Result != SHFL_FILE_EXISTS)
    {
      LogFunc("directory %s does not exist\n", sf_i->path->String.utf8);
      sf_dir_info_free(sf_d);
    }
  }
  
  if (params.Result != SHFL_FILE_EXISTS)
  {
    LogFunc("directory %s does not exist\n", sf_i->path->String.utf8);
    sf_dir_info_free(sf_d);
  }
}
return -ENOENT;

sf_dir_info_empty(sf_d);
err = sf_dir_read_all(sf_g, sf_i, sf_d, params.Handle);
rc = VbglR0SfClose(&client_handle, &sf_g->map, params.Handle);
if (RT_FAILURE(rc))
    LogFunc("VbglR0SfClose(%s) failed rc=%Rrc\n", sf_i->path->String.utf8, rc);
if (err)
    return err;
sf_i->force_reread = 0;
}
cur = 0;
list = &sf_d->info_list;
list_for_each(pos, list)
{
    struct sf_dir_buf *b;
    SHFLDIRINFO *info;
    loff_t i;
    b = list_entry(pos, struct sf_dir_buf, head);
    if (dir->f_pos >= cur + b->cEntries)
    {
        cur += b->cEntries;
        continue;
    }
    for (i = 0, info = b->buf; i < dir->f_pos - cur; ++i)
    {
        size_t size;
        size = offsetof(SHFLDIRINFO, name.String) + info->name.u16Size;
        info = (SHFLDIRINFO *) ((uintptr_t) info + size);
    }
    *d_type = sf_get_d_type(info->Info.Attr.fMode);
return sf_nlscpy(sf_g, d_name, NAME_MAX, info->name.String.utf8, info->name.u16Length);
}
return 1;
*/
/* This is called when vfs wants to populate internal buffers with
directory's contents. [opaque] is an argument to the
[filldir]. [filldir] magically modifies it's argument - [opaque]
and takes following additional arguments (which i in turn get from
the host via sf_getdent):

* name : name of the entry (i must also supply it's length huh?)
* type : type of the entry (FILE | DIR | etc) (i ellect to use DT_UNKNOWN)
* pos : position/index of the entry
* ino : inode number of the entry (i fake those)

* [dir] contains:
  * f_pos : cursor into the directory listing
  * private_data : mean of communication with the host side
  * Extract elements from the directory listing (incrementing f_pos
  along the way) and feed them to [filldir] until:
    * a. there are no more entries (i.e. sf_getdent set done to 1)
    * b. failure to compute fake inode number
    * c. filldir returns an error (see comment on that)

#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 11, 0)
static int sf_dir_iterate(struct file *dir, struct dir_context *ctx)
#else
static int sf_dir_read(struct file *dir, void *opaque, filldir_t filldir)
#endif
{
    TRACE();
    for (;;)
    {
        int err;
        ino_t fake_ino;
        loff_t sanity;
        char d_name[NAME_MAX];
        int d_type = DT_UNKNOWN;
        err = sf_getdent(dir, d_name, &d_type);
        switch (err)
        {
        case 1:
            return 0;
        case 0:
            break;
        case -1:
            default:
                /* skip erroneous entry and proceed */
+ LogFunc("sf_getdent error %d\n", err));
+ dir->f_pos += 1;
+if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 11, 0)
+ ctx->pos += 1;
+endif
+    continue;
+ }
+
+ /* d_name now contains a valid entry name */
+if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 11, 0)
+    sanity = ctx->pos + 0xbeef;
+else
+    sanity = dir->f_pos + 0xbeef;
+endif
+ fake_ino = sanity;
+ if (sanity - fake_ino)
+ {    LogRelFunc("can not compute ino\n");
+     return -EINVAL;
+ }
+
+if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 11, 0)
+    if (!dir_emit(ctx, d_name, strlen(d_name), fake_ino, d_type))
+    {
+        LogFunc("dir_emit failed\n");
+        return 0;
+    }
+else
+    err = filldir(opaque, d_name, strlen(d_name), dir->f_pos, fake_ino, d_type);
+ if (err)
+ {    LogFunc("filldir returned error %d\n", err));
+     /* Rely on the fact that filldir returns error
+        only when it runs out of space in opaque */
+     return 0;
+ }
+endif
+
+    dir->f_pos += 1;
+if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 11, 0)
+    ctx->pos += 1;
+endif
+}
+
+ BUG();
+}
+struct file_operations sf_dir_fops =
+{
+    .open = sf_dir_open,
+    .iterate = sf_dir_iterate,
+    .read = generic_read_dir
+    .readdir = sf_dir_read,
+    .release = sf_dir_release,
+    .llseek = generic_file_llseek
+};
+
+/* iops */
+
+/**
+ * This is called when vfs failed to locate dentry in the cache. The
+ * job of this function is to allocate inode and link it to dentry.
+ * [dentry] contains the name to be looked in the [parent] directory.
+ * Failure to locate the name is not a "hard" error, in this case NULL
+ * inode is added to [dentry] and vfs should proceed trying to create
+ * the entry via other means. NULL(or "positive" pointer) ought to be
+ * returned in case of success and "negative" pointer on error
+ */
+static struct dentry *sf_lookup(struct inode *parent, struct dentry *dentry
+                                , unsigned int flags
+                                , struct nameidata *nd
+                               )
+{
+    int err;
+    struct sf_inode_info *sf_i, *sf_new_i;
+    struct sf_glob_info *sf_g;
+    SHFLSTRING *path;
+    struct inode *inode;
+    ino_t ino;
+    SHFLFSOBJINFO fsinfo;
+    TRACE();
+    sf_g = GET_GLOB_INFO(parent->i_sb);
+    sf_i = GET_INODE_INFO(parent);
+    BUG_ON(!sf_g);
BUG_ON(!sf_i);

err = sf_path_from_dentry(__func__, sf_g, sf_i, dentry, &path);
if (err)
  goto fail0;

err = sf_stat(__func__, sf_g, path, &fsinfo, 1);
if (err)
  {
    if (err == -ENOENT)
      {
        /* -ENOENT: add NULL inode to dentry so it later can be
           created via call to create/mkdir/open */
        kfree(path);
        inode = NULL;
      }
    else
      goto fail1;
  }
else
  {
    sf_new_i = kmalloc(sizeof(*sf_new_i), GFP_KERNEL);
    if (!sf_new_i)
      {
        LogRelFunc("could not allocate memory for new inode info\n");
        err = -ENOMEM;
        goto fail1;
      }
    sf_new_i->handle = SHFL_HANDLE_NIL;
    sf_new_i->force_reread = 0;

    ino = iunique(parent->i_sb, 1);
#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 25)
    inode = iget_locked(parent->i_sb, ino);
#else
    inode = iget(parent->i_sb, ino);
#endif
    if (!inode)
      {
        LogFunc("iget failed");
        err = -ENOMEM; /* XXX: ?? */
        goto fail2;
      }

    SET_INODE_INFO(inode, sf_new_i);
    sf_init_inode(sf_g, inode, &fsinfo);
    sf_new_i->path = path;
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 25)
+        unlock_new_inode(inode);
+#endif
+
+    sf_i->force_restat = 0;
+    dentry->d_time = jiffies;
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 38)
+    d_set_d_op(dentry, &sf_dentry_ops);
+    dentry->d_op = &sf_dentry_ops;
+#else
+    d_set_d_op(dentry, &sf_dentry_ops);
+    dentry->d_op = &sf_dentry_ops;
+#endif
+    d_add(dentry, inode);
+    return NULL;
+
+fail2:
+    kfree(sf_new_i);
+
+fail1:
+    kfree(path);
+
+fail0:
+    return ERR_PTR(err);
+
+/**
+ * This should allocate memory for sf_inode_info, compute a unique inode
+ * number, get an inode from vfs, initialize inode info, instantiate
+ * dentry.
+ *
+ * @param parent inode entry of the directory
+ * @param dentry directory cache entry
+ * @param path path name
+ * @param info file information
+ * @param handle handle
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_instantiate(struct inode *parent, struct dentry *dentry,
+                          SHFLSTRING *path, PSHFLFSOBJINFO info, SHFLHANDLE handle)
+{
+    int err;
+    ino_t ino;
+    struct inode *inode;
+    struct sf_inode_info *sf_new_i;
+    struct sf_glob_info *sf_g = GET_GLOB_INFO(parent->i_sb);
+
+    TRACE();
+    BUG_ON(!sf_g);
+ sf_new_i = kmalloc(sizeof(*sf_new_i), GFP_KERNEL);
+ if (!sf_new_i)
+  {
+      LogRelFunc("could not allocate inode info.\n");
+      err = -ENOMEM;
+      goto fail0;
+  }
+
+  ino = iunique(parent->i_sb, 1);
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 25)
+    inode = iget_locked(parent->i_sb, ino);
+#else
+    inode = iget(parent->i_sb, ino);
+#endif
+  if (!inode)
+  {
+      LogFunc("iget failed");
+      err = -ENOMEM;
+      goto fail1;
+  }
+
+  sf_init_inode(sf_g, inode, info);
+  sf_new_i->path = path;
+  SET_INODE_INFO(inode, sf_new_i);
+  sf_new_i->force_restat = 1;
+  sf_new_i->force_reread = 0;
+
+  d_instantiate(dentry, inode);
+
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 25)
+    unlock_new_inode(inode);
+#endif
+
+  /* Store this handle if we leave the handle open. */
+  sf_new_i->handle = handle;
+  return 0;
+
+fail1:
+  kfree(sf_new_i);
+
+fail0:
+  return err;
+
+}**
+ * Create a new regular file / directory.
+ * @param parent        inode of the directory
+ * @param dentry        directory cache entry
+ * @param mode          file mode
+ * @param fDirectory    true if directory, false otherwise
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_create_aux(struct inode *parent, struct dentry *dentry,
+                         umode_t mode, int fDirectory)
+{
+    int rc, err;
+    SHFLCREATEPARMS params;
+    SHFLSTRING *path;
+    struct sf_inode_info *sf_i = GET_INODE_INFO(parent);
+    struct sf_glob_info *sf_g = GET_GLOB_INFO(parent->i_sb);
+    TRACE();
+    BUG_ON(!sf_i);
+    BUG_ON(!sf_g);
+    err = sf_path_from_dentry(__func__, sf_g, sf_i, dentry, &path);
+    if (err)
+        goto fail0;
+    RT_ZERO(params);
+    params.Handle = SHFL_HANDLE_NIL;
+    params.CreateFlags = 0
+                        | SHFL_CF_ACT_CREATE_IF_NEW
+                        | SHFL_CF_ACT_FAIL_IF_EXISTS
+                        | SHFL_CF_ACCESS_READWRITE
+                        | (fDirectory ? SHFL_CF_DIRECTORY : 0)
+                        ;
+    params.Info.Attr.fMode = 0
+                        | (fDirectory ? RTFS_TYPE_DIRECTORY : RTFS_TYPE_FILE)
+                        | (mode & S_IRWXUGO)
+                        ;
+    params.Info.Attr.enmAdditional = RTFSOBJATTRADD NOTHING;
+    LogFunc(("sf_create_aux: calling VbglR0SfCreate, folder %s, flags %\n",
        path->String.utf8, params.CreateFlags));
+    rc = VbglR0SfCreate(&client_handle, &sf_g->map, path, &params);
+    if (RT_FAILURE(rc))
+    {
+        if (rc == VERR_WRITE_PROTECT)
+        {
+            err = -EROFS;
+            goto fail1;
+        }
+    }
+}
err = -EPROTO;
LogFunc("(%d): VbglR0SfCreate(%s) failed rc=%Rrc\n", fDirectory, sf_i->path->String.utf8, rc);
goto fail1;
}

if (params.Result != SHFL_FILE_CREATED)
{
    err = -EPERM;
    LogFunc("(%d): could not create file %s result=%d\n", fDirectory, sf_i->path->String.utf8, params.Result);
goto fail1;
}

err = sf_instantiate(parent, dentry, path, &params.Info, fDirectory ? SHFL_HANDLE_NIL : params.Handle);
if (err)
{
    LogFunc("(%d): could not instantiate dentry for %s err=%d\n", fDirectory, sf_i->path->String.utf8, err);
goto fail2;
}

/*
 * Don't close this handle right now. We assume that the same file is
 * opened with sf_reg_open() and later closed with sf_reg_close(). Save
 * the handle in between. Does not apply to directories. True?
 * */
if (fDirectory)
{
    rc = VbglR0SfClose(&client_handle, &sf_g->map, params.Handle);
    if (RT_FAILURE(rc))
        LogFunc("(%d): VbglR0SfClose failed rc=%Rrc\n", fDirectory, rc);
}

sf_i->force_restat = 1;
return 0;
+fail2:
+   rc = VbglR0SfClose(&client_handle, &sf_g->map, params.Handle);
+   if (RT_FAILURE(rc))
+       LogFunc("(%d): VbglR0SfClose failed rc=%Rrc\n", fDirectory, rc);
+fail1:
+   kfree(path);
+fail0:
+   return err;
/* Create a new regular file. */

* @param parent    inode of the directory
* @param dentry    directory cache entry
* @param mode      file mode
* @param excl      Possible O_EXCL...
* @returns 0 on success, Linux error code otherwise
*/

#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 6, 0) || defined(DOXYGEN_RUNNING)
static int sf_create(struct inode *parent, struct dentry *dentry, umode_t mode, bool excl)
#elif LINUX_VERSION_CODE >= KERNEL_VERSION(3, 3, 0)
static int sf_create(struct inode *parent, struct dentry *dentry, umode_t mode, struct nameidata *nd)
#else
static int sf_create(struct inode *parent, struct dentry *dentry, int mode, struct nameidata *nd)
#endif
{
    TRACE();
    return sf_create_aux(parent, dentry, mode, 0);
}

/* Create a new directory. */

* @param parent    inode of the directory
* @param dentry    directory cache entry
* @param mode      file mode
* @returns 0 on success, Linux error code otherwise
*/
#elif LINUX_VERSION_CODE >= KERNEL_VERSION(3, 3, 0)
static int sf_mkdir(struct inode *parent, struct dentry *dentry, umode_t mode)
#else
static int sf_mkdir(struct inode *parent, struct dentry *dentry, int mode)
#endif
{
    TRACE();
    return sf_create_aux(parent, dentry, mode, 1);
}

/* Remove a regular file / directory. */

* @param parent    inode of the directory
* @param dentry    directory cache entry

+ * @param fDirectory    true if directory, false otherwise
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_unlink_aux(struct inode *parent, struct dentry *dentry, int fDirectory)
+{
+    int rc, err;
+    struct sf_glob_info *sf_g = GET_GLOB_INFO(parent->i_sb);
+    struct sf_inode_info *sf_i = GET_INODE_INFO(parent);
+    SHFLSTRING *path;
+    uint32_t fFlags;
+
+    TRACE();
+    BUG_ON(!sf_g);
+
+    err = sf_path_from_dentry(__func__, sf_g, sf_i, dentry, &path);
+    if (err)
+        goto fail0;
+
+    fFlags = fDirectory ? SHFL_REMOVE_DIR : SHFL_REMOVE_FILE;
+    if (   dentry->d_inode
+        && ((dentry->d_inode->i_mode & S_IFLNK) == S_IFLNK))
+        fFlags |= SHFL_REMOVE_SYMLINK;
+    rc = VbglR0SfRemove(&client_handle, &sf_g->map, path, fFlags);
+    if (RT_FAILURE(rc))
+    {
+        LogFunc(("(%d): VbglR0SfRemove(%s) failed rc=%Rrc
", fDirectory, path->String.utf8, rc));
+        err = -RTErrConvertToErrno(rc);
+        goto fail1;
+    }
+
+    /* directory access/change time changed */
+    sf_i->force_restat = 1;
+    /* directory content changed */
+    sf_i->force_reread = 1;
+    
+    err = 0;
+    
+fail1:
+    kfree(path);
+
+fail0:
+    return err;
+}
+
+/**
+ * Remove a regular file.
+ *
+ @param parent    inode of the directory
+ * @param dentry directory cache entry
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_unlink(struct inode *parent, struct dentry *dentry)
+{
+    TRACE();
+    return sf_unlink_aux(parent, dentry, 0);
+}
+
+/**
+ * Remove a directory.
+ *
+ * @param parent inode of the directory
+ * @param dentry directory cache entry
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_rmdir(struct inode *parent, struct dentry *dentry)
+{
+    TRACE();
+    return sf_unlink_aux(parent, dentry, 1);
+}
+
+/**
+ * Rename a regular file / directory.
+ *
+ * @param old_parent inode of the old parent directory
+ * @param old_dentry old directory cache entry
+ * @param new_parent inode of the new parent directory
+ * @param new_dentry new directory cache entry
+ * @param flags flags
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_rename(struct inode *old_parent, struct dentry *old_dentry,
+                     struct inode *new_parent, struct dentry *new_dentry
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 9, 0)
+                     , unsigned flags
+#endif
+                     )
+{
+    int err = 0, rc = VINF_SUCCESS;
+    struct sf_glob_info *sf_g = GET_GLOB_INFO(old_parent->i_sb);
+
+    TRACE();
+
+    if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 9, 0)
+        unsigned flags
+    endif
+    )
+    {
+        int err = 0, rc = VINF_SUCCESS;
+        struct sf_glob_info *sf_g = GET_GLOB_INFO(old_parent->i_sb);
+        TRACE();
+    }
+}
return -EINVAL;
}
#endif

if (sf_g != GET_GLOB_INFO(new_parent->i_sb)) {
    LogFunc("rename with different roots\n");
    err = -EINVAL;
} else {
    struct sf_inode_info *sf_old_i = GET_INODE_INFO(old_parent);
    struct sf_inode_info *sf_new_i = GET_INODE_INFO(new_parent);
    /* As we save the relative path inside the inode structure, we need to change
       this if the rename is successful. */
    struct sf_inode_info *sf_file_i = GET_INODE_INFO(old_dentry->d_inode);
    SHFLSTRING *old_path;
    SHFLSTRING *new_path;
    
    BUG_ON(!sf_old_i);
    BUG_ON(!sf_new_i);
    BUG_ON(!sf_file_i);
    
    old_path = sf_file_i->path;
    err = sf_path_from_dentry(__func__, sf_g, sf_new_i,
                                new_dentry, &new_path);
    if (err)
        LogFunc("failed to create new path\n");
    else {
        int fDir = ((old_dentry->d_inode->i_mode & S_IFDIR) != 0);
        
        rc = VbgIR0SfRename(&client_handle, &sf_g->map, old_path,
                            new_path, fDir ? 0 : SHFL_RENAME_FILE | SHFL_RENAME_REPLACE_IF_EXISTS);
        if (RT_SUCCESS(rc))
            kfree(old_path);
            sf_new_i->force_restat = 1;
            sf_old_i->force_restat = 1; /* XXX: needed? */
            /* Set the new relative path in the inode. */
            sf_file_i->path = new_path;
        }
    else
        LogFunc("VbgIR0SfRename failed rc=%Rrc\n", rc);
        
        err = -RTErrConvertToErrno(rc);
        kfree(new_path);
    }
}
+ }  
+ return err;
+ }
+ 
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+static int sf_symlink(struct inode *parent, struct dentry *dentry, const char *symname)
+{
+  int err;
+  int rc;
+  struct sf_inode_info *sf_i;
+  struct sf_glob_info *sf_g;
+  SHFLSTRING *path, *ssymname;
+  SHFLFSOBJINFO info;
+  int symname_len = strlen(symname) + 1;
+
+  TRACE();
+  sf_g = GET_GLOB_INFO(parent->i_sb);
+  sf_i = GET_INODE_INFO(parent);
+
+  BUG_ON(!sf_g);
+  BUG_ON(!sf_i);
+
+  err = sf_path_from_dentry(__func__, sf_g, sf_i, dentry, &path);
+  if (err)
+      goto fail0;
+
+  ssymname = kmalloc(offsetof(SHFLSTRING, String.utf8) + symname_len, GFP_KERNEL);
+  if (!ssymname)
+  {
+      LogRelFunc("kmalloc failed, caller=sf_symlink\n");
+      err = -ENOMEM;
+      goto fail1;
+  }
+
+  ssymname->u16Length = symname_len - 1;
+  ssymname->u16Size = symname_len;
+  memcpy(ssymname->String.utf8, symname, symname_len);
+
+  rc = VbglR0SfSymlink(&client_handle, &sf_g->map, path, ssymname, &info);
+  kfree(ssymname);
+
+  if (RT_FAILURE(rc))
+  {
+      if (rc == VERR_WRITE_PROTECT)
+      {
+        err = -EROFS;
+        goto fail1;
+      }
+  

+ LogFunc("VbglR0SfSymlink(%s) failed rc=%Rrc\n",
+        sf_i->path->String.utf8, rc));
+ err = -EPROTO;
+ goto fail1;
+ }
+
+ err = sf_instantiate(parent, dentry, path, &info, SHFL_HANDLE_NIL);
+ if (err)
+ {
+    LogFunc("could not instantiate dentry for %s err=%d\n",
+            sf_i->path->String.utf8, err));
+    goto fail1;
+ }
+
+ sf_i->force_restat = 1;
+ return 0;
+
+ #ifdef
+
+ struct inode_operations sf_dir_iops =
+ {
+    .lookup = sf_lookup,  
+    .create = sf_create,  
+    .mkdir = sf_mkdir,    
+    .rmdir = sf_rmdir,    
+    .unlink = sf_unlink,  
+    .rename = sf_rename,  
+    .revalidate = sf_inode_revalidate
+ #endif
+ #ifdef
+
+ struct
+
+ #endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/divdi3.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/divdi3.c
@@ -0,0 +1,70 @@
+/*	$NetBSD: divdi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $*/
+
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+ * OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
+ * SUCH DAMAGE.
+ */
+
+/**
+ * \#include <sys/cdefs.h>
+ * \#if defined(LIBC_SCCS) \&\& \!defined(lint)
+ * \#if 0
+ * static char sccsid[] = "@(#)divdi3.c 8.1 (Berkeley) 6/4/93";
+ * \#else
+ * \_ RCSID("$NetBSD: divdi3.c,v 1.8 2005/12/11 12:24:37 christos Exp ") ;
+ * \#endif
+ * \#endif */ /* LIBC_SCCS and not lint */
+ *
+ * \#include "quad.h"
+ *
+ * Divide two signed quads.
+ * ??? if -1/2 should produce -1 on this machine, this code is wrong
+ */
+ *quad_t
+ __divdi3(a, b)
quad_t a, b;
+
+quad_t ua, ub, uq;
+int neg = 0;
+
+ua = a;
+ub = b;
+
+if (a < 0)
+ua = -ua, neg ^= 1;
+if (b < 0)
+ub = -ub, neg ^= 1;
+
+uq = __qdivrem(ua, ub, (u_quad_t *)0);
+if (neg)
+uq = - uq;
+return uq;
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/VBoxGuest.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/VBoxGuest.h
@@ -0,0 +1,927 @@
+/** @file
+ * VBoxGuest - VirtualBox Guest Additions Driver Interface. (ADD,DEV)
+ *
+ * @note This file is used by 16-bit compilers too (OpenWatcom).
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ */
/*@defgroup grp_vboxguest VirtualBox Guest Additions Device Driver */

/* Also know as VBoxGuest. */

/* @} */

/*@defgroup grp_vboxguest_ioc VirtualBox Guest Additions Driver Interface */

/* @note This is considered internal in ring-3, please use the VbgIR3 functions. */

/* - I/O controls for user and/or kernel mode starts at 0. */

/* - IDC specific requests descends from 127. */

/* - Bits 7 and 6 are currently reserved for future hacks. */

/* @remarks When creating new IOCTL interfaces keep in mind that not all OSes supports reporting back the output size. (This got messed up a little bit in VBoxDrv.) */

/* The request size is also a little bit tricky as it's passed as part of the request code on unix. The size field is 14 bits on Linux, 12 bits on *BSD, 13 bits Darwin, and 8-bits on Solaris. All the BSDs and Darwin kernels will make use of the size field, while Linux and Solaris will not. We're of course using the size to validate and/or map/lock the request, so it has to be valid. */

/* For Solaris we will have to do something special though, 255 isn't sufficient for all we need. A 4KB restriction (BSD) is probably not too problematic (yet) as a general one. */

/* More info can be found in SUPDRVIOC.h and related sources. */

/* @remarks If adding interfaces that only has input or only has output, some new macros needs to be created so the most efficient IOCTL data buffering method can be used. */

/* @} */

#if !defined(IN_RC) && !defined(IN_RING0_AGNOSTIC) && !defined(IPRT_NO_CRT)
+/** Fictive start address of the hypervisor physical memory for MmMapIoSpace. */
+#define VBOXGUEST_HYPERVISOR_PHYSICAL_START UINT32_C(0xf8000000)
+
+#ifdef RT_OS_DARWIN
+/** Cookie used to fend off some unwanted clients to the IOService. */
+#define VBOXGUEST_DARWIN_IOSERVICE_COOKIE UINT32_C(0x56426f78) /* 'VBox' */
+#endif
+
+#ifdef(RT_OS_WINDOWS)
+#ifndef CTL_CODE
+# include <iprt/win/windows.h>
+#endif
  /* Automatic buffering, size not encoded. */
+# define VBGL_IOCTL_CODE_SIZE(Function, Size)       CTL_CODE(FILE_DEVICE_UNKNOWN, 2048 +
(Function), METHOD_BUFFERED, FILE_WRITE_ACCESS)
+  /* Defined in VBoxGuestA-os2.asm. */
+# define VBGL_IOCTL_CODE_BIG(Function)              CTL_CODE(FILE_DEVICE_UNKNOWN, 2048 +
(Function), METHOD_BUFFERED, FILE_WRITE_ACCESS)
+  /* Defined in VBoxGuestA-os2.asm. */
+# define VBGL_IOCTL_CODE_FAST(Function)             CTL_CODE(FILE_DEVICE_UNKNOWN, 2048 +
(Function), METHOD_NEITHER, FILE_WRITE_ACCESS)
+  /* Defined in VBoxGuestA-os2.asm. */
+# define VBGL_IOCTL_CODE_STRIPPED(a_uIOCtl)         (a_uIOCtl)
+# define VBOXGUEST_DEVICE_NAME                      "\\\VBoxGuest"
+/** The support service name. */
+# define VBOXGUEST_SERVICE_NAME                     "VBoxGuest"
+/** Global name for Win2k+ */
+# define VBOXGUEST_DEVICE_NAME_GLOBAL               "\\\Global\VBoxGuest"
+/** Win32 driver name */
+# define VBOXGUEST_DEVICE_NAME_NT                   L"\Device\VBoxGuest"
+/** Device name. */
+# define VBOXGUEST_DEVICE_NAME_DOS                  L"\DosDevices\VBoxGuest"
+
+#elif defined(RT_OS_OS2)
+  /* No automatic buffering, size limited to 255 bytes => use VBGLBIGREQ for everything. */
+# define VBGL_IOCTL_CATEGORY                        0xc2
+  /* Defined in VBoxGuestA-os2.asm. */
+# define VBGL_IOCTL_CATEGORY_FAST                   0xc3 /**< Also defined in VBoxGuestA-os2.asm. */
+z define VBGL_IOCTL_CODE_SIZE(Function, Size)       ((unsigned char)(Function))
+  /* Defined in VBoxGuestA-os2.asm. */
+# define VBGL_IOCTL_CODE_BIG(Function)              ((unsigned char)(Function))
+  /* Defined in VBoxGuestA-os2.asm. */
+# define VBGL_IOCTL_CODE_FAST(Function)             ((unsigned char)(Function))
+  /* Defined in VBoxGuestA-os2.asm. */
+# define VBGL_IOCTL_CODE_STRIPPED(a_uIOCtl)         (a_uIOCtl)
+# define VBOXGUEST_DEVICE_NAME                      "\Dev\VBoxGst$"
+/** Short device name for AttachDD. */
+/** @note Case sensitive. Must match what VBoxGuestA-os2.asm says! */
+# define VBOXGUEST_DEVICE_NAME_SHORT                "vboxgst$"
+
+#elif defined(RT_OS_SOLARIS)
+  /* No automatic buffering, size limited to 255 bytes => use VBGLBIGREQ for everything. */
+# include <sys/ioccom.h>
+#endif
+
+/**
+ * The VBoxGuest I/O control version.
+ *
+ * As usual, the high word contains the major version and changes to it
+ * signifies incompatible changes.
+ *
+ * The lower word is the minor version number, it is increased when new
+ * functions are added or existing changed in a backwards compatible manner.
+ */
+#define VBGL_IOC_VERSION UINT32_C(0x00010000)
+
+/** @name VBGL_IOCTL_DRIVER_INFO
+ * Adjust and get driver information.
+ *
+ * @note May switch the session to a backwards compatible interface version if
+ *       uClientVersion indicates older client code.
+ *
+ * @} */
+#define VBGL_IOCTL_DRIVER_VERSION_INFO VBGL_IOCTL_CODE_SIZE(0,
VBGL_IOCTL DRIVER_VERSION_INFO_SIZE)
+#define VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE sizeof(VBGLIOCDRIVERVERSIONINFO)
+#define VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE_IN
RT_UOFFSET_AFTER(VBGLIOCDRIVERVERSIONINFO, u.In)
+#define VBGL_IOCTL_DRIVER_VERSION_INFO_SIZE_OUT sizeof(VBGLIOCDRIVERVERSIONINFO)
+typedef struct VBGLIOCDRIVERVERSIONINFO
+{
  /** The header. */
  VBGLREQHDR     Hdr;
  union
  {
    struct
    {
      /** The requested interface version number (VBGL_IOC_VERSION). */
      uint32_t    uReqVersion;
      /** The minimum interface version number
      * (typically the major version part of VBGL_IOC_VERSION). */
      uint32_t    uMinVersion;
      /** Reserved, MBZ. */
      uint32_t    uReserved1;
      /** Reserved, MBZ. */
      uint32_t    uReserved2;
    } In;
    ...
struct
{
    /** Interface version for this session (typically VBGL_IOC_VERSION). */
    uint32_t uSessionVersion;
    /** The version of the IDC interface (VBGL_IOC_VERSION). */
    uint32_t uDriverVersion;
    /** The SVN revision of the driver.
     * This will be set to 0 if not compiled into the driver. */
    uint32_t uDriverRevision;
    /** Reserved \#1 (will be returned as zero until defined). */
    uint32_t uReserved1;
    /** Reserved \#2 (will be returned as zero until defined). */
    uint32_t uReserved2;
} Out;

} VBGLIOCDRIVERVERSIONINFO, RT_FAR *PVBGLIOCDRIVERVERSIONINFO;

/** @} */

/** @name VBGL_IOCTL_GET_PORT_INFO
 * Query VMMDev I/O port region and MMIO mapping address.
 * @remarks Ring-0 only.
 * @*/

#define VBGL_IOCTL_GET_VMMDEV_IO_INFO               VBGL_IOCTL_CODE_SIZE(1,
    VBGL_IOCTL_GET_VMMDEV_IO_INFO_SIZE)
#define VBGL_IOCTL_GET_VMMDEV_IO_INFO_SIZE          sizeof(VBGLIOCGETVMMDEVIOINFO)
#define VBGL_IOCTL_GET_VMMDEV_IO_INFO_SIZE_IN       sizeof(VBGLREQHDR)
#define VBGL_IOCTL_GET_VMMDEV_IO_INFO_SIZE_OUT      sizeof(VBGLIOCGETVMMDEVIOINFO)

typedef struct VBGLIOCGETVMMDEVIOINFO
{
    /** The header. */
    VBGLREQHDR Hdr;
    union
    {
        /** The MMIO mapping.  NULL if no MMIO region. */
        struct VMMDevMemory volatile RT_FAR *pvVmmDevMapping;
        /** The I/O port address. */
        RTIOPORT IoPort;
    }

} VBGLIOCGETVMMDEVIOINFO

/** The header. */

VBGLREQHDR Hdr;
union
{
    /** The MMIO mapping.  NULL if no MMIO region. */
    struct VMMDevMemory volatile RT_FAR *pvVmmDevMapping;
    /** The I/O port address. */
    RTIOPORT IoPort;
/** Padding, ignore. */
  RTIOPORT    auPadding[HC_ARCH_BITS == 64 ? 3 : 1];
} Out;

/** @} */

/** @name VBGL_IOCTL_VMMDEV_REQUEST
 * IOCTL to VBoxGuest to perform a VMM Device request less than 1KB in size.
 * @{
 */
#define VBGL_IOCTL_VMMDEV_REQUEST(a_cb)             VBGL_IOCTL_CODE_SIZE(2, (a_cb))
/** @} */

/** @name VBGL_IOCTL_VMMDEV_REQUEST_BIG
 * IOCTL to VBoxGuest to perform a VMM Device request that can 1KB or larger.
 * @{
 */
#define VBGL_IOCTL_VMMDEV_REQUEST_BIG               VBGL_IOCTL_CODE_BIG(3)
/** @} */

#ifdef VBOX_WITH_HGCM
/** @name VBGL_IOCTL_HGCM_CONNECT
 * Connect to a HGCM service.
 * @{
 */
#define VBGL_IOCTL_HGCM_CONNECT                    VBGL_IOCTL_CODE_SIZE(4, VBGL_IOCTL_HGCM_CONNECT_SIZE)

#define VBGL_IOCTL_HGCM_CONNECT_SIZE               sizeof(VBGLIOCHGCMCONNECT)
#define VBGL_IOCTL_HGCM_CONNECT_SIZE_IN            sizeof(VBGLIOCHGCMCONNECT)
#define VBGL_IOCTL_HGCM_CONNECT_SIZE_OUT           RT_UOFFSET_AFTER(VBGLIOCHGCMCONNECT, u.Out)
#endif VBOX_WITH_HGCM

typedef struct VBGLIOCHGCMCONNECT
{
| /* The header. */ |
| VBGLREQHDR Hdr; |
| union |
| { |
| struct |
| { |
|  HGCMServiceLocation Loc; |
| } In; |
| struct |
| { |
|  uint32_t idClient; |
+  } Out;
+ } u;
+} VBGLIOCHGCMCONNECT, RT_FAR *PVBGLIOCHGCMCONNECT;
+AssertCompileSize(VBGLIOCHGCMCONNECT, 24 + 132);
+#elif !defined(__GNUC__) /* Some GCC versions can't handle the complicated RT_UOFFSET_AFTER macro, it
seems. */
+  && (!defined(RT_OS_OS2) || !defined(__IBMC__) && !defined(__IBMCPP__) &&
(!defined(__WATCOMC__) || !defined(__cplusplus))
+AssertCompile(VBGL_IOCTL_HGCM_CONNECT_SIZE_OUT == 24 + 4);
+#endif
+/** @} */
+
+/** @name VBGL_IOCTL_HGCM_DISCONNECT
+ * Disconnect from a HGCM service.
+ * @{ */
+# define VBGL_IOCTL_HGCM_DISCONNECT                 VBGL_IOCTL_CODE_SIZE(5,
VBGL_IOCTL_HGCM_DISCONNECT_SIZE)
+# define VBGL_IOCTL_HGCM_DISCONNECT_SIZE            sizeof(VBGLIOCHGCMDISCONNECT)
+# define VBGL_IOCTL_HGCM_DISCONNECT_SIZE_IN         sizeof(VBGLIOCHGCMDISCONNECT)
+# define VBGL_IOCTL_HGCM_DISCONNECT_SIZE_OUT        sizeof(VBGLREQHDR)
+/** @note This is also used by a VbglR0 API. */
+typedef struct VBGLIOCHGCMDISCONNECT
+{
+    /** The header. */
+    VBGLREQHDR          Hdr;
+    union
+    {
+        struct
+        {
+            uint32_t    idClient;
+        } In;
+    } u;
+} VBGLIOCHGCMDISCONNECT, RT_FAR *PVBGLIOCHGCMDISCONNECT;
+AssertCompileSize(VBGLIOCHGCMDISCONNECT, 24 + 4);
+/** @} */
+
+/** @name VBGL_IOCTL_HGCM_CALL, VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA
+ * Make a call to a HGCM service. There are several variations here.
+ * @{ */
+# define VBGL_IOCTL_HGCM_CALL_32(a_cb)              VBGL_IOCTL_CODE_SIZE(6, (a_cb))
+    /* The VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA variation is for other drivers (like
+    * the graphics ones) passing on requests from user land that contains user
+    * data. These calls are always interruptible.
+    */
+ + /* @} */
+# define VBGL_IOCTL_HGCM_CALL_32(a_cb) VBGL_IOCTL_CODE_SIZE(6, (a_cb))
```c
#define VBGL_IOCTL_HGCM_CALL_64(a_cb)              VBGL_IOCTL_CODE_SIZE(7, (a_cb))
#define VBGL_IOCTL_HGCM_CALL(a_cb)                VBGL_IOCTL_HGCM_CALL_64(a_cb)
#define VBGL_IOCTL_HGCM_CALL_32(a_cb)              VBGL_IOCTL_HGCM_CALL_64(a_cb)
#endif
#define VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA(a_cb)  VBGL_IOCTL_CODE_SIZE(8, (a_cb))
@end

/** @} */
#endif /* VBOX_WITH_HGCM */

/** @name VBGL_IOCTL_LOG */
 * IOCTL to VBoxGuest to perform backdoor logging.
 * @{ */
#define VBOXGUEST_IOCTL_LOG(Size)
#define VBGL_IOCTL_LOG(a_cchMsg)                    VBGL_IOCTL_CODE_BIG(9)
#define VBGL_IOCTL_LOG_SIZE(a_cchMsg)               (sizeof(VBGLREQHDR) + (a_cchMsg) + 1)
#define VBGL_IOCTL_LOG_SIZE_IN(a_cchMsg)            (sizeof(VBGLREQHDR) + (a_cchMsg) + 1)
#define VBGL_IOCTL_LOG_SIZE_OUT                     sizeof(VBGLREQHDR)

typedef struct VBGLIOCLOG
{
    /** The header. */
    VBGLREQHDR                      Hdr;
    union
        {
            struct
                {
                    /** The log message. */
                    char                    szMsg[RT_FLEXIBLE_ARRAY_IN_NESTED_UNION];
                } In;
        } u;
} VBGLIOCLOG, RT_FAR *PVBGLIOCLOG;
@end
/** @} */

/** @name VBGL_IOCTL_WAIT_FOR_EVENTS */
 * Wait for a VMMDev host event notification.
 * @{ */
#define VBGL_IOCTL_WAIT_FOR_EVENTS                  VBGL_IOCTL_CODE_SIZE(10,
#define VBGL_IOCTL_WAIT_FOR_EVENTS_SIZE             sizeof(VBGLIOCWAITFOREVENTS)
#define VBGL_IOCTL_WAIT_FOR_EVENTS_SIZE_IN          sizeof(VBGLIOCWAITFOREVENTS)
#define VBGL_IOCTL_WAIT_FOR_EVENTS_SIZE_OUT         sizeof(VBGLIOCWAITFOREVENTS)

typedef struct VBGLIOCWAITFOREVENTS
{
    /** The header. */
    VBGLIOCWAITFOREVENTS                      Hdr;
    union
        {
            struct
                {
                    /** The log message. */
                    char                    szMsg[RT_FLEXIBLE_ARRAY_IN_NESTED_UNION];
                } In;
        } u;
} VBGLIOCWAITFOREVENTS, RT_FAR *PVBGLIOCWAITFOREVENTS;
@end
```
+ /** The header. */
+ VBGLREQHDR Hdr;
+ union
+ {
+   struct
+     {
+       /** Timeout in milliseconds. */
+       uint32_t cMsTimeOut;
+       /** Events to wait for. */
+       uint32_t fEvents;
+     } In;
+   struct
+     {
+       /** Events that occurred. */
+       uint32_t fEvents;
+     } Out;
+ } u;
} VBGLIOCWAITFOREVENTS, RT_FAR *PVBGLIOCWAITFOREVENTS;
+AssertCompileSize(VBGLIOCWAITFOREVENTS, 24 + 8);
+/** @} */
+
+ /**< name VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS
+ * IOCTL to VBoxGuest to interrupt (cancel) any pending
+ * VBGL_IOCTL_WAIT_FOR_EVENTS and return.
+ * Handled inside the guest additions and not seen by the host at all.
+ * After calling this, VBGL_IOCTL_WAIT_FOR_EVENTS should no longer be called in
+ * the same session. At the time of writing this is not enforced; at the time
+ * of reading it may be.
+ * @see VBGL_IOCTL_WAIT_FOR_EVENTS
+ */
+ * @} */
+
+/*#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS VBGL_IOCTL_CODE_SIZE(11,
+   VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE)
+#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE sizeof(VBGLREQHDR)
+#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE_IN sizeof(VBGLREQHDR)
+#define VBGL_IOCTL_INTERRUPT_ALL_WAIT_FOR_EVENTS_SIZE_OUT sizeof(VBGLREQHDR)
+/** @} */ */
+
+ /**< name VBGL_IOCTL_CHANGE_FILTER_MASK
+ * IOCTL to VBoxGuest to control the event filter mask.
+ */
+ * @} */
+/*#define VBGL_IOCTL_CHANGE_FILTER_MASK VBGL_IOCTL_CODE_SIZE(12,
+   VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE)
+#define VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE sizeof(VBGLIOCCHANGEFILTERMASK)
```c
#define VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE_IN   sizeof(VBGLIOCCHANGEFILTERMASK)
#define VBGL_IOCTL_CHANGE_FILTER_MASK_SIZE_OUT  sizeof(VBGLREQHDR)

typedef struct VBGLIOCCHANGEFILTERMASK
{
    /** The header. */
    VBGLREQHDR                      Hdr;
    union
    {
        struct
        {
            /** Flags to set. */
            uint32_t fOrMask;
            /** Flags to remove. */
            uint32_t fNotMask;
        } In;
    } u;
} VBGLIOCCHANGEFILTERMASK, RT_FAR *PVBGLIOCCHANGEFILTERMASK;

AssertCompileSize(VBGLIOCCHANGEFILTERMASK, 24 + 8);

/** @} */

/** @name VBGL_IOCTL_GUEST_CAPS_ACQUIRE
 * IOCTL to for acquiring and releasing guest capabilities.
 *
 * This is used for multiple purposes:
 * 1. By doing @a acquire r3 client application (e.g. VBoxTray) claims it will
 *    use the given session for performing operations like @a seamless or
 *    @a auto-resize, thus, if the application terminates, the driver will
 *    automatically cleanup the caps reported to host, so that host knows guest
 *    does not support them anymore
 * 2. In a multi-user environment this will not allow r3 applications (like
 *    VBoxTray) running in different user sessions simultaneously to interfere
 *    with each other. An r3 client application (like VBoxTray) is responsible
 *    for Acquiring/Releasing caps properly as needed.
 *
 * VERR_RESOURCE_BUSY is returned if any capabilities in the fOrMask are
 * currently acquired by some other VBoxGuest session.
 *
 */

+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES           VBGL_IOCTL_CODE_SIZE(13,
                                                                                     VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE)
+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE
sizeof(VBGLIOCACQUIREGUESTCAPS)
+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE_IN  sizeof(VBGLIOCACQUIREGUESTCAPS)
+#define VBGL_IOCTL_ACQUIRE_GUEST_CAPABILITIES_SIZE_OUT sizeof(VBGLREQHDR)

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```
/** Default operation (full acquire/release). */
#define VBGL_IOC_AGC_FLAGS_DEFAULT UINT32_C(0x00000000)
/** Configures VBoxGuest to use the specified caps in Acquire mode, w/o making
 * any caps acquisition/release. This is only possible to set acquire mode for
 * caps, but not clear it, so fNotMask is ignored when this flag is set. */
#define VBGL_IOC_AGC_FLAGS_CONFIG_ACQUIRE_MODE UINT32_C(0x00000001)
/** Valid flag mask. */
#define VBGL_IOC_AGC_FLAGS_VALID_MASK UINT32_C(0x00000001)

typedef struct VBGLIOCACQUIREGUESTCAPS
{
    /** The header. */
    VBGLREQHDR              Hdr;
    union
    {
        struct
        {
            /** Acquire flags (VBGL_IOC_AGC_FLAGS_XXX). */
            uint32_t        fFlags;
            /** Guest capabilities to acquire (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fOrMask;
            /** Guest capabilities to release (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fNotMask;
        } In;
    } u;
} VBGLIOCACQUIREGUESTCAPS, RT_FAR *PVBGLIOCACQUIREGUESTCAPS;
AssertCompileSize(VBGLIOCACQUIREGUESTCAPS, 24 + 12);
/** @} */

/** @name VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES
 * IOCTL to VBoxGuest to set guest capabilities.
 * @{ */
#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES            VBGL_IOCTL_CODE_SIZE(14,
VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE)
#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE       sizeof(VBGLIOCSETGUESTCAPS)
#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE_IN    sizeof(VBGLIOCSETGUESTCAPS)
#define VBGL_IOCTL_CHANGE_GUEST_CAPABILITIES_SIZE_OUT   sizeof(VBGLIOCSETGUESTCAPS)
typedef struct VBGLIOCSETGUESTCAPS
{
    /** The header. */
    VBGLREQHDR              Hdr;
    union
    {
        struct
        {
            /** The capabilities to set (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fOrMask;
            /** The capabilities to release (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fNotMask;
        } In;
    } u;
} VBGLIOCSETGUESTCAPS,
AssertCompileSize(VBGLIOCSETGUESTCAPS, 24 + 12);
/** @} */

/** @name VBGL_IOC_CHANGED
 * IOCTL to VBoxGuest to change guest capabilities.
 * @{ */
#define VBGL_IOC_CHANGED            VBGL_IOC_CHANGED_SIZE
#define VBGL_IOC_CHANGED_SIZE       sizeof(VBGLIOCCHANGEDCAPS)
#define VBGL_IOC_CHANGED_SIZE_IN    sizeof(VBGLIOCCHANGEDCAPS)
#define VBGL_IOC_CHANGED_SIZE_OUT   sizeof(VBGLIOCCHANGEDCAPS)
typedef struct VBGLIOCCHANGEDCAPS
{
    /** The header. */
    VBGLREQHDR              Hdr;
    union
    {
        struct
        {
            /** The capabilities to set (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fOrMask;
            /** The capabilities to release (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fNotMask;
        } In;
    } u;
} VBGLIOCCHANGEDCAPS,
AssertCompileSize(VBGLIOCCHANGEDCAPS, 24 + 12);
/** @} */

/** @name VBGL_IOC_CHANGED
 * IOCTL to VBoxGuest to change guest capabilities.
 * @{ */
#define VBGL_IOC_CHANGED            VBGL_IOC_CHANGED_SIZE
#define VBGL_IOC_CHANGED_SIZE       sizeof(VBGLIOCCHANGEDCAPS)
#define VBGL_IOC_CHANGED_SIZE_IN    sizeof(VBGLIOCCHANGEDCAPS)
#define VBGL_IOC_CHANGED_SIZE_OUT   sizeof(VBGLIOCCHANGEDCAPS)
typedef struct VBGLIOCCHANGEDCAPS
{
    /** The header. */
    VBGLREQHDR              Hdr;
    union
    {
        struct
        {
            /** The capabilities to set (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fOrMask;
            /** The capabilities to release (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fNotMask;
        } In;
    } u;
} VBGLIOCCHANGEDCAPS,
AssertCompileSize(VBGLIOCCHANGEDCAPS, 24 + 12);
/** @} */

/** @name VBGL_IOC_CHANGED
 * IOCTL to VBoxGuest to change guest capabilities.
 * @{ */
#define VBGL_IOC_CHANGED            VBGL_IOC_CHANGED_SIZE
#define VBGL_IOC_CHANGED_SIZE       sizeof(VBGLIOCCHANGEDCAPS)
#define VBGL_IOC_CHANGED_SIZE_IN    sizeof(VBGLIOCCHANGEDCAPS)
#define VBGL_IOC_CHANGED_SIZE_OUT   sizeof(VBGLIOCCHANGEDCAPS)
typedef struct VBGLIOCCHANGEDCAPS
{
    /** The header. */
    VBGLREQHDR              Hdr;
    union
    {
        struct
        {
            /** The capabilities to set (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fOrMask;
            /** The capabilities to release (VMMDEV_GUEST_SUPPORTS_XXX). */
            uint32_t        fNotMask;
        } In;
    } u;
} VBGLIOCCHANGEDCAPS,
AssertCompileSize(VBGLIOCCHANGEDCAPS, 24 + 12);
/** @} */
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```c
+ uint32_t fOrMask;
+ /** The capabilities to drop (VMMDEV_GUEST_SUPPORTS_XXX). */
+ uint32_t fNotMask;
+ } In;
+ struct
+ {
+ /** The capabilities held by the session after the call (VMMDEV_GUEST_SUPPORTS_XXX). */
+ uint32_t fSessionCaps;
+ /** The capabilities for all the sessions after the call (VMMDEV_GUEST_SUPPORTS_XXX). */
+ uint32_t fGlobalCaps;
+ } Out;
+ } u;
+} VBGLIOCSETGUESTCAPS, RT_FAR *PVBGLIOCSETGUESTCAPS;
+AssertCompileSize(VBGLIOCSETGUESTCAPS, 24 + 8);
+typedef VBGLIOCSETGUESTCAPS VBoxGuestSetCapabilitiesInfo;
+/** @} */
+
+/** @name VBGL_IOCTL_SET_MOUSE_STATUS
+ * IOCTL to VBoxGuest to update the mouse status features.
+ * @{ */
+#define VBGL_IOCTL_SET_MOUSE_STATUS                 VBGL_IOCTL_CODE_SIZE(15,
+VBGL_IOCTL_SET_MOUSE_STATUS_SIZE)
+#define VBGL_IOCTL_SET_MOUSE_STATUS_SIZE            sizeof(VBGLIOCSETMOUSESTATUS)
+#define VBGL_IOCTL_SET_MOUSE_STATUS_SIZE_IN         sizeof(VBGLIOCSETMOUSESTATUS)
+#define VBGL_IOCTL_SET_MOUSE_STATUS_SIZE_OUT        sizeof(VBGLREQHDR)
+typedef struct VBGLIOCSETMOUSESTATUS
+
+ { +
+ /** The header. */
+ VBGLREQHDR Hdr;
+ union
+ {
+ struct
+ {
+ /** Mouse status flags (VMMDEV_MOUSE_XXX). */
+ uint32_t fStatus;
+ } In;
+ } u;
+} VBGLIOCSETMOUSESTATUS, RT_FAR *PVBGLIOCSETMOUSESTATUS;
+/** @} */
+
+/** @name VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK
+ *
+ * IOCTL to for setting the mouse driver callback.
+ * @note The callback will be called in interrupt context with the VBoxGuest
+ *       device event spinlock held.
+ * @note ring-0 only.
```
+ * + * @} */
+#define VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK_SIZE
sizeof(VBGLIOCSETMOUSENOTIFYCALLBACK)
+#define VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK_SIZE_IN
sizeof(VBGLIOCSETMOUSENOTIFYCALLBACK)
+#define VBGL_IOCTL_SET_MOUSE_NOTIFY_CALLBACK_SIZE_OUT
sizeof(VBGLREQHDR)
+typedef struct VBGLIOCSETMOUSENOTIFYCALLBACK
+
+ /** @} */
+
+/** @name VBGL_IOCTL_CHECK_BALLOON
+ * IOCTL to VBoxGuest to check memory ballooning.
+ *
+ * The guest kernel module / device driver will ask the host for the current size of
+ * the balloon and adjust the size. Or it will set fHandledInR0 = false and R3 is
+ * responsible for allocating memory and calling R0 (VBGL_IOCTL_CHANGE_BALLOON).
+ * @} */
+#define VBGL_IOCTL_CHECK_BALLOON_SIZE
sizeof(VBGLIOCCHECKBALLOON)
+#define VBGL_IOCTL_CHECK_BALLOON_SIZE_IN
sizeof(VBGLREQHDR)
+#define VBGL_IOCTL_CHECK_BALLOON_SIZE_OUT
sizeof(VBGLIOCCHECKBALLOON)
+typedef struct VBGLIOCCHECKBALLOON
+
+ /** @} */
+
+ /** The header. */
+ VBGLREQHDR Hdr;
+ union
+ {
+ struct
+ {
+ /** Mouse notification callback function. */
+ PFNVBOXGUESTMOUSENOTIFY pfnNotify;
+ /** The callback argument. */
+ void RT_FAR *pvUser;
+ } In;
+ } u;
+ } In;
+ } u;
+ } In;
+ VBGLOICSETMOUSENOTIFYCALLBACK, RT_FAR *PBGLOICSETMOUSENOTIFYCALLBACK;
+/** @} */
+
+ /** The size of the balloon in chunks of 1MB. */
typedef VBGLIOCCHECKBALLOON VBoxGuestCheckBalloonInfo;

/** @} */

/** @name VBGL_IOCTL_CHANGE_BALLOON
 * IOCTL to VBoxGuest to supply or revoke one chunk for ballooning.
 * @{ */

#define VBGL_IOCTL_CHANGE_BALLOON                   VBGL_IOCTL_CODE_SIZE(18,
                                              VBGL_IOCTL_CHANGE_BALLOON_SIZE)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE              sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_IN           sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_OUT          sizeof(VBGLREQHDR)

typedef struct VBGLIOCCHANGEBALLOON
{
    /** The header. */
    VBGLREQHDR          Hdr;
    union
    {
        struct
        {
            /** Address of the chunk (user space address). */
            RTR3PTR     pvChunk;
            /** Explicit alignment padding, MBZ. */
            uint8_t     abPadding[ARCH_BITS == 64 ? 0 + 7 : 4 + 7];
            /** true = inflate, false = deflate. */
            bool        fInflate;
            
            } In;
        } u;
} VBGLIOCCHANGEBALLOON, RT_FAR *PVBGLIOCCHANGEBALLOON;

/** @} */

uint32_t     cBalloonChunks;

/** .false = handled in R0, no further action required.
 *  true = allocate balloon memory in R3. */

uint32_t     cBalloonChunks;

/** false = handled in R0, no further action required.
 *   true = allocate balloon memory in R3. */

bool        fHandleInR3;

/** Explicit padding, please ignore. */

bool        afPadding[3];

} Out;

} u;

} VBGLIOCCHECKBALLOON, RT_FAR *PVBGLIOCCHECKBALLOON;

AssertCompileSize(VBGLIOCCHECKBALLOON, 24 + 8);

typedef VBGLIOCCHECKBALLOON VBoxGuestCheckBalloonInfo;

/** @} */

/** @name VBGL_IOCTL_CHANGE_BALLOON
 * IOCTL to VBoxGuest to supply or revoke one chunk for ballooning.
 * @{ */

#define VBGL_IOCTL_CHANGE_BALLOON                   VBGL_IOCTL_CODE_SIZE(18,
                                              VBGL_IOCTL_CHANGE_BALLOON_SIZE)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE              sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_IN           sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_OUT          sizeof(VBGLREQHDR)

typedef struct VBGLIOCCHANGEBALLOON
{
    /** The header. */
    VBGLREQHDR          Hdr;
    union
    {
        struct
        {
            /** Address of the chunk (user space address). */
            RTR3PTR     pvChunk;
            /** Explicit alignment padding, MBZ. */
            uint8_t     abPadding[ARCH_BITS == 64 ? 0 + 7 : 4 + 7];
            /** true = inflate, false = deflate. */
            bool        fInflate;
            
            } In;
        } u;
} VBGLIOCCHANGEBALLOON, RT_FAR *PVBGLIOCCHANGEBALLOON;

AssertCompileSize(VBGLIOCCHANGEBALLOON, 24+16);

/** @} */

/** @name VBGL_IOCTL_CHANGE_BALLOON
 * IOCTL to VBoxGuest to supply or revoke one chunk for ballooning.
 * @{ */

#define VBGL_IOCTL_CHANGE_BALLOON                   VBGL_IOCTL_CODE_SIZE(18,
                                              VBGL_IOCTL_CHANGE_BALLOON_SIZE)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE              sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_IN           sizeof(VBGLIOCCHANGEBALLOON)
#define VBGL_IOCTL_CHANGE_BALLOON_SIZE_OUT          sizeof(VBGLREQHDR)

typedef struct VBGLIOCCHANGEBALLOON
{
    /** The header. */
    VBGLREQHDR          Hdr;
    union
    {
        struct
        {
            /** Address of the chunk (user space address). */
            RTR3PTR     pvChunk;
            /** Explicit alignment padding, MBZ. */
            uint8_t     abPadding[ARCH_BITS == 64 ? 0 + 7 : 4 + 7];
            /** true = inflate, false = deflate. */
            bool        fInflate;
            
            } In;
        } u;
} VBGLIOCCHANGEBALLOON, RT_FAR *PVBGLIOCCHANGEBALLOON;

AssertCompileSize(VBGLIOCCHANGEBALLOON, 24+16);

/** @} */
/** @name VBGL_IOCTL_WRITE_CORE_DUMP
 * IOCTL to VBoxGuest to write guest core.
 * @{ */
#define VBGL_IOCTL_WRITE_CORE_DUMP                  VBGL_IOCTL_CODE_SIZE(19,
VBGL_IOCTL_WRITE_CORE_DUMP_SIZE)
#define VBGL_IOCTL_WRITE_CORE_DUMP_SIZE             sizeof(VBGLIOCWRITECOREDUMP)
#define VBGL_IOCTL_WRITE_CORE_DUMP_SIZE_IN          sizeof(VBGLIOCWRITECOREDUMP)
#define VBGL_IOCTL_WRITE_CORE_DUMP_SIZE_OUT         sizeof(VBGLREQHDR)
typedef struct VBGLIOCWRITECOREDUMP
{"}
 + /** The header. */
 + VBGLREQHDR    Hdr;
 + union
 + {
 +     struct
 +     {
 +         /** Flags (reserved, MBZ). */
 +         uint32_t    fFlags;
 +     } In;
 + } u;
+} VBGLIOCWRITECOREDUMP, RT_FAR *PVBGLIOCWRITECOREDUMP;
+AssertCompileSize(VBGLIOCWRITECOREDUMP, 24 + 4);
typedef VBGLIOCWRITECOREDUMP VBoxGuestWriteCoreDump;
+/** @} */
+
+ifdef VBOX_WITH_DPC_LATENCY_CHECKER
/** @name VBGL_IOCTL_DPC_LATENCY_CHECKER
 * IOCTL to VBoxGuest to perform DPC latency tests, printing the result in
 * the release log on the host. Takes no data, returns no data.
 * @{ */
#define VBGL_IOCTL_DPC_LATENCY_CHECKER             VBGL_IOCTL_CODE_SIZE(20,
VBGL_IOCTL_DPC_LATENCY_CHECKER_SIZE)
#define VBGL_IOCTL_DPC_LATENCY_CHECKER_SIZE        sizeof(VBGLREQHDR)
#define VBGL_IOCTL_DPC_LATENCY_CHECKER_SIZE_IN     sizeof(VBGLREQHDR)
#define VBGL_IOCTL_DPC_LATENCY_CHECKER_SIZE_OUT    sizeof(VBGLREQHDR)
+} VBGLIOCWRITECOREDUMP VBoxGuestWriteCoreDump;
+/** @} */
+endif
+
+ifdef RT_OS_OS2
/** The data buffer layout for the IDC entry point (AttachDD).
 * @remark  This is defined in multiple 16-bit headers / sources.
 * Some places it’s called VBGOS2IDC to short things a bit.
 * */
typedef struct VBGLOS2ATTACHDD
+/**
+/
+ /** VBGL_IOC_VERSION. */
+ uint32_t u32Version;
+ /** Opaque session handle. */
+ uint32_t u32Session;
+
+ /**
+ * The 32-bit service entry point.
+ *
+ * @returns VBox status code.
+ * @param   u32Session          The session handle (PVBOXGUESTSESSION).
+ * @param   iFunction           The requested function.
+ * @param   pReqHdr             The input/output data buffer. The caller
+ * ensures that this cannot be swapped out, or that
+ * it's acceptable to take a page in fault in the
+ * current context. If the request doesn't take
+ * input or produces output, apssing NULL is okay.
+ * @param cbReq                The size of the data buffer.
+ */
+# if ARCH_BITS == 32 || defined(DOXYGEN_RUNNING)
  DECLCALLBACKMEMBER(int, pfnServiceEP)(uint32_t u32Session, unsigned iFunction, PVBGLREQHDR pReqHdr, size_t cbReq);
+# else
  uint32_t pfnServiceEP;
+# endif
+
+ /** The 16-bit service entry point for C code (cdecl).
+ *
+ * It's the same as the 32-bit entry point, but the types has
+ * changed to 16-bit equivalents.
+ *
+ * @code
+ int far cdecl
+ VBoxGuestOs2IDCService16(uint32_t u32Session, uint16_t iFunction,
+                         PVBGLREQHDR fpvData, uint16_t cbData);
+ * @endcode
+ */
+# if ARCH_BITS == 16 || defined(DOXYGEN_RUNNING)
  DECLCALLBACKMEMBER(int, fpfnServiceEP)(uint32_t u32Session, uint16_t iFunction, PVBGLREQHDR fpvData, uint16_t cbData);
+# else
  RTFAR16 fpfnServiceEP;
+# endif
+
+ /** The 16-bit service entry point for Assembly code (register).
+ *
+ * This is just a wrapper around fpfnServiceEP to simplify calls
+ * from 16-bit assembly code.
+ * @returns (e)ax: VBox status code; cx: The amount of data returned.
+ *
+ * @param  u32Session  eax   - The above session handle.
+ * @param  iFunction   dl    - The requested function.
+ * @param  pvData      es:bx - The input/output data buffer.
+ * @param  cbData      cx    - The size of the data buffer.
+ */
+ RTFAR16 fpfnServiceAsmEP;
+ } VBGLOS2ATTACHDD;
+ /** Pointer to VBOXGUESTOS2IDCCONNECT buffer. */
+ typedef VBGLOS2ATTACHDD RT_FAR *PVBGLOS2ATTACHDD;
+
+ + */
+ * Prototype for the 16-bit callback returned by AttachDD on OS/2.
+ * @param  pAttachInfo Pointer to structure to fill in.
+ */
+# if defined(__IBMC__) || defined(__IBMCPP__)
+ typedef void (* __cdecl RT_FAR_CODE PFNVBGLOS2ATTACHDD)(PVBGLOS2ATTACHDD pAttachInfo);
+ #else
+ typedef void (__cdecl RT_FAR_CODE *PFNVBGLOS2ATTACHDD)(PVBGLOS2ATTACHDD pAttachInfo);
+ #endif
+ #endif /* RT_OS_OS2 */
+
+ /** @name VBGL_IOCL_IDC_CONNECT
+ * IDC client connect request.
+ *
+ * On platforms other than Windows and OS/2, this will also create a kernel
+ * session for the caller.
+ *
+ * @note ring-0 only.
+ */
+ #define VBGL_IOCTL_IDC_CONNECT                      VBGL_IOCTL_CODE_SIZE(63,
+ VBGL_IOCTL_IDC_CONNECT_SIZE)
+ #define VBGL_IOCTL_IDC_CONNECT_SIZE                 sizeof(VBGLIOCIDCCONNECT)
+ #define VBGL_IOCTL_IDC_CONNECT_SIZE_IN              RT_UOFFSET_AFTER(VBGLIOCIDCCONNECT,
+ u.In)
+ #define VBGL_IOCTL_IDC_CONNECT_SIZE_OUT             sizeof(VBGLIOCIDCCONNECT)
+ typedef struct VBGLIOCIDCCONNECT
+ {
+    /** The header. */
+    VBGLREQHDR          Hdr;
+    /** The payload union. */
+    union
+    {
+        struct
+        {
/** VBGL_IOCCTL_IDC_CONNECT_MAGIC_COOKIE. */
+ uint32_t u32MagicCookie;
+ /** The desired version of the I/O control interface (VBGL_IOC_VERSION). */
+ uint32_t uReqVersion;
+ /** The minimum version of the I/O control interface (VBGL_IOC_VERSION). */
+ uint32_t uMinVersion;
+ /** Reserved, MBZ. */
+ uint32_t uReserved;
+ } In;
+ struct
+ {
+ /** The session handle (opaque). */
+ #if ARCH_BITS >= 32
+ void RT_FAR *pvSession;
+ #else
+ uint32_t pvSession;
+ #endif
+ /** The version of the I/O control interface for this session
+ *(typically VBGL_IOC_VERSION). */
+ uint32_t uSessionVersion;
+ /** The I/O control interface version for of the driver (VBGL_IOC_VERSION). */
+ uint32_t uDriverVersion;
+ /** The SVN revision of the driver. */
+ * This will be set to 0 if not compiled into the driver. */
+ uint32_t uDriverRevision;
+ /** Reserved \#1 (will be returned as zero until defined). */
+ summer32_t uReserved1;
+ /** Reserved \#2 (will be returned as NULL until defined). */
+ void RT_FAR *pvReserved2;
+ } Out;
+ } u;
+ } VBGLIOCIDCCONNECT, RT_FAR *PVGLIOCIDCCONNECT;
+AssertCompileSize(VBGLIOCIDCCONNECT, 24 + 16 + (ARCH_BITS == 64 ? 8 : 4) * 2);
+#if !defined(__GNUC__) /* Some GCC versions can't handle the complicated RT_UOFFSET_AFTER macro, it
+seems. */
+ && !defined(RT_OS_OS2) || !defined(__IBMC__) && !defined(__IBMCPP__) &&
+ (!defined(__WATCOMC__) || !defined(__cplusplus)))
+AssertCompile(VBGL_IOCCTL_IDC_CONNECT_SIZE_IN == 24 + 16);
+#endif
+#define VBGL_IOCCTL_IDC_CONNECT_MAGIC_COOKIE UINT32_C(0x55aa4d5a) /**< Magic value for
doing an IDC connect. */
+/** @} */
+ +
+ +/** @name VBGL_IOCCTL_IDC_DISCONNECT */
+ * IDC client disconnect request.
+ * This will destroy the kernel session associated with the IDC connection.
+#define VBGL_IOCTL_IDC_DISCONNECT                VBGL_IOCTL_CODE_SIZE(62,
VBGL_IOCTL_IDC_DISCONNECT_SIZE)
+#define VBGL_IOCTL_IDC_DISCONNECT_SIZE          sizeof(VBGLIOCIDCDISCONNECT)
+#define VBGL_IOCTL_IDC_DISCONNECT_SIZE_IN       sizeof(VBGLIOCIDCDISCONNECT)
+#define VBGL_IOCTL_IDC_DISCONNECT_SIZE_OUT      sizeof(VBGLREQHDR)
+typedef struct VBGLIOCIDCDISCONNECT
+{
+    /** The header. */
+    VBGLREQHDR       Hdr;
+    union
+    {
+        struct
+        {
+            /** The session handle for platforms where this is needed. */
+#if ARCH_BITS >= 32
+                void RT_FAR *pvSession;
+#else
+                uint32_t     pvSession;
+#endif
+        } In;
+    } u;
+} VBGLIOCIDCDISCONNECT, RT_FAR *PVBGLIOCIDCDISCONNECT;
+AssertCompileSize(VBGLIOCIDCDISCONNECT, 24 + (ARCH_BITS == 64 ? 8 : 4));
+/** @} */
+
+#if !defined(RT_OS_WINDOWS) && !defined(RT_OS_OS2)
+RT_C_DECLS_BEGIN
+/**
+ * The VBoxGuest IDC entry point.
+ *
+ * @returns VBox status code.
+ * @param   pvSession   The session.
+ * @param   uReq        The request code.
+ * @param   pReqHdr     The request.
+ * @param   cbReq       The request size.
+ */
+int VBOXCALL VBoxGuestIDC(void RT_FAR *pvSession, uintptr_t uReq, PVBGLREQHDR pReqHdr, size_t cbReq);
+RT_C_DECLS_END
+#endif
+
+#if defined(RT_OS_LINUX) || defined(RT_OS_SOLARIS) || defined(RT_OS_FREEBSD)
/* Private IOCTLs between user space and the kernel video driver. DRM private
 * IOCTLs always have the type 'd' and a number between 0x40 and 0x99 (0x9F?) */

/** Stop using HGSMI in the kernel driver until it is re-enabled, so that a
 * user-space driver can use it. It must be re-enabled before the kernel
 * driver can be used again in a sensible way. */
/** @note These IOCTLs was removed from the code, but are left here as
 * templates as we may need similar ones in future. */
#define DRM_VBOX_DISABLE_HGSMI 0
#define DRM_IOCTL_VBOX_DISABLE_HGSMI VBOX_DRM_IOCTL(DISABLE_HGSMI)
#define VBOXVIDEO_IOCTL_DISABLE_HGSMI _IO('d', DRM_IOCTL_VBOX_DISABLE_HGSMI)
#define DRM_VBOX_ENABLE_HGSMI 1
#define DRM_IOCTL_VBOX_ENABLE_HGSMI VBOX_DRM_IOCTL(ENABLE_HGSMI)
#define VBOXVIDEO_IOCTL_ENABLE_HGSMI _IO('d', DRM_IOCTL_VBOX_ENABLE_HGSMI)
@endef /* RT_OS_LINUX || RT_OS_SOLARIS || RT_OS_FREEBSD */
@endef /* defined(IN_RC) && !defined(IN_RING0_AGNOSTIC) && !defined(IPRT_NO_CRT) */
@endif
/** @} */
/** @} */
#endif
---

/** @file
 * VBoxGuest - VirtualBox Guest Additions, Core Types.
 * This contains types that are used both in the VBoxGuest I/O control interface
 * and the VBoxGuestLib. The goal is to avoid having to include VBoxGuest.h
 * everywhere VBoxGuestLib.h is used.
 */

/** Copyright (C) 2006-2017 Oracle Corporation
 *
 * This file is part of VirtualBox Open Source Edition (OSE), as
 * available from http://www.virtualbox.org. This file is free software;
 * you can redistribute it and/or modify it under the terms of the GNU
 * General Public License (GPL) as published by the Free Software
 * Foundation, in version 2 as it comes in the "COPYING" file of the
 * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
 * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
# ifndef __VBoxGuestCoreTypes_h
#define __VBoxGuestCoreTypes_h

#include <iprt/types.h>
#include <iprt/assertcompile.h>

/** @addtogroup grp_vboxguest
 * @{ */

/** @} */

/*@addtogroup grp_vboxguest
 * @*/

/* Common in/out header.
 *
* This is a copy/mirror of VMMDevRequestHeader to prevent duplicating data and
* needing to verify things multiple times. For that reason this differs a bit
* from SUPREQHDR.
* */

/*@ sa VMMDevRequestHeader
 */

typedef struct VBGLREQHDR {
  
  /** IN: The request input size, and output size if cbOut is zero. 
   */
  @sa VMMDevRequestHeader::size */
  uint32_t cbIn;
  /** IN: Structure version (VBGLREQHDR_VERSION) 
   */
  @sa VMMDevRequestHeader::version */
  uint32_t uVersion;
  /** IN: The VMMDev request type, set to VBGLREQHDR_TYPE_DEFAULT unless this is a 
   */
  @sa VMMDevRequestType, VMMDevRequestHeader::requestType */
  uint32_t uType;
  /** OUT: The VBox status code of the operation, out direction only. */
  int32_t rc;
  /** IN: The output size. This is optional - set to zero to use cbIn as the 
   */
  @ output size. */
  uint32_t cbOut;
  /** Reserved, MBZ. */

}
typedef VBGLREQHDR RT_FAR *PVBGLREQHDR;

/** Version of VMMDevRequestHeader structure. */
#define VBGLREQHDR_VERSION UINT32_C(0x10001)
/** Default request type. Use this for non-VMMDev requests. */
#define VBGLREQHDR_TYPE_DEFAULT UINT32_C(0)

/** Initialize a VBGLREQHDR structure for a fixed size I/O control call. */
#define VBGLREQHDR_INIT(a_pHdr, a_IOCtl)  
    do {  
        (a_pHdr)->cbIn = (uint32_t)(a_IOCtl);
        (a_pHdr)->uVersion = VBGLREQHDR_VERSION;
        (a_pHdr)->uType = VBGLREQHDR_TYPE_DEFAULT;
        (a_pHdr)->rc = VERR_INTERNAL_ERROR;
        (a_pHdr)->cbOut = 0;
        (a_pHdr)->uReserved = 0;
    } while (0)

/** Initialize a VBGLREQHDR structure for a VMMDev request. */
#define VBGLREQHDR_INIT_VMMDEV(a_pHdr, a_cb, a_enmType)  
    do {  
        (a_pHdr)->cbIn = (a_cb);
        (a_pHdr)->uVersion = VBGLREQHDR_VERSION;
        (a_pHdr)->uType = (a_enmType);
        (a_pHdr)->rc = VERR_INTERNAL_ERROR;
        (a_pHdr)->cbOut = 0;
        (a_pHdr)->uReserved = 0;
    } while (0)

/** For VBGL_IOCTL_HGCM_CALL and VBGL_IOCTL_HGCM_CALL_WITH_USER_DATA. */
#define VMMDEV_REQ_HDR_INIT()  
    do {  
        (a_pHdr)->cbIn = (a_cb);
        (a_pHdr)->uVersion = VBGLREQHDR_VERSION;
        (a_pHdr)->uType = (a_enmType);
        (a_pHdr)->rc = VERR_INTERNAL_ERROR;
        (a_pHdr)->cbOut = 0;
        (a_pHdr)->uReserved = 0;
    } while (0)

/** Pointer to a IOC header. */
typedef VBGLREQHDR RT_FAR *PVBGLREQHDR;

/** Version of VMMDevRequestHeader structure. */
#define VBGLREQHDR_VERSION UINT32_C(0x10001)
/** Default request type. Use this for non-VMMDev requests. */
#define VBGLREQHDR_TYPE_DEFAULT UINT32_C(0)

/** Initialize a VBGLREQHDR structure for a fixed size I/O control call. */
#define VBGLREQHDR_INIT(a_pHdr, a_IOCtl)  
    do {  
        (a_pHdr)->cbIn = (uint32_t)(a_IOCtl);
        (a_pHdr)->uVersion = VBGLREQHDR_VERSION;
        (a_pHdr)->uType = VBGLREQHDR_TYPE_DEFAULT;
        (a_pHdr)->rc = VERR_INTERNAL_ERROR;
        (a_pHdr)->cbOut = (uint32_t)(a_IOCtl);
        (a_pHdr)->uReserved = 0;
    } while (0)

/** Initialize a VBGLREQHDR structure, extended version. */
#define VBGLREQHDR_INIT_EX(a_pHdr, a_cbIn, a_cbOut)  
    do {  
        (a_pHdr)->cbIn = (uint32_t)(a_IOCtl);
        (a_pHdr)->uVersion = VBGLREQHDR_VERSION;
        (a_pHdr)->uType = VBGLREQHDR_TYPE_DEFAULT;
        (a_pHdr)->rc = VERR_INTERNAL_ERROR;
        (a_pHdr)->cbOut = (uint32_t)(a_IOCtl);
        (a_pHdr)->uReserved = 0;
    } while (0)
typedef struct VBGLIOCHGCMCALL
+
+    /** Common header. */
+    VBGLREQHDR Hdr;
+    /** Input: The id of the caller. */
+    uint32_t u32ClientID;
+    /** Input: Function number. */
+    uint32_t u32Function;
+    /** Input: How long to wait (milliseconds) for completion before cancelling the
+    * call. This is ignored if not a VBGL_IOCTL_HGCM_CALL_TIMED or
+    * VBGL_IOCTL_HGCM_CALL_TIMED_32 request. */
+    uint32_t cMsTimeout;
+    /** Input: Whether a timed call is interruptible (ring-0 only). This is ignored
+    * if not a VBGL_IOCTL_HGCM_CALL_TIMED or VBGL_IOCTL_HGCM_CALL_TIMED_32
+    * request, or if made from user land. */
+    bool fInterruptible;
+    /** Explicit padding, MBZ. */
+    uint8_t bReserved;
+    /** Input: How many parameters following this structure. */
+    * The parameters are either HGCMFunctionParameter64 or HGCMFunctionParameter32,
+    * depending on whether we're receiving a 64-bit or 32-bit request.
+    * The current maximum is 61 parameters (given a 1KB max request size,
+    * and a 64-bit parameter size of 16 bytes).
+    * @note This information is duplicated by Hdr.cbIn, but it's currently too much
+    * work to eliminate this. */
+    uint16_t cParms;
+    /* Parameters follow in form HGCMFunctionParameter aParms[cParms] */
+    VBGLOCHGCMCALL, RT_FAR *PVBGLIOCHGCMCALL;
+
+    AssertCompileSize(VBGLIOCHGCMCALL, 24 + 16);
+
+    typedef VBGLIOCHGCMCALL const RT_FAR *PCVBGLIOCHGCMCALL;
+
+    /** Initialize a HGCM header (VBGLIOCHGCMCALL) for a non-timed call. */
+
+    # define VBGL_HGCM_HDR_INIT(a_pHdr, a_idClient, a_idFunction, a_cParameters) \
+        do {
+            VBGLREQHDR_INIT_EX(&(a_pHdr)->Hdr, \
+                           sizeof(VBGLIOCHGCMCALL) + (a_cParameters) * sizeof(HGCMFunctionParameter), \
+                           sizeof(VBGLIOCHGCMCALL) + (a_cParameters) * sizeof(HGCMFunctionParameter)); \
+            (a_pHdr)->u32ClientID    = (a_idClient); \
+            }
(a_pHdr)->u32Function = (a_idFunction); \
(a_pHdr)->cMsTimeout = RT_INDEFINITE_WAIT; \
(a_pHdr)->fInterruptible = true; \
(a_pHdr)->bReserved = 0; \
(a_pHdr)->cParms = (a_cParameters); \
} while (0)

+/**
+ * Initialize a HGCM header (VBGLIOCHGCMCALL) for a non-timed call, custom size.
+ *
+ * This is usually only needed when appending page lists to the call.
+ *
+ * @param   a_pHdr          The header to initialize.
+ * @param   a_idClient      The client connection ID to call thru.
+ * @param   a_idFunction    The function we're calling
+ * @param   a_cParameters   Number of parameters.
+ * @param   a_cbReq         The request size.
+ */
+# define VBGL_HGCM_HDR_INIT_EX(a_pHdr, a_idClient, a_idFunction, a_cParameters, a_cbReq) \
+ do { \
+    Assert((a_cbReq) >= sizeof(VBGLIOCHGCMCALL) + (a_cParameters) * 
sizeof(HGCMFunctionParameter)); \
+    VBGLREQHDR_INIT_EX(&(a_pHdr)->Hdr, (a_cbReq), (a_cbReq)); \
+    (a_pHdr)->u32ClientID    = (a_idClient); \
+    (a_pHdr)->u32Function    = (a_idFunction); \
+    (a_pHdr)->cMsTimeout     = RT_INDEFINITE_WAIT; \
+    (a_pHdr)->fInterruptible = true; \
+    (a_pHdr)->bReserved      = 0; \
+    (a_pHdr)->cParms         = (a_cParameters); \
+ } while (0)
+
+/**
+ * Initialize a HGCM header (VBGLIOCHGCMCALL), with timeout (interruptible).
+ *
+ * @param   a_pHdr          The header to initialize.
+ * @param   a_idClient      The client connection ID to call thru.
+ * @param   a_idFunction    The function we're calling
+ * @param   a_cParameters   Number of parameters.
+ * @param   a_cMsTimeout    The timeout in milliseconds.
+ */
+# define VBGL_HGCM_HDR_INIT_TIMED(a_pHdr, a_idClient, a_idFunction, a_cParameters, a_cMsTimeout) \
+ do { \
+    (a_pHdr)->u32ClientID    = (a_idClient); \
+    (a_pHdr)->u32Function    = (a_idFunction); \
+    (a_pHdr)->cMsTimeout     = (a_cMsTimeout); \
+    (a_pHdr)->fInterruptible = true; \
+    (a_pHdr)->bReserved      = 0; \
+    (a_pHdr)->cParms         = (a_cParameters); \
+ } while (0)
+ } while (0)
+
+/** Get the pointer to the first HGCM parameter. */
+/*
+#define VBGL_HGCM_GET_CALL_PARMS(a_pInfo) ((HGCMFunctionParameter *)((uint8_t *)(a_pInfo) +
+sizeof(VBGLOCHGCMCALL)) )
+/** Get the pointer to the first HGCM parameter in a 32-bit request. */
+/*
+#define VBGL_HGCM_GET_CALL_PARMS32(a_pInfo) ((HGCMFunctionParameter32 *)((uint8_t *)(a_pInfo)+
+sizeof(VBGLOCHGCMCALL)) )
+
+/** @} */
+
+/* Mouse event notification callback function.
+ * @param pvUser Argument given when setting the callback.
+ */
+typedef DECLCALLBACK(void) FNVBOXGUESTMOUSENOTIFY(void *pvUser);
+/** Pointer to a mouse event notification callback function. */
+typedef FNVBOXGUESTMOUSENOTIFY *PFNVBOXGUESTMOUSENOTIFY; /**< @todo fix type prefix */
+
+#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/VBoxGuestLib.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/VBoxGuestLib.h
@@ -0,0 +1,926 @@
+/** @file
+ * VBoxGuestLib - VirtualBox Guest Additions Library.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ */
+/* This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ * You may elect to license modified versions of this file under the
+ */
+*/
+ */
+
+#ifndef ___VBox_VBoxGuestLib_h
+#define ___VBox_VBoxGuestLib_h
+
+#include <VBox/types.h>
+#include <VBox/VMMDevCoreTypes.h>
+#include <VBox/VBoxGuestCoreTypes.h>
+
+/** @defgroup grp_vboxguest_lib VirtualBox Guest Additions Library
+ * @ingroup grp_vboxguest
+ * @}
+ */
+
+/** @page pg_guest_lib VirtualBox Guest Library
+ * This is a library for abstracting the additions driver interface. There are
+ * multiple versions of the library depending on the context. The main
+ * distinction is between kernel and user mode where the interfaces are very
+ * different.
+ * 
+ */
+
+/** @section sec_guest_lib_ring0 Ring-0
+ * In ring-0 there are two version:
+ * - VBOX_LIB_VBGL_R0_BASE / VBoxGuestR0LibBase for the VBoxGuest main driver,
+ * who is responsible for managing the VMMDev virtual hardware.
+ * - VBOX_LIB_VBGL_R0 / VBoxGuestR0Lib for other (client) guest drivers.
+ *
+ * The library source code and the header have a define VBGL_VBOXGUEST, which is
+ * defined for VBoxGuest and undefined for other drivers. Drivers must choose
+ * right library in their makefiles and set VBGL_VBOXGUEST accordingly.
+ *
+ * The libraries consists of:
+ * - common code to be used by both VBoxGuest and other drivers;
+ * - VBoxGuest specific code;
+ * - code for other drivers which communicate with VBoxGuest via an IOCTL.
+ *
+ */
+
+/** @section sec_guest_lib_ring3 Ring-3
+ * There are more variants of the library here:
+ * - VBOX_LIB_VBGL_R3 / VBoxGuestR3Lib for programs.
+ * - VBOX_LIB_VBGL_R3_XFREE86 / VBoxGuestR3LibXFree86 for old style XFree
+ * drivers which uses special loader and or symbol resolving strategy.
+ * - VBOX_LIB_VBGL_R3_SHARED / VBoxGuestR3LibShared for shared objects / DLLs /
+ * Dylibs.
+ /** HGCM client ID. */
+ typedef uint32_t HGCMCLIENTID;
+
+ /** @defgroup grp_vboxguest_lib_root Ring-0 interface. */
+ */
+ +@ifdef grp_vboxguest_lib_root
+ +@def DECLR0VBGL
+ + * Declare a VBGL ring-0 API with the right calling convention and visibility.
+ + * @param type Return type. */
+ +@ifdef RT_OS_DARWIN /** @todo probably apply to all, but don't want a forest fire on our hands right now. */
+ +@define DECLR0VBGL(type) DECLHIDDEN(type) VBOXCALL
+ +@else
+ +@define DECLR0VBGL(type) type VBOXCALL
+ +endif
+ +@define DECLVBGL(type) DECLR0VBGL(type)
+
+/**
+ * The library initialization function to be used by the main VBoxGuest driver.
+ */
+ +@return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0InitPrimary(RTIOPORT portVMMDev, struct VMMDevMemory *pVMMDevMemory);
+
+/**
+ * The library termination function to be used by the main VBoxGuest driver.
+ */
+ +@author bird (2017-08-23)
+ */
+DECLR0VBGL(void) VbglR0TerminatePrimary(void);
+
+/**
+ * The library initialization function to be used by all drivers other than the main VBoxGuest system driver.
+ */
+ +@return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0InitClient(void);
+/**
+ * The library termination function.
+ */
+DECLR0VBGL(void) VbglR0TerminateClient(void);
+
+@name The IDC Client Interface
+ * {
+ * /
+ +
+/* **
+ * Inter-Driver Communication Handle.
+ */
+typedef union VBGLIDCHANDLE
+{
+    /**< Padding for opaque usage.
+    * Must be greater or equal in size than the private struct. */
+    void *apvPadding[4];
+#ifdef VBGLIDCHANDLEPRIVATE_DECLARED
+    /**< The private view. */
+    struct VBGLIDCHANDLEPRIVATE s;
+#endif
+} VBGLIDCHANDLE;
+/** Pointer to a handle. */
typedef VBGLIDCHANDLE *PVBGLIDCHANDLE;
+
+DECLR0VBGL(int) VbglR0IdcOpen(PVBGLIDCHANDLE pHandle, uint32_t uReqVersion, uint32_t uMinVersion,
+                              uint32_t *puSessionVersion, uint32_t *puDriverVersion, uint32_t *puDriverRevision);
+struct VBGLREQHDR;
+DECLR0VBGL(int) VbglR0IdcCallRaw(PVBGLIDCHANDLE pHandle, uintptr_t uReq, struct VBGLREQHDR *pReqHdr, uint32_t cbReq);
+DECLR0VBGL(int) VbglR0IdcCall(PVBGLIDCHANDLE pHandle, uintptr_t uReq, struct VBGLREQHDR *pReqHdr, uint32_t cbReq);
+DECLR0VBGL(int) VbglR0IdcClose(PVBGLIDCHANDLE pHandle);
+
+/** * @} */
+
+@name Generic request functions.
+ * {
+ * /
+ +
+/** *
+ * Allocate memory for generic request and initialize the request header.
+ *
+ * @returns VBox status code.
+ * @param ppReq Where to return the pointer to the allocated memory.
+ * @param cbReq Size of memory block required for the request.
+ * @param enmReqType the generic request type.
+ */
+#+#+if defined(__VBox_VMMDev_h) || defined(DOXYGEN_RUNNING)
+#+#+DECLR0VBGL(int) VbglR0GRAloc(struct VMMDevRequestHeader **ppReq, size_t cbReq,
+#+#+VMMDevRequestType enmReqType);
+#+#+else
+#+#+DECLR0VBGL(int) VbglR0GRAloc(struct VMMDevRequestHeader **ppReq, size_t cbReq, int32_t
+#+#+enmReqType);
+#+#+endif
+ + +/#**
+ +# Perform the generic request.
+ + *
+ +# @param pReq pointer the request structure.
+ + *
+ +# @return VBox status code.
+ + */
+ +#+#+DECLR0VBGL(int) VbglR0GRPerform(struct VMMDevRequestHeader *pReq);
+ + +/#**
+ +# Free the generic request memory.
+ + *
+ +# @param pReq pointer the request structure.
+ + *
+ +# @return VBox status code.
+ + */
+ +#+#+DECLR0VBGL(void) VbglR0GRFree(struct VMMDevRequestHeader *pReq);
+ + +/#**
+ +# Verify the generic request header.
+ + *
+ +# @param pReq pointer the request header structure.
+ +# @param cbReq size of the request memory block. It should be equal to the request size
+ +# for fixed size requests. It can be greater than the request size for
+ +# variable size requests.
+ + *
+ +# @return VBox status code.
+ + */
+ +#+#+DECLR0VBGL(int) VbglGR0Verify(const struct VMMDevRequestHeader *pReq, size_t cbReq);
+ + +/** @ ] */ */
+ +#+#+ifdef VBOX_WITH_HGCM
+ +#+struct VBGLIOCHGCMCALL;
+ +#+ ifndef VBGL__VBOXGUEST
+#+#+endif
+#+#+endif
+#+#+Open Source Used In 5GaaS Edge AC-4 38835
+/**
+ * Callback function called from HGCM helpers when a wait for request
+ * completion IRQ is required.
+ *
+ + * @returns VINF_SUCCESS, VERR_INTERRUPT or VERR_TIMEOUT.
+ * @param   pvData      VBoxGuest pointer to be passed to callback.
+ * @param   u32Data     VBoxGuest 32 bit value to be passed to callback.
+ */
+typedef DECLCALLBACK(int) FNVBGLHGCMCALLBACK(VMMDevHGCMRequestHeader *pHeader, void *pvData, uint32_t u32Data);
+/** Pointer to a FNVBGLHGCMCALLBACK. */
+typedef FNVBGLHGCMCALLBACK *PFNVBGLHGCMCALLBACK;
+
+/**
+ * Perform a connect request.
+ *
+ * That is locate required service and obtain a client identifier for future
+ * access.
+ *
+ * @note This function can NOT handle cancelled requests!
+ *
+ * @param   pLoc                The service to connect to.
+ * @param   pidClient           Where to return the client ID on success.
+ * @param   pfnAsyncCallback    Required pointer to function that is called when host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest implements waiting for an IRQ in this function.
+ * @param   pvAsyncData         An arbitrary VBoxGuest pointer to be passed to callback.
+ * @param   u32AsyncData        An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ *
+ * @return  VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInternalConnect(HGCMServiceLocation const *pLoc, HGCMCLIENTID *pidClient,
+                                        PFNVBGLHGCMCALLBACK pfnAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData);
+
+/**
+ * Perform a disconnect request.
+ *
+ * That is tell the host that the client will not call the service anymore.
+ *
+ * @note This function can NOT handle cancelled requests!
+ *
+ * @param   idClient            The client ID to disconnect.
+ * @param   pfnAsyncCallback    Required pointer to function that is called when host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest implements waiting for an IRQ in this function.
+ @param pvAsyncData An arbitrary VBoxGuest pointer to be passed to callback.
+ @param u32AsyncData An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ @return VBox status code.
+ */
+
+DECLR0VBGL(int) VbglR0HGCMInternalDisconnect(HGCMCLIENTID idClient, 
+    PFNVBGLHGCMCALLBACK pfAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData);
+
+/** Call a HGCM service.
+ */
+ @note This function can deal with cancelled requests.
+ *
+ @param pCallInfo The request data.
+ @param fFlags Flags, see VBGLR0_HGCMCALL_F_XXX.
+ @param pfAsyncCallback Required pointer to function that is called when
+    host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest
+ implements waiting for an IRQ in this function.
+ @param pvAsyncData An arbitrary VBoxGuest pointer to be passed to callback.
+ @param u32AsyncData An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ *
+ @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInternalCall(struct VBGLIOCHGCMCALL *pCallInfo, uint32_t cbCallInfo, 
+    uint32_t fFlags, 
+    PFNVBGLHGCMCALLBACK pfAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData);
+
+/** Call a HGCM service. (32 bits packet structure in a 64 bits guest)
+ */
+ @note This function can deal with cancelled requests.
+ *
+ @param pCallInfo The request data.
+ @param fFlags Flags, see VBGLR0_HGCMCALL_F_XXX.
+ @param pfAsyncCallback Required pointer to function that is called when
+    host returns VINF_HGCM_ASYNC_EXECUTE. VBoxGuest
+ implements waiting for an IRQ in this function.
+ @param pvAsyncData An arbitrary VBoxGuest pointer to be passed to callback.
+ @param u32AsyncData An arbitrary VBoxGuest 32 bit value to be passed to callback.
+ *
+ @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMInternalCall32(struct VBGLIOCHGCMCALL *pCallInfo, uint32_t cbCallInfo, 
+    uint32_t fFlags, 
+    PFNVBGLHGCMCALLBACK pfAsyncCallback, void *pvAsyncData, uint32_t u32AsyncData);
/** @name VbglR0HGCMInternalCall flags */

/** User mode request. */
#define VBGLR0_HGCMCALL_F_USER          UINT32_C(0)

/** Kernel mode request. */
#define VBGLR0_HGCMCALL_F_KERNEL        UINT32_C(1)

/** Mode mask. */
#define VBGLR0_HGCMCALL_F_MODE_MASK     UINT32_C(1)

/** @} */

else  /* !VBGL_VBOXGUEST */

struct VBGLHGCMHANDLEDATA;
typedef struct VBGLHGCMHANDLEDATA *VBGLHGCMHANDLE;

/** @name HGCM functions */

/** Initializes HGCM in the R0 guest library. Must be called before any HGCM connections are made. Is called by VbgIInitClient(). */
DECLR0VBGL(int) VbglR0HGCMInit(void);

/** Terminates HGCM in the R0 guest library. Is called by VbgITerminate(). */
DECLR0VBGL(int) VbglR0HGCMTerminate(void);

/** Connect to a service. */
DECLR0VBGL(int) VbglR0HGCMConnect(void);

/** Params: */
/** @param pHandle Pointer to variable that will hold a handle to be used further in VbgIHGCMCall and VbgI HGCMClose. */
/** @param pszServiceName The service to connect to. */
/** @param pidClient Where to return the client ID for the connection. */
DECLR(int) VbglR0HGCMConnect(VBGLHGCMHANDLE *pHandle, const char *pszServiceName, HGCMCLIENTID *pidClient);

DECLR(int) VbglR0HGCMDisconnect(VBGLHGCMHANDLE handle, HGCMCLIENTID idClient);

DECLR(int) VbglR0HGCMCallRaw(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);

DECLR(int) VbglR0HGCMCall(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);

DECLR(int) VbglR0HGCMCallRaw(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);

DECLR(int) VbglR0HGCMCall(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);
+ * @param handle      Handle of the connection.
+ * @param pData       Call request information structure, including function parameters.
+ * @param cbData      Length in bytes of data.
+ *
+ * @return VBox status code.
+ */
+DECLR0VBGL(int) VbglR0HGCMCallUserDataRaw(VBGLHGCMHANDLE handle, struct VBGLIOCHGCMCALL*pData, uint32_t cbData);
+
+/** @} */
+
+/** @name Undocumented helpers for talking to the Chromium OpenGL Host Service
+ * @{ */
+typedef VBGLHGCMHANDLE VBGLCRCTLHANDLE;
+DECLR0VBGL(int) VbglR0CrCtlCreate(VBGLCRCTLHANDLE *phCtl);
+DECLR0VBGL(int) VbglR0CrCtlDestroy(VBGLCRCTLHANDLE hCtl);
+DECLR0VBGL(int) VbglR0CrCtlConConnect(VBGLCRCTLHANDLE hCtl, HGCMCLIENTID *pidClient);
+DECLR0VBGL(int) VbglR0CrCtlConDisconnect(VBGLCRCTLHANDLE hCtl, HGCMCLIENTID idClient);
+struct VBGLIOCHGCMCALL;
+DECLR0VBGL(int) VbglR0CrCtlConCallRaw(VBGLCRCTLHANDLE hCtl, struct VBGLIOCHGCMCALL *pCallInfo, int cbCallInfo);
+DECLR0VBGL(int) VbglR0CrCtlConCall(VBGLCRCTLHANDLE hCtl, struct VBGLIOCHGCMCALL *pCallInfo, int cbCallInfo);
+DECLR0VBGL(int) VbglR0CrCtlConCallUserDataRaw(VBGLCRCTLHANDLE hCtl, struct VBGLIOCHGCMCALL *pCallInfo, int cbCallInfo);
+/** @} */
+
+# endif /* !VBGL_VBOXGUEST */
+
+# endif /* VBOX_WITH_HGCM */
+
+/** *
+ * Initialize the heap.
+ */
+/** @returns VBox status code. */
+DECLR0VBGL(int) VbglR0PhysHeapInit(void);
+
+/** *
+ * Shutdown the heap. */
+DECLR0VBGL(void) VbglR0PhysHeapTerminate(void);
+
+/** *
+ * Allocate a memory block. */
+/** @returns Virtual address of the allocated memory block. */
+ * @param cbSize Size of block to be allocated.
+ */
+DECLR0VBGL(void *) VbglR0PhysHeapAlloc(uint32_t cbSize);
+
+/**
+ * Get physical address of memory block pointed by the virtual address.
+ */
+DECLR0VBGL(uint32_t) VbglR0PhysHeapGetPhysAddr(void *pv);
+
+/**
+ * Free a memory block.
+ */
+DECLR0VBGL(void) VbglR0PhysHeapFree(void *pv);
+
+DECLR0VBGL(int) VbglR0QueryVMMDevMemory(struct VMMDevMemory **ppVMMDevMemory);
+DECLR0VBGL(bool) VbglR0CanUsePhysPageList(void);
+
+#ifndef VBOX_GUEST
+/** @name Mouse
+ * @{ */
+DECLR0VBGL(int) VbglR0SetMouseNotifyCallback(PFNVBOXGUESTMOUSENOTIFY pfnNotify, void *pvUser);
+DECLR0VBGL(int) VbglR0GetMouseStatus(uint32_t *pfFeatures, uint32_t *px, uint32_t *py);
+DECLR0VBGL(int) VbglR0SetMouseStatus(uint32_t fFeatures);
+/** @} */
+#endif /* VBOX_GUEST */
+/** @} */
+/** @defgroup grp_vboxguest_lib_r3 Ring-3 interface.
+ * @{ */
+DECLR0VBGL(int) VbglR0SetMouseNotifyCallback(PFNVBOXGUESTMOUSENOTIFY pfnNotify, void *pvUser);
+DECLR0VBGL(int) VbglR0GetMouseStatus(uint32_t *pfFeatures, uint32_t *px, uint32_t *py);
+DECLR0VBGL(int) VbglR0SetMouseStatus(uint32_t fFeatures);
+/** @} */
+#ifndef IN_RING3
+/** @} */
+*/
+/** @} */
+#ifdef IN_RING3
+*/
+/** @} */
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+*/
+/** @def VBGLR3DECL
+ * Ring 3 VBGL declaration.
+ * @param   type    The return type of the function declaration.
+ */
++# define VBGLR3DECL(type) DECLHIDDEN(type) VBOXCALL
+
+/** @name General-purpose functions
+ * @{ */
+VBGLR3DECL(int)     VbglR3Init(void);
+VBGLR3DECL(int)     VbglR3InitUser(void);
+# ifdef ___iprt_time_h
+VBGLR3DECL(int)     VbglR3GetHostTime(PRTTIMESPEC pTime);
+# endif
+VBGLR3DECL(int)     VbglR3InterruptEventWaits(void);
+VBGLR3DECL(int)     VbglR3WriteLog(const char *pch, size_t cch);
+VBGLR3DECL(int)     VbglR3CtlFilterMask(uint32_t fOr, uint32_t fNot);
+VBGLR3DECL(int)     VbglR3Daemonize(bool fNoChDir, bool fNoClose, bool fRespawn, unsigned *
+*pcRespawn);
+VBGLR3DECL(int)     VbglR3PidFile(const char *pszPath, PRTFILE phFile);
+VBGLR3DECL(void)    VbglR3ClosePidFile(const char *pszPath, RTFILE hFile);
+VBGLR3DECL(int)     VbglR3SetGuestCaps(uint32_t fOr, uint32_t fNot);
+VBGLR3DECL(int)     VbglR3AcquireGuestCaps(uint32_t fOr, uint32_t fNot, bool fConfig);
+VBGLR3DECL(int)     VbglR3WaitEvent(uint32_t fMask, uint32_t cMillies, uint32_t *pfEvents);
+
+VBGLR3DECL(int)     VbglR3ReportAdditionsStatus(VBoxGuestFacilityType Facility, VBoxGuestFacilityStatus StatusCurrent,
+                                                uint32_t fFlags);
+VBGLR3DECL(int)     VbglR3GetAdditionsVersion(char **ppszVer, char **ppszVerEx, char **ppszRev);
+VBGLR3DECL(int)     VbglR3GetAdditionsInstallationPath(char **ppszPath);
+VBGLR3DECL(int)     VbglR3GetSessionId(uint64_t *pu64IdSession);
+
+/** @} */
+
+/** @name Shared clipboard
+ * @{ */
+VBGLR3DECL(int)     VbglR3ClipboardConnect(HGCMCLIENTID *pidClient);
+VBGLR3DECL(int)     VbglR3ClipboardDisconnect(HGCMCLIENTID idClient);
+VBGLR3DECL(int)     VbglR3ClipboardGetHostMsg(HGCMCLIENTID idClient, uint32_t *pMsg, uint32_t *
+*pfFormats);
+VBGLR3DECL(int)     VbglR3ClipboardReadData(HGCMCLIENTID idClient, uint32_t fFormat, void *pv,
+                                                uint32_t cb, uint32_t *pcb);
+VBGLR3DECL(int)     VbglR3ClipboardReportFormats(HGCMCLIENTID idClient, uint32_t fFormats);
+VBGLR3DECL(int)     VbglR3ClipboardWriteData(HGCMCLIENTID idClient, uint32_t fFormat, void *pv,
+                                                uint32_t cb);
+/** @} */
+
+/** @name Seamless mode
+ * @{ */
+Open Source Used In 5GaaS Edge AC-4 38842
VBGLR3DECL(int) VbglR3SeamlessSetCap(bool fState);

VBGLR3DECL(int) VbglR3SeamlessWaitEvent(VMMDevSeamlessMode *pMode);

VBGLR3DECL(int) VbglR3SeamlessSendRects(uint32_t cRects, PRTRECT pRects);

VBGLR3DECL(int) VbglR3SeamlessGetLastEvent(VMMDevSeamlessMode *pMode);

/** @} */

/** @name Mouse */

VBGLR3DECL(int) VbglR3GetMouseStatus(uint32_t *pfFeatures, uint32_t *px, uint32_t *py);

VBGLR3DECL(int) VbglR3SetMouseStatus(uint32_t fFeatures);

/** @} */

/** @name Video */

VBGLR3DECL(int) VbglR3VideoAccelEnable(bool fEnable);

VBGLR3DECL(int) VbglR3VideoAccelFlush(void);

VBGLR3DECL(int) VbglR3SetPointerShape(uint32_t fFlags, uint32_t xHot, uint32_t yHot, uint32_t cx,
                                          uint32_t cy,
                                          const void *pvImg, size_t cbImg);

VBGLR3DECL(int) VbglR3SetPointerShapeReq(struct VMMDevReqMousePointer *pReq);

/** @} */

/** @name Display */

VBGLR3DECL(int) VbglR3GetDisplayChangeRequest(uint32_t *pcx, uint32_t *pcy, uint32_t *pcBits,
                                               uint32_t *piDisplay,
                                               uint32_t *pdx, uint32_t *pdy, bool *pfEnabled, bool *pfOrigin,
                                               bool fAck);

VBGLR3DECL(int) VbglR3HostLikesVideoMode(uint32_t cx, uint32_t cy, uint32_t cBits);

VBGLR3DECL(int) VbglR3VideoModeGetHighestSavedScreen(unsigned *pcScreen);

VBGLR3DECL(int) VbglR3SaveVideoMode(unsigned cScreen, unsigned cx, unsigned cy, unsigned cBits,
                                     unsigned x, unsigned y, bool fEnabled);

VBGLR3DECL(int) VbglR3RetrieveVideoMode(unsigned cScreen, unsigned *pcx, unsigned *pcy, unsigned *pcBits,
                                         unsigned *px, unsigned *py, bool *pfEnabled);

/** @} */
+/** @name VRDP */
+VBGLR3DECL(int) VbglR3VrdpGetChangeRequest(bool *pfActive, uint32_t *puExperienceLevel);
+
+/** @name VM Statistics */
+VBGLR3DECL(int) VbglR3StatQueryInterval(uint32_t *pu32Interval);
+# if defined(__VBox_VMMDev_h) || defined(DOXYGEN_RUNNING)
+VBGLR3DECL(int) VbglR3StatReport(VMMDevReportGuestStats *pReq);
+# endif
+
+/** @name Memory ballooning */
+VBGLR3DECL(int) VbglR3MemBalloonRefresh(uint32_t *pcChunks, bool *pfHandleInR3);
+VBGLR3DECL(int) VbglR3MemBalloonChange(void *pv, bool fInflate);
+
+/** @name Core Dump */
+VBGLR3DECL(int) VbglR3WriteCoreDump(void);
+
+# ifdef VBOX_WITH_GUEST_PROPS
+/** @name Guest properties */
+VBGLR3DECL(int) VbglR3GuestPropConnect(uint32_t *pidClient);
+VBGLR3DECL(int) VbglR3GuestPropDisconnect(HGCMCLIENTID idClient);
+VBGLR3DECL(int) VbglR3GuestPropWrite(HGCMCLIENTID idClient, const char *pszName, const char *pszValue, const char *pszFlags);
+VBGLR3DECL(int) VbglR3GuestPropWriteValue(HGCMCLIENTID idClient, const char *pszName, const char *pszValueFormat, va_list va) RT_IPRT_FORMAT_ATTR(3, 0);
+VBGLR3DECL(int) VbglR3GuestPropWriteValueF(HGCMCLIENTID idClient, const char *pszName, const char *pszValueFormat, ...) RT_IPRT_FORMAT_ATTR(3, 4);
+VBGLR3DECL(int) VbglR3GuestPropRead(HGCMCLIENTID idClient, const char *pszName, void *pvBuf, uint32_t cbBuf, char **ppszValue, uint64_t *pu64Timestamp, char **ppszFlags, uint32_t *pcbBufActual);
+VBGLR3DECL(int) VbglR3GuestPropReadValue(uint32_t ClientId, const char *pszName, char *pszValue, uint32_t cchValue,
+VBGLR3DECL(int) VbgIR3GuestPropReadValueAlloc(HGCMCLIENTID idClient, const char *pszName, char **ppszValue);
+VBGLR3DECL(void) VbgIR3GuestPropReadValueFree(char *pszValue);
+VBGLR3DECL(int) VbgIR3GuestPropEnumRaw(HGCMCLIENTID idClient, const char *paszPatterns, char *pcBuf, uint32_t cbBuf,
+     uint32_t *pcbBufActual);
+VBGLR3DECL(int) VbgIR3GuestPropEnum(HGCMCLIENTID idClient, char const * const *ppaszPatterns, uint32_t cPatterns,
+   PVBGLR3GUESTPROPENUM *ppHandle, char const **ppszName, char const **ppszValue,
+   uint64_t *pu64Timestamp, char const **ppszFlags);
+VBGLR3DECL(int) VbgIR3GuestPropDelete(HGCMCLIENTID idClient, const char *pszName);
+VBGLR3DECL(int) VbgIR3GuestPropDelSet(HGCMCLIENTID idClient, char const * const *papszPatterns, uint32_t cPatterns);
+VBGLR3DECL(int) VbgIR3GuestPropWait(HGCMCLIENTID idClient, const char *pszPatterns, void *pvBuf, uint32_t cbBuf,
+  uint64_t u64Timestamp, uint32_t cMillies, char ** ppszName, char **ppszValue,
+  uint64_t *pu64Timestamp, char **ppszFlags, uint32_t *pcbBufActual);
+/** @} */
+
+/** @name Guest user handling / reporting. */
+* @} */
+VBGLR3DECL(int) VbgIR3GuestUserReportState(const char *pszUser, const char *pszDomain,
+ VBoxGuestUserState enmState,
+   uint8_t *pbDetails, uint32_t cbDetails);
+/** @} */
+
+/** @name Host version handling */
+* @} */
+VBGLR3DECL(int) VbgIR3HostVersionCheckForUpdate(HGCMCLIENTID idClient, bool *pfUpdate, char **ppszHostVersion,
+  char **ppszGuestVersion);
+VBGLR3DECL(int) VbgIR3HostVersionLastCheckedLoad(HGCMCLIENTID idClient, char **ppszVer);
+VBGLR3DECL(int) VbgIR3HostVersionLastCheckedStore(HGCMCLIENTID idClient, const char *pszVer);
+# endif /* VBOX_WITH_GUEST_PROPS defined */
+
+# ifdef VBOX_WITH_SHARED_FOLDERS
+/** @} */
+/* Structure containing mapping information for a shared folder. */
+*/
typedef struct VBGLR3SHAREDFOLDERMAPPING {
    /** Mapping status. */
    uint32_t u32Status;
    /** Root handle. */
    uint32_t u32Root;
} VBGLR3SHAREDFOLDERMAPPING;

/** Pointer to a shared folder mapping information structure. */
typedef VBGLR3SHAREDFOLDERMAPPING *PVBGLR3SHAREDFOLDERMAPPING;

/** Pointer to a const shared folder mapping information structure. */
typedef VBGLR3SHAREDFOLDERMAPPING const *PCVBGLR3SHAREDFOLDERMAPPING;

VBGLR3DECL(int)     VbglR3SharedFolderConnect(uint32_t *pidClient);
VBGLR3DECL(int)     VbglR3SharedFolderDisconnect(HGCMCLIENTID idClient);
VBGLR3DECL(bool)    VbglR3SharedFolderExists(HGCMCLIENTID idClient, const char *pszShareName);
VBGLR3DECL(int)     VbglR3SharedFolderGetMappings(HGCMCLIENTID idClient, bool fAutoMountOnly,
                                                  PVBGLR3SHAREDFOLDERMAPPING *ppaMappings, uint32_t *pcMappings);
VBGLR3DECL(void)    VbglR3SharedFolderFreeMappings(PVBGLR3SHAREDFOLDERMAPPING paMappings);
VBGLR3DECL(int)     VbglR3SharedFolderGetName(HGCMCLIENTID idClient,uint32_t u32Root, char **ppszName);
VBGLR3DECL(int)     VbglR3SharedFolderGetMountPrefix(char **ppszPrefix);
VBGLR3DECL(int)     VbglR3SharedFolderGetMountDir(char **ppszDir);

/** @} */
#endif /* VBOX_WITH_SHARED_FOLDERS defined */

#ifdef VBOX_WITH_GUEST_CONTROL
/** @name Guest control
 * @{ */

/** Structure containing the context required for
 * either retrieving or sending a HGCM guest control
 * commands from or to the host.
 * @note: Do not change parameter order without also
 * adapting all structure initializers.
 */
typedef struct VBGLR3GUESTCTRLCMDCTX {
    /** @todo This struct could be handy if we want to implement
     * a second communication channel, e.g. via TCP/IP.
     * Use a union for the HGCM stuff then. */
    /** IN: HGCM client ID to use for
     * communication. */
    uint32_t u32ClientID;
    /** IN/OUT: Context ID to retrieve
     */
}
+ * or to use. */
+ uint32_t uContextID;
+ /** IN: Protocol version to use. */
+ uint32_t uProtocol;
+ /** OUT: Number of parameters retrieved. */
+ uint32_t uNumParms;
+ } VBGLR3GUESTCTRLCMDCTX, *PVBGLR3GUESTCTRLCMDCTX;

+ /* General message handling on the guest. */
+ VbglR3DECL(int) VbglR3GuestCtrlConnect(uint32_t *pidClient);
+ VbglR3DECL(int) VbglR3GuestCtrlDisconnect(uint32_t idClient);
+ VbglR3DECL(int) VbglR3GuestCtrlMsgFilterSet(uint32_t uClientId, uint32_t uValue, uint32_t uMaskAdd,
+ uint32_t uMaskRemove);
+ VbglR3DECL(int) VbglR3GuestCtrlMsgFilterUnset(uint32_t uClientId);
+ VbglR3DECL(int) VbglR3GuestCtrlMsgReply(PVBGLR3GUESTCTRLCMDCTX pCtx, int rc);
+ VbglR3DECL(int) VbglR3GuestCtrlMsgReplyEx(PVBGLR3GUESTCTRLCMDCTX pCtx, int rc, uint32_t
+ uType,
+                                          void *pvPayload, uint32_t cbPayload);
+ VbglR3DECL(int) VbglR3GuestCtrlMsgSkip(uint32_t uClientId);
+ VbglR3DECL(int) VbglR3GuestCtrlMsgWaitFor(uint32_t uClientId, uint32_t *puMsg, uint32_t
+ *puNumParms);
+ VbglR3DECL(int) VbglR3GuestCtrlCancelPendingWaits(HGCMCLIENTID idClient);

+ /* Heme session handling. */
+ VbglR3DECL(int) VbglR3GuestCtrlSessionClose(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t tFlags);
+ VbglR3DECL(int) VbglR3GuestCtrlSessionNotify(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uType, uint32_t
+ uResult);
+ VbglR3DECL(int) VbglR3GuestCtrlSessionGetOpen(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t
+ *puProtocol, char *pszUser, uint32_t cbUser,
+ char *pszPassword, uint32_t cbPassword, char *pszDomain, uint32_t cbDomain,
+ uint32_t *pfFlags, uint32_t *pidSession);
+ VbglR3DECL(int) VbglR3GuestCtrlSessionGetClose(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t
+ *pfFlags, uint32_t *pidSession);

+ /* Guest path handling. */
+ VbglR3DECL(int) VbglR3GuestCtrlPathGetRename(PVBGLR3GUESTCTRLCMDCTX pCtx, char *pszSource, uint32_t cbSource, char *pszDest,
+ uint32_t cbDest, uint32_t *pfFlags);

+ /* Guest process execution. */
+ VbglR3DECL(int) VbglR3GuestCtrlProcGetStart(PVBGLR3GUESTCTRLCMDCTX pCtx, char *pszCmd,
+ uint32_t cbCmd, uint32_t *pfFlags,
+ char *pszArgs, uint32_t cbArgs, uint32_t *puNumArgs, char *pszEnv, uint32_t
+ *pcbEnv,
+ uint32_t *puNumEnvVars, char *pszUser, uint32_t cbUser, char *pszPassword,
+ uint32_t cbPassword, uint32_t *puTimeoutMS, uint32_t *puPriority,
+ uint64_t *puAffinity, uint32_t cbAffinity, uint32_t *pcAffinity);
+ VbglR3DECL(int) VbglR3GuestCtrlProcTerminate(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t
+ *puPID);
+ VbglR3DECL(int) VbglR3GuestCtrlProcGetInput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puPID, uint32_t
+ *pfFlags, void *pvData,
+ uint32_t cbData, uint32_t *pcbSize);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcGetOutput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puPID, uint32_t *puHandle, uint32_t *pfFlags);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcGetWaitFor(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puPID, uint32_t *puWaitFlags, + uint32_t *puTimeoutMS);
+% Guest native directory handling. */
+VBGLR3DECL(int) VbgIR3GuestCtrlDirGetRemove(PVBGLR3GUESTCTRLCMDCTX pCtx, char *pszPath, uint32_t cbPath, uint32_t *pfFlags);
+% Guest native file handling. */
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetOpen(PVBGLR3GUESTCTRLCMDCTX pCtx, char *pszFileName, uint32_t cbFileName, char *pszOpenMode,
+ uint32_t cbOpenMode, char *pszDisposition, uint32_t cbDisposition, char *pszSharing,
+ uint32_t cbSharing, uint32_t *puCreationMode, uint64_t *puOffset);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetClose(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetRead(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle, uint32_t *puToRead);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetReadAt(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle,
+ uint32_t *puToRead, uint64_t *poffRead);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetWrite(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle,
+ void *pvData, uint32_t cbData, uint32_t *pcbActual);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetWriteAt(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle, void *pvData, uint32_t cbData,
+ uint32_t *pcbActual, uint64_t *poffWrite);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetSeek(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle,
+ uint32_t *puSeekMethod, uint64_t *poffSeek);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileGetTell(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t *puHandle);
+% Guest -> Host. */
+VBGLR3DECL(int) VbgIR3GuestCtrlFileCbOpen(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc, uint32_t uFileHandle);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileCbClose(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileCbError(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileCbRead(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc, void *pvData, uint32_t cbData);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileCbWrite(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc, uint32_t cbData);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileCbSeek(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc, uint64_t *uOffActual);
+VBGLR3DECL(int) VbgIR3GuestCtrlFileCbTell(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uRc, uint64_t *uOffActual);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcCbStatus(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uPID, uint32_t uStatus, uint32_t fFlags,
+ void *pvData, uint32_t cbData);
+VBGLR3DECL(int) VbgIR3GuestCtrlProcCbOutput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t uPID,
uint32_t u32PID, uint32_t uStatus,
+                                           void *pvData, uint32_t cbData);
+VBGLR3DECL(int) VbglR3GuestCtrlProcCbStatusInput(PVBGLR3GUESTCTRLCMDCTX pCtx, uint32_t
+u32PID, uint32_t uStatus,
+                                           uint32_t fFlags, uint32_t cbWritten);  
+
+/** @} */ */
+} /* VBOX_WITH_GUEST_CONTROL defined */
+
+/** @name Auto-logon handling
+ * @} */
+VBGLR3DECL(int) VbglR3AutoLogonReportStatus(VBoxGuestFacilityStatus enmStatus);
+VBGLR3DECL(bool) VbglR3AutoLogonIsRemoteSession(void);
+/** @} */ */
+
+/** @name User credentials handling
+ * @} */
+VBGLR3DECL(int) VbglR3CredentialsQueryAvailability(void);
+VBGLR3DECL(int) VbglR3CredentialsRetrieve(char **ppszUser, char **ppszPassword, char **ppszDomain);
+VBGLR3DECL(int) VbglR3CredentialsRetrieveUtf16(PRTUTF16 *ppwszUser, PRTUTF16 *ppwszPassword,
+PRTUTF16 *ppwszDomain);
+VBGLR3DECL(int) VbglR3CredentialsDestroy(char *pszUser, char *pszPassword, char *pszDomain,
+uint32_t cPasses);
+VBGLR3DECL(int) VbglR3CredentialsDestroyUtf16(PRTUTF16 pwszUser, PRTUTF16 pwszPassword,
+PRTUTF16 pwszDomain,
+                                           uint32_t cPasses);
+/** @} */ */
+
+/** @name CPU hotplug monitor
+ * @} */
+VBGLR3DECL(int) VbglR3CpuHotPlugInit(void);
+VBGLR3DECL(int) VbglR3CpuHotPlugTerm(void);
+VBGLR3DECL(int) VbglR3CpuHotPlugWaitForEvent(VMMDevCpuEventType *penmEvent, uint32_t
+*pidCpuCore, uint32_t *pidCpuPackage);
+/** @} */ */
+
+/** @name Page sharing
+ * @} */
+struct VMMDEVSHAREDREGIONDESC;
+VBGLR3DECL(int) VbglR3RegisterSharedModule(char *pszModuleName, char *pszVersion, RTGCPTR64
+GCBaseAddr, uint32_t cbModule,
+                                           unsigned cRegions, struct VMMDEVSHAREDREGIONDESC *pRegions);
+VBGLR3DECL(int) VbglR3UnregisterSharedModule(char *pszModuleName, char *pszVersion, RTGCPTR64
+GCBaseAddr, uint32_t cbModule);
+VBGLR3DECL(int) VbglR3CheckSharedModules(void);
+VBGLR3DECL(bool) VbglR3PageSharingIsEnabled(void);
+VBGLR3DECL(int) VbglR3PageIsShared(RTGCPTR pPage, bool *pfShared, uint64_t *puPageFlags);
+/** @} */ */
/** @name Drag and Drop
 * @{ */

/** Structure containing the context required for
 * either retrieving or sending a HGCM guest drag’n drop
 * commands from or to the host.
 */

/** Note: Do not change parameter order without also
 * adapting all structure initializers.
 */

typedef struct VBGLR3GUESTDNDCMDCTX
{
    /** @todo This struct could be handy if we want to implement
     * a second communication channel, e.g. via TCP/IP.
     */
    uint32_t uClientID;
    /** The VM’s current session ID. */
    uint64_t uSessionID;
    /** Protocol version to use. */
    uint32_t uProtocol;
    /** Number of parameters retrieved for the current command. */
    uint32_t uNumParms;
    /** Max chunk size (in bytes) for data transfers. */
    uint32_t cbMaxChunkSize;
} VBGLR3GUESTDNDCMDCTX, *PVBGLR3GUESTDNDCMDCTX;

typedef struct VBGLR3DNDHGCMEVENT
{
    uint32_t uType;               /** The event type this struct contains. */
    uint32_t uScreenId;           /** Screen ID this request belongs to. */
    char    *pszFormats;          /** Format list (\r\n separated). */
    uint32_t cbFormats;           /** Size (in bytes) of pszFormats (\0 included). */

union
{
    struct
    {
        uint32_t uXpos;       /** X position of guest screen. */
        uint32_t uYpos;       /** Y position of guest screen. */
        uint32_t uDefAction;  /** Proposed DnD action. */
        uint32_t uAllActions; /** Allowed DnD actions. */
    } a; /** Values used in init, move and drop event type. */

    struct
    {
        void    *pvData;      /** Data request. */
    }
};
typedef VBGLR3DNDHGCMEVENT *PVBGLR3DNDHGCMEVENT;
typedef const PVBGLR3DNDHGCMEVENT CPVBGLR3DNDHGCMEVENT;

VBGLR3DECL(int) VbglR3DnDConnect(PVBGLR3GUESTNDNDCMDCTX pCtx);
VBGLR3DECL(int) VbglR3DnDDisconnect(PVBGLR3GUESTNDNDCMDCTX pCtx);

VBGLR3DECL(int) VbglR3DnDRecvNextMsg(PVBGLR3GUESTNDNDCMDCTX pCtx, CPVBGLR3DNDHGCMEVENT pEvent);

VBGLR3DECL(int) VbglR3DnDHGSendAckOp(PVBGLR3GUESTDNDCMDCTX pCtx, uint32_t uAction);
VBGLR3DECL(int) VbglR3DnDHGSendReqData(PVBGLR3GUESTNDNDCMDCTX pCtx, const char *pcszFormat);
VBGLR3DECL(int) VbglR3DnDHGSendProgress(PVBGLR3GUESTNDNDCMDCTX pCtx, uint32_t uStatus, uint8_t uPercent, int rcErr);

VBGLR3DECL(int) VbglR3DnDGHSendAckPending(PVBGLR3GUESTNDNDCMDCTX pCtx, uint32_t uDefAction, uint32_t uAllActions, const char* pcszFormats, uint32_t cbFormats);
VBGLR3DECL(int) VbglR3DnDGHSendData(PVBGLR3GUESTNDNDCMDCTX pCtx, const char *pszFormat, void *pvData, uint32_t cbData);
VBGLR3DECL(int) VbglR3DnDGHSendError(PVBGLR3GUESTNDNDCMDCTX pCtx, int rcOp);

/* Generic Host Channel Service. */
VBGLR3DECL(int) VbglR3HostChannelInit(uint32_t *pidClient);
VBGLR3DECL(void) VbglR3HostChannelTerm(uint32_t idClient);
VBGLR3DECL(int) VbglR3HostChannelAttach(uint32_t *pu32ChannelHandle, uint32_t u32HGCMClientId, const char *pszName, uint32_t u32Flags);
VBGLR3DECL(void) VbglR3HostChannelDetach(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId);
VBGLR3DECL(int) VbglR3HostChannelSend(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId, void *pvData, uint32_t cbData);
VBGLR3DECL(int) VbglR3HostChannelRecv(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId, void *pvData, uint32_t cbData, uint32_t *pu32SizeReceived, uint32_t *pu32SizeRemainning);
VBGLR3DECL(int) VbglR3HostChannelControl(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId, uint32_t u32Code, void *pvParm, uint32_t cbParm, void *pvData, uint32_t cbData, uint32_t *pu32SizeDataReturned);
VBGLR3DECL(int) VbglR3HostChannelEventWait(uint32_t *pu32ChannelHandle, uint32_t u32HGCMClientId, uint32_t *pu32EventId, void *pvParm, uint32_t cbParm, uint32_t *pu32SizeReturned);
VBGLR3DECL(int) VbglR3HostChannelEventCancel(uint32_t u32ChannelHandle, uint32_t u32HGCMClientId);
VBGLR3DECL(int) VbglR3HostChannelQuery(const char *pszName, uint32_t u32HGCMClientId, uint32_t u32Code,
# Open Source Used In 5GaaS Edge AC-4

```c
void *pvParm, uint32_t cbParm, void *pvData, uint32_t cbData,
uint32_t *pu32SizeDataReturned);

/** @name Mode hint storage
 * @{ */

+VBGLR3DECL(int) VbglR3ReadVideoMode(unsigned cDisplay, unsigned *cx,
+                                unsigned *cy, unsigned *cBPP, unsigned *x,
+                                unsigned *y, unsigned *fEnabled);
+VBGLR3DECL(int) VbglR3WriteVideoMode(unsigned cDisplay, unsigned cx,
+                                unsigned cy, unsigned cBPP, unsigned x,
+                                unsigned y, unsigned fEnabled);
/** @} */

/** @name Generic HGCM
 * @{ */

+VBGLR3DECL(int)     VbglR3HGCMConnect(const char *pszServiceName, HGCMCLIENTID *pidClient);
+VBGLR3DECL(int)     VbglR3HGCMDisconnect(HGCMCLIENTID idClient);
+struct VBGLIOCHGCMCALL;
+VBGLR3DECL(int)     VbglR3HGCMCall(struct VBGLIOCHGCMCALL *pInfo, size_t cbInfo);
/** @} */

@endif /* IN_RING3 */
/** @} */

@endif /* RT_C_DECLS_END */

+++/ linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/VBoxGuestLibSharedFolders.h
@@ -0,0 +1,124 @@

/* $Id: VBoxGuestLibSharedFolders.h $ */
/** @file
 * VBoxGuestLib - Central calls header.
 */

+#endef /* IN_RING3 */
/** @} */

+RT_C_DECLS_END

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 */

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/VBoxGuestLibSharedFolders.h
```
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#ifndef ___VBox_VBoxGuestLibSharedFolders_h_
#define ___VBox_VBoxGuestLibSharedFolders_h_

#include <VBox/VBoxGuestLib.h>
#include <VBox/shflsvc.h>

#ifndef IN_RING0
#error "ring-0 only"
#endif

RT_C_DECLS_BEGIN

/** @addtogroup grp_vboxguest_lib_r0
 * @
 */

typedef struct VBGLSFCLIENT
{
    HGCMCLIENTID idClient;
    VBGLHGCMHANDLE handle;
} VBGLSFCLIENT;
typedef VBGLSFCLIENT *PVBGLSFCLIENT;

typedef struct VBGLSFMAP
{
    SHFLROOT root;
} VBGLSFMAP, *PVBGLSFMAP;

DECLVBGL(int) VbglR0SfInit(void);
DECLVBGL(void) VbglR0SfTerm(void);
DECLVBGL(int) VbglR0SfConnect(PVBGLSFCLIENT pClient);
DECLVBGL(void) VbglR0SfDisconnect(PVBGLSFCLIENT pClient);

DECLVBGL(int) VbglR0SfQueryMappings(PVBGLSFCLIENT pClient, SHFLMAPPING paMappings[],
uint32_t *pcMappings);
+DECLVBGL(int) VbgIR0SfQueryMapName(PVBGLSFCLIENT pClient, SHFLROOT root, SHFLSTRING *pString, uint32_t size);
+
+/**
+ * Create a new file or folder or open an existing one in a shared folder. Proxies
+ * to vbssCreate in the host shared folder service.
+ *
+ * @returns IPRT status code, but see note below
+ * @param   pClient      Host-guest communication connection
+ * @param   pMap         The mapping for the shared folder in which the file
+ *                       or folder is to be created
+ * @param   pParsedPath  The path of the file or folder relative to the shared
+ *                       folder
+ * @param   pCreateParms Parameters for file/folder creation. See the
+ *                       structure description in shflsvc.h
+ * @retval  pCreateParms See the structure description in shflsvc.h
+ *
+ * @note This function reports errors as follows. The return value is always
+ * VINF_SUCCESS unless an exceptional condition occurs - out of
+ * memory, invalid arguments, etc. If the file or folder could not be
+ * opened or created, pCreateParms->Handle will be set to
+ * SHFL_HANDLE_NIL on return. In this case the value in
+ * pCreateParms->Result provides information as to why (e.g.
+ * SHFL_FILE_EXISTS). pCreateParms->Result is also set on success
+ * as additional information.
+ */
+DECLVBGL(int) VbgIR0SfCreate(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING pParsedPath, PSHFLCREATEPARMS pCreateParms);
+
+DECLVBGL(int) VbgIR0SfClose(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE Handle);
+DECLVBGL(int) VbgIR0SfRemove(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING pParsedPath, uint32_t flags);
+DECLVBGL(int) VbgIR0SfRename(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING pSrcPath, PSHFLSTRING pDestPath, uint32_t flags);
+DECLVBGL(int) VbgIR0SfFlush(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile);
+
+DECLVBGL(int) VbgIR0SfRead(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer, uint8_t *pBuffer, bool fLocked);
+DECLVBGL(int) VbgIR0SfReadPageList(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer, uint16_t offFirstPage, uint16_t cPages, RTGCPHYS64 *paPages);
+
+DECLVBGL(int) VbgIR0SfWrite(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer, uint8_t *pBuffer, bool fLocked);
+
+DECLVBGL(int) VbgIR0SfWritePhysCont(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer, RTCCPHYS PhysBuffer);
+DECLVBGL(int) VbgIR0SfWritePageList(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile, uint64_t offset, uint32_t *pcbBuffer, RTCCPHYS PhysBuffer);
hFile, uint64_t offset, uint32_t *pcbBuffer,
+        uint16_t offFirstPage, uint16_t cPages, RTGCPHYS64 *paPages);
+
+DECLVBGL(int) VbglR0SfLock(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile,
+     uint64_t offset, uint64_t cbSize, uint32_t fLock);
+
+DECLVBGL(int) VbglR0SfDirInfo(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE
+    hFile,PSHFLSTRING ParsedPath, uint32_t flags,
+        uint32_t index, uint32_t *pcbBuffer, PSHFLDIRINFO pBuffer, uint32_t *pcFiles);
+
+DECLVBGL(int) VbglR0SfFsInfo(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, SHFLHANDLE hFile,
+    uint32_t flags, uint32_t *pcbBuffer, PSHFLDIRINFO pBuffer);
+
+DECLVBGL(int) VbglR0SfMapFolder(PVBGLSFCLIENT pClient, PSHFLSTRING szFolderName,
+    PVBGLSFMAP pMap);
+
+DECLVBGL(int) VbglR0SfUnmapFolder(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap);
+
+DECLVBGL(int) VbglR0SfSetUtf8(PVBGLSFCLIENT pClient);
+
+DECLVBGL(int) VbglR0SfReadLink(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING
+    ParsedPath, uint32_t pcbBuffer, uint8_t *pBuffer);
+
+DECLVBGL(int) VbglR0SfSymlink(PVBGLSFCLIENT pClient, PVBGLSFMAP pMap, PSHFLSTRING
+     pNewPath, PSHFLSTRING pOldPath, PSHFLFSOBJINFO pBuffer);
+
+DECLVBGL(int) VbglR0SfSetSymlinks(PVBGLSFCLIENT pClient);
+
+/** @} */
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/VBoxGuestMangling.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/VBoxGuestMangling.h
@@ -0,0 +1,32 @@
+/** @file
+ * VBoxGuest - Mangling of IPRT symbols for guest drivers.
+ * This is included via a compiler directive on platforms with a global kernel
+ * symbol name space (i.e. not Windows, OS/2 and Mac OS X (?)).
+ */
+
+/**
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+ */
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+ */
+
+ #define RT_MANGLER(symbol)   VBoxGuest_##symbol
+ #include <iprt/mangling.h>
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/VMMDev.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/VMMDev.h
@@ -0,0 +1,1823 @@
+/** @file
+ * Virtual Device for Guest <-> VMM/Host communication (ADD.DEV).
+ */
+
+ /*
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+ */
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBox_VMMDev_h
+#define ___VBox_VMMDev_h
+
+#include <VBox/cdefs.h>
```c
#include <VBox/param.h>             /* for the PCI IDs. */
#include <VBox/types.h>
#include <VBox/err.h>
#include <VBox/ostypes.h>
#include <VBox/VMMDevCoreTypes.h>
#include <iprt/assertcompile.h>

#pragma pack(4) /* force structure dword packing here. */
RT_C_DECLS_BEGIN

/** @defgroup grp_vmmdev    VMM Device
 * @note This interface cannot be changed, it can only be extended!
 */
/** @}
 */

/** Size of VMMDev RAM region accessible by guest.
 * Must be big enough to contain VMMDevMemory structure (see further down).
 * For now: 4 megabyte.
 */
#define VMMDEV_RAM_SIZE              (4 * 256 * PAGE_SIZE)

/** Size of VMMDev heap region accessible by guest.
 * (Must be a power of two (pci range.).)
 */
#define VMMDEV_HEAP_SIZE             (4 * PAGE_SIZE)

/** Port for generic request interface (relative offset). */
#define VMMDEV_PORT_OFF_REQUEST      0

/** @defgroup grp_vmmdev_req    VMMDev Generic Request Interface
 */
/** @}
 */

/** @defgroup grp_vmmdev_req    VMMDev Generic Request Interface
 */
/** @}
 */

/** @defgroup grp_vmmdev    VMM Device
 */
/** @note This interface cannot be changed, it can only be extended!
 */
/** @}
 */
```
```c
#define VMMDEV_VERSION 0x00010004
#define VMMDEV_VERSION_MAJOR (VMMDEV_VERSION >> 16)
#define VMMDEV_VERSION_MINOR (VMMDEV_VERSION & 0xffff)

/** @} */
+
/** Maximum request packet size. */
#define VMMDEV_MAX_VMMDEVREQ_SIZE _1M
/** Maximum number of HGCM parameters. */
+ @todo r=bird: This is wrong wrt user land calls. For them it iss 61.
+ See comments on VBGLIOCHGCMCALL::cParms. */
#define VMMDEV_MAX_HGCM_PARMS 1024
/** Maximum total size of hgcm buffers in one call. */
#define VMMDEV_MAX_HGCM_DATA_SIZE UINT32_C(0x7FFFFFFF)

/** VMMDev request types. */
+ @note when updating this, adjust vmmdevGetRequestSize() as well
+ */
typedef enum VMMDevRequestType 
{ 
+ VMMDevReq_InvalidRequest = 0,
+ VMMDevReq_GetMouseStatus = 1,
+ VMMDevReq_SetMouseStatus = 2,
+ VMMDevReq_SetPointerShape = 3,
+ VMMDevReq_GetHostVersion = 4,
+ VMMDevReq_Idle = 5,
+ VMMDevReq_GetHostTime = 10,
+ VMMDevReq_GetHypervisorInfo = 20,
+ VMMDevReq_SetHypervisorInfo = 21,
+ VMMDevReq_RegisterPatchMemory = 22, /**< @since version 3.0.6 */
+ VMMDevReq_DeregisterPatchMemory = 23, /**< @since version 3.0.6 */
+ VMMDevReq_SetPowerStatus = 30,
+ VMMDevReq_AcknowledgeEvents = 41,
+ VMMDevReq_CtlGuestFilterMask = 42,
+ VMMDevReq_ReportGuestInfo = 50,
+ VMMDevReq_ReportGuestInfo2 = 58, /**< @since version 3.2.0 */
+ VMMDevReq_ReportGuestStatus = 59, /**< @since version 3.2.8 */
+ VMMDevReq_ReportGuestUserState = 74, /**< @since version 4.3 */
+ /**<
+ * Retrieve a display resize request sent by the host using
+ * @a IDisplay:setVideoModeHint. Deprecated.
+ * Similar to @a VMMDevReq_GetDisplayChangeRequest2, except that it only
+ * considers host requests sent for the first virtual display. This guest
+ * request should not be used in new guest code, and the results are
+ * undefined if a guest mixes calls to this and
+ * @a VMMDevReq_GetDisplayChangeRequest2.
+ */
```
+ VMMDevReq_GetDisplayChangeRequest    = 51,
+ VMMDevReq_VideoModeSupported         = 52,
+ VMMDevReq_GetHeightReduction         = 53,
+ /**<
+ * Retrieve a display resize request sent by the host using
+ * @a IDisplay:setVideoModeHint.
+ *
+ * Queries a display resize request sent from the host. If the
+ * @a eventAck member is sent to true and there is an unqueried
+ * request available for one of the virtual display then that request will
+ * be returned. If several displays have unqueried requests the lowest
+ * numbered display will be chosen first. Only the most recent unseen
+ * request for each display is remembered.
+ * If @a eventAck is set to false, the last host request queried with
+ * @a eventAck set is resent, or failing that the most recent received from
+ * the host. If no host request was ever received then all zeros are
+ * returned.
+ */
+ VMMDevReq_GetDisplayChangeRequest2   = 54,
+ VMMDevReq_ReportGuestCapabilities    = 55,
+ VMMDevReq_SetGuestCapabilities       = 56,
+ VMMDevReq_VideoModeSupported2        = 57, /**< @since version 3.2.0 */
+ VMMDevReq_GetDisplayChangeRequestEx  = 80, /**< @since version 4.2.4 */
+#ifdef VBOX_WITH_HGCM
+ VMMDevReq_HGCMConnect                = 60,
+ VMMDevReq_HGCMDisconnect             = 61,
+ #ifdef VBOX_WITH_64_BITS_GUESTS
+ VMMDevReq_HGCMCall32                 = 62,
+ VMMDevReq_HGCMCall64                 = 63,
+ #else
+ VMMDevReq_HGCMCall                   = 62,
+ #endif /* VBOX_WITH_64_BITS_GUESTS */
+ VMMDevReq_HGCMCancel                 = 64,
+ VMMDevReq_HGCMCancel2                = 65,
+#endif /* VBOX_WITH_HGCM */
+ VMMDevReq_VideoAccelEnable           = 70,
+ VMMDevReq_VideoAccelFlush            = 71,
+ VMMDevReq_VideoSetVisibleRegion      = 72,
+ VMMDevReq_GetSeamlessChangeRequest   = 73,
+ VMMDevReq_QueryCredentials           = 100,
+ VMMDevReq_ReportCredentialsJudgement = 101,
+ VMMDevReq_ReportGuestStats           = 110,
+ VMMDevReq_GetMemBalloonChangeRequest = 111,
+ VMMDevReq_GetStatisticsChangeRequest = 112,
+ VMMDevReq_ChangeMemBalloon           = 113,
+ VMMDevReq_GetVRDPChangeRequest       = 150,
+ VMMDevReq_LogString                  = 200,
+ VMMDevReq_GetCpuHotPlugRequest       = 210,
+ VMMDevReq_SetCpuHotPlugStatus = 211,
+ VMMDevReq_RegisterSharedModule = 212,
+ VMMDevReq_UnregisterSharedModule = 213,
+ VMMDevReq_CheckSharedModules = 214,
+ VMMDevReq_GetPageSharingStatus = 215,
+ VMMDevReq_DebugIsPageShared = 216,
+ VMMDevReq_GetSessionId = 217, /**< @since version 3.2.8 */
+ VMMDevReq_WriteCoreDump = 218,
+ VMMDevReq_GuestHeartbeat = 219,
+ VMMDevReq_HeartbeatConfigure = 220,
+ VMMDevReq_SizeHack = 0x7fffffff
} VMMDevRequestType;
+
+#ifdef VBOX_WITH_64_BITS_GUESTS
+/*
+ * Constants and structures are redefined for the guest.
+ *
+ * Host code MUST always use either *32 or *64 variant explicitly.
+ * Host source code will use VBOX_HGCM_HOST_CODE define to catch undefined
+ * data types and constants.
+ *
+ * This redefinition means that the new additions builds will use
+ * the *64 or *32 variants depending on the current architecture bit count (ARCH_BITS).
+ */
+stdint VMMDevRequestHeader;
+/
+*/
+*/
+## ifdef VBOX_HGCM_HOST_CODE
+*/
+## if ARCH_BITS == 64
+## define VMMDevReq_HGCMCall VMMDevReq_HGCMCall64
+## elif ARCH_BITS == 32 || ARCH_BITS == 16
+## define VMMDevReq_HGCMCall VMMDevReq_HGCMCall32
+## else
+## error "Unsupported ARCH_BITS"
+## endif
+## endif /* !VBOX_HGCM_HOST_CODE */
+##endif /* VBOX_WITH_64_BITS_GUESTS */
+/
+/** Version of VMMDevRequestHeader structure. */
+##define VMMDEV_REQUEST_HEADER_VERSION (0x10001)
+
+/
+/**
+ * Generic VMMDev request header.
+ *
+ * This structure is copied/mirrored by VBGLREQHDR in the VBoxGuest I/O control
+ * interface. Changes there needs to be mirrored in it.
+ *
+ * @sa VBGLREQHDR
+ */
typedef struct VMMDevRequestHeader
/** IN: Size of the structure in bytes (including body).
  */
uint32_t size;
/** IN: Version of the structure. */
uint32_t version;
/** IN: Type of the request.
  * @note VBGLREQHDR uses this for optional output size. */
VMMDevRequestType requestType;
/** OUT: VBox status code. */
int32_t rc;
/** Reserved field no.1. MBZ.
  * @note VBGLREQHDR uses this for optional output size, however never for a
  * real VMMDev request, only in the I/O control interface. */
uint32_t reserved1;
/** Reserved field no.2. MBZ. */
uint32_t reserved2;
} VMMDevRequestHeader;

AssertCompileSize(VMMDevRequestHeader, 24);

/** Initialize a VMMDevRequestHeader structure.
 * Same as VBGLREQHDR_INIT_VMMDEV(). */
#define VMMDEV_REQ_HDR_INIT(a_pHdr, a_cb, a_enmType) 
  do { 
    (a_pHdr)->size = (a_cb); 
    (a_pHdr)->version = VMMDEV_REQUEST_HEADER_VERSION; 
    (a_pHdr)->requestType = (a_enmType); 
    (a_pHdr)->rc = VERR_INTERNAL_ERROR; 
    (a_pHdr)->reserved1 = 0; 
    (a_pHdr)->reserved2 = 0; 
  } while (0)

/** Mouse status request structure.
 *
 */
typedef struct
{
  VMMDevRequestHeader header;
  uint32_t mouseFeatures;
  int32_t pointerXPos;
  int32_t pointerYPos;
}
+} VMMDevReqMouseStatus;
+AssertCompileSize(VMMDevReqMouseStatus, 24+12);
+
+/** @name Mouse capability bits (VMMDevReqMouseStatus::mouseFeatures).
+ * @{ */
+/** The guest can (== wants to) handle absolute coordinates. */
+#define VMMDEV_MOUSE_GUEST_CAN_ABSOLUTE RT_BIT(0)
+/** The host can (== wants to) send absolute coordinates.
+ * (Input not captured.) */
+#define VMMDEV_MOUSE_HOST_WANTS_ABSOLUTE RT_BIT(1)
+/** The guest can *NOT* switch to software cursor and therefore depends on the
+ * host cursor.
+ */
+/** When guest additions are installed and the host has promised to display the
+ * cursor itself, the guest installs a hardware mouse driver. Don't ask the
+ * guest to switch to a software cursor then. */
+#define VMMDEV_MOUSE_GUEST_NEEDS_HOST_CURSOR RT_BIT(2)
+/** The host does NOT provide support for drawing the cursor itself. */
+#define VMMDEV_MOUSE_HOST_CANNOT_HWPOINTER RT_BIT(3)
+/** The guest can read VMMDev events to find out about pointer movement */
+#define VMMDEV_MOUSE_NEW_PROTOCOL RT_BIT(4)
+/** If the guest changes the status of the
+ * VMMDEV_MOUSE_GUEST_NEEDS_HOST_CURSOR bit, the host will honour this */
+#define VMMDEV_MOUSE_HOST_RECHECKS_NEEDS_HOST_CURSOR RT_BIT(5)
+/** The host supplies an absolute pointing device. The Guest Additions may
+ * wish to use this to decide whether to install their own driver */
+#define VMMDEV_MOUSE_HOST_HAS_ABS_DEV RT_BIT(6)
+/** The mask of all VMMDEV_MOUSE_* flags */
+#define VMMDEV_MOUSE_MASK UINT32_C(0x0000007f)
+/** The mask of guest capability changes for which notification events should
+ * be sent */
+#define VMMDEV_MOUSE_NOTIFY_HOST_MASK
+ (VMMDEV_MOUSE_GUEST_CAN_ABSOLUTE |
VMMDEV_MOUSE_GUEST_NEEDS_HOST_CURSOR)
+/** The mask of all capabilities which the guest can legitimately change */
+#define VMMDEV_MOUSE_GUEST_MASK
+ (VMMDEV_MOUSE_NOTIFY_HOST_MASK | VMMDEV_MOUSE_NEW_PROTOCOL)
+/** The mask of host capability changes for which notification events should
+ * be sent */
+#define VMMDEV_MOUSE_NOTIFY_GUEST_MASK
+ (VMMDEV_MOUSE_HOST_WANTS_ABSOLUTE |
VMMDEV_MOUSE_HOST_CANNOT_HWPOINTER |
VMMDEV_MOUSE_HOST_RECHECKS_NEEDS_HOST_CURSOR |
VMMDEV_MOUSE_HOST_HAS_ABS_DEV)
+/** @} */
+ /** @name Absolute mouse reporting range
+ * @{ */
+ /** @todo Should these be here? They are needed by both host and guest. */
+ /** The minimum value our pointing device can return. */
+ #define VMMDEV_MOUSE_RANGE_MIN 0
+ /** The maximum value our pointing device can return. */
+ #define VMMDEV_MOUSE_RANGE_MAX 0xFFFF
+ /** The full range our pointing device can return. */
+ #define VMMDEV_MOUSE_RANGE (VMMDEV_MOUSE_RANGE_MAX - VMMDEV_MOUSE_RANGE_MIN)
+ /** @} */
+
+ /**
+ * Mouse pointer shape/visibility change request.
+ *
+ * Used by VMMDevReq_SetPointerShape. The size is variable.
+ */
+ typedef struct VMMDevReqMousePointer
+ {
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** VBOX_MOUSE_POINTER_* bit flags from VBox/Graphics/VBoxVideo.h. */
+    uint32_t fFlags;
+    /** x coordinate of hot spot. */
+    uint32_t xHot;
+    /** y coordinate of hot spot. */
+    uint32_t yHot;
+    /** Width of the pointer in pixels. */
+    uint32_t width;
+    /** Height of the pointer in scanlines. */
+    uint32_t height;
+    /** Pointer data. */
+    *
+    ****
+    * The data consists of 1 bpp AND mask followed by 32 bpp XOR (color) mask.
+    *
+    * For pointers without alpha channel the XOR mask pixels are 32 bit values: (lsb)BGR0(msb).
+    * For pointers with alpha channel the XOR mask consists of (lsb)BGRA(msb) 32 bit values.
+    *
+    * Guest driver must create the AND mask for pointers with alpha channel, so if host does not
+    * support alpha, the pointer could be displayed as a normal color pointer. The AND mask can
+    * be constructed from alpha values. For example alpha value >= 0xf0 means bit 0 in the AND mask.
+    *
+    * The AND mask is 1 bpp bitmap with byte aligned scanlines. Size of AND mask,
+    * therefore, is cbAnd = (width + 7) / 8 * height. The padding bits at the
+    * end of any scanline are undefined.
The XOR mask follows the AND mask on the next 4 bytes aligned offset:
uint8_t *pXor = pAnd + (cbAnd + 3) & ~3
Bytes in the gap between the AND and the XOR mask are undefined.
XOR mask scanlines have no gap between them and size of XOR mask is:
cXor = width * 4 * height.

Preallocate 4 bytes for accessing actual data as p->pointerData.
char pointerData[4];
}
VMMDevReqMousePointer;
+AssertCompileSize(VMMDevReqMousePointer, 24+24);
+
/**
 * Get the size that a VMMDevReqMousePointer request should have for a given
 * size of cursor, including the trailing cursor image and mask data.
 * @note an "empty" request still has the four preallocated bytes of data
 *
 * @returns the size
 * @param  width   the cursor width
 * @param  height  the cursor height
 */
DECLINLINE(size_t) vmmdevGetMousePointerReqSize(uint32_t width, uint32_t height)
{
    size_t cbBase = RT_OFFSETOF(VMMDevReqMousePointer, pointerData[0]);
    size_t cbMask = (width + 7) / 8 * height;
    size_t cbArgb = width * height * 4;
    return RT_MAX(cbBase + ((cbMask + 3) & ~3) + cbArgb,
                  sizeof(VMMDevReqMousePointer));
}
+
+
/**
 * String log request structure.
 *
 * Used by VMMDevReq_LogString.
 * @deprecated  Use the IPRT logger or VbglR3WriteLog instead.
 */
typedef struct
{
    /** header */
    VMMDevRequestHeader header;
    /** variable length string data */
    char szString[1];
} VMMDevReqLogString;
+AssertCompileSize(VMMDevReqLogString, 24+4);
+
/*! VirtualBox host version request structure.

* Used by VMMDevReq_GetHostVersion.

* @remarks VBGL uses this to detect the presence of new features in the
interface.
*/
typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** Major version. */
    uint16_t major;
    /** Minor version. */
    uint16_t minor;
    /** Build number. */
    uint32_t build;
    /** SVN revision. */
    uint32_t revision;
    /** Feature mask. */
    uint32_t features;
} VMMDevReqHostVersion;

AssertCompileSize(VMMDevReqHostVersion, 24+16);

/** @name VMMDevReqHostVersion::features
 */
/** @{ */
/** Physical page lists are supported by HGCM. */
#define VMMDEV_HVF_HGCM_PHYS_PAGE_LIST  RT_BIT(0)
/** @} */

/** Guest capabilities structure.

* Used by VMMDevReq_ReportGuestCapabilities.
*/
typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /**Capabilities (VMMDEV_GUEST_*). */
    uint32_t caps;
} VMMDevReqGuestCapabilities;

AssertCompileSize(VMMDevReqGuestCapabilities, 24+4);
/**
 * Guest capabilities structure, version 2.
 * 
 * Used by VMMDevReq_SetGuestCapabilities.
 */

typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** Mask of capabilities to be added. */
    uint32_t u32OrMask;
    /** Mask of capabilities to be removed. */
    uint32_t u32NotMask;
} VMMDevReqGuestCapabilities2;

AssertCompileSize(VMMDevReqGuestCapabilities2, 24+8);

/**
 * Idle request structure.
 * 
 * Used by VMMDevReq_Idle.
 */

typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
} VMMDevReqIdle;

AssertCompileSize(VMMDevReqIdle, 24);

/**
 * Host time request structure.
 * 
 * Used by VMMDevReq_GetHostTime.
 */

typedef struct {
    /** Header */
    VMMDevRequestHeader header;
    /** OUT: Time in milliseconds since unix epoch. */
    uint64_t time;
} VMMDevReqHostTime;

AssertCompileSize(VMMDevReqHostTime, 24+8);

/**
 * Hypervisor info structure.
 * 

+ * Used by VMMDevReq_GetHypervisorInfo and VMMDevReq_SetHypervisorInfo.
+ */
+ typedef struct
+ {
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** Guest virtual address of proposed hypervisor start. 
+     * Not used by VMMDevReq_GetHypervisorInfo. 
+     * @todo Make this 64-bit compatible? */
+    RTGCPTR32 hypervisorStart;
+    /** Hypervisor size in bytes. */
+    uint32_t hypervisorSize;
+} VMMDevReqHypervisorInfo;
+AssertCompileSize(VMMDevReqHypervisorInfo, 24+8);
+
+/** @name Default patch memory size. 
+ * Used by VMMDevReq_RegisterPatchMemory and VMMDevReq_DeregisterPatchMemory. 
+ * @{ */
+#define VMMDEV_GUEST_DEFAULT_PATCHMEM_SIZE          8192
+/** @} */
+
+/**
+ * Patching memory structure. (locked executable & read-only page from the guest's perspective)
+ * 
+ * Used by VMMDevReq_RegisterPatchMemory and VMMDevReq_DeregisterPatchMemory
+ * */
+ typedef struct
+ {
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** Guest virtual address of the patching page(s). */
+    RTGCPTR64          pPatchMem;
+    /** Patch page size in bytes. */
+    uint32_t          cbPatchMem;
+} VMMDevReqPatchMemory;
+AssertCompileSize(VMMDevReqPatchMemory, 24+12);
+
+/**
+ * Guest power requests.
+ * 
+ * See VMMDevReq_SetPowerStatus and VMMDevPowerStateRequest.
+ * */
+ typedef enum
+ {
+    VMMDevPowerState_Invalid   = 0,
+    VMMDevPowerState_Pause     = 1,
+    VMMDevPowerState_PowerOff  = 2,
+ VMMDevPowerState_SaveState = 3,
+ VMMDevPowerState_SizeHack = 0x7fffffff
+} VMMDevPowerState;
+AssertCompileSize(VMMDevPowerState, 4);
+
+/**
+ * VM power status structure.
+ *
+ * Used by VMMDevReq_SetPowerStatus.
+ */
+typedef struct
+{
+  /** Header. */
+  VMMDevRequestHeader header;
+  /** Power state request. */
+  VMMDevPowerState powerState;
+} VMMDevPowerStateRequest;
+AssertCompileSize(VMMDevPowerStateRequest, 24+4);
+
+
+/**
+ * Pending events structure.
+ *
+ * Used by VMMDevReq_AcknowledgeEvents.
+ */
+typedef struct
+{
+  /** Header. */
+  VMMDevRequestHeader header;
+  /** OUT: Pending event mask. */
+  uint32_t events;
+} VMMDevEvents;
+AssertCompileSize(VMMDevEvents, 24+4);
+
+
+/**
+ * Guest event filter mask control.
+ *
+ * Used by VMMDevReq_CtlGuestFilterMask.
+ */
+typedef struct
+{
+  /** Header. */
+  VMMDevRequestHeader header;
+  /** Mask of events to be added to the filter. */
+  uint32_t u32OrMask;
+  /** Mask of events to be removed from the filter. */
+  uint32_t u32NotMask;
```c
+} VMMDevCtlGuestFilterMask;
+AssertCompileSize(VMMDevCtlGuestFilterMask, 24+8);
+
+
+/**
+ * Guest information structure.
+ *
+ * Used by VMMDevReportGuestInfo and PDMIVMDEVCONNECTOR::pfnUpdateGuestVersion.
+ */
+typedef struct VBoxGuestInfo
+{
+    /** The VMMDev interface version expected by additions. 
+     * *Deprecated*, do not use anymore! Will be removed. */
+    uint32_t interfaceVersion;
+    /** Guest OS type. */
+    VBOXOSTYPE osType;
+} VBoxGuestInfo;
+AssertCompileSize(VBoxGuestInfo, 8);
+
+/**
+ * Guest information report.
+ *
+ * Used by VMMDevReq_ReportGuestInfo.
+ */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** Guest information. */
+    VBoxGuestInfo guestInfo;
+} VMMDevReportGuestInfo;
+AssertCompileSize(VMMDevReportGuestInfo, 24+8);
+
+
+/**
+ * Guest information structure, version 2.
+ *
+ */
+typedef struct VBoxGuestInfo2
+{
+    /** Major version. */
+    uint16_t additionsMajor;
+    /** Minor version. */
+    uint16_t additionsMinor;
+    /** Build number. */
+    uint32_t additionsBuild;
+    /** SVN revision. */
```
+    uint32_t additionsRevision;
+    /** Feature mask, currently unused. */
+    uint32_t additionsFeatures;
+    /** The intentional meaning of this field was:
+     * Some additional information, for example 'Beta 1' or something like that.
+     *
+     * The way it was implemented was implemented: VBOX_VERSION_STRING.
+     *
+     * This means the first three members are duplicated in this field (if the guest
+     * build config is sane). So, the user must check this and chop it off before
+     * usage. There is, because of the Main code's blind trust in the field's
+     * content, no way back. */
+    char     szName[128];
+} VBoxGuestInfo2;
+AssertCompileSize(VBoxGuestInfo2, 144);
+
+/**
+ * Guest information report, version 2.
+ *
+ * Used by VMMDevReq_ReportGuestInfo2.
+ */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader header;
+    /** Guest information. */
+    VBoxGuestInfo2 guestInfo;
+} VMMDevReportGuestInfo2;
+AssertCompileSize(VMMDevReportGuestInfo2, 24+144);
+
+/**
+ * The facility class.
+ *
+ * This needs to be kept in sync with AdditionsFacilityClass of the Main API!
+ */
+typedef enum
+{
+    VBoxGuestFacilityClass_None       = 0,
+    VBoxGuestFacilityClass_Driver     = 10,
+    VBoxGuestFacilityClass_Service    = 30,
+    VBoxGuestFacilityClass_Program    = 50,
+    VBoxGuestFacilityClass_Feature    = 100,
+    VBoxGuestFacilityClass_ThirdParty = 999,
+    VBoxGuestFacilityClass_All        = 0x7ffffffe,
+    VBoxGuestFacilityClass_SizeHack   = 0x7fffffff
+} VBoxGuestFacilityClass;
+AssertCompileSize(VBoxGuestFacilityClass, 4);
/**
 * Guest status structure.
 * Used by VMMDevReqGuestStatus.
 */
typedef struct VBoxGuestStatus
{
    /** Facility the status is indicated for. */
    VBoxGuestFacilityType facility;
    /** Current guest status. */
    VBoxGuestFacilityStatus status;
    /** Flags, not used at the moment. */
    uint32_t flags;
} VBoxGuestStatus;

AssertCompileSize(VBoxGuestStatus, 12);

/**
 * Guest Additions status structure.
 */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Guest information. */
    VBoxGuestStatus guestStatus;
} VMMDevReportGuestStatus;

AssertCompileSize(VMMDevReportGuestStatus, 24+12);

/**
 * Guest user status updates.
 */
typedef struct VBoxGuestUserStatus
{
    /** The guest user state to send. */
    VBoxGuestUserState state;
    /** Size (in bytes) of szUser. */
    uint32_t cbUser;
    /** Size (in bytes) of szDomain. */
    uint32_t cbDomain;
    /** Size (in bytes) of aDetails. */
    uint32_t cbDetails;
    /** Note: Here begins the dynamically allocated region. */
    /** Guest user to report state for. */
}
+ char    szUser[1];
+ /**< Domain the guest user is bound to. */
+ char    szDomain[1];
+ /**< Optional details of the state. */
+ uint8_t  aDetails[1];
+} VBoxGuestUserStatus;
+AssertCompileSize(VBoxGuestUserStatus, 20);
+
+
+/**
 * Guest user status structure.
 */
+* Used by VMMDevReq_ReportGuestUserStatus.
+*/
+typedef struct
+{
+ /**< Header. */
+ VMMDevRequestHeader header;
+ /**< Guest user status. */
+ VBoxGuestUserStatus status;
+} VMMDevReportGuestUserState;
+AssertCompileSize(VMMDevReportGuestUserState, 24+20);
+
+
+/**
 * Guest statistics structure.
 */
+*/
+typedef struct VBoxGuestStatistics
+{
+ /**< Virtual CPU ID. */
+ uint32_t  u32CpuId;
+ /**< Reported statistics. */
+ uint32_t  u32StatCaps;
+ /**< Idle CPU load (0-100) for last interval. */
+ uint32_t  u32CpuLoad_Idle;
+ /**< Kernel CPU load (0-100) for last interval. */
+ uint32_t  u32CpuLoad_Kernel;
+ /**< User CPU load (0-100) for last interval. */
+ uint32_t  u32CpuLoad_User;
+ /**< Nr of threads. */
+ uint32_t  u32Threads;
+ /**< Nr of processes. */
+ uint32_t  u32Processes;
+ /**< Nr of handles. */
+ uint32_t  u32Handles;
+ /**< Memory load (0-100). */
+}
+ uint32_t u32MemoryLoad;
+ /** Page size of guest system. */
+ uint32_t u32PageSize;
+ /** Total physical memory (in 4KB pages). */
+ uint32_t u32PhysMemTotal;
+ /** Available physical memory (in 4KB pages). */
+ uint32_t u32PhysMemAvail;
+ /** Ballooned physical memory (in 4KB pages). */
+ uint32_t u32PhysMemBalloon;
+ /** Total number of committed memory (which is not necessarily in-use) (in 4KB pages). */
+ uint32_t u32MemCommitTotal;
+ /** Total amount of memory used by the kernel (in 4KB pages). */
+ uint32_t u32MemKernelTotal;
+ /** Total amount of paged memory used by the kernel (in 4KB pages). */
+ uint32_t u32MemKernelPaged;
+ /** Total amount of nonpaged memory used by the kernel (in 4KB pages). */
+ uint32_t u32MemKernelNonPaged;
+ /** Total amount of memory used for the system cache (in 4KB pages). */
+ uint32_t u32MemSystemCache;
+ /** Pagefile size (in 4KB pages). */
+ uint32_t u32PageFileSize;
+ } VBoxGuestStatistics;
+ AssertCompileSize(VBoxGuestStatistics, 19*4);
+
+ /** @name Guest statistics values (VBoxGuestStatistics::u32StatCaps).
+ * @{ */
+ #define VBOX_GUEST_STAT_CPU_LOAD_IDLE       RT_BIT(0)
+ #define VBOX_GUEST_STAT_CPU_LOAD_KERNEL     RT_BIT(1)
+ #define VBOX_GUEST_STAT_CPU_LOAD_USER       RT_BIT(2)
+ #define VBOX_GUEST_STAT_THREADS             RT_BIT(3)
+ #define VBOX_GUEST_STAT_PROCESSES           RT_BIT(4)
+ #define VBOX_GUEST_STAT_HANDLES             RT_BIT(5)
+ #define VBOX_GUEST_STAT_MEMORY_LOAD         RT_BIT(6)
+ #define VBOX_GUEST_STAT_PHYS_MEM_TOTAL      RT_BIT(7)
+ #define VBOX_GUEST_STAT_PHYS_MEM_AVAIL      RT_BIT(8)
+ #define VBOX_GUEST_STAT_PHYS_MEM_BALLOON    RT_BIT(9)
+ #define VBOX_GUEST_STAT_MEM_COMMIT_TOTAL    RT_BIT(10)
+ #define VBOX_GUEST_STAT_MEM_KERNEL_TOTAL    RT_BIT(11)
+ #define VBOX_GUEST_STAT_MEM_KERNEL_PAGED    RT_BIT(12)
+ #define VBOX_GUEST_STAT_MEM_KERNEL_NONPAGED RT_BIT(13)
+ #define VBOX_GUEST_STAT_MEM_SYSTEM_CACHE    RT_BIT(14)
+ #define VBOX_GUEST_STAT_PAGE_FILE_SIZE      RT_BIT(15)
+ /** @} */
+
+ /**
+ * Guest statistics command structure.
+ *
+ * Used by VMMDevReq_ReportGuestStats.
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Guest information. */
    VBoxGuestStatistics guestStats;
} VMMDevReportGuestStats;
AssertCompileSize(VMMDevReportGuestStats, 24+19*4);

/** Memory balloon change request structure. */
#define VMMDEV_MAX_MEMORY_BALLOON(PhysMemTotal)     ( (9 * (PhysMemTotal)) / 10 )

/** Poll for ballooning change request.
 * Used by VMMDevReq_GetMemBalloonChangeRequest.
 */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Balloon size in megabytes. */
    uint32_t            cBalloonChunks;
    /** Guest ram size in megabytes. */
    uint32_t            cPhysMemChunks;
    /** Setting this to VMMDEV_EVENT_BALLOON_CHANGE_REQUEST indicates that the request is a response to that event.
     * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
    uint32_t            eventAck;
} VMMDevGetMemBalloonChangeRequest;
AssertCompileSize(VMMDevGetMemBalloonChangeRequest, 24+12);

/** Change the size of the balloon.
 * Used by VMMDevReq_ChangeMemBalloon.
 */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** The number of pages in the array. */
    uint32_t            cPages;
    /** true = inflate, false = deflate. */
    uint32_t            fInflate;

+ /** Physical address (RTGCPHYS) of each page, variable size. */
+ RTGCPHYS aPhysPage[1];
+ } VMMDevChangeMemBalloon;
+ AssertCompileSize(VMMDevChangeMemBalloon, 24+16);
+
+ /**
+ * Guest statistics interval change request structure.
+ *
+ * Used by VMMDevReq_GetStatisticsChangeRequest.
+ */
+ typedef struct
+ {
+ /** Header. */
+ VMMDevRequestHeader header;
+ /** The interval in seconds. */
+ uint32_t u32StatInterval;
+ /** Setting this to VMMDEV_EVENT_STATISTICS_INTERVAL_CHANGE_REQUEST indicates
+ * that the request is a response to that event.
+ * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
+ uint32_t eventAck;
+ } VMMDevGetStatisticsChangeRequest;
+ AssertCompileSize(VMMDevGetStatisticsChangeRequest, 24+8);
+
+ /** The size of a string field in the credentials request (including '\0').
+ * @see VMMDevCredentials */
+ #define VMMDEV_CREDENTIALS_SZ_SIZE          128
+
+ /** Credentials request structure.
+ *
+ * Used by VMMDevReq_QueryCredentials.
+ */
+ typedef struct
+ {
+ /** Header. */
+ VMMDevRequestHeader header;
+ /** IN/OUT: Request flags. */
+ uint32_t u32Flags;
+ /** OUT: User name (UTF-8). */
+ char szUserName[VMMDEV_CREDENTIALS_SZ_SIZE];
+ /** OUT: Password (UTF-8). */
+ char szPassword[VMMDEV_CREDENTIALS_SZ_SIZE];
+ /** OUT: Domain name (UTF-8). */
+ char szDomain[VMMDEV_CREDENTIALS_SZ_SIZE];
+ } VMMDevCredentials;
+ AssertCompileSize(VMMDevCredentials, 24+4+3*128);
/** Credentials request flag (VMMDevCredentials::u32Flags) *
+ * @ { */
+/** query from host whether credentials are present */
+#define VMMDEV_CREDENTIALS_QUERYPRESENCE RT_BIT(1)
+/** read credentials from host (can be combined with clear) */
+#define VMMDEV_CREDENTIALS_READ RT_BIT(2)
+/** clear credentials on host (can be combined with read) */
+#define VMMDEV_CREDENTIALS_CLEAR RT_BIT(3)
+/** read credentials for judgement in the guest */
+#define VMMDEV_CREDENTIALS_READJUDGE RT_BIT(8)
+/** clear credentials for judgement on the host */
+#define VMMDEV_CREDENTIALS_CLEARJUDGE RT_BIT(9)
+/** report credentials acceptance by guest */
+#define VMMDEV_CREDENTIALS_JUDGE_OK RT_BIT(10)
+/** report credentials denial by guest */
+#define VMMDEV_CREDENTIALS_JUDGE_DENY RT_BIT(11)
+/** report that no judgement could be made by guest */
+#define VMMDEV_CREDENTIALS_JUDGE_NOJUDGEMENT RT_BIT(12)
+
+/** flag telling the guest that credentials are present */
+#define VMMDEV_CREDENTIALS_PRESENT RT_BIT(16)
+/** flag telling guest that local logons should be prohibited */
+#define VMMDEV_CREDENTIALS_NOLOCALLOGON RT_BIT(17)
+@ } */
+
+/
+ * Seamless mode change request structure.
+ *
+ * Used by VMMDevReq_GetSeamlessChangeRequest.
+ */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader header;
+
+    /** New seamless mode. */
+    VMMDevSeamlessMode mode;
+
+    /** Setting this to VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST indicates
+     * that the request is a response to that event.
+     * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
+    uint32_t eventAck;
+] VMMDevSeamlessChangeRequest;
+AssertCompileSize(VMMDevSeamlessChangeRequest, 24+8);
+AssertCompileMemberOffset(VMMDevSeamlessChangeRequest, eventAck, 24+4);
+
/**
 * Display change request structure.
 *
 * Used by VMMDevReq_GetDisplayChangeRequest.
 */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Horizontal pixel resolution (0 = do not change). */
    uint32_t xres;
    /** Vertical pixel resolution (0 = do not change). */
    uint32_t yres;
    /** Bits per pixel (0 = do not change). */
    uint32_t bpp;
    /** Setting this to VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST indicates
     * that the request is a response to that event.
     * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
    uint32_t eventAck;
} VMMDevDisplayChangeRequest;
AssertCompileSize(VMMDevDisplayChangeRequest, 24+16);

/**
 * Display change request structure, version 2.
 *
 * Used by VMMDevReq_GetDisplayChangeRequest2.
 */
typedef struct
{
    /** Header. */
    VMMDevRequestHeader header;
    /** Horizontal pixel resolution (0 = do not change). */
    uint32_t xres;
    /** Vertical pixel resolution (0 = do not change). */
    uint32_t yres;
    /** Bits per pixel (0 = do not change). */
    uint32_t bpp;
    /** Setting this to VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST indicates
     * that the request is a response to that event.
     * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
    uint32_t eventAck;
    /** 0 for primary display, 1 for the first secondary, etc. */
    uint32_t display;
} VMMDevDisplayChangeRequest2;
AssertCompileSize(VMMDevDisplayChangeRequest2, 24+20);


/**
 * Display change request structure, version Extended.
 * 
 * Used by VMMDevReq_GetDisplayChangeRequestEx.
 */

typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** Horizontal pixel resolution (0 = do not change). */
    uint32_t xres;
    /** Vertical pixel resolution (0 = do not change). */
    uint32_t yres;
    /** Bits per pixel (0 = do not change). */
    uint32_t bpp;
    /** Setting this to VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST indicates
     * that the request is a response to that event.
     * (Don't confuse this with VMMDevReq_AcknowledgeEvents.) */
    uint32_t eventAck;
    /** 0 for primary display, 1 for the first secondary, etc. */
    uint32_t display;
    /** New OriginX of secondary virtual screen */
    uint32_t cxOrigin;
    /** New OriginY of secondary virtual screen */
    uint32_t cyOrigin;
    /** Change in origin of the secondary virtual screen is
     * required */
    bool fChangeOrigin;
    /** secondary virtual screen enabled or disabled */
    bool fEnabled;
} VMMDevDisplayChangeRequestEx;

AssertCompileSize(VMMDevDisplayChangeRequestEx, 24+32);

/**
 * Video mode supported request structure.
 * 
 * Used by VMMDevReq_VideoModeSupported.
 */

typedef struct {
    /** Header. */
    VMMDevRequestHeader header;
    /** IN: Horizontal pixel resolution. */
    uint32_t width;
    /** IN: Vertical pixel resolution. */
    uint32_t height;
    /** IN: Bits per pixel. */
    uint32_t bpp;
} VMMDevVideoModeSupported;
+ uint32_t bpp;
+ /** OUT: Support indicator. */
+ bool fSupported;
+ } VMMDevVideoModeSupportedRequest;
+ AssertCompileSize(VMMDevVideoModeSupportedRequest, 24+16);
+
+/**
+ * Video mode supported request structure for a specific display.
+ *
+ * Used by VMMDevReq_VideoModeSupported2.
+ */
+ typedef struct
+
+{  
+ /** Header. */
+  VMMDevRequestHeader header;
+  /** IN: The guest display number. */
+  uint32_t display;
+  /** IN: Horizontal pixel resolution. */
+  uint32_t width;
+  /** IN: Vertical pixel resolution. */
+  uint32_t height;
+  /** IN: Bits per pixel. */
+  uint32_t bpp;
+  /** OUT: Support indicator. */
+  bool fSupported;
+ } VMMDevVideoModeSupportedRequest2;
+ AssertCompileSize(VMMDevVideoModeSupportedRequest2, 24+20);
+
+/**
+ * Video modes height reduction request structure.
+ *
+ * Used by VMMDevReq_GetHeightReduction.
+ */
+ typedef struct
+
+{  
+ /** Header. */
+  VMMDevRequestHeader header;
+  /** OUT: Height reduction in pixels. */
+  uint32_t heightReduction;
+ } VMMDevGetHeightReductionRequest;
+ AssertCompileSize(VMMDevGetHeightReductionRequest, 24+4);
+
+/**
+ * VRDP change request structure.
+ *
+ * Used by VMMDevReq_GetVRDPChangeRequest.
+ */
+
+typedef struct
+{
+  /** Header */
+  VMMDevRequestHeader header;
+  /** Whether VRDP is active or not. */
+  uint8_t u8VRDPActive;
+  /** The configured experience level for active VRDP. */
+  uint32_t u32VRDPExperienceLevel;
+} VMMDevVRDPChangeRequest;

+AssertCompileSize(VMMDevVRDPChangeRequest, 24+8);
+AssertCompileMemberOffset(VMMDevVRDPChangeRequest, u8VRDPActive, 24);
+AssertCompileMemberOffset(VMMDevVRDPChangeRequest, u32VRDPExperienceLevel, 24+4);
+
+/** @name VRDP Experience level (VMMDevVRDPChangeRequest::u32VRDPExperienceLevel)
+ * @{ */
+#define VRDP_EXPERIENCE_LEVEL_ZERO     0 /**< Theming disabled. */
+#define VRDP_EXPERIENCE_LEVEL_LOW      1 /**< Full window dragging and desktop wallpaper disabled. */
+#define VRDP_EXPERIENCE_LEVEL_MEDIUM   2 /**< Font smoothing, gradients. */
+#define VRDP_EXPERIENCE_LEVEL_HIGH     3 /**< Animation effects disabled. */
+#define VRDP_EXPERIENCE_LEVEL_FULL     4 /**< Everything enabled. */
+/** @} */
+
+/**
+ * VBVA enable request structure.
+ *
+ * Used by VMMDevReq_VideoAccelEnable.
+ */
+typedef struct
+{
+  /** Header. */
+  VMMDevRequestHeader header;
+  /** 0 - disable, !0 - enable. */
+  uint32_t u32Enable;
+  /** The size of VBVAMEMORY::au8RingBuffer expected by driver.
+   * The host will refuse to enable VBVA if the size is not equal to
+   * VBVAMEMORY::cbRingBuffer.
+   */
+  uint32_t cbRingBuffer;
+  /** Guest initializes the status to 0. Host sets appropriate VBVA_F_STATUS_ flags. */
+  uint32_t fu32Status;
+} VMMDevVideoAccelEnable;

+AssertCompileSize(VMMDevVideoAccelEnable, 24+12);
+
+/** @name VMMDevVideoAccelEnable::fu32Status.
+ * @{ */
+#define VBVA_F_STATUS_ACCEPTED (0x01)
+#define VBVA_F_STATUS_ENABLED (0x02)
+/** @} */
+
+
+/**
+ * VBVA flush request structure.
+ *
+ * Used by VMMDevReq_VideoAccelFlush.
+ */
typedef struct
+
+ { /* Header. */
+  VMMDevRequestHeader header;
+ } VMMDevVideoAccelFlush;
+
+
+/**
+ * VBVA set visible region request structure.
+ *
+ * Used by VMMDevReq_VideoSetVisibleRegion.
+ */
typedef struct
+
+ { /* Header. */
+  VMMDevRequestHeader header;
+  /* Number of rectangles */
+  uint32_t cRect;
+  /* Rectangle array.
+  * @todo array is spelled aRects[1]. */
+  RTRECT Rect;
+ } VMMDevVideoSetVisibleRegion;
+
+/**
+ * CPU event types.
+ */
typedef enum
+
+ { /* VMMDevCpuStatusType_Invalid = 0,
+  * VMMDevCpuStatusType_Disable = 1,
+  * VMMDevCpuStatusType_Enable = 2,
+  * VMMDevCpuStatusType_SizeHack = 0x7fffffff
+  */
+ } VMMDevCpuStatusType;
+ */
+ typedef struct
+ {
+   /**< Header. */
+   VMMDevRequestHeader header;
+   /**< Status type */
+   VMMDevCpuStatusType enmStatusType;
+ } VMMDevCpuHotPlugStatusRequest;
+ AssertCompileSize(VMMDevCpuHotPlugStatusRequest, 24+4);
+ */
+ /* Get the ID of the changed CPU and event type. */
+ */
+ typedef struct
+ {
+   /**< Header. */
+   VMMDevRequestHeader header;
+   /**< Event type */
+   VMMDevCpuEventType  enmEventType;
+   /**< core id of the CPU changed */
+   uint32_t            idCpuCore;
+   /**< package id of the CPU changed */
+   uint32_t            idCpuPackage;
+ } VMMDevGetCpuHotPlugRequest;
+ AssertCompileSize(VMMDevGetCpuHotPlugRequest, 24+4+4+4);
+ */
+ */
+ /* Shared region description */
+ */
+ typedef struct VMMDEVSHAREDREGIONDESC
+ {
+   RTGCPTTR64           GCRegionAddr;
+   uint32_t            cbRegion;
+   uint32_t            u32Alignment;
+ } VMMDEVSHAREDREGIONDESC;
+ AssertCompileSize(VMMDEVSHAREDREGIONDESC, 16);
+ */
+ #define VMMDEVSHAREDREGIONDESC_MAX          32
+ */
+ /* Shared module registration */
+ */
+ typedef struct
+ {
+   /**< Header. */
+   VMMDevRequestHeader header;
+   /**< Shared module size. */
+   ...
+ uint32_t cbModule;
+ /**< Number of included region descriptors */
+ uint32_t cRegions;
+ /**< Base address of the shared module. */
+ RTGC_PTR64 GCBaseAddr;
+ /**< Guest OS type. */
+ VBOXOSFAMILY enmGuestOS;
+ /**< Alignment. */
+ uint32_t u32Align;
+ /**< Module name */
+ char szName[128];
+ /**< Module version */
+ char szVersion[16];
+ /**< Shared region descriptor(s). */
+ VMMDEVSHAREDREGIONDESC aRegions[1];
+} VMMDevSharedModuleRegistrationRequest;
+AssertCompileSize(VMMDevSharedModuleRegistrationRequest, 24+4+4+8+4+4+128+16+16);
+
+/**
 * Shared module unregistration
 */
+typedef struct
+{
+ /**< Header. */
+ VMMDevRequestHeader header;
+ /**< Shared module size. */
+ uint32_t cbModule;
+ /**< Align at 8 byte boundary. */
+ uint32_t u32Alignment;
+ /**< Base address of the shared module. */
+ RTGC_PTR64 GCBaseAddr;
+ /**< Module name */
+ char szName[128];
+ /**< Module version */
+ char szVersion[16];
+} VMMDevSharedModuleUnregistrationRequest;
+AssertCompileSize(VMMDevSharedModuleUnregistrationRequest, 24+4+4+8+128+16);
+
+/**
 * Shared module periodic check
 */
+typedef struct
+{
+ /**< Header. */
+ VMMDevRequestHeader header;
+} VMMDevSharedModuleCheckRequest;

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+AssertCompileSize(VMMDevSharedModuleCheckRequest, 24);
+
+/**
+ * Paging sharing enabled query
+ */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader         header;
+    /** Enabled flag (out) */
+    bool                        fEnabled;
+    /** Alignment */
+    bool                        fAlignment[3];
+} VMMDevPageSharingStatusRequest;
+AssertCompileSize(VMMDevPageSharingStatusRequest, 24+4);
+
+/**
+ * Page sharing status query (debug build only)
+ */
+typedef struct
+{
+    /** Header. */
+    VMMDevRequestHeader         header;
+    /** Page address. */
+    RTGCPTR                     GCPtrPage;
+    /** Page flags. */
+    uint64_t                    uPageFlags;
+    /** Shared flag (out) */
+    bool                        fShared;
+    /** Alignment */
+    bool                        fAlignment[3];
+} VMMDevPageIsSharedRequest;
+
+/**
+ * Session id request structure.
+ *
+ * Used by VMMDevReq_GetSessionId.
+ */
+typedef struct
+{
+    /** Header */
+    VMMDevRequestHeader         header;
+    /** OUT: unique session id; the id will be different after each start, reset or restore of the VM */
+    uint64_t                    idSession;
+} VMMDevReqSessionId;
+AssertCompileSize(VMMDevReqSessionId, 24+8);
+ /**
 + * Write Core Dump request.
 + *
 + * Used by VMMDevReq_WriteCoreDump.
 + */
 + typedef struct
 + {
 +     /** Header. */
 +     VMMDevRequestHeader header;
 +     /** Flags (reserved, MBZ). */
 +     uint32_t fFlags;
 + } VMMDevReqWriteCoreDump;
 + AssertCompileSize(VMMDevReqWriteCoreDump, 24+4);
 +
 + /** Heart beat check state structure.
 + * Used by VMMDevReq_HeartbeatConfigure. */
 + typedef struct
 + {
 +     /** Header. */
 +     VMMDevRequestHeader header;
 +     /** OUT: Guest heartbeat interval in nanosec. */
 +     uint64_t cNsInterval;
 +     /** Heartbeat check flag. */
 +     bool fEnabled;
 + } VMMDevReqHeartbeat;
 + AssertCompileSize(VMMDevReqHeartbeat, 24+12);
 +
 +#ifdef VBOX_WITH_HGCM
 +
 +# define VBOX_HGCM_REQ_DONE RT_BIT_32(VBOX_HGCM_REQ_DONE_BIT)
 +# define VBOX_HGCM_REQ_DONE_BIT 0
 + /* define VBOX_HGCM_REQ_CANCELLED (0x2)
 + */
 +
 + /**
 + * HGCM request header.
 + */
 + typedef struct VMMDevHGCMRequestHeader
 + {
 +     /** Request header. */
 +     VMMDevRequestHeader header;
 + } VMMDevHGCMRequestHeader header;
 +
 +/*
 + * @name HGCM flags.
 + */
 +/* @ { 
 + */
 +/* define VBOX_HGCM_REQ_DONE RC(Bit 32(VBOX_HGCM_REQ DONE_BIT)
 +/* define VBOX_HGCM_REQ_DONE_BIT 0
 +/* define VBOX_HGCM_REQ_CANCELLED (0x2)
 + */
 +
 +/*
 + * HGCM request header.
 + */
 +typedef struct VMMDevHGCMRequestHeader
 + {
 +     /** Request header. */
 +     VMMDevRequestHeader header;
 + +
+ /** HGCM flags. */
+ uint32_t fu32Flags;
+
+ /** Result code. */
+ int32_t result;
+
+ } VMMDevHGCMRequestHeader;
+ AssertCompileSize(VMMDevHGCMRequestHeader, 24+8);
+
+ /**
+ * HGCM connect request structure.
+ *
+ * Used by VMMDevReq_HGCMConnect.
+ */
+ typedef struct
+
+ {  
+ /** HGCM request header. */
+  VMMDevHGCMRequestHeader header;
+
+  /** IN: Description of service to connect to. */
+  HGCMServiceLocation loc;
+
+  /** OUT: Client identifier assigned by local instance of HGCM. */
+  uint32_t u32ClientID;
+ } VMMDevHGCMConnect;
+ AssertCompileSize(VMMDevHGCMConnect, 32+132+4);
+
+ /**
+ * HGCM disconnect request structure.
+ *
+ * Used by VMMDevReq_HGCMDisconnect.
+ */
+ typedef struct
+
+ {  
+ /** HGCM request header. */
+  VMMDevHGCMRequestHeader header;
+
+  /** IN: Client identifier. */
+  uint32_t u32ClientID;
+ } VMMDevHGCMDisconnect;
+ AssertCompileSize(VMMDevHGCMDisconnect, 32+4);
+
+ /**
+ * HGCM call request structure.
+ *
+ * Used by VMMDevReq_HGCMCall, VMMDevReq_HGCMCall32 and VMMDevReq_HGCMCall64.
+ */
+ typedef struct
typedef struct {
    uint32_t flags;        /**< VBOX_HGCM_F_PARM_* . */
    uint16_t offFirstPage; /**< Offset in the first page where data begins. */
    uint16_t cPages;       /**< Number of pages. */
    RTGCPHYS64 aPages[1];  /**< Page addresses. */
} HGCMPageListInfo;

AssertCompileSize(HGCMPageListInfo, 4+2+2+8);

/** Get the pointer to the first parameter of a HGCM call request . */
#define VMMDevHGCMParmType_PageList points to this structure to actually describe the
* buffer.
+ */
+ typedef struct
+ {
+    uint32_t flags;        /**< VBOX_HGCM_F_PARM_* . */
+    uint16_t offFirstPage; /**< Offset in the first page where data begins. */
+    uint16_t cPages;       /**< Number of pages. */
+    RTGCPHYS64 aPages[1];  /**< Page addresses. */
+ } HGCMPageListInfo;
+ AssertCompileSize(HGCMPageListInfo, 4+2+2+8);
+  
+  /** Get the pointer to the first parameter of a HGCM call request . */
+  #define VMMDevHGCM_Call_PARM(a)   ((HGCMFunctionParameter *)((uint8_t *)(a) + sizeof
+                                  (VMMDevHGCMCall)))
+  /** Get the pointer to the first parameter of a 32-bit HGCM call request . */
+  #define VMMDevHGCM_Call_PARM32(a) ((HGCMFunctionParameter32 *)((uint8_t *)(a) + sizeof
+                                    (VMMDevHGCMCall)))
+  
+  #ifdef VBOX_WITH_64_BITS_GUESTS

/* Explicit defines for the host code. */
ifdef VBOX_HGCM_HOST_CODE
  define VMMDEV_HGCM_CALL_PARMS32(a) ((HGCMFunctionParameter32 *)((uint8_t *)(a) + sizeof (VMMDevHGCMCall)))
endif /* VBOX_HGCM_HOST_CODE */
endif /* VBOX_WITH_64_BITS_GUESTS */

#define VBOX_HGCM_MAX_PARMS 32

/**
 * HGCM cancel request structure.
 *
 * The Cancel request is issued using the same physical memory address as was
 * used for the corresponding initial HGCMCall.
 *
 * Used by VMMDevReq_HGCMCancel.
 */
typedef struct
{
  /** Header. */
  VMMDevHGCMRequestHeader header;
} VMMDevHGCMCancel;
AssertCompileSize(VMMDevHGCMCancel, 32);

/**
 * HGCM cancel request structure, version 2.
 *
 * VINF_SUCCESS when cancelled.
 * VERR_NOT_FOUND if the specified request cannot be found.
 * VERR_INVALID_PARAMETER if the address is invalid valid.
 */
typedef struct
{
  /** Header. */
  VMMDevRequestHeader header;
  /** The physical address of the request to cancel. */
  RTGCPHYS32 physReqToCancel;
} VMMDevHGCMCancel2;
AssertCompileSize(VMMDevHGCMCancel2, 24+4);
#endif /* VBOX_WITH_HGCM */
+ * Inline helper to determine the request size for the given operation.
+ * Returns 0 if the given operation is not handled and/or supported.
+ *
+ * @returns Size.
+ * @param requestType The VMMDev request type.
+ */
+ DECLINLINE(size_t) vmmdevGetRequestSize(VMMDevRequestType requestType)
+ {
+    switch (requestType)
+    {
+        case VMMDevReq_GetMouseStatus:
+            return sizeof(VMMDevReqMouseStatus);
+        case VMMDevReq_SetMouseStatus:
+            return sizeof(VMMDevReqMouseStatus);
+        case VMMDevReq_SetPointerShape:
+            return sizeof(VMMDevReqMousePointer);
+        case VMMDevReq_GetHostVersion:
+            return sizeof(VMMDevReqHostVersion);
+        case VMMDevReq_Idle:
+            return sizeof(VMMDevReqIdle);
+        case VMMDevReq_GetHostTime:
+            return sizeof(VMMDevReqHostTime);
+        case VMMDevReq_GetHypervisorInfo:
+            return sizeof(VMMDevReqHypervisorInfo);
+        case VMMDevReq_DeregisterPatchMemory:
+            return sizeof(VMMDevReqPatchMemory);
+        case VMMDevReq_RegisterPatchMemory:
+            return sizeof(VMMDevReqPatchMemory);
+        case VMMDevReq_SetPowerStatus:
+            return sizeof(VMMDevPowerStateRequest);
+        case VMMDevReq_AcknowledgeEvents:
+            return sizeof(VMMDevEvents);
+        case VMMDevReq_ReportGuestInfo:
+            return sizeof(VMMDevReportGuestInfo);
+        case VMMDevReq_ReportGuestInfo2:
+            return sizeof(VMMDevReportGuestInfo2);
+        case VMMDevReq_ReportGuestStatus:
+            return sizeof(VMMDevReportGuestStatus);
+        case VMMDevReq_ReportGuestUserState:
+            return sizeof(VMMDevReportGuestUserState);
+        case VMMDevReq_GetDisplayChangeRequest:
+            return sizeof(VMMDevDisplayChangeRequest);
+        case VMMDevReq_GetDisplayChangeRequest2:
+            return sizeof(VMMDevDisplayChangeRequest2);
+        case VMMDevReq_GetDisplayChangeRequestEx:
+            return sizeof(VMMDevDisplayChangeRequestEx);
+        case VMMDevReq_VideoModeSupported:
+            return sizeof(VMMDevVideoModeSupportedRequest);
+        case VMMDevReq_GetHeightReduction:
+            return sizeof(VMMDevVideoModeSupportedRequest);
+    }
+                   return sizeof(VMMDevGetHeightReductionRequest);
+             case VMMDevReq_ReportGuestCapabilities:
+                   return sizeof(VMMDevReqGuestCapabilities);
+             case VMMDevReq_SetGuestCapabilities:
+                   return sizeof(VMMDevReqGuestCapabilities2);
+         +#ifdef VBOX_WITH_HGCM
+             case VMMDevReq_HGCMConnect:
+                   return sizeof(VMMDevHGCMConnect);
+             case VMMDevReq_HGCMDisconnect:
+                   return sizeof(VMMDevHGCMDisconnect);
+         +#ifdef VBOX_WITH_64_BITS_GUESTS
+             case VMMDevReq_HGCMCall32:
+                   return sizeof(VMMDevHGCMCall);
+             case VMMDevReq_HGCMCall64:
+                   return sizeof(VMMDevHGCMCall);
+         +#endif /* VBOX_WITH_HGCM */
+         +#endif /* VBOX_WITH_64_BITS_GUESTS */
+         +#else
+             case VMMDevReq_HGCMCall:
+                   return sizeof(VMMDevHGCMCall);
+         +#endif /* */ VBOX_WITH_64_BITS_GUESTS */
+             case VMMDevReq_HGCMCancel:
+                   return sizeof(VMMDevHGCMCancel);
+         +#endif /* */ VBOX_WITH_HGCM */
+             case VMMDevReq_VideoAccelEnable:
+                   return sizeof(VMMDevVideoAccelEnable);
+             case VMMDevReq_VideoAccelFlush:
+                   return sizeof(VMMDevVideoAccelFlush);
+             case VMMDevReq_VideoSetVisibleRegion:
+                   /* The original protocol didn't consider a guest with NO visible
+                     * windows */
+                   return sizeof(VMMDevVideoSetVisibleRegion) - sizeof(RTRECT);
+             case VMMDevReq_GetSeamlessChangeRequest:
+                   return sizeof(VMMDevSeamlessChangeRequest);
+             case VMMDevReq_QueryCredentials:
+                   return sizeof(VMMDevCredentials);
+             case VMMDevReq_ReportGuestStats:
+                   return sizeof(VMMDevReportGuestStats);
+             case VMMDevReq_GetMemBalloonChangeRequest:
+                   return sizeof(VMMDevGetMemBalloonChangeRequest);
+             case VMMDevReq_GetStatisticsChangeRequest:
+                   return sizeof(VMMDevGetStatisticsChangeRequest);
+             case VMMDevReq_ChangeMemBalloon:
+                   return sizeof(VMMDevChangeMemBalloon);
+             case VMMDevReq_GetVRDPChangeRequest:
+                   return sizeof(VMMDevVRDPChangeRequest);
+             case VMMDevReq_LogString:
+                   return sizeof(VMMDevReqLogString);
+             case VMMDevReq_CtlGuestFilterMask:
+                   return sizeof(VMMDevCtlGuestFilterMask);
case VMMDevReq_GetCpuHotPlugRequest:
            return sizeof(VMMDevGetCpuHotPlugRequest);
+ case VMMDevReq_SetCpuHotPlugStatus:
+             return sizeof(VMMDevCpuHotPlugStatusRequest);
+ case VMMDevReq_RegisterSharedModule:
+             return sizeof(VMMDevSharedModuleRegistrationRequest);
+ case VMMDevReq_UnregisterSharedModule:
+             return sizeof(VMMDevSharedModuleUnregistrationRequest);
+ case VMMDevReq_CheckSharedModules:
+             return sizeof(VMMDevSharedModuleCheckRequest);
+ case VMMDevReq_GetPageSharingStatus:
+             return sizeof(VMMDevPageSharingStatusRequest);
+ case VMMDevReq_DebugIsPageShared:
+             return sizeof(VMMDevPageIsSharedRequest);
+ case VMMDevReq_GetSessionId:
+             return sizeof(VMMDevReqSessionId);
+ case VMMDevReq_HeartbeatConfigure:
+             return sizeof(VMMDevReqHeartbeat);
+ case VMMDevReq_GuestHeartbeat:
+             return sizeof(VMMDevRequestHeader);
+ default:
+         break;
+     }
+     return 0;
+
+     +/**
+     + * Initializes a request structure.
+     + *
+     + * @returns VBox status code.
+     + * @param   req             The request structure to initialize.
+     + * @param   type            The request type.
+     + */
+DECLINLINE(int) vmmdevInitRequest(VMMDevRequestHeader *req, VMMDevRequestType type)
+{
+     uint32_t requestSize;
+     if (!req)
+         return VERR_INVALID_PARAMETER;
+     requestSize = (uint32_t)vmmdevGetRequestSize(type);
+     if (!requestSize)
+         return VERR_INVALID_PARAMETER;
+     req->size        = requestSize;
+     req->version     = VMMDEV_REQUEST_HEADER_VERSION;
+     req->requestType = type;
+     req->rc          = VERR_GENERAL_FAILURE;
+     req->reserved1   = 0;
```c
+    req->reserved2 = 0;
+    return VINF_SUCCESS;
+
+/** @} */
+
+/** @name VBVA ring defines. */
+/** * The VBVA ring buffer is suitable for transferring large (< 2GB) amount of * data. For example big bitmaps which do not fit to the buffer. */
+/** * Guest starts writing to the buffer by initializing a record entry in the */
+/** aRecords queue. VBVA_F_RECORD_PARTIAL indicates that the record is being */
+/** written. As data is written to the ring buffer, the guest increases off32End */
+/** for the record. */
+/** * The host reads the aRecords on flushes and processes all completed records. */
+/** When host encounters situation when only a partial record presents and */
+/** cbRecord & ~VBVA_F_RECORD_PARTIAL >= VBVA_RING_BUFFER_SIZE - */
+/** VBVA_RING_BUFFER_THRESHOLD, the host fetched all record data and updates */
+/** off32Head. After that on each flush the host continues fetching the data */
+/** until the record is completed. */
+/** */
+/** */
+//#define VMMDEV_VBVA_RING_BUFFER_SIZE (_4M - _1K)
+//#define VMMDEV_VBVA_RING_BUFFER_THRESHOLD (4 * _1K)
++#define VMMDEV_VBVA_MAX_RECORDS (64)
+/** @} */
+
+/** * VBVA record. */
+/** */
+typedef struct VMMDEVVBVARECORD
+{
+    /** The length of the record. Changed by guest. */
+    uint32_t cbRecord;
+} VMMDEVVBVARECORD;
+AssertCompileSize(VMMDEVVBVARECORD, 4);
+
+#if ARCH_BITS >= 32
+/** * VBVA memory layout. */
+/** * This is a subsection of the VMMDevMemory structure. */
+/** */
+typedef struct VBVAMEMORY
```
/** VBVA_F_MODE_* */
uint32_t fu32ModeFlags;

/** The offset where the data start in the buffer. */
uint32_t off32Data;

/** The offset where next data must be placed in the buffer. */
uint32_t off32Free;

/** The ring buffer for data. */
uint8_t au8RingBuffer[VMMDEV_VBVA_RING_BUFFER_SIZE];

/** The queue of record descriptions. */
VMMDEVVBVARECORD aRecords[VMMDEV_VBVA_MAX_RECORDS];
uint32_t indexRecordFirst;
uint32_t indexRecordFree;

/** RDP orders supported by the client. The guest reports only them
 * and falls back to DIRTY rects for not supported ones.
 */
* (1 << VBVA_VRDP_*)
*/
uint32_t fu32SupportedOrders;

} VBVAMEMORY;

/** The layout of VMMDEV RAM region that contains information for guest. */
*/
typedef struct VMMDevMemory
{
    /** The size of this structure. */
    uint32_t u32Size;
    /** The structure version. (VMMDEV_MEMORY_VERSION) */
    uint32_t u32Version;

    union
    {
        struct
        {
            /** Flag telling that VMMDev set the IRQ and acknowledge is required */
            bool fHaveEvents;
        } V1_04;

        struct
        {
            
        } V1_04;

    } V1_04;

    union
    { 
        struct
        { 
            
        } V1_04;

    } V1_04;
/** Pending events flags, set by host. */
uint32_t u32HostEvents;
/** Mask of events the guest wants to see, set by guest. */
uint32_t u32GuestEventMask;
} V1_03;
}

VBVAMEMORY vbvaMemory;

/** @} */

RT_C_DECLS_END
#pragma pack()
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/VMMDevCoreTypes.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/VMMDevCoreTypes.h
@@ -0,0 +1,516 @@
+/** @file
+ * Virtual Device for Guest <-> VMM/Host communication, Core Types. (ADD,DEV)
+ *
+ * These types are needed by several headers VBoxGuestLib.h and are kept
+ * separate to avoid having to include the whole VMMDev.h fun.
+ */
+ +
+ +*/
+ + * Copyright (C) 2006-2017 Oracle Corporation
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+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef ___VBox_VMMDevCoreTypes_h
+define ___VBox_VMMDevCoreTypes_h
+
#include <iprt/assertcompile.h>
+#include <iprt/types.h>
+#ifndef __cplusplus
+# include <iprt/err.h>
+#endif
+
/** @addtogroup grp_vmmdev
* @{
*/

/* Helpful forward declarations: */
struct VMMDevRequestHeader;
struct VMMDevReqMousePointer;
struct VMMDevMemory;
+
+
/** @name VMMDev events.
 * Used mainly by VMMDevReq_AcknowledgeEvents/VMMDevEvents and version 1.3 of
 * VMMDevMemory.
 * @{
 */
#define VMMDEV_EVENT_MOUSE_CAPABILITIES_CHANGED RT_BIT(0)
#define VMMDEV_EVENT_HGCM RT_BIT(1)
#define VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST RT_BIT(2)
#define VMMDEV_EVENT_JUDGE_CREDENTIALS RT_BIT(3)
#define VMMDEV_EVENT_RESTORED RT_BIT(4)
#define VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST RT_BIT(5)
#define VMMDEV_EVENT_MEMORY_BALLOON_SIZE_CHANGED RT_BIT(6)

/** Host mouse capabilities has been changed. */
+#define VMMDEV_EVENT_MOUSE_CAPABILITIES_CHANGED RT_BIT(0)
+
/** HGCM event. */
+#define VMMDEV_EVENT_HGCM RT_BIT(1)
+
/** A display change request has been issued. */
+#define VMMDEV_EVENT_DISPLAY_CHANGE_REQUEST RT_BIT(2)
+
/** Credentials are available for judgement. */
+#define VMMDEV_EVENT_JUDGE_CREDENTIALS RT_BIT(3)
+
/** The guest has been restored. */
+#define VMMDEV_EVENT_RESTORED RT_BIT(4)
+
/** Seamless mode state changed. */
+#define VMMDEV_EVENT_SEAMLESS_MODE_CHANGE_REQUEST RT_BIT(5)
+
/** Memory balloon size changed. */
+/**
+define VMMDEV_EVENT_BALLOON_CHANGE_REQUEST RT_BIT(6)
+/** Statistics interval changed. */
+define VMMDEV_EVENT_STATISTICS_INTERVAL_CHANGE_REQUEST RT_BIT(7)
+/** VRDP status changed. */
+define VMMDEV_EVENT_VRDP RT_BIT(8)
+/** New mouse position data available. */
+define VMMDEV_EVENT_MOUSE_POSITION_CHANGED RT_BIT(9)
+/** CPU hotplug event occurred. */
+define VMMDEV_EVENT_CPU_HOTPLUG RT_BIT(10)
+/** The mask of valid events, for sanity checking. */
+define VMMDEV_EVENT_VALID_EVENT_MASK UINT32_C(0x000007ff)
+@]
+
+
+@name The ballooning chunk size which VMMDev works at.
+ @ [ *
+define VMMDEV_MEMORY_BALLOON_CHUNK_PAGES (_1M/4096)
+define VMMDEV_MEMORY_BALLOON_CHUNK_SIZE (VMMDEV_MEMORY_BALLOON_CHUNK_PAGES*4096)
+@]
+
+
+ Seamlessness Mode.
+
+ * Used by VbglR3SeamlessWaitEvent
+ *
+ @ ingroup grp_vmmdev_req
+ */
+typedef enum
+
+ VMMDev_Seamless_Disabled = 0, /**< normal mode; entire guest desktop displayed. */
+ VMMDev_Seamless_Visible_Region = 1, /**< visible region mode; only top-level guest windows
+ VMMDev_Seamless_Host_Window = 2, /**< windowed mode; each top-level guest window is
+ VMMDev_Seamless_SizeHack = 0x7fffffff
+
+ AssertCompileSize(VMMDevSeamlessMode, 4);
+ +
+ @]
+
+ CPU event types.
+ *
+ * Used by VbglR3CpuHotplugWaitForEvent
+ *
+ @ ingroup grp_vmmdev_req
+ */
typedef enum
{
    VMMDevCpuEventType_Invalid = 0,
    VMMDevCpuEventType_None = 1,
    VMMDevCpuEventType_Plug = 2,
    VMMDevCpuEventType_Unplug = 3,
    VMMDevCpuEventType_SizeHack = 0x7fffffff
} VMMDevCpuEventType;

AssertCompileSize(VMMDevCpuEventType, 4);

/** @name Guest capability bits.
 * Used by VMMDevReq_ReportGuestCapabilities and VMMDevReq_SetGuestCapabilities.
 */
/** @*/
/* The guest supports seamless display rendering. */
#define VMMDEV_GUEST_SUPPORTS_SEAMLESS RT_BIT_32(0)
/** The guest supports mapping guest to host windows. */
#define VMMDEV_GUEST_SUPPORTS_GUEST_HOST_WINDOW_MAPPING RT_BIT_32(1)
/** The guest graphical additions are active. */
#define VMMDEV_GUEST_SUPPORTS_GRAPHICS RT_BIT_32(2)
/** The mask of valid events, for sanity checking. */
#define VMMDEV_GUEST_CAPABILITIES_MASK UINT32_C(0x00000007)
/** @} */

/** The guest facility.
 * This needs to be kept in sync with AdditionsFacilityType of the Main API!
 */
/** */
typedef enum
{
    VBoxGuestFacilityType_Unknown         = 0,
    VBoxGuestFacilityType_VBoxGuestDriver = 20,
    VBoxGuestFacilityType_AutoLogon       = 90, /**< VBoxGINA / VBoxCredProv / pam_vbox. */
    VBoxGuestFacilityType_VBoxService     = 100,
    VBoxGuestFacilityType_VBoxTrayClient  = 101, /**< VBoxTray (Windows), VBoxClient (Linux, Unix). */
    VBoxGuestFacilityType_Seamless        = 1000,
    VBoxGuestFacilityType_Graphics        = 1100,
    VBoxGuestFacilityType_MonitorAttach   = 1101,
    VBoxGuestFacilityType_All             = 0x7fffffff,
} VBoxGuestFacilityType;

AssertCompileSize(VBoxGuestFacilityType, 4);
+/**
+ * The current guest status of a facility.
+ * This needs to be kept in sync with AdditionsFacilityStatus of the Main API!
+ *
+ * @remarks r=bird: Pretty please, for future types like this, simply do a
+ *          linear allocation without any gaps. This stuff is impossible work
+ *          efficiently with, let alone validate. Applies to the other facility
+ *          enums too.
+ */
typedef enum
+
+ VBoxGuestFacilityStatus_Inactive    = 0,
+ VBoxGuestFacilityStatus_Paused      = 1,
+ VBoxGuestFacilityStatus_PreInit     = 20,
+ VBoxGuestFacilityStatus_Init        = 30,
+ VBoxGuestFacilityStatus_Active      = 50,
+ VBoxGuestFacilityStatus_Terminating = 100,
+ VBoxGuestFacilityStatus_Terminated  = 101,
+ VBoxGuestFacilityStatus_Failed = 800,
+ VBoxGuestFacilityStatus_Unknown     = 999,
+ VBoxGuestFacilityStatus_SizeHack    = 0x7fffffff
+
+ AssertCompileSize(VBoxGuestFacilityStatus, 4);
+
+
+/**
+ * The current status of specific guest user.
+ * This needs to be kept in sync with GuestUserState of the Main API!
+ */
typedef enum VBoxGuestUserState
+
+ VBoxGuestUserState_Unknown            = 0,
+ VBoxGuestUserState_LoggedIn           = 1,
+ VBoxGuestUserState_LoggedOut          = 2,
+ VBoxGuestUserState_Locked             = 3,
+ VBoxGuestUserState_Unlocked           = 4,
+ VBoxGuestUserState_Disabled           = 5,
+ VBoxGuestUserState_Idle               = 6,
+ VBoxGuestUserState_InUse              = 7,
+ VBoxGuestUserState_Created            = 8,
+ VBoxGuestUserState_Deleted            = 9,
+ VBoxGuestUserState_SessionChanged     = 10,
+ VBoxGuestUserState_CredentialsChanged = 11,
+ VBoxGuestUserState_RoleChanged        = 12,
+ VBoxGuestUserState_GroupAdded         = 13,
+ VBoxGuestUserState_GroupRemoved       = 14,
+ VBoxGuestUserState_Elevated           = 15,
VBoxGuestUserState_SizeHack = 0x7fffffff

+} VBoxGuestUserState;
+AssertCompileSize(VBoxGuestUserState, 4);
+
+
+/**
 + * HGCM service location types.
 + * @ingroup grp_vmmdev_req
 + */
+typedef enum
+
+{  
+  VMMDevHGCMLoc_Invalid = 0,
+  VMMDevHGCMLoc_LocalHost = 1,
+  VMMDevHGCMLoc_LocalHost_Existing = 2,
+  VMMDevHGCMLoc_SizeHack = 0x7fffffff
+} HGCMServiceLocationType;
+AssertCompileSize(HGCMServiceLocationType, 4);
+
+/**
 + * HGCM host service location.
 + * @ingroup grp_vmmdev_req
 + */
+typedef struct
+
+{  
+   char achName[128]; /**< This is really szName. */
+} HGCMServiceLocationHost;
+AssertCompileSize(HGCMServiceLocationHost, 128);
+
+/**
 + * HGCM service location.
 + * @ingroup grp_vmmdev_req
 + */
+typedef struct HGCMSERVICELOCATION
+
+{  
+  /** Type of the location. */
+  HGCMServiceLocationType type;
+  
+  union
+  {  
+   HGCMServiceLocationHost host;
+  } u;
+} HGCMServiceLocation;
+AssertCompileSize(HGCMServiceLocation, 128+4);
+
+/**
 + * HGCM parameter type.
typedef enum
{
    VMMDevHGCMParmType_Invalid            = 0,
    VMMDevHGCMParmType_32bit              = 1,
    VMMDevHGCMParmType_64bit              = 2,
    VMMDevHGCMParmType_PhysAddr           = 3, /**< @deprecated Doesn't work, use PageList. */
    VMMDevHGCMParmType_LinAddr            = 4, /**< In and Out */
    VMMDevHGCMParmType_LinAddr_In         = 5, /**< In (read; host<-guest) */
    VMMDevHGCMParmType_LinAddr_Out        = 6, /**< Out (write; host->guest) */
    VMMDevHGCMParmType_LinAddr_Locked     = 7, /**< Locked In and Out */
    VMMDevHGCMParmType_LinAddr_Locked_In  = 8, /**< Locked In (read; host<-guest) */
    VMMDevHGCMParmType_LinAddr_Locked_Out = 9, /**< Locked Out (write; host->guest) */
    VMMDevHGCMParmType_PageList           = 10, /**< Physical addresses of locked pages for a buffer. */
    VMMDevHGCMParmType_SizeHack           = 0x7fffffff
} HGCMFunctionParameterType;

AssertCompileSize(HGCMFunctionParameterType, 4);

#ifdef VBOX_WITH_64_BITS_GUESTS
/**
 * HGCM function parameter, 32-bit client.
 */
#define VMMDevHGCMParmType_sizeHack 0x7fffffff

typedef struct
{
    HGCMFunctionParameterType type;
    union
    {
        uint32_t   value32;
        uint64_t   value64;
        struct
        {
            uint32_t size;   /**< Size of the buffer described by the page list. */
            union
            {
                RTGCPHYS32 physAddr;
                RTGC_PTR32 linearAddr;
            } u;
        } Pointer;
    }
    PageList
    u;
} HGCMFunctionParameterType;
#endif
```c
#ifdef __cplusplus
    void SetUInt32(uint32_t u32)
    {
        type = VMMDevHGCMParmType_32bit;
        u.value64 = 0; /* init unused bits to 0 */
        u.value32 = u32;
    }

    int GetUInt32(uint32_t RT_FAR *pu32)
    {
        if (type == VMMDevHGCMParmType_32bit)
        {
            *pu32 = u.value32;
            return VINF_SUCCESS;
        }
        return VERR_INVALID_PARAMETER;
    }

    void SetUInt64(uint64_t u64)
    {
        type = VMMDevHGCMParmType_64bit;
        u.value64 = u64;
    }

    int GetUInt64(uint64_t RT_FAR *pu64)
    {
        if (type == VMMDevHGCMParmType_64bit)
        {
            *pu64 = u.value64;
            return VINF_SUCCESS;
        }
        return VERR_INVALID_PARAMETER;
    }

    void SetPtr(void RT_FAR *pv, uint32_t cb)
    {
        type = VMMDevHGCMParmType_LinAddr;
        u.Pointer.size = cb;
        u.Pointer.u.linearAddr = (RTGCPTR32)(uintptr_t)pv;
    }
#endif /* __cplusplus */

} HGCMFunctionParameter32;
#pragma pack()
AssertCompileSize(HGCMFunctionParameter32, 4+8);

/**
 * HGCM function parameter, 64-bit client.
 */
```
We force structure dword packing here for hysterical raisins. Saves us 4 bytes, at the cost of misaligning the value64, physAddr and linearAddr members of every other parameter structure. */

```c
typedef struct {
    HGCMFunctionParameterType type;
    union {
        uint32_t   value32;
        uint64_t   value64;
        struct {
            uint32_t size;
            union {
                RTGCPHYS64 physAddr;
                RTGCPTR64  linearAddr;
            } u;
        } Pointer;
        struct {
            uint32_t size; /**< Size of the buffer described by the page list. */
            uint32_t offset; /**< Relative to the request header, valid if size != 0. */
        } PageList;
    } u;
} HGCMFunctionParameter;
```

```c
void SetUInt32(uint32_t u32) {
    type = VMMDevHGCMParmType_32bit;
    u.value64 = 0; /* init unused bits to 0 */
    u.value32 = u32;
}

int GetUInt32(uint32_t u32) {
    if (type == VMMDevHGCMParmType_32bit) {
        *pu32 = u.value32;
        return VINF_SUCCESS;
    }
    return VERR_INVALID_PARAMETER;
}

void SetUInt64(uint64_t u64) {
    type = VMMDevHGCMParmType_64bit;
    u.value64 = u64;
}
```c
int GetUInt64(uint64_t RT_FAR *pu64)
{
    if (type == VMMDevHGCMParmType_64bit)
    {
        *pu64 = u.value64;
        return VINF_SUCCESS;
    }
    return VERR_INVALID_PARAMETER;
}

void SetPtr(void RT_FAR *pv, uint32_t cb)
{
    type = VMMDevHGCMParmType_LinAddr;
    u.Pointer.size = cb;
    u.Pointer.u.linearAddr = (uintptr_t)pv;
}
```

```c
/* Redefine the structure type for the guest code. */
#ifndef VBOX_HGCM_HOST_CODE
#if ARCH_BITS == 64
#define HGCMFunctionParameter HGCMFunctionParameter64
#elif ARCH_BITS == 32 || ARCH_BITS == 16
#define HGCMFunctionParameter HGCMFunctionParameter32
#else
#error "Unsupported sizeof (void *)"
#endif
#endif /* !VBOX_HGCM_HOST_CODE */

/* !VBOX_HGCM_HOST_CODE */

+#pragma pack(4) /* We force structure dword packing here for hysterical raisins.  Saves us 4 bytes, at the cost of
                   misaligning the value64 member of every other parameter structure. */
typedef struct
{
    HGCMFunctionParameterType type;
    union
    {
        uint32_t value32;
```
+ uint64_t value64;
+ struct
+ {  
+     uint32_t size;
+ 
+     union
+     {  
+         RTGCPHYS32 physAddr;
+         RTGCPtr32 linearAddr;
+     } u;
+ } Pointer;
+ struct
+ {  
+     uint32_t size; /**< Size of the buffer described by the page list. */
+     uint32_t offset; /**< Relative to the request header, valid if size != 0. */
+ } PageList;
+ } u;

#ifdef __cplusplus
+ void SetUInt32(uint32_t u32)
+ {
+     type = VMMDevHGCMPArmType_32bit;
+     u.value64 = 0; /* init unused bits to 0 */
+     u.value32 = u32;
+ }
+
+ int GetUInt32(uint32_t *pu32)
+ {
+     if (type == VMMDevHGCMPArmType_32bit)
+     {
+         *pu32 = u.value32;
+         return VINF_SUCCESS;
+     }
+     return VERR_INVALID_PARAMETER;
+ }
+
+ void SetUInt64(uint64_t u64)
+ {
+     type = VMMDevHGCMPArmType_64bit;
+     u.value64 = u64;
+ }
+
+ int GetUInt64(uint64_t *pu64)
+ {
+     if (type == VMMDevHGCMPArmType_64bit)
+     {
+         *pu64 = u.value64;
+         return VINF_SUCCESS;
+     }
return VERR_INVALID_PARAMETER;
}

void SetPtr(void *pv, uint32_t cb)
{
    type = VMMDevHGCMParmType_LinAddr;
    u.Pointer.size = cb;
    u.Pointer.u.linearAddr = (uintptr_t)pv;
}
#endif /* __cplusplus */

HGCMFunctionParameter;
#pragma pack()
AssertCompileSize(HGCMFunctionParameter, 4+8);
#endif /* !VBOX_WITH_64_BITS_GUESTS */
/** @} */
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/cdefs.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/cdefs.h
@@ -0,0 +1,461 @@
/** @file
 * VirtualBox - Common C and C++ definition.
 */
/*
 * Copyright (C) 2006-2017 Oracle Corporation
 */
+#ifndef ___VBox_cdefs_h

Open Source Used In 5GaaS Edge AC-4 38905
```c
#define ___VBox_cdefs_h
+
#include <iprt/cdefs.h>
+
+/** @defgroup VBox Common Definitions and Macros
+ * @{
+ */
+
+/** @def VBOX_WITH_STATISTICS
+ * When defined all statistics will be included in the build.
+ * This is enabled by default in all debug builds.
+ */
+ifndef VBOX_WITH_STATISTICS
+ifdef DEBUG
+ define VBOX_WITH_STATISTICS
+ endif
+#endif
+
+/** @def VBOX_STRICT
+ * Alias for RT_STRICT.
+ */
+ifndef RT_STRICT
+ifndef VBOX_STRICT
+ define VBOX_STRICT
+ endif
+#endif
+
+/** Shut up DOXYGEN warnings and guide it properly thru the code.
+ */
+ifndef DOXYGEN_RUNNING
+ define VBOX_WITH_STATISTICS
+ define VBOX_STRICT
+ define IN_DBG
+ define IN_DIS
+ define IN_INTNET_R0
+ define IN_INTNET_R3
+ define IN_PCIRAW_R0
+ define IN_PCIRAW_R3
+ define IN_REM_R3
+ define IN_SUP_R0
+ define IN_SUP_R3
+ define IN_SUP_RC
+ define IN_SUP_STATIC
+ define IN_USBLIB
+ define IN_VBOXDDU
```
+define IN_VMM_RC
+define IN_VMM_R0
+define IN_VMM_R3
+define IN_VMM_STATIC
+endif
+
+
+/** @def VBOXCALL
  + * The standard calling convention for VBOX interfaces.
  + */
+define VBOXCALL RTCALL
+
+
+/** @def IN_DIS
  + * Used to indicate whether we're inside the same link module as the
  + * disassembler.
  + */
+/** @def DISDECL(type)
  + * Disassembly export or import declaration.
  + * @param type The return type of the function declaration.
  + */
+if defined(IN_DIS)
  +ifdef IN_DIS_STATIC
  +# define DISDECL(type) DECLHIDDEN(type) VBOXCALL
  +# else
  +# define DISDECL(type) DECLIMPORT(type) VBOXCALL
  +#endif
+else
  +# define DISDECL(type) DECLIMPORT(type) VBOXCALL
  +#endif
+
+
+/** @def IN_DBG
  + * Used to indicate whether we're inside the same link module as the debugger
  + * console, gui, and related things (ring-3).
  + */
+/** @def DBGDECL(type)
  + * Debugger module export or import declaration.
  + * Functions declared using this exists only in R3 since the
  + * debugger modules is R3 only.
  + * @param type The return type of the function declaration.
  + */
+if defined(IN_DBG_R3) || defined(IN_DBG)
  +# define DBGDECL(type) DECLIMPORT(type) VBOXCALL

Open Source Used In 5GaaS Edge AC-4 38907
+else
+# define DBGDECL(type) DECLIMPORT(type) VBOXCALL
+#endif
+
+
+/** @def IN_INTNET_R3
+ * Used to indicate whether we're inside the same link module as the Ring-3
+ * Internal Networking Service.
+ */
+/** @def INTNETR3DECL(type)
+ * Internal Networking Service export or import declaration.
+ * @param type The return type of the function declaration.
+ */
+#ifndef IN_INTNET_R3
+# define INTNETR3DECL(type) DECLEXPORT(type) VBOXCALL
+#else
+# define INTNETR3DECL(type) DECLIMPORT(type) VBOXCALL
+#endif
+
+/** @def IN_INTNET_R0
+ * Used to indicate whether we're inside the same link module as the R0
+ * Internal Network Service.
+ */
+/** @def INTNETR0DECL(type)
+ * Internal Networking Service export or import declaration.
+ * @param type The return type of the function declaration.
+ */
+#ifndef IN_INTNET_R0
+# define INTNETR0DECL(type) DECLEXPORT(type) VBOXCALL
+#else
+# define INTNETR0DECL(type) DECLIMPORT(type) VBOXCALL
+#endif
+
+/** @def IN_PCIRAW_R3
+ * Used to indicate whether we're inside the same link module as the Ring-3
+ * PCI passthrough support.
+ */
+/** @def PCIRAWR3DECL(type)
+ * PCI passthrough export or import declaration.
+ * @param type The return type of the function declaration.
+ */
+#ifndef IN_PCIRAW_R3
+# define PCIRAWR3DECL(type) DECLEXPORT(type) VBOXCALL
+#else
+# define PCIRAWR3DECL(type) DECLIMPORT(type) VBOXCALL

*/ ** @def IN_PCIRAW_R0
+ * Used to indicate whether we're inside the same link module as the R0
+ * PCI passthrough support.
+ */
+/** @def PCIRAWR0DECL(type)
+ * PCI passthrough export or import declaration.
+ * @param type The return type of the function declaration.
+ */
+#endif
+/** IN_PCIRAW_R0
+ define PCIRAWR0DECL(type) DECLEXPORT(type) VBOXCALL
+ return type of the function declaration.
+ */
+endif
+
+/** @def IN_REM_R3
+ * Used to indicate whether we're inside the same link module as
+ * the HC Ring-3 Recompiled Execution Manager.
+ */
+/** @def REMR3DECL(type)
+ * Recompiled Execution Manager HC Ring-3 export or import declaration.
+ * @param type The return type of the function declaration.
+ */
+ifdef IN_REM_R3
+ define REMR3DECL(type) DECLEXPORT(type) VBOXCALL
+endif
+
+/** @def IN_SUP_R3
+ * Used to indicate whether we're inside the same link module as the Ring-3
+ * Support Library or not.
+ */
+/** @def SUPR3DECL(type)
+ * Support Library export or import declaration.
+ * @param type The return type of the function declaration.
+ */
+ifdef IN_SUP_R3
+ define SUPR3DECL(type) DECLEXPORT(type) VBOXCALL
+endif

Open Source Used in 5GaaS Edge AC-4 38909
/** @def IN_SUP_R0
 * Used to indicate whether we're inside the same link module as the Ring-0
 * Support Library or not.
 */
/** @def SUPR0DECL(type)
 * Support library export or import declaration.
 * @param   type    The return type of the function declaration.
 */
#if defined(IN_SUP_R0) || defined(IN_SUP_R3) || defined(IN_SUP_RC)
#define SUPDECL(type)      DECLEXPORT(type) VBOXCALL
#else
#define SUPDECL(type)      DECLIMPORT(type) VBOXCALL
#endif

/** @def IN_USBLIB
 * Used to indicate whether we're inside the same link module as the USBLib.
 */
/** @def USBLIB_DECL
 * USBLIB export or import declaration.
 * @param   type    The return type of the function declaration.
 */
#ifdef IN_RING0
#define USBLIB_DECL(type)   type VBOXCALL
#elif defined(IN_USBLIB)
#define USBLIB_DECL(type)   DECLEXPORT(type) VBOXCALL
#else
#define USBLIB_DECL(type)   DECLIMPORT(type) VBOXCALL
#endif

/** @def IN_VMM_STATIC
 * Used to indicate that the virtual machine monitor is built or used as a
 * static library.
 */
/** @def IN_VMM_R3
 * Used to indicate whether we're inside the same link module as the ring 3 part of the
 * virtual machine monitor or not.
 */
/** @def VMMR3DECL
 * Ring-3 VMM export or import declaration.
 * @param   type    The return type of the function declaration.
 */
#pragma ifdef IN_VMM_R3
#pragma ifdef IN_VMM_R3
#pragma ifdef IN_VMM_STATIC
#define VMMR3DECL(type)           DECLHIDDEN(type) VBOXCALL
#pragma endif
#pragma endif
#pragma endif

Open Source Used In 5GasS Edge AC-4  38911
/* @def IN_VMM_R0 */
/* Used to indicate whether we’re inside the same link module as the ring-0 part */
/* of the virtual machine monitor or not. */
*/
/** @def IN_VMM_R0 */
/* define VMMR0DECL(type) DECLEXPORT(type) VBOXCALL */
/* ifdef IN_VMM_STATIC */
/* define VMMR3DECL(type) DECLHIDDEN(type) VBOXCALL */
/* else */
/* define VMMR3DECL(type) DECLIMPORT(type) VBOXCALL */
/* endif */
/* ifdef IN_VMM_R0 */
/* define VMMR0DECL(type) DECLEXPORT(type) VBOXCALL */
/* ifdef IN_RING0 */
/* define VMMR0DECL(type) DECLIMPORT(type) VBOXCALL */
/* else */
/* define VMMR0DECL(type) DECL_INVALID(type) */
/* endif */
/* ifdef IN_VMM_R0 */
/* define VMMRCDECL(type) DECLEXPORT(type) VBOXCALL */
/* ifdef IN_RC */
/* define VMMRCDECL(type) DECLIMPORT(type) VBOXCALL */
/* else */
/* define VMMRCDECL(type) DECL_INVALID(type) */
/* endif */
/* ifdef IN_VMM_R0 */
/* define VMMRZDECL(type) DECLEXPORT(type) VBOXCALL */
/* ifdef IN_RC */
/* define VMMRZDECL(type) DECLIMPORT(type) VBOXCALL */
/* else */
/* define VMMRZDECL(type) DECL_INVALID(type) */
/* endif */
/* ifdef IN_VMM_R0 */
/* define VMMRZDECL(type) DECLEXPORT(type) VBOXCALL */
/* ifdef IN_RC */
/* define VMMRZDECL(type) DECLIMPORT(type) VBOXCALL */
/* else */
/* define VMMRZDECL(type) DECL_INVALID(type) */
/* endif */
+ */
+#if defined(IN_VMM_R0) || defined(IN_VMM_RC)
+# define VMMRZDECL(type)            DECLEXPORT(type) VBOXCALL
+#elif defined(IN_RING0) || defined(IN_RZ)
+# define VMMRZDECL(type)            DECLIMPORT(type) VBOXCALL
+#else
+# define VMMRZDECL(type)            DECL_INVALID(type)
+#endif
 +
+/** @def VMMDECL
+ * VMM export or import declaration.
+ * @param   type    The return type of the function declaration.
+ */
+#endif
+
+/** @def VMM_INT_DECL
+ * VMM internal function.
+ * @param   type    The return type of the function declaration.
+ */
+ifndef IN_VMM_STATIC
+# define VMM_INT_DECL(type)         DECLHIDDEN(type) VBOXCALL
+#elif defined(IN_VMM_R3) || defined(IN_VMM_R0) || defined(IN_VMM_RC)
+# define VMM_INT_DECL(type)         DECLEXPORT(type) VBOXCALL
+#else
+# define VMM_INT_DECL(type)         DECL_INVALID(type)
+#endif
+
+/** @def VMMR3_INT_DECL
+ * VMM internal function, ring-3.
+ * @param   type    The return type of the function declaration.
+ */
+ifdef IN_VMM_R3
+# define VMMR3_INT_DECL(type)       DECLHIDDEN(type) VBOXCALL
+else
+# define VMMR3_INT_DECL(type)       DECL_INVALID(type)
+#endif
+
+/** @def VMMR0_INT_DECL
+ * VMM internal function, ring-0.
+ * @param   type    The return type of the function declaration.
+ */
+ifdef IN_VMM_R0
+# define VMMR0_INT_DECL(type)       DECLHIDDEN(type) VBOXCALL
+else
+endif
/** @def VMMR0_INT_DECL(type)       DECL_INVALID(type) */

/** @def VMMRC_INT_DECL */
+ * VMM internal function, raw-mode context.
+ * @param   type    The return type of the function declaration.
+ */
+#ifdef IN_VMM_RC
+#define VMMRC_INT_DECL(type)       DECLHIDDEN(type) VBOXCALL
+#else
+#define VMMRC_INT_DECL(type)       DECL_INVALID(type)
+#endif

/** @def VMMRZ_INT_DECL */
+ * VMM internal function, ring-0 + raw-mode context.
+ * @param   type    The return type of the function declaration.
+ */
+#if defined(IN_VMM_RC) || defined(IN_VMM_R0)
+#define VMMRZ_INTDECL(type)       DECLHIDDEN(type) VBOXCALL
+#else
+#define VMMRZ_INTDECL(type)       DECL_INVALID(type)
+#endif

/** @def IN_VBOXDDU */
+ * Used to indicate whether we're inside the VBoxDDU shared object.
+ */
+#ifdef IN_VBOXDDU
+   #ifdef IN_VBOXDDU_STATIC
+     #define VBOXDDU_DECL(type) type
+   #else
+     #define VBOXDDU_DECL(type) DECLEXPORT(type) VBOXCALL
+   #endif
+ #else
+   #define VBOXDDU_DECL(type) DECLIMPORT(type) VBOXCALL
+ #endif

/** @} */

/** @} */

/** @defgroup grp_devdrv    Device Emulations and Drivers */
+ * @defgroup grp_err       VBox Error Codes
+ */
+ */ * @defgroup grp_err  VBox Error Codes
+ */ *
+ * SED-START */
+ */ */ * @name Misc. Status Codes
+ */ *
+ */ */ Failed to allocate VM memory. */

*/
*/ */
*/ */ * @defgroup grp_err       VBox Error Codes
*/ *
*/ */ * @defgroup grp_err  VBox Error Codes
*/ *
*/ */ */ * @name Misc. Status Codes
*/ *
*/ */ */ Failed to allocate VM memory. */

*/
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*/ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ */ }
+define VERR_NO_VM_MEMORY (-1000)
+/** RC is toasted and the VMM should be terminated at once, but no need to
+ panic about it ;-) */
+define VERR_DONT_PANIC (-1001)
+/** Unsupported CPU. */
+define VERR_UNSUPPORTED_CPU (-1002)
+/** Unsupported CPU mode. */
+define VERR_UNSUPPORTED_CPU_MODE (-1003)
+/** Page not present. */
+define VERR_PAGE_NOT_PRESENT (-1004)
+/** Invalid/Corrupted configuration file. */
+define VERR_CFG_INVALID_FORMAT (-1005)
+/** No configuration value exists. */
+define VERR_CFG_NO_VALUE (-1006)
+/** Selector not present. */
+define VERR_SELECTOR_NOT_PRESENT (-1007)
+/** Not code selector. */
+define VERR_NOT_CODE_SELECTOR (-1008)
+/** Not data selector. */
+define VERR_NOT_DATA_SELECTOR (-1009)
+/** Out of selector bounds. */
+define VERR_OUT_OF_SELECTOR_BOUNDS (-1010)
+/** Invalid selector. Usually beyond table limits. */
+define VERR_INVALID_SELECTOR (-1011)
+/** Invalid requested privilege level. */
+define VERR_INVALID_RPL (-1012)
+/** PML4 entry not present. */
+define VERR_PAGE_MAP_LEVEL4_NOT_PRESENT (-1013)
+/** Page directory pointer not present. */
+define VERR_PAGE_DIRECTORY_PTR_NOT_PRESENT (-1014)
+/** Raw mode doesn't support SMP. */
+define VERR_RAW_MODE_INVALID_SMP (-1015)
+/** Invalid VM handle. */
+define VERR_INVALID_VM_HANDLE (-1016)
+/** Invalid VM handle. */
+define VERR_INVALID_VM_CPU_HANDLE (-1017)
+/** Invalid Virtual CPU ID. */
+define VERR_INVALID_CPU_ID (-1018)
+/** Too many VCPUs. */
+define VERR_TOO_MANY_CPUS (-1019)
+/** The service was disabled on the host.
+ * Returned by pfInit in VBoxService to indicated a non-fatal error that
+ * should results in the particular service being disabled. */
+define VERR_SERVICE_DISABLED (-1020)
+/** The requested feature is not supported in raw-mode. */
+define VERR_NOT_SUP_IN_RAW_MODE (-1021)
+/** Invalid CPU index. */
+define VERR_INVALID_CPU_INDEX (-1022)
+/** This VirtualBox build does not support raw-mode. */
+#define VERR_RAW_MODE_NOT_SUPPORTED (-1023)
+/** Essential fields in the shared VM structure doesn't match the global one. */
+#define VERR_INCONSISTENT_VM_HANDLE (-1024)
+/** @} */
+
+
+/** @name Execution Monitor/Manager (EM) Status Codes
+ *
+ * The order of the status codes between VINF_EM_FIRST and VINF_EM_LAST
+ * are of vital importance. The lower the number the higher importance
+ * as a scheduling instruction.
+ * @} */
+
+/** First scheduling related status code. */
+#define VINF_EM_FIRST  1100
+/** Indicating that the VM is being terminated and that the execution
+ * shall stop. */
+#define VINF_EM_TERMINATE  1100
+/** Hypervisor code was stepped.
+ * EM will first send this to the debugger, and if the issue isn't
+ * resolved there it will enter guru meditation. */
+#define VINF_EM_DBG_HYPER_STEPPED  1101
+/** Hit a breakpoint in the hypervisor code,
+ * EM will first send this to the debugger, and if the issue isn't
+ * resolved there it will enter guru meditation. */
+#define VINF_EM_DBG_HYPER_BREAKPOINT  1102
+/** Hit a possible assertion in the hypervisor code,
+ * EM will first send this to the debugger, and if the issue isn't
+ * resolved there it will enter guru meditation. */
+#define VINF_EM_DBG_HYPER_ASSERTION  1103
+/** Generic debug event, suspend the VM for debugging. */
+#define VINF_EM_DBG_EVENT  1104
+/** Indicating that the VM should be suspended for debugging because
+ * the developer wants to inspect the VM state. */
+#define VINF_EM_DBG_STOP  1105
+/** Indicating success single stepping and that EM should report that
+ * event to the debugger. */
+#define VINF_EM_DBG_STEPPED  1106
+/** Indicating that a breakpoint was hit and that EM should notify the debugger
+ * and in the event there is no debugger fail fatally. */
+#define VINF_EM_DBG_BREAKPOINT  1107
+/** Indicating that EM should single step an instruction.
+ * The instruction is stepped in the current execution mode (RAW/REM). */
+#define VINF_EM_DBG_STEP  1108
+/** Indicating that the VM is being turned off and that the EM should
+ * exit to the VM awaiting the destruction request. */
+#define VINF_EM_OFF  1109
/** Indicating that the VM has been suspended and that the thread should wait for request telling it what to do next. */
#define VINF_EM_SUSPEND 1110

/** Indicating that the VM has been reset and that scheduling goes back to startup defaults. */
#define VINF_EM_RESET 1111

/** Indicating that the VM has executed a halt instruction and that the emulation thread should wait for an interrupt before resuming execution. */
#define VINF_EM_HALT 1112

/** Indicating that the VM has been resumed and that the thread should start executing. */
#define VINF_EM_RESUME 1113

/** Indicating that we've got an out-of-memory condition and that we need to take the appropriate actions to deal with this. */
#define VINF_EM_NO_MEMORY 1114

/** The fatal variant of VINF_EM_NO_MEMORY. */
#define VERR_EM_NO_MEMORY (-1114)

/** Indicating that a rescheduling to recompiled execution. Typically caused by raw-mode executing code which is difficult/slow to virtualize rawly. */
#define VINF_EM_RESCHEDULE_REM 1115

/** Indicating that a rescheduling to vmx-mode execution. Typically caused by REM detecting that hardware-accelerated raw-mode execution is possible. */
#define VINF_EM_RESCHEDULE_HM 1116

/** Indicating that a rescheduling to raw-mode execution. Typically caused by REM detecting that raw-mode execution is possible. */
#define VINF_EM_RESCHEDULE_RAW 1117

/** Indicating that a rescheduling now is required. Typically caused by interrupts having changed the EIP. */
#define VINF_EM_RESCHEDULE 1118

/** PARAV call */
#define VINF_EM_RESCHEDULE_PARAV 1119

/** Go back into wait for SIPI mode */
#define VINF_EM_WAIT_SIPI 1120

/** Last scheduling related status code. (inclusive) */
#define VINF_EM_LAST 1120

/** Reason for leaving RC: Guest trap which couldn't be handled in RC. The trap is generally forwarded to the REM and executed there. */
#define VINF_EM_RAW_GUEST_TRAP 1121
+/** Reason for leaving RC: Interrupted by external interrupt.
 + * The interrupt needed to be handled by the host OS. */
 +#define VINF_EM_RAW_INTERRUPT 1122
+/** Reason for leaving RC: Interrupted by external interrupt while in hypervisor
+ * code. The interrupt needed to be handled by the host OS and hypervisor
+ * execution must be resumed. VM state is not complete at this point. */
+#define VINF_EM_RAW_INTERRUPT_HYPER 1123
+/** Reason for leaving RC: A Ring switch was attempted.
+ * Normal cause of action is to execute this in REM. */
+#define VINF_EM_RAW_RING SWITCH 1124
+/** Reason for leaving RC: A Ring switch was attempted using software interrupt.
+ * Normal cause of action is to execute this in REM. */
+#define VINF_EM_RAW_RING SWITCH INT 1125
+/** Reason for leaving RC: A privileged instruction was attempted executed.
+ * Normal cause of action is to execute this in REM. */
+#define VINF_EM_RAW_EXCEPTION_PRIVILEGED 1126
+
+/** Reason for leaving RZ: Emulate instruction. */
+#define VINF_EM_RAW_EMULATE INSTR 1127
+/** Reason for leaving RC: Unhandled TSS write.
+ * Recompiler gets control. */
+#define VINF_EM_RAW_EMULATE INSTR_TSS_FAULT 1128
+/** Reason for leaving RC: Unhandled LDT write.
+ * Recompiler gets control. */
+#define VINF_EM_RAW_EMULATE INSTR_LDT_FAULT 1129
+/** Reason for leaving RC: Unhandled IDT write.
+ * Recompiler gets control. */
+#define VINF_EM_RAW_EMULATE INSTR_IDT_FAULT 1130
+/** Reason for leaving RC: Partly handled GDT write.
+ * Recompiler gets control. */
+#define VINF_EM_RAW_EMULATE INSTR_GDT_FAULT 1131
+/** Reason for leaving RC: jump inside generated patch jump.
+ * Fatal error. */
+#define VERR_EM_RAW PATCH CONFLICT (-1133)
+/** Reason for leaving RZ: Ring-3 operation pending. */
+#define VINF_EM_RAW_TO_R3 1135
+/** Reason for leaving RC: Timer pending. */
+#define VINF_EM_RAW TIMER PENDING 1136
+/** Reason for leaving RC: Interrupt pending (guest). */
+#define VINF_EM_RAW INTERRUPT PENDING 1137
+/** Reason for leaving RC: Encountered a stale selector. */
+#define VINF_EM_RAW_STALE SELECTOR 1138
+/** Reason for leaving RC: The IRET resuming guest code trapped. */
+#define VINF_EM_RAW IRET TRAP 1139
+/** Reason for leaving RC: Emulate (MM)IO intensive code in the recompiler. */
+#define VINF_EM_RAW EMULATE_IO_BLOCK 1140
+/** The interpreter was unable to deal with the instruction at hand. */
+#define VERR_EM INTERPRETER (-1148)
/** Internal EM error caused by an unknown warning or informational status code. */
#define VERR_EM_INTERNAL_ERROR (-1149)
/** Pending VM request packet. */
#define VINF_EM_PENDING_REQUEST 1150
/** Start instruction stepping (debug only). */
#define VINF_EM_RAW_EMULATE_DBG_STEP 1151
/** Patch TPR access instruction. */
#define VINF_EM_HM_PATCH_TPR_INSTR 1152
/** Unexpected guest mapping conflict detected. */
#define VERR_EM_UNEXPECTED_MAPPING_CONFLICT (-1154)
/** Reason for leaving RC: A triple-fault condition. Currently, causes 
 * a guru meditation. */
#define VINF_EM_TRIPLE_FAULT 1155
/** The specified execution engine cannot execute guest code in the current 
 * state. */
#define VERR_EM_CANNOT_EXEC_GUEST (-1156)
/** Reason for leaving RC: Inject a TRPM event. */
#define VINF_EM_RAW_INJECT_TRPM_EVENT 1157
/** Guest tried to trigger a CPU hang. The guest is probably up to no good. */
#define VERR_EM_GUEST_CPU_HANG (-1158)

/** @} */

/** @} */

/** Debugging Facility (DBGF) DBGF Status Codes */
/** @} */

/** The function called requires the caller to be attached as a 
 * debugger to the VM. */
#define VERR_DBGF_NOT_ATTACHED (-1200)
/** Someone (including the caller) was already attached as 
 * debugger to the VM. */
#define VERR_DBGF_ALREADY_ATTACHED (-1201)
/** Tried to halt a debugger which was already halted. 
 * (This is a warning and not an error.) */
#define VWRN_DBGF_ALREADY_HALTED 1202
/** The DBGF has no more free breakpoint slots. */
#define VERR_DBGF_NO_MORE_BP_SLOTS (-1203)
/** The DBGF couldn't find the specified breakpoint. */
#define VERR_DBGF_BP_NOT_FOUND (-1204)
/** Attempted to enabled a breakpoint which was already enabled. */
#define VINF_DBGF_BP_ALREADY_ENABLED 1205
/** Attempted to disabled a breakpoint which was already disabled. */
#define VINF_DBGF_BP_ALREADY_DISABLED 1206
/** The breakpoint already exists. */
#define VINF_DBGF_BP_ALREADY_EXIST 1207
/** The byte string was not found. */
#define VERR_DBGF_MEM_NOT_FOUND (-1208)
/** The OS was not detected. */
```c
#define VERR_DBGF_OS_NOT_DETCTED          (-1209)
/** The OS was not detected. */
#define VINF_DBGF_OS_NOT_DETCTED          1209
/** The specified register was not found. */
#define VERR_DBGF_REGISTER_NOT_FOUND      (-1210)
/** The value was truncated to fit. */
#define VINF_DBGF_TRUNCATED_REGISTER      1211
/** For queries this means that the register is wider than the queried value. */
#define VINF_DBGF_ZERO_EXTENDED_REGISTER  1212
/** For setters this means that the value is wider than the register. */
#define VERR_DBGF_UNSUPPORTED_CAST        (-1213)
/** The register is read-only and cannot be modified. */
#define VERR_DBGF_READ_ONLY_REGISTER      (-1214)
/** Internal processing error \#1 in the DBGF register code. */
#define VERR_DBGF_REG_IPE_1               (-1215)
/** Internal processing error \#2 in the DBGF register code. */
#define VERR_DBGF_REG_IPE_2               (-1216)
/** Unhandled \#DB in hypervisor code. */
#define VERR_DBGF_HYPER_DB_XCPT           (-1217)
/** Internal processing error \#1 in the DBGF stack code. */
#define VERR_DBGF_STACK_IPE_1             (-1218)
/** Internal processing error \#2 in the DBGF stack code. */
#define VERR_DBGF_STACK_IPE_2             (-1219)
/** No trace buffer available, please change the VM config. */
#define VERR_DBGF_NO_TRACE_BUFFER         (-1220)
/** @} */
+
+/** @name Patch Manager (PATM) Status Codes
+ */
+/** Non fatal Patch Manager analysis phase warning */
+define VWRN_CONTINUE_ANALYSIS          1400
+/** Non fatal Patch Manager recompile phase warning (mapped to VWRN_CONTINUE_ANALYSIS). */
+define VWRN_CONTINUE_RECOMPILE         VWRN_CONTINUE_ANALYSIS
+/** Continue search (mapped to VWRN_CONTINUE_ANALYSIS). */
+define VWRN_PATM_CONTINUE_SEARCH       VWRN_CONTINUE_ANALYSIS
+/** Patch installation refused (patch too complex or unsupported instructions ) */
+define VERR_PATCHING_REFUSED          (-1401)
+/** Unable to find patch */
+define VERR_PATCH_NOT_FOUND           (-1402)
+/** Patch disabled */
+define VERR_PATCH_DISABLED            (-1403)
+/** Patch enabled */
```
```c
#define VWRN_PATCH_ENABLED                  1404
/** Patch was already disabled */
#define VERR_PATCH_ALREADY_DISABLED         (-1405)
/** Patch was already enabled */
#define VERR_PATCH_ALREADY_ENABLED          (-1406)
/** Patch was removed. */
#define VWRN_PATCH_REMOVED                  1407
+
/** Reason for leaving RC: \#GP with EIP pointing to patch code. */
#define VINF_PATM_PATCH_TRAP_GP             1408
/** First leave RC code. */
#define VINF_PATM_LEAVE_RC_FIRST             VINF_PATM_PATCH_TRAP_GP
/** Reason for leaving RC: \#PF with EIP pointing to patch code. */
#define VINF_PATM_PATCH_TRAP_PF             1409
/** Reason for leaving RC: int3 with EIP pointing to patch code. */
#define VINF_PATM_PATCH_INT3                1410
/** Reason for leaving RC: \#PF for monitored patch page. */
#define VINF_PATM_CHECK_PATCH_PAGE          1411
/** Reason for leaving RC: duplicate instruction called at current eip. */
#define VINF_PATM_DUPLICATE_FUNCTION        1412
/** Execute one instruction with the recompiler */
#define VINF_PATCH_EMULATE_INSTR            1413
/** Reason for leaving RC: attempt to patch MMIO write. */
#define VINF_PATM_HC_MMIO_PATCH_WRITE       1414
/** Reason for leaving RC: attempt to patch MMIO read. */
#define VINF_PATM_HC_MMIO_PATCH_READ        1415
/** Reason for leaving RC: pending irq after iret that sets IF. */
#define VINF_PATM_PENDING_IRQ_AFTER_IRET    1416
/** Last leave RC code. */
#define VINF_PATM_LEAVE_RC_LAST             VINF_PATM_PENDING_IRQ_AFTER_IRET
+
/** No conflicts to resolve */
#define VERR_PATCH_NO_CONFLICT              (-1425)
/** Detected unsafe code for patching */
#define VERR_PATCH_UNSsafe_CODE             (-1426)
/** Terminate search branch */
#define VWRN_PATCH_END_BRANCH               1427
/** Already patched */
#define VERR_PATM_ALREADY_PATCHED           (-1428)
/** Spinlock detection failed. */
#define VINF_PATM_SPINLOCK_FAILED           (1429)
/** Continue execution after patch trap. */
#define VINF_PATCH_CONTINUE                 (1430)
/** The patch manager is not used because we're using HM and VT-x/AMD-V. */
#define VERR_PATM_HM_IPE                    (-1431)
/** Unexpected trap in patch code. */
#define VERR_PATM_IPE_TRAP_IN_PATCH_CODE    (-1432)
```
/** @} */
+#define VWRN_CSAM_TRAP_NOT_HANDLED          1500
+#define VWRN_CSAM_INSTRUCTION_PATCHED       1501
+#define VWRN_CSAM_PAGE_NOT_FOUND            1502
+#define VINF_CSAM_PENDING_ACTION            1503
+#define VERR_CSAM_HM_IPE                    (-1504)
/** @} */
+
+/** @name Page Monitor/Manager (PGM) Status Codes
+ * @{ }
+ */
+/** Attempt to create a GC mapping which conflicts with an existing mapping. */
+#define VERR_PGM_MAPPING_CONFLICT           (-1600)
+/** The physical handler range has no corresponding RAM range.
+ * If this is MMIO, see todo above the return. If not MMIO, then it's
+ * someone else's fault... */
+#define VERR_PGM_HANDLER_PHYSICAL_NO_RAM_RANGE (-1601)
+/** Attempt to register an access handler for a virtual range of which a part
+ * was already handled. */
+#define VERR_PGM_HANDLER_VIRTUAL_CONFLICT   (-1602)
+/** Attempt to register an access handler for a physical range of which a part
+ * was already handled. */
+#define VERR_PGM_HANDLER_PHYSICAL_CONFLICT  (-1603)
+/** Invalid page directory specified to PGM. */
+#define VERR_PGM_INVALID_PAGE_DIRECTORY     (-1604)
+/** Invalid GC physical address. */
+#define VERR_PGM_INVALID_GC_PHYSICAL_ADDRESS (-1605)
+/** Invalid GC physical range. Usually used when a specified range crosses
+ * a RAM region boundary. */
+#define VERR_PGM_INVALID_GC_PHYSICAL_RANGE  (-1606)
+/** Specified access handler was not found. */
+#define VERR_PGM_HANDLER_NOT_FOUND          (-1607)
+/** Attempt to register a RAM range of which parts are already
+ * covered by existing RAM ranges. */
+#define VERR_PGM_RAM_CONFLICT               (-1608)
+/** Failed to add new mappings because the current mappings are fixed
+ * in guest os memory. */
+\#define VERR_PGM_MAPPINGS_FIXED (-1609)
+/** Failed to fix mappings because of a conflict with the intermediate code. */
+\#define VERR_PGM_MAPPINGS_FIX_CONFLICT (-1610)
+/** Failed to fix mappings because a mapping rejected the address. */
+\#define VERR_PGM_MAPPINGS_FIX_REJECTED (-1611)
+/** Failed to fix mappings because the proposed memory area was too small. */
+\#define VERR_PGM_MAPPINGS_FIX_TOO_SMALL (-1612)
+/** Reason for leaving RZ: The urge to syncing CR3. */
+\#define VINF_PGM_SYNC_CR3 1613
+/** Page not marked for dirty bit tracking */
+\#define VINF_PGM_NO_DIRTY_BIT_TRACKING 1614
+/** Page fault caused by dirty bit tracking: corrected */
+\#define VINF_PGM_HANDLED_DIRTY_BIT_FAULT 1615
+/** Go ahead with the default Read/Write operation.
+ * This is returned by a R3 physical or virtual handler when it wants the
+ * PGMPHys[Read|Write] routine do the reading/writing. */
+\#define VINF_PGM_HANDLER_DO_DEFAULT 1616
+/** The paging mode of the host is not supported yet. */
+\#define VERR_PGM_UNSUPPORTED_HOST_PAGING_MODE (-1617)
+/** The physical guest page is a reserved/MMIO page and does not have any HC
+ * address. */
+\#define VINF_PGM_PHYS_PAGE_RESERVED (-1618)
+/** No page directory available for the hypervisor. */
+\#define VERR_PGM_NO_HYPERVISOR_ADDRESS (-1619)
+/** The shadow page pool was flushed.
+ * This means that a global CR3 sync was flagged. Anyone receiving this kind of status
+ * will have to get down to a SyncCR3 ASAP. See also VINF_PGM_SYNC_CR3. */
+\#define VINF_PGM_POOL_FLUSHED (-1620)
+/** The shadow page pool was cleared.
+ * This is a error code internal to the shadow page pool, it will be
+ * converted to a VERR_PGM_POOL_FLUSHED before leaving the pool code. */
+\#define VINF_PGM_POOL_CLEARED (-1621)
+/** The returned shadow page is cached. */
+\#define VINF_PGM_CACHED_PAGE 1622
+/** Returned by handler registration, modification and deregistration
+ * when the shadow PTs could be updated because the guest page
+ * aliased or/and mapped by multiple PTs. */
+\#define VINF_PGM_GCPHYS_ALIASED 1623
+/** Reason for leaving RC: Paging mode changed.
+ * PGMChangeMode() uses this to force a switch to R3 so it can safely deal with
+ * a mode switch. */
+\#define VINF_PGM_CHANGE_MODE 1624
+/** SyncPage modified the PDE.
+ * This is an internal status code used to communicate back to the \#PF handler
+ * that the PDE was (probably) marked not-present and it should restart the instruction. */
+\#define VINF_PGM_SYNCPAGE_MODIFIED_PDE 1625
+/** Physical range crosses dynamic ram chunk boundary; translation to HC ptr not safe. */
+\#define VERR_PGM_GCPHYS_RANGE_CROSSES_BOUNDARY (-1626)
/** Conflict between the core memory and the intermediate paging context, try again.
+ * There are some very special conditions applying to the intermediate paging context
+ * (used during the world switches), and some times we continuously run into these
+ * when asking the host kernel for memory during VM init. Let us know if you run into
+ * this and we'll adjust the code so it tries harder to avoid it.
+ */
+#define VERR_PGM_INTERMEDIATE_PAGING_CONFLICT (-1627)
/** The shadow paging mode is not supported yet. */
+#define VERR_PGM_UNSUPPORTED_SHADOW_PAGING_MODE (-1628)
/** The dynamic mapping cache for physical memory failed. */
+#define VERR_PGM_DYNMAP_FAILED (-1629)
/** The auto usage cache for the dynamic mapping set is full. */
+#define VERR_PGM_DYNMAP_FULL_SET (-1630)
/** The initialization of the dynamic mapping cache failed. */
+#define VERR_PGM_DYNMAP_SETUP_ERROR (-1631)
/** The expanding of the dynamic mapping cache failed. */
+#define VERR_PGM_DYNMAP_EXPAND_ERROR (-1632)
/** The page is unassigned (akin to VERR_PGM_INVALID_GC_PHYSICAL_ADDRESS). */
+#define VERR_PGM_PHYS_TLB_UNASSIGNED (-1633)
/** Catch any access and route it thru PGM. */
+#define VERR_PGM_PHYS_TLB_CATCH_ALL (-1634)
/** Catch write access and route it thru PGM. */
+#define VINF_PGM_PHYS_TLB_CATCH_WRITE 1635
/** Catch write access and route it thru PGM. */
+#define VERR_PGM_PHYS_TLB_CATCH_WRITE (-1635)
/** No CR3 root shadow page table. */
+#define VERR_PGM_NO_CR3_SHADOW_ROOT (-1636)
/** Trying to free a page with an invalid Page ID. */
+#define VERR_PGM_PHYS_INVALID_PAGE_ID (-1637)
/** PGMPhysWrite/Read hit a handler in Ring-0 or raw-mode context. */
+#define VERR_PGM_PHYS_WR_HIT_HANDLER (-1638)
/** Trying to free a page that isn't RAM. */
+#define VERR_PGM_PHYS_NOT_RAM (-1639)
/** Not ROM page. */
+#define VERR_PGM_PHYS_NOT_ROM (-1640)
/** Not MMIO page. */
+#define VERR_PGM_PHYS_NOT_MMIO (-1641)
/** Not MMIO2 page. */
+#define VERR_PGM_PHYS_NOT_MMIO2 (-1642)
/** Already aliased to a different page. */
+#define VERR_PGM_HANDLER_ALREADY_ALIASED (-1643)
/** Already aliased to the same page. */
+#define VINF_PGM_HANDLER_ALREADY_ALIASED (1643)
/** PGM pool flush pending - return to ring 3. */
+#define VINF_PGM_POOL_FLUSH_PENDING (1644)
/** Unable to use the range for a large page. */
+#define VERR_PGM_INVALID_LARGE_PAGE_RANGE (-1645)
/** Don't mess around with ballooned pages. */
+#define VERR_PGM_PHYS_PAGE_BALLOONED (-1646)
+/** Internal processing error \#1 in page access handler code. */
+#define VERR_PGM_HANDLER_IPE_1 (-1647)
+
+
+/** pgmPhysPageMapCommon encountered PGMPAGETYPE_MMIO2_ALIAS_MMIO. */
+#define VERR_PGM_MAP_MMIO2_ALIAS_MMIO (-1651)
+/** Guest mappings are disabled. */
+#define VERR_PGM_MAPPINGS_DISABLED (-1652)
+/** No guest mappings when SMP is enabled. */
+#define VERR_PGM_MAPPINGS_SMP (-1653)
+/** Invalid saved page state. */
+#define VERR_PGM_INVALID_SAVED_PAGE_STATE (-1654)
+/** Encountered an unexpected page type in the saved state. */
+#define VERR_PGM_LOAD_UNEXPECTED_PAGE_TYPE (-1655)
+/** Encountered an unexpected page state in the saved state. */
+#define VERR_PGM_UNEXPECTED_PAGE_STATE (-1656)
+/** Couldn't find MMIO2 range from saved state. */
+#define VERR_PGM_SAVED_MMIO2_RANGE_NOT_FOUND (-1657)
+/** Couldn't find MMIO2 page from saved state. */
+#define VERR_PGM_SAVED_MMIO2_PAGE_NOT_FOUND (-1658)
+/** Couldn't find ROM range from saved state. */
+#define VERR_PGM_SAVED_ROM_RANGE_NOT_FOUND (-1659)
+/** Couldn't find ROM page from saved state. */
+#define VERR_PGM_SAVED_ROM_PAGE_NOT_FOUND (-1660)
+/** ROM page mismatch between saved state and the VM. */
+#define VERR_PGM_SAVED_ROM_PAGE_PROT (-1661)
+/** Unknown saved state record. */
+#define VERR_PGM_SAVED_REC_TYPE (-1662)
+/** Internal processing error in the PGM dynmap (r0/rc). */
+#define VERR_PGM_DYNMAP_IPE (-1663)
+/** Internal processing error in the PGM handy page allocator. */
+#define VERR_PGM_HANDY_PAGE_IPE (-1664)
+/** Failed to map the guest PML4. */
+#define VERR_PGM_PML4_MAPPING (-1665)
+/** Failed to obtain a pool page. */
+#define VERR_PGM_POOL_GET_PAGE_FAILED (-1666)
+/** A PGM function was called in a mode where it isn't supposed to be used. */
+#define VERR_PGM_NOT_USED_IN_MODE (-1667)
+/** The CR3 address specified memory we don't know about. */
+#define VERR_PGM_INVALID_CR3_ADDR (-1668)
+/** One or the PDPEs specified memory we don't know about. */
+#define VERR_PGM_INVALID_PDPE_ADDR (-1669)
+/** Internal processing error in the PGM physical handler code. */
+#define VERR_PGM_PHYS_HANDLER_IPE (-1670)
+/** Internal processing error \#1 in the PGM physical page mapping code. */
+#define VERR_PGM_PHYS_PAGE_MAP_IPE_1 (-1671)
+/** Internal processing error \#2 in the PGM physical page mapping code. */
+/* Internal processing error \#3 in the PGM physical page mapping code. */
+define VERR_PGM_PHYS_PAGE_MAP_IPE_3 (-1673)
+/* Internal processing error \#4 in the PGM physical page mapping code. */
+define VERR_PGM_PHYS_PAGE_MAP_IPE_4 (-1674)
+/** Too many loops looking for a page to reuse. */
+define VERR_PGM_POOL_TOO_MANY_LOOPS (-1675)
+/* Internal processing error related to guest mappings. */
+define VERR_PGM_MAPPING_IPE (-1676)
+/* An attempt was made to grow an already maxed out page pool. */
+define VERR_PGM_POOL_MAXED_OUT_ALREADY (-1677)
+/* Internal processing error in the page pool code. */
+define VERR_PGM_POOL_IPE (-1678)
+/* The write monitor is already engaged. */
+define VERR_PGM_WRITE_MONITOR_ENGAGED (-1679)
+/* Failed to get a guest page which is expected to be present. */
+define VERR_PGM_PHYS_PAGE_GET_IPE (-1680)
+/* We were given a NULL pPage parameter. */
+define VERR_PGM_PHYS_NULL_PAGE_PARAM (-1681)
+/* PCI passthru is not supported by this build. */
+define VERR_PGM_PCI_PASSTHRU_MISCONFIG (-1682)
+/* Too many MMIO2 ranges. */
+define VERR_PGM_TOO_MANY_MMI02_RANGES (-1683)
+/* Internal processing error in the PGM physical page mapping code dealing
+ * with MMIO2 pages. */
+define VERR_PGM_PHYS_PAGE_MAP_MMI02_IPE (-1684)
+/* Internal processing error in the PGM physical page handling code related to
+ * MMIO/MMIO2. */
+define VERR_PGM_PHYS_MMIO_EX_IPE (-1685)
+/* @ } */
+
+/* @name Memory Monitor (MM) Status Codes
+ @ { 
+ /* 
+ /* Attempt to register a RAM range of which parts are already
+ * covered by existing RAM ranges. */
+#define VERR_MM_RAM_CONFLICT (-1700)
+/* Hypervisor memory allocation failed. */
+define VERR_MM_HYPER_NO_MEMORY (-1701)
+/* A bad trap type ended up in mmGCRamTrap0eHandler. */
+define VERR_MM_BAD_TRAP_TYPE_IPE (-1702)
+/* @ } */
+
+/* @name CPU Monitor (CPUM) Status Codes
+ @ { 
+ /*

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+/** The caller shall raise an \#GP(0) exception. */
+/** Incompatible CPUM configuration. */
+/** CPUMR3DisasmInstrCPU unexpectedly failed to determine the hidden
 + * parts of the CS register. */
+/** Couldn't find the end of CPUID sub-leaves. */
+/** CPUM internal processing error \#1. */
+/** CPUM internal processing error \#2. */
+/** The specified CPU cannot be found in the CPU database. */
+/** Invalid CPUMCPU offset in MSR range. */
+/** Return to ring-3 to read the MSR there. */
+/** Return to ring-3 to write the MSR there. */
+/** Too many CPUID leaves. */
+/** Invalid config value. */
+/** The loaded XSAVE component mask is not compatible with the host CPU
 + * or/and VM config. */
+/** The loaded XSAVE component mask is not valid. */
+/** The loaded XSAVE header is not valid. */
+/** Indicates that we modified the host CR0 (FPU related). */
+/** The specified data unit already exist. */
+/** The specified data unit wasn't found. */
+/** The specified data unit wasn't owned by caller. */
+/** @name Save State Manager (SSM) Status Codes
 + * @ { 
 + * @ }
 + /** The specified data unit already exist. */
 + /** The specified data unit wasn't found. */
 + /** The specified data unit wasn't owned by caller. */
 + #define VERR_SSM_UNIT_EXISTS (-1800)
 + #define VERR_SSM_UNIT_NOT_FOUND (-1801)
 + #define VERR_SSM_UNIT_NOT_OWNER (-1802)
+/** General saved state file integrity error. */
+#define VERR_SSM_INTEGRITY             (-1810)
+/** The saved state file magic was not recognized. */
+#define VERR_SSM_INTEGRITY_MAGIC      (-1811)
+/** The saved state file version is not supported. */
+#define VERR_SSM_INTEGRITY_VERSION    (-1812)
+/** The saved state file size didn't match the one in the header. */
+#define VERR_SSM_INTEGRITY_SIZE       (-1813)
+/** The CRC of the saved state file did not match. */
+#define VERR_SSM_INTEGRITY_CRC        (-1814)
+/** The machine uuid field wasn't null. */
+#define VERR_SSM_INTEGRITY_MACHINE    (-1815)
+/** Saved state header integrity error. */
+#define VERR_SSM_INTEGRITY_HEADER     (-1816)
+/** Unit header integrity error. */
+#define VERR_SSM_INTEGRITY_UNIT       (-1817)
+/** Invalid unit magic (internal data tag). */
+#define VERR_SSM_INTEGRITY_UNIT_MAGIC (-1818)
+/** The file contained a data unit which no-one wants. */
+#define VERR_SSM_INTEGRITY_UNIT_NOT_FOUND (-1819)
+/** Incorrect version numbers in the header. */
+#define VERR_SSM_INTEGRITY_VBOX_VERSION (-1820)
+/** Footer integrity error. */
+#define VERR_SSM_INTEGRITY_FOOTER     (-1821)
+/** Record header integrity error. */
+#define VERR_SSM_INTEGRITY_REC_HDR    (-1822)
+/** Termination record integrity error. */
+#define VERR_SSM_INTEGRITY_REC_TERM   (-1823)
+/** Termination record CRC mismatch. */
+#define VERR_SSM_INTEGRITY_REC_TERM_CRC (-1824)
+/** Decompression integrity error. */
+#define VERR_SSM_INTEGRITY_DECOMPRESSION (-1825)
+/** Saved state directory wintertides error. */
+#define VERR_SSM_INTEGRITY_DIR        (-1826)
+/** The saved state directory magic is wrong. */
+#define VERR_SSM_INTEGRITY_DIR_MAGIC  (-1827)
+
+/** A data unit in the saved state file was defined but didn't any
+ * routine for processing it. */
+#define VERR_SSM_NO_LOAD_EXEC         (-1830)
+/** A restore routine attempted to load more data then the unit contained. */
+#define VERR_SSM_LOADED_TOO_MUCH      (-1831)
+/** Not in the correct state for the attempted operation. */
+#define VERR_SSM_INVALID_STATE        (-1832)
+/** Not in the correct state for the attempted operation. */
+#define VERR_SSM_LOADED_TOO_LITTLE    (-1833)
+
+/** Unsupported data unit version. */
+ * A SSM user returns this if it doesn't know the u32Version. */
+#define VERR_SSM_UNSUPPORTED_DATA_UNIT_VERSION (-1840)
+/** The format of a data unit has changed. */
+ * A SSM user returns this if it's not able to read the format for
+ * other reasons than u32Version. */
+#define VERR_SSM_DATA_UNIT_FORMAT_CHANGED (-1841)
+/** The CPUID instruction returns different information when loading than when saved. */
+ * Normally caused by hardware changes on the host, but could also be caused by
+ * changes in the BIOS setup. */
+#define VERR_SSM_LOAD_CPUID_MISMATCH (-1842)
+/** The RAM size differs between the saved state and the VM config. */
+#define VERR_SSM_LOAD_MEMORY_SIZE_MISMATCH (-1843)
+/** The state doesn't match the VM configuration in one or another way. */
+ * (There are certain PCI reconfiguration which the OS could potentially
+ * do which can cause this problem. Check this out when it happens.) */
+#define VERR_SSM_LOAD_CONFIG_MISMATCH (-1844)
+/** The virtual clock frequency differs too much. */
+ * The clock source for the virtual time isn't reliable or the code have changed. */
+#define VERR_SSM_VIRTUAL_CLOCK_HZ (-1845)
+/** A timeout occurred while waiting for async IDE operations to finish. */
+#define VERR_SSM_IDE_ASYNC_TIMEOUT (-1846)
+/** One of the structure magics was wrong. */
+#define VERR_SSM_STRUCTURE_MAGIC (-1847)
+/** The data in the saved state doesn't conform to expectations. */
+#define VERR_SSM_UNEXPECTED_DATA (-1848)
+/** Trying to read a 64-bit guest physical address into a 32-bit variable. */
+#define VERR_SSM_GCPHYS_OVERFLOW (-1849)
+/** Trying to read a 64-bit guest virtual address into a 32-bit variable. */
+#define VERR_SSM_GCPTR_OVERFLOW (-1850)
+/** Vote for another pass. */
+#define VINF_SSM_VOTE_FOR_ANOTHER_PASS 1851
+/** Vote for done tell SSM not to call again until the final pass. */
+#define VINF_SSM_VOTE_DONE_DONT_CALL_AGAIN 1852
+/** Vote for giving up. */
+#define VINF_SSM_VOTE_FOR_GIVING_UP (-1853)
+/** Don't call again until the final pass. */
+#define VINF_SSM_DONT_CALL_AGAIN 1854
+/** Giving up a live snapshot/teleportation attempt because of too many
+ * passes. */
+#define VINF_SSM_TOO_MANY_PASSES (-1855)
+/** Giving up a live snapshot/teleportation attempt because the state grew to
+ * big. */
+#define VINF_SSM_STATE_GREW_TOO_BIG (-1856)
+/** Giving up a live snapshot attempt because we're low on disk space. */
+#define VERR_SSM_LOW_ON_DISK_SPACE (-1857)
+/** The operation was cancelled. */
+#define VERR_SSM_CANCELLED (-1858)
+/** Nothing that can be cancelled. */
+/** The operation has already been cancelled. */
+/** The machine was powered off while saving. */
+/** The live snapshot/teleportation operation was aborted because of a guru * meditation. */
+/** The live snapshot/teleportation operation was aborted because of a fatal * runtime error. */
+/** The VM was suspended before or while saving. don't resume execution. */
+/** Complex SSM field fed to SSMR3PutStruct or SSMR3GetStruct. Use the * extended API. */
+/** Invalid size of a SSM field with the specified transformation. */
+/** The specified field is outside the structure. */
+/** The field does not follow immediately the previous one. */
+/** The field contains an invalid callback or transformation index. */
+/** The field contains an invalid padding size. */
+/** The field contains a value that is out of range. */
+/** Generic stream error. */
+/** SSM did a callback for a pass we didn't expect. */
+/** Someone is trying to skip backwards in the stream... */
+/** Someone is trying to write a memory block which is too big to encode. */
+/** Encountered an bad (/unknown) record type. */
+/** Internal processing error \#1 in SSM code. */
+/** Internal processing error \#2 in SSM code. */
+/** Internal processing error \#3 in SSM code. */
+/** A field contained an transformation that should only be used when loading * old states. */
+/** A field contained an transformation that should only be used when loading * old states. */
+/** @} */
+
+
+/** @name Virtual Machine (VM) Status Codes
+ */
+
+/** The specified at reset handler wasn't found. */
+#define VERR_VM_ATRESET_NOT_FOUND       (-1900)
+/** Invalid VM request type. */
+/** For the VMR3ReqAlloc() case, the caller just specified an illegal enmType. For
+ all the other occurrences it means indicates corruption, broken logic, or stupid
+ interface user. */
+#define VERR_VM_REQUEST_INVALID_TYPE     (-1901)
+/** Invalid VM request state. */
+/** The state of the request packet was not the expected and accepted one(s). Either
+ the interface user screwed up, or we've got corruption/broken logic. */
+#define VERR_VM_REQUEST_STATE            (-1902)
+/** Invalid VM request packet. */
+/** One or more of the VM controlled packet members didn't contain the correct
+ values. Some thing's broken. */
+#define VERR_VM_REQUEST_INVALID_PACKAGE  (-1903)
+/** The status field has not been updated yet as the request is still
+ pending completion. Someone queried the iStatus field before the request
+ has been fully processed. */
+#define VERR_VM_REQUEST_STATUS_STILL_PENDING  (-1904)
+/** The request has been freed, don't read the status now. */
+/** Someone is reading the iStatus field of a freed request packet. */
+#define VERR_VM_REQUEST_STATUS_FREED     (-1905)
+/** A VM api requiring EMT was called from another thread. */
+/** Use the VMR3ReqCall() apis to call it! */
+#define VERR_VM_THREAD_NOT_EMT           (-1906)
+/** The VM state was invalid for the requested operation. */
+/** Go check the 'VM Statechart Diagram.gif'. */
+#define VERR_VM_INVALID_VM_STATE         (-1907)
+/** The support driver is not installed. */
+/** On linux, open returned ENOENT. */
+#define VERR_VM_DRIVER_NOT_INSTALLED     (-1908)
+/** The support driver is not accessible. */
+/** On linux, open returned EPERM. */
+#define VERR_VM_DRIVER_NOT_ACCESSIBLE    (-1909)
+/** Was not able to load the support driver. */
+/** On linux, open returned ENODEV. */
+#define VERR_VM_DRIVER_LOAD_ERROR        (-1910)
+/** Was not able to open the support driver. */
+/** Generic open error used when none of the other ones fit. */
+#define VERR_VM_DRIVER_OPEN_ERROR        (-1911)
+/** The installed support driver doesn't match the version of the user. */
+#define VERR_VM_DRIVER_VERSION_MISMATCH (-1912)
+/** Saving the VM state is temporarily not allowed. Try again later. */
+/#define VERR_VM_SAVE_STATE_NOT_ALLOWED (-1913)
+/** An EMT called an API which cannot be called on such a thread. */
+/#define VERR_VM_THREAD_IS_EMT (-1914)
+/** Encountered an unexpected VM state. */
+/#define VERR_VM_UNEXPECTED_VM_STATE (-1915)
+/** Unexpected unstable VM state. */
+/#define VERR_VM_UNEXPECTED_UNSTABLE_STATE (-1916)
+/** Too many arguments passed to a VM request / request corruption. */
+/#define VERR_VM_REQUEST_TOO_MANY_ARGS_IPE (-1917)
+/** Fatal EMT wait error. */
+/#define VERR_VM_FATAL_WAIT_ERROR (-1918)
+/** The VM request was killed at VM termination. */
+/#define VERR_VM_REQUEST_KILLED (-1919)
+*/ @]
+
+/* @name VBox Remote Desktop Protocol (VRDP) Status Codes */
+*/ @ {
+ */
+/** Successful completion of operation (mapped to generic iprt status code). */
+/#define VINF_VRDP_SUCCESS VINF_SUCCESS
+/** VRDP transport operation timed out (mapped to generic iprt status code). */
+/#define VERR_VRDP_TIMEOUT VERR_TIMEOUT
+
+/** Unsupported ISO protocol feature */
+/#define VERR_VRDP_ISO_UNSUPPORTED (-2000)
+/** Security (en/decryption) engine error */
+/#define VERR_VRDP_SEC_ENGINE_FAIL (-2001)
+/** VRDP protocol violation */
+/#define VERR_VRDP_PROTOCOL_ERROR (-2002)
+/** Unsupported VRDP protocol feature */
+/#define VERR_VRDP_NOT_SUPPORTED (-2003)
+/** VRDP protocol violation, client sends less data than expected */
+/#define VERR_VRDP_INSUFFICIENT_DATA (-2004)
+/** Internal error, VRDP packet is in wrong operation mode */
+/#define VERR_VRDP_INVALID_MODE (-2005)
+/** Memory allocation failed */
+/#define VERR_VRDP_NO_MEMORY (-2006)
+/** Client has been rejected */
+/#define VERR_VRDP_ACCESS_DENIED (-2007)
+/** VRPD receives a packet that is not supported */
+/#define VWRN_VRDP_PDU_NOT_SUPPORTED 2008
+/** VRDP script allowed the packet to be processed further */
+/#define VINF_VRDP_PROCESS_PDU 2009
+/** VRDP script has completed its task */
+/#define VINF_VRDP_OPERATION_COMPLETED 2010
+/** VRDP thread has started OK and will run */
+/** Framebuffer is resized, terminate send bitmap procedure */
+/** Output can be enabled for the client. */
+/** @} */

+/* @} */ *
+
+
+/* @name Configuration Manager (CFGM) Status Codes */
+
+/** The integer value was too big for the requested representation. */
+/** Child node was not found. */
+/** Path to child node was invalid (i.e. empty). */
+/** Value not found. */
+/** No parent node specified. */
+/** No node was specified. */
+/** The value is not an integer. */
+/** The value is not a zero terminated character string. */
+/** The value is not a byte string. */
+/** The specified string / bytes buffer was too small. Specify a larger one and retry. */
+/** The path of a new node contained slashes or was empty. */
+/** A new node couldn’t be inserted because one with the same name exists. */
+/** A new leaf couldn’t be inserted because one with the same name exists. */
+/** An unknown config value was encountered. */
+/** An unknown config node (key) was encountered. */
+/** Internal processing error \#1 in CFGM. */

+/** @} */ *
+
+
+/* @name Time Manager (TM) Status Codes */
+/* @} */
+ /** The loaded timer state was incorrect. */
+ #define VERR_TM_LOAD_STATE                  (-2200)
+ /** The timer was not in the correct state for the request operation. */
+ #define VERR_TM_INVALID_STATE               (-2201)
+ /** The timer was in a unknown state. Corruption or stupid coding error. */
+ #define VERR_TM_UNKNOWN_STATE               (-2202)
+ /** The timer was stuck in an unstable state until we grew impatient and returned. */
+ #define VERR_TM_UNSTABLE_STATE              (-2203)
+ /** TM requires GIP. */
+ #define VERR_TM_GIP_REQUIRED                (-2204)
+ /** TM does not support the GIP version. */
+ #define VERR_TM_GIP_VERSION                 (-2205)
+ /** The GIP update interval is too large. */
+ #define VERR_TM_GIP_UPDATE_INTERVAL_TOO_BIG (-2206)
+ /** The timer has a bad clock enum value, probably corruption. */
+ #define VERR_TM_TIMER_BAD_CLOCK             (-2207)
+ /** The timer failed to reach a stable state. */
+ #define VERR_TM_TIMER_UNSTABLE_STATE        (-2208)
+ /** Attempt to resume a running TSC. */
+ #define VERR_TM_TSC_ALREADY_TICKING         (-2209)
+ /** Attempt to pause a paused TSC. */
+ #define VERR_TM_TSC_ALREADY_PAUSED          (-2210)
+ /** Invalid value for cVirtualTicking. */
+ #define VERR_TM_VIRTUAL_TICKING_IPE         (-2211)
+ /** @} */
+
+ /** @} */
+
+ /** @name Recompiled Execution Manager (REM) Status Codes */
+ * @ { 
+ * *
+ * @ ** Fatal error in virtual hardware. */
+ * #define VERR_REM_VIRTUAL_HARDWARE_ERROR     (-2300)
+ * @** Fatal error in the recompiler cpu. */
+ * #define VERR_REM_VIRTUAL_CPU_ERROR          (-2301)
+ * @** Recompiler execution was interrupted by forced action. */
+ * #define VINF_REM_INTERRUPTED_FF             2302
+ * @** Too many similar traps. This is a very useful debug only
+ * check (we don't do double/triple faults in REM). */
+ * #define VERR_REM_TOO_MANY_TRAPS            (-2304)
+ * @** The REM is out of breakpoint slots. */
+ * #define VERR_REM_NO_MORE_BP_SLOTS           (-2305)
+ * @** The REM could not find any breakpoint on the specified address. */
+ * #define VERR_REM_BP_NOT_FOUND               (-2306)
+ * @ } */
+
+ /** @} */
+
+ /** @name Trap Manager / Monitor (TRPM) Status Codes */
+ * @{ 
+ */
+/** No active trap. Cannot query or reset a non-existing trap. */
+#define VERR_TRPM_NO_ACTIVE_TRAP        (-2400)
+/** Active trap. Cannot assert a new trap when one is already active. */
+#define VERR_TRPM_ACTIVE_TRAP           (-2401)
+/** Reason for leaving RC: Guest tried to write to our IDT - fatal. 
+ * The VM will be terminated assuming the worst, i.e. that the 
+ * guest has read the idtr register. */
+#define VERR_TRPM_SHADOW_IDT_WRITE      (-2402)
+/** Reason for leaving RC: Fatal trap in hypervisor. */
+#define VERR_TRPM_DONT_PANIC            (-2403)
+/** Reason for leaving RC: Double Fault. */
+#define VERR_TRPM_SHADOW_GDT_WRITE      (-2500)
+/** Reason for leaving RC: Guest tried to write to our LDT - fatal. 
+ * The VM will be terminated assuming the worst, i.e. that the 
+ * guest has read the ldtr register. */
+#define VERR_TRPM_SHADOW_LDT_WRITE      (-2501)
+/** Reason for leaving RC: Guest tried to write to our LDT - fatal. 
+ * The VM will be terminated assuming the worst, i.e. that the 
+ * guest has read the ldr register. */
+#define VERR_TRPM_SHADOW_TSS_WRITE      (-2502)
+/** Reason for leaving RC: Sync the GDT table to solve a conflict. */
+#define VINF_TRPM_XCPT_DISPATCHED       2405
+/** Bad TRPM_TRAP_IN_OP. */
+#define VERR_TRPM_BAD_TRAP_IN_OP        (-2406)
+/** Internal processing error \#1 in TRPM. */
+#define VERR_TRPM_IPE_1                 (-2407)
+/** Internal processing error \#2 in TRPM. */
+#define VERR_TRPM_IPE_2                 (-2408)
+/** Internal processing error \#3 in TRPM. */
+#define VERR_TRPM_IPE_3                 (-2409)
+/** Got into a part of TRPM that is not used when HM (VT-x/AMD-V) is enabled. */
+#define VERR_TRPM_HM_IPE                (-2410)
+/** @} */
+
+
+/** @name Selector Manager / Monitor (SELM) Status Code 
+ * @{ 
+ * Reason for leaving RC: Guest tried to write to our GDT - fatal. 
+ * The VM will be terminated assuming the worst, i.e. that the 
+ * guest has read the gdtr register. */
+#define VERR_SELM_SHADOW_GDT_WRITE      (-2500)
+/** Reason for leaving RC: Guest tried to write to our LDT - fatal. 
+ * The VM will be terminated assuming the worst, i.e. that the 
+ * guest has read the ldtr register. */
+#define VERR_SELM_SHADOW_LDT_WRITE      (-2501)
+/** Reason for leaving RC: Guest tried to write to our TSS - fatal. 
+ * The VM will be terminated assuming the worst, i.e. that the 
+ * guest has read the ltr register. */
+#define VERR_SELM_SHADOW_TSS_WRITE      (-2502)
+/** Reason for leaving RC: Sync the GDT table to solve a conflict. */
+#define VINF_SELM_SYNC_GDT              2503
+/** No valid TSS present. */
+#define VERR_SELM_NO_TSS                (-2504)
+/** Invalid guest LDT selector. */
+define VERR_SELMD_INVALID_LDT (-2505)
+/** The guest LDT selector is out of bounds. */
+define VERR_SELMD_LDT_OUT_OF_BOUNDS (-2506)
+/** Unknown error while reading the guest GDT during shadow table updating. */
+define VERR_SELMD_GDT_READ_ERROR (-2507)
+/** The guest GDT so full that we cannot find free space for our own selectors. */
+define VERR_SELMD_GDT_TOO_FULL (-2508)
+/** Got into a part of SELM that is not used when HM (VT-x/AMD-V) is enabled. */
+define VERR_SELMD_HM_IPE (-2509)
+@] */
+
+@name I/O Manager / Monitor (IOM) Status Code
+
+* [ 
+*/
+/** The specified I/O port range was invalid.
+* It was either empty or it was out of bounds. */
+define VERR_IOM_INVALID_IOPORT_RANGE (-2600)
+/** The specified R0 or RC I/O port range didn't have a corresponding R3 range.
+* IOMR3IOPortRegisterR3() must be called first. */
+define VERR_IOM_NO_R3_IOPORT_RANGE (-2601)
+/** The specified I/O port range intruded on an existing range. There is
+* a I/O port conflict between two device, or a device tried to register
+* the same range twice. */
+define VERR_IOM_IOPORT_RANGE_CONFLICT (-2602)
+/** The I/O port range specified for removal wasn't found or it wasn't contiguous. */
+define VERR_IOM_IOPORT_RANGE_NOT_FOUND (-2603)
+/** The specified I/O port range was owned by some other device(s). Both registration
+* and deregistration, but in the first case only RC and R0 ranges. */
+define VERR_IOM_NOT_IOPORT_RANGE_OWNER (-2604)
+
+/** The specified MMIO range was invalid.
+* It was either empty or it was out of bounds. */
+define VERR_IOM_INVALID_MMIO_RANGE (-2605)
+/** The specified R0 or RC MMIO range didn't have a corresponding R3 range.
+* IOMR3MMIORegisterR3() must be called first. */
+define VERR_IOM_NO_R3_MMIO_RANGE (-2606)
+/** The specified MMIO range was owned by some other device(s). Both registration
+* and deregistration, but in the first case only RC and R0 ranges. */
+define VERR_IOM_NOT_MMIO_RANGE_OWNER (-2607)
+/** The specified MMIO range intruded on an existing range. There is
+* a MMIO conflict between two device, or a device tried to register
+* the same range twice. */
+define VERR_IOM_MMIO_RANGE_CONFLICT (-2608)
+/** The MMIO range specified for removal was not found. */
+define VERR_IOM_MMIO_RANGE_NOT_FOUND (-2609)
+/** The MMIO range specified for removal was invalid. The range didn't match
+ * a MMIO range, only one or more full ranges. */
+#define VERR_IOM_INCOMPLETE_MMIO_RANGE      (-2610)
+/** An invalid I/O port size was specified for a read or write operation. */
+#define VERR_IOM_INVALID_IOPORT_SIZE        (-2611)
+/** The MMIO handler was called for a bogus address! Internal error! */
+#define VERR_IOM_MMIO_HANDLER_BOGUS_CALL    (-2612)
+/** The MMIO handler experienced a problem with the disassembler. */
+#define VERR_IOM_MMIO_HANDLER_DISASM_ERROR  (-2613)
+/** The port being read was not presentunused) and IOM shall return ~0 according to size. */
+#define VINF_IOM_IOPORT_UNUSED              (-2614)
+/** Unused MMIO register read, fill with 00. */
+#define VINF_IOM_MMIO_UNUSED_00             2615
+/** Unused MMIO register read, fill with FF. */
+#define VINF_IOM_MMIO_UNUSED_FF             2616
+/** Reason for leaving RZ: I/O port read. */
+#define VINF_IOM_R3_IOPORT_READ             2620
+/** Reason for leaving RZ: I/O port write. */
+#define VINF_IOM_R3_IOPORT_WRITE            2621
+/** Reason for leaving RZ: Pending I/O port write. Since there is also
+ * VMCPU_FF_IOM for this condition, it's ok to drop this status code for
+ * some other VINF_EM_XXX statuses. */
+#define VINF_IOM_R3_IOPORT_COMMIT_WRITE     2622
+/** Reason for leaving RZ: MMIO read. */
+#define VINF_IOM_R3_MMIO_READ               2623
+/** Reason for leaving RZ: MMIO write. */
+#define VINF_IOM_R3_MMIO_WRITE              2624
+/** Reason for leaving RZ: MMIO read/write. */
+#define VINF_IOM_R3_MMIO_READ_WRITE         2625
+/** Reason for leaving RZ: Pending MMIO write. Since there is also
+ * VMCPU_FF_IOM for this condition, it's ok to drop this status code for
+ * some other VINF_EM_XXX statuses. */
+#define VINF_IOM_R3_MMIO_COMMIT_WRITE       2626
+/** IOMGCIOPortHandler was given an unexpected opcode. */
+#define VERR_IOM_IOPORT_UNKNOWN_OPCODE      (-2630)
+/** Internal processing error #1 in the I/O port code. */
+#define VERR_IOM_IOPORT_IPE_1               (-2631)
+/** Internal processing error #2 in the I/O port code. */
+#define VERR_IOM_IOPORT_IPE_2               (-2632)
+/** Internal processing error #3 in the I/O port code. */
+#define VERR_IOM_IOPORT_IPE_3               (-2633)
+/** Internal processing error #1 in the MMIO code. */
+#define VERR_IOM_MMIO_IPE_1                 (-2634)
+/** Internal processing error #2 in the MMIO code. */
+#define VERR_IOM_MMIO_IPE_2                 (-2635)
/** Internal processing error \#3 in the MMIO code. */
#define VERR_IOM_MMIO_IPE_3 (-2636)
/** Got into a part of IOM that is not used when HM (VT-x/AMD-V) is enabled. */
#define VERR_IOM_HM_IPE (-2637)
/** Internal processing error while merging status codes. */
#define VERR_IOM_FF_STATUS_IPE (-2638)
/** @} */

/** @} name Virtual Machine Monitor (VMM) Status Codes
 * @{
 * */

/** Reason for leaving RZ: Calling host function. */
#define VINF_VMM_CALL_HOST 2700
/** Reason for leaving R0: Hit a ring-0 assertion on EMT. */
#define VERR_VMM_RING0_ASSERTION (-2701)
/** The hyper CR3 differs between PGM and CPUM. */
#define VERR_VMM_HYPER_CR3_MISMATCH (-2702)
/** Reason for leaving RZ: Illegal call to ring-3. */
#define VERR_VMM_RING3_CALL_DISABLED (-2703)
/** The VMMR0.r0 module version does not match VBoxVMM.dll/so/dylib. */
#define VERR_VMM_R0_VERSION_MISMATCH (-2704)
/** The VMMRC.rc module version does not match VBoxVMM.dll/so/dylib. */
#define VERR_VMM_RC_VERSION_MISMATCH (-2705)
/** VMM set jump error. */
#define VERR_VMM_SET_JMP_ERROR (-2706)
/** VMM set jump stack overflow error. */
#define VERR_VMM_SET_JMP_STACK_OVERFLOW (-2707)
/** VMM set jump resume error. */
#define VERR_VMM_SET_JMP_ABORTED_RESUME (-2708)
/** VMM long jump error. */
#define VERR_VMM_LONG_JMP_ERROR (-2709)
/** Unknown ring-3 call attempted. */
#define VERR_VMM_UNKNOWN_RING3_CALL (-2710)
/** The ring-3 call didn't set an RC. */
#define VERR_VMM_RING3_CALL_NO_RC (-2711)
/** Reason for leaving RC: Caller the tracer in ring-0. */
#define VINF_VMM_CALL_TRACER (2712)
/** Internal processing error \#1 in the switcher code. */
#define VERR_VMM_SWITCHER_IPE_1 (-2713)
/** Reason for leaving RZ: Unknown call to ring-3. */
#define VINF_VMM_UNKNOWN_RING3_CALL (2714)
/** Attempted to use stub switcher. */
+#define VERR_VMM_SWITCHER_STUB              (-2715)
+/** HM returned in the wrong state. */
+#define VERR_VMM_WRONG_HM_VM_CPU_STATE      (-2716)
+/** SMAP enabled, but the AC flag was found to be clear - check the kernel
+ * log for details. */
+define VERR_VMM_SMAP_BUT_AC_CLEAR         (-2717)
+/** @} */
+
+
+/** @name Pluggable Device and Driver Manager (PDM) Status Codes
+ * @
+ * @*/
+/** An invalid LUN specification was given. */
+define VERR_PDM_NO_SUCH_LUN               (-2800)
+/** A device encountered an unknown configuration value.
+ * This means that the device is potentially misconfigured and the device
+ * construction or unit attachment failed because of this. */
+define VERR_PDM_DEVINS_UNKNOWN_CFG_VALUES  (-2801)
+/** The above driver doesn't export a interface required by a driver being
+ * attached to it. Typical misconfiguration problem. */
+define VERR_PDM_MISSING_INTERFACE_ABOVE   (-2802)
+/** The below driver doesn't export a interface required by the drive
+ * having attached it. Typical misconfiguration problem. */
+define VERR_PDM_MISSING_INTERFACE_BELOW    (-2803)
+/** A device didn't find a required interface with an attached driver.
+ * Typical misconfiguration problem. */
+define VERR_PDM_MISSING_INTERFACE          (-2804)
+/** A driver encountered an unknown configuration value.
+ * This means that the driver is potentially misconfigured and the driver
+ * construction failed because of this. */
+define VERR_PDM_DRVINS_UNKNOWN_CFG_VALUES  (-2805)
+/** The PCI bus assigned to a device didn't have room for it.
+ * Either too many devices are configured on the same PCI bus, or there are
+ * some internal problem where PDM/PCI doesn't free up slots when unplugging devices. */
+define VERR_PDM_TOO_PCI_MANY_DEVICES       (-2806)
+/** A queue is out of free items, the queueing operation failed. */
+define VERR_PDM_NO_QUEUE_ITEMS            (-2807)
+/** Not possible to attach further drivers to the driver.
+ * A driver which doesn't support attachments (below of course) will
+ * return this status code if it found that further drivers were configured
+ * to be attached to it. */
+define VERR_PDM_DRVINS_NO_ATTACH           (-2808)
+/** Not possible to attach drivers to the device.
+ * A device which doesn't support attachments (below of course) will
+ * return this status code if it found that drivers were configured
+ * to be attached to it. */
+define VERR_PDM_DEVINS_NO_ATTACH           (-2809)
+/** No attached driver.
+ * The PDMDRVHLP::pfnAttach and PDMDEVHLP::pfnDriverAttach will return
+ * this error when no driver was configured to be attached. */
+#define VERR_PDM_NO_ATTACHED_DRIVER  (-2810)
+/** The media geometry hasn't been set yet, so it cannot be obtained.
+ * The caller should then calculate the geometry from the media size. */
+#define VERR_PDM_GEOMETRY_NOT_SET    (-2811)
+/** The media translation hasn't been set yet, so it cannot be obtained.
+ * The caller should then guess the translation. */
+#define VERR_PDM_TRANSLATION_NOT_SET (-2812)
+/** The media is not mounted, operation requires a mounted media. */
+#define VERR_PDM_MEDIA_NOT_MOUNTED   (-2813)
+/** Mount failed because a media was already mounted. Unmount the media
+ * and retry the mount. */
+#define VERR_PDM_MEDIA_MOUNTED       (-2814)
+/** The media is locked and cannot be unmounted. */
+#define VERR_PDM_MEDIA_LOCKED        (-2815)
+/** No 'Type' attribute in the DrvBlock configuration.
+ * Misconfiguration. */
+#define VERR_PDM_BLOCK_NO_TYPE       (-2816)
+/** The 'Type' attribute in the DrvBlock configuration had an unknown value.
+ * Misconfiguration. */
+#define VERR_PDM_BLOCK_UNKNOWN_TYPE  (-2817)
+/** The 'Translation' attribute in the DrvBlock configuration had an unknown value.
+ * Misconfiguration. */
+#define VERR_PDM_BLOCK_UNKNOWN_TRANSLATION (-2818)
+/** The block driver type wasn't supported.
+ * Misconfiguration of the kind you get when attaching a floppy to an IDE controller. */
+#define VERR_PDM_UNSUPPORTED_BLOCK_TYPE (-2819)
+/** An attempt on detaching a driver without anyone actually being attached, or
+ * performing any other operation on an attached driver. */
+#define VERR_PDM_NO_DRIVER_ATTACHED  (-2820)
+/** The attached driver configuration is missing the 'Driver' attribute. */
+#define VERR_PDM_CFG_MISSING_DRIVER_NAME (-2821)
+/** The configured driver wasn't found.
+ * Either the necessary driver modules wasn't loaded, the name was
+ * misspelled, or it was a misconfiguration. */
+#define VERR_PDM_DRIVER_NOT_FOUND    (-2822)
+/** The Ring-3 module was already loaded. */
+#define VINF_PDM_ALREADY_LOADED      (2823)
+/** A module name is too long. */
+#define VERR_PDM_MODULE_NAME_TOO_LONG (-2824)
+/** The name of the module clashed with an existing module. */
+#define VERR_PDM_MODULE_NAME_CLASH   (-2825)
+/** Couldn't find any export for registration of drivers/devices. */
+#define VERR_PDM_NO_REGISTRATION_EXPORT (-2826)
+/** A module name is too long. */
+#define VERR_PDM_MODULE_NAME_TOO_LONG (-2827)
/* Driver name clash. Another driver with the same name as the */
/* one being registered exists. */
#define VERR_PDM_DRIVER_NAME_CLASH         (-2828)

/* The version of the driver registration structure is unknown */
/* to this VBox version. Either mixing incompatible versions or */
/* the structure isn’t correctly initialized. */
#define VERR_PDM_UNKNOWN_DRVREG_VERSION   (-2829)
#define VERR_PDM_INVALID_DRIVER_REGISTRATION   (-2830)
#define VERR_PDM_INVALID_DRIVER_HOST_BITS   (-2831)
#define VERR_PDM_DRIVER_DETACH_NOT_POSSIBLE (-2832)
#define VERR_PDM_NO_PCI_BUS                (-2833)
#define VERR_PDM_NOT_PCI_DEVICE            (-2834)

/* The version of the device registration structure is unknown */
/* to this VBox version. Either mixing incompatible versions or */
/* the structure isn’t correctly initialized. */
#define VERR_PDM_UNKNOWN_DEVREG_VERSION    (-2835)
#define VERR_PDM_INVALID_DEVICE_REGISTRATION  (-2836)
#define VERR_PDM_INVALID_DEVICE_GUEST_BITS  (-2837)
#define VERR_PDM_INVALID_DEVICE_HOST_BITS   (-2838)
#define VERR_PDMDEVICE_NAME_CLASH            (-2839)
#define VERR_PDM_DEVICE_NOT_FOUND           (-2840)
#define VERR_PDM_DEVICE_INSTANCE_NOT_FOUND  (-2841)
#define VERR_PDM_DEVICE_INSTANCE_NO_IBASE   (-2842)
#define VERR_PDM_DEVICE_INSTANCE_LUN_NOT_FOUND  (-2843)
#define VERR_PDM_DRIVER_INSTANCE_NOT_FOUND  (-2844)
#define VERR_PDM_LUN_NOT_FOUND              (-2845)
+/#define VERR_PDM_NO_DRIVER_ATTACHED_TO_LUN          (-2846)
+/** The Logical Unit was found, but it had no driver attached to it. */
+/#define VINF_PDM_NO_DRIVER_ATTACHED_TO_LUN          2846
+/** No PIC device instance is registered with the current VM and thus
+ * the PIC operation cannot be performed. */
+/#define VERR_PDM_NO_PIC_INSTANCE                    (-2847)
+/** No PIC device instance is registered with the current VM and thus
+ * the PIC operation cannot be performed. */
+/#define VERR_PDM_NO_APIC_INSTANCE                   (-2848)
+/** No PIC device instance is registered with the current VM and thus
+ * the PIC operation cannot be performed. */
+/#define VERR_PDM_NO_DMAC_INSTANCE                   (-2849)
+/** No PIC device instance is registered with the current VM and thus
+ * the PIC operation cannot be performed. */
+/#define VERR_PDM_NO_RTC_INSTANCE                    (-2850)
+/** Unable to open the host interface due to a sharing violation. */
+/#define VERR_PDM_HIF_SHARING_VIOLATION              (-2851)
+/** Unable to open the host interface. */
+/#define VERR_PDM_HIF_OPEN_FAILED                    (-2852)
+/** The device doesn't support runtime driver attaching.
+ * The PDMDEVREG::pfnAttach callback function is NULL. */
+/#define VERR_PDM_DEVICE_NO_RT_ATTACH                (-2853)
+/** The device doesn't support runtime driver attaching.
+ * The PDMDEVREG::pfnAttach callback function is NULL. */
+/#define VERR_PDM_DRIVER_NO_RT_ATTACH                (-2854)
+/** Invalid host interface version. */
+/#define VERR_PDM_HIF_INVALID_VERSION                (-2855)
+/** The version of the USB device registration structure is unknown
+ * to this VBox version. Either mixing incompatible versions or
+ * the structure isn't correctly initialized. */
+/#define VERR_PDM_UNKNOWN_USBREG_VERSION             (-2856)
+/** Invalid entry in the device registration structure. */
+/#define VERR_PDM_INVALID_USB_REGISTRATION           (-2857)
+/** Driver name clash. Another driver with the same name as the
+ * one being registered exists. */
+/#define VERR_PDM_USB_NAME_CLASH                     (-2858)
+/** The USB hub is already registered. */
+/#define VERR_PDM_USB_HUB_EXISTS                     (-2859)
+/** Couldn't find any USB hubs to attach the device to. */
+/#define VERR_PDM_NO_USB_HUBS                        (-2860)
+/** Couldn't find any free USB ports to attach the device to. */
+/#define VERR_PDM_NO_USB_PORTS                      (-2861)
+/** Couldn't find the USB Proxy device. Using OSE? */
+/#define VERR_PDM_NO_USBPROXY                       (-2862)
+/** The async completion template is still used. */
+/#define VERR_PDM_ASYNC_TEMPLATE_BUSY                (-2863)
+/** The async completion task is already suspended. */
+/** The async completion task is not suspended. */
+/** The driver properties were invalid, and as a consequence construction
+ * failed. Caused my unusable media or similar problems. */
+/** Too many instances of a device. */
+/** Too many instances of a driver. */
+/** Too many instances of a usb device. */
+/** The device instance structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The device helper structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The USB device instance structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The USB device helper structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The driver instance structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The driver helper structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** Invalid media or similar problems. */
+/** Too many instances of a device. */
+/** Too many instances of a driver. */
+/** Too many instances of a usb device. */
+/** The device instance structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The device helper structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The USB device instance structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The USB device helper structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The driver instance structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** The driver helper structure version has changed. */
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+/** Generic device structure version mismatch.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_DEVICE_VERSION_MISMATCH (-2876)
+/** Generic USB device structure version mismatch.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_USBDEV_VERSION_MISMATCH (-2877)
+/** Generic driver structure version mismatch.
+ *
+ * If you have upgraded VirtualBox recently, please make sure you have
+ * terminated all VMs and upgraded any extension packs. If this error
+ * persists, try re-installing VirtualBox. */
+#define VERR_PDM_DRIVER_VERSION_MISMATCH (-2878)
+/** PDMVMMDevHeapR3ToGCPPhys failure. */
+#define VERR_PDM_DEV_HEAP_R3_TO_GCPHYS (-2879)
+/** A legacy device isn't implementing the HPET notification interface. */
+#define VERR_PDM_HPET_LEGACY_NOTIFY_MISSING (-2880)
+/** Internal processing error in the critical section code. */
+#define VERR_PDM_PDM_CRITSECT_IPE (-2881)
+/** The critical section being deleted was not found. */
+#define VERR_PDM_PDM_CRITSECT_NOT_FOUND (-2882)
+/** A PDMThread API was called by the wrong thread. */
+#define VERR_PDM_THREAD_INVALID_CALLER (-2883)
+/** Internal processing error \#1 in the PDM Thread code. */
+#define VERR_PDM_THREAD_IPE_1 (-2884)
+/** Internal processing error \#2 in the PDM Thread code. */
+#define VERR_PDM_THREAD_IPE_2 (-2885)
+/** Only one PCI function is supported per PDM device. */
+#define VERR_PDM_PDM_CRITSECT_IPE (-2886)
+/** Bad PCI configuration. */
+#define VERR_PDM_BAD_PCI_CONFIG (-2887)
+/** Internal processing error \# in the PDM device code. */
+#define VERR_PDM_DEV_IPE_1 (-2888)
+/** Misconfigured driver chain transformation. */
+#define VERR_PDM_MISCONFIGURED_DRV_TRANSFORMATION (-2889)
+/** The driver is already removed, not more transformations possible (at
+ * present). */
+#define VERR_PDM_CANNOT_TRANSFORM_REMOVED_DRIVER (-2890)
+/** The PCI device isn't configured as a busmaster, physical memory access
+ * rejected. */
+#define VERR_PDM_PDM_CANT_TRANSFORM_REMOVED_DRIVER (-2891)
+/** Got into a part of PDM that is not used when HM (VT-x/AMD-V) is enabled. */
+#define VERR_PDM_HM_IPE (-2892)
/** The I/O request was canceled. */
#define VERR_PDM_MEDIAEX_IOREQ_CANCELED (-2893)
/** There is not enough room to store the data. */
#define VERR_PDM_MEDIAEX_IOBUF_OVERFLOW (-2894)
/** There is not enough data to satisfy the request. */
#define VERR_PDM_MEDIAEX_IOBUF_UNDERRUN (-2895)
/** The I/O request ID is already existing. */
#define VERR_PDM_MEDIAEX_IOREQID_CONFLICT (-2896)
/** The I/O request ID was not found. */
#define VERR_PDM_MEDIAEX_IOREQID_NOT_FOUND (-2897)
/** The I/O request is in progress. */
#define VINF_PDM_MEDIAEX_IOREQ_IN_PROGRESS 2898
/** The I/O request is in an invalid state for this operation. */
#define VERR_PDM_MEDIAEX_IOREQ_INVALID_STATE (-2899)
+/** @} */

/** @name Host-Guest Communication Manager (HGCM) Status Codes */
+ * @ {
+ *  
+/** Requested service does not exist. */
+define VERR_HGCM_SERVICE_NOT_FOUND (-2900)
+/** Service rejected client connection */
+define VINF_HGCM_CLIENT_REJECTED 2901
+/** Command address is invalid. */
+define VERR_HGCM_INVALID_CMD_ADDRESS (-2902)
+/** Service will execute the command in background. */
+define VINF_HGCM_ASYNC_EXECUTE 2903
+/** HGCM could not perform requested operation because of an internal error. */
+define VERR_HGCM_INTERNAL (-2904)
+/** Invalid HGCM client id. */
+define VERR_HGCM_INVALID_CLIENT_ID (-2905)
+/** The HGCM is saving state. */
+define VINF_HGCM_SAVE_STATE (2906)
+/** Requested service already exists. */
+define VERR_HGCM_SERVICE_EXISTS (-2907)
+/** @} */

/** @name Network Address Translation Driver (DrvNAT) Status Codes */
+ * @ {
+/** Failed to find the DNS configured for this machine. */
+define VINF_NAT_DNS 3000
+/** Failed to convert the specified Guest IP to a binary IP address. */
+Malformed input. */
+define VERR_NAT_REDIR_GUEST_IP (-3001)
/** Failed while setting up a redirector rule. *
+ * There probably is a conflict between the rule and some existing *
+ * service on the computer. */
+#define VERR_NAT_REDIR_SETUP (-3002)
/** @} */

/** @name HostIF Driver (DrvTUN) Status Codes *
+ * @{
+ */
+/** The Host Interface Networking init program failed. */
+#define VERR_HOSTIF_INIT_FAILED (-3100)
+/** The Host Interface Networking device name is too long. */
+#define VERR_HOSTIF_DEVICE_NAME_TOO_LONG (-3101)
+/** The Host Interface Networking name config IOCTL call failed. */
+#define VERR_HOSTIF_IOCTL (-3102)
+/** Failed to make the Host Interface Networking handle non-blocking. */
+#define VERR_HOSTIF_BLOCKING (-3103)
+/** If a Host Interface Networking filehandle was specified it's not allowed to *
+ * have any init or term programs. */
+#define VERR_HOSTIF_FD_AND_INIT_TERM (-3104)
+/** The Host Interface Networking terminate program failed. */
+#define VERR_HOSTIF_TERM_FAILED (-3105)
+/** @} */

/** @name VBox HDD Container (VD) Status Codes *
+ * @{
+ */
+/** Invalid image type. */
+#define VERR_VD_INVALID_TYPE (-3200)
+/** Operation can't be done in current HDD container state. */
+#define VERR_VD_INVALID_STATE (-3201)
+/** Configuration value not found. */
+#define VERR_VD_VALUE_NOT_FOUND (-3202)
+/** Virtual HDD is not opened. */
+#define VERR_VD_NOT_OPENED (-3203)
+/** Requested image is not opened. */
+#define VERR_VD_IMAGE_NOT_FOUND (-3204)
+/** Image is read-only. */
+#define VERR_VD_IMAGE_READ_ONLY (-3205)
+/** Geometry hasn't been set. */
+#define VERR_VD_GEOMETRY_NOT_SET (-3206)
+/** No data for this block in image. */
+#define VERR_VD_BLOCK_FREE (-3207)
+/** Differencing and parent images can't be used together due to UUID. */
+#define VERR_VD_UUID_MISMATCH (-3208)
+/** Asynchronous I/O request finished. */
+*/ ** Asynchronous I/O is not finished yet. */
+*/ ** The image is too small or too large for this format. */
+*/ ** Configuration value is unknown. This indicates misconfiguration. */
+*/ ** Interface is unknown. This indicates misconfiguration. */
+*/ ** The DEK for disk encryption is missing. */
+*/ ** The provided password to decrypt the DEK was incorrect. */
+*/ ** Generic: Invalid image file header. Use this for plugins. */
+*/ ** VDI: Invalid image file header. */
+*/ ** VDI: Invalid image file header: invalid signature. */
+*/ ** VDI: Invalid image file header: invalid version. */
+*/ ** Comment string is too long. */
+*/ ** VMDK: Invalid image file header. */
+*/ ** VMDK: Invalid image file header: invalid signature. */
+*/ ** VMDK: Invalid image file header: invalid version. */
+*/ ** VMDK: Image property not found. */
+*/ ** VMDK: Operation can't be done in current image state. */
+*/ ** VMDK: Format is invalid/inconsistent. */
+*/ ** VMDK: Invalid write position. */
+*/ ** iSCSI: Invalid header, i.e. dummy for validity check. */
+*/ ** iSCSI: Operation can't be done in current image state. */
+*/ ** iSCSI: Invalid device type (not a disk). */
+*/ ** iSCSI: Initiator secret not decrypted */
+*/ ** VHD: Invalid image file header. */
+*/ ** Parallels HDD: Invalid image file header. */
+*/ ** DMG: Invalid image file header. */
+/** Raw: Invalid image file header. */
+#define VERR_VD_RAW_INVALID_HEADER (-3270)
+/** Raw: Invalid image file type. */
+#define VERR_VD_RAW_INVALID_TYPE (-3271)
+/** The backend needs more metadata before it can continue. */
+#define VERR_VD_NOT_ENOUGH_METADATA (-3272)
+/** The disk has a cache attached already. */
+#define VERR_VD_CACHE_ALREADY_EXISTS (-3274)
+/** There is no cache attached to the disk. */
+#define VERR_VD_CACHE_NOT_FOUND (-3275)
+/** The cache is not up to date with the image. */
+#define VERR_VD_CACHE_NOT_UP_TO_DATE (-3276)
+/** The given range does not meet the required alignment. */
+#define VERR_VD_DISCARD_ALIGNMENT_NOT_MET (-3277)
+/** The discard operation is not supported for this image. */
+#define VERR_VD_DISCARD_NOT_SUPPORTED (-3278)
+/** The image is the correct format but is corrupted. */
+#define VERR_VD_IMAGE_CORRUPTED (-3279)
+/** Repairing the image is not supported. */
+#define VERR_VD_IMAGE_REPAIR_NOT_SUPPORTED (-3280)
+/** Repairing the image is not possible because the corruption is too severe. */
+#define VERR_VD_IMAGE_REPAIR_IMPOSSIBLE (-3281)
+/** Reading from the image was not possible because the offset is out of the image range. */
+ /* This usually indicates that there is a minor corruption in the image meta data. */
+#define VERR_VD_READ_OUT_OF_RANGE (-3282)
+/** Block read was marked as free in the image and returned as a zero block. */
+#define VINF_VD_NEW_ZEROED_BLOCK 3283
+/** Unable to parse the XML in DMG file. */
+#define VERR_VD_DMG_XMLPARSE_ERROR (-3284)
+/** Unable to locate a usable DMG file within the XAR archive. */
+#define VERR_VD_DMG_NOT_FOUND_INSIDE_XAR (-3285)
+/** The size of the raw image is not dividable by 512 */
+#define VERR_VD_RAW_SIZE_MODULO_512 (-3286)
+/** The size of the raw image is not dividable by 2048 */
+#define VERR_VD_RAW_SIZE_MODULO_2048 (-3287)
+/** The size of the raw optical image is too small (<= 32K) */
+#define VERR_VD_RAW_SIZE_OPTICAL_TOO_SMALL (-3288)
+/** The size of the raw floppy image is too big (>2.88MB) */
+#define VERR_VD_RAW_SIZE_FLOPPY_TOO_BIG (-3289)
+ * @} */
+ /** Library was not initialized. */
+ #define VERR_VBGL_NOT_INITIALIZED (-3300)
+ /** Virtual address was not allocated by the library. */
+ #define VERR_VBGL_INVALID_ADDR (-3301)
+ /** IOCtl to VBoxGuest driver failed. */
+ #define VERR_VBGL_IOCTL_FAILED (-3302)
+ @} */
+
+ /** @} */
+
+ /** VBox USB (VUSB) Status Codes */
+ + * {
+ + */
+ + /** No available ports on the hub.
+ + * This error is returned when a device is attempted created and/or attached
+ + * to a hub which is out of ports. */
+ + #define VERR_VUSB_NO_PORTS (-3400)
+ + /** The requested operation cannot be performed on a detached USB device. */
+ + #define VERR_VUSB_DEVICE_NOT_ATTACHED (-3401)
+ + /** Failed to allocate memory for a URB. */
+ + #define VERR_VUSB_NO_URB_MEMORY (-3402)
+ + /** General failure during URB queuing.
+ + * This will go away when the queueing gets proper status code handling. */
+ + #define VERR_VUSB_FAILED_TO_QUEUE_URB (-3403)
+ + /** Device creation failed because the USB device name was not found. */
+ + #define VERR_VUSB_DEVICE_NAME_NOT_FOUND (-3404)
+ + /** Not permitted to open the USB device.
+ + * The user doesn't have access to the device in the usbfs, check the mount options. */
+ + #define VERR_VUSB_USBFS_PERMISSION (-3405)
+ + /** The requested operation cannot be performed because the device
+ + * is currently being reset. */
+ + #define VERR_VUSB_DEVICE_IS_RESETTING (-3406)
+ + /** The requested operation cannot be performed because the device
+ + * is currently suspended. */
+ + #define VERR_VUSB_DEVICE_IS_SUSPENDED (-3407)
+ + /** Not permitted to open the USB device.
+ + * The user doesn't have access to the device node, check group memberships. */
+ + #define VERR_VUSB_USB_DEVICE_PERMISSION (-3408)
+ + @} */
+
+ /** @} */
+
+ /** VBox VGA Status Codes */
+ + * {
+ + */
+ + /** One of the custom modes was incorrect.
+ + * The format or bit count of the custom mode value is invalid. */
+ + #define VERR_VGA_INVALID_CUSTOM_MODE (-3500)
+ + /** The display connector is resizing. */
+#define VINF_VGA_RESIZE_IN_PROGRESS (3501)
+/** Unexpected PCI region change during VGA saved state loading. */
+#define VERR_VGA_UNEXPECTED_PCI_REGION_LOAD_CHANGE (-3502)
+/** @} */
+
+/** The networking interface to filter was not found. */
+#define VERR_INTNET_FLT_IF_NOT_FOUND (-3600)
+/** The networking interface to filter was busy (used by someone). */
+#define VERR_INTNET_FLT_IF_BUSY (-3601)
+/** Failed to create or connect to a networking interface filter. */
+#define VERR_INTNET_FLT_IF_FAILED (-3602)
+/** The network already exists with a different trunk configuration. */
+#define VERR_INTNET_INCOMPATIBLE_TRUNK (-3603)
+/** The network already exists with a different security profile (restricted / public). */
+#define VERR_INTNET_INCOMPATIBLE_FLAGS (-3604)
+/** Failed to create a virtual network interface instance. */
+#define VERR_INTNET_FLT_VNIC_CREATE_FAILED (-3605)
+/** Failed to retrieve a virtual network interface link ID. */
+#define VERR_INTNET_FLT_VNIC_LINK_ID_NOT_FOUND (-3606)
+/** Failed to initialize a virtual network interface instance. */
+#define VERR_INTNET_FLT_VNIC_INIT_FAILED (-3607)
+/** Failed to open a virtual network interface instance. */
+#define VERR_INTNET_FLT_VNIC_OPEN_FAILED (-3608)
+/** Failed to retrieve underlying (lower mac) link. */
+#define VERR_INTNET_FLT_LOWER_LINK_INFO_NOT_FOUND (-3609)
+/** Failed to open underlying link instance. */
+#define VERR_INTNET_FLT_LOWER_LINK_OPEN_FAILED (-3610)
+/** Failed to get underlying link ID. */
+#define VERR_INTNET_FLT_LOWER_LINK_ID_NOT_FOUND (-3611)
+/** @} */
+
+/** The component factory was not found. */
+#define VERR_SUPDRV_COMPONENT_NOT_FOUND (-3700)
+/** The component factories do not support the requested interface. */
+#define VERR_SUPDRV_INTERFACE_NOT_SUPPORTED (-3701)
+/** The service module was not found. */
+#define VERR_SUPDRV_SERVICE_NOT_FOUND (-3702)
+/** The host kernel is too old. */
+#define VERR_SUPDRV_KERNEL_TOO_OLD_FOR_VTX (-3703)
+/** Bad VTG magic value. */
+#define VERR_SUPDRV_VTG_MAGIC (-3704)
+/** Bad VTG bit count value. */
+#define VERR_SUPDRV_VTG_BITS (-3705)
+/** Bad VTG header - misc. */
+#define VERR_SUPDRV_VTG_BAD_HDR_MISC (-3706)
+/** Bad VTG header - offset. */
+#define VERR_SUPDRV_VTG_BAD_HDR_OFF (-3707)
+/** Bad VTG header - offset. */
+#define VERR_SUPDRV_VTG_BAD_HDR_PTR (-3708)
+/** Bad VTG header - size value is not a multiple of the structure size. */
+#define VERR_SUPDRV_VTG_BAD_HDR_NOT_MULTIPLE (-3711)
+/** Bad VTG string table offset. */
+#define VERR_SUPDRV_VTG_STRTAB_OFF (-3712)
+/** Bad VTG string. */
+#define VERR_SUPDRV_VTG_BAD_STRING (-3713)
+/** VTG string is too long. */
+#define VERR_SUPDRV_VTG_STRING_TOO_LONG (-3714)
+/** Bad VTG attribute value. */
+#define VERR_SUPDRV_VTG_BAD_ATTR (-3715)
+/** Bad VTG provider descriptor. */
+#define VERR_SUPDRV_VTG_BAD_PROVIDER (-3716)
+/** Bad VTG probe descriptor. */
+#define VERR_SUPDRV_VTG_BAD_PROBE (-3717)
+/** Bad VTG argument list descriptor. */
+#define VERR_SUPDRV_VTG_BAD_ARGLIST (-3718)
+/** Bad VTG probe enabled data. */
+#define VERR_SUPDRV_VTG_BAD_PROBE_ENABLED (-3719)
+/** Bad VTG probe location record. */
+#define VERR_SUPDRV_VTG_BAD_PROBE_LOC (-3720)
+/** The VTG object for the session or image has already been registered. */
+#define VERR_SUPDRV_VTG_ALREADY_REGISTERED (-3721)
+/** A driver may only register one VTG object per session. */
+#define VERR_SUPDRV_VTG_ONLY_ONCE_PER_SESSION (-3722)
+/** A tracer has already been registered. */
+#define VERR_SUPDRV_TRACER_ALREADY_REGISTERED (-3723)
+/** The session has no tracer associated with it. */
+#define VERR_SUPDRV_TRACER_NOT_REGISTERED (-3724)
+/** The tracer has already been opened in this session. */
+#define VERR_SUPDRV_TRACER_ALREADY_OPENED (-3725)
+/** The tracer has not been opened. */
+#define VERR_SUPDRV_TRACER_NOT_OPENED (-3726)
+/** There is no tracer present. */
+#define VERR_SUPDRV_TRACER_NOT_PRESENT (-3727)
+/** The tracer is unloading. */
+define VERR_SUPDRV_TRACER_UNLOADING (-3728)
+/** Another thread in the session is talking to the tracer. */
+define VERR_SUPDRV_TRACER_SESSION_BUSY (-3729)
+/** The tracer cannot open it self in the same session. */
+define VERR_SUPDRV_TRACER_CANNOT_OPEN_SELF (-3730)
+/** Bad argument flags. */
+define VERR_SUPDRV_TRACER_BAD_ARG_FLAGS (-3731)
+/** The session has reached the max number of (user mode) providers. */
+define VERR_SUPDRV_TRACER_TOO_MANY_PROVIDERS (-3732)
+/** The tracepoint provider object is too large. */
+define VERR_SUPDRV_TRACER_TOO_LARGE (-3733)
+/** The probe location array isn't adjacent to the probe enable array. */
+define VERR_SUPDRV_TRACER_UMOD_NOT_ADJACENT (-3734)
+/** The user mode tracepoint provider has too many probe locations and
+ * probes. */
+define VERR_SUPDRV_TRACER_UMOD_TOO_MANY_PROBES (-3735)
+/** The user mode tracepoint provider string table is too large. */
+define VERR_SUPDRV_TRACER_UMOD_STRTAB_TOO_BIG (-3736)
+/** The user mode tracepoint provider string table offset is bad. */
+define VERR_SUPDRV_TRACER_UMOD_STRTAB_OFF_BAD (-3737)
+/** The VM process was denied access to vboxdrv because someone have managed to
+ * open the process or its main thread with too broad access rights. */
+define VERR_SUPDRV_HARDENING_EVIL_HANDLE (-3738)
+/** Error opening the ApiPort LPC object. */
+define VERR_SUPDRV_APIPORT_OPEN_ERROR (-3739)
+/** Error enumerating all processes in the session. */
+define VERR_SUPDRV_SESSION_PROCESS_ENUM_ERROR (-3740)
+/** The CSRSS instance associated with the client process could not be
+ * located. */
+define VERR_SUPDRV_CSRSS_NOT_FOUND (-3741)
+/** Type error opening the ApiPort LPC object. */
+define VERR_SUPDRV_APIPORT_OPEN_ERROR_TYPE (-3742)
+/** Failed to measure the TSC delta between two CPUs. */
+define VERR_SUPDRV_TSC_DELTA_MEASUREMENT_FAILED (-3743)
+/** Failed to calculate the TSC frequency. */
+define VERR_SUPDRV_TSC_FREQ_MEASUREMENT_FAILED (-3744)
+/** Failed to get the delta-adjusted TSC value. */
+define VERR_SUPDRV_TSC_READ_FAILED (-3745)
+/** Failed to measure the TSC delta between two CPUs, continue without any
+ * TSC-delta. */
+define VWRN_SUPDRV_TSC_DELTA_MEASUREMENT_FAILED 3746
+/** A TSC-delta measurement request is currently being serviced. */
+define VERR_SUPDRV_TSC_DELTA_MEASUREMENT_BUSY (-3747)
+/** The process trying to open VBoxDrv is not a budding VM process (1). */
+define VERR_SUPDRV_NOT_BUDDING_VM_PROCESS_1 (-3748)
+/** The process trying to open VBoxDrv is not a budding VM process (2). */
+define VERR_SUPDRV_NOT_BUDDING_VM_PROCESS_2 (-3749)
+
+/** Raw-mode is unavailable courtesy of Hyper-V. */
+enum define VERR_SUPDRV_NO_RAW_MODE_HYPER_V_ROOT (-7000)
+/** @} */
+
+/** @} Support Library Status Codes
+
+*/
+/** The specified path was not absolute (hardening). */
+###define VERR_SUPLIB_PATH_NOT_ABSOLUTE (-3750)
+/** The specified path was not clean (hardening). */
+###define VERR_SUPLIB_PATH_NOT_CLEAN (-3751)
+/** The specified path is too long (hardening). */
+###define VERR_SUPLIB_PATH_TOO_LONG (-3752)
+/** The specified path is too short (hardening). */
+###define VERR_SUPLIB_PATH_TOO_SHORT (-3753)
+/** The specified path has too many components (hardening). */
+###define VERR_SUPLIB_PATH_TOO_MANY_COMPONENTS (-3754)
+/** The specified path is a root path (hardening). */
+###define VERR_SUPLIB_PATH_IS_ROOT (-3755)
+/** Failed to enumerate directory (hardening). */
+###define VERR_SUPLIB_DIR_ENUM_FAILED (-3756)
+/** Failed to stat a file/dir during enumeration (hardening). */
+###define VERR_SUPLIB_STAT_ENUM_FAILED (-3757)
+/** Failed to stat a file/dir (hardening). */
+###define VERR_SUPLIB_STAT_FAILED (-3758)
+/** Failed to fstat a native handle (hardening). */
+###define VERR_SUPLIB_FSTAT_FAILED (-3759)
+/** Found an illegal symbolic link (hardening). */
+###define VERR_SUPLIB_SYMLINKS_ARE_NOT_PERMITTED (-3760)
+/** Found something which isn't a file nor a directory (hardening). */
+###define VERR_SUPLIB_NOT_DIR_NOT_FILE (-3761)
+/** The specified path is a directory and not a file (hardening). */
+###define VERR_SUPLIB_IS_DIRECTORY (-3762)
+/** The specified path is a file and not a directory (hardening). */
+###define VERR_SUPLIB_IS_FILE (-3763)
+/** The path is not the same object as the native handle (hardening). */
+###define VERR_SUPLIB_NOT_SAME_OBJECT (-3764)
+/** The owner is not root (hardening). */
+###define VERR_SUPLIB_OWNER_NOT_ROOT (-3765)
+/** The group is a non-system group and it has write access (hardening). */
+###define VERR_SUPLIB_WRITE_NON_SYS_GROUP (-3766)
+/** The file or directory is world writable (hardening). */
+###define VERR_SUPLIB_WORLD_WRITABLE (-3767)
+/** The argv[0] of an internal application does not match the executable image path (hardening). */
+###define VERR_SUPLIB_INVALID_ARGV0_INTERNAL (-3768)
+/** The internal application does not reside in the correct place (hardening). */
+/** Unable to establish trusted of VM process (0). */
+/** Unable to establish trusted of VM process (1). */
+/** Unable to establish trusted of VM process (2). */
+/** Unable to establish trusted of VM process (3). */
+/** Unable to establish trusted of VM process (4). */
+/** Unable to establish trusted of VM process (5). */
+/** Unable to make text memory writeable (hardening). */
+/** Unable to seal text memory again to protect against write access (hardening). */
+/** Unexpected instruction encountered for which there is no patch strategy
+ * implemented (hardening). */
+/** The GMM is out of pages and needs to be give another chunk of user memory that
+ * it can lock down and borrow pages from. */
+/** Unable to allocate more pages from the host system. */
+/** Hit the global allocation limit.
+ * If you know there is still sufficient memory available, try raising the limit. */
+/** Hit the a VM account limit. */
+/** Attempt to free more memory than what was previously allocated. */
+/** Attempted to report too many pages as deflated. */
+/** The page to be freed or updated was not found. */
+/** The specified shared page was not actually private. */
+/** The specified shared page was not actually shared. */
+/** The page to be freed was already freed. */
+/** The GMM Status Codes
+ * @}
+*/

+/** @} */

+/** VBox GMM Status Codes
+ * @}
+*/

+/** VBox GMM Status Codes
+ * @}
+*/

+/** VBox GMM Status Codes
+ * @}
+*/

+/** VBox GMM Status Codes
+ * @}
+*/
#define VERR_GMM_NOT_PAGE_OWNER  (-3810)

#define VERR_GMM_CHUNK_NOT_FOUND  (-3811)

#define VERR_GMM_CHUNK_ALREADY_MAPPED  (-3812)

#define VERR_GMM_CHUNK_NOT_MAPPED  (-3813)

#define VERR_GMM_TOO_MANY_CHUNK_MAPPINGS  (-3814)

#define VERR_GMM_MEMORY_RESOLUTION_DECLINED  (-3815)

#define VERR_GMM_IS_NOT_SANE  (-3816)

#define VERR_GMM_CHUNK_INSERT  (-3817)

#define VERR_GMM_INSTANCE  (-3818)

#define VERR_GMM_MTX_FLAGS  (-3819)

#define VERR_GMM_ALLOC_PAGES_IPE  (-3820)

#define VERR_GMM_ACTUAL_PAGES_IPE  (-3821)

#define VERR_GMM_MODULE_NAME_TOO_LONG  (-3822)

#define VERR_GMM_MODULE_VERSION_TOO_LONG  (-3823)

#define VERR_GMM_TOO_MANY_REGIONS  (-3824)

#define VERR_GMM_TOO_MANY_PER_VM_MODULES  (-3825)

#define VERR_GMM_TOO_MANY_GLOBAL_MODULES  (-3826)

#define VINF_GMM_SHARED_MODULE_ALREADY_REGISTERED  (3827)

#define VERR_GMM_SHARED_MODULE_ADDRESS_CLASH  (-3828)

#define VERR_GMM_SHARED_MODULE_NOT_FOUND  (-3829)

#define VERR_GMM_BAD_SHARED_MODULE_SIZE  (-3830)

#define VERR_GMM_SHARED_MODULE_BAD_REGIONS_SIZE  (-3831)

/** @} */
/** @name VBox GVM Status Codes * @ */

/** The GVM is out of VM handle space. */
#define VERR_GVM_TOO_MANY_VMS (-3900)

/** The EMT was not blocked at the time of the call. */
#define VINF_GVM_NOT_BLOCKED 3901

/** The EMT was not busy running guest code at the time of the call. */
#define VINF_GVM_NOT_BUSY_IN_GC 3902

/** RTThreadYield was called during a GVMMR0SchedPoll call. */
#define VINF_GVM_YIELDED 3903

/** @} */

/** @name VBox VMX Status Codes * @ */

/** VMXON failed; possibly because it was already run before. */
#define VERR_VMX_VMXON_FAILED (-4000)

/** Invalid VMCS pointer. */
#define VERR_VMX_INVALID_VMCS_PTR (-4001)

/** Invalid VMCS index or write to read-only element. */
#define VERR_VMX_INVALID_VMCS_FIELD (-4002)

/** Reserved for future status code that we wish to OR with VERR_VMX_INVALID_VMCS_PTR and VERR_VMX_INVALID_VMCS_FIELD. */
#define VERR_VMX_RESERVED (-4003)

/** Invalid VMXON pointer. */
#define VERR_VMX_INVALID_VMXON_PTR (-4004)

/** Unable to start VM execution. */
#define VERR_VMX_UNABLE_TO_START_VM (-4005)

/** Unable to switch due to invalid host state. */
#define VERR_VMX_INVALID_HOST_STATE (-4006)

/** IA32_FEATURE_CONTROL MSR not setup correctly (turn on VMX in the host system BIOS) */
#define VERR_VMX_ILLEGAL_FEATURE_CONTROL_MSR (-4007)

/** Invalid CPU mode for VMX execution. */
#define VERR_VMX_UNSUPPORTED_MODE (-4008)

/** VMX CPU extension not available */
#define VERR_VMX_NO_VMX (-4009)

/** CPU was incorrectly left in VMX root mode; incompatible with VirtualBox */
#define VERR_VMX_IN_VMX_ROOT_MODE (-4011)

/** Somebody cleared X86_CR4_VMXE in the CR4 register. */
#define VERR_VMX_X86_CR4_VMXE_CLEARED (-4012)

/** Failed to enable and lock VT-x features. */
#define VERR_VMX_MSR_LOCKING_FAILED (-4013)

/** Unable to switch due to invalid guest state. */
+define VERR_VMX_INVALID_GUEST_STATE                (-4014)  /**< Unexpected VM exit. */
+define VERR_VMX_UNEXPECTED_EXIT                    (-4015)  /**< Unexpected VM exception. */
+define VERR_VMX_UNEXPECTED_EXCEPTION               (-4016)  /**< Unexpected interruption exit type. */
+define VERR_VMX_UNEXPECTED_INTERRUPTION_EXIT_TYPE  (-4017)  /**< CPU is not in VMX root mode; unexpected when leaving VMX root mode. */
+define VERR_VMX_NOT_IN_VMX_ROOT_MODE               (-4018)  /**< Undefined VM exit code. */
+define VERR_VMX_VMPTRLD_FAILED                     (-4021)  /**< VMPTRLD failed; possibly because of invalid VMCS launch-state. */
+define VERR_VMX_INVALID_VMCS_PTR_TO_START_VM       (-4022)  /**< Internal VMX processing error no 1. */
+define VERR_VMX_IPE_1                             (-4023)  /**< Internal VMX processing error no 2. */
+define VERR_VMX_IPE_2                             (-4024)  /**< Internal VMX processing error no 3. */
+define VERR_VMX_IPE_3                             (-4025)  /**< Internal VMX processing error no 4. */
+define VERR_VMX_IPE_4                             (-4026)  /**< Internal VMX processing error no 5. */
+define VERR_VMX_IPE_5                             (-4027)  /**< VT-x features for all modes (SMX and non-SMX) disabled by the BIOS. */
+define VERR_VMX_MSР_ALL_VMX_DISABLED               (-4028)  /**< VT-x features disabled by the BIOS. */
+define VERR_VMX_MSР_VMX_DISABLED                   (-4029)  /**< VM-Entry Controls internal cache invalid. */
+define VERR_VMX_ENTRY_CTLS_CACHE_INVALID          (-4030)  /**< VM-Exit Controls internal cache invalid. */
+define VERR_VMX_EXIT_CTLS_CACHE_INVALID            (-4031)  /**< VM-Execution Pin-based Controls internal cache invalid. */
+define VERR_VMX_PIN_EXEC_CTLS_CACHE_INVALID        (-4032)  /**< VM-Execution Primary Processor-based Controls internal cache */
+define VERR_VMX_PROC_EXEC_CTLS_CACHE_INVALID       (-4033)  /**< VM-Execution Secondary Processor-based Controls internal */
+define VERR_VMX_PROC_EXEC2_CTLS_CACHE_INVALID      (-4034)  /**< Failed to set VMXON enable bit while enabling VT-x through the MSR. */
+define VERR_VMX_MSР_VMX_ENABLE_FAILED              (-4035)  /**< Failed to enable VMXON-in-SMX bit while enabling VT-x through the MSR. */
+define VERR_VMX_MSР_SMX_VMX_ENABLE_FAILED          (-4036)  /**< @} */
+ + +
/** @name VBox SVM Status Codes */
+/** Unable to start VM execution. */
+\#define VERR_SVM_UNABLE_TO_START_VM (-4050)
+/** AMD-V bit not set in K6_EFER MSR */
+\#define VERR_SVM_ILLEGAL_EFER_MSR (-4051)
+/** AMD-V CPU extension not available. */
+\#define VERR_SVM_NO_SVM (-4052)
+/** AMD-V CPU extension disabled (by BIOS). */
+\#define VERR_SVM_DISABLED (-4053)
+/** AMD-V CPU extension in-use. */
+\#define VERR_SVM_IN_USE (-4054)
+/** Invalid pVMCB. */
+\#define VERR_SVM_INVALID_PVMCB (-4055)
+/** Unexpected SVM exit. */
+\#define VERR_SVM_UNEXPECTED_EXIT (-4056)
+/** Unexpected SVM exception exit. */
+\#define VERR_SVM_UNEXPECTED_XCPT_EXIT (-4057)
+/** Unexpected SVM patch type. */
+\#define VERR_SVM_UNEXPECTED_PATCH_TYPE (-4058)
+/** Unable to start VM execution due to an invalid guest state. */
+\#define VERR_SVM_INVALID_GUEST_STATE (-4059)
+/** Unknown or unrecognized SVM exit. */
+\#define VERR_SVM_UNKNOWN_EXIT (-4060)
+/** Internal SVM processing error no 1. */
+\#define VERR_SVM_IPE_1 (-4061)
+/** Internal SVM processing error no 2. */
+\#define VERR_SVM_IPE_2 (-4062)
+/** Internal SVM processing error no 3. */
+\#define VERR_SVM_IPE_3 (-4063)
+/** Internal SVM processing error no 4. */
+\#define VERR_SVM_IPE_4 (-4064)
+/** Internal SVM processing error no 5. */
+\#define VERR_SVM_IPE_5 (-4065)
+/** The nested-guest \#VMEXIT processing failed, initiate shutdown. */
+\#define VERR_SVM_VMEXIT_FAILED (-4066)
+/** An operation caused a nested-guest SVM \#VMEXIT. */
+\#define VINF_SVM_VMEXIT 4067
+/** VMRUN emulation succeeded, ready to immediately enter the nested-guest. */
+\#define VINF_SVM_VMRUN 4068
+/** @} */
+
+/** @name VBox HM Status Codes */
+/** Unable to start VM execution. */
+/** No CPUID support. */
+/** Host is about to go into suspend mode. */
+/** Conflicting CFGM values. */
+/** Internal processing error in the HM init code. */
+/** Unexpected MSR in the auto-load/store area. */
+/** No 32-bit to 64-bit switcher in place. */
+/** HM0Leave was called on the wrong CPU. */
+/** Internal processing error \#1 in the HM code. */
+/** Internal processing error \#2 in the HM code. */
+/** Wrong 32/64-bit switcher. */
+/** Unknown I/O instruction. */
+/** Unsupported CPU feature combination. */
+/** Internal processing error \#3 in the HM code. */
+/** Internal processing error \#4 in the HM code. */
+/** Internal processing error \#5 in the HM code. */
+/** Invalid HM64ON32OP value. */
+/** Resume guest execution after injecting a double-fault. */
+/** The requested nested-guest VM-exit intercept is not active or not in */
+/** nested-guest execution mode. */
+/** @ } */ */
+/** @name VBox Disassembler Status Codes */
+/** Invalid opcode byte(s) */
+/** Generic failure during disassembly. */
+/** @ }
+/** No read callback. */
+/** Invalid Mod/RM. */
+/** Invalid parameter index. */
+/** The instruction is too long. */
+/** @} */
+
+/** @} */

+/** VBox Webservice Status Codes */
+ /** @} */
+/** Authentication failed (ISessionManager::logon()) */
+/** Invalid format of managed object reference */
+/** Invalid session ID in managed object reference */
+/** Invalid object ID in managed object reference */
+/** Unsupported interface for managed object reference */
+/** @} */
+
+/** @} */

+/** VBox PARAV Status Codes */
+ /** @} */
+/** Switch back to host */
+/** command processing is pending, a completion handler will be called */
+/** @} */
+
+/** @} */

+/** VBox Video HW Acceleration command status */
+ /** @} */
+/** these for conversion that is lossless with respect to important COM */
status codes. These methods should be moved to the glue library.

+ * @
+ * \ '{@  */
+ */** Unexpected turn of events. */
+ */
+#define VERR_COM_UNEXPECTED (-4600)
+ */** The base of the VirtualBox COM status codes (the lower value)
+ * corresponding 1:1 to VBOX_E_XXX. This is the lowest value. */
+ */
+#define VERR_COM_VBOX_LOWEST (-4699)
+ */** Object corresponding to the supplied arguments does not exist. */
+ */
+#define VERR_COM_OBJECT_NOT_FOUND (VERR_COM_VBOX_LOWEST + 1)
+ */** Current virtual machine state prevents the operation. */
+ */
+#define VERR_COM_INVALID_VM_STATE (VERR_COM_VBOX_LOWEST + 2)
+ */** Virtual machine error occurred attempting the operation. */
+ */
+#define VERR_COM_VM_ERROR (VERR_COM_VBOX_LOWEST + 3)
+ */** File not accessible or erroneous file contents. */
+ */
+#define VERR_COM_FILE_ERROR (VERR_COM_VBOX_LOWEST + 4)
+ */** IPRT error. */
+ */
+#define VERR_COM_IPRT_ERROR (VERR_COM_VBOX_LOWEST + 5)
+ */** Pluggable Device Manager error. */
+ */
+#define VERR_COM_PDM_ERROR (VERR_COM_VBOX_LOWEST + 6)
+ */** Current object state prohibits operation. */
+ */
+#define VERR_COM_INVALID_OBJECT_STATE (VERR_COM_VBOX_LOWEST + 7)
+ */** Host operating system related error. */
+ */
+#define VERR_COM_HOST_ERROR (VERR_COM_VBOX_LOWEST + 8)
+ */** Requested operation is not supported. */
+ */
+#define VERR_COM_NOT_SUPPORTED (VERR_COM_VBOX_LOWEST + 9)
+ */** Invalid XML found. */
+ */
+#define VERR_COM_XML_ERROR (VERR_COM_VBOX_LOWEST + 10)
+ */** Current session state prohibits operation. */
+ */
+#define VERR_COM_INVALID_SESSION_STATE (VERR_COM_VBOX_LOWEST + 11)
+ */** Object being in use prohibits operation. */
+ */
+#define VERR_COM_OBJECT_IN_USE (VERR_COM_VBOX_LOWEST + 12)
+ */** Returned by callback methods which does not need to be called
+ * again because the client does not actually make use of them. */
+ */
+#define VERR_COM_DONT_CALL_AGAIN (VERR_COM_VBOX_LOWEST + 13)
+ */
+ */
+ */** @name VBox VMMDev Status codes
+ * @
+ */
+ */** CPU hotplug events from VMMDev are not monitored by the guest. */
+ */
+#define VERR_VMMDEV_CPU_HOTPLUG_NOT_MONITORED_BY_GUEST (-4700)
+ */
+ */
+ */** @name VBox async I/O manager Status Codes
+ * @
+ */
+ */** Async I/O task is pending, a completion handler will be called. */
+ */
+#define VINF_AIO_TASK_PENDING 4800
+/** @} */
+
+/** @name VBox Virtual SCSI Status Codes
+ */
+/** LUN type is not supported. */
+#define VERR_VSCSI_LUN_TYPE_NOT_SUPPORTED           (-4900)
+/** LUN is already/still attached to a device. */
+#define VERR_VSCSI_LUN_ATTACHED_TO_DEVICE           (-4901)
+/** The specified LUN is invalid. */
+#define VERR_VSCSI_LUN_INVALID                      (-4902)
+/** The LUN is not attached to the device. */
+#define VERR_VSCSI_LUN_NOT_ATTACHED                 (-4903)
+/** The LUN is still busy. */
+#define VERR_VSCSI_LUN_BUSY                         (-4904)
+/** @} */
+
+/** @name VBox FAM Status Codes
+ */
+/** FAM failed to open a connection. */
+#define VERR_FAM_OPEN_FAILED                        (-5000)
+/** FAM failed to add a file to the list to be monitored. */
+#define VERR_FAM_MONITOR_FILE_FAILED                (-5001)
+/** FAM failed to add a directory to the list to be monitored. */
+#define VERR_FAM_MONITOR_DIRECTORY_FAILED           (-5002)
+/** The connection to the FAM daemon was lost. */
+#define VERR_FAM_CONNECTION_LOST                    (-5003)
+/** @} */
+
+/** @name PCI Passtrhough Status Codes
+ */
+/** RamPreAlloc not set. */
+/** RAM pre-allocation is currently a requirement for PCI passthrough. */
+#define VERR_PCI_PASSTHROUGH_NO_RAM_PREALLOC        (-5100)
+/** VT-x/AMD-V not active. */
+/** PCI passthrough currently works only if VT-x/AMD-V is active. */
+#define VERR_PCI_PASSTHROUGH_NO_HM                  (-5101)
+/** Nested paging not active. */
+/** PCI passthrough currently works only if nested paging is active. */
+#define VERR_PCI_PASSTHROUGH_NO_NESTED_PAGING       (-5102)
+/** @} */
+
+/** @name GVMM Status Codes
+ */
+ */
+/** Internal error obtaining the GVMM instance. */
+define VERR_GVMM_INSTANCE (-5200)
+/** GVMM does not support the range of CPUs present/possible on the host. */
+define VERR_GVMM_HOST_CPU_RANGE (-5201)
+/** GVMM ran into some broken IPRT code. */
+define VERR_GVMM_BROKEN_IPRT (-5202)
+/** Internal processing error \#1 in the GVMM code. */
+define VERR_GVMM_IPE_1 (-5203)
+/** Internal processing error \#2 in the GVMM code. */
+define VERR_GVMM_IPE_2 (-5204)
+/** Cannot destroy VM because not all other EMTs have deregistered. */
+define VERR_GVMM_NOT_ALL_EMTS_DEREGISTERED (-5205)
+/** @} */
+
+/** @} */
+/** IEM Status Codes */
+* @ { */
+/** The instruction is not yet implemented by IEM. */
+define VERR_IEM_INSTR_NOT_IMPLEMENTED (-5300)
+/** Invalid operand size passed to an IEM function. */
+define VERR_IEM_INVALID_OPERAND_SIZE (-5301)
+/** Invalid address mode passed to an IEM function. */
+define VERR_IEM_INVALID_ADDRESS_MODE (-5302)
+/** Invalid effective segment register number passed to an IEM function. */
+define VERR_IEM_INVALID_EFF_SEG (-5303)
+/** Invalid instruction length passed to an IEM function. */
+define VERR_IEM_INVALID_INSTR_LENGTH (-5304)
+/** Internal status code for indicating that a selector isn’t valid (LAR, LSL,
+ + VERR, VERW). This is not used outside the instruction implementations. */
+define VINF_IEM_SELECTOR_NOT_OK (5305)
+/** Restart the current instruction. For testing only. */
+define VERR_IEM_RESTART_INSTRUCTION (-5389)
+/** This particular aspect of the instruction is not yet implemented by IEM. */
+define VERR_IEM_ASPECT_NOT_IMPLEMENTED (-5390)
+/** Internal processing error \#1 in the IEM code. */
+define VERR_IEM_IPE_1 (-5391)
+/** Internal processing error \#2 in the IEM code. */
+define VERR_IEM_IPE_2 (-5392)
+/** Internal processing error \#3 in the IEM code. */
+define VERR_IEM_IPE_3 (-5393)
+/** Internal processing error \#4 in the IEM code. */
+define VERR_IEM_IPE_4 (-5394)
+/** Internal processing error \#5 in the IEM code. */
+define VERR_IEM_IPE_5 (-5395)
+/** Internal processing error \#6 in the IEM code. */
+define VERR_IEM_IPE_6 (-5396)
+/** Internal processing error \#7 in the IEM code. */
+/*#define VERR_IEM_IPE_7 (-5397)
+/** Internal processing error \#8 in the IEM code. */
+/#define VERR_IEM_IPE_8 (-5398)
+/** Internal processing error \#9 in the IEM code. */
+/#define VERR_IEM_IPE_9 (-5399)
+/** @} */
+
+/** @} */
+@name DBGC Status Codes
+ * @{ */
+/** Status that causes DBGC to quit. */
+/#define VERR_DBGC_QUIT (-5400)
+/** Async command pending. */
+/#define VWRN_DBGC_CMD_PENDING 5401
+/** The command has already been registered. */
+/#define VWRN_DBGC_ALREADY_REGISTERED 5402
+/** The command cannot be deregistered because has not been registered. */
+/#define VERR_DBGC_COMMANDS_NOT_REGISTERED (-5403)
+/** Unknown breakpoint. */
+/#define VERR_DBGC_BP_NOT_FOUND (-5404)
+/** The breakpoint already exists. */
+/#define VERR_DBGC_BP_EXISTS (-5405)
+/** The breakpoint has no command. */
+/#define VINF_DBGC_BP_NO_COMMAND 5406
+/** Generic debugger command failure. */
+/#define VERR_DBGC_COMMAND_FAILED (-5407)
+/** Logic bug in the DBGC code. */
+/#define VERR_DBGC_IPE (-5408)
+
+/** The lowest parse status code. */
+/#define VERR_DBGC_PARSE_LOWEST (-5499)
+/** Syntax error - too few arguments. */
+/#define VERR_DBGC_PARSE_TOO_FEW_ARGUMENTS (VERR_DBGC_PARSE_LOWEST + 0)
+/** Syntax error - too many arguments. */
+/#define VERR_DBGC_PARSE_TOO_MANY_ARGUMENTS (VERR_DBGC_PARSE_LOWEST + 1)
+/** Syntax error - too many arguments for static storage. */
+/#define VERR_DBGC_PARSE_ARGUMENT_OVERFLOW (VERR_DBGC_PARSE_LOWEST + 2)
+/** Syntax error - expected binary operator. */
+/#define VERR_DBGC_PARSE_EXPECTED_BINARY_OP (VERR_DBGC_PARSE_LOWEST + 3)
+
+/** Syntax error - the argument does not allow a range to be specified. */
+/#define VERR_DBGC_PARSE_NO_RANGE_ALLOWED (VERR_DBGC_PARSE_LOWEST + 5)
+/** Syntax error - unbalanced quotes. */
+/#define VERR_DBGC_PARSE_UNBALANCED_QUOTE (VERR_DBGC_PARSE_LOWEST + 6)
+/** Syntax error - unbalanced parenthesis. */
+/#define VERR_DBGC_PARSE_UNBALANCED_PARENTHESIS (VERR_DBGC_PARSE_LOWEST + 7)
+/** Syntax error - an argument or subargument contains nothing useful. */
+/#define VERR_DBGC_PARSE_EMPTY_ARGUMENT (VERR_DBGC_PARSE_LOWEST + 8)
+/** Syntax error - invalid operator usage. */
+#define VERR_DBGParse_UNEXPECTED_OPERATOR (VERR_DBGParse_LOWEST + 9)
+/** Syntax error - invalid numeric value. */
+#define VERR_DBGParse_INVALID_NUMBER (VERR_DBGParse_LOWEST + 10)
+/** Syntax error - numeric overflow. */
+#define VERR_DBGParse_NUMBER_TOO_BIG (VERR_DBGParse_LOWEST + 11)
+/** Syntax error - invalid operation attempted. */
+#define VERR_DBGParse_INVALID_OPERATION (VERR_DBGParse_LOWEST + 12)
+/** Syntax error - function not found. */
+#define VERR_DBGParse_FUNCTION_NOT_FOUND (VERR_DBGParse_LOWEST + 13)
+/** Syntax error - the specified function is not a function. */
+#define VERR_DBGParse_NOT_A_FUNCTION (VERR_DBGParse_LOWEST + 14)
+/** Syntax error - out of scratch memory. */
+#define VERR_DBGParse_NO_SCRATCH (VERR_DBGParse_LOWEST + 15)
+/** Syntax error - out of regular heap memory. */
+#define VERR_DBGParse_NO_MEMORY (VERR_DBGParse_LOWEST + 16)
+/** Syntax error - incorrect argument type. */
+#define VERR_DBGParse_INCORRECT_ARG_TYPE (VERR_DBGParse_LOWEST + 17)
+/** Syntax error - an undefined variable was referenced. */
+#define VERR_DBGParse_VARIABLE_NOT_FOUND (VERR_DBGParse_LOWEST + 18)
+/** Syntax error - a type conversion failed. */
+#define VERR_DBGParse_CONVERSION_FAILED (VERR_DBGParse_LOWEST + 19)
+/** Syntax error - you hit a debugger feature which isn't implemented yet. */
+  * (Feel free to help implement it.) */
+#define VERR_DBGParse_NOT_IMPLEMENTED (VERR_DBGParse_LOWEST + 20)
+/** Syntax error - Couldn't satisfy a request for a specific result type. */
+#define VERR_DBGParse_BAD_RESULT_TYPE (VERR_DBGParse_LOWEST + 21)
+/** Syntax error - Cannot read symbol value, it is a set-only symbol. */
+#define VERR_DBGParse_WRITEONLY_SYMBOL (VERR_DBGParse_LOWEST + 22)
+/** Syntax error - Invalid command name. */
+#define VERR_DBGParse_INVALID_COMMAND_NAME (VERR_DBGParse_LOWEST + 23)
+/** Syntax error - Command not found. */
+#define VERR_DBGParse_COMMAND_NOT_FOUND (VERR_DBGParse_LOWEST + 24)
+/** Syntax error - buggy parser. */
+#define VERR_DBGParse_BUG (VERR_DBGParse_LOWEST + 25)
+**@] */ */
+
+
+/** @name Support driver/library shared verification status codes. */
+  * @{ */
+/** Process Verification Failure: The memory content does not match the image */
+  * file. */
+#define VERR_SUP_VP_MEMORY_VS_FILE_MISMATCH (-5600)
+/** Process Verification Failure: The memory protection of a image file section */
+  * does not match what the section header prescribes. */
+#define VERR_SUP_VP_SECTION_PROTECTION_MISMATCH (-5601)
+/** Process Verification Failure: One of the section in the image file is not */
+  * mapped into memory. */
#define VERR_SUP_VP_SECTION_NOT_MAPPED (-5602)
/** Process Verification Failure: One of the section in the image file is not fully mapped into memory. */

#define VERR_SUP_VP_SECTION_NOT_FULLY_MAPPED (-5603)
/** Process Verification Failure: Bad file alignment value in image header. */

#define VERR_SUP_VP_BAD_FILE_ALIGNMENT_VALUE (-5604)
/** Process Verification Failure: Bad image base in header. */

#define VERR_SUP_VP_BAD_IMAGE_BASE (-5605)
/** Process Verification Failure: Bad image signature. */

#define VERR_SUP_VP_BAD_IMAGE_SIGNATURE (-5606)
/** Process Verification Failure: Bad image size. */

#define VERR_SUP_VP_BAD_IMAGE_SIZE (-5607)
/** Process Verification Failure: Bad new-header offset in the MZ header. */

#define VERR_SUP_VP_BAD_MZ_OFFSET (-5608)
/** Process Verification Failure: Bad optional header field. */

#define VERR_SUP_VP_BAD_OPTIONAL_HEADER (-5609)
/** Process Verification Failure: Bad section alignment value in image header. */

#define VERR_SUP_VP_BAD_SECTION_ALIGNMENT_VALUE (-5610)
/** Process Verification Failure: Bad section raw data size. */

#define VERR_SUP_VP_BAD_SECTION_FILE_SIZE (-5611)
/** Process Verification Failure: Bad virtual section address. */

#define VERR_SUP_VP_BAD_SECTION_RVA (-5612)
/** Process Verification Failure: Bad virtual section size. */

#define VERR_SUP_VP_BAD_SECTION_VIRTUAL_SIZE (-5613)
/** Process Verification Failure: Bad size of image header. */

#define VERR_SUP_VP_BAD_SIZE_OF_HEADERS (-5614)
/** Process Verification Failure: The process is being debugged. */

#define VERR_SUP_VP_DEBUGGED (-5615)
/** Process Verification Failure: A DLL was found more than once. */

#define VERR_SUP_VP_DUPLICATE_DLL_MAPPING (-5616)
/** Process Verification Failure: Image section region is too large. */

#define VERR_SUP_VP_EMPTY_REGION_TOO_LARGE (-5617)
/** Process Verification Failure: Executable file name and process image name does not match up. */

#define VERR_SUP_VP_EXE_VS_PROC_NAME_MISMATCH (-5618)
/** Process Verification Failure: Found executable memory allocated in the process. There is only supposed be executable memory associated with image file mappings (DLLs & EXE). */

#define VERR_SUP_VP_FOUND_EXEC_MEMORY (-5619)
/** Process Verification Failure: There is more than one known executable mapped into the process. */

#define VERR_SUP_VP_FOUND_MORE_THAN_ONE_EXE_MAPPING (-5620)
/** Process Verification Failure: Error closing image file handle. */

#define VERR_SUP_VP_IMAGE_FILE_CLOSE_ERROR (-5621)
/** Process Verification Failure: Error opening image file. */

#define VERR_SUP_VP_IMAGE_FILE_OPEN_ERROR (-5622)
/** Process Verification Failure: Error reading image file header. */
```c
#define VERR_SUP_VP_IMAGE_HDR_READ_ERROR (-5623)
/** Process Verification Failure: Image mapping is bogus as the first region
 + * has different AllocationBase and BaseAddress values, indicating that a
 + * section was unmapped or otherwise tampered with. */

#define VERR_SUP_VP_IMAGE_MAPPING_BASE_ERROR (-5624)
/** Process Verification Failure: Error reading process memory for comparing
 + * with disk data. */

#define VERR_SUP_VP_MEMORY_READ_ERROR (-5625)
/** Process Verification Failure: Found no executable mapped into the process
 + * address space. */

#define VERR_SUP_VP_NO_FOUND_NO_EXE_MAPPING (-5626)
/** Process Verification Failure: An image mapping failed to report a name. */

#define VERR_SUP_VP_NO_IMAGE_MAPPING_NAME (-5627)
/** Process Verification Failure: No KERNE32.DLL mapping found. This is
 + * impossible. */

#define VERR_SUP_VP_NO_KERNEL32_MAPPING (-5628)
/** Process Verification Failure: Error allocating memory. */

#define VERR_SUP_VP_NO_MEMORY (-5629)
/** Process Verification Failure: Error allocating state memory or querying
 + * the system32 path. */

#define VERR_SUP_VP_NO_MEMORY_STATE (-5630)
/** Process Verification Failure: No NTDLL.DLL mapping found. This is
 + * impossible. */

#define VERR_SUP_VP_NO_NTDLL_MAPPING (-5631)
/** Process Verification Failure: A DLL residing outside System32 was found
 + * in the process. */

#define VERR_SUP_VP_NON_SYSTEM32_DLL (-5632)
/** Process Verification Failure: An unknown and unwanted DLL was found loaded
 + * into the process. */

#define VERR_SUP_VP_NOT_KNOWN_DLL_OR_EXE (-5633)
/** Process Verification Failure: The name of an image file changes between
 + * mapping regions. */

#define VERR_SUP_VP_NT_MAPPING_NAME_CHANGED (-5634)
/** Process Verification Failure: Error querying process name. */

#define VERR_SUP_VP_NT_QI_PROCESS_NM_ERROR (-5635)
/** Process Verification Failure: Error querying thread information. */

#define VERR_SUP_VP_NT_QI_THREAD_ERROR (-5636)
/** Process Verification Failure: Error query virtual memory information. */

#define VERR_SUP_VP_NT_QI_VIRTUAL_MEMORY_ERROR (-5637)
/** Process Verification Failure: Error query virtual memory mapping name. */

#define VERR_SUP_VP_NT_QI_VIRTUAL_MEMORY_NM_ERROR (-5638)
/** Process Verification Failure: Error determining the full path of
 + * System32. */

#define VERR_SUP_VP_SYSTEM32_PATH (-5639)
/** Process Verification Failure: The process has more than one thread. */

#define VERR_SUP_VP_THREAD_NOT_ALONE (-5640)
/** Process Verification Failure: The image mapping is too large (>= 2GB). */

#define VERR_SUP_VP_TOO_HIGH_REGION_RVA (-5641)
```
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+/** Process Verification Failure: The memory region is too large (>= 2GB). */
+\#define VERR_SUP_VP_TOO_LARGE_REGION (-5642)
+/** Process Verification Failure: There are too many DLLs loaded. */
+\#define VERR_SUP_VP_TOO_MANY_DLLS_LOADED (-5643)
+/** Process Verification Failure: An image has too many regions. */
+\#define VERR_SUP_VP_TOO_MANY_IMAGE_REGIONS (-5644)
+/** Process Verification Failure: The process has too many virtual memory
+ * regions. */
+\#define VERR_SUP_VP_TOO_MANY_MEMORY_REGIONS (-5645)
+/** Process Verification Failure: An image has too many sections. */
+\#define VERR_SUP_VP_TOO_MANY_SECTIONS (-5646)
+/** Process Verification Failure: An image is targeting an unexpected
+ * machine/CPU. */
+\#define VERR_SUP_VP_UNEXPECTED_IMAGE_MACHINE (-5647)
+/** Process Verification Failure: Unexpected section protection flag
+ * combination. */
+\#define VERR_SUP_VP_UNEXPECTED_SECTION_FLAGS (-5648)
+/** Process Verification Failure: Expected the process and exe to have forced
+ * integrity checking enabled (verifying signatures). */
+\#define VERR_SUP_VP_EXE_MISSING_FORCE_INTEGRITY (-5649)
+/** Process Verification Failure: Expected the process and exe to have dynamic
+ * base enabled. */
+\#define VERR_SUP_VP_EXE_MISSING_DYNAMIC_BASE (-5650)
+/** Process Verification Failure: Expected the process and exe to advertise
+ * NX compatibility. */
+\#define VERR_SUP_VP_EXE_MISSING_NX_COMPAT (-5651)
+/** Process Verification Failure: The DIICharacteristics of the process
+ * does not match the value in the optional header in the exe file. */
+\#define VERR_SUP_VP_DLL_CHARACTERISTICS_MISMATCH (-5652)
+/** Process Verification Failure: The ImageCharacteristics of the process
+ * does not match the value in the file header in the exe file. */
+\#define VERR_SUP_VP_IMAGE_CHARACTERISTICS_MISMATCH (-5653)
+/** Process Verification Failure: Error querying image information. */
+\#define VERR_SUP_VP_NT_QI_PROCESS_IMG_INFO_ERROR (-5654)
+/** Process Verification Failure: Error querying debug port. */
+\#define VERR_SUP_VP_NT_QI_PROCESS_DBG_PORT_ERROR (-5655)
+/** WinVerifyTrust failed with an unexpected status code when using the
+ * catalog-file approach. */
+\#define VERR_SUP_VP_WINTRUST_CAT_FAILURE (-5656)
+/** The image is required to be signed with the same certificate as the rest
+ * of VirtualBox. */
+\#define VERR_SUP_VP_NOT_SIGNED_WITH_BUILD_CERT (-5657)
+/** Internal processing error: Not build certificate. */
+\#define VERR_SUP_VP_NOT_BUILD_CERT_IPE (-5658)
+/** The image requires to be signed using the kernel-code signing process. */
+\#define VERR_SUP_VP_NOT_VALID_KERNEL_CODE_SIGNATURE (-5659)
+/** Unexpected number of valid paths. */
+\#define VERR_SUP_VP_UNEXPECTED_VALID_PATH_COUNT (-5660)
The image is required to force integrity checks. */
+#define VERR_SUP VP_SIGNATURE_CHECKS NOT_ENFORCED (-5661)
+/** Process Verification Failure: Symantec Endpoint Protection must be
+ * disabled for the VirtualBox VM processes.
+ * http://www.symantec.com/connect/articles/creating-application-control-exclusions-symantec-endpoint-
+ * protection-121 */
+#define VERR_SUP VP_SYSFSER_DLL (-5662)
+/** Process Purification Failure: KERNE32.DLL already mapped into the initial
+ * process (suspended). */
+#define VERR_SUP VP KERNEL32_ALREADY_MAPPED (-5663)
+/** Process Purification Failure: NtFreeVirtualMemory failed on a chunk of
+ * executable memory which shouldn't be present in the process. */
+#define VERR_SUP VP FREE_VIRTUAL_MEMORY FAILED (-5664)
+/** Process Purification Failure: Both NtUnmapViewOfSection and
+ * NtProtectVirtualMemory failed to get rid of or passify an non-image
+ * executable mapping. */
+#define VERR_SUP VP UNMAP AND PROTECT FAILED (-5665)
+/** Process Purification Failure: Unknown memory type of executable memory. */
+#define VERR_SUP VP UNKOWN_MEM_TYPE (-5666)
+/** The image file is not owned by TrustedInstaller is it should be. */
+#define VERR_SUP VP NOT OWNED BY TRUSTED_INSTALLER (-5667)
+/** The image is outside the expected range. */
+#define VERR_SUP VP IMAGE TOO BIG (-5668)
+/** Stub process not found so it cannot be revalidated when vboxdrv is opened
+ * by the VM process. */
+#define VERR_SUP VP STUB NOT FOUND (-5669)
+/** Error opening the stub process for revalidation when vboxdrv is opened by
+ * the VM process. */
+#define VERR_SUP VP STUB OPEN ERROR (-5670)
+/** Stub process thread not found during revalidation upon vboxdrv opening by
+ * the VM process. */
+#define VERR SUP VP STUB THREAD NOT FOUND (-5671)
+/** Error opening the stub process thread for revalidation when vboxdrv is
+ * opened by the VM process. */
+#define VERR_SUP VP STUB THREAD OPEN ERROR (-5672)
+/** Process Purification Failure: NtAllocateVirtualMemory failed to get us
+ * suitable replacement memory for a chunk of executable memory that
+ * shouldn't be present in our process. (You will only see this message if you
+ * got potentially fatally buggy anti-virus software installed.) */
+#define VERR_SUP VP REPLACEVIRTUAL MEMORY FAILED (-5673)
+/** Error getting the file mode. */
+#define VERR_SUP VP FILE MODE ERROR (-5674)
+/** Error creating an event semaphore for used with asynchronous reads. */
+#define VERR_SUP VP CREATE_READ_EVT SEM FAILED (-5675)
+/** Undesirable module. */
+#define VERR_SUP VP UNDESIRABLE MODULE (-5676)
+
+}
/** @name VBox Extension Pack Status Codes
 * @}
 */

/** The host is not supported. Uninstall the extension pack.
 */
#define VERR_EXTPACK_UNSUPPORTED_HOST_UNINSTALL (-6000)

/** The VirtualBox version is not supported by one of the extension packs.
 */
#define VERR_EXTPACK_VBOX_VERSION_MISMATCH (-6001)

/** @} */

/** @name VBox Guest Control Status Codes
 * @}
 */

/** Guest side reported an error. */
#define VERR_GSTCTL_GUEST_ERROR (-6200)

/** A guest control object has changed its overall status. */
#define VWRN_GSTCTL_OBJECTSTATE_CHANGED 6220

/** Guest process is in a wrong state. */
#define VERR_GSTCTL_PROCESS_WRONG_STATE (-6221)

/** Started guest process terminated with an exit code <> 0. */
#define VWRN_GSTCTL_PROCESS_EXIT_CODE 6221

/** @} */

/** @name GIM Status Codes
 * @}
 */

/** No GIM provider is configured for this VM. */
#define VERR_GIM_NOT_ENABLED (-6300)

/** GIM internal processing error \#1. */
#define VERR_GIM_IPE_1 (-6301)

/** GIM internal processing error \#2. */
#define VERR_GIM_IPE_2 (-6302)

/** GIM internal processing error \#3. */
#define VERR_GIM_IPE_3 (-6303)

/** The GIM provider does not support any paravirtualized TSC. */
#define VERR_GIM_PVTSC_NOT_AVAILABLE (-6304)

/** The guest has not setup use of the paravirtualized TSC. */
#define VERR_GIM_PVTSC_NOT_ENABLED (-6305)

/** Unknown or invalid GIM provider. */
#define VERR_GIM_INVALID_PROVIDER (-6306)

/** GIM generic operation failed. */
```c
#define VERR_GIM_OPERATION_FAILED (-6307)
/** The GIM provider does not support any hypercalls. */

#define VERR_GIM_HYPERCALLS_NOT_AVAILABLE (-6308)
/** The guest has not setup use of the hypercalls. */

#define VERR_GIM_HYPERCALLS_NOT_ENABLED (-6309)
/** The GIM device is not registered with GIM when it ought to be. */

#define VERR_GIM_DEVICE_NOT_REGISTERED (-6310)
/** Hypercall cannot be enabled/performed due to access/permissions/CPL. */

#define VERR_GIM_HYPERCALL_ACCESS_DENIED (-6311)
/** Failed to read to a memory region while performing a hypercall. */

#define VERR_GIM_HYPERCALL_MEMORY_READ_FAILED (-6312)
/** Failed to write to a memory region while performing a hypercall. */

#define VERR_GIM_HYPERCALL_MEMORY_WRITE_FAILED (-6313)
/** Generic hypercall operation failure. */

#define VERR_GIM_HYPERCALL_FAILED (-6314)
/** No debug connection configured. */

#define VERR_GIM_NO_DEBUG_CONNECTION (-6315)
/** Return to ring-3 to perform the hypercall there. */

#define VINF_GIM_R3_HYPERCALL 6316
/** Continuing hypercall at the same RIP, continue guest execution. */

#define VINF_GIM_HYPERCALL.Continuing 6317
/** Instruction that triggers the hypercall is invalid/unrecognized. */

#define VERR_GIM_INVALID_HYPERCALL_INSTR (-6318)
/** @} */

/** @name Main API Status Codes */

+ * @ {
+ */
+ /** The configuration constructor in main failed due to a COM error. Check
+ * the release log of the VM for further details. */
+ #define VERR_MAIN_CONFIG_CONSTRUCTOR_COM_ERROR (-6400)
+ /** The configuration constructor in main failed due to an internal consistency
+ * error. Consult the release log of the VM for further details. */
+ #define VERR_MAIN_CONFIG_CONSTRUCTOR_IPE (-6401)
+ /** @} */

/** @name VBox Drag and Drop Status Codes */
+ * @ {
+ */
+ /** Guest side reported an error. */
+ #define VERR_GSTDND_GUEST_ERROR (-6500)
+ /** @} */

/** @name Audio Status Codes */
+ * @ {
+ */
```

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---
+ /** Host backend couldn't be initialized. Happen if the audio server is not
+ reachable, audio hardware is not available or similar. We should use the
+ * NULL audio driver. */
+#define VERR_AUDIO_BACKEND_INIT_FAILED (-6600)
+ /** No free input streams. */
+#define VERR_AUDIO_NO_FREE_INPUT_STREAMS (-6601)
+ /** No free output streams. */
+#define VERR_AUDIO_NO_FREE_OUTPUT_STREAMS (-6602)
+ /** Pending stream disable operation in progress. */
+#define VERR_AUDIO_STREAM_PENDING_DISABLE (-6603)
+ /** There is more data available. */
+ * This can happen due to a buffer wraparound of a buffer read/write operation. */
+#define VINF_AUDIO_MORE_DATA_AVAILABLE (6604)
+ @}
+
+ @}

+ @name APIC Status Codes
+ @{
+ /** No pending interrupt. */
+#define VERR_APIC_INTR_NOT_PENDING (-6700)
+ /** Pending interrupt is masked by TPR. */
+#define VERR_APIC_INTR_MASKED_BY_TPR (-6701)
+ /** APIC did not accept the interrupt. */
+#define VERR_APIC_INTR_DISCARDED (-6702)
+ @}
+
+ @{
+
+ @}

+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/hgcmsvc.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/hgcmsvc.h
@@ -0,0 +1,423 @@
+/** @file
+ * Host-Guest Communication Manager (HGCM) - Service library definitions.
+ */
+ *
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBox_hgcm_h
+#define ___VBox_hgcm_h
+
+#include <iprt/assert.h>
+#include <iprt/string.h>
+#include <VBox/cdefs.h>
+#include <VBox/types.h>
+#include <VBox/err.h>
+#ifdef VBOX_TEST_HGCM_PARMS
+# include <iprt/test.h>
+#endif
+
+/** @todo proper comments. */
+
+/**
+ * Service interface version.
+ *
+ * Includes layout of both VBOXHGCMSVCFNTABLE and VBOXHGCMSVCHELPER.
+ *
+ * A service can work with these structures if major version
+ * is equal and minor version of service is <= version of the
+ * structures.
+ *
+ * For example when a new helper is added at the end of helpers
+ * structure, then the minor version will be increased. All older
+ * services still can work because they have their old helpers
+ * unchanged.
+ *
+ * Revision history.
+ * 1.1->2.1 Because the pfHandle now also has the pvClient parameter.
+ * 2.1->2.2 Because pfHandle and pfLoadState were added
+ * 2.2->3.1 Because pfHandle is now synchronous, returns rc, and parameters were changed
+ * 3.1->3.2 Because pfHandleExtension was added

+ * 3.2->3.3 Because pfndisconnectClient helper was added
+ * 3.3->4.1 Because the pvService entry and parameter was added
+ * 4.1->4.2 Because the VBOX_HGCM_SVC_PARM_CALLBACK parameter type was added
+ * 4.2->5.1 Removed the VBOX_HGCM_SVC_PARM_CALLBACK parameter type, as
+ * this problem is already solved by service extension callbacks
+ */
+#define VBOX_HGCM_SVC_VERSION_MAJOR (0x0005)
+#define VBOX_HGCM_SVC_VERSION_MINOR (0x0001)
+#define VBOX_HGCM_SVC_VERSION ((VBOX_HGCM_SVC_VERSION_MAJOR « 16) +
VBOX_HGCM_SVC_VERSION_MINOR)
+
+/** Typed pointer to distinguish a call to service. */
+struct VBOXHGCMCALLHANDLE_TYPEDEF;
+typedef struct VBOXHGCMCALLHANDLE_TYPEDEF *VBOXHGCMCALLHANDLE;
+
+/** Service helpers pointers table. */
+typedef struct VBOXHGCMSVCHELPERS
+{
+    /** The service has processed the Call request. */
+    DECLR3CALLBACKMEMBER(void, pfnCallComplete, (VBOXHGCMCALLHANDLE callHandle, int32_t rc));
+    void *pvInstance;
+    /** The service disconnects the client. */
+    DECLR3CALLBACKMEMBER(void, pfnDisconnectClient, (void *pvInstance, uint32_t u32ClientID));
+} VBOXHGCMSVCHELPERS;
+
+typedef VBOXHGCMSVCHELPERS *PVBOXHGCMSVCHELPERS;
+
+#define VBOX_HGCM_SVC_PARM_INVALID (0U)
+#define VBOX_HGCM_SVC_PARM_32BIT (1U)
+#define VBOX_HGCM_SVC_PARM_64BIT (2U)
+#define VBOX_HGCM_SVC_PARM_PTR   (3U)
+
+typedef struct VBOXHGCMSVCPARM
+{
+    /** VBOX_HGCM_SVC_PARM_* values. */
+    uint32_t type;
+    union
+    {
+        uint32_t uint32;
+        uint64_t uint64;
+        struct
+        {
+            uint32_t uint32;
+            uint64_t uint64;
+            struct
+            {
    /** Extract an uint32_t value from an HGCM parameter structure */
    int getUInt32(uint32_t *u32)
    {
        AssertPtrReturn(u32, VERR_INVALID_POINTER);
        int rc = VINF_SUCCESS;
        if (type != VBOX_HGCM_SVC_PARM_32BIT)
            rc = VERR_INVALID_PARAMETER;
        if (RT_SUCCESS(rc))
            *u32 = u.uint32;
        return rc;
    }

    /** Extract a uint64_t value from an HGCM parameter structure */
    int getUInt64(uint64_t *u64)
    {
        AssertPtrReturn(u64, VERR_INVALID_POINTER);
        int rc = VINF_SUCCESS;
        if (type != VBOX_HGCM_SVC_PARM_64BIT)
            rc = VERR_INVALID_PARAMETER;
        if (RT_SUCCESS(rc))
            *u64 = u.uint64;
        return rc;
    }

    /** Extract a pointer value from an HGCM parameter structure */
    int getPointer(void **ppv, uint32_t *pcb)
    {
        AssertPtrReturn(ppv, VERR_INVALID_POINTER);
        AssertPtrReturn(pcb, VERR_INVALID_POINTER);
        if (type == VBOX_HGCM_SVC_PARM_PTR)
        {
            *ppv = u.pointer.addr;
            *pcb = u.pointer.size;
            return VINF_SUCCESS;
        }

        return VERR_INVALID_PARAMETER;
    }

    /** Extract a constant pointer value from an HGCM parameter structure */
    int getPointer(const void **ppcv, uint32_t *pcb)
    {
        AssertPtrReturn(ppcv, VERR_INVALID_POINTER);
        return VINF_SUCCESS;
    }

    /** Extract a constant pointer value from an HGCM parameter structure */
    int getPointer(const void **ppcv, uint32_t *pcb)
+ AssertPtrReturn(pcb, VERR_INVALID_POINTER);
+ void *pv;
+ int rc = getPointer(&pv, pcb);
+ *ppcv = pv;
+ return rc;
+ }
+
+ /** Extract a pointer value to a non-empty buffer from an HGCM parameter
+ * structure */
+ int getBuffer(void **ppv, uint32_t *pcb)
+ {
+    AssertPtrReturn(ppv, VERR_INVALID_POINTER);
+    AssertPtrReturn(pcb, VERR_INVALID_POINTER);
+    void *pv = NULL;
+    uint32_t cb = 0;
+    int rc = getPointer(&pv, &cb);
+    if (   RT_SUCCESS(rc)
+        && VALID_PTR(pv)
+        && cb > 0)
+    {
+        *ppv = pv;
+        *pcb = cb;
+        return VINF_SUCCESS;
+    }
+
+    return VERR_INVALID_PARAMETER;
+ }
+
+ /** Extract a pointer value to a non-empty constant buffer from an HGCM
+ * parameter structure */
+ int getBuffer(const void **ppcv, uint32_t *pcb)
+ {
+    AssertPtrReturn(ppcv, VERR_INVALID_POINTER);
+    AssertPtrReturn(pcb, VERR_INVALID_POINTER);
+    void *pcv = NULL;
+    int rc = getBuffer(&pcv, pcb);
+    *ppcv = pcv;
+    return rc;
+ }
+
+ /** Extract a string value from an HGCM parameter structure */
+ int getString(char **ppch, uint32_t *pcb)
+ {
+    uint32_t cb = 0;
+    char *pch = NULL;
+    int rc = getBuffer((void **)pch, &cb);
+    if (RT_FAILURE(rc))
+    {
+        return VERR_INVALID_PARAMETER;
+    }
+
+    return VINF_SUCCESS;
+ }

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    int getString(const char **ppch, uint32_t *pcb)
    {
        char *pch = NULL;
        int rc = getString(&pch, pcb);
        *ppch = pch;
        return rc;
    }

    /** Set a uint32_t value to an HGCM parameter structure */
    void setUInt32(uint32_t u32)
    {
        type = VBOX_HGCM_SVC_PARM_32BIT;
        u.uint32 = u32;
    }

    /** Set a uint64_t value to an HGCM parameter structure */
    void setUInt64(uint64_t u64)
    {
        type = VBOX_HGCM_SVC_PARM_64BIT;
        u.uint64 = u64;
    }

    /** Set a pointer value to an HGCM parameter structure */
    void setPointer(void *pv, uint32_t cb)
    {
        type = VBOX_HGCM_SVC_PARM_PTR;
        u.pointer.addr = pv;
        u.pointer.size = cb;
    }

    /** Set a const string value to an HGCM parameter structure */
    void setString(const char *psz)
    {
        type = VBOX_HGCM_SVC_PARM_PTR;
        u.pointer.addr = (void *)psz;
        u.pointer.size = (uint32_t)strlen(psz) + 1;
#ifdef ___iprt_cpp_ministring_h
    /** Set a const string value to an HGCM parameter structure */
    void setCppString(const RTCString &rString)
    {
        type = VBOX_HGCM_SVC_PARM_PTR;
        u.pointer.addr = (void *)rString.c_str();
        u.pointer.size = (uint32_t)rString.length() + 1;
    }
#endif

#ifdef VBOX_TEST_HGCM_PARMS
    /** Test the getString member function. Indirectly tests the getPointer
     * and getBuffer APIs.
     * @param  hTest an running IPRT test
     * @param  aType the type that the parameter should be set to before
     * calling getString
     * @param  apcc the value that the parameter should be set to before
     * calling getString, and also the address (!) which we
     * expect getString to return. Stricter than needed of
     * course, but I was feeling lazy.
     * @param  acb the size that the parameter should be set to before
     * calling getString, and also the size which we expect
     * getString to return.
     * @param  rcExp the expected return value of the call to getString.
     */
    void doTestGetString(RTTEST hTest, uint32_t aType, const char *apcc,
                         uint32_t acb, int rcExp)
    {
        /* An RTTest API like this, which would print out an additional line
         * of context if a test failed, would be nice. This is because the
         * line number alone doesn't help much here, given that this is a
         * subroutine called many times. */
        /*
         * RTTestContextF(hTest,
         *     ("doTestGetString, aType=%u, apcc=%p, acp=%u, rcExp=%Rrc",
         *      aType, apcc, acp, rcExp));
         */
        /*
         * setPointer((void *)apcc, acb);
         * type = aType; /* in case we don't want VBOX_HGCM_SVC_PARM_PTR */
         * const char *pcc = NULL;
         * uint32_t cb = 0;
         * int rc = getString(&pcc, &cb);
         * RTTEST_CHECK_RC(hTest, rc, rcExp);
         * if (RT_SUCCESS(rcExp))
         * {
         *     RTTEST_CHECK_MSG_RETV(hTest, (pcc == apcc),
         */
/** Run some unit tests on the getString method and indirectly test
 * getPointer and getBuffer as well. */
 void testGetString(RTTEST hTest)
 {
 RTTestSub(hTest, "HGCM string parameter handling");
doTestGetString(hTest, VBOX_HGCM_SVC_PARM_32BIT, "test", 3,
 VERR_INVALID_PARAMETER);
doTestGetString(hTest, VBOX_HGCM_SVC_PARM_PTR, "test", 5,
 VINF_SUCCESS);
doTestGetString(hTest, VBOX_HGCM_SVC_PARM_PTR, "test", 3,
 VERR_BUFFER_OVERFLOW);
doTestGetString(hTest, VBOX_HGCM_SVC_PARM_PTR, "test\xf0", 6,
 VERR_INVALID_UTF8_ENCODING);
doTestGetString(hTest, VBOX_HGCM_SVC_PARM_PTR, "test", 0,
 VERR_INVALID_PARAMETER);
doTestGetString(hTest, VBOX_HGCM_SVC_PARM_PTR, (const char *)0x1, 5,
 VERR_INVALID_PARAMETER);
 RTTestSubDone(hTest);

} #endif

VBOXHGCMSVCPARM() : type(VBOX_HGCM_SVC_PARM_INVALID) {}
#endif

typedef VBOXHGCMSVCPARM *PVBOXHGCMSVCPARM;

#ifdef VBOX_WITH_CRHGSMI
typedef void * HGCMCVSHANDLE;

typedef DECLCALLBACK(void) HGCMHOSTFASTCALLCB (int32_t result, uint32_t u32Function, PVBOXHGCMSVCPARM pParam, void *pvContext);
typedef HGCMHOSTFASTCALLCB *PHGCMHOSTFASTCALLCB;
#endif

/** Service specific extension callback.
 * This callback is called by the service to perform service specific operation.
 */
+ * @param pvExtension The extension pointer.
+ * @param u32Function What the callback is supposed to do.
+ * @param pvParm The function parameters.
+ * @param cbParm The size of the function parameters.
+ */
typedef DECLCALLBACK(int) FNHGCMSVCEXT(void *pvExtension, uint32_t u32Function, void *pvParm, uint32_t cbParms);
typedef FNHGCMSVCEXT *PFNHCMSVCEXT;
+
/** The Service DLL entry points.
+ */
+ * HGCM will call the DLL "VBoxHGCMSvcLoad"
+ * function and the DLL must fill in the VBOXHGCMSVCFTABLE
+ * with function pointers.
+ */
+
+ /* The structure is used in separately compiled binaries so an explicit packing is required. */
+ #pragma pack(1) /* @todo r=bird: The pragma pack(1) is not at all required!! */
typedef struct VBOXHGCMSVCFTABLE {
+ /* @name Filled by HGCM
+ *
+ + /* Size of the structure. */
+ uint32_t cbSize;
+ + /* Version of the structure, including the helpers. */
+ uint32_t u32Version;
+ + PVBOXHGCMSVCHELPERS pHelpers;
+ } /* @ */
+
+ /* @name Filled in by the service.
+ *
+ + /* Size of client information the service want to have. */
+ uint32_t cbClient;
+ #if ARCH_BITS == 64
+ /* Ensure that the following pointers are properly aligned on 64-bit system. */
+ uint32_t u32Alignment0;
+ #endif
+
+ /* Uninitialize service */
+ DECLR3CALLBACKMEMBER(int, pfnUnload, (void *pvService));
+
+ /* Inform the service about a client connection. */
+ DECLR3CALLBACKMEMBER(int, pfnConnect, (void *pvService, uint32_t u32ClientID, void *pvClient));
+
+ /* Inform the service that the client wants to disconnect. */
+ DECLR3CALLBACKMEMBER(int, pfnDisconnect, (void *pvService, uint32_t u32ClientID, void *pvClient));
+

/** Service entry point. 
 * Return code is passed to pfnCallComplete callback. */
+ DECLR3CALLBACKMEMBER(void, pfnCall, (void *pvService, VBOXHGCMCALLHANDLE callHandle, 
  uint32_t u32ClientID, void *pvClient, uint32_t function, uint32_t cParms, VBOXHGCMSVCPARM paParms[]));

/** Host Service entry point meant for privileged features invisible to the guest. 
 * Return code is passed to pfnCallComplete callback. */
+ DECLR3CALLBACKMEMBER(int, pfnHostCall, (void *pvService, uint32_t function, uint32_t cParms, 
  VBOXHGCMSVCPARM paParms[]));

/** Inform the service about a VM save operation. */
+ DECLR3CALLBACKMEMBER(int, pfnSaveState, (void *pvService, uint32_t u32ClientID, void *pvClient, 
  PSSMHANDLE pSSM));

/** Inform the service about a VM load operation. */
+ DECLR3CALLBACKMEMBER(int, pfnLoadState, (void *pvService, uint32_t u32ClientID, void *pvClient, 
  PSSMHANDLE pSSM));

/** Register a service extension callback. */
+ DECLR3CALLBACKMEMBER(int, pfnRegisterExtension, (void *pvService, PFNHGCMSVCEXT 
  pfnExtension, void *pvExtension));

/** User/instance data pointer for the service. */
+ void *pvService;

/** @} */
+} VBOXHGCMSVCFNTABLE;
+#pragma pack()
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#include <iprt/log.h>

#define RTLOG_DEBUG_PORT 0x504

/** PC port for debug output */
#define RTLOG_DEBUG_PORT 0x504

#pragma once

#define __VBox_log_h
#define __VBox_log_h

/**
* Set the default loggroup.
*/

ifndef LOG_GROUP
define LOG_GROUP_DEFAULT
endif

#include <iprt/log.h>

/**
* VirtualBox Logging Groups.
* (Remember to update LOGGROUP_NAMES!)
*/

@remark It should be pretty obvious, but just to have mentioned it, the values are sorted alphabetically (using the english alphabet) except for _DEFAULT which is always first.

If anyone might be wondering what the alphabet looks like:
typedef enum LOGGROUP
{
    /** The default VBox group. */
    LOG_GROUP_DEFAULT = RTLOGGROUP_FIRST_USER,
    /** Audio mixer group. */
    LOG_GROUP_AUDIO_MIXER,
    /** Audio mixer buffer group. */
    LOG_GROUP_AUDIO_MIXER_BUFFER,
    /** Auto-logon group. */
    LOG_GROUP_AUTOLOGON,
    /** CFGM group. */
    LOG_GROUP_CFGM,
    /** CPUM group. */
    LOG_GROUP_CPUM,
    /** CSAM group. */
    LOG_GROUP_CSAM,
    /** Debug Console group. */
    LOG_GROUP_DBGC,
    /** DBGF group. */
    LOG_GROUP_DBGF,
    /** DBGF info group. */
    LOG_GROUP_DBGF_INFO,
    /** The debugger gui. */
    LOG_GROUP_DBGG,
    /** Generic Device group. */
    LOG_GROUP_DEV,
    /** AC97 Device group. */
    LOG_GROUP_DEV_AC97,
    /** ACPI Device group. */
    LOG_GROUP_DEV_ACPI,
    /** AHCI Device group. */
    LOG_GROUP_DEV_AHCI,
    /** APIC Device group. */
    LOG_GROUP_DEV_APIC,
    /** BusLogic SCSI host adapter group. */
    LOG_GROUP_DEV_BUSLOGIC,
    /** DMA Controller group. */
    LOG_GROUP_DEV_DMA,
    /** Gigabit Ethernet Device group. */
    LOG_GROUP_DEV_E1000,
    /** Extensible Firmware Interface Device group. */
    LOG_GROUP_DEV_EFI,
    /** USB EHCI Device group. */
    LOG_GROUP_DEV_EHCI,
    /** Floppy Controller Device group. */
    LOG_GROUP_DEV_FDC,
/** Guest Interface Manager Device group. */
#define LOG_GROUP_DEV_GIM,
/** HDA Device group. */
#define LOG_GROUP_DEV_HDA,
/** HDA Codec Device group. */
#define LOG_GROUP_DEV_HDA_CODEC,
/** High Precision Event Timer Device group. */
#define LOG_GROUP_DEV_HPET,
/** IDE Device group. */
#define LOG_GROUP_DEV_IDE,
/** I/O APIC Device group. */
#define LOG_GROUP_DEV_IOAPIC,
/** The internal networking IP stack Device group. */
#define LOG_GROUP_DEV_INIP,
/** KeyBoard Controller Device group. */
#define LOG_GROUP_DEV_KBD,
/** Low Pin Count Device group. */
#define LOG_GROUP_DEV_LPC,
/** LsiLogic SCSI controller Device group. */
#define LOG_GROUP_DEV_LSILOGICSCSI,
/** NVMe Device group. */
#define LOG_GROUP_DEV_NVME,
/** USB OHCI Device group. */
#define LOG_GROUP_DEV_OHCI,
/** Parallel Device group */
#define LOG_GROUP_DEV_PARALLEL,
/** PC Device group. */
#define LOG_GROUP_DEV_PC,
/** PC Architecture Device group. */
#define LOG_GROUP_DEV_PC_ARCH,
/** PC BIOS Device group. */
#define LOG_GROUP_DEV_PC_BIOS,
/** PCI Device group. */
#define LOG_GROUP_DEV_PCI,
/** PCI Raw Device group. */
#define LOG_GROUP_DEV_PCI_RAW,
/** PCNet Device group. */
#define LOG_GROUP_DEV_PCNET,
/** PIC Device group. */
#define LOG_GROUP_DEV_PIC,
/** PIT Device group. */
#define LOG_GROUP_DEV_PIT,
/** RTC Device group. */
#define LOG_GROUP_DEV_RTC,
/** SB16 Device group. */
#define LOG_GROUP_DEV_SB16,
/** Serial Device group */
#define LOG_GROUP_DEV_SERIAL,
/** System Management Controller Device group. */
LOG_GROUP_DEV_SMC,
/** VGA Device group. */
LOG_GROUP_DEV_VGA,
/** Virtio PCI Device group. */
LOG_GROUP_DEV_VIRTIO,
/** Virtio Network Device group. */
LOG_GROUP_DEV_VIRTIO_NET,
/** VMM Device group. */
LOG_GROUP_DEV_VMM,
/** VMM Device group for backdoor logging. */
LOG_GROUP_DEV_VMM_BACKDOOR,
/** VMM Device group for logging guest backdoor logging to stderr. */
LOG_GROUP_DEV_VMM_STDERR,
/** VMSVGA Device group. */
LOG_GROUP_DEV_VMSVGA,
/** USB xHCI Device group. */
LOG_GROUP_DEV_XHCI,
/** Disassembler group. */
LOG_GROUP_DIS,
/** Generic driver group. */
LOG_GROUP_DRV,
/** ACPI driver group */
LOG_GROUP_DRV_ACPI,
/** Audio driver group */
LOG_GROUP_DRV_AUDIO,
/** Block driver group. */
LOG_GROUP_DRV_BLOCK,
/** Char driver group. */
LOG_GROUP_DRV_CHAR,
/** Disk integrity driver group. */
LOG_GROUP_DRV_DISK_INTEGRITY,
/** Video Display driver group. */
LOG_GROUP_DRV_DISPLAY,
/** Floppy media driver group. */
LOG_GROUP_DRV_FLOPPY,
/** Host Audio driver group. */
LOG_GROUP_DRV_HOST_AUDIO,
/** Host Base block driver group. */
LOG_GROUP_DRV_HOST_BASE,
/** Host DVD block driver group. */
LOG_GROUP_DRV_HOST_DVD,
/** Host floppy block driver group. */
LOG_GROUP_DRV_HOST_FLOPPY,
/** Host Parallel Driver group */
LOG_GROUP_DRV_HOST_PARALLEL,
/** Host Serial Driver Group */
LOG_GROUP_DRV_HOST_SERIAL,
+ /** The internal networking transport driver group. */
+ LOG_GROUP_DRV_INTNET,
+ /** ISO (CD/DVD) media driver group. */
+ LOG_GROUP_DRV_ISO,
+ /** Keyboard Queue driver group. */
+ LOG_GROUP_DRV_KBD_QUEUE,
+ /** lwIP IP stack driver group. */
+ LOG_GROUP_DRV_LWIP,
+ /** Video Miniport driver group. */
+ LOG_GROUP_DRV_MINIPORT,
+ /** Mouse driver group. */
+ LOG_GROUP_DRV_MOUSE,
+ /** Mouse Queue driver group. */
+ LOG_GROUP_DRV_MOUSE_QUEUE,
+ /** Named Pipe stream driver group. */
+ LOG_GROUP_DRV_NAMEDPIPE,
+ /** NAT network transport driver group */
+ LOG_GROUP_DRV_NAT,
+ /** Raw image driver group */
+ LOG_GROUP_DRV_RAW_IMAGE,
+ /** SCSI driver group. */
+ LOG_GROUP_DRV_SCSI,
+ /** Host SCSI driver group. */
+ LOG_GROUP_DRV_SCSIHOST,
+ /** TCP socket stream driver group. */
+ LOG_GROUP_DRV_TCP,
+ /** Async transport driver group */
+ LOG_GROUP_DRV_TRANSPORT_ASYNC,
+ /** TUN network transport driver group */
+ LOG_GROUP_DRV_TUN,
+ /** UDP socket stream driver group. */
+ LOG_GROUP_DRV_UDP,
+ /** UDP tunnel network transport driver group. */
+ LOG_GROUP_DRV_UDPTUNNEL,
+ /** USB Proxy driver group. */
+ LOG_GROUP_DRV_USBPROXY,
+ /** VBoxHDD media driver group. */
+ LOG_GROUP_DRV_VBOXHDD,
+ /** VBox HDD container media driver group. */
+ LOG_GROUP_DRV_VD,
+ /** VRDE audio driver group. */
+ LOG_GROUP_DRV_VRDE_AUDIO,
+ /** Virtual Switch transport driver group */
+ LOG_GROUP_DRV_VSWITCH,
+ /** USB driver group */
+ LOG_GROUP_DRV_VUSB,
+ /** EM group. */
+ LOG_GROUP_EM,
+ /** FTM group. */
+ LOG_GROUP_FTM,
+ /** GIM group. */
+ LOG_GROUP_GIM,
+ /** GMM group. */
+ LOG_GROUP_GMM,
+ /** Guest control. */
+ LOG_GROUP_GUEST_CONTROL,
+ /** Guest drag’n drop. */
+ LOG_GROUP_GUEST_DND,
+ /** GUI group. */
+ LOG_GROUP_GUI,
+ /** GVMM group. */
+ LOG_GROUP_GVMM,
+ /** HGCM group */
+ LOG_GROUP_HGCM,
+ /** HGSMI group */
+ LOG_GROUP_HGSMI,
+ /** HM group. */
+ LOG_GROUP_HM,
+ /** IEM group. */
+ LOG_GROUP_IEM,
+ /** I/O buffer management group. */
+ LOG_GROUP_IOBUFMGMT,
+ /** IOM group. */
+ LOG_GROUP_IOM,
+ /** XPCOM IPC group. */
+ LOG_GROUP_IPC,
+ /** lwIP group. */
+ LOG_GROUP_LWIP,
+ /** lwIP group, api_lib.c API_LIB_DEBUG */
+ LOG_GROUP_LWIP_API_LIB,
+ /** lwIP group, api_msg.c API_MSG_DEBUG */
+ LOG_GROUP_LWIP_API_MSG,
+ /** lwIP group, etharp.c ETHARP_DEBUG */
+ LOG_GROUP_LWIP_ETHARP,
+ /** lwIP group, icmp.c ICMP_DEBUG */
+ LOG_GROUP_LWIP_ICMP,
+ /** lwIP group, igmp.c IGMP_DEBUG */
+ LOG_GROUP_LWIP_IGMP,
+ /** lwIP group, inet.c INET_DEBUG */
+ LOG_GROUP_LWIP_INET,
+ /** lwIP group, IP_DEBUG (sic!) */
+ LOG_GROUP_LWIP_IP4,
+ /** lwIP group, ip_frag.c IP_REASS_DEBUG (sic!) */
+ LOG_GROUP_LWIP_IP4_REASS,
+ /** lwIP group, IP6_DEBUG */
+ LOG_GROUP_LWIP_IP6,
+ /** lwIP group, mem.c MEM_DEBUG */
+ LOG_GROUP_LWIP_MEM,
+ /** lwIP group, memp.c MEMP_DEBUG */
+ LOG_GROUP_LWIP_MEMP,
+ /** lwIP group, netif.c NETIF_DEBUG */
+ LOG_GROUP_LWIP_NETIF,
+ /** lwIP group, pbuf.c PBUF_DEBUG */
+ LOG_GROUP_LWIP_PBUF,
+ /** lwIP group, raw.c RAW_DEBUG */
+ LOG_GROUP_LWIP_RAW,
+ /** lwIP group, sockets.c SOCKETS_DEBUG */
+ LOG_GROUP_LWIP_SOCKETS,
+ /** lwIP group, SYS_DEBUG */
+ LOG_GROUP_LWIP_SYS,
+ /** lwIP group, TCP_DEBUG */
+ LOG_GROUP_LWIP_TCP,
+ /** lwIP group, tcpip.c TCPIP_DEBUG */
+ LOG_GROUP_LWIP_TCPIP,
+ /** lwIP group, TCP_CWND_DEBUG (congestion window) */
+ LOG_GROUP_LWIP_TCP_CWND,
+ /** lwIP group, tcp_in.c TCP_FR_DEBUG (fast retransmit) */
+ LOG_GROUP_LWIP_TCP_FR,
+ /** lwIP group, tcp_in.c TCP_INPUT_DEBUG */
+ LOG_GROUP_LWIP_TCP_INPUT,
+ /** lwIP group, tcp_out.c TCP_OUTPUT_DEBUG */
+ LOG_GROUP_LWIP_TCP_OUTPUT,
+ /** lwIP group, TCP_QLEN_DEBUG */
+ LOG_GROUP_LWIP_TCP_QLEN,
+ /** lwIP group, TCP_RST_DEBUG */
+ LOG_GROUP_LWIP_TCP_RST,
+ /** lwIP group, TCP_RTO_DEBUG (retransmit) */
+ LOG_GROUP_LWIP_TCP_RTO,
+ /** lwIP group, tcp_in.c TCP_WND_DEBUG (window updates) */
+ LOG_GROUP_LWIP_TCP_WND,
+ /** lwIP group, timers.c TIMERS_DEBUG */
+ LOG_GROUP_LWIP_TIMERS,
+ /** lwIP group, udp.c UDP_DEBUG */
+ LOG_GROUP_LWIP_UDP,
+ /** Main group. */
+ LOG_GROUP_MAIN,
+ /** Main group, IAdditionsFacility. */
+ LOG_GROUP_MAIN_ADDITIONSFacility,
+ /** Main group, IAdditionsStateChangedEvent. */
+ LOG_GROUP_MAIN_ADDITIONSSTATEchangedevent,
+ /** Main group, IAppliance. */
+ LOG_GROUP_MAIN_APPLIANCE,
+ /** Main group, IAudioAdapter. */
+ LOG_GROUP_MAIN_AUDIOADAPTER,
+ /** Main group, IAudioAdapterChangedEvent. */
+ LOG_GROUP_MAIN_AUDIOADAPTERCHANGEDEVENT,
+ /** Main group, IBandwidthControl. */
+ LOG_GROUP_MAIN_BANDWIDTHCONTROL,
+ /** Main group, IBandwidthGroup. */
+ LOG_GROUP_MAIN_BANDWIDTHGROUP,
+ /** Main group, IBandwidthGroupChangedEvent. */
+ LOG_GROUP_MAIN_BANDWIDTHGROUPCHANGEDEVENT,
+ /** Main group, IBIOSSettings. */
+ LOG_GROUP_MAIN_BIOSSETTINGS,
+ /** Main group, ICanShowWindowEvent. */
+ LOG_GROUP_MAIN_CANSHOWWINDOWEVENT,
+ /** Main group, ICertificate. */
+ LOG_GROUP_MAIN_CERTIFICATE,
+ /** Main group, IClipboardModeChangedEvent. */
+ LOG_GROUP_MAIN_CLIPBOARDMODECHANGEDEVENT,
+ /** Main group, IConsole. */
+ LOG_GROUP_MAIN_CONSOLE,
+ /** Main group, ICPUChangedEvent. */
+ LOG_GROUP_MAIN_CPUCHANGEDEVENT,
+ /** Main group, ICPUExecutionCapChangedEvent. */
+ LOG_GROUP_MAIN_CPUEXECUTIONCAPCHANGEDEVENT,
+ /** Main group, IDHCPServer. */
+ LOG_GROUP_MAIN_DHCPSERVER,
+ /** Main group, IDirectory. */
+ LOG_GROUP_MAIN_DIRECTORY,
+ /** Main group, IDisplay. */
+ LOG_GROUP_MAIN_DISPLAY,
+ /** Main group, IDisplaySourceBitmap. */
+ LOG_GROUP_MAIN_DISPLAYSOURCEBITMAP,
+ /** Main group, IDnDBase. */
+ LOG_GROUP_MAIN_DNDBASE,
+ /** Main group, IDnDModeChangedEvent. */
+ LOG_GROUP_MAIN_DNDMODECHANGEDEVENT,
+ /** Main group, IDnDSource. */
+ LOG_GROUP_MAIN_DNDSOURCE,
+ /** Main group, IDnDTarget. */
+ LOG_GROUP_MAIN_DNDTARGET,
+ /** Main group, IEmulatedUSB. */
+ LOG_GROUP_MAIN_EMULATEDUSB,
+ /** Main group, IEvent. */
+ LOG_GROUP_MAIN_EVENT,
+ /** Main group, IEventListener. */
+ LOG_GROUP_MAIN_EVENTLISTENER,
+ /** Main group, IEventSource. */
+ LOG_GROUP_MAIN_EVENTSOURCE,
+ /** Main group, IEventSourceChangedEvent. */
+ LOG_GROUP_MAIN_EVENTSOURCECHANGEDEVENT,
/** Main group, IExtPack. */
LOG_GROUP_MAIN_EXTPACK,
/** Main group, IExtPackBase. */
LOG_GROUP_MAIN_EXTPACKBASE,
/** Main group, IExtPackFile. */
LOG_GROUP_MAIN_EXTPACKFILE,
/** Main group, IExtPackManager. */
LOG_GROUP_MAIN_EXTPACKMANAGER,
/** Main group, IExtPackPlugin. */
LOG_GROUP_MAIN_EXTPACKPLUGIN,
/** Main group, IExtraDataCanChangeEvent. */
LOG_GROUP_MAIN_EXTRADATACANCHANGEEVENT,
/** Main group, IExtraDataChangedEvent. */
LOG_GROUP_MAIN_EXTRADATACHANGEDEVENT,
/** Main group, IFile. */
LOG_GROUP_MAIN_FILE,
/** Main group, IFramebuffer. */
LOG_GROUP_MAIN_FRAMEBUFFER,
/** Main group, IFramebufferOverlay. */
LOG_GROUP_MAIN_FRAMEBUFFEROVERLAY,
/** Main group, IFsObjInfo. */
LOG_GROUP_MAIN_FSOBJINFO,
/** Main group, IGuest. */
LOG_GROUP_MAIN_GUEST,
/** Main group, IGuestDirectory. */
LOG_GROUP_MAIN_GUESTDIRECTORY,
/** Main group, IGuestDnDSource. */
LOG_GROUP_MAIN_GUESTDNDSOURCE,
/** Main group, IGuestDnDTarget. */
LOG_GROUP_MAIN_GUESTDNDTARGET,
/** Main group, IGuestErrorInfo. */
LOG_GROUP_MAIN_GUESTERRORINFO,
/** Main group, IGuestFile. */
LOG_GROUP_MAIN_GUESTFILE,
/** Main group, IGuestFileEvent. */
LOG_GROUP_MAIN_GUESTFILEEVENT,
/** Main group, IGuestFileIOEvent. */
LOG_GROUP_MAIN_GUESTFILEIOEVENT,
/** Main group, IGuestFileOffsetChangedEvent. */
LOG_GROUP_MAIN_GUESTFILEOFFSETCHANGEDEVENT,
/** Main group, IGuestFileReadEvent. */
LOG_GROUP_MAIN_GUESTFILEREADEVENT,
/** Main group, IGuestFileRegisteredEvent. */
LOG_GROUP_MAIN_GUESTFILEREGISTERDEVENT,
+ /* Main group, IGuestFsObjInfo. */
+ LOG_GROUP_MAIN_GUESTFSOBJINFO,
+ /* Main group, IGuestKeyboardEvent. */
+ LOG_GROUP_MAIN_GUESTKEYBOARDEVENT,
+ /* Main group, IGuestMonitorChangedEvent. */
+ LOG_GROUP_MAIN_GUESTMONITORCHANGEDEVENT,
+ /* Main group, IGuestMouseEvent. */
+ LOG_GROUP_MAIN_GUESTMOUSEEVENT,
+ /* Main group, IGuestMultiTouchEvent. */
+ LOG_GROUP_MAIN_GUESTMULTITOUCHEVENT,
+ /* Main group, IGuestOSType. */
+ LOG_GROUP_MAIN_GUESTOSTYPE,
+ /* Main group, IGuestProcess. */
+ LOG_GROUP_MAIN_GUESTPROCESS,
+ /* Main group, IGuestProcessEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSEVENT,
+ /* Main group, IGuestProcessInputNotifyEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSINPUTNOTIFYEVENT,
+ /* Main group, IGuestProcessIOEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSIOEVENT,
+ /* Main group, IGuestProcessOutputEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSOUTPUTEVENT,
+ /* Main group, IGuestProcessRegisteredEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSREGISTEREDEVENT,
+ /* Main group, IGuestProcessStateChangedEvent. */
+ LOG_GROUP_MAIN_GUESTPROCESSSTATECHANGEDEVENT,
+ /* Main group, IGuestPropertyChangedEvent. */
+ LOG_GROUP_MAIN_GUESTPROPERTYCHANGEDEVENT,
+ /* Main group, IGuestScreenInfo. */
+ LOG_GROUP_MAIN_GUESTSCREENINFO,
+ /* Main group, IGuestSession. */
+ LOG_GROUP_MAIN_GUESTSESSION,
+ /* Main group, IGuestSessionEvent. */
+ LOG_GROUP_MAIN_GUESTSESSIONEVENT,
+ /* Main group, IGuestSessionRegisteredEvent. */
+ LOG_GROUP_MAIN_GUESTSESSIONREGISTEREDEVENT,
+ /* Main group, IGuestSessionStateChangedEvent. */
+ LOG_GROUP_MAIN_GUESTSESSIONSTATECHANGEDEVENT,
+ /* Main group, IGuestUserStateChangedEvent. */
+ LOG_GROUP_MAIN_GUESTUSERSTATECHANGEDEVENT,
+ /* Main group, IHost. */
+ LOG_GROUP_MAIN_HOST,
+ /* Main group, IHostNameResolutionConfigurationChangeEvent. */
+ LOG_GROUP_MAIN_HOSTNAMERESOLUTIONCONFIGURATIONCHANGEEVENT,
+ /* Main group, IHostNetworkInterface. */
+ LOG_GROUP_MAIN_HOSTNETWORKINTERFACE,
+ /* Main group, IHostPCIDevicePlugEvent. */
+ LOG_GROUP_MAIN_HOSTPCIDEVICEPLUGEVENT,
+ /** Main group, IHostUSBDevice. */
+ LOG_GROUP_MAIN_HOSTUSBDEVICE,
+ /** Main group, IHostUSBDeviceFilter. */
+ LOG_GROUP_MAIN_HOSTUSBDEVICEFILTER,
+ /** Main group, IHostVideoInputDevice. */
+ LOG_GROUP_MAIN_HOSTVIDEOINPUTDEVICE,
+ /** Main group, IInternalMachineControl. */
+ LOG_GROUP_MAIN_INTERNALMACHINECONTROL,
+ /** Main group, IInternalSessionControl. */
+ LOG_GROUP_MAIN_INTERNALSESSIONCONTROL,
+ /** Main group, IKeyboard. */
+ LOG_GROUP_MAIN_KEYBOARD,
+ /** Main group, IKeyboardLedsChangedEvent. */
+ LOG_GROUP_MAIN_KEYBOARDLEDSCHANGEDEVENT,
+ /** Main group, IMachine. */
+ LOG_GROUP_MAIN_MACHINE,
+ /** Main group, IMachineDataChangedEvent. */
+ LOG_GROUP_MAIN_MACHINEDATACHANGEDEVENT,
+ /** Main group, IMachineDebugger. */
+ LOG_GROUP_MAIN_MACHINEDEBUGGER,
+ /** Main group, IMachineEvent. */
+ LOG_GROUP_MAIN_MACHINEEVENT,
+ /** Main group, IMachineRegisteredEvent. */
+ LOG_GROUP_MAIN_MACHINEREGISTEREDEVENT,
+ /** Main group, IMachineStateChangedEvent. */
+ LOG_GROUP_MAIN_MACHINESTATECHANGEDEVENT,
+ /** Main group, IMedium. */
+ LOG_GROUP_MAIN_MEDIUM,
+ /** Main group, IMediumAttachment. */
+ LOG_GROUP_MAIN_MEDIUMATTACHMENT,
+ /** Main group, IMediumChangedEvent. */
+ LOG_GROUP_MAIN_MEDIUMCHANGEDEVENT,
+ /** Main group, IMediumConfigChangedEvent. */
+ LOG_GROUP_MAIN_MEDIUMCONFIGCHANGEDEVENT,
+ /** Main group, IMediumFormat. */
+ LOG_GROUP_MAIN_MEDIUMFORMAT,
+ /** Main group, IMediumRegisteredEvent. */
+ LOG_GROUP_MAIN_MEDIUMREGISTEREDEVENT,
+ /** Main group, INATNetwork. */
+ LOG_GROUP_MAIN_NATNETWORK,
+ /** Main group, INATNetworkAlterEvent. */
+ LOG_GROUP_MAIN_NATNETWORKALTEREVENT,
+ /** Main group, INATNetworkChangedEvent. */
+ LOG_GROUP_MAIN_NATNETWORKCHANGEDEVENT,
+ /** Main group, INATNetworkCreationDeletionEvent. */
+ LOG_GROUP_MAIN_NATNETWORKCREATIONDELETIONEVENT,
+ /** Main group, INATNetworkPortForwardEvent. */
+ LOG_GROUP_MAIN_NATNETWORKPORTFORWARDEVENT,
+ /** Main group, INATNetworkSettingEvent. */
+ LOG_GROUP_MAIN_NATNETWORKSETTINGEVENT,
+ /** Main group, INATNetworkStartStopEvent. */
+ LOG_GROUP_MAIN_NATNETWORKSTARTSTOPEVENT,
+ /** Main group, INATRedirectEvent. */
+ LOG_GROUP_MAIN_NATREDIRECTEVENT,
+ /** Main group, INetworkAdapter. */
+ LOG_GROUP_MAIN_NETWORKADAPTER,
+ /** Main group, INetworkAdapterChangedEvent. */
+ LOG_GROUP_MAIN_NETWORKADAPTERCHANGEDEVENT,
+ /** Main group, IParallelPort. */
+ LOG_GROUP_MAIN_PARALLELPORT,
+ /** Main group, IParallelPortChangedEvent. */
+ LOG_GROUP_MAIN_PARALLELPORTCHANGEDEVENT,
+ /** Main group, IPCIAddress. */
+ LOG_GROUP_MAIN_PCIADDRESS,
+ /** Main group, IPCIDeviceAttachment. */
+ LOG_GROUP_MAIN_PCIDEVICEATTACHMENT,
+ /** Main group, IPerformanceCollector. */
+ LOG_GROUP_MAIN_PERFORMANCECOLLECTOR,
+ /** Main group, IPerformanceMetric. */
+ LOG_GROUP_MAIN_PERFORMANCEMETRIC,
+ /** Main group, IProcess. */
+ LOG_GROUP_MAIN_PROCESS,
+ /** Main group, IProgress. */
+ LOG_GROUP_MAIN_PROGRESS,
+ /** Main group, IProgressEvent. */
+ LOG_GROUP_MAIN_PROGRESSEVENT,
+ /** Main group, IProgressPercentageChangedEvent. */
+ LOG_GROUP_MAIN_PROGRESSPERCENTAGECHANGEDEVENT,
+ /** Main group, IProgressTaskCompletedEvent. */
+ LOG_GROUP_MAIN_PROGRESSTASKCOMPLETEDEVENT,
+ /** Main group, IReusableEvent. */
+ LOG_GROUP_MAIN_REUSABLEEVENT,
+ /** Main group, IRuntimeErrorEvent. */
+ LOG_GROUP_MAIN_RUNTIMEERROREVENT,
+ /** Main group, ISerialPort. */
+ LOG_GROUP_MAIN_SERIALPORT,
+ /** Main group, ISerialPortChangedEvent. */
+ LOG_GROUP_MAIN_SERIALPORTCHANGEDEVENT,
+ /** Main group, ISession. */
+ LOG_GROUP_MAIN_SESSION,
+ /** Main group, ISessionStateChangedEvent. */
+ LOG_GROUP_MAIN_SESSIONSTATECHANGEDEVENT,
+ /** Main group, ISharedFolder. */
+ LOG_GROUP_MAIN_SHAREDFOLDER,
+ /** Main group, ISharedFolderChangedEvent. */
+ LOG_GROUP_MAIN_SHAREDFOLDERCHANGEDEVENT,
+ /** Main group, IShowWindowEvent. */
+ LOG_GROUP_MAIN_SHOWWINDOWEVENT,
+ /** Main group, ISnapshot. */
+ LOG_GROUP_MAIN_SNAPSHOT,
+ /** Main group, ISnapshotChangedEvent. */
+ LOG_GROUP_MAIN_SNAPSHOTCHANGEDEVENT,
+ /** Main group, ISnapshotDeletedEvent. */
+ LOG_GROUP_MAIN_SNAPSHOTDELETEDEVENT,
+ /** Main group, ISnapshotEvent. */
+ LOG_GROUP_MAIN_SNAPSHOTEVENT,
+ /** Main group, ISnapshotTakenEvent. */
+ LOG_GROUP_MAIN_SNAPSHOTRESTOREDEVENT,
+ /** Main group, ISnapshotRestoredEvent. */
+ LOG_GROUP_MAIN_SNAPSHOTTAKENEVENT,
+ /** Main group, IStateChangedEvent. */
+ LOG_GROUP_MAIN_STATECHANGEDEVENT,
+ /** Main group, IStorageController. */
+ LOG_GROUP_MAIN_STORAGECONTROLLER,
+ /** Main group, IStorageControllerChangedEvent. */
+ LOG_GROUP_MAIN_STORAGECONTROLLERCHANGEDEVENT,
+ /** Main group, IStorageDeviceChangedEvent. */
+ LOG_GROUP_MAIN_STORAGEDEVICESCHANGEDEVENT,
+ /** Main group, ISystemProperties. */
+ LOG_GROUP_MAIN_SYSTEMPROPERTIES,
+ /** Main group, IToken. */
+ LOG_GROUP_MAIN_TOKEN,
+ /** Main group, IUnattended. */
+ LOG_GROUP_MAIN_UNATTENDED,
+ /** Main group, IUSBController. */
+ LOG_GROUP_MAIN_USBCONTROLLER,
+ /** Main group, IUSBControllerChangedEvent. */
+ LOG_GROUP_MAIN_USBCONTROLLERCHANGEDEVENT,
+ /** Main group, IUSBDevice. */
+ LOG_GROUP_MAIN_USBDEVICE,
+ /** Main group, IUSBDeviceFilter. */
+ LOG_GROUP_MAIN_USBDEVICEFILTER,
+ /** Main group, IUSBDeviceFilters. */
+ LOG_GROUP_MAIN_USBDEVICEFILTERS,
+ /**< Main group, IUSBDeviceStateChangedEvent. */
+ LOG_GROUP_MAIN_USBDEVICESCLAIMED,  
+ /**< Main group, IUSBProxyBackend. */
+ LOG_GROUP_MAIN_USBPROXYBACKEND, 
+ /**< Main group, IVBoxSVC. */
+ LOG_GROUP_MAIN_VBOXSVC, 
+ /**< Main group, IVBoxSVCAvailabilityChangedEvent. */
+ LOG_GROUP_MAIN_VBOXSVCAVAILABILITYCHANGEDEVENT, 
+ /**< Main group, IVetoEvent. */
+ LOG_GROUP_MAIN_VETOEVENT,  
+ /**< Main group, IVFSExplorer. */
+ LOG_GROUP_MAIN_VFSEXPLORER,  
+ /**< Main group, IVVideoCaptureChangedEvent. */
+ LOG_GROUP_MAIN_VIDEOCAPTURECHANGEDEVENT, 
+ /**< Main group, IVirtualBox. */
+ LOG_GROUP_MAIN_VIRTUALBOX,  
+ /**< Main group, IVirtualBoxClient. */
+ LOG_GROUP_MAIN_VIRTUALBOXCLIENT,  
+ /**< Main group, IVirtualBoxSDS. */
+ LOG_GROUP_MAIN_VIRTUALBOXSDS, 
+ /**< Main group, IVirtualSystemDescription. */
+ LOG_GROUP_MAIN_VIRTUALSYSTEMDESCRIPTION,  
+ /**< Main group, VMM device interfaces. */
+ LOG_GROUP_MAIN_VMMEDEVINTERFACES,  
+ /**< Main group, IVRDEServer. */
+ LOG_GROUP_MAIN_VRDESERVER,  
+ /**< Main group, IVRDEServerChangedEvent. */
+ LOG_GROUP_MAIN_VRDESERVERCHANGEDEVENT, 
+ /**< Main group, IVRDEServerInfo. */
+ LOG_GROUP_MAIN_VRDESERVERINFO,  
+ /**< Main group, IVRDEServerInfoChangedEvent. */
+ LOG_GROUP_MAIN_VRDESERVERINFOCHANGEDEVENT, 
+ /**< Misc. group intended for external use only. */
+ LOG_GROUP_MISC, 
+ /**< MM group. */
+ LOG_GROUP_MM, 
+ /**< MM group. */
+ LOG_GROUP_MM_HEAP,  
+ /**< MM group. */
+ LOG_GROUP_MM_HYPER,  
+ /**< MM Hypervisor Heap group. */
+ LOG_GROUP_MM_HYPER_HEAP, 
+ /**< MM Physical/Ram group. */
+ LOG_GROUP_MM_PHYS,  
+ /**< MM Page pool group. */
+ LOG_GROUP_MM_POOL,  
+ /**< The NAT service group */
+ LOG_GROUP_NAT_SERVICE,
+ /** The network adaptor driver group. */
+ LOG_GROUP_NET_ADP_DRV,
+ /** The network filter driver group. */
+ LOG_GROUP_NET_FLT_DRV,
+ /** The common network service group */
+ LOG_GROUP_NET_SERVICE,
+ /** Network traffic shaper driver group. */
+ LOG_GROUP_NET_SHAPER,
+ /** PATM group. */
+ LOG_GROUP_PATM,
+ /** PDM group. */
+ LOG_GROUP_PDM,
+ /** PDM Async completion group. */
+ LOG_GROUP_PDM_ASYNC_COMPLETION,
+ /** PDM Block cache group. */
+ LOG_GROUP_PDM_BLK_CACHE,
+ /** PDM Device group. */
+ LOG_GROUP_PDM_DEVICE,
+ /** PDM Driver group. */
+ LOG_GROUP_PDM_DRIVER,
+ /** PDM Loader group. */
+ LOG_GROUP_PDM_LDR,
+ /** PDM Loader group. */
+ LOG_GROUP_PDM_QUEUE,
+ /** PGM group. */
+ LOG_GROUP_PGM,
+ /** PGM dynamic mapping group. */
+ LOG_GROUP_PGM_DYNMAP,
+ /** PGM physical group. */
+ LOG_GROUP_PGM_PHYS,
+ /** PGM physical access group. */
+ LOG_GROUP_PGM_PHYS_ACCESS,
+ /** PGM shadow page pool group. */
+ LOG_GROUP_PGM_POOL,
+ /** PGM shared paging group. */
+ LOG_GROUP_PGM_SHARED,
+ /** REM group. */
+ LOG_GROUP_REM,
+ /** REM disassembly handler group. */
+ LOG_GROUP_REM_DISAS,
+ /** REM access handler group. */
+ LOG_GROUP_REM_HANDLER,
+ /** REM I/O port access group. */
+ LOG_GROUP_REM_IOPORT,
+ /** REM MMIO access group. */
+ LOG_GROUP_REM_MMIO,
+ /** REM Printf. */
+ LOG_GROUP_REM_PRINTF,
/** REM running group. */
+ LOG_GROUP_REM_RUN,
+ /** SELM group. */
+ LOG_GROUP_SELM,
+ /** Shared clipboard host service group. */
+ LOG_GROUP_SHARED_CLIPBOARD,
+ /** Chromium OpenGL host service group. */
+ LOG_GROUP_SHARED_CROPENGL,
+ /** Shared folders host service group. */
+ LOG_GROUP_SHARED_FOLDERS,
+ /** OpenGL host service group. */
+ LOG_GROUP_SHARED_OPENGL,
+ /** The internal networking service group. */
+ LOG_GROUP_SRV_INTERNET,
+ /** SSM group. */
+ LOG_GROUP_SSM,
+ /** STAM group. */
+ LOG_GROUP_STAM,
+ /** SUP group. */
+ LOG_GROUP_SUP,
+ /** SUPport driver group. */
+ LOG_GROUP_SUP_DRV,
+ /** TM group. */
+ LOG_GROUP_TM,
+ /** TRPM group. */
+ LOG_GROUP_TRPM,
+ /** USB cardreader group. */
+ LOG_GROUP_USB_CARDREADER,
+ /** USB driver group. */
+ LOG_GROUP_USB_DRV,
+ /** USBFilter group. */
+ LOG_GROUP_USB_FILTER,
+ /** USB keyboard device group. */
+ LOG_GROUP_USB_KBD,
+ /** USB mouse/tablet device group. */
+ LOG_GROUP_USB_MOUSE,
+ /** MSD USB device group. */
+ LOG_GROUP_USB_MSD,
+ /** USB remote support. */
+ LOG_GROUP_USB_REMOTE,
+ /** USB webcam. */
+ LOG_GROUP_USB_WEBCAM,
+ /** VBox Guest Additions Driver (VBoxGuest). */
+ LOG_GROUP_VGDRV,
+ /** VBox Guest Additions Library. */
+ LOG_GROUP_VBGL,
+ /** Generic virtual disk layer. */
+ LOG_GROUP_VD,
/** CUE/BIN virtual disk backend. */
+ LOG_GROUP_VD_CUE,

/** DMG virtual disk backend. */
+ LOG_GROUP_VD_DMG,

/** iSCSI virtual disk backend. */
+ LOG_GROUP_VD_ISCSI,

/** Parallels HDD virtual disk backend. */
+ LOG_GROUP_VD_PARALLELS,

/** QCOW virtual disk backend. */
+ LOG_GROUP_VD_QCOW,

/** QED virtual disk backend. */
+ LOG_GROUP_VD_QED,

/** Raw virtual disk backend. */
+ LOG_GROUP_VD_RAW,

/** VDI virtual disk backend. */
+ LOG_GROUP_VD_VDI,

/** VHD virtual disk backend. */
+ LOG_GROUP_VD_VHD,

/** VHDX virtual disk backend. */
+ LOG_GROUP_VD_VHDX,

/** VM group. */
+ LOG_GROUP_VM,

/** VMM group. */
+ LOG_GROUP_VMM,

/** VRDE group */
+ LOG_GROUP_VRDE,

/** VRDP group */
+ LOG_GROUP_VRDP,

/** VSCSI group */
+ LOG_GROUP_VSCSI,

/** Webservice group. */
+ LOG_GROUP_WEBSERVICE

+ /* !!!ALPHABETICALLY!!! */
+ } VBOX_LOGGROUP;

+ 

+ /** @def VBOX_LOGGROUP_NAMES */
+ * VirtualBox Logging group names.
+ *
+ * Must correspond 100% to LOGGROUP!
+ * Don't forget commas!
+ *
+ * @remark It should be pretty obvious, but just to have
+ * mentioned it, the values are sorted alphabetically (using the
+ * english alphabet) except for _DEFAULT which is always first.
+ *
If anyone might be wondering what the alphabet looks like:

```
+ * a b c d e f g h i j k l m n o p q r s t u v w x y z
+ */
```

```
#define VBOX_LOGGROUP_NAMES
+
+ RT_LOGGROUP_NAMES, \
+ "DEFAULT",   \
+ "AUDIO_MIXER", \ 
+ "AUDIO_MIXER_BUFFER", \
+ "AUTOLOGON",   \
+ "CFGM",       \ 
+ "CPUM",      \ 
+ "CSAM",      \ 
+ "DBGC",      \ 
+ "DBGF",      \ 
+ "DBGF_INFO", \ 
+ "DBGG",      \ 
+ "DEV",       \ 
+ "DEV_AC97",  \ 
+ "DEV_ACPI",  \ 
+ "DEV_AHCI",  \ 
+ "DEV_APIC",  \ 
+ "DEV_BUSLOGIC",\ 
+ "DEV_DMA",   \ 
+ "DEV_E1000", \ 
+ "DEV_EFI",   \ 
+ "DEV_EHCI",  \ 
+ "DEV_FDC",   \ 
+ "DEV_GIM",   \ 
+ "DEV_HDA",   \ 
+ "DEV_HDA_CODEC",\ 
+ "DEV_HPET",  \ 
+ "DEV_IDE",   \ 
+ "DEV_IOAPIC",\ 
+ "DEV_INIP",  \ 
+ "DEV_KBD",   \ 
+ "DEV_LPC",   \ 
+ "DEV_LSILOGICSCSI",\ 
+ "DEV_NVME",  \ 
+ "DEV_OHCI",  \ 
+ "DEV_PARALLEL",\ 
+ "DEV_PC",    \ 
+ "DEV_PC_ARCH",\ 
+ "DEV_PC_BIOS",\ 
+ "DEV_PCI",   \ 
+ "DEV_PCI_RAW",\ 
+ "DEV_PCIE",  \ 
+ "DEV_PCNET", \ 
+ "DEV_PIC",   \ 
```
+ "DEV_PIT", \
+ "DEV_RTC", \
+ "DEV_SB16", \
+ "DEV_SERIAL", \
+ "DEV_SMC", \
+ "DEV_VGA", \
+ "DEV_VIRTIO", \
+ "DEV_VIRTIO_NET", \
+ "DEV_VMM", \
+ "DEV_VMM_BACKDOOR", \
+ "DEV_VMM_STDERR", \
+ "DEV_VMSVGA", \
+ "DEV_XHCI", \
+ "DIS", \
+ "DRV", \
+ "DRV_ACPI", \
+ "DRV_AUDIO", \
+ "DRV_BLOCK", \
+ "DRV_CHAR", \
+ "DRV_DISK_INTEGRITY", \
+ "DRV_DISPLAY", \
+ "DRV_FLOPPY", \
+ "DRV_HOST_AUDIO", \
+ "DRV_HOST_BASE", \
+ "DRV_HOST_DVD", \
+ "DRV_HOST_FLOPPY", \
+ "DRV_HOST_PARALLEL", \
+ "DRV_HOST_SERIAL", \
+ "DRV_INTNET", \
+ "DRV_ISO", \
+ "DRV_KBD_QUEUE", \
+ "DRV_LWIP", \
+ "DRV_MINIPORT", \
+ "DRV_MOUSE", \
+ "DRV_MOUSE_QUEUE", \
+ "DRV_NAMEDPIPE", \
+ "DRV_NAT", \
+ "DRV_RAW_IMAGE", \
+ "DRV_SCSI", \
+ "DRV_SCSIHOST", \
+ "DRV_TCP", \
+ "DRV_TRANSPORT_ASYNC", \
+ "DRV_TUN", \
+ "DRV_UDP", \
+ "DRV_UDPTUNNEL", \
+ "DRV_USBPROXY", \
+ "DRV_VBOXHDD", \
+ "DRV_VD",
+ "DRV_VRDE_AUDIO",
+ "DRV_VSWITCH",
+ "DRV_VUSB",
+ "EM",
+ "FTM",
+ "GIM",
+ "GMM",
+ "GUEST_CONTROL",
+ "GUEST_DND",
+ "GVMM",
+ "HGCM",
+ "HGSMI",
+ "HM",
+ "IEM",
+ "IOBUF_MGMT",
+ "IOM",
+ "IPC",
+ "LWIP",
+ "LWIP_API_LIB",
+ "LWIP_API_MSG",
+ "LWIP_ETHARP",
+ "LWIP_ICMP",
+ "LWIP_IGMP",
+ "LWIP_INET",
+ "LWIP_IP4",
+ "LWIP_IP4_REASS",
+ "LWIP_IP6",
+ "LWIP_MEM",
+ "LWIP_MEMP",
+ "LWIP_NETIF",
+ "LWIP_PBUF",
+ "LWIP_RAW",
+ "LWIP_SOCKETS",
+ "LWIP_SYS",
+ "LWIP_TCP",
+ "LWIP_TCPIP",
+ "LWIP_TCP_CWND",
+ "LWIP_TCP_FR",
+ "LWIP_TCP_INPUT",
+ "LWIP_TCP_OUTPUT",
+ "LWIP_TCP_QLEN",
+ "LWIP_TCP_RST",
+ "LWIP_TCP_RTO",
+ "LWIP_TCP_WND",
+ "LWIP_TIMERS",
+ "LWIP_UDP",
+ "MAIN"
"MAIN_GUESTFILEREADEVENT",
"MAIN_GUESTFILEREGISTEREDEVENT",
"MAIN_GUESTFILESTATECHANGEDEVENT",
"MAIN_GUESTFILEWRITEEVENT",
"MAIN_GUESTFSOBJINFO",
"MAIN_GUESTKEYBOARDEVENT",
"MAIN_GUESTMONITORSTATECHANGEDEVENT",
"MAIN_GUESTMOUSEEVENT",
"MAIN_GUESTMULTITOUCEVENT",
"MAIN_GUESTOSTYPE",
"MAIN_GUESTPROCESS",
"MAIN_GUESTPROCESSEVENT",
"MAIN_GUESTPROCESSINPUTNOTIFYEVENT",
"MAIN_GUESTPROCESSIOEVENT",
"MAIN_GUESTPROCESSOCTYPE",
"MAIN_GUESTPROCESSOUTPUTEVENT",
"MAIN_GUESTPROCESSREGISTEREDEVENT",
"MAIN_GUESTPROCESSSTATECHANGEDEVENT",
"MAIN_GUESTPROPERTYCHANGEDEVENT",
"MAIN_GUESTSCREENINFO",
"MAIN_GUESTSESSION",
"MAIN_GUESTSESSIONEVENT",
"MAIN_GUESTSESSIONREGISTEREDEVENT",
"MAIN_GUESTSESSIONSTATECHANGEDEVENT",
"MAIN_GUESTUSERSTATECHANGEDEVENT",
"MAIN_HOST",
"MAIN_HOSTNAME",
"MAIN_HOSTNAMERESOLUTIONCONFIGURATIONCHANGEDEVENT",
"MAIN_HOSTNETWORKINTERFACE",
"MAIN_HOSTPCIDEVICEPLUGEVENT",
"MAIN_HOSTUSBDEVICE",
"MAIN_HOSTUSBDEVICEFILTER",
"MAIN_HOSTVIDEOINPUTDEVICE",
"MAIN_INTERNALMACHINECONTROL",
"MAIN_INTERNALSESSIONCONTROL",
"MAIN_KEYBOARD",
"MAIN_KEYBOARDLEDSCHANGEDEVENT",
"MAIN_MACHINE",
"MAIN_MACHINEDATACHANGEDEVENT",
"MAIN_MACHINEDEBUGGER",
"MAIN_MACHINETIME",
"MAIN_MACHINEREGISTEREDEVENT",
"MAIN_MACHINESTATECHANGEDEVENT",
"MAIN_MEDIUM",
"MAIN_MEDIUMATTACHMENT",
"MAIN_MEDIUMCHANGEDEVENT",
"MAIN_MEDIUMCONFIGCHANGEDEVENT",
"MAIN_MEDIUMFORMAT",
"MAIN_MEDIUMREGISTEREDEVENT",
"MAIN_MOUSE"
"MAIN_MOUSECAPABILITYCHANGED", \
"MAIN_MOUSEPOINTERSHAPE", \
"MAIN_MOUSEPOINTERSHAPECHANGED", \
"MAIN_NATENGINE", \
"MAIN_NATNETWORK", \
"MAIN_NATNETWORKALTEREVENT", \
"MAIN_NATNETWORKCHANGED", \
"MAIN_NATNETWORKCREATIONDELETIONEVENT", \
"MAIN_NATNETWORKPORTFORWARMEVENT", \
"MAIN_NATNETWORKSETTINGEVENT", \
"MAIN_NATNETWORKSTARTSTOPEVENT", \
"MAIN_NATREDIRECTEVENT", \
"MAIN_NETWORKADAPTER", \
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"MAIN_USBPROXYBACKEND",
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"MAIN_VETOEVENT",
"MAIN_VFSEXPLORER",
"MAIN_VIDEOCAPTURECHANGEDEVENT",
"MAIN_VIRTUALBOX",
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"PGM_PHYS",
"PGM_PHYS_ACCESS",
"PGM_POOL",
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+ "REM_HANDLER", \
+ "REM_IOPORT", \
+ "REM_MMIO", \
+ "REM_PRINTF", \
+ "REM_RUN", \
+ "SELM", \
+ "SHARED_CLIPBOARD", \
+ "SHARED_CROPENGL", \
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+ "SHARED_OPENGL", \
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+ "SSM", \
+ "STAM", \
+ "SUP", \
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+ "TM", \
+ "TRPM", \
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+ "USB_DRV", \
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+ "USB_KBD", \
+ "USB_MOUSE", \
+ "USB_MSD", \
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+ "VBGL", \
+ "VD", \
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+ "VD_DMG", \
+ "VD_ISCSI", \
+ "VD_PARALLELS", \
+ "VD_QCOW", \
+ "VD_QED", \
+ "VD_RAW", \
+ "VD_VDI", \
+ "VD_VHD", \
+ "VD_VHDX", \
+ "VD_VMDK", \
+ "VM", \
+ "VMM", \
+ "VRDE", \
+ "VRDP", \
+ "VSCSI", \
+ "WEBSERVICE", \
+
+ /** @} */
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/ostypes.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/ostypes.h
@@ -0,0 +1,170 @@
+/** @file  
+ * VirtualBox - Global Guest Operating System definition.
+ */
+ +
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+ +
+#ifndef ___VBox_ostypes_h
+#define ___VBox_ostypes_h
+
+#include <iprt/cdefs.h>
+
+RT_C_DECLS_BEGIN
+
+/**
+ * Global list of guest operating system types.
+ *
+ * They are grouped into families. A family identifier is always has
+ * mod 0x10000 == 0. New entries can be added, however other components
+ * depend on the values (e.g. the Qt GUI and guest additions) so the
+ * existing values MUST stay the same.
+ *
+ * Note: distinguish between 32 & 64 bits guest OSes by checking bit 8 (mod 0x100)
+ */
+ typedef enum VBOXOSTYPE
+ {
+ VBOXOSTYPE_Unknown = 0,
+ VBOXOSTYPE_Unknown_x64 = 0x00100,
+ VBOXOSTYPE_DOS = 0x10000,
+ VBOXOSTYPE_Win31 = 0x15000,
+ VBOXOSTYPE_Win9x = 0x20000,
+ VBOXOSTYPE_Win95 = 0x21000,
+ VBOXOSTYPE_Win98 = 0x22000,
+ VBOXOSTYPE_WinMe = 0x23000,
+ VBOXOSTYPE_WinNT = 0x30000,
+ VBOXOSTYPE_WinNT_x64 = 0x30100,
+ VBOXOSTYPE_WinNT4 = 0x31000,
+ VBOXOSTYPE_Win2k = 0x32000,
+ VBOXOSTYPE_WinXP = 0x33000,
+ VBOXOSTYPE_WinXP_x64 = 0x33100,
+ VBOXOSTYPE_Win2k3 = 0x34000,
+ VBOXOSTYPE_Win2k3_x64 = 0x34100,
+ VBOXOSTYPE_WinVista = 0x35000,
+ VBOXOSTYPE_WinVista_x64 = 0x35100,
+ VBOXOSTYPE_Win2k8 = 0x36000,
+ VBOXOSTYPE_Win2k8_x64 = 0x36100,
+ VBOXOSTYPE_Win7 = 0x37000,
+ VBOXOSTYPE_Win7_x64 = 0x37100,
+ VBOXOSTYPE_Win8 = 0x38000,
+ VBOXOSTYPE_Win8_x64 = 0x38100,
+ VBOXOSTYPE_Win2k12_x64 = 0x39100,
+ VBOXOSTYPE_Win81 = 0x3A000,
+ VBOXOSTYPE_Win81_x64 = 0x3A100,
+ VBOXOSTYPE_Win10 = 0x3B000,
+ VBOXOSTYPE_Win10_x64 = 0x3B100,
+ VBOXOSTYPE_Win2k16_x64 = 0x3C100,
+ VBOXOSTYPE_OS2 = 0x40000,
+ VBOXOSTYPE_OS2Warp3 = 0x41000,
+ VBOXOSTYPE_OS2Warp4 = 0x42000,
+ VBOXOSTYPE_OS2Warp45 = 0x43000,
+ VBOXOSTYPE_ECS = 0x44000,
+ VBOXOSTYPE_OS21x = 0x48000,
+ VBOXOSTYPE_Linux = 0x50000,
+ VBOXOSTYPE_Linux_x64 = 0x50100,
+ VBOXOSTYPE_Linux22 = 0x51000,
+ VBOXOSTYPE_Linux24 = 0x52000,
+ VBOXOSTYPE_Linux24_x64 = 0x52100,
+ VBOXOSTYPE_Linux26 = 0x53000,
+ VBOXOSTYPE_Linux26_x64 = 0x53100,
+ VBOXOSTYPE_ArchLinux = 0x54000,
+ VBOXOSTYPE_ArchLinux_x64 = 0x54100,
+ VBOXOSTYPE_Debian = 0x55000,
+ VBOXOSTYPE_Debian_x64 = 0x55100,
+ VBOXOSTYPE_OpenSUSE = 0x56000,
+ VBOXOSTYPE_OpenSUSE_x64 = 0x56100,
+ VBOXOSTYPE_FedoraCore = 0x57000,
+ VBOXOSTYPE_FedoraCore_x64 = 0x57100,
+ VBOXOSTYPE_Gentoo = 0x58000,
+ VBOXOSTYPE_Gentoo_x64 = 0x58100,
+ VBOXOSTYPE_Mandriva = 0x59000,
+ VBOXOSTYPE_Mandriva_x64 = 0x59100,
+ VBOXOSTYPE_RedHat = 0x5A000,
+ VBOXOSTYPE_RedHat_x64 = 0x5A100,
+ VBOXOSTYPE_Turbolinux = 0x5B000,
+ VBOXOSTYPE_Turbolinux_x64 = 0x5B100,
+ VBOXOSTYPE_Ubuntu = 0x5C000,
+ VBOXOSTYPE_Ubuntu_x64 = 0x5C100,
+ VBOXOSTYPE_Xandros = 0x5D000,
+ VBOXOSTYPE_Xandros_x64 = 0x5D100,
+ VBOXOSTYPE_Oracle = 0x5E000,
+ VBOXOSTYPE_Oracle_x64 = 0x5E100,
+ VBOXOSTYPE_FreeBSD = 0x60000,
+ VBOXOSTYPE_FreeBSD_x64 = 0x60100,
+ VBOXOSTYPE_OpenBSD = 0x61000,
+ VBOXOSTYPE_OpenBSD_x64 = 0x61100,
+ VBOXOSTYPE_NetBSD = 0x62000,
+ VBOXOSTYPE_NetBSD_x64 = 0x62100,
+ VBOXOSTYPE_Netware = 0x70000,
+ VBOXOSTYPE_Solaris = 0x80000,
+ VBOXOSTYPE_Solaris_x64 = 0x80100,
+ VBOXOSTYPE_OpenSolaris = 0x81000,
+ VBOXOSTYPE_OpenSolaris_x64 = 0x82100,
+ VBOXOSTYPE_Solaris11_x64 = 0x82100,
+ VBOXOSTYPE_L4 = 0x90000,
+ VBOXOSTYPE_QNX = 0xA0000,
+ VBOXOSTYPE_MacOS = 0xB0000,
+ VBOXOSTYPE_MacOS_x64 = 0xB0100,
+ VBOXOSTYPE_MacOS106 = 0xB2000,
+ VBOXOSTYPE_MacOS106_x64 = 0xB2100,
+ VBOXOSTYPE_MacOS107_x64 = 0xB3100,
+ VBOXOSTYPE_MacOS108_x64 = 0xB4100,
+ VBOXOSTYPE_MacOS109_x64 = 0xB5100,
+ VBOXOSTYPE_MacOS1010_x64 = 0xB6100,
+ VBOXOSTYPE_MacOS1011_x64 = 0xB7100,
+ VBOXOSTYPE_MacOS1012_x64 = 0xB8100,
+ VBOXOSTYPE_MacOS1013_x64 = 0xB9100,
+ VBOXOSTYPE_JRockitVE = 0xC0000,
+ VBOXOSTYPE_Haiku = 0xD0000,
+ VBOXOSTYPE_Haiku_x64 = 0xD0100,
+ VBOXOSTYPE_VBoxBS_x64 = 0xE0100,

+/** The bit number which indicates 64-bit or 32-bit. */
+#define VBOXOSTYPE_x64_BIT 8
+ /** The mask which indicates 64-bit. */
+ VBOXOSTYPE_x64 = 1 << VBOXOSTYPE_x64_BIT,
+ /** The usual 32-bit hack. */
+ VBOXOSTYPE_32BIT_HACK = 0x7fffffff
+ } VBOXOSTYPE;
+
+
+/**
+ * Global list of guest OS families.
+ */
+typedef enum VBOXOSFAMILY
+{
+ VBOXOSFAMILY_Unknown = 0,
+ VBOXOSFAMILY_Windows32 = 1,
+ VBOXOSFAMILY_Windows64 = 2,
+ VBOXOSFAMILY_Linux32 = 3,
+ VBOXOSFAMILY_Linux64 = 4,
+ VBOXOSFAMILY_FreeBSD32 = 5,
+ VBOXOSFAMILY_FreeBSD64 = 6,
+ VBOXOSFAMILY_Solaris32 = 7,
+ VBOXOSFAMILY_Solaris64 = 8,
+ VBOXOSFAMILY_MacOSX32 = 9,
+ VBOXOSFAMILY_MacOSX64 = 10,
+ /** The usual 32-bit hack. */
+ VBOXOSFAMILY_32BIT_HACK = 0x7fffffff
+ } VBOXOSFAMILY;
+
+RT_C_DECLS_END
+
+endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/param.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/param.h
@@ -0,0 +1,190 @@
+/** @file
+ * VirtualBox Parameter Definitions. (VMM,+)
+ *
+ * param.mac is generated from this file by running 'kmk incs' in the root.
+ */
+ *
+/**
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
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+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
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+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBox_param_h
+#define ___VBox_param_h
+
+#include <iprt/param.h>
+#include <iprt/cdefs.h>
+
+/** @defgroup grp_vbox_param  VBox Parameter Definition
+ * @@
+ */
+
+/** The maximum number of pages that can be allocated and mapped
+ * by various MM, PGM and SUP APIs. */
+#if ARCH_BITS == 64
+# define VBOX_MAX_ALLOC_PAGE_COUNT (_512M / PAGE_SIZE)
+#else
+# define VBOX_MAX_ALLOC_PAGE_COUNT (_256M / PAGE_SIZE)
+endif
+
+/** @def VBOX_WITH_PAGE_SHARING
+ * Enables the page sharing code.
+ * @remarks This must match GMMR0Init; currently we only support page fusion on
+ * all 64-bit hosts except Mac OS X */
+#if (   HC_ARCH_BITS == 64          /* ASM-NOINC */
+     && (defined(RT_OS_FREEBSD) || defined(RT_OS_LINUX) || defined(RT_OS_SOLARIS) ||
defined(RT_OS_WINDOWS)) ) /* ASM-NOINC */
+     || defined(DOXYGEN_RUNNING)        /* ASM-NOINC */
+# define VBOX_WITH_PAGE_SHARING     /* ASM-NOINC */
+ENDIF /* ASM-NOINC */
+
+/** @defgroup grp_vbox_param_mm  Memory Monitor Parameters
+ * @@
+ */
+
+/** Initial address of Hypervisor Memory Area.
+ * MUST BE PAGE TABLE ALIGNED! */

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```c
#define MM_HYPER_AREA_ADDRESS       UINT32_C(0xa0000000)
+
/** The max size of the hypervisor memory area. */
#define MM_HYPER_AREA_MAX_SIZE      (40U * _1M) /**< @todo Readjust when floating RAMRANGES have been implemented. Used to be 20 * _1MB */
+
/** Maximum number of bytes we can dynamically map into the hypervisor region. */
+ * This must be a power of 2 number of pages!
+ */
#define MM_HYPER_DYNAMIC_SIZE       (16U * PAGE_SIZE)
+
/** The minimum guest RAM size in bytes. */
#define MM_RAM_MIN                  UINT32_C(0x00400000)
+/** The maximum guest RAM size in bytes. */
+if HC_ARCH_BITS == 64
++define MM_RAM_MAX                 UINT64_C(0x200000000000)
++else
++define MM_RAM_MAX                 UINT64_C(0x000E00000000)
+endif
+/** The minimum guest RAM size in MBs. */
+define MM_RAM_MIN_IN_MB           UINT32_C(4)
+/** The maximum guest RAM size in MBs. */
+if HC_ARCH_BITS == 64
++define MM_RAM_MAX_IN_MB          UINT32_C(2097152)
++else
++define MM_RAM_MAX_IN_MB          UINT32_C(3584)
+endif
+/** The default size of the below 4GB RAM hole. */
+define MM_RAM_HOLE_SIZE_DEFAULT   (512U * _1M)
+/** The maximum 64-bit MMIO BAR size.
+ * @remarks There isn't really any limit here other than the size of the
+ * tracking structures we need (around 1/256 of the size). */
+if HC_ARCH_BITS == 64
++define MM_MMIO_64_MAX             _1T
++else
++define MM_MMIO_64_MAX             (_1G64 * 16)
+endif
+/** The maximum 32-bit MMIO BAR size. */
+define MM_MMIO_32_MAX              _2G
+/** @ } */
+
+@defgroup grp_vbox_param_pgm  Page Manager Parameters
+ * @ {
+ */
+/** The number of handy pages.
+ * This should be a power of two. */
```
#define PGM_HANDY_PAGES             128
+/** The threshold at which allocation of more handy pages is flagged. */
+#define PGM_HANDY_PAGES_SET_FF     32
+/** The threshold at which we will allocate more when in ring-3.
+ * This is must be smaller than both PGM_HANDY_PAGES_SET_FF and
+ * PGM_HANDY_PAGES_MIN. */
+#define PGM_HANDY_PAGES_R3_ALLOC   8
+/** The threshold at which we will allocate more when in ring-0 or raw mode.
+ * The idea is that we should never go below this threshold while in ring-0 or
+ * raw mode because of PGM_HANDY_PAGES_RZ_TO_R3. However, should this happen and
+ * we are actually out of memory, we will have 8 page to get out of whatever
+ * code we're executing.
+ *
+ * This is must be smaller than both PGM_HANDY_PAGES_SET_FF and
+ * PGM_HANDY_PAGES_MIN. */
+#define PGM_HANDY_PAGES_RZ_ALLOC   8
+/** The threshold at which we force return to R3 ASAP.
+ * The idea is that this should be large enough to get out of any code and up to
+ * the main EM loop when we are out of memory.
+ * This must be less or equal to PGM_HANDY_PAGES_MIN. */
+#define PGM_HANDY_PAGES_RZ_TO_R3    24
+/** The minimum number of handy pages (after allocation).
+ * This must be greater or equal to PGM_HANDY_PAGES_SET_FF.
+ * Another name would be PGM_HANDY_PAGES_EXTRA_RESERVATION or _PARANOIA. :-) */
+#define PGM_HANDY_PAGES_MIN         32
+/** @} */

/** @} */

/** @defgroup grp_vbox_param_vmm VMM Parameters */
+/** @} */
+/** VMM stack size. */
+#ifdef RT_OS_DARWIN
+## define VMM_STACK_SIZE 16384U
+##else
+## define VMM_STACK_SIZE 8192U
+##endif
+/** Min number of Virtual CPUs. */
+##define VMM_MIN_CPU_COUNT 1
+/** Max number of Virtual CPUs. */
+##define VMM_MAX_CPU_COUNT 64
+/** @} */

+/** @} */

+/** @defgroup grp_vbox_pci PCI Identifiers */
+/** VirtualBox PCI vendor ID. */
+#define VBOX_PCI_VENDORID       (0x80ee)
+
+/** @name VirtualBox graphics card identifiers
+ * @{ */
+#define VBOX_VENDORID          VBOX_PCI_VENDORID /**< @todo wonderful choice of name! Please squeeze a _VGA_ or something in there, please. */
+#define VBOX_DEVICEID           (0xbeef) /**< @todo ditto. */
+#define VBOX_VESA_VENDORID      VBOX_PCI_VENDORID
+#define VBOX_VESA_DEVICEID      (0xbeef)
+/** @} */

+/** @} */
+
+/** @} */
+
+/** @} */
+
+/** @defgroup grp_vbox_param_misc Misc */
+/** @} */
+
+/** The maximum size of a generic segment offload (GSO) frame. This limit is imposed by the 16-bit frame size in internal networking header. */
+#define VBOX_MAX_GSO_SIZE       0xfff0
+
+/** @} */
+
+/** @} */
+
+/** @} */
+
+endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/shflsvc.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/shflsvc.h
@@ -0,0 +1,1435 @@
+/** @file
+ * Shared Folders: Common header for host service and guest clients.
+ */
+/** */
+/** */
+/** Copyright (C) 2006-2017 Oracle Corporation
+ */
+/** */
+/** This file is part of VirtualBox Open Source Edition (OSE), as
+ available from http://www.virtualbox.org. This file is free software;
+ you can redistribute it and/or modify it under the terms of the GNU
+ General Public License (GPL) as published by the Free Software
+ */
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBox_shflsvc_h
+#define ___VBox_shflsvc_h
+
+#ifndef BIT_FLAG
+#define BIT_FLAG(__Field, __Flag)       ((__Field) & (__Flag))
+#endif
+
+#ifndef BIT_FLAG_SET
+#define BIT_FLAG_SET(__Field, __Flag)   ((__Field) |= (__Flag))
+#endif
+
+#ifndef BIT_FLAG_CLEAR
+#define BIT_FLAG_CLEAR(__Field, __Flag) ((__Field) &= ~(__Flag))
+#endif
+
/** @} */
+
/** @name Some bit flag manipulation macros. */
+ * @{ *
+* *
+#ifndef BIT_FLAG
+#define BIT_FLAG(__Field, __Flag)       ((__Field) & (__Flag))
+#endif
+
+** @} */
+
/** Structures shared between guest and the service
+ * can be relocated and use offsets to point to variable
+ * length parts.
+ */
+
+**
+ * Shared folders protocol works with handles.

---

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+ * Before doing any action on a file system object,
+ * one have to obtain the object handle via a SHFL_FN_CREATE
+ * request. A handle must be closed with SHFL_FN_CLOSE.
+ */
+
+/** Shared Folders service functions. (guest)
+ * @}
+ */
+
+/** Query mappings changes. */
+#define SHFL_FN_QUERY_MAPPINGS  (1)
+/** Query mappings changes. */
+#define SHFL_FN_QUERY_MAP_NAME  (2)
+/** Open/create object. */
+#define SHFL_FN_CREATE        (3)
+/** Close object handle. */
+#define SHFL_FN_CLOSE         (4)
+/** Read object content. */
+#define SHFL_FN_READ          (5)
+/** Write new object content. */
+#define SHFL_FN_WRITE         (6)
+/** Lock/unlock a range in the object. */
+#define SHFL_FN_LOCK          (7)
+/** List object content. */
+#define SHFL_FN_LIST          (8)
+/** Query/set object information. */
+#define SHFL_FN_INFORMATION   (9)
+/** Remove object */
+#define SHFL_FN_REMOVE        (11)
+/** Map folder (legacy) */
+#define SHFL_FN_MAP_FOLDER_OLD (12)
+/** Unmap folder */
+#define SHFL_FN_UNMAP_FOLDER  (13)
+/** Rename object (possibly moving it to another directory) */
+#define SHFL_FN_RENAME        (14)
+/** Flush file */
+#define SHFL_FN_FLUSH         (15)
+/** @todo macl, a description, please. */
+#define SHFL_FN_SET_UTF8      (16)
+/** Map folder */
+#define SHFL_FN_MAP_FOLDER    (17)
+/** Read symlink destination (as of VBox 4.0) */
+#define SHFL_FN_READLINK      (18)
+/** Create symlink (as of VBox 4.0) */
+#define SHFL_FN_SYMLINK       (19)
+/** Ask host to show symlinks (as of VBox 4.0) */
+#define SHFL_FN_SET_SYMLINKS  (20)
+
/** @} */
+
/** Shared Folders service functions. (host) */
+ * @}
+ */
+
/** Add shared folder mapping. */
#define SHFL_FN_ADD_MAPPING (1)
/** Remove shared folder mapping. */
#define SHFL_FN_REMOVE_MAPPING (2)
/** Set the led status light address. */
#define SHFL_FN_SET_STATUS_LED (3)
/** Allow the guest to create symbolic links (as of VBox 4.0) */
#define SHFL_FN_ALLOW_SYMLINKS_CREATE (4)
/** @} */
+
/** Root handle for a mapping. Root handles are unique. */
+ * @note
+ * Function parameters structures consider
+ * the root handle as 32 bit value. If the typedef
+ * will be changed, then function parameters must be
+ * changed accordingly. All those parameters are marked
+ * with SHFLROOT in comments.
+ */
typedef uint32_t SHFLROOT;
+
#define SHFL_ROOT_NIL ((SHFLROOT)~0)
+
/** A shared folders handle for an opened object. */
typedef uint64_t SHFLHANDLE;
+
#define SHFL_HANDLE_NIL  ((SHFLHANDLE)~0LL)
#define SHFL_HANDLE_ROOT ((SHFLHANDLE)0LL)
+
/** Hardcoded maximum length (in chars) of a shared folder name. */
#define SHFL_MAX_LEN         (256)
/** Hardcoded maximum number of shared folder mapping available to the guest. */
#define SHFL_MAX_MAPPINGS    (64)
+
/** @name Shared Folders strings. They can be either UTF-8 or UTF-16. */
+ * @}
+ */
+
/** Shared folder string buffer structure. */
typedef struct _SHFLSTRING
/** Allocated size of the String member in bytes. */
  uint16_t u16Size;
  
/** Length of string without trailing null in bytes. */
  uint16_t u16Length;

/** UTF-8 or UTF-16 string. Null terminated. */
union
  {#if 1
    uint8_t  utf8[1];
    RTUTF16 utf16[1];
    uint16_t ucs2[1]; /**< misnomer, use utf16. */
  +#else
    uint8_t  utf8[RT_FLEXIBLE_ARRAY_IN_NESTED_UNION];
    RTUTF16 utf16[RT_FLEXIBLE_ARRAY_IN_NESTED_UNION];
    RTUTF16 ucs2[RT_FLEXIBLE_ARRAY_IN_NESTED_UNION]; /**< misnomer, use utf16. */
  +#endif
  } String;
} SHFLSTRING;

AssertCompileSize(RTUTF16, 2);
AssertCompileSize(SHFLSTRING, 6);
AssertCompileMemberOffset(SHFLSTRING, String, 4);
/** The size of SHFLSTRING w/o the string part. */
#define SHFLSTRING_HEADER_SIZE  4
AssertCompileMemberOffset(SHFLSTRING, String, SHFLSTRING_HEADER_SIZE);

/** Pointer to a shared folder string buffer. */
typedef SHFLSTRING *PSHFLSTRING;
/** Pointer to a const shared folder string buffer. */
typedef const SHFLSTRING *PCSHFLSTRING;

/** Calculate size of the string. */
DECLINLINE(uint32_t) ShflStringSizeOfBuffer(PCSHFLSTRING pString)
{
    return pString ? (uint32_t)(SHFLSTRING_HEADER_SIZE + pString->u16Size) : 0;
}

DECLINLINE(uint32_t) ShflStringLength(PCSHFLSTRING pString)
{
    return pString ? pString->u16Length : 0;
}

DECLINLINE(PCSHFLSTRING) ShflStringInitBuffer(void *pvBuffer, uint32_t u32Size)
{
    PSHFLSTRING pString = NULL;
    const uint32_t u32HeaderSize = SHFLSTRING_HEADER_SIZE;
+ /*
+  * Check that the buffer size is big enough to hold a zero sized string
+  * and is not too big to fit into 16 bit variables.
+  */
+ if (u32Size >= u32HeaderSize && u32Size - u32HeaderSize <= 0xFFFF)
+ {
+     pString = (PSHFLSTRING)pvBuffer;
+     pString->u16Size = (uint16_t)(u32Size - u32HeaderSize);
+     pString->u16Length = 0;
+     if (pString->u16Size >= sizeof(pString->String.ucs2[0]))
+         pString->String.ucs2[0] = 0;
+     else if (pString->u16Size >= sizeof(pString->String.utf8[0]))
+         pString->String.utf8[0] = 0;
+ }
+ return pString;
+
+ /***
+ * Validates a HGCM string output parameter.
+ *
+ * @returns true if valid, false if not.
+ *
+ * @param   pString     The string buffer pointer.
+ * @param   cbBuf       The buffer size from the parameter.
+ */
+DECLINLINE(bool) ShflStringIsValidOut(PCSHFLSTRING pString, uint32_t cbBuf)
+{
+    if (RT_LIKELY(cbBuf > RT_UOFFSETOF(SHFLSTRING, String)))
+        if (RT_LIKELY((uint32_t)pString->u16Size + RT_UOFFSETOF(SHFLSTRING, String) <= cbBuf))
+            if (RT_LIKELY(pString->u16Length < pString->u16Size))
+                return true;
+    return false;
+}
+
+ /***
+ * Validates a HGCM string input parameter.
+ *
+ * @returns true if valid, false if not.
+ *
+ * @param   pString     The string buffer pointer.
+ * @param   cbBuf       The buffer size from the parameter.
+ * @param   fUtf8Not16  Set if UTF-8 encoding, clear if UTF-16 encoding.
+ */
+DECLINLINE(bool) ShflStringIsValidIn(PCSHFLSTRING pString, uint32_t cbBuf, bool fUtf8Not16)
+{ 
+    int rc;
+}
+ if (RT_LIKELY(cbBuf > RT_UOFFSETOF(SHFLSTRING, String)))
+ {  
+   if (RT_LIKELY((uint32_t)pString->u16Size + RT_UOFFSETOF(SHFLSTRING, String) <= cbBuf))
+   {  
+     if (fUtf8Not16)
+     {  
+       /* UTF-8: */
+       if (RT_LIKELY(pString->u16Length < pString->u16Size))
+       {  
+         rc = RTStrValidateEncodingEx((const char *)&pString->String.utf8[0], pString->u16Length + 1,
+                                    RTSTR_VALIDATE_ENCODING_EXACT_LENGTH | RTSTR_VALIDATE_ENCODING_ZERO_TERMINATED);
+         if (RT_SUCCESS(rc))
+           return true;
+       }  
+       else
+       {  
+         /* UTF-16: */
+         if (RT_LIKELY(!(pString->u16Length & 1)))
+         {  
+           if (RT_LIKELY((uint32_t)sizeof(RTUTF16) + pString->u16Length <= pString->u16Size))
+           {  
+             rc = RTUtf16ValidateEncodingEx(&pString->String.ucs2[0], pString->u16Length / 2 + 1,
+                                            RTSTR_VALIDATE_ENCODING_EXACT_LENGTH | RTSTR_VALIDATE_ENCODING_ZERO_TERMINATED);
+             if (RT_SUCCESS(rc))
+               return true;
+           }  
+         }  
+       }  
+     }  
+   }  
+   else
+   {  
+     /* UTF-16: */
+     if (RT_LIKELY(!(pString->u16Length & 1)))
+     {  
+       if (RT_LIKELY((uint32_t)sizeof(RTUTF16) + pString->u16Length <= pString->u16Size))
+       {  
+         rc = RTUtf16ValidateEncodingEx(&pString->String.ucs2[0], pString->u16Length / 2 + 1,
+                                            RTSTR_VALIDATE_ENCODING_EXACT_LENGTH | RTSTR_VALIDATE_ENCODING_ZERO_TERMINATED);
+         if (RT_SUCCESS(rc))
+           return true;
+       }  
+     }  
+   }  
+   return false;
+}
+
+/**
+ * Validates an optional HGCM string input parameter.
+ *
+ * @returns true if valid, false if not.
+ *
+ * @param pString   The string buffer pointer. Can be NULL.
+ * @param cbBuf     The buffer size from the parameter.
+ * @param fUtf8Not16 Set if UTF-8 encoding, clear if UTF-16 encoding.
+ */
+DECLINLINE(bool) ShflStringIsValidOrNullIn(PCSHFLSTRING pString, uint32_t cbBuf, bool fUtf8Not16)
+{
+   if (pString)
return ShflStringIsValidIn(pString, cbBuf, fUtf8Not16);
if (RT_LIKELY(cbBuf == 0))
    return true;
return false;
}

/** @} */

/**
 * The available additional information in a SHFLFSOBJATTR object.
 */
typedef enum SHFLFSOBJATTRADD {
    /** No additional information is available / requested. */
    SHFLFSOBJATTRADD_NOTHING = 1,
    /** The additional unix attributes (SHFLFSOBJATTR::u::Unix) are
     * available / requested. */
    SHFLFSOBJATTRADD_UNIX,
    /** The additional extended attribute size (SHFLFSOBJATTR::u::EASize) is
     * available / requested. */
    SHFLFSOBJATTRADD_EASIZE,
    /** The last valid item (inclusive). */
    SHFLFSOBJATTRADD_LAST = SHFLFSOBJATTRADD_EASIZE,
    /** The usual 32-bit hack. */
    SHFLFSOBJATTRADD_32BIT_SIZE_HACK = 0x7fffffff
} SHFLFSOBJATTRADD;

/* Assert sizes of the IRPT types we're using below. */
AssertCompileSize(RTFMODE, 4);
AssertCompileSize(RTFOFF, 8);
AssertCompileSize(RTINODE, 8);
AssertCompileSize(RTTIMESPEC, 8);
AssertCompileSize(RTDEV, 4);
AssertCompileSize(RTUID, 4);

/**
 * Shared folder filesystem object attributes.
 */
#pragma pack(1)
typedef struct SHFLFSOBJATTR {
    /** Mode flags (st_mode). RTFS_UNIX_*, RTFS_TYPE_*, and RTFS_DOS_*.
     * @remarks We depend on a number of RTFS_ defines to remain unchanged.
     */
} SHFLFSOBJATTR;
Fortunately, these are depending on windows, dos and unix standard values, so this shouldn't be much of a pain. */

RTFMODE fMode;

/** The additional attributes available. */

SHFLFSOBJATTRADD enmAdditional;

/** Additional attributes.
 *
 * Unless explicitly specified to an API, the API can provide additional
data as it is provided by the underlying OS.
 */

union SHFLFSOBJATTRUNION
{
  /**< Additional Unix Attributes
   * These are available when SHFLFSOBJATTRADD is set in fUnix.
   */
  
  struct SHFLFSOBJATTRUNIX
  {
    /**< Additional Unix Attributes
       * These are available when SHFLFSOBJATTRADD is set in fUnix.
       */
    
    /** The user owning the filesystem object (st_uid).
     * This field is ~0U if not supported. */
    RTUID uid;

    /** The group the filesystem object is assigned (st_gid).
     * This field is ~0U if not supported. */
    RTGID gid;

    /** Number of hard links to this filesystem object (st_nlink).
     * This field is 1 if the filesystem doesn't support hardlinking or
     * the information isn't available.
     */
    uint32_t cHardlinks;

    /**< The device number of the device which this filesystem object resides on (st_dev).
     * This field is 0 if this information is not available. */
    RTDEV INodeIdDevice;

    /**< The unique identifier (within the filesystem) of this filesystem object (st_ino).
     * Together with INodeIdDevice, this field can be used as a OS wide unique id
     * when both their values are not 0.
     * This field is 0 if the information is not available. */
    RTINODE INodeId;

    /**< User flags (st_flags).
     * This field is 0 if this information is not available. */
    uint32_t fFlags;
/** The current generation number (st_gen).
* This field is 0 if this information is not available. */
uint32_t GenerationId;

/** The device number of a character or block device type object (st_rdev).
* This field is 0 if the file isn't of a character or block device type and
* when the OS doesn't subscribe to the major+minor device identification scheme. */
RTDEV Device;

/**
* Extended attribute size.
*/
struct SHFLFSOBJATTREASIZE
{
  /** Size of EAs. */
  RTFOFF cb;
} EASize;

/** Pointer to a shared folder filesystem object attributes structure. */
typedef SHFLFSOBJATTR *PSHFLFSOBJATTR;
/** Pointer to a const shared folder filesystem object attributes structure. */
typedef const SHFLFSOBJATTR *PCSHFLFSOBJATTR;

/**
* Filesystem object information structure.
*/
#pragma pack(1)
typedef struct SHFLFSOBJINFO
{
  /** Logical size (st_size).
* For normal files this is the size of the file.
* For symbolic links, this is the length of the path name contained
* in the symbolic link.
* For other objects this fields needs to be specified.
* */
  RTFOFF cbObject;

  /** Disk allocation size (st_blocks * DEV_BSIZE). */
  RTFOFF cbAllocated;

  /** Time of last access (st_atime).
* @remarks Here (and other places) we depend on the IPRT timespec to
* remain unchanged. */

+ RTTIMESPEC AccessTime;
+
+ /** Time of last data modification (st_mtime). */
+ RTTIMESPEC ModificationTime;
+
+ /** Time of last status change (st_ctime).
+ * If not available this is set to ModificationTime.
+ */
+ RTTIMESPEC ChangeTime;
+
+ /** Time of file birth (st_birthtime).
+ * If not available this is set to ChangeTime.
+ */
+ RTTIMESPEC BirthTime;
+
+ /** Attributes. */
+ SHFLFSOBJATTR Attr;
+
+ } SHFLFSOBJINFO;
+#pragma pack()
+/** Pointer to a shared folder filesystem object information structure. */
+typedef SHFLFSOBJINFO *PSHFLFSOBJINFO;
+
+/** Pointer to a const shared folder filesystem object information
+ * structure. */
+typedef const SHFLFSOBJINFO *PCSHFLFSOBJINFO;
+
+/** Copy file system objinfo from IPRT to shared folder format.
+ */
+DECLINLINE(void) vbfsCopyFsObjInfoFromIprt(PSHFLFSOBJINFO pDst, PCRTFSOBJINFO pSrc)
+{
+    pDst->cbObject          = pSrc->cbObject;
+    pDst->cbAllocated       = pSrc->cbAllocated;
+    pDst->AccessTime        = pSrc->AccessTime;
+    pDst->ModificationTime  = pSrc->ModificationTime;
+    pDst->ChangeTime        = pSrc->ChangeTime;
+    pDst->BirthTime         = pSrc->BirthTime;
+    pDst->Attr.fMode        = pSrc->Attr.fMode;
+    /* Clear bits which we don't pass through for security reasons. */
+    pDst->Attr.fMode       &= ~(RTFS_UNIX_ISUID | RTFS_UNIX_ISGID | RTFS_UNIX_ISTXT);
+    RT_ZERO(pDst->Attr.u);
+    switch (pSrc->Attr.enmAdditional)
+    {

+ default:
+ case RTFSOBJATTRADD_NOTHING:
+     pDst->Attr.enmAdditional = SHFLFSOBJATTRADD_NOTHING;
+     break;
+
+ case RTFSOBJATTRADD_UNIX:
+     pDst->Attr.enmAdditional = SHFLFSOBJATTRADD_UNIX;
+     pDst->Attr.u.Unix.uid = pSrc->Attr.u.Unix.uid;
+     pDst->Attr.u.Unix.gid = pSrc->Attr.u.Unix.gid;
+     pDst->Attr.u.Unix.cHardlinks = pSrc->Attr.u.Unix.cHardlinks;
+     pDst->Attr.u.Unix.INodeIdDevice = pSrc->Attr.u.Unix.INodeIdDevice;
+     pDst->Attr.u.Unix.INodeId = pSrc->Attr.u.Unix.INodeId;
+     pDst->Attr.u.Unix.fFlags = pSrc->Attr.u.Unix.fFlags;
+     break;
+
+ case RTFSOBJATTRADD_EASIZE:
+     pDst->Attr.enmAdditional = SHFLFSOBJATTRADD_EASIZE;
+     pDst->Attr.u.EASize.cb = pSrc->Attr.u.EASize.cb;
+     break;
+
+/** Result of an open/create request.
+ * Along with handle value the result code
+ * identifies what has happened while
+ * trying to open the object.
+ */
+typedef enum _SHFLCREATERESULT
+{@
+    SHFL_NO_RESULT,
+    /** Specified path does not exist. */
+    SHFL_PATH_NOT_FOUND,
+    /** Path to file exists, but the last component does not. */
+    SHFL_FILE_NOT_FOUND,
+    /** File already exists and either has been opened or not. */
+    SHFL_FILE_EXISTS,
+    /** New file was created. */
+    SHFL_FILE_CREATED,
+    /** Existing file was replaced or overwritten. */
+    SHFL_FILE_REPLACED
+} SHFLCREATERESULT;
+@}
/* No flags. Initialization value. */
#define SHFL_CF_NONE                  (0x00000000)

/* Lookup only the object, do not return a handle. All other flags are ignored. */
#define SHFL_CF_LOOKUP                (0x00000001)

/* Open parent directory of specified object. 
 * Useful for the corresponding Windows FSD flag 
 * and for opening paths like \dir\*.\* to search the 'dir'. 
 * @todo possibly not needed??? 
 */
#define SHFL_CF_OPEN_TARGET_DIRECTORY (0x00000002)
#define SHFL_CF_DIRECTORY             (0x00000004)

/* Open/create action to do if object exists 
 * and if the object does not exists. 
 * REPLACE file means atomically DELETE and CREATE. 
 * OVERWRITE file means truncating the file to 0 and
 * setting new size. 
 * When opening an existing directory REPLACE and OVERWRITE 
 * actions are considered invalid, and cause returning 
 * FILE_EXISTS with NIL handle. 
 */
#define SHFL_CF_ACT_MASK_IF_EXISTS      (0x000000F0)
#define SHFL_CF_ACT_MASK_IF_NEW         (0x00000F00)
#define SHFL_CF_ACT_OPEN_IF_EXISTS      (0x00000000)
#define SHFL_CF_ACT_FAIL_IF_EXISTS      (0x00000010)
#define SHFL_CF_ACT_REPLACE_IF_EXISTS   (0x00000020)
#define SHFL_CF_ACT_OVERWRITE_IF_EXISTS (0x00000030)

/* What to do if object exists. */
#define SHFL_CF_ACT_OPEN_IF_EXISTS      (0x00000000)
#define SHFL_CF_ACT_FAIL_IF_EXISTS      (0x00000010)
#define SHFL_CF_ACT_REPLACE_IF_EXISTS   (0x00000020)
#define SHFL_CF_ACT_OVERWRITE_IF_EXISTS (0x00000030)

/* What to do if object does not exist. */
#define SHFL_CF_ACT_CREATE_IF_NEW       (0x00000000)
#define SHFL_CF_ACT_FAIL_IF_NEW         (0x00000100)

/* Read/write requested access for the object. */
#define SHFL_CF_ACCESS_MASK_RW          (0x00003000)
#define SHFL_CF_ACCESS_NONE             (0x00000000)
#define SHFL_CF_ACCESS_READ             (0x00001000)
#define SHFL_CF_ACCESS_WRITE            (0x00002000)
```c

#define SHFL_CF_ACCESS_WRITE     (0x00002000)
/** Read/Write access requested. */

#define SHFL_CF_ACCESS_READWRITE (SHFL_CF_ACCESS_READ | SHFL_CF_ACCESS_WRITE)
+
 /** Requested share access for the object. */

#define SHFL_CF_ACCESS_MASK_DENY   (0x0000C000)

 /** Allow any access. */

#define SHFL_CF_ACCESS_DENYNONE    (0x00000000)
/** Do not allow read. */

#define SHFL_CF_ACCESS_DENYREAD    (0x00004000)
/** Do not allow write. */

#define SHFL_CF_ACCESS_DENYWRITE   (0x00008000)
/** Do not allow access. */

#define SHFL_CF_ACCESS_DENYALL     (SHFL_CF_ACCESS_DENYREAD | SHFL_CF_ACCESS_DENYWRITE)
+
 /** Requested access to attributes of the object. */

#define SHFL_CF_ACCESS_MASK_ATTR   (0x00030000)

 /** No access requested. */

#define SHFL_CF_ACCESS_ATTR_NONE   (0x00000000)
/** Read access requested. */

#define SHFL_CF_ACCESS_ATTR_READ   (0x00010000)
/** Write access requested. */

#define SHFL_CF_ACCESS_ATTR_WRITE  (0x00020000)
/** Read/Write access requested. */

#define SHFL_CF_ACCESS_ATTR_READWRITE (SHFL_CF_ACCESS_ATTR_READ | SHFL_CF_ACCESS_ATTR_WRITE)
+
 /** The file is opened in append mode. Ignored if SHFL_CF_ACCESS_WRITE is not set. */

#define SHFL_CF_ACCESS_APPEND      (0x00040000)
+
 /** @} */

#pragma pack(1)

typedef struct _SHFLCREATEPARMS
+
{    /* Returned handle of opened object. */
    SHFLHANDLE Handle;
+
    /* Returned result of the operation */
    SHFLCREATERESULT Result;
+
    /* SHFL_C_ */
    uint32_t CreateFlags;
+
    /* Attributes of object to create and
```
+     * returned actual attributes of opened/created object.
+     */
+     SHFLFSOBJINFO Info;
+
+} SHFLCREATEPARMS;
+#pragma pack()
+
+typedef SHFLCREATEPARMS *PSHFLCREATEPARMS;
+
+/** Shared Folders mappings.
+ * @}
+ */
+
+/** The mapping has been added since last query. */
+#define SHFL_MS_NEW        (1)
+/** The mapping has been deleted since last query. */
+#define SHFL_MS_DELETED    (2)
+
+typedef struct _SHFLMAPPING
+{
+    /** Mapping status. */
    uint32_t u32Status;
    /** Root handle. */
    SHFLROOT root;
} SHFLMAPPING;
+/** Pointer to a SHFLMAPPING structure. */
+typedef SHFLMAPPING *PSHFLMAPPING;
+
+/** @} */
+
+/** Shared Folder directory information
+ * @}
+ */
+
+typedef struct _SHFLDIRINFO
+{
+    /** Full information about the object. */
    SHFLFSOBJINFO Info;
    /** The length of the short field (number of RTUTF16 chars).
    * It is 16-bit for reasons of alignment. */
    uint16_t cucShortName;
    /** The short name for 8.3 compatibility.
    * Empty string if not available.
    */
    RTUTF16 uszShortName[14];
    /** @todo malloc, a description, please. */
    SHFLSTRING name;
+ SHFLDIRINFO, *PSHFLDIRINFO;
+
+
+ /**
+ * Shared folder filesystem properties.
+ */
+ typedef struct SHFLFSPROPERTIES
+ {
+     /** The maximum size of a filesystem object name.
+     * This does not include the '\0'. */
+     uint32_t cbMaxComponent;
+
+     /** True if the filesystem is remote.
+     * False if the filesystem is local. */
+     bool fRemote;
+
+     /** True if the filesystem is case sensitive.
+     * False if the filesystem is case insensitive. */
+     bool fCaseSensitive;
+
+     /** True if the filesystem is mounted read only.
+     * False if the filesystem is mounted read write. */
+     bool fReadOnly;
+
+     /** True if the filesystem can encode unicode object names.
+     * False if it can't. */
+     bool fSupportsUnicode;
+
+     /** True if the filesystem is compresses.
+     * False if it isn't or we don't know. */
+     bool fCompressed;
+
+     /** True if the filesystem compresses of individual files.
+     * False if it doesn't or we don't know. */
+     bool fFileCompression;
+
+     /** @todo more? */
+ } SHFLFSPROPERTIES;
+
+ AssertCompileSize(SHFLFSPROPERTIES, 12);
+
+ typedef SHFLFSPROPERTIES *PSHFLFSPROPERTIES;
+
+ typedef SHFLFSPROPERTIES const *PCSHFLFSPROPERTIES;
+
+ /**
+ * Copy file system properties from IPRT to shared folder format.
+ *
+ * @param   pDst                The shared folder structure.
+ * @param   pSrc                The IPRT structure.
+ */
+DECLINLINE(void) vbfsCopyFsPropertiesFromIprt(PSHFLFSPROPERTIES pDst, PCRTFSPROPERTIES pSrc)
+{
+    RT_ZERO(*pDst);                     /* zap the implicit padding. */
+    pDst->cbMaxComponent   = pSrc->cbMaxComponent;
+    pDst->fRemote          = pSrc->fRemote;
+    pDst->fCaseSensitive   = pSrc->fCaseSensitive;
+    pDst->fReadOnly        = pSrc->fReadOnly;
+    pDst->fSupportsUnicode = pSrc->fSupportsUnicode;
+    pDst->fCompressed      = pSrc->fCompressed;
+    pDst->fFileCompression = pSrc->fFileCompression;
+}
+
+typedef struct _SHFLVOLINFO
+
+{
+    RTFOFF    ullTotalAllocationBytes;
+    RTFOFF    ullAvailableAllocationBytes;
+    uint32_t   ulBytesPerAllocationUnit;
+    uint32_t   ulBytesPerSector;
+    uint32_t   ulSerial;
+    SHFLFSPROPERTIES fsProperties;
+} SHFLVOLINFO, *PSHFLVOLINFO;
+
+/** @} */
+
+/** Function parameter structures. */
+/** @} */
+
+/** SHFL_FN_QUERY_MAPPINGS */
+/** Validation mask. Needs to be adjusted */
+/* whenever a new SHFL_MF_ flag is added. */
+#define SHFL_MF_MASK       (0x00000011)
+#define SHFL_MF_UCS2       (0x00000000)
+#define SHFL_MF_UTF8       (0x00000001)
+#define SHFL_MF_AUTOMOUNT  (0x00000010)
+
+#define SHFL_MF_SYSTEM_MASK    (0x0000FF00)
+#define SHFL_MF_SYSTEM_NONE    (0x00000000)
+/* Type of guest system. For future system dependent features. */
+#define SHFL_MF_SYSTEM_MASK    (0x00000001)
+#define SHFL_MF_SYSTEM_NONE    (0x00000000)
```c
#define SHFL_MF_SYSTEM_WINDOWS (0x00000100)
#define SHFL_MF_SYSTEM_LINUX   (0x00000200)

/** Parameters structure. */
typedef struct _VBoxSFQueryMappings
{
    VBGLIOCHGCMCALL callInfo;
    
    /** 32bit, in: */
    * Flags describing various client needs.
    */
    HGCMFunctionParameter flags;
    
    /** 32bit, in/out: */
    * Number of mappings the client expects.
    * This is the number of elements in the
    * mappings array.
    */
    HGCMFunctionParameter numberOfMappings;
    
    /** pointer, in/out: */
    * Points to array of SHFLMAPPING structures.
    */
    HGCMFunctionParameter mappings;
} VBoxSFQueryMappings;

/** Number of parameters */
#define SHFL_CPARMS_QUERY_MAPPINGS (3)

/** Parameters structure. */
typedef struct _VBoxSFQueryMapName
{
    VBGLIOCHGCMCALL callInfo;
    
    /** 32bit, in: SHFLROOT */
    * Root handle of the mapping which name is queried.
    */
    HGCMFunctionParameter root;
    
    /** pointer, in/out: */
    * Points to SHFLSTRING buffer.
```

---

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+ */
+ HGCMFunctionParameter name;
+
+ } VBoxSFQueryMapName;
+
+ /**< Number of parameters */
+#define SHFL_CPARMS_QUERY_MAP_NAME (2)
+
+ /**<
+ * SHFL_FN_MAP_FOLDER_OLD
+ */
+
+ /**< Parameters structure. */
+typedef struct _VBoxSFMapFolder_Old
+
+ VBGLIOCHGCMCALL callInfo;
+
+ /**< pointer, in:
+ * Points to SHFLSTRING buffer.
+ */
+ HGCMFunctionParameter path;
+
+ /**< pointer, out: SHFLROOT
+ * Root handle of the mapping which name is queried.
+ */
+ HGCMFunctionParameter root;
+
+ /**< pointer, in: RTUTF16
+ * Path delimiter
+ */
+ HGCMFunctionParameter delimiter;
+
+ } VBoxSFMapFolder_Old;
+
+ /**< Number of parameters */
+#define SHFL_CPARMS_MAP_FOLDER_OLD (3)
+
+ /**<
+ * SHFL_FN_MAP_FOLDER
+ */
+
+ /**< Parameters structure. */
+typedef struct _VBoxSFMapFolder
+
+ VBGLIOCHGCMCALL callInfo;
+
+ /**< pointer, in:
+ * Points to SHFLSTRING buffer.
+ */
HGCMFunctionParameter path;
+
+ /* pointer, out: SHFLROOT
+ * Root handle of the mapping which name is queried.
+ */
+ HGCMFunctionParameter root;
+
+ /* pointer, in: RTUTF16
+ * Path delimiter
+ */
+ HGCMFunctionParameter delimiter;
+
+ /* pointer, in: SHFLROOT
+ * Case sensitive flag
+ */
+ HGCMFunctionParameter fCaseSensitive;
+
+ VBoxSFMapFolder;
+
+/** Number of parameters */
+#define SHFL_CPARMS_MAP_FOLDER (4)
+
+/**
+ * SHFL_FN_UNMAP_FOLDER
+ */
+
+/** Parameters structure. */
+typedef struct _VBoxSFUnmapFolder
+{
+ + VBGLIOCHGCMCALL callInfo;
+ +
+ + /* pointer, in: SHFLROOT
+ * Root handle of the mapping which name is queried.
+ */
+ + HGCMFunctionParameter root;
+
+ VBoxSFUnmapFolder;
+
+/** Number of parameters */
+#define SHFL_CPARMS_UNMAP_FOLDER (1)
+
+/**
+ * SHFL_FN_CREATE
+ */
+
+/** Parameters structure. */
typedef struct _VBoxSFCreate {
    VBGLIOCHGCMCALL callInfo;
    
    /** pointer, in: SHFLROOT
     * Root handle of the mapping which name is queried.
     */
    HGCMFunctionParameter root;
    
    /** pointer, in:
     * Points to SHFLSTRING buffer.
     */
    HGCMFunctionParameter path;
    
    /** pointer, in/out:
     * Points to SHFLCREATEPARMS buffer.
     */
    HGCMFunctionParameter parms;
} VBoxSFCreate;

/** Number of parameters */
#define SHFL_CPARMS_CREATE (3)

/** Parameters structure. */
typedef struct _VBoxSFClose {
    VBGLIOCHGCMCALL callInfo;
    
    /** pointer, in: SHFLROOT
     * Root handle of the mapping which name is queried.
     */
    HGCMFunctionParameter root;
    
    /** value64, in:
     * SHFLHANDLE of object to close.
     */
    HGCMFunctionParameter handle;
} VBoxSFClose;

/** Number of parameters */
#define SHFL_CPARMS_CLOSE (2)

/**
 * SHFL_FN_READ
 */

/** Parameters structure. */
typedef struct VBoxSFRead
{
    VBGLIOCHGCMCALL callInfo;
    /* pointer, in: SHFLROOT
     * Root handle of the mapping which name is queried.
     */
    HGCMFunctionParameter root;
    /* value64, in:
     * SHFLHANDLE of object to read from.
     */
    HGCMFunctionParameter handle;
    /* value64, in:
     * Offset to read from.
     */
    HGCMFunctionParameter offset;
    /* value64, in/out:
     * Bytes to read/How many were read.
     */
    HGCMFunctionParameter cb;
    /* pointer, out:
     * Buffer to place data to.
     */
    HGCMFunctionParameter buffer;
} VBoxSFRead;

/** Number of parameters */
#define SHFL_CPARMS_READ (5)
/ ** Parameters structure. */
+typedef struct _VBoxSFWrite
+{  
+    VBGLIOCHGCMCALL callInfo;
+
+    /** pointer, in: SHFLROOT 
+     * Root handle of the mapping which name is queried.
+     */
+    HGCMFunctionParameter root;
+
+    /** value64, in: 
+     * SHFLHANDLE of object to write to. 
+     */
+    HGCMFunctionParameter handle;
+
+    /** value64, in:
+     * Offset to write to. 
+     */
+    HGCMFunctionParameter offset;
+
+    /** value64, in/out:
+     * Bytes to write/How many were written. 
+     */
+    HGCMFunctionParameter cb;
+
+    /** pointer, in: 
+     * Data to write. 
+     */
+    HGCMFunctionParameter buffer;
+
+} VBoxSFWrite;
+
+/** Number of parameters */
+#define SHFL_CPARMS_WRITE (5)
+
+
+/**
+ * SHFL_FN_LOCK
+ */
+
+/** Lock owner is the HGCM client. */
+
+/** Lock mode bit mask. */
+#define SHFL_LOCK_MODE_MASK (0x3)
+/** Cancel lock on the given range. */
+#define SHFL_LOCK_CANCEL (0x0)
+/** Acquire read only lock. Prevent write to the range. */
+//define SHFL_LOCK_SHARED     (0x1)
+/** Acquire write lock. Prevent both write and read to the range. */
+//define SHFL_LOCK_EXCLUSIVE  (0x2)

+/** Do not wait for lock if it can not be acquired at the time. */
+//define SHFL_LOCK_NOWAIT     (0x0)
+/** Wait and acquire lock. */
+//define SHFL_LOCK_WAIT       (0x4)

+/** Lock the specified range. */
+//define SHFL_LOCK_PARTIAL    (0x0)
+/** Lock entire object. */
+//define SHFL_LOCK_ENTIRE     (0x8)

+/** Parameters structure. */
+typedef struct _VBoxSFLock
+{
+    VBGLIOCHGCMCALL callInfo;
+
+    /**< pointer, in: SHFLROOT
    +    * Root handle of the mapping which name is queried.
    +    */
+    HGCMFunctionParameter root;
+
+    /**< value64, in:
    +    * SHFLHANDLE of object to be locked.
    +    */
+    HGCMFunctionParameter handle;
+
+    /**< value64, in:
    +    * Starting offset of lock range.
    +    */
+    HGCMFunctionParameter offset;
+
+    /**< value64, in:
    +    * Length of range.
    +    */
+    HGCMFunctionParameter length;
+
+    /**< value32, in:
    +    * Lock flags SHFL_LOCK_*.
    +    */
+    HGCMFunctionParameter flags;
+
+} VBoxSFLock;
+
+/** Number of parameters */
+#define SHFL_CPARMS_LOCK (5)
/** Parameters structure. */
typedef struct _VBoxSFFlush
{
    VBGLIOCHGCMCALL callInfo;

    /** pointer, in: SHFLROOT
    * Root handle of the mapping which name is queried.
    */
    HGCMFunctionParameter root;

    /** value64, in:
    * SHFLHANDLE of object to be locked.
    */
    HGCMFunctionParameter handle;
} VBoxSFFlush;

/** Number of parameters */
#define SHFL_CPARMS_FLUSH (2)

/** Listing information includes variable length RTDIRENTRY[EX] structures. */

/** @todo might be necessary for future. */
#define SHFL_LIST_NONE        0
#define SHFL_LIST_RETURN_ONE  1

/** Parameters structure. */
typedef struct _VBoxSFList
{
    VBGLIOCHGCMCALL callInfo;

    /** pointer, in: SHFLROOT
    * Root handle of the mapping which name is queried.
    */
    HGCMFunctionParameter root;

    /** value64, in:
+ * SHFLHANDLE of object to be listed.
+ */
+ HGCMFunctionParameter handle;
+
+ /** value32, in:
+ * List flags SHFL_LIST_*.
+ */
+ HGCMFunctionParameter flags;
+
+ /** value32, in/out:
+ * Bytes to be used for listing information/How many bytes were used.
+ */
+ HGCMFunctionParameter cb;
+
+ /** pointer, in/optional
+ * Points to SHFLSTRING buffer that specifies a search path.
+ */
+ HGCMFunctionParameter path;
+
+ /** pointer, out:
+ * Buffer to place listing information to. (SHFLDIRINFO)
+ */
+ HGCMFunctionParameter buffer;
+
+ /** value32, in/out:
+ * Indicates a key where the listing must be resumed.
+ * in: 0 means start from begin of object.
+ * out: 0 means listing completed.
+ */
+ HGCMFunctionParameter resumePoint;
+
+ /** pointer, out:
+ * Number of files returned
+ */
+ HGCMFunctionParameter cFiles;
+
+ } VBoxSFList;
+
+ /** Number of parameters */
+ #define SHFL_CPARMS_LIST (8)
+
+ +
+ +
+ +
+ /**
+ * SHFL_FN_READLINK
+ */
+
+ /** Parameters structure. */
typedef struct _VBoxSFReadLink {
    VBGLIOCHGCMCALL callInfo;
    HGCMFunctionParameter root;
    HGCMFunctionParameter path;
    HGCMFunctionParameter buffer;
} VBoxSFReadLink;

#define SHFL_CPARMS_READLINK 3

#define SHFL_INFO_MODE_MASK 0x1
#define SHFL_INFO_GET 0x0
#define SHFL_INFO_SET 0x1
#define SHFL_INFO_NAME 0x2
#define SHFL_INFO_SIZE 0x4
#define SHFL_INFO_FILE 0x8
#define SHFL_INFO_VOLUME 0x10

@todo different file info structures
+/** Parameters structure. */
+typedef struct _VBoxSFInformation
+{
+  VBGLIOCHGCMCALL callInfo;
+
+  /** pointer, in: SHFLROOT
+   * Root handle of the mapping which name is queried.
+   */
+  HGCMFunctionParameter root;
+
+  /** value64, in:
+   * SHFLHANDLE of object to be listed.
+   */
+  HGCMFunctionParameter handle;
+
+  /** value32, in:
+   * SHFL_INFO_ *
+   */
+  HGCMFunctionParameter flags;
+
+  /** value32, in/out:
+   * Bytes to be used for information/How many bytes were used.
+   */
+  HGCMFunctionParameter cb;
+
+  /** pointer, in/out:
+   * Information to be set/get (SHFLFSOBJINFO or SHFLSTRING). Do not forget
+   * to set the SHFLFSOBJINFO::Attr::enmAdditional for Get operation as well.
+   */
+  HGCMFunctionParameter info;
+
+} VBoxSFInformation;
+
+/** Number of parameters */
+#define SHFL_CPARMS_INFORMATION (5)
+
+/**
+ * SHFL_FN_REMOVE
+ */
+#define SHFL_REMOVE_FILE        (0x1)
+#define SHFL_REMOVE_DIR         (0x2)
+#define SHFL_REMOVE_SYMLINK     (0x4)
+
+/** Parameters structure. */
+typedef struct _VBoxSFRemove
+{
  + VBGLIOCHGCMCALL callInfo;
  +
  + /**< pointer, in: SHFLROOT
  +  * Root handle of the mapping which name is queried.
  +  */
  + HGCMFunctionParameter root;
  +
  + /**< pointer, in:
  +  * Points to SHFLSTRING buffer.
  +  */
  + HGCMFunctionParameter path;
  +
  + /**< value32, in:
  +  * remove flags (file/directory)
  +  */
  + HGCMFunctionParameter flags;
  +
  +} VBoxSFReplace;
+
+#define SHFL_CPARMS_REMOVE (3)
+
+
+/**
+ * SHFL_FN_RENAME
+ */
+
+#define SHFL_RENAME_FILE                (0x1)
+#define SHFL_RENAME_DIR                 (0x2)
+#define SHFL_RENAME_REPLACE_IF_EXISTS   (0x4)
+
+/** Parameters structure. */
+typedef struct _VBoxSFRename
+
+{
  + VBGLIOCHGCMCALL callInfo;
  +
  + /**< pointer, in: SHFLROOT
  +  * Root handle of the mapping which name is queried.
  +  */
  + HGCMFunctionParameter root;
  +
  + /**< pointer, in:
  +  * Points to SHFLSTRING src.
  +  */
  + HGCMFunctionParameter src;
  +
  + /**< pointer, in:
  +  * Points to SHFLSTRING dest.
+ /*
+ HGCMFunctionParameter dest;
+
+ /** value32, in:
+ * rename flags (file/directory)
+ */
+ HGCMFunctionParameter flags;
+
+ } VBoxSF Rename;
+
+#define SHFL_CPARMS_RENAME (4)
+
+
+/**
+ * SHFL_FN_SYMLINK
+ */
+
+/** Parameters structure. */
+typedef struct _VBoxSF Symlink
+
+ VBGLIOCHGCMCALL callInfo;
+
+ /** pointer, in: SHFLROOT
+ * Root handle of the mapping which name is queried.
+ */
+ HGCMFunctionParameter root;
+
+ /** pointer, in:
+ * Points to SHFLSTRING of path for the new symlink.
+ */
+ HGCMFunctionParameter newPath;
+
+ /** pointer, in:
+ * Points to SHFLSTRING of destination for symlink.
+ */
+ HGCMFunctionParameter oldPath;
+
+ /** pointer, out:
+ * Information about created symlink.
+ */
+ HGCMFunctionParameter info;
+
+ } VBoxSF Symlink;
+
+#define SHFL_CPARMS_SYMLINK (4)
+
+
/**
 * SHFL_FN_ADD_MAPPING
 * Host call, no guest structure is used.
 */

/** mapping is writable */
#define SHFL_ADD_MAPPING_F_WRITABLE (RT_BIT_32(0))
/** mapping is automounted by the guest */
#define SHFL_ADD_MAPPING_F_AUTOMOUNT (RT_BIT_32(1))
/** allow the guest to create symlinks */
#define SHFL_ADD_MAPPING_F_CREATE_SYMLINKS (RT_BIT_32(2))
/** mapping is actually missing on the host */
#define SHFL_ADD_MAPPING_F_MISSING (RT_BIT_32(3))

#define SHFL_CPARMS_ADD_MAPPING  (3)

/**
 * SHFL_FN_REMOVE_MAPPING
 * Host call, no guest structure is used.
 */

#define SHFL_CPARMS_REMOVE_MAPPING (1)

/**
 * SHFL_FN_SET_STATUS_LED
 * Host call, no guest structure is used.
 */

#define SHFL_CPARMS_SET_STATUS_LED (1)

/** @} */

#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/VBox/types.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/types.h
@@ -0,0 +1,1082 @@

/** @file
 * VirtualBox - Types.
 */

@endif

--- linux-4.15.0.org/ubuntu/vbox/vboxsf/include/VBox/types.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/VBox/types.h
@@ -0,0 +1,1082 @@

/* @file
 * VirtualBox - Types.
 */

@endif

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 *
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___VBox_types_h
+#define ___VBox_types_h
+
+#include <VBox/cdefs.h>
+#include <iprt/types.h>
+
+#defgroup grp_types VBox Basic Types
+ * @ {
+ */
+
+#defgroup grp_types_both Common Guest and Host Context Basic Types
+ * @ {
+ */
+
+#defgroup grp_types_hc Host Context Basic Types
+ * @ {
+ */
+
+ */** @ defgroup grp_types_ge Guest Context Basic Types
+ * @ {
+ */
+
+ */** Pointer to per support driver session data.
+ * (The data is a R0 entity and private to the the R0 SUP part. All
typedef R0PTRTYPE(struct SUPDRVSESSION *) PSUPDRVSESSION;

/** Event semaphore handle. Ring-0 / ring-3. */
typedef R0PTRTYPE(struct SUPSEMEVENTHANDLE *) SUPSEMEVENT;

/** Pointer to an event semaphore handle. */

/** Nil event semaphore handle. */
define NIL_SUPSEMEVENT ((SUPSEMEVENT)0)

/** Multiple release event semaphore handle. Ring-0 / ring-3. */
typedef R0PTRTYPE(struct SUPSEMEVENTMULTIHANDLE *) SUPSEMEVENTMULTI;

/** Pointer to a multiple release event semaphore handle. */

define NIL_SUPSEMEVENTMULTI ((SUPSEMEVENTMULTI)0)

/** Pointer to a VM. */
typedef struct VM * PVM;

/** Pointer to a VM - Ring-0 Ptr. */
typedef R0PTRTYPE(struct VM *) PVMR0;

/** Pointer to a VM - Ring-3 Ptr. */
typedef R3PTRTYPE(struct VM *) PVMR3;

/** Pointer to a VM - RC Ptr. */
typedef RCPTRTYPE(struct VM *) PVMRC;

/** Pointer to a virtual CPU structure. */
typedef struct VMCPU * PVMCPU;

/** Pointer to a const virtual CPU structure. */
typedef const struct VMCPU * PCVMCPU;

/** Pointer to a virtual CPU structure - Ring-3 Ptr. */
typedef R3PTRTYPE(struct VMCPU *) PVMCPUR3;

/** Pointer to a virtual CPU structure - Ring-0 Ptr. */
typedef R0PTRTYPE(struct VMCPU *) PVMCPUR0;

/** Pointer to a virtual CPU structure - RC Ptr. */
typedef RCPTRTYPE(struct VMCPU *) PVMCPURC;

/** Pointer to a virtual CPU structure - Ring-0 (global) VM structure. */
typedef R0PTRTYPE(struct GVM *) PGVM;

/** Pointer to a virtual CPU structure - Ring-3 (user mode) VM structure. */
typedef R3PTRTYPE(struct UVM *) PUVM;

/** Pointer to a virtual CPU structure - Ring-3 (user mode) VMCPU structure. */
typedef R3PTRTYPE(struct UVMCPU *) PUVMCPU;
typedef uint32_t VMCPUID;

/** Pointer to a virtual CPU ID. */
typedef VMCPUID *PVMCPUID;

/** @name Special CPU ID values. Most of these are for request scheduling. */
+
+ * @{ */
+ /** All virtual CPUs. */
+#define VMCPUID_ALL UINT32_C(0xffffffff2)
+/** All virtual CPUs, descending order. */
+#define VMCPUID_ALL_REVERSE UINT32_C(0xffffffff3)
+/** Any virtual CPU. */
+ * Intended for scheduling a VM request or some other task. */
+#define VMCPUID_ANY UINT32_C(0xffffffff4)
+/** Any virtual CPU; always queue for future execution. */
+ * Intended for scheduling a VM request or some other task. */
+#define VMCPUID_ANY_QUEUE UINT32_C(0xffffffff5)
+/** The NIL value. */
+#define NIL_VMCPUID UINT32_C(0xfffffffd)
+/** @} */

/** Virtual CPU set. */
typedef struct VMCPUSET {
+ /** The bitmap data. */
+ uint32_t au32Bitmap[8 /*256/32*/];
+} VMCPUSSET;

/** Pointer to a Virtual CPU set. */
typedef VMCPUSSET *PVMCPUSSET;

/** Pointer to a const Virtual CPU set. */
typedef VMCPUSSET const *PCVMCPUSSET;

/** VM State */
typedef enum VMSTATE {
+ /** The VM is being created. */
+ VMSTATE_CREATING = 0,
+ /** The VM is created. */
+ VMSTATE_CREATED,
+ /** The VM state is being loaded from file. */
+ VMSTATE_LOADING,
+ /** The VM is being powered on */
+ VMSTATE_POWERING_ON,}
+ /** The VM is being resumed. */
+ VMSTATE_RESUMING,
+ /** The VM is running. */
+ VMSTATE_RUNNING,
+ /** Live save: The VM is running and the state is being saved. */
+ VMSTATE_RUNNING_LS,
+ /** Fault Tolerance: The VM is running and the state is being synced. */
+ VMSTATE_RUNNING_FT,
+ /** The VM is being reset. */
+ VMSTATE_RESETTING,
+ /** Live save: The VM is being reset and immediately suspended. */
+ VMSTATE_RESETTING_LS,
+ /** The VM is being soft/warm reset. */
+ VMSTATE_SOFT_RESETTING,
+ /** Live save: The VM is being soft/warm reset (not suspended afterwards). */
+ VMSTATE_SOFT_RESETTING_LS,
+ /** The VM is being suspended. */
+ VMSTATE_SUSPENDING,
+ /** Live save: The VM is being suspended during a live save operation, either as
+ * part of the normal flow or VMR3Reset. */
+ VMSTATE_SUSPENDING_LS,
+ /** Live save: The VM is being suspended by VMR3Suspend during live save. */
+ VMSTATE_SUSPENDING_EXT_LS,
+ /** The VM is suspended. */
+ VMSTATE_SUSPENDED,
+ /** Live save: The VM has been suspended and is waiting for the live save
+ * operation to move on. */
+ VMSTATE_SUSPENDED_LS,
+ /** Live save: The VM has been suspended by VMR3Suspend during a live save. */
+ VMSTATE_SUSPENDED_EXT_LS,
+ /** The VM is suspended and its state is being saved by EMT(0). (See SSM) */
+ VMSTATE_SAVING,
+ /** The VM is being debugged. (See DBGF.) */
+ VMSTATE_DEBUGGING,
+ /** Live save: The VM is being debugged while the live phase is going on. */
+ VMSTATE_DEBUGGING_LS,
+ /** The VM is being powered off. */
+ VMSTATE_POWERING_OFF,
+ /** Live save: The VM is being powered off and the save cancelled. */
+ VMSTATE_POWERING_OFF_LS,
+ /** The VM is switched off, awaiting destruction. */
+ VMSTATE_OFF,
+ /** Live save: Waiting for cancellation and transition to VMSTATE_OFF. */
+ VMSTATE_OFF_LS,
+ /** The VM is powered off because of a fatal error. */
+ VMSTATE_FATAL_ERROR,
+ /** Live save: Waiting for cancellation and transition to FatalError. */
+ VMSTATE_FATAL_ERROR_LS,
+ /** The VM is in guru meditation over a fatal failure. */
+ VMSTATE_GURU_MEDITATION,
+ /** Live save: Waiting for cancellation and transition to GuruMeditation. */
+ VMSTATE_GURU_MEDITATION_LS,
+ /** The VM is screwed because of a failed state loading. */
+ VMSTATE_LOAD_FAILURE,
+ /** The VM is being destroyed. */
+ VMSTATE_DESTROYING,
+ /** Terminated. */
+ VMSTATE_TERMINATED,
+ /** hack forcing the size of the enum to 32-bits. */
+ VMSTATE_MAKE_32BIT_HACK = 0x7fffffff
+ } VMSTATE;

+ /**
+ * Indicates that VBOXSTRICTRC is in strict mode.
+ */
+ +ifdef(__cplusplus)
+ &   ARCH_BITS == 64 /* cdecl requires classes and structs as hidden params. */
+ &   !defined(_MSC_VER) /* trouble similar to 32-bit gcc. */
+ &   ( defined(RT_STRICT) 
+   defined(VBOX_ALL)
+   defined(DOXYGEN_RUNNING) )
+## define VBOXSTRICTRC_STRICT_ENABLED 1
+##endif

+ /**
+ * Strict VirtualBox status code.
+ */
+ +* 
+ * This is normally an 32-bit integer and the only purpose of the type is to
+ * highlight the special handling that is required. But in strict build it is a
+ * class that causes compilation and runtime errors for some of the incorrect
+ * handling.
+ */
+ +#ifdef VBOXSTRICTRC_STRICT_ENABLED
+struct VBOXSTRICTRC
+{
+    /** The status code. */
+    int32_t m_rc;
+
+public:
/** Default constructor setting the status to VERR_IPE_UNINITIALIZED_STATUS. */
VBOXSTRICTRC()
+#ifdef VERR_IPE_UNINITIALIZED_STATUS
    : m_rc(VERR_IPE_UNINITIALIZED_STATUS)
+#endif
    {
    }

/** Constructor for normal integer status codes. */
VBOXSTRICTRC(int32_t const rc)
    { m_rc(rc) }

/** Getter that VBOXSTRICTRC_VAL can use. */
int32_t getValue() const { return m_rc; }

/** @name Comparison operators
 * @{ */
    bool operator==(int32_t rc) const { return m_rc == rc; }
    bool operator!=(int32_t rc) const { return m_rc != rc; }
    bool operator<=(int32_t rc) const { return m_rc <= rc; }
    bool operator>=(int32_t rc) const { return m_rc >= rc; }
    bool operator<(int32_t rc) const { return m_rc <  rc; }
    bool operator>(int32_t rc) const { return m_rc >  rc; }
    bool operator==(const VBOXSTRICTRC &rRc) const { return m_rc == rRc.m_rc; }
    bool operator!=(const VBOXSTRICTRC &rRc) const { return m_rc != rRc.m_rc; }
    bool operator<=(const VBOXSTRICTRC &rRc) const { return m_rc <= rRc.m_rc; }
    bool operator>=(const VBOXSTRICTRC &rRc) const { return m_rc >= rRc.m_rc; }
    bool operator<(const VBOXSTRICTRC &rRc) const { return m_rc <  rRc.m_rc; }
    bool operator>(const VBOXSTRICTRC &rRc) const { return m_rc >  rRc.m_rc; }
    /** @} */

/** Special automatic cast for RT_SUCCESS_NP. */
operator RTErrStrictType2() const { return RTErrStrictType2(m_rc); }

private:
/** @name Constructors that will prevent some of the bad types.
 * @{ */
    VBOXSTRICTRC(uint8_t rc) : m_rc(-999) { NOREF(rc); }
    VBOXSTRICTRC(uint16_t rc) : m_rc(-999) { NOREF(rc); }
    VBOXSTRICTRC(uint32_t rc) : m_rc(-999) { NOREF(rc); }
    VBOXSTRICTRC(uint64_t rc) : m_rc(-999) { NOREF(rc); }
    VBOXSTRICTRC(int8_t rc) : m_rc(-999) { NOREF(rc); }


+ VBOXSTRICTRC(int16_t rc) : m_rc(-999) { NOREF(rc); }
+ VBOXSTRICTRC(int64_t rc) : m_rc(-999) { NOREF(rc); }
+ /**< @} */ */
+};
+<# ifdef _MSC_VER
+ # pragma warning(disable:4190)
+ # endif
+<# else
+ typedef int32_t VBOXSTRICTRC;
+<# endif
+<# ifdef VBOXSTRICTRC_STRICT_ENABLED
+ # define VBOXSTRICTRC_VAL(rcStrict) ( (rcStrict).getValue() )
+<# else
+ # define VBOXSTRICTRC_VAL(rcStrict) (rcStrict)
+<# endif
+<# define VBOXSTRICTRC_TODO(rcStrict) VBOXSTRICTRC_VAL(rcStrict)
+
+/** Pointer to a PDM Base Interface. */
+typedef struct PDMIBASE *PPDMIBASE;
+/** Pointer to a pointer to a PDM Base Interface. */
+typedef PPDMIBASE *PPPDMIBASE;
+
+/** Pointer to a PDM Device Instance. */
+typedef struct PDMDEVINS *PPDMDEVINS;
+/** Pointer to a pointer to a PDM Device Instance. */
+typedef PPDMDEVINS *PPPDMDEVINS;
+/** R3 pointer to a PDM Device Instance. */
+typedef R3PTRTYPE(PPDMDEVINS) PPDMDEVINSR3;
+/** R0 pointer to a PDM Device Instance. */
+typedef R0PTRTYPE(PPDMDEVINS) PPDMDEVINSR0;
+/** RC pointer to a PDM Device Instance. */
+typedef RCPTRTYPE(PPDMDEVINS) PPDMDEVINSRC;
+
+ /** Pointer to a PDM PCI device structure. */
+ typedef struct PDMPCIDEV *PPDMPCIDEV;
+
+ /** Pointer to a PDM USB Device Instance. */
+ typedef struct PDMUSBDEVINS *PPDMPUSBDEVINS;
typedef struct PDMUSBINS *PPDMUSBINS;
/** Pointer to a pointer to a PDM USB Device Instance. */
typedef PPDMUSBINS *PPPDMUSBINS;
+
/** Pointer to a PDM Driver Instance. */
typedef struct PDMDRVINS *PPDMDRVINS;
/** Pointer to a pointer to a PDM Driver Instance. */
typedef PPDMDRVINS *PPPDMDRVINS;
/** R3 pointer to a PDM Driver Instance. */
typedef R3PTRTYPE(PPDMDRVINS) PPDMDRVINSR3;
/** R0 pointer to a PDM Driver Instance. */
typedef R0PTRTYPE(PPDMDRVINS) PPDMDRVINSR0;
/** RC pointer to a PDM Driver Instance. */
typedef RCPTRTYPE(PPDMDRVINS) PPDMDRVINSRC;
+
/** Pointer to a PDM Service Instance. */
typedef struct PDMSRVINS *PPDMSRVINS;
/** Pointer to a pointer to a PDM Service Instance. */
typedef PPDMSRVINS *PPPDMMSRVINS;
+
/** Pointer to a PDM critical section. */
typedef union PDMCRITSECT *PPDMCRITSECT;
/** Pointer to a const PDM critical section. */
typedef const union PDMCRITSECT *PCPDMCRITSECT;
+
/** Pointer to a PDM read/write critical section. */
typedef union PDMCRITSECTRW *PPDMCRITSECTRW;
/** Pointer to a const PDM read/write critical section. */
typedef union PDMCRITSECTRW const *PCPDMCRITSECTRW;
+
/** R3 pointer to a timer. */
typedef R3PTRTYPE(struct TMTIMER *) PTMTIMERR3;
/** Pointer to a R3 pointer to a timer. */
typedef PTMTIMERR3 *PPTMTIMERR3;
+
/** R0 pointer to a timer. */
typedef R0PTRTYPE(struct TMTIMER *) PTMTIMERR0;
/** Pointer to a R3 pointer to a timer. */
typedef PTMTIMERR0 *PPTMTIMERR0;
+
/** RC pointer to a timer. */
typedef RCPTRTYPE(struct TMTIMER *) PTMTIMERRC;
/** Pointer to a RC pointer to a timer. */
typedef PTMTIMERRC *PPTMTIMERRC;
+
/** Pointer to a timer. */
typedef CTX_SUFF(PTMTIMER) PTMTIMER;
/** Pointer to a pointer to a timer. */
+typedef PTMTIMER *PPTMTIMER;
+
+/** SSM Operation handle. */
+typedef struct SSMHANDLE *PSSMHANDLE;
+/** Pointer to a const SSM stream method table. */
+typedef struct SSMSTRMOPS const *PCSSMSTRMOPS;
+
+/** Pointer to a CPUMCTX. */
+typedef struct CPUMCTX *PCPUMCTX;
+/** Pointer to a const CPUMCTX. */
+typedef const struct CPUMCTX *PCCPUMCTX;
+
+/** Pointer to a CPU context core. */
+typedef struct CPUMCTXCORE *PCPUMCTXCORE;
+/** Pointer to a const CPU context core. */
+typedef const struct CPUMCTXCORE *PCCPUMCTXCORE;
+
+/** Pointer to a selector register. */
+typedef struct CPUMSELREG *PCPUMSELREG;
+/** Pointer to a const selector register. */
+typedef const struct CPUMSELREG *PCCPUMSELREG;
+
+/** Pointer to selector hidden registers. */
+* @deprecated Replaced by PCPUMSELREG */
+typedef struct CPUMSELREG *PCPUMSELREGHID;
+/** Pointer to const selector hidden registers. */
+* @deprecated Replaced by PCCPUMSELREG */
+typedef const struct CPUMSELREG *PCCPUMSELREGHID;
+
+/** @} */
+
+/** @defgroup grp_types_idt Interrupt Descriptor Table Entry. */
+* @todo This all belongs in x86.h! */
+* @ { */
+
+/** @todo VBOXIDT -> VBOXDESCIDT, skip the complex variations. We'll never use them. */
+
+/** IDT Entry, Task Gate view. */
+#pragma pack(1) /* paranoia */
+typedef struct VBOXIDTE_TASKGATE {
+  /** Reserved. */
+  unsigned u16Reserved1 : 16;
+  /** Task Segment Selector. */
+  unsigned u16TSS : 16;
+  /** More reserved. */
+  unsigned u8Reserved2 : 8;
typedef struct VBOXIDTE_INTERRUPTGATE
{
    /** Low offset word. */
    unsigned    u16OffsetLow : 16;
    /** Segment Selector. */
    unsigned    u16SegSel : 16;
    /** Reserved. */
    unsigned    u5Reserved2 : 5;
    /** Fixed value bit 0 - Set to 0. */
    unsigned    u1Fixed0 : 1;
    /** Fixed value bit 1 - Set to 0. */
    unsigned    u1Fixed1 : 1;
    /** Fixed value bit 2 - Set to 0. */
    unsigned    u1Fixed2 : 1;
    /** Fixed value bit 3 - Set to 0. */
    unsigned    u1Fixed3 : 1;
    /** Fixed value bit 4 - Set to 1. */
    unsigned    u1Fixed4 : 1;
    /** Fixed value bit 5 - Set to 1. */
    unsigned    u1Fixed5 : 1;
    /** Gate size, 1 = 32 bits, 0 = 16 bits. */
    unsigned    u132BitGate : 1;
    /** Fixed value bit 5 - Set to 0. */
    unsigned    u1Fixed6 : 1;
} VBOXIDTE_INTERRUPTGATE;

#define pack(1)                  /* paranoia */

typedef struct VBOXIDTE_INTERRUPTGATE *PVBOXIDTE_INTERRUPTGATE;

#pragma pack()
+ /** Descriptor Privilege level. */
+ unsigned u2DPL : 2;
+ /** Present flag. */
+ unsigned u1Present : 1;
+ /** High offset word. */
+ unsigned u16OffsetHigh : 16;
+ } VBOXIDTE_INTERRUPTGATE;
+ /*pragma pack()*/
+ /** Pointer to IDT Entry, Interrupt gate view. */
+ typedef VBOXIDTE_INTERRUPTGATE *PVBOXIDTE_INTERRUPTGATE;
+
+ /** IDT Entry, Trap Gate view. */
+ /*pragma pack(1)*/
+ typedef struct VBOXIDTE_TRAPGATE
+
+ + /** Low offset word. */
+ + unsigned u16OffsetLow : 16;
+ + /** Segment Selector. */
+ + unsigned u16SegSel : 16;
+ + /** Reserved. */
+ + unsigned u5Reserved2 : 5;
+ + /** Fixed value bit 0 - Set to 0. */
+ + unsigned u1Fixed0 : 1;
+ + /** Fixed value bit 1 - Set to 0. */
+ + unsigned u1Fixed1 : 1;
+ + /** Fixed value bit 2 - Set to 0. */
+ + unsigned u1Fixed2 : 1;
+ + /** Fixed value bit 3 - Set to 1. */
+ + unsigned u1Fixed3 : 1;
+ + /** Fixed value bit 4 - Set to 1. */
+ + unsigned u1Fixed4 : 1;
+ + /** Fixed value bit 5 - Set to 1. */
+ + unsigned u1Fixed5 : 1;
+ + /** Gate size. 1 = 32 bits, 0 = 16 bits. */
+ + unsigned u132BitGate : 1;
+ + /** Fixed value bit 5 - Set to 0. */
+ + unsigned u1Fixed6 : 1;
+ + /** Descriptor Privilege level. */
+ + unsigned u2DPL : 2;
+ + /** Present flag. */
+ + unsigned u1Present : 1;
+ + /** High offset word. */
+ + unsigned u16OffsetHigh : 16;
+ } VBOXIDTE_TRAPGATE;
+ /*pragma pack()*/
+ /** Pointer to IDT Entry, Trap Gate view. */
+ typedef VBOXIDTE_TRAPGATE *PVBOXIDTE_TRAPGATE;
typedef struct VBOXIDTE_GENERIC
{
    /** Low offset word. */
    unsigned u16OffsetLow : 16;
    /** Segment Selector. */
    unsigned u16SegSel : 16;
    /** Reserved. */
    unsigned u5Reserved : 5;
    /** IDT Type part one (not used for task gate). */
    unsigned u3Type1 : 3;
    /** IDT Type part two. */
    unsigned u5Type2 : 5;
    /** Descriptor Privilege level. */
    unsigned u2DPL : 2;
    /** Present flag. */
    unsigned u1Present : 1;
    /** High offset word. */
    unsigned u16OffsetHigh : 16;
} VBOXIDTE_GENERIC;

typedef VBOXIDTE_GENERIC *PVBOXIDTE_GENERIC;

#define VBOX_IDTE_TYPE1             0
#define VBOX_IDTE_TYPE2_TASK        0x5
#define VBOX_IDTE_TYPE2_INT_16      0x6
#define VBOX_IDTE_TYPE2_INT_32      0xe
#define VBOX_IDTE_TYPE2_TRAP_16     0x7
#define VBOX_IDTE_TYPE2_TRAP_32     0xf

#pragma pack(1)                         /* paranoia */
typedef union VBOXIDTE
{
    /** Task gate view. */
    VBOXIDTE_TASKGATE       Task;
    /** Trap gate view. */
    VBOXIDTE_TRAPGATE       Trap;
    /** Interrupt gate view. */
    VBOXIDTE_INTERRUPTGATE  Int;
};
/* Generic IDT view. */
VBOXIDTE_GENERIC  Gen;

/* 8 bit unsigned integer view. */
uint8_t     au8[8];

/* 16 bit unsigned integer view. */
uint16_t    au16[4];

/* 32 bit unsigned integer view. */
uint32_t    au32[2];

/* 64 bit unsigned integer view. */
uint64_t    au64;
} VBOXIDTE;

#pragma pack()

/* Pointer to IDT Entry. */
typedef VBOXIDTE *PVBOXIDTE;

/* Pointer to IDT Entry. */
typedef VBOXIDTE const *PCVBOXIDTE;

/* IDT Entry, 64-bit mode, Interrupt gate view. */
#pragma pack(1)                         /* paranoia */
typedef struct VBOXIDTE64_INTERRUPTGATE
{
    /* Low offset word. */
    unsigned    u16OffsetLow : 16;
    /* Segment Selector. */
    unsigned    u16SegSel : 16;
    /* Interrupt Stack Table Index. */
    unsigned    u3Ist : 3;
    /* Fixed value bit 0 - Set to 0. */
    unsigned    u1Fixed0 : 1;
    /* Fixed value bit 1 - Set to 0. */
    unsigned    u1Fixed1 : 1;
    /* Fixed value bit 2 - Set to 0. */
    unsigned    u1Fixed2 : 1;
    /* Fixed value bit 3 - Set to 0. */
    unsigned    u1Fixed3 : 1;
    /* Gate size, 1 = 32 bits, 0 = 16 bits. */
    unsigned    u132BitGate : 1;
    /* Fixed value bit 7 - Set to 1. */
    unsigned    u1Fixed7 : 1;
    /* Fixed value bit 5 - Set to 0. */
    unsigned    u1Fixed5 : 1;
    /* Fixed value bit 6 - Set to 1. */
    unsigned    u1Fixed6 : 1;
    /* Fixed value bit 7 - Set to 1. */
    unsigned    u1Fixed7 : 1;
    /* Gate size, 1 = 32 bits, 0 = 16 bits. */
    unsigned    u132BitGate : 1;
    /* Fixed value bit 5 - Set to 0. */
    unsigned    u1Fixed5 : 1;
+ /** Descriptor Privilege level. */    
+ unsigned u2DPL : 2;
+ /** Present flag. */    
+ unsigned u1Present : 1;
+ /** High offset word. */    
+ unsigned u16OffsetHigh : 16;
+ /** Offset bits 32..63. */    
+ unsigned u32OffsetHigh64;
+ /** Reserved. */    
+ unsigned u32Reserved;
+ } VBOXIDTE64_INTERRUPTGATE;
+} VBOXIDTE64_INTERRUPTGATE;
+/** Pointer to IDT Entry, 64-bit mode, Interrupt gate view. */
+typedef VBOXIDTE64_INTERRUPTGATE *PVBOXIDTE64_INTERRUPTGATE;
+
+/** IDT Entry, 64-bit mode, Trap gate view. */    
+#pragma pack(1)    /* paranoia */
+typedef struct VBOXIDTE64_TRAPGATE
+
+{    
+ /** Low offset word. */    
+ unsigned u16OffsetLow : 16;
+ /** Segment Selector. */    
+ unsigned u16SegSel : 16;
+ /** Interrupt Stack Table Index. */    
+ unsigned u3Ist : 3;
+ /** Fixed value bit 0 - Set to 0. */    
+ unsigned u1Fixed0 : 1;
+ /** Fixed value bit 1 - Set to 0. */    
+ unsigned u1Fixed1 : 1;
+ /** Fixed value bit 2 - Set to 0. */    
+ unsigned u1Fixed2 : 1;
+ /** Fixed value bit 3 - Set to 0. */    
+ unsigned u1Fixed3 : 1;
+ /** Fixed value bit 4 - Set to 0. */    
+ unsigned u1Fixed4 : 1;
+ /** Fixed value bit 5 - Set to 1. */    
+ unsigned u1Fixed5 : 1;
+ /** Fixed value bit 6 - Set to 1. */    
+ unsigned u1Fixed6 : 1;
+ /** Fixed value bit 7 - Set to 1. */    
+ unsigned u1Fixed7 : 1;
+ /** Gate size, 1 = 32 bits, 0 = 16 bits. */    
+ unsigned u132BitGate : 1;
+ /** Fixed value bit 5 - Set to 0. */    
+ unsigned u1Fixed8 : 1;
+ /** Descriptor Privilege level. */    
+ unsigned u2DPL : 2;
+ /** Present flag. */
+ unsigned u1Present : 1;
+ /**< High offset word. */
+ unsigned u16OffsetHigh : 16;
+ /**< Offset bits 32..63. */
+ unsigned u32OffsetHigh64;
+ /**< Reserved. */
+ unsigned u32Reserved;
+} VBOXIDTE64_TRAPGATE;
+#pragma pack()  
+ /**< Pointer to IDT Entry, 64-bit mode, Trap gate view. */
+typedef VBOXIDTE64_TRAPGATE *PVBOXIDTE64_TRAPGATE;
+
+ /**< IDT Entry, 64-bit mode, Generic view. */
+#pragma pack(1)  /* paranoia */
+typedef struct VBOXIDTE64_GENERIC
+{
+ /**< Low offset word. */
+ unsigned u16OffsetLow : 16;
+ /**< Segment Selector. */
+ unsigned u16SegSel : 16;
+ /**< Reserved. */
+ unsigned u3Ist : 3;
+ /**< Fixed value bit 0 - Set to 0. */
+ unsigned u1Fixed0 : 1;
+ /**< Fixed value bit 1 - Set to 0. */
+ unsigned u1Fixed1 : 1;
+ /**< IDT Type part one (not used for task gate). */
+ unsigned u3Type1 : 3;
+ /**< IDT Type part two. */
+ unsigned u5Type2 : 5;
+ /**< Descriptor Privilege level. */
+ unsigned u2DPL : 2;
+ /**< Present flag. */
+ unsigned u1Present : 1;
+ /**< High offset word. */
+ unsigned u16OffsetHigh : 16;
+ /**< Offset bits 32..63. */
+ unsigned u32OffsetHigh64;
+ /**< Reserved. */
+ unsigned u32Reserved;
+} VBOXIDTE64_GENERIC;
+#pragma pack()  
+ /**< Pointer to IDT Entry, 64-bit mode, Generic view. */
+typedef VBOXIDTE64_GENERIC *PVBOXIDTE64_GENERIC;
+
+ /**< IDT Entry, 64-bit mode. */
+#pragma pack(1)  /* paranoia */
+typedef union VBOXIDTE64
/** Trap gate view. */
VBOXIDTE64_TRAPGATE Trap;
/** Interrupt gate view. */
VBOXIDTE64_INTERRUPTGATE Int;
/** Generic IDT view. */
VBOXIDTE64_GENERIC Gen;
/** 8 bit unsigned integer view. */
uint8_t au8[16];
/** 16 bit unsigned integer view. */
uint16_t au16[8];
/** 32 bit unsigned integer view. */
uint32_t au32[4];
/** 64 bit unsigned integer view. */
uint64_t au64[2];
} VBOXIDTE64;
#pragma pack()
/** Pointer to IDT Entry. */
typedef VBOXIDTE64 *PVBOXIDTE64;
/** Pointer to IDT Entry. */
typedef VBOXIDTE64 const *PCVBOXIDTE64;
#pragma pack(1)
/** IDTR */
typedef struct VBOXIDTR
{
    /** Size of the IDT. */
    uint16_t cbIdt;
    /** Address of the IDT. */
    uint64_t pIdt;
} VBOXIDTR, *PVBOXIDTR;
#pragma pack()
/** @} */
/** VBOXIDTE_OFFSET */
#define VBOXIDTE_OFFSET(desc) \
        (  ((uint32_t)((desc).Gen.u16OffsetHigh) << 16) \
         | (           (desc).Gen.u16OffsetLow        ) )
/** VBOXIDTE64_OFFSET */
#define VBOXIDTE64_OFFSET(desc) \
        ( ((uint32_t)((desc).Gen.u16OffsetHigh) << 16) \
         | ( (desc).Gen.u16OffsetLow ) )
/** @def VBOXIDTE_OFFSET */
#define VBOXIDTE_OFFSET(desc) \
    * Return the offset of an IDT entry.
    */
    #define VBOXIDTE_OFFSET(desc) \
    * Return the offset of an IDT entry.
    */
( (uint64_t)((desc).Gen.u32OffsetHigh64) << 32) \\
| (uint32_t)((desc).Gen.u32OffsetHigh)   << 16) \\
| (   (desc).Gen.u16OffsetLow          ) )
+

#define pack(1)
+/** GDTR */
+typedef struct VBOXGDTR
+{
+  /**< Size of the GDT. */
+  uint16_t    cbGdt;
+  /**< Address of the GDT. */
+  uint64_t    pGdt;
+} VBOXGDTR;
+
#pragma pack()  // @} 

/** Pointer to GDTR. */
+typedef VBOXGDTR *PVBOXGDTR;
+
+/** @} */

+/** 32-bit Task Segment used in raw mode.
+ * @todo Move this to SELM! Use X86TSS32 instead.
+ */
+#define pack(1)
+typedef struct VBOXTSS
+{
+  /**< 0x00 - Back link to previous task. (static) */
+  RTSEL       selPrev;
+  uint16_t    padding1;
+  /**< 0x04 - Ring-0 stack pointer. (static) */
+  uint32_t    esp0;
+  /**< 0x08 - Ring-0 stack segment. (static) */
+  RTSEL       ss0;
+  uint16_t    padding_ss0;
+  /**< 0x0c - Ring-1 stack pointer. (static) */
+  uint32_t    esp1;
+  /**< 0x10 - Ring-1 stack segment. (static) */
+  RTSEL       ss1;
+  uint16_t    padding_ss1;
+  /**< 0x14 - Ring-2 stack pointer. (static) */
+  uint32_t    esp2;
+  /**< 0x18 - Ring-2 stack segment. (static) */
+  RTSEL       ss2;
+  uint16_t    padding_ss2;
+  /**< 0x1c - Page directory for the task. (static) */
+  uint32_t    cr3;
+  /**< 0x20 - EIP before task switch. */

---

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```c
+    uint32_t    eip;
+    /** 0x24 - EFLAGS before task switch. */
+    uint32_t    eflags;
+    /** 0x28 - EAX before task switch. */
+    uint32_t    eax;
+    /** 0x2c - ECX before task switch. */
+    uint32_t    ecx;
+    /** 0x30 - EDX before task switch. */
+    uint32_t    edx;
+    /** 0x34 - EBX before task switch. */
+    uint32_t    ebx;
+    /** 0x38 - ESP before task switch. */
+    uint32_t    esp;
+    /** 0x3c - EBP before task switch. */
+    uint32_t    ebp;
+    /** 0x40 - ESI before task switch. */
+    uint32_t    esi;
+    /** 0x44 - EDI before task switch. */
+    uint32_t    edi;
+    /** 0x48 - ES before task switch. */
+    RTSEL       es;
+    uint16_t    padding_es;
+    /** 0x4c - CS before task switch. */
+    RTSEL       cs;
+    uint16_t    padding_cs;
+    /** 0x50 - SS before task switch. */
+    RTSEL       ss;
+    uint16_t    padding_ss;
+    /** 0x54 - DS before task switch. */
+    RTSEL       ds;
+    uint16_t    padding_ds;
+    /** 0x58 - FS before task switch. */
+    RTSEL       fs;
+    uint16_t    padding_fs;
+    /** 0x5c - GS before task switch. */
+    RTSEL       gs;
+    uint16_t    padding_gs;
+    /** 0x60 - LDTR before task switch. */
+    RTSEL       selLdt;
+    uint16_t    padding_ldt;
+    /** 0x64 - Debug trap flag */
+    uint16_t    fDebugTrap;
+    /** 0x66 - Offset relative to the TSS of the start of the I/O Bitmap */
+    * and the end of the interrupt redirection bitmap. */
+    uint16_t    offIoBitmap;
+    /** 0x68 - 32 bytes for the virtual interrupt redirection bitmap. (VME) */
+    uint8_t     IntRedirBitmap[32];
+} VBOXTSS:
```
+#pragma pack()
+/** Pointer to task segment. */
+typedef VBOXTSS *PVBOXTSS;
+/** Pointer to const task segment. */
+typedef const VBOXTSS *PCVBOXTSS;
+
+/**
+ * Pointer to a callback method table provided by the VM API user. */
+typedef struct VMM2USERMETHODS const *PCVMM2USERMETHODS;
+
+/**
+ * Data transport buffer (scatter/gather)
+ */
+typedef struct PDMDATASEG
+{
+    /** Length of buffer in entry. */
+    size_t  cbSeg;
+    /** Pointer to the start of the buffer. */
+    void   *pvSeg;
+} PDMDATASEG;
+/**
+ * Pointer to a data transport segment. */
+typedef PDMDATASEG *PPDMDATASEG;
+/**
+ * Pointer to a const data transport segment. */
+typedef PDMDATASEG const *PCPDMDATASEG;
+
+/**
+ * Forms of generic segment offloading.
+ */
+typedef enum PDMNETWORKGSOTYPE
+{
+    /** Invalid zero value. */
+    PDMNETWORKGSOTYPE_INVALID = 0,
+    /** TCP/IPv4 - no CWR/ECE encoding. */
+    PDMNETWORKGSOTYPE_IPV4_TCP,
+    /** TCP/IPv6 - no CWR/ECE encoding. */
+    PDMNETWORKGSOTYPE_IPV6_TCP,
+    /** UDP/IPv4. */
+    PDMNETWORKGSOTYPE_IPV4_UDP,
+    /** UDP/IPv6. */
+    PDMNETWORKGSOTYPE_IPV6_UDP,
+    /** TCP/IPv6 over IPv4 tunneling - no CWR/ECE encoding. */
+    PDMNETWORKGSOTYPE_IPV4_IPV6_TCP,
+    /** TCP/IPv6 over IPv6 tunneling - no CWR/ECE encoding. */
+    PDMNETWORKGSOTYPE_IPV6_IPV6_TCP,
+    /** The header offsets and sizes relates to IPv4 and TCP, the IPv6 header is figured out as needed. */
+    @todo Needs checking against facts, this is just an outline of the idea. */
+    PDMNETWORKGSOTYPE_IPV4_IPV6_UDP,
+    /** UDP/IPv4 over IPv4 tunneling. */
+    PDMNETWORKGSOTYPE_IPV4_IPV4_UDP,
+    /** UDP/IPv6 over IPv4 tunneling. */
+    PDMNETWORKGSOTYPE_IPV6_IPV4_UDP,
+    /** UDP/IPv6 over IPv6 tunneling. */
+    PDMNETWORKGSOTYPE_IPV6_IPV6_UDP,
+    /** The header offsets and sizes relates to IPv6 and TCP, the IPv4 header is figured out as needed. */
+    PDMNETWORKGSOTYPE_IPV6_IPV6_UDP,
+}
* The header offsets and sizes relates to IPv4 and UDP, the IPv6 header is
generated as needed.
* @todo Needs checking against facts, this is just an outline of the idea. */
PDMNETWORKGSOTYPE_IPV4_IPV6_UDP,
/** The end of valid GSO types. */
PDMNETWORKGSOTYPE_END
} PDMNETWORKGSOTYPE;

+/** *
+ * Generic segment offloading context.
+ *
+ * We generally follow the E1000 specs wrt to which header fields we change.
+ * However the GSO type implies where the checksum fields are and that they are
+ * always updated from scratch (no half done pseudo checksums).
+ *
+ * @remarks This is part of the internal network GSO packets. Take great care
+ * when making changes. The size is expected to be exactly 8 bytes.
+ */
typedef struct PDMNETWORKGSO
{[
+ /** The type of segmentation offloading we're performing (PDMNETWORKGSOTYPE). */
+ uint8_t u8Type;
+ /** The total header size. */
+ uint8_t cbHdrsTotal;
+ /** The max segment size (MSS) to apply. */
+ uint16_t cbMaxSeg;
+
+ /** Offset of the first header (IPv4 / IPv6). 0 if not not needed. */
+ uint8_t offHdr1;
+ /** Offset of the second header (TCP / UDP). 0 if not not needed. */
+ uint8_t offHdr2;
+ /** The header size used for segmentation (equal to offHdr2 in UFO). */
+ uint8_t cbHdrsSeg;
+ /** Unused. */
+ uint8_t u8Unused;
} PDMNETWORKGSO;
+/** Pointer to a GSO context. */
typedef PDMNETWORKGSO *PPDMNETWORKGSO;
+/** Pointer to a const GSO context. */
typedef PDMNETWORKGSO const *PCPDMNETWORKGSO;
+
+/** *
+ * The current ROM page protection.
+ *
+ * @remarks This is part of the saved state.
+ */
+typedef enum PGMROMPROT
+{
+    /** The customary invalid value. */
+    PGMROMPROT_INVALID = 0,
+    /** Read from the virgin ROM page, ignore writes. */
+    PGMROMPROT_READ_ROM_WRITE_IGNORE,
+    /** Read from the virgin ROM page, write to the shadow RAM. */
+    PGMROMPROT_READ_ROM_WRITE_RAM,
+    /** Read from the shadow ROM page, ignore writes. */
+    PGMROMPROT_READ_RAM_WRITE_IGNORE,
+    /** Read from the shadow ROM page, write to the shadow RAM. */
+    PGMROMPROT_READ_RAM_WRITE_RAM,
+    /** The end of valid values. */
+    PGMROMPROT_END,
+    /** The usual 32-bit type size hack. */
+    PGMROMPROT_32BIT_HACK = 0x7fffffff
+} PGMROMPROT;

+typedef struct PGMPAGEMAPLOCK
+{
+    void       *pvPage;
+    PVMCPU      pVCpu;
+    uintptr_t   uPageAndType;
+    void       *pvMap;
+} PGMPAGEMAPLOCK;

+#if defined(IN_RC) || defined(VBOX_WITH_2X_4GB_ADDR_SPACE_IN_R0)
+    /** The locked page. */
+    void pvPage;
+    /** Pointer to the CPU that made the mapping. */
+    PVMCPU pVCpu;
+    /** Pointer to the PGMPAGE and lock type. */
+    uintptr_t uPageAndType;
+    /** Read lock type value. */
+    #define PGMPAGEMAPLOCK_TYPE_READ ((uintptr_t)0)
+    /** Write lock type value. */
+    #define PGMPAGEMAPLOCK_TYPE_WRITE ((uintptr_t)1)
+    /** Lock type mask. */
+    #define PGMPAGEMAPLOCK_TYPE_MASK ((uintptr_t)1)
+    /** Pointer to the PGMCHUNKR3MAP. */
+    void *pvMap;
+    #endif
/** Pointer to a page mapping lock. */
typedef PGMPAGEMAPLOCK *PPGMPAGEMAPLOCK;

/** Pointer to a info helper callback structure. */
typedef struct DBGINFOHLP *PDBGINFOHLP;

/** Pointer to a const info helper callback structure. */
typedef const struct DBGINFOHLP *PCDBGINFOHLP;

/** Pointer to a const register descriptor. */
typedef struct DBGFREGDESC const *PCDBGFREGDESC;

/** Configuration manager tree node - A key. */
typedef struct CFGMNODE *PCFGMNODE;

/** Configuration manager tree leaf - A value. */
typedef struct CFGMLEAF *PCFGMLEAF;

/** CPU modes. */
typedef enum CPUMMODE
{
    /** The usual invalid zero entry. */
    CPUMMODE_INVALID = 0,
    /** Real mode. */
    CPUMMODE_REAL,
    /** Protected mode (32-bit). */
    CPUMMODE_PROTECTED,
    /** Long mode (64-bit). */
    CPUMMODE_LONG
} CPUMMODE;

/** CPU mode flags (DISSTATE::mode). */
typedef enum DISCPUMODE
{
    /** hack forcing the size of the enum to 32-bits. */
    DISCPUMODE_MAKE_32BIT_HACK = 0x7fffffff

+} DISCPUMODE;
+
+/** Pointer to the disassembler state. */
+typedef struct DISSTATE *PDISSTATE;
+/** Pointer to a const disassembler state. */
+typedef struct DISSTATE const *PCDISSTATE;
+
+/** @deprecated  PDISSTATE and change pCpu and pDisState to pDis. */
+typedef PDISSTATE PDISCPUSTATE;
+/** @deprecated  PCDISSTATE and change pCpu and pDisState to pDis. */
+typedef PCDISSTATE PCDISCPUSTATE;
+
+/** @} */
+
+#endif
+##include <iprt/mem.h>
+
+endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/asm-amd64-x86.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/asm-amd64-x86.h
@@ -0,0 +1,3362 @@
+/** @file
+ * IPRT - AMD64 and x86 Specific Assembly Functions.
+ */
+
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+
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_asm_amd64_x86_h
+#define ___iprt_asm_amd64_x86_h
+
+#include <iprt/types.h>
+#include <iprt/assert.h>
+  /* Emit the intrinsics at all optimization levels. */
+  #if defined(_MSC_VER) && RT_INLINE_ASM_USES_INTRIN
+    #pragma warning(push)
+    #pragma warning(disable:4668) /* Several incorrect __cplusplus uses. */
+    #pragma warning(disable:4255) /* Incorrect __slwpcb prototype. */
+    #include <intrin.h>
+    #pragma warning(pop)
+    /* Emit the intrinsics at all optimization levels. */
+  #endif
+  #endif
+# pragma intrinsic(_ReadWriteBarrier)
+# pragma intrinsic(__cpuid)
+# pragma intrinsic(_enable)
+# pragma intrinsic(_disable)
+# pragma intrinsic(_rdtsc)
+# pragma intrinsic(__readmsr)
+# pragma intrinsic(__writemsr)
+# pragma intrinsic(__outbyte)
+# pragma intrinsic(__outbytestring)
+# pragma intrinsic(__outword)
+# pragma intrinsic(__outwordstring)
+# pragma intrinsic(__outdword)
+# pragma intrinsic(__outdwordstring)
+# pragma intrinsic(__inbyte)
+# pragma intrinsic(__inbytestring)
+# pragma intrinsic(__inword)
+# pragma intrinsic(__inwordstring)
+# pragma intrinsic(__indword)
+# pragma intrinsic(__indwordstring)
+# pragma intrinsic(__invlpg)
+# pragma intrinsic(__wbinvd)
+# pragma intrinsic(__readcr0)
+# pragma intrinsic(__readcr2)
+# pragma intrinsic(__readcr3)
+# pragma intrinsic(__readcr4)
+# pragma intrinsic(__writecr0)
+# pragma intrinsic(__writecr3)
+# pragma intrinsic(__writecr4)
+# pragma intrinsic(__readdr)
+# pragma intrinsic(__writedr)
+# ifdef RT_ARCH_AMD64
+#  pragma intrinsic(__readcr8)
+#  pragma intrinsic(__writecr8)
+# endif
+# ifdef
+# if RT_INLINE_ASM_USES_INTRIN >= 14
+#  pragma intrinsic(__halt)
+# endif
+# if RT_INLINE_ASM_USES_INTRIN >= 15
+#  pragma intrinsic(__readeflags)
+#  pragma intrinsic(__writeeflags)
+# endif
+# endif
+
+/*
+ * Include #pragma aux definitions for Watcom C/C++.
+ */
+if defined(__WATCOMC__) && ARCH_BITS == 16
+# include "asm-amd64-x86-watcom-16.h"
+elif defined(__WATCOMC__) && ARCH_BITS == 32
+# include "asm-amd64-x86-watcom-32.h"
+endif
+
+/** @defgroup grp_rt_asm_amd64_x86  AMD64 and x86 Specific ASM Routines
+ * @ingroup grp_rt_asm
+ * @{
+ *
+ /** @todo find a more proper place for these structures? */
+ *
+#pragma pack(1)
+/** IDTR */
+typedef struct RTIDTR
+{
+  /** Size of the IDT. */
+  uint16_t cbIdt;
+  /** Address of the IDT. */
+#if ARCH_BITS != 64
+    uint32_t pIdt;
+#else
+    uint64_t pIdt;
+#endif
+  /** @internal */
+  typedef struct RTIDTRALIGNEDINT
+  {
+    /** Alignment padding. */
+    uint16_t au16Padding[ARCH_BITS == 64 ? 3 : 1];
+    /** The IDTR structure. */
+    RTIDTR Idtr;
+  } RTIDTRALIGNEDINT;
+  /** Wrapped RTIDTR for preventing misalignment exceptions. */
+} RTIDTRALIGNED;

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AssertCompileSize(RTIDTRALIGNED, ((ARCH_BITS == 64) + 1) * 8);
/** Pointer to a an RTIDTR alignment wrapper. */
typedef RTIDTRALIGNED RT_FAR *PRIDTRALIGNED;

#pragma pack(1)
/** GDTR */
typedef struct RTGDTR
{
    /** Size of the GDT. */
    uint16_t cbGdt;
    /** Address of the GDT. */
#if ARCH_BITS != 64
    uint32_t pGdt;
#else
    uint64_t pGdt;
#endif
} RTGDTR, RT_FAR *PRTGDTR;
#pragma pack()

#pragma pack(1)
/** @internal */
typedef struct RTGDTRALIGNEDINT
{
    /** Alignment padding. */
    uint16_t au16Padding[ARCH_BITS == 64 ? 3 : 1];
    /** The GDTR structure. */
    RTGDTR Gdtr;
} RTGDTRALIGNEDINT;
#pragma pack()

/** Wrapped RTGDTR for preventing misalignment exceptions. */
typedef union RTGDTRALIGNED
{
    /** Try make sure this structure has optimal alignment. */
    uint64_t auAlignmentHack[ARCH_BITS == 64 ? 2 : 1];
    /** Aligned structure. */
    RTGDTRALIGNEDINT s;
} RTGDTRALIGNED;

AssertCompileSize(RTIDTRALIGNED, ((ARCH_BITS == 64) + 1) * 8);
/** Pointer to a an RTGDTR alignment wrapper. */
typedef RTGDTRALIGNED RT_FAR *PRGDTRALIGNED;

/** Gets the content of the IDTR CPU register. */
/** @param pldr Where to store the IDTR contents. */
+if RT_INLINE_ASMEXTERNAL
+DECLASM(void) ASMGetIDTR(PRTIDTR pIdtr);
+else
+DECLINLINE(void) ASMGetIDTR(PRTIDTR pIdtr)
+
+if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("sidt %0":"m"(*pIdtr));
+else
+    __asm
+    {
+    #ifdef RT_ARCH_AMD64
+        mov     rax, [pIdtr]
+        sidt    [rax]
+    #else
+        mov     eax, [pIdtr]
+        sidt    [eax]
+    #endif
+    }
+}
+endif
+
+/**
+ * Gets the content of the IDTR.LIMIT CPU register.
+ * @returns IDTR limit.
+ */
+if RT_INLINE_ASMEXTERNAL
+DECLASM(uint16_t) ASMGetIdtrLimit(void);
+else
+DECLINLINE(uint16_t) ASMGetIdtrLimit(void)
+{
+    RTIDTRALIGNED TmpIdtr;
+    #ifdef RT_ARCH_AMD64
+        mov     rax, [pIdtr]
+        sidt    [rax]
+    #else
+        mov     eax, [pIdtr]
+        sidt    [eax]
+    #endif
+    return TmpIdtr.s.Idtr.cbIdt;
+}
+endif
+
+/**
+ * Sets the content of the IDTR CPU register.
+ */
+ * @param   pIdtr   Where to load the IDTR contents from
+ */
+#elif RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMSetIDTR(const RTIDTR RT_FAR *pIdtr);
+彩神 else
+DECLINLINE(void) ASMSetIDTR(const RTIDTR RT_FAR *pIdtr)
+{ /*
+    __asm___volatile__("lidt %0" : : "m" (*pIdtr));
+彩神 else
+    __asm
+    {
+彩神 ifdef RT_ARCH_AMD64
+彩神     mov     rax, [pIdtr]
+彩神     lidt    [rax]
+彩神 else
+彩神     mov     eax, [pIdtr]
+彩神     lidt    [eax]
+彩神 endif
+彩神 }
+彩神 endif
+彩神
+彩神 /**<
+彩神 * Gets the content of the GDTR CPU register.
+彩神 * @param   pGdtr   Where to store the GDTR contents.
+彩神 */
+彩神 */
+彩神 ifndef RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMGetGDTR(PRTGDTR pGdtr);
+彩神 else
+DECLINLINE(void) ASMGetGDTR(PRTGDTR pGdtr)
+{ /*
+彩神 __asm___volatile__("sgdt %0" : =m" (*pGdtr));
+彩神 else
+彩神 __asm
+彩神 {
+彩神 ifdef RT_ARCH_AMD64
+彩神     mov     rax, [pGdtr]
+彩神     sgdt    [rax]
+彩神 else
+彩神     mov     eax, [pGdtr]
+彩神     sgdt    [eax]
+彩神 endif
+彩神 }
+彩神 endif
+彩神 */
+ /**
+  * Sets the content of the GDTR CPU register.
+  * @param   pGdtr   Where to load the GDTR contents from
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMSetGDTR(const RTGDTR RT_FAR *pGdtr);
+ +#else
+ #define ASMSetGDTR(const RTGDTR RT_FAR *pGdtr)
+ +{}
+ +# if RT_INLINE_ASM_EXTERNAL
+ #endif
+ #endif
+ #endif
+ #endif
+ /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ + /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ +
+ +
+ /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ +
+ +
+ /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ +
+ +
+ /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ +
+ +
+ /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ +
+ +
+ /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ +
+ +
+ /**
+  * Get the cs register.
+  * @returns cs.
+  */
+ #=> RT_INLINE_ASM_EXTERNAL
+ #ifndef ASMGetCS(void);
+ +#else
+ #define ASMGetCS(void)
+ +{}
+ +#endif
+ +
+ +
++
+    mov     ax, ds
+    mov     [SelDS], ax
+}  
+    return SelDS;
+}  
+  
+  /**
+   * Get the DS register.
+   * @returns DS.
+   */
+  +#if RT_INLINE_ASM_EXTERNAL
+  #DECLASM(RTSEL) ASMGetDS(void);
+  +#else
+  #DECLINLINE(RTSEL) ASMGetDS(void)
+  +{
+    RTSEL SelDS;
+    +#if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("movw \%ds, \%0\n\t" : "=r" (SelDS));
+    +# else
+    __asm
+    + { 
+    mov     ax, ds
+    mov     [SelDS], ax
+    + }  
+    +# endif
+    +    return SelDS;
+    +}  
+  +#endif
+  +
+  +  /**
+   * Get the ES register.
+   * @returns ES.
+   */
+  +#if RT_INLINE_ASM_EXTERNAL
+  #DECLASM(RTSEL) ASMGetES(void);
+  +#else
+  #DECLINLINE(RTSEL) ASMGetES(void)
+  +{
+    RTSEL SelES;
+    +#if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("movw \%es, \%0\n\t" : "=r" (SelES));
+    +# else
+    __asm
+    + { 
+    mov     ax, es
+    mov     [SelES], ax
+    + }  
+    +# endif
+    +    return SelES;
+    +}  
+  +#endif
+  +
+    mov [SelES], ax
+  }
+#endif
+  return SelES;
+
+}="# endif
+    return SelES;
+
+/*
+ * Get the FS register.
+ * @returns FS.
+ * @returns FS.
+ */
+//if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetFS(void);
+#else
+DECLINLINE(RTSEL) ASMGetFS(void)
+{
+  RTSEL SelFS;
+  //if RT_INLINE_ASM_GNU_STYLE
+  __asm__ __volatile__("movw %%fs, %0
+    : "=r" (SelFS));
+  else
+    __asm
+    {
+      mov ax, fs
+      mov [SelFS], ax
+    }
+  endif
+  return SelFS;
+}="# endif
+    return SelFS;
+
+/*
+ * Get the GS register.
+ * @returns GS.
+ */
+//if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetGS(void);
+#else
+DECLINLINE(RTSEL) ASMGetGS(void)
+{
+  RTSEL SelGS;
+  //if RT_INLINE_ASM_GNU_STYLE
+  __asm__ __volatile__("movw %%gs, %0
+    : "=r" (SelGS));
+  else
+    __asm
+    {
+      mov ax, gs
+    }
+  endif
+  return SelGS;
+}="# endif
+    return SelGS;
+    mov     [SelGS], ax
+  }
+# endif
+  return SelGS;
+}
+#endif
+
+/**
+ * Get the SS register.
+ * @returns SS.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetSS(void);
+#else
+DECLINLINE(RTSEL) ASMGetSS(void)
+{
+    RTSEL SelSS;
+    __asm
+    { mov ax, ss
+      mov [SelSS], ax
+    }
+# endif
+    return SelSS;
+}
+#endif
+
+/**
+ * Get the TR register.
+ * @returns TR.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetTR(void);
+#else
+DECLINLINE(RTSEL) ASMGetTR(void)
+{
+    RTSEL SelTR;
+    __asm
+    { str ax
+    mov     [SelTR], ax
+ }     +# endif
+    return SelTR;
+}        +#endif
+
+/**
+ * Get the LDTR register.
+ * @returns LDTR.
+ * @returns LDTR.
+ */
+if RT_INLINE_ASM_EXTERNAL
+DECLASM(RTSEL) ASMGetLDTR(void);
+else
+DECLINLINE(RTSEL) ASMGetLDTR(void)
+{      + RTSEL SelLDTR;
+    RTSEL SelLDTR;
+    __asm    __volatile__("sldt %w0\n\t": "r" (SelLDTR));
+    __asm
+    {        + asm volatile(__"sldt %w0\n\t": "r" (SelLDTR));
+    + __asm
+    + {            + asm
+    +     sldt   ax
+    +     mov    [SelLDTR], ax
+    +     sldt   ax
+    + }     +# endif
+    return SelLDTR;
+}        +#endif
+
+/**
+ * Get the access rights for the segment selector.
+ * @returns The access rights on success or UINT32_MAX on failure.
+ * @param   uSel        The selector value.
+ * @param   uSel        The selector value.
+ * @returns The access rights on success or UINT32_MAX on failure.
+ * @returns The access rights on success or UINT32_MAX on failure.
+ * @param   uSel        The selector value.
+ * @param   uSel        The selector value.
+ * @returns The access rights on success or UINT32_MAX on failure.
+ * @param   uSel        The selector value.
+ */
+if RT_INLINE_ASM_EXTERNAL
+DECLASM(uint32_t) ASMGetSegAttr(uint32_t uSel);
+else
+DECLINLINE(uint32_t) ASMGetSegAttr(uint32_t uSel)
+{      + uint32_t uAttr;
+     uint32_t uAttr;
+     uint32_t uAttr;
+     /* LAR only accesses 16-bit of the source operand, but eax for the
destination operand is required for getting the full 32-bit access rights. */
  #if RT_INLINE_ASM_GNU_STYLE
  __asm__ __volatile__("lar %1, %%eax\n"
                        "jz done%=\n"
                        "movl $0xffffffff, %%eax\n"
                        "done%=\n"
                        "movl %%eax, %0\n"
                        : "=r" (uAttr)
                        : "r" (uSel)
                        : "cc", "%eax");
  #else
  __asm
  {
    lar eax, [uSel]
    jz done
    mov eax, 0xffffffff
    done:
    mov [uAttr], eax
  }
  #endif
  return uAttr;
#endif

/**
 * Get the [RE]FLAGS register.
 * @returns [RE]FLAGS.
 */
#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
DECLASM(RTCCUINTREG) ASMGetFlags(void);
#else
DECLINLINE(RTCCUINTREG) ASMGetFlags(void)
{
    RTCCUINTREG uFlags;
    #if RT_INLINE_ASM_GNU_STYLE
    #ifdef RT_ARCH_AMD64
    __asm__ __volatile__("pushfq\n"
                          "popq %0\n"
                          : "=r" (uFlags));
    #else
    __asm__ __volatile__("pushfl\n"
                          "popl %0\n"
                          : "=r" (uFlags));
    #endif
    #elif RT_INLINE_ASM_USES_INTRIN >= 15
    uFlags = __readeflags();
    #else
+ __asm
+ {
+  +# ifdef RT_ARCH_AMD64
+  +    pushfq
+  +    pop [uFlags]
+  +# else
+  +    pushfd
+  +    pop [uFlags]
+  +# endif
+  +}
+  +# endif
+  + return uFlags;
+ +}
+  +#endif
+
+/**
+  * Set the [RE]FLAGS register.
+  * @param   uFlags      The new [RE]FLAGS value.
+  */
+  +#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+  #DECLASM(void) ASMSetFlags(RTCCUINTREG uFlags);
+  +#else
+  #DECLINLINE(void) ASMSetFlags(RTCCUINTREG uFlags)
+  +{
+  +# if RT_INLINE_ASM_GNU_STYLE
+  +# ifdef RT_ARCH_AMD64
+    __asm__ __volatile__("pushq %0\n\t"
+                         "popfq\n\t"
+                         : : "g" (uFlags));
+  +# else
+    __asm__ __volatile__("pushl %0\n\t"
+                         "popfl\n\t"
+                         : : "g" (uFlags));
+  +# endif
+  +# elif RT_INLINE_ASM_USES_INTRIN >= 15
+  +# writeeflags(uFlags);
+  +# else
+  + __asm
+  + {
+  +# ifdef RT_ARCH_AMD64
+  +    push [uFlags]
+  +    popfq
+  +# else
+  +    push [uFlags]
+  +    popfd
+  +# endif
+  +}
/**
 * Modifies the [RE]FLAGS register.
 * @returns Original value.
 * @param   fAndEfl   Flags to keep (applied first).
 * @param   fOrEfl    Flags to be set.
 * @*/
#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
DECLASM(RTCCUINTREG) ASMChangeFlags(RTCCUINTREG fAndEfl, RTCCUINTREG fOrEfl);
#else
DECLINLINE(RTCCUINTREG) ASMChangeFlags(RTCCUINTREG fAndEfl, RTCCUINTREG fOrEfl)
{
    RTCCUINTREG fOldEfl;
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("pushfq
	"                         
movq  (%%rsp), %0
	"                         andq  %0, %1
	"                         orq   %3, %1
	"                         mov   %1, (%%rsp)
	"                         "movf\n\n"
	" =r" (fOldEfl),
	" =r" (fAndEfl)
	" I" (fAndEfl),
    "rn" (fOrEfl) );
#else
    __asm
    { 
#  ifdef RT_ARCH_AMD64
        mov     rdx, [fAndEfl]
        mov     rcx, [fOrEfl]
        
    #endif
#endif
    
    #endif
#endif
    
    #else
    RTCCUINTREG fOldEfl = __readeflags();
    __writeeflags((fOldEfl & fAndEfl) | fOrEfl);
#endif
else
    
    #ifdef RT_ARCH_AMD64
        mov     rdx, [fAndEfl]
        mov     rcx, [fOrEfl]
        
    #endif
#endif

+ pushfq
+ mov  rax, [rsp]
+ and  rdx, rax
+ or   rdx, rcx
+ mov  [rsp], rdx
+ popfq
+ mov  [fOldEfl], rax
+# else
+ mov  edx, [fAndEfl]
+ mov  ecx, [fOrEfl]
+ pushfd
+ mov  eax, [esp]
+ and  edx, eax
+ or   edx, ecx
+ mov  [esp], edx
+ popfd
+ mov  [fOldEfl], eax
+# endif
+ }
+# endif
+ return fOldEfl;
+}
+#endif
+
+/**
+ * Modifies the [RE]FLAGS register by ORing in one or more flags.
+ * @returns Original value.
+ * @param   fOrEfl      The flags to be set (ORed in).
+ */
+#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+DECLASM(RTCCUINTREG) ASMAddFlags(RTCCUINTREG fOrEfl);
+#else
+DECLINLINE(RTCCUINTREG) ASMAddFlags(RTCCUINTREG fOrEfl)
{  
    RTCCUINTREG fOldEfl;
    
    #if RT_INLINE_ASM_GNU_STYLE
    #ifdef RT_ARCH_AMD64
    __asm__ __volatile__("pushfq
	"                        
                         "movq  (%%rsp), %0
	"                         
                         "orq   %1, (%%rsp)
	"                         
                         "popfq\n\t"
                         
                         : "=&r" (fOldEfl)
                         
                         : "rm" (fOrEfl) );
    
    #else
    __asm__ __volatile__("pushfl\n\t"
                         
                         "movl  (%%esp), %0\n\t"
                         
                         "orl   %1, (%%esp)\n\t"
                         
    
    #endif
    }
+ "popfl\n"
+ : "+or\" (fOldEfl)
+ : "m" (fOrEfl) );
+# endif
+# else RT_INLINE_ASM_USES_INTRIN >= 15
+ fOldEfl = __readeflags();
+ __writeeflags(fOldEfl | fOrEfl);
+# else
+ __asm
+ {
+# ifdef RT_ARCH_AMD64
+ mov     rcx, [fOrEfl]
+ pushfq
+ mov     rdx, [rsp]
+ or      [rsp], rcx
+ popfq
+ mov     [fOldEfl], rax
+# else
+ mov     ecx, [fOrEfl]
+ pushfd
+ mov     edx, [esp]
+ or      [esp], ecx
+ popfd
+ mov     [fOldEfl], eax
+# endif
+ }
+# endif
+ return fOldEfl;
+}
+#endif
+
+#**
+ * Modifies the [RE]FLAGS register by AND'ing out one or more flags.
+ * @returns Original value.
+ * @param   fAndEfl   The flags to keep.
+ */
+#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+DECLASM(RTCCUINTREG) ASMClearFlags(RTCCUINTREG fAndEfl);
+#else
+DECLINLINE(RTCCUINTREG) ASMClearFlags(RTCCUINTREG fAndEfl)
{ RTCCUINTREG fOldEfl;
+#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+DECLASM(RTCCUINTREG) ASMClearFlags(RTCCUINTREG fAndEfl);
+#else
+DECLINLINE(RTCCUINTREG) ASMClearFlags(RTCCUINTREG fAndEfl)
+ RTCCUINTREG fOldEfl;
+#if RT_INLINE_ASM_GNU_STYLE
+# ifdef RT_ARCH_AMD64
+ __asm__ __volatile__("pushfq\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
+ "jne \n"
+ "ret\n"
+ "movq (%%rsp), %0\n"
+ "andq %1, (%%rsp)\n"
+ "movq (%%esp), %0\n"
+ "cmpq %0, %1\n"
# else
+ __asm__ __volatile__("pushfl\n"
+ "movl (%%esp), %0\n"
+ "andl %1, (%%esp)\n"
+ "popfl\n"
+ : "=&r" (fOldEfl)
+ : "rn" (fAndEfl) );
+# endif
+# elif RT_INLINE_ASM_USES_INTRIN >= 15
+ fOldEfl = __readeflags();
+ __writeeflags(fOldEfl & fAndEfl);
+# else
+ __asm
+ {
+ # ifdef RT_ARCH_AMD64
+ mov   rdx, [fAndEfl]
+ pushfq
+ mov   rdx, [rsp]
+ and   [rsp], rdx
+ popfq
+ mov   [fOldEfl], rax
+ # else
+ mov   edx, [fAndEfl]
+ pushfd
+ mov   edx, [esp]
+ and   [esp], edx
+ popfd
+ mov   [fOldEfl], eax
+ # endif
+ }
+ # endif
+ return fOldEfl;
+ }
+#endif
+
+/**
+ * Gets the content of the CPU timestamp counter register.
+ * @returns TSC.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint64_t) ASMReadTSC(void);
+#else
+DECLINLINE(uint64_t) ASMReadTSC(void)
{  
  RTUINT64U u;
  +# if RT_INLINE_ASM_GNU_STYLE
  +#  __asm__ __volatile__("rdtsc\n\t" : "=a" (u.s.Lo), "=d" (u.s.Hi));
  +#  __asm__ __volatile__("rdtscp\n\t" : "=a" (u.s.Lo), "=d" (u.s.Hi), "=c" (*puAux)); 
  +# else
  +#  __asm
  +  {
  +    rdtsc
  +    mov [u.s.Lo], eax
  +    mov [u.s.Hi], edx
  +  }
  +# endif
  +# endif
  +  return u.u;
  +}
} 

/**
 * Gets the content of the CPU timestamp counter register and the
 * associated AUX value.
 * 
 * @returns TSC.
 * @param   puAux   Where to store the AUX value.
 */
#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
DECLASM(uint64_t) ASMReadTscWithAux(uint32_t RT_FAR *puAux);
#else
DECLINLINE(uint64_t) ASMReadTscWithAux(uint32_t RT_FAR *puAux)
{
    RTUINT64U u;
    +# if RT_INLINE_ASM_GNU_STYLE
    +#  __asm__ __volatile__("rdtsc\n\t" : "=a" (u.s.Lo), "=d" (u.s.Hi), "=c" (*puAux));
    +# else
    +#  __asm
    +  {
    +    rdtsc
    +    mov [u.s.Lo], eax
    +    mov [u.s.Hi], edx
    +  }
    +# endif
    +  return u.u;
    +}
} 

/* rdtscp is not supported by ancient linux build VM of course :-(( */
/* __asm__ __volatile__("rdtsc\n\t" : "=a" (u.s.Lo), "=d" (u.s.Hi), "=c" (*puAux)); */
/* __asm__ __volatile__(".byte 0x0f,0x01,0xf9\n\t" : "=a" (u.s.Lo), "=d" (u.s.Hi), "=c" (*puAux)); */
#else
+# if RT_INLINE_ASM_USES_INTRIN >= 15
  + u.u = __rdtscp(puAux);
  +# else
  +#  __asm
  +  {
  +    rdtscp
  +    mov [u.s.Lo], eax
  +    mov [u.s.Hi], edx
  +    mov eax, [puAux]
  +}
+    mov    [eax], ecx
+  }
+#elif endif
+#endif
+    return u.u;
+]#endif
+
+/**
+ * Performs the cpuid instruction returning all registers.
+ *
+ + @param   uOperator   CPUID operation (eax).
+ + @param   pvEAX       Where to store eax.
+ + @param   pvEBX       Where to store ebx.
+ + @param   pvECX       Where to store ecx.
+ + @param   pvEDX       Where to store edx.
+ + @remark  We're using void pointers to ease the use of special bitfield structures and such.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMCpuId(uint32_t uOperator, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void
+                        RT_FAR *pvECX, void RT_FAR *pvEDX);
+#else
+DECLINLINE(void) ASMCpuId(uint32_t uOperator, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void
+                         RT_FAR *pvECX, void RT_FAR *pvEDX)
+{
+    if RT_INLINE_ASM_GNU_STYLE
+    #ifdef RT_ARCH_AMD64
+        RTCCUINTREG uRAX, uRBX, uRCX, uRDX;
+        __asm__ __volatile__ (
+            "cpuid
+
+            : "a" (uRAX),
+              "b" (uRBX),
+              "c" (uRCX),
+              "d" (uRDX)
+             : "0" (uOperator), "2" (0));
+        *(uint32_t RT_FAR *)pvEAX = (uint32_t)uRAX;
+        *(uint32_t RT_FAR *)pvEBX = (uint32_t)uRBX;
+        *(uint32_t RT_FAR *)pvECX = (uint32_t)uRCX;
+        *(uint32_t RT_FAR *)pvEDX = (uint32_t)uRDX;
+    #else
+        __asm__ __volatile__ ("xchgl %%ebx, %1\n
+        : "a" (*uint32_t *)pvEAX),
+              "b" (*uint32_t *)pvEBX),
+              "c" (*uint32_t *)pvECX),
+              "d" (*uint32_t *)pvEDX
+             : "0" (uOperator), "2" (0));
+    #endif
+  }
+  */
+}
+ # endif
+ +# elif RT_INLINE_ASM_USES_INTRIN
+   int aInfo[4];
+   __cpuid(aInfo, uOperator);
+   *(uint32_t RT_FAR *)pvEAX = aInfo[0];
+   *(uint32_t RT_FAR *)pvEBX = aInfo[1];
+   *(uint32_t RT_FAR *)pvECX = aInfo[2];
+   *(uint32_t RT_FAR *)pvEDX = aInfo[3];
+ 
+ +# else
+   uint32_t    uEAX;
+   uint32_t    uEBX;
+   uint32_t    uECX;
+   uint32_t    uEDX;
+   __asm
+   {
+     push    ebx
+     mov     eax, [uOperator]
+     cpuid
+     mov     [uEAX], eax
+     mov     [uEBX], ebx
+     mov     [uECX], ecx
+     mov     [uEDX], edx
+     pop     ebx
+   } 
+   *(uint32_t RT_FAR *)pvEAX = uEAX;
+   *(uint32_t RT_FAR *)pvEBX = uEBX;
+   *(uint32_t RT_FAR *)pvECX = uECX;
+   *(uint32_t RT_FAR *)pvEDX = uEDX;
+ #endif
+ ]
+ #endif
+
+ /*
+ * Performs the CPUID instruction with EAX and ECX input returning ALL output
+ * registers.
+ *
+ * @param   uOperator   CPUID operation (eax).
+ * @param   uIdxECX     ecx index
+ * @param   pvEAX       Where to store eax.
+ * @param   pvEBX       Where to store ebx.
+ * @param   pvECX       Where to store ecx.
+ * @param   pvEDX       Where to store edx.
+ * @remark  We're using void pointers to ease the use of special bitfield structures and such.
+ */
+ #if RT_INLINE_ASM_EXTERNAL || RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMCpuId_Idx_ECX(uint32_t uOperator, uint32_t uIdxECX, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void RT_FAR *pvECX, void RT_FAR *pvEDX);
#else
DECLINLINE(void) ASMCpuId_Idx_ECX(uint32_t uOperator, uint32_t uIdxECX, void RT_FAR *pvEAX, void RT_FAR *pvEBX, void RT_FAR *pvECX, void RT_FAR *pvEDX)
{
#if RT_INLINE_ASM_GNU_STYLE
    RTCCUINTREG uRAX, uRBX, uRCX, uRDX;
    __asm__ (
        "cpuid
        : =a" (uRAX),
        "=b" (uRBX),
        "=c" (uRCX),
        "=d" (uRDX)
        : "0" (uOperator),
        "2" (uIdxECX);
    *(uint32_t RT_FAR *)pvEAX = (uint32_t)uRAX;
    *(uint32_t RT_FAR *)pvEBX = (uint32_t)uRBX;
    *(uint32_t RT_FAR *)pvECX = (uint32_t)uRCX;
    *(uint32_t RT_FAR *)pvEDX = (uint32_t)uRDX;
#else
    __asm__ (
        "xchgl %%ebx, %1
        cpuid
        xchgl %%ebx, %1
        : =a" (*(uint32_t *)pvEAX),
        =r" (*(uint32_t *)pvEBX),
        =c" (*(uint32_t *)pvECX),
        =d" (*(uint32_t *)pvEDX)
        : "0" (uOperator),
        "2" (uIdxECX);
#endif
#endif
#if RT_INLINE_ASM_USES_INTRIN
    int aInfo[4];
    __cpuidex(aInfo, uOperator, uIdxECX);
    *(uint32_t RT_FAR *)pvEAX = aInfo[0];
    *(uint32_t RT_FAR *)pvEBX = aInfo[1];
    *(uint32_t RT_FAR *)pvECX = aInfo[2];
    *(uint32_t RT_FAR *)pvEDX = aInfo[3];
#else
    uint32_t uEAX;
    uint32_t uEBX;
    uint32_t uECX;
    uint32_t uEDX;
    __asm
    {
        push ebx

```c
+    mov    eax, [uOperator]
+    mov    ecx, [uIdxECX]
+    cpuid
+    mov    [uEAX], eax
+    mov    [uEBX], ebx
+    mov    [uECX], ecx
+    mov    [uEDX], edx
+    pop    ebx
+    }
+    *(uint32_t RT_FAR *)pvEAX = uEAX;
+    *(uint32_t RT_FAR *)pvEBX = uEBX;
+    *(uint32_t RT_FAR *)pvECX = uECX;
+    *(uint32_t RT_FAR *)pvEDX = uEDX;
+    */
+    }#endif
+    #endif
++
+/**
+  * CPUID variant that initializes all 4 registers before the CPUID instruction.
+  *
+  * @returns The EAX result value.
+  * @param   uOperator   CPUID operation (eax).
+  * @param   uInitEBX    The value to assign EBX prior to the CPUID instruction.
+  * @param   uInitECX    The value to assign ECX prior to the CPUID instruction.
+  * @param   uInitEDX    The value to assign EDX prior to the CPUID instruction.
+  * @param   pvEAX       Where to store eax. Optional.
+  * @param   pvEBX       Where to store ebx. Optional.
+  * @param   pvECX       Where to store ecx. Optional.
+  * @param   pvEDX       Where to store edx. Optional.
+  */
+DECLASM(uint32_t) ASMCpuIdExSlow(uint32_t uOperator, uint32_t uInitEBX, uint32_t uInitECX,
+                                 void RT_FAR *pvEAX, void RT_FAR *pvEBX, void RT_FAR *pvECX, void RT_FAR
+                                 *pvEDX);
+
+/**
+  * Performs the cpuid instruction returning ecx and edx.
+  *
+  * @param   uOperator   CPUID operation (eax).
+  * @param   pvECX       Where to store ecx.
+  * @param   pvEDX       Where to store edx.
+  * @remark  We're using void pointers to ease the use of special bitfield structures and such.
+  */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMCpuId_ECX_EDX(uint32_t uOperator, void RT_FAR *pvECX, void RT_FAR *
pvEDX);
+*/
+/**
+  * Performs the cpuid instruction returning ecx and edx.
+  *
+  * @param   uOperator   CPUID operation (eax).
+  * @param   pvECX       Where to store ecx.
+  * @param   pvEDX       Where to store edx.
+  * @remark  We're using void pointers to ease the use of special bitfield structures and such.
+  */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMCpuId_ECX_EDX(uint32_t uOperator, void RT_FAR *pvECX, void RT_FAR *
pvEDX);
+*/
+endif
```
DECLINLINE(void) ASMCpuId_ECX_EDX(uint32_t uOperator, void RT_FAR *pvECX, void RT_FAR *pvEDX)
{
    uint32_t uEBX;
    ASMCpuId(uOperator, &uOperator, &uEBX, pvECX, pvEDX);
}
#endif

/**
 * Performs the cpuid instruction returning eax.
 *
 * @param   uOperator   CPUID operation (eax).
 * @returns EAX after cpuid operation.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMCpuId_EAX(uint32_t uOperator);
#else
DECLINLINE(uint32_t) ASMCpuId_EAX(uint32_t uOperator)
{
    RTCCUINTREG xAX;
    #if RT_INLINE_ASM_GNU_STYLE
    #  ifdef RT_ARCH_AMD64
        __asm__ (
            "cpuid"
            : "=a" (xAX)
            : "0" (uOperator)
            : "rbx", "rcx", "rdx";
    #  else
        __asm__ (
            "push  %%ebx\n	"
            "cpuid\n	"
            "pop   %%ebx\n	"
            : "=a" (xAX)
            : "0" (uOperator)
            : "ecx", "edx";
    #  endif
    # elif RT_INLINE_ASM_USES_INTRIN
        int aInfo[4];
        __cpuid(aInfo, uOperator);
        xAX = aInfo[0];
    # else
        __asm
    # endif
    # elif RT_INLINE_ASM_GNU_STYLE
        __asm__ (
            "push  %%ebx\n	"
            "cpuid\n	"
            "pop   %%ebx\n	"
            : "=a" (xAX)
            : "0" (uOperator)
            : "edx", "ecx", "ebx";
    # else
        __asm
    # endif
    */
    # elif RT_INLINE_ASM_GNU_STYLE
    # ifdef RT_ARCH_AMD64
    #  ifdef RT_ARCH_AMD64
        __asm__ (
            "cpuid"
            : "=a" (xAX)
            : "0" (uOperator)
            : "edx", "ecx", "ebx";
    #  else
        __asm__ (
            "cpuid"
            : "=a" (xAX)
            : "0" (uOperator)
            : "edx", "ecx", "ebx";
    #  endif
    # else
        __asm
    # endif
    */
    # endif
    RTCCUINTREG xAX;
    #if RT_INLINE_ASM_GNU_STYLE
    #  ifdef RT_ARCH_AMD64
        __asm__ (
            "cpuid"
            : "=a" (xAX)
            : "0" (uOperator)
            : "rbx", "rcx", "rdx";
    #  else
        __asm__ (
            "push  %%ebx\n	"
            "cpuid"
+ {  
+   push  ebx  
+   mov   eax, [uOperator]  
+   cpuid  
+   mov   [xAX], eax  
+   pop    ebx  
+ }  
+## endif  
+ return (uint32_t)xAX;  
+}  
+##endif 
+  
+  
+/** 
+ * Performs the cpuid instruction returning ebx.  
+ * 
+ * @param   uOperator   CPUID operation (eax).  
+ * @returns EBX after cpuid operation.  
+ */  
+if RT_INLINE_ASM_EXTERNAL && !_RT_INLINE_ASM_USES_INTRIN  
+DECLASM(uint32_t) ASMCpuId_EBX(uint32_t uOperator);  
+else  
+DECLINLINE(uint32_t) ASMCpuId_EBX(uint32_t uOperator)  
+{  
+ RTCCUINTREG xBX;  
+## if RT_INLINE_ASM_GNU_STYLE  
+## ifdef RT_ARCH_AMD64  
+ RTCCUINTREG uSpill;  
+  __asm__ ("cpuid"
+   : "a" (uSpill),
+   "b" (xBX)
+   : "0" (uOperator)
+   : "rdx", "rcx");  
+## else  
+  __asm__ ("cpuid"
+   : "a" (uOperator),
+   "d" (xBX)
+   : "0" (uOperator)
+   : "edx", "ecx");  
+## endif  
+## endif  
+  
+## else (defined(PIC) || defined(__PIC__)) && defined(__i386__)  
+  __asm__ ("push %ebx\n"
+   "cpu\n"
+   "mov %ebx, %edx\n"
+   "pop %ebx\n"
+   : "a" (uOperator),
+   "d" (xBX)
+   : "0" (uOperator)
+   : "edx", "ecx");  
+## else  
+  __asm__ ("cpuid"
+   : "a" (uOperator),
+   "b" (xBX)
+   : "0" (uOperator)
+   : "edx", "ecx");  
+## endif  
+}  
+##endif
+  }  
+  
+  +# endif  
+  +  return (uint32_t)xBX;  
+  +  +#endif  
+  +  +  
+  +  +  /**<
+  +  * Performs the cpuid instruction returning ecx.
+  +  */
+  +#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+  +DECLASM(uint32_t) ASMCpuId_ECX(uint32_t uOperator);
+  +#else
+  +DECLINLINE(uint32_t) ASMCpuId_ECX(uint32_t uOperator)
+  +{
+  +    RTCCUINTREG xCX;
+  +  +# if RT_INLINE_ASM_GNU_STYLE
+  +    ifdef RT_ARCH_AMD64
+  +      RTCCUINTREG uSpill;
+  +      __asm__ ("cpuid"
+  +               : "a" (uSpill),
+  +                 "c" (xCX)
+  +               : "0" (uOperator)
+  +               : "rbx", "rdx");
+  +  +# elseif defined(PIC) || defined(__PIC__) && defined(__i386__)
+  +      __asm__ ("push  %ebx\n\t"
+  +               "cpuid\n\t"
+  +               "pop  %ebx\n\t"
+  +               : "a" (uOperator),
+  +                 "c" (xCX)
+    : "0" (uOperator)  
+    : "edx");
+  else
+    __asm__ ("cpuid"
+    : "a" (uOperator),
+      "c" (xCX)
+    : "0" (uOperator)
+    : "ebx", "edx");
+
+  endif
+
+endif
+
elseif RT_INLINE_ASM_USES_INTRIN
+    int aInfo[4];
+    __cpuid(aInfo, uOperator);
+    xCX = aInfo[2];
+
+  else
+    __asm
+    {
+      push    ebx
+      mov      eax, [uOperator]
+      cpuid
+      mov      [xCX], ecx
+      pop      ebx
+    }
+  endif
+  return (uint32_t)xCX;
+}
+endif
+
+/**
+ * Performs the cpuid instruction returning edx.
+ *
+ * @param   uOperator   CPUID operation (eax).
+ * @returns EDX after cpuid operation.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMCpuId_EDX(uint32_t uOperator);
+else
+DECLINLINE(uint32_t) ASMCpuId_EDX(uint32_t uOperator)
+{
+    RTCCUINTREG xDX;
+    __asm__ ("cpuid"
+    : "a" (uSpill),
+      "c" (uSpill))
+    : "eax", "edx");
+  return (uint32_t)xDX;
+}
+
+if RT_INLINE_ASM_GNU_STYLE
+if RT_ARCH_AMD64
+RTCCUINTREG uSpill;
+__asm__ ("cpuid"
+    : "a" (uSpill),
+      "c" (uSpill))
+    : "eax", "edx");

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+ "=d" (xDX)
+ : "0" (uOperator)
+ : "rbx", "rcx");
++ else (defined(PIC) || defined(__PIC__)) && defined(__i386__)
+ _asm_ ("push %ebx
	" +
+ "cpuid
	" +
+ "pop %ebx
	"
+ : ":a" (uOperator),
+ ":=d" (xDX)
+ : ":0" (uOperator)
+ : ":ecx");
++ endif
+
++ else
+ _asm_ ("cpuid"
+ : ":=a" (uOperator),
+ ":=d" (xDX)
+ : ":0" (uOperator)
+ : ":ebx", "ecx");
++ endif
+
++ else
+ RT_INLINE_ASM_USES_INTRIN
+ int aInfo[4];
+ _cpuid(aInfo, uOperator);
+ xDX = aInfo[3];
+
++ else
+ _asm
+ {
+ push ebx
+ mov eax, [uOperator]
+ cpuid
+ mov [xDX], edx
+ pop ebx
+ }
++ endif
+ return ((uint32_t)xDX);
+}
++endif
+
++
+/*
+ * Checks if the current CPU supports CPUID.
+ *
+ * @returns true if CPUID is supported.
+ */
+ifdef __WATCOMC__
+DECLASM(bool) ASMHasCpuId(void);
+else
+DECLINLINE(bool) ASMHasCpuId(void)
# ifdef RT_ARCH_AMD64
    return true; /* ASSUME that all amd64 compatible CPUs have cpuid. */
#else /* !RT_ARCH_AMD64 */
    bool        fRet = false;
#endif
#if RT_INLINE_ASM_GNU_STYLE
    uint32_t    u1;
    uint32_t    u2;
    __asm__ ("push\f
    "pop   \f
    "mov   \f
    "xorl  $0x200000, \f
    "push  \f
    "pushf\f
    "popf\f
    "pushf\f
    "push\f
    "cmpl  \f
    "setne %0\f
    "push \f
    "pop\f
    ": =m" (fRet), ":=r" (u1), ":=r" (u2));
#else
    __asm
    {
        pushfd
        pop     eax
        mov     ebx, eax
        xor     eax, 0200000h
        push    eax
        popfd
        pushfd
        pop     eax
        cmp     eax, ebx
        setne   fRet
        push    ebx
        popfd
        popfd
    }
#endif
/*
 * Gets the APIC ID of the current CPU.
 */
@returns the APIC ID.
/*
+ *\n+ +#if RT_INLINE_ASM_EXTERNAL \&\& !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(uint8_t) ASMGetApicId(void);
+ +#else
+ DECLINLINE(uint8_t) ASMGetApicId(void)
+ {
+ \+ RTCCUINTREG xBX;
+ #\+ if RT_INLINE_ASM_GNU_STYLE
+ #\+ ifdef RT_ARCH_AMD64
+ \+ RTCCUINTREG uSpill;
+ \+ __asm__ __volatile__ ("cpuid"
+ \+ : "a" (uSpill),
+ \+ "b" (xBX)
+ \+ : "0" (1)
+ \+ : "rcx", "rdx",
+ \+ #\+ elif RT_INLINE_ASM_USES_INTRIN
+ \+ int aInfo[4];
+ \+ __cpuid(aInfo, 1);
+ \+ xBX = aInfo[1];
+ \+ #\+ else
+ \+ __asm
+ \+ {\n+ \+ \+ push ebx
+ \+ \+ mov eax, 1
+ \+ \+ cpuid
+ \+ \+ mov [xBX], ebx
+ \+ \+ pop ebx
+ \+ \+ }
+ #\+ endif
+ #\+ endif
+ RT_INLINE_ASM_EXTERNAL \&\& !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(uint8_t) ASMGetApicId(void);
+ else
+ DECLINLINE(uint8_t) ASMGetApicId(void)
+ {
+ \+ RTCCUINTREG xBX;
+ #\+ if RT_INLINE_ASM_GNU_STYLE
+ #\+ ifdef RT_ARCH_AMD64
+ \+ RTCCUINTREG uSpill;
+ \+ __asm__ __volatile__ ("cpuid"
+ \+ : "a" (uSpill),
+ \+ "b" (xBX)
+ \+ : "0" (1)
+ \+ : "rcx", "rdx",
+ \+ #\+ elif RT_INLINE_ASM_USES_INTRIN
+ \+ int aInfo[4];
+ \+ __cpuid(aInfo, 1);
+ \+ xBX = aInfo[1];
+ \+ #\+ else
+ \+ __asm
+ \+ {\n+ \+ \+ push ebx
+ \+ \+ mov eax, 1
+ \+ \+ cpuid
+ \+ \+ mov [xBX], ebx
+ \+ \+ pop ebx
+ \+ \+ }
+ #\+ endif
+ */
+    return (uint8_t)(xBX >> 24);
+}
+#endif
+
+/**
+ * Tests if it a genuine Intel CPU based on the ASMCpuId(0) output.
+ * @returns true/false.
+ * @param   uEBX    EBX return from ASMCpuId(0)
+ * @param   uECX    ECX return from ASMCpuId(0)
+ * @param   uEDX    EDX return from ASMCpuId(0)
+ */
+DECLINLINE(bool) ASMIsIntelCpuEx(uint32_t uEBX, uint32_t uECX, uint32_t uEDX)
+{
+    return uEBX == UINT32_C(0x756e6547)
+        && uECX == UINT32_C(0x6c65746e)
+        && uEDX == UINT32_C(0x49656e69);
+}
+
+/**
+ * Tests if this is a genuine Intel CPU.
+ * @returns true/false.
+ * @remarks ASSUMES that cpuid is supported by the CPU.
+ */
+DECLINLINE(bool) ASMIsIntelCpu(void)
+{
+    uint32_t uEAX, uEBX, uECX, uEDX;
+    ASMCpuId(0, &uEAX, &uEBX, &uECX, &uEDX);
+    return ASMIsIntelCpuEx(uEBX, uECX, uEDX);
+}
+
+/**
+ * Tests if it an authentic AMD CPU based on the ASMCpuId(0) output.
+ * @returns true/false.
+ * @param   uEBX    EBX return from ASMCpuId(0)
+ * @param   uECX    ECX return from ASMCpuId(0)
+ * @param   uEDX    EDX return from ASMCpuId(0)
+ */
+DECLINLINE(bool) ASMIsAmdCpuEx(uint32_t uEBX, uint32_t uECX, uint32_t uEDX)
+{
+    return uEBX == UINT32_C(0x68747541)
+        && uECX == UINT32_C(0x444d4163)
+        && uEDX == UINT32_C(0x69746e65);
/**
 * Tests if this is an authentic AMD CPU.
 * @returns true/false.
 * @remarks ASSUMES that cpuid is supported by the CPU.
 */
DECLINLINE(bool) ASMIsAmdCpu(void)
{
    uint32_t uEAX, uEBX, uECX, uEDX;
    ASMCpuId(0, &uEAX, &uEBX, &uECX, &uEDX);
    return ASMIsAmdCpuEx(uEBX, uECX, uEDX);
}

/**
 * Tests if it a centaur hauling VIA CPU based on the ASMCpuId(0) output.
 * @returns true/false.
 * @param   uEBX    EBX return from ASMCpuId(0).
 * @param   uECX    ECX return from ASMCpuId(0).
 * @param   uEDX    EDX return from ASMCpuId(0).
 */
DECLINLINE(bool) ASMIsViaCentaurCpuEx(uint32_t uEBX, uint32_t uECX, uint32_t uEDX)
{
    return uEBX == UINT32_C(0x746e6543)
        && uECX == UINT32_C(0x736c7561)
        && uEDX == UINT32_C(0x48727561);
}

/**
 * Tests if this is a centaur hauling VIA CPU.
 * @returns true/false.
 * @remarks ASSUMES that cpuid is supported by the CPU.
 */
DECLINLINE(bool) ASMIsViaCentaurCpu(void)
{
    uint32_t uEAX, uEBX, uECX, uEDX;
    ASMCpuId(0, &uEAX, &uEBX, &uECX, &uEDX);
    return ASMIsViaCentaurCpuEx(uEBX, uECX, uEDX);
}
+ * Checks whether ASMCpuId_EAX(0x00000000) indicates a valid range.
+ *
+ *
+ * @returns true/false.
+ * @param uEAX The EAX value of CPUID leaf 0x00000000.
+ *
+ * @note This only succeeds if there are at least two leaves in the range.
+ * @remarks The upper range limit is just some half reasonable value we've
+ *          picked out of thin air.
+ */
DECLINLINE(bool) ASMIsValidStdRange(uint32_t uEAX)
{
    return uEAX >= UINT32_C(0x00000001) && uEAX <= UINT32_C(0x000fffff);
}

+ /**
+ * Checks whether ASMCpuId_EAX(0x80000000) indicates a valid range.
+ *
+ * This only succeeds if there are at least two leaves in the range.
+ *
+ * @returns true/false.
+ * @param uEAX The EAX value of CPUID leaf 0x80000000.
+ *
+ * @note This only succeeds if there are at least two leaves in the range.
+ * @remarks The upper range limit is just some half reasonable value we've
+ *          picked out of thin air.
+ */
DECLINLINE(bool) ASMIsValidExtRange(uint32_t uEAX)
{
    return uEAX >= UINT32_C(0x80000001) && uEAX <= UINT32_C(0x800fffff);
}

+ /**
+ * Extracts the CPU family from ASMCpuId(1) or ASMCpuId(0x80000001)
+ *
+ * @returns Family.
+ * @param uEAX EAX return from ASMCpuId(1) or ASMCpuId(0x80000001).
+ */
DECLINLINE(uint32_t) ASMGetCpuFamily(uint32_t uEAX)
{
    return ((uEAX >> 8) & 0xf) == 0xf
        ? ((uEAX >> 20) & 0x7f) + 0xf
        : ((uEAX >> 8) & 0xf);
}
+/**
 + * Extracts the CPU model from ASMCpuId(1) or ASMCpuId(0x80000001), Intel variant.
 + *
 + * @returns Model.
 + * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
 + */
+DECLINLINE(uint32_t) ASMGetCpuModelIntel(uint32_t uEAX)
+
+
+/**
 + * Extracts the CPU model from ASMCpuId(1) or ASMCpuId(0x80000001), AMD variant.
 + *
 + * @returns Model.
 + * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
 + */
+DECLINLINE(uint32_t) ASMGetCpuModelAMD(uint32_t uEAX)
+
+
+/**
 + * Extracts the CPU model from ASMCpuId(1) or ASMCpuId(0x80000001)
 + *
 + * @returns Model.
 + * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
 + * @param   fIntel  Whether it's an intel CPU. Use ASMIsIntelCpuEx() or ASMIsIntelCpu().
 + */
+DECLINLINE(uint32_t) ASMGetCpuModel(uint32_t uEAX, bool fIntel)
+
+/**
 + * Extracts the CPU stepping from ASMCpuId(1) or ASMCpuId(0x80000001)
 + *
 + * @returns Model.
 + * @param   uEAX    EAX from ASMCpuId(1) or ASMCpuId(0x80000001).
 + */
+ *\*/
+DECLINLINE(uint32_t) ASMGetCpuStepping(uint32_t uEAX)
+{
+    return uEAX & 0xf;
+}
+
+/**
+ * Get cr0.
+ * @returns cr0.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetCR0(void);
+#else
+DECLINLINE(RTCCUINTXREG) ASMGetCR0(void)
+{
+    RTCCUINTXREG uCR0;
+    uCR0 = __readcr0();
+    __asm
+    {# ifdef RT_ARCH_AMD64
+        mov     rax, cr0
+        mov     [uCR0], rax
+    }# else
+    mov     eax, cr0
+    mov     [uCR0], eax
+    #endif
+    return uCR0;
+}#endif
+
+/**
+ * Sets the CR0 register.
+ * @param   uCR0 The new CR0 value.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+{-#ifdef RT_ARCH_AMD64
+    __asm volatile("movq %0, %cr0\n\n" : "r" (uCR0));
+}# else
+    __asm
+    {# ifdef RT_ARCH_AMD64
+        mov     rax, cr0
+        mov     [uCR0], rax
+    }# else
+    mov     eax, cr0
+    mov     [uCR0], eax
+    #endif
+    return uCR0;
+}#endif
+
+/*
+ * Open Source Used In 5GaaS Edge AC-4 39102
+ */
DECLASM(void) ASMSetCR0(RTCCUINTXREG uCR0);
+DECLINLINE(void) ASMSetCR0(RTCCUINTXREG uCR0)
+
+ if RT_INLINE_ASM_USES_INTRIN
+    __writecr0(uCR0);
+
+ elif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__ (
+        "movq %0, %%cr0\n\n" : "r" (uCR0));
+    __asm__ __volatile__ (
+        "movl %0, %%cr0\n\n" : "r" (uCR0));
+ endif
+ else
+    __asm
+
+     ifdef RT_ARCH_AMD64
+        mov     rax, [uCR0]
+        mov     cr0, rax
+     else
+        mov     eax, [uCR0]
+        mov     cr0, eax
+     endif
+
+ endif
+
+/**
+ * Get cr2.
+ * @returns cr2.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetCR2(void);
+else
+DECLINLINE(RTCCUINTXREG) ASMGetCR2(void)
+
+ RTCCUINTXREG uCR2;
+ if RT_INLINE_ASM_USES_INTRIN
+    uCR2 = __readcr2();
+
+ elif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__ ("movq %0, %%cr2, %0\n\n" : "r" (uCR2));
+    __asm__ __volatile__ ("movl %0, %%cr2, %0\n\n" : "r" (uCR2));
+ endif
```c
+
+    __asm
+    {
+        ifdef RT_ARCH_AMD64
+            mov     rax, cr2
+            mov     [uCR2], rax
+        else
+            mov     eax, cr2
+            mov     [uCR2], eax
+        endif
+    }
+
+  return uCR2;
+
+}
+
+
+/**
+ * Sets the CR2 register.
+ * @param   uCR2 The new CR0 value.
+ */
+if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMSetCR2(RTCCUINTXREG uCR2);
+else
+DECLINLINE(void) ASMSetCR2(RTCCUINTXREG uCR2)
+{
+    if RT_INLINE_ASM_GNU_STYLE
+        ifdef RT_ARCH_AMD64
+            __asm__ __volatile__("movq %0, %%cr2\n" "r" (uCR2));
+        else
+            __asm__ __volatile__("movl %0, %%cr2\n" "r" (uCR2));
+        endif
+    else
+        __asm
+        {
+            ifdef RT_ARCH_AMD64
+                mov     rax, [uCR2]
+                mov     cr2, rax
+            else
+                mov     eax, [uCR2]
+                mov     cr2, eax
+            endif
+        }
+    }
+}
+*/
+*/
+*/
```

---

**Open Source Used In 5GaaS Edge AC-4 39104**
/**
+ * Get cr3.
+ * @returns cr3.
+ */
+\if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetCR3(void);
+\else
+DECLINLINE(RTCCUINTXREG) ASMGetCR3(void)
+\{
+    RTCCUINTXREG uCR3;
+    \if RT_INLINE_ASM_USES_INTRIN
+    uCR3 = __readcr3();
+    \else
+    \if RT_INLINE_ASM_GNU_STYLE
+    # ifdef RT_ARCH_AMD64
+    \asm__attribute__ ("volatile") __asm__ __volatile__ ("movq  %%cr3, %0" : "=r" (uCR3));
+    \else
+    \asm__attribute__ ("volatile") __asm__ __volatile__ ("movl  %%cr3, %0" : "=r" (uCR3));
+    \endif
+    \else
+    \asm
+    {# ifdef RT_ARCH_AMD64
+        mov     rax, cr3
+        mov     [uCR3], rax
+    \else
+        mov     eax, cr3
+        mov     [uCR3], eax
+    \endif
+    }
+    \endif
+    return uCR3;
+\} 
+#endif 
+
+/**
+ * Sets the CR3 register.
+ */
+\if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetCR3(RTCCUINTXREG uCR3);
+\else
+DECLINLINE(void) ASMSetCR3(RTCCUINTXREG uCR3)
+\{
+    \if RT_INLINE_ASM_USES_INTRIN
+    __writecr3(uCR3);
+    \else
+    \asm
+    {# ifdef RT_ARCH_AMD64
+        mov     rax, cr3
+        mov     [uCR3], rax
+    \else
+        mov     eax, cr3
+        mov     [uCR3], eax
+    \endif
+    }
+    \endif
+    return uCR3;
+\} 
+#endif 
+
+  
+  +# elif RT_INLINE_ASM_GNU_STYLE
+  +# ifdef RT_ARCH_AMD64
+  +  __asm__ __volatile__("movq %0, %%cr3\n\t" : "r" (uCR3));
+  +# else
+  +  __asm__ __volatile__("movl %0, %%cr3\n\t" : "r" (uCR3));
+  +# endif
+  +# else
+  +  __asm
+  +  {
+  +  +# ifdef RT_ARCH_AMD64
+  +  mov rax, [uCR3]
+  +  mov cr3, rax
+  +  +# else
+  +  mov eax, [uCR3]
+  +  mov cr3, eax
+  +  +# endif
+  +  }
+  +# endif
+  +}
+  +#endif
+
+  /**
+   * Reloads the CR3 register.
+   */
+  
+  +#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMReloadCR3(void);
+  +#else
+DECLINLINE(void) ASMReloadCR3(void)
+  {
+  +# if RT_INLINE_ASM_USES_INTRIN
+    __writecr3(__readcr3());
+  +# elif RT_INLINE_ASM_GNU_STYLE
+    RTCCUINTXREG u;
+    +# ifdef RT_ARCH_AMD64
+      __asm__ __volatile__("movq __%cr3, %0\n\t"
+      +  "movq %0, __%cr3\n\t"
+      +  : "=r" (u));
+    +# else
+      __asm__ __volatile__("movl __%cr3, %0\n\t"
+      +  "movl %0, __%cr3\n\t"
+      +  : "=r" (u));
+    +# endif
+  +# else
+    __asm
+    {
+      +# ifdef RT_ARCH_AMD64
+        mov rax, [uCR3]
+        mov cr3, rax
+      +# else
+        mov eax, [uCR3]
+        mov cr3, eax
+      +# endif
+      }
+    }
ifdef RT_ARCH_AMD64
  mov rax, cr3
  mov cr3, rax
#else
  mov eax, cr3
  mov cr3, eax
endif
#endif

/**
 * Get cr4.
 * @returns cr4.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(RTCCUINTXREG) ASMGetCR4(void);
#else
DECLINLINE(RTCCUINTXREG) ASMGetCR4(void)
{
  RTCCUINTXREG uCR4;
  if RT_INLINE_ASM_USES_INTRIN
    uCR4 = __readcr4();
  else
    __asm __volatile__("movq  %%cr4, %0	
: "="r" (uCR4));
  else
    __asm __volatile__("movl  %%cr4, %0	
: "="r" (uCR4));
#endif
#endif

ifdef RT_ARCH_AMD64
  __asm __volatile__("movq  %0, %1
: "="r" (uCR4));
#else
  __asm __volatile__("movl  %0, %1
: "="r" (uCR4));
#endif
#endif
else
  __asm
  {
#ifdef RT_ARCH_AMD64
    mov rax, cr4
    mov [uCR4], rax
#else
  push eax /* just in case */
/*mov  eax, cr4*/
  _emit 0x0f
  _emit 0x20
  _emit 0xe0
  mov [uCR4], eax
  pop eax
#endif
    }
+## endif
+\* return uCR4;
+\}  
+##endif
+
+/**
+ * Sets the CR4 register.
+ * 
+ * @param   uCR4    New CR4 value.
+ * */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetCR4(RTCCUINTXREG uCR4);
+#endif
+DECLINLINE(void) ASMSetCR4(RTCCUINTXREG uCR4)
+{ 
+## if RT_INLINE_ASM_USES_INTRIN
+  __writecr4(uCR4);
+
+## elif RT_INLINE_ASM_GNU_STYLE
+## ifdef RT_ARCH_AMD64
+  __asm__ __volatile__("movq %0, %cr4\n\t": "r" (uCR4));
+## else
+  __asm__ __volatile__("movl %0, %cr4\n\t": "r" (uCR4));
+## endif
+## else
+  __asm
+
+## ifdef RT_ARCH_AMD64
+  mov    rax, [uCR4]
+  mov    cr4, rax
+## else
+  mov    eax, [uCR4]
+  _emit   0x0F
+  _emit   0x22
+  _emit   0xE0        /* mov     cr4, eax */
+## endif
+  }  
+## endif
+}  
+##endif
+
+/**
+ * Get cr8.
+ * @returns cr8.
+ * @remark  The lock prefix hack for access from non-64-bit modes is NOT used and 0 is returned.
+ * */
```c
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetCR8(void);
+else
+DECLINLINE(RTCCUINTXREG) ASMGetCR8(void)
+{
+  +#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+    RTCCUINTXREG uCR8;
+  +# else
+    RTCCUINTXREG uCR8 = __readcr8();
+  +# endif
+  +# else
+    RTCCUINTXREG uCR8 = __loadcr8();
+  +# endif
+    return uCR8;
+  +# endif
+}

/**
 * Get XCR0 (eXtended feature Control Register 0).
 * @returns xcr0.
 */
DECLASM(uint64_t) ASMGetXcr0(void);

/**
 * Sets the XCR0 register.
 * @param   uXcr0   The new XCR0 value.
 */
DECLASM(void) ASMSetXcr0(uint64_t uXcr0);

/**
 * Save extended CPU state.
 * @param   pXStateArea     Where to save the state.
 * @param   fComponents     Which state components to save.
 */
DECLASM(void) ASMXSave(struct X86XSAVEAREA RT_FAR *pXStateArea, uint64_t fComponents);
```
+ * Loads extended CPU state.
+ * @param   pXStateArea     Where to load the state from.
+ * @param   fComponents     Which state components to load.
+ */
+DECLASM(void) ASMXRstor(struct X86XSAVEAREA const RT_FAR *pXStateArea, uint64_t fComponents);
+
+struct X86FXSTATE;
+/**
+ * Save FPU and SSE CPU state.
+ * @param   pXStateArea     Where to save the state.
+ */
+DECLASM(void) ASMFxSave(struct X86FXSTATE RT_FAR *pXStateArea);
+
+/**
+ * Load FPU and SSE CPU state.
+ * @param   pXStateArea     Where to load the state from.
+ */
+DECLASM(void) ASMFxRstor(struct X86FXSTATE const RT_FAR *pXStateArea);
+
+/**
+ * Enables interrupts (EFLAGS.IF).
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMIntEnable(void);
+else
+DECLINLINE(void) ASMIntEnable(void)
+
+{  
+    __asm("sti
");
+    __asm("sti
");
+    _enable();
+    sti
+    endif
+}
+endif
+
+/**
+ * Disables interrupts (!EFLAGS.IF).
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMIntDisable(void);
+else
+DECLINLINE(void) ASMIntDisable(void)
+{  
+    __asm("sti
");
+    _disable();
+    __asm sti
+    endif
+}
/**
 * Disables interrupts and returns previous xFLAGS.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(RTCCUINTREG) ASMIntDisableFlags(void);
#else
DECLINLINE(RTCCUINTREG) ASMIntDisableFlags(void)
{
    RTCCUINTREG xFlags;
    #if RT_INLINE_ASM_GNU_STYLE
    #ifdef RT_ARCH_AMD64
        __asm__ __volatile__("pushfq
	"cli
	"popq  %0
	:
	="r" (xFlags));
    #else
        __asm__ __volatile__("pushfl
	"cli
	"popl  %0
	:
	="r" (xFlags));
    #endif
    #elif RT_INLINE_ASM_USES_INTRIN && !defined(RT_ARCH_X86)
        xFlags = ASMGetFlags();
        _disable();
    #else
        __asm {
            pushfd
            cli
            pop  [xFlags]
        }
    
    return xFlags;
}
#endif
*/
/*
   #endif
*/
+ * Are interrupts enabled?
+ *
+ * @returns true / false.
+ */
+DECLINLINE(bool) ASMIntAreEnabled(void)
+
+ RTCCUINTREG uFlags = ASMGetFlags();
+ return uFlags & 0x200 /* X86_EFL_IF */ ? true : false;
+
+ /*
+ * Halts the CPU until interrupted.
+ */
+#if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 14
+DECLASM(void) ASMHalt(void);
+#else
+DECLINLINE(void) ASMHalt(void)
+
+ #if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("hlt
+                          ");
+#elif RT_INLINE_ASM_USES_INTRIN
+    __halt();
+#else
+    __asm {
+        hlt
+    }
+#endif
+}
+#endif
+/*
+ * Reads a machine specific register.
+ */
+#if RT_INLINE_ASM_EXTERNAL & RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint64_t) ASMRdMsr(uint32_t uRegister);
+#else
+DECLINLINE(uint64_t) ASMRdMsr(uint32_t uRegister)
+
+ RTUINT64U u;
+ #if RT_INLINE_ASM_GNU_STYLE
+    __asm__ volatile(("rdmsr\n")
+    : "a" (u.s.Lo),
+    "d" (u.s.Hi)
+      : "c" (uRegister));
+
+# elif RT_INLINE_ASM_USES_INTRIN
+    u.u = __readmsr(uRegister);
+
+# else
+    __asm
+    {
+        mov     ecx, [uRegister]
+        rdmsr
+        mov     [u.s.Lo], eax
+        mov     [u.s.Hi], edx
+    }
+# endif
+
+    return u.u;
+
+  #endif
+
+/**
+ * Writes a machine specific register.
+ *
+ * @returns Register content.
+ * @param   uRegister   Register to write to.
+ * @param   u64Val      Value to write.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMWrMsr(uint32_t uRegister, uint64_t u64Val);
+else
+DECLINLINE(void) ASMWrMsr(uint32_t uRegister, uint64_t u64Val)
+{
+    RTUINT64U u;
+
+    u.u = u64Val;
+
+    __asm
+    {
+        mov     ecx, [uRegister]
+        rdmsr
+        mov     [u.s.Lo], eax
+        mov     [u.s.Hi], edx
+    }
+}
+    mov     edx, [u.s.Hi]
+    mov     eax, [u.s.Lo]
+    wrmsr
+    }
+    +# endif
+    +}
+    +#endif
+
+    #endif
+
+    /**
+    * Reads a machine specific register, extended version (for AMD).
+    *
+    * @returns Register content.
+    * @param   uRegister   Register to read.
+    * @param   uXDI        RDI/EDI value.
+    */
+    +#if RT_INLINE_ASM_EXTERNAL
+    DECLASM(uint64_t) ASMRdMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI);
+    +#else
+    DECLINLINE(uint64_t) ASMRdMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI)
+    {
+        RTUINT64U u;
+        #if RT_INLINE_ASM_GNU_STYLE
+            __asm__ __volatile__("rdmsr
+            : "=a" (u.s.Lo),
+            "=d" (u.s.Hi)
+            : "c" (uRegister),
+            "D" (uXDI));
+        #else
+            __asm
+            {
+                mov     ecx, [uRegister]
+                xchg    edi, [uXDI]
+                rdmsr
+                mov     [u.s.Lo], eax
+                mov     [u.s.Hi], edx
+                xchg    edi, [uXDI]
+            }
+        +#endif
+    +}
+    +#if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("rdmsr
+            : "=a" (u.s.Lo),
+            "=d" (u.s.Hi)
+            : "c" (uRegister),
+            "D" (uXDI));
+    +#else
+        __asm
+        {
+            mov     ecx, [uRegister]
+            xchg    edi, [uXDI]
+            rdmsr
+            mov     [u.s.Lo], eax
+            mov     [u.s.Hi], edx
+            xchg    edi, [uXDI]
+        }
+    +#endif
+    +}
+    +#endif
+
+    /**
+    * Writes a machine specific register, extended version (for AMD).
+ * @returns Register content.
+ * @param uRegister Register to write to.
+ * @param uXDI RDI/EDI value.
+ * @param u64Val Value to write.
+ */
+\#if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMWrMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI, uint64_t u64Val);
+\#else
+DECLINLINE(void) ASMWrMsrEx(uint32_t uRegister, RTCCUINTXREG uXDI, uint64_t u64Val)
+{
+ RTUINT64U u;
+ + u.u = u64Val;
+\# if RT_INLINE_ASM_GNU_STYLE
+  __asm__ __volatile__("wrmsr
+                      :"a" (u.s.Lo),
+                      ":d" (u.s.Hi),
+                      ":c" (uRegister),
+                      ":D" (uXDI));
+\# else
+    __asm
+    {
+        mov     ecx, [uRegister]
+        xchg    edi, [uXDI]
+        mov     edx, [u.s.Hi]
+        mov     eax, [u.s.Lo]
+        wrmsr
+        xchg    edi, [uXDI]
+    }
+\# endif
+\} +\# endwhile
+\} +\#endif
+
+/**
+ * Reads low part of a machine specific register.
+ *
+ * @returns Register content.
+ * @param uRegister Register to read.
+ */
+\#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMRdMsr_Low(uint32_t uRegister);
+\#else
+DECLINLINE(uint32_t) ASMRdMsr_Low(uint32_t uRegister)
+{
+    ++asm
+    {
+        mov ecx, [uRegister]
+        xchg edi, [uXDI]
+        mov edx, [u.s.Hi]
+        mov eax, [u.s.Lo]
+        wrmsr
+        xchg edi, [uXDI]
+    } +\# endif
+\} +\#endif
+
+/**
+ * Reads low part of a machine specific register.
+ *
+ * @returns Register content.
+ * @param uRegister Register to read.
+ */
+\#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMRdMsr_Low(uint32_t uRegister);
+\#else
+DECLINLINE(uint32_t) ASMRdMsr_Low(uint32_t uRegister)
+{
+    ++asm
+    {
+        mov ecx, [uRegister]
+        xchg edi, [uXDI]
+        mov edx, [u.s.Hi]
+        mov eax, [u.s.Lo]
+        wrmsr
+        xchg edi, [uXDI]
+    } +\# endif
+\} +\# endif
uint32_t u32;
+
if RT_INLINE_ASM_GNU_STYLE
+ __asm__ volatile("rdmsr\n\t"
+     : "a" (u32)
+     : "c" (uRegister)
+     : "edx");
+
#elif RT_INLINE_ASM_USES_INTRIN
+    u32 = (uint32_t)__readmsr(uRegister);
+
#else
+    __asm
+    {
+        mov     ecx, [uRegister]
+        rdmsr
+        mov     [u32], eax
+    }
+    return u32;
+
#endif
+
/**
 * Reads high part of a machine specific register.
 * @returns Register content.
 * @param   uRegister   Register to read.
 */
+
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMRdMsr_High(uint32_t uRegister);
#else
DECLINLINE(uint32_t) ASMRdMsr_High(uint32_t uRegister)
{
    uint32_t    u32;
+
    if RT_INLINE_ASM_GNU_STYLE
+ __asm__ volatile("rdmsr\n\t"
+     : "d" (u32)
+     : "c" (uRegister)
+     : "eax");
+
    elif RT_INLINE_ASM_USES_INTRIN
+    u32 = (uint32_t)(__readmsr(uRegister) >> 32);
+
    else
+    __asm
+    {
+        int u32;
+        __asm
+        {
+            mov     ecx, [uRegister]
+            rdmsr
+            mov     [u32], eax
+        }
+    }
+
    return u32;
+
}
mov    ecx, [uRegister]
rdmsr
mov    [u32], edx

}="# endif
+
+ return u32;
+
}="#endif
+
+
+/#*
+ * Gets dr0.
+ *
+ * @returns dr0.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetDR0(void);
+#endif
+DECLINLINE(RTCCUINTXREG) ASMGetDR0(void)
+
{ RTCCUINTXREG uDR0;
+ #if RT_INLINE_ASM_USES_INTRIN
+ uDR0 = __readdr(0);
+ #elif RT_INLINE_ASM_GNU_STYLE
+ # ifdef RT_ARCH_AMD64
+ __asm__ __volatile__('movq  %%dr0, %0
	' : "=r" (uDR0));
+ #else
+ __asm__ __volatile__('movl  %%dr0, %0
	' : "=r" (uDR0));
+ #endif
+ #else
+ __asm
+ { RTCCUINTXREG uDR0;
+ # ifdef RT_ARCH_AMD64
+ mov    rax, dr0
+ mov    [uDR0], rax
+ #else
+ mov    eax, dr0
+ mov    [uDR0], eax
+ #endif
+ }="# endif
+ return uDR0;
+}="#endif
+
+/#*
/**
 * Gets dr1.
 * @returns dr1.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(RTCCUINTXREG) ASMGetDR1(void);
#else
DECLINLINE(RTCCUINTXREG) ASMGetDR1(void)
{
    RTCCUINTXREG uDR1;
    #if RT_INLINE_ASM_USES_INTRIN
    uDR1 = __readdr(1);
    #elif RT_INLINE_ASM_GNU_STYLE
    #ifdef RT_ARCH_AMD64
    __asm__ __volatile__("movq   %%dr1, %0
         : =r" (uDR1));
    #else
    __asm__ __volatile__("movl   %%dr1, %0
         : =r" (uDR1));
    #endif
    #else
    __asm
    {
        #ifdef RT_ARCH_AMD64
        mov     rax, dr1
        mov     [uDR1], rax
        #else
        mov     eax, dr1
        mov     [uDR1], eax
        #endif
    }
    #endif
    return uDR1;
}
#endif

/**
 * Gets dr2.
 * @returns dr2.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(RTCCUINTXREG) ASMGetDR2(void);
#else
DECLINLINE(RTCCUINTXREG) ASMGetDR2(void)
{
    RTCCUINTXREG uDR2;
    #if RT_INLINE_ASM_USES_INTRIN
    uDR2 = __readdr(2);
+## elif RT_INLINE_ASM_GNU_STYLE
+## ifdef RT_ARCH_AMD64
+  + __asm__ __volatile__("movq %0, %1\n\t": "=r" (uDR2));
+## else
+  + __asm__ __volatile__("movl %0, %1\n\t": "=r" (uDR2));
+## endif
+## else
+  + __asm
+  + {
+  +## ifdef RT_ARCH_AMD64
+  +    mov     rax, dr2
+  +    mov     [uDR2], rax
+  +## else
+  +    mov     eax, dr2
+  +    mov     [uDR2], eax
+  +## endif
+  +  }
+  +## endif
+  + return uDR2;
++
+##endif
+
+/**
+ * Gets dr3.
+ *
+ * @returns dr3.
+ */
+##if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetDR3(void);
+##else
+DECLINLINE(RTCCUINTXREG) ASMGetDR3(void)
+{
+  RTCCUINTXREG uDR3;
+## if RT_INLINE_ASM_USES_INTRIN
+  uDR3 = __readdr(3);
+## else if RT_INLINE_ASM_GNU_STYLE
+## ifdef RT_ARCH_AMD64
+  + __asm__ __volatile__("movq %0, %1\n\t": "=r" (uDR3));
+## else
+  + __asm__ __volatile__("movl %0, %1\n\t": "=r" (uDR3));
+## endif
+## else
+  + __asm
+  + {
+  +## ifdef RT_ARCH_AMD64
+  +    mov     rax, dr3
+  +    mov     [uDR3], rax
+  +## else
+  +    mov     eax, dr3
+  +    mov     [uDR3], eax
+  +## endif
+  +  }

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+# else
+    mov     eax, dr3
+    mov     [uDR3], eax
+# endif
+  }
+# endif
+ return uDR3;
+
+#endif
+-/#
+ * Gets dr6.
+ *
+ * @returns dr6.
+ */
+*if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetDR6(void);
+*else
+DECLINLINE(RTCCUINTXREG) ASMGetDR6(void)
+{
+    RTCCUINTXREG uDR6;
+  *if RT_INLINE_ASM_USES_INTRIN
+    uDR6 = __readdr(6);
+  *elif RT_INLINE_ASM_GNU_STYLE
+  *if RT_ARCH_AMD64
+    __asm__ __volatile__("movq  \%dr6, \%0\n\t": "=r" (uDR6));
+  *else
+    __asm__ __volatile__("movl  \%dr6, \%0\n\t": "=r" (uDR6));
+  *endif
+  *else
+    __asm
+    {
+      __asm__ __volatile__("movq  \%dr6, \%0\n\t": "=r" (uDR6));
+    }
+  *endif
+ return uDR6;
+}
+*endif
+}
+*/

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+ * Reads and clears DR6.
+ *
+ * @returns DR6.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(RTCCUINTXREG) ASMGetAndClearDR6(void);
+#else
+DECLINLINE(RTCCUINTXREG) ASMGetAndClearDR6(void)
+{
+    RTCCUINTXREG uDR6;
+    #if RT_INLINE_ASM_USES_INTRIN
+        uDR6 = __readdr(6);
+    +# elif RT_INLINE_ASM_GNU_STYLE
+        RTCCUINTXREG uNewValue = 0xffff0ff0U; /* 31-16 and 4-11 are 1's, 12 and 63-31 are zero. */
+    +# else RT_ARCH_AMD64
+        __asm__ __volatile__ ("movq   %0, %1
+                        : "r" (uDR6)
+                        : "r" (uNewValue));
+    +# endif
+    +# else
+        __asm__ __volatile__ ("movl   %0, %1
+                        : "r" (uDR6)
+                        : "r" (uNewValue));
+    +# endif
+    #if RT_INLINE_ASM_USES_INTRIN
+        __writedr(6, 0xffff0ff0U); /* 31-16 and 4-11 are 1's, 12 and 63-31 are zero. */
+    +# elif RT_INLINE_ASM_GNU_STYLE
+        RTCCUINTXREG uNewValue = 0xffff0ff0U; /* 31-16 and 4-11 are 1's, 12 and 63-31 are zero. */
+    +# else RT_ARCH_AMD64
+        mov     rax, dr6
+        mov     [uDR6], rax
+        mov     rcx, rax
+        mov     ecx, 0xffff0ff0h; /* 31-16 and 4-11 are 1's, 12 and 63-31 are zero. */
+        mov     dr6, rcx
+    +# else
+        mov     eax, dr6
+        mov     [uDR6], eax
+        mov     ecx, 0xffff0ff0h; /* 31-16 and 4-11 are 1's, 12 is zero. */
+        mov     dr6, ecx
+    +# endif
+    return uDR6;
+    #endif
+ return uDR6;
+}
/**
 * Gets dr7.
 *
 * @returns dr7.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(RTCCUINTXREG) ASMGetDR7(void);
#else
DECLINLINE(RTCCUINTXREG) ASMGetDR7(void)
{
    RTCCUINTXREG uDR7;
    #if RT_INLINE_ASM_USES_INTRIN
    uDR7 = __readdr(7);
    #elif RT_INLINE_ASM_GNU_STYLE
    #ifdef RT_ARCH_AMD64
        __asm__ __volatile__("movq %%dr7, %0
        : "=r" (uDR7));
    #else
        __asm__ __volatile__("movl %%dr7, %0
        : "=r" (uDR7));
    #endif
    #else
        __asm
        {
            #ifdef RT_ARCH_AMD64
                mov     rax, dr7
                mov     [uDR7], rax
            #else
                mov     eax, dr7
                mov     [uDR7], eax
            #endif
        }
    #endif
    return uDR7;
}
#else
DECLASM(void) ASMSetDR0(RTCCUINTXREG uDRVal);
#endif

/**
 * Sets dr0.
 *
 * @param   uDRVal   Debug register value to write
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMSetDR0(RTCCUINTXREG uDRVal);
#else
DECLINLINE(void) ASMSetDR0(RTCCUINTXREG uDRVal)
{
    __writedr(0, uDRVal);
}
#endif

/**
 * @param   uDRVal   Debug register value to write
 */
### if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("movq \%0, \%0\dr0\ul": "r" (uDRVal));
+ else
+ __asm__ __volatile__("movl \%0, \%0\dr0\ul": "r" (uDRVal));
+ endif
+ else
+ __asm__
+ {
+ __asm__ __volatile__("movq \%0, \%0\dr0\ul": "r" (uDRVal));
+ else
+ mov rax, [uDRVal]
+ mov dr0, rax
+ __asm__ __volatile__("movl \%0, \%0\dr0\ul": "r" (uDRVal));
+ }
+ endif
+ }
+    mov     dr1, eax
+### endif
+    }
+### endif
+}
+###endif
+
+  /**
+   * Sets dr2.
+   *
+   * @param   uDRVal   Debug register value to write
+   */
+  */
+  #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+  DECLASM(void) ASMSetDR2(RTCCUINTXREG uDRVal);
+  #else
+  DECLINLINE(void) ASMSetDR2(RTCCUINTXREG uDRVal)
+  +
+  #if RT_INLINE_ASM_USES_INTRIN
+  __writedr(2, uDRVal);
+  +#endif
+  #ifdef RT_INLINE_ASM_GNU_STYLE
+  #if RT_ARCH_AMD64
+    __asm__ __volatile__("movq   %0, %%dr2
	" : : "r" (uDRVal));
+  +#else
+    __asm__ __volatile__("movl   %0, %%dr2
	" : : "r" (uDRVal));
+  +#endif
+  #else
+    __asm
+      {
+    #ifdef RT_ARCH_AMD64
+        mov     rax, [uDRVal]
+        mov     dr2, rax
+    +#else
+        mov     eax, [uDRVal]
+        mov     dr2, eax
+    +#endif
+    }
+  +#endif
+    }
+  +#endif
+
+  /**
+   * Sets dr3.
+   *
+   * @param   uDRVal   Debug register value to write
+   */
+  */
+  #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+  DECLASM(void) ASMSetDR3(RTCCUINTXREG uDRVal);
+  #else
+  DECLINLINE(void) ASMSetDR3(RTCCUINTXREG uDRVal)
+  +
+  #if RT_INLINE_ASM_USES_INTRIN
+  __writedr(3, uDRVal);
+  +#endif
+  #ifdef RT_INLINE_ASM_GNU_STYLE
+  #if RT_ARCH_AMD64
+    __asm__ __volatile__("movq   %0, %%dr3
	" : : "r" (uDRVal));
+  +#else
+    __asm__ __volatile__("movl   %0, %%dr3
	" : : "r" (uDRVal));
+  +#endif
+  #else
+    __asm
+      {
+    #ifdef RT_ARCH_AMD64
+        mov     rax, [uDRVal]
+        mov     dr3, rax
+    +#else
+        mov     eax, [uDRVal]
+        mov     dr3, eax
+    +#endif
+    }
+  +#endif
+  #endif
+
```
+DECLASM(void) ASMSetDR3(RTCCUINTXREG uDRVal);
+#else
+DECLINLINE(void) ASMSetDR3(RTCCUINTXREG uDRVal)
+{
+  #if RT_INLINE_ASM_USES_INTRIN
+    __writedr(3, uDRVal);
+  #elif RT_INLINE_ASM_GNU_STYLE
+    #ifdef RT_ARCH_AMD64
+      __asm__ __volatile__("movq %0, %%dr3\n\t" : : "r" (uDRVal));
+    #else
+      __asm__ __volatile__("movl %0, %%dr3\n\t" : : "r" (uDRVal));
+    #endif
+  #else
+    __asm
+    {
+      #ifdef RT_ARCH_AMD64
+        mov     rax, [uDRVal]
+        mov     dr3, rax
+      #else
+        mov     eax, [uDRVal]
+        mov     dr3, eax
+      #endif
+    }
+  #endif
+  +#endif
+  +#endif
+  }
+  }  
+}
+/*
+ * Sets dr6.
+ *
+ * @param   uDRVal   Debug register value to write
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMSetDR6(RTCCUINTXREG uDRVal);
+#else
+DECLINLINE(void) ASMSetDR6(RTCCUINTXREG uDRVal)
+{
+  #if RT_INLINE_ASM_USES_INTRIN
+    __writedr(6, uDRVal);
+  #elif RT_INLINE_ASM_GNU_STYLE
+    #ifdef RT_ARCH_AMD64
+      __asm__ __volatile__("movq %0, %%dr6\n\t" : : "r" (uDRVal));
+    #else
+      __asm__ __volatile__("movl %0, %%dr6\n\t" : : "r" (uDRVal));
+    #endif
+  #else
+    __asm
+    {
+      #ifdef RT_ARCH_AMD64
+        mov     rax, [uDRVal]
+        mov     dr6, rax
+      #else
+        mov     eax, [uDRVal]
+        mov     dr6, eax
+      #endif
+    }
+  #endif
+  +#endif
+  +#endif
+  }
+/*
ifdef RT_ARCH_AMD64
    mov rax, [uDRVal]
    mov dr6, rax
else
    mov eax, [uDRVal]
    mov dr6, eax
endif
}
#endif

/**
 * Sets dr7.
 *
 * @param uDRVal Debug register value to write
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMSetDR7(RTCCUINTXREG uDRVal);
#else
DECLINLINE(void) ASMSetDR7(RTCCUINTXREG uDRVal)
{
    #if RT_INLINE_ASM_USES_INTRIN
        __writedr(7, uDRVal);
    #elif RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("movq %0, %%dr7
	" : : "r" (uDRVal));
    #else
        __asm__ __volatile__("movl %0, %%dr7\n" : : "r" (uDRVal));
    #endif
#endif
 */
# ifndef RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMSetDR7(RTCCUINTXREG uDRVal);
#else
DECLINLINE(void) ASMSetDR7(RTCCUINTXREG uDRVal)
{
    #if RT_INLINE_ASM_USES_INTRIN
        __writedr(7, uDRVal);
    #elif RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("movq %0, %%dr7\n" : : "r" (uDRVal));
    #else
        __asm__ __volatile__("movl %0, %%dr7\n" : : "r" (uDRVal));
    #endif
#endif
 */
/**
 * Writes a 8-bit unsigned integer to an I/O port, ordered.
 * *
 * @param   Port I/O port to write to.
 * @param   u8 8-bit integer to write.
 * *
 * #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
 * DECLASM(void) ASMOutU8(RTIOPORT Port, uint8_t u8);
 * #else
 * DECLINLINE(void) ASMOutU8(RTIOPORT Port, uint8_t u8)
 * {
 * #if RT_INLINE_ASM_GNU_STYLE
 * + __asm__ __volatile__("outb %b1, %w0\n"
 * +       :: "Nd" (Port),
 * +       "a" (u8));
 * +
 * +#elif RT_INLINE_ASM_USES_INTRIN
 * + outbyte(Port, u8);
 * +
 * +#else
 * + __asm
 * + { 
 * +       mov dx, [Port]
 * +       mov al, [u8]
 * +       out dx, al
 * + } 
 * +# endif
 * +}
 * #endif
 * 
 * */
 *
 * * Reads a 8-bit unsigned integer from an I/O port, ordered.
 * *
 * * @returns 8-bit integer.
 * * @param   Port I/O port to read from.
 * *
 * #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
 * DECLASM(uint8_t) ASMInU8(RTIOPORT Port);
 * #else
 * DECLINLINE(uint8_t) ASMInU8(RTIOPORT Port)
 * {
 *     uint8_t u8;
 *     #if RT_INLINE_ASM_GNU_STYLE
 *         __asm__ __volatile__("inb %w1, %b0\n"
 *             :: "Nd" (Port),
 *             "a" (u8));
 *     #endif
 * }
 * #endif
 * 
 * */
```c
#elif RT_INLINE_ASM_USES_INTRIN
    u8 = __inbyte(Port);
#else
    __asm
    {
        mov     dx, [Port]
        in      al, dx
        mov     [u8], al
    }
#endif
    return u8;
#endif

/**
 * Writes a 16-bit unsigned integer to an I/O port, ordered.
 *
 * @param   Port    I/O port to write to.
 * @param   u16     16-bit integer to write.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutU16(RTIOPORT Port, uint16_t u16);
#else
DECLINLINE(void) ASMOutU16(RTIOPORT Port, uint16_t u16)
{
    #if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("outw %w1, %w0\nl"
                         :: "Nd" (Port),
                            "a" (u16));
    #elif RT_INLINE_ASM_USES_INTRIN
        __outword(Port, u16);
    #else
        __asm
        {
            mov     dx, [Port]
            mov     ax, [u16]
            out     dx, ax
        }
    #endif
    return u8;
}
#endif
```
+ * Reads a 16-bit unsigned integer from an I/O port, ordered.
+ *
+ * @returns 16-bit integer.
+ * @param   Port    I/O port to read from.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint16_t) ASMInU16(RTIOPORT Port);
+#else
+DECLINLINE(uint16_t) ASMInU16(RTIOPORT Port)
+{
+    uint16_t u16;
+    __asm
+    {
+        mov     dx, [Port]
+        in      ax, dx
+        mov     [u16], ax
+    }
+    return u16;
+}
+#endif
+
+/**
+ * Writes a 32-bit unsigned integer to an I/O port, ordered.
+ *
+ * @param   Port    I/O port to write to.
+ * @param   u32     32-bit integer to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMOutU32(RTIOPORT Port, uint32_t u32);
+#else
+DECLINLINE(void) ASMOutU32(RTIOPORT Port, uint32_t u32)
+{
+    __asm
+    {
+        mov     dx, [Port]
+        in      ax, dx
+        mov     [u16], ax
+    }
+    return u16;
+}
+#endif
+/**
+ * Writes a 32-bit unsigned integer to an I/O port, ordered.
+ *
+ * @param   Port    I/O port to write to.
+ * @param   u32     32-bit integer to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMOutU32(RTIOPORT Port, uint32_t u32);
+#else
+DECLINLINE(void) ASMOutU32(RTIOPORT Port, uint32_t u32)
+{
+    __asm
+    {
+        mov     dx, [Port]
+        in      ax, dx
+        mov     [u16], ax
+    }
+    return u16;
+}
+/**
+ * Writes a 32-bit unsigned integer to an I/O port, ordered.
+ *
+ * @param   Port    I/O port to write to.
+ * @param   u32     32-bit integer to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMOutU32(RTIOPORT Port, uint32_t u32);
+#else
+DECLINLINE(void) ASMOutU32(RTIOPORT Port, uint32_t u32)
+{
+    __asm
+    {
+        mov     dx, [Port]
+        in      ax, dx
+        mov     [u16], ax
+    }
+    return u16;
+}
+/**
+ * Writes a 32-bit unsigned integer to an I/O port, ordered.
+ *
+ * @param   Port    I/O port to write to.
+ * @param   u32     32-bit integer to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMOutU32(RTIOPORT Port, uint32_t u32);
+#else
+DECLINLINE(void) ASMOutU32(RTIOPORT Port, uint32_t u32)
+{
+    __asm
+    {
+        mov     dx, [Port]
+        in      ax, dx
+        mov     [u16], ax
+    }
+    return u16;
+}
+/**
+ * Writes a 32-bit unsigned integer to an I/O port, ordered.
+ *
+ * @param   Port    I/O port to write to.
+ * @param   u32     32-bit integer to write.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMOutU32(RTIOPORT Port, uint32_t u32);
+#else
+DECLINLINE(void) ASMOutU32(RTIOPORT Port, uint32_t u32)
+{
+    __asm
+    {
+        mov     dx, [Port]
+        in      ax, dx
+        mov     [u16], ax
+    }
+    return u16;
+}
+# elif RT_INLINE_ASM_USES_INTRIN
+    __outdword(Port, u32);
+
+# else
+    __asm
+    {
+        mov     dx, [Port]
+        mov     eax, [u32]
+        out     dx, eax
+    }
+# endif
+
+/**
+ * Reads a 32-bit unsigned integer from an I/O port, ordered.
+ *
+ * @returns 32-bit integer.
+ * @param   Port    I/O port to read from.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMInU32(RTIOPORT Port);
+else
+DECLINLINE(uint32_t) ASMInU32(RTIOPORT Port)
+{
+    uint32_t u32;
+    if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("inl %w1, %0\n"
+            : "a" (u32)
+            : "Nd" (Port));
+
+    elif RT_INLINE_ASM_USES_INTRIN
+        u32 = __indword(Port);
+
+    else
+        __asm
+        {
+            mov     dx, [Port]
+            in      eax, dx
+            mov     [u32], eax
+        }
+    #endif
+    #endif
+    return u32;
+
+/**
+ * Reads an 8-bit unsigned integer from an I/O port, ordered.
+ *
+ * @returns 8-bit integer.
+ * @param   Port    I/O port to read from.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint8_t) ASMInU8(RTIOPORT Port);
+else
+DECLINLINE(uint8_t) ASMInU8(RTIOPORT Port)
+{
+    uint8_t u8;
+    if RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("inb %b1, %0\n"
+            : "a" (u8)
+            : "Nd" (Port));
+
+    elif RT_INLINE_ASM_USES_INTRIN
+        u8 = __indword(Port);
+
+    else
+        __asm
+        {
+            mov     dx, [Port]
+            in      eax, dx
+            mov     [u8], eax
+        }
+    #endif
+    #endif
+    return u8;
+
/**
 * Writes a string of 8-bit unsigned integer items to an I/O port, ordered.
 * @param Port I/O port to write to.
 * @param pau8 Pointer to the string buffer.
 * @param c The number of items to write.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutStrU8(RTIOPORT Port, uint8_t const RT_FAR *pau8, size_t c);
#else
DECLINLINE(void) ASMOutStrU8(RTIOPORT Port, uint8_t const RT_FAR *pau8, size_t c)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("rep; outsb
	" : "+S" (pau8),
       "+c" (c)
       : "d" (Port));

#elif RT_INLINE_ASM_USES_INTRIN
    __outbytestring(Port, (unsigned char RT_FAR *)pau8, (unsigned long)c);

#else
    __asm {
        mov     dx, [Port]
        mov     ecx, [c]
        mov     eax, [pau8]
        xchg    esi, eax
        rep outsb
        xchg    esi, eax
    }
#endif
}
#endif

/**
 * Reads a string of 8-bit unsigned integer items from an I/O port, ordered.
 * @param Port I/O port to read from.
 * @param pau8 Pointer to the string buffer (output).
 * @param c The number of items to read.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMInStrU8(RTIOPORT Port, uint8_t RT_FAR *pau8, size_t c);
#else
DECLINLINE(void) ASMInStrU8(RTIOPORT Port, uint8_t RT_FAR *pau8, size_t c)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("rep; outsb
	" : "+S" (pau8),
       "+c" (c)
       : "d" (Port));

#elif RT_INLINE_ASM_USES_INTRIN
    __outbytestring(Port, (unsigned char RT_FAR *)pau8, (unsigned long)c);

#else
    __asm {
        mov     dx, [Port]
        mov     ecx, [c]
        mov     eax, [pau8]
        xchg    esi, eax
        rep outsb
        xchg    esi, eax
    }
#endif
}
#endif

/**
 * Reads a string of 8-bit unsigned integer items from an I/O port, ordered.
 * @param Port I/O port to read from.
 * @param pau8 Pointer to the string buffer (output).
 * @param c The number of items to read.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMInStrU8(RTIOPORT Port, uint8_t RT_FAR *pau8, size_t c);
#else
DECLINLINE(void) ASMInStrU8(RTIOPORT Port, uint8_t RT_FAR *pau8, size_t c)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("rep; outsb
	" : "+S" (pau8),
       "+c" (c)
       : "d" (Port));

#elif RT_INLINE_ASM_USES_INTRIN
    __outbytestring(Port, (unsigned char RT_FAR *)pau8, (unsigned long)c);

#else
    __asm {
       mov     dx, [Port]
       mov     ecx, [c]
       mov     eax, [pau8]
       xchg    esi, eax
       rep outsb
       xchg    esi, eax
    }
#endif
}
#endif
```c
+# if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("rep; insb\n	" 
+                      : "+D" (pau8),
+                      "+e" (c)
+                      : "d" (Port));
+
+elsif RT_INLINE_ASM_USES_INTRIN
+    __inbytestring(Port, pau8, (unsigned long)c);
+else
+    __asm
+    {
+      mov     dx, [Port]
+      mov     ecx, [c]
+      mov     eax, [pau8]
+      xchg    edi, eax
+      rep insb
+      xchg    edi, eax
+    }  
+endif
+
+#endif
+
/**
 * Writes a string of 16-bit unsigned integer items to an I/O port, ordered.
 */
+@param Port  I/O port to write to.
+@param pau16 Pointer to the string buffer.
+@param c The number of items to write.
+/
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutStrU16(RTIOPORT Port, uint16_t const RT_FAR *pau16, size_t c);
#else
DECLINLINE(void) ASMOutStrU16(RTIOPORT Port, uint16_t const RT_FAR *pau16, size_t c)
{
    if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("rep; outsw\n	" 
                    : "+S" (pau16),
                    "+c" (c)
                    : "d" (Port));
    else
        __outwordstring(Port, (unsigned short RT_FAR *)pau16, (unsigned long)c);
    else
    __asm
    {
```

mov     dx, [Port]
mov     ecx, [c]
mov     eax, [pau16]
xchg    esi, eax
rep outsw
xchg    esi, eax
}

/**
 * Reads a string of 16-bit unsigned integer items from an I/O port, ordered.
 *
 * @param   Port    I/O port to read from.
 * @param   pau16   Pointer to the string buffer (output).
 * @param   c       The number of items to read.
 *
 * #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMInStrU16(RTIOPORT Port, uint16_t RT_FAR *pau16, size_t c);
#else
DECLINLINE(void) ASMInStrU16(RTIOPORT Port, uint16_t RT_FAR *pau16, size_t c)
{
    __asm__ __volatile__("rep; insw
	" : "D" (pau16),
      : "c" (c)
      : "d" (Port));

#else RT_INLINE_ASM_GNU_STYLE
    __inwordstring(Port, pau16, (unsigned long)c);

#else
    __asm
    {
        mov     dx, [Port]
mov     ecx, [c]
mov     eax, [pau16]
xchg    edi, eax
rep insw
xchg    edi, eax
    }
#endif
}
/**
 * Writes a string of 32-bit unsigned integer items to an I/O port, ordered.
 *
 * @param   Port    I/O port to write to.
 * @param   pau32   Pointer to the string buffer.
 * @param   c       The number of items to write.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMOutStrU32(RTIOPORT Port, uint32_t const RT_FAR *pau32, size_t c);
#else
DECLINLINE(void) ASMOutStrU32(RTIOPORT Port, uint32_t const RT_FAR *pau32, size_t c)
{
    #if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("rep; outsl
	" : "+S" (pau32),
            "+c" (c)
            : "d" (Port));
    
#else
    __asm
        {
            mov     dx, [Port]
            mov     ecx, [c]
            mov     eax, [pau32]
            xchg    esi, eax
            rep outsd
            xchg    esi, eax
        }
    #endif
#endif

/**
 * Reads a string of 32-bit unsigned integer items from an I/O port, ordered.
 *
 * @param   Port    I/O port to read from.
 * @param   pau32   Pointer to the string buffer (output).
 * @param   c       The number of items to read.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMInStrU32(RTIOPORT Port, uint32_t RT_FAR *pau32, size_t c);
#else
DECLINLINE(void) ASMInStrU32(RTIOPORT Port, uint32_t RT_FAR *pau32, size_t c)
{
    #if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("rep; outsIuV"
            : "+S" (pau32),
            "+c" (Port));
    
#else
    __asm
        {
            mov     dx, [Port]
            mov     ecx, [c]
            mov     eax, [pau32]
            xchg    esi, eax
            rep outsIu
            xchg    esi, eax
        }
    #endif
#endif

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### if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("rep; insl\n"
+     : "+D" (pau32),
+     "+c" (c)
+     : "d" (Port));
+
### else
+ __indwordstring(Port, (unsigned long RT_FAR *)pau32, (unsigned long)c);
+
### endif
+ __asm
+ {
+   mov     dx, [Port]
+   mov     ecx, [c]
+   mov     eax, [pau32]
+   xchg    edi, eax
+   rep insd
+   xchg    edi, eax
+ }
### endif
+
/* Invalidate page.
 *
 * @param   uPtr    Address of the page to invalidate.
 */
### if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMInvalidatePage(RTCCUINTXREG uPtr);
### else
DECLINLINE(void) ASMInvalidatePage(RTCCUINTXREG uPtr)
{
### if RT_INLINE_ASM_USES_INTRIN
    __invlpg((void RT_FAR *)uPtr);
+
### else
### ifdef RT_ARCH_AMD64
    mov     rax, [uPtr]
    invlpg  [rax]
### else
    mov     eax, [uPtr]
### endif
}
+ invlpg [eax]
+## endif
+}
+## endif
+}
+##endif
+
+/**
+ * Write back the internal caches and invalidate them.
+ */
+##if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMWriteBackAndInvalidateCaches(void);
+##else
+DECLINLINE(void) ASMWriteBackAndInvalidateCaches(void)
+{
+## if RT_INLINE_ASM_USES_INTRIN
+   __wbinvd();
+
+## elif RT_INLINE_ASM_GNU_STYLE
+   __asm__ __volatile__("wbinvd");
+## else
+   __asm
+   {
+     wbinvd
+   }
+## endif
+}
+##endif
+
+/**
+ * Invalidate internal and (perhaps) external caches without first
+ * flushing dirty cache lines. Use with extreme care.
+ */
+##if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMInvalidateInternalCaches(void);
+##else
+DECLINLINE(void) ASMInvalidateInternalCaches(void)
+{
+## if RT_INLINE_ASM_GNU_STYLE
+   __asm__ __volatile__("invd");
+## else
+   __asm
+   {
+     invd
+   }
+## endif
+}
/**
 * Memory load/store fence, waits for any pending writes and reads to complete.
 * Requires the X86_CPUID_FEATURE_EDX_SSE2 CPUID bit set.
 */
DECLINLINE(void) ASMMemoryFenceSSE2(void)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__ (".byte 0x0f,0xae,0xf0
	");
#elif RT_INLINE_ASM_USES_INTRIN
    _mm_mfence();
#else
    __asm
    {
        _emit   0x0f
        _emit   0xae
        _emit   0xf0
    }
#endif
}

/**
 * Memory store fence, waits for any writes to complete.
 * Requires the X86_CPUID_FEATURE_EDX_SSE CPUID bit set.
 */
DECLINLINE(void) ASMWriteFenceSSE(void)
{
#if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__ (".byte 0x0f,0xae,0xf8
	");
#elif RT_INLINE_ASM_USES_INTRIN
    _mm_sfence();
#else
    __asm
    {
        _emit   0x0f
        _emit   0xae
        _emit   0xf8
    }
#endif
}

/**
 * Memory load fence, waits for any pending reads to complete.
+ * Requires the X86_CPUID_FEATURE_EDX_SSE2 CPUID bit set.
+ */
+DECLINLINE(void) ASMReadFenceSSE2(void)
+{
+    if (RT_INLINE_ASM_GNU_STYLE)
+        __asm__ __volatile__ (".byte 0x0f,0xae,0xe8\n"");
+    else
+        __asm
+            { _emit   0x0f
+              _emit   0xae
+              _emit   0xe8
+            }
+    }
+
+    if (_MSC_VER || !defined(RT_ARCH_AMD64))
+    {
+        __asm (".byte 0x0f,0x01,0xca\n"");
+    }
+
+    if (RT_INLINE_ASM_GNU_STYLE)
+    {
+        __asm__ __volatile__ (".byte 0x0f,0x01,0xca\n"");
+    }
+    else
+    {
+        __asm (".byte 0x0f,0x01,0xca\n"");
+    }
+    }
```c
+ __asm__ __volatile__ (".byte 0x0f,0x01,0xcb\n");
+#else
+ __asm
+ {
+ _emit   0x0f
+ _emit   0x01
+ _emit   0xcb
+ }
+#endif
+}
+#endif /* !_MSC_VER) || !RT_ARCH_AMD64 */
+
+/** @} */
+#endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/asm-math.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/asm-math.h
@@ -0,0 +1,438 @@
+/** @file
+ * IPRT - Assembly Routines for Optimizing some Integers Math Operations.
+ */
+
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+
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+* CDDL are applicable instead of those of the GPL.
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+* You may elect to license modified versions of this file under the
+* terms and conditions of either the GPL or the CDDL or both.
+*/
+
+ifndef __iprt_asm_math_h
+define __iprt_asm_math_h
+
+include <iprt/types.h>
```
/** @defgroup grp_rt_asm_math   Integer Math Optimizations
 * @ingroup grp_rt_asm
 * @{ */

/** Multiplies two unsigned 32-bit values returning an unsigned 64-bit result.
 * @returns u32F1 * u32F2.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_X86)
DECLASM(uint64_t) ASMMult2xU32RetU64(uint32_t u32F1, uint32_t u32F2);
#else
DECLINLINE(uint64_t) ASMMult2xU32RetU64(uint32_t u32F1, uint32_t u32F2)
{
# ifdef RT_ARCH_X86
    uint64_t u64;
#  if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("mull %d
                         : "=A" (u64)
                         : "a" (u32F2), "d" (u32F1));
    # else
    __asm
    {
        mov     edx, [u32F1]
        mov     eax, [u32F2]
        mul     edx
        mov     dword ptr [u64], eax
        mov     dword ptr [u64 + 4], edx
    #endif
}
+ }
+# endif
+ return u64;
+# else /* generic: */
+ return (uint64_t)u32F1 * u32F2;
+# endif
+}
+#endif
+
+
+/**
+ * Multiplies two signed 32-bit values returning a signed 64-bit result.
+*
+ * @returns u32F1 * u32F2.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_X86)
+DECLASM(int64_t) ASMMult2xS32RetS64(int32_t i32F1, int32_t i32F2);
+#else
+DECLINLINE(int64_t) ASMMult2xS32RetS64(int32_t i32F1, int32_t i32F2)
+{
+# ifdef RT_ARCH_X86
+ int64_t i64;
+# if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("imull %%edx"
+
: "=A" (i64)
+
: "a" (i32F2), "d" (i32F1));
+# elif RT_INLINE_ASM_USES_INTRIN
+ i64 = __emul(i32F1, i32F2);
+# else
+ __asm
+ {
+
mov edx, [i32F1]
+
mov eax, [i32F2]
+
imul edx
+
mov dword ptr [i64], eax
+
mov dword ptr [i64 + 4], edx
+ }
+# endif
+ return i64;
+# else /* generic: */
+ return (int64_t)i32F1 * i32F2;
+# endif
+}
+#endif
+
+
+#if ARCH_BITS == 64
+DECLINLINE(uint64_t) ASMMult2xU64Ret2xU64(uint64_t u64F1, uint64_t u64F2, uint64_t *pu64ProdHi)

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+{  
+# if defined(RT_ARCH_AMD64) && (RT_INLINE_ASM_GNU_STYLE || RT_INLINE_ASM_USES_INTRIN)  
++ if RT_INLINE_ASM_GNU_STYLE  
+  + uint64_t u64Low, u64High;  
+  + __asm__ __volatile__("mulq %%rdx"  
+  +    : "=a" (u64Low), "=d" (u64High)  
+  +    : "0" (u64F1), "1" (u64F2));  
+  + *pu64ProdHi = u64High;  
+  + return u64Low;  
++ elif RT_INLINE_ASM_USES_INTRIN  
+  + return _umul128(u64F1, u64F2, pu64ProdHi);  
++ else  
++ # error "hmm"  
++ endif  
++ else /* generic: */  
+ /*  
+ * F1 * F2 = Prod  
+ * -- --  
+ * ab * cd = b*d + a*d*10 + b*c*10 + a*c*100  
+ *  
+ * Where a, b, c and d are 'digits', and 10 is max digit + 1.  
+ *  
+ * Our digits are 32-bit wide, so instead of 10 we multiply by 4G.  
+ * Prod = F1.s.Lo*F2.s.Lo  + F1.s.Hi*F2.s.Lo*4G  
+ */  
+ RTUINT128U Prod;  
+ RTUINT64U Tmp1;  
+ uint64_t u64Tmp;  
+ RTUINT64U F1, F2;  
+ F1.u = u64F1;  
+ F2.u = u64F2;  
+  
+ Prod.s.Lo = ASMMult2xU32RetU64(F1.s.Lo, F2.s.Lo);  
+  
+ Tmp1.u = ASMMult2xU32RetU64(F1.s.Hi, F2.s.Lo);  
+  
+ u64Tmp = (uint64_t)Prod.DWords.dw1 + Tmp1.s.Lo;  
+  
+ Prod.DWords.dw1 = (uint32_t)u64Tmp;  
+  
+ Prod.s.Hi = Tmp1.s.Hi;  
+  
+ Prod.s.Hi += u64Tmp >> 32; /* carry */  
+  
+ Tmp1.u = ASMMult2xU32RetU64(F1.s.Lo, F2.s.Hi);  
+  
+ u64Tmp = (uint64_t)Prod.DWords.dw1 + Tmp1.s.Lo;  
+  
+ Prod.DWords.dw1 = (uint32_t)u64Tmp;  
+  
+ u64Tmp >>= 32; /* carry */  
+  
+ u64Tmp += Prod.DWords.dw2;  
+  
+ u64Tmp += Tmp1.s.Hi;  
+  
+ Prod.DWords.dw2 = (uint32_t)u64Tmp;  
}
Prod.DWords.dw3 += u64Tmp >> 32; /* carry */

Prod.s.Hi += ASMMult2xU32RetU64(F1.s.Hi, F2.s.Hi);

*pu64ProdHi = Prod.s.Hi;

return Prod.s.Lo;

+# endif
+
+#endif
+
+
+/**
+ * Divides a 64-bit unsigned by a 32-bit unsigned returning an unsigned 32-bit result.
+ *
+ */
+ * @returns u64 / u32.
+ */
+* 
+*# if RT_INLINE_ASM_EXTERNAL && defined(RT_ARCH_X86)
+DECLASM(uint32_t) ASMDivU64ByU32RetU32(uint64_t u64, uint32_t u32);
+*#else
+DECLINLINE(uint32_t) ASMDivU64ByU32RetU32(uint64_t u64, uint32_t u32)
+
+* # ifdef RT_ARCH_X86
+* #  if RT_INLINE_ASM_GNU_STYLE
+RTCCUINTREG uDummy;
+__asm__ __volatile__('"divl %%3"
+    :"a" (u32), "d"(uDummy)
+    :"A" (u64), "r" (u32));
+* # else
+* #  else
+{ 
+    mov     eax, dword ptr [u64]
+    mov     edx, dword ptr [u64 + 4]
+    mov     ecx, [u32]
+    div     ecx
+    mov     [u32], eax
+    } 
+* # endif
+* return u32;
+*# else /* generic: */
+* return (uint32_t)(u64 / u32);
+*# endif
+* }
+*#endif
+
+* */
+* Divides a 64-bit signed by a 32-bit signed returning a signed 32-bit result.
+*
### ASMDivS64ByS32RetS32

```c
DECLASM(int32_t) ASMDivS64ByS32RetS32(int64_t i64, int32_t i32);
```

### ASMModU64ByU32RetU32

```c
DECLASM(uint32_t) ASMModU64ByU32RetU32(uint64_t u64, uint32_t u32);
```
+       ; "a" (uDummy), "d"(u32)
+       ; "A" (u64), "i" (u32));
+# else
+      __asm
+      {
+        mov     eax, dword ptr [u64]
+        mov     edx, dword ptr [u64 + 4]
+        mov     ecx, [u32]
+        div     ecx
+        mov     [u32], edx
+      }
+# endif
+      return u32;
+# else /* generic: */
+      return (uint32_t)(u64 % u32);
+# endif
+
+/**
+ * Performs 64-bit signed by a 32-bit signed division with a 32-bit signed result,
+ * returning the rest.
+ *
+ * @returns u64 % u32.
+ *
+ * @remarks It is important that the result is <= UINT32_MAX or we'll overflow and crash.
+ */
+#if RT_INLINE_ASM_EXTERNAL && defined(RT_ARCH_X86)
+DECLASM(int32_t) ASMModS64ByS32RetS32(int64_t i64, int32_t i32);
+#else
+DECLINLINE(int32_t) ASMModS64ByS32RetS32(int64_t i64, int32_t i32)
+
+    # ifdef RT_ARCH_X86
+    # if RT_INLINE_ASM_GNU_STYLE
+      RTCCUINTREG iDummy;
+      __asm__ __volatile__("idivl %3"
+                        : "a" (iDummy), "d"(i32)
+                        : "A" (i64), "r" (i32));
+    #else
+      __asm
+      {
+        mov     eax, dword ptr [i64]
+        mov     edx, dword ptr [i64 + 4]
+        mov     ecx, [i32]
+        idiv    ecx
+        mov     [i32], edx
+      }
### endif
+ return i32;
### else /* generic: */
+ return (int32_t)(i64 % i32);
### endif
+
###endif
+
+
+/**
+ * Multiple a 32-bit by a 32-bit integer and divide the result by a 32-bit integer
+ * using a 64 bit intermediate result.
+ *
+ * @returns (u32A * u32B) / u32C.
+ * @param   u32A    The 32-bit value (A).
+ * @param   u32B    The 32-bit value to multiple by A.
+ * @param   u32C    The 32-bit value to divide A*B by.
+ *
+ * @returns Architecture specific.
+ * @returns Make sure the result won't ever exceed 32-bit, because hardware
+ *          exception may be raised if it does.
+ * @returns On x86 this may be used to avoid dragging in 64-bit builtin
+ *          arithmetics functions.
+ */
+#if RT_INLINE_ASM_EXTERNAL && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
+DECLASM(uint32_t) ASMMultU32ByU32DivByU32(uint32_t u32A, uint32_t u32B, uint32_t u32C);
+#else
+DECLINLINE(uint32_t) ASMMultU32ByU32DivByU32(uint32_t u32A, uint32_t u32B, uint32_t u32C)
+{
+    uint32_t u32Result, u32Spill;
+    __asm__ __volatile__("mull %2
	"       
+            "divl %3\n"       
+            : "=&a" (u32Result),
+            "=&d" (u32Spill)
+            : "r" (u32B),
+            "r" (u32C),
+            "0" (u32A));
+    return u32Result;
+}#else
+ return (uint32_t)(((uint64_t)u32A * u32B) / u32C);
+}#endif
+
+/**
+ * Multiple a 64-bit by a 32-bit integer and divide the result by a 32-bit integer
+ * using a 96 bit intermediate result.
+ *
+ * @returns (u64A * u32B) / u32C.
+ * @param   u64A    The 64-bit value.
+ * @param   u32B    The 32-bit value to multiple by A.
+ * @param   u32C    The 32-bit value to divide A*B by.
+ *
+ * @remarks Architecture specific.
+ * @remarks Make sure the result won't ever exceed 64-bit, because hardware
+ * exception may be raised if it does.
+ * @remarks On x86 this may be used to avoid dragging in 64-bit builtin
+ * arithmetics function.
+ */

#if RT_INLINE_ASM_EXTERNAL || !defined(__GNUC__) || (!defined(RT_ARCH_AMD64) &&
!defined(RT_ARCH_X86))
DECLASM(uint64_t) ASMMultU64ByU32DivByU32(uint64_t u64A, uint32_t u32B, uint32_t u32C);
#else
DECLINLINE(uint64_t) ASMMultU64ByU32DivByU32(uint64_t u64A, uint32_t u32B, uint32_t u32C)
{
#if RT_INLINE_ASM_GNU_STYLE
#  ifdef RT_ARCH_AMD64
    uint64_t u64Result, u64Spill;
    __asm__ __volatile__("mulq %2\n	"
                         "divq %3\n	"
                         : "=&a" (u64Result),
                           "=&d" (u64Spill)
                         : "r" ((uint64_t)u32B),
                           "r" ((uint64_t)u32C),
                           "0" (u64A));
    return u64Result;
#  else
    uint32_t u32Dummy;
    uint64_t u64Result;
    __asm__ __volatile__("mull %%ecx       \n	" /* eax = u64Lo.lo = (u64A.lo * u32B).lo */
                         "xchg %%eax,%%esi \
	" /* esi = u64Lo.lo */
                         "xchg %%edx,%%edi \
	" /* edi = u32C */
                         "xchg %%edx,%%ecx \
	" /* ecx = u32C */
                         "mull %%edx       \n	" /* eax = u64Hi.lo = (u64A.hi * u32B).lo */
                         "addl %%edi,%%eax \
	" /* eax = u64Hi.lo += u64Lo.hi */
                         "adcl $0,%%edx    \n	" /* eax = u64Hi.hi += carry */
                         "divl %%ecx       \n	" /* eax = u64Hi / u32C */
                         "movl %%eax,%%edi \n	" /* edi = u64Result.hi = u64Hi / u32C */
    return u64Result;
#  endif RT_ARCH_AMD64
#endif}
#endif
"movl %esi,%%eax /* eax = u64Lo.lo */
"divl %%ecx    /* u64Result.lo */
"movl %edi,%%edx /* u64Result.hi */
: ^=A"(u64Result), ^=c"(u32Dummy),
: ^="S"(u32Dummy), ^=D"(u32Dummy)
: "a"((uint32_t)u64A),
: "S"((uint32_t)(u64A >> 32)),
: "c"(u32B),
: "D"(u32C));
return u64Result;
#endif
#else
RTUINT64U u;
+.uint64_t u64Lo = (uint64_t)(u64A & 0xffffffff) * u32B;
+ uint64_t u64Hi = (uint64_t)(u64A >> 32) * u32B;
+ u64Hi += (u64Lo >> 32);
+ u.s.Hi = (uint32_t)(u64Hi / u32C);
+ u.s.Lo = (uint32_t)(((u64Hi % u32C) << 32) + (u64Lo & 0xffffffff)) / u32C);
+ return u.u;
#endif
}
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
#ifndef __iprt_asm_h
#define __iprt_asm_h
+
#include <iprt/cdefs.h>
#include <iprt/types.h>
#include <iprt/assert.h>
/** @def RT_INLINE_ASM_USES_INTRIN
 * Defined as 1 if we're using a _MSC_VER 1400.
 * Otherwise defined as 0.
 */
+
/* Solaris 10 header ugliness */
#if defined u
#undef u
#endif
+
#if defined(_MSC_VER) && RT_INLINE_ASM_USES_INTRIN
#pragma warning(push)
#pragma warning(disable:4668) /* Several incorrect __cplusplus uses. */
#pragma warning(disable:4255) /* Incorrect __slwpcb prototype. */
#pragma include <intrin.h>
#pragma warning(pop)
/* Emit the intrinsics at all optimization levels. */
#pragma intrinsic(_ReadWriteBarrier)
#pragma intrinsic(_cpuid)
#pragma intrinsic(_stosd)
#pragma intrinsic(_stosw)
#pragma intrinsic(_stosb)
#pragma intrinsic(_BitScanForward)
#pragma intrinsic(_BitScanReverse)
#pragma intrinsic(_bittest)
#pragma intrinsic(_bittestandset)
#pragma intrinsic(_bittestandreset)
#pragma intrinsic(_bittestandcomplement)
#pragma intrinsic(_byteswap_ushort)
#pragma intrinsic(_byteswap_ulong)
#pragma intrinsic(_interlockedbittestandset)
#pragma intrinsic(_interlockedbittestandreset)
#pragma intrinsic(_InterlockedAnd)
#pragma intrinsic(_InterlockedOr)
#pragma intrinsic(_InterlockedIncrement)
#pragma intrinsic(_InterlockedDecrement)
+# pragma intrinsic(_InterlockedExchange)
+# pragma intrinsic(_InterlockedExchangeAdd)
+# pragma intrinsic(_InterlockedCompareExchange)
+# pragma intrinsic(_InterlockedCompareExchange64)
+# pragma intrinsic(_rotl)
+# pragma intrinsic(_rotr)
+# pragma intrinsic(_rotl64)
+# pragma intrinsic(_rotr64)
+# ifdef RT_ARCH_AMD64
+# pragma intrinsic(__stosq)
+# pragma intrinsic(_byteswap_uint64)
+# pragma intrinsic(_InterlockedExchange64)
+# pragma intrinsic(_InterlockedExchangeAdd64)
+# pragma intrinsic(_InterlockedAnd64)
+# pragma intrinsic(_InterlockedOr64)
+# pragma intrinsic(_InterlockedIncrement64)
+# pragma intrinsic(_InterlockedDecrement64)
+# endif
+#endif

+/*
 * Include #pragma aux definitions for Watcom C/C++.
 */
+*/
+#if defined(__WATCOMC__) && ARCH_BITS == 16 && defined(RT_ARCH_X86)
+# include "asm-watcom-x86-16.h"
+#elif defined(__WATCOMC__) && ARCH_BITS == 32 && defined(RT_ARCH_X86)
+# include "asm-watcom-x86-32.h"
+#endif

/** @defgroup grp_rt_asm    ASM - Assembly Routines */
+ * @ingroup grp_rt
+ *
+ * @remarks The difference between ordered and unordered atomic operations are that
+ * the former will complete outstanding reads and writes before continuing
+ * while the latter doesn't make any promises about the order. Ordered
+ * operations doesn't, it seems, make any 100% promise wrt to whether
+ * the operation will complete before any subsequent memory access.
+ * (please, correct if wrong.)
+ * ASMA AtomicSomething operations are all ordered, while ASMA AtomicUoSomething
+ * are unordered (note the Uo).
+ *
+ * @remarks Some remarks about __volatile__: Without this keyword gcc is allowed to reorder
+ * or even optimize assembler instructions away. For instance, in the following code
+ * the second rdmsr instruction is optimized away because gcc treats that instruction
+ * as deterministic:
+*
+*
@code
+*
static inline uint64_t rdmsr_low(int idx)
+*
{
+*
uint32_t low;
+*
__asm__ ("rdmsr" : "=a"(low) : "c"(idx) : "edx");
+*
}
+*
...
+*
uint32_t msr1 = rdmsr_low(1);
+*
foo(msr1);
+*
msr1 = rdmsr_low(1);
+*
bar(msr1);
+*
@endcode
+*
+*
The input parameter of rdmsr_low is the same for both calls and therefore gcc will
+*
use the result of the first call as input parameter for bar() as well. For rdmsr this
+*
is not acceptable as this instruction is _not_ deterministic. This applies to reading
+*
machine status information in general.
+*
+ * @{
+ */
+
+
+/** @def RT_INLINE_ASM_GCC_4_3_X_X86
+ * Used to work around some 4.3.x register allocation issues in this version of
+ * the compiler. So far this workaround is still required for 4.4 and 4.5 but
+ * definitely not for 5.x */
+#if (RT_GNUC_PREREQ(4, 3) && !RT_GNUC_PREREQ(5, 0) && defined(__i386__))
+# define RT_INLINE_ASM_GCC_4_3_X_X86 1
+#else
+# define RT_INLINE_ASM_GCC_4_3_X_X86 0
+#endif
+
+/** @def RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
+ * i686-apple-darwin9-gcc-4.0.1 (GCC) 4.0.1 (Apple Inc. build 5493) screws up
+ * RTSemRWRequestWrite semsemrw-lockless-generic.cpp in release builds. PIC
+ * mode, x86.
+*
+ * Some gcc 4.3.x versions may have register allocation issues with cmpxchg8b
+ * when in PIC mode on x86.
+ */
+#ifndef RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
+# if defined(DOXYGEN_RUNNING) || defined(__WATCOMC__) /* Watcom has trouble with the expression
below */
+# define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 1
+# elif defined(_MSC_VER) /* Visual C++ has trouble too, but it'll only tell us when C4688 is enabled. */
+# define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 0
+# elif ( (defined(PIC) || defined(__PIC__)) \

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+
&& defined(RT_ARCH_X86) \
+
&& ( RT_INLINE_ASM_GCC_4_3_X_X86 \
+
|| defined(RT_OS_DARWIN)) )
+# define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 1
+# else
+# define RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 0
+# endif
+#endif
+
+
+/** @def ASMReturnAddress
+ * Gets the return address of the current (or calling if you like) function or method.
+ */
+#ifdef _MSC_VER
+# ifdef __cplusplus
+extern "C"
+# endif
+void * _ReturnAddress(void);
+# pragma intrinsic(_ReturnAddress)
+# define ASMReturnAddress() _ReturnAddress()
+#elif defined(__GNUC__) || defined(DOXYGEN_RUNNING)
+# define ASMReturnAddress() __builtin_return_address(0)
+#elif defined(__WATCOMC__)
+# define ASMReturnAddress() Watcom_does_not_appear_to_have_intrinsic_return_address_function()
+#else
+# error "Unsupported compiler."
+#endif
+
+
+/**
+ * Compiler memory barrier.
+*
+ * Ensure that the compiler does not use any cached (register/tmp stack) memory
+ * values or any outstanding writes when returning from this function.
+*
+ * This function must be used if non-volatile data is modified by a
+ * device or the VMM. Typical cases are port access, MMIO access,
+ * trapping instruction, etc.
+ */
+#if RT_INLINE_ASM_GNU_STYLE
+# define ASMCompilerBarrier() do { __asm__ __volatile__("" : : : "memory"); } while (0)
+#elif RT_INLINE_ASM_USES_INTRIN
+# define ASMCompilerBarrier() do { _ReadWriteBarrier(); } while (0)
+#elif defined(__WATCOMC__)
+void ASMCompilerBarrier(void);
+#else /* 2003 should have _ReadWriteBarrier() but I guess we're at 2002 level then... */
+DECLINLINE(void) ASMCompilerBarrier(void)
+{

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+ __asm
+ { 
+ } 
+#endif
+
+/** @def ASMBreakpoint 
+ * Debugger Breakpoint. 
+ * @deprecated Use RT_BREAKPOINT instead. 
+ * @internal 
+ */
+#define ASMBreakpoint() RT_BREAKPOINT()
+
+
+/**
+ * Spinloop hint for platforms that have these, empty function on the other
+ * platforms.
+ *
+ * x86 & AMD64: The PAUSE variant of NOP for helping hyperthreaded CPUs detecting
+ * spin locks.
+ */
+#if RT_INLINE_ASM_EXTERNAL && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
+DECLASM(void) ASMNopPause(void);
+#else
+DECLINLINE(void) ASMNopPause(void)
+{
+ if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+  if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__(".byte 0xf3,0x90
+      ");
+  else
+    /* dummy */
+ } 
+#endif
+#else
+/* dummy */
+#endif 
+
+/**
+ * Atomically Exchange an unsigned 8-bit value, ordered.
+ *
+ * @returns Current *pu8 value
+ * @param pu8 Pointer to the 8-bit variable to update.
+ */
+ * @param   u8     The 8-bit value to assign to *pu8.
+ */
+ #=>if RT_INLINE_ASM_EXTERNAL
+ #DECLASM(uint8_t) ASMAtomicXchgU8(volatile uint8_t RT_FAR *pu8, uint8_t u8);
+ #=>else
+ #DECLINLINE(uint8_t) ASMAtomicXchgU8(volatile uint8_t RT_FAR *pu8, uint8_t u8)
+ +
+ #=> if RT_INLINE_ASM_GNU_STYLE
+ + __asm__ __volatile__("xchgb %0, %1\n"
+ +    : "=m" (*pu8),
+ +    "=q" (u8) /* =r - busted on g++ (GCC) 3.4.4 20050721 (Red Hat 3.4.4-2) */
+ +    : "1" (u8),
+ +    "m" (*pu8));
+ #=> else
+ + __asm
+ + {
+ #=> ifdef RT_ARCH_AMD64
+ +    mov     rdx, [pu8]
+ +    mov     al, [u8]
+ +    xchg    [rdx], al
+ +    mov     [u8], al
+ +# else
+ +    mov     edx, [pu8]
+ +    mov     al, [u8]
+ +    xchg    [edx], al
+ +    mov     [u8], al
+ +# endif
+ + }
+ +# endif
+ + return u8;
+ +}
+ +#endif
+ +
+ +/*
+ * Atomically Exchange a signed 8-bit value, ordered.
+ * 
+ * @returns Current *pu8 value
+ * @param   pi8     Pointer to the 8-bit variable to update.
+ * @param   i8      The 8-bit value to assign to *pi8.
+ */
+ #DECLINLINE(int8_t) ASMAtomicXchgS8(volatile int8_t RT_FAR *pi8, int8_t i8)
+ +{
+ +    return (int8_t)ASMAtomicXchgU8((volatile uint8_t RT_FAR *)pi8, (uint8_t)i8);
+ +}
+ +
+ +/*.*/
+ * Atomically Exchange a bool value, ordered.
+ *
+ * @returns Current *pf value
+ * @param   pf Pointer to the 8-bit variable to update.
+ * @param   f The 8-bit value to assign to *pi8.
+ */
+DECLINLINE(bool) ASMAtomicXchgBool(volatile bool RT_FAR *pf, bool f)
+
+ifdef _MSC_VER
+    return !!ASMAtomicXchgU8((volatile uint8_t RT_FAR *)pf, (uint8_t)f);
+else
+    return (bool)ASMAtomicXchgU8((volatile uint8_t RT_FAR *)pf, (uint8_t)f);
+endif
+
+/**
+ * Atomically Exchange an unsigned 16-bit value, ordered.
+ *
+ * @returns Current *pu16 value
+ * @param   pu16 Pointer to the 16-bit variable to update.
+ * @param   u16 The 16-bit value to assign to *pu16.
+ */
+if RT_INLINE_ASM_EXTERNAL
+DECLASM(uint16_t) ASMAtomicXchgU16(volatile uint16_t RT_FAR *pu16, uint16_t u16);
+else
+DECLINLINE(uint16_t) ASMAtomicXchgU16(volatile uint16_t RT_FAR *pu16, uint16_t u16)
+
+if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("xchgw %0, %1
	" : "=m" (*pu16),
+        "+r" (u16),
+        ":1" (u16),
+        "m" (*pu16));
+else
+    __asm
+    {  
+    # ifdef RT_ARCH_AMD64
+        mov     rdx, [pu16]
+        mov     ax, [u16]
+        xchg    [rdx], ax
+        mov     [u16], ax
+    # else
+        mov     edx, [pu16]
+        mov     ax, [u16]
+        xchg    [edx], ax
+        mov     [u16], ax
+    # endif
+    }
+ }       
+ # endif 
+ return u16;  
+ } 
+ #endif 
+ 
+ +/-** 
+ */ 
+ * Atomically Exchange a signed 16-bit value, ordered. 
+ * 
+ * @returns Current *pu16 value 
+ * @param   pi16    Pointer to the 16-bit variable to update. 
+ * @param   i16     The 16-bit value to assign to *pi16. 
+ */ 
+ DECLINLINE(int16_t) ASMAtomicXchgS16(volatile int16_t RT_FAR *pi16, int16_t i16) 
+ {   
+  return (int16_t)ASMAtomicXchgU16((volatile uint16_t RT_FAR *)pi16, (uint16_t)i16); 
+ } 
+ 
+ +/**   
+ */ 
+ * Atomically Exchange an unsigned 32-bit value, ordered. 
+ * 
+ * @returns Current *pu32 value 
+ * @param   pu32    Pointer to the 32-bit variable to update. 
+ * @param   u32     The 32-bit value to assign to *pu32. 
+ * 
+ * @remarks Does not work on 286 and earlier. 
+ * */ 
+ +#if RT_INLINE_ASM_EXTERNAL &!RT_INLINE_ASM_USES_INTRIN 
+ DECLASM(uint32_t) ASMAtomicXchgU32(volatile uint32_t RT_FAR *pu32, uint32_t u32); 
+ +#else 
+ DECLINLINE(uint32_t) ASMAtomicXchgU32(volatile uint32_t RT_FAR *pu32, uint32_t u32) 
+ {   
+  #if RT_INLINE_ASM_GNU_STYLE 
+    __asm__ __volatile__("xchgl %0, %1\n\t" 
+                         : "=m" (*pu32), 
+                           "=r" (u32) 
+                         : "1" (u32), 
+                           "m" (*pu32)); 
+  
+  #elif RT_INLINE_ASM_USES_INTRIN 
+    u32 = __InterlockedExchange((long RT_FAR *)pu32, u32); 
+  
+  #else 
+    __asm 
+    { 
+      
+    +# ifdef RT_ARCH_AMD64
+ mov   rdx, [pu32]
+ mov   eax, u32
+ xchg  [rdx], eax
+ mov   [u32], eax
+  
+ mov   edx, [pu32]
+ mov   eax, u32
+ xchg  [edx], eax
+ mov   [u32], eax
+
+   }
+  
+ return u32;
+  
+  
+}  
+
+ /**
+ * Atomically Exchange a signed 32-bit value, ordered.
+ *
+ * @returns Current *pu32 value
+ * @param   pi32  Pointer to the 32-bit variable to update.
+ * @param   i32   The 32-bit value to assign to *pi32.
+ * */
+DECLINLINE(int32_t) ASMAtomicXchgS32(volatile int32_t RT_FAR *pi32, int32_t i32)
+{
+ return (int32_t)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)pi32, (uint32_t)i32);
+}
+
+/**
+ * Atomically Exchange an unsigned 64-bit value, ordered.
+ *
+ * @returns Current *pu64 value
+ * @param   pu64  Pointer to the 64-bit variable to update.
+ * @param   u64   The 64-bit value to assign to *pu64.
+ * */
+#if (RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN) 
+|| RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
+DECLASM(uint64_t) ASMAtomicXchgU64(volatile uint64_t RT_FAR *pu64, uint64_t u64);
+#else
+DECLINLINE(uint64_t) ASMAtomicXchgU64(volatile uint64_t RT_FAR *pu64, uint64_t u64)
+{
+ if defined(RT_ARCH_AMD64)
+  
+ if RT_INLINE_ASM_USES_INTRIN
+   u64 = _InterlockedExchange64((__int64 *)pu64, u64);
+  +# elif RT_INLINE_ASM_GNU_STYLE
+  +  __asm__ __volatile__("xchgq %0, %1\n"
+  +    : "=m" (*pu64),
+  +    "=r" (u64)
+  +    : "1" (u64),
+  +    "m" (*pu64));
+  +# else
+  +  __asm
+  +  {
+  +    mov    rdx, [pu64]
+  +    mov    rax, [u64]
+  +    xchg   [rdx], rax
+  +    mov    [u64], rax
+  +  }
+  +# endif
+  +# else /* !RT_ARCH_AMD64 */
+  +# if RT_INLINE_ASM_GNU_STYLE
+  +# if defined(PIC) || defined(__PIC__)
+  +  uint32_t u32EBX = (uint32_t)u64;
+  +  __asm__ __volatile__("xchgl %%esi, %5\n"
+  +                       "xchgl %%ebx, %3
+  +                        1:
+  +                      lock; cmpxchg8b (%5)\n"/*"xchgl %%esi, %5\n"
+  +                       : "=A" (u64),
+  +                       "=m" (*pu64)
+  +                       : "0" (*pu64),
+  +                       "m" (u32EBX),
+  +                       "c" ((uint32_t)(u64 >> 32)),
+  +                       "S" (pu64));
+  +# else /* !PIC */
+  +  __asm__ __volatile__("xchgl %%esi, %5\n"
+  +                      "lock; cmpxchg8b %1\n"
+  +                      "jnz 1b
+  +                      : "=A" (u64),
+  +                      "=m" (*pu64)
+  +                      : "0" (*pu64),
+  +                      "m" (u32EBX),
+  +                      "c" ((uint32_t)(u64 >> 32));
+  +# endif
+  +# else /* !PIC */
+  +  __asm__ __volatile__("1\n"
+  +                      "lock; cmpxchg8b %1\n"
+  +                      "jnz 1b
+  +                      : "=A" (u64),
+  +                      "=m" (*pu64)
+  +                      : "0" (*pu64),
+  +                      "b" ((uint32_t)u64),
+  +                      "c" ((uint32_t)(u64 >> 32));
+  +# endif
+  +# else
+  +  __asm
+  +  {
+  +    mov    ebx, dword ptr [u64]
+  +    mov    ecx, dword ptr [u64 + 4]
+ mov edi, pu64
+ mov eax, dword ptr [edi]
+ mov edx, dword ptr [edi + 4]
+ retry:
+    lock cmpxchg8b [edi]
+    jnz retry
+    mov dword ptr [u64], eax
+    mov dword ptr [u64 + 4], edx
+ }
+}  endif
+} endif /* !RT_ARCH_AMD64 */
+ return u64;
+}  endif
+
+/**
+ * Atomically Exchange an signed 64-bit value, ordered.
+ *
+ * @returns Current *pi64 value
+ * @param   pi64    Pointer to the 64-bit variable to update.
+ * @param   i64     The 64-bit value to assign to *pi64.
+ */
+DECLINLINE(int64_t) ASMAtomicXchgS64(volatile int64_t RT_FAR *pi64, int64_t i64)
+{
+    return (int64_t)ASMAtomicXchgU64((volatile uint64_t RT_FAR *)pi64, (uint64_t)i64);
+}
+
+/**
+ * Atomically Exchange a pointer value, ordered.
+ *
+ * @returns Current *ppv value
+ * @param   ppv    Pointer to the pointer variable to update.
+ * @param   pv     The pointer value to assign to *ppv.
+ */
+DECLINLINE(void RT_FAR *) ASMAtomicXchgPtr(void RT_FAR * volatile RT_FAR *ppv, const void RT_FAR *pv)
+{
+    #if ARCH_BITS == 32 || ARCH_BITS == 16
+        return (void RT_FAR *)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)pi64, (uint32_t)i64);
+    #elif ARCH_BITS == 64
+        return (void RT_FAR *)ASMAtomicXchgU64((volatile uint64_t RT_FAR *)pi64, (uint64_t)i64);
+    #else
+        #error "ARCH_BITS is bogus"
+    #endif
+*/
+ * Convenience macro for avoiding the annoying casting with ASMAtomicXchgPtr.
+ *
+ * @returns Current *pv value
+ * @param ppv Pointer to the pointer variable to update.
+ * @param pv The pointer value to assign to *ppv.
+ * @param Type The type of *ppv, sans volatile.
+ */
+#ifndef __GNUC__
+# define ASMAtomicXchgPtrT(ppv, pv, Type)  
+ __extension__ 
+ (({
+ __typeof__(*(ppv)) volatile * const ppvTypeChecked = (ppv); \
+ Type const pvTypeChecked = (pv); \ 
+ Type pvTypeCheckedRet = (__typeof__(*(ppv))) ASMAtomicXchgPtr((void * volatile *)ppvTypeChecked, \ 
+ (void *)pvTypeChecked); \ 
+ pvTypeCheckedRet; \ 
+ })
+#define ASMAtomicXchgPtrT(ppv, pv, Type)  
+ (Type)ASMAtomicXchgPtr((void RT_FAR * volatile RT_FAR *)(ppv), (void RT_FAR *)(pv))
+#endif
+/*
+ * Atomically Exchange a raw-mode context pointer value, ordered.
+ *
+ * @returns Current *ppv value
+ * @param ppvRC Pointer to the pointer variable to update.
+ * @param pvRC The pointer value to assign to *ppv.
+ */
+DECLINLINE(RTRCPTR) ASMAtomicXchgRCPtr(RTRCPTR volatile RT_FAR *ppvRC, RTRCPTR pvRC) 
+{ 
+ return (RTRCPTR)ASMAtomicXchgU32((uint32_t volatile RT_FAR *)(void RT_FAR *)(ppvRC, \ 
+ (uint32_t)pvRC); 
+ }
+/*
+ * Atomically Exchange a ring-0 pointer value, ordered.
+ *
+ * @returns Current *ppv value
+ * @param ppvR0 Pointer to the pointer variable to update.
+ * @param pvR0 The pointer value to assign to *ppv.
+ */
DECLINLINE(RTR0PTR) ASMAtomicXchgR0Ptr(RTR0PTR volatile RT_FAR *ppvR0, RTR0PTR pvR0)
+
+if R0_ARCH_BITS == 32 || ARCH_BITS == 16
+  return (RTR0PTR)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)void RT_FAR *ppvR0,
+  (uint32_t)pvR0);
+else
++error "R0_ARCH_BITS is bogus"
+endif
+
+/**
+ * Atomically Exchange a ring-3 pointer value, ordered.
+ *
+ * @returns Current *ppv value
+ * @param ppvR3 Pointer to the pointer variable to update.
+ * @param pvR3 The pointer value to assign to *ppv.
+ */
+DECLINLINE(RTR3PTR) ASMAtomicXchgR3Ptr(RTR3PTR volatile RT_FAR *ppvR3, RTR3PTR pvR3)
+
+if R3_ARCH_BITS == 32 || ARCH_BITS == 16
+  return (RTR3PTR)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)void RT_FAR *ppvR3,
+  (uint32_t)pvR3);
+else
++error "R3_ARCH_BITS is bogus"
+endif
+
+/** @def ASMAtomicXchgHandle
+ * Atomically Exchange a typical IPRT handle value, ordered.
+ *
+ * @param ph Pointer to the value to update.
+ * @param hNew The new value to assigned to *pu.
+ * @param phRes Where to store the current *ph value.
+ *
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ */
+#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+#define ASMAtomicXchgHandle(ph, hNew, phRes)
+do {
+  AssertCompile(sizeof(*ph) == sizeof(uint32_t));
+  AssertCompile(sizeof(*hNew) == sizeof(uint32_t));
+  AssertCompile(sizeof(*phRes) == sizeof(uint32_t));
+  AssertCompile(hNew != phRes);
+  AssertCompile(hNew != ph);
+  AssertCompile(phRes != ph);
+  hNew = (uint32_t)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)void RT_FAR *ph,
+  (uint32_t)hNew);
+  phRes = (uint32_t)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)void RT_FAR *ph,
+  (uint32_t)phRes);
+  hNew = (uint32_t)ASMAtomicXchgU32((volatile uint32_t RT_FAR *)void RT_FAR *hNew,
+  (uint32_t)ph);
AssertCompile(sizeof(*phRes) == sizeof(uint32_t));
*(uint32_t RT_FAR *)(phRes) = ASMAtomicXchgU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)(hNew));
} while (0)
#endif

#define ASMAtomicXchgHandle(ph, hNew, phRes) 
    do { 
        AssertCompile(sizeof(*ph)    == sizeof(uint64_t)); 
        AssertCompile(sizeof(*phRes) == sizeof(uint64_t)); 
        *(uint64_t RT_FAR *)(phRes) = ASMAtomicXchgU64((uint64_t volatile RT_FAR *)(ph), (const uint64_t)(hNew)); 
    } while (0)
#else
#error HC_ARCH_BITS
#endif

#define ASMAtomicXchgSize(pu, uNew) 
    do { 
        switch (sizeof(*pu)) { 
            case 1: ASMAtomicXchgU8( (volatile uint8_t  RT_FAR *)(void RT_FAR *)(pu), (uint8_t)(uNew)); break;
            case 2: ASMAtomicXchgU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); break;
            case 4: ASMAtomicXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break;
            case 8: ASMAtomicXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break;
            default: AssertMsgFailed("ASMAtomicXchgSize: size %d is not supported\n", sizeof(*pu)); 
        } 
    } while (0)

#define ASMAtomicXchgSize(pu, uNew) 
    do { 
        switch (sizeof(*pu)) { 
            case 1: ASMAtomicXchgU8( (volatile uint8_t  RT_FAR *)(void RT_FAR *)(pu), (uint8_t)(uNew)); break;
            case 2: ASMAtomicXchgU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); break;
            case 4: ASMAtomicXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break;
            case 8: ASMAtomicXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break;
            default: AssertMsgFailed("ASMAtomicXchgSize: size %d is not supported\n", sizeof(*pu)); 
        } 
    } while (0)

+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu8         Pointer to the value to update.
+ * @param   u8New       The new value to assigned to *pu8.
+ * @param   u8Old       The old value to *pu8 compare with.
+ *
+ * @returns x86: Requires a 486 or later.
+ */
+ #if RT_INLINE_ASM_EXTERNAL || !RT_INLINE_ASM_GNU_STYLE
+ DECLASM(bool) ASMAtomicCmpXchgU8(volatile uint8_t RT_FAR *pu8, const uint8_t u8New, const uint8_t u8Old);
+ #else
+ DECLINLINE(bool) ASMAtomicCmpXchgU8(volatile uint8_t RT_FAR *pu8, const uint8_t u8New, uint8_t u8Old)
+ {
+     uint8_t u8Ret;
+     __asm__ __volatile__("lock; cmpxchgb %3, %0
	" : "=m" (*pu8),
                  "=qm" (u8Ret),
                  "=a" (u8Old)
             : "q" (u8New),
             "2" (u8Old),
             "m" (*pu8));
+     return (bool)u8Ret;
+ }
+#endif
/**
 * Atomically Compare and Exchange a signed 8-bit value, ordered.
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 * @param   pi8   Pointer to the value to update.
 * @param   i8New The new value to assigned to *pi8.
 * @param   i8Old The old value to *pi8 compare with.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(bool) ASMAtomicCmpXchgS8(volatile int8_t RT_FAR *pi8, const int8_t i8New, const int8_t i8Old)
{
    return ASMAtomicCmpXchgU8((volatile uint8_t RT_FAR *)pi8, (const uint8_t)i8New, (const uint8_t)i8Old);
}

/**
 * Atomically Compare and Exchange a bool value, ordered.
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 * @param   pf   Pointer to the value to update.
 * @param   fNew The new value to assigned to *pf.
 * @param   fOld The old value to *pf compare with.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(bool) ASMAtomicCmpXchgBool(volatile bool RT_FAR *pf, const bool fNew, const bool fOld)
{
    return ASMAtomicCmpXchgU8((volatile uint8_t RT_FAR *)pf, (const uint8_t)fNew, (const uint8_t)fOld);
}

/**
 * Atomically Compare and Exchange an unsigned 32-bit value, ordered.
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 * @param   pu32  Pointer to the value to update.
 * @param   u32New The new value to assigned to *pu32.
 * @param   u32Old The old value to *pu32 compare with.
 */
+ *
+ */
+\#if RT_INLINE_ASM_EXTERNAL && \!RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMAtomicCmpXchgU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, const uint32_t u32Old);
+\#else
+DECLINLINE(bool) ASMAtomicCmpXchgU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, uint32_t u32Old)
+{
+\# if RT_INLINE_ASM_GNU_STYLE
+    uint8_t u8Ret;
+    __asm__ __volatile__("lock; cmpxchgl %3, %0\n	"
+                      : "+m" (*pu32),
+                        "+qm" (u8Ret),
+                        "+a" (u32Old)
+                      : "r" (u32New),
+                        "+2" (u32Old),
+                        "+m" (*pu32));
+    return (bool)u8Ret;
+
+\# elif RT_INLINE_ASM_USES_INTRIN
+    return (uint32_t)_InterlockedCompareExchange((long RT_FAR *)pu32, u32New, u32Old) == u32Old;
+
+\# else
+    uint32_t u32Ret;
+    __asm
+    {
+      \# ifdef RT_ARCH_AMD64
+        mov     rdx, [pu32]
+      \# else
+        mov     edx, [pu32]
+      \# endif
+        mov     eax, [u32Old]
+        mov     ecx, [u32New]
+        lock           cmpxchg [rdx], ecx
+      \# else
+        lock           cmpxchg [edx], ecx
+      \# endif
+      setz    al
+      movzx   eax, al
+      mov     [u32Ret], eax
+    }
+    return !!u32Ret;
+\# endif
+}
Atomically Compare and Exchange a signed 32-bit value, ordered.

@returns true if xchg was done.
@returns false if xchg wasn't done.

@param pi32 Pointer to the value to update.
@param i32New The new value to assigned to *pi32.
@param i32Old The old value to *pi32 compare with.

@remarks x86: Requires a 486 or later.

DECLINLINE(bool) ASMAtomicCmpXchgS32(volatile int32_t RT_FAR *pi32, const int32_t i32New, const int32_t i32Old)
{
    return ASMAtomicCmpXchgU32((volatile uint32_t RT_FAR *)pi32, (uint32_t)i32New, (uint32_t)i32Old);
}

Atomically Compare and exchange an unsigned 64-bit value, ordered.

@returns true if xchg was done.
@returns false if xchg wasn't done.

@param pu64 Pointer to the 64-bit variable to update.
@param u64New The 64-bit value to assign to *pu64.
@param u64Old The value to compare with.

@remarks x86: Requires a Pentium or later.

#if (RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN) || RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC
DECLASM(bool) ASMAtomicCmpXchgU64(volatile uint64_t RT_FAR *pu64, const uint64_t u64New, const uint64_t u64Old);
#else
DECLINLINE(bool) ASMAtomicCmpXchgU64(volatile uint64_t RT_FAR *pu64, uint64_t u64New, uint64_t u64Old)
{
    if (RT_INLINE_ASM_USES_INTRIN)
        return (uint64_t)_InterlockedCompareExchange64((__int64 RT_FAR *)pu64, u64New, u64Old) == u64Old;
    else
        return (uint64_t)_InterlockedCompareExchange64((__int64 RT_FAR *)pu64, u64New, u64Old) == u64Old;
#endif
__asm__ __volatile__("lock; cmpxchgq %3, %0\n\t"
                         "setz  %1\n\t"
                         : "=m" (*pu64),
                         "=qm" (u8Ret),
                         "=a" (u64Old)
                         : "r" (u64New),
                         "2" (u64Old),
                         "m" (*pu64));

return (bool)u8Ret;

bool fRet;
__asm
{
    mov     rdx, [pu32]
    mov     rax, [u64Old]
    mov     rcx, [u64New]
    lock cmpxchg [rdx], rcx
    setz    al
    mov     [fRet], al
}
return fRet;

#endif
#endif /* !RT_ARCH_AMD64 */
uint32_t u32Ret;
#ifndef RT_INLINE_ASM_GNU_STYLE
#ifndef defined(PIC) || defined(__PIC__)
uint32_t u32EBX = (uint32_t)u64New;
uint32_t u32Spill;
#endif

__asm__ __volatile__("xchgl %%ebx, %4\n\t"
                         "lock; cmpxchg8b (%6)\n\t"
                         "setz  %%al\n\t"
                         "movl  %4, %%ebx\n\t"
                         "movzbl %%al, %%eax\n\t"
                         : "=a" (u32Ret),
                         "=d" (u32Spill),
                         "m" (*pu64)
                         : "A" (u64Old),
                         "m" ( u32EBX ),
                         "c" ((uint32_t)(u64New >> 32) ),
                         "S" (pu64));
#endif /* !PIC */
uint32_t u32Spill;
__asm__ __volatile__("lock; cmpxchg8b %2\n\t"
                         "setz  %%al\n\t"
"movzbl %al, %eax
	":="a" (u32Ret),
+ "=d" (u32Spill),
+ "+m" (*pu64)
+ 
+ : "A" (u64Old),
+ "b" ( (uint32_t)u64New ),
+ "c" ( (uint32_t)(u64New >> 32 ));

#else
+ return (bool)u32Ret;
+ #elif
+ __asm
+ {
+    mov     ebx, dword ptr [u64New]
+    mov     ecx, dword ptr [u64New + 4]
+    mov     edi, [pu64]
+    mov     eax, dword ptr [u64Old]
+    mov     edx, dword ptr [u64Old + 4]
+    lock cmpxchg8b [edi]
+    setz    al
+    movzx   eax, al
+    mov     dword ptr [u32Ret], eax
+ }
+ return !!u32Ret;
+ #endif
+}
+ return (bool)u32Ret;
+ #endif /* !RT_ARCH_AMD64 */
+
+ /**
+ * Atomically Compare and exchange a signed 64-bit value, ordered.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pi64    Pointer to the 64-bit variable to update.
+ * @param   i64     The 64-bit value to assign to *pu64.
+ * @param   i64Old  The value to compare with.
+ *
+ * @returns @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pi64    Pointer to the 64-bit variable to update.
+ * @param   i64     The 64-bit value to assign to *pu64.
+ * @param   i64Old  The value to compare with.
+ *
+ * @returns requires a Pentium or later.
+ */
+DECLINLINE(bool) ASMAtomicCmpXchgS64(volatile int64_t RT_FAR *pi64, const int64_t i64, const int64_t
+i64Old)
+{  
+    return ASMAtomicCmpXchgU64((volatile uint64_t RT_FAR *)pi64, (uint64_t)i64, (uint64_t)i64Old);
+}
+ return ASMAtomicCmpXchgU64((volatile uint64_t RT_FAR *)pi64, (uint64_t)i64, (uint64_t)i64Old);
/**
 * Atomically Compare and Exchange a pointer value, ordered.
 *
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 *
 * @param   ppv         Pointer to the value to update.
 * @param   pvNew       The new value to assigned to *ppv.
 * @param   pvOld       The old value to *ppv compare with.
 *
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(bool) ASMAtomicCmpXchgPtrVoid(void RT_FAR * volatile RT_FAR *ppv, const void RT_FAR *pvNew, const void RT_FAR *pvOld)
{
#if ARCH_BITS == 32 || ARCH_BITS == 16
    return ASMAtomicCmpXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv, (uint32_t)pvNew, (uint32_t)pvOld);
#elif ARCH_BITS == 64
    return ASMAtomicCmpXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv, (uint64_t)pvNew, (uint64_t)pvOld);
#else
    #error "ARCH_BITS is bogus"
#endif
}

/**
 * Atomically Compare and Exchange a pointer value, ordered.
 *
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 *
 * @param   ppv         Pointer to the value to update.
 * @param   pvNew       The new value to assigned to *ppv.
 * @param   pvOld       The old value to *ppv compare with.
 *
 * @remarks This is relatively type safe on GCC platforms.
 * @remarks x86: Requires a 486 or later.
 */
#ifdef __GNUC__
#define ASMAtomicCmpXchgPtr(ppv, pvNew, pvOld) \
    __extension__ \
    ({
        __typeof__(*(ppv)) volatile * const ppvTypeChecked   = (ppv); \
        __typeof__(*(ppv))            const pvNewTypeChecked = (pvNew); \
        __typeof__(*(ppv))            const pvOldTypeChecked = (pvOld); \
        bool fMacroRet = ASMAtomicCmpXchgPtrVoid((void * volatile *)ppvTypeChecked, \

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(void *)pvNewTypeChecked, (void *)pvOldTypeChecked); 
   fMacroRet; 
   })
#endif
+#else
+# define ASMAtomicCmpXchgPtr(ppv, pvNew, pvOld) 
 + ASMAtomicCmpXchgPtrVoid((void RT_FAR * volatile RT_FAR *)(ppv), (void RT_FAR *)(pvNew), (void
RT_FAR *)(pvOld))
+#endif
 +
+/** @def ASMAtomicCmpXchgHandle 
+ * Atomically Compare and Exchange a typical IPRT handle value, ordered.
+ *
+ * @param   ph          Pointer to the value to update.
+ * @param   hNew        The new value to assigned to *pu.
+ * @param   hOld        The old value to *pu compare with.
+ * @param   fRc         Where to store the result.
+ *
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ * @remarks x86: Requires a 486 or later.
+ */
+#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+# define ASMAtomicCmpXchgHandle(ph, hNew, hOld, fRc) 
 + do {
 +    AssertCompile(sizeof(*(ph)) == sizeof(uint32_t)); 
 +    (fRc) = ASMAtomicCmpXchgU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)(hNew), (const
uint32_t)(hOld)); 
 + } while (0)
+#elif HC_ARCH_BITS == 64
+# define ASMAtomicCmpXchgHandle(ph, hNew, hOld, fRc) 
 + do {
 +    AssertCompile(sizeof(*(ph)) == sizeof(uint64_t)); 
 +    (fRc) = ASMAtomicCmpXchgU64((uint64_t volatile RT_FAR *)(ph), (const uint64_t)(hNew), (const
uint64_t)(hOld)); 
 + } while (0)
+#else
+# error HC_ARCH_BITS
+#endif
+/** @def ASMAtomicCmpXchgSize 
+ * Atomically Compare and Exchange a value which size might differ
+ * between platforms or compilers, ordered.
+ *
+ * @param   pu          Pointer to the value to update.
+ * @param   uNew        The new value to assigned to *pu.
+ * @param   uOld        The old value to *pu compare with.
+ * @param   fRc         Where to store the result.
+ */
### ASMAtomicCmpXchgSize

@remarks x86: Requires a 486 or later.
+ */

```c
#define ASMAtomicCmpXchgSize(pu, uNew, uOld, fRc) \
    do { \
        switch (sizeof(*(pu))) { \
            case 4: (fRc) = ASMAtomicCmpXchgU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), \
                (uint32_t)(uNew), (uint32_t)(uOld)); \
                break; \
            case 8: (fRc) = ASMAtomicCmpXchgU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), \
                (uint64_t)(uNew), (uint64_t)(uOld)); \
                break; \
            default: AssertMsgFailed("ASMAtomicCmpXchgSize: size %d is not supported\n", sizeof(*pu))); \
                (fRc) = false; \
                break; \
        } \
    } while (0)

/**
 * Atomically Compare and Exchange an unsigned 32-bit value, additionally
 * passes back old value, ordered.
 *
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 *
 * @param   pu32        Pointer to the value to update.
 * @param   u32New      The new value to assigned to *pu32.
 * @param   u32Old      The old value to *pu32 compare with.
 * @param   pu32Old     Pointer store the old value at.
 *
 * @remarks x86: Requires a 486 or later.
 * + */

#if RT_INLINE_ASM_EXTERNAL && !RT:inline_ASM_USES_INTRIN
DECLASM(bool) ASMAtomicCmpXchgExU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, const 
    uint32_t u32Old, uint32_t RT_FAR *pu32Old);
#else
DECLINLINE(bool) ASMAtomicCmpXchgExU32(volatile uint32_t RT_FAR *pu32, const uint32_t u32New, 
    const uint32_t u32Old, uint32_t RT_FAR *pu32Old)
{
    #if RT_INLINE_ASM_GNU_STYLE
        uint8_t u8Ret;
        __asm__ __volatile__("lock; cmpxchgl %3, %0\n"
            : "=m" (*pu32),
            "=qm" (u8Ret),
            "=a" (*pu32Old)
            : "r" (u32New),
            "!
```
```c
+ "a" (u32Old),
+ "m" (*pu32));
+ return (bool)u8Ret;
+
+# elif RT_INLINE_ASM_USES_INTRIN
+ return (*pu32Old =_InterlockedCompareExchange((long RT_FAR *)pu32, u32New, u32Old)) == u32Old;
+
+# else
+ uint32_t u32Ret;
+ __asm
+ {
+# ifdef RT_ARCH_AMD64
+ mov     rdx, [pu32]
+# else
+ mov     edx, [pu32]
+# endif
+ mov     eax, [u32Old]
+ mov     ecx, [u32New]
+# ifdef RT_ARCH_AMD64
+ lock cmpxchg [rdx], ecx
+ mov     rdx, [pu32Old]
+ mov     [rdx], eax
+# else
+ lock cmpxchg [edx], ecx
+ mov     edx, [pu32Old]
+ mov     [edx], eax
+# endif
+ setz    al
+ movzx   eax, al
+ mov     [u32Ret], eax
+ }  
+ return !!u32Ret;
+# endif
+
+}
+
+/*
+ * Atomically Compare and Exchange a signed 32-bit value, additionally
+ * passes back old value, ordered.
+ *
+ * @param   pi32        Pointer to the value to update.
+ * @param   i32New      The new value to assigned to *pi32.
+ * @param   i32Old      The old value to *pi32 compare with.
+ * @param   pi32Old     Pointer store the old value at.
+ */
```
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
+ * @param   pu64Old Pointer store the old value at.
+ *
+ * @returns true if xchg was done.
+ * @returns false if xchg wasn't done.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to update.
+ * @param   u64New The 64-bit value to assign to *pu64.
+ * @param   u64Old The value to compare with.
```c
+    bool fRet;
+    __asm
+    {
+        mov     rdx, [pu32]
+        mov     rax, [u64Old]
+        mov     rcx, [u64New]
+        lock cmpxchg [rdx], rcx
+        mov     rdx, [pu64Old]
+        mov     [rdx], rax
+        setz    al
+        mov     [fRet], al
+    }
+    return fRet;
+}  
```

```c
else /* !RT_ARCH_AMD64 */
```
Atomically Compare and exchange a signed 64-bit value, additionally passing back old value, ordered.

- **returns true if xchg was done.**
- **returns false if xchg wasn't done.**

- **param** pi64 Pointer to the 64-bit variable to update.
- **param** i64 The 64-bit value to assign to *pu64.
- **param** i64Old The value to compare with.
- **param** pi64Old Pointer store the old value at.

- **remarks x86: Requires a Pentium or later.**

+DECLINLINE(bool) ASMAtomicCmpXchgExS64(volatile int64_t RT_FAR *pi64, const int64_t i64, const int64_t i64Old, int64_t RT_FAR *pi64Old) +
+ return ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)pi64, (uint64_t)i64, (uint64_t)i64Old, (uint64_t RT_FAR *)pi64Old); +} 
+ **def** ASMAtomicCmpXchgExHandle 
+ Atomically Compare and Exchange a typical IPRT handle value, ordered.
+ 
+ **param** ph Pointer to the value to update.
+ **param** hNew The new value to assigned to *pu.
+ **param** hOld The old value to *pu compare with.
+ **param** fRc Where to store the result.
+ * @param   phOldVal  Pointer to where to store the old value.
+ *
+ * Remarks This doesn't currently work for all handles (like RTFILE).
+ */
+#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+#define ASMAtomicCmpXchgExHandle(ph, hNew, hOld, fRc, phOldVal) \  
+  do { \  
+      AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \  
+      AssertCompile(sizeof(*phOldVal) == sizeof(uint32_t)); \  
+      (fRc) = ASMAtomicCmpXchgExU32((volatile uint32_t RT_FAR *)(pu), (uint32_t)(uNew), (uint32_t)(uOld),  
+          (uint32_t RT_FAR *)(puOldVal)); \  
+  } while (0)
+#elif HC_ARCH_BITS == 64
+#define ASMAtomicCmpXchgExHandle(ph, hNew, hOld, fRc, phOldVal) \  
+  do { \  
+      AssertCompile(sizeof(*ph) == sizeof(uint64_t)); \  
+      AssertCompile(sizeof(*phOldVal) == sizeof(uint64_t)); \  
+      (fRc) = ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)(pu), (uint64_t)(uNew), (uint64_t)(uOld),  
+          (uint64_t RT_FAR *)(puOldVal)); \  
+  } while (0)
+#else
+  #error HC_ARCH_BITS
+endif

+/** @def ASMAtomicCmpXchgExSize
+ * Atomically Compare and Exchange a value which size might differ
+ * between platforms or compilers. Additionally passes back old value.
+ *\n+ * @param   pu          Pointer to the value to update.
+ * @param   uNew        The new value to assigned to *pu.
+ * @param   uOld        The old value to *pu compare with.
+ * @param   fRc         Where to store the result.
+ * @param   puOldVal    Pointer to where to store the old value.
+ *
+ * Remarks x86: Requires a 486 or later.
+ */
+#define ASMAtomicCmpXchgExSize(pu, uNew, uOld, fRc, puOldVal) \  
+  do { \  
+      switch (sizeof(*pu)) { \  
+          case 4: (fRc) = ASMAtomicCmpXchgExU32((volatile uint32_t RT_FAR *)(pu), (uint32_t)(uNew), (uint32_t)(uOld), (uint32_t RT_FAR *)(puOldVal)); \  
+              break; \  
+          case 8: (fRc) = ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)(pu), (uint64_t)(uNew), (uint64_t)(uOld), (uint64_t RT_FAR *)(puOldVal)); \  
+              break; \  
+          default: AssertMsgFailed("ASMAtomicCmpXchgSize: size %d is not supported\n", sizeof(*pu))); \  
+              (fRc) = false; \  
+      }  

(uOldVal) = 0; \
break; \
} \ 
} while (0) 
+

/**
 * Atomically Compare and Exchange a pointer value, additionally
 * passing back old value, ordered.
 *
 * @returns true if xchg was done.
 * @returns false if xchg wasn't done.
 *
 * @param   ppv         Pointer to the value to update.
 * @param   pvNew       The new value to assigned to *ppv.
 * @param   pvOld       The old value to *ppv compare with.
 * @param   ppvOld      Pointer store the old value at.
 *
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(bool) ASMAtomicCmpXchgExPtrVoid(void RT_FAR * volatile RT_FAR *ppv, const void
RT_FAR *pvNew, const void RT_FAR *pvOld,
   void RT_FAR * RT_FAR *ppvOld)
{
#if ARCH_BITS == 32 || ARCH_BITS == 16
    return ASMAtomicCmpXchgExU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv, (uint32_t)pvNew,
(uint32_t)pvOld, (uint32_t RT_FAR *)ppvOld);
#else
    return ASMAtomicCmpXchgExU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv, (uint64_t)pvNew,
(uint64_t)pvOld, (uint64_t RT_FAR *)ppvOld);
#endif
}
+ * @remarks This is relatively type safe on GCC platforms.
+ * @remarks x86: Requires a 486 or later.
+ */
+#ifdef __GNUC__
+ # define ASMAtomicCmpXchgExPtrVoid((void * volatile *)ppvTypeChecked, (void *)pvNewTypeChecked,
+ (void *)pvOldTypeChecked, (void **)ppvOldTypeChecked)
+     fMacroRet;
+ }
+ }
+ +#else
+ # define ASMAtomicCmpXchgExPtr(ppv, pvNew, pvOld, ppvOld) \
+  ASMAtomicCmpXchgExPtrVoid((void * RT_FAR * RT_FAR *)(ppv), (void RT_FAR *)(pvNew), (void
+ RT_FAR * RT_FAR *)(pvOld), (void RT_FAR * RT_FAR *)(ppvOld))
+ +#endif
+ /* Virtualization unfriendly serializing instruction, always exits.
+ */
+ #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(void) ASMSerializeInstructionCpuId(void);
+ #else
+ DECLINLINE(void) ASMSerializeInstructionCpuId(void)
+ {
+ # if RT_INLINE_ASM_GNU_STYLE
+     RTCCUINTREG xAX = 0;
+ #if RT_ARCH_AMD64
+     __asm__ __volatile__ ("cpuid" 
+                          : =a" (xAX) 
+                          : "0" (xAX) 
+                          : "rbx", "rcx", "rdx", "memory");
+ #elif (defined(PIC) || defined(__PIC__)) && defined(__i386__)
+     __asm__ __volatile__ ("push %%ebx\n\t" 
+                          : =a" (xAX) 
+                          : "0" (xAX) 
+                          : "ecx", "edx", "memory");
+ #else
+     __asm__ __volatile__ ("cpuid\n\t" 
+                          : =a" (xAX) 
+                          : "0" (xAX) 
+                          : "memory");
+ #endif
+     "%%ebx\n\t"
+     "pop %%ebx\n\t"
+     "%%eax\n\t"
+     "%%edx\n\t"
+     "%%ecx\n\t"
+     "%%ebx\n\t"
+     "%%edx\n\t"
+     "%%eax\n\t"
+     "%%edx\n\t"
+     "%%ebx\n\t"
+     "%%ecx\n\t"
+     "%%eax\n\t"
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+     "%%eax\n\t"
+     "%%edx\n\t"
+     "%%ebx\n\t"
### endif
+
### elif RT_INLINE_ASM_USES_INTRIN
+ int aInfo[4];
+ __ReadWriteBarrier();
+ __cpuid(aInfo, 0);
+
### else
+ __asm
+ {
+     push    ebx
+     xor     eax, eax
+     cpuid
+     pop     ebx
+ }
### endif
+
###endif
+
/**
 * Virtualization friendly serializing instruction, though more expensive.
 */
###if RT_INLINE_ASM_EXTERNAL
DECLASM(void) ASMSerializeInstructionIRet(void);
###else
DECLINLINE(void) ASMSerializeInstructionIRet(void)
{
### if RT_INLINE_ASM_GNU_STYLE
### ifdef RT_ARCH_AMD64
###  __asm__ __volatile__ (
+      "movq  %%rsp,%%r10\n"
+      "subq  $128, %%rsp\n" /*redzone*/
+      "mov  %%ss, %eal\n"
+      "pushq %%rax\n"
+      "pushq %%r10\n"
+      "pushfq\n"
+      "movl  %%cs, %%eax\n"
+      "pushq %%rax\n"
+      "leaq  1f(%%rip), %%rax\n"
+      "pushq %%rax\n"
+      "iretq\n"
+      "1:\n"
+      ::: "rax", "r10", "memory";
###  else
###   __asm__ __volatile__ ("pushfl\n"
+      "pushl %%cs\n"
+      "pushl 1f\n"
+      "...
+     "iretd\n"
+     "1:\n"
+     :: "memory");
+## endif
+
## else
+    __asm
+    {
+        pushfd
+        push cs
+        push la_ret
+        iretd
+    la_ret:
+    }
+## endif
+
##endif
+
/**
 * Virtualization friendlier serializing instruction, may still cause exits.
 */
+*/
+##if RT_INLINE_ASM_EXTERNAL && RT_INLINE_ASM_USES_INTRIN < 15
+DECLASM(void) ASMSerializeInstructionRdTscp(void);
+##else
+DECLINLINE(void) ASMSerializeInstructionRdTscp(void)
+{
+## if RT_INLINE_ASM_GNU_STYLE
+    /* rdtscp is not supported by ancient linux build VM of course :-( */
+## else
+    __asm
+    {
+        rdtscp
+    }
+## endif
+## else
+## if RT_INLINE_ASM_USES_INTRIN >= 15
+    uint32_t ulignore;
+    _ReadWriteBarrier();
+    (void)_rdtscp(&ulignore);
+    (void)ulIgnore;
+## else
+    __asm
+    {
+        rdtscp
+    }
+## endif
+## endif

+ }  
+ #endif  
+  
+  
+ /*****************************************************************  
+ * Serialize Instruction.  
+ */  
+ if (defined(RT_ARCH_X86) && ARCH_BITS == 16) || defined(IN_GUEST)  
+ # define ASMSerializeInstruction() ASMSerializeInstructionIRet()  
+ else  
+ # define ASMSerializeInstruction() ASMSerializeInstructionCpuId()  
+ #endif  
+  
+  
+ /*****************************************************************  
+ * Memory fence, waits for any pending writes and reads to complete.  
+ */  
+ DECLINLINE(void) ASMMemoryFence(void)  
+ {  
+    /** @todo use mfence? check if all cpus we care for support it. */  
+ #if ARCH_BITS == 16  
+    uint16_t volatile u16;  
+    ASMAtomicXchgU16(&u16, 0);  
+ #else  
+    uint32_t volatile u32;  
+    ASMAtomicXchgU32(&u32, 0);  
+ #endif  
+ }  
+  
+  
+ /*****************************************************************  
+ * Write fence, waits for any pending writes to complete.  
+ */  
+ DECLINLINE(void) ASMWriteFence(void)  
+ {  
+    /** @todo use sfence? check if all cpus we care for support it. */  
+    ASMMemoryFence();  
+ }  
+  
+  
+ /*****************************************************************  
+ * Read fence, waits for any pending reads to complete.  
+ */  
+ DECLINLINE(void) ASMReadFence(void)  
+ {  
+    /** @todo use lfence? check if all cpus we care for support it. */  
+    ASMMemoryFence();  
+ }
/**
 * Atomically reads an unsigned 8-bit value, ordered.
 * @returns Current *pu8 value
 * @param   pu8 Pointer to the 8-bit variable to read.
 */
DECLINLINE(uint8_t) ASMAtomicReadU8(volatile uint8_t RT_FAR *pu8)
{
    ASMMemoryFence();
    return *pu8;  /* byte reads are atomic on x86 */
}

/**
 * Atomically reads an unsigned 8-bit value, unordered.
 * @returns Current *pu8 value
 * @param   pu8 Pointer to the 8-bit variable to read.
 */
DECLINLINE(uint8_t) ASMAtomicUoReadU8(volatile uint8_t RT_FAR *pu8)
{
    return *pu8;  /* byte reads are atomic on x86 */
}

/**
 * Atomically reads a signed 8-bit value, ordered.
 * @returns Current *pi8 value
 * @param   pi8 Pointer to the 8-bit variable to read.
 */
DECLINLINE(int8_t) ASMAtomicReadS8(volatile int8_t RT_FAR *pi8)
{
    ASMMemoryFence();
    return *pi8;  /* byte reads are atomic on x86 */
}

/**
 * Atomically reads a signed 8-bit value, unordered.
 * @returns Current *pi8 value
 * @param   pi8 Pointer to the 8-bit variable to read.
 */
DECLINLINE(int8_t) ASMAtomicUoReadS8(volatile int8_t RT_FAR *pi8)
{
return *pi8; /* byte reads are atomic on x86 */
+
+
+/**
 + * Atomically reads an unsigned 16-bit value, ordered.
 + *
 + * @returns Current *pu16 value
 + * @param   pu16   Pointer to the 16-bit variable to read.
 + */
+DECLINLINE(uint16_t) ASMAtomicReadU16(volatile uint16_t RT_FAR *pu16)
+
+  ASMMemoryFence();
+  Assert(!((uintptr_t)pu16 & 1));
+  return *pu16;
+
+
+/**
 + * Atomically reads an unsigned 16-bit value, unordered.
 + *
 + * @returns Current *pu16 value
 + * @param   pu16   Pointer to the 16-bit variable to read.
 + */
+DECLINLINE(uint16_t) ASMAtomicUoReadU16(volatile uint16_t RT_FAR *pu16)
+
+  ASMMemoryFence();
+  Assert(!((uintptr_t)pu16 & 1));
+  return *pu16;
+
+
+/**
 + * Atomically reads a signed 16-bit value, ordered.
 + *
 + * @returns Current *pi16 value
 + * @param   pi16   Pointer to the 16-bit variable to read.
 + */
+DECLINLINE(int16_t) ASMAtomicReadS16(volatile int16_t RT_FAR *pi16)
+
+  ASMMemoryFence();
+  Assert(!((uintptr_t)pi16 & 1));
+  return *pi16;
+
+
+/**
 + * Atomically reads a signed 16-bit value, unordered.
 + *
+ * @returns Current *pi16 value
+ * @param  pi16  Pointer to the 16-bit variable to read.
+ */
+DECLINLINE(int16_t) ASMAtomicUoReadS16(volatile int16_t RT_FAR *pi16)
+{
+    Assert(!((uintptr_t)pi16 & 1));
+    return *pi16;
+}
+
+/**
+ * Atomically reads an unsigned 32-bit value, ordered.
+ *
+ * @returns Current *pu32 value
+ * @param  pu32  Pointer to the 32-bit variable to read.
+ */
+DECLINLINE(uint32_t) ASMAtomicReadU32(volatile uint32_t RT_FAR *pu32)
+{
+    ASMMemoryFence();
+    Assert(!((uintptr_t)pu32 & 3));
+    #if ARCH_BITS == 16
+        AssertFailed(); /* @todo 16-bit */
+    #endif
+    return *pu32;
+}
+
+/**
+ * Atomically reads an unsigned 32-bit value, unordered.
+ *
+ * @returns Current *pu32 value
+ * @param  pu32  Pointer to the 32-bit variable to read.
+ */
+DECLINLINE(uint32_t) ASMAtomicUoReadU32(volatile uint32_t RT_FAR *pu32)
+{
+    Assert(!((uintptr_t)pu32 & 3));
+    #if ARCH_BITS == 16
+        AssertFailed(); /* @todo 16-bit */
+    #endif
+    return *pu32;
+}
+
+/**
+ * Atomically reads a signed 32-bit value, ordered.
+ *
+ * @returns Current *pi32 value
+ * @param  pi32  Pointer to the 32-bit variable to read.
+ * 
+ DECLINLINE(int32_t) ASMAtomicReadS32(volatile int32_t RT_FAR *pi32) 
+ { 
+  ASMMemoryFence(); 
+  Assert(!((uintptr_t)pi32 & 3)); 
+  #if ARCH_BITS == 16 
+  AssertFailed(); /**< @todo 16-bit */ 
+  #endif 
+  return *pi32; 
+ } 
+ 
+ +/** 
+ * Atomically reads a signed 32-bit value, unordered. 
+ * 
+ * @returns Current *pi32 value 
+ * @param   pi32    Pointer to the 32-bit variable to read. 
+ */ 
+ DECLINLINE(int32_t) ASMAtomicUoReadS32(volatile int32_t RT_FAR *pi32) 
+ { 
+  Assert(!((uintptr_t)pi32 & 3)); 
+  #if ARCH_BITS == 16 
+  AssertFailed(); /**< @todo 16-bit */ 
+  #endif 
+  return *pi32; 
+ } 
+ 
+ +/** 
+ * Atomically reads an unsigned 64-bit value, ordered. 
+ * 
+ * @returns Current *pu64 value 
+ * @param   pu64    Pointer to the 64-bit variable to read. 
+ *                  The memory pointed to must be writable. 
+ * 
+ * @remarks This may fault if the memory is read-only! 
+ * @remarks x86: Requires a Pentium or later. 
+ */ 
+ +#if (RT_INLINE_ASM_EXTERNAL && !defined(RT_ARCH_AMD64)) \ 
+ || RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC 
+ DECLASM(uint64_t) ASMAtomicReadU64(volatile uint64_t RT_FAR *pu64); 
+ #else 
+ DECLINLINE(uint64_t) ASMAtomicReadU64(volatile uint64_t RT_FAR *pu64) 
+ { 
+  uint64_t u64; 
+  #ifdef RT_ARCH_AMD64 
+  Assert(!((uintptr_t)pu64 & 7)); 
+  >/**# if RT_INLINE_ASM_GNU_STYLE
+ __asm volatile(__asm__) {
+     "mfence\n"
+     "movq %1, %0\n"
+     : "=r" (u64)
+     : "m" (*pu64));
+# else
+ __asm
+ {
+     mfence
+     mov rdx, [pu64]
+     mov rax, [rdx]
+     mov [u64], rax
+ }
+# endif*/
+ ASMMemoryFence();
+ u64 = *pu64;
+# else /* !RT_ARCH_AMD64 */
+# if RT_INLINE_ASM_GNU_STYLE
+#   if defined(PIC) || defined(__PIC__)
+     uint32_t u32EBX = 0;
+     Assert(!((uintptr_t)pu64 & 7));
+     __asm volatile("xchgl %%ebx, %3\n"
+                    "lock; cmpxchg8b (%5)\n"
+                    "movl %3, %%ebx\n"
+                    : "=A" (u64),
+#   if RT_GNUC_PREREQ(4, 3)
+                           "m" (*pu64)
+#   else
+                           "m" (*pu64)
+#   endif
+                    : "0" (0ULL),
+                    "m" (u32EBX),
+                    "c" (0),
+                    "S" (pu64));
+# else /* !PIC */
+#   __asm volatile("lock; cmpxchg8b %1\n"
+                   : "=A" (u64),
+                   "m" (*pu64)
+                   : "0" (0ULL),
+                   "b" (0),
+                   "c" (0));
+# endif
+# else
+     Assert(!(uintptr_t)pu64 & 7));
+ __asm
+ {
+     xor eax, eax
+     xor edx, edx
+     mov edi, pu64

+ xor ecx, ecx
+ xor ebx, ebx
+ lock cmpxchg8b [edi]
+ mov dword ptr [u64], eax
+ mov dword ptr [u64 + 4], edx
+ }
+#endif
+endif /* !RT_ARCH_AMD64 */
+ return u64;
+
+endif
+
+/**
+ * Atomically reads an unsigned 64-bit value, unordered.
+ *
+ * @returns Current *pu64 value
+ * @param   pu64    Pointer to the 64-bit variable to read.
+ *                  The memory pointed to must be writable.
+ *
+ * @remarks This may fault if the memory is read-only!
+ * @remarks x86: Requires a Pentium or later.
+ *
+*/
+#if !defined(RT_ARCH_AMD64) \ 
+ && ( (RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN) \ 
+ || RT_INLINE_DONT_MIX_CMPXCHG8B_AND_PIC)
+DECLASM(uint64_t) ASMAtomicUoReadU64(volatile uint64_t RT_FAR *pu64);
+#else
+DECLINLINE(uint64_t) ASMAtomicUoReadU64(volatile uint64_t RT_FAR *pu64)
+
+ { uint64_t u64;
+ }
+endif RT_ARCH_AMD64
+ Assert(((uintptr_t)pu64 & 7));
+*/
+ if RT_INLINE_ASM_GNU_STYLE
+ Assert(((uintptr_t)pu64 & 7));
+ __asm__ __volatile__ ("movq %1, %0
	"
                         : "=r" (u64)
                         : "m" (*pu64));
+#else
+ __asm
+
+ { mov rdx, [pu64]
+ mov rax, [rdx]
+ mov [u64], rax
+ }
+#endif */
+ u64 = *pu64;
+#else /* !RT_ARCH_AMD64 */
```c
/* RT_INLINE_ASM_GNU_STYLE */
if defined(PIC) || defined(__PIC__)
+ uint32_t u32EBX = 0;
+ uint32_t u32Spill;
+ Assert(!((uintptr_t)pu64 & 7));
+ __asm__ __volatile__("xor %%eax,%%eax
                           xor %%ecx,%%ecx
                           xor %%edx,%%edx
                           xchgl %%ebx, %3
                           lock; cmpxchg8b (%4)
                           movl %3, %%ebx
                           : "=A" (u64),
#    if RT_GNUC_PREREQ(4, 3)
                           "+m" (*pu64),
#    else /* !PIC */
                           "=m" (*pu64),
#    endif
                           "=c" (u32Spill)
                           : "m" (u32EBX),
                           "S" (pu64));
#  else /* !RT_ARCH_AMD64 */
    Assert(!((uintptr_t)pu64 & 7));
    __asm
    {
        xor     eax, eax
        xor     edx, edx
        mov     edi, pu64
        xor     ecx, ecx
        xor     ebx, ebx
        lock cmpxchg8b [edi]
        mov     dword ptr [u64], eax
        mov     dword ptr [u64 + 4], edx
    }
#  endif
# endif /* !RT_GNUC_PREREQ(4, 3) */
# else
+ Assert(!((uintptr_t)pu64 & 7));
+ __asm
+ {
+     xor  eax, eax
+     xor  edx, edx
+     mov  edi, pu64
+     xor  ecx, ecx
+     xor  ebx, ebx
+     lock cmpxchg8b [edi]
+     mov  dword ptr [u64], eax
+     mov  dword ptr [u64 + 4], edx
+ }
# endif
/* !RT_ARCH_AMD64 */
return u64;
+
```
/**
 * Atomically reads a signed 64-bit value, ordered.
 * @returns Current *pi64 value
 * @param   pi64    Pointer to the 64-bit variable to read.
 *                  The memory pointed to must be writable.
 * @remarks This may fault if the memory is read-only!
 * @remarks x86: Requires a Pentium or later.
 */
DECLINLINE(int64_t) ASMAtomicReadS64(volatile int64_t RT_FAR *pi64)
{
    return (int64_t)ASMAtomicReadU64((volatile uint64_t RT_FAR *)pi64);
}

/**
 * Atomically reads a signed 64-bit value, unordered.
 * @returns Current *pi64 value
 * @param   pi64    Pointer to the 64-bit variable to read.
 *                  The memory pointed to must be writable.
 * @remarks This will fault if the memory is read-only!
 * @remarks x86: Requires a Pentium or later.
 */
DECLINLINE(int64_t) ASMAtomicUoReadS64(volatile int64_t RT_FAR *pi64)
{
    return (int64_t)ASMAtomicUoReadU64((volatile uint64_t RT_FAR *)pi64);
}

/**
 * Atomically reads a size_t value, ordered.
 * @returns Current *pcb value
 * @param   pcb     Pointer to the size_t variable to read.
 */
DECLINLINE(size_t) ASMAtomicReadZ(size_t volatile RT_FAR *pcb)
{
#if ARCH_BITS == 64
    return ASMAtomicReadU64((uint64_t volatile RT_FAR *)pcb);
#elif ARCH_BITS == 32
    return ASMAtomicReadU32((uint32_t volatile RT_FAR *)pcb);
#elif ARCH_BITS == 16
    AssertCompileSize(size_t, 2);
    return ASMAtomicReadU16((uint16_t volatile RT_FAR *)pcb);
#else

+/* error "Unsupported ARCH_BITS value"
+*/
+
+/
+*/
+ * Atomically reads a size_t value, unordered.
+ *
+ * @returns Current *pcb value
+ * @param pcb Pointer to the size_t variable to read.
+ */
+DECLINLINE(size_t) ASMAtomicUoReadZ(size_t volatile RT_FAR *pcb)
+{
+    #if ARCH_BITS == 64 || ARCH_BITS == 16
+        return ASMAtomicUoReadU64((uint64_t volatile RT_FAR *)pcb);
+    #elif ARCH_BITS == 32
+        return ASMAtomicUoReadU32((uint32_t volatile RT_FAR *)pcb);
+    #elif ARCH_BITS == 16
+        AssertCompileSize(size_t, 2);
+        return ASMAtomicUoReadU16((uint16_t volatile RT_FAR *)pcb);
+    #else
+        # error "Unsupported ARCH_BITS value"
+    #endif
+}
+
+/
+*/
+ * Atomically reads a pointer value, ordered.
+ *
+ * @returns Current *pv value
+ * @param ppv Pointer to the pointer variable to read.
+ *
+ * @remarks Please use ASMAtomicReadPtrT, it provides better type safety and
+ *          requires less typing (no casts).
+ */
+DECLINLINE(void RT_FAR *) ASMAtomicReadPtr(void RT_FAR * volatile RT_FAR *ppv)
+{
+    #if ARCH_BITS == 32 || ARCH_BITS == 16
+        return (void RT_FAR *)ASMAtomicReadU32((volatile uint32_t RT_FAR *)ppv);
+    #elif ARCH_BITS == 64
+        return (void RT_FAR *)ASMAtomicReadU64((volatile uint64_t RT_FAR *)ppv);
+    #else
+        #error "ARCH_BITS is bogus"
+    #endif
+}
+
+/
+*/
+ * Convenience macro for avoiding the annoying casting with ASMAtomicReadPtr.
+ * @returns Current *pv value
+ * @param   ppv    Pointer to the pointer variable to read.
+ * @param   Type   The type of *ppv, sans volatile.
+ */
+#ifdef __GNUC__
++ define ASMAtomicReadPtrT(ppv, Type) \n+   __extension__ \n+   ({\n+       __typeof__(*(ppv)) volatile *ppvTypeChecked = (ppv); \n+       Type pvTypeChecked = ((__typeof__(*(ppv))) ASMAtomicReadPtr((void * volatile *)ppvTypeChecked); \n+       pvTypeChecked; \n+   })
++ #else
++ define ASMAtomicReadPtrT(ppv, Type) \n+   (Type)ASMAtomicReadPtr((void RT_FAR * volatile RT_FAR *)(ppv))
++ #endif

/**
 * Atomically reads a pointer value, unordered.
 *
 * @returns Current *pv value
 * @param   ppv    Pointer to the pointer variable to read.
 *
 * @remarks Please use ASMAtomicUoReadPtrT, it provides better type safety and
 *          requires less typing (no casts).
 */
DECLINLINE(void RT_FAR *) ASMAtomicUoReadPtr(void RT_FAR * volatile RT_FAR *ppv)
{
#if ARCH_BITS == 32 || ARCH_BITS == 16
    return (void RT_FAR *)ASMAtomicUoReadU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv);
#elif ARCH_BITS == 64
    return (void RT_FAR *)ASMAtomicUoReadU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv);
#else
    #error "ARCH_BITS is bogus"
#endif
}

/**
 * Convenience macro for avoiding the annoying casting with ASMAtomicUoReadPtr.
 */
+DECLINLINE(void RT_FAR *) ASMAtomicUoReadPtr(void RT_FAR * volatile RT_FAR *ppv)
{++
+    return (void RT_FAR *)ASMAtomicUoReadU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv);
+    #elif ARCH_BITS == 64
+    return (void RT_FAR *)ASMAtomicUoReadU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv);
+    #else
+    #error "ARCH_BITS is bogus"
+    #endif
+}

*/
+#ifdef __GNUC__
+* @returns Current *pv value
+* @param   ppv    Pointer to the pointer variable to read.
+* @param   Type   The type of *ppv, sans volatile.
+ */
+#ifndef __GNUC__
+*
+# define ASMAtomicUoReadPtrT(ppv, Type) \ 
+ __extension__ \ 
+ ({\ 
+    __typeof__(*(ppv)) volatile * constppvTypeChecked = (ppv); \ 
+    Type pvTypeChecked = (__typeof__(*(ppv))) ASMAtomicUoReadPtr((void * volatile *)ppvTypeChecked); \ 
+    pvTypeChecked; \ 
+  }) \ 
+#else \ 
+# define ASMAtomicUoReadPtrT(ppv, Type) \ 
+ (Type)ASMAtomicUoReadPtr((void RT_FAR * volatile RT_FAR *)(ppv)) \ 
+#endif \ 
+
+/** \ 
+ * Atomically reads a boolean value, ordered. \ 
+ * \ 
+ * @returns Current *pf value \ 
+ * @param   pf      Pointer to the boolean variable to read. \ 
+ */ \ 
+DECLINLINE(bool) ASMAtomicReadBool(volatile bool RT_FAR *pf) \ 
+{\ 
+    ASMMemoryFence(); \ 
+    return *pf; /* byte reads are atomic on x86 */ \ 
+} \ 
+
+/** \ 
+ * Atomically reads a boolean value, unordered. \ 
+ * \ 
+ * @returns Current *pf value \ 
+ * @param   pf      Pointer to the boolean variable to read. \ 
+ */ \ 
+DECLINLINE(bool) ASMAtomicUoReadBool(volatile bool RT_FAR *pf) \ 
+{\ 
+    return *pf; /* byte reads are atomic on x86 */ \ 
+} \ 
+
+/** \ 
+ * Atomically read a typical IPRT handle value, ordered. \ 
+ * \ 
+ * @param   ph      Pointer to the handle variable to read. \ 
+ * @param   phRes   Where to store the result. \ 
+ * \ 
+ * @remarks This doesn’t currently work for all handles (like RTFILE). \ 
+ */ \ 
+#if HC_ARCH_BITS == 32 || ARCH_BITS == 16 \ 
+# define ASMAtomicReadHandle(ph, phRes) \ 
+}
do {
  AssertCompile(sizeof(*ph) == sizeof(uint32_t));
  AssertCompile(sizeof(*phRes) == sizeof(uint32_t));
  *(uint32_t RT_FAR *)(phRes) = ASMAtomicReadU32((uint32_t volatile RT_FAR *)(ph));
} while (0)
#elif HC_ARCH_BITS == 64
#define ASMAtomicReadHandle(ph, phRes) 
do {
  AssertCompile(sizeof(*ph) == sizeof(uint64_t));
  AssertCompile(sizeof(*phRes) == sizeof(uint64_t));
  *(uint64_t RT_FAR *)(phRes) = ASMAtomicReadU64((uint64_t volatile RT_FAR *)(ph));
} while (0)
#else
#error HC_ARCH_BITS
#endif

/**
 * Atomically read a typical IPRT handle value, unordered.
 * @param   ph      Pointer to the handle variable to read.
 * @param   phRes   Where to store the result.
 * @remarks This doesn’t currently work for all handles (like RTFILE).
 */
#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
#define ASMAtomicUoReadHandle(ph, phRes) 
do {
  AssertCompile(sizeof(*ph) == sizeof(uint32_t));
  AssertCompile(sizeof(*phRes) == sizeof(uint32_t));
  *(uint32_t RT_FAR *)(phRes) = ASMAtomicUoReadU32((uint32_t volatile RT_FAR *)(ph));
} while (0)
#elif HC_ARCH_BITS == 64
#define ASMAtomicUoReadHandle(ph, phRes) 
do {
  AssertCompile(sizeof(*ph) == sizeof(uint64_t));
  AssertCompile(sizeof(*phRes) == sizeof(uint64_t));
  *(uint64_t RT_FAR *)(phRes) = ASMAtomicUoReadU64((uint64_t volatile RT_FAR *)(ph));
} while (0)
#else
#error HC_ARCH_BITS
#endif

/**
 * Atomically read a value which size might differ
 * between platforms or compilers, ordered.
 */
+ * @param   pu      Pointer to the variable to read.
+ * @param   puRes   Where to store the result.
+ */
+#define ASMAtomicReadSize(pu, puRes) \
    do { \
        switch (sizeof(*(pu))) { \
            case 1: *(uint8_t  RT_FAR *)(puRes) = ASMAtomicReadU8( (volatile uint8_t  RT_FAR *)(void RT_FAR *))(pu); break; \
            case 2: *(uint16_t RT_FAR *)(puRes) = ASMAtomicReadU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu)); break; \
            case 4: *(uint32_t RT_FAR *)(puRes) = ASMAtomicReadU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu)); break; \
            case 8: *(uint64_t RT_FAR *)(puRes) = ASMAtomicReadU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu)); break; \
            default: AssertMsgFailed("ASMAtomicReadSize: size %d is not supported\n", sizeof(*(pu))); \
        } \
    } while (0)

/**
 * Atomically read a value which size might differ
 * between platforms or compilers, unordered.
 *
 * @param   pu      Pointer to the variable to read.
 * @param   puRes   Where to store the result.
 */
+#define ASMAtomicUoReadSize(pu, puRes) \
    do { \
        switch (sizeof(*(pu))) { \
            case 1: *(uint8_t  RT_FAR *)(puRes) = ASMAtomicUoReadU8( (volatile uint8_t  RT_FAR *)(void RT_FAR *)(pu)); break; \
            case 2: *(uint16_t RT_FAR *)(puRes) = ASMAtomicUoReadU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu)); break; \
            case 4: *(uint32_t RT_FAR *)(puRes) = ASMAtomicUoReadU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu)); break; \
            case 8: *(uint64_t RT_FAR *)(puRes) = ASMAtomicUoReadU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu)); break; \
            default: AssertMsgFailed("ASMAtomicReadSize: size %d is not supported\n", sizeof(*(pu))); \
        } \
    } while (0)

/**
 * Atomically writes an unsigned 8-bit value, ordered.
 *
 * @param   pu8     Pointer to the 8-bit variable.
 * @param   u8      The 8-bit value to assign to *pu8.
 */
DECLINLINE(void) ASMAtomicWriteU8(volatile uint8_t RT_FAR *pu8, uint8_t u8)
{
    ASMAtomicXchgU8(pu8, u8);
}

/**
 * Atomically writes an unsigned 8-bit value, unordered.
 * @param   pu8     Pointer to the 8-bit variable.
 * @param   u8      The 8-bit value to assign to *pu8.
 */
DECLINLINE(void) ASMAtomicUoWriteU8(volatile uint8_t RT_FAR *pu8, uint8_t u8)
{
    *pu8 = u8; /* byte writes are atomic on x86 */
}

/**
 * Atomically writes a signed 8-bit value, ordered.
 * @param   pi8     Pointer to the 8-bit variable to read.
 * @param   i8      The 8-bit value to assign to *pi8.
 */
DECLINLINE(void) ASMAtomicWriteS8(volatile int8_t RT_FAR *pi8, int8_t i8)
{
    ASMAtomicXchgS8(pi8, i8);
}

/**
 * Atomically writes a signed 8-bit value, unordered.
 * @param   pi8     Pointer to the 8-bit variable to write.
 * @param   i8      The 8-bit value to assign to *pi8.
 */
DECLINLINE(void) ASMAtomicUoWriteS8(volatile int8_t RT_FAR *pi8, int8_t i8)
{
    *pi8 = i8; /* byte writes are atomic on x86 */
}

/**
 * Atomically writes an unsigned 16-bit value, ordered.
 * @param   pu16    Pointer to the 16-bit variable to write.
 * @param   u16     The 16-bit value to assign to *pu16.
 */
DECLINLINE (void) ASMAtomicWriteU16 (volatile uint16_t RT_FAR *pu16, uint16_t u16) {
    ASMAtomicXchgU16 (pu16, u16);
}

/*
 * Atomically writes an unsigned 16-bit value, unordered.
 *
 * @param   pu16    Pointer to the 16-bit variable to write.
 * @param   u16     The 16-bit value to assign to *pu16.
 */
DECLINLINE (void) ASMAtomicUoWriteU16 (volatile uint16_t RT_FAR *pu16, uint16_t u16) {
    Assert (!((uintptr_t)pu16 & 1));
    *pu16 = u16;
}

/*
 * Atomically writes a signed 16-bit value, ordered.
 *
 * @param   pi16    Pointer to the 16-bit variable to write.
 * @param   i16     The 16-bit value to assign to *pi16.
 */
DECLINLINE (void) ASMAtomicWriteS16 (volatile int16_t RT_FAR *pi16, int16_t i16) {
    ASMAtomicXchgS16 (pi16, i16);
}

/*
 * Atomically writes a signed 16-bit value, unordered.
 *
 * @param   pi16    Pointer to the 16-bit variable to write.
 * @param   i16     The 16-bit value to assign to *pi16.
 */
DECLINLINE (void) ASMAtomicUoWriteS16 (volatile int16_t RT_FAR *pi16, int16_t i16) {
    Assert (!((uintptr_t)pi16 & 1));
    *pi16 = i16;
}

/*
 * Atomically writes an unsigned 32-bit value, ordered.
 *
 * @param   pu32    Pointer to the 32-bit variable to write.
 * @param   u32     The 32-bit value to assign to *pu32.
 */
DECLINLINE (void) ASMAtomicWriteU32 (volatile uint32_t RT_FAR *pu32, uint32_t u32) {
    ASMAtomicXchgU32 (pu32, u32);
}

/*
 * Atomically writes a signed 32-bit value, ordered.
 *
 * @param   pi32    Pointer to the 32-bit variable to write.
 * @param   i32     The 32-bit value to assign to *pi32.
 */
DECLINLINE (void) ASMAtomicWriteS32 (volatile int32_t RT_FAR *pi32, int32_t i32) {
    ASMAtomicXchgS32 (pi32, i32);
}

/*
 * Atomically writes a signed 32-bit value, unordered.
 *
 * @param   pi32    Pointer to the 32-bit variable to write.
 * @param   i32     The 32-bit value to assign to *pi32.
 */
DECLINLINE (void) ASMAtomicUoWriteS32 (volatile int32_t RT_FAR *pi32, int32_t i32) {
    Assert (!((uintptr_t)pi32 & 1));
    *pi32 = i32;
}
+ * @param   u32     The 32-bit value to assign to *pu32.
+ */
+DECLINLINE(void) ASMAtomicWriteU32(volatile uint32_t RT_FAR *pu32, uint32_t u32)
+{
+    ASMAtomicXchgU32(pu32, u32);
+}
+
+/**
+ * Atomically writes an unsigned 32-bit value, unordered.
+ *
+ * @param   pu32    Pointer to the 32-bit variable to write.
+ * @param   u32     The 32-bit value to assign to *pu32.
+ */
+DECLINLINE(void) ASMAtomicUoWriteU32(volatile uint32_t RT_FAR *pu32, uint32_t u32)
+{
+    Assert(!((uintptr_t)pu32 & 3));
+    #if ARCH_BITS >= 32
+        *pu32 = u32;
+    #else
+        ASMAtomicXchgU32(pu32, u32);
+    #endif
+}
+
+/**
+ * Atomically writes a signed 32-bit value, ordered.
+ *
+ * @param   pi32    Pointer to the 32-bit variable to write.
+ * @param   i32     The 32-bit value to assign to *pi32.
+ */
+DECLINLINE(void) ASMAtomicWriteS32(volatile int32_t RT_FAR *pi32, int32_t i32)
+{
+    ASMAtomicXchgS32(pi32, i32);
+}
+
+/**
+ * Atomically writes a signed 32-bit value, unordered.
+ *
+ * @param   pi32    Pointer to the 32-bit variable to write.
+ * @param   i32     The 32-bit value to assign to *pi32.
+ */
+DECLINLINE(void) ASMAtomicUoWriteS32(volatile int32_t RT_FAR *pi32, int32_t i32)
+{
+    Assert(!((uintptr_t)pi32 & 3));
+    #if ARCH_BITS >= 32
+        *pi32 = i32;
+    #else
+        ASMAtomicXchgS32(pi32, i32);
+    #endif
+}
+###
+ * Atomically writes an unsigned 64-bit value, ordered.
+ *
+ * @param   pu64   Pointer to the 64-bit variable to write.
+ * @param   u64    The 64-bit value to assign to *pu64.
+ */
+DECLINLINE(void) ASMAtomicWriteU64(volatile uint64_t RT_FAR *pu64, uint64_t u64)
+{
+    ASMAtomicXchgU64(pu64, u64);
+}
+DECLINLINE(void) ASMAtomicUoWriteU64(volatile uint64_t RT_FAR *pu64, uint64_t u64)
+{
+    Assert(!((uintptr_t)pu64 & 7));
+    if (ARCH_BITS == 64)
+        *pu64 = u64;
+    else
+        ASMAtomicXchgU64(pu64, u64);
+}
+DECLINLINE(void) ASMAtomicWriteS64(volatile int64_t RT_FAR *pi64, int64_t i64)
+{
+    ASMAtomicXchgS64(pi64, i64);
+}
+DECLINLINE(void) ASMAtomicWriteS64(volatile int64_t RT_FAR *pi64, int64_t i64)
+{
+    ASMAtomicXchgS64(pi64, i64);
+}
**Atomically writes a signed 64-bit value, unordered.**

+ *
+ * @param   pi64  Pointer to the 64-bit variable to write.
+ * @param   i64   The 64-bit value to assign to *pi64.
+ */
+DECLINLINE(void) ASMAtomicUoWriteS64(volatile int64_t RT_FAR *pi64, int64_t i64)
+{
+    Assert(!((uintptr_t)pi64 & 7));
+    if ARCH_BITS == 64
+        *pi64 = i64;
+    else
+        ASMAtomicXchgS64(pi64, i64);
+}
+
/**
 * Atomically writes a size_t value, ordered.
 *
 * @returns nothing.
 * @param   pcb     Pointer to the size_t variable to write.
 * @param   cb      The value to assign to *pcb.
 * */
+DECLINLINE(void) ASMAtomicWriteZ(volatile size_t RT_FAR *pcb, size_t cb)
+{
+    if ARCH_BITS == 64
+        ASMAtomicWriteU64((uint64_t volatile *)pcb, cb);
+    elif ARCH_BITS == 32
+        ASMAtomicWriteU32((uint32_t volatile *)pcb, cb);
+    elif ARCH_BITS == 16
+        AssertCompileSize(size_t, 2);
+        ASMAtomicWriteU16((uint16_t volatile *)pcb, cb);
+    else
+        error "Unsupported ARCH_BITS value"
+}
+
/**
 * Atomically writes a boolean value, unordered.
 *
 * @param   pf      Pointer to the boolean variable to write.
 * @param   f       The boolean value to assign to *pf.
 * */
+DECLINLINE(void) ASMAtomicWriteBool(volatile bool RT_FAR *pf, bool f)
+{
+    ASMAtomicWriteU8((uint8_t volatile RT_FAR *)pf, f);
+}
/**
 * Atomically writes a boolean value, unordered.
 * 
 * @param   pf      Pointer to the boolean variable to write.
 * @param   f       The boolean value to assign to *pf.
 */
DECLINLINE(void) ASMAtomicUoWriteBool(volatile bool RT_FAR *pf, bool f)
{
    *pf = f;    /* byte writes are atomic on x86 */
}

/**
 * Atomically writes a pointer value, ordered.
 * 
 * @param   ppv     Pointer to the pointer variable to write.
 * @param   pv      The pointer value to assign to *ppv.
 */
DECLINLINE(void) ASMAtomicWritePtrVoid(void RT_FAR * volatile RT_FAR *ppv, const void *pv)
{
#if ARCH_BITS == 32 || ARCH_BITS == 16
    ASMAtomicWriteU32((volatile uint32_t RT_FAR *)(void RT_FAR *)ppv, (uint32_t)pv);
#elif ARCH_BITS == 64
    ASMAtomicWriteU64((volatile uint64_t RT_FAR *)(void RT_FAR *)ppv, (uint64_t)pv);
#else
#error "ARCH_BITS is bogus"
#endif
}

/**
 * Atomically writes a pointer value, ordered.
 * 
 * @param   ppv     Pointer to the pointer variable to write.
 * @param   pv      The pointer value to assign to *ppv. If NULL use
 *                  ASMAtomicWriteNullPtr or you'll land in trouble.
 * 
 * @remarks This is relatively type safe on GCC platforms when @a pv isn't
 *          NULL.
 */
#ifdef __GNUC__
#define ASMAtomicWritePtr(ppv, pv) \
    do \
    { \
        __typeof__(*(ppv)) volatile RT_FAR * const ppvTypeChecked = (ppv); \
        __typeof__(*(ppv))                   const pvTypeChecked  = (pv); \

#endif

#ifdef __GNUC__
#define ASMAtomicWritePtr(ppv, pv) \
    do \
    { \
        __typeof__(*(ppv)) volatile RT_FAR * const ppvTypeChecked = (ppv); \
        __typeof__(*(ppv))                   const pvTypeChecked  = (pv); \

#endif
+    AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *));
+    AssertCompile(sizeof(pv) == sizeof(void RT_FAR *));
+    Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) ));
+    
+    ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppvTypeChecked), (void RT_FAR *)((pvTypeChecked));
+    } while (0)
+#else
+    /* Define ASMAtomicWritePtr(pv, pv) */
+    do
+    {
+        AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *));
+        AssertCompile(sizeof(pv) == sizeof(void RT_FAR *));
+        Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) ));
+        
+        ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppvTypeChecked), (void RT_FAR *)(pv));
+    } while (0)
+#endif
+
+/**
+ * Atomically sets a pointer to NULL, ordered.
+ *
+ * @param   ppv     Pointer to the pointer variable that should be set to NULL.
+ *
+ * @remarks This is relatively type safe on GCC platforms.
+ */
+#ifdef __GNUC__
+    do
+    {
+        __typeof__(*(ppv)) * const ppvTypeChecked = (ppv);
+        AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *));
+        Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) ));
+        ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppvTypeChecked), NULL);
+    } while (0)
+#else
+    /* Define ASMAtomicWriteNullPtr(pv) */
+    do
+    { 
+        AssertCompile(sizeof(*ppv) == sizeof(void RT_FAR *));
+        Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) ));
+        ASMAtomicWritePtrVoid((void RT_FAR * volatile RT_FAR *)(ppvTypeChecked), NULL);
+    } while (0)
+#endif
+*/
+
/** 
 * Atomically writes a pointer value, unordered. 
 * 
 * @returns Current *pv value 
 * @param   ppv     Pointer to the pointer variable. 
 * @param   pv      The pointer value to assign to *ppv. If NULL use 
 *                  ASMAtomicUoWriteNullPtr or you'll land in trouble. 
 * 
 * @remarks This is relatively type safe on GCC platforms when @a pv isn't 
 *          NULL. 
 */
#define ASMAtomicUoWritePtr(ppv, pv) \
+    do \
+    { \
+      __typeof__(*(ppv)) volatile * const ppvTypeChecked = (ppv); \
+      __typeof__(*(ppv))            const pvTypeChecked  = (pv); \
+      \
+      AssertCompile(sizeof(*ppv) == sizeof(void *)); \
+      AssertCompile(sizeof(pv) == sizeof(void *)); \
+      Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
+      \
+      *(ppvTypeChecked) = pvTypeChecked; \
+    } while (0)
#define ASMAtomicUoWriteNullPtr(ppv) \
+    do \
+    { \
+      __typeof__(*(ppv)) volatile * const ppvTypeChecked = (ppv); \
+      __typeof__(*(ppv))            const pvTypeChecked  = (pv); \
+      \
+      AssertCompile(sizeof(*ppv) == sizeof(void *)); \
+      AssertCompile(sizeof(pv) == sizeof(void *)); \
+      Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
+      \
+      *(ppvTypeChecked) = pvTypeChecked; \
+    } while (0)
#endif 

/*
 * Atomically sets a pointer to NULL, unordered.
 * 
 * @param   ppv     Pointer to the pointer variable that should be set to NULL.
 * 
 * @remarks This is relatively type safe on GCC platforms.
 */
#define ASMAtomicUoWriteNullPtr(ppv) \
+    do \
+    { \
+      __typeof__(*(ppv)) volatile * const ppvTypeChecked = (ppv); \
+      __typeof__(*(ppv))            const pvTypeChecked  = (pv); \
+      \
+      AssertCompile(sizeof(*ppv) == sizeof(void *)); \
+      AssertCompile(sizeof(pv) == sizeof(void *)); \
+      Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) )); \
+      \
+      *(ppvTypeChecked) = pvTypeChecked; \
+    } while (0)
#endif
AssertCompile(sizeof(*ppv) == sizeof(void *));
Assert(!( (uintptr_t)ppv & ((ARCH_BITS / 8) - 1) ));
*(ppvTypeChecked) = NULL;
} while (0)
#endif
+
+
+/**
+ * Atomically write a typical IPRT handle value, ordered.
+ *
+ * @param   ph      Pointer to the variable to update.
+ * @param   hNew    The value to assign to *ph.
+ *
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ */
+#if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+# define ASMAAtomicWriteHandle(ph, hNew) 
+ do { 
+   AssertCompile(sizeof(*ph) == sizeof(uint32_t));
+   ASMAAtomicWriteU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)(hNew));
+ } while (0)
+#elif HC_ARCH_BITS == 64
+# define ASMAAtomicWriteHandle(ph, hNew) 
+ do { 
+   AssertCompile(sizeof(*ph) == sizeof(uint64_t));
+   ASMAAtomicWriteU64((uint64_t volatile RT_FAR *)(ph), (const uint64_t)(hNew));
+ } while (0)
+#else
+# error HC_ARCH_BITS
+#endif
+/**
+ * Atomically write a typical IPRT handle value, unordered.
+ *
+ * @param   ph      Pointer to the variable to update.
+ * @param   hNew    The value to assign to *ph.
+ *
+ * @remarks This doesn't currently work for all handles (like RTFILE).
+ */
+if HC_ARCH_BITS == 32 || ARCH_BITS == 16
+define ASMAtomicUoWriteHandle(ph, hNew) \
+ do { \n+ AssertCompile(sizeof(*ph) == sizeof(uint32_t)); \n+ ASMAtomicUoWriteU32((uint32_t volatile RT_FAR *)(ph), (const uint32_t)hNew); \n+ } while (0)
+elif HC_ARCH_BITS == 64
+define ASMAtomicUoWriteHandle(ph, hNew) \
+ do { \n+ AssertCompile(sizeof(*ph) == sizeof(uint64_t)); \n+ ASMAtomicUoWriteU64((uint64_t volatile RT_FAR *)(ph), (const uint64_t)hNew); \n+ } while (0)
+else
+error HC_ARCH_BITS
+endif
+
+/**
+ * Atomically write a value which size might differ
+ * between platforms or compilers, ordered.
+ *
+ * @param   pu      Pointer to the variable to update.
+ * @param   uNew    The value to assign to *pu.
+ */
+#define ASMAtomicWriteSize(pu, uNew) \
+ do { \n+    switch (sizeof(*pu)) { \n+        case 1: ASMAtomicWriteU8( (volatile uint8_t RT_FAR *)(void RT_FAR *)(pu), (uint8_t )(uNew)); break; \n+        case 2: ASMAtomicWriteU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); break; \n+        case 4: ASMAtomicWriteU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; \n+        case 8: ASMAtomicWriteU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; \n+        default: AssertMsgFailed("ASMAtomicWriteSize: size %d is not supported\n", sizeof(*pu))); \n+    } \n+ } while (0)
+
+/**
+ * Atomically write a value which size might differ
+ * between platforms or compilers, unordered.
+ *
+ * @param   pu      Pointer to the variable to update.
+ * @param   uNew    The value to assign to *pu.
+ */
+#define ASMAtomicUoWriteSize(pu, uNew) \
+ do { \
+    switch (sizeof(*pu)) { \
+        case 1: ASMAtomicUoWriteU8( (volatile uint8_t RT_FAR *)(void RT_FAR *)(pu), (uint8_t )(uNew)); break; \
+        case 2: ASMAtomicUoWriteU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); break; \
+        case 4: ASMAtomicUoWriteU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; \
+        case 8: ASMAtomicUoWriteU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; \
+        default: AssertMsgFailed("ASMAtomicUoWriteSize: size %d is not supported\n", sizeof(*pu))); \
+    } \
+ } while (0)
+
switch (sizeof(*(pu))) { \\
    case 1: ASMAtomicUoWriteU8((volatile uint8_t RT_FAR *)(void RT_FAR *)(pu), (uint8_t)(uNew)); break; \\
    case 2: ASMAtomicUoWriteU16((volatile uint16_t RT_FAR *)(void RT_FAR *)(pu), (uint16_t)(uNew)); break; \\
    case 4: ASMAtomicUoWriteU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; \\
    case 8: ASMAtomicUoWriteU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; \\
    default: AssertMsgFailed("ASMAtomicWriteSize: size %d is not supported\n", sizeof(*pu)); \}
+ } \}
+ } while (0)
+
+
+/**
+ * Atomically exchanges and adds to a 16-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param   pu16        Pointer to the value.
+ * @param   u16         Number to add.
+ *
+ * @remarks Currently not implemented, just to make 16-bit code happy.
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLASM(uint16_t) ASMAtomicAddU16(uint16_t volatile RT_FAR *pu16, uint32_t u16);
+
+
+/**
+ * Atomically exchanges and adds to a 32-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param   pu32        Pointer to the value.
+ * @param   u32         Number to add.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMAtomicAddU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
+#else
+DECLINLINE(uint32_t) ASMAtomicAddU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
+{
+  # if RT_INLINE_ASM_USES_INTRIN
+    u32 = _InterlockedExchangeAdd((long RT_FAR *)pu32, u32);
+    return u32;
+  
+  #elif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("lock; xaddl %0, %1\lt"
+)}
/**
 * Atomically exchanges and adds to a signed 32-bit value, ordered.
 *
 * @returns The old value.
 * @param   pi32        Pointer to the value.
 * @param   i32         Number to add.
 *
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(int32_t) ASMAtomicAddS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    return (int32_t)ASMAtomicAddU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)i32);
}

/**
 * Atomically exchanges and adds to a 64-bit value, ordered.
 *
 * @returns The old value.
 * @param   pu64        Pointer to the value.
 * @param   u64         Number to add.
 *
 * @remarks x86: Requires a Pentium or later.
 */
+/**
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint64_t) ASMAtomicAddU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
+#else
+DECLINLINE(uint64_t) ASMAtomicAddU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
+{
+  if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
+    u64 = _InterlockedExchangeAdd64(_int64 RT_FAR *)pu64, u64);
+  return u64;
+  else
+    uint64_t u64Old;
+    for (; ;)
+      {
+        uint64_t u64New;
+        u64Old = ASMAtomicUoReadU64(pu64);
+        u64New = u64Old + u64;
+        if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
+          break;
+        ASMNopPause();
+      }
+      return u64Old;
+  #endif
+  #endif
+
+  /**
+  * Atomically exchanges and adds to a signed 64-bit value, ordered.
+  *
+  * @returns The old value.
+  * @param pi64 Pointer to the value.
+  * @param i64 Number to add.
+  * @remark x86: Requires a Pentium or later.
+  */
+DECLINLINE(int64_t) ASMAtomicAddS64(int64_t volatile RT_FAR *pi64, int64_t i64)
+{
+  return (int64_t)ASMAtomicAddU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)i64);
+}
Atomically exchanges and adds to a size_t value, ordered.

@returns The old value.
@param pcb Pointer to the size_t value.
@param cb Number to add.

DECLINLINE(size_t) ASMAtomicAddZ(size_t volatile RT_FAR *pcb, size_t cb)
{
#if ARCH_BITS == 64
    AssertCompileSize(size_t, 8);
    return ASMAtomicAddU64((uint64_t volatile RT_FAR *)pcb, cb);
#elif ARCH_BITS == 32
    AssertCompileSize(size_t, 4);
    return ASMAtomicAddU32((uint32_t volatile RT_FAR *)pcb, cb);
#elif ARCH_BITS == 16
    AssertCompileSize(size_t, 2);
    return ASMAtomicAddU16((uint16_t volatile RT_FAR *)pcb, cb);
#else
    #error "Unsupported ARCH_BITS value"
#endif
}

Atomically exchanges and adds a value which size might differ between platforms or compilers, ordered.

@param pu Pointer to the variable to update.
@param uNew The value to add to *pu.
@param puOld Where to store the old value.

#define ASMAtomicAddSize(pu, uNew, puOld) \
    do { \
        switch (sizeof(*pu)) { \
        case 4: *(uint32_t  *)(puOld) = ASMAtomicAddU32((volatile uint32_t RT_FAR *)(void RT_FAR *)(pu), (uint32_t)(uNew)); break; \
        case 8: *(uint64_t  *)(puOld) = ASMAtomicAddU64((volatile uint64_t RT_FAR *)(void RT_FAR *)(pu), (uint64_t)(uNew)); break; \
        default: AssertMsgFailed("ASMAtomicAddSize: size %d is not supported\n", sizeof(*pu))); \ 
        } \ 
    while (0)

+ * Atomically exchanges and subtracts to an unsigned 16-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param pu16 Pointer to the value.
+ * @param u16 Number to subtract.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
DECLINLINE(uint16_t) ASMAtomicSubU16(uint16_t volatile RT_FAR *pu16, uint32_t u16)
{
    return ASMAtomicAddU16(pu16, (uint16_t)-(int16_t)u16);
}

+ * Atomically exchanges and subtracts to a signed 16-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param pi16 Pointer to the value.
+ * @param i16 Number to subtract.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
DECLINLINE(int16_t) ASMAtomicSubS16(int16_t volatile RT_FAR *pi16, int16_t i16)
{
    return (int16_t)ASMAtomicAddU16((uint16_t volatile RT_FAR *)pi16, (uint16_t)-i16);
}

+ * Atomically exchanges and subtracts to an unsigned 32-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param pu32 Pointer to the value.
+ * @param u32 Number to subtract.
+ *
+ * @returns The old value.
+ * @param pi32 Pointer to the value.
+ * @param i32 Number to subtract.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(int32_t) ASMAtomicSubS32(int32_t volatile RT_FAR *pi32, int32_t i32)
+{
+    return (int32_t)ASMAtomicAddU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)-i32);
+}
+
+ /*
+ * Atomically exchanges and subtracts to an unsigned 64-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param pu64 Pointer to the value.
+ * @param u64 Number to subtract.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(uint64_t) ASMAtomicSubU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
+{
+    return ASMAtomicAddU64(pu64, (uint64_t)-(int64_t)u64);
+}
+
+ /*
+ * Atomically exchanges and subtracts to a signed 64-bit value, ordered.
+ *
+ * @returns The old value.
+ * @param pi64 Pointer to the value.
+ * @param i64 Number to subtract.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(int64_t) ASMAtomicSubS64(int64_t volatile RT_FAR *pi64, int64_t i64)
+{
+    return (int64_t)ASMAtomicAddU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)-i64);
+}
+
+ /*
+ * Atomically exchanges and subtracts to a size_t value, ordered.
+ *
+ * @returns The old value.
+ * @param pcb Pointer to the size_t value.
+ * @param cb Number to subtract.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(size_t) ASMAtomicSubZ(size_t volatile RT_FAR *pcb, size_t cb)
+{
+    +#if ARCH_BITS == 64
+        return ASMAtomicSubU64((uint64_t volatile RT_FAR *)pcb, cb);
+    +#elif ARCH_BITS == 32
+        return ASMAtomicSubU32((uint32_t volatile RT_FAR *)pcb, cb);
+    +#elif ARCH_BITS == 16
+        AssertCompileSize(size_t, 2);
+        return ASMAtomicSubU16((uint16_t volatile RT_FAR *)pcb, cb);
+    +#else
+        +# error "Unsupported ARCH_BITS value"
+    +#endif
+}
+
+/**
+ * Atomically exchanges and subtracts a value which size might differ between
+ * platforms or compilers, ordered.
+ *
+ * @param   pu      Pointer to the variable to update.
+ * @param   uNew    The value to subtract to *pu.
+ * @param   puOld   Where to store the old value.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#define ASMAtomicSubSize(pu, uNew, puOld)  
+    do { 
+        switch (sizeof(*(pu))) { 
+            case 4: *(uint32_t RT_FAR *)(puOld) = ASMAtomicSubU32((volatile uint32_t RT_FAR *)(void
+                    RT_FAR *)(pu), (uint32_t)(uNew)); break; 
+            case 8: *(uint64_t RT_FAR *)(puOld) = ASMAtomicSubU64((volatile uint64_t RT_FAR *)(void
+                    RT_FAR *)(pu), (uint64_t)(uNew)); break; 
+            default: AssertMsgFailed("ASMAtomicSubSize: size %d is not supported\n", sizeof(*(pu)))); 
+        } 
+    } while (0)
+
+/**
+ * Atomically increment a 16-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pu16        Pointer to the value to increment.
+ * @remarks Not implemented. Just to make 16-bit code happy.
+ *
+ * @remarks x86: Requires a 486 or later.

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DECLASM(uint16_t) ASMAtomicIncU16(uint16_t volatile RT_FAR *pu16);

/**
 * Atomically increment a 32-bit value, ordered.
 *
 * @returns The new value.
 * @param   pu32        Pointer to the value to increment.
 *
 * @remarks x86: Requires a 486 or later.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMAtomicIncU32(uint32_t volatile RT_FAR *pu32);
#else
DECLINLINE(uint32_t) ASMAtomicIncU32(uint32_t volatile RT_FAR *pu32)
{
    uint32_t u32;
    #if RT_INLINE_ASM_USES_INTRIN
    u32 = _InterlockedIncrement((long RT_FAR *)pu32);
    return u32;
    #elif RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("lock; xaddl %0, %1\n\t"
                         : "=r" (u32),
                           "=m" (*pu32)
                         : "0" (1),
                           "m" (*pu32)
                         : "memory");
    return u32+1;
    #else
    __asm
    {
        mov     eax, 1
        #ifdef RT_ARCH_AMD64
        mov     rdx, [pu32]
        lock xadd [rdx], eax
        #else
        mov     edx, [pu32]
        lock xadd [edx], eax
        #endif
        mov     [pu32], [eax]
    }
    return u32+1;
    #endif
}
#endif
/**
 * Atomically increment a signed 32-bit value, ordered.
 * @returns The new value.
 * @param   pi32  Pointer to the value to increment.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(int32_t) ASMAtomicIncS32(int32_t volatile RT_FAR *pi32) {
    return (int32_t)ASMAtomicIncU32((uint32_t volatile RT_FAR *)pi32);
}

/**
 * Atomically increment a 64-bit value, ordered.
 * @returns The new value.
 * @param   pu64  Pointer to the value to increment.
 * @remarks x86: Requires a Pentium or later.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint64_t) ASMAtomicIncU64(uint64_t volatile RT_FAR *pu64);
#else
DECLINLINE(uint64_t) ASMAtomicIncU64(uint64_t volatile RT_FAR *pu64) {
#if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
    uint64_t u64;
    u64 = _InterlockedIncrement64((__int64 RT_FAR *)pu64);
    return u64;
#else
    return ASMAtomicAddU64(pu64, 1) + 1;
#endif
}
#endif
/**
 * Atomically increment a signed 64-bit value, ordered.
 * @returns The new value.
 * @param   pi64        Pointer to the value to increment.
 * @remarks x86: Requires a Pentium or later.
 */
DECLINLINE(int64_t) ASMAtomicIncS64(int64_t volatile RT_FAR *pi64)
{
    return (int64_t)ASMAtomicIncU64((uint64_t volatile RT_FAR *)pi64);
}

/**
 * Atomically increment a size_t value, ordered.
 * @returns The new value.
 * @param   pcb         Pointer to the value to increment.
 * @remarks x86: Requires a 486 or later.
 */
DECLINLINE(int64_t) ASMAtomicIncZ(size_t volatile RT_FAR *pcb)
{
#if ARCH_BITS == 64
    return ASMAtomicIncU64((uint64_t volatile RT_FAR *)pcb);
#elif ARCH_BITS == 32
    return ASMAtomicIncU32((uint32_t volatile RT_FAR *)pcb);
#elif ARCH_BITS == 16
    return ASMAtomicIncU16((uint16_t volatile RT_FAR *)pcb);
#else
# error "Unsupported ARCH_BITS value"
#endif
}

/**
 * Atomically decrement an unsigned 32-bit value, ordered.
 * @returns The new value.
 * @param   pu16        Pointer to the value to decrement.
 * @remarks Not implemented. Just to make 16-bit code happy.
 * @remarks x86: Requires a 486 or later.
 */
DECLASM(uint32_t) ASMAtomicDecU16(uint16_t volatile RT_FAR *pu16);
+/**
+ * Atomically decrement an unsigned 32-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pu32        Pointer to the value to decrement.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint32_t) ASMAtomicDecU32(uint32_t volatile RT_FAR *pu32);
+#else
+DECLINLINE(uint32_t) ASMAtomicDecU32(uint32_t volatile RT_FAR *pu32)
+{
+    uint32_t u32;
+# if RT_INLINE_ASM_USES_INTRIN
+    u32 = _InterlockedDecrement((long RT_FAR *)pu32);
+    return u32;
+    
+    #elif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__ ("lock; xaddl %0, %1\n\t"
+                          : "=r" (u32),
+                          : "=m" (*pu32)
+                          : "0" (-1),
+                          : "m" (*pu32)
+                          : "memory");
+    return u32-1;
+    
+    #else
+    __asm__
+    {;
+        mov     eax, -1
+#ifdef RT_ARCH_AMD64
+        mov     rdx, [pu32]
+        lock xadd [rdx], eax
+#else
+        mov     edx, [pu32]
+        lock xadd [edx], eax
+#endif
+        mov     u32, eax
+    }
+    return u32-1;
+#endif
+}
+#endif
+/**
+ * Atomically decrement an unsigned 32-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pi32   Pointer to the value to decrement.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(int32_t) ASMAtomicDecS32(int32_t volatile RT_FAR *pi32)
+{
+    return (int32_t)ASMAtomicDecU32((uint32_t volatile RT_FAR *)pi32);
+
+/**
+ * Atomically decrement an unsigned 64-bit value, ordered.
+ *
+ * @returns The new value.
+ * @param   pu64   Pointer to the value to decrement.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(uint64_t) ASMAtomicDecU64(uint64_t volatile RT_FAR *pu64);
+#else
+DECLINLINE(uint64_t) ASMAtomicDecU64(uint64_t volatile RT_FAR *pu64)
+{
+    #if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
+        uint64_t u64 = _InterlockedDecrement64((__int64 volatile RT_FAR *)pu64);
+        return u64;
+    #elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
+        uint64_t u64;
+        __asm__ __volatile__("lock; xaddq %q0, %l\n\n"
+                    : "=r" (u64),
+                    "=m" (*pu64)
+                    : "0" (~(*uint64_t)0),
+                    "m" (*pu64)
+                    : "memory");
+        return u64-1;
+    #else
+        return ASMAtomicAddU64(pu64, UINT64_MAX) - 1;
+    #endif
+}  
+}
+#endif
+**
+ * Atomically decrement a signed 64-bit value, ordered.
+ * @returns The new value.
+ * @param   pi64 Pointer to the value to decrement.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(int64_t) ASMAtomicDecS64(int64_t volatile RT_FAR *pi64) +{
+   return (int64_t)ASMAtomicDecU64((uint64_t volatile RT_FAR *)pi64);
+}
+
+/**
+ * Atomically decrement a size_t value, ordered.
+ *
+ * @returns The new value.
+ * @param   pcb Pointer to the value to decrement.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+DECLINLINE(int64_t) ASMAtomicDecZ(size_t volatile RT_FAR *pcb) +{
+   #if ARCH_BITS == 64
+      return ASMAtomicDecU64((uint64_t volatile RT_FAR *)pcb);
+   #elif ARCH_BITS == 32
+      return ASMAtomicDecU32((uint32_t volatile RT_FAR *)pcb);
+   #elif ARCH_BITS == 16
+      return ASMAtomicDecU16((uint16_t volatile RT_FAR *)pcb);
+   #else
+      #error "Unsupported ARCH_BITS value"
+   #endif
+}
+
+/**
+ * Atomically Or an unsigned 32-bit value, ordered.
+ *
+ * @param   pu32   Pointer to the pointer variable to OR u32 with.
+ * @param   u32    The value to OR *pu32 with.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL &amp; !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMAtomicOrU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
+#else
+DECLINLINE(void) ASMAtomicOrU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
+{*
+   #if RT_INLINE_ASM_USES_INTRIN
# InterlockedOr

```c
+ _InterlockedOr((long volatile RT_FAR *)pu32, (long)u32);
+
+# elif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("lock; orl %1, %0\n\n"
+        : "=m" (*pu32)
+        : "ir" (u32),
+            "m" (*pu32));
+# else
+    __asm
+    {
+        mov     eax, [u32]
+        mov     rdx, [pu32]
+        lock    or [rdx], eax
+    }\n
+# endif
+
+/**
+ * Atomically Or a signed 32-bit value, ordered.
+ *
+ * @param   pi32   Pointer to the pointer variable to OR u32 with.
+ * @param   i32    The value to OR *pu32 with.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+DECLINLINE(void) ASMAtomicOrS32(int32_t volatile RT_FAR *pi32, int32_t i32)
+{
+    ASMAtomicOrU32((uint32_t volatile RT_FAR *)pi32, i32);
+
+/**
+ * Atomically Or an unsigned 64-bit value, ordered.
+ *
+ * @param   pu64   Pointer to the pointer variable to OR u64 with.
+ * @param   u64    The value to OR *pu64 with.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMAtomicOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
```
DECLINLINE(void) ASMAtomicOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
{
    #if RT_INLINE_ASM_USESINTRIN && defined(RT_ARCH_AMD64)
        _InterlockedOr64((__int64 volatile RT_FAR *)pu64, (__int64)u64);
    #elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
        __asm__ __volatile__("lock; orq %1, %q0\n	" : "=m" (*pu64)
                             : "r" (u64),
                               "m" (*pu64));
    #else
        for (;;)
        {
            uint64_t u64Old = ASMAtomicUoReadU64(pu64);
            uint64_t u64New = u64Old | u64;
            if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
                break;
            ASMNopPause();
        }
    #endif
}

DECLINLINE(void) ASMAtomicOrS64(int64_t volatile RT_FAR *pi64, int64_t i64)
{
    ASMAtomicOrU64((uint64_t volatile RT_FAR *)pi64, i64);
}

DECLINLINE(void) ASMAtomicAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
{
    #if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
        for (;;)
        {
            uint32_t u32Old = ASMAtomicUoReadU32(pu32);
            uint32_t u32New = u32Old & u32;
            if (ASMAtomicCmpXchgU32(pu32, u32New, u32Old))
                break;
            ASMNopPause();
        }
    #endif
}

DECLINLINE(void) ASMAtomicAndS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    ASMAtomicAndU32((uint32_t volatile RT_FAR *)pi32, i32);
}

DECLASM(void) ASMAtomicAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
#else
DECLINLINE(void) ASMAtomicAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
{
    #if RT_INLINE_ASM_USES_INTRIN
        _InterlockedAnd((long volatile RT_FAR *)pu32, u32);
    
    #elif RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("lock; andl %1, %0\n	"
            : "=m" (*pu32)
            : "ir" (u32),
               "m" (*pu32));
    
    #else
        __asm
        {
            mov     eax, [u32]
        # ifdef RT_ARCH_AMD64
            mov     rdx, [pu32]
            lock and [rdx], eax
        # else
            mov     edx, [pu32]
            lock and [edx], eax
        # endif
        }
    
    #endif
}
#endif

/**
 * Atomically And a signed 32-bit value, ordered.
 *
 * @param   pi32   Pointer to the pointer variable to AND i32 with.
 * @param   i32    The value to AND *pi32 with.
 *
 * @remarks x86: Requires a 386 or later.
 */
DECLINLINE(void) ASMAtomicAndS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    ASMAtomicAndU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)i32);
}

/**
 * Atomically And an unsigned 64-bit value, ordered.
 *
 * @param   pu64   Pointer to the pointer variable to AND u64 with.
 * @param   u64    The value to AND *pu64 with.
 */
+ * @remarks x86: Requires a Pentium or later.
+ */
+ 
+ if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMAtomicAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
+ else
+DECLINLINE(void) ASMAtomicAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
+ {
+ if RT_INLINE_ASM_USES_INTRIN && defined(RT_ARCH_AMD64)
+    _InterlockedAnd64((__int64 volatile RT_FAR *)pu64, u64);
+ else
+    for (;;)
+    {
+        uint64_t u64Old = ASMAtomicUoReadU64(pu64);
+        uint64_t u64New = u64Old & u64;
+        if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
+            break;
+        ASMNopPause();
+    }
+} 
+ endif
+}
+ endif
+ 
+ /**
+ * Atomically And a signed 64-bit value, ordered.
+ *
+ * @param   pi64   Pointer to the pointer variable to AND i64 with.
+ * @param   i64    The value to AND *pi64 with.
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(void) ASMAtomicAndS64(int64_t volatile RT_FAR *pi64, int64_t i64)
+ {
+    ASMAtomicAndU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)i64);
+}
+ 
+ /**
+ * Atomically OR an unsigned 32-bit value, unordered but interrupt safe.
+ *
+ * @param   pu32   Pointer to the pointer variable to OR u32 with.
/* @param   u32   The value to OR *pu32 with.

*/
#endif
#else
DECLINLINE(void) ASMAtomicUoOrU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
{
    #if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("orl %1, %0
                          : "=m" (*pu32)
                          : "ir" (u32),
                             "m" (*pu32));
    #else
        __asm
        {
            mov     eax, [u32]
            ifdef RT_ARCH_AMD64
                mov     rdx, [pu32]
                or      [rdx], eax
            else
                mov     edx, [pu32]
                or      [edx], eax
            endif
        }
    #endif
}
#endif

/**
 * Atomically OR a signed 32-bit value, unordered.
 *
 * @param   pi32   Pointer to the pointer variable to OR u32 with.
 * @param   i32    The value to OR *pu32 with.
 *
 * @remarks x86: Requires a 386 or later.
 */
DECLINLINE(void) ASMAtomicUoOrS32(int32_t volatile RT_FAR *pi32, int32_t i32)
{
    ASMAtomicUoOrU32((uint32_t volatile RT_FAR *)pi32, i32);
}

/**
 * Atomically OR an unsigned 64-bit value, unordered.
 *
 */
@param pu64 Pointer to the pointer variable to OR u64 with.
+ * @param u64 The value to OR *pu64 with.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+ 
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMAtomicUoOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
+#else
+DECLINLINE(void) ASMAtomicUoOrU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
+{
+  
+ if RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
+    __asm__ __volatile__("orq %1, %q0\n\t"
+                        : "=m" (*pu64)
+                        : "r" (u64),
+                          "m" (*pu64));
+  
+ else
+  
+ for (;;) 
+  {
+    uint64_t u64Old = ASMAtomicUoReadU64(pu64);
+    uint64_t u64New = u64Old | u64;
+    if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
+      break;
+    ASMNopPause();
+  }
+  
+}
+#elif RT_INLINE_ASM_EXTERNAL
+}
+ 
+/**
+ * Atomically Or a signed 64-bit value, unordered.
+ * @param pi64 Pointer to the pointer variable to OR i64 with.
+ * @param i64 The value to OR *pi64 with.
+ *
+ * @remarks x86: Requires a Pentium or later.
+ */
+DECLINLINE(void) ASMAtomicUoOrS64(int64_t volatile RT_FAR *pi64, int64_t i64)
+{
+  ASMAtomicUoOrU64((uint64_t volatile RT_FAR *)pi64, i64);
+}
+ 
+/**
+ * Atomically And an unsigned 32-bit value, unordered.
+ * @param pu32 Pointer to the pointer variable to AND u32 with.
+ * @param u32 The value to AND *pu32 with.
+ */
+ * @remx86: Requires a 386 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMAtomicUoAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32);
+#else
+DECLINLINE(void) ASMAtomicUoAndU32(uint32_t volatile RT_FAR *pu32, uint32_t u32)
+
+  __asm__ __volatile__("andl %1, %0\n\n")
+    : "m" (*pu32)
+    : "ir" (u32),
+    "m" (*pu32));
+#else
+  ASMAtomicUoAndU32((uint32_t volatile RT_FAR *)pi32, (uint32_t)i32);
+
+  __asm__ __volatile__("andl %1, %0\n\n")
+    : "m" (*pu32)
+    : "ir" (u32),
+    "m" (*pu32));
+
+#endif
+ * @param u64 The value to AND *pu64 with.
+ *
+ * @remark x86: Requires a Pentium or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMAtomicUoAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64);
+#else
+DECLINLINE(void) ASMAtomicUoAndU64(uint64_t volatile RT_FAR *pu64, uint64_t u64)
+{
+  #if RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
+    __asm__ __volatile__("andq %1, %0\n\t"
+                        : "=m" (*pu64)
+                        : "r" (u64),
+                        "m" (*pu64));
+  #else
+    for (;;)
+    {
+      uint64_t u64Old = ASMAtomicUoReadU64(pu64);
+      uint64_t u64New = u64Old & u64;
+      if (ASMAtomicCmpXchgU64(pu64, u64New, u64Old))
+        break;
+      ASMNopPause();
+    }
+  }
+  #endif
+  #endif
+
+/**
+ * Atomically And a signed 64-bit value, unordered.
+ *
+ * @param pi64 Pointer to the pointer variable to AND i64 with.
+ * @param i64 The value to AND *pi64 with.
+ *
+ * @remark x86: Requires a Pentium or later.
+ */
+#DECLINLINE(void) ASMAtomicUoAndS64(int64_t volatile RT_FAR *pi64, int64_t i64)
+{
+  ASMAtomicUoAndU64((uint64_t volatile RT_FAR *)pi64, (uint64_t)i64);
+}
+
+/**
+ * Atomically increment an unsigned 32-bit value, unordered.
+ *
+ * @returns the new value.
+ * @param pu32 Pointer to the variable to increment.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+ +#if RT_INLINE_ASM_EXTERNAL
+ #DECLASM(uint32_t) ASMAtomicUoIncU32(uint32_t volatile RT_FAR *pu32);
+ +#else
+ #DECLINLINE(uint32_t) ASMAtomicUoIncU32(uint32_t volatile RT_FAR *pu32)
+ +
+ + uint32_t u32;
+ +# if RT_INLINE_ASM_GNU_STYLE
+ + __asm__ __volatile__("xadd %0, %1\n"
+ + : "=r" (u32),
+ + "=m" (*pu32)
+ + : "0" (1),
+ + "m" (*pu32)
+ + : "memory");
+ + return u32 + 1;
+ +# else
+ + __asm
+ + {
+ + mov eax, 1
+ +# ifdef RT_ARCH_AMD64
+ + mov rdx, [pu32]
+ + xadd [rdx], eax
+ +# else
+ + mov edx, [pu32]
+ + xadd [edx], eax
+ +# endif
+ + mov u32, eax
+ + }
+ + return u32 + 1;
+ +# endif
+ +}
+ +#endif
+
+ +/**
+ * Atomically decrement an unsigned 32-bit value, unordered.
+ *
+ * @returns the new value.
+ * @param   pu32   Pointer to the variable to decrement.
+ *
+ * @remarks x86: Requires a 486 or later.
+ */
+ +#if RT_INLINE_ASM_EXTERNAL
+ #DECLASM(uint32_t) ASMAtomicUoDecU32(uint32_t volatile RT_FAR *pu32);
+ +#else
+ #DECLINLINE(uint32_t) ASMAtomicUoDecU32(uint32_t volatile RT_FAR *pu32)
+ +
+ +
```c
+ uint32_t u32;
+# if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("lock; xaddl %0, %1\n"
+ : "=r" (u32),
+ "=m" (*pu32)
+ : "0" (-1),
+ "m" (*pu32)
+ : "memory");
+ return u32 - 1;
+# else
+ __asm
+ {
+ mov eax, -1
+# ifdef RT_ARCH_AMD64
+ mov rdx, [pu32]
+ xadd [rdx], eax
+# else
+ mov edx, [pu32]
+ xadd [edx], eax
+# endif
+ mov u32, eax
+ }
+ return u32 - 1;
+# endif
+}
+#endif
+
+/** @def RT_ASM_PAGE_SIZE
+ * We try avoid dragging in iprt/param.h here.
+ * @internal
+ */
+/* We try avoid dragging in iprt/param.h here.
+ * @internal
+ */
+ ifdef RT_ARCH_SPARC64
+ define RT_ASM_PAGE_SIZE 0x2000
+ ifdef(PAGE_SIZE) && !defined(NT_INCLUDED)
+ if PAGE_SIZE != 0x2000
+ error "PAGE_SIZE is not 0x2000!"
+ endif
+ endif
+#else
+ define RT_ASM_PAGE_SIZE 0x1000
+ ifdef(PAGE_SIZE) && !defined(NT_INCLUDED)
+ if PAGE_SIZE != 0x1000
+ error "PAGE_SIZE is not 0x1000!"
+ endif
+ endif
+#endif
+*/
```
/**
 * Zeros a 4K memory page.
 *
 * @param pv Pointer to the memory block. This must be page aligned.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMMemZeroPage(volatile void RT_FAR *pv);
#else
DECLINLINE(void) ASMMemZeroPage(volatile void RT_FAR *pv)
{
#if RT_INLINE_ASM_USES_INTRIN
#if RT_ARCH_AMD64
    __stosq((unsigned __int64 *)pv, 0, RT_ASM_PAGE_SIZE / 8);
#else
    __stosd((unsigned long *)pv, 0, RT_ASM_PAGE_SIZE / 4);
#endif
#elif RT_INLINE_ASM_GNU_STYLE
    RTCCUINTREG uDummy;
#if RT_ARCH_AMD64
    __asm__ __volatile__("rep stosq"
                       : "=D" (pv),
                       "=c" (uDummy)
                       : "0" (pv),
                       "c" (RT_ASM_PAGE_SIZE >> 3),
                       "a" (0)
                       : "memory");
#else
    __asm__ __volatile__("rep stosl"
                       : "=D" (pv),
                       "=c" (uDummy)
                       : "0" (pv),
                       "c" (RT_ASM_PAGE_SIZE >> 2),
                       "a" (0)
                       : "memory");
#endif
#else
    __asm
    {
#if RT_ARCH_AMD64
        xor     rax, rax
        mov     ecx, 0200h
        mov     rdi, [pv]
        rep     stosq
#else
        xor     eax, eax
        mov     ecx, 0400h
        mov     edi, [pv]
+ rep stosd
+## endif
+}
+## endif
+
+/**
+ * Zeros a memory block with a 32-bit aligned size.
+ *
+ * @param   pv  Pointer to the memory block.
+ * @param   cb  Number of bytes in the block. This MUST be aligned on 32-bit!
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMMemZero32(volatile void RT_FAR *pv, size_t cb);
+else
+DECLINLINE(void) ASMMemZero32(volatile void RT_FAR *pv, size_t cb)
+{
+## if RT_INLINE_ASM_USES_INTRIN
+## ifdef RT_ARCH_AMD64
+ if (!((cb & 7))
+ __stosq((unsigned __int64 RT_FAR *)pv, 0, cb / 8);
+ else
+## endif
+ __stosd((unsigned long RT_FAR *)pv, 0, cb / 4);
+
+## elif RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("rep stosl"
+ : "=D" (pv),
+ "=c" (cb)
+ : "0" (pv),
+ "1" (cb >> 2),
+ "a" (0)
+ : "memory");
+## else asm
+ { 
+ xor eax, eax
+## ifdef RT_ARCH_AMD64
+ mov rcx, [cb]
+ shr rcx, 2
+ mov rdi, [pv]
+## else
+ mov ecx, [cb]
+ shr ecx, 2
+ mov edi, [pv]
+## endif
+    rep stosd
+  }
+}  
+#endif
+}
+endif
+
+/**
+ * Fills a memory block with a 32-bit aligned size.
+ *
+ * @param   pv  Pointer to the memory block.
+ * @param   cb  Number of bytes in the block. This MUST be aligned on 32-bit!
+ * @param   u32 The value to fill with.
+ */
+if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMMemFill32(void *pv, size_t cb, uint32_t u32);
+} else
DECLINLINE(void) ASMMemFill32(void *pv, size_t cb, uint32_t u32)
+{
+    __stosq((unsigned __int64 RT_FAR *)pv, RT_MAKE_U64(u32, u32), cb / 8);
+} else
+    __stosd((unsigned long RT_FAR *)pv, u32, cb / 4);
+
+__asm__ __volatile__("rep stosl"
+    : "=D" (pv),
+      : "c" (cb)
+    : "0" (pv),
+      : "1" (cb >> 2),
+      : "a" (u32)
+    : "memory");
+} else
+    __asm
+    {
+        mov     rcx, [cb]
+        shr     rcx, 2
+        mov     rdi, [pv]
+    }
+    __asm__ __volatile__("rep stosl"
+        : "=D" (pv),
+          : "c" (cb)
+        : "0" (pv),
+          : "1" (cb >> 2),
+          : "a" (u32)
+        : "memory");
+} else
+    __asm
+    {
+        mov     ecx, [cb]
+        shr     ecx, 2
+        mov     edi, [pv]
+    }  
+endif
+    mov     eax, [u32]
/**
 * Checks if a memory block is all zeros.
 * @returns Pointer to the first non-zero byte.
 * @returns NULL if all zero.
 *
 * @param   pv  Pointer to the memory block.
 * @param   cb  Number of bytes in the block.
 *
 * @todo Fix name, it is a predicate function but it's not returning boolean!
 * @*/
#if !defined(RDESKTOP) && (!defined(RT_OS_LINUX) || !defined(__KERNEL__))
DECLASM(void RT_FAR *) ASMMemFirstNonZero(void const RT_FAR *pv, size_t cb);
#else
DECLINLINE(void RT_FAR *) ASMMemFirstNonZero(void const RT_FAR *pv, size_t cb)
{
    uint8_t const *pb = (uint8_t const RT_FAR *)pv;
    for (; cb; cb--, pb++)
        if (RT_LIKELY(*pb == 0))
            { /* likely */ }
        else
            return (void RT_FAR *)pb;
    return NULL;
}
#endif

/**
 * Checks if a memory block is all zeros.
 * @returns true if zero, false if not.
 *
 * @param   pv  Pointer to the memory block.
 * @param   cb  Number of bytes in the block.
 *
 * @sa      ASMMemFirstNonZero
 */
DECLINLINE(bool) ASMMemIsZero(void const RT_FAR *pv, size_t cb)
{
    return ASMMemFirstNonZero(pv, cb) == NULL;
}
/**
 * Checks if a memory page is all zeros.
 * @returns true / false.
 * @param   pvPage      Pointer to the page. Must be aligned on 16 byte boundary
 */
DECLINLINE(bool) ASMMemIsZeroPage(void const RT_FAR *pvPage)
{
#if 0 /*RT_INLINE_ASM_GNU_STYLE - this is actually slower... */
    union { RTCCUINTREG r; bool f; } uAX;
    RTCCUINTREG xCX, xDI;
   Assert(!((uintptr_t)pvPage & 15));
    __asm__ __volatile__("repe; 
#  ifdef RT_ARCH_AMD64
                         "scasq
	"#  else
                         "scasl
	"#  endif
                         "setnc %al
	": "=&c" (xCX),
                       "=&D" (xDI),
                       "=&a" (uAX.r)
               : "mr" (pvPage),
#  ifdef RT_ARCH_AMD64
               "0" (RT_ASM_PAGE_SIZE/8),
#  else
               "0" (RT_ASM_PAGE_SIZE/4),
#  endif
               "1" (pvPage),
               "2" (0));
    return uAX.f;
#else
   uintptr_t const RT_FAR *puPtr = (uintptr_t const RT_FAR *)pvPage;
   size_t                  cLeft = RT_ASM_PAGE_SIZE / sizeof(uintptr_t) / 8;
   Assert(!((uintptr_t)pvPage & 15));
   for (;;)
   {
       if (puPtr[0])        return false;
       if (puPtr[4])        return false;
       if (puPtr[2])        return false;
       if (puPtr[6])        return false;
       if (puPtr[1])        return false;
   }
#endif
}
if (puPtr[5]) return false;
+
if (puPtr[3]) return false;
+
if (puPtr[7]) return false;
+
if (!--cLeft)
    return true;
+
puPtr += 8;
+
#endif
+
/**
 * Checks if a memory block is filled with the specified byte, returning the
 * first mismatch.
 *
 * This is sort of an inverted memchr.
 *
 * @returns Pointer to the byte which doesn't equal u8.
 * @returns NULL if all equal to u8.
 *
 * @param pv Pointer to the memory block.
 * @param cb Number of bytes in the block.
 * @param u8 The value it's supposed to be filled with.
 *
 * @remarks No alignment requirements.
 *
 */
+#if (!defined(RT_OS_LINUX) || !defined(__KERNEL__)) \
+    && (!defined(RT_OS_FREEBSD) || !defined(_KERNEL))
+DECLASM(void *) ASMMemFirstMismatchingU8(void const RT_FAR *pv, size_t cb, uint8_t u8);
+#else
+DECLINLINE(void *) ASMMemFirstMismatchingU8(void const RT_FAR *pv, size_t cb, uint8_t u8)
+{
+    uint8_t const *pb = (uint8_t const RT_FAR *)pv;
+    for (; cb; cb--, pb++)
+        if (RT_LIKELY(*pb == u8))
+        { /* likely */
+            else
+                return (void *)pb;
+        return NULL;
+    }
+#endif
+
*/
* Checks if a memory block is filled with the specified byte.
@returns true if all matching, false if not.
+ *
+ @returns Pointer to the memory block.
+ @param pv
+ @param cb Number of bytes in the block.
+ @param u8 The value it's supposed to be filled with.
+ *
+ @returns Pointer to the first value which doesn't equal u32.
+ @returns NULL if all equal to u32.
+ *
+ @param pv
+ @param cb Number of bytes in the block. This MUST be aligned on 32-bit!
+ @param u32 The value it's supposed to be filled with.
+ */
+DECLINLINE(uint32_t RT_FAR *) ASMMemFirstMismatchingU32(void const RT_FAR *pv, size_t cb, uint32_t u32)
+{    uint32_t const RT_FAR *pu32 = (uint32_t const RT_FAR *)pv;
+    for (; cb; cb -= 4, pu32++)
+        if (RT_LIKELY(*pu32 == u32))
+            return (uint32_t RT_FAR *)pu32;
+        else
+            return NULL;
+}    return NULL;
+}    return NULL;
+/**
+ * Probes a byte pointer for read access.
+ */
+ * While the function will not fault if the byte is not read accessible,
+ * the idea is to do this in a safe place like before acquiring locks
+ * and such like.
+ * Also, this functions guarantees that an eager compiler is not going
+ * to optimize the probing away.
+ *
+ * @param pvByte Pointer to the byte.
+ */
+ if RT_INLINE_ASM_EXTERNAL
+ DECLASM(uint8_t) ASMProbeReadByte(const void RT_FAR *pvByte);
+ else
+ DECLINLINE(uint8_t) ASMProbeReadByte(const void RT_FAR *pvByte)
+ {
+ /*@todo verify that the compiler actually doesn't optimize this away. (intel & gcc) */
+ uint8_t u8;
+ if RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("movb (%1), %0
+ 	": "r" (u8)
+ 	: "r" (pvByte));
+ else
+ __asm
+ {
+ #ifdef RT_ARCH_AMD64
+ mov     rax, [pvByte]
+ mov     al, [rax]
+ #else
+ mov     eax, [pvByte]
+ mov     al, [eax]
+ #endif
+ mov     [u8], al
+ }
+ return u8;
+ }
+ #endif
+ /*
+ * Probes a buffer for read access page by page.
+ *
+ * While the function will fault if the buffer is not fully read
+ * accessible, the idea is to do this in a safe place like before
+ * acquiring locks and such like.
+ *
+ * Also, this functions guarantees that an eager compiler is not going
+ * to optimize the probing away.
+ *
+ * @param pvBuf Pointer to the buffer.
+ * @param cbBuf The size of the buffer in bytes. Must be >= 1.
+ */
+ DECLINLINE(void) ASMProbeReadBuffer(const void RT_FAR *pvBuf, size_t cbBuf)
+ {
+ /*@todo verify that the compiler actually doesn't optimize this away. (intel & gcc) */
+ /* the first byte */
+ const uint8_t RT_FAR *pu8 = (const uint8_t RT_FAR *)pvBuf;
+ ASMProbeReadByte(pu8);
+
+ /* the pages in between pages. */
+ while (cbBuf > RT_ASM_PAGE_SIZE)
+ {
+    ASMProbeReadByte(pu8);
+    cbBuf -= RT_ASM_PAGE_SIZE;
+    pu8 += RT_ASM_PAGE_SIZE;
+ }
+
+ /* the last byte */
+ ASMProbeReadByte(pu8 + cbBuf - 1);
+}
+
+/** @defgroup grp_inline_bits   Bit Operations
+ * @}
+ */
+
+/**
+ * Sets a bit in a bitmap.
+ *
+ * @param   pvBitmap    Pointer to the bitmap. This should be 32-bit aligned.
+ * @param   iBit        The bit to set.
+ *
+ * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ *          However, doing so will yield better performance as well as avoiding
+ *          traps accessing the last bits in the bitmap.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(void) ASMBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
#else
DECLINLINE(void) ASMBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit)
{
#if RT_INLINE_ASM_USES_INTRIN
    _bittestandset((long RT_FAR *)pvBitmap, iBit);
#else
    __asm__ __volatile__("btsl %1, %0"
                           : "=m" (*(volatile long RT_FAR *)pvBitmap)
                           : "Ir" (iBit),
                           "m" (*(volatile long RT_FAR *)pvBitmap)
                           : "memory");
#else

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+ __asm
+ {
"ifdef RT_ARCH_AMD64
  mov rax, [pvBitmap]
  mov edx, [iBit]
  bts [rax], edx
"else
  mov eax, [pvBitmap]
  mov edx, [iBit]
  bts [eax], edx
"endif
"endif

+ * Atomically sets a bit in a bitmap, ordered.
+ *
+ * @param   pvBitmap    Pointer to the bitmap. Must be 32-bit aligned, otherwise
+ * the memory access isn't atomic!
+ * @param   iBit        The bit to set.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+"ifdef RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMAtomicBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
+"else
+DECLINLINE(void) ASMAtomicBitSet(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
  AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+  _interlockedbittestandset((long RT_FAR *)pvBitmap, iBit);
+  "if RT_INLINE_ASM_USES_INTRIN
+    _interlockedbittestandset((long RT_FAR *)pvBitmap, iBit);
+  "else
+    __asm
+      {"ifdef RT_ARCH_AMD64
        mov rax, [pvBitmap]
        mov edx, [iBit]
        lock bts [rax], edx
"else
        mov eax, [pvBitmap]
        mov edx, [iBit]
        lock bts [eax], edx
"endif
+    }
**Clears a bit in a bitmap.**

+ @param pvBitmap Pointer to the bitmap.
+ @param iBit The bit to clear.

+ @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ However, doing so will yield better performance as well as avoiding
+ traps accessing the last bits in the bitmap.
+ */

+ if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(void) ASMBitClear(void *pvBitmap, int32_t iBit);
+ if RT_INLINE_ASM_USES_INTRIN
+ _bittestandreset((long *)pvBitmap, iBit);
+ else
+ __asm__ __volatile__("btrl %1, %0"
+ : "=m" (*volatile long RT_FAR *)pvBitmap
+ : "Ir" (iBit),
+ "m" (*volatile long RT_FAR *)pvBitmap
+ : "memory");
+ else
+ __asm
+ {
+ if RT_ARCH_AMD64
+ mov rax, [pvBitmap]
+ mov edx, [iBit]
+ btr [rax], edx
+ else
+ mov eax, [pvBitmap]
+ mov edx, [iBit]
+ btr [eax], edx
+ else
+ mov eax, [pvBitmap]
+ mov edx, [iBit]
+ btr [eax], edx
+ endif
+ }
+ endif
/**
 * Atomically clears a bit in a bitmap, ordered.
 *
 * @param   pvBitmap    Pointer to the bitmap. Must be 32-bit aligned, otherwise
 *                      the memory access isn't atomic!
 * @param   iBit        The bit to toggle set.
 *
 * @remarks No memory barrier, take care on smp.
 * @remarks x86: Requires a 386 or later.
 */

/**
 * Toggles a bit in a bitmap.
 *
 * @param   pvBitmap    Pointer to the bitmap.
 */
+ * @param iBit The bit to toggle.
+ *
+ * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ * However, doing so will yield better performance as well as avoiding
+ * traps accessing the last bits in the bitmap.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(void) ASMBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(void) ASMBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+  if RT_INLINE_ASM_USES_INTRIN
+    __bittestandcomplement((long RT_FAR *)pvBitmap, iBit);
+  elseif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("btcl %1, %0"
+      : "+m" (*(volatile long *)pvBitmap)
+      : "Ir" (iBit),
+          "m" (*(volatile long *)pvBitmap)
+      : "memory");
+  #else
+    __asm
+    {
+      ifdef RT_ARCH_AMD64
+        mov rax, [pvBitmap]
+        mov edx, [iBit]
+        btc [rax], edx
+      else
+        mov eax, [pvBitmap]
+        mov edx, [iBit]
+        btc [eax], edx
+      endif
+    }
+  endif
+}
+endif
+
+/*
+ * Atomically toggles a bit in a bitmap, ordered.
+ *
+ * @param pvBitmap Pointer to the bitmap. Must be 32-bit aligned, otherwise
+ * the memory access isn't atomic!
+ * @param iBit The bit to test and set.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL
+DECLASM(void) ASMAtomicBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);
+}
+DECLINLINE(void) ASMAtomicBitToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+    AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
+#if RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__('"lock; btcl %1, %0"
+        : "m" (*((volatile long RT_FAR *)pvBitmap)
+        : "Ir" (iBit),
+        "m" (*((volatile long RT_FAR *)pvBitmap)
+        : "memory");
+# else
+    __asm
+    {
+        mov     rax, [pvBitmap]
+        mov     edx, [iBit]
+        lockbtc [rax], edx
+    }
+# endif
+}
+}
+}
+
+/**
+ * Tests and sets a bit in a bitmap.
+ *
+ * @returns true if the bit was set.
+ * @returns false if the bit was clear.
+ *
+ * @param   pvBitmap    Pointer to the bitmap.
+ * @param   iBit        The bit to test and set.
+ *
+ * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ *          However, doing so will yield better performance as well as avoiding
+ *          traps accessing the last bits in the bitmap.
+ */
+*if RT_INLINE_ASM_EXTERNAL &!RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(bool) ASMBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit)
+{
+    union { bool f; uint32_t u32; uint8_t u8; } rc;
+# if RT_INLINE_ASM_USES_INTRIN
rc.u8 = _bittestandset((long RT_FAR *)pvBitmap, iBit);
+
+# elif RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__("btsl %2, %1\n\t" "setc %b0\n\t" "andl $1, %0\n\t"
+ : "=q" (rc.u32),
+ : "Ir" (iBit),
+ : "memory");
+# else
+ __asm
+ {
+   mov edx, [iBit]
+   ifdef RT_ARCH_AMD64
+     mov rax, [pvBitmap]
+     bts [rax], edx
+   else
+     mov eax, [pvBitmap]
+     bts [eax], edx
+   endif
+   setc al
+   and eax, 1
+   mov [rc.u32], eax
+ }
+# endif
+ return rc.f;
+}  
+#endif
+
+/**
+ * Atomically tests and sets a bit in a bitmap, ordered.
+ *
+ * @returns true if the bit was set.
+ * @returns false if the bit was clear.
+ *
+ * @param pvBitmap   Pointer to the bitmap. Must be 32-bit aligned, otherwise
+ * the memory access isn't atomic!
+ * @param iBit      The bit to set.
+ *
+ * @remarks x86: Requires a 386 or later.
+ */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMAtomicBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(bool) ASMAtomicBitTestAndSet(volatile void RT_FAR *pvBitmap, int32_t iBit)
union { bool f; uint32_t u32; uint8_t u8; } rc;

AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));

# if RT_INLINE_ASM_USES_INTRIN
    rc.u8 = _interlockedbittestandset((long RT_FAR *)pvBitmap, iBit);
# elif RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("lock; btsl %2, %1\n"
                         "setc %b0\n"
                         "andl $1, %0\n"
                         : "=q" (rc.u32),
                         : "Ir" (iBit),
                         : "memory");
# else
    __asm
    {
        mov     edx, [iBit]
        mov     eax, [pvBitmap]
        lock bts [eax], edx
    }
    mov     eax, [pvBitmap]
    lock bts [eax], edx
}

# endif

    return rc.f;

#endif

/**
 * Tests and clears a bit in a bitmap.
 *
 * @returns true if the bit was set.
 * @returns false if the bit was clear.
 *
 * @param   pvBitmap    Pointer to the bitmap.
 * @param   iBit        The bit to test and clear.
 *
 * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
 * However, doing so will yield better performance as well as avoiding
 * traps accessing the last bits in the bitmap.
 */
+#if RT_INLINE_ASMEXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(bool) ASMBitTestAndClear(volatile void RT_FAR *pvBitmap, int32_t iBit);
+#else
+DECLINLINE(bool) ASMBitTestAndClear(volatile void RT_FAR *pvBitmap, int32_t iBit)
+
+    union { bool f; uint32_t u32; uint8_t u8; } rc;
+    #if RT_INLINE_ASM_USES_INTRIN
+    rc.u8 = _bittestandreset((long RT_FAR *)pvBitmap, iBit);
+    
+    #elif RT_INLINE_ASM_GNU_STYLE
+    __asm__ __volatile__("btrl %2, %1\n
	"setc %b0\n
	"andl $1, %0\n
    : "=q" (rc.u32),
+    
+    "=m" (*volatile long RT_FAR *)pvBitmap)
+    
+    : "Ir" (iBit),
+    
+    "m" (*volatile long RT_FAR *)pvBitmap)
+    
+    : "memory");
+    
+    #endif
+    }
+    return rc.f;
+endif
+
+/**
+  * Atomically tests and clears a bit in a bitmap, ordered.
+  *
+  * @returns true if the bit was set.
+  *
+  * @returns false if the bit was clear.
+  *
+  * @param   pvBitmap    Pointer to the bitmap. Must be 32-bit aligned, otherwise
+  *
+  * the memory access isn't atomic!
+  *
+  * @param   iBit        The bit to test and clear.
+ * @remarks No memory barrier, take care on smp.
+ * @remarks x86: Requires a 386 or later.
+ */
+ 
+ if RT_INLINE_ASM_EXTERNAL &amp;&amp; !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(bool) ASMAtomicBitTestAndClear(void RT_FAR *pvBitmap, int32_t iBit);
+ 
+ DECLINLINE(bool) ASMAtomicBitTestAndClear(void RT_FAR *pvBitmap, int32_t iBit)
+ {
+ union { bool f; uint32_t u32; uint8_t u8; } rc;
+ AssertMsg(!((uintptr_t)pvBitmap &amp; 3), ("address %p not 32-bit aligned", pvBitmap));
+ 
+ if RT_INLINE_ASM_USES_INTRIN
+ rc.u8 = _interlockedbittestandreset((long RT_FAR *)pvBitmap, iBit);
+ 
+ endif RT_INLINE_ASM_GNU_STYLE
+ __asm__ __volatile__ ("lock; btrl %2, %1
	" setc %b0
	"andl $1, %0"
	: =q (rc.u32),
	: =m (*pvBitmap)
	: Ir (iBit),
	: m (*pvBitmap)
	: memory");
+ 
+ endif RT_INLINE_ASM_AMD64
+ mov rax, [pvBitmap]
+ lock btr [rax], edx
+ 
+ mov eax, [pvBitmap]
+ lock btr [eax], edx
+ 
+ setc al
+ and eax, 1
+ mov [rc.u32], eax
+ 
+ return rc.f;
+
+ endif

+ Tests and toggles a bit in a bitmap.
+ 
+ @returns true if the bit was set.
+ * @returns false if the bit was clear.
+ *
+ * @param pvBitmap Pointer to the bitmap.
+ * @param iBit The bit to test and toggle.
+ *
+ * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
+ * However, doing so will yield better performance as well as avoiding
+ * traps accessing the last bits in the bitmap.
+ */
 +#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+ DECLASM(bool) ASMBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);
+ +#else
+ DECLINLINE(bool) ASMBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
+ {
+    union { bool f; uint32_t u32; uint8_t u8; } rc;
+    if RT_INLINE_ASM_USES_INTRIN
+        rc.u8 = _bittestandcomplement((long RT_FAR *)pvBitmap, iBit);
+    +
+    +#else
+    +#elif RT_INLINE_ASM_GNU_STYLE
+        __asm__ __volatile__("btcl %2, %1
	"  
                         "setc %b0\nlt"
+            "andl $1, %0\nlt"
+            : "q" (rc.u32),
+            : "Ir" (iBit),
+            : "memory");
+    +#endif
+    return rc.f;
+}
/**
 * Atomically tests and toggles a bit in a bitmap, ordered.
 * @returns true if the bit was set.
 * @returns false if the bit was clear.
 * @param pvBitmap Pointer to the bitmap. Must be 32-bit aligned, otherwise
 * the memory access isn't atomic!
 * @param iBit The bit to test and toggle.
 * @remarks x86: Requires a 386 or later.
 */

#if RT_INLINE_ASM_EXTERNAL
DECLASM(bool) ASMAtomicBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit);
#else
DECLINLINE(bool) ASMAtomicBitTestAndToggle(volatile void RT_FAR *pvBitmap, int32_t iBit)
{
    union { bool f; uint32_t u32; uint8_t u8; } rc;
    AssertMsg(!((uintptr_t)pvBitmap & 3), ("address %p not 32-bit aligned", pvBitmap));
    #if RT_INLINE_ASM_GNU_STYLE
    __asm__ __volatile__("lock; btcl %2, %1
	" 
                         "setc %b0\n\t"
                         "andl $1, %0\n\t"
                         : "=q" (rc.u32),
                           "=m" (*(volatile long RT_FAR *)pvBitmap)
                         : "Ir" (iBit),
                           "m" *(volatile long RT_FAR *)pvBitmap
                         : "memory");
    #else
    __asm
    {
        mov     edx, [iBit]
        #ifdef RT_ARCH_AMD64
        mov     rax, [pvBitmap]
        lock btc [rax], edx
        #else
        mov     eax, [pvBitmap]
        lock btc [eax], edx
        #endif
    }
    setc    al
    and     eax, 1
    mov     [rc.u32], eax
    
    return rc.f;
}
#endif

/**
 * Tests if a bit in a bitmap is set.
 *
 * @returns true if the bit is set.
 * @returns false if the bit is clear.
 *
 * @param pvBitmap Pointer to the bitmap.
 * @param iBit The bit to test.
 *
 * @remarks The 32-bit aligning of pvBitmap is not a strict requirement.
 *          However, doing so will yield better performance as well as avoiding
 *          traps accessing the last bits in the bitmap.
 */

#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(bool) ASMBitTest(const volatile void RT_FAR *pvBitmap, int32_t iBit);
#else
DECLINLINE(bool) ASMBitTest(const volatile void RT_FAR *pvBitmap, int32_t iBit)
{
    union { bool f; uint32_t u32; uint8_t u8; } rc;
#if RT_INLINE_ASM_USES_INTRIN
    rc.u32 = _bittest((long *)pvBitmap, iBit);
#elif RT_INLINE_ASM_GNU_STYLE

    __asm__ __volatile__("btl %2, %1
	" setc %b0
	"andl $1, %0
	: "=q" (rc.u32)
	: "m" (*(const volatile long RT_FAR *)pvBitmap),
	"Ir" (iBit)
	: "memory");
#else
    __asm
    {
        mov   edx, [iBit]
#ifdef RT_ARCH_AMD64
        mov   rax, [pvBitmap]
        bt    [rax], edx
#else
        mov   eax, [pvBitmap]
        bt    [eax], edx
#endif
    }
    setc   al
    and    eax, 1
    mov    [rc.u32], eax
}
#endif
    return rc.f;
/**
 * Clears a bit range within a bitmap.
 */
+#ifdef
+
+/**
+ * @param   pvBitmap    Pointer to the bitmap.
+ * @param   iBitStart   The first bit to clear.
+ * @param   iBitEnd     The first bit not to clear.
+ */
+DECLINLINE(void) ASMBitClearRange(void RT_FAR *pvBitmap, int32_t iBitStart, int32_t iBitEnd)
+{
+    if (iBitStart < iBitEnd)
+    {
+        volatile uint32_t RT_FAR *pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitStart >> 5);
+        int32_t iStart = iBitStart & ~31;
+        int32_t iEnd   = iBitEnd & ~31;
+        if (iStart == iEnd)
+            *pu32 &= ((UINT32_C(1) << (iBitStart & 31)) - 1) | ~((UINT32_C(1) << (iBitEnd & 31)) - 1);
+        else
+        {
+            /* bits in first dword. */
+            if (iBitStart & 31)
+            {
+                *pu32 &= (UINT32_C(1) << (iBitStart & 31)) - 1;
+                pu32++;
+                iBitStart = iStart + 32;
+            }
+            /* whole dword. */
+            if (iBitStart != iEnd)
+                ASMMemZero32(pu32, (iEnd - iBitStart) >> 3);
+            /* bits in last dword. */
+            if (iBitEnd & 31)
+            {
+                pu32 = (volatile uint32_t *)pvBitmap + (iBitEnd >> 5);
+                *pu32 &= ~(UINT32_C(1) << (iBitEnd & 31)) - 1);
+            }
+        }
+    }
+}
+/**
 * Sets a bit range within a bitmap.
 */
+ * @param   pvBitmap    Pointer to the bitmap.
+ * @param   iBitStart   The first bit to set.
+ * @param   iBitEnd     The first bit not to set.
+ */
+DECLINLINE(void) ASMBitSetRange(volatile void RT_FAR *pvBitmap, int32_t iBitStart, int32_t iBitEnd)
+
+ if (iBitStart < iBitEnd)
+ {
+    volatile uint32_t RT_FAR *pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitStart >> 5);
+    int32_t iStart = iBitStart & ~31;
+    int32_t iEnd   = iBitEnd & ~31;
+    if (iStart == iEnd)
+        *pu32 |= ((UINT32_C(1) << (iBitEnd - iBitStart)) - 1) << (iBitStart & 31);
+    else
+        {
+            /* bits in first dword. */
+            if (iBitStart & 31)
+                {
+                    *pu32 |= (UINT32_C(1) << (iBitStart & 31)) - 1;
+                    pu32++;
+                    iBitStart = iStart + 32;
+                }
+            /* whole dword. */
+            if (iBitStart != iEnd)
+                ASMMemFill32(pu32, (iEnd - iBitStart) >> 3, ~UINT32_C(0));
+            /* bits in last dword. */
+            if (iBitEnd & 31)
+                {
+                    pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitEnd >> 5);
+                    *pu32 |= (UINT32_C(1) << (iBitEnd & 31)) - 1;
+                }
+        }
+
+    /* whole dword. */
+    if (iBitStart != iEnd)
+        ASMMemFill32(pu32, (iEnd - iBitStart) >> 3, ~UINT32_C(0));
+
+    /* bits in last dword. */
+    if (iBitEnd & 31)
+    {
+        pu32 = (volatile uint32_t RT_FAR *)pvBitmap + (iBitEnd >> 5);
+        *pu32 |= (UINT32_C(1) << (iBitEnd & 31)) - 1;
+    }
+
+    }
+DECLINLINE(int32_t) ASMBitFirstClear(const volatile void RT_FAR *pvBitmap, uint32_t cBits)
+{
+    if (cBits)
+    {
+        int32_t iBit;
+        RTCCUINTREG uEAX, uECX, uEDI;
+        cBits = RT_ALIGN_32(cBits, 32);
+        ___asm___ __volatile__("repe; scasl\n"
+            "je \n"
+       ="# if RT_INLINE_ASM_GNU_STYLE
+            RTCCUINTREG uEAX, uECX, uEDI;
+            cBits = RT_ALIGN_32(cBits, 32);
+            ___asm___ __volatile__("repe; scasl\n"
+                "je \n"
+       ="# ifdef RT_ARCH_AMD64
+                "lea -4(%rdi), %rdi\n"
+                "xorl (%rdi), %eax\n"
+                "subq %5, %rdi\n"
+       ="# else
+                "lea -4(%edi), %edi\n"
+                "xorl (%edi), %eax\n"
+                "subl %5, %edi\n"
+       ="# endif
+                "shll $3, %edi\n"
+                "bsfl %eax, %edx\n"
+                "addl %edi, %edx\n"
+                "1: \n"
+                : "=d" (iBit),
+                "+=c" (uECX),
+                "+=D" (uEDI),
+                "+=a" (uEAX)
+                : "0" (0xffffffff),
+                "mr" (pvBitmap),
+                "1" (cBits >> 5),
+                "2" (pvBitmap),
+                "3" (0xffffffff);
+       ="# else
+            cBits = RT_ALIGN_32(cBits, 32);
+            ___asm
+            {
+       ="# ifdef RT_ARCH_AMD64
+            mov rdi, [pvBitmap]
+            mov rbx, rdi
+       ="# else
+            mov edi, [pvBitmap]
+            mov ebx, edi
+       ="# endif
+            mov edx, 0xffffffff
+            mov eax, edx
+            mov ecx, [cBits]
+            shr ecx, 5
```c
    +       repe scasd
    +       je    done
    +
    +#  ifdef RT_ARCH_AMD64
    +       lea    rdi, [rdi - 4]
    +       xor    eax, [rdi]
    +       sub    rdi, rbx
    +#  else
    +       lea    edi, [edi - 4]
    +       xor    eax, [edi]
    +       sub    edi, ebx
    +#  endif
    +       shl    edi, 3
    +       bsf    edx, eax
    +       add    edx, edi
    +       done:
    +       mov    [iBit], edx
    +   }
    +#  endif
    +       return iBit;
    +   }
    +   return -1;
    +}
    +#endif
    +
    +/**
    + * Finds the next clear bit in a bitmap.
    + *
    + * @returns Index of the first zero bit.
    + * @returns -1 if no clear bit was found.
    + * @param   pvBitmap    Pointer to the bitmap.
    + * @param   cBits       The number of bits in the bitmap. Multiple of 32.
    + * @param   iBitPrev    The bit returned from the last search.
    + *                      The search will start at iBitPrev + 1.
    + */
    +#if RT_INLINE_ASM_EXTERNAL
    +DECLASM(int) ASMBitNextClear(const volatile void RT_FAR *pvBitmap, uint32_t cBits, uint32_t iBitPrev);
    +#else
    +DECLINLINE(int) ASMBitNextClear(const volatile void RT_FAR *pvBitmap, uint32_t cBits, uint32_t iBitPrev)
    +{
    +    const volatile uint32_t RT_FAR *pau32Bitmap = (const volatile uint32_t RT_FAR *)pvBitmap;
    +    int                             iBit = ++iBitPrev & 31;
    +    if (iBit)
    +    {
    +        /*
    +         * Inspect the 32-bit word containing the unaligned bit.
    +        */
    +```
```c
    #if RT_INLINE_ASM_USES_INTRIN
        unsigned long ulBit = 0;
        if (_BitScanForward(&ulBit, u32))
            return ulBit + iBitPrev;
    #else
    #  if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__(
            "bsf %1, %0\n"
            "jnz 1f\n"
            "movl $-1, %0\n"  
            "1:\n"
            : "=r" (iBit)
            : "r" (u32));
    #  else
        __asm
        {
            mov     edx, [u32]
            bsf     eax, edx
            jnz     done
            mov     eax, 0xffffffff
        done:
            mov     [iBit], eax
        }
    #  endif
        if (iBit >= 0)
            return iBit + iBitPrev;
    #endif

    /*
     * Skip ahead and see if there is anything left to search.
     */
    + iBitPrev |= 31;
    + iBitPrev++;
    if (cBits <= (uint32_t)iBitPrev)
        return -1;

    /*
     * 32-bit aligned search, let ASMBitFirstClear do the dirty work.
     */
    + iBit = ASMBitFirstClear(&pau32Bitmap[iBitPrev / 32], cBits - iBitPrev);
    + if (iBit >= 0)
        iBit += iBitPrev;
    return iBit;
```
/**
 * Finds the first set bit in a bitmap.
 */

/* @returns Index of the first set bit. */
/* @returns -1 if no clear bit was found. */
/* @param   pvBitmap    Pointer to the bitmap. */
/* @param   cBits       The number of bits in the bitmap. Multiple of 32. */

#if RT_INLINE_ASM_EXTERNAL
DECLASM(int32_t) ASMBitFirstSet(const volatile void RT_FAR *pvBitmap, uint32_t cBits);
#else
DECLINLINE(int32_t) ASMBitFirstSet(const volatile void RT_FAR *pvBitmap, uint32_t cBits)
{
    if (cBits)
    {
        int32_t iBit;
        # if RT_INLINE_ASM_GNU_STYLE
        RTCCUINTREG uEAX, uECX, uEDI;
        cBits = RT_ALIGN_32(cBits, 32);
        __asm__ __volatile__ ("repe; scasl
	"                             "je    1f
	"                             "lea   -4(%%edi), %%edi
	"                             "movl  (%%edi), %%eax
	"                             "subq  %5, %%edi
");
        __asm__ __volatile__(
            "shll  $3, %%edi\n"
            "bsfl  %%eax, %%edx\n"
            "addl  %%edi, %%edx\n"
            "1:\n"
            : "=d" (iBit),
            "=&c" (uECX),
            "=&D" (uEDI),
            "=&a" (uEAX)
            : "0" (0xffffffff),
            "mr" (pvBitmap),
            "1" (cBits >> 5),
            "2" (pvBitmap),
            "3" (0));
        # else
        cBits = RT_ALIGN_32(cBits, 32);
        __asm
        {
            "lea   -4(%%edi), %%edi\n"
            "movl  (%%edi), %%eax\n"
            "subl  %5, %%edi\n"
        }
        # endif
    }
}
#endif
### Finds the next set bit in a bitmap.

@returns Index of the next set bit.
@returns -1 if no set bit was found.
@param pvBitmap Pointer to the bitmap.
@param cBits The number of bits in the bitmap. Multiple of 32.
@param iBitPrev The bit returned from the last search.
The search will start at iBitPrev + 1.

/**
+ * Finds the next set bit in a bitmap.
+ *
+ * @returns Index of the next set bit.
+ * @returns -1 if no set bit was found.
+ * @param pvBitmap Pointer to the bitmap.
+ * @param cBits The number of bits in the bitmap. Multiple of 32.
+ * @param iBitPrev The bit returned from the last search.
+ * @returns The search will start at iBitPrev + 1.
+ */
#endif

DECLASM(int) ASMBitNextSet(const volatile void RT_FAR *pvBitmap, uint32_t cBits, uint32_t iBitPrev);
DECLINLINE(int) ASMBitNextSet(const volatile void *pvBitmap, uint32_t cBits, uint32_t iBitPrev)
{
    const volatile uint32_t *pau32Bitmap = (const volatile uint32_t *)pvBitmap;
    int iBit = ++iBitPrev & 31;
    if (iBit)
    {
        /* Inspect the 32-bit word containing the unaligned bit. */
        uint32_t u32 = pau32Bitmap[iBitPrev / 32] >> iBit;

        if (RT_INLINE_ASM_USES_INTRIN
            
        unsigned long ulBit = 0;
        if (_BitScanForward(&ulBit, u32))
            return ulBit + iBitPrev;
        # else
        # if RT_INLINE_ASM_GNU_STYLE
        __asm__ __volatile__("bsf %1, %0
            "
                "jnz 1f
            "movl $-1, %0
            1:
            : "=r" (iBit)
            : "r" (u32);
        # else
        __asm
            mov     edx, [u32]
            bsf     eax, edx
            jnz     done
            mov     eax, 0xffffffff
        done:
            mov     [iBit], eax
            
        # endif
        # else
        # if RT_INLINE_ASM_GNU_STYLE
        __asm

        /* Skip ahead and see if there is anything left to search. */
        iBitPrev |= 31;
        iBitPrev++;
        if (cBits <= (uint32_t)iBitPrev)
            return -1;
        }
    }


/* 32-bit aligned search, let ASMBitFirstClear do the dirty work. */

iBit = ASMBitFirstSet(&pau32Bitmap[iBitPrev / 32], cBits - iBitPrev);
if (iBit >= 0)
iBit += iBitPrev;
return iBit;
}
#endif
+

/**
 * Finds the first bit which is set in the given 32-bit integer.
 * Bits are numbered from 1 (least significant) to 32.
 *
 * @returns index [1..32] of the first set bit.
 * @returns 0 if all bits are cleared.
 * @param   u32     Integer to search for set bits.
 * @remarks Similar to ffs() in BSD.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitFirstSetU32(uint32_t u32);
#else
DECLINLINE(unsigned) ASMBitFirstSetU32(uint32_t u32)
{
#if RT_INLINE_ASM_USES_INTRIN
    unsigned long iBit;
    if (_BitScanForward(&iBit, u32))
        iBit++;
    else
        iBit = 0;
#elif RT_INLINE_ASM_GNU_STYLE
    uint32_t iBit;
    __asm__ __volatile__("bsf  %1, %0
                         jnz  1f
                         xorl %0, %0
                         jmp  2f
        1:
        incl %0
        2:
        ":=r" (iBit)
        : "rm" (u32));
#else
    uint32_t iBit;
    __asm__ __volatile__("bsf  %1, %0\n" "jnz  1f\n" "xorl %0, %0\n" "jmp  2f\n" "1:\n" "incl %0\n" "2:\n" : "=r" (iBit)
        : "rm" (u32));
#endif
    return iBit;
}
#endif

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+ xor  eax, eax
+ jmp  done
+ found:
+    inc  eax
+ done:
+    mov  [iBit], eax
+ }
+# endif
+ return iBit;
+
+#endif
+
/**
 * Finds the first bit which is set in the given 32-bit integer.
 * @returns index [1..32] of the first set bit.
 * @returns 0 if all bits are cleared.
 * @param   i32     Integer to search for set bits.
 * @remark  Similar to ffs() in BSD.
 */
DECLINLINE(unsigned) ASMBitFirstSetS32(int32_t i32)
{
    return ASMBitFirstSetU32((uint32_t)i32);
}
+
/**
 * Finds the first bit which is set in the given 64-bit integer.
 * @returns index [1..64] of the first set bit.
 * @returns 0 if all bits are cleared.
 * @param   u64     Integer to search for set bits.
 * @remark  Similar to ffs() in BSD.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitFirstSetU64(uint64_t u64);
#else
DECLINLINE(unsigned) ASMBitFirstSetU64(uint64_t u64)
{
#if RT_INLINE_ASM_USES_INTRIN
    unsigned long iBit;
#if ARCH_BITS == 64
    if (_BitScanForward64(&iBit, u64))
        iBit++;
#endif
    return iBit;
#endif
}
#endif
+ else
  + iBit = 0;
+# else
  + if (_BitScanForward(&iBit, (uint32_t)u64))
  + iBit++;
  + else if (_BitScanForward(&iBit, (uint32_t)(u64 >> 32)))
  + iBit += 33;
  + else
  + iBit = 0;
+# endif
+# endif RT_INLINE_ASM_GNU_STYLE && ARCH_BITS == 64
  + uint64_t iBit;
  + __asm__ __volatile__("bsfq %1, %0\n\t"
                         "jnz  1f\n\t"
                         "xorl %k0, %k0\n\t"
                         "jmp  2f\n\t"
                         "1:\n\t"
                         "incl %k0\n"
                         "2:\n\t"
                         : "=r" (iBit)
                         : "rm" (u64));
+# else
  + unsigned iBit = ASMBitFirstSetU32((uint32_t)u64);
  + if (!iBit)
  + {
  +   iBit = ASMBitFirstSetU32((uint32_t)(u64 >> 32));
  +   if (iBit)
  +     iBit += 32;
  + }
+# endif
  + return (unsigned)iBit;
+}
+#endif
+
+/**
 * Finds the first bit which is set in the given 16-bit integer.
 * *
 * @returns index [1..16] of the first set bit.
 * @returns 0 if all bits are cleared.
 * @param   u16     Integer to search for set bits.
 * @remarks For 16-bit bs3kit code.
 * */
+#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
+DECLASM(unsigned) ASMBitFirstSetU16(uint16_t u16);
+#else
+DECLINLINE(unsigned) ASMBitFirstSetU16(uint16_t u16)
+{
  return ASMBitFirstSetU32((uint32_t)u16);
+}
+#endif

+/**
 + * Finds the last bit which is set in the given 32-bit integer.
 + * Bits are numbered from 1 (least significant) to 32.
 + *
 + * @returns index [1..32] of the last set bit.
 + * @returns 0 if all bits are cleared.
 + * @param   u32     Integer to search for set bits.
 + * @remark  Similar to fls() in BSD.
 + */
+if RT_INLINE_ASM_EXTERNAL & !RT_INLINE_ASM_USES_INTRIN
+DECLASM(unsigned) ASMBitLastSetU32(uint32_t u32);
+#else
+DECLINLINE(unsigned) ASMBitLastSetU32(uint32_t u32)
+{
+  if (_BitScanReverse(&iBit, u32))
+    iBit++;
+  else
+    iBit = 0;
+}
+## if RT_INLINE_ASM_USES_INTRIN
+  unsigned long iBit;
+  if (_BitScanReverse(&iBit, u32))
+    iBit++;
+  else
+    iBit = 0;
+## else
+  uint32_t iBit;
+  __asm__ __volatile__ ("bsrl %1, %0
\n"
+                      "jnz     \n"
+                      "xorl %0, %0
\n"
+                      "jmp     \n"
+                      "1: \n"
+                      "incl %0\n"
+                      "2: \n"
+                      : ":r" (iBit)
+                      : ":rm" (u32));
+## else
+  uint32_t iBit;
+  __asm
+  {  
+    bsr  eax, [u32]
+    jnz  found
+    xor  eax, eax
+    jmp  done
+  found:
+    inc  eax
done:
  mov [iBit], eax
}
#endif
  return iBit;
}
#endif

/**
 * Finds the last bit which is set in the given 32-bit integer.
 * Bits are numbered from 1 (least significant) to 32.
 * @returns index [1..32] of the last set bit.
 * @returns 0 if all bits are cleared.
 * @param i32 Integer to search for set bits.
 * @remark Similar to fls() in BSD.
 */
DECLINLINE(unsigned) ASMBitLastSetS32(int32_t i32)
{
  return ASMBitLastSetU32((uint32_t)i32);
}

/**
 * Finds the last bit which is set in the given 64-bit integer.
 * Bits are numbered from 1 (least significant) to 64.
 * @returns index [1..64] of the last set bit.
 * @returns 0 if all bits are cleared.
 * @param u64 Integer to search for set bits.
 * @remark Similar to fls() in BSD.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitLastSetU64(uint64_t u64);
#else
DECLINLINE(unsigned) ASMBitLastSetU64(uint64_t u64)
{
  #if RT_INLINE_ASM_USES_INTRIN
    unsigned long iBit;
    #if ARCH_BITS == 64
      if (_BitScanReverse64(&iBit, u64))
        iBit++;
    else
      iBit = 0;
    #else
      if (_BitScanReverse(&iBit, (uint32_t)(u64 >> 32)))
        iBit++;
    else
      iBit = 0;
  #endif
  #endif
  return iBit;
}
#endif

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iBit += 33;
else if (_BitScanReverse(&iBit, (uint32_t)u64))
    iBit++;
else
    iBit = 0;
#endif
#elif RT_INLINE_ASM_GNU_STYLE && ARCH_BITS == 64
    uint64_t iBit;
    __asm__ __volatile__("bsrq %1, %0\n\n    "jnz  1f\n\n    "xorl \%k0, \%k0\n\n    "jmp  2\n\n    "1:\n\n    "incl \%k0\n\n    "2:\n\n    : "=r" (iBit)
    : "rm" (u64);
#else
    unsigned iBit = ASMBitLastSetU32((uint32_t)(u64 >> 32));
    if (iBit)
        iBit += 32;
    else
        iBit = ASMBitLastSetU32((uint32_t)u64);
#endif
    return (unsigned)iBit;
#endif

/**
 * Finds the last bit which is set in the given 16-bit integer.
 * Bits are numbered from 1 (least significant) to 16.
 * @returns index [1..16] of the last set bit.
 * @returns 0 if all bits are cleared.
 * @param   u16     Integer to search for set bits.
 * @remarks For 16-bit bs3kit code.
 */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitLastSetU16(uint16_t u16);
#else
DECLINLINE(unsigned) ASMBitLastSetU16(uint16_t u16)
{
    return ASMBitLastSetU32((uint32_t)u16);
}
#endif

+ * Finds the last bit which is set in the given 16-bit integer.
+ * Bits are numbered from 1 (least significant) to 16.
+ * @returns index [1..16] of the last set bit.
+ * @returns 0 if all bits are cleared.
+ * @param   u16     Integer to search for set bits.
+ * @remarks For 16-bit bs3kit code.
+ */
#if RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(unsigned) ASMBitLastSetU16(uint16_t u16);
#else
DECLINLINE(unsigned) ASMBitLastSetU16(uint16_t u16)
{
    return ASMBitLastSetU32((uint32_t)u16);
}
#endif
/**
 * Reverse the byte order of the given 16-bit integer.
 * @returns Revert
 * @param u16 16-bit integer value.
 */

#ifndef RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint16_t) ASMByteSwapU16(uint16_t u16);
#else
DECLINLINE(uint16_t) ASMByteSwapU16(uint16_t u16)
{
    if RT_INLINE_ASM_USES_INTRIN
        u16 = _byteswap_ushort(u16);
    else
        _asm
            { mov     ax, [u16]
              ror     ax, 8
              mov     [u16], ax
            }=
    return u16;
}
#endif

/**
 * Reverse the byte order of the given 32-bit integer.
 * @returns Revert
 * @param u32 32-bit integer value.
 */

#ifndef RT_INLINE_ASM_EXTERNAL && !RT_INLINE_ASM_USES_INTRIN
DECLASM(uint32_t) ASMByteSwapU32(uint32_t u32);
#else
DECLINLINE(uint32_t) ASMByteSwapU32(uint32_t u32)
{
    if RT_INLINE_ASM_USES_INTRIN
        u32 = _byteswap_ulong(u32);
    else
        _asm
            { mov     eax, [u32]
              rorph   eax, 256
              mov     [u32], eax
            }=
    return u32;
}
#endif
```c
+    bswap  eax
+    mov  [u32], eax
+  }
+  }# endif
+  return u32;
+}  
+#endif
+
+/**
+ * Reverse the byte order of the given 64-bit integer.
+ *
+ * @returns Revert
+ * @param   u64     64-bit integer value.
+ */
+DECLINLINE(uint64_t) ASMByteSwapU64(uint64_t u64)
+{
+    #if defined(RT_ARCH_AMD64) && RT_INLINE_ASM_USES_INTRIN
+        u64 = _byteswap_uint64(u64);
+    #else
+        u64 = (uint64_t)ASMByteSwapU32((uint32_t)u64) << 32
+             | (uint64_t)ASMByteSwapU32((uint32_t)(u64 >> 32));
+    #endif
+    return u64;
+}
+
+/**
+ * Rotate 32-bit unsigned value to the left by @a cShift.
+ *
+ * @returns Rotated value.
+ * @param   u32                 The value to rotate.
+ * @param   cShift              How many bits to rotate by.
+ */
+#ifdef __WATCOMC__
+DECLASM(uint32_t) ASMRotateLeftU32(uint32_t u32, unsigned cShift);
+#else
+DECLINLINE(uint32_t) ASMRotateLeftU32(uint32_t u32, uint32_t cShift)
+{
+    #if RT_INLINE_ASM_USES_INTRIN
+        return _rol(u32, cShift);
+    #elif RT_INLINE_ASM_GNU_STYLE && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
+        __asm__ __volatile__ ("roll %b1, %0" : =g" (u32) : "Ic" (cShift), "0" (u32));
+        return u32;
+    #else
+        cShift &= 31;
+        return (u32 << cShift) | (u32 >> (32 - cShift));
+    #endif
+#endif
```

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+} #endif
+
+/**
+ * Rotate 32-bit unsigned value to the right by @a cShift.
+ *
+ * @returns Rotated value.
+ * @param   u32                 The value to rotate.
+ * @param   cShift              How many bits to rotate by.
+ */
+endif
+
+DECLASM(uint32_t) ASMRotateRightU32(uint32_t u32, unsigned cShift);
+ else
+DECLINLINE(uint32_t) ASMRotateRightU32(uint32_t u32, uint32_t cShift)
+{
+    #if RT_INLINE_ASM_USES_INTRIN
+        return _rotr(u32, cShift);
+    #elif RT_INLINE_ASM_GNU_STYLE && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
+        __asm__ __volatile__("rorl %b1, %0": "=g" (u32), "c" (cShift), "0" (u32));
+        return u32;
+    #else
+        cShift &= 31;
+        return (u32 >> cShift) | (u32 << (32 - cShift));
+    # endif
+    }
+    #endif
+
+/**
+ * Rotate 64-bit unsigned value to the left by @a cShift.
+ *
+ * @returns Rotated value.
+ * @param   u64                 The value to rotate.
+ * @param   cShift              How many bits to rotate by.
+ */
+DECLINLINE(uint64_t) ASMRotateLeftU64(uint64_t u64, uint32_t cShift)
+{
+    #if RT_INLINE_ASM_USES_INTRIN
+        return _rotl64(u64, cShift);
+    #elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_AMD64)
+        __asm__ __volatile__("rolq %b1, %0": "=g" (u64), "c" (cShift), "0" (u64));
+        return u64;
+    #elif RT_INLINE_ASM_GNU_STYLE && defined(RT_ARCH_X86)
+        uint32_t uSpill;
+        __asm__ __volatile__("testb $0x20, %%cl\n\t" /* if (cShift >= 0x20) { swap(u64.hi, u64lo); cShift -= 0x20; */ if (cShift >= 0x20) { swap(u64.hi, u64lo); cShift -= 0x20; } */
+            ",jz 1f\n\t"
+            ")
+            1f: 
}
+ "xchgl %%eax, %%edx\n\n" + "1:\n\n" + "andb $0x1f, %c\n\n" /* if (cShift & 0x1f) { */ + "jz 2\n\n" + "movl %edx, %2\n\n" /* save the hi value in %3. */ + "shldl %c, %eax, %edx\n\n" /* shift the hi value left, feeding MSBits from the low value. */ + "shldl %c, %2, %eax\n\n" /* shift the lo value left, feeding MSBits from the saved hi value. */ + "2:\n\n" /* } */ + ": =A" (u64), "=c" (cShift), "=r" (uSpill) + : "0" (u64), + : "1" (cShift)); + return u64; + } + + /* Rotate 64-bit unsigned value to the right by @a cShift. + * + * @returns Rotated value. + * @param   u64                 The value to rotate. + * @param   cShift              How many bits to rotate by. + */ +DECLINLINE(uint64_t) ASMRotateRightU64(uint64_t u64, uint32_t cShift) +{
+    cShift &= 63;
+    return (u64 << cShift) | (u64 >> (64 - cShift));
+}
+}
+**
+ /* Rotates a 64-bit unsigned value to the right by @a cShift. + */
+ /*
+ * @returns Rotated value.
+ * @param   u64                 The value to rotate.
+ * @param   cShift              How many bits to rotate by.
+ */
+DECLINLINE(uint64_t) ASMRotateRightU64(uint64_t u64, uint32_t cShift) +{
+    cShift &= 63;
+    return (u64 << cShift) | (u64 >> (64 - cShift));
+}
+**
+ /* Rotates a 64-bit unsigned value to the right by @a cShift. + */
+ /*
+ * @returns Rotated value.
+ * @param   u64                 The value to rotate.
+ * @param   cShift              How many bits to rotate by.
+ */
+DECLINLINE(uint64_t) ASMRotateRightU64(uint64_t u64, uint32_t cShift) +{
+    cShift &= 63;
+    return (u64 << cShift) | (u64 >> (64 - cShift));
+}
+**
+ /* Rotates a 64-bit unsigned value to the right by @a cShift. + */
+ /*
+ * @returns Rotated value.
+ * @param   u64                 The value to rotate.
+ * @param   cShift              How many bits to rotate by.
+ */
+DECLINLINE(uint64_t) ASMRotateRightU64(uint64_t u64, uint32_t cShift) +{
+    cShift &= 63;
+    return (u64 << cShift) | (u64 >> (64 - cShift));
+}
+**
+ /* Rotates a 64-bit unsigned value to the right by @a cShift. + */
+ /*
+ * @returns Rotated value.
+ * @param   u64                 The value to rotate.
+ * @param   cShift              How many bits to rotate by.
+ */
+DECLINLINE(uint64_t) ASMRotateRightU64(uint64_t u64, uint32_t cShift) +{
+    cShift &= 63;
+    return (u64 << cShift) | (u64 >> (64 - cShift));
+}
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+     "2\u4"  /* } */
+     : "=A" (u64), "=c" (cShift), "=r" (uSpill)
+     : "0" (u64),
+     "1" (cShift));
+   return u64;
+
+#else
+   cShift &= 63;
+   return (u64 >> cShift) | (u64 << (64 - cShift));
+#endif
+
+/** @} */
+
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/assert.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/assert.h
@@ -0,0 +1,2671 @@
+/** @file
+ * IPRT - Assertions.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+
+ /* The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+
+ /* You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef __iprt_assert_h
+ define __iprt_assert_h

### grp_rt_assert - Assertions

Assertions are generally used to check preconditions and other assumptions. Sometimes it is also used to catch odd errors or errors that one would like to inspect in the debugger. They should not be used for errors that happen frequently.

IPRT provides a host of assertion macros, so many that it can be a bit overwhelming at first. Don't despair, there is a system (surprise).

First there are four families of assertions:
- **Assert** - The normal strict build only assertions.
- **AssertLogRel** - Calls LogRel() in non-strict builds, otherwise like Assert.
- **AssertRelease** - Triggers in all builds.
- **AssertFatal** - Triggers in all builds and cannot be continued.

Then there are variations wrt to argument list and behavior on failure:
- **Msg** - Custom RTVFPrint-like message with the assertion message.
- **Return** - Return the specific rc on failure.
- **ReturnVoid** - Return (void) on failure.
- **Break** - Break (out of switch/loop) on failure.
- **Stmt** - Execute the specified statement(s) on failure.
- **RC** - Assert RT_SUCCESS.
- **RCSuccess** - Assert VINF_SUCCESS.

As you might have noticed, the macros don't follow the coding guidelines wrt to macros supposedly being all uppercase and underscored. For various reasons they don't, and nobody has complained yet. Wonder why... :-)

Each project has its own specific guidelines on how to use assertions, so the above is just trying to give you the general idea from the IPRT point of view.

The 1st part of an assert message.
+ * @param pszExpr Expression. Can be NULL.
+ * @param uLine Location line number.
+ * @param pszFile Location file name.
+ * @param pszFunction Location function name.
+ */
+RTDECL(void)    RTAssertMsg1(const char *pszExpr, unsigned uLine, const char *pszFile, const char *pszFunction);
+/**
+ * Weak version of RTAssertMsg1 that can be overridden locally in a module to
+ * modify, redirect or otherwise mess with the assertion output.
+ *
+ * @copydoc RTAssertMsg1
+ */
+RTDECL(void)    RTAssertMsg1Weak(const char *pszExpr, unsigned uLine, const char *pszFile, const char *pszFunction);
+/**
+ * The 2nd (optional) part of an assert message.
+ *
+ * @param pszFormat Printf like format string.
+ * @param ... Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+/**
+ * Weak version of RTAssertMsg2 that forwards to RTAssertMsg2WeakV.
+ *
+ * There is not need to override this, check out RTAssertMsg2WeakV instead!
+ *
+ * @copydoc RTAssertMsg2
+ */
+RTDECL(void)    RTAssertMsg2Weak(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+/**
+ * The 2nd (optional) part of an assert message.
+ *
+ * @param pszFormat Printf like format string.
+ * @param va Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2V(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+/**
+ * Weak version of RTAssertMsg2V that can be overridden locally in a module to
+ * modify, redirect or otherwise mess with the assertion output.
+ *
+ * @copydoc RTAssertMsg2V
+ */
+RTDECL(void)    RTAssertMsg2WeakV(const char *pszFormat, va_list va) RT_IPRT_FORMATATTR(1, 0);
+/**
+ * Additional information which should be appended to the 2nd part of an
+ * assertion message.
+ *
+ + * @param pszFormat  Printf like format string.
+ * @param ...        Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2Add(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+/**
+ * Weak version of RTAssertMsg2Add that forwards to RTAssertMsg2AddWeakV.
+ *
+ * There is not need to override this, check out RTAssertMsg2AddWeakV instead!
+ *
+ * @copydoc RTAssertMsg2Add
+ */
+RTDECL(void)    RTAssertMsg2AddWeak(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * Additional information which should be appended to the 2nd part of an
+ * assertion message.
+ *
+ + * @param pszFormat  Printf like format string.
+ * @param va         Arguments to that string.
+ */
+RTDECL(void)    RTAssertMsg2AddV(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+/**
+ * Weak version of RTAssertMsg2AddV that can be overridden locally in a module
+ * to modify, redirect or otherwise mess with the assertion output.
+ *
+ + * @copydoc RTAssertMsg2AddV
+ */
+RTDECL(void)    RTAssertMsg2AddWeakV(const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(1, 0);
+
+#ifdef IN_RING0
+/**
+ * Panics the system as the result of a fail assertion.
+ */
+RTR0DECL(void)  RTR0AssertPanicSystem(void);
+#endif /* IN_RING0 */
+
+/**
+ * Overridable function that decides whether assertions executes the panic
+ * (breakpoint) or not.
+ *
+ * The generic implementation will return true.
+ *
+ * @returns false if the breakpoint should be hit, true if it should be ignored.
+ */
@remark The RTDECL() makes this a bit difficult to override on Windows. So, you'll have to use RTASSERT_HAVE_SHOULD_PANIC or RTASSERT_HAVE_SHOULD_PANIC_PRIVATE there to control the kind of prototype.
+ */
#if !defined(RTASSERT_HAVE_SHOULD_PANIC) && !defined(RTASSERT_HAVE_SHOULD_PANIC_PRIVATE)
+RTDECL(bool) RTAssertShouldPanic(void);
#elif defined(RTASSERT_HAVE_SHOULD_PANIC_PRIVATE)
+bool RTAssertShouldPanic(void);
#else
+DECLEXPORT(bool) RTCALL RTAssertShouldPanic(void); +*/
+ /*
+ * Controls whether the assertions should be quiet or noisy (default).
+ *
+ * @returns The old setting.
+ * @param   fQuiet The new setting.
+ */
+RTDECL(bool) RTAssertSetQuiet(bool fQuiet);
+
+ /**
+ * Are assertions quiet or noisy?
+ *
+ * @returns True if they are quiet, false if noisy.
+ */
+RTDECL(bool) RTAssertAreQuiet(void);
+
+ /**
+ * Makes the assertions panic (default) or not.
+ *
+ * @returns The old setting.
+ * @param   fPanic The new setting.
+ */
+RTDECL(bool) RTAssertSetMayPanic(bool fPanic);
+
+ /**
+ * Can assertion panic.
+ *
+ * @returns True if they can, false if not.
+ */
+RTDECL(bool) RTAssertMayPanic(void);
+
+ /**
+ * @name Globals for crash analysis
+ * @remarks This is the full potential set, it
+ * @{
+ */
+/** The last assert message, 1st part. */
+extern RTDATADECL(char)  g_szRTAssertMsg1[1024];
+/** The last assert message, 2nd part. */
+extern RTDATADECL(char)  g_szRTAssertMsg2[4096];
+/** The last assert message, expression. */
+extern RTDATADECL(const char * volatile) g_pszRTAssertExpr;
+/** The last assert message, file name. */
+extern RTDATADECL(const char * volatile) g_pszRTAssertFile;
+/** The last assert message, line number. */
+extern RTDATADECL(uint32_t volatile)  g_u32RTAssertLine;
+/** The last assert message, function name. */
+extern RTDATADECL(const char * volatile) g_pszRTAssertFunction;
+/** @} */
+
+RT_C_DECLS_END
+
+/** @def RTAssertDebugBreak()
+ * Debugger breakpoint instruction.
+ * @remarks This macro does not depend on RT_STRICT.
+ */
+#define RTAssertDebugBreak()    do { RT_BREAKPOINT(); } while (0)
+
+/** @name Assertions
+ * These assertions will only trigger when RT_STRICT is defined. When it is
+ * undefined they will all be no-ops and generate no code.
+ */
+/** @{
+ */
+#define RTASSERT_QUIET
+ * This can be defined to shut up the messages for a file where this would be
+ * problematic because the message printing code path passes thru it.
+ */
+#ifdef DOXYGEN_RUNNING
+## define RTASSERT_QUIET
+#endif
+#if defined(RTASSERT_QUIET) && !defined(DOXYGEN_RUNNING)
+## define RTAssertMsg1Weak(pszExpr, uLine, pszfile, pszFunction)
+   do { } while (0)
+## define RTAssertMsg2Weak       if (1) {} else RTAssertMsg2Weak
+#endif
/** @def RTAssertDoPanic
 * Raises an assertion panic appropriate to the current context.
 * @remarks This macro does not depend on RT STRICT.
 * @*/
#if defined(IN_RING0) \\
+ && (defined(RT_OS_DARWIN) || defined(RT_OS_HAIKU) || defined(RT_OS_SOLARIS))
+# define RTAssertDoPanic() RTR0AssertPanicSystem()
+# else
+# define RTAssertDoPanic() RTAssertDebugBreak()
+# endif
+
/** @def AssertBreakpoint()
 * Assertion Breakpoint.
 * @deprecated Use RTAssertPanic or RTAssertDebugBreak instead.
 * @*/
+#ifdef RT_STRICT
+# define AssertBreakpoint() RTAssertDebugBreak()
+#else
+# define AssertBreakpoint() do { } while (0)
+# endif
+
/** @def RTAssertPanic()
 * If RT STRICT is defined this macro will invoke RTAssertDoPanic if
 * RTAssertShouldPanic returns true. If RT STRICT isn't defined it won't do any
 * thing.
 * @*/
#if defined(RT_STRICT) && !defined(RTASSERT_DONT_PANIC)
+# define RTAssertPanic() do { if (RTAssertShouldPanic()) RTAssertDoPanic(); } while (0)
+# else
+# define RTAssertPanic() do { } while (0)
+# endif
+
/** @def Assert
 * Assert that an expression is true. If false, hit breakpoint.
 * @param expr Expression which should be true.
 * @*/
+#ifdef RT_STRICT
+# define Assert(expr) \\
+ do {
+  if (RT_LIKELY(!!(expr)))
+  { /* likely */ } \\
+  else \\
+  { \\
+    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \\
+    RTAssertPanic();
+  }
+ }
+ else \\
+  if (RT_LIKELY(!!(expr)))
+  { /* likely */ } \\
+  else \\
+  { \\
+    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \\
+    RTAssertPanic();
+  }
+ */
/** @def AssertStmt
 * Assert that an expression is true. If false, hit breakpoint and execute the
 * statement.
 * @param   expr    Expression which should be true.
 * @param   stmt    Statement to execute on failure.
 * + */
+ ifndef RT_STRICT
+ # define AssertStmt(expr, stmt) \ 
+ do { \ 
+ if (RT_LIKELY(!!(expr))) \ 
+ { /* likely */ } \ 
+ else \ 
+ { \ 
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \ 
+ RTAssertPanic(); \ 
+ stmt; \ 
+ } \ 
+ } while (0)
+ #endif
+ endif
+ endif
+*/ @def AssertReturn
+ * Assert that an expression is true and returns if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ *
+ * @param   expr    Expression which should be true.
+ * @param   rc      What is to be presented to return.
+ */
+ ifndef RT_STRICT
+ # define AssertReturn(expr, rc) \ 
+ do { \ 
+ if (RT_LIKELY(!!(expr))) \ 
+ { /* likely */ } \ 
+ else \ 
+ { \ 
+ stmt; \ 
+ } \ 
+ } while (0)
+ endif
+ endif
+*/
+     if (RT_LIKELY(!(expr)))
+     { /* likely */ }
+     else
+     { \
+         RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__);
+         RTAssertPanic();
+         return (rc);
+     } while (0)
+ } while (0)
+
+/** @def AssertReturn(expr, rc) */
+do \
+  if (RT_LIKELY(!(expr)))
+  { /* likely */ }
+  else
+  {
+      RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+      RTAssertPanic();
+      return (rc);
+  } while (0)
+
+/** @def AssertReturnStmt */
+/** Assert that an expression is true, if it isn't execute the given statement */
+/** and return rc. */
+/** In RT_STRICT mode it will hit a breakpoint before executing the statement and */
+/** returning. */
+/** @param expr Expression which should be true. */
+/** @param stmt Statement to execute before returning on failure. */
+/** @param rc What is to be presented to return. */
+/** */
+ifdef RT_STRICT
+/** define AssertReturnStmt(expr, stmt, rc) */
+do \
+  if (RT_LIKELY(!(expr)))
+  { /* likely */ }
+  else
+  {
+      RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
+      RTAssertPanic();
+      stmt;
+      return (rc);
+  } \ 
+  while (0)
+} while (0)
+} while (0)
+else
+
+/** define AssertReturnStmt(expr, stmt, rc) */
+do \
+  if (RT_LIKELY(!(expr)))
+  { /* likely */ }
+  else
+  {
+      RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+      RTAssertPanic();
+      stmt;
+      return (rc);
+  } \
+  while (0)
+} while (0)
+} while (0)
+ { /* likely */ } \
+ else \
+ { \
+ stmt; \
+ return (rc); \
+ } \
+ } while (0)
+#endif
+
+/** @def AssertReturnVoid
+ * Assert that an expression is true and returns if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ *
+ */
+ * @param expr Expression which should be true.
+ */
+#ifdef RT_STRICT
+#define AssertReturnVoid(expr) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else \
+ { \
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
+ RTAssertPanic(); \
+ return; \
+ } \
+ } while (0)
+#else
+#define AssertReturnVoid(expr) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else \
+ return; \
+ } while (0)
+#endif
+
+/** @def AssertReturnVoidStmt
+ * Assert that an expression is true, if it isn't execute the given statement
+ * and return.
+ *
+ */
+ * @param expr Expression which should be true.
+ * @param stmt Statement to execute before returning on failure.
+ */
+#ifdef RT_STRICT

+ # define AssertReturnVoidStmt(expr, stmt) \
+    do { \
+        if (RT_LIKELY(!!(expr))) \
+        { /* likely */ } \
+        else \
+        { \
+            RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+            RTAssertPanic(); \
+            stmt; \
+            return; \
+        } \
+    } while (0)
+
+    #else
+    # define AssertReturnVoidStmt(expr, stmt) \
+    do { \
+        if (RT_LIKELY(!!(expr))) \
+        { /* likely */ } \
+        else \
+        { \
+            stmt; \
+            return; \
+        } \
+    } while (0)
+    #endif
+
+    #ifdef RT_STRICT
+    # define AssertBreak(expr) \
+    if (RT_LIKELY(!!(expr))) \
+    { /* likely */ } \
+    else if (1) \
+    { \
+        RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+        RTAssertPanic(); \
+        break; \
+    } else \
+    break
+    #endif

@def AssertBreak
+ * Assert that an expression is true and breaks if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before breaking.
+ *
+ * @param expr Expression which should be true.
+ */
+#ifdef RT_STRICT
+    # define AssertBreak(expr) \
+    if (RT_LIKELY(!!(expr))) \
+    { /* likely */ } \
+    else if (1) \
+    { \
+        RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+        RTAssertPanic(); \
+        break;
+    } else \
+    break
+    #else
+    # define AssertBreak(expr) \
+    if (RT_LIKELY(!!(expr))) \
+    { /* likely */ } \
+    else \
+    ```
+ break
+ #endif
+
+ /** @def AssertContinue
+ * Assert that an expression is true and continue if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before continuing.
+ *
+ * @param   expr    Expression which should be true.
+ * */
+#ifdef RT_STRICT
+ # define AssertContinue(expr) \
+   if (RT_LIKELY(!!(expr))) \
+   { /* likely */ } \
+   else if (1) \
+   { \
+     RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+     RTAssertPanic(); \
+     continue; \
+   } else do {} while (0)
+ #else
+ # define AssertContinue(expr) \
+   if (RT_LIKELY(!!(expr))) \
+   { /* likely */ } \
+   else \
+     continue
+ #endif
+
+ /** @def AssertBreakStmt
+ * Assert that an expression is true and breaks if it isn't.
+ * In RT_STRICT mode it will hit a breakpoint before doing break.
+ *
+ * @param   expr    Expression which should be true.
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ */
+#ifdef RT_STRICT
+ # define AssertBreakStmt(expr, stmt) \
+   if (RT_LIKELY(!!(expr))) \
+   { /* likely */ } \
+   else if (1) \
+   { \
+     RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+     RTAssertPanic(); \
+     stmt; \
+     break; \
+   } else do {} while (0)
+ #else
+ # define AssertBreakStmt(expr, stmt) \
+   if (RT_LIKELY(!!(expr))) \
+   }
/** @def AssertMsg
 * Assert that an expression is true. If it's not print message and hit breakpoint.
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 */
#ifdef RT_STRICT
#define AssertMsg(expr, a)  \
    do { \
        if (RT_LIKELY(!!(expr))) \
        { /* likely */ } \
        else \
        { \
            RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
            RTAssertMsg2Weak a; \
            RTAssertPanic(); \
        } \
    } while (0)
#else
#define AssertMsg(expr, a)  do { } while (0)
#endif
/** @def AssertMsgStmt
 * Assert that an expression is true. If it's not print message and hit
 * breakpoint and execute the statement.
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 * @param   stmt    Statement to execute in case of a failed assertion.
 * @remarks The expression and statement will be evaluated in all build types.
 */
#ifdef RT_STRICT
#define AssertMsgStmt(expr, a, stmt)  \
    do { \
        if (RT_LIKELY(!!(expr))) \
        { /* likely */ } \
        else \
        { \
            RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
            RTAssertMsg2Weak a; \
            RTAssertPanic(); \
        } \
    } while (0)
#else
#define AssertMsgStmt(expr, a, stmt)  do { } while (0)
#endif
RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
RTAssertMsg2Weak a; \
RTAssertPanic(); \
stmt; \
} \
} while (0)
#else
#define AssertMsgStmt(expr, a, stmt)  \
    do { \
    if (RT_LIKELY(!(expr))) \
    { /* likely */ } \
    else \
    { \
    stmt; \
    } \
    } \
} while (0)
#endif

/** @def AssertMsgReturn
 * Assert that an expression is true and returns if it isn't.
 * In RT_STRICT mode it will hit a breakpoint before returning.
 * *
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 * @param   rc      What is to be presented to return.
 * */
#ifdefine RT_STRICT
#define AssertMsgReturn(expr, a, rc)  \
    do { \
    if (RT_LIKELY(!!(expr))) \
    { /* likely */ } \
    else \
    { \
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
    RTAssertMsg2Weak a; \
    RTAssertPanic(); \
    return (rc); \
    } \
    } while (0)
#else
#define AssertMsgReturn(expr, a, rc)  \
    do { \
    if (RT_LIKELY(!!(expr))) \
    { /* likely */ } \
    else \
    { \
    return (rc); \
    } \
    } while (0)
#endif
### @def AssertMsgReturnStmt
+ * Assert that an expression is true, if it isn’t execute the statement and
+ * return.
+ *
+ * In RT STRICT mode it will hit a breakpoint before returning.
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute before returning in case of a failed
+ * assertion.
+ * @param rc What is to be presented to return.
+ */

```c
#ifdef RT_STRICT
#define AssertMsgReturnStmt(expr, a, stmt, rc)  \
    do {  \
        if (RT_LIKELY(!!(expr)))  \
        { /* likely */ }  \
        else  \
        {  \
            RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);  \
            RTAssertMsg2Weak a;  \
            RTAssertPanic();  \
            stmt;  \
            return (rc);  \
        }  \
    } while (0)
#else
#define AssertMsgReturnStmt(expr, a, stmt, rc)  \
    do {  \
        if (RT_LIKELY(!!(expr)))  \
        { /* likely */ }  \
        else  \
        {  \
            stmt;  \
            return (rc);  \
        }  \
    } while (0)
#endif
```

### @def AssertMsgReturnVoid
+ * Assert that an expression is true and returns if it isn’t. In RT STRICT mode it will hit a breakpoint before returning.
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ */

```c
```
+ifdef RT_STRICT
+  define AssertMsgReturnVoid(expr, a) \ 
+    do { \ 
+      if (RT_LIKELY(!!(expr))) \ 
+        { /* likely */ } \ 
+      else \ 
+        { \ 
+          RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \ 
+        RTAssertMsg2Weak a; \ 
+        RTAssertPanic(); \ 
+        return; \ 
+        } \ 
+      } while (0) \ 
+  } \ 
+endif
+
+/** @def AssertMsgReturnVoidStmt
+ * Assert that an expression is true, if it isn't execute the statement and
+ * return.
+ *
+ * In RT_STRICT mode it will hit a breakpoint before returning.
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute before return in case of a failed assertion.
+ */
+ifdef RT_STRICT
+  define AssertMsgReturnVoidStmt(expr, a, stmt) \ 
+    do { \ 
+      if (RT_LIKELY(!!(expr))) \ 
+        { /* likely */ } \ 
+      else \ 
+        { \ 
+          RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
+          RTAssertMsg2Weak a; \ 
+          RTAssertPanic(); \ 
+          stmt; \ 
+          return; \ 
+        } \ 
+      } while (0) \ 
+endif

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#define AssertMsgReturnVoidStmt(expr, a, stmt) \
  do { \
  if (RT_LIKELY(!(!expr))) \
  { /* likely */ } \
  else \
  { \
  stmt; \
  return; \
  } \
  } while (0)
#endif

/** @def AssertMsgBreak 
 * Assert that an expression is true and breaks if it isn't.
 * In RT_STRICT mode it will hit a breakpoint before returning.
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 */
#ifdef RT_STRICT
#define AssertMsgBreak(expr, a) \
  if (RT_LIKELY(!(!expr))) \
  { /* likely */ } \
  else if (1) \
  { \
  RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
  RTAssertMsg2Weak a; \
  RTAssertPanic(); \
  break; \
  } else \
  break
#else
#define AssertMsgBreak(expr, a) \
  if (RT_LIKELY(!(!expr))) \
  { /* likely */ } \
  else \
  break
#endif

/** @def AssertMsgBreakStmt 
 * Assert that an expression is true and breaks if it isn't.
 * In RT_STRICT mode it will hit a breakpoint before doing break.
 * @param   expr    Expression which should be true.
 * @param   stmt    Statement to execute before break in case of a failed assertion.
 */
```c
/** @def AssertMsgBreakStmt(expr, a, stmt) */
+ if (RT_LIKELY(!!(expr)))
+ { /* likely */ } 
+ else if (1) 
+ { 
+   RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+   RTAssertMsg2Weak a; 
+   RTAssertPanic(); 
+   stmt; 
+   break; 
+ } else 
+   break
+#else
+ if (RT_LIKELY(!!(expr)))
+ { /* likely */ } 
+ else if (1) 
+ { 
+   stmt; 
+   break; 
+ } else 
+   break
+#endif
+/** @def AssertFailed */
+#ifdef RT_STRICT
+# define AssertFailed()  
+    do { 
+        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); 
+        RTAssertPanic(); 
+    } while (0)
+#else
+# define AssertFailed()         do { } while (0)
+#endif
+/** @def AssertFailedStmt */
+#ifdef RT_STRICT
+# define AssertFailedStmt(stmt) 
+    do { 
+        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); 
+        RTAssertPanic(); 
+    } while (0)
+#else
+    do { } while (0)
+#endif
+/** @def AssertFailedStmt */
+#ifdef RT_STRICT
+# define AssertFailedStmt(stmt) 
+    do { 
+        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); 
+        RTAssertPanic(); 
+    } while (0)
+#else
+    do { } while (0)
+#endif
```
RTAssertPanic();
stmt;
} while (0)
#endif
/*
 */
/** @def AssertFailedReturn
 * An assertion failed, hit breakpoint (RT_STRICT mode only) and return.
 */
/*
 */
#else
#define AssertFailedReturn(stmt) do { stmt; } while (0)
#endif

/** @def AssertFailedReturnStmt
 * An assertion failed, hit breakpoint (RT_STRICT mode only), execute a
 * statement and return a value.
 */
/*
 */
#ifdef RT_STRICT
#define AssertFailedReturnStmt(stmt, rc) do {
  RTAssertMsg1Weak((const char*)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);
  RTAssertPanic();
  stmt;
  return (rc);
} while (0)
#else
#define AssertFailedReturnStmt(stmt, rc) do {
  stmt;
  return (rc);
} while (0)
#endif

/*
 */
/** @def AssertFailedReturnStmt
 * An assertion failed, hit breakpoint (RT_STRICT mode only), execute a
 * statement and return a value.
 */
/*
 */
#else
#define AssertFailedReturnStmt(stmt, rc) do {
  RTAssertMsg1Weak((const char*)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);
  RTAssertPanic();
  stmt;
  return (rc);
} while (0)
#endif
+/** @def AssertFailedReturnVoid
+ * An assertion failed, hit breakpoint (RT_STRICT mode only) and return.
+ */
+#ifdef RT_STRICT
+# define AssertFailedReturnVoid() \
+    do { \
+        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+        RTAssertPanic(); \
+        return; \
+    } while (0)
+#else
+# define AssertFailedReturnVoid() \
+    do { \
+        return; \
+    } while (0)
+#endif
+
+/** @def AssertFailedReturnVoidStmt
+ * An assertion failed, hit breakpoint (RT_STRICT mode only), execute a
+ * statement and return.
+ *
+ * @param stmt The statement to execute before returning.
+ */
+#ifdef RT_STRICT
+# define AssertFailedReturnVoidStmt(stmt) \
+    do { \
+        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+        RTAssertPanic(); \
+        stmt; \
+        return; \
+    } while (0)
+#else
+# define AssertFailedReturnVoidStmt(stmt) \
+    do { \
+        stmt; \
+        return; \
+    } while (0)
+#endif
+
+/** @def AssertFailedBreak
+ * An assertion failed, hit breakpoint (RT_STRICT mode only) and break.
+ */
+#ifdef RT_STRICT
+# define AssertFailedBreak() \
+    if (1) { \
+        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+    }
+#else
+# define AssertFailedBreak() \
+    if (1) { 
+    }
+#endif
+    RTAssertPanic(); \ 
+    break; \ 
+  } else \ 
+  break 
+#else
+  
+  # define AssertFailedBreak() \ 
+  if (1) \ 
+  break; \ 
+  else \ 
+  break 
+#endif
+  
+/** @def AssertFailedBreakStmt
+ * An assertion failed, hit breakpoint (RT_STRICT mode only), execute
+ * the given statement and break.
+ *
+ * @param stmt Statement to execute before break.
+ */
+*/
+#ifdef RT_STRICT
+  
+  # define AssertFailedBreakStmt(stmt) \ 
+  if (1) { \ 
+   RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
+   RTAssertPanic(); \ 
+   stmt; \ 
+   break; \ 
+  } else \ 
+  break 
+#else
+  
+  # define AssertFailedBreakStmt(stmt) \ 
+  if (1) { \ 
+   stmt; \ 
+   break; \ 
+  } else \ 
+  break 
+#endif
+  
+/** @def AssertMsgFailed
+ * An assertion failed print a message and a hit breakpoint.
+ *
+ * @param a printf argument list (in parenthesis).
+ */
+*/
+#ifdef RT_STRICT
+  
+  # define AssertMsgFailed(a) \ 
+  do { \ 
+   RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION
+   __PRETTY_FUNCTION__); \ 
+   RTAssertMsg2Weak a; \ 
+   RTAssertMsg2Weak a; \ 
+   RTAssertMsg2Weak a; 

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/** @def AssertMsgFailedBreak
 + * An assertion failed, hit breakpoint with message (RT_STRICT mode only) and break.
 + *
 + * @param   a   printf argument list (in parenthesis).
 + *
 */
#ifdef RT_STRICT
+#define AssertMsgFailedBreak(a)  
+ if (1) { 
+   RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+   RTAssertMsg2Weak a; 
+   RTAssertPanic(); 
+   break; 
+ } else 
+   break
+#else
+#define AssertMsgFailedBreak(a)  
+ if (1) 
+   break; 
+ else 
+   break
+#endif

/** @def AssertMsgFailedBreakStmt
 + * An assertion failed, hit breakpoint (RT_STRICT mode only), execute
 + * the given statement and break.
 + *
 + * @param   a   printf argument list (in parenthesis).
 + * @param   stmt Statement to execute before break.
 + *
 */
#ifdef RT_STRICT
+#define AssertMsgFailedBreakStmt(a, stmt) 
+ if (1) { 
+   RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+   RTAssertMsg2Weak a; 
+   RTAssertPanic(); 
+   stmt; 
+   break; 
+ } else 
+   break
+#else
+#define AssertMsgFailedBreakStmt(a, stmt) 
+ if (1) { 
+   stmt; 
+   break; 
+ } else 
+   break
+#endif
+/** @} */
+
+
+/** @name Release Log Assertions */
+
+* These assertions will work like normal strict assertion when RT_STRICT is
+* defined and LogRel statements when RT_STRICT is undefined. Typically used for
+* things which shouldn't go wrong, but when it does you'd like to know one way
+* or the other.
+
+* */
+
+* @
+
+/** @} */
+
+/** @def RTAssertLogRelMsg1 */
+
+* RTAssertMsg1Weak (strict builds) / LogRel wrapper (non-strict).
+
+*/
+
+#ifdef RT_STRICT
+## define RTAssertLogRelMsg1(pszExpr, iLine, pszFile, pszFunction) \
+   RTAssertMsg1Weak(pszExpr, iLine, pszFile, pszFunction)
+##else
+   LogRel("AssertLogRel %s(%d) %s: %s\n",\n+      (pszFile), (iLine), (pszFunction), (pszExpr) ))
+##endif
+
+/** @def RTAssertLogRelMsg2 */
+
+* RTAssertMsg2Weak (strict builds) / LogRel wrapper (non-strict).
+
+*/
+
+#ifdef RT_STRICT
+## define RTAssertLogRelMsg2 a
+   RTAssertMsg2Weak a
+##else
+   LogRel(a)
+##endif
+
+/** @def AssertLogRel */
+
+* Assert that an expression is true.
+* Strict builds will hit a breakpoint, non-strict will only do LogRel.
+
+* */
+
+#define AssertLogRel(expr) \
+    do { \
+        if (RT_LIKELY(!!(expr))) \
+        { /* likely */ } \
+        else \
+        { \
+            RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+        }
+    }/* likely */
+
+/** @} */
+
+/** @} */
/** @def AssertLogRelReturn
 * Assert that an expression is true, return \a rc if it isn't.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 * *
 * @param   expr    Expression which should be true.
 * @param   rc      What is to be presented to return.
 * *
 * @def AssertLogRelReturn(expr, rc)
 + do { \
 +     if (RT_LIKELY(!!(expr))) \
 +     { /* likely */ } \
 +     else \
 +     { \
 +         RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
 +         RTAssertPanic(); \
 +         return (rc); \
 +     } \
 + } while (0)
 + */

/** @def AssertLogRelReturnVoid
 * Assert that an expression is true, return void if it isn't.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 * *
 * @param   expr    Expression which should be true.
 * *
 * @def AssertLogRelReturnVoid(expr)
 + do { \
 +     if (RT_LIKELY(!!(expr))) \
 +     { /* likely */ } \
 +     else \
 +     { \
 +         RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
 +         RTAssertPanic(); \
 +         return; \
 +     } \
 + } while (0)
 + */

/** @def AssertLogRelBreak
 * Assert that an expression is true, break if it isn't.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 * *
 * @param   expr    Expression which should be true.
 * *
 * @def AssertLogRelBreak(expr)
 +
if (RT_LIKELY(!(expr)))
{
/* likely */
}
else if (1)
{

RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
RTAssertPanic();
break;
}
else
break

/** @def AssertLogRelBreakStmt
 * Assert that an expression is true, execute \a stmt and break if it isn't.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 * @param expr Expression which should be true.
 * @param stmt Statement to execute before break in case of a failed assertion.
 */
#define AssertLogRelBreakStmt(expr, stmt) 
if (RT_LIKELY(!(expr)))
{
/* likely */
}
else
{

RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
RTAssertPanic();
stmt;
break;
}
else
break

/** @def AssertLogRelMsg
 * Assert that an expression is true.
 * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 * @param expr Expression which should be true.
 * @param a printf argument list (in parenthesis).
 */
#define AssertLogRelMsg(expr, a) 
do {
if (RT_LIKELY(!(expr)))
{
/* likely */
}
else
{

RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
RTAssertLogRelMsg2(a);
RTAssertPanic();
RTAssertLogRelMsg2(a);
RTAssertPanic();
}
while (0)
 /** @def AssertLogRelMsgStmt
 + * Assert that an expression is true, execute \a stmt and break if it isn't
 + * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 + *
 + * @param   expr Expression which should be true.
 + * @param   a printf argument list (in parenthesis).
 + * @param   stmt Statement to execute in case of a failed assertion.
 + */
+#define AssertLogRelMsgStmt(expr, a, stmt) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else\ 
+ { \
+ RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+ RTAssertLogRelMsg2(a); \
+ RTAssertPanic(); \
+ stmt; \
+ } \
+ } while (0)
+
 /** @def AssertLogRelMsgReturn
 + * Assert that an expression is true, return \a rc if it isn't.
 + * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 + *
 + * @param   expr Expression which should be true.
 + * @param   a printf argument list (in parenthesis).
 + * @param   rc What is to be presented to return.
 + */
+#define AssertLogRelMsgReturn(expr, a, rc) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else\ 
+ { \
+ RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+ RTAssertLogRelMsg2(a); \
+ RTAssertPanic(); \
+ return (rc); \
+ } \
+ } while (0)
+
 /** @def AssertLogRelMsgReturnStmt
 + * Assert that an expression is true, execute \a stmt and return \a rcRet if it
 + * isn't.
 + * Strict builds will hit a breakpoint, non-strict will only do LogRel.
 + *
+ @param expr Expression which should be true.
+ @param a printf argument list (in parenthesis).
+ @param stmt Statement to execute before returning in case of a failed assertion.
+ @param rcRet What is to be presented to return.
+ */
+#define AssertLogRelMsgReturnStmt(expr, a, stmt, rcRet) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else \
+ { \
+ RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+ RTAssertLogRelMsg2(a); \
+ RTAssertPanic(); \
+ stmt; \
+ return (rcRet); \
+ } \
+ } while (0)
+
+/** @def AssertLogRelMsgReturnVoid 
+ * Assert that an expression is true, return (void) if it isn’t.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ */
+#define AssertLogRelMsgReturnVoid(expr, a) \
+ do { \
+ if (RT_LIKELY(!!(expr))) \
+ { /* likely */ } \
+ else \
+ { \
+ RTAssertLogRelMsg1(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+ RTAssertLogRelMsg2(a); \
+ RTAssertPanic(); \
+ return; \
+ } \
+ } while (0)
+
+/** @def AssertLogRelMsgBreak 
+ * Assert that an expression is true, break if it isn’t.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ */
+#define AssertLogRelMsgBreak(expr, a) \

+ */
+#define AssertLogRelFailedReturn(rc) \
+    do { \n+        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+        RTAssertPanic(); \n+        return (rc); \n+    } while (0)
+
+/** @def AssertLogRelFailedReturnVoid
+ * An assertion failed, hit a breakpoint and return.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+#define AssertLogRelFailedReturnVoid() \
+    do { \n+        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+        RTAssertPanic(); \n+        return; \n+    } while (0)
+
+/** @def AssertLogRelFailedBreak
+ * An assertion failed, break.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+#define AssertLogRelFailedBreak() \
+    if (1) \n+    { \n+        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+        RTAssertPanic(); \n+        break; \n+    } else \n+    break
+
+/** @def AssertLogRelFailedBreakStmt
+ * An assertion failed, execute \a stmt and break.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param stmt Statement to execute before break.
+ */
+#define AssertLogRelFailedBreakStmt(stmt) \
+    if (1) \n+    { \n+        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n+        RTAssertPanic(); \n+        stmt; \n+        break; \n+    } else \n+    break
+
@@@ def AssertLogRelMsgFailed
+ * An assertion failed.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ */
+#define AssertLogRelMsgFailed(a) \
    do { \
        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
        RTAssertLogRelMsg2(a); \
        RTAssertPanic(); \
    } while (0) \
+
+/** @def AssertLogRelMsgFailedStmt
+ * An assertion failed, execute @a stmt.
+ *
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel. The
+ * statement will be executed in regardless of build type.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute after raising/logging the assertion.
+ */
+#define AssertLogRelMsgFailedStmt(a, stmt) \
    do { \
        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
        RTAssertLogRelMsg2(a); \
        RTAssertPanic(); \
        stmt; \
    } while (0) \
+
+/** @def AssertLogRelMsgFailedReturn
+ * An assertion failed, return @a rc.
+ *
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param rc What is to be presented to return.
+ */
+#define AssertLogRelMsgFailedReturn(a, rc) \
    do { \
        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
        RTAssertLogRelMsg2(a); \
        RTAssertPanic(); \
        return (rc); \
    } while (0) \
+
+/** @def AssertLogRelMsgFailedReturnStmt
+ * An assertion failed, execute @a stmt and return @a rc.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ * @param   a       printf argument list (in parenthesis).
+ * @param   stmt   Statement to execute before returning in case of a failed
+ *                assertion.
+ * @param   rc     What is to be presented to return.
+ */
+#define AssertLogRelMsgFailedReturnStmt(a, stmt, rc)  
    do { 
    + RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    + RTAssertLogRelMsg2(a); 
    + RTAssertPanic(); 
    + stmt; 
    + return (rc); 
    + } while (0)
+
+/** @def AssertLogRelMsgFailedReturnVoid
+ * An assertion failed, return void.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+#define AssertLogRelMsgFailedReturnVoid(a)  
    do { 
    + RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    + RTAssertLogRelMsg2(a); 
    + RTAssertPanic(); 
    + return; 
    + } while (0)
+
+/** @def AssertLogRelMsgFailedReturnVoidStmt
+ * An assertion failed, execute @a stmt and return void.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ */
+#define AssertLogRelMsgFailedReturnVoidStmt(a, stmt)  
    do { 
    + RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
    + RTAssertLogRelMsg2(a); 
    + RTAssertPanic(); 
    + stmt; 
    + return; 
    + } while (0)
+
+/** @def AssertLogRelMsgFailedBreak
+ * An assertion failed, break.
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+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ */
#define AssertLogRelMsgFailedBreak(a) \
    if (1)\n    {\n        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__);\n        RTAssertLogRelMsg2(a); \n        break; \n    } else \n    break
+
+/** @def AssertLogRelMsgFailedBreakStmt
+ * An assertion failed, execute \a stmt and break.
+ * Strict builds will hit a breakpoint, non-strict will only do LogRel.
+ *
+ * @param a printf argument list (in parenthesis).
+ * @param stmt Statement to execute before break.
+ */
#define AssertLogRelMsgFailedBreakStmt(a, stmt) \
    if (1) \n    { \n        RTAssertLogRelMsg1((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \n        RTAssertLogRelMsg2(a); \n        RTAssertPanic(); \n        stmt; \n        break; \n    } else \n    break
+
+/** @} */
+
+/** @name Release Assertions
+ * These assertions are always enabled.
+ * @}
+ */
+
+/** @def RTAssertReleasePanic()
+ * Invokes RTAssertShouldPanic and RTAssertDoPanic.
+ *
+ * It might seem odd that RTAssertShouldPanic is necessary when its result isn't
+ * checked, but it's done since RTAssertShouldPanic is overrideable and might be
+ * used to bail out before taking down the system (the VMMR0 case).
+ */
+#define RTAssertReleasePanic() do { RTAssertShouldPanic(); RTAssertDoPanic(); } while (0)
+ +
+/** @def AssertRelease
+ * Assert that an expression is true. If it's not hit a breakpoint.
+ *
+ * @param expr Expression which should be true.
+ */
+#define AssertRelease(expr) \ 
+    do { \ 
+        if (RT_LIKELY(!!(expr))) \ 
+        { /* likely */ } \ 
+        else \ 
+        { \ 
+            RTAssertMsg1Weak(#expr, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \ 
+            RTAssertReleasePanic(); \ 
+        } \ 
+    } while (0)
+ +
+/** @def AssertReleaseReturn
+ * Assert that an expression is true, hit a breakpoint and return if it isn't.
+ *
+ * @param expr Expression which should be true.
+ * @param rc What is to be presented to return.
+ */
+#define AssertReleaseReturn(expr, rc) \ 
+    do { \ 
+        if (RT_LIKELY(!!(expr))) \ 
+        { /* likely */ } \ 
+        else \ 
+        { \ 
+            RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+            RTAssertReleasePanic(); \ 
+            return (rc); \ 
+        } \ 
+    } while (0)
+ +
+/** @def AssertReleaseReturnVoid
+ * Assert that an expression is true, hit a breakpoint and return if it isn't.
+ *
+ * @param expr Expression which should be true.
+ */
+#define AssertReleaseReturnVoid(expr) \ 
+    do { \ 
+        if (RT_LIKELY(!!(expr))) \ 
+        { /* likely */ } \

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else \ 
  { \ 
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
    RTAssertReleasePanic(); \ 
    return; \ 
  } \ 
} while (0) 
+
+
+/** @def AssertReleaseBreak 
+ * Assert that an expression is true, hit a breakpoint and break if it isn't. 
+ *
+ * @param expr Expression which should be true. 
+ */
+#define AssertReleaseBreak(expr) \ 
  if (RT_LIKELY(!!(expr))) \ 
  { /* likely */ } \ 
  else if (1) \ 
  { \ 
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
    RTAssertReleasePanic(); \ 
    break; \ 
  } else \ 
  break 
+
+/** @def AssertReleaseBreakStmt 
+ * Assert that an expression is true, hit a breakpoint and break if it isn't. 
+ *
+ * @param expr Expression which should be true. 
+ * @param stmt Statement to execute before break in case of a failed assertion. 
+ */
+#define AssertReleaseBreakStmt(expr, stmt) \ 
  if (RT_LIKELY(!!(expr))) \ 
  { /* likely */ } \ 
  else if (1) \ 
  { \ 
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \ 
    RTAssertReleasePanic(); \ 
    stmt; \ 
    break; \ 
  } else \ 
  break 
+
+/** @def AssertReleaseMsg 
+ * Assert that an expression is true, print the message and hit a breakpoint if it isn't. 
+ *
+ * @param expr Expression which should be true.
+ * @param a printf argument list (in parenthesis).
+ */
+#define AssertReleaseMsg(expr, a) \   
+ do { \  
+ if (RT_LIKELY(!!(expr))) \   
+ { /* likely */ } \  
+ else \  
+ { \  
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \  
+ RTAssertMsg2Weak a; \  
+ RTAssertReleasePanic(); \  
+ } \  
+ } while (0)  
  
+/** @def AssertReleaseMsgReturn \   
+ * Assert that an expression is true, print the message and hit a breakpoint and return if it isn't. \   
+ */ \   
+@def AssertReleaseMsgReturn(expr, a, rc) \   
+ do { \  
+ if (RT_LIKELY(!!(expr))) \  
+ { /* likely */ } \  
+ else \  
+ { \  
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \  
+ RTAssertMsg2Weak a; \  
+ RTAssertReleasePanic(); \  
+ return (rc); \  
+ } \  
+ } while (0)  
  
+/** @def AssertReleaseMsgReturnVoid \   
+ * Assert that an expression is true, print the message and hit a breakpoint and return if it isn't. \   
+ */ \   
+#define AssertReleaseMsgReturnVoid(expr, a) \   
+ do { \  
+ if (RT_LIKELY(!!(expr))) \  
+ { /* likely */ } \  
+ else \  
+ { \  
+ RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); \  
+ RTAssertMsg2Weak a; \
RTAssertReleasePanic();
return;
}
while (0)
+
+
/** @def AssertReleaseMsgBreak
+ * Assert that an expression is true, print the message and hit a breakpoint and break if it isn't.
+ *
+ * @param   expr    Expression which should be true.
+ * @param   a       printf argument list (in parenthesis).
+ */
+#define AssertReleaseMsgBreak(expr, a)  
+ if (RT_LIKELY(!!(expr))) 
+ { /* likely */ } 
+ else if (1) 
+ { 
+   RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+   RTAssertMsg2Weak a; 
+   RTAssertReleasePanic(); 
+   break; 
+ } else 
+   break
+
+/** @def AssertReleaseMsgBreakStmt
+ * Assert that an expression is true, print the message and hit a breakpoint and break if it isn't.
+ *
+ * @param   expr    Expression which should be true.
+ * @param   a       printf argument list (in parenthesis).
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ */
+#define AssertReleaseMsgBreakStmt(expr, a, stmt)  
+ if (RT_LIKELY(!!(expr))) 
+ { /* likely */ } 
+ else if (1) 
+ { 
+   RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__); 
+   RTAssertMsg2Weak a; 
+   RTAssertReleasePanic(); 
+   stmt; 
+   break; 
+ } else 
+   break
+
+/** @def AssertReleaseFailed
+ * An assertion failed, hit a breakpoint.
+ */
+`define AssertReleaseFailed() \
+  do { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+    RTAssertReleasePanic(); \
+  } while (0) 
+
+/** @def AssertReleaseFailedReturn 
+ * An assertion failed, hit a breakpoint and return. 
+ */ 
+/** @param rc What is to be presented to return. 
+ */ 
+`define AssertReleaseFailedReturn(rc) \
+  do { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+    RTAssertReleasePanic(); \
+    return (rc); \
+  } while (0) 
+
+/** @def AssertReleaseFailedReturnVoid 
+ * An assertion failed, hit a breakpoint and return. 
+ */ 
+`define AssertReleaseFailedReturnVoid() \
+  do { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+    RTAssertReleasePanic(); \
+    return; \
+  } while (0) 
+
+/** @def AssertReleaseFailedBreak 
+ * An assertion failed, hit a breakpoint and break. 
+ */ 
+`define AssertReleaseFailedBreak() \
+  if (1) { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
+    RTAssertReleasePanic(); \
+    break; \
+  } else \n+    break 
+
+/** @def AssertReleaseFailedBreakStmt 
+ * An assertion failed, hit a breakpoint and break. 
+ */ 
+/** @param stmt Statement to execute before break. 
+ */ 
+`define AssertReleaseFailedBreakStmt(stmt) \
+  if (1) { \
+    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \

RTAssertReleasePanic();
stmt;
break;
} else
break

/** @def AssertReleaseMsgFailed
 * An assertion failed, print a message and hit a breakpoint.
 *
 * @param a printf argument list (in parenthesis).
 */
#define AssertReleaseMsgFailed(a) \
  do { \
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION \__PRETTY_FUNCTION__); \
    RTAssertMsg2Weak a; \
    RTAssertReleasePanic(); \
  } while (0)

/** @def AssertReleaseMsgFailedReturn
 * An assertion failed, print a message, hit a breakpoint and return.
 *
 * @param a printf argument list (in parenthesis).
 * @param rc What is to be presented to return.
 */
#define AssertReleaseMsgFailedReturn(a, rc) \
  do { \
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
    RTAssertMsg2Weak a; \
    RTAssertReleasePanic(); \
    return (rc); \
  } while (0)

/** @def AssertReleaseMsgFailedReturnVoid
 * An assertion failed, print a message, hit a breakpoint and return.
 *
 * @param a printf argument list (in parenthesis).
 */
#define AssertReleaseMsgFailedReturnVoid(a) \
  do { \
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
    RTAssertMsg2Weak a; \
    RTAssertReleasePanic(); \
    return; \
  } while (0)


/** @def AssertReleaseMsgFailedBreak
 * An assertion failed, print a message, hit a breakpoint and break.
 * *
 * @param   a  printf argument list (in parenthesis).
 * @*/
#define AssertReleaseMsgFailedBreak(a) \
    if (1) { \
        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
        RTAssertMsg2Weak a; \ 
        RTAssertReleasePanic(); \ 
        break; \ 
    } else \ 
    break \

/** @def AssertReleaseMsgFailedBreakStmt
 * An assertion failed, print a message, hit a breakpoint and break.
 * *
 * @param   a  printf argument list (in parenthesis).
 * @param   stmt  Statement to execute before break.
 * @*/
#define AssertReleaseMsgFailedBreakStmt(a, stmt) \
    if (1) { \
        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
        RTAssertMsg2Weak a; \ 
        RTAssertReleasePanic(); \ 
        stmt; \ 
        break; \ 
    } else \ 
    break \

/** @} */

/** @name Fatal Assertions
 * These are similar to release assertions except that you cannot ignore them in
 * any way, they will loop for ever if RTAssertDoPanic returns.
 * *
 * @*/
/** @def AssertFatal
 * Assert that an expression is true. If it's not hit a breakpoint (for ever).
 * *
 * @param   expr  Expression which should be true.
 * @*/
#define AssertFatal(expr)  \
    do { \
    RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, __PRETTY_FUNCTION__); \
    RTAssertMsg2Weak a; \ 
    RTAssertReleasePanic(); \ 
    expr; \ 
    break; \ 
    } else \ 
    break \

/** @} */
if (RT_LIKELY(!(expr)))
{ /* likely */ }
else
for (;;)
{
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
    RTAssertReleasePanic();
}
} while (0)

/** @def AssertFatalMsg
 * Assert that an expression is true, print the message and hit a breakpoint (for ever) if it isn't.
 * @param   expr    Expression which should be true.
 * @param   a       printf argument list (in parenthesis).
 */
#define AssertFatalMsg(expr, a) do { if (RT_LIKELY(!(expr)))
{ /* likely */ }
else
for (;;)
{
    RTAssertMsg1Weak(#expr, __LINE__, __FILE__, __PRETTY_FUNCTION__);
    RTAssertMsg2Weak a;
    RTAssertReleasePanic();
} while (0)
+/** @def AssertFatalFailed
 * An assertion failed, hit a breakpoint (for ever).
 */
#define AssertFatalFailed() do { for (;;)
{ RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__);
    RTAssertReleasePanic();
} while (0)
+/** @def AssertFatalMsgFailed
 * An assertion failed, print a message and hit a breakpoint (for ever).
 * @param   a   printf argument list (in parenthesis).
 */
#define AssertFatalMsgFailed(a)
do { \
    for (;;) \
    { \
        RTAssertMsg1Weak((const char *)0, __LINE__, __FILE__, RT_GCC_EXTENSION __PRETTY_FUNCTION__); \
        RTAssertMsg2Weak a; \
        RTAssertReleasePanic(); \
    } \
} while (0)

/** @} */

/** @name Convenience Assertions Macros
 * @{
 *
 +/** @def AssertRC
 + * Asserts a iprt status code successful.
 + *
 + * On failure it will print info about the rc and hit a breakpoint.
 + *
 + * @param   rc  iprt status code.
 + * @remark  rc is referenced multiple times. In release mode is NOREF('ed).
 + */
+#define AssertRC(rc) AssertMsgRC(rc, ("%Rra\n", (rc)))
 +
 +/** @def AssertRCStmt
 + * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and execute
 + * @a stmt if it isn't.
 + *
 + * @param   rc      iprt status code.
 + * @param   stmt    Statement to execute before returning in case of a failed
 + *                  assertion.
 + * @remark  rc is referenced multiple times. In release mode is NOREF('ed).
 + */
+#define AssertRCStmt(rc, stmt) AssertMsgRCStmt(rc, ("%Rra\n", (rc)), stmt)
 +
 +/** @def AssertRCReturn
 + * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and return if it isn't.
 + *
 + * @param   rc      iprt status code.
 + * @param   rcRet   What is to be presented to return.
 + * @remark  rc is referenced multiple times. In release mode is NOREF('ed).
 + */
+#define AssertRCReturn(rc, rcRet) AssertMsgRCReturn(rc, ("%Rra\n", (rc)), rcRet)
### @def AssertRCReturnStmt

- * Asserts a iprt status code successful, bitch (RT_STRICT mode only), execute
  - * stmt and returns @a rcRet if it isn't.
  + *
  + * @param rc    iprt status code.
  + * @param stmt  Statement to execute before returning in case of a failed assertion.
  + * @param rcRet What is to be presented to return.
  + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
  + */

```c
#define AssertRCReturnStmt(rc, stmt, rcRet) AssertMsgRCReturnStmt(rc, ("%Rra\n", (rc)), stmt, rcRet)
```

### @def AssertRCReturnVoid

- * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and return if it isn't.
  + *
  + * @param rc    iprt status code.
  + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
  + */

```c
#define AssertRCReturnVoid(rc) AssertMsgRCReturnVoid(rc, ("%Rra\n", (rc)))
```

### @def AssertRCReturnVoidStmt

- * Asserts a iprt status code successful, bitch (RT_STRICT mode only), and execute the given statement/return if it isn't.
  + *
  + * @param rc    iprt status code.
  + * @param stmt  Statement to execute before returning on failure.
  + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
  + */

```c
#define AssertRCReturnVoidStmt(rc, stmt) AssertMsgRCReturnVoidStmt(rc, ("%Rra\n", (rc)), stmt)
```

### @def AssertRCBreak

- * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and break if it isn't.
  + *
  + * @param rc    iprt status code.
  + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
  + */

```c
#define AssertRCBreak(rc) AssertMsgRCBreak(rc, ("%Rra\n", (rc)))
```

### @def AssertRCBreakStmt

- * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and break if it isn't.
  + *
  + * @param rc    iprt status code.
  + * @param stmt  Statement to execute before break in case of a failed assertion.
  + * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
  + */

```c
#define AssertRCBreakStmt rc, stmt) AssertMsgRCBreakStmt(rc, ("%Rra\n", (rc)), stmt)
```

### @def AssertMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * It prints a custom message and hits a breakpoint on FAILURE.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+
+#define AssertMsgRC(rc, msg) \
+    do { AssertMsg(RT_SUCCESS_NP(rc), msg); NOREF(rc); } while (0)
+
+/** @def AssertMsgRCStmt
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and
+ * execute @a stmt if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @param   stmt    Statement to execute before returning in case of a failed
+ *                  assertion.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+
+#define AssertMsgRCStmt(rc, msg, stmt) \
+    do { AssertMsgStmt(RT_SUCCESS_NP(rc), msg, stmt); NOREF(rc); } while (0)
+
+/** @def AssertMsgRCReturn
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and return
+ * @a rcRet if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+
+#define AssertMsgRCReturn(rc, msg, rcRet) \
+    do { AssertMsgReturn(RT_SUCCESS_NP(rc), msg, rcRet); NOREF(rc); } while (0)
+
+/** @def AssertMsgRCReturnStmt
+ * Asserts a iprt status code successful, bitch (RT_STRICT mode only), execute
+ * @a stmt and return @a rcRet if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @param   stmt    Statement to execute before returning in case of a failed
+ *                  assertion.
+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+
+#define AssertMsgRCReturnStmt(rc, msg, stmt, rcRet) \
do { AssertMsgReturnStmt(RT_SUCCESS_NP(rc), msg, stmt, rcRet); NOREF(rc); } while (0)

/** @def AssertMsgRCReturnVoid
  * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and return
  * void if it isn't.
  *
  * @param   rc      iprt status code.
  * @param   msg     printf argument list (in parenthesis).
  * @remark  rc is referenced multiple times. In release mode is NOREF('ed).
  */
#define AssertMsgRCReturnVoid(rc, msg) \
  do { AssertMsgRCReturnVoid(RT_SUCCESS(rc), msg); NOREF(rc); } while (0)

/** @def AssertMsgRCReturnVoidStmt
  * Asserts a iprt status code successful, bitch (RT_STRICT mode only), execute
  * @a stmt and return void if it isn't.
  *
  * @param   rc      iprt status code.
  * @param   msg     printf argument list (in parenthesis).
  * @param   stmt    Statement to execute before break in case of a failed assertion.
  * @remark  rc is referenced multiple times. In release mode is NOREF('ed).
  */
#define AssertMsgRCReturnVoidStmt(rc, msg, stmt) \
  do { AssertMsgRCReturnVoidStmt(RT_SUCCESS(rc), msg, stmt); NOREF(rc); } while (0)

/** @def AssertMsgRCBreak
  * Asserts a iprt status code successful, bitch (RT_STRICT mode only) and break
  * if it isn't.
  *
  * @param   rc      iprt status code.
  * @param   msg     printf argument list (in parenthesis).
  * @remark  rc is referenced multiple times. In release mode is NOREF('ed).
  */
#define AssertMsgRCBreak(rc, msg) \
  if (1) { AssertMsgBreak(RT_SUCCESS(rc), msg); NOREF(rc); } else do {} while (0)

/** @def AssertMsgRCBreakStmt
  * Asserts a iprt status code successful, bitch (RT_STRICT mode only), execute
  * @a stmt and break if it isn't.
  *
  * @param   rc      iprt status code.
  * @param   msg     printf argument list (in parenthesis).
  * @param   stmt    Statement to execute before break in case of a failed assertion.
  * @remark  rc is referenced multiple times. In release mode is NOREF('ed).
  */
#define AssertMsgRCBreakStmt(rc, msg, stmt) \
  if (1) { AssertMsgBreakStmt(RT_SUCCESS_NP(rc), msg, stmt); NOREF(rc); } else do {} while (0)

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+/** @def AssertRCSuccess
+ * Asserts an iprt status code equals VINF_SUCCESS.
+ * On failure it will print info about the rc and hit a breakpoint.
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCSuccess(rc) do { AssertMsg((rc) == VINF_SUCCESS, (“%Rra\n”, (rc))); NOREF(rc);
+ while (0)
+ +/** @def AssertRCSuccessReturn
+ * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and return if it isn’t.
+ * @param rc iprt status code.
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCSuccessReturn(rc, rcRet) AssertMsgReturn((rc) == VINF_SUCCESS, (“%Rra\n”, (rc)), rcRet)
+ +/** @def AssertRCSuccessReturnVoid
+ * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and return if it isn’t.
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCSuccessReturnVoid(rc) AssertMsgReturnVoid((rc) == VINF_SUCCESS, (“%Rra\n”, (rc)))
+ +/** @def AssertRCSuccessBreak
+ * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and break if it isn’t.
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times. In release mode is NOREF()'ed.
+ */
+#define AssertRCSuccessBreak(rc) AssertMsgBreak((rc) == VINF_SUCCESS, (“%Rra\n”, (rc)))
+ +/** @def AssertRCSuccessBreakStmt
+ * Asserts that an iprt status code equals VINF_SUCCESS, bitch (RT_STRICT mode only) and break if it isn’t.
+ * @param rc iprt status code.
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ */
+#define AssertRCSuccessBreakStmt(rc, stmt) AssertMsgBreakStmt((rc) == VINF_SUCCESS, (“%Rra\n”, (rc)), stmt)
+ +/** @def AssertLogRelRC
+ * Asserts a iprt status code successful.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
#define AssertLogRelRC(rc) AssertLogRelMsgRC((rc))

+/** @def AssertLogRelRCReturn
+ * Asserts a iprt status code successful, returning \a rc if it isn't.
+ *
+ * @param rc iprt status code.
+ * @param rcRet What is to be presented to return.
+ *
+ */
#define AssertLogRelRCReturn(rc, rcRet) AssertLogRelMsgRCReturn(rc, rcRet)

+/** @def AssertLogRelRCReturnStmt
+ * Asserts a iprt status code successful, executing \a stmt and returning \a rc
+ * if it isn't.
+ *
+ * @param rc iprt status code.
+ * @param stmt Statement to execute before returning in case of a failed
+ * assertion.
+ * @param rcRet What is to be presented to return.
+ *
+ */
#define AssertLogRelRCReturnStmt(rc, stmt, rcRet) AssertLogRelMsgRCReturnStmt(rc, stmt, rcRet)

+/** @def AssertLogRelRCReturnVoid
+ * Asserts a iprt status code successful, returning (void) if it isn't.
+ *
+ * @param rc iprt status code.
+ *
+ */
#define AssertLogRelRCReturnVoid(rc) AssertLogRelMsgRCReturnVoid(rc)

+/** @def AssertLogRelRCBreak
+ * Asserts a iprt status code successful, breaking if it isn't.
+ *
+ * @param rc iprt status code.
+ *
+ */
#define AssertLogRelRCBreak(rc) AssertLogRelMsgRCBreak(rc)

+/** @def AssertLogRelRCBreakStmt
+ * Asserts a iprt status code successful, execute \a statement and break if it isn't.
+ *
+ *
+ * @param rc iprt status code.
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertLogRelRCBreakStmt(rc, stmt)   AssertLogRelMsgRCBreakStmt(rc, ("%Rra\n", (rc)), stmt) +
+/** @def AssertLogRelMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+#define AssertLogRelMsgRC(rc, msg)       AssertLogRelMsg(RT_SUCCESS_NP(rc), msg) +
+/** @def AssertLogRelMsgRCReturn
+ * Asserts a iprt status code successful.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertLogRelMsgRCReturn(rc, msg, rcRet) AssertLogRelMsgReturn(RT_SUCCESS_NP(rc), msg, rcRet) +
+/** @def AssertLogRelMsgRCReturnStmt
+ * Asserts a iprt status code successful, execute `stmt` and return on
+ * failure.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @param stmt Statement to execute before returning in case of a failed
+ * assertion.
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertLogRelMsgRCReturnStmt(rc, msg, stmt, rcRet) AssertLogRelMsgReturnStmt(RT_SUCCESS_NP(rc), msg, stmt, rcRet) +
+/** @def AssertLogRelMsgRCReturnVoid
+ * Asserts a iprt status code successful.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+#define AssertLogRelMsgRCReturnVoid(rc, msg)   AssertLogRelMsgReturnVoid(RT_SUCCESS_NP(rc), msg) +
+/** @def AssertLogRelMsgRCBreak
+ * Asserts a iprt status code successful.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertLogRelMsgRCBreak(rc, msg)           AssertLogRelMsgBreak(RT_SUCCESS(rc), msg)
+
+/** @def AssertLogRelMsgRCBreakStmt
+ * Asserts a iprt status code successful, execute `stmt` and break if it isn't.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertLogRelMsgRCBreakStmt(rc, msg, stmt) AssertLogRelMsgBreakStmt(RT_SUCCESS_NP(rc), msg, stmt)
+
+/** @def AssertLogRelRCSuccess
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc  iprt status code.
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertLogRelRCSuccess(rc)               AssertLogRelMsg((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+
+/** @def AssertLogRelRCSuccessReturn
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc      iprt status code.
+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertLogRelRCSuccessReturn(rc, rcRet)  AssertLogRelMsgReturn((rc) == VINF_SUCCESS, ("%Rra\n", (rc)), rcRet)
+
+/** @def AssertLogRelRCSuccessReturnVoid
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc      iprt status code.
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertLogRelRCSuccessReturnVoid(rc)     AssertLogRelMsgReturnVoid((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+}
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc   iprt status code.
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertLogRelRCSuccessBreak(rc) AssertLogRelMsgBreak((rc) == VINF_SUCCESS, (%Rra\n", (rc)))
+
+/** @def AssertLogRelRCSuccessBreakStmt
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * @param   rc   iprt status code.
+ * @param   stmt Statement to execute before break in case of a failed assertion.
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertLogRelRCSuccessBreakStmt(rc, stmt) AssertLogRelMsgBreakStmt((rc) == VINF_SUCCESS, (%Rra\n", (rc)), stmt)
+
+/** @def AssertReleaseRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param   rc   iprt status code.
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertReleaseRC(rc) AssertReleaseMsgRC(rc, (%Rra\n", (rc)))
+
+/** @def AssertReleaseRCReturn
+ * Asserts a iprt status code successful, returning if it isn’t.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param   rc   iprt status code.
+ * @param   rcRet What is to be presented to return.
+ * @remark   rc is referenced multiple times.
+ */
+#define AssertReleaseRCReturn(rc, rcRet) AssertReleaseMsgRCReturn(rc, (%Rra\n", (rc)), rcRet)
+
+/** @def AssertReleaseRCReturnVoid
+ * Asserts a iprt status code successful, returning if it isn’t.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param   rc   iprt status code.
```c
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertReleaseRCReturnVoid(rc) AssertReleaseMsgRCReturnVoid(rc, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseRCBreak
+ * Asserts a iprt status code successful, breaking if it isn't.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally breaking the current statement if the breakpoint is somehow ignored.
+ *
+ * @param   rc      iprt status code.
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertReleaseRCBreak(rc) AssertReleaseMsgRCBreak(rc, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseRCBreakStmt
+ * Asserts a iprt status code successful, break if it isn't.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally the break statement will be issued if the breakpoint is somehow ignored.
+ *
+ * @param   rc      iprt status code.
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertReleaseRCBreakStmt(rc, stmt) AssertReleaseMsgRCBreakStmt(rc, ("%Rra\n", (rc)), stmt)
+
+/** @def AssertReleaseMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed and a breakpoint is hit.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRC(rc, msg) AssertReleaseMsg(RT_SUCCESS_NP(rc), msg)
+
+/** @def AssertReleaseMsgRCReturn
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @param   rcRet   What is to be presented to return.
+ * @remark  rc is referenced multiple times.
+ */
```

---

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#define AssertReleaseMsgRCReturn(rc, msg, rcRet)    AssertReleaseMsgReturn(RT_SUCCESS_NP(rc), msg, rcRet)
+
+/** @def AssertReleaseMsgRCReturnVoid
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRCReturnVoid(rc, msg)    AssertReleaseMsgReturnVoid(RT_SUCCESS_NP(rc), msg)
+
+/** @def AssertReleaseMsgRCBreak
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * breaking the current status if the breakpoint is somehow ignored.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRCBreak(rc, msg)        AssertReleaseMsgBreak(RT_SUCCESS(rc), msg)
+
+/** @def AssertReleaseMsgRCBreakStmt
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed, a breakpoint is hit, and finally
+ * the break statement is issued if the breakpoint is somehow ignored.
+ *
+ * @param   rc      iprt status code.
+ * @param   msg     printf argument list (in parenthesis).
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ * @remark  rc is referenced multiple times.
+ */
+#define AssertReleaseMsgRCBreakStmt(rc, msg, stmt)  AssertReleaseMsgBreakStmt(RT_SUCCESS_NP(rc), msg, stmt)
+
+/** @def AssertReleaseRCSuccess
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param   rc  iprt status code.
+* @remark rc is referenced multiple times.
+*/
+#define AssertReleaseRCSuccess(rc) AssertReleaseMsg((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseRCSuccessReturn
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @param rcRet What is to be presented to return.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccessReturn(rc, rcRet) AssertReleaseMsgReturn((rc) == VINF_SUCCESS, ("%Rra\n", (rc)), rcRet)
+
+/** @def AssertReleaseRCSuccessReturnVoid
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally returning from the function if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccessReturnVoid(rc) AssertReleaseMsgReturnVoid((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseRCSuccessBreak
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally breaking the current statement if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertReleaseRCSuccessBreak(rc) AssertReleaseMsgBreak((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+
+/** @def AssertReleaseRCSuccessBreakStmt
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed, a breakpoint hit
+ * and finally the break statement will be issued if the breakpoint is somehow ignored.
+ *
+ * @param rc iprt status code.
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertRelease RCSuccessBreakStmt(rc, stmt) AssertReleaseMsgBreakStmt((rc) == VINF_SUCCESS, 
("%Rra\n", (rc)), stmt)
+
+ /*
** @def AssertFatalRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertFatalRC(rc) AssertFatalMsgRC(rc, (%Rra\n", (rc)))
+
+ /*
** @def AssertFatalMsgRC
+ * Asserts a iprt status code successful.
+ *
+ * On failure a custom message is printed and a breakpoint is hit.
+ *
+ * @param rc iprt status code.
+ * @param msg printf argument list (in parenthesis).
+ * @remark rc is referenced multiple times.
+ */
+#define AssertFatalMsgRC(rc, msg) AssertFatalMsg(RT_SUCCESS_NP(rc), msg)
+
+ /*
** @def AssertFatalRCSuccess
+ * Asserts that an iprt status code equals VINF_SUCCESS.
+ *
+ * On failure information about the error will be printed and a breakpoint hit.
+ *
+ * @param rc iprt status code.
+ * @remark rc is referenced multiple times.
+ */
+#define AssertFatalRCSuccess(rc) AssertFatalMsg((rc) == VINF_SUCCESS, ("%Rra\n", (rc)))
+
+ /*
** @def AssertPtr
+ * Asserts that a pointer is valid.
+ *
+ * @param pv The pointer.
+ */
+#define AssertPtr(pv) AssertMsg(VALID_PTR(pv), ("%p\n", (pv)))
+
+ /*
** @def AssertPtrReturn
+ * Asserts that a pointer is valid.
/** @def AssertPtrReturn
 * Asserts that a pointer is valid.
 *
 * @param   pv      The pointer.
 * @param   rcRet   What is to be presented to return.
 */
#define AssertPtrReturn(pv, rcRet)      AssertMsgReturn(VALID_PTR(pv), ("%p\n", (pv)), rcRet)
+
+/** @def AssertPtrReturnVoid
+ * Asserts that a pointer is valid.
+ *
+ * @param   pv      The pointer.
+ */
+#define AssertPtrReturnVoid(pv)         AssertMsgReturnVoid(VALID_PTR(pv), ("%p\n", (pv)))
+
+/** @def AssertPtrBreak
+ * Asserts that a pointer is valid.
+ *
+ * @param   pv      The pointer.
+ */
+#define AssertPtrBreak(pv)              AssertMsgBreak(VALID_PTR(pv), ("%p\n", (pv)))
+
+/** @def AssertPtrBreakStmt
+ * Asserts that a pointer is valid.
+ *
+ * @param   pv      The pointer.
+ * @param   stmt    Statement to execute before break in case of a failed assertion.
+ */
+#define AssertPtrBreakStmt(pv, stmt)    AssertMsgBreakStmt(VALID_PTR(pv), ("%p\n", (pv)), stmt)
+
+/** @def AssertPtrNull
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param   pv      The pointer.
+ */
+#define AssertPtrNull(pv)               AssertMsg(VALID_PTR(pv) || (pv) == NULL, ("%p\n", (pv)))
+
+/** @def AssertPtrNullReturn
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param   pv      The pointer.
+ * @param   rcRet   What is to be presented to return.
+ */
+#define AssertPtrNullReturn(pv, rcRet) AssertMsgReturn(VALID_PTR(pv) || (pv) == NULL, ("%p\n", (pv)), rcRet)
+
+/** @def AssertPtrNullReturnVoid
+ * Asserts that a pointer is valid or NULL.
+ *
+ * @param   pv      The pointer.
+ */

+ */
+ #define AssertPtrNullReturnVoid(pv) AssertMsgReturnVoid(VALID_PTR(pv) || (pv) == NULL, (%p
, (pv)))
+ */
+ /* @def AssertPtrNullBreak
+ * Asserts that a pointer is valid or NULL.
+ * @param pv The pointer.
+ */
+ #define AssertPtrNullBreak(pv) AssertMsgBreak(VALID_PTR(pv) || (pv) == NULL, (%p
, (pv)))
+ */
+ /* @def AssertPtrNullBreakStmt
+ * Asserts that a pointer is valid or NULL.
+ * @param pv The pointer.
+ * @param stmt Statement to execute before break in case of a failed assertion.
+ */
+ #define AssertPtrNullBreakStmt(pv, stmt) AssertMsgBreakStmt(VALID_PTR(pv) || (pv) == NULL, (%p
, (pv)), stmt)
+ */
+ /* @def AssertGCPhys32
+ * Asserts that the high word of a physical address is zero
+ * @param GCPhys The address (RTGCPHYS).
+ */
+ #define AssertGCPhys32(GCPhys) AssertMsg(VALID_PHYS32(GCPhys), (%RGp
, (RTGCPHYS)(GCPhys)))
+ */
+ /* @def AssertGCPtr32
+ * Asserts that the high word of a physical address is zero
+ * @param GCPtr The address (RTGCPTLR).
+ */
+ #if GC_ARCH_BITS == 32
+ # define AssertGCPtr32(GCPtr) do { } while (0)
+ #else
+ # define AssertGCPtr32(GCPtr) AssertMsg(!((GCPtr) & UINT64_C(0xffffffff00000000)), (%RGv
, GCPtr))
+ #endif
+ */
+ /* @def AssertForEach
+ * Equivalent to Assert for each value of the variable from the starting
+ * value to the finishing one.
+ * @param var Name of the counter variable.
+ * @param vartype Type of the counter variable.
+ * @param first Lowest inclusive value of the counter variable.
+ * This must be free from side effects.
+ * @param end Highest exclusive value of the counter variable.
+ * This must be free from side effects.
+ * @param expr Expression which should be true for each value of @a var.
+ */
+#define AssertForEach(var, vartype, first, end, expr)\
  do {\
    vartype var;\
    Assert((first) == (first) && (end) == (end)); /* partial check for side effects */\
    for (var = (first); var < (end); var++)\
      AssertMsg(expr, ("%s = %#RX64 (%RI64)", #var, (uint64_t)var, (int64_t)var));\
  } while (0)
#
define AssertNtStatus
+ * Asserts that the NT_SUCCESS() returns true for the given NTSTATUS value.
+ *
+ * @param a_rcNt The NTSTATUS to check. Will be evaluated twice and
+ * subjected to NOREF().
+ * @sa AssertRC()
+ */
+ define AssertNtStatus(a_rcNt)\
  do { AssertMsg(NT_SUCCESS(a_rcNt), ("%#x\n", (a_rcNt))); NOREF(a_rcNt); } while (0)
+/#define AssertNtStatusSuccess
+ * Asserts that the given NTSTATUS value equals STATUS_SUCCESS.
+ *
+ * @param a_rcNt The NTSTATUS to check. Will be evaluated twice and
+ * subjected to NOREF().
+ * @sa AssertRCSuccess()
+ */
+ define AssertNtStatusSuccess(a_rcNt)\
  do { AssertMsg((a_rcNt) == STATUS_SUCCESS, ("%#x\n", (a_rcNt))); NOREF(a_rcNt); } while (0)
+*/
+ @} */
+
+@} */
+
+#endif /* RT_OS_WINDOWS */
+
+*/
+ @ ] */
+
+*/
+ @ ] */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/assertcompile.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/assertcompile.h
@@ -0,0 +1,236 @@
+/** @file
+ * IPRT - Compile Time Assertions.
+ */
/*
 * Copyright (C) 2006-2017 Oracle Corporation
 *
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 * available from http://www.virtualbox.org. This file is free software;
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 * terms and conditions of either the GPL or the CDDL or both.
 */

#ifndef ___iprt_assertcompile_h
#define ___iprt_assertcompile_h

#include <iprt/cdefs.h>

/** @defgroup  grp_rt_assert_compile    Compile time assertions
 * @ingroup grp_rt
 *
 * These assertions are used to check structure sizes, member/size alignments
 * and similar compile time expressions.
 *
 * @remarks As you might have noticed, the AssertCompile macros don't follow the
 * coding guidelines wrt to macros supposedly being all uppercase and
 * underscored. For various reasons they don't, and nobody has
 * complained yet.
 *
 * @}
 */

/**
 * RTASSERTTYPE is the type the AssertCompile() macro redefines.
 * It has no other function and shouldn't be used.
 *
 * Visual C++ uses this.
 */
typedef int RTASSERTTYPE[1];
/**
 * RTASSERTVAR is the type the AssertCompile() macro redefines.
 * It has no other function and shouldn't be used.
 * GCC uses this.
 */
#ifdef __GNUC__
RT_C_DECLS_BEGIN
#endif
extern int RTASSERTVAR[1];
#ifdef __GNUC__
RT_C_DECLS_END
#endif
+
/** @def RTASSERT_HAVE_STATIC_ASSERT
 * Indicates that the compiler implements static_assert(expr, msg).
 */
#ifdef _MSC_VER
# if _MSC_VER >= 1600 && defined(__cplusplus)
# define RTASSERT_HAVE_STATIC_ASSERT
# endif
#endif
#if defined(__GNUC__) && defined(__GXX_EXPERIMENTAL_CXX0X__)
# define RTASSERT_HAVE_STATIC_ASSERT
#endif
#if RT_CLANG_PREREQ(6, 0)
# if __has_feature(cxx_static_assert) || __has_feature(c_static_assert)
# define RTASSERT_HAVE_STATIC_ASSERT
# endif
#endif
#ifdef DOXYGEN_RUNNING
# define RTASSERT_HAVE_STATIC_ASSERT
#endif
+
/** @def AssertCompileNS
 * Asserts that a compile-time expression is true. If it's not break the build.
 * This differs from AssertCompile in that it accepts some more expressions
 * than what C++0x allows - NS = Non-standard.
 * @param expr Expression which should be true.
 */
#ifdef __GNUC__
# define AssertCompileNS(expr) extern int RTASSERTVAR[1] __attribute__((__unused__)),
RTASSERTVAR[(expr) ? 1 : 0] __attribute__((__unused__))
#elif defined(__IBMC__) || defined(__IBMCPP__)
# define AssertCompileNS(expr) extern int RTASSERTVAR[(expr) ? 1 : 0]
#else
# define AssertCompileNS(expr) typedef int RTASSERTTYPE[(expr) ? 1 : 0]
/** @def AssertCompile
 * Asserts that a C++0x compile-time expression is true. If it's not break the
 * build.
 * @param expr Expression which should be true.
 */
#ifdef RTASSERT_HAVE_STATIC_ASSERT
#define AssertCompile(expr) static_assert(!!(expr), #expr)
#else
#define AssertCompile(expr) AssertCompileNS(expr)
#endif

/** @def AssertCompileSize
 * Asserts a size at compile.
 * @param type The type.
 * @param size The expected type size.
 */
#define AssertCompileSize(type, size) \
    AssertCompile(sizeof(type) == (size))

/** @def AssertCompileSizeAlignment
 * Asserts a size alignment at compile.
 * @param type The type.
 * @param align The size alignment to assert.
 */
#define AssertCompileSizeAlignment(type, align) \
    AssertCompile(!(sizeof(type) & ((align) - 1)))
/** @def AssertCompileMemberSize
+ * Asserts a member offset alignment at compile.
+ * @param type The type.
+ * @param member The member.
+ * @param size The member size to assert.
+ */
+\#define AssertCompileMemberSize(type, member, size) \
  AssertCompile(RTASSERT_OFFSET_OF(type, member) == (size))
+
/** @def AssertCompileMemberSizeAlignment
+ * Asserts a member size alignment at compile.
+ * @param type The type.
+ * @param member The member.
+ * @param align The member size alignment to assert.
+ */
+\#define AssertCompileMemberSizeAlignment(type, member, align) \
  AssertCompile(!(RTASSERT_OFFSET_OF(type, member) & ((align) - 1)))
+
/** @def AssertCompileMemberAlignment
+ * Asserts a member offset alignment at compile.
+ * @param type The type.
+ * @param member The member.
+ * @param align The member offset alignment to assert.
+ */
+\#define AssertCompileMemberAlignment(type, member, align) \
  AssertCompile(!(RTASSERT_OFFSET_OF(type, member) & ((align) - 1)))
+
/** @def AssertCompileMemberOffset
+ * Asserts an offset of a structure member at compile.
+ * @param type The type.
+ * @param member The member.
+ * @param off The expected offset.
+ */
+\#define AssertCompileMemberOffset(type, member, off) \
  AssertCompile(RTASSERT_OFFSET_OF(type, member) == (off))
+
/** @def AssertCompile2MemberOffsets
+ * Asserts that two (sub-structure) members in union have the same offset.
+ * @param type The type.
+ * @param member1 The first member.
+ * @param member2 The second member.
+ */
+\#define AssertCompile2MemberOffsets(type, member1, member2) \
  AssertCompile(RTASSERT_OFFSET_OF(type, member1) == RTASSERT_OFFSET_OF(type, member2))
+
/** @def AssertCompileAdjacentMembers
+ * Asserts that two structure members are adjacent.
+ * @param type The type.
+ */
+ * IPRT - Common C and C++ definitions.
+ */

+ *
+ /*
+ */
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ */

+ ifndef ___iprt_cdefs_h
+ define ___iprt_cdefs_h
+
+/** @defgroup grp_rt_cdefs  IPRT Common Definitions and Macros
+ * @{
+ */
+
+/** @def RT_C_DECLS_BEGIN
+ * Used to start a block of function declarations which are shared
+ * between C and C++ program.
+ */
+
+/** @def RT_C_DECLS_END
+ * Used to end a block of function declarations which are shared
+ * between C and C++ program.
+ */
+
+ifdef(__cplusplus)
+ define RT_C_DECLS_BEGIN extern "C" {
+ define RT_C_DECLS_END   }
+else
+ define RT_C_DECLS_BEGIN
+ define RT_C_DECLS_END

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+#endif
+
+/*
+ * Shut up DOXYGEN warnings and guide it properly thru the code.
+ */
+#ifdef DOXYGEN_RUNNING
+# define __AMD64__
+# define __X86__
+# define RT_ARCH_AMD64
+# define RT_ARCH_X86
+# define RT_ARCH_SPARC
+# define RT_ARCH_SPARC64
+# define IN_RING0
+# define IN_RING3
+# define IN_RC
+# define IN_RC
+# define IN_RT_RC
+# define IN_RT_R0
+# define IN_RT_R3
+# define IN_RT_STATIC
+# define RT STRICT
+# define RT NO STRICT
+# define RT LOCK STRICT
+# define RT LOCK NO STRICT
+# define RT LOCK STRICT ORDER
+# define RT LOCK NO STRICT ORDER
+# define RT BREAKPOINT
+# define RT NO DEPRECATED_MACROS
+# define RT EXCEPTIONS_ENABLED
+# define RT BIG ENDIAN
+# define RT LITTLE_ENDIAN
+# define RT_COMPILER GROKS 64BIT_BITFIELDS
+# define RT_COMPILER WITH 80BIT LONG DOUBLE
+# define RT_NO_VISIBILITY_HIDDEN
+# define RT_GCC_SUPPORTS_VISIBILITY_HIDDEN
+# define RT_COMPILER_SUPPORTS VA_ARGS
+# define RT_COMPILER_SUPPORTS LAMBD
+#endif /* DOXYGEN_RUNNING */
+
+/** @def RT ARCH X86
+ * Indicates that we're compiling for the X86 architecture.
+ */
+
+/** @def RT ARCH AMD64
+ * Indicates that we're compiling for the AMD64 architecture.
+ */
@@method RT_ARCH_SPARC
+ * Indicates that we're compiling for the SPARC V8 architecture (32-bit).
+ */
+
+@@method RT_ARCH_SPARC64
+ * Indicates that we're compiling for the SPARC V9 architecture (64-bit).
+ */
+# if !defined(RT_ARCH_X86) \n+ & & !defined(RT_ARCH_AMD64) \n+ & & !defined(RT_ARCH_SPARC) \n+ & & !defined(RT_ARCH_SPARC64) \n+ & & !defined(RT_ARCH_ARM) \n+# if defined(__amd64__) || defined(__x86_64__) || defined(_M_X64) || defined(__AMD64__) \n+# define RT_ARCH_AMD64 \n+# elif defined(__i386__) || defined(_M_IX86) || defined(__X86__) \n+# define RT_ARCH_X86 \n+# elif defined(__sparc__) \n+# define RT_ARCH_SPARC64 \n+# elif defined(__sparc__) \n+# elif defined(__arm__) || defined(__ARM__) \n+# define RT_ARCH_ARM \n+# elif defined(RT_ARCH_X86) && defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_X86 and RT_ARCH_AMD64 cannot be defined at the same time!" \n+# elif defined(RT_ARCH_AMD64) && defined(RT_ARCH_SPARC) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_SPARC cannot be defined at the same time!" \n+# elif defined(RT_ARCH_AMD64) && defined(RT_ARCH_SPARC64) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_SPARC64 cannot be defined at the same time!" \n+# elif defined(RT_ARCH_SPARC) && defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_SPARC and RT_ARCH_AMD64 cannot be defined at the same time!" \n+# elif defined(RT_ARCH_ARM) && defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_ARM and RT_ARCH_AMD64 cannot be defined at the same time!" \n+# elif defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_ARM cannot be defined at the same time!" \n+& & \n+# elif defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_ARM cannot be defined at the same time!" \n+# elif defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_ARM cannot be defined at the same time!" \n+# elif defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_ARM cannot be defined at the same time!" \n+# elif defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_ARM cannot be defined at the same time!" \n+# elif defined(RT_ARCH_AMD64) \n+# define "Both RT_ARCH_AMD64 and RT_ARCH_ARM cannot be defined at the same time!"
Final check (PORTME).

#define RT_ARCH_X86 (defined(RT_ARCH_X86) != 0) 
#define RT_ARCH_AMD64 (defined(RT_ARCH_AMD64) != 0) 
#define RT_ARCH_SPARC (defined(RT_ARCH_SPARC) != 0) 
#define RT_ARCH_SPARC64 (defined(RT_ARCH_SPARC64) != 0) 
#define RT_ARCH_ARM (defined(RT_ARCH_ARM) != 0) 
#else  
  != 1  
#error "Exactly one RT_ARCH_XXX macro shall be defined"
#endif

#define RT_GNUC_PREREQ(a_MinMajor, a_MinMinor)      RT_GNUC_PREREQ_EX(a_MinMajor, a_MinMinor, 0)
#define RT_GNUC_PREREQ_EX(a_MinMajor, a_MinMinor, a_OtherRet) 
  ((__GNUC__ << 16) + __GNUC_MINOR__ >= ((a_MinMajor) << 16) + (a_MinMinor))
#else  
  (a_OtherRet)
#endif

#define RT_MSC_PREREQ(a_MinVer)                     RT_MSC_PREREQ_EX(a_MinVer, 0)
#define RT_MSC_PREREQ_EX(a_MinVer, a_OtherRet) 
  ((__GNUC__ << 16) + __GNUC_MINOR__ >= ((a_MinMajor) << 16) + (a_MinMinor))
#else  

#endif

#define RT_MSC_PREREQ(a_MinVer)                     RT_MSC_PREREQ_EX(a_MinVer, 0)
#define RT_MSC_PREREQ_EX(a_MinVer, a_OtherRet) 
  ((a_MinMajor) << 16) + (a_MinMinor))
#else  

#endif

#define RT_MSC_PREREQ(a_MinVer)                     RT_MSC_PREREQ_EX(a_MinVer, 0)
#define RT_MSC_PREREQ_EX(a_MinVer, a_OtherRet) 
  (a_OtherRet)
# define RT_MSC_PREREQ_EX(a_MinVer, a_OtherRet)     ( (_MSC_VER) >= (a_MinVer) )
#else
# define RT_MSC_PREREQ_EX(a_MinVer, a_OtherRet)     (a_OtherRet)
#endif
/** @name RT_MSC_VER_XXX - _MSC_VER values to use with RT_MSC_PREREQ.
 * @remarks The VCxxx values are derived from the CRT DLLs shipping with the
 *          compilers.
 */
#define RT_MSC_VER_VC50     (1100)              /**< Visual C++ 5.0. */
#define RT_MSC_VER_VC60     (1200)              /**< Visual C++ 6.0. */
#define RT_MSC_VER_VC70     (1300)              /**< Visual C++ 7.0. */
#define RT_MSC_VER_VC71     RT_MSC_VER_VC70    /**< Visual C++ 7.1, aka Visual Studio 2003. */
#define RT_MSC_VER_VS2003   (1310)              /**< Visual Studio 2003, aka Visual C++ 7.1. */
#define RT_MSC_VER_VC71     RT_MSC_VER_VS2003   /**< Visual Studio 2005. */
#define RT_MSC_VER_VS2005   (1400)              /**< Visual Studio 2005. */
#define RT_MSC_VER_VC80     RT_MSC_VER_VS2005   /**< Visual Studio 2008. */
#define RT_MSC_VER_VS2008   (1500)              /**< Visual Studio 2008. */
#define RT_MSC_VER_VC90     RT_MSC_VER_VS2008   /**< Visual Studio 2008. */
#define RT_MSC_VER_VC100    RT_MSC_VER_VS2010   /**< Visual Studio 2010. */
#define RT_MSC_VER_VS2010   (1600)              /**< Visual Studio 2010. */
#define RT_MSC_VER_VC110    RT_MSC_VER_VS2012   /**< Visual Studio 2012. */
#define RT_MSC_VER_VS2012   (1700)              /**< Visual Studio 2012. */
#define RT_MSC_VER_VC120    RT_MSC_VER_VS2013   /**< Visual Studio 2013. */
#define RT_MSC_VER_VS2013   (1800)              /**< Visual Studio 2013. */
#define RT_MSC_VER_VC140    RT_MSC_VER_VS2015   /**< Visual Studio 2015. */
#define RT_MSC_VER_VS2015   (1900)              /**< Visual Studio 2015. */
/** @} */

/** @def RT_CLANG_PREREQ
 * Shorter than fiddling with __clang_major__ and __clang_minor__.
 * @param   a_MinMajor      Minimum major version
 * @param   a_MinMinor      The minor version number part.
 */
#define RT_CLANG_PREREQ(a_MinMajor, a_MinMinor)      RT_CLANG_PREREQ_EX(a_MinMajor,
#define RT_CLANG_PREREQ_EX(a_MinMajor, a_MinMinor, a_OtherRet) \
++ ((__clang_major__ <= 16) + __clang_minor__ >= ((a_MinMajor) <= 16) + (a_MinMinor))
#else

/** @def __X86__
 * Indicates that we're compiling for the X86 architecture.
 * @deprecated
 */

/** @def __AMD64__
 * Indicates that we're compiling for the AMD64 architecture.
 * @deprecated
 */

#if !defined(__X86__) && !defined(__AMD64__) && (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
 # if defined(RT_ARCH_AMD64)
 #  define __AMD64__
 # elif defined(RT_ARCH_X86)
 #  define __X86__
 # else
 #  error "Check what predefined macros your compiler uses to indicate architecture."
 # endif
#else if defined(__X86__) && defined(__AMD64__) || (defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86))
# error "Both __X86__ and __AMD64__ cannot be defined at the same time!"
#endif
#ifndef __X86__ && !defined(RT_ARCH_X86)
# error "__X86__ without RT_ARCH_X86!"
#endif
#ifndef __AMD64__ && !defined(RT_ARCH_AMD64)
# error "__AMD64__ without RT_ARCH_AMD64!"
#endif

/** @def RT_BIG_ENDIAN
 * Defined if the architecture is big endian. */
/** @def RT_LITTLE_ENDIAN
 * Defined if the architecture is little endian. */
#if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86) || defined(RT_ARCH_ARM)
# define RT_LITTLE_ENDIAN
#elif defined(RT_ARCH_SPARC) || defined(RT_ARCH_SPARC64)
# define RT_BIG_ENDIAN
#else
# error "PORTME: architecture endianess"
#endif
#if defined(RT_BIG_ENDIAN) && defined(RT_LITTLE_ENDIAN)
# error "Both RT_BIG_ENDIAN and RT_LITTLE_ENDIAN are defined"
#endif

/** @def IN_RING0
 * Used to indicate that we're compiling code which is running...
+ * in Ring-0 Host Context.
+ */
+
+ /** @def IN_RING3
+ * Used to indicate that we're compiling code which is running
+ * in Ring-3 Host Context.
+ */
+
+ /** @def IN_RC
+ * Used to indicate that we're compiling code which is running
+ * in the Raw-mode Context (implies R0).
+ */
+#if !defined(IN_RING3) && !defined(IN_RING0) && !defined(IN_RC) && !defined(IN_RC)
+# error "You must define which context the compiled code should run in; IN_RING3, IN_RING0 or IN_RC"
+#endif
+
+ /* ARCH_BITS validation (PORTME). */
+ * ARCH_BITS validation (PORTME). */
+ #if defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC64)
+ define ARCH_BITS 64
+ #elif !defined(__I86__) || !defined(__WATCOMC__)
+ define ARCH_BITS 32
+ #else
+ define ARCH_BITS 16
+ #endif
+ #endif
+
+ /* ARCH_BITS validation (PORTME). */
+ if ARCH_BITS == 64
+ if defined(RT_ARCH_X86) || defined(RT_ARCH_SPARC) || defined(RT_ARCH_ARM)
+ # error "ARCH_BITS=64 but non-64-bit RT_ARCH_XXX defined."
+ #endif
+ if !defined(RT_ARCH_AMD64) && !defined(RT_ARCH_SPARC)
+ # error "ARCH_BITS=64 but no 64-bit RT_ARCH_XXX defined."
+ #endif
+
+ #elif ARCH_BITS == 32
+ if defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC)
+ # error "ARCH_BITS=32 but non-32-bit RT_ARCH_XXX defined."
+ #endif

+ #if !defined(RT_ARCH_X86) && !defined(RT_ARCH_SPARC) && !defined(RT_ARCH_ARM)
+ # error "ARCH_BITS=32 but no 32-bit RT_ARCH_XXX defined."
+ #endif
+
+#elif ARCH_BITS == 16
+ #if defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC) || defined(RT_ARCH_SPARC64) ||
+ defined(RT_ARCH_ARM)
+ # error "ARCH_BITS=16 but non-16-bit RT_ARCH_XX defined."
+ #endif
+ #if !defined(RT_ARCH_X86)
+ # error "ARCH_BITS=16 but RT_ARCH_X86 isn't defined."
+ #endif
+
+#else
+ #error "Unsupported ARCH_BITS value!"
+##endif
+
+/** @def HC_ARCH_BITS
+ * Defines the host architecture bit count.
+ */
+ +#if !defined(HC_ARCH_BITS) || defined(DOXYGEN_RUNNING)
+ nowrap IN_RC
+ nowrap define HC_ARCH_BITS ARCH_BITS
+ nowrap else
+ nowrap define HC_ARCH_BITS 32
+ nowrap endif
+ nowrap endif
+
+/** @def GC_ARCH_BITS
+ * Defines the guest architecture bit count.
+ */
+ +#if !defined(GC_ARCH_BITS) && !defined(DOXYGEN_RUNNING)
+ ifndef VBOX_WITH_64_BITS_GUESTS
+ nowrap define GC_ARCH_BITS 64
+ nowrap else
+ nowrap define GC_ARCH_BITS 32
+ nowrap endif
+ nowrap endif
+
+/** @def R3_ARCH_BITS
+ * Defines the host ring-3 architecture bit count.
+ */
+ +#if !defined(R3_ARCH_BITS) || defined(DOXYGEN_RUNNING)
+ ifndef IN_RING3
+ nowrap define R3_ARCH_BITS ARCH_BITS
+ nowrap else
+ nowrap define R3_ARCH_BITS HC_ARCH_BITS
+ nowrap endif

+##endif
+
+/** @def R0_ARCH_BITS
+ * Defines the host ring-0 architecture bit count.
+ */
+#endif
+if defined(R0_ARCH_BITS) || defined(DOXYGEN_RUNNING)
+in_RING0
+# define R0_ARCH_BITS ARCH_BITS
+else
+# define R0_ARCH_BITS HC_ARCH_BITS
+endif
+endif
+
+/** @def GC_ARCH_BITS
+ * Defines the guest architecture bit count.
+ */
+endif
+if defined(GC_ARCH_BITS) || defined(DOXYGEN_RUNNING)
+in_RC
+# define GC_ARCH_BITS ARCH_BITS
+else
+# define GC_ARCH_BITS 32
+endif
+endif
+
+/** @name RT_OPSYS_XXX - Operative System Identifiers. 
+ * These are the value that the RT_OPSYS \#define can take. @{ 
+ */
+/** Unknown OS. */
+#define RT_OPSYS_UNKNOWN 0
+/** OS Agnostic. */
+#define RT_OPSYS_AGNOSTIC 1
+/** Darwin - aka Mac OS X. */
+#define RT_OPSYS_DARWIN 2
+/** DragonFly BSD. */
+#define RT_OPSYS_DRAGONFLY 3
+/** DOS. */
+#define RT_OPSYS_DOS 4
+/** FreeBSD. */
+#define RT_OPSYS_FREEBSD 5
+/** Haiku. */
+#define RT_OPSYS_HAIKU 6
+/** Linux. */
+#define RT_OPSYS_LINUX 7
+/** L4. */
+#define RT_OPSYS_L4 8
+/** Minix. */
+*/
+#define RT_OPSYS_MINIX      9
+/** NetBSD. */
+define RT_OPSYS_NETBSD     11
+/** Netware. */
+define RT_OPSYS_NETWARE    12
+/** NT (native). */
+define RT_OPSYS_NT        13
+/** OpenBSD. */
+define RT_OPSYS_OPENBSD   14
+/** OS/2. */
+define RT_OPSYS_OS2       15
+/** Plan 9. */
+define RT_OPSYS_PLAN9     16
+/** QNX. */
+define RT_OPSYS_QNX       17
+/** Solaris. */
+define RT_OPSYS_SOLARIS   18
+/** UEFI. */
+define RT_OPSYS_UEFI      19
+/** Windows. */
+define RT_OPSYS_WINDOWS   20
+/** The max RT_OPSYS_XXX value (exclusive). */
+define RT_OPSYS_MAX       21
+/** @} */
+
+/** @def RT_OPSYS
+ * Indicates which OS we're targeting. It's a \#define with is
+ * assigned one of the RT_OPSYS_XXX defines above.
+ */
+ * So to test if we're on FreeBSD do the following:
+ * @code
+ *  #if RT_OPSYS == RT_OPSYS_FREEBSD
+ *  some_funky_freebsd_specific_stuff();
+ *  #endif
+ * @endcode
+ */
+
+/** @def RT_OPSYS
+ * Set RT_OPSYS_XXX according to RT_OS_XXX.
+ *
+ * Replace: \# elif defined(RT_OS_\1)\n\# define RT_OPSYS RT_OPSYS_\1
+ */
+#ifndef RT_OPSYS
+# if defined(RT_OS_UNKNOWN) || defined(DOXYGEN_RUNNING)
+ define RT_OPSYS RT_OPSYS_UNKNOWN
+# elif defined(RT_OS_AGNOSTIC)
+ define RT_OPSYS RT_OPSYS_AGNOSTIC
+# define RT_OPSYS RT_OPSYS_AGNOSTIC

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+ elif defined(RT_OS_DARWIN)
+ define RT_OPSYS RT_OPSYS_DARWIN
+ elif defined(RT_OS_DRAGONFLY)
+ define RT_OPSYS RT_OPSYS_DRAGONFLY
+ elif defined(RT_OS_DOS)
+ define RT_OPSYS RT_OPSYS_DOS
+ elif defined(RT_OS_FREEBSD)
+ define RT_OPSYS RT_OPSYS_FREEBSD
+ elif defined(RT_OS_HAIKU)
+ define RT_OPSYS RT_OPSYS_HAIKU
+ elif defined(RT_OS_LINUX)
+ define RT_OPSYS RT_OPSYS_LINUX
+ elif defined(RT_OS_L4)
+ define RT_OPSYS RT_OPSYS_L4
+ elif defined(RT_OS_MINIX)
+ define RT_OPSYS RT_OPSYS_MINIX
+ elif defined(RT_OS_NETBSD)
+ define RT_OPSYS RT_OPSYS_NETBSD
+ elif defined(RT_OS_NETWARE)
+ define RT_OPSYS RT_OPSYS_NETWARE
+ elif defined(RT_OS_NT)
+ define RT_OPSYS RT_OPSYS_NT
+ elif defined(RT_OS_OPENBSD)
+ define RT_OPSYS RT_OPSYS_OPENBSD
+ elif defined(RT_OS_OS2)
+ define RT_OPSYS RT_OPSYS_OS2
+ elif defined(RT_OS_PLAN9)
+ define RT_OPSYS RT_OPSYS_PLAN9
+ elif defined(RT_OS_QNX)
+ define RT_OPSYS RT_OPSYS_QNX
+ elif defined(RT_OS_SOLARIS)
+ define RT_OPSYS RT_OPSYS_SOLARIS
+ elif defined(RT_OS_UEFI)
+ define RT_OPSYS RT_OPSYS_UEFI
+ elif defined(RT_OS_WINDOWS)
+ define RT_OPSYS RT_OPSYS_WINDOWS
+ endif
+#endif
+
+ /*
+ * Guess RT_OPSYS based on compiler predefined macros.
+ */
+ifndef RT_OPSYS
+ if defined(__APPLE__)
+ define RT_OPSYS RT_OPSYS_DARWIN
+ elif defined(__DragonFly__)
+ define RT_OPSYS RT_OPSYS_DRAGONFLY
+ elif defined(__FreeBSD__) /*??*/
# define RT_OPSYS RT_OPSYS_FREEBSD
## elif defined(__gnu_linux__) 
## define RT_OPSYS RT_OPSYS_LINUX
## elif defined(__NetBSD__) /*??*/
## define RT_OPSYS RT_OPSYS_NETBSD
## elif defined(__OpenBSD__) /*??*/
## define RT_OPSYS RT_OPSYS_OPENBSD
## elif defined(__OS2__) 
## define RT_OPSYS RT_OPSYS_OS2
## elif defined(__sun__) || defined(__sunOS__) || defined(__sun) || defined(__SunOS)
## define RT_OPSYS RT_OPSYS_SOLARIS
## elif defined(_WIN32) || defined(_WIN64)
## define RT_OPSYS RT_OPSYS_WINDOWS
## elif defined(MSDOS) || defined(MSDOS) || defined(DOS16RM) /* OW+MSC || MSC || DMC */
## define RT_OPSYS RT_OPSYS_DOS
else
## error "Port Me"
#endif
#endif

/*
 * Do some consistency checks.
 * Replace: #if defined(RT_OS_\1) && RT_OPSYS != RT_OPSYS_\1
# error RT_OPSYS vs RT_OS_\1
#endif
 */
#if defined(RT_OS_UNKNOWN) && RT_OPSYS != RT_OPSYS_UNKNOWN
# error RT_OPSYS vs RT_OS_UNKNOWN
#endif
#if defined(RT_OS_AGNOSTIC) && RT_OPSYS != RT_OPSYS_AGNOSTIC
# error RT_OPSYS vs RT_OS_AGNOSTIC
#endif
#if defined(RT_OS_DARWIN) && RT_OPSYS != RT_OPSYS_DARWIN
# error RT_OPSYS vs RT_OS_DARWIN
#endif
#if defined(RT_OS_DARWIN) && RT_OPSYS != RT_OPSYS_DARWIN
# error RT_OPSYS vs RT_OS_DARWIN
#endif
#if defined(RT_OS_DRAGONFLY) && RT_OPSYS != RT_OPSYS_DRAGONFLY
# error RT_OPSYS vs RT_OS_DRAGONFLY
#endif
#if defined(RT_OS_DOS) && RT_OPSYS != RT_OPSYS_DOS
# error RT_OPSYS vs RT_OS_DOS
#endif
#if defined(RT_OS_FREEBSD) && RT_OPSYS != RT_OPSYS_FREEBSD
# error RT_OPSYS vs RT_OS_FREEBSD
#endif
+endif
+if defined(RT_OS_HAIKU) && RT_OPSYS != RT_OPSYS_HAIKU
  +# error RT_OPSYS vs RT_OS_HAIKU
+endif
+if defined(RT_OS_LINUX) && RT_OPSYS != RT_OPSYS_LINUX
  +# error RT_OPSYS vs RT_OS_LINUX
+endif
+if defined(RT_OS_L4) && RT_OPSYS != RT_OPSYS_L4
  +# error RT_OPSYS vs RT_OS_L4
+endif
+if defined(RT_OS_MINIX) && RT_OPSYS != RT_OPSYS_MINIX
  +# error RT_OPSYS vs RT_OS_MINIX
+endif
+if defined(RT_OS_NETBSD) && RT_OPSYS != RT_OPSYS_NETBSD
  +# error RT_OPSYS vs RT_OS_NETBSD
+endif
+if defined(RT_OS_NETWARE) && RT_OPSYS != RT_OPSYS_NETWARE
  +# error RT_OPSYS vs RT_OS_NETWARE
+endif
+if defined(RT_OS_NT) && RT_OPSYS != RT_OPSYS_NT
  +# error RT_OPSYS vs RT_OS_NT
+endif
+if defined(RT_OS_OPENBSD) && RT_OPSYS != RT_OPSYS_OPENBSD
  +# error RT_OPSYS vs RT_OS_OPENBSD
+endif
+if defined(RT_OS_OS2) && RT_OPSYS != RT_OPSYS_OS2
  +# error RT_OPSYS vs RT_OS_OS2
+endif
+if defined(RT_OS_PLAN9) && RT_OPSYS != RT_OPSYS_PLAN9
  +# error RT_OPSYS vs RT_OS_PLAN9
+endif
+if defined(RT_OS_QNX) && RT_OPSYS != RT_OPSYS_QNX
  +# error RT_OPSYS vs RT_OS_QNX
+endif
+if defined(RT_OS_SOLARIS) && RT_OPSYS != RT_OPSYS_SOLARIS
  +# error RT_OPSYS vs RT_OS_SOLARIS
+endif
+if defined(RT_OS_UEFI) && RT_OPSYS != RT_OPSYS_UEFI
  +# error RT_OPSYS vs RT_OS_UEFI
+endif
+if defined(RT_OS_WINDOWS) && RT_OPSYS != RT_OPSYS_WINDOWS
  +# error RT_OPSYS vs RT_OS_WINDOWS
+endif
+
+/*
+ * Make sure the RT_OS_XXX macro is defined.
+ *
+ * Search:  #define RT_OPSYS_([A-Z0-9]+).*
+ * Replace: #elif RT_OPSYS == RT_OPSYS_\1\n# ifndef RT_OPSYS_\1\n# define RT_OPSYS_\1\n# endif
+ */
+ if RT_OPSYS == RT_OPSYS_UNKNOWN
+ ifndef RT_OS_UNKNOWN
+ define RT_OS_UNKNOWN
+ endif
+ elif RT_OPSYS == RT_OPSYS_AGNOSTIC
+ ifndef RT_OS_AGNOSTIC
+ define RT_OS_AGNOSTIC
+ endif
+ elif RT_OPSYS == RT_OPSYS_DARWIN
+ ifndef RT_OS_DARWIN
+ define RT_OS_DARWIN
+ endif
+ elif RT_OPSYS == RT_OPSYS_DRAGONFLY
+ ifndef RT_OS_DRAGONFLY
+ define RT_OS_DRAGONFLY
+ endif
+ elif RT_OPSYS == RT_OPSYS_DOS
+ ifndef RT_OS_DOS
+ define RT_OS_DOS
+ endif
+ elif RT_OPSYS == RT_OPSYS_FREEBSD
+ ifndef RT_OS_FREEBSD
+ define RT_OS_FREEBSD
+ endif
+ elif RT_OPSYS == RT_OPSYS_HAIKU
+ ifndef RT_OS_HAIKU
+ define RT_OS_HAIKU
+ endif
+ elif RT_OPSYS == RT_OPSYS_LINUX
+ ifndef RT_OS_LINUX
+ define RT_OS_LINUX
+ endif
+ elif RT_OPSYS == RT_OPSYS_L4
+ ifndef RT_OS_L4
+ define RT_OS_L4
+ endif
+ elif RT_OPSYS == RT_OPSYS_MINIX
+ ifndef RT_OS_MINIX
+ define RT_OS_MINIX
+ endif
+ elif RT_OPSYS == RT_OPSYS_NETBSD
+ ifndef RT_OS_NETBSD
+ define RT_OS_NETBSD
+ endif
+ elif RT_OPSYS == RT_OPSYS_NETWARE
+ ifndef RT_OS_NETWARE
+ define RT_OS_NETWARE
+ endif
/**
 * Checks whether the given OpSys uses DOS-style paths or not.
 * 
 * By DOS-style paths we include drive lettering and UNC paths.
 * 
 * @returns true / false
 * @param   a_OpSys     The RT_OPSYS_XXX value to check, will be reference multiple times.
 * +*/
+#define RT_OPSYS_USES_DOS_PATHS(a_OpSys) \ 
+   ( (a_OpSys) == RT_OPSYS_WINDOWS \ 
+     || (a_OpSys) == RT_OPSYS_OS2 \ 
+     || (a_OpSys) == RT_OPSYS_DOS )
+
+/** @def CTXTYPE
+ * Declare a type differently in GC, R3 and R0.
+ *
+ * @param   GCType  The GC type.
+ * @param   R3Type  The R3 type.
+ * @param   R0Type  The R0 type.
+ * @remark  For pointers used only in one context use RCPTRTYPE(), R3R0PTRTYPE(), R3PTRTYPE() or R0PTRTYPE().
+ */
+#ifdef IN_RC
+# define CTXTYPE(GCType, R3Type, R0Type)  GCType
+#elif defined(IN_RING3)
+# define CTXTYPE(GCType, R3Type, R0Type)  R3Type
+#else
+# define CTXTYPE(GCType, R3Type, R0Type)  R0Type
+#endif
+
+/** @def RCPTRTYPE
+ * Declare a pointer which is used in the raw mode context but appears in structure(s) used by
+ * both HC and RC. The main purpose is to make sure structures have the same
+ * size when built for different architectures.
+ *
+ * @param   RCType  The RC type.
+ */
+#define RCPTRTYPE(RCType)       CTXTYPE(RCType, RTRCPTR, RTRCPTR)
+
+/** @def R3R0PTRTYPE
+ * Declare a pointer which is used in HC, is explicitly valid in ring 3 and 0,
+ * but appears in structure(s) used by both HC and GC. The main purpose is to
+ * make sure structures have the same size when built for different architectures.
+ *
+ * @param   R3R0Type  The R3R0 type.
+ * @remarks This used to be called HCPTYPE.
+ */
+#define R3R0PTRTYPE(R3R0Type)   CTXTYPE(RTHCPTR, R3R0Type, R3R0Type)
+
+/** @def R3PTRTYPE
+ * Declare a pointer which is used in R3 but appears in structure(s) used by
+ * both HC and GC. The main purpose is to make sure structures have the same
+ * size when built for different architectures.
+ *
+ *
+ * @param   R3Type  The R3 type.
+ */
+#define R3PTRTYPE(R3Type)       CTXTYPE(RTHCUINTPTR, R3Type, RTHCUINTPTR)
+
+/** @def R0PTRTYPE
+ * Declare a pointer which is used in R0 but appears in structure(s) used by
+ * both HC and GC. The main purpose is to make sure structures have the same
+ * size when built for different architectures.
+ *
+ * @param   R0Type  The R0 type.
+ */
+#define R0PTRTYPE(R0Type)       CTXTYPE(RTHCUINTPTR, RTHCUINTPTR, R0Type)
+
+/** @def CTXSUFF
+ * Adds the suffix of the current context to the passed in
+ * identifier name. The suffix is HC or GC.
+ *
+ * @param   var     Identifier name.
+ */
+#ifdef IN_RC
+ # define CTXSUFF(var)       var##GC
+ # define OTHERCTXSUFF(var)  var##HC
+#else
+ # define CTXSUFF(var)       var##HC
+ # define OTHERCTXSUFF(var)  var##GC
+ #endif
+
+/** @def CTXALLSUFF
+ * Adds the suffix of the current context to the passed in
+ * identifier name. The suffix is R3, R0 or GC.
+ *
+ * @param   var     Identifier name.
+ */
+#ifdef IN_RC
+ # define CTXALLSUFF(var)    var##GC
+#else
+ # define CTXALLSUFF(var)    var##HC
+ #endif

+## define CTXALLSUFF(var) var##R0
+##else
+## define CTXALLSUFF(var) var##R3
+##endif

+/** @def CTX_SUFF
+ * Adds the suffix of the current context to the passed in
+ * identifier name. The suffix is R3, R0 or RC.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param var Identifier name.
+ *
+ * @remark This will replace CTXALLSUFF and CTXSUFF before long.
+ */
+ifdef IN_RC
+## define CTX_SUFF(var) var##RC
+##elif defined(IN_RING0)
+## define CTX_SUFF(var) var##R0
+##else
+## define CTX_SUFF(var) var##R3
+##endif

+/** @def CTX_SUFF_Z
+ * Adds the suffix of the current context to the passed in
+ * identifier name, combining RC and R0 into RZ.
+ * The suffix thus is R3 or RZ.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param var Identifier name.
+ *
+ * @remark This will replace CTXALLSUFF and CTXSUFF before long.
+ */
+ifdef IN_RING3
+## define CTX_SUFF_Z(var) var##R3
+##else
+## define CTX_SUFF_Z(var) var##RZ
+##endif

+/** @def CTXMID
+ * Adds the current context as a middle name of an identifier name
+ * The middle name is HC or GC.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param first First name.
+ * @param last Surname.
+ */
+/** @def OTHERCTXMID

---

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+ * Adds the other context as a middle name of an identifier name
+ * The middle name is HC or GC.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param   first   First name.
+ * @param   last    Surname.
+ * @deprecated use CTX_MID or CTX_MID_Z
+ */
+#ifdef IN_RC
+## define CTXMID(first, last)        first##GC##last
+## define OTHERCTXMID(first, last)  first##HC##last
+##else
+## define CTXMID(first, last)        first##HC##last
+## define OTHERCTXMID(first, last)  first##GC##last
+##endif
+
+/** @def CTXALLMID
+ * Adds the current context as a middle name of an identifier name.
+ * The middle name is R3, R0 or GC.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param   first   First name.
+ * @param   last    Surname.
+ * @deprecated use CTX_MID or CTX_MID_Z
+ */
+#ifdef IN_RC
+## define CTXALLMID(first, last)     first##GC##last
+##elif defined(IN_RING0)
+## define CTXALLMID(first, last)     first##R0##last
+##else
+## define CTXALLMID(first, last)     first##R3##last
+##endif
+
+/** @def CTX_MID
+ * Adds the current context as a middle name of an identifier name.
+ * The middle name is R3, R0 or RC.
+ *
+ * This is macro should only be used in shared code to avoid a forest of ifdefs.
+ * @param   first   First name.
+ * @param   last    Surname.
+ */
+#ifdef IN_RC
+## define CTX_MID(first, last)       first##RC##last
+##elif defined(IN_RING0)
+## define CTX_MID(first, last)       first##R0##last
+##else
+## define CTX_MID(first, last)       first##R3##last
+##endif
/** @def CTX_MID_Z
 * Adds the current context as a middle name of an identifier name, combining RC
 * and R0 into RZ.
 * @param   first   First name.
 * @param   last    Surname.
 */
#ifdef IN_RING3
# define CTX_MID_Z(first, last)     first##R3##last
#else
# define CTX_MID_Z(first, last)     first##RZ##last
#endif

/** @def R3STRING
 * A macro which in GC and R0 will return a dummy string while in R3 it will return
 * the parameter.
 * This is typically used to wrap description strings in structures shared
 * between R3, R0 and/or GC. The intention is to avoid the #ifdef IN_RING3 mess.
 * @param   pR3String   The R3 string. Only referenced in R3.
 * @see R0STRING and GCSTRING
 */
#ifdef IN_RING3
# define R3STRING(pR3String)    (pR3String)
#else
# define R3STRING(pR3String)    ("<R3_STRING>")
#endif

/** @def R0STRING
 * A macro which in GC and R3 will return a dummy string while in R0 it will return
 * the parameter.
 * This is typically used to wrap description strings in structures shared
 * between R3, R0 and/or GC. The intention is to avoid the #ifdef IN_RING0 mess.
 * @param   pR0String   The R0 string. Only referenced in R0.
 * @see R3STRING and GCSTRING
 */
#ifdef IN_RING0
# define R0STRING(pR0String)    (pR0String)
#else
# define R0STRING(pR0String)    ("<R0_STRING>")
#endif
/** @def RCSTRING
 * A macro which in R3 and R0 will return a dummy string while in RC it will return
 * the parameter.
 * *
 * This is typically used to wrap description strings in structures shared
 * between R3, R0 and/or RC. The intention is to avoid the \#ifdef IN_RC mess.
 * *
 * @param   pRCString   The RC string. Only referenced in RC.
 * @see R3STRING, R0STRING
 * */
#ifdef IN_RC
#define RCSTRING(pRCString)    (pRCString)
#else
#define RCSTRING(pRCString)    (<RC_STRING>)
#endif

/** @def RT_NOTHING
 * A macro that expands to nothing.
 * This is primarily intended as a dummy argument for macros to avoid the
 * undefined behavior passing empty arguments to an macro (ISO C90 and C++98,
 * gcc v4.4 warns about it).
 * */
#define RT_NOTHING

/** @def RT_GCC_EXTENSION
 * Macro for shutting up GCC warnings about using language extensions. */
#ifdef __GNUC__
#define RT_GCC_EXTENSION       __extension__
#else
#define RT_GCC_EXTENSION
#endif

/** @def RT_GCC_NO_WARN_DEPRECATED_BEGIN
 * Used to start a block of code where GCC should not warn about deprecated
 * declarations. */
#if RT_GNUC_PREREQ(4, 6)
#define RT_GCC_NO_WARN_DEPRECATED_BEGIN \
   _Pragma("GCC diagnostic push") \
   _Pragma("GCC diagnostic ignored "-Wdeprecated-declarations")"
#else
#define RT_GCC_NO_WARN_DEPRECATED_BEGIN
#endif

/** @def RT_GCC_NO_WARN_DEPRECATED_END
 * Used to end a block of code where GCC should not warn about deprecated
 * declarations. */
#define RT_GCC_NO_WARN_DEPRECATED_END \
   _Pragma("GCC diagnostic pop")
#endif

/** Open Source Used In 5GaaS Edge AC-4 39349 */
and the compiler can thus save itself the bother of trying
to catch any of them. Put this between the closing parenthesis
and the semicolon in function prototypes (and implementation if C++).

@remarks May not work on C++ methods, mainly intended for C-style APIs.

@remarks The use of the nothrow attribute with GCC is because old compilers
(4.1.1, 32-bit) leaking the nothrow into global space or something
when used with RTDECL or similar. Using this forces use to have two
macros, as the nothrow attribute is not for the function definition.

*/
#endif RT_EXCEPTIONS_ENABLED
#ifdef __GNUC__
#ifdef RT_GNUC_PREREQ(3, 3)
#define RT_NO_THROW_PROTO __attribute__((__nothrow__))
#else
#define RT_NO_THROW_PROTO
#endif
#else
#define RT_NO_THROW_PROTO throw()
#endif

/** @def RT_NO_THROW_DEF
 * The counter part to RT_NO_THROW_PROTO that is added to the function
 * definition.
 */
#ifdef RT_EXCEPTIONS_ENABLED && !defined(__GNUC__)
#define RT_NO_THROW_DEF RT_NO_THROW_PROTO
#else
#define RT_NO_THROW_DEF
#endif

/** @def RT_THROW
 * How to express that a method or function throws a type of exceptions. Some
 * compilers does not want this kind of information and will warning about it.
 */
#ifdef RT_EXCEPTIONS_ENABLED
#define RT_THROW
#else
#define RT_THROW
#endif

*++ @param type The type exception.
+*
@remarks If the actual throwing is done from the header, enclose it by
*++
ifdef RT_EXCEPTIONS_ENABLED ...
else ...
endif so the header
*++ compiles cleanly without exceptions enabled.
+*
*++ Do NOT use this for the actual throwing of exceptions!
+*/
#ifdef RT_EXCEPTIONS_ENABLED
+# if RT_MSC_PREREQ_EX(RT_MSC_VER_VC71, 0)
+# define RT_THROW(type)
+# elif RT_GNUC_PREREQ(7, 0)
+# define RT_THROW(type)
+# else
+# define RT_THROW(type) throw(type)
+# endif
+#else
+# define RT_THROW(type)
+#endif
+
+/** @def RT_FALL_THROUGH
+ * Tell the compiler that we're falling through to the next case in a switch.
+ * @sa RT_FALL_THRU */
+#if RT_GNUC_PREREQ(7, 0)
+# define RT_FALL_THROUGH() __attribute__((fallthrough))
+#else
+# define RT_FALL_THROUGH() (void)0
+#endif
+/** @def RT_FALL_THRU
+ * Tell the compiler that we're falling thru to the next case in a switch.
+ * @sa RT_FALL_THROUGH */
+#define RT_FALL_THRU() RT_FALL_THROUGH()
+
+/** @def RT_IPRT_FORMAT_ATTR
+ * Identifies a function taking an IPRT format string.
+ * @param   a_iFmt  The index (1-based) of the format string argument.
+ * @param   a_iArgs The index (1-based) of the first format argument, use 0 for
+ *                  va_list.
+ * @param   a_iArgs The index (1-based) of the first format argument, use 0 for
+ *                  va_list.
+ */
+#if defined(__GNUC__) && defined(WITH_IPRT_FORMAT_ATTRIBUTE)
+# define RT_IPRT_FORMAT_ATTR(a_iFmt, a_iArgs) __attribute__((__iprt_format__(a_iFmt, a_iArgs)))
+#else
+#define RT_IPRT_FORMAT_ATTR(a_iFmt, a_iArgs)
+#endif
+
+/** @def RT_IPRT_FORMAT_ATTR_MAYBE_NULL
+ * Identifies a function taking an IPRT format string, NULL is allowed.
+ * @param   a_iFmt  The index (1-based) of the format string argument.
+ * @param   a_iArgs The index (1-based) of the first format argument, use 0 for
+ *                  va_list.
+ */
+#if defined(__GNUC__) && defined(WITH_IPRT_FORMAT_ATTRIBUTE)
+# define RT_IPRT_FORMAT_ATTR_MAYBE_NULL(a_iFmt, a_iArgs) __attribute__((__iprt_format__null__(a_iFmt, a_iArgs)))
+#else
+#define RT_IPRT_FORMAT_ATTR_MAYBE_NULL(a_iFmt, a_iArgs)
+#endif
+// define RT_IPRT_FORMAT_ATTR_MAYBE_NULL(a_iFmt, a_iArgs)
+#endif
+
+/** @def RT_GCC_SUPPORTS_VISIBILITY_HIDDEN
+ * Indicates that the "hidden" visibility attribute can be used (GCC) */
+#if defined(__GNUC__)
+  #if __GNUC__ >= 4 && !defined(RT_OS_OS2) && !defined(RT_OS_WINDOWS)
+  #define RT_GCC_SUPPORTS_VISIBILITY_HIDDEN
+  #endif
+#endif
+
+/** @def RT_COMPILER_SUPPORTS_VA_ARGS
+ * If the defined, the compiler supports the variadic macro feature (... __VA_ARGS__). */
+#if defined(_MSC_VER)
+  #if _MSC_VER >= 1600 /* Visual C++ v10.0 / 2010 */
+  #define RT_COMPILER_SUPPORTS_VA_ARGS
+  #endif
+#elif defined(__GNUC__) && defined(RT_ARCH_X86)
+  #define RT_COMPILER_SUPPORTS_VA_ARGS
+#else
+  #define RTCALL
+#endif
+
+/** @def RTCALL
+ * The standard calling convention for the Runtime interfaces.
+ * 
+ * @remarks The regparm(0) in the X86/GNUC variant deals with -mregparm=x use in
+ *          the linux kernel and potentially elsewhere (3rd party).
+ */
+#if defined(_MSC_VER) || defined(__WATCOMC__)
+# define RTCALL __cdecl
+#elif defined(RT_OS_OS2)
+# define RTCALL __cdecl
+#elif defined(__GNUC__) && defined(RT_ARCH_X86)
+# define RTCALL __attribute__((__cdecl__,__regparm__(0)))
+#else
+# define RTCALL
+#endif
+
+/** @def DECLEXPORT
+ * How to declare an exported function.
+ * 
+ * @param type The return type of the function declaration.
+ */
+#if defined(_MSC_VER) || defined(RT_OS_OS2)
+# define DECLEXPORT(type) __declspec(dllexport) type
+elif defined(RT_USE_VISIBILITY_DEFAULT)
+ define DECLEXPORT(type)  __attribute__((visibility("default"))) type
+else
+ define DECLEXPORT(type)  type
+endif
+
/** @def DECLIMPORT
 * How to declare an imported function.
 * @param   type    The return type of the function declaration.
 */
#if defined(_MSC_VER) || (defined(RT_OS_OS2) && !defined(__IBMC__) && !defined(__IBMCPP__))
 define DECLIMPORT(type)  __declspec(dllimport) type
#else
 define DECLIMPORT(type)  type
#endif

/** @def DECLHIDDEN
 * How to declare a non-exported function or variable.
 * @param   type    The return type of the function or the data type of the variable.
 */
#if !defined(RT_GCC_SUPPORTS_VISIBILITY_HIDDEN) || defined(RT_NO_VISIBILITY_HIDDEN)
 define DECLHIDDEN(type)  type
#else
 define DECLHIDDEN(type)  __attribute__((visibility("hidden"))) type
#endif

/** @def DECL_HIDDEN_CONST
 * Workaround for g++ warnings when applying the hidden attribute to a const
 * definition.  Use DECLHIDDEN for the declaration.
 * @param   a_Type      The return type of the function or the data type of
 *                      the variable.
 */
#if defined(__cplusplus) && defined(__GNUC__)
 define DECL_HIDDEN_CONST(a_Type)  a_Type
#else
 define DECL_HIDDEN_CONST(a_Type)  DECLHIDDEN(a_Type)
#endif

/** @def DECL_INVALID
 * How to declare a function not available for linking in the current context.
 * The purpose is to create compile or like time errors when used.  This isn't
 * possible on all platforms.
 * @param   type    The return type of the function.
 */
#if defined(_MSC_VER)
 define DECL_INVALID(type)  __declspec(dllimport) type __stdcall
#else defined(__GNUC__) && defined(__cplusplus)
 define DECL_INVALID(type)  extern "C++" type
#endif

+### else
+### define DECL_INVALID(type) type
+### endif
+
+/** @def DECLASM
+ * How to declare an internal assembly function.
+ * @param   type    The return type of the function declaration.
+ */
+###ifdef __cplusplus
+### define DECLASM(type)           extern "C" type RTCALL
+###else
+### define DECLASM(type)           type RTCALL
+###endif
+
+/** @def DECLASMTYPE
+ * How to declare an internal assembly function type.
+ * @param   type    The return type of the function.
+ */
+###define DECLASMTYPE(type)       type RTCALL
+
+/** @def DECL_NO_RETURN
+ * How to declare a function which does not return.
+ * @note This macro can be combined with other macros, for example
+ * @code
+ *   EMR3DECL(DECL_NO_RETURN(void)) foo(void);
+ * @endcode
+ */
+###ifdef _MSC_VER
+### define DECL_NO_RETURN(type)   __declspec(noreturn) type
+###elif defined(__GNUC__)
+### define DECL_NO_RETURN(type)   __attribute__((noreturn)) type
+###else
+### define DECL_NO_RETURN(type)   type
+###endif
+/** @deprecated Use DECL_NO_RETURN instead. */
+###define DECLNORETURN(type) DECL_NO_RETURN(type)
+
+/** @def DECL_RETURNS_TWICE
+ * How to declare a function which may return more than once.
+ * @note This macro can be combined with other macros, for example
+ * @code
+ *   EMR3DECL(DECL_RETURNS_TWICE(void)) MySetJmp(void);
+ * @endcode
+ */
+###if RT_GNUC_PREREQ(4, 1)
+### define DECL_RETURNS_TWICE(type) __attribute__((returns_twice)) type
+###else
+### define DECL_RETURNS_TWICE(type) type
+###endif
+/** @def DECL_RETURNS_TWICE(type) __attribute__((returns_twice)) type
+*/  @def DECLWEAK
+  * How to declare a variable which is not necessarily resolved at
+  * runtime.
+  * @note This macro can be combined with other macros, for example
+  * @code
+  * EMR3DECL(DECLWEAK(int)) foo;
+  * @endcode
+  */
+  ifndef __GNUC__
+  # define DECLWEAK(type) type __attribute__((weak))
+  else
+  # define DECLWEAK(type) type
+  endif
+  */
+  @def DECLCALLBACK
+  * How to declare an call back function type.
+  * @param type The return type of the function declaration.
+  */
+  #define DECLCALLBACK(type) type RT_FAR_CODE RTCALL
+  */
+  @def DECLCALLBACKPTR
+  * How to declare an call back function pointer.
+  * @param type The return type of the function declaration.
+  * @param name The name of the variable member.
+  */
+  ifndef __IBMC__ || defined(__IBMCPP__)
+  # define DECLCALLBACKPTR(type, name) type (* RTCALL name)
+  else
+  # define DECLCALLBACKPTR(type, name) type (RT_FAR_CODE RTCALL * name)
+  endif
+  */
+  @def DECLCALLBACKMEMBER
+  * How to declare an call back function pointer member.
+  * @param type The return type of the function declaration.
+  * @param name The name of the struct/union/class member.
+  */
+  ifndef __IBMC__ || defined(__IBMCPP__)
+  # define DECLCALLBACKMEMBER(type, name) type (* RTCALL name)
+  else
+  # define DECLCALLBACKMEMBER(type, name) type (RT_FAR_CODE RTCALL * name)
+  endif
+  */
+  @def DECLR3CALLBACKMEMBER
+  * How to declare an call back function pointer member - R3 Ptr.
+  * @param type The return type of the function declaration.
+  * @param name The name of the struct/union/class member.
+ * @param args The argument list enclosed in parentheses.
+ */
+/#ifdef IN_RING3
+## define DECLR3CALLBACKMEMBER(type, name, args) DECLCALLBACKMEMBER(type, name) args
+#else
+## define DECLR3CALLBACKMEMBER(type, name, args) RTR3PTR name
+##endif
+
+/** @def DECLR3CALLBACKMEMBER
+ * How to declare an callback function pointer member - RC Ptr.
+ * @param type The return type of the function declaration.
+ * @param name The name of the struct/union/class member.
+ * @param args The argument list enclosed in parentheses.
+ */
+/#ifdef IN_RC
+## define DECLRCCallbackMEMBER(type, name, args) DECLCALLBACKMEMBER(type, name)  args
+#else
+## define DECLRCCallbackMEMBER(type, name, args) RTRCPTR name
+##endif
+
+/** @def DECLR0CALLBACKMEMBER
+ * How to declare an callback function pointer member - R0 Ptr.
+ * @param type The return type of the function declaration.
+ * @param name The name of the struct/union/class member.
+ * @param args The argument list enclosed in parentheses.
+ */
+/#ifdef IN_RING0
+## define DECLR0CALLBACKMEMBER(type, name, args) DECLCALLBACKMEMBER(type, name) args
+#else
+## define DECLR0CALLBACKMEMBER(type, name, args) RTR0PTR name
+##endif
+
+/** @def DECLINLINE
+ * How to declare a function as inline.
+ * @param type The return type of the function declaration.
+ * @remarks Don't use this macro on C++ methods.
+ */
+/#ifdef __GNUC__
+## define DECLINLINE(type) static __inline__ type
+#elif defined(__cplusplus)
+## define DECLINLINE(type) static inline type
+#elif defined(_MSC_VER)
+## define DECLINLINE(type) static _inline type
+#elif defined(__IBMC__)
+## define DECLINLINE(type) _Inline type
+#else
+## define DECLINLINE(type) inline type
+##endif
/** @def DECL_FORCE_INLINE
 * How to declare a function as inline and try convince the compiler to always
 * inline it regardless of optimization switches.
 * @param   type    The return type of the function declaration.
 * @remarks Use sparsely and with care. Don't use this macro on C++ methods.
 */
#ifdef __GNUC__
#define DECL_FORCE_INLINE(type)    __attribute__((__always_inline__)) DECLINLINE(type)
#elif defined(_MSC_VER)
#define DECL_FORCE_INLINE(type)    __forceinline type
#else
#define DECL_FORCE_INLINE(type)    DECLINLINE(type)
#endif

/** @def DECL_NO_INLINE
 * How to declare a function telling the compiler not to inline it.
 * @param   scope   The function scope, static or RT_NOTHING.
 * @param   type    The return type of the function declaration.
 * @remarks Don't use this macro on C++ methods.
 */
#ifdef __GNUC__
#define DECL_NO_INLINE(scope,type) __attribute__((__noinline__)) scope type
#elif defined(_MSC_VER)
#define DECL_NO_INLINE(scope,type) __declspec(noinline) scope type
#else
#define DECL_NO_INLINE(scope,type) scope type
#endif

/** @def IN_RT_STATIC
 * Used to indicate whether we're linking against a static IPRT
 * @param   type    The return type of the function declaration.
 */

/** @def IN_RT_R0
 * Used to indicate whether we're inside the same link module as the host
 * context ring-0 Runtime Library.
 */

/** @def RTR0DECL(type)
 * Runtime Library host context ring-0 export or import declaration.
 * @param   type    The return type of the function declaration.
 */
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+ ifdef IN_RT_R0
+ ifdef IN_RT_STATIC
+# define RTR0DECL(type) DECLHIDDEN(type) RTCALL
+ else
+# define RTR0DECL(type) DECLEXPORT(type) RTCALL
+ endif
+else
+# define RTR0DECL(type) DECLIMPORT(type) RTCALL
+endif
+
+/** @def IN_RT_R3
+ * Used to indicate whether we're inside the same link module as the host
+ * context ring-3 Runtime Library.
+ */
+/** @def RTR3DECL(type)
+ * Runtime Library host context ring-3 export or import declaration.
+ * @param type The return type of the function declaration.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+ ifdef IN_RT_R3
+ ifdef IN_RT_STATIC
+# define RTR3DECL(type) DECLHIDDEN(type) RTCALL
+ else
+# define RTR3DECL(type) DECLEXPORT(type) RTCALL
+ endif
+else
+# define RTR3DECL(type) DECLIMPORT(type) RTCALL
+endif
+
+/** @def IN_RT_RC
+ * Used to indicate whether we're inside the same link module as the raw-mode
+ * context (RC) runtime library.
+ */
+/** @def RTRCDECL(type)
+ * Runtime Library raw-mode context export or import declaration.
+ * @param type The return type of the function declaration.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+ ifdef IN_RT_RC
+ ifdef IN_RT_STATIC
+# define RTRCDECL(type) DECLHIDDEN(type) RTCALL
+ else
+# define RTRCDECL(type) DECLEXPORT(type) RTCALL
+ endif
+else
+# define RTRCDECL(type) DECLIMPORT(type) RTCALL
+endif

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+ /* @def RTDECL(type)
+  * Runtime Library export or import declaration.
+  * Functions declared using this macro exists in all contexts.
+  * @param   type    The return type of the function declaration.
+  * @remarks This is only used inside IPRT. Other APIs need to define their own
+  *          XXXX_DECL macros for dealing with import/export/static visibility.
+  */
+<if defined(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
+<if define IN_RT_STATIC
++ define RTDECL(type)    DECLHIDDEN(type) RTCALL
+else
++ define RTDECL(type)    DECLEXPORT(type) RTCALL
+endif
+else
++ define RTDECL(type)    DECLIMPORT(type) RTCALL
+endif
++/** @def RTDECL(type)
+  * Runtime Library export or import declaration.
+  * Data declared using this macro exists in all contexts.
+  * @param   type    The data type.
+  * @remarks This is only used inside IPRT. Other APIs need to define their own
+  *          XXXX_DECL macros for dealing with import/export/static visibility.
+  */
+<if defined(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
+<if define IN_RT_STATIC
++ define RTDECL_DATA_CONST(type)    DECL_HIDDEN_CONST(type)
+else
++ define RTDECL_DATA_CONST(type)    DECLEXPORT(type)
+endif
+endif
++/** @def RT_DECL_DATA_CONST(type)
+  * Definition of a const variable. See DECL_HIDDEN_CONST.
+  * @param   type    The const data type.
+  * @remarks This is only used inside IPRT. Other APIs need to define their own
+  *          XXXX_DECL macros for dealing with import/export/static visibility.
+  */
+<if defined(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
+<if define IN_RT_STATIC
++ define RTDECL(type)    DECLHIDDEN(type)
+endif
+endif
++ define RTDECL(type)    DECLHIDDEN(type)
+else
++ define RTDECL(type)    DECLEXPORT(type)
+endif
+else
++ define RTDECL(type)    DECLIMPORT(type)
+endif
+endif
++ else
++ define RTDECL(type)    DECLEXPORT(type)
+endif
+endif
+else
+# define RTDATADECL(type) DECLIMPORT(type)
+# define RTDECL_DATA_CONST(type) DECLIMPORT(type)
+#endif
+
+/** @def RT_DECL_CLASS
+ * Declares an class living in the runtime.
+ * @remarks This is only used inside IPRT. Other APIs need to define their own
+ * XXXX_DECL macros for dealing with import/export/static visibility.
+ */
+#if defined(IN_RT_R3) || defined(IN_RT_RC) || defined(IN_RT_R0)
+#ifdef IN_RT_STATIC
+# define RT_DECL_CLASS
+#else
+# define RT_DECL_CLASS DECLIMPORT_CLASS
+#else
+# define RT_DECL_CLASS DECLEXPORT_CLASS
+endif
+
+/** @def RT_NOCRT
+ * Symbol name wrapper for the No-CRT bits.
+ *
+ * In order to coexist in the same process as other CRTs, we need to
+ * decorate the symbols such that they don't conflict the ones in the
+ * other CRTs. The result of such conflicts / duplicate symbols can
+ * confuse the dynamic loader on Unix like systems.
+ * Define RT_WITHOUT_NOCRT_WRAPPERS to drop the wrapping.
+ * Define RT_WITHOUT_NOCRT_WRAPPER_ALIASES to drop the aliases to the
+ * wrapped names.
+ */
+#ifndef RT_WITHOUT_NOCRT_WRAPPERS
+# define RT_NOCRT(name) nocrt_ ## name
+# define RT_NOCRT_STR(name) "nocrt_" # name
+#else
+# define RT_NOCRT(name) name
+# define RT_NOCRT_STR(name) #name
+#endif
+
+/** @def RT_LIKELY
+ * Give the compiler a hint that an expression is very likely to hold true.
+ */
Some compilers support explicit branch prediction so that the CPU backend can hint the processor and also so that code blocks can be reordered such that the predicted path sees a more linear flow, thus improving cache behaviour, etc.

IPRT provides the macros RT_LIKELY() and RT_UNLIKELY() as a way to utilize this compiler feature when present.

A few notes about the usage:

- Generally, order your code use RT_LIKELY() instead of RT_UNLIKELY().
- Generally, use RT_UNLIKELY() with error condition checks (unless you have some _strong_ reason to do otherwise, in which case document it), and/or RT_LIKELY() with success condition checks, assuming you want to optimize for the success path.
- Other than that, if you don’t know the likelihood of a test succeeding from empirical or other 'hard' evidence, don't make predictions unless you happen to be a Dirk Gently character.
- These macros are meant to be used in places that get executed a lot. It is wasteful to make predictions in code that is executed rarely (e.g. at subsystem initialization time) as the basic block reordering that this affects can often generate larger code.
- Note that RT_SUCCESS() and RT_FAILURE() already makes use of RT_LIKELY() and RT_UNLIKELY(). Should you wish for prediction free status checks, use the RT_SUCCESS_NP() and RT_FAILURE_NP() macros instead.

@returns the boolean result of the expression.
@see RT_UNLIKELY

Give the compiler a hint that an expression is highly unlikely to hold true.

See the usage instructions give in the RT_LIKELY() docs.

@returns the boolean result of the expression.
@see RT_LIKELY

@deprecated Please use RT_LIKELY() instead wherever possible! That gives us a better chance of the windows compilers to generate favorable code too. The belief is that the compiler will by default assume the if-case is more likely than the else-case.
+ */
+*if defined(__GNUC__)
+* if __GNUC__ >= 3 && !defined(FORTIFY_RUNNING)
+* define RT_LIKELY(expr) __builtin_expect((expr), 1)
+* define RT_UNLIKELY(expr) __builtin_expect((expr), 0)
+* else
+* define RT_LIKELY(expr) (expr)
+* define RT_UNLIKELY(expr) (expr)
+* endif
+*else
+* define RT_LIKELY(expr) (expr)
+* define RT_UNLIKELY(expr) (expr)
+*endif
+
+/** @def RT_EXPAND_2
+ * Helper for RT_EXPAND. */
+*define RT_EXPAND_2(a_Expr) a_Expr
+/** @def RT_EXPAND
+ * Returns the expanded expression.
+ * @param   a_Expr              The expression to expand. */
+*define RT_EXPAND(a_Expr) RT_EXPAND_2(a_Expr)
+
+/** @def RT_STR
+ * Returns the argument as a string constant.
+ * @param   str     Argument to stringify. */
+*define RT_STR(str) #str
+/** @def RT_XSTR
+ * Returns the expanded argument as a string.
+ * @param   str     Argument to expand and stringify. */
+*define RT_XSTR(str) RT_STR(str)
+
+/** @def RT_LSTR_2
+ * Helper for RT_WSTR that gets the expanded @a str.
+ * @param   str     String literal to prefix with 'L'. */
+*define RT_LSTR_2(str) L##str
+/** @def RT_LSTR
+ * Returns the expanded argument with a L string prefix.
+ * @param   str     String literal to . */
+*define RT_LSTR(str) RT_LSTR_2(str)
+
+/** @def RT_UNPACK_CALL
+ * Unpacks the an argument list inside an extra set of parenthesis and turns it
+ * into a call to @a a_Fn.
+ *
+ * @param   a_Fn       Function/macro to call.
+ * @param   a_Args     Parameter list in parenthesis.
+ */
+#define RT_UNPACK_CALL(a_Fn, a_Args) a_Fn a_Args
+
+/*#if defined(RT_COMPILER_SUPPORTS_VA_ARGS) || defined(DOXYGEN_RUNNING)
+ */
+/** @def RT_UNPACK_ARGS
+ * Returns the arguments without parenthesis.
+ * @param   ...         Parameter list in parenthesis.
+ * @remarks Requires RT_COMPILER_SUPPORTS_VA_ARGS.
+ */
+#define RT_UNPACK_ARGS(...)    __VA_ARGS__
+
+/** @def RT_COUNT_VA_ARGS_HLP
+ * Helper for RT_COUNT_VA_ARGS that picks out the argument count from
+ * RT_COUNT_VA_ARGS_REV_SEQ.*/
+#define RT_COUNT_VA_ARGS_HLP( 
+ c69, c68, c67, c66, c65, c64, c63, c62, c61, c60, 
+ c59, c58, c57, c56, c55, c54, c53, c52, c51, c50, 
+ c49, c48, c47, c46, c45, c44, c43, c42, c41, c40, 
+ c39, c38, c37, c36, c35, c34, c33, c32, c31, c30, 
+ c29, c28, c27, c26, c25, c24, c23, c22, c21, c20, 
+ c19, c18, c17, c16, c15, c14, c13, c12, c11, c10, 
+ c9, c8, c7, c6, c5, c4, c3, c2, c1, cArgs,...) cArgs
+/** Argument count sequence. */
+#define RT_COUNT_VA_ARGS_REV_SEQ
+     69,  68,  67,  66,  65,  64,  63,  62,  61,  60, 
+     59,  58,  57,  56,  55,  54,  53,  52,  51,  50, 
+     49,  48,  47,  46,  45,  44,  43,  42,  41,  40, 
+     39,  38,  37,  36,  35,  34,  33,  32,  31,  30, 
+     29,  28,  27,  26,  25,  24,  23,  22,  21,  20, 
+     19,  18,  17,  16,  15,  14,  13,  12,  11,  10, 
+     9,   8,   7,   6,   5,   4,   3,   2,   1,   0
+/** This is for zero arguments. At least Visual C++ requires it. */
+#define RT_COUNT_VA_ARGS_PREFIX_RT NOTHING   RT_COUNT_VA_ARGS_REV_SEQ
+/**
+ * Counts the number of arguments given to the variadic macro.
+ * @returns Number of arguments in the ellipsis
+ * @param   ...     Arguments to count.
+ * @remarks Requires RT_COMPILER_SUPPORTS_VA_ARGS.
+ */
+#define RT_COUNT_VA_ARGS(...) 
+   RT_UNPACK_CALL(RT_COUNT_VA_ARGS_HLP, (RT_COUNT_VA_ARGS_PREFIX_ #


### RT_CONCAT
#### RT_CONCAT3
#### RT_CONCAT4
#### RT_CONCAT5
+\#define RT_CONCAT5(a,b,c,d,e) RT_CONCAT5_HLP(a,b,c,d,e)
+/** RT_CONCAT5 helper, don't use. */
+\#define RT_CONCAT5_HLP(a,b,c,d,e) a##b##c##d##e
+
+/** @def RT_CONCAT6 */
+ * Concatenate the expanded arguments without any extra spaces in between.
+ *
+ * @param   a       The 1st part.
+ * @param   b       The 2nd part.
+ * @param   c       The 3rd part.
+ * @param   d       The 4th part.
+ * @param   e       The 5th part.
+ * @param   f       The 6th part.
+ */
+\#define RT_CONCAT6(a,b,c,d,e,f) RT_CONCAT6_HLP(a,b,c,d,e,f)
+/** RT_CONCAT6 helper, don't use. */
+\#define RT_CONCAT6_HLP(a,b,c,d,e,f) a##b##c##d##e##f
+
+/** @def RT_CONCAT7 */
+ * Concatenate the expanded arguments without any extra spaces in between.
+ *
+ * @param   a       The 1st part.
+ * @param   b       The 2nd part.
+ * @param   c       The 3rd part.
+ * @param   d       The 4th part.
+ * @param   e       The 5th part.
+ * @param   f       The 6th part.
+ * @param   g       The 7th part.
+ */
+\#define RT_CONCAT7(a,b,c,d,e,f,g) RT_CONCAT7_HLP(a,b,c,d,e,f,g)
+/** RT_CONCAT7 helper, don't use. */
+\#define RT_CONCAT7_HLP(a,b,c,d,e,f,g) a##b##c##d##e##f##g
+
+/** @def RT_CONCAT8 */
+ * Concatenate the expanded arguments without any extra spaces in between.
+ *
+ * @param   a       The 1st part.
+ * @param   b       The 2nd part.
+ * @param   c       The 3rd part.
+ * @param   d       The 4th part.
+ * @param   e       The 5th part.
+ * @param   f       The 6th part.
+ * @param   g       The 7th part.
+ * @param   h       The 8th part.
+ */
+\#define RT_CONCAT8(a,b,c,d,e,f,g,h) RT_CONCAT8_HLP(a,b,c,d,e,f,g,h)
+/** RT_CONCAT8 helper, don't use. */
+\#define RT_CONCAT8_HLP(a,b,c,d,e,f,g,h) a##b##c##d##e##f##g##h
/** @def RT_CONCAT9
 * Concatenate the expanded arguments without any extra spaces in between.
 * *
 * @param a The 1st part.
 * @param b The 2nd part.
 * @param c The 3rd part.
 * @param d The 4th part.
 * @param e The 5th part.
 * @param f The 6th part.
 * @param g The 7th part.
 * @param h The 8th part.
 * @param i The 9th part.
 */
#define RT_CONCAT9(a,b,c,d,e,f,g,h,i)   RT_CONCAT9_HLP(a,b,c,d,e,f,g,h,i)

/** RT_CONCAT9 helper, don’t use. */
#define RT_CONCAT9_HLP(a,b,c,d,e,f,g,h,i) a##b##c##d##e##f##g##h##i

/** @def RT_STR_TUPLE
 * String constant tuple - string constant, strlen(string constant).
 */
#define RT_STR_TUPLE(a_szConst)  a_szConst, (sizeof(a_szConst) - 1)

/** @def RT_CASE_RET_STR
 * Macro for using in switch statements that turns constants into strings.
 */
#define RT_CASE_RET_STR(a_Const)     case a_Const: return #a_Const

/** @def RT_BIT
 * Convert a bit number into an integer bitmask (unsigned).
 */
#define RT_BIT(bit)                             ( 1U << (bit) )

/** @def RT_BIT_32
 * Convert a bit number into a 32-bit bitmask (unsigned).
 */
#define RT_BIT_32(bit)                          ( UINT32_C(1) << (bit) )
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+ * Convert a bit number into a 64-bit bitmask (unsigned).
+ * @param   bit     The bit number.
+ */
+#define RT_BIT_64(bit) ( UINT64_C(1) << (bit) )
+
+/** @def RT_BF_GET
+ * Gets the value of a bit field in an integer value.
+ *
+ * This requires a couple of macros to be defined for the field:
+ * - \a_FieldNm\_SHIFT: The shift count to get to the field.
+ * - \a_FieldNm\_MASK: The field mask.
+ *
+ * @returns The bit field value.
+ * @param   a_uValue        The integer value containing the field.
+ * @param   a_FieldNm       The field name prefix for getting at the _SHIFT and _MASK macros.
+ * @sa      #RT_BF_CLEAR, #RT_BF_SET, #RT_BF_MAKE, #RT_BF_ZMASK
+ */
+#define RT_BF_GET(a_uValue, a_FieldNm) ((a_uValue) >> RT_CONCAT(a_FieldNm,_SHIFT)) & RT_BF_ZMASK(a_FieldNm)
+
+/** @def RT_BF_SET
+ * Sets the given bit field in the integer value.
+ *
+ * This requires a couple of macros to be defined for the field:
+ * - \a_FieldNm\_SHIFT: The shift count to get to the field.
+ * - \a_FieldNm\_MASK: The field mask. Must have the same type as the integer value!!
+ *
+ * @returns Integer value with bit field set to @a a_uFieldValue.
+ * @param   a_uValue        The integer value containing the field.
+ * @param   a_FieldNm       The field name prefix for getting at the _SHIFT and _MASK macros.
+ * @param   a_uFieldValue   The new field value.
+ * @sa      #RT_BF_GET, #RT_BF_CLEAR, #RT_BF_MAKE, #RT_BF_ZMASK
+ */
+#define RT_BF_SET(a_uValue, a_FieldNm, a_uFieldValue) ( RT_BF_CLEAR(a_uValue, a_FieldNm) | RT_BF_MAKE(a_FieldNm, a_uFieldValue) )
+
+/** @def RT_BF_CLEAR
+ * Clears the given bit field in the integer value.
+ *
+ * This requires a couple of macros to be defined for the field:
+ * - \a_FieldNm\_SHIFT: The shift count to get to the field.
+ * - \a_FieldNm\_MASK: The field mask. Must have the same type as the integer value!!
+ *
+ * @returns Integer value with bit field set to zero.
+ * @param  a_uValue The integer value containing the field.
+ * @param  a_FieldNm The field name prefix for getting at the _SHIFT and
+ *                _MASK macros.
+ * @sa      #RT_BF_GET, #RT_BF_SET, #RT_BF_MAKE, #RT_BF_ZMASK
+ */
+#define RT_BF_CLEAR(a_uValue, a_FieldNm)        ( (a_uValue) & ~RT_CONCAT(a_FieldNm,_MASK) )
+
+/** @def RT_BF_MAKE
+ * Shifts and masks a bit field value into position in the integer value.
+ * This requires a couple of macros to be defined for the field:
+ * - \a_FieldNm\_SHIFT: The shift count to get to the field.
+ * - \a_FieldNm\_MASK: The field mask.
+ * @param  a_FieldNm The field name prefix for getting at the _SHIFT and
+ *                _MASK macros.
+ * @param  a_uFieldValue The field value that should be masked and shifted
+ *                      into position.
+ * @sa      #RT_BF_GET, #RT_BF_SET, #RT_BF_CLEAR, #RT_BF_ZMASK
+ */
+#define RT_BF_MAKE(a_FieldNm, a_uFieldValue)    ( ((a_uFieldValue) & RT_BF_ZMASK(a_FieldNm) ) <<
RT_CONCAT(a_FieldNm,_SHIFT) )
+
+/** @def RT_BF_ZMASK
+ * Helper for getting the field mask shifted to bit position zero.
+ * @param  a_FieldNm The field name prefix for getting at the _SHIFT and
+ *                _MASK macros.
+ * @sa      #RT_BF_GET, #RT_BF_SET, #RT_BF_CLEAR, #RT_BF_MAKE
+ */
+#define RT_BF_ZMASK(a_FieldNm)                  ( RT_CONCAT(a_FieldNm,_MASK) >>
RT_CONCAT(a_FieldNm,_SHIFT) )
+
+/** Bit field compile time check helper
+ * @internal */
+#define RT_BF_CHECK_DO_XOR_MASK(a_uLeft, a_RightPrefix, a_FieldNm)  ((a_uLeft) ^
RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK))
+/** Bit field compile time check helper
+ * @internal */
+#define RT_BF_CHECK_DO_OR_MASK(a_uLeft, a_RightPrefix, a_FieldNm)   ((a_uLeft) |
RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK))
+/** Bit field compile time check helper
+ * @internal */
+#define RT_BF_CHECK_DO_1ST_MASK_BIT(a_uLeft, a_RightPrefix, a_FieldNm) \
    ((a_uLeft) && ( (RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK) >>
RT_CONCAT3(a_RightPrefix, a_FieldNm, _SHIFT)) & 1U ) )
+/** Used to check that a bit field mask does not start too early.
```c
+ * @internal */
+#define RT_BF_CHECK_DO_MASK_START(a_uLeft, a_RightPrefix, a_FieldNm) \
+  ( (a_uLeft) \ 
+  && ( RT_CONCAT3(a_RightPrefix, a_FieldNm, _SHIFT) == 0 \ 
+  || ( ( (RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK) >> RT_CONCAT3(a_RightPrefix, 
+  a_FieldNm, _SHIFT)) & 1U) \ 
+    << RT_CONCAT3(a_RightPrefix, a_FieldNm, _SHIFT)) & 1U) \ 
+    << RT_CONCAT3(a_RightPrefix, a_FieldNm, _SHIFT)) /* => single bit mask, correct type */ \ 
+    - 1U) /* => mask of all bits below the field */ \ 
+    & RT_CONCAT3(a_RightPrefix, a_FieldNm, _MASK)) == 0 ) )
+/** @name Bit field compile time check recursion workers. 
+ * @internal
+ * @{  */
+#define RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f1) \
+  a_DoThis(a_uLeft, a_RightPrefix, f1)
+#define RT_BF_CHECK_DO_2(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2) \
+  RT_BF_CHECK_DO_1(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2)
+#define RT_BF_CHECK_DO_3(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3) \
+  RT_BF_CHECK_DO_2(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3)
+#define RT_BF_CHECK_DO_4(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4) \
+  RT_BF_CHECK_DO_3(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3, f4)
+#define RT_BF_CHECK_DO_5(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4, f5) \
+  RT_BF_CHECK_DO_4(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3, f4, f5)
+#define RT_BF_CHECK_DO_6(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4, f5, f6) \
+  RT_BF_CHECK_DO_5(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3, f4, f5, f6)
+#define RT_BF_CHECK_DO_7(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4, f5, f6, 
+  f7) \
+  RT_BF_CHECK_DO_6(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3, f4, f5, f6, f7)
+#define RT_BF_CHECK_DO_8(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4, f5, f6, 
+  f7, f8) \
+  RT_BF_CHECK_DO_7(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3, f4, f5, f6, f7, f8)
+#define RT_BF_CHECK_DO_9(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4, f5, f6, 
+  f7, f8, f9) \
+  RT_BF_CHECK_DO_8(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9)
+#define RT_BF_CHECK_DO_10(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4, f5, f6, 
+  f7, f8, f9, f10) \
+  RT_BF_CHECK_DO_9(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), 
+  a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10)
+#define RT_BF_CHECK_DO_11(a_DoThis, a_uLeft, a_RightPrefix,                                        f1, f2, f3, f4, f5, f6, 
+  f7, f8, f9, f10, f11) \
+  RT_BF_CHECK_DO_10(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1),
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a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11)  
#define RT_BF_CHECK_DO_12(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12)  
 + RT_BF_CHECK_DO_11(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12)  
#define RT_BF_CHECK_DO_13(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13)  
 + RT_BF_CHECK_DO_12(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13)  
#define RT_BF_CHECK_DO_14(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14)  
 + RT_BF_CHECK_DO_13(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14)  
#define RT_BF_CHECK_DO_15(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15)  
 + RT_BF_CHECK_DO_14(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15)  
#define RT_BF_CHECK_DO_16(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16)  
 + RT_BF_CHECK_DO_15(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16)  
#define RT_BF_CHECK_DO_17(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17)  
 + RT_BF_CHECK_DO_16(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17)  
#define RT_BF_CHECK_DO_18(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18)  
 + RT_BF_CHECK_DO_17(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18)  
#define RT_BF_CHECK_DO_19(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19)  
 + RT_BF_CHECK_DO_18(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19)  
#define RT_BF_CHECK_DO_20(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20)  
 + RT_BF_CHECK_DO_19(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20)  
#define RT_BF_CHECK_DO_21(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21)  
 + RT_BF_CHECK_DO_20(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21)  
#define RT_BF_CHECK_DO_22(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22)  
 + RT_BF_CHECK_DO_21(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22)  
#define RT_BF_CHECK_DO_23(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23)  
 + RT_BF_CHECK_DO_22(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1),
a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41)
+define RT_BF_CHECK_DO_42(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41)
+ RT_BF_CHECK_DO_41(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43) +
+define RT_BF_CHECK_DO_43(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43) +
+define RT_BF_CHECK_DO_44(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44) +
+define RT_BF_CHECK_DO_45(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45) +
+define RT_BF_CHECK_DO_46(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46) +
+define RT_BF_CHECK_DO_47(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47) +
+define RT_BF_CHECK_DO_48(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48) +
+define RT_BF_CHECK_DO_49(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49) +
+define RT_BF_CHECK_DO_48(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49)
+define RT_BF_CHECK_DO_50(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49)
+ RT_BF_CHECK_DO_49(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50)
+define RT_BF_CHECK_DO_51(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50)
+ RT_BF_CHECK_DO_50(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51)
+define RT_BF_CHECK_DO_52(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51)
+ RT_BF_CHECK_DO_51(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52)
+define RT_BF_CHECK_DO_53(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51)
+ RT_BF_CHECK_DO_52(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53)
+define RT_BF_CHECK_DO_54(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51)
+ RT_BF_CHECK_DO_53(a_DoThis, a_uLeft, a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53)
+define RT_BF_CHECK_DO_55(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53)
+define RT_BF_CHECK_DO_56(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53)
#define RT_BF_CHECK_DO_57(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56) 
+ RT_BF_CHECK_DO_56(a_DoThis, RT_BF_CHECK_DO_1(a_DoThis, a_uLeft, a_RightPrefix,f1), a_RightPrefix, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57) 
+ RT_BF_CHECK_DO_58(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58) 
+ RT_BF_CHECK_DO_59(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59) 
+ RT_BF_CHECK_DO_60(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60) 
+ RT_BF_CHECK_DO_61(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60, f61) 
+ RT_BF_CHECK_DO_62(a_DoThis, a_uLeft, a_RightPrefix, f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14, f15, f16, f17, f18, f19, f20, f21, f22, f23, f24, f25, f26, f27, f28, f29, f30, f31, f32, f33, f34, f35, f36, f37, f38, f39, f40, f41, f42, f43, f44, f45, f46, f47, f48, f49, f50, f51, f52, f53, f54, f55, f56, f57, f58, f59, f60, f61, f62)
```c
#define RT_BF_ASSERT_COMPILE_CHECKS(a_Prefix, a_uZero, a_uCovered, a_Fields) 
    AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_OR_MASK,     a_uZero, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == a_uCovered); 
    AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_XOR_MASK, a_uCovered, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == 0); 
    AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_1ST_MASK_BIT,   true, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == true); 
    AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_MASK_START,     true, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == true) 
/** @ } */
+/** @def RT_BF_ASSERT_COMPILE_CHECKS */
+* Emits a series of AssertCompile statements checking that the bit-field
+* declarations doesn't overlap, has holes, and generally makes some sense.
+*+ This requires variadic macros because its too much to type otherwise.
+*/
+*if defined(RT_COMPILER_SUPPORTS_VA_ARGS) || defined(DOXYGEN_RUNNING)
+*define RT_BF_ASSERT_COMPILE_VA_ARGS(a_Prefix, a_uZero, a_uCovered, a_Fields) 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_OR_MASK,     a_uZero, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == a_uCovered); 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_XOR_MASK, a_uCovered, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == 0); 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_1ST_MASK_BIT,   true, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == true); 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_MASK_START,     true, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == true) 
+/** Bit field compile time check helper
+*+ @internal */
+*if defined(RT_COMPILER_SUPPORTS_VA_ARGS) || defined(DOXYGEN_RUNNING)
+*define RT_BF_ASSERT_COMPILE_VA_ARGS(a_Prefix, a_uZero, a_uCovered, a_Fields) 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_OR_MASK,     a_uZero, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == a_uCovered); 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_XOR_MASK, a_uCovered, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == 0); 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_1ST_MASK_BIT,   true, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == true); 
+  AssertCompile(RT_BF_CHECK_DO_N(RT_BF_CHECK_DO_MASK_START,     true, a_Prefix, 
RT_UNPACK_ARGS a_Fields ) == true) 
+/** Bit field compile time check helper
+*+ @internal */
```
+ * @param \( u \) \( \text{uAlignment} \) The alignment. Power of two!
+ *
+ * @remark Be extremely careful when using this macro with type which sizeof \(!=\) sizeof int.
+ * When possible use any of the other RT\_ALIGN\_* macros. And when that\'s not
+ * possible, make 101\% sure that \( \text{uAlignment} \) is specified with a right sized type.
+ *
+ * Specifying an unsigned 32-bit alignment constant with a 64-bit value will give
+ * you a 32-bit return value!
+ *
+ * In short: Don\'t use this macro. Use RT\_ALIGN\_T() instead.
+ */
+#define RT_ALIGN\( (u, \text{uAlignment}) \) \( (((u) + (((\text{uAlignment}) - 1)) & ~((\text{uAlignment}) - 1)) \)
+
+/** @def RT_ALIGN\_T
+ * Align macro.
+ * @param \( u \) Value to align.
+ * @param \( \text{uAlignment} \) The alignment. Power of two!
+ * @param \( \text{type} \) Integer type to use while aligning.
+ * @remark This macro is the preferred alignment macro, it doesn\'t have any of the pitfalls RT\_ALIGN has.
+ */
+#define RT_ALIGN\_T\( (u, \text{uAlignment}, \text{type}) \) \( (((\text{type})(u) + (((\text{uAlignment}) - 1)) & ~((\text{type})(\text{uAlignment}) - 1)) \)
+
+/** @def RT_ALIGN\_32
+ * Align macro for a 32-bit value.
+ * @param \( u32 \) Value to align.
+ * @param \( \text{uAlignment} \) The alignment. Power of two!
+ */
+#define RT_ALIGN\_32\( (u32, \text{uAlignment}) \) RT\_ALIGN\_T\( (u32, \text{uAlignment}, \text{uint32\_t}) \)
+
+/** @def RT_ALIGN\_64
+ * Align macro for a 64-bit value.
+ * @param \( u64 \) Value to align.
+ * @param \( \text{uAlignment} \) The alignment. Power of two!
+ */
+#define RT_ALIGN\_64\( (u64, \text{uAlignment}) \) RT\_ALIGN\_T\( (u64, \text{uAlignment}, \text{uint64\_t}) \)
+
+/** @def RT_ALIGN\_Z
+ * Align macro for size\_t.
+ * @param \( cb \) Value to align.
+ * @param \( \text{uAlignment} \) The alignment. Power of two!
+ */
+#define RT_ALIGN\_Z\( (cb, \text{uAlignment}) \) RT\_ALIGN\_T\( (cb, \text{uAlignment}, \text{size\_t}) \)
+
+/** @def RT_ALIGN\_P
+ * Align macro for pointers.
+ * @param \( pv \) Value to align.
+ * @param \( \text{uAlignment} \) The alignment. Power of two!
+ */
+ define RT_ALIGN_P(pv, uAlignment) RTP_ALIGN_PT(pv, uAlignment, void *)
+
+/** @def RT_ALIGN_PT
+ * Align macro for pointers with type cast.
+ * @param u Value to align.
+ * @param uAlignment The alignment. Power of two!
+ * @param CastType The type to cast the result to.
+ */
+define RT_ALIGN_PT(u, uAlignment, CastType) ((CastType)RT_ALIGN_T(u, uAlignment, uintptr_t))
+
+/** @def RT_ALIGN_R3PT
+ * Align macro for ring-3 pointers with type cast.
+ * @param u Value to align.
+ * @param uAlignment The alignment. Power of two!
+ * @param CastType The type to cast the result to.
+ */
+define RT_ALIGN_R3PT(u, uAlignment, CastType) ((CastType)RT_ALIGN_T(u, uAlignment, RTR3UINTPTR))
+
+/** @def RT_ALIGN_R0PT
+ * Align macro for ring-0 pointers with type cast.
+ * @param u Value to align.
+ * @param uAlignment The alignment. Power of two!
+ * @param CastType The type to cast the result to.
+ */
+define RT_ALIGN_R0PT(u, uAlignment, CastType) ((CastType)RT_ALIGN_T(u, uAlignment, RTR0UINTPTR))
+
+/** @def RT_ALIGN_GCPT
+ * Align macro for GC pointers with type cast.
+ * @param u Value to align.
+ * @param uAlignment The alignment. Power of two!
+ * @param CastType The type to cast the result to.
+ */
+define RT_ALIGN_GCPT(u, uAlignment, CastType) ((CastType)RT_ALIGN_T(u, uAlignment, RTGCUINTPTR))
+
+/** @def RT_OFFSETOF
+ * Our own special offsetof() variant, returns a signed result.
+ * This differs from the usual offsetof() in that it's not relying on builtins
+ * compiler stuff and thus can use variables in arrays the structure may
+ * contain. This is useful to determine the sizes of structures ending
+ * with a variable length field. For gcc >= 4.4 see @bugref{7775}.
+ * @returns offset into the structure of the specified member. signed.
+ * @param type Structure type.
+ * @param member Member.
+ */
+}
+ if defined(__cplusplus) && RT_GNUC_PREREQ(4, 4)
+ # define RT_OFFSETOF(type, member) ( (int)(uintptr_t)&( ((type *)(void *)0x1000)->member) - 0x1000 )
+ #else
+ # define RT_OFFSETOF(type, member) ( (int)(uintptr_t)&( ((type *)(void *)0)->member) )
+ #endif
+ */
+ */@def RT_OFFSETOF
+ * Our own special offsetof() variant, returns an unsigned result.
+ *
+ * This differs from the usual offsetof() in that it's not relying on built-in
+ * compiler stuff and thus can use variables in arrays the structure may
+ * contain. This is useful to determine the sizes of structures ending
+ * with a variable length field. For gcc >= 4.4 see @bugref{7775}.
+ *
+ * @returns offset into the structure of the specified member. unsigned.
+ * @param type Structure type.
+ * @param member Member.
+ */
+ if defined(__cplusplus) && RT_GNUC_PREREQ(4, 4)
+ # define RT_UOFFSETOF(type, member) ( (uintptr_t)&( ((type *)(void *)0x1000)->member) - 0x1000 )
+ #else
+ # define RT_UOFFSETOF(type, member) ( (uintptr_t)&( ((type *)(void *)0)->member) )
+ #endif
+ */
+ */@def RT_UOFFSETOF
+ * RT_OFFSETOF with an addend.
+ *
+ * @returns offset into the structure of the specified member. signed.
+ * @param type Structure type.
+ * @param member Member.
+ * @param addend The addend to add to the offset.
+ */
+ define RT_OFFSETOF_ADD(type, member, addend) ( (int)RT_UOFFSETOF_ADD(type, member, addend) )
+ */
+ */@def RT_UOFFSETOF_ADD
+ * RT_OFFSETOF with an addend.
+ *
+ * @returns offset into the structure of the specified member. signed.
+ * @param type Structure type.
+ * @param member Member.
+ * @param addend The addend to add to the offset.
+ */
+ define RT_UOFFSETOF_ADD(type, member, addend) ( (uintptr_t)&( ((type *)(void *)(uintptr_t)(addend))->member) )
+ 
+ 
+ 

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+/** @def RT_SIZEOFMEMB
+ * Get the size of a structure member.
+ *
+ * @returns size of the structure member.
+ * @param   type    Structure type.
+ * @param   member  Member.
+ */
+#define RT_SIZEOFMEMB(type, member)             ( sizeof(((type *)(void *)0)->member) )
+
+/** @def RT_UOFFSET_AFTER
+ * Returns the offset of the first byte following a structure/union member.
+ *
+ * @return byte offset into the struct.
+ * @param   a_Type      Structure type.
+ * @param   a_Member    The member name.
+ */
+#define RT_UOFFSET_AFTER(a_Type, a_Member)      ( RT_UOFFSETOF(a_Type, a_Member) + 
RT_SIZEOFMEMB(a_Type, a_Member) )
+
+/** @def RT_FROM_MEMBER
+ * Convert a pointer to a structure member into a pointer to the structure.
+ *
+ * @returns pointer to the structure.
+ * @param   pMem    Pointer to the member.
+ * @param   Type    Structure type.
+ * @param   Member  Member name.
+ */
+#define RT_FROM_MEMBER(pMem, Type, Member)      ( (Type *) ((uint8_t *)(void *)(pMem) - 
RT_UOFFSETOF(Type, Member)) )
+
+/** @def RT_FROM_CPP_MEMBER
+ * Same as RT_FROM_MEMBER except it avoids the annoying g++ warnings about
+ * invalid access to non-static data member of NULL object.
+ *
+ * @returns pointer to the structure.
+ * @param   pMem    Pointer to the member.
+ * @param   Type    Structure type.
+ * @param   Member  Member name.
+ *
+ * @remarks Using the __builtin_offsetof does not shut up the compiler.
+ */
+#if defined(__GNUC__) && defined(__cplusplus)
+    # define RT_FROM_CPP_MEMBER(pMem, Type, Member) 
+    ( (Type *) ((uintptr_t)(pMem) - (uintptr_t)&((Type *)0x1000)->Member + 0x1000U) )
+else
+    # define RT_FROM_CPP_MEMBER(pMem, Type, Member) RT_FROM_MEMBER(pMem, Type, Member)
+endif
+
/** @def RT_ELEMENTS
 * Calculates the number of elements in a statically sized array.
 * @returns Element count.
 * @param   aArray      Array in question.
 * */
#define RT_ELEMENTS(aArray)                     ( sizeof(aArray) / sizeof((aArray)[0]) )

/** @def RT_FLEXIBLE_ARRAY
 * What to up inside the square brackets when declaring a structure member
 * with a flexible size.
 * @note    Use RT_UOFFSETOF() to calculate the structure size.
 * @note    Never to a sizeof() on the structure or member!
 * @note    The member must be the last one.
 * @note    GCC does not permit using this in a union. So, for unions you must
 *          use RT_FLEXIBLE_ARRAY_IN_UNION instead.
 * @note    GCC does not permit using this in nested structures, where as MSC
 *          does. So, use RT_FLEXIBLE_ARRAY_NESTED for that.
 * @note    GCC does not permit using this in a union. So, for unions you must
 *          use RT_FLEXIBLE_ARRAY_NESTED, RT_FLEXIBLE_ARRAY_IN_UNION
 * */
#if RT_MSC_PREREQ(RT_MSC_VER_VS2005)/** @todo Probably much much earlier. */
 || (defined(__cplusplus) && RT_GNUC_PREREQ(6, 1) && !RT_GNUC_PREREQ(7, 0)) /* gcc-7 warns again */
 || defined(__WATCOMC__) /* openwatcom 1.9 supports it, we don't care about older atm. */
 || RT_CLANG_PREREQ_EX(3, 4, 0) /* Only tested clang v3.4, support is probably older. */
#define RT_FLEXIBLE_ARRAY
#if defined(__cplusplus) && defined(_MSC_VER)
#pragma warning(disable:4200) /* -wd4200 does not work with VS2010 */
#endif
#elif defined(__STDC_VERSION__)
#if __STDC_VERSION__ >= 1999901L
#define RT_FLEXIBLE_ARRAY
#else
#define RT_FLEXIBLE_ARRAY 1
#endif
#endif
#endif
#endif
#else
#define RT_FLEXIBLE_ARRAY 1
#endif

/** @def RT_FLEXIBLE_ARRAY_NESTED
 * Variant of RT_FLEXIBLE_ARRAY for use in structures that are nested.
 * @sa      RT_FLEXIBLE_ARRAY_NESTED, RT_FLEXIBLE_ARRAY_IN_UNION
 */
#endif

*/
/** @}*/

}
+ * MSC is less strict and let you do struct { struct { char szName[]; } s; }; 
+ * 
+ * @note See notes for RT_FLEXIBLE_ARRAY. 
+ * 
+ * @note GCC does not permit using this in a union. So, for unions you must 
+ * use RT_FLEXIBLE_ARRAY_IN_NESTED_UNION instead. 
+ * 
+ * @sa RT_FLEXIBLE_ARRAY, RT_FLEXIBLE_ARRAY_IN_NESTED_UNION
+ */
+ }
+ #ifdef _MSC_VER
+ # define RT_FLEXIBLE_ARRAY_NESTED               RT_FLEXIBLE_ARRAY
+ #else
+ # define RT_FLEXIBLE_ARRAY_NESTED               1
+ #endif
+ 
+ /** @def RT_FLEXIBLE_ARRAY_IN_UNION 
+ * The union version of RT_FLEXIBLE_ARRAY. 
+ * 
+ * @remarks GCC does not support flexible array members in unions, 6.1.x 
+ * actively checks for this. Visual C++ 2010 seems happy with it. 
+ * 
+ * @note See notes for RT_FLEXIBLE_ARRAY. 
+ * 
+ * @sa RT_FLEXIBLE_ARRAY, RT_FLEXIBLE_ARRAY_IN_NESTED_UNION
+ */
+ #ifdef _MSC_VER
+ # define RT_FLEXIBLE_ARRAY_IN_UNION             RT_FLEXIBLE_ARRAY
+ #else
+ # define RT_FLEXIBLE_ARRAY_IN_UNION             1
+ #endif
+ 
+ /** @def RT_FLEXIBLE_ARRAY_IN_NESTED_UNION 
+ * The union version of RT_FLEXIBLE_ARRAY_NESTED. 
+ * 
+ * @note See notes for RT_FLEXIBLE_ARRAY. 
+ * 
+ * @sa RT_FLEXIBLE_ARRAY, RT_FLEXIBLE_ARRAY_IN_NESTED_UNION
+ */
+ #ifdef _MSC_VER
+ # define RT_FLEXIBLE_ARRAY_IN_NESTED_UNION      RT_FLEXIBLE_ARRAY_NESTED
+ #else
+ # define RT_FLEXIBLE_ARRAY_IN_NESTED_UNION      1
+ #endif
+ 
+ /** @def RT_UNION_NM 
+ * For compilers (like DTrace) that does not grok nameless unions, we have a 
+ * little hack to make them palatable. 
+ * 
+ */
/** @def RT_STRUCT_NM
 * For compilers (like DTrace) that does not grok nameless structs (it is
 * non-standard C++), we have a little hack to make them palatable.
 */
#ifdef IPRT_WITHOUT_NAMED_UNIONS_AND_STRUCTS
#define RT_UNION_NM(a_Nm)  a_Nm
#define RT_STRUCT_NM(a_Nm) a_Nm
#else
#define RT_UNION_NM(a_Nm)
#define RT_STRUCT_NM(a_Nm)
#endif

/**
 * Checks if the value is a power of two.
 *
 * @returns true if power of two, false if not.
 * @param   uVal                The value to test.
 * @remarks 0 is a power of two.
 * @see     VERR_NOT_POWER_OF_TWO
 */
#define RT_IS_POWER_OF_TWO(uVal)                ( ((uVal) & ((uVal) - 1)) == 0)

#ifdef RT_OS_OS2
/* Undefine RT_MAX since there is an unfortunate clash with the max
resource type define in os2.h. */
#undef RT_MAX
#endif

/** @def RT_MAX
 * Finds the maximum value.
 * @returns The higher of the two.
 * @param   Value1      Value 1
 * @param   Value2      Value 2
 */
#define RT_MAX(Value1, Value2)                  ( (Value1) >= (Value2) ? (Value1) : (Value2) )

/** @def RT_MIN
 * Finds the minimum value.
 * @returns The lower of the two.
 * @param   Value1      Value 1
 * @param   Value2      Value 2
 */
#define RT_MIN(Value1, Value2)                  ( (Value1) <= (Value2) ? (Value1) : (Value2) )

/** @def RT_CLAMP
 * Clamps the value to minimum and maximum values.
 * @returns The clamped value.
 * @param   Value       The value to check.
 */
+ * @param   Min         Minimum value.
+ * @param   Max         Maximum value.
+ */
+ #define RT_CLAMP(Value, Min, Max)               ( (Value) > (Max) ? (Max) : (Value) < (Min) ? (Min) : (Value) )
+
+/** @def RT_ABS
+ * Get the absolute (non-negative) value.
+ * @returns The absolute value of Value.
+ * @param   Value       The value.
+ */
+ #define RT_ABS(Value)                           ( (Value) >= 0 ? (Value) : -(Value) )
+
+/** @def RT_BOOL
+ * Turn non-zero/zero into true/false
+ * @returns The resulting boolean value.
+ * @param   Value       The value.
+ */
+ #define RT_BOOL(Value)                          ( !!(Value) )
+
+/** @def RT_LO_U8
+ * Gets the low uint8_t of a uint16_t or something equivalent. */
+ #ifdef __GNUC__
+    #define RT_LO_U8(a)    __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint16_t)); (uint8_t)(a); })
+#elif defined(_MSC_VER) /* shut up cast truncates constant value warnings */
+    #define RT_LO_U8(a)                            ( (uint8_t)(UINT8_MAX & (a)) )
+#else
+    #define RT_LO_U8(a)                            ( (uint8_t)(a) )
+ #endif
+/** @def RT_HI_U8
+ * Gets the high uint8_t of a uint16_t or something equivalent. */
+ #ifdef __GNUC__
+    #define RT_HI_U8(a)    __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint16_t)); (uint8_t)((a) >> 8); })
+#else
+    #define RT_HI_U8(a)                            ( (uint8_t)((a) >> 8) )
+ #endif
+
+/** @def RT_LO_U16
+ * Gets the low uint16_t of a uint32_t or something equivalent. */
+ #ifdef __GNUC__
+    #define RT_LO_U16(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint32_t)); (uint16_t)(a); })
+#elif defined(_MSC_VER) /* shut up cast truncates constant value warnings */
+    #define RT_LO_U16(a)                           ( (uint16_t)(UINT16_MAX & (a)) )
+#else
+    #define RT_LO_U16(a)                           ( (uint16_t)(a) )
+ #endif
+/** @def RT_HI_U16
+ * Gets the high uint16_t of a uint32_t or something equivalent. */
+ #ifdef __GNUC__
+    #define RT_HI_U16(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint32_t)); (uint16_t)((a) >> 8); })
+#else
+    #define RT_HI_U16(a)                            ( (uint16_t)((a) >> 8) )
+ #endif
+*/
+# define RT_HI_U16(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint32_t)); (uint16_t)((a) >> 16); })
+#else
+# define RT_HI_U16(a)   ( (uint16_t)((a) >> 16) )
+#endif
+
+/** @def RT_LO_U32
+ * Gets the low uint32_t of a uint64_t or something equivalent. */
+﻿#ifdef __GNUC__
+ # define RT_LO_U32(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint64_t)); (uint32_t)(a); })
+ #elif defined(_MSC_VER) /* shut up cast truncates constant value warnings */
+ # define RT_LO_U32(a)   ( (uint32_t)(UINT32_MAX & (a)) )
+ #else
+ # define RT_LO_U32(a)   ( (uint32_t)(a) )
+ #endif
+/** @def RT_HI_U32
+ * Gets the high uint32_t of a uint64_t or something equivalent. */
+ #=>ifdef __GNUC__
+ # define RT_HI_U32(a)   __extension__ ({ AssertCompile(sizeof((a)) == sizeof(uint64_t)); (uint32_t)((a) >> 32); })
+ #else
+ # define RT_HI_U32(a)   ( (uint32_t)((a) >> 32) )
+ #endif
+/** @def RT_BYTE1
+ * Gets the first byte of something. */
+ #define RT_BYTE1(a)   ( (a)         & 0xff )
+/** @def RT_BYTE2
+ * Gets the second byte of something. */
+ #define RT_BYTE2(a)   ( ((a) >>  8) & 0xff )
+/** @def RT_BYTE3
+ * Gets the second byte of something. */
+ #define RT_BYTE3(a)   ( ((a) >> 16) & 0xff )
+/** @def RT_BYTE4
+ * Gets the fourth byte of something. */
+ #define RT_BYTE4(a)   ( ((a) >> 24) & 0xff )
+/** @def RT_BYTE5
+ * Gets the fifth byte of something. */
+ #define RT_BYTE5(a)   ( ((a) >> 32) & 0xff )
+/** @def RT_BYTE6
+ * Gets the sixth byte of something. */
+ #define RT_BYTE6(a)   ( ((a) >> 40) & 0xff )
+/** @def RT_BYTE7
+ * Gets the seventh byte of something. */
+ #define RT_BYTE7(a)   ( ((a) >> 48) & 0xff )
+/** @def RT_BYTE8
+ * Gets the eight byte of something. */
+ #define RT_BYTE8(a)   ( ((a) >> 56) & 0xff )
/** @def RT_LODWORD
 * Gets the low dword (=uint32_t) of something.
 * @deprecated  Use RT_LO_U32. */
#define RT_LODWORD(a)                           ( (uint32_t)(a) )

/** @def RT_HIDWORD
 * Gets the high dword (=uint32_t) of a 64-bit of something.
 * @deprecated  Use RT_HI_U32. */
#define RT_HIDWORD(a)                           ( (uint32_t)((a) >> 32) )

/** @def RT_LOWORD
 * Gets the low word (=uint16_t) of something.
 * @deprecated  Use RT_LO_U16. */
#define RT_LOWORD(a)                            ( (a) & 0xffff )

/** @def RT_HIWORD
 * Gets the high word (=uint16_t) of a 32-bit something.
 * @deprecated  Use RT_HI_U16. */
#define RT_HIWORD(a)                            ( (a) >> 16 )

/** @def RT_LOBYTE
 * Gets the low byte of something.
 * @deprecated  Use RT_LO_U8. */
#define RT_LOBYTE(a)                            ( (a) & 0xff )

/** @def RT_HIBYTE
 * Gets the high byte of a 16-bit something.
 * @deprecated  Use RT_HI_U8. */
#define RT_HIBYTE(a)                            ( (a) >> 8 )

/** @def RT_MAKE_U64
 * Constructs a uint64_t value from two uint32_t values.
 */
#define RT_MAKE_U64(Lo, Hi)                     ( (uint64_t)((uint32_t)(Hi)) << 32 | (uint32_t)(Lo) )

/** @def RT_MAKE_U64_FROM_U16
 * Constructs a uint64_t value from four uint16_t values.
 */
#define RT_MAKE_U64_FROM_U16(w0, w1, w2, w3)    ((uint64_t)(  (uint64_t)((uint16_t)(w3)) << 48 
  | (uint64_t)((uint16_t)(w2)) << 32 
  | (uint32_t)((uint16_t)(w1)) << 16 
  |            (uint16_t)(w0) ))

/** @def RT_MAKE_U64_FROM_U8
 * Constructs a uint64_t value from eight uint8_t values.
 */
#define RT_MAKE_U64_FROM_U8(b0, b1, b2, b3, b4, b5, b6, b7) 

```c
+ ((uint64_t)((uint8_t)(b7)) << 56 \
+ | (uint64_t)((uint8_t)(b6)) << 48 \
+ | (uint64_t)((uint8_t)(b5)) << 40 \
+ | (uint64_t)((uint8_t)(b4)) << 32 \
+ | (uint32_t)((uint8_t)(b3)) << 24 \
+ | (uint32_t)((uint8_t)(b2)) << 16 \
+ | (uint16_t)((uint8_t)(b1)) << 8 \
+ | (uint8_t)(b0) ))
+
+/** @def RT_MAKE_U32
+ * Constructs a uint32_t value from two uint16_t values.
+ */
+#define RT_MAKE_U32(Lo, Hi) \
+ ((uint32_t)((uint32_t)((uint16_t)(Hi)) << 16 \
+ | (uint16_t)(Lo))
+
+/** @def RT_MAKE_U32_FROM_U8
+ * Constructs a uint32_t value from four uint8_t values.
+ */
+#define RT_MAKE_U32_FROM_U8(b0, b1, b2, b3) \
+ ((uint32_t)((uint32_t)((uint8_t)(b3)) << 24 \
+ | (uint32_t)((uint8_t)(b2)) << 16 \
+ | (uint16_t)((uint8_t)(b1)) << 8 \
+ | (uint8_t)(b0))
+
+/** @def RT_MAKE_U16
+ * Constructs a uint16_t value from two uint8_t values.
+ */
+#define RT_MAKE_U16(Lo, Hi) \
+ ((uint16_t)((uint16_t)((uint8_t)(Hi)) << 8 \
+ | (uint8_t)(Lo))
+
++++

+/** @def RT_BSWAP_U64
+ * Reverses the byte order of an uint64_t value. */
+if 0
+# define RT_BSWAP_U64(u64) RT_BSWAP_U64_C(u64)
+#elif defined(__GNUC__)
+# define RT_BSWAP_U64(u64) (__builtin_constant_p((u64)) \
+ ? RT_BSWAP_U64_C(u64) : ASMByteSwapU64(u64))
+#else
+# define RT_BSWAP_U64(u64) ASMByteSwapU64(u64)
+#endif
+
+/** @def RT_BSWAP_U32
+ * Reverses the byte order of an uint32_t value. */
+if 0
+# define RT_BSWAP_U32(u32) RT_BSWAP_U32_C(u32)
```

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+#ifndef defined(__GNUC__)  
+define RT_BSWAP_U32(u32)  (_builtin_constant_p((u32))  
+    ? RT_BSWAP_U32_C(u32) : ASMByteSwapU32(u32))  
+#elif defined(__GNUC__)  
+define RT_BSWAP_U32(u32)  (__builtin_constant_p((u32))  
+    ? RT_BSWAP_U32_C(u32) : ASMByteSwapU32(u32))  
+#else  
+define RT_BSWAP_U32(u32)  ASMByteSwapU32(u32)  
+#endif
+
+/** @def RT_BSWAP_U16  
+ * Reverses the byte order of an uint16_t value. */  
+#if 0  
+#define RT_BSWAP_U16(u16)  RT_BSWAP_U16_C(u16)  
+#elif defined(__GNUC__)  
+#define RT_BSWAP_U16(u16)  (__builtin_constant_p((u16))  
+    ? RT_BSWAP_U16_C(u16) : ASMByteSwapU16(u16))  
+#else  
+#define RT_BSWAP_U16(u16)  ASMByteSwapU16(u16)  
+#endif
+
+/** @def RT_BSWAP_U64_C  
+ * Reverses the byte order of an uint64_t constant. */  
+#define RT_BSWAP_U64_C(u64) RT_MAKE_U64(RT_BSWAP_U32_C((u64) >> 32),  
+RT_BSWAP_U32_C((u64) & 0xffffffff))
+
+/** @def RT_BSWAP_U32_C  
+ * Reverses the byte order of an uint32_t constant. */  
+#define RT_BSWAP_U32_C(u32) RT_MAKE_U32_FROM_U8(RT_BYTE4(u32), RT_BYTE3(u32),  
+RT_BYTE2(u32), RT_BYTE1(u32))
+
+/** @def RT_BSWAP_U16_C  
+ * Reverses the byte order of an uint16_t constant. */  
+#define RT_BSWAP_U16_C(u16) RT_MAKE_U16(RT_HIBYTE(u16), RT_LOBYTE(u16))
+
+/** @def RT_H2LE_U64  
+ * Converts an uint64_t value from host to little endian byte order. */  
+#ifdef RT_BIG_ENDIAN  
+#define RT_H2LE_U64(u64)   RT_BSWAP_U64(u64)
+else  
+#define RT_H2LE_U64(u64)   (u64)
+#endif
+
+/** @def RT_H2LE_U64_C  
+ * Converts an uint64_t constant from host to little endian byte order. */  
+#ifdef RT_BIG_ENDIAN  
+#define RT_H2LE_U64_C(u64) RT_BSWAP_U64_C(u64)
+else  
+#define RT_H2LE_U64_C(u64) (u64)
+##endif
+
+/** @def RT_H2LE_U32
+ * Converts an uint32_t value from host to little endian byte order. */
+##ifdef RT_BIG_ENDIAN
+## define RT_H2LE_U32(u32) RT_BSWAP_U32(u32)
+##else
+## define RT_H2LE_U32(u32) (u32)
+##endif
+
+/** @def RT_H2LE_U32_C
+ * Converts an uint32_t constant from host to little endian byte order. */
+##ifdef RT_BIG_ENDIAN
+## define RT_H2LE_U32_C(u32) RT_BSWAP_U32_C(u32)
+##else
+## define RT_H2LE_U32_C(u32) (u32)
+##endif
+
+/** @def RT_LE2H_U64
+ * Converts an uint64_t value from little endian to host byte order. */
+##ifdef RT_BIG_ENDIAN
+## define RT_LE2H_U64(u64) RT_BSWAP_U64(u64)
+##else
+## define RT_LE2H_U64(u64) (u64)
+##endif
+
+/** @def RT_LE2H_U64_C
+ * Converts an uint64_t constant from little endian to host byte order. */
+##ifdef RT_BIG_ENDIAN
+## define RT_LE2H_U64_C(u64) RT_BSWAP_U64_C(u64)
+##else
+# define RT_LE2H_U64_C(u64) (u64)
+#endif
+
+/** @def RT_LE2H_U32
+ * Converts an uint32_t value from little endian to host byte order. */
+#endif
+#ifdef RT_BIG_ENDIAN
+# define RT_LE2H_U32(u32) RT_BSWAP_U32(u32)
+#else
+# define RT_LE2H_U32(u32) (u32)
+#endif
+
+/** @def RT_LE2H_U32_C
+ * Converts an uint32_t constant from little endian to host byte order. */
+#endif
+#ifdef RT_BIG_ENDIAN
+# define RT_LE2H_U32_C(u32) RT_BSWAP_U32_C(u32)
+#else
+# define RT_LE2H_U32_C(u32) (u32)
+#endif
+
+/** @def RT_LE2H_U16
+ * Converts an uint16_t value from little endian to host byte order. */
+#endif
+#ifdef RT_BIG_ENDIAN
+# define RT_LE2H_U16(u16) RT_BSWAP_U16(u16)
+#else
+# define RT_LE2H_U16(u16) (u16)
+#endif
+
+/** @def RT_LE2H_U16_C
+ * Converts an uint16_t constant from little endian to host byte order. */
+#endif
+#ifdef RT_BIG_ENDIAN
+# define RT_LE2H_U16_C(u16) RT_BSWAP_U16_C(u16)
+#else
+# define RT_LE2H_U16_C(u16) (u16)
+#endif
+
+/** @def RT_H2BE_U64
+ * Converts an uint64_t value from host to big endian byte order. */
+#endif
+#ifdef RT_BIG_ENDIAN
+# define RT_H2BE_U64(u64) (u64)
+#else
+# define RT_H2BE_U64(u64) RT_BSWAP_U64(u64)
+#endif
+
+/** @def RT_H2BE_U64_C
+ * Converts an uint64_t constant from host to big endian byte order. */
+#endif
+#ifdef RT_BIG_ENDIAN
+# define RT_H2BE_U64_C(u64) (u64)
+#else
+# define RT_H2BE_U64_C(u64) RT_BSWAP_U64_C(u64)
+#endif

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+### define RT_H2BE_U64_C(u64) RT_BSWAP_U64_C(u64)
+#endif
+
+/** @def RT_H2BE_U32
+ * Converts an uint32_t value from host to big endian byte order. */
+ifdef RT_BIG_ENDIAN
+### define RT_H2BE_U32(u32) (u32)
+#else
+### define RT_H2BE_U32(u32) RT_BSWAP_U32(u32)
+#endif
+
+/** @def RT_H2BE_U32_C
+ * Converts an uint32_t constant from host to big endian byte order. */
+ifdef RT_BIG_ENDIAN
+### define RT_H2BE_U32_C(u32) (u32)
+#else
+### define RT_H2BE_U32_C(u32) RT_BSWAP_U32_C(u32)
+#endif
+
+/** @def RT_H2BE_U16
+ * Converts an uint16_t value from host to big endian byte order. */
+ifdef RT_BIG_ENDIAN
+### define RT_H2BE_U16(u16) (u16)
+#else
+### define RT_H2BE_U16(u16) RT_BSWAP_U16(u16)
+#endif
+
+/** @def RT_H2BE_U16_C
+ * Converts an uint16_t constant from host to big endian byte order. */
+ifdef RT_BIG_ENDIAN
+### define RT_H2BE_U16_C(u16) (u16)
+#else
+### define RT_H2BE_U16_C(u16) RT_BSWAP_U16_C(u16)
+#endif
+
+/** @def RT_BE2H_U64
+ * Converts an uint64_t value from big endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+### define RT_BE2H_U64(u64) (u64)
+#else
+### define RT_BE2H_U64(u64) RT_BSWAP_U64(u64)
+#endif
+
+/** @def RT_BE2H_U64_C
+ * Converts an uint64_t constant from big endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+### define RT_BE2H_U64_C(u64) (u64)
+ifdef RT_BIG_ENDIAN
+define RT_BE2H_U64_C(u64) RT_BSWAP_U64_C(u64)
+endif
+
+/** @def RT_BE2H_U32
+ * Converts an uint32_t value from big endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+define RT_BE2H_U32(u32) (u32)
+else
+define RT_BE2H_U32(u32) RT_BSWAP_U32(u32)
+endif
+
+/** @def RT_BE2H_U32_C
+ * Converts an uint32_t value from big endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+define RT_BE2H_U32_C(u32) (u32)
+else
+define RT_BE2H_U32_C(u32) RT_BSWAP_U32_C(u32)
+endif
+
+/** @def RT_BE2H_U16
+ * Converts an uint16_t value from big endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+define RT_BE2H_U16(u16) (u16)
+else
+define RT_BE2H_U16(u16) RT_BSWAP_U16(u16)
+endif
+
+/** @def RT_BE2H_U16_C
+ * Converts an uint16_t constant from big endian to host byte order. */
+ifdef RT_BIG_ENDIAN
+define RT_BE2H_U16_C(u16) (u16)
+else
+define RT_BE2H_U16_C(u16) RT_BSWAP_U16_C(u16)
+endif
+
+/** @def RT_H2N_U64
+ * Converts an uint64_t value from host to network byte order. */
+define RT_H2N_U64(u64) RT_H2BE_U64(u64)
+
+/** @def RT_H2N_U64_C
+ * Converts an uint64_t constant from host to network byte order. */
+define RT_H2N_U64_C(u64) RT_H2BE_U64_C(u64)
+
+/** @def RT_H2N_U32
+ * Converts an uint32_t value from host to network byte order. */
+define RT_H2N_U32(u32) RT_H2BE_U32(u32)
/** @def RT_H2N_U32_C
 * Converts an uint32_t constant from host to network byte order. */
#define RT_H2N_U32_C(u32)   RT_H2BE_U32_C(u32)
+
/** @def RT_H2N_U16
 * Converts an uint16_t value from host to network byte order. */
#define RT_H2N_U16(u16)     RT_H2BE_U16(u16)
+
/** @def RT_H2N_U16_C
 * Converts an uint16_t constant from host to network byte order. */
#define RT_H2N_U16_C(u16)   RT_H2BE_U16_C(u16)
+
/** @def RT_N2H_U64
 * Converts an uint64_t value from network to host byte order. */
#define RT_N2H_U64(u64)     RT_BE2H_U64(u64)
+
/** @def RT_N2H_U64_C
 * Converts an uint64_t constant from network to host byte order. */
#define RT_N2H_U64_C(u64)   RT_BE2H_U64_C(u64)
+
/** @def RT_N2H_U32
 * Converts an uint32_t value from network to host byte order. */
#define RT_N2H_U32(u32)     RT_BE2H_U32(u32)
+
/** @def RT_N2H_U32_C
 * Converts an uint32_t constant from network to host byte order. */
#define RT_N2H_U32_C(u32)   RT_BE2H_U32_C(u32)
+
/** @def RT_N2H_U16
 * Converts an uint16_t value from network to host byte order. */
#define RT_N2H_U16(u16)     RT_BE2H_U16(u16)
+
/** @def RT_N2H_U16_C
 * Converts an uint16_t value from network to host byte order. */
#define RT_N2H_U16_C(u16)   RT_BE2H_U16_C(u16)
+
/* The BSD sys/param.h + machine/param.h file is a major source of
 * namespace pollution. Kill off some of the worse ones unless we're
 * compiling kernel code. */
#if defined(RT_OS_DARWIN) \
  && !defined(KERNEL) \
  && !defined(RT_NO_BSD_PARAM_H_UNDEFING) \
  && ( defined(_SYS_PARAM_H_) || defined(_I386_PARAM_H_) )
/* sys/param.h: */
+# undef PSWP
+# undef PVM
+# undef PINOD
+# undef PRIBO
+# undef PVFS
+# undef PZERO
+# undef PSOCK
+# undef PWAIT
+# undef PLOCK
+# undef PPAUSE
+# undef PUSER
+# undef PRIMASK
+# undef MINBUCKET
+# undef MAXALLOCSAVE
+# undef FSHIFT
+# undef FSCALE
+
+/** i386/machine.h: */
+# undef ALIGN
+# undef ALIGNBYTES
+# undef DELAY
+# undef STATUS_WORD
+# undef USERMODE
+# undef BASEPRI
+# undef MSIZE
+# undef CLSIZE
+# undef CLSIZELOG2
+#endif
+
+/** @def NIL_OFFSET
+ * NIL offset.
+ * Whenever we use offsets instead of pointers to save space and relocation effort
+ * NIL_OFFSET shall be used as the equivalent to NULL.
+ */
+#define NIL_OFFSET (~0U)
+
+
+/** @def NOREF
+ * Keeps the compiler from bitching about an unused parameter, local variable,
+ * or other stuff, will never use _Pragma are is thus more flexible.
+ */
+#define NOREF(var)               (void)(var)
+
+/** @def RT_NOREF_PV
+ * Keeps the compiler from bitching about an unused parameter or local variable.
+ * This one cannot be used with structure members and such, like for instance
+ * AssertRC may end up doing due to its generic nature.
+ */
+if defined(__cplusplus) && RT_CLANG_PREREQ(6, 0)
+ define RT_NOREF_PV(var) _Pragma(RTT_STR(unused(var)))
+ else
+ define RT_NOREF_PV(var) (void)(var)
+ endif

+/** @def RT_NOREF1
+ * RT_NOREF_PV shorthand taking on parameter. */
+define RT_NOREF1(var1) RT_NOREF_PV(var1)
+/** @def RT_NOREF2
+ * RT_NOREF_PV shorthand taking two parameters. */
+define RT_NOREF2(var1, var2) RT_NOREF_PV(var1); RT_NOREF1(var2)
+/** @def RT_NOREF3
+ * RT_NOREF_PV shorthand taking three parameters. */
+define RT_NOREF3(var1, var2, var3) RT_NOREF_PV(var1); RT_NOREF2(var2, var3)
+/** @def RT_NOREF4
+ * RT_NOREF_PV shorthand taking four parameters. */
+define RT_NOREF4(var1, var2, var3, var4) RT_NOREF_PV(var1); RT_NOREF3(var2, var3, var4)
+/** @def RT_NOREF5
+ * RT_NOREF_PV shorthand taking five parameters. */
+define RT_NOREF5(var1, var2, var3, var4, var5) RT_NOREF_PV(var1); RT_NOREF4(var2, var3, var4, var5)
+/** @def RT_NOREF6
+ * RT_NOREF_PV shorthand taking six parameters. */
+define RT_NOREF6(var1, var2, var3, var4, var5, var6) RT_NOREF_PV(var1); RT_NOREF5(var2, var3, var4, var5, var6)
+/** @def RT_NOREF7
+ * RT_NOREF_PV shorthand taking seven parameters. */
+define RT_NOREF7(var1, var2, var3, var4, var5, var6, var7) 
+ RT_NOREF_PV(var1); RT_NOREF6(var2, var3, var4, var5, var6, var7)
+/** @def RT_NOREF8
+ * RT_NOREF_PV shorthand taking eight parameters. */
+define RT_NOREF8(var1, var2, var3, var4, var5, var6, var7, var8) 
+ RT_NOREF_PV(var1); RT_NOREF7(var2, var3, var4, var5, var6, var7, var8)
+/** @def RT_NOREF9
+ * RT_NOREF_PV shorthand taking nine parameters. */
+define RT_NOREF9(var1, var2, var3, var4, var5, var6, var7, var8, var9) 
+ RT_NOREF_PV(var1); RT_NOREF8(var2, var3, var4, var5, var6, var7, var8, var9)
+/** @def RT_NOREF10
+ * RT_NOREF_PV shorthand taking ten parameters. */
+define RT_NOREF10(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10) 
+ RT_NOREF_PV(var1); RT_NOREF9(var2, var3, var4, var5, var6, var7, var8, var9, var10)
+/** @def RT_NOREF11
+ * RT_NOREF_PV shorthand taking eleven parameters. */
+define RT_NOREF11(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11) 
+ RT_NOREF_PV(var1); RT_NOREF10(var2, var3, var4, var5, var6, var7, var8, var9, var10)
/** @def RT_NOREF12
* RT_NOREF_PV shorthand taking twelve parameters. */
#define RT_NOREF12(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12) \
    RT_NOREF_PV(var1); RT_NOREF11(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12)
/** @def RT_NOREF13
* RT_NOREF_PV shorthand taking thirteen parameters. */
#define RT_NOREF13(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13) \
    RT_NOREF_PV(var1); RT_NOREF12(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13)
/** @def RT_NOREF14
* RT_NOREF_PV shorthand taking fourteen parameters. */
#define RT_NOREF14(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14) \
    RT_NOREF_PV(var1); RT_NOREF13(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14)
/** @def RT_NOREF15
* RT_NOREF_PV shorthand taking fifteen parameters. */
#define RT_NOREF15(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15) \
    RT_NOREF_PV(var1); RT_NOREF14(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15)
/** @def RT_NOREF16
* RT_NOREF_PV shorthand taking fifteen parameters. */
#define RT_NOREF16(var1, var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15, var16) \
    RT_NOREF_PV(var1); RT_NOREF15(var2, var3, var4, var5, var6, var7, var8, var9, var10, var11, var12, var13, var14, var15, var16)
/** @def RT_NOREF17
* RT_NOREF_PV shorthand taking seventeen parameters. */
/** @def RT_NOREF18
* RT_NOREF_PV shorthand taking eighteen parameters. */
/** @def RT_NOREF19
* RT_NOREF_PV shorthand taking nineteen parameters. */
/** @def RT_NOREF20
* RT_NOREF_PV shorthand taking twenty parameters. */
/** @def RT_NOREF21
* RT_NOREF_PV shorthand taking twentyone parameters. */
+ /** @def RT_NOREF22
+ * RT_NOREF_PV shorthand taking twentytwo parameters. */
+ /** @def RT_NOREF
+ * RT_NOREF_PV variant using the variadic macro feature of C99.
+ */
+ #ifdef RT_COMPILER_SUPPORTS_VA_ARGS
+ # define RT_NOREF(...)
+ # endif
+ + RT_UNPACK_CALL(RT_CONCAT(RT_NOREF, RT_EXPAND(RT_COUNT_VA_ARGS(__VA_ARGS__)),(__VA_ARGS__)))
+ #endif
+ + /** @def RT_BREAKPOINT
+ * Emit a debug breakpoint instruction.
+ */
+ #ifdef __GNUC__
+ # if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)
+ # if !defined(__L4ENV__)
+ # define RT_BREAKPOINT() __asm__ __volatile__("int $3\n\tnop\n\t")
+ # else
+ # define RT_BREAKPOINT() __asm__ __volatile__("int3; jmp 1f; 1:\n");
+ # endif
+ # elif defined(RT_ARCH_SPARC64)
+ # define RT_BREAKPOINT() __asm__ __volatile__("illtrap 0\n");
+ /* @todo Sparc64: this is just a wild guess. */
+ # elif defined(RT_ARCH_SPARC)
+ # define RT_BREAKPOINT() __asm__ __volatile__("unimp 0\n");
+ /* @todo Sparc: this is just a wild guess (same as Sparc64, just different name). */
+ # endif
+ #endif
+ #ifdef _MSC_VER
+ # define RT_BREAKPOINT() __debugbreak()
+ #endif
+ #if defined(__IBMC__) || defined(__IBMCPP__)
+ # define RT_BREAKPOINT() __interrupt(3)
+##endif
+##if defined(__WATCOMC__)
+## define RT_BREAKPOINT() __asm { int 3 }
+##endif
+##ifndef RT_BREAKPOINT
+## error "This compiler/arch is not supported!"
+##endif
+
+/** @defgroup grp_rt_cdefs_size Size Constants */
+/* (Of course, these are binary computer terms, not SI) */
+*/
+/** 1 K (Kilo) (1 024). */
+define _1K 0x00000400
+/** 2 K (Kilo) (2 048). */
+define _2K 0x00000800
+/** 4 K (Kilo) (4 096). */
+define _4K 0x00001000
+/** 8 K (Kilo) (8 192). */
+define _8K 0x00002000
+/** 16 K (Kilo) (16 384). */
+define _16K 0x00004000
+/** 32 K (Kilo) (32 768). */
+define _32K 0x00008000
+/** 64 K (Kilo) (65 536). */
+if ARCH_BITS != 16
+define _64K UINT32_C(0x00010000)
+else
+define _64K 0x00010000
+endif
+/** 128 K (Kilo) (131 072). */
+if ARCH_BITS != 16
+define _128K 0x00020000
+else
+define _128K UINT32_C(0x00020000)
+endif
+/** 256 K (Kilo) (262 144). */
+if ARCH_BITS != 16
+define _256K 0x00040000
+else
+define _256K UINT32_C(0x00040000)
+endif
+/** 512 K (Kilo) (524 288). */
+if ARCH_BITS != 16
+define _512K 0x00080000
+else
+define _512K UINT32_C(0x00080000)
+endif
+/** 1 M (Mega)                (1 048 576). */
+if ARCH_BITS != 16
+define _1M                0x00100000
+else
+define _1M                UINT32_C(0x00100000)
+endif
+/** 2 M (Mega)                (2 097 152). */
+if ARCH_BITS != 16
+define _2M                0x00200000
+else
+define _2M                UINT32_C(0x00200000)
+endif
+/** 4 M (Mega)                (4 194 304). */
+if ARCH_BITS != 16
+define _4M                0x00400000
+else
+define _4M                UINT32_C(0x00400000)
+endif
+/** 8 M (Mega)                (8 388 608). */
+define _8M                UINT32_C(0x00800000)
+/** 16 M (Mega)                (16 777 216). */
+define _16M               UINT32_C(0x01000000)
+/** 32 M (Mega)                (33 554 432). */
+define _32M               UINT32_C(0x02000000)
+/** 64 M (Mega)                (67 108 864). */
+define _64M               UINT32_C(0x04000000)
+/** 128 M (Mega)               (134 217 728). */
+define _128M              UINT32_C(0x08000000)
+/** 256 M (Mega)               (268 435 456). */
+define _256M              UINT32_C(0x10000000)
+/** 512 M (Mega)               (536 870 912). */
+define _512M              UINT32_C(0x20000000)
+/** 1 G (Giga)               (1 073 741 824). */
+if ARCH_BITS != 16
+define _1G                0x40000000
+else
+define _1G                UINT32_C(0x40000000)
+endif
+/** 1 G (Giga)               (1 073 741 824). */
+if ARCH_BITS != 16
+define _1G64              0x40000000
+else
+define _1G64             UINT64_C(0x40000000)
+endif
+/** 2 G (Giga)               (2 147 483 648). */
+define _2G32             UINT32_C(0x80000000)
+/** 2 G (Giga)               (2 147 483 648). */
+/* 4 G (Giga) (4 294 967 296). */
+if ARCH_BITS != 16
+define _4G UINT64_C(0x0000000080000000)
+endif
+/** 1 T (Tera) (1 099 511 627 776). */
+if ARCH_BITS != 16
+define _1T UINT64_C(0x0000000080000000)
+endif
+/** 1 P (Peta) (1 125 899 906 842 624). */
+if ARCH_BITS != 16
+define _1P UINT64_C(0x0000000080000000)
+endif
+/** 1 E (Exa) (1 152 921 504 606 842 624). */
+if ARCH_BITS != 16
+define _1E UINT64_C(0x0000000080000000)
+endif
+/** 2 E (Exa) (2 305 843 009 213 693 976). */
+if ARCH_BITS != 16
+define _2E UINT64_C(0x0000000080000000)
+endif
+/** @} */
+
+/* @defgroup grp_rt_cdefs_decimal_grouping Decimal Constant Grouping Macros */
+/* @ */
+#define RT_D1(g1) g1
+#define RT_D2(g1, g2) g1#g2
+#define RT_D3(g1, g2, g3) g1#g2#g3
+#define RT_D4(g1, g2, g3, g4) g1#g2#g3#g4
+#define RT_D5(g1, g2, g3, g4, g5) g1#g2#g3#g4#g5
+#define RT_D6(g1, g2, g3, g4, g5, g6) g1#g2#g3#g4#g5#g6
+#define RT_D7(g1, g2, g3, g4, g5, g6, g7) g1#g2#g3#g4#g5#g6#g7
+/* define RT_D1_U(g1) UINT32_C(g1) */
+/** 1 minute expressed in nanoseconds (64-bit). */
+#define RT_NS_1MIN UINT64_C(60000000000)
+/** 45 second expressed in nanoseconds. */
+#define RT_NS_45SEC UINT64_C(45000000000)
+/** 30 second expressed in nanoseconds. */
+#define RT_NS_30SEC UINT64_C(30000000000)
+/** 20 second expressed in nanoseconds. */
+#define RT_NS_20SEC UINT64_C(20000000000)
+/** 15 second expressed in nanoseconds. */
+#define RT_NS_15SEC UINT64_C(15000000000)
+/** 10 second expressed in nanoseconds. */
+#define RT_NS_10SEC UINT64_C(10000000000)
+/** 1 second expressed in nanoseconds. */
+#define RT_NS_1SEC UINT32_C(1000000000)
+/** 100 millisecond expressed in nanoseconds. */
+#define RT_NS_100MS UINT32_C(100000000)
+/** 10 millisecond expressed in nanoseconds. */
+#define RT_NS_10MS UINT32_C(10000000)
+/** 1 millisecond expressed in nanoseconds. */
+#define RT_NS_1MS UINT32_C(1000000)
+/** 100 microseconds expressed in nanoseconds. */
+#define RT_NS_100US UINT32_C(100000)
+/** 10 microseconds expressed in nanoseconds. */
+#define RT_NS_10US UINT32_C(10000)
+/** 1 microsecond expressed in nanoseconds. */
+#define RT_NS_1US UINT32_C(1000)

+/** 1 second expressed in nanoseconds - 64-bit type. */
+#define RT_NS_1SEC_64 UINT64_C(1000000000)
+/** 100 millisecond expressed in nanoseconds - 64-bit type. */
+#define RT_NS_100MS_64 UINT64_C(100000000)
+/** 10 millisecond expressed in nanoseconds - 64-bit type. */
+#define RT_NS_10MS_64 UINT64_C(10000000)
+/** 1 millisecond expressed in nanoseconds - 64-bit type. */
+#define RT_NS_1MS_64 UINT64_C(1000000)
+/** 100 microseconds expressed in nanoseconds - 64-bit type. */
+#define RT_NS_100US_64 UINT64_C(100000)
+/** 10 microseconds expressed in nanoseconds - 64-bit type. */
+#define RT_NS_10US_64 UINT64_C(10000)
+/** 1 microsecond expressed in nanoseconds - 64-bit type. */
+#define RT_NS_1US_64 UINT64_C(1000)

+/** 1 hour expressed in microseconds. */
+#define RT_US_1HOUR UINT32_C(36000000000)
+/** 1 minute expressed in microseconds. */
+#define RT_US_1MIN UINT32_C(6000000000)
+/** 1 second expressed in microseconds. */
+#define RT_US_1SEC UINT32_C(10000000)
+/** 100 millisecond expressed in microseconds. */
+#define RT_US_100MS UINT32_C(100000)
+/** 10 millisecond expressed in microseconds. */
+#define RT_US_10MS UINT32_C(10000)
+/** 1 millisecond expressed in microseconds. */
+#define RT_US_1MS UINT32_C(1000)
+
+/** 1 hour expressed in microseconds - 64-bit type. */
+#define RT_US_1HOUR_64 UINT64_C(3600000000)
+/** 1 minute expressed in microseconds - 64-bit type. */
+#define RT_US_1MIN_64 UINT64_C(60000000)
+/** 1 second expressed in microseconds - 64-bit type. */
+#define RT_US_1SEC_64 UINT64_C(1000000)
+/** 100 millisecond expressed in microseconds - 64-bit type. */
+#define RT_US_100MS_64 UINT64_C(100000)
+/** 10 millisecond expressed in microseconds - 64-bit type. */
+#define RT_US_10MS_64 UINT64_C(10000)
+/** 1 millisecond expressed in microseconds - 64-bit type. */
+#define RT_US_1MS_64 UINT64_C(1000)
+
+/** 1 hour expressed in milliseconds. */
+#define RT_MS_1HOUR UINT32_C(3600000)
+/** 1 minute expressed in milliseconds. */
+#define RT_MS_1MIN UINT32_C(60000)
+/** 1 second expressed in milliseconds. */
+#define RT_MS_1SEC UINT32_C(1000)
+/** 1 hour expressed in milliseconds - 64-bit type. */
+#define RT_MS_1HOUR_64 UINT64_C(3600000)
+/** 1 minute expressed in milliseconds - 64-bit type. */
+#define RT_MS_1MIN_64 UINT64_C(60000)
+/** 1 second expressed in milliseconds - 64-bit type. */
+#define RT_MS_1SEC_64 UINT64_C(1000)
+
+/** The number of seconds per week. */
+#define RT_SEC_1WEEK UINT32_C(604800)
+/** The number of seconds per day. */
+#define RT_SEC_1DAY UINT32_C(86400)
+/** The number of seconds per hour. */
+#define RT_SEC_1HOUR UINT32_C(3600)
+
+/** The number of seconds per week - 64-bit type. */
+#define RT_SEC_1WEEK_64 UINT64_C(604800)
+/** The number of seconds per day - 64-bit type. */
+#define RT_SEC_1DAY_64 UINT64_C(86400)
+/** The number of seconds per hour - 64-bit type. */
+#define RT_SEC_1HOUR_64 UINT64_C(3600)
+/** @} */
/** @defgroup grp_rt_cdefs_dbgtype  Debug Info Types */
+/** Other format. */
+#define RT_DBGTYPE_OTHER  RT_BIT_32(0)
+/** Stabs. */
+#define RT_DBGTYPE_STABS RT_BIT_32(1)
+/** Debug With Arbitrary Record Format (DWARF). */
+#define RT_DBGTYPE_DWARF RT_BIT_32(2)
+/** Microsoft Codeview debug info. */
+#define RT_DBGTYPE_CODEVIEW RT_BIT_32(3)
+/** Watcom debug info. */
+#define RT_DBGTYPE_WATCOM RT_BIT_32(4)
+/** IBM High Level Language debug info. */
+#define RT_DBGTYPE_HLL RT_BIT_32(5)
+/** Old OS/2 and Windows symbol file. */
+#define RT_DBGTYPE_SYM RT_BIT_32(6)
+/** Map file. */
+#define RT_DBGTYPE_MAP RT_BIT_32(7)
+/** @} */
+
+/** @defgroup grp_rt_cdefs_exetype  Executable Image Types */
+/** Some other format. */
+#define RT_EXETYPE_OTHER RT_BIT_32(0)
+/** Portable Executable. */
+#define RT_EXETYPE_PE RT_BIT_32(1)
+/** Linear eXecutable. */
+#define RT_EXETYPE_LX RT_BIT_32(2)
+/** Linear Executable. */
+#define RT_EXETYPE_LE RT_BIT_32(3)
+/** New Executable. */
+#define RT_EXETYPE_NE RT_BIT_32(4)
+/** DOS Executable (Mark Zbikowski). */
+#define RT_EXETYPE_MZ RT_BIT_32(5)
+/** COM Executable. */
+#define RT_EXETYPE_COM RT_BIT_32(6)
+/** a.out Executable. */
+#define RT_EXETYPE_AOUT RT_BIT_32(7)
+/** Executable and Linkable Format. */
+#define RT_EXETYPE_ELF RT_BIT_32(8)
+/** Mach-O Executable (including FAT ones). */
+#define RT_EXETYPE_MACHO RT_BIT_32(9)
+/** TE from UEFI. */
+#define RT_EXETYPE_TE RT_BIT_32(9)
+/** @} */
/** @def VALID_PTR
 * Pointer validation macro.
 * @param   ptr         The pointer.
 */

#if defined(RT_ARCH_AMD64)
#if defined(RT_OS_DARWIN) /* first 4GB is reserved for legacy kernel. */
#define RT_VALID_PTR(ptr)    (   (uintptr_t)(ptr) >= _4G \ 
   && !((uintptr_t)(ptr) & 0xffff800000000000ULL) )
#else /* !IN_RING3 */
#define RT_VALID_PTR(ptr)     (   (uintptr_t)(ptr) + 0x1000U >= 0x2000U \ 
   && !((uintptr_t)(ptr) & 0xffff800000000000ULL) )
#endif /* !IN_RING3 */
#elif defined(RT_ARCH_X86)
#define RT_VALID_PTR(ptr)      ( (uintptr_t)(ptr) + 0x1000U >= 0x2000U )
#else /* !IN_RING3 */
#endif /* !IN_RING3 */
#elif defined(RT_ARCH_SPARC64)
#if defined(IN_RING3)
#define RT_VALID_PTR(ptr)    ( (uintptr_t)(ptr) + 0x80000000ULL ) - figure this. */
#else /* !IN_RING3 */
#define RT_VALID_PTR(ptr)    ( (uintptr_t)(ptr) >= 0x01000000U )
#endif /* !IN_RING3 */
#endif /* !IN_RING3 */

+##elif defined(RT_ARCH_SPARC)
+## ifdef IN_RING3
+## ifdef RT_OS_SOLARIS
+/** Sparc user mode: According to
+## define RT_VALID_PTR(ptr)  ((uintptr_t)(ptr) + 0x400000U >= 0x400000U + 0x2000U )
+## else
+## error "Port me"
+## endif
+##else /* !IN_RING3 */
+## ifdef RT_OS_SOLARIS
+/** @todo Sparc kernel mode: Check the sources! */
+## define RT_VALID_PTR(ptr)  ((uintptr_t)(ptr) + 0x1000U >= 0x2000U )
+## else
+## error "Port me"
+## endif
+##endif /* !IN_RING3 */
+
+##elif defined(RT_ARCH_ARM)
+/* ASSUMES that at least the last and first 4K are out of bounds. */
+## define RT_VALID_PTR(ptr)  ((uintptr_t)(ptr) + 0x1000U >= 0x2000U )
+##else
+##error "Architecture identifier missing / not implemented."
+##endif
+
+##elif defined(RT_ARCH_SPARC)
+## ifdef RT_VALID_ALIGNED_PTR
+## define RT_VALID_ALIGNED_PTR(ptr, align)   \
+    ( !((uintptr_t)(ptr) & (uintptr_t)((align) - 1)) \ 
+    && VALID_PTR(ptr) )
+
+## define VALID_PTR(ptr)  RT_VALID_PTR(ptr)
+## define VALID_ALIGNED_PTR(ptr, align)   \
+    ( !((uintptr_t)(ptr) & (uintptr_t)((align) - 1)) \ 
+    && VALID_PTR(ptr) )
+
+## define VALID_PHYS32(Phys)  ( (uint64_t)(Phys) < (uint64_t)_4G )
+
+## define N_  
+## The #define N_ is used to mark a string for translation. This is usable in
+ * any part of the code, as it is only used by the tools that create message
+ * catalogs. This macro is a no-op as far as the compiler and code generation
+ * is concerned.
+ *
+ * If you want to both mark a string for translation and translate it, use _().
+ */
+#define N_(s) (s)
+
+/** @def _
+ * The \#define _ is used to mark a string for translation and to translate it
+ * in one step.
+ *
+ * If you want to only mark a string for translation, use N_().
+ */
+#define _(_s) gettext(s)
+
+/** @def __PRETTY_FUNCTION__
+ * With GNU C we'd like to use the builtin __PRETTY_FUNCTION__, so define that
+ * for the other compilers.
+ */
+#if !defined(__GNUC__) && !defined(__PRETTY_FUNCTION__)
+# ifdef _MSC_VER
+  # define __PRETTY_FUNCTION__    __FUNCSIG__
+# else
+  # define __PRETTY_FUNCTION__    __FUNCTION__
+# endif
+#endif
+
+/** @def RT_STRICT
+ * The \#define RT_STRICT controls whether or not assertions and other runtime
+ * checks should be compiled in or not. This is defined when DEBUG is defined.
+ *
+ * If RT_NO_STRICT is defined, it will unconditionally be undefined.
+ *
+ * If you want assertions which are not subject to compile time options use
+ * the AssertRelease*() flavors.
+ */
+#if !defined(RT STRICT) && defined(DEBUG)
+# define RT STRICT
+#endif
+ifdef RT NO STRICT
+# define RT STRICT
+#endif
+
+/** @todo remove this: */
+#if !defined(RT LOCK STRICT) && !defined(DEBUG_bird)
+# define RT LOCK NO STRICT
+endif
+if !defined(RT_LOCK STRICT ORDER) && !defined(DEBUG bird)
+# define RT LOCK NO STRICT ORDER
+endif
+/** @def RT LOCK STRICT
+ * The \#define RT LOCK STRICT controls whether deadlock detection and related
+ * checks are done in the lock and semaphore code. It is by default enabled in
+ * RT STRICT builds, but this behavior can be overridden by defining
+ * RT LOCK NO STRICT. */
+if !defined(RT LOCK STRICT) && !defined(RT LOCK NO STRICT) && defined(RT STRICT)
+# define RT LOCK STRICT
+endif
+/** @def RT LOCK NO STRICT
+ * The \#define RT LOCK NO STRICT disables RT LOCK STRICT. */
+if defined(RT LOCK NO STRICT) && defined(RT LOCK STRICT)
+# undef RT LOCK STRICT
+endif
+
+/** @def RT LOCK STRICT ORDER
+ * The \#define RT LOCK STRICT ORDER controls whether locking order is checked
+ * by the lock and semaphore code. It is by default enabled in RT STRICT
+ * builds, but this behavior can be overridden by defining
+ * RT LOCK NO STRICT ORDER. */
+if !defined(RT LOCK STRICT ORDER) && !defined(RT LOCK NO STRICT ORDER) &&
defined(RT STRICT)
+# define RT LOCK STRICT ORDER
+endif
+/** @def RT LOCK NO STRICT ORDER
+ * The \#define RT LOCK NO STRICT ORDER disables RT LOCK STRICT ORDER. */
+if defined(RT LOCK NO STRICT ORDER) && defined(RT LOCK STRICT ORDER)
+# undef RT LOCK STRICT ORDER
+endif
+
+/** Source position. */
+#define RT SRC POS __FILE__, __LINE__, RT GCC EXTENSION __PRETTY_FUNCTION__
+
+/** Source position declaration. */
+#define RT_SRC_POS_DECL const char *pszFile, unsigned iLine, const char *pszFunction
+
+/** Source position arguments. */
+#define RT_SRC_POS_ARGS pszFile, iLine, pszFunction
+
+/** Applies NOREF() to the source position arguments. */
+#define RT_SRC_POS_NOREF() do { NOREF(pszFile); NOREF(iLine); NOREF(pszFunction); } while (0)
+
+
+/** @def RT_INLINE_ASM_EXTERNAL
+ * Defined as 1 if the compiler does not support inline assembly.
+ * The ASM* functions will then be implemented in external .asm files.
+ */
+#
+if (defined(_MSC_VER) && defined(RT_ARCH_AMD64)) \
+ || (!defined(RT_ARCH_AMD64) && !defined(RT_ARCH_X86)) \
+ || defined(__WATCOMC__) 
+define RT_INLINE_ASM_EXTERNAL 1 
+else 
+define RT_INLINE_ASM_EXTERNAL 0 
+endif 
+
+/** @def RT_INLINE_ASM_GNU_STYLE
+ * Defined as 1 if the compiler understands GNU style inline assembly.
+ */
+#
+if defined(_MSC_VER) || defined(__WATCOMC__) 
+define RT_INLINE_ASM_GNU_STYLE 0 
+else 
+define RT_INLINE_ASM_GNU_STYLE 1 
+endif 
+
+/** @def RT_INLINE_ASM_USES_INTRIN
+ * Defined as the major MSC version if the compiler have and uses intrin.h.
+ * Otherwise it is 0. */
+ifndef _MSC_VER 
+#if   _MSC_VER >= 1700 /* Visual C++ v11.0 / 2012 */ 
+# define RT_INLINE_ASM_USES_INTRIN 17 
+# elif _MSC_VER >= 1600 /* Visual C++ v10.0 / 2010 */ 
+# define RT_INLINE_ASM_USES_INTRIN 16 
+# elif _MSC_VER >= 1500 /* Visual C++ v9.0 / 2008 */ 
+# define RT_INLINE_ASM_USES_INTRIN 15 
+# elif _MSC_VER >= 1400 /* Visual C++ v8.0 / 2005 */ 
+# define RT_INLINE_ASM_USES_INTRIN 14 
+# endif 
+#endif 
+#ifndef RT_INLINE_ASM_USES_INTRIN 
+# define RT_INLINE_ASM_USES_INTRIN 0 
+#endif 
+
+/** @def RT_COMPILER_SUPPORTS_LAMBDA
+ * If the defined, the compiler supports lambda expressions. These expressions
+ * are useful for embedding assertions and type checks into macros. */
+ifndef _MSC_VER && defined(__cplusplus) 
+#if _MSC_VER >= 1600 /* Visual C++ v10.0 / 2010 */ 
+# define RT_COMPILER_SUPPORTS_LAMBDA 
+# endif 
+#ifndef RT_COMPILER_SUPPORTS_LAMBDA 
+# define RT_COMPILER_SUPPORTS_LAMBDA 0 
+# endif 
+/* 4.5 or later, I think, if in ++11 mode... */
+*/ @def RT_DATA_IS_FAR
+ * Set to 1 if we're in 16-bit mode and use far pointers.
+ */
+#if ARCH_BITS == 16 && defined(__WATCOMC__) \ 
+ && (defined(__COMPACT__) || defined(__LARGE__))
+# define RT_DATA_IS_FAR 1
+#else
+# define RT_DATA_IS_FAR 0
+#endif
+
+*/ @def RT_FAR
+ * For indicating far pointers in 16-bit code.
+ */
+*/ @def RT_NEAR
+ * For indicating near pointers in 16-bit code.
+ */
+*/ @def RT_FAR_CODE
+ * For indicating far 16-bit functions.
+ */
+*/ @def RT_NEAR_CODE
+ * For indicating near 16-bit functions.
+ */
+*/ @def RT_FAR_DATA
+ * For indicating far 16-bit external data, i.e. in a segment other than DATA16.
+ */
+#if ARCH_BITS == 16
+# define RT_FAR    __far
+# define RT_NEAR   __near
+# define RT_FAR_CODE    __far
+# define RT_NEAR_CODE   __near
+# define RT_FAR_DATA    __far
+#else
+# define RT_FAR
+# define RT_NEAR
+# define RT_FAR_CODE
+# define RT_NEAR_CODE
+# define RT_FAR_DATA
+#endif
+
+}
/*
+ * @def DECLEXPORT_CLASS
+ * How to declare an exported class. Place this macro after the 'class'
+ * keyword in the declaration of every class you want to export.
+ *
+ * @note It is necessary to use this macro even for inner classes declared
+ * inside the already exported classes. This is a GCC specific requirement,
+ * but it seems not to harm other compilers.
+ */
+#ifdef __cplusplus
++#if defined(_MSC_VER) || defined(RT_OS_OS2)
++# define DECLEXPORT_CLASS       __declspec(dllexport)
++#elif defined(RT_USE_VISIBILITY_DEFAULT)
++# define DECLEXPORT_CLASS       __attribute__((visibility("default")))
++#else
++# define DECLEXPORT_CLASS
++#endif
+/
++#ifdef __cplusplus
+*/
+*@
+** @def DECLIMPORT_CLASS
+* How to declare an imported class Place this macro after the 'class'
+* keyword in the declaration of every class you want to export.
+ *
+ * @note It is necessary to use this macro even for inner classes declared
+ * inside the already exported classes. This is a GCC specific requirement,
+ * but it seems not to harm other compilers.
+ */
+#if defined(_MSC_VER) || (defined(RT_OS_OS2) && !defined(__IBMC__) && !defined(__IBMCPP__))
+# define DECLIMPORT_CLASS       __declspec(dllimport)
++#elif defined(RT_USE_VISIBILITY_DEFAULT)
+# define DECLIMPORT_CLASS       __attribute__((visibility("default")))
++#else
+# define DECLIMPORT_CLASS
++#endif
+/
+﻿#ifdef __cplusplus
+*/
+*@
+** @def WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP
+ * Macro to work around error C2593 of the not-so-smart MSVC 7.x ambiguity
+ * resolver. The following snippet clearly demonstrates the code causing this
+ * error:
+ * @code
+ * class A
+ * {
+ *     public:
+ *         operator bool() const { return false; }
+ *         operator int*() const { return NULL; }
+ *     }
+ * #endif
+ */
+ * {  
+ *
+ *      A a;
+ *      if (!a);
+ *      if (a && 0);
+ *      return 0;
+ *
+ *  }  
+ * @endcode 
+ * The code itself seems pretty valid to me and GCC thinks the same. 
+ *
+ * This macro fixes the compiler error by explicitly overloading implicit 
+ * global operators !, && and || that take the given class instance as one of 
+ * their arguments.
+ *
+ * The best is to use this macro right after the class declaration.
+ *
+ * @note The macro expands to nothing for compilers other than MSVC.
+ *
+ * @param Cls Class to apply the workaround to
+ */
+#if defined(_MSC_VER)
+# define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP(Cls) \
+   inline bool operator! (const Cls &that) { return !bool (that); } \ 
+   inline bool operator&& (const Cls &that, bool b) { return bool (that) && b; } \ 
+   inline bool operator|| (const Cls &that, bool b) { return bool (that) || b; } \ 
+   inline bool operator&& (bool b, const Cls &that) { return b && bool (that); } \ 
+   inline bool operator|| (bool b, const Cls &that) { return b || bool (that); } 
+#else
+# define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP(Cls)
+#endif

/** @def WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL
 * Version of WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP for template classes.
 */

+ * @param Tpl Name of the template class to apply the workaround to
+ * @param ArgsDecl arguments of the template, as declared in |<>| after the
+ * @param Args arguments of the template, as specified in |<>| after the
+ * template class name when using the, including |<>|
+ *
+ * Example:
+ * @code
+ * // template class declaration
+ * template <class C>
+ * class Foo { ... };
+ * // applied workaround
+ * WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL (Foo, <class C>, <C>)
+ * @endcode
+ */
```c++
+if defined(_MSC_VER)
+  define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL(Tpl, ArgsDecl, Args) \
+    template ArgsDecl \
+    inline bool operator! (const Tpl Args &that) { return !bool (that); } \
+    template ArgsDecl \
+    inline bool operator&& (const Tpl Args &that, bool b) { return bool (that) && b; } \
+    template ArgsDecl \
+    inline bool operator|| (const Tpl Args &that, bool b) { return bool (that) || b; } \
+    template ArgsDecl \
+    inline bool operator&& (bool b, const Tpl Args &that) { return b && bool (that); } \
+    template ArgsDecl \
+    inline bool operator|| (bool b, const Tpl Args &that) { return b || bool (that); }
+else
+  define WORKAROUND_MSVC7_ERROR_C2593_FOR_BOOL_OP_TPL(Tpl, ArgsDecl, Args)
+endif
+
+/** @def DECLARE_CLS_COPY_CTOR_ASSIGN_NOOP 
+ * Declares the copy constructor and the assignment operation as inlined no-ops 
+ * (non-existent functions) for the given class. Use this macro inside the 
+ * private section if you want to effectively disable these operations for your 
+ * class.
+ */
+define DECLARE_CLS_COPY_CTOR_ASSIGN_NOOP(Cls) \
+   inline Cls(const Cls &); \
+   inline Cls &operator= (const Cls &)
+
+/** @def DECLARE_CLS_NEW_DELETE_NOOP 
+ * Declares the new and delete operations as no-ops (non-existent functions) 
+ * for the given class. Use this macro inside the private section if you want 
+ * to effectively limit creating class instances on the stack only.
+ */
+define DECLARE_CLS_NEW_DELETE_NOOP(Cls) \
+   inline static void *operator new (size_t); \
+   inline static void operator delete (void *)
+
+endif /* __cplusplus */
```
### IPRT - Status Codes

/* @file
 * IPRT - Status Codes.
 */

/*
 * Copyright (C) 2006-2017 Oracle Corporation
 */

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 * available from http://www.virtualbox.org. This file is free software;
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 * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
 */

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 * of the Common Development and Distribution License Version 1.0
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 * VirtualBox OSE distribution, in which case the provisions of the
 * CDDL are applicable instead of those of the GPL.
 */

/* You may elect to license modified versions of this file under the
 * terms and conditions of either the GPL or the CDDL or both.
 */

#ifndef ___iprt_err_h
#define ___iprt_err_h

#include <iprt/cdefs.h>
#include <iprt/types.h>
#include <iprt/stdarg.h>

/** @defgroup grp_rt_err            RTErr - Status Codes
 * @ingroup grp_rt
 *
 * The IPRT status codes are in two ranges: \{0..999\} and \{22000..32766\}. The
 * IPRT users are free to use the range \{1000..21999\}. See RTERR_RANGE1_FIRST,
 * RTERR_RANGE1_LAST, RTERR_RANGE2_FIRST, RTERR_RANGE2_LAST, RTERR_USER_FIRST
 * and RTERR_USER_LAST.
 */
```cpp
/** @defgroup grp_rt_err_hlp        Status Code Helpers
 */

#ifdef __cplusplus
/
 /** Strict type validation class.
 */
 + * This is only really useful for type checking the arguments to RT_SUCCESS,
 + * RT_SUCCESS_NP, RT_FAILURE and RT_FAILURE_NP. The RTErrStrictType2
 + * constructor is for integration with external status code strictness regimes.
 */
+class RTErrStrictType
+{
+  int32_t m_rc;
+
+public:
+  /**
  * Constructor for interaction with external status code strictness regimes.
  */
  + * This is a special constructor for helping external return code validator
  + * classes interact cleanly with RT_SUCCESS, RT_SUCCESS_NP, RT_FAILURE and
  + * RT_FAILURE_NP while barring automatic cast to integer.
  + *
  + * @param   rcObj       IPRT status code object from an automatic cast.
  */
+  RTEerrStrictType(RTErrStrictType2 const rcObj)
+    : m_rc(rcObj.getValue())
+  { }
+
+   /**
  * Integer constructor used by RT_SUCCESS_NP.
  */
  + * @param   rc          IPRT style status code.
  */
+  RTEerrStrictType(int32_t rc)
+    : m_rc(rc)
+  { }
+  
+  /**
+  * @todo figure where int32_t is long instead of int. */
+  */
```

---

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+ * Integer constructor used by RT_SUCCESS_NP.
+ *
+ * @param   rc          IPRT style status code.
+ */
+ RTErrStrictType(signed int rc)
+     : m_rc(rc)
+ {
+     }
+ */
+ * Test for success.
+ */
+ bool success() const
+ {
+     return m_rc >= 0;
+ }
+
+private:
+ /*@name Try ban a number of wrong types.
+ * @*/
+ RTErrStrictType(uint8_t rc)         : m_rc(-999) { NOREF(rc); }
+ RTErrStrictType(uint16_t rc)        : m_rc(-999) { NOREF(rc); }
+ RTErrStrictType(uint32_t rc)        : m_rc(-999) { NOREF(rc); }
+ RTErrStrictType(uint64_t rc)        : m_rc(-999) { NOREF(rc); }
+ RTErrStrictType(int8_t rc)          : m_rc(-999) { NOREF(rc); }
+ RTErrStrictType(int16_t rc)         : m_rc(-999) { NOREF(rc); }
+ RTErrStrictType(int64_t rc)         : m_rc(-999) { NOREF(rc); }
+ /*@todo fight long here - clashes with int32_t/int64_t on some platforms. */
+ /*@ */
+ };
+ /*_cplusplus */
+
+/*@ def RTERR_STRICT_RC
+ * Indicates that RT_SUCCESS_NP, RT_SUCCESS, RT_FAILURE_NP and RT_FAILURE should
+ * make type enforcing at compile time.
+ *
+ * @remarks Only define this for C++ code.
+ */
+ ifndef __cplusplus
+ 
+ & defined(RTERR_STRICT_RC)
+ & defined(DOXYGEN_RUNNING)
+ | defined(_DEBUG)
+ | defined(RT_STRICT) )
+ define RTERR_STRICT_RC 1
+ endif
+

+/** @def RT_SUCCESS
+ * Check for success. We expect success in normal cases, that is the code path depending on
+ * this check is normally taken. To prevent any prediction use RT_SUCCESS_NP instead.
+ *
+ * @returns true if rc indicates success.
+ * @returns false if rc indicates failure.
+ *
+ * @param   rc  The iprt status code to test.
+ */
+#define RT_SUCCESS(rc)      ( RT_LIKELY(RT_SUCCESS_NP(rc)) )

+/** @def RT_SUCCESS_NP
+ * Check for success. Don't predict the result.
+ *
+ * @returns true if rc indicates success.
+ * @returns false if rc indicates failure.
+ *
+ * @param   rc  The iprt status code to test.
+ */
+#ifdef RTERR_STRICT_RC
+# define RT_SUCCESS_NP(rc)   ( RTErrStrictType(rc).success() )
+#else
+# define RT_SUCCESS_NP(rc)   ( (int)(rc) >= VINF_SUCCESS )
+#endif

+/** @def RT_FAILURE
+ * Check for failure, predicting unlikely.
+ *
+ * We don't expect in normal cases, that is the code path depending on this
+ * check is normally NOT taken. To prevent any prediction use RT_FAILURE_NP
+ * instead.
+ *
+ * @returns true if rc indicates failure.
+ * @returns false if rc indicates success.
+ *
+ * @param   rc  The iprt status code to test.
+ *
+ * @remarks Please structure your code to use the RT_SUCCESS() macro instead of
+ *          RT_FAILURE() where possible, as that gives us a better shot at good
+ *          code with the windows compilers.
+ */
+#define RT_FAILURE(rc)      ( RT_UNLIKELY(!RT_SUCCESS_NP(rc)) )

+/** @def RT_FAILURE_NP
+ * Check for failure, no prediction.
+ *
+ * @returns true if rc indicates failure.
+ * @returns false if rc indicates success.
+ *
+ * @param   rc  The iprt status code to test.
+ */
+#define RT_FAILURE_NP(rc)   ( !RT_SUCCESS_NP(rc) )
+
+RT_C_DECLS_BEGIN
+
+/**
+ * Converts a Darwin HRESULT error to an iprt status code.
+ *
+ * @returns iprt status code.
+ * @param   iNativeCode    HRESULT error code.
+ * @remark  Darwin ring-3 only.
+ */
+RTDECL(int)  RTErrConvertFromDarwinCOM(int32_t iNativeCode);
+
+/**
+ * Converts a Darwin IOReturn error to an iprt status code.
+ *
+ * @returns iprt status code.
+ * @param   iNativeCode    IOReturn error code.
+ * @remark  Darwin only.
+ */
+RTDECL(int)  RTErrConvertFromDarwinIO(int iNativeCode);
+
+/**
+ * Converts a Darwin kern_return_t error to an iprt status code.
+ *
+ * @returns iprt status code.
+ * @param   iNativeCode    kern_return_t error code.
+ * @remark  Darwin only.
+ */
+RTDECL(int)  RTErrConvertFromDarwinKern(int iNativeCode);
+
+/**
+ * Converts a Darwin error to an iprt status code.
+ *
+ * This will consult RTErrConvertFromDarwinKern, RTErrConvertFromDarwinIO
+ * and RTErrConvertFromDarwinCOM in this order. The latter is ring-3 only as it
+ * doesn't apply elsewhere.
+ *
+ * @returns iprt status code.
+ * @param   iNativeCode    Darwin error code.
+ * @remark  Darwin only.
+ */
+RTDECL(int)  RTErrConvertFromDarwin(int iNativeCode);
+
+/*
+ * @returns false if rc indicates success.
+ */
+*/
+RTDECL(int) RTErrConvertFromDarwin(int iNativeCode);
+
+/**
+ * Converts errno to iprt status code.
+ *
+ * @returns iprt status code.
+ * @param   uNativeCode    errno code.
+ */
+RTDECL(int) RTErrConvertFromErrno(unsigned uNativeCode);
+
+/**
+ * Converts a L4 errno to a iprt status code.
+ *
+ * @returns iprt status code.
+ * @param   uNativeCode    l4 errno.
+ * @remark  L4 only.
+ */
+RTDECL(int) RTErrConvertFromL4Errno(unsigned uNativeCode);
+
+/**
+ * Converts NT status code to iprt status code.
+ *
+ * Needless to say, this is only available on NT and winXX targets.
+ *
+ * @returns iprt status code.
+ * @param   lNativeCode    NT status code.
+ * @remark  Windows only.
+ */
+RTDECL(int) RTErrConvertFromNtStatus(long lNativeCode);
+
+/**
+ * Converts OS/2 error code to iprt status code.
+ *
+ * @returns iprt status code.
+ * @param   uNativeCode    OS/2 error code.
+ * @remark  OS/2 only.
+ */
+RTDECL(int) RTErrConvertFromOS2(unsigned uNativeCode);
+
+/**
+ * Converts Win32 error code to iprt status code.
+ *
+ * @returns iprt status code.
+ * @param   uNativeCode    Win32 error code.
+ * @remark  Windows only.
+ */
+RTDECL(int) RTErrConvertFromWin32(unsigned uNativeCode);
+
+/**
+ * Converts an iprt status code to a errno status code.
+ *
+ * @returns errno status code.
+ * @param   iErr   iprt status code.
+ */
+RTDECL(int)  RTErrConvertToErrno(int iErr);
+
+#ifdef IN_RING3
+
+/**
+ * iprt status code message.
+ */
+typedef struct RTSTATUSMSG
+{
+    /** Pointer to the short message string. */
+    const char *pszMsgShort;
+    /** Pointer to the full message string. */
+    const char *pszMsgFull;
+    /** Pointer to the define string. */
+    const char *pszDefine;
+    /** Status code number. */
+    int         iCode;
+} RTSTATUSMSG;
+/** Pointer to iprt status code message. */
+typedef RTSTATUSMSG *PRTSTATUSMSG;
+/** Pointer to const iprt status code message. */
+typedef const RTSTATUSMSG *PCRTSTATUSMSG;
+
+/**
+ * Get the message structure corresponding to a given iprt status code.
+ *
+ * @returns Pointer to read-only message description.
+ * @param   rc      The status code.
+ */
+RTDECL(PCRTSTATUSMSG) RTErrGet(int rc);
+
+/**
+ * Get the define corresponding to a given iprt status code.
+ *
+ * @returns Pointer to read-only string with the \#define identifier.
+ * @param   rc      The status code.
+ */
+#define RTErrGetDefine(rc)      (RTErrGet(rc)->pszDefine)
+
+/**
+ * Get the short description corresponding to a given iprt status code.
+ *
+ @returns Pointer to read-only string with the description.
+ @param rc The status code.
+ */
+#define RTErrGetShort(rc) (RTErrGet(rc)->pszMsgShort)
+
+/**
+ * Get the full description corresponding to a given iprt status code.
+ *
+ * @returns Pointer to read-only string with the description.
+ * @param rc The status code.
+ */
+#define RTErrGetFull(rc) (RTErrGet(rc)->pszMsgFull)
+
+ifdef RT_OS_WINDOWS
+/**
+ * Windows error code message.
+ */
typedef struct RTWINERRMSG
+
+ /** Pointer to the message structure corresponding to a given Windows error code.
+ * @returns Pointer to read-only message description.
+ * @param rc The status code.
+ */
+RTDECL(PCRTWINERRMSG) RTErrWinGet(long rc);
+
+/** On windows COM errors are part of the Windows error database. */
typedef RTWINERRMSG *PRTWINERRMSG;
+/** Pointer to const Windows error code message. */
typedef const RTWINERRMSG *PCRTWINERRMSG;
+
+/**
+ * COM/XPCOM error code message.
+ */
typedef struct RTCOMERRMSG
/** Pointer to the full message string. */
const char *pszMsgFull;
/** Pointer to the define string. */
const char *pszDefine;
/** Error code number. */
uint32_t    iCode;
} RTCOMERRMSG;

/** Pointer to a XPCOM/COM error code message. */
typedef RTCOMERRMSG *PRTCOMERRMSG;
/** Pointer to const a XPCOM/COM error code message. */
typedef const RTCOMERRMSG *PCRTCOMERRMSG;

/** Get the message structure corresponding to a given COM/XPCOM error code. */
/** @returns Pointer to read-only message description. */
/** @param rc The status code. */
RTDECL(PCRTCOMERRMSG) RTErrCOMGet(uint32_t rc);

/** @defgroup RTERRINFO_FLAGS_XXX   RTERRINFO::fFlags */
/** Custom structure (the default). */
define RTERRINFO_FLAGS_T_CUSTOM    UINT32_C(0)
/** Static structure (RTERRINOSTATIC). */
define RTERRINFO_FLAGS_T_STATIC    UINT32_C(1)
/** Allocated structure (RTErrInfoAlloc). */
define RTERRINFO_FLAGS_T_ALLOC     UINT32_C(2)
/** Reserved type. */
define RTERRINFO_FLAGS_T_RESERVED  UINT32_C(3)
/** Type mask. */
define RTERRINFO_FLAGS_T_MASK      UINT32_C(3)
/** Error info is set. */
define RTERRINFO_FLAGS_SET         RT_BIT_32(2)
/** Fixed flags (magic). */
define RTERRINFO_FLAGS_MAGIC       UINT32_C(0xbabe0000)
/** The bit mask for the magic value. */
define RTERRINFO_FLAGS_MAGIC_MASK  UINT32_C(0xffff0000)

/** Initializes an error info structure. */
/** @returns @a pErrInfo. */

+ * @param   pErrInfo            The error info structure to init.
+ * @param   pszMsg              The message buffer. Must be at least one byte.
+ * @param   cbMsg               The size of the message buffer.
+ */
+DECLINLINE(PRTERRINFO) RTErrInfoInit(PRTERRINFO pErrInfo, char *pszMsg, size_t cbMsg)
+
+ *pszMsg = \0;
+
+ pErrInfo->fFlags         = RTERRINFO_FLAGS_T_CUSTOM | RTERRINFO_FLAGS_MAGIC;
+ pErrInfo->rc             = /*VINF_SUCCESS*/ 0;
+ pErrInfo->pszMsg         = pszMsg;
+ pErrInfo->cbMsg          = cbMsg;
+ pErrInfo->apvReserved[0] = NULL;
+ pErrInfo->apvReserved[1] = NULL;
+
+ return pErrInfo;
+}
+
+/**
+ * Initialize a static error info structure.
+ *
+ * @returns Pointer to the core error info structure.
+ * @param   pStaticErrInfo      The static error info structure to init.
+ */
+DECLINLINE(PRTERRINFO) RTErrInfoInitStatic(PRTERRINFOSTATIC pStaticErrInfo)
+
{ RTErrInfoInit(&pStaticErrInfo->Core, pStaticErrInfo->szMsg, sizeof(pStaticErrInfo->szMsg));
+ pStaticErrInfo->Core.fFlags = RTERRINFO_FLAGS_T_STATIC | RTERRINFO_FLAGS_MAGIC;
+ return &pStaticErrInfo->Core;
+}
+
+/**
+ * Allocates a error info structure with a buffer at least the given size.
+ *
+ * @returns Pointer to an error info structure on success, NULL on failure.
+ *
+ * @param   cbMsg               The minimum message buffer size. Use 0 to get
+ *                              the default buffer size.
+ */
+RTDECL(PRTERRINFO)  RTErrInfoAlloc(size_t cbMsg);
+
+/**
+ * Same as RTErrInfoAlloc, except that an IPRT status code is returned.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   cbMsg               The minimum message buffer size. Use 0 to get
+ *                              the default buffer size.
+ * @param   ppErrInfo           Where to store the pointer to the allocated
+ * error info structure on success. This is
+ * always set to NULL.
+ */
+RTDECL(int)         RTErrInfoAllocEx(size_t cbMsg, PRERRINFO *ppErrInfo);
+
+/**
+ * Frees an error info structure allocated by RTErrInfoAlloc or
+ * RTErrInfoAllocEx.
+ *
+ * @param   pErrInfo            The error info structure.
+ */
+RTDECL(void)        RTErrInfoFree(PRERRINFO pErrInfo);
+
+/**
+ * Fills in the error info details.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszMsg              The error message string.
+ */
+RTDECL(int)         RTErrInfoSet(PRERRINFO pErrInfo, int rc, const char *pszMsg);
+
+/**
+ * Fills in the error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszFormat           The format string.
+ * @param   ...                 The format arguments.
+ */
+RTDECL(int)         RTErrInfoSetF(PRERRINFO pErrInfo, int rc, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);
+
+/**
+ * Fills in the error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   pszFormat           The format string.
+ * @param   va                  The format arguments.
+ */
+RTDECL(int)         RTErrInfoSetF(PRERRINFO pErrInfo, int rc, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);
+RTDECL(int) RTErrInfoSetV(PRTERRINFO pErrInfo, int rc, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(3, 0);
+
+/**
+ * Adds more error info details.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo    The error info structure to fill in.
+ * @param   rc          The status code to return.
+ * @param   pszMsg      The error message string to add.
+ */
+RTDECL(int) RTErrInfoAdd(PRTERRINFO pErrInfo, int rc, const char *pszMsg);
+
+/**
+ * Adds more error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo    The error info structure to fill in.
+ * @param   rc          The status code to return.
+ * @param   pszFormat   The format string to add.
+ */
+RTDECL(int) RTErrInfoAddF(PRTERRINFO pErrInfo, int rc, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);
+
+/**
+ * Adds more error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo    The error info structure to fill in.
+ * @param   rc          The status code to return.
+ * @param   pszFormat   The format string to add.
+ * @param   va          The format arguments.
+ */
+RTDECL(int) RTErrInfoAddV(PRTERRINFO pErrInfo, int rc, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(3, 0);
+
/** @name RTERRINFO_LOG_F_XXX
+ * @{ */
+/** Both debug and release log. */
+#define RTERRINFO_LOG_F_RELEASE RT_BIT_32(0)
+/** @} */
+
+* Fills in the error info details.
+ * @returns @a rc.
+ *
+ * @param  pErrInfo    The error info structure to fill in.
+ * @param  rc          The status code to return.
+ * @param  iLogGroup   The logging group.
+ * @param  fFlags      RTERRINFO_LOG_F_XXX.
+ * @param  pszMsg      The error message string.
+ */
+RTDECL(int)         RTErrInfoLogAndSet(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
const char *pszMsg);
+
+/**
+ * Fills in the error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param  pErrInfo    The error info structure to fill in.
+ * @param  rc          The status code to return.
+ * @param  iLogGroup   The logging group.
+ * @param  fFlags      RTERRINFO_LOG_F_XXX.
+ * @param  pszFormat   The format string.
+ * @param  ...         The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndSetF(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(5, 6);
+
+/**
+ * Fills in the error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param  pErrInfo    The error info structure to fill in.
+ * @param  rc          The status code to return.
+ * @param  iLogGroup   The logging group.
+ * @param  fFlags      RTERRINFO_LOG_F_XXX.
+ * @param  pszFormat   The format string.
+ * @param  va          The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndSetV(PRTERRINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags,
const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(5, 0);
+
+/**
+ * Adds more error info details.
+ *
+ * @returns @a rc.
+ *
+ * @param  pErrInfo    The error info structure to fill in.
+ */
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszMsg              The error message string to add.
+ */
+RTDECL(int)         RTErrInfoLogAndAdd(PRTERINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags, const char *pszMsg);
+
+/**
+ * Adds more error info details, with a sprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszFormat           The format string to add.
+ * @param   ...                 The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndAddF(PRTERINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags, const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(5, 6);
+
+/**
+ * Adds more error info details, with a vsprintf style message.
+ *
+ * @returns @a rc.
+ *
+ * @param   pErrInfo            The error info structure to fill in.
+ * @param   rc                  The status code to return.
+ * @param   iLogGroup           The logging group.
+ * @param   fFlags              RTERRINFO_LOG_F_XXX.
+ * @param   pszFormat           The format string to add.
+ * @param   va                  The format arguments.
+ */
+RTDECL(int)         RTErrInfoLogAndAddV(PRTERINFO pErrInfo, int rc, uint32_t iLogGroup, uint32_t fFlags, const char *pszFormat, va_list va) RT_IPRT_FORMAT_ATTR(5, 0);

/** @name Macros wrapping the RTErrInfoLog* functions.
 * @{ */
#define RTERRINFO_LOG_SET(  a_pErrInfo, a_rc, a_pszMsg)             RTErrInfoLogAndSet( a_pErrInfo, a_rc,
LOG_GROUP, 0, a_pszMsg)
#define RTERRINFO_LOG_SET_V(a_pErrInfo, a_rc, a_pszMsg, a_va)       RTErrInfoLogAndSetV(a_pErrInfo,
a_rc, LOG_GROUP, 0, a_pszMsg, a_va)
#define RTERRINFO_LOG_ADD(  a_pErrInfo, a_rc, a_pszMsg)             RTErrInfoLogAndAdd( a_pErrInfo,
a_rc, LOG_GROUP, 0, a_pszMsg)
#define RTERRINFO_LOG_ADD_V(a_pErrInfo, a_rc, a_pszMsg, a_va)       RTErrInfoLogAndAddV(a_pErrInfo,
a_rc, LOG_GROUP, 0, a_pszMsg, a_va)
```c
+#ifdef RT_COMPILER_SUPPORTS_VA_ARGS
+/*@ */
+
+/** @} */
+
+/**
 * Checks if the error info is set.
 * @returns true if set, false if not.
 * @param   pErrInfo            The error info structure. NULL is OK.
 * @param   pErrInfo            The error info structure. NULL is OK.
 * */
+DECLINLINE(bool) RTErrInfoIsSet(PCRTERRINFO pErrInfo)
+{
+    if (!pErrInfo)
+        return false;
+    return (pErrInfo->fFlags & (RTERRINFO_FLAGS_MAGIC_MASK | RTERRINFO_FLAGS_SET))
+        == (RTERRINFO_FLAGS_MAGIC | RTERRINFO_FLAGS_SET);
+}
+
+/**
 * Clears the error info structure.
 * @param   pErrInfo            The error info structure. NULL is OK.
 * */
+DECLINLINE(void) RTErrInfoClear(PRTERROINFO pErrInfo)
+{
```
+ if (pErrInfo)
+ {
+    pErrInfo->fFlags &= ~RTERRINFO_FLAGS_SET;
+    pErrInfo->rc = /*VINF_SUCCESS*/0;
+    *pErrInfo->pszMsg = '0';
+ }
+ }
+
+/**
+ * Storage for error variables.
+ *
+ * @remarks Do NOT touch the members! They are platform specific and what's
+ *          where may change at any time!
+ */
+typedef union RTERRVARS
+{
+    int8_t  ai8Vars[32];
+    int16_t ai16Vars[16];
+    int32_t ai32Vars[8];
+    int64_t ai64Vars[4];
+} RTERRVARS;
+/** Pointer to an error variable storage union. */
typedef RTERRVARS *PRTERRVARS;
+/** Pointer to a const error variable storage union. */
typedef RTERRVARS const *PCRTERRVARS;
+
+/**
+ * Saves the error variables.
+ *
+ * @returns @a pVars.
+ * @param   pVars       The variable storage union.
+ */
+RTDECL(PRTERRVARS) RTErrVarsSave(PRTERRVARS pVars);
+
+/**
+ * Restores the error variables.
+ *
+ * @param   pVars       The variable storage union.
+ */
+RTDECL(void) RTErrVarsRestore(PCRTERRVARS pVars);
+
+/**
+ * Checks if the first variable set equals the second.
+ *
+ * @returns true if they are equal, false if not.
+ * @param   pVars1      The first variable storage union.
+ * @param   pVars2      The second variable storage union.
+ */
+
+RTDECL(bool) RTErrVarsAreEqual(PCRTERRVARS pVars1, PCRTERRVARS pVars2);
+
+/**
+ * Checks if the (live) error variables have changed since we saved them.
+ *
+ * @returns @c true if they have changed, @c false if not.
+ * @param pVars The saved variables to compare the current state
+ * against.
+ */
+RTDECL(bool) RTErrVarsHaveChanged(PCRTERRVARS pVars);
+
+RT_C_DECLS_END
+
+/** @} */
+
+/** @name Status Code Ranges
+ * @{ */
+/** The first status code in the primary IPRT range. */
+#define RTERR_RANGE1_FIRST                  0
+/** The last status code in the primary IPRT range. */
+#define RTERR_RANGE1_LAST                   999
+
+/** The first status code in the secondary IPRT range. */
+#define RTERR_RANGE2_FIRST                  22000
+/** The last status code in the secondary IPRT range. */
+#define RTERR_RANGE2_LAST                   32766
+
+/** The first status code in the user range. */
+#define RTERR_USER_FIRST                    1000
+/** The last status code in the user range. */
+#define RTERR_USER_LAST                     21999
+/** @} */
+
+/** SED-START */
+
+/** @name Misc. Status Codes
+ * @{ */
+/** Success. */
+#define VINF_SUCCESS                        0
+
+/** General failure - DON'T USE THIS!!! */
+#define VERR_GENERAL_FAILURE                (-1)
+/** Invalid parameter. */
+#define VERR_INVALID_PARAMETER              (-2)
+/** Invalid parameter. */
+#define VWRN_INVALID_PARAMETER              2

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+/** Invalid magic or cookie. */
+#define VERR_INVALID_MAGIC (-3)
+/** Invalid magic or cookie. */
+#define VWRN_INVALID_MAGIC 3
+/** Invalid loader handle. */
+#define VERR_INVALID_HANDLE (-4)
+/** Invalid loader handle. */
+#define VWRN_INVALID_HANDLE 4
+/** Invalid memory pointer. */
+#define VERR_INVALID_POINTER (-6)
+/** Failed to lock the address range. */
+#define VERR_LOCK_FAILED (-5)
+/** Failed to patch the IDT. */
+#define VERR_IDT_FAILED (-7)
+/** Memory allocation failed. */
+#define VERR_NO_MEMORY (-8)
+/** Already loaded. */
+#define VERR_ALREADY_LOADED (-9)
+/** Permission denied. */
+#define VERR_PERMISION_DENIED (-10)
+/** Permission denied. */
+#define VINF_PERMISION_DENIED 10
+/** Version mismatch. */
+#define VERR_VERSION_MISMMATCH (-11)
+/** The request function is not implemented. */
+#define VERR_NOT_IMPLEMENTED (-12)
+/** Invalid flags was given. */
+#define VERR_INVALID_FLAGS (-13)
+/** Not equal. */
+#define VERR_NOT_EQUAL (-18)
+/** The specified path does not point at a symbolic link. */
+#define VERR_NOT_SYMLINK (-19)
+/** Failed to allocate temporary memory. */
+#define VERR_NO_TMP_MEMORY (-20)
+/** Invalid file mode mask (RTFMODE). */
+#define VERR_INVALID_FMODE (-21)
+/** Incorrect call order. */
+#define VERR_WRONG_ORDER (-22)
+/** There is no TLS (thread local storage) available for storing the current thread. */
+#define VERR_NO_TLS_FOR_SELF (-23)
+/** Failed to set the TLS (thread local storage) entry which points to our thread structure. */
+#define VERR_FAILED_TO_SET_SELF_TLS (-24)
+/** Not able to allocate contiguous memory. */
+#define VERR_NO_CONT_MEMORY (-26)
+/** No memory available for page table or page directory. */
+#define VERR_NO_PAGE_MEMORY (-27)
+/** Already initialized. */
+/* The specified thread is dead. */
+/* The specified thread is not waitable. */
+/* Pagetable not present. */
+/* Typically an API was used by the wrong thread. */
+/* The per process timer is busy. */
+/* Address conflict. */
+/* Unresolved (unknown) host platform error. */
+/* Invalid context. */
+/* Not supported. */
+/* Access denied. */
+/* Call interrupted. */
+/* Call interrupted. */
+/* Timeout. */
+/* Buffer too small to save result. */
+/* Buffer too small to save result. */
+/* Data size overflow. */
+/* Max threads number reached. */
+/* Max process number reached. */
+/* The recipient process has refused the signal. */
+/* A signal is already pending. */
+/* The signal being posted is not correct. */
+/** The state changed. 
+ This is a generic error message and needs a context to make sense. */
+#define VERR_STATE_CHANGED (-48)
+/** Warning, the state changed. 
+ This is a generic error message and needs a context to make sense. */
+#define VWRN_STATE_CHANGED 48
+/** Error while parsing UUID string */
+#define VERR_INVALID_UUID_FORMAT (-49)
+/** The specified process was not found. */
+#define VERR_PROCESS_NOT_FOUND (-50)
+/** The process specified to a non-block wait had not exited. */
+#define VERR_PROCESS_RUNNING (-51)
+/** Retry the operation. */
+#define VERR_TRY_AGAIN (-52)
+/** Retry the operation. */
+#define VINF_TRY_AGAIN 52
+/** Generic parse error. */
+#define VERR_PARSE_ERROR (-53)
+/** Value out of range. */
+#define VERR_OUT_OF_RANGE (-54)
+/** A numeric conversion encountered a value which was too big for the target. */
+#define VERR_NUMBER_TOO_BIG (-55)
+/** A numeric conversion encountered a value which was too big for the target. */
+#define VWRN.Number_TOO_BIG 55
+/** The number bein converted (string) contained no digits. */
+#define VERR_NO_DIGITS (-56)
+/** The number begin converted (string) contained no digits. */
+#define VWRN_NO_DIGITS 56
+/** Encountered a '-' during conversion to an unsigned value. */
+#define VERR_NEGATIVE_UNSIGNED (-57)
+/** Encountered a '-' during conversion to an unsigned value. */
+#define VWRN_NEGATIVE_UNSIGNED 57
+/** Error while characters translation (unicode and so). */
+#define VERR_NO_TRANSLATION (-58)
+/** Error while characters translation (unicode and so). */
+#define VWRN.NO_TRANSLATION 58
+/** Encountered unicode code point which is reserved for use as endian indicator (0xffff or 0xfffe). */
+#define VERR_CODE_POINT_ENDIAN_INDICATOR (-59)
+/** Encountered unicode code point in the surrogate range (0xd800 to 0xdfff). */
+#define VERR_CODE_POINT_SURROGATE (-60)
+/** A string claiming to be UTF-8 is incorrectly encoded. */
+#define VERR_INVALID_UTF8_ENCODING (-61)
+/** A string claiming to be in UTF-16 is incorrectly encoded. */
+#define VERR_INVALID_UTF16_ENCODING (-62)
+/** Encountered a unicode code point which cannot be represented as UTF-16. */
+#define VERR_CANT_RECODE_AS_UTF16 (-63)
+/** Got an out of memory condition trying to allocate a string. */
+#define VERR_NO_STR_MEMORY (-64)
+/** Got an out of memory condition trying to allocate a UTF-16 (/UCS-2) string. */
+#define VERR_NO_UTF16_MEMORY (-65)
+/** Got an out of memory condition trying to allocate a code point array. */
+#define VERR_NO_CODE_POINT_MEMORY (-66)
+/** Can't free the memory because it's used in mapping. */
+#define VERR_MEMORY_BUSY (-67)
+/** The timer can't be started because it's already active. */
+#define VERR_TIMER_ACTIVE (-68)
+/** The timer can't be stopped because it's already suspended. */
+#define VERR_TIMER_SUSPENDED (-69)
+/** The operation was cancelled by the user (copy) or another thread (local ipc). */
+#define VERR_CANCELLED (-70)
+/** Failed to initialize a memory object. */
+ * Exactly what this means is OS specific. */
+#define VERR_MEMOBJ_INIT_FAILED (-71)
+/** Out of memory condition when allocating memory with low physical backing. */
+#define VERR_NO_LOW_MEMORY (-72)
+/** Out of memory condition when allocating physical memory (without mapping). */
+#define VERR_NO_PHYS_MEMORY (-73)
+/** The address (virtual or physical) is too big. */
+#define VERR_ADDRESS_TOO_BIG (-74)
+/** Failed to map a memory object. */
+#define VERR_MAP_FAILED (-75)
+/** Trailing characters. */
+#define VERR_TRAILING_CHARS (-76)
+/** Trailing characters. */
+#define VWRN_TRAILING_CHARS 76
+/** Trailing spaces. */
+#define VERR_TRAILING_SPACES (-77)
+/** Trailing spaces. */
+#define VWRN_TRAILING_SPACES 77
+/** Generic not found error. */
+#define VERR_NOT_FOUND (-78)
+/** Generic not found warning. */
+#define VWRN_NOT_FOUND 78
+/** Generic invalid state error. */
+#define VERR_INVALID_STATE (-79)
+/** Generic invalid state warning. */
+#define VWRN_INVALID_STATE 79
+/** Generic out of resources error. */
+#define VERR_OUT_OF_RESOURCES (-80)
+/** Generic out of resources warning. */
+#define VWRN_OUT_OF_RESOURCES 80
+/** No more handles available, too many open handles. */
+#define VERR_NO_MORE_HANDLES (-81)
+/** Preemption is disabled. */
+ * The requested operation can only be performed when preemption is enabled. */
+#define VERR_PREEMPT_DISABLED (-82)
/* End of string. */
#define VERR_END_OF_STRING (-83)
/* End of string. */
#define VINF_END_OF_STRING 83
/* A page count is out of range. */
#define VERR_PAGE_COUNT_OUT_OF_RANGE (-84)
/* Generic object destroyed status. */
#define VERR_OBJECT.DestroyED (-85)
/* Generic object was destroyed by the call status. */
#define VINF_OBJECT_DestroyED 85
/* Generic dangling objects status. */
#define VERR_DANGLING_OBJECTS (-86)
/* Generic dangling objects status. */
#define VWRN_DANGLING_OBJECTS 86
/* Invalid Base64 encoding. */
#define VERR_INVALID_BASE64_ENCODING (-87)
/* Return instigated by a callback or similar. */
#define VERR_CALLBACK_RETURN (-88)
/* Return instigated by a callback or similar. */
#define VINF_CALLBACK_RETURN 88
/* Authentication failure. */
#define VERR_AUTHENTICATION_FAILURE (-89)
/* Not a power of two. */
#define VERR_NOT_POWER_OF_TWO (-90)
/* Status code, typically given as a parameter, that isn't supposed to be used. */
#define VERR_IGNORED (-91)
/* Concurrent access to the object is not allowed. */
#define VERR_CONCURRENT_ACCESS (-92)
/* The caller does not have a reference to the object. */
/* This status is used when two threads is caught sharing the same object */
/* reference. */
#define VERR_CALLER_NO_REFERENCE (-93)
/* Generic no change error. */
#define VERR_NO_CHANGE (-95)
/* Generic no change info. */
#define VINF_NO_CHANGE 95
/* Out of memory condition when allocating executable memory. */
#define VERR_NO_EXEC_MEMORY (-96)
/* The alignment is not supported. */
#define VERR_UNSUPPORTED_ALIGNMENT (-97)
/* The alignment is not really supported, however we got lucky with this */
/* allocation. */
#define VINF_UNSUPPORTED_ALIGNMENT 97
/* Duplicate something. */
#define VERR_DUPLICATE (-98)
/* Something is missing. */
#define VERR_MISSING (-99)
/* An unexpected (unknown) exception was caught. */
+/** Buffer underflow. */
+/** The RTPROC_FLAGS_DETACHED flag isn't supported. */
+/** The system has too many CPUs. */
+/** Unresolved (unknown) file i/o error. */

+/** Buffer underflow. */
+/** Something is not available or not working properly. */
+/** The RTPROC_FLAGS_DETACHED flag isn't supported. */
+/** An account is restricted in a certain way. */
+/** Not able satisfy all the requirements of the request. */
+/** The requested allocation is too big. */
+/** Mismatch. */
+/** Wrong type. */
+/** This indicates that the process does not have sufficient privileges to perform the operation. */
+/** Process does not have the trusted code base (TCB) privilege needed for user authentication or/and process creation as a given user. TCB is also called 'Act as part of the operating system'. */
+/** Process does not have the assign primary token (APT) privilege needed for creating process as a given user. APT is also called 'Replace a process level token'. */
+/** Process does not have the increase quota (IQ) privilege needed for creating a process as a given user. IQ is also called 'Increase quotas'. */
+/** The system has too many CPUs. */
+/** Unresolved (unknown) file i/o error. */

+/** Uneven input. */
+/** An account is restricted in a certain way. */
+/** An account is restricted in a certain way. */
+/** Not able satisfy all the requirements of the request. */
+/** Not able satisfy all the requirements of the request. */
+/** The requested allocation is too big. */
+/** Mismatch. */
+/** Wrong type. */
+/** This indicates that the process does not have sufficient privileges to perform the operation. */
+/** Process does not have the trusted code base (TCB) privilege needed for user authentication or/and process creation as a given user. TCB is also called 'Act as part of the operating system'. */
+/** Process does not have the assign primary token (APT) privilege needed for creating process as a given user. APT is also called 'Replace a process level token'. */
+/** Process does not have the increase quota (IQ) privilege needed for creating a process as a given user. IQ is also called 'Increase quotas'. */
+/** The system has too many CPUs. */
+/** Unresolved (unknown) file i/o error. */
#define VERR_FILE_IO_ERROR (-100)  /**< File/Device open failed. */
#define VERR_OPEN_FAILED (-101)  /**< File not found. */
#define VERR_FILE_NOT_FOUND (-102)  /**< Path not found. */
#define VERR_PATH_NOT_FOUND (-103)  /**< Invalid (malformed) file/path name. */
#define VERR_INVALID_NAME (-104)  /**< The object in question already exists. */
#define VERR_ALREADY_EXISTS (-105)  /**< The object in question already exists. */
#define VWRN_ALREADY_EXISTS 105  /**< Too many open files. */
#define VERR_TOO_MANY_OPEN_FILES (-106)  /**< Seek error. */
#define VERRSEEK (-107)  /**< Seek below file start. */
#define VERR_NEGATIVE_SEEK (-108)  /**< Trying to seek on device. */
#define VERRSEEK_ON_DEVICE (-109)  /**< Reached the end of the file. */
#define VERR_EOF (-110)  /**< Reached the end of the file. */
#define VINF_EOF 110  /**< Generic file read error. */
#define VERR_READ_ERROR (-111)  /**< Generic file write error. */
#define VERR_WRITE_ERROR (-112)  /**< Write protect error. */
#define VERR_WRITE_PROTECT (-113)  /**< Sharing violation, file is being used by another process. */
#define VERR_SHARING_VIOLATION (-114)  /**< Unable to lock a region of a file. */
#define VERR_FILE_LOCK_FAILED (-115)  /**< File access error, another process has locked a portion of the file. */
#define VERR_FILE_LOCK_VIOLATION (-116)  /**< File or directory can't be created. */
#define VERR_CANT_CREATE (-117)  /**< Directory can't be deleted. */
#define VERR_CANT_DELETE_DIRECTORY (-118)  /**< Can't move file to another disk. */
#define VERR_NOTSAME_DEVICE (-119)  /**< The filename or extension is too long. */
#define VERR_FILENAME_TOO_LONG (-120)  /**< Media not present in drive. */
#define VERR_MEDIA_NOT_PRESENT (-121)  /**< The type of media was not recognized. Not formatted? */
+#define VERR_MEDIA_NOT_RECOGNIZED    (-122)
+/** Can't unlock - region was not locked. */
+#define VERR_FILE_NOT_LOCKED        (-123)
+/** Unrecoverable error: lock was lost. */
+#define VERR_FILE_LOCK_LOST         (-124)
+/** Can't delete directory with files. */
+#define VERR_DIR_NOT_EMPTY          (-125)
+/** A directory operation was attempted on a non-directory object. */
+#define VERR_NOT_A_DIRECTORY        (-126)
+/** A non-directory operation was attempted on a directory object. */
+#define VERR_IS_A_DIRECTORY         (-127)
+/** Tried to grow a file beyond the limit imposed by the process or the filesystem. */
+#define VERR_FILE_TOO_BIG           (-128)
+/** No pending request the aio context has to wait for completion. */
+#define VERR_FILE_AIO_NO_REQUEST    (-129)
+/** The request could not be canceled or prepared for another transfer
+  * because it is still in progress. */
+#define VERR_FILE_AIO_IN_PROGRESS   (-130)
+/** The request could not be canceled because it already completed. */
+#define VERR_FILE_AIO_COMPLETED     (-131)
+/** The I/O context couldn't be destroyed because there are still pending requests. */
+#define VERR_FILE_AIO_BUSY          (-132)
+/** The requests couldn't be submitted because that would exceed the capacity of the context. */
+#define VERR_FILE_AIO_LIMIT_EXCEEDED(-133)
+/** The request was canceled. */
+#define VERR_FILE_AIO_CANCELED      (-134)
+/** The request wasn't submitted so it can't be canceled. */
+#define VERR_FILE_AIO_NOT_SUBMITTED(-135)
+/** A request was not prepared and thus could not be submitted. */
+#define VERR_FILE_AIO_NOT_PREPARED  (-136)
+/** Not all requests could be submitted due to resource shortage. */
+#define VERR_FILE_AIO_INSUFFICIENT_RESSOURCES (-137)
+/** Device or resource is busy. */
+#define VERRRESOURCE_BUSY           (-138)
+/** A file operation was attempted on a non-file object. */
+#define VERRNOT_A_FILE              (-139)
+/** A non-file operation was attempted on a file object. */
+#define VERRIS_A_FILE               (-140)
+/** Unexpected filesystem object type. */
+#define VERRUNEXPECTED_FS_OBJ_TYPE  (-141)
+/** A path does not start with a root specification. */
+#define VERRPATH_DOES_NOT_START_WITH_ROOT(-142)
+/** A path is relative, expected an absolute path. */
+#define VERRPATH_IS_RELATIVE        (-143)
+/** A path is not relative (start with root), expected an relative path. */
+#define VERRPATH_IS_NOT_RELATIVE    (-144)
+/** Zero length path. */
+#define VERRPATHZERO_LENGTH         (-145)
+/** There are not enough events available on the host to create the I/O context. */
+ * This exact meaning is host platform dependent. */
+#define VERR_FILE_AIO_INSUFFICIENT_EVENTS (-146)
+/** @} */
+
+
+/** @} */
+@name Generic Filesystem I/O Status Codes
+
+ * @{
+
+/** Unresolved (unknown) disk i/o error. */
+#define VERR_DISK_IO_ERROR (-150)
+/** Invalid drive number. */
+#define VERR_INVALID_DRIVE (-151)
+/** Disk is full. */
+#define VERR_DISK_FULL (-152)
+/** Disk was changed. */
+#define VERR_DISK_CHANGE (-153)
+/** Drive is locked. */
+#define VERR_DRIVE_LOCKED (-154)
+/** The specified disk or diskette cannot be accessed. */
+#define VERR_DISK_INVALID_FORMAT (-155)
+/** Too many symbolic links. */
+#define VERR_TOO_MANY_SYMLINKS (-156)
+/** The OS does not support setting the time stamps on a symbolic link. */
+#define VERR_NS_SYMLINK_SET_TIME (-157)
+/** The OS does not support changing the owner of a symbolic link. */
+#define VERR_NS_SYMLINK_CHANGE_OWNER (-158)
+/** Symbolic link not allowed. */
+#define VERR_SYMLINK_NOT_ALLOWED (-159)
+/** @} */
+
+
+ /** @} */
+@name Generic Directory Enumeration Status Codes
+
+ * @{
+
+/** Unresolved (unknown) search error. */
+#define VERR_SEARCH_ERROR (-200)
+/** No more files found. */
+#define VERR_NO_MORE_FILES (-201)
+/** No more search handles available. */
+#define VERR_NO_MORE_SEARCH_HANDLES (-202)
+/** RTDirReadEx() failed to retrieve the extra data which was requested. */
+#define VWRN_NO_DIRENT_INFO 203
+/** @} */
+
+
+ /** @} */
+@name Internal Processing Errors
+
+ * @{


/* Internal error - this should never happen. */
#define VERR_INTERNAL_ERROR (-225)

/* Internal error no. 2. */
#define VERR_INTERNAL_ERROR_2 (-226)

/* Internal error no. 3. */
#define VERR_INTERNAL_ERROR_3 (-227)

/* Internal error no. 4. */
#define VERR_INTERNAL_ERROR_4 (-228)

/* Internal error no. 5. */
#define VERR_INTERNAL_ERROR_5 (-229)

/* Internal error: Unexpected status code. */
#define VERR_IPE_UNEXPECTED_STATUS (-230)

/* Internal error: Unexpected status code. */
#define VERR_IPE_UNEXPECTED_INFO_STATUS (-231)

/* Internal error: Unexpected status code. */
#define VERR_IPE_UNEXPECTED_ERROR_STATUS (-232)

/* Internal error: Uninitialized status code. */
#define VERR_IPE_UNINITIALIZED_STATUS (-233)

/* Internal error: Supposedly unreachable default case in a switch. */
#define VERR_IPE_NOT_REACHED_DEFAULT_CASE (-234)

/** @} */

/** @name Generic Device I/O Status Codes */

/* Unresolved (unknown) device i/o error. */
#define VERR_DEV_IO_ERROR (-250)

/* Device i/o: Bad unit. */
#define VERR_IO_BAD_UNIT (-251)

/* Device i/o: Not ready. */
#define VERR_IO_NOT_READY (-252)

/* Device i/o: Bad command. */
#define VERR_IO_BAD_COMMAND (-253)

/* Device i/o: CRC error. */
#define VERR_IO_CRC (-254)

/* Device i/o: Bad length. */
#define VERR_IO_BAD_LENGTH (-255)

/* Device i/o: Sector not found. */
#define VERR_IO_SECTOR_NOT_FOUND (-256)

/* Device i/o: General failure. */
#define VERR_IO_GEN_FAILURE (-257)

/** @} */

/** @name Generic Pipe I/O Status Codes */
+ * @} 
+ */
+/** Unresolved (unknown) pipe i/o error. */
+#define VERR_PIPE_IO_ERROR (-300)
+/** Broken pipe. */
+#define VERR_BROKEN_PIPE (-301)
+/** Bad pipe. */
+#define VERR_BAD_PIPE (-302)
+/** Pipe is busy. */
+#define VERR_PIPE_BUSY (-303)
+/** No data in pipe. */
+#define VERR_NO_DATA (-304)
+/** Pipe is not connected. */
+#define VERR_PIPE_NOT_CONNECTED (-305)
+/** More data available in pipe. */
+#define VERR_MORE_DATA (-306)
+/** Expected read pipe, got a write pipe instead. */
+#define VERR_PIPE_NOT_READ (-307)
+/** Expected write pipe, got a read pipe instead. */
+#define VERR_PIPE_NOT_WRITE (-308)
+/** @} */
+
+
+/** @name Generic Semaphores Status Codes 
+ * @} 
+/** Unresolved (unknown) semaphore error. */
+#define VERR_SEM_ERROR (-350)
+/** Too many semaphores. */
+#define VERR_TOO_MANY_SEMAPHORES (-351)
+/** Exclusive semaphore is owned by another process. */
+#define VERR_EXCL_SEM_ALREADY_OWNED (-352)
+/** The semaphore is set and cannot be closed. */
+#define VERR_SEM_IS_SET (-353)
+/** The semaphore cannot be set again. */
+#define VERR_TOO_MANY_OPENS (-356)
+/** The maximum posts for the event semaphore has been reached. */
+#define VERR_TOO_MANY_POSTS (-357)
+/** The event semaphore has already been posted. */
+#define VERR_ALREADY_POSTED (-358)
+/** The event semaphore has already been reset. */
+#define VERR_ALREADY_RESET (-359)
+/** The semaphore is in use. */
+#define VERR_SEM_BUSY (-360)
+/** The previous ownership of this semaphore has ended. */
+#define VERR_SEM_OWNER_DIED (-361)
+/** Failed to open semaphore by name - not found. */
+#define VERR_SEM_NOT_FOUND (-362)
+/** Semaphore destroyed while waiting. */
+#define VERR_SEM_DESTROYED (-363)
+/** Nested ownership requests are not permitted for this semaphore type. */
+#define VERR_SEM_NESTED (-364)
+/** The release call only release a semaphore nesting, i.e. the caller is still
+ * holding the semaphore. */
+#define VINF_SEM_NESTED (364)
+/** Deadlock detected. */
+#define VERR_DEADLOCK (-365)
+/** Ping-Pong listen or speak out of turn error. */
+#define VERR_SEM_OUT_OF_TURN (-366)
+/** Tried to take a semaphore in a bad context. */
+#define VERR_SEM_BAD_CONTEXT (-367)
+/** Don’t spin for the semaphore, but it is safe to try grab it. */
+#define VINF_SEM_BAD_CONTEXT (367)
+/** Wrong locking order detected. */
+#define VERR_SEM_LV_WRONG_ORDER (-368)
+/** Wrong release order detected. */
+#define VERR_SEM_LV_WRONG_RELEASE_ORDER (-369)
+/** Attempt to recursively enter a non-recursive lock. */
+#define VERR_SEM_LV_NESTED (-370)
+/** Invalid parameters passed to the lock validator. */
+#define VERR_SEM_LV_INVALID_PARAMETER (-371)
+/** The lock validator detected a deadlock. */
+#define VERR_SEM_LV_DEADLOCK (-372)
+/** The deadlock was not caused by the current operation, but existed already. */
+#define VERR_SEM_LV_EXISTING_DEADLOCK (-373)
+/** Not the lock owner according our records. */
+#define VERR_SEM_LV_NOT_OWNER (-374)
+/** An illegal lock upgrade was attempted. */
+#define VERR_SEM_LV_ILLEGAL_UPGRADE (-375)
+/** The thread is not a valid signaller of the event. */
+#define VERR_SEM_LV_NOT_SIGNALLER (-376)
+/** Internal error in the lock validator or related components. */
+#define VERR_SEM_LV_INTERNAL_ERROR (-377)
+/** @} */
+
+/** @} Generic Network I/O Status Codes */
+/** @} *
+/** Unresolved (unknown) network error. */
+#define VERR_NET_IO_ERROR (-400)
+/** The network is busy or is out of resources. */
+#define VERR_NET_OUT_OF_RESOURCES (-401)
+/** Net host name not found. */
+#define VERR_NET_HOST_NOT_FOUND (-402)
+/** Network path not found. */
+#define VERR_NET_PATH_NOT_FOUND (-403)
+/** General network printing error. */
+#define VERR_NET_PRINT_ERROR (-404)
+/** The machine is not on the network. */
+#define VERR_NET_NO_NETWORK (-405)
+/** Name is not unique on the network. */
+#define VERR_NET_NOT_UNIQUE_NAME (-406)
+
+/* These are BSD networking error codes - numbers correspond, don't mess! */
+/** Operation in progress. */
+#define VERR_NET_IN_PROGRESS (-436)
+/** Operation already in progress. */
+#define VERR_NET_ALREADY_IN_PROGRESS (-437)
+/** Attempted socket operation with a non-socket handle. */
+/** (This includes closed handles.) */
+#define VERR_NET_NOT_SOCKET (-438)
+/** Destination address required. */
+#define VERR_NET_DEST_ADDRESS_REQUIRED (-439)
+/** Message too long. */
+#define VERR_NET_MSG_SIZE (-440)
+/** Protocol wrong type for socket. */
+#define VERR_NET_PROTOCOL_TYPE (-441)
+/** Protocol not available. */
+#define VERR_NET_PROTOCOL_NOT_AVAILABLE (-442)
+/** Protocol not supported. */
+#define VERR_NET_PROTOCOL_NOT_SUPPORTED (-443)
+/** Socket type not supported. */
+#define VERR_NET_SOCKET_TYPE_NOT_SUPPORTED (-444)
+/** Operation not supported. */
+#define VERR_NET_OPERATION_NOT_SUPPORTED (-445)
+/** Protocol family not supported. */
+#define VERR_NET_PROTOCOL_FAMILY_NOT_SUPPORTED (-446)
+/** Address family not supported by protocol family. */
+#define VERR_NET_ADDRESS_FAMILY_NOT_SUPPORTED (-447)
+/** Address already in use. */
+#define VERR_NET_ADDRESS_IN_USE (-448)
+/** Can't assign requested address. */
+#define VERR_NET_ADDRESS_NOT_AVAILABLE (-449)
+/** Network is down. */
+#define VERR_NET_DOWN (-450)
+/** Network is unreachable. */
+#define VERR_NET_UNREACHABLE (-451)
+/** Network dropped connection on reset. */
+/** Software caused connection abort. */
+/** Connection reset by peer. */
+/** No buffer space available. */
+/** Socket is already connected. */
+/** Socket is not connected. */
+/** Can't send after socket shutdown. */
+/** Too many references: can't splice. */
+/** Too many references: can't splice. */
+/** Connection refused. */
+/** ELOOP is not net. */
+/** ENAMETOOLONG is not net. */
+/** Host is down. */
+/** No route to host. */
+/** Protocol error. */
+/** Incomplete packet was submitted by guest. */
+/** @ } */
+
+
+@name TCP Status Codes
+ * @ {
+ */
+/** Stop the TCP server. */
+/** The server was stopped. */
+/** The TCP server was shut down using RTTcpServerShutdown. */
+/** The TCP server was destroyed. */
+/** The TCP server has no client associated with it. */
+/** } */
/** @name UDP Status Codes */
/** Stop the UDP server. */
#define VERR_UDP_SERVER_STOP (-520)
/** The server was stopped. */
#define VINF_UDP_SERVER_STOP 520
/** The UDP server was shut down using RTUdpServerShutdown. */
#define VERR_UDP_SERVER_SHUTDOWN (-521)
/** The UDP server was destroyed. */
#define VERR_UDP_SERVER_DESTROYED (-522)
/** The UDP server has no client associated with it. */
#define VINF_UDP_SERVER_NO_CLIENT 523
/** @} */

/** @name L4 Specific Status Codes */
/** Invalid offset in an L4 dataspace */
#define VERR_L4_INVALID_DS_OFFSET (-550)
/** IPC error */
#define VERR_IPC (-551)
/** Item already used */
#define VERR_RESOURCE_IN_USE (-552)
/** Source/destination not found */
#define VERR_IPC_PROCESS_NOT_FOUND (-553)
/** Receive timeout */
#define VERR_IPC_RECEIVE_TIMEOUT (-554)
/** Send timeout */
#define VERR_IPC_SEND_TIMEOUT (-555)
/** Receive cancelled */
#define VERR_IPC_RECEIVE_CANCELLED (-556)
/** Send cancelled */
#define VERR_IPC_SEND_CANCELLED (-557)
/** Receive aborted */
#define VERR_IPC_RECEIVE_ABORTED (-558)
/** Send aborted */
#define VERR_IPC_SEND_ABORTED (-559)
/** Couldn't map pages during receive */
#define VERR_IPC_RECEIVE_MAP_FAILED (-560)
/** Couldn't map pages during send */
#define VERR_IPC_SEND_MAP_FAILED (-561)
/** Send pagefault timeout in receive */
#define VERR_IPC_RECEIVE_SEND_PF_TIMEOUT (-562)
/** Send pagefault timeout in send */
#define VERR_IPC_SEND_SEND_PF_TIMEOUT (-563)
/** (One) receive buffer was too small, or too few buffers */
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#define VINF_IPC_RECEIVE_MSG_CUT                564
+/** (One) send buffer was too small, or too few buffers */
#define VINF_IPC_SEND_MSG_CUT                   565
+/** Dataspace manager server not found */
#define VERR_L4_DS_MANAGER_NOT_FOUND            (-566)
+/** @} */
+
+
+@name Loader Status Codes.
+
+ * @{
+ */
+
+/** Invalid executable signature. */
+=define VERR_INVALID_EXE_SIGNATURE              (-600)
+/** The iprt loader recognized a ELF image, but doesn't support loading it. */
+=define VERR_ELF_EXE_NOT_SUPPORTED              (-601)
+/** The iprt loader recognized a PE image, but doesn't support loading it. */
+=define VERR_PE_EXE_NOT_SUPPORTED               (-602)
+/** The iprt loader recognized a LX image, but doesn't support loading it. */
+=define VERR_LX_EXE_NOT_SUPPORTED               (-603)
+/** The iprt loader recognized a LE image, but doesn't support loading it. */
+=define VERR_LE_EXE_NOT_SUPPORTED               (-604)
+/** The iprt loader recognized a NE image, but doesn't support loading it. */
+=define VERR_NE_EXE_NOT_SUPPORTED               (-605)
+/** The iprt loader recognized a MZ image, but doesn't support loading it. */
+=define VERR_MZ_EXE_NOT_SUPPORTED               (-606)
+/** The iprt loader recognized an a.out image, but doesn't support loading it. */
+=define VERR_AOUT_EXE_NOT_SUPPORTED             (-607)
+/** Bad executable. */
+=define VERR_BAD_EXE_FORMAT                    (-608)
+/** Symbol (export) not found. */
+=define VERR_SYMBOL_NOT_FOUND                  (-609)
+/** Module not found. */
+=define VERR_MODULE_NOT_FOUND                  (-610)
+/** The loader resolved an external symbol to an address to big for the image format. */
+=define VERR_SYMBOL_VALUE_TOO_BIG              (-611)
+/** The image is too big. */
+=define VERR_IMAGE_TOO_BIG                    (-612)
+/** The image base address is to high for this image type. */
+=define VERR_IMAGE_BASE_TOO_HIGH               (-614)
+/** Mismatching architecture. */
+=define VERR_LDR_ARCH_MISMATCH                 (-615)
+/** Mismatch between IPRT and native loader. */
+=define VERR_LDR_MISMATCH_NATIVE               (-616)
+/** Failed to resolve an imported (external) symbol. */
+=define VERR_LDR_IMPORTED_SYMBOL_NOT_FOUND     (-617)
+/** Generic loader failure. */
+=define VERR_LDR_GENERAL_FAILURE               (-618)
+/** Code signing error. */
+define VERR_LDR_IMAGE_HASH  (-619)
+/** The PE loader encountered delayed imports, a feature which hasn't been implemented yet. */
+define VERR_LDRPE_DELAY_IMPORT  (-620)
+/** The PE loader encountered a malformed certificate. */
+define VERR_LDRPE_CERT_MALFORMED  (-621)
+/** The PE loader encountered a certificate with an unsupported type or structure revision. */
+define VERR_LDRPE_CERT_UNSUPPORTED  (-622)
+/** The PE loader doesn't know how to deal with the global pointer data directory entry yet. */
+define VERR_LDRPE_GLOBALPTR  (-623)
+/** The PE loader doesn't support the TLS data directory yet. */
+define VERR_LDRPE_TLS  (-624)
+/** The PE loader doesn't grok the COM descriptor data directory entry. */
+define VERR_LDRPE_COM_DESCRIPTOR  (-625)
+/** The PE loader encountered an unknown load config directory/header size. */
+define VERR_LDRPE_LOAD_CONFIG_SIZE  (-626)
+/** The PE loader encountered a lock prefix table, a feature which hasn't been implemented yet. */
+define VERR_LDRPE_LOCK_PREFIX_TABLE  (-627)
+/** The PE loader encountered some Guard CF stuff in the load config. */
+define VERR_LDRPE_GUARD_CF_STUFF  (-628)
+/** The ELF loader doesn't handle foreign endianness. */
+define VERR_LDRELF_ODD_ENDIAN  (-630)
+/** The ELF image is 'dynamic', the ELF loader can only deal with 'relocatable' images at present. */
+define VERR_LDRELF_DYN  (-631)
+/** The ELF image is 'executable', the ELF loader can only deal with 'relocatable' images at present. */
+define VERR_LDRELF_EXEC  (-632)
+/** The ELF image was created for an unsupported target machine type. */
+define VERR_LDRELF_MACHINE  (-633)
+/** The ELF version is not supported. */
+define VERR_LDRELF_VERSION  (-634)
+/** The ELF loader cannot handle multiple SYMTAB sections. */
+define VERR_LDRELF_MULTIPLE_SYMTABS  (-635)
+/** The ELF loader encountered a relocation type which is not implemented. */
+define VERR_LDRELF_RELOCATION_NOT_SUPPORTED  (-636)
+/** The ELF loader encountered a bad symbol index. */
+define VERR_LDRELF_INVALID_SYMBOL_INDEX  (-637)
+/** The ELF loader encountered an invalid symbol name offset. */
+define VERR_LDRELF_INVALID_SYMBOL_NAME_OFFSET  (-638)
+/** The ELF loader encountered an invalid relocation offset. */
+define VERR_LDRELF_INVALID_RELOCATION_OFFSET  (-639)
+/** The ELF loader didn't find the symbol/string table for the image. */
+define VERR_LDRELF_NO_SYMBOL_OR_NO_STRING_TABLES  (-640)
+/** Invalid link address. */
+define VERR_LDR_INVALID_LINK_ADDRESS  (-647)
+/** Invalid image relative virtual address. */
+define VERR_LDR_INVALID_RVA  (-648)
+/** Invalid segment/offset address. */
+define VERR_LDR_INVALID_SEG_OFFSET  (-649)
+/** @} */
+/** @name Debug Info Reader Status Codes. */
+*/
+*/ The module contains no line number information. */
+#define VERR_DBG_NO_LINE_NUMBERS (-650)
+/** The module contains no symbol information. */
+#define VERR_DBG_NO_SYMBOLS (-651)
+/** The specified segment:offset address was invalid. Typically an attempt at
+ addressing outside the segment boundary. */
+#define VERR_DBG_INVALID_ADDRESS (-652)
+/** Invalid segment index. */
+#define VERR_DBG_INVALID_SEGMENT_INDEX (-653)
+/** Invalid segment offset. */
+#define VERR_DBG_INVALID_SEGMENT_OFFSET (-654)
+/** Invalid image relative virtual address. */
+#define VERR_DBG_INVALID_RVA (-655)
+/** Address conflict within a module/segment. */
+* Attempted to add a segment, symbol or line number that fully or partially
+* overlaps with an existing one. */
+#define VERR_DBG_ADDRESS_CONFLICT (-657)
+/** Duplicate symbol within the module. */
+* Attempted to add a symbol which name already exists within the module. */
+#define VERR_DBG_DUPLICATE_SYMBOL (-658)
+/** The segment index specified when adding a new segment is already in use. */
+#define VERR_DBG_SEGMENT_INDEX_CONFLICT (-659)
+/** No line number was found for the specified address/ordinal/whatever. */
+#define VERR_DBG_LINE_NOT_FOUND (-660)
+/** The length of the symbol name is out of range. */
+* This means it is an empty string or that it's greater or equal to
+* RTDBG_SYMBOL_NAME_LENGTH. */
+#define VERR_DBG_SYMBOL_NAME_OUT_OF_RANGE (-661)
+/** The length of the file name is out of range. */
+* This means it is an empty string or that it's greater or equal to
+* RTDBG_FILE_NAME_LENGTH. */
+#define VERR_DBG_FILE_NAME_OUT_OF_RANGE (-662)
+/** The length of the segment name is out of range. */
+* This means it is an empty string or that it is greater or equal to
+* RTDBG_SEGMENT_NAME_LENGTH. */
+#define VERR_DBG_SEGMENT_NAME_OUT_OF_RANGE (-663)
+/** The specified address range wraps around. */
+#define VERR_DBG_ADDRESS_WRAP (-664)
+/** The file is not a valid NM map file. */
+#define VERR_DBG_NOT_NM_MAP_FILE (-665)
+/** The file is not a valid /proc/kallsyms file. */
+#define VERR_DBG_NOT_LINUX_KALLSYMS (-666)
+/** Unable to parse the CodeView debug information. */
+#define VERR.CV_BAD_FORMAT (-691)
+/** Unfinished CodeView debug information feature. */
+#define VERR.CV_TODO (-692)
+/** Internal processing error the CodeView debug information reader. */
+#define VERR.CV_IPE (-693)
+
+/** @} */
+
+/** @} Request Packet Status Codes. */
+ * @
+ */
+/** Invalid RT request type. */
+ * For the RTReqAlloc() case, the caller just specified an illegal enmType. For
+ * all the other occurrences it means indicates corruption, broken logic, or stupid
+ * interface user. */
+#define VERR_RT_REQUEST_INVALID_TYPE (-700)
+/** Invalid RT request state. */
+ * The state of the request packet was not the expected and accepted one(s). Either
+ * the interface user screwed up, or we've got corruption/broken logic. */
+#define VERR_RT_REQUEST_STATE (-701)
+/** Invalid RT request packet. */
+ * One or more of the RT controlled packet members didn't contain the correct
+ * values. Some thing's broken. */
+#define VERR_RT_REQUEST_INVALID_PACKAGE (-702)
+/** The status field has not been updated yet as the request is still
+ * pending completion. Someone queried the iStatus field before the request
+ * has been fully processed. */
+#define VERR_RT_REQUEST_STATUS_STILL_PENDING (-703)
+/** The request has been freed, don't read the status now. */
+ * Someone is reading the iStatus field of a freed request packet. */
+#define VERR_RT_REQUEST_STATUS_FREED (-704)
+
+/** @} Environment Status Code */
+ * @
+ */
+/** The specified environment variable was not found. (RTEnvGetEx) */
+#define VERR_ENV_VAR_NOT_FOUND (-750)
+/** The specified environment variable was not found. (RTEnvUnsetEx) */
+#define VINF_ENV_VAR_NOT_FOUND (750)
+/** Unable to translate all the variables in the default environment due to
+ * codeset issues (LANG / LC_ALL / LC_CTYPE). */
+#define VWRN_ENV_NOT_FULLY_TRANSLATED (751)
+/** Invalid environment variable name. */
+#define VERR_ENV_INVALID_VAR_NAME (-752)
+/** The environment variable is an unset record. */
+#define VINF_ENV_VAR_UNSET (753)
+/** The environment variable has been recorded as being unset. */
```c
#define VERR_ENV_VAR_UNSET                      (-753)
/** @} */
/** @} */
/** @name Multiprocessor Status Codes. */
/+ * @ {
/+ */
/+/** The specified cpu is offline. */
/+#define VERR_CPU_OFFLINE                        (-800)
/+/** The specified cpu was not found. */
/+#define VERR_CPU_NOT_FOUND                      (-801)
/+/** Not all of the requested CPUs showed up in the PFNRTMPWORKER. */
/+#define VERR_NOT_ALL_CPUS_SHOWED                (-802)
/+/** Internal processing error in the RTMp code.*/
/+#define VERR_CPU_IPE_1                          (-803)
/+/** @} */
/+ /** @name RTGetOpt status codes */
/+ * @ {
/+ */
/+/** RTGetOpt: Command line option not recognized. */
/+#define VERR_GETOPT_UNKNOWN_OPTION              (-825)
/+/** RTGetOpt: Command line option needs argument. */
/+#define VERR_GETOPT_REQUIRED_ARGUMENT_MISSING   (-826)
/+/** RTGetOpt: Command line option has argument with bad format. */
/+#define VERR_GETOPT_INVALID_ARGUMENT_FORMAT     (-827)
/+/** RTGetOpt: Not an option. */
/+#define VINF_GETOPT_NOT_OPTION                  828
/+/** RTGetOpt: Command line option needs an index. */
/+#define VERR_GETOPT_INDEX_MISSING               (-829)
/+/** @} */
/+ /** @name RTCache status codes */
/+ * @ {
/+ */
/+/** RTCache: cache is full. */
/+#define VERR_CACHE_FULL                         (-850)
/+/** RTCache: cache is empty. */
/+#define VERR_CACHE_EMPTY                        (-851)
/+/** @} */
/+ /** @name RTMemCache status codes */
/+ * @ {
/+ */
/+/** Reached the max cache size. */
/+#define VERR_MEM_CACHE_MAX_SIZE                 (-855)
/+/** @} */
/+ /** @name RTS3 status codes */
/+ * @ {
/+ */
/+/** Access denied error. */
/+#define VERR_S3_ACCESS_DENIED                   (-875)
```
+/** The bucket/key wasn't found. */
+define VERR_S3_NOT_FOUND (-876)
+/** Bucket already exists. */
+define VERR_S3_BUCKET_ALREADY_EXISTS (-877)
+/** Can't delete bucket with keys. */
+define VERR_S3_BUCKET_NOT_EMPTY (-878)
+/** The current operation was canceled. */
+define VERR_S3_CANCELED (-879)
+@]
+
+@] name HTTP status codes
+* @]
+
+/** HTTP initialization failed. */
+define VERR_HTTP_INIT_FAILED (-885)
+/** The server has not found anything matching the URI given. */
+define VERR_HTTP_NOT_FOUND (-886)
+/** The request is for something forbidden. Authorization will not help. */
+define VERR_HTTP_ACCESS_DENIED (-887)
+/** The server did not understand the request due to bad syntax. */
+define VERR_HTTP_BAD_REQUEST (-888)
+/** Couldn't connect to the server (proxy?). */
+define VERR_HTTP_COULDN'T_CONNECT (-889)
+/** SSL connection error. */
+define VERR_HTTP_SSL_CONNECT_ERROR (-890)
+/** CAcert is missing or has the wrong format. */
+define VERR_HTTP_CACERT_WRONG_FORMAT (-891)
+/** Certificate cannot be authenticated with the given CA certificates. */
+define VERR_HTTP_CACERT_CANNOT_AUTHENTICATE (-892)
+/** The current HTTP request was forcefully aborted */
+define VERR_HTTP_ABORTED (-893)
+/** Request was redirected. */
+define VERR_HTTP_REDIRECTED (-894)
+/** Proxy couldn't be resolved. */
+define VERR_HTTP_PROXY_NOT_FOUND (-895)
+/** The remote host couldn't be resolved. */
+define VERR_HTTP_HOST_NOT_FOUND (-896)
+/** Unexpected cURL error configure the proxy. */
+define VERR_HTTP_CURL_PROXY_CONFIG (-897)
+/** Generic CURL error. */
+define VERR_HTTP_CURL_ERROR (-899)
+@]
+
+@] name RTManifest status codes
+* @]
+
+/** A digest type used in the manifest file isn't supported. */
+define VERR_MANIFEST_UNSUPPORTED_DIGEST_TYPE (-900)
+/** An entry in the manifest file couldn't be interpreted correctly. */
+define VERR_MANIFEST_WRONG_FILE_FORMAT (-901)
+/** A digest doesn't match the corresponding file. */
+#define VERR_MANIFEST_DIGEST_MISMATCH (-902)
+/** The file list doesn't match to the content of the manifest file. */
+#define VERR_MANIFEST_FILE_MISMATCH (-903)
+/** The specified attribute (name) was not found in the manifest. */
+#define VERR_MANIFEST_ATTR_NOT_FOUND (-904)
+/** The attribute type did not match. */
+#define VERR_MANIFEST_ATTR_TYPE_MISMATCH (-905)
+/** No attribute of the specified types was found. */
+#define VERR_MANIFEST_ATTR_TYPE_NOT_FOUND (-906)
+@ }

+/** @name RTTar status codes */
+ * @{ */
+/** The checksum of a tar header record doesn't match. */
+#define VERR_TAR_CHKSUM_MISMATCH (-925)
+/** The tar end of file record was read. */
+#define VERR_TAR_END_OF_FILE (-926)
+/** The tar file ended unexpectedly. */
+#define VERR_TAR_UNEXPECTED_EOS (-927)
+/** The tar termination records was encountered without reaching the end of
 + * the input stream. */
+#define VERR_TAR_EOS_MORE_INPUT (-928)
+/** A number tar header field was malformed. */
+#define VERR_TAR_BAD_NUM_FIELD (-929)
+/** A numeric tar header field was not terminated correctly. */
+#define VERR_TAR_BAD_NUM_FIELD_TERM (-930)
+/** A number tar header field was encoded using base-256 which this
 + * tar implementation currently does not support. */
+#define VERR_TAR_BASE_256_NOT_SUPPORTED (-931)
+/** A number tar header field yielded a value too large for the internal
 + * variable of the tar interpreter. */
+#define VERR_TAR_NUM_VALUE_TOO_LARGE (-932)
+/** The combined minor and major device number type is too small to hold the
 + * value stored in the tar header. */
+#define VERR_TAR_DEV_VALUE_TOO_LARGE (-933)
+/** The mode field in a tar header is bad. */
+#define VERR_TAR_BAD_MODE_FIELD (-934)
+/** The mode field should not include the type. */
+#define VERR_TAR_MODE_WITH_TYPE (-935)
+/** The size field should be zero for links and symlinks. */
+#define VERR_TAR_SIZE_NOT_ZERO (-936)
+/** Encountered an unknown type flag. */
+#define VERR_TAR_UNKNOWN_TYPE_FLAG (-937)
+/** The tar header is all zeros. */
+#define VERR_TAR_ZERO_HEADER (-938)
+/** Not a uniform standard tape v0.0 archive header. */
+#define VERR_TAR_NOT_USTAR_V00 (-939)
+/** The name is empty. */
+#define VERR_TAR_EMPTY_NAME (-940)
+/** A non-directory entry has a name ending with a slash. */
+#define VERR_TAR_NON_DIR_ENDS_WITH_SLASH (-941)
+/** Encountered an unsupported portable archive exchange (pax) header. */
+#define VERR_TAR_UNSUPPORTED_PAX_TYPE (-942)
+/** Encountered an unsupported Solaris Tar extension. */
+#define VERR_TAR_UNSUPPORTED_SOLARIS_HDR_TYPE (-943)
+/** Encountered an unsupported GNU Tar extension. */
+#define VERR_TAR_UNSUPPORTED_GNU_HDR_TYPE (-944)
+/** Malformed checksum field in the tar header. */
+#define VERR_TAR_MALFORMED_GNU_LONGXXXX (-945)
+/** Malformed checksum field in the tar header. */
+#define VERR_TAR_BAD_CHKSUM_FIELD (-946)
+/** Too long name or link string. */
+#define VERR_TAR_NAME_TOO_LONG (-947)
+/** A directory entry in the archive. */
+#define VINF_TAR_DIR_PATH (948)
+/** @} */
+
+/** @} */
+/** RTPoll status codes */
+ * @ }
+/** The handle is not pollable. */
+#define VERR_POLL_HANDLE_NOT_POLLABLE (-950)
+/** The handle ID is already present in the poll set. */
+#define VERR_POLL_HANDLE_ID_EXISTS (-951)
+/** The handle ID was not found in the set. */
+#define VERR_POLL_HANDLE_ID_NOT_FOUND (-952)
+/** The poll set is full. */
+#define VERR_POLL_SET_IS_FULL (-953)
+/** @} */
+
+/** @} */
+/** Pkzip status codes */
+ * @ }
+/** No end of central directory record found. */
+#define VERR_PKZIP_NO_EOCB (-960)
+/** Too long name string. */
+#define VERR_PKZIP_NAME_TOO_LONG (-961)
+/** Local file header corrupt. */
+#define VERR_PKZIP_BAD_LF_HEADER (-962)
+/** Central directory file header corrupt. */
+#define VERR_PKZIP_BAD_CDF_HEADER (-963)
+/** Encountered an unknown type flag. */
+#define VERR_PKZIP_UNKNOWN_TYPE_FLAG (-964)
+/** Found a ZIP64 Extra Information Field in a ZIP32 file. */
+#define VERR_PKZIP_ZIP64EX_IN_ZIP32 (-965)
+
/** @name RTZip status codes */
#define VERR_ZIP_ERROR                          (-22000)
/** The compressed data was corrupted. */
#define VERR_ZIP_CORRUPTED                      (-22001)
/** Ran out of memory while compressing or uncompressing. */
#define VERR_ZIP_NO_MEMORY                      (-22002)
/** The compression format version is unsupported. */
#define VERR_ZIP_UNSUPPORTED_VERSION            (-22003)
/** The compression method is unsupported. */
#define VERR_ZIP_UNSUPPORTED_METHOD             (-22004)
/** The compressed data started with a bad header. */
#define VERR_ZIP_BAD_HEADER                     (-22005)

/** @} */

/** @name RTVfs status codes */
#define VERR_VFS_CHAIN_NO_PREFIX                    (-22100)
#define VERR_VFS_CHAIN_EMPTY                        (-22101)
#define VERR_VFS_CHAIN_EXPECTED_ELEMENT             (-22102)
#define VERR_VFS_CHAIN_UNKNOWN_TYPE                 (-22103)
#define VERR_VFS_CHAIN_EXPECTED_LEFT_PARENTHESES    (-22104)
#define VERR_VFS_CHAIN_EXPECTED_RIGHT_PARENTHESES   (-22105)
#define VERR_VFS_CHAIN_EXPECTED_PROVIDER_NAME       (-22106)
#define VERR_VFS_CHAIN_EXPECTED_SEPARATOR           (-22107)
#define VERR_VFS_CHAIN_LEADING_SEPARATOR           (-22108)
#define VERR_VFS_CHAIN_TRAILING_SEPARATOR          (-22109)
#define VERR_VFS_CHAIN_MUST_BE_FIRST_ELEMENT        (-22110)
#define VERR_VFS_CHAIN_CANNOT_BE_FIRST_ELEMENT      (-22111)
#define VERR_VFS_CHAIN_CAST_FAILED                  (-22112)
#define VERR_VFS_CHAIN_IPE                          (-22113)
#define VERR_VFS_CHAIN_PROVIDER_NOT_FOUND           (-22114)
+/** VFS chain does not terminate with the desired object type. */
+/#define VERR_VFS_CHAIN_FINAL_TYPE_MISMATCH (-22115)
+/** VFS chain element takes no arguments. */
+/#define VERR_VFS_CHAIN_NO_ARGS (-22116)
+/** VFS chain element takes exactly one argument. */
+/#define VERR_VFS_CHAIN_ONE_ARG (-22117)
+/** VFS chain element expected at most one argument. */
+/#define VERR_VFS_CHAIN_AT_MOST_ONE_ARG (-22118)
+/** VFS chain element expected at least one argument. */
+/#define VERR_VFS_CHAIN_AT_LEAST_ONE_ARG (-22119)
+/** VFS chain element takes exactly two arguments. */
+/#define VERR_VFS_CHAIN_TWO_ARGS (-22120)
+/** VFS chain element expected at most two arguments. */
+/#define VERR_VFS_CHAIN_AT_MOST_TWO_ARGS (-22121)
+/** VFS chain element expected at most two arguments. */
+/#define VERR_VFS_CHAIN_AT_MOST_TWO_ARGS (-22122)
+/** VFS chain element takes exactly three arguments. */
+/#define VERR_VFS_CHAIN_THREE_ARGS (-22123)
+/** VFS chain element expected at most three arguments. */
+/#define VERR_VFS_CHAIN_AT_MOST_THREE_ARGS (-22124)
+/** VFS chain element expected at most three arguments. */
+/#define VERR_VFS_CHAIN_AT_MOST_THREE_ARGS (-22125)
+/** VFS chain element takes exactly four arguments. */
+/#define VERR_VFS_CHAIN_FOURARGS (-22126)
+/** VFS chain element expected at most four arguments. */
+/#define VERR_VFS_CHAIN_AT_MOST_FOUR_ARGS (-22127)
+/** VFS chain element expected at most four arguments. */
+/#define VERR_VFS_CHAIN_AT_MOST_FOUR_ARGS (-22128)
+/** VFS chain element takes exactly five arguments. */
+/#define VERR_VFS_CHAIN_FIVE_ARGS (-22129)
+/** VFS chain element expected at least five arguments. */
+/#define VERR_VFSCHAIN_AT_LEAST_FIVE_ARGS (-22130)
+/** VFS chain element expected at most five arguments. */
+/#define VERR_VFSCHAIN_AT_MOST_FIVE_ARGS (-22131)
+/** VFS chain element takes exactly six arguments. */
+/#define VERR_VFSCHAIN_SIX_ARGS (-22132)
+/** VFS chain element expected at least six arguments. */
+/#define VERR_VFSCHAIN_AT_LEAST_SIX_ARGS (-22133)
+/** VFS chain element expected at most six arguments. */
+/#define VERR_VFSCHAIN_AT_MOST_SIX_ARGS (-22134)
+/** VFS chain element expected at most six arguments. */
+/#define VERR_VFSCHAIN_AT_MOST_SIX_ARGS (-22135)
+/** VFS chain element expected non-empty argument. */
+/#define VERR_VFSCHAIN_EMPTY_ARG (-22136)
+/** Invalid argument to VFS chain element. */
+/#define VERR_VFSCHAIN_INVALID_ARGUMENT (-22137)
VFS chain element only provides file and I/O stream (ios) objects. */
#define VERR_VFS_CHAIN_ONLY_FILE_OR_IOS (-22139)
VFS chain element only provides I/O stream (ios) objects. */
#define VERR_VFS_CHAIN_ONLY_IOS (-22140)
VFS chain element only provides directory (dir) objects. */
#define VERR_VFS_CHAIN_ONLY_DIR (-22141)
VFS chain element only provides file system stream (fss) objects. */
#define VERR_VFS_CHAIN_ONLY_FSS (-22142)
VFS chain element only provides file system (vfs) objects. */
#define VERR_VFS_CHAIN_ONLY_VFS (-22143)
VFS chain element only provides file, I/O stream (ios), or
* directory (dir) objects. */
#define VERR_VFS_CHAIN_ONLY_FILE_OR_IOS_OR_DIR (-22144)
VFS chain element only provides file, I/O stream (ios), or
* directory (dir) objects. */
#define VERR_VFS_CHAIN_ONLY_DIR_OR_VFS (-22145)
VFS chain element takes a file object as input. */
#define VERR_VFS_CHAIN_TAKES_FILE (-22146)
VFS chain element takes a file or I/O stream (ios) object as input. */
#define VERR_VFS_CHAIN_TAKES_FILE_OR_IOS (-22147)
VFS chain element takes a directory (dir) object as input. */
#define VERR_VFS_CHAIN_TAKES_DIR (-22148)
VFS chain element takes a file system stream (fss) object as input. */
#define VERR_VFS_CHAIN_TAKES_FSS (-22149)
VFS chain element takes a file system (vfs) object as input. */
#define VERR_VFS_CHAIN_TAKES_VFS (-22150)
VFS chain element takes a directory (dir) or file system (vfs)
* object as input. */
#define VERR_VFS_CHAIN_TAKES_DIR_OR_VFS (-22151)
VFS chain element takes a directory (dir), file system stream (fss),
* or file system (vfs) object as input. */
#define VERR_VFS_CHAIN_TAKES_DIR_OR_FSS_OR_VFS (-22152)
VFS chain element only provides a read-only I/O stream, while the chain
* requires write access. */
#define VERR_VFS_CHAIN_READ_ONLY_IOS (-22153)
VFS chain element only provides a read-only I/O stream, while the chain
* read access. */
#define VERR_VFS_CHAIN_WRITE_ONLY_IOS (-22154)
VFS chain only has a single element and it is just a path, need to be
* treated as a normal file system request. */
#define VERR_VFS_CHAIN_PATH_ONLY (-22155)
VFS chain element preceding the final path needs to be a directory, file
* system or file system stream. */
#define VERR_VFS_CHAIN_TYPE_MISMATCH_PATH_ONLY (-22156)
VFS chain doesn't end with a path only element. */
#define VERR_VFS_CHAIN_NOT_PATH_ONLY (-22157)
The path only element at the end of the VFS chain is too short to make out
* the parent directory. */
+/* @ */ */

+/** @name RTDvm status codes */
+ * @}
+/** The volume map doesn't contain any valid volume. */
+#define VERR_DVM_MAP_EMPTY (-22200)
+/** There is no volume behind the current one. */
+#define VERR_DVM_MAP_NO_VOLUME (-22201)
+/** @ */ */

+/** @name Logger status codes */
+ * @}
+/** The internal logger revision did not match. */
+#define VERR_LOG_REVISION_MISMATCH (-22300)
+/** @} */ */

+/* see above, 22400..22499 is used for misc codes! */
+
+/** @name Logger status codes */
+ * @}
+/** Power off is not supported by the hardware or the OS. */
+#define VERR_SYS_CANNOT_POWER_OFF (-22500)
+/** The halt action was requested, but the OS may actually power
+ * off the machine. */
+#define VINF_SYS_MAY_POWER_OFF (22501)
+/** Shutdown failed. */
+#define VERR_SYS_SHUTDOWN_FAILED (-22502)
+/** @} */ */

+/** @name Filesystem status codes */
+ * @}
+/** Filesystem can't be opened because it is corrupt. */
+#define VERR_FILESYSTEM_CORRUPT (-22600)
+/** @} */ */

+/** @name RTZipXar status codes. */
+ * @}
+/** Wrong magic value. */
+#define VERR_XAR_WRONG_MAGIC (-22700)
+/** Bad header size. */
+#define VERR_XAR_BAD_HDR_SIZE (-22701)
+/** Unsupported version. */
+#define VERR_XAR_UNSUPPORTED_VERSION (-22702)
+/** Unsupported hashing function. */
+#define VERR_XAR_UNSUPPORTED_HASH_FUNCTION (-22703)
+/** The table of content (TOC) is too small and therefore can't be valid. */
+#define VERR_XAR_TOC_TOO_SMALL (-22704)
+/** The table of content (TOC) is too big. */
+#define VERR_XAR_TOC_TOO_BIG (-22705)
+/** The compressed table of content is too big. */
+define VERR_XAR_TOC_TOO_BIG_COMPRESSED (-22706)
+/** The uncompressed table of content size in the header didn't match what *
+ * ZLib returned. */
+define VERR_XAR_TOC_UNCOMP_SIZE_MISMATCH (-22707)
+/** The table of content string length didn't match the size specified in the *
+ * header. */
+define VERR_XAR_TOC_STRLEN_MISMATCH (-22708)
+/** XML error while parsing the table of content. */
+define VERR_XAR_TOC_XML_PARSE_ERROR (-22710)
+/** The table of content XML document does not have a toc element. */
+define VERR_XML_TOC_ELEMENT_MISSING (-22711)
+/** The table of content XML element (toc) has siblings, we expected it to be *
+ * an only child or the root element (xar). */
+define VERR_XML_TOC_ELEMENT_HAS_SIBLINGS (-22712)
+/** The XAR table of content digest doesn't match. */
+define VERR_XAR_TOC_DIGEST_MISMATCH (-22713)
+/** Bad or missing XAR checksum element. */
+define VERR_XAR_BAD_CHECKSUM_ELEMENT (-22714)
+/** The hash function in the header doesn't match the one in the table of *
+ * content. */
+define VERR_XAR_HASH_FUNCTION_MISMATCH (-22715)
+/** Bad digest length encountered in the table of content. */
+define VERR_XAR_BAD_DIGEST_LENGTH (-22716)
+/** The order of elements in the XAR file does not lend it self to expansion *
+ * from via an I/O stream. */
+define VERR_XAR_NOT_STREAMABLE_ELEMENT_ORDER (-22717)
+/** Missing offset element in table of content sub-element. */
+define VERR_XAR_MISSING_OFFSET_ELEMENT (-22718)
+/** Bad offset element in table of content sub-element. */
+define VERR_XAR_BAD_OFFSET_ELEMENT (-22719)
+/** Missing size element in table of content sub-element. */
+define VERR_XAR_MISSING_SIZE_ELEMENT (-22720)
+/** Bad size element in table of content sub-element. */
+define VERR_XAR_BAD_SIZE_ELEMENT (-22721)
+/** Missing length element in table of content sub-element. */
+define VERR_XAR_MISSING_LENGTH_ELEMENT (-22722)
+/** Bad length element in table of content sub-element. */
+define VERR_XAR_BAD_LENGTH_ELEMENT (-22723)
+/** Bad file element in XAR table of content. */
+define VERR_XAR_BAD_FILE_ELEMENT (-22724)
+/** Missing data element for XAR file. */
+define VERR_XAR_MISSING_DATA_ELEMENT (-22725)
+/** Unknown XAR file type value. */
/** Missing encoding element for XAR data stream. */
#define VERR_XAR_UNKNOWN_FILE_TYPE (-22726)

/** Bad timestamp for XAR file. */
#define VERR_XAR_NO_ENCODING (-22727)

/** Bad file mode for XAR file. */
#define VERR_XAR_BAD_FILE_TIMESTAMP (-22728)

/** Bad file mode for XAR file. */
#define VERR_XAR_BAD_FILE_MODE (-22729)

/** Bad file user id for XAR file. */
#define VERR_XAR_BAD_FILE_UID (-22730)

/** Bad file group id for XAR file. */
#define VERR_XAR_BAD_FILE_GID (-22731)

/** Bad file inode device number for XAR file. */
#define VERR_XAR_BAD_FILE_DEVICE_NO (-22732)

/** Bad file inode number for XAR file. */
#define VERR_XAR_BAD_FILE_INODE (-22733)

/** Invalid name for XAR file. */
#define VERR_XAR_INVALID_FILE_NAME (-22734)

/** The message digest of the extracted data does not match the one supplied. */
#define VERR_XAR_EXTRACTED_HASH_MISMATCH (-22735)

/** The extracted data has exceeded the expected size. */
#define VERR_XAR_EXTRACTED_SIZE_EXCEEDED (-22736)

/** The message digest of the archived data does not match the one supplied. */
#define VERR_XAR_ARCHIVED_HASH_MISMATCH (-22737)

/** The decompressor completed without using all the input data. */
#define VERR_XAR_UNUSED_ARCHIVED_DATA (-22738)

/** Expected the archived and extracted XAR data sizes to be the same for uncompressed data. */
#define VERR_XAR_ARCHIVED_AND_EXTRACTED_SIZES_MISMATCH (-22739)

/** Error reading a certificate in PEM format from BIO. */
#define VERR_X509_READING_CERT_FROM_BIO (-23100)

/** Error extracting a public key from the certificate. */
#define VERR_X509_EXTRACT_PUBKEY_FROM_CERT (-23101)

/** Signature verification failed. */
#define VERR_X509_RSA_VERIFICATION_FAILURE (-23103)

/** Basic constraints were not found. */
#define VERR_X509_NO_BASIC_CONSTRAINTS (-23104)

/** Error getting extensions from the certificate. */
#define VERR_X509_GETTING_EXTENSION_FROM_CERT (-23105)

/** Error getting a data from the extension. */
#define VERR_X509_GETTING_DATA_FROM_EXTENSION (-23106)

/** Error formatting an extension. */
#define VERR_X509_PRINT_EXTENSION_TO_BIO (-23107)
+/** X509 certificate verification error. */
+define VERR_X509_CERTIFICATE_VERIFICATION_FAILURE (-23108)
+/** X509 certificate isn't self signed. */
+define VERR_X509_NOT_SELF_SIGNED_CERTIFICATE (-23109)
+/** Warning X509 certificate isn't self signed. */
+define VINF_X509_NOT_SELF_SIGNED_CERTIFICATE 23109
+/** @} */

+/** @name RTAsn1 status codes
+ * @{ */
+/** Temporary place holder. */
+define VERR_ASN1_ERROR (-22800)
+/** Encountered an ASN.1 string type that is not supported. */
+define VERR_ASN1_STRING_TYPE_NOT_IMPLEMENTED (-22801)
+/** Invalid ASN.1 UTF-8 STRING encoding. */
+define VERR_ASN1_INVALID_UTF8_STRING_ENCODING (-22802)
+/** Invalid ASN.1 NUMERIC STRING encoding. */
+define VERR_ASN1_INVALID_NUMERIC_STRING_ENCODING (-22803)
+/** Invalid ASN.1 PRINTABLE STRING encoding. */
+define VERR_ASN1_INVALID_PRINTABLE_STRING_ENCODING (-22804)
+/** Invalid ASN.1 T61/TELETEX STRING encoding. */
+define VERR_ASN1_INVALID_T61_STRING_ENCODING (-22805)
+/** Invalid ASN.1 VIDEOTEX STRING encoding. */
+define VERR_ASN1_INVALID_VIDEOTEX_STRING_ENCODING (-22806)
+/** Invalid ASN.1 IA5 STRING encoding. */
+define VERR_ASN1_INVALID_IA5_STRING_ENCODING (-22807)
+/** Invalid ASN.1 GRAPHIC STRING encoding. */
+define VERR_ASN1_INVALID_GRAPHIC_STRING_ENCODING (-22808)
+/** Invalid ASN.1 ISO-646/VISIBLE STRING encoding. */
+define VERR_ASN1_INVALID_VISIBLE_STRING_ENCODING (-22809)
+/** Invalid ASN.1 GENERAL STRING encoding. */
+define VERR_ASN1_INVALID_GENERAL_STRING_ENCODING (-22810)
+/** Invalid ASN.1 UNIVERSAL STRING encoding. */
+define VERR_ASN1_INVALID_UNIVERSAL_STRING_ENCODING (-22811)
+/** Invalid ASN.1 BMP STRING encoding. */
+define VERR_ASN1_INVALID_BMP_STRING_ENCODING (-22812)
+/** Invalid ASN.1 OBJECT IDENTIFIER encoding. */
+define VERR_ASN1_INVALID_OBJID_ENCODING (-22813)
+/** A component value of an ASN.1 OBJECT IDENTIFIER is too big for our internal representation (32-bits). */
+define VERR_ASN1_OBJID_COMPONENT_TOO_BIG (-22814)
+/** Too many components in an ASN.1 OBJECT IDENTIFIER for our internal representation. */
+define VERR_ASN1_OBJID_COMPONENT_TOO_MANY_COMPONENTS (-22815)
+/** The dotted-string representation of an ASN.1 OBJECT IDENTIFIER would be too long for our internal representation. */
+define VERR_ASN1_OBJID_TOO_LONG_STRING_FORM (-22816)
+/** Invalid dotted string. */
+/* Constructed string type not implemented. */
+*/
+##define VERR_ASN1_CONSTRUCTED_STRING_NOT_IMPL (-22818)
+*/
+##define VERR_ASN1_STRING_TAG_MISMATCH (-22819)
+*/
+##define VERR_ASN1_TIME_TAG_MISMATCH (-22820)
+*/
+##define VINF_ASN1_MORE_DATA (22821)
+*/
+##define VINF_ASN1_NOT_ENCODED (22822)
+*/
+##define VERR_ASN1_TELETEX_UNKNOWN_ESC_SEQ (-22823)
+*/
+##define VERR_ASN1_TELETEX_UNSUPPORTED_ESC_SEQ (-22824)
+*/
+##define VERR_ASN1_TELETEX_UNSUPPORTED_CHARSET (-22825)
+*/
+##define VERR_ASN1_NO_VTABLE (-22826)
+*/
+##define VERR_ASN1_NO_CHECK_SANITY_METHOD (-22827)
+*/
+##define VERR_ASN1_NOT_PRESENT (-22828)
+*/
+##define VINF_ASN1_CURSOR_LONG_TAG (-22830)
+*/
+##define VERR_ASN1_CURSOR_BAD_LENGTH (-22834)
+*/
+##define VERR_ASN1_CURSOR_BAD_LENGTH_ENCODING (-22831)
+*/
+##define VERR_ASN1_CURSOR_ILLEGAL_IDEFINITE_LENGTH (-22832)
+*/
+##define VERR_ASN1_CURSOR_IDEFINITE_LENGTH_NOT_SUP (-22833)
+*/
+##define VERR_ASN1_CURSOR_BAD_LENGTH (-22834)
+*/
+##define VINF_ASN1_CURSOR_NO_MORE_DATA (-22835)
+*/
+##define VERR_ASN1_CURSOR_TOO_LITTLE_DATA_LEFT (-22836)
+*/
+##define VERR_ASN1_CURSOR_ILLEGAL_CONSTRUCTED_STRING (-22837)
+*/
+##define VERR_ASN1_CURSOR_TAG_MISMATCH (-22838)
+*/
+##define VERR_ASN1_CURSOR_TAG_FLAG_CLASS_MISMATCH (-22839)
+*/
+##define VERR_ASN1_CURSOR_TAG_FLAG_CLASS_MISMATCH (-22839)
+*/
+##define VINF_ASN1_BITSTRING_OUT_OF_BOUNDS (-22840)
+/** Bad ASN.1 time object. */
+#define VERR_ASN1_TIME_BAD_normalize_INPUT (-22841)
+/** Failed to normalize ASN.1 time object. */
+#define VERR_ASN1_TIME_normalize_ERROR (-22842)
+/** Normalization of ASN.1 time object didn't work out. */
+#define VERR_ASN1_TIME_normalize_MISMATCH (-22843)
+/** Invalid ASN.1 UTC TIME encoding. */
+#define VERR_ASN1_INVALID_UTC_TIME_encoding (-22844)
+/** Invalid ASN.1 GENERALIZED TIME encoding. */
+#define VERR_ASN1_INVALID_GENERALIZED_TIME_encoding (-22845)
+/** Invalid ASN.1 BOOLEAN encoding. */
+#define VERR_ASN1_INVALID_BOOLEAN_encoding (-22846)
+/** Invalid ASN.1 NULL encoding. */
+#define VERR_ASN1_INVALID_NULL_encoding (-22847)
+/** Invalid ASN.1 BIT STRING encoding. */
+#define VERR_ASN1_INVALID_BITSTRING_encoding (-22848)
+/** Unimplemented ASN.1 tag reached the RTAsn1DynType code. */
+#define VERR_ASN1_DYNTYPE_TAG_NOT_IMPL (-22849)
+/** ASN.1 tag and flags/class mismatch in RTAsn1DynType code. */
+#define VERR_ASN1_DYNTYPE_BAD_TAG (-22850)
+/** Unexpected ASN.1 fake/dummy object. */
+#define VERR_ASN1_DUMMY_OBJECT (-22851)
+/** ASN.1 object is too long. */
+#define VERR_ASN1_TOO_LONG (-22852)
+/** Expected primitive ASN.1 object. */
+#define VERR_ASN1_EXPECTED_PRIMITIVE (-22853)
+/** Expected valid data pointer for ASN.1 object. */
+#define VERR_ASN1_INVALID_DATA_POINTER (-22854)
+/** The ASN.1 encoding is too deeply nested for the decoder. */
+#define VERR_ASN1_TOO_DEEPLY_NESTED (-22855)
+/** Generic unexpected object ID error. */
+#define VERR_ASN1_UNEXPECTED_OBJ_ID (-22856)
+
+/** ANS.1 internal error 1. */
+#define VERR_ASN1_INTERNAL_ERROR_1 (-22895)
+/** ANS.1 internal error 2. */
+#define VERR_ASN1_INTERNAL_ERROR_2 (-22896)
+/** ANS.1 internal error 3. */
+#define VERR_ASN1_INTERNAL_ERROR_3 (-22897)
+/** ANS.1 internal error 4. */
+#define VERR_ASN1_INTERNAL_ERROR_4 (-22898)
+/** ANS.1 internal error 5. */
+#define VERR_ASN1_INTERNAL_ERROR_5 (-22899)
+*/@ */
+
+@name More RTLdr status codes.
+@*/
+/** Image Verification Failure: No Authenticode Signature. */
+** Image Verification Warning: No Authenticode Signature, but on whitelist. */
+** Image Verification Failure: Error reading image headers. */
+** Image Verification Failure: Error reading section headers. */
+** Image Verification Failure: Error reading authenticode signature data. */
+** Image Verification Failure: Error reading file for hashing. */
+** Image Verification Failure: Error determining the file length. */
+** Image Verification Failure: Error allocating memory for state data. */
+** Image Verification Failure: Error allocating memory for authenticode signature data. */
+** Image Verification Failure: Error allocating memory for section headers. */
+** Image Verification Failure: Authenticode parsing output. */
+** Image Verification Failure: Invalid security directory entry. */
+** Image Verification Failure: Invalid security directory entry. */
+** Image Verification Failure: More than one certificate table entry. */
+** Image Verification Failure: More than one certificate table entry. */
+** Image Verification Failure: More than one certificate table entry. */
+** Image Verification Failure: More than one certificate table entry. */
+** Image Verification Failure: More than one certificate table entry. */
+** Image Verification Failure: More than one certificate table entry. */
+** Image Verification Failure: Invalid section count. */
+** Image Verification Failure: Raw data offsets and sizes are out of range. */
+** Image Verification Failure: Optional header magic and target machine does not match. */
+** Unsupported image target architecture. */
+** Unsupported image target architecture. */
+** Unsupported image target architecture. */
+** Unsupported image target architecture. */
+** Image Verification Failure: Internal error in signature parser. */
+** Generic BER parse error. Will be refined later. */
+** Generic BER parse error. Will be refined later. */
Expected the signed data content to be the object ID of SpcIndirectDataContent, found something else instead. */
#define VERR_LDRVI_EXPECTED_INDIRECT_DATA_CONTENT_OID (-22923)
/** Page hash table size overflow. */
#define VERR_LDRVI_PAGE_HASH_TAB_SIZE_OVERFLOW (-22924)
/** Page hash table is too long (covers signature data, i.e. itself). */
#define VERR_LDRVI_PAGE_HASH_TAB_TOO_LONG (-22925)
/** The page hash table is not strictly ordered by offset. */
#define VERR_LDRVI_PAGE_HASH_TAB_NOT_STRICTLY_SORTED (-22926)
/** The page hash table hashes data outside the defined and implicit sections. */
#define VERR_LDRVI_PAGE_HASH_TAB_HASHES_NON_SECTION_DATA (-22927)
/** Page hash mismatch. */
#define VERR_LDRVI_PAGE_HASH_MISMATCH (-22928)
/** Image hash mismatch. */
#define VERR_LDRVI_IMAGE_HASH_MISMATCH (-22929)
/** Cannot resolve symbol because it’s a forwarder. */
#define VERR_LDR_FORWARDER (-22950)
/** The symbol is not a forwarder. */
#define VERR_LDR_NOT_FORWARDER (-22951)
/** Malformed forwarder entry. */
#define VERR_LDR_BAD_FORWARDER (-22952)
/** Too long forwarder chain or there is a loop. */
#define VERR_LDR_FORWARDER_CHAIN_TOO_LONG (-22953)
/** Support for forwarders has not been implemented. */
#define VERR_LDR_FORWARDERS_NOT_SUPPORTED (-22954)
/** Generic X.509 error. */
#define VERR_CR_X509_GENERIC_ERROR (-23000)
/** Internal error in the X.509 code. */
#define VERR_CR_X509_INTERNAL_ERROR (-23001)
/** Internal error in the X.509 certificate path building and verification */
#define VERR_CR_X509_CERTPATHS_INTERNAL_ERROR (-23002)
/** Path not verified yet. */
#define VERR_CR_X509_NOT_VERIFIED (-23003)
/** The certificate path has no trust anchor. */
#define VERR_CR_X509_NO_TRUST_ANCHOR (-23004)
/** Unknown X.509 certificate signature algorithm. */
#define VERR_CR_X509_UNKNOWN_CERT_SIGN_ALGO (-23005)
/** Certificate signature algorithm mismatch. */
#define VERR_CR_X509_CERTSIGN_ALGO_MISMATCH (-23006)
/** The signature algorithm in the to-be-signed certificate part does not match */
#define VERR_CR_X509_CERTSIGN_ALGO_MISMATCH (-23006)
#define VERR_CR_X509_CERT_TBS_SIGN_ALGO_MISMATCH (-23007)
/** Certificate extensions requires certificate version 3 or later. */
#define VERR_CR_X509_TBSCERT_EXTS_REQ_V3 (-23008)
/** Unique issuer and subject IDs require version certificate 2. */
#define VERR_CR_X509_TBSCERT_UNIQUE_ID_REQ_V2 (-23009)
/** Certificate serial number length is out of bounds. */
#define VERR_CR_X509_TBSCERT_SERIAL_NUMBER_OUT_OF_BOUNDS (-23010)
/** Unsupported X.509 certificate version. */
#define VERR_CR_X509_TBSCERT_UNSUPPORTED_VERSION (-23011)
/** Public key is too small. */
#define VERR_CR_X509_PUBLIC_KEY_TOO_SMALL (-23012)
/** Invalid string tag for a X.509 name object. */
#define VERR_CR_X509_INVALID_NAME_STRING_TAG (-23013)
/** Empty string in X.509 name object. */
#define VERR_CR_X509_NAMEEMPTY_STRING (-23014)
/** Non-string object inside X.509 name object. */
#define VERR_CR_X509_NAME_NOT_STRING (-23015)
/** Empty set inside X.509 name. */
#define VERR_CR_X509_NAMEEMPTY_SET (-23016)
/** Empty sub-string set inside X.509 name. */
#define VERR_CR_X509_NAMEEMPTY_SUB_SET (-23017)
/** The NotBefore and NotAfter values of an X.509 Validity object seems to have been swapped around. */
#define VERR_CR_X509_VALIDITY_SWAPPED (-23018)
/** Duplicate certificate extension. */
#define VERR_CR_X509_TBSCERT_DUPLICATE_EXTENSION (-23019)
/** Missing relative distinguished name map entry. */
#define VERR_CR_X509_NAMEMISSING_RDN_MAP_ENTRY (-23020)
/** Certificate path validator: No trusted certificate paths. */
#define VERR_CR_X509_CPVNO_TRUSTED_PATHS (-23021)
/** Certificate path validator: No valid certificate policy. */
#define VERR_CR_X509_CPVNO_VALID_POLICY (-23022)
/** Certificate path validator: Unknown critical certificate extension. */
#define VERR_CR_X509_CPVUNKNOWN_CRITICAL_EXTENSION (-23023)
/** Certificate path validator: Intermediate certificate is missing the KeyCertSign usage flag. */
#define VERR_CR_X509_CPVMISSING_KEY_CERTSIGN (-23024)
/** Certificate path validator: Hit the max certificate path length before reaching trust anchor. */
#define VERR_CR_X509_CPVMAX_PATH_LENGTH (-23025)
/** Certificate path validator: Intermediate certificate is not marked as a certificate authority (CA). */
#define VERR_CR_X509_CPVNOT_CA_CERT (-23026)
/** Certificate path validator: Intermediate certificate is not a version 3 certificate. */
#define VERR_CR_X509_CPVNOT_V3_CERT (-23027)
/** Certificate path validator: Invalid policy mapping (to/from anyPolicy). */
#define VERR_CR_X509_CPVINVALID_POLICY_MAPPING (-23028)
+/** Certificate path validator: Name constraints permits no names. */
+#define VERR_CR_X509_CPV_NO_PERMITTED_NAMES (-23029)
+/** Certificate path validator: Name constraints does not permits the
+ * certificate name. */
+#define VERR_CR_X509_CPV_NAME_NOT_PERMITTED (-23030)
+/** Certificate path validator: Name constraints does not permits the
+ * alternative certificate name. */
+#define VERR_CR_X509_CPV_ALT_NAME_NOT_PERMITTED (-23031)
+/** Certificate path validator: Intermediate certificate subject does not
+ * match child issuer property. */
+#define VERR_CR_X509_CPV_ISSUER_MISMATCH (-23032)
+/** Certificate path validator: The certificate is not valid at the
+ * specified time. */
+#define VERR_CR_X509_CPV_NOT_VALID_AT_TIME (-23033)
+/** Certificate path validator: Unexpected choice found in general subtree
+ * object (name constraints). */
+#define VERR_CR_X509_CPV_UNEXP_GENERAL_SUBTREE_CHOICE (-23034)
+/** Certificate path validator: Unexpected minimum value found in general
+ * subtree object (name constraints). */
+#define VERR_CR_X509_CPV_UNEXP_GENERAL_SUBTREE_MIN (-23035)
+/** Certificate path validator: Unexpected maximum value found in
+ * general subtree object (name constraints). */
+#define VERR_CR_X509_CPV_UNEXP_GENERAL_SUBTREE_MAX (-23036)
+/** Certificate path builder: Encountered bad certificate context. */
+#define VERR_CR_X509_CPB_BAD_CERT_CTX (-23037)
+/** OpenSSL d2i_X509 failed. */
+#define VERR_CR_X509_OSSL_D2I_FAILED (-23090)
+/** @} */
+
+/** @name RTCrPkcs7 status codes. */
+/* @} */
+/** Generic PKCS \#7 error. */
+#define VERR_CR_PKCS7_GENERIC_ERROR (-23300)
+/** Signed data verification failed because there are zero signer infos. */
+#define VERR_CR_PKCS7_NO_SIGNER_INFOS (-23301)
+/** Signed data certificate not found. */
+#define VERR_CR_PKCS7_SIGNED_DATA_CERT_NOT_FOUND (-23302)
+/** Signed data verification failed due to key usage issues. */
+#define VERR_CR_PKCS7_KEY_USAGE_MISMATCH (-23303)
+/** Signed data verification failed because of missing (or duplicate)
+ * authenticated content-type attribute. */
+#define VERR_CR_PKCS7_MISSING_CONTENT_TYPE_ATTRIB (-23304)
+/** Signed data verification failed because of the authenticated content-type
+ * attribute did not match. */
+#define VERR_CR_PKCS7_CONTENT_TYPE_ATTRIB_MISMATCH (-23305)
+/** Signed data verification failed because of a malformed authenticated
+ * content-type attribute. */
+#define VERR_CR_PKCS7_BAD_CONTENT_TYPE_ATTRIB (-23306)
+/** Signed data verification failed because of missing (or duplicate)
+ * authenticated message-digest attribute. */
+#define VERR_CR_PKCS7_MISSING_MESSAGE_DIGEST_ATTRIB (-23307)
+/** Signed data verification failed because the authenticated message-digest
+ * attribute did not match. */
+#define VERR_CR_PKCS7_MESSAGE_DIGEST_ATTRIB_MISMATCH (-23308)
+/** Signed data verification failed because of a malformed authenticated
+ * message-digest attribute. */
+#define VERR_CR_PKCS7_BAD_MESSAGE_DIGEST_ATTRIB (-23309)
+/** Signature verification failed. */
+#define VERR_CR_PKCS7_SIGNATURE_VERIFICATION_FAILED (-23310)
+/** Internal PKCS \#7 error. */
+#define VERR_CR_PKCS7_INTERNAL_ERROR (-22311)
+/** OpenSSL d2i_PKCS7 failed. */
+#define VERR_CR_PKCS7_OSSL_D2I_FAILED (-22312)
+/** OpenSSL PKCS \#7 verification failed. */
+#define VERR_CR_PKCS7_OSSL_VERIFY_FAILED (-22313)
+/** Digest algorithm parameters are not supported by the PKCS \#7 code. */
+#define VERR_CR_PKCS7_DIGEST_PARAMS_NOT_IMPL (-22314)
+/** The digest algorithm of a signer info entry was not found in the list of
+ * digest algorithms in the signed data. */
+#define VERR_CR_PKCS7_DIGEST_ALGO_NOT_FOUND_IN_LIST (-22315)
+/** The PKCS \#7 content is not signed data. */
+#define VERR_CR_PKCS7_NOT_SIGNED_DATA (-22316)
+/** No digest algorithms listed in PKCS \#7 signed data. */
+#define VERR_CR_PKCS7_NO_DIGEST_ALGORITHMS (-22317)
+/** Too many digest algorithms used by PKCS \#7 signed data. This is an
+ * internal limitation of the code that aims at saving kernel stack space. */
+#define VERR_CR_PKCS7_TOO_MANY_DIGEST_ALGORITHMS (-22318)
+/** Error creating digest algorithm calculator. */
+#define VERR_CR_PKCS7_DIGEST_CREATE_ERROR (-22319)
+/** Error while calculating a digest for a PKCS \#7 verification operation. */
+#define VERR_CR_PKCS7_DIGEST_CALC_ERROR (-22320)
+/** Unsupported PKCS \#7 signed data version. */
+#define VERR_CR_PKCS7_SIGNED_DATA_VERSION (-22350)
+/** PKCS \#7 signed data has no digest algorithms listed. */
+#define VERR_CR_PKCS7_SIGNED_DATA_NO_DIGEST_ALGOS (-22351)
+/** Unknown digest algorithm used by PKCS \#7 object. */
+#define VERR_CR_PKCS7_UNKNOWN_DIGEST_ALGORITHM (-22352)
+/** Expected PKCS \#7 object to ship at least one certificate. */
+#define VERR_CR_PKCS7_NO_CERTIFICATES (-22353)
+/** Expected PKCS \#7 object to not contain any CRLs. */
+#define VERR_CR_PKCS7EXPECTED_NO_CRLS (-22354)
+/** Expected PKCS \#7 object to contain exactly on signer info entry. */
+#define VERR_CR_PKCS7EXPECTED_ONE_SIGNER_INFO (-22355)
+/** Unsupported PKCS \#7 signer info version. */
+#define VERR_CR_PKCS7SIGNER_INFO_VERSION (-22356)
+/** PKCS \#7 signer info contains no issuer serial number. */
+/** Exected PKCS #7 object to ship the signer certificate(s). */
+/** The encrypted digest algorithm does not match the one in the certificate. */
+/** Expected PKCS #7 object to ship the signer certificate(s). */
+/** @} */
+
+/** Generic SPC error. */
+/** Generic SPC error. */
+/** @} */
+
+/** RTCrSpc status codes. */
+/** RTCrSpc status codes. */
+/** @} */
+
+/** RTCrSpc status codes. */
+/** RTCrSpc status codes. */
+/** @} */
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+/** RTCrSpc status codes. */
+/** RTCrSpc status codes. */
+/** @} */
+
+/** RTCrSpc status codes. */
+/** RTCrSpc status codes. */
+/** @} */
+
+/** RTCrSpc status codes. */
+/** RTCrSpc status codes. */
+/** @} */
# RTCrPkix status codes.

**Generic PKCS #7 error.**

```c
#define VERR_CR_PKIX_GENERIC_ERROR (-23500)
```

Parameters was presented to a signature schema that does not take any.

```c
#define VERR_CR_PKIX_SIGNATURE_TAKES_NO_PARAMETERS (-23501)
```

Unknown hash digest type.

```c
#define VERR_CR_PKIX_UNKNOWN_DIGEST_TYPE (-23502)
```

Internal error.

```c
#define VERR_CR_PKIX_INTERNAL_ERROR (-23503)
```

The hash is too long for the key used when signing/verifying.

```c
#define VERR_CR_PKIX_HASH_TOO_LONG_FOR_KEY (-23504)
```

The signature is too long for the scratch buffer.

```c
#define VERR_CR_PKIX_SIGNATURE_TOO_LONG (-23505)
```

The signature is greater than or equal to the key.

```c
#define VERR_CR_PKIX_SIGNATURE_GE_KEY (-23506)
```

The signature is negative.

```c
#define VERR_CR_PKIX_SIGNATURE_NEGATIVE (-23507)
```

Invalid signature length.

```c
#define VERR_CR_PKIX_INVALID_SIGNATURE_LENGTH (-23508)
```

PKIX signature no does not match up to the current data.

```c
#define VERR_CR_PKIX_SIGNATURE_MISMATCH (-23509)
```

PKIX cipher algorithm parameters are not implemented.

```c
#define VERR_CR_PKIX_CIPHER_ALGO_PARAMS_NOT_IMPL (-23510)
```

Cipher algorithm is not known to us.

```c
#define VERR_CR_PKIX_CIPHER_ALGO_NOT_KNOWN (-23511)
```

PKIX cipher algorithm is not known to OpenSSL.

```c
#define VERR_CR_PKIX_CIPHER_ALGO_OSSL_NOT_KNOWN (-23512)
```

PKIX cipher algorithm is not known to OpenSSL EVP API.

```c
#define VERR_CR_PKIX_CIPHER_ALGO_OSSL_EVP_NOT_KNOWN (-23513)
```

OpenSSL failed to init PKIX cipher algorithm context.

```c
#define VERR_CR_PKIX_CIPHER_ALGO_OSSL_CTX_INIT_FAILED (-23514)
```

Final OpenSSL PKIX verification failed.

```c
#define VERR_CR_PKIX_OSSL_VERIFY_FINAL_FAILED (-23515)
```

OpenSSL failed to decode the public key.

```c
#define VERR_CR_PKIX_OSSL_D2I_PUBLIC_KEY_FAILED (-23516)
```

The EVP PKEY type API in OpenSSL failed.

```c
#define VERR_CR_PKIX_OSSL_EVP_PKEY_TYPE_ERROR (-23517)
```

**Generic store error.**

```c
#define VERR_CR_STORE_GENERIC_ERROR (-23700)
```

Generic store error.

```c
#define VERR_CR_STORE_GENERIC_ERROR (-23700)
```

**RTCrRsa status codes.**

```c
#define VERR_CR_RSA_GENERIC_ERROR (-23800)
```

Generic rsa error.

```c
#define VERR_CR_RSA_GENERIC_ERROR (-23800)
```
/** Generic RSA error. */
#define VERR_CR_RSA_GENERIC_ERROR (-23900)
/** @} */

/** @name RTBigNum status codes. */
/** Sensitive input requires the result(s) to be initialized as sensitive. */
#define VERR_BIGNUM_SENSITIVE_INPUT (-24000)
/** Attempt to divide by zero. */
#define VERR_BIGNUM_DIV_BY_ZERO (-24001)
/** Negative exponent makes no sense to integer math. */
#define VERR_BIGNUM_NEGATIVE_EXPONENT (-24002)
/** @} */

/** @name RTCrDigest status codes. */
/** OpenSSL failed to initialize the digest algorithm context. */
#define VERR_CR_DIGEST_OSSL_DIGEST_INIT_ERROR (-24200)
/** OpenSSL failed to clone the digest algorithm context. */
#define VERR_CR_DIGEST_OSSL_DIGEST_CTX_COPY_ERROR (-24201)
/** @} */

/** @name RTPath status codes. */
/** Unknown glob variable. */
#define VERR_PATH_MATCH_UNKNOWN_VARIABLE (-24400)
/** The specified glob variable must be first in the pattern. */
#define VERR_PATH_MATCH_VARIABLE_MUST_BE_FIRST (-24401)
/** Hit unimplemented glob pattern matching feature. */
#define VERR_PATH_MATCH_FEATURE_NOT_IMPLEMENTED (-24402)
/** Unknown character class in glob pattern. */
#define VERR_PATH_GLOB_UNKNOWN_CHAR_CLASS (-24403)
/** @} */

/** @name RTUri status codes. */
/** The URI is empty */
#define VERR_URI_EMPTY (-24600)
/** The URI is too short to be a valid URI. */
#define VERR_URI_TOO_SHORT (-24601)
/** Invalid scheme. */
#define VERR_URI_INVALID_SCHEME (-24602)
/** Invalid port number. */
#define VERR_URI_INVALID_PORT_NUMBER (-24603)
/** Invalid escape sequence. */
#define VERR_URI_INVALID_ESCAPE_SEQ (-24604)
/** Escape URI char decodes as zero (the C string terminator). */
+#define VERR_URI_ESCAPED_ZERO (-24605)
+/** Escaped URI characters does not decode to valid UTF-8. */
+#define VERR_URI_ESCAPED_CHARS_NOT_VALID_UTF8 (-24606)
+/** Escaped URI character is not a valid UTF-8 lead byte. */
+#define VERR_URI_INVALID_ESCAPED_UTF8_LEAD_BYTE (-24607)
+/** Escaped URI character sequence with invalid UTF-8 continuation byte. */
+#define VERR_URI_INVALID_ESCAPED_UTF8_CONTINUATION_BYTE (-24608)
+/** Missing UTF-8 continuation in escaped URI character sequence. */
+#define VERR_URI_MISSING_UTF8_CONTINUATION_BYTE (-24609)
+/** Expected URI using the 'file:' scheme. */
+#define VERR_URI_NOT_FILE_SCHEME (-24610)
+/** @} */
+
+/** @} @name RTJson status codes.
+ * @} */
+#define VERR_JSON_VALUE_INVALID_TYPE (-24700)
+/** The called method does not work with the value type of the given JSON value. */
+#define VERR_JSON_ITERATOR_END (-24701)
+/** The JSON document is malformed. */
+#define VERR_JSON_MALFORMED (-24702)
+/** @} */
+
+/** @} @name RTVfs status codes.
+ * @} */
+#define VERR_VFS_UNKNOWN_FORMAT (-24800)
+/** Unknown file system format. */
+#define VERR_VFS_BOGUS_FORMAT (-24801)
+/** Found bogus offset in the file system. */
+#define VERR_VFS_BOGUS_OFFSET (-24802)
+/** Unsupported file system format. */
+#define VERR_VFS_UNSUPPORTED_FORMAT (-24803)
+/** @} */
+
+/** @} @name RTFsIsoMaker status codes.
+ * @} */
+#define VERR_ISOMK_BOOT_CAT_NO_VALIDATION_ENTRY (-25000)
+/** No validation entry in the boot catalog. */
+#define VERR_ISOMK_BOOT_CAT_NO_DEFAULT_ENTRY (-25001)
+/** Expected section header. */
+#define VERR_ISOMK_BOOT_CAT_EXPECTED_SECTION_HEADER (-25002)
+/** Entry in a boot catalog section is empty. */
+#define VERR_ISOMK_BOOT_CAT_EMPTY_ENTRY (-25003)
+/** Entry in a boot catalog section is another section. */
+#define VERR_ISOMK_BOOT_CAT_INVALID_SECTION_SIZE (-25004)
+/** Unsectioned boot catalog entry. */
+/** @} */
#define VERR_ISOMK_BOOT_CAT_ERRATIC_ENTRY (-25005)  
/** The file is too big for the current ISO level (4GB+ sized files require ISO level 3). */

#define VERR_ISOMK_FILE_TOO_BIG_REQ_ISO_LEVEL_3 (-25006)  
/** Cannot add symbolic link to namespace which isn't configured to support it. */

#define VERR_ISOMK_SYMLINK_REQ_ROCK_RIDGE (-25007)  
/** Cannot add symbolic link to one of the selected namespaces. */

#define VINF_ISOMK_SYMLINK_REQ_ROCK_RIDGE (25007)  
/** Cannot add symbolic link because no namespace is configured to support it. */

#define VERR_ISOMK_SYMLINK_SUPPORT_DISABLED (-25008)  
/** No space for rock ridge 'CE' entry in directory record. */

#define VINF_ISOMK_RR_NO_SPACE_FOR_CE (-25009)  
/** Internal ISO maker error: Rock ridge read problem. */

#define VERR_ISOMK_IPE_RR_READ (-25010)  
/** Internal ISO maker error: Buggy namespace table. */

#define VINF_ISOMK_IPE_TABLE (-25011)  
/** Internal ISO maker error: Namespace problem \#1. */

#define VERR_ISOMK_IPE_NAMESPACE_1 (-25012)  
/** Internal ISO maker error: Namespace problem \#2. */

#define VINF_ISOMK_IPE_NAMESPACE_2 (-25013)  
/** Internal ISO maker error: Namespace problem \#3. */

#define VERR_ISOMK_IPE_NAMESPACE_3 (-25014)  
/** Internal ISO maker error: Namespace problem \#4. */

#define VINF_ISOMK_IPE_NAMESPACE_4 (-25015)  
/** Internal ISO maker error: Namespace problem \#5. */

#define VERR_ISOMK_IPE_NAMESPACE_5 (-25016)  
/** Internal ISO maker error: Namespace problem \#6. */

#define VINF_ISOMK_IPE_NAMESPACE_6 (-25017)  
/** Internal ISO maker error: Empty path. */

#define VERR_ISOMK_IPE_EMPTY_PATH (-25018)  
/** Internal ISO maker error: Unexpected empty component. */

#define VINF_ISOMK_IPE_EMPTY_COMPONENT (-25019)  
/** Internal ISO maker error: Expected path to start with root slash. */

#define VERR_ISOMK_IPE_ROOT_SLASH (-25020)  
/** Internal ISO maker error: Descriptor miscounting. */

#define VINF_ISOMK_IPE_DESC_COUNT (-25021)  
/** Internal ISO maker error: Buffer size. */

#define VERR_ISOMK_IPE_BUFFER_SIZE (-25022)  
/** Internal ISO maker error: Boot catalog file handle problem. */

#define VINF_ISOMK_IPE_BOOT_CAT_FILE (-25023)  
/** Internal ISO maker error: Inconsistency producing trans.tbl file. */

#define VERR_ISOMK_IPE_PRODUCE_TRANS_TBL (-25024)  
/** Internal ISO maker error: Read file data probem \#1. */

#define VINF_ISOMK_IPE_READ_FILE_DATA_1 (-25025)  
/** Internal ISO maker error: Read file data probem \#2. */

#define VERR_ISOMK_IPE_READ_FILE_DATA_2 (-25026)  
/** Internal ISO maker error: Read file data probem \#3. */

#define VINF_ISOMK_IPE_READ_FILE_DATA_3 (-25027)
+/** Internal ISO maker error: Finalization problem #1. */
+#define VERR_ISO_MK_IPE_FINALIZE_1 (-25028)
+/** The spill file grew larger than 4GB. */
+#define VERR_ISO_MK_RR_SPILL_FILE_FULL (-25029)
+
+/** Requested to import an unknown ISO format. */
+#define VERR_ISO_MK_IMPORT_UNKNOWN_FORMAT (-25100)
+/** Too many volume descriptors in the import ISO. */
+#define VERR_ISO_MK_IMPORT_TOO_MANY_VOL_DESCS (-25101)
+/** Import ISO contains a bad volume descriptor header. */
+#define VERR_ISO_MK_IMPORT_INVALID_VOL_DESC_HDR (-25102)
+/** Import ISO contains more than one primary volume descriptor. */
+#define VERR_ISO_MK_IMPORT_MULTIPLE_PRIMARY_VOL_DESCS (-25103)
+/** Import ISO contains more than one el torito descriptor. */
+#define VERR_ISO_MK_IMPORT_MULTIPLE_EL_TORITO_DESCS (-25104)
+/** Import ISO contains more than one joliet volume descriptor. */
+#define VERR_ISO_MK_IMPORT_MULTIPLE_JOLIET_VOL_DESCS (-25105)
+/** Import ISO starts with supplementary volume descriptor before any
+ * primary ones. */
+#define VERR_ISO_MK_IMPORT_SUPPLEMENTARY_BEFORE_PRIMARY (-25106)
+/** Import ISO contains an unsupported primary volume descriptor version. */
+#define VERR_ISO_MK_IMPORT_PRIMARY_VOL_DESC_VER (-25107)
+/** Import ISO contains a bad primary volume descriptor. */
+#define VERR_ISO_MK_IMPORT_BAD_PRIMARY_VOL_DESC (-25108)
+/** Import ISO contains an unsupported supplementary volume descriptor
+ * version. */
+#define VERR_ISO_MK_IMPORT_SUP_VOL_DESC_VER (-25109)
+/** Import ISO contains a bad supplementary volume descriptor. */
+#define VERR_ISO_MK_IMPORT_BAD_SUP_VOL_DESC (-25110)
+/** Import ISO uses a logical block size other than 2KB. */
+#define VERR_ISO_MK_IMPORT_LOGICAL_BLOCK_SIZE_NOT_2KB (-25111)
+/** Import ISO contains more than volume. */
+#define VERR_ISO_MK_IMPORT_MORE_THAN_ONE_VOLUME_IN_SET (-25112)
+/** Import ISO uses invalid volume sequence number. */
+#define VERR_ISO_MK_IMPORT_INVALID_VOLUMNE_SEQ_NO (-25113)
+/** Import ISO has different volume space sizes of primary and supplementary
+ * volume descriptors. */
+#define VERR_ISO_MK_IMPORT_VOLUME_SPACE_SIZE_MISMATCH (-25114)
+/** Import ISO has different volume set sizes of primary and supplementary
+ * volume descriptors. */
+#define VERR_ISO_MK_IMPORT_VOLUME_SET_SIZE_MISMATCH (-25115)
+/** Import ISO contains a bad root directory record. */
+#define VERR_ISO_MK_IMPORT_BAD_ROOT_DIR_REC (-25116)
+/** Import ISO contains a zero sized root directory. */
+#define VERR_ISO_MK_IMPORT_ZERO_SIZED_ROOT_DIR (-25117)
+/** Import ISO contains a root directory with a mismatching volume sequence
+ * number. */
+#define VERR_ISO_MK_IMPORT_ROOT_VOLUME_SEQ_NO (-25118)
+/** Import ISO contains a root directory with an out of bounds data extent. */
+#define VERR_ISOMK_IMPORT_ROOT_DIR_EXTENT_OUT_OF_BOUNDS (-25119)
+/** Import ISO contains a root directory with a bad record length. */
+#define VERR_ISOMK_IMPORT_BAD_ROOT_DIR_REC_LENGTH (-25120)
+/** Import ISO contains a root directory without the directory flag set. */
+#define VERR_ISOMK_IMPORT_ROOT_DIR_WITHOUT_DIR_FLAG (-25121)
+/** Import ISO contains a root directory with multiple extents. */
+#define VERR_ISOMK_IMPORT_ROOT_DIR_IS_MULTI_EXTENT (-25122)
+/** Import ISO contains a too deep directory subtree. */
+#define VERR_ISOMK_IMPORT_TOO_DEEP_DIR_TREE (-25123)
+/** Import ISO contains a bad directory record. */
+#define VERR_ISOMK_IMPORT_BAD_DIR_REC (-25124)
+/** Import ISO contains a directory record with a mismatching volume sequence number. */
+#define VERR_ISOMK_IMPORT_DIR_REC_VOLUME_SEQ_NO (-25125)
+/** Import ISO contains a directory with an extent that is out of bounds. */
+#define VERR_ISOMK_IMPORT_DIR_REC_EXTENT_OUT_OF_BOUNDS (-25126)
+/** Import ISO contains a directory with a bad record length. */
+#define VERR_ISOMK_IMPORT_BAD_DIR_REC_LENGTH (-25127)
+/** Import ISO contains a '.' or '..' directory record with a bad name length. */
+#define VERR_ISOMK_IMPORT_DOT_DIR_REC_BAD_NAME_LENGTH (-25128)
+/** Import ISO contains a directory record with an extent that is out of bounds. */
+#define VERR_ISOMK_IMPORT_DIR_REC_EXTENT_OUT_OF_BOUNDS (-25129)
+/** Import ISO contains a directory with a more than one extent, that's currently not supported. */
+#define VERR_ISOMK_IMPORT_DIR_WITH_MORE_EXTENTS (-25130)
+/** Import ISO contains a multi-extent directory record that differs significantly from first record. */
+#define VERR_ISOMK_IMPORT_MISMATCHING_MULTI_EXTENT_REC (-25131)
+/** Import ISO contains a non-final multi-extent directory record with a size that isn't block aligned. */
+#define VERR_ISOMK_IMPORT_MISALIGNED_MULTI_EXTENT (-25132)
+/** Import ISO contains a non-contiguous multi-extent data, this is currently not supported. */
+#define VERR_ISOMK_IMPORT_NON_CONTIGUOUS_MULTI_EXTENT (-25133)
+/** The boot catalog block in the import ISO is out of bounds. */
+#define VERR_ISOMK_IMPORT_BOOT_CAT_BAD_OUT_OF_BOUNDS (-25140)
+/** The boot catalog block in the import ISO has an incorrect validation header ID. */
+#define VERR_ISOMK_IMPORT_BOOT_CAT_BAD_VALIDATION_HEADER_ID (-25141)
+/** The boot catalog validation entry in the import ISO has incorrect keys. */
+#define VERR_ISOMK_IMPORT_BOOT_CAT_BAD_VALIDATION_KEYS (-25142)
+/** The boot catalog validation entry in the import ISO has an incorrect checksum. */
+#define VERR_ISOMK_IMPORT_BOOT_CAT_BAD_VALIDATION_CHECKSUM (-25143)
+/** A boot catalog entry in the import ISO has an unknown type. */
+#define VERR_ISOMK_IMPORT_BOOT_CAT_UNKNOWN_HEADER_ID (-25144)
/** A boot catalog entry in the import ISO has an invalid boot media type. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_INVALID_BOOT_MEDIA_TYPE (-25145)

/** The default boot catalog entry in the import ISO has invalid flags set. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_DEF_ENTRY_INVALID_FLAGS (-25146)

/** A boot catalog entry in the import ISO has reserved flag set. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_ENTRY_RESERVED_FLAG (-25147)

/** A boot catalog entry in the import ISO is using the unused field. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_ENTRY_USES_UNUSED_FIELD (-25148)

/** A boot catalog entry in the import ISO points to a block after the end of the image input file. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_ENTRY_IMAGE_OUT_OF_BOUNDS (-25149)

/** A boot catalog entry in the import ISO has an image with an indeterminate size. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_ENTRY_UNKNOWN_IMAGE_SIZE (-25150)

/** The boot catalog in the import ISO is larger than a sector or it is missing the final section header entry. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_MISSING_FINAL_OR_TOO_BIG (-25151)

/** The default boot catalog entry in the import ISO an invalid boot indicator value. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_DEF_ENTRY_INVALID_BOOT_IND (-25152)

/** A boot catalog extension entry in the import ISO was either flagged incorrectly in the previous entry or has an invalid header ID. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_EXT_ENTRY_INVALID_ID (-25153)

/** A boot catalog extension entry in the import ISO uses undefined flags which will be lost. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_EXT_ENTRY_UNDEFINED_FLAGS (-25154)

/** A boot catalog extension entry in the import ISO indicates more entries when we reached the end of the boot catalog sector. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_EXT_ENTRY_END_OF_SECTOR (-25155)

/** A boot catalog entry in the import ISO sets the continuation flag when using NONE as the selection criteria type. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_ENTRY_CONTINUATION_WITH_NONE (-25156)

/** A boot catalog entry in the import ISO sets the continuation flag when we reached the ned of the boot catalog secotr. */
#define VERR_ISOMK_IMPORT_BOOT_CAT_ENTRY_CONTINUATION_EOS (-25157)

/** Descriptor tag is all zeros. */
#define VERR_ISOFS_TAG_IS_ALL_ZEROS (-25300)

/** Unsupported descriptor tag version. */
#define VERR_ISOFS_UNSUPPORTED_TAG_VERSION (-25301)

/** Bad descriptor tag checksum. */
#define VERR_ISOFS_BAD_TAG_CHECKSUM (-25302)

/** Descriptor tag sector number mismatch. */
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+/* define VERR_ISOFS_TAG_SECTOR_MISMATCH    (-25303)
+/* Descriptor CRC mismatch. */
+/* define VERR_ISOFS_DESC_CRC_MISMATCH      (-25304)
+/* Insufficient data to check descriptor CRC. */
+/* define VERR_ISOFS_INSUFFICIENT_DATA_FOR_DESC_CRC  (-25305)
+/* Unexpected/unknown/bad descriptor in volume descriptor sequence. */
+/* define VERR_ISOFS_UNEXPECTED_VDS_DESC      (-25306)
+/* Too many primary volume descriptors. */
+/* define VERR_ISOFS_TOO_MANY_PVDS           (-25307)
+/* Too many logical volume descriptors. */
+/* define VERR_ISOFS_TOO_MANY_LVDS           (-25308)
+/* Too many partition descriptors. */
+/* define VERR_ISOFS_TOO_MANY_PDS            (-25309)
+/* The logical volume descriptor has a too big partition map. */
+/* define VERR_ISOFS_TOO_BIT_PARTMAP_IN_LVD   (-25310)
+/* No primary volume descriptors found. */
+/* define VERR_ISOFS_NO_PVD                  (-25311)
+/* No logical volume descriptors found. */
+/* define VERR_ISOFS_NO_LVD                  (-25312)
+/* No partition descriptors found. */
+/* define VERR_ISOFS_NO_PD                   (-25313)
+/* Multiple primary volume descriptors found, we can only deal with one. */
+/* define VERR_ISOFS_MULTIPLE_PVDS          (-25314)
+/* Multiple logical volume descriptors found, we can only deal with one. */
+/* define VERR_ISOFS_MULTIPLE_LVDS          (-25315)
+/* Too many partition maps in the logical volume descriptor. */
+/* define VERR_ISOFS_TOO_MANY_PART_MAPS      (-25316)
+/* Malformed partition map table in the logical volume descriptor. */
+/* define VERR_ISOFS_MALFORMED_PART_MAP_TABLE  (-25317)
+/* Unable to find partition descriptor for a partition map table entry. */
+/* define VERR_ISOFS_PARTITION_NOT_FOUND     (-25318)
+/* Partition mapping table is shorter than described. */
+/* define VERR_ISOFS_INCOMPLETE_PART_MAP_TABLE  (-25319)
+/* Unknown partition map entry type. */
+/* define VERR_ISOFS_UNKNOWN_PART_MAP_ENTRY_TYPE  (-25320)
+/* Unknown partition ID found in the partition map table. */
+/* define VERR_ISOFS_UNKNOWN_PART_MAP_TYPE_ID  (-25321)
+/* Support for virtual partitions as not yet been implemented. */
+/* define VERR_ISOFS_VPM_NOT_SUPPORTED       (-25322)
+/* Support for sparable partitions as not yet been implemented. */
+/* define VERR_ISOFS_SPM_NOT_SUPPORTED       (-25323)
+/* Support for metadata partitions as not yet been implemented. */
+/* define VERR_ISOFS_MPM_NOT_SUPPORTED       (-25324)
+/* Invalid or unsupported logical block size. */
+/* define VERR_ISOFS_UNSUPPORTED_LOGICAL_BLOCK_SIZE  (-25325)
+/* Unsupported domain ID in logical volume descriptor. */
+/* define VERR_ISOFS_BAD_LVD_DOMAIN_ID       (-25326)
+/* Malformed or invalid file set descriptor location. */
/** @} */
/** @} */
@enddoc

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/fs.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/fs.h
@@ -0,0 +1,641 @@
+/** @file
+ * IPRT - Filesystem.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef ___iprt_fs_h
+ define ___iprt_fs_h
+
+ include <iprt/cdefs.h>
+ include <iprt/types.h>
+ include <iprt/time.h>
+
+ RT_C_DECLS_BEGIN
+
+ RT_C_DECLS_END

---
@ingroup grp_rt
+
+ @ {
+ */
+
+ /** @name Filesystem Object Mode Flags.
+ *
+ * There are two sets of flags: the unix mode flags and the dos attributes.
+ *
+ * APIs returning mode flags will provide both sets.
+ *
+ * When specifying mode flags to any API at least one of them must be given. If
+ * one set is missing the API will synthesize it from the one given if it
+ * requires it.
+ *
+ * Both sets match their x86 ABIs, the DOS/NT one is simply shifted up 16 bits.
+ * The DOS/NT range is bits 16 to 31 inclusively. The Unix range is bits 0 to 15
+ * (inclusively).
+ *
+ * @remarks These constants have been committed to a binary format and must not
+ * be changed in any incompatible ways.
+ *
+ * @ { /*
+ */
+
+ /** Set user id on execution (S_ISUID). */
+#define RTFS_UNIX_ISUID 0004000U
+ /** Set group id on execution (S_ISGID). */
+#define RTFS_UNIX_ISGID 0002000U
+ /** Sticky bit (S_ISVTX / S_ISTXT). */
+#define RTFS_UNIX_ISTXT 0001000U
+
+ /** Owner RWX mask (S_IRWXU). */
+#define RTFS_UNIX_IRWXU 0000700U
+ /** Owner readable (S_IRUSR). */
+#define RTFS_UNIX_IRUSR 0000400U
+ /** Owner writable (S_IWUSR). */
+#define RTFS_UNIX_IWUSR 0000200U
+ /** Owner executable (S_IXUSR). */
+#define RTFS_UNIX_IXUSR 0000100U
+
+ /** Group RWX mask (S_IRWXG). */
+#define RTFS_UNIX_IRWXG 0000070U
+ /** Group readable (S_IRGRP). */
+#define RTFS_UNIX_IRGRP 0000040U
+ /** Group writable (S_IWGRP). */
+#define RTFS_UNIX_IWGRP 0000020U
+ /** Group executable (S_IXGRP). */
+\#define RTFS_UNIX_IXGRP              0000010U
+
+/** Other RWX mask (S_IRWXO). */
+\#define RTFS_UNIX_IRWXO             0000007U
+/** Other readable (S_IROTH). */
+\#define RTFS_UNIX_IROTH             0000004U
+/** Other writable (S_IWOTH). */
+\#define RTFS_UNIX_IWOTH             0000002U
+/** Other executable (S_IXOTH). */
+\#define RTFS_UNIX_IXOTH             0000001U
+
+/** All UNIX access permission bits (0777). */
+\#define RTFS_UNIX_ALL_ACCESS_PERMS  0000777U
+/** All UNIX permission bits, including set id and sticky bits. */
+\#define RTFS_UNIX_ALL_PERMS         0007777U
+
+/** Named pipe (fifo) (S_IFIFO). */
+\#define RTFS_TYPE_FIFO              0010000U
+/** Character device (S_IFCHR). */
+\#define RTFS_TYPE_DEV_CHAR          0020000U
+/** Directory (S_IFDIR). */
+\#define RTFS_TYPE_DIRECTORY         0040000U
+/** Block device (S_IFBLK). */
+\#define RTFS_TYPE_DEV_BLOCK         0060000U
+/** Regular file (S_IFREG). */
+\#define RTFS_TYPE_FILE              0100000U
+/** Symbolic link (S_IFLNK). */
+\#define RTFS_TYPE_SYMLINK           0120000U
+/** Socket (S_IFSOCK). */
+\#define RTFS_TYPE_SOCKET            0140000U
+/** Whiteout (S_IFWHT). */
+\#define RTFS_TYPE_WHITEOUT          0160000U
+/** Type mask (S_IFMT). */
+\#define RTFS_TYPE_MASK              0170000U
+/** The shift count to convert between RTFS_TYPE_MASK and DIRENTRYTYPE. */
+\#define RTFS_TYPE_DIRENTRYTYPE_SHIFT 12
+
+/** Unix attribute mask. */
+\#define RTFS_UNIX_MASK              0xffffU
+/** The mask of all the NT, OS/2 and DOS attributes. */
+\#define RTFS_DOS_MASK               (0x7fffU << RTFS_DOS_SHIFT)
+
+/** The shift value. */
+\#define RTFS_DOS_SHIFT             16
+/** The mask of the OS/2 and DOS attributes. */
+\#define RTFS_DOS_MASK_OS2           (0x003fU << RTFS_DOS_SHIFT)
+/** The mask of the NT attributes. */
+\#define RTFS_DOS_MASK_NT            (0x7fffU << RTFS_DOS_SHIFT)
/** Readonly object. */
#define RTFS_DOS_READONLY (0x0001U << RTFS_DOS_SHIFT)
/** Hidden object. */
#define RTFS_DOS_HIDDEN (0x0002U << RTFS_DOS_SHIFT)
/** System object. */
#define RTFS_DOS_SYSTEM (0x0004U << RTFS_DOS_SHIFT)
/** Directory. */
#define RTFS_DOS_DIRECTORY (0x0010U << RTFS_DOS_SHIFT)
/** Archived object. */
#define RTFS_DOS_ARCHIVED (0x0020U << RTFS_DOS_SHIFT)
/** Undocumented / Reserved, used to be the FAT volume label. */
#define RTFS_DOS_NT DEVICE (0x0040U << RTFS_DOS_SHIFT)
/** Normal object, no other attribute set (NT). */
#define RTFS_DOS_NT_NORMAL (0x0080U << RTFS_DOS_SHIFT)
/** Temporary object (NT). */
#define RTFS_DOS_NT_TEMPORARY (0x0100U << RTFS_DOS_SHIFT)
/** Sparse file (NT). */
#define RTFS_DOS_NT_SPARSE_FILE (0x0200U << RTFS_DOS_SHIFT)
/** Reparse point (NT). */
#define RTFS_DOS_NT_REPARSE_POINT (0x0400U << RTFS_DOS_SHIFT)
/** Compressed object (NT). */
#define RTFS_DOS_NT_COMPRESSED (0x0800U << RTFS_DOS_SHIFT)
/** Physically offline data (NT). */
#define RTFS_DOS_NT_OFFLINE (0x1000U << RTFS_DOS_SHIFT)
/** Not content indexed by the content indexing service (NT). */
#define RTFS_DOS_NT_NOT_CONTENT_INDEXED (0x2000U << RTFS_DOS_SHIFT)
/** Encrypted object (NT). */
#define RTFS_DOS_NT_ENCRYPTED (0x4000U << RTFS_DOS_SHIFT)

/** @} */

/** @} */

/** Filesystem Object Type Predicates. */
/** @} */

/** Checks the mode flags indicate a named pipe (fifo) (S_ISFIFO). */
#define RTFS_IS_FIFO(fMode) (( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_FIFO )
/** Checks the mode flags indicate a character device (S_ISCHR). */
#define RTFS_IS_DEV_CHAR(fMode) (( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_DEV_CHAR )
/** Checks the mode flags indicate a directory (S_ISDIR). */
#define RTFS_IS_DIRECTORY(fMode) (( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_DIRECTORY )
/** Checks the mode flags indicate a block device (S_ISBLK). */
#define RTFS_IS_DEV BLOCK(fMode) (( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_DEV_BLOCK )
+/** Checks the mode flags indicate a regular file (S_ISREG). */
+#define RTFS_IS_FILE(fMode)         ( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_FILE )
+/** Checks the mode flags indicate a symbolic link (S_ISLNK). */
+#define RTFS_IS_SYMLINK(fMode)      ( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_SYMLINK )
+/** Checks the mode flags indicate a socket (S_ISSOCK). */
+#define RTFS_IS_SOCKET(fMode)       ( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_SOCKET )
+/** Checks the mode flags indicate a whiteout (S_ISWHT). */
+#define RTFS_IS_WHITEOUT(fMode)     ( ((fMode) & RTFS_TYPE_MASK) == RTFS_TYPE_WHITEOUT )
+/** @} */
+
+
+/**
 * @name Filesystem type IDs returned by RTFsQueryType.
 * 
 * This enum is subject to changes and must not be used as part of any ABI or
 * binary format (file, network, etc).
 * 
 * @remark When adding new entries, please update RTFsTypeName(). Also, try
 * add them to the most natural group.
 */
+typedef enum RTFSTYPE
+{
+    /** Unknown file system. */
+    RTFSTYPE_UNKNOWN = 0,
+    
+    /** Universal Disk Format. */
+    RTFSTYPE_UDF,
+    /** ISO 9660, aka Compact Disc File System (CDFS). */
+    RTFSTYPE_ISO9660,
+    /** Filesystem in Userspace. */
+    RTFSTYPE_FUSE,
+    /** VirtualBox shared folders. */
+    RTFSTYPE_VBOXSHF,
+    
+    /** Linux: */
+    RTFSTYPE_EXT,
+    RTFSTYPE_EXT2,
+    RTFSTYPE_EXT3,
+    RTFSTYPE_EXT4,
+    RTFSTYPE_XFS,
+    RTFSTYPE_CIFS,
+    RTFSTYPE_SMBFS,
+    RTFSTYPE_TMPFS,
+    RTFSTYPE_SYSFS,
+    RTFSTYPE_PROC,
+    RTFSTYPE_OCFS2,
+    RTFSTYPE_BTRFS,
+}
/* Windows: */
+ /* New Technology File System. */
+ RTFSTYPE_NTFS,
+ /* FAT12, FAT16 and FAT32 lumped into one basket.
+ * The partition size limit of FAT12 and FAT16 will be the factor
+ * limiting the file size (except, perhaps for the 64KB cluster case on
+ * non-Windows hosts). */
+ RTFSTYPE_FAT,
+ /* Extended File Allocation Table, main target are flash drives. */
+ RTFSTYPE_EXFAT,
+
+ /* Solaris: */
+ /* Zettabyte File System. */
+ RTFSTYPE_ZFS,
+ /* Unix File System. */
+ RTFSTYPE_UFS,
+ /* Network File System. */
+ RTFSTYPE_NFS,
+
+ /* Mac OS X: */
+ /* Hierarchical File System. */
+ RTFSTYPE_HFS,
+ /* @todo RTFSTYPE_HFS_PLUS? */
+ RTFSTYPE_AUTOFS,
+ RTFSTYPE_DEVFS,
+
+ /* *BSD: */
+
+ /* OS/2: */
+ /* High Performance File System. */
+ RTFSTYPE_HPFS,
+ /* Journaled File System (v2). */
+ RTFSTYPE_JFS,
+
+ /* The end of valid Filesystem types IDs. */
+ RTFSTYPE_END,
+ /* The usual 32-bit type blow up. */
+ RTFSTYPE_32BIT_HACK = 0xffffffff
+ } RTFSTYPE;
+/** Pointer to a Filesystem type ID. */
+typedef RTFSTYPE *PRTFSTYPE;
+
+/** The available additional information in a RTFSOBJATTR object.
+ */
+typedef enum RTFSOBJATTRADD
+{
```c
/** No additional information is available / requested. */
RTFSOBJATTRADD_NOTHING = 1,
/** The additional unix attributes (RTFSOBJATTR::u::Unix) are available /
* requested. */
RTFSOBJATTRADD_UNIX,
/** The additional unix attributes (RTFSOBJATTR::u::UnixOwner) are
* available / requested. */
RTFSOBJATTRADD_UNIX_OWNER,
/** The additional unix attributes (RTFSOBJATTR::u::UnixGroup) are
* available / requested. */
RTFSOBJATTRADD_UNIX_GROUP,
/** The additional extended attribute size (RTFSOBJATTR::u::EASize) is available / requested. */
RTFSOBJATTRADD_EASIZE,
/** The last valid item (inclusive).
* The valid range is RTFSOBJATTRADD_NOTHING thru RTFSOBJATTRADD_LAST. */
RTFSOBJATTRADD_LAST = RTFSOBJATTRADD_EASIZE,

/** The usual 32-bit hack. */
RTFSOBJATTRADD_32BIT_SIZE_HACK = 0x7fffffff
}
RTFSOBJATTRADD;

/** The number of bytes reserved for the additional attribute union. */
#define RTFSOBJATTRUNION_MAX_SIZE       128

/** Additional Unix Attributes (RTFSOBJATTRADD_UNIX). */
typedef struct RTFSOBJATTRUNIX
{
    /** The user owning the filesystem object (st_uid).
* This field is NIL_RTUID if not supported. */
    RTUID           uid;

    /** The group the filesystem object is assigned (st_gid).
* This field is NIL_RTGID if not supported. */
    RTGID           gid;

    /** Number of hard links to this filesystem object (st_nlink).
* This field is 1 if the filesystem doesn't support hardlinking or
* the information isn't available. */
    uint32_t        cHardlinks;

    /** The device number of the device which this filesystem object resides on (st_dev).
* This field is 0 if this information is not available. */
    RTDEV           INodeIdDevice;

    /** The unique identifier (within the filesystem) of this filesystem object (st_ino).*/
    } RTFSOBJATTRUNIX;
```
* Together with INodeIdDevice, this field can be used as a OS wide unique id
* when both their values are not 0.
* This field is 0 if the information is not available.
* 
* @remarks The special ‘.’ dir always shows up with 0 on NTFS/Windows. */

RTINODE INodeId;

/** User flags (st_flags).
* This field is 0 if this information is not available. */

uint32_t fFlags;

/** The current generation number (st_gen).
* This field is 0 if this information is not available. */

uint32_t GenerationId;

/** The device number of a character or block device type object (st_rdev).
* This field is 0 if the file isn't of a character or block device type and
* when the OS doesn't subscribe to the major+minor device identification scheme. */

RTDEV Device;

} RTFSOBJATTRUNIX;

* Additional Unix Attributes (RTFSOBJATTRADD_UNIX_OWNER).
* 
* @remarks This interface is mainly for TAR.

+ **
+ typedef struct RTFSOBJATTRUNIXOWNER {
+ 
+ /** The user owning the filesystem object (st_uid).
+ * This field is NIL_UID if not supported. */
+ 
+ RTUID uid;
+ 
+ /** The user name.
+ * Empty if not available or not supported, truncated if too long. */
+ 
+ char szName[RTFSOBJATTRUNION_MAX_SIZE - sizeof(RTUID)];
+ 
+ } RTFSOBJATTRUNIXOWNER;
+ 
+
+ **
+ * Additional Unix Attributes (RTFSOBJATTRADD_UNIX_GROUP).
+ * 
+ * @remarks This interface is mainly for TAR.
+ 
+ */
+
+ typedef struct RTFSOBJATTRUNIXGROUP {
+ 
+ /** The user owning the filesystem object (st_uid).
+ * This field is NIL_GID if not supported. */
+ 
+ RTGID gid;
+ /* The group name.
+ * Empty if not available or not supported, truncated if too long. */
+ char   szName[RTFSOBJATTRUNION_MAX_SIZE - sizeof(RTGID)];
+ } RTFSOBJATTRUNIONGROUP;
+
+
+/**
+ * Filesystem object attributes.
+ */
typedef struct RTFSOBJATTR
+
+ /* Mode flags (st_mode). RTFS_UNIX_*, RTFS_TYPE_*, and RTFS_DOS_*. */
+ RTFMODE   fMode;
+
+ /* The additional attributes available. */
+ RTFSOBJATTRADD   enmAdditional;
+
+ /*
+ * Additional attributes.
+ *
+ * Unless explicitly specified to an API, the API can provide additional
+ * data as it is provided by the underlying OS.
+ */
+ union RTFSOBJATTRUNION
+
+ { /* Additional Unix Attributes - RTFSOBJATTRADD_UNIX. */
+   RTFSOBJATTRUNIX   Unix;
+   /* Additional Unix Owner Attributes - RTFSOBJATTRADD_UNIX_OWNER. */
+   RTFSOBJATTRUNIXOWNER   UnixOwner;
+   /* Additional Unix Group Attributes - RTFSOBJATTRADD_UNIX_GROUP. */
+   RTFSOBJATTRUNIXGROUP   UnixGroup;
+   /*
+   * Extended attribute size is available when RTFS_DOS_HAVE_EA_SIZE is set.
+   */
+   struct RTFSOBJATTREASIZE
+   { /* Size of EAs. */
+     RTOFF   cb;
+   } EASize;
+   /* Reserved space. */
+   uint8_t   abReserveSpace[128];
+ } u;
+ } RTFSOBJATTR;
+/** Pointer to a filesystem object attributes structure. */
typedef RTFSOBJATTR *PRTFSOBJATTR;
+/** Pointer to a const filesystem object attributes structure. */
typedef const RTFSOBJATTR *PCRTFSOBJATTR;
/**
 * Filesystem object information structure.
 * This is returned by the RTPathQueryInfo(), RTFileQueryInfo() and RTDirRead() APIs.
 */
typedef struct RTFSOBJINFO
{
   /** Logical size (st_size).
    * For normal files this is the size of the file.
    * For symbolic links, this is the length of the path name contained
    * in the symbolic link.
    * For other objects this fields needs to be specified.
    */
   RTFOFF       cbObject;

   /** Disk allocation size (st_blocks * DEV_BSIZE). */
   RTFOFF       cbAllocated;

   /** Time of last access (st_atime). */
   RTTIMESPEC   AccessTime;

   /** Time of last data modification (st_mtime). */
   RTTIMESPEC   ModificationTime;

   /** Time of last status change (st_ctime).
    * If not available this is set to ModificationTime.
    */
   RTTIMESPEC   ChangeTime;

   /** Time of file birth (st_birthtime).
    * If not available this is set to ChangeTime.
    */
   RTTIMESPEC   BirthTime;

   /** Attributes. */
   RTFSOBJATTR  Attr;
} RTFSOBJINFO;

/** Pointer to a filesystem object information structure. */
typedef RTFSOBJINFO *PRTFSOBJINFO;

/** Pointer to a const filesystem object information structure. */
typedef const RTFSOBJINFO *PCRTFSOBJINFO;
+/**
+ * Query the sizes of a filesystem.
+ *
+ * @returns IPRT status code.
+ * @param   pszFsPath       Path within the mounted filesystem.
+ * @param   pcbTotal        Where to store the total filesystem space. (Optional)
+ * @param   pcbFree         Where to store the remaining free space in the filesystem. (Optional)
+ * @param   pcbBlock        Where to store the block size. (Optional)
+ * @param   pcbSector       Where to store the sector size. (Optional)
+ *
+ * @sa      RTFileQueryFsSizes
+ */
+RTR3DECL(int) RTFsQuerySizes(const char *pszFsPath, PRTFOFF pcbTotal, RTFOFF *pcbFree,
+                               uint32_t *pcbBlock, uint32_t *pcbSector);
+
+/**
+ * Query the mountpoint of a filesystem.
+ *
+ * @returns IPRT status code.
+ * @returns VERR_BUFFER_OVERFLOW if cbMountpoint isn't enough.
+ * @param   pszFsPath       Path within the mounted filesystem.
+ * @param   pszMountpoint   Where to store the mountpoint path.
+ * @param   cbMountpoint    Size of the buffer pointed to by pszMountpoint.
+ */
+RTR3DECL(int) RTFsQueryMountpoint(const char *pszFsPath, char *pszMountpoint, size_t cbMountpoint);
+
+/**
+ * Query the label of a filesystem.
+ *
+ * @returns IPRT status code.
+ * @returns VERR_BUFFER_OVERFLOW if cbLabel isn't enough.
+ * @param   pszFsPath       Path within the mounted filesystem.
+ * @param   pszLabel        Where to store the label.
+ * @param   cbLabel         Size of the buffer pointed to by pszLabel.
+ */
+RTR3DECL(int) RTFsQueryLabel(const char *pszFsPath, char *pszLabel, size_t cbLabel);
+
+/**
+ * Query the serial number of a filesystem.
+ *
+ * @returns IPRT status code.
+ * @param   pszFsPath       Path within the mounted filesystem.
+ * @param   pu32Serial      Where to store the serial number.
+ */
+RTR3DECL(int) RTFsQuerySerial(const char *pszFsPath, uint32_t *pu32Serial);
+
+/**
+ * Query the name of the filesystem driver.
+ */
+ * @returns iprt status code.
+ * @returns VERR_BUFFER_OVERFLOW if cbFsDriver isn't enough.
+ * @param   pszFsPath       Path within the mounted filesystem.
+ * @param   pszFsDriver     Where to store the filesystem driver name.
+ * @param   cbFsDriver      Size of the buffer pointed to by pszFsDriver.
+ */
+RTR3DECL(int) RTFsQueryDriver(const char *pszFsPath, char *pszFsDriver, size_t cbFsDriver);
+
+/**
+ * Query the name of the filesystem the file is located on.
+ *
+ * @returns iprt status code.
+ * @param   pszFsPath       Path within the mounted filesystem. It must exist.
+ *                          In case this is a symlink, the file it refers to is
+ *                          evaluated.
+ * @param   penmType        Where to store the filesystem type, this is always
+ *                          set. See RTFSTYPE for the values.
+ */
+RTR3DECL(int) RTFsQueryType(const char *pszFsPath, PRTFSTYPE penmType);
+
+#endif /* IN_RING3 */
+
+/**
+ * Gets the name of a filesystem type.
+ *
+ * @returns Pointer to a read-only string containing the name.
+ * @param   enmType         A valid filesystem ID. If outside the valid range,
+ *                          the returned string will be pointing to a static
+ *                          memory buffer which will be changed on subsequent
+ *                          calls to this function by any thread.
+ */
+RTDECL(const char *) RTFsTypeName(RTFSTYPE enmType);
+
+/**
+ * Filesystem properties.
+ */
+typedef struct RTFSPROPERTIES
+{
+    /** The maximum size of a filesystem object name.
+     * This does not include the '\0'. */
+    uint32_t cbMaxComponent;
+    bool    fRemote;
+    bool    fCaseSensitive;
+}
+ * False if the filesystem is case insensitive. */
+ bool fCaseSensitive;
+
+ /**< True if the filesystem is mounted read only.
+ * False if the filesystem is mounted read write. */
+ bool fReadOnly;
+
+ /**< True if the filesystem can encode unicode object names.
+ * False if it can't. */
+ bool fSupportsUnicode;
+
+ /**< True if the filesystem is compresses.
+ * False if it isn't or we don't know. */
+ bool fCompressed;
+
+ /**< True if the filesystem compresses of individual files.
+ * False if it doesn't or we don't know. */
+ bool fFileCompression;
+
+ /**< @todo more? */
+
+} RTFSPROPERTIES;

+/** Pointer to a filesystem properties structure. */
+typedef RTFSPROPERTIES *PRTFSPROPERTIES;
+/** Pointer to a const filesystem properties structure. */
+typedef RTFSPROPERTIES const *PCRTFSPROPERTIES;
+
+#ifdef IN_RING3
+
+/**
+ * Query the properties of a mounted filesystem.
+ *
+ * @returns iprt status code.
+ * @param   pszFsPath       Path within the mounted filesystem.
+ * @param   pProperties     Where to store the properties.
+ */
+RTR3DECL(int) RTFsQueryProperties(const char *pszFsPath, PRTFSPROPERTIES pProperties);
+
+/**
+ * Checks if the given volume is case sensitive or not.
+ *
+ * This may be misleading in some cases as we lack the necessary APIs to query
+ * the information on some system (or choose not to use them) and are instead
+ * returning the general position on case sensitive file name of the system.
+ *
+ * @returns @c true if case sensitive, @c false if not.
+ * @param   pszFsPath       Path within the mounted file system.
+ */
+RTR3DECL(bool) RTFsIsCaseSensitive(const char *pszFsPath);
/** Mountpoint enumerator callback.
 * @returns iprt status code. Failure terminates the enumeration.
 * @param pszMountpoint The mountpoint name.
 * @param pvUser The user argument.
 */
typedef DECLCALLBACK(int) FNRTFSMOUNTPOINTENUM(const char *pszMountpoint, void *pvUser);
/** Pointer to a FNRTFSMOUNTPOINTENUM(). */
typedef FNRTFSMOUNTPOINTENUM *PFNRTFSMOUNTPOINTENUM;

/** Enumerate mount points.
 * @returns iprt status code.
 * @param pfnCallback The callback function.
 * @param pvUser The user argument to the callback.
 */
RTR3DECL(int) RTFsMountpointsEnum(PFNRTFSMOUNTPOINTENUM pfnCallback, void *pvUser);

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/latin1.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/latin1.h
@@ -0,0 +1,392 @@
+/** @file
+ * IPRT - String Manipulation, Latin-1 (ISO-8859-1) encoding.
+ */
+/
+--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/latin1.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/latin1.h
@@ -0,0 +1,392 @@
+/** @file
+ * IPRT - String Manipulation, Latin-1 (ISO-8859-1) encoding.
+ */
+/

+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+/
+ /*
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
#ifndef ___iprt_latin1_h
#define ___iprt_latin1_h

#include <iprt/string.h>

RT_C_DECLS_BEGIN

/** @defgroup rt_str_latin1     Latin-1 (ISO-8859-1) String Manipulation
 * @ingroup grp_rt_str
 *
 * Deals with Latin-1 encoded strings.
 *
 * @warning Make sure to name all variables dealing with Latin-1 strings
 * such that there is no way to mistake them for normal UTF-8 strings.
 * There may be severe security issues resulting from mistaking Latin-1
 * for UTF-8!
 *
 * @*/

/**
 * Get the unicode code point at the given string position.
 *
 * @returns unicode code point.
 * @returns RTUNICP_INVALID if the encoding is invalid.
 * @param   pszLatin1   The Latin-1 string.
 */
DECLINLINE(RTUNICP) RTLatin1GetCp(const char *pszLatin1) {
    return *(const unsigned char *)pszLatin1;
}

/**
 * Get the unicode code point at the given string position.
 *
 * @returns iprt status code.
 * @param   ppszLatin1  Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point. This
+ * is advanced one character forward on failure.
+ * @param   pCp Where to store the code point. RTUNICP_INVALID is stored
+ * here on failure.
+ */
+DECLINLINE(int) RTLatin1GetCpEx(const char **ppszLatin1, PRTUNICP pCp)
+{
+    const unsigned char uch = **(const unsigned char **)ppszLatin1;
+    (*ppszLatin1)++;
+    *pCp = uch;
+    return VINF_SUCCESS;
+
+    }/*
+ * Get the unicode code point at the given string position for a string of a
+ * given maximum length.
+ *
+ * @returns iprt status code.
+ * @retval  VERR_END_OF_STRING if *pcch is 0. *pCp is set to RTUNICP_INVALID.
+ * @param   ppszLatin1 Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point.
+ * @param   pcchLatin1 Pointer to the maximum string length. This will be
+ * decremented by the size of the code point found.
+ * @param   pCp Where to store the code point.
+ * RTUNICP_INVALID is stored here on failure.
+ */
+DECLINLINE(int) RTLatin1GetCpNEx(const char **ppszLatin1, size_t *pcchLatin1, PRTUNICP pCp)
+{
+    if (RT_LIKELY(*pcchLatin1 != 0))
+    {
+        const unsigned char uch = **(const unsigned char **)ppszLatin1;
+        (*ppszLatin1)++;
+        (*pcchLatin1)--;
+        *pCp = uch;
+        return VINF_SUCCESS;
+    }
+    *pCp = RTUNICP_INVALID;
+    return VERR_END_OF_STRING;
+
+}/*
+ * Get the Latin-1 size in characters of a given Unicode code point.
+ *
+ * The code point is expected to be a valid Unicode one, but not necessarily in
+ * the range supported by Latin-1.
+ *
+ * @returns the size in characters, or zero if there is no Latin-1 encoding
DECLINLINE(size_t) RTLatin1CpSize(RTUNICP CodePoint)
{
    if (CodePoint < 0x100)
        return 1;
    return 0;
}

DECLINLINE(char *) RTLatin1PutCp(char *pszLatin1, RTUNICP CodePoint)
{
    AssertReturn(CodePoint < 0x100, NULL);
    *pszLatin1++ = (unsigned char)CodePoint;
    return pszLatin1;
}

DECLINLINE(char *) RTLatin1NextCp(const char *pszLatin1)
{
    pszLatin1++;  
    return (char *)pszLatin1;
}

DECLINLINE(char *) RTLatin1PrevCp(const char *pszLatin1, const char *pszLatin1Start)
{
    pszLatin1--;  
    return (char *)pszLatin1;
}
+ * @param   pszLatin1   Pointer to the current code point.
+ */
+DECLINLINE(char *) RTLatin1PrevCp(const char *pszLatin1Start, const char *pszLatin1)
+{
+    if ((uintptr_t)pszLatin1 > (uintptr_t)pszLatin1Start)
+    {
+        pszLatin1--;  
+        return (char *)pszLatin1;
+    }
+    return (char *)pszLatin1Start;
+}
+
+/**
+ * Translate a Latin1 string into a UTF-8 allocating the result buffer (default
+ * tag).
+ */
+@returns iprt status code.
+@param   pszLatin1   Latin1 string to convert.
+@param   ppszString   Receives pointer of allocated UTF-8 string on
+                      success, and is always set to NULL on failure.
+ */
+ The returned pointer must be freed using RTStrFree().
+*/
+#define RTLatin1ToUtf8(pszLatin1, ppszString)       RTLatin1ToUtf8Tag((pszLatin1), (ppszString), RTSTR_TAG)
+
+/**
+ * Translates Latin-1 to UTF-8 using buffer provided by the caller or a fittingly
+ * sized buffer allocated by the function (default tag).
+ */
+@returns iprt status code.
+@param   pszLatin1   The Latin-1 string to convert.
+@param   cchLatin1   The number of Latin-1 characters to translate from
+                    pszLatin1. The translation will stop when reaching
+                    cchLatin1 or the terminator (\0'). Use RTSTR_MAX
+                    to translate the entire string.
+@param   ppsz        If @a cch is non-zero, this must either be pointing
#def RTLatin1ToUtf8Ex(pszLatin1, cchLatin1, ppsz, cch, pcch) \ 
RLatin1ToUtf8ExTag((pszLatin1), (cchLatin1), (ppsz), (cch), (pcch), RTSTR_TAG) 
+
+* Translates Latin1 to UTF-8 using buffer provided by the caller or a fittingly 
+* sized buffer allocated by the function (custom tag).
+* +* @returns iprt status code.
+* +* @param   pszLatin1       The Latin1 string to convert.
+* +* @param   cchLatin1       The number of Latin1 characters to translate from 
+* +*   pwszString. The translation will stop when 
+* +*   reaching cchLatin1 or the terminator ('\0'). Use 
+* +*   RTSTR_MAX to translate the entire string.
+* +* @param   ppsz            If cch is non-zero, this must either be pointing to 
+* +*   a pointer to a buffer of the specified size, or 
+* +*   pointer to a NULL pointer. If *ppsz is NULL or cch 
+* +*   is zero a buffer of at least cch chars will be 
+* +*   allocated to hold the translated string. If a 
+* +*   buffer was requested it must be freed using 
+* +*   RTStrFree().
+* +* @param   cch             The buffer size in chars (the type). This includes 
+* +*   the terminator.
+* +* @param   pcch            Where to store the length of the translated string, 
+* +*   excluding the terminator. (Optional)
+* +* +* This may be set under some error conditions, 
+* +*   however, only for VERR_BUFFER_OVERFLOW and 
+* +*   VERR_NO_STR_MEMORY will it contain a valid string 
+* +*   length that can be used to resize the buffer.
+* +* @param   pszTag          Allocation tag used for statistics and such.
+* +* +*/
+RTDECL(int) RTLatin1ToUtf8ExTag(const char *pszLatin1, size_t cchLatin1, char **ppsz, size_t cch, size_t *pcch,
const char *pszTag);

/**
 * Calculates the length of the Latin-1 string in UTF-8 chars (bytes).
 *
 * The primary purpose of this function is to help allocate buffers for
 * RTLatin1ToUtf8() of the correct size. For most other purposes
 * RTLatin1ToUtf8Ex() should be used.
 *
 * @returns Number of chars (bytes).
 * @returns 0 if the string was incorrectly encoded.
 * @param pszLatin1 The Latin-1 string.
 */
+RTDECL(size_t) RTLatin1CalcUtf8Len(const char *pszLatin1);

/**
 * Calculates the length of the Latin-1 string in UTF-8 chars (bytes).
 *
 * @returns iprt status code.
 * @param pszLatin1 The Latin-1 string.
 * @param cchLatin1 The max string length. Use RTSTR_MAX to process the
 * entire string.
 * @param pcch Where to store the string length (in bytes). Optional.
 * This is undefined on failure.
 */
+RTDECL(int) RTLatin1CalcUtf8LenEx(const char *pszLatin1, size_t cchLatin1, size_t *pcch);

/**
 * Calculates the length of the Latin-1 (ISO-8859-1) string in RTUTF16 items.
 *
 * @returns Number of RTUTF16 items.
 * @param pszLatin1 The Latin-1 string.
 */
+RTDECL(size_t) RTLatin1CalcUtf16Len(const char *pszLatin1);

/**
 * Calculates the length of the Latin-1 (ISO-8859-1) string in RTUTF16 items.
 *
 * @returns iprt status code.
 * @param pszLatin1 The Latin-1 string.
 * @param cchLatin1 The max string length. Use RTSTR_MAX to process the
 * entire string.
 * @param pcwc Where to store the string length. Optional.
 * This is undefined on failure.
 */
+RTDECL(int) RTLatin1CalcUtf16LenEx(const char *pszLatin1, size_t cchLatin1, size_t *pcwc);
Translate a Latin-1 (ISO-8859-1) string into a UTF-16 allocating the result

@returns iprt status code.

@param pszLatin1 The Latin-1 string to convert.

@returns pointer to the allocated UTF-16 string. The returned string must be freed using RTUtf16Free().

*/
#define RTLatin1ToUtf16(pszLatin1, ppwszString) RTLatin1ToUtf16Tag((pszLatin1), (ppwszString), RTSTR_TAG)

Translate a Latin-1 (ISO-8859-1) string into a UTF-16 allocating the result

@returns iprt status code.

@returns pointer to the allocated UTF-16 string. The returned string must be freed using RTUtf16Free().

@returns Allocation tag used for statistics and such.

*/
RTDECL(int) RTLatin1ToUtf16Tag(const char *pszLatin1, PRTUTF16 *ppwszString, const char *pszTag);

Translates pszLatin1 from Latin-1 (ISO-8859-1) to UTF-16, allocating the result buffer if requested (default tag).

@returns iprt status code.

@returns The Latin-1 string to convert.

The maximum size in chars (the type) to convert. The conversion stops when it reaches cchLatin1 or the string terminator (\0). Use RTSTR_MAX to translate the entire string.

If cwc is non-zero, this must either be pointing to pointer to a buffer of the specified size, or pointer to a NULL pointer.

If *ppwsz is NULL or cwc is zero a buffer of at least cwc items will be allocated to hold the translated string. If a buffer was requested it must be freed using RTUtf16Free().

The buffer size in RTUTF16s. This includes the terminator.

Where to store the length of the translated string, excluding the terminator. (Optional)

This may be set under some error conditions, however, only for VERR_BUFFER_OVERFLOW and VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ */
+#define RTLatin1ToUtf16Ex(pszLatin1, cchLatin1, ppwsz, cwc, pcwc) \
+ RTLatin1ToUtf16ExTag((pszLatin1), (cchLatin1), (ppwsz), (cwc), (pcwc), RTSTR_TAG)
+
+ /**
+ * Translates pszLatin1 from Latin-1 (ISO-8859-1) to UTF-16, allocating the
+ * result buffer if requested.
+ *
+ @returns iprt status code.
+ @param pszLatin1 The Latin-1 string to convert.
+ @param cchLatin1 The maximum size in chars (the type) to convert. The
+ conversion stops when it reaches cchLatin1 or the
+ string terminator ('\0'). Use RTSTR_MAX to
+ translate the entire string.
+ @param ppwsz If cwc is non-zero, this must either be pointing
+ to pointer to a buffer of the specified size, or
+ pointer to a NULL pointer.
+ @param cwc If *ppwsz is NULL or cwc is zero a buffer of at
+ least cwc items will be allocated to hold the
+ translated string. If a buffer was requested it
+ must be freed using RTUtf16Free().
+ @param pcwc Where to store the length of the translated string,
+ excluding the terminator. (Optional)
+ @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTLatin1ToUtf16ExTag(const char *pszLatin1, size_t cchLatin1,
                                 PRTUTF16 *ppwsz, size_t cwc, size_t *pcwc, const char *pszTag);
+
+RT_C_DECLS_END
+
+/** @} */
+
+/** @} */

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/log.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/log.h
@@ -0,0 +1,2568 @@

/** @file
+ * IPRT - Logging.
+ */
+
+/
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef ___iprt_log_h
+ define ___iprt_log_h
+
+ include <iprt/cdefs.h>
+ include <iprt/types.h>
+ include <iprt/stdarg.h>
+
+RT_C_DECLS_BEGIN
+
+/** @defgroup grp_rt_log    RTLog - Logging
+ * @ingroup grp_rt
+ */
+@
+ /*
+
+ /** @defgroup grp_rt_log    RTLog - Logging
+ * (Remember to update RT_LOGGROUP_NAMES!)
+ */
+ @remark It should be pretty obvious, but just to have
+ * mentioned it, the values are sorted alphabetically (using the
+ * english alphabet) except for _DEFAULT which is always first.
+ *
+ If anyone might be wondering what the alphabet looks like:
+ * a b c d e f g h i j k l m n o p q r s t u v w x y z
typedef enum RTLOGGROUP
{
    /** Default logging group. */
    RTLOGGROUP_DEFAULT,
    RTLOGGROUP_CRYPTO,
    RTLOGGROUP_DBG,
    RTLOGGROUP_DBG_DWARF,
    RTLOGGROUP_DIR,
    RTLOGGROUP_FILE,
    RTLOGGROUP_FS,
    RTLOGGROUP_HTTP,
    RTLOGGROUP_LDR,
    RTLOGGROUP_PATH,
    RTLOGGROUP_PROCESS,
    RTLOGGROUP_SYMLINK,
    RTLOGGROUP_THREAD,
    RTLOGGROUP_TIME,
    RTLOGGROUP_TIMER,
    RTLOGGROUP_LOCALIPC,
    RTLOGGROUP_VFS,
    RTLOGGROUP_ZIP = 31,
    RTLOGGROUP_FIRST_USER = 32
} RTLOGGROUP;

/** @def RT_LOGGROUP_NAMES
 * IPRT Logging group names.
 *
 * @remark It should be pretty obvious, but just to have
 *         mentioned it, the values are sorted alphabetically (using the
 *         english alphabet) except for _DEFAULT which is always first.
 *
 *         If anyone might be wondering what the alphabet looks like:
 *         a b c d e f g h i j k l m n o p q r s t u v w x y z
 */
#define RT_LOGGROUP_NAMES
    "DEFAULT",
    "RT_CRYPTO",
    "RT_DBG",
    "RT_DBG_DWARF",
    "RT_DIR",
    "RT_FILE",
    "RT_FS",
    "RT_HTTP",
    "RT_LDR",
    "RT_LOGGROUP_NAMES"
+ "RT_PATH", \
+ "RT_PROCESS", \
+ "RT_SYMLINK", \
+ "RT_THREAD", \
+ "RT_TIME", \
+ "RT_TIMER", \
+ "RT_LOCALIPC", \
+ "RT_VFS", \
+ "RT_17", \
+ "RT_18", \
+ "RT_19", \
+ "RT_20", \
+ "RT_21", \
+ "RT_22", \
+ "RT_23", \
+ "RT_24", \
+ "RT_25", \
+ "RT_26", \
+ "RT_27", \
+ "RT_28", \
+ "RT_29", \
+ "RT_30", \
+ "RT_ZIP" \n+
+
+/** @def LOG_GROUP
+ * Active logging group.
+ */
+#ifdef LOG_GROUP
+# define LOG_GROUP RTLOGGROUP_DEFAULT
+#endif
+
+/** @def LOG_FN_FMT
+ * You can use this to specify you desired way of printing __PRETTY_FUNCTION__
+ * if you dislike the default one.
+ */
+#ifdef LOG_FN_FMT
+# define LOG_FN_FMT "%Rfn"
+#endif
+
+/** Logger structure. */
+ifdef IN_RC
+typedef struct RTLOGGERRC RTLOGGER;
+else
+typedef struct RTLOGGER RTLOGGER;
+endif
+/** Pointer to logger structure. */
+typedef RTLOGGER *PRTLOGGER;
+/** Pointer to const logger structure. */
+typedef const RTLOGGER *PCRTLOGGER;
+
+/** Guest context logger structure. */
+typedef struct RTLOGGERRC RTLOGGERRC;
+/** Pointer to guest context logger structure. */
+typedef RTLOGGERRC *PRTLOGGERRC;
+/** Pointer to const guest context logger structure. */
+typedef const RTLOGGERRC *PCRTLOGGERRC;
+
+/**
+ * Logger phase.
+ *
+ * Used for signalling the log header/footer callback what to do.
+ */
+typedef enum RTLOGPHASE
+{
+    /** Begin of the logging. */
+    RTLOGPHASE_BEGIN = 0,
+    /** End of the logging. */
+    RTLOGPHASE_END,
+    /** Before rotating the log file. */
+    RTLOGPHASE_PREROTATE,
+    /** After rotating the log file. */
+    RTLOGPHASE_POSTROTATE,
+    /** 32-bit type blow up hack. */
+    RTLOGPHASE_32BIT_HACK = 0x7fffffff
+} RTLOGPHASE;
+
+/**
+ * Logger function.
+ *
+ * @param   pszFormat   Format string.
+ * @param ...   Optional arguments as specified in the format string.
+ */
+typedef DECLCALLBACK(void) FNRTLOGGER(const char *pszFormat, ...)
+    RT_IPRT_FORMAT_ATTR(1, 2);
+/** Pointer to logger function. */
+typedef FNRTLOGGER *PFNRTLOGGER;
### Flush function.

```c
/**
 * Flush function.
 *
 * @param   pLogger     Pointer to the logger instance which is to be flushed.
 * @endcode
 */
typedef DECLCALLBACK(void) FNRTLOGFLUSH(PRTLOGGER pLogger);
/** Pointer to flush function. */
typedef FNRTLOGFLUSH *PFNRTLOGFLUSH;
```

### Pointer to flush function.

```c
/**
 * Pointer to flush function.
 *
 * @param   pLogger     Pointer to the logger instance which is to be flushed.
 * @endcode
 */
typedef DECLCALLBACK(void) FNRTLOGFLUSHGC(PRTLOGGERRC pLogger);
/** Pointer to logger function. */
typedef RCPTRTYPE(FNRTLOGFLUSHGC *) PFNRTLOGFLUSHGC;
```

### Pointer to logger function.

```c
/**
 * Header/footer message callback.
 *
 * @param   pLogger     Pointer to the logger instance.
 * @param   pszFormat   Format string.
 * @param   ...         Optional arguments specified in the format string.
 * @endcode
 */
typedef DECLCALLBACK(void) FNRTLOGPHASEMSG(PRTLOGGER pLogger, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(2, 3);
/** Pointer to header/footer message callback function. */
typedef FNRTLOGPHASEMSG *PFNRTLOGPHASEMSG;
```

### Pointer to header/footer message callback function.

```c
/**
 * Log file header/footer callback.
 *
 * @param   pLogger         Pointer to the logger instance.
 * @param   enmLogPhase     Indicates at what time the callback is invoked.
 * @param   pfnLogPhaseMsg  Callback for writing the header/footer (RTLogPrintf
 *                          and others are out of bounds).
 * @endcode
 */
typedef DECLCALLBACK(void) FNRTLOGPHASE(PRTLOGGER pLogger, RTLOGPHASE enmLogPhase,
PFNRTLOGPHASEMSG pfnLogPhaseMsg);
/** Pointer to log header/footer callback function. */
typedef FNRTLOGPHASE *PFNRTLOGPHASE;
```

### Pointer to log header/footer callback function.

```c
/**
 * Custom log prefix callback.
 *
 * @endcode
 */
```
/* @returns The number of chars written. */
/* @param  pLogger   Pointer to the logger instance. */
/* @param  pchBuf    Output buffer pointer. */
/* No need to terminate the output. */
/* @param  cchBuf    The size of the output buffer. */
/* @param  pvUser    The user argument. */
*/
typedef DECLCALLBACK(size_t) FNRTLOGPREFIX(PRTLOGGER pLogger, char *pchBuf, size_t cchBuf, void *pvUser);
/** Pointer to prefix callback function. */
typedef FNRTLOGPREFIX *PFNRTLOGPREFIX;

/** RTLOGGERRC::u32Magic value. (John Rogers Searle) */
```c
#define RTLOGGERRC_MAGIC    0x19320731

#ifndef IN_RC
/** Pointer to internal logger bits. */
typedef struct RTLOGGERINTERNAL *PRTLOGGERINTERNAL;
/**
 * Logger instance structure.
 */
struct RTLOGGER
{
    /** Pointer to temporary scratch buffer.
     * This is used to format the log messages. */
    char                    achScratch[49152];
    /** Current scratch buffer position. */
    uint32_t                offScratch;
    /** Magic number. */
    uint32_t                u32Magic;
    /** Logger instance flags - RTLOGFLAGS. */
    uint32_t                fFlags;
    /** Destination flags - RTLOGDEST. */
    uint32_t                fDestFlags;
    /** Pointer to the internal bits of the logger. */
    * (The memory is allocated in the same block as RTLOGGER.) */
    PRTLOGGERINTERNAL       pInt;
    /** Pointer to the logger function (used in non-C99 mode only). */
    *
    * This is actually pointer to a wrapper which will push a pointer to the
    * instance pointer onto the stack before jumping to the real logger function.
    * A very unfortunate hack to work around the missing variadic macro
    * support in older C++/C standards. (The memory is allocated using
    * RTMemExecAlloc(), except for agnostic R0 code.) */
    PFNRTLOGGER             pfnLogger;
    /** Number of groups in the afGroups and papszGroups members. */
    *uint32_t                cGroups;
    /** Group flags array - RTLOGGRPFLAGS. */
    * This member have variable length and may extend way beyond
    * the declared size of 1 entry. */
    *uint32_t                afGroups[1];
};
/**
 * RTLOGGER::u32Magic value. (Avram Noam Chomsky) */
#define RTLOGGER_MAGIC     UINT32_C(0x19281207)
#endif /* !IN_RC */
```
/**
 * Logger flags.
 */

typedef enum RTLOGFLAGS {

    /** The logger instance is disabled for normal output. */
    RTLOGFLAGS_DISABLED             = 0x00000001,

    /** The logger instance is using buffered output. */
    RTLOGFLAGS_BUFFERED             = 0x00000002,

    /** The logger instance expands LF to CR/LF. */
    RTLOGFLAGS_USECRLF              = 0x00000010,

    /** Append to the log destination where applicable. */
    RTLOGFLAGS_APPEND               = 0x00000020,

    /** Show relative timestamps with PREFIX_TSC and PREFIX_TS */
    RTLOGFLAGS_REL_TS               = 0x00000040,

    /** Show decimal timestamps with PREFIX_TSC and PREFIX_TS */
    RTLOGFLAGS_DECIMAL_TS           = 0x00000080,

    /** Open the file in write through mode. */
    RTLOGFLAGS_WRITE_THROUGH        = 0x00000100,

    /** Flush the file to disk when flushing the buffer. */
    RTLOGFLAGS_FLUSH                = 0x00000200,

    /** Restrict the number of log entries per group. */
    RTLOGFLAGS_RESTRICT_GROUPS      = 0x00000400,

    /** New lines should be prefixed with the write and read lock counts. */
    RTLOGFLAGS_PREFIX_LOCK_COUNTS   = 0x00000800,

    /** New lines should be prefixed with the CPU id (ApicID on intel/amd). */
    RTLOGFLAGS_PREFIX_CPUID         = 0x00001000,

    /** New lines should be prefixed with the native process id. */
    RTLOGFLAGS_PREFIX_PID           = 0x00002000,

    /** New lines should be prefixed with group flag number causing the output. */
    RTLOGFLAGS_PREFIX_FLAG_NO       = 0x00004000,

    /** New lines should be prefixed with group flag name causing the output. */
    RTLOGFLAGS_PREFIX_FLAG          = 0x00008000,

    /** New lines should be prefixed with group number. */
    RTLOGFLAGS_PREFIX_GROUP_NO      = 0x00010000,

    /** New lines should be prefixed with group name. */
    RTLOGFLAGS_PREFIX_GROUP         = 0x00020000,

    /** New lines should be prefixed with the native thread id. */
    RTLOGFLAGS_PREFIX_TID           = 0x00040000,

    /** New lines should be prefixed with thread name. */
    RTLOGFLAGS_PREFIX_THREAD        = 0x00080000,

    /** New lines should be prefixed with data from a custom callback. */
    RTLOGFLAGS_PREFIX_CUSTOM        = 0x00100000,

    /** New lines should be prefixed with formatted timestamp since program start. */
    RTLOGFLAGS_PREFIX_TIME_PROG     = 0x00200000,

    /** New lines should be prefixed with formatted timestamp (UCT). */
    RTLOGFLAGS_PREFIX_TIME_PROG     = 0x00400000,

}
RTLOGFLAGS

/** New lines should be prefixed with milliseconds since program start. */
RTLOGFLAGS_PREFIX_MS_PROG = 0x10000000,
/** New lines should be prefixed with timestamp. */
RTLOGFLAGS_PREFIX_TSC = 0x20000000,
/** New lines should be prefixed with timestamp. */
RTLOGFLAGS_PREFIX_TS = 0x40000000,
/** The prefix mask. */
RTLOGFLAGS_PREFIX_MASK = 0x7dff8000

RTLOGFLAGS:
+
+/**
+ * Logger per group flags.
+ *
+ * @remarks We only use the lower 16 bits here. We'll be combining it with the
+ * group number in a few places.
+ */
+typedef enum RTLOGGRPFLAGS
+
+ /** Enabled. */
+ RTLOGGRPFLAGS_ENABLED = 0x0001,
+ /** Flow logging. */
+ RTLOGGRPFLAGS_FLOW = 0x0002,
+ /** Warnings logging. */
+ RTLOGGRPFLAGS_WARN = 0x0004,
+ /**< 0x0008 for later. */
+ RTLOGGRPFLAGS_LEVEL_1 = 0x0010,
+ /** Level 2 logging. */
+ RTLOGGRPFLAGS_LEVEL_2 = 0x0020,
+ /** Level 3 logging. */
+ RTLOGGRPFLAGS_LEVEL_3 = 0x0040,
+ /** Level 4 logging. */
+ RTLOGGRPFLAGS_LEVEL_4 = 0x0080,
+ /** Level 5 logging. */
+ RTLOGGRPFLAGS_LEVEL_5 = 0x0100,
+ /** Level 6 logging. */
+ RTLOGGRPFLAGS_LEVEL_6 = 0x0200,
+ /** Level 7 logging. */
+ RTLOGGRPFLAGS_LEVEL_7 = 0x0400,
+ /** Level 8 logging. */
+ RTLOGGRPFLAGS_LEVEL_8 = 0x0800,
+ /** Level 9 logging. */
+ RTLOGGRPFLAGS_LEVEL_9 = 0x1000,
+ /** Level 10 logging. */
+ RTLOGGRPFLAGS_LEVEL_10 = 0x2000,
+ /** Level 11 logging. */
+ RTLOGGRPFLAGS_LEVEL_11 = 0x4000,
+ /** Level 12 logging. */
+ RTLOGRPFLEVELS_LEVEL_12 = 0x8000,
+
+ /** Restrict the number of log entries. */
+ RTLOGRPFLEVELS_RESTRICT = 0x40000000,
+ /** Blow up the type. */
+ RTLOGRPFLEVELS_32BIT_HACK = 0x7fffffff
+
+} RTLOGRPFLEVELS;
+
+/**
+ * Logger destination types and flags.
+ */
+typedef enum RTLOGDEST
+{
+  /** Log to file. */
+  RTLOGDEST_FILE = 0x00000001,
+  /** Log to stdout. */
+  RTLOGDEST_STDOUT = 0x00000002,
+  /** Log to stderr. */
+  RTLOGDEST_STDERR = 0x00000004,
+  /** Log to debugger (win32 only). */
+  RTLOGDEST_DEBUGGER = 0x00000008,
+  /** Log to com port. */
+  RTLOGDEST_COM = 0x00000010,
+  /** Log a memory ring buffer. */
+  RTLOGDEST_RINGBUF = 0x00000020,
+  /** Open files with no deny (share read, write, delete) on Windows. */
+  RTLOGDEST_F_NO_DENY = 0x00010000,
+  /** Delay opening the log file, logging to the buffer untill
+   * RTLogClearFileDelayFlag is called. */
+  RTLOGDEST_F_DELAY_FILE = 0x00020000,
+  /** Just a dummy flag to be used when no other flag applies. */
+  RTLOGDEST_DUMMY = 0x20000000,
+  /** Log to a user defined output stream. */
+  RTLOGDEST_USER = 0x40000000
+} RTLOGDEST;
+
+RTDECL(void) RTLogPrintfEx(void *pvInstance, unsigned fFlags, unsigned iGroup,
+                           const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(4, 5);
+
+#ifdef DOXYGEN_RUNNING
+# define LOG_DISABLED
+# define LOG_ENABLED
+# define LOG_ENABLE_FLOW
+#endif
+
+}
/** @def LOG_DISABLED
 * Use this compile time define to disable all logging macros. It can
 * be overridden for each of the logging macros by the LOG_ENABLE*
 * compile time defines.
 */

 /** @def LOG_ENABLED
 * Use this compile time define to enable logging when not in debug mode
 * or LOG_DISABLED is set.
 * This will enabled Log() only.
 */

 /** @def LOG_ENABLE_FLOW
 * Use this compile time define to enable flow logging when not in
 * debug mode or LOG_DISABLED is defined.
 * This will enable LogFlow() only.
 */

 /*
 * Determine whether logging is enabled and forcefully normalize the indicators.
 */
#if (defined(DEBUG) || defined(LOG_ENABLED)) && !defined(LOG_DISABLED)
# undef  LOG_DISABLED
# undef  LOG_ENABLED
# define LOG_ENABLED
#else
# undef  LOG_ENABLED
# undef  LOG_DISABLED
# define LOG_DISABLED
#endif

/** @def LOG_USE_C99
 * Governs the use of variadic macros.
 */
#ifndef LOG_USE_C99
#pragma if (defined(DEBUG) || defined(LOG_ENABLED)) && !defined(LOG_DISABLED)
#pragma undef  LOG_DISABLED
#pragma undef  LOG_ENABLED
#pragma define LOG_ENABLED
#ifdef
#pragma undef  LOG_ENABLED
#pragma undef  LOG_DISABLED
#pragma define LOG_DISABLED
#pragma endif

#pragma ifndef LOG_USE_C99
#pragma endif

#pragma ifndef LOG_USE_C99
#pragma endif

#pragma endif

#pragma endif

/** @name Macros for checking whether a log level is enabled. */
/** @def LogIsItEnabled
 * Checks whether the specified logging group is enabled or not.
 */

 /** @name Macros for checking whether an event is enabled. */
/** @def LogIsItEnabled
 * Checks whether the specified logging group is enabled or not.
 */
+#ifdef LOG_ENABLED
+  +# define LogIsItEnabled(a_fFlags, a_iGroup) ( RTLogDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)) 
+   != NULL )
+  +#else
+  +# define LogIsItEnabled(a_fFlags, a_iGroup) (false)
+  +#endif
+
+/** @def LogIsEnabled
+ * Checks whether level 1 logging is enabled.
+ */
+#define LogIsEnabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP)
+
+/** @def LogIs2Enabled
+ * Checks whether level 2 logging is enabled.
+ */
+#define LogIs2Enabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP)
+
+/** @def LogIs3Enabled
+ * Checks whether level 3 logging is enabled.
+ */
+#define LogIs3Enabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP)
+
+/** @def LogIs4Enabled
+ * Checks whether level 4 logging is enabled.
+ */
+#define LogIs4Enabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP)
+
+/** @def LogIs5Enabled
+ * Checks whether level 5 logging is enabled.
+ */
+#define LogIs5Enabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP)
+
+/** @def LogIs6Enabled
+ * Checks whether level 6 logging is enabled.
+ */
+#define LogIs6Enabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP)
+
+/** @def LogIs7Enabled
+ * Checks whether level 7 logging is enabled.
+ */
+#define LogIs7Enabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP)
+
+/** @def LogIs8Enabled
+ * Checks whether level 8 logging is enabled.
+ */
+#define LogIs8Enabled()  LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP)
+/** @def LogIs9Enabled
#define LogIs9Enabled()     LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP)
+
+/** @def LogIs10Enabled
+ * Checks whether level 10 logging is enabled.
+ */
+#define LogIs10Enabled()    LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP)
+
+/** @def LogIs11Enabled
+ * Checks whether level 11 logging is enabled.
+ */
+#define LogIs11Enabled()    LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP)
+
+/** @def LogIs12Enabled
+ * Checks whether level 12 logging is enabled.
+ */
+#define LogIs12Enabled()    LogIsItEnabled(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP)
+
+/** @def LogIsFlowEnabled
+ * Checks whether execution flow logging is enabled.
+ */
+#define LogIsFlowEnabled()  LogIsItEnabled(RTLOGGRPFLAGS_FLOW, LOG_GROUP)
+
+/** @def LogIsWarnEnabled
+ * Checks whether execution flow logging is enabled.
+ */
+#define LogIsWarnEnabled()  LogIsItEnabled(RTLOGGRPFLAGS_WARN, LOG_GROUP)
+/** @} */
+
+/** @def LogIt
+ * Write to specific logger if group enabled.
+ */
+#ifdef LOG_ENABLED
+## if defined(LOG_USE_C99)
+  # define _LogRemoveParentheseis(...)                   __VA_ARGS__
+  # define _LogIt(a_fFlags, a_iGroup, ...)             __VA_ARGS__
+  do 
+  +   \register PRTLOGGER LogIt_pLogger = RTLogDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \ 
+  +   \if (RT_LIKELY(!LogIt_pLogger)) \ 
+  +     { /* likely */ } \ 
+  +   else \ 
+  +     RTLogLoggerEx(LogIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \ 
+  + } while (0)
+## define LogIt(a_fFlags, a_iGroup, fmtargs) _LogIt(a_fFlags, a_iGroup, _LogRemoveParentheseis fmtargs)
+ define _LogItAlways(a_fFlags, a_iGroup, ...) RTLogLoggerEx(NULL, a_fFlags, UINT32_MAX, __VA_ARGS__) 
+ define LogItAlways(a_fFlags, a_iGroup, fmtargs) _LogItAlways(a_fFlags, a_iGroup, _LogRemoveParentheses fmtargs)
+ /** @todo invent a flag or something for skipping the group check so we can pass iGroup. LogItAlways. */
+ else
+ define LogIt(a_fFlags, a_iGroup, fmtargs)
+ do 
+ { 
+ register PRTLOGGER LogIt_pLogger = RTLogDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); 
+ if (RT_LIKELY(!LogIt_pLogger))
+ { /* likely */ } 
+ else 
+ { 
+ LogIt_pLogger->pfnLogger fmtargs;
+ } 
+ } while (0)
+ define LogItAlways(a_fFlags, a_iGroup, fmtargs)
+ do 
+ { 
+ register PRTLOGGER LogIt_pLogger = RTLogDefaultInstanceEx(RT_MAKE_U32(0, UINT16_MAX)); 
+ if (LogIt_pLogger)
+ LogIt_pLogger->pfnLogger fmtargs;
+ } while (0)
+ endif
+ #else
+ define LogIt(a_fFlags, a_iGroup, fmtargs) do { } while (0)
+ define LogItAlways(a_fFlags, a_iGroup, fmtargs) do { } while (0)
+ if defined(LOG_USE_C99)
+ define _LogRemoveParentheses(...) __VA_ARGS__
+ define _LogIt(a_fFlags, a_iGroup, ...) do { } while (0)
+ define _LogItAlways(a_fFlags, a_iGroup, ...) do { } while (0)
+ endif
+ endif
+ 
+ /** @name Basic logging macros
+ * @{ */
+ /** @def LogAlways Level 1 logging that works regardless of the group settings.
+ */
+ define LogAlways(a) LogItAlways(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, a)
+ 
+ /** @def Log Level 1 logging.
+ */
+ define Log(a) LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, a)
+/** @def Log2  
+ * Level 2 logging.
+ */
+#define Log2(a) LogIt(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP, a)
+
+/** @def Log3  
+ * Level 3 logging.
+ */
+#define Log3(a) LogIt(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, a)
+
+/** @def Log4  
+ * Level 4 logging.
+ */
+#define Log4(a) LogIt(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP, a)
+
+/** @def Log5  
+ * Level 5 logging.
+ */
+#define Log5(a) LogIt(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP, a)
+
+/** @def Log6  
+ * Level 6 logging.
+ */
+#define Log6(a) LogIt(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP, a)
+
+/** @def Log7  
+ * Level 7 logging.
+ */
+#define Log7(a) LogIt(RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP, a)
+
+/** @def Log8  
+ * Level 8 logging.
+ */
+#define Log8(a) LogIt(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP, a)
+
+/** @def Log9  
+ * Level 9 logging.
+ */
+#define Log9(a) LogIt(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, a)
+
+/** @def Log10  
+ * Level 10 logging.
+ */
+#define Log10(a) LogIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, a)
+
+/** @def Log11  
+ * Level 11 logging.
+ */
+\#define Log11(a) LogIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, a) + +/** @def Log12 + * Level 12 logging. + */ +\#define Log12(a) LogIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, a) + +/** @def LogFlow + * Logging of execution flow. + */ +\#define LogFlow(a) LogIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, a) + +/** @def LogWarn + * Logging of warnings. + */ +\#define LogWarn(a) LogIt(RTLOGGRPFLAGS_WARN, LOG_GROUP, a) +/** @} */ + +/** @name Logging macros prefixing the current function name. + */ +*/ +/** @def LogFunc + * Level 1 logging inside C/C++ functions. + * Prepends the given log message with the function name followed by a + * semicolon and space. + * @param a Log message in format "string\n [, args]\n". + */ +\ifdef LOG_USE_C99 +\# define LogFunc(a) _LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a ) +\else +\# define LogFunc(a) do { Log((LOG_FN_FMT "::", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); Log(a); } while (0) +\endif + /** @def Log2Func + * Level 2 logging inside C/C++ functions. + * Prepends the given log message with the function name followed by a + * semicolon and space. + * @param a Log message in format "string\n [, args]\n". + */ +\ifdef LOG_USE_C99 +\# define Log2Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP, LOG_FN_FMT ": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a ) +\else +\# define Log2Func(a) do { Log((LOG_FN_FMT "::", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); Log(a); } while (0) +\endif
+else
+  define Log2Func(a) do [ Log2((LOG_FN_FMT ": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__));
Log2(a); ] while (0)
+endif
+
+/** @def Log3Func
+ * Level 3 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>.
+ */
+ifdef LOG_USE_C99
+  define Log3Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, LOG_FN_FMT ": %M",
RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheseis a )
+endif
+
+/** @def Log4Func
+ * Level 4 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>.
+ */
+ifdef LOG_USE_C99
+  define Log4Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP, LOG_FN_FMT ": %M",
RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheseis a )
+endif
+
+/** @def Log5Func
+ * Level 5 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>.
+ */
+ifdef LOG_USE_C99
+  define Log5Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP, LOG_FN_FMT ": %M",
RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheseis a )
+endif
+ 
+#ifndef LOG_USE_C99
+* Level 5 logging inside C/C++ functions.
+*
+* Prepends the given log message with the function name followed by a
+* semicolon and space.
+*
+* @param a Log message in format ("string\n", [args])<tt>
+*/
+#endif

+/** @def Log5Func
+ * Level 5 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format ("string\n", [args])
+ */
+*/
#
+#else
+
+/** @def Log6Func
+ * Level 6 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format ("string\n", [args])
+ */
+*/
#
+endif

+/** @def Log7Func
+ * Level 7 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format ("string\n", [args])
+ */
+*/
#
+ifndef LOG_USE_C99
+* Level 6 logging inside C/C++ functions.
+*
+* Prepends the given log message with the function name followed by a
+* semicolon and space.
+*
+* @param a Log message in format ("string\n", [args])
+*/
+*/
#
+endif

+/** @def Log8Func
+ * Level 8 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format ("string\n", [args])
+ */
+*/
#
+ifndef LOG_USE_C99
+* Level 5 logging inside C/C++ functions.
+*
+* Prepends the given log message with the function name followed by a
+* semicolon and space.
+*
+* @param a Log message in format ("string\n", [args])
+*/
+*/
#
+endif

+/** @def Log7Func
+ * Level 7 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format ("string\n", [args])
+ */
+*/
#
+ifndef LOG_USE_C99
+* Level 6 logging inside C/C++ functions.
+*
+* Prepends the given log message with the function name followed by a
+* semicolon and space.
+*
+* @param a Log message in format ("string\n", [args])
+*/
+*/
#
+endif

+/** @def Log8Func
+ * Level 8 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format ("string\n", [args])
+ */
+*/
#
+ifndef LOG_USE_C99
+* Level 5 logging inside C/C++ functions.
+*
+* Prepends the given log message with the function name followed by a
+* semicolon and space.
+*
+* @param a Log message in format ("string\n", [args])
+*/
+*/
#
+endif
+/#else
+/# define Log8Func(a) do { Log8((LOG_FN_FMT ": ". RT_GCC_EXTENSION __PRETTY_FUNCTION__));
Log8(a); } while (0)
+/#endif
+
+/** @def Log9Func
+ * Level 9 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format <tt>("string\n", [args])</tt>.
+ */
+/#ifdef LOG_USE_C99
+/# define Log9Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, LOG_FN_FMT ": %M",
RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+/#else
+/# define Log9Func(a) do { Log9((LOG_FN_FMT ": ". RT_GCC_EXTENSION __PRETTY_FUNCTION__));
Log9(a); } while (0)
+/#endif
+
+/** @def Log10Func
+ * Level 10 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format <tt>("string\n", [args])</tt>.
+ */
+/#ifdef LOG_USE_C99
+/# define Log10Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, LOG_FN_FMT ": %M",
RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+/#else
+/# define Log10Func(a) do { Log10((LOG_FN_FMT ": ". RT_GCC_EXTENSION __PRETTY_FUNCTION__));
Log10(a); } while (0)
+/#endif
+
+/** @def Log11Func
+ * Level 11 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param a Log message in format <tt>("string\n", [args])</tt>.
+ */
+/#ifdef LOG_USE_C99
+/# define Log11Func(a) _LogIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, LOG_FN_FMT ": %M",
RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+/#else
+/# define Log11Func(a) do { Log11((LOG_FN_FMT ": ". RT_GCC_EXTENSION __PRETTY_FUNCTION__));
Log11(a); } while (0)
+/#endif
+
+/** @def Log11Func
+ * Level 11 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param   a   Log message in format <tt>"string\n", \[args]\</tt>.
+ */
+#endif

+/** @def Log12Func
+ * Level 12 logging inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by a
+ * semicolon and space.
+ *
+ * @param   a   Log message in format <tt>"string\n", \[args]\</tt>.
+ */
+endif

+/** @def LogFlowFunc
+ * Macro to log the execution flow inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by
+ * a semicolon and space.
+ *
+ * @param   a   Log message in format <tt>"string\n", \[args]\</tt>.
+ */
+ifdef LOG_USE_C99
+define LogFlowFunc(a) \ 
    _LogIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, LOG_FN_FMT": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+else
+define LogFlowFunc(a) \ 
    do { LogFlow((LOG_FN_FMT": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a)); LogFlow(a); } while (0)
+endif

+/** @def LogWarnFunc
+ * Macro to log a warning inside C/C++ functions.
+ *
+ * Prepends the given log message with the function name followed by
+ * a semicolon and space.
+ *
+ * @param   a   Log message in format <tt>"string\n", \[args]\</tt>.
+ */
+ifdef LOG_USE_C99
+define LogWarnFunc(a) \ 
    _LogIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, LOG_FN_FMT": %M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+else
+define LogWarnFunc(a) \ 
    do { LogWarn((LOG_FN_FMT": ", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a)); LogWarn(a); } while (0)
+endif
```c
+// define LogWarnFunc(a) \
+  _LogIt(RTLOGGRPFLAGS_WARN, LOG_GROUP, LOG_FN_FMT " : %M", __PRETTY_FUNCTION__, 
+  _LogRemoveParenthesesis a ) 
+#endif
+// define LogWarnFunc(a) 
+  do { LogFlow((LOG_FN_FMT " : ", __PRETTY_FUNCTION__)); LogFlow(a); } while (0)
+#endif
+/** @} */

+/** @name Logging macros prefixing the this pointer value and method name. 
+ * @{ */
+/** @def LogThisFunc 
+ * Level 1 logging inside a C++ non-static method, with object pointer and 
+ * method name prefixed to the given message. 
+ * @param   a   Log message in format <tt>("string\n", [args])</tt>. 
+ * @ */
+#ifdef LOG_USE_C99
+  #define LogThisFunc(a) \
+    _LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, "{%p} " LOG_FN_FMT " : %M", this, 
+    __PRETTY_FUNCTION__, _LogRemoveParenthesesis a ) 
+#else
+  #define LogThisFunc(a) do { Log2("{%p} " LOG_FN_FMT " : ", this, __PRETTY_FUNCTION__); Log2(a); } while (0)
+#endif
+/** @}*/

+/** @def Log2ThisFunc 
+ * Level 2 logging inside a C++ non-static method, with object pointer and 
+ * method name prefixed to the given message. 
+ * @param   a   Log message in format <tt>("string\n", [args])</tt>. 
+ * @ */
+#ifdef LOG_USE_C99
+  #define Log2ThisFunc(a) \
+    _LogIt(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP, "{%p} " LOG_FN_FMT " : %M", this, 
+    __PRETTY_FUNCTION__, _LogRemoveParenthesesis a ) 
+#else
+  #define Log2ThisFunc(a) do { Log2("{%p} " LOG_FN_FMT " : ", this, __PRETTY_FUNCTION__); Log2(a); } while (0)
+#endif
+/** @}*/

+/** @def Log3ThisFunc 
+ * Level 3 logging inside a C++ non-static method, with object pointer and 
+ * method name prefixed to the given message. 
+ * @param   a   Log message in format <tt>("string\n", [args])</tt>. 
+ * @ */
+#ifdef LOG_USE_C99
+  #define Log3ThisFunc(a) \
+    _LogIt(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, "{%p} " LOG_FN_FMT " : %M", this, 
+    __PRETTY_FUNCTION__, _LogRemoveParenthesesis a ) 
+#else
+  #define Log3ThisFunc(a) do { Log2("{%p} " LOG_FN_FMT " : ", this, __PRETTY_FUNCTION__); Log2(a); } while (0)
+#endif
+/** @}*/
```
```c
+  __LogIt(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, "[%p] " LOG_FN_FMT ": %M", this,
  __PRETTY_FUNCTION__, __LogRemoveParentheses a )
+#else
+  # define Log3ThisFunc(a) do { Log3("[%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log3(a);
  } while (0)
+  #endif
+  
+  /** @def Log4ThisFunc
+   * Level 4 logging inside a C++ non-static method, with object pointer and
+   * method name prefixed to the given message.
+   * @param   a   Log message in format <tt>("string\n" [, args])</tt>.
+   */
+  #ifdef LOG_USE_C99
+  # define Log4ThisFunc(a) \
+    __LogIt(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP, "[%p] " LOG_FN_FMT ": %M", this,
+     __PRETTY_FUNCTION__, __LogRemoveParentheses a )
+  +#else
+  # define Log4ThisFunc(a) do { Log4("[%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__);
+     Log4(a);
+  } while (0)
+  #endif
+  
++  /** @def Log5ThisFunc
+   * Level 5 logging inside a C++ non-static method, with object pointer and
+   * method name prefixed to the given message.
+   * @param   a   Log message in format <tt>("string\n" [, args])</tt>.
+   */
+  #ifdef LOG_USE_C99
+  # define Log5ThisFunc(a) \
+    __LogIt(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP, "[%p] " LOG_FN_FMT ": %M", this,
+     __PRETTY_FUNCTION__, __LogRemoveParentheses a )
+  +#else
+  # define Log5ThisFunc(a) do { Log5("[%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log5(a);
+     } while (0)
+  #endif
+  
++  /** @def Log6ThisFunc
+   * Level 6 logging inside a C++ non-static method, with object pointer and
+   * method name prefixed to the given message.
+   * @param   a   Log message in format <tt>("string\n" [, args])</tt>.
+   */
+  #ifdef LOG_USE_C99
+  # define Log6ThisFunc(a) \
+    __LogIt(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP, "[%p] " LOG_FN_FMT ": %M", this,
+     __PRETTY_FUNCTION__, __LogRemoveParentheses a )
+  +#else
+  # define Log6ThisFunc(a) do { Log6("[%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); Log6(a);
+     } while (0)
+  #endif
```
/** @def Log7ThisFunc
 * Level 7 logging inside a C++ non-static method, with object pointer and
 * method name prefixed to the given message.
 * @param   a   Log message in format <tt>"string\n" [, args]]</tt>
 */
#endif

/** @def Log8ThisFunc
 * Level 8 logging inside a C++ non-static method, with object pointer and
 * method name prefixed to the given message.
 * @param   a   Log message in format <tt>"string\n" [, args]]</tt>
 */
#endif

/** @def Log9ThisFunc
 * Level 9 logging inside a C++ non-static method, with object pointer and
 * method name prefixed to the given message.
 * @param   a   Log message in format <tt>"string\n" [, args]]</tt>
 */
#endif

/** @def Log10ThisFunc
 * Level 10 logging inside a C++ non-static method, with object pointer and
 * method name prefixed to the given message.
 * @param   a   Log message in format <tt>"string\n" [, args]]</tt>
 */
 +#ifdef LOG_USE_C99
 +# define Log10ThisFunc(a) \n +  _LogIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, "\[\%p] " LOG_FN_FMT ": %M", this, 
+  __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#endif
+# define Log10ThisFunc(a) do { Log10("\[\%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); 
+  Log10(a); } while (0)
+#endif
+/** @def Log11ThisFunc
+ * Level 11 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param a Log message in format <tt>("string\n" [, args])</tt>.
+ */
+#ifndef LOG_USE_C99
+# define Log11ThisFunc(a) \n+  _LogIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, "\[\%p] " LOG_FN_FMT ": %M", this, 
+  __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+# define Log11ThisFunc(a) do { Log11("\[\%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); 
+  Log11(a); } while (0)
+#endif
+/** @def Log12ThisFunc
+ * Level 12 logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param a Log message in format <tt>("string\n" [, args])</tt>.
+ */
+ifndef LOG_USE_C99
+# define Log12ThisFunc(a) \n+  _LogIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, "\[\%p] " LOG_FN_FMT ": %M", this, 
+  __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+# define Log12ThisFunc(a) do { Log12("\[\%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); 
+  Log12(a); } while (0)
+#endif
+/** @def LogFlowThisFunc
+ * Flow level logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param a Log message in format <tt>("string\n" [, args])</tt>.
+ */
+ifndef LOG_USE_C99
+# define LogFlowThisFunc(a) \n+  _LogIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, "\[\%p] " LOG_FN_FMT ": %M", this, 
+  __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+# define LogFlowThisFunc(a) do { LogFlow("\[\%p] " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); 
+  LogFlow(a); } while (0)
+#endif
}
LogFlow(a); } while (0)
+*/
+
+/** @def LogWarnThisFunc
+ * Warning level logging inside a C++ non-static method, with object pointer and
+ * method name prefixed to the given message.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+*/
+#ifdef LOG_USE_C99
+/** @} */
+
+/** @name Misc Logging Macros
+ * @{ */
+
+/** @def Log1Warning
+ * The same as Log(), but prepends a <tt>"WARNING! "</tt> string to the message.
+ * @param   a   Custom log message in format <tt>("string\n" [, args])</tt>
+ */
+*/
+#if defined(LOG_USE_C99)
+/** @def Log1WarningFunc
+ * The same as LogWarning(), but prepends the log message with the function name.
+ * @param   a   Log message in format <tt>("string\n" [, args])</tt>
+ */
+*/
+#ifdef LOG_USE_C99
+/** @} */
+*/
/** @def Log1WarningThisFunc
  * The same as LogWarningFunc() but for class functions (methods): the resulting
  * log line is additionally prepended with a hex value of |this| pointer.
  * *
  * @param   a   Log message in format <tt>("string\n" [, args])</tt>.
  * @*/
+ifdef LOG_USE_C99
+define Log1WarningThisFunc(a) \
  _LogIt(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, "{%p} " LOG_FN_FMT ": WARNING! %M", this, \
  __PRETTY_FUNCTION__, _LogRemoveParenthesesIs a )
+else
+define Log1WarningThisFunc(a) \
  do { Log(("{%p} " LOG_FN_FMT ": WARNING! ", this, __PRETTY_FUNCTION__)); Log(a); } while (0)
+endif
+
+/** Shortcut to |LogFlowFunc ("ENTER\n")|, marks the beginnig of the function. */
+define LogFlowFuncEnter()  LogFlowFunc("ENTER\n")
+
+/** Shortcut to |LogFlowFunc ("LEAVE\n")|, marks the end of the function. */
+define LogFlowFuncLeave()  LogFlowFunc("LEAVE\n")
+
+/** Shortcut to |LogFlowThisFunc ("LEAVE: %Rrc\n")|, marks the end of the function. */
+define LogFlowThisFuncLeaveRC(rc)  LogFlowThisFunc("LEAVE: %Rrc\n", (rc))
+
+/** Shortcut to |LogFlowThisFunc ("ENTER\n")|, marks the beginnig of the function. */
+define LogFlowThisFuncEnter()  LogFlowThisFunc("ENTER\n")
+
+/** Shortcut to |LogFlowThisFunc ("LEAVE\n")|, marks the end of the function. */
+define LogFlowThisFuncLeave()  LogFlowThisFunc("LEAVE\n")
+
+/** @def LogObjRefCnt
  * Helper macro to print the current reference count of the given COM object
  * to the log file.
  * *
  * @param pObj  Pointer to the object in question (must be a pointer to an
  *              IUnknown subclass or simply define COM-style AddRef() and
  *              Release() methods)
  * @*/
+define LogObjRefCnt(pObj)  \
  do { \
    if (LogIsFlowEnabled()) \
    { \
      int cRefsForLog = (pObj)->AddRef(); \ 
      LogFlow(("{%p}.refCnt=%d\n", (pObj), cRefsForLog - 1)); \ 
      (pObj)->Release(); \ 
    } \ 
  } \ 

+  } while (0)
+/** @} */
+
+
+/** @name Passing Function Call Position When Logging. */
+ * This is a little bit ugly as we have to omit the comma before the
+ * position parameters so that we don't incur any overhead in non-logging
+ * builds (!defined(LOG_ENABLED).
+ *
+ * @} */
+
+/** Source position for passing to a function call. */
+#ifdef LOG_ENABLED
+# define RTLOG_COMMA_SRC_POS        , __FILE__, __LINE__, __PRETTY_FUNCTION__
+#else
+# define RTLOG_COMMA_SRC_POS        RT_NOTHING
+#endif
+/** Source position declaration. */
+#ifdef LOG_ENABLED
+# define RTLOG_COMMA_SRC_POS_DECL   , const char *pszFile, unsigned iLine, const char *pszFunction
+#else
+# define RTLOG_COMMA_SRC_POS_DECL   RT_NOTHING
+#endif
+/** Source position arguments. */
+#ifdef LOG_ENABLED
+# define RTLOG_COMMA_SRC_POS_ARGS   , pszFile, iLine, pszFunction
+#else
+# define RTLOG_COMMA_SRC_POS_ARGS   RT_NOTHING
+#endif
+/** Applies NOREF() to the source position arguments. */
+#ifdef LOG_ENABLED
+# define RTLOG_SRC_POS_NOREF()      do { NOREF(pszFile); NOREF(iLine); NOREF(pszFunction); } while
+(0)
+#else
+# define RTLOG_SRC_POS_NOREF()      do {} while (0)
+#endif
+/** @} */
+
+
+/** @name Release Logging */
+ */
+#ifdef DOXYGEN_RUNNING
+# define RTLOG_REL_DISABLED
+# define RTLOG_REL_ENABLED
+} while (0)
+#ifdef DOXYGEN_RUNNING
+# define RTLOG_REL_DISABLED
+# define RTLOG_REL_ENABLED

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+ #endif
+
+/** @def RTLOG_REL_DISABLED
+ * Use this compile time define to disable all release logging
+ * macros.
+ */
+
+/** @def RTLOG_REL_ENABLED
+ * Use this compile time define to override RTLOG_REL_DISABLED.
+ */
+
+* Determine whether release logging is enabled and forcefully normalize the indicators.
+ */
+/
+if !defined(RTLOG_REL_DISABLED) || defined(RTLOG_REL_ENABLED)
+# undef RTLOG_REL_DISABLED
+# undef RTLOG_REL_ENABLED
+# define RTLOG_REL_ENABLED
+#else
+# undef RTLOG_REL_ENABLED
+# undef RTLOG_REL_DISABLED
+# define RTLOG_REL_DISABLED
+#endif
+
+/** @name Macros for checking whether a release log level is enabled.
+ * @{ */
+/** @def LogRelIsItEnabled
+ * Checks whether the specified release logging group is enabled or not.
+ */
+#define LogRelIsItEnabled(a_fFlags, a_iGroup) ( RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)) != NULL )
+
+/** @def LogRelIsEnabled
+ * Checks whether level 1 release logging is enabled.
+ */
+#define LogRelIsEnabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP)
+
+/** @def LogRelIs2Enabled
+ * Checks whether level 2 release logging is enabled.
+ */
+#define LogRelIs2Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP)
+
+/** @def LogRelIs3Enabled
+ * Checks whether level 3 release logging is enabled.
+ */
+#define LogRelIs3Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP)
+
+/** @def LogRelIs4Enabled
+ * Checks whether level 4 release logging is enabled.
+ * Checks whether level 4 release logging is enabled.
+ */
+#define LogRelIs4Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP)
+
+/** @def LogRelIs5Enabled
+ * Checks whether level 5 release logging is enabled.
+ */
+#define LogRelIs5Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP)
+
+/** @def LogRelIs6Enabled
+ * Checks whether level 6 release logging is enabled.
+ */
+#define LogRelIs6Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP)
+
+/** @def LogRelIs7Enabled
+ * Checks whether level 7 release logging is enabled.
+ */
+#define LogRelIs7Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP)
+
+/** @def LogRelIs8Enabled
+ * Checks whether level 8 release logging is enabled.
+ */
+#define LogRelIs8Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP)
+
+/** @def LogRelIs9Enabled
+ * Checks whether level 9 release logging is enabled.
+ */
+#define LogRelIs9Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP)
+
+/** @def LogRelIs10Enabled
+ * Checks whether level 10 release logging is enabled.
+ */
+#define LogRelIs10Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP)
+
+/** @def LogRelIs11Enabled
+ * Checks whether level 11 release logging is enabled.
+ */
+#define LogRelIs11Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP)
+
+/** @def LogRelIs12Enabled
+ * Checks whether level 12 release logging is enabled.
+ */
+#define LogRelIs12Enabled() LogRelIsItEnabled(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP)
+
+/** @def LogRelIsFlowEnabled
+ * Checks whether execution flow release logging is enabled.
+ */
+#define LogRelIsFlowEnabled() LogRelIsItEnabled(RTLOGGRPFLAGS_FLOW, LOG_GROUP)
```c
/** @def LogRelIsWarnEnabled
 * Checks whether warning level release logging is enabled.
 */
#define LogRelIsWarnEnabled()  LogRelIsItEnabled(RTLOGGRPFLAGS_FLOW, LOG_GROUP)
/** @} */

/** @def LogRelIt
 * Write to specific logger if group enabled.
 */
/** @def LogRelItLikely
 * Write to specific logger if group enabled, assuming it likely it is enabled.
 */
/** @def LogRelMaxIt
 * Write to specific logger if group enabled and at least than a_cMax messages
 * have hit the log. Uses a static variable to count.
 */
#ifdef RTLOG_REL_ENABLED
#ifdef LOG_USE_C99
#define _LogRelRemoveParentheseis(...)                    __VA_ARGS__
#define _LogRelIt(a_fFlags, a_iGroup, ...) \
    do \
    { \
        PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \
        if (RT_LIKELY(!LogRelIt_pLogger)) \
        { /* likely */ } \
        else \
            RTLogLoggerEx(LogRelIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \
        _LogIt(a_fFlags, a_iGroup, __VA_ARGS__); \
    } while (0)
#define LogRelIt(a_fFlags, a_iGroup, fmtargs) \
    _LogRelIt(a_fFlags, a_iGroup, _LogRelRemoveParentheseis fmtargs)
#define _LogRelItLikely(a_fFlags, a_iGroup, ...) \
    do \
    { \
        PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); \
        if (LogRelIt_pLogger) \
            RTLogLoggerEx(LogRelIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \
        _LogIt(a_fFlags, a_iGroup, __VA_ARGS__); \
    } while (0)
#define LogRelItLikely(a_fFlags, a_iGroup, fmtargs) \
    _LogRelItLikely(a_fFlags, a_iGroup, _LogRelRemoveParentheseis fmtargs)
#define _LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, ...) \
    do \
    { \
```
+ PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup));
+ \ 
+ if (LogRelIt_pLogger) 
+ { \ 
+ static uint32_t s_LogRelMaxIt_cLogged = 0; \ 
+ if (s_LogRelMaxIt_cLogged < (a_cMax)) \ 
+ { \ 
+ s_LogRelMaxIt_cLogged++; \ 
+ RTLogLoggerEx(LogRelIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \ 
+ } \ 
+ } \ 
+ _LogIt(a_fFlags, a_iGroup, __VA_ARGS__); \ 
+ } while (0)
+# define LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, fmtargs) 
+ _LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, _LogRelRemoveParentheseis fmtargs)
+# else
+# define LogRelItLikely(a_fFlags, a_iGroup, fmtargs) 
+ do \ 
+ PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); 
+ \ 
+ if (LogRelIt_pLogger) 
+ { \ 
+ LogRelIt_pLogger->pfnLogger fmtargs; \ 
+ } \ 
+ _LogIt(a_fFlags, a_iGroup, fmtargs); \ 
+ } while (0)
+# define LogRelIt(a_fFlags, a_iGroup, fmtargs) 
+ do \ 
+ PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); 
+ \ 
+ if (RT_LIKELY(!LogRelIt_pLogger)) 
+ { /* likely */ } \ 
+ else \ 
+ { \ 
+ LogRelIt_pLogger->pfnLogger fmtargs; \ 
+ } \ 
+ _LogIt(a_fFlags, a_iGroup, fmtargs); \ 
+ } while (0)
+# define LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, fmtargs) 
+ do \ 
+ PRTLOGGER LogRelIt_pLogger = RTLogRelGetDefaultInstanceEx(RT_MAKE_U32(a_fFlags, a_iGroup)); 
+ \ 
+ if (LogRelIt_pLogger) 
+ { \ 
+ static uint32_t s_LogRelMaxIt_cLogged = 0; \ 
+ if (s_LogRelMaxIt_cLogged < (a_cMax)) \ 
+ { \ 
+ s_LogRelMaxIt_cLogged++; \ 
+ RTLogLoggerEx(LogRelIt_pLogger, a_fFlags, a_iGroup, __VA_ARGS__); \ 
+ } \ 
+ } \ 
+ _LogIt(a_fFlags, a_iGroup, __VA_ARGS__); \ 
+ } while (0)
+    if (s_LogRelMaxIt_cLogged < (a_cMax)) |
+    { |
+        s_LogRelMaxIt_cLogged++; |
+        LogRelIt_pLogger->pfnLogger fmtargs; |
+    } |
+    } |
+    LogIt(a_fFlags, a_iGroup, fmtargs); |
+ } while (0)
+
+# endif
+#else   /* !RTLOG_REL_ENABLED */
+# define LogRelIt(a_fFlags, a_iGroup, fmtargs)              do { } while (0)
+# define LogRelItLikely(a_fFlags, a_iGroup, fmtargs)        do { } while (0)
+# define LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, fmtargs) do { } while (0)
+# if defined(LOG_USE_C99)
+# define _LogRelRemoveParenthesesis(...)                    __VA_ARGS__
+# define _LogRelIt(a_fFlags, a_iGroup, ...)                do { } while (0)
+# define _LogRelItLikely(a_fFlags, a_iGroup, ...)          do { } while (0)
+# define _LogRelMaxIt(a_cMax, a_fFlags, a_iGroup, ...)     do { } while (0)
+# endif
+#endif  /* !RTLOG_REL_ENABLED */
+
+/** @name Basic release logging macros */
+* @{ */
+/** @def LogRel */
+* Level 1 release logging. */
+* /
+*#define LogRel(a)           LogRelItLikely(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, a)
+*#define LogRel2(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_2,  LOG_GROUP, a)
+*#define LogRel3(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_3,  LOG_GROUP, a)
+*#define LogRel4(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_4,  LOG_GROUP, a)
+*#define LogRel5(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_5,  LOG_GROUP, a)
/** @def LogRel6
 * Level 6 release logging.
 */
#define LogRel6(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP, a)

/** @def LogRel7
 * Level 7 release logging.
 */
#define LogRel7(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP, a)

/** @def LogRel8
 * Level 8 release logging.
 */
#define LogRel8(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP, a)

/** @def LogRel9
 * Level 9 release logging.
 */
#define LogRel9(a)          LogRelIt(RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, a)

/** @def LogRel10
 * Level 10 release logging.
 */
#define LogRel10(a)         LogRelIt(RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, a)

/** @def LogRel11
 * Level 11 release logging.
 */
#define LogRel11(a)         LogRelIt(RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, a)

/** @def LogRel12
 * Level 12 release logging.
 */
#define LogRel12(a)         LogRelIt(RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, a)

/** @def LogRelFlow
 * Logging of execution flow.
 */
#define LogRelFlow(a)       LogRelIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, a)

/** @def LogRelWarn
 * Warning level release logging.
 */
#define LogRelWarn(a)       LogRelIt(RTLOGGRPFLAGS_WARN, LOG_GROUP, a)

*/
+/** @name Basic release logging macros with local max
+ */
+/** @def LogRelMax
+ Level 1 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax(a_cMax, a)        LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, a)
+
+/** @def LogRelMax2
+ Level 2 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax2(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_2, LOG_GROUP, a)
+
+/** @def LogRelMax3
+ Level 3 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax3(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_3, LOG_GROUP, a)
+
+/** @def LogRelMax4
+ Level 4 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax4(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_4, LOG_GROUP, a)
+
+/** @def LogRelMax5
+ Level 5 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax5(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_5, LOG_GROUP, a)
+
+/** @def LogRelMax6
+ Level 6 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax6(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_6, LOG_GROUP, a)
+
+/** @def LogRelMax7
+ Level 7 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax7(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_7, LOG_GROUP, a)
+
+/** @def LogRelMax8
+ Level 8 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax8(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_8, LOG_GROUP, a)
+
+/** @def LogRelMax9
+ Level 9 release logging with a max number of log entries.
+ */
+```c
#define LogRelMax9(a_cMax, a)       LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_9, LOG_GROUP, a)
+
/** @def LogRelMax10
+ * Level 10 release logging with a max number of log entries.
+ */
#define LogRelMax10(a_cMax, a) LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_10, LOG_GROUP, a)
+
/** @def LogRelMax11
+ * Level 11 release logging with a max number of log entries.
+ */
#define LogRelMax11(a_cMax, a) LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_11, LOG_GROUP, a)
+
/** @def LogRelMax12
+ * Level 12 release logging with a max number of log entries.
+ */
#define LogRelMax12(a_cMax, a) LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_12, LOG_GROUP, a)
+
/** @def LogRelMaxFlow
+ * Logging of execution flow with a max number of log entries.
+ */
#define LogRelMaxFlow(a_cMax, a) LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_FLOW, LOG_GROUP, a)
+/** @} */
+
/** @name Release logging macros prefixing the current function name.
+ * @{ */

/** @def LogRelFunc
+ * Release logging. Prepends the given log message with the function name
+ * followed by a semicolon and space.
+ */
#ifdef LOG_USE_C99
#define LogRelFunc(a) _LogRelItLikely(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, LOG_FN_FMT "\: \%M", RT_GCC_EXTENSION __PRETTY_FUNCTION__, _LogRemoveParentheses a )
#else
#define LogRelFunc(a) do { LogRel((LOG_FN_FMT "\: \", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); LogRel(a); } while (0)
#endif
+
/** @def LogRelFlowFunc
+ * Release logging. Macro to log the execution flow inside C/C++ functions.
+ */
#define LogRelFlowFunc(a) do { LogRel((LOG_FN_FMT ": \", RT_GCC_EXTENSION __PRETTY_FUNCTION__)); LogRel(a); } while (0)
+
/** @} */

+/** @param a Log message in format \<tt>("string\n" [, args])</tt>.}
+ */
+#ifdef LOG_USE_C99
+# define LogRelFlowFunc(a)  _LogRelIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, LOG_FN_FMT "": %M", __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+ define LogRelFlowFunc(a) do { LogRelFlow((LOG_FN_FMT ": ", __PRETTY_FUNCTION__)); LogRelFlow(a); } while (0)
+#endif
+
+/** @def LogRelMaxFunc
+ * Release logging. Prepends the given log message with the function name
+ * followed by a semicolon and space.
+ */
+#ifdef LOG_USE_C99
+# define LogRelMaxFunc(a_cMax, a) \
+ _LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_1, LOG_Group, LOG_FN_FMT "": %M", __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+ define LogRelMaxFunc(a_cMax, a) \
+ do { LogRelMax(a_cMax, (LOG_FN_FMT ": ", __PRETTY_FUNCTION__)); LogRelMax(a_cMax, a); } while (0)
+#endif
+
+/** @def LogRelMaxFlowFunc
+ * Release logging. Macro to log the execution flow inside C/C++ functions.
+ * Prepends the given log message with the function name followed by
+ * a semicolon and space.
+ */
+#ifdef LOG_USE_C99
+# define LogRelMaxFlowFunc(a_cMax, a) \
+ _LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_FLOW, LOG_GROUP, LOG_FN_FMT ": ", __PRETTY_FUNCTION__, _LogRemoveParentheses a )
+#else
+ define LogRelMaxFlowFunc(a_cMax, a) \
+ do { LogRelMaxFlow(a_cMax, (LOG_FN_FMT ": ", __PRETTY_FUNCTION__)); LogRelFlow(a_cMax, a); } while (0)
+#endif
+
+/** @} */
+
+/** @name Release Logging macros prefixing the this pointer value and method name. */
+/** @} */
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/** @def LogRelThisFunc 
 * The same as LogRelFunc but for class functions (methods): the resulting log 
 * line is additionally prepended with a hex value of [this] pointer.
 */

#elifdef LOG_USE_C99
攻打 LogRelThisFunc(a) \n + _LogRelItLikely(RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a ) 
#else
攻打 LogRelThisFunc(a) \n + do { LogRel("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); LogRel(a); } while (0)
#endif
+
/** @def LogRelMaxThisFunc 
 * The same as LogRelFunc but for class functions (methods): the resulting log 
 * line is additionally prepended with a hex value of [this] pointer.
 * @param  a_cMax  Max number of times this should hit the log.
 * @param  a       Log message in format <tt>("string\n", args)</tt>.
 */

#elifdef LOG_USE_C99
攻打 LogRelMaxThisFunc(a_cMax, a) \n + _LogRelMaxIt(a_cMax, RTLOGGRPFLAGS_LEVEL_1, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a ) 
#else
攻打 LogRelMax(a_cMax, "{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__);
攻打 LogRelMax(a_cMax, a); } while (0)
#endif
+
/** @def LogRelFlowThisFunc 
 * The same as LogRelFunc but for class functions (methods): the resulting
 * log line is additionally prepended with a hex value of [this] pointer.
 */

#elifdef LOG_USE_C99
攻打 LogRelFlowThisFunc(a) \n + _LogRelIt(RTLOGGRPFLAGS_FLOW, LOG_GROUP, "{%p} " LOG_FN_FMT ": %M", this, __PRETTY_FUNCTION__, _LogRemoveParentheses a ) 
#else
攻打 LogRelFlowThisFunc(a) do { LogRelFlow("{%p} " LOG_FN_FMT ": ", this, __PRETTY_FUNCTION__); LogRelFlow(a); } while (0)
#endif
+
/** Shortcut to |LogRelFlowFunc ("ENTER\n")|, marks the beginnig of the function. */

#define LogRelFlowFuncEnter() LogRelFlowFunc("ENTER\n")
+
/** Shortcut to |LogRelFlowFunc ("LEAVE\n")|, marks the end of the function. */

#define LogRelFlowFuncLeave() LogRelFlowFunc("LEAVE\n")
+/** Shortcut to |LogRelFlowFunc("LEAVE: %Rrc\n")|, marks the end of the function. */
+#define LogRelFlowFuncLeaveRC(rc)  LogRelFlowFunc("LEAVE: %Rrc\n", (rc))
+
+/** Shortcut to |LogRelFlowThisFunc("ENTER\n")|, marks the beginning of the function. */
+#define LogRelFlowThisFuncEnter()  LogRelFlowThisFunc("ENTER\n")
+
+/** Shortcut to |LogRelFlowThisFunc("LEAVE\n")|, marks the end of the function. */
+#define LogRelFlowThisFuncLeave()  LogRelFlowThisFunc("LEAVE\n")
+
+/** @} */
+
+#ifndef IN_RC
+/**
+ * Sets the default release logger instance.
+ * @returns The old default instance.
+ * @param   pLogger     The new default release logger instance.
+ */
+RTDECL(PRTLOGGER) RTLogRelSetDefaultInstance(PRTLOGGER pLogger);
+#endif /* !IN_RC */
+
+/**
+ * Gets the default release logger instance.
+ *
+ * @returns Pointer to default release logger instance if available, otherwise NULL.
+ */
+RTDECL(PRTLOGGER) RTLogRelGetDefaultInstance(void);
+
+/**
+ * Gets the default release logger instance.
+ *
+ * @returns Pointer to default release logger instance if available, otherwise NULL.
+ * @param   fFlagsAndGroup  The flags in the lower 16 bits, the group number in
+ *                          the high 16 bits.
+ */
+RTDECL(PRTLOGGER) RTLogRelGetDefaultInstanceEx(uint32_t fFlagsAndGroup);
+
+/**
+ * Write to a logger instance, defaulting to the release one.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param   pLogger     Pointer to logger instance.
+ * @param   fFlags      The logging flags.
+ * @param   iGroup      The group.
+ */
+ * The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ * only for internal usage!
+ * @param pszFormat Format string.
+ * @param ... Format arguments.
+ * @remark This is a worker function for LogRelIt.
+ */
+RTDECL(void) RTLogRelLogger(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup,
    const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(4, 5);
+
+/**
+ * Write to a logger instance, defaulting to the release one.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param pLogger Pointer to logger instance. If NULL the default release instance is attempted.
+ * @param fFlags The logging flags.
+ * @param iGroup The group.
+ * @param pszFormat Format string.
+ * @param args Format arguments.
+ */
+RTDECL(void) RTLogRelLoggerV(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup,
    const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(4, 0);
+
+/**
+ * printf like function for writing to the default release log.
+ *
+ * @param pszFormat Printf like format string.
+ * @param ... Optional arguments as specified in pszFormat.
+ *
+ * @remark The API doesn’t support formatting of floating point numbers at the moment.
+ */
+RTDECL(void) RTLogRelPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * vprintf like function for writing to the default release log.
+ *
+ * @param pszFormat Printf like format string.
+ * @param args Optional arguments as specified in pszFormat.
+ *
+ * @remark The API doesn’t support formatting of floating point numbers at the moment.
+ */
+RTDECL(void) RTLogRelPrintfV(const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(1, 0);
+
+/**
+ * Changes the buffering setting of the default release logger.
+ */
+ * This can be used for optimizing longish logging sequences.
+ *
+ * @returns The old state.
+ * @param   fBuffered The new state.
+ */
+RTDECL(bool) RTLogRelSetBuffering(bool fBuffered);
+
+/** @} */
+
+/** @name COM port logging */
+
+#ifdef DOXYGEN_RUNNING
+# define LOG_TO_COM
+# define LOG_NO_COM
+#endif
+
+/** @def LOG_TO_COM Redirects the normal logging macros to the serial versions. */
+*/
+
+/** @def LOG_NO_COM Disables all LogCom* macros. */
+*/
+
+/** @def LogCom Generic logging to serial port. */
+*/
+#if defined(LOG_ENABLED) && !defined(LOG_NO_COM)
+# define LogCom(a) RTLogComPrintf a
+#else
+# define LogCom(a) do { } while (0)
+#endif
+
+/** @def LogComFlow Logging to serial port of execution flow. */
+*/
+#if defined(LOG_ENABLED) && defined(LOG_ENABLE_FLOW) && !defined(LOG_NO_COM)
+# define LogComFlow(a) RTLogComPrintf a
+#else
+# define LogComFlow(a) do { } while (0)
+#endif
+
+#ifdef LOG_TO_COM

+# undef Log
+# define Log(a) LogCom(a)
+# undef LogFlow
+# define LogFlow(a) LogComFlow(a)
+#endif
+
+/** @} */
+
+/** @} Backdoor Logging
+ * @{
+ * @def LOG_TO_BACKDOOR
+ * Redirects the normal logging macros to the backdoor versions.
+ */
+
+/** @} LOG_TO_BACKDOOR
+ * @} Defines LOG_TO_BACKDOOR
+ * Disables all LogBackdoor* macros.
+ */
+
+/** @} LogBackdoor
+ * Generic logging to the VBox backdoor via port I/O.
+ */
+
+/** @} LOG_ENABLED) && !defined(LOG_NO_BACKDOOR) #define LogBackdoor(a) RLogBackdoorPrintf a
+else
+endif
+
+/** @} LogBackdoorFlow
+ * Logging of execution flow messages to the backdoor I/O port.
+ */
+
+/** @} LOG_ENABLED) && !defined(LOG_NO_BACKDOOR) #define LogBackdoorFlow(a) RLogBackdoorPrintf a
+else
+endif
+
+/** @} LogRelBackdoor
+ * Release logging to the VBox backdoor via port I/O.
+ */
+
+/** @} LOG_NO_BACKDOOR) #define LogRelBackdoor
+ * Release logging to the VBox backdoor via port I/O.
+ */
+
+/** @}
/** @} */

/**
 * Gets the default logger instance, creating it if necessary.
 *
 * @returns Pointer to default logger instance if available, otherwise NULL.
 */
RTDECL(PRTLOGGER) RTLogDefaultInstance(void);

/**
 * Gets the logger instance if enabled, creating it if necessary.
 *
 * @returns Pointer to default logger instance, if group has the specified
 *          flags enabled. Otherwise NULL is returned.
 * @param   fFlagsAndGroup  The flags in the lower 16 bits, the group number in
 *                          the high 16 bits.
 */
RTDECL(PRTLOGGER) RTLogDefaultInstanceEx(uint32_t fFlagsAndGroup);

/**
 * Gets the default logger instance.
 *
 * @returns Pointer to default logger instance if available, otherwise NULL.
 */
RTDECL(PRTLOGGER) RTLogGetDefaultInstance(void);

/**
 * Gets the default logger instance if enabled.
+ * @returns Pointer to default logger instance, if group has the specified
+ * flags enabled. Otherwise NULL is returned.
+ * @param  fFlagsAndGroup The flags in the lower 16 bits, the group number in
+ * the high 16 bits.
+ */
+RTDECL(PRTLOGGER) RTLogGetDefaultInstanceEx(uint32_t fFlagsAndGroup);
+
+#ifndef IN_RC
+/**
+ * Sets the default logger instance.
+ *
+ * @returns The old default instance.
+ * @param  pLogger  The new default logger instance.
+ */
+RTDECL(PRTLOGGER) RTLogSetDefaultInstance(PRTLOGGER pLogger);
+#endif /* !IN_RC */
+
+#ifdef IN_RING0
+/**
+ * Changes the default logger instance for the current thread.
+ *
+ * @returns IPRT status code.
+ * @param  pLogger  The logger instance. Pass NULL for deregistration.
+ * @param  uKey Associated key for cleanup purposes. If pLogger is NULL,
+ * all instances with this key will be deregistered. So in
+ * order to only deregister the instance associated with the
+ * current thread use 0.
+ */
+RTDECL(int) RTLogSetDefaultInstanceThread(PRTLOGGER pLogger, uintptr_t uKey);
+#endif /* IN_RING0 */
+
+#ifndef IN_RC
+/**
+ * Creates the default logger instance for a iprt users.
+ *
+ * Any user of the logging features will need to implement
+ * this or use the generic dummy.
+ *
+ * @returns Pointer to the logger instance.
+ */
+RTDECL(PRTLOGGER) RTLogDefaultInit(void);
+/**
+ * Create a logger instance.
+ *
+ * @returns iprt status code.
RTDECL(int) RTLogCreate(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings, const char *pszEnvVarBase, unsigned cGroups, const char * const *papszGroups, uint32_t fDestFlags, const char *pszFilenameFmt, ...)

+ RTDECL(int) RTLogCreate(PRTLOGGER *ppLogger, uint32_t tfFlags, const char *pszGroupSettings,
+                         const char *pszEnvVarBase, unsigned cGroups, const char * const *papszGroups,
+                         uint32_t fDestFlags, const char *pszFilenameFmt, ...)

RT_IPRT_FORMAT_ATTR_MAYBE_NULL(8, 9);

+/*
+ * Create a logger instance.
+ *
+ * @param   ppLogger            Where to store the logger instance.
+ * @param   fFlags              Logger instance flags, a combination of the
+ *                              RTLOGFLAGS_* values.
+ * @param   pszGroupSettings    The initial group settings.
+ * @param   pszEnvVarBase       Base name for the environment variables for
+ *                              this instance.
+ * @param   cGroups             Number of groups in the array.
+ * @param   papszGroups         Pointer to array of groups. This must stick
+ *                              around for the life of the logger instance.
+ * @param   fDestFlags          The destination flags. RTLOGDEST_FILE is ORed
+ *                              if pszFilenameFmt specified.
+ * @param   pszFilenameFmt      Log filename format string. Standard
+ *                              RTStrFormat().
+ * @param   ...                 Format arguments.
+ */

+RTDECL(int) RTLogCreate(PRTLOGGER *ppLogger, uint32_t tfFlags, const char *pszGroupSettings,
+                         const char *pszEnvVarBase, unsigned cGroups, const char * const *papszGroups,
+                         uint32_t fDestFlags, const char *pszFilenameFmt, ...)

RT_IPRT_FORMAT_ATTR_MAYBE_NULL(8, 9);

+*/

+ @param ppLogger            Where to store the logger instance.
+ @param fFlags              Logger instance flags, a combination of the
+ RTLOGFLAGS_* values.
+ @param pszGroupSettings    The initial group settings.
+ @param pszEnvVarBase       Base name for the environment variables for
+ this instance.
+ @param cGroups             Number of groups in the array.
+ @param papszGroups         Pointer to array of groups. This must stick
+ around for the life of the logger instance.
+ @param fDestFlags          The destination flags. RTLOGDEST_FILE is ORed
+ if pszFilenameFmt specified.
+ @param pfLogPhase          Callback function for starting logging and for
+ ending or starting a new file for log history
+ rotation. NULL is OK.
+ @param cHistory            Number of old log files to keep when performing
+ log history rotation. 0 means no history.
+ @param cbHistoryMax        Maximum size of log file when performing
+ history rotation. 0 means no size limit.
+ @param cSecsHistoryTimeSlot Maximum time interval per log file when
+ performing history rotation, in seconds.
+ 0 means time limit.
+ @param pErrInfo            Where to return extended error information.
RTDECL(int) RTLogCreateEx(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings, const char *pszEnvVarBase, unsigned cGroups, const char * const * papszGroups, uint32_t fDestFlags, PFNRTLOGPHASE pfnPhase, uint32_t cHistory, uint64_t cbHistoryFileMax, uint32_t cSecsHistoryTimeSlot, PRERRORINFO pErrInfo, const char *pszFilenameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(13, 14);

RTDECL(int) RTLogCreateExV(PRTLOGGER *ppLogger, uint32_t fFlags, const char *pszGroupSettings, const char *pszEnvVarBase, unsigned cGroups, const char * const * papszGroups, uint32_t fDestFlags, PFNRTLOGPHASE pfnPhase, uint32_t cHistory, uint64_t cbHistoryFileMax, uint32_t cSecsHistoryTimeSlot, PRERRORINFO pErrInfo, const char *pszFilenameFmt, va_list args) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(13, 0);
+/**
+ * Create a logger instance for singled threaded ring-0 usage.
+ *
+ * @returns iprt status code.
+ *
+ * @param   pLogger             Where to create the logger instance.
+ * @param   cbLogger            The amount of memory available for the logger instance.
+ * @param   pLoggerR0Ptr        The ring-0 address corresponding to @a pLogger.
+ * @param   pfnLoggerR0Ptr      Pointer to logger wrapper function.
+ * @param   pfnFlushR0Ptr       Pointer to flush function.
+ * @param   fFlags              Logger instance flags, a combination of the RTLOGFLAGS_* values.
+ * @param   fDestFlags          The destination flags.
+ */
+RTDECL(int) RTLogCreateForR0(PRTLOGGER pLogger, size_t cbLogger,
   RTR0PTR pLoggerR0Ptr, RTR0PTR pfnLoggerR0Ptr, RTR0PTR pfnFlushR0Ptr,
   uint32_t fFlags, uint32_t fDestFlags);
+
+/**
+ * Calculates the minimum size of a ring-0 logger instance.
+ *
+ * @returns The minimum size.
+ * @param   cGroups             The number of groups.
+ * @param   fFlags              Relevant flags.
+ */
+RTDECL(size_t) RTLogCalcSizeForR0(uint32_t cGroups, uint32_t fFlags);
+
+/**
+ * Destroys a logger instance.
+ *
+ * The instance is flushed and all output destinations closed (where applicable).
+ *
+ * @returns iprt status code.
+ * @param   pLogger             The logger instance which close destroyed. NULL is fine.
+ */
+RTDECL(int) RTLogDestroy(PRTLOGGER pLogger);
+
+/**
+ * Create a logger instance clone for RC usage.
+ *
+ * @returns iprt status code.
+ * @param   pLogger             The logger instance to be cloned.
+ * @param   pLoggerRC           Where to create the RC logger instance.
+ * @param   cbLoggerRC          Amount of memory allocated to for the RC logger
+ *                               instance clone.
+ * @param   pfnLoggerRCPtr      Pointer to logger wrapper function for this
+ *                               instance (RC Ptr).
+ * @param   pfnFlushRCPtr       Pointer to flush function (RC Ptr).
+ */
+ * @param   fFlags              Logger instance flags, a combination of the RTLOGFLAGS_* values.
+ *
+RTDECL(int) RTLogCloneRC(PRTLOGGER pLogger, PRTLOGGERRC pLoggerRC, size_t cbLoggerRC,
+ RTRCPTR pfnLoggerRCPtr, RTRCPTR pfnFlushRCPtr, uint32_t fFlags);
+ 
+ /**
+ * Flushes a RC logger instance to a R3 logger.
+ *
+ * @returns iprt status code.
+ * @param   pLoggerRC   The RC logger instance to flush.
+ * @param   pLogger     The R3 logger instance to flush pLoggerRC to. If NULL the default logger is used.
+ *
+RTDECL(void) RTLogFlushRC(PRTLOGGER pLogger, PRTLOGGERRC pLoggerRC);
+ 
+ /**
+ * Flushes the buffer in one logger instance onto another logger.
+ *
+ * @returns iprt status code.
+ *
+ * @param   pSrcLogger   The logger instance to flush.
+ * @param   pDstLogger   The logger instance to flush onto. If NULL the default logger will be used.
+ *
+RTDECL(void) RTLogFlushToLogger(PRTLOGGER pSrcLogger, PRTLOGGER pDstLogger);
+ 
+ /**
+ * Flushes a R0 logger instance to a R3 logger.
+ *
+ * @returns iprt status code.
+ *
+ * @param   pLogger      The R3 logger instance to flush pLoggerR0 to. If NULL the default logger is used.
+ * @param   pLoggerR0    The R0 logger instance to flush.
+ *
+RTDECL(void) RTLogFlushR0(PRTLOGGER pLogger, PRTLOGGER pLoggerR0);
+ 
+ /**
+ * Sets the custom prefix callback.
+ *
+ * @returns IPRT status code.
+ *
+ * @param   pLogger     The logger instance.
+ * @param   pfnCallback The callback.
+ * @param   pvUser      The user argument for the callback.
+ *
+RTDECL(int) RTLogSetCustomPrefixCallback(PRTLOGGER pLogger, PFNRTLOGPREFIX pfnCallback, void *pvUser);
+ 
+ /**

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Same as RTLogSetCustomPrefixCallback for loggers created by RTLogCreateForR0.

@returns IPRT status code.
@param pLogger The logger instance.
@param pLoggerR0Ptr The ring-0 address corresponding to @a pLogger.
@param pfnCallbackR0Ptr The callback.
@param pvUserR0Ptr The user argument for the callback.

RTDECL(int) RTLogSetCustomPrefixCallbackForR0(PRTLOGGER pLogger, RTR0PTR pLoggerR0Ptr, RTR0PTR pfnCallbackR0Ptr, RTR0PTR pvUserR0Ptr);

Copies the group settings and flags from logger instance to another.

@returns IPRT status code.
@param pDstLogger The destination logger instance.
@param pDstLoggerR0Ptr The ring-0 address corresponding to @a pDstLogger.
@param pSrcLogger The source logger instance. If NULL the default one is used.
@param fFlagsOr OR mask for the flags.
@param fFlagsAnd AND mask for the flags.

RTDECL(int) RTLogCopyGroupsAndFlagsForR0(PRTLOGGER pDstLogger, RTR0PTR pDstLoggerR0Ptr, PCRTLOGGER pSrcLogger, uint32_t fFlagsOr, uint32_t fFlagsAnd);

Get the current log group settings as a string.

@returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
@param pLogger Logger instance (NULL for default logger).
@param pszBuf The output buffer.
@param cchBuf The size of the output buffer. Must be greater than zero.

RTDECL(int) RTLogGetGroupSettings(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf);

Updates the group settings for the logger instance using the specified specification string.

@returns iprt status code.
@returns Failures can safely be ignored.
@param pLogger Logger instance (NULL for default logger).
@param pszValue Value to parse.

RTDECL(int) RTLogGroupSettings(PRTLOGGER pLogger, const char *pszValue);
/**
 * Updates the flags for the logger instance using the specified
 * specification string.
 *
 * @returns iprt status code.
 * Failures can safely be ignored.
 *
 * @param   pLogger     Logger instance (NULL for default logger).
 * @param   pszValue    Value to parse.
 */
RTDECL(int) RTLogFlags(PRTLOGGER pLogger, const char *pszValue);
+
+/**
 * Changes the buffering setting of the specified logger.
 *
 * This can be used for optimizing longish logging sequences.
 *
 * @returns The old state.
 *
 * @param   pLogger         The logger instance (NULL is an alias for the
 *                          default logger).
 * @param   fBuffered       The new state.
 */
RTDECL(bool) RTLogSetBuffering(PRTLOGGER pLogger, bool fBuffered);
+
+/**
 * Sets the max number of entries per group.
 *
 * @returns Old restriction.
 *
 * @param   pLogger             The logger instance (NULL is an alias for the
 *                              default logger).
 * @param   cMaxEntriesPerGroup The max number of entries per group.
 * @remarks Lowering the limit of an active logger may quietly mute groups.
 * Raising it may reactivate already muted groups.
 */
RTDECL(uint32_t) RTLogSetGroupLimit(PRTLOGGER pLogger, uint32_t cMaxEntriesPerGroup);
+
+#ifndef IN_RC
+/**
 * Get the current log flags as a string.
 *
 * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW.
 *
 * @param   pLogger             Logger instance (NULL for default logger).
 * @param   pszBuf              The output buffer.
 * @param   cchBuf              The size of the output buffer. Must be greater
 * @returns than zero.
 */
RTDECL(int) RTLogGetFlags(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf);
/**
 * Updates the logger destination using the specified string.
 */
RTDECL(int) RTLogDestinations(PRTLOGGER pLogger, char const *pszValue);

/**
 * Clear the file delay flag if set, opening the destination and flushing.
 */
RTDECL(int) RTLogClearFileDelayFlag(PRTLOGGER pLogger, PRERRINFO pErrInfo);

/**
 * Get the current log destinations as a string.
 */
RTDECL(int) RTLogGetDestinations(PRTLOGGER pLogger, char *pszBuf, size_t cchBuf);

/**
 * Flushes the specified logger.
 */
RTDECL(void) RTLogFlush(PRTLOGGER pLogger);

/**
 * Write to a logger instance.
 */
RTDECL(int) RTLogWrite(PRTLOGGER pLogger, char const *pszFormat, ...);
+ RTDECL(void) RTLogLogger(PRTLOGGER pLogger, void *pvCallerRet, const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(3, 4);
+
+/**
+ * Write to a logger instance.
+ *
+ * @param   pLogger     Pointer to logger instance.
+ * @param   pszFormat   Format string.
+ * @param   args        Format arguments.
+ */
+RTDECL(void) RTLogLoggerV(PRTLOGGER pLogger, const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(3, 0);
+
+/**
+ * Write to a logger instance.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param   pLogger     Pointer to logger instance. If NULL the default logger instance will be attempted.
+ * @param   fFlags      The logging flags.
+ * @param   iGroup      The group.
+ *                      The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ *                      only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   ...         Format arguments.
+ * @remark  This is a worker function of LogIt.
+ */
+RTDECL(void) RTLogLoggerEx(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup,
+                           const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(4, 5);
+
+/**
+ * Write to a logger instance.
+ *
+ * This function will check whether the instance, group and flags makes up a
+ * logging kind which is currently enabled before writing anything to the log.
+ *
+ * @param   pLogger     Pointer to logger instance. If NULL the default logger instance will be attempted.
+ * @param   fFlags      The logging flags.
+ * @param   iGroup      The group.
+ *                      The value ~0U is reserved for compatibility with RTLogLogger[V] and is
+ *                      only for internal usage!
+ * @param   pszFormat   Format string.
+ * @param   args        Format arguments.
+ */
+RTDECL(void) RTLogLoggerExV(PRTLOGGER pLogger, unsigned fFlags, unsigned iGroup,
+                            const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(4, 0);
/**
 * printf like function for writing to the default log.
 *
 * @param   pszFormat   Printf like format string.
 * @param   ...         Optional arguments as specified in pszFormat.
 *
 * @remark The API doesn’t support formatting of floating point numbers at the moment.
 */

RTDECL(void) RTLogPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);

/**
 * vprintf like function for writing to the default log.
 *
 * @param   pszFormat   Printf like format string.
 * @param   va          Optional arguments as specified in pszFormat.
 *
 * @remark The API doesn’t support formatting of floating point numbers at the moment.
 */

RTDECL(void) RTLogPrintfV(const char *pszFormat, va_list va)  RT_IPRT_FORMAT_ATTR(1, 0);

/**
 * Dumper vprintf-like function outputting to a logger.
 *
 * @param   pvUser          Pointer to the logger instance to use, NULL for
 *                          default instance.
 * @param   pszFormat       Format string.
 * @param   va              Format arguments.
 */

RTDECL(void) RTLogDumpPrintfV(void *pvUser, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(2, 0);

#ifndef DECLARED_FNRTSTROUTPUT          /* duplicated in iprt/string.h */
#define DECLARED_FNRTSTROUTPUT

/**
 * Output callback.
 *
 * @returns number of bytes written.
 * @param   pvArg       User argument.
 * @param   pachChars   Pointer to an array of utf-8 characters.
 * @param   cbChars     Number of bytes in the character array pointed to by pachChars.
 */

typedef DECLCALLBACK(size_t) FNRTSTROUTPUT(void *pvArg, const char *pachChars, size_t cbChars);

/** Pointer to callback function. */
#define FNRTSTROUTPUT *PFNRTSTROUTPUT
#endif
/**
 * Partial vsprintf worker implementation.
 *
 * @returns number of bytes formatted.
 * @param   pfnOutput   Output worker.
 *                     Called in two ways. Normally with a string an it’s length.
 *                     For termination, it’s called with NULL for string, 0 for length.
 * @param   pvArg       Argument to output worker.
 * @param   pszFormat   Format string.
 * @param   args        Argument list.
 */

RTDECL(size_t) RTLogFormatV(PFNRTSTROUTPUT pfnOutput, void *pvArg, const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(3, 0);

/**
 * Write log buffer to COM port.
 *
 * @param   pach        Pointer to the buffer to write.
 * @param   cb          Number of bytes to write.
 */

RTDECL(void) RTLogWriteCom(const char *pach, size_t cb);

/**
 * Prints a formatted string to the serial port used for logging.
 *
 * @returns Number of bytes written.
 * @param   pszFormat   Format string.
 * @param   ...         Optional arguments specified in the format string.
 */

RTDECL(size_t) RTLogComPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);

/**
 * Prints a formatted string to the serial port used for logging.
 *
 * @returns Number of bytes written.
 * @param   pszFormat   Format string.
 * @param   args        Optional arguments specified in the format string.
 */

RTDECL(size_t) RTLogComPrintfV(const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(1, 0);

#if 0 /* not implemented yet */

/** Indicates that the semaphores shall be used to notify the other
 * part about buffer changes. */

#define LOGHOOKBUFFER_FLAGS_SEMAPHORED 1

#endif /* not implemented yet */
* Log Hook Buffer.
* Use to communicate between the logger and a log consumer.
*
typedef struct RTLOGHOOKBUFFER
{
    /** Write pointer. */
    volatile void *pvWrite;
    /** Read pointer. */
    volatile void *pvRead;
    /** Buffer start. */
    void *pvStart;
    /** Buffer end (exclusive). */
    void *pvEnd;
    /** Signaling semaphore used by the writer to wait on a full buffer. */
    * Only used when indicated in flags. */
    void *pvSemWriter;
    /** Signaling semaphore used by the read to wait on an empty buffer. */
    * Only used when indicated in flags. */
    void *pvSemReader;
    /** Buffer flags. Current reserved and set to zero. */
    volatile unsigned fFlags;
} RTLOGHOOKBUFFER;

/** Pointer to a log hook buffer. */
typedef RTLOGHOOKBUFFER *PRTLOGHOOKBUFFER;

/** Register a logging hook. */
* This type of logging hooks are expecting different threads acting
* producer and consumer. They share a circular buffer which have two
* pointers one for each end. When the buffer is full there are two
* alternatives (indicated by a buffer flag), either wait for the
* consumer to get it's job done, or to write a generic message saying
* buffer overflow.
* Since the waiting would need a signal semaphore, we'll skip that for now.
*
* @returns iprt status code.
* @param pBuffer Pointer to a logger hook buffer.
*/
+RTDECL(int) RTLogRegisterHook(PRTLOGGER pLogger, PRTLOGHOOKBUFFER pBuffer);

/** Deregister a logging hook registered with RTLogRegisterHook(). */
* @returns iprt status code.
* @param pBuffer Pointer to a logger hook buffer.
+ */
+RTDECL(int) RTLogDeregisterHook(PRTLOGGER pLogger, PRTLOGHOOKBUFFER pBuffer);
+ 
+#endif /* not implemented yet */
+ 
+ +/**
+ * Write log buffer to a debugger (RTLOGDEST_DEBUGGER).
+ *
+ @param  pach  What to write.
+ @param  cb    How much to write.
+ @remark When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteDebugger(const char *pach, size_t cb);
+
+/**
+ * Write log buffer to a user defined output stream (RTLOGDEST_USER).
+ *
+ @param  pach  What to write.
+ @param  cb    How much to write.
+ @remark When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteUser(const char *pach, size_t cb);
+
+/**
+ * Write log buffer to stdout (RTLOGDEST_STDOUT).
+ *
+ @param  pach  What to write.
+ @param  cb    How much to write.
+ @remark When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteStdOut(const char *pach, size_t cb);
+
+/**
+ * Write log buffer to stderr (RTLOGDEST_STDERR).
+ *
+ @param  pach  What to write.
+ @param  cb    How much to write.
+ @remark When linking statically, this function can be replaced by defining your own.
+ */
+RTDECL(void) RTLogWriteStdErr(const char *pach, size_t cb);
+
+#ifdef VBOX
+
+/**
+ * Prints a formatted string to the backdoor port.
+ *
+ */
+RTDECL(void) RTLogWriteStdErr(const char *pach, size_t cb);
+
+#ifndef VBOX
+
+ * @returns Number of bytes written.
+ * @param pszFormat Format string.
+ * @param ... Optional arguments specified in the format string.
+ */
+RTDECL(size_t) RTLogBackdoorPrintf(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2);
+
+/**
+ * Prints a formatted string to the backdoor port.
+ *
+ * @returns Number of bytes written.
+ * @param pszFormat Format string.
+ * @param args Optional arguments specified in the format string.
+ */
+RTDECL(size_t) RTLogBackdoorPrintfV(const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(1, 0);
+
+#endif /* VBOX */
+
+RT_C_DECLS_END
+
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/mangling.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/mangling.h
@@ -0,0 +1,3709 @@
+/** @file
+ * IPRT - Symbol Mangling.
+ *
+ * This header is used to mangle public IPRT symbol to make it possible to have
+ * several IPRT version loaded into one symbol space at the same time. To
+ * enable symbol mangling you create a header which the compiler includes for
+ * every compilation unit (check out the -include option of gcc). Your header
+ * will define RT_MANGLER(name) and then include this header to set up the
+ * actual mappings.
+ */
+
+/**
+ * Copyright (C) 2011-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
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```
#ifndef ___iprt_mangling_h
#define ___iprt_mangling_h

#ifndef RT_MANGLER
#error "RT_MANGLER is not defined."
#endif

#ifndef DOXYGEN_RUNNING

/** @def RT_WITH_MANGLING
 * Indicates that we're mangling symbols. */
#define RT_WITH_MANGLING

/* Stable functions (alphabetical order): */

/* ASM*: */
#define ASMAddFlags                                    RT_MANGLER(ASMAddFlags)
#define ASMAddFlags_EndProc                            RT_MANGLER(ASMAddFlags_EndProc)
#define ASMAtomicAddU16                                RT_MANGLER(ASMAtomicAddU16)
#define ASMAtomicAddU16_EndProc                        RT_MANGLER(ASMAtomicAddU16_EndProc)
#define ASMAtomicAddU32                                RT_MANGLER(ASMAtomicAddU32)
#define ASMAtomicAddU32_EndProc                        RT_MANGLER(ASMAtomicAddU32_EndProc)
#define ASMAtomicAddU64                                RT_MANGLER(ASMAtomicAddU64)
#define ASMAtomicAddU64_EndProc                        RT_MANGLER(ASMAtomicAddU64_EndProc)
#define ASMAtomicAndU32                                RT_MANGLER(ASMAtomicAndU32)
#define ASMAtomicAndU32_EndProc                        RT_MANGLER(ASMAtomicAndU32_EndProc)
#define ASMAtomicAndU64                                RT_MANGLER(ASMAtomicAndU64)
#define ASMAtomicAndU64_EndProc                        RT_MANGLER(ASMAtomicAndU64_EndProc)
#define ASMAtomicBitClear                              RT_MANGLER(ASMAtomicBitClear)
#define ASMAtomicBitClear_EndProc                      RT_MANGLER(ASMAtomicBitClear_EndProc)
```

```
# define ASMAtomicBitSet RT_MANGLER(ASMAtomicBitSet)
# define ASMAtomicBitSet_EndProc RT_MANGLER(ASMAtomicBitSet_EndProc)
# define ASMAtomicBitTestAndClear RT_MANGLER(ASMAtomicBitTestAndClear)
# define ASMAtomicBitTestAndClear_EndProc RT_MANGLER(ASMAtomicBitTestAndClear_EndProc)
# define ASMAtomicBitTestAndSet RT_MANGLER(ASMAtomicBitTestAndSet)
# define ASMAtomicBitTestAndSet_EndProc RT_MANGLER(ASMAtomicBitTestAndSet_EndProc)
# define ASMAtomicBitTestAndToggle RT_MANGLER(ASMAtomicBitTestAndToggle)
# define ASMAtomicBitTestAndToggle_EndProc RT_MANGLER(ASMAtomicBitTestAndToggle_EndProc)
# define ASMAtomicCmpXchgExU32 RT_MANGLER(ASMAtomicCmpXchgExU32)
# define ASMAtomicCmpXchgExU32_EndProc RT_MANGLER(ASMAtomicCmpXchgExU32_EndProc)
# define ASMAtomicCmpXchgExU64 RT_MANGLER(ASMAtomicCmpXchgExU64)
# define ASMAtomicCmpXchgExU64_EndProc RT_MANGLER(ASMAtomicCmpXchgExU64_EndProc)
# define ASMAtomicCmpXchgU32 RT_MANGLER(ASMAtomicCmpXchgU32)
# define ASMAtomicCmpXchgU32_EndProc RT_MANGLER(ASMAtomicCmpXchgU32_EndProc)
# define ASMAtomicCmpXchgU64 RT_MANGLER(ASMAtomicCmpXchgU64)
# define ASMAtomicCmpXchgU64_EndProc RT_MANGLER(ASMAtomicCmpXchgU64_EndProc)
# define ASMAtomicCmpXchgU8 RT_MANGLER(ASMAtomicCmpXchgU8)
# define ASMAtomicCmpXchgU8_EndProc RT_MANGLER(ASMAtomicCmpXchgU8_EndProc)
# define ASMAtomicDecU16 RT_MANGLER(ASMAtomicDecU16)
# define ASMAtomicDecU16_EndProc RT_MANGLER(ASMAtomicDecU16_EndProc)
# define ASMAtomicDecU32 RT_MANGLER(ASMAtomicDecU32)
# define ASMAtomicDecU32_EndProc RT_MANGLER(ASMAtomicDecU32_EndProc)
# define ASMAtomicDecU64 RT_MANGLER(ASMAtomicDecU64)
# define ASMAtomicDecU64_EndProc RT_MANGLER(ASMAtomicDecU64_EndProc)
# define ASMAtomicIncU16 RT_MANGLER(ASMAtomicIncU16)
# define ASMAtomicIncU16_EndProc RT_MANGLER(ASMAtomicIncU16_EndProc)
# define ASMAtomicIncU32 RT_MANGLER(ASMAtomicIncU32)
# define ASMAtomicIncU32_EndProc RT_MANGLER(ASMAtomicIncU32_EndProc)
# define ASMAtomicIncU64 RT_MANGLER(ASMAtomicIncU64)
# define ASMAtomicIncU64_EndProc RT_MANGLER(ASMAtomicIncU64_EndProc)
# define ASMAtomicOrU32 RT_MANGLER(ASMAtomicOrU32)
# define ASMAtomicOrU32_EndProc RT_MANGLER(ASMAtomicOrU32_EndProc)
# define ASMAtomicOrU64 RT_MANGLER(ASMAtomicOrU64)
# define ASMAtomicOrU64_EndProc RT_MANGLER(ASMAtomicOrU64_EndProc)
# define ASMAtomicReadU64 RT_MANGLER(ASMAtomicReadU64)
# define ASMAtomicReadU64_EndProc RT_MANGLER(ASMAtomicReadU64_EndProc)
# define ASMAtomicUoAndU32 RT_MANGLER(ASMAtomicUoAndU32)
# define ASMAtomicUoAndU32_EndProc RT_MANGLER(ASMAtomicUoAndU32_EndProc)
# define ASMAtomicUoAndU64 RT_MANGLER(ASMAtomicUoAndU64)
# define ASMAtomicUoAndU64_EndProc RT_MANGLER(ASMAtomicUoAndU64_EndProc)
# define ASMAtomicUoAndU64_EndProc RT_MANGLER(ASMAtomicUoAndU64_EndProc)
# define ASMAtomicUoAndU64_EndProc RT_MANGLER(ASMAtomicUoAndU64_EndProc)
# define ASMAtomicUoDecU32 RT_MANGLER(ASMAtomicUoDecU32)
# define ASMAtomicUoDecU32_EndProc RT_MANGLER(ASMAtomicUoDecU32_EndProc)
# define ASMAtomicUoDecU32_EndProc RT_MANGLER(ASMAtomicUoDecU32_EndProc)
RT_MANGLER(ASMBitToggle)  
RT_MANGLER(ASMBitToggle_EndProc)

RT_MANGLER(ASMByteSwapU16)  
RT_MANGLER(ASMByteSwapU16_EndProc)

RT_MANGLER(ASMByteSwapU32)  
RT_MANGLER(ASMByteSwapU32_EndProc)

RT_MANGLER(ASMChangeFlags)  
RT_MANGLER(ASMChangeFlags_EndProc)

RT_MANGLER(ASMClearFlags)  
RT_MANGLER(ASMClearFlags_EndProc)

RT_MANGLER(ASMCpuId)  
RT_MANGLER(ASMCpuId_EAX)  
RT_MANGLER(ASMCpuId_EBX)  
RT_MANGLER(ASMCpuId_ECX)  
RT_MANGLER(ASMCpuId_EDX)  
RT_MANGLER(ASMCpuId_EndProc)

RT_MANGLER(ASMCpuId_EAX_EndProc)  
RT_MANGLER(ASMCpuId_EBX_EndProc)  
RT_MANGLER(ASMCpuId_ECX_EndProc)  
RT_MANGLER(ASMCpuId_EDX_EndProc)  
RT_MANGLER(ASMCpuId_EndProc)

RT_MANGLER(ASMCpuId_EDX)  
RT_MANGLER(ASMCpuId_EDX_EndProc)

RT_MANGLER(ASMCpuId_Idx_ECX)  
RT_MANGLER(ASMCpuId_Idx_ECX_EndProc)

RT_MANGLER(ASMCpuIdExSlow)  
RT_MANGLER(ASMCpuIdExSlow_EndProc)

RT_MANGLER(ASMGetApicId)  
RT_MANGLER(ASMGetApicId_EndProc)

RT_MANGLER(ASMGetCR0)  
RT_MANGLER(ASMGetCR0_EndProc)

RT_MANGLER(ASMGetCR1)  
RT_MANGLER(ASMGetCR1_EndProc)

RT_MANGLER(ASMGGetCR2)  
RT_MANGLER(ASMGGetCR2_EndProc)

RT_MANGLER(ASMGGetCR3)  
RT_MANGLER(ASMGGetCR3_EndProc)

RT_MANGLER(ASMGGetCR4)  
RT_MANGLER(ASMGGetCR4_EndProc)

RT_MANGLER(ASMGGetCR8)  
RT_MANGLER(ASMGGetCR8_EndProc)

RT_MANGLER(ASMGGetCS)  
RT_MANGLER(ASMGGetCS_EndProc)

RT_MANGLER(ASMGGetDR0)  
RT_MANGLER(ASMGGetDR0_EndProc)

RT_MANGLER(ASMGGetDR1)  
RT_MANGLER(ASMGGetDR1_EndProc)

RT_MANGLER(ASMGGetDR2)  
RT_MANGLER(ASMGGetDR2_EndProc)
+# define ASMGetDR3                                      RT_MANGLER(ASMGetDR3)
+# define ASMGetDR3_EndProc                             RT_MANGLER(ASMGetDR3_EndProc)
+## define ASMGetDR6                                    RT_MANGLER(ASMGetDR6)
+## define ASMGetDR6_EndProc                            RT_MANGLER(ASMGetDR6_EndProc)
+## define ASMGetDR7                                    RT_MANGLER(ASMGetDR7)
+## define ASMGetDR7_EndProc                            RT_MANGLER(ASMGetDR7_EndProc)
+## define ASMGetDS                                     RT_MANGLER(ASMGetDS)
+## define ASMGetDS_EndProc                             RT_MANGLER(ASMGetDS_EndProc)
+## define ASMGetES                                     RT_MANGLER(ASMGetES)
+## define ASMGetES_EndProc                             RT_MANGLER(ASMGetES_EndProc)
+## define ASMGetFlags                                  RT_MANGLER(ASMGetFlags)
+## define ASMGetFlags_EndProc                          RT_MANGLER(ASMGetFlags_EndProc)
+## define ASMGetFS                                     RT_MANGLER(ASMGetFS)
+## define ASMGetFS_EndProc                             RT_MANGLER(ASMGetFS_EndProc)
+## define ASMGetGDTR                                    RT_MANGLER(ASMGetGDTR)
+## define ASMGetGDTR_EndProc                           RT_MANGLER(ASMGetGDTR_EndProc)
+## define ASMGetGS                                     RT_MANGLER(ASMGetGS)
+## define ASMGetGS_EndProc                             RT_MANGLER(ASMGetGS_EndProc)
+## define ASMGetIDTR                                    RT_MANGLER(ASMGetIDTR)
+## define ASMGetIDTR_EndProc                           RT_MANGLER(ASMGetIDTR_EndProc)
+## define ASMGetIdtrLimit                              RT_MANGLER(ASMGetIdtrLimit)
+## define ASMGetIdtrLimit_EndProc                      RT_MANGLER(ASMGetIdtrLimit_EndProc)
+## define ASMGetLDTR                                    RT_MANGLER(ASMGetLDTR)
+## define ASMGetLDTR_EndProc                           RT_MANGLER(ASMGetLDTR_EndProc)
+## define ASMGetSegAttr                                 RT_MANGLER(ASMGetSegAttr)
+## define ASMGetSegAttr_EndProc                        RT_MANGLER(ASMGetSegAttr_EndProc)
+## define ASMGetSS                                     RT_MANGLER(ASMGetSS)
+## define ASMGetSS_EndProc                             RT_MANGLER(ASMGetSS_EndProc)
+## define ASMGetTR                                     RT_MANGLER(ASMGetTR)
+## define ASMGetTR_EndProc                             RT_MANGLER(ASMGetTR_EndProc)
+## define ASMGetXcr0                                    RT_MANGLER(ASMGetXcr0)
+## define ASMGetXcr0_EndProc                           RT_MANGLER(ASMGetXcr0_EndProc)
+## define ASMHalnt                                    RT_MANGLER(ASMHalnt)
+## define ASMHalnt_EndProc                             RT_MANGLER(ASMHalnt_EndProc)
+## define ASMInStrU16                                  RT_MANGLER(ASMInStrU16)
+## define ASMInStrU16_EndProc                          RT_MANGLER(ASMInStrU16_EndProc)
+## define ASMInStrU32                                  RT_MANGLER(ASMInStrU32)
+## define ASMInStrU32_EndProc                          RT_MANGLER(ASMInStrU32_EndProc)
+## define ASMInStrU8                                   RT_MANGLER(ASMInStrU8)
+## define ASMInStrU8_EndProc                           RT_MANGLER(ASMInStrU8_EndProc)
+## define ASMIntDisable                                RT_MANGLER(ASMIntDisable)
+## define ASMIntDisable_EndProc                        RT_MANGLER(ASMIntDisable_EndProc)
+## define ASMIntDisableFlags                           RT_MANGLER(ASMIntDisableFlags)
+## define ASMIntDisableFlags_EndProc                   RT_MANGLER(ASMIntDisableFlags_EndProc)
+## define ASMIntEnable                                 RT_MANGLER(ASMIntEnable)
+## define ASMIntEnable_EndProc                         RT_MANGLER(ASMIntEnable_EndProc)
+## define ASMInU16                                     RT_MANGLER(ASMInU16)
+## define ASMInU16_EndProc                             RT_MANGLER(ASMInU16_EndProc)
+ define ASMInU32
+ define ASMInU32_EndProc
+ define ASMInU8
+ define ASMInU8_EndProc
+ define ASMInvalidateInternalCaches
+ define ASMInvalidateInternalCaches_EndProc
+ define ASMInvalidatePage
+ define ASMInvalidatePage_EndProc
+ define ASMMemFill32
+ define ASMMemFill32_EndProc
+ define ASMMemFirstNonZero
+ define ASMMemFirstNonZero_EndProc
+ define ASMMemFirstMismatchingU8
+ define ASMMemFirstMismatchingU8_EndProc
+ define ASMMemFirstMismatchingU32
+ define ASMMemFirstMismatchingU32_EndProc
+ define ASMMemIsZero
+ define ASMMemIsZero_EndProc
+ define ASMMemIsAllU8
+ define ASMMemIsAllU8_EndProc
+ define ASMMemZero32
+ define ASMMemZero32_EndProc
+ define ASMMemZeroPage
+ define ASMMemZeroPage_EndProc
+ define ASMNopPause
+ define ASMNopPause_EndProc
+ define ASMOOutStrU16
+ define ASMOOutStrU16_EndProc
+ define ASMOOutStrU32
+ define ASMOOutStrU32_EndProc
+ define ASMOOutStrU8
+ define ASMOOutStrU8_EndProc
+ define ASMOOutU16
+ define ASMOOutU16_EndProc
+ define ASMOOutU32
+ define ASMOOutU32_EndProc
+ define ASMOOutU8
+ define ASMOOutU8_EndProc
+ define ASMPReadByte
+ define ASMPReadByte_EndProc
+ define ASMRdMsr
+ define ASMRdMsr_EndProc
+ define ASMRdMsr_High
+ define ASMRdMsr_High_EndProc
+ define ASMRdMsr_Low
+ define ASMRdMsr_Low_EndProc
+# define ASMRdMsrEx                RT_MANGLER(ASMRdMsrEx)
+# define ASMRdMsrEx_EndProc        RT_MANGLER(ASMRdMsrEx_EndProc)
+# define ASMReadTSC                RT_MANGLER(ASMReadTSC)
+# define ASMReadTSC_EndProc        RT_MANGLER(ASMReadTSC_EndProc)
+# define ASMReadTscWithAux         RT_MANGLER(ASMReadTscWithAux)
+# define ASMReadTscWithAux_EndProc RT_MANGLER(ASMReadTscWithAux_EndProc)
+# define ASMReloadTscWithAux       RT_MANGLER(ASMReloadTscWithAux)
+# define ASMReloadTscWithAux_EndProc RT_MANGLER(ASMReloadTscWithAux_EndProc)
+# define ASMReloadCR3              RT_MANGLER(ASMReloadCR3)
+# define ASMReloadCR3_EndProc      RT_MANGLER(ASMReloadCR3_EndProc)
+# define ASMSetCR0                 RT_MANGLER(ASMSetCR0)
+# define ASMSetCR0_EndProc         RT_MANGLER(ASMSetCR0_EndProc)
+# define ASMSetCR2                 RT_MANGLER(ASMSetCR2)
+# define ASMSetCR2_EndProc         RT_MANGLER(ASMSetCR2_EndProc)
+# define ASMSetCR3                 RT_MANGLER(ASMSetCR3)
+# define ASMSetCR3_EndProc         RT_MANGLER(ASMSetCR3_EndProc)
+# define ASMSetCR4                 RT_MANGLER(ASMSetCR4)
+# define ASMSetCR4_EndProc         RT_MANGLER(ASMSetCR4_EndProc)
+# define ASMSetDR0                 RT_MANGLER(ASMSetDR0)
+# define ASMSetDR0_EndProc         RT_MANGLER(ASMSetDR0_EndProc)
+# define ASMSetDR1                 RT_MANGLER(ASMSetDR1)
+# define ASMSetDR1_EndProc         RT_MANGLER(ASMSetDR1_EndProc)
+# define ASMSetDR2                 RT_MANGLER(ASMSetDR2)
+# define ASMSetDR2_EndProc         RT_MANGLER(ASMSetDR2_EndProc)
+# define ASMSetDR3                 RT_MANGLER(ASMSetDR3)
+# define ASMSetDR3_EndProc         RT_MANGLER(ASMSetDR3_EndProc)
+# define ASMSetDR6                 RT_MANGLER(ASMSetDR6)
+# define ASMSetDR6_EndProc         RT_MANGLER(ASMSetDR6_EndProc)
+# define ASMSetDR7                 RT_MANGLER(ASMSetDR7)
+# define ASMSetDR7_EndProc         RT_MANGLER(ASMSetDR7_EndProc)
+# define ASMSetXcr0                RT_MANGLER(ASMSetXcr0)
+# define ASMSetXcr0_EndProc        RT_MANGLER(ASMSetXcr0_EndProc)
+# define RTCdromLock                                    RT_MANGLER(RTCdromLock)
+# define RTCdromUnlock                                  RT_MANGLER(RTCdromUnlock)
+# define RTCdromCount                                   RT_MANGLER(RTCdromCount)
+# define RTCdromOrdinalToName                           RT_MANGLER(RTCdromOrdinalToName)
+# define RTCdromOpenByOrdinal                           RT_MANGLER(RTCdromOpenByOrdinal)
+# define RTCdromCount                                   RT_MANGLER(RTCdromCount)

+# define RTCdromDestroy                                 RT_MANGLER(RTCdromDestroy)
+# define RTCdromFree                                    RT_MANGLER(RTCdromFree)

+# define RTCircBufIsReading                             RT_MANGLER(RTCircBufIsReading)
+# define RTCircBufIsWriting                             RT_MANGLER(RTCircBufIsWriting)

+# define RTCircBufOpenByOrdinal                          RT_MANGLER(RTCircBufOpenByOrdinal)
+# define RTCircBufOffsetRead                             RT_MANGLER(RTCircBufOffsetRead)
+# define RTCircBufOffsetWrite                            RT_MANGLER(RTCircBufOffsetWrite)

+# define RTCircBufReleaseReadBlock                      RT_MANGLER(RTCircBufReleaseReadBlock)
+# define RTCircBufReleaseWriteBlock                     RT_MANGLER(RTCircBufReleaseWriteBlock)

+# define RTCircBufReset                                 RT_MANGLER(RTCircBufReset)
+# define RTCircBufSize                                  RT_MANGLER(RTCircBufSize)

+# define RTCircBufUsed                                  RT_MANGLER(RTCircBufUsed)

+# define RTCoreDumperDisable                            RT_MANGLER(RTCoreDumperDisable)  /* solaris */
+# define RTCoreDumperSetup                              RT_MANGLER(RTCoreDumperSetup)    /* solaris */

+# define RTCrc16Ccitt                                    RT_MANGLER(RTCrc16Ccitt)
+# define RTCrc16CcittProcess                             RT_MANGLER(RTCrc16CcittProcess)  /* solaris */
+# define RTCrc16CcittFinish                              RT_MANGLER(RTCrc16CcittFinish)    /* solaris */

+# define RTCrc16CcittStart                               RT_MANGLER(RTCrc16CcittStart)

+# define RTCrc32                                       RT_MANGLER(RTCrc32)

+# define RTCrc32Finish                                  RT_MANGLER(RTCrc32Finish)
+# define RTCrc32Process                                 RT_MANGLER(RTCrc32Process)

+# define RTCrc32Start                                   RT_MANGLER(RTCrc32Start)

+# define RTCrc32C                                      RT_MANGLER(RTCrc32C)

+# define RTCrc32CFinish                                 RT_MANGLER(RTCrc32CFinish)

+# define RTCrc32CProcess                                RT_MANGLER(RTCrc32CProcess)

+# define RTCrc32CStart                                  RT_MANGLER(RTCrc32CStart)

+# define RTCrc64                                       RT_MANGLER(RTCrc64)

+# define RTCrc64Finish                                 RT_MANGLER(RTCrc64Finish)

+# define RTCrc64Process                                RT_MANGLER(RTCrc64Process)

+# define RTCrc64Start                                  RT_MANGLER(RTCrc64Start)

+# define RTCrcAdler32                                  RT_MANGLER(RTCrcAdler32)

+# define RTCrcAdler32Finish                            RT_MANGLER(RTCrcAdler32Finish)

+# define RTCrcAdler32Process                            RT_MANGLER(RTCrcAdler32Process)

+# define RTCrcAdler32Start                              RT_MANGLER(RTCrcAdler32Start)

+# define RTCritSectDelete                              RT_MANGLER(RTCritSectDelete)

+# define RTCritSectEnter                                RT_MANGLER(RTCritSectEnter)

+# define RTCritSectEnterDebug                           RT_MANGLER(RTCritSectEnterDebug)

+# define RTCritSectEnterMultiple                        RT_MANGLER(RTCritSectEnterMultiple)

+# define RTCritSectEnterMultipleDebug                   RT_MANGLER(RTCritSectEnterMultipleDebug)
+-# define RTCritSectInit RT_MANGLER(RTCritSectInit)
+-# define RTCritSectInitEx RT_MANGLER(RTCritSectInitEx)
+-# define RTCritSectLeave RT_MANGLER(RTCritSectLeave)
+-# define RTCritSectLeaveMultiple RT_MANGLER(RTCritSectLeaveMultiple)
+-# define RTCritSectSetSubClass RT_MANGLER(RTCritSectSetSubClass)
+-# define RTCritSectTryEnter RT_MANGLER(RTCritSectTryEnter)
+-# define RTCritSectTryEnterDebug RT_MANGLER(RTCritSectTryEnterDebug)
+-# define RTCritSectRwDelete RT_MANGLER(RTCritSectRwDelete)
+-# define RTCritSectRwEnterExcl RT_MANGLER(RTCritSectRwEnterExcl)
+-# define RTCritSectRwEnterExclDebug RT_MANGLER(RTCritSectRwEnterExclDebug)
+-# define RTCritSectRwEnterShared RT_MANGLER(RTCritSectRwEnterShared)
+-# define RTCritSectRwEnterSharedDebug RT_MANGLER(RTCritSectRwEnterSharedDebug)
+-# define RTCritSectRwGetReadCount RT_MANGLER(RTCritSectRwGetReadCount)
+-# define RTCritSectRwGetWriteRecursion RT_MANGLER(RTCritSectRwGetWriteRecursion)
+-# define RTCritSectRwGetWriterReadRecursion RT_MANGLER(RTCritSectRwGetWriterReadRecursion)
+-# define RTCritSectRwInit RT_MANGLER(RTCritSectRwInit)
+-# define RTCritSectRwInitEx RT_MANGLER(RTCritSectRwInitEx)
+-# define RTCritSectRwIsReadOwner RT_MANGLER(RTCritSectRwIsReadOwner)
+-# define RTCritSectRwIsWriteOwner RT_MANGLER(RTCritSectRwIsWriteOwner)
+-# define RTCritSectRwLeaveExcl RT_MANGLER(RTCritSectRwLeaveExcl)
+-# define RTCritSectRwLeaveShared RT_MANGLER(RTCritSectRwLeaveShared)
+-# define RTCritSectRwSetSubClass RT_MANGLER(RTCritSectRwSetSubClass)
+-# define RTCritSectRwTryEnterExcl RT_MANGLER(RTCritSectRwTryEnterExcl)
+-# define RTCritSectRwTryEnterExclDebug RT_MANGLER(RTCritSectRwTryEnterExclDebug)
+-# define RTCritSectRwTryEnterShared RT_MANGLER(RTCritSectRwTryEnterShared)
+-# define RTCritSectRwTryEnterSharedDebug RT_MANGLER(RTCritSectRwTryEnterSharedDebug)
+-# define RTDbgAsCreate RT_MANGLER(RTDbgAsCreate)
+-# define RTDbgAsCreateF RT_MANGLER(RTDbgAsCreateF)
+-# define RTDbgAsCreateV RT_MANGLER(RTDbgAsCreateV)
+-# define RTDbgAsFirstAddr RT_MANGLER(RTDbgAsFirstAddr)
+-# define RTDbgAsLastAddr RT_MANGLER(RTDbgAsLastAddr)
+-# define RTDbgAsLineAdd RT_MANGLER(RTDbgAsLineAdd)
+-# define RTDbgAsLineByAddr RT_MANGLER(RTDbgAsLineByAddr)
+-# define RTDbgAsLineByAddrA RT_MANGLER(RTDbgAsLineByAddrA)
+-# define RTDbgAsLockExcl RT_MANGLER(RTDbgAsLockExcl)
+-# define RTDbgAsModuleByAddr RT_MANGLER(RTDbgAsModuleByAddr)
+-# define RTDbgAsModuleByIndex RT_MANGLER(RTDbgAsModuleByIndex)
+-# define RTDbgAsModuleByName RT_MANGLER(RTDbgAsModuleByName)
+-# define RTDbgAsModuleCount RT_MANGLER(RTDbgAsModuleCount)
+-# define RTDbgAsModuleLink RT_MANGLER(RTDbgAsModuleLink)
+-# define RTDbgAsModuleLinkSeg RT_MANGLER(RTDbgAsModuleLinkSeg)
+-# define RTDbgAsModuleQueryMapByIndex RT_MANGLER(RTDbgAsModuleQueryMapByIndex)
+-# define RTDbgAsModuleUnlink RT_MANGLER(RTDbgAsModuleUnlink)
+-# define RTDbgAsModuleName RT_MANGLER(RTDbgAsModuleName)
+-# define RTDbgAsRelease RT_MANGLER(RTDbgAsRelease)
+-# define RTDbgAsRetain RT_MANGLER(RTDbgAsRetain)
# define RTDbgAsSymbolAdd
RT_MANGLER(RTDbgAsSymbolAdd)
# define RTDbgAsSymbolByAddr
RT_MANGLER(RTDbgAsSymbolByAddr)
# define RTDbgAsSymbolByAddrA
RT_MANGLER(RTDbgAsSymbolByAddrA)
# define RTDbgAsSymbolByName
RT_MANGLER(RTDbgAsSymbolByName)
# define RTDbgAsSymbolByNameA
RT_MANGLER(RTDbgAsSymbolByNameA)
# define RTDbgAsUnlockExcl
RT_MANGLER(RTDbgAsUnlockExcl)
# define RTDbgCfgCreate
RT_MANGLER(RTDbgCfgCreate)
# define RTDbgCfgRetain
RT_MANGLER(RTDbgCfgRetain)
# define RTDbgCfgRelease
RT_MANGLER(RTDbgCfgRelease)
# define RTDbgCfgChangeString
RT_MANGLER(RTDbgCfgChangeString)
# define RTDbgCfgChangeUInt
RT_MANGLER(RTDbgCfgChangeUInt)
# define RTDbgCfgQueryString
RT_MANGLER(RTDbgCfgQueryString)
# define RTDbgCfgQueryUInt
RT_MANGLER(RTDbgCfgQueryUInt)
# define RTDbgCfgOpenDbg
RT_MANGLER(RTDbgCfgOpenDbg)
# define RTDbgCfgOpenDsymBundle
RT_MANGLER(RTDbgCfgOpenDsymBundle)
# define RTDbgCfgOpenMachOImage
RT_MANGLER(RTDbgCfgOpenMachOImage)
# define RTDbgCfgOpenDwo
RT_MANGLER(RTDbgCfgOpenDwo)
# define RTDbgCfgOpenPdb70
RT_MANGLER(RTDbgCfgOpenPdb70)
# define RTDbgCfgOpenPdb20
RT_MANGLER(RTDbgCfgOpenPdb20)
# define RTDbgCfgOpenPeImage
RT_MANGLER(RTDbgCfgOpenPeImage)
# define RTDbgCfgSetLogCallback
RT_MANGLER(RTDbgCfgSetLogCallback)
# define RTDbgLineAlloc
RT_MANGLER(RTDbgLineAlloc)
# define RTDbgLineDup
RT_MANGLER(RTDbgLineDup)
# define RTDbgLineFree
RT_MANGLER(RTDbgLineFree)
# define RTDbgModCreate
RT_MANGLER(RTDbgModCreate)
# define RTDbgModCreateFromDbg
RT_MANGLER(RTDbgModCreateFromDbg)
# define RTDbgModCreateFromDwo
RT_MANGLER(RTDbgModCreateFromDwo)
# define RTDbgModCreateFromImage
RT_MANGLER(RTDbgModCreateFromImage)
# define RTDbgModCreateFromMap
RT_MANGLER(RTDbgModCreateFromMap)
# define RTDbgModCreateFromPdb
RT_MANGLER(RTDbgModCreateFromPdb)
# define RTDbgModCreateFromPemage
RT_MANGLER(RTDbgModCreateFromPemage)
# define RTDbgModCreateFromMachOImage
RT_MANGLER(RTDbgModCreateFromMachOImage)
# define RTDbgModGetTag
RT_MANGLER(RTDbgModGetTag)
# define RTDbgModImageSize
RT_MANGLER(RTDbgModImageSize)
# define RTDbgModIsDeferred
RT_MANGLER(RTDbgModIsDeferred)
# define RTDbgModIsExports
RT_MANGLER(RTDbgModIsExports)
# define RTDbgModLineAdd
RT_MANGLER(RTDbgModLineAdd)
# define RTDbgModLineByAddr
RT_MANGLER(RTDbgModLineByAddr)
# define RTDbgModLineByAddrA
RT_MANGLER(RTDbgModLineByAddrA)
# define RTDbgModLineByOrdinal
RT_MANGLER(RTDbgModLineByOrdinal)
# define RTDbgModLineByOrdinalA
RT_MANGLER(RTDbgModLineByOrdinalA)
# define RTDbgModLineCount
RT_MANGLER(RTDbgModLineCount)
# define RTDbgModName
RT_MANGLER(RTDbgModName)
# define RTDbgModDebugFile
RT_MANGLER(RTDbgModDebugFile)
# define RTDbgModImageFile
RT_MANGLER(RTDbgModImageFile)
# define RTDbgModImageFileUsed
RT_MANGLER(RTDbgModImageFileUsed)
# define RTDbgModRelease
RT_MANGLER(RTDbgModRelease)
# define RTDbgModRemoveAll
RT_MANGLER(RTDbgModRemoveAll)
+ define RTDirRelDirRemove RT_MANGER(RTDirRelDirRemove)
+ define RTDirRelPathQueryInfo RT_MANGER(RTDirRelPathQueryInfo)
+ define RTDirRelPathSetMode RT_MANGER(RTDirRelPathSetMode)
+ define RTDirRelPathSetTimes RT_MANGER(RTDirRelPathSetTimes)
+ define RTDirRelPathSetOwner RT_MANGER(RTDirRelPathSetOwner)
+ define RTDirRelPathRename RT_MANGER(RTDirRelPathRename)
+ define RTDirRelPathUnlink RT_MANGER(RTDirRelPathUnlink)
+ define RTDirRelSymlinkCreate RT_MANGER(RTDirRelSymlinkCreate)
+ define RTDirRelSymlinkRead RT_MANGER(RTDirRelSymlinkRead)
+ define RTVfsDirOpenDir RT_MANGER(RTVfsDirOpenDir)
+ define RTVfsDirFromRtDir RT_MANGER(RTVfsDirFromRtDir)
+ define RTVfsDirOpenNormal RT_MANGER(RTVfsDirOpenNormal)
+ define RTDvmCreate RT_MANGER(RTDvmCreate)
+ define RTDvmCreateFromVfsFile RT_MANGER(RTDvmCreateFromVfsFile)
+ define RTDvmRetain RT_MANGER(RTDvmRetain)
+ define RTDvmRelease RT_MANGER(RTDvmRelease)
+ define RTDvmMapOpen RT_MANGER(RTDvmMapOpen)
+ define RTDvmMapInitialize RT_MANGER(RTDvmMapInitialize)
+ define RTDvmMapGetFormatName RT_MANGER(RTDvmMapGetFormatName)
+ define RTDvmMapGetFormatType RT_MANGER(RTDvmMapGetFormatType)
+ define RTDvmMapGetValidVolumes RT_MANGER(RTDvmMapGetValidVolumes)
+ define RTDvmMapGetMaxVolumes RT_MANGER(RTDvmMapGetMaxVolumes)
+ define RTDvmMapQueryBlockStatus RT_MANGER(RTDvmMapQueryBlockStatus)
+ define RTDvmMapQueryFirstVolume RT_MANGER(RTDvmMapQueryFirstVolume)
+ define RTDvmMapQueryNextVolume RT_MANGER(RTDvmMapQueryNextVolume)
+ define RTDvmVolumeRetain RT_MANGER(RTDvmVolumeRetain)
+ define RTDvmVolumeRelease RT_MANGER(RTDvmVolumeRelease)
+ define RTDvmVolumeGetSize RT_MANGER(RTDvmVolumeGetSize)
+ define RTDvmVolumeQueryName RT_MANGER(RTDvmVolumeQueryName)
+ define RTDvmVolumeGetType RT_MANGER(RTDvmVolumeGetType)
+ define RTDvmVolumeGetFlags RT_MANGER(RTDvmVolumeGetFlags)
+ define RTDvmVolumeRead RT_MANGER(RTDvmVolumeRead)
+ define RTDvmVolumeWrite RT_MANGER(RTDvmVolumeWrite)
+ define RTDvmVolumeSetQueryBlockStatusCallback RT_MANGER(RTDvmVolumeSetQueryBlockStatusCallback)
+ define RTDvmVolumeTypeGetDescr RT_MANGER(RTDvmVolumeTypeGetDescr)
+ define RTDvmVolumeCreateVfsFile RT_MANGER(RTDvmVolumeCreateVfsFile)
+ define RTEnvApplyChanges RT_MANGER(RTEnvApplyChanges)
+ define RTEnvClone RT_MANGER(RTEnvClone)
+ define RTEnvCloneUtf16Block RT_MANGER(RTEnvCloneUtf16Block)
+ define RTEnvCountEx RT_MANGER(RTEnvCountEx)
+ define RTEnvCreate RT_MANGER(RTEnvCreate)
+ define RTEnvCreateChangeRecord RT_MANGER(RTEnvCreateChangeRecord)
+ define RTEnvDestroy RT_MANGER(RTEnvDestroy)
+ define RTEnvDupEx RT_MANGER(RTEnvDupEx)
+ define RTEnvExist RT_MANGER(RTEnvExist)
+ define RTEnvExistsBad RT_MANGER(RTEnvExistsBad)
+ define RTEnvExistsUtf8 RT_MANGER(RTEnvExistsUtf8)
Open Source Used In 5GaaS Edge AC-4  39575

+## define RTEEnvExistEx
+## define RTEEnvFreeUtf8Block
+## define RTEEnvFreeUtf16Block
+## define RTEEnvGet
+## define RTEEnvGetBad
+## define RTEEnvGetByIndexEx
+## define RTEEnvGetByIndexRawEx
+## define RTEEnvGetUtf8
+## define RTEEnvGetEx
+## define RTEEnvGetExecEnvP
+## define RTEEnvIsChangeRecord
+## define RTEEnvPut
+## define RTEEnvPutBad
+## define RTEEnvPutUtf8
+## define RTEEnvPutEx
+## define RTEEnvQueryUtf16Block
+## define RTEEnvQueryUtf8Block
+## define RTEEnvReset
+## define RTEEnvSet
+## define RTEEnvSetBad
+## define RTEEnvSetUtf8
+## define RTEEnvSetEx
+## define RTEEnvUnset
+## define RTEEnvUnsetBad
+## define RTEEnvUnsetUtf8
+## define RTEEnvUnsetEx
+## define RTEErrCOMGet
+## define RTEErrConvertFromErrno
+## define RTEErrConvertToErrno
+## define RTEErrGet
+## define RTEErrInfoAlloc
+## define RTEErrInfoAllocEx
+## define RTEErrInfoFree
+## define RTEErrInfoSet
+## define RTEErrInfoSetF
+## define RTEErrInfoSetV
+## define RTEErrInfoLogAndSet
+## define RTEErrInfoLogAndSetF
+## define RTEErrInfoLogAndSetV
+## define RTEErrInfoLogAndAdd
+## define RTEErrInfoLogAndAddF
+## define RTEErrInfoLogAndAddV
+## define RTEErrVarsAreEqual
+## define RTEErrVarsHaveChanged
+## define RTEErrVarsRestore
+## define RTEErrVarsSave
+## define RTFileAioCtxAssociateWithFile
+## define RTFileAioCtxCreate

RT_M ANGLER(RTEEnvExistEx)
RT_M ANGLER(RTEEnvExistEx)
RT_M ANGLER(RTEEnvFreeUtf8Block)
RT_M ANGLER(RTEEnvFreeUtf16Block)
RT_M ANGLER(RTEEnvGet)
RT_M ANGLER(RTEEnvGet)
RT_M ANGLER(RTEEnvGetUtf8)
RT_M ANGLER(RTEEnvGetEx)
RT_M ANGLER(RTEEnvGetExecEnvP)
RT_M ANGLER(RTEEnvIsChangeRecord)
RT_M ANGLER(RTEEnvPut)
RT_M ANGLER(RTEEnvPutBad)
RT_M ANGLER(RTEEnvPutUtf8)
RT_M ANGLER(RTEEnvPutEx)
RT_M ANGLER(RTEEnvQueryUtf16Block)
RT_M ANGLER(RTEEnvQueryUtf8Block)
RT_M ANGLER(RTEEnvReset)
RT_M ANGLER(RTEEnvSet)
RT_M ANGLER(RTEEnvSetBad)
RT_M ANGLER(RTEEnvSetUtf8)
RT_M ANGLER(RTEEnvSetEx)
RT_M ANGLER(RTEEnvUnset)
RT_M ANGLER(RTEEnvUnsetBad)
RT_M ANGLER(RTEEnvUnsetUtf8)
RT_M ANGLER(RTEEnvUnsetEx)
RT_M ANGLER(RTEErrCOMGet)
RT_M ANGLER(RTEErrConvertFromErrno)
RT_M ANGLER(RTEErrConvertToErrno)
RT_M ANGLER(RTEErrGet)
RT_M ANGLER(RTEErrInfoAlloc)
RT_M ANGLER(RTEErrInfoAllocEx)
RT_M ANGLER(RTEErrInfoFree)
RT_M ANGLER(RTEErrInfoSet)
RT_M ANGLER(RTEErrInfoSetF)
RT_M ANGLER(RTEErrInfoSetV)
RT_M ANGLER(RTEErrInfoLogAndSet)
RT_M ANGLER(RTEErrInfoLogAndSetF)
RT_M ANGLER(RTEErrInfoLogAndSetV)
RT_M ANGLER(RTEErrInfoLogAndAdd)
RT_M ANGLER(RTEErrInfoLogAndAddF)
RT_M ANGLER(RTEErrInfoLogAndAddV)
RT_M ANGLER(RTEErrVarsAreEqual)
RT_M ANGLER(RTEErrVarsHaveChanged)
RT_M ANGLER(RTEErrVarsRestore)
RT_M ANGLER(RTEErrVarsSave)
RT_M ANGLER(RTFileAioCtxAssociateWithFile)
RT_M ANGLER(RTFileAioCtxCreate)
"define RTFileReadAll          RT_MANGLER(RTFileReadAll)
"define RTFileReadAllByHandle RT_MANGLER(RTFileReadAllByHandle)
"define RTFileReadAllByHandleEx RT_MANGLER(RTFileReadAllByHandleEx)
"define RTFileReadAllEx       RT_MANGLER(RTFileReadAllEx)
"define RTFileReadAllFree     RT_MANGLER(RTFileReadAllFree)
"define RTFileReadAt          RT_MANGLER(RTFileReadAt)
"define RTFileRename          RT_MANGLER(RTFileRename)
"define RTFileSeek            RT_MANGLER(RTFileSeek)
"define RTFileSetAllocationSize RT_MANGLER(RTFileSetAllocationSize)
"define RTFileSetForceFlags   RT_MANGLER(RTFileSetForceFlags)
"define RTFileSetMode         RT_MANGLER(RTFileSetMode)
"define RTFileSetOwner        RT_MANGLER(RTFileSetOwner)
"define RTFileSetSize         RT_MANGLER(RTFileSetSize)
"define RTFileSetTimes        RT_MANGLER(RTFileSetTimes)
"define RTFileSgReadAt        RT_MANGLER(RTFileSgReadAt)
"define RTFileSgWriteAt       RT_MANGLER(RTFileSgWriteAt)
"define RTFileTell            RT_MANGLER(RTFileTell)
"define RTFileToNative        RT_MANGLER(RTFileToNative)
"define RTFileUnlock          RT_MANGLER(RTFileUnlock)
"define RTFileWrite           RT_MANGLER(RTFileWrite)
"define RTFileWriteAt         RT_MANGLER(RTFileWriteAt)
"define RTFilesystemVfsFromFile RT_MANGLER(RTFilesystemVfsFromFile)
"define RTFsIsCaseSensitive   RT_MANGLER(RTFsIsCaseSensitive)
"define RTFsQueryProperties   RT_MANGLER(RTFsQueryProperties)
"define RTFsQuerySerial       RT_MANGLER(RTFsQuerySerial)
"define RTFsQuerySizes        RT_MANGLER(RTFsQuerySizes)
"define RTFsQueryType         RT_MANGLER(RTFsQueryType)
"define RTFsTypeName          RT_MANGLER(RTFsTypeName)
"define RTFsFatVolOpen        RT_MANGLER(RTFsFatVolOpen)
"define RTFsFatVolFormat      RT_MANGLER(RTFsFatVolFormat)
"define RTFsFatVolFormat144   RT_MANGLER(RTFsFatVolFormat144)
"define RTFsIso9660VolOpen    RT_MANGLER(RTFsIso9660VolOpen)
"define RTFsIsoMakerCreate    RT_MANGLER(RTFsIsoMakerCreate)
"define RTFsIsoMakerRetain    RT_MANGLER(RTFsIsoMakerRetain)
"define RTFsIsoMakerRelease   RT_MANGLER(RTFsIsoMakerRelease)
"define RTFsIsoMakerBootCatSetFile RT_MANGLER(RTFsIsoMakerBootCatSetFile)
"define RTFsIsoMakerBootCatSetValidationEntry
RT_MANGLER(RTFsIsoMakerBootCatSetValidationEntry)
"define RTFsIsoMakerBootCatSetSectionEntry RT_MANGLER(RTFsIsoMakerBootCatSetSectionEntry)
"define RTFsIsoMakerBootCatSetSectionHeaderEntry
RT_MANGLER(RTFsIsoMakerBootCatSetSectionHeaderEntry)
"define RTFsIsoMakerQueryObjIdxForBootCatalog
RT_MANGLER(RTFsIsoMakerQueryObjIdxForBootCatalog)
"define RTFsIsoMakerGetIso9660Level RT_MANGLER(RTFsIsoMakerGetIso9660Level)
"define RTFsIsoMakerSetImagePadding RT_MANGLER(RTFsIsoMakerSetImagePadding)
"define RTFsIsoMakerSetIso9660Level RT_MANGLER(RTFsIsoMakerSetIso9660Level)
"define RTFsIsoMakerSetJolietUcs2Level RT_MANGLER(RTFsIsoMakerSetJolietUcs2Level)
"define RTFsIsoMakerSetRockRidgeLevel RT_MANGLER(RTFsIsoMakerSetRockRidgeLevel)
Open Source Used In 5GaaS Edge AC-4 39578

```c
+# define RTFsIsoMakerSetJolietRockRidgeLevel
RT_MANGLER(RTFsIsoMakerSetJolietRockRidgeLevel)
+# define RTFsIsoMakerSetAttrInheritStyle
RT_MANGLER(RTFsIsoMakerSetAttrInheritStyle)
+# define RTFsIsoMakerSetDefaultDirMode
RT_MANGLER(RTFsIsoMakerSetDefaultDirMode)
+# define RTFsIsoMakerSetDefaultFileMode
RT_MANGLER(RTFsIsoMakerSetDefaultFileMode)
+# define RTFsIsoMakerSetForcedDirMode
RT_MANGLER(RTFsIsoMakerSetForcedDirMode)
+# define RTFsIsoMakerSetForcedFileMode
RT_MANGLER(RTFsIsoMakerSetForcedFileMode)
+# define RTFsIsoMakerSetPathGroupId
RT_MANGLER(RTFsIsoMakerSetPathGroupId)
+# define RTFsIsoMakerSetPathMode
RT_MANGLER(RTFsIsoMakerSetPathMode)
+# define RTFsIsoMakerSetPathOwnerMode
RT_MANGLER(RTFsIsoMakerSetPathOwnerMode)
+# define RTFsIsoMakerSetSysAreaContent
RT_MANGLER(RTFsIsoMakerSetSysAreaContent)
+# define RTFsIsoMakerSetStringProp
RT_MANGLER(RTFsIsoMakerSetStringProp)
+# define RTFsIsoMakerGetObjIdxForPath
RT_MANGLER(RTFsIsoMakerGetObjIdxForPath)
+# define RTFsIsoMakerObjEnableBootInfoTablePatching
RT_MANGLER(RTFsIsoMakerObjEnableBootInfoTablePatching)
+# define RTFsIsoMakerObjQueryDataSize
RT_MANGLER(RTFsIsoMakerObjQueryDataSize)
+# define RTFsIsoMakerObjRemove
RT_MANGLER(RTFsIsoMakerObjRemove)
+# define RTFsIsoMakerObjSetPath
RT_MANGLER(RTFsIsoMakerObjSetPath)
+# define RTFsIsoMakerObjSetNameAndParent
RT_MANGLER(RTFsIsoMakerObjSetNameAndParent)
+# define RTFsIsoMakerObjSetRockName
RT_MANGLER(RTFsIsoMakerObjSetRockName)
+# define RTFsIsoMakerAddUnnamedDir
RT_MANGLER(RTFsIsoMakerAddUnnamedDir)
+# define RTFsIsoMakerAddDir
RT_MANGLER(RTFsIsoMakerAddDir)
+# define RTFsIsoMakerAddFileWithSrcPath
RT_MANGLER(RTFsIsoMakerAddFileWithSrcPath)
+# define RTFsIsoMakerAddFileWithVfsFile
RT_MANGLER(RTFsIsoMakerAddFileWithVfsFile)
+# define RTFsIsoMakerAddUnnamedFileWithSrcPath
RT_MANGLER(RTFsIsoMakerAddUnnamedFileWithSrcPath)
+# define RTFsIsoMakerAddUnnamedFileWithVfsFile
RT_MANGLER(RTFsIsoMakerAddUnnamedFileWithVfsFile)
+# define RTFsIsoMakerAddUnnamedFileWithCommonSrc
RT_MANGLER(RTFsIsoMakerAddUnnamedFileWithCommonSrc)
+# define RTFsIsoMakerAddSymlink
RT_MANGLER(RTFsIsoMakerAddSymlink)
+# define RTFsIsoMakerAddUnnamedSymlink
RT_MANGLER(RTFsIsoMakerAddUnnamedSymlink)
+# define RTFsIsoMakerAddCommonSourceFile
RT_MANGLER(RTFsIsoMakerAddCommonSourceFile)
+# define RTFsIsoMakerImport
RT_MANGLER(RTFsIsoMakerImport)
+# define RTFsIsoMakerFinalize
RT_MANGLER(RTFsIsoMakerFinalize)
+# define RTFsIsoMakerCreateVfsOutputFile
RT_MANGLER(RTFsIsoMakerCreateVfsOutputFile)
+# define RTFsIsoMakerCmd
RT_MANGLER(RTFsIsoMakerCmd)
+# define RTFsIsoMakerCmdEx
RT_MANGLER(RTFsIsoMakerCmdEx)
+# define RTGetOpt
RT_MANGLER(RTGetOpt)
+# define RTGetOptArgvFree
RT_MANGLER(RTGetOptArgvFree)
+# define RTGetOptArgvFreeEx
RT_MANGLER(RTGetOptArgvFreeEx)
+# define RTGetOptArgvFromString
RT_MANGLER(RTGetOptArgvFromString)
+# define RTGetOptArgvToOString
RT_MANGLER(RTGetOptArgvToOString)
+# define RTGetOptArgvToUtf16String
RT_MANGLER(RTGetOptArgvToUtf16String)
+# define RTGetOptFetchValue
RT_MANGLER(RTGetOptFetchValue)
+# define RTGetOptInit
RT_MANGLER(RTGetOptInit)
+# define RTGetOptNonOptionArrayPtr
RT_MANGLER(RTGetOptNonOptionArrayPtr)
```

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Open Source Used In 5GaaS Edge AC-4 39578
+ define RTJsonGetValueArraySize RT_MANGLER(RTJsonValueGetArraySize)
+ define RTJsonGetValueString RT_MANGLER(RTJsonValueGetString)
+ define RTJsonGetValueType RT_MANGLER(RTJsonValueGetType)
+ define RTJsonGetValueQueryArraySizeEx RT_MANGLER(RTJsonValueQueryArraySizeEx)
+ define RTJsonGetValueQueryBooleanByName RT_MANGLER(RTJsonValueQueryBooleanByName)
+ define RTJsonGetValueQueryByIndex RT_MANGLER(RTJsonValueQueryByIndex)
+ define RTJsonGetValueQueryByName RT_MANGLER(RTJsonValueQueryByName)
+ define RTJsonGetValueQueryInteger RT_MANGLER(RTJsonValueQueryInteger)
+ define RTJsonGetValueQueryIntegerByName RT_MANGLER(RTJsonValueQueryIntegerByName)
+ define RTJsonGetValueQueryString RT_MANGLER(RTJsonValueQueryString)
+ define RTJsonGetValueQueryStringByName RT_MANGLER(RTJsonValueQueryStringByName)
+ define RTJsonValueRelease RT_MANGLER(RTJsonValueRelease)
+ define RTJsonValueRetain RT_MANGLER(RTJsonValueRetain)
+ define RTKrnModInfoGetFilePath RT_MANGLER(RTKrnModInfoGetFilePath)
+ define RTKrnModInfoGetLoadAddr RT_MANGLER(RTKrnModInfoGetLoadAddr)
+ define RTKrnModInfoGetName RT_MANGLER(RTKrnModInfoGetName)
+ define RTKrnModInfoGetRefCount RT_MANGLER(RTKrnModInfoGetRefCount)
+ define RTKrnModInfoGetSize RT_MANGLER(RTKrnModInfoGetSize)
+ define RTKrnModInfoQueryRefModInfo RT_MANGLER(RTKrnModInfoQueryRefModInfo)
+ define RTKrnModInfoRetain RT_MANGLER(RTKrnModInfoRetain)
+ define RTKrnModInfoRelease RT_MANGLER(RTKrnModInfoRelease)
+ define RTKrnModLoadedGetCount RT_MANGLER(RTKrnModLoadedGetCount)
+ define RTKrnModLoadedQueryInfo RT_MANGLER(RTKrnModLoadedQueryInfo)
+ define RTKrnModLoadedQueryInfoAll RT_MANGLER(RTKrnModLoadedQueryInfoAll)
+ define RTKrnModQueryLoaded RT_MANGLER(RTKrnModQueryLoaded)
+ define RTLatin1CalcUtf16Len RT_MANGLER(RTLatin1CalcUtf16Len)
+ define RTLatin1CalcUtf16LenEx RT_MANGLER(RTLatin1CalcUtf16LenEx)
+ define RTLatin1CalcUtf8Len RT_MANGLER(RTLatin1CalcUtf8Len)
+ define RTLatin1CalcUtf8LenEx RT_MANGLER(RTLatin1CalcUtf8LenEx)
+ define RTLatin1ToUtf16ExTag RT_MANGLER(RTLatin1ToUtf16ExTag)
+ define RTLatin1ToUtf16Tag RT_MANGLER(RTLatin1ToUtf16Tag)
+ define RTLatin1ToUtf8ExTag RT_MANGLER(RTLatin1ToUtf8ExTag)
+ define RTLatin1ToUtf8Tag RT_MANGLER(RTLatin1ToUtf8Tag)
+ define RTLdrClose RT_MANGLER(RTLdrClose)
+ define RTLdrEnumDbgInfo RT_MANGLER(RTLdrEnumDbgInfo)
+ define RTLdrEnumSegments RT_MANGLER(RTLdrEnumSegments)
+ define RTLdrEnumSymbols RT_MANGLER(RTLdrEnumSymbols)
+ define RTLdrGetArch RT_MANGLER(RTLdrGetArch)
+ define RTLdrGetBits RT_MANGLER(RTLdrGetBits)
+ define RTLdrGetEndian RT_MANGLER(RTLdrGetEndian)
+ define RTLdrGetFormat RT_MANGLER(RTLdrGetFormat)
+ define RTLdrGetFunction RT_MANGLER(RTLdrGetFunction)
+ define RTLdrGetNativeHandle RT_MANGLER(RTLdrGetNativeHandle)
+ define RTLdrGetSuff RT_MANGLER(RTLdrGetSuff)
+ define RTLdrGetSymbol RT_MANGLER(RTLdrGetSymbol)
+ define RTLdrGetSymbolEx RT_MANGLER(RTLdrGetSymbolEx)
+ define RTLdrGetSystemSymbol RT_MANGLER(RTLdrGetSystemSymbol)
+ define RTLdrGetType RT_MANGLER(RTLdrGetType)
```c
#define RTLockValidatorRecExclCheckOrder           RT_MANGLER(RTLockValidatorRecExclCheckOrder)
#define RTLockValidatorRecExclCheckOrderAndBlocking RT_MANGLER(RTLockValidatorRecExclCheckOrderAndBlocking)
#define RTLockValidatorRecExclCreate               RT_MANGLER(RTLockValidatorRecExclCreate)
#define RTLockValidatorRecExclCreateV              RT_MANGLER(RTLockValidatorRecExclCreateV)
#define RTLockValidatorRecExclDelete               RT_MANGLER(RTLockValidatorRecExclDelete)
#define RTLockValidatorRecExclDestroy              RT_MANGLER(RTLockValidatorRecExclDestroy)
#define RTLockValidatorRecExclInit                  RT_MANGLER(RTLockValidatorRecExclInit)
#define RTLockValidatorRecExclInitV                 RT_MANGLER(RTLockValidatorRecExclInitV)
#define RTLockValidatorRecExclRecursion             RT_MANGLER(RTLockValidatorRecExclRecursion)
#define RTLockValidatorRecExclRecursionMixed       RT_MANGLER(RTLockValidatorRecExclRecursionMixed)
#define RTLockValidatorRecExclReleaseOwner         RT_MANGLER(RTLockValidatorRecExclReleaseOwner)
#define RTLockValidatorRecExclReleaseOwnerUnchecked RT_MANGLER(RTLockValidatorRecExclReleaseOwnerUnchecked)
#define RTLockValidatorRecExclSetOwner              RT_MANGLER(RTLockValidatorRecExclSetOwner)
#define RTLockValidatorRecExclSetSubClass           RT_MANGLER(RTLockValidatorRecExclSetSubClass)
#define RTLockValidatorRecExclUnwind                RT_MANGLER(RTLockValidatorRecExclUnwind)
#define RTLockValidatorRecExclUnwindMixed           RT_MANGLER(RTLockValidatorRecExclUnwindMixed)
#define RTLockValidatorRecMakeSiblings             RT_MANGLER(RTLockValidatorRecMakeSiblings)
#define RTLockValidatorRecSharedAddOwner           RT_MANGLER(RTLockValidatorRecSharedAddOwner)
#define RTLockValidatorRecSharedCheckAndRelease    RT_MANGLER(RTLockValidatorRecSharedCheckAndRelease)
#define RTLockValidatorRecSharedCheckBlocking       RT_MANGLER(RTLockValidatorRecSharedCheckBlocking)
#define RTLockValidatorRecSharedCheckOrder          RT_MANGLER(RTLockValidatorRecSharedCheckOrder)
#define RTLockValidatorRecSharedCheckOrderAndBlocking RT_MANGLER(RTLockValidatorRecSharedCheckOrderAndBlocking)
#define RTLockValidatorRecSharedCheckSignaller      RT_MANGLER(RTLockValidatorRecSharedCheckSignaller)
#define RTLockValidatorRecSharedCreate              RT_MANGLER(RTLockValidatorRecSharedCreate)
#define RTLockValidatorRecSharedCreateV             RT_MANGLER(RTLockValidatorRecSharedCreateV)
#define RTLockValidatorRecSharedDelete              RT_MANGLER(RTLockValidatorRecSharedDelete)
#define RTLockValidatorRecSharedDestroy             RT_MANGLER(RTLockValidatorRecSharedDestroy)
#define RTLockValidatorRecSharedInit                 RT_MANGLER(RTLockValidatorRecSharedInit)
#define RTLockValidatorRecSharedInitV               RT_MANGLER(RTLockValidatorRecSharedInitV)
#define RTLockValidatorRecSharedIsOwner              RT_MANGLER(RTLockValidatorRecSharedIsOwner)
#define RTLockValidatorRecSharedRemoveOwner         RT_MANGLER(RTLockValidatorRecSharedRemoveOwner)
#define RTLockValidatorRecSharedResetOwner          RT_MANGLER(RTLockValidatorRecSharedResetOwner)
#define RTLockValidatorRecSharedSetSubClass         RT_MANGLER(RTLockValidatorRecSharedSetSubClass)
#define RTLockValidatorSetEnabled                   RT_MANGLER(RTLockValidatorSetEnabled)
```
 +# define RTLogRelSetDefaultInstance                     RT_MANGLER(RTLogRelSetDefaultInstance)
 +# define RTLogSetBuffering                              RT_MANGLER(RTLogSetBuffering)
 +# define RTLogSetCustomPrefixCallback                   RT_MANGLER(RTLogSetCustomPrefixCallback)
 +# define RTLogSetCustomPrefixCallbackForR0              RT_MANGLER(RTLogSetCustomPrefixCallbackForR0)
 +# define RTLogSetDefaultInstance                        RT_MANGLER(RTLogSetDefaultInstance)
 +# define RTLogSetDefaultInstanceThread                  RT_MANGLER(RTLogSetDefaultInstanceThread) /* r0drv */
 +# define RTLogSetGroupLimit                             RT_MANGLER(RTLogSetGroupLimit)
 +# define RTLogWriteCom                                  RT_MANGLER(RTLogWriteCom)
 +# define RTLogWriteCom                                  RT_MANGLER(RTLogWriteCom)
 +# define RTLogWriteDebugger                             RT_MANGLER(RTLogWriteDebugger)
 +# define RTLogWriteStdErr                               RT_MANGLER(RTLogWriteStdErr)
 +# define RTLogWriteStdOut                               RT_MANGLER(RTLogWriteStdOut)
 +# define RTLogWriteUser                                 RT_MANGLER(RTLogWriteUser)
 +# define RTManifestCreate                               RT_MANGLER(RTManifestCreate)
 +# define RTManifestDup                                  RT_MANGLER(RTManifestDup)
 +# define RTManifestEntryAdd                             RT_MANGLER(RTManifestEntryAdd)
 +# define RTManifestEntryAddIoStream                     RT_MANGLER(RTManifestEntryAddIoStream)
 +# define RTManifestEntryAddPassthrIoStream              RT_MANGLER(RTManifestEntryAddPassthrIoStream)
 +# define RTManifestEntryExists                          RT_MANGLER(RTManifestEntryExists)
 +# define RTManifestEntryRemove                          RT_MANGLER(RTManifestEntryRemove)
 +# define RTManifestEntryQueryAttr                       RT_MANGLER(RTManifestEntryQueryAttr)
 +# define RTManifestEntrySetAttr                         RT_MANGLER(RTManifestEntrySetAttr)
 +# define RTManifestEntryUnsetAttr                       RT_MANGLER(RTManifestEntryUnsetAttr)
 +# define RTManifestEquals                               RT_MANGLER(RTManifestEquals)
 +# define RTManifestEqualsEx                             RT_MANGLER(RTManifestEqualsEx)
 +# define RTManifestPtolosAddEntryNow                    RT_MANGLER(RTManifestPtolosAddEntryNow)
 +# define RTManifestPtolosIsInstanceOf                   RT_MANGLER(RTManifestPtolosIsInstanceOf)
 +# define RTManifestQueryAllAttrTypes                    RT_MANGLER(RTManifestQueryAllAttrTypes)
 +# define RTManifestQueryAttr                            RT_MANGLER(RTManifestQueryAttr)
 +# define RTManifestReadStandard                         RT_MANGLER(RTManifestReadStandard)
 +# define RTManifestReadStandardEx                       RT_MANGLER(RTManifestReadStandardEx)
 +# define RTManifestReadStandardFromFile                 RT_MANGLER(RTManifestReadStandardFromFile)
 +# define RTManifestRelease                              RT_MANGLER(RTManifestRelease)
 +# define RTManifestRetain                               RT_MANGLER(RTManifestRetain)
 +# define RTManifestSetAttr                              RT_MANGLER(RTManifestSetAttr)
 +# define RTManifestUnsetAttr                            RT_MANGLER(RTManifestUnsetAttr)
 +# define RTManifestVerify                                RT_MANGLER(RTManifestVerify)
 +# define RTManifestVerifyDigestType                     RT_MANGLER(RTManifestVerifyDigestType)
 +# define RTManifestVerifyFiles                          RT_MANGLER(RTManifestVerifyFiles)
 +# define RTManifestVerifyFilesBuf                       RT_MANGLER(RTManifestVerifyFilesBuf)
 +# define RTManifestWriteFiles                           RT_MANGLER(RTManifestWriteFiles)
 +# define RTManifestWriteFilesBuf                       RT_MANGLER(RTManifestWriteFilesBuf)
 +# define RTManifestWriteStandard                        RT_MANGLER(RTManifestWriteStandard)
 +# define RTManifestWriteStandardToFile                  RT_MANGLER(RTManifestWriteStandardToFile)
 +# define RTMd5                                          RT_MANGLER(RTMd5)
 +# define RTMd5Final                                     RT_MANGLER(RTMd5Final)
 +# define RTMd5FromString                                RT_MANGLER(RTMd5FromString)
+# define RTMemLockedFree                                RT_MANGLER(RTMemLockedFree)
+# define RTMemPageAllocTag                              RT_MANGLER(RTMemPageAllocTag)
+# define RTMemPageAllocZTag                             RT_MANGLER(RTMemPageAllocZTag)
+# define RTMemPageFree                                  RT_MANGLER(RTMemPageFree)
+# define RTMemPoolAlloc                                 RT_MANGLER(RTMemPoolAlloc)
+# define RTMemPoolAllocZ                                RT_MANGLER(RTMemPoolAllocZ)
+# define RTMemPoolCreate                                RT_MANGLER(RTMemPoolCreate)
+# define RTMemPoolDup                                   RT_MANGLER(RTMemPoolDup)
+# define RTMemPoolDupEx                                 RT_MANGLER(RTMemPoolDupEx)
+# define RTMemPoolFree                                  RT_MANGLER(RTMemPoolFree)
+# define RTMemPoolRealloc                               RT_MANGLER(RTMemPoolRealloc)
+# define RTMemPoolRefCount                              RT_MANGLER(RTMemPoolRefCount)
+# define RTMemPoolRelease                               RT_MANGLER(RTMemPoolRelease)
+# define RTMemPoolRetain                                RT_MANGLER(RTMemPoolRetain)
+# define RTMemProtect                                   RT_MANGLER(RTMemProtect)
+# define RTMemReallocTag                                RT_MANGLER(RTMemReallocTag)
+# define RTMemTmpAllocTag                               RT_MANGLER(RTMemTmpAllocTag)
+# define RTMemTmpAllocZTag                              RT_MANGLER(RTMemTmpAllocZTag)
+# define RTMemTmpFree                                   RT_MANGLER(RTMemTmpFree)
+# define RTMemTrackerDumpAllToFile                      RT_MANGLER(RTMemTrackerDumpAllToFile)
+# define RTMemTrackerDumpAllToLog                       RT_MANGLER(RTMemTrackerDumpAllToLog)
+# define RTMemTrackerDumpAllToLogRel                    RT_MANGLER(RTMemTrackerDumpAllToLogRel)
+# define RTMemTrackerDumpAllToStdErr                    RT_MANGLER(RTMemTrackerDumpAllToStdErr)
+# define RTMemTrackerDumpAllToStdOut                    RT_MANGLER(RTMemTrackerDumpAllToStdOut)
+# define RTMemTrackerDumpStatsToFile                    RT_MANGLER(RTMemTrackerDumpStatsToFile)
+# define RTMemTrackerDumpStatsToLog                     RT_MANGLER(RTMemTrackerDumpStatsToLog)
+# define RTMemTrackerDumpStatsToLogRel                  RT_MANGLER(RTMemTrackerDumpStatsToLogRel)
+# define RTMemTrackerDumpStatsToStdErr                  RT_MANGLER(RTMemTrackerDumpStatsToStdErr)
+# define RTMemTrackerDumpStatsToStdOut                  RT_MANGLER(RTMemTrackerDumpStatsToStdOut)
+# define RTMemTrackerHdrAlloc                           RT_MANGLER(RTMemTrackerHdrAlloc)
+# define RTMemTrackerHdrFree                            RT_MANGLER(RTMemTrackerHdrFree)
+# define RTMemTrackerHdrReallocDone                     RT_MANGLER(RTMemTrackerHdrReallocDone)
+# define RTMemTrackerHdrReallocPrep                     RT_MANGLER(RTMemTrackerHdrReallocPrep)
+# define RTMemWipeThoroughly                            RT_MANGLER(RTMemWipeThoroughly)
+# define RTMpCpuId                                      RT_MANGLER(RTMpCpuId)
+# define RTMpCpuIdFromSetIndex                          RT_MANGLER(RTMpCpuIdFromSetIndex)
+# define RTMpCpuIdToSetIndex                            RT_MANGLER(RTMpCpuIdToSetIndex)
+# define RTMpCurSetIndex                                RT_MANGLER(RTMpCurSetIndex)
+# define RTMpCurSetIndexAndId                           RT_MANGLER(RTMpCurSetIndexAndId)
+# define RTMpGetArraySize                               RT_MANGLER(RTMpGetArraySize)
+# define RTMpGetCount                                   RT_MANGLER(RTMpGetCount)
+# define RTMpGetCurFrequency                            RT_MANGLER(RTMpGetCurFrequency)
+# define RTMpGetDescription                            RT_MANGLER(RTMpGetDescription)
+# define RTMpGetCpuGroupCounts                          RT_MANGLER(RTMpGetCpuGroupCounts)
+# define RTMpGetMaxCpuGroupCount                        RT_MANGLER(RTMpGetMaxCpuGroupCount)
+# define RTMpGetMaxCpuId                                RT_MANGLER(RTMpGetMaxCpuId)
+# define RTMpGetMaxFrequency                            RT_MANGLER(RTMpGetMaxFrequency)
+# define RTPathExists RT_MANGLER(RTPathExists)
+# define RTPathExistsEx RT_MANGLER(RTPathExistsEx)
+# define RTPathSuffix RT_MANGLER(RTPathSuffix)
+# define RTPathFilename RT_MANGLER(RTPathFilename)
+# define RTPathFilenameEx RT_MANGLER(RTPathFilenameEx)
+# define RTPathGetCurrent RT_MANGLER(RTPathGetCurrent)
+# define RTPathGetCurrentDrive RT_MANGLER(RTPathGetCurrentDrive)
+# define RTPathGetCurrentOn Drive RT_MANGLER(RTPathGetCurrentOnDrive)
+# define RTPathGetMode RT_MANGLER(RTPathGetMode)
+# define RTPathGlob RT_MANGLER(RTPathGlob)
+# define RTPathGlobFree RT_MANGLER(RTPathGlobFree)
+# define RTPathHasSuffix RT_MANGLER(RTPathHasSuffix)
+# define RTPathHasPath RT_MANGLER(RTPathHasPath)
+# define RTPathIsSame RT_MANGLER(RTPathIsSame)
+# define RTPathJoin RT_MANGLER(RTPathJoin)
+# define RTPathJoinA RT_MANGLER(RTPathJoinA)
+# define RTPathJoinEx RT_MANGLER(RTPathJoinEx)
+# define RTPathParse RT_MANGLER(RTPathParse)
+# define RTPathParsedReassemble RT_MANGLER(RTPathParsedReassemble)
+# define RTPathParseSimple RT_MANGLER(RTPathParseSimple)
+# define RTPathQueryInfo RT_MANGLER(RTPathQueryInfo)
+# define RTPathQueryInfoEx RT_MANGLER(RTPathQueryInfoEx)
+# define RTPathReal RT_MANGLER(RTPathReal)
+# define RTPathRealDup RT_MANGLER(RTPathRealDup)
+# define RTPathRename RT_MANGLER(RTPathRename)
+# define RTPathRmCmd RT_MANGLER(RTPathRmCmd)
+# define RTPathSetCurrent RT_MANGLER(RTPathSetCurrent)
+# define RTPathSetMode RT_MANGLER(RTPathSetMode) /* not-win */
+# define RTPathSetOwner RT_MANGLER(RTPathSetOwner) /* not-win */
+# define RTPathSetOwnerEx RT_MANGLER(RTPathSetOwnerEx) /* not-win */
+# define RTPathSetTimes RT_MANGLER(RTPathSetTimes)
+# define RTPathSetTimesEx RT_MANGLER(RTPathSetTimesEx)
+# define RTPathSharedLibs RT_MANGLER(RTPathSharedLibs)
+# define RTPathSkipRootSpec RT_MANGLER(RTPathSkipRootSpec)
+# define RTPathSplit RT_MANGLER(RTPathSplit)
+# define RTPathSplitATag RT_MANGLER(RTPathSplitATag)
+# define RTPathSplitFree RT_MANGLER(RTPathSplitFree)
+# define RTPathSplitReassemble RT_MANGLER(RTPathSplitReassemble)
+# define RTPathStartsWith RT_MANGLER(RTPathStartsWith)
+# define RTPathStartsWithRoot RT_MANGLER(RTPathStartsWithRoot)
+# define RTPathStripSuffix RT_MANGLER(RTPathStripSuffix)
+# define RTPathStripFilename RT_MANGLER(RTPathStripFilename)
+# define RTPathStripTrailingSlash RT_MANGLER(RTPathStripTrailingSlash)
+# define RTPathTemp RT_MANGLER(RTPathTemp)
+# define RTPathTraverseList RT_MANGLER(RTPathTraverseList)
+# define RTPathUnlink RT_MANGLER(RTPathUnlink)
+# define RTPathUserDocuments RT_MANGLER(RTPathUserDocuments)
+# define RTPathUserHome RT_MANGLER(RTPathUserHome)
+ # define RTR0DbgKnrlnfQrySymbol  RT_MANGLE(RTR0DbgKnrlnfQrySymbol) /* r0drv */
+ # define RTR0DbgKnrlnfRelease RT_MANGLE(RTR0DbgKnrlnfRelease) /* r0drv */
+ # define RTR0DbgKnrlnfRetain RT_MANGLE(RTR0DbgKnrlnfRetain) /* r0drv */
+ # define RTR0Init RT_MANGLE(RTR0Init) /* r0drv */
+ # define RTR0MemAreKnrlnAndUsrDifferent RT_MANGLE(RTR0MemAreKnrlnAndUsrDifferent) /* r0drv */
+ # define RTR0MemExecDonate RT_MANGLE(RTR0MemExecDonate) /* r0drv */
+ # define RTR0MemKernIsValidAddr RT_MANGLE(RTR0MemKernIsValidAddr) /* r0drv */
+ # define RTR0MemObjAddress RT_MANGLE(RTR0MemObjAddress) /* r0drv */
+ # define RTR0MemObjAddressR3 RT_MANGLE(RTR0MemObjAddressR3) /* r0drv */
+ # define RTR0MemKernCopyFrom RT_MANGLE(RTR0MemKernCopyFrom) /* r0drv */
+ # define RTR0MemKernCopyTo RT_MANGLE(RTR0MemKernCopyTo) /* r0drv */
+ # define RTR0MemObjAllocContTag RT_MANGLE(RTR0MemObjAllocContTag) /* r0drv */
+ # define RTR0MemObjAllocLowTag RT_MANGLE(RTR0MemObjAllocLowTag) /* r0drv */
+ # define RTR0MemObjAllocPageTag RT_MANGLE(RTR0MemObjAllocPageTag) /* r0drv */
+ # define RTR0MemObjAllocPhysExTag RT_MANGLE(RTR0MemObjAllocPhysExTag) /* r0drv */
+ # define RTR0MemObjAllocPhysNCTag RT_MANGLE(RTR0MemObjAllocPhysNCTag) /* r0drv */
+ # define RTR0MemObjAllocPhysTag RT_MANGLE(RTR0MemObjAllocPhysTag) /* r0drv */
+ # define RTR0MemObjEnterPhysTag RT_MANGLE(RTR0MemObjEnterPhysTag) /* r0drv */
+ # define RTR0MemObjFree RT_MANGLE(RTR0MemObjFree) /* r0drv */
+ # define RTR0MemObjGetPagePhysAddr RT_MANGLE(RTR0MemObjGetPagePhysAddr) /* r0drv */
+ # define RTR0MemObjIsMapping RT_MANGLE(RTR0MemObjIsMapping) /* r0drv */
+ # define RTR0MemObjLockKernelTag RT_MANGLE(RTR0MemObjLockKernelTag) /* r0drv */
+ # define RTR0MemObjLockUserTag RT_MANGLE(RTR0MemObjLockUserTag) /* r0drv */
+ # define RTR0MemObjMapKernelExTag RT_MANGLE(RTR0MemObjMapKernelExTag) /* r0drv */
+ # define RTR0MemObjMapKernelTag RT_MANGLE(RTR0MemObjMapKernelTag) /* r0drv */
+ # define RTR0MemObjMapUserTag RT_MANGLE(RTR0MemObjMapUserTag) /* r0drv */
+ # define RTR0MemObjProtect RT_MANGLE(RTR0MemObjProtect) /* r0drv */
+ # define RTR0MemObjReserveKernelTag RT_MANGLE(RTR0MemObjReserveKernelTag) /* r0drv */
+ # define RTR0MemObjReserveUserTag RT_MANGLE(RTR0MemObjReserveUserTag) /* r0drv */
+ # define RTR0MemObjSize RT_MANGLE(RTR0MemObjSize) /* r0drv */
+ # define RTR0MemUserCopyFrom RT_MANGLE(RTR0MemUserCopyFrom) /* r0drv */
+ # define RTR0MemUserCopyTo RT_MANGLE(RTR0MemUserCopyTo) /* r0drv */
+ # define RTR0MemUserisValidAddr RT_MANGLE(RTR0MemUserisValidAddr) /* r0drv */
+ # define RTR0ProcHandleSelf RT_MANGLE(RTR0ProcHandleSelf) /* r0drv */
+ # define RTR0Term RT_MANGLE(RTR0Term) /* r0drv */
# define RTR0TermForced
RT_MANGLER(RTR0TermForced) /* r0drv */
# define RTR3InitDll
RT_MANGLER(RTR3InitDll)
# define RTR3InitExe
RT_MANGLER(RTR3InitExe)
# define RTR3InitExeNoArguments
RT_MANGLER(RTR3InitExeNoArguments)
# define RTR3InitEx
RT_MANGLER(RTR3InitEx)
# define RTR3InitIsInitialized
RT_MANGLER(RTR3InitIsInitialized)
# define RTR3InitIsUnobtrusive
RT_MANGLER(RTR3InitIsUnobtrusive)
# define rtR3MemAlloc
RT_MANGLER(rtR3MemAlloc)
# define rtR3MemFree
RT_MANGLER(rtR3MemFree)
# define rtR3MemRealloc
RT_MANGLER(rtR3MemRealloc)
# define RTRCInit
RT_MANGLER(RTRCInit)
# define RTRCTerm
RT_MANGLER(RTRCTerm)
# define RTRandAdvBytes
RT_MANGLER(RTRandAdvBytes)
# define RTRandAdvCreateParkMiller
RT_MANGLER(RTRandAdvCreateParkMiller)
# define RTRandAdvCreateSystemFaster
RT_MANGLER(RTRandAdvCreateSystemFaster)
# define RTRandAdvCreateSystemTruer
RT_MANGLER(RTRandAdvCreateSystemTruer)
# define RTRandAdvDestroy
RT_MANGLER(RTRandAdvDestroy)
# define RTRandAdvRestoreState
RT_MANGLER(RTRandAdvRestoreState)
# define RTRandAdvS32
RT_MANGLER(RTRandAdvS32)
# define RTRandAdvS32Ex
RT_MANGLER(RTRandAdvS32Ex)
# define RTRandAdvS64
RT_MANGLER(RTRandAdvS64)
# define RTRandAdvS64Ex
RT_MANGLER(RTRandAdvS64Ex)
# define RTRandAdvSaveState
RT_MANGLER(RTRandAdvSaveState)
# define RTRandAdvSeed
RT_MANGLER(RTRandAdvSeed)
# define RTRandAdvU32
RT_MANGLER(RTRandAdvU32)
# define RTRandAdvU32Ex
RT_MANGLER(RTRandAdvU32Ex)
# define RTRandAdvU64
RT_MANGLER(RTRandAdvU64)
# define RTRandAdvU64Ex
RT_MANGLER(RTRandAdvU64Ex)
# define RTRandBytes
RT_MANGLER(RTRandBytes)
# define RTRandS32
RT_MANGLER(RTRandS32)
# define RTRandS32Ex
RT_MANGLER(RTRandS32Ex)
# define RTRandS64
RT_MANGLER(RTRandS64)
# define RTRandS64Ex
RT_MANGLER(RTRandS64Ex)
# define RTRandU32
RT_MANGLER(RTRandU32)
# define RTRandU32Ex
RT_MANGLER(RTRandU32Ex)
# define RTRandU64
RT_MANGLER(RTRandU64)
# define RTRandU64Ex
RT_MANGLER(RTRandU64Ex)
# define RTRReqPoolAlloc
RT_MANGLER(RTRReqPoolAlloc)
# define RTRReqPoolCallEx
RT_MANGLER(RTRReqPoolCallEx)
# define RTRReqPoolCallExV
RT_MANGLER(RTRReqPoolCallExV)
# define RTRReqPoolCallWait
RT_MANGLER(RTRReqPoolCallWait)
# define RTRReqPoolCallNoWait
RT_MANGLER(RTRReqPoolCallNoWait)
# define RTRReqPoolCallVoidWait
RT_MANGLER(RTRReqPoolCallVoidWait)
# define RTRReqPoolCallVoidNoWait
RT_MANGLER(RTRReqPoolCallVoidNoWait)
# define RTRReqPoolCreate
RT_MANGLER(RTRReqPoolCreate)
# define RTRReqPoolGetCfgVar
RT_MANGLER(RTRReqPoolGetCfgVar)
# define RTRReqPoolGetStat
RT_MANGLER(RTRReqPoolGetStat)
# define RTRReqPoolRetain
RT_MANGLER(RTRReqPoolRetain)
r0drv */

+## define RTSemEventMultiWaitNoResume RT_MANGLER(RTSemEventMultiWaitNoResume)
+## define RTSemEventRemoveSignaller RT_MANGLER(RTSemEventRemoveSignaller)
+## define RTSemEventSetSignaller RT_MANGLER(RTSemEventSetSignaller)
+## define RTSemEventSignal RT_MANGLER(RTSemEventSignal)
+## define RTSemEventWait RT_MANGLER(RTSemEventWait)
+## define RTSemEventWaitEx /* r0drv */
+## define RTSemEventWaitExDebug /* r0drv */
+## define RTSemEventWaitNoResume RT_MANGLER(RTSemEventWaitNoResume)
+## define RTSemFastMutexCreate RT_MANGLER(RTSemFastMutexCreate)
+## define RTSemFastMutexDestroy RT_MANGLER(RTSemFastMutexDestroy)
+## define RTSemFastMutexRelease RT_MANGLER(RTSemFastMutexRelease)
+## define RTSemFastMutexRequest RT_MANGLER(RTSemFastMutexRequest)
+## define RTSemMutexCreate RT_MANGLER(RTSemMutexCreate)
+## define RTSemMutexCreateEx RT_MANGLER(RTSemMutexCreateEx)
+## define RTSemMutexDestroy RT_MANGLER(RTSemMutexDestroy)
+## define RTSemMutexIsOwned RT_MANGLER(RTSemMutexIsOwned)
+## define RTSemMutexRelease RT_MANGLER(RTSemMutexRelease)
+## define RTSemMutexRequest RT_MANGLER(RTSemMutexRequest)
+## define RTSemMutexRequestDebug RT_MANGLER(RTSemMutexRequestDebug)
+## define RTSemMutexRequestNoResume RT_MANGLER(RTSemMutexRequestNoResume)
+## define RTSemMutexRequestNoResumeDebug RT_MANGLER(RTSemMutexRequestNoResumeDebug)
+## define RTSemMutexSetSubClass RT_MANGLER(RTSemMutexSetSubClass)
+## define RTSemPing RT_MANGLER(RTSemPing)
+## define RTSemPingPongDelete RT_MANGLER(RTSemPingPongDelete)
+## define RTSemPingPingInit RT_MANGLER(RTSemPingPingInit)
+## define RTSemPingWait RT_MANGLER(RTSemPingWait)
+## define RTSemPong RT_MANGLER(RTSemPong)
+## define RTSemPongWait RT_MANGLER(RTSemPongWait)
+## define RTSemRWCreate RT_MANGLER(RTSemRWCreate)
+## define RTSemRWCreateEx RT_MANGLER(RTSemRWCreateEx)
+## define RTSemRWDestroy RT_MANGLER(RTSemRWDestroy)
+## define RTSemRWGetReadCount RT_MANGLER(RTSemRWGetReadCount)
+## define RTSemRWGetWriteRecursion RT_MANGLER(RTSemRWGetWriteRecursion)
+## define RTSemRWGetWriterReadRecursion RT_MANGLER(RTSemRWGetWriterReadRecursion)
+## define RTSemRWIsReadOwner RT_MANGLER(RTSemRWIsReadOwner)
+## define RTSemRWIsWriteOwner RT_MANGLER(RTSemRWIsWriteOwner)
+## define RTSemRWReleaseRead RT_MANGLER(RTSemRWReleaseRead)
+## define RTSemRWReleaseWrite RT_MANGLER(RTSemRWReleaseWrite)
+## define RTSemRWRequestRead RT_MANGLER(RTSemRWRequestRead)
+## define RTSemRWRequestReadDebug RT_MANGLER(RTSemRWRequestReadDebug)
+## define RTSemRWRequestReadNoResume RT_MANGLER(RTSemRWRequestReadNoResume)
+## define RTSemRWRequestReadNoResumeDebug RT_MANGLER(RTSemRWRequestReadNoResumeDebug)
+## define RTSemRWRequestWrite RT_MANGLER(RTSemRWRequestWrite)
+## define RTSemRWRequestWriteDebug RT_MANGLER(RTSemRWRequestWriteDebug)
+## define RTSemRWRequestWriteNoResume RT_MANGLER(RTSemRWRequestWriteNoResume)
+# define RTSemRWRequestWriteNoResumeDebug
RT_MANGLER(RTSemRWRequestWriteNoResumeDebug)
+# define RTSemRWSetSubClass
RT_MANGLER(RTSemRWSetSubClass)
+# define RTSemSpinMutexCreate
RT_MANGLER(RTSemSpinMutexCreate)
+# define RTSemSpinMutexDestroy
RT_MANGLER(RTSemSpinMutexDestroy)
+# define RTSemSpinMutexRelease
RT_MANGLER(RTSemSpinMutexRelease)
+# define RTSemSpinMutexRequest
RT_MANGLER(RTSemSpinMutexRequest)
+# define RTSemSpinMutexTryRequest
RT_MANGLER(RTSemSpinMutexTryRequest)
+# define RTSemXRoadsCreate
RT_MANGLER(RTSemXRoadsCreate)
+# define RTSemXRoadsDestroy
RT_MANGLER(RTSemXRoadsDestroy)
+# define RTSemXRoadsEWEEnter
RT_MANGLER(RTSemXRoadsEWEEnter)
+# define RTSemXRoadsEWLeave
RT_MANGLER(RTSemXRoadsEWLeave)
+# define RTSemXRoadsNSEnter
RT_MANGLER(RTSemXRoadsNSEnter)
+# define RTSemXRoadsNSLeave
RT_MANGLER(RTSemXRoadsNSLeave)
+# define RTSgBufAdvance
RT_MANGLER(RTSgBufAdvance)
+# define RTSgBufClone
RT_MANGLER(RTSgBufClone)
+# define RTSgBufCmp
RT_MANGLER(RTSgBufCmp)
+# define RTSgBufCmpEx
RT_MANGLER(RTSgBufCmpEx)
+# define RTSgBufCopy
RT_MANGLER(RTSgBufCopy)
+# define RTSgBufCopyFromBuf
RT_MANGLER(RTSgBufCopyFromBuf)
+# define RTSgBufCopyToBuf
RT_MANGLER(RTSgBufCopyToBuf)
+# define RTSgBufInit
RT_MANGLER(RTSgBufInit)
+# define RTSgBufIsZero
RT_MANGLER(RTSgBufIsZero)
+# define RTSgBufReset
RT_MANGLER(RTSgBufReset)
+# define RTSgBufSegArrayCreate
RT_MANGLER(RTSgBufSegArrayCreate)
+# define RTSgBufSet
RT_MANGLER(RTSgBufSet)
+# define RTSgBufGetNextSegment
RT_MANGLER(RTSgBufGetNextSegment)
+# define RTSha1
RT_MANGLER(RTSha1)
+# define RTSha1Check
RT_MANGLER(RTSha1Check)
+# define RTSha1Digest
RT_MANGLER(RTSha1Digest)
+# define RTSha1DigestFromFile
RT_MANGLER(RTSha1DigestFromFile)
+# define RTSha1Final
RT_MANGLER(RTSha1Final)
+# define RTSha1FromString
RT_MANGLER(RTSha1FromString)
+# define RTSha1Init
RT_MANGLER(RTSha1Init)
+# define RTSha1ToString
RT_MANGLER(RTSha1ToString)
+# define RTSha1Update
RT_MANGLER(RTSha1Update)
+# define RTSha224
RT_MANGLER(RTSha224)
+# define RTSha224Check
RT_MANGLER(RTSha224Check)
+# define RTSha224Final
RT_MANGLER(RTSha224Final)
+# define RTSha224FromString
RT_MANGLER(RTSha224FromString)
+# define RTSha224Init
RT_MANGLER(RTSha224Init)
+# define RTSha224ToString
RT_MANGLER(RTSha224ToString)
+# define RTSha224Update
RT_MANGLER(RTSha224Update)
+# define RTSha224Digest
RT_MANGLER(RTSha224Digest)
+# define RTSha224DigestFromFile
RT_MANGLER(RTSha224DigestFromFile)
+# define RTSha256
RT_MANGLER(RTSha256)
+# define RTSha256Check
RT_MANGLER(RTSha256Check)
+# define RTSha256Final
RT_MANGLER(RTSha256Final)
+-# define RTSha256FromString
+-# define RTSha256Init
+-# define RTSha256ToFile
+-# define RTSha256Update
+-# define RTSha256DigestFromFile
+-# define RTSha256Digest
+-# define RTSha256DigestFromFile
+-# define RTSha256Digest
+-# define RTSha256Update
+-# define RTSha256Digest
+-# define RTSha384FromString
+-# define RTSha384Init
+-# define RTSha384ToFile
+-# define RTSha384Update
+-# define RTSha384DigestFromFile
+-# define RTSha384Digest
+-# define RTSha384DigestFromFile
+-# define RTSha384Digest
+-# define RTSha384Update
+-# define RTSha384Digest
+-# define RTSha512FromString
+-# define RTSha512Init
+-# define RTSha512ToFile
+-# define RTSha512Update
+-# define RTSha512DigestFromFile
+-# define RTSha512Digest
+-# define RTSha512DigestFromFile
+-# define RTSha512Digest
+-# define RTSha512Update
+-# define RTSha512Digest
+-# define RTSha512t224FromString
+-# define RTSha512t224Init
+-# define RTSha512t224ToFile
+-# define RTSha512t224Update
+-# define RTSha512t224DigestFromFile
+-# define RTSha512t224Digest
+-# define RTSha512t224DigestFromFile
+-# define RTSha512t224Digest
+-# define RTSha512t224Update
+-# define RTSha512t256FromString
+-# define RTSha512t256Init
+-# define RTSha512t256ToFile
+-# define RTSha512t256Update
+-# define RTSha512t256DigestFromFile
+-# define RTSha512t256Digest
+-# define RTSha512t256DigestFromFile
+-# define RTSha512t256Digest
+-# define RTSha512t256Update
+-# define RTSocketClose
+-# define RTSocketFromNative
+-# define RTSocketQueryAddressStr
+-# define RTSocketGetLocalAddress
+-# define RTSocketGetPeerAddress
+-# define RTSocketParseInetAddress
+-# define RTSocketRead
+-# define RTSocketReadFrom
+-# define RTSocketReadNB
+-# define RTSocketRelease
+-# define RTSocketRetain
+-# define RTSocketSelectOne
+-# define RTSocketSelectOneEx
+-# define RTSocketSetInheritance
+# define RTTestDestroy
 RT_MANGLER(RTTestDestroy)
+# define RTTestDisableAssertions
 RT_MANGLER(RTTestDisableAssertions)
+# define RTTestErrorCount
 RT_MANGLER(RTTestErrorCount)
+# define RTTestFailed
 RT_MANGLER(RTTestFailed)
+# define RTTestFailedV
 RT_MANGLER(RTTestFailedV)
+# define RTTestFailureDetails
 RT_MANGLER(RTTestFailureDetails)
+# define RTTestFailureDetailsV
 RT_MANGLER(RTTestFailureDetailsV)
+# define RTTestGuardedAlloc
 RT_MANGLER(RTTestGuardedAlloc)
+# define RTTestGuardedAllocHead
 RT_MANGLER(RTTestGuardedAllocHead)
+# define RTTestGuardedAllocTail
 RT_MANGLER(RTTestGuardedAllocTail)
+# define RTTestGuardedFree
 RT_MANGLER(RTTestGuardedFree)
+# define RTTestIDisableAssertions
 RT_MANGLER(RTTestIDisableAssertions)
+# define RTTestIErrorCount
 RT_MANGLER(RTTestIErrorCount)
+# define RTTestIErrorInc
 RT_MANGLER(RTTestIErrorInc)
+# define RTTestIFailed
 RT_MANGLER(RTTestIFailed)
+# define RTTestIFailedRc
 RT_MANGLER(RTTestIFailedRc)
+# define RTTestIFailedRcV
 RT_MANGLER(RTTestIFailedRcV)
+# define RTTestIFailedV
 RT_MANGLER(RTTestIFailedV)
+# define RTTestIFailureDetails
 RT_MANGLER(RTTestIFailureDetails)
+# define RTTestIFailureDetailsV
 RT_MANGLER(RTTestIFailureDetailsV)
+# define RTTestInitAndCreate
 RT_MANGLER(RTTestInitAndCreate)
+# define RTTestInitExAndCreate
 RT_MANGLER(RTTestInitExAndCreate)
+# define RTTestIPassed
 RT_MANGLER(RTTestIPassed)
+# define RTTestIPassedV
 RT_MANGLER(RTTestIPassedV)
+# define RTTestIPrintf
 RT_MANGLER(RTTestIPrintf)
+# define RTTestIPrintfV
 RT_MANGLER(RTTestIPrintfV)
+# define RTTestIRestoreAssertions
 RT_MANGLER(RTTestIRestoreAssertions)
+# define RTTestISub
 RT_MANGLER(RTTestISub)
+# define RTTestISubDone
 RT_MANGLER(RTTestISubDone)
+# define RTTestISubF
 RT_MANGLER(RTTestISubF)
+# define RTTestISubV
 RT_MANGLER(RTTestISubV)
+# define RTTestIValue
 RT_MANGLER(RTTestIValue)
+# define RTTestIValueF
 RT_MANGLER(RTTestIValueF)
+# define RTTestIValueV
 RT_MANGLER(RTTestIValueV)
+# define RTTestPassed
 RT_MANGLER(RTTestPassed)
+# define RTTestPassedV
 RT_MANGLER(RTTestPassedV)
+# define RTTestPrintf
 RT_MANGLER(RTTestPrintf)
+# define RTTestPrintfNI
 RT_MANGLER(RTTestPrintfNI)
+# define RTTestPrintfNIV
 RT_MANGLER(RTTestPrintfNIV)
+# define RTTestPrintfV
 RT_MANGLER(RTTestPrintfV)
+# define RTTestRestoreAssertions
 RT_MANGLER(RTTestRestoreAssertions)
+# define RTTestSetDefault
 RT_MANGLER(RTTestSetDefault)
+# define RTTestSkipAndDestroy
 RT_MANGLER(RTTestSkipAndDestroy)
+# define RTTestSkipAndDestroyV
 RT_MANGLER(RTTestSkipAndDestroyV)
+# define RTTestSkipped
 RT_MANGLER(RTTestSkipped)
+# define RTTestSkippedV
 RT_MANGLER(RTTestSkippedV)
+# define RTTestSub
 RT_MANGLER(RTTestSub)
+## define RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp_EndProc
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp_EndProc)
+## define RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim)
+## define RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim_EndProc
RT_MANGLER(RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim_EndProc)
+## define RTTimeNormalize
RT_MANGLER(RTTimeNormalize)
+## define RTTimeNow
RT_MANGLER(RTTimeNow)
+## define RTTimeProgramMicroTS
RT_MANGLER(RTTimeProgramMicroTS)
+## define RTTimeProgramMilliTS
RT_MANGLER(RTTimeProgramMilliTS)
+## define RTTimeProgramNanoTS
RT_MANGLER(RTTimeProgramNanoTS)
+## define RTTimeProgramSecTS
RT_MANGLER(RTTimeProgramSecTS)
+## define RTTimeProgramStartNanoTS
RT_MANGLER(RTTimeProgramStartNanoTS)
+## define RTTimerCanDoHighResolution
RT_MANGLER(RTTimerCanDoHighResolution)
+## define RTTimerChangeInterval
RT_MANGLER(RTTimerChangeInterval)
+## define RTTimerCreate
RT_MANGLER(RTTimerCreate)
+## define RTTimerCreateEx
RT_MANGLER(RTTimerCreateEx)
+## define RTTimerDestroy
RT_MANGLER(RTTimerDestroy)
+## define RTTimerGetSystemGranularity
RT_MANGLER(RTTimerGetSystemGranularity) /* r0drv */
+## define RTTimerLRCreate
RT_MANGLER(RTTimerLRCreate)
+## define RTTimerLRCreateEx
RT_MANGLER(RTTimerLRCreateEx)
+## define RTTimerLRDestroy
RT_MANGLER(RTTimerLRDestroy)
+## define RTTimerLRStart
RT_MANGLER(RTTimerLRStart)
+## define RTTimerLRStop
RT_MANGLER(RTTimerLRStop)
+## define RTTimerLRChangeInterval
RT_MANGLER(RTTimerLRChangeInterval)
+## define RTTimerReleaseSystemGranularity
RT_MANGLER(RTTimerReleaseSystemGranularity) /*
r0drv */
+## define RTTimerRequestSystemGranularity
RT_MANGLER(RTTimerRequestSystemGranularity) /*
r0drv */
+## define RTTimerStart
RT_MANGLER(RTTimerStart)
+## define RTTimerStop
RT_MANGLER(RTTimerStop)
+## define RTTimeSet
RT_MANGLER(RTTimeSet)
+## define RTTimeSpecFromString
RT_MANGLER(RTTimeSpecFromString)
+## define RTTimeSpecToString
RT_MANGLER(RTTimeSpecToString)
+## define RTTimeSystemMilliTS
RT_MANGLER(RTTimeSystemMilliTS)
+## define RTTimeSystemNanoTS
RT_MANGLER(RTTimeSystemNanoTS)
+## define RTTimeFromString
RT_MANGLER(RTTimeFromString)
+## define RTTimeToString
RT_MANGLER(RTTimeToString)
+## define RTTimeZoneGetInfoByUnixName
RT_MANGLER(RTTimeZoneGetInfoByUnixName)
+## define RTTimeZoneGetInfoByWindowsName
RT_MANGLER(RTTimeZoneGetInfoByWindowsName)
+## define RTTimeZoneGetInfoByWindowsIndex
RT_MANGLER(RTTimeZoneGetInfoByWindowsIndex)
+## define RTTimeZoneGetCurrent
RT_MANGLER(RTTimeZoneGetCurrent)
+## define RTTlsAlloc
RT_MANGLER(RTTlsAlloc)
+## define RTTlsAllocEx
RT_MANGLER(RTTlsAllocEx)
+## define RTTlsFree
RT_MANGLER(RTTlsFree)
+## define RTTlsGet
RT_MANGLER(RTTlsGet)
# define RTTlsGetEx
# define RTTlsSet
# define RTTraceBufAddMsg
# define RTTraceBufAddMsgEx
# define RTTraceBufAddMsgF
# define RTTraceBufAddMsgV
# define RTTraceBufAddPos
# define RTTraceBufAddPosMsg
# define RTTraceBufAddPosMsgEx
# define RTTraceBufAddPosMsgF
# define RTTraceBufAddPosMsgV
# define RTTraceBufCarve
# define RTTraceBufCreate
# define RTTraceBufDisable
# define RTTraceBufDumpToAssert
# define RTTraceBufDumpToLog
# define RTTraceBufEnable
# define RTTraceBufEnumEntries
# define RTTraceBufGetEntryCount
# define RTTraceBufGetEntrySize
# define RTTraceBufRelease
# define RTTraceBufRetain
# define RTTraceGetDefaultBuf
# define RTTraceSetDefaultBuf
# define RTUdpCreateClientSocket
# define RTUdpRead
# define RTUdpServerCreate
# define RTUdpServerCreateEx
# define RTUdpServerDestroy
# define RTUdpServerListen
# define RTUdpServerShutdown
# define RTUdpWrite
# define RTUniFree
# define RTUriCreate
# define RTUriFileCreate
# define RTUriFileCreateEx
# define RTUriFilePath
# define RTUriFilePathEx
# define RTUriParse
# define RTUriParsedAuthority
# define RTUriParsedAuthorityHost
# define RTUriParsedAuthorityPassword
# define RTUriParsedAuthorityPort
# define RTUriParsedAuthorityUsername
# define RTUriParsedFragment
# define RTUriParsedPath
# define RTUriParsedScheme
# define RTUriParsedQuery
RT_MANGLER(RTUriIsSchemeMatch)
RT_MANGLER(RTUtf16AllocTag)
RT_MANGLER(RTUtf16ReallocTag)
RT_MANGLER(RTUtf16CalcLatin1Len)
RT_MANGLER(RTUtf16CalcLatin1LenEx)
RT_MANGLER(RTUtf16CalcUtf8Len)
RT_MANGLER(RTUtf16CalcUtf8LenEx)
RT_MANGLER(RTUtf16BigCalcUtf8Len)
RT_MANGLER(RTUtf16BigCalcUtf8LenEx)
RT_MANGLER(RTUtf16LittleCalcUtf8Len)
RT_MANGLER(RTUtf16LittleCalcUtf8LenEx)
RT_MANGLER(RTUtf16Cmp)
RT_MANGLER(RTUtf16CmpAscii)
RT_MANGLER(RTUtf16CmpUtf8)
RT_MANGLER(RTUtf16DupTag)
RT_MANGLER(RTUtf16Free)
RT_MANGLER(RTUtf16GetCpExInternal)
RT_MANGLER(RTUtf16BigGetCpExInternal)
RT_MANGLER(RTUtf16GetCpInternal)
RT_MANGLER(RTUtf16BigGetCpInternal)
RT_MANGLER(RTUtf16ICmp)
RT_MANGLER(RTUtf16BigICmp)
RT_MANGLER(RTUtf16CmpUtf8)
RT_MANGLER(RTUtf16NICmp)
RT_MANGLER(RTUtf16LittleNICmp)
RT_MANGLER(RTUtf16ValidEncoding)
RT_MANGLER(RTUtf16Len)
RT_MANGLER(RTUtf16LocaleICmp)
RT_MANGLER(RTUtf16PutCpInternal)
RT_MANGLER(RTUtf16BigPutCpInternal)
RT_MANGLER(RTUtf16ToLatin1ExTag)
RT_MANGLER(RTUtf16ToLatin1Tag)
RT_MANGLER(RTUtf16ToLower)
RT_MANGLER(RTUtf16ToUpper)
RT_MANGLER(RTUtf16PurgeComplementSet)
RT_MANGLER(RTUtf16ToUtf8ExTag)
RT_MANGLER(RTUtf16BigToUtf8ExTag)
RT_MANGLER(RTUtf16LittleToUtf8ExTag)
RT_MANGLER(RTUtf16ToUtf8Tag)
RT_MANGLER(RTUtf16BigToUtf8Tag)
RT_MANGLER(RTUtf16ValidateEncoding)
RT_MANGLER(RTUtf16ValidateEncodingEx)
RT_MANGLER(RTUuidClear)
RT_MANGLER(RTUuidCompare)
RT_MANGLER(RTUuidCompare2Strs)
RT_MANGLER(RTUuidCompareStr)
+# define RTVfsFileSeek
+# define RTVfsFileSeek
+# define RTVfsFileSgRead
+# define RTVfsFileSgWrite
+# define RTVfsFileTell
+# define RTVfsFileToIoStream
+# define RTVfsFileWrite
+# define RTVfsFileWriteAt
+# define RTVfsFsStreamToPrivate
+# define RTVfsFsStreamEnd
+# define RTVfsFsStreamNext
+# define RTVfsFsStreamPushFile
+# define RTVfsFsStreamQueryInfo
+# define RTVfsFsStreamRelease
+# define RTVfsFsStreamRetain
+# define RTVfsFsStreamRetainDebug
+# define RTVfsFsStreamToDir
+# define RTVfsFsStreamToDirDebug
+# define RTVfsFsStreamToDirUndo
+# define RTVfsFsStreamToNormalDir
+# define RTVfsFsStreamToDirUndo
+# define RTVfsFsStreamToNormalDir
+# define RTVfsIoStreamToPrivate
+# define RTVfsIoStreamToPrivate
+# define RTVfsIoStreamFlush
+# define RTVfsIoStreamToBuffer
+# define RTVfsIoStreamToBuffer
+# define RTVfsIoStreamToRTPipe
+# define RTVfsIoStreamToStdHandle
+# define RTVfsIoStreamGetOpenFlags
+# define RTVfsIoStreamIsAtEnd
+# define RTVfsIoStreamOpenNormal
+# define RTVfsIoStreamPoll
+# define RTVfsIoStreamQueryInfo
+# define RTVfsIoStreamRead
+# define RTVfsIoStreamReadAt
+# define RTVfsIoStreamReadAll
+# define RTVfsIoStreamReadAllFree
+# define RTVfsIoStreamRelease
+# define RTVfsIoStreamRetain
+# define RTVfsIoStreamRetainDebug
+# define RTVfsIoStreamSgRead
+# define RTVfsIoStreamSgWrite
+# define RTVfsIoStreamSkip
+# define RTVfsIoStreamTell
+# define RTVfsIoStreamToFile
+# define RTVfsIoStreamValidateUtf8Encoding
+# define RTVfsIoStreamWrite
+# define RTVfsIoStreamWriteAt
+# define RTVfsIoStreamZeroFill
+# define RTVfsIsRangeInUse
+# define RTVfsLockAcquireReadSlow
+# define RTVfsLockAcquireWriteSlow RT_MANGLER(RTVfsLockAcquireWriteSlow)
+# define RTVfsLockRelease RT_MANGLER(RTVfsLockRelease)
+# define RTVfsLockReleaseReadSlow RT_MANGLER(RTVfsLockReleaseReadSlow)
+# define RTVfsLockReleaseWriteSlow RT_MANGLER(RTVfsLockReleaseWriteSlow)
+# define RTVfsLockRetain RT_MANGLER(RTVfsLockRetain)
+# define RTVfsLockRetainDebug RT_MANGLER(RTVfsLockRetainDebug)
+# define RTVfsMemFileCreate RT_MANGLER(RTVfsMemFileCreate)
+# define RTVfsMemIoStrmCreate RT_MANGLER(RTVfsMemIoStrmCreate)
+# define RTVfsMemorizeIoStreamAsFile RT_MANGLER(RTVfsMemorizeIoStreamAsFile)
+# define RTVfsNew RT_MANGLER(RTVfsNew)
+# define RTVfsNewBaseObj RT_MANGLER(RTVfsNewBaseObj)
+# define RTVfsNewDir RT_MANGLER(RTVfsNewFile)
+# define RTVfsNewFile RT_MANGLER(RTVfsNewFile)
+# define RTVfsNewFsStream RT_MANGLER(RTVfsNewFsStream)
+# define RTVfsNewIoStream RT_MANGLER(RTVfsNewIoStream)
+# define RTVfsNewSymlink RT_MANGLER(RTVfsNewSymlink)
+# define RTVfsObjFromDir RT_MANGLER(RTVfsObjFromDir)
+# define RTVfsObjFromFile RT_MANGLER(RTVfsObjFromFile)
+# define RTVfsObjFromFsStream RT_MANGLER(RTVfsObjFromFsStream)
+# define RTVfsObjFromIoStream RT_MANGLER(RTVfsObjFromIoStream)
+# define RTVfsObjFromSymlink RT_MANGLER(RTVfsObjFromSymlink)
+# define RTVfsObjFromVfs RT_MANGLER(RTVfsObjFromVfs)
+# define RTVfsObjQueryInfo RT_MANGLER(RTVfsObjQueryInfo)
+# define RTVfsObjRelease RT_MANGLER(RTVfsObjRelease)
+# define RTVfsObjRetain RT_MANGLER(RTVfsObjRetain)
+# define RTVfsObjRetainDebug RT_MANGLER(RTVfsObjRetainDebug)
+# define RTVfsObjToDir RT_MANGLER(RTVfsObjToDir)
+# define RTVfsObjToFile RT_MANGLER(RTVfsObjToFile)
+# define RTVfsObjToFsStream RT_MANGLER(RTVfsObjToFsStream)
+# define RTVfsObjToIoStream RT_MANGLER(RTVfsObjToIoStream)
+# define RTVfsObjToSymlink RT_MANGLER(RTVfsObjToSymlink)
+# define RTVfsObjToVfs RT_MANGLER(RTVfsObjToVfs)
+# define RTVfsParsePath RT_MANGLER(RTVfsParsePath)
+# define RTVfsParsePathA RT_MANGLER(RTVfsParsePathA)
+# define RTVfsParsePathAppend RT_MANGLER(RTVfsParsePathAppend)
+# define RTVfsParsePathFree RT_MANGLER(RTVfsParsePathFree)
+# define RTVfsRelease RT_MANGLER(RTVfsRelease)
+# define RTVfsOpenRoot RT_MANGLER(RTVfsOpenRoot)
+# define RTVfsQuerPathInfo RT_MANGLER(RTVfsQueryPathInfo)
+# define RTVfsRetain RT_MANGLER(RTVfsRetain)
+# define RTVfsRetainDebug RT_MANGLER(RTVfsRetainDebug)
+# define RTVfsSymlinkQueryInfo RT_MANGLER(RTVfsSymlinkQueryInfo)
+# define RTVfsSymlinkRead RT_MANGLER(RTVfsSymlinkRead)
+# define RTVfsSymlinkRelease RT_MANGLER(RTVfsSymlinkRelease)
+# define RTVfsSymlinkRetain RT_MANGLER(RTVfsSymlinkRetain)
+# define RTVfsSymlinkRetainDebug RT_MANGLER(RTVfsSymlinkRetainDebug)
+# define RTVfsSymlinkSetMode RT_MANGLER(RTVfsSymlinkSetMode)
+# define RTVfsSymlinkSetOwner RT_MANGLER(RTVfsSymlinkSetOwner)
+% define RTAsn1SeqOfCore_Init                              RT_MANGLER(RTAsn1SeqOfCore_Init)
+% define RTAsn1SequenceCore_Clone                         RT_MANGLER(RTAsn1SequenceCore_Clone)
+% define RTAsn1SequenceCore_Init                          RT_MANGLER(RTAsn1SequenceCore_Init)
+% define RTAsn1SetCore_Clone                              RT_MANGLER(RTAsn1SetCore_Clone)
+% define RTAsn1SetCore_Init                               RT_MANGLER(RTAsn1SetCore_Init)
+% define RTAsn1SetOfCore_Clone                            RT_MANGLER(RTAsn1SetOfCore_Clone)
+% define RTAsn1SetOfCore_Init                             RT_MANGLER(RTAsn1SetOfCore_Init)
+% define RTAsn1VtCheckSanity                              RT_MANGLER(RTAsn1VtCheckSanity)
+% define RTAsn1VtClone                                    RT_MANGLER(RTAsn1VtClone)
+% define RTAsn1VtCompare                                   RT_MANGLER(RTAsn1VtCompare)
+% define RTAsn1VtDeepEnum                                  RT_MANGLER(RTAsn1VtDeepEnum)
+% define RTAsn1VtDelete                                   RT_MANGLER(RTAsn1VtDelete)
+% define RTAsn1CursorCheckEnd                              RT_MANGLER(RTAsn1CursorCheckEnd)
+% define RTAsn1CursorGetBitString                         RT_MANGLER(RTAsn1CursorGetBitString)
+% define RTAsn1CursorGetBitStringEx                       RT_MANGLER(RTAsn1CursorGetBitStringEx)
+% define RTAsn1CursorGetBmpString                         RT_MANGLER(RTAsn1CursorGetBmpString)
+% define RTAsn1CursorGetBoolean                           RT_MANGLER(RTAsn1CursorGetBoolean)
+% define RTAsn1CursorGetContextTagNCursor                 RT_MANGLER(RTAsn1CursorGetContextTagNCursor)
+% define RTAsn1CursorGetCore                              RT_MANGLER(RTAsn1CursorGetCore)
+% define RTAsn1CursorGetDynType                           RT_MANGLER(RTAsn1CursorGetDynType)
+% define RTAsn1CursorGetIa5String                          RT_MANGLER(RTAsn1CursorGetIa5String)
+% define RTAsn1CursorGetInteger                           RT_MANGLER(RTAsn1CursorGetInteger)
+% define RTAsn1CursorGetObjId                             RT_MANGLER(RTAsn1CursorGetObjId)
+% define RTAsn1CursorGetOctetString                       RT_MANGLER(RTAsn1CursorGetOctetString)
+% define RTAsn1CursorGetSequenceCursor                    RT_MANGLER(RTAsn1CursorGetSequenceCursor)
+% define RTAsn1CursorGetSetCursor                         RT_MANGLER(RTAsn1CursorGetSetCursor)
+% define RTAsn1CursorGetString                            RT_MANGLER(RTAsn1CursorGetString)
+% define RTAsn1CursorGetTime                              RT_MANGLER(RTAsn1CursorGetTime)
+% define RTAsn1CursorGetUtf8String                        RT_MANGLER(RTAsn1CursorGetUtf8String)
+% define RTAsn1CursorInitAllocation                       RT_MANGLER(RTAsn1CursorInitAllocation)
+% define RTAsn1CursorInitArrayAllocation                  RT_MANGLER(RTAsn1CursorInitArrayAllocation)
+% define RTAsn1CursorInitPrimary                          RT_MANGLER(RTAsn1CursorInitPrimary)
+% define RTAsn1CursorInitSubFromCore                      RT_MANGLER(RTAsn1CursorInitSubFromCore)
+% define RTAsn1CursorIsNextEx                             RT_MANGLER(RTAsn1CursorIsNextEx)
+% define RTAsn1CursorMatchTagClassFlagsEx                 RT_MANGLER(RTAsn1CursorMatchTagClassFlagsEx)
+% define RTAsn1CursorPeek                                RT_MANGLER(RTAsn1CursorPeek)
+% define RTAsn1CursorReadHdr                               RT_MANGLER(RTAsn1CursorReadHdr)
+% define RTAsn1CursorSetInfo                              RT_MANGLER(RTAsn1CursorSetInfo)
+% define RTAsn1CursorSetInfoV                             RT_MANGLER(RTAsn1CursorSetInfoV)
+% define RTAsn1Dump                                       RT_MANGLER(RTAsn1Dump)
+% define RTAsn1QueryObjIdName                             RT_MANGLER(RTAsn1QueryObjIdName)
+% define RTAsn1EncodePrepare                             RT_MANGLER(RTAsn1EncodePrepare)
+% define RTAsn1EncodeRecalcHdrSize                        RT_MANGLER(RTAsn1EncodeRecalcHdrSize)
+% define RTAsn1EncodeToBuffer                            RT_MANGLER(RTAsn1EncodeToBuffer)
+% define RTAsn1EncodeWrite                                RT_MANGLER(RTAsn1EncodeWrite)
+% define RTAsn1EncodeWriteHeader                         RT_MANGLER(RTAsn1EncodeWriteHeader)
+% define RTAsn1BitString_CheckSanity                     RT_MANGLER(RTAsn1BitString_CheckSanity)
+++ define RTAsn1BitString_Clone
+++ define RTAsn1BitString_Compare
+++ define RTAsn1BitString_Delete
+++ define RTAsn1BitString_Enum
+++ define RTAsn1BitString_GetAsUInt64
+++ define RTAsn1BitString_Init
+++ define RTAsn1SeqOfBitStrings_CheckSanity
+++ define RTAsn1SeqOfBitStrings_Clone
+++ define RTAsn1SeqOfBitStrings_Compare
+++ define RTAsn1SeqOfBitStrings_Delete
+++ define RTAsn1SeqOfBitStrings_Enum
+++ define RTAsn1SeqOfBitStrings_Init
+++ define RTAsn1SetOfBitStrings_CheckSanity
+++ define RTAsn1SetOfBitStrings_Clone
+++ define RTAsn1SetOfBitStrings_Compare
+++ define RTAsn1SetOfBitStrings_Delete
+++ define RTAsn1SetOfBitStrings_Enum
+++ define RTAsn1SetOfBitStrings_Init
+++ define RTAsn1BitString_DecodeAsn1
+++ define RTAsn1BitString_DecodeAsn1Ex
+++ define RTAsn1SeqOfBitStrings_DecodeAsn1
+++ define RTAsn1SetOfBitStrings_DecodeAsn1
+++ define RTAsn1Boolean_CheckSanity
+++ define RTAsn1Boolean_Clone
+++ define RTAsn1Boolean_Compare
+++ define RTAsn1Boolean_Delete
+++ define RTAsn1Boolean_Enum
+++ define RTAsn1Boolean_Init
+++ define RTAsn1Boolean_InitDefault
+++ define RTAsn1Boolean_Set
+++ define RTAsn1SeqOfBooleans_CheckSanity
+++ define RTAsn1SeqOfBooleans_Clone
+++ define RTAsn1SeqOfBooleans_Compare
+++ define RTAsn1SeqOfBooleans_Delete
+++ define RTAsn1SeqOfBooleans_Enum
+++ define RTAsn1SeqOfBooleans_Init
+++ define RTAsn1SetOfBooleans_CheckSanity
+++ define RTAsn1SetOfBooleans_Clone
+++ define RTAsn1SetOfBooleans_Compare
+++ define RTAsn1SetOfBooleans_Delete
+++ define RTAsn1SetOfBooleans_Enum
+++ define RTAsn1SetOfBooleans_Init
+++ define RTAsn1Boolean_DecodeAsn1
+++ define RTAsn1SeqOfBooleans_DecodeAsn1
+++ define RTAsn1SetOfBooleans_DecodeAsn1
+++ define RTAsn1Core_ChangeTag
+++ define RTAsn1Core_CheckSanity
+++ define RTAsn1Core_Clone
RT_MANGLER(RTAsn1Integer_UnsignedCompareWithU64)
+
#define RTAsn1Integer_UnsignedLastBit RT_MANGLER(RTAsn1Integer_UnsignedLastBit)
+
#define RTAsn1SeqOfIntegers_CheckSanity RT_MANGLER(RTAsn1SeqOfIntegers_CheckSanity)
+
#define RTAsn1SeqOfIntegers_Clone RT_MANGLER(RTAsn1SeqOfIntegers_Clone)
+
#define RTAsn1SeqOfIntegers_Compare RT_MANGLER(RTAsn1SeqOfIntegers_Compare)
+
#define RTAsn1SeqOfIntegers_Delete RT_MANGLER(RTAsn1SeqOfIntegers_Delete)
+
#define RTAsn1SeqOfIntegers_Enum RT_MANGLER(RTAsn1SeqOfIntegers_Enum)
+
#define RTAsn1SeqOfIntegers_Init RT_MANGLER(RTAsn1SeqOfIntegers_Init)
+
#define RTAsn1SetOfIntegers_CheckSanity RT_MANGLER(RTAsn1SetOfIntegers_CheckSanity)
+
#define RTAsn1SetOfIntegers_Clone RT_MANGLER(RTAsn1SetOfIntegers_Clone)
+
#define RTAsn1SetOfIntegers_Compare RT_MANGLER(RTAsn1SetOfIntegers_Compare)
+
#define RTAsn1SetOfIntegers_Delete RT_MANGLER(RTAsn1SetOfIntegers_Delete)
+
#define RTAsn1SetOfIntegers_Enum RT_MANGLER(RTAsn1SetOfIntegers_Enum)
+
#define RTAsn1SetOfIntegers_Init RT_MANGLER(RTAsn1SetOfIntegers_Init)
+
#define RTAsn1Integer_DecodeAsn1 RT_MANGLER(RTAsn1Integer_DecodeAsn1)
+
#define RTAsn1SeqOfIntegers_DecodeAsn1 RT_MANGLER(RTAsn1SeqOfIntegers_DecodeAsn1)
+
#define RTAsn1SeqOfIntegers_DecodeAsn1 RT_MANGLER(RTAsn1SetOfIntegers_DecodeAsn1)
+
#define RTAsn1Null_CheckSanity RT_MANGLER(RTAsn1Null_CheckSanity)
+
#define RTAsn1Null_Clone RT_MANGLER(RTAsn1Null_Clone)
+
#define RTAsn1Null_Compare RT_MANGLER(RTAsn1Null_Compare)
+
#define RTAsn1Null_Delete RT_MANGLER(RTAsn1Null_Delete)
+
#define RTAsn1Null_Enum RT_MANGLER(RTAsn1Null_Enum)
+
#define RTAsn1Null_Init RT_MANGLER(RTAsn1Null_Init)
+
#define RTAsn1Null_DecodeAsn1 RT_MANGLER(RTAsn1Null_DecodeAsn1)
+
#define RTAsn1ObjIdCountComponents RT_MANGLER(RTAsn1ObjIdCountComponents)
+
#define RTAsn1ObjIdGetComponentsAsUInt32 RT_MANGLER(RTAsn1ObjIdGetComponentsAsUInt32)
+
#define RTAsn1ObjIdGetLastComponentsAsUInt32 RT_MANGLER(RTAsn1ObjIdGetLastComponentsAsUInt32)
+
#define RTAsn1ObjId_CheckSanity RT_MANGLER(RTAsn1ObjId_CheckSanity)
+
#define RTAsn1ObjId_Clone RT_MANGLER(RTAsn1ObjId_Clone)
+
#define RTAsn1ObjId_Compare RT_MANGLER(RTAsn1ObjId_Compare)
+
#define RTAsn1ObjId_CompareWithString RT_MANGLER(RTAsn1ObjId_CompareWithString)
+
#define RTAsn1ObjId_Delete RT_MANGLER(RTAsn1ObjId_Delete)
+
#define RTAsn1ObjId_Init RT_MANGLER(RTAsn1ObjId_Init)
+
#define RTAsn1ObjId_InitFromString RT_MANGLER(RTAsn1ObjId_InitFromString)
+
#define RTAsn1ObjId_StartsWith RT_MANGLER(RTAsn1ObjId_StartsWith)
+
#define RTAsn1SeqOfObjIds_CheckSanity RT_MANGLER(RTAsn1SeqOfObjIds_CheckSanity)
+
#define RTAsn1SeqOfObjIds_Clone RT_MANGLER(RTAsn1SeqOfObjIds_Clone)
+
#define RTAsn1SeqOfObjIds_Compare RT_MANGLER(RTAsn1SeqOfObjIds_Compare)
+
#define RTAsn1SeqOfObjIds_Delete RT_MANGLER(RTAsn1SeqOfObjIds_Delete)
+
#define RTAsn1SeqOfObjIds_Enum RT_MANGLER(RTAsn1SeqOfObjIds_Enum)
+
#define RTAsn1SeqOfObjIds_Init RT_MANGLER(RTAsn1SeqOfObjIds_Init)
+
#define RTAsn1SetOfObjIds_CheckSanity RT_MANGLER(RTAsn1SetOfObjIds_CheckSanity)
+
#define RTAsn1SetOfObjIds_Clone RT_MANGLER(RTAsn1SetOfObjIds_Clone)
+
#define RTAsn1SetOfObjIds_Compare RT_MANGLER(RTAsn1SetOfObjIds_Compare)
+
#define RTAsn1SetOfObjIds_Delete RT_MANGLER(RTAsn1SetOfObjIds_Delete)
+ # define RTCrRsaPublicKey_Init                          RT_MANGLER(RTCrRsaPublicKey_Init)
+ # define RTCrRsaDigestInfo_CheckSanity                  RT_MANGLER(RTCrRsaDigestInfo_CheckSanity)
+ # define RTCrRsaOtherPrimeInfo_CheckSanity              RT_MANGLER(RTCrRsaOtherPrimeInfo_CheckSanity)
+ # define RTCrRsaOtherPrimeInfos_CheckSanity
RT_MANGLER(RTCrRsaOtherPrimeInfos_CheckSanity)
+ # define RTCrRsaPrivateKey_CheckSanity                  RT_MANGLER(RTCrRsaPrivateKey_CheckSanity)
+ # define RTCrRsaPublicKey_CheckSanity                   RT_MANGLER(RTCrRsaPublicKey_CheckSanity)
+ # define RTCrPemFindFirstSectionInContent               RT_MANGLER(RTCrPemFindFirstSectionInContent)
+ # define RTCrPemFreeSections                            RT_MANGLER(RTCrPemFreeSections)
+ # define RTCrPemParseContent                            RT_MANGLER(RTCrPemParseContent)
+ # define RTCrPemReadFile                                RT_MANGLER(RTCrPemReadFile)
+ # define RTCrPks7Attribute_DecodeAsn1                   RT_MANGLER(RTCrPks7Attribute_DecodeAsn1)
+ # define RTCrPks7Attributes_DecodeAsn1                  RT_MANGLER(RTCrPks7Attributes_DecodeAsn1)
+ # define RTCrPks7ContentInfo_DecodeAsn1                 RT_MANGLER(RTCrPks7ContentInfo_DecodeAsn1)
+ # define RTCrPks7DigestInfo_DecodeAsn1                  RT_MANGLER(RTCrPks7DigestInfo_DecodeAsn1)
+ # define RTCrPkcs7IssuerAndSerialNumber_DecodeAsn1
RT_MANGLER(RTCrPkcs7IssuerAndSerialNumber_DecodeAsn1)
+ # define RTCrPkcs7SignedData_DecodeAsn1                 RT_MANGLER(RTCrPkcs7SignedData_DecodeAsn1)
+ # define RTCrPkcs7SignerInfo_DecodeAsn1                 RT_MANGLER(RTCrPkcs7SignerInfo_DecodeAsn1)
+ # define RTCrPkcs7Attribute_Compare                     RT_MANGLER(RTCrPkcs7Attribute_Compare)
+ # define RTCrPkcs7Attribute_Delete                      RT_MANGLER(RTCrPkcs7Attribute_Delete)
+ # define RTCrPkcs7Attribute_Enum                        RT_MANGLER(RTCrPkcs7Attribute_Enum)
+ # define RTCrPkcs7Attributes_Compare                    RT_MANGLER(RTCrPkcs7Attributes_Compare)
+ # define RTCrPkcs7Attributes_Delete                     RT_MANGLER(RTCrPkcs7Attributes_Delete)
+ # define RTCrPkcs7Attributes_Enum                       RT_MANGLER(RTCrPkcs7Attributes_Enum)
+ # define RTCrPkcs7ContentInfo_Compare                   RT_MANGLER(RTCrPkcs7ContentInfo_Compare)
+ # define RTCrPkcs7ContentInfo_Delete                    RT_MANGLER(RTCrPkcs7ContentInfo_Delete)
+ # define RTCrPkcs7ContentInfo_Enum                      RT_MANGLER(RTCrPkcs7ContentInfo_Enum)
+ # define RTCrPkcs7ContentInfo_IsSignedData              RT_MANGLER(RTCrPkcs7ContentInfo_IsSignedData)
+ # define RTCrPkcs7DigestInfo_Compare                    RT_MANGLER(RTCrPkcs7DigestInfo_Compare)
+ # define RTCrPkcs7DigestInfo_Delete                     RT_MANGLER(RTCrPkcs7DigestInfo_Delete)
+ # define RTCrPkcs7DigestInfo_Enum                       RT_MANGLER(RTCrPkcs7DigestInfo_Enum)
+ # define RTCrPkcs7IssuerAndSerialNumber_Compare        RT_MANGLER(RTCrPkcs7IssuerAndSerialNumber_Compare)
+ # define RTCrPkcs7IssuerAndSerialNumber_Delete          RT_MANGLER(RTCrPkcs7IssuerAndSerialNumber_Delete)
+ # define RTCrPkcs7IssuerAndSerialNumber_Enum
RT_MANGLER(RTCrPkcs7IssuerAndSerialNumber_Enum)
+ # define RTCrPkcs7SignedData_Compare                    RT_MANGLER(RTCrPkcs7SignedData_Compare)
+ # define RTCrPkcs7SignedData_Delete                     RT_MANGLER(RTCrPkcs7SignedData_Delete)
+ # define RTCrPkcs7SignedData_Enum                       RT_MANGLER(RTCrPkcs7SignedData_Enum)
+ # define RTCrPkcs7SignerInfo_Compare                    RT_MANGLER(RTCrPkcs7SignerInfo_Compare)
+ # define RTCrPkcs7SignerInfo_Delete                     RT_MANGLER(RTCrPkcs7SignerInfo_Delete)
+ # define RTCrPkcs7SignerInfo_Enum                       RT_MANGLER(RTCrPkcs7SignerInfo_Enum)
+ # define RTCrPkcs7SignerInfo_GetSigningTime             RT_MANGLER(RTCrPkcs7SignerInfo_GetSigningTime)
+ # define RTCrPkcs7SignerInfo_GetMsTimestamp

RT_MANGLER(RTCrPkcs7SignerInfo_GetMsTimestamp)
+# define RTCrPkcs7SignerInfos_Compare   RT_MANGLER(RTCrPkcs7SignerInfos_Compare)
+# define RTCrPkcs7SignerInfos_Delete   RT_MANGLER(RTCrPkcs7SignerInfos_Delete)
+# define RTCrPkcs7SignerInfos_Enum     RT_MANGLER(RTCrPkcs7SignerInfos_Enum)
+# define RTCrPkcs7Attribute_Clone     RT_MANGLER(RTCrPkcs7Attribute_Clone)
+# define RTCrPkcs7Attribute_Init      RT_MANGLER(RTCrPkcs7Attribute_Init)
+# define RTCrPkcs7Attributes_Clone    RT_MANGLER(RTCrPkcs7Attributes_Clone)
+# define RTCrPkcs7Attributes_Init     RT_MANGLER(RTCrPkcs7Attributes_Init)
+# define RTCrPkcs7ContentInfo_Clone   RT_MANGLER(RTCrPkcs7ContentInfo_Clone)
+# define RTCrPkcs7ContentInfo_Init    RT_MANGLER(RTCrPkcs7ContentInfo_Init)
+# define RTCrPkcs7DigestInfo_Clone    RT_MANGLER(RTCrPkcs7DigestInfo_Clone)
+# define RTCrPkcs7DigestInfo_Init     RT_MANGLER(RTCrPkcs7DigestInfo_Init)
+# define RTCrPkcs7IssuerAndSerialNumber_Clone
RT_MANGLER(RTCrPkcs7IssuerAndSerialNumber_Clone)
+# define RTCrPkcs7IssuerAndSerialNumber_Init
RT_MANGLER(RTCrPkcs7IssuerAndSerialNumber_Init)
+# define RTCrPkcs7SignedData_DataClone  RT_MANGLER(RTCrPkcs7SignedData_DataClone)
+# define RTCrPkcs7SignedData_Init      RT_MANGLER(RTCrPkcs7SignedData_Init)
+# define RTCrPkcs7SignerInfo.Clone     RT_MANGLER(RTCrPkcs7SignerInfo.Clone)
+# define RTCrPkcs7SignerInfo_Init      RT_MANGLER(RTCrPkcs7SignerInfo_Init)
+# define RTCrPkcs7SignerInfos.Clone   RT_MANGLER(RTCrPkcs7SignerInfos.Clone)
+# define RTCrPkcs7SignerInfos_Init     RT_MANGLER(RTCrPkcs7SignerInfos_Init)
+# define RTCrPkcs7Attribute.CheckSanity   RT_MANGLER(RTCrPkcs7Attribute.CheckSanity)
+# define RTCrPkcs7Attributes.CheckSanity   RT_MANGLER(RTCrPkcs7Attributes.CheckSanity)
+# define RTCrPkcs7ContentInfo.CheckSanity   RT_MANGLER(RTCrPkcs7ContentInfo.CheckSanity)
+# define RTCrPkcs7DigestInfo.CheckSanity   RT_MANGLER(RTCrPkcs7DigestInfo.CheckSanity)
+# define RTCrPkcs7IssuerAndSerialNumber_CheckSanity
RT_MANGLER(RTCrPkcs7IssuerAndSerialNumber_CheckSanity)
+# define RTCrPkcs7SignedData.CheckSanity   RT_MANGLER(RTCrPkcs7SignedData.CheckSanity)
+# define RTCrPkcs7SignerInfo.CheckSanity   RT_MANGLER(RTCrPkcs7SignerInfo.CheckSanity)
+# define RTCrPkcs7SignerInfos.CheckSanity   RT_MANGLER(RTCrPkcs7SignerInfos.CheckSanity)
+# define RTCrPkcs7VerifyCertCallbackCodeSigning
RT_MANGLER(RTCrPkcs7VerifyCertCallbackCodeSigning)
+# define RTCrPkcs7VerifyCertCallbackDefault   RT_MANGLER(RTCrPkcs7VerifyCertCallbackDefault)
+# define RTCrPkcs7VerifySignedData   RT_MANGLER(RTCrPkcs7VerifySignedData)
+# define RTCrPkcs7Cert.CheckSanity   RT_MANGLER(RTCrPkcs7Cert.CheckSanity)
+# define RTCrPkcs7Cert.Clone   RT_MANGLER(RTCrPkcs7Cert.Clone)
+# define RTCrPkcs7Cert.Compare   RT_MANGLER(RTCrPkcs7Cert.Compare)
+# define RTCrPkcs7Cert.DecodeAsn1   RT_MANGLER(RTCrPkcs7Cert.DecodeAsn1)
+# define RTCrPkcs7Cert.Delete   RT_MANGLER(RTCrPkcs7Cert.Delete)
+# define RTCrPkcs7Cert.Enum   RT_MANGLER(RTCrPkcs7Cert.Enum)
+# define RTCrPkcs7Cert_Init   RT_MANGLER(RTCrPkcs7Cert_Init)
+# define RTCrPkcs7SetOfCerts.CheckSanity   RT_MANGLER(RTCrPkcs7SetOfCerts.CheckSanity)
+# define RTCrPkcs7SetOfCerts.Clone   RT_MANGLER(RTCrPkcs7SetOfCerts.Clone)
+# define RTCrPkcs7SetOfCerts.Compare   RT_MANGLER(RTCrPkcs7SetOfCerts.Compare)
+# define RTCrPkcs7SetOfCerts.DecodeAsn1   RT_MANGLER(RTCrPkcs7SetOfCerts.DecodeAsn1)
+# define RTCrPkcs7SetOfCerts.Delete   RT_MANGLER(RTCrPkcs7SetOfCerts.Delete)
+# define RTCrPkcs7SetOfCerts.Enum   RT_MANGLER(RTCrPkcs7SetOfCerts.Enum)
+ define RTCrPks7SetOfCerts_Init
  RT_MANGLE(RTCrPks7SetOfCerts_Init)
+ define RTCrPks7SetOfCerts_FindX509ByIssuerAndSerialNumber
  RT_MANGLE(RTCrPks7SetOfCerts_FindX509ByIssuerAndSerialNumber)
+ define RTCrPks7SetOfContentInfos_CheckSanity
  RT_MANGLE(RTCrPks7SetOfContentInfos_CheckSanity)
+ define RTCrPks7SetOfContentInfos_Clone
  RT_MANGLE(RTCrPks7SetOfContentInfos_Clone)
+ define RTCrPks7SetOfContentInfos_Compare
  RT_MANGLE(RTCrPks7SetOfContentInfos_Compare)
+ define RTCrPks7SetOfContentInfos_DecodeAsn1
  RT_MANGLE(RTCrPks7SetOfContentInfos_DecodeAsn1)
+ define RTCrPks7SetOfContentInfos_Delete
  RT_MANGLE(RTCrPks7SetOfContentInfos_Delete)
+ define RTCrPks7SetOfContentInfos_Enum
  RT_MANGLE(RTCrPks7SetOfContentInfos_Enum)
+ define RTCrPks7SetOfSignedData_Init
  RT_MANGLE(RTCrPks7SetOfSignedData_Init)
+ define RTCrPks7SetOfSignedData_Delete
  RT_MANGLE(RTCrPks7SetOfSignedData_Delete)
+ define RTCrPks7SetOfSignedData_Compare
  RT_MANGLE(RTCrPks7SetOfSignedData_Compare)
+ define RTCrPks7SetOfSignedData_DecodeAsn1
  RT_MANGLE(RTCrPks7SetOfSignedData_DecodeAsn1)
+ define RTCrPks7SetOfSignedData_Delete
  RT_MANGLE(RTCrPks7SetOfSignedData_Delete)
+ define RTCrPks7SetOfSignedData_Enum
  RT_MANGLE(RTCrPks7SetOfSignedData_Enum)
+ define RTCrPks7SetOfSignedData_CheckSanity
  RT_MANGLE(RTCrPks7SetOfSignedData_CheckSanity)
}
Define the symbols:

- `RTCrSpcAttributeTypeAndOptionalValue_Init`  
- `RTCrSpcIndirectDataContent_Clone`  
- `RTCrSpcIndirectDataContent_Init`  
- `RTCrSpcLink_Clone`  
- `RTCrSpcLink_Init`  
- `RTCrSpcPeImageData_Clone`  
- `RTCrSpcPeImageData_Init`  
- `RTCrSpcSerializedObjectAttribute_Clone`  
- `RTCrSpcSerializedObjectAttribute_Init`  
- `RTCrSpcSerializedObjectAttributes_Clone`  
- `RTCrSpcSerializedObjectAttributes_Init`  
- `RTCrSpcSerializedObject_Clone`  
- `RTCrSpcSerializedObject_Init`  
- `RTCrSpcSerializedPageHashes_Clone`  
- `RTCrSpcSerializedPageHashes_Init`  
- `RTCrSpcString_Clone`  
- `RTCrSpcString_Init`  
- `RTCrSpcAttributeTypeAndOptionalValue_CheckSanity`  
- `RTCrSpcIndirectDataContent_CheckSanity`  
- `RTCrSpcIndirectDataContent_CheckSanityEx`  
- `RTCrSpcPeImageData_CheckSanity`  
- `RTCrSpcSerializedObjectAttribute_CheckSanity`  
- `RTCrSpcSerializedObjectAttributes_CheckSanity`  
- `RTCrSpcSerializedObject_CheckSanity`  
- `RTCrSpcSerializedPageHashes_CheckSanity`  
- `RTCrSpcString_CheckSanity`  
- `RTCrX509AlgorithmIdentifier_DecodeAsn1`  
- `RTCrX509AlgorithmIdentifiers_DecodeAsn1`  
- `RTCrX509AttributeTypeAndValue_DecodeAsn1`  
- `RTCrX509AttributeTypeAndValues_DecodeAsn1`  
- `RTCrX509AuthorityKeyIdentifier_DecodeAsn1`  
- `RTCrX509BasicConstraints_DecodeAsn1`  
- `RTCrX509BasicConstraints_DecodeAsn1`
+# define RTCrX509CertificatePolicies_DecodeAsn1
RT_MANGLER(RTCrX509CertificatePolicies_DecodeAsn1)

+# define RTCrX509Certificate_DecodeAsn1
RT_MANGLER(RTCrX509Certificate_DecodeAsn1)

+# define RTCrX509Certificates_DecodeAsn1
RT_MANGLER(RTCrX509Certificates_DecodeAsn1)

+# define RTCrX509Extension_DecodeAsn1
RT_MANGLER(RTCrX509Extension_DecodeAsn1)

+# define RTCrX509Extension_ExtnValue_DecodeAsn1
RT_MANGLER(RTCrX509Extension_ExtnValue_DecodeAsn1)

+# define RTCrX509Extensions_DecodeAsn1
RT_MANGLER(RTCrX509Extensions_DecodeAsn1)

+# define RTCrX509GeneralName_DecodeAsn1
RT_MANGLER(RTCrX509GeneralName_DecodeAsn1)

+# define RTCrX509GeneralNames_DecodeAsn1
RT_MANGLER(RTCrX509GeneralNames_DecodeAsn1)

+# define RTCrX509GeneralSubtree_DecodeAsn1
RT_MANGLER(RTCrX509GeneralSubtree_DecodeAsn1)

+# define RTCrX509GeneralSubtrees_DecodeAsn1
RT_MANGLER(RTCrX509GeneralSubtrees_DecodeAsn1)

+# define RTCrX509NameConstraints_DecodeAsn1
RT_MANGLER(RTCrX509NameConstraints_DecodeAsn1)

+# define RTCrX509Name_DecodeAsn1
RT_MANGLER(RTCrX509Name_DecodeAsn1)

+# define RTCrX509OldAuthorityKeyIdentifier_DecodeAsn1
RT_MANGLER(RTCrX509OldAuthorityKeyIdentifier_DecodeAsn1)

+# define RTCrX509OtherName_DecodeAsn1
RT_MANGLER(RTCrX509OtherName_DecodeAsn1)

+# define RTCrX509PolicyConstraints_DecodeAsn1
RT_MANGLER(RTCrX509PolicyConstraints_DecodeAsn1)

+# define RTCrX509PolicyInformation_DecodeAsn1
RT_MANGLER(RTCrX509PolicyInformation_DecodeAsn1)

+# define RTCrX509PolicyMapping_DecodeAsn1
RT_MANGLER(RTCrX509PolicyMapping_DecodeAsn1)

+# define RTCrX509PolicyMappings_DecodeAsn1
RT_MANGLER(RTCrX509PolicyMappings_DecodeAsn1)

+# define RTCrX509PolicyQualifierInfo_DecodeAsn1
RT_MANGLER(RTCrX509PolicyQualifierInfo_DecodeAsn1)

+# define RTCrX509PolicyQualifierInfos_DecodeAsn1
RT_MANGLER(RTCrX509PolicyQualifierInfos_DecodeAsn1)

+# define RTCrX509SubjectPublicKeyInfo_DecodeAsn1
RT_MANGLER(RTCrX509SubjectPublicKeyInfo_DecodeAsn1)

+# define RTCrX509TbsCertificate_DecodeAsn1
RT_MANGLER(RTCrX509TbsCertificate_DecodeAsn1)

+# define RTCrX509TbsCertificateCreate
RT_MANGLER(RTCrX509TbsCertificateCreate)

+# define RTCrX509Validity_DecodeAsn1
RT_MANGLER(RTCrX509Validity_DecodeAsn1)

+# define RTCrX509CertPathsBuild
RT_MANGLER(RTCrX509CertPathsBuild)

+# define RTCrX509CertPathsCreate
RT_MANGLER(RTCrX509CertPathsCreate)

+# define RTCrX509CertPathsCreateEx
RT_MANGLER(RTCrX509CertPathsCreateEx)

+# define RTCrX509CertPathsDumpAll
RT_MANGLER(RTCrX509CertPathsDumpAll)

+# define RTCrX509CertPathsDumpOne
RT_MANGLER(RTCrX509CertPathsDumpOne)

+# define RTCrX509CertPathsGetPathCount
RT_MANGLER(RTCrX509CertPathsGetPathCount)

+# define RTCrX509CertPathsGetPathLength
RT_MANGLER(RTCrX509CertPathsGetPathLength)

+# define RTCrX509CertPathsGetPathNodeCert
RT_MANGLER(RTCrX509CertPathsGetPathNodeCert)

+# define RTCrX509CertPathsGetPathVerifyResult
RT_MANGLER(RTCrX509CertPathsGetPathVerifyResult)
+ # define RTCrX509CertPathsQueryPathInfo  RT_MANGLER(RTCrX509CertPathsQueryPathInfo)
+ # define RTCrX509CertPathsRelease  RT_MANGLER(RTCrX509CertPathsRelease)
+ # define RTCrX509CertPathsRetain  RT_MANGLER(RTCrX509CertPathsRetain)
+ # define RTCrX509CertPathsSetTrustedStore  RT_MANGLER(RTCrX509CertPathsSetTrustedStore)
+ # define RTCrX509CertPathsSetUntrustedArray  RT_MANGLER(RTCrX509CertPathsSetUntrustedArray)
+ # define RTCrX509CertPathsSetUntrustedSet  RT_MANGLER(RTCrX509CertPathsSetUntrustedSet)
+ # define RTCrX509CertPathsSetUntrustedStore  RT_MANGLER(RTCrX509CertPathsSetUntrustedStore)
+ # define RTCrX509CertPathsSetValidTime  RT_MANGLER(RTCrX509CertPathsSetValidTime)
+ # define RTCrX509CertPathsSetValidTimeSpec  RT_MANGLER(RTCrX509CertPathsSetValidTimeSpec)
+ # define RTCrX509CertPathsValidateAll  RT_MANGLER(RTCrX509CertPathsValidateAll)
+ # define RTCrX509CertPathsValidateOne  RT_MANGLER(RTCrX509CertPathsValidateOne)
+ # define RTCrX509AlgorithmIdentifier_CombineEncryptionAndDigest  RT_MANGLER(RTCrX509AlgorithmIdentifier_CombineEncryptionAndDigest)
+ # define RTCrX509AlgorithmIdentifier_CombineEncryptionOidAndDigestOid  RT_MANGLER(RTCrX509AlgorithmIdentifier_CombineEncryptionOidAndDigestOid)
+ # define RTCrX509AlgorithmIdentifier_Compare  RT_MANGLER(RTCrX509AlgorithmIdentifier_Compare)
+ # define RTCrX509AlgorithmIdentifier_CompareDigestAndEncryptedDigest  RT_MANGLER(RTCrX509AlgorithmIdentifier_CompareDigestAndEncryptedDigest)
+ # define RTCrX509AlgorithmIdentifier_CompareDigestOidAndEncryptedDigestOid  RT_MANGLER(RTCrX509AlgorithmIdentifier_CompareDigestOidAndEncryptedDigestOid)
+ # define RTCrX509AlgorithmIdentifier_CompareWithString  RT_MANGLER(RTCrX509AlgorithmIdentifier_CompareWithString)
+ # define RTCrX509AlgorithmIdentifier_Delete  RT_MANGLER(RTCrX509AlgorithmIdentifier_Delete)
+ # define RTCrX509AlgorithmIdentifier_Enum  RT_MANGLER(RTCrX509AlgorithmIdentifier_Enum)
+ # define RTCrX509AlgorithmIdentifiers_Compare  RT_MANGLER(RTCrX509AlgorithmIdentifiers_Compare)
+ # define RTCrX509AlgorithmIdentifiers_Delete  RT_MANGLER(RTCrX509AlgorithmIdentifiers_Delete)
+ # define RTCrX509AlgorithmIdentifiers_Enum  RT_MANGLER(RTCrX509AlgorithmIdentifiers_Enum)
+ # define RTCrX509AlgorithmIdentifiers_Compare  RT_MANGLER(RTCrX509AlgorithmIdentifiers_Compare)
+ # define RTCrX509AlgorithmIdentifiers_Delete  RT_MANGLER(RTCrX509AlgorithmIdentifiers_Delete)
+ # define RTCrX509AlgorithmIdentifiers_Enum  RT_MANGLER(RTCrX509AlgorithmIdentifiers_Enum)
+ # define RTCrX509AttributeTypeAndValue_Compare  RT_MANGLER(RTCrX509AttributeTypeAndValue_Compare)
+ # define RTCrX509AttributeTypeAndValue_Delete  RT_MANGLER(RTCrX509AttributeTypeAndValue_Delete)
+ # define RTCrX509AttributeTypeAndValue_Delete  RT_MANGLER(RTCrX509AttributeTypeAndValue_Delete)
+ # define RTCrX509AttributeTypeAndValue_Enum  RT_MANGLER(RTCrX509AttributeTypeAndValue_Enum)
+ # define RTCrX509AttributeTypeAndValues_Compare  RT_MANGLER(RTCrX509AttributeTypeAndValues_Compare)
+ # define RTCrX509AttributeTypeAndValues_Delete  RT_MANGLER(RTCrX509AttributeTypeAndValues_Delete)
+ # define RTCrX509AttributeTypeAndValues_Delete  RT_MANGLER(RTCrX509AttributeTypeAndValues_Delete)
+ # define RTCrX509AttributeTypeAndValues_Enum  RT_MANGLER(RTCrX509AttributeTypeAndValues_Enum)
+ # define RTCrX509AuthorityKeyIdentifier_Compare  RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Compare)
+# define RTCrX509Name_Compare RT_MANGLER(RTCrX509Name_Compare)
+# define RTCrX509Name_ConstraintMatch RT_MANGLER(RTCrX509Name_ConstraintMatch)
+# define RTCrX509Name_Delete RT_MANGLER(RTCrX509Name_Delete)
+# define RTCrX509Name_Enum RT_MANGLER(RTCrX509Name_Enum)
+# define RTCrX509Name_FormatAsString RT_MANGLER(RTCrX509Name_FormatAsString)
+# define RTCrX509Name_MatchByRfc5280 RT_MANGLER(RTCrX509Name_MatchByRfc5280)
+# define RTCrX509Name_MatchWithString RT_MANGLER(RTCrX509Name_MatchWithString)
+# define RTCrX509Name_GetShortRdn RT_MANGLER(RTCrX509Name_GetShortRdn)
+# define RTCrX509OldAuthorityKeyIdentifier_Compare RT_MANGLER(RTCrX509OldAuthorityKeyIdentifier_Compare)
+# define RTCrX509OldAuthorityKeyIdentifier_Delete RT_MANGLER(RTCrX509OldAuthorityKeyIdentifier_Delete)
+# define RTCrX509OldAuthorityKeyIdentifier_Enum RT_MANGLER(RTCrX509OldAuthorityKeyIdentifier_Enum)
+# define RTCrX509OtherName_Compare RT_MANGLER(RTCrX509OtherName_Compare)
+# define RTCrX509OtherName_Delete RT_MANGLER(RTCrX509OtherName_Delete)
+# define RTCrX509OtherName_Enum RT_MANGLER(RTCrX509OtherName_Enum)
+# define RTCrX509PolicyConstraints_Compare RT_MANGLER(RTCrX509PolicyConstraints_Compare)
+# define RTCrX509PolicyConstraints_Delete RT_MANGLER(RTCrX509PolicyConstraints_Delete)
+# define RTCrX509PolicyConstraints_Enum RT_MANGLER(RTCrX509PolicyConstraints_Enum)
+# define RTCrX509PolicyInformation_Compare RT_MANGLER(RTCrX509PolicyInformation_Compare)
+# define RTCrX509PolicyInformation_Delete RT_MANGLER(RTCrX509PolicyInformation_Delete)
+# define RTCrX509PolicyInformation_Enum RT_MANGLER(RTCrX509PolicyInformation_Enum)
+# define RTCrX509PolicyMapping_Compare RT_MANGLER(RTCrX509PolicyMapping_Compare)
+# define RTCrX509PolicyMapping_Delete RT_MANGLER(RTCrX509PolicyMapping_Delete)
+# define RTCrX509PolicyMapping_Enum RT_MANGLER(RTCrX509PolicyMapping_Enum)
+# define RTCrX509PolicyMappings_Compare RT_MANGLER(RTCrX509PolicyMappings_Compare)
+# define RTCrX509PolicyMappings_Delete RT_MANGLER(RTCrX509PolicyMappings_Delete)
+# define RTCrX509PolicyMappings_Enum RT_MANGLER(RTCrX509PolicyMappings_Enum)
+# define RTCrX509PolicyQualifierInfo_Compare RT_MANGLER(RTCrX509PolicyQualifierInfo_Compare)
+# define RTCrX509PolicyQualifierInfo_Delete RT_MANGLER(RTCrX509PolicyQualifierInfo_Delete)
+# define RTCrX509PolicyQualifierInfo_Enum RT_MANGLER(RTCrX509PolicyQualifierInfo_Enum)
+# define RTCrX509PolicyQualifierInfos_Compare RT_MANGLER(RTCrX509PolicyQualifierInfos_Compare)
+# define RTCrX509PolicyQualifierInfos_Delete RT_MANGLER(RTCrX509PolicyQualifierInfos_Delete)
+# define RTCrX509PolicyQualifierInfos_Enum RT_MANGLER(RTCrX509PolicyQualifierInfos_Enum)
+# define RTCrX509SubjectPublicKeyInfo_Compare RT_MANGLER(RTCrX509SubjectPublicKeyInfo_Compare)
+# define RTCrX509SubjectPublicKeyInfo_Delete RT_MANGLER(RTCrX509SubjectPublicKeyInfo_Delete)
+# define RTCrX509SubjectPublicKeyInfo_Enum RT_MANGLER(RTCrX509SubjectPublicKeyInfo_Enum)
+# define RTCrX509TbsCertificate_Compare RT_MANGLER(RTCrX509TbsCertificate_Compare)
+# define RTCrX509TbsCertificate_Delete RT_MANGLER(RTCrX509TbsCertificate_Delete)
+# define RTCrX509TbsCertificate_Enum RT_MANGLER(RTCrX509TbsCertificate_Enum)
+# define RTCrX509TbsCertificate_ReprocessExtensions
RT_MANGLER(RTCrX509TbsCertificate_ReprocessExtensions)
++# define RTCrX509Validity_Compare RT_MANGLER(RTCrX509Validity_Compare)
++# define RTCrX509Validity_Delete RT_MANGLER(RTCrX509Validity_Delete)
++# define RTCrX509Validity_Enum RT_MANGLER(RTCrX509Validity_Enum)
++# define RTCrX509Validity_IsValidAtTimeSpec RT_MANGLER(RTCrX509Validity_IsValidAtTimeSpec)
++# define RTCrX509Certificate_ReadFromFile RT_MANGLER(RTCrX509Certificate_ReadFromFile)
++# define RTCrX509Certificate_ReadFromBuffer RT_MANGLER(RTCrX509Certificate_ReadFromBuffer)
++# define RTCrX509AlgorithmIdentifier_Clone RT_MANGLER(RTCrX509AlgorithmIdentifier_Clone)
++# define RTCrX509AlgorithmIdentifier_Init RT_MANGLER(RTCrX509AlgorithmIdentifier_Init)
++# define RTCrX509AlgorithmIdentifiers_Clone RT_MANGLER(RTCrX509AlgorithmIdentifiers_Clone)
++# define RTCrX509AlgorithmIdentifiers_Init RT_MANGLER(RTCrX509AlgorithmIdentifiers_Init)
++# define RTCrX509AttributeTypeAndValue_Clone RT_MANGLER(RTCrX509AttributeTypeAndValue_Clone)
++# define RTCrX509AttributeTypeAndValue_Init RT_MANGLER(RTCrX509AttributeTypeAndValue_Init)
++# define RTCrX509AttributeTypeAndValues_Clone RT_MANGLER(RTCrX509AttributeTypeAndValues_Clone)
++# define RTCrX509AttributeTypeAndValues_Init RT_MANGLER(RTCrX509AttributeTypeAndValues_Init)
++# define RTCrX509AuthorityKeyIdentifier_Clone RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Clone)
++# define RTCrX509AuthorityKeyIdentifier_Init RT_MANGLER(RTCrX509AuthorityKeyIdentifier_Init)
++# define RTCrX509BasicConstraints_Clone RT_MANGLER(RTCrX509BasicConstraints_Clone)
++# define RTCrX509BasicConstraints_Init RT_MANGLER(RTCrX509BasicConstraints_Init)
++# define RTCrX509CertificatePolicies_Init RT_MANGLER(RTCrX509CertificatePolicies_Init)
++# define RTCrX509Certificate_Clone RT_MANGLER(RTCrX509Certificate_Clone)
++# define RTCrX509Certificate_Init RT_MANGLER(RTCrX509Certificate_Init)
++# define RTCrX509Certificates_Clone RT_MANGLER(RTCrX509Certificates_Clone)
++# define RTCrX509Certificates_Init RT_MANGLER(RTCrX509Certificates_Init)
++# define RTCrX509Extension_Clone RT_MANGLER(RTCrX509Extension_Clone)
++# define RTCrX509Extension_Init RT_MANGLER(RTCrX509Extension_Init)
++# define RTCrX509Extensions_Clone RT_MANGLER(RTCrX509Extensions_Clone)
++# define RTCrX509Extensions_Init RT_MANGLER(RTCrX509Extensions_Init)
++# define RTCrX509GeneralName_Clone RT_MANGLER(RTCrX509GeneralName_Clone)
++# define RTCrX509GeneralName_Init RT_MANGLER(RTCrX509GeneralName_Init)
++# define RTCrX509GeneralNames_Clone RT_MANGLER(RTCrX509GeneralNames_Clone)
++# define RTCrX509GeneralNames_Init RT_MANGLER(RTCrX509GeneralNames_Init)
++# define RTCrX509GeneralSubtree_Clone RT_MANGLER(RTCrX509GeneralSubtree_Clone)
++# define RTCrX509GeneralSubtree_Init RT_MANGLER(RTCrX509GeneralSubtree_Init)
++# define RTCrX509GeneralSubtrees_Clone RT_MANGLER(RTCrX509GeneralSubtrees_Clone)
++# define RTCrX509GeneralSubtrees_Init RT_MANGLER(RTCrX509GeneralSubtrees_Init)
++# define RTCrX509NameConstraints_Clone RT_MANGLER(RTCrX509NameConstraints_Clone)
++# define RTCrX509NameConstraints_Init RT_MANGLER(RTCrX509NameConstraints_Init)
++# define RTCrX509Name_Clone RT_MANGLER(RTCrX509Name_Clone)
++# define RTCrX509Name_Init RT_MANGLER(RTCrX509Name_Init)
RT_MANGLER(RTCrX509GeneralSubtree_CheckSanity)
+# define RTCrX509GeneralSubtrees_CheckSanity
RT_MANGLER(RTCrX509GeneralSubtrees_CheckSanity)
+# define RTCrX509NameConstraints_CheckSanity
RT_MANGLER(RTCrX509NameConstraints_CheckSanity)
+# define RTCrX509Name_CheckSanity
RT_MANGLER(RTCrX509Name_CheckSanity)
+# define RTCrX509OtherName_CheckSanity
RT_MANGLER(RTCrX509OtherName_CheckSanity)
+# define RTCrX509PolicyConstraints_CheckSanity
RT_MANGLER(RTCrX509PolicyConstraints_CheckSanity)
+# define RTCrX509PolicyInformation_CheckSanity
RT_MANGLER(RTCrX509PolicyInformation_CheckSanity)
+# define RTCrX509PolicyMapping_CheckSanity
RT_MANGLER(RTCrX509PolicyMapping_CheckSanity)
+# define RTCrX509PolicyMappings_CheckSanity
RT_MANGLER(RTCrX509PolicyMappings_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
+# define RTCrX509PolicyQualifierInfo_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfo_CheckSanity)
+# define RTCrX509PolicyQualifierInfos_CheckSanity
RT_MANGLER(RTCrX509PolicyQualifierInfos_CheckSanity)
rtcrtafcertpathcontrols_decodeasn1
RT_MANGLER(RTCrTafCertPathControls_DecodeAsn1)
rtcrtaftrustanchorchoice_decodeasn1
RT_MANGLER(RTCrTafTrustAnchorChoice_DecodeAsn1)
rtcrtaftrustanchorinfo_decodeasn1
RT_MANGLER(RTCrTafTrustAnchorInfo_DecodeAsn1)
rtcrtaftrustanchorlist_decodeasn1
RT_MANGLER(RTCrTafTrustAnchorList_DecodeAsn1)
rtcrtafcertpathcontrols_compare
RT_MANGLER(RTCrTafCertPathControls_Compare)
rtcrtafcertpathcontrols_delete
RT_MANGLER(RTCrTafCertPathControls_Delete)
rtcrtafcertpathcontrols_enum
RT_MANGLER(RTCrTafCertPathControls_Enum)
rtcrtaftrustanchorchoice_compare
RT_MANGLER(RTCrTafTrustAnchorChoice_Compare)
rtcrtaftrustanchorchoice_delete
RT_MANGLER(RTCrTafTrustAnchorChoice_Delete)
rtcrtaftrustanchorchoice_enum
RT_MANGLER(RTCrTafTrustAnchorChoice_Enum)
rtcrtaftrustanchorinfo_compare
RT_MANGLER(RTCrTafTrustAnchorInfo_Compare)
rtcrtaftrustanchorinfo_delete
RT_MANGLER(RTCrTafTrustAnchorInfo_Delete)
rtcrtaftrustanchorinfo_enum
RT_MANGLER(RTCrTafTrustAnchorInfo_Enum)
rtcrtaftrustanchorlist_compare
RT_MANGLER(RTCrTafTrustAnchorList_Compare)
rtcrtaftrustanchorlist_delete
RT_MANGLER(RTCrTafTrustAnchorList_Delete)
rtcrtaftrustanchorlist_enum
RT_MANGLER(RTCrTafTrustAnchorList_Enum)
+# define RTCrTafCertPathControls_ClonerRT_MANGLER(RTCrTafCertPathControls_Cloner)
+# define RTCrTafCertPathControls_InitRT_MANGLER(RTCrTafCertPathControls_Init)
+# define RTCrTafTrustAnchorChoice_ClonerRT_MANGLER(RTCrTafTrustAnchorChoice_Cloner)
+# define RTCrTafTrustAnchorChoice_InitRT_MANGLER(RTCrTafTrustAnchorChoice_Init)
+# define RTCrTafTrustAnchorInfo_ClonerRT_MANGLER(RTCrTafTrustAnchorInfo_Cloner)
+# define RTCrTafTrustAnchorInfo_InitRT_MANGLER(RTCrTafTrustAnchorInfo_Init)
+# define RTCrTafTrustAnchorList_ClonerRT_MANGLER(RTCrTafTrustAnchorList_Cloner)
+# define RTCrTafTrustAnchorList_InitRT_MANGLER(RTCrTafTrustAnchorList_Init)
+# define RTCrTafCertPathControls_CheckSanityRT_MANGLER(RTCrTafCertPathControls_CheckSanity)
+# define RTCrTafTrustAnchorChoice_CheckSanityRT_MANGLER(RTCrTafTrustAnchorChoice_CheckSanity)
+# define RTCrTafTrustAnchorInfo_CheckSanityRT_MANGLER(RTCrTafTrustAnchorInfo_CheckSanity)
+# define RTCrTafTrustAnchorList_CheckSanityRT_MANGLER(RTCrTafTrustAnchorList_CheckSanity)
+# define RTCrTspAccuracy_CheckSanityRT_MANGLER(RTCrTspAccuracy_CheckSanity)
+# define RTCrTspAccuracy_CloneRT_MANGLER(RTCrTspAccuracy_Clone)
+# define RTCrTspAccuracy.CompareRT_MANGLER(RTCrTspAccuracy.Compare)
+# define RTCrTspAccuracy_DecodeAsn1RT_MANGLER(RTCrTspAccuracy_DecodeAsn1)
+# define RTCrTspAccuracy_DeleteRT_MANGLER(RTCrTspAccuracy_Delete)
+# define RTCrTspAccuracy_EnumRT_MANGLER(RTCrTspAccuracy_Enum)
+# define RTCrTspAccuracy_InitRT_MANGLER(RTCrTspAccuracy_Init)
+# define RTCrTspMessageImprint_CheckSanityRT_MANGLER(RTCrTspMessageImprint_CheckSanity)
+# define RTCrTspMessageImprint_CloneRT_MANGLER(RTCrTspMessageImprint_Clone)
+# define RTCrTspMessageImprint.CompareRT_MANGLER(RTCrTspMessageImprint.Compare)
+# define RTCrTspMessageImprint_DecodeAsn1RT_MANGLER(RTCrTspMessageImprint_DecodeAsn1)
+# define RTCrTspMessageImprint_DeleteRT_MANGLER(RTCrTspMessageImprint_Delete)
+# define RTCrTspMessageImprint_EnumRT_MANGLER(RTCrTspMessageImprint_Enum)
+# define RTCrTspMessageImprint_InitRT_MANGLER(RTCrTspMessageImprint_Init)
+# define RTCrTspTstInfo_CheckSanityRT_MANGLER(RTCrTspTstInfo_CheckSanity)
+# define RTCrTspTstInfo_CloneRT_MANGLER(RTCrTspTstInfo_Clone)
+# define RTCrTspTstInfo.CompareRT_MANGLER(RTCrTspTstInfo.Compare)
+# define RTCrTspTstInfo_DecodeAsn1RT_MANGLER(RTCrTspTstInfo_DecodeAsn1)
+# define RTCrTspTstInfo_DeleteRT_MANGLER(RTCrTspTstInfo_Delete)
+# define RTCrTspTstInfo_EnumRT_MANGLER(RTCrTspTstInfo_Enum)
+# define RTCrTspTstInfo_InitRT_MANGLER(RTCrTspTstInfo_Init)
+# define RTCrCertCtxReleaseRT_MANGLER(RTCrCertCtxRelease)
+# define RTCrCertCtxRetainRT_MANGLER(RTCrCertCtxRetain)
+# define RTCrCertCtxAddEncodedRT_MANGLER(RTCrCertCtxAddEncoded)
+# define RTCrStoreCertByIssuerAndSerialNoRT_MANGLER(RTCrStoreCertByIssuerAndSerialNo)
+# define RTCrStoreCertCountRT_MANGLER(RTCrStoreCertCount)
+# define RTCrStoreCertFindAllRT_MANGLER(RTCrStoreCertFindAll)
+# define RTCrStoreCertFindBySubjectOrAltSubjectByRfc5280RT_MANGLER(RTCrStoreCertFindBySubjectOrAltSubjectByRfc5280)
+# define RTCrStoreCertSearchDestroyRT_MANGLER(RTCrStoreCertSearchDestroy)
+# define RTCrStoreCertSearchNextRT_MANGLER(RTCrStoreCertSearchNext)
RT_MANGLER(RTCrStoreConvertToOpenSslCertStack)
+# define RTCrStoreConvertToOpenSslCertStore RT_MANGLER(RTCrStoreConvertToOpenSslCertStore)
+# define RTCrStoreRelease RT_MANGLER(RTCrStoreRelease)
+# define RTCrStoreRetain RT_MANGLER(RTCrStoreRetain)
+# define RTCrStoreCreateInMem RT_MANGLER(RTCrStoreCreateInMem)
+# define RTCrStoreCreateSnapshotByld RT_MANGLER(RTCrStoreCreateSnapshotById)
+# define RTCrStoreCreateSnapshotOfUserAndSystemTrustedCAsAndCerts
RT_MANGLER(RTCrStoreCreateSnapshotOfUserAndSystemTrustedCAsAndCerts)
+# define RTCrStoreCertAddFromDir RT_MANGLER(RTCrStoreCertAddFromDir)
+# define RTCrStoreCertAddFromFile RT_MANGLER(RTCrStoreCertAddFromFile)
+# define RTCrStoreCertAddFromJavaKeyStore RT_MANGLER(RTCrStoreCertAddFromJavaKeyStore)
+# define RTCrStoreCertAddFromJavaKeyStoreInMem
RT_MANGLER(RTCrStoreCertAddFromJavaKeyStoreInMem)
+# define RTCrStoreCertAddWantedFromStore RT_MANGLER(RTCrStoreCertAddWantedFromStore)
+# define RTCrStoreCertAddWantedFromDir RT_MANGLER(RTCrStoreCertAddWantedFromDir)
+# define RTCrStoreCertAddWantedFromFile RT_MANGLER(RTCrStoreCertAddWantedFromFile)
+# define RTCrStoreCertAddWantedFromStore RT_MANGLER(RTCrStoreCertAddWantedFromStore)
+# define RTCrStoreCertAddWantedFromFishingExpedition
RT_MANGLER(RTCrStoreCertAddWantedFromFishingExpedition)
+# define RTCrStoreCertCheckWanted RT_MANGLER(RTCrStoreCertCheckWanted)
+# define RTCrStoreCertExportAsPem RT_MANGLER(RTCrStoreCertExportAsPem)
+# define RTErrInfoAdd RT_MANGLER(RTErrInfoAdd)
+# define RTErrInfoAddF RT_MANGLER(RTErrInfoAddF)
+# define RTErrInfoAddV RT_MANGLER(RTErrInfoAddV)
+# define RTLdrHashImage RT_MANGLER(RTLdrHashImage)
+# define RTLdrOpenWithReader RT_MANGLER(RTLdrOpenWithReader)
+# define RTLdrQueryPropEx RT_MANGLER(RTLdrQueryPropEx)
+# define RTLdrVerifySignature RT_MANGLER(RTLdrVerifySignature)
+# define RTBigNumAdd RT_MANGLER(RTBigNumAdd)
+# define RTBigNumAssign RT_MANGLER(RTBigNumAssign)
+# define RTBigNumBitWidth RT_MANGLER(RTBigNumBitWidth)
+# define RTBigNumByteWidth RT_MANGLER(RTBigNumByteWidth)
+# define RTBigNumClone RT_MANGLER(RTBigNumClone)
+# define RTBigNumCompare RT_MANGLER(RTBigNumCompare)
+# define RTBigNumCompareWithS64 RT_MANGLER(RTBigNumCompareWithS64)
+# define RTBigNumCompareWithU64 RT_MANGLER(RTBigNumCompareWithU64)
+# define RTBigNumDestroy RT_MANGLER(RTBigNumDestroy)
+# define RTBigNumDivide RT_MANGLER(RTBigNumDivide)
+# define RTBigNumDivideKnuth RT_MANGLER(RTBigNumDivideKnuth)
+# define RTBigNumDivideLong RT_MANGLER(RTBigNumDivideLong)
+# define RTBigNumExponentiate RT_MANGLER(RTBigNumExponentiate)
+# define RTBigNumInit RT_MANGLER(RTBigNumInit)
+# define RTBigNumInitZero RT_MANGLER(RTBigNumInitZero)
+# define RTBigNumModExp RT_MANGLER(RTBigNumModExp)
+# define RTBigNumModulo RT_MANGLER(RTBigNumModulo)
+# define RTBigNumMultiply RT_MANGLER(RTBigNumMultiply)
+# define RTBigNumNegate RT_MANGLER(RTBigNumNegate)
+# define RTBigNumNegateThis RT_MANGLER(RTBigNumNegateThis)
+# define RTAsn1SetOfBitStrings_InsertEx
RT_MANGLER(RTAsn1SetOfBitStrings_InsertEx)
+# define RTAsn1SetOfBooleans_Erase
RT_MANGLER(RTAsn1SetOfBooleans_Erase)
+# define RTAsn1SetOfBooleans_InsertEx
RT_MANGLER(RTAsn1SetOfBooleans_InsertEx)
+# define RTAsn1SetOfCores_Erase
RT_MANGLER(RTAsn1SetOfCores_Erase)
+# define RTAsn1SetOfCores_InsertEx
RT_MANGLER(RTAsn1SetOfCores_InsertEx)
+# define RTAsn1SetOfIntegers_Erase
RT_MANGLER(RTAsn1SetOfIntegers_Erase)
+# define RTAsn1SetOfIntegers_InsertEx
RT_MANGLER(RTAsn1SetOfIntegers_InsertEx)
+# define RTAsn1SetOfObjIds_Erase
RT_MANGLER(RTAsn1SetOfObjIds_Erase)
+# define RTAsn1SetOfObjIds_InsertEx
RT_MANGLER(RTAsn1SetOfObjIds_InsertEx)
+# define RTAsn1SetOfObjIdSeqs_Erase
RT_MANGLER(RTAsn1SetOfObjIdSeqs_Erase)
+# define RTAsn1SetOfObjIdSeqs_InsertEx
RT_MANGLER(RTAsn1SetOfObjIdSeqs_InsertEx)
+# define RTAsn1SetOfOctetStrings_Erase
RT_MANGLER(RTAsn1SetOfOctetStrings_Erase)
+# define RTAsn1SetOfOctetStrings_InsertEx
RT_MANGLER(RTAsn1SetOfOctetStrings_InsertEx)
+# define RTAsn1SetOfStrings_Erase
RT_MANGLER(RTAsn1SetOfStrings_Erase)
+# define RTAsn1SetOfStrings_InsertEx
RT_MANGLER(RTAsn1SetOfStrings_InsertEx)
+# define RTAsn1SetOfTimes_Erase
RT_MANGLER(RTAsn1SetOfTimes_Erase)
+# define RTAsn1SetOfTimes_InsertEx
RT_MANGLER(RTAsn1SetOfTimes_InsertEx)
+# define RTCrPkcs7Attributes_Erase
RT_MANGLER(RTCrPkcs7Attributes_Erase)
+# define RTCrPkcs7Attributes_InsertEx
RT_MANGLER(RTCrPkcs7Attributes_InsertEx)
+# define RTCrPkcs7SetOfCerts_Erase
RT_MANGLER(RTCrPkcs7SetOfCerts_Erase)
+# define RTCrPkcs7SetOfCerts_InsertEx
RT_MANGLER(RTCrPkcs7SetOfCerts_InsertEx)
+# define RTCrPkcs7SetOfContentInfos_Erase
RT_MANGLER(RTCrPkcs7SetOfContentInfos_Erase)
+# define RTCrPkcs7SetOfContentInfos_InsertEx
RT_MANGLER(RTCrPkcs7SetOfContentInfos_InsertEx)
+# define RTCrPkcs7SetOfSignedData_Erase
RT_MANGLER(RTCrPkcs7SetOfSignedData_Erase)
+# define RTCrPkcs7SetOfSignedData_InsertEx
RT_MANGLER(RTCrPkcs7SetOfSignedData_InsertEx)
+# define RTCrPkcs7SignerInfos_Erase
RT_MANGLER(RTCrPkcs7SignerInfos_Erase)
+# define RTCrPkcs7SignerInfos_InsertEx
RT_MANGLER(RTCrPkcs7SignerInfos_InsertEx)
+# define RTCrRsaOtherPrimeInfos_Erase
RT_MANGLER(RTCrRsaOtherPrimeInfos_Erase)
+# define RTCrRsaOtherPrimeInfos_InsertEx
RT_MANGLER(RTCrRsaOtherPrimeInfos_InsertEx)
+# define RTCrSpcSerializedObjectAttributes_Erase
RT_MANGLER(RTCrSpcSerializedObjectAttributes_Erase)
+# define RTCrSpcSerializedObjectAttributes_InsertEx
RT_MANGLER(RTCrSpcSerializedObjectAttributes_InsertEx)
+# define RTCrTafTrustAnchorList_Erase
RT_MANGLER(RTCrTafTrustAnchorList_Erase)
+# define RTCrTafTrustAnchorList_InsertEx
RT_MANGLER(RTCrTafTrustAnchorList_InsertEx)
+# define RTCrX509AlgorithmIdentifiers_Erase
RT_MANGLER(RTCrX509AlgorithmIdentifiers_Erase)
+# define RTCrX509AlgorithmIdentifiers_InsertEx
RT_MANGLER(RTCrX509AlgorithmIdentifiers_InsertEx)
+# define RTCrX509CertificatePolicies_Erase
RT_MANGLER(RTCrX509CertificatePolicies_Erase)
+# define RTCrX509CertificatePolicies_InsertEx
RT_MANGLER(RTCrX509CertificatePolicies_InsertEx)
+# define RTCrX509Certificates_Erase
RT_MANGLER(RTCrX509Certificates_Erase)
+# define RTCrX509Certificates_InsertEx
RT_MANGLER(RTCrX509Certificates_InsertEx)
+# define RTCrX509Extensions_Erase
RT_MANGLER(RTCrX509Extensions_Erase)
+# define RTCrX509Extensions_InsertEx
RT_MANGLER(RTCrX509Extensions_InsertEx)
+ # define RTCrX509GeneralNames_Erase            RT_MANGLER(RTCrX509GeneralNames_Erase)
+ # define RTCrX509GeneralNames_InsertEx        RT_MANGLER(RTCrX509GeneralNames_InsertEx)
+ # define RTCrX509GeneralSubtrees_Erase       RT_MANGLER(RTCrX509GeneralSubtrees_Erase)
+ # define RTCrX509GeneralSubtrees_InsertEx    RT_MANGLER(RTCrX509GeneralSubtrees_InsertEx)
+ # define RTCrX509Name_Erase                  RT_MANGLER(RTCrX509Name_Erase)
+ # define RTCrX509Name_InsertEx               RT_MANGLER(RTCrX509Name_InsertEx)
+ # define RTCrX509PolicyMappings_Erase        RT_MANGLER(RTCrX509PolicyMappings_Erase)
+ # define RTCrX509PolicyMappings_InsertEx     RT_MANGLER(RTCrX509PolicyMappings_InsertEx)
+ # define RTCrX509PolicyQualifierInfos_Erase  RT_MANGLER(RTCrX509PolicyQualifierInfos_Erase)
+ # define RTCrX509PolicyQualifierInfos_InsertEx RT_MANGLER(RTCrX509PolicyQualifierInfos_InsertEx)
+ # define RTCrX509CertificateMarkers RT_MANGLER(RTCrX509CertificateMarkers)
+ # define g_apfnRTZlibDeps                     RT_MANGLER(g_apfnRTZlibDeps) /* os2 win solaris */
+ # define g_aRTUniFlagsRanges                  RT_MANGLER(g_aRTUniFlagsRanges)
+ # define g_aRTUniLowerRanges                  RT_MANGLER(g_aRTUniLowerRanges)
+ # define g_aRTUniUpperRanges                  RT_MANGLER(g_aRTUniUpperRanges)
+ # define g_fRTAlignmentChecks                 RT_MANGLER(g_fRTAlignmentChecks)
+ # define g_hKrnlDbgInfo                      RT_MANGLER(g_hKrnlDbgInfo) /* solaris */
+ # define g_pStdErr                           RT_MANGLER(g_pStdErr)
+ # define g_pStdIn                            RT_MANGLER(g_pStdIn)
+ # define g_pStdOut                           RT_MANGLER(g_pStdOut)
+ # define g_pszRTAssertExpr                   RT_MANGLER(g_pszRTAssertExpr)
+ # define g_pszRTAssertFile                   RT_MANGLER(g_pszRTAssertFile)
+ # define g_szRTAssertMsg1                     RT_MANGLER(g_szRTAssertMsg1)
+ # define g_szRTAssertMsg2                     RT_MANGLER(g_szRTAssertMsg2)
+ # define g_u32RTAssertLine                   RT_MANGLER(g_u32RTAssertLine)
+/
+ /* sort/merge into the above later: */
+ # define g_RTAsn1Time_Vtable                 RT_MANGLER(g_RTAsn1Time_Vtable)
+ # define g_RTAsn1String_Vtable               RT_MANGLER(g_RTAsn1String_Vtable)
+ # define g_RTAsn1OctetString_Vtable          RT_MANGLER(g_RTAsn1OctetString_Vtable)
+ # define g_RTAsn1ObjId_Vtable                RT_MANGLER(g_RTAsn1ObjId_Vtable)
+ # define g_RTAsn1Null_Vtable                 RT_MANGLER(g_RTAsn1Null_Vtable)
+ # define g_RTAsn1Integer_Vtable              RT_MANGLER(g_RTAsn1Integer_Vtable)
+ # define g_RTAsn1Core_Vtable                 RT_MANGLER(g_RTAsn1Core_Vtable)
+ # define g_RTAsn1Boolean_Vtable              RT_MANGLER(g_RTAsn1Boolean_Vtable)
+ # define g_RTAsn1BitString_Vtable            RT_MANGLER(g_RTAsn1BitString_Vtable)
+ # define g_RTAsn1DefaultAllocator            RT_MANGLER(g_RTAsn1DefaultAllocator)
+ # define g_RTAsn1EFenceAllocator             RT_MANGLER(g_RTAsn1EFenceAllocator)
+ # define g_aRTCrX509CertificateMarkers      RT_MANGLER(g_aRTCrX509CertificateMarkers)
+ # define g_cRTCrX509CertificateMarkers      RT_MANGLER(g_cRTCrX509CertificateMarkers)
+ /*if 0 */ Disabled for now as I'm not sure the assembler supports mangling yet. */
```c
+# define g_abRTZeroPage   RT_MANGLER(g_abRTZeroPage)
+# define g_abRTZero4K    RT_MANGLER(g_abRTZero4K)
+# define g_abRTZero8K    RT_MANGLER(g_abRTZero8K)
+# define g_abRTZero16K   RT_MANGLER(g_abRTZero16K)
+# define g_abRTZero32K   RT_MANGLER(g_abRTZero32K)
+# define g_abRTZero64K   RT_MANGLER(g_abRTZero64K)
+#endif
+
+
+/*
+ * Unstable functions (alphabetical order):
+ */
+/** @todo the list is incomplete! See the .def files + libraries. */
+
+
+/**
+ * Unstable variables (alphabetical order):
+ */
+/** none */
+
+#endif /* !DOXYGEN_RUNNING */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/mem.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/mem.h
@@ -0,0 +1,987 @@
+/** @file
+ * IPRT - Memory Management and Manipulation.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+
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+ */
+
+#ifndef ___iprt_mem_h
+#define ___iprt_mem_h
+
+
+#include <iprt/cdefs.h>
+#include <iprt/types.h>
+
+
+#ifdef IN_RC
+# error "There are no RTMem APIs available Guest Context!"
+#endif
+
+
+/** @defgroup grp_rt_mem    RTMem - Memory Management and Manipulation
+ * @ingroup grp_rt
+ * @}
+ */
+
+RT_C_DECLS_BEGIN
+
/** @def RTMEM_ALIGNMENT
+ * The alignment of the memory blocks returned by RTMemAlloc(), RTMemAllocZ(),
+ * RTMemRealloc(), RTMemTmpAlloc() and RTMemTmpAllocZ() for allocations greater
+ * than RTMEM_ALIGNMENT.
+ */
+/** @note This alignment is not forced if the electric fence is active!
+ */
+#if defined(RT_OS_OS2)
+# define RTMEM_ALIGNMENT    4
+#else
+# define RTMEM_ALIGNMENT    8
+#endif
+
+/** @def RTMEM_TAG
+ * The default allocation tag used by the RTMem allocation APIs.
+ */
+/** When not defined before the inclusion of iprt/mem.h or iprt/memobj.h, this
+ * will default to the pointer to the current file name. The memory API will
+ * make of use of this as pointer to a volatile but read-only string.
+ * The alternative tag includes the line number for a more-detailed analysis.
+ */
+#ifndef RTMEM_TAG
+## define RTMEM_TAG (__FILE__ ":" RT_XSTR(__LINE__))

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/** @name Allocate temporary memory. */
/** @{ */

/** Allocates temporary memory with default tag. */
+ * Temporary memory blocks are used for not too large memory blocks which
+ * are believed not to stick around for too long. Using this API instead
+ * of RTMemAlloc() not only gives the heap manager room for optimization
+ * but makes the code easier to read.
+ */
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
#define RTMemTmpAlloc(cb)               RTMemTmpAllocTag((cb), RTMEM_TAG)

/** Allocates temporary memory with custom tag. */
+ * Temporary memory blocks are used for not too large memory blocks which
+ * are believed not to stick around for too long. Using this API instead
+ * of RTMemAlloc() not only gives the heap manager room for optimization
+ * but makes the code easier to read.
+ */
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
RTDECL(void *)  RTMemTmpAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/** Allocates zero'd temporary memory with default tag. */
+ * Same as RTMemTmpAlloc() but the memory will be zero'd.
+ */
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
#define RTMemTmpAllocZ(cb)              RTMemTmpAllocZTag((cb), RTMEM_TAG)

+### else
+### define RTMEM_TAG (__FILE__)
+### endif
+###endif
+
+/**
+ * Allocates temporary memory with default tag.
+ */
+/**
+ * Temporary memory blocks are used for not too large memory blocks which
+ * are believed not to stick around for too long. Using this API instead
+ * of RTMemAlloc() not only gives the heap manager room for optimization
+ * but makes the code easier to read.
+ */
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
+###define RTMemTmpAlloc(cb)               RTMemTmpAllocTag((cb), RTMEM_TAG)
+
+/**
+ * Allocates temporary memory with custom tag.
+ */
+/**
+ * Temporary memory blocks are used for not too large memory blocks which
+ * are believed not to stick around for too long. Using this API instead
+ * of RTMemAlloc() not only gives the heap manager room for optimization
+ * but makes the code easier to read.
+ */
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *)  RTMemTmpAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

+/**
+ * Allocates zero'd temporary memory with default tag.
+ */
+/**
+ * Same as RTMemTmpAlloc() but the memory will be zero'd.
+ */
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure, assertion raised in strict builds.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
+###define RTMemTmpAllocZ(cb)              RTMemTmpAllocZTag((cb), RTMEM_TAG)
/**
 * Allocates zero'd temporary memory with custom tag.
 */

/** Same as RTMemTmpAlloc() but the memory will be zero'd.
 * @returns Pointer to the allocated memory.
 * @returns NULL on failure, assertion raised in strict builds.
 * @param cb Size in bytes of the memory block to allocated.
 * @param pszTag Allocation tag used for statistics and such.
 */
RTDECL(void *) RTMemTmpAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/** Free temporary memory.
 * @param pv Pointer to memory block.
 */
RTDECL(void) RTMemTmpFree(void *pv) RT_NO_THROW_PROTO;

/** @} */

/** Allocates memory with default tag.
 * @returns Pointer to the allocated memory.
 * @returns NULL on failure, assertion raised in strict builds.
 * @param cb Size in bytes of the memory block to allocated.
 */
#define RTMemAlloc(cb)                  RTMemAllocTag((cb), RTMEM_TAG)

/** Allocates memory with custom tag.
 * @returns Pointer to the allocated memory.
 * @returns NULL on failure, assertion raised in strict builds.
 * @param cb Size in bytes of the memory block to allocated.
 * @param pszTag Allocation tag used for statistics and such.
 */
RTDECL(void *) RTMemAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/** Allocates zero'd memory with default tag.
 * Instead of memset(pv, 0, sizeof()) use this when you want zero'd
 * memory. This keeps the code smaller and the heap can skip the memset
 * in about 0.42% of calls :-).
 */

+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocated.
+ */
+#define RTMemAllocZ(cb) RTMemAllocZTag((cb), RTMEM_TAG)
+
+/**
+ * Allocates zero'd memory with custom tag.
+ *
+ * Instead of memset(pv, 0, sizeof()) use this when you want zero'd
+ * memory. This keeps the code smaller and the heap can skip the memset
+ * in about 0.42% of calls :-).  
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocated.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Wrapper around RTMemAlloc for automatically aligning variable sized
+ * allocations so that the various electric fence heaps works correctly.
+ *
+ * @returns See RTMemAlloc.
+ * @param cbUnaligned The unaligned size.
+ */
+#define RTMemAllocVar(cbUnaligned) RTMemAllocVarTag((cbUnaligned), RTMEM_TAG)
+
+/**
+ * Wrapper around RTMemAllocTag for automatically aligning variable sized
+ * allocations so that the various electric fence heaps works correctly.
+ *
+ * @returns See RTMemAlloc.
+ * @param cbUnaligned The unaligned size.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemAllocVarTag(size_t cbUnaligned, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Wrapper around RTMemAllocZ for automatically aligning variable sized
+ * allocations so that the various electric fence heaps works correctly.
+ *
+ * @returns See RTMemAllocZ.
+ * @param cbUnaligned The unaligned size.
+ */
+#define RTMemAllocZVar(cbUnaligned) RTMemAllocZVarTag((cbUnaligned), RTMEM_TAG)
+
+/**
 + * Wrapper around RTMemAllocZTag for automatically aligning variable sized
 + * allocations so that the various electric fence heaps works correctly.
 + *
 + * @returns See RTMemAllocZ.
 + * @return cbUnaligned The unaligned size.
 + * @param pszTag Allocation tag used for statistics and such.
 + */
+RTDECL(void *) RTMemAllocZVarTag(size_t cbUnaligned, const char *pszTag) RT_NO_THROWPROTO;
+
+/**
 + * Duplicates a chunk of memory into a new heap block (default tag).
 + *
 + * @returns New heap block with the duplicate data.
 + * @return NULL if we’re out of memory.
 + * @param pvSrc The memory to duplicate.
 + * @param cb The amount of memory to duplicate.
 + */
+#define RTMemDup(pvSrc, cb) RTMemDupTag((pvSrc), (cb), RTMEM_TAG)
+
+/**
 + * Duplicates a chunk of memory into a new heap block (custom tag).
 + *
 + * @returns New heap block with the duplicate data.
 + * @returns NULL if we’re out of memory.
 + * @param pvSrc The memory to duplicate.
 + * @param cb The amount of memory to duplicate.
 + * @param pszTag Allocation tag used for statistics and such.
 + */
+RTDECL(void *) RTMemDupTag(const void *pvSrc, size_t cb, const char *pszTag) RT_NO_THROWPROTO;
+
+/**
 + * Duplicates a chunk of memory into a new heap block with some additional
 + * zeroed memory (default tag).
 + *
 + * @returns New heap block with the duplicate data.
 + * @returns NULL if we’re out of memory.
 + * @param pvSrc The memory to duplicate.
 + * @param cbSrc The amount of memory to duplicate.
 + * @param cbExtra The amount of extra memory to allocate and zero.
 + */
+#define RTMemDupEx(pvSrc, cbSrc, cbExtra) RTMemDupExTag((pvSrc), (cbSrc), (cbExtra), RTMEM_TAG)
+
+/**
 + * Duplicates a chunk of memory into a new heap block with some additional
 + * zeroed memory (default tag).
 + *
 + * @returns New heap block with the duplicate data.
 + */
@returns NULL if we're out of memory.
+ @param pvSrc The memory to duplicate.
+ @param cbSrc The amount of memory to duplicate.
+ @param cbExtra The amount of extra memory to allocate and zero.
+ @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemDupExTag(const void *pvSrc, size_t cbSrc, size_t cbExtra, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Reallocates memory with default tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param pvOld The memory block to reallocate.
+ * @param cbNew The new block size (in bytes).
+ */
+#define RTMemRealloc(pvOld, cbNew)          RTMemReallocTag((pvOld), (cbNew), RTMEM_TAG)
+
+/**
+ * Reallocates memory with custom tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param pvOld The memory block to reallocate.
+ * @param cbNew The new block size (in bytes).
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *)  RTMemReallocTag(void *pvOld, size_t cbNew, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Frees memory.
+ *
+ * @param pv Pointer to memory block.
+ */
+RTDECL(void)    RTMemFree(void *pv) RT_NO_THROW_PROTO;
+
+/** @name RTR0MemAllocEx and RTR0MemAllocExTag flags.
+ * @{ */
+/** The returned memory should be zeroed. */
+#define RTMEMALLOCEX_FLAGS_ZEROED          RT_BIT(0)
+/** It must be load code into the returned memory block and execute it. */
+#define RTMEMALLOCEX_FLAGS_EXEC            RT_BIT(1)
+/** Allocation from any context. */
+/** Will return VERR_NOT_SUPPORTED if not supported. */
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```c
#define RTMEMALLOC_FLAGS_ANY_CTX_ALLOC    RT_BIT(2)

/** Allocate the memory such that it can be freed from any context.
 * Will return VERR_NOT_SUPPORTED if not supported. */
#define RTMEMALLOC_FLAGS_ANY_CTX_FREE    RT_BIT(3)

/** Allocate and free from any context.
 * Will return VERR_NOT_SUPPORTED if not supported. */
#define RTMEMALLOC_FLAGS_ANY_CTX    (RTMEMALLOC_FLAGS_ANY_CTX_ALLOC | RTMEMALLOC_FLAGS_ANY_CTX_FREE)

/** Reachable by 16-bit address.
 * Will return VERR_NOT_SUPPORTED if not supported. */
#define RTMEMALLOC_FLAGS_16BIT_REACH    RT_BIT(4)

/** Reachable by 32-bit address.
 * Will return VERR_NOT_SUPPORTED if not supported. */
#define RTMEMALLOC_FLAGS_32BIT_REACH    RT_BIT(5)

/** Mask of valid flags. */
#define RTMEMALLOC_FLAGS_VALID_MASK    UINT32_C(0x0000003f)

/** Mask of valid flags for ring-0. */
#define RTMEMALLOC_FLAGS_VALID_MASK_R0    UINT32_C(0x0000000f)

/** @} */

/**
 * Extended heap allocation API, default tag.
 *
 * @returns IPRT status code.
 * @retval VERR_NO_MEMORY if we're out of memory.
 * @retval VERR_NO_EXEC_MEMORY if we're out of executable memory.
 * @retval VERR_NOT_SUPPORTED if any of the specified flags are unsupported.
 *
 * @param cb                  The amount of memory to allocate.
 * @param cbAlignment         The alignment requirements. Use 0 to indicate
default alignment.
 * @param fFlags              A combination of the RTMEMALLOC_FLAGS_XXX
 * defines.
 * @param ppv                 Where to return the memory.
 */
#define RTMemAllocEx(cb, cbAlignment, fFlags, ppv) RTMemAllocExTag((cb), (cbAlignment), (fFlags), RTMEM_TAG, (ppv))

/** Extended heap allocation API, custom tag.
 *
 * Depending on the implementation, using this function may add extra overhead,
 * so use the simpler APIs where ever possible.
 *
 * @returns IPRT status code.
 * @retval VERR_NO_MEMORY if we're out of memory.
 * @retval VERR_NO_EXEC_MEMORY if we're out of executable memory.
 * @retval VERR_NOT_SUPPORTED if any of the specified flags are unsupported.
 */
```
+ * @param cb The amount of memory to allocate.
+ * @param cbAlignment The alignment requirements. Use 0 to indicate
default alignment.
+ * @param fFlags A combination of the RTMEMALLOCEX_FLAGS_XXX
+ * defines.
+ * @param pszTag The tag.
+ * @param ppv Where to return the memory.
+ */
+RTDECL(int) RTMemAllocExTag(size_t cb, size_t cbAlignment, uint32_t fFlags, const char *pszTag, void **ppv) RT_NO_THROW_PROTO;
+
+/**
+ * For freeing memory allocated by RTMemAllocEx or RTMemAllocExTag.
+ *
+ * @param pv What to free, NULL is fine.
+ * @param cb The amount of allocated memory.
+ */
+RTDECL(void) RTMemFreeEx(void *pv, size_t cb) RT_NO_THROW_PROTO;
+
+/**
+ * Allocates memory which may contain code (default tag).
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb Size in bytes of the memory block to allocate.
+ */
+#define RTMemExecAlloc(cb)              RTMemExecAllocTag((cb), RTMEM_TAG)
+
+/**
+ * Allocates memory which may contain code (custom tag).
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(void *)  RTMemExecAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Free executable/read/write memory allocated by RTMemExecAlloc().
+ *
+ * @param pv Pointer to memory block.
+ * @param cb The allocation size.
+ */
+RTDECL(void)    RTMemExecFree(void *pv, size_t cb) RT_NO_THROW_PROTO;
#if defined(IN_RING0) && defined(RT_ARCH_AMD64) && defined(RT_OS_LINUX)
+/**
+ * Donate read+write+execute memory to the exec heap.
+ *
+ * This API is specific to AMD64 and Linux/GNU. A kernel module that desires to
+ * use RTMemExecAlloc on AMD64 Linux/GNU will have to donate some statically
+ * allocated memory in the module if it wishes for GCC generated code to work.
+ * GCC can only generate modules that work in the address range ~2GB to ~0
+ * currently.
+ *
+ * The API only accept one single donation.
+ *
+ * @returns IPRT status code.
+ * @param   pvMemory    Pointer to the memory block.
+ * @param   cb          The size of the memory block.
+ */
+RTR0DECL(int) RTR0MemExecDonate(void *pvMemory, size_t cb) RT_NO_THROW_PROTO;
+#endif /* R0+AMD64+LINUX */
+
+/**
+ * Allocate page aligned memory with default tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL if we're out of memory.
+ * @param   cb  Size of the memory block. Will be rounded up to page size.
+ */
+#define RTMemPageAlloc(cb)              RTMemPageAllocTag((cb), RTMEM_TAG)
+
+/**
+ * Allocate page aligned memory with custom tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL if we're out of memory.
+ * @param   cb  Size of the memory block. Will be rounded up to page size.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ */
+RTDECL(void *) RTMemPageAllocTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Allocate zero'd page aligned memory with default tag.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL if we're out of memory.
+ * @param   cb  Size of the memory block. Will be rounded up to page size.
+ */
+#define RTMemPageAllocZ(cb)             RTMemPageAllocZTag((cb), RTMEM_TAG)
+
/**
 * Allocate zero'd page aligned memory with custom tag.
 * @returns Pointer to the allocated memory.
 * @returns NULL if we're out of memory.
 * @param cb Size of the memory block. Will be rounded up to page size.
 * @param pszTag Allocation tag used for statistics and such.
 */
RTDECL(void *) RTMemPageAllocZTag(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/** Free a memory block allocated with RTMemPageAlloc() or RTMemPageAllocZ().
 * @param pv Pointer to the block as it was returned by the allocation function.
 * @param cb The allocation size. Will be rounded up to page size.
 */
RTDECL(void) RTMemPageFree(void *pv, size_t cb) RT_NO_THROW_PROTO;

/** Page level protection flags for RTMemProtect().
 * @}
 */
#define RTMEM_PROT_NONE   0
#define RTMEM_PROT_READ   1
#define RTMEM_PROT_WRITE  2
#define RTMEM_PROT_EXEC   4

/** Change the page level protection of a memory region.
 * @returns iprt status code.
 * @param pv Start of the region. Will be rounded down to nearest page boundary.
 * @param cb Size of the region. Will be rounded up to the nearest page boundary.
 * @param fProtect The new protection, a combination of the RTMEM_PROT_* defines.
 */
RTDECL(int) RTMemProtect(void *pv, size_t cb, unsigned fProtect) RT_NO_THROW_PROTO;

/** Goes thru some pains to make sure the specified memory block is thoroughly
 * scrambled.
 * @param pv The start of the memory block.
 */
+ * @param   cb      The size of the memory block.
+ * @param   cMinPasses  The minimum number of passes to make.
+ */
+RTDECL(void) RTMemWipeThoroughly(void *pv, size_t cb, size_t cMinPasses) RT_NO_THROW_PROTO;
+
+ ifdef IN_RING0
+ 
+ /**
+ * Allocates physical contiguous memory (below 4GB).
+ * The allocation is page aligned and the content is undefined.
+ *
+ * @returns Pointer to the memory block. This is page aligned.
+ * @param   pPhys   Where to store the physical address.
+ * @param   cb      The allocation size in bytes. This is always
+ *                  rounded up to PAGE_SIZE.
+ */
+RTR0DECL(void *) RTMemContAlloc(PRTCCPHYS pPhys, size_t cb) RT_NO_THROW_PROTO;
+
+ /**
+ * Frees memory allocated using RTMemContAlloc().
+ *
+ * @param   pv      Pointer to return from RTMemContAlloc().
+ * @param   cb      The cb parameter passed to RTMemContAlloc().
+ */
+RTR0DECL(void) RTMemContFree(void *pv, size_t cb) RT_NO_THROW_PROTO;
+
+ /**
+ * Copy memory from an user mode buffer into a kernel buffer.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_ACCESS_DENIED on error.
+ *
+ * @param   pvDst       The kernel mode destination address.
+ * @param   R3PtrSrc    The user mode source address.
+ * @param   cb          The number of bytes to copy.
+ */
+RTR0DECL(int) RTR0MemUserCopyFrom(void *pvDst, RTR3PTR R3PtrSrc, size_t cb);
+
+ /**
+ * Copy memory from a kernel buffer into a user mode one.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_ACCESS_DENIED on error.
+ *
+ * @param   R3PtrDst    The user mode destination address.
+ * @param   pvSrc       The kernel mode source address.
+ * @param   cb          The number of bytes to copy.
+ */
+RTR0DECL(int) RTR0MemUserCopyTo(RTR3PTR R3PtrDst, void const *pvSrc, size_t cb);
+
+/**
+ * Tests if the specified address is in the user addressable range.
+ *
+ * This function does not check whether the memory at that address is accessible
+ * or anything of that sort, only if the address itself is in the user mode
+ * range.
+ *
+ * @returns true if it's in the user addressable range. 
+ * @param R3Ptr   The user mode pointer to test.
+ *
+ * @remarks Some systems may have overlapping kernel and user address ranges.
+ *          One prominent example of this is the x86 version of Mac OS X. Use
+ *          RTR0MemAreKrnlAndUsrDifferent() to check.
+ */
+RTR0DECL(bool) RTR0MemUserIsValidAddr(RTR3PTR R3Ptr);
+
+/**
+ * Tests if the specified address is in the kernel mode range.
+ *
+ * This function does not check whether the memory at that address is accessible
+ * or anything of that sort, only if the address itself is in the kernel mode
+ * range.
+ *
+ * @returns true if it's in the kernel range. 
+ * @param pv       The alleged kernel mode pointer.
+ *
+ * @remarks Some systems may have overlapping kernel and user address ranges.
+ *          One prominent example of this is the x86 version of Mac OS X. Use
+ *          RTR0MemAreKrnlAndUsrDifferent() to check.
+ */
+RTR0DECL(bool) RTR0MemKernelIsValidAddr(void *pv);
+
+/**
+ * Are user mode and kernel mode address ranges distinctly different.
+ *
+ * This determines whether RTR0MemKernelIsValidAddr and RTR0MemUserIsValidAddr
+ * can be used for deciding whether some arbitrary address is a user mode or a
+ * kernel mode one.
+ *
+ * @returns true if they are, false if not.
+ */
+RTR0DECL(bool) RTR0MemAreKrnlAndUsrDifferent(void);
+
+/**
+ * Copy memory from an potentially unsafe kernel mode location and into a safe
+ * (kernel) buffer.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_ACCESS_DENIED on error.
+ * @retval VERR_NOT_SUPPORTED if not (yet) supported.
+ *
+ * @param   pvDst       The destination address (safe).
+ * @param   pvSrc       The source address (potentially unsafe).
+ * @param   cb          The number of bytes to copy.
+ */
+RTR0DECL(int) RTR0MemCopyFrom(void *pvDst, void const *pvSrc, size_t cb);
+
+/**
+ * Copy from a safe (kernel) buffer and to a potentially unsafe kernel mode
+ * location.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_ACCESS_DENIED on error.
+ * @retval VERR_NOT_SUPPORTED if not (yet) supported.
+ *
+ * @param   pvDst       The destination address (potentially unsafe).
+ * @param   pvSrc       The source address (safe).
+ * @param   cb          The number of bytes to copy.
+ */
+RTR0DECL(int) RTR0MemCopyTo(void *pvDst, void const *pvSrc, size_t cb);
+
+endif /* IN_RING0 */
+
+/** @name Electrical Fence Version of some APIs.
+ * @{
+ *
+ */
+/**
+ * Same as RTMemTmpAllocTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param   cb      Size in bytes of the memory block to allocate.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ * @param   SRC_POS The source position where call is being made from.
+ * Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *) RTMemEfTmpAlloc(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemTmpAllocZTag() except that it's fenced.
+ *

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+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb   Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ *             RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfTmpAllocZ(size_t cb, const char *pszTag, RT_SRC_POSDECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemTmpFree() except that it's for fenced memory.
+ *
+ * @param pv    Pointer to memory block.
+ * @param SRC_POS The source position where call is being made from. Use
+ *             RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void)    RTMemEfTmpFree(void *pv, RT_SRC_POS_DECL) RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory. Free with RTMemEfFree().
+ * @returns NULL on failure.
+ * @param cb   Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ *             RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAlloc(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocZTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb   Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ *             RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAllocZ(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocVarTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cb   Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ *             RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAllocVar(size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+ * @returns Pointer to the allocated memory. Free with RTMemEfFree().
+ * @returns NULL on failure.
+ * @param cbUnaligned Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAllocVar(size_t cbUnaligned, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemAllocZVarTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param cbUnaligned Size in bytes of the memory block to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfAllocZVar(size_t cbUnaligned, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemReallocTag() except that it's fenced.
+ *
+ * @returns Pointer to the allocated memory.
+ * @returns NULL on failure.
+ * @param pvOld The memory block to reallocate.
+ * @param cbNew The new block size (in bytes).
+ * @param pszTag Allocation tag used for statistics and such.
+ * @param SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *)  RTMemEfRealloc(void *pvOld, size_t cbNew, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Free memory allocated by any of the RTMemEf* allocators.
+ *
+ * @param pv Pointer to memory block.
+ * @param SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void)    RTMemEfFree(void *pv, RT_SRC_POS_DECL) RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemDupTag() except that it's fenced.
+ *
+ * @returns New heap block with the duplicate data.
+ * @returns NULL if we're out of memory.
+ * @param   pvSrc   The memory to duplicate.
+ * @param   cb      The amount of memory to duplicate.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ * @param   SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *) RTMemEfDup(const void *pvSrc, size_t cb, const char *pszTag, RT_SRC_POS_DECL)
RT_NO_THROW_PROTO;
+
+/**
+ * Same as RTMemEfDupExTag except that it's fenced.
+ *
+ * @returns New heap block with the duplicate data.
+ * @returns NULL if we're out of memory.
+ * @param   pvSrc   The memory to duplicate.
+ * @param   cb      The amount of memory to duplicate.
+ * @param   cbExtra The amount of extra memory to allocate and zero.
+ * @param   pszTag  Allocation tag used for statistics and such.
+ * @param   SRC_POS The source position where call is being made from. Use
+ * RT_SRC_POS when possible. Optional.
+ */
+RTDECL(void *) RTMemEfDupEx(const void *pvSrc, size_t cbSrc, size_t cbExtra, const char *pszTag,
RT_SRC_POS_DECL) RT_NO_THROW_PROTO;
+
+/** @def RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF
+ * Define RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF to enable electric fence new and
+ * delete operators for classes which uses the RTMEMEF_NEW_AND_DELETE_OPERATORS
+ * macro.
+ */
+/** @def RTMEMEF_NEW_AND_DELETE_OPERATORS
+ * Defines the electric fence new and delete operators for a class when
+ * RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF is define.
+ */
+/** @def RTR0MEMEF_NEW_AND_DELETE_OPERATORS_IOKIT
+ * Defines the electric fence new and delete operators for an IOKit class when
+ * RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF is define.
+ *
+ * This differs from RTMEMEF_NEW_AND_DELETE_OPERATORS in that the memory we
+ * allocate is initialized to zero. It is also assuming we don't have nothrow
+ * variants and exceptions, so fewer variations.
+ */
+#if defined(RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF) &&
!defined(RTMEM_NO_WRAP_SOME_NEW_AND_DELETE_TO_EF)
++# define RTMEMEF_NEW_AND_DELETE_OPERATORS() \
+ void *operator new(size_t cb) RT_THROW(std::bad_alloc)\ 
+ { 
+     void *pv = RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+     if (RT_LIKELY(pv)) 
+         return pv; 
+     throw std::bad_alloc(); 
+ } 
+ void *operator new(size_t cb, const std::nothrow_t &nothrow_constant) RT_NO_THROW_DEF\ 
+ { 
+     NOREF(nothrow_constant); 
+     return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
+ 
+ void *operator new[](size_t cb) RT_THROW(std::bad_alloc)\ 
+ { 
+     void *pv = RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+     if (RT_LIKELY(pv)) 
+         return pv; 
+     throw std::bad_alloc(); 
+ } 
+ void *operator new[](size_t cb, const std::nothrow_t &nothrow_constant) RT_NO_THROW_DEF\ 
+ { 
+     NOREF(nothrow_constant); 
+     return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
+ 
+ void operator delete(void *) RT_NO_THROW_DEF\ 
+ { 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ void operator delete(void *, const std::nothrow_t &nothrow_constant) RT_NO_THROW_DEF\ 
+ { 
+     NOREF(nothrow_constant); 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ void operator delete[](void *) RT_NO_THROW_DEF\ 
+ { 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ void operator delete[](void *, const std::nothrow_t &nothrow_constant) RT_NO_THROW_DEF\ 
+ { 
+     NOREF(nothrow_constant); 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ 
+ typedef int UsingElectricNewAndDeleteOperators
+ #else 
+ #define RTMEMEF_NEW_AND_DELETE_OPERATORS() 
+ 
+ void *operator new(size_t cb)
```c
+ { 
+     return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
+ void *operator new(size_t cb, const std::nothrow_t &nothrow_constant) 
+ { 
+     NOREF(nothrow_constant); 
+     return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
+ void *operator new[](size_t cb) 
+ { 
+     return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
+ void *operator new[](size_t cb, const std::nothrow_t &nothrow_constant) 
+ { 
+     NOREF(nothrow_constant); 
+     return RTMemEfAlloc(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
+ void operator delete(void *pv) 
+ { 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ void operator delete(void *pv, const std::nothrow_t &nothrow_constant) 
+ { 
+     NOREF(nothrow_constant); 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ void operator delete[](void *pv) 
+ { 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ void operator delete[](void *pv, const std::nothrow_t &nothrow_constant) 
+ { 
+     NOREF(nothrow_constant); 
+     RTMemEfFree(pv, RT_SRC_POS); 
+ } 
+ typedef int UsingElectricNewAndDeleteOperators
+ #endif 
+ #define RTR0MEMEF_NEW_AND_DELETE_OPERATORS_IOKIT() 
+ void *operator new(size_t cb) 
+ { 
+     return RTMemEfAllocZ(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
+ void *operator new[](size_t cb) 
+ { 
+     return RTMemEfAllocZ(cb, RTMEM_TAG, RT_SRC_POS); 
+ } 
```
void operator delete(void *pv)
{
    RTMemEfFree(pv, RT_SRC_POS);
}

void operator delete[](void *pv)
{
    RTMemEfFree(pv, RT_SRC_POS);
}

typedef int UsingElectricNewAndDeleteOperators
#endif
#ifdef RTMEMEF_NEW_AND_DELETE_OPERATORS

typedef int UsingDefaultNewAndDeleteOperators
#endif
#define RTMEMEF_NEW_AND_DELETE_OPERATORS()
#define RTR0MEMEF_NEW_AND_DELETE_OPERATORS_IOKIT()
#endif
#ifdef DOXYGEN_RUNNING
#define RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF
#endif
/** @def RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF
 * Define RTMEM_WRAP_SOME_NEW_AND_DELETE_TO_EF to wrap RTMem APIs to RTMemEf APIs.
 */
#if defined(RT_MEM_NEW_AND_DELETE_APIS) && !defined(RT_MEM_NO_WRAP_TO_EF_APIS) && ( defined(IN_RING3) || ( defined(IN_RING0) && !defined(IN_RING0_AGNOSTIC) && ( defined(RT_OS_DARWIN) || 0 ) ) )
#define RTMemTmpAllocTag(cb, pszTag)                   RTMemEfTmpAlloc((cb), (pszTag), RT_SRC_POS)
#define RTMemTmpAllocZTag(cb, pszTag)                  RTMemEfTmpAllocZ((cb), (pszTag), RT_SRC_POS)
#define RTMemTmpFree(pv)                               RTMemEfTmpFree((pv), RT_SRC_POS)
#define RTMemAllocTag(cb, pszTag)                      RTMemEfAlloc((cb), (pszTag), RT_SRC_POS)
#define RTMemAllocZTag(cb, pszTag)                     RTMemEfAllocZ((cb), (pszTag), RT_SRC_POS)
#define RTMemAllocVarTag(cbUnaligned, pszTag)          RTMemEfAllocVar((cbUnaligned), (pszTag), RT_SRC_POS)
#define RTMemAllocZVarTag(cbUnaligned, pszTag)         RTMemEfAllocZVar((cbUnaligned), (pszTag), RT_SRC_POS)
#define RTMemReallocTag(pvOld, cbNew, pszTag)          RTMemEfRealloc((pvOld), (cbNew), (pszTag), RT_SRC_POS)
#define RTMemFree(pv)                                  RTMemEfFree((pv), RT_SRC_POS)
#define RTMemDupTag(pvSrc, cb, pszTag)                 RTMemEfDup((pvSrc), (cb), (pszTag), RT_SRC_POS)
#define RTMemDupExTag(pvSrc, cbSrc, cbExtra, pszTag)   RTMemEfDupEx((pvSrc), (cbSrc), (cbExtra), (pszTag), RT_SRC_POS)
#endif
#ifdef DOXYGEN_RUNNING
#define RTMEM_WRAP_TO_EF_APIS
#endif
+ * Fenced drop-in replacement for RTMemTmpAllocTag.
+ * @copydoc RTMemTmpAllocTag
+ */
+RTDECL(void *)  RTMemEfTmpAllocNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Fenced drop-in replacement for RTMemTmpAllocZTag.
+ * @copydoc RTMemTmpAllocZTag
+ */
+RTDECL(void *)  RTMemEfTmpAllocZNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Fenced drop-in replacement for RTMemTmpFreeTag.
+ * @copydoc RTMemTmpFree
+ */
+RTDECL(void)    RTMemEfTmpFreeNP(void *pv) RT_NO.Throw_PROTO;
+
+/**
+ * Fenced drop-in replacement for RTMemAllocTag.
+ * @copydoc RTMemAllocTag
+ */
+RTDECL(void *)  RTMemEfAllocNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Fenced drop-in replacement for RTMemAllocZTag.
+ * @copydoc RTMemAllocZTag
+ */
+RTDECL(void *)  RTMemEfAllocZNP(size_t cb, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Fenced drop-in replacement for RTMemAllocVarTag
+ * @copydoc RTMemAllocVarTag
+ */
+RTDECL(void *)  RTMemEfAllocVarNP(size_t cbUnaligned, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Fenced drop-in replacement for RTMemAllocZVarTag.
+ * @copydoc RTMemAllocZVarTag
+ */
+RTDECL(void *)  RTMemEfAllocZVarNP(size_t cbUnaligned, const char *pszTag) RT_NO_THROW_PROTO;
+
+/**
+ * Fenced drop-in replacement for RTMemReallocTag.
+ * @copydoc RTMemReallocTag
+ */
+RTDECL(void *)  RTMemEfReallocNP(void *pvOld, size_t cbNew, const char *pszTag)
+ RT_NO_THROW_PROTO;
+
/** *
 * Fenced drop-in replacement for RTMemFree.
 * @copydoc RTMemFree
 */
RTDECL(void) RTMemEfFreeNP(void *pv) RT_NO_THROW_PROTO;

/** *
 * Fenced drop-in replacement for RTMemDupExTag.
 * @copydoc RTMemDupTag
 */
RTDECL(void *) RTMemEfDupNP(const void *pvSrc, size_t cb, const char *pszTag) RT_NO_THROW_PROTO;

/** *
 * Fenced drop-in replacement for RTMemDupExTag.
 * @copydoc RTMemDupExTag
 */
RTDECL(void *) RTMemEfDupExNP(const void *pvSrc, size_t cbSrc, size_t cbExtra, const char *pszTag) RT_NO_THROW_PROTO;

/** @} */

RT_C_DECLS_END
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_nocrt_limits_h
+#define ___iprt_nocrt_limits_h
+
+#include <iprt/types.h>
+
+#define CHAR_BIT 8
+#define SCHAR_MAX 0x7f
+#define SCHAR_MIN (-0x7f - 1)
+#define UCHAR_MAX 0xff
+#if 1 /* ASSUMES: signed char */
+# define CHAR_MAX SCHAR_MAX
+# define CHAR_MIN SCHAR_MIN
+#else
+# define CHAR_MAX UCHAR_MAX
+# define CHAR_MIN 0
+#endif
+
+#define WORD_BIT 16
+#define USHRT_MAX 0xffff
+#define SHRT_MAX 0x7fff
+#define SHRT_MIN (-0x7fff - 1)
+
/* ASSUMES 32-bit int */
+#define UINT_MAX 0xffffffffU
+#define INT_MAX 0x7fffffff
+#define INT_MIN (-0x7fffffff - 1)
+
+#if defined(RT_ARCH_X86) || defined(RT_OS_WINDOWS) || defined(RT_ARCH_SPARC)
+# define LONG_BIT 32
+# define ULONG_MAX 0xffffffffU
+# define LONG_MAX 0x7ffffffff
+# define LONG_MIN (-0x7ffffffff - 1)
+#elif defined(RT_ARCH_AMD64) || defined(RT_ARCH_SPARC64)
+# define LONG_BIT 64
+# define ULONG_MAX UINT64_C(0xffffffffffffffff)
+# define LONG_MAX INT64_C(0x7fffffffffffffff)
+# define LONG_MIN (INT64_C(-0x7fffffffffffffff) - 1)
+#else
+# error "PORTME"
```c
+#ifndef
+
+#define LLONG_BIT 64
+#define ULLONG_MAX UINT64_C(0xffffffffffffffff)
+#define LLONG_MAX INT64_C(0x7fffffffffffffff)
+#define LLONG_MIN (INT64_C(-0x7fffffffffffffff) - 1)
+
+#if ARCH_BITS == 32
+# define SIZE_T_MAX 0xffffffffU
+# define SSIZE_MAX 0x7fffffff
+#elif ARCH_BITS == 64
+# define SIZE_T_MAX UINT64_C(0xffffffffffffffff)
+# define SSIZE_MAX INT64_C(0x7fffffffffffffff)
+#else
+# error "huh?"
+#endif
+
+/*#define OFF_MAX __OFF_MAX
+#define OFF_MIN __OFF_MIN*/
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/param.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/param.h
@@ -0,0 +1,131 @@
+/** @file
+ * IPRT - Parameter Definitions.
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
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+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
*/
/** @todo Much of the PAGE_* stuff here is obsolete and highly risky to have around.
 * As for component configs (MM_*), either we gather all in here or we move those bits away! */

/* Undefine PAGE_SIZE and PAGE_SHIFT to avoid unnecessary noise when clashing
 * with system headers. Include system headers before / after iprt depending
 * on which you wish to take precedence. */
#undef PAGE_SIZE
#undef PAGE_SHIFT

/* Undefine PAGE_OFFSET_MASK to avoid the conflict with the-linux-kernel.h */
#undef PAGE_OFFSET_MASK

/**
 * i386 Page size.
 */
#if defined(RT_ARCH_SPARC64)
#define PAGE_SIZE 8192
#else
#define PAGE_SIZE 4096
#endif

/**
 * i386 Page shift.
 * This is used to convert between size (in bytes) and page count.
 */
#if defined(RT_ARCH_SPARC64)
#define PAGE_SHIFT 13
#else
#define PAGE_SHIFT 12
#endif

/**
 * i386 Page offset mask.
 */

/* Do NOT one-complement this for whatever purpose. You may get a 32-bit const when you want a 64-bit one.
 * Use PAGE_BASE_MASK, PAGE_BASE_GC_MASK, PAGE_BASE_HC_MASK, PAGE_ADDRESS() or
 * X86_PTE_PAE_PG_MASK.
 */
+if defined(RT_ARCH_SPARC64)
+define PAGE_OFFSET_MASK 0x1fff
+else
+define PAGE_OFFSET_MASK 0xffff
+endif
+
+/**
+ * Page address mask for the guest context POINTERS.
+ * @remark Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ */
+#define PAGE_BASE_GC_MASK (~(RTGCUINTPTR)PAGE_OFFSET_MASK)
+
+/**
+ * Page address mask for the host context POINTERS.
+ * @remark Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ */
+#define PAGE_BASE_HC_MASK (~(RTHCUINTPTR)PAGE_OFFSET_MASK)
+
+/**
+ * Page address mask for the both context POINTERS.
+ *
+ * Be careful when using this since it may be a size too big!
+ * @remark Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ */
+#define PAGE_BASE_MASK (~(RTUINTPTR)PAGE_OFFSET_MASK)
+
+/**
+ * Get the page aligned address of a POINTER in the CURRENT context.
+ *
+ * @returns Page aligned address (it's an uintptr_t).
+ * @param pv The virtual address to align.
+ *
+ * @remarks Physical addresses are always masked using X86_PTE_PAE_PG_MASK!
+ * @remarks This only works with POINTERS in the current context.
+ * Do NOT use on guest address or physical address!
+ */
+#define PAGE_ADDRESS(pv) ((uintptr_t)(pv) & ~(uintptr_t)PAGE_OFFSET_MASK)
+
+/**
+ * Get the page aligned address of a physical address
+ *
+ * @returns Page aligned address (it's an RTHCPHYS or RTGCPHYS).
+ * @param Phys The physical address to align.
+ */
+#define PHYS_PAGE_ADDRESS(Phys) ((Phys) & X86_PTE_PAE_PG_MASK)
+
+/**
+ * Host max path (the reasonable value).
+ @remarks defined both by iprt/param.h and iprt/path.h.
+ */
+ */
+#endif
+*/
+
+/** @} */
+/** @} */
+
+/** @} */
+
+#endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/path.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/path.h
@@ -0,0 +1,1490 @@
+/** @file
+ * IPRT - Path Manipulation.
+ */
+
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * CDDL are applicable instead of those of the GPL.
+ */
+
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_path_h
+#define ___iprt_path_h
+
+### define RTPATH_MAX (4096 + 4) /* (PATH_MAX + 1) on linux w/ some alignment */
+###endif

+* @remarks defined both by iprt/param.h and iprt/path.h.
+*/
+*/
+### defined(__iprt_path_h) || defined(DOXYGEN_RUNNING)
+### define RTPATH_MAX (4096 + 4) /* (PATH_MAX + 1) on linux w/ some alignment */
+###endif
+
+/** @} */
+/** @} */
+
+/** @} */
+
+#endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/path.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/path.h
@@ -0,0 +1,1490 @@
+/** @file
+ * IPRT - Path Manipulation.
+ */
+
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+ */
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+
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+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+
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+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_path_h
+#define ___iprt_path_h
+
+### define RTPATH_MAX (4096 + 4) /* (PATH_MAX + 1) on linux w/ some alignment */
+###endif

+* @remarks defined both by iprt/param.h and iprt/path.h.
+*/
+*/
+### defined(__iprt_path_h) || defined(DOXYGEN_RUNNING)
+### define RTPATH_MAX (4096 + 4) /* (PATH_MAX + 1) on linux w/ some alignment */
+###endif

Open Source Used In 5GaaS Edge AC-4 39666
### RTPATH_MAX

(4096 + 4) /* (PATH_MAX + 1) on linux w/ some alignment */

### RTPATH_TAG

The default allocation tag used by the RTPath allocation APIs.

When not defined before the inclusion of iprt/string.h, this will default to
the pointer to the current file name. The string API will make use of
this as pointer to a volatile but read-only string.

### RTPATH_F_XXX - Generic flags for APIs working on the file system.

Last component: Work on the link.

Last component: Follow if link.

Don't allow symbolic links as part of the path.

The parameters will be referenced multiple times.

Validates a flags parameter containing RTPATH_F_*.
/** @name RTPATH_STR_F_XXX - Generic flags for APIs working with path strings. */
/** @defgroup RTPATH_STR_F_XXX_Generic_flags_for_APIs_working_with_path_strings */

/** Host OS path style (default 0 value). */
#define RTPATH_STR_F_STYLE_HOST         UINT32_C(0x00000000)
/** DOS, OS/2 and Windows path style. */
#define RTPATH_STR_F_STYLE_DOS          UINT32_C(0x00000001)
/** Unix path style. */
#define RTPATH_STR_F_STYLE_UNIX         UINT32_C(0x00000002)
/** Reserved path style. */
#define RTPATH_STR_F_STYLE_RESERVED     UINT32_C(0x00000003)
/** The path style mask. */
#define RTPATH_STR_F_STYLE_MASK         UINT32_C(0x00000003)
/** Partial path - no start. */
#define RTPATH_STR_F_NO_START           UINT32_C(0x00000010)
/** Partial path - no end. */
#define RTPATH_STR_F_NO_END             UINT32_C(0x00000020)
/** Partial path - no start and no end. */
#define RTPATH_STR_F_MIDDLE             (RTPATH_STR_F_NO_START | RTPATH_STR_F_NO_END)
/** Reserved for future use. */
#define RTPATH_STR_F_RESERVED_MASK      UINT32_C(0x0000ffcc)
/** @} */

/** Validates a flags parameter containing RTPATH_FSTR_. */
#define RTPATH_STR_F_IS_VALID(a_fFlags, a_fIgnore) 
     (   ((a_fFlags) & ~((uint32_t)(a_fIgnore) | RTPATH_STR_F_STYLE_MASK | RTPATH_STR_F_MIDDLE))
     == 0 \
     && ((a_fFlags) & RTPATH_STR_F_STYLE_MASK) != RTPPATH_STR_F_STYLE_RESERVED \
     && ((a_fFlags) & RTPATH_STR_F_RESERVED_MASK) == 0 )

/** @def RTPATH_STYLE */
#define RTPATH_STYLE       RTPATH_STR_F_STYLE_DOS

/** @def RTPATH_SLASH */
#define RTPATH_SLASH       /* The preferred slash character. */
@remark IPRT will always accept unix slashes. So, normally you would never have to use this define.
@end

#define RTPATH_SLASH       '\'
#elif RTPATH_STYLE == RTPATH_STR_F_STYLE_UNIX
#define RTPATH_SLASH       '/'
#else
#error "Unsupported RTPATH_STYLE value."
#endif

#define RTPATH_DELIMITER    RTPATH_SLASH

#define RTPATH_SLASH_STR   RTPATH_SLASH

#define RTPATH_IS_SLASH(a_ch)      ( (a_ch) == '\' || (a_ch) == '/' )

#define RTPATH_IS_VOLSEP

Open Source Used In 5GaaS Edge AC-4 39669
### RTPATH_IS_VOLSEP

Checks if a character marks the end of the volume specification.

```c
/* Checks if a character marks the end of the volume specification. */

#define RTPATH_IS_VOLSEP(a_ch)   ( (a_ch) == ':' )
```

### RTPATH_IS_SEP

Checks if a character is path component separator.

```c
/* Checks if a character is path component separator */

#define RTPATH_IS_SEP(a_ch)     ( RTPATH_IS_SLASH(a_ch) || RTPATH_IS_VOLSEP(a_ch) )
```

### RTPathExists

Checks if the path exists.

```c
/* Checks if the path exists. */

RTDECL(bool) RTPathExists(const char *pszPath);
```
/**
 * Sets the current working directory of the process.
 *
 * @returns IPRT status code.
 * @param   pszPath         The path to the new working directory.
 */
RTDECL(int)  RTPathSetCurrent(const char *pszPath);

/**
 * Gets the current working directory of the process.
 *
 * @returns IPRT status code.
 * @param   pszPath         Where to store the path.
 * @param   cchPath         The size of the buffer pszPath points to.
 */
RTDECL(int)  RTPathGetCurrent(char *pszPath, size_t cchPath);

/**
 * Gets the current working directory on the specified drive.
 *
 * @returns IPRT status code.
 * @param   chDrive         The drive we're querying the driver letter on.
 * @param   pszPath         Where to store the working directroy path.
 * @param   cbPath          The size of the buffer pszPath points to.
 */
RTDECL(int) RTPathGetCurrentOnDrive(char chDrive, char *pszPath, size_t cbPath);

/**
 * Gets the current working drive of the process.
 *
 * Normally drive letter and colon will be returned, never trailing a root
 * slash. If the current directory is on a UNC share, the root of the share
 * will be returned. On systems without drive letters, an empty string is
 * returned for consistency.
 *
 * @returns IPRT status code.
 * @param   pszPath         Where to store the working drive or UNC root.
 * @param   cbPath          The size of the buffer pszPath points to.
 */
RTDECL(int) RTPathGetCurrentDrive(char *pszPath, size_t cbPath);

/**
 * Get the real path (no symlinks, no . or .. components), must exist.
 *
 * @returns iprt status code.
 * @param   pszPath         The path to resolve.
 */
+ * @param   pszRealPath     Where to store the real path.
+ * @param   cchRealPath     Size of the buffer.
+ */
+RTDECL(int) RTPathReal(const char *pszPath, char *pszRealPath, size_t cchRealPath);
+
+/**
+ * Same as RTPathReal only the result is RTStrDup'ed.
+ *
+ * @returns Pointer to real path. Use RTStrFree() to free this string.
+ * @returns NULL if RTPathReal() or RTStrDup() fails.
+ * @param   pszPath         The path to resolve.
+ */
+RTDECL(char *) RTPathRealDup(const char *pszPath);
+
+/**
+ * Get the absolute path (starts from root, no . or .. components), doesn't have
+ * to exist. Note that this method is designed to never perform actual file
+ * system access, therefore symlinks are not resolved.
+ *
+ * @returns iprt status code.
+ * @param   pszPath         The path to resolve.
+ * @param   pszAbsPath      Where to store the absolute path.
+ * @param   cchAbsPath      Size of the buffer.
+ */
+RTDECL(int) RTPathAbs(const char *pszPath, char *pszAbsPath, size_t cchAbsPath);
+
+/**
+ * Same as RTPathAbs only the result is RTStrDup'ed.
+ *
+ * @returns Pointer to the absolute path. Use RTStrFree() to free this string.
+ * @returns NULL if RTPathAbs() or RTStrDup() fails.
+ * @param   pszPath         The path to resolve.
+ */
+RTDECL(char *) RTPathAbsDup(const char *pszPath);
+
+/**
+ * Get the absolute path (no symlinks, no . or .. components), assuming the
+ * given base path as the current directory. The resulting path doesn't have
+ * to exist.
+ *
+ * @returns iprt status code.
+ * @param   pszBase         The base path to act like a current directory.
+ *                          When NULL, the actual cwd is used (i.e. the call
+ *                          is equivalent to RTPathAbs(pszPath, ...).
+ * @param   pszPath         The path to resolve.
+ * @param   pszAbsPath      Where to store the absolute path.
+ * @param   cchAbsPath      Size of the buffer.
+ */
+RTDECL(int) RTPathAbsEx(const char *pszBase, const char *pszPath, char *pszAbsPath, size_t cchAbsPath);
+
+/**
+ * Same as RTPathAbsEx only the result is RTStrDup()ed.
+ *
+ * @returns Pointer to the absolute path. Use RTStrFree() to free this string.
+ * @returns NULL if RTPathAbsEx() or RTStrDup() fails.
+ * @parampszBase The base path to act like a current directory.
+ *           When NULL, the actual cwd is used (i.e. the call
+ *           is equivalent to RTPathAbs(pszPath, ...).
+ * @paramszPath The path to resolve.
+ */
+RTDECL(char *) RTPathAbsExDup(const char *pszBase, const char *pszPath);
+
+/**
+ * Strips the filename from a path. Truncates the given string in-place by overwriting the
+ * last path separator character with a null byte in a platform-neutral way.
+ *
+ * @parampszPath Path from which filename should be extracted, will be truncated.
+ * If the string contains no path separator, it will be changed to a "." string.
+ */
+RTDECL(void) RTPathStripFilename(char *pszPath);
+
+/**
+ * Strips the last suffix from a path.
+ *
+ * @parampszPath Path which suffix should be stripped.
+ */
+RTDECL(void) RTPathStripSuffix(char *pszPath);
+
+/**
+ * Strips the trailing slashes of a path name.
+ *
+ * @returns The new length of pszPath.
+ * @parampszPath Path to strip.
+ */
+RTDECL(size_t) RTPathStripTrailingSlash(char *pszPath);
+
+/**
+ * Skips the root specification, if present.
+ *
+ * @return Pointer to the first char after the root specification. This can be
+ *        pointing to the terminator, if the path is only a root
+ *        specification.
+ * @parampszPath The path to skip ahead in.
+ */
+RTDECL(char *) RTPathSkipRootSpec(const char *pszPath);
+
+/**
+ * Ensures that the path has a trailing path separator such that file names can
+ * be appended without further work.
+ *
+ * This can be helpful when preparing for efficiently combining a directory path
+ * with the filenames returned by RTDirRead. The return value gives you the
+ * position at which you copy the RTDIRENTRY::szName to construct a valid path
+ * to it.
+ *
+ * @returns The length of the path, 0 on buffer overflow.
+ * @param   pszPath     The path.
+ * @param   cbPath      The length of the path buffer @a pszPath points to.
+ */
+RTDECL(size_t) RTPathEnsureTrailingSeparator(char *pszPath, size_t cbPath);
+
+/**
+ * Changes all the slashes in the specified path to DOS style.
+ *
+ * Unless @a fForce is set, nothing will be done when on a UNIX flavored system
+ * since paths wont work with DOS style slashes there.
+ *
+ * @returns @a pszPath.
+ * @param   pszPath             The path to modify.
+ * @param   fForce              Whether to force the conversion on non-DOS OSes.
+ */
+RTDECL(char *) RTPathChangeToDosSlashes(char *pszPath, bool fForce);
+
+/**
+ * Changes all the slashes in the specified path to unix style.
+ *
+ * Unless @a fForce is set, nothing will be done when on a UNIX flavored system
+ * since paths wont work with DOS style slashes there.
+ *
+ * @returns @a pszPath.
+ * @param   pszPath             The path to modify.
+ * @param   fForce              Whether to force the conversion on non-DOS OSes.
+ */
+RTDECL(char *) RTPathChangeToUnixSlashes(char *pszPath, bool fForce);
+
+/**
+ * Simple parsing of the a path.
+ *
+ * It figures the length of the directory component, the offset of
+ * the file name and the location of the suffix dot.
+ *
+ * @returns The path length.
+ * @param pszPath Path to find filename in.
+ * @param pcchDir Where to put the length of the directory component. If
+ * no directory, this will be 0. Optional.
+ * @param poffName Where to store the filename offset.
+ * If empty string or if it's ending with a slash this
+ * will be set to -1. Optional.
+ * @param poffSuff Where to store the suffix offset (the last dot).
+ * If empty string or if it's ending with a slash this
+ * will be set to -1. Optional.
+ */
+RTDECL(size_t) RTPathParseSimple(const char *pszPath, size_t *pcchDir, ssize_t *poffName, ssize_t *poffSuff);
+
+/**
+ * Finds the filename in a path.
+ *
+ * @returns Pointer to filename within pszPath.
+ * @returns NULL if no filename (i.e. empty string or ends with a slash).
+ * @param pszPath Path to find filename in.
+ */
+RTDECL(char *) RTPathFilename(const char *pszPath);
+
+/**
+ * Finds the filename in a path, extended version.
+ *
+ * @returns Pointer to filename within pszPath.
+ * @returns NULL if no filename (i.e. empty string or ends with a slash).
+ * @param pszPath Path to find filename in.
+ * @param fFlags RTPATH_STR_F_STYLE_XXX. Other RTPATH_STR_F_XXX flags
+ * will be ignored.
+ */
+RTDECL(char *) RTPathFilenameEx(const char *pszPath, uint32_t fFlags);
+
+/**
+ * Finds the suffix part of in a path (last dot and onwards).
+ *
+ * @returns Pointer to suffix within pszPath.
+ * @returns NULL if no suffix
+ * @param pszPath Path to find suffix in.
+ * @remarks IPRT terminology: A suffix includes the dot, the extension starts
+ * after the dot. For instance suffix ".txt" and extension 'txt'.
+ */
+RTDECL(char *) RTPathSuffix(const char *pszPath);
+ * @returns true if extension / suffix present.
+ * @returns false if no extension / suffix.
+ * @param   pszPath Path to check.
+ */
+RTDECL(bool) RTPathHasSuffix(const char *pszPath);
+/** Same thing, different name. */
+#define RTPathHasExt RTPathHasSuffix
+
+/**
+ * Checks if a path includes more than a filename.
+ *
+ * @returns true if path present.
+ * @returns false if no path.
+ * @param   pszPath Path to check.
+ */
+RTDECL(bool) RTPathHasPath(const char *pszPath);
+/** Misspelled, don't use. */
+#define RTPathHavePath RTPathHasPath
+
+/**
+ * Checks if the path starts with a root specifier or not.
+ *
+ * @returns @c true if it starts with root, @c false if not.
+ *
+ * @param   pszPath Path to check.
+ */
+RTDECL(bool) RTPathStartsWithRoot(const char *pszPath);
+
+/**
+ * Counts the components in the specified path.
+ *
+ * An empty string has zero components. A lone root slash is considered have
+ * one. The paths `/init` and `/bin/` are considered having two components. An
+ * UNC share specifier like `\myserver\share` will be considered as one single
+ * component.
+ *
+ * @returns The number of path components.
+ * @param   pszPath The path to parse.
+ */
+RTDECL(size_t) RTPathCountComponents(const char *pszPath);
+/**
+ * Copies the specified number of path components from @a pszSrc and into @a
+ * pszDst.
+ *
+ * @returns VINF_SUCCESS or VERR_BUFFER_OVERFLOW. In the latter case the buffer
+ * is not touched.
+ *
+ * @param   pszDst      The destination buffer.
+ * @param   cbDst       The size of the destination buffer.
+ * @param   pszSrc      The source path.
+ * @param   cComponents The number of components to copy from @a pszSrc.
+ */
+RTDECL(int) RTPathCopyComponents(char *pszDst, size_t cbDst, const char *pszSrc, size_t cComponents);
+
/** @name Path properties returned by RTPathParse and RTPathSplit.
+ */
+@{ *
+
+/** Indicates that there is a filename.
+ * @if not set, either a lone root spec was given (RTPATH_PROP_UNC,
+ * RTPATH_PROP_ROOT_SLASH, or RTPATH_PROP_VOLUME) or the final component had a
+ * trailing slash (RTPATH_PROP_DIR_SLASH). */
+#define RTPATH_PROP_FILENAME        UINT16_C(0x0001)
+/** Indicates that a directory was specified using a trailing slash.
+ * @if This is not set for lone root specifications (RTPATH_PROP_UNC,
+ * RTPATH_PROP_ROOT_SLASH, or RTPATH_PROP_VOLUME).
+ * @if The slash is not counted into the last component. However, it is
+ * counted into cchPath. */
+#define RTPATH_PROP_DIR_SLASH       UINT16_C(0x0002)
+
+/** The filename has a suffix (extension). */
+#define RTPATH_PROP_SUFFIX          UINT16_C(0x0004)
+/** Indicates that this is an UNC path (Windows and OS/2 only).
+ * @if UNC = Universal Naming Convention. It is on the form '//Computer/',
+ * '//Namespace/', '//ComputerName/Resource' and '//Namespace/Resource'.
+ * RTPathParse, RTPathSplit and friends does not consider the 'Resource' as
+ * part of the UNC root specifier. Thus the root specs for the above examples
+ * would be '//ComputerName' or '//Namespace/'.
+ * @if Please note that '//something' is not a UNC path, there must be a slash
+ * following the computer or namespace.
+ */
+#define RTPATH_PROP_UNC             UINT16_C(0x0010)
+/** A root slash was specified (unix style root).
+ * @if (While the path must relative if not set, this being set doesn't make it
+ * absolute.)
+ *
+ * This will be set in the following examples: '/', '/bin', 'C:/', 'C:/Windows',
+ * '//f', '//./PhysicalDisk0', '//example.org/', and '//example.org/share'.
+ *
+ * It will not be set for the following examples: '.', 'bin/ls', 'C:', and
+ * 'C:Windows'.
+ /*
+ #define RTPATH_PROP_ROOT_SLASH  UINT16_C(0x0020)
+ /** A volume is specified (Windows, DOS and OS/2).
+ * For examples: 'C:', 'C:/', and 'A:/AutoExec.bat'. */
+ #define RTPATH_PROP_VOLUME  UINT16_C(0x0040)
+ /** The path is absolute, i.e. has a root specifier (root-slash,
+ * volume or UNC) and contains no winding '..' bits, though it may contain
+ * unnecessary slashes (RTPATH_PROP_EXTRA_SLASHES) and '.' components
+ * (RTPATH_PROP_DOT_REFS).
+ *
+ * On systems without volumes and UNC (unix style) it will be set for '/',
+ * '/bin/ls', and '/bin//ls', but not for 'bin/ls', '/bin/..usr/bin/env',
+ * './bin/ls' or '/'.
+ *
+ * On systems with volumes, it will be set for 'C:/', C:/Windows', and
+ * 'C:/Windows/', but not for 'C:', 'C:Windows', or 'C:/Windows/..boot.ini'.
+ *
+ * On systems with UNC paths, it will be set for '/localhost/',
+ * '/localhost/CS', '/localhost/CS/Windows/System32', '/localhost/...', and
+ * '/localhost/CS//AutoExec.bat', but not for
+ * '/localhost/CS/Windows/..AutoExec.bat'.
+ *
+ * @note For the RTPathAbs definition, this flag needs to be set while both
+ * RTPATH_PROP_EXTRA_SLASHES and RTPATH_PROP_DOT_REFS must be cleared.
+ */
+ 
+ #define RTPATH_PROP_ABSOLUTE  UINT16_C(0x0100)
+ /** Relative path. Inverse of RTPATH_PROP_ABSOLUTE. */
+ #define RTPATH_PROP_RELATIVE  UINT16_C(0x0200)
+ /** The path contains unnecessary slashes. Meaning, that if */
+ #define RTPATH_PROP_EXTRA_SLASHES  UINT16_C(0x0400)
+ /** The path contains references to the special '.' (dot) directory link. */
+ #define RTPATH_PROP_DOT_REFS  UINT16_C(0x0800)
+ /** The path contains references to the special '..' (dot) directory link.
+ * RTPATH_PROP_RELATIVE will always be set together with this. */
+ #define RTPATH_PROP_DOTDOT_REFS  UINT16_C(0x1000)
+
+
+ /** Macro to determine whether to insert a slash after the first component when
+ * joining it with something else.
+ * (All other components in a split or parsed path require slashes added.) */
+ #define RTPATH_PROP_FIRST_NEEDS_NO_SLASH(a_fProps) \
+    RT_BOOL( (a_fProps) & (RTPATH_PROP_ROOT_SLASH | RTPATH_PROP_VOLUME | RTPATH_PROP_EXTRA_SLASHES) )
+
+ /** Macro to determine whether there is a root specification of any kind
+ * (unix, volumes, unc). */
+ #define RTPATH_PROP_HAS_ROOT_SPEC(a_fProps) \
+    RT_BOOL( (a_fProps) & (RTPATH_PROP_ROOT_SLASH | RTPATH_PROP_VOLUME | RTPATH_PROP_UNC) )

/** Parsed path. */
/** The first component is the root, volume or UNC specifier, if present. Use RTPATH_PROP_HAS_ROOT_SPEC() on RTPATHPARSED::fProps to determine its presence. */
/** Other than the root component, no component will include directory separators (slashes). */

typedef struct RTPATHPARSED
{
    /** Number of path components. */
    * This will always be set on VERR_BUFFER_OVERFLOW returns from RTPathParsed so the caller can calculate the required buffer size. */
    uint16_t cComps;
    /** Path property flags, RTPATH_PROP_XXX */
    uint16_t fProps;
    /** On success this is the length of the described path, i.e. sum of all component lengths and necessary separators. */
    * Do NOT use this to index in the source path in case it contains unnecessary slashes that RTPathParsed has ignored here. */
    uint16_t cchPath;
    /** Reserved for future use. */
    uint16_t u16Reserved;
    /** The offset of the filename suffix, offset of the NUL char if none. */
    uint16_t offSuffix;
    /** The length of the suffix. */
    uint16_t cchSuffix;
    /** Array of component descriptors (variable size). */
    * @note Don't try figure the end of the input path by adding up off and cch of the last component. If RTPATH_PROP_DIR_SLASH is set, there may be one or more trailing slashes that are unaccounted for! */
    struct
    {
        /** The offset of the component. */
        uint16_t off;
        /** The length of the component. */
        uint16_t cch;
    } aComps[1];
} RTPATHPARSED;
/** Pointer to to a parsed path result. */
typedef RTPATHPARSED *PRTPATHPARSED;
/**
 * Pointer to a const parsed path result. */

typedef RTPATHPARSED *PCRTPATHPARSED;

/**
 * Parses the path.
 *
 * @returns IPRT status code.
 * @retval  VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
 * @retval  VERR_INVALID_PARAMETER if cbOutput is less than the RTPATHPARSED structure. No output. (asserted)
 * @retval  VERR_BUFFER_OVERFLOW there are more components in the path than
 *          there is space in aComps. The required amount of space can be
 *          determined from the pParsed->cComps:
 *          @code
 *              RT_OFFSETOF(RTPATHPARSED, aComps[pParsed->cComps])
 *          @endcode
 * @retval  VERR_PATH_ZERO_LENGTH if the path is empty.
 *
 * @param   pszPath             The path to parse.
 * @param   pParsed             Where to store the details of the parsed path.
 * @param   cbParsed            The size of the buffer. Must be at least the
 *                              size of RTPATHPARSED.
 * @param   fFlags              Combination of RTPATH_STR_F_XXX flags.
 *                              Most users will pass 0.
 * @sa      RTPathSplit, RTPathSplitA.
 */
RTDECL(int) RTPathParse(const char *pszPath, PRTPATHPARSED pParsed, size_t cbParsed, uint32_t fFlags);

/**
 * Reassembles a path parsed by RTPathParse.
 *
 * This will be more useful as more APIs manipulating the RTPATHPARSED output
 * are added.
 *
 * @returns IPRT status code.
 * @retval  VERR_BUFFER_OVERFLOW if @a cbDstPath is less than or equal to
 *          RTPATHPARSED::cchPath.
 *
 * @param   pszSrcPath          The source path.
 * @param   pParsed             The parser output for @a pszSrcPath.
 * @param   fFlags              Combination of RTPATH_STR_F_STYLE_XXX flags.
 *                              Most users will pass 0.
 * @param   pszDstPath          Pointer to the buffer where the path is to be
 *                              reassembled.
 * @param   cbDstPath           The size of the output buffer.
 */
RTDECL(int) RTPathParsedReassemble(const char *pszSrcPath, PRTPATHPARSED pParsed, uint32_t fFlags,
char *pszDstPath, size_t cbDstPath);

+/**
+ * Output buffer for RTPathSplit and RTPathSplitA.
+ */
typedef struct RTPATHSPLIT
+
+ /** Number of path components. 
+ * This will always be set on VERR_BUFFER_OVERFLOW returns from RTPathParsed
+ * so the caller can calculate the required buffer size. */
+ uint16_t cComps;
+ /** Path property flags, RTPATH_PROP_XXX */
+ uint16_t fProps;
+ /** On success this is the length of the described path, i.e. sum of all
+ * component lengths and necessary separators. 
+ * Do NOT use this to index in the source path in case it contains
+ * unnecessary slashes that RTPathSplit has ignored here. */
+ uint16_t cchPath;
+ /** Reserved (internal use). */
+ uint16_t u16Reserved;
+ /** The amount of memory used (on success) or required (on
+ * VERR_BUFFER_OVERFLOW) of this structure and it's strings. */
+ uint32_t cbNeeded;
+ /** Pointer to the filename suffix (the dot), if any. Points to the NUL
+ * character of the last component if none or if RTPATH_PROP_DIR_SLASH is
+ * present. */
+ const char *pszSuffix;
+ /** Array of component strings (variable size). */
+ char *apszComps[1];

} RTPATHSPLIT;

/** Pointer to a split path buffer. */
typedef RTPATHSPLIT *PRTPATHSPLIT;

/** Pointer to a const split path buffer. */
typedef RTPATHSPLIT const *PCRTPATHSPLIT;

/**
 * Splits the path into individual component strings, carved from user supplied
 * the given buffer block.
 *
+ @returns IPRT status code.
+ @retval VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
+ @retval VERR_INVALID_PARAMETER if cbOutput is less than the RTPATHSPLIT
+ structure. No output. (asserted)
+ @retval VERR_BUFFER_OVERFLOW there are more components in the path than
+ there is space in aComps. The required amount of space can be
+ determined from the pParsed->cComps:
+ @code
+ * @param pszPath       The path to parse.
+ * @param pSplit        Where to store the details of the parsed path.
+ * @param cbSplit       The size of the buffer pointed to by @a pSplit
+ *                       (variable sized array at the end). Must be at
+ *                       least the size of RTPATHSPLIT.
+ * @param fFlags        Combination of RTPATH_STR_F_XXX flags.
+ *                       Most users will pass 0.
+ *
+ * @sa RTPathSplitA, RTPathParse.
+ */
+RTDECL(int) RTPathSplit(const char *pszPath, PRTPATHSPLIT pSplit, size_t cbSplit, uint32_t fFlags);
+
+/**
+ * Splits the path into individual component strings, allocating the buffer on
+ * the default thread heap.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
+ * @retval VERR_PATH_ZERO_LENGTH if the path is empty.
+ *
+ * @param pszPath       The path to parse.
+ * @param ppSplit       Where to return the pointer to the output on
+ *                       success. This must be freed by calling
+ *                       RTPPathSplitFree().
+ * @param fFlags        Combination of RTPATH_STR_F_XXX flags.
+ *                       Most users will pass 0.
+ * @sa RTPathSplitFree, RTPathSplit, RTPathParse.
+ */
+#define RTPathSplitA(pszPath, ppSplit, fFlags) RTPPathSplitATag(pszPath, ppSplit, fFlags, RTPATH_TAG)
+
+/**
+ * Splits the path into individual component strings, allocating the buffer on
+ * the default thread heap.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_INVALID_POINTER if pParsed or pszPath is an invalid pointer.
+ * @retval VERR_PATH_ZERO_LENGTH if the path is empty.
+ *
+ * @param pszPath       The path to parse.
+ * @param ppSplit       Where to return the pointer to the output on
+ *                       success. This must be freed by calling
+ *                       RTPPathSplitFree().
+ * @param fFlags        Combination of RTPATH_STR_F_XXX flags.
+ */
Most users will pass 0.

@paraz pszTag Allocation tag used for statistics and such.
@sa RPathSplitFree, RPathSplit, RPathParse.
*/

RTDECL(int) RPathSplitATag(const char *pszPath, PRTPATHSPLIT *ppSplit, uint32_t fFlags, const char *pszTag);
+
+/**
+ * Frees buffer returned by RPathSplitA.
+ *
+ * @param pSplit What RPathSplitA returned.
+ * @sa RPathSplitA
+ */
+RTDECL(void) RPathSplitFree(PRTPATHSPLIT pSplit);
+
+/**
+ * Reassembles a path parsed by RPathSplit.
+ *
+ * This will be more useful as more APIs manipulating the RTPATHSPLIT output are
+ * added.
+ *
+ * @returns IPRT status code.
+ * @retval VERR_BUFFER_OVERFLOW if @a cbDstPath is less than or equal to
+ * RTPATHSPLIT::cchPath.
+ *
+ * @param pSplit A split path (see RPathSplit, RPathSplitA).
+ * @param fFlags Combination of RTPATH_STR_F_STYLE_XXX.
+ * Most users will pass 0.
+ *
+ * @param pszDstPath Pointer to the buffer where the path is to be
+ * reassembled.
+ *
+ * @param cbDstPath The size of the output buffer.
+ */
+RTDECL(int) RPathSplitReassemble(PRTPATHSPLIT pSplit, uint32_t fFlags, char *pszDstPath, size_t cbDstPath);
+
+/**
+ * Checks if the two paths leads to the file system object.
+ *
+ * If the objects exist, we'll query attributes for them. If that's not
+ * conclusive (some OSes) or one of them doesn't exist, we'll use a combination
+ * of RPathAbs and RPathCompare to determine the result.
+ *
+ * @returns true, false, or VERR_FILENAME_TOO_LONG.
+ *
+ * @param pszPath1 The first path.
+ * @param pszPath2 The second path.
+ */
+RTDECL(int) RPathIsSame(const char *pszPath1, const char *pszPath2);
Compares two paths.

The comparison takes platform-dependent details into account, such as:

- On DOS-like platforms, both separator chars (\ and /) are considered to be equal.
- On platforms with case-insensitive file systems, mismatching characters are uppercased and compared again.

@returns @< 0 if the first path less than the second path.
@returns 0 if the first path identical to the second path.
@returns @> 0 if the first path greater than the second path.

@param   pszPath1 Path to compare (must be an absolute path).
@param   pszPath2 Path to compare (must be an absolute path).

@remarks File system details are currently ignored. This means that you won't get case-insensitive compares on unix systems when a path goes into a case-insensitive filesystem like FAT, HPFS, HFS, NTFS, JFS, or similar. For NT, OS/2 and similar you won't get case-sensitive compares on a case-sensitive file system.

Checks if a path starts with the given parent path.

This means that either the path and the parent path matches completely, or that the path is to some file or directory residing in the tree given by the parent directory.

The path comparison takes platform-dependent details into account, see RTPathCompare() for details.

@returns [true] when `pszPath` starts with `pszParentPath` (or when they are identical), or [false] otherwise.

@param   pszPath Path to check, must be an absolute path.
@param   pszParentPath Parent path, must be an absolute path.

@remarks This API doesn't currently handle root directory compares in a manner consistent with the other APIs. RTPathStartsWith(pszSomePath, ") will not work if pszSomePath isn't ".

RTDECL(int) RTPathCompare(const char *pszPath1, const char *pszPath2);

RTDECL(int) RTPathStartsWith(const char *pszPath, const char *pszParentPath);
+ /**
+ RTDECL(bool) RTPathStartsWith(const char *pszPath, const char *pszParentPath);
+ */
+ /**
+  * Appends one partial path to another.
+  *
+  * The main purpose of this function is to deal correctly with the slashes when
+  * concatenating the two partial paths.
+  *
+  * @retval  VINF_SUCCESS on success.
+  * @retval  VERR_BUFFER_OVERFLOW if the result is too big to fit within
+  *         cbPathDst bytes. No changes has been made.
+  * @retval  VERR_INVALID_PARAMETER if the string pointed to by pszPath is longer
+  *         than cbPathDst-1 bytes (failed to find terminator). Asserted.
+  *
+  * @param   pszPath         The path to append pszAppend to. This serves as both
+  *                          input and output. This can be empty, in which case
+  *                          pszAppend is just copied over.
+  * @param   cbPathDst       The size of the buffer pszPath points to, terminator
+  *                          included. This should NOT be strlen(pszPath).
+  * @param   pszAppend       The partial path to append to pszPath. This can be
+  *                          NULL, in which case nothing is done.
+  * @param   cchAppendMax    The maximum number or characters to take from @a
+  *                          pszAppend. RTSTR_MAX is fine.
+  */
+ RTDECL(int) RTPathAppend(char *pszPath, size_t cbPathDst, const char *pszAppend);
+ */
@remarks On OS/2, Window and similar systems, concatenating a drive letter specifier with a slash prefixed path will result in an absolute path. Meaning, RTPathAppend(strcpy(szBuf, "C:"), sizeof(szBuf), "/bar") will result in "C:/bar". (This follows directly from the behavior when pszPath is empty.)

On the other hand, when joining a drive letter specifier with a partial path that does not start with a slash, the result is not an absolute path. Meaning, RTPathAppend(strcpy(szBuf, "C:"), "bar") will result in "C:bar".

RTDECL(int) RTPathAppendEx(char *pszPath, size_t cbPathDst, const char *pszAppend, size_t cchAppendMax);

Like RTPathAppend, but with the base path as a separate argument instead of in the path buffer.

@retval VINF_SUCCESS on success.
@retval VERR_BUFFER_OVERFLOW if the result is too big to fit within cbPathDst bytes.
@retval VERR_INVALID_PARAMETER if the string pointed to by pszPath is longer than cbPathDst-1 bytes (failed to find terminator). Asserted.

@param pszPathDst Where to store the resulting path.
@param cbPathDst The size of the buffer pszPathDst points to, terminator included.
@param pszPathSrc The base path to copy into @a pszPathDst before appending @a pszAppend.
@param pszAppend The partial path to append to pszPathSrc. This can be NULL, in which case nothing is done.

RTDECL(int) RTPathJoin(char *pszPathDst, size_t cbPathDst, const char *pszPathSrc, const char *pszAppend);

Same as RTPathJoin, except that the output buffer is allocated.
@returns Buffer containing the joined up path, call RTStrFree to free. NULL on allocation failure.
@param pszPathSrc The base path to copy into @a pszPathDst before appending @a pszAppend.
@param pszAppend The partial path to append to pszPathSrc. This can be NULL, in which case nothing is done.

RTDECL(char *) RTPathJoinA(const char *pszPathSrc, const char *pszAppend);
+/**
 + * Extended version of RTPathJoin, both inputs can be specified as substrings.
 + *
 + * @retval VINF_SUCCESS on success.
 + * @retval VERR_BUFFER_OVERFLOW if the result is too big to fit within
 + *       cbPathDst bytes.
 + * @retval VERR_INVALID_PARAMETER if the string pointed to by pszPath is longer
 + *       than cbPathDst-1 bytes (failed to find terminator). Asserted.
 + *
 + * @param   pszPathDst Where to store the resulting path.
 + * @param   cbPathDst The size of the buffer pszPathDst points to,
 + *               terminator included.
 + * @param   pszPathSrc The base path to copy into @a pszPathDst before
 + *                  appending @a pszAppend.
 + * @param   cchPathSrcMax The maximum number of bytes to copy from @a
 + *                  pszPathSrc. RTSTR_MAX is find.
 + * @param   pszAppend The partial path to append to pszPathSrc. This can
 + *          be NULL, in which case nothing is done.
 + * @param   cchAppendMax The maximum number of bytes to copy from @a
 + *                  pszAppend. RTSTR_MAX is find.
 + *
 + */
+RTDECL(int) RTPathJoinEx(char *pszPathDst, size_t cbPathDst,
                         const char *pszPathSrc, size_t cchPathSrcMax,
                         const char *pszAppend, size_t cchAppendMax);
+
+/**
 + * Callback for RTPathTraverseList that's called for each element.
 + *
 + * @returns IPRT style status code. Return VERR_TRY_AGAIN to continue, any other
 + *          value will abort the traversing and be returned to the caller.
 + *
 + * @param   pchPath Pointer to the start of the current path. This is
 + *                  not null terminated.
 + * @param   cchPath The length of the path.
 + * @param   pvUser1 The first user parameter.
 + * @param   pvUser2 The second user parameter.
 + */
+typedef DECLCALLBACK(int) FNRTPATHTRAVERSER(char const *pchPath, size_t cchPath, void *pvUser1,
                                             void *pvUser2);
+/**
 + * Traverses a string that can contain multiple paths separated by a special
 + * character.
 + */
/**
   * Calculate a relative path between the two given paths.
   *
   * @returns IPRT status code.
   * @retval  VINF_SUCCESS on success.
   * @retval  VERR_BUFFER_OVERFLOW if the result is too big to fit within
   *          cbPathDst bytes.
   * @retval  VERR_NOT_SUPPORTED if both paths start with different volume specifiers.
   * @param   pszPathDst      Where to store the resulting path.
   * @param   cbPathDst       The size of the buffer pszPathDst points to,
   *                          terminator included.
   * @param   pszPathFrom     The path to start from creating the relative path.
   * @param   pszPathTo       The path to reach with the created relative path.
   */
+RTDECL(int) RTPathCalcRelative(char *pszPathDst, size_t cbPathDst,
                               const char *pszPathFrom,
                               const char *pszPathTo);
+
+#ifdef IN_RING3
+
+/**
   * Gets the path to the directory containing the executable.
   *
   * @returns iprt status code.
   * @param   pszPath     Buffer where to store the path.
   * @param   cchPath     Buffer size in bytes.
   */
+RTDECL(int) RTPathExecDir(char *pszPath, size_t cchPath);
+*/

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+ * @returns iprt status code.
+ * @param pszPath Buffer where to store the path.
+ * @param cchPath Buffer size in bytes.
+ */
+RTDECL(int) RTPathUserHome(char *pszPath, size_t cchPath);
+
+/**
+ * Gets the user documents directory.
+ *
+ * The returned path isn't guaranteed to exist.
+ *
+ * @returns iprt status code.
+ * @param pszPath Buffer where to store the path.
+ * @param cchPath Buffer size in bytes.
+ */
+RTDECL(int) RTPathUserDocuments(char *pszPath, size_t cchPath);
+
+/**
+ * Gets the directory of shared libraries.
+ *
+ * This is not the same as RTPathAppPrivateArch() as Linux depends all shared
+ * libraries in a common global directory where ld.so can find them.
+ *
+ * @returns iprt status code.
+ * @param pszPath Buffer where to store the path.
+ * @param cchPath Buffer size in bytes.
+ */
+RTDECL(int) RTPathSharedLibs(char *pszPath, size_t cchPath);
+
+/**
+ * Gets the directory for architecture-independent application data, for
+ * example NLS files, module sources, ...
+ *
+ * @returns iprt status code.
+ * @param pszPath Buffer where to store the path.
+ * @param cchPath Buffer size in bytes.
+ */
+RTDECL(int) RTPathAppPrivateNoArch(char *pszPath, size_t cchPath);
+/**
+ * Gets the directory for architecture-dependent application data, for
+ * example modules which can be loaded at runtime.
+ *
+ * Linux:  /usr/lib/@<application@>
+ * Solaris: /opt/@<application@>/@<arch>@ or something
+ * Windows: @<program files directory@>/@<application@>
+ * Old path: same as RTPathExecDir()
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Buffer where to store the path.
+ * @param   cchPath     Buffer size in bytes.
+ */
+RTDECL(int) RTPathAppPrivateArch(char *pszPath, size_t cchPath);
+
+/**
+ * Gets the toplevel directory for architecture-dependent application data.
+ *
+ * This differs from RTPathAppPrivateArch on Solaris only where it will work
+ * around the /opt/@<application@>/amd64 and /opt/@<application@>/i386 multi
+ * architecture installation style.
+ *
+ * Linux:  /usr/lib/@<application@>
+ * Solaris: /opt/@<application@>
+ * Windows: @<program files directory@>/@<application@>
+ * Old path: same as RTPathExecDir()
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Buffer where to store the path.
+ * @param   cchPath     Buffer size in bytes.
+ */
+RTDECL(int) RTPathAppPrivateArchTop(char *pszPath, size_t cchPath);
+
+/**
+ * Gets the directory for documentation.
+ *
+ * Linux:  /usr/share/doc/@<application@>
+ * Solaris: /opt/@<application@>
+ * Windows: @<program files directory@>/@<application@>
+ * Old path: same as RTPathExecDir()
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Buffer where to store the path.
+ * @param   cchPath     Buffer size in bytes.
+ */
+RTDECL(int) RTPathAppDocs(char *pszPath, size_t cchPath);
+
/**
 * Gets the temporary directory path.
 * @returns iprt status code.
 * @param   pszPath     Buffer where to store the path.
 * @param   cchPath     Buffer size in bytes.
 */
RTDECL(int) RTPathTemp(char *pszPath, size_t cchPath);
+
+
/**
 * RTPathGlob result entry.
 */
+
+typedef struct RTPATHGLOBENTRY
+
+{
+    /** List entry. */
+    struct RTPATHGLOBENTRY *pNext;
+    /** RTDIRENTRYTYPE value. */
+    uint8_t                 uType;
+    /** Unused explicit padding. */
+    uint8_t                 bUnused;
+    /** The length of the path. */
+    uint16_t                cchPath;
+    /** The path to the file (variable length). */
+    char                    szPath[1];
+} RTPATHGLOBENTRY;
+
+/** Pointer to a GLOB result entry. */
+typedef RTPATHGLOBENTRY *PRTPATHGLOBENTRY;
+
+/** Pointer to a const GLOB result entry. */
+typedef RTPATHGLOBENTRY const *PCRTPATHGLOBENTRY;
+
+/** Pointer to a GLOB result entry pointer. */
+typedef PCRTPATHGLOBENTRY *PPCRTPATHGLOBENTRY;
+
+/**
 * Performs wildcard expansion on a path pattern.
 * @returns IPRT status code.
 * @param   pszPattern      The pattern to expand.
 * @param   fFlags          RTPATHGLOB_F_XXX.
 * @param   ppHead          Where to return the head of the result list. This
 *                          is always set to NULL on failure.
 * @param   pcResults       Where to return the number of the result. Optional.
 */
+RTDECL(int) RTPathGlob(const char *pszPattern, uint32_t fFlags, PCRTPATHGLOBENTRY ppHead,
+uint32_t *pcResults);
+
+/** @name RTPATHGLOB_F_XXX - RTPathGlob flags

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+ * @ { */
+/** Case insensitive. */
+#define RTPATHGLOB_F_IGNORE_CASE RT_BIT_32(0)
+/** Do not expand \$\{EnvOrSpecialVariable\} in the pattern. */
+#define RTPATHGLOB_F_NO_VARIABLES RT_BIT_32(1)
+/** Do not interpret a leading tilde as a home directory reference. */
+#define RTPATHGLOB_F_NO_TILDE RT_BIT_32(2)
+/** Only return the first match. */
+#define RTPATHGLOB_F_FIRST_ONLY RT_BIT_32(3)
+/** Only match directories (implied if pattern ends with slash). */
+#define RTPATHGLOB_F_ONLY_DIRS RT_BIT_32(4)
+/** Do not match directories. (Can't be used with RTPATHGLOB_F_ONLY_DIRS or 
+ * patterns containing a trailing slash.) */
+#define RTPATHGLOB_F_NO_DIRS RT_BIT_32(5)
+/** Disables the '**' wildcard pattern for matching zero or more subdirs. */
+#define RTPATHGLOB_F_NO_STARSTAR RT_BIT_32(6)
+/** Mask of valid flags. */
+#define RTPATHGLOB_F_MASK UINT32_C(0x0000007f)
+/** @} */
+
+/** Free the results produced by RTPathGlob.
+ */
+/*
+ * @param phHead What RTPathGlob returned. NULL ignored.
+ */
+RTDECL(void) RTPathGlobFree(PCRTPATHGLOBENTRY pHead);
+
+/**
+ * Query information about a file system object.
+ */
+/*
+ * This API will resolve NOT symbolic links in the last component (just like
+ * unix lstat()).
+ */
+/*
+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS if the object exists, information returned.
+ * @retval VERR_PATH_NOT_FOUND if any but the last component in the specified
+ * path was not found or was not a directory.
+ * @retval VERR_FILE_NOT_FOUND if the object does not exist (but path to the
+ * parent directory exists).
+ */
+/*
+ * @param pszPath Path to the file system object.
+ */
+/*
+ * @param pObjInfo Object information structure to be filled on successful 
+ * return.
+ */
+/*
+ * @param enmAdditionalAttributes
+ * Which set of additional attributes to request.
+ */
+/* Use RTFSOBJATTRADD NOTHING if this doesn't matter.
+ */
+RTR3DECL(int) RTPathQueryInfo(const char *pszPath, PRTFSOBJINFO pObjInfo, RTFSOBJATTRADD enmAdditionalAttrs);
+
+/**
+ * Query information about a file system object.
+ *
+ * @returns IPRT status code.
+ * @retval  VINF_SUCCESS if the object exists, information returned.
+ * @retval  VERR_PATH_NOT_FOUND if any but the last component in the specified
+ *         path was not found or was not a directory.
+ * @retval  VERR_FILE_NOT_FOUND if the object does not exist (but path to the
+ *         parent directory exists).
+ *
+ * @param   pszPath     Path to the file system object.
+ * @param   pObjInfo    Object information structure to be filled on successful return.
+ * @param   enmAdditionalAttribs
+ *                   Which set of additional attributes to request.
+ *                   Use RTFSOBJATTRADD_NOTHING if this doesn't matter.
+ *
+ * @param   fFlags      RTPATH_F_ON_LINK or RTPATH_F_FOLLOW_LINK.
+ */
+RTR3DECL(int) RTPathQueryInfoEx(const char *pszPath, PRTFSOBJINFO pObjInfo, RTFSOBJATTRADD enmAdditionalAttribs, uint32_t fFlags);
+
+/**
+ * Changes the mode flags of a file system object.
+ *
+ * The API requires at least one of the mode flag sets (Unix/Dos) to
+ * be set. The type is ignored.
+ *
+ * This API will resolve symbolic links in the last component since
+ * mode isn't important for symbolic links.
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Path to the file system object.
+ * @param   fMode       The new file mode, see @ref grp_rt_fs for details.
+ */
+RTR3DECL(int) RTPathSetMode(const char *pszPath, RTFMODE fMode);
+
+/**
+ * Gets the mode flags of a file system object.
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Path to the file system object.
+ * @param   pfMode      Where to store the file mode, see @ref grp_rt_fs for details.
+ *
+ * @remark  This is wrapper around RTPathQueryInfoEx(RTPATH_F_FOLLOW_LINK) and
+ *          exists to complement RTPathSetMode().
+ */
RTPathGetMode(const char *pszPath, PRTFMODE pfMode);
+
+/**
+ * Changes one or more of the timestamps associated of file system object.
+ *
+ * This API will not resolve symbolic links in the last component (just
+ * like unix utimes()).
+ *
+ * @returns iprt status code.
+ * @param   pszPath             Path to the file system object.
+ * @param   pAccessTime         Pointer to the new access time.
+ * @param   pModificationTime   Pointer to the new modification time.
+ * @param   pChangeTime         Pointer to the new change time. NULL if not to be changed.
+ * @param   pBirthTime          Pointer to the new time of birth. NULL if not to be changed.
+ *
+ * @remark  The file system might not implement all these time attributes,
+ *          the API will ignore the ones which aren't supported.
+ *
+ * @remark  The file system might not implement the time resolution
+ *          employed by this interface, the time will be chopped to fit.
+ *
+ * @remark  The file system may update the change time even if it's
+ *          not specified.
+ *
+ * @remark  POSIX can only set Access & Modification and will always set both.
+ */
RTPathSetTimes(const char *pszPath, PCRTTIMESPEC pAccessTime, PCRTTIMESPEC pModificationTime,
+                   PCRTTIMESPEC pChangeTime, PCRTTIMESPEC pBirthTime);
+
+/**
+ * Changes one or more of the timestamps associated of file system object.
+ *
+ * @returns iprt status code.
+ * @param   pszPath             Path to the file system object.
+ * @param   pAccessTime         Pointer to the new access time.
+ * @param   pModificationTime   Pointer to the new modification time.
+ * @param   pChangeTime         Pointer to the new change time. NULL if not to be changed.
+ * @param   pBirthTime          Pointer to the new time of birth. NULL if not to be changed.
+ * @param   fFlags              RTPATH_F_ON_LINK or RTPATH_F_FOLLOW_LINK.
+ *
+ * @remark  The file system might not implement all these time attributes,
+ *          the API will ignore the ones which aren't supported.
+ *
+ * @remark  The file system might not implement the time resolution
+ *          employed by this interface, the time will be chopped to fit.
+ *
+ * @remark  The file system may update the change time even if it's
+ * not specified.
+ *
+ * @remark POSIX can only set Access & Modification and will always set both.
+ */
+RTR3DECL(int) RTPathSetTimesEx(const char *pszPath, PCRTTIMESPEC pAccessTime, PCRTTIMESPEC pModificationTime,
+                               PCRTTIMESPEC pChangeTime, PCRTTIMESPEC pBirthTime, uint32_t fFlags);
+ *
+/**
+ * Gets one or more of the timestamps associated of file system object.
+ *
+ * @returns iprt status code.
+ * @param   pszPath             Path to the file system object.
+ * @param   pAccessTime         Where to store the access time. NULL is ok.
+ * @param   pModificationTime   Where to store the modification time. NULL is ok.
+ * @param   pChangeTime         Where to store the change time. NULL is ok.
+ * @param   pBirthTime          Where to store the creation time. NULL is ok.
+ *
+ * @remark This is wrapper around RTPathQueryInfo() and exists to complement
+ * RTPathSetTimes(). If the last component is a symbolic link, it will
+ * not be resolved.
+ */
+RTR3DECL(int) RTPathGetTimes(const char *pszPath, PRTTIMESPEC pAccessTime, PRTTIMESPEC pModificationTime,
+                             PRTTIMESPEC pChangeTime, PRTTIMESPEC pBirthTime);
+ *
+/**
+ * Changes the owner and/or group of a file system object.
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Path to the file system object.
+ * @param   uid         The new file owner user id. Pass NIL_RTUID to leave
+ *                      this unchanged.
+ * @param   gid         The new group id. Pass NIL_RTGUID to leave this
+ *                      unchanged.
+ */
+RTR3DECL(int) RTPathSetOwner(const char *pszPath, uint32_t uid, uint32_t gid);
+ */
+ * @param   gid         The new group id. Pass NIL_RTGID to leave this
+ * unchanged.
+ * @param   fFlags      RTPATH_F_ON_LINK or RTPATH_F_FOLLOW_LINK.
+ */
+RTR3DECL(int) RTPathSetOwnerEx(const char *pszPath, uint32_t uid, uint32_t gid, uint32_t fFlags);
+
+/**
+ * Gets the owner and/or group of a file system object.
+ *
+ * @returns iprt status code.
+ * @param   pszPath     Path to the file system object.
+ * @param   pUid        Where to store the owner user id. NULL is ok.
+ * @param   pGid        Where to store the group id. NULL is ok.
+ *
+ * @remark This is wrapper around RTPathQueryInfo() and exists to complement
+ * RTPathGetOwner(). If the last component is a symbolic link, it will
+ * not be resolved.
+ */
+RTR3DECL(int) RTPathGetOwner(const char *pszPath, uint32_t *pUid, uint32_t *pGid);
+
+/** @name RTPathRename, RTDirRename & RTFileRename flags.
+ * @{ */
+/** Do not replace anything. */
+#define RTPATHRENAME_FLAGS_NO_REPLACE   UINT32_C(0)
+/** This will replace attempt any target which isn't a directory. */
+#define RTPATHRENAME_FLAGS_REPLACE      RT_BIT(0)
+/** Don't allow symbolic links as part of the path.
+ * @remarks this flag is currently not implemented and will be ignored. */
+#define RTPATHRENAME_FLAGS_NO_SYMLINKS  RT_BIT(1)
+/** @} */
+
+/**
+ * Renames a path within a filesystem.
+ *
+ * This will rename symbolic links. If RTPATHRENAME_FLAGS_REPLACE is used and
+ * pszDst is a symbolic link, it will be replaced and not its target.
+ *
+ * @returns IPRT status code.
+ * @param   pszSrc      The source path.
+ * @param   pszDst      The destination path.
+ * @param   fRename     Rename flags, RTPATHRENAME_FLAGS_*.
+ */
+RTR3DECL(int) RTPathRename(const char *pszSrc, const char *pszDst, unsigned fRename);
+
+/** @name RTPathUnlink flags.
+ * @{ */
+/** Don't allow symbolic links as part of the path.
+ * @returns IPRT status code.
+ * @param   pszPath     The path.
+ * @param   fUnlink     Unlink flags, RTPATHUNLINK_FLAGS_*.
+ */
+RTR3DECL(int) RTPathUnlink(const char *pszPath, uint32_t fUnlink);
+
+/**
+ * A /bin/rm tool.
+ *
+ * @returns Program exit code.
+ *
+ * @param   cArgs               The number of arguments.
+ * @param   papszArgs           The argument vector. (Note that this may be
+ *                              reordered, so the memory must be writable.)
+ */
+RTDECL(RTEXITCODE) RTPathRmCmd(unsigned cArgs, char **papszArgs);
+
+/** @} */
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_semaphore_h
+#define ___iprt_semaphore_h
+
+#include <iprt/cdefs.h>
+#include <iprt/types.h>
+if defined(RT_LOCK_STRICT_ORDER) && defined(IN_RING3)
+# include <iprt/lockvalidator.h>
+endif
+
+RT_C_DECLS_BEGIN
+
/** @defgroup grp_rt_sems RTSem - Semaphores
 * This module implements all kinds of event and mutex semaphores; in addition
 * to these, IPRT implements "critical sections", which are fast recursive
 * mutexes (see @ref grp_rt_critsect ). C++ users may find @ref grp_rt_cpp_lock
 * interesting.
 */
+ @ingroup grp_rt
+ @ {
+ */
+
+/*@ name Generic Semaphore Wait Flags.
+ @
+ @remarks Exactly one of RTSEMWAIT_FLAGS_RELATIVE and
+ RTSEMWAIT_FLAGS_ABSOLUTE must be set, unless
+ RTSEMWAIT_FLAGS_INDEFINITE is used.
+ *
+ Exactly one of RTSEMWAIT_FLAGS_NANOSECS and
+ RTSEMWAIT_FLAGS_MILLISECS must be set, unless
+ RTSEMWAIT_FLAGS_INDEFINITE is used.
+ *
+ Exactly one of RTSEMWAIT_FLAGS_RESUME and RTSEMWAIT_FLAGS_NORESUME
+ must be set.
+ The interruptible vs resume stuff is ring-0 vs ring-3 semantics.
+ @ { */
+/** The timeout is relative. */
+#define RTSEMWAIT_FLAGS_RELATIVE RT_BIT_32(0)
+/** The timeout is absolute. */
+#define RTSEMWAIT_FLAGS_ABSOLUTE RT_BIT_32(1)
+/** The timeout is specified in nanoseconds. */
+#define RTSEMWAIT_FLAGS_NANOSECS RT_BIT_32(2)
+/** The timeout is specified in milliseconds. */
+#define RTSEMWAIT_FLAGS_MILLISECS RT_BIT_32(3)
+/** Indefinite wait. */
+/** The relative/absolute and nano-/millisecond flags are ignored. */
+#define RTSEMWAIT_FLAGS_INDEFINITE RT_BIT_32(4)
+/** Mask covering the time related bits. */
+#define RTSEMWAIT_FLAGS_TIME_MASK UINT32_C(0x0000001f)
+
+/** Interruptible wait. */
+#define RTSEMWAIT_FLAGS_INTERRUPTIBLE RT_BIT_32(5)
+/** No automatic resume, same as interruptible. */
+#define RTSEMWAIT_FLAGS_NORESUME RTSEMWAIT_FLAGS_INTERRUPTIBLE
+/** Uninterruptible wait. */
+#define RTSEMWAIT_FLAGS_UNINTERRUPTIBLE RTSEMWAIT_FLAGS_INTERRUPTIBLE
+/** Resume on interrupt, same as uninterruptible. */
+#define RTSEMWAIT_FLAGS_RESUME RTSEMWAIT_FLAGS_UNINTERRUPTIBLE
+
+/** Macro for validate the flags. */
+#define RTSEMWAIT_FLAGS_ARE_VALID(fFlags) \
+ (   !((fFlags) & UINT32_C(0xffffff80)) \
+    &&  (  ((fFlags) & RTSEMWAIT_FLAGS_INDEFINITE) \
+           ? ( (((fFlags) & UINT32_C(0x20))) ^ (((fFlags) >> 1) & UINT32_C(0x20)) ) == UINT32_C(0x20) \
+           : ( (((fFlags) & UINT32_C(0x25))) ^ (((fFlags) >> 1) & UINT32_C(0x25)) ) == UINT32_C(0x25) ) )
+/** @ */
+
+/** @
defgroup grp_rt_sems_event  RTSemEvent - Single Release Event Semaphores */
+ * Event semaphores can be used for inter-thread communication when one thread
+ * wants to notify another thread that something happened. A thread can block
+ * ("wait") on an event semaphore until it is signalled by another thread; see
+ * RTSemEventCreate, RTSemEventSignal and RTSemEventWait.
+ * @
+/** */
+ Create an event semaphore.
+ * @returns iprt status code.
+ * @param phEventSem Where to store the handle to the newly created
+ * event semaphore.
+ */
+RTDECL(int) RTSemEventCreate(PRTSEMEVENT phEventSem);
+
+/**
+ * Create an event semaphore.
+ *
+ * @returns iprt status code.
+ * @param phEventSem Where to store the handle to the newly created
+ * event semaphore.
+ * @param fFlags Flags, any combination of the
+ * RTSEMEVENT_FLAGS_XXX #defines.
+ * @param hClass The class (no reference consumed). Since we
+ * don't do order checks on event semaphores, the
+ * use of the class is limited to controlling the
+ * timeout threshold for deadlock detection.
+ * @param pszNameFmt Name format string for the lock validator,
+ * optional (NULL). Max length is 32 bytes.
+ * @param ... Format string arguments.
+ */
+RTDECL(int) RTSemEventCreateEx(PRTSEMEVENT phEventSem, uint32_t fFlags, RTLOCKVALCLASS hClass,
+                                const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(4, 5);
+
+/** @name RTSemMutexCreateEx flags
+ * @{ */
+/** Disables lock validation. */
+#define RTSEMEVENT_FLAGS_NO_LOCK_VAL UINT32_C(0x00000001)
+/** Bootstrap hack for use with certain memory allocator locks only! */
+#define RTSEMEVENT_FLAGS_BOOTSTRAP_HACK UINT32_C(0x00000004)
+/** @} */
+
+/**
+ * Destroy an event semaphore.
+ *
+ * @returns iprt status code.
+ * @param hEventSem Handle of the event semaphore. NIL_RTSEMEVENT
+ * is quietly ignored (VINF_SUCCESS).
+ */
+RTDECL(int) RTSemEventDestroy(RTSEMEVENT hEventSem);
+
+/**
+ * Signal an event semaphore.
+ *
+ * The event semaphore will be signaled and automatically reset after exactly
+ * one thread have successfully returned from RTSemEventWait() after
+ * waiting/polling on that semaphore.
+ *
+ * @returns iprt status code.
+ * @param   hEventSem   The event semaphore to signal.
+ *
+ * @remarks ring-0: This works when preemption is disabled. However it is
+ * system specific whether it works in interrupt context or with
+ * interrupts disabled.
+ */
+RTDECL(int)  RTSemEventSignal(RTSEMEVENT hEventSem);
+
+/**
+ * Wait for the event semaphore to be signaled, resume on interruption.
+ *
+ * This function will resume if the wait is interrupted by an async system event
+ * (like a unix signal) or similar.
+ *
+ * @returns iprt status code.
+ * Will not return VERR_INTERRUPTED.
+ * @param   hEventSem   The event semaphore to wait on.
+ * @param   cMillies    Number of milliseconds to wait.
+ */
+RTDECL(int)  RTSemEventWait(RTSEMEVENT hEventSem, RTMSINTERVAL cMillies);
+
+/**
+ * Wait for the event semaphore to be signaled, return on interruption.
+ *
+ * This function will not resume the wait if interrupted.
+ *
+ * @returns iprt status code.
+ * @param   hEventSem   The event semaphore to wait on.
+ * @param   cMillies    Number of milliseconds to wait.
+ */
+RTDECL(int)  RTSemEventWaitNoResume(RTSEMEVENT hEventSem, RTMSINTERVAL cMillies);
+
+/**
+ * Extended API for waiting on an event semaphore to be signaled.
+ *
+ * @returns IPRT status code.
+ * @param   hEventSem   The event semaphore to wait on.
+ * @param   fFlags      Combination of RTSEMWAIT_FLAGS_XXX.
+ * @param   uTimeout    The timeout, ignored if
+ * RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ * Whether this is absolute or relative,
+ * milliseconds or nanoseconds depends on the @a
+ * fFlags value. Do not pass RT_INDEFINITE_WAIT
+ * here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
+ */
+ /**
+ RTDECL(int) RTSemEventWaitEx(RTSEMEVENT hEventSem, uint32_t tFlags, uint64_t uTimeout);
+ */
+ */**
+ * Debug version of RTSemEventWaitEx that tracks the location.
+ */
+ */**
+ @returns IPRT status code, see RTSemEventWaitEx.
+ */
+ @param hEventSem The event semaphore to wait on.
+ */
+ @param tFlags See RTSemEventWaitEx.
+ */
+ @param uTimeout See RTSemEventWaitEx.
+ */
+ @param uld Some kind of locking location ID. Typically a
+ */
+ return address up the stack. Optional (0).
+ */
+ @param SRC_POS The source position where call is being made
+ */
+ from. Use RT_SRC_POS when possible. Optional.
+ */
+ */
+RTDECL(int) RTSemEventWaitExDebug(RTSEMEVENT hEventSem, uint32_t tFlags, uint64_t uTimeout,
+ RTHCUINTPTR uld, RT_SRC_POS_DECL);
+ */
+ */**
+ * Gets the best timeout resolution that RTSemEventWaitEx can do.
+ */
+ */
+RTDECL(uint32_t) RTSemEventGetResolution(void);
+ */
+ */**
+ * Sets the signaller thread to one specific thread.
+ */
+ * This is only used for validating usage and deadlock detection. When used
+ * after calls to RTSemEventAddSignaller, the specified thread will be the only
+ * signalling thread.
+ */
+ */
+RTDECL(void) RTSemEventSetSignaller(RTSEMEVENT hEventSem, RTTHREAD hThread);
+ */
+ */**
+ * To add more signalling threads.
+ */
+ * First call RTSemEventSetSignaller then add further threads with this.
+ */
+ */
+RTDECL(void) RTSemEventSetSignaller(RTSEMEVENT hEventSem, RTTHREAD hThread);
+ */
+ */
+RTDECL(void) RTSemEventAddSignaller(RTSEMEVENT hEventSem, RTTHREAD hThread);
+/**
+ * To remove a signalling thread.
+ *
+ * Reverts work done by RTSemEventAddSignaller and RTSemEventSetSignaller.
+ *
+ * @param   hEventSem    The event semaphore.
+ * @param   hThread      A previously added thread.
+ */
+RTDECL(void) RTSemEventRemoveSignaller(RTSEMEVENT hEventSem, RTTHREAD hThread);
+
+/** @} */
+
+/** @defgroup grp_rt_sems_event_multi   RTSemEventMulti - Multiple Release Event Semaphores
+ * A variant of @ref grp_rt_sems_event where all threads will be unblocked when
+ * signalling the semaphore.
+ */
+/**
+ * Creates a multiple release event semaphore.
+ *
+ * @returns iprt status code.
+ * @param   phEventMultiSem  Where to store the handle to the newly created
+ *                         multiple release event semaphore.
+ */
+RTDECL(int)  RTSemEventMultiCreate(PRTSEMEVENTMULTI phEventMultiSem);
+
+/**
+ * Creates a multiple release event semaphore.
+ *
+ * @returns iprt status code.
+ * @param   phEventMultiSem  Where to store the handle to the newly created
+ *                         multiple release event semaphore.
+ * @param   fFlags          Flags, any combination of the
+ *                          RTSEMEVENTMULTI_FLAGS_XXX \#defines.
+ * @param   hClass          The class (no reference consumed). Since we
+ *                          don't do order checks on event semaphores, the
+ *                          use of the class is limited to controlling the
+ *                          timeout threshold for deadlock detection.
+ * @param   pszNameFmt      Name format string for the lock validator,
+ *                          optional (NULL). Max length is 32 bytes.
+ * @param   ...             Format string arguments.
+ */
+RTDECL(int)  RTSemEventMultiCreateEx(PRTSEMEVENTMULTI phEventMultiSem, uint32_t fFlags,
RTLOCKVALCLASS hClass,
+     const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(4, 5);
+
+/** @name RTSemMutexCreateEx flags */
+/** Disables lock validation. */
+#define RTSEMEVENTMULTI_FLAGS_NO_LOCK_VAL   UINT32_C(0x00000001)
+
+/** @returns iprt status code. */
+/** @param hEventMultiSem The multiple release event semaphore. NIL is quietly ignored (VINF_SUCCESS). */
+/** @} */
+RTDECL(int)  RTSemEventMultiDestroy(RTSEMEVENTMULTI hEventMultiSem);
+
+/** @returns iprt status code. */
+/** @param hEventMultiSem The multiple release event semaphore. */
+/** @remarks ring-0: This works when preemption is disabled. However it is system specific whether it works in interrupt context or with interrupts disabled. */
+/** @} */
+RTDECL(int)  RTSemEventMultiSignal(RTSEMEVENTMULTI hEventMultiSem);
+
+/** @returns iprt status code. */
+/** @param hEventMultiSem The multiple release event semaphore. */
+/** @} */
+RTDECL(int)  RTSemEventMultiReset(RTSEMEVENTMULTI hEventMultiSem);
+
+/** Wait for the event multi semaphore to be signaled, resume on interruption. */
+/** This function will resume if the wait is interrupted by an async system event (like a unix signal) or similar. */
+/** Will not return VERR_INTERRUPTED. */
+/** @param hEventMultiSem The multiple release event semaphore. */
+/** @param cMillies Number of milliseconds to wait. */
+RTDECL(int) RTSemEventMultiWait(RTSEMEVENTMULTI hEventMultiSem, RTMSINTERVAL cMillies);
+
+/**
+ * Wait for the event multi semaphore to be signaled, return on interruption.
+ *
+ * This function will not resume the wait if interrupted.
+ *
+ * @returns iprt status code.
+ * @param   hEventMultiSem   The multiple release event semaphore.
+ * @param   cMillies         Number of milliseconds to wait.
+ * @todo    Rename to RTSemEventMultiWaitIntr since it is mainly for
+ *          ring-0 consumption.
+ */
+RTDECL(int) RTSemEventMultiWaitNoResume(RTSEMEVENTMULTI hEventMultiSem, RTMSINTERVAL cMillies);
+
+/**
+ * Extended API for waiting on an event semaphore to be signaled.
+ *
+ * @returns IPRT status code.
+ * @param   hEventMultiSem   The multiple release event semaphore to wait
+ * on.
+ * @param   fFlags           Combination of the RTSEMWAIT_FLAGS XXX.
+ * @param   uTimeout         The timeout, ignored if
+ * RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ * Whether this is absolute or relative,
+ * milliseconds or nanoseconds depends on the @a
+ * fFlags value. Do not pass RT_INDEFINITE_WAIT
+ * here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
+ */
+RTDECL(int) RTSemEventMultiWaitEx(RTSEMEVENTMULTI hEventMultiSem, uint32_t fFlags, uint64_t uTimeout);
+
+/**
+ * Debug version of RTSemEventMultiWaitEx that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemEventMultiWaitEx.
+ * @param   hEventMultiSem   The multiple release event semaphore handle.
+ * @param   fFlags           See RTSemEventMultiWaitEx.
+ * @param   uTimeout         See RTSemEventMultiWaitEx.
+ * @param   uId              Some kind of locking location ID. Typically a
+ * return address up the stack. Optional (0).
+ * @param   SRC_POS          The source position where call is being made
+ * from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int) RTSemEventMultiWaitExDebug(RTSEMEVENTMULTI hEventMultiSem, uint32_t fFlags, uint64_t uTimeout);
+ RTHCUINTPTR uid, RT_SRC_POS_DECL);
+
+/**
+ * Gets the best timeout resolution that RTSemEventMultiWaitEx can do.
+ *
+ * @returns The resolution in nanoseconds.
+ */
+RTDECL(uint32_t) RTSemEventMultiGetResolution(void);
+
+/**
+ * Sets the signaller thread to one specific thread.
+ *
+ * This is only used for validating usage and deadlock detection. When used
+ * after calls to RTSemEventAddSignaller, the specified thread will be the only
+ * signalling thread.
+ *
+ * @param   hEventMultiSem   The multiple release event semaphore. 
+ * @param   hThread             The thread that will signal it. Pass 
+ *                              NIL_RTTHREAD to indicate that there is no 
+ *                              special signalling thread.
+ */
+RTDECL(void) RTSemEventMultiSetSignaller(RTSEMEVENTMULTI hEventMultiSem, RTTHREAD hThread);
+
+/**
+ * To add more signalling threads.
+ *
+ * First call RTSemEventSetSignaller then add further threads with this.
+ *
+ * @param   hEventMultiSem   The multiple release event semaphore. 
+ * @param   hThread             The thread that will signal it. NIL_RTTHREAD is 
+ *                              not accepted.
+ */
+RTDECL(void) RTSemEventMultiAddSignaller(RTSEMEVENTMULTI hEventMultiSem, RTTHREAD hThread);
+
+/**
+ * To remove a signalling thread.
+ *
+ * Reverts work done by RTSemEventAddSignaller and RTSemEventSetSignaller.
+ *
+ * @param   hEventMultiSem   The multiple release event semaphore. 
+ * @param   hThread             A previously added thread.
+ */
+RTDECL(void) RTSemEventMultiRemoveSignaller(RTSEMEVENTMULTI hEventMultiSem, RTTHREAD hThread);
+
+/** @} */
** @defgroup grp_rt_sems_mutex RTSemMutex - Mutex semaphores.
+ *
+ * Mutex semaphores protect a section of code or data to which access must be
+ * exclusive. Only one thread can hold access to a critical section at one
+ * time. See RTSemMutexCreate, RTSemMutexRequest and RTSemMutexRelease.
+ *
+ * @remarks These are less efficient than "fast mutexes" and "critical
+ * sections", which IPRT implements as well; see @ref
+ * grp_rt_sems_fast_mutex and @ref grp_rt_critsect.
+ *
+ * @}
+ */
+
+/**
+ * Create a mutex semaphore.
+ *
+ * @returns iprt status code.
+ * @param   phMutexSem    Where to store the mutex semaphore handle.
+ */
+RTDECL(int)  RTSemMutexCreate(PRTSEMMUTEX phMutexSem);
+
+/**
+ * Creates a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param   phMutexSem          Where to store the handle to the newly created
+ *                             mutex semaphore.
+ * @param   fFlags              Flags, any combination of the
+ *                             RTSEMMUTEX_FLAGS_XXX #defines.
+ * @param   hClass              The class (no reference consumed). If NIL, no
+ *                             lock order validation will be performed on this
+ *                             lock.
+ * @param   uSubClass           The sub-class. This is used to define lock
+ *                             order within a class. RTLOCKVAL_SUB_CLASS_NONE
+ *                             is the recommended value here.
+ * @param   pszNameFmt          Name format string for the lock validator,
+ *                             optional (NULL). Max length is 32 bytes.
+ * @param   ...                 Format string arguments.
+ */
+RTDECL(int) RTSemMutexCreateEx(PRTSEMMUTEX phMutexSem, uint32_t fFlags, RTLOCKVALCLASS hClass, uint32_t uSubClass,
+                             const char *pszNameFmt, ...); RT_IPRT_FORMAT_ATTR_MAYBE_NULL(5, 6);
+
+/** @name RTSemMutexCreateEx flags
+ * @{ */
+/** Disables lock validation. */
+#define RTSEMMUTEX_FLAGS_NO_LOCK_VAL    UINT32_C(0x00000001)
/** @} */

/** *
 * Destroy a mutex semaphore.
 * *
 * @returns iprt status code.
 * @param   hMutexSem           The mutex semaphore to destroy. NIL is quietly ignored (VINF_SUCCESS).
 */
RTDECL(int)  RTSemMutexDestroy(RTSEMMUTEX hMutexSem);

/** *
 * Changes the lock validator sub-class of the mutex semaphore.
 * *
 * It is recommended to try make sure that nobody is using this semaphore while changing the value.
 * *
 * @returns The old sub-class. RTLOCKVAL_SUB_CLASS_INVALID is returns if the lock validator isn't compiled in or either of the parameters are invalid.
 * @param   hMutexSem           The handle to the mutex semaphore.
 * @param   uSubClass           The new sub-class value.
 */
RTDECL(uint32_t) RTSemMutexSetSubClass(RTSEMMUTEX hMutexSem, uint32_t uSubClass);

/** *
 * Request ownership of a mutex semaphore, resume on interruption.
 * *
 * This function will resume if the wait is interrupted by an async system event (like a unix signal) or similar.
 * *
 * The same thread may request a mutex semaphore multiple times, a nested counter is kept to make sure it's released on the right RTSemMutexRelease() call.
 * *
 * @returns iprt status code. Will not return VERR_INTERRUPTED.
 * @param   hMutexSem           The mutex semaphore to request ownership over.
 * @param   cMillies            The number of milliseconds to wait.
 */
RTDECL(int)  RTSemMutexRequest(RTSEMMUTEX hMutexSem, RTMSINTERVAL cMillies);

/** *
 * Request ownership of a mutex semaphore, return on interruption.
 * *
 * This function will not resume the wait if interrupted.
 * */
The same thread may request a mutex semaphore multiple times, a nested counter is kept to make sure it's released on the right

RTSemMutexRelease() call.

@returns iprt status code.
@returns iprt status code.

@returns iprt status code.
@returns iprt status code.

The mutex semaphore to request ownership over.

The number of milliseconds to wait.

Some kind of locking location ID. Typically a
return address up the stack. Optional (0).

The source position where call is being made
from. Use RT_SRC_POS when possible. Optional.

The mutex semaphore to request ownership over.

The mutex semaphore to request ownership over.

The number of milliseconds to wait.

Some kind of locking location ID. Typically a
return address up the stack. Optional (0).

The source position where call is being made
from. Use RT_SRC_POS when possible. Optional.

Request ownership of a mutex semaphore, extended edition.

The same thread may request a mutex semaphore multiple times, a nested counter is kept to make sure it's released on the right

RTSemMutexRelease() call.

@returns iprt status code.
@returns iprt status code.

The mutex semaphore to request ownership over.
+ @param fFlags Combination of the RTSEMWAIT_FLAGS_XXX.
+ @param uTimeout The timeout, ignored if
+ RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ Whether this is absolute or relative,
+ milliseconds or nanoseconds depends on the @a
+ fFlags value. Do not pass RT_INDEFINITE_WAIT
+ here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
+ */
+RTDECL(int)  RTSemMutexRequestEx(RTSEMMUTEX hMutexSem, uint32_t fFlags, uint64_t uTimeout);
+
+/**
+ * Debug version of RTSemMutexRequestEx that tracks the location.
+ *
+ +@returns iprt status code.
+ + @param hMutexSem The mutex semaphore to request ownership over.
+ + @param fFlags See RTSemMutexRequestEx.
+ + @param uTimeout See RTSemMutexRequestEx.
+ + @param uld Some kind of locking location ID. Typically a
+ + return address up the stack. Optional (0).
+ + @param SRC_POS The source position where call is being made
+ + from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int)  RTSemMutexRequestExDebug(RTSEMMUTEX hMutexSem, uint32_t fFlags, uint64_t uTimeout,
+                                     RTHCUINTPTR uld, RT_SRC_POS_DECL);
+
+/**
+ * Release the ownership of a mutex semaphore.
+ *
+ +@returns iprt status code.
+ + @param hMutexSem The mutex to release the ownership of. It goes
+ + without saying the the calling thread must own
+ + it.
+ */
+RTDECL(int)  RTSemMutexRelease(RTSEMMUTEX hMutexSem);
+
+/**
+ * Checks if the mutex semaphore is owned or not.
+ *
+ +@returns true if owned, false if not.
+ + @param hMutexSem The mutex semaphore.
+ */
+RTDECL(bool) RTSemMutexIsOwned(RTSEMMUTEX hMutexSem);
+
+/* Strict build: Remap the two request calls to the debug versions. */
+#if defined(RT_STRICT) && !defined(RTSEMMUTEX_WITHOUT_REMAPPING) &&
+!defined(RT_WITH_MANGLING)
+ ifdef ___iprt_asm_h
+ define RTSemMutexRequest(hMutexSem, cMillies) RTSemMutexRequestDebug((hMutexSem),

(cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+## define RTSemMutexRequestNoResume(hMutexSem, cMillies)
+RTSemMutexRequestNoResumeDebug((hMutexSem), (cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+## define RTSemMutexRequestEx(hMutexSem, flags, uTimeout)  RTSemMutexRequestExDebug((hMutexSem),
+(flags), (uTimeout), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
+## else
+## define RTSemMutexRequest(hMutexSem, cMillies)            RTSemMutexRequestDebug((hMutexSem),
+(cMillies), 0, RT_SRC_POS)
+## define RTSemMutexRequestNoResume(hMutexSem, cMillies)
+RTSemMutexRequestNoResumeDebug((hMutexSem), (cMillies), 0, RT_SRC_POS)
+## define RTSemMutexRequestEx(hMutexSem, flags, uTimeout)  RTSemMutexRequestExDebug((hMutexSem),
+(flags), (uTimeout), 0, RT_SRC_POS)
+## endif
+##endif
+
+/* Strict lock order: Automatically classify locks by init location. */
+##if   defined(RT_LOCK_STRICT_ORDER) && defined(IN_RING3) &&
+!defined(RTSEMMUTEX_WITHOUT_REMAPPING) && !defined(RT_WITH_MANGLING)
+## define RTSemMutexCreate(phMutexSem)\n+    RTSemMutexCreateEx((phMutexSem), 0 /*fFlags*/, \n+                       RTLockValidatorClassForSrcPos(RT_SRC_POS, NULL), \n+                       RTLOCKVAL_SUB_CLASS_NONE, NULL)
+##endif
+
+/** @} */
+
/** @defgroup grp_rt_sems_fast_mutex RTSemFastMutex - Fast Mutex Semaphores */
+* Fast mutexes work like regular mutexes in that they allow only a single
+* thread access to a critical piece of code or data. As opposed to mutexes,
+* they require no syscall if the fast mutex is not held (like critical
+* sections). Unlike critical sections however, they are *not* recursive.
+* @remarks The fast mutexes has sideeffects on IRQL on Windows hosts. So use
+* with care and test on windows with driver verifier.
+* @param phFastMtx Where to store the handle to the newly created
+* fast mutex semaphore.
+* @returns iprt status code.
+*/
+RTDECL(int)  RTSemFastMutexCreate(PRTSEMFASTMUTEX phFastMtx);
+
+/**
+ * Destroy a fast mutex semaphore.
+ *
+ * @returns iprt status code.
+ *
+ * @param   hFastMtx            Handle to the fast mutex semaphore. NIL is
+ *                              quietly ignored (VINF_SUCCESS).
+ */
+RTDECL(int)  RTSemFastMutexDestroy(RTSEMFASTMUTEX hFastMtx);
+
+/**
+ * Request ownership of a fast mutex semaphore.
+ *
+ * The same thread may request a mutex semaphore multiple times,
+ * a nested counter is kept to make sure it's released on the right
+ * RTSemMutexRelease() call.
+ *
+ * @returns iprt status code.
+ *
+ * @param   hFastMtx            Handle to the fast mutex semaphore.
+ */
+RTDECL(int)  RTSemFastMutexRequest(RTSEMFASTMUTEX hFastMtx);
+
+/**
+ * Release the ownership of a fast mutex semaphore.
+ *
+ * @returns iprt status code.
+ *
+ * @param   hFastMtx            Handle to the fast mutex semaphore. It goes
+ *                              without saying the the calling thread must own
+ *                              it.
+ */
+RTDECL(int)  RTSemFastMutexRelease(RTSEMFASTMUTEX hFastMtx);
+
+/** @} */
+
+/** @defgroup grp_rt_sems_spin_mutex RTSemSpinMutex - Spinning Mutex Semaphores
+ *
+ * A very adaptive variant of mutex semaphore that is tailored for the ring-0
+ * logger.
+ *
+ */
+@{} */
+
+/**
+ * Creates a spinning mutex semaphore.
+ *
+ * @returns iprt status code.
+ *
+ * @retval  VERR_INVALID_PARAMETER on invalid flags.
+ * @retval VERR_NO_MEMORY if out of memory for the semaphore structure and handle.
+ *
+ * @param phSpinMtx Where to return the handle to the create semaphore.
+ * @param fFlags Flags, see RTSEMSPINMUTEX_FLAGS_XXX.
+ */
+RTDECL(int) RTSemSpinMutexCreate(PRTSEMSPINMUTEX phSpinMtx, uint32_t fFlags);
+
+/** @name RTSemSpinMutexCreate flags. */
+* @} */
+/** Always take the semaphore in a IRQ safe way.
+ * (In plain words: always disable interrupts.) */
+#define RTSEMSPINMUTEX_FLAGS_IRQ_SAFE RT_BIT_32(0)
+/** Mask of valid flags. */
+#define RTSEMSPINMUTEX_FLAGS_VALID_MASK UINT32_C(0x00000001)
+/** @} */
+
+/**
+ * Destroys a spinning mutex semaphore.
+ *
+ * @returns iprt status code.
+ * @retval VERR_INVALID_HANDLE (or crash) if the handle is invalid. (NIL will not cause this status.)
+ *
+ * @param hSpinMtx The semaphore handle. NIL_RTSEMSPINMUTEX is ignored quietly (VINF_SUCCESS).
+ */
+RTDECL(int) RTSemSpinMutexDestroy(RTSEMSPINMUTEX hSpinMtx);
+
+/**
+ * Request the spinning mutex semaphore.
+ *
+ * This may block if the context we're called in allows this. If not it will spin. If called in an interrupt context, we will only spin if the current owner isn't interrupted. Also, on some systems it is not always possible to wake up blocking threads in all contexts, so, which will either be indicated by returning VERR_SEM_BAD_CONTEXT or by temporarily switching the semaphore into pure spinlock state.
+ *
+ * Preemption will be disabled upon return. IRQs may also be disabled.
+ *
+ * @returns iprt status code.
+ * @retval VERR_SEM_BAD_CONTEXT if the context it's called in isn't suitable for releasing it if someone is sleeping on it.
+ * @retval VERR_SEM_DESTROYED if destroyed.
+ * @retval VERR_SEM_NESTED if held by the caller. Asserted.
+ * @retval VERR_INVALID_HANDLE if the handle is invalid. Asserted
+ */
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexRequest(RTSEMSPINMUTEX hSpinMtx);
+
+/**
+ * Like RTSemSpinMutexRequest but it won't block or spin if the semaphore is
+ * held by someone else.
+ *
+ * @returns iprt status code.
+ *
+ * @retval  VERR_SEM_BUSY if held by someone else.
+ * @retval  VERR_SEM_DESTROYED if destroyed.
+ * @retval  VERR_SEM_NESTED if held by the caller. Asserted.
+ * @retval  VERR_INVALID_HANDLE if the handle is invalid. Asserted
+ *
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexTryRequest(RTSEMSPINMUTEX hSpinMtx);
+
+/**
+ * Releases the semaphore previously acquired by RTSemSpinMutexRequest or
+ * RTSemSpinMutexTryRequest.
+ *
+ * @returns iprt status code.
+ *
+ * @retval  VERR_SEM_DESTROYED if destroyed.
+ * @retval  VERR_NOT_OWNER if not owner. Asserted.
+ * @retval  VERR_INVALID_HANDLE if the handle is invalid. Asserted.
+ *
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexRelease(RTSEMSPINMUTEX hSpinMtx);
+
+/** @} */
+
+/** @} */
+
+/**
+ * Creates a read/write semaphore.
+ *
+ * @returns iprt status code.
+ *
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexRequest(RTSEMSPINMUTEX hSpinMtx);
+
+/**
+ * Like RTSemSpinMutexRequest but it won't block or spin if the semaphore is
+ * held by someone else.
+ *
+ * @returns iprt status code.
+ *
+ * @retval  VERR_SEM_BUSY if held by someone else.
+ * @retval  VERR_SEM_DESTROYED if destroyed.
+ * @retval  VERR_SEM_NESTED if held by the caller. Asserted.
+ * @retval  VERR_INVALID_HANDLE if the handle is invalid. Asserted
+ *
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexTryRequest(RTSEMSPINMUTEX hSpinMtx);
+
+/**
+ * Releases the semaphore previously acquired by RTSemSpinMutexRequest or
+ * RTSemSpinMutexTryRequest.
+ *
+ * @returns iprt status code.
+ *
+ * @retval  VERR_SEM_DESTROYED if destroyed.
+ * @retval  VERR_NOT_OWNER if not owner. Asserted.
+ * @retval  VERR_INVALID_HANDLE if the handle is invalid. Asserted.
+ *
+ * @param   hSpinMtx    The semaphore handle.
+ */
+RTDECL(int) RTSemSpinMutexRelease(RTSEMSPINMUTEX hSpinMtx);
+
+/** @} */
+ * RW semaphore.
+ */
+RTDECL(int) RTSemRWCreate(PRTSEMRW phRWSem);
+
+/**
+ * Creates a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param phRWSem Where to store the handle to the newly created
+ * RW semaphore.
+ * @param fFlags Flags, any combination of the RTSEMRW_FLAGS_XXX
+ * #defines.
+ * @param hClass The class (no reference consumed). If NIL, no
+ * lock order validation will be performed on this
+ * lock.
+ * @param uSubClass The sub-class. This is used to define lock
+ * order within a class. RTLOCKVAL_SUB_CLASS_NONE
+ * is the recommended value here.
+ * @param pszNameFmt Name format string for the lock validator,
+ * optional (NULL). Max length is 32 bytes.
+ * @param ... Format string arguments.
+ */
+RTDECL(int) RTSemRWCreateEx(PRTSEMRW phRWSem, uint32_t fFlags, RTLOCKVALCLASS hClass,
+                              uint32_t uSubClass,
+                              const char *pszNameFmt, ...) RT_IPRT_FORMAT_ATTR_MAYBE_NULL(5, 6);
+
+/** @name RTSemRWCreateEx flags
+ * @{ */
+/** Disables lock validation. */
+#define RTSEMRW_FLAGS_NO_LOCK_VAL   UINT32_C(0x00000001)
+/** @} */
+
+/** Destroys a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param hRWSem Handle to the read/write semaphore. NIL is
+ * quietly ignored (VINF_SUCCESS).
+ */
+RTDECL(int) RTSemRWDestroy(RTSEMRW hRWSem);
+
+/** Changes the lock validator sub-class of the read/write semaphore.
+ *
+ * @returns The old sub-class. RTLOCKVAL_SUB_CLASS_INVALID is returns if the
/* lock validator isn't compiled in or either of the parameters are invalid.
 * @param hRWSem Handle to the read/write semaphore.
 * @param uSubClass The new sub-class value.
 */
RTDECL(uint32_t) RTSemRWSetSubClass(RTSEMRW hRWSem, uint32_t uSubClass);

/**
 * Request read access to a read/write semaphore, resume on interruption.
 * @returns iprt status code.
 * @retval VINF_SUCCESS on success.
 * @retval VERR_INTERRUPT if the wait was interrupted.
 * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
 * @param hRWSem Handle to the read/write semaphore.
 * @param cMillies The number of milliseconds to wait.
 */
RTDECL(int) RTSemRWRequestRead(RTSEMRW hRWSem, RTMSINTERVAL cMillies);

/**
 * Request read access to a read/write semaphore, return on interruption.
 * @returns iprt status code.
 * @retval VINF_SUCCESS on success.
 * @retval VERR_INTERRUPT if the wait was interrupted.
 * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
 * @param hRWSem Handle to the read/write semaphore.
 * @param cMillies The number of milliseconds to wait.
 */
RTDECL(int) RTSemRWRequestReadNoResume(RTSEMRW hRWSem, RTMSINTERVAL cMillies);

/**
 * Debug version of RTSemRWRequestRead that tracks the location.
 * @returns iprt status code.
 * @retval VINF_SUCCESS on success.
 * @retval VERR_INTERRUPT if the wait was interrupted.
 * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
 * @param hRWSem Handle to the read/write semaphore.
 * @param cMillies The number of milliseconds to wait.
 * @param uId Some kind of locking location ID. Typically a return address up the stack. Optional (0).
 * @param SRC_POS The source position where call is being made from. Use RT_SRC_POS when possible. Optional.
 */
+RTDECL(int) RTSemRWRequestReadDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies, RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
/*
 * Debug version of RTSemRWRequestWriteNoResume that tracks the location.
 */
+ *
/* @returns iprt status code.
 * @retval VINF_SUCCESS on success.
 * @retval VERR_INTERRUPT if the wait was interrupted.
 */
+ @param hRWSem Handle to the read/write semaphore.
+ @param cMillies The number of milliseconds to wait.
+ @param uId Some kind of locking location ID. Typically a return address up the stack. Optional (0).
+ @param SRC_POS The source position where call is being made
 * from. Use RT_SRC_POS when possible. Optional.
 */
+/
+RTDECL(int) RTSemRWRequestReadNoResumeDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies, RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
/*
 * Request read access to a read/write semaphore, extended edition.
 */
+ *
/* @returns iprt status code.
 * @retval VINF_SUCCESS on success.
 * @retval VERR_INTERRUPT if the wait was interrupted.
 * @retval VERR_TIMEOUT if the wait timed out.
 * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
 */
+ @param hRWSem Handle to the read/write semaphore.
+ @param fFlags Combination of the RTSEMWAIT_FLAGS_XXX.
+ @param uTimeout The timeout, ignored if
 * RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
 * Whether this is absolute or relative,
 * milliseconds or nanoseconds depends on the @a
 * fFlags value. Do not pass RT_INDEFINITE_WAIT
 * here, use RTSEMWAIT_FLAGS_INDEFINITE instead.
 */
+/
+RTDECL(int) RTSemRWRequestReadEx(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout);
+
/*
 * Debug version of RTSemRWRequestReadEx that tracks the location.
 */
+ *
/* @returns iprt status code.
 * @retval VINF_SUCCESS on success.
 * @retval VERR_INTERRUPT if the wait was interrupted.
 */
+ * @retval VERR_TIMEOUT if the wait timed out.
+ * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param hRWSem Handle to the read/write semaphore.
+ * @param fFlags See RTSemRWRequestReadEx.
+ * @param uTimeout See RTSemRWRequestReadEx.
+ * @param uId Some kind of locking location ID. Typically a
+ * return address up the stack. Optional (0).
+ * @param SRC_POS The source position where call is being made
+ * from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int) RTSemRWRequestReadExDebug(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout,
+                                         RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
+/**
+ * Release read access to a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param hRWSem Handle to the read/write semaphore. It goes
+ * without saying that caller must own read
+ * privileges to the semaphore.
+ */
+RTDECL(int) RTSemRWReleaseRead(RTSEMRW hRWSem);
+
+/**
+ * Request write access to a read/write semaphore, resume on interruption.
+ *
+ * @returns iprt status code.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_DEADLOCK if the caller owned the read lock.
+ * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param hRWSem Handle to the read/write semaphore.
+ * @param cMillies The number of milliseconds to wait.
+ */
+RTDECL(int) RTSemRWRequestWrite(RTSEMRW hRWSem, RTMSINTERVAL cMillies);
+
+/**
+ * Request write access to a read/write semaphore, return on interruption.
+ *
+ * @returns iprt status code.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_INTERRUPT if the wait was interrupted.
+ * @retval VERR_DEADLOCK if the caller owned the read lock.
+ * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param hRWSem Handle to the read/write semaphore.
+ * @param cMillies The number of milliseconds to wait.
+ RTDECL(int) RTSemRWRequestWriteNoResume(RTSEMRW hRWSem, RTMSINTERVAL cMillies);
+
+/**
+ * Debug version of RTSemRWRequestWrite that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemRWRequestWrite.
+ * @param hRWSem Handle to the read/write semaphore.
+ * @param cMillies The number of milliseconds to wait.
+ * @param uId Some kind of locking location ID. Typically a
+ * return address up the stack. Optional (0).
+ * @param SRC_POS The source position where call is being made
+ * from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int) RTSemRWRequestWriteDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies,
RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
+/**
+ * Debug version of RTSemRWRequestWriteNoResume that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemRWRequestWriteNoResume.
+ * @param hRWSem Handle to the read/write semaphore.
+ * @param cMillies The number of milliseconds to wait.
+ * @param uId Some kind of locking location ID. Typically a
+ * return address up the stack. Optional (0).
+ * @param SRC_POS The source position where call is being made
+ * from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int) RTSemRWRequestWriteNoResumeDebug(RTSEMRW hRWSem, RTMSINTERVAL cMillies,
RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
+/**
+ * Request write access to a read/write semaphore, extended edition.
+ *
+ * @returns iprt status code.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_INTERRUPTED if the wait was interrupted.
+ * @retval VERR_TIMEOUT if the wait timed out.
+ * @retval VERR_DEADLOCK if the caller owned the read lock. Do not depend on
+ * this as it is implementation specific.
+ * @retval VERR_INVALID_HANDLE if hRWSem is invalid.
+ *
+ * @param hRWSem Handle to the read/write semaphore.
+ * @param fFlags Combination of the RTSEMWAIT_FLAGS_XXX.
+ * @param uTimeout The timeout, ignored if
+ * RTSEMWAIT_FLAGS_INDEFINITE is set in @a flags.
+ * Whether this is absolute or relative,
+ * milliseconds or nanoseconds depends on the @a
+ */
+RTDECL(int) RTSemRWRequestWriteEx(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout);
+
+/**
+ * Debug version of RTSemRWRequestWriteEx that tracks the location.
+ *
+ * @returns IPRT status code, see RTSemRWRequestWriteEx.
+ * @param   hRWSem              Handle to the read/write semaphore.
+ * @param   fFlags              See RTSemRWRequestWriteEx.
+ * @param   uTimeout            See RTSemRWRequestWriteEx.
+ * @param   uId                 Some kind of locking location ID. Typically a
+ *                              return address up the stack. Optional (0).
+ * @param   SRC_POS             The source position where call is being made
+ *                              from. Use RT_SRC_POS when possible. Optional.
+ */
+RTDECL(int) RTSemRWRequestWriteExDebug(RTSEMRW hRWSem, uint32_t fFlags, uint64_t uTimeout,
+                                        RTHCUINTPTR uId, RT_SRC_POS_DECL);
+
+/**
+ * Release write access to a read/write semaphore.
+ *
+ * @returns iprt status code.
+ * @param   hRWSem              Handle to the read/write semaphore.  Goes
+ *                              without saying that caller must have write
+ *                              access to the semaphore.
+ */
+RTDECL(int) RTSemRWReleaseWrite(RTSEMRW hRWSem);
+
+/**
+ * Checks if the caller is the exclusive semaphore owner.
+ *
+ * @returns true / false accoringly.
+ * @param   hRWSem              Handle to the read/write semaphore.
+ */
+RTDECL(bool) RTSemRWIsWriteOwner(RTSEMRW hRWSem);
+
+/**
+ * Checks if the caller is one of the read owners of the semaphore.
+ *
+ * @note   !CAUTION! This API doesn't work reliably if lock validation isn't
+ *         enabled. Meaning, the answer is not trustworthy unless
+ *         RT_LOCK STRICT or RTSEMRW STRICT was defined at build time. Also,
+ *         make sure you do not use RTSEMRW_FLAGS_NO_LOCK_VAL when creating
+ *         the semaphore. And finally, if you used a locking class, don't
+ *         disable deadlock detection by setting cMsMinDeadlock to
+ *         RT_INDEFINITE_WAIT.
+ *
In short, only use this for assertions.

@returns true if reader, false if not.

@param hRWSem Handle to the read/write semaphore.

@returns The write recursion count (0 if bad semaphore handle).
@returns The read recursion count (0 if bad semaphore handle).
@returns The read count (0 if bad semaphore handle).

This includes all read recursions, so it might be higher than the number of read owners. It does not include reads done by the current writer.

Strict build: Remap the four request calls to the debug versions. */
#if defined(RT_STRICT) && !defined(RTSEMRW_WITHOUT_REMAPPING) && !defined(RT_WITH_MANGLING)
#endif
#define RTSemRWRequestRead(hRWSem, cMillies) RTSemRWRequestReadDebug((hRWSem), cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
#define RTSemRWRequestWrite(hRWSem, cMillies) RTSemRWRequestWriteDebug((hRWSem), cMillies), (uintptr_t)ASMReturnAddress(), RT_SRC_POS)
/* Strict lock order: Automatically classify locks by init location. */
#if defined(RT_LOCK_STRICT_ORDER) && defined(IN_RING3) &&
!defined(RTSEMRW_WITHOUT_REMAPPING) && !defined(RT_WITH_MANGLING)
#define RTSemRWCreate(phSemRW) \
    RTSemRWCreateEx((phSemRW), 0 /*fFlags*/, \
                    RTLockValidatorClassForSrcPos(RT_SRC_POS, NULL), \
                    RTLOCKVAL_SUB_CLASS_NONE, NULL)
#endif

+*/ @ group grp_rt_sems_pingpong RTSemPingPong - Ping-Pong Construct
+ *
+ * Serialization of a two way communication.
+ *
+ * @ { *
+ *
+ */
+ * Ping-pong speaker
+ */
typedef enum RTPINGPONGSPEAKER
+{
+    /** Not initialized. */
+    RTPINGPONGSPEAKER_UNINITIALIZE = 0,
+    /** Ping is speaking, Pong is waiting. */
+    RTPINGPONGSPEAKER_PING,
+    /** Pong is signaled, Ping is waiting. */
+    RTPINGPONGSPEAKER_UNINITIALIZE = 0,
+ RTPINGPONGSPEAKER_PONG_SIGNALED,
+ /** Pong is speaking, Ping is waiting. */
+ RTPINGPONGSPEAKER_PONG,
+ /** Ping is signaled, Pong is waiting. */
+ RTPINGPONGSPEAKER_PING_SIGNALED,
+ /** Hack to ensure that it's at least 32-bits wide. */
+ RTPINGPONGSPEAKER_HACK = 0x7fffffff
+ } RTPINGPONGSPEAKER;
+
+ /**
+ * Ping-Pong construct.
+ *
+ * Two threads, one saying Ping and the other saying Pong. The construct
+ * makes sure they don't speak out of turn and that they can wait and poll
+ * on the conversation.
+ */
+ typedef struct RTPINGPONG
+ {
+    /** The semaphore the Ping thread waits on. */
+    RTSEMEVENT Ping;
+    /** The semaphore the Pong thread waits on. */
+    RTSEMEVENT Pong;
+    /** The current speaker. */
+    volatile RTPINGPONGSPEAKER enmSpeaker;
+#if HC_ARCH_BITS == 64
+    /** Padding the structure to become a multiple of sizeof(RTHCPTR). */
+    uint32_t u32Padding;
+#endif
+ } RTPINGPONG;
+ /** Pointer to Ping-Pong construct. */
+ typedef RTPINGPONG *PRTPINGPONG;
+
+ /**
+ * Init a Ping-Pong construct.
+ *
+ * @returns iprt status code.
+ * @param   pPP   Pointer to the ping-pong structure which needs initialization.
+ */
+ RTDECL(int) RTSemPingPongInit(PRTPINGPONG pPP);
+
+ /**
+ * Deletes a Ping-Pong construct.
+ *
+ * @returns iprt status code.
+ * @param   pPP   Pointer to the ping-pong structure which is to be destroyed.
+ *(I.e. put into uninitialized state.)
+ */
+ RTDECL(int) RTSemPingPongDelete(PRTPINGPONG pPP);
/*
 * Signals the pong thread in a ping-pong construct. (I.e. sends pong.)
 * This is called by the pong thread.
 *
 * @returns iprt status code.
 * @param   pPP         Pointer to the ping-pong structure to pong.
 */
+RTDECL(int) RTSemPong(PRTPINGPONG pPP);
+
+/**
 * Signals the ping thread in a ping-pong construct. (I.e. sends ping.)
 * This is called by the ping thread.
 *
 * @returns iprt status code.
 * @param   pPP         Pointer to the ping-pong structure to ping.
 */
+RTDECL(int) RTSemPing(PRTPINGPONG pPP);
+
+/**
 * Wait function for the ping thread.
 *
 * @returns iprt status code.
 *          Will not return VERR_INTERRUPTED.
 * @param   pPP         Pointer to the ping-pong structure to wait on.
 * @param   cMillies    Number of milliseconds to wait.
 */
+RTDECL(int) RTSemPingWait(PRTPINGPONG pPP, RTMSINTERVAL cMillies);
+
+/**
 * Wait function for the pong thread.
 *
 * @returns iprt status code.
 *          Will not return VERR_INTERRUPTED.
 * @param   pPP         Pointer to the ping-pong structure to wait on.
 * @param   cMillies    Number of milliseconds to wait.
 */
+RTDECL(int) RTSemPongWait(PRTPINGPONG pPP, RTMSINTERVAL cMillies);
+
+/**
 * Checks if the pong thread is speaking.
 *
 * @returns true / false.
 * @param   pPP         Pointer to the ping-pong structure.
 */
+DECLINLINE(bool) RTSemPingIsSpeaker(PRTPINGPONG pPP)
RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
    return enmSpeaker == RTPINGPONGSPEAKER_PING;
+
+
+/**
+ * Checks if the pong thread is speaking.
+ *
+ * @returns true / false.
+ * @param   pPP Pointer to the ping-pong structure.
+ * @remark  This is NOT the same as !RTSemPingIsSpeaker().
+ */
+DECLINLINE(bool) RTSemPongIsSpeaker(PRTPINGPONG pPP)
++
    RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
    return enmSpeaker == RTPINGPONGSPEAKER_PONG;
+
+
+/**
+ * Checks whether the ping thread should wait.
+ *
+ * @returns true / false.
+ * @param   pPP Pointer to the ping-pong structure.
+ * @remark  This is NOT the same as !RTSemPingShouldWait().
+ */
+DECLINLINE(bool) RTSemPingShouldWait(PRTPINGPONG pPP)
++
    RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
    return enmSpeaker == RTPINGPONGSPEAKER_PONG
        || enmSpeaker == RTPINGPONGSPEAKER_PONG_SIGNALED
        || enmSpeaker == RTPINGPONGSPEAKER_PING_SIGNALED;
+
+
+/**
+ * Checks whether the pong thread should wait.
+ *
+ * @returns true / false.
+ * @param   pPP Pointer to the ping-pong structure.
+ * @remark  This is NOT the same as !RTSemPingShouldWait().
+ */
+DECLINLINE(bool) RTSemPongShouldWait(PRTPINGPONG pPP)
++
    RTPINGPONGSPEAKER enmSpeaker = pPP->enmSpeaker;
    return enmSpeaker == RTPINGPONGSPEAKER_PING
        || enmSpeaker == RTPINGPONGSPEAKER_PING_SIGNALED
+ || enmSpeaker == RTPINGPONGSPEAKER_PONG_SIGNED:
+
+** @} */
+
+/** @defgroup grp_sems_xhrds RTSemXRoads - Crossroads
+ *
+ * The crossroads semaphore is intended to prevent two classes of incompatible
+ * events from occurring simultaneously, like south/north bound traffic and
+ * west/east bound traffic at a 4-way junction.
+ *
+ * @remarks In order to simplify the implementation, the current flow is always
+ * given priority. So, it won't work at all well when busy!
+ *
+ * @remarks "XRoads" is used as a name because it is briefer than "crossroads"
+ * and it slightly stresses that is a 4 way crossing to the users of
+ * American English.
+ * @ {
+ */
+
+/**
+ * Creates a crossroads semaphore.
+ * @returns IPRT status code.
+ *
+ * @param phXRoads Where to return the handle to the newly created
+ * crossroads semaphore.
+ */
+RTDECL(int) RTSemXRoadsCreate(PRTSEMXROADS phXRoads);
+
+/**
+ * Destroys a crossroads semaphore.
+ * @returns IPRT status code.
+ *
+ * @param hXRoads Handle to the crossroads semaphore that is to be
+ * destroyed. NIL_RTSEMXROADS is quietly ignored
+ * (VINF_SUCCESS).
+ */
+RTDECL(int) RTSemXRoadsDestroy(RTSEMXROADS hXRoads);
+
+/**
+ * Enter the crossroads from the south or north.
+ *
+ * (Coupled with RTSemXRoadsNSLeave.)
+ *
+ * @returns IPRT status code.
+ * @param   hXRoads             Handle to the crossroads semaphore. 
+ */
+RTDECL(int) RTSemXRoadsNSEnter(RTSEMXROADS hXRoads);
+
+/** *
+ * Leave the crossroads to the north or south. 
+ * (Coupled with RTSemXRoadsNSEnter.) 
+ *
+ * @returns IPRT status code. 
+ * @param   hXRoads             Handle to the crossroads semaphore. 
+ */
+RTDECL(int) RTSemXRoadsNSLeave(RTSEMXROADS hXRoads);
+
+/** *
+ * Leave the crossroads from the east or west. 
+ * (Coupled with RTSemXRoadsEWEnter.) 
+ *
+ * @returns IPRT status code. 
+ * @param   hXRoads             Handle to the crossroads semaphore. 
+ */
+RTDECL(int) RTSemXRoadsEWEnter(RTSEMXROADS hXRoads);
+
+/** *
+ * Leave the crossroads to the west or east. 
+ * (Coupled with RTSemXRoadsEWEnter.) 
+ *
+ * @returns IPRT status code. 
+ * @param   hXRoads             Handle to the crossroads semaphore. 
+ */
+RTDECL(int) RTSemXRoadsEWLeave(RTSEMXROADS hXRoads);
+
+/** @} */
+/** @} */
+RT_C_DECLS_END
+
+endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/stdarg.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/stdarg.h
@@ -0,0 +1,59 @@
+/** @file
+ * IPRT - stdarg.h wrapper.
+ */

+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * ( CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_stdarg_h
+#define ___iprt_stdarg_h
+
+#ifdef IPRT_NO_CRT
+# include <iprt/types.h>
+# include <iprt/nocrt/compiler/compiler.h>
+#else
+# include <iprt/cdefs.h>
+# if defined(RT_OS_FREEBSD) && defined(_KERNEL)
+# include <machine/stdarg.h>
+# else defined(RT_OS_NETBSD) && defined(_KERNEL)
+# include <sys/stdarg.h>
+# elif defined(RT_OS_SOLARIS) && defined(_KERNEL) && defined(__GNUC__)
+# include <stdarg.h>
+# else __GNUC__ >= 4 /* System headers refers to __builtin_stdarg_start. */
+# define __builtin_stdarg_start __builtin_va_start
+# endif
+#endif
+
+#ifdef __GNUC__
+#endif
+
+#*/
+
+ /* Older MSC versions doesn't implement va_copy. Newer (12.0+?) ones does
+ * implement it like below, but for now it's easier to continue like for the
+ * older ones so we can more easily handle R0, RC and other weird contexts.
#ifndef __iprt_stdint_h
#define __iprt_stdint_h

#include <iprt/cdefs.h>

#endif

+ && RT_MSC_PREREQ_EX(RT_MSC_VER_VS2010, 1 /*non-msc*/) \\
+ && !defined(__IBMC__) \\
+ && !defined(__IBMCPP__) \\
+ && !defined(IPRT_NO_CRT) \\
+ && !defined(IPRT_DONT_USE_SYSTEM_STDINT_H) \\
+ && !defined(DOXYGEN_RUNNING) 
+
+## ifndef __STDC_CONSTANT_MACROS
+## define __STDC_CONSTANT_MACROS
+## endif
+## ifndef __STDC_LIMIT_MACROS
+## define __STDC_LIMIT_MACROS
+## endif
+## ifdef _MSC_VER
+## pragma warning(push)
+## pragma warning(disable:4668)
+## endif
+## include <stdint.h>
+## ifdef _MSC_VER
+## pragma warning(pop)
+## endif
+
+## if defined(RT_OS_DARWIN) && defined(KERNEL) && defined(RT_ARCH_AMD64)
+ /*
+ * Kludge to fix the incorrect 32-bit constant macros in
+ * Kernel.framework/Headers/stdin.h. uint32_t and int32_t are
+ * int not long as these macros use, which is significant when
+ * targeting AMD64. (10a222)
+ */
+## undef INT32_C
+## define INT32_C(Value) (Value)
+## undef UINT32_C
+## define UINT32_C(Value) (Value ## U)
+## endif /* 64-bit darwin kludge. */
+
+##elif defined(RT_OS_FREEBSD) && defined(_KERNEL)
+
+## ifndef __STDC_CONSTANT_MACROS
+## define __STDC_CONSTANT_MACROS
+## endif
+## ifndef __STDC_LIMIT_MACROS
+## define __STDC_LIMIT_MACROS
+## endif
+## include <sys/stdint.h>
+
+##elif defined(RT_OS_NETBSD) && defined(_KERNEL)
+
+## ifndef __STDC_CONSTANT_MACROS
+## define __STDC_CONSTANT_MACROS
+## endif
+## ifndef __STDC_LIMIT_MACROS
+## define __STDC_LIMIT_MACROS
+## endif

---

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+ # define __STDC_CONSTANT_MACROS
+ # endif
+ #ifndef __STDC_LIMIT_MACROS
+ # define __STDC_LIMIT_MACROS
+ # endif
+ # include <sys/stdint.h>
+
+ /* No system stdint.h */
+ +
+ * Define the types we use.
+ * The linux kernel defines all these in linux/types.h, so skip it.
+ */
+ #if (!(defined(RT_OS_LINUX) && defined(__KERNEL__)) |
+ | defined(IPRT_NO_CRT) |
+ | defined(IPRT_DONT_USE_SYSTEM_STDINT_H) |
+ | defined(DOXYGEN_RUNNING)
+
+ /* Simplify the [u]int64_t type detection mess. */
+ #undef IPRT_STDINT_USE_STRUCT_FOR_64_BIT_TYPES
+ #ifdef __IBMCPP__
+ #  if __IBMCPP__ < 350 && (defined(__WINDOWS__) || defined(__AIX)) || defined(__OS2__)
+ #    define IPRT_STDINT_USE_STRUCT_FOR_64_BIT_TYPES
+ #  endif
+ #endif
+ #ifdef __IBMC__
+ #  if __IBMC__   < 350 && (defined(__WINDOWS__) || defined(__AIX)) || defined(__OS2__)
+ #    define IPRT_STDINT_USE_STRUCT_FOR_64_BIT_TYPES
+ #  endif
+ #endif
+
+ /* x-bit types */
+ #if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86) || defined(RT_ARCH_SPARC) ||
+ defined(RT_ARCH_SPARC64)
+
+ if !defined(_INT8_T_DECLARED) && !defined(_INT8_T)
+ typedef signed char  int8_t;
+ #endif
+ if !defined(_UINT8_T_DECLARED) && !defined(_UINT8_T)
+ typedef unsigned char uint8_t;
+ #endif
+ if !defined(_INT16_T_DECLARED) && !defined(_INT16_T)
+ typedef signed short int16_t;
+ #endif
+ if !defined(_UINT16_T_DECLARED) && !defined(_UINT16_T)
+ typedef unsigned short uint16_t;
+ #endif
+ if !defined(_INT32_T_DECLARED) && !defined(_INT32_T)
+ #if ARCH_BITS != 16
+typedef signed int          int32_t;
+#    else
+typedef signed long         int32_t;
+#    endif
+#   endif
+#   ifndef _UINT32_T_DECLARED
+#     if ARCH_BITS != 16
+typedef unsigned int        uint32_t;
+#     else
+typedef unsigned long       uint32_t;
+#     endif
+#   endif
+#   ifndef _INT64_T_DECLARED && _INT64_T
+#     if defined(_MSVC_VER)
+#       ifndef _INT64_T_DECLARED && _INT64_T
+typedef signed _int64       int64_t;
+#       endif
+#       ifndef _UINT64_T_DECLARED && _UINT64_T
+typedef unsigned _int64     uint64_t;
+#       endif
+#     else
+#       ifndef _WATCOMC__
+typedef signed __int64      int64_t;
+#       endif
+#       ifndef _UINT64_T_DECLARED && _UINT64_T
+typedef unsigned __int64    uint64_t;
+#       endif
+#     endif
+#   elif defined(IPRT_STDINT_USE_STRUCT_FOR_64_BIT_TYPES)
+#     if defined(_INT64_T_DECLARED) && _INT64_T
+typedef struct { uint32_t lo; int32_t hi; }     int64_t;
+#     endif
+#     if defined(_UINT64_T_DECLARED) && _UINT64_T
+typedef struct { uint32_t lo; uint32_t hi; }    uint64_t;
+#     endif
+#   else /* Use long long for 64-bit types */
+#     if defined(_INT64_T_DECLARED) && _INT64_T
+typedef signed long long    int64_t;
+#     endif
+#     if defined(_UINT64_T_DECLARED) && _UINT64_T
+typedef unsigned long long  uint64_t;
+#     endif
+#   endif
+#   ifdef _INTMAX_T_DECLARED
+typedef int64_t             intmax_t;
+#   endif
+#   ifdef _UINTMAX_T_DECLARED
+typedef uint64_t            uintmax_t;
+

endif
+
else
endif /* PORTME: Add architecture. Don't forget to check the [U]INTx_C() and [U]INTMAX_MIN/MAX macros.*/
endif
+
endif /* !linux kernel or stuff */
+
/* pointer <-> integer types */
if !defined(_MSC_VER) || defined(DOXYGEN_RUNNING)
if ARCH_BITS == 32
|| defined(RT_OS_LINUX)
|| defined(RT_OS_FREEBSD)
if !defined(_INTPTR_T_DECLARED) && !defined(_INTPTR_T)
typedef signed long intptr_t;
endif
if !defined(_UINTPTR_T_DECLARED) && !defined(_UINTPTR_T)
typedef unsigned long uintptr_t;
endif
else
endif /* !_MSC_VER */
#endif /* no system stdint.h */

/* Make sure the [U]INTx_C(c) macros are present.
   For In C++ source the system stdint.h may have skipped these if it was
   included before we managed to define __STDC_CONSTANT_MACROS. (Kludge alert!) */
if !defined(INT8_C)
|| !defined(INT16_C)
|| !defined(INT32_C)
|| !defined(INT64_C)
|| !defined(INTMAX_C)
|| !defined(UINT8_C)
|| !defined(UINT16_C)
|| !defined(UINT32_C)
|| !defined(UINT64_C)
|| !defined(UINTMAX_C)
+# define INT8_C(Value) (Value)
+# define INT16_C(Value) (Value)
+# define UINT8_C(Value) (Value)
+# define UINT16_C(Value) (Value)
+% if ARCH_BITS != 16
+# define INT32_C(Value) (Value)
+# define UINT32_C(Value) (Value ## U)
+# define INT64_C(Value) (Value ## LL)
+# define UINT64_C(Value) (Value ## ULL)
+% else
+# define INT32_C(Value) (Value ## L)
+# define UINT32_C(Value) (Value ## UL)
+# define INT64_C(Value) (Value ## LL)
+# define UINT64_C(Value) (Value ## ULL)
+% endif
+# define INTMAX_C(Value) INT64_C(Value)
+# define UINTMAX_C(Value) UINT64_C(Value)
+%endif

+ /*
 * Make sure the INTx_MIN and [U]INTx_MAX macros are present.
 * For In C++ source the system stdint.h may have skipped these if it was
 * included before we managed to define __STDC_LIMIT_MACROS. (Kludge alert!)
 */
+%if !defined(INT8_MIN) \
+ || !defined(INT16_MIN) \
+ || !defined(INT32_MIN) \
+ || !defined(INT64_MIN) \
+ || !defined(INT8_MAX) \
+ || !defined(INT16_MAX) \
+ || !defined(INT32_MAX) \
+ || !defined(INT64_MAX) \
+ || !defined(UINT8_MAX) \
+ || !defined(UINT16_MAX) \
+ || !defined(UINT32_MAX) \
+ || !defined(UINT64_MAX) \
+ || !defined(INT8_MIN) \\n+|| !defined(INT16_MIN) \\n+|| !defined(INT32_MIN) \\n+|| !defined(INT64_MIN) \\n+|| !defined(INT8_MAX) \\n+|| !defined(INT16_MAX) \\n+|| !defined(INT32_MAX) \\n+|| !defined(INT64_MAX) \\n+|| !defined(UINT8_MAX) \\n+|| !defined(UINT16_MAX) \\n+|| !defined(UINT32_MAX) \\n+|| !defined(UINT64_MAX)
+%# define INT8_MIN (INT8_C(-0x7f) - 1)
+%# define INT16_MIN (INT16_C(-0x7fff) - 1)
+%# define INT32_MIN (INT32_C(-0x7fffffff) - 1)
+%# define INT64_MIN (INT64_C(-0x7fffffffffffffff) - 1)
+%# define INT8_MAX INT8_C(0x7f)
+%# define INT16_MAX INT16_C(0x7fff)
+%# define INT32_MAX INT32_C(0x7fffffff)
+%# define INT64_MAX INT64_C(0x7fffffffffffffff)
+%# define UINT8_MAX UINT8_C(0xff)
+%# define UINT16_MAX UINT16_C(0xffff)
+%# define UINT32_MAX UINT32_C(0xffffffff)
/* define UINT64_MAX       UINT64_C(0xffffffffffffffff) */
+
/* define INTMAX_MIN       INT64_MIN */
/* define INTMAX_MAX       INT64_MAX */
/* define UINTMAX_MAX      UINT64_MAX */
#endif
+
#endif

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/string.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/string.h
@@ -0,0 +1,3243 @@
+/** @file
+ * IPRT - String Manipulation.
+ */
+
/* Copyright (C) 2006-2017 Oracle Corporation */
+
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+ * available from http://www.virtualbox.org. This file is free software;
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+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ */
+
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_string_h
+#define ___iprt_string_h
+
+#include <iprt/cdefs.h>
+#include <iprt/types.h>
+#include <iprt/assert.h>
+#include <iprt/stdarg.h>
+#include <iprt/err.h> /* for VINF_SUCCESS */
+#if defined(RT_OS_LINUX) && defined(__KERNEL__)
+    /* no C++ hacks ('new' etc) here anymore! */
+#include <linux/string.h>
+ +#elif defined(IN_XF86_MODULE) && !defined(NO_ANSIC)
+ RT_C_DECLS_BEGIN
+ # include "xf86_ansic.h"
+ RT_C_DECLS_END
+
+ +#elif defined(RT_OS_FREEBSD) && defined(_KERNEL)
+ RT_C_DECLS_BEGIN
+ # include <sys/libkern.h>
+ RT_C_DECLS_END
+
+ +#elif defined(RT_OS_NETBSD) && defined(_KERNEL)
+ RT_C_DECLS_BEGIN
+ # include <lib/libkern/libkern.h>
+ RT_C_DECLS_END
+
+ +#elif defined(RT_OS_SOLARIS) && defined(_KERNEL)
+ */
+ /* Same case as with FreeBSD kernel:
+ * The string.h stuff clashes with sys/system.h
+ * ffs = find first set bit.
+ */
+ # define ffs ffs_string_h
+ # include <string.h>
+ +# undef ffs
+ +# undef strpbrk
+
+ #else
+ # include <string.h>
+ #endif
+
+ /* For the time being: */
+ #include <iprt/utf16.h>
+ #include <iprt/latin1.h>
+
+ /*
+ * Supply prototypes for standard string functions provided by
+ * IPRT instead of the operating environment.
+ */
+ +#if defined(RT_OS_DARWIN) && defined(KERNEL)
+ RT_C_DECLS_BEGIN
+ void *memchr(const void *pv, int ch, size_t cb);
+ char *strpbrk(const char *pszStr, const char *pszChars);
+ RT_C_DECLS_END
+ #endif
+
+ +#if defined(RT_OS_FREEBSD) && defined(_KERNEL)
+ RT_C_DECLS_BEGIN
+ /*

@def RT_USE_RTC_3629
+ * When defined the UTF-8 range will stop at 0x10ffff. If not defined, the
+ * range stops at 0x7fffffff.
+ * @remarks Must be defined both when building and using the IPRT. */
+#ifdef DOXYGEN_RUNNING
+# define RT_USE_RTC_3629
+#endif
+
+/**
+ * Byte zero the specified object.
+ *
+ * This will use sizeof(Obj) to figure the size and will call memset, bzero
+ * or some compiler intrinsic to perform the actual zeroing.
+ *
+ * @param   Obj     The object to zero. Make sure to dereference pointers.
+ *
+ * @remarks Because the macro may use memset it has been placed in string.h
+ * instead of cdefs.h to avoid build issues because someone forgot
+ * to include this header.
+ *
+ * @ingroup grp_rt_cdefs
+ */
+ #define RT_ZERO(Obj)        RT_BZERO(&(Obj), sizeof(Obj))
+
+/**
+ * Byte zero the specified memory area.
+ *
+ * This will call memset, bzero or some compiler intrinsic to clear the
+ * specified bytes of memory.
/*
 * @param pv Pointer to the memory.
 * @param cb The number of bytes to clear. Please, don't pass 0.

 * @remarks Because the macro may use memset it has been placed in string.h
 * instead of cdefs.h to avoid build issues because someone forgot
 * to include this header.
 *
 * @ingroup grp_rt_cdefs
 */
#define RT_BZERO(pv, cb)    do { memset((pv), 0, cb); } while (0)

/** @defgroup grp_rt_str RTStr - String Manipulation
 * Mostly UTF-8 related helpers where the standard string functions won't do.
 */
#define RTSTR_MAX       (~(size_t)0)
#define RTSTR_TAG      (__FILE__)
+ * @param  ppszString      Receives pointer of allocated native CP string.
+ * The returned pointer must be freed using RTStrFree().
+ * @param  pszString      UTF-8 string to convert.
+ */
#define RTStrUtf8ToCurrentCP(ppszString, pszString)     RTStrUtf8ToCurrentCPTag((ppszString), (pszString), RTSTR_TAG)
+
+/**
+ * Allocates tmp buffer with custom tag, translates pszString from UTF8 to
+ * current codepage.
+ *
+ * @returns iprt status code.
+ * @param  ppszString      Receives pointer of allocated native CP string.
+ * The returned pointer must be freed using
+ * RTStrFree(), const char *pszTag
+ * @param  pszString      UTF-8 string to convert.
+ * @param  pszTag          Allocation tag used for statistics and such.
+ */
+RTR3DECL(int)  RTStrUtf8ToCurrentCPTag(char **ppszString, const char *pszString, const char *pszTag);
+
+/**
+ * Allocates tmp buffer, translates pszString from current codepage to UTF-8.
+ *
+ * @returns iprt status code.
+ * @param  ppszString      Receives pointer of allocated UTF-8 string.
+ * The returned pointer must be freed using RTStrFree().
+ * @param  pszString      Native string to convert.
+ */
+#define RTStrCurrentCPToUtf8(ppszString, pszString)     RTStrCurrentCPToUtf8Tag((ppszString), (pszString), RTSTR_TAG)
+
+/**
+ * Allocates tmp buffer, translates pszString from current codepage to UTF-8.
+ *
+ * @returns iprt status code.
+ * @param  ppszString      Receives pointer of allocated UTF-8 string.
+ * The returned pointer must be freed using RTStrFree().
+ * @param  pszString      Native string to convert.
+ * @param  pszTag          Allocation tag used for statistics and such.
+ */
+#define RTStrCurrentCPToUtf8Tag(char **ppszString, const char *pszString, const char *pszTag);
+
+endif /* IN_RING3 */
+
+/**
+ * Free string allocated by any of the non-UCS-2 string functions.
+ *
+ * @returns iprt status code.
+ * @param   pszString  Pointer to buffer with string to free.
+ *         NULL is accepted.
+ */
+RTDECL(void)  RTStrFree(char *pszString);
+
+/**
+ * Allocates a new copy of the given UTF-8 string (default tag).
+ *
+ * @returns Pointer to the allocated UTF-8 string.
+ */
+#define RTStrDup(pszString)             RTStrDupTag((pszString), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the given UTF-8 string (custom tag).
+ *
+ * @returns Pointer to the allocated UTF-8 string.
+ *
+ * @param   pszString       UTF-8 string to duplicate.
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(char *) RTStrDupTag(const char *pszString, const char *pszTag);
+
+/**
+ * Allocates a new copy of the given UTF-8 substring (default tag).
+ *
+ * @returns iprt status code.
+ * @param   ppszString      Receives pointer of the allocated UTF-8 string.
+ *                          The returned pointer must be freed using RTStrFree().
+ * @param   pszString       UTF-8 string to duplicate.
+ */
+#define RTStrDupEx(ppszString, pszString)   RTStrDupExTag((ppszString), (pszString), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the given UTF-8 substring (custom tag).
+ *
+ * @returns iprt status code.
+ *
+ * @param   ppszString      Receives pointer of the allocated UTF-8 string.
+ *                          The returned pointer must be freed using RTStrFree().
+ * @param   pszString       UTF-8 string to duplicate.
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int)  RTStrDupExTag(char **ppszString, const char *pszString, const char *pszTag);
+
+/**
+ * Allocates a new copy of the given UTF-8 substring (default tag).
+ *
+ * @returns Pointer to the allocated UTF-8 substring.
+ * @param   pszString       UTF-8 string to duplicate.
+ */
+ * @param cchMax The max number of chars to duplicate, not counting
+ * the terminator.
+ */
+#define RTStrDupN(pszString, cchMax) RTStrDupNTag((pszString), (cchMax), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the given UTF-8 substring (custom tag).
+ *
+ * @returns Pointer to the allocated UTF-8 substring.
+ *
+ * @param pszString UTF-8 string to duplicate.
+ * @param cchMax The max number of chars to duplicate, not counting
+ * the terminator.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(char *) RTStrDupNTag(const char *pszString, size_t cchMax, const char *pszTag);
+
+/**
+ * Appends a string onto an existing IPRT allocated string (default tag).
+ *
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param ppsz Pointer to the string pointer. The string
+ * pointer must either be NULL or point to a string
+ * returned by an IPRT string API. (In/Out)
+ * @param pszAppend The string to append. NULL and empty strings
+ * are quietly ignored.
+ */
+#define RTStrAAppend(ppsz, pszAppend) RTStrAAppendTag((ppsz), (pszAppend), RTSTR_TAG)
+
+/**
+ * Appends a string onto an existing IPRT allocated string (custom tag).
+ *
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param ppsz Pointer to the string pointer. The string
+ * pointer must either be NULL or point to a string
+ * returned by an IPRT string API. (In/Out)
+ * @param pszAppend The string to append. NULL and empty strings
+ * are quietly ignored.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrAAppendTag(char **ppsz, const char *pszAppend, const char *pszTag);
+ * Appends N bytes from a strings onto an existing IPRT allocated string
+ * (default tag).
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ * pointer must either be NULL or point to a string
+ * returned by an IPRT string API. (In/Out)
+ * @param   pszAppend           The string to append. Can be NULL if cchAppend
+ * is NULL.
+ * @param   cchAppend           The number of chars (not code points) to append
+ * from pszAppend. Must not be more than
+ * @a pszAppend contains, except for the special
+ * value RTSTR_MAX that can be used to indicate all
+ * of @a pszAppend without having to strlen it.
+ */
+#define RTStrAAppendN(ppsz, pszAppend, cchAppend)   RTStrAAppendNTag((ppsz), (pszAppend),
                                        (cchAppend), RTSTR_TAG)
+
+/*
+ * Appends N bytes from a strings onto an existing IPRT allocated string (custom
+ * tag).
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ * remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ * pointer must either be NULL or point to a string
+ * returned by an IPRT string API. (In/Out)
+ * @param   pszAppend           The string to append. Can be NULL if cchAppend
+ * is NULL.
+ * @param   cchAppend           The number of chars (not code points) to append
+ * from pszAppend. Must not be more than
+ * @a pszAppend contains, except for the special
+ * value RTSTR_MAX that can be used to indicate all
+ * of @a pszAppend without having to strlen it.
+ * @param   pszTag              Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrAAppendNTag(char **ppsz, const char *pszAppend, size_t cchAppend, const char *pszTag);
+
+/*
+ * Appends one or more strings onto an existing IPRT allocated string.
+ *
+ * This is a very flexible and efficient alternative to using RTStrAPprintf to
+ * combine several strings together.
+ * @retval VINF_SUCCESS  
+ * @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz  
+ * remains unchanged.
+ *
+ * @param ppsz Pointer to the string pointer. The string  
+ * pointer must either be NULL or point to a string  
+ * returned by an IPRT string API. (In/Out)
+ * @param cPairs The number of string / length pairs in the  
+ * @a va.
+ * @param va List of string (const char *) and length  
+ * (size_t) pairs. The strings will be appended to  
+ * the string in the first argument.
+ */
+
+ define RTStrAAppendExNV(ppsz, cPairs, va) RTStrAAppendExNVTag((ppsz), (cPairs), (va), RTSTR_TAG)
+ +/**
+ * Appends one or more strings onto an existing IPRT allocated string.
+ *
+ * This is a very flexible and efficient alternative to using RTStrAPrintf to  
+ * combine several strings together.
+ *
+ * @retval VINF_SUCCESS  
+ * @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz  
+ * remains unchanged.
+ *
+ * @param ppsz Pointer to the string pointer. The string  
+ * pointer must either be NULL or point to a string  
+ * returned by an IPRT string API. (In/Out)
+ * @param cPairs The number of string / length pairs in the  
+ * @a va.
+ * @param va List of string (const char *) and length  
+ * (size_t) pairs. The strings will be appended to  
+ * the string in the first argument.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrAAppendExNVTag(char **ppsz, size_t cPairs, va_list va, const char *pszTag);
+
+/**
+ * Appends one or more strings onto an existing IPRT allocated string  
+ * (untagged).
+ *
+ * This is a very flexible and efficient alternative to using RTStrAPrintf to  
+ * combine several strings together.
+ *
+ * @retval VINF_SUCCESS  
+ * @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz  
+ * remains unchanged.
+ * @param   ppsz                Pointer to the string pointer. The string
+ *                                 pointer must either be NULL or point to a string
+ *                                 returned by an IPRT string API. (In/Out)
+ * @param   cPairs              The number of string / length pairs in the
+ *                                 ellipsis.
+ * @param   ...                List of string (const char *) and length
+ *                                 (size_t) pairs. The strings will be appended to
+ *                                 the string in the first argument.
+ */
+DECLINLINE(int) RTStrAAppendExN(char **ppsz, size_t cPairs, ...)
+
+ int     rc;
+ va_list va;
+ va_start(va, cPairs);
+ rc = RTStrAAppendExNVTag(ppsz, cPairs, va, RTSTR_TAG);
+ va_end(va);
+ return rc;
+
+/**
+ * Appendes one or more strings onto an existing IPRT allocated string (custom
+ * tag).
+ *
+ * This is a very flexible and efficient alternative to using RTStrAPrintf to
+ * combine several strings together.
+ *
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ *       remains unchanged.
+ *
+ * @param   ppsz                Pointer to the string pointer. The string
+ *                                 pointer must either be NULL or point to a string
+ *                                 returned by an IPRT string API. (In/Out)
+ *
+ * @param   pszTag              Allocation tag used for statistics and such.
+ * @param   cPairs              The number of string / length pairs in the
+ *                                 ellipsis.
+ * @param   ...                List of string (const char *) and length
+ *                                 (size_t) pairs. The strings will be appended to
+ *                                 the string in the first argument.
+ */
+DECLINLINE(int) RTStrAAppendExNTag(char **ppsz, const char *pszTag, size_t cPairs, ...)
+
+ int     rc;
+ va_list va;
+ va_start(va, cPairs);
+ rc = RTStrAAppendExNVTag(ppsz, cPairs, va, pszTag);
+ va_end(va);
return rc;
}
+
+/**
+ * Truncates an IPRT allocated string (default tag).
+ *
+ * @retval VINF_SUCCESS.
+ * @retval VERR_OUT_OF_RANGE if cchNew is too long. Nothing is done.
+ *
+ * @param ppsz Pointer to the string pointer. The string
+ * can be NULL if @a cchNew is 0, no change
+ * is made then. If we actually reallocate the
+ * string, the string pointer might be changed by
+ * this call. (In/Out)
+ *
+ * @param cchNew The new string length (excluding the
+ * terminator). The string must be at least this
+ * long or we'll return VERR_OUT_OF_RANGE and
+ * assert on you.
+ */
+#define RTStrATruncate(ppsz, cchNew) RTStrATruncateTag((ppsz), (cchNew), RTSTR_TAG)
+
+/**
+ * Truncates an IPRT allocated string.
+ *
+ * @retval VINF_SUCCESS.
+ * @retval VERR_OUT_OF_RANGE if cchNew is too long. Nothing is done.
+ *
+ * @param ppsz Pointer to the string pointer. The string
+ * can be NULL if @a cchNew is 0, no change
+ * is made then. If we actually reallocate the
+ * string, the string pointer might be changed by
+ * this call. (In/Out)
+ *
+ * @param cchNew The new string length (excluding the
+ * terminator). The string must be at least this
+ * long or we'll return VERR_OUT_OF_RANGE and
+ * assert on you.
+ *
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrATruncateTag(char **ppsz, size_t cchNew, const char *pszTag);
+
+/**
+ * Allocates memory for string storage (default tag).
+ *
+ * You should normally not use this function, except if there is some very
+ * custom string handling you need doing that isn't covered by any of the other
+ * APIs.
+ *
+ * @returns Pointer to the allocated string. The first byte is always set
+ * to the string terminator char, the contents of the remainder of the
+ * memory is undefined. The string must be freed by calling RTStrFree.
+ *
+ * NULL is returned if the allocation failed. Please translate this to
+ * VERR_NO_STR_MEMORY and not VERR_NO_MEMORY. Also consider
+ * RTStrAllocEx if an IPRT status code is required.
+ *
+ * @param cb How many bytes to allocate. If this is zero, we
+ * will allocate a terminator byte anyway.
+ */
+#define RTStrAlloc(cb) RTStrAllocTag((cb), RTSTR_TAG)
+
+/**
+ * Allocates memory for string storage (custom tag).
+ *
+ * You should normally not use this function, except if there is some very
+ * custom string handling you need doing that isn't covered by any of the other
+ * APIs.
+ *
+ * @returns Pointer to the allocated string. The first byte is always set
+ * to the string terminator char, the contents of the remainder of the
+ * memory is undefined. The string must be freed by calling RTStrFree.
+ *
+ * NULL is returned if the allocation failed. Please translate this to
+ * VERR_NO_STR_MEMORY and not VERR_NO_MEMORY. Also consider
+ * RTStrAllocEx if an IPRT status code is required.
+ *
+ * @param cb How many bytes to allocate. If this is zero, we
+ * will allocate a terminator byte anyway.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(char *) RTStrAllocTag(size_t cb, const char *pszTag);
+
+/**
+ * Allocates memory for string storage, with status code (default tag).
+ *
+ * You should normally not use this function, except if there is some very
+ * custom string handling you need doing that isn't covered by any of the other
+ * APIs.
+ *
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_STR_MEMORY
 *
+ * @param ppsz Where to return the allocated string. This will
+ * be set to NULL on failure. On success, the
+ * returned memory will always start with a
+ * terminator char so that it is considered a valid
+ * C string, the contents of rest of the memory is
+ @param cb How many bytes to allocate. If this is zero, we
+ will allocate a terminator byte anyway.
+ */
)#define RTStrAllocEx(ppsz, cb) RTStrAllocExTag((ppsz), (cb), RTSTR_TAG)
+
+/**
+ Allocates memory for string storage, with status code (custom tag).
+ *
+ You should normally not use this function, except if there is some very
+ custom string handling you need doing that isn't covered by any of the other
+ APIs.
+ *
+ @retval VINF_SUCCESS
+ @retval VERR_NO_STR_MEMORY
+
+ @param ppsz Where to return the allocated string. This will
+ be set to NULL on failure. On success, the
+ returned memory will always start with a
+ terminator char so that it is considered a valid
+ C string, the contents of rest of the memory is
+ undefined.
+ @param cb How many bytes to allocate. If this is zero, we
+ will allocate a terminator byte anyway.
+ @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrAllocExTag(char **ppsz, size_t cb, const char *pszTag);
+
+/**
+ Reallocates the specified string (default tag).
+ *
+ You should normally not have use this function, except perhaps to truncate a
+ really long string you've got from some IPRT string API, but then you should
+ use RTStrATruncate.
+ *
+ @returns VINF_SUCCESS.
+ @retval VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz
+ remains unchanged.
+ *
+ @param ppsz Pointer to the string variable containing the
+ input and output string.
+ *
+ When not freeing the string, the result will
+ always have the last byte set to the terminator
+ character so that when used for string
+ truncation the result will be a valid C string
+ (your job to keep it a valid UTF-8 string).
When the input string is NULL and we're supposed to reallocate, the returned string will also have the first byte set to the terminator char so it will be a valid C string.

When @a cbNew is zero, we'll behave like RTStrFree and @a *ppsz will be set to NULL.

When not zero, this will be the new size of the memory backing the string, i.e. it includes the terminator char.

Reallocates the specified string (custom tag).

You should normally not have use this function, except perhaps to truncate a really long string you've got from some IPRT string API, but then you should use RTStrATruncate.

@returns VINF_SUCCESS.
@retval  VERR_NO_STR_MEMORY if we failed to reallocate the string, @a *ppsz remains unchanged.

Pointer to the string variable containing the input and output string.

When not freeing the string, the result will always have the last byte set to the terminator character so that when used for string truncation the result will be a valid C string (your job to keep it a valid UTF-8 string).

When the input string is NULL and we're supposed to reallocate, the returned string will also have the first byte set to the terminator char so it will be a valid C string.

When @a cbNew is zero, we'll behave like RTStrFree and @a *ppsz will be set to NULL.

When not zero, this will be the new size of the memory backing the string, i.e. it includes the terminator char.

Allocation tag used for statistics and such.

RTDECL(int) RTStrReallocTag(char **ppsz, size_t cbNew, const char *pszTag);
/**
 * Validates the UTF-8 encoding of the string.
 * @returns iprt status code.
 * @param psz The string.
 */
RTDECL(int) RTStrValidateEncoding(const char *psz);

/** @name Flags for RTStrValidateEncodingEx and RTUtf16ValidateEncodingEx
 * @@
 * @define RTSTR_VALIDATE_ENCODING_ZERO_TERMINATED RT_BIT_32(0)
 * Check that the string is zero terminated within the given size.
 * VERR_BUFFER_OVERFLOW will be returned if the check fails. */
#define RTSTR_VALIDATE_ENCODING_EXACT_LENGTH RT_BIT_32(1)

/**
 * Validates the UTF-8 encoding of the string.
 * @returns iprt status code.
 * @param psz The string.
 * @param cch The max string length (/ size). Use RTSTR_MAX to
 * process the entire string.
 * @param fFlags Combination of RTSTR_VALIDATE_ENCODING_XXX flags.
 */
RTDECL(int) RTStrValidateEncodingEx(const char *psz, size_t cch, uint32_t fFlags);

/** Checks if the UTF-8 encoding is valid.
 * @returns true / false.
 * @param psz The string.
 */
RTDECL(bool) RTStrIsValidEncoding(const char *psz);

/** Purge all bad UTF-8 encoding in the string, replacing it with '?'.
 * @returns The number of bad characters (0 if nothing was done).
 * @param psz The string to purge.
 */
RTDECL(size_t) RTStrPurgeEncoding(char *psz);
/**
 * Sanitizes a (valid) UTF-8 string by replacing all characters outside a white
 * list in-place by an ASCII replacement character.
 *
 * Multi-byte characters will be replaced byte by byte.
 *
 * @returns The number of code points replaced. In the case of an incorrectly
 * encoded string -1 will be returned, and the string is not completely
 * processed. In the case of puszValidPairs having an odd number of
 * code points, -1 will be also return but without any modification to
 * the string.
 *
 * @param   psz            The string to sanitise.
 * @param   puszValidPairs A zero-terminated array of pairs of Unicode points.
 *                         Each pair is the start and end point of a range,
 *                         and the union of these ranges forms the white list.
 * @param   chReplacement  The ASCII replacement character.
 */
RTDECL(ssize_t) RTStrPurgeComplementSet(char *psz, PCRTUNICP puszValidPairs, char chReplacement);

/**
 * Gets the number of code points the string is made up of, excluding
 * the terminator.
 *
 * @returns Number of code points (RTUNICP).
 * @returns 0 if the string was incorrectly encoded.
 * @param   psz         The string.
 */
RTDECL(size_t) RTStrUniLen(const char *psz);

/**
 * Gets the number of code points the string is made up of, excluding
 * the terminator.
 * This function will validate the string, and incorrectly encoded UTF-8
 * strings will be rejected.
 *
 * @returns iprt status code.
 * @param   psz         The string.
 * @param   cch         The max string length. Use RTSTR_MAX to process the entire string.
 * @param   pcuc        Where to store the code point count.
 *                      This is undefined on failure.
 */
RTDECL(int) RTStrUniLenEx(const char *psz, size_t cch, size_t *pcuc);

/**
 * Translate a UTF-8 string into an unicode string (i.e. RTUNICPs), allocating the string buffer.
+ * @returns iprt status code.
+ * @param pszString UTF-8 string to convert.
+ * @param ppUniString Receives pointer to the allocated unicode string.
+ * The returned string must be freed using RTUniFree().
+ */
+RTDECL(int) RTStrToUni(const char *pszString, PRTUNICP *ppUniString);
+
+/**
+ * Translates pszString from UTF-8 to an array of code points, allocating the result
+ * array if requested.
+ *
+ * @returns iprt status code.
+ * @param pszString UTF-8 string to convert.
+ * @param cchString The maximum size in chars (the type) to convert. The conversion stop
+ * when it reaches cchString or the string terminator (\0').
+ * Use RTSTR_MAX to translate the entire string.
+ * @param ppaCps If cCps is non-zero, this must either be pointing to pointer to
+ * a buffer of the specified size, or pointer to a NULL pointer.
+ * If *ppusz is NULL or cCps is zero a buffer of at least cCps items
+ * will be allocated to hold the translated string.
+ * If a buffer was requested it must be freed using RTUtf16Free().
+ * @param cCps The number of code points in the unicode string. This includes the terminator.
+ * @param pcCps Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ */
+RTDECL(int)  RTStrToUniEx(const char *pszString, size_t cchString, PRTUNICP *ppaCps, size_t cCps, size_t *pcCps);
+
+/**
+ * Calculates the length of the string in RTUTF16 items.
+ *
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings will be rejected. The primary purpose of this function is to
+ * help allocate buffers for RTStrToUtf16Ex of the correct size. For most
+ * other purposes RTStrCalcUtf16LenEx() should be used.
+ *
+ * @returns Number of RTUTF16 items.
+ * @returns 0 if the string was incorrectly encoded.
+ * @param psz The string.
+ */
+RTDECL(size_t) RTStrCalcUtf16Len(const char *psz);
/**
 * Calculates the length of the string in RTUTF16 items.
 *
 * This function will validate the string, and incorrectly encoded UTF-8
 * strings will be rejected.
 *
 * @returns iprt status code.
 * @param   psz         The string.
 * @param   cch         The max string length. Use RTSTR_MAX to process the entire string.
 * @param   pcwc        Where to store the string length. Optional.
 *                      This is undefined on failure.
 */
RTDECL(int) RTStrCalcUtf16LenEx(const char *psz, size_t cch, size_t *pcwc);

/**
 * Translate a UTF-8 string into a UTF-16 allocating the result buffer (default
 * tag).
 *
 * @returns iprt status code.
 * @param   pszString       UTF-8 string to convert.
 * @param   ppwszString     Receives pointer to the allocated UTF-16 string.
 *                          The returned string must be freed using RTUtf16Free().
 */
#define RTStrToUtf16(pszString, ppwszString)    RTStrToUtf16Tag((pszString), (ppwszString), RTSTR_TAG)

/**
 * Translate a UTF-8 string into a UTF-16 allocating the result buffer (custom
 * tag).
 *
 * This differs from RTStrToUtf16 in that it always produces a
 * big-endian string.
 *
 * @returns iprt status code.
 * @param   pszString       UTF-8 string to convert.
 * @param   ppwszString     Receives pointer to the allocated UTF-16 string.
 *                         The returned string must be freed using RTUtf16Free().
 * @param   pszTag          Allocation tag used for statistics and such.
 */
RTDECL(int) RTStrToUtf16Tag(const char *pszString, PRTUTF16 *ppwszString, const char *pszTag);

/**
 * Translate a UTF-8 string into a UTF-16BE allocating the result buffer
 * (default tag).
 *
 * This differs from RTStrToUtf16Tag in that it always produces a
 * big-endian string.
 *
 * @returns iprt status code.
 * @param   pszString       UTF-8 string to convert.
 * @param   ppwszString     Receives pointer to the allocated UTF-16 string.
 *                         The returned string must be freed using RTUtf16Free().
 * @param   pszTag          Allocation tag used for statistics and such.
 */
+RTDECL(int) RTStrToUtf16Tag(const char *pszString, PRTUTF16 *ppwszString, const char *pszTag);
/**
 * Translate a UTF-8 string into a UTF-16BE allocating the result buffer (custom
 * tag).
 *
 * @returns iprt status code.
 * @param   pszString       UTF-8 string to convert.
 * @param   ppwszString     Receives pointer to the allocated UTF-16BE string.
 *                          The returned string must be freed using RTUtf16Free().
 * @param   pszTag          Allocation tag used for statistics and such.
 */
#define RTStrToUtf16BigTag(pszString, ppwszString, pszTag)

/**
 * Translates pszString from UTF-8 to UTF-16, allocating the result buffer if requested.
 *
 * @returns iprt status code.
 * @param   pszString       UTF-8 string to convert.
 * @param   cchString       The maximum size in chars (the type) to convert. The conversion stop
 *                          when it reaches cchString or the string terminator ('\0').
 * @param   ppwsz           If cwc is non-zero, this must either be pointing to pointer to
 *                          a buffer of the specified size, or pointer to a NULL pointer.
 *                          If *ppwsz is NULL or cwc is zero a buffer of at least cwc items
 *                          will be allocated to hold the translated string.
 *                          If a buffer was requested it must be freed using RTUtf16Free().
 * @param   cwc             The buffer size in RTUTF16s. This includes the terminator.
 * @param   pcwc            Where to store the length of the translated string,
 *                          excluding the terminator. (Optional)
 *                          This may be set under some error conditions,
 *                          however, only for VERR_BUFFER_OVERFLOW and
 *                          VERR_NO_STR_MEMORY will it contain a valid string
 *                          length that can be used to resize the buffer.
 */
#define RTStrToUtf16ExTag(pszString, cchString, ppwsz, cwc, pcwc)
+ * @returns iprt status code.
+ * @param pszString  UTF-8 string to convert.
+ * @param cchString  The maximum size in chars (the type) to convert. The conversion stop
+ *          when it reaches cchString or the string terminator ('\0').
+ *          Use RTSTR_MAX to translate the entire string.
+ * @param ppwsz      If cwc is non-zero, this must either be pointing to pointer to
+ *          a buffer of the specified size, or pointer to a NULL pointer.
+ *          If *ppwsz is NULL or cwc is zero a buffer of at least cwc items
+ *          will be allocated to hold the translated string.
+ *          If a buffer was requested it must be freed using RTUtf16Free().
+ * @param cwc        The buffer size in RTUTF16s. This includes the terminator.
+ * @param pcwc       Where to store the length of the translated string,
+ *          excluding the terminator. (Optional)
+ *          This may be set under some error conditions,
+ *          however, only for VERR_BUFFER_OVERFLOW and
+ *          VERR_NO_STR_MEMORY will it contain a valid string
+ *          length that can be used to resize the buffer.
+ * @param pszTag     Allocation tag used for statistics and such.
+ */

**RTDECL(int) RTStrToUtf16ExTag(const char *pszString, size_t cchString,
+                  PRTUTF16 *ppwsz, size_t cwc, size_t *pcwc, const char *pszTag);**

+ /*
+ * Translates pszString from UTF-8 to UTF-16BE, allocating the result buffer if requested.
+ * This differs from RTStrToUtf16Ex in that it always produces a
+ * big-endian string.
+ * @returns iprt status code.
+ * @param pszString  UTF-8 string to convert.
+ * @param cchString  The maximum size in chars (the type) to convert. The conversion stop
+ *          when it reaches cchString or the string terminator ('\0').
+ *          Use RTSTR_MAX to translate the entire string.
+ * @param ppwsz      If cwc is non-zero, this must either be pointing to pointer to
+ *          a buffer of the specified size, or pointer to a NULL pointer.
+ *          If *ppwsz is NULL or cwc is zero a buffer of at least cwc items
+ *          will be allocated to hold the translated string.
+ *          If a buffer was requested it must be freed using RTUtf16Free().
+ * @param cwc        The buffer size in RTUTF16s. This includes the terminator.
+ * @param pcwc       Where to store the length of the translated string,
+ *          excluding the terminator. (Optional)
+ *          This may be set under some error conditions,
+ *          however, only for VERR_BUFFER_OVERFLOW and
+ *          VERR_NO_STR_MEMORY will it contain a valid string
+ *          length that can be used to resize the buffer.
#define RTStrToUtf16BigExTag(pszString, cchString, ppwsz, cwc, pcwc, pszTag) \
    RTStrToUtf16BigExTag((pszString), (cchString), (ppwsz), (cwc), (pcwc), RTSTR_TAG)

/**
 * This differs from RTStrToUtf16ExTag in that it always produces a
 * big-endian string.
 */
+ * @returns iprt status code.
+ * @param   pszString       UTF-8 string to convert.
+ * @param   cchString       The maximum size in chars (the type) to convert. The conversion stop
+ *                          when it reaches cchString or the string terminator ('\0').
+ *                          Use RTSTR_MAX to translate the entire string.
+ * @param   ppwsz           If cwc is non-zero, this must either be pointing to pointer to
+ *                          a buffer of the specified size, or pointer to a NULL pointer.
+ *                          If *ppwsz is NULL or cwc is zero a buffer of at least cwc items
+ *                          will be allocated to hold the translated string.
+ *                          If a buffer was requested it must be freed using RTUtf16Free().
+ * @param   cwc             The buffer size in RTUTF16s. This includes the terminator.
+ * @param   pcwc            Where to store the length of the translated string,
+ *                          excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int)  RTStrToUtf16BigExTag(const char *pszString, size_t cchString,
+                                  PRTUTF16 *ppwsz, size_t cwc, size_t *pcwc, const char *pszTag);

/**
 * Calculates the length of the string in Latin-1 characters.
 */
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings as well as string with codepoints outside the latin-1 range will be
+ * rejected. The primary purpose of this function is to help allocate buffers
+ * for RTStrToLatin1Ex of the correct size. For most other purposes
+ * RTStrCalcLatin1LenEx() should be used.
+ * @returns Number of Latin-1 characters.
+ * @returns 0 if the string was incorrectly encoded.
+ * @param   psz       The string.
+ */
+RTDECL(size_t) RTStrCalcLatin1Len(const char *psz);
+
+/**
+ * Calculates the length of the string in Latin-1 characters.
+ *
+ * This function will validate the string, and incorrectly encoded UTF-8
+ * strings as well as string with codepoints outside the latin-1 range will be
+ * rejected.
+ *
+ * @returns iprt status code.
+ *
+ * @param   psz         The string.
+ * @param   cch         The max string length. Use RTSTR_MAX to process the
+ *                      entire string.
+ * @param   pcch        Where to store the string length. Optional.
+ *                      This is undefined on failure.
+ */
+RTDECL(int) RTStrCalcLatin1LenEx(const char *psz, size_t cch, size_t *pcch);
+
+/**
+ * Translate a UTF-8 string into a Latin-1 allocating the result buffer (default
+ * tag).
+ *
+ * @returns iprt status code.
+ *
+ * @param   pszString       UTF-8 string to convert.
+ * @param   ppszString      Receives pointer to the allocated Latin-1 string.
+ *                          The returned string must be freed using RTStrFree().
+ */
+#define RTStrToLatin1(pszString, ppszString)    RTStrToLatin1Tag((pszString), (ppszString), RTSTR_TAG)
+
+/**
+ * Translate a UTF-8 string into a Latin-1 allocating the result buffer (custom
+ * tag).
+ *
+ * @returns iprt status code.
+ *
+ * @param   pszString       UTF-8 string to convert.
+ * @param   ppszString      Receives pointer to the allocated Latin-1 string.
+ *                          The returned string must be freed using RTStrFree().
+ *
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrToLatin1Tag(const char *pszString, char **ppszString, const char *pszTag);
+
+/**
+ * Translates pszString from UTF-8 to Latin-1, allocating the result buffer if requested.
+ *
+ * @returns iprt status code.
+ *
+ * @param   pszString       UTF-8 string to convert.
+ * @param   chString        The maximum size in chars (the type) to convert.
+ *                          The conversion stop when it reaches chString or
the string terminator (\0'). Use RTSTR_MAX to translate the entire string.

+ * @param ppsz If cch is non-zero, this must either be pointing to
+ * pointer to a buffer of the specified size, or
+ * pointer to a NULL pointer. If *ppsz is NULL or cch
+ * is zero a buffer of at least cch items will be
+ * allocated to hold the translated string. If a
+ * buffer was requested it must be freed using
+ * RTStrFree().
+ * @param cch The buffer size in bytes. This includes the
+ * terminator.
+ * @param pcch Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ */

#define RTStrToLatin1Ex(pszString, cchString, ppsz, cch, pcch) \
    RTStrToLatin1ExTag((pszString), (cchString), (ppsz), (cch), (pcch), RTSTR_TAG) \
+
+/**
+ * Translates pszString from UTF-8 to Latin1, allocating the result buffer if
+ * requested (custom tag).
+ *
+ * @returns iprt status code.
+ * @param pszString UTF-8 string to convert.
+ * @param cchString The maximum size in chars (the type) to convert.
+ * The conversion stop when it reaches cchString or
+ * the string terminator (\0'). Use RTSTR_MAX to
+ * translate the entire string.
+ * @param ppsz If cch is non-zero, this must either be pointing to
+ * pointer to a buffer of the specified size, or
+ * pointer to a NULL pointer. If *ppsz is NULL or cch
+ * is zero a buffer of at least cch items will be
+ * allocated to hold the translated string. If a
+ * buffer was requested it must be freed using
+ * RTStrFree().
+ * @param cch The buffer size in bytes. This includes the
+ * terminator.
+ * @param pcch Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTStrToLatin1ExTag(const char *pszString, size_t cchString, char **ppsz, size_t cch, size_t *pcch, const char *pszTag);
+
+/**
+ * Get the unicode code point at the given string position.
+ *
+ * @returns unicode code point.
+ * @returns RTUNICP_INVALID if the encoding is invalid.
+ */
+RTDECL(RTUNICP) RTStrGetCpInternal(const char *psz);
+
+/**
+ * Get the unicode code point at the given string position.
+ *
+ * @returns iprt status code
+ * @returns VERR_INVALID_UTF8_ENCODING if the encoding is invalid.
+ * @param ppsz The string cursor.
+ * This is advanced one character forward on failure.
+ * @param pCp Where to store the unicode code point.
+ * Stores RTUNICP_INVALID if the encoding is invalid.
+ */
+RTDECL(int) RTStrGetCpExInternal(const char **ppsz, PRTUNICP pCp);
+
+/**
+ * Get the unicode code point at the given string position for a string of a
+ * given length.
+ *
+ * @returns iprt status code
+ * @retval VERR_INVALID_UTF8_ENCODING if the encoding is invalid.
+ * @retval VERR_END_OF_STRING if *pcch is 0. *pCp is set to RTUNICP_INVALID.
+ * @param ppsz The string.
+ * @param pcch Pointer to the length of the string. This will be
decremented by the size of the code point.
+ * @param pCp Where to store the unicode code point.
+ * Stores RTUNICP_INVALID if the encoding is invalid.
+ */
+RTDECL(int) RTStrGetCpNExInternal(const char **ppsz, size_t *pcch, PRTUNICP pCp);
+
+/**
+ * Put the unicode code point at the given string position
+ * and return the pointer to the char following it.
+ *
+ * This function will not consider anything at or following the
+ * buffer area pointed to by psz. It is therefore not suitable for
+ * inserting code points into a string, only appending/overwriting.
+ *
+ * @returns pointer to the char following the written code point.
+ * @param psz     The string.
+ * @param CodePoint The code point to write.
+ *
+ * This should not be RTUNICP_INVALID or any other
+ * character out of the UTF-8 range.
+ *
+ * @remark This is a worker function for RTStrPutCp().
+ *
+ */
+RTDECL(char *) RTStrPutCpInternal(char *psz, RTUNICP CodePoint);
+
+**
+ * Get the unicode code point at the given string position.
+ *
+ * @returns unicode code point.
+ * @returns RTUNICP_INVALID if the encoding is invalid.
+ * @param psz     The string.
+ *
+ * @remark We optimize this operation by using an inline function for
+ * the most frequent and simplest sequence, the rest is
+ * handled by RTStrGetCpInternal().
+ *
+ */
+DECLINLINE(RTUNICP) RTStrGetCp(const char *psz)
+{
+    const unsigned char uch = *(const unsigned char *)psz;
+    if (!(uch & RT_BIT(7))
+        return uch;
+    return RTStrGetCpInternal(psz);
+}
+
+**
+ * Get the unicode code point at the given string position.
+ *
+ * @returns iprt status code.
+ * @param ppsz    Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point.
+ * @param pCp     Where to store the code point.
+ *
+ * RTUNICP_INVALID is stored here on failure.
+ *
+ * @remark We optimize this operation by using an inline function for
+ * the most frequent and simplest sequence, the rest is
+ * handled by RTStrGetCpExInternal().
+ *
+ */
+DECLINLINE(int) RTStrGetCpEx(const char **ppsz, PRTUNICP pCp)
+{
const unsigned char uch = **(const unsigned char **)ppsz;
if (!(uch & RT_BIT(7)))
{
    (*ppsz)++;
    *pCp = uch;
    return VINF_SUCCESS;
}
return RTStrGetCpExInternal(ppsz, pCp);
}

/**
 * Get the unicode code point at the given string position for a string of a
 * given maximum length.
 *
 * @returns iprt status code.
 * @retval  VERR_INVALID_UTF8.Encoding if the encoding is invalid.
 * @retval  VERR_END_OF_STRING if *pcch is 0. *pCp is set to RTUNICP_INVALID.
 *
 * @param   ppsz        Pointer to the string pointer. This will be updated to
 *                      point to the char following the current code point.
 * @param   pcch        Pointer to the maximum string length. This will be
decremented by the size of the code point found.
 * @param   pCp         Where to store the code point.
 *                      RTUNICP_INVALID is stored here on failure.
 *
 * @remark  We optimize this operation by using an inline function for
 *          the most frequent and simplest sequence, the rest is
 *          handled by RTStrGetCpExInternal().
 */
DECLINLINE(int) RTStrGetCpNEx(const char **ppsz, size_t *pcch, PRTUNICP pCp)
{
    if (RT_LIKELY(*pcch != 0))
    {
        const unsigned char uch = **(const unsigned char **)ppsz;
        if (!(uch & RT_BIT(7)))
        {
            (*ppsz)++;
            (*pcch)--;
            *pCp = uch;
            return VINF_SUCCESS;
        }
    }
    return RTStrGetCpNExInternal(ppsz, pcch, pCp);
}

/**
 * Get the UTF-8 size in characters of a given Unicode code point.
 */
The code point is expected to be a valid Unicode one, but not necessarily in
the range supported by UTF-8.

@returns The number of chars (bytes) required to encode the code point, or
zero if there is no UTF-8 encoding.

@param CodePoint The unicode code point.

DECLINLINE(size_t) RTStrCpSize(RTUNICP CodePoint)
{
    if (CodePoint < 0x00000080)
        return 1;
    if (CodePoint < 0x00000800)
        return 2;
    if (CodePoint < 0x00010000)
        return 3;
    ifdef RT_USE_RTC_3629
    if (CodePoint < 0x00011000)
        return 4;
    ifdef RT_USE_RTC_3629
    else
    if (CodePoint < 0x00020000)
        return 4;
    else
    if (CodePoint < 0x04000000)
        return 5;
    else
    if (CodePoint < 0x7fffffff)
        return 6;
    endif
    return 0;
}

DECLINLINE(char *) RTStrPutCp(char *psz, RTUNICP CodePoint)
{
    if (CodePoint < 0x00000080)
        return 1;
    if (CodePoint < 0x00000800)
        return 2;
    if (CodePoint < 0x00010000)
        return 3;
    ifdef RT_USE_RTC_3629
    if (CodePoint < 0x00011000)
        return 4;
    endif
    if (CodePoint < 0x00020000)
        return 4;
    else
    if (CodePoint < 0x04000000)
        return 5;
    else
    if (CodePoint < 0x7fffffff)
        return 6;
    endif
    return 0;

    /*
    Put the unicode code point at the given string position
    and return the pointer to the char following it.
    *
    * This function will not consider anything at or following the
    * buffer area pointed to by psz. It is therefore not suitable for
    * inserting code points into a string, only appending/overwriting.
    * *
    * @returns pointer to the char following the written code point.
    * @param psz The string.
    * @param CodePoint The code point to write.
    * This should not be RTUNICP_INVALID or any other
    * character out of the UTF-8 range.
    *
    * @remark We optimize this operation by using an inline function for
    * the most frequent and simplest sequence, the rest is
    * handled by RTStrPutCpInternal().
    */

DECLINLINE(char *) RTStrPutCp(char *psz, RTUNICP CodePoint)
if (CodePoint < 0x80)
{
    *psz++ = (unsigned char)CodePoint;
    return psz;
}
return RTStrPutCpInternal(psz, CodePoint);
}

/**
 * Skips ahead, past the current code point.
 * @returns Pointer to the char after the current code point.
 * @param   psz     Pointer to the current code point.
 * @remark  This will not move the next valid code point, only past the current one.
 */
DECLINLINE(char *) RTStrNextCp(const char *psz)
{
    RTUNICP Cp;
    RTStrGetCpEx(&psz, &Cp);
    return (char *)psz;
}

/**
 * Skips back to the previous code point.
 * @returns Pointer to the char before the current code point.
 * @returns pszStart on failure.
 * @param   pszStart    Pointer to the start of the string.
 * @param   psz         Pointer to the current code point.
 */
RTDECL(char *) RTStrPrevCp(const char *pszStart, const char *psz);

/* @page pg_rt_str_format  The IPRT Format Strings */
/*
 * IPRT implements most of the commonly used format types and flags with the
 * exception of floating point which is completely missing. In addition IPRT
 * provides a number of IPRT specific format types for the IPRT typedefs and
 * other useful things. Note that several of these extensions are similar to
 * \%p and doesn't care much if you try add formating flags/width/precision.
 */
/*
 * Group 0a, The commonly used format types:
 * - \%s - Takes a pointer to a zero terminated string (UTF-8) and
 *      prints it with the optionally adjustment (width, -) and
 *      length restriction (precision).
 * - \%ls - Same as \%s except that the input is UTF-16 (output UTF-8).
 */
+ * - \%ls - Same as \%s except that the input is UCS-32 (output UTF-8).
+ * - \%s - Same as \%s, used to convert to current codeset but this is
+ * now done by the streams code. Deprecated, use \%s.
+ * - \%IS - Ditto. Deprecated, use \%ls.
+ * - \%LS - Ditto. Deprecated, use \%LS.
+ * - \%c - Takes a char and prints it.
+ * - \%d - Takes a signed integer and prints it as decimal. Thousand
+ * separator (\'), zero padding (0), adjustment (+-), width,
+ * precision
+ * - \%i - Same as \%d.
+ * - \%u - Takes an unsigned integer and prints it as decimal. Thousand
+ * separator (\'), zero padding (0), adjustment (+-), width,
+ * precision
+ * - \%x - Takes an unsigned integer and prints it as lowercased
+ * hexadecimal. The special hash (#) flag causes a '0x'  
+ * prefixed to be printed. Zero padding (0), adjustment (+-),
+ * width, precision.
+ * - \%X - Same as \%x except that it is uppercased.
+ * - \%o - Takes an unsigned (?) integer and prints it as octal. Zero
+ * padding (0), adjustment (+-), width, precision.
+ * - \%p - Takes a pointer (void technically) and prints it. Zero
+ * padding (0), adjustment (+-), width, precision.
+ * - \%ll - Takes a long long (uint64_t).
+ * - \%L - Takes a long long (uint64_t).
+ * - \%l - Takes a long (uint32_t, uint64_t)
+ * - \%h - Takes a short (int16_t).
+ * - \%hh - Takes a char (int8_t).
+ * - \%H - Takes a char (int8_t).
+ * - \%z - Takes a size_t.
+ * - \%j - Takes a intmax_t (int64_t).
+ * - \%t - Takes a ptrdiff_t.
+ * The \%d, \%i, \%u, \%x, \%X and \%o format types support the following
+ * argument type specifiers:
+ * - \%ll - Takes a long long (uint64_t).
+ * - \%L - Takes a long long (uint64_t).
+ * - \%l - Takes a long (uint32_t, uint64_t)
+ * - \%h - Takes a short (int16_t).
+ * - \%hh - Takes a char (int8_t).
+ * - \%H - Takes a char (int8_t).
+ * - \%z - Takes a size_t.
+ * - \%j - Takes a intmax_t (int64_t).
+ * - \%t - Takes a ptrdiff_t.
+ * The type in parentheses is typical sizes, however when printing those types
+ * you are better off using the special group 2 format types below (\%RX32 and
+ * such).
+ * Group 0b, IPRT format tricks:
+ * - \%M - Replaces the format string, takes a string pointer.
+ * - \%N - Nested formatting, takes a pointer to a format string
+ * followed by the pointer to a va_list variable. The va_list
+ * variable will not be modified and the caller must do va_end()
+ * on it. Make sure the va_list variable is NOT in a parameter
+ * list or some gcc versions/targets may get it all wrong.
+ Group 1, the basic runtime typedefs (excluding those which obviously are + pointer):
+  - %RTbool - Takes a bool value and prints 'true', 'false', or '!%d!'.
+  - %RTfile - Takes a #RTFILE value.
+  - %RTmode - Takes a #RTMODE value.
+  - %RToff - Takes a #RTOFF value.
+  - %RTf16 - Takes a #RTFAR16 value.
+  - %RTf32 - Takes a #RTFAR32 value.
+  - %RTf64 - Takes a #RTFAR64 value.
+  - %RTgid - Takes a #RTGID value.
+  - %RTino - Takes a #RTINODE value.
+  - %RTint - Takes a #RTINT value.
+  - %RTiop - Takes a #RTIOPORT value.
+  - %RTlrm - Takes a #RTLDRMOD value.
+  - %RTmac - Takes a #RCRTMAC pointer.
+  - %RTnaddr - Takes a #PCRTNETADDR value.
+  - %RTnaipv4 - Takes a #RTNETADDRTPV4 value.
+  - %RTnaipv6 - Takes a #PCRTNETADDRTPV6 value.
+  - %RTnthrd - Takes a #RTNATIVETHREAD value.
+  - %RTproc - Takes a #RTPROCESS value.
+  - %RTptr - Takes a #RTINTPTR or #RTUINTPTR value (but not void *).
+  - %RTreg - Takes a #RTCCUINTREG value.
+  - %RTsel - Takes a #RTSEL value.
+  - %RTsem - Takes a #RTSEMEVENT value.
#RTSEMEVENTMULTI, #RTSEMMUTEX, #RTSEMFASTMUTEX, or #RTSEMRW value.
+  - %RTsock - Takes a #RTSOCKET value.
+  - %RTthrd - Takes a #RTTHREAD value.
+  - %RTuid - Takes a #RTUID value.
+  - %RTuint - Takes a #RTUINT value.
+  - %RTunicp - Takes a #RTUNICP value.
+  - %RTutf16 - Takes a #RTUTF16 value.
+  - %RTuuid - Takes a #PCRTUUID and will print the UUID as a string.
+  - %RTxuint - Takes a #RTUINT or #RTINT value, formatting it as hex.
+  - %RGi - Takes a #RTGCINT value.
+  - %RGp - Takes a #RTGCPHYS value.
+  - %GR - Takes a #RTGCUINTREG value.
+  - %RGu - Takes a #RTGCUINT value.
+  - %RGv - Takes a #RTGCPTPR, #RTGCINTPTR or #RTGCUINTPTR value.
+  - %RGx - Takes a #RTGCUINT or #RTGCINT value, formatting it as hex.
+  - %RH - Takes a #RTHCINT value.
+  - %RHp - Takes a #RTHCPHY value.
+  - %RHR - Takes a #RTHCINTREG value.
+  - %RHu - Takes a #RTHCUINT value.
+  - %RHv - Takes a #RTHCPTPR, #RTHCINTPTR or #RTHCUINTPTR value.
+  - %RHx - Takes a #RTHCINT or #RTHCINT value, formatting it as hex.
+  - %RR - Takes a #RTRCPTPR, #RTRCINTPTR or #RTRCUINTPTR value.
+  - %RCi - Takes a #RTINT value.
+ * - \%RCp    - Takes a \#RTCCPHYS value.
+ * - \%RCr    - Takes a \#RTCCUINTREG value.
+ * - \%RCu    - Takes a \#RTUINT value.
+ * - \%RCv    - Takes a \#uintptr_t, \#intptr_t, void * value.
+ * - \%RCx    - Takes a \#RTUINT or \#RTINT value, formatting it as hex.
+ *
+ *
+ * Group 2, the generic integer types which are preferred over relying on what
+ * bit-count a 'long', 'short', or 'long long' has on a platform. This are
+ * highly preferred for the \[u\]intXX_t kind of types:
+ * - \%RI[8|16|32|64]  - Signed integer value of the specified bit count.
+ * - \%RU[8|16|32|64]  - Unsigned integer value of the specified bit count.
+ * - \%RX[8|16|32|64]  - Hexadecimal integer value of the specified bit count.
+ *
+ *
+ * Group 3, hex dumpers and other complex stuff which requires more than simple
+ * formatting:
+ * - \%Rhxd    - Takes a pointer to the memory which is to be dumped in typical
+ *               hex format. Use the precision to specify the length, and the width to
+ *               set the number of bytes per line. Default width and precision is 16.
+ * - \%RxD     - Same as \%Rhxd, except that it skips duplicate lines.
+ * - \%Rhxs    - Takes a pointer to the memory to be displayed as a hex string,
+ *               i.e. a series of space separated bytes formatted as two digit hex value.
+ *               Use the precision to specify the length. Default length is 16 bytes.
+ *               The width, if specified, is ignored.
+ * - \%Rrc     - Takes an integer iprt status code as argument. Will insert the
+ *               status code define corresponding to the iprt status code.
+ * - \%Rrs     - Takes an integer iprt status code as argument. Will insert the
+ *               short description of the specified status code.
+ * - \%Rrf     - Takes an integer iprt status code as argument. Will insert the
+ *               full description of the specified status code.
+ * - \%Rra     - Takes an integer iprt status code as argument. Will insert the
+ *               status code define + full description.
+ * - \%Rwc     - Takes a long Windows error code as argument. Will insert the status
+ *               code define corresponding to the Windows error code.
+ * - \%Rwf     - Takes a long Windows error code as argument. Will insert the
+ *               full description of the specified status code.
+ * - \%Rwa     - Takes a long Windows error code as argument. Will insert the
+ *               error code define + full description.
+ * - \%Rhc     - Takes a COM/XPCOM status code as argument. Will insert the status
+ *               code define corresponding to the Windows error code.
+ * - \%Rhf     - Takes a COM/XPCOM status code as argument. Will insert the
+ *               full description of the specified status code.
+ * - \%Rhra    - Takes a COM/XPCOM error code as argument. Will insert the
+ *               error code define + full description.
+ *
+ * - \%Rfn     - Pretty printing of a function or method. It drops the
return code and parameter list.
- %Rbn - Prints the base name. For dropping the path in order to save space when printing a path name.
- %lRbs - Same as %ls except inlut is big endian UTF-16.
+ * On other platforms, %Rw? simply prints the argument in a form of 0xXXXXXXXX.
+ *
+ * Group 4, structure dumpers:
+ * - %RDtimespec - Takes a PCRTTIMESPEC.
+ *
+ *
+ * Group 5, XML / HTML escapers:
+ * - %RMas - Takes a string pointer (const char *) and outputs it as an attribute value with the proper escaping.
+ * This typically ends up in double quotes.
+ *
+ * - %RMes - Takes a string pointer (const char *) and outputs it as an element with the necessary escaping.
+ *
+ *
+ * Group 6, CPU Architecture Register dumpers:
+ * - %RAx86[reg] - Takes a 64-bit register value if the register is 64-bit or smaller. Check the code wrt which registers are implemented.
+ *
+ */
+
+ ifndef DECLARED_FNRTSTROUTPUT /* duplicated in iprt/log.h */
+ define DECLARED_FNRTSTROUTPUT
+/**
+ * Output callback.
+ *
+ * @returns number of bytes written.
+ * @param pvArg User argument.
+ * @param pachChars Pointer to an array of utf-8 characters.
+ * @param cbChars Number of bytes in the character array pointed to by pachChars.
+ */
typedef DECLDCALLBACK(size_t) FNRTSTROUTPUT(void *pvArg, const char *pachChars, size_t cbChars);
+/**
+ * Pointer to callback function.
+ */
typedef FNRTSTROUTPUT *PFNRTSTROUTPUT;
+endif
+
+ /** @name Format flag.
+ * These are used by RTStrFormat extensions and RTStrFormatNumber, mind that not all flags makes sense to both of the functions.
+ */
+ define RTSTR_F_CAPACITY 0x0001
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```c
#define RTSTR_F_LEFT            0x0002
#define RTSTR_F_ZEROPAD         0x0004
#define RTSTR_F_SPECIAL         0x0008
#define RTSTR_F_VALSIGNED       0x0010
#define RTSTR_F_PLUS            0x0020
#define RTSTR_F_BLANK           0x0040
#define RTSTR_F_WIDTH           0x0080
#define RTSTR_F_PRECISION       0x0100
#define RTSTR_F_THOUSAND_SEP    0x0200
#define RTSTR_F_OBFUSCATE_PTR   0x0400
+
#define RTSTR_F_BIT_MASK        0xf800
#define RTSTR_F_8BIT            0x0800
#define RTSTR_F_16BIT           0x1000
#define RTSTR_F_32BIT           0x2000
#define RTSTR_F_64BIT           0x4000
#define RTSTR_F_128BIT          0x8000
+/** @} */ +
+
+/** @def RTSTR_GET_BIT_FLAG
+ * Gets the bit flag for the specified type.
+ */ +
+/** RTSTR_GET_BIT_FLAG(type) \
+ ( sizeof(type) * 8 == 32  ? RTSTR_F_32BIT \
+ : sizeof(type) * 8 == 64  ? RTSTR_F_64BIT \
+ : sizeof(type) * 8 == 16  ? RTSTR_F_16BIT \
+ : sizeof(type) * 8 == 8   ? RTSTR_F_8BIT \
+ : sizeof(type) * 8 == 128 ? RTSTR_F_128BIT \
+ : 0) +
+
+/**
+ * Callback to format non-standard format specifiers.
+ *
+ * @returns The number of bytes formatted.
+ * @param pvArg Formatter argument.
+ * @param pfnOutput Pointer to output function.
+ * @param pvArgOutput Argument for the output function.
+ * @param ppszFormat Pointer to the format string pointer. Advance this till the char
+ * after the format specifier.
+ * @param pArgs Pointer to the argument list. Use this to fetch the arguments.
+ * @param chWidth Format Width. -1 if not specified.
+ * @param chPrecision Format Precision. -1 if not specified.
+ * @param fFlags Flags (RTSTR_NTFS_ *).
+ * @param chArgSize The argument size specifier, 'l' or 'L'.
+ */ +
typedef DECLCALLBACK(size_t) FNSTRFORMAT(void *pvArg, PFNRTSTROUTPUT pfnOutput, void *pvArgOutput,
```
** Pointer to a FNSTRFORMAT() function. */
+ typedef FNSTRFORMAT *PFNSTRFORMAT;
+
+ /**
+ * Partial implementation of a printf like formatter.
+ * It doesn't do everything correct, and there is no floating point support.
+ * However, it supports custom formats by the means of a format callback.
+ *
+ * @returns number of bytes formatted.
+ * @param   pfnOutput   Output worker.
+ * Called in two ways. Normally with a string and its length.
+ * For termination, it's called with NULL for string, 0 for length.
+ * @param   pvArgOutput Argument to the output worker.
+ * @param   pfnFormat   Custom format worker.
+ * @param   pvArgFormat Argument to the format worker.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   InArgs      Argument list.
+ */
+RTDECL(size_t) RTStrFormatV(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, PFNSTRFORMAT pfnFormat, void *pvArgFormat,
+                            const char *pszFormat, va_list InArgs) RT_IPRT_FORMAT_ATTR(5, 0);
+
+ /**
+ * Partial implementation of a printf like formatter.
+ * It doesn't do everything correct, and there is no floating point support.
+ * However, it supports custom formats by the means of a format callback.
+ *
+ * @returns number of bytes formatted.
+ * @param   pfnOutput   Output worker.
+ * Called in two ways. Normally with a string and its length.
+ * For termination, it's called with NULL for string, 0 for length.
+ * @param   pvArgOutput Argument to the output worker.
+ * @param   pfnFormat   Custom format worker.
+ * @param   pvArgFormat Argument to the format worker.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   ...         Argument list.
+ */
+RTDECL(size_t) RTStrFormat(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput, PFNSTRFORMAT pfnFormat, void *pvArgFormat,
+                            const char *pszFormat, va_list InArgs) RT_IPRT_FORMAT_ATTR(5, 6);
+
+ /**
+ * Formats an integer number according to the parameters.
+ */
+ * @returns Length of the formatted number.
+ * @param psz Pointer to output string buffer of sufficient size.
+ * @param u64Value Value to format.
+ * @param uiBase Number representation base.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags Flags, RTSTR_F_XXX.
+ */
+RTDECL(int) RTStrFormatNumber(char *psz, uint64_t u64Value, unsigned int uiBase, signed int cchWidth, signed int cchPrecision, unsigned int fFlags);
+
+/**
+ * Formats an unsigned 8-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param pszBuf The output buffer.
+ * @param cbBuf The size of the output buffer.
+ * @param u8Value The value to format.
+ * @param uiBase Number representation base.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU8(char *pszBuf, size_t cbBuf, uint8_t u8Value, unsigned int uiBase, signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 16-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param pszBuf The output buffer.
+ * @param cbBuf The size of the output buffer.
+ * @param u16Value The value to format.
+ * @param uiBase Number representation base.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU16(char *pszBuf, size_t cbBuf, uint16_t u16Value, unsigned int uiBase, signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 32-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param pszBuf The output buffer.
+ * @param cbBuf The size of the output buffer.
+ */
+ * @param   u32Value        The value to format.
+ * @param   uiBase          Number representation base.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU32(char *pszBuf, size_t cbBuf, uint32_t u32Value, unsigned int uiBase,
+                           signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 64-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param   pszBuf          The output buffer.
+ * @param   cbBuf           The size of the output buffer.
+ * @param   u64Value        The value to format.
+ * @param   uiBase          Number representation base.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatU64(char *pszBuf, size_t cbBuf, uint64_t u64Value, unsigned int uiBase,
+                              signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 128-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param   pszBuf          The output buffer.
+ * @param   cbBuf           The size of the output buffer.
+ * @param   pu128Value      The value to format.
+ * @param   uiBase          Number representation base.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ * @remarks The current implementation is limited to base 16 and doesn't do
+          width or precision and probably ignores few flags too.
+ */
+RTDECL(ssize_t) RTStrFormatU128(char *pszBuf, size_t cbBuf, PCRTUINT128U pu128Value, unsigned int uiBase,
+                                 signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 256-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param   pszBuf          The output buffer.
+ * @param   cbBuf           The size of the output buffer.
+ *
+ * @param   pu256Value      The value to format.
+ * @param   uiBase          Number representation base.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ * @remarks The current implementation is limited to base 16 and doesn't do
+ *          width or precision and probably ignores few flags too.
+ */
+RTDECL(ssize_t) RTStrFormatU256(char *pszBuf, size_t cbBuf, PCRTUINT256U pu256Value, unsigned int
uiBase,
    + signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an unsigned 512-bit number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param   pszBuf          The output buffer.
+ * @param   cbBuf           The size of the output buffer.
+ * @param   pu512Value      The value to format.
+ * @param   uiBase          Number representation base.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ * @remarks The current implementation is limited to base 16 and doesn't do
+ *          width or precision and probably ignores few flags too.
+ */
+RTDECL(ssize_t) RTStrFormatU512(char *pszBuf, size_t cbBuf, PCRTUINT512U pu512Value, unsigned int
uiBase,
    + signed int cchWidth, signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an 80-bit extended floating point number.
+ *
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param   pszBuf          The output buffer.
+ * @param   cbBuf           The size of the output buffer.
+ * @param   pr80Value       The value to format.
+ * @param   cchWidth        Width.
+ * @param   cchPrecision    Precision.
+ * @param   fFlags          Flags, RTSTR_F_XXX.
+ */
+RTDECL(ssize_t) RTStrFormatR80(char *pszBuf, size_t cbBuf, PCRTFLOAT80U pr80Value, signed int
         cchWidth,
    + signed int cchPrecision, uint32_t fFlags);
+
+/**
+ * Formats an 80-bit extended floating point number, version 2.
+ * @returns The length of the formatted number or VERR_BUFFER_OVERFLOW.
+ * @param pszBuf The output buffer.
+ * @param cbBuf The size of the output buffer.
+ * @param pr80Value The value to format.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags Flags, RTSTR_F_XXX.
+ */
+ RTDECL(ssize_t) RTStrFormatR80u2(char *pszBuf, size_t cbBuf, PCRTFLOAT80U2 pr80Value, signed int cchWidth,
+                                      signed int cchPrecision, uint32_t fFlags);
+
+ /**
+ * Callback for formatting a type.
+ *
+ * This is registered using the RTStrFormatTypeRegister function and will
+ * be called during string formatting to handle the specified %R[type].
+ * The argument for this format type is assumed to be a pointer and it's
+ * passed in the @a pvValue argument.
+ *
+ * @returns Length of the formatted output.
+ * @param pfnOutput Output worker.
+ * @param pvArgOutput Argument to the output worker.
+ * @param pszType The type name.
+ * @param pvValue The argument value.
+ * @param cchWidth Width.
+ * @param cchPrecision Precision.
+ * @param fFlags Flags (NTFS_*).
+ * @param pvUser The user argument.
+ */
+ typedef DECLCALLBACK(size_t) FNRTSTRFORMATTYPE(PFNRTSTROUTPUT pfnOutput, void *pvArgOutput,
+                                                 void const *pszType, void const *pvValue,
+                                                 int cchWidth, int cchPrecision, unsigned fFlags,
+                                                 void *pvUser);
+ /** Pointer to a FNRTSTRFORMATTYPE. */
+ typedef FNRTSTRFORMATTYPE *PFNRTSTRFORMATTYPE;
+
+ /**
+ * Register a format handler for a type.
+ *
+ * The format handler is used to handle %R[type] format types, where the argument
+ * in the vector is a pointer value (a bit restrictive, but keeps it simple).
+ */
+
The caller must ensure that no other thread will be making use of any of the dynamic formatting type facilities simultaneously with this call.

+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_ALREADY_EXISTS if the type has already been registered.
+ * @retval VERR_TOO_MANY_OPEN_FILES if all the type slots has been allocated already.
+ *
+ * @param pszType The type name.
+ * @param pfnHandler The handler address. See FNRTSTRFORMATTYPE for details.
+ * @param pvUser The user argument to pass to the handler. See RTStrFormatTypeSetUser
+ * for how to update this later.
+ */
+RTDECL(int) RTStrFormatTypeRegister(const char *pszType, PFNRTSTRFORMATTYPE pfnHandler, void *pvUser);
+
+/**
+ * Deregisters a format type.
+ *
+ * The caller must ensure that no other thread will be making use of any of the dynamic formatting type facilities simultaneously with this call.
+ *
+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_FILE_NOT_FOUND if not found.
+ *
+ * @param pszType The type to deregister.
+ */
+RTDECL(int) RTStrFormatTypeDeregister(const char *pszType);
+
+/**
+ * Sets the user argument for a type.
+ *
+ * This can be used if a user argument needs relocating in GC.
+ *
+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_FILE_NOT_FOUND if not found.
+ *
+ * @param pszType The type to update.
+ * @param pvUser The new user argument value.
+ */
+RTDECL(int) RTStrFormatTypeSetUser(const char *pszType, void *pvUser);
+
+/**
+ * String printf.
+ */
+ @returns The length of the returned string (in pszBuffer) excluding the
+ terminator.
+ @param pszBuffer  Output buffer.
+ @param cchBuffer  Size of the output buffer.
+ @param pszFormat  Pointer to the format string, @see pg_rt_str_format.
+ @param args      The format argument.
+
+ @deprecated Use RTStrPrintf2V! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintfV(char *pszBuffer, size_t cchBuffer, const char *pszFormat, va_list args)
RT_IPRT_FORMAT_ATTR(3, 0);
+
+/**
+ * String printf.
+ *
+ * @returns The length of the returned string (in pszBuffer) excluding the
+ * terminator.
+ * @param pszBuffer  Output buffer.
+ * @param cchBuffer  Size of the output buffer.
+ * @param pszFormat  Pointer to the format string, @see pg_rt_str_format.
+ * @param ...       The format argument.
+
+ * @deprecated Use RTStrPrintf2! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintf(char *pszBuffer, size_t cchBuffer, const char *pszFormat, ...)
RT_IPRT_FORMAT_ATTR(3, 4);
+
+/**
+ * String printf with custom formatting.
+ *
+ * @returns The length of the returned string (in pszBuffer) excluding the
+ * terminator.
+ * @param pfnFormat  Pointer to handler function for the custom formats.
+ * @param pvArg      Argument to the pfnFormat function.
+ * @param pszBuffer  Output buffer.
+ * @param cchBuffer  Size of the output buffer.
+ * @param pszFormat  Pointer to the format string, @see pg_rt_str_format.
+ * @param args       The format argument.
+
+ * @deprecated Use RTStrPrintf2ExV! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintfExV(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cchBuffer,
                                       const char *pszFormat, va_list args)  RT_IPRT_FORMAT_ATTR(5, 0);
+
+/**
+ * String printf with custom formatting.
+ *
+ * @returns The length of the returned string (in pszBuffer) excluding the

---

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+ *      terminator.
+ *      pfnFormat  Pointer to handler function for the custom formats.
+ *      pvArg     Argument to the pfnFormat function.
+ *      pszBuffer Output buffer.
+ *      cchBuffer Size of the output buffer.
+ *      pszFormat Pointer to the format string, @see pg_rt_str_format.
+ *      ...       The format argument.
+ *
+ * @deprecated Use RTStrPrintf2Ex! Problematic return value on overflow.
+ */
+RTDECL(size_t) RTStrPrintfEx(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cchBuffer,
+                             const char *pszFormat, ...)  RT_IPRT_FORMAT_ATTR(5, 6);
+
+**
+ * String printf, version 2.
+ *
+ * @returns On success, positive count of formatted character excluding the
+ *         terminator. On buffer overflow, negative number giving the required
+ *         buffer size (including terminator char).
+ *
+ * @param   pszBuffer   Output buffer.
+ * @param   chBuffer    Size of the output buffer.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   args        The format argument.
+ */
+RTDECL(ssize_t) RTStrPrintf2V(char *pszBuffer, size_t cbBuffer, const char *pszFormat, va_list args)
RT_IPRT_FORMAT_ATTR(3, 0);
+
+**
+ * String printf, version 2.
+ *
+ * @returns On success, positive count of formatted character excluding the
+ *         terminator. On buffer overflow, negative number giving the required
+ *         buffer size (including terminator char).
+ *
+ * @param   pszBuffer   Output buffer.
+ * @param   cbBuffer    Size of the output buffer.
+ * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
+ * @param   ...         The format argument.
+ */
+RTDECL(ssize_t) RTStrPrintf2(char *pszBuffer, size_t cbBuffer, const char *pszFormat, ...)  
RT_IPRT_FORMAT_ATTR(3, 4);
+
+**
+ * String printf with custom formatting, version 2.
+ *
+ * @returns On success, positive count of formatted character excluding the
+ *         terminator. On buffer overflow, negative number giving the required
+ * buffer size (including terminator char).
+ *
+ *
+ */

+RTDECL(ssize_t) RTStrPrintf2ExV(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cbBuffer,
+ const char *pszFormat, va_list args) RT_IPRT_FORMAT_ATTR(5, 0);
+
+/**
+ * String printf with custom formatting, version 2.
+ *
+ */

+RTDECL(ssize_t) RTStrPrintf2Ex(PFNSTRFORMAT pfnFormat, void *pvArg, char *pszBuffer, size_t cbBuffer,
+ const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(5, 6);
+
+/**
+ * Allocating string printf (default tag).
+ *
+ */

#define RTStrAPprintfV(ppszBuffer, pszFormat, args) RTStrAPprintfVTag((ppszBuffer), (pszFormat), (args),
RTSTR_TAG)
+
+/**
+ * Allocating string printf (custom tag).
+ *
+ */

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/*
 * Allocating string printf.
 *
 * @returns The length of the string in the returned *ppszBuffer excluding the
 *          terminator.
 * @returns -1 on failure.
 * @param   ppszBuffer  Where to store the pointer to the allocated output buffer.
 *                      The buffer should be freed using RTStrFree().
 *                      On failure *ppszBuffer will be set to NULL.
 * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
 * @param   args        The format argument.
 * @param   pszTag      Allocation tag used for statistics and such.
 * @returns -1 on failure.
 * @param   ppszBuffer  Where to store the pointer to the allocated output buffer.
 *                      The buffer should be freed using RTStrFree().
 *                      On failure *ppszBuffer will be set to NULL.
 * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
 * @param   pszTag      Allocation tag used for statistics and such.
 */

RTDECL(int) RTStrAPprintfVTag(char **ppszBuffer, const char *pszFormat, va_list args, const char *pszTag)
RT_IPRT_FORMAT_ATTR(2, 0);

/**
 * Allocating string printf (custom tag).
 *
 * @returns The length of the string in the returned *ppszBuffer excluding the
 *          terminator.
 * @returns -1 on failure.
 * @param   ppszBuffer  Where to store the pointer to the allocated output buffer.
 *                      The buffer should be freed using RTStrFree().
 *                      On failure *ppszBuffer will be set to NULL.
 * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
 * @param   ...         The format argument.
 */
DECLINLINE(int) RT_IPRT_FORMAT_ATTR(2, 3) RTStrAPprintf(char **ppszBuffer, const char *pszFormat, ...
{
  int     cbRet;
  va_list va;
  va_start(va, pszFormat);
  cbRet = RTStrAPprintfVTag(ppszBuffer, pszFormat, va, RTSTR_TAG);
  va_end(va);
  return cbRet;
}

/**
 * Allocating string printf (custom tag).
 *
 * @returns The length of the string in the returned *ppszBuffer excluding the
 *          terminator.
 * @returns -1 on failure.
 * @param   ppszBuffer  Where to store the pointer to the allocated output buffer.
 *                      The buffer should be freed using RTStrFree().
 *                      On failure *ppszBuffer will be set to NULL.
 * @param   pszTag      Allocation tag used for statistics and such.
 * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
 * @param   ...         The format argument.
 */
DECLINLINE(int) RT_IPRT_FORMAT_ATTR(3, 4) RTStrAPrintfTag(char **ppszBuffer, const char *pszTag, const char *pszFormat, ...)
{
    int cbRet;
    va_list va;
    va_start(va, pszFormat);
    cbRet = RTStrAPrintfVTag(ppszBuffer, pszFormat, va, pszTag);
    va_end(va);
    return cbRet;
}

/**
 * Allocating string printf, version 2.
 *
 * @returns Formatted string. Use RTStrFree() to free it. NULL when out of
 * memory.
 * @param pszFormat Pointer to the format string. @see pg_rt_str_format.
 * @param args The format argument.
 *
 #define RTStrAPrintf2V(pszFormat, args)     RTStrAPrintf2VTag((pszFormat), (args), RTSTR_TAG)
 +
 /**
 * Allocating string printf, version 2.
 *
 * @returns Formatted string. Use RTStrFree() to free it. NULL when out of
 * memory.
 * @param pszFormat Pointer to the format string. @see pg_rt_str_format.
 * @param args The format argument.
 * @param pszTag Allocation tag used for statistics and such.
 *
 #define RTStrAPrintf2(const char *pszFormat, ...) RTStrAPrintf2VTag((pszFormat), (args), RTSTR_TAG)
 +
 /**
 * Allocating string printf, version 2 (default tag).
 *
 * @returns Formatted string. Use RTStrFree() to free it. NULL when out of
 * memory.
 * @param pszFormat Pointer to the format string. @see pg_rt_str_format.
 * @param ... The format argument.
 *
 #define RTStrAPrintf2V(const char *pszFormat, va_list args, const char *pszTag) RT_IPRT_FORMAT_ATTR(1, 0);
 +
 /**
 * Allocating string printf, version 2 (default tag).
 *
 * @returns Formatted string. Use RTStrFree() to free it. NULL when out of
 * memory.
 * @param ... The format argument.
 *
 #define RTStrAPrintf2(const char *pszFormat, ...) RT_IPRT_FORMAT_ATTR(1, 2) RTStrAPrintf2(const char *pszFormat, ...)
 +

 char *pszRet;
 va_list va;
 va_start(va, pszFormat);
 pszRet = RTStrAPrintf2VTag(pszFormat, va, RTSTR_TAG);
va_end(va);
    return pszRet;
}

/**
 * Allocating string printf, version 2 (custom tag).
 *
 * @returns Formatted string. Use RTStrFree() to free it. NULL when out of memory.
 * @param   pszTag      Allocation tag used for statistics and such.
 * @param   pszFormat   Pointer to the format string, @see pg_rt_str_format.
 * @param   ...         The format argument.
 */
DECLINLINE(char *) RT_IPRT_FORMAT_ATTR(2, 3) RTStrAPprintf2Tag(const char *pszTag, const char *pszFormat, ...)
{
    char   *pszRet;
    va_list va;
    va_start(va, pszFormat);
    pszRet = RTStrAPprintf2VTag(pszFormat, va, pszTag);
    va_end(va);
    return pszRet;
}

/**
 * Strips blankspaces from both ends of the string.
 *
 * @returns Pointer to first non-blank char in the string.
 * @param   psz     The string to strip.
 */
RTDECL(char *) RTStrStrip(char *psz);

/**
 * Strips blankspaces from the start of the string.
 *
 * @returns Pointer to first non-blank char in the string.
 * @param   psz     The string to strip.
 */
RTDECL(char *) RTStrStripL(const char *psz);

/**
 * Strips blankspaces from the end of the string.
 *
 * @returns psz.
 * @param   psz     The string to strip.
 */
RTDECL(char *) RTStrStripR(char *psz);
+/**
+ * String copy with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *         buffer will contain as much of the string as it can hold, fully
+ *         terminated.
+ *
+ * @param   pszDst              The destination buffer.
+ * @param   cbDst               The size of the destination buffer (in bytes).
+ * @param   pszSrc              The source string. NULL is not OK.
+ */
+RTDECL(int) RTStrCopy(char *pszDst, size_t cbDst, const char *pszSrc);
+
+/**
+ * String copy with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *         buffer will contain as much of the string as it can hold, fully
+ *         terminated.
+ *
+ * @param   pszDst              The destination buffer.
+ * @param   cbDst               The size of the destination buffer (in bytes).
+ * @param   pszSrc              The source string. NULL is not OK.
+ * @param   cchSrcMax           The maximum number of chars (not code points) to
+ *                              copy from the source string, not counting the
+ *                              terminator as usual.
+ */
+RTDECL(int) RTStrCopyEx(char *pszDst, size_t cbDst, const char *pszSrc, size_t cchSrcMax);
+
+/**
+ * String copy with overflow handling and buffer advancing.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *         buffer will contain as much of the string as it can hold, fully
+ *         terminated.
+ *
+ * @param   ppszDst             Pointer to the destination buffer pointer.
+ *                              This will be advanced to the end of the copied
+ *                              bytes (points at the terminator). This is also
+ *                              updated on overflow.
+ * @param   pcbDst              Pointer to the destination buffer size
+ *                              variable. This will be updated in accord with
+ *                              the buffer pointer.
+ * @param   pszSrc              The source string. NULL is not OK.
+ */
+RTDECL(int) RTStrCopyP(char **ppszDst, size_t *pcbDst, const char *pszSrc);
+
+/**
+ * String copy with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   ppszDst             Pointer to the destination buffer pointer.
+ *                              This will be advanced to the end of the copied
+ *                              bytes (points at the terminator). This is also
+ *                              updated on overflow.
+ * @param   pcbDst              Pointer to the destination buffer size
+ *                              variable. This will be updated in accord with
+ *                              the buffer pointer.
+ * @param   pszSrc              The source string. NULL is not OK.
+ * @param   cchSrcMax           The maximum number of chars (not code points) to
+ *                              copy from the source string, not counting the
+ *                              terminator as usual.
+ */
+RTDECL(int) RTStrCopyPEx(char **ppszDst, size_t *pcbDst, const char *pszSrc, size_t cchSrcMax);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   pszDst              The destination buffer.
+ * @param   cbDst               The size of the destination buffer (in bytes).
+ * @param   pszSrc              The source string. NULL is not OK.
+ */
+RTDECL(int) RTStrCat(char *pszDst, size_t cbDst, const char *pszSrc);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   pszDst              The destination buffer.
+ * @param   cbDst               The size of the destination buffer (in bytes).
+ * @param pszSrc  The source string. NULL is not OK.
+ * @param cchSrcMax  The maximum number of chars (not code points) to
+ *                      copy from the source string, not counting the
+ *                      terminator as usual.
+ */
+RTDECL(int) RTStrCatEx(char *pszDst, size_t cbDst, const char *pszSrc, size_t cchSrcMax);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *        buffer will contain as much of the string as it can hold, fully
+ *        terminated.
+ *
+ * @param ppszDst  Pointer to the destination buffer pointer.
+ *                 This will be advanced to the end of the copied
+ *                 bytes (points at the terminator). This is also
+ *                 updated on overflow.
+ * @param pcbDst  Pointer to the destination buffer size
+ *                variable. This will be updated in accord with
+ *                the buffer pointer.
+ * @param pszSrc  The source string. NULL is not OK.
+ */
+RTDECL(int) RTStrCatP(char **ppszDst, size_t *pcbDst, const char *pszSrc);
+
+/**
+ * String concatenation with overflow handling and buffer advancing.
+ *
+ * @retval VINF_SUCCESS on success.
+ * @retval VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *        buffer will contain as much of the string as it can hold, fully
+ *        terminated.
+ *
+ * @param ppszDst  Pointer to the destination buffer pointer.
+ *                 This will be advanced to the end of the copied
+ *                 bytes (points at the terminator). This is also
+ *                 updated on overflow.
+ * @param pcbDst  Pointer to the destination buffer size
+ *                variable. This will be updated in accord with
+ *                the buffer pointer.
+ * @param pszSrc  The source string. NULL is not OK.
+ * @param cchSrcMax  The maximum number of chars (not code points) to
+ *                    copy from the source string, not counting the
+ *                    terminator as usual.
+ */
+RTDECL(int) RTStrCatPEx(char **ppszDst, size_t *pcbDst, const char *pszSrc, size_t cchSrcMax);
/**
 * Performs a case sensitive string compare between two UTF-8 strings.
 *
 * Encoding errors are ignored by the current implementation. So, the only
 * difference between this and the CRT strcmp function is the handling of
 * NULL arguments.
 *
 * @returns < 0 if the first string less than the second string.
 * @returns 0 if the first string identical to the second string.
 * @returns > 0 if the first string greater than the second string.
 * @param   psz1        First UTF-8 string. Null is allowed.
 * @param   psz2        Second UTF-8 string. Null is allowed.
 *
 * @returns < 0 if the first string less than the second string.
 * @returns 0 if the first string identical to the second string.
 * @returns > 0 if the first string greater than the second string.
 * @param   psz1        First UTF-8 string. Null is allowed.
 * @param   psz2        Second UTF-8 string. Null is allowed.
 * @param   cchMax      The maximum string length
 *
 * @returns < 0 if the first string less than the second string.
 * @returns 0 if the first string identical to the second string.
 * @returns > 0 if the first string greater than the second string.
 * @param   psz1        First UTF-8 string. Null is allowed.
 * @param   psz2        Second UTF-8 string. Null is allowed.
 * @param   size_t cchMax The maximum string length
 *
 * @returns < 0 if the first string less than the second string.
 * @returns 0 if the first string identical to the second string.
 * @returns > 0 if the first string greater than the second string.
 *
 * This is a simplified compare, as only the simplified lower/upper case folding
 * specified by the unicode specs are used. It does not consider character pairs
 * as they are used in some languages, just simple upper & lower case compares.
 * The result is the difference between the mismatching codepoints after they
 * both have been lower cased.
 *
 * If the string encoding is invalid the function will assert (strict builds)
 * and use RTStrCmp for the remainder of the string.
 */

RTDECL(int) RTStrCmp(const char *psz1, const char *psz2);

RTDECL(int) RTStrNCmp(const char *psz1, const char *psz2, size_t cchMax);

RTDECL(int) RTStrNCmp(const char *psz1, const char *psz2, size_t cchMax);

RTDECL(int) RTStrNCmp(const char *psz1, const char *psz2, size_t cchMax);
+ * @param psz1 First UTF-8 string. Null is allowed.
+ * @param psz2 Second UTF-8 string. Null is allowed.
+ */
+RTDECL(int) RTStrICmp(const char *psz1, const char *psz2);
+
+/**
+ * Performs a case insensitive string compare between two UTF-8 strings, given a
+ * maximum string length.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * The result is the difference between the mismatching codepoints after they
+ * both have been lower cased.
+ *
+ * If the string encoding is invalid the function will assert (strict builds)
+ * and use RTStrCmp for the remainder of the string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param psz1 First UTF-8 string. Null is allowed.
+ * @param psz2 Second UTF-8 string. Null is allowed.
+ * @param cchMax Maximum string length
+ */
+RTDECL(int) RTStrNICmp(const char *psz1, const char *psz2, size_t cchMax);
+
+/**
+ * Performs a case insensitive string compare between a UTF-8 string and a 7-bit
+ * ASCII string.
+ *
+ * This is potentially faster than RTStrICmp and drags in less dependencies. It
+ * is really handy for hardcoded inputs.
+ *
+ * If the string encoding is invalid the function will assert (strict builds)
+ * and use RTStrCmp for the remainder of the string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param psz1 First UTF-8 string. Null is allowed.
+ * @param psz2 Second string, 7-bit ASCII. Null is allowed.
+ * @sa RTUtf16ICmpAscii
+ */
+RTDECL(int) RTStrICmpAscii(const char *psz1, const char *psz2);
+
+/**/
+ * Checks whether @a pszString starts with @a pszStart.
+ *
+ * @returns true / false.
+ *
+ * @param   pszString   The string to check.
+ * @param   pszStart    The start string to check for.
+ */
+RTDECL(int) RTStrStartsWith(const char *pszString, const char *pszStart);
+
+/**
+ * Checks whether @a pszString starts with @a pszStart, case insensitive.
+ *
+ * @returns true / false.
+ *
+ * @param   pszString   The string to check.
+ * @param   pszStart    The start string to check for.
+ */
+RTDECL(int) RTStrIStartsWith(const char *pszString, const char *pszStart);
+
+/**
+ * Locates a case sensitive substring.
+ *
+ * If any of the two strings are NULL, then NULL is returned. If the needle is
+ * an empty string, then the haystack is returned (i.e. matches anything).
+ *
+ * @returns Pointer to the first occurrence of the substring if found, NULL if
+ *          not.
+ *
+ * @param   pszHaystack The string to search.
+ * @param   pszNeedle   The substring to search for.
+ *
+ * @remarks The difference between this and strstr is the handling of NULL
+ *          pointers.
+ */
+RTDECL(char *) RTStrStr(const char *pszHaystack, const char *pszNeedle);
+
+/**
+ * Locates a case insensitive substring.
+ *
+ * If any of the two strings are NULL, then NULL is returned. If the needle is
+ * an empty string, then the haystack is returned (i.e. matches anything).
+ *
+ * @returns Pointer to the first occurrence of the substring if found, NULL if
+ *          not.
+ *
+ * @param   pszHaystack The string to search.
+ * @param   pszNeedle   The substring to search for.
+ *
+ */
+RTDECL(char *) RTStrIStr(const char *pszHaystack, const char *pszNeedle);
/**
 * Converts the string to lower case.
 * @returns Pointer to the converted string.
 * @param   psz     The string to convert.
 */
RTDECL(char *) RTStrToLower(char *psz);

/**
 * Converts the string to upper case.
 * @returns Pointer to the converted string.
 * @param   psz     The string to convert.
 */
RTDECL(char *) RTStrToUpper(char *psz);

/**
 * Checks if the string is case foldable, i.e. whether it would change if
 * subject to RTStrToLower or RTStrToUpper.
 * @returns true / false
 * @param   psz     The string in question.
 */
RTDECL(bool) RTStrIsCaseFoldable(const char *psz);

/**
 * Checks if the string is upper cased (no lower case chars in it).
 * @returns true / false
 * @param   psz     The string in question.
 */
RTDECL(bool) RTStrIsUpperCased(const char *psz);

/**
 * Checks if the string is lower cased (no upper case chars in it).
 * @returns true / false
 * @param   psz     The string in question.
 */
RTDECL(bool) RTStrIsLowerCased(const char *psz);

/**
 * Find the length of a zero-terminated byte string, given
 * a max string length.
 * @returns
 * See also RTStrNLenEx.
 */
+++ The string length or cbMax. The returned length does not include
+++ the zero terminator if it was found.
+++ @param pszString The string.
+++ @param cchMax The max string length.
++*/
+RTDECL(size_t) RTStrNLen(const char *pszString, size_t cchMax);
+
+/**
+ * Find the length of a zero-terminated byte string, given
+ * a max string length.
+ * See also RTStrNLen.
+ * @returns IPRT status code.
+ * @retval VINF_SUCCESS if the string has a length less than cchMax.
+ * @retval VERR_BUFFER_OVERFLOW if the end of the string wasn't found
+ * before cchMax was reached.
+ /*
+ * @param pszString The string.
+ * @param cchMax The max string length.
+ * @param pcch Where to store the string length excluding the
+ * terminator. This is set to cchMax if the terminator
+ * isn't found.
+ */
+RTDECL(int) RTStrNLenEx(const char *pszString, size_t cchMax, size_t *pcch);
+
+RT_C_DECLS_END
+
+/** The maximum size argument of a memchr call. */
+#define RTSTR_MEMCHR_MAX ((~(size_t)0 >> 1) - 15)
+
+/**
+ * Find the zero terminator in a string with a limited length.
+ * @returns Pointer to the zero terminator.
+ * @returns NULL if the zero terminator was not found.
+ */
+if defined(__cplusplus) && !defined(DOXYGEN_RUNNING)
+DECLINLINE(char const *) RTStrEnd(char const *pszString, size_t cchMax, size_t *pcch)
{+ /* Avoid potential issues with memchr seen in glibc.
+ * See sysdeps/x86_64/memchr.S in glibc versions older than 2.11 */
+ while (cchMax > RTSTR_MEMCHR_MAX)
+ {
char const *pszRet = (char const *)memchr(pszString, '\0', RTSTR_MEMCHR_MAX);
if (RT_LIKELY(pszRet))
    return pszRet;
pszString += RTSTR_MEMCHR_MAX;
cchMax -= RTSTR_MEMCHR_MAX;
}
return (char const *)memchr(pszString, '\0', cchMax);
+
+DECLINLINE(char *) RTStrEnd(char *pszString, size_t cchMax)
+*/
+DECLINLINE(char *) RTStrEnd(const char *pszString, size_t cchMax)
+*/
+
+/* Avoid potential issues with memchr seen in glibc.
+ * See sysdeps/x86_64/memchr.S in glibc versions older than 2.11 */
+ while (cchMax > RTSTR_MEMCHR_MAX)
+ {
+     char *pszRet = (char *)memchr(pszString, '\0', RTSTR_MEMCHR_MAX);
+     if (RT_LIKELY(pszRet))
+         return pszRet;
+     pszString += RTSTR_MEMCHR_MAX;
+     cchMax -= RTSTR_MEMCHR_MAX;
+ }
+ return (char const *)memchr(pszString, '\0', cchMax);
+
+RT_C_DECLS_BEGIN
+
+/**
+ * Finds the offset at which a simple character first occurs in a string.
+ *
+ * @returns The offset of the first occurrence or the terminator offset.
+ * @param   pszHaystack The string to search.
+ * @param   chNeedle   The character to search for.
+ */
+DECLINLINE(size_t) RTStrOffCharOrTerm(const char *pszHaystack, char chNeedle)
+{
+    const char *psz = pszHaystack;
+    char ch;
+    while (   (ch = *psz) != chNeedle
+               && ch != '\0')
+        psz++;
+    return psz - pszHaystack;
+}
+ * Matches a simple string pattern.
+ *
+ * @returns true if the string matches the pattern, otherwise false.
+ *
+ * @param pszPattern The pattern. Special chars are '*’ and '?’, where the
+ *          asterisk matches zero or more characters and question
+ *          mark matches exactly one character.
+ *
+ * @param pszString The string to match against the pattern.
+ */
+RTDECL(bool) RTStrSimplePatternMatch(const char *pszPattern, const char *pszString);
+
+/**
+ * Matches a simple string pattern, neither which needs to be zero terminated.
+ *
+ * This is identical to RTStrSimplePatternMatch except that you can optionally
+ * specify the length of both the pattern and the string. The function will
+ * stop when it hits a string terminator or either of the lengths.
+ *
+ * @returns true if the string matches the pattern, otherwise false.
+ *
+ * @param pszPattern The pattern. Special chars are '*’ and '?’, where the
+ *          asterisk matches zero or more characters and question
+ *          mark matches exactly one character.
+ *
+ * @param cchPattern The pattern length. Pass RTSTR_MAX if you don’t know the
+ *          length and wish to stop at the string terminator.
+ *
+ * @param pszString The string to match against the pattern.
+ *
+ * @param cchString The string length. Pass RTSTR_MAX if you don’t know the
+ *          length and wish to match up to the string terminator.
+ */
+RTDECL(bool) RTStrSimplePatternNMatch(const char *pszPattern, size_t cchPattern,
+                                      const char *pszString, size_t cchString);
+
+/**
+ * Matches multiple patterns against a string.
+ *
+ * The patterns are separated by the pipe character (|).
+ *
+ * @returns true if the string matches the pattern, otherwise false.
+ *
+ * @param pszPatterns The patterns.
+ *
+ * @param cchPatterns The lengths of the patterns to use. Pass RTSTR_MAX to
+ *          stop at the terminator.
+ *
+ * @param pszString The string to match against the pattern.
+ *
+ * @param cchString The string length. Pass RTSTR_MAX stop stop at the
+ *          terminator.
+ *
+ * @param poffPattern Offset into the patterns string of the pattern that
+ *          matched. If no match, this will be set to RTSTR_MAX.
+ *
+ * This is optional, NULL is fine.
+ RTDECL(bool) RTStrSimplePatternMultiMatch(const char *pszPatterns, size_t cchPatterns,
        const char *pszString, size_t cchString,
        size_t *poffPattern);
+
+/**
+ * Compares two version strings RTStrICmp fashion.
+ *
+ * The version string is split up into sections at punctuation, spaces,
+ * underscores, dashes and plus signs. The sections are then split up into
+ * numeric and string sub-sections. Finally, the sub-sections are compared
+ * in a numeric or case insensitive fashion depending on what they are.
+ *
+ * The following strings are considered to be equal: "1.0.0", "1.00.0", "1.0",
+ * "1". These aren't: "1.0.0r993", "1.0", "1r993", "1.0_Beta3", "1.1"
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param   pszVer1     First version string to compare.
+ * @param   pszVer2     Second version string to compare first version with.
+ */
+RTDECL(int) RTStrVersionCompare(const char *pszVer1, const char *pszVer2);
+
+/** @defgroup rt_str_conv String To/From Number Conversions */
+
+/** @returns iprt status code.
+ * Warnings are used to indicate conversion problems.
+ * @returns VWRN_NUMBER_TOO_BIG
+ * @returns VWRN_NEGATIVE_UNSIGNED
+ * @returns VWRN_TRAILING_CHARS
+ * @returns VWRN_TRAILING_SPACES
+ * @returns VINF_SUCCESS
+ * @returns VERR_NO_DIGITS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ *
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu64        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt64Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint64_t *pu64);
/**
 * Converts a string representation of a number to a 64-bit unsigned number,
 * making sure the full string is converted.
 *
 * @returns iprt status code.
 *          Warnings are used to indicate conversion problems.
 * @retval VWRN_NUMBER_TOO_BIG
 * @retval VWRN_NEGATIVE_UNSIGNED
 * @retval VINF_SUCCESS
 * @retval VERR_NO_DIGITS
 * @retval VERR_TRAILING_SPACES
 * @retval VERR_TRAILING_CHARS
 *
 * @param   pszValue    Pointer to the string value.
 * @param   uBase       The base of the representation used.
 *                      If 0 the function will look for known prefixes before defaulting to 10.
 * @param   pu64        Where to store the converted number. (optional)
 * @returns int
 */
RTDECL(int) RTStrToUInt64Full(const char *pszValue, unsigned uBase, uint64_t *pu64);

/**
 * Converts a string representation of a number to a 64-bit unsigned number.
 * The base is guessed.
 *
 * @returns 64-bit unsigned number on success.
 * @returns 0 on failure.
 * @param   pszValue    Pointer to the string value.
 * @returns uint64_t
 */
RTDECL(uint64_t) RTStrToUInt64(const char *pszValue);

/**
 * Converts a string representation of a number to a 32-bit unsigned number.
 *
 * @returns iprt status code.
 *          Warnings are used to indicate conversion problems.
 * @retval VWRN_NUMBER_TOO_BIG
 * @retval VWRN_NEGATIVE_UNSIGNED
 * @retval VWRN_TRAILING_CHARS
 * @retval VWRN_TRAILING_SPACES
 * @retval VINF_SUCCESS
 * @retval VERR_NO_DIGITS
 *
 * @param   pszValue    Pointer to the string value.
 * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
 * @param   uBase       The base of the representation used.
 *                      If 0 the function will look for known prefixes before defaulting to 10.
 * @param   pu32        Where to store the converted number. (optional)
 * @returns int
 */
+ RTDECL(int) RTStrToUInt32Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint32_t *pu32);
+ */
+ * Converts a string representation of a number to a 32-bit unsigned number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_TRAILING_CHARS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ *             If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu32        Where to store the converted number. (optional)
+ */
+ RTDECL(int) RTStrToUInt32Full(const char *pszValue, unsigned uBase, uint32_t *pu32);
+ */
+ * Converts a string representation of a number to a 64-bit unsigned number.
+ * The base is guessed.
+ *
+ * @returns 32-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+ RTDECL(uint32_t) RTStrToUInt32(const char *pszValue);
+ */
+ * Converts a string representation of a number to a 16-bit unsigned number.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pu16 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt16Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint16_t *pu16);
+
+/**
+ * Converts a string representation of a number to a 16-bit unsigned number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ * Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_NEGATIVE_UNSIGNED
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ * @retval VERR_TRAILING_SPACES
+ * @retval VERR_TRAILING_CHARS
+ *
+ * @param pszValue Pointer to the string value.
+ * @param uBase The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pu16 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt16Full(const char *pszValue, unsigned uBase, uint16_t *pu16);
+
+/**
+ * Converts a string representation of a number to a 16-bit unsigned number.
+ * The base is guessed.
+ *
+ * @returns 16-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param pszValue Pointer to the string value.
+ */
+RTDECL(uint16_t) RTStrToUInt16(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 8-bit unsigned number.
+ *
+ * @returns iprt status code.
+ * Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_NEGATIVE_UNSIGNED
+ * @retval VWRN_TRAILING_CHARS
+ * @retval VWRN_TRAILING_SPACES
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ *
+ * @param pszValue Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ *                         If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu8         Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt8Ex(const char *pszValue, char **ppszNext, unsigned uBase, uint8_t *pu8);
+
+/**
+ * Converts a string representation of a number to a 8-bit unsigned number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_NEGATIVE_UNSIGNED
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_TRAILING_CHARS
+ *
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ *                         If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pu8         Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToUInt8Full(const char *pszValue, unsigned uBase, uint8_t *pu8);
+
+/**
+ * Converts a string representation of a number to a 8-bit unsigned number.
+ * The base is guessed.
+ *
+ * @returns 8-bit unsigned number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ */
+RTDECL(uint8_t) RTStrToUInt8(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 64-bit signed number.
+ *
+ * @returns iprt status code.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ */
+ * @param   pszValue    Pointer to the string value.
+ * @param   ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param   uBase       The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pi64        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt64Ex(const char *pszValue, char **ppszNext, unsigned uBase, int64_t *pi64);
+
+/**
+ * Converts a string representation of a number to a 64-bit signed number,
+ * making sure the full string is converted.
+ * @returns 64-bit signed number on success.
+ * @returns 0 on failure.
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pi64        Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt64Full(const char *pszValue, unsigned uBase, int64_t *pi64);
+
+/**
+ * Converts a string representation of a number to a 32-bit signed number.
+ * @returns iprt status code.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_TRAILING_CHARS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_NO_DIGITS
+ * @param   pszValue    Pointer to the string value.
+ * @param   pszValue    Pointer to the string value.
+ * @param   uBase       The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param   pi64        Where to store the converted number. (optional)
+ */
+RTDECL(int64_t) RTStrToInt64(const char *pszValue);
+ * @param pszValue Pointer to the string value.
+ * @param ppszNext Where to store the pointer to the first char following the number. (Optional)
+ * @param uBase The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pi32 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt32Ex(const char *pszValue, char **ppszNext, unsigned uBase, int32_t *pi32);
+
+/**
+ * Converts a string representation of a number to a 32-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ * Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VINF_SUCCESS
+ * @retval VERR_TRAILING_CHARS
+ * @retval VERR_TRAILING_SPACES
+ * @retval VERR_NO_DIGITS
+ *
+ * @param pszValue Pointer to the string value.
+ * @param uBase The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pi32 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt32Full(const char *pszValue, unsigned uBase, int32_t *pi32);
+
+/**
+ * Converts a string representation of a number to a 32-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 32-bit signed number on success.
+ * @returns 0 on failure.
+ */
+RTDECL(int32_t) RTStrToInt32(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number.
+ *
+ * @returns iprt status code.
+ * Warnings are used to indicate conversion problems.
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VWRN_TRAILING_CHARS
+ * @retval VWRN_TRAILING_SPACES
+ * @retval VINF_SUCCESS
+ * @retval VERR_NO_DIGITS
+ */
+ * @param pszValue    Pointer to the string value.
+ * @param ppszNext    Where to store the pointer to the first char following the number. (Optional)
+ * @param uBase       The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pi16       Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt16Ex(const char *pszValue, char **ppszNext, unsigned uBase, int16_t *pi16);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_TRAILING_CHARS
+ * @retval  VERR_TRAILING_SPACES
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param pszValue    Pointer to the string value.
+ * @param uBase       The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pi16       Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt16Full(const char *pszValue, unsigned uBase, int16_t *pi16);
+
+/**
+ * Converts a string representation of a number to a 16-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 16-bit signed number on success.
+ * @returns 0 on failure.
+ * @param pszValue    Pointer to the string value.
+ */
+RTDECL(int16_t) RTStrToInt16(const char *pszValue);
+
+/**
+ * Converts a string representation of a number to a 8-bit signed number.
+ *
+ * @returns iprt status code.
+ *          Warnings are used to indicate conversion problems.
+ * @retval  VWRN_NUMBER_TOO_BIG
+ * @retval  VWRN_TRAILING_CHARS
+ * @retval  VWRN_TRAILING_SPACES
+ * @retval  VINF_SUCCESS
+ * @retval  VERR_NO_DIGITS
+ *
+ * @param pszValue Pointer to the string value.
+ * @param ppszNext Where to store the pointer to the first char following the number. (Optional)
+ * @param uBase The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ * @param pi8 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt8Ex(const char *pszValue, char **ppszNext, unsigned uBase, int8_t *pi8);
+
+/**
+ * Converts a string representation of a number to a 8-bit signed number,
+ * making sure the full string is converted.
+ *
+ * @returns iprt status code.
+ *
+ * Warnings are used to indicate conversion problems.
+ *
+ * @retval VWRN_NUMBER_TOO_BIG
+ * @retval VINF_SUCCESS
+ * @retval VERR_TRAILING_CHARS
+ * @retval VERR_TRAILING_SPACES
+ * @retval VERR_NO_DIGITS
+ *
+ * @param pszValue Pointer to the string value.
+ *
+ * @param uBase The base of the representation used.
+ * If 0 the function will look for known prefixes before defaulting to 10.
+ *
+ * @param pi8 Where to store the converted number. (optional)
+ */
+RTDECL(int) RTStrToInt8Full(const char *pszValue, unsigned uBase, int8_t *pi8);
+
+/**
+ * Converts a string representation of a number to a 8-bit signed number.
+ * The base is guessed.
+ *
+ * @returns 8-bit signed number on success.
+ * @returns 0 on failure.
+ *
+ * @param pszValue Pointer to the string value.
+ */
+RTDECL(int8_t) RTStrToInt8(const char *pszValue);
+
+/**
+ * Formats a buffer stream as hex bytes.
+ *
+ * The default is no separating spaces or line breaks or anything.
+ *
+ * @returns IPRT status code.
+ *
+ * @retval VERR_INVALID_POINTER if any of the pointers are wrong.
+ *
+ * @retval VERR_BUFFER_OVERFLOW if the buffer is insufficient to hold the bytes.
+ *
+ * @param pszBuf Output string buffer.
+ * @param cbBuf The size of the output buffer.
+ */
+ * @param   pv          Pointer to the bytes to stringify.
+ * @param   cb          The number of bytes to stringify.
+ * @param   fFlags      Combination of RTSTRPRINTHEXBYTES_F_XXX values.
+ * @sa      RTUtf16PrintHexBytes.
+ */
+RTDECL(int) RTStrPrintHexBytes(char *pszBuf, size_t cbBuf, void const *pv, size_t cb, uint32_t fFlags);
+/** @name RTSTRPRINTHEXBYTES_F_XXX - flags for RTStrPrintHexBytes and RTUtf16PrintHexBytes. */
+/** Upper case hex digits, the default is lower case. */
+#define RTSTRPRINTHEXBYTES_F_UPPER      RT_BIT(0)
+/** Add a space between each group. */
+#define RTSTRPRINTHEXBYTES_F_SEP_SPACE  RT_BIT(1)
+/** Add a colon between each group. */
+#define RTSTRPRINTHEXBYTES_F_SEP_COLON  RT_BIT(2)
+/** @} */
+
+/** Converts a string of hex bytes back into binary data. */
+/** @returns IPRT status code. */
+/** VERR_INVALID_POINTER if any of the pointers are wrong. */
+/** VERR_BUFFER_OVERFLOW if the string contains too many hex bytes. */
+/** VERR_BUFFER_UNDERFLOW if there aren't enough hex bytes to fill up */
+/** the output buffer. */
+/** VERR_UNEVEN_INPUT if the input contains a half byte. */
+/** VERR_NO_DIGITS */
+/** VWRN_TRAILING_CHARS */
+/** VWRN_TRAILING_SPACES */
+RTDECL(int) RTStrConvertHexBytes(char const *pszHex, void *pv, size_t cb, uint32_t fFlags);
+/** @} */
+
+/** @defgroup rt_str_space  Unique String Space */
+/** Pointer to a string name space container node core. */
+/** typedef struct RTSTRSPACECORE *PRTSTRSPACECORE; */
+/** Pointer to a pointer to a string name space container node core. */
+/** typedef PRTSTRSPACECORE *PPRTSTRSPACECORE; */
+/** Pointer to a string name space container node core. */
+/** typedef struct RTSTRSPACECORE *PRTSTRSPACECORE; */
+/** Pointer to a pointer to a string name space container node core. */
+/** typedef PRTSTRSPACECORE *PPRTSTRSPACECORE; */
/**
 * String name space container node core.
 */
typedef struct RTSTRSPACECORE
{
    /** Hash key. Don't touch. */
    uint32_t        Key;
    /** Pointer to the left leaf node. Don't touch. */
    PRTSTRSPACECORE pLeft;
    /** Pointer to the left right node. Don't touch. */
    PRTSTRSPACECORE pRight;
    /** Pointer to the list of string with the same key. Don't touch. */
    PRTSTRSPACECORE pList;
    /** Height of this tree: max(height(left), height(right)) + 1. Don't touch */
    unsigned char   uchHeight;
    /** The string length. Read only! */
    size_t          cchString;
    /** Pointer to the string. Read only! */
    const char     *pszString;
} RTSTRSPACECORE;

/** String space. (Initialize with NULL.) */
typedef PRTSTRSPACECORE     RTSTRSPACE;
/** Pointer to a string space. */
typedef PPRTSTRSPACECORE    PRTSTRSPACE;

/**
 * Inserts a string into a unique string space.
 *
 * @returns true on success.
 * @returns false if the string collided with an existing string.
 * @param   pStrSpace       The space to insert it into.
 * @param   pStr            The string node.
 */
RTDECL(bool) RTStrSpaceInsert(PRTSTRSPACE pStrSpace, PRTSTRSPACECORE pStr);

/**
 * Removes a string from a unique string space.
 *
 * @returns Pointer to the removed string node.
 * @returns NULL if the string was not found in the string space.
 * @param   pStrSpace       The space to remove it from.
 * @param   pszString       The string to remove.
 */
RTDECL(PRTSTRSPACECORE) RTStrSpaceRemove(PRTSTRSPACE pStrSpace, const char *pszString);
+ * Gets a string from a unique string space.
+ *
+ * @returns Pointer to the string node.
+ * @returns NULL if the string was not found in the string space.
+ * @param pStrSpace The space to get it from.
+ * @param pszString The string to get.
+ */
+RTDECL(PRTSTRSPACECORE) RTStrSpaceGet(PRTSTRSPACE pStrSpace, const char *pszString);
+
+/**
+ * Gets a string from a unique string space.
+ *
+ * @returns Pointer to the string node.
+ * @returns NULL if the string was not found in the string space.
+ * @param pStrSpace The space to get it from.
+ * @param pszString The string to get.
+ * @param cchMax The max string length to evaluate. Passing
+ * RTSTR_MAX is ok and makes it behave just like
+ * RTStrSpaceGet.
+ */
+RTDECL(PRTSTRSPACECORE) RTStrSpaceGetN(PRTSTRSPACE pStrSpace, const char *pszString, size_t cchMax);
+
+/**
+ * Callback function for RTStrSpaceEnumerate() and RTStrSpaceDestroy().
+ *
+ * @returns 0 on continue.
+ * @returns Non-zero to aborts the operation.
+ * @param pStr The string node
+ * @param pvUser The user specified argument.
+ */
+typedef DECLCALLBACK(int)   FNRTSTRSPACECALLBACK(PRTSTRSPACECORE pStr, void *pvUser);
+/** Pointer to callback function for RTStrSpaceEnumerate() and RTStrSpaceDestroy(). */
+typedef FNRTSTRSPACECALLBACK *PFNRTSTRSPACECALLBACK;
+
+/**
+ * Destroys the string space.
+ *
+ * The caller supplies a callback which will be called for each of the string
+ * nodes in for freeing their memory and other resources.
+ *
+ * @returns 0 or what ever non-zero return value pfnCallback returned
+ * when aborting the destruction.
+ * @param pStrSpace The space to destroy.
+ * @param pfnCallback The callback.
+ * @param pvUser The user argument.
+ */
+RTDECL(int) RTStrSpaceDestroy(PRTSTRSPACE pStrSpace, PFNRTSTRSPACECALLBACK pfnCallback,
void *pvUser);
+
+/**
+ * Enumerates the string space.
+ * The caller supplies a callback which will be called for each of
+ * the string nodes.
+ *
+ * @returns 0 or what ever non-zero return value pfnCallback returned
+ * when aborting the destruction.
+ * @param   pStrSpace       The space to enumerate.
+ * @param   pfnCallback     The callback.
+ * @param   pvUser          The user argument.
+ */
+RTDECL(int) RTStrSpaceEnumerate(PRTSTRSPACE pStrSpace, PFNRTSTRSPACECALLBACK pfnCallback,
void *pvUser);
+
+/** @} */
+
+/** @defgroup rt_str_hash       Sting hashing
+ * @{ */
+
+/**
+ * Hashes the given string using algorithm \#1.
+ *
+ * @returns String hash.
+ * @param   pszString       The string to hash.
+ */
+RTDECL(uint32_t)    RTStrHash1(const char *pszString);
+
+/**
+ * Hashes the given string as if they were concatenated using algorithm \#1.
+ *
+ * @returns String hash.
+ * @param   pszString       The string to hash.
+ * @param   cchString       The max length to hash. Hashing will stop if the
+ *                          terminator character is encountered first. Passing
+ *                          RTSTR_MAX is fine.
+ */
+RTDECL(uint32_t)    RTStrHash1N(const char *pszString, size_t cchString);
+
+/**
+ * Hashes the given strings as if they were concatenated using algorithm \#1.
+ *
+ * @returns String hash.
+ * @param   cPairs          The number of string / length pairs in the
+ *                          ellipsis.
+ * @param   ...             List of string (const char *) and length
RTDECL(uint32_t) RTStrHash1ExN(size_t cPairs, ...);
+
+/**
+ * Hashes the given strings as if they were concatenated using algorithm #1.
+ *
+ * @returns String hash.
+ * @param   cPairs          The number of string / length pairs in the @a va.
+ * @param   va              List of string (const char *) and length
+ *                         (size_t) pairs. Passing RTSTR_MAX as the size is
+ *                         fine.
+ */
+RTDECL(uint32_t) RTStrHash1ExNV(size_t cPairs, va_list va);
+
+/** @} */
+
+/** @} */
+
+RT_C_DECLS_END
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/time.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/time.h
@@ -0,0 +1,1125 @@
+/** @file
+ * IPRT - Time.
+ */
+@#ifdef
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/time.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/time.h
@@ -0,0 +1,1125 @@
+/** @file
+ * Copyright (C) 2006-2017 Oracle Corporation
+ */
+@#ifdef
+
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ *
+ * The contents of this file may alternatively be used under the terms
+ * of the Common Development and Distribution License Version 1.0
+ * (CDDL) only, as it comes in the "COPYING.CDDL" file of the
+ * VirtualBox OSE distribution, in which case the provisions of the
+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ifndef ___iprt_time_h
+define ___iprt_time_h
+
+include <iprt/cdefs.h>
+include <iprt/types.h>
+
+RT_C_DECLS_BEGIN
+
+/** @defgroup grp_rt_time   RTTime - Time
+ * @ingroup grp_rt
+ * @{
+ */
+
+/** Time Specification.
+ *
+ * Use the inline RTTimeSpecGet/Set to operate on structure this so we
+ * can easily change the representation if required later.
+ *
+ * The current representation is in nanoseconds relative to the unix epoch
+ * (1970-01-01 00:00:00 UTC). This gives us an approximate span from
+ * 1678 to 2262 without sacrificing the resolution offered by the various
+ * host OSes (BSD & LINUX 1ns, NT 100ns).
+ */
+typedef struct RTTIMESPEC
+{
+    /** Nanoseconds since epoch.
+     * The name is intentionally too long to be comfortable to use because you should be
+     * using inline helpers! */
+    int64_t i64NanosecondsRelativeToUnixEpoch;
+} RTTIMESPEC;
+
+/** @name RTTIMESPEC methods
+ * @{
+ */
+
+/** Gets the time as nanoseconds relative to the unix epoch.
+ *
+ * @returns Nanoseconds relative to unix epoch.
+ * @param pTime The time spec to interpret.
+ */
+DECLINLINE(int64_t) RTTimeSpecGetNano(PCRTTIMESPEC pTime)
+{
+    return pTime->i64NanosecondsRelativeToUnixEpoch;
+}
+ * Sets the time given by nanoseconds relative to the unix epoch.
+ *
+ * @returns pTime.
+ * @param pTime The time spec to modify.
+ * @param i64Nano The new time in nanoseconds.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetNano(PRTTIMESPEC pTime, int64_t i64Nano)
+
+ pTime->i64NanosecondsRelativeToUnixEpoch = i64Nano;
+ return pTime;
+
+
+/**
+ * Gets the time as microseconds relative to the unix epoch.
+ *
+ * @returns microseconds relative to unix epoch.
+ * @param pTime The time spec to interpret.
+ */
+DECLINLINE(int64_t) RTTimeSpecGetMicro(PCRTTIMESPEC pTime)
+
+ return pTime->i64NanosecondsRelativeToUnixEpoch / RT_NS_1US;
+
+
+/**
+ * Sets the time given by microseconds relative to the unix epoch.
+ *
+ * @returns pTime.
+ * @param pTime The time spec to modify.
+ * @param i64Micro The new time in microsecond.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetMicro(PRTTIMESPEC pTime, int64_t i64Micro)
+
+ pTime->i64NanosecondsRelativeToUnixEpoch = i64Micro * RT_NS_1US;
+ return pTime;
+
+
+/**
+ * Gets the time as milliseconds relative to the unix epoch.
+ *
+ * @returns milliseconds relative to unix epoch.
+ * @param pTime The time spec to interpret.
DECLINLINE(int64_t) RTTimeSpecGetMilli(PCRTTIMESPEC pTime) {
    return pTime->i64NanosecondsRelativeToUnixEpoch / RT_NS_1MS;
}

DECLINLINE(PRTTIMESPEC) RTTimeSpecSetMilli(PRTTIMESPEC pTime, int64_t i64Milli) {
    pTime->i64NanosecondsRelativeToUnixEpoch = i64Milli * RT_NS_1MS;
    return pTime;
}

DECLINLINE(int64_t) RTTimeSpecGetSeconds(PCRTTIMESPEC pTime) {
    return pTime->i64NanosecondsRelativeToUnixEpoch / RT_NS_1SEC;
}

DECLINLINE(PRTTIMESPEC) RTTimeSpecSetSeconds(PRTTIMESPEC pTime, int64_t i64Seconds) {
    pTime->i64NanosecondsRelativeToUnixEpoch = i64Seconds * RT_NS_1SEC;
    return pTime;
}
+ * Makes the time spec absolute like abs() does (i.e. a positive value).
+ *
+ * @returns pTime.
+ * @param pTime The time spec to modify.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecAbsolute(PRTTIMESPEC pTime)
+{
+    if (pTime->i64NanosecondsRelativeToUnixEpoch < 0)
+        pTime->i64NanosecondsRelativeToUnixEpoch = -pTime->i64NanosecondsRelativeToUnixEpoch;
+    return pTime;
+}
+
+/**
+ * Negates the time.
+ *
+ * @returns pTime.
+ * @param pTime The time spec to modify.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecNegate(PRTTIMESPEC pTime)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch = -pTime->i64NanosecondsRelativeToUnixEpoch;
+    return pTime;
+}
+
+/**
+ * Adds a time period to the time.
+ *
+ * @returns pTime.
+ * @param pTime The time spec to modify.
+ * @param pTimeAdd The time spec to add to pTime.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecAdd(PRTTIMESPEC pTime, PCRTTIMESPEC pTimeAdd)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch += pTimeAdd->i64NanosecondsRelativeToUnixEpoch;
+    return pTime;
+}
+
+/**
+ * Adds a time period given as nanoseconds from the time.
+ *
+ * @returns pTime.
+ * @param pTime The time spec to modify.
+ * @param i64Nano The time period in nanoseconds.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecAddNano(PRTTIMESPEC pTime, int64_t i64Nano)
/**
 * Adds a time period give as microseconds from the time.
 *
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Micro    The time period in microseconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecAddMicro(PRTTIMESPEC pTime, int64_t i64Micro)
{
    pTime->i64NanosecondsRelativeToUnixEpoch += i64Micro * RT_NS_1US;
    return pTime;
}

/**
 * Adds a time period give as milliseconds from the time.
 *
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Milli    The time period in milliseconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecAddMilli(PRTTIMESPEC pTime, int64_t i64Milli)
{
    pTime->i64NanosecondsRelativeToUnixEpoch += i64Milli * RT_NS_1MS;
    return pTime;
}

/**
 * Adds a time period give as seconds from the time.
 *
 * @returns pTime.
 * @param   pTime       The time spec to modify.
 * @param   i64Seconds  The time period in seconds.
 */
DECLINLINE(PRTTIMESPEC) RTTimeSpecAddSeconds(PRTTIMESPEC pTime, int64_t i64Seconds)
{
    pTime->i64NanosecondsRelativeToUnixEpoch += i64Seconds * RT_NS_1SEC;
    return pTime;
}
/**
 + * Subtracts a time period from the time.
 + *
 + * @returns pTime.
 + * @param   pTime       The time spec to modify.
 + * @param   pTimeSub    The time spec to subtract from pTime.
 + */
DECLAREINLINE(PRTTIMESPEC) RTTimeSpecSub(PRTTIMESPEC pTime, PCRTTIMESPEC pTimeSub)
+
+ pTime->i64NanosecondsRelativeToUnixEpoch -= pTimeSub->i64NanosecondsRelativeToUnixEpoch;
+ return pTime;
+
+
+/**
 + * Subtracts a time period give as nanoseconds from the time.
 + *
 + * @returns pTime.
 + * @param   pTime       The time spec to modify.
 + * @param   i64Nano     The time period in nanoseconds.
 + */
DECLAREINLINE(PRTTIMESPEC) RTTimeSpecSubNano(PRTTIMESPEC pTime, int64_t i64Nano)
+
+ pTime->i64NanosecondsRelativeToUnixEpoch -= i64Nano;
+ return pTime;
+
+
+/**
 + * Subtracts a time period give as microseconds from the time.
 + *
 + * @returns pTime.
 + * @param   pTime       The time spec to modify.
 + * @param   i64Micro    The time period in microseconds.
 + */
DECLAREINLINE(PRTTIMESPEC) RTTimeSpecSubMicro(PRTTIMESPEC pTime, int64_t i64Micro)
+
+ pTime->i64NanosecondsRelativeToUnixEpoch -= i64Micro * RT_NS_1US;
+ return pTime;
+
+
+/**
 + * Subtracts a time period give as milliseconds from the time.
 + *
 + * @returns pTime.
 + * @param   pTime       The time spec to modify.
 + * @param   i64Milli    The time period in milliseconds.
 + */
DECLINLINE(PRTTIMESPEC) RTTimeSpecSubMilli(PRTTIMESPEC pTime, int64_t i64Milli)
{
    pTime->i64NanosecondsRelativeToUnixEpoch -= i64Milli * RT_NS_1MS;
    return pTime;
}

DECLINLINE(PRTTIMESPEC) RTTimeSpecSubSeconds(PRTTIMESPEC pTime, int64_t i64Seconds)
{
    pTime->i64NanosecondsRelativeToUnixEpoch -= i64Seconds * RT_NS_1SEC;
    return pTime;
}

DECLINLINE(void) RTTimeSpecGetSecondsAndNano(PRTTIMESPEC pTime, int32_t *pi32Seconds, int32_t *pi32Nano)
{
    int64_t i64 = RTTimeSpecGetNano(pTime);
    int32_t i32Nano = (int32_t)(i64 % RT_NS_1SEC);
    i64 /= RT_NS_1SEC;
    if (i32Nano < 0)
    {
        i32Nano += RT_NS_1SEC;
        i64--;
    }
    *pi32Seconds = (int32_t)i64;
    *pi32Nano = i32Nano;
}

/* PORTME: Add struct timeval guard macro here. */
#ifndef TIMEVAL
#}
### RTTimeSpecGetTimeval

```c
DECLINLINE(struct timeval *) RTTimeSpecGetTimeval(PCRTTIMESPEC pTime, struct timeval *pTimeval)
{
    int64_t i64 = RTTimeSpecGetMicro(pTime);
    int32_t i32Micro = (int32_t)(i64 % RT_US_1SEC);
    i64 /= RT_US_1SEC;
    if (i32Micro < 0)
    {
        i32Micro += RT_US_1SEC;
        i64--;
    }
    pTimeval->tv_sec = (time_t)i64;
    pTimeval->tv_usec = i32Micro;
    return pTimeval;
}
```

### RTTimeSpecSetTimeval

```c
DECLINLINE(PRTTIMESPEC) RTTimeSpecSetTimeval(PRTTIMESPEC pTime, const struct timeval *pTimeval)
{
    return RTTimeSpecAddMicro(RTTimeSpecSetSeconds(pTime, pTimeval->tv_sec), pTimeval->tv_usec);
}
```

---

### RTTimeSpecGetTimeval

```c
DECLINLINE(struct timespec *) RTTimeSpecGetTimeval(PCRTTIMESPEC pTime, struct timespec *pTimeval)
{
    int64_t i64 = RTTimeSpecGetMicro(pTime);
    int32_t i32Micro = (int32_t)(i64 % RT_US_1SEC);
    i64 /= RT_US_1SEC;
    if (i32Micro < 0)
    {
        i32Micro += RT_US_1SEC;
        i64--;
    }
    pTimeval->tv_sec = (time_t)i64;
    pTimeval->tv_nsec = i32Micro;
    return pTimeval;
}
```

### RTTimeSpecSetTimeval

```c
DECLINLINE(PRTTIMESPEC) RTTimeSpecSetTimeval(PRTTIMESPEC pTime, const struct timespec *pTimeval)
{
    return RTTimeSpecAddMicro(RTTimeSpecSetSeconds(pTime, pTimeval->tv_sec), pTimeval->tv_nsec);
}
```

---

### PORTME: Add struct timespec guard macro here. */

```c
#define TIMEVAL_TO_TIMESPEC 
```

---

### DECLINLINE(PRTTIMESPEC) RTTimeSpecGetTimeval(PCRTTIMESPEC pTime, struct timespec *pTimeval)

```c
DECLINLINE(struct timespec *) RTTimeSpecGetTimeval(PCRTTIMESPEC pTime, struct timespec *pTimeval)
{
    int64_t i64 = RTTimeSpecGetMicro(pTime);
    int32_t i32Micro = (int32_t)(i64 % RT_US_1SEC);
    i64 /= RT_US_1SEC;
    if (i32Micro < 0)
    {
        i32Micro += RT_US_1SEC;
        i64--;
    }
    pTimeval->tv_sec = (time_t)i64;
    pTimeval->tv_nsec = i32Micro;
    return pTimeval;
}
```

### DECLINLINE(PRTTIMESPEC) RTTimeSpecSetTimeval(PRTTIMESPEC pTime, const struct timespec *pTimeval)

```c
DECLINLINE(PRTTIMESPEC) RTTimeSpecSetTimeval(PRTTIMESPEC pTime, const struct timespec *pTimeval)
{
    return RTTimeSpecAddMicro(RTTimeSpecSetSeconds(pTime, pTimeval->tv_sec), pTimeval->tv_nsec);
}
```
DECLINLINE(struct timespec *) RTTimeSpecGetTimespec(PCRTTIMESPEC pTime, struct timespec *pTimespec)
{
    int64_t i64 = RTTimeSpecGetNano(pTime);
    int32_t i32Nano = (int32_t)(i64 % RT_NS_1SEC);
    i64 /= RT_NS_1SEC;
    if (i32Nano < 0)
    {
        i32Nano += RT_NS_1SEC;
        i64--;
    }
    pTimespec->tv_sec = (time_t)i64;
    pTimespec->tv_nsec = i32Nano;
    return pTimespec;
}

DECLINLINE(PRTTIMESPEC) RTTimeSpecSetTimespec(PRTTIMESPEC pTime, const struct timespec *pTimespec)
{
    return RTTimeSpecAddNano(RTTimeSpecSetSeconds(pTime, pTimespec->tv_sec), pTimespec->tv_nsec);
}
#endif /* various ways of detecting struct timespec */

/** The offset of the unix epoch and the base for NT time (in 100ns units).
 * Nt time starts at 1601-01-01 00:00:00. */
#define RTTIME_NT_TIME_OFFSET_UNIX (116444736000000000LL)

DECLINLINE(uint64_t) RTTimeSpecGetNtTime(PCRTTIMESPEC pTime)
{
    return pTime->i64NanosecondsRelativeToUnixEpoch / 100
+ RTTIME_NT_TIME_OFFSET_UNIX;
+
+
+/**
+ * Sets the time given by Nt time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   u64NtTime   The new time in Nt time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetNtTime(PRTTIMESPEC pTime, uint64_t u64NtTime)
+{
+    pTime->i64NanosecondsRelativeToUnixEpoch =
+        ((int64_t)u64NtTime - RTTIME_NT_TIME_OFFSET_UNIX) * 100;
+    return pTime;
+}
+
+#ifdef _FILETIME_
+
+/**
+ * Gets the time as NT file time.
+ *
+ * @returns pFileTime.
+ * @param   pTime       The time spec to interpret.
+ * @param   pFileTime   Pointer to NT filetime structure.
+ */
+DECLINLINE(PFILETIME) RTTimeSpecGetNtFileTime(PCRTTIMESPEC pTime, PFILETIME pFileTime)
+{
+    *((uint64_t *)pFileTime) = RTTimeSpecGetNtTime(pTime);
+    return pFileTime;
+}
+
+/**
+ * Sets the time as NT file time.
+ *
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   pFileTime   Where to store the time as Nt file time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetNtFileTime(PRTTIMESPEC pTime, const FILETIME *pFileTime)
+{
+    return RTTimeSpecSetNtTime(pTime, *(const uint64_t *)pFileTime);
+}
+#endif
+/** The offset to the start of DOS time. 
+ * DOS time starts 1980-01-01 00:00:00. */
+#define RTTIME_OFFSET_DOS_TIME (315328000000000000LL)
+
+
+/**
+ * Gets the time as seconds relative to the start of dos time.
+ * @returns seconds relative to the start of dos time.
+ * @param   pTime       The time spec to interpret.
+ */
+DECLINLINE(int64_t) RTTimeSpecGetDosSeconds(PCRTTIMESPEC pTime)
+
+  return (pTime->i64NanosecondsRelativeToUnixEpoch - RTTIME_OFFSET_DOS_TIME)
+       / RT_NS_1SEC;
+
+
+/**
+ * Sets the time given by seconds relative to the start of dos time.
+ * @returns pTime.
+ * @param   pTime       The time spec to modify.
+ * @param   i64Seconds  The new time in seconds relative to the start of dos time.
+ */
+DECLINLINE(PRTTIMESPEC) RTTimeSpecSetDosSeconds(PRTTIMESPEC pTime, int64_t i64Seconds)
+
+  pTime->i64NanosecondsRelativeToUnixEpoch = i64Seconds * RT_NS_1SEC
+  + RTTIME_OFFSET_DOS_TIME;
+  return pTime;
+
+
+/**
+ * Compare two time specs.
+ * @returns true they are equal.
+ * @returns false they are not equal.
+ * @param   pTime1  The 1st time spec.
+ * @param   pTime2  The 2nd time spec.
+ */
+DECLINLINE(bool) RTTimeSpecIsEqual(PCRTTIMESPEC pTime1, PCRTTIMESPEC pTime2)
+
+  return pTime1->i64NanosecondsRelativeToUnixEpoch == pTime2->i64NanosecondsRelativeToUnixEpoch;
+
+}
+ * Compare two time specs.
+ *
+ * @returns 0 if equal, -1 if @a pLeft is smaller, 1 if @a pLeft is larger.
+ * @returns false they are not equal.
+ * @param pLeft The 1st time spec.
+ * @param pRight The 2nd time spec.
+ */
+DECLINLINE(int) RTTimeSpecCompare(PCRTTIMESPEC pLeft, PCRTTIMESPEC pRight)
+{
+    if (pLeft->i64NanosecondsRelativeToUnixEpoch == pRight->i64NanosecondsRelativeToUnixEpoch)
+        return 0;
+    return pLeft->i64NanosecondsRelativeToUnixEpoch < pRight->i64NanosecondsRelativeToUnixEpoch ? -1 : 1;
+}
+
+/**
+ * Converts a time spec to a ISO date string.
+ *
+ * @returns psz on success.
+ * @returns NULL on buffer underflow.
+ * @param pTime The time spec.
+ * @param psz Where to store the string.
+ * @param cb The size of the buffer.
+ */
+RTDECL(char *) RTTimeSpecToString(PCRTTIMESPEC pTime, char *psz, size_t cb);
+
+/**
+ * Attempts to convert an ISO date string to a time structure.
+ *
+ * We're a little forgiving with zero padding, unspecified parts, and leading
+ * and trailing spaces.
+ *
+ * @retval pTime on success,
+ * @retval NULL on failure.
+ *
+ @param pTime The time spec.
+ @parampszString The ISO date string to convert.
+ */
+RTDECL(PRTTIMESPEC) RTTimeSpecFromString(PRTTIMESPEC pTime, const char *pszString);
+
+/** @} */
+
+/** Exploded time.
+ */
+#pragma pack(1)
+typedef struct RTTIME
/** The year number. */
int32_t i32Year;

/** The month of the year (1-12). January is 1. */
uint8_t u8Month;

/** The day of the week (0-6). Monday is 0. */
uint8_t u8WeekDay;

/** The day of the year (1-366). January the 1st is 1. */
uint16_t u16YearDay;

/** The day of the month (1-31). */
uint8_t u8MonthDay;

/** Hour of the day (0-23). */
uint8_t u8Hour;

/** The minute of the hour (0-59). */
uint8_t u8Minute;

/** The second of the minute (0-60). */
uint8_t u8Second;

/** The nanoseconds of the second (0-999999999). */
uint32_t u32Nanosecond;

/** Flags, of the RTTIME_FLAGS_* #defines. */
uint32_t fFlags;

/** UCT time offset in minutes (-840-840). */
int32_t offUTC;

/** Pointer to a exploded time structure. */
typedef RTTIME *PRTTIME;

/** Pointer to a const exploded time structure. */
typedef const RTTIME *PCRTTIME;

/** @name RTTIME::fFlags values. */
* @{
/** Set if the time is UTC. If clear the time local time. */
#define RTTIME_FLAGS_TYPE_MASK 3
#define RTTIME_FLAGS_TYPE_UTC 2

/** Set if the time is local and daylight saving time is in effect. */
#define RTTIME_FLAGS_TYPE_LOCAL 3

/** Set if the time is local and there is no data available on daylight saving time. */
#define RTTIME_FLAGS_NO_DST_DATA RT_BIT(4)

/** Set if the year is a leap year. */
#define RTTIME_FLAGS_LEAP_YEAR RT_BIT(6)
/** Set if the year is a common year. */
+ * This is mutual exclusivw with RTTIME_FLAGS_LEAP_YEAR. */
+ 
+ #define RTTIME_FLAGS_COMMON_YEAR RT_BIT(7)
+ /** The mask of valid flags. */
+ 
+ #define RTTIME_FLAGS_MASK UINT32_C(0xff)
+ /** @} */
+ 
+ /** Gets the current system time (UTC). */
+ + * @returns pTime.
+ * @param pTime Where to store the time.
+ */
+ 
+ RTDECL(PRTTIMESPEC) RTTimeNow(PRTTIMESPEC pTime);
+ 
+ /** Sets the system time. */
+ + * @returns IPRT status code
+ * @param pTime The new system time (UTC).
+ */
+ 
+ RTDECL(int) RTTimeSet(PCRTTIMESPEC pTime);
+ 
+ /** Explodes a time spec (UTC). */
+ + * @returns pTime.
+ * @param pTime Where to store the exploded time.
+ * @param pTimeSpec The time spec to exploded.
+ */
+ 
+ RTDECL(PRTTIME) RTTimeExplode(PRTTIME pTime, PCRTTIMESPEC pTimeSpec);
+ 
+ /** Implodes exploded time to a time spec (UTC). */
+ + * @returns pTime on success.
+ * @returns NULL if the pTime data is invalid.
+ * @param pTimeSpec Where to store the imploded UTC time.
+ * @param pTime Pointer to the exploded time to implode.
+ * @returns RTTimeNormalize() to calculate u16YearDay and
+ * Normalizes the fields of a time structure.
+ *
+ * It is possible to calculate year-day from month/day and vice
+ * versa. If you adjust any of of these, make sure to zero the
+ * other so you make it clear which of the fields to use. If
+ * it's ambiguous, the year-day field is used (and you get
+ * assertions in debug builds).
+ *
+ * All the time fields and the year-day or month/day fields will
+ * be adjusted for overflows. (Since all fields are unsigned, there
+ * is no underflows.) It is possible to exploit this for simple
+ * date math, though the recommended way of doing that to implode
+ * the time into a timespec and do the math on that.
+ *
+ * @returns pTime on success.
+ * @returns NULL if the data is invalid.
+ *
+ * @param   pTime       The time structure to normalize.
+ *
+ * @remarks This function doesn't work with local time, only with UTC time.
+ */
+RTDECL(PRTTIME) RTTimeNormalize(PRTTIME pTime);
+
+/**
+ * Gets the current local system time.
+ *
+ * @returns pTime.
+ * @param   pTime   Where to store the local time.
+ */
+RTDECL(PRTTIMESPEC) RTTimeLocalNow(PRTTIMESPEC pTime);
+
+/**
+ * Gets the delta between UTC and local time.
+ *
+ * @param   LocalTime;  RTTIMESPEC
+ * @endcode
+ * @endcode
+ * @returns Returns the nanosecond delta between UTC and local time.
+ */
+RTDECL(int64_t) RTTimeLocalDeltaNano(void);
/**
 * Explodes a time spec to the localized timezone.
 * 
 * @returns pTime.
 * @param   pTime       Where to store the exploded time.
 * @param   pTimeSpec   The time spec to exploded (UTC).
 * @ */
RTDECL(PRTIME) RTTimeLocalExplode(PRTIME pTime, PCRTTIMESPEC pTimeSpec);
+
/**
 * Normalizes the fields of a time structure containing local time.
 * 
 * @returns pTime on success.
 * @returns NULL if the data is invalid.
 * @param   pTime       The time structure to normalize.
 * @ */
RTDECL(PRTIME) RTTimeLocalNormalize(PRTIME pTime);
+
/**
 * Converts a time spec to a ISO date string.
 * 
 * @returns psz on success.
 * @returns NULL on buffer underflow.
 * @param   pTime       The time. Caller should've normalized this.
 * @param   psz         Where to store the string.
 * @param   cb          The size of the buffer.
 * @ */
RTDECL(char *) RTTimeToString(PCRTTIME pTime, char *psz, size_t cb);
+
/**
 * Attempts to convert an ISO date string to a time structure.
 * 
 * @retval  pTime on success,
 * @retval  NULL on failure.
 * @param   pTime       Where to store the time on success.
 * @param   pszString   The ISO date string to convert.
 * @ */
RTDECL(PRTTIME) RTTimeFromString(PRTTIME pTime, const char *pszString);
+
/**
 * Checks if a year is a leap year or not.
 * 
 * @returns true if it's a leap year.
 * @ */

+ * @returns false if it’s a common year.
+ * @param   i32Year   The year in question.
+ */
+RTDECL(bool) RTTimeIsLeapYear(int32_t i32Year);
+
+/**
+ * Compares two normalized time structures.
+ *
+ * @retval  0 if equal.
+ * @retval -1 if @a pLeft is earlier than @a pRight.
+ * @retval  1 if @a pRight is earlier than @a pLeft.
+ *
+ * @param   pLeft       The left side time. NULL is accepted.
+ * @param   pRight      The right side time. NULL is accepted.
+ *
+ * @note    A NULL time is considered smaller than anything else. If both are
+ *          NULL, they are considered equal.
+ */
+RTDECL(int) RTTimeCompare(PCRTTIME pLeft, PCRTTIME pRight);
+
+/**
+ * Gets the current nanosecond timestamp.
+ *
+ * @returns nanosecond timestamp.
+ */
+RTDECL(uint64_t) RTTimeNanoTS(void);
+
+/**
+ * Gets the current millisecond timestamp.
+ *
+ * @returns millisecond timestamp.
+ */
+RTDECL(uint64_t) RTTimeMilliTS(void);
+
+/**
+ * Debugging the time api.
+ *
+ * @returns the number of 1ns steps which has been applied by RTTimeNanoTS().
+ */
+RTDECL(uint32_t) RTTimeDbgSteps(void);
+
+/**
+ * Debugging the time api.
+ *
+ * @returns the number of times the TSC interval expired RTTimeNanoTS().
+ */
+RTDECL(uint32_t) RTTimeDbgExpired(void);
/**
 * Debugging the time api.
 *
 * @returns the number of bad previous values encountered by RTTimeNanoTS().
 */
RTDECL(uint32_t) RTTimeDbgBad(void);

/**
 * Debugging the time api.
 *
 * @returns the number of update races in RTTimeNanoTS().
 */
RTDECL(uint32_t) RTTimeDbgRaces(void);

/** @name RTTimeNanoTS GIP worker functions, for TM. */
/** Pointer to a RTTIMENANOTSDATA structure. */
typedef struct RTTIMENANOTSDATA *PRTTIMENANOTSDATA;

/**
 * Nanosecond timestamp data.
 *
 * This is used to keep track of statistics and callback so IPRT and TM (VirtualBox) can share code.
 *
 * @remark Keep this in sync with the assembly version in timesupA.asm.
 */
typedef struct RTTIMENANOTSDATA {
    /**
     * Where the previous timestamp is stored.
     * This is maintained to ensure that time doesn't go backwards or anything. */
    uint64_t volatile *pu64Prev;

    /**
     * Helper function that's used by the assembly routines when something goes bust.
     */
    DECLCALLBACKMEMBER(void, pfnBad)(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS, uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS);

    /**
     * Callback for when rediscovery is required.
     */
    DECLCALLBACKMEMBER(void, pfnBad)(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS, uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS);

    /*
     * @param pData Pointer to this structure.
     */
    DECLCALLBACKMEMBER(void, pfnBad)(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS, uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS);

    /*
     * @returns Nanosecond timestamp.
     */
+ * @param pData Pointer to this structure.
+ */
+ DECLCALLBACKMEMBER(uint64_t, pfnRediscover)(PRTTIMENANOTSDATA pData);
+
+ /*
+ * Callback for when some CPU index related stuff goes wrong.
+ */
+ * @returns Nanosecond timestamp.
+ * @param pData Pointer to this structure.
+ * @param idApic The APIC ID if available, otherwise (UINT16_MAX-1).
+ * @param iCpuSet The CPU set index if available, otherwise (UINT16_MAX-1).
+ * @param iGipCpu The GIP CPU array index if available, otherwise (UINT16_MAX-1).
+ */
+ DECLCALLBACKMEMBER(uint64_t, pfnBadCpuIndex)(PRTTIMENANOTSDATA pData, uint16_t idApic,
+ uint16_t iCpuSet, uint16_t iGipCpu);
+
+ /**< Number of 1ns steps because of overshooting the period. */
+ uint32_t c1nsSteps;
+ /**< The number of times the interval expired (overflow). */
+ uint32_t cExpired;
+ /**< Number of "bad" previous values. */
+ uint32_t cBadPrev;
+ /**< The number of update races. */
+ uint32_t cUpdateRaces;
+ } RTTIMENANOTSDATA;
+
+} ifndef IN_RING3
+/**
+ * The Ring-3 layout of the RTTIMENANOTSDATA structure.
+ */
+typedef struct RTTIMENANOTSDATAR3
+{
+  R3PTRTYPE(uint64_t volatile *) pu64Prev;
+  DECLR3CALLBACKMEMBER(void, pfnBad,(PRTTIMENANOTSDATA pData, uint64_t u64NanoTS,
+                                  uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS));
+  DECLR3CALLBACKMEMBER(uint64_t, pfnRediscover,(PRTTIMENANOTSDATA pData));
+  DECLR3CALLBACKMEMBER(uint64_t, pfnBadCpuIndex,(PRTTIMENANOTSDATA pData, uint16_t idApic,
+                                                 uint16_t iCpuSet, uint16_t iGipCpu));
+  uint32_t c1nsSteps;
+  uint32_t cExpired;
+  uint32_t cBadPrev;
+  uint32_t cUpdateRaces;
+ } RTTIMENANOTSDATAR3;
+} else
+typedef RTTIMENANOTSDATA RTTIMENANOTSDATAR3;
+#endif
+ #ifndef IN_RING0
+ /**
+  * The Ring-3 layout of the RTTIMENANOTSDATA structure.
+ */
+ typedef struct RTTIMENANOTSDATAR0
+ {
+    R0PTRTYPE(uint64_t volatile *) pu64Prev;
+    DECLR0CALLBACKMEMBER(void, pfnBad,(RTTIMENANOTSDATA pData, uint64_t u64NanoTS,
      uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS));
+    DECLR0CALLBACKMEMBER(uint64_t, pfnRediscover,(RTTIMENANOTSDATA pData));
+    DECLR0CALLBACKMEMBER(uint64_t, pfnBadCpuIndex,(RTTIMENANOTSDATA pData, uint16_t
      idApic, uint16_t iCpuSet, uint16_t iGipCpu));
+    uint32_t c1nsSteps;
+    uint32_t cExpired;
+    uint32_t cBadPrev;
+    uint32_t cUpdateRaces;
+ } RTTIMENANOTSDATAR0;
+ #else
+ typedef RTTIMENANOTSDATA RTTIMENANOTSDATAR0;
+ #endif
+
+ #ifndef IN_RC
+ /**
+  * The RC layout of the RTTIMENANOTSDATA structure.
+ */
+ typedef struct RTTIMENANOTSDATARC
+ {
+    RCPTRTYPE(uint64_t volatile *) pu64Prev;
+    DECLRCCALLBACKMEMBER(void, pfnBad,(RTTIMENANOTSDATA pData, uint64_t u64NanoTS,
      uint64_t u64DeltaPrev, uint64_t u64PrevNanoTS));
+    DECLRCCALLBACKMEMBER(uint64_t, pfnRediscover,(RTTIMENANOTSDATA pData));
+    DECLRCCALLBACKMEMBER(uint64_t, pfnBadCpuIndex,(RTTIMENANOTSDATA pData, uint16_t
      idApic, uint16_t iCpuSet, uint16_t iGipCpu));
+    uint32_t c1nsSteps;
+    uint32_t cExpired;
+    uint32_t cBadPrev;
+    uint32_t cUpdateRaces;
+ } RTTIMENANOTSDATARC;
+ #else
+ typedef RTTIMENANOTSDATA RTTIMENANOTSDATARC;
+ #endif
+
+ /** Internal RTTimeNanoTS worker (assembly). */
+ typedef DECLCALLBACK(uint64_t) FNTIMENANOTSINTERNAL(PRTTIMENANOTSDATA pData);
+ /** Pointer to an internal RTTimeNanoTS worker (assembly). */
+ typedef FNTIMENANOTSINTERNAL *PFNTIMENANOTSINTERNAL;
+ RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarNoDelta(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarNoDelta(PRTTIMENANOTSDATA pData);
+#ifdef IN_RING3
+RTDECL(uint64_t) RTTimeNanoTSLegacyAsyncUseApicId(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLegacyAsyncUseRdtscp(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLegacyAsyncUseRdtscpGroupChNumCl(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLegacyAsyncUseIdtrLim(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDeltaUseApicId(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDeltaUseRdtscp(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDeltaUseIdtrLim(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceAsyncUseApicId(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceAsyncUseRdtscp(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceAsyncUseRdtscpGroupChNumCl(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceAsyncUseIdtrLim(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDeltaUseApicId(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDeltaUseRdtscp(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDeltaUseIdtrLim(PRTTIMENANOTSDATA pData);
+#else
+RTDECL(uint64_t) RTTimeNanoTSLegacyAsync(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLegacySyncInvarWithDelta(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceAsync(PRTTIMENANOTSDATA pData);
+RTDECL(uint64_t) RTTimeNanoTSLFenceSyncInvarWithDelta(PRTTIMENANOTSDATA pData);
+#endif
+
+/** @} */
+
+/** *
+ * Gets the current nanosecond timestamp.
+ *
+ * This differs from RTTimeNanoTS in that it will use system APIs and not do any
+ * resolution or performance optimizations.
+ *
+ * @returns nanosecond timestamp.
+ */
+RTDECL(uint64_t) RTTimeSystemNanoTS(void);
+
+/** *
+ * Gets the current millisecond timestamp.
+ *
+ * This differs from RTTimeNanoTS in that it will use system APIs and not do any
+ * resolution or performance optimizations.
+ *
+ * @returns millisecond timestamp.
+ */
+RTDECL(uint64_t) RTTimeSystemMilliTS(void);
+
+/** *
+ * Get the nanosecond timestamp relative to program startup.
+ */
/*
 * @returns Timestamp relative to program startup.
 */
RTDECL(uint64_t) RTTimeProgramNanoTS(void);

/*@returns Timestamp relative to program startup.
 */
RTDECL(uint64_t) RTTimeProgramMicroTS(void);

/*@returns Timestamp relative to program startup.
 */
RTDECL(uint64_t) RTTimeProgramMilliTS(void);

/*@returns Timestamp relative to program startup.
 */
RTDECL(uint32_t) RTTimeProgramSecTS(void);

/*@returns Program startup timestamp.
 */
RTDECL(uint64_t) RTTimeProgramStartNanoTS(void);

/**
 * Time zone information.
 */
typedef struct RTTIMEZONEINFO
{
    /**< Unix time zone name (continent/country[/city]). */
    const char *pszUnixName;
    /**< Windows time zone name. */
    const char *pszWindowsName;
    /**< The length of the unix time zone name. */
    uint8_t cchUnixName;
    /**< The length of the windows time zone name. */
    uint8_t cchWindowsName;
    /**< Two letter country/territory code if applicable, otherwise 'ZZ'. */
}
+ char szCountry[3];
+ /* Two letter windows country/territory code if applicable.
+ * Empty string if no windows mapping. */
+ char szWindowsCountry[3];
+ #if 0 /* Add when needed and it's been extracted. */
+ /** The standard delta in minutes (add to UTC). */
+ int16_t cMinStdDelta;
+ /** The daylight saving time delta in minutes (add to UTC). */
+ int16_t cMinDstDelta;
+#endif
+ /** closest matching windows time zone index. */
+ uint32_t idxWindows;
+ /** Flags, RTTIMEZONEINFO_F_XXX. */
+ uint32_t fFlags;
+ } RTTIMEZONEINFO;
+/** Pointer to time zone info. */
+typedef RTTIMEZONEINFO const *PCRTTIMEZONEINFO;
+
+/** @name RTTIMEZONEINFO_F_XXX - time zone info flags. */
+*/
+/** @} */
+
+/** Looks up static time zone information by unix name. */
+*/
+/** @returns Pointer to info entry if found, NULL if not. */
+/** @param pszName The unix zone name (TZ). */
+*/
+RTDECL(PCRTTIMEZONEINFO) RTTimeZoneGetInfoByUnixName(const char *pszName);
+
+/** Looks up static time zone information by window name. */
+*/
+/** @returns Pointer to info entry if found, NULL if not. */
+/** @param pszName The windows zone name (reg key). */
+*/
+RTDECL(PCRTTIMEZONEINFO) RTTimeZoneGetInfoByWindowsName(const char *pszName);
+
+/** Looks up static time zone information by windows index. */
+*/
+/** @returns Pointer to info entry if found, NULL if not. */
+/** @param idxZone The windows timezone index. */
+*/
+RTDECL(PCRTTIMEZONEINFO) RTTimeZoneGetInfoByWindowsIndex(uint32_t idxZone);
/**
 * Get the current time zone (TZ).
 *
 * @returns IPRT status code.
 * @param   pszName     Where to return the time zone name.
 * @param   cbName      The size of the name buffer.
 */
RTDECL(int) RTTimeZoneGetCurrent(char *pszName, size_t cbName);

/** @} */

RT_C_DECLS_END

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/types.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/types.h
@@ -0,0 +1,3163 @@
/** @file
 * IPRT - Types.
 */

+#ifndef ___iprt_types_h
+#define ___iprt_types_h

#include <iprt/cdefs.h>
#include <iprt/stdint.h>
#include <iprt/stdarg.h>

/*
 * Include standard C types.
 */
#ifndef IPRT_NO_CRT

#if defined(IN_XF86_MODULE) && !defined(NO_ANSIC)
    /*
     * Kludge for xfree86 modules: size_t and other types are redefined.
     */
    RT_C_DECLS_BEGIN
    #include "xf86_ansic.h"
    #undef NULL
    RT_C_DECLS_END
#endif

#elif defined(RT_OS_DARWIN) && defined(KERNEL)
    /*
     * Kludge for the darwin kernel:
     * stddef.h is missing IIRC.
     */
    ifndef _PTRDIFF_T
    define _PTRDIFF_T
    typedef __darwin_ptrdiff_t ptrdiff_t;
    endif
#endif

#elif defined(RT_OS_FREEBSD) && defined(_KERNEL)
    /*
     * Kludge for the FreeBSD kernel:
     * stddef.h and sys/types.h have slightly different offsetof definitions
     * when compiling in kernel mode. This is just to make GCC shut up.
     */
    ifndef _STDDEF_H_
    undef offsetof
    endif
    ifndef _SYS_TYPES_H_
    undef offsetof
    endif
#endif

elif defined(RT_OS_FREEBSD) && HC_ARCH_BITS == 64 && defined(RT_ARCH_X86)
    /*
     * Kludge for compiling 32-bit code on a 64-bit FreeBSD:
     */

FreeBSD declares uint64_t and int64_t wrong (long unsigned and long int though they need to be long long unsigned and long long int). These defines conflict with our declaration in stdint.h. Adding the defines below omits the definitions in the system header.

```c
#include <stddef.h>
#define _UINT64_T_DECLARED
#define _INT64_T_DECLARED
#define _UINTPTR_T_DECLARED
#define _INTPTR_T_DECLARED
#include <sys/types.h>

#elif defined(RT_OS_NETBSD) && defined(_KERNEL)

#include <sys/types.h>

#elif defined(RT_OS_LINUX) && defined(__KERNEL__)  
```

Kludge for NetBSD-6.x where the definition of bool in <sys/types.h> does not check for C++.

```c
#elif defined(__cplusplus) && defined(bool)
#undef bool
#undef true
#undef false
#endif
```

Kludge for NetBSD-6.x where <sys/types.h> does not define ptrdiff_t for the kernel code. Note that we don't worry about redefinition in <stdint.h> since that header doesn't exist for _KERNEL code.

```c
#elif defined(_BSD_PTRDIFF_T_)
typedef _BSD_PTRDIFF_T_ ptrdiff_t;
#endif
```

Kludge for the linux kernel: 1. sys/types.h doesn't mix with the kernel. 2. Starting with 2.6.19, linux/types.h typedefs bool and linux/stddef.h declares false and true as enum values. 3. Starting with 2.6.24, linux/types.h typedefs uintptr_t. We work around these issues here and nowhere else.

```c
/#endif defined(RT_OS_LINUX) && defined(__KERNEL__)#endif defined(RT_OS_NETBSD) && defined(_KERNEL)_def _plusplus) && defined(bool)
#undef bool
#undef true
#undef false
#endif
```

```c
typedef bool _Bool;
```
+## endif
+## define bool linux_bool
+## define true linux_true
+## define false linux_false
+## define uintptr_t linux_uintptr_t
+## include <linux/version.h>
+## if LINUX_VERSION_CODE >= KERNEL_VERSION(2,6,33)
+## include <generated/autoconf.h>
+## else
+## ifndef AUTOCONF_INCLUDED
+## include <linux/autoconf.h>
+## endif
+## endif
+## include <linux/compiler.h>
+## if defined(__cplusplus)
+  /*
+   * Starting with 3.3, <linux/compiler-gcc.h> appends 'notrace' (which
+   * expands to __attribute__((no_instrument_function))) to inline,
+   * __inline and __inline__. Revert that.
+   */
+  #undef inline
+  define inline inline
+  #undef __inline_
+  define __inline__ __inline__
+  #undef __inline
+  define __inline __inline
+  endif
+## include <linux/types.h>
+## include <linux/stddef.h>
+  /*
+   * Starting with 3.4, <linux/stddef.h> defines NULL as '((void*)0)' which
+   * does not work for C++ code.
+   */
+## undef NULL
+## undef intptr_t
+## ifdef __GNUC__
+## if !RT_GNUC_PREREQ(4, 1)
+  /*
+   * <linux/compiler-gcc[3,4].h> does
+   * #define __inline__ __inline__ __attribute__((always_inline))
+   * in some older Linux kernels. Forcing inlining will fail for some RTStrA*
+   * functions with gcc <= 4.0 due to passing variable argument lists.
+   */
+## endif
+## endif
+## undef false
+# undef true
+# undef bool
+# else
+# include <stddef.h>
+# include <sys/types.h>
+# endif
+
+/* Define any types missing from sys/types.h on windows. */
+# ifdef _MSC_VER
+# undef ssize_t
+ typedef intptr_t ssize_t;
+# endif
+
+/* else */
+/* no crt */
+# include <iprt/nocrt/compiler/compiler.h>
+#endif /* no crt */
+
+/** @def NULL
 + * NULL pointer.
 + */
+#ifndef NULL
+# ifdef __cplusplus
+ define NULL 0
+# else
+ define NULL ((void*)0)
+# endif
+#endif
+
+/** @} grp_rt_types  IPRT Base Types */
+ * @{
+ */
+
+/** define wchar_t, we don't wanna include all the wcsstuff to get this. */
+#ifdef _MSC_VER
+# ifndef WCHAR_T_DEFINED
+ typedef unsigned short wchar_t;
+# define WCHAR_T_DEFINED
+# endif
+#ifdef __GNUC__
+ /** @todo wchar_t on GNUC */
+#endif
+
+)
C doesn’t have bool, nor does VisualAge for C++ v3.08.

/*
 * ifdef (__cplusplus) || (defined(__IBMCPP__) && defined(RT_OS_OS2))
 * if defined(__GNUC__)
 * #ifdef (__GNUC__) && __GNUC__ < 3
 * typedef uint8_t bool;
 * #elif defined(RT_OS_FREEBSD)
 * ifndef __bool_true_false_are_defined
 * typedef _Bool bool;
 * #endif
 * endif
 * #elif defined(RT_OS_NETBSD)
 * #if !defined(__KERNEL)
 * /*
 * * For the kernel code <stdbool.h> is not available, but bool is
 * * provided by <sys/types.h> included above.
 * */
 * #include <stdbool.h>
 *
 * /*
 * ... but the story doesn’t end here. The C standard says that
 * * <stdbool.h> defines preprocessor macro “bool” that expands to
 * * “_Bool”, but adds that a program may undefine/redefine it
 * * (this is 7.16 in C99 and 7.18 in C11). We have to play this
 * * game here because X11 code uses “bool” as a struct member name
 * * - so undefine “bool” and provide it as a typedef instead. We
 * * still keep #include <stdbool.h> so that any code that might
 * * include it later doesn’t mess things up.
 * */
 * #ifndef bool
 * typedef _Bool bool;
 * endif
 * else
 * #if (defined(RT_OS_DARWIN) || defined(RT_OS_HAIKU)) && (defined(__STDBOOL_H) ||
 * defined(__STDBOOL_H))
 * #ifndef bool
 * endif
 * endif
 * else
 * #if RT_MSC_PREREQ(RT_MSC_VER_VC120)
 * include <stdbool.h>
 * #elif defined(RT_OS_DARWIN) || defined(RT_OS_HAIKU)
 * #ifdef (__GNUC__) && __GNUC__ < 3
 * typedef uint8_t bool;
 * endif
 * endif
 * else
 * #define true (1)
### endif
### ifndef false
### define false (0)
### endif
+**
+* 128-bit unsigned integer.
+*/
+#if defined(__GNUC__) && defined(RT_ARCH_AMD64)
typedef __uint128_t uint128_t;
#else
typedef struct uint128_s {
+   # ifdef RT_BIG_ENDIAN
   #endif
 +   uint64_t    Hi;
 +   uint64_t    Lo;
 +} uint128_t;
+#endif
+

### endif
+
+**
+* 128-bit signed integer.
+*/
+#if defined(__GNUC__) && defined(RT_ARCH_AMD64)
typedef __int128_t int128_t;
#else
typedef struct int128_s {
+   # ifdef RT_BIG_ENDIAN
   #endif
 +   int64_t     Hi;
 +   uint64_t    Lo;
 +} int128_t;
+#endif
+

### endif
+
+**
+* 16-bit unsigned integer union.
+*/
typedef union RTUINT16U
+{  
    /** natural view. */  
    uint16_t  u;
+
    /** 16-bit view. */  
    uint16_t  au16[1];
    /** 8-bit view. */  
    uint8_t   au8[2];
    /** 16-bit hi/lo view. */  
    struct  
    {  
        #ifdef RT_BIG_ENDIAN  
        uint8_t    Hi;
        uint8_t    Lo;
        #else  
        uint8_t    Lo;
        uint8_t    Hi;
        #endif  
    } s;
} RTUINT16U;
/** Pointer to a 16-bit unsigned integer union. */
typedef RTUINT16U RT_FAR *PRTUINT16U;
/** Pointer to a const 32-bit unsigned integer union. */
typedef const RTUINT16U RT_FAR *PCRTUINT16U;
+
+
/**  
* 32-bit unsigned integer union.  
*/
typedef union RTUINT32U
+{  
    /** natural view. */  
    uint32_t  u;
    /** Hi/Low view. */  
    struct  
    {  
        #ifdef RT_BIG_ENDIAN  
        uint16_t    Hi;
        uint16_t    Lo;
        #else  
        uint16_t    Lo;
        uint16_t    Hi;
        #endif  
    } s;
} s;
/** Word view. */
    struct  
    {  
        #ifdef RT_BIG_ENDIAN  
        uint16_t    Hi;
        uint16_t    Lo;
        #else  
        uint16_t    Lo;
        uint16_t    Hi;
        #endif  
    } s;
/** Word view. */
    struct  
    {  
        #ifdef RT_BIG_ENDIAN  
        uint16_t    Hi;
        uint16_t    Lo;
        #else  
        uint16_t    Lo;
        uint16_t    Hi;
        #endif  
    } s;
+    #ifdef RT_BIG_ENDIAN
+        uint32_t    Hi;
+        uint32_t    Lo;
+    #else
+        uint32_t    Lo;
+        uint32_t    Hi;
+    +#endif
+    } s;
+    /** Double-Word view. */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint32_t    dw1;
+            uint32_t    dw0;
+        #else
+            uint32_t    dw0;
+            uint32_t    dw1;
+        +#endif
+    } Words;
+}
+
+    /** 32-bit view. */
+    uint32_t    au32[1];
+    /** 16-bit view. */
+    uint16_t    au16[2];
+    /** 8-bit view. */
+    uint8_t     au8[4];
+
+} RTUINT32U;
+
+/** Pointer to a 32-bit unsigned integer union. */
+typedef RTUINT32U RT_FAR *PRTUINT32U;
+
+/** Pointer to a const 32-bit unsigned integer union. */
+typedef const RTUINT32U RT_FAR *PCRTUINT32U;
+
+/**
+ * 64-bit unsigned integer union.
+ */
+typedef union RTUINT64U
+{
+    /** Natural view. */
+    uint64_t    u;
+    /** Hi/Low view. */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint32_t    Hi;
+            uint32_t    Lo;
+        #else
+            uint32_t    Lo;
+            uint32_t    Hi;
+        +#endif
+    } s;
+    /** Double-Word view. */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint32_t    dw1;
+            uint32_t    dw0;
+        #else
+            uint32_t    dw0;
+            uint32_t    dw1;
+        +#endif
+    } Words;
+} RTUINT64U;
+
+/** Pointer to a 64-bit unsigned integer union. */
+typedef RTUINT64U RT_FAR *PRTUINT64U;
+
+/** Pointer to a const 64-bit unsigned integer union. */
+typedef const RTUINT64U RT_FAR *PCRTUINT64U;
```c
+  { } DWords;
+  /** Word view. */
+  struct
+  { }
+  #ifdef RT_BIG_ENDIAN
+  +    uint16_t    w3;
+  +    uint16_t    w2;
+  +    uint16_t    w1;
+  +    uint16_t    w0;
+  +#else
+  +    uint16_t    w0;
+  +    uint16_t    w1;
+  +    uint16_t    w2;
+  +    uint16_t    w3;
+  +#endif
+  +  } Words;
+  /** 64-bit view. */
+  +    uint64_t    au64[1];
+  /** 32-bit view. */
+  +    uint32_t    au32[2];
+  /** 16-bit view. */
+  +    uint16_t    au16[4];
+  /** 8-bit view. */
+  +    uint8_t     au8[8];
+  } RTUINT64U;
+  /** Pointer to a 64-bit unsigned integer union. */
+  typedef RTUINT64U RT_FAR *PRTUINT64U;
+  /** Pointer to a const 64-bit unsigned integer union. */
+  typedef const RTUINT64U RT_FAR *PCRTUINT64U;
+  
+  
+  /** 128-bit unsigned integer union. */
+  +  */
+  +#pragma pack(1)
+  +  typedef union RTUINT128U
+  { }
+  /** Hi/Low view. */
+  +  * @remarks We put this first so we can have portable initializers
+  +  * (RTUINT128_INIT) */
+  +  struct
+  { }
+  #ifdef RT_BIG_ENDIAN
+  +    uint64_t    Hi;
+  +    uint64_t    Lo;
+  +#else
```
+    uint64_t   Lo;
+    uint64_t   Hi;
+#endif
+  } s;
+
+  /** Natural view.
+   * WARNING! This member depends on the compiler supporting 128-bit stuff. */
+  uint128_t   u;
+
+  /** Quad-Word view. */
+  struct
+  {
+    #ifdef RT_BIG_ENDIAN
+      uint64_t   qw1;
+      uint64_t   qw0;
+    #else
+      uint64_t   qw0;
+      uint64_t   qw1;
+    #endif
+  } QWords;
+  /** Double-Word view. */
+  struct
+  {
+    #ifdef RT_BIG_ENDIAN
+      uint32_t   dw3;
+      uint32_t   dw2;
+      uint32_t   dw1;
+      uint32_t   dw0;
+    #else
+      uint32_t   dw0;
+      uint32_t   dw1;
+      uint32_t   dw2;
+      uint32_t   dw3;
+    #endif
+  } DWords;
+  /** Word view. */
+  struct
+  {
+    #ifdef RT_BIG_ENDIAN
+      uint16_t   w7;
+      uint16_t   w6;
+      uint16_t   w5;
+      uint16_t   w4;
+      uint16_t   w3;
+      uint16_t   w2;
+      uint16_t   w1;
+      uint16_t   w0;
+    #else
+      uint16_t   w0;
+      uint16_t   w1;
+      uint16_t   w2;
+      uint16_t   w3;
+      uint16_t   w4;
+      uint16_t   w5;
+      uint16_t   w6;
+      uint16_t   w7;
+    #endif
+  } Ws;
typedef union 
 + {
   +    uint16_t  w0;
   +    uint16_t  w1;
   +    uint16_t  w2;
   +    uint16_t  w3;
   +    uint16_t  w4;
   +    uint16_t  w5;
   +    uint16_t  w6;
   +    uint16_t  w7;
   + } Words;
+
+    /** 64-bit view. */
+    uint64_t    au64[2];
+    /** 32-bit view. */
+    uint32_t    au32[4];
+    /** 16-bit view. */
+    uint16_t    au16[8];
+    /** 8-bit view. */
+    uint8_t     au8[16];
+ } RTUINT128U;
+
+    #pragma pack()
+
+    /** Pointer to a 128-bit unsigned integer union. */
+    typedef RTUINT128U RT_FAR *PRTUINT128U;
+
+    /** Pointer to a const 128-bit unsigned integer union. */
+    typedef const RTUINT128U RT_FAR *PCRTUINT128U;
+
+    /**< @def RTUINT128_INIT
+       * Portable RTUINT128U initializer. */
+    #ifdef RT_BIG_ENDIAN
+    # define RTUINT128_INIT(a_Hi, a_Lo) { { a_Hi, a_Lo } }
+    #else
+    # define RTUINT128_INIT(a_Hi, a_Lo) { { a_Lo, a_Hi } }
+    #endif
+
+    /**< @def RTUINT128_INIT_C
+       * Portable RTUINT128U initializer for 64-bit constants. */
+    #ifdef RT_BIG_ENDIAN
+    # define RTUINT128_INIT_C(a_Hi, a_Lo) { { UINT64_C(a_Hi), UINT64_C(a_Lo) } }
+    #else
+    # define RTUINT128_INIT_C(a_Hi, a_Lo) { { UINT64_C(a_Lo), UINT64_C(a_Hi) } }
+    #endif
    +

    /**<
       * 256-bit unsigned integer union.
       */
    +
+    #pragma pack(1)
+    /**<
       * typedef union RTUINT256U
       */

---

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+{
+    /** Quad-Word view (first as it's used by RTUINT256_INIT). */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint64_t    qw3;
+            uint64_t    qw2;
+            uint64_t    qw1;
+            uint64_t    qw0;
+        #else
+            uint64_t    qw0;
+            uint64_t    qw1;
+            uint64_t    qw2;
+            uint64_t    qw3;
+        #endif
+    } QWords;
+    /** Double-Word view. */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint32_t    dw7;
+            uint32_t    dw6;
+            uint32_t    dw5;
+            uint32_t    dw4;
+            uint32_t    dw3;
+            uint32_t    dw2;
+            uint32_t    dw1;
+            uint32_t    dw0;
+        #else
+            uint32_t    dw0;
+            uint32_t    dw1;
+            uint32_t    dw2;
+            uint32_t    dw3;
+            uint32_t    dw4;
+            uint32_t    dw5;
+            uint32_t    dw6;
+            uint32_t    dw7;
+        #endif
+    } DWords;
+    /** Word view. */
+    struct
+    {
+        #ifdef RT_BIG_ENDIAN
+            uint16_t    w15;
+            uint16_t    w14;
+            uint16_t    w13;
+            uint16_t    w12;
+        #endif
+    } WWords;
+}
+ uint16_t w10;
+ uint16_t w9;
+ uint16_t w8;
+ uint16_t w7;
+ uint16_t w6;
+ uint16_t w5;
+ uint16_t w4;
+ uint16_t w3;
+ uint16_t w2;
+ uint16_t w1;
+ uint16_t w0;
+ #else
+ uint16_t w0;
+ uint16_t w1;
+ uint16_t w2;
+ uint16_t w3;
+ uint16_t w4;
+ uint16_t w5;
+ uint16_t w6;
+ uint16_t w7;
+ uint16_t w8;
+ uint16_t w9;
+ uint16_t w10;
+ uint16_t w11;
+ uint16_t w12;
+ uint16_t w13;
+ uint16_t w14;
+ uint16_t w15;
+ #endif
+ } Words;
+
+ /** Double-Quad-Word view. */
+ struct
+ {
+ #ifdef RT_BIG_ENDIAN
+ RTUINT128U dqw1;
+ RTUINT128U dqw0;
+ #else
+ RTUINT128U dqw0;
+ RTUINT128U dqw1;
+ #endif
+ } DQWords;
+
+ /** 128-bit view. */
+ RTUINT128U au128[2];
+ /** 64-bit view. */
+ uint64_t au64[4];
+ /** 32-bit view. */
+ uint32_t  au32[8];
+ /** 16-bit view. */
+ uint16_t  au16[16];
+ /** 8-bit view. */
+ uint8_t   au8[32];
+ } RTUINT256U;
+#pragma pack()
+ /** Pointer to a 256-bit unsigned integer union. */
+ typedef RTUINT256U RT_FAR *PRTUINT256U;
+ /** Pointer to a const 256-bit unsigned integer union. */
+ typedef const RTUINT256U RT_FAR *PCRTUINT256U;
+
+ /** @def RTUINT256_INIT
+ * Portable RTUINT256U initializer. */
+ #ifdef RT_BIG_ENDIAN
+ ## define RTUINT256_INIT(a_Qw3, a_Qw2, a_Qw1, a_Qw0)   { { a_Qw3, a_Qw2, a_Qw1, a_Qw0 } } 
+ #else
+ ## define RTUINT256_INIT(a_Qw3, a_Qw2, a_Qw1, a_Qw0)   { { a_Qw0, a_Qw1, a_Qw2, a_Qw3 } } 
+ #endif
+ 
+ /** @def RTUINT256_INIT_C
+ * Portable RTUINT256U initializer for 64-bit constants. */
+ #define RTUINT256_INIT_C(a_Qw3, a_Qw2, a_Qw1, a_Qw0)  
+ RTUINT256_INIT(UINT64_C(a_Qw3), UINT64_C(a_Qw2), UINT64_C(a_Qw1), UINT64_C(a_Qw0))
+
+ /**
+ * 512-bit unsigned integer union.
+ */
+ #pragma pack(1)
+ typedef union RTUINT512U
+ { 
+ /** Quad-Word view (first as it's used by RTUINT512_INIT). */
+ struct
+ { 
+ #ifdef RT_BIG_ENDIAN
+ uint64_t   qw7;
+ uint64_t   qw6;
+ uint64_t   qw5;
+ uint64_t   qw4;
+ uint64_t   qw3;
+ uint64_t   qw2;
+ uint64_t   qw1;
+ uint64_t   qw0;
+ #else
+ uint64_t   qw0;
+ uint64_t   qw1;
+ uint64_t   qw2;
+ >>>>>
+ uint64_t qw3;
+ uint64_t qw4;
+ uint64_t qw5;
+ uint64_t qw6;
+ uint64_t qw7;
+#endif
+ } QWords;
+ /**< Double-Word view. */
+ struct
+ {
+#ifdef RT_BIG_ENDIAN
+ uint32_t dw15;
+ uint32_t dw14;
+ uint32_t dw13;
+ uint32_t dw12;
+ uint32_t dw11;
+ uint32_t dw10;
+ uint32_t dw9;
+ uint32_t dw8;
+ uint32_t dw7;
+ uint32_t dw6;
+ uint32_t dw5;
+ uint32_t dw4;
+ uint32_t dw3;
+ uint32_t dw2;
+ uint32_t dw1;
+ uint32_t dw0;
+#else
+ uint32_t dw0;
+ uint32_t dw1;
+ uint32_t dw2;
+ uint32_t dw3;
+ uint32_t dw4;
+ uint32_t dw5;
+ uint32_t dw6;
+ uint32_t dw7;
+ uint32_t dw8;
+ uint32_t dw9;
+ uint32_t dw10;
+ uint32_t dw11;
+ uint32_t dw12;
+ uint32_t dw13;
+ uint32_t dw14;
+ uint32_t dw15;
+#endif
+ } DWords;
+ /**< Word view. */
+ struct
#ifdef RT_BIG_ENDIAN
  uint16_t  w31;
  uint16_t  w30;
  uint16_t  w29;
  uint16_t  w28;
  uint16_t  w27;
  uint16_t  w26;
  uint16_t  w25;
  uint16_t  w24;
  uint16_t  w23;
  uint16_t  w22;
  uint16_t  w21;
  uint16_t  w20;
  uint16_t  w19;
  uint16_t  w18;
  uint16_t  w17;
  uint16_t  w16;
  uint16_t  w15;
  uint16_t  w14;
  uint16_t  w13;
  uint16_t  w12;
  uint16_t  w11;
  uint16_t  w10;
  uint16_t  w9;
  uint16_t  w8;
  uint16_t  w7;
  uint16_t  w6;
  uint16_t  w5;
  uint16_t  w4;
  uint16_t  w3;
  uint16_t  w2;
  uint16_t  w1;
  uint16_t  w0;
#else
  uint16_t  w0;
  uint16_t  w1;
  uint16_t  w2;
  uint16_t  w3;
  uint16_t  w4;
  uint16_t  w5;
  uint16_t  w6;
  uint16_t  w7;
  uint16_t  w8;
  uint16_t  w9;
  uint16_t  w10;
  uint16_t  w11;
  uint16_t  w12;
#endif
+ uint16_t    w13;
+ uint16_t    w14;
+ uint16_t    w15;
+ uint16_t    w16;
+ uint16_t    w17;
+ uint16_t    w18;
+ uint16_t    w19;
+ uint16_t    w20;
+ uint16_t    w21;
+ uint16_t    w22;
+ uint16_t    w23;
+ uint16_t    w24;
+ uint16_t    w25;
+ uint16_t    w26;
+ uint16_t    w27;
+ uint16_t    w28;
+ uint16_t    w29;
+ uint16_t    w30;
+ uint16_t    w31;
+ #endif
+ } Words;
+
+ /** Double-Quad-Word view. */
+ struct
+ {
+ #ifdef RT_BIG_ENDIAN
+     RTUINT128U  dqw3;
+     RTUINT128U  dqw2;
+     RTUINT128U  dqw1;
+     RTUINT128U  dqw0;
+ #else
+     RTUINT128U  dqw0;
+     RTUINT128U  dqw1;
+     RTUINT128U  dqw2;
+     RTUINT128U  dqw3;
+ #endif
+ } DQWords;
+
+ /** Octo-Word view. */
+ struct
+ {
+ #ifdef RT_BIG_ENDIAN
+     RTUINT256U  ow3;
+     RTUINT256U  ow2;
+     RTUINT256U  ow1;
+     RTUINT256U  ow0;
+ #else
+     RTUINT256U  ow0;
+ </raw_text>
+ RTUINT256U ow1;
+ RTUINT256U ow2;
+ RTUINT256U ow3;
+} OWords;
+
+ /** 256-bit view. */
+ RTUINT256U au256[2];
+ /** 128-bit view. */
+ RTUINT128U au128[4];
+ /** 64-bit view. */
+ uint64_t au64[8];
+ /** 32-bit view. */
+ uint32_t au32[16];
+ /** 16-bit view. */
+ uint16_t au16[32];
+ /** 8-bit view. */
+ uint8_t au8[64];
+} RTUINT512U;
+#pragma pack()
+/** Pointer to a 512-bit unsigned integer union. */
+typedef RTUINT512U RT_FAR *PRTUINT512U;
+/** Pointer to a const 512-bit unsigned integer union. */
+typedef const RTUINT512U RT_FAR *PCRTUINT512U;
+
+/** @def RTUINT512_INIT
+ * Portable RTUINT512U initializer. */
+#ifdef RT_BIG_ENDIAN
+/** define RTUINT512_INIT(a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0) \ 
+{ { a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0 } } 
+*/
+#else
+/** define RTUINT512_INIT(a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0) \ 
+{ { a_Qw0, a_Qw1, a_Qw2, a_Qw3, a_Qw4, a_Qw5, a_Qw6, a_Qw7 } } 
+*/
+#endif
+
+/** @def RTUINT512_INIT_C
+ * Portable RTUINT512U initializer for 64-bit constants. */
+#define RTUINT512_INIT_C(a_Qw7, a_Qw6, a_Qw5, a_Qw4, a_Qw3, a_Qw2, a_Qw1, a_Qw0) \
+ RTUINT512_INIT(UINT64_C(a_Qw7), UINT64_C(a_Qw6), UINT64_C(a_Qw5), UINT64_C(a_Qw4), \ 
+ UINT64_C(a_Qw3), UINT64_C(a_Qw2), UINT64_C(a_Qw1), UINT64_C(a_Qw0))
+
+/**
+ * Double precision floating point format (64-bit).
+ */
+typedef union RTFLOAT64U
+{ 
+/*if defined(RT_ARCH_AMD64) || defined(RT_ARCH_X86)*/
 /**< Double view. */
+ double rd;
+ #endif
+ /**< Format using regular bitfields. */
+ struct
+ {
+ #ifdef RT_BIG_ENDIAN
+ /**< The sign indicator. */
+ + uint32_t fSign : 1;
+ /**< The exponent (offseted by 1023). */
+ + uint32_t uExponent : 11;
+ /**< The fraction, bits 32 thru 51. */
+ + uint32_t u20FractionHigh : 20;
+ /**< The fraction, bits 0 thru 31. */
+ + uint32_t u32FractionLow;
+ + #if RT_COMPILER_GROKS_64BIT_BITFIELDS
+ + /**< Format using 64-bit bitfields. */
+ + RT_GCC_EXTENSION struct
+ + {
+ + # ifdef RT_BIG_ENDIAN
+ + /**< The sign indicator. */
+ + RT_GCC_EXTENSION uint64_t fSign : 1;
+ /**< The exponent (offseted by 1023). */
+ + RT_GCC_EXTENSION uint64_t uExponent : 11;
+ /**< The fraction. */
+ + RT_GCC_EXTENSION uint64_t uFraction : 52;
+ + #else
+ + /**< The fraction. */
+ + RT_GCC_EXTENSION uint64_t uFraction : 52;
+ /**< The exponent (offseted by 1023). */
+ + RT_GCC_EXTENSION uint64_t uExponent : 11;
+ /**< The sign indicator. */
+ + RT_GCC_EXTENSION uint64_t fSign : 1;
+ + #endif
+ + } s64;
+ + #endif
+ } s;
/** 64-bit view. */
uint64_t   au64[1];
/** 32-bit view. */
uint32_t   au32[2];
/** 16-bit view. */
uint16_t   au16[4];
/** 8-bit view. */
uint8_t    au8[8];
} RTFLOAT64U;
/** Pointer to a double precision floating point format union. */
typedef RTFLOAT64U RT_FAR *PRTFLOAT64U;
/** Pointer to a const double precision floating point format union. */
typedef const RTFLOAT64U RT_FAR *PCRTFLOAT64U;

/** Pointer to a double precision floating point format union. */
+/** Extended Double precision floating point format (80-bit). */
+#pragma pack(1)
typedef union RTFLOAT80U
+
+ /** Format using bitfields. */
+ RT_GCC_EXTENSION struct
+ {  
+++ ifdef RT_BIG_ENDIAN
+++ /** The sign indicator. */
+++     RT_GCC_EXTENSION uint16_t   fSign : 1;
+++ /** The exponent (offseted by 16383). */
+++     RT_GCC_EXTENSION uint16_t   uExponent : 15;
+++ /** The mantissa. */
+++     uint64_t                    u64Mantissa;
+++ } s:
+++ else
+++ /** The mantissa. */
+++     uint64_t u64Mantissa;
+++ /** The exponent (offseted by 16383). */
+++     RT_GCC_EXTENSION uint16_t   uExponent : 15;
+++ /** The sign indicator. */
+++     RT_GCC_EXTENSION uint16_t   fSign : 1;
++# endif
+ } s:
+
+ /** 64-bit view. */
+ uint64_t   au64[1];
+ /** 32-bit view. */
+ uint32_t   au32[2];
+ /** 16-bit view. */
+ uint16_t  au16[5];
+ /** 8-bit view. */
+ uint8_t   au8[10];
+ } RTFLOAT80U;
+#pragma pack()
+/** Pointer to a extended precision floating point format union. */
+typedef RTFLOAT80U RT_FAR *PRTFLOAT80U;
+/** Pointer to a const extended precision floating point format union. */
+typedef const RTFLOAT80U RT_FAR *PCRTFLOAT80U;
+
+/**
+ * A variant of RTFLOAT80U that may be larger than 80-bits depending on how the
+ * compiler implements long double.
+ */
+#pragma pack(1)
+typedef union RTFLOAT80U2
+{
+#ifdef RT_COMPILER_WITH_80BIT_LONG_DOUBLE
+    /** Long double view. */
+    long double     lrd;
+#else
+    /** Format using bitfields. */
+    RT_GCC_EXTENSION struct
+    {
+        /** The sign indicator. */
+        RT_GCC_EXTENSION uint16_t   fSign : 1;
+        /** The exponent (offseted by 16383). */
+        RT_GCC_EXTENSION uint16_t   uExponent : 15;
+        /** The mantissa. */
+        uint64_t                    u64Mantissa;
+    } s;
+    /** Bitfield exposing the J bit and the fraction. */
+    RT_GCC_EXTENSION struct
+    {
+        /** The sign indicator. */
+        RT_GCC_EXTENSION uint16_t   fSign : 1;
+    } s;
+#endif
+    /** The mantissa. */
+    uint64_t u64Mantissa;
+    /** The exponent (offseted by 16383). */
+    RT_GCC_EXTENSION uint16_t uExponent : 15;
+    /** The sign indicator. */
+    RT_GCC_EXTENSION uint16_t fSign : 1;
+} s;
+}
+#ifdef RT_BIG_ENDIAN
+ */
+ RT_GCC_EXTENSION uint16_t  fSign : 1;
+ */
+ RT_GCC_EXTENSION uint16_t   uExponent : 15;
+ */
+ RT_GCC_EXTENSION uint16_t u64Mantissa;
RT_GCC_EXTENSION uint16_t fSign : 1;
/** The exponent (offseted by 16383). */
RT_GCC_EXTENSION uint16_t uExponent : 15;
/** The J bit, aka the integer bit. */
uint32_t fInteger;
/** The fraction, bits 32 thru 62. */
uint32_t u31FractionHigh : 31;
/** The fraction, bits 0 thru 31. */
uint32_t u32FractionLow : 32;

#ifdef RT_COMPILER_GROKS_64BIT_BITFIELDS
/** 64-bit bitfields exposing the J bit and the fraction. */
RT_GCC_EXTENSION struct
{
#ifdef RT_BIG_ENDIAN
/** The sign indicator. */
RT_GCC_EXTENSION uint16_t fSign : 1;
/** The exponent (offseted by 16383). */
RT_GCC_EXTENSION uint16_t uExponent : 15;
/** The J bit, aka the integer bit. */
RT_GCC_EXTENSION uint64_t fInteger : 1;
/** The fraction. */
RT_GCC_EXTENSION uint64_t u63Fraction : 63;
#else
/** The fraction. */
RT_GCC_EXTENSION uint64_t u63Fraction : 63;
/** The J bit, aka the integer bit. */
RT_GCC_EXTENSION uint64_t fInteger : 1;
/** The exponent (offseted by 16383). */
RT_GCC_EXTENSION uint16_t uExponent : 15;
/** The sign indicator. */
RT_GCC_EXTENSION uint16_t fSign : 1;
#endif
}
#endif
/** 64-bit view. */
    uint64_t    au64[1];
/** 32-bit view. */
    uint32_t    au32[2];
/** 16-bit view. */
    uint16_t    au16[5];
/** 8-bit view. */
    uint8_t     au8[10];
} RTFLOAT80U2;
#pragma pack()
/** Pointer to a extended precision floating point format union, 2nd
 * variant. */
typedef RTFLOAT80U2 RT_FAR *PRTFLOAT80U2;
/** Pointer to a const extended precision floating point format union, 2nd
 * variant. */
typedef const RTFLOAT80U2 RT_FAR *PCRTFLOAT80U2;

/** Generic function type.
 * @see PFNRT
 */
typedef DECLCALLBACK(void) FNRT(void);

/** Generic function pointer.
 * With -pedantic, gcc-4 complains when casting a function to a data object, for
 * example:
 * @code
 * void foo(void)
 * {
 * }
 * void *bar = (void *)foo;
 * @endcode
 * The compiler would warn with "ISO C++ forbids casting between
 * pointer-to-function and pointer-to-object". The purpose of this warning is
 * not to bother the programmer but to point out that he is probably doing
 * something dangerous, assigning a pointer to executable code to a data object.
 */
typedef FNRT *PFNRT;

/** Millisecond interval. */
typedef uint32_t                        RTMSINTERVAL;
/** Pointer to a millisecond interval. */
typedef RTMSINTERVAL RT_FAR *PRTMSINTERVAL;
/** Pointer to a const millisecond interval. */
typedef const RTMSINTERVAL RT_FAR *PCRTMSINTERVAL;
+
/** Pointer to a time spec structure. */
typedef struct RTTIMESPEC RT_FAR *PRTTIMESPEC;
/** Pointer to a const time spec structure. */
typedef const struct RTTIMESPEC RT_FAR *PCRTTIMESPEC;
+
+/** @defgroup grp_rt_types_both Common Guest and Host Context Basic Types + */ + * @}
+ */
+
+/** Signed integer which can contain both GC and HC pointers. */
#ifdef (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
typedef int32_t RTINTPTR;
#elseif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
typedef int64_t RTINTPTR;
#else
#error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif
/** Pointer to signed integer which can contain both GC and HC pointers. */
typedef RTINTPTR RT_FAR *PRTINTPTR;
/** Pointer const to signed integer which can contain both GC and HC pointers. */
typedef const RTINTPTR RT_FAR *PCRTINTPTR;
+
+/** The maximum value the RTINTPTR type can hold. */
#ifdef (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
#define RTINTPTR_MAX INT32_MAX
#elseif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
#define RTINTPTR_MAX INT64_MAX
#else
#error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif
+/** The minimum value the RTINTPTR type can hold. */
#ifdef (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
#define RTINTPTR_MIN INT32_MIN
#elseif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
#define RTINTPTR_MIN INT64_MIN
#else
#error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif
+/** Unsigned integer which can contain both GC and HC pointers. */
typedef uint32_t            RTUINTPTR;
#else
    #define RTUINTPTR_MAX      UINT32_MAX
#endif
/** Pointer to unsigned integer which can contain both GC and HC pointers. */
typedef RTUINTPTR   RT_FAR *PRTUINTPTR;
/** Pointer const to unsigned integer which can contain both GC and HC pointers. */
typedef const RTUINTPTR RT_FAR *PCRTUINTPTR;
/** The maximum value the RTUINTPTR type can hold. */
#if (HC_ARCH_BITS == 32 && GC_ARCH_BITS == 32) || (HC_ARCH_BITS == 16 || GC_ARCH_BITS == 16)
    #define RTUINTPTR_MAX      UINT32_MAX
#elif (HC_ARCH_BITS == 64 || GC_ARCH_BITS == 64)
    #define RTUINTPTR_MAX      UINT64_MAX
#else
    #error Unsupported HC_ARCH_BITS and/or GC_ARCH_BITS values.
#endif
/** Signed integer. */
typedef int32_t               RTINT;
/** Pointer to signed integer. */
typedef RTINT           RT_FAR *PRTINT;
/** Pointer to const signed integer. */
typedef const RTINT     RT_FAR *PCRTINT;
/** Unsigned integer. */
typedef uint32_t              RTUINT;
/** Pointer to unsigned integer. */
typedef RTUINT          RT_FAR *PRTUINT;
/** Pointer to const unsigned integer. */
typedef const RTUINT    RT_FAR *PCRTUINT;
/** A file offset / size (off_t). */
typedef int64_t              RTFOFF;
/** Pointer to a file offset / size. */
typedef RTFOFF          RT_FAR *PRTFOFF;
/** The max value for RTFOFF. */
#define RTFOFF_MAX              INT64_MAX
/** The min value for RTFOFF. */
#define RTFOFF_MIN              INT64_MIN
/** File mode (see iprt/fs.h). */
typedef uint32_t              RTFMODE;
/** Pointer to file mode. */
typedef RTFMODE RT_FAR *PRTFMODE;
+
+/** Device unix number. */
typedef uint32_t RTDEV;
+/** Pointer to a device unix number. */
typedef RTDEV RT_FAR *PRTDEV;
+
+/** @name RTDEV Macros
+ * @{  */
+/**
+ * Our makedev macro.
+ * @returns RTDEV
+ * @param   uMajor          The major device number.
+ * @param   uMinor          The minor device number.
+ * */
+#define RTDEV_MAKE(uMajor, uMinor)      ((RTDEV)( ((RTDEV)(uMajor) << 24) | (uMinor & UINT32_C(0x00ffffff)) ))
+/**
+ * Get the major device node number from an RTDEV type.
+ * @returns The major device number of @a uDev
+ * @param   uDev            The device number.
+ * */
+#define RTDEV_MAJOR(uDev)               ((uDev) >> 24)
+/**
+ * Get the minor device node number from an RTDEV type.
+ * @returns The minor device number of @a uDev
+ * @param   uDev            The device number.
+ * */
+#define RTDEV_MINOR(uDev)               ((uDev) & UINT32_C(0x00ffffff))
+/** @ } */
+
+/** i-node number. */
typedef uint64_t RTINODE;
+/** Pointer to a i-node number. */
typedef RTINODE RT_FAR *PRTINODE;
+
+/** User id. */
typedef uint32_t RTUID;
+/** Pointer to a user id. */
typedef RTUID RT_FAR *PRTUID;
+/** NIL user id.
+ * @todo check this for portability! */
+#define NIL_RTUID               (~(RTUID)0)
+
+/** Group id. */
typedef uint32_t RTGID;
+/** Pointer to a group id. */
typedef RTGID RT_FAR *PRTGID;
```c
/** NIL group id. */
/** @todo check this for portability! */
#define NIL_RTGID (~(RTGID)0)

/** I/O Port. */
typedef uint16_t RTIOPORT;
/** Pointer to I/O Port. */
typedef RTIOPORT *PRTIOPORT;
/** Pointer to const I/O Port. */
typedef const RTIOPORT *PCRTIOPORT;

/** Selector. */
typedef uint16_t RTSEL;
/** Pointer to selector. */
typedef RTSEL *PRTSEL;
/** Pointer to const selector. */
typedef const RTSEL *PCRTSEL;
/** Max selector value. */
#define RTSEL_MAX UINT16_MAX

/** Far 16-bit pointer. */
#pragma pack(1)
typedef struct RTFAR16 {
    uint16_t off;
    RTSEL sel;
} RTFAR16;
#pragma pack()
/** Pointer to Far 16-bit pointer. */
typedef RTFAR16 *PRTFAR16;
/** Pointer to const Far 16-bit pointer. */
typedef const RTFAR16 *PCRTFAR16;

/** Far 32-bit pointer. */
#pragma pack(1)
typedef struct RTFAR32 {
    uint32_t off;
    RTSEL sel;
} RTFAR32;
#pragma pack()
/** Pointer to Far 32-bit pointer. */
typedef RTFAR32 *PRTFAR32;
/** Pointer to const Far 32-bit pointer. */
typedef const RTFAR32 *PCRTFAR32;

/** Far 64-bit pointer. */
#pragma pack(1)
typedef struct RTFAR64 {
    uint64_t off;
    RTSEL sel;
} RTFAR64;
#pragma pack()
/** Pointer to Far 64-bit pointer. */
typedef RTFAR64 *PRTFAR64;
/** Pointer to const Far 64-bit pointer. */
typedef const RTFAR64 *PCRTFAR64;
```
typedef struct RTFAR64 {
    uint64_t off;
    RTSEL sel;
} RTFAR64;
#pragma pack()
/** Pointer to Far 64-bit pointer. */
typedef RTFAR64 RT_FAR *PRTFAR64;
/** Pointer to const Far 64-bit pointer. */
typedef const RTFAR64 RT_FAR *PCRTFAR64;

/** @} */

/** @} */
/** @defgroup grp_rt_types_hc  Host Context Basic Types */
/** @{ */

/** HC Natural signed integer. */
/** @deprecated silly type. */
typedef int32_t RTHCINT;
/** Pointer to HC Natural signed integer. */
/** @deprecated silly type. */
typedef RTHCINT RT_FAR *PRTHCINT;
/** Pointer to const HC Natural signed integer. */
/** @deprecated silly type. */
typedef const RTHCINT RT_FAR *PCRTHCINT;

/** HC Natural unsigned integer. */
/** @deprecated silly type. */
typedef uint32_t RTHCUINT;
/** Pointer to HC Natural unsigned integer. */
/** @deprecated silly type. */
typedef RTHCUINT RT_FAR *PRTHCUINT;
/** Pointer to const HC Natural unsigned integer. */
/** @deprecated silly type. */
typedef const RTHCUINT RT_FAR *PCRTHCUINT;

/** Signed integer which can contain a HC pointer. */
#if HC_ARCH_BITS == 32 || HC_ARCH_BITS == 16
typedef int32_t RTHCINTPTR;
#else
typedef int64_t RTHCINTPTR;
#else
#error Unsupported HC_ARCH_BITS value.
#endif
/** Pointer to signed integer which can contain a HC pointer. */
+typedef RT HCINTPTR          RT_FAR *PRHCINTPTR;
+/** Pointer to const signed integer which can contain a HC pointer. */
+typedef const RT HCINTPTR RT_FAR *PCRHCINTPTR;
+/** Max RTHCINTPTR value. */
+#if HC_ARCH_BITS == 32
  +# define RTHCINTPTR_MAX     INT32_MAX
+#elif HC_ARCH_BITS == 64
  +# define RTHCINTPTR_MAX     INT64_MAX
  +#else
  +# define RTHCINTPTR_MAX     INT16_MAX
+#endif
+/** Min RTHCINTPTR value. */
+#if HC_ARCH_BITS == 32
  +# define RTHCINTPTR_MIN     INT32_MIN
+#elif HC_ARCH_BITS == 64
  +# define RTHCINTPTR_MIN     INT64_MIN
  +#else
  +# define RTHCINTPTR_MIN     INT16_MIN
+#endif
+/** Signed integer which can contain a HC ring-3 pointer. */
+#if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
  +typedef int32_t              RTR3INTPTR;
+#elif R3_ARCH_BITS == 64
  +typedef int64_t              RTR3INTPTR;
  +#else
  +# error Unsupported R3_ARCH_BITS value.
+#endif
+/** Pointer to signed integer which can contain a HC ring-3 pointer. */
+typedef RTR3INTPTR          RT_FAR *PRTR3INTPTR;
+/** Pointer to const signed integer which can contain a HC ring-3 pointer. */
+typedef const RTR3INTPTR RT_FAR *PCRTR3INTPTR;
+/** Max RTR3INTPTR value. */
+#if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
  +# define RTR3INTPTR_MAX     INT32_MAX
  +#else
  +# define RTR3INTPTR_MAX     INT64_MAX
+#endif
+/** Min RTR3INTPTR value. */
+#if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
  +# define RTR3INTPTR_MIN     INT32_MIN
  +#else
  +# define RTR3INTPTR_MIN     INT64_MIN
+#endif
+/** Signed integer which can contain a HC ring-0 pointer. */
+#if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
  +typedef int32_t              RTR0INTPTR;
#elif R0_ARCH_BITS == 64
+typedef int64_t RTR0INTPTR;
+else
+/* error Unsupported R0_ARCH_BITS value. */
+#endif
+/** Pointer to signed integer which can contain a HC ring-0 pointer. */
+typedef RTR0INTPTR RT_FAR *PRTR0INTPTR;
+/** Pointer to const signed integer which can contain a HC ring-0 pointer. */
+typedef const RTR0INTPTR RT_FAR *PCRTR0INTPTR;
+/** Max RTR0INTPTR value. */
+#if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+# define RTR0INTPTR_MAX INT32_MAX
+#else
+# define RTR0INTPTR_MAX INT64_MAX
+#endif
+/** Min RTR0INTPTR value. */
+#if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+# define RTR0INTPTR_MIN INT32_MIN
+#else
+# define RTR0INTPTR_MIN INT64_MIN
+#endif
+/** Unsigned integer which can contain a HC pointer. */
+#if HC_ARCH_BITS == 32 || HC_ARCH_BITS == 16
+typedef uint32_t RTHCUINTPTR;
+#elif HC_ARCH_BITS == 64
+typedef uint64_t RTHCUINTPTR;
+#else
+/* error Unsupported HC_ARCH_BITS value. */
+#endif
+/** Pointer to unsigned integer which can contain a HC pointer. */
+typedef RTHCUINTPTR RT_FAR *PRTHCUINTPTR;
+/** Pointer to unsigned integer which can contain a HC pointer. */
+typedef const RTHCUINTPTR RT_FAR *PCRTHCUINTPTR;
+/** Max RTHCUINTPTR value. */
+#if HC_ARCH_BITS == 32 || HC_ARCH_BITS == 16
+# define RTHCUINTPTR_MAX UINT32_MAX
+#else
+# define RTHCUINTPTR_MAX UINT64_MAX
+#endif
+/** Unsigned integer which can contain a HC ring-3 pointer. */
+#if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
+typedef uint32_t RTR3UINTPTR;
+#elif R3_ARCH_BITS == 64
+typedef uint64_t RTR3UINTPTR;
+else
+/** Error Unsupported R3_ARCH_BITS value. */
+endif
+/** Pointer to unsigned integer which can contain a HC ring-3 pointer. */
+typedef RTR3UINTPTR RT_FAR *PRTR3UINTPTR;
+/** Pointer to unsigned integer which can contain a HC ring-3 pointer. */
+typedef const RTR3UINTPTR RT_FAR *PCRTR3UINTPTR;
+/** Max RTHCUINTTPR value. */
+#if R3_ARCH_BITS == 32 || R3_ARCH_BITS == 16
+define RTR3UINTPTR_MAX UINT32_MAX
+else
+define RTR3UINTPTR_MAX UINT64_MAX
+endif
+
+/** Unsigned integer which can contain a HC ring-0 pointer. */
+#if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+typedef uint32_t RTR0UINTPTR;
+elif R0_ARCH_BITS == 64
+typedef uint64_t RTR0UINTPTR;
+else
+#error Unsupported R0_ARCH_BITS value.
+endif
+
+/** Pointer to unsigned integer which can contain a HC ring-0 pointer. */
+typedef RTR0UINTPTR RT_FAR *PRTR0UINTPTR;
+/** Pointer to unsigned integer which can contain a HC ring-0 pointer. */
+typedef const RTR0UINTPTR RT_FAR *PCRTR0UINTPTR;
+/** Max RTR0UINTTPR value. */
+#if R0_ARCH_BITS == 32 || R0_ARCH_BITS == 16
+define RTR0UINTPTR_MAX UINT32_MAX
+else
+define RTR0UINTPTR_MAX UINT64_MAX
+endif
+
+/** Host Physical Memory Address. */
+typedef uint64_t RTHCPHYS;
+/** Pointer to Host Physical Memory Address. */
+typedef RTHCPHYS RT_FAR *PRTHCPHYS;
+/** Pointer to const Host Physical Memory Address. */
+typedef const RTHCPHYS RT_FAR *PRTHCPHYS;
+/** Max RTHCPHYS value. */
+define NIL_RTHCPHYS (~(RTHCPHYS)0)
+define RTHCPHYS_MAX UINT64_MAX
+
+/** HC pointer. */
+ifndef IN_RC
+typedef void            RT_FAR *RTHCPTR;
+else
+typedef RTHCUINTPTR     RTHCPTR;
+endif
+/** Pointer to HC pointer. */
+typedef RTHCPTR         RT_FAR *PRTHCPTR;
+/** Pointer to const HC pointer. */
+typedef const RTHCPTR          *PCRTHCPTR;
+/** @def NIL_RTHCPTR
+ * NIL HC pointer.
+ */
+#define NIL_RTHCPTR     ((RTHCPTR)0)
+/** Max RTHCPTR value. */
+#define RTHCPTR_MAX    ((RTHCPTR)RTHCUINTPTR_MAX)
+
+/** HC ring-3 pointer. */
+ifndef IN_RING3
+typedef void            RT_FAR *RTR3PTR;
+else
+typedef RTR3UINTPTR     RTR3PTR;
+endif
+/** Pointer to HC ring-3 pointer. */
+typedef RTR3PTR         RT_FAR *PRTR3PTR;
+/** Pointer to const HC ring-3 pointer. */
+typedef const RTR3PTR          *PCRTR3PTR;
+/** @def NIL_RTR3PTR
+ * NIL HC ring-3 pointer.
+ */
+#ifndef IN_RING3
+# define NIL_RTR3PTR    ((RTR3PTR)0)
+#else
+# define NIL_RTR3PTR    (NULL)
+#endif
+/** Max RTR3PTR value. */
+#define RTR3PTR_MAX    ((RTR3PTR)RTR3UINTPTR_MAX)
+
+/** HC ring-0 pointer. */
+ifndef IN_RING0
+typedef void            RT_FAR *RTR0PTR;
+else
+typedef RTR0UINTPTR     RTR0PTR;
+endif
+/** Pointer to HC ring-0 pointer. */
+typedef RTR0PTR         RT_FAR *PRTR0PTR;
/** Pointer to const HC ring-0 pointer. */
+typedef const RTR0PTR *PCRTR0PTR;
/** @def NIL_RTR0PTR
 * NIL HC ring-0 pointer.
 */
+#ifndef IN_RING0
+# define NIL_RTR0PTR ((RTR0PTR)0)
+#else
+# define NIL_RTR0PTR (NULL)
+#endif
/** Max RTR3PTR value. */
+#define RTR0PTR_MAX ((RTR0PTR)RTR0UINTPTR_MAX)
+
/** Unsigned integer register in the host context. */
+#if HC_ARCH_BITS == 32
+typedef uint32_t RTHCUINTREG;
+#elif HC_ARCH_BITS == 64
+typedef uint64_t RTHCUINTREG;
+#elif HC_ARCH_BITS == 16
+typedef uint16_t RTHCUINTREG;
+#else
+# error "Unsupported HC_ARCH_BITS!"
+#endif
/** Pointer to an unsigned integer register in the host context. */
+typedef RTHCUINTREG RT_FAR *PRTHCUINTREG;
/** Pointer to a const unsigned integer register in the host context. */
+typedef const RTHCUINTREG RT_FAR *PCRTHCUINTREG;
+
/** Unsigned integer register in the host ring-3 context. */
+#if R3_ARCH_BITS == 32
+typedef uint32_t RTR3UINTREG;
+#elif R3_ARCH_BITS == 64
+typedef uint64_t RTR3UINTREG;
+#elif R3_ARCH_BITS == 16
+typedef uint16_t RTR3UINTREG;
+#else
+# error "Unsupported R3_ARCH_BITS!"
+#endif
/** Pointer to an unsigned integer register in the host ring-3 context. */
+typedef RTR3UINTREG RT_FAR *PRTR3UINTREG;
/** Pointer to a const unsigned integer register in the host ring-3 context. */
+typedef const RTR3UINTREG RT_FAR *PCRTR3UINTREG;
+
/** Unsigned integer register in the host ring-3 context. */
+#if R0_ARCH_BITS == 32
+typedef uint32_t RTR0UINTREG;
+#elif R0_ARCH_BITS == 64

+typedef uint64_t RTR0UINTREG;
+#elif R0_ARCH_BITS == 16
+typedef uint16_t RTR0UINTREG;
+#else
+ +#endif
+  +#error "Unsupported R3_ARCH_BITS!"
+  #endif
+/** Pointer to an unsigned integer register in the host ring-3 context. */
+typedef RTR0UINTREG RT_FAR *PRTR0UINTREG;
+/** Pointer to a const unsigned integer register in the host ring-3 context. */
+typedef const RTR0UINTREG RT_FAR *PCRTR0UINTREG;
+ /** @} */
+
+/** @} */
+/** @defgroup grp_rt_types_gc Guest Context Basic Types */
+*/
+* @{
+ *
+
+/** Natural signed integer in the GC.
+ * @deprecated silly type. */
+#if GC_ARCH_BITS == 32
+typedef int32_t RTGCINT;
+#elif GC_ARCH_BITS == 64 /** @todo this isn't right, natural int is 32-bit, see RTHCINT. */
+typedef int64_t RTGCINT;
+#endif
+/** Pointer to natural signed integer in GC.
+ * @deprecated silly type. */
+* typedef RTGCINT RT_FAR *PRTGCINT;
+/** Pointer to const natural signed integer in GC.
+ * @deprecated silly type. */
+* typedef const RTGCINT RT_FAR *PCRTGCINT;
+
+/** Natural unsigned integer in the GC.
+ * @deprecated silly type. */
+#if GC_ARCH_BITS == 32
+typedef uint32_t RTGCUINT;
+#elif GC_ARCH_BITS == 64 /** @todo this isn't right, natural int is 32-bit, see RTHCUINT. */
+typedef uint64_t RTGCUINT;
+#endif
+/** Pointer to natural unsigned integer in GC.
+ * @deprecated silly type. */
+* typedef RTGCUINT RT_FAR *PRTGCUINT;
+/** Pointer to const natural unsigned integer in GC.
+ * @deprecated silly type. */
+* typedef const RTGCUINT RT_FAR *PCRTGCUINT;
+ */
+/** Pointer to natural unsigned integer in GC.
+ * @deprecated silly type. */
+* typedef RTGCUINT RT_FAR *PRTGCUINT;
+/** Pointer to const natural unsigned integer in GC.
+ * @deprecated silly type. */
+* typedef const RTGCUINT RT_FAR *PCRTGCUINT;
+ */
+/** Signed integer which can contain a GC pointer. */
+#if GC_ARCH_BITS == 32
typedef int32_t RTGCINTPTR;
#endif
/** Pointer to signed integer which can contain a GC pointer. */
typedef RTGCINTPTR RT_FAR *PRTGCINTPTR;
/** Pointer to const signed integer which can contain a GC pointer. */
typedef const RTGCINTPTR RT_FAR *PCRTGCINTPTR;

/** Unsigned integer which can contain a GC pointer. */
#if GC_ARCH_BITS == 32
typedef uint32_t RTGCUINTPTR;
#elif GC_ARCH_BITS == 64
typedef uint64_t RTGCUINTPTR;
#else
#error Unsupported GC_ARCH_BITS value.
#endif
/** Pointer to unsigned integer which can contain a GC pointer. */
typedef RTGCUINTPTR RT_FAR *PRTGCUINTPTR;
/** Pointer to unsigned integer which can contain a GC pointer. */
typedef const RTGCUINTPTR RT_FAR *PCRTGCUINTPTR;

/** Unsigned integer which can contain a 32 bits GC pointer. */
typedef uint32_t RTGCUINTPTR32;
/** Pointer to unsigned integer which can contain a 32 bits GC pointer. */
typedef RTGCUINTPTR32 RT_FAR *PRTGCUINTPTR32;
/** Pointer to unsigned integer which can contain a 32 bits GC pointer. */
typedef const RTGCUINTPTR32 RT_FAR *PCRTGCUINTPTR32;

/** Unsigned integer which can contain a 64 bits GC pointer. */
typedef uint64_t RTGCUINTPTR64;
/** Pointer to unsigned integer which can contain a 64 bits GC pointer. */
typedef RTGCUINTPTR64 RT_FAR *PRTGCUINTPTR64;
/** Pointer to unsigned integer which can contain a 64 bits GC pointer. */
typedef const RTGCUINTPTR64 RT_FAR *PCRTGCUINTPTR64;

/** Guest Physical Memory Address. */
typedef uint64_t RTGCPHYS;
/** Pointer to Guest Physical Memory Address. */
typedef RTGCPHYS RT_FAR *PRTGCPHYS;
/** Pointer to const Guest Physical Memory Address. */
typedef const RTGCPHYS RT_FAR *PCRTGCPHYS;
/** @def NIL_RTGCPHYS */
def NIL_RTGCPHYS
  * NIL GC Physical Address.
  * NIL_RTGCPHYS is used to signal an invalid physical address, similar
  * to the NULL pointer. Note that this value may actually be valid in
  * some contexts.
  */
+\#define NIL_RTGCPHYS       (~(RTGCPHYS)0U)
+/** Max guest physical memory address value. */
+\#define RTGCPHYS_MAX      UINT64_MAX
+
+
+/** Guest Physical Memory Address; limited to 32 bits. */
+\typedef uint32_t        RTGCPHYS32;
+/** Pointer to Guest Physical Memory Address. */
+\typedef RTGCPHYS32      RT_FAR *PRTGCPHYS32;
+/** Pointer to const Guest Physical Memory Address. */
+\typedef const RTGCPHYS32 RT_FAR *PCRTGCPHYS32;
+/** @def NIL_RTGCPHYS32
+ * NIL GC Physical Address.
+ * NIL_RTGCPHYS32 is used to signal an invalid physical address, similar
+ * to the NULL pointer. Note that this value may actually be valid in
+ * some contexts.
+ */
+\#define NIL_RTGCPHYS32    (~((RTGCPHYS32)0))
+
+
+/** Guest Physical Memory Address; limited to 64 bits. */
+\typedef uint64_t        RTGCPHYS64;
+/** Pointer to Guest Physical Memory Address. */
+\typedef RTGCPHYS64      RT_FAR *PRTGCPHYS64;
+/** Pointer to const Guest Physical Memory Address. */
+\typedef const RTGCPHYS64 RT_FAR *PCRTGCPHYS64;
+/** @def NIL_RTGCPHYS64
+ * NIL GC Physical Address.
+ * NIL_RTGCPHYS64 is used to signal an invalid physical address, similar
+ * to the NULL pointer. Note that this value may actually be valid in
+ * some contexts.
+ */
+\#define NIL_RTGCPHYS64    (~((RTGCPHYS64)0))
+
+/** Guest context pointer, 32 bits.
+ * Keep in mind that this type is an unsigned integer in
+ * HC and void pointer in GC.
+ */
+\typedef RTGCUINTPTR32    RTGCPR32;
+/** Pointer to a guest context pointer. */
+\typedef RTGCPR32        RT_FAR *PRTGCPR32;
+/** Pointer to a const guest context pointer. */
+\typedef const RTGCPR32   RT_FAR *PCRTGCPR32;
+/** @def NIL_RTGCPR32
+ * NIL GC pointer.
+ */
+\#define NIL_RTGCPR32      (~(RTGCPR32)0)
+/** Guest context pointer, 64 bits. */
+typedef RTGCUINTPTR64 RTGC_PTR64;
+/** Pointer to a guest context pointer. */
+typedef RTGCPTR64 RT_FAR *PRTGCPTR64;
+/** Pointer to a const guest context pointer. */
+typedef const RTGCPTR64 RT_FAR *PCRTGCPTR64;
+/** @def NIL_RTGCPTR64
+ * NIL GC pointer.
+ */
+#define NIL_RTGCPTR64 ((RTGCPTR64)0)
+
+/** Guest context pointer. */
+* Keep in mind that this type is an unsigned integer in
+ * HC and void pointer in GC.
+ */
+/** If GC_ARCH_BITS == 64 */
+typedef RTGCPTR64 RTGCPTR;
+/** Pointer to a guest context pointer. */
+typedef PRTGCPTR64 PRTGCPTR;
+/** Pointer to a const guest context pointer. */
+typedef PCRTGCPTR64 PCRTGCPTR;
+/** @def NIL_RTGCPTR
+ * NIL GC pointer.
+ */
+#define NIL_RTGCPTR NIL_RTGCPTR64
+/** Max RTGCPTR value. */
+#define RTGCPTR_MAX UINT64_MAX
+#elif GC_ARCH_BITS == 32
+typedef RTGCPTR32 RTGCPTR;
+/** Pointer to a guest context pointer. */
+typedef PRTGCPTR32 PRTGCPTR;
+/** Pointer to a const guest context pointer. */
+typedef PCRTGCPTR32 PCRTGCPTR;
+/** @def NIL_RTGCPTR
+ * NIL GC pointer.
+ */
+#define NIL_RTGCPTR NIL_RTGCPTR32
+/** Max RTGCPTR value. */
+#define RTGCPTR_MAX UINT32_MAX
+#else
+#error "Unsupported GC_ARCH_BITS!"
+#endif
+
+/** Unsigned integer register in the guest context. */
+typedef uint32_t RTGCUINTREG32;
+/** Pointer to an unsigned integer register in the guest context. */
+typedef RTGCUINTREG32 RT_FAR *PRTGCUINTREG32;
/** Pointer to a const unsigned integer register in the guest context. */
typedef const RTGCUINTREG32 RT_FAR *PCRTGCUINTREG32;

/** Pointer to an unsigned integer register in the guest context. */
typedef RTGCUINTREG64 RT_FAR *PRTGCUINTREG64;

/** Pointer to a const unsigned integer register in the guest context. */
typedef const RTGCUINTREG64 RT_FAR *PCRTGCUINTREG64;

#if GC_ARCH_BITS == 64
typedef RTGCUINTREG64 RTGCUINTREG;
#elif GC_ARCH_BITS == 32
typedef RTGCUINTREG32 RTGCUINTREG;
#else
#error "Unsupported GC_ARCH_BITS!"
#endif

/** Pointer to an unsigned integer register in the guest context. */
typedef RTGCUINTREG RT_FAR *PRTGCUINTREG;
/** Pointer to a const unsigned integer register in the guest context. */
typedef const RTGCUINTREG RT_FAR *PCRTGCUINTREG;

/** @} */

/** @} */

/** Raw mode context pointer; a 32 bits guest context pointer. */
/** Keep in mind that this type is an unsigned integer in */
/** HC and void pointer in RC. */
#ifdef IN_RC
typedef void RT_FAR *RTRCPTR;
#else
typedef uint32_t RTRCPTR;
#endif

/** Pointer to a raw mode context pointer. */
typedef RTRCPTR RT_FAR *PRTRCPTR;
/** Pointer to a const raw mode context pointer. */
typedef const RTRCPTR RT_FAR *PCRTRCPTR;

#ifdef IN_RC
#define NIL_RTGC_PTR ((RTRCPTR)0)
#else
#define NIL_RTGC_PTR (NULL)
#endif
/** @def RTRCPTR_MAX
 * The maximum value a RTRCPTR can have. Mostly used as INVALID value.
 * */
#define RTRCPTR_MAX ((RTRCPTR)UINT32_MAX)

/** Raw mode context pointer, unsigned integer variant. */
typedef int32_t RTRCINTPTR;

/** @def RTRCUINTPTR_MAX
 * The maximum value a RTRCUINTPTR can have.
 * */
#define RTRCUINTPTR_MAX ((RTRCUINTPTR)UINT32_MAX)

/** Raw mode context pointer, signed integer variant. */
typedef uint32_t RTRCUINTPTR;

/** @def RTRCINTPTR_MIN
 * The minimum value a RTRCINTPTR can have.
 * */
#define RTRCINTPTR_MIN ((RTRCINTPTR)INT32_MIN)

/** @def RTRCINTPTR_MAX
 * The maximum value a RTRCINTPTR can have.
 * */
#define RTRCINTPTR_MAX ((RTRCINTPTR)INT32_MAX)

/** @} */

/** @} */

/** Current Context Physical Memory Address. */
ifdef IN_RC
typedef RTGCPHYS RTCCPHYS;
#else
typedef RTHCPHYS RTCCPHYS;
#endif

/** Pointer to Current Context Physical Memory Address. */
typedef RTCCPHYS RT_FAR *PRTCCPHYS;

/** Pointer to const Current Context Physical Memory Address. */
typedef const RTCCPHYS RT_FAR *PCRTCCPHYS;

/** @def NIL_RTCCPHYS
 * NIL CC Physical Address.
 * NIL_RTCCPHYS is used to signal an invalid physical address, similar
 * to the NULL pointer.
 * */
ifdef IN_RC
#define NIL_RTCCPHYS NIL_RTGCPHYS
#else

#define NIL_RTCCPHYS NIL_RTGCPHYS
#endif

+/* Ununsigned integer register in the current context. */
+if ARCH_BITS == 32
+typedef uint32_t RTCCUINTREG;
+elif ARCH_BITS == 64
+typedef uint64_t RTCCUINTREG;
+elif ARCH_BITS == 16
+typedef uint16_t RTCCUINTREG;
+else
+error "Unsupported ARCH_BITS!"
+endif
+/* Pointer to an unsigned integer register in the current context. */
typedef RTCCUINTREG RT_FAR *PRTCCUINTREG;
+/* Pointer to a const unsigned integer register in the current context. */
typedef RTCCUINTREG const RT_FAR *PCRTCCUINTREG;
+
+/* Signed integer register in the current context. */
+if ARCH_BITS == 32
+typedef int32_t RTCCINTREG;
+elif ARCH_BITS == 64
+typedef int64_t RTCCINTREG;
+elif ARCH_BITS == 16
+typedef int16_t RTCCINTREG;
+endif
+/* Pointer to a signed integer register in the current context. */
typedef RTCCINTREG RT_FAR *PRTCCINTREG;
+/* Pointer to a const signed integer register in the current context. */
typedef RTCCINTREG const RT_FAR *PCRTCCINTREG;
+
+/* Unsigned integer extended register in the current context.
   @ remarks This is for dealing with EAX in 16-bit mode. */
+if ARCH_BITS == 16 && defined(RT_ARCH_X86)
typedef uint32_t RTCCUINTXREG;
+else
+typedef RTCCUINTREG RTCCUINTXREG;
+endif
+/* Pointer to an unsigned integer register in the current context. */
typedef RTCCUINTREG RT_FAR *PRTCCUINTXREG;
+/* Pointer to a const unsigned integer register in the current context. */
typedef RTCCUINTREG const RT_FAR *PCRTCCUINTXREG;
+
+/* Signed integer extended register in the current context.
   @ remarks This is for dealing with EAX in 16-bit mode. */
+if ARCH_BITS == 16 && defined(RT_ARCH_X86)
typedef int32_t RTCCINTXREG;
+else
typedef RTCCINTREG         RTCCINTXREG;
#endif
/** Pointer to a signed integer extended register in the current context. */
typedef RTCCINTXREG     RT_FAR *PRTCCINTXREG;
/** Pointer to a const signed integer extended register in the current context. */
typedef RTCCINTXREG const RT_FAR *PCRTCCINTXREG;

/** @def RTCCUINTREG_C  
 * Defines a constant of RTCCUINTREG type.  
 * @param a_Value   Constant value */
/** @def RTCCUINTREG_MAX  
 * Max value that RTCCUINTREG can hold. */
/** @def RTCCUINTREG_FMT  
 * Generic IPRT format specifier for RTCCUINTREG. */
/** @def RTCCUINTREG_XFMT  
 * Generic IPRT format specifier for RTCCUINTREG, hexadecimal. */
#if ARCH_BITS == 32
#define RTCCUINTREG_C(a_Value)     UINT32_C(a_Value)
#define RTCCUINTREG_MAX            UINT32_MAX
#define RTCCUINTREG_FMT            "RU32"
#define RTCCUINTREG_XFMT           "RX32"
#elif ARCH_BITS == 64
#define RTCCUINTREG_C(a_Value)     UINT64_C(a_Value)
#define RTCCUINTREG_MAX            UINT64_MAX
#define RTCCUINTREG_FMT            "RU64"
#define RTCCUINTREG_XFMT           "RX64"
#elif ARCH_BITS == 16
#define RTCCUINTREG_C(a_Value)     UINT16_C(a_Value)
#endif

/** @def RTCCINTREG_C  
 * Defines a constant of RTCCINTREG type.  
 * @param a_Value   Constant value */
/** @def RTCCINTREG_MAX  
 * Max value that RTCCINTREG can hold. */
/** @def RTCCINTREG_MIN  
 * Min value that RTCCINTREG can hold. */
/** @def RTCCINTREG_FMT  
 * Generic IPRT format specifier for RTCCINTREG. */
/** @def RTCCINTREG_XFMT  
 * Generic IPRT format specifier for RTCCINTREG, hexadecimal. */
#ifif ARCH_BITS == 32
#define RTCCINTREG_C(a_Value)      INT32_C(a_Value)
#define RTCCINTREG_MAX             INT32_MAX
#define RTCCINTREG_MIN             INT32_MIN
#define RTCCINTREG_FMT             "RI32"
#define RTCCINTREG_XFMT            "RX32"
#elif ARCH_BITS == 64
#define RTCCINTREG_C(a_Value)      INT64_C(a_Value)
#define RTCCINTREG_MAX             INT64_MAX
#define RTCCINTREG_MIN             INT64_MIN
#define RTCCINTREG_FMT             "RI64"
#define RTCCINTREG_XFMT            "RX64"
#elif ARCH_BITS == 16
#define RTCCINTREG_C(a_Value)      INT16_C(a_Value)
#endif
```c
#define RTCCUINTREG_MAX    UINT16_MAX
#define RTCCUINTREG_FMT    "RU16"
#define RTCCUINTREG_XFMT   "RX16"
#define RTCCINTREG_C(a_Value)  INT16_C(a_Value)
#define RTCCINTREG_MAX    INT16_MAX
#define RTCCINTREG_MIN    INT16_MIN
#define RTCCINTREG_FMT    "RI16"
#define RTCCINTREG_XFMT   "RX16"
#endif

/** @def RTCCUINTXREG_C  
* Defines a constant of RTCCUINTXREG type.  
* @param a_Value    Constant value */
/** @def RTCCUINTXREG_MAX  
* Max value that RTCCUINTXREG can hold. */
/** @def RTCCUINTXREG_FMT  
* Generic IPRT format specifier for RTCCUINTXREG. */
/** @def RTCCUINTXREG_XFMT  
* Generic IPRT format specifier for RTCCUINTXREG, hexadecimal. */
/** @def RTCCINTXREG_C  
* Defines a constant of RTCCINTXREG type.  
* @param a_Value    Constant value */
/** @def RTCCINTXREG_MAX  
* Max value that RTCCINTXREG can hold. */
/** @def RTCCINTXREG_FMT  
* Generic IPRT format specifier for RTCCINTXREG. */
/** @def RTCCINTXREG_XFMT  
* Generic IPRT format specifier for RTCCINTXREG, hexadecimal. */
#if ARCH_BITS == 16 && defined(RT_ARCH_X86)
#define RTCCUINTXREG_C(a_Value)    UINT32_C(a_Value)
#define RTCCUINTXREG_MAX           UINT32_MAX
#define RTCCUINTXREG_FMT           "RU32"
#define RTCCUINTXREG_XFMT          "RX32"
#define RTCCINTXREG_C(a_Value)     INT32_C(a_Value)
#define RTCCINTXREG_MAX            INT32_MAX
#define RTCCINTXREG_FMT            "RI32"
#define RTCCINTXREG_XFMT           "RX32"
#else
#define RTCCUINTXREG_C(a_Value)    RTCCUINTREG_C(a_Value)
#define RTCCUINTXREG_MAX           RTCCUINTREG_MAX
#define RTCCUINTXREG_FMT           RTCCUINTREG_FMT
#define RTCCUINTXREG_XFMT          RTCCUINTREG_XFMT
#define RTCCINTXREG_C(a_Value)     RTCCINTREG_C(a_Value)
#define RTCCINTXREG_MAX            RTCCINTREG_MAX
#endif
```
/** Pointer to a big integer number. */
typedef struct RTBIGNUM RT_FAR *PRTBIGNUM;
/** Pointer to a const big integer number. */
typedef struct RTBIGNUM const RT_FAR *PCRTBIGNUM;

/** Pointer to a critical section. */
typedef struct RTCRITSECT RT_FAR *PRTCRITSECT;
/** Pointer to a const critical section. */
typedef const struct RTCRITSECT RT_FAR *PCRTCRITSECT;

/** Pointer to a read/write critical section. */
typedef struct RTCRITSECTRW RT_FAR *PRTCRITSECTRW;
/** Pointer to a const read/write critical section. */
typedef const struct RTCRITSECTRW RT_FAR *PCRTCRITSECTRW;

/** Condition variable handle. */
typedef R3PTRTYPE(struct RTCONDVARINTERNAL RT_FAR *) RTCONDVAR;
/** Pointer to a condition variable handle. */
typedef RTCONDVAR RT_FAR *PRTCONDVAR;
/** Nil condition variable handle. */
define NIL_RTCONDVAR 0

/** Cryptographic (certificate) store handle. */
typedef R3R0PTRTYPE(struct RTCRSTOREINT RT_FAR *) RTCRSTORE;
/** Pointer to a Cryptographic (certificate) store handle. */
typedef RTCRSTORE RT_FAR *PRTCRSTORE;
/** Nil Cryptographic (certificate) store handle. */
define NIL_RTCRSTORE 0

/** Pointer to a const (store) certificate context. */
typedef struct RTCRCERTCTX const RT_FAR *PCRTCRCERTCTX;

/** Cryptographic message digest handle. */
typedef R3R0PTRTYPE(struct RTCRDIAGESTINT RT_FAR *) RTCRDIAGEST;
/** Pointer to a cryptographic message digest handle. */
typedef RTCRDIAGEST RT_FAR *PRTCRDIAGEST;
/** NIL cryptographic message digest handle. */
define NIL_RTCRDIAGEST (0)
+/** Public key encryption schema handle. */
+typedef R3R0PTRTYPE(struct RTCRPKIXENCRIPTIONINT RT_FAR *) RTCRPKIXENCRIPTION;
+/** Pointer to a public key encryption schema handle. */
+typedef RTCRPKIXENCRIPTION RT_FAR *PRTCRPKIXENCRIPTION;
+/** NIL public key encryption schema handle */
+#define NIL_RTCRPKIXENCRIPTION (0)
+
+/** Public key signature schema handle. */
+typedef R3R0PTRTYPE(struct RTCRPKIXSIGNATUREINT RT_FAR *) RTCRPKIXSIGNATURE;
+/** Pointer to a public key signature schema handle. */
+typedef RTCRPKIXSIGNATURE RT_FAR *PRTCRPKIXSIGNATURE;
+/** NIL public key signature schema handle */
+#define NIL_RTCRPKIXSIGNATURE (0)
+
+/** X.509 certificate paths builder & validator handle. */
+typedef R3R0PTRTYPE(struct RTCRX509CERTPATHSINT RT_FAR *) RTCRX509CERTPATHS;
+/** Pointer to a certificate paths builder & validator handle. */
+typedef RTCRX509CERTPATHS RT_FAR *PRTCRX509CERTPATHS;
+/** Nil certificate paths builder & validator handle. */
+#define NIL_RTCRX509CERTPATHS 0
+
+/** Directory handle. */
+typedef struct RTDIRINTERNAL *RTDIR;
+/** Pointer to directory handle. */
+typedef RTDIR *PRTDIR;
+/** NIL directory handle. */
+#define NIL_RTDIR ((RTDIR)0)
+
+/** File handle. */
+typedef R3R0PTRTYPE(struct RTFILEINT RT_FAR *) RTFILE;
+/** Pointer to file handle. */
+typedef RTFILE RT_FAR *PRTFILE;
+/** Nil file handle. */
+#define NIL_RTFILE ((RTFILE)~(RTHCINTPTR)0)
+
+/** Async I/O request handle. */
+typedef R3PTRTYPE(struct RTFILEAIOREQINTERNAL RT_FAR *) RTFILEAIOREQ;
+/** Pointer to an async I/O request handle. */
+typedef RTFILEAIOREQ RT_FAR *PRTFILEAIOREQ;
+/** Nil request handle. */
+#define NIL_RTFILEAIOREQ 0
+
+/** Async I/O completion context handle. */
+typedef R3PTRTYPE(struct RTFILEAIOCTXINTERNAL RT_FAR *) RTFILEAIOCTX;
+/** Pointer to an async I/O completion context handle. */
+typedef RTFILEAIOCTX RT_FAR *PRTFILEAIOCTX;
+/** Nil context handle. */
+\#define NIL_RTFILEAIOCTX 0
+
+/** ISO image maker handle. */
+typedef struct RTFSISOMAKERINT RT_FAR *RTFSISOMAKER;
+/** Pointer to an ISO image maker handle. */
+typedef RTFSISOMAKER RT_FAR *PRTFSISOMAKER;
+/** NIL ISO maker handle. */
+\#define NIL_RTFSISOMAKER ((RTFSISOMAKER)0)
+
+/** INI-file handle. */
+typedef struct RTINIFILEINT RT_FAR *RTINIFILE;
+/** Pointer to an INI-file handle. */
+typedef RTINIFILE RT_FAR *PRTINIFILE;
+/** NIL INI-file handle. */
+\#define NIL_RTINIFILE ((RTINIFILE)0)
+
+/** Loader module handle. */
+typedef R3R0PTRTYPE(struct RTLDRMODINTERNAL RT_FAR *) RTLDRMOD;
+/** Pointer to a loader module handle. */
+typedef RTLDRMOD RT_FAR *PRTLDRMOD;
+/** Nil loader module handle. */
+\#define NIL_RTLDRMOD 0
+
+/** Lock validator class handle. */
+typedef R3R0PTRTYPE(struct RTLOCKVALCLASSINT RT_FAR *) RTLOCKVALCLASS;
+/** Pointer to a lock validator class handle. */
+typedef RTLOCKVALCLASS RT_FAR *PRTLOCKVALCLASS;
+/** Nil lock validator class handle. */
+\#define NIL_RTLOCKVALCLASS ((RTLOCKVALCLASS)0)
+
+/** Ring-0 memory object handle. */
+typedef R0PTRTYPE(struct RTR0MEMOBJINTERNAL RT_FAR *) RTR0MEMOBJ;
+/** Pointer to a Ring-0 memory object handle. */
+typedef RTR0MEMOBJ RT_FAR *PRTR0MEMOBJ;
+/** Nil ring-0 memory object handle. */
+\#define NIL_RTR0MEMOBJ 0
+
+/** Native thread handle. */
+typedef RTHCUINTPTR RTNATIVETHREAD;
+/** Pointer to an native thread handle. */
+typedef RTNATIVETHREAD RT_FAR *PRTNATIVETHREAD;
+/** Nil native thread handle. */
+\#define NIL_RTNATIVETHREAD (~(RTNATIVETHREAD)0)
+
+/** Pipe handle. */
+typedef R3R0PTRTYPE(struct RTPIPEINTERNAL RT_FAR *) RTPIPE;
+/** Pointer to a pipe handle. */
+typedef RTPIPE RT_FAR *PRTPIPE;
+/** Nil pipe handle.
+ * @remarks This is not 0 because of UNIX and OS/2 handle values. Take care! */
+#define NIL_RTPIPE ((RTPIPE)RTHCUINTPTR_MAX)
+
+/** @typedef RTPOLLSET
+ * Poll set handle. */
+typedef R3R0PTRTYPE(struct RTPOLLSETINTERNAL RT_FAR *) RTPOLLSET;
+/** Pointer to a poll set handle. */
+typedef RTPOLLSET RT_FAR *PRTPOLLSET;
+/** Nil poll set handle handle. */
+#define NIL_RTPOLLSET ((RTPOLLSET)0)
+
+/** Process identifier. */
+typedef uint32_t RTPROCESS;
+/** Pointer to a process identifier. */
+typedef RTPROCESS RT_FAR *PRTPROCESS;
+/** Nil process identifier. */
+#define NIL_RTPROCESS (~(RTPROCESS)0)
+
+/** Process ring-0 handle. */
+typedef RTR0UINTPTR RTR0PROCESS;
+/** Pointer to a ring-0 process handle. */
+typedef RTR0PROCESS RT_FAR *PRTR0PROCESS;
+/** Nil ring-0 process handle. */
+#define NIL_RTR0PROCESS (~(RTR0PROCESS)0)
+
+/** @typedef RTSEMEVENT
+ * Event Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMEVENTINTERNAL RT_FAR *) RTSEMEVENT;
+/** Pointer to an event semaphore handle. */
+typedef RTSEMEVENT RT_FAR *PRTSEMEVENT;
+/** Nil event semaphore handle. */
+#define NIL_RTSEMEVENT 0
+
+/** @typedef RTSEMEVENTMULTI
+ * Event Multiple Release Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMEVENTMULTIINTERNAL RT_FAR *) RTSEMEVENTMULTI;
+/** Pointer to an event multiple release semaphore handle. */
+typedef RTSEMEVENTMULTI RT_FAR *PRTSEMEVENTMULTI;
+/** Nil multiple release event semaphore handle. */
+#define NIL_RTSEMEVENTMULTI 0
+
+/** @typedef RTSEMFASTMUTEX
+ * Fast mutex Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMFASTMUTEXINTERNAL RT_FAR *) RTSEMFASTMUTEX;
+/** Pointer to a fast mutex semaphore handle. */
+typedef RTSEMFASTMUTEX RT_FAR *PRTSEMFASTMUTEX;
+/** Nil fast mutex semaphore handle. */
#define NIL_RTSEMMUTEX 0
+
/** @typedef RTSEMMUTEX */
+ * Mutex Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMMUTEXINTERNAL RT_FAR *) RTSEMMUTEX;
+/** Pointer to a mutex semaphore handle. */
+typedef RTSEMMUTEX RT_FAR *PRTSEMMUTEX;
+/** Nil mutex semaphore handle. */
+#define NIL_RTSEMMUTEX 0
+
/** @typedef RTSEMSPINMUTEX */
+ * Spinning mutex Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMSPINMUTEXINTERNAL RT_FAR *) RTSEMSPINMUTEX;
+/** Pointer to a spinning mutex semaphore handle. */
+typedef RTSEMSPINMUTEX RT_FAR *PRTSEMSPINMUTEX;
+/** Nil spinning mutex semaphore handle. */
+#define NIL_RTSEMSPINMUTEX 0
+
/** @typedef RTSEMRW */
+ * Read/Write Semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMRWINTERNAL RT_FAR *) RTSEMRW;
+/** Pointer to a read/write semaphore handle. */
+typedef RTSEMRW RT_FAR *PRTSEMRW;
+/** Nil read/write semaphore handle. */
+#define NIL_RTSEMRW 0
+
/** @typedef RTSEMXROADS */
+ * Crossroads semaphore handle. */
+typedef R3R0PTRTYPE(struct RTSEMXROADSINTERNAL RT_FAR *) RTSEMXROADS;
+/** Pointer to a crossroads semaphore handle. */
+typedef RTSEMXROADS RT_FAR *PRTSEMXROADS;
+/** Nil crossroads semaphore handle. */
+#define NIL_RTSEMXROADS ((RTSEMXROADS)0)
+
/** Spinlock handle. */
+typedef R3R0PTRTYPE(struct RTSPINLOCKINTERNAL RT_FAR *) RTSPINLOCK;
+/** Pointer to a spinlock handle. */
+typedef RTSPINLOCK RT_FAR *PRTSPINLOCK;
+/** Nil spinlock handle. */
+#define NIL_RTSPINLOCK 0
+
/** Socket handle. */
+typedef R3R0PTRTYPE(struct RTSOCKETINT RT_FAR *) RTSOCKET;
+/** Pointer to socket handle. */
+typedef RTSOCKET RT_FAR *PRTSOCKET;
+/** Nil socket handle. */
+#define NIL_RTSOCKET ((RTSOCKET)0)
+
/* Pointer to a RTTCPSERVER handle. */
typedef struct RTTCPSERVER RT_FAR *PRTTCPSERVER;
/* Pointer to a RTUDPSERVER handle. */
typedef struct RTUDPSERVER RT_FAR *PRTUDPSERVER;
/* Nil RTTCPSERVER handle. */
#define NIL_RTTCPSERVER ((PRTTCPSERVER)0)

/* Pointer to a RTUDPSERVER handle. */
typedef struct RTUDPSERVER RT_FAR *PRTUDPSERVER;
/* Pointer to a RTUDPSERVER handle. */
typedef PRTUDPSERVER RT_FAR *PPRTUDPSERVER;
/* Nil RTUDPSERVER handle. */
#define NIL_RTUDPSERVER ((PRTUDPSERVER)0)

/* Thread handle. */
typedef R3R0PTRTYPE(struct RTTHREADINT RT_FAR *) RTTHREAD;
/* Pointer to thread handle. */
typedef RTTHREAD RT_FAR *PRTTHREAD;
/* Nil thread handle. */
#define NIL_RTTHREAD 0

/* Thread context switching hook handle. */
typedef R0PTRTYPE(struct RTTHREADCTXHOOKINT RT_FAR *) RTTHREADCTXHOOK;
/* Pointer to Thread context switching hook handle. */
typedef RTTHREADCTXHOOK RT_FAR *PRTTHREADCTXHOOK;
/* Nil Thread context switching hook handle. */
#define NIL_RTTHREADCTXHOOK ((RTTHREADCTXHOOK)0)

/* A TLS index. */
typedef RTHCINTPTR RTTLS;
/* Pointer to a TLS index. */
typedef RTTLS RT_FAR *PRTTLS;
/* Pointer to a const TLS index. */
typedef RTTLS const RT_FAR *PCRTTLS;
/* NIL TLS index value. */
#define NIL_RTTLS ((RTTLS)-1)

/* Trace buffer handle. */
/* @remarks This is not a R3/R0 type like most other handles! */
/* Pointer to a trace buffer handle. */
typedef struct RTTRACEBUFINT RT_FAR *RTTRACEBUF;
/* Nil trace buffer handle. */
#define NIL_RTTRACEBUF ((RTTRACEBUF)0)
/* The handle of the default trace buffer. */
/* This can be used with any of the RTTraceBufAdd APIs. */
#define RTTRACEBUF_DEFAULT ((RTTRACEBUF)-2)
+ /** Handle to a simple heap. */
+ typedef R3R0PTRTYPE(struct RTHEAPSIMPLEINTERNAL RT_FAR *) RTHEAPSIMPLE;
+ /** Pointer to a handle to a simple heap. */
+ typedef RTHEAPSIMPLE RT_FAR *PRTHEAPSIMPLE;
+ /** NIL simple heap handle. */
+ #define NIL_RTHEAPSIMPLE ((RTHEAPSIMPLE)0)
+
+ /** Handle to an offset based heap. */
+ typedef R3R0PTRTYPE(struct RTHEAPOFFSETINTERNAL RT_FAR *) RTHEAPOFFSET;
+ /** Pointer to a handle to an offset based heap. */
+ typedef RTHEAPOFFSET RT_FAR *PRTHEAPOFFSET;
+ /** NIL offset based heap handle. */
+ #define NIL_RTHEAPOFFSET ((RTHEAPOFFSET)0)
+
+ /** Handle to an environment block. */
+ typedef R3PTRTYPE(struct RTENVINTERNAL RT_FAR *) RTENV;
+ /** Pointer to a handle to an environment block. */
+ typedef RTENV RT_FAR *PRTENV;
+ /** NIL simple heap handle. */
+ #define NIL_RTENV ((RTENV)0)
+
+ /** A CPU identifier.
+ * @remarks This doesn’t have to correspond to the APIC ID (intel/amd). Nor
+ * does it have to correspond to the bits in the affinity mask, at
+ * least not until we’ve sorted out Windows NT. */
+ typedef uint32_t RTCPUID;
+ /** Pointer to a CPU identifier. */
+ typedef RTCPUID RT_FAR *PRTCPUID;
+ /** Pointer to a const CPU identifier. */
+ typedef RTCPUID const RT_FAR *PCRTCPUID;
+ /** Nil CPU Id. */
+ #define NIL_RTCPUID ((RTCPUID)~0)
+
+ /** The maximum number of CPUs a set can contain and IPRT is able
+ * to reference. (Should be max of support arch/platforms.)
+ * @remarks Must be a multiple of 64 (see RTCPUSET). */
+ #if defined(RT_ARCH_X86) || defined(RT_ARCH_AMD64)
+ # define RTCPUSET_MAX_CPUS 256
+ #elif defined(RT_ARCH_SPARC) || defined(RT_ARCH_SPARC64)
+ # define RTCPUSET_MAX_CPUS 1024
+ #else
+ # define RTCPUSET_MAX_CPUS 64
+ #endif
+ /** A CPU set.
+ * @note Treat this as an opaque type and always use RTCpuSet* for
+ * manipulating it. */
+ typedef struct RTCPUSET
+{
    /** The bitmap. */
    uint64_t bmSet[RTCPUSET_MAX_CPUS / 64];
} RTCPUSET;

+/** Pointer to a CPU set. */
+typedef RTCPUSET RT_FAR *PRTCPUSET;

+/** Pointer to a const CPU set. */
+typedef RTCPUSET const RT_FAR *PCRTCPUSET;

+/** A handle table handle. */
+typedef R3R0PTRTYPE(struct RTHANDLETABLEINT RT_FAR *) RTHANDLETABLE;

+/** A pointer to a handle table handle. */
+typedef RTCPUSET RT_FAR *PRTHANDLETABLE;

+/** @def NIL_RTHANDLETABLE
* NIL handle table handle. */
+#define NIL_RTHANDLETABLE ((RTHANDLETABLE)0)

+/** A handle to a low resolution timer. */
+typedef R3R0PTRTYPE(struct RTTIMERLRINT RT_FAR *) RTTIMERLR;

+/** A pointer to a low resolution timer handle. */
+typedef RTTIMERLR RT_FAR *PRTTIMERLR;

+/** @def NIL_RTTIMERLR
* NIL low resolution timer handle value. */
+#define NIL_RTTIMERLR ((RTTIMERLR)0)

+/** Handle to a random number generator. */
+typedef R3R0PTRTYPE(struct RTRANDINT RT_FAR *) RTRAND;

+/** Pointer to a random number generator handle. */
+typedef RTRAND RT_FAR *PRTRAND;

+/** @def NIL_RTRAND
* NIL random number generator handle value. */
+#define NIL_RTRAND ((RTRAND)0)

+/** Debug address space handle. */
+typedef R3R0PTRTYPE(struct RTDBGASINT RT_FAR *) RTDBGAS;

+/** Pointer to a debug address space handle. */
+typedef RTDBGAS RT_FAR *PRTDBGAS;

+/** NIL debug address space handle. */
+#define NIL_RTDBGAS ((RTDBGAS)0)

+/** Debug module handle. */
+typedef R3R0PTRTYPE(struct RTDBGMODINT RT_FAR *) RTDBGMOD;

+/** Pointer to a debug module handle. */
+typedef RTDBGMOD RT_FAR *PRTDBGMOD;

+/** NIL debug module handle. */
+#define NIL_RTDBGMOD ((RTDBGMOD)0)

+/** Manifest handle. */
+typedef struct RTMANIFESTINT RT_FAR *RTMANIFEST;
typedef RTMANIFEST RT_FAR *PRTMANIFEST;

#define NIL_RTMANIFEST ((RTMANIFEST)~(uintptr_t)0)

typedef R3R0PTRTYPE(struct RTMEMPOOLINT RT_FAR *) RTMEMPOOL;

typedef RTMEMPOOL RT_FAR *PRTMEMPOOL;

#define NIL_RTMEMPOOL ((RTMEMPOOL)0)

#define RTMEMPOOL_DEFAULT ((RTMEMPOOL)-2)

typedef RTMEMPOOL

typedef R3R0PTRTYPE(struct RTSTRCACHEINT RT_FAR *) RTSTRCACHE;

typedef RTSTRCACHE RT_FAR *PRTSTRCACHE;

#define NIL_RTSTRCACHE ((RTSTRCACHE)0)

#define RTSTRCACHE_DEFAULT ((RTSTRCACHE)-2)

typedef struct RTVFSINTERNAL RT_FAR *RTVFS;

typedef RTVFS RT_FAR *PRTVFS;

#define NIL_RTVFS ((RTVFS)--(uintptr_t)0)

typedef struct RTVFSOBJINTERNAL RT_FAR *RTVFSOBJ;

typedef RTVFSOBJ RT_FAR *PRTVFSOBJ;

#define NIL_RTVFSOBJ ((RTVFSOBJ)--(uintptr_t)0)

typedef struct RTVFSDIRINTERNAL RT_FAR *RTVFSDIR;

typedef RTVFSDIR RT_FAR *PRTVFSDIR;

#define NIL_RTVFSDIR ((RTVFSDIR)--(uintptr_t)0)

typedef struct RTVFSFSSTREAMINTERNAL RT_FAR *RTVFSFSSTREAM;

typedef RTVFSFSSTREAM RT_FAR *PRTVFSFSSTREAM;

#define NIL_RTVFSFSSTREAM ((RTVFSFSSTREAM)--(uintptr_t)0)
typedef RTVFSFSSTREAM RT_FAR *PRTVFSFSSTREAM;

/** A NIL VFS filesystem stream handle. */
#define NIL_RTVFSFSSTREAM ((RTVFSFSSTREAM)~(uintptr_t)0)

/** Virtual Filesystem I/O stream handle. */
typedef struct RTVFSIOSTREAMINTERNAL RT_FAR *RTVFSIOSTREAM;

/** Pointer to a VFS I/O stream handle. */
typedef RTVFSIOSTREAM RT_FAR *PRTVFSIOSTREAM;

/** A NIL VFS I/O stream handle. */
#define NIL_RTVFSIOSTREAM ((RTVFSIOSTREAM)~(uintptr_t)0)

/** Virtual Filesystem file handle. */
typedef struct RTVFSFILEINTERNAL RT_FAR *RTVFSFILE;

/** Pointer to a VFS file handle. */
typedef RTVFSFILE RT_FAR *PRTVFSFILE;

/** A NIL VFS file handle. */
#define NIL_RTVFSFILE ((RTVFSFILE)~(uintptr_t)0)

/** Virtual Filesystem symbolic link handle. */
typedef struct RTVFSSYMLINKINTERNAL RT_FAR *RTVFSSYMLINK;

/** Pointer to a VFS symbolic link handle. */
typedef RTVFSSYMLINK RT_FAR *PRTVFSSYMLINK;

/** A NIL VFS symbolic link handle. */
#define NIL_RTVFSSYMLINK ((RTVFSSYMLINK)~(uintptr_t)0)

/** Async I/O manager handle. */
typedef struct RTAIOMGRINT RT_FAR *RTAIOMGR;

/** Pointer to a async I/O manager handle. */
typedef RTAIOMGR RT_FAR *PRTAIOMGR;

/** A NIL async I/O manager handle. */
#define NIL_RTAIOMGR ((RTAIOMGR)~(uintptr_t)0)

/** Async I/O manager file handle. */
typedef struct RTAIOMGRFILEINT RT_FAR *RTAIOMGRFILE;

/** Pointer to a async I/O manager file handle. */
typedef RTAIOMGRFILE RT_FAR *PRTAIOMGRFILE;

/** A NIL async I/O manager file handle. */
#define NIL_RTAIOMGRFILE ((RTAIOMGRFILE)~(uintptr_t)0)

/** Kernel module information record handle. */
typedef struct RTKRNLMODINFOINT RT_FAR *RTKRNLMODINFO;

/** Pointer to a kernel information record handle. */
typedef RTKRNLMODINFO RT_FAR *PRTKRNLMODINFO;

/** A NIL kernel module information record handle. */
#define NIL_RTKRNLMODINFO ((RTKRNLMODINFO)~(uintptr_t)0);
This is usually used together with RTHANDLEUNION.

*/

+ typedef enum RTHANDLETYPE
+ {
+    /** The invalid zero value. */
+    RTHANDLETYPE_INVALID = 0,
+    /** File handle. */
+    RTHANDLETYPE_FILE,
+    /** Pipe handle */
+    RTHANDLETYPE_PIPE,
+    /** Socket handle. */
+    RTHANDLETYPE_SOCKET,
+    /** Thread handle. */
+    RTHANDLETYPE_THREAD,
+    /** The end of the valid values. */
+    RTHANDLETYPE_END,
+    /** The 32-bit type blow up. */
+    RTHANDLETYPE_32BIT_HACK = 0x7fffffff
+ } RTHANDLETYPE;

/** Pointer to a handle type. */
typedef RTHANDLETYPE RT_FAR *PRTHANDLETYPE;

+/**
+ * Handle union.
+ *
+ * This is usually used together with RTHANDLETYPE or as RTHANDLE.
+ */
+ typedef union RTHANDLEUNION
+ {
+     RTFILE          hFile;        /**< File handle. */
+     RTPIPE          hPipe;        /**< Pipe handle. */
+     RTSOCKET        hSocket;      /**< Socket handle. */
+     RTTHREAD        hThread;      /**< Thread handle. */
+     /** Generic integer handle value.
+      * Note that RTFILE is not yet pointer sized, so accessing it via this member
+      * isn't necessarily safe or fully portable. */
+     RTHCUINTPTR     uInt;
+ } RTHANDLEUNION;

/** Pointer to a handle union. */
typedef RTHANDLEUNION RT_FAR *PRTHANDLEUNION;

/** Pointer to a const handle union. */
typedef RTHANDLEUNION const RT_FAR *PCRTHANDLEUNION;

+/**
+ * Generic handle.
+ */
+ typedef struct RTHANDLE
/** The handle type. */
RTHANDLETYPE enmType;
/** The handle value. */
RTHANDLEUNION u;
} RTHANDLE;
/** Pointer to a generic handle. */
typedef RTHANDLE RT_FAR *PRTHANDLE;
/** Pointer to a const generic handle. */
typedef RTHANDLE const RT_FAR *PCRTHANDLE;

/** Pointer to a generic handle. */
typedef RTHANDLE RT_FAR *PRTHANDLE;
/** Pointer to a const generic handle. */
typedef RTHANDLE const RT_FAR *PCRTHANDLE;

+/
+ * Standard handles.
+ *
+ * @remarks These have the correct file descriptor values for unixy systems and
+ * can be used directly in code specific to those platforms.
+ */
+typedef enum RTHANDLESTD
+{
+ /** Invalid standard handle. */
+ RTHANDLESTD_INVALID = -1,
+ /** The standard input handle. */
+ RTHANDLESTD_INPUT = 0,
+ /** The standard output handle. */
+ RTHANDLESTD_OUTPUT,
+ /** The standard error handle. */
+ RTHANDLESTD_ERROR,
+ /** The typical 32-bit type hack. */
+ RTHANDLESTD_32BIT_HACK = 0x7fffffff
+} RTHANDLESTD;
+
+
+/**
+ * Error info.
+ *
+ * @see RTErrInfo.*
+ */
+typedef struct RTERRINFO
+{
+ /** Flags, see RTERRINFO_FLAGS_XXX. */
+ uint32_t tFlags;
+ /** The status code. */
+ int32_t rc;
+ /** The size of the message */
+ size_t cbMsg;
+ /** The error buffer. */
+ char *pszMsg;
+ /** Reserved for future use. */
+ void *apvReserved[2];
+ } RTERRINFO;
+ /** Pointer to an error info structure. */
+ typedef RTERRINFO RT_FAR *PRTERRINFO;
+ /** Pointer to a const error info structure. */
+ typedef RTERRINFO const RT_FAR *PCRTERRINFO;
+
+ /**
+ * Static error info structure, see RTErrInfoInitStatic.
+ */
+ typedef struct RTERRINFOSTATIC
+
+ { 
+ /** The core error info. */
+ RTERRINFO Core;
+ /** The static message buffer. */
+ char szMsg[3072];
+ } RTERRINFOSTATIC;
+ /** Pointer to a error info buffer. */
+ typedef RTERRINFOSTATIC RT_FAR *PRTERRINFOSTATIC;
+ /** Pointer to a const static error info buffer. */
+ typedef RTERRINFOSTATIC const RT_FAR *PCRTERRINFOSTATIC;
+
+ /** UUID data type. */
+ *
+ /** @remarks IPRT defines that the first three integers in the @c Gen struct
+ interpretation are in little endian representation. This is
+ different to many other UUID implementation, and requires
+ conversion if you need to achieve consistent results. */
+ */
+ typedef union RTUUID
+
+ { 
+ /** 8-bit view. */
+ uint8_t au8[16];
+ /** 16-bit view. */
+ uint16_t au16[8];
+ /** 32-bit view. */
+ uint32_t au32[4];
+ /** 64-bit view. */
+ uint64_t au64[2];
+ /** The way the UUID is declared by the DCE specification. */
+ struct
+ { 
+ uint32_t u32TimeLow;
+  uint16_t  u16TimeMid;
+  uint16_t  u16TimeHiAndVersion;
+  uint8_t   u8ClockSeqHiAndReserved;
+  uint8_t   u8ClockSeqLow;
+  uint8_t   au8Node[6];
+  } Gen;
+} RTUUID;
+/** Pointer to UUID data. */
typedef RTUUID RT_FAR *PRTUUID;
+/** Pointer to readonly UUID data. */
typedef const RTUUID RT_FAR *PCRTUUID;
+
+/** Initializes a RTUUID structure with all zeros (RTUuidIsNull() true). */
+#define RTUUID_INITIALIZE_NULL { { 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 } }
+
+/** UUID string maximum length. */
+#define RTUUID_STR_LENGTH 37
+
+
+/** Compression handle. */
typedef struct RTZIPCOMP RT_FAR *PRTZIPCOMP;
+/** Decompressor handle. */
typedef struct RTZIPDECOMP RT_FAR *PRTZIPDECOMP;
+
+
+/** Unicode Code Point. */
typedef uint32_t                RTUNICP;
+/** Pointer to an Unicode Code Point. */
typedef RTUNICP RT_FAR *PRTUNICP;
+/** Pointer to a Unicode Code Point. */
typedef const RTUNICP RT_FAR *PCRTUNICP;
+/** Max value a RTUNICP type can hold. */
+#define RTUNICP_MAX         ( ~(RTUNICP)0 )
+/** Invalid code point. */
+* This is returned when encountered invalid encodings or invalid
+  * unicode code points. */
+#define RTUNICP_INVALID      ( UINT32_C(0xfffffffe) )
+
+
+/** UTF-16 character. */
+* @remark  wchar_t is not usable since it's compiler defined.
+* @remark  When we use the term character we're not talking about unicode code point, but
+  * the basic unit of the string encoding. Thus cwc - count of wide chars - means
+  * count of RTUTF16; cuc - count of unicode chars - means count of RTUNICP;
+  * and cch means count of the typedef 'char', which is assumed to be an octet.
+ typedef uint16_t         RTUTF16;
+ /** Pointer to a UTF-16 character. */
+ typedef RTUTF16         RT_FAR *PRTUTF16;
+ /** Pointer to a const UTF-16 character. */
+ typedef const RTUTF16   RT_FAR *PCRTUTF16;
+
+ /**
+ * String tuple to go with the RT_STR_TUPLE macro.
+ */
+ typedef struct RTSTRTUPLE
+ {
+     /** The string. */
+     const char *psz;
+     /** The string length. */
+     size_t      cch;
+ } RTSTRTUPLE;
+ /** Pointer to a string tuple. */
+ typedef RTSTRTUPLE RT_FAR *PRTSTRTUPLE;
+ /** Pointer to a const string tuple. */
+ typedef RTSTRTUPLE const RT_FAR *PCRTSTRTUPLE;
+
+ /**
+ * Wait for ever if we have to.
+ */
+ #define RT_INDEFINITE_WAIT      (~0U)
+
+ /**
+ * Generic process callback.
+ */
+ typedef DECLCALLBACK(int) FNRTPROGRESS(unsigned uPrecentage, void *pvUser);
+ /** Pointer to a generic progress callback function, FNRTPROCESS(). */
+ typedef FNRTPROGRESS *PFNRTPROGRESS;
+
+ /**
+ * Generic vprintf-like callback function for dumpers.
+ */
+ typedef DECLCALLBACK(void) FNRTDUMPPRINTFV(void *pvUser, const char *pszFormat, va_list va)
RT_IPRT_FORMAT_ATTR(2, 0);
+/** Pointer to a generic printf-like function for dumping. */
+typedef FNRTDUMPPRINTFV *PFNRTDUMPPRINTFV;
+
+/**
+ * A point in a two dimentional coordinate system.
+ */
+typedef struct RTPOINT
+{
+    /** X coordinate. */
+    int32_t x;
+    /** Y coordinate. */
+    int32_t y;
+} RTPOINT;
+/** Pointer to a point. */
+typedef RTPOINT RT_FAR *PRTPOINT;
+/** Pointer to a const point. */
+typedef const RTPOINT RT_FAR *PCRTPOINT;
+
+/**
+ * Rectangle data type, double point.
+ */
+typedef struct RTRECT
+{
+    /** left X coordinate. */
+    int32_t xLeft;
+    /** top Y coordinate. */
+    int32_t yTop;
+    /** right X coordinate. (exclusive) */
+    int32_t xRight;
+    /** bottom Y coordinate. (exclusive) */
+    int32_t yBottom;
+} RTRECT;
+/** Pointer to a double point rectangle. */
+typedef RTRECT RT_FAR *PRTRECT;
+/** Pointer to a const double point rectangle. */
+typedef const RTRECT RT_FAR *PCRTRECT;
+
+/**
+ * Rectangle data type, point + size.
+ */
+typedef struct RTRECT2
+{
+    /** X coordinate.
+     * Unless stated otherwise, this is the top left corner. */
+    int32_t
```c
int32_t x;
/** Y coordinate.
 * Unless stated otherwise, this is the top left corner. */
int32_t y;
/** The width.
 * Unless stated otherwise, this is to the right of (x,y) and will not
 * be a negative number. */
int32_t cx;
/** The height.
 * Unless stated otherwise, this is down from (x,y) and will not be a
 * negative number. */
int32_t cy;

RTRECT2;
/** Pointer to a point + size rectangle. */
typedef RTRECT2 RT_FAR *PRTRECT2;
/** Pointer to a const point + size rectangle. */
typedef const RTRECT2 RT_FAR *PCRTRECT2;

/** The size of a rectangle. */
typedef struct RTRECTSIZE
{
    /** The width (along the x-axis). */
    uint32_t cx;
    /** The height (along the y-axis). */
    uint32_t cy;
} RTRECTSIZE;
/** Pointer to a rectangle size. */
typedef RTRECTSIZE RT_FAR *PRTRECTSIZE;
/** Pointer to a const rectangle size. */
typedef const RTRECTSIZE RT_FAR *PCRTRECTSIZE;

/** Ethernet MAC address. */
/** The first 24 bits make up the Organisationally Unique Identifier (OUI),
 * where the first bit (little endian) indicates multicast (set) / unicast,
 * and the second bit indicates locally (set) / global administered. If all
 * bits are set, it's a broadcast. */
typedef union RTMAC
{
    /** @todo add a bitfield view of this stuff. */
    /** 8-bit view. */
    uint8_t au8[6];
```

+ /**< 16-bit view. */
+ uint16_t au16[3];
+} RTMAC;
+/** Pointer to a MAC address. */
typedef RTMAC RT_FAR *PRTMAC;
+/** Pointer to a readonly MAC address. */
typedef const RTMAC RT_FAR *PCRTMAC;
+
+/** Pointer to a lock validator record. */
+* The structure definition is found in iprt/lockvalidator.h. */
typedef struct RTLOCKVALRECEXCL RT_FAR *PRTLOCKVALRECEXCL;
+/** Pointer to a record of one ownership share. */
typedef struct RTLOCKVALRECSHRD RT_FAR *PRTLOCKVALRECSHRD;
+/** Pointer to a lock validator source position. */
+* The structure definition is found in iprt/lockvalidator.h. */
typedef struct RTLOCKVALSRCPOS RT_FAR *PRTLOCKVALSRCPOS;
+/** Pointer to a const lock validator source position. */
+* The structure definition is found in iprt/lockvalidator.h. */
typedef struct RTLOCKVALSRCPOS const RT_FAR *PCRTLOCKVALSRCPOS;
+
+/** @name Special sub-class values. */
+* The range 16..UINT32_MAX is available to the user, the range 0..15 is
+* reserved for the lock validator. In the user range the locks can only be
+* taking in ascending order.
+* @} */
+/** Invalid value. */
+#define RTLOCKVAL_SUB_CLASS_INVALID UINT32_C(0)
+/** Not allowed to be taken with any other locks in the same class. */
+* This is the recommended value. */
+#define RTLOCKVAL_SUB_CLASS_NONE UINT32_C(1)
+/** Any order is allowed within the class. */
+#define RTLOCKVAL_SUB_CLASS_ANY UINT32_C(2)
+/** The first user value. */
+#define RTLOCKVAL_SUB_CLASS_USER UINT32_C(16)
+/** @} */
+
+/** Digest types. */
+*/
typedef enum RTDIGESTTYPE
+
+ /**< Invalid digest value. */
+ RTDIGESTTYPE_INVALID = 0,
+ /**< Unknown digest type. */
+ RTDIGESTTYPE_UNKNOWN,
+ /** CRC32 checksum. */
+ RTDIGESTTYPE_CRC32,
+ /** CRC64 checksum. */
+ RTDIGESTTYPE_CRC64,
+ /** MD2 checksum (unsafe!). */
+ RTDIGESTTYPE_MD2,
+ /** MD4 checksum (unsafe!!). */
+ RTDIGESTTYPE_MD4,
+ /** MD5 checksum (unsafe!). */
+ RTDIGESTTYPE_MD5,
+ /** SHA-1 checksum (unsafe!). */
+ RTDIGESTTYPE_SHA1,
+ /** SHA-224 checksum. */
+ RTDIGESTTYPE_SHA224,
+ /** SHA-256 checksum. */
+ RTDIGESTTYPE_SHA256,
+ /** SHA-384 checksum. */
+ RTDIGESTTYPE_SHA384,
+ /** SHA-512 checksum. */
+ RTDIGESTTYPE_SHA512,
+ /** SHA-512/224 checksum. */
+ RTDIGESTTYPE_SHA512T224,
+ /** SHA-512/256 checksum. */
+ RTDIGESTTYPE_SHA512T256,
+ /** End of valid types. */
+ RTDIGESTTYPE_END,
+ /** Usual 32-bit type blowup. */
+ RTDIGESTTYPE_32BIT_HACK = 0x7fffffff
+ } RTDIGESTTYPE;
+
+ /***
+ * Process exit codes.
+ */
+ typedef enum RTEXITCODE
+ {
+ /** Success. */
+ RTEXITCODE_SUCCESS = 0,
+ /** General failure. */
+ RTEXITCODE_FAILURE = 1,
+ /** Invalid arguments. */
+ RTEXITCODE_SYNTAX = 2,
+ /** Initialization failure (usually IPRT, but could be used for other
+ * components as well). */
+ RTEXITCODE_INIT = 3,
+ /** Test skipped. */
+ RTEXITCODE_SKIPPED = 4,
+ /** The end of valid exit codes. */
+ RTEXITCODE_END,
/** The usual 32-bit type hack. */
RTEXITCODE_32BIT_HACK = 0x7fffffff
}

/**
 * Range descriptor.
 */
typedef struct RTRANGE {
+ /**< Start offset. */
+ uint64_t offStart;
+ /**< Range size. */
+ size_t cbRange;
} RTRANGE;

/** Pointer to a range descriptor. */
typedef RTRANGE RT_FAR *PRTRANGE;
 /**< Pointer to a readonly range descriptor. */
typedef const RTRANGE RT_FAR *PCRTRANGE;

 /**<
 * Generic pointer union.
 */
typedef union RTPTRUNION {
+ /**< Pointer into the void. */
+ void RT_FAR *pv;
+ /**< As a signed integer. */
+ intptr_t i;
+ /**< As an unsigned integer. */
+ intptr_t u;
+ /**< Pointer to char value. */
+ char RT_FAR *pch;
+ /**< Pointer to char value. */
+ unsigned char RT_FAR *puch;
+ /**< Pointer to a int value. */
+ int RT_FAR *pi;
+ /**< Pointer to a unsigned int value. */
+ unsigned int RT_FAR *pu;
+ /**< Pointer to a long value. */
+ long RT_FAR *pl;
+ /**< Pointer to a long value. */
+ unsigned long RT_FAR *pul;
+ /**< Pointer to a 8-bit unsigned value. */
+ uint8_t RT_FAR *pu8;
+ /**< Pointer to a 16-bit unsigned value. */
+ uint16_t RT_FAR *pu16;
+ /**< Pointer to a 32-bit unsigned value. */
+
+ uint32_t  RT_FAR *pu32;
+ /**< Pointer to a 64-bit unsigned value. */
+ uint64_t  RT_FAR *pu64;
+ /**< Pointer to a UTF-16 character. */
+ PRTUTF16       pwc;
+ /**< Pointer to a UUID character. */
+ PRTUUID        pUuid;
+} RTPTRUNION;
+ /**< Pointer to a pointer union. */
+typedef RTPTRUNION RT_FAR *PRTPTRUNION;
+
+ /**<
+ * Generic const pointer union.
+ */
+typedef union RTCPTRUNION
+
+ /**< Pointer into the void. */
+ void const  RT_FAR *pv;
+ /**< As a signed integer. */
+ intptr_t     i;
+ /**< As an unsigned integer. */
+ intptr_t     u;
+ /**< Pointer to char value. */
+ char const   RT_FAR *pch;
+ /**< Pointer to char value. */
+ unsigned char const RT_FAR *puch;
+ /**< Pointer to a int value. */
+ int const    RT_FAR *pi;
+ /**< Pointer to a unsigned int value. */
+ unsigned int const RT_FAR *pu;
+ /**< Pointer to a long value. */
+ long const   RT_FAR *pl;
+ /**< Pointer to a long value. */
+ unsigned long const RT_FAR *pul;
+ /**< Pointer to a 8-bit unsigned value. */
+ uint8_t const RT_FAR *pu8;
+ /**< Pointer to a 16-bit unsigned value. */
+ uint16_t const RT_FAR *pu16;
+ /**< Pointer to a 32-bit unsigned value. */
+ uint32_t const RT_FAR *pu32;
+ /**< Pointer to a 64-bit unsigned value. */
+ uint64_t const RT_FAR *pu64;
+ /**< Pointer to a UTF-16 character. */
+ PCRTUTF16     pwc;
+ /**< Pointer to a UUID character. */
+ PCRTUUID      pUuid;
+} RTCPTRUNION;
+ /**< Pointer to a const pointer union. */
typedef RTCPTRUNION RT_FAR *PRTCPTRUNION;

/**
 * Generic volatile pointer union.
 */
typedef union RTVPTRUNION
{
    /** Pointer into the void. */
    void volatile RT_FAR *pv;
    /** As a signed integer. */
    intptr_t i;
    /** As an unsigned integer. */
    intptr_t u;
    /** Pointer to char value. */
    char volatile RT_FAR *pch;
    /** Pointer to char value. */
    unsigned char volatile RT_FAR *puch;
    /** Pointer to a int value. */
    int volatile RT_FAR *pi;
    /** Pointer to a unsigned int value. */
    unsigned int volatile RT_FAR *pu;
    /** Pointer to a long value. */
    long volatile RT_FAR *pl;
    /** Pointer to a long value. */
    unsigned long volatile RT_FAR *pul;
    /** Pointer to a 8-bit unsigned value. */
    uint8_t volatile RT_FAR *pu8;
    /** Pointer to a 16-bit unsigned value. */
    uint16_t volatile RT_FAR *pu16;
    /** Pointer to a 32-bit unsigned value. */
    uint32_t volatile RT_FAR *pu32;
    /** Pointer to a 64-bit unsigned value. */
    uint64_t volatile RT_FAR *pu64;
    /** Pointer to a UTF-16 character. */
    RTUTF16 volatile RT_FAR *pwc;
    /** Pointer to a UUID character. */
    RTUUID volatile RT_FAR *pUuid;
} RTVPTRUNION;

/**
 * Generic const volatile pointer union.
 */
typedef RTVPTRUNION RT_FAR *PRTVPTRUNION;

/**
 * Generic const volatile pointer union.
 */
typedef union RTCVPTRUNION
{
    /** Pointer into the void. */
    void const volatile RT_FAR *pv;
} RTCVPTRUNION;
/** As a signed integer. */
intptr_t i;
/** As an unsigned integer. */
intptr_t u;
/** Pointer to char value. */
char const volatile RT_FAR *pch;
/** Pointer to char value. */
unsigned char const volatile RT_FAR *puch;
/** Pointer to a int value. */
int const volatile RT_FAR *pi;
/** Pointer to a unsigned int value. */
unsigned int const volatile RT_FAR *pu;
/** Pointer to a long value. */
long const volatile RT_FAR *pl;
/** Pointer to a long value. */
unsigned long const volatile RT_FAR *pul;
/** Pointer to a 8-bit unsigned value. */
uint8_t const volatile RT_FAR *pu8;
/** Pointer to a 16-bit unsigned value. */
uint16_t const volatile RT_FAR *pu16;
/** Pointer to a 32-bit unsigned value. */
uint32_t const volatile RT_FAR *pu32;
/** Pointer to a 64-bit unsigned value. */
uint64_t const volatile RT_FAR *pu64;
/** Pointer to a UTF-16 character. */
RTUTF16 const volatile RT_FAR *pwc;
/** Pointer to a UUID character. */
RTUUID const volatile RT_FAR *pUuid;
} RTCVPTRUNION;
/** Pointer to a const pointer union. */
typedef RTCVPTRUNION RT_FAR *PRTCVPTRUNION;

#ifdef __cplusplus
/**
 * Strict type validation helper class.
 *
 * See RTErrStrictType and RT_SUCCESS_NP.
 */
class RTErrStrictType2 {
    /**
     * The status code.
     */
    int32_t m_rc;
    
    public:
    /**
     */
#else
/**
 * Strict type validation helper class.
 *
 * See RTErrStrictType and RT_SUCCESS_NP.
 */
class RTErrStrictType2 {
    /**
     * The status code.
     */
    int32_t m_rc;
    
    public:
    /**
/* Constructor.
 * @param   rc     IPRT style status code.
 */
RTErrStrictType2(int32_t rc) : m_rc(rc)
{
}

/**
 * Get the status code.
 * @returns IPRT style status code.
 */
int32_t getValue() const
{
    return m_rc;
}
}

@end

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/uint64.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/uint64.h
@@ -0,0 +1,1330 @@
/** @file
 * IPRT - RTUINT64U methods for old 32-bit and 16-bit compilers.
 */
*/
+/**
 + * Copyright (C) 2011-2017 Oracle Corporation
 + *
 + * This file is part of VirtualBox Open Source Edition (OSE), as
 + * available from http://www.virtualbox.org. This file is free software;
 + * you can redistribute it and/or modify it under the terms of the GNU
 + * General Public License (GPL) as published by the Free Software
 + * Foundation, in version 2 as it comes in the "COPYING" file of the
 + * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
 + * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
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 + * CDDL are applicable instead of those of the GPL.
 + *
 + * You may elect to license modified versions of this file under the
 + * terms and conditions of either the GPL or the CDDL or both.
 + */
```c
#ifndef ___iprt_uint64_h
#define ___iprt_uint64_h

#include <iprt/cdefs.h>
#include <iprt/types.h>
#include <iprt/asm.h>

RT_C_DECLS_BEGIN

/** @defgroup grp_rt_uint64 RTUInt64 - 64-bit Unsigned Integer Methods for ancient compilers
 * @ingroup grp_rt
 * @{
 */

/**
 * Test if a 128-bit unsigned integer value is zero.
 *
 * @returns true if they are, false if they aren't.
 * @param   pValue          The input and output value.
 * @*/
DECLINLINE(bool) RTUInt64IsZero(PRTUINT64U pValue)
{
#if ARCH_BITS >= 32
    return pValue->s.Lo == 0
        && pValue->s.Hi == 0;
#else
    return pValue->Words.w0 == 0
        && pValue->Words.w1 == 0
        && pValue->Words.w2 == 0
        && pValue->Words.w3 == 0;
#endif
}

/**
 * Set a 128-bit unsigned integer value to zero.
 *
 * @returns pResult
 * @param   pResult             The result variable.
 * @*/
DECLINLINE(PRTUINT64U) RTUInt64SetZero(PRTUINT64U pResult)
{
#if ARCH_BITS >= 32
    pResult->s.Hi = 0;
    pResult->s.Lo = 0;
#else
    pResult->Words.w0 = 0;
    pResult->Words.w1 = 0;
    pResult->Words.w2 = 0;
    pResult->Words.w3 = 0;
#endif
}

RT_C_DECLS_END

@endgroup
@end
*/
#endif
```
+ pResult->Words.w0 = 0;
+ pResult->Words.w1 = 0;
+ pResult->Words.w2 = 0;
+ pResult->Words.w3 = 0;
+ #endif
+ return pResult;
+
+ +#*/
+ * Set a 32-bit unsigned integer value to the maximum value.
+ *
+ * @returns pResult
+ * @param pResult The result variable.
+ */
+ DECLINLINE(PRTUINT64U) RTUInt64SetMax(PRTUINT64U pResult)
+ {#if ARCH_BITS >= 32
+    pResult->s.Hi = UINT32_MAX;
+    pResult->s.Lo = UINT32_MAX;
+ #else
+    pResult->Words.w0 = UINT16_MAX;
+    pResult->Words.w1 = UINT16_MAX;
+    pResult->Words.w2 = UINT16_MAX;
+    pResult->Words.w3 = UINT16_MAX;
+ #endif
+    return pResult;
+ }
+
+ +#*/
+ * Adds two 64-bit unsigned integer values.
+ *
+ * @returns pResult
+ * @param pResult The result variable.
+ * @param pValue1 The first value.
+ * @param pValue2 The second value.
+ */
+ DECLINLINE(PRTUINT64U) RTUInt64Add(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+ {#if ARCH_BITS >= 32
+    pResult->s.Hi = pValue1->s.Hi + pValue2->s.Hi;
+    pResult->s.Lo = pValue1->s.Lo + pValue2->s.Lo;
+    if (pResult->s.Lo < pValue1->s.Lo)
+        pResult->s.Hi++;
+    return pResult;
+    if (pResult->s.Hi < pValue1->s.Hi)
+        pResult->s.Lo++;
/**
 * Adds a 64-bit and a 32-bit unsigned integer values.
 * @returns pResult
 * @param   pResult             The result variable.
 * @param   pValue1             The first value.
 * @param   uValue2             The second value, 32-bit.
 */
DECLINLINE(PRTUINT64U) RTUInt64AddU32(PRTUINT64U pResult, PCRTUINT64U pValue1, uint32_t uValue2)
{
    pResult->s.Hi = pValue1->s.Hi;
    pResult->s.Lo = pValue1->s.Lo + uValue2;
    if (pResult->s.Lo < pValue1->s.Lo)
        pResult->s.Hi++;
    return pResult;
}

/**
 * Subtracts a 64-bit unsigned integer value from another.
 * @returns pResult
 * @param   pResult             The result variable.
 * @param   pValue1             The minuend value.
 * @param   pValue2             The subtrahend value.
 */
DECLINLINE(PRTUINT64U) RTUInt64Sub(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
    pResult->s.Lo = pValue1->s.Lo - pValue2->s.Lo;
    pResult->s.Hi = pValue1->s.Hi - pValue2->s.Hi;
    if (pResult->s.Lo > pValue1->s.Lo)
        pResult->s.Hi--;
    return pResult;
}

/**
 * Multiplies two 64-bit unsigned integer values.
 * @returns pResult
 * @param   pResult             The result variable.
 * @param   pValue1             The first value.
 * @param   pValue2             The second value.
 */
DECLINLINE(PRTUINT64U) RTUInt64Mul(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
    RTUINT32U uTmp;

    /* multiply all words in v1 by v2.w0. */
    pResult->s.Lo = (uint32_t)pValue1->Words.w0 * pValue2->Words.w0;
    uTmp.u = (uint32_t)pValue1->Words.w1 * pValue2->Words.w0;
    pResult->Words.w3 = 0;
    pResult->Words.w2 = uTmp.Words.w1;
    pResult->Words.w1 += uTmp.Words.w0;
    if (pResult->Words.w1 < uTmp.Words.w0)
        if (pResult->Words.w2++ == UINT16_MAX)
            pResult->Words.w3++;
    pResult->s.Hi += (uint32_t)pValue1->Words.w2 * pValue2->Words.w0;
    pResult->Words.w3 += pValue1->Words.w3 * pValue2->Words.w0;

    /* multiply w0, w1 & w2 in v1 by v2.w1. */
    uTmp.u = (uint32_t)pValue1->Words.w0 * pValue2->Words.w1;
    pResult->Words.w1 += uTmp.Words.w0;
    if (pResult->Words.w1 < uTmp.Words.w0)
        if (pResult->Words.w2++ == UINT16_MAX)
            pResult->Words.w3++;
    pResult->Words.w2 += uTmp.Words.w1;
    if (pResult->Words.w2 < uTmp.Words.w1)
        pResult->Words.w3++;
    pResult->s.Hi += (uint32_t)pValue1->Words.w1 * pValue2->Words.w1;
    pResult->Words.w3 += pValue1->Words.w2 * pValue2->Words.w1;

    /* multiply w0 & w1 in v1 by v2.w2. */
    pResult->s.Hi += (uint32_t)pValue1->Words.w1 * pValue2->Words.w2;
    pResult->Words.w3 += pValue1->Words.w2 * pValue2->Words.w1;

    /* multiply w0 in v1 by v2.w3. */
    pResult->Words.w3 += pValue1->Words.w0 * pValue2->Words.w3;
    return pResult;
}

+ * Multiplies an 64-bit unsigned integer by a 32-bit unsigned integer value.
+ *
/**
 * Multiplies two 32-bit unsigned integer values with 64-bit precision.
 * @returns pResult
 */

DECLINLINE(PRTUINT64U) RTUInt64MulByU32(PRTUINT64U pResult, PCRTUINT64U pValue1, uint32_t uValue2)
{
    u16_t const uLoValue2 = (u16_t)uValue2;
    u16_t const uHiValue2 = (u16_t)(uValue2 >> 16);
    RTUINT32U uTmp;

    /* multiply all words in v1 by uLoValue1. */
    pResult->s.Lo = (uint32_t)pValue1->Words.w0 * uLoValue2;
    uTmp.u = (uint32_t)pValue1->Words.w1 * uLoValue2;
    pResult->Words.w3 = 0;
    pResult->Words.w2 = uTmp.Words.w1;
    pResult->Words.w1 += uTmp.Words.w0;
    if (pResult->Words.w1 < uTmp.Words.w0)
        if (pResult->Words.w2++ == UINT16_MAX)
            pResult->Words.w3++;
    pResult->s.Hi += (uint32_t)pValue1->Words.w2 * uLoValue2;
    pResult->Words.w3 += pValue1->Words.w3 * uLoValue2;

    /* multiply w0, w1 & w2 in v1 by uHiValue2. */
    uTmp.u = (uint32_t)pValue1->Words.w0 * uHiValue2;
    pResult->Words.w1 += uTmp.Words.w0;
    if (pResult->Words.w1 < uTmp.Words.w0)
        if (pResult->Words.w2++ == UINT16_MAX)
            pResult->Words.w3++;
    pResult->Words.w2 += uTmp.Words.w1;
    if (pResult->Words.w2 < uTmp.Words.w1)
        pResult->Words.w3++;
    pResult->s.Hi += (uint32_t)pValue1->Words.w1 * uHiValue2;
    pResult->Words.w3 += pValue1->Words.w2 * uHiValue2;
    return pResult;
}

/**
 * @returns pResult
 */
+ * @param   pResult             The result variable.
+ * @param   uValue1             The first value. 32-bit.
+ * @param   uValue2             The second value, 32-bit.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64MulU32ByU32(PRTUINT64U pResult, uint32_t uValue1, uint32_t uValue2)
+{
+    uint16_t const uLoValue1 = (uint16_t)uValue1;
+    uint16_t const uHiValue1 = (uint16_t)(uValue1 >> 16);
+    uint16_t const uLoValue2 = (uint16_t)uValue2;
+    uint16_t const uHiValue2 = (uint16_t)(uValue2 >> 16);
+    RTUINT32U uTmp;
+
+    /* Multiply uLoValue1 and uHiValue1 by uLoValue1. */
+    pResult->s.Lo = (uint32_t)uLoValue1 * uLoValue2;
+    uTmp.u = (uint32_t)uHiValue1 * uLoValue2;
+    pResult->Words.w3 = 0;
+    pResult->Words.w2 = uTmp.Words.w1;
+    pResult->Words.w1 += uTmp.Words.w0;
+    if (pResult->Words.w1 < uTmp.Words.w0)
+        if (pResult->Words.w2++ == UINT16_MAX)
+            pResult->Words.w3++;
+
+    /* Multiply uLoValue1 and uHiValue1 by uHiValue2. */
+    uTmp.u = (uint32_t)uLoValue1 * uHiValue2;
+    pResult->Words.w1 += uTmp.Words.w0;
+    if (pResult->Words.w1 < uTmp.Words.w0)
+        if (pResult->Words.w2++ == UINT16_MAX)
+            pResult->Words.w3++;
+    pResult->Words.w2 += uTmp.Words.w1;
+    if (pResult->Words.w2 < uTmp.Words.w1)
+        pResult->Words.w3++;
+    pResult->s.Hi += (uint32_t)uHiValue1 * uHiValue2;
+    return pResult;
+}
+
+DECLINLINE(PRTUINT64U) RTUInt64DivRem(PRTUINT64U pQuotient, PRTUINT64U pRemainder, PCRTUINT64U pValue1, PCRTUINT64U pValue2);
+
+/**
+ * Divides a 64-bit unsigned integer value by another.
+ */
+* @returns pResult
+* @param   pResult             The result variable.
+ * @param   pValue1             The dividend value.
+ * @param   pValue2             The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64Div(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    RTUINT64U Ignored;
+    return RTUInt64DivRem(pResult, &Ignored, pValue1, pValue2);
+}
+
+/**
+ * Divides a 64-bit unsigned integer value by another, returning the remainder.
+ *
+ * @returns pResult
+ * @param   pResult             The result variable (remainder).
+ * @param   pValue1             The dividend value.
+ * @param   pValue2             The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64Mod(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    RTUINT64U Ignored;
+    RTUInt64DivRem(&Ignored, pResult, pValue1, pValue2);
+    return pResult;
+}
+
+/**
+ * Bitwise AND of two 64-bit unsigned integer values.
+ *
+ * @returns pResult
+ * @param   pResult             The result variable.
+ * @param   pValue1             The first value.
+ * @param   pValue2             The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64And(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    pResult->s.Hi = pValue1->s.Hi & pValue2->s.Hi;
+    pResult->s.Lo = pValue1->s.Lo & pValue2->s.Lo;
+    return pResult;
+}
+
+/**
+ * Bitwise OR of two 64-bit unsigned integer values.
+ *
/* @returns pResult  The result variable. */
/* @param  pResult     The result variable. */
/* @param  pValue1     The first value. */
/* @param  pValue2     The second value. */

DECLINLINE(PRTUINT64U) RTUInt64Or(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
    pResult->s.Hi = pValue1->s.Hi | pValue2->s.Hi;
    pResult->s.Lo = pValue1->s.Lo | pValue2->s.Lo;
    return pResult;
}

/**
 * Bitwise XOR of two 64-bit unsigned integer values.
 *
 * @returns pResult  The result variable. */
/* @param  pResult     The result variable. */
/* @param  pValue1     The first value. */
/* @param  pValue2     The second value. */

DECLINLINE(PRTUINT64U) RTUInt64Xor(PRTUINT64U pResult, PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
    pResult->s.Hi = pValue1->s.Hi ^ pValue2->s.Hi;
    pResult->s.Lo = pValue1->s.Lo ^ pValue2->s.Lo;
    return pResult;
}

/**
 * Shifts a 64-bit unsigned integer value @a cBits to the left.
 *
 * @returns pResult  The result variable. */
/* @param  pResult     The result variable. */
/* @param  pValue      The value to shift. */
/* @param  cBits       The number of bits to shift it. */

DECLINLINE(PRTUINT64U) RTUInt64ShiftLeft(PRTUINT64U pResult, PCRTUINT64U pValue, int cBits)
{
    cBits &= 63;
    if (cBits < 32)
    {
        pResult->s.Lo = pValue->s.Lo << cBits;
        pResult->s.Hi = (pValue->s.Hi << cBits) | (pValue->s.Lo >> (32 - cBits));
    }
    else
+ { 
+     pResult->s.Lo = 0;
+     pResult->s.Hi = pValue->s.Lo << (cBits - 32);
+ } 
+ return pResult;
+
+
+/**
+ * Shifts a 64-bit unsigned integer value @a cBits to the right.
+ *
+ * @returns pResult
+ * @param   pResult             The result variable.
+ * @param   pValue              The value to shift.
+ * @param   cBits               The number of bits to shift it.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64ShiftRight(PRTUINT64U pResult, PCRTUINT64U pValue, int cBits)
+{
+    cBits &= 63;
+    if (cBits < 32)
+    {
+        pResult->s.Hi = pValue->s.Hi >> cBits;
+        pResult->s.Lo = (pValue->s.Lo >> cBits) | (pValue->s.Hi << (32 - cBits));
+    }
+    else
+    {
+        pResult->s.Hi = 0;
+        pResult->s.Lo = pValue->s.Hi >> (cBits - 32);
+    }
+    return pResult;
+}
+
+
+/**
+ * Boolean not (result 0 or 1).
+ *
+ * @returns pResult.
+ * @param   pResult             The result variable.
+ * @param   pValue              The value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64BooleanNot(PRTUINT64U pResult, PCRTUINT64U pValue)
+{
+    pResult->s.Lo = pValue->s.Lo || pValue->s.Hi ? 0 : 1;
+    pResult->s.Hi = 0;
+    return pResult;
+}
/**
 * Bitwise not (flips each bit of the 64 bits).
 * @returns pResult.
 * @param pResult The result variable.
 * @param pValue The value.
 */
DECLINLINE(PRTUINT64U) RTUInt64BitwiseNot(PRTUINT64U pResult, PCRTUINT64U pValue)
{
    pResult->s.Hi = ~pValue->s.Hi;
    pResult->s.Lo = ~pValue->s.Lo;
    return pResult;
}

/**
 * Assigns one 64-bit unsigned integer value to another.
 * @returns pResult
 * @param pResult The result variable.
 * @param pValue The value to assign.
 */
DECLINLINE(PRTUINT64U) RTUInt64Assign(PRTUINT64U pResult, PCRTUINT64U pValue)
{
#if ARCH_BITS >= 32
    pResult->s.Hi = pValue->s.Hi;
    pResult->s.Lo = pValue->s.Lo;
#else
    pResult->Words.w0 = pValue->Words.w0;
    pResult->Words.w1 = pValue->Words.w1;
    pResult->Words.w2 = pValue->Words.w2;
    pResult->Words.w3 = pValue->Words.w3;
#endif
    return pResult;
}

/**
 * Assigns a boolean value to 64-bit unsigned integer.
 * @returns pValueResult
 * @param pValueResult The result variable.
 * @param fValue The boolean value.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignBoolean(PRTUINT64U pValueResult, bool fValue)
{
#if ARCH_BITS >= 32
    pValueResult->s.Lo = fValue;
#else
    pValueResult->s.Lo = fValue;
#endif
}
pValueResult->s.Hi = 0;
#else
    pValueResult->Words.w0 = fValue;
    pValueResult->Words.w1 = 0;
    pValueResult->Words.w2 = 0;
    pValueResult->Words.w3 = 0;
#endif
    return pValueResult;
}

/**
 * Assigns a 8-bit unsigned integer value to 64-bit unsigned integer.
 * @returns pValueResult
 * @param   pValueResult        The result variable.
 * @param   u8Value             The 8-bit unsigned integer value.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignU8(PRTUINT64U pValueResult, uint8_t u8Value)
{
#if ARCH_BITS >= 32
    pValueResult->s.Lo = u8Value;
    pValueResult->s.Hi = 0;
#else
    pValueResult->Words.w0 = u8Value;
    pValueResult->Words.w1 = 0;
    pValueResult->Words.w2 = 0;
    pValueResult->Words.w3 = 0;
#endif
    return pValueResult;
}

/**
 * Assigns a 16-bit unsigned integer value to 64-bit unsigned integer.
 * @returns pValueResult
 * @param   pValueResult        The result variable.
 * @param   u16Value            The 16-bit unsigned integer value.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignU16(PRTUINT64U pValueResult, uint16_t u16Value)
{
#if ARCH_BITS >= 32
    pValueResult->s.Lo = u16Value;
    pValueResult->s.Hi = 0;
#else
    pValueResult->Words.w0 = u16Value;
    pValueResult->Words.w1 = 0;
#endif
+ pValueResult->Words.w2 = 0;
+ pValueResult->Words.w3 = 0;
+#endif
+ return pValueResult;
+
+/**
+ * Assigns a 32-bit unsigned integer value to 64-bit unsigned integer.
+ *
+ * @returns pValueResult
+ * @param   pValueResult The result variable.
+ * @param   u32Value The 32-bit unsigned integer value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignU32(PRTUINT64U pValueResult, uint32_t u32Value)
+{
+    pValueResult->s.Lo = u32Value;
+    pValueResult->s.Hi = 0;
+    return pValueResult;
+}
+
+/**
+ * Adds two 64-bit unsigned integer values, storing the result in the first.
+ *
+ * @returns pValue1Result.
+ * @param   pValue1Result The first value and result.
+ * @param   pValue2 The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignAdd(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    uint32_t const uTmp = pValue1Result->s.Lo;
+    pValue1Result->s.Lo += pValue2->s.Lo;
+    if (pValue1Result->s.Lo < uTmp)
+        pValue1Result->s.Hi++;
+    pValue1Result->s.Hi += pValue2->s.Hi;
+    return pValue1Result;
+}
+ * Subtracts two 64-bit unsigned integer values, storing the result in the
+ * first.
+ *
+ * @returns pValue1Result.
+ * @param   pValue1Result   The minuend value and result.
+ * @param   pValue2         The subtrahend value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignSub(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    uint32_t const uTmp = pValue1Result->s.Lo;
+    pValue1Result->s.Lo -= pValue2->s.Lo;
+    if (pValue1Result->s.Lo > uTmp)
+        pValue1Result->s.Hi--;
+    pValue1Result->s.Hi -= pValue2->s.Hi;
+    return pValue1Result;
+}
+
+/**
+ * Multiplies two 64-bit unsigned integer values, storing the result in the
+ * first.
+ *
+ * @returns pValue1Result.
+ * @param   pValue1Result   The first value and result.
+ * @param   pValue2         The second value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignMul(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    RTUINT64U Result;
+    RTUInt64Mul(&Result, pValue1Result, pValue2);
+    *pValue1Result = Result;
+    return pValue1Result;
+}
+
+/**
+ * Divides a 64-bit unsigned integer value by another, storing the result in
+ * the first.
+ *
+ * @returns pValue1Result.
+ * @param   pValue1Result   The dividend value and result.
+ * @param   pValue2         The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignDiv(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    RTUINT64U Result;
+    RTUINT64U Ignored;
+    RTUInt64DivRem(&Result, &Ignored, pValue1Result, pValue2);
/**
 * Divides a 64-bit unsigned integer value by another, storing the remainder in
 * the first.
 * @returns pValue1Result.
 * @param   pValue1Result   The dividend value and result (remainder).
 * @param   pValue2         The divisor value.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignMod(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
{
    RTUINT64U Ignored;
    RTUINT64U Result;
    RTUInt64DivRem(&Ignored, &Result, pValue1Result, pValue2);
    *pValue1Result = Result;
    return pValue1Result;
}

/**
 * Performs a bitwise AND of two 64-bit unsigned integer values and assigned
 * the result to the first one.
 * @returns pValue1Result.
 * @param   pValue1Result   The first value and result.
 * @param   pValue2         The second value.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignAnd(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
{
#if ARCH_BITS >= 32
    pValue1Result->s.Hi &= pValue2->s.Hi;
    pValue1Result->s.Lo &= pValue2->s.Lo;
#else
    pValue1Result->Words.w0 &= pValue2->Words.w0;
    pValue1Result->Words.w1 &= pValue2->Words.w1;
    pValue1Result->Words.w2 &= pValue2->Words.w2;
    pValue1Result->Words.w3 &= pValue2->Words.w3;
#endif
    return pValue1Result;
}

/**
 * Performs a bitwise AND of a 64-bit unsigned integer value and a mask made
+ * up of the first N bits, assigning the result to the the 64-bit value.
+ *
+ * @returns pValueResult.
+ * @param   pValueResult    The value and result.
+ * @param   cBits           The number of bits to AND (counting from the first
+ *                          bit).
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignAndNFirstBits(PRTUINT64U pValueResult, unsigned cBits)
+{    
+    if (cBits <= 32)
+    {      
+        if (cBits != 32)
+            pValueResult->s.Lo &= (RT_BIT_32(cBits) - 1);
+        pValueResult->s.Hi = 0;
+    }
+    else if (cBits < 64)
+        pValueResult->s.Hi &= (RT_BIT_32(cBits - 32) - 1);
+    return pValueResult;
+}

/**
 * Performs a bitwise OR of two 64-bit unsigned integer values and assigned
 * the result to the first one.
 *
 * @returns pValue1Result.
 * @param   pValue1Result   The first value and result.
 * @param   pValue2         The second value.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignOr(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{    
+    #if ARCH_BITS >= 32
+        pValue1Result->s.Hi |= pValue2->s.Hi;
+        pValue1Result->s.Lo |= pValue2->s.Lo;
+    #else
+        pValue1Result->Words.w0 |= pValue2->Words.w0;
+        pValue1Result->Words.w1 |= pValue2->Words.w1;
+        pValue1Result->Words.w2 |= pValue2->Words.w2;
+        pValue1Result->Words.w3 |= pValue2->Words.w3;
+    #endif
+    return pValue1Result;
+}

+/**
 * ORs in a bit and assign the result to the input value.
 *
 * @returns pValue1Result.
+ * @param   pValue1Result   The first value and result.
+ * @param   iBit            The bit to set (0 based).
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignOrBit(PRTUINT64U pValue1Result, unsigned iBit)
+{
+    if (ARCH_BITS >= 32)
+        pValue1Result->s.Hi |= RT_BIT_32(iBit - 32);
+    else
+        pValue1Result->s.Lo |= RT_BIT_32(iBit);
+} elseif
+    if (iBit >= 32)
+        if (iBit >= 48)
+            pValue1Result->Words.w3 |= UINT16_C(1) << (iBit - 48);
+        else
+            pValue1Result->Words.w2 |= UINT16_C(1) << (iBit - 32);
+    else
+        if (iBit >= 16)
+            pValue1Result->Words.w1 |= UINT16_C(1) << (iBit - 16);
+        else
+            pValue1Result->Words.w0 |= UINT16_C(1) << (iBit);
+}endif
+    return pValue1Result;
+}
+
+
+
+/**
+ * Performs a bitwise XOR of two 64-bit unsigned integer values and assigned
+ * the result to the first one.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignXor(PRTUINT64U pValue1Result, PCRTUINT64U pValue2)
+{
+    if (ARCH_BITS >= 32)
+        pValue1Result->s.Hi ^= pValue2->s.Hi;
+    else
+        pValue1Result->s.Lo ^= pValue2->s.Lo;
+} elseif
+    if (pValue1Result->Words.w0 ^= pValue2->Words.w0);
+    pValue1Result->Words.w1 ^= pValue2->Words.w1;
+    pValue1Result->Words.w2 ^= pValue2->Words.w2;
```c
+    pValue1Result->Words.w3 ^= pValue2->Words.w3;
+    #endif
+    return pValue1Result;
+}
+
+
+/**
+ * Performs a bitwise left shift on a 64-bit unsigned integer value, assigning
+ * the result to it.
+ *
+ * @returns pValueResult.
+ * @param   pValueResult    The first value and result.
+ * @param   cBits           The number of bits to shift.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64AssignShiftLeft(PRTUINT64U pValueResult, int cBits)
+{
+    RTUINT64U const InVal = *pValueResult;
+    if (cBits > 0)
+    {
+        /* (left shift) */
+        cBits &= 31;
+        if (cBits >= 32)
+        {
+            pValueResult->s.Lo  = 0;
+            pValueResult->s.Hi  = InVal.s.Lo << (cBits - 32);
+        }
+        else
+        {
+            pValueResult->s.Hi  = InVal.s.Hi << cBits;
+            pValueResult->s.Hi |= InVal.s.Lo >> (32 - cBits);
+            pValueResult->s.Lo  = InVal.s.Lo << cBits;
+        }
+    }
+    else if (cBits < 0)
+    {
+        /* (right shift) */
+        cBits = -cBits;
+        cBits &= 31;
+        if (cBits >= 32)
+        {
+            pValueResult->s.Hi  = 0;
+            pValueResult->s.Lo  = InVal.s.Hi >> (cBits - 32);
+        }
+        else
+        {
+            pValueResult->s.Hi  = InVal.s.Hi >> cBits;
+            pValueResult->s.Lo |= InVal.s.Lo >> (32 - cBits);
+            pValueResult->s.Hi  = InVal.s.Hi >> cBits;
+        }
+    }
+    return pValueResult;
+}
```
/**
 * Performs a bitwise left shift on a 64-bit unsigned integer value, assigning
 * the result to it.
 * @returns pValueResult.
 * @param pValueResult The first value and result.
 * @param cBits The number of bits to shift.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignShiftRight(PRTUINT64U pValueResult, int cBits)
{
    return RTUInt64AssignShiftLeft(pValueResult, -cBits);
}

/**
 * Performs a bitwise NOT on a 64-bit unsigned integer value, assigning the
 * result to it.
 * @returns pValueResult
 * @param pValueResult The value and result.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignBitwiseNot(PRTUINT64U pValueResult)
{
#if ARCH_BITS >= 32
    pValueResult->s.Hi = ~pValueResult->s.Hi;
    pValueResult->s.Lo = ~pValueResult->s.Lo;
#else
    pValueResult->Words.w0 = ~pValueResult->Words.w0;
    pValueResult->Words.w1 = ~pValueResult->Words.w1;
    pValueResult->Words.w2 = ~pValueResult->Words.w2;
    pValueResult->Words.w3 = ~pValueResult->Words.w3;
#endif
    return pValueResult;
}

/**
 * Performs a boolean NOT on a 64-bit unsigned integer value, assigning the
 * result to it.
 * @returns pValueResult
 * @param pValueResult The value and result.
 */
DECLINLINE(PRTUINT64U) RTUInt64AssignBooleanNot(PRTUINT64U pValueResult)
{
    return RTUInt64AssignBoolean(pValueResult, RTUInt64IsZero(pValueResult));
}

DECLINLINE(int) RTUInt64Compare(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
#if ARCH_BITS >= 32
    if (pValue1->s.Hi != pValue2->s.Hi)
        return pValue1->s.Hi > pValue2->s.Hi ? 1 : -1;
    if (pValue1->s.Lo != pValue2->s.Lo)
        return pValue1->s.Lo > pValue2->s.Lo ? 1 : -1;
    return 0;
#else
    if (pValue1->Words.w3 != pValue2->Words.w3)
        return pValue1->Words.w3 > pValue2->Words.w3 ? 1 : -1;
    if (pValue1->Words.w2 != pValue2->Words.w2)
        return pValue1->Words.w2 > pValue2->Words.w2 ? 1 : -1;
    if (pValue1->Words.w1 != pValue2->Words.w1)
        return pValue1->Words.w1 > pValue2->Words.w1 ? 1 : -1;
    if (pValue1->Words.w0 != pValue2->Words.w0)
        return pValue1->Words.w0 > pValue2->Words.w0 ? 1 : -1;
    return 0;
#endif
}

DECLINLINE(bool) RTUInt64IsSmaller(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
    return RTUInt64Compare(pValue1, pValue2) < 0;
}

DECLINLINE(Bool) RTUInt64IsSmaller(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
{
    return RTUInt64Compare(pValue1, pValue2) < 0;
}
+if ARCH_BITS >= 32
+ return pValue1->s.Hi < pValue2->s.Hi
+   || ( pValue1->s.Hi == pValue2->s.Hi
+       && pValue1->s.Lo < pValue2->s.Lo);
+else
+ return pValue1->Words.w3 < pValue2->Words.w3
+   || ( pValue1->Words.w3 == pValue2->Words.w3
+       && ( pValue1->Words.w2 < pValue2->Words.w2
+           || ( pValue1->Words.w2 == pValue2->Words.w2
+                   && ( pValue1->Words.w1 < pValue2->Words.w1
+                       || ( pValue1->Words.w1 == pValue2->Words.w1
+                           && pValue1->Words.w0 < pValue2->Words.w0)))));
+#endif
+
+/**
+ * Tests if a 32-bit unsigned integer value is larger than another.
+ *
+ */
+@returns true if the first value is larger, false if not.
+@param pValue1 The first value.
+@param pValue2 The second value.
+*/
+DECLINLINE(bool) RTUInt64IsLarger(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+if ARCH_BITS >= 32
+ return pValue1->s.Hi > pValue2->s.Hi
+   || ( pValue1->s.Hi == pValue2->s.Hi
+       && pValue1->s.Lo > pValue2->s.Lo);
+else
+ return pValue1->Words.w3 > pValue2->Words.w3
+   || ( pValue1->Words.w3 == pValue2->Words.w3
+       && ( pValue1->Words.w2 > pValue2->Words.w2
+           || ( pValue1->Words.w2 == pValue2->Words.w2
+                   && ( pValue1->Words.w1 > pValue2->Words.w1
+                       || ( pValue1->Words.w1 == pValue2->Words.w1
+                           && pValue1->Words.w0 > pValue2->Words.w0)))));
+#endif
+
+/**
+ * Tests if a 64-bit unsigned integer value is larger or equal than another.
+ *
+ */
+@returns true if the first value is larger or equal, false if not.
+@param pValue1 The first value.
+@param pValue2 The second value.
+*/
DECLINLINE(bool) RTUInt64IsLargerOrEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+
+    return pValue1->s.Hi > pValue2->s.Hi
+    || (  pValue1->s.Hi == pValue2->s.Hi
+          && pValue1->s.Lo >= pValue2->s.Lo);
+    
+if ARCH_BITS >= 32
+    return pValue1->Words.w3 > pValue2->Words.w3
+    || (  pValue1->Words.w3 == pValue2->Words.w3
+          && (  pValue1->Words.w2 > pValue2->Words.w2
+                || (  pValue1->Words.w2 == pValue2->Words.w2
+                      && (  pValue1->Words.w1 > pValue2->Words.w1
+                            || (  pValue1->Words.w1 == pValue2->Words.w1
+                                  && pValue1->Words.w0 >= pValue2->Words.w0)))));
+endif
+
+DECLINLINE(bool) RTUInt64IsEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+
+if ARCH_BITS >= 32
+    return pValue1->s.Hi == pValue2->s.Hi
+    && pValue1->s.Lo == pValue2->s.Lo;
+else
+    return pValue1->Words.w0 == pValue2->Words.w0
+    && pValue1->Words.w1 == pValue2->Words.w1
+    && pValue1->Words.w2 == pValue2->Words.w2
+    && pValue1->Words.w3 == pValue2->Words.w3;
+endif
+
+DECLINLINE(bool) RTUInt64IsNotEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+
+    return pValue1->s.Hi > pValue2->s.Hi
+    || (  pValue1->s.Hi == pValue2->s.Hi
+          && pValue1->s.Lo >= pValue2->s.Lo);
+    
+if ARCH_BITS >= 32
+    return pValue1->Words.w3 > pValue2->Words.w3
+    || (  pValue1->Words.w3 == pValue2->Words.w3
+          && (  pValue1->Words.w2 > pValue2->Words.w2
+                || (  pValue1->Words.w2 == pValue2->Words.w2
+                      && (  pValue1->Words.w1 > pValue2->Words.w1
+                            || (  pValue1->Words.w1 == pValue2->Words.w1
+                                  && pValue1->Words.w0 >= pValue2->Words.w0)))));
+endif
+
+DECLINLINE(bool) RTUInt64IsEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+
+if ARCH_BITS >= 32
+    return pValue1->s.Hi == pValue2->s.Hi
+    && pValue1->s.Lo == pValue2->s.Lo;
+else
+    return pValue1->Words.w0 == pValue2->Words.w0
+    && pValue1->Words.w1 == pValue2->Words.w1
+    && pValue1->Words.w2 == pValue2->Words.w2
+    && pValue1->Words.w3 == pValue2->Words.w3;
+endif
+
+DECLINLINE(bool) RTUInt64IsNotEqual(PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+
+    return !RTUInt64IsEqual(pValue1, pValue2);
+}
+
+/**
+ * Sets a bit in a 64-bit unsigned integer type.
+ *
+ * @returns pValueResult.
+ * @param   pValueResult    The input and output value.
+ * @param   iBit            The bit to set.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64BitSet(PRTUINT64U pValueResult, unsigned iBit)
+{
+    if (iBit < 32)
+    {
+        if (ARCH_BITS >= 32)
+            pValueResult->s.Lo |= RT_BIT_32(iBit);
+        else
+            if (iBit < 16)
+                pValueResult->Words.w0 |= UINT16_C(1) << iBit;
+            else
+                 pValueResult->Words.w1 |= UINT16_C(1) << (iBit - 32);
+    } else if (iBit < 64)
+    {
+        if (ARCH_BITS >= 32)
+            pValueResult->s.Hi |= RT_BIT_32(iBit - 32);
+        else
+            if (iBit < 48)
+                pValueResult->Words.w2 |= UINT16_C(1) << (iBit - 64);
+            else
+                 pValueResult->Words.w3 |= UINT16_C(1) << (iBit - 96);
+    } else if (ARCH_BITS >= 32)
+    {
+        pValueResult->s.Hi |= RT_BIT_32(iBit - 32);
+    } else
+        if (iBit < 48)
+            pValueResult->Words.w2 |= UINT16_C(1) << (iBit - 64);
+        else
+             pValueResult->Words.w3 |= UINT16_C(1) << (iBit - 96);
+    return pValueResult;
+}
+
+/**
+ * Sets a bit in a 64-bit unsigned integer type.
+ *
+ * @returns pValueResult.
+ * @param   pValueResult    The input and output value.
+ * @param   iBit            The bit to set.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64BitClear(PRTUINT64U pValueResult, unsigned iBit)
+{
if (iBit < 32)
{
    if (iBit < 48)
        pValueResult->Words.w0 &= ~(UINT16_C(1) << (iBit));
    else
        pValueResult->Words.w1 &= ~(UINT16_C(1) << (iBit - 32));
#endif
    else if (iBit < 64)
    {
#if ARCH_BITS >= 32
        pValueResult->s.Hi &= ~RT_BIT_32(iBit - 32);
#else
        if (iBit < 48)
            pValueResult->Words.w2 &= ~(UINT16_C(1) << (iBit - 64));
        else
            pValueResult->Words.w3 &= ~(UINT16_C(1) << (iBit - 96));
#endif
    }
    return pValueResult;
}

/**
 * Tests if a bit in a 64-bit unsigned integer value is set.
 *
 * @returns pValueResult.
 * @param   pValueResult    The input and output value.
 * @param   iBit            The bit to test.
 * @*/
DECLINLINE(bool) RTUInt64BitTest(PRTUINT64U pValueResult, unsigned iBit)
{
    bool fRc;
    if (iBit < 32)
    {
#if ARCH_BITS >= 32
        fRc = RT_BOOL(pValueResult->s.Lo & RT_BIT_32(iBit));
#else
        if (iBit < 16)
            fRc = RT_BOOL(pValueResult->Words.w0 & (UINT16_C(1) << (iBit)));
        else
            fRc = RT_BOOL(pValueResult->Words.w1 & (UINT16_C(1) << (iBit - 16)));
#endif
    }
    else if (iBit < 64)
    {
#if ARCH_BITS >= 32
        pValueResult->s.Hi &= ~RT_BIT_32(iBit - 32);
#else
        if (iBit < 48)
            pValueResult->Words.w2 &= ~(UINT16_C(1) << (iBit - 64));
        else
            pValueResult->Words.w3 &= ~(UINT16_C(1) << (iBit - 96));
#endif
    }
    return pValueResult;
}
    { if (ARCH_BITS >= 32)
        fRc = RT_BOOL(pValueResult->s.Hi & RT_BIT_32(iBit - 32));
    +#else
        if (iBit < 48)
            fRc = RT_BOOL(pValueResult->Words.w2 & (UINT16_C(1) << (iBit - 32)));
        else
            fRc = RT_BOOL(pValueResult->Words.w3 & (UINT16_C(1) << (iBit - 48)));
    +#endif
    } else
        fRc = false;
    return fRc;
}

/**
 * Set a range of bits a 64-bit unsigned integer value.
 * @returns pValueResult.
 * @param pValueResult    The input and output value.
 * @param iFirstBit       The first bit to test.
 * @param cBits           The number of bits to set.
 * @*/
DECLINLINE(PRTUINT64U) RTUInt64BitSetRange(PRTUINT64U pValueResult, unsigned iFirstBit, unsigned cBits)
{
    /* bounds check & fix. */
    if (iFirstBit < 64)
    {
        if (iFirstBit + cBits > 64)
            cBits = 64 - iFirstBit;
        
        #if ARCH_BITS >= 32
            if (iFirstBit + cBits < 32)
                pValueResult->s.Lo |= (RT_BIT_32(cBits) - 1) << iFirstBit;
            else if (iFirstBit + cBits < 64 && iFirstBit >= 32)
                pValueResult->s.Hi |= (RT_BIT_32(cBits) - 1) << (iFirstBit - 32);
        +#else
            if (iFirstBit + cBits < 16)
                pValueResult->Words.w0 |= ((UINT16_C(1) << cBits) - 1) << iFirstBit;
            else if (iFirstBit + cBits < 32 && iFirstBit >= 16)
                pValueResult->Words.w1 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 16);
            else if (iFirstBit + cBits < 48 && iFirstBit >= 32)
                pValueResult->Words.w2 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 32);
            else if (iFirstBit + cBits < 64 && iFirstBit >= 48)
                pValueResult->Words.w3 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 48);
        +#else
            if (iFirstBit + cBits < 16)
                pValueResult->Words.w0 |= ((UINT16_C(1) << cBits) - 1) << iFirstBit;
            else if (iFirstBit + cBits < 32 && iFirstBit >= 16)
                pValueResult->Words.w1 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 16);
            else if (iFirstBit + cBits < 48 && iFirstBit >= 32)
                pValueResult->Words.w2 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 32);
            else if (iFirstBit + cBits < 64 && iFirstBit >= 48)
                pValueResult->Words.w3 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 48);
        +#endif
    } else
        if (iFirstBit + cBits < 16)
            pValueResult->Words.w0 |= ((UINT16_C(1) << cBits) - 1) << iFirstBit;
        else if (iFirstBit + cBits < 32 && iFirstBit >= 16)
            pValueResult->Words.w1 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 16);
        else if (iFirstBit + cBits < 48 && iFirstBit >= 32)
            pValueResult->Words.w2 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 32);
        else if (iFirstBit + cBits < 64 && iFirstBit >= 48)
            pValueResult->Words.w3 |= ((UINT16_C(1) << cBits) - 1) << (iFirstBit - 48);
else
#endif
    while (cBits-- > 0)
        RTUInt64BitSet(pValueResult, iFirstBit++);
    }
    return pValueResult;
}

/**
 * Test if all the bits of a 64-bit unsigned integer value are set.
 * @returns true if they are, false if they aren't.
 * @param pValue The input and output value.
 */
DECLINLINE(bool) RTUInt64BitAreAllSet(PRTUINT64U pValue)
{
#if ARCH_BITS >= 32
    return pValue->s.Hi == UINT32_MAX
        && pValue->s.Lo == UINT32_MAX;
#else
    return pValue->Words.w0 == UINT16_MAX
        && pValue->Words.w1 == UINT16_MAX
        && pValue->Words.w2 == UINT16_MAX
        && pValue->Words.w3 == UINT16_MAX;
#endif
}

/**
 * Test if all the bits of a 64-bit unsigned integer value are clear.
 * @returns true if they are, false if they aren't.
 * @param pValue The input and output value.
 */
DECLINLINE(bool) RTUInt64BitAreAllClear(PRTUINT64U pValue)
{
    return RTUInt64IsZero(pValue);
}

DECLINLINE(unsigned) RTUInt64BitCount(PCRTUINT64U pValue)
{
    unsigned cBits;
    if (pValue->s.Hi != 0)
    {
#if ARCH_BITS >= 32
        cBits = 32 + ASMBitLastSetU32(pValue->s.Hi);
#else
        for (cBits = 0; cBits < 32; cBits++)
            if (pValue->s.Hi & (1U << cBits))
                cBits = 32 + ASMBitLastSetU32(pValue->s.Hi);
#endif
    }
    return cBits;
}
+else
+  if (pValue->Words.w3)
+    cBits = 48 + ASMBitLastSetU16(pValue->Words.w3);
+  else
+    cBits = 32 + ASMBitLastSetU16(pValue->Words.w2);
+endif
+
+  } else
+  {
+    +#if ARCH_BITS >= 32
+    +    cBits = ASMBitLastSetU32(pValue->s.Lo);
+    +#else
+    +    if (pValue->Words.w1)
+    +      cBits = 16 + ASMBitLastSetU16(pValue->Words.w1);
+    +    else
+    +      cBits = 0 + ASMBitLastSetU16(pValue->Words.w0);
+    +#endif
+    
+    return cBits;
+  }
+
+  */
+/**
+ * Divides a 64-bit unsigned integer value by another, returning both quotient
+ * and remainder.
+ *
+ * @returns pQuotient, NULL if pValue2 is 0.
+ * @param   pQuotient           Where to return the quotient.
+ * @param   pRemainder          Where to return the remainder.
+ * @param   pValue1             The dividend value.
+ * @param   pValue2             The divisor value.
+ */
+DECLINLINE(PRTUINT64U) RTUInt64DivRem(PRTUINT64U pQuotient, PRTUINT64U pRemainder,
+PCRTUINT64U pValue1, PCRTUINT64U pValue2)
+{
+    int iDiff;
+
+    /*
+    * Sort out all the special cases first.
+    */
+    /* Divide by zero or 1? */
+    if (!pValue2->s.Hi)
+    {
+        if (!pValue2->s.Lo)
+        {
+            return NULL;
+        }
+        if (pValue2->s.Lo == 1)
+        {
+            /*
+ RTUInt64SetZero(pRemainder);
+ *pQuotient = *pValue1;
+ return pQuotient;
+ }
+ /**< @todo RTUInt64DivModByU32 */
+ }
+ /* Dividend is smaller? */
+ iDiff = RTUInt64Compare(pValue1, pValue2);
+ if (iDiff < 0)
+ {
+   *pRemainder = *pValue1;
+   RTUInt64SetZero(pQuotient);
+ }
+ else if (iDiff == 0)
+ {
+   RTUInt64SetZero(pRemainder);
+   RTUInt64AssignU8(pQuotient, 1);
+ }
+ else
+ {
+   /* Prepare.
+    */
+   unsigned iBitAdder = RTUInt64BitCount(pValue1) - RTUInt64BitCount(pValue2);
+   RTUINT64U NormDivisor = *pValue2;
+   if (iBitAdder)
+   {
+     RTUInt64ShiftLeft(&NormDivisor, pValue2, iBitAdder);
+     if (RTUInt64IsLarger(&NormDivisor, pValue1))
+     {
+       RTUInt64AssignShiftRight(&NormDivisor, 1);
+       iBitAdder--;
+     }
+   }
+   else
+   
+   NormDivisor = *pValue2;
+   
+   RTUInt64SetZero(pQuotient);
+   *pRemainder = *pValue1;
+   /*
+    * Do the division.
+    */
+   if (RTUInt64IsLargerOrEqual(pRemainder, pValue2))
+   {
+     

for (;;) {
    if (RTUInt64IsLargerOrEqual(pRemainder, &NormDivisor)) {
        RTUInt64AssignSub(pRemainder, &NormDivisor);
        RTUInt64AssignOrBit(pQuotient, iBitAdder);
    }
    if (RTUInt64IsSmaller(pRemainder, pValue2)) break;
    RTUInt64AssignShiftRight(&NormDivisor, 1);
    iBitAdder--;
}
return pQuotient;
}
#ifndef __iprt_uni_h
#define __iprt_uni_h

/** @defgroup grp_rt_uni RTUniCp - Unicode Code Points
 * @ingroup grp_rt
 * @{
 */

/** @def RTUNI_USE_WCTYPE
 * Define RTUNI_USE_WCTYPE to not use the IPRT unicode data but the
 * data which the C runtime library provides. */
#ifdef DOXYGEN_RUNNING
#define RTUNI_USE_WCTYPE
#endif

#include <iprt/types.h>
#ifdef RTUNI_USE_WCTYPE
#include <wctype.h>
#endif

RT_C_DECLS_BEGIN

#ifndef RTUNI_USE_WCTYPE

/** A unicode flags range.
 * @internal */
typedef struct RTUNIFLAGSRANGE
{
    /** The first code point of the range. */
    RTUNICP BeginCP;
    /** The last + 1 code point of the range. */
    RTUNICP EndCP;
    /** Pointer to the array of case folded code points. */
    const uint8_t *pafFlags;
} RTUNIFLAGSRANGE;
typedef RTUNIFLAGSRANGE *PRTUNIFLAGSRANGE;
typedef const RTUNIFLAGSRANGE *PCRTUNIFLAGSRANGE;

RT_C_DECLS_END

@end group grp_rt_uni
@end group grp_rt
*/
/** A unicode case folded range. */
typedef struct RTUNICASERANGE {
    /** The first code point of the range. */
    RTUNICP BeginCP;
    /** The last + 1 code point of the range. */
    RTUNICP EndCP;
    /** Pointer to the array of case folded code points. */
    PCRTUNICP paFoldedCPs;
} RTUNICASERANGE;

/** Pointer to a case folded range. */
typedef RTUNICASERANGE *PRTUNICASERANGE;

/** Pointer to a const case folded range. */
typedef const RTUNICASERANGE *PCRTUNICASERANGE;

/** @name Unicode Code Point Flags. */
* @{
#define RTUNI_UPPER RT_BIT(0)
#define RTUNI_LOWER RT_BIT(1)
#define RTUNI_ALPHA RT_BIT(2)
#define RTUNI_XDIGIT RT_BIT(3)
#define RTUNI_DDIGIT RT_BIT(4)
#define RTUNI_WSPACE RT_BIT(5)
+#define RTUNI_BSPACE RT_BIT(6) - later */
/+** When set, the codepoint requires further checking wrt NFC and NFD normalization. I.e. set when either of QC_NFD and QC_NFC are not Y. */
+#define RTUNI_QC_NFX RT_BIT(7)
/+** @} */

/+**
/+*
/+ Array of flags ranges.
/+ * @internal
/+ */
+extern RTDATADECL(const RTUNIFLAGSRANGE) g_aRTUniFlagsRanges[];
/+*/
/+* Gets the flags for a unicode code point.
/+ *
/+ * @returns The flag mask. (RTUNI_*)
/+ * @param CodePoint The unicode code point.
DECLINLINE(RTUNICP) rtUniCpFlags(RTUNICP CodePoint)
{
    PCRTUNIFLAGSRANGE pCur = &g_aRTUniFlagsRanges[0];
    do
    {
        if (pCur->EndCP > CodePoint)
        {
            if (pCur->BeginCP <= CodePoint)
                return pCur->pafFlags[CodePoint - pCur->BeginCP];
            break;
        }
        pCur++;
    } while (pCur->EndCP != RTUNICP_MAX);
    return 0;
}

/**
 * Checks if a unicode code point is upper case.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsUpper(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_UPPER) != 0;
}

/**
 * Checks if a unicode code point is lower case.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsLower(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_LOWER) != 0;
}

/**
 * Checks if a unicode code point is case foldable.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsFoldable(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_FOLD) != 0;
}

/**
 * Checks if a unicode code point is case invariant.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsCaseInvariant(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_CASE_INVARIANT) != 0;
}
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param   CodePoint       The code point.
+ */
+DECLINLINE(bool) RTUniCpIsFoldable(RTUNICP CodePoint)
+{
+    /* Right enough. */
+    return (rtUniCpFlags(CodePoint) & (RTUNI_LOWER | RTUNI_UPPER)) != 0;
+}
+
+/**
+ * Checks if a unicode code point is alphabetic.
+ *
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param   CodePoint       The code point.
+ */
+DECLINLINE(bool) RTUniCpIsAlphabetic(RTUNICP CodePoint)
+{
+    return (rtUniCpFlags(CodePoint) & RTUNI_ALPHA) != 0;
+}
+
+/**
+ * Checks if a unicode code point is a decimal digit.
+ *
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param   CodePoint       The code point.
+ */
+DECLINLINE(bool) RTUniCpIsDecDigit(RTUNICP CodePoint)
+{
+    return (rtUniCpFlags(CodePoint) & RTUNI_DDIGIT) != 0;
+}
+
+/**
+ * Checks if a unicode code point is a hexadecimal digit.
+ *
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param   CodePoint       The code point.
+ */
+DECLINLINE(bool) RTUniCpIsHexDigit(RTUNICP CodePoint)
+{
+    return (rtUniCpFlags(CodePoint) & RTUNI_XDIGIT) != 0;
+}
/* Checks if a unicode code point is white space.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param   CodePoint   The code point.
 */

DECLINLINE(bool) RTUniCpIsSpace(RTUNICP CodePoint)
{
    return (rtUniCpFlags(CodePoint) & RTUNI_WSPACE) != 0;
}

/* Array of uppercase ranges.
 * @internal
 */
extern RTDATADECL(const RTUNICASERANGE) g_aRTUniUpperRanges[];

/* Array of lowercase ranges.
 * @internal
 */
extern RTDATADECL(const RTUNICASERANGE) g_aRTUniLowerRanges[];

/* Folds a unicode code point using the specified range array.
 * @returns FOlded code point.
 * @param   CodePoint   The unicode code point to fold.
 * @param   pCur         The case folding range to use.
 */
DECLINLINE(RTUNICP) rtUniCpFold(RTUNICP CodePoint, PCRTUNICASERANGE pCur)
{
    do
    {
        if (pCur->EndCP > CodePoint)
        {
            if (pCur->BeginCP <= CodePoint)
                CodePoint = pCur->paFoldedCPs[CodePoint - pCur->BeginCP];
            break;
        }
        pCur++;
    } while (pCur->EndCP != RTUNICP_MAX);
return CodePoint;
}

/**
 * Folds a unicode code point to upper case.
 * @returns Folded code point.
 * @param CodePoint The unicode code point to fold.
 */
DECLINLINE(RTUNICP) RTUniCpToUpper(RTUNICP CodePoint)
{
    return rtUniCpFold(CodePoint, &g_aRTUniUpperRanges[0]);
}

/**
 * Folds a unicode code point to lower case.
 * @returns Folded code point.
 * @param CodePoint The unicode code point to fold.
 */
DECLINLINE(RTUNICP) RTUniCpToLower(RTUNICP CodePoint)
{
    return rtUniCpFold(CodePoint, &g_aRTUniLowerRanges[0]);
}

#else /* RTUNI_USE_WCTYPE */

/**
 * Checks if a unicode code point is upper case.
 * @returns true if it is.
 * @returns false if it isn't.
 * @param CodePoint The code point.
 */
DECLINLINE(bool) RTUniCpIsUpper(RTUNICP CodePoint)
{
    return !!iswupper(CodePoint);
}

/**
 * Checks if a unicode code point is lower case.
 * @returns true if it is.
 */
DECLINLINE(bool) RTUniCpIsLower(RTUNICP CodePoint)
{
    return !!iswlower(CodePoint);
}
+ * @returns false if it isn't.
+ * @param CodePoint The code point.
+ */
+DECLINLINE(bool) RTUniCpIsLower(RTUNICP CodePoint)
+{
+    return !!iswlower(CodePoint);
+}
+
+/**
+ * Checks if a unicode code point is foldable.
+ *
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param CodePoint The code point.
+ */
+DECLINLINE(bool) RTUniCpIsFoldable(RTUNICP CodePoint)
+{
+    /* Right enough. */
+    return iswupper(CodePoint) || iswlower(CodePoint);
+}
+
+/**
+ * Checks if a unicode code point is alphabetic.
+ *
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param CodePoint The code point.
+ */
+DECLINLINE(bool) RTUniCpIsAlphabetic(RTUNICP CodePoint)
+{
+    return !!iswalpha(CodePoint);
+}
+
+/**
+ * Checks if a unicode code point is a decimal digit.
+ *
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param CodePoint The code point.
+ */
+DECLINLINE(bool) RTUniCpIsDigit(RTUNICP CodePoint)
+{
+    return !!iswdigit(CodePoint);
+}
+/**
+ * Checks if a unicode code point is a hexadecimal digit.
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param CodePoint The code point.
+ */
+DECLINLINE(bool) RTUniCpIsHexDigit(RTUNICP CodePoint)
+{
+    return !!iswxdigit(CodePoint);
+}
+
+/**
+ * Checks if a unicode code point is white space.
+ * @returns true if it is.
+ * @returns false if it isn't.
+ * @param CodePoint The code point.
+ */
+DECLINLINE(bool) RTUniCpIsSpace(RTUNICP CodePoint)
+{
+    return !!iswspace(CodePoint);
+}
+
+/**
+ * Folds a unicode code point to upper case.
+ * @returns Folded code point.
+ * @param CodePoint The unicode code point to fold.
+ */
+DECLINLINE(RTUNICP) RTUniCpToUpper(RTUNICP CodePoint)
+{
+    return towupper(CodePoint);
+}
+
+/**
+ * Folds a unicode code point to lower case.
+ * @returns Folded code point.
+ * @param CodePoint The unicode code point to fold.
+ */
+DECLINLINE(RTUNICP) RTUniCpToLower(RTUNICP CodePoint)
+{
+    return tolower(CodePoint);
+}
# endif /* RTUNI_USE_WTYPE */

+/**
+ * Frees a unicode string.
+ *
+ * @param   pusz        The string to free.
+ */
+RTDECL(void) RTUniFree(PRTUNICP pusz);
+
+/**
+ * Checks if a code point valid.
+ *
+ * Any code point (defined or not) within the 17 unicode planes (0 thru 16),
+ * except surrogates will be considered valid code points by this function.
+ *
+ * @returns true if in range, false if not.
+ * @param   CodePoint       The unicode code point to validate.
+ */
+DECLINLINE(bool) RTUniCpIsValid(RTUNICP CodePoint)
+{
+    return CodePoint <= 0x00d7ff
+        || (   CodePoint <= 0x10ffff
+            && CodePoint >= 0x00e000);
+}
+
+/**
+ * Checks if the given code point is in the BMP range.
+ *
+ * Surrogates are not considered in the BMP range by this function.
+ *
+ * @returns true if in BMP, false if not.
+ * @param   CodePoint       The unicode code point to consider.
+ */
+DECLINLINE(bool) RTUniCpIsBMP(RTUNICP CodePoint)
+{
+    return CodePoint <= 0xd7ff
+        || (   CodePoint <= 0xffff
+            && CodePoint >= 0xe000);
+ * Folds a unicode code point to lower case.
+ *
+ * @returns Folded code point.
+ * @param CodePoint The unicode code point to fold.
+ */
+DECLINLINE(size_t) RTUniCpCalcUtf8Len(RTUNICP CodePoint)
+{
+    if (CodePoint < 0x80)
+        return 1;
+    return 2
+        + (CodePoint >= 0x00000800)
+        + (CodePoint >= 0x00010000)
+        + (CodePoint >= 0x00200000)
+        + (CodePoint >= 0x00400000)
+        + (CodePoint >= 0x80000000) /* illegal */;
+}
+
+** @} */
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/include/iprt/utf16.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/include/iprt/utf16.h
@@ -0,0 +1,1332 @@
+/** @file
+ * IPRT - String Manipulation, UTF-16 encoding.
+ */
+*/
+*/
+*/
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+*/
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```c
+ * You may elect to license modified versions of this file under the terms and conditions of either the GPL or the CDDL or both.
+ */
+
+#ifndef ___iprt_utf16_h
+#define ___iprt_utf16_h
+
+#include <iprt/string.h>
+
+RT_C_DECLS_BEGIN
+
+
+/** @defgroup rt_str_utf16 UTF-16 String Manipulation
+ * @ingroup grp_rt_str
+ */
+
+/** * Allocates memory for UTF-16 string storage (default tag).
+ * You should normally not use this function, except if there is some very custom string handling you need doing that isn't covered by any of the other APIs.
+ * @returns Pointer to the allocated UTF-16 string. The first wide char is always set to the string terminator char, the contents of the remainder of the memory is undefined. The string must be freed by calling RTUtf16Free.
+ * NULL is returned if the allocation failed. Please translate this to VERR_NO_UTF16_MEMORY and not VERR_NO_MEMORY. Also consider RTUtf16AllocEx if an IPRT status code is required.
+ *
+ * @param cb How many bytes to allocate, will be rounded up to a multiple of two. If this is zero, we will allocate a terminator wide char anyway.
+ */
+#define RTUtf16Alloc(cb) RTUtf16AllocTag((cb), RTSTR_TAG)
+
+/** * Allocates memory for UTF-16 string storage (custom tag).
+ * You should normally not use this function, except if there is some very custom string handling you need doing that isn't covered by any of the other APIs.
+ * @returns Pointer to the allocated UTF-16 string. The first wide char is
```
always set to the string terminator char, the contents of the remainder of the memory is undefined. The string must be freed by calling RTUtf16Free.

NULL is returned if the allocation failed. Please translate this to VERR_NO_UTF16_MEMORY and not VERR_NO_MEMORY. Also consider RTUtf16AllocExTag if an IPRT status code is required.

+ @param cb How many bytes to allocate, will be rounded up to a multiple of two. If this is zero, we will allocate a terminator wide char anyway.
+ @param pszTag Allocation tag used for statistics and such.

/**
 * Reallocates the specified UTF-16 string (default tag).
 *
 * You should normally not use this function, except if there is some very custom string handling you need doing that isn't covered by any of the other APIs.
 *
 * @returns VINF_SUCCESS.
 * @retval VERR_NO_UTF16_MEMORY if we failed to reallocate the string, @a *ppwsz remains unchanged.
 *
 * @param ppwsz Pointer to the string variable containing the input and output string.
 *
 * When not freeing the string, the result will always have the last RTUTF16 set to the terminator character so that when used for string truncation the result will be a valid C-style string (your job to keep it a valid UTF-16 string).
 *
 * When the input string is NULL and we're supposed to reallocate, the returned string will also have the first RTUTF16 set to the terminator char so it will be a valid C-style string.
 *
 * @param cbNew When @a cbNew is zero, we'll behave like RTUtf16Free and @a *ppwsz will be set to NULL.
 *
 * When not zero, this will be rounded up to a multiple of two, and used as the new size of the memory backing the string, i.e. it includes the terminator (RTUTF16) char.
+ */
+ #define RTUtf16Realloc(ppwsz, cbNew) RTUtf16ReallocTag((ppwsz), (cbNew), RTSTR_TAG)
+
+ /**
+ * Reallocates the specified UTF-16 string (custom tag).
+ *
+ * You should normally not use this function, except if there is some very
+ * custom string handling you need doing that isn't covered by any of the other
+ * APIs.
+ *
+ * @returns VINF_SUCCESS.
+ * @retval  VERR_NO_UTF16_MEMORY if we failed to reallocate the string. @a
+ *          *ppwsz remains unchanged.
+ *
+ * @param   ppwsz               Pointer to the string variable containing the
+ *                              input and output string.
+ *
+ * When not freeing the string, the result will
+ * always have the last RTUTF16 set to the
+ * terminator character so that when used for
+ * string truncation the result will be a valid
+ * C-style string (your job to keep it a valid
+ * UTF-16 string).
+ *
+ * When the input string is NULL and we're supposed
+ * to reallocate, the returned string will also
+ * have the first RTUTF16 set to the terminator
+ * char so it will be a valid C-style string.
+ *
+ * @param   cbNew               When @a cbNew is zero, we'll behave like
+ *                              RTUtf16Free and @a *ppwsz will be set to NULL.
+ *
+ * When not zero, this will be rounded up to a
+ * multiple of two, and used as the new size of the
+ * memory backing the string, i.e. it includes the
+ * terminator (RTUTF16) char.
+ *
+ * @param   pszTag              Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTUtf16ReallocTag(PRTUTF16 *ppwsz, size_t cbNew, const char *pszTag);
+
+/**
+ * Free a UTF-16 string allocated by RTStrToUtf16(), RTStrToUtf16Ex(),
+ * RTLatin1ToUtf16(), RTLatin1ToUtf16Ex(), RTUtf16Dup() or RTUtf16DupEx().
+ *
+ * @returns iprt status code.
+ *
+ * @param   pwszString           The UTF-16 string to free. NULL is accepted.
+ */
+RTDECL(void)  RTUtf16Free(PRTUTF16 pwszString);
+/**
+ * Allocates a new copy of the specified UTF-16 string (default tag).
+ *
+ * @returns Pointer to the allocated string copy. Use RTUtf16Free() to free it.
+ * @returns NULL when out of memory.
+ * @param pwszString UTF-16 string to duplicate.
+ * @remark This function will not make any attempt to validate the encoding.
+ */
+#define RTUtf16Dup(pwszString)          RTUtf16DupTag((pwszString), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the specified UTF-16 string (custom tag).
+ *
+ * @returns Pointer to the allocated string copy. Use RTUtf16Free() to free it.
+ * @returns NULL when out of memory.
+ * @param pwszString UTF-16 string to duplicate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @remark This function will not make any attempt to validate the encoding.
+ */
+RTDECL(PRTUTF16) RTUtf16DupTag(PCRTUTF16 pwszString, const char *pszTag);
+
+/**
+ * Allocates a new copy of the specified UTF-16 string (default tag).
+ *
+ * @returns iprt status code.
+ * @param ppwszString Receives pointer of the allocated UTF-16 string.
+ *                 Receives pointer of the allocated UTF-16 string.
+ *                 The returned pointer must be freed using RTUtf16Free().
+ * @param pwszString UTF-16 string to duplicate.
+ * @param cwcExtra Number of extra RTUTF16 items to allocate.
+ * @remark This function will not make any attempt to validate the encoding.
+ */
+#define RTUtf16DupEx(ppwszString, pwszString, cwcExtra) \
+    RTUtf16DupExTag((ppwszString), (pwszString), (cwcExtra), RTSTR_TAG)
+
+/**
+ * Allocates a new copy of the specified UTF-16 string (custom tag).
+ *
+ * @returns iprt status code.
+ * @param ppwszString Receives pointer of the allocated UTF-16 string.
+ *                 Receives pointer of the allocated UTF-16 string.
+ *                 The returned pointer must be freed using RTUtf16Free().
+ * @param pwszString UTF-16 string to duplicate.
+ * @param cwcExtra Number of extra RTUTF16 items to allocate.
+ * @param pszTag Allocation tag used for statistics and such.
+ * @remark This function will not make any attempt to validate the encoding.
+ */
+RTDECL(int) RTUtf16DupExTag(PRTUTF16 *ppwszString, PCRTUTF16 pwszString, size_t cwcExtra, const char *pszTag);
/**
 * Returns the length of a UTF-16 string in UTF-16 characters
 * without trailing '\0'.
 *
 * Surrogate pairs counts as two UTF-16 characters here. Use RTUtf16CpCnt()
 * to get the exact number of code points in the string.
 *
 * @returns The number of RTUTF16 items in the string.
 * @param   pwszString  Pointer the UTF-16 string.
 * @remark  This function will not make any attempt to validate the encoding.
 */

RTDECL(size_t) RTUtf16Len(PCRTUTF16 pwszString);

/**
 * Find the length of a zero-terminated byte string, given a max string length.
 *
 * @returns The string length or cbMax. The returned length does not include
 *          the zero terminator if it was found.
 *
 * @param   pwszString  The string.
 * @param   cwcMax      The max string length in RTUTF16s.
 * @sa      RTUtf16NLenEx, RTStrNLen.
 */

RTDECL(size_t) RTUtf16NLen(PCRTUTF16 pwszString, size_t cwcMax);

/**
 * Find the length of a zero-terminated byte string, given
 * a max string length.
 *
 * @returns IPRT status code.
 * @retval  VINF_SUCCESS if the string has a length less than cchMax.
 * @retval  VERR_BUFFER_OVERFLOW if the end of the string wasn't found
 *          before cwcMax was reached.
 *
 * @param   pwszString  The string.
 * @param   cwcMax      The max string length in RTUTF16s.
 * @param   pcwc        Where to store the string length excluding the
 *                      terminator. This is set to cwcMax if the terminator
 *                      isn't found.
 * @sa      RTUtf16NLenEx, RTStrNLenEx.
 */

RTDECL(int) RTUtf16NLenEx(PCRTUTF16 pwszString, size_t cwcMax, size_t *pcwc);

/**
 * Find the zero terminator in a string with a limited length.
 *
 * @returns Pointer to the zero terminator.
 */
+ * @returns NULL if the zero terminator was not found.
+ *
+ * @param  pwszString  The string.
+ * @param  cwcMax      The max string length. RTSTR_MAX is fine.
+ */
+RTDECL(PCRTUTF16) RTUtf16End(PCRTUTF16 pwszString, size_t cwcMax);
+
+/**
+ * Strips blankspaces from both ends of the string.
+ *
+ * @returns Pointer to first non-blank char in the string.
+ * @param  pwsz  The string to strip.
+ */
+RTDECL(PRTUTF16) RTUtf16Strip(PRTUTF16 pwsz);
+
+/**
+ * Strips blankspaces from the start of the string.
+ *
+ * @returns Pointer to first non-blank char in the string.
+ * @param  pwsz  The string to strip.
+ */
+RTDECL(PRTUTF16) RTUtf16StripL(PCRTUTF16 pwsz);
+
+/**
+ * Strips blankspaces from the end of the string.
+ *
+ * @returns pwsz.
+ * @param  pwsz  The string to strip.
+ */
+RTDECL(PRTUTF16) RTUtf16StripR(PRTUTF16 pwsz);
+
+/**
+ * String copy with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pwszSrc             The source string. NULL is not OK.
+ */
+RTDECL(int) RTUtf16Copy(PRTUTF16 pwszDst, size_t cwcDst, PCRTUTF16 pwszSrc);
+
+/**
+ * String copy with overflow handling, ASCII source.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *         buffer will contain as much of the string as it can hold, fully
+ *         terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pszSrc              The source string, pure ASCII. NULL is not OK.
+ */
+RTDECL(int) RTUtf16CopyAscii(PRTUTF16 pwszDst, size_t cwcDst, const char *pszSrc);
+
+/**
+ * String copy with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *         buffer will contain as much of the string as it can hold, fully
+ *         terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pwszSrc             The source string. NULL is not OK.
+ * @param   cwcSrcMax           The maximum number of chars (not code points) to
+ *                              copy from the source string, not counting the
+ *                              terminator as usual.
+ */
+RTDECL(int) RTUtf16CopyEx(PRTUTF16 pwszDst, size_t cwcDst, PCRTUTF16 pwszSrc, size_t cwcSrcMax);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *         buffer will contain as much of the string as it can hold, fully
+ *         terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pwszSrc             The source string. NULL is not OK.
+ */
+RTDECL(int) RTUtf16Cat(PRTUTF16 pwszDst, size_t cwcDst, PCRTUTF16 pwszSrc);
+
+/**
+ * String concatenation with overflow handling, ASCII source.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *         buffer will contain as much of the string as it can hold, fully
+ */
+ * terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pszSrc              The source string, pure ASCII. NULL is not OK.
+ */
+RTDECL(int) RTUtf16CatAscii(PRTUTF16 pwszDst, size_t cwcDst, const char *pszSrc);
+
+/**
+ * String concatenation with overflow handling.
+ *
+ * @retval  VINF_SUCCESS on success.
+ * @retval  VERR_BUFFER_OVERFLOW if the destination buffer is too small. The
+ *          buffer will contain as much of the string as it can hold, fully
+ *          terminated.
+ *
+ * @param   pwszDst             The destination buffer.
+ * @param   cwcDst              The size of the destination buffer in RTUTF16s.
+ * @param   pwszSrc              The source string. NULL is not OK.
+ * @param   cwcSrcMax           The maximum number of UTF-16 chars (not code
+ *                              points) to copy from the source string, not
+ *                              counting the terminator as usual.
+ */
+RTDECL(int) RTUtf16CatEx(PRTUTF16 pwszDst, size_t cwcDst, PCRTUTF16 pwszSrc, size_t cwcSrcMax);
+
+/**
+ * Performs a case sensitive string compare between two UTF-16 strings.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second UTF-16 string. Null is allowed.
+ * @remark  This function will not make any attempt to validate the encoding.
+ */
+RTDECL(int) RTUtf16Cmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case sensitive string compare between an UTF-16 string and a pure
+ * ASCII string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   psz2        Second string, pure ASCII. Null is allowed.
+ * @remark  This function will not make any attempt to validate the encoding.
+ */
```c
+RTDECL(int) RTUtf16CmpAscii(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case sensitive string compare between an UTF-16 string and a UTF-8
+ * string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param pwsz1     First UTF-16 string. Null is allowed.
+ * @param psz2      Second string, UTF-8. Null is allowed.
+ */
+RTDECL(int) RTUtf16CmpUtf8(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case insensitive string compare between two UTF-16 strings.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param pwsz1     First UTF-16 string. Null is allowed.
+ * @param pwsz2     Second UTF-16 string. Null is allowed.
+ */
+RTDECL(int) RTUtf16ICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case insensitive string compare between two big endian UTF-16
+ * strings.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
+ * as they are used in some languages, just simple upper & lower case compares.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ *
+ * @param pwsz1     First big endian UTF-16 string. Null is allowed.
+ * @param pwsz2     Second big endian UTF-16 string. Null is allowed.
+ */
+RTDECL(int) RTUtf16BigICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case insensitive string compare between an UTF-16 string and a
```
+ * UTF-8 string.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   psz2        Second string, UTF-8. Null is allowed.
+ * @returns NULL and empty strings are treated equally.
+ */
+RTDECL(int) RTUtf16ICmpUtf8(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case insensitive string compare between an UTF-16 string and a
+ * pure ASCII string.
+ *
+ * Since this compare only takes cares about the first 128 codepoints in
+ * unicode, no tables are needed and there aren't any real complications.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   psz2        Second string, pure ASCII. Null is allowed.
+ */
+RTDECL(int) RTUtf16ICmpAscii(PCRTUTF16 pwsz1, const char *psz2);
+
+/**
+ * Performs a case insensitive string compare between two UTF-16 strings
+ * using the current locale of the process (if applicable).
+ *
+ * This differs from RTUtf16ICmp() in that it will try, if a locale with the
+ * required data is available, to do a correct case-insensitive compare. It
+ * follows that it is more complex and thereby likely to be more expensive.
+ *
+ * @returns < 0 if the first string less than the second string.
+ * @returns 0 if the first string identical to the second string.
+ * @returns > 0 if the first string greater than the second string.
+ * @param   pwsz1       First UTF-16 string. Null is allowed.
+ * @param   pwsz2       Second UTF-16 string. Null is allowed.
+ */
+RTDECL(int) RTUtf16LocaleICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2);
+
+/**
+ * Performs a case insensitive string compare between two UTF-16 strings,
+ * stopping after N characters.
+ *
+ * This is a simplified compare, as only the simplified lower/upper case folding
+ * specified by the unicode specs are used. It does not consider character pairs
as they are used in some languages, just simple upper & lower case compares.

* @returns < 0 if the first string less than the second string.
* @returns 0 if the first string identical to the second string.
* @returns > 0 if the first string greater than the second string.
* @param pwsz1 First UTF-16 string. Null is allowed.
* @param pwsz2 Second UTF-16 string. Null is allowed.
* @param cwcMax Maximum number of characters to compare.
 */

RTDECL(int) RTUtf16NICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2, size_t cwcMax);

/**
 * Performs a case insensitive string compare between two big endian UTF-16
 * strings, stopping after N characters.
 *
 * This is a simplified compare, as only the simplified lower/upper case folding
 * specified by the unicode specs are used. It does not consider character pairs
 * as they are used in some languages, just simple upper & lower case compares.
 *
 * @returns < 0 if the first string less than the second string.
 * @returns 0 if the first string identical to the second string.
 * @returns > 0 if the first string greater than the second string.
 * @param pwsz1 First big endian UTF-16 string. Null is allowed.
 * @param pwsz2 Second big endian UTF-16 string. Null is allowed.
 * @param cwcMax Maximum number of characters to compare.
 */

RTDECL(int) RTUtf16BigNICmp(PCRTUTF16 pwsz1, PCRTUTF16 pwsz2, size_t cwcMax);

/**
 * Performs a case insensitive string compare between a UTF-16 string and a pure
 * ASCII string, stopping after N characters.
 *
 * Since this compare only takes cares about the first 128 codepoints in
 * unicode, no tables are needed and there aren't any real complications.
 *
 * @returns < 0 if the first string less than the second string.
 * @returns 0 if the first string identical to the second string.
 * @returns > 0 if the first string greater than the second string.
 * @param pwsz1 The UTF-16 first string. Null is allowed.
 * @param psz2 The pure ASCII second string. Null is allowed.
 * @param cwcMax Maximum number of UTF-16 characters to compare.
 */

RTDECL(int) RTUtf16NICmpAscii(PCRTUTF16 pwsz1, const char *psz2, size_t cwcMax);

/**
 * Folds a UTF-16 string to lowercase.
 *
+ * This is a very simple folding; uses the simple lowercase code point, it is not related to any locale just the most common lowercase codepoint setup by the unicode specs, and it will not create new surrogate pairs or remove existing ones.
+ *
+ * @returns Pointer to the passed in string.
+ * @param pwsz The string to fold.
+ */
+RTDECL(PRTUTF16) RTUtf16ToLower(PRTUTF16 pwsz);
+
+/**
+ * Folds a UTF-16 string to uppercase.
+ *
+ * This is a very simple folding; uses the simple uppercase code point, it is not related to any locale just the most common uppercase codepoint setup by the unicode specs, and it will not create new surrogate pairs or remove existing ones.
+ *
+ * @returns Pointer to the passed in string.
+ * @param pwsz The string to fold.
+ */
+RTDECL(PRTUTF16) RTUtf16ToUpper(PRTUTF16 pwsz);
+
+/**
+ * Validates the UTF-16 encoding of the string.
+ *
+ * @returns iprt status code.
+ * @param pwsz The string.
+ */
+RTDECL(int) RTUtf16ValidateEncoding(PCRTUTF16 pwsz);
+
+/**
+ * Validates the UTF-16 encoding of the string.
+ *
+ * @returns iprt status code.
+ * @param pwsz The string.
+ * @param cwc The max string length (/ size) in UTF-16 units. Use RTSTR_MAX to process the entire string.
+ * @param fFlags Combination of RTSTR_VALIDATE_ENCODING_XXX flags.
+ */
+RTDECL(int) RTUtf16ValidateEncodingEx(PCRTUTF16 pwsz, size_t cwc, uint32_t fFlags);
+
+/**
+ * Checks if the UTF-16 encoding is valid.
+ *
+ * @returns true / false.
+ * @param pwsz The string.
+ */
+RTDECL(bool) RTUtf16IsValidEncoding(PCRTUTF16 pwsz);
+
+/**
+ * Sanitise a (valid) UTF-16 string by replacing all characters outside a white
+ * list in-place by an ASCII replacement character.
+ *
+ * Surrogate paris will be replaced by two chars.
+ *
+ * @returns The number of code points replaced. In the case of an incorrectly
+ * encoded string -1 will be returned, and the string is not completely
+ * processed. In the case of puszValidPairs having an odd number of
+ * code points, -1 will be also return but without any modification to
+ * the string.
+ *
+ * @param   pwsz           The string to sanitise.
+ * @param   puszValidPairs A zero-terminated array of pairs of Unicode points.
+ *                         Each pair is the start and end point of a range,
+ *                         and the union of these ranges forms the white list.
+ * @param   chReplacement  The ASCII replacement character.
+ * @sa      RTStrPurgeComplementSet
+ */
+RTDECL(ssize_t) RTUtf16PurgeComplementSet(PRTUTF16 pwsz, PCRTUNICP puszValidPairs, char
+chReplacement);
+
+/**
+ * Translate a UTF-16 string into a UTF-8 allocating the result buffer (default
+ * tag).
+ *
+ * @returns iprt status code.
+ *
+ * @param   pwszString      UTF-16 string to convert.
+ * @param   ppszString      Receives pointer of allocated UTF-8 string on
+ *                          success, and is always set to NULL on failure.
+ *                          The returned pointer must be freed using RTStrFree().
+ */
+#define RTUtf16ToUtf8(pwszString, ppszString)       RTUtf16ToUtf8Tag((pwszString), (ppszString),
+RTSTR_TAG)
+
+/**
+ * Translate a UTF-16 string into a UTF-8 allocating the result buffer.
+ *
+ * @returns iprt status code.
+ *
+ * @param   pwszString      UTF-16 string to convert.
+ * @param   ppszString      Receives pointer of allocated UTF-8 string on
+ *                          success, and is always set to NULL on failure.
+ *                          The returned pointer must be freed using RTStrFree().
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int)  RTUtf16ToUtf8Tag(PCRTUTF16 pwszString, char **ppszString, const char *pszTag);
/**
 * Translate a UTF-16BE string into a UTF-8 allocating the result buffer
 * (default tag).
 *
 * This differs from RTUtf16ToUtf8 in that the input is always a
 * big-endian string.
 *
 * @returns iprt status code.
 *
 * @param   pwszString       UTF-16BE string to convert.
 * @param   ppszString       Receives pointer of allocated UTF-8 string on
 *                          success, and is always set to NULL on failure.
 *                          The returned pointer must be freed using RTStrFree().
 *
 * #define RTUtf16BigToUtf8(pwszString, ppszString)       RTUtf16BigToUtf8Tag((pwszString), (ppszString),
 *                              RTSTR_TAG)
 */
 RTDECL(int)  RTUtf16BigToUtf8Tag(PCRTUTF16 pwszString, char **ppszString, const char *pszTag);

/**
 * Translate a UTF-16BE string into a UTF-8 allocating the result buffer.
 *
 * This differs from RTUtf16ToUtf8Tag in that the input is always a
 * big-endian string.
 *
 * @returns iprt status code.
 *
 * @param   pwszString       UTF-16BE string to convert.
 * @param   ppszString       Receives pointer of allocated UTF-8 string on
 *                          success, and is always set to NULL on failure.
 *                          The returned pointer must be freed using RTStrFree().
 *
 * @param   pszTag           Allocation tag used for statistics and such.
 *
 * #define RTUtf16LittleToUtf8(pwszString, ppszString)     RTUtf16LittleToUtf8Tag((pwszString), (ppszString),
 *                                 RTSTR_TAG)
 */

+RTDECL(int)  RTUtf16LittleToUtf8Tag(PCRTUTF16 pwszString, char **ppszString, const char *pszTag);

/**
 * Translate a UTF-16LE string into a UTF-8 allocating the result buffer
 * (default tag).
 *
 * This differs from RTUtf16ToUtf8 in that the input is always a
 * little-endian string.
 *
 * @returns iprt status code.
 *
 * @param   pwszString       UTF-16LE string to convert.
 * @param   ppszString       Receives pointer of allocated UTF-8 string on
 *                          success, and is always set to NULL on failure.
 *                          The returned pointer must be freed using RTStrFree().
 *
 * #define RTUtf16LittleToUtf8(pwszString, ppszString)     RTUtf16LittleToUtf8Tag((pwszString), (ppszString),
 *                                 RTSTR_TAG)
 */
/**
 * Translate a UTF-16LE string into a UTF-8 allocating the result buffer.
 *
 * This differs from RTUtf16ToUtf8Tag in that the input is always a
 * little-endian string.
 *
 * @returns iprt status code.
 * @param   pwszString      UTF-16LE string to convert.
 * @param   ppszString      Receives pointer of allocated UTF-8 string on
 *                          success, and is always set to NULL on failure.
 *                          The returned pointer must be freed using RTStrFree().
 * @param   pszTag          Allocation tag used for statistics and such.
 * @returns iprt status code.
 * @param   pwszString      The UTF-16 string to convert.
 * @param   cwcString       The number of RTUTF16 items to translate from pwszString.
 *                          The translation will stop when reaching cwcString or the terminator (\0').
 *                          Use RTSTR_MAX to translate the entire string.
 * @param   ppsz             If cch is non-zero, this must either be pointing to a pointer to
 *                          a buffer of the specified size, or pointer to a NULL pointer.
 *                          If *ppsz is NULL or cch is zero a buffer of at least cch chars
 *                          will be allocated to hold the translated string.
 *                          If a buffer was requested it must be freed using RTStrFree().
 * @param   cch             The buffer size in chars (the type). This includes the terminator.
 *                          Where to store the length of the translated string,
 *                          excluding the terminator. (Optional)
 * @param   pcch            Where to store the length of the translated string,
 *                          excluding the terminator. (Optional)
 *
 * This may be set under some error conditions,
 * however, only for VERR_BUFFER_OVERFLOW and
 * VERR_NO_STR_MEMORY will it contain a valid string
 * length that can be used to resize the buffer.
 */
#define RTUtf16ToUtf8Ex(pwszString, cwcString, ppsz, cch, pcch) \
    RTUtf16ToUtf8ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG) \
+*/
*/
+ * @param   cwcString       The number of RTUTF16 items to translate from pwszString.
+ *                     The translation will stop when reaching cwcString or the terminator ('\0').
+ *                     Use RTSTR_MAX to translate the entire string.
+ * @param   ppsz            If cch is non-zero, this must either be pointing to a pointer to
+ *                          a buffer of the specified size, or pointer to a NULL pointer.
+ *                          If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ *                          will be allocated to hold the translated string.
+ *                          If a buffer was requested it must be freed using RTStrFree().
+ * @param   cch             The buffer size in chars (the type). This includes the terminator.
+ * @param   pcch            Where to store the length of the translated string,
+ *                          excluding the terminator. (Optional)
+ *
+ *                          This may be set under some error conditions,
+ *                          however, only for VERR_BUFFER_OVERFLOW and
+ *                          VERR_NO_STR_MEMORY will it contain a valid string
+ *                          length that can be used to resize the buffer.
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int)  RTUtf16ToUtf8ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch, size_t
*pcc, const char *pszTag);
+
+/**
+ * Translates UTF-16BE to UTF-8 using buffer provided by the caller or a
+ * fittingly sized buffer allocated by the function (default tag).
+ *
+ * This differs from RTUtf16ToUtf8Ex in that the input is always a
+ * big-endian string.
+ *
+ * @returns iprt status code.
+ * @param   pwszString      The UTF-16BE string to convert.
+ * @param   cwcString       The number of RTUTF16 items to translate from pwszString.
+ *                     The translation will stop when reaching cwcString or the terminator ('\0').
+ *                     Use RTSTR_MAX to translate the entire string.
+ * @param   ppsz            If cch is non-zero, this must either be pointing to a pointer to
+ *                          a buffer of the specified size, or pointer to a NULL pointer.
+ *                          If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ *                          will be allocated to hold the translated string.
+ *                          If a buffer was requested it must be freed using RTStrFree().
+ * @param   cch             The buffer size in chars (the type). This includes the terminator.
+ * @param   pcch            Where to store the length of the translated string,
+ *                          excluding the terminator. (Optional)
+ *
+ *                          This may be set under some error conditions,
+ *                          however, only for VERR_BUFFER_OVERFLOW and
+ *                          VERR_NO_STR_MEMORY will it contain a valid string
+ *                          length that can be used to resize the buffer.
+ */
+#define RTUtf16BigToUtf8Ex(pwszString, cwcString, ppsz, cch, pcch) \
+ RTUtf16BigToUtf8ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG)
+ /*
+ * Translates UTF-16BE to UTF-8 using buffer provided by the caller or a
+ * fittingly sized buffer allocated by the function (custom tag).
+ *
+ * This differs from RTUtf16ToUtf8ExTag in that the input is always a
+ * big-endian string.
+ *
+ * @returns iprt status code.
+ * @param   pwszString      The UTF-16BE string to convert.
+ * @param   cwcString       The number of RTUTF16 items to translate from pwszString.
+ *                          The translation will stop when reaching cwcString or the terminator (\0').
+ * @param   ppsz            If cch is non-zero, this must either be pointing to a pointer to
+ *                          a buffer of the specified size, or pointer to a NULL pointer.
+ *                          If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ *                          will be allocated to hold the translated string.
+ *                          If a buffer was requested it must be freed using RTStrFree().
+ * @param   cch             The buffer size in chars (the type). This includes the terminator.
+ * @param   pcch            Where to store the length of the translated string,
+ *                          excluding the terminator. (Optional)
+ *
+ *                          This may be set under some error conditions,
+ *                          however, only for VERR_BUFFER_OVERFLOW and
+ *                          VERR_NO_STR_MEMORY will it contain a valid string
+ *                          length that can be used to resize the buffer.
+ * @param   pszTag          Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTUtf16BigToUtf8ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch,
size_t *pcch, const char *pszTag);
+ /*
+ * Translates UTF-16LE to UTF-8 using buffer provided by the caller or a
+ * fittingly sized buffer allocated by the function (default tag).
+ *
+ * This differs from RTUtf16ToUtf8Ex in that the input is always a
+ * little-endian string.
+ *
+ * @returns iprt status code.
+ * @param   pwszString      The UTF-16LE string to convert.
+ * @param   cwcString       The number of RTUTF16 items to translate from pwszString.
+ *                          The translation will stop when reaching cwcString or the terminator (\0').
+ * @param   ppsz            If cch is non-zero, this must either be pointing to a pointer to
+ *                          a buffer of the specified size, or pointer to a NULL pointer.
+ *                          If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ *                          will be allocated to hold the translated string.
+ */
+ * @param   cch           The buffer size in chars (the type). This includes the terminator.
+ * @param   pcch          Where to store the length of the translated string,
+ *        excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ */
+ #define RTUtf16LittleToUtf8Ex(pwszString, cwcString, ppsz, cch, pcch) 
+  RTUtf16LittleToUtf8ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG)
+ +/**
+ * Translates UTF-16LE to UTF-8 using buffer provided by the caller or a
+ * fittingly sized buffer allocated by the function (custom tag).
+ *
+ * This differs from RTUtf16ToUtf8ExTag in that the input is always a
+ * little-endian string.
+ *
+ * @returns iprt status code.
+ * @param   pwszString     The UTF-16LE string to convert.
+ * @param   cwcString      The number of RTUTF16 items to translate from pwszString.
+ *        The translation will stop when reaching cwcString or the terminator ('\0').
+ *        Use RTSTR_MAX to translate the entire string.
+ * @param   ppsz           If cch is non-zero, this must either be pointing to a pointer to
+ *                          a buffer of the specified size, or pointer to a NULL pointer.
+ *                          If *ppsz is NULL or cch is zero a buffer of at least cch chars
+ *                          will be allocated to hold the translated string.
+ *                          If a buffer was requested it must be freed using RTStrFree().
+ * @param   cch            The buffer size in chars (the type). This includes the terminator.
+ * @param   pcch           Where to store the length of the translated string,
+ *        excluding the terminator. (Optional)
+ *
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ * @param   pszTag         Allocation tag used for statistics and such.
+ */
+ RTDECL(int) RTUtf16LittleToUtf8ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch,
+                                       const char *pszTag);
+ +/**
+ * Calculates the length of the UTF-16 string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16
strings will be rejected. The primary purpose of this function is to help allocate buffers for RTUtf16ToUtf8() of the correct size. For most other purposes RTUtf16ToUtf8Ex() should be used.
+ *
+ * @returns Number of char (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param pwsz The UTF-16 string.
+ */
+RTDECL(size_t) RTUtf16CalcUtf8Len(PCRTUTF16 pwsz);
+
+/**
+ * Calculates the length of the UTF-16BE string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16BE strings will be rejected. The primary purpose of this function is to help allocate buffers for RTUtf16BigToUtf8() of the correct size. For most other purposes RTUtf16BigToUtf8Ex() should be used.
+ *
+ * @returns Number of char (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param pwsz The UTF-16BE string.
+ */
+RTDECL(size_t) RTUtf16BigCalcUtf8Len(PCRTUTF16 pwsz);
+
+/**
+ * Calculates the length of the UTF-16LE string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16LE strings will be rejected. The primary purpose of this function is to help allocate buffers for RTUtf16LittleToUtf8() of the correct size. For most other purposes RTUtf16LittleToUtf8Ex() should be used.
+ *
+ * @returns Number of char (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param pwsz The UTF-16LE string.
+ */
+RTDECL(size_t) RTUtf16LittleCalcUtf8Len(PCRTUTF16 pwsz);
+
+/**
+ * Calculates the length of the UTF-16 string in UTF-8 chars (bytes).
+ *
+ * This function will validate the string, and incorrectly encoded UTF-16 strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param pwsz The string.
+ * @param cwc The max string length. Use RTSTR_MAX to process the entire string.
+ * @param pcch Where to store the string length (in bytes). Optional.
This is undefined on failure.

RTDECL(int) RTUtf16CalcUtf8LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+/**
+ * Calculates the length of the UTF-16BE string in UTF-8 chars (bytes).
+ * This function will validate the string, and incorrectly encoded UTF-16BE
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param   pwsz    The string.
+ * @param   cwc    The max string length. Use RTSTR_MAX to process the entire string.
+ * @param   pcch   Where to store the string length (in bytes). Optional.
+ * This is undefined on failure.
+ */

RTDECL(int) RTUtf16BigCalcUtf8LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+/**
+ * Calculates the length of the UTF-16LE string in UTF-8 chars (bytes).
+ * This function will validate the string, and incorrectly encoded UTF-16LE
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param   pwsz    The string.
+ * @param   cwc    The max string length. Use RTSTR_MAX to process the entire string.
+ * @param   pcch   Where to store the string length (in bytes). Optional.
+ * This is undefined on failure.
+ */

RTDECL(int) RTUtf16LittleCalcUtf8LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+/**
+ * Translate a UTF-16 string into a Latin-1 (ISO-8859-1) allocating the result
+ * buffer (default tag).
+ *
+ * @returns iprt status code.
+ * @param   pwszString    UTF-16 string to convert.
+ */

#define RTUtf16ToLatin1Tag(pwszString, ppszString) RTUtf16ToLatin1Tag((pwszString), (ppszString))
+
+/**
+ * Translate a UTF-16 string into a Latin-1 (ISO-8859-1) allocating the result
+ * buffer (custom tag).
+ */
+ * @returns iprt status code.
+ * @param pwszString UTF-16 string to convert.
+ * @param ppszString Receives pointer of allocated Latin1 string on
+ * success, and is always set to NULL on failure.
+ * The returned pointer must be freed using RTStrFree().
+ * @param pszTag Allocation tag used for statistics and such.
+ */
+RTDECL(int) RTUtf16ToLatin1Tag(PCRTUTF16 pwszString, char **ppszString, const char *pszTag);
+
+/**
+ * Translates UTF-16 to Latin-1 (ISO-8859-1) using buffer provided by the caller
+ * or a fittingly sized buffer allocated by the function (default tag).
+ */
+/**
+ * @returns iprt status code.
+ * @param pwszString The UTF-16 string to convert.
+ * @param cwcString The number of RTUTF16 items to translate from
+ * pwszString. The translation will stop when reaching
+ * cwcString or the terminator ('\0'). Use RTSTR_MAX
+ * to translate the entire string.
+ * @param ppsz Pointer to the pointer to the Latin-1 string. The
+ * buffer can optionally be preallocated by the caller.
+ * If cch is zero, *ppsz is undefined.
+ * If cch is non-zero and *ppsz is not NULL, then this
+ * will be used as the output buffer.
+ * VERR_BUFFER_OVERFLOW will be returned if this is
+ * insufficient.
+ * If cch is zero or *ppsz is NULL, then a buffer of
+ * sufficient size is allocated. cch can be used to
+ * specify a minimum size of this buffer. Use
+ * RTUtf16Free() to free the result.
+ * @param cch The buffer size in chars (the type). This includes
+ * the terminator.
+ * @param pcch Where to store the length of the translated string,
+ * excluding the terminator. (Optional)
+ * This may be set under some error conditions,
+ * however, only for VERR_BUFFER_OVERFLOW and
+ * VERR_NO_STR_MEMORY will it contain a valid string
+ * length that can be used to resize the buffer.
+ */
+#define RTUtf16ToLatin1Ex(pwszString, cwcString, ppsz, cch, pcch)\
+ RTUtf16ToLatin1ExTag((pwszString), (cwcString), (ppsz), (cch), (pcch), RTSTR_TAG)
/**
 * Translates UTF-16 to Latin-1 (ISO-8859-1) using buffer provided by the caller
 * or a fittingly sized buffer allocated by the function (custom tag).
 * @returns iprt status code.
 * @param   pwszString      The UTF-16 string to convert.
 * @param   cwcString       The number of RTUTF16 items to translate from
 *                          pwszString. The translation will stop when reaching
 *                          cwcString or the terminator ('\0'). Use RTSTR_MAX
 *                          to translate the entire string.
 * @param   ppsz            Pointer to the pointer to the Latin-1 string. The
 *                          buffer can optionally be preallocated by the caller.
 * @param   cch             The buffer size in chars (the type). This includes
 *                          the terminator.
 * @param   pcch            Where to store the length of the translated string,
 *                          excluding the terminator. (Optional)
 *                          This may be set under some error conditions,
 *                          however, only for VERR_BUFFER_OVERFLOW and
 *                          VERR_NO_STR_MEMORY will it contain a valid string
 *                          length that can be used to resize the buffer.
 * @param   pszTag          Allocation tag used for statistics and such.
 * @returns Number of char (bytes).
 */
+RTDECL(int)  RTUtf16ToLatin1ExTag(PCRTUTF16 pwszString, size_t cwcString, char **ppsz, size_t cch,
   size_t *pcch, const char *pszTag);
+/**
* Calculates the length of the UTF-16 string in Latin-1 (ISO-8859-1) chars.
* @returns Number of char (bytes).
+ * @returns 0 if the string was incorrectly encoded.
+ * @param pwsz The UTF-16 string.
+ */
+RTDECL(size_t) RTUtf16CalcLatin1Len(PCRTUTF16 pwsz);
+
+/**
+ * Calculates the length of the UTF-16 string in Latin-1 (ISO-8859-1) chars.
+ * This function will validate the string, and incorrectly encoded UTF-16
+ * strings will be rejected.
+ *
+ * @returns iprt status code.
+ * @param pwsz The string.
+ * @param cwc The max string length. Use RTSTR_MAX to process the
+ *     entire string.
+ * @param pcch Where to store the string length (in bytes). Optional.
+ *     This is undefined on failure.
+ */
+RTDECL(int) RTUtf16CalcLatin1LenEx(PCRTUTF16 pwsz, size_t cwc, size_t *pcch);
+
+/**
+ * Get the unicode code point at the given string position.
+ *
+ * @returns unicode code point.
+ * @returns RTUNICP_INVALID if the encoding is invalid.
+ * @param pwsz The string.
+ *
+ * @remark This is an internal worker for RTUtf16GetCp().
+ */
+RTDECL(RTUNICP) RTUtf16GetCpInternal(PCRTUTF16 pwsz);
+
+/**
+ * Get the unicode code point at the given string position, big endian.
+ *
+ * @returns iprt status code.
+ * @param ppwsz Pointer to the string pointer. This will be updated to
+ *     point to the char following the current code point.
+ * @param pCp Where to store the code point.
+ *     RTUNICP_INVALID is stored here on failure.
+ *
+ * @remark This is an internal worker for RTUtf16GetCpEx().
+ */
+RTDECL(int) RTUtf16GetCpExInternal(PCRTUTF16 *ppwsz, PRTUNICP pCp);
+ * @param   ppwsz Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point.
+ * @param   pCp   Where to store the code point.
+ * RTUNICP_INVALID is stored here on failure.
+ *
+ * @remark This is an internal worker for RTUtf16BigGetCpEx().
+ */
+RTDECL(int) RTUtf16BigGetCpExInternal(PCRTUTF16 *ppwsz, PRTUNICP pCp);
+
+/**
+ * Put the unicode code point at the given string position
+ * and return the pointer to the char following it.
+ *
+ * This function will not consider anything at or following the
+ * buffer area pointed to by pwsz. It is therefore not suitable for
+ * inserting code points into a string, only appending/overwriting.
+ *
+ * @returns pointer to the char following the written code point.
+ * @param   pwsz        The string.
+ * @param   CodePoint   The code point to write.
+ *                    This should not be RTUNICP_INVALID or any other
+ *                    character out of the UTF-16 range.
+ *
+ * @remark This is an internal worker for RTUtf16GetCpEx().
+ */
+RTDECL(PRTUTF16) RTUtf16PutCpInternal(PRTUTF16 pwsz, RTUNICP CodePoint);
+
+/**
+ * Get the unicode code point at the given string position.
+ *
+ * @returns unicode code point.
+ * @returns RTUNICP_INVALID if the encoding is invalid.
+ * @param   pwsz        The string.
+ *
+ * @remark We optimize this operation by using an inline function for
+ *         everything which isn't a surrogate pair or an endian indicator.
+ */
+DECLINLINE(RTUNICP) RTUtf16GetCp(PCRTUTF16 pwsz)
+{
+    const RTUTF16 wc = *pwsz;
+    if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe))
+        return wc;
+    return RTUtf16GetCpInternal(pwsz);
+}
+ * @returns iprt status code.
+ * @param   ppwsz       Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point.
+ * @param   pCp         Where to store the code point.
+ * RTUNICP_INVALID is stored here on failure.
+ *
+ * @remark We optimize this operation by using an inline function for
+ * everything which isn’t a surrogate pair or and endian indicator.
+ */
+DECLINLINE(int) RTUtf16GetCpEx(PCRTUTF16 *ppwsz, PRTUNICP pCp)
+{
+    const RTUTF16 wc = **ppwsz;
+    if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe))
+    {
+        (*ppwsz)+=1;
+        *pCp = wc;
+        return VINF_SUCCESS;
+    }
+    return RTUtf16GetCpExInternal(ppwsz, pCp);
+}
+}
+
+/**
+ * Get the unicode code point at the given string position, big endian version.
+ *
+ * @returns iprt status code.
+ * @param   ppwsz       Pointer to the string pointer. This will be updated to
+ * point to the char following the current code point.
+ * @param   pCp         Where to store the code point.
+ * RTUNICP_INVALID is stored here on failure.
+ *
+ * @remark We optimize this operation by using an inline function for
+ * everything which isn’t a surrogate pair or and endian indicator.
+ */
+DECLINLINE(int) RTUtf16BigGetCpEx(PCRTUTF16 *ppwsz, PRTUNICP pCp)
+{
+    #ifdef RT_BIG_ENDIAN
+        return RTUtf16GetCpEx(ppwsz, pCp);
+    #else
+    # ifdef ___iprt_asm_h
+        const RTUTF16 wc = RT_BE2H_U16(**ppwsz);
+        if (wc < 0xd800 || (wc > 0xdfff && wc < 0xfffe))
+        {
+            (*ppwsz)+=1;
+            *pCp = wc;
+            return VINF_SUCCESS;
+        }
+    # endif
+    return RTUtf16BigGetCpExInternal(ppwsz, pCp);
+    #endif
+    return RTUtf16BigGetCpExInternal(ppwsz, pCp);
/**
 * Put the unicode code point at the given string position
 * and return the pointer to the char following it.
 *
 * This function will not consider anything at or following the
 * buffer area pointed to by pwsz. It is therefore not suitable for
 * inserting code points into a string, only appending/overwriting.
 *
 * @returns pointer to the char following the written code point.
 * @param   pwsz        The string.
 * @param   CodePoint   The code point to write.
 *                      This should not be RTUNICP_INVALID or any other
 *                      character out of the UTF-16 range.
 *
 * @remark  We optimize this operation by using an inline function for
 *          everything which isn't a surrogate pair or and endian indicator.
 */
DECLINLINE(PRTUTF16) RTUtf16PutCp(PRTUTF16 pwsz, RTUNICP CodePoint)
{
    if (CodePoint < 0xd800 || (CodePoint > 0xd800 && CodePoint < 0xfffe))
    {
        *pwsz++ = (RTUTF16)CodePoint;
        return pwsz;
    }
    return RTUtf16PutCpInternal(pwsz, CodePoint);
}

/**
 * Skips ahead, past the current code point.
 *
 * @returns Pointer to the char after the current code point.
 * @param   pwsz    Pointer to the current code point.
 * @remark  This will not move the next valid code point, only past the current one.
 */
DECLINLINE(PRTUTF16) RTUtf16NextCp(PCRTUTF16 pwsz)
{
    RTUNICP Cp;
    RTUtf16GetCpEx(&pwsz, &Cp);
    return (PRTUTF16)pwsz;
}

/**
 * Skips backwards, to the previous code point.
 *
 * @returns Pointer to the char after the current code point.
 */
+* @param pwszStart Pointer to the start of the string.
+* @param pwsz Pointer to the current code point.
+*/
+RTDECL(PRTUTF16) RTUtf16PrevCp(PCRTUTF16 pwszStart, PCRTUTF16 pwsz);
+
+/**
+ * Checks if the UTF-16 char is the high surrogate char (i.e.
+ * the 1st char in the pair).
+ *
+ * @returns true if it is.
+ * @returns false if it isn’t.
+ * @param wc The character to investigate.
+ */
+DECLINLINE(bool) RTUtf16IsHighSurrogate(RTUTF16 wc)
+{
+    return wc >= 0xd800 && wc <= 0xdbff;
+}
+
+/**
+ * Checks if the UTF-16 char is the low surrogate char (i.e.
+ * the 2nd char in the pair).
+ *
+ * @returns true if it is.
+ * @returns false if it isn’t.
+ * @param wc The character to investigate.
+ */
+DECLINLINE(bool) RTUtf16IsLowSurrogate(RTUTF16 wc)
+{
+    return wc >= 0xdc00 && wc <= 0xdfff;
+}
+
+/**
+ * Checks if the two UTF-16 chars form a valid surrogate pair.
+ *
+ * @returns true if they do.
+ * @returns false if they doesn’t.
+ * @param wcHigh The high (1st) character.
+ * @param wcLow The low (2nd) character.
+ */
+DECLINLINE(bool) RTUtf16IsSurrogatePair(RTUTF16 wcHigh, RTUTF16 wcLow)
+{
+    return RTUtf16IsHighSurrogate(wcHigh)
+        && RTUtf16IsLowSurrogate(wcLow);
+}
+ * Formats a buffer stream as hex bytes.
+ *
+ * The default is no separating spaces or line breaks or anything.
+ *
+ * @returns IPRT status code.
+ * @retval  VERR_INVALID_POINTER if any of the pointers are wrong.
+ * @retval  VERR_BUFFER_OVERFLOW if the buffer is insufficient to hold the bytes.
+ *
+ * @param   pwszBuf     Output string buffer.
+ * @param   cwcBuf      The size of the output buffer in RTUTF16 units.
+ * @param   pv          Pointer to the bytes to stringify.
+ * @param   cb          The number of bytes to stringify.
+ * @param   fFlags      Combination of RTSTRPRINTHEXBYTES_F_XXX values.
+ *
+ * @sa      RTStrPrintHexBytes.
+ */
+RTDECL(int) RTUtf16PrintHexBytes(PRTUTF16 pwszBuf, size_t cwcBuf, void const *pv, size_t cb, uint32_t fFlags);
+
+/** @} */
+
+/** @} */
+
+RT_C_DECLS_END
+
+/** @} */
+
+endif
+
+--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/lnkops.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/lnkops.c
@@ -0,0 +1,107 @@
+/** @file
+ * vboxsf -- VirtualBox Guest Additions for Linux:
+ * Operations for symbolic links.
+ */
+#
+* vboxsf -- VirtualBox Guest Additions for Linux:
+* Operations for symbolic links.
+*/
+
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+
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+* Foundation, in version 2 as it comes in the "COPYING" file of the
+* VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+* hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+*/
+
+#include "vfsmod.h"
+
+if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+
+ if LINUX_VERSION_CODE < KERNEL_VERSION(4, 5, 0)
+ if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 2, 0)
+static const char *sf_follow_link(struct dentry *dentry, void **cookie)
+ else
+static void *sf_follow_link(struct dentry *dentry, struct nameidata *nd)
+ else
+
+ if (path)
+ {
+    error = 0;
+    rc = VbglR0SfReadLink(&client_handle, &sf_g->map, sf_i->path, PATH_MAX, path);
+    if (RT_FAILURE(rc))
+    {
+        LogFunc("VbglR0SfReadLink failed, caller=%s, rc=%Rrc\n", __func__, rc);
+        free_page((unsigned long)path);
+        error = -EPROTO;
+    }
+    }
+}
+ else /* LINUX_VERSION_CODE >= KERNEL_VERSION(4, 5, 0) */
+
+static void sf_put_link(struct dentry *dentry, struct nameidata *nd, void *cookie)
+{
+    char *page = nd_get_link(nd);
+    if (!IS_ERR(page))
+        free_page((unsigned long)page);
+}
struct delayed_call *done)
+
+ struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
+ struct sf_inode_info *sf_i = GET_INODE_INFO(inode);
+ char *path;
+ int rc;
+
+ if (!dentry)
+     return ERR_PTR(-ECHILD);
+    path = kzalloc(PAGE_SIZE, GFP_KERNEL);
+ if (!path)
+    return ERR_PTR(-ENOMEM);
+ rc = VbglR0SfReadLink(&client_handle, &sf_g->map, sf_i->path, PATH_MAX, path);
+ if (RT_FAILURE(rc))
+     {
+     LogFunc("VbglR0SfReadLink failed, caller=%s, rc=%Rrc\n", __func__, rc);
+     kfree(path);
+     return ERR_PTR(-EPROTO);
+    }
+    set_delayed_call(done, kfree_link, path);
+    return path;
+}
＋#endif /* LINUX_VERSION_CODE < KERNEL_VERSION(4, 5, 0) */
＋
＋struct inode_operations sf_lnk_iops =
+{
+    .readlink = generic_readlink,
+    .get_link = sf_get_link,
+    .follow_link = sf_follow_link,
+    .put_link = free_page_put_link,
+    .follow_link = sf_follow_link,
+    .put_link = sf_put_link
+}
+
+/*- NetBSD: moddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp */
+/*- Copyright (c) 1992, 1993 */
+*/
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OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
SUCH DAMAGE.

#include <sys/cdefs.h>
#if defined(LIBC_SCCS) && !defined(lint)
#define sccsid[] = "#@(#)moddi3.c 8.1 (Berkeley) 6/4/93"
#else
#define _RCSID("$NetBSD: moddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $")
#endif
#endif /* LIBC_SCCS and not lint */
#include "quad.h"
#endif
#ifdef(LIBC_SCCS) && !defined(lint)
#define sccsid[] = "#@(#)moddi3.c 8.1 (Berkeley) 6/4/93"
#else
#define _RCSID("$NetBSD: moddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $")
#endif
#endif /* LIBC_SCCS and not lint */

/*
 * Return remainder after dividing two signed quads.
 *
 * XXX we assume a % b < 0 iff a < 0, but this is actually machine-dependent.
 */
quad_t
```c
+__moddi3(a, b)
+quad_t a, b;
+{
+u_quad_t ua, ub, ur;
+int neg = 0;
+
+ua = a;
+ub = b;
+
+if (a < 0)
+ua = -ua, neg ^= 1;
+if (b < 0)
+ub = -ub;
+(void)__qdivrem(ua, ub, &ur);
+if (neg)
+ur = -ur;
+return (ur);
+}
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/product-generated.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/product-generated.h
@@ -0,0 +1,10 @@
+#ifndef ___product_generated_h___
+#define ___product_generated_h___
+
+#define VBOX_VENDOR "Oracle Corporation"
+#define VBOX_VENDOR_SHORT "Oracle"
+#define VBOX_PRODUCT "Oracle VM VirtualBox"
+#define VBOX_BUILD_PUBLISHER "_Ubuntu"
+#define VBOX_C_YEAR "2018"
+
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/qdivrem.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/qdivrem.c
@@ -0,0 +1,285 @@
/*
 *
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 * at Lawrence Berkeley Laboratory under DARPA contract BG 91-66 and
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 */
*/
```
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+ * LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY
+ * OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
+ * SUCH DAMAGE.
+ */
+
+ /* This algorithm is from Knuth vol. 2 (2nd ed), section 4.3.1, pp. 257–259.
+ */
+
+ /* Include <sys/cdefs.h>
+ * If defined(LIBC_SCCS) & & !defined(lint)
+ */
+
+ static char scsccid[] = " @(\#)qdivrem.c8.1 (Berkeley) 6/4/93"
+ ;
+
+ /* Include "quad.h"
+ +
+ */
+
+ define_B(int)1 << HALF_BITS /* digit base */
+
+ /* Combine two `digits' to make a single two-digit number. */
+ define_COMBINE(a, b) (((u_int)(a) << HALF_BITS) | (b))
+
+ /* Select a type for digits in base B: use unsigned short if they fit */
+ if UINT_MAX == 0xffffffffU & & USHRT_MAX >= 0xffff
+ typedef unsigned short digit; 
+ else
+ typedef u_int digit;
+ endif
+static void shl __P((digit *p, int len, int sh));
+
+/*
+__qdive(u, v, rem) returns u/v and, optionally, sets *rem to u%v.
+*/
+/*
+ * We do this in base 2-sup-HALF_BITS, so that all intermediate products
+ * fit within u_int. As a consequence, the maximum length dividend and
+ * divisor are 4 `digits' in this base (they are shorter if they have
+ * leading zeros).
+ */
+u_quad_t
+__qdive(uq, vq, arq)
+u_quad_t uq, vq, *arq;
+
+union uu tmp;
+digit *u, *v, *q;
+digit v1, v2;
+u_int qhat, rhat, t;
+int m, n, d, j, i;
+digit uspace[5], vspace[5], qspace[5];
+
+/*
+ * Take care of special cases: divide by zero, and u < v.
+ */
+if (vq == 0) { 
+/* divide by zero. */
+static volatile const unsigned int zero = 0;
+    
tmp.ul[H] = tmp.ul[L] = 1 / zero;
+    if (arq)
+        *arq = uq;
+    return (tmp.q);
+}
+if (uq < vq) { 
+    if (arq)
+        *arq = uq;
+    return (0);
+}
+u = &uspace[0];
+v = &vspace[0];
+q = &qspace[0];
+
+/*
+ * Break dividend and divisor into digits in base B, then
+ * count leading zeros to determine m and n. When done, we
+ * will have:
+ */
+u = (u[1]u[2]...u[m+n]) sub B
\[ v = (v[1]v[2]...v[n]) \text{ sub } B \]
\[ v[1] \neq 0 \]
\[ 1 < n \leq 4 \text{ (if } n = 1, \text{ we use a different division algorithm)} \]
\[ *m >= 0 \text{ (otherwise } u < v, \text{ which we already checked)} \]
\[ *m + n = 4 \]
\[ * \text{ and thus} \]
\[ *m = 4 - n \leq 2 \]
\[ */ \]
\[ tmp.uq = uq; \]
\[ u[0] = 0; \]
\[ u[1] = \text{(digit)HHALF(tmp.ul[H])}; \]
\[ u[2] = \text{(digit)LHALF(tmp.ul[H])}; \]
\[ u[3] = \text{(digit)HHALF(tmp.ul[L])}; \]
\[ u[4] = \text{(digit)LHALF(tmp.ul[L])}; \]
\[ tmp.uq = vq; \]
\[ v[1] = \text{(digit)HHALF(tmp.ul[H])}; \]
\[ v[2] = \text{(digit)LHALF(tmp.ul[H])}; \]
\[ v[3] = \text{(digit)HHALF(tmp.ul[L])}; \]
\[ v[4] = \text{(digit)LHALF(tmp.ul[L])}; \]
\[ \text{for (n = 4; v[1] == 0; v++){ } } \]
\[ \text{if } (n == 1) { } \]
\[ u\_int rbj/* r*B+u[j] \text{ (not root boy jim) */} \]
\[ \text{digit q1, q2, q3, q4;} \]
\[ ++ \]
\[ */* \]
\[ * \text{ Change of plan, per exercise 16.} \]
\[ *r = 0; \]
\[ *\text{for } j = 1..4; \]
\[ *q[j] = \text{floor}(r*B + u[j]) / v), \]
\[ *r = (r*B + u[j]) \% v; \]
\[ * \text{ We unroll this completely here.} \]
\[ */ \]
\[ t = v[2]/* nonzero, by definition */ \]
\[ q1 = \text{(digit)t(u[1] / t);} \]
\[ rbj = \text{COMBINE(u[1] \% t, u[2]);} \]
\[ q2 = \text{(digit)rbj / t);} \]
\[ rbj = \text{COMBINE(rbj \% t, u[3]);} \]
\[ q3 = \text{(digit)rbj / t);} \]
\[ rbj = \text{COMBINE(rbj \% t, u[4]);} \]
\[ q4 = \text{(digit)rbj / t);} \]
\[ \text{if (arq)} \]
\[ *arq = rbj \% t; \]
\[ tmp.ul[H] = \text{COMBINE(q1, q2);} \]
\[ tmp.ul[L] = \text{COMBINE(q3, q4);} \]
\[ \text{return (tmp.q);} \]
\[ { } \]
\[ { } \]
+/*
+ * By adjusting q once we determine m, we can guarantee that
+ * there is a complete four-digit quotient at &\$\text{q}[1]\$ when
+ * we finally stop.
+ */
+for (m = 4 - n; u[1] == 0; u++)
+m--;
+for (i = 4 - m; --i >= 0;)
+q[i] = 0;
+q += 4 - m;
+
+/*
+ * Here we run Program D, translated from MIX to C and acquiring
+ * a few minor changes.
+ */
+ * D1: choose multiplier \(1 \ll d\) to ensure \(v[1] \geq B/2\).
+ */
+d = 0;
+for (t = v[1]; t < B / 2; t <<= 1)
+d++;;
+if (d > 0) {
+shl(&u[0], m + n, d);/* u <<= d */
+shl(&v[1], n - 1, d);/* v <<= d */
+}
+/*
+ * D2: j = 0.
+ */
+j = 0;
+v1 = v[1];/* for D3 -- note that v[1..n] are constant */
+v2 = v[2];/* for D3 */
do {
+digit uj0, uj1, uj2;
+
+/*
+ * D3: Calculate qhat (\(^q\), in TeX notation).
+ * Let qhat = \(\text{min}((u[j]*B + u[j+1])/v[1], B-1)\), and
+ * let rhat = (u[j]*B + u[j+1]) mod v[1].
+ * While rhat < B and v[2]*qhat > rhat*B+u[j+2],
+ * decrement qhat and increase rhat correspondingly.
+ * Note that if rhat \(\geq\) B, v[2]*qhat \(<\) rhat*B.
+ */
+uj0 = u[j + 0];/* for D3 only -- note that u[j+...] change */
+uj1 = u[j + 1];/* for D3 only */
+uj2 = u[j + 2];/* for D3 only */
+if (uj0 == v1) {
+qhat = B;
+rhat = uj1;
+goto qhat_too_big;
/* D4: Multiply and subtract. */
/* The variable `t' holds any borrows across the loop. */
/* We split this up so that we do not require v[0] = 0, */
/* and to eliminate a final special case. */
/* */
+for (t = 0, i = n; i > 0; i--) {
  +t = u[i + j] - v[i] * qhat - t;
  +u[i + j] = (digit)LHALF(t);
  +t = (B - HHALF(t)) & (B - 1);
+}

/* */
/* D5: test remainder. */
/* There is a borrow if and only if HHALF(t) is nonzero; */
/* in that (rare) case, qhat was too large (by exactly 1). */
/* Fix it by adding v[1..n] to u[j..j+n]. */
/* */
+if (HHALF(t)) {
  +qhat--;
  +for (t = 0, i = n; i > 0; i--) { /* D6: add back. */
    +t += u[i + j] + v[i];
    +u[i + j] = (digit)LHALF(t);
    +t = HHALF(t);
  +}
  +u[j] = (digit)LHALF(u[j] + t);
+}

/* */
/* D7: loop on j. */
/* If caller wants the remainder, we have to calculate it as */
/* u[m..m+n] >> d (this is at most n digits and thus fits in */
/* u[m+1..m+n], but we may need more source digits). */
/* */
+if (arq) {
  +} else {
+u_int nn = COMBINE(uj0, uj1);
+qhat = nn / v1;
+rhat = nn % v1;
+
+while (v2 * qhat > COMBINE(rhat, uj2)) {
+qhat_too_big:
+qhat--;
+if ((rhat += v1) >= B)
+break;
+}
+/* */
+/* D4: Multiply and subtract. */
+/* The variable `t' holds any borrows across the loop. */
+/* We split this up so that we do not require v[0] = 0, */
+/* and to eliminate a final special case. */
+/* */
+for (t = 0, i = n; i > 0; i--) {
+  +t = u[i + j] - v[i] * qhat - t;
+  +u[i + j] = (digit)LHALF(t);
+  +t = (B - HHALF(t)) & (B - 1);
+}
+/* */
+/* D5: test remainder. */
+/* There is a borrow if and only if HHALF(t) is nonzero; */
+/* in that (rare) case, qhat was too large (by exactly 1). */
+/* Fix it by adding v[1..n] to u[j..j+n]. */
+/* */
+if (HHALF(t)) {
+  +qhat--;
+  +for (t = 0, i = n; i > 0; i--) { /* D6: add back. */
+    +t += u[i + j] + v[i];
+    +u[i + j] = (digit)LHALF(t);
+    +t = HHALF(t);
+  +}
+  +u[j] = (digit)LHALF(u[j] + t);
+}
+/* */
+/* D7: loop on j. */
+/* If caller wants the remainder, we have to calculate it as */
+/* u[m..m+n] >> d (this is at most n digits and thus fits in */
+/* u[m+1..m+n], but we may need more source digits). */
+/* */
+if (arq) {
+}
+if (d) {
+for (i = m + n; i > m; --i)
+u[i] = (digit)(((u_int)u[i] >> d) |
+LHALF(((u_int)u[i - 1] << (HALF_BITS - d)));
+u[i] = 0;
+
+}
+tmp.ul[H] = COMBINE(uspace[1], uspace[2]);
+tmp.ul[L] = COMBINE(uspace[3], uspace[4]);
+*arq = tmp.q;
+
+
+tmp.ul[H] = COMBINE(qspace[1], qspace[2]);
+tmp.ul[L] = COMBINE(qspace[3], qspace[4]);
+return (tmp.q);
+
+
+*/
+ * Shift p[0]..p[len] left `sh' bits, ignoring any bits that
+ * `fall out' the left (there never will be any such anyway).
+ * We may assume len >= 0.  NOTE THAT THIS WRITES len+1 DIGITS.
+ */
+static void
+shl(digit *p, int len, int sh)
+{
+int i;
+
+for (i = 0; i < len; i++)
+p[i] = (digit)(LHALF((u_int)p[i] << sh) |
+(u_int)p[i + 1] >> (HALF_BITS - sh)));
+p[i] = (digit)(LHALF((u_int)p[i] << sh));
+}

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/quad.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/quad.h
@@ -0,0 +1,165 @@
+/*
+ * Copyright (c) 1992, 1993
+ * The Regents of the University of California.  All rights reserved.
+ *
+ * This software was developed by the Computer Systems Engineering group
+ * at Lawrence Berkeley Laboratory under DARPA contract BG 91-66 and
+ * contributed to Berkeley.
+ *
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+ * modification, are permitted provided that the following conditions
+ * are met:
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+ *    notices, this list of conditions and the following disclaimer.
+ * 2. Redistributions in binary form must reproduce the above copyright
+ *    notices, this list of conditions and the following disclaimer in the
+ *    documentation and/or other materials provided with the distribution.
+ * 3. The name of the Author may not be used to endorse or promote products
+ *    derived from this software without specific prior written permission.
+ */
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+ * notice, this list of conditions and the following disclaimer in the
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+ * 3. Neither the name of the University nor the names of its contributors
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+ * IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE
+ * ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE
+ * FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL
+ * DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS
+ * OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)
+ * HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT
+ * LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY
+ * OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
+ * SUCH DAMAGE.
+ *
+ * Quad arithmetic.
+ *
+ * This library makes the following assumptions:
+ *
+ * - The type long long (aka quad_t) exists.
+ *
+ * - A quad variable is exactly twice as long as `int'.
+ *
+ * - The machine's arithmetic is two's complement.
+ *
+ * This library can provide 128-bit arithmetic on a machine with 128-bit
+ * quads and 64-bit ints, for instance, or 96-bit arithmetic on machines
+ * with 48-bit ints.
+ *
+ * #if 0 /* iprt */
+ */
+###include <sys/types.h>
+###if !defined(_KERNEL) && !defined(_STANDALONE)
+###include <limits.h>
+###else
+###include <machine/limits.h>
+###endif
+###else /* iprt */
+###include <iprt/types.h>
```c
/*
 * Depending on the desired operation, we view a `long long' (aka quad_t) in
 * one or more of the following formats.
 */
union uu {
    quad_t q; /* as a (signed) quad */
    u_quad_t uq; /* as an unsigned quad */
    int sl[2]; /* as two signed ints */
    u_int ul[2]; /* as two unsigned ints */
};

/* Define high and low parts of a quad_t. */
#define H _QUAD_HIGHWORD
#define L _QUAD_LOWWORD

/* Total number of bits in a quad_t and in the pieces that make it up.
 * These are used for shifting, and also below for halfword extraction
 * and assembly. */
#define QUAD_BITS(sizeof(quad_t) * CHAR_BIT)
#define INT_BITS(sizeof(int) * CHAR_BIT)
```
+\#define \texttt{HALF\_BITS} (sizeof(int) * CHAR\_BIT / 2)
+
+/**
+  * Extract high and low shortwords from longword, and move low shortword of
+  * longword to upper half of long, i.e., produce the upper longword of
+  * ((quad\_t)(x) << (number\_of\_bits\_in\_int/2)). `x' must actually be u\_int.)
+  *
+  * These are used in the multiply code, to split a longword into upper
+  * and lower halves, and to reassemble a product as a quad\_t, shifted left
+  * (sizeof(int)*CHAR\_BIT/2).
+  */
+#define HHALF(x) ((u\_int)(x) >> HALF\_BITS)
+#define LHALF(x) ((u\_int)(x) & (((int)1 << HALF\_BITS) - 1))
+#define LHUP(x) ((u\_int)(x) << HALF\_BITS)
+
+/**
+  * XXX
+  * Compensate for gcc 1 vs gcc 2. Gcc 1 defines ?sh?di3's second argument
+  * as u\_quad\_t, while gcc 2 correctly uses int. Unfortunately, we still use
+  * both compilers.
+  */
+\#if \_GNU\_PREREQ____(2, 0) || defined(int)
+\#define intqshift\_t;\n+\#else
+\#define u\_quad\_tqshift\_t;\n+\#endif
+
+\#RT\_C\_DECLS\_BEGIN
+quad\_t __addi3 \_P((quad\_t, quad\_t));
+quad\_t __anddi3 \_P((quad\_t, quad\_t));
+quad\_t __ashldi3 \_P((quad\_t, qshift\_t));
+quad\_t __ashrdi3 \_P((quad\_t, qshift\_t));
+quad\_t __cmpdi2 \_P((quad\_t, quad\_t));
+quad\_t __divdi3 \_P((quad\_t, quad\_t));
+quad\_t __fixdfdi \_P((double));
+quad\_t __fixsfdi \_P((float));
+u\_quad\_t __fixunssfdi \_P((double));
+u\_quad\_t __floatdidf \_P((float));
+double __floatdidf \_P((quad\_t));
+float __floatdisf \_P((quad\_t));
+double __floatundsdfdi \_P(u\_quad\_t);
+quad\_t __iordi3 \_P((quad\_t, quad\_t));
+quad\_t __lshldi3 \_P((quad\_t, qshift\_t));
+quad\_t __lshrdi3 \_P((quad\_t, qshift\_t));
+quad\_t __moddi3 \_P((quad\_t, quad\_t));
+quad\_t __muldi3 \_P((quad\_t, quad\_t));
+quad\_t __negdi2 \_P((quad\_t));
+quad\_t __one\_cmpldi2 \_P((quad\_t));
+u_quad_t __qdivrem __P((u_quad_t, u_quad_t, u_quad_t *));
+quad_t __subdi3 __P((quad_t, quad_t));
+int __ucmpdi2 __P((u_quad_t, u_quad_t));
+u_quad_t __udivdi3 __P((u_quad_t, u_quad_t, u_quad_t));
+u_quad_t __umoddi3 __P((u_quad_t, u_quad_t, u_quad_t));
+quad_t __xordi3 __P((quad_t, quad_t));
+RT_C_DECLS_END
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/r0drv/linux/the-linux-kernel.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/r0drv/linux/the-linux-kernel.h
@@ -0,0 +1,452 @@
+/* $Id: the-linux-kernel.h $ */
+/** @file
+ * IPRT - Include all necessary headers for the Linux kernel.
+ * /
+ */
+
+/* Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
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+ *
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+ * CDDL are applicable instead of those of the GPL.
+ *
+ * You may elect to license modified versions of this file under the
+ * terms and conditions of either the GPL or the CDDL or both.
+ */
+
+ ifndef __the_linux_kernel_h
+ define __the_linux_kernel_h
+
+ /* Include iprt/types.h to install the bool wrappers.
+ * Then use the linux bool type for all the stuff include here.
+ */
+ include <iprt/types.h>
+ define bool linux_bool
+
+ if RT_GNUC_PREREQ(4, 6)
+ pragma GCC diagnostic push
+endif
+#if RT_GNUC_PREREQ(4, 2)
+#pragma GCC diagnostic ignored "-Wunused-parameter"
+#if !defined(__cplusplus) && RT_GNUC_PREREQ(4, 3)
+#pragma GCC diagnostic ignored "-Wold-style-declaration" /* 2.6.18-411.0.0.0.1.el5/build/include/asm/apic.h:110: warning: 'inline' is not at beginning of declaration [-Wold-style-declaration] */
+endif
+#endif
+
+#include <linux/version.h>
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 33)
+include <generated/autoconf.h>
+else
+ifndef AUTOCONF_INCLUDED
+include <linux/autoconf.h>
+endif
+#endif
+
+/* We only support 2.4 and 2.6 series kernels */
+#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 4, 0)
+error We only support 2.4 and 2.6 series kernels
+#endif
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 0) && LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+error We only support 2.4 and 2.6 series kernels
+#endif
+
+#if defined(CONFIG_MODVERSIONS) && !defined(MODVERSIONS)
+# define MODVERSIONS
+define MODVERSIONS
+# if LINUX_VERSION_CODE < KERNEL_VERSION(2, 5, 71)
+include <linux/modversions.h>
+endif
+#endif
+#ifndef KBUILD_STR
+#ifdef KBUILD_STR
+# define KBUILD_STR(s) s
+else
+# define KBUILD_STR(s) #s
+endif
+#endif
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 3, 0)
+# include <linux/kconfig.h> /* for macro IS_ENABLED */
+#endif
+#include <linux/string.h>
+#include <linux/spinlock.h>
+#include <linux/slab.h>
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 27)
`#include <linux/vmalloc.h>`
`#define wchar_t linux_wchar_t`
`#include <linux/nls.h>`
`#undef wchar_t`
`#include <asm/mman.h>`
`#include <asm/io.h>`
`#include <asm/uaccess.h>`
`#include <asm/div64.h>`
`
/* For thread-context hooks. */
`#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 18) &&
 defined(CONFIG_PREEMPT_NOTIFIERS)
  #include <linux/preempt.h>
`#endif
`+
/* for workqueue / task queues. */
`#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
  #include <linux/workqueue.h>
`#endif
`+
/* cr4_init_shadow() / cpu_tlbstate. */
`#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 20, 0)
  #include <asm/tlbflush.h>
`#endif
`+
/* set_pages_x() */
`#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 12, 0)
  #include <asm/set_memory.h>
`#endif
`+
`#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 7, 0)
  #include <asm/smap.h>
`#else
  static inline void clac(void) {}
  static inline void stac(void) {}
`#endif
`+
`#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
 .isDefined page_to_pfn
`#endif
`+
Open Source Used In 5GaaS Edge AC-4 39976`
+ ifndef DEFINE_WAIT
+ * define DEFINE_WAIT(name) DECLARE_WAITQUEUE(name, current)
+ endif
+
+ ifndef __GFP_NOWARN
+ * define __GFP_NOWARN 0
+ endif
+
+ /*
+ * 2.4 / early 2.6 compatibility wrappers
+ */
+ if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 7)
+ + ifndef MAX_JIFFY_OFFSET
+ * define MAX_JIFFY_OFFSET (~0UL >> 1)-1)
+ + endif
+
+ * if LINUX_VERSION_CODE < KERNEL_VERSION(2, 4, 29) || LINUX_VERSION_CODE >=
+ KERNEL_VERSION(2, 6, 0)
+ + DECLINLINE(unsigned int) jiffies_to_msecs(unsigned long cJiffies)
+ +{ + * if HZ <= 1000 && !(1000 % HZ)
+ * return (1000 / HZ) * cJiffies;
+ * else
+ * return (cJiffies + (HZ / 1000) - 1) / (HZ / 1000);
+ * endif
+ +} +
+
+DECLINLINE(unsigned long) msecs_to_jiffies(unsigned int cMillies)
+ +{ + * if HZ > 1000
+ * if (cMillies > jiffies_to_msecs(MAX_JIFFY_OFFSET))
+ * return MAX_JIFFY_OFFSET;
+ * else
+ * return cMillies * (Hz / 1000);
+ * endif
+ +} +
+
+ ifndef / < 2.4.29 || >= 2.6.0 */
*/
+ */
+ /* 2.4 compatibility wrappers */
+ */
+#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+ /* define prepare_to_wait(q, wait, state) */
+ do {
+ add_wait_queue(q, wait);
+ set_current_state(state);
+ } while (0)
+ /* define after_wait(wait) */
+ do {
+ list_del_init(&(wait)->task_list);
+ } while (0)
+ /* define finish_wait(q, wait) */
+ do {
+ set_current_state(TASK_RUNNING);
+ remove_wait_queue(q, wait);
+ } while (0)
+ */
+ else /* >= 2.6.0 */
+ /* define after_wait(wait) */
+ do {} while (0)
+ */
+ endif /* >= 2.6.0 */
+ */
+ */
+ endif /* <= 2.6.0 */
+ */
+ */
+ * @def TICK_NSEC
+ * The time between ticks in nsec */
+ ifndef TICK_NSEC
+ define TICK_NSEC (1000000000UL / HZ)
+ endif
+ */
+ */
+ */
+ * This sucks soooo badly on x86! Why don't they export __PAGE_KERNEL_EXEC so PAGE_KERNEL_EXEC
+ would be usable?
+ */
+ */
+ */
+ */
+ */
+ */
+ /> 2.6.27 */
+ */
+ */
+ /* define MY_PAGE_KERNEL_EXEC __pgprot(boot_cpu_has(X86_FEATURE_PGE) ?
+ */
+ */
+ */
OPEN_SOURCE_USED_IN_5GaaS_EDGE_AC-4 39979

/* The redhat hack section. */
#ifndef NO_REDHAT_HACKS

/* accounting. */
#ifndef LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
#endif

/* backported remap_page_range. */
#ifndef RT_ARCH_AMD64
#define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) do { if (pgprot_val(prot) != pgprot_val(PAGE_KERNEL)) change_page_attr(pPages, cPages, prot); change_page_attr(pPages, cPages, prot); } while (0)
#endif
#endif
#endif
#endif

#ifndef MY_CHANGE_PAGE_ATTR
#ifdef RT_ARCH_AMD64
#define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) \ do { \ if (pgprot_val(prot) != pgprot_val(PAGE_KERNEL)) \ change_page_attr(pPages, cPages, prot); \ change_page_attr(pPages, cPages, prot); \ } while (0)
#endif
#endif
#endif

#ifndef RT_ARCH_AMD64
/* In 2.6.9-22.ELsmp we have to call change_page_attr() twice when changing
the page attributes from PAGE_KERNEL to something else, because there appears
to be a bug in one of the many patches that redhat applied.
It should be safe to do this on less buggy linux kernels too. :-)

#define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) \ do { \ if (pgprot_val(prot) != pgprot_val(PAGE_KERNEL)) \ change_page_attr(pPages, cPages, prot); \ change_page_attr(pPages, cPages, prot); \ } while (0)
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif
#endif

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+ define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) \ 
+   do { \ 
+       change_page_attr(pPages, cPages, PAGE_KERNEL_NOCACHE); \ 
+       change_page_attr(pPages, cPages, prot); \ 
+   } while (0) 
+\# else 
+\# define MY_CHANGE_PAGE_ATTR(pPages, cPages, prot) change_page_attr(pPages, cPages, prot) 
+\# endif 
+\#endif 
+\#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 25) 
+\# define MY_SET_PAGES_EXEC(pPages, cPages) set_pages_x(pPages, cPages) 
+\# define MY_SET_PAGES_NOEXEC(pPages, cPages) set_pages_nx(pPages, cPages) 
+\#else 
+\# define MY_SET_PAGES_EXEC(pPages, cPages) \ 
+   do { \ 
+       if (pgprot_val(MY_PAGE_KERNEL_EXEC) != pgprot_val(PAGE_KERNEL)) \ 
+           MY_CHANGE_PAGE_ATTR(pPages, cPages, MY_PAGE_KERNEL_EXEC); \ 
+   } while (0) 
+\# define MY_SET_PAGES_NOEXEC(pPages, cPages) \ 
+   do { \ 
+       if (pgprot_val(MY_PAGE_KERNEL_EXEC) != pgprot_val(PAGE_KERNEL)) \ 
+           MY_CHANGE_PAGE_ATTR(pPages, cPages, PAGE_KERNEL); \ 
+   } while (0) 
+\#endif 
+\/** @def ONE_MSEC_IN_JIFFIES 
+ * The number of jiffies that make up 1 millisecond. Must be at least 1! */ 
+\#if HZ <= 1000 
+\# define ONE_MSEC_IN_JIFFIES 1 
+\#elif !(HZ % 1000) 
+\# define ONE_MSEC_IN_JIFFIES (HZ / 1000) 
+\#else 
+\# define ONE_MSEC_IN_JIFFIES ((HZ + 999) / 1000) 
+\# error "$HZ is not a multiple of 1000, the GIP stuff won't work right!"
+\#endif 
+\ */
+\ */
+\ * Stop using the linux bool type. 
+ \*/
+\#undef bool 
+\ */
+\#if RT_GNUC_PREREQ(4, 6) 
+\# pragma GCC diagnostic pop 
+\#endif 
+\ */
+\ * There are post-2.6.24 kernels (confusingly with unchanged version number)
+ * which eliminate macros which were marked as deprecated.
+ */
+ ifndef __attribute_used__
+ define __attribute_used__ __used
+ endif
+ /**
+ * Hack for shortening pointers on linux so we can stuff more stuff into the
+ * task_struct::comm field. This is used by the semaphore code but put here
+ * because we don't have any better place atm. Don't use outside IPRT, please.
+ */
+ ifndef RT_ARCH_AMD64
+ define IPRT_DEBUG_SEMS_ADDRESS(addr)  ((long)(addr) & (long)-UINT64_C(0xffffffff000000000))
+ else
+ define IPRT_DEBUG_SEMS_ADDRESS(addr)  (long)(addr)
+ endif
+ /**
+ * Puts semaphore info into the task_struct::comm field if IPRT_DEBUG_SEMS is
+ * defined.
+ */
+ ifndef IPRT_DEBUG_SEMS
+ define IPRT_DEBUG_SEMS_STATE(pThis, chState) \
+ snprintf(current->comm, sizeof(current->comm), "%c%lx", (chState), \
+ IPRT_DEBUG_SEMS_ADDRESS(pThis));
+ else
+ define IPRT_DEBUG_SEMS_STATE(pThis, chState) do {} while (0)
+ endif
+ /**
+ * Puts semaphore info into the task_struct::comm field if IPRT_DEBUG_SEMS is
+ * defined.
+ */
+ ifndef IPRT_DEBUG_SEMS
+ define IPRT_DEBUG_SEMS_STATE_RC(pThis, chState, rc) \
+ snprintf(current->comm, sizeof(current->comm), "%c%lx:%d", (chState), \
+ IPRT_DEBUG_SEMS_ADDRESS(pThis), rc);
+ else
+ define IPRT_DEBUG_SEMS_STATE_RC(pThis, chState, rc) do {} while (0)
+ endif
+ /** @name Macros for preserving EFLAGS.AC on 3.19+/amd64 paranoid.
+ * The AMD 64 switch_to in macro in arch/x86/include/asm/switch_to.h stopped
+ * restoring flags.
+ * @} */
+ ifdef(CONFIG_X86_SMAP) || defined(RT_STRICT) ||
+ defined(IPRT_WITH_EFLAGS_AC_PRESERVING)
+ include <iprt/asm-amd64-x86.h>
/* There are some conflicting defines in iprt/param.h, sort them out here. */

#ifndef ___iprt_param_h
# undef PAGE_SIZE
# undef PAGE_OFFSET_MASK
#include <iprt/param.h>
#endif

/* Some global indicator macros. */

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 28)
# define IPRT_LINUX_HAS_HRTIMER
#endif

/* Workqueue stuff, see initterm-r0drv-linux.c. */

#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 5, 41)
typedef struct work_struct RTR0LNXWORKQUEUEITEM;
#endif

typedef struct tq_struct RTR0LNXWORKQUEUEITEM;

DECLHIDDEN(void) rtR0LnxWorkqueuePush(RTR0LNXWORKQUEUEITEM *pWork, void (*pfnWorker)(RTR0LNXWORKQUEUEITEM *));

DECLHIDDEN(void) rtR0LnxWorkqueueFlush(void);

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/regops.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/regops.c
@@ -0,0 +1,730 @@
### vboxsf - VBox Linux Shared Folders, Regular file inode and file operations

* Copyright (C) 2006-2017 Oracle Corporation

* This file is part of VirtualBox Open Source Edition (OSE), as available from http://www.virtualbox.org. This file is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License (GPL) as published by the Free Software Foundation, in version 2 as it comes in the "COPYING" file of the VirtualBox OSE distribution. VirtualBox OSE is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.

* Limitations: only COW memory mapping is supported

```c
#include "vfsmod.h"

static void *alloc_bounce_buffer(size_t *tmp_sizep, PRTCCPHYS physp, size_t xfer_size, const char *caller)
{
    size_t tmp_size;
    void *tmp;

    /* try for big first. */
    tmp_size = RT_ALIGN_Z(xfer_size, PAGE_SIZE);
    if (tmp_size > 16U*_1K)
        tmp_size = 16U*_1K;
    tmp = kmalloc(tmp_size, GFP_KERNEL);
    if (!tmp)
    {
        /* fall back on a page sized buffer. */
        tmp = kmalloc(PAGE_SIZE, GFP_KERNEL);
        if (!tmp)
        {
            LogRel(("%s: could not allocate bounce buffer for xfer_size=%zu %s\n", caller, xfer_size));
            return NULL;
        }
        tmp_size = PAGE_SIZE;
    }

    *tmp_sizep = tmp_size;
    *physp = virt_to_phys(tmp);
    }
```
+    return tmp;
+
+static void free_bounce_buffer(void *tmp)
+{
+    kfree (tmp);
+}
+
+/* fops */
+static int sf_reg_read_aux(const char *caller, struct sf_glob_info *sf_g,
+                           struct sf_reg_info *sf_r, void *buf,
+                           uint32_t *nread, uint64_t pos)
+{
+    /**< @todo bird: yes, kmap() and kmalloc() input only. Since the buffer is
+        contiguous in physical memory (kmalloc or single page), we should
+        use a physical address here to speed things up. */
+    int rc = VbglR0SfRead(&client_handle, &sf_g->map, sf_r->handle,
+                          pos, nread, buf, false /* already locked? */);
+    if (RT_FAILURE(rc))
+    {
+        LogFunc(("VbglR0SfRead failed. caller=%s, rc=%Rrc\n", caller, rc));
+        return -EPROTO;
+    }
+    return 0;
+}
+
+static int sf_reg_write_aux(const char *caller, struct sf_glob_info *sf_g,
+                            struct sf_reg_info *sf_r, void *buf,
+                            uint32_t *nwritten, uint64_t pos)
+{
+    /**< @todo bird: yes, kmap() and kmalloc() input only. Since the buffer is
+        contiguous in physical memory (kmalloc or single page), we should
+        use a physical address here to speed things up. */
+    int rc = VbglR0SfWrite(&client_handle, &sf_g->map, sf_r->handle,
+                            pos, nwritten, buf, false /* already locked? */);
+    if (RT_FAILURE(rc))
+    {
+        LogFunc(("VbglR0SfWrite failed. caller=%s, rc=%Rrc\n", caller, rc));
+        return -EPROTO;
+    }
+    return 0;
+}

/** Read from a regular file. */
static ssize_t sf_reg_read(struct file *file, char *buf, size_t size, loff_t *off)
{
    int err;
    void *tmp;
    RTCCPHYS tmp_phys;
    size_t tmp_size;
    size_t left = size;
    ssize_t total_bytes_read = 0;
    struct inode *inode = GET_F_DENTRY(file)->d_inode;
    struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
    struct sf_reg_info *sf_r = file->private_data;
    loff_t pos = *off;

    TRACE();
    if (!S_ISREG(inode->i_mode))
    {
        LogFunc("read from non regular file %d\n", inode->i_mode);
        return -EINVAL;
    }

    /** XXX Check read permission according to inode->i_mode! */

    if (!size)
        return 0;

    tmp = alloc_bounce_buffer(&tmp_size, &tmp_phys, size, __PRETTY_FUNCTION__);
    if (!tmp)
        return -ENOMEM;

    while (left)
    {
        uint32_t to_read, nread;

        to_read = tmp_size;
        if (to_read > left)
            to_read = (uint32_t) left;

        nread = to_read;

        err = sf_reg_read_aux(__func__, sf_g, sf_r, tmp, &nread, pos);
        if (err)
            goto fail;
if (copy_to_user(buf, tmp, nread))
{
    err = -EFAULT;
    goto fail;
}

pos += nread;
left -= nread;
buf += nread;
total_bytes_read += nread;
if (nread != to_read)
    break;
}

*off += total_bytes_read;
free_bounce_buffer(tmp);
return total_bytes_read;

fail:
    free_bounce_buffer(tmp);
    return err;
}

/**
 * Write to a regular file.
 *
 * @param file          the file
 * @param buf           the buffer
 * @param size          length of the buffer
 * @param off           offset within the file
 * @returns the number of written bytes on success, Linux error code otherwise
 */
static ssize_t sf_reg_write(struct file *file, const char *buf, size_t size, loff_t *off)
{
    int err;
    void *tmp;
    RTCCPHYS tmp_phys;
    size_t tmp_size;
    size_t left = size;
    ssize_t total_bytes_written = 0;
    struct inode *inode = GET_F_DENTRY(file)->d_inode;
    struct sf_inode_info *sf_i = GET_INODE_INFO(inode);
    struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
    struct sf_reg_info *sf_r = file->private_data;
    loff_t pos;

    TRACE();
+ BUG_ON(!sf_i);
+ BUG_ON(!sf_g);
+ BUG_ON(!sf_r);
+ 
+ if (!S_ISREG(inode->i_mode))
+ {
+     LogFunc("write to non regular file \%d\n", inode->i_mode);
+     return -EINVAL;
+ }
+ 
+ pos = *off;
+ if (file->f_flags & O_APPEND)
+ {
+     pos = inode->i_size;
+     *off = pos;
+ }
+ 
+ /** XXX Check write permission according to inode->i_mode! */
+ 
+ if (!size)
+     return 0;
+ 
+ tmp = alloc_bounce_buffer(&tmp_size, &tmp_phys, size, __PRETTY_FUNCTION__);
+ if (!tmp)
+     return -ENOMEM;
+ 
+ while (left)
+ {
+     uint32_t to_write, nwritten;
+     
+     to_write = tmp_size;
+     if (to_write > left)
+         to_write = (uint32_t) left;
+     
+     nwritten = to_write;
+     
+     if (copy_from_user(tmp, buf, to_write))
+     {
+         err = -EFAULT;
+         goto fail;
+     }
+     
+     err = VbglR0SfWritePhysCont(&client_handle, &sf_g->map, sf_r->handle,
+                                  pos, &nwritten, tmp_phys);
+     err = RT_FAILURE(err) ? -EPROTO : 0;
+     if (err)
+         goto fail;
+ 
+     pos = *off;
+     *off = pos;
+ 
+     
+     to_write = tmp_size;
+     if (to_write > left)
+         to_write = (uint32_t) left;
+     
+     nwritten = to_write;
+     
+     if (copy_from_user(tmp, buf, to_write))
+     {
+         err = -EFAULT;
+         goto fail;
+     }
+     
+     err = VbglR0SfWritePhysCont(&client_handle, &sf_g->map, sf_r->handle,
+                                  pos, &nwritten, tmp_phys);
+     err = RT_FAILURE(err) ? -EPROTO : 0;
+     if (err)
+         goto fail;
pos += nwritten;
left -= nwritten;
buf += nwritten;
total_bytes_written += nwritten;
if (nwritten != to_write)
    break;
*
*off += total_bytes_written;
if (*off > inode->i_size)
   inode->i_size = *off;
sf_i->force_restat = 1;
free_bounce_buffer(tmp);
return total_bytes_written;
+fail:
    free_bounce_buffer(tmp);
    return err;
+*/
+*  * Open a regular file.
+*
+*  @param inode the inode
+*  @param file the file
+*  @returns 0 on success, Linux error code otherwise
+*/
+static int sf_reg_open(struct inode *inode, struct file *file)
{+int rc, rc_linux = 0;
 +struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
 +struct sf_inode_info *sf_i = GET_INODE_INFO(inode);
 +struct sf_reg_info *sf_r;
 +SHFLCREATEPARMS params;
 +
 +TRACE();
 +BUG_ON(!sf_g);
 +BUG_ON(!sf_i);
 +LogFunc(\"open %s\n", sf_i->path->String.utf8);
 +sf_r = kmalloc(sizeof(*sf_r), GFP_KERNEL);
 +if (!sf_r)
 +    {+        LogRelFunc(\"could not allocate reg info\n");
 +            return -ENOMEM;
 +    }
/* Already open? */
if (sf_i->handle != SHFL_HANDLE_NIL) {
  /*
   * This inode was created with sf_create_aux(). Check the CreateFlags:
   * O_CREAT, O_TRUNC: inherent true (file was just created). Not sure
   * about the access flags (SHFL_CF_ACCESS_*)
   */
  sf_i->force_restat = 1;
  sf_r->handle = sf_i->handle;
  sf_i->handle = SHFL_HANDLE_NIL;
  sf_i->file = file;
  file->private_data = sf_r;
  return 0;
}

RT_ZERO(params);
params.Handle = SHFL_HANDLE_NIL;
/* We check the value of params.Handle afterwards to find out if
 * the call succeeded or failed, as the API does not seem to cleanly
 * distinguish error and informational messages.
 * *
 * Furthermore, we must set params.Handle to SHFL_HANDLE_NIL to
 * make the shared folders host service use our fMode parameter */
if (file->f_flags & O_CREAT) {
  LogFunc("O_CREAT set\n");
  params.CreateFlags |= SHFL_CF_ACT_CREATE_IF_NEW;
  /* We ignore O_EXCL, as the Linux kernel seems to call create
   * beforehand itself, so O_EXCL should always fail. */
  if (file->f_flags & O_TRUNC) {
    LogFunc("O_TRUNC set\n");
    params.CreateFlags |= SHFL_CF_ACT_OVERWRITE_IF_EXISTS;
  } else {
    params.CreateFlags |= SHFL_CF_ACT_OPEN_IF_EXISTS;
  }
} else {
  params.CreateFlags |= SHFL_CF_ACT_FAIL_IF_NEW;
  if (file->f_flags & O_TRUNC) {
    LogFunc("O_TRUNC set\n");
    params.CreateFlags |= SHFL_CF_ACT_OVERWRITE_IF_EXISTS;
  }
}
switch (file->f_flags & O_ACCMODE) {
    case O_RDONLY:
        params.CreateFlags |= SHFL_CF_ACCESS_READ;
        break;
    case O_WRONLY:
        params.CreateFlags |= SHFL_CF_ACCESS_WRITE;
        break;
    case O_RDWR:
        params.CreateFlags |= SHFL_CF_ACCESS_READWRITE;
        break;
    default:
        BUG();
}

if (file->f_flags & O_APPEND) {
    LogFunc("O_APPEND set\n");
    params.CreateFlags |= SHFL_CF_ACCESS_APPEND;
}

params.Info.Attr.fMode = inode->i_mode;
LogFunc("sf_reg_open: calling VbglR0SfCreate, file %s, flags=%#x, %#x\n",
        sf_i->path->String.utf8 , file->f_flags, params.CreateFlags);
rc = VbglR0SfCreate(&client_handle, &sf_g->map, sf_i->path, &params);
if (RT_FAILURE(rc)) {
    LogFunc("VbglR0SfCreate failed flags=%d,%#x rc=%Rrc\n",
        file->f_flags, params.CreateFlags, rc);
    kfree(sf_r);
    return -RTErrConvertToErrno(rc);
}

if (SHFL_HANDLE_NIL == params.Handle) {
    switch (params.Result) {
    case SHFL_PATH_NOT_FOUND:
    case SHFL_FILE_NOT_FOUND:
        rc_linux = -ENOENT;
        break;
    case SHFL_FILE_EXISTS:
        rc_linux = -EEXIST;
        break;
    default:
        break;
    }
break;
    default:
        break;
    }
}

sf_i->force_restat = 1;
sf_r->handle = params.Handle;
sf_i->file = file;
file->private_data = sf_r;
return rc_linux;
}
+
+/**
+ * Close a regular file.
+ *
+ * @param inode         the inode
+ * @param file          the file
+ * @returns 0 on success, Linux error code otherwise
+ */
+static int sf_reg_release(struct inode *inode, struct file *file)
+
+{
+    int rc;
+    struct sf_reg_info *sf_r;
+    struct sf_glob_info *sf_g;
+    struct sf_inode_info *sf_i = GET_INODE_INFO(inode);
+
+    TRACE();
+    sf_g = GET_GLOB_INFO(inode->i_sb);
+    sf_r = file->private_data;
+
+    BUG_ON(!sf_g);
+    BUG_ON(!sf_r);
+
+    /* See the smbfs source (file.c). mmap in particular can cause data to be
+     * written to the file after it is closed, which we can't cope with. We
+     * copy and paste the body of filemap_write_and_wait() here as it was not
+     * defined before 2.6.6 and not exported until quite a bit later. */
+    /* filemap_write_and_wait(inode->i_mapping); */
+    if (   inode->i_mapping->nrpages
+        && filemap_fdatawrite(inode->i_mapping) != -EIO)
+        filemap_fdatawait(inode->i_mapping);
+
+    rc = VbglR0SfClose(&client_handle, &sf_g->map, sf_r->handle);
+    if (RT_FAILURE(rc))
+        LogFunc("VbglR0SfClose failed rc=%Rrc\n", rc);
+    

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+ kfree(sf_r);
+ sf_i->file = NULL;
+ sf_i->handle = SHFL_HANDLE_NIL;
+ file->private_data = NULL;
+ return 0;
+
+ /* Don't use GFP_HIGHUSER as long as sf_reg_read_aux() calls VbglR0SfRead()
+ * which works on virtual addresses. On Linux cannot reliably determine the
+ * physical address for high memory, see rtR0MemObjNativeLockKernel(). */
+ page = alloc_page(GFP_USER);

+ +#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+ static int sf_reg_fault(struct vm_fault *vmf)
+ +#elif LINUX_VERSION_CODE > KERNEL_VERSION(2, 6, 25)
+ static int sf_reg_fault(struct vm_area_struct *vma, struct vm_fault *vmf)
+ +#elif LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+ static struct page *sf_reg_nopage(struct vm_area_struct *vma, unsigned long vaddr, int *type)
+ +# define SET_TYPE(t) *type = (t)
+ +#else /* LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0) */
+ static struct page *sf_reg_nopage(struct vm_area_struct *vma, unsigned long vaddr, int unused)
+ +# define SET_TYPE(t)
+ +#endif
+ +{
+ +    struct page *page;
+ +    char *buf;
+ +    loff_t off;
+ +    uint32_t nread = PAGE_SIZE;
+ +    int err;
+ +    struct file *file = vma->vm_file;
+ +    struct inode *inode = GET_F_DENTRY(file)->d_inode;
+ +    struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
+ +    struct sf_reg_info *sf_r = file->private_data;
+ +
+ +    TRACE();
+ +    if (vmf->pgoff > vma->vm_end)
+ +        return VM_FAULT_SIGBUS;
+ +    if (vaddr > vma->vm_end)
+ +        SET_TYPE(VM_FAULT_SIGBUS);
+ +    else
+ +        {    
+ +        SET_TYPE(VM_FAULT_SIGBUS);
+ +        return NOPAGE_SIGBUS;
+ +        }
+ +    }
if (!page) {
    LogRelFunc("failed to allocate page\n");
#if LINUX_VERSION_CODE > KERNEL_VERSION(2, 6, 25)
    return VM_FAULT_OOM;
#else
    SET_TYPE(VM_FAULT_OOM);
    return NOPAGE_OOM;
#endif
    
    buf = kmap(page);
#if LINUX_VERSION_CODE > KERNEL_VERSION(2, 6, 25)
    off = (vmf->pgoff << PAGE_SHIFT);
#else
    off = (vaddr - vma->vm_start) + (vma->vm_pgoff << PAGE_SHIFT);
#endif
    err = sf_reg_read_aux(__func__, sf_g, sf_r, buf, &nread, off);
    if (err)
        { 
            kunmap(page);
            put_page(page);
#if LINUX_VERSION_CODE > KERNEL_VERSION(2, 6, 25)
        return VM_FAULT_SIGBUS;
#else
        SET_TYPE(VM_FAULT_SIGBUS);
        return NOPAGE_SIGBUS;
#endif
        } 
    
    BUG_ON (nread > PAGE_SIZE);
    if (!nread)
        {
#if LINUX_VERSION_CODE > KERNEL_VERSION(2, 6, 25)
        clear_user_page(page_address(page), vmf->pgoff, page);
#else
        clear_user_page(page_address(page), vaddr, page);
#endif
    
#if LINUX_VERSION_CODE > KERNEL_VERSION(2, 6, 25)
        clear_user_page(page_address(page), vaddr, page);
#else
        clear_user_page(page_address(page), vaddr);
    
    } 
else
        memset(buf + nread, 0, PAGE_SIZE - nread);
    
    flush_dcache_page(page);
    kunmap(page);
#if LINUX_VERSION_CODE > KERNEL_VERSION(2, 6, 25)
    vmf->page = page;
    return 0;

+#else
+    SET_TYPE(VM_FAULT_MAJOR);
+    return page;
+}  
+
+static struct vm_operations_struct sf_vma_ops =
+{
+  
+    .fault = sf_reg_fault
+  
+    .nopage = sf_reg_nopage
+}  
+
+static int sf_reg_mmap(struct file *file, struct vm_area_struct *vma)
+{
+    TRACE();
+    if (vma->vm_flags & VM_SHARED)
+    {
+        LogFunc(\"shared mmapping not available\n\")
+        return -EINVAL;
+    }
+    vma->vm_ops = &sf_vma_ops;
+    return 0;
+}
+
+struct file_operations sf_reg_fops =
+{
+  .read      = sf_reg_read,
+  .open      = sf_reg_open,
+  .write     = sf_reg_write,
+  .release   = sf_reg_release,
+  .mmap      = sf_reg_mmap,
+    
+    .splice_read = generic_file_splice_read,
+    .sendfile    = generic_file_sendfile,
+    .aio_read    = generic_file_aio_read,
+    .aio_write   = generic_file_aio_write,
+}  
+
+/**@todo This code is known to cause caching of data which should not be
+ * cached. Investigate. */
+  
+if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 31)
+  
+if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 23)
+ .fsync = noop_fsync,
+ # else
+ .fsync = simple_sync_file,
+ # endif
+ .llseek = generic_file_llseek,
+ };
+
+ struct inode_operations sf_reg_iops =
+ {
+ #if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+ .revalidate = sf_inode_revalidate
+ #else
+ .getattr = sf_getattr,
+ .setattr = sf_setattr
+ #endif
+ };
+
+ #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+ static int sf_readpage(struct file *file, struct page *page)
+ {
+ struct inode *inode = GET_F_DENTRY(file)->d_inode;
+ struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
+ struct sf_reg_info *sf_r = file->private_data;
+ uint32_t nread = PAGE_SIZE;
+ char *buf;
+ loff_t off = ((loff_t)page->index) << PAGE_SHIFT;
+ int ret;
+ 
+ TRACE();
+ 
+ buf = kmap(page);
+ 
+ ret = sf_reg_read_aux(__func__, sf_g, sf_r, buf, &nread, off);
+ if (ret)
+ {
+ kunmap(page);
+ if (PageLocked(page))
+ unlock_page(page);
+ return ret;
+ }
+ 
+ BUG_ON(nread > PAGE_SIZE);
+ memset(&buf[nread], 0, PAGE_SIZE - nread);
+ flush_dcache_page(page);
+ kunmap(page);
+ SetPageUptodate(page);
+ unlock_page(page);
static int sf_writepage(struct page *page, struct writeback_control *wbc)
{
    struct address_space *mapping = page->mapping;
    struct inode *inode = mapping->host;
    struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
    struct sf_inode_info *sf_i = GET_INODE_INFO(inode);
    struct file *file = sf_i->file;
    struct sf_reg_info *sf_r = file->private_data;
    char *buf;
    uint32_t nwritten = PAGE_SIZE;
    int end_index = inode->i_size >> PAGE_SHIFT;
    loff_t off = ((loff_t) page->index) << PAGE_SHIFT;
    int err;

    TRACE();

    if (page->index >= end_index)
        nwritten = inode->i_size & (PAGE_SIZE-1);

    buf = kmap(page);

    err = sf_reg_write_aux(__func__, sf_g, sf_r, buf, &nwritten, off);
    if (err < 0)
    {
        ClearPageUptodate(page);
        goto out;
    }

    if (off > inode->i_size)
        inode->i_size = off;

    if (PageError(page))
        ClearPageError(page);
    err = 0;

out:
    kunmap(page);
    unlock_page(page);
    return err;
}

# if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 24)
int sf_write_begin(struct file *file, struct address_space *mapping, loff_t pos,
unsigned len, unsigned flags, struct page **pagep, void **fsdata)
+{
    TRACE();

    return simple_write_begin(file, mapping, pos, len, flags, pagep, fsdata);
+
}  
+

int sf_write_end(struct file *file, struct address_space *mapping, loff_t pos,
+     unsigned len, unsigned copied, struct page *page, void *fsdata)
+{
+    struct inode *inode = mapping->host;
+    struct sf_glob_info *sf_g = GET_GLOB_INFO(inode->i_sb);
+    struct sf_reg_info *sf_r = file->private_data;
+    void *buf;
+    unsigned from = pos & (PAGE_SIZE - 1);
+    uint32_t nwritten = len;
+    int err;
+
    TRACE();
+
    buf = kmap(page);
+    err = sf_reg_write_aux(__func__, sf_g, sf_r, buf+from, &nwritten, pos);
+    kunmap(page);
+
+    if (!PageUptodate(page) && err == PAGE_SIZE)
+        SetPageUptodate(page);
+
    if (err >= 0) {
+        pos += nwritten;
+        if (pos > inode->i_size)
+            inode->i_size = pos;
+    }
+
    unlock_page(page);
+
    return nwritten;
+
}  
+
#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 6, 0)
    put_page(page);
#else
    page_cache_release(page);
#endif

+struct address_space_operations sf_reg_aops =
+{
    .readpage  = sf_readpage,
+ .writepage = sf_writepage,
+# if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 24)
+ .write_begin = sf_write_begin,
+ .write_end = sf_write_end,
+# else
+ .prepare_write = simple_prepare_write,
+ .commit_write = simple_commit_write,
+# endif
+};
+
+/*	$NetBSD: udivdi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $*/
+
+/*-.
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+ * LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY
/* OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF * SUCH DAMAGE. */
/* #include <sys/cdefs.h> */
/* if defined(LIBC_SCCS) && !defined(lint) */
/* if 0 */
/* static char ss[] = "@(#)udivdi3.c8.1 (Berkeley) 6/4/93"; */
/* */
/* #include "quad.h" */
/* */
/* * Divide two unsigned quads. */
/* */
/* u_quad_t __udivdi3(a, b) */
/* { */
/* return (__qdivrem(a, b, (u_quad_t *)0)); */
/* } */
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/udivmoddi4.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/udivmoddi4.c
@@ -0,0 +1,53 @@
+/* $Id: udivmoddi4.c $ */
+/** @file */
+/* IPRT - __udivmoddi4 implementation */
+*/
+*/
+*/
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#include <iprt/stdint.h>
#include <iprt/uint64.h>

uint64_t __udivmoddi4(uint64_t u64A, uint64_t u64B, uint64_t *pu64R);

/**
 * __udivmoddi4() implementation to satisfy external references from 32-bit code generated by gcc-7 or later.
 */

uint64_t __udivmoddi4(uint64_t u64A, uint64_t u64B, uint64_t *pu64R)
{
    RTUINT64U Divident;
    RTUINT64U Divisor;
    RTUINT64U Quotient;
    RTUINT64U Reminder;
    Divident.u = u64A;
    Divisor.u  = u64B;
    RTUInt64DivRem(&Quotient, &Reminder, &Divident, &Divisor);
    if (pu64R)
        *pu64R = Reminder.u;
    return Quotient.u;
}

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/umoddi3.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/umoddi3.c
@@ -0,0 +1,58 @@
+/*	$NetBSD: umoddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $*/
+
+/*@param  u64A The divident value.
+@param  u64B The divisor value.
+@param  pu64R A pointer to the reminder. May be NULL.
+@returns u64A / u64B
 */
+uint64_t __udivmoddi4(uint64_t u64A, uint64_t u64B, uint64_t *pu64R)
+{
+    RTUINT64U Divident;
+    RTUINT64U Divisor;
+    RTUINT64U Quotient;
+    RTUINT64U Reminder;
+    Divident.u = u64A;
+    Divisor.u  = u64B;
+    RTUInt64DivRem(&Quotient, &Reminder, &Divident, &Divisor);
+    if (pu64R)
+        *pu64R = Reminder.u;
+    return Quotient.u;
+}

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/umoddi3.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/umoddi3.c
@@ -0,0 +1,58 @@
+/*	$NetBSD: umoddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $*/
+
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+ SUCH DAMAGE.
+ */
+
/*#include <sys/cdefs.h>
#if defined(LIBC_SCCS) && !defined(lint)
#if 0
static char sccsid[] = "(@(#)umoddi3.c 8.1 (Berkeley) 6/4/93";
#else
__RCSID("$NetBSD: umoddi3.c,v 1.8 2005/12/11 12:24:37 christos Exp $");
#endif
#endif /* LIBC_SCCS and not lint */
+
#include "quad.h"
+
/*
 + * Return remainder after dividing two unsigned quads.
 + */
+u_quad_t
+__umoddi3(a, b)
+u_quad_t a, b;
+{
+u_quad_t r;
+
+(void)__qdivrem(a, b, &r);
+return (r);
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/utils.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/utils.c
/** @file
 * vboxsf -- VirtualBox Guest Additions for Linux:
 * Utility functions.
 * Mainly conversion from/to VirtualBox/Linux data structures
 */

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 */

#include "vfsmod.h"
#include <iprt/asm.h>
#include <linux/nfs_fs.h>
#include <linux/vfs.h>

/* #define USE_VMALLOC */

/* sf_reg_aops and sf_backing_dev_info are just quick implementations to make
 * sendfile work. For more information have a look at
 * and the sample implementation
 * http://pserver.samba.org/samba/ftp/cifs-cvs/samplefs.tar.gz
 */

#ifndef LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
static void sf_ftime_from_timespec(time_t *time, RTTIMESPEC *ts)
{
    int64_t t = RTTimeSpecGetNano(ts);
    do_div(t, 1000000000);
    *time = t;
}

static void sf_timespec_from_ftime(RTTIMESPEC *ts, time_t *time)
#endif
```c
+{    int64_t t = 1000000000 * *time;
+    RTTimeSpecSetNano(ts, t);
+}
+#else /* >= 2.6.0 */
+static void sf_ftime_from_timespec(struct timespec *tv, RTTIMESPEC *ts)
+{    int64_t t = RTTimeSpecGetNano(ts);
+    int64_t nsec;
+
+    nsec = do_div(t, 1000000000);
+    tv->tv_sec = t;
+    tv->tv_nsec = nsec;
+}
+
+static void sf_timespec_from_ftime(RTTIMESPEC *ts, struct timespec *tv)
+{    int64_t t = (int64_t)tv->tv_nsec + (int64_t)tv->tv_sec * 1000000000;
+    RTTimeSpecSetNano(ts, t);
+}
+#endif /* >= 2.6.0 */
+
+/* set [inode] attributes based on [info], uid/gid based on [sf_g] */
+void sf_init_inode(struct sf_glob_info *sf_g, struct inode *inode,
+                   PSHFLFSOBJINFO info)
+{    PSHFLFSOBJATTR attr;
+    int mode;
+
+    TRACE();
+
+    attr = &info->Attr;
+
+    #define mode_set(r) attr->fMode & (RTFS_UNIX_##r) ? (S_##r) : 0;
+    mode  = mode_set(IRUSR);
+    mode |= mode_set(IWUSR);
+    mode |= mode_set(IXUSR);
+
+    mode |= mode_set(IRGRP);
+    mode |= mode_set(IWGRP);
+    mode |= mode_set(IXGRP);
+
+    mode |= mode_set(IROTH);
+    mode |= mode_set(IWOTH);
+    mode |= mode_set(IXOTH);
+
+    #undef mode_set
+
```

+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+inode->i_mapping->a_ops = &sf_reg_aops;
+#if LINUX_VERSION_CODE <= KERNEL_VERSION(3, 19, 0)
+    /* XXX Was this ever necessary? */
+    inode->i_mapping->backing_dev_info = &sf_g->bdi;
+#endif
 +#endif
+
+if (RTFS_IS_DIRECTORY(attr->fMode))
+ {
+    inode->i_mode = sf_g->dmode != ~0 ? (sf_g->dmode & 0777) : mode;
+    inode->i_mode &= ~sf_g->dmask;
+    inode->i_mode |= S_IFDIR;
+    inode->i_op = &sf_dir_iops;
+    inode->i_fop = &sf_dir_fops;
+    /* XXX: this probably should be set to the number of entries
+       in the directory plus two (..) */
+    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 2, 0)
+        set_nlink(inode, 1);
+    +#else
+        inode->i_nlink = 1;
+    +#endif
+}
+else if (RTFS_IS_SYMLINK(attr->fMode))
+ {
+    inode->i_mode = sf_g->fmode != ~0 ? (sf_g->fmode & 0777): mode;
+    inode->i_mode &= ~sf_g->fmask;
+    inode->i_mode |= S_IFLNK;
+    inode->i_op = &sf_lnk_iops;
+    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 2, 0)
+        set_nlink(inode, 1);
+    +#else
+        inode->i_nlink = 1;
+    +#endif
+    }
+else
+ {
+    inode->i_mode = sf_g->fmode != ~0 ? (sf_g->fmode & 0777): mode;
+    inode->i_mode &= ~sf_g->fmask;
+    inode->i_mode |= S_IFREG;
+    inode->i_op = &sf_reg_iops;
+    inode->i_fop = &sf_reg_fops;
+    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 2, 0)
+        set_nlink(inode, 1);
+    +#else
+        inode->i_nlink = 1;
+    +#endif
+}
+else
+ {
+    inode->i_mode = sf_g->fmode != ~0 ? (sf_g->fmode & 0777): mode;
+    inode->i_mode &= ~sf_g->fmask;
+    inode->i_mode |= S_IFREG;
+    inode->i_op = &sf_reg_iops;
+    inode->i_fop = &sf_reg_fops;
+    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 2, 0)
+        set_nlink(inode, 1);
+    +#else
+        inode->i_nlink = 1;
+   (inode->i_uid = make_kuid(current_user_ns(), sf_g->uid);
+    inode->i_gid = make_kgid(current_user_ns(), sf_g->gid);
+    } else
+    inode->i_uid = sf_g->uid;
+    inode->i_gid = sf_g->gid;
+  #endif
+
+  inode->i_size = info->cbObject;
+  #if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 19) && !defined(KERNEL_FC6)
+    inode->i_blksize = 4096;
+  #endif
+  #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 11)
+    inode->i_blkbits = 12;
+  #endif
+  /* i_blocks always in units of 512 bytes! */
+  inode->i_blocks = (info->cbAllocated + 511) / 512;
+  
+  sf_ftime_from_timespec(&inode->i_atime, &info->AccessTime);
+  sf_ftime_from_timespec(&inode->i_ctime, &info->ChangeTime);
+  sf_ftime_from_timespec(&inode->i_mtime, &info->ModificationTime);
+}
+
+int sf_stat(const char *caller, struct sf_glob_info *sf_g,
+            SHFLSTRING *path, PSHFLFSOBJINFO result, int ok_to_fail)
+{  
+  int rc;
+  SHFLCREATEPARMS params;
+  NOREF(caller);
+  
+  TRACE();
+  
+  RT_ZERO(params);  
+  params.Handle = SHFL_HANDLE_NIL;
+  params.CreateFlags = SHFL_CF_LOOKUP | SHFL_CF_ACT_FAIL_IF_NEW;
+  LogFunc("sf_stat: calling VbglR0SfCreate, file %s, flags %#x\n", 
+          path->String.utf8, params.CreateFlags));
+  rc = VbglR0SfCreate(&client_handle, &sf_g->map, path, &params);
+  if (rc == VERR_INVALID_NAME)
+  {
+    /* this can happen for names like 'foo*' on a Windows host */
+    return -ENOENT;
+  }
+  if (RT_FAILURE(rc))
+  {
+    
+    

LogFunc("VbglR0SfCreate(%s) failed. caller=%s, rc=%Rrc\n", 
    path->String.utf8, rc, caller));
    return -EPROTO;
+
+    if (params.Result != SHFL_FILE_EXISTS)
+    {
+        if (!ok_to_fail)
+            LogFunc("VbglR0SfCreate(%s) file does not exist. caller=%s, result=%d\n", 
+                    path->String.utf8, params.Result, caller));
+            return -ENOENT;
+    }
+
+    *result = params.Info;
+    return 0;
+
+    /* this is called directly as iop on 2.4, indirectly as dop
+    [sf_dentry_revalidate] on 2.4/2.6, indirectly as iop through
+    [sf_getattr] on 2.6. the job is to find out whether dentry/inode is
+    still valid. the test is failed if [dentry] does not have an inode
+    or [sf_stat] is unsuccessful, otherwise we return success and
+    update inode attributes */
+    int sf_inode_revalidate(struct dentry *dentry)
+    {
+        int err;
+        struct sf_glob_info *sf_g;
+        struct sf_inode_info *sf_i;
+        SHFLFSOBJINFO info;
+
+        TRACE();
+        if (!dentry || !dentry->d_inode)
+        {
+            LogFunc("no dentry(%p) or inode(%p)\n", dentry, dentry->d_inode);
+            return -EINVAL;
+        }
+
+        sf_g = GET_GLOB_INFO(dentry->d_inode->i_sb);
+        sf_i = GET_INODE_INFO(dentry->d_inode);
+
+        +#if 0
+        printk("%s called by %p:%p\n", 
+                sf_i->path->String.utf8, 
+                __builtin_return_address (0), 
+                __builtin_return_address (1));
+        +#endif
+
+        BUG_ON(!sf_g);
+        BUG_ON(!sf_i);
if (!sf_i->force_restat)
{
    if (jiffies - dentry->d_time < sf_g->ttl)
        return 0;
}

err = sf_stat(__func__, sf_g, sf_i->path, &info, 1);
if (err)
    return err;

dentry->d_time = jiffies;
sf_init_inode(sf_g, dentry->d_inode, &info);
return 0;
}

/* this is called during name resolution/lookup to check if the 
   [dentry] in the cache is still valid. the job is handled by 
   [sf_inode_revalidate] */
static int
#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 6, 0)
sf_dentry_revalidate(struct dentry *dentry, unsigned flags)
#else
sf_dentry_revalidate(struct dentry *dentry, struct nameidata *nd)
#endif
{
    TRACE();

#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 6, 0)
    if (flags & LOOKUP_RCU)
        return -ECHILD;
#else
    /* see Documentation/filesystems/vfs.txt */
    if (nd && nd->flags & LOOKUP_RCU)
        return -ECHILD;
#endif

    if (sf_inode_revalidate(dentry))
        return 0;

    return 1;
}

/* on 2.6 this is a proxy for [sf_inode_revalidate] which (as a side 
   effect) updates inode attributes for [dentry] (given that [dentry] 
   has inode at all) from these new attributes we derive [kstat] via
+ #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+ #if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+ int sf_getattr(const struct path *path, struct kstat *kstat, u32 request_mask, unsigned int flags)
+ #else
+ int sf_getattr(struct vfsmount *mnt, struct dentry *dentry, struct kstat *kstat)
+ #endif
+ { int err;
+ int err;
+ #if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+ struct dentry *dentry = path->dentry;
+ #endif
+ TRACE();
+ err = sf_inode_revalidate(dentry);
+ if (err)
+ return err;
+ generic_fillattr(dentry->d_inode, kstat);
+ return 0;
+ }
+ int sf_setattr(struct dentry *dentry, struct iattr *iattr)
+ { struct sf_glob_info *sf_g;
+ struct sf_inode_info *sf_i;
+ SHFLCREATEPARMS params;
+ SHFLFSOBJINFO info;
+ uint32_t cbBuffer;
+ int rc, err;
+ TRACE();
+ sf_g = GET_GLOB_INFO(dentry->d_inode->i_sb);
+ sf_i = GET_INODE_INFO(dentry->d_inode);
+ err = 0;
+ RT_ZERO(params);
+ params.Handle = SHFL_HANDLE_NIL;
+ params.CreateFlags = SHFL_CF_ACT_OPEN_IF_EXISTS
+ | SHFL_CF_ACT_FAIL_IF_NEW
+ | SHFL_CF_ACCESS_ATTR_WRITE;
+ /* this is at least required for Posix hosts */
+ if (iattr->ia_valid & ATTR_SIZE)
+ params.CreateFlags |= SHFL_CF_ACCESS_WRITE;
+ rc = VbgIR0SfCreate(&client_handle, &sf_g->map, sf_i->path, &params);
+ if (RT_FAILURE(rc))
+ {
+    LogFunc(("VbglR0SfCreate(%s) failed rc=%Rrc\n", 
+             sf_i->path->String.utf8, rc));
+    err = -RTErrConvertToErrno(rc);
+    goto fail2;
+ }
+ if (params.Result != SHFL_FILE_EXISTS)
+ {
+    LogFunc(("file %s does not exist\n", sf_i->path->String.utf8));
+    err = -ENOENT;
+    goto fail1;
+ }
+
+    /* Setting the file size and setting the other attributes has to be 
+     * handled separately, see implementation of vbsfSetFSInfo() in 
+     * vbsf.cpp */
+    if (iattr->ia_valid & (ATTR_MODE | ATTR_ATIME | ATTR_MTIME))
+    {
+#define mode_set(r) ((iattr->ia_mode & (S_##r)) ? RTFS_UNIX_##r : 0)
+        RT_ZERO(info);
+        if (iattr->ia_valid & ATTR_MODE)
+        {
+            info.Attr.fMode  = mode_set(IRUSR);
+            info.Attr.fMode |= mode_set(IWUSR);
+            info.Attr.fMode |= mode_set(IXUSR);
+            info.Attr.fMode |= mode_set(IRGRP);
+            info.Attr.fMode |= mode_set(IWGRP);
+            info.Attr.fMode |= mode_set(IXGRP);
+            info.Attr.fMode |= mode_set(IROTH);
+            info.Attr.fMode |= mode_set(IWOTH);
+            info.Attr.fMode |= mode_set(IXOTH);
+            if (iattr->ia_mode & S_IFDIR)
+                info.Attr.fMode |= RTFS_TYPE_DIRECTORY;
+            else
+                info.Attr.fMode |= RTFS_TYPE_FILE;
+        }
+        if (iattr->ia_valid & ATTR_ATIME)
+            sf_timespec_from_ftime(&info.AccessTime, &iattr->ia_atime);
+        if (iattr->ia_valid & ATTR_MTIME)
+            sf_timespec_from_ftime(&info.ModificationTime, &iattr->ia_mtime);
+        /* ignore ctime (inode change time) as it can't be set from userland anyway */
+        cbBuffer = sizeof(info);
+        rc = VbglR0SfSfInfo(&client_handle, &sf_g->map, params.Handle,
```c
    SHFL_INFO_SET | SHFL_INFO_FILE, &cbBuffer,
    (PSHFLDIRINFO)&info);
    if (RT_FAILURE(rc))
    {
        LogFunc("VbglR0SfFsInfo(%s, FILE) failed rc=%Rrc\n",
                sf_i->path->String.utf8, rc);
        err = -RTErrConvertToErrno(rc);
        goto fail1;
    }
    
    if (iattr->ia_valid & ATTR_SIZE)
    {
        RT_ZERO(info);
        info.cbObject = iattr->ia_size;
        cbBuffer = sizeof(info);
        rc = VbglR0SfFsInfo(&client_handle, &sf_g->map, params.Handle,
                            SHFL_INFO_SET | SHFL_INFO_SIZE, &cbBuffer,
                            (PSHFLDIRINFO)&info);
        if (RT_FAILURE(rc))
        {
            LogFunc("VbglR0SfFsInfo(%s, SIZE) failed rc=%Rrc\n",
                    sf_i->path->String.utf8, rc);
            err = -RTErrConvertToErrno(rc);
            goto fail1;
        }
    }

    rc = VbglR0SfClose(&client_handle, &sf_g->map, params.Handle);
    if (RT_FAILURE(rc))
        LogFunc("VbglR0SfClose(%s) failed rc=%Rrc\n", sf_i->path->String.utf8, rc));

    return sf_inode_revalidate(dentry);
    +fail1:
    + rc = VbglR0SfClose(&client_handle, &sf_g->map, params.Handle);
    + if (RT_FAILURE(rc))
    +     LogFunc("VbglR0SfClose(%s) failed rc=%Rrc\n", sf_i->path->String.utf8, rc));
    +
    + return err;
    +}  
#endif /* >= 2.6.0 */

static int sf_make_path(const char *caller, struct sf_inode_info *sf_i,
                        const char *d_name, size_t d_len, SHFLSTRING **result)
{  
    size_t path_len, shflstring_len;
```
+ SHFLSTRING *tmp;
+ uint16_t p_len;
+ uint8_t *p_name;
+ int fRoot = 0;
+
+ TRACE();
+ p_len = sf_i->path->u16Length;
+ p_name = sf_i->path->String.utf8;
+
+ if (p_len == 1 && *p_name == '/')
+ {
+    path_len = d_len + 1;
+    fRoot = 1;
+ }
+ else
+ {
+    /* lengths of constituents plus terminating zero plus slash */
+    path_len = p_len + d_len + 2;
+    if (path_len > 0xffff)
+    {
+        LogFunc(("path too long.  caller=%s, path_len=%zu\n", caller, path_len));
+        return -ENAMETOOLONG;
+    }
+    shflstring_len = offsetof(SHFLSTRING, String.utf8) + path_len;
+    tmp = kmalloc(shflstring_len, GFP_KERNEL);
+    if (!tmp)
+    {
+        LogRelFunc("kmalloc failed, caller=%s\n", caller);
+        return -ENOMEM;
+    }
+    tmp->u16Length = path_len - 1;
+    tmp->u16Size = path_len;
+
+    if (fRoot)
+        memcpy(&tmp->String.utf8[0], d_name, d_len + 1);
+    else
+    {
+        memcpy(&tmp->String.utf8[0], p_name, p_len);
+        tmp->String.utf8[p_len] = '/';
+        memcpy(&tmp->String.utf8[p_len + 1], d_name, d_len);
+        tmp->String.utf8[p_len + 1 + d_len] = '\0';
+    }
+    *result = tmp;
+    return 0;
+}
int sf_path_from_dentry(const char *caller, struct sf_glob_info *sf_g,  
struct sf_inode_info *sf_i, struct dentry *dentry,  
SHFLSTRING **result)
{
    int err;
    const char *d_name;
    size_t d_len;
    const char *name;
    size_t len = 0;
    TRACE();
    d_name = dentry->d_name.name;
    d_len = dentry->d_name.len;

    if (sf_g->nls)
    {
        size_t in_len, i, out_bound_len;
        const char *in;
        char *out;

        in = d_name;
        in_len = d_len;

        out_bound_len = PATH_MAX;
        out = kmalloc(out_bound_len, GFP_KERNEL);
        name = out;

        for (i = 0; i < d_len; ++i)
        {
            /* We renamed the linux kernel wchar_t type to linux_wchar_t in  
               the-linux-kernel.h, as it conflicts with the C++ type of that name. */
            linux_wchar_t uni;
            int nb;

            nb = sf_g->nls->char2uni(in, in_len, &uni);
            if (nb < 0)
            {
                LogFunc("nls->char2uni failed x %d
",  
               *in, in_len));
                err = -EINVAL;
                goto fail1;
            }
+   in_len -= nb;
+   in += nb;
+
+   +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 31)
+   +   nb = utf32_to_utf8(uni, out, out_bound_len);
+   +#else
+   +   nb = utf8_wctomb(out, uni, out_bound_len);
+   +#endif
+   +   if (nb < 0)
+   +   {
+   +     LogFunc(("nls->uni2char failed %x %d\n", uni, out_bound_len));
+   +     err = -EINVAL;
+   +     goto fail1;
+   +   }
+   +   out_bound_len -= nb;
+   +   out += nb;
+   +   len += nb;
+   +   }
+   +   if (len >= PATH_MAX - 1)
+   +   {
+   +     err = -ENAMETOOLONG;
+   +     goto fail1;
+   +   }
+   +   LogFunc(("result(%d) = %.*s\n", len, len, name));
+   +   *out = 0;
+   + }
+   else
+   + {
+   +   name = d_name;
+   +   len = d_len;
+   + }
+   
+   err = sf_make_path(caller, sf_i, name, len, result);
+   +   if (name != d_name)
+   +     kfree(name);
+   
+   return err;
+   +
+ fail1:
+   +   kfree(name);
+   +   return err;
+]
+}
+
+int sf_nlscpy(struct sf_glob_info *sf_g,
+   char *name, size_t name_bound_len,
+   const unsigned char *utf8_name, size_t utf8_len)
+{  
+  if (sf_g->nls)  
+  {  
+    const char *in;  
+    char *out;  
+    size_t out_len;  
+    size_t out_bound_len;  
+    size_t in_bound_len;  
+    
+    in = utf8_name;  
+    in_bound_len = utf8_len;  
+    
+    out = name;  
+    out_len = 0;  
+    out_bound_len = name_bound_len;  
+    
+    while (in_bound_len)  
+    {  
+      int nb;  
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 31)  
+        unicode_t uni;  
+        
+        nb = utf8_to_utf32(in, in_bound_len, &uni);  
+#else  
+        linux_wchar_t uni;  
+        
+        nb = utf8_mbtowc(&uni, in, in_bound_len);  
+#endif  
+        
+        if (nb < 0)  
+        {  
+          LogFunc("utf8_mbtowc failed(%s) %x:%d\n",  
+            (const char *) utf8_name, *in, in_bound_len));  
+          return -EINVAL;  
+        }  
+        in += nb;  
+        in_bound_len -= nb;  
+        
+        nb = sf_g->nls->uni2char(uni, out, out_bound_len);  
+        if (nb < 0)  
+        {  
+          LogFunc("nls->uni2char failed(%s) %x:%d\n",  
+            utf8_name, uni, out_bound_len));  
+          return nb;  
+        }  
+        out += nb;  
+        out_bound_len -= nb;  
+        
+        out_len += nb;  
+  }  
+}
    *out = 0;
    }
    else
    {
        if (utf8_len + 1 > name_bound_len)
            return -ENAMETOOLONG;
        memcpy(name, utf8_name, utf8_len + 1);
    }
    return 0;
}

static struct sf_dir_buf *sf_dir_buf_alloc(void)
+
{
    struct sf_dir_buf *b;
    
    TRACE();
    b = kmalloc(sizeof(*b), GFP_KERNEL);
    if (!b)
    {
        LogRelFunc("could not alloc directory buffer\n");
        return NULL;
    }

    #ifdef USE_VMALLOC
    b->buf = vmalloc(DIR_BUFFER_SIZE);
    #else
    b->buf = kmalloc(DIR_BUFFER_SIZE, GFP_KERNEL);
    #endif
    if (!b->buf)
    {
        kfree(b);
        LogRelFunc("could not alloc directory buffer storage\n");
        return NULL;
    }

    INIT_LIST_HEAD(&b->head);
    b->cEntries = 0;
    b->cbUsed = 0;
    b->cbFree = DIR_BUFFER_SIZE;
    return b;
}

static void sf_dir_buf_free(struct sf_dir_buf *b)
+
{
    BUG_ON(!b || !b->buf);

    +static void sf_dir_buf_free(struct sf_dir_buf *b)
    +{
        + BUG_ON(!b || !b->buf);
        +

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TRACE();
list_del(&b->head);
#ifdef USE_VMALLOC
    vfree(b->buf);
#else
    kfree(b->buf);
#endif
    kfree(b);
}

/**
 * Free the directory buffer.
 */
void sf_dir_info_free(struct sf_dir_info *p)
{
    struct list_head *list, *pos, *tmp;
    TRACE();
    list = &p->info_list;
    list_for_each_safe(pos, tmp, list)
    {
        struct sf_dir_buf *b;
        b = list_entry(pos, struct sf_dir_buf, head);
        sf_dir_buf_free(b);
    }
    kfree(p);
}

/**
 * Empty (but not free) the directory buffer.
 */
void sf_dir_info_empty(struct sf_dir_info *p)
{
    struct list_head *list, *pos, *tmp;
    TRACE();
    list = &p->info_list;
    list_for_each_safe(pos, tmp, list)
    {
        struct sf_dir_buf *b;
        b = list_entry(pos, struct sf_dir_buf, head);
        b->cEntries = 0;
        b->cbUsed = 0;
        b->cbFree = DIR_BUFFER_SIZE;
    }
}
Create a new directory buffer descriptor.

```
+ struct sf_dir_info *sf_dir_info_alloc(void)
+{
+    struct sf_dir_info *p;
+
+    TRACE();
+    p = kmalloc(sizeof(*p), GFP_KERNEL);
+    if (!p)
+    {
+        LogRelFunc("could not alloc directory info\n");
+        return NULL;
+    }
+
+    INIT_LIST_HEAD(&p->info_list);
+    return p;
+
+/**
+ * Search for an empty directory content buffer.
+ */
+static struct sf_dir_buf *sf_get_empty_dir_buf(struct sf_dir_info *sf_d)
+{
+    struct list_head *list, *pos;
+
+    list = &sf_d->info_list;
+    list_for_each(pos, list)
+    {
+        struct sf_dir_buf *b;
+        
+        b = list_entry(pos, struct sf_dir_buf, head);
+        if (!b)
+            return NULL;
+        else
+        {
+            if (b->cbUsed == 0)
+                return b;
+        }
+    }
+
+    return NULL;
+}
+
+int sf_dir_read_all(struct sf_glob_info *sf_g, struct sf_inode_info *sf_i,
+                    struct sf_dir_info *sf_d, SHFLHANDLE handle)
+{
+    int err;
+    SHFLSTRING *mask;
```
+ struct sf_dir_buf *b;
+ TRACE();
+ err = sf_make_path(__func__, sf_i, "*", 1, &mask);
+ if (err)
+     goto fail0;
+ for (;;)
+ {
+     int rc;
+     void *buf;
+     uint32_t cbSize;
+     uint32_t cEntries;
+
+     b = sf_get_empty_dir_buf(sf_d);
+     if (!b)
+     {
+         b = sf_dir_buf_alloc();
+         if (!b)
+         {
+             err = -ENOMEM;
+             LogRelFunc("could not alloc directory buffer\n");
+             goto fail1;
+         }
+         list_add(&b->head, &sf_d->info_list);
+     }
+     buf = b->buf;
+     cbSize = b->cbFree;
+
+     rc = VbglR0SfDirInfo(&client_handle, &sf_g->map, handle, mask,
+                          0, 0, &cbSize, buf, &cEntries);
+     switch (rc)
+     {
+         case VINF_SUCCESS:
+             RT_FALL_THRU();
+         case VERR_NO_MORE_FILES:
+             break;
+         case VERR_NO_TRANSLATION:
+             LogFunc("host could not translate entry\n");
+             /* XXX */
+             break;
+         default:
+             err = -RTErrConvertToErrno(rc);
+             LogFunc("VbglR0SfDirInfo failed rc=\%Rrc\n", rc);
+             goto fail1;
+     }
+ }
+ b->cEntries += cEntries;
+ b->cbFree   -= cbSize;
+ b->cbUsed   += cbSize;
+
+ if (RT_FAILURE(rc))
+     break;
+ }
+ err = 0;
+
+fail1:
+     kfree(mask);
+
+fail0:
+     return err;
+
+int sf_get_volume_info(struct super_block *sb, STRUCT_STATFS *stat)
+{
+    struct sf_glob_info *sf_g;
+    SHFLVOLINFO SHFLVolumeInfo;
+    uint32_t cbBuffer;
+    int rc;
+
+    sf_g = GET_GLOB_INFO(sb);
+    cbBuffer = sizeof(SHFLVolumeInfo);
+    rc = VbglR0SfFsInfo(&client_handle, &sf_g->map, 0, SHFL_INFO_GET | SHFL_INFO_VOLUME,
+                         &cbBuffer, (PSHFLDIRINFO)&SHFLVolumeInfo);
+    if (RT_FAILURE(rc))
+        return -RTErrConvertToErrno(rc);
+
+    stat->f_type        = NFS_SUPER_MAGIC; /* XXX vboxsf type? */
+    stat->f_bsize       = SHFLVolumeInfo.ulBytesPerAllocationUnit;
+    stat->f_blocks      = SHFLVolumeInfo.ullTotalAllocationBytes
+                         / SHFLVolumeInfo.ulBytesPerAllocationUnit;
+    stat->f_bfree       = SHFLVolumeInfo.ullAvailableAllocationBytes
+                         / SHFLVolumeInfo.ulBytesPerAllocationUnit;
+    stat->f_bavail      = SHFLVolumeInfo.ullAvailableAllocationBytes
+                         / SHFLVolumeInfo.ulBytesPerAllocationUnit;
+    stat->f_files       = 1000;
+    stat->f_ffree       = 1000; /* don't return 0 here since the guest may think
+                                * that it is not possible to create any more files */
+    stat->f_fileno.val[0] = 0;
+    stat->f_fileno.val[1] = 0;
+    stat->f_name.length = 255;
+    return 0;
+}
+
+struct dentry_operations sf_dentry_ops =

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+{
+   .d_revalidate = sf_dentry_revalidate
+};
+
+int sf_init_backing_dev(struct sf_glob_info *sf_g)
+{
+   int rc = 0;
+   /* Each new shared folder map gets a new uint64_t identifier,
+    * allocated in sequence. We ASSUME the sequence will not wrap. */
+   static uint64_t u64Sequence = 0;
+   u64CurrentSequence = ASMAtomicIncU64(&s_u64Sequence);
+   sf_g->bdi.ra_pages = 0; /* No readahead */
+   if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 12)
+      sf_g->bdi.capabilities = BDI_CAP_MAP_DIRECT /* MAP_SHARED */
+         | BDI_CAP_MAP_COPY /* MAP_PRIVATE */
+         | BDI_CAP_READ_MAP /* can be mapped for reading */
+         | BDI_CAP_WRITE_MAP /* can be mapped for writing */
+         | BDI_CAP_EXEC_MAP; /* can be mapped for execution */
+   endif /* >= 2.6.12 */
+   if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 24)
+      rc = bdi_init(&sf_g->bdi);
+   endif /* >= 2.6.24 */
+   if (!rc)
+      rc = bdi_register(&sf_g->bdi, NULL, "vboxsf-%llu",
+         (unsigned long long)u64CurrentSequence);
+   endif /* >= 2.6.26 */
+   endif /* >= 2.6.24 */
+   return rc;
+}
+
+void sf_done_backing_dev(struct sf_glob_info *sf_g)
+{
+   if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 24) && LINUX_VERSION_CODE <=
+      KERNEL_VERSION(3, 19, 0)
+      bdi_destroy(&sf_g->bdi); /* includes bdi_unregister */
+}
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU General Public License (GPL) as published by the Free Software Foundation, in version 2 as it comes in the "COPYING" file of the VirtualBox OSE distribution. VirtualBox OSE is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+
+ ifndef VBFS_MOUNT_H
+ define VBFS_MOUNT_H
+
+/* Linux constraints the size of data mount argument to PAGE_SIZE - 1. */
+ define MAX_HOST_NAME 256
+ define MAX_NLS_NAME 32
+
+ define VBSF_MOUNT_SIGNATURE_BYTE_0 '\377'
+ define VBSF_MOUNT_SIGNATURE_BYTE_1 '\376'
+ define VBSF_MOUNT_SIGNATURE_BYTE_2 '\375'
+
+ struct vbsf_mount_info_new
+
+ struct vbsf_mount_opts
+
+    int uid;
+    int gid;
+    int ttl;
+    int dmode;
+    int fmode;
+    int dmask;
+    int fmask;
+    int ronly;
+    int sloppy;
+    int noexec;
+    int nodev;
+    int nosuid;
+    int remount;
+    char nls_name[MAX_NLS_NAME];
+    char *convertcp;
+};
+
+/** Completes the mount operation by adding the new mount point to mtab if required. */
+int vbsfmount_complete(const char *host_name, const char *mount_point,
+                       unsigned long flags, struct vbsf_mount_opts *opts);
+
+/* vim: set ts=4 sw=4 noet */

--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/version-generated.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/version-generated.h
@@ -0,0 +1,13 @@
+#ifndef ___version_generated_h___
+#define ___version_generated_h___
+
+#define VBOX_VERSION_MAJOR 5
+#define VBOX_VERSION_MINOR 2
+#define VBOX_VERSION_BUILD 8
+#define VBOX_VERSION_STRING_RAW "5.2.8"
+#define VBOX_VERSION_STRING "5.2.8_KernelUbuntu"
+#define VBOX_API_VERSION_STRING "5_2"
+
+#define VBOX_PRIVATE_BUILD_DESC "Private build by buildd"
+
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/vfsmod.c
+++ linux-4.15.0/ubuntu/vbox/vboxsf/vfsmod.c
@@ -0,0 +1,654 @@
+/** @file
+ * vboxsf -- VirtualBox Guest Additions for Linux:
+ * Virtual File System for VirtualBox Shared Folders
+ */
+/** @file
+ * vboxsf -- VirtualBox Guest Additions for Linux:
+ * Virtual File System for VirtualBox Shared Folders
+ */
+** Module initialization/finalization
+** File system registration/deregistration
+ * Superblock reading
+ * Few utility functions
+ */
+
+ /*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+
+ /**
+ * @note Anyone wishing to make changes here might wish to take a look at
+ * http://www.atnf.csiro.au/people/rgooch/linux/vfs.txt
+ * which seems to be the closest there is to official documentation on
+ * writing filesystem drivers for Linux.
+ */
+
+ +#include "vfsmod.h"
+ +#include "version-generated.h"
+ +#include "revision-generated.h"
+ +#include "product-generated.h"
+ +#include "VBoxGuestR0LibInternal.h"
+
+ MODULE_DESCRIPTION(VBOX_PRODUCT " VFS Module for Host File System Access");
+ MODULE_AUTHOR(VBOX_VENDOR);
+ MODULE_LICENSE("GPL");
+ ifdef MODULE_ALIAS_FS
+ MODULE_ALIAS_FS("vboxsf");
+ endif
+ ifdef MODULE_VERSION
+ MODULE_VERSION(VBOX_VERSION_STRING " r" RT_XSTR(VBOX_SVN_REV));
+ endif
+
+ /* globals */
+ VBGLSFCLIENT client_handle;
+
+ /* forward declarations */
+ static struct super_operations sf_super_ops;
+
+ /* allocate global info, try to map host share */
+ static int sf_glob_alloc(struct vbsf_mount_info_new *info, struct sf_glob_info **sf_gp)
+ int err, rc;
+ SHFLSTRING *str_name;
+ size_t name_len, str_len;
+ struct sf_glob_info *sf_g;
+
+ TRACE();
+ sf_g = kmalloc(sizeof(*sf_g), GFP_KERNEL);
+ if (!sf_g)
+ {
+   err = -ENOMEM;
+   LogRelFunc("could not allocate memory for global info\n");
+   goto fail0;
+ }
+
+ RT_ZERO(*sf_g);
+
+ if (info->nullchar != '0'
+     || info->signature[0] != VBSF_MOUNT_SIGNATURE_BYTE_0
+     || info->signature[1] != VBSF_MOUNT_SIGNATURE_BYTE_1
+     || info->signature[2] != VBSF_MOUNT_SIGNATURE_BYTE_2)
+ {
+   err = -EINVAL;
+   goto fail1;
+ }
+
+ info->name[sizeof(info->name) - 1] = 0;
+ info->nls_name[sizeof(info->nls_name) - 1] = 0;
+
+ name_len = strlen(info->name);
+ str_len = offsetof(SHFLSTRING, String.utf8) + name_len + 1;
+ str_name = kmalloc(str_len, GFP_KERNEL);
+ if (!str_name)
+ {
+   err = -ENOMEM;
+   LogRelFunc("could not allocate memory for host name\n");
+   goto fail1;
+ }
+
+ str_name->u16Length = name_len;
+ str_name->u16Size = name_len + 1;
+ memcpy(str_name->String.utf8, info->name, name_len + 1);
+
#define _IS_UTF8(_str) \   (strcmp(_str, "utf8") == 0)
#define _IS_EMPTY(_str) \   (strcmp(_str, "," ) == 0)

/* Check if NLS charset is valid and not points to UTF8 table */
    if (info->nls_name[0])
    {
        if (_IS_UTF8(info->nls_name))
            sf_g->nls = NULL;
        else
        {
            sf_g->nls = load_nls(info->nls_name);
            if (!sf_g->nls)
            {
                err = -EINVAL;
                LogFunc("failed to load nls %s\n", info->nls_name);
                kfree(str_name);
                goto fail1;
            }
        }
    }
    else
    {
        /* If no NLS charset specified, try to load the default
         * one if it's not points to UTF8. */
        if (!_IS_UTF8(CONFIG_NLS_DEFAULT) && !_IS_EMPTY(CONFIG_NLS_DEFAULT))
            sf_g->nls = load_nls_default();
        else
            sf_g->nls = NULL;
    }

    rc = VbglR0SfMapFolder(&client_handle, str_name, &sf_g->map);
    kfree(str_name);

    if (RT_FAILURE(rc))
    {
        err = -EPROTO;
        LogFunc("VbglR0SfMapFolder failed rc=%d\n", rc);
        goto fail2;
    }

    sf_g-> ttl = info-> ttl;
    sf_g-> uid = info-> uid;
    sf_g-> gid = info-> gid;

    if ((unsigned)info->length >= sizeof(struct vbsf_mount_info_new))
+ { 
+     /* new fields */
+     sf_g->dmode = info->dmode;
+     sf_g->fmode = info->fmode;
+     sf_g->dmask = info->dmask;
+     sf_g->fmask = info->fmask;
+ } 
+ else 
+ { 
+     sf_g->dmode = ~0;
+     sf_g->fmode = ~0;
+ } 
+ 
+ *sf_gp = sf_g; 
+ return 0; 
+ 
+ fail2: 
+     if (sf_g->nls) 
+         unload_nls(sf_g->nls); 
+ 
+ fail1: 
+     kfree(sf_g); 
+ 
+ fail0: 
+     return err; 
+ } 
+ 
+ /* unmap the share and free global info [sf_g] */ 
+ static void 
+ sf_glob_free(struct sf_glob_info *sf_g) 
+ { 
+     int rc; 
+ 
+     TRACE(); 
+     rc = VbglR0SfUnmapFolder(&client_handle, &sf_g->map); 
+     if (RT_FAILURE(rc)) 
+         LogFunc("VbglR0SfUnmapFolder failed rc=%d\n", rc); 
+     
+     if (sf_g->nls) 
+         unload_nls(sf_g->nls); 
+ 
+     kfree(sf_g); 
+ } 
+ 
+ /** 
+  * This is called (by sf_read_super_[24|26] when vfs mounts the fs and 
+  * wants to read super_block. 
+  * 
}
+ * calls [sf.glob_alloc] to map the folder and allocate global
+ * information structure.
+ *
+ * initializes [sb], initializes root inode and dentry.
+ *
+ * should respect [flags]
+ */
+static int sf_read_super_aux(struct super_block *sb, void *data, int flags)
+{
+    int err;
+    struct dentry *droot;
+    struct inode *iroot;
+    struct sf_inode_info *sf_i;
+    struct sf_glob_info *sf_g;
+    SHFLFSOBJINFO fsinfo;
+    struct vbsf_mount_info_new *info;
+    bool fInodePut = true;
+    
+    TRACE();
+    if (!data)
+    {
+        LogFunc(("no mount info specified\n"));
+        return -EINVAL;
+    }
+    
+    info = data;
+    
+    if (flags & MS_REMOUNT)
+    {
+        LogFunc(("remounting is not supported\n"));
+        return -ENOSYS;
+    }
+    
+    err = sf.glob_alloc(info, &sf_g);
+    if (err)
+        goto fail0;
+    
+    sf_i = kmalloc(sizeof (*sf_i), GFP_KERNEL);
+    if (!sf_i)
+    {
+        err = -ENOMEM;
+        LogRelFunc(("could not allocate memory for root inode info\n"));
+        goto fail1;
+    }
+    
+    sf_i->handle = SHFL_HANDLE_NIL;
+    sf_i->path = kmalloc(sizeof(SHFLSTRING) + 1, GFP_KERNEL);
+    if (!sf_i->path)
+ {  
+   err = -ENOMEM;  
+   LogRelFunc("could not allocate memory for root inode path\n");  
+   goto fail2;  
+ }

+ sf_i->path->u16Length = 1;  
+ sf_i->path->u16Size = 2;  
+ sf_i->path->String.utf8[0] = '/';  
+ sf_i->path->String.utf8[1] = 0;  
+ sf_i->force_reread = 0;  
+
+ err = sf_stat(__func__, sf_g, sf_i->path, &fsinfo, 0);  
+ if (err)
+ {  
+   LogFunc("could not stat root of share\n");  
+   goto fail3;  
+ }

+ sb->s_magic = 0xface;  
+ sb->s_blocksize = 1024;  

+#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 3)
+   /* Required for seek/sendfile.  
+     * Must by less than or equal to INT64_MAX despite the fact that the  
+     * declaration of this variable is unsigned long long. See determination  
+     * of 'loff_t_max' in fs/read_write.c / do_sendfile(). I don't know the  
+     * correct limit but MAX_LFS_FILESIZE (8TB-1 on 32-bit boxes) takes the  
+     * page cache into account and is the suggested limit. */
+   #if defined MAX_LFS_FILESIZE
+     sb->s_maxbytes = MAX_LFS_FILESIZE;  
+   +#else
+     sb->s_maxbytes = 0x7fffffffffffffffULL;  
+   +#endif
+   +#endif
+   sb->s_op = &sf_super_ops;
+
+   +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 25)
+     iroot = iget_locked(sb, 0);  
+   +#else
+     iroot = iget(sb, 0);  
+   +#endif
+   if (!iroot)
+   {  
+     err = -ENOMEM; /* XXX */  
+     LogFunc("could not get root inode\n");  
+     goto fail3;  
+   }
+  if (sf_init_backing_dev(sf_g))
+  {
+      err = -EINVAL;
+      LogFunc("could not init bdi\n");
+  }
+
+  sf_init_inode(sf_g, iroot, &fsinfo);
+  SET_INODE_INFO(iroot, sf_i);
+
+  lock_new_inode(iroot);
+  if (LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 25))
+      unlock_new_inode(iroot);
+  #endif
+  if (!droot)
+      goto fail5;
+  
+  sb->s_root = droot;
+  SET_GLOB_INFO(sb, sf_g);
+  return 0;
+
+fail5:
+  sf_done_backing_dev(sf_g);
+fail4:
+  if (f_inodePut)
+      iput(iroot);
+fail3:
+  kfree(sf_i->path);
+fail2:
+ kfree(sf_i);
+
+fail1:
+    sf_glob_free(sf_g);
+}
+fail0:
+    return err;
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+static struct super_block *
+sf_read_super_24(struct super_block *sb, void *data, int flags)
+{
+    int err;
+
+    TRACE();
+    err = sf_read_super_aux(sb, data, flags);
+    if (err)
+        return NULL;
+
+    return sb;
+
+#endif

/* this is called when vfs is about to destroy the [inode]. all
resources associated with this [inode] must be cleared here */
+#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 36)
+static void sf_clear_inode(struct inode *inode)
+
+    struct sf_inode_info *sf_i;
+
+    TRACE();
+    sf_i = GET_INODE_INFO(inode);
+    if (!sf_i)
+        return;
+
+    BUG_ON(!sf_i->path);
+    kfree(sf_i->path);
+    kfree(sf_i);
+    SET_INODE_INFO(inode, NULL);
+
+#else
+static void sf_evict_inode(struct inode *inode)
+
+    struct sf_inode_info *sf_i;
+
+    TRACE();
+    truncate_inode_pages(&inode->i_data, 0);
+  if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 5, 0)
+    clear_inode(inode);
+  /* this is called by vfs when it wants to populate [inode] with data.
+     the only thing that is known about inode at this point is its index
+     hence we can’t do anything here, and let lookup/whatever with the
+     job to properly fill then [inode] */
+  +#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 25)
+  +static void sf_read_inode(struct inode *inode)
+  +{
+  +}
+  +#endif
+  /* vfs is done with [sb] (umount called) call [sf_glob_free] to unmap
+     the folder and free [sf_g] */
+  +static void sf_put_super(struct super_block *sb)
+  +{
+  +  struct sf_glob_info *sf_g;
+  +  sf_g = GET_GLOB_INFO(sb);
+  +  BUG_ON(!sf_g);
+  +  sf_done_backing_dev(sf_g);
+  +  sf_glob_free(sf_g);
+  +}
+  +#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 18)
+  +static int sf_statfs(struct super_block *sb, STRUCT_STATFS *stat)
+  +{
+  +  return sf_get_volume_info(sb, stat);
+  +}
+  +#else
+  +static int sf_statfs(struct dentry *dentry, STRUCT_STATFS *stat)
+  +{
+  +  struct super_block *sb = dentry->d_inode->i_sb;
+    return sf_get_volume_info(sb, stat);
+
+}  
+#endif
+
+static int sf_remount_fs(struct super_block *sb, int *flags, char *data)
+{
+    #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 4, 23)
+        struct sf_glob_info *sf_g;
+        struct sf_inode_info *sf_i;
+        struct inode *iroot;
+        SHFLFSOBJINFO fsinfo;
+        int err;
+
+        sf_g = GET_GLOB_INFO(sb);
+        BUG_ON(!sf_g);
+        if (data && data[0] != 0)
+        {
+            struct vbsf_mount_info_new *info =
+                (struct vbsf_mount_info_new *)data;
+            if (   info->signature[0] == VBSF_MOUNT_SIGNATURE_BYTE_0
+                && info->signature[1] == VBSF_MOUNT_SIGNATURE_BYTE_1
+                && info->signature[2] == VBSF_MOUNT_SIGNATURE_BYTE_2)
+            {
+                sf_g->uid = info->uid;
+                sf_g->gid = info->gid;
+                sf_g->ttl = info->ttl;
+                sf_g->dmode = info->dmode;
+                sf_g->fmode = info->fmode;
+                sf_g->dmask = info->dmask;
+                sf_g->fmask = info->fmask;
+            }
+        }
+
+        iroot = ilookup(sb, 0);
+        if (!iroot)
+            return -ENOSYS;
+
+        sf_i = GET_INODE_INFO(iroot);
+        err = sf_stat(__func__, sf_g, sf_i->path, &fsinfo, 0);
+        BUG_ON(err != 0);
+        sf_init_inode(sf_g, iroot, &fsinfo);
+        /*unlock_new_inode(iroot);*/
+        return 0;
+    #else
+        return -ENOSYS;
+    #endif
+}
+static struct super_operations sf_super_ops =
+{
+    .clear_inode = sf_clear_inode,
+    .evict_inode = sf_evict_inode,
+    .read_inode  = sf_read_inode,
+    .put_super   = sf_put_super,
+    .statfs      = sf_statfs,
+    .remount_fs  = sf_remount_fs
+};
+
+if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+static DECLARE_FSTYPE(vboxsf_fs_type, "vboxsf", sf_read_super_24, 0);
+else
+static int
+sf_read_super_26(struct super_block *sb, void *data, int flags)
+{
+    int err;
+
+    TRACE();
+    err = sf_read_super_aux(sb, data, flags);
+    if (err)
+        printk(KERN_DEBUG "sf_read_super_aux err=%d\n", err);
+    return err;
+}
+
+if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 18)
+static struct super_block *sf_get_sb(struct file_system_type *fs_type, int flags,
+                                       const char *dev_name, void *data)
+{
+    TRACE();
+    return get_sb_nodev(fs_type, flags, data, sf_read_super_26);
+}
+else
+    const char *dev_name, void *data, struct vfsmount *mnt)
+{
+    TRACE();
+    return get_sb_nodev(fs_type, flags, data, sf_read_super_26, mnt);
+}
+else
+    const char *dev_name, void *data)
+}
+{    TRACE();    return mount_nodev(fs_type, flags, data, sf_read_super_26); +}    +# endif
+static struct file_system_type vboxsf_fs_type = +{    .owner = THIS_MODULE,    .name = "vboxsf",    +# if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 39)    .get_sb = sf_get_sb,    +# else    .mount = sf_mount,    +# endif    .kill = kill_anon_super    +};    +#endif
+    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)    +static int follow_symlinks = 0;    +module_param(follow_symlinks, int, 0);    +MODULE_PARM_DESC(follow_symlinks, "Let host resolve symlinks rather than showing them");    +#endif
+    +/* Module initialization/finalization handlers */    +static int __init init(void)    +{    +    int rcVBox;
+    +    rcVBox = 0;
+    +    int err;
+    +    TRACE();
+    +    if (sizeof(struct vboxsf_mount_info_new) > PAGE_SIZE)
+    +    {
+        printk(KERN_ERR
+                    "Mount information structure is too large %lu\n"
+                    "Must be less than or equal to %lu\n",
+                    (unsigned long)sizeof (struct vboxsf_mount_info_new),
+                    (unsigned long)PAGE_SIZE);
+        return -EINVAL;
+    +    }
+    +    err = register_filesystem(&vboxsf_fs_type);
+    +    if (err)
+    +    {
+        LogFunc("register_filesystem err=%d\n", err);
    return err;

    rcVBox = VbglR0HGCMInit();
    if (RT_FAILURE(rcVBox))
    {
        LogRelFunc("VbglR0HGCMInit failed, rc=%d\n", rcVBox);
        rcRet = -EPROTO;
        goto fail0;
    }

    rcVBox = VbglR0SfConnect(&client_handle);
    if (RT_FAILURE(rcVBox))
    {
        LogRelFunc("VbglR0SfConnect failed, rc=%d\n", rcVBox);
        rcRet = -EPROTO;
        goto fail1;
    }

    rcVBox = VbglR0SfSetUtf8(&client_handle);
    if (RT_FAILURE(rcVBox))
    {
        LogRelFunc("VbglR0SfSetUtf8 failed, rc=%d\n", rcVBox);
        rcRet = -EPROTO;
        goto fail2;
    }

    if (RT_FAILURE(rcVBox))
    {
        printk(KERN_WARNING
                 "vboxsf: Host unable to show symlinks, rc=%d\n", rcVBox);
    }

    printk(KERN_DEBUG
            "vboxsf: Successfully loaded version " VBOX_VERSION_STRING
            " (interface " RT_XSTR(VMMDEV_VERSION) ")\n"
            return 0;
    
    fail2:
    VbglR0SfDisconnect(&client_handle);
+ fail1:
+ VbglR0HGCMTerminate();
+
+ fail0:
+ unregister_filesystem(&vboxsf_fs_type);
+ return rcRet;
+
+ static void __exit fini(void)
+ {
+ TRACE();
+
+ VbglR0SIDisconnect(&client_handle);
+ VbglR0HGCMTerminate();
+ unregister_filesystem(&vboxsf_fs_type);
+ }
+
+ module_init(init);
+ module_exit(fini);
+
+ /* C++ hack */
+ int __gxx_personality_v0 = 0xdeadbeef;
--- linux-4.15.0.orig/ubuntu/vbox/vboxsf/vfsmod.h
+++ linux-4.15.0/ubuntu/vbox/vboxsf/vfsmod.h
@@ -0,0 +1,168 @@
+/** @file
+ * vboxsf - VirtualBox Guest Additions for Linux.
+ */
+ +
+ /* Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * This file is part of VirtualBox Open Source Edition (OSE), as
+ * available from http://www.virtualbox.org. This file is free software;
+ * you can redistribute it and/or modify it under the terms of the GNU
+ * General Public License (GPL) as published by the Free Software
+ * Foundation, in version 2 as it comes in the "COPYING" file of the
+ * VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+ * hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+ */
+
+ #ifndef VFSMOD_H
+ #define VFSMOD_H
+
+ #define LOG_GROUP LOG_GROUP_SHARED_FOLDERS
+ #include "the-linux-kernel.h"
+ #include <VBox/log.h>
```c
#include <linux/backing-dev.h>

#include <VBox/VBoxGuestLibSharedFolders.h>
#include "vbsfmount.h"

#define DIR_BUFFER_SIZE (16*_1K)

/* per-shared folder information */
struct sf_glob_info
{
    VBGLSFMAP map;
    struct nls_table *nls;
    int ttl;
    int uid;
    int gid;
    int dmode;
    int fmode;
    int dmask;
    int fmask;
    #if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
    struct backing_dev_info bdi;
    #endif
};

/* per-inode information */
struct sf_inode_info
{
    /* which file */
    SHFLSTRING *path;
    /* some information was changed, update data on next revalidate */
    int force_restat;
    /* directory content changed, update the whole directory on next sf_getdent */
    int force_reread;
    /* file structure, only valid between open() and release() */
    struct file *file;
    /* handle valid if a file was created with sf_create_aux until it will be opened with sf_reg_open */
    SHFLHANDLE handle;
};

struct sf_dir_info
{
    struct list_head info_list;
};
```

---

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+struct sf_dir_buf
+{
+    size_t cEntries;
+    size_t cbFree;
+    size_t cbUsed;
+    void  *buf;
+    struct list_head head;
+};
+
+struct sf_reg_info
+{
+    SHFLHANDLE handle;
+};
+
+extern VBGLSFCLIENT client_handle;
+
+/* forward declarations */
+extern struct inode_operations         sf_dir_iops;
+extern struct inode_operations         sf_lnk_iops;
+extern struct inode_operations         sf_reg_iops;
+extern struct file_operations          sf_dir_fops;
+extern struct file_operations          sf_reg_fops;
+extern struct dentry_operations        sf_dentry_ops;
+extern struct address_space_operations sf_reg_aops;
+
+extern void sf_init_inode(struct sf_glob_info *sf_g, struct inode *inode,
+                          PSHFLFSOBJINFO info);
+extern int  sf_stat(const char *caller, struct sf_glob_info *sf_g,
+                    SHFLSTRING *path, PSHFLFSOBJINFO result, int ok_to_fail);
+extern int  sf_inode_revalidate(struct dentry *dentry);
+if LINUX_VERSION_CODE >= KERNEL_VERSION(2, 6, 0)
+    #if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+    extern int  sf_getattr(const struct path *path, struct kstat *kstat,
+                             u32 request_mask, unsigned int query_flags);
+    #else
+    extern int  sf_getattr(struct vfsmount *mnt, struct dentry *dentry,
+                            struct kstat *kstat);
+    #endif
+else
+extern int  sf_getattr(struct vfsmount *mnt, struct dentry *dentry,
+                        struct kstat *kstat);
+endif
+extern int  sf_setattr(struct dentry *dentry, struct iattr *iattr);
+endif
+extern int  sf_path_from_dentry(const char *caller, struct sf_glob_info *sf_g,
+                                struct sf_inode_info *sf_i, struct dentry *dentry,
+                                SHFLSTRING **result);
+extern int  sf_nlscpy(struct sf_glob_info *sf_g,
+                        char *name, size_t name_bound_len,
+                        const unsigned char *utf8_name, size_t utf8_len);
+extern void sf_dir_info_free(struct sf_dir_info *p);
+extern void sf_dir_info_empty(struct sf_dir_info *p);
+extern struct sf_dir_info *sf_dir_info_alloc(void);
+extern int sf_dir_read_all(struct sf_glob_info *sf_g, struct sf_inode_info *sf_i,
+    struct sf_dir_info *sf_d, SHFLHANDLE handle);
+extern int sf_init_backing_dev(struct sf_glob_info *sf_g);
+extern void sf_done_backing_dev(struct sf_glob_info *sf_g);
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
+# define STRUCT_STATFS struct statfs
+#else
+# define STRUCT_STATFS struct kstatfs
+#endif
+int sf_get_volume_info(struct super_block *sb, STRUCT_STATFS *stat);
+
+#ifdef __cplusplus
# define CMC_API __attribute__ ((cdecl, regparm (0)))
 #=>else
# define CMC_API __attribute__ ((regparm (0)))
 +#endif
 +
+/* Following casts are here to prevent assignment of void * to
 + pointers of arbitrary type */
 +#if LINUX_VERSION_CODE < KERNEL_VERSION(2, 6, 0)
 +# define GET_GLOB_INFO(sb)       ((struct sf_glob_info *) (sb)->u.generic_sbp)
 +# define SET_GLOB_INFO(sb, sf_g) (sb)->u.generic_sbp = sf_g
 +#else
 +# define GET_GLOB_INFO(sb)       ((struct sf_glob_info *) (sb)->s_fs_info)
 +# define SET_GLOB_INFO(sb, sf_g) (sb)->s_fs_info = sf_g
 +#endif
 +
+/*#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 19, 0)
+ # define GET_F_DENTRY(f)        (f->f_path.dentry)
+#else
+ # define GET_F_DENTRY(f)        (f->f_dentry)
+ #endif
+*/
+#ifdef
+
--- linux-4.15.0.org/ubuntu/vbox/vboxvideo/Makefile
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/Makefile
@@ -0,0 +1,52 @@
+KBUILD_EXTMOD=${srctree}/ubuntu/vbox
+## @file
+## VirtualBox Guest Additions Module Makefile.
+## (For 2.6.x this file must be 'Makefile'!)
+## Copyright (C) 2006-2017 Oracle Corporation
+## This file is part of VirtualBox Open Source Edition (OSE), as
+## available from http://www.virtualbox.org. This file is free software;
+## you can redistribute it and/or modify it under the terms of the GNU
+## General Public License (GPL) as published by the Free Software
+## Foundation, in version 2 as it comes in the "COPYING" file of the
+## VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+## hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+
+ obj ?= $(CURDIR)
+ include $(obj)/Makefile.include.header
+
+ BUILD =
+ # We want to build on Linux 3.11 and later and on all EL 7 kernels.
+ ifneq ($(filter-out 1.% 2.% 3.0.% 3.1.% 3.2.% 3.3.% 3.4.% 3.5.% 3.6.% 3.7.%
+                   3.8.% 3.9.% 3.10.%,$(KERN_VER)),)
+     BUILD = 1
+ endif
+ ifdef $(filter-out %.el7.x86_64,$(KERN_VER)),
+     BUILD = 1
+ endif
+
+ifeq ($(BUILD),)
+endif
+
+MOD_NAME   = vboxvideo
+MOD_OBJS   = hgsni_base.o
+            modesetting.o vbox_drv.o vbox_fb.o vbox_irq.o vbox_main.o
+            vbox_mode.o vbox_ttm.o vbva_base.o vbox_prime.o vbox_hgsni.o
+MOD_INCL   = -IS(KBUILD_EXTMOD) -Iinclude/drm
+
+include $(obj)/Makefile.include.footer
+
+else # ! wildcard $(KERN_INCL)/drm/drm_rect.h
+
+ all:
+ install:
+ clean:
+
+endif # ! wildcard $(KERN_INCL)/drm/drm_rect.h
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/Makefile.include.footer
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/Makefile.include.footer
@@ -0,0 +1,112 @@
+## @file
+## VirtualBox Guest Additions kernel module Makefile, common parts.
+##
+## See Makefile.include.header for details of how to use this.
+##
+
+## Copyright (C) 2006-2017 Oracle Corporation
+
+## This file is part of VirtualBox Open Source Edition (OSE), as
+## available from http://www.virtualbox.org. This file is free software;
+## you can redistribute it and/or modify it under the terms of the GNU
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+## Foundation, in version 2 as it comes in the "COPYING" file of the
+## VirtualBox OSE distribution. VirtualBox OSE is distributed in the
+## hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.
+
+
+## override is required by the Debian guys
+override MODULE = $(MOD_NAME)
+OBS   = $(MOD_OBJS)
+
+KBUILD_VERBOSE ?= 1
+LINUX_VERBOSE = $(if $(KBUILD_VERBOSE),1,)
+
+
+## Compiler options
+
+ifdef INCL
+ INCL ::= $(addprefix -I,$(KERN_INCL) $(EXTRA_INCL))
+ ifdef KBUILD_EXTMOD
+ KBUILD_EXTMOD ::= $(shell pwd)
+ endif
+ INCL += $(MOD_INCL)
+ export INCL
+endif
+KFLAGS := -D__KERNEL__ -DMODULE $(MOD_DEFS)
+ifeq ($(BUILD_TYPE), debug)
+ KFLAGS += -DDEBUG -DDEBUG_$(subst $(subst _, _,_),$($(USERNAME)) -
 DDEBUG_USERNAME=$(subst $(subst _, _,_),$($(USERNAME))
+endif
+
+ifeq ($(KERN_VERSION), 24)
+##
+## 2.4
+##
+
+## Note: while 2.4 kernels could also do "proper" builds from kbuild, the make
+## script needed to support it was somewhat different from 2.6. Since this
+## script works and 2.4 is not a moving target we will not try do do things the
+## "proper" way.
+
+ifeq ($(BUILD_TARGET_ARCH),amd64)
+ KFLAGS += -mcmodel=kernel
+endif
+
+CFLAGS := -O2 -DVBOX_LINUX_2_4 $(MOD_CFLAGS) $(INCL) $(KFLAGS) $(MOD_EXTRA)
 $(KDEBUG)
+MODULE_EXT := o
+
+# 2.4 Module linking
+$(MODULE).o: $(OBJS)
+ $(LD) -o $@ -r $(OBJS)
+
+.PHONY: $(MODULE)
+all: $(MODULE)
+
+install: $(MODULE)
+ @ mkdir -p $(MODULE_DIR);
+ @ install -m 0644 -o root -g root $(MODULE).$(MODULE_EXT) $(MODULE_DIR);
+ @ PATH="$(PATH):/bin:/sbin" depmod -a;
+
+clean:
+ @ for f in $(sort $(dir $(OBJS)))); do rm -rf $$f/*.o $$f/*.cmd $$f/*.flags; done
+ @ rm -rf $(MOD_NAME)* .tmp_ver* $(MOD_NAME).* Modules.symvers modules.order
+
+else  # ! $(KERN_VERSION), 24
+##
+## 2.6 and later
+##
+
+MODULE_EXT := ko
+ $(MODULE)-y := $(OBJS)
+
+ # build defs
+ EXTRA_CFLAGS += $(MOD_CFLAGS) $(INCL) $(KFLAGS) $(MOD_EXTRA) $(KDEBUG)
+
+ .PHONY: $(MODULE)
+ all: $(MODULE)
+
+ obj-m += $(MODULE).o
+
+ JOBS := $(shell (getconf _NPROCESSORS_ONLN || grep -Ec '^processor|^CPU[0-9]' /proc/cpuinfo) 2>/dev/null)
+ ifeq ($(JOBS),0)
+   JOBS := 1
+ endif
+
+ # OL/UEK: disable module signing for external modules -- we don't have any private key
+ $(MODULE):
+ $(MAKE) V=$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
+ SRCROOT=$(CURDIR) $(if $(JOBS),-j$(JOBS),) modules
+
+ install: $(MODULE)
+ $(MAKE) V=$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
+ SRCROOT=$(CURDIR) INSTALL_MOD_PATH=$(INSTALL_MOD_PATH) INSTALL_MOD_DIR=$(INSTALL_MOD_DIR) modules_install
+
+ modules_install: install
+
+ clean:
+ $(MAKE) V=$(LINUX_VERBOSE) CONFIG_MODULE_SIG= -C $(KERN_DIR) SUBDIRS=$(CURDIR)
+ SRCROOT=$(CURDIR) clean
+
+ .PHONY: $(MODULE) install modules_install clean
+ endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/Makefile.include.header
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/Makefile.include.header
@@ -0,0 +1,158 @@
+# $Id: Makefile.include.header $
## @file
# VirtualBox Guest Additions kernel module Makefile, common parts.
#
# (For 2.6.x, the main file must be called 'Makefile')
#
# Copyright (C) 2006-2017 Oracle Corporation
#
# This file is part of VirtualBox Open Source Edition (OSE), as
available from http://www.virtualbox.org. This file is free software;
you can redistribute it and/or modify it under the terms of the GNU
General Public License (GPL) as published by the Free Software
Foundation, in version 2 as it comes in the "COPYING" file of the
VirtualBox OSE distribution. VirtualBox OSE is distributed in the
hope that it will be useful, but WITHOUT ANY WARRANTY of any kind.

Testing:
* Building with KERN_DIR set uses the value specified and
the default value for the unspecified one if any.

These file should be included by the Makefiles for any kernel modules we
build as part of the Guest Additions. The intended way of doing this is as
follows:

Linux kbuild sets this to our source directory if we are called from
there

include $(obj)/Makefile.include.header
MOD_NAME = <name of the module to be built, without extension>
MOD_OBJS = <list of object files which should be included>
MOD_DEFS = <any additional defines which this module needs>
MOD_INCL = <any additional include paths which this module needs>
MOD_CFLAGS = <any additional CFLAGS which this module needs>
include $(obj)/Makefile.include.footer

The kmk kBuild define KBUILD_TARGET_ARCH is available.

First, figure out which architecture we're targeting and the build type.
(We have to support basic cross building (ARCH=i386|x86_64).)
While at it, warn about BUILD_* vars found to help with user problems.

ifeq ($(filter-out x86_64 amd64 AMD64,$(shell dpkg-architecture -qDEB_HOST_GNU_CPU))),
BUILD_TARGET_ARCH_DEF := amd64
else
BUILD_TARGET_ARCH_DEF := x86
endif
ifeq ($(filter-out amd64 x86,$(BUILD_TARGET_ARCH])),
$(warning Ignoring unknown BUILD_TARGET_ARCH value '$(BUILD_TARGET_ARCH)'.)
BUILD_TARGET_ARCH :=
endif
ifeq ($(BUILD_TARGET_ARCH),)
ifeq ($(ARCH),x86_64)
BUILD_TARGET_ARCH := amd64
else
  ifeq (ARCH,i386)
    BUILD_TARGET_ARCH := x86
  else
    BUILD_TARGET_ARCH := $(BUILD_TARGET_ARCH_DEF)
  endif
endif
else
  ifneq (BUILD_TARGET_ARCH, $(BUILD_TARGET_ARCH_DEF))
    $(warning Using BUILD_TARGET_ARCH='$(BUILD_TARGET_ARCH)' from the $(origin BUILD_TARGET_ARCH).)
  endif
endif

ifeq ($(filter-out release profile debug strict,$(BUILD_TYPE)),)
  $(warning Ignoring unknown BUILD_TYPE value '$(BUILD_TYPE)'.)
endif
else
  ifneq ($(BUILD_TYPE),release)
    $(warning Using BUILD_TYPE='$(BUILD_TYPE)' from the $(origin BUILD_TYPE).)
  endif
endif
ifeq ($(USERNAME),)
  USERNAME := noname
endif

ifeq ($(KERNELRELEASE),)
  # building from this directory
  #
  # kernel base directory
  ifdef KERN_DIR
    ifndef KERN_VER
      ifeq ($(filter %/build,$(KERN_DIR)),)
        $(error The variable KERN_DIR must be a kernel build folder and end with /build without a trailing slash, or KERN_VER must be set)
      endif
    endif
    ifndef KERN_VER
      ifdef KERN_DIR
        ifndef KERN_VER
          ifeq ($(filter %/build,$(KERN_DIR)),)
            $(error The variable KERN_DIR must be a kernel build folder and end with /build without a trailing slash, or KERN_VER must be set)
          endif
        endif
      endif
    endif
    endif
  endif
endif
ifeq ($(USERNAME),)
+ KERN_VER = $(notdir $(patsubst %/build,.,$(KERN_DIR)))
+ ifdef $(shell expr $(KERN_VER) : '[0-9]*.[0-9]*.[0-9]*',0)
+ $(error The kernel build folder path must end in <version>/build, or the variable KERN_VER must be set)
+ endif
+ endif
+ KERN_VER ?= $(shell uname -r)
+ endif
+
+ # guess kernel major version (24 or later)
+ ifdef $(shell if grep "'2\.[4].' /lib/modules/$(KERN_VER)/build/include/linux/version.h > /dev/null 2>&1; then echo yes; fi).yes)
+ KERN_VERSION := 24
+ else
+ KERN_VERSION := 26
+ endif
+
+else # neq($(KERNELRELEASE),)
+
+ # building from kbuild (make -C <kernel_directory> M=`pwd`
+ +
+ # guess kernel major version (24 or 26)
+ ifdef $(shell if echo "$(VERSION).$(PATCHLEVEL)." | grep '2\.[4].\' > /dev/null; then echo yes; fi).yes)
+ KERN_VERSION := 24
+ else
+ KERN_VERSION := 26
+ endif
+
+ KERN_VER := $(KERNELRELEASE)
+
+endif # neq($(KERNELRELEASE),)
+
+# Kernel build folder
+KERN_DIR := $(srctree)
+ifndef $(shell if test -d $(KERN_DIR); then echo yes; fi).yes)
+ $(error Error: unable to find the headers of the Linux kernel to build against. \
+ Specify KERN_VER=<version> (currently $(KERN_VER)) and run Make again)
+endif
+
+## Kernel include folder
+KERN_INCL := $(KERN_DIR)/include
+
+## module install folder
+INSTALL_MOD_DIR ?= misc
+MODULE_DIR := $(INSTALL_MOD_PATH)/lib/modules/$(KERN_VER)/$(INSTALL_MOD_DIR)
+
+## debug - show guesses.
+ifdef DEBUG
+$(warning dbg: INSTALL_MOD_PATH = $(INSTALL_MOD_PATH))
+$(warning dbg: INSTALL_MOD_DIR = $(INSTALL_MOD_DIR))
+$(warning dbg: KERN_DIR = $(KERN_DIR))
+$(warning dbg: KERN_INCL = $(KERN_INCL))
+$(warning dbg: KERN_VERSION = $(KERN_VERSION))
+$(warning dbg: MODULE_DIR = $(MODULE_DIR))
+endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/hgsmi_base.c
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/hgsmi_base.c
@@ -0,0 +1,290 @@
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * Permission is hereby granted, free of charge, to any person
+ * obtaining a copy of this software and associated documentation
+ * files (the "Software"), to deal in the Software without
+ * restriction, including without limitation the rights to use,
+ * copy, modify, merge, publish, distribute, sublicense, and/or sell
+ * copies of the Software, and to permit persons to whom the
+ * Software is furnished to do so, subject to the following
+ * conditions:
+ *
+ * The above copyright notice and this permission notice shall be
+ * included in all copies or substantial portions of the Software.
+ *
+ * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND,
+ * EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES
+ * OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND
+ * NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT
+ * HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,
+ * WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
+ * FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR
+ * OTHER DEALINGS IN THE SOFTWARE.
+ */
+
+#include "vbox_drv.h"
+#include "vbox_err.h"
+#include "vboxvideo_guest.h"
+#include "vboxvideo_vbe.h"
+#include "hgsmi_channels.h"
+#include "hgsmi_ch_setup.h"
+
+/** Detect whether HGSMI is supported by the host. */
+bool VBoxHGSMIIIsSupported(void)
+{
+u16 DispiId;
+
+outw(VBE_DISPI_INDEX_ID, VBE_DISPI_IOPORT_INDEX);
+outw(VBE_DISPI_ID_HGSMI, VBE_DISPI_IOPORT_DATA);
Dispid = inw(VBE_DISPI_IOPORT_DATA);
+
+return (Dispid == VBE_DISPI_ID_HGSMI);
+
+/
+ * Inform the host of the location of the host flags in VRAM via an HGSMI command.
+ * @returns IPRT status value.
+ * @returns VERR_NOT_IMPLEMENTED if the host does not support the command.
+ * @returns VERR_NO_MEMORY if a heap allocation fails.
+ * @param ctx the context of the guest heap to use.
+ * @param location the offset chosen for the flags withing guest VRAM.
+ */
+int hgsmi_report_flags_location(struct gen_pool * ctx, u32 location)
+
+struct hgsmi_buffer_location *p;
+
+/* Allocate the IO buffer. */
+p = hgsmi_buffer_alloc(ctx, sizeof(*p), HGSMI_CH_HGSMI,
+HGSMI_CC_HOST_FLAGS_LOCATION);
+if (!p)
+    return VERR_NO_MEMORY;
+
+/* Prepare data to be sent to the host. */
+p->location = location;
+p->buf_len  = sizeof(struct hgsmi_host_flags);
+/* No need to check that the buffer is valid as we have just allocated it. */
+hgsmi_buffer_submit(ctx, p);
+/* Free the IO buffer. */
+hgsmi_buffer_free(ctx, p);
+
+return VINF_SUCCESS;
+
+
+/
+ * Notify the host of HGSMI-related guest capabilities via an HGSMI command.
+ * @returns IPRT status value.
+ * @returns VERR_NOT_IMPLEMENTED if the host does not support the command.
+ * @returns VERR_NO_MEMORY if a heap allocation fails.
+ * @param ctx the context of the guest heap to use.
+ * @param caps the capabilities to report, see struct vbva_caps.
+ */
+int hgsmi_send_caps_info(struct gen_pool * ctx, u32 caps)
+
+struct vbva_caps *p;
/* Allocate the IO buffer. */
p = hgsmi_buffer_alloc(ctx, sizeof(*p), HGSMI_CH_VBVA, VBVA_INFO_CAPS);
+if (!p)
+return VERR_NO_MEMORY;
+
/* Prepare data to be sent to the host. */
+p->rc = VERR_NOT_IMPLEMENTED;
+p->caps = caps;
+/* No need to check that the buffer is valid as we have just allocated it. */
+hgsmi_buffer_submit(ctx, p);
+
WARN_ON_ONCE(RT_FAILURE(p->rc));
+/* Free the IO buffer. */
+hgsmi_buffer_free(ctx, p);
+return p->rc;
+
/**
 * Get the information needed to map the basic communication structures in
 * device memory into our address space. All pointer parameters are optional.
 * *
 * @param  cbVRAM               how much video RAM is allocated to the device
 * @param  poffVRAMBaseMapping  where to save the offset from the start of the
 *                              device VRAM of the whole area to map
 * @param  pcbMapping           where to save the mapping size
 * @param  poffGuestHeapMemory  where to save the offset into the mapped area
 *                              of the guest heap backing memory
 * @param  pcbGuestHeapMemory   where to save the size of the guest heap
 * @param  poffHostFlags        where to save the offset into the mapped area
 *                              of the host flags
 * */
+void VBoxHGSMIGetBaseMappingInfo(u32 cbVRAM,
+            u32 *poffVRAMBaseMapping,
+            u32 *pcbMapping,
+            u32 *poffGuestHeapMemory,
+            u32 *pcbGuestHeapMemory,
+            u32 *poffHostFlags)
+{
+if (poffVRAMBaseMapping)
+*poffVRAMBaseMapping = cbVRAM - VBVA_ADAPTER_INFORMATION_SIZE;
+if (pcbMapping)
+*pcbMapping = VBVA_ADAPTER_INFORMATION_SIZE;
+if (poffGuestHeapMemory)
+*poffGuestHeapMemory = 0;
+if (pcbGuestHeapMemory)
+*pcbGuestHeapMemory = VBVA_ADAPTER_INFORMATION_SIZE
+ sizeof(struct hgsmi_host_flags);
+if (poffHostFlags)
+*poffHostFlags = VBVA_ADAPTER_INFORMATION_SIZE
+ sizeof(struct hgsmi_host_flags);
+
+/**
+ * Query the host for an HGSMI configuration parameter via an HGSMI command.
+ * @returns iprt status value
+ * @param  ctx      the context containing the heap used
+ * @param  index  the index of the parameter to query,
+ * @see struct vbva_conf32::index
+ * @param  value_ret where to store the value of the parameter on success
+ */
+int hgsmi_query_conf(struct gen_pool * ctx, u32 index, u32 *value_ret)
+{
+struct vbva_conf32 *p;
+
+/* Allocate the IO buffer. */
+p = hgsmi_buffer_alloc(ctx, sizeof(*p), HGSMI_CH_VBVA,
+VBVA_QUERY_CONF32);
+if (!p)
+return VERR_NO_MEMORY;
+
+/* Prepare data to be sent to the host. */
+p->index = index;
+p->value = U32_MAX;
+/* No need to check that the buffer is valid as we have just allocated it. */
+hgsmi_buffer_submit(ctx, p);
+*value_ret = p->value;
+/* Free the IO buffer. */
+hgsmi_buffer_free(ctx, p);
+return VINF_SUCCESS;
+}
+
+/**
+ * Pass the host a new mouse pointer shape via an HGSMI command.
+ * @returns success or failure
+ * @param  ctx      the context containing the heap to be used
+ * @param  flags    cursor flags, @see VMMDevReqMousePointer::flags
+ * @param  hot_x     horizontal position of the hot spot
+ * @param  hot_y     vertical position of the hot spot
+ * @param  width    width in pixels of the cursor
+ * @param  height    height in pixels of the cursor
+ * @param  pixels   pixel data, @see VMMDevReqMousePointer for the format
+ */
int hgsmi_update_pointer_shape(struct gen_pool * ctx, u32 flags,
						u32 hot_x, u32 hot_y, u32 width, u32 height,
						u8 *pixels, u32 len)
{
    struct vbva_mouse_pointer_shape *p;
    u32 pixel_len = 0;
    int rc;

    if (flags & VBOX_MOUSE_POINTER_SHAPE) {
        /* Size of the pointer data:
         * sizeof (AND mask) + sizeof (XOR MASK)
         */
        +pixel_len = ((((width + 7) / 8) * height + 3) & ~3)
        + width * 4 * height;
        +if (pixel_len > len)
            +return VERR_INVALID_PARAMETER;
        +*/
        + * If shape is supplied, then always create the pointer visible.
        + * See comments in 'vboxUpdatePointerShape'
        + */
        +flags |= VBOX_MOUSE_POINTER_VISIBLE;
    }
    /* Allocate the IO buffer. */
    p = hgsmi_buffer_alloc(ctx, sizeof(*p) + pixel_len, HGSMI_CH_VBVA,
        +VBVA_MOUSE_POINTER_SHAPE);
    +if (!p)
        +return VERR_NO_MEMORY;
    /* Prepare data to be sent to the host. */
    +/* Will be updated by the host. */
    +p->result = VINF_SUCCESS;
    +/* We have our custom flags in the field */
    +p->flags = flags;
    +p->hot_x = hot_x;
    +p->hot_y = hot_y;
    +p->width = width;
    +p->height = height;
    +if (pixel_len)
        +/* Copy the actual pointer data. */
        +memcpy (p->data, pixels, pixel_len);
    +/* No need to check that the buffer is valid as we have just allocated it. */
    +hgsmi_buffer_submit(ctx, p);
    +rc = p->result;
    +/* Free the IO buffer. */
    +hgsmi_buffer_free(ctx, p);
    +return rc;
/*
 * Report the guest cursor position. The host may wish to use this information
 * to re-position its own cursor (though this is currently unlikely). The
 * current host cursor position is returned.
 * @param  ctx The context containing the heap used.
 * @param  report_position Are we reporting a position?
 * @param  x Guest cursor X position.
 * @param  y Guest cursor Y position.
 * @param  x_host Host cursor X position is stored here. Optional.
 * @param  y_host Host cursor Y position is stored here. Optional.
 * @returns  iprt status code.
 * @returns  VERR_NO_MEMORY HGSMI heap allocation failed.
 */
int hgsmi_cursor_position(struct gen_pool * ctx, bool report_position,  
						u32 x, u32 y, u32 *x_host, u32 *y_host)  
{  
	/* Allocate the IO buffer. */  
	struct vbva_cursor_position *p;  
+  
+/* Allocate the IO buffer. */  
*p = hgsmi_buffer_alloc(ctx, sizeof(*p), HGSMI_CH_VBVA,  
+VBVA_CURSOR_POSITION);  
+if (!p)  
+return VERR_NO_MEMORY;  
+/* Prepare data to be sent to the host. */  
+p->report_position = report_position;  
+p->x = x;  
+p->y = y;  
+/* No need to check that the buffer is valid as we have just allocated it. */  
+hgsmi_buffer_submit(ctx, p);  
+if (x_host)  
+*x_host = p->x;  
+if (y_host)  
+*y_host = p->y;  
+/* Free the IO buffer. */  
+hgsmi_buffer_free(ctx, p);  
+return VINF_SUCCESS;  
+}
+  
+  
+/*
 * @todo Mouse pointer position to be read from VMMDev memory, address of the
 * memory region can be queried from VMMDev via an IOCTL. This VMMDev memory
 * region will contain host information which is needed by the guest.
 * */
+  
+  * Reading will not cause a switch to the host.
Have to take into account:
  * synchronization: host must write to the memory only from EMT,
  * large structures must be read under flag, which tells the host
  * that the guest is currently reading the memory (OWNER flag?).
  * guest writes: may be allocate a page for the host info and make
    the page readonly for the guest.
  * the information should be available only for additions drivers.
  * VMMDev additions driver will inform the host which version of the info
    it expects, host must support all versions.

---

```plaintext
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/hgsmi_ch_setup.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/hgsmi_ch_setup.h
@@ -0,0 +1,80 @@
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * Permission is hereby granted, free of charge, to any person
+ * obtaining a copy of this software and associated documentation
+ * files (the "Software"), to deal in the Software without
+ * restriction, including without limitation the rights to use,
+ * copy, modify, merge, publish, distribute, sublicense, and/or sell
+ * copies of the Software, and to permit persons to whom the
+ * Software is furnished to do so, subject to the following
+ * conditions:
+ *
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+ * included in all copies or substantial portions of the Software.
+ *
+ * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND,
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+ * OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND
+ * NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT
+ * HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,
+ * WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
+ * FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR
+ * OTHER DEALINGS IN THE SOFTWARE.
+ */
 *
+ #ifndef __HGSMI_CH_SETUP_H__
+ #define __HGSMI_CH_SETUP_H__
+ 
+ #include "hgsmi_defs.h"
+ 
+ /* HGSMI setup and configuration channel commands and data structures. */
+ */
+ *
+ * Tell the host the location of hgsmi_host_flags structure, where the host
+ * can write information about pending buffers, etc, and which can be quickly
+ * polled by the guest without a need to port IO.
+ */
+#define HGSMI_CC_HOST_FLAGS_LOCATION 0
+
+struct hgsmi_buffer_location {
+u32 location;
+u32 buf_len;
+};
+assert_compile_size(struct hgsmi_buffer_location, 8);
+
+/* HGSMI setup and configuration data structures. */
+/* host->guest commands pending, should be accessed under FIFO lock only */
+#define HGSMIHOSTFLAGS_COMMANDS_PENDING 0x01u
+/* IRQ is fired, should be accessed under VGAS::lock only */
+#define HGSMIHOSTFLAGS_IRQ 0x02u
+#ifdef VBOX_WITH_WDDM
+/* one or more guest commands is completed, should be accessed under FIFO lock only */
+#define HGSMIHOSTFLAGS_GCOMMAND_COMPLETED 0x04u
+/* watchdog timer interrupt flag (used for debugging), should be accessed under VGAS::lock only */
+#define HGSMIHOSTFLAGS_WATCHDOG 0x08u
+#endif
+/* vsync interrupt flag, should be accessed under VGAS::lock only */
+/*define HGSMIHOSTFLAGS_VSYNC 0x10u
+/* monitor hotplug flag, should be accessed under VGAS::lock only */
+/*define HGSMIHOSTFLAGS_HOTPLUG 0x20u
+/** Cursor capability state change flag, should be accessed under
+ * VGAS::lock only. @see struct vbva_conf32.
+ */
+#define HGSMIHOSTFLAGS_CURSOR_CAPABILITIES 0x40u
+
+struct hgsmi_host_flags {
+  
+  volatile u32 host_flags;
+  u32 reserved[3];
+};
+assert_compile_size(struct hgsmi_host_flags, 16);
+
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/hgsmi_channels.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/hgsmi_channels.h
/*
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 * OTHER DEALINGS IN THE SOFTWARE.
 */

#ifndef __HGSMI_CHANNELS_H__
#define __HGSMI_CHANNELS_H__

/* Each channel has an 8 bit identifier. There are a number of predefined
 (hardcoded) channels.
 *
 * HGSMI_CH_HGSMI channel can be used to map a string channel identifier
 * to a free 16 bit numerical value. Values are allocated in range
 * [HGSMI_CH_STRING_FIRST;HGSMI_CH_STRING_LAST].
 */

/* Predefined channel identifiers. Used internally by VBOX to simplify the channel setup. */
//#define HGSMI_CH_RESERVED 0x00
//#define HGSMI_CH_HGSMI 0x01
//#define HGSMI_CH_VBVA 0x02
/* Graphics: Seamless with a single guest region */
#define HGSMI_CH_SEAMLESS 0x03
/* Graphics: Seamless with separate host windows */
#define HGSMI_CH_SEAMLESS2 0x04
/* Graphics: OpenGL HW acceleration */
#define HGSMI_CH_OPENGL 0x05

/* Dynamically allocated channel identifiers. */
/* The first channel index to be used for string mappings (inclusive) */
#define HGSMI_CH_STRING_FIRST 0x20
/* The last channel index for string mappings (inclusive) */
#define HGSMI_CH_STRING_LAST 0xff

/* Check whether the channel identifier is allocated for a dynamic channel */
#define HGSMI_IS_DYNAMIC_CHANNEL(_channel) (((u8)(_channel) & 0xE0) != 0)

#endif /* !__HGSMI_CHANNELS_H__*/
#ifndef ___VBox_Graphics_HGSMIContext_h___
#define ___VBox_Graphics_HGSMIContext_h___

#include "HGSMI.h"
#include "gsmch_setup.h"
#include "vbox_err.h"

#ifdef VBOX_WDDM_MINIPORT
#include "wddm/VBoxMPShgsmi.h"
typedef VBOXSHGSMI HGSMIGUESTCMDHEAP;
define HGSMIGUESTCMDMDHEAP_GET(_p) (&(_p)->Heap)
#else
typedef HGSMIHEAP HGSMIGUESTCMDHEAP;
define HGSMIGUESTCMDMDHEAP_GET(_p) (_p)
#endif

/**
 * Structure grouping the context needed for submitting commands to the host
 * via HGSMI
 */
typedef struct HGSMIGUESTCOMMANDCONTEXT {
	/** Information about the memory heap located in VRAM from which data
 * structures to be sent to the host are allocated. */
	HGSMIGUESTCMDHEAP heapCtx;
	/** The I/O port used for submitting commands to the host by writing their
 * offsets into the heap. */
	RTIOPORT port;
} HGSMIGUESTCOMMANDCONTEXT, *PHGSMIGUESTCOMMANDCONTEXT;

/**
 * Structure grouping the context needed for receiving commands from the host
 * via HGSMI
 */
typedef struct HGSMIHOSTCOMMANDCONTEXT {
	/** Information about the memory area located in VRAM in which the host
 * places data structures to be read by the guest. */
	HGSMIAREA areaCtx;
	/** Convenience structure used for matching host commands to handlers. */
	/** @todo handlers are registered individually in code rather than just
 * passing a static structure in order to gain extra flexibility. There is
 * currently no expected usage case for this though. Is the additional
 * complexity really justified? */
	HGSMICHANNELINFO channels;
	/** Flag to indicate that one thread is currently processing the command
 * queue. */
} HGSMIHOSTCOMMANDCONTEXT, *PHGSMIHOSTCOMMANDCONTEXT;
volatile bool fHostCmdProcessing;
+/* Pointer to the VRAM location where the HGSMI host flags are kept. */
volatile struct hgsmi_host_flags *pfHostFlags;
+/** The I/O port used for receiving commands from the host as offsets into
+ the memory area and sending back confirmations (command completion,
+ * IRQ acknowledgement). */
+RTIOPORT port;
+} HGSMIHOSTCOMMANDCONTEXT, *PHGSMIHOSTCOMMANDCONTEXT;
+
+/** @name HGSMI context initialisation APIs.
+ * @{ */
+/** @todo we should provide a cleanup function too as part of the API */
+int VBoxHGSMISetupGuestContext(struct gen_pool * ctx,
+void *pvGuestHeapMemory,
+u32 cbGuestHeapMemory,
+u32 offVRAMGuestHeapMemory,
+const HGSMIENV *pEnv);
+void VBoxHGSMISetupHostContext(PHGSMIHOSTCOMMANDCONTEXT ctx,
+void *pvBaseMapping,
+u32 offHostFlags,
+void *pvHostAreaMapping,
+u32 offVRAMHostArea,
+u32 cbHostArea);
+
+/** @} */
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/hgsmi_defs.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/hgsmi_defs.h
@@ -0,0 +1,112 @@
+/*
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OTHER DEALINGS IN THE SOFTWARE.
*/

#ifndef ___VBox_Graphics_HGSMIDefs_h
#define ___VBox_Graphics_HGSMIDefs_h

#include "vbox_err.h"

/* HGSMI uses 32 bit offsets and sizes. */

#define HGSMIOFFSET_VOID ((u32)~0)

/* Describes a shared memory area buffer. */
* Used for calculations with offsets and for buffers verification.
*/

typedef struct HGSMIAREA {
  u8     *pu8Base;  /* The starting address of the area. Corresponds to offset 'offBase'. */
  u32  offBase;  /* The starting offset of the area. */
  u32  offLast;  /* The last valid offset:
                  * offBase + cbArea - 1 - (sizeof(header) + sizeof(tail)).
                  */
  u32    cbArea;  /* Size of the area. */
} HGSMIAREA;

/* The buffer description flags. */
#define HGSMI_BUFFER_HEADER_F_SEQ_MASK     0x03 /* Buffer sequence type mask. */
#define HGSMI_BUFFER_HEADER_F_SEQ_SINGLE   0x00 /* Single buffer, not a part of a sequence. */
#define HGSMI_BUFFER_HEADER_F_SEQ_START    0x01 /* The first buffer in a sequence. */
#define HGSMI_BUFFER_HEADER_F_SEQ_CONTINUE 0x02 /* A middle buffer in a sequence. */
#define HGSMI_BUFFER_HEADER_F_SEQ_END      0x03 /* The last buffer in a sequence. */

#pragma pack(1) /**< @todo not necessary. use assert_compile_size instead. */

typedef struct HGSMIBUFFERHEADER {
  u32    u32DataSize;  /* Size of data that follows the header. */
  u8     u8Flags;  /* The buffer description: HGSMI_BUFFER_HEADER_F_* */
} HGSMIBUFFERHEADER;
+u8  u8Channel;    /* The channel the data must be routed to. */
+u16  u16ChannelInfo;  /* Opaque to the HGSMI, used by the channel. */
+
+union {
+u8  au8Union[8];    /* Opaque placeholder to make the union 8 bytes. */
+
++struct {
    /* HGSMI_BUFFER_HEADER_F_SEQ_SINGLE */
+u32  u32Reserved1;    /* A reserved field, initialize to 0. */
+u32  u32Reserved2;    /* A reserved field, initialize to 0. */
+}  Buffer;
+
++struct {
    /* HGSMI_BUFFER_HEADER_F_SEQ_START */
+u32  u32SequenceNumber;    /* The sequence number, the same for all buffers in the sequence. */
+u32  u32SequenceSize;    /* The total size of the sequence. */
+}  SequenceStart;
+
++struct {
    /* HGSMI_BUFFER_HEADER_F_SEQ_CONTINUE and HGSMI_BUFFER_HEADER_F_SEQ_END */
+u32  u32SequenceNumber;    /* The sequence number, the same for all buffers in the sequence. */
+u32  u32SequenceOffset;    /* Data offset in the entire sequence. */
+}  SequenceContinue;
+}  u;
+
+/* 8 bytes buffer tail. */
++typedef struct HGSMIBUFFERTAIL {
+u32  reserved;    /* Reserved, must be initialized to 0. */
+u32  u32Checksum;    /* Verifyer for the buffer header and offset and for first 4 bytes of the tail. */
+}  HGSMIBUFFERTAIL;
+#pragma pack()
+
+assert_compile_size(HGSMIBUFFERHEADER, 16);
+assert_compile_size(HGSMIBUFFERTAIL, 8);
+
+/* The size of the array of channels. Array indexes are u8. Note: the value must not be changed. */
+#define HGSMI_NUMBER_OF_CHANNELS 0x100
+
++typedef struct HGSMIENV {
+/* Environment context pointer. */
+void  *pvEnv;
+
+/* Allocate system memory. */
+void  (*pfAlloc)(void *pvEnv, u32 len);
+
+/* Free system memory. */
+void  (*pfFree)(void *pvEnv, void *pv);
+}  HGSMIENV;
+
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+*/
+
+#include "vboxvideo_guest.h"
+#include "vboxvideo_vbe.h"
+#include "hgsmi_channels.h"
+
+#ifndef VBOX_GUESTR3XF86MOD
+#include "vbox_err.h"
+#endif
+
+/**
+* Gets the count of virtual monitors attached to the guest via an HGSMI
+* command
+ *
+* @returns the right count on success or 1 on failure.
+* @param ctx the context containing the heap to use
+ */
+-u32 VBoxHGSMIGetMonitorCount(struct gen_pool * ctx)
+{
+/* Query the configured number of displays. */
+u32 cDisplays = 0;
+gsmi_query_conf(ctx, VBOX_VBVA_CONF32_MONITOR_COUNT, &cDisplays);
+// LogFunc("cDisplays = %d\n", cDisplays);
+if (cDisplays == 0 || cDisplays > VBOX_VIDEO_MAX_SCREENS)
+/* Host reported some bad value. Continue in the 1 screen mode. */
cDisplays = 1;
+return cDisplays;
+}
+
+/**
+ * Returns the size of the video RAM in bytes.
+ * @returns the size
+ */
+u32 VBoxVideoGetVRAMSize(void)
+{
+/** @note A 32bit read on this port returns the VRAM size. */
+return inl(VBE_DISPI_IOPORT_DATA);
+}
+
+/**
+ * Check whether this hardware allows the display width to have non-multiple-
+ * of-eight values.
+ * @returns true if any width is allowed, false otherwise.
+ */
+bool VBoxVideoAnyWidthAllowed(void)
+{
+unsigned DispiId;
+outw(VBE_DISPI_INDEX_ID, VBE_DISPI_IOPORT_INDEX);
+outw(VBE_DISPI_ID_ANYX, VBE_DISPI_IOPORT_DATA);
+DispilId = inw(VBE_DISPI_IOPORT_DATA);
+return (DispilId == VBE_DISPI_ID_ANYX);
+}
+
+/**
+ * Tell the host about how VRAM is divided up between each screen via an HGSMI
+ * command. It is acceptable to specify identical data for each screen if
+ * they share a single framebuffer.
+ * @returns iprt status code, either VERR_NO_MEMORY or the status returned by
+ * @a pfnFill
+ * @todo What was I thinking of with that callback function? It
+ * would be much simpler to just pass in a structure in normal
+ * memory and copy it.
+ * @param   ctx       the context containing the heap to use
+ * @param   u32Count  the number of screens we are activating
+ * @param   pfnFill   a callback which initialises the VBVAINFOVIEW structures
+ *                   for all screens
+ * @param   pvData    context data for @a pfnFill
+ */
+ int VBoxHGSMISendViewInfo(struct gen_pool * ctx,
+				u32 u32Count,
+		 PFNHGSMIFILLVIEWINFO pfnFill,
+	void *pvData)
+	{
+		int rc;
+	/* Issue the screen info command. */
+	void *p = hgsmi_buffer_alloc(ctx, sizeof(VBVAINFOVIEW) * u32Count,
+						HGSMI_CH_VBVA, VBVA_INFO_VIEW);
+	if (p) {
+		VBVAINFOVIEW *pInfo = (VBVAINFOVIEW *)p;
+		rc = pfnFill(pvData, pInfo, u32Count);
+		if (RT_SUCCESS(rc))
+			hgsmi_buffer_submit (ctx, p);
+		hgsmi_buffer_free(ctx, p);
+	} else
+		rc = VERR_NO_MEMORY;
+	return rc;
+	}
+
+/**
+ * Set a video mode using port registers. This must be done for the first
+ * screen before every HGSMI modeset and also works when HGSM is not enabled.
+ * @param   width      the mode width
+ * @param   height     the mode height
+ * @param   cVirtWidth  the mode pitch
+ * @param   bpp        the colour depth of the mode
+ * @param   flags      flags for the mode. These will be or-ed with the
+ *                     default _ENABLED flag, so unless you are restoring
+ *                     a saved mode or have special requirements you can pass
+ *                     zero here.
+ * @param   cx          the horizontal panning offset
+ * @param   cy          the vertical panning offset
+ */
+ void VBoxVideoSetModeRegisters(u16 width, u16 height,
+						u16 cVirtWidth, u16 bpp,
+						u16 flags, u16 cx,
+						u16 cy)
+	{
+	/* set the mode characteristics */
+	outw(VBE_DISPI_INDEX_XRES, VBE_DISPI_IOPORT_INDEX);
/* enable the mode */
+outw(VBE_DISPI_INDEX_ENABLE, VBE_DISPI_IOPORT_INDEX);
+outw(flags | VBE_DISPI_ENABLED, VBE_DISPI_IOPORT_DATA);
/+* Panning registers */
+outw(VBE_DISPI_INDEX_X_OFFSET, VBE_DISPI_IOPORT_INDEX);
+outw(cx, VBE_DISPI_IOPORT_DATA);
+outw(VBE_DISPI_INDEX_Y_OFFSET, VBE_DISPI_IOPORT_INDEX);
+outw(cy, VBE_DISPI_IOPORT_DATA);
+/** @todo read from the port to see if the mode switch was successful */
+}
+
+
+/**
+ * Get the video mode for the first screen using the port registers. All
+ * parameters are optional
+ * @returns true if the VBE mode returned is active, false if we are in VGA
+ * mode
+ * @note If anyone else needs additional register values just extend the
+ * function with additional parameters and fix any existing callers.
+ * @param  pcWidth where to store the mode width
+ * @param  pcHeight where to store the mode height
+ * @param  pcVirtWidth where to store the mode pitch
+ * @param pcBPP where to store the colour depth of the mode
+ * @param pfFlags where to store the flags for the mode
+ */
+bool VBoxVideoGetModeRegisters(u16 *pcWidth, u16 *pcHeight,
+u16 *pcVirtWidth, u16 *pcBPP,
+u16 *pfFlags)
+{
+u16 flags;
+
+outw(VBE_DISPI_INDEX_ENABLE, VBE_DISPI_IOPORT_INDEX);
+flags = inw(VBE_DISPI_IOPORT_DATA);
+if (pcWidth) {
+outw(VBE_DISPI_INDEX_XRES, VBE_DISPI_IOPORT_INDEX);
+*pcWidth = inw(VBE_DISPI_IOPORT_DATA);
+}
+if (pcHeight) {
+outw(VBE_DISPI_INDEX_YRES, VBE_DISPI_IOPORT_INDEX);
+*pcHeight = inw(VBE_DISPI_IOPORT_DATA);
+}
+if (pcVirtWidth) {
+outw(VBE_DISPI_INDEX_VIRT_WIDTH, VBE_DISPI_IO_PORT_INDEX);
+*pcVirtWidth = inw(VBE_DISPI_IO_PORT_DATA);
+}
+if (pcBPP) {
+outw(VBE_DISPI_INDEX_BPP, VBE_DISPI_IO_PORT_INDEX);
+*pcBPP = inw(VBE_DISPI_IO_PORT_DATA);
+}
+if (pfFlags)
+*pfFlags = flags;
+return (!!(flags & VBE_DISPI_ENABLED));
+
+/**
+ * Disable our extended graphics mode and go back to VGA mode.
+ */
+void VBoxVideoDisableVBE(void)
+{
+outw(VBE_DISPI_INDEX_ENABLE, VBE_DISPI_IO_PORT_INDEX);
+outw(0, VBE_DISPI_IO_PORT_DATA);
+
+/**
+ * Set a video mode via an HGSMI request. The views must have been
+ * initialised first using @a VBoxHGSMISendViewInfo and if the mode is being
+ * set on the first display then it must be set first using registers.
+ * @param  ctx      The context containing the heap to use.
+ * @param  display  the screen number
+ * @param  origin_x  the horizontal displacement relative to the first screen
+ * @param  origin_y  the vertical displacement relative to the first screen
+ * @param  start_offset  the offset of the visible area of the framebuffer
+ * relative to the framebuffer start
+ * @param  pitch   the offset in bytes between the starts of two adjacent
+ * scan lines in video RAM
+ * @param  width    the mode width
+ * @param  height   the mode height
+ * @param  bpp      the colour depth of the mode
+ * @param  flags    flags
+ */
+void hgsmi_process_display_info(struct gen_pool * ctx,
+u32 display,
+s32 origin_x,
+s32 origin_y,
+u32 start_offset,
+u32 pitch,
+u32 width,
+u32 height,
+u16 bpp,
+u16 flags)
+
+/* Issue the screen info command. */
+void *p = hgsmi_buffer_alloc(ctx,
+sizeof (VBVAINFOSCREEN),
+HGSMI_CH_VBVA,
+VBVA_INFO_SCREEN);
+if (!p) {
  // LogFunc("HGSMIHeapAlloc failed\n");
} else {
  VBVAINFOSCREEN *pScreen = (VBVAINFOSCREEN *)p;
+
  pScreen->view_index    = display;
  pScreen->origin_x      = origin_x;
  pScreen->origin_y      = origin_y;
  pScreen->start_offset  = start_offset;
  pScreen->line_size     = pitch;
  pScreen->width        = width;
  pScreen->height       = height;
  pScreen->bits_per_pixel = bpp;
  pScreen->flags        = flags;
+
  hgsmi_buffer_submit(ctx, p);
+
  hgsmi_buffer_free(ctx, p);
+}
+
+/** Report the rectangle relative to which absolute pointer events should be
* expressed. This information remains valid until the next VBVA resize event
* for any screen, at which time it is reset to the bounding rectangle of all
* virtual screens.
* @param  ctx      The context containing the heap to use.
* @param  origin_x  Upper left X co-ordinate relative to the first screen.
* @param  origin_y  Upper left Y co-ordinate relative to the first screen.
* @param  width    Rectangle width.
* @param  height   Rectangle height.
* @returns  iprt status code.
* @returns  VERR_NO_MEMORY       HGSMI heap allocation failed.
* */
+int      hgsmi_update_input_mapping(struct gen_pool * ctx, s32  origin_x, s32  origin_y,
+                                    u32 width, u32 height)
+
+{ +
  int rc = VINF_SUCCESS;
  struct vbva_report_input_mapping *p;
+// Log(\"%s: origin_x=%d, origin_y=%d, width=%u, height=%u\n\", __PRETTY_FUNCTION__, (int)origin_x, (int)origin_x, +// (unsigned)width, (unsigned)height)); +* /* Allocate the IO buffer. */ +p = hgsmi_buffer_alloc(ctx, sizeof(struct vbva_report_input_mapping), HGSMI_CH_VBVA, +VBVA_REPORT_INPUT_MAPPING); +if (p) { +* /* Prepare data to be sent to the host. */ +p->x  = origin_x; +p->y  = origin_y; +p->cx = width; +p->cy = height; +rc = hgsmi_buffer_submit(ctx, p); +*/* Free the IO buffer. */ +hgsmi_buffer_free(ctx, p); +} else +rc = VERR_NO_MEMORY; +// LogFunc((\"rc = %d\n\", rc)); +return rc; +
+
+/** + * Get most recent video mode hints. + * @param  ctx      the context containing the heap to use + * @param  screens  the number of screens to query hints for, starting at 0. + * @param  hints   array of struct vbva_modehint structures for receiving the hints. + * @returns  iprt status code + * @returns  VERR_NO_MEMORY      HGSMI heap allocation failed. + * @returns  VERR_NOT_SUPPORTED  Host does not support this command. + */ +int hgsmi_get_mode_hints(struct gen_pool * ctx, +unsigned screens, struct vbva_modehint *hints) +{ +int rc; +void *p; +
+WARN_ON_ONCE(!((hints))); +if (WARN_ON(!hints)) +return VERR_INVALID_POINTER; +p = hgsmi_buffer_alloc(ctx, sizeof(struct vbva_query_mode_hints) +screens * sizeof(struct vbva_modehint), +HGSMI_CH_VBVA, VBVA_QUERY_MODE_HINTS); +if (!p) { +// LogFunc("HGSMIHeapAlloc failed\n"); +return VERR_NO_MEMORY; +}
} else {
    struct vbva_query_mode_hints *pQuery = p;
    +
    +pQuery->hints_queried_count = screens;
    +pQuery->cbHintStructureGuest = sizeof(struct vbva_modehint);
    +pQuery->rc = VERR_NOT_SUPPORTED;
    +
    +hgsmi_buffer_submit(ctx, p);
    +rc = pQuery->rc;
    +if (RT_SUCCESS(rc))
    +memcpy(hints, ((u8 *)p) + sizeof(struct vbva_query_mode_hints),
    +screens * sizeof(struct vbva_modehint));
    +
    +hgsmi_buffer_free(ctx, p);
    +}
    +return rc;
    +}
    +
    +/**
    + * Query the supported flags in VBVAINFOSCREEN::flags.
    + *
    + * @returns The mask of VBVA_SCREEN_F_ * flags or 0 if host does not support the request.
    + * @param  ctx  the context containing the heap to use
    + */
    +u16 VBoxHGSMIGetScreenFlags(struct gen_pool * ctx)
    +{
    +u32 flags = 0;
    +int rc = hgsmi_query_conf(ctx, VBOX_VBVA_CONF32_SCREEN_FLAGS, &flags);
    +// LogFunc("flags = 0x%x rc %Rrc\n", flags, rc));
    +if (RT_FAILURE(rc) || flags > U16_MAX)
    +flags = 0;
    +return (u16)flags;
    +}
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/product-generated.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/product-generated.h
@@ -0,0 +1,10 @@
+#ifndef ___product_generated_h___
+#define ___product_generated_h___
+
+#define VBOX_VENDOR "Oracle Corporation"
+#define VBOX_VENDOR_SHORT "Oracle"
+#define VBOX_PRODUCT "Oracle VM VirtualBox"
+#define VBOX_BUILD_PUBLISHER "_Ubuntu"
+#define VBOX_C_YEAR "2018"
+
+#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/revision-generated.h
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vbox_drv.c
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vbox_drv.c
@@ -0,0 +1,331 @@
+/* $Id: vbox_drv.c $ */
+/*
+ * Copyright (C) 2013-2017 Oracle Corporation
+ * This file is based on ast_drv.c
+ * Copyright 2012 Red Hat Inc.
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+ *
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+ * Michael Thayer <michael.thayer@oracle.com,
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+ */
+/#include "vbox_drv.h"
+
+/#include "version-generated.h"
+/#include "revision-generated.h"
+
+/#include <linux/module.h>
+/#include <linux/console.h>
+/#include <linux/vt_kern.h>
+
+/#include <drm/drmP.h>
+/#include <drm/drm_crtc_helper.h>
+
+*/
+int vbox_modeset = -1;
+
+MODULE_PARM_DESC(modeset, "Disable/Enable modesetting");
+module_param_named(modeset, vbox_modeset, int, 0400);
+
+static struct drm_driver driver;
+
+static const struct pci_device_id pciidlist[] = { { 0x80ee, 0xbeef, PCI_ANY_ID, PCI_ANY_ID, 0, 0, 0 },
+{ 0, 0, 0 },
+};
+MODULE_DEVICE_TABLE(pci, pciidlist);
+
+static int vbox_pci_probe(struct pci_dev *pdev, const struct pci_device_id *ent)
+{
+return drm_get_pci_dev(pdev, ent, &driver);
+}
+
+static void vbox_pci_remove(struct pci_dev *pdev)
+{
+struct drm_device *dev = pci_get_drvdata(pdev);
+
+drm_put_dev(dev);
+}
+
+static int vbox_drm_freeze(struct drm_device *dev)
+{
+drm_kms_helper_poll_disable(dev);
+
+pci_save_state(dev->pdev);
+
+console_lock();
+vbox_fbdev_set_suspend(dev, 1);
+console_unlock();
+
+return 0;
+}
+
+static int vbox_drm_thaw(struct drm_device *dev)
+{
+drm_mode_config_reset(dev);
+
+drm_helper_resume_force_mode(dev);
+
+console_lock();
+vbox_fbdev_set_suspend(dev, 0);
+console_unlock();
+
+return 0;
+}
+static int vbox_drm_resume(struct drm_device *dev) {
+int ret;
+
+if (pci_enable_device(dev->pdev))
+return -EIO;
+
+ret = vbox_drm_thaw(dev);
+if (ret)
+return ret;
+
+drm_kms_helper_poll_enable(dev);
+
+return 0;
+}
+
+static int vbox_pm_suspend(struct device *dev) {
+struct pci_dev *pdev = to_pci_dev(dev);
+struct drm_device *ddev = pci_get_drvdata(pdev);
+int error;
+
+error = vbox_drm_freeze(ddev);
+if (error)
+return error;
+
+pci_disable_device(pdev);
+pci_set_power_state(pdev, PCI_D3hot);
+
+return 0;
+}
+
+static int vbox_pm_resume(struct device *dev) {
+struct drm_device *ddev = pci_get_drvdata(to_pci_dev(dev));
+
+return vbox_drm_resume(ddev);
+}
+
+static int vbox_pm_freeze(struct device *dev) {
+struct pci_dev *pdev = to_pci_dev(dev);
+struct drm_device *ddev = pci_get_drvdata(pdev);
+
+if (!ddev || !ddev->dev_private)
+return -ENODEV;
+
+if (1ddev || !ddev->dev_private)
+return -ENODEV;
+}
+return vbox_drm_freeze(ddev);
+
+static int vbox_pm_thaw(struct device *dev)
+
+{
+struct drm_device *ddev = pci_get_drvdata(to_pci_dev(dev));
+
+return vbox_drm_thaw(ddev);
+
+
+static int vbox_pm_poweroff(struct device *dev)
+
+{
+struct drm_device *ddev = pci_get_drvdata(to_pci_dev(dev));
+
+return vbox_drm_freeze(ddev);
+
+
+static const struct dev_pm_ops vbox_pm_ops = {
+	suspend = vbox_pm_suspend,
+	resume = vbox_pm_resume,
+	freeze = vbox_pm_freeze,
+
thaw = vbox_pm_thaw,
+
+poweroff = vbox_pm_poweroff,
+
+restore = vbox_pm_resume,
+
+};
+
+static struct pci_driver vbox_pci_driver = {
+
+name = DRIVER_NAME,
+
id_table = pciidlist,
+
+probe = vbox_pci_probe,
+
+remove = vbox_pci_remove,
+
+driver.pm = &vbox_pm_ops,
+
+};
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(4, 7, 0) && !defined(RHEL_74)
+
+/* This works around a bug in X servers prior to 1.18.4, which sometimes
+ * submit more dirty rectangles than the kernel is willing to handle and
+ * then disable dirty rectangle handling altogether when they see the
+ * EINVAL error. I do not want the code to hang around forever, which is
+ * why I am limiting it to certain kernel versions. We can increase the
+ * limit if some distributions uses old X servers with new kernels. */
+long vbox_ioctl(struct file *filp, unsigned int cmd, unsigned long arg)
+
+{
+long rc = drm_ioctl(filp, cmd, arg);
+
+if (cmd == DRM_IOCTL_MODE_DIRTYFB && rc == -EINVAL)
+return -EOVERFLOW;
+
+"
return rc;
}
#endif /* LINUX_VERSION_CODE < KERNEL_VERSION(4, 7, 0) && !RHEL_74 */

static const struct file_operations vbox_fops = {
	.owner = THIS_MODULE,
	.open = drm_open,
	.release = drm_release,
#ifdef LINUX_VERSION_CODE < KERNEL_VERSION(4, 7, 0) && !defined(RHEL_74)
	.unlocked_ioctl = vbox_ioctl,
#else
	.unlocked_ioctl = drm_ioctl,
#endif
	.mmap = vbox_mmap,
	.poll = drm_poll,
#ifdef LINUX_VERSION_CODE < KERNEL_VERSION(3, 12, 0) && !defined(RHEL_73)
	.fasync = drm_fasync,
#endif
#ifdef CONFIG_COMPAT
	.compat_ioctl = drm_compat_ioctl,
#endif
	.read = drm_read,
};

static int vbox_master_set(struct drm_device *dev, struct drm_file *file_priv, bool from_open)
{
struct vbox_private *vbox = dev->dev_private;

/*
 * We do not yet know whether the new owner can handle hotplug, so we
 * do not advertise dynamic modes on the first query and send a
 * tentative hotplug notification after that to see if they query again.
 */
vbox->initial_mode_queried = false;

mutex_lock(&vbox->hw_mutex);
/*
 * Disable VBVA when someone releases master in case the next person
 * tries tries to do VESA.
 */
mutex_lock(&vbox->hw_mutex);
/*
 * Disable VBVA when someone releases master in case the next person
 */
mutex_lock(&vbox->hw_mutex);
/*
 * Update: we also disable it because if the new master does not do
 */
mutex_lock(&vbox->hw_mutex);
/*
 * as we receive a dirty rectangle report.
 */
static void vbox_master_drop(struct drm_device *dev, struct drm_file *file_priv, bool from_release)
{
    struct vbox_private *vbox = dev->dev_private;

    /* See vbox_master_set() */
    vbox->initial_mode_queried = false;

    mutex_lock(&vbox->hw_mutex);
    vbox_disable_accel(vbox);
    mutex_unlock(&vbox->hw_mutex);
}

static struct drm_driver driver = {
    .driver_features =
        DRIVER_MODESET | DRIVER_GEM | DRIVER_HAVE_IRQ | DRIVER_IRQ_SHARED |
        DRIVER_PRIME,
    .dev_priv_size = 0,
    .load = vbox_driver_load,
    .unload = vbox_driver_unload,
    .lastclose = vbox_driver_lastclose,
    .master_set = vbox_master_set,
    .master_drop = vbox_master_drop,
    .set_busid = drm_pci_set_busid,
    .fops = &vbox_fops,
    .irq_handler = vbox_irq_handler,
    .name = DRIVER_NAME,
    .desc = DRIVER_DESC,
    .date = DRIVER_DATE,
    .major = DRIVER_MAJOR,
    .minor = DRIVER_MINOR,
    .patchlevel = DRIVER_PATCHLEVEL,

#if LINUX_VERSION_CODE >KERNEL_VERSION(3, 18, 0) || defined(RHEL_73)
    .set_busid = drm_pci_set_busid,
#endif
};
+ .gem_free_object = vbox_gem_free_object,
+ .dumb_create = vbox_dumb_create,
+ .dumb_map_offset = vbox_dumb_mmap_offset,
+ #if LINUX_VERSION_CODE < KERNEL_VERSION(3, 12, 0) && !defined(RHEL_73)
+ .dumb_destroy = vbox_dumb_destroy,
+ #else
+ .dumb_destroy = drm_gem_dumb_destroy,
+ #endif
+ .prime_handle_to_fd = drm_gem_prime_handle_to_fd,
+ .prime_fd_to_handle = drm_gem_prime_fd_to_handle,
+ .gem_prime_export = drm_gem_prime_export,
+ .gem_prime_import = drm_gem_prime_import,
+ .gem_prime_pin = vbox_gem_prime_pin,
+ .gem_prime_unpin = vbox_gem_prime_unpin,
+ .gem_prime_get_sg_table = vbox_gem_prime_get_sg_table,
+ .gem_prime_import_sg_table = vbox_gem_prime_import_sg_table,
+ .gem_prime_vmap = vbox_gem_prime_vmap,
+ .gem_prime_vunmap = vbox_gem_prime_vunmap,
+ .gem_prime_mmap = vbox_gem_prime_mmap,
+ };
+
+ static int __init vbox_init(void)
+ {
+ #if defined(CONFIG_VGA_CONSOLE) || LINUX_VERSION_CODE >= KERNEL_VERSION(4, 7, 0)
+ if (vgacon_text_force() && vbox_modeset == -1)
+ return -EINVAL;
+ #endif
+
+ if (vbox_modeset == 0)
+ return -EINVAL;
+
+ return pci_register_driver(&vbox_pci_driver);
+ }
+
+ static void __exit vbox_exit(void)
+ {
+ pcl_unregister_driver(&vbox_pci_driver);
+ }
+
+ static int __init vbox_init(void)
+ {
+ }
+ #ifdef CONFIG_VGA_CONSOLE || LINUX_VERSION_CODE >= KERNEL_VERSION(4, 7, 0)
+ if (vgacon_text_force() && vbox_modeset == -1)
+ return -EINVAL;
+ #endif
+
+ if (vbox_modeset == 0)
+ return -EINVAL;
+
+ return pci_register_driver(&vbox_pci_driver);
+ }
+
+ static void __exit vbox_exit(void)
+ {
+ pcl_unregister_driver(&vbox_pci_driver);
+ }
+
+ module_init(vbox_init);
+ module_exit(vbox_exit);
+
+ MODULE_AUTHOR(DRIVER_AUTHOR);
+ MODULE_DESCRIPTION(DRIVER_DESC);
+ MODULE_LICENSE("GPL and additional rights");
+ #ifdef MODULE_VERSION
+ MODULE_VERSION(VBOX_VERSION_STRING " r" __stringify(VBOX_SVN_REV));
+ }
+* Copyright (C) 2013-2017 Oracle Corporation
+* This file is based on ast_drv.h
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+* Michael Thayer <michael.thayer@oracle.com,
+* Hans de Goede <hdegoede@redhat.com>
+*/
+ifndef ___VBOX_DRV_H___
+define ___VBOX_DRV_H___
+
+define LOG_GROUP LOG_GROUP_DEV_VGA
+
+include <linux/version.h>
+
+if LINUX_VERSION_CODE < KERNEL_VERSION(4, 5, 0)
+include <linux/types.h>
+include <linux/spinlock_types.h>
+endif
+
+include <linux/genalloc.h>
+include <linux/io.h>
+include <linux/string.h>
+ if defined(RHEL_MAJOR) && defined(RHEL_MINOR)
+ if RHEL_MAJOR == 7 && RHEL_MINOR >= 4
+ define RHEL_73
+ define RHEL_74
+ elif RHEL_MAJOR == 7 && RHEL_MINOR >= 3
+ define RHEL_73
+ endif
+ endif
+
+ include <drm/drmP.h>
+ if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 18, 0) || defined(RHEL_73)
+ include <drm/drm_gem.h>
+ endif
+ include <drm/drm_fb_helper.h>
+ if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+ include <drm/drm_encoder.h>
+ endif
+
+ include <drm/ttm/ttm_bo_api.h>
+ include <drm/ttm/ttm_bo_driver.h>
+ include <drm/ttm/ttm_placement.h>
+ include <drm/ttm/ttm_memory.h>
+ include <drm/ttm/ttm_module.h>
+
+ include "vboxvideo_guest.h"
+ include "vboxvideo_vbe.h"
+ include "hgsmi_ch_setup.h"
+
+ include "product-generated.h"
+
+ define DRIVER_AUTHOR VBOX_VENDOR
+
+ define DRIVER_NAME "vboxvideo"
+ define DRIVER_DESC VBOX_PRODUCT " Graphics Card"
+ define DRIVER_DATE "20130823"
+
+ define DRIVER_MAJOR 1
+ define DRIVER_MINOR 0
+ define DRIVER_PATCHLEVEL 0
+
+ define VBOX_MAX_CURSOR_WIDTH 64
+ define VBOX_MAX_CURSOR_HEIGHT 64
+ define CURSOR_PIXEL_COUNT (VBOX_MAX_CURSOR_WIDTH * VBOX_MAX_CURSOR_HEIGHT)
+ define CURSOR_DATA_SIZE (CURSOR_PIXEL_COUNT * 4 + CURSOR_PIXEL_COUNT / 8)
+
+ define VBOX_MAX SCREENS 32
+
+\ define GUEST_HEAP_OFFSET(vbox) ((vbox)->full_vram_size - \
+ VBVA_ADAPTER_INFORMATION_SIZE)
+\ define GUEST_HEAP_SIZE VBVA_ADAPTER_INFORMATION_SIZE
+\ define GUEST_HEAP_USABLE_SIZE (VBVA_ADAPTER_INFORMATION_SIZE - \
+sizeof(struct hgsmi_host_flags))
+\ define HOST_FLAGS_OFFSET GUEST_HEAP_USABLE_SIZE
+
+struct vbox_fbdev;
+
+struct vbox_private {
+struct drm_device *dev;
+
+u8 __iomem *guest_heap;
+u8 __iomem *vbva_buffers;
+struct gen_pool *guest_pool;
+struct vbva_buf_context *vbva_info;
+bool any_pitch;
+unsigned int num_crtcs;
+/** Amount of available VRAM, including space used for buffers. */
+u32 full_vram_size;
+/** Amount of available VRAM, not including space used for buffers. */
+u32 available_vram_size;
+/** Array of structures for receiving mode hints. */
+struct vbva_modehint *last_mode_hints;
+
+struct vbox_fbdev *fbdev;
+
+int fb_mtrr;
+
+struct {
+struct drm_global_reference mem_global_ref;
+struct ttm_bo_global_ref bo_global_ref;
+struct ttm_bo_device bdev;
+bool mm_initialised;
+} ttm;
+
+struct mutex hw_mutex; /* protects modeset and accel/vbva accesses */
+
+bool isr_installed;
+/**
+ * We decide whether or not user-space supports display hot-plug
+ * depending on whether they react to a hot-plug event after the initial
+ * mode query.
+ */
+bool initial_mode_queried;
+struct work_struct hotplug_work;
+u32 input_mapping_width;
+u32 input_mapping_height;
+/**/
+ * Is user-space using an X.Org-style layout of one large frame-buffer
+ * encompassing all screen ones or is the fbdev console active?
+ */
+bool single_framebuffer;
+u32 cursor_width;
+u32 cursor_height;
+u32 cursor_hot_x;
+u32 cursor_hot_y;
+size_t cursor_data_size;
+u8 cursor_data[CURSOR_DATA_SIZE];
+};
+
+#ifndef CURSOR_PIXEL_COUNT
+#define CURSOR_PIXEL_COUNT
+
+int vbox_driver_load(struct drm_device *dev, unsigned long flags);
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+void vbox_driver_unload(struct drm_device *dev);
+#else
+int vbox_driver_unload(struct drm_device *dev);
+#endif
+void vbox_driver_lastclose(struct drm_device *dev);
+
+struct vbox_gem_object;
+
+#ifndef VGA_PORT_HGSMI_HOST
+#define VGA_PORT_HGSMI_HOST             0x3b0
+#define VGA_PORT_HGSMI_GUEST            0x3d0
+#endif
+
+struct vbox_connector {
+struct drm_connector base;
+char name[32];
+struct vbox_crtc *vbox_crtc;
+struct {
+u32 width;
+u32 height;
+bool disconnected;
+} mode_hint;
+};
+
+struct vbox_crtc {
+struct drm_crtc base;
+bool blanked;
+bool disconnected;
+unsigned int crtc_id;
+u32 fb_offset;
+bool cursor_enabled;
+u32 x_hint;
+u32 y_hint;
+);
+
+struct vbox_encoder {
+struct drm_encoder base;
+};
+
+struct vbox_framebuffer {
+struct drm_framebuffer base;
+struct drm_gem_object *obj;
+};
+
+struct vbox_fbdev {
+struct drm_fb_helper helper;
+struct vbox_framebuffer afb;
+int size;
+struct ttm_bo_kmap_obj mapping;
+int x1, y1, x2, y2;/* dirty rect */
+spinlock_t dirty_lock;
+};
+
+#define to_vbox_crtc(x) container_of(x, struct vbox_crtc, base)
+#define to_vbox_connector(x) container_of(x, struct vbox_connector, base)
+#define to_vbox_encoder(x) container_of(x, struct vbox_encoder, base)
+#define to_vbox_framebuffer(x) container_of(x, struct vbox_framebuffer, base)
+
+int vbox_mode_init(struct drm_device *dev);
+void vbox_mode_fini(struct drm_device *dev);
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 3, 0)
+#define DRM_MODE_FB_CMD drm_mode_fb_cmd
+#else
+#define DRM_MODE_FB_CMD drm_mode_fb_cmd2
+#endif
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 15, 0) && !defined(RHEL_73)
+#define CRTC_FB(crtc) ((crtc)->fb)
+#else
+#define CRTC_FB(crtc) ((crtc)->primary->fb)
+#endif
+
+void vbox_enable_accel(struct vbox_private *vbox);
+void vbox_disable_accel(struct vbox_private *vbox);
+void vbox_report_caps(struct vbox_private *vbox);
+
+void vbox_framebuffer_dirty_rectangles(struct drm_framebuffer *fb,
+    struct drm_clip_rect *rects,
unsigned int num_rects);
+
int vbox_framebuffer_init(struct drm_device *dev,
  struct vbox_framebuffer *vbox_fb,
#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 5, 0) || defined(RHEL_73)
  const
#endif
  struct DRM_MODE_FB_CMD *mode_cmd,
  struct drm_gem_object *obj);
+
int vbox_fbdev_init(struct drm_device *dev);
void vbox_fbdev_fini(struct drm_device *dev);
void vbox_fbdev_set_suspend(struct drm_device *dev, int state);
+
+struct vbox_bo {
struct ttm_buffer_object bo;
struct ttm_placement placement;
struct ttm_bo_kmap_obj kmap;
struct drm_gem_object gem;
#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 18, 0) && !defined(RHEL_73)
u32 placements[3];
#else
struct ttm_place placements[3];
#endif
+int pin_count;
+};
+
#define gem_to_vbox_bo(gobj) container_of((gobj), struct vbox_bo, gem)
+
static inline struct vbox_bo *vbox_bo(struct ttm_buffer_object *bo)
+{
+return container_of(bo, struct vbox_bo, bo);
+}
+
#define to_vbox_obj(x) container_of(x, struct vbox_gem_object, base)
+
int vbox_dumb_create(struct drm_file *file,
  struct drm_device *dev,
  struct drm_mode_create_dumb *args);
#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 12, 0) && !defined(RHEL_73)
int vbox_dumb_destroy(struct drm_file *file,
  struct drm_device *dev, u32 handle);
#endif
+
void vbox_gem_free_object(struct drm_gem_object *obj);
int vbox_dumb_mmap_offset(struct drm_file *file,
  struct drm_device *dev, u32 handle,
  u32 handle, u64 *offset);
```c
#define DRM_FILE_PAGE_OFFSET (0x10000000ULL >> PAGE_SHIFT)

int vbox_mm_init(struct vbox_private *vbox);
void vbox_mm_fini(struct vbox_private *vbox);

int vbox_bo_create(struct drm_device *dev, int size, int align,
    u32 flags, struct vbox_bo **pvboxbo);

int vbox_gem_create(struct drm_device *dev,
    u32 size, bool iskernel, struct drm_gem_object **obj);

int vbox_bo_pin(struct vbox_bo *bo, u32 pl_flag, u64 *gpu_addr);
int vbox_bo_unpin(struct vbox_bo *bo);

static inline int vbox_bo_reserve(struct vbox_bo *bo, bool no_wait)
{
    int ret;

    if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 7, 0) || defined(RHEL_74)
        ret = ttm_bo_reserve(&bo->bo, true, no_wait, NULL);
    else
        ret = ttm_bo_reserve(&bo->bo, true, no_wait, false, 0);

    if (ret) {
        DRM_ERROR("reserve failed %p
", bo);
        return ret;
    }

    return 0;
}

static inline void vbox_bo_unreserve(struct vbox_bo *bo)
{
    ttm_bo_unreserve(&bo->bo);
}

void vbox_ttm_placement(struct vbox_bo *bo, int domain);
int vbox_bo_push_sysram(struct vbox_bo *bo);
int vbox_mmap(struct file *filp, struct vm_area_struct *vma);

int vbox_gem_prime_pin(struct drm_gem_object *obj);
void vbox_gem_prime_unpin(struct drm_gem_object *obj);
struct sg_table *vbox_gem_prime_get_sg_table(struct drm_gem_object *obj);
struct drm_gem_object *vbox_gem_prime_import_sg_table(struct drm_device *dev,
    struct sg_table *sg_table);

#ifdef LINUX_VERSION_CODE < KERNEL_VERSION(3, 18, 0) && !defined(RHEL_73)
    size_t size,
```
else
  struct dma_buf_attachment
  *attach,
#endif
  struct sg_table *table);
void *vbox_gem_prime_vmap(struct drm_gem_object *obj);
void vbox_gem_prime_vunmap(struct drm_gem_object *obj, void *vaddr);
int vbox_gem_prime_mmap(struct drm_gem_object *obj,
  struct vm_area_struct *area);
+
+ /* vbox_irq.c */
  +int vbox_irq_init(struct vbox_private *vbox);
  +void vbox_irq_fini(struct vbox_private *vbox);
  +void vbox_report_hotplug(struct vbox_private *vbox);
  +irqreturn_t vbox_irq_handler(int irq, void *arg);
+
+ /* vbox_hgsmi.c */
  +void *hgsmi_buffer_alloc(struct gen_pool *guest_pool, size_t size,
        u8 channel, u16 channel_info);
  +void hgsmi_buffer_free(struct gen_pool *guest_pool, void *buf);
  +int hgsmi_buffer_submit(struct gen_pool *guest_pool, void *buf);
+
  static inline void vbox_write_ioport(u16 index, u16 data)
  +{
        +outw(index, VBE_DISPI_IOPORT_INDEX);
        +outw(data, VBE_DISPI_IOPORT_DATA);
  +}
+
#endif
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vbox_err.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vbox_err.h
@@ -0,0 +1,65 @@
+/*
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+ */
+
+#ifndef __VBOX_ERR_H__
+#define __VBOX_ERR_H__
+
+/** @name VirtualBox error macros
+ * @{ */
+
+#define VINF_SUCCESS                        0
+#define VERR_INVALID_PARAMETER              (-2)
+#define VERR_INVALID_POINTER                (-6)
+#define VERR_NO_MEMORY                      (-8)
+#define VERR_NOT_IMPLEMENTED                (-12)
+#define VERR_INVALID_FUNCTION               (-36)
+#define VERR_NOT_SUPPORTED                  (-37)
+#define VERR_TOO_MUCH_DATA                  (-42)
+#define VERR_NOT_FOUND                      (-78)
+#define VERR_INVALID_STATE                 (-79)
+#define VERR_OUT_OF_RESOURCES              (-80)
+#define VERR_ALREADY_EXISTS                (-105)
+#define VERR_INTERNAL_ERROR                (-225)
+
+#define RT_SUCCESS_NP(rc)   ( (int)(rc) >= VINF_SUCCESS )
+#define RT_SUCCESS(rc)      ( likely(RT_SUCCESS_NP(rc)) )
+#define RT_FAILURE(rc)      ( unlikely(!RT_SUCCESS_NP(rc)) )
+
/** @}  */
+
/** @name VirtualBox assertions
+ * @{ */
+
/* Unlike BUILD_BUG_ON(), these can be used outside of functions. */
+extern int vbox_assert_var[1];
+#define assert_compile(expr) \
+extern int vbox_assert_var[1] __attribute__((__unused__)), \
+vbox_assert_var[(expr) ? 1 : 0] __attribute__((__unused__)) \
+#define assert_compile_size(type, size) \
+assert_compile(sizeof(type) == (size))
+
/** @} */
+
+/* */
/* Include from most specific to most general to be able to override things. */
#include "vbox_drv.h"
#include "vboxvideo.h"
+
#include <linux/module.h>
#include <linux/kernel.h>
#include <linux/errno.h>
#include <linux/string.h>
#include <linux/mm.h>
#include <linux/tty.h>
#include <linux/sysrq.h>
#include <linux/delay.h>
#include <linux/fb.h>
#include <linux/init.h>
+
#include <drm/drmP.h>
+ /* Tell the host about dirty rectangles to update. */
+ static void vbox_dirty_update(struct vbox_fbdev *fbdev, int x, int y, int width, int height)
+ {
+ struct drm_gem_object *obj;
+ struct vbox_bo *bo;
+ int ret = -EBUSY;
+ bool store_for_later = false;
+ int x2, y2;
+ unsigned long flags;
+ struct drm_clip_rect rect;
+ 
+ obj = fbdev->afb.obj;
+ bo = gem_to_vbox_bo(obj);
+ 
+ /* try and reserve the BO, if we fail with busy 
+ then the BO is being moved and we should 
+ store up the damage until later. */
+ if (drm_can_sleep())
+ ret = vbox_bo_reserve(bo, true);
+ if (ret) {
+ if (ret != -EBUSY)
+ return;
+ 
+ store_for_later = true;
+ }
+ 
+ x2 = x + width - 1;
+ y2 = y + height - 1;
+ spin_lock_irqsave(&fbdev->dirty_lock, flags);
+ 
+ if (fbdev->y1 < y)
+ y = fbdev->y1;
+ if (fbdev->y2 > y2)
+ y2 = fbdev->y2;
+ if (fbdev->x1 < x)
+ x = fbdev->x1;
+ if (fbdev->x2 > x2)
+x2 = fbdev->x2;
+
+if (store_for_later) {
+ fbdev->x1 = x;
+ fbdev->x2 = x2;
+ fbdev->y1 = y;
+ fbdev->y2 = y2;
+ spin_unlock_irqrestore(&fbdev->dirty_lock, flags);
+ return;
+ }
+
+ fbdev->x1 = INT_MAX;
+ fbdev->y1 = INT_MAX;
+ fbdev->x2 = 0;
+ fbdev->y2 = 0;
+
+ spin_unlock_irqrestore(&fbdev->dirty_lock, flags);
+
+ /*
+ * Not sure why the original code subtracted 1 here, but I will keep
+ * it that way to avoid unnecessary differences.
+ */
+ rect.x1 = x;
+ rect.x2 = x2 + 1;
+ rect.y1 = y;
+ rect.y2 = y2 + 1;
+ vbox_framebuffer_dirty_rectangles(&fbdev->afb.base, &rect, 1);
+
+ vbox_bo_unreserve(bo);
+}
+
+#ifdef CONFIG_FB_DEFERRED_IO
+static void vbox_deferred_io(struct fb_info *info, struct list_head *pagelist)
+{
+ struct vbox_fbdev *fbdev = info->par;
+ unsigned long start, end, min, max;
+ struct page *page;
+ int y1, y2;
+ +
+ +min = ULONG_MAX;
+ +max = 0;
+ +list_for_each_entry(page, pagelist, lru) {
+ + start = page->index << PAGE_SHIFT;
+ + end = start + PAGE_SIZE - 1;
+ + min = min(min, start);
+ + max = max(max, end);
+ +}
+ +
+
+ /*
+ * Foreign code snippet
+ */
+ +
+ /*
+ * Not sure why the original code subtracted 1 here, but I will keep
+ * it that way to avoid unnecessary differences.
+ */
+ rect.x1 = x;
+ rect.x2 = x2 + 1;
+ rect.y1 = y;
+ rect.y2 = y2 + 1;
+ vbox_framebuffer_dirty_rectangles(&fbdev->afb.base, &rect, 1);
+
+ vbox_bo_unreserve(bo);
+}
+
+#ifdef CONFIG_FB_DEFERRED_IO
+static void vbox_deferred_io(struct fb_info *info, struct list_head *pagelist)
+{
+ struct vbox_fbdev *fbdev = info->par;
+ unsigned long start, end, min, max;
+ struct page *page;
+ int y1, y2;
+ +
+ +min = ULONG_MAX;
+ +max = 0;
+ +list_for_each_entry(page, pagelist, lru) {
+ + start = page->index << PAGE_SHIFT;
+ + end = start + PAGE_SIZE - 1;
+ + min = min(min, start);
+ + max = max(max, end);
+ +}
+ +
+
+if (min < max) {
+  y1 = min / info->fix.line_length;
+  y2 = (max / info->fix.line_length) + 1;
+  DRM_INFO("%s: Calling dirty update: 0, %d, %d, %d\n",
+      __func__, y1, info->var.xres, y2 - y1 - 1);
+  vbox_dirty_update(fbdev, 0, y1, info->var.xres, y2 - y1 - 1);
+}
+
+static struct fb_deferred_io vbox_defio = {
+  .delay = VBOX_DIRTY_DELAY,
+  .deferred_io = vbox_deferred_io,
+};
+#endif
+
+static void vbox_fillrect(struct fb_info *info, const struct fb_fillrect *rect)
+{
+  struct vbox_fbdev *fbdev = info->par;
+  sys_fillrect(info, rect);
+  vbox_dirty_update(fbdev, rect->dx, rect->dy, rect->width, rect->height);
+}
+
+static void vbox_copyarea(struct fb_info *info, const struct fb_copyarea *area)
+{
+  struct vbox_fbdev *fbdev = info->par;
+  sys_copyarea(info, area);
+  vbox_dirty_update(fbdev, area->dx, area->dy, area->width, area->height);
+}
+
+static void vbox_imageblit(struct fb_info *info, const struct fb_image *image)
+{
+  struct vbox_fbdev *fbdev = info->par;
+  sys_imageblit(info, image);
+  vbox_dirty_update(fbdev, image->dx, image->dy, image->width, image->height);
+}
+
+static struct fb_ops vboxfb_ops = {
+  .owner = THIS_MODULE,
+  .fb_check_var = drm_fb_helper_check_var,
+  .fb_set_par = drm_fb_helper_set_par,
+  .fb_fillrect = vbox_fillrect,
+  .fb_copyarea = vbox_copyarea,
+  .fb_imageblit = vbox_imageblit,
+  .fb_pan_display = drm_fb_helper_pan_display,
+.fb_blank = drm_fb_helper_blank,
+.fb_setcmap = drm_fb_helper_setcmap,
+.fb_debug_enter = drm_fb_helper_debug_enter,
+.fb_debug_leave = drm_fb_helper_debug_leave,
+};
+
+static int vboxfb_create_object(struct vbox_fbdev *fbdev,
+struct DRM_MODE_FB_CMD *mode_cmd,
+struct drm_gem_object **__gobj_p)
+{
+struct drm_device *dev = fbdev->helper.dev;
+u32 size;
+struct drm_gem_object *obj;
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 3, 0)
+u32 pitch = mode_cmd->pitch;
+#else
+u32 pitch = mode_cmd->pitches[0];
+#endif
+
+int ret = 0;
+
+size = pitch * mode_cmd->height;
+ret = vbox_gem_create(dev, size, true, &obj);
+if (ret)
+return ret;
+
+gobj_p = obj;
+return ret;
+}
+
+static int vboxfb_create(struct drm_fb_helper *helper,
+ struct drm_fb_helper_surface_size *sizes)
+{
+struct vbox_fbdev *fbdev =
+ container_of(helper, struct vbox_fbdev, helper);
+struct drm_device *dev = fbdev->helper.dev;
+struct DRM_MODE_FB_CMD mode_cmd;
+struct drm_framebuffer *fb;
+struct fb_info *info;
+struct device *device = &dev->pdev->dev;
+struct drm_gem_object *gobj = NULL;
+struct vbox_bo *bo = NULL;
+int size, ret;
+u32 pitch;
+
+mode_cmd.width = sizes->surface_width;
+mode_cmd.height = sizes->surface_height;
+pitch = mode_cmd.width * ((sizes->surface_bpp + 7) / 8);
+if LINUX_VERSION_CODE < KERNEL_VERSION(3, 3, 0)
+mode_cmd bpp = sizes->surface bpp;
+mode_cmd depth = sizes->surface_depth;
+mode_cmd pitch = pitch;
+} else
+mode_cmd pixel format = drm_mode_legacy_fb_format(sizes->surface bpp,
+ sizes->surface_depth);
+mode_cmd pitches[0] = pitch;
+} endif
+
+size = pitch * mode_cmd.height;
+
+ret = vboxfb_create_object(fbdev, &mode_cmd, &gobj);
+if (ret) {
+DRM_ERROR("failed to create fbcon backing object %d\n", ret);
+return ret;
+}
+
+ret = vbox framebuffer init(dev, &fbdev->afb, &mode_cmd, gobj);
+if (ret)
+return ret;
+
+bo = gem_to vbox bo(gobj);
+
+ret = vbox bo reserve(bo, false);
+if (ret)
+return ret;
+
+ret = vbox bo pin(bo, TTM PL_FLAG_VRAM, NULL);
+if (ret) {
+vbox bo unreserve(bo);
+return ret;
+}
+
+ret = ttm bo kmap(&bo->bo, 0, bo->bo.num_pages, &bo->kmap);
+vbox bo unreserve(bo);
+if (ret) {
+DRM_ERROR("failed to kmap fbcon\n");
+return ret;
+}
+
+info = framebuffer alloc(0, device);
+if (!info)
+return -ENOMEM;
+info->par = fbdev;
+
+fbdev->size = size;
+
+fb = &fbdev->afb.base;
+fbdev->helper.fb = fb;
+fbdev->helper.fbdev = info;
+
+strcpy(info->fix.id, "vboxdrmfb");
+
+/*
+ * The last flag forces a mode set on VT switches even if the kernel
+ * does not think it is needed.
+ */
+info->flags = FBINFO_DEFAULT | FBINFO_CAN_FORCE_OUTPUT |
+ FBINFO_MISC_ALWAYS_SETPAR;
+info->fbops = &vboxfb_ops;
+
+ret = fb_alloc_cmap(&info->cmap, 256, 0);
+if (ret)
+return -ENOMEM;
+
+/*
+ * This seems to be done for safety checking that the framebuffer
+ * is not registered twice by different drivers.
+ */
+info->apertures = alloc_apertures(1);
+if (!info->apertures)
+return -ENOMEM;
+
+info->apertures->ranges[0].base = pci_resource_start(dev->pdev, 0);
+info->apertures->ranges[0].size = pci_resource_len(dev->pdev, 0);
+info->fix.smem_start = 0;
+info->fix.smem_len = size;
+
+ifdef CONFIG_FB_DEFERRED_IO
+info->fbdefio = &vbox_defio;
+fb_deferred_io_init(info);
+endif
+
+info->pixmap.flags = FB_PIXMAP_SYSTEM;
+
+ifdef LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+drm_fb_helper_fill_fix(info, fb->pitches[0], fb->format->depth);
+#else
+drm_fb_helper_fill_fix(info, fb->pitches[0], fb->depth);
+#endif
+drm_fb_helper_fill_var(info, &fbdev->helper, sizes->fb_width,
+ sizes->fb_height);
+
+info->screen_base = bo->kmap.virtual;
+info->screen_size = size;
+
+ifdef CONFIG_FB_DEFERRED_IO
+info->fbdefio = &vbox_defio;
+fb_deferred_io_init(info);
+endif
+
+info->pixmap.flags = FB_PIXMAP_SYSTEM;
+
DRM_DEBUG_KMS("allocated %dx%d\n", fb->width, fb->height);
+
+return 0;
+}
+
+static struct drm_fb_helper_funcs vbox_fb_helper_funcs = {  
+.fb_probe = vboxfb_create,
+};  
+
+static void vbox_fbdev_destroy(struct drm_device *dev, struct vbox_fbdev *fbdev)  
+{  
+struct fb_info *info;  
+struct vbox_framebuffer *afb = &fbdev->afb;  
+  
+if (fbdev->helper.fbdev) {  
+info = fbdev->helper.fbdev;  
+unregister_framebuffer(info);  
+if (info->cmap.len)  
+fb_dealloc_cmap(&info->cmap);  
+framebuffer_release(info);  
+}
+
+if (afb->obj) {  
+struct vbox_bo *bo = gem_to_vbox_bo(afb->obj);  
+
+if (!vbox_bo_reserve(bo, false)) {  
+bo->kmap.virtual  
+ttm_bo_kunmap(&bo->kmap);  
+/*  
+ * QXL does this, but is it really needed before  
+ * freeing?  
+ */  
+if (bo->pin_count)  
+vbox_bo_unpin(bo);  
+vbox_bo_unreserve(bo);  
+}
+
+drm_gem_object_unreference_unlocked(afb->obj);  
+afb->obj = NULL;  
+}
+
+drm_fb_helper_fini(&fbdev->helper);  
+
+if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 9, 0)  
+drm_framebuffer_unregister_private(&afb->base);  
+endif  
+
+drm_framebuffer_cleanup(&afb->base);  
+}
+
+int vbox_fbdev_init(struct drm_device *dev)
+{  
+    struct vbox_private *vbox = dev->dev_private;  
+    struct vbox_fbdev *fbdev;  
+    int ret;  
+    +
+    fbdev = kzalloc(sizeof(*fbdev), GFP_KERNEL);  
+    +if (!fbdev)  
+        +return -ENOMEM;  
+    +vbox->fbdev = fbdev;  
+    +spin_lock_init(&fbdev->dirty_lock);  
+    +
+    +#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 17, 0) && !defined(RHEL_73)  
+        +fbdev->helper.funcs = &vbox_fb_helper_funcs;  
+    +#else  
+        +drm_fb_helper_prepare(dev, &fbdev->helper, &vbox_fb_helper_funcs);  
+    +#endif  
+    +#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)  
+        +ret = drm_fb_helper_init(dev, &fbdev->helper, vbox->num_crtcs);  
+    +#else  
+        +ret =  
+            +    drm_fb_helper_init(dev, &fbdev->helper, vbox->num_crtcs,  
+            +    vbox->num_crtcs);  
+    +#endif  
+    +if (ret)  
+        +goto free;  
+    +
+    +ret = drm_fb_helper_single_add_all_connectors(&fbdev->helper);  
+    +if (ret)  
+        +goto fini;  
+    +
+    +/* disable all the possible outputs/crtcs before entering KMS mode */  
+    +drm_helper_disable_unused_functions(dev);  
+    +
+    +ret = drm_fb_helper_initial_config(&fbdev->helper, 32);  
+    +if (ret)  
+        +goto fini;  
+    +
+    +return 0;  
+    +
+fini:  
+    +drm_fb_helper_fin(&fbdev->helper);  
+    +free:  
+    +kfree(fbdev);  
+    +vbox->fbdev = NULL;  
+    +
+    +return ret;  
+}
+ void vbox_fbdev_fini(struct drm_device *dev)
+ {
+ struct vbox_private *vbox = dev->dev_private;
+ +
+ if (!vbox->fbdev)
+ return;
+ +
+ vbox_fbdev_destroy(dev, vbox->fbdev);
+ kfree(vbox->fbdev);
+ vbox->fbdev = NULL;
+ +
+ +
+ void vbox_fbdev_set_suspend(struct drm_device *dev, int state)
+ {
+ struct vbox_private *vbox = dev->dev_private;
+ +
+ if (!vbox->fbdev)
+ return;
+ +
+ fb_set_suspend(vbox->fbdev->helper.fbdev, state);
+ +
+ */
+ /* Contributed by Hans de Goede <hdegoede@redhat.com>
+ */
+ */
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+ */
+
+#include "vbox_drv.h"
+#include "vboxvideo_vbe.h"
+
+/* One-at-a-Time Hash from http://www.burtleburtle.net/bob/hash/doobs.html */
+static u32 hgsmi_hash_process(u32 hash, const u8 *data, int size)
+{
+  while (size--)
+  {
+    hash += *data++;
+    hash += (hash << 10);
+    hash ^= (hash >> 6);
+  }
+
+  return hash;
+}
+
+static u32 hgsmi_hash_end(u32 hash)
+{
+  hash += (hash << 3);
+  hash ^= (hash >> 11);
+  hash += (hash << 15);
+}
+
+/* Not really a checksum but that is the naming used in all vbox code */
+static u32 hgsmi_checksum(u32 offset, 
+ const HGSMIBUFFERHEADER *header,
+ const HGSMIBUFFERTAIL *tail)
+{
+  u32 checksum;
+
+  checksum = hgsmi_hash_process(0, (u8 *)&offset, sizeof(offset));
+  checksum = hgsmi_hash_process(checksum, (u8 *)header, sizeof(*header));
+  /* 4 -> Do not checksum the checksum itself */
+  checksum = hgsmi_hash_process(checksum, (u8 *)tail, 4);
+  return hgsmi_hash_end(checksum);
+}
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 13, 0)
+void *gen_pool_dma_alloc(struct gen_pool *pool, size_t size, dma_addr_t *dma)
+{
+  unsigned long vaddr = gen_pool_alloc(pool, size);
+  
+```
+if (vaddr)
+  *dma = gen_pool_virt_to_phys(pool, vaddr);
+return (void *)&vaddr;
+
+#endif
+
+void *hgsmi_buffer_alloc(struct gen_pool *guest_pool, size_t size,
+  u8 channel, u16 channel_info)
+
+  HGSMIBUFFERHEADER *h;
+  HGSMIBUFFERTAIL  *t;
+  size_t total_size;
+  dma_addr_t offset;
+
+  total_size = size + sizeof(HGSMIBUFFERHEADER) + sizeof(HGSMIBUFFERTAIL);
+  h = gen_pool_dma_alloc(guest_pool, total_size, &offset);
+  if (!h)
+    return NULL;
+
+  t = (HGSMIBUFFERTAIL *)((u8 *)h + sizeof(HGSMIBUFFERHEADER) + size);
+
+  h->u8Flags = HGSMI_BUFFER_HEADER_F_SEQ_SINGLE;
+  h->u32DataSize = size;
+  h->u8Channel = channel;
+  h->u16ChannelInfo = channel_info;
+  memset(&h->u.au8Union, 0, sizeof(h->u.au8Union));
+
+  t->reserved = 0;
+  t->u32Checksum = hgsmi_checksum(offset, h, t);
+
+  return (u8 *)h + sizeof(HGSMIBUFFERHEADER);
+}
+
+void hgsmi_buffer_free(struct gen_pool *guest_pool, void *buf)
+
+  HGSMIBUFFERHEADER *h =
+  (HGSMIBUFFERHEADER *)((u8 *)buf - sizeof(HGSMIBUFFERHEADER));
+  size_t total_size = h->u32DataSize + sizeof(HGSMIBUFFERHEADER) +
+    sizeof(HGSMIBUFFERTAIL);
+
+  gen_pool_free(guest_pool, (unsigned long)h, total_size);
+
+int hgsmi_buffer_submit(struct gen_pool *guest_pool, void *buf)
+
+  phys_addr_t offset;
+
+  offset = gen_pool_virt_to_phys(guest_pool, (unsigned long)buf -
outl((u32)~0, VGA_PORT_HGSMI_HOST);

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 */

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 * Michael Thayer <michael.thayer@oracle.com,
 * Hans de Goede <hdegoede@redhat.com>
 */

#include "vbox_drv.h"

#include "vboxvideo.h"

#include <drm/drm_crtc_helper.h>

static void vbox_clear_irq(void)
{
    uint32_t offset = sizeof(HGSMIBUFFERHEADER);
    outl(offset, VGA_PORT_HGSMI_GUEST);
    /* Make the compiler aware that the host has changed memory. */
    mb();
    return VINF_SUCCESS;
}
static u32 vbox_get_flags(struct vbox_private *vbox)
{
    return readl(vbox->guest_heap + HOST_FLAGS_OFFSET);
}

void vbox_report_hotplug(struct vbox_private *vbox)
{
    schedule_work(&vbox->hotplug_work);
}

irqreturn_t vbox_irq_handler(int irq, void *arg)
{
    struct drm_device *dev = (struct drm_device *)arg;
    struct vbox_private *vbox = (struct vbox_private *)dev->dev_private;
    u32 host_flags = vbox_get_flags(vbox);

    if (!(host_flags & HGSMIHOSTFLAGS_IRQ))
        return IRQ_NONE;

    /* Due to a bug in the initial host implementation of hot-plug irqs,
    * the hot-plug and cursor capability flags were never cleared.
    * Fortunately we can tell when they would have been set by checking
    * that the VSYNC flag is not set.
    */
    if (host_flags &
        (HGSMIHOSTFLAGS_HOTPLUG | HGSMIHOSTFLAGS_CURSOR_CAPABILITIES) &
        !(host_flags & HGSMIHOSTFLAGS_VSYNC))
        vbox_report_hotplug(vbox);

    vbox_clear_irq();

    return IRQ_HANDLED;
}

/**
 * Check that the position hints provided by the host are suitable for GNOME
 * shell (i.e. all screens disjoint and hints for all enabled screens) and if
 * not replace them with default ones. Providing valid hints improves the
 * chances that we will get a known screen layout for pointer mapping.
 */
static void validate_or_set_position_hints(struct vbox_private *vbox)
{
    int i, j;
    u16 currentx = 0;
    bool valid = true;
for (i = 0; i < vbox->num_crtcs; ++i) {
  for (j = 0; j < i; ++j) {
    struct vbva_modehint *hintsi = &vbox->last_mode_hints[i];
    struct vbva_modehint *hintsj = &vbox->last_mode_hints[j];
    if (hintsi->fEnabled && hintsj->fEnabled) {
      if (hintsi->dx >= 0xffff ||
          hintsi->dy >= 0xffff ||
          hintsj->dx >= 0xffff ||
          hintsj->dy >= 0xffff ||
          (hintsi->dx <
            hintsj->dx + (hintsj->cx & 0x8fff) &&
            hintsj->dx <,
            hintsj->dy + (hintsj->cy & 0x8fff) &&
            hintsj->dy <
            hintsj->dy + (hintsj->cy & 0x8fff) &&
            hintsj->dy <
            hintsj->dy))
        valid = false;
    }
  }
}
if (!valid)
  for (i = 0; i < vbox->num_crtcs; ++i) {
    if (vbox->last_mode_hints[i].fEnabled) {
      vbox->last_mode_hints[i].dx = currentx;
      vbox->last_mode_hints[i].dy = 0;
      currentx +=
        vbox->last_mode_hints[i].cx & 0x8fff;
    }
  }
/**
 * Query the host for the most recent video mode hints.
 */
static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
  int rc;
  
  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
  int rc;
  
  * Query the host for the most recent video mode hints.
  */
  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
  int rc;
  
  * Query the host for the most recent video mode hints.
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  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
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  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
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  * Query the host for the most recent video mode hints.
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  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
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  * Query the host for the most recent video mode hints.
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  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
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  * Query the host for the most recent video mode hints.
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  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
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  * Query the host for the most recent video mode hints.
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  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
  int rc;
  
  * Query the host for the most recent video mode hints.
  */
  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
  int rc;
  
  * Query the host for the most recent video mode hints.
  */
  static void vbox_update_mode_hints(struct vbox_private *vbox) {
  struct drm_device *dev = vbox->dev;
  struct drm_connector *connector;
  struct vbox_connector *vbox_connector;
  struct vbva_modehint *hints;
  u16 flags;
  bool disconnected;
  unsigned int crtc_id;
  int rc;
rc = hgsmi_get_mode_hints(vbox->guest_pool, vbox->num_crtcs, vbox->last_mode_hints);
if (RT_FAILURE(rc)) {
  DRM_ERROR("vgsmi: hgsmi_get_mode_hints failed, rc=%i\n",
  rc);
  return;
}
validate_or_set_position_hints(vbox);
#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 9, 0)
drm_modeset_lock_all(dev);
#else
mutex_lock(&dev->mode_config.mutex);
#endif
list_for_each_entry(connector, &dev->mode_config.connector_list, head) {
  vbox_connector = to_vbox_connector(connector);
  hints = vbox->last_mode_hints[vbox_connector->vbox_crtc->crtc_id];
  if (hints->magic == VBVAMODEHINT_MAGIC) {
    disconnected = !(hints->fEnabled);
    crtc_id = vbox_connector->vbox_crtc->crtc_id;
    flags = VBVA_SCREEN_F_ACTIVE
    | (disconnected ? VBVA_SCREEN_F_DISABLED :
      VBVA_SCREEN_F_BLANK);
    vbox_connector->mode_hint.width = hints->cx;
    vbox_connector->mode_hint.height = hints->cy;
    vbox_connector->vbox_crtc->x_hint = hints->dx;
    vbox_connector->vbox_crtc->y_hint = hints->dy;
    vbox_connector->mode_hint.disconnected = disconnected;
    if (vbox_connector->vbox_crtc->disconnected != disconnected) {
      hgsmi_process_display_info(vbox->guest_pool,
        crtc_id, 0, 0, 0,
        hints->cx * 4,
        hints->cx,
        hints->cy, 0,
        flags);
      vbox_connector->vbox_crtc->disconnected =
        disconnected;
    }
  }
}
#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 9, 0)
drm_modeset_unlock_all(dev);
#else
mutex_unlock(&dev->mode_config.mutex);
#endif
+static void vbox_hotplug_worker(struct work_struct *work)
+
+struct vbox_private *vbox = container_of(work, struct vbox_private,
+ hotplug_work);
+
+vbox_update_mode_hints(vbox);
+drm_kms_helper_hotplug_event(vbox->dev);
+
+
+int vbox_irq_init(struct vbox_private *vbox)
+{
+    int ret;
+
+vbox_update_mode_hints(vbox);
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 16, 0) || defined(RHEL_73)
+    ret = drm_irq_install(vbox->dev, vbox->dev->pdev->irq);
+#else
+    ret = drm_irq_install(vbox->dev);
+#endif
+    if (unlikely(ret != 0)) {
+        vbox_irq_fini(vbox);
+        DRM_ERROR("Failed installing irq: %d\n", ret);
+        return 1;
+    }
+    INIT_WORK(&vbox->hotplug_work, vbox_hotplug_worker);
+    vbox->isr_installed = true;
+    return 0;
+}
+
+void vbox_irq_fini(struct vbox_private *vbox)
+{
+    if (vbox->isr_installed) {
+        drm_irq_uninstall(vbox->dev);
+        flush_work(&vbox->hotplug_work);
+        vbox->isr_installed = false;
+    }
+}

--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vbox_main.c
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vbox_main.c
@@ -0,0 +1,562 @@
+/*
+ * Copyright (C) 2013-2017 Oracle Corporation
+ * This file is based on ast_main.c
+ * Copyright 2012 Red Hat Inc.
+ *
+ * Permission is hereby granted, free of charge, to any person obtaining a
+ * copy of this software and associated documentation files (the
+ * "Software"), to deal in the Software without restriction, including
+ */
+ * without limitation the rights to use, copy, modify, merge, publish,
+ * distribute, sub license, and/or sell copies of the Software, and to
+ * permit persons to whom the Software is furnished to do so, subject to
+ * the following conditions:
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+ * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
+ * FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT. IN NO EVENT SHALL
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+ * USE OR OTHER DEALINGS IN THE SOFTWARE.
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+ * The above copyright notice and this permission notice (including the
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+ * of the Software.
+ *
+ * Authors: Dave Airlie <airlied@redhat.com>,
+ *          Michael Thayer <michael.thayer@oracle.com,
+ *          Hans de Goede <hdegoede@redhat.com>
+ */
+
+static void vbox_user_framebuffer_destroy(struct drm_framebuffer *fb)
+{
+
+struct vbox_framebuffer *vbox_fb = to_vbox_framebuffer(fb);
+
+if (vbox_fb->obj)
+    drm_gem_object_unreference_unlocked(vbox_fb->obj);
+
+drm_framebuffer_cleanup(fb);
+kfree(fb);
+
+void vbox_enable_accel(struct vbox_private *vbox)
+{
+
+unsigned int i;
+struct VBVABUFFER *vbva;
+
+if (!vbox->vbva || vbox->vbva_buffers) {
+    /* Should never happen... */
+    DRM_ERROR("vboxvideo: failed to set up VBVA
");
+}

#include "vbox_drv.h"
+
+include "vboxvideo_guest.h"
+include "vboxvideo_vbe.h"
+
+include <drm/drm_fb_helper.h>
+include <drm/drm_crtc_helper.h>
+
+static void vbox_user_framebuffer_destroy(struct drm_framebuffer *fb)
+{
+
+struct vbox_framebuffer *vbox_fb = to_vbox_framebuffer(fb);
+
+if (vbox_fb->obj)
+    drm_gem_object_unreference_unlocked(vbox_fb->obj);
+
+drm_framebuffer_cleanup(fb);
+kfree(fb);
+
+void vbox_enable_accel(struct vbox_private *vbox)
+{
+
+unsigned int i;
+struct VBVABUFFER *vbva;
+
+if (!vbox->vbva || vbox->vbva_buffers) {
+    /* Should never happen... */
+    DRM_ERROR("vboxvideo: failed to set up VBVA
");
+}
+return;
+
+for (i = 0; i < vbox->num_crtcs; ++i) {
+if (!vbox->vbva_info[i].vbva) {
+vbva = (struct VBVABUFFER *)
+((u8 *)vbox->vbva_buffers +
+ i * VBVA_MIN_BUFFER_SIZE);
+if (!vbva_enable(&vbox->vbva_info[i],
+ vbox->guest_pool, vbva, i)) {
+/* very old host or driver error. */
+DRM_ERROR("vboxvideo: vbva_enable failed - heap allocation error\n");
+return;
+}
+}
+
+void vbox_disable_accel(struct vbox_private *vbox)
+{
+unsigned int i;
+
+for (i = 0; i < vbox->num_crtcs; ++i)
+vbva_disable(&vbox->vbva_info[i], vbox->guest_pool, i);
+}
+
+void vbox_report_caps(struct vbox_private *vbox)
+{
+u32 caps = VBVACAPS_DISABLE_CURSOR_INTEGRATION
+ | VBVACAPS_IRQ | VBVACAPS_USE_VBVA_ONLY;
+if (vbox->initial_mode_queried)
+caps |= VBVACAPS_VIDEO_MODE_HINTS;
+hgsmi_send_caps_info(vbox->guest_pool, caps);
+}
+}
+/**
+ * Send information about dirty rectangles to VBVA. If necessary we enable
+ * VBVA first, as this is normally disabled after a change of master in case
+ * the new master does not send dirty rectangle information (is this even
+ * allowed?)
+ */
+void vbox_framebuffer_dirty_rectangles(struct drm_framebuffer *fb,
+ struct drm_clip_rect *rects,
+ unsigned int num_rects)
+{
+struct vbox_private *vbox = fb->dev->dev_private;
+struct drm_crtc *crtc;
+unsigned int i;
mutex_lock(&vbox->hw_mutex);
list_for_each_entry(crtc, &fb->dev->mode_config.crtc_list, head) {
  if (CRTC_FB(crtc) == fb) {
    vbox_enable_accel(vbox);
    for (i = 0; i < num_rects; ++i) {
      VBoxACMDHDR cmd_hdr;
      unsigned int crtc_id =
        to_vbox_crtc(crtc)->crtc_id;
      if ((rects[i].x1 >
          crtc->x + crtc->hwmode.hdisplay) ||
          (rects[i].y1 >
          crtc->y + crtc->hwmode.vdisplay) ||
          (rects[i].x2 < crtc->x) ||
          (rects[i].y2 < crtc->y))
        continue;
      cmd_hdr.x = (s16)rects[i].x1;
      cmd_hdr.y = (s16)rects[i].y1;
      cmd_hdr.w = (u16)rects[i].x2 - rects[i].x1;
      cmd_hdr.h = (u16)rects[i].y2 - rects[i].y1;
      if (vbva_buffer_begin_update(
          &vbox->vbva_info[crtc_id],
          vbox->guest_pool)) {
        VBoxVBVAWrite(&vbox->vbva_info[crtc_id],
          vbox->guest_pool,
          &cmd_hdr,
          sizeof(cmd_hdr));
        vbva_buffer_end_update(
          &vbox->vbva_info[crtc_id]);
      }
    }
    mutex_unlock(&vbox->hw_mutex);
  }
  static int vbox_user_framebuffer_dirty(struct drm_framebuffer *fb,
    struct drm_file *file_priv,
    unsigned int flags, unsigned int color,
    struct drm_clip_rect *rects,
    unsigned int num_rects)
  {
    vbox_framebuffer_dirty_rectangles(fb, rects, num_rects);
    return 0;
  }
}

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static const struct drm_framebuffer_funcs vbox_fb_funcs = {
    .destroy = vbox_user_framebuffer_destroy,
    .dirty = vbox_user_framebuffer_dirty,
};

int vbox_framebuffer_init(struct drm_device *dev,
    struct vbox_framebuffer *vbox_fb,
#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 5, 0) || defined(RHEL_73)
    const
#endif
    struct DRM_MODE_FB_CMD *mode_cmd,
    struct drm_gem_object *obj)
{
    int ret;

#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
    drm_helper_mode_fill_fb_struct(dev, &vbox_fb->base, mode_cmd);
#else
    drm_helper_mode_fill_fb_struct(&vbox_fb->base, mode_cmd);
#endif
    vbox_fb->obj = obj;
    ret = drm_framebuffer_init(dev, &vbox_fb->base, &vbox_fb_funcs);
    if (ret) {
        DRM_ERROR("framebuffer init failed %d\n", ret);
        return ret;
    }

    return 0;
}

static struct drm_framebuffer *vbox_user_framebuffer_create(
    struct drm_device *dev,
    struct drm_file *filp,
#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 5, 0) || defined(RHEL_73)
    const struct drm_mode_FB_CMD2 *mode_cmd)
#else
    struct drm_mode_FB_CMD2 *mode_cmd)
#endif
{
    struct drm_gem_object *obj;
    struct vbox_framebuffer *vbox_fb;
    int ret;

#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 7, 0) || defined(RHEL_74)
    obj = drm_gem_object_lookup(filp, mode_cmd->handles[0]);
#else
    struct drm_mode_FB_CMD2 *mode_cmd)
#endif
    struct drm_framebuffer *vbox_user_framebuffer_create(
    struct drm_device *dev,
    struct drm_file *filp,
#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 5, 0) || defined(RHEL_73)
    const struct drm_mode_FB_CMD2 *mode_cmd)
#else
    struct drm_mode_FB_CMD2 *mode_cmd)
#endif
    { struct drm_gem_object *obj;
        struct vbox_framebuffer *vbox_fb;
        int ret;

        struct drm_file *filp;
    }
#endif
}
obj = drm_gem_object_lookup(dev, filp, mode_cmd->handles[0]);
#endif
if (!obj)
+return ERR_PTR(-ENOENT);
+
+vbox_fb = kzalloc(sizeof(*vbox_fb), GFP_KERNEL);
+if (!vbox_fb) {
+    drm_gem_object_unreference_unlocked(obj);
+    return ERR_PTR(-ENOMEM);
+
+    ret = vbox_framebuffer_init(dev, vbox_fb, mode_cmd, obj);
+    if (ret) {
+        drm_gem_object_unreference_unlocked(obj);
+        kfree(vbox_fb);
+        return ERR_PTR(ret);
+    }
+
+    return &vbox_fb->base;
+}
+
+static const struct drm_mode_config_funcs vbox_mode_funcs = {
+    .fb_create   = vbox_user_framebuffer_create,
+};
+
+static void vbox_accel_fini(struct vbox_private *vbox)
+{
+    if (vbox->vbva_info) {
+        vbox_disable_accel(vbox);
+        kfree(vbox->vbva_info);
+        vbox->vbva_info = NULL;
+    }
+    if (vbox->vbva_buffers) {
+        pci_iounmap(vbox->dev->pdev, vbox->vbva_buffers);
+        vbox->vbva_buffers = NULL;
+    }
+
+    +#if LINUX_VERSION_CODE < KERNEL_VERSION(4, 0, 0) && !defined(RHEL_73)
+    +#define pci_iomap_range(dev, bar, offset, maxlen) \
+        ioremap(pci_resource_start(dev, bar) + (offset), maxlen)
+    +#endif
+    +
+    +static int vbox_accel_init(struct vbox_private *vbox)
+    +{
+        unsigned int i;
+        +vbox->vbva_info = kmalloc(vbox->num_crtcs, sizeof(*vbox->vbva_info),
+            GFP_KERNEL);
+ GFP_KERNEL);
+if (!vbox->vbva_info)
+return -ENOMEM;
+
+ /* Take a command buffer for each screen from the end of usable VRAM. */
+vbox->available_vram_size -= vbox->num_crtcs * VBVA_MIN_BUFFER_SIZE;
+
+vbox->vbva_buffers = pci_iomap_range(vbox->dev->pdev, 0,
+ vbox->available_vram_size,
+ vbox->num_crtcs *
+ VBVA_MIN_BUFFER_SIZE);
+if (!vbox->vbva_buffers)
+return -ENOMEM;
+
+for (i = 0; i < vbox->num_crtcs; ++i)
+VBoxVBVASetupBufferContext(&vbox->vbva_info[i],
+ vbox->available_vram_size +
+ i * VBVA_MIN_BUFFER_SIZE,
+ VBVA_MIN_BUFFER_SIZE);
+
+return 0;
+
+/** Do we support the 4.3 plus mode hint reporting interface? */
+static bool have_hgsmi_mode_hints(struct vbox_private *vbox)
+{
+u32 have_hints, have_cursor;
+int ret;
+
+ret = hgsmi_query_conf(vbox->guest_pool,
+ VBOX_VBVA_CONF32_MODE_HINT_REPORTING,
+ &have_hints);
+if (RT_FAILURE(ret))
+return false;
+
+ret = hgsmi_query_conf(vbox->guest_pool,
+ VBOX_VBVA_CONF32_GUEST_CURSOR_REPORTING,
+ &have_cursor);
+if (RT_FAILURE(ret))
+return false;
+
+return have_hints == VINF_SUCCESS && have_cursor == VINF_SUCCESS;
+
+/**
+ * Set up our heaps and data exchange buffers in VRAM before handing the rest
+ * to the memory manager.
+ */
+static int vbox_hw_init(struct vbox_private *vbox)
+
+{  
+  int ret;
+
+   vbox->full_vram_size = VBoxVideoGetVRAMSize();
+   vbox->any_pitch = VBoxVideoAnyWidthAllowed();
+   
+   DRM_INFO("VRAM %08x\n", vbox->full_vram_size);
+   
+   /* Map guest-heap at end of vram */
+   vbox->guest_heap =
+       pci_iomap_range(vbox->dev->pdev, 0, GUEST_HEAP_OFFSET(vbox),
+                       GUEST_HEAP_SIZE);
+   +if (!vbox->guest_heap)
+       return -ENOMEM;
+   
+   /* Create guest-heap mem-pool use 2^4 = 16 byte chunks */
+   vbox->guest_pool = gen_pool_create(4, -1);
+   +if (!vbox->guest_pool)
+       return -ENOMEM;
+   
+   ret = gen_pool_add_virt(vbox->guest_pool,
+     (unsigned long)vbox->guest_heap,
+     GUEST_HEAP_OFFSET(vbox),
+     GUEST_HEAP_USABLE_SIZE, -1);
+   +if (ret)
+       return ret;
+   
+   /* Reduce available VRAM size to reflect the guest heap. */
+   vbox->available_vram_size = GUEST_HEAP_OFFSET(vbox);
+   
+   /* Linux drm represents monitors as a 32-bit array. */
+   vbox->num_crtcs = min_t(u32, VBoxHGSMIGetMonitorCount(vbox->guest_pool),
+                           VBOX_MAX_SCREENS);
+   
+   +if (!have_hgsmi_mode_hints(vbox))
+       return -ENOTSUPP;
+   
+   vbox->last_mode_hints =
+       kcalloc(vbox->num_crtcs, sizeof(struct vbva_modehint), GFP_KERNEL);
+   +if (!vbox->last_mode_hints)
+       return -ENOMEM;
+   
+   +return vbox_accel_init(vbox);
+ }
+
+static void vbox_hw_fini(struct vbox_private *vbox)
+
+{  
+  vbox_accel_fini(vbox);
int vbox_driver_load(struct drm_device *dev, unsigned long flags)
{
    struct vbox_private *vbox;
    int ret = 0;
    vbox = kzalloc(sizeof(*vbox), GFP_KERNEL);
    if (!vbox)
        return -ENOMEM;
    dev->dev_private = vbox;
    vbox->dev = dev;
    mutex_init(&vbox->hw_mutex);
    ret = vbox_hw_init(vbox);
    if (ret)
        goto out_free;
    ret = vbox_mm_init(vbox);
    if (ret)
        goto out_free;
    drm_mode_config_init(dev);
    dev->mode_config.funcs = (void *)&vbox_mode_funcs;
    dev->mode_config.min_width = 64;
    dev->mode_config.min_height = 64;
    dev->mode_config.max_width = VBE_DISPI_MAX_XRES;
    dev->mode_config.max_height = VBE_DISPI_MAX_YRES;
    ret = vbox_mode_init(dev);
    if (ret)
        goto out_free;
    ret = vbox_irq_init(vbox);
    if (ret)
        goto out_free;
    ret = vbox_fbdev_init(dev);
    if (ret)
+goto out_free;
+return 0;
+
+out_free:
+vbox_driver_unload(dev);
+return ret;
+
+}
+
+if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+void vbox_driver_unload(struct drm_device *dev)
+#else
+int vbox_driver_unload(struct drm_device *dev)
+#endif
+
+
+struct vbox_private *vbox = dev->dev_private;
+
+vbox_fbdev_fini(dev);
+vbox_irq_fini(vbox);
+vbox_mode_fini(dev);
+if (dev->mode_config.funcs)
+drm_mode_config_cleanup(dev);
+
+vbox_hw_fini(vbox);
+vbox_mm_fini(vbox);
+if (vbox->guest_pool)
+gen_pool_destroy(vbox->guest_pool);
+if (vbox->guest_heap)
+pci_iounmap(dev->pdev, vbox->guest_heap);
+kfree(vbox);
+dev->dev_private = NULL;
+
+if LINUX_VERSION_CODE < KERNEL_VERSION(4, 11, 0)
+return 0;
+#endif
+
+/**
+ * @note this is described in the DRM framework documentation.  AST does not
+ * have it, but we get an oops on driver unload if it is not present.
+ */
+
+void vbox_driver_lastclose(struct drm_device *dev)
+
+}
+
+if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 16, 0) || defined(RHEL_73)
+if (vbox->fbdev)
+drm_fb_helper_restore_fbdev_mode_unlocked(&vbox->fbdev->helper);
+#else
int vbox_gem_create(struct drm_device *dev,
    u32 size, bool iskernel, struct drm_gem_object **obj)
{
    struct vbox_bo *vboxbo;
    int ret;
    *obj = NULL;
    size = roundup(size, PAGE_SIZE);
    if (size == 0)
        return -EINVAL;
    ret = vbox_bo_create(dev, size, 0, 0, &vboxbo);
    if (ret) {
        if (ret != -ERESTARTSYS)
            DRM_ERROR("failed to allocate GEM object\n");
        return ret;
    }
    *obj = &vboxbo->gem;
    return 0;
}

int vbox_dumb_create(struct drm_file *file,
    struct drm_device *dev, struct drm_mode_create_dumb *args)
{
    int ret;
    struct drm_gem_object *gobj;
    u32 handle;
    
    args->pitch = args->width * ((args->bpp + 7) / 8);
    args->size = args->pitch * args->height;
    
    ret = vbox_gem_create(dev, args->size, false, &gobj);
    if (ret)
        return ret;
    ret = drm_gem_handle_create(file, gobj, &handle);
    drm_gem_object_unreference_unlocked(gobj);
    if (ret)
+return ret;
+
+args->handle = handle;
+
+return 0;
+
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 12, 0) && !defined(RHEL_73)
+int vbox_dumb_destroy(struct drm_file *file,
+    struct drm_device *dev, u32 handle)
+{
+    return drm_gem_handle_delete(file, handle);
+}
+#endif
+
+static void vbox_bo_unref(struct vbox_bo **bo)
+{
+    struct ttm_buffer_object *tbo;
+
+    if ((*bo) == NULL)
+        return;
+
+    tbo = &(*bo->bo);
+    ttm_bo_unref(&tbo);
+    if (!tbo)
+        *bo = NULL;
+}
+
+void vbox_gem_free_object(struct drm_gem_object *obj)
+{
+    struct vbox_bo *vbox_bo = gem_to_vbox_bo(obj);
+
+    vbox_bo_unref(&vbox_bo);
+}
+
+static inline u64 vbox_bo_mmap_offset(struct vbox_bo *bo)
+{
+    #if LINUX_VERSION_CODE < KERNEL_VERSION(3, 12, 0) && !defined(RHEL_73)
+    return bo->bo.addr_space_offset;
+    #else
+    return drm_vma_node_offset_addr(&bo->bo.vma_node);
+    #endif
+}
+
+int
+vbox_dumb_mmap_offset(struct drm_file *file,
+    struct drm_device *dev,
+    u32 handle, u64 *offset)
+{
+struct drm_gem_object *obj;
+int ret;
+struct vbox_bo *bo;
+
+mutex_lock(&dev->struct_mutex);
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 7, 0) || defined(RHEL_74)
+obj = drm_gem_object_lookup(file, handle);
+#else
+obj = drm_gem_object_lookup(dev, file, handle);
+#endif
+if (!obj) {
+ret = -ENOENT;
+goto out_unlock;
+}
+
+bo = gem_to_vbox_bo(obj);
+%offset = vbox_bo_mmap_offset(bo);
+
+drm_gem_object_unreference(obj);
+ret = 0;
+
+out_unlock:
+mutex_unlock(&dev->struct_mutex);
+return ret;
+
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vbox_mode.c
@@ -0,0 +1,911 @@
+/
+ * Copyright (C) 2013-2017 Oracle Corporation
+ * This file is based on ast_mode.c
+ * Copyright 2012 Red Hat Inc.
+ * Parts based on xf86-video-ast
+ * Copyright (c) 2005 ASPEED Technology Inc.
+ *
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+ * of the Software.
+ *
+ */
+ */
+ * Authors: Dave Airlie <airlied@redhat.com>
+ *          Michael Thayer <michael.thayer@oracle.com,
+ *          Hans de Goede <hdegoede@redhat.com>
+ */
+#include "vbox_drv.h"
+#include <linux/export.h>
+#include <drm/drm_crtc_helper.h>
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 18, 0) || defined(RHEL_73)
+#include <drm/drm_plane_helper.h>
+#endif
+
+#include "vboxvideo.h"
+#include "hgsmi_channels.h"
+
+static int vbox_cursor_set2(structdrm_crtc *crtc, struct drm_file *file_priv,
+ u32 handle, u32 width, u32 height,
+ s32 hot_x, s32 hot_y);
+static int vbox_cursor_move(struct drm_crtc *crtc, int x, int y);
+
+/**
+ * Set a graphics mode. Poke any required values into registers, do an HGSMI
+ * mode set and tell the host we support advanced graphics functions.
+ */
+static void vbox_do_modeset(struct drm_crtc *crtc,
+ const struct drm_display_mode *mode)
+{
+ struct vbox_crtc *vbox_crtc = to_vbox_crtc(crtc);
+ struct vbox_private *vbox;
+ int width, height, bpp, pitch;
+ unsigned int crtc_id;
+ u16 flags;
+ s32 x_offset, y_offset;
+ vbox = crtc->dev->dev_private;
+ width = mode->hdisplay ? mode->hdisplay : 640;
+ height = mode->vdisplay ? mode->vdisplay : 480;
+ crtc_id = vbox_crtc->crtc_id;
+ #if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
+...
+bpp = crtc->enabled ? CRTC_FB(crtc)->format->cpp[0] * 8 : 32;
+pitch = crtc->enabled ? CRTC_FB(crtc)->pitches[0] : width * bpp / 8;
+#elif LINUX_VERSION_CODE >= KERNEL_VERSION(3, 3, 0)
+bpp = crtc->enabled ? CRTC_FB(crtc)->bits_per_pixel : 32;
+pitch = crtc->enabled ? CRTC_FB(crtc)->pitches[0] : width * bpp / 8;
+#else
+bpp = crtc->enabled ? CRTC_FB(crtc)->bits_per_pixel : 32;
+pitch = crtc->enabled ? CRTC_FB(crtc)->pitch : width * bpp / 8;
+#endif
+x_offset = vbox->single_framebuffer ? crtc->x : vbox_crtc->x_hint;
+y_offset = vbox->single_framebuffer ? crtc->y : vbox_crtc->y_hint;
+
/*
 * This is the old way of setting graphics modes. It assumed one screen
 * + and a frame-buffer at the start of video RAM. On older versions of
 * + VirtualBox, certain parts of the code still assume that the first
 * + screen is programmed this way, so try to fake it.
 * */
+if (vbox_crtc->crtc_id == 0 && crtc->enabled &&
    vbox_crtc->fb_offset / pitch < 0xffff - crtc->y &&
    vbox_crtc->fb_offset % (bpp / 8) == 0)
    VBoxVideoSetModeRegisters(
        width, height, pitch * 8 / bpp,
        #if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 11, 0)
            CRTC_FB(crtc)->format->cpp[0] * 8,
        #else
            CRTC_FB(crtc)->bits_per_pixel,
        #endif
        0,
        vbox_crtc->fb_offset % pitch / bpp + crtc->x,
        vbox_crtc->fb_offset / pitch + crtc->y);
+
+flags = VBVA_SCREEN_F_ACTIVE;
+flags |= (crtc->enabled && !vbox_crtc->blanked) ?
    0 : VBVA_SCREEN_F_BLANK;
+flags |= vbox_crtc->disconnected ? VBVA_SCREEN_F_DISABLED : 0;
+hgsmi_process_display_info(vbox->guest_pool, vbox_crtc->crtc_id,
    x_offset, y_offset,
    crtc->x * bpp / 8 + crtc->y * pitch,
    pitch, width, height,
    vbox_crtc->blanked ? 0 : bpp, flags);
+}
+
+static int vbox_set_view(struct drm_crtc *crtc)
+{
+    struct vbox_crtc *vbox_crtc = to_vbox_crtc(crtc);
+    struct vbox_private *vbox = crtc->dev->dev_private;
+    void *p;
/*
 * Tell the host about the view. This design originally targeted the Windows XP driver architecture and assumed that each screen would have a dedicated frame buffer with the command buffer following it, the whole being a "view". The host works out which screen a command buffer belongs to by checking whether it is in the first view, then whether it is in the second and so on. The first match wins. We cheat around this by making the first view be the managed memory plus the first command buffer, the second the same plus the second buffer and so on.
 */
+p = hgsmi_buffer_alloc(vbox->guest_pool, sizeof(VBVAINFOVIEW), HGSMI_CH_VBVA, VBVA_INFO_VIEW);
+if (p) {
+VBVAINFOVIEW *pInfo = (VBVAINFOVIEW *) p;
+
+pInfo->view_index = vbox_crtc->crtc_id;
+pInfo->u32ViewOffset = vbox_crtc->fb_offset;
+pInfo->u32ViewSize = vbox->available_vram_size - vbox_crtc->fb_offset + vbox_crtc->crtc_id * VBVA_MIN_BUFFER_SIZE;
+pInfo->u32MaxScreenSize = vbox->available_vram_size - vbox_crtc->fb_offset;
+hgsmi_buffer_submit(vbox->guest_pool, p);
+hgsmi_buffer_free(vbox->guest_pool, p);
+} else {
+return -ENOMEM;
+
+return 0;
+
+static void vbox_crtc_dpms(struct drm_crtc *crtc, int mode) {
+struct vbox_crtc *vbox_crtc = to_vbox_crtc(crtc);
+struct vbox_private *vbox = crtc->dev->dev_private;
+
+switch (mode) {
+case DRM_MODE_DPMS_ON:
+vbox_crtc->blanked = false;
+break;
+case DRM_MODE_DPMS_STANDBY:
+case DRM_MODE_DPMS_SUSPEND:
+case DRM_MODE_DPMS_OFF:
+vbox_crtc->blanked = true;
+break;
+}
mutex_lock(&vbox->hw_mutex);
vbox_do_modeset(crtc, &crtc->hwmode);
mutex_unlock(&vbox->hw_mutex);
}

static bool vbox_crtc_mode_fixup(struct drm_crtc *crtc,
				 const struct drm_display_mode *mode,
				 struct drm_display_mode *adjusted_mode)
{
	return true;
}

static bool vbox_set_up_input_mapping(struct vbox_private *vbox)
{
struct drm_crtc *crtci;
struct drm_connector *connectori;
struct drm_framebuffer *fb1 = NULL;
bool single_framebuffer = true;
bool old_single_framebuffer = vbox->single_framebuffer;
u16 width = 0, height = 0;

/*
 * Are we using an X.Org-style single large frame-buffer for all crtc?
 * If so then screen layout can be deduced from the crtc offsets.
 * Same fall-back if this is the fbdev frame-buffer.
 */
list_for_each_entry(crtci, &vbox->dev->mode_config.crtc_list, head) {
	if (!fb1) {
		fb1 = CRTC_FB(crtci);
		if (to_vbox_framebuffer(fb1) == &vbox->fbdev->afb)
			break;
		} else if (CRTC_FB(crtci) & & fb1 != CRTC_FB(crtci)) {
		single_framebuffer = false;
		}
	}

++ if (single_framebuffer) {
list_for_each_entry(crtci, &vbox->dev->mode_config.crtc_list,
+ head) {
++ if (to_vbox_crtc(crtci)->crtc_id == 0) {
++ vbox->single_framebuffer = true;
++ vbox->input_mapping_width =
+      CRTC_FB(crtci)->width;
+vbox->input_mapping_height =
  +  CRTC_FB(crtci)->height;
+return old_single_framebuffer !=
  +  vbox->single_framebuffer;
+}
+}
+}
+/* Otherwise calculate the total span of all screens. */
+list_for_each_entry(connectori, &vbox->dev->mode_config.connector_list,
  +  head) {
+  struct vbox_connector *vbox_connector =
  +  to_vbox_connector(connectori);
+  struct vbox_crtc *vbox_crtc = vbox_connector->vbox_crtc;
  +
  +  width = max_t(u16, width, vbox_crtc->x_hint +
  +     vbox_connector->mode_hint.width);
  +  height = max_t(u16, height, vbox_crtc->y_hint +
  +     vbox_connector->mode_hint.height);
  +}
  +
  +vbox->single_framebuffer = false;
  +vbox->input_mapping_width = width;
  +vbox->input_mapping_height = height;
  +
  +return old_single_framebuffer != vbox->single_framebuffer;
+}
+
+static int vbox_crtc_do_set_base(struct drm_crtc *crtc,
  +  struct drm_framebuffer *old_fb, int x, int y)
  +{
  +  struct vbox_private *vbox = crtc->dev->dev_private;
  +  struct vbox_crtc *vbox_crtc = to_vbox_crtc(crtc);
  +  struct drm_gem_object *obj;
  +  struct vbox_framebuffer *vbox_fb;
  +  struct vbox_bo *bo;
  +  int ret;
  +  u64 gpu_addr;
  +
  +  /* Unpin the previous fb. */
  +  if (old_fb) {
  +    vbox_fb = to_vbox_framebuffer(old_fb);
  +    obj = vbox_fb->obj;
  +    bo = gem_to_vbox_bo(obj);
  +    ret = vbox_bo_reserve(bo, false);
  +    if (ret)
  +      return ret;
  +  }
  +  vbox_bo_unpin(bo);
vbox_bo_unreserve(bo);
+
+vbox_fb = to_vbox_framebuffer(CRTC_FB(crtc));
+obj = vbox_fb->obj;
+bo = gem_to_vbox_bo(obj);
+
+ret = vbox_bo_reserve(bo, false);
+if (ret)
+return ret;
+
+ret = vbox_bo_pin(bo, TTM_PL_FLAG_VRAM, &gpu_addr);
+vbox_bo_unreserve(bo);
+if (ret)
+return ret;
+
+vbox_crtc->fb_offset = gpu_addr;
+if (vbox_set_up_input_mapping(vbox)) {
+struct drm_crtc *crtci;
+
+list_for_each_entry(crtci, &vbox->dev->mode_config.crtc_list, head) {
+vbox_set_view(crtc);
+vbox_do_modeset(crtci, &crtci->mode);
+}
+}
+
+return 0;
+
+static int vbox_crtc_mode_set_base(struct drm_crtc *crtc, int x, int y,
+struct drm_framebuffer *old_fb)
+{
+return vbox_crtc_do_set_base(crtc, old_fb, x, y);
+}
+
+static int vbox_crtc_mode_set(struct drm_crtc *crtc,
+struct drm_display_mode *mode,
+struct drm_display_mode *adjusted_mode,
+int x, int y, struct drm_framebuffer *old_fb)
+{
+struct vbox_private *vbox = crtc->dev->dev_private;
+int rc = 0;
+
+vbox_crtc_mode_set_base(crtc, x, y, old_fb);
+
+mutex_lock(&vbox->hw_mutex);
+rc = vbox_set_view(crtc);
+if (!rc)
+vbox_do_modeset(crtc, mode);
+hsmi_update_input_mapping(vbox->guest_pool, 0, 0,
+ vbox->input_mapping_width,
+ vbox->input_mapping_height);
+mutex_unlock(&vbox->hw_mutex);
+
+return rc;
+
+static void vbox_crtc_disable(struct drm_crtc *crtc)
+{
+}
+
+static void vbox_crtc_prepare(struct drm_crtc *crtc)
+{
+}
+
+static void vbox_crtc_commit(struct drm_crtc *crtc)
+{
+}
+
+static const struct drm_crtc_helper_funcs vbox_crtc_helper_funcs = {
+.dpms = vbox_crtc_dpms,
+.mode_fixup = vbox_crtc_mode_fixup,
+.mode_set = vbox_crtc_mode_set,
+/* .mode_set_base = vbox_crtc_mode_set_base, */
+.disable = vbox_crtc_disable,
+.prepare = vbox_crtc_prepare,
+.commit = vbox_crtc_commit,
+};
+
+static void vbox_crtc_reset(struct drm_crtc *crtc)
+{
+}
+
+static void vbox_crtc_destroy(struct drm_crtc *crtc)
+{
+}
+
+static const struct drm_crtc_funcs vbox_crtc_funcs = {
+.cursor_move = vbox_cursor_move,
+.cursor_set2 = vbox_cursor_set2,
+.reset = vbox_crtc_reset,
+.set_config = drm_crtc_helper_set_config,
+/* .gamma_set = vbox_crtc_gamma_set, */
+destroy = vbox_crtc_destroy,
+
+static struct vbox_crtc *vbox_crtc_init(struct drm_device *dev, unsigned int i)
+{
+    struct vbox_crtc *vbox_crtc;
++vbox_crtc = kzalloc(sizeof(*vbox_crtc), GFP_KERNEL);
+if (!vbox_crtc)
+    return NULL;
++vbox_crtc->crtc_id = i;
++
++drm_crtc_init(dev, &vbox_crtc->base, &vbox_crtc_funcs);
++drm_mode_crtc_set_gamma_size(&vbox_crtc->base, 256);
++drm_crtc_helper_add(&vbox_crtc->base, &vbox_crtc_helper_funcs);
+} return vbox_crtc;
+
+static void vbox_encoder_destroy(struct drm_encoder *encoder)
+{
+    drm_encoder_cleanup(encoder);
+kfree(encoder);
+
++#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 13, 0) && !defined(RHEL_73)
++static struct drm_encoder *drm_encoder_find(struct drm_device *dev, u32 id)
++{
++    struct drm_mode_object *mo;
++
++    mo = drm_mode_object_find(dev, id, DRM_MODE_OBJECT_ENCODER);
++    return mo ? obj_to_encoder(mo) : NULL;
++} endif
++
++static struct drm_encoder *vbox_best_single_encoder(struct drm_connector *connector)
++{
++    int enc_id = connector->encoder_ids[0];
++
++    /* pick the encoder ids */
++    if (enc_id)
++#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 15, 0)
++        return drm_encoder_find(connector->dev, NULL, enc_id);
++    else
++        return drm_encoder_find(connector->dev, enc_id);
++#endif


+ return NULL;
+
+ static const struct drm_encoder_funcs vbox_enc_funcs = {
+ .destroy = vbox_encoder_destroy,
+ };
+
+ static void vbox_encoder_dpms(struct drm_encoder *encoder, int mode)
+ {
+ }
+
+ static bool vbox_mode_fixup(struct drm_encoder *encoder,
+ const struct drm_display_mode *mode,
+ struct drm_display_mode *adjusted_mode)
+ {
+ return true;
+ }
+
+ static void vbox_encoder_mode_set(struct drm_encoder *encoder,
+ struct drm_display_mode *mode,
+ struct drm_display_mode *adjusted_mode)
+ {
+ }
+
+ static void vbox_encoder_prepare(struct drm_encoder *encoder)
+ {
+ }
+
+ static void vbox_encoder_commit(struct drm_encoder *encoder)
+ {
+ }
+
+ static const struct drm_encoder_helper_funcs vbox_enc_helper_funcs = {
+ .dpms = vbox_encoder_dpms,
+ .mode_fixup = vbox_mode_fixup,
+ .prepare = vbox_encoder_prepare,
+ .commit = vbox_encoder_commit,
+ .mode_set = vbox_encoder_mode_set,
+ };
+
+ static struct drm_encoder *vbox_encoder_init(struct drm_device *dev,
+ unsigned int i)
+ {
+ struct vbox_encoder *vbox_encoder;
+ + vbox_encoder = kzalloc(sizeof(*vbox_encoder), GFP_KERNEL);
+ if (!vbox_encoder)
return NULL;
+
+drm_encoder_init(dev, &vbox_encoder->base, &vbox_enc_funcs,
+ DRM_MODE_ENCODER_DAC
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 5, 0) || defined(RHEL_73)
+ , NULL
+#endif
+
+drm_encoder_helper_add(&vbox_encoder->base, &vbox_enc_helper_funcs);
+
+vbox_encoder->base.possible_crtcs = 1 << i;
+
+return &vbox_encoder->base;
+
+}
+
+/**
+ * Generate EDID data with a mode-unique serial number for the virtual
+ * monitor to try to persuade Unity that different modes correspond to
+ * different monitors and it should not try to force the same resolution on
+ * them.
+ */
+
+static void vbox_set_edid(struct drm_connector *connector, int width,
+ int height)
+{
+enum { EDID_SIZE = 128 };
+unsigned char edid[EDID_SIZE] = {
+ 0x00, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0x00,/* header */
+ 0x58, 0x58,/* manufacturer (VBX) */
+ 0x00, 0x00,/* product code */
+ 0x00, 0x00, 0x00, 0x00,/* serial number goes here */
+ 0x01,/* week of manufacture */
+ 0x00,/* year of manufacture */
+ 0x01, 0x03,/* EDID version */
+ 0x80,/* capabilities - digital */
+ 0x00,/* horiz. res in cm, zero for projectors */
+ 0x00,/* vert. res in cm */
+ 0x78,/* display gamma (120 == 2.2). */
+ 0xEE,/* features (standby, suspend, off, RGB, std */
+ 0xEE,/* colour space, preferred timing mode */
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
+ 0xEE, 0x91, 0xA3, 0x54, 0x4C, 0x99, 0x26, 0x0F, 0x50, 0x54,
/* descriptor block 2, monitor ranges */
+0x00, 0x00, 0x00, 0xFD, 0x00,
+0x00, 0xC8, 0x00, 0xC8, 0x64, 0x00, 0x0A, 0x20, 0x20, 0x20,
+ 0x20, 0x20,
/* 0-200Hz vertical, 0-200KHz horizontal, 1000MHz pixel clock */
+0x20,
/* descriptor block 3, monitor name */
+0x00, 0x00, 0x00, 0xFC, 0x00,
+'V', 'B', 'O', 'X', ',', 'm', 'o', 'n', 'i', 't', 'o', 'r',

/* descriptor block 4: dummy data */
+0x00, 0x00, 0x00, 0x10, 0x00,
+0x0A, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20,
+0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20,
+0x20,
+0x00,/ * number of extensions */
+0x00/* checksum goes here */
+
+int clock = (width + 6) * (height + 6) * 60 / 10000;
+unsigned int i, sum = 0;
+
+edid[12] = width & 0xff;
+edid[13] = width >> 8;
+edid[14] = height & 0xff;
+edid[15] = height >> 8;
+edid[54] = clock & 0xff;
+edid[55] = clock >> 8;
+edid[56] = width & 0xff;
+edid[58] = (width >> 4) & 0xf0;
+edid[59] = height & 0xff;
+edid[61] = (height >> 4) & 0xf0;
+
+for (i = 0; i < EDID_SIZE - 1; ++i)
+sum += edid[i];
+edid[EDID_SIZE - 1] = (0x100 - (sum & 0xFF)) & 0xFF;
+drm_mode_connector_update_edid_property(connector, (struct edid *)edid);
+
+static int vbox_get_modes(struct drm_connector *connector)
+{
+struct vbox_connector *vbox_connector = NULL;
+struct drm_display_mode *mode = NULL;
+struct vbox_private *vbox = NULL;
+unsigned int num_modes = 0;
+int preferred_width, preferred_height;
+
+vbox_connector = to_vbox_connector(connector);
+vbox = connector->dev->dev_private;
+/*
Heuristic: we do not want to tell the host that we support dynamic resizing unless we feel confident that the user space client using the video driver can handle hot-plug events. So the first time modes are queried after a "master" switch we tell the host that we do not, and immediately after we send the client a hot-plug notification as a test to see if they will respond and query again. That is also the reason why capabilities are reported to the host at this place in the code rather than elsewhere. We need to report the flags location before reporting the IRQ capability.

```
+ Heuristic: we do not want to tell the host that we support dynamic resizing unless we feel confident that the user space client using the video driver can handle hot-plug events. So the first time modes are queried after a "master" switch we tell the host that we do not, and immediately after we send the client a hot-plug notification as a test to see if they will respond and query again. That is also the reason why capabilities are reported to the host at this place in the code rather than elsewhere. We need to report the flags location before reporting the IRQ capability.
+ */
+ hgsmi_report_flags_location(vbox->guest_pool, GUEST_HEAP_OFFSET(vbox) + HOST_FLAGS_OFFSET);
+ if (vbox_connector->vbox_crtc->crtc_id == 0)
+ vbox_report_caps(vbox);
+ if (!vbox->initial_mode_queried) {
+ if (vbox_connector->vbox_crtc->crtc_id == 0) {
+ vbox->initial_mode_queried = true;
+ vbox_report_hotplug(vbox);
+ }
+ return drm_add_modes_noedid(connector, 800, 600);
+ }
+ num_modes = drm_add_modes_noedid(connector, 2560, 1600);
+ preferred_width = vbox_connector->mode_hint.width ?
+ vbox_connector->mode_hint.width : 1024;
+ preferred_height = vbox_connector->mode_hint.height ?
+ vbox_connector->mode_hint.height : 768;
+ mode = drm_cvt_mode(connector->dev, preferred_width, preferred_height,
+ 60, false, false, false);
+ if (mode) {
+ mode->type |= DRM_MODE_TYPE_PREFERRED;
+ drm_mode_probed_add(connector, mode);
++num_modes;
+ }
+ vbox_set_edid(connector, preferred_width, preferred_height);
+
+ #if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 19, 0) || defined(RHEL_73)
+ if (vbox_connector->vbox_crtc->x_hint != -1)
+ drm_object_property_set_value(&connector->base,
+ vbox->dev->mode_config.suggested_x_property,
+ vbox_connector->vbox_crtc->x_hint);
+ else
+ drm_object_property_set_value(&connector->base,
+ vbox->dev->mode_config.suggested_x_property, 0);
+ } else
+ drm_object_property_set_value(&connector->base,
+ vbox->dev->mode_config.suggested_y_property, 0);
+ if (vbox_connector->vbox_crtc->y_hint != -1)
+ drm_object_property_set_value(&connector->base,
+ vbox->dev->mode_config.suggested_y_property,
+ vbox->dev->mode_config.suggested_y_property,
+ vbox->dev->mode_config.suggested_y_property, 0);
+ }
```
+vbox_connector->vbox_crtc->y_hint);
+else
+dram_object_property_set_value(&connector->base,
+ vbox->dev->mode_config.suggested_y_property, 0);
+#endif
+
+return num_modes;
+
+static int vbox_mode_valid(struct drm_connector *connector,
+ struct drm_display_mode *mode)
+{ return MODE_OK;
+
+static void vbox_connector_destroy(struct drm_connector *connector)
+{ struct vbox_connector *vbox_connector = NULL;
+
+vbox_connector = to_vbox_connector(connector);
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 17, 0) && !defined(RHEL_73)
+drm_sysfs_connector_remove(connector);
+#else
+drm_connector_unregister(connector);
+#endif
+drm_connector_cleanup(connector);
+kfree(connector);
+
+static enum drm_connector_status
+vbox_connector_detect(struct drm_connector *connector, bool force)
+{ struct vbox_connector *vbox_connector = NULL;
+
+(void)force;
+vbox_connector = to_vbox_connector(connector);
+
+return vbox_connector->mode_hint.disconnected ?
+ connector_status_disconnected : connector_status_connected;
+
+static int vbox_fill_modes(struct drm_connector *connector, u32 max_x,
+ u32 max_y)
+{ struct vbox_connector *vbox_connector;
+ struct drm_device *dev;
+ struct drm_display_mode *mode, *iterator;
vbox Connector = to_vbox_connector(connector);
+dev = vbox connector->base.dev;
+list for each entry_safe(mode, iterator, &connector->modes, head) {
+list_del(&mode->head);
+drm_mode_destroy(dev, mode);
+
+return drm_helper_probe_single_connector_modes(connector, max_x, max_y);
+
+static const struct drm_connector_helper_funcs vbox_connector_helper_funcs = {
+.mode_valid = vbox_mode_valid,
+.get_modes = vbox_get_modes,
+.best_encoder = vbox_best_single_encoder,
+};
+
+static const struct drm_connector_funcs vbox_connector_funcs = {
+.dpms = drm_helper_connector_dpms,
+.detect = vbox_connector_detect,
+.fill_modes = vbox_fill_modes,
+.destroy = vbox_connector_destroy,
+};
+
+static int vbox_connector_init(struct drm_device *dev,
+ struct vbox crtc *vbox crtc,
+ struct drm_encoder *encoder)
+{
+struct vbox_connector *vbox_connector;
+struct drm_connector *connector;
+
vbox_connector = kzalloc(sizeof(*vbox_connector), GFP_KERNEL);
+if (!vbox_connector)
+return -ENOMEM;
+
+connector = &vbox_connector->base;
+vbox_connector->vbox crtc = vbox crtc;
+
+drm_connector_init(dev, connector, &vbox Connector_funcs,
+ DRM_MODE_CONNECTOR_VGA);
+drm_connector_helper_add(connector, &vbox Connector_helper_funcs);
+
+connector->interlace_allowed = 0;
+connector->doublescan_allowed = 0;
+
+if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 19, 0) || defined(RHEL_73)
+drm_mode_create_suggested_offset_properties(dev);
+drm_object_attach_property(&connector->base,
+ dev->mode_config.suggested_x_property, 0);
+ drm_object_attach_property(&connector->base, 
+ dev->mode_config.suggested_y_property, 0);
+#endif
+#endif LINUX_VERSION_CODE < KERNEL_VERSION(3, 17, 0) && !defined(RHEL_73)
+ drm_sysfs_connector_add(connector);
+else
+ drm_connector_register(connector);
+endif
+
+ drm_mode_connector_attach_encoder(connector, encoder);
+
+ return 0;
+
+int vbox_mode_init(struct drm_device *dev)
+{
+ struct vbox_private *vbox = dev->dev_private;
+ struct drm_encoder *encoder;
+ struct vbox_crtc *vbox_crtc;
+ unsigned int i;
+
+ /* vbox_cursor_init(dev); */
+ for (i = 0; i < vbox->num_crtcs; ++i) {
+ vbox_crtc = vbox_crtc_init(dev, i);
+ if (!vbox_crtc)
+ return -ENOMEM;
+ encoder = vbox_encoder_init(dev, i);
+ if (!encoder)
+ return -ENOMEM;
+ vbox_connector_init(dev, vbox_crtc, encoder);
+ } 
+
+ return 0;
+
+void vbox_mode_fini(struct drm_device *dev)
+{
+ /* vbox_cursor_fini(dev); */
+ }
+
+static void copy_cursor_image(u8 *src, u8 *dst, u32 width, u32 height,
+ size_t mask_size)
+{
size_t line_size = (width + 7) / 8;

for (i = 0; i < height; ++i)
for (j = 0; j < width; ++j)
    if (((u32 *)src)[i * width + j] > 0xf0000000)
        dst[i * line_size + j / 8] |= (0x80 >> (j % 8));

static int vbox_cursor_set2(struct drm_crtc *crtc, struct drm_file *file_priv,
    u32 handle, u32 width, u32 height,
    s32 hot_x, s32 hot_y)
{
    struct vbox_private *vbox = crtc->dev->dev_private;
    struct vbox_crtc *vbox_crtc = to_vbox_crtc(crtc);
    struct drm_gem_object *obj;
    struct vbox_bo *bo;
    int ret, rc;
    struct ttm_bo_kmap_obj uobj_map;
    u8 *src;
    u8 *dst = NULL;
    u32 caps = 0;
    size_t data_size, mask_size;
    bool src_isiomem;

    /* Re-set this regularly as in 5.0.20 and earlier the information was
     * lost on save and restore.
     */
    +hgsmi_update_input_mapping(vbox->guest_pool, 0, 0,
        vbox->input_mapping_width,
        vbox->input_mapping_height);
    if (!handle) {
        bool cursor_enabled = false;
        struct drm_crtc *crtci;
        +/*
        Hide cursor. */
        vbox_crtc->cursor_enabled = false;
        +list_for_each_entry(crtci, &vbox->dev->mode_config.crtc_list,
            head)
        +if (to_vbox_crtc(crtci)->cursor_enabled)
            cursor_enabled = true;
        +if (!cursor_enabled)
            +hgsmi_update_pointer_shape(vbox->guest_pool, 0, 0, 0,
                0, 0, NULL, 0);
            return 0;
+vbox_crtc->cursor_enabled = true;
+if (width > VBOX_MAX_CURSOR_WIDTH || height > VBOX_MAX_CURSOR_HEIGHT ||
    width == 0 || height == 0)
+return -EINVAL;
+rc = hgsmi_query_conf(vbox->guest_pool,
+VBOX_VBVA_CONF32_CURSOR_CAPABILITIES, &caps);
+ret = rc == VINF_SUCCESS ? 0 : rc == VERR_NO_MEMORY ? -ENOMEM : -EINVAL;
+if (ret)
+return ret;
+
+if (!(caps & VBOX_VBVA_CURSOR_CAPABILITY_HARDWARE))
+/
+ * -EINVAL means cursor_set2() not supported, -EAGAIN means
+ * retry at once.
+ */
+return -EBUSY;
+
+/*if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 7, 0) || defined(RHEL_74)
+obj = drm_gem_object_lookup(file_priv, handle);
+#else
+obj = drm_gem_object_lookup(crtc->dev, file_priv, handle);
+*/
+endif
+if (obj) {
+bo = gem_to_vbox_bo(obj);
+ret = vbox_bo_reserve(bo, false);
+if (!ret) {
+/*
+ * The mask must be calculated based on the alpha
+ * channel, one bit per ARGB word, and must be 32-bit
+ * padded.
+ */
+mask_size = ((width + 7) / 8 * height + 3) & ~3;
+data_size = width * height * 4 + mask_size;
+vbox->cursor_hot_x = min_t(u32, max(hot_x, 0), width);
+vbox->cursor_hot_y = min_t(u32, max(hot_y, 0), height);
+vbox->cursor_width = width;
+vbox->cursor_height = height;
+vbox->cursor_data_size = data_size;
+dst = vbox->cursor_data;
+ret =
+    ttm_bo_kmap(&bo->bo, 0, bo->bo.num_pages,
+    &uobj_map);
+if (!ret) {
+src =
+    ttm_kmap_obj_virtual(&uobj_map,
+    &src_isiomem);
+if (!src_isiomem) {
+u32 flags =
+  VBOX_MOUSE_POINTER_VISIBLE |
+  VBOX_MOUSE_POINTER_SHAPE |
+  VBOX_MOUSE_POINTER_ALPHA;
+copy_cursor_image(src, dst, width,
+  height, mask_size);
+rc = hgsmi_update_pointer_shape(
+vbox->guest_pool, flags,
+vbox->cursor_hot_x,
+vbox->cursor_hot_y,
+width, height, dst, data_size);
+ret =
+  rc == VINF_SUCCESS ? 0 : rc ==
+  VERR_NO_MEMORY ? -ENOMEM : rc ==
+  VERR_NOT_SUPPORTED ? -EBUSY :
+  -EINVAL;
+} else {
+  DRM_ERROR("src cursor bo should be in main memory\n");
+}
+ttm_bo_kunmap(&uobj_map);
+} else {
+vbox->cursor_data_size = 0;
+}
+vbox_bo_unreserve(bo);
+
+drm_gem_object_unreference_unlocked(obj);
+} else {
+  DRM_ERROR("Cannot find cursor object %x for crtc\n", handle);
+  ret = -ENOENT;
+} 
+
+return ret;
+
+static int vbox_cursor_move(struct drm_crtc *crtc, int x, int y)
+{
+  struct vbox_private *vbox = crtc->dev->dev_private;
+  u32 flags = VBOX_MOUSE_POINTER_VISIBLE |
+                 VBOX_MOUSE_POINTER_SHAPE | VBOX_MOUSE_POINTER_ALPHA;
+  s32 crtc_x =
+      vbox->single_framebuffer ? crtc->x : to_vbox_crtc(crtc)->x_hint;
+  s32 crtc_y =
+      vbox->single_framebuffer ? crtc->y : to_vbox_crtc(crtc)->y_hint;
+  u32 host_x, host_y;
+  u32 hot_x = 0;
+  u32 hot_y = 0;
+  int rc;
+  +
/*
* We compare these to unsigned later and don't
* need to handle negative.
* */
+if (x + crtc_x < 0 || y + crtc_y < 0 || vbox->cursor_data_size == 0)
+return 0;
+
+rc = hgsmi_cursor_position(vbox->guest_pool, true, x + crtc_x,
+    y + crtc_y, &host_x, &host_y);
+/* Work around a bug after save and restore in 5.0.20 and earlier. */
+if (RT_FAILURE(rc) || (host_x == 0 && host_y == 0))
+return rc == VINF_SUCCESS ? 0 
+    : rc == VERR_NO_MEMORY ? -ENOMEM : -EINVAL;
+
+hot_x = min(host_x - x - crtc_x, vbox->cursor_width);
+if (y + crtc_y < host_y)
+hot_y = min(host_y - y - crtc_y, vbox->cursor_height);
+if (host_x == vbox->cursor_hot_x && host_y == vbox->cursor_hot_y)
+return 0;
+vbox->cursor_hot_x = hot_x;
+vbox->cursor_hot_y = hot_y;
+rc = hgsmi_update_pointer_shape(vbox->guest_pool, flags, hot_x, hot_y,
+    vbox->cursor_width,
+    vbox->cursor_height, vbox->cursor_data,
+    vbox->cursor_data_size);
+return rc == VINF_SUCCESS ? 0 : rc == VERR_NO_MEMORY ? -ENOMEM : rc ==
+    VERR_NOT_SUPPORTED ? -EBUSY : -EINVAL;
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vbox_prime.c
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vbox_prime.c
@@ -0,0 +1,80 @@
+/*
+ * Copyright (C) 2017 Oracle Corporation
+ * This file is based on ????.c?
+ * Copyright 2017 Canonical
+ */
+ * Permission is hereby granted, free of charge, to any person obtaining a
+ * copy of this software and associated documentation files (the "Software"),
+ * to deal in the Software without restriction, including without limitation
+ * the rights to use, copy, modify, merge, publish, distribute, sublicense,
+ * and/or sell copies of the Software, and to permit persons to whom the
+ * Software is furnished to do so, subject to the following conditions:
+ * 
+ * The above copyright notice and this permission notice shall be included in
+ * all copies or substantial portions of the Software.
+ */
+ * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
+ * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
#include <vbox_drv.h>

/* Based on qxl_prime.c: 
   * Empty Implementations as there should not be any other driver for a virtual 
   * device that might share buffers with vboxvideo 
   */

int vbox_gem_prime_pin(struct drm_gem_object *obj)
{
    WARN_ONCE(1, "not implemented");
    return -ENOSYS;
}

void vbox_gem_prime_unpin(struct drm_gem_object *obj)
{
    WARN_ONCE(1, "not implemented");
}

struct sg_table *vbox_gem_prime_get_sg_table(struct drm_gem_object *obj)
{
    WARN_ONCE(1, "not implemented");
}

struct drm_gem_object *vbox_gem_prime_import_sg_table(struct drm_device *dev,
#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 18, 0) && !defined(RHEL_73)
    size_t size,
#else
    struct dma_buf_attachment
    *
#endif
    , struct sg_table *table)
{
    WARN_ONCE(1, "not implemented");
    return ERR_PTR(-ENOSYS);
}

void *vbox_gem_prime_vmap(struct drm_gem_object *obj)
+{  
+WARN_ONCE(1, "not implemented");  
+return ERR_PTR(-ENOSYS);  
+}
+
+void vbox_gem_prime_vunmap(struct drm_gem_object *obj, void *vaddr)  
+{  
+WARN_ONCE(1, "not implemented");  
+}
+
+int vbox_gem_prime_mmap(struct drm_gem_object *obj, struct vm_area_struct *area)  
+{  
+WARN_ONCE(1, "not implemented");  
+return -ENOSYS;  
+}

--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vbox_ttm.c  
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vbox_ttm.c  
@@ -0,0 +1,515 @@
+/*
+ * Copyright (C) 2013-2017 Oracle Corporation
+ * This file is based on ast_ttm.c
+ * Copyright 2012 Red Hat Inc.
+ *
+ * Permission is hereby granted, free of charge, to any person obtaining a
+ * copy of this software and associated documentation files (the
+ * "Software"), to deal in the Software without restriction, including
+ * without limitation the rights to use, copy, modify, merge, publish,
+ * distribute, sub license, and/or sell copies of the Software, and to
+ * permit persons to whom the Software is furnished to do so, subject to
+ * the following conditions:
+ *
+ * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
+ * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
+ * FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL
+ * THE COPYRIGHT HOLDERS, AUTHORS AND/OR ITS SUPPLIERS BE LIABLE FOR ANY CLAIM,
+ * DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR
+ * OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE
+ * USE OR OTHER DEALINGS IN THE SOFTWARE.
+ *
+ * The above copyright notice and this permission notice (including the
+ * next paragraph) shall be included in all copies or substantial portions
+ * of the Software.
+ *
+ * Authors: Dave Airlie <airlied@redhat.com>
+ * Michael Thayer <michael.thayer@oracle.com>
+ */
+#include "vbox_drv.h"
#include <ttm/ttm_page_alloc.h>

#include linux/defparam.h

#include <linux/init.h>

#define ALLOW_OOMoops 0

#define __KERNEL__

#define LINUX_VERSION_CODE < KERNEL_VERSION(3, 18, 0) && !defined(RHEL_73)

#define PLACEMENT_FLAGS(placement) (placement)

#define PLACEMENT_FLAGS(placement) ((placement).flags)

#endif

static inline struct vbox_private *vbox_bdev(struct ttm_bo_device *bd)
{
    return container_of(bd, struct vbox_private, ttm.bdev);
}

static int vbox_ttm_mem_global_init(struct drm_global_reference *ref)
{
    return ttm_mem_global_init(ref->object);
}

static void vbox_ttm_mem_global_release(struct drm_global_reference *ref)
{
    ttm_mem_global_release(ref->object);
}

/**
 * Adds the vbox memory manager object/structures to the global memory manager.
 */

static int vbox_ttm_global_init(struct vbox_private *vbox)
{
    struct drm_global_reference *global_ref;
    int r;

    global_ref = &vbox->ttm.mem_global_ref;
    global_ref->global_type = DRM_GLOBAL_TTM_MEM;
    global_ref->size = sizeof(struct ttm_mem_global);
    global_ref->init = &vbox_ttm_mem_global_init;
    global_ref->release = &vbox_ttm_mem_global_release;
    r = drm_global_item_ref(global_ref);
    if (r != 0) {
        DRM_ERROR("Failed setting up TTM memory accounting subsystem.\n");
        return r;
    }

    vbox->ttm.bo_global_ref.mem_glob = vbox->ttm.mem_global_ref.object;
    global_ref = &vbox->ttm.bo_global_ref.ref;
    global_ref->global_type = DRM_GLOBAL_TTM_BO;
    global_ref->size = sizeof(struct ttm_bo_global);
    global_ref->init = &ttm_bo_global_init;
    global_ref->release = &ttm_bo_global_release;
+ r = drm_global_item_ref(global_ref);
+ if (r != 0) {
+   DRM_ERROR("Failed setting up TTM BO subsystem.\n");
+   drm_global_item_unref(&vbox->ttm.mem_global_ref);
+   return r;
+ }
+ return 0;
+ }
+ /*
+ * Removes the vbox memory manager object from the global memory manager.
+ */
+ static void vbox_ttm_global_release(struct vbox_private *vbox)
+ {
+   if (!vbox->ttm.mem_global_ref.release)
+     return;
+   drm_global_item_unref(&vbox->ttm.bo_global_ref.ref);
+   drm_global_item_unref(&vbox->ttm.mem_global_ref);
+   vbox->ttm.mem_global_ref.release = NULL;
+ }
+ 
+ static void vbox_bo_ttm_destroy(struct ttm_buffer_object *tbo)
+ {
+   struct vbox_bo *bo;
+   bo = container_of(tbo, struct vbox_bo, bo);
+   drm_gem_object_release(&bo->gem);
+   kfree(bo);
+ }
+ 
+ static bool vbox_ttm_bo_is_vbox_bo(struct ttm_buffer_object *bo)
+ {
+   if (bo->destroy == &vbox_bo_ttm_destroy)
+     return true;
+   return false;
+ }
+ 
+ static int
+ vbox_bo_init_mem_type(struct ttm_bo_device *bdev, u32 type,
+                       struct ttm_mem_type_manager *man)
+ {
+   switch (type) {
+   case TTM_PL_SYSTEM:
+man->flags = TTM_MEMTYPE_FLAG_MAPPABLE;
+man->available_caching = TTM_PL_MASK_CACHING;
+man->default_caching = TTM_PL_FLAG_CACHED;
+break;
+case TTM_PL_VRAM:
+man->func = &ttm_bo_manager_func;
+man->flags = TTM_MEMTYPE_FLAG_FIXED | TTM_MEMTYPE_FLAG_MAPPABLE;
+man->available_caching = TTM_PL_FLAG_UNCACHED | TTM_PL_FLAG_WC;
+man->default_caching = TTM_PL_FLAG_WC;
+break;
+default:
+DRM_ERROR("Unsupported memory type %u\n", (unsigned int)type);
+return -EINVAL;
+
+return 0;
+
+static void
+vbox_bo_evict_flags(struct ttm_buffer_object *bo, struct ttm_placement *pl)
+{
+struct vbox_bo *vboxbo = vbox_bo(bo);
+
+if (!vbox_ttm_bo_is_vbox_bo(bo))
+return;
+
+vbox_ttm_placement(vboxbo, TTM_PL_FLAG_SYSTEM);
+*pl = vboxbo->placement;
+}
+
+static int vbox_bo_verify_access(struct ttm_buffer_object *bo,
+struct file *filp)
+{
+return 0;
+}
+
+static int vbox_ttm_io_mem_reserve(struct ttm_bo_device *bdev,
+struct ttm_mem_reg *mem)
+{
+struct ttm_mem_type_manager *man = &bdev->man[mem->mem_type];
+struct vbox_private *vbox = vbox_bdev(bdev);
+
+mem->bus.addr = NULL;
+mem->bus.offset = 0;
+mem->bus.size = mem->num_pages << PAGE_SHIFT;
+mem->bus.base = 0;
+mem->bus.is_iomem = false;
+if (!(man->flags & TTM_MEMTYPE_FLAG_MAPPABLE))
+return -EINVAL;
+switch (mem->mem_type) {
+case TTM_PL_SYSTEM:
+ /* system memory */
+ return 0;
+case TTM_PL_VRAM:
+ mem->bus.offset = mem->start << PAGE_SHIFT;
+ mem->bus.base = pci_resource_start(vbox->dev->pdev, 0);
+ mem->bus.is_iomem = true;
+ break;
+default:
+ return -EINVAL;
+}
+ return 0;
+
+static void vbox_ttm_io_mem_free(struct ttm_bo_device *bdev,
+ struct ttm_mem_reg *mem)
+ {
+ 
+ static int vbox_bo_move(struct ttm_buffer_object *bo,
+ bool evict, bool interruptible,
+ bool no_wait_gpu, struct ttm_mem_reg *new_mem)
+ {
+ int r;
+ 
+ #if LINUX_VERSION_CODE < KERNEL_VERSION(4, 8, 0) && !defined(RHEL_74)
+ r = ttm_bo_move_memcpy(bo, evict, no_wait_gpu, new_mem);
+ #elif LINUX_VERSION_CODE < KERNEL_VERSION(4, 9, 0) && !defined(RHEL_74)
+ r = ttm_bo_move_memcpy(bo, evict, interruptible, no_wait_gpu, new_mem);
+ #else
+ r = ttm_bo_move_memcpy(bo, interruptible, no_wait_gpu, new_mem);
+ #endif
+ return r;
+ }
+ 
+ static void vbox_ttm_backend_destroy(struct ttm_tt *tt)
+ {
+ ttm_tt_fini(tt);
+ kfree(tt);
+ }
+ 
+ static struct ttm_backend_func vbox_tt_backend_func = {
+ .destroy = &vbox_ttm_backend_destroy,
+ };
+ 
+ static struct ttm_tt *vbox_ttm_tt_create(struct ttm_bo_device *bdev,
unsigned long size,
+ u32 page_flags,
+ struct page *dummy_read_page)
+{
+struct ttm_tt *tt;
+
+tt = kzalloc(sizeof(*tt), GFP_KERNEL);
+if (!tt)
+return NULL;
+
+tt->func = &vbox_tt_backend_func;
+if (ttm_tt_init(tt, bdev, size, page_flags, dummy_read_page)) {
+kfree(tt);
+return NULL;
+}
+
+return tt;
+}
+
+static int vbox_ttm_tt_populate(struct ttm_tt *ttm)
+{
+return ttm_pool_populate(ttm);
+}
+
+static void vbox_ttm_tt_unpopulate(struct ttm_tt *ttm)
+{
+ttm_pool_unpopulate(ttm);
+}
+
+struct ttm_bo_driver vbox_bo_driver = {
+.ttm_tt_create = vbox_ttm_tt_create,
+.ttm_tt_populate = vbox_ttm_tt_populate,
+.ttm_tt_unpopulate = vbox_ttm_tt_unpopulate,
+.init_mem_type = vbox_bo_init_mem_type,
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 10, 0) || defined(RHEL_74)
+.eviction_valuable = ttm_bo_eviction_valuable,
+#else
+.evict_flags = vbox_bo_evict_flags,
+.move = vbox_bo_move,
+.verify_access = vbox_bo_verify_access,
+.io_mem_reserve = &vbox_ttm_io_mem_reserve,
+.io_mem_free = &vbox_ttm_io_mem_free,
+﻿#if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 12, 0)
+.io_mem_pfn = ttm_bo_default_io_mem_pfn,
+#else
+endif
+endif
+if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 7, 0) && LINUX_VERSION_CODE <
+KERNEL_VERSION(4, 11, 0)) \n+endif
+
.lru_tail = &ttm_bo_default_lru_tail,
+swap_lru_tail = &ttm_bo_default_swap_lru_tail,
+} ;
+
+int vbox_mm_init(struct vbox_private *vbox)
+{
+int ret;
+struct drm_device *dev = vbox->dev;
+struct ttm_bo_device *bdev = &vbox->ttm.bdev;
+
+ret = vbox_ttm_global_init(vbox);
+if (ret)
+return ret;
+
+ret = ttm_bo_device_init(&vbox->ttm.bdev,
+ vbox->ttm.bo_global_ref.ref.object,
+ &vbox_bo_driver,
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 15, 0) || defined(RHEL_73)
+ dev->anon_inode->i_mapping,
+#endif
+ DRM_FILE_PAGE_OFFSET, true);
+if (ret) {
+DRM_ERROR("Error initialising bo driver; %d\n", ret);
+return ret;
+}
+
+ret = ttm_bo_init_mm(bdev, TTM_PL_VRAM,
+ vbox->available_vram_size >> PAGE_SHIFT);
+if (ret) {
+DRM_ERROR("Failed ttm VRAM init: %d\n", ret);
+return ret;
+}
+#ifdef DRM_MTRR WC
+vbox->fb_mtrr = drm_mtrr_add(pci_resource_start(dev->pdev, 0),
+ pci_resource_len(dev->pdev, 0),
+ DRM_MTRR WC);
+#else
+vbox->fb_mtrr = arch_phys_wc_add(pci_resource_start(dev->pdev, 0),
+ pci_resource_len(dev->pdev, 0));
+#endif
+
+vbox->ttm.mm_initialised = true;
+
+return 0;
+}
+
+void vbox_mm_fini(struct vbox_private *vbox)
+{
+#ifdef DRM_MTRR_WC
+struct drm_device *dev = vbox->dev;
+#endif
+if (!vbox->ttm.mm_initialised)
+return;
+ttm_bo_device_release(&vbox->ttm.bdev);
+
vbox_ttm_global_release(vbox);
+
+#endif
+
+void vbox_ttm_placement(struct vbox_bo *bo, int domain)
+{
+u32 c = 0;
+if (LINUX_VERSION_CODE < KERNEL_VERSION(3, 18, 0) || !defined(RHEL_73))
+bo->placement.fpfn = 0;
+bo->placement.lpfn = 0;
+}
+unsigned int i;
+}
+
+bo->placement.placement = bo->placements;
+bo->placement.busy_placement = bo->placements;
+
+if (domain & TTM_PL_FLAG_VRAM)
+PLACEMENT_FLAGS(bo->placements[c++]) =
+TTM_PL_FLAG_WC | TTM_PL_FLAG_UNCACHED | TTM_PL_FLAG_VRAM;
+if (domain & TTM_PL_FLAG_SYSTEM)
+PLACEMENT_FLAGS(bo->placements[c++]) =
+TTM_PL_MASK_CACHING | TTM_PL_FLAG_SYSTEM;
+if (c)
+bo->placement.num_placement = c;
+bo->placement.num_busy_placement = c;
+#if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 18, 0) || defined(RHEL_73)
+for (i = 0; i < c; ++i) {
+bo->placements[i].fpfn = 0;
+bo->placements[i].lpfn = 0;
+}
+}

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```c
+
+int vbox_bo_create(struct drm_device *dev, int size, int align,
+ u32 flags, struct vbox_bo **pvboxbo)
+{
+struct vbox_private *vbox = dev->dev_private;
+struct vbox_bo *vboxbo;
+nsize_t acc_size;
+int ret;
+
vboxbo = kzalloc(sizeof(*vboxbo), GFP_KERNEL);
+if (!vboxbo)
+    return -ENOMEM;
+
+ret = drm_gem_object_init(dev, &vboxbo->gem, size);
+if (ret) {
+kfree(vboxbo);
+    return ret;
+}
+
vboxbo->bo.bdev = &vbox->ttm.bdev;
+if LINUX_VERSION_CODE < KERNEL_VERSION(3, 15, 0) && !defined(RHEL_73)
+vboxbo->bo.bdev->dev_mapping = dev->dev_mapping;
+
+vbox_ttm_placement(vboxbo, TTM_PL_FLAG_VRAM | TTM_PL_FLAG_SYSTEM);
+
+acc_size = ttm_bo_dma_acc_size(&vbox->ttm.bdev, size,
+ sizeof(struct vbox_bo));
+
+ret = ttm_bo_init(&vbox->ttm.bdev, &vboxbo->bo, size,
+ ttm_bo_type_device, &vboxbo->placement,
+ align >> PAGE_SHIFT, false, NULL, acc_size,
+ if LINUX_VERSION_CODE >= KERNEL_VERSION(3, 18, 0) || defined(RHEL_73)
+ NULL,
+endif
+NULL, vboxbo->ttm_destroy);
+if (ret)
+    return ret;
+
+*pvboxbo = vboxbo;
+
+return 0;
+}
+
+static inline u64 vbox_bo_gpu_offset(struct vbox_bo *bo)
```
int vbox_bo_pin(struct vbox_bo *bo, u32 pl_flag, u64 *gpu_addr)
{
    int i, ret;
    if (bo->pin_count) {
        bo->pin_count++;
        if (gpu_addr)
            *gpu_addr = vbox_bo_gpu_offset(bo);
        return 0;
    }
    vbox_ttm_placement(bo, pl_flag);
    for (i = 0; i < bo->placement.num_placement; i++)
        PLACEMENT_FLAGS(bo->placements[i]) |= TTM_PL_FLAG_NO_EVICT;
    ret = ttm_bo_validate(&bo->bo, &bo->placement, false, false);
    if (ret)
        return ret;
    bo->pin_count = 1;
    if (gpu_addr)
        *gpu_addr = vbox_bo_gpu_offset(bo);
    return 0;
}

int vbox_bo_unpin(struct vbox_bo *bo)
{
    int i, ret;
    if (!bo->pin_count) {
        DRM_ERROR("unpin bad %p\n", bo);
        return 0;
    }
    bo->pin_count--;
    if (bo->pin_count)
        return 0;
    for (i = 0; i < bo->placement.num_placement; i++)
        PLACEMENT_FLAGS(bo->placements[i]) &= ~TTM_PL_FLAG_NO_EVICT;
ret = ttm_bo_validate(&bo->bo, &bo->placement, false, false);
+if (ret)
+return ret;
+
+return 0;
+
+/
+ * Move a vbox-owned buffer object to system memory if no one else has it
+ * pinned. The caller must have pinned it previously, and this call will
+ * release the caller's pin.
+ */
+int vbox_bo_push_sysram(struct vbox_bo *bo)
+{
+int i, ret;
+
+/*
+ * Move a vbox-owned buffer object to system memory if no one else has it
+ * pinned. The caller must have pinned it previously, and this call will
+ * release the caller's pin.
+ */
+int vbox_bo_push_sysram(struct vbox_bo *bo)
+{
+int i, ret;
+
+if (!bo->pin_count) {
  +DRM_ERROR("unpin bad %p\n", bo);
  +return 0;
  +}
  +bo->pin_count--;
  +if (bo->pin_count)
  +return 0;
  +
  +if (bo->kmap.virtual)
  +ttm_bo_kunmap(&bo->kmap);
  +
  +vbox_ttm_placement(bo, TTM_PL_FLAG_SYSTEM);
  +
  +for (i = 0; i < bo->placement.num_placement; i++)
  +PLACEMENT_FLAGS(bo->placements[i]) |= TTM_PL_FLAG_NO_EVICT;
  +
  +ret = ttm_bo_validate(&bo->bo, &bo->placement, false, false);
  +if (ret) {
    +DRM_ERROR("pushing to VRAM failed\n");
    +return ret;
  +}
  +
  +return 0;
  +}
  +
  +int vbox_mmap(struct file *filp, struct vm_area_struct *vma)
  +{
    +struct drm_file *file_priv;
    +struct vbox_private *vbox;
    +
    +if (unlikely(vma->vm_pgoff < DRM_FILE_PAGE_OFFSET))
      +return -EINVAL;

+ file_priv = filp->private_data;
+ vbox = file_priv->minor->dev->dev_private;
+
+ return ttm_bo_mmap(filp, vma, &vbox->ttm.bdev);
+}

--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vboxvideo.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vboxvideo.h
@@ -0,0 +1,1945 @@
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * Permission is hereby granted, free of charge, to any person
+ * obtaining a copy of this software and associated documentation
+ * files (the "Software"), to deal in the Software without
+ * restriction, including without limitation the rights to use,
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+ * copies of the Software, and to permit persons to whom the
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+ * HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,
+ * WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
+ * FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR
+ * OTHER DEALINGS IN THE SOFTWARE.
+ */
+
+ifndef ___VBox_Graphics_VBoxVideo_h
+define ___VBox_Graphics_VBoxVideo_h
+
+include "vbox_err.h"
+
+/* this should be in sync with monitorCount <xsd:maxInclusive value="64"/> in src/VBox/Main/xml/VirtualBox-settings-common.xsd */
+define VBOX_VIDEO_MAX_SCREENS 64
+
+/
+ * The last 4096 bytes of the guest VRAM contains the generic info for all
+ * DualView chunks: sizes and offsets of chunks. This is filled by miniport.
+ *
+ * Last 4096 bytes of each chunk contain chunk specific data: framebuffer info,
The VRAM layout:

- Last 4096 bytes - Adapter information area.
- 4096 bytes aligned miniport heap (value specified in the config rounded up).
- Slack - what left after dividing the VRAM.
- 4096 bytes aligned framebuffers:
- last 4096 bytes of each framebuffer is the display information area.

The Virtual Graphics Adapter information in the guest VRAM is stored by the guest video driver using structures prepended by VBOXVIDEOINFOHDR.

When the guest driver writes dword 0 to the VBE_DISPI_INDEX_VBOX_VIDEO, the host starts to process the info. The first element at the start of the 4096 bytes region should be normally be a LINK that points to the actual information chain. That way the guest driver can have some fixed layout of the information memory block and just rewrite the link to point to relevant memory chain.

The processing stops at the END element.

The host can access the memory only when the port IO is processed. All data that will be needed later must be copied from these 4096 bytes. But other VRAM can be used by host until the mode is disabled.

The guest driver writes dword 0xffffffff to the VBE_DISPI_INDEX_VBOX_VIDEO to disable the mode.

VBE_DISPI_INDEX_VBOX_VIDEO is used to read the configuration information from the host and issue commands to the host.

The guest writes the VBE_DISPI_INDEX_VBOX_VIDEO index register, the the following operations with the VBE data register can be performed:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>write 16 bit value</td>
<td>NOP</td>
</tr>
<tr>
<td>read 16 bit value</td>
<td>count of monitors</td>
</tr>
<tr>
<td>write 32 bit value</td>
<td>sets the vbox command value and the command processed by the host</td>
</tr>
<tr>
<td>read 32 bit value</td>
<td>result of the last vbox command is returned</td>
</tr>
</tbody>
</table>

#define VBOX_VIDEO_PRIMARY_SCREEN 0
#define VBOX_VIDEO_NO_SCREEN ~0

VBA command header.

@todo Where does this fit in?
+*/
+typedef struct VBVACMDHDR {
+   /** Coordinates of affected rectangle. */
+   int16_t x;
+   int16_t y;
+   u16 w;
+   u16 h;
+} VBVACMDHDR;
+assert_compile_size(VBVACMDHDR, 8);
+
+/** @name VBVA ring defines.
+ * The VBVA ring buffer is suitable for transferring large (< 2GB) amount of
+ * data. For example big bitmaps which do not fit to the buffer.
+ * Guest starts writing to the buffer by initializing a record entry in the
+ * records queue. VBVA_F_RECORD_PARTIAL indicates that the record is being
+ * written. As data is written to the ring buffer, the guest increases off32End
+ * for the record.
+ *
+ * The host reads the records on flushes and processes all completed records.
+ * When host encounters situation when only a partial record presents and
+ * len_and_flags & ~VBVA_F_RECORD_PARTIAL >= VBVA_RING_BUFFER_SIZE -
+ * VBVA_RING_BUFFER_THRESHOLD, the host fetched all record data and updates
+ * off32Head. After that on each flush the host continues fetching the data
+ * until the record is completed.
+ *
+ */
+#define VBVA_RING_BUFFER_SIZE        (4*1024*1024 - 1024)
+#define VBVA_RING_BUFFER_THRESHOLD   (4 * 1024)
+
+#define VBVA_MAX_RECORDS (64)
+
+#define VBVA_F_MODE_ENABLED         0x00000001u
+#define VBVA_F_MODE_VRDP            0x00000002u
+#define VBVA_F_MODE_VRDP_RESET      0x00000004u
+#define VBVA_F_MODE_VRDP_ORDER_MASK 0x00000008u
+
+#define VBVA_F_STATE_PROCESSING     0x00010000u
+
+#define VBVA_F_RECORD_PARTIAL       0x80000000u
+
/** VBVA record.
 */
+typedef struct VBVARECORD {
+   /** The length of the record. Changed by guest. */
+   u32 len_and_flags;
+}
```c
+} VBVARECORD;
+assert_compile_size(VBVARECORD, 4);
+
+/* The size of the information. */
+/*
+ * The minimum HGSMI heap size is PAGE_SIZE (4096 bytes) and is a restriction of the
+ * runtime heapsimple API. Use minimum 2 pages here, because the info area also may
+ * contain other data (for example struct hgsmi_host_flags structure).
+ */
+#ifndef VBOX_XPDM_MINIPORT
+# define VBVA_ADAPTER_INFORMATION_SIZE (64*1024)
+#else
+#define VBVA_ADAPTER_INFORMATION_SIZE (16*1024)
+#define VBVA_DISPLAY_INFORMATION_SIZE (64*1024)
+#endif
+#define VBVA_MIN_BUFFER_SIZE (64*1024)
+
+/* The value for port IO to let the adapter to interpret the adapter memory. */
+#define VBOX_VIDEO_DISABLE_ADAPTER_MEMORY 0xFFFFFFFF
+
+/* The value for port IO to let the adapter to interpret the adapter memory. */
+#define VBOX_VIDEO_INTERPRET_ADAPTER_MEMORY 0x00000000
+
+/* The value for port IO to let the adapter to interpret the display memory.
+ * The display number is encoded in low 16 bits.
+ */
+#define VBOX_VIDEO_INTERPRET_DISPLAY_MEMORY_BASE 0x00010000
+
+/* The end of the information. */
+#define VBOX_VIDEO_INFO_TYPE_END 0
+/* Instructs the host to fetch the next VBOXVIDEOINFOHDR at the given offset of VRAM. */
+#define VBOX_VIDEO_INFO_TYPE_LINK 1
+/* Information about a display memory position. */
+#define VBOX_VIDEO_INFO_TYPE_DISPLAY 2
+/* Information about a screen. */
+#define VBOX_VIDEO_INFO_TYPE_SCREEN 3
+/* Information about host notifications for the driver. */
+#define VBOX_VIDEO_INFO_TYPE_HOST_EVENTS 4
+/* Information about non-volatile guest VRAM heap. */
+#define VBOX_VIDEO_INFO_TYPE_NV_HEAP 5
+/* VBVA enable/disable. */
+#define VBOX_VIDEO_INFO_TYPE_VBVA_STATUS 6
+/* VBVA flush. */
+#define VBOX_VIDEO_INFO_TYPE_VBVA_FLUSH 7
+/* Query configuration value. */
+#define VBOX_VIDEO_INFO_TYPE_QUERY_CONF32 8
```
#pragma pack(1)

typedef struct VBOXVIDEOINFOHDR {
  u8 u8Type;
  u8 u8Reserved;
  u16 u16Length;
} VBOXVIDEOINFOHDR;

typedef struct VBOXVIDEOINFOLINK {
  /* Relative offset in VRAM */
  s32 i32Offset;
} VBOXVIDEOINFOLINK;

/* Resides in adapter info memory. Describes a display VRAM chunk. */
typedef struct VBOXVIDEOINFODISPLAY {
  /* Index of the framebuffer assigned by guest. */
  u32 index;
  /* Absolute offset in VRAM of the framebuffer to be displayed on the monitor. */
  u32 offset;
  /* The size of the memory that can be used for the screen. */
  u32 u32FramebufferSize;
  /* The size of the memory that is used for the Display information.
   * The information is at offset + u32FramebufferSize */
  u32 u32InformationSize;
} VBOXVIDEOINFODISPLAY;

/* Resides in display info area, describes the current video mode. */
#define VBOX_VIDEO_INFO_SCREEN_F_NONE   0x00
#define VBOX_VIDEO_INFO_SCREEN_F_ACTIVE 0x01
typedef struct VBOXVIDEOINFOSCREEN {
  /* Physical X origin relative to the primary screen. */
  s32 xOrigin;
  /* Physical Y origin relative to the primary screen. */
  s32 yOrigin;
  /* The scan line size in bytes. */
  u32 line_size;
/* Width of the screen. */
+u16 u16Width;
+
/* Height of the screen. */
+u16 u16Height;
+
/* Color depth. */
+u8 bitsPerPixel;
+
/* VBOX_VIDEO_INFO_SCREEN_F_* */
+u8 u8Flags;
} VBOXVIDEOINFOSCREEN;
+
/* The guest initializes the structure to 0. The positions of the structure in the
display info area must not be changed, host will update the structure. Guest checks
the events and modifies the structure as a response to host. */
+
#define VBOX_VIDEO_INFO_HOST_EVENTS_F_NONE        0x00000000
#define VBOX_VIDEO_INFO_HOST_EVENTS_F_VRDP_RESET  0x00000080
+
typedef struct VBOXVIDEOINFOHOSTEVENTS {
/* Host events. */
+u32 fu32Events;
} VBOXVIDEOINFOHOSTEVENTS;
+
/* Resides in adapter info memory. Describes the non-volatile VRAM heap. */
typedef struct VBOXVIDEOINFONVHEAP {
/* Absolute offset in VRAM of the start of the heap. */
+u32 u32HeapOffset;
+
/* The size of the heap. */
+u32 u32HeapSize;
+
} VBOXVIDEOINFONVHEAP;
+
/* Display information area. */
typedef struct VBOXVIDEOINFOVBVASTATUS {
/* Absolute offset in VRAM of the start of the VBVA QUEUE. 0 to disable VBVA. */
+u32 u32QueueOffset;
+
/* The size of the VBVA QUEUE. 0 to disable VBVA. */
+u32 u32QueueSize;
+
} VBOXVIDEOINFOVBVASTATUS;
+
typedef struct VBOXVIDEOINFOVBVAFLUSH {
+u32 u32DataStart;
+u32 u32DataEnd;
+
+} VBOXVIDEOINFOVBAFLUSH;
+
+#define VBOX_VIDEO_QCI32_MONITOR_COUNT 0
+#define VBOX_VIDEO_QCI32_OFFSCREEN_HEAP_SIZE 1
+
typedef struct VBOXVIDEOINFOQUERYCONF32 {
+u32 index;
+
+} VBOXVIDEOINFOQUERYCONF32;
+#pragma pack()
+
+#ifdef VBOX_WITH_VIDEOHWACCEL
+#pragma pack(1)
+
+#define VBOXVHWA_VERSION_MAJ 0
+#define VBOXVHWA_VERSION_MIN 0
+#define VBOXVHWA_VERSION_BLD 6
+#define VBOXVHWA_VERSION_RSV 0
+
typedef enum {
+VBOXVHWACMD_TYPE_SURF_CANCREATE = 1,
+VBOXVHWACMD_TYPE_SURF_CREATE,
+VBOXVHWACMD_TYPE_SURF_DESTROY,
+VBOXVHWACMD_TYPE_SURF_LOCK,
+VBOXVHWACMD_TYPE_SURF_UNLOCK,
+VBOXVHWACMD_TYPE_SURF_BLT,
+VBOXVHWACMD_TYPE_SURF_FLIP,
+VBOXVHWACMD_TYPE_SURF_OVERLAY_UPDATE,
+VBOXVHWACMD_TYPE_SURF_OVERLAY_SETPOSITION,
+VBOXVHWACMD_TYPE_SURF_COLORKEY_SET,
+VBOXVHWACMD_TYPE_QUERY_INFO1,
+VBOXVHWACMD_TYPE_QUERY_INFO2,
+VBOXVHWACMD_TYPE_ENABLE,
+VBOXVHWACMD_TYPE_DISABLE,
+VBOXVHWACMD_TYPE_HH_CONSTRUCT,
+VBOXVHWACMD_TYPE_HH_RESET
+#ifdef VBOX_WITH_WDDM
+, VBOXVHWACMD_TYPE_SURF_GETINFO
+, VBOXVHWACMD_TYPE_SURF_COLORFILL
+#endif
+
+} VBOXVHWACMD_TYPE_HH_DISABLE
+, VBOXVHWACMD_TYPE_HH_ENABLE
+, VBOXVHWACMD_TYPE_HH_SAVESTATE_SAVEBEGIN
typedef struct VBOXVHWACMD {
    VBOXVHWACMD_TYPE enmCmd; /* command type */
    volatile s32 rc; /* command result */
    s32 iDisplay; /* display index */
    volatile s32 Flags; /* ored VBOXVHWACMD_FLAG_xxx values */
    uint64_t GuestVBVAReserved1; /* field internally used by the guest VBVA cmd handling, must NOT be modified by clients */
    uint64_t GuestVBVAReserved2; /* field internally used by the guest VBVA cmd handling, must NOT be modified by clients */
    volatile u32 cRefs;
    s32 Reserved;
    union {
        struct VBOXVHWACMD *pNext;
        u32 offNext;
        uint64_t Data; /* the body is 64-bit aligned */
    } u;
    char body[1];
} VBOXVHWACMD;

#ifdef VBOXVHWACMD_FLAG_HG_ASYNCH
    0x00010000
#endif
/* asynch completion is performed by issuing the event */
#define VBOXVHWACMD_FLAG_GH_ASYNCH_EVENT 0x00000001
/* issue interrupt on asynch completion */
#define VBOXVHWACMD_FLAG_GH_ASYNCH_IRQ 0x00000002
/* guest does not do any op on completion of this command, the host may copy the command and indicate that it does not need the command anymore */
#define VBOXVHWACMD_FLAG_GH_ASYNCH_NOCOMPLETION 0x00000004
/* the host has copied the VBOXVHWACMD_FLAG_GH_ASYNCH_NOCOMPLETION command and returned it to the guest */
#define VBOXVHWACMD_FLAG_HG_ASYNCH_RETURNED 0x00020000
/* this is the host->host cmd, i.e. a configuration command posted by the host to the framebuffer */
#define VBOXVHWACMD_FLAG_HH_CMD 0x10000000

typedef struct VBOXVHWACMD {
    VBOXVHWACMD_TYPE enmCmd; /* command type */
    volatile s32 rc; /* command result */
    s32 iDisplay; /* display index */
    volatile s32 Flags; /* ored VBOXVHWACMD_FLAG_xxx values */
    uint64_t GuestVBVAReserved1; /* field internally used by the guest VBVA cmd handling, must NOT be modified by clients */
    uint64_t GuestVBVAReserved2; /* field internally used by the guest VBVA cmd handling, must NOT be modified by clients */
    volatile u32 cRefs;
    s32 Reserved;
    union {
        struct VBOXVHWACMD *pNext;
        u32 offNext;
        uint64_t Data; /* the body is 64-bit aligned */
    } u;
    char body[1];
} VBOXVHWACMD;

#define VBOXVHWACMD_HEADSIZE() (RT_OFFSETOF(VBOXVHWACMD, body))
#define VBOXVHWACMD_SIZE_FROMBODYSIZE(_s) (VBOXVHWACMD_HEADSIZE() + (_s))
#define VBOXVHWACMD_SIZE(_tCmd) (VBOXVHWACMD_SIZE_FROMBODYSIZE(sizeof(_tCmd)))

typedef unsigned int VBOXVHWACMD_LENGTH;

typedef uint64_t VBOXVHWA_SURFHANDLE;
/**Open Source Used In 5GaaS Edge AC-4**

```c
#define VBOXVHWA_SURFHANDLE_INVALID 0ULL
#define VBOXVHWACMD_BODY(_p, _t) (((_t*)(_p))->body)
#define VBOXVHWACMD_HEAD(_pb) ((VBOXVHWACMD*)((u8*)(_pb) - RT_OFFSETOF(VBOXVHWACMD, body)))

typedef struct VBOXVHWA_RECTL {
    s32 left;
    s32 top;
    s32 right;
    s32 bottom;
} VBOXVHWA_RECTL;

typedef struct VBOXVHWA_COLORKEY {
    u32 low;
    u32 high;
} VBOXVHWA_COLORKEY;

typedef struct VBOXVHWA_PIXELFORMAT {
    u32 flags;
    u32 fourCC;
    union {
        u32 rgbBitCount;
        u32 yuvBitCount;
    } c;
    union {
        u32 rgbRBitMask;
        u32 yuvYBitMask;
    } m1;
    union {
        u32 rgbGBitMask;
        u32 yuvUBitMask;
    } m2;
    union {
        u32 rgbBBitMask;
        u32 yuvVBitMask;
    } m3;
    union {
        u32 rgbABitMask;
    } m4;
    u32 Reserved;
} VBOXVHWA_PIXELFORMAT;

typedef struct VBOXVHWA_SURFACEDESC {
```
+u32 flags;
+u32 height;
+u32 width;
+u32 pitch;
+u32 sizeX;
+u32 sizeY;
+u32 cBackBuffers;
+u32 Reserved;
+VBOXVHWA_COLORKEY DstOverlayCK;
+VBOXVHWA_COLORKEY DstBltCK;
+VBOXVHWA_COLORKEY SrcOverlayCK;
+VBOXVHWA_COLORKEY SrcBltCK;
+VBOXVHWA_PIXELFORMAT PixelFormat;
+u32 surfCaps;
+u32 Reserved2;
+VBOXVHWA_SURFHANDLE hSurf;
+uint64_t offSurface;
+} VBOXVHWA_SURFACEDESC;
+
+typedef struct VBOXVHWA_BLTFX {
+u32 flags;
+u32 rop;
+u32 rotationOp;
+u32 rotation;
+u32 fillColor;
+u32 Reserved;
+VBOXVHWA_COLORKEY DstCK;
+VBOXVHWA_COLORKEY SrcCK;
+} VBOXVHWA_BLTFX;
+
+typedef struct VBOXVHWA_OVERLAYFX {
+u32 flags;
+u32 Reserved1;
+u32 fxFlags;
+u32 Reserved2;
+VBOXVHWA_COLORKEY DstCK;
+VBOXVHWA_COLORKEY SrcCK;
+} VBOXVHWA_OVERLAYFX;
+
+#define VBOXVHWA_CAPS_BLT 0x00000040
+#define VBOXVHWA_CAPS_BLTCOLORFILL 0x04000000
+#define VBOXVHWA_CAPS_BLTFOURCC 0x00000100
+#define VBOXVHWA_CAPS_BLTSTRETCH 0x00000200
+#define VBOXVHWA_CAPS_BLTQUEUE 0x00000080
+
+#define VBOXVHWA_CAPS_OVERLAY 0x00000800
+#define VBOXVHWA_CAPS_OVERLAYFOURCC 0x00002000
+#define VBOXVHWA_CAPS_OVERLAYSTRETCH 0x00004000
+define VBOXVHWA_CAPS_OVERLAYCANTCLIP 0x00001000
+
+define VBOXVHWA_CAPS_COLORKEY 0x00400000
+define VBOXVHWA_CAPS_COLORKEYHWASSIST 0x01000000
+
+define VBOXVHWA_SCAPS_BACKBUFFER 0x00000004
+define VBOXVHWA_SCAPS_COMPLEX 0x00000008
+define VBOXVHWA_SCAPS_FLIP 0x00000010
+define VBOXVHWA_SCAPS_FRONTBUFFER 0x00000020
+define VBOXVHWA_SCAPS_OFFSCREENPLAIN 0x00000040
+define VBOXVHWA_SCAPS_OVERLAY 0x00000080
+define VBOXVHWA_SCAPS_PRIMARYSURFACE 0x00000100
+define VBOXVHWA_SCAPS_SYSTEMMEMORY 0x00000200
+define VBOXVHWA_SCAPS_VIDEOMEMORY 0x00000400
+define VBOXVHWA_SCAPS_VISIBLE 0x00000800
+define VBOXVHWA_SCAPS_LOCALVIDMEM 0x01000000
+
+define VBOXVHWA_PF_PALETTEINDEXED8 0x00000020
+define VBOXVHWA_PF_RGB 0x00000040
+define VBOXVHWA_PF_RGBTOYUV 0x00000100
+define VBOXVHWA_PF_YUV 0x00000200
+define VBOXVHWA_PF_FOURCC 0x00000004
+
+define VBOXVHWA_LOCK_DISCARDCONTENTS 0x00002000
+
+define VBOXVHWA_CFG_ENABLED 0x00000001
+
+define VBOXVHWA_SD_BACKBUFFERCOUNT 0x00000020
+define VBOXVHWA_SD_CAPS 0x00000001
+define VBOXVHWA_SD_CKDESTBLT 0x00000400
+define VBOXVHWA_SD_CKDESTOVERLAY 0x00000200
+define VBOXVHWA_SD_CKSRCBDLT 0x00010000
+define VBOXVHWA_SD_CKSRCOVERLAY 0x00008000
+define VBOXVHWA_SD_HEIGHT 0x00000002
+define VBOXVHWA_SD_PITCH 0x00000008
+define VBOXVHWA_SD_PIXELFORMAT 0x00000100
+/*define VBOXVHWA_SD_REFRESHRATE 0x00040000*/
+define VBOXVHWA_SD_WIDTH 0x00000004
+
+define VBOXVHWA_CKEYCAPS_DESTBLT 0x00000001
+define VBOXVHWA_CKEYCAPS_DESTBLTCLRSPACE 0x00000002
+define VBOXVHWA_CKEYCAPS_DESTBLTCLRSPACEYUV 0x00000004
+define VBOXVHWA_CKEYCAPS_DESTBLTYUV 0x00000008
+define VBOXVHWA_CKEYCAPS_DESTOVERLAY 0x00000010
+define VBOXVHWA_CKEYCAPS_DESTOVERLAYCLRSPACE 0x00000020
+define VBOXVHWA_CKEYCAPS_DESTOVERLAYCLRSPACEYUV 0x00000040
+define VBOXVHWA_CKEYCAPS_DESTOVERLAYONEACTIVE 0x00000080
+define VBOXVHWA_CKEYCAPS_DESTOVERLAYYUYV 0x00000100
+#define VBOXVHWA_CKEYCAPS_SRCBLT 0x00000200
+#define VBOXVHWA_CKEYCAPS_SRCBLTCLRSPACE 0x00000400
+#define VBOXVHWA_CKEYCAPS_SRCBLTCLRSPACEYUV 0x00000800
+#define VBOXVHWA_CKEYCAPS_SRCLTYUV 0x00001000
+#define VBOXVHWA_CKEYCAPS_SRCOVERLAY 0x00002000
+#define VBOXVHWA_CKEYCAPS_SRCOVERLAYCLRSPACE 0x00004000
+#define VBOXVHWA_CKEYCAPS_SRCOVERLAYCLRSPACEYUV 0x00008000
+#define VBOXVHWA_CKEYCAPS_SRCOVERLAYONEACTIVE 0x00010000
+#define VBOXVHWA_CKEYCAPS_SRCOVERLAYYUV 0x00020000
+#define VBOXVHWA_CKEYCAPS_NOCOSTOVERLAY 0x00040000
+
+  +#define VBOXVHWA_BLT_COLORFILL 0x00000400
+  +#define VBOXVHWA_BLT_DDFX 0x00008000
+  +#define VBOXVHWA_BLT_EXTENDED_FLAGS 0x40000000
+  +#define VBOXVHWA_BLT_EXTENDED_LINEAR_CONTENT 0x00000004
+  +#define VBOXVHWA_BLT_EXTENDED_PRESENTATION_STRETCHFACTOR 0x00000010
+  +#define VBOXVHWA_BLT_KEYDESTOVERRIDE 0x00004000
+  +#define VBOXVHWA_BLT_KEYSRCOVERRIDE 0x00010000
+  +#define VBOXVHWA_BLT_LAST_PRESENTATION 0x20000000
+  +#define VBOXVHWA_BLT_PRESENTATION 0x10000000
+  +#define VBOXVHWA_BLT_ROP 0x00020000
+  +
+  +#define VBOXVHWA_OVER_DDFX 0x00080000
+  +#define VBOXVHWA_OVER_HIDE 0x00002000
+  +#define VBOXVHWA_OVER_KEYDEST 0x00004000
+  +#define VBOXVHWA_OVER_KEYDESTOVERRIDE 0x00008000
+  +#define VBOXVHWA_OVER_KEYSRC 0x00010000
+  +#define VBOXVHWA_OVER_KEYSRCOVERRIDE 0x00020000
+  +#define VBOXVHWA_OVER_SHOW 0x00040000
+
+  +#define VBOXVHWA_CKEY_COLORSPACE 0x00000001
+  +#define VBOXVHWA_CKEY_DESTBLT 0x00000002
+  +#define VBOXVHWA_CKEY_DESTOVERLAY 0x00000004
+  +#define VBOXVHWA_CKEY_SRCBLT 0x00000008
+  +#define VBOXVHWA_CKEY_SRCOVERLAY 0x00000010
+
+  +#define VBOXVHWA_BLT_ARITHSTRETCHY 0x00000001
+  +#define VBOXVHWA_BLT_MIRRORLEFTRIGHT 0x00000002
+  +#define VBOXVHWA_BLT_MIRRORUPDOWN 0x00000004
+
+  +#define VBOXVHWA_OVERFX_ARITHSTRETCHY 0x00000001
+  +#define VBOXVHWA_OVERFX_MIRRORLEFTRIGHT 0x00000002
+  +#define VBOXVHWA_OVERFX_MIRRORUPDOWN 0x00000004
+
+  +#define VBOXVHWA_CAPS2_CANRENDERWINDOWED 0x00008000
+  +#define VBOXVHWA_CAPS2_COPYFOURCC 0x00000000
+  +#define VBOXVHWA_CAPS2_WIDESURFACES 0x00000000
+  +#define VBOXVHWA_CAPS2_COPYFOURCC 0x00008000
#define VBOXVHWA_CAPS2_FLIPINTERVAL 0x00200000
#define VBOXVHWA_CAPS2_FLIPNOVSYNC 0x00400000

#define VBOXVHWA_OFFSET64_VOID (UINT64_MAX)

typedef struct VBOXVHWA_VERSION {
    u32 maj;
    u32 min;
    u32 bld;
    u32 reserved;
} VBOXVHWA_VERSION;

#define VBOXVHWA_VERSION_INIT(_pv) do {
    (_pv)->maj = VBOXVHWA_VERSION_MAJ;
    (_pv)->min = VBOXVHWA_VERSION_MIN;
    (_pv)->bld = VBOXVHWA_VERSION_BLD;
    (_pv)->reserved = VBOXVHWA_VERSION_RSV;
} while(0)

typedef struct VBOXVHWACMD_QUERYINFO1 {
    union {
        struct {
            VBOXVHWA_VERSION guestVersion;
        } in;
        struct {
            u32 cfgFlags;
            u32 caps;
            u32 caps2;
            u32 colorKeyCaps;
            u32 stretchCaps;
            u32 surfaceCaps;
            u32 numOverlays;
            u32 curOverlays;
            u32 numFourCC;
            u32 reserved;
        } out;
    } u;
} VBOXVHWACMD_QUERYINFO1;

typedef struct VBOXVHWACMD_QUERYINFO2 {
    u32 numFourCC;
    u32 FourCC[1];
+} VBOXVHWACMD_QUERYINFO2;
+
+  +#define VBOXVHWAINFO2_SIZE(_cFourCC) RT_OFFSETOF(VBOXVHWACMD_QUERYINFO2,
+                     FourCC[_cFourCC])
+  +
+  +typedef struct VBOXVHWACMD_SURF_CANCREATE {
+  +VBOXVHWA_SURFACEDESC SurfInfo;
+  } VBOXVHWACMD_SURF_CANCREATE;
+
+  +typedef struct VBOXVHWACMD_SURF_CREATE {
+  +VBOXVHWA_SURFACEDESC SurfInfo;
+  } VBOXVHWACMD_SURF_CREATE;
+
+  +#ifdef VBOX_WITH_WDDM
+  +typedef struct VBOXVHWACMD_SURF_GETINFO {
+  +VBOXVHWA_SURFACEDESC SurfInfo;
+  } VBOXVHWACMD_SURF_GETINFO;
+  +#endif
+
+  +typedef struct VBOXVHWACMD_SURF_DESTROY {
+  +union {
+    +struct {
+      +VBOXVHWA_SURFHANDLE hSurf;
+    } in;
+    } u;
+  } VBOXVHWACMD_SURF_DESTROY;
+
+  +typedef struct VBOXVHWACMD_SURF_LOCK {
+  +union {
+    +struct {
+      +VBOXVHWA_SURFHANDLE hSurf;
+    } in;
+    } u;
+  } VBOXVHWACMD_SURF_LOCK;
+typedef struct VBOXVHWACMD_SURF_UNLOCK {
+union {
+struct {
+VBOXVHWA_SURFHANDLE hSurf;
+u32 xUpdatedMemValid;
+u32 reserved;
+VBOXVHWA_RECTL xUpdatedMemRect;
+} in;
+} u;
+} VBOXVHWACMD_SURF_UNLOCK;
+
+typedef struct VBOXVHWACMD_SURF_BLT {
+uint64_t DstGuestSurfInfo;
+uint64_t SrcGuestSurfInfo;
+union {
+struct {
+VBOXVHWA_SURFHANDLE hDstSurf;
+uint64_t offDstSurface;
+VBOXVHWA_RECTL dstRect;
+VBOXVHWA_SURFHANDLE hSrcSurf;
+uint64_t offSrcSurface;
+VBOXVHWA_RECTL srcRect;
+u32 flags;
+u32 xUpdatedSrcMemValid;
+VBOXVHWA_BLTFX desc;
+VBOXVHWA_RECTL xUpdatedSrcMemRect;
+} in;
+} u;
+} VBOXVHWACMD_SURF_BLT;
+
+#ifdef VBOX_WITH_WDDM
+typedef struct VBOXVHWACMD_SURF_COLORFILL {
+union {
+struct {
+VBOXVHWA_SURFHANDLE hSurf;
+uint64_t offSurface;
+u32 reserved;
+u32 cRects;
+VBOXVHWA_RECTL aRects[1];
+} in;
+} u;
+} VBOXVHWACMD_SURF_COLORFILL;
+#endif
+
+typedef struct VBOXVHWACMD_SURF_FLIP {
+uint64_t TargGuestSurfInfo;
+uint64_t CurrGuestSurfInfo;
union {
    struct {
        VBOXVHWA_SURFHANDLE hTargSurf;
        uint64_t offTargSurface;
        VBOXVHWA_SURFHANDLE hCurrSurf;
        uint64_t offCurrSurface;
        u32 flags;
        u32 xUpdatedTargMemValid;
        VBOXVHWA_RECTL xUpdatedTargMemRect;
    } in;
    } u;
} VBOXVHWACMD_SURF_FLIP;

typedef struct VBOXVHWACMD_SURF_COLORKEY_SET {
    union {
        struct {
            VBOXVHWA_SURFHANDLE hSurf;
            uint64_t offSurface;
            VBOXVHWA_COLORKEY CKey;
            u32 flags;
            u32 reserved;
        } in;
    } u;
} VBOXVHWACMD_SURF_COLORKEY_SET;

#define VBOXVHWACMD_SURF_OVERLAY_UPDATE_F_SRCMEMRECT 0x00000001
#define VBOXVHWACMD_SURF_OVERLAY_UPDATE_F_DSTMEMRECT 0x00000002

typedef struct VBOXVHWACMD_SURF_OVERLAY_UPDATE {
    union {
        struct {
            VBOXVHWA_SURFHANDLE hDstSurf;
            uint64_t offDstSurface;
            VBOXVHWA_RECTL dstRect;
            VBOXVHWA_SURFHANDLE hSrcSurf;
            uint64_t offSrcSurface;
            VBOXVHWA_RECTL srcRect;
            u32 flags;
            u32 xFlags;
            VBOXVHWA_OVERLAYFX desc;
            VBOXVHWA_RECTL xUpdatedSrcMemRect;
            VBOXVHWA_RECTL xUpdatedDstMemRect;
        } in;
    } u;
} VBOXVHWACMD_SURF_OVERLAY_UPDATE;

typedef struct VBOXVHWACMD_SURF_OVERLAY_SETPOSITION {
    union {
        struct {
            VBOXVHWA_SURFHANDLE hDstSurf;
            uint64_t offDstSurface;
            VBOXVHWA_RECTL dstRect;
            VBOXVHWA_SURFHANDLE hSrcSurf;
            uint64_t offSrcSurface;
            VBOXVHWA_RECTL srcRect;
            u32 flags;
            u32 xFlags;
            VBOXVHWA_OVERLAYFX desc;
            VBOXVHWA_RECTL xUpdatedSrcMemRect;
            VBOXVHWA_RECTL xUpdatedDstMemRect;
        } in;
    } u;
} VBOXVHWACMD_SURF_OVERLAY_SETPOSITION;
+struct {
+VBOXVHWA_SURFHANDLE hDstSurf;
+uint64_t offDstSurface;
+VBOXVHWA_SURFHANDLE hSrcSurf;
+uint64_t offSrcSurface;
+u32 xPos;
+u32 yPos;
+u32 flags;
+u32 reserved;
+} in;
+} u;
+} VBOXVHWACMD_SURF_OVERLAY_SETPOSITION;
+
+typedef struct VBOXVHWACMD_HH_CONSTRUCT {
+void    *pVM;
+/* VRAM info for the backend to be able to properly translate VRAM offsets */
+void    *pvVRAM;
+u32 chVRAM;
+} VBOXVHWACMD_HH_CONSTRUCT;
+
+typedef struct VBOXVHWACMD_HH_SAVESTATE_SAVEPERFORM {
+struct SSMHANDLE * pSSM;
+} VBOXVHWACMD_HH_SAVESTATE_SAVEPERFORM;
+
+typedef struct VBOXVHWACMD_HH_SAVESTATE_LOADPERFORM {
+struct SSMHANDLE * pSSM;
+} VBOXVHWACMD_HH_SAVESTATE_LOADPERFORM;
+
+typedef void FNVBOXVHWA_HH_CALLBACK(void*);
+typedef FNVBOXVHWA_HH_CALLBACK *PFNVBOXVHWA_HH_CALLBACK;
+
+#define VBOXVHWA_HH_CALLBACK_SET(_pCmd, _pfn, _parg) \
+    do { \
+        (_pCmd)->GuestVBVAReserved1 = (uint64_t)(uintptr_t)(_pfn); \
+        (_pCmd)->GuestVBVAReserved2 = (uint64_t)(uintptr_t)(_parg); \
+    }while(0)
+
+#define VBOXVHWA_HH_CALLBACK_GET(_pCmd) ((PFNVBOXVHWA_HH_CALLBACK)(_pCmd)- \
+    >GuestVBVAReserved1)
+#define VBOXVHWA_HH_CALLBACK_GET_ARG(_pCmd) ((void*)(_pCmd)->GuestVBVAReserved2)
+
+#pragma pack()
+#endif /* #ifdef VBOX_WITH_VIDEOHWACCEL */
+
+#ifdef VBOX_WITH_VIDEOHWACCEL
+#pragma pack(1)
+
+typedef struct VBVAHOSTFLAGS {
+u32 host_events;
+u32 supported_orders;
+} VBVAHOSTFLAGS;
+
+typedef struct VBVABUFFER {
+VBVAHOSTFLAGS host_flags;
+
+/* The offset where the data start in the buffer. */
+u32 data_offset;
+/* The offset where next data must be placed in the buffer. */
+u32 free_offset;
+
+/* The queue of record descriptions. */
+VBVARECORD records[VBVA_MAX_RECORDS];
+u32 first_record_index;
+u32 free_record_index;
+
+/* Space to leave free in the buffer when large partial records are transferred. */
+u32 partial_write_tresh;
+
+u32 data_len;
+u8  data[1]; /* variable size for the rest of the VBVABUFFER area in VRAM. */
+} VBVABUFFER;
+
+#define VBVA_MAX_RECORD_SIZE (128*_1M)
+
+/* guest->host commands */
+#define VBVA_QUERY_CONF32  1
+#define VBVA_SET_CONF32   2
+#define VBVA_INFO_VIEW    3
+#define VBVA_INFO_HEAP    4
+#define VBVA_FLUSH        5
+#define VBVA_INFO_SCREEN  6
+#define VBVA_ENABLE       7
+#define VBVA_MOUSE_POINTER_SHAPE 8
+#ifdef VBOX_WITH_VIDEOHWACCEL
+# define VBVA_VHWA_CMD 9
+#endif /* # ifdef VBOX_WITH_VIDEOHWACCEL */
+#ifdef VBOX_WITH_VDMA
+# define VBVA_VDMA_CTL 10 /* setup G<->H DMA channel info */
+# define VBVA_VDMA_CMD 11 /* G->H DMA command */
+#endif
+
+#define VBVA_INFO_CAPS 12 /* informs host about HGSMI caps. see struct vbva_caps below */
+#define VBVA_SCANLINE_CFG 13 /* configures scanline, see VBVASCANLINECFG below */
+#define VBVA_SCANLINE_INFO 14 /* requests scanline info, see VBVASCANLINEINFO below */
+#define VBVA_CMDVBVA_SUBMIT 16 /* inform host about VBVA Command submission */
+#define VBVA_CMDVBVA_FLUSH 17 /* inform host about VBVA Command submission */
+#define VBVA_CMDVBVA_CTL 18 /* G->H DMA command */
/* Query most recent mode hints sent. */
/** Report the guest virtual desktop position and size for mapping host and
 * guest pointer positions. */
/* Report the guest cursor position and query the host position. */

host->guest commands */
host->guest commands */

#define VBVA_QUERY_MODE_HINTS 19 /* Query most recent mode hints sent. */
#define VBVA_REPORT_INPUT_MAPPING 20
#define VBVA_CURSOR_POSITION 21

define VBVAHG_EVENT 1
#define VBVAHG_DISPLAY_CUSTOM 2
#ifdef VBOX_WITH_VDMA
#define VBVAHG_SHGSMI_COMPLETION 3
#endif

#ifdef VBOX_WITH_VIDEOHWACCEL
#define VBVAHG_DCUSTOM_VHWA_CMDCOMPLETE 1
#pragma pack(1)
typedef struct VBVAHOSTCMDVHWACMDCOMPLETE {
  u32 offCmd;
} VBVAHOSTCMDVHWACMDCOMPLETE;
#pragma pack()
#endif /* #ifdef VBOX_WITH_VIDEOHWACCEL */

#pragma pack(1)
typedef enum {
  VBVAHOSTCMD_OP_EVENT = 1,
  VBVAHOSTCMD_OP_CUSTOM
} VBVAHOSTCMD_OP_TYPE;

typedef struct VBVAHOSTCMDMDEVENT {
  uint64_t pEvent;
} VBVAHOSTCMDMDEVENT;

typedef struct VBVAHOSTCMD {
  /* destination ID if >=0 specifies display index, otherwise the command is directed to the miniport */
  s32 iDstID;
  s32 customOpCode;
  union {
    struct VBVAHOSTCMD *pNext;
    u32 offNext;
    uint64_t Data; /* the body is 64-bit aligned */
  } u;
  char body[1];
} VBVAHOSTCMD;

#define VBVAHOSTCMD_SIZE(_size) (sizeof(VBVAHOSTCMD) + (_size))
#define VBVAHOSTCMD_BODY(_pCmd, _tBody) ((_tBody*)(_pCmd)->body)
#define VBVAHOSTCMD_HDR(_pBody) ((VBVAHOSTCMD*)((u8*)_pBody) - RT_OFFSETOF(VBVAHOSTCMD, body))
+
#define VBVAHOSTCMD_HDRSIZE (RT_OFFSETOF(VBVAHOSTCMD, body))
+
#pragma pack()
+
#define VBOX_VBVA_CONF32_MONITOR_COUNT 0
#define VBOX_VBVA_CONF32_HOST_HEAP_SIZE 1
+/** Returns VINF_SUCCESS if the host can report mode hints via VBVA. */
+* Set value to VERR_NOT_SUPPORTED before calling. */
+//define VBOX_VBVA_CONF32_MODE_HINT_REPORTING 2
+/** Returns VINF_SUCCESS if the host can report guest cursor enabled status via */
+* VBVA. Set value to VERR_NOT_SUPPORTED before calling. */
+//define VBOX_VBVA_CONF32_GUEST_CURSOR_REPORTING 3
+/** Returns the currently available host cursor capabilities. Available if */
+* struct vbva_conf32::VBOX_VBVA_CONF32_GUEST_CURSOR_REPORTING returns success. */
+* @see VMMDevReqMouseStatus::mouseFeatures. */
+//define VBOX_VBVA_CONF32_CURSOR_CAPABILITIES 4
+/** Returns the supported flags in VBVAINFOSCREEN::u8Flags. */
+//define VBOX_VBVA_CONF32_SCREEN_FLAGS 5
+/** Returns the max size of VBVA record. */
+//define VBOX_VBVA_CONF32_MAX_RECORD_SIZE 6
+
typedef struct vbva_conf32 {
+u32 index;
+u32 value;
+} vbva_conf32;
+
+/** Reserved for historical reasons. */
+//define VBOX_VBVA_CURSOR_CAPABILITY_RESERVED0 BIT(0)
+/** Guest cursor capability: can the host show a hardware cursor at the host */
+* pointer location? */
+//define VBOX_VBVA_CURSOR_CAPABILITY_HARDWARE BIT(1)
+/** Reserved for historical reasons. */
+//define VBOX_VBVA_CURSOR_CAPABILITY_RESERVED2 BIT(2)
+/** Reserved for historical reasons. Must always be unset. */
+//define VBOX_VBVA_CURSOR_CAPABILITY_RESERVED3 BIT(3)
+/** Reserved for historical reasons. */
+//define VBOX_VBVA_CURSOR_CAPABILITY_RESERVED4 BIT(4)
+/** Reserved for historical reasons. */
+//define VBOX_VBVA_CURSOR_CAPABILITY_RESERVED5 BIT(5)
+
typedef struct VBVAINFOSCREEN {
+/** Index of the screen, assigned by the guest. */
+u32 view_index;
+
+/** The screen offset in VRAM, the framebuffer starts here. */
+u32 view_index;

+u32 u32ViewOffset;
+
+/* The size of the VRAM memory that can be used for the view. */
+u32 u32ViewSize;
+
+/* The recommended maximum size of the VRAM memory for the screen. */
+u32 u32MaxScreenSize;
+} VBVAINFOVIEW;
+
+typedef struct VBVAINFOHEAP {
+/* Absolute offset in VRAM of the start of the heap. */
+u32 u32HeapOffset;
+
+/* The size of the heap. */
+u32 u32HeapSize;
+
+} VBVAINFOHEAP;
+
+typedef struct VBVAFLUSH {
+u32 reserved;
+
+} VBVAFLUSH;
+
+typedef struct VBVACMDVBVASUBMIT {
+u32 reserved;
+} VBVACMDVBVASUBMIT;
+
+/* flush is requested because due to guest command buffer overflow */
+#define VBVACMDVBVAFLUSH_F_GUEST_BUFFER_OVERFLOW 1
+
+typedef struct VBVACMDVBVAFLUSH {
+u32 flags;
+} VBVACMDVBVAFLUSH;
+
+
+/* VBVAINFOSCREEN::u8Flags */
+#define VBVA_SCREEN_F_NONE 0x0000
+#define VBVA_SCREEN_F_ACTIVE 0x0001
+/** The virtual monitor has been disabled by the guest and should be removed
+ * by the host and ignored for purposes of pointer position calculation. */
+#define VBVA_SCREEN_F_DISABLED 0x0002
+/** The virtual monitor has been blanked by the guest and should be blacked
+ * out by the host using width, height, etc values from the VBVAINFOSCREEN request. */
+#define VBVA_SCREEN_F_BLANK 0x0004
+/** The virtual monitor has been blanked by the guest and should be blacked
+ * out by the host using the previous mode values for width. height, etc. */
+#define VBVA_SCREEN_F_BLANK2 0x0008
+

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```c
typedef struct VBVAINFOSCREEN { 
  /* Which view contains the screen. */
  u32 view_index;
  
  /* Physical X origin relative to the primary screen. */
  s32 origin_x;
  
  /* Physical Y origin relative to the primary screen. */
  s32 origin_y;
  
  /* Offset of visible framebuffer relative to the framebuffer start. */
  u32 start_offset;
  
  /* The scan line size in bytes. */
  u32 line_size;
  
  /* Width of the screen. */
  u32 width;
  
  /* Height of the screen. */
  u32 height;
  
  /* Color depth. */
  u16 bits_per_pixel;
  
  /* VBVA_SCREEN_F_* */
  u16 flags;
  
} VBVAINFOSCREEN;

/* VBVAENABLE::flags */
#define VBVA_F_NONE    0x00000000
#define VBVA_F_ENABLE  0x00000001
#define VBVA_F_DISABLE 0x00000002
/* extended VBVA to be used with WDDM */
#define VBVA_F_EXTENDED 0x00000004
/* vbva offset is absolute VRAM offset */
#define VBVA_F_ABSOFFSET 0x00000008

typedef struct VBVAENABLE { 
  flags;
  offset;
  result;
} VBVAENABLE;

typedef struct vbva_enable_ex { 
  VBVAENABLE base;
  screen_id;
```
+} vbva_enable_ex;
+
+typedef struct vbva_mouse_pointer_shape {
+/* The host result. */
+s32 result;
+
+/* VBOX_MOUSE_POINTER_* bit flags. */
+u32 flags;
+
+/* X coordinate of the hot spot. */
+u32 hot_x;
+
+/* Y coordinate of the hot spot. */
+u32 hot_y;
+
+/* Width of the pointer in pixels. */
+u32 width;
+
+/* Height of the pointer in scanlines. */
+u32 height;
+
+/* Pointer data.
+ *
+ ****
+ * The data consists of 1 bpp AND mask followed by 32 bpp XOR (color) mask.
+ *
+ * For pointers without alpha channel the XOR mask pixels are 32 bit values: (lsb)BGR0(msb).
+ * For pointers with alpha channel the XOR mask consists of (lsb)BGRA(msb) 32 bit values.
+ *
+ * Guest driver must create the AND mask for pointers with alpha channel, so if host does not
+ * support alpha, the pointer could be displayed as a normal color pointer. The AND mask can
+ * be constructed from alpha values. For example alpha value >= 0xf0 means bit 0 in the AND mask.
+ *
+ * The AND mask is 1 bpp bitmap with byte aligned scanlines. Size of AND mask,
+ * therefore, is cbAnd = (width + 7) / 8 * height. The padding bits at the
+ * end of any scanline are undefined.
+ *
+ * The XOR mask follows the AND mask on the next 4 bytes aligned offset:
+ * u8 *pXor = pAnd + (cbAnd + 3) & ~3
+ * Bytes in the gap between the AND and the XOR mask are undefined.
+ * XOR mask scanlines have no gap between them and size of XOR mask is:
+ * cXor = width * 4 * height.
+ ****
+ *
+ * Preallocate 4 bytes for accessing actual data as p->data.
+ */
+u8 data[4];
```c
/** @name struct vbva_mouse_pointer_shape::flags
 * @note The VBOX_MOUSE_POINTER_* flags are used in the guest video driver,
 *       values must be <= 0x8000 and must not be changed. (try make more sense
 *       of this, please).
 * @}
 */

#define VBOX_MOUSE_POINTER_VISIBLE (0x0001)
#define VBOX_MOUSE_POINTER_ALPHA   (0x0002)
#define VBOX_MOUSE_POINTER_SHAPE   (0x0004)

/* the guest driver can handle asynch guest cmd completion by reading the command offset from io port */
#define VBVACAPS_COMPLETEGCMD_BY_IOREAD 0x00000001

/* the guest driver can handle video adapter IRQs */
#define VBVACAPS_IRQ 0x00000002

/* The guest can read video mode hints sent via VBVA. */
#define VBVACAPS_VIDEO_MODE_HINTS 0x00000004

/* The guest can switch to a software cursor on demand. */
#define VBVACAPS_DISABLE_CURSOR_INTEGRATION 0x00000008

/* The guest does not depend on host handling the VBE registers. */
#define VBVACAPS_USE_VBVA_ONLY 0x00000010

typedef struct vbva_caps {
  s32 rc;
  u32 caps;
} vbva_caps;

/* makes graphics device generate IRQ on VSYNC */
#define VBVASCANLINECFG_ENABLE_VSYNC_IRQ 0x00000001

/* guest driver may request the current scanline */
#define VBVASCANLINECFG_ENABLE_SCANLINE_INFO 0x00000002

/* request the current refresh period, returned in u32RefreshPeriodMs */
#define VBVASCANLINECFG_QUERY_REFRESH_PERIOD 0x00000004

/* set new refresh period specified in u32RefreshPeriodMs. */
#define VBVASCANLINECFG_SET_REFRESH_PERIOD 0x00000008

typedef struct VBVASCANLINECFG {
  s32 rc;
  u32 flags;
  u32 u32RefreshPeriodMs;
  u32 reserved;
```

---

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---
typedef struct VBVASCANLINEINFO {
  s32 rc;
  u32 screen_id;
  u32 u32InVBlank;
  u32 u32ScanLine;
} VBVASCANLINEINFO;

/** Query the most recent mode hints received from the host. */
typedef struct vbva_query_mode_hints {
/** The maximum number of screens to return hints for. */
  u16 hints_queried_count;
/** The size of the mode hint structures directly following this one. */
  cbHintStructureGuest;
/** The return code for the operation. Initialise to VERR_NOT_SUPPORTED. */
  s32 rc;
} vbva_query_mode_hints;

/** Structure in which a mode hint is returned. The guest allocates an array
 * of these immediately after the struct vbva_query_mode_hints structure. To accomodate
 * future extensions, the struct vbva_query_mode_hints structure specifies the size of
 * the struct vbva_modehint structures allocated by the guest, and the host only fills
 * out structure elements which fit into that size. The host should fill any
 * unused members (e.g. dx, dy) or structure space on the end with ~0. The
 * whole structure can legally be set to ~0 to skip a screen. */
typedef struct vbva_modehint {
  magic;
  cx;
  cy;
  bpp;  /* Which has never been used... */
  display;
  dx;  /**< X offset into the virtual frame-buffer. */
  dy;  /**< Y offset into the virtual frame-buffer. */
  fEnabled;  /* Not flags. Add new members for new flags. */
} vbva_modehint;

#define VBVAMODEHINT_MAGIC 0x0801add9u

/** Report the rectangle relative to which absolute pointer events should be
 * expressed. This information remains valid until the next VBVA resize event
 * for any screen, at which time it is reset to the bounding rectangle of all
 * virtual screens and must be re-set.
 * @see VBVA_REPORT_INPUT_MAPPING. */
typedef struct vbva_report_input_mapping {
  s32 x;  /**< Upper left X co-ordinate relative to the first screen. */
  s32 y;  /**< Upper left Y co-ordinate relative to the first screen. */
  cx;  /**< Rectangle width. */
+u32 cy; /**< Rectangle height. */
+} vbva_report_input_mapping;
+
+/** Report the guest cursor position and query the host one. The host may wish
+ * to use the guest information to re-position its own cursor (though this is
+ * currently unlikely).
+ * @see VBVA_CURSOR_POSITION */
typedef struct vbva_cursor_position {
+u32 report_position; /**< Are we reporting a position? */
+u32 x;      /**< Guest cursor X position */
+u32 y;      /**< Guest cursor Y position */
+} vbva_cursor_position;
+
+#pragma pack()
+
+typedef uint64_t VBOXVIDEOOFFSET;
+
+#define VBOXVIDEOOFFSET_VOID ((VBOXVIDEOOFFSET)-0)
+
+#pragma pack(1)
+
+/*
* VBOXSHGSMI made on top HGSMI and allows receiving notifications
* about G->H command completion
*/
+/*
* SHGSMI command header */
typedef struct VBOXSHGSMIHEADER {
+uint64_t pvNext; /*<- completion processing queue */
+u32 flags;      /*<- see VBOXSHGSMI_FLAG_XXX Flags */
+u32 cRefs;      /*<- command referece count */
+uint64_t u64Info1; /*<- contents depends on the flags value */
+uint64_t u64Info2; /*<- contents depends on the flags value */
+} VBOXSHGSMIHEADER, *PVBOXSHGSMIHEADER;
+
+typedef enum {
+VBOXVDMACMD_TYPE_UNDEFINED = 0,
+VBOXVDMACMD_TYPE_DMA_PRESENT_BLT   = 1,
+VBOXVDMACMD_TYPE_DMA_BPB_TRANSFER,
+VBOXVDMACMD_TYPE_DMA_BPB_FILL,
+VBOXVDMACMD_TYPE_DMA_PRESENT_SHADOW2PRIMARY,
+VBOXVDMACMD_TYPE_DMA_PRESENT_CLRFILL,
+VBOXVDMACMD_TYPE_DMA_PRESENT_FLIP,
+VBOXVDMACMD_TYPE_DMA_NOP,
+VBOXVDMACMD_TYPE_CHROMIUM_CMD, /* chromium cmd */
+VBOXVDMACMD_TYPE_DMA_BPB_TRANSFER_VRAMSYS,
+VBOXVDMACMD_TYPE_CHILD_STATUS_IRQ /* make the device notify child (monitor) state change IRQ */
+} VBOXVDMACMD_TYPE;
/* the command processing was asynch, set by the host to indicate asynch command completion
  * must not be cleared once set, the command completion is performed by issuing a host->guest completion command
  * while keeping this flag unchanged */
#define VBOXSHGSMI_FLAG_HG_ASYNCH 0x00010000
#if 0
/* if set   - asynch completion is performed by issuing the event,
  * if cleared - asynch completion is performed by calling a callback */
#define VBOXSHGSMI_FLAG_GH_ASYNCH_EVENT 0x00000001
#endif

/* issue interrupt on asynch completion, used for critical G->H commands,
  * i.e. for completion of which guest is waiting. */
#define VBOXSHGSMI_FLAG_GH_ASYNCH_IRQ 0x00000002
/+ guest does not do any op on completion of this command,
  * the host may copy the command and indicate that it does not need the command anymore
  * by not setting VBOXSHGSMI_FLAG_HG_ASYNCH */
#define VBOXSHGSMI_FLAG_GH_ASYNCH_NOCOMPLETION 0x00000004
/+ guest requires the command to be processed asynchronously,
  * not setting VBOXSHGSMI_FLAG_HG_ASYNCH by the host in this case is treated as command failure */
#define VBOXSHGSMI_FLAG_GH_ASYNCH_FORCE 0x00000008
/+ force IRQ on cmd completion */
#define VBOXSHGSMI_FLAG_GH_ASYNCH_IRQ_FORCE 0x00000010
/+ an IRQ-level callback is associated with the command */
#define VBOXSHGSMI_FLAG_GH_ASYNCH_CALLBACK_IRQ 0x00000020
/+ guest expects this command to be completed synchronously */

static inline u8 * VBoxSHGSMIBufferData (const VBOXSHGSMIHEADER* pHeader)
{
	return (u8 *)pHeader + sizeof (VBOXSHGSMIHEADER);
}

#define VBoxSHGSMIBufferHeaderSize() (sizeof (VBOXSHGSMIHEADER))

static inline PVBOXSHGSMIHEADER VBoxSHGSMIBufferHeader (const void *pvData)
{
	return (PVBOXSHGSMIHEADER)((u8 *)pvData - sizeof (VBOXSHGSMIHEADER));
}

#ifdef VBOX_WITH_VDMA
#pragma pack(1)

/* VDMA - Video DMA */

/* VDMA Control API */
/* VBOXVDMA_CTL::flags */
typedef enum {
    VBOXVDMA_CTL_TYPE_NONE = 0,
    VBOXVDMA_CTL_TYPE_ENABLE,
    VBOXVDMA_CTL_TYPE_DISABLE,
    VBOXVDMA_CTL_TYPE_FLUSH,
    VBOXVDMA_CTL_TYPE_WATCHDOG
} VBOXVDMA_CTL_TYPE;

typedef struct VBOXVDMA_CTL {
    VBOXVDMA_CTL_TYPE enmCtl;
    u32 offset;
    s32 result;
} VBOXVDMA_CTL, *PVBOXVDMA_CTL;

typedef struct VBOXVDMA_RECTL {
    int16_t left;
    int16_t top;
    u16 width;
    u16 height;
} VBOXVDMA_RECTL, *PVBOXVDMA_RECTL;

typedef enum {
    VBOXVDMA_PIXEL_FORMAT_UNKNOWN    =  0,
    VBOXVDMA_PIXEL_FORMAT_R8G8B8     = 20,
    VBOXVDMA_PIXEL_FORMAT_A8R8G8B8   = 21,
    VBOXVDMA_PIXEL_FORMAT_X8R8G8B8   = 22,
    VBOXVDMA_PIXEL_FORMAT_R5G6B5     = 23,
    VBOXVDMA_PIXEL_FORMAT_X1R5G5B5   = 24,
    VBOXVDMA_PIXEL_FORMAT_A1R5G5B5   = 25,
    VBOXVDMA_PIXEL_FORMAT_A4R4G4B4   = 26,
    VBOXVDMA_PIXEL_FORMAT_R3G3B2     = 27,
    VBOXVDMA_PIXEL_FORMAT_A8        = 28,
    VBOXVDMA_PIXEL_FORMAT_A8R3G3B2   = 29,
    VBOXVDMA_PIXEL_FORMAT_X4R4G4B4   = 30,
    VBOXVDMA_PIXEL_FORMAT_A2B10G10R10 = 31,
    VBOXVDMA_PIXEL_FORMAT_A8B8G8R8   = 32,
    VBOXVDMA_PIXEL_FORMAT_X8B8G8R8   = 33,
    VBOXVDMA_PIXEL_FORMAT_G16R16     = 34,
    VBOXVDMA_PIXEL_FORMAT_A2R10G10B10 = 35,
    VBOXVDMA_PIXEL_FORMAT_A16B16G16R16 = 36,
    VBOXVDMA_PIXEL_FORMAT_A8P8      = 40,
    VBOXVDMA_PIXEL_FORMAT_P8        = 41,
    VBOXVDMA_PIXEL_FORMAT_L8        = 50,
    VBOXVDMA_PIXEL_FORMAT_A8L8      = 51,
    VBOXVDMA_PIXEL_FORMAT_A4L4      = 52,
    VBOXVDMA_PIXEL_FORMAT_V8U8      = 60,
    VBOXVDMA_PIXEL_FORMAT_L6V5U5    = 61,
typedef struct VBOXVDMA_SURF_DESC {
    u32 width;
    u32 height;
    VBOXVDMA_PIXEL_FORMAT format;
    u32 bpp;
    u32 pitch;
    u32 flags;
} VBOXVDMA_SURF_DESC, *PVBOXVDMA_SURF_DESC;

typedef uint64_t VBOXVDMASURFHANDLE;

/* region specified as a rectangle, otherwise it is a size of memory pointed to by phys address */
#define VBOXVDMAOPERAND_FLAGS_RECTL       0x1
/* Surface handle is valid */
#define VBOXVDMAOPERAND_FLAGS_PRIMARY        0x2
/* address is offset in VRAM */
#define VBOXVDMAOPERAND_FLAGS_VRAMOFFSET  0x4

/* VBOXVDMACBUF_DR::phBuf specifies offset in VRAM */
#define VBOXVDMACBUF_FLAG_BUF_VRAM_OFFSET 0x00000001
/* command buffer follows the VBOXVDMACBUF_DR in VRAM, VBOXVDMACBUF_DR::phBuf is ignored */
#define VBOXVDMACBUF_FLAG_BUF_FOLLOWS_DR  0x00000002

/* We can not submit the DMA command via VRAM since we do not have control over
 * DMA command buffer [de]allocation, i.e. we only control the buffer contents.
 * In other words the system may call one of our callbacks to fill a command buffer
 * with the necessary commands and then discard the buffer w/o any notification.
 * We have only DMA command buffer physical address at submission time.
 * so the only way is to */
typedef struct VBOXVDMACBUF_DR {
    u16 flags;
    u16 cbBuf;
    /* RT_SUCCESS() - on success
     * VERR_INTERRUPTED - on preemption
     * VERR_xxx - on error */
typedef struct VBOXVDMACMD {
    VBOXVDMACMD_TYPE enmType;
    u32 u32CmdSpecific;
} VBOXVDMACMD, *PVBOXVDMACMD;

#define VBOXVDMACMD_HEADER_SIZE() sizeof (VBOXVDMACMD)
#define VBOXVDMACMD_SIZE_FROMBODYSIZE(_s) (VBOXVDMACMD_HEADER_SIZE() + (_s))
#define VBOXVDMACMD_BODY(_pCmd, _t) ( (_t*)(((u8*)(_pCmd)) + VBOXVDMACMD_HEADER_SIZE()) )
#define VBOXVDMACMD_BODY_SIZE(_s) ( (_s) - VBOXVDMACMD_HEADER_SIZE() )
#define VBOXVDMACMD_FROM_BODY(_pCmd) ( (VBOXVDMACMD*)(((u8*)(_pCmd)) - VBOXVDMACMD_HEADER_SIZE()) )
#define VBOXVDMACMD_BODY_FIELD_OFFSET(_ot, _t, _f) ( (_ot)(uintptr_t)(VBOXVDMACMD_BODY(0, u8) + RT_OFFSETOF(_t, _f) ) )

typedef struct VBOXVDMACMD_DMA_PRESENT_BLT {
    VBOXVIDEOOFFSET off Src;
    VBOXVIDEOOFFSET off Dst;
    VBOXVDMA_SURF_DESC srcDesc;
    VBOXVDMA_SURF_DESC dstDesc;
    VBOXVDMA_RECTL src Rectl;
    VBOXVDMA_RECTL dst Rectl;
    u32 reserved;
    u32 c DstSubRects;
    VBOXVDMA_RECTL a DstSubRects[1];
} VBOXVDMACMD_DMA_PRESENT_BLT, *PVBOXVDMACMD_DMA_PRESENT_BLT;

typedef struct VBOXVDMACMD_DMA_PRESENT_SHADOW2PRIMARY {
    VBOXVDMA_RECTL Rect;
} VBOXVDMACMD_DMA_PRESENT_SHADOW2PRIMARY,
*PVBOXVDMACMD_DMA_PRESENT_SHADOW2PRIMARY;

#define VBOXVDMACMD_DMA_BPB_TRANSFER_F_SRC_VRAMOFFSET 0x00000001
+\#define VBOXVDMACMD_DMA_BPB_TRANSFER_F_DST_VRAMOFFSET 0x00000002
+
+typedef struct VBOXVDMACMD_DMA_BPB_TRANSFER {
  +u32 cbTransferSize;
  +u32 flags;
  +union {
    +uint64_t phBuf;
    +VBOXVIDEOOFFSET offVramBuf;
  } Src;
  +union {
    +uint64_t phBuf;
    +VBOXVIDEOOFFSET offVramBuf;
  } Dst;
  +} VBOXVDMACMD_DMA_BPB_TRANSFER, *PVBOXVDMACMD_DMA_BPB_TRANSFER;
+
+\#define VBOXVDMACMD_SYSMEMEL_F_PAGELIST 0x00000001
+
+typedef struct VBOXVDMACMD_SYSMEMEL {
  +u32 cPages;
  +u32 flags;
  +uint64_t phBuf[1];
  +} VBOXVDMACMD_SYSMEMEL, *PVBOXVDMACMD_SYSMEMEL;
+
+\#define VBOXVDMACMD_SYSMEMEL_NEXT(_pEl) (((_pEl)->flags &
  VBOXVDMACMD_SYSMEMEL_F_PAGELIST) ? 
  (*((PVBOXVDMACMD_SYSMEMEL)(((_pEl)->flags &
  VBOXVDMACMD_SYSMEMEL_F_PAGELIST) ? 
  +((VBOXVDMACMD_SYSMEMEL)(((u8*)((_pEl)+RT_OFFSETOF(VBOXVDMACMD_SYSMEMEL,
  phBuf[(_pEl)->cPages])))
  +; \n  +((_pEl)+1) 
  +
  +\#define VBOXVDMACMD_DMA_BPB_TRANSFER_VRAMSYS_SYS2VRAM 0x00000001
  +
  +typedef struct VBOXVDMACMD_DMA_BPB_TRANSFER_VRAMSYS {
  +u32 cTransferPages;
  +u32 flags;
  +VBOXVIDEOOFFSET offVramBuf;
  +VBOXVDMACMD_SYSMEMEL FirstEl;
  +} VBOXVDMACMD_DMA_BPB_TRANSFER_VRAMSYS,
  +*PVBOXVDMACMD_DMA_BPB_TRANSFER_VRAMSYS;
  +
  +typedef struct VBOXVDMACMD_DMA_BPB_FILL {
  +VBOXVIDEOOFFSET offSurf;
  +u32 cbFillSize;
  +u32 u32FillPattern;
  +} VBOXVDMACMD_DMA_BPB_FILL, *PVBOXVDMACMD_DMA_BPB_FILL;
  +
  +\#define VBOXVMDA_CHILD_STATUS_F_CONNECTED    0x01
  +\#define VBOXVMDA_CHILD_STATUS_F_DISCONNECTED 0x02
+\#define VBOXVDMA_CHILD_STATUS_F_ROTATED 0x04
+
+typedef struct VBOXVDMA_CHILD_STATUS {
+    u32 iChild;
+    u8  flags;
+    u8  u8RotationAngle;
+    u16 u16Reserved;
+} VBOXVDMA_CHILD_STATUS, *PVBOXVDMA_CHILD_STATUS;
+
+\/* apply the aInfos are applied to all targets, the iTarget is ignored */
+\#define VBOXVDMACMD_CHILD_STATUS_IRQ_F_APPLY_TO_ALL 0x00000001
+
+typedef struct VBOXVDMACMD_CHILD_STATUS_IRQ {
+    u32 cInfos;
+    u32 flags;
+    VBOXVDMA_CHILD_STATUS aInfos[1];
+} VBOXVDMACMD_CHILD_STATUS_IRQ, *PVBOXVDMACMD_CHILD_STATUS_IRQ;
+
+\#pragma pack()
+\#endif /* #ifdef VBOX_WITH_VDMA */
+
+\#pragma pack(1)
+typedef struct VBOXVDMACMD_CHROMIUM_BUFFER {
+    VBOXVIDEOOFFSET offBuffer;
+    u32 buffer_length;
+    u32 u32GuestData;
+    uint64_t u64GuestData;
+} VBOXVDMACMD_CHROMIUM_BUFFER, *PVBOXVDMACMD_CHROMIUM_BUFFER;
+
+typedef struct VBOXVDMACMD_CHROMIUM_CMD {
+    u32 cBuffers;
+    u32 reserved;
+    VBOXVDMACMD_CHROMIUM_BUFFER aBuffers[1];
+} VBOXVDMACMD_CHROMIUM_CMD, *PVBOXVDMACMD_CHROMIUM_CMD;
+
+typedef enum {
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE_UNKNOWN = 0,
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE_CRHGSML_SETUP,
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE_SAVESTATE_BEGIN,
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE_SAVESTATE_END,
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE_CRHGSML_SETUP_MAINCB,
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE_CRCONNECT,
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE_SIZEHACK = 0x7fffffff
+} VBOXVDMACMD_CHROMIUM_CTL_TYPE;
+
+typedef struct VBOXVDMACMD_CHROMIUM_CTL {
+    VBOXVDMACMD_CHROMIUM_CTL_TYPE enmType;
+    u32 cbCmd;
+} VBOXVDMACMD_CHROMIUM_CTL, *PVBOXVDMACMD_CHROMIUM_CTL;
+} VBOXVDMACMD_CHROMIUM_CTL, *PVBOXVDMACMD_CHROMIUM_CTL;
+
+
typedef struct PDMIDISPLAYVBVACALLBACKS *HCRHGSMICMDCOMPLETION;
+typedef int FNCRHGSMICMDCOMPLETION(HCRHGSMICMDCOMPLETION hCompletion,
PVBOXVDMACMD_CHROMIUM_CMD pCmd, int rc);
+typedef FNCRHGSMICMDCOMPLETION *PFNCRHGSMICMDCOMPLETION;
+
+/* tells whether 3D backend has some 3D overlay data displayed */
+typedef bool FNCROGLHASDATA(void);
+typedef FNCROGLHASDATA *PFNCROGLHASDATA;
+
+/* same as PFNCROGLHASDATA, but for specific screen */
+typedef bool FNCROGLHASDATAFORSCREEN(u32 i32ScreenID);
+typedef FNCROGLHASDATAFORSCREEN *PFNCROGLHASDATAFORSCREEN;
+
+/* callbacks chrogl gives to main */
+typedef struct CR_MAIN_INTERFACE {
+  PFNCROGLHASDATA pfnHasData;
+  PFNCROGLHASDATAFORSCREEN pfnHasDataForScreen;
+} CR_MAIN_INTERFACE;
+
+typedef struct VBOXVDMACMD_CHROMIUM_CTL_CRHGSMI_SETUP_MAINCB {
+  VBOXVDMACMD_CHROMIUM_CTL Hdr;
+  /*in*/
+  HCRHGSMICMDCOMPLETION hCompletion;
+  PFNCROGLHASDATAFORSCREEN pfnCompletion;
+  /*out*/
+  CR_MAIN_INTERFACE MainInterface;
+} CRHGSMIBACKGROUND_SETUP_MAINCB;

+typedef struct VBOXCRCON_SERVER *HVBOXCRCON_SERVER;
+typedef struct PDMIDISPLAYVBVACALLBACKS* HVBOXCRCON_CLIENT;
+
+typedef struct VBOXCRCON_3DRGN_CLIENT* HVBOXCRCON_3DRGN_CLIENT;
+typedef struct VBOXCRCON_3DRGN_ASYNCCLIENT* HVBOXCRCON_3DRGN_ASYNCCLIENT;
+
+/* server callbacks */
+/* submit chromium cmd */
+typedef int FNVBOXCRCON_SVR_CRCMD(HVBOXCRCON_SERVER hServer,
PVBOXVDMACMD_CHROMIUM_CMD pCmd, u32 cbCmd);
+typedef FNVBOXCRCON_SVR_CRCMD *PFNVBOXCRCON_SVR_CRCMD;
+
+/* submit chromium control cmd */
+typedef int FNVBOXCRCON_SVR_CRCTL(HVBOXCRCON_SERVER hServer,
PVBOXVDMACMD_CHROMIUM_CTL pCtl, u32 cbCmd);
+typedef FNVBOXCRCON_SVR_CRCTL *PFNVBOXCRCON_SVR_CRCTL;
typedef int FNVBOXCRCON_SVR_3DRGN_GET(HVBOXCRCON_SERVER hServer, HVBOXCRCON_3DRGN_CLIENT hRgnClient, u32 idScreen);
typedef FNVBOXCRCON_SVR_3DRGN_GET *PFNVBOXCRCON_SVR_3DRGN_GET;

/* 3D Regions Client callbacks */
/* called from the PFNVBOXCRCON_SVR_3DRGN_GET callback in case server has 3D data and is going to request the process the request asynchronously, */
typedef int FNVBOXCRCON_3DRGN_ONSUBMIT(HVBOXCRCON_3DRGN_CLIENT hRgnClient, u32 idScreen, HVBOXCRCON_3DRGN_ASYNCCLIENT *phRgnAsyncClient);
typedef FNVBOXCRCON_3DRGN_ONSUBMIT *PFNVBOXCRCON_3DRGN_ONSUBMIT;

/* called from the "regions get" command processing thread, to indicate that the "regions get" is started. */
typedef int FNVBOXCRCON_3DRGN_BEGIN(HVBOXCRCON_3DRGN_ASYNCCLIENT hRgnAsyncClient, u32 idScreen);
typedef FNVBOXCRCON_3DRGN_BEGIN *PFNVBOXCRCON_3DRGN_BEGIN;

/* called from the "regions get" command processing thread, to report a 3D region. */
typedef int FNVBOXCRCON_3DRGN_REPORT(HVBOXCRCON_3DRGN_ASYNCCLIENT hRgnAsyncClient, u32 idScreen, void *pvData, u32 cbStride, const void *pRect);
typedef FNVBOXCRCON_3DRGN_REPORT *PFNVBOXCRCON_3DRGN_REPORT;

/* called from the "regions get" command processing thread, to indicate that the "regions get" is completed. */
typedef int FNVBOXCRCON_3DRGN_END(HVBOXCRCON_3DRGN_ASYNCCLIENT hRgnAsyncClient, u32 idScreen);
typedef FNVBOXCRCON_3DRGN_END *PFNVBOXCRCON_3DRGN_END;

/* client callbacks */
/* complete chromium cmd */
typedef int FNVBOXCRCON_CLT_CRCTL_COMPLETE(HVBOXCRCON_CLIENT hClient, PVBOXVDMACMD_CHROMIUM_CTL pCtl, int rc);
typedef FNVBOXCRCON_CLT_CRCTL_COMPLETE *PFNVBOXCRCON_CLT_CRCTL_COMPLETE;
typedef int FNVBOXCRCON_CLT_CRCMD_COMPLETE(HVBOXCRCON_CLIENT hClient, PVBOXVDMACMD_CHROMIUM_CMD pCmd, int rc);
+typedef FNVBOXCRCON_CLT_CRCMD_COMPLETE *PFNVBOXCRCON_CLT_CRCMD_COMPLETE;

typedef struct VBOXCRCON_SERVER_CALLBACKS {
    HVBOXCRCON_SERVER hServer;
    PFNVBOXCRCON_SVR_CRCMD pfnCrCmd;
    PFNVBOXCRCON_SVR_CRCTL pfnCrCtl;
    PFNVBOXCRCON_SVR_3DRGN_GET pfn3DRgnGet;
} VBOXCRCON_SERVER_CALLBACKS, *PVBOXCRCON_SERVER_CALLBACKS;

typedef struct VBOXCRCON_CLIENT_CALLBACKS {
    HVBOXCRCON_CLIENT hClient;
    PFNVBOXCRCON_CLT_CRCMD_COMPLETE pfnCrCmdComplete;
    PFNVBOXCRCON_CLT_CRCTL_COMPLETE pfnCrCtlComplete;
    PFNVBOXCRCON_3DRGN_ONSUBMIT pfn3DRgnOnSubmit;
    PFNVBOXCRCON_3DRGN_BEGIN pfn3DRgnBegin;
    PFNVBOXCRCON_3DRGN_REPORT pfn3DRgnReport;
    PFNVBOXCRCON_3DRGN_END pfn3DRgnEnd;
} VBOXCRCON_CLIENT_CALLBACKS, *PVBOXCRCON_CLIENT_CALLBACKS;

/* issued by Main to establish connection between Main and CrOpenGL service */
typedef struct VBOXVDMACMD_CHROMIUM_CTL_CRCONNECT {
    VBOXVDMACMD_CHROMIUM_CTL Hdr;
    /* input (filled by Client): */
    /*class VMMDev*/ void *pVMMDev;
    VBOXCRCON_CLIENT_CALLBACKS ClientCallbacks;
    /* output (filled by Server): */
    VBOXCRCON_SERVER_CALLBACKS ServerCallbacks;
} VBOXVDMACMD_CHROMIUM_CTL_CRCONNECT, *PVBOXVDMACMD_CHROMIUM_CTL_CRCONNECT;

/* ring command buffer dr */
#define VBOXCMDVBVA_STATE_SUBMITTED   1
#define VBOXCMDVBVA_STATE_CANCELLED   2
#define VBOXCMDVBVA_STATE_IN_PROGRESS 3
/* the "completed" state is signalled via the ring buffer values */

/* CrHgsmi command */
#define VBOXCMDVBVA_OPTYPE_CRCMD                        1
#define VBOXCMDVBVA_OPTYPE_BLT                          2
#define VBOXCMDVBVA_OPTYPE_FLIP                         3
#define VBOXCMDVBVA_OPTYPE_ColorFill
+/* allocation paging transfer request */
+#define VBOXCMDVBVA_OPTYPE_PAGING_TRANSFER 5
+/* allocation paging fill request */
+#define VBOXCMDVBVA_OPTYPE_PAGING_FILL 6
+/* same as VBOXCMDVBVA_OPTYPE_NOP, but contains VBOXCMDVBVA_HDR data */
+#define VBOXCMDVBVA_OPTYPE_NOPCMD 7
+/* actual command is stored in guest system memory */
+#define VBOXCMDVBVA_OPTYPE_SYSMEMCMD 8
+/* complex command - i.e. can contain multiple commands
+ * i.e. the VBOXCMDVBVA_OPTYPE_COMPLEXCMD VBOXCMDVBVA_HDR is followed
+ * by one or more VBOXCMDVBVA_HDR commands.
+ * Each command's size is specified in it's VBOXCMDVBVA_HDR's u32FenceID field */
+#define VBOXCMDVBVA_OPTYPE_COMPLEXCMD 9
+
+//* nop - is a one-bit command. The buffer size to skip is determined by VBVA buffer size */
+#define VBOXCMDVBVA_OPTYPE_NOP 0x80
+
+//* u8Flags flags */
+/* transfer from RAM to Allocation */
+#define VBOXCMDVBVA_OPF_PAGING_TRANSFER_IN 0x80
+
+#define VBOXCMDVBVA_OPF_BLT_TYPE_SAMEDIM_A8R8G8B8 0
+#define VBOXCMDVBVA_OPF_BLT_TYPE_GENERIC_A8R8G8B8 1
+#define VBOXCMDVBVA_OPF_BLT_TYPE_OFFPRIMSZFMT_OR_ID 2
+
+#define VBOXCMDVBVA_OPF_CLRFILL_TYPE_GENERIC_A8R8G8B8 0
+
+#define VBOXCMDVBVA_OPF_CLRFILL_TYPE_MASK 1
+
+blit direction is from first operand to second */
+#define VBOXCMDVBVA_OPF_BLT_DIR_IN_2 0x10
+/* operand 1 contains host id */
+#define VBOXCMDVBVA_OPF_OPERAND1_ISID 0x20
+/* operand 2 contains host id */
+#define VBOXCMDVBVA_OPF_OPERAND2_ISID 0x40
+/* primary hint id is src */
+#define VBOXCMDVBVA_OPF_PRIMARY_HINT_SRC 0x80
+
+/* trying to make the header as small as possible,
+ * we'd have pretty few op codes actually, so 8bit is quite enough,
+ * we will be able to extend it in any way. */
+typedef struct VBOXCMDVBVA_HDR {
+/* one VBOXCMDVBVA_OPTYPE XXX, except NOP, see comments above */
+u8 u8OpCode;
+/* command-specific
+ * VBOXCMDVBVA_OPTYPE_CRCMD - must be null
+ * VBOXCMDVBVA_OPTYPE_BLT - OR-ed VBOXCMDVBVA_OPF_ALLOC_XXX flags
+ * VBOXCMDVBVA_OPTYPE_PAGING_TRANSFER - must be null
+ * VBOXCMDVBVA_OPTYPE_PAGING_FILL - must be null
+ * VBOXCMDVBVA_OPTYPE_NOPCMD - must be null
+ * VBOXCMDVBVA_OPTYPE_NOP - not applicable (as the entire VBOXCMDVBVA_HDR is not valid) */
+u8 u8Flags;
+/* one of VBOXCMDVBVA_STATE_XXX*/
+volatile u8 u8State;
+union {
+/* result, 0 on success, otherwise contains the failure code TBD */
+int8_t i8Result;
+u8 u8PrimaryID;
+} u;
+union {
+/* complex command (VBOXCMDVBVA_OPTYPE_COMPLEXCMD) element data */
+struct {
+/* command length */
+u16 u16CbCmdHost;
+/* guest-specific data, host expects it to be NULL */
+u16 u16CbCmdGuest;
+} complexCmdEl;
+/* DXGK DDI fence ID */
+u32 u32FenceID;
+} u2;
+} VBOXCMDVBVA_HDR;
+
+typedef u32 VBOXCMDVBVAAOFFSET;
+typedef uint64_t VBOXCMDVBVAPHADDR;
+typedef u32 VBOXCMDVBVAPAGEIDX;
+
+typedef struct VBOXCMDVBVA_CRCMD_BUFFER {
+u32 buffer_length;
+VBOXCMDVBVAAOFFSET offBuffer;
+} VBOXCMDVBVA_CRCMD_BUFFER;
+
+typedef struct VBOXCMDVBVA_CRCMD_CMD {
+cBuffers;
+VBOXCMDVBVA_CRCMD_BUFFER aBuffers[1];
+} VBOXCMDVBVA_CRCMD_CMD;
+
+typedef struct VBOXCMDVBVA_CRCMD {
+VBOXCMDVBVA_HDRHdr;
+VBOXCMDVBVA_CRCMD.Cmd;
+} VBOXCMDVBVA_CRCMD;
typedef struct VBOXCMDVBVA_ALLOCINFO {
    union {
        VBOXCMDVBVAOFFSET offVRAM;
        u32 id;
    } u;
} VBOXCMDVBVA_ALLOCINFO;

typedef struct VBOXCMDVBVA_ALLOCDESC {
    VBOXCMDVBVA_ALLOCINFO Info;
    u16 u16Width;
    u16 u16Height;
} VBOXCMDVBVA_ALLOCDESC;

typedef struct VBOXCMDVBVA_RECT {
    /** Coordinates of affected rectangle. */
    int16_t xLeft;
    int16_t yTop;
    int16_t xRight;
    int16_t yBottom;
} VBOXCMDVBVA_RECT;

typedef struct VBOXCMDVBVA_POINT {
    int16_t x;
    int16_t y;
} VBOXCMDVBVA_POINT;

typedef struct VBOXCMDVBVA_BLT_HDR {
    VBOXCMDVBVA_HDR Hdr;
    VBOXCMDVBVA_POINT Pos;
} VBOXCMDVBVA_BLT_HDR;

typedef struct VBOXCMDVBVA_BLT_PRIMARY {
    VBOXCMDVBVA_BLT_HDR Hdr;
    VBOXCMDVBVA_ALLOCINFO alloc;
    /* the rects count is determined from the command size */
    VBOXCMDVBVA_RECT aRects[1];
} VBOXCMDVBVA_BLT_PRIMARY;

typedef struct VBOXCMDVBVA_BLT_PRIMARY_GENERIC_A8R8G8B8 {
    VBOXCMDVBVA_BLT_HDR Hdr;
    VBOXCMDVBVA_ALLOCDESC alloc;
    /* the rects count is determined from the command size */
    VBOXCMDVBVA_RECT aRects[1];
} VBOXCMDVBVA_BLT_PRIMARY_GENERIC_A8R8G8B8;

typedef struct VBOXCMDVBVA_BLT_OFFPRIMSZFMT_OR_ID {
    VBOXCMDVBVA_BLT_HDR Hdr;
VBOXCMDVBVA_ALLOCINFO alloc;
+u32 id;
/* the rects count is determined from the command size */
VBOXCMDVBVA_RECT aRects[1];
} VBOXCMDVBVA_BLT_OFFPRIMSZFMT_OR_ID;
+
typedef struct VBOXCMDVBVA_BLT_SAMEDIM_A8R8G8B8 {  
VBOXCMDVBVA_BLT_HDR Hdr;
VBOXCMDVBVA_ALLOCCDESC alloc1;
VBOXCMDVBVA_ALLOCINFO info2;
/* the rects count is determined from the command size */
VBOXCMDVBVA_RECT aRects[1];
} VBOXCMDVBVA_BLT_SAMEDIM_A8R8G8B8;
+
typedef struct VBOXCMDVBVA_BLT_GENERIC_A8R8G8B8 {  
VBOXCMDVBVA_BLT_HDR Hdr;
VBOXCMDVBVA_ALLOCCDESC alloc1;
VBOXCMDVBVA_ALLOCCDESC alloc2;
/* the rects count is determined from the command size */
VBOXCMDVBVA_RECT aRects[1];
} VBOXCMDVBVA_BLT_GENERIC_A8R8G8B8;
+
#define VBOXCMDVBVA_SIZEOF_BLTSTRUCT_MAX (sizeof (VBOXCMDVBVA_BLT_GENERIC_A8R8G8B8))
+
typedef struct VBOXCMDVBVA_FLIP {  
VBOXCMDVBVA_HDR Hdr;
VBOXCMDVBVA_ALLOCINFO src;
VBOXCMDVBVA_RECT aRects[1];
} VBOXCMDVBVA_FLIP;
+
#define VBOXCMDVBVA_SIZEOF_FLIPSTRUCT_MIN (RT_OFFSETOF(VBOXCMDVBVA_FLIP, aRects))
+
typedef struct VBOXCMDVBVA_CLRFILL_HDR {  
VBOXCMDVBVA_HDR Hdr;
u32 u32Color;
} VBOXCMDVBVA_CLRFILL_HDR;
+
typedef struct VBOXCMDVBVA_CLRFILL_PRIMARY {  
VBOXCMDVBVA_CLRFILL_HDR Hdr;
} VBOXCMDVBVA_CLRFILL_PRIMARY;
+
typedef struct VBOXCMDVBVA_CLRFILL_GENERIC_A8R8G8B8 {  
VBOXCMDVBVA_CLRFILL_HDR Hdr;
VBOXCMDVBVA_ALLOCCDESC dst;
VBOXCMDVBVA_RECT aRects[1];
} VBOXCMDVBVA_CLRFILL_GENERIC_A8R8G8B8;
#define VBOXCMDVBVA_SIZEOF_CLRFILLSTRUCT_MAX (sizeof (VBOXCMDVBVA_CLRFILL_GENERIC_A8R8G8B8))

#if 0
#define VBOXCMDVBVA_SYSCMEMEL_CPAGES_MAX 0x1000

typedef struct VBOXCMDVBVA_SYSCMEMEL {
  u32 cPagesAfterFirst : 12;
  u32 iPage1 : 20;
  u32 iPage2;
} VBOXCMDVBVA_SYSCMEMEL;
#endif

typedef struct VBOXCMDVBVA_PAGING_TRANSFER_DATA {
  /* for now can only contain offVRAM.
   * paging transfer can NOT be initiated for allocations having host 3D object (hostID) associated */
  VBOXCMDVBVA_ALLOCINFO Alloc;
  VBOXCMDVBVAPAGEIDX aPageNumbers[1];
} VBOXCMDVBVA_PAGING_TRANSFER_DATA;

typedef struct VBOXCMDVBVA_PAGING_TRANSFER {
  VBOXCMDVBVA_HDR Hdr;
  VBOXCMDVBVA_PAGING_TRANSFER_DATA Data;
} VBOXCMDVBVA_PAGING_TRANSFER;

typedef struct VBOXCMDVBVA_PAGING_FILL {
  VBOXCMDVBVA_HDR Hdr;
  u32 u32CbFill;
  u32 u32Pattern;
  /* paging transfer can NOT be initiated for allocations having host 3D object (hostID) associated */
  VBOXCMDVBVAOFFSET offVRAM;
} VBOXCMDVBVA_PAGING_FILL;

typedef struct VBOXCMDVBVA_SYSCMEMCMD {
  VBOXCMDVBVA_HDR Hdr;
  VBOXCMDVBVAPHADDR phCmd;
} VBOXCMDVBVA_SYSCMEMCMD;

#define VBOXCMDVBVACTL_TYPE_ENABLE 1
#define VBOXCMDVBVACTL_TYPE_3DCTL 2
#define VBOXCMDVBVACTL_TYPE_RESIZE 3

typedef struct VBOXCMDVBVA_CTL {
  u32 u32Type;
  s32 result;
} VBOXCMDVBVA_CTL;
typedef struct VBOXCMDVBVA_CTL_ENABLE {
  VBOXCMDVBVA_CTL Hdr;
  VBVENABLE Enable;
} VBOXCMDVBVA_CTL_ENABLE;

#define VBOXCMDVBVA_SCREENMAP_SIZE(_elType) ((VBOX_VIDEO_MAX_SCREENS + sizeof (_elType) - 1) / sizeof (_elType))
#define VBOXCMDVBVA_SCREENMAP_DECL(_elType, _name) _elType _name[VBOXCMDVBVA_SCREENMAP_SIZE(_elType)]

typedef struct VBOXCMDVBVA_RESIZE_ENTRY {
  VBVAINFOSCREEN Screen;
} VBOXCMDVBVA_RESIZE_ENTRY;

typedef struct VBOXCMDVBVA_RESIZE {
  VBOXCMDVBVA_RESIZE_ENTRY aEntries[1];
} VBOXCMDVBVA_RESIZE;

typedef struct VBOXCMDVBVA_CTL_RESIZE {
  VBOXCMDVBVA_CTL Hdr;
  VBOXCMDVBVA_RESIZE Resize;
} VBOXCMDVBVA_CTL_RESIZE;

#define VBOXCMDVBVA3DCTL_TYPE_CONNECT     1
#define VBOXCMDVBVA3DCTL_TYPE_DISCONNECT  2
#define VBOXCMDVBVA3DCTL_TYPE_CMD         3

typedef struct VBOXCMDVBVA_3DCTL {
  u32 u32Type;
  u32 u32CmdClientId;
} VBOXCMDVBVA_3DCTL;

typedef struct VBOXCMDVBVA_3DCTL_CONNECT {
  VBOXCMDVBVA_3DCTL Hdr;
  u32 u32MajorVersion;
  u64_t u64Pid;
} VBOXCMDVBVA_3DCTL_CONNECT;

typedef struct VBOXCMDVBVA_3DCTL_CMD {
  VBOXCMDVBVA_3DCTL Hdr;
  VBOXCMDVBVA_HDR Cmd;
} VBOXCMDVBVA_3DCTL_CMD;

typedef struct VBOXCMDVBVA_CTL_3DCTL_CMD {
  VBOXCMDVBVA_CTL Hdr;
  VBOXCMDVBVA_3DCTL_CMD Cmd;
} VBOXCMDVBVA_CTL_3DCTL_CMD;
typedef struct VBOXCMDVBVA_CTL_3DCTL_CONNECT {
    VBOXCMDVBVA_CTL Hdr;
    VBOXCMDVBVA_3DCTL_CONNECT Connect;
} VBOXCMDVBVA_CTL_3DCTL_CONNECT;

typedef struct VBOXCMDVBVA_CTL_3DCTL {
    VBOXCMDVBVA_CTL Hdr;
    VBOXCMDVBVA_3DCTL Ctl;
} VBOXCMDVBVA_CTL_3DCTL;

#pragma pack()

#ifdef VBOXVDMA_WITH_VBVA
#pragma pack(1)
#endif

#ifpack()
+ * NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT
+ * HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,
+ * WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
+ * FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR
+ * OTHER DEALINGS IN THE SOFTWARE.
+ */
+
+
+#ifndef ___VBox_Graphics_VBoxVideoGuest_h___
+#define ___VBox_Graphics_VBoxVideoGuest_h___
+
+#include "vbox_err.h"
+#include "vbox_drv.h"
+#include "vboxvideo.h"
+
+
+/**
+ * Structure grouping the context needed for sending graphics acceleration
+ * information to the host via VBVA. Each screen has its own VBVA buffer.
+ */
+*/
+typedef struct vbva_buf_context {
+/** Offset of the buffer in the VRAM section for the screen */
+u32    buffer_offset;
+/** Length of the buffer in bytes */
+u32    buffer_length;
+/** This flag is set if we wrote to the buffer faster than the host could
+ * read it. */
+bool    buffer_overflow;
+/** The VBVA record that we are currently preparing for the host, NULL if
+ * none. */
+struct VBVARECORD *record;
+/** Pointer to the VBVA buffer mapped into the current address space. Will
+ * be NULL if VBVA is not enabled. */
+struct VBVABUFFER *vbva;
+} vbva_buf_context, *PVBVABUFFERCONTEXT;
+
+/** @name base HGSMI APIs
+ * @{ */
+bool     VBoxHGSMIIIsSupported(void);
+void     VBoxHGSMIGetBaseMappingInfo(u32 cbVRAM,
+u32 *poffVRAMBaseMapping,
+u32 *pcbMapping,
+u32 *poffGuestHeapMemory,
+u32 *pcbGuestHeapMemory,
+u32 *poffHostFlags);
+int      hgsmi_report_flags_location(struct gen_pool * ctx,
+u32 location);
+int      hgsmi_send_caps_info(struct gen_pool * ctx,
+u32 caps);
+void     VBoxHGSMIGetHostAreaMapping(struct gen_pool * ctx,
+u32 cbVRAM,
+u32 offVRAMBaseMapping,
+u32 *poffVRAMHostArea,
+u32 *pcbHostArea);
+int      VBoxHGSMISendHostCtxInfo(struct gen_pool * ctx,
+u32 offVRAMFlagsLocation,
+u32 caps,
+u32 offVRAMHostArea,
+u32 cbHostArea);
+int      hgsmi_query_conf(struct gen_pool * ctx,
+u32 index, u32 *value_ret);
+int      VBoxQueryConfHGSMIDef(struct gen_pool * ctx,
+u32 index, u32 u32DefValue, u32 *value_ret);
+int      hgsmi_update_pointer_shape(struct gen_pool * ctx,
+u32 flags,
+u32 hot_x,
+u32 hot_y,
+u32 width,
+u32 height,
+u8 *pixels,
+u32 len);
+int      hgsmi_cursor_position(struct gen_pool * ctx, bool report_position, u32 x, u32 y,
+u32 *x_host, u32 *y_host);
+
+/** @} */ */
+
+/** @name VBVA APIs
+ * @{ */
+bool vbva_enable(struct vbva_buf_context * ctx,
+struct gen_pool * pHGSMICtx,
+struct VBVABUFFER *vbva, s32 screen);
+void vbva_disable(struct vbva_buf_context * ctx,
+struct gen_pool * pHGSMICtx,
+s32 screen);
+bool vbva_buffer_begin_update(struct vbva_buf_context * ctx,
+struct gen_pool * pHGSMICtx);
+void vbva_buffer_end_update(struct vbva_buf_context * ctx);
+bool VBoxVBVAWrite(struct vbva_buf_context * ctx,
+struct gen_pool * pHGSMICtx,
+const void *pv, u32 len);
+bool VBoxVBVAOrderSupported(struct vbva_buf_context * ctx, unsigned code);
+void VBoxVBVASetupBufferContext(struct vbva_buf_context * ctx,
+u32 buffer_offset,
+u32 buffer_length);
+
+/** @} */
+
+/** @name Modesetting APIs
+ * @{ */
+
+u32 VBoxHGSMIGetMonitorCount(struct gen_pool * ctx);
+u32 VBoxVideoGetVRAMSize(void);
+bool VBoxVideoAnyWidthAllowed(void);
+u16 VBoxHGSMIGetScreenFlags(struct gen_pool * ctx);
+
+struct VBVAINFOVIEW;
+/**
+ * Callback function called from VBoxHGSMISendViewInfo to initialise
+ * the VBoxINFOVIEW structure for each screen.
+ *
+ */
+typedef int FNHGSMIFILLVIEWINFO(void *pvData,

+ struct VBVAINFOVIEW *pInfo,
+ u32 cViews);
+/** Pointer to a FNHGSMIFILLVIEWINFO callback */
+typedef FNHGSMIFILLVIEWINFO *PFNHGSMIFILLVIEWINFO;
+
+int VBoxHGSMISendViewInfo(struct gen_pool * ctx,
+u32 u32Count,
+PFNHGSMIFILLVIEWINFO pfnFill,
+void *pvData);
+void VBoxVideoSetModeRegisters(u16 width, u16 height,
+ u16 cVirtWidth, u16 bpp,
+ u16 flags,
+ u16 cx, u16 cy);
+bool VBoxVideoGetModeRegisters(u16 *pcWidth,
+ u16 *pcHeight,
+ u16 *pcVirtWidth,
+ u16 *pcBPP,
+ u16 *pfFlags);
+void VBoxVideoDisableVBE(void);
+void hgsmi_process_display_info(struct gen_pool * ctx,
+ u32 display,
+ s32 origin_x,
+ s32 origin_y,
+ u32 start_offset,
+ u32 pitch,
+ u32 width,
+u32 height,
+u16 bpp,
+u16 flags);
+int hgsni_update_input_mapping(struct gen_pool * ctx, s32 origin_x, s32 origin_y,
+u32 width, u32 height);
+int hgsni_get_mode_hints(struct gen_pool * ctx,
+unsigned screens, struct vbva_modehint *hints);
+
+/** @} */
+
+
+#endif
+
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vboxvideo_vbe.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vboxvideo_vbe.h
@@ -0,0 +1,84 @@
+/*
+ * Copyright (C) 2006-2017 Oracle Corporation
+ *
+ * Permission is hereby granted, free of charge, to any person
+ * obtaining a copy of this software and associated documentation
+ * files (the "Software"), to deal in the Software without
+ * restriction, including without limitation the rights to use,
+ * copy, modify, merge, publish, distribute, sublicense, and/or sell
+ * copies of the Software, and to permit persons to whom the
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+ * HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,
+ * WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
+ * FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR
+ * OTHER DEALINGS IN THE SOFTWARE.
+ */
+
+#ifndef ___VBox_Graphics_VBoxVideoVBE_h
+#define ___VBox_Graphics_VBoxVideoVBE_h
+
/** @todo FIXME: Either dynamically ask host for this or put somewhere high in
 * physical memory like 0xE0000000. */
+ #define VBE_DISPI_BANK_ADDRESS 0xA0000
+ #define VBE_DISPI_BANK_SIZE_KB 64
+
+ #define VBE_DISPI_MAX_XRES 16384
+ #define VBE_DISPI_MAX_YRES 16384
+ #define VBE_DISPI_MAX_BPP 32
+
+ #define VBE_DISPI_IOPORT_INDEX 0x01CE
+ #define VBE_DISPI_IOPORT_DATA 0x01CF
+
+ #define VBE_DISPI_IOPORT_DAC_WRITE_INDEX 0x03C8
+ #define VBE_DISPI_IOPORT_DAC_DATA 0x03C9
+
+ #define VBE_DISPI_INDEX_ID 0x0
+ #define VBE_DISPI_INDEX_XRES 0x1
+ #define VBE_DISPI_INDEX_YRES 0x2
+ #define VBE_DISPI_INDEX_BPP 0x3
+ #define VBE_DISPI_INDEX_ENABLE 0x4
+ #define VBE_DISPI_INDEX_BANK 0x5
+ #define VBE_DISPI_INDEX_VIRT_WIDTH 0x6
+ #define VBE_DISPI_INDEX_VIRT_HEIGHT 0x7
+ #define VBE_DISPI_INDEX_X_OFFSET 0x8
+ #define VBE_DISPI_INDEX_Y_OFFSET 0x9
+ #define VBE_DISPI_INDEX_VBOX_VIDEO 0xa
+ #define VBE_DISPI_INDEX_FB_BASE_HI 0xb
+
+ #define VBE_DISPI_ID0 0xB0C0
+ #define VBE_DISPI_ID1 0xB0C1
+ #define VBE_DISPI_ID2 0xB0C2
+ #define VBE_DISPI_ID3 0xB0C3
+ #define VBE_DISPI_ID4 0xB0C4
+
+ #define VBE_DISPI_ID_VBOX_VIDEO 0xBE00
+ /* The VBOX interface id. Indicates support for VBVA shared memory interface. */
+ #define VBE_DISPI_ID_HGSMI 0xBE01
+ #define VBE_DISPI_ID_ANYX 0xBE02
+
+ #define VBE_DISPI_DISABLED 0x00
+ #define VBE_DISPI_ENABLED 0x01
+ #define VBE_DISPI_GETCAPS 0x02
+ #define VBE_DISPI_8BIT_DAC 0x20
+/** @note this definition is a BOCHS legacy, used only in the video BIOS code and ignored by the emulated hardware. */
+ #define VBE_DISPI_LFB_ENABLED 0x40
+ #define VBE_DISPI_NOCLEARMEM 0x80
+
+ #define VGA_PORT_HGSMI_HOST 0x3b0
+    ifdef /* !___VBox_Graphics_VBoxVideoVBE_h */
+    --- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/vbva_base.c
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/vbva_base.c
@@ -0,0 +1,367 @@
+    /*
+     * Copyright (C) 2006-2017 Oracle Corporation
+     *
+     * Permission is hereby granted, free of charge, to any person
+     * obtaining a copy of this software and associated documentation
+     * files (the "Software"), to deal in the Software without
+     * restriction, including without limitation the rights to use,
+     * copy, modify, merge, publish, distribute, sublicense, and/or sell
+     * copies of the Software, and to permit persons to whom the
+     * Software is furnished to do so, subject to the following
+     * conditions:
+     *
+     * The above copyright notice and this permission notice shall be
+     * included in all copies or substantial portions of the Software.
+     *
+     * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND,
+     * EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES
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+     * NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT
+     * HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,
+     * WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING
+     * FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR
+     * OTHER DEALINGS IN THE SOFTWARE.
+     */
+
+    #include "vboxvideo_guest.h"
+    #include "vbox_err.h"
+    #include "hgsmi_channels.h"
+
+    /* There is a hardware ring buffer in the graphics device video RAM, formerly
+     * in the VBox VMMDev PCI memory space.
+     * All graphics commands go there serialized by vbva_buffer_begin_update.
+     * and vbva_buffer_end_update.
+     * free_offset is writing position. data_offset is reading position.
+     * free_offset == data_offset means buffer is empty.
+     * There must be always gap between data_offset and free_offset when data
+     * are in the buffer.
+     * Guest only changes free_offset, host changes data_offset.
+     */
+ /* Forward declarations of internal functions. */
+ static void vbva_buffer_flush(struct gen_pool * ctx);
+ static void vbva_buffer_place_data_at(struct vbva_buf_context * ctx, const void *p,
+ u32 len, u32 offset);
+ static bool vbva_write(struct vbva_buf_context * ctx,
+ struct gen_pool * pHGSMICtx,
+ const void *p, u32 len);
+ +
+ static bool vbva_inform_host(struct vbva_buf_context * ctx,
+ struct gen_pool * pHGSMICtx,
+ s32 screen, bool enable)
+ {  
+ bool ret = false;
+ +
+ +#if 0 /* All callers check this */
+ +#if (ppdev->bHGSMISupported)
+ +#endif
+ +{
+ +void *p = hgsmi_buffer_alloc(pHGSMICtx,
+ sizeof (struct vbva_enable_ex),
+ HGSMI_CH_VBVA,
+ VBVA_ENABLE);
+ if (!p) {
+ +// LogFunc("HGSMIHeapAlloc failed
"));
+ } else {
+ +struct vbva_enable_ex *pEnable = p;
+ +
+ +pEnable->base.flags = enable? VBVA_F_ENABLE: VBVA_F_DISABLE;
+ +pEnable->base.offset = ctx->buffer_offset;
+ +pEnable->base.result = VERR_NOT_SUPPORTED;
+ +#if (screen >= 0) {
+ +pEnable->base.flags |= VBVA_F_EXTENDED | VBVA_F_ABSOFFSET;
+ +pEnable->screen_id = screen;
+ +}
+ +hgsmi_buffer_submit(pHGSMICtx, p);
+ +
+ +#if (enable) {
+ +ret = RT_SUCCESS(pEnable->base.result);
+ } else {
+ +ret = true;
+ +}
+ +hgsmi_buffer_free(pHGSMICtx, p);
+ +}
+ * Public hardware buffer methods.
+ */
+bool vbva_enable(struct vbva_buf_context * ctx,
+struct gen_pool * pHGSMICtx,
+VBVABUFFER *vbva, s32 screen)
+{
+bool ret = false;
+
+  /* LogFlowFunc("vbva %p
", vbva));
+
+  /* All callers check this */
+if (ppdev->bHGSMSupported)
+  {
+  /* LogFunc("vbva %p vbva off 0x%x
", vbva, ctx->buffer_offset));
+
+  vbva->host_flags.host_events = 0;
+  vbva->host_flags.supported_orders = 0;
+  vbva->data_offset = 0;
+  vbva->free_offset = 0;
+  memset(vbva->records, 0, sizeof (vbva->records));
+  vbva->first_record_index = 0;
+  vbva->free_record_index = 0;
+  vbva->partial_write_tresh = 256;
+  vbva->data_len = ctx->buffer_length - sizeof (VBVABUFFER) + sizeof (vbva->data);
+  
+  ctx->buffer_overflow = false;
+  ctx->record = NULL;
+  ctx->vbva = vbva;
+
+  ret = vbva_inform_host(ctx, pHGSMICtx, screen, true);
+}
+
+if (!ret) {
+vbva_disable(ctx, pHGSMICtx, screen);
+}
+
+return ret;
+}
+{  
+  // LogFlowFunc("
"),
+  +ctx->buffer_overflow = false;
+  +ctx->record = NULL;
+  +ctx->vbva = NULL;
+  +vbva_inform_host(ctx, pGSMICtx, screen, false);
+  +return;
+}
+
+bool vbva_buffer_begin_update(struct vbva_buf_context * ctx,
+struct gen_pool * pGSMICtx)
+{
+  bool ret = false;
+  
+  // LogFunc("flags = 0x%08X
", ctx->vbva? ctx->vbva->host_events: -1));
+  +if (ctx->vbva
+&& (ctx->vbva->host_flags.host_events & VBVA_F_MODE_ENABLED)) {
+    u32 next;
+    +WARN_ON_ONCE(!(!ctx->buffer_overflow));
+    +WARN_ON_ONCE(!((ctx->record == NULL));
+    +next = (ctx->vbva->free_record_index + 1) % VBVA_MAX_RECORDS;
+    +if (next == ctx->vbva->first_record_index) {
+      /* All slots in the records queue are used. */
+      +vbva_buffer_flush (pGSMICtx);
+      +}
+      +
+      +if (next == ctx->vbva->first_record_index) {
+        /* Even after flush there is no place. Fail the request. */
+        +WARN_ON_ONCE(!(!ctx->buffer_overflow));
+        +WARN_ON_ONCE(!((ctx->record == NULL));
+        +next = (ctx->vbva->free_record_index + 1) % VBVA_MAX_RECORDS;
+        +if (next == ctx->vbva->first_record_index) {
+          /* Initialize the record. */
+          +vbvarecord *record = &ctx->vbva->records[ctx->vbva->free_record_index];
+          +record->len_and_flags = VBVA_F_RECORD_PARTIAL;
+          +ctx->vbva->free_record_index = next;
+          +WARN_ON_ONCE(!(!ctx->buffer_overflow));
+          +WARN_ON_ONCE(!((ctx->record == NULL));
+          +vbva_inform_host(ctx, pGSMICtx, screen, false);
+          +return;
+        }
+      }
+    }
+  }
+  +/* Remember which record we are using. */
+ctx->record = record;
+
+ret = true;
+}
+
+return ret;
+
+void vbva_buffer_end_update(struct vbva_buf_context * ctx)
+{
+    VBVARECORD *record;
+
+    // LogFunc("\n");
+
+    WARN_ON_ONCE(!((ctx->vbva)));  
+
+    record = ctx->record;
+    WARN_ON_ONCE(!((record && (record->len_and_flags & VBVA_F_RECORD_PARTIAL))));  
+
+    /* Mark the record completed. */
+    record->len_and_flags &= ~VBVA_F_RECORD_PARTIAL;
+    ctx->buffer_overflow = false;
+    ctx->record = NULL;
+
+    return;
+}

+static u32 vbva_buffer_available (const VBVABUFFER *vbva)
+{
+    s32 diff = vbva->data_offset - vbva->free_offset;
+
+    return diff > 0? diff: vbva->data_len + diff;
+}

+static void vbva_buffer_flush(struct gen_pool * ctx)
+{
+    /* Issue the flush command. */
+    void *p = hgsmi_buffer_alloc(ctx, 
+    sizeof (VBVAFLUSH), 
+    HGSMI_CH_VBVA, 
+    HGSMI_CH_VBVA, 
+    VBVA_FLUSH);  
+    if (!p) {
+        // LogFunc("HGSMIHeapAlloc failed\n");  
+    }
+} else {
+VBVAFLUSH *pFlush = (VBVAFLUSH *)p;
+
+pFlush->reserved = 0;
+
+hgsmi_buffer_submit(ctx, p);
+
+hgsmi_buffer_free(ctx, p);
+
+
+return;
+
+
+return;
+
+
+static void vbva_buffer_place_data_at(struct vbva_buf_context * ctx, const void *p,
+u32 len, u32 offset)
+{
+VBVABUFFER *vbva = ctx->vbva;
+/u32 bytes_till_boundary = vbva->data_len - offset;
+u8 *dst = &vbva->data[offset];
+s32 diff = len - bytes_till_boundary;
+
+if (diff <= 0) {
+/* Chunk will not cross buffer boundary. */
+memcpy (dst, p, len);
+} else {
+/* Chunk crosses buffer boundary. */
+memcpy (dst, p, bytes_till_boundary);
+memcpy (&vbva->data[0], (u8 *)p + bytes_till_boundary, diff);
+
+
+return;
+
+
+static bool vbva_write(struct vbva_buf_context * ctx,
+struct gen_pool * pHGSMICtx,
+const void *p, u32 len)
+{
+VBVARECORD *record;
+u32 available;
+
+u32 cbWritten = 0;
+
+VBVABUFFER *vbva = ctx->vbva;
+WARN_ON_ONCE(!((vbva)));
+
+if (!vbva || ctx->buffer_overflow) {
+return false;
+}
+ WARN_ON_ONCE(!((vbva->first_record_index != vbva->free_record_index)));
+ record = ctx->record;
+ WARN_ON_ONCE(!((record && (record->len_and_flags & VBVA_F_RECORD_PARTIAL)));
+ // LogFunc("%d\n", len);
+ available = vbva_buffer_available(vbva);
+ while (len > 0) {
+ u32 chunk = len;
+ // LogFunc("vbva->free_offset %d, record->len_and_flags 0x%08X, available %d, len %d, cbWritten %d\n",
+ // vbva->free_offset, record->len_and_flags, available, len, cbWritten));
+ if (chunk >= available) {
+ // LogFunc("1) avail %d, chunk %d\n", available, chunk);
+ vbva_buffer_flush(pHGSMICtx);
+ available = vbva_buffer_available(vbva);
+ if (chunk >= available) {
+ // LogFunc("no place for %d bytes. Only %d bytes available after flush. Going to partial writes.\n",
+ // len, available));
+ if (available <= vbva->partial_write_tresh) {
+ // LogFunc("Buffer overflow!!!\n");
+ ctx->buffer_overflow = true;
+ WARN_ON_ONCE(!((false));
+ return false;
+ } } +
+ chunk = available - vbva->partial_write_tresh;
+ } }
+ WARN_ON_ONCE(!((chunk <= len)));
+ WARN_ON_ONCE(!((chunk <= vbva_buffer_available(vbva)));
+ vbva_buffer_place_data_at(ctx, (u8 *)p + cbWritten, chunk, vbva->free_offset);
+ vbva->free_offset = (vbva->free_offset + chunk) % vbva->data_len;
+ record->len_and_flags += chunk;
+ available -= chunk;
+ len -= chunk;
cbWritten += chunk;
+
+return true;
+
+/*
+ * Public writer to the hardware buffer.
+ */
+bool VBoxVBVAWrite(struct vbva_buf_context * ctx,
+struct gen_pool * pHGSMICtx,
+const void *pv, u32 len)
+{
+return vbva_write (ctx, pHGSMICtx, pv, len);
+}
+
+bool VBoxVBVAOrderSupported(struct vbva_buf_context * ctx, unsigned code)
+{
+VBVABUFFER *vbva = ctx->vbva;
+
+if (!vbva) {
+return false;
+}
+
+if (vbva->host_flags.supported_orders & (1 << code)) {
+return true;
+}
+
+return false;
+}
+
+void VBoxVBVASetupBufferContext(struct vbva_buf_context * ctx,
+u32 buffer_offset,
+u32 buffer_length)
+{
+ctx->buffer_offset = buffer_offset;
+ctx->buffer_length = buffer_length;
+}
--- linux-4.15.0.orig/ubuntu/vbox/vboxvideo/version-generated.h
+++ linux-4.15.0/ubuntu/vbox/vboxvideo/version-generated.h
@@ -0,0 +1,13 @@
+#ifndef ___version_generated_h___
+#define ___version_generated_h___
+
+#define VBOX_VERSION_MAJOR 5
+#define VBOX_VERSION_MINOR 2
+#define VBOX_VERSION_BUILD 8
+#define VBOX_VERSION_STRING_RAW "5.2.8"
```c
#define VBOX_VERSION_STRING "5.2.8_KernelUbuntu"
#define VBOX_API_VERSION_STRING "5_2"

#define VBOX_PRIVATE_BUILD_DESC "Private build by buildd"

--- linux-4.15.0.orig/ubuntu/xr-usb-serial/Makefile
+++ linux-4.15.0/ubuntu/xr-usb-serial/Makefile
@@ -0,0 +1,15 @@
+obj-m := xr_usb_serial_common.o
+
+KERNELDIR ?= /lib/modules/$(shell uname -r)/build
+PWD := $(shell pwd)
+
+EXTRA_CFLAGS := -DDEBUG=0
+
+all:
+$ (MAKE) -C $(KERNELDIR) M=$(PWD)
+
+modules_install:
+$ (MAKE) -C $(KERNELDIR) M=$(PWD) modules_install
+
+clean:
+rm -rf *.o *~ core .depend *.cmd *.ko *.mod.c .tmp_versions vty
--- linux-4.15.0.orig/ubuntu/xr-usb-serial/README.txt
+++ linux-4.15.0/ubuntu/xr-usb-serial/README.txt
@@ -0,0 +1,50 @@
+Exar USB Serial Driver
+======================
+Version 1A, 1/9/2015
+
+This driver will work with any USB UART function in these Exar devices:
+XR21V1410/1412/1414
+XR21B1411
+XR21B1420/1422/1424
+XR22801/802/804
+
+The source code has been tested on various Linux kernels from 3.6.x to 3.17.x.
+This may also work with newer kernels as well.
+
+Installation
+----------
+
+# Compile and install the common usb serial driver module
+
+# make
+# insmod ./xr_usb_serial_common.ko
```
Plug the device into the USB host. You should see up to four devices created, typically /dev/ttyXRUSB[0-3].

Tips for Debugging

Check that the USB UART is detected by the system

```
# lsusb
```

Check that the CDC-ACM driver was not installed for the Exar USB UART

```
# ls /dev/tty*
```

To remove the CDC-ACM driver and install the driver:

```
# rmmod cdc-acm
# modprobe -r usbserial
# modprobe usbserial
# insmod ./xr_usb_serial_common.ko
```

Technical Support

Send any technical questions/issues to uarttechsupport@exar.com.

--- linux-4.15.0.orig/ubuntu/xr-usb-serial/xr_usb_serial_common.c
+++ linux-4.15.0/ubuntu/xr-usb-serial/xr_usb_serial_common.c
@@ -0,0 +1,1802 @@
/*
 * This program is free software; you can redistribute it and/or modify
 * it under the terms of the GNU General Public License as published by
 * the Free Software Foundation; either version 2 of the License, or
 * (at your option) any later version.
 *
 * This program is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
 * GNU General Public License for more details.
 *
 * You should have received a copy of the GNU General Public License
 * along with this program; if not, write to the Free Software
 * Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
 */
/*
/*
 * Copyright (c) 2015 Exar Corporation, Inc.
 *
 * This driver will work with any USB UART function in these Exar devices:
 * XR21V1410/1412/1414
 * XR21B1411
 * XR21B1420/1422/1424
 * XR22801/802/804
 *
 * The driver has been tested on various kernel versions from 3.6.x to 3.17.x.
 * This driver may work on newer versions as well. There is a different driver available
 * from www.exar.com that will work with kernel versions 2.6.18 to 3.4.x.
 *
 * ChangeLog:
 * Version 1A - Initial released version.
 */

#include <linux/kernel.h>
#include <linux/errno.h>
#include <linux/init.h>
#include <linux/slab.h>
#include <linux/tty.h>
#include <linux/serial.h>
#include <linux/tty_driver.h>
#include <linux/tty_flip.h>
#include <linux/module.h>
#include <linux/mutex.h>
#include <linux/uaccess.h>
#include <linux/usb.h>
#include <linux/usb/cdc.h>
#include <asm/byteorder.h>
#include <asm/unaligned.h>
#include <linux/list.h>
#include "linux/version.h"

#define "xr_usb_serial_common.h"
#define "xr_usb_serial_ioctl.h"

#define DRIVER_AUTHOR "<uarttechsupport@exar.com>"
#define DRIVER_DESC "Exar USB UART (serial port) driver"

static struct usb_driver xr_usb_serial_driver;
static struct tty_driver *xr_usb_serial_tty_driver;
static struct xr_usb_serial *xr_usb_serial_table[XR_USB_SERIAL_TTY_MINORS];

+//#undef DEBUG
+#undef VERBOSE_DEBUG
+
+}
+static DEFINE_MUTEX(xr_usb_serial_table_lock);
+
+/*
+ * xr_usb_serial_table accessors
+ */
+
+/*
+ * Look up an XR_USB_SERIAL structure by index. If found and not disconnected, increment
+ * its refcount and return it with its mutex held.
+ */
+static struct xr_usb_serial *xr_usb_serial_get_by_index(unsigned index)
+{
+struct xr_usb_serial *xr_usb_serial;
+
+mutex_lock(&xr_usb_serial_table_lock);
+xr_usb_serial = xr_usb_serial_table[index];
+if (xr_usb_serial)
+{
+mutex_lock(&xr_usb_serial->mutex);
+if (xr_usb_serial->disconnected)
+{
+mutex_unlock(&xr_usb_serial->mutex);
+xr_usb_serial = NULL;
+}
+else {
+tty_port_get(&xr_usb_serial->port);
+mutex_unlock(&xr_usb_serial->mutex);
+}
+
+mutex_unlock(&xr_usb_serial_table_lock);
+return xr_usb_serial;
+}
+
+/*
+ * Try to find an available minor number and if found, associate it with 'xr_usb_serial'.
+ */
+static int xr_usb_serial_alloc_minor(struct xr_usb_serial *xr_usb_serial)
+{
+int minor;
+
+mutex_lock(&xr_usb_serial_table_lock);
+for (minor = 0; minor < XR_USB_SERIAL_TTY_MINORS; minor++)
+{
+if (!xr_usb_serial_table[minor])
+{
+xr_usb_serial_table[minor] = xr_usb_serial;
+break;
+}
+
+mutex_unlock(&xr_usb_serial_table_lock);
+}
+return minor;
+}
/* Release the minor number associated with 'xr_usb_serial'. */
static void xr_usb_serial_release_minor(struct xr_usb_serial *xr_usb_serial)
{
    mutex_lock(&xr_usb_serial_table_lock);
    xr_usb_serial_table[xr_usb_serial->minor] = NULL;
    mutex_unlock(&xr_usb_serial_table_lock);
}

/* Functions for XR_USB_SERIAL control messages. */

static int xr_usb_serial_ctrl_msg(struct xr_usb_serial *xr_usb_serial, int request, int value,
							void *buf, int len)
{
    int retval = usb_control_msg(xr_usb_serial->dev, usb_sndctrlpipe(xr_usb_serial->dev, 0),
		request, USB_RT_XR_USB_SERIAL, value,
		xr_usb_serial->control->altsetting[0].desc.bInterfaceNumber,
		buf, len, 5000);
    dev_dbg(&xr_usb_serial->control->dev,
			"%s - rq 0x%02x, val %#x, len %#x, result %d
",
			__func__, request, value, len, retval);
    return retval < 0 ? retval : 0;
}

#include "xr_usb_serial_hal.c"

/* Write buffer management.
 * All of these assume proper locks taken by the caller.
 */

static int xr_usb_serial_wb_alloc(struct xr_usb_serial *xr_usb_serial)
{
    int i, wbn;
    struct xr_usb_serial_wb *wb;

    wbn = 0;
    i = 0;
    for (;;) {
        wb = &xr_usb_serial->wb[wbn];
        if (wb->use) {
            i = 1;
        }
    }
+wbn = (wbn + 1) % XR_USB_SERIAL_NW;
+if (++i >= XR_USB_SERIAL_NW)
+return -1;
+
+static int xr_usb_serial_wb_is_avail(struct xr_usb_serial *xr_usb_serial)
+{
+int i, n;
+unsigned long flags;
+n = XR_USB_SERIAL_NW;
+spin_lock_irqsave(&xr_usb_serial->write_lock, flags);
+for (i = 0; i < XR_USB_SERIAL_NW; i++)
+n -= xr_usb_serial->wb[i].use;
+spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
+return n;
+}
+
+static void xr_usb_serial_write_done(struct xr_usb_serial *xr_usb_serial, struct xr_usb_serial_wb *wb)
+{
+wb->use = 0;
+xr_usb_serial->transmitting--;
+usb_autopm_put_interface_async(xr_usb_serial->control);
+}
+
+static int xr_usb_serial_start_wb(struct xr_usb_serial *xr_usb_serial, struct xr_usb_serial_wb *wb)
+{
+int rc;
+
+xr_usb_serial->transmitting++;
+
+wb->urb->transfer_buffer = wb->buf;
+wb->urb->transfer_dma = wb->dmah;
+wb->urb->transfer_buffer_length = wb->len;
+wb->urb->dev = xr_usb_serial->dev;
+
+rc = usb_submit_urb(wb->urb, GFP_ATOMIC);
+
+if (rc < 0) {
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+dev_err(&xr_usb_serial->data->dev, 
+"%s - usb_submit_urb(write bulk) failed: %d\n", 
+__func__, rc); 
+xr_usb_serial_write_done(xr_usb_serial, wb); 
+
+return rc; 
+
+ */
+ * attributes exported through sysfs 
+ */
+static ssize_t show_caps 
+(struct device *dev, struct device_attribute *attr, char *buf) 
+{ 
+struct usb_interface *intf = to_usb_interface(dev); 
+struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf); 
+ 
+return sprintf(buf, "%d", xr_usb_serial->ctrl_caps); 
+}
+static DEVICE_ATTR(bmCapabilities, S_IRUGO, show_caps, NULL); 
+
+static ssize_t show_country_codes 
+(struct device *dev, struct device_attribute *attr, char *buf) 
+{ 
+struct usb_interface *intf = to_usb_interface(dev); 
+struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf); 
+
+memcpy(buf, xr_usb_serial->country_codes, xr_usb_serial->country_code_size); 
+return xr_usb_serial->country_code_size; 
+}
+static DEVICE_ATTR(wCountryCodes, S_IRUGO, show_country_codes, NULL); 
+
+static ssize_t show_country_rel_date 
+(struct device *dev, struct device_attribute *attr, char *buf) 
+{ 
+struct usb_interface *intf = to_usb_interface(dev); 
+struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf); 
+
+return sprintf(buf, "%d", xr_usb_serial->country_rel_date); 
+}
+static DEVICE_ATTR(iCountryCodeRelDate, S_IRUGO, show_country_rel_date, NULL); 
+
+static ssize_t set_rs485_422_en(struct device *dev, 
+struct device_attribute *attr, const char *buf, 
+size_t count)
+{


struct usb_interface *intf = to_usb_interface(dev);
struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf);

int error, value = 0;

error = kstrtoint(buf, 0, &value);
if (error)
    return error;
if (value == 0)
    xr_usb_serial->rs485_422_en = false;
else if (value == 1)
    // RS485,RS422 HD/FD mode
    xr_usb_serial->rs485_422_en = true;

return count;

static ssize_t show_rs485_422_en(struct device *dev,
    struct device_attribute *attr, char *buf)
{
    struct usb_interface *intf = to_usb_interface(dev);
    struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf);
    
    if (xr_usb_serial->rs485_422_en == false) {
        return sprintf(buf, "0");
    } else if (xr_usb_serial->rs485_422_en == true) {
        // RS485,RS422 HD/FD mode
        return sprintf(buf, "1");
    }
    return 0;
}

static DEVICE_ATTR(bRS485_422_en, 0644, show_rs485_422_en, set_rs485_422_en);

/* Interrupt handlers for various XR_USB_SERIAL device responses */

/* control interface reports status changes with “interrupt” transfers */
static void xr_usb_serial_ctrl_irq(struct urb *urb) {
    struct xr_usb_serial *xr_usb_serial = urb->context;
    struct usb_cdc_notification *dr = urb->transfer_buffer;
    struct tty_struct *tty;
    unsigned char *data;
    int newctrl;
    int retval;
+int status = urb->status;
+int i;
+unsigned char *p;
+
+switch (status) {
+case 0:
+    p = (unsigned char *)(urb->transfer_buffer);
+for(i=0;i<urb->actual_length;i++)
+    
+        dev_dbg(&xr_usb_serial->control->dev,"0x%02x\n",p[i]);
+    */ success */
+    break;
+case -ECONNRESET:
+case -ENOENT:
+case -ESHUTDOWN:
+    /* this urb is terminated, clean up */
+    dev_dbg(&xr_usb_serial->control->dev,
+        "%s - urb shutting down with status: %d\n",
+        __func__, status);
+    return;
+default:
+    dev_dbg(&xr_usb_serial->control->dev,
+        "%s - nonzero urb status received: %d\n",
+        __func__, status);
+    goto exit;
+}
+
+usb_mark_last_busy(xr_usb_serial->dev);
+
+data = (unsigned char *)(dr + 1);
+switch (dr->bNotificationType) {
+case USB_CDC_NOTIFY_NETWORK_CONNECTION:
+    dev_dbg(&xr_usb_serial->control->dev, "%s - network connection: %d\n",
+        __func__, dr->wValue);
+    break;
+
+case USB_CDC_NOTIFY_SERIAL_STATE:
+    #if LINUX_VERSION_CODE > KERNEL_VERSION(3, 9, 0)
+        newctrl = get_unaligned_le16(data);
+        if (!xr_usb_serial->clocal && (xr_usb_serial->ctrlin & ~newctrl & XR_USB_SERIAL_CTRL_DCD)) {
+            dev_dbg(&xr_usb_serial->control->dev, "%s - calling hangup\n",
+                __func__);
+            tty_port_tty_hangup(&xr_usb_serial->port, false);
+        }
+    #else
+        tty = tty_port_tty_get(&xr_usb_serial->port);
+        newctrl = get_unaligned_le16(data);
+    #endif
if (tty)
{
if (!xr_usb_serial->clocal &&
  (xr_usb_serial->ctrlin & ~newctrl & XR_USB_SERIAL_CTRL_DCD))
{
  dev_dbg(&xr_usb_serial->control->dev,
   "%s - calling hangup\n", __func__);
  tty_hangup(tty);
  
  tty_kref_put(tty);
}
#endif

xr_usb_serial->ctrlin = newctrl;

dev_dbg(&xr_usb_serial->control->dev,
   "%s - input control lines: dcd%c dsr%c break%c ring%c framing%c parity%c overrun%c
", __func__,
   xr_usb_serial->ctrlin & XR_USB_SERIAL_CTRL_DCD ? '+' : '-',
   xr_usb_serial->ctrlin & XR_USB_SERIAL_CTRL_DSR ? '+' : '-',
   xr_usb_serial->ctrlin & XR_USB_SERIAL_CTRL_BRK ? '+' : '-',
   xr_usb_serial->ctrlin & XR_USB_SERIAL_CTRL_RI  ? '+' : '-',
   xr_usb_serial->ctrlin & XR_USB_SERIAL_CTRL_FRAMING ? '+' : '-',
   xr_usb_serial->ctrlin & XR_USB_SERIAL_CTRL_PARITY ? '+' : '-',
   xr_usb_serial->ctrlin & XR_USB_SERIAL_CTRL_OVERRUN ? '+' : '-');
break;

default:
{
  dev_dbg(&xr_usb_serial->control->dev,
   "%s - unknown notification %d received: index %d len %d data0 %d data1 %d
", __func__,
   dr->bNotificationType, dr->wIndex,
   dr->wLength, data[0], data[1]);
  
  break;
}
exit:

retval = usb_submit_urb(urb, GFP_ATOMIC);
if (retval)
{
  dev_err(&xr_usb_serial->control->dev, "%s - usb_submit_urb failed: %d\n", __func__, retval);
}

static int xr_usb_serial_submit_read_urb(struct xr_usb_serial *xr_usb_serial, int index, gfp_t mem_flags)
{
int res;

if (!test_and_clear_bit(index, &xr_usb_serial->read_urbs_free))
  return 0;
dev_vdbg(&xr_usb_serial->dev, "%s - urb %d\n", __func__, index);
res = usb_submit_urb(xr_usb_serial->read_urbs[index], mem_flags);
if (res) {
    if (res != -EPERM) {
dev_err(&xr_usb_serial->dev, "%s - usb_submit_urb failed: %d\n", __func__, res);
    }
set_bit(index, &xr_usb_serial->read_urbs_free);
return res;
}
return 0;

static int xr_usb_serial_submit_read_urbs(struct xr_usb_serial *xr_usb_serial, gfp_t mem_flags)
{
    int res;
    int i;
    for (i = 0; i < xr_usb_serial->rx_buflimit; ++i) {
        res = xr_usb_serial_submit_read_urb(xr_usb_serial, i, mem_flags);
        if (res)
            return res;
    }
    return 0;
}
static void xr_usb_serial_process_read_urb(struct xr_usb_serial *xr_usb_serial, struct urb *urb)
{
    struct tty_struct *tty;
    if (!urb->actual_length)
        return;
#if LINUX_VERSION_CODE > KERNEL_VERSION(3, 9, 0)
tty_insert_flip_string(&xr_usb_serial->port, urb->transfer_buffer, urb->actual_length);
tty_flip_buffer_push(&xr_usb_serial->port);
#else
tty = tty_port_tty_get(&xr_usb_serial->port);
    if (!tty)
        return;
tty_insert_flip_string(tty, urb->transfer_buffer, urb->actual_length);
tty_flip_buffer_push(tty);
    tty_kref_put(tty);
#endif
static void xr_usb_serial_read_bulk_callback(struct urb *urb)
{
    struct xr_usb_serial_rb *rb = urb->context;
    struct xr_usb_serial *xr_usb_serial = rb->instance;
    unsigned long flags;

    dev_vdbg(&xr_usb_serial->data->dev, "%s - urb %d, len %d\n", __func__,
             rb->index, urb->actual_length);
    set_bit(rb->index, &xr_usb_serial->read_urbs_free);

    if (!xr_usb_serial->dev) {
        dev_dbg(&xr_usb_serial->data->dev, "%s - disconnected\n", __func__);
        return;
    }
    usb_mark_last_busy(xr_usb_serial->dev);

    if (urb->status) {
        dev_dbg(&xr_usb_serial->data->dev, "%s - non-zero urb status: %d\n",
                __func__, urb->status);
        return;
    }
    xr_usb_serial_process_read_urb(xr_usb_serial, urb);

    /* throttle device if requested by tty */
    spin_lock_irqsave(&xr_usb_serial->read_lock, flags);
    xr_usb_serial->throttled = xr_usb_serial->throttle_req;
    if (!xr_usb_serial->throttled && !xr_usb_serial->susp_count) {
        spin_unlock_irqrestore(&xr_usb_serial->read_lock, flags);
        xr_usb_serial_submit_read_urb(xr_usb_serial, rb->index, GFP_ATOMIC);
    } else {
        spin_unlock_irqrestore(&xr_usb_serial->read_lock, flags);
    }
}

static void xr_usb_serial_write_bulk(struct urb *urb)
{
    struct xr_usb_serial_wb *wb = urb->context;
    struct xr_usb_serial *xr_usb_serial = wb->instance;
    unsigned long flags;

    if (urb->status || (urb->actual_length != urb->transfer_buffer_length)) {
        dev_vdbg(&xr_usb_serial->data->dev, "%s - len %d/%d, status %d\n",
                 __func__, urb->actual_length, urb->transfer_buffer_length,
                 urb->status);
        return;
    }
    dev_dbg(&xr_usb_serial->data->dev, "%s - urb %d, len %d\n", __func__,
            rb->index, urb->actual_length);
    spin_lock_irqsave(&xr_usb_serial->write_lock, flags);
    if (!xr_usb_serial->throttled && !xr_usb_serial->susp_count) {
        spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
        xr_usb_serial_submit_write_urb(xr_usb_serial, rb->index, GFP_ATOMIC);
    } else {
        spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
    }
}
urb->status);
+
spin_lock_irqsave(&xr_usb_serial->write_lock, flags);
xr_usb_serial_write_done(xr_usb_serial, wb);
spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
schedule_work(&xr_usb_serial->work);
+
static void xr_usb_serial_softint(struct work_struct *work)
+
struct xr_usb_serial *xr_usb_serial = container_of(work, struct xr_usb_serial, work);
+  struct tty_struct *tty;
+
+dev_vdbg(&xr_usb_serial->data->dev->dev, "%s\n", __func__);
+if LINUX_VERSION_CODE > KERNEL_VERSION(3, 9, 0)
tty_port tty_wakeup(&xr_usb_serial->port);
+else
  tty = tty_port tty_get(&xr_usb_serial->port);
+  if (!tty)
+    return;
+  tty_wakeup(tty);
+  tty_kref_put(tty);
+endif
+
/*
 * TTY handlers
 */
+
static int xr_usb_serial_tty_install(struct tty_driver *driver, struct tty_struct *tty)
+
struct xr_usb_serial *xr_usb_serial;
+int retval;
+
+dev_dbg(tty->dev, "%s\n", __func__);
+
xr_usb_serial = xr_usb_serial_get_by_index(tty->index);
+if (!xr_usb_serial)
+    return -ENODEV;
+
retval = tty_standard_install(driver, tty);
+if (retval)
+    goto error_init_termios;
+
tty->driver_data = xr_usb_serial;
+return 0;
+error_init_termios:
+tty_port_put(&xr_usb_serial->port);
+return retval;
+
+static int xr_usb_serial_tty_open(struct tty_struct *tty, struct file *filp)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+
+dev_dbg(tty->dev, "%s\n", __func__);
+
+return tty_port_open(&xr_usb_serial->port, tty, filp);
+}
+
+static int xr_usb_serial_port_activate(struct tty_port *port, struct tty_struct *tty)
+{
+struct xr_usb_serial *xr_usb_serial = container_of(port, struct xr_usb_serial, port);
+int retval = -ENODEV;
+
+dev_dbg(&xr_usb_serial->control->dev, "%s\n", __func__);
+
+mutex_lock(&xr_usb_serial->mutex);
+if (xr_usb_serial->disconnected)
+goto disconnected;
+
+retval = usb_autopm_get_interface(xr_usb_serial->control);
+if (retval)
+goto error_get_interface;
+
+/*
+ * FIXME: Why do we need this? Allocating 64K of physically contiguous
+ * memory is really nasty...
+ */
+set_bit(TTY_NO_WRITE_SPLIT, &tty->flags);
+xr_usb_serial->control->needs_remote_wakeup = 1;
+
+xr_usb_serial->ctrlurb->dev = xr_usb_serial->dev;
+if (usb_submit_urb(xr_usb_serial->ctrlurb, GFP_KERNEL)) {
+dev_err(&xr_usb_serial->control->dev,
+"%s - usb_submit_urb(ctrl irq) failed\n", __func__);
+goto error_submit_urb;
+}
+
+xr_usb_serial->ctrlout = XR_USB_SERIAL_CTRL_DTR | XR_USB_SERIAL_CTRL_RTS;
+if (xr_usb_serial_set_control(xr_usb_serial, xr_usb_serial->ctrlout) < 0 &&
+xr_usb_serial->ctrl_caps & USB_CDC_CAP_LINE)
+goto error_set_control;
+}
usb_autopm_put_interface(xr_usb_serial->control);
+
+ /*
+ * Unthrottle device in case the TTY was closed while throttled.
+ */
+spin_lock_irq(&xr_usb_serial->read_lock);
xr_usb_serial->throttled = 0;
xr_usb_serial->throttle_req = 0;
spin_unlock_irq(&xr_usb_serial->read_lock);
+
+if (xr_usb_serial_submit_read_urbs(xr_usb_serial, GFP_KERNEL))
+goto error_submit_read_urbs;
+
+mutex_unlock(&xr_usb_serial->mutex);
+
+return 0;
+
+error_submit_read_urbs:
xr_usb_serial->ctrlout = 0;
xr_usb_serial_set_control(xr_usb_serial, xr_usb_serial->ctrlout);

error_set_control:
usb_kill_urb(xr_usb_serial->ctrlurb);
error_submit_urb:
usb_autopm_put_interface(xr_usb_serial->control);

error_get_interface:
+ disconnected:

+mutex_unlock(&xr_usb_serial->mutex);
+return retval;
+
+
+static void xr_usb_serial_port_destruct(struct tty_port *port)
+{
+struct xr_usb_serial *xr_usb_serial = container_of(port, struct xr_usb_serial, port);
+
+dev_dbg(&xr_usb_serial->control->dev, "%s\n", __func__);
+    #if LINUX_VERSION_CODE < KERNEL_VERSION(3, 7, 0)
tty_unregister_device(xr_usb_serial_tty_driver, xr_usb_serial->minor);
+endif
+xr_usb_serial_release_minor(xr_usb_serial);
+usb_put_intf(xr_usb_serial->control);
+kfree(xr_usb_serial->country_codes);
+kfree(xr_usb_serial);
+
+
+static void xr_usb_serial_port_shutdown(struct tty_port *port)
+{
+struct xr_usb_serial *xr_usb_serial = container_of(port, struct xr_usb_serial, port);
+
+dev_dbg(&xr_usb_serial->control->dev, "\n", __func__);
+    #if LINUX_VERSION_CODE < KERNEL_VERSION(3, 7, 0)
tty_unregister_device(xr_usb_serial_tty_driver, xr_usb_serial->minor);
+endif
+xr_usb_serial_release_minor(xr_usb_serial);
+usb_put_intf(xr_usb_serial->control);
+kfree(xr_usb_serial->country_codes);
+kfree(xr_usb_serial);
+
+}
+dev_dbg(&xr_usb_serial->control->dev, "%s
", __func__); 
+
+mutex_lock(&xr_usb_serial->mutex);
+if (!xr_usb_serial->disconnected) {
+usb_autopm_get_interface(xr_usb_serial->control);
+xr_usb_serial_set_control(xr_usb_serial, xr_usb_serial->ctrlout = 0);
+xr_usb_serial->ctrlurb = usb_new_urb(
+for (i = 0; i < XR_USB_SERIAL_NW; i++)
+for (i = 0; i < jr_usb_serial->rx_buflimit; i++)
+for (i = 0; i < xr_usb_serial->read_urbs[i]);
+xr_usb_serial->ctrlurb = usb_new_urb(
+usb_autopm_put_interface(xr_usb_serial->control);
+
+mutex_unlock(&xr_usb_serial->mutex);
+)
+
+static void xr_usb_serial_tty_cleanup(struct tty_struct *tty) {
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+dev_dbg(&xr_usb_serial->control->dev, "%s
", __func__); 
+tty_port_put(&xr_usb_serial->port);
+
+static void xr_usb_serial_tty_hangup(struct tty_struct *tty) {
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+dev_dbg(&xr_usb_serial->control->dev, "%s
", __func__); 
+tty_port_hangup(&xr_usb_serial->port);
+
+static void xr_usb_serial_tty_close(struct tty_struct *tty, struct file *filp) {
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+dev_dbg(&xr_usb_serial->control->dev, "%s
", __func__); 
+tty_port_close(&xr_usb_serial->port, tty, filp);
+
+static int xr_usb_serial_tty_write(struct tty_struct *tty, 
+const unsigned char *buf, int count) {
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+int stat;
+unsigned long flags;
+int wbn;
+struct xr_usb_serial_wb *wb;
+
+}
+if (!count)
+  return 0;
+
+dev_vdbg(&xr_usb_serial->data->dev, "%s - count %d\n", __func__, count);
+
+spin_lock_irqsave(&xr_usb_serial->write_lock, flags);
+wbn = xr_usb_serial_wb_alloc(xr_usb_serial);
+if (wbn < 0) {
+  spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
+  return 0;
+}
+w = &xr_usb_serial->wb[wbn];
+
+if (!xr_usb_serial->dev) {
+  wb->use = 0;
+  spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
+  return -ENODEV;
+}
+
+count = (count > xr_usb_serial->writesize) ? xr_usb_serial->writesize : count;
+dev_vdbg(&xr_usb_serial->data->dev, "%s - write %d\n", __func__, count);
+memcpy(wb->buf, buf, count);
+wb->len = count;
+
+usb_autopm_get_interface_async(xr_usb_serial->control);
+
+if (xr_usb_serial->susp_count) {
+  if (!xr_usb_serial->delayed_wb)
+    xr_usb_serial->delayed_wb = wb;
+  else
+    usb_autopm_put_interface_async(xr_usb_serial->control);
+  spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
+  return count;/* A white lie */
+}
+
+usb_mark_last_busy(xr_usb_serial->dev);
+
+stat = xr_usb_serial_start_wb(xr_usb_serial, wb);
+spin_unlock_irqrestore(&xr_usb_serial->write_lock, flags);
+
+if (stat < 0)
+  return stat;
+return count;
+
+static int xr_usb_serial_tty_write_room(struct tty_struct *tty)
+{
+  struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+  /* Do not let the line discipline to know that we have a reserve,
+ * or it might get too enthusiastic.
+ */
+return xr_usb_serial_wb_isavail(xr_usb_serial) ? xr_usb_serial->writesize : 0;
+}
+
+static int xr_usb_serial_tty_chars_in_buffer(struct tty_struct *tty)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+/*
+ * if the device was unplugged then any remaining characters fell out
+ * of the connector ;)
+ */
+if (xr_usb_serial->disconnected)
+return 0;
+/*
+ * This is inaccurate (overcounts), but it works.
+ */
+return (XR_USB_SERIAL_NW - xr_usb_serial_wb_isavail(xr_usb_serial)) * xr_usb_serial->writesize;
+}
+
+static void xr_usb_serial_tty_throttle(struct tty_struct *tty)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+
+spin_lock_irq(&xr_usb_serial->read_lock);
+xr_usb_serial->throttle_req = 1;
+spin_unlock_irq(&xr_usb_serial->read_lock);
+}
+
+static void xr_usb_serial_tty_unthrottle(struct tty_struct *tty)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+
+unsigned int was_throttled;
+spin_lock_irq(&xr_usb_serial->read_lock);
+was_throttled = xr_usb_serial->throttled;
+xr_usb_serial->throttled = 0;
+xr_usb_serial->throttle_req = 0;
+spin_unlock_irq(&xr_usb_serial->read_lock);
+
+if (was_throttled)
+xr_usb_serial_submit_read_urbs(xr_usb_serial, GFP_KERNEL);
+}
+
+static int xr_usb_serial_tty_break_ctl(struct tty_struct *tty, int state)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+int retval;
+
+retval = xr_usb_serial_send_break(xr_usb_serial, state ? 0xffff : 0);
+if (retval < 0)
+dev_dbg(&xr_usb_serial->control->dev, "%s - send break failed\n", __func__);
+return retval;
+
+static int xr_usb_serial_tty_tiocmget(struct tty_struct *tty)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+dev_dbg(&xr_usb_serial->control->dev, "xr_usb_serial_tty_tiocmget\n");
+    return xr_usb_serial_tiocmget(xr_usb_serial);
+
+}
+
+static int xr_usb_serial_tty_tiocmset(struct tty_struct *tty,
+    unsigned int set, unsigned int clear)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+dev_dbg(&xr_usb_serial->control->dev, "xr_usb_serial_tty_tiocmset set=0x%x clear=0x%x\n", set, clear);
+    return xr_usb_serial_tiocmset(xr_usb_serial,set,clear);
+
+}
+
+static int get_serial_info(struct xr_usb_serial *xr_usb_serial, struct serial_struct __user *info)
+{
+    struct serial_struct tmp;
+
+    if (!info)
+        return -EINVAL;
+
+    memset(&tmp, 0, sizeof(tmp));
+    tmp.flags = ASYNC_LOW_LATENCY;
+    tmp.xmit_fifo_size = xr_usb_serial->writesize;
+    tmp.baud_base = le32_to_cpu(xr_usb_serial->line.dwDTERate);
+    tmp.close_delay = xr_usb_serial->port.close_delay / 10;
+    tmp.closing_wait = xr_usb_serial->port.closing_wait == ASYNC_CLOSING_WAIT_NONE ? 
+ASYNC_CLOSING_WAIT_NONE :
+    xr_usb_serial->port.closing_wait / 10;
+
+    if (copy_to_user(info, &tmp, sizeof(tmp)))
+        return -EFAULT;
+    else
+        return 0;
+}
+
+static int set_serial_info(struct xr_usb_serial *xr_usb_serial,
+struct serial_struct __user *newinfo)
+
+struct serial_struct new_serial;
+unsigned int closing_wait, close_delay;
+int retval = 0;
+
+if (copy_from_user(&new_serial, newinfo, sizeof(new_serial)))
+return -EFAULT;
+
+close_delay = new_serial.close_delay * 10;
+closing_wait = new_serial.closing_wait == ASYNC_CLOSING_WAIT_NONE ?
+ASYNC_CLOSING_WAIT_NONE : new_serial.closing_wait * 10;
+
+mutex_lock(&(xr_usb_serial->port.mutex));
+
+if (!capable(CAP_SYS_ADMIN)) {
+    if ((close_delay != xr_usb_serial->port.close_delay) ||
+        (closing_wait != xr_usb_serial->port.closing_wait))
+        retval = -EPERM;
+    else
+        retval = -EOPNOTSUPP;
+} else {
+    xr_usb_serial->port.close_delay = close_delay;
+    xr_usb_serial->port.closing_wait = closing_wait;
+}
+
+mutex_unlock(&(xr_usb_serial->port.mutex));
+return retval;
+}
+
+static int xr_usb_serial_tty_ioctl(struct tty_struct *tty,
+    unsigned int cmd, unsigned long arg)
+
+    unsigned int channel, reg, val;
+    short *data;
+
+    switch (cmd) {
+    case TIOCGSERIAL: /* gets serial port data */
+        rv = get_serial_info(xr_usb_serial, (struct serial_struct __user *) arg);
+        break;
+    case TIOCSSERIAL:
+        rv = set_serial_info(xr_usb_serial, (struct serial_struct __user *) arg);
+        break;
+    case XR_USB_SERIAL_GET_REG:
+        if (get_user(channel, (int __user *)arg))
+            return -EFAULT;
+        // rest of the code...
+    if (get_user(reg, (int __user *)(arg + sizeof(int))))
+        return -EFAULT;
+
+    data = kmalloc(2, GFP_KERNEL);
+    if (data == NULL) {
+        dev_err(&xr_usb_serial->control->dev, "Cannot allocate USB buffer.\n", __func__);
+        return -ENOMEM;
+    }
+
+    if (channel == -1)
+    {
+        rv = xr_usb_serial_get_reg(xr_usb_serial, reg, data);
+    }
+    else
+    {
+        rv = xr_usb_serial_get_reg_ext(xr_usb_serial, channel, reg, data);
+    }
+    if (rv != 1) {
+        dev_err(&xr_usb_serial->control->dev, "Cannot get register (%d)\n", rv);
+        kfree(data);
+        return -EFAULT;
+    }
+
+    if (put_user(le16_to_cpu(*data), (int __user *)(arg + 2 * sizeof(int))))
+    {
+        dev_err(&xr_usb_serial->control->dev, "Cannot put user result\n");
+        kfree(data);
+        return -EFAULT;
+    }
+
+    rv = 0;
+    kfree(data);
+    break;
+
+    case XR_USB_SERIAL_SET_REG:
+    if (get_user(channel, (int __user *)arg))
+        return -EFAULT;
+    if (get_user(reg, (int __user *)(arg + sizeof(int))))
+        return -EFAULT;
+    if (get_user(val, (int __user *)(arg + 2 * sizeof(int))))
+        return -EFAULT;
+    if (channel == -1)
+    {
+        rv = xr_usb_serial_set_reg(xr_usb_serial, reg, val);
+    }
+    else
+    {
+        rv = xr_usb_serial_set_reg_ext(xr_usb_serial, channel, reg, val);
+    }
```c
+ }  
+ if (rv < 0) 
+     return -EFAULT;
+rv = 0;
+ break;
+case XR_USB_SERIAL_LOOPBACK:  
+ if (get_user(channel, (int __user *)arg))
+     return -EFAULT;
+ if (channel == -1)
+     channel = xr_usb_serial->channel;
+ rv = xr_usb_serial_set_loopback(xr_usb_serial,channel);
+ if (rv < 0)
+     return -EFAULT;
+ rv = 0;
+ break;
+
+return rv;
+
+static void xr_usb_serial_tty_set_termios(struct tty_struct *tty,
+struct ktermios *termios_old)
+{
+struct xr_usb_serial *xr_usb_serial = tty->driver_data;
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 7, 0)
+struct ktermios *termios = tty->termios;
+#else
+    struct ktermios *termios = &tty->termios;
+#endif
+    struct usb_cdc_line_coding newline;
+    int newctrl = xr_usb_serial->ctrlout;
+    xr_usb_serial_disable(xr_usb_serial);
+    newline.dwDTERate = cpu_to_le32(tty_get_baud_rate(tty));
+    newline.bCharFormat = termios->c_cflag & CSTOPB ? 1 : 0;
+    newline.bParityType = termios->c_cflag & PARENB ?
+        (termios->c_cflag & PARODD ? 1 : 2) +
+        (termios->c_cflag & CMSPAR ? 2 : 0) : 0;
+    switch (termios->c_cflag & CSIZE) {
+        case CS5:/*using CS5 replace of the 9 bit data mode*/
+            newline.bDataBits = 9;
+            break;
+        case CS6:
+            newline.bDataBits = 6;
+            break;
+        case CS7:
+            newline.bDataBits = 7;
+        break;
+    }
```
break;
+case CS8:
+default:
+newline.bDataBits = 8;
+break;
+
} */ FIXME: Needs to clear unsupported bits in the termios */
+xr_usb_serial->clocal = ((termios->c_cflag & CLOCAL) != 0);
+
+if (!newline.dwDTERate) {
+newline.dwDTERate = xr_usb_serial->line.dwDTERate;
+newctrl &= ~XR_USB_SERIAL_CTRL_DTR;
+} else
+newctrl |= XR_USB_SERIAL_CTRL_DTR;
+
+if (newctrl != xr_usb_serial->ctrlout)
+xr_usb_serial_set_control(xr_usb_serial, xr_usb_serial->ctrlout = newctrl);
+
+ xr_usb_serial_set_flow_mode(xr_usb_serial,tty,cflag); /* set the serial flow mode */
+
+if (memcmp(&xr_usb_serial->line, &newline, sizeof newline))
+
+{  
+memcpy(&xr_usb_serial->line, &newline, sizeof newline);
+dev_dbg(&xr_usb_serial->control->dev, "%s - set line: %d %d %d %d\n", 
+__func__,
+le32_to_cpu(newline.dwDTERate),
+newline.bCharFormat, newline.bParityType,
+newline.bDataBits);
+ xr_usb_serial_set_line(xr_usb_serial, &xr_usb_serial->line);
+}
+ xr_usb_serial_enable(xr_usb_serial);
+
+static const struct tty_port_operations xr_usb_serial_port_ops = {
+.shutdown = xr_usb_serial_port_shutdown,
+.activate = xr_usb_serial_port_activate,
+.destruct = xr_usb_serial_port_destruct,
+};
+
+/*
+ * USB probe and disconnect routines.
+ */
+
+/* Little helpers: write/read buffers free */
+static void xr_usb_serial_write_buffers_free(struct xr_usb_serial *xr_usb_serial)
+{
+int i;
+struct xr_usb_serial_wb *wb;
struct usb_device *usb_dev = interface_to_usbdev(xr_usb_serial->control);
+
+for (wb = &xr_usb_serial->wb[0], i = 0; i < XR_USB_SERIAL_NW; i++, wb++)
+usb_free_coherent(usb_dev, xr_usb_serial->writesize, wb->buf, wb->dmah);
+
+static void xr_usb_serial_read_buffers_free(struct xr_usb_serial *xr_usb_serial)
+{
+struct usb_device *usb_dev = interface_to_usbdev(xr_usb_serial->control);
+int i;
+
+for (i = 0; i < xr_usb_serial->rx_buflimit; i++)
+usb_free_coherent(usb_dev, xr_usb_serial->readsize,
+  xr_usb_serial->read_buffers[i].base, xr_usb_serial->read_buffers[i].dma);
+}
+
+/* Little helper: write buffers allocate */
+static int xr_usb_serial_write_buffers_alloc(struct xr_usb_serial *xr_usb_serial)
+{
+int i;
+struct xr_usb_serial_wb *wb;
+
+for (wb = &xr_usb_serial->wb[0], i = 0; i < XR_USB_SERIAL_NW; i++, wb++) {
+wb->buf = usb_alloc_coherent(xr_usb_serial->dev, xr_usb_serial->writesize, GFP_KERNEL,
+  &wb->dmah);
+if (!wb->buf) {
++i;
--wb;
usb_free_coherent(xr_usb_serial->dev, xr_usb_serial->writesize,
  wb->buf, wb->dmah);
+
+return -ENOMEM;
+}
+
+static int xr_usb_serial_probe(struct usb_interface *intf,
  + const struct usb_device_id *id)
+{
+struct usb_cdc_union_desc *union_header = NULL;
+struct usb_cdc_country_functional_desc *cfd = NULL;
+unsigned char *buffer = intf->altsetting->extra;
+int buflen = intf->altsetting->extralen;
+struct usb_interface *control_interface;
+struct usb_interface *data_interface;
+struct usb_endpoint_descriptor *epctrl = NULL;

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struct usb_endpoint_descriptor *epread = NULL;
struct usb_endpoint_descriptor *epwrite = NULL;
struct usb_device *usb_dev = interface_to_usbdev(intf);
struct xr_usb_serial *xr_usb_serial;
int minor;
int ctlsize, readsize;
u8 *buf;
u8 ac_management_function = 0;
u8 call_management_function = 0;
int data_interface_num = -1;
unsigned long quirks;
int num_rx_buf;
int i;
int combined_interfaces = 0;
struct device *tty_dev;
int rv = -ENOMEM;

/* normal quirks */
quirks = (unsigned long)id->driver_info;

if (quirks == IGNORE_DEVICE)
	return -ENODEV;

num_rx_buf = (quirks == SINGLE_RX_URB) ? 1 : XR_USB_SERIAL_NR;

dev_dbg(&intf->dev, "USB_device_id idVendor:%04x, idProduct %04x\n",id->idVendor,id->idProduct);

/* handle quirks deadly to normal probing*/
if (quirks == NO_UNION_NORMAL) {
data_interface = usb_ifnum_to_if(usb_dev, 1);
control_interface = usb_ifnum_to_if(usb_dev, 0);
goto skip_normal_probe;
}

/* normal probing*/
if (!buffer) {
dev_err(&intf->dev, "Weird descriptor references\n");
return -EINVAL;
}

if (!buflen) {
if (intf->cur_altsetting->endpoint &&
intf->cur_altsetting->endpoint->extralen &&
intf->cur_altsetting->endpoint->extra) {
dev_dbg(&intf->dev,
"Seeking extra descriptors on endpoint\n");
}
buffer = intf->cur_altsetting->endpoint->extra;
+} else {
+dev_err(&intf->dev,
+"Zero length descriptor references\n");
+return -EINVAL;
+
while (buflen > 0) {
+if (buffer[1] != USB_DT_CS_INTERFACE) {
+dev_err(&intf->dev, "skipping garbage\n");
+goto next_desc;
+}
+
+switch (buffer[2]) {
+case USB_CDC_UNION_TYPE: /* we've found it */
+if (union_header) {
+dev_err(&intf->dev, "More than one 
+"union descriptor, skipping ...
");
+goto next_desc;
+}
+
+union_header = (struct usb_cdc_union_desc *)buffer;
+break;
+case USB_CDC_COUNTRY_TYPE: /* export through sysfs*/
+cfd = (struct usb_cdc_country_functional_desc *)buffer;
+break;
+case USB_CDC_HEADER_TYPE: /* maybe check version */
+break; /* for now we ignore it */
+case USB_CDC_ACM_TYPE:
+ac_management_function = buffer[3];
+break;
+case USB_CDC_CALL_MANAGEMENT_TYPE:
+call_management_function = buffer[3];
+call_interface_num = buffer[4];
+if (((quirks & NOT_A_MODEM) == 0 && (call_management_function & 3) != 3)
+dev_err(&intf->dev, "This device cannot do calls on its own. It is not a modem.\n");
+break;
+default:
+/* there are LOTS more CDC descriptors that
+ * could legitimately be found here.
+ */
+dev_dbg(&intf->dev, "Ignoring descriptor: "
+"type %02x, length %d\n",
+buffer[2], buffer[0]);
+break;
+
+next_desc:
+buflen -= buffer[0];
buffer += buffer[0];
}
+
if (!union_header) {
+if (call_interface_num > 0) {
+dev_dbg(&intf->dev, "No union descriptor, using call management descriptor\n");
+/* quirks for Droids MuIn LCD */
+if (quirks & NO_DATA_INTERFACE)
+data_interface = usb_ifnum_to_if(usb_dev, 0);
+else
+data_interface = usb_ifnum_to_if(usb_dev, (data_interface_num = call_interface_num));
+control_interface = intf;
+}
+} else {
+if (intf->cur_altsetting->desc.bNumEndpoints != 3) {
+dev_dbg(&intf->dev,"No union descriptor, giving up\n");
+return -ENODEV;
+} else {
+dev_warn(&intf->dev,"No union descriptor, testing for castrated device\n");
+combined_interfaces = 1;
+control_interface = data_interface = intf;
goto look_for_collapsed_interface;
+}
+
+if (data_interface_num != call_interface_num)
+dev_dbg(&intf->dev, "Separate call control interface. That is not fully supported.\n");
+
+if (control_interface == data_interface) {
+/* some broken devices designed for windows work this way */
+dev_warn(&intf->dev,"Control and data interfaces are not separated!\n");
+combined_interfaces = 1;
+/* a popular other OS doesn't use it */
+quirks |= NO_CAP_LINE;
+if (data_interface->cur_altsetting->desc.bNumEndpoints != 3) {
+dev_err(&intf->dev, "This needs exactly 3 endpoints\n");
+return -EINVAL;
+}
+look_for_collapsed_interface:
+for (i = 0; i < 3; i++) {
+struct usb_endpoint_descriptor *ep;
+ep = &data_interface->cur_altsetting->endpoint[i].desc;
+
+if (usb_endpoint_is_int_in(ep))
+epctrl = ep;
+else if (usb_endpoint_is_bulk_out(ep))
+epwrite = ep;
+else if (usb_endpoint_is_bulk_in(ep))
+epread = ep;
+else
+return -EINVAL;
+
+if (!epctrl || !epread || !epwrite)
+return -ENODEV;
+else
+goto made_compressed_probe;
+
+skip_normal_probe:
+
+/* workaround for switched interfaces */
+if (data_interface->cur_altsetting->desc.bInterfaceClass
+!= CDC_DATA_INTERFACE_TYPE) {
+if (control_interface->cur_altsetting->desc.bInterfaceClass
+== CDC_DATA_INTERFACE_TYPE) {
+t = control_interface;
+control_interface = data_interface;
+data_interface = t;
+} else {
+return -EINVAL;
+}
+}
+
+/* Accept probe requests only for the control interface */
+if (!combined_interfaces && intf != control_interface)
+return -ENODEV;
+
+if (!combined_interfaces && usb_interface_claimed(data_interface)) {
+/* valid in this context */
+dev_dbg(&intf->dev, "The data interface isn't available\n");
+return -EBUSY;
+
+if (data_interface->cur_altsetting->desc.bNumEndpoints < 2 ||
+control_interface->cur_altsetting->desc.bNumEndpoints == 0)
+return -EINVAL;
+
+epctrl = &control_interface->cur_altsetting->endpoint[0].desc;
+epread = &data_interface->cur_altsetting->endpoint[0].desc;
+epwrite = &data_interface->cur_altsetting->endpoint[1].desc;
+
+/* workaround for switched endpoints */
+if (!usb_endpoint_dir_in(epread)) {
+    /* descriptors are swapped */
+    struct usb_endpoint_descriptor *t;
+    dev_dbg(&intf->dev,
+        "The data interface has switched endpoints\n");
+    t = epread;
+    epread = epwrite;
+    epwrite = t;
+}
+made_compressed_probe:
+dev_dbg(&intf->dev, "interfaces are valid\n");
+
+xr_usb_serial = kzalloc(sizeof(struct xr_usb_serial), GFP_KERNEL);
+if (xr_usb_serial == NULL) {
+    dev_err(&intf->dev, "out of memory (xr_usb_serial kzalloc)\n");
+    goto alloc_fail;
+}
+
+minor = xr_usb_serial_alloc_minor(xr_usb_serial);
+if (minor == XR_USB_SERIAL_TTY_MINORS) {
+    dev_err(&intf->dev, "no more free xr_usb_serial devices\n");
+    kfree(xr_usb_serial);
+    return -ENODEV;
+}
+
+ctrlsize = usb_endpoint_maxp(epctrl);
+readsize = usb_endpoint_maxp(epread) *
+  (quirks == SINGLE_RX_URB ? 1 : 2);
+xr_usb_serial->combined_interfaces = combined_interfaces;
+xr_usb_serial->writesize = usb_endpoint_maxp(epwrite) * 20;
+xr_usb_serial->control = control_interface;
+xr_usb_serial->data = data_interface;
+xr_usb_serial->minor = minor;
+xr_usb_serial->dev = usb_dev;
+xr_usb_serial->ctrl_caps = ac_management_function;
+if (quirks & NO_CAP_LINE)
+    xr_usb_serial->ctrl_caps &= ~USB_CDC_CAP_LINE;
+xr_usb_serial->ctrlsize = ctrlsize;
+xr_usb_serial->readsize = readsize;
+xr_usb_serial->rx_bufflimit = num_rx_buf;
+INIT_WORK(&xr_usb_serial->work, xr_usb_serial_softint);
+spin_lock_init(&xr_usb_serial->write_lock);
+spin_lock_init(&xr_usb_serial->read_lock);
+mutex_init(&xr_usb_serial->mutex);
+xr_usb_serial->rx_endpoint = usb_rcvbulkpipe(usb_dev, epread->bEndpointAddress);
+xr_usb_serial->is_int_ep = usb_endpoint_xfer_int(epread);
+if (xr_usb_serial->is_int_ep)
  +xr_usb_serial->bInterval = epread->bInterval;
+tty_port_init(&xr_usb_serial->port);
+xr_usb_serial->port.ops = &xr_usb_serial_port_ops;
+xr_usb_serial->DeviceVendor = id->idVendor;
+xr_usb_serial->DeviceProduct = id->idProduct;
+#else
+if((xr_usb_serial->DeviceProduct&0xfff0) == 0x1410)
  +//map the serial port A B C D to blocknum 0 1 2 3 for the xr21v141x device
  +xr_usb_serial->channel = epwrite->bEndpointAddress - 1;
+}
+else if((xr_usb_serial->DeviceProduct&0xfff0) == 0x1420)
  +//map the serial port A B C D to blocknum 0 2 4 6 for the xr21B142x device
  +xr_usb_serial->channel = (epwrite->bEndpointAddress - 4)*2;
+}
+else
+{
  +xr_usb_serial->channel = epwrite->bEndpointAddress;
+}
+#endif
+buf = usb_alloc_coherent(usb_dev, ctrlsize, GFP_KERNEL, &xr_usb_serial->ctrl_dma);
+if (!buf) {
  +dev_err(&intf->dev, "out of memory (ctrl buffer alloc)\n");
  +goto alloc_fail2;
+}
+xr_usb_serial->ctrl_buffer = buf;
+
+if (xr_usb_serial->write_buffers_alloc(xr_usb_serial) < 0) {
  +dev_err(&intf->dev, "out of memory (write buffer alloc)\n");
  +goto alloc_fail4;
+}
+
+xr_usb_serial->ctrlurb = usb_alloc_urb(0, GFP_KERNEL);
+if (!xr_usb_serial->ctrlurb) {
  +dev_err(&intf->dev, "out of memory (ctrlurb kmalloc)\n");
  +goto alloc_fail5;
+}
+for (i = 0; i < num_rx_buf; i++) {
  +struct xr_usb_serial_rb *rb = &(xr_usb_serial->read_buffers[i]);
+struct urb *urb;  
+
+rb->base = usb_alloc_coherent(xr_usb_serial->dev, readsize, GFP_KERNEL,
+&rb->dma);  
+if (!rb->base) {  
+dev_err(&intf->dev, "out of memory 
+"(read bufs usb_alloc_coherent)\n");  
goto alloc_fail6;  
+}  
+rb->index = i;  
+rb->instance = xr_usb_serial;  
+
+urb = usb_alloc_urb(0, GFP_KERNEL);  
+if (!urb) {  
+dev_err(&intf->dev, 
+"out of memory (read urbs usb_alloc_urb)\n");  
goto alloc_fail6;  
+}  
+urb->transfer_flags |= URB_NO_TRANSFER_DMA_MAP;  
+urb->transfer_dma = rb->dma;  
+if (xr_usb_serial->is_int_ep) {  
+usb_fill_int_urb(urb, xr_usb_serial->dev,  
+xr_usb_serial->rx_endpoint,  
+rb->base,  
+xr_usb_serial->readsize,  
+xr_usb_serial->read_bulk_callback, rb,  
+xr_usb_serial->bInterval);  
+} else {  
+usb_fill_bulk_urb(urb, xr_usb_serial->dev,  
+xr_usb_serial->rx_endpoint,  
+rb->base,  
+xr_usb_serial->readsize,  
+xr_usb_serial->read_bulk_callback, rb);  
+}  
+)
+
xr_usb_serial->read_urbs[i] = urb;  
+__set_bit(i, &xr_usb_serial->read_urbs_free);  
+}
+
+for (i = 0; i < XR_USB_SERIAL_NW; i++) {
+struct xr_usb_serial_wb *snd = &(xr_usb_serial->wb[i]);
+
+snd->urb = usb_alloc_urb(0, GFP_KERNEL);  
+if (snd->urb == NULL) {  
+dev_err(&intf->dev, 
+"out of memory (write urbs usb_alloc_urb)\n");  
goto alloc_fail7;  
+}  
+

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if (usb_endpoint_xfer_int(epwrite))
+usb_fill_int_urb(snd->urb, usb_dev,
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 7, 0)
+usb_sndbulkpipe(usb_dev, epwrite->bEndpointAddress),
+#else
+usb_sndintpipe(usb_dev, epwrite->bEndpointAddress),
+endif
+NULL, xr_usb_serial->writesize, xr_usb_serial_write_bulk, snd, epwrite->bInterval);
+else
+usb_fill_bulk_urb(snd->urb, usb_dev,
+usb_sndbulkpipe(usb_dev, epwrite->bEndpointAddress),
+NULL, xr_usb_serial->writesize, xr_usb_serial_write_bulk, snd);  
+snd->transfer_flags = URB_NO_TRANSFER_DMA_MAP;
+snd->instance = xr_usb_serial;
+
+usb_set_intfdata(intf, xr_usb_serial);
+
+xr_usb_serial->rs485_422_en = false;  //default enable rs232
+i = device_create_file(&intf->dev, &dev_attr_bRS485_422_en);
+if (i < 0)
+goto alloc_fail7;
+
+i = device_create_file(&intf->dev, &dev_attr_bmCapabilities);
+if (i < 0)
+goto alloc_fail8;
+
+i = device_create_file(&intf->dev, &dev_attr_iCountryCodeRelDate);
+if (i < 0) {
+device_remove_file(&intf->dev, &dev_attr_wCountryCodes);
+
+if (cfd) { /* export the country data */
+xr_usb_serial->country_codes = kmalloc(cfd->bLength - 4, GFP_KERNEL);
+if (!xr_usb_serial->country_codes)
+skip_countries;
+xr_usb_serial->country_code_size = cfd->bLength - 4;
+memcpy(xr_usb_serial->country_codes, (u8 *)&cfd->wCountyCode0,
+cfd->bLength - 4);
+xr_usb_serial->country_rel_date = cfd->iCountryCodeRelDate;
+
+i = device_create_file(&intf->dev, &dev_attr_wCountryCodes);
+if (i < 0) {
+kfree(xr_usb_serial->country_codes);
+xr_usb_serial->country_codes = NULL;
+xr_usb_serial->country_code_size = 0;
+skip_countries;
+
+i = device_create_file(&intf->dev,
+&dev_attr_iCountryCodeRelDate);
+if (i < 0) {
+device_remove_file(&intf->dev, &dev_attr_wCountryCodes);

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```c
+kfree(xr_usb_serial->country_codes);
+xr_usb_serial->country_codes = NULL;
+xr_usb_serial->country_code_size = 0;
+goto skip_countries;
+}
+
+skip_countries:
+usb_fill_int_urb(xr_usb_serial->ctrlurb, usb_dev,
+ usb_rcvintpipe(usb_dev, epctrl->bEndpointAddress),
+ xr_usb_serial->ctrl_buffer, ctrlsize, xr_usb_serial_ctrl_irq, xr_usb_serial,
+ /* works around buggy devices */
+ epctrl->bInterval ? epctrl->bInterval : 0xff);
+xr_usb_serial->ctrlurb->transfer_flags |= URB_NO_TRANSFER_DMA_MAP;
+xr_usb_serial->ctrlurb->transfer_dma = xr_usb_serial->ctrl_dma;
+
+dev_info(&intf->dev, "ttyXR_USB_SERIAL%d: USB XR_USB_SERIAL device\n", minor);
+
+ xr_usb_serial_pre_setup(xr_usb_serial);
+
+xr_usb_serial_set_control(xr_usb_serial, xr_usb_serial->ctrlout);
+
+xr_usb_serial->line.dwDTERate = cpu_to_le32(9600);
+xr_usb_serial->line.bDataBits = 8;
+xr_usb_serial_set_line(xr_usb_serial, &xr_usb_serial->line);
+
+usb_driver_claim_interface(&xr_usb_serial_driver, data_interface, xr_usb_serial);
+usb_set_intfdata(data_interface, xr_usb_serial);
+
+usb_get_intf(control_interface);
+#if LINUX_VERSION_CODE < KERNEL_VERSION(3, 7, 0)
+ tty_register_device(xr_usb_serial_tty_driver, minor, &control_interface->dev);
+#else
+ttty_dev = tty_port_register_device(&xr_usb_serial->port, xr_usb_serial_tty_driver, minor,
+&control_interface->dev);
+if (IS_ERR(tty_dev)) {
+rv = PTR_ERR(tty_dev);
+goto alloc_fail9;
+}
+#endif
+return 0;
+alloc_fail9:
+
+return 0;
+alloc_fail9:
+if (xr_usb_serial->country_codes) {
+device_remove_file(&xr_usb_serial->control->dev, 
+&dev_attr_wCountryCodes);
+device_remove_file(&xr_usb_serial->control->dev, 
+&dev_attr_iCountryCodeRelDate);
```
device_remove_file(&xr_usb_serial->control->dev, &dev_attr_bmCapabilities);
+alloc_fail8:
+device_remove_file(&xr_usb_serial->control->dev, &dev_attr_RS485_422_en);
+alloc_fail7:
+usb_set_intfdata(intf, NULL);
+for (i = 0; i < XR_USB_SERIAL_NW; i++)
+usb_free_urb(xr_usb_serial->wb[i].urb);
+alloc_fail6:
+for (i = 0; i < num_rx_buf; i++)
+usb_free_urb(xr_usb_serial->read_urbs[i]);
+xr_usb_serial_read_buffers_free(xr_usb_serial);
+alloc_fail5:
+xr_usb_serial_write_buffers_free(xr_usb_serial);
+alloc_fail4:
+usb_free_coherent(usb_dev, ctrlsize, xr_usb_serial->ctrl_buffer, xr_usb_serial->ctrl_dma);
+alloc_fail2:
+xr_usb_serial_release_minor(xr_usb_serial);
+kfree(xr_usb_serial);
+alloc_fail:
+return rv;
+
+static void stop_data_traffic(struct xr_usb_serial *xr_usb_serial)
+{
+int i;
+
+dev_dbg(&xr_usb_serial->control->dev, "%s\n", __func__);
+
+usb_kill_urb(xr_usb_serial->ctrlurb);
+for (i = 0; i < XR_USB_SERIAL_NW; i++)
+usb_kill_urb(xr_usb_serial->wb[i].urb);
+for (i = 0; i < xr_usb_serial->rx_buflimit; i++)
+usb_kill_urb(xr_usb_serial->read_urbs[i]);
+
cancel_work_sync(&xr_usb_serial->work);
+
+static void xr_usb_serial_disconnect(struct usb_interface *intf)
+{
+struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf);
+
+usb_dev = interface_to_usbdev(intf);
+struct tty_struct *tty;
+
+dev_dbg(&intf->dev, "%s\n", __func__);
/* sibling interface is already cleaning up */
+if (!xr_usb_serial)
+return;
+
+mutex_lock(&xr_usb_serial->mutex);
+xr_usb_serial->disconnected = true;
+if (xr_usb_serial->country_codes) {
+device_remove_file(&xr_usb_serial->control->dev,
+&dev_attr_wCountryCodes);
+device_remove_file(&xr_usb_serial->control->dev,
+&dev_attr_iCountryCodeRelDate);
+
+device_remove_file(&xr_usb_serial->control->dev,
+&dev_attr_bmCapabilities);
+device_remove_file(&xr_usb_serial->control->dev,
+&dev_attr_bRS485_422_en);
+usb_set_intfdata(xr_usb_serial->control, NULL);
+usb_set_intfdata(xr_usb_serial->data, NULL);
+mutex_unlock(&xr_usb_serial->mutex);
+
+tty = tty_port_tty_get(&xr_usb_serial->port);
+if (tty) {
+tty_vhangup(tty);
+tty_kref_put(tty);
+}
+tty_unregister_device(xr_usb_serial_tty_driver, xr_usb_serial->minor);
+
+usb_free_urb(xr_usb_serial->ctrlurb);
+for (i = 0; i < XR_USB_SERIAL_NW; i++)
+usb_free_urb(xr_usb_serial->wb[i].urb);
+for (i = 0; i < xr_usb_serial->rx_buflimit; i++)
+usb_free_urb(xr_usb_serial->read_urbs[i]);
+xr_usb_serial_write_buffers_free(xr_usb_serial);
+usb_free_coherent(usb_dev, xr_usb_serial->ctrlsize, xr_usb_serial->ctrl_buffer, xr_usb_serial->ctrl_dma);
+xr_usb_serial_read_buffers_free(xr_usb_serial);
+
+if (!xr_usb_serial->combined_interfaces)
+usb_driver_release_interface(&xr_usb_serial_driver, intf == xr_usb_serial->control ?
+xr_usb_serial->data : xr_usb_serial->control);
+
+tty_port_put(&xr_usb_serial->port);
+}
+
+#ifdef CONFIG_PM
+static int xr_usb_serial_suspend(struct usb_interface *intf, pm_message_t message)
+{ xl
+static struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf);
int cnt;

if (PMSG_IS_AUTO(message)) {
    int b;

    spin_lock_irq(&xr_usb_serial->write_lock);
    b = xr_usb_serial->transmitting;
    spin_unlock_irq(&xr_usb_serial->write_lock);
    if (b)
        return -EBUSY;
}

spin_lock_irq(&xr_usb_serial->read_lock);
spin_lock(&xr_usb_serial->write_lock);
    cnt = xr_usb_serial->susp_count++;
spin_unlock(&xr_usb_serial->write_lock);
spin_unlock_irq(&xr_usb_serial->read_lock);

if (cnt)
    return 0;

if (test_bit(ASYNCB_INITIALIZED, &xr_usb_serial->port.flags))
    stop_data_traffic(xr_usb_serial);
return 0;
}

static int xr_usb_serial_resume(struct usb_interface *intf)
{
    struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf);
    struct xr_usb_serial_wb *wb;
    int rv = 0;
    int cnt;

    spin_lock_irq(&xr_usb_serial->read_lock);
    xr_usb_serial->susp_count -= 1;
    cnt = xr_usb_serial->susp_count;
    spin_unlock_irq(&xr_usb_serial->read_lock);

    if (cnt)
        return 0;

    if (test_bit(ASYNCB_INITIALIZED, &xr_usb_serial->port.flags)) {
        rv = usb_submit_urb(xr_usb_serial->ctrlurb, GFP_NOIO);
        spin_lock_irq(&xr_usb_serial->write_lock);
        if (xr_usb_serial->delayed_wb) {
            wb = xr_usb_serial->delayed_wb;
xr_usb_serial->delayed_wb = NULL;
+spin_unlock_irq(&xr_usb_serial->write_lock);
+xr_usb_serial_start_wb(xr_usb_serial, wb);
+} else {
+spin_unlock_irq(&xr_usb_serial->write_lock);
+
+/*
+ * delayed error checking because we must
+ * do the write path at all cost
+ */
+if (rv < 0)
+goto err_out;
+
+rv = xr_usb_serial_submit_read_urbs(xr_usb_serial, GFP_NOIO);
+}
+
+err_out:
+return rv;
+}
+
+static int xr_usb_serial_reset_resume(struct usb_interface *intf)
+{
+struct xr_usb_serial *xr_usb_serial = usb_get_intfdata(intf);
+ struct tty_struct *tty;
+if (test_bit(ASYNCB_INITIALIZED, &xr_usb_serial->port.flags)) {
+if (LINUX_VERSION_CODE > KERNEL_VERSION(3, 9, 0))
+tty_port_tty_hangup(&xr_usb_serial->port, false);
+} else
+tty = tty_port_tty_get(&xr_usb_serial->port);
+if (tty) {
+tty_hangup(tty);
+tty_kref_put(tty);
+}
+#endif
+}
+return xr_usb_serial_resume(intf);
+
+#endif /* CONFIG_PM */
+
+/* USB driver structure.
+ */
+static const struct usb_device_id xr_usb_serial_ids[] = {
+  { USB_DEVICE(0x04e2, 0x1410)},
+  { USB_DEVICE(0x04e2, 0x1411)},
+  { USB_DEVICE(0x04e2, 0x1412)},
+ { USB_DEVICE(0x04e2, 0x1414)},
+ { USB DEVICE(0x04e2, 0x1420)},
+ { USB_DEVICE(0x04e2, 0x1421)},
+ { USB_DEVICE(0x04e2, 0x1422)},
+ { USB_DEVICE(0x04e2, 0x1424)},
+ { USB_DEVICE(0x04e2, 0x1400)},
+ { USB_DEVICE(0x04e2, 0x1401)},
+ { USB DEVICE(0x04e2, 0x1402)},
+ { USB_DEVICE(0x04e2, 0x1403)},
+ { }
+};
+
+MODULE_DEVICE_TABLE(usb, xr_usb_serial_ids);
+
+static struct usb_driver xr_usb_serial_driver = {
+ .name = "cdc_xr_usb_serial",
+ .probe = xr_usb_serial_probe,
+ .disconnect = xr_usb_serial_disconnect,
+ #ifdef CONFIG_PM
+ .suspend = xr_usb_serial_suspend,
+ .resume = xr_usb_serial_resume,
+ .reset_resume = xr_usb_serial_reset_resume,
+ #endif
+ .id_table = xr_usb_serial_ids,
+ #ifdef CONFIG_PM
+ .supports_autosuspend = 1,
+ #endif
+ .disable_hub_initiated_lpm = 1,
+};
+
+/*
 * TTY driver structures.
 + */
+
+static const struct tty_operations xr_usb_serial_ops = {
+ .install = xr_usb_serial_tty_install,
+ .open = xr_usb_serial_tty_open,
+ .close = xr_usb_serial_tty_close,
+ .cleanup = xr_usb_serial_tty_cleanup,
+ .hangup = xr_usb_serial_tty_hangup,
+ .write = xr_usb_serial_tty_write,
+ .write_room = xr_usb_serial_tty_write_room,
+ .ioctl = xr_usb_serial_tty_ioctl,
+ .throttle = xr_usb_serial_tty_throttle,
+ .unthrottle = xr_usb_serial_tty_unthrottle,
+ .chars_in_buffer = xr_usb_serial_tty_chars_in_buffer,
+ .break_ctl = xr_usb_serial_tty_break_ctl,
+ .set_termios = xr_usb_serial_tty_set_termios,
.+tiocmget =xr_usb_serial_tty_tiocmget,
.+tiocmset =xr_usb_serial_tty_tiocmset,
+}
+
+/*
+ * Init / exit.
+ */
+
+static int __init xr_usb_serial_init(void)
+{
+int retval;
+xr_usb_serial_tty_driver = alloc_tty_driver(XR_USB_SERIAL_TTY_MINORS);
+if (!xr_usb_serial_tty_driver)
+    return -ENOMEM;
+xr_usb_serial_tty_driver->driver_name = "xr_usb_serial",
+xr_usb_serial_tty_driver->name = "ttyXRUSB",
+xr_usb_serial_tty_driver->major = XR_USB_SERIAL_TTY_MAJOR,
+xr_usb_serial_tty_driver->minor_start = 0,
+xr_usb_serial_tty_driver->type = TTY_DRIVER_TYPE_SERIAL,
+xr_usb_serial_tty_driver->subtype = SERIAL_TYPE_NORMAL,
+xr_usb_serial_tty_driver->flags = TTY_DRIVER_REAL_RAW | TTY_DRIVER_DYNAMIC_DEV;
+xr_usb_serial_tty_driver->init_termios = tty_std_termios;
+xr_usb_serial_tty_driver->init_termios.c_cflag = B9600 | CS8 | CREAD |
+    HUPCL | CLOCAL;
++tty_set_operations(xr_usb_serial_tty_driver, &xr_usb_serial_ops);
+
+retval = tty_register_driver(xr_usb_serial_tty_driver);
+if (retval) {
+    put_tty_driver(xr_usb_serial_tty_driver);
+    return retval;
+}
+
+retval = usb_register(&xr_usb_serial_driver);
+if (retval) {
+    tty_unregister_driver(xr_usb_serial_tty_driver);
+    put_tty_driver(xr_usb_serial_tty_driver);
+    return retval;
+}
+
+printk(KERN_INFO KBUILD_MODNAME "" DRIVER_DESC "\n");
+
+return 0;
+}
+
+static void __exit xr_usb_serial_exit(void)
+{
+usb_deregister(&xr_usb_serial_driver);
+tty_unregister_driver(xr_usb_serial_tty_driver);
+#define USB_RT_XR_USB_SERIAL(USB_TYPE_CLASS | USB_RECIP_INTERFACE)
+
+/*
+ * Output control lines.
+ */
+
+#define XR_USB_SERIAL_CTRL_DTR		0x01
+#define XR_USB_SERIAL_CTRL_RTS		0x02
+
+/*
+ * Input control lines and line errors.
+ */
+
+#define XR_USB_SERIAL_CTRL_DCD		0x01
+#define XR_USB_SERIAL_CTRL_DSR		0x02
+#define XR_USB_SERIAL_CTRL_BRK		0x04
+#define XR_USB_SERIAL_CTRL_RI		0x08
+
+#define XR_USB_SERIAL_CTRL_FRAMING	0x10
+#define XR_USB_SERIAL_CTRL_PARITY	0x20
+#define XR_USB_SERIAL_CTRL_OVERRUN	0x40
+
+/*
+ * Internal driver structures.
+ */
+
+/* The only reason to have several buffers is to accommodate assumptions
+ * in line disciplines. They ask for empty space amount, receive our URB size,
+ * and proceed to issue several 1-character writes, assuming they will fit.
+ * The very first write takes a complete URB. Fortunately, this only happens
+ * when processing onlcr, so we only need 2 buffers. These values must be
+ * powers of 2.
+ */
+#define XR_USB_SERIAL_NW  16
+#define XR_USB_SERIAL_NR  16
+
+struct xr_usb_serial_wb {
+unsigned char *buf;
+dma_addr_t dmah;
+int len;
+int use;
+struct urb*urb;
+struct xr_usb_serial*instance;
+};
+
+struct xr_usb_serial_rb {
+int size;
}
+unsigned char*base;
+dma_addr_t dma;
+int index;
+struct xr_usb_serial*instance;
+};
+
+struct reg_addr_map {
+unsigned int uart_enable_addr;
+unsigned int uart_format_addr;
+unsigned int uart_flow_addr;
+unsigned int uart_loopback_addr;
+ unsigned int uart_xon_char_addr;
+unsigned int uart_xoff_char_addr;
+unsigned int uart_gpio_mode_addr;
+unsigned int uart_gpio_dir_addr;
+unsigned int uart_gpio_set_addr;
+unsigned int uart_gpio_clr_addr;
+unsigned int uart_gpio_status_addr;
+unsigned int tx_break_addr;
+unsigned int uart_custom_driver;
+unsigned int uart_low_latency;
+};
+
+struct xr_usb_serial {
+struct usb_device *dev;/* the corresponding usb device */
+struct usb_interface *control;/* control interface */
+struct usb_interface *data;/* data interface */
+struct tty_port port; /* our tty port data */
+struct urb *ctrlurb;/* urbs */
+u8 *ctrl_buffer;/* buffers of urbs */
+dma_addr_t ctrl_dma;/* dma handles of buffers */
+u8 *country_codes;/* country codes from device */
+unsigned int country_code_size;/* size of this buffer */
+unsigned int country_rel_date;/* release date of version */
+struct xr_usb_serial_wb wb[XR_USB_SERIAL_NW];
+unsigned long read_urbs_free;
+struct urb *read_urbs[XR_USB_SERIAL_NR];
+struct xr_usb_serial_rb read_buffers[XR_USB_SERIAL_NR];
+int rx_buflimit;
+int rx_endpoint;
+spinlock_t read_lock;
+int write_used;/* number of non-empty write buffers */
+int transmitting;
+spinlock_t write_lock;
+struct mutex mutex;
+bool disconnected;
+struct usb_cdc_line_coding line;/* bits, stop, parity */
+struct work_struct work;/* work queue entry for line discipline waking up */
+unsigned int ctrlin;/* input control lines (DCD, DSR, RI, break, overruns) */
+unsigned int ctrlout;/* output control lines (DTR, RTS) */
+unsigned int writesize;/* max packet size for the output bulk endpoint */
+unsigned int readsize,ctrlsize;/* buffer sizes for freeing */
+unsigned int minor;/* xr_usb_serial minor number */
+unsigned char clocal;/* termios CLOCAL */
+unsigned int ctrl_caps;/* control capabilities from the class specific header */
+unsigned int susp_count;/* number of suspended interfaces */
+unsigned int combined_interfaces:1;/* control and data collapsed */
+unsigned int is_int_ep:1;/* interrupt endpoints contrary to spec used */
+unsigned int throttled:1;/* actually throttled */
+unsigned int throttle_req:1;/* throttle requested */
+u8 bInterval;
+struct xr_usb_serial_wb *delayed_wb;/* write queued for a device about to be woken */
+unsigned int channel;
+unsigned short DeviceVendor;
+unsigned short DeviceProduct;
+struct reg_addr_map reg_map;
+bool rs485_422_en;
+
+/* constants describing various quirks and errors */
+#define NO_UNION_NORMAL			1
+#define SINGLE_RX_URB2			2
+#define NO_CAP_LINE			4
+#define NOT_A_MODEM			8
+#define NO_DATA_INTERFACE			16
+#define IGNORE_DEVICE			32
+
+/* define UART_ENABLE_TX */
+/* define UART_ENABLE_RX */
+
+/* define UART_GPIO_CLR_DTR */
+/* define UART_GPIO_SET_DTR */
+/* define UART_GPIO_CLR_RTS */
+/* define UART_GPIO_SET_RTS */
+
+/* define LOOPBACK_ENABLE_TX_RX */
+/* define LOOPBACK_ENABLE_RTS_CTS */
+/* define LOOPBACK_ENABLE_DTR_DSR */
+
+/* define UART_FLOW_MODE_NONE */
+/* define UART_FLOW_MODE_HW */
+/* define UART_FLOW_MODE_SW */
+#define UART_GPIO_MODE_SEL_GPIO          0x0
+#define UART_GPIO_MODE_SEL_RTS_CTS       0x1
+
+#define XR2280x_FUNC_MGR_OFFSET           0x40
+
+
--- linux-4.15.0.orig/ubuntu/xr-usb-serial/xr_usb_serial_hal.c
+++ linux-4.15.0/ubuntu/xr-usb-serial/xr_usb_serial_hal.c
@@ -0,0 +1,722 @@
+/*
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program is distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program; if not, write to the Free Software
+ * Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
+ */
+
+#define XR_SET_MAP_XR2280X              5
+#define XR_GET_MAP_XR2280X              5
+
+#define XR_SET_MAP_XR21B142X             0
+#define XR_GET_MAP_XR21B142X             0
+
+#define XR_SET_MAP_XR21V141X             0
+#define XR_GET_MAP_XR21V141X             1
+
+#define XR_SET_MAP_XR21B1411             0
+#define XR_GET_MAP_XR21B1411             1
+
+
+int xr_usb_serial_set_reg(struct xr_usb_serial *xr_usb_serial,int regnum, int value)
+{
+    int result;
+    int channel = 0;
+    dev_dbg(&xr_usb_serial->control->dev, "%s Channel:%d 0x%02x = 0x%02x\n", __func__,channel,regnum, value);
+    if((xr_usb_serial->DeviceProduct&0xffff) == 0x1400)
int XR2280xaddr = XR2280x_FUNC_MGR_OFFSET + regnum;

result = usb_control_msg(xr_usb_serial->dev, /* usb device */
    usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
    XR_SET_MAP_XR2280X, /* request */
    USB_DIR_OUT | USB_TYPE_VENDOR, /* request_type */
    value, /* request value */
    XR2280xaddr, /* index */
    NULL, /* data */
    0, /* size */
    5000); /* timeout */

else if((xr_usb_serial->DeviceProduct == 0x1410) ||
    (xr_usb_serial->DeviceProduct == 0x1412) ||
    (xr_usb_serial->DeviceProduct == 0x1414))
{
    if(xr_usb_serial->channel)
        channel = xr_usb_serial->channel - 1;

    result = usb_control_msg(xr_usb_serial->dev, /* usb device */
        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
        XR_SET_MAP_XR21V141X, /* request */
        USB_DIR_OUT | USB_TYPE_VENDOR , /* request_type */
        value, /* request value */
        regnum | (channel << 8), /* index */
        NULL, /* data */
        0, /* size */
        5000); /* timeout */

} else if(xr_usb_serial->DeviceProduct == 0x1411)
{
    result = usb_control_msg(xr_usb_serial->dev, /* usb device */
        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
        XR_SET_MAP_XR21B1411, /* request */
        USB_DIR_OUT | USB_TYPE_VENDOR , /* request_type */
        value, /* request value */
        regnum , /* index */
        NULL, /* data */
        0, /* size */
        5000); /* timeout */

} else if((xr_usb_serial->DeviceProduct == 0x1420)||
    (xr_usb_serial->DeviceProduct == 0x1422)||
    (xr_usb_serial->DeviceProduct == 0x1424))
{
    channel = (xr_usb_serial->channel - 4)*2;
+ result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                        XR_SET_MAP_XR21B142X, /* request */
+                        USB_DIR_OUT | USB_TYPE_VENDOR | 1, /* request_type */
+                        value, /* request value */
+                        regnum | (channel << 8), /* index */
+                        NULL, /* data */
+                        0, /* size */
+                        5000); /* timeout */
+}
+else
+{
+    result = -1;
+}
+if(result < 0)
+    dev_dbg(&xr_usb_serial->control->dev, "%s Error:%d\n", __func__,result);
+ return result;
+
+
+
+} }
+
+int xr_usb_serial_set_reg_ext(struct xr_usb_serial *xr_usb_serial,int channel,int regnum, int value)
+{
+    int result;
+    int XR2280xaddr = XR2280x_FUNC_MGR_OFFSET + regnum;
+    dev_dbg(&xr_usb_serial->control->dev, "%s channel:%d 0x%02x = 0x%02x\n", __func__,channel,regnum,value);
+    if((xr_usb_serial->DeviceProduct&0xfff0) == 0x1400)
+    {
+        result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                        XR_SET_MAP_XR2280X, /* request */
+                        USB_DIR_OUT | USB_TYPE_VENDOR, /* request_type */
+                        value, /* request value */
+                        XR2280xaddr, /* index */
+                        NULL, /* data */
+                        0, /* size */
+                        5000); /* timeout */
+    }
+    else if((xr_usb_serial->DeviceProduct == 0x1410) ||
+            (xr_usb_serial->DeviceProduct == 0x1412) ||
+            (xr_usb_serial->DeviceProduct == 0x1414))
+    {
+        result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                        XR_SET_MAP_XR21V141X, /* request */
+                        USB_DIR_OUT | USB_TYPE_VENDOR, /* request_type */
+                        value, /* request value */
+                        XR2280xaddr, /* index */
+                        NULL, /* data */
+                        0, /* size */
+                        5000); /* timeout */
+    }
+    else if((xr_usb_serial->DeviceProduct == 0x1410) ||
+            (xr_usb_serial->DeviceProduct == 0x1412) ||
+            (xr_usb_serial->DeviceProduct == 0x1414))
+    {
+        result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                        XR_SET_MAP_XR21V141X, /* request */
+                        USB_DIR_OUT | USB_TYPE_VENDOR, /* request_type */
+                        value, /* request value */
+                        XR2280xaddr, /* index */
+                        NULL, /* data */
+                        0, /* size */
+                        5000); /* timeout */
+    }
+    else
+    {
+regnum | (channel << 8), /* index */
+NULL, /* data */
+0, /* size */
+5000); /* timeout */
+
+else if(xr_usb_serial->DeviceProduct == 0x1411)
+{
+    result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+        XR_SET_MAP_XR21B1411, /* request */
+        USB_DIR_OUT | USB_TYPE_VENDOR, /* request_type */
+        value, /* request value */
+        regnum, /* index */
+        NULL, /* data */
+        0, /* size */
+        5000); /* timeout */
+}
+else if((xr_usb_serial->DeviceProduct == 0x1420)||
+    (xr_usb_serial->DeviceProduct == 0x1422)||
+    (xr_usb_serial->DeviceProduct == 0x1424))
+{
+    result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+        usb_sndctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+        XR_SET_MAP_XR21B142X, /* request */
+        USB_DIR_OUT | USB_TYPE_VENDOR | 1, /* request_type */
+        value, /* request value */
+        regnum | (channel << 8), /* index */
+        NULL, /* data */
+        0, /* size */
+        5000); /* timeout */
+}
+else
+{
+    result = -1;
+}
+
+if(result < 0)
+dev_dbg(&xr_usb_serial->control->dev, "%s Error:%d\n", __func__, result);
+ return result;
+
+int xr_usb_serial_get_reg(struct xr_usb_serial *xr_usb_serial,int regnum, short *value)
+{
+    int result;
+    int channel = 0;
+    
+    if((xr_usb_serial->DeviceProduct&0xfff0) == 0x1400)
```c
int XR2280xaddr = XR2280x_FUNC_MGR_OFFSET + regnum;
result = usb_control_msg(xr_usb_serial->dev, /* usb device */
    usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
    XR_GET_MAP_XR2280X, /* request */
    USB_DIR_IN | USB_TYPE_VENDOR, /* request_type */
    0, /* request value */
    XR2280xaddr, /* index */
    value, /* data */
    2, /* size */
    5000); /* timeout */

else if((xr_usb_serial->DeviceProduct == 0x1410) ||
    (xr_usb_serial->DeviceProduct == 0x1412) ||
    (xr_usb_serial->DeviceProduct == 0x1414))
{
    if(xr_usb_serial->channel)
    channel = xr_usb_serial->channel -1;
    result = usb_control_msg(xr_usb_serial->dev, /* usb device */
        usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
        XR_GET_MAP_XR21V141X, /* request */
        USB_DIR_IN | USB_TYPE_VENDOR, /* request_type */
        0, /* request value */
        regnum | (channel << 8), /* index */
        value, /* data */
        1, /* size */
        5000); /* timeout */
}
else if(xr_usb_serial->DeviceProduct == 0x1411)
{
    result = usb_control_msg(xr_usb_serial->dev, /* usb device */
        usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
        XR_GET_MAP_XR21B1411, /* request */
        USB_DIR_IN | USB_TYPE_VENDOR, /* request_type */
        0, /* request value */
        regnum, /* index */
        value, /* data */
        2, /* size */
        5000); /* timeout */
}
else if((xr_usb_serial->DeviceProduct == 0x1420) ||
    (xr_usb_serial->DeviceProduct == 0x1422) ||
    (xr_usb_serial->DeviceProduct == 0x1424))
{
    if(xr_usb_serial->DeviceProduct == 0x1420)
    {
```

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```
+ channel = (xr_usb_serial->channel - 4) * 2;
+ result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                         usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                         XR_GET_MAP_XR21B142X, /* request */
+                         USB_DIR_IN | USB_TYPE_VENDOR | 1, /* request_type */
+                         0, /* request value */
+                         regnum | (channel << 8), /* index */
+                         value, /* data */
+                         2, /* size */
+                         2, /* timeout */
+                         5000); /* timeout */
+
+}  
+else
+  + result = -1;
+}  
+
+if(result < 0)
+  + dev_dbg(&xr_usb_serial->control->dev, "%s channel:%d Reg 0x%x Error:%d\n", __func__, channel, regnum, result);
+else
+  + dev_dbg(&xr_usb_serial->control->dev, "%s channel:%d 0x%x = 0x%04x\n", __func__, channel, regnum, *value);
+  
+return result;
+
+
+int xr_usb_serial_get_reg_ext(struct xr_usb_serial *xr_usb_serial, int channel, int regnum, short *value)
+{
+  +int result;
+  +int XR2280xaddr = XR2280x_FUNC_MGR_OFFSET + regnum;
+  +if((xr_usb_serial->DeviceProduct&0xfff0) == 0x1400)
+    +result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                               usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                               XR_GET_MAP_XR2280X, /* request */
+                               USB_DIR_IN | USB_TYPE_VENDOR, /* request_type */
+                               0, /* request value */
+                               XR2280xaddr, /* index */
+                               value, /* data */
+                               2, /* size */
+                               5000); /* timeout */
+    +
+    +
+    +
+    +
+}

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+ else if((xr_usb_serial->DeviceProduct == 0x1410) ||
+ (xr_usb_serial->DeviceProduct == 0x1412) ||
+ (xr_usb_serial->DeviceProduct == 0x1414))
+ {
+   unsigned char reg_value = 0;
+   result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                             usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                             XR_GET_MAP_XR21V141X, /* request */
+                             USB_DIR_IN | USB_TYPE_VENDOR, /* request_type */
+                             0, /* request value */
+                             regnum | (channel << 8), /* index */
+                             &reg_value, /* data */
+                             1, /* size */
+                             5000); /* timeout */
+   dev_dbg(&xr_usb_serial->control->dev, "xr_usb_serial_get_reg_ext reg:%x\n",reg_value);
+   *value = reg_value;
+ }
+ else if(xr_usb_serial->DeviceProduct == 0x1411)
+ {
+     result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                              usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                              XR_GET_MAP_XR21B1411, /* request */
+                              USB_DIR_IN | USB_TYPE_VENDOR, /* request_type */
+                              0, /* request value */
+                              regnum | (channel << 8), /* index */
+                              value, /* data */
+                              2, /* size */
+                              5000); /* timeout */
+ }
+ else if((xr_usb_serial->DeviceProduct == 0x1420) ||
+          (xr_usb_serial->DeviceProduct == 0x1422) ||
+          (xr_usb_serial->DeviceProduct == 0x1424))
+ {
+     result = usb_control_msg(xr_usb_serial->dev, /* usb device */
+                              usb_rcvctrlpipe(xr_usb_serial->dev, 0), /* endpoint pipe */
+                              XR_GET_MAP_XR21B142X, /* request */
+                              USB_DIR_IN | USB_TYPE_VENDOR | 1, /* request_type */
+                              0, /* request value */
+                              regnum | (channel << 8), /* index */
+                              value, /* data */
+                              2, /* size */
+                              5000); /* timeout */
+ }
+ else
+ {
+   result = -1;
+ }
+}
+if(result < 0)
+dev_dbg(&xr_usb_serial->control->dev, "%s Error:%d\n", __func__, result);
+else
+    dev_dbg(&xr_usb_serial->control->dev, "%s channel:%d 0x%x = 0x%04x\n", __func__, channel, regnum, *value);
+
+return result;
+
+}
+
+struct xr21v141x_baud_rate
+{
+    unsigned int tx;
+    unsigned int rx0;
+    unsigned int rx1;
+};
+
+static struct xr21v141x_baud_rate xr21v141x_baud_rates[] = {
+{ 0x000, 0x000, 0x000 },
+{ 0x000, 0x000, 0x000 },
+{ 0x100, 0x000, 0x100 },
+{ 0x020, 0x400, 0x020 },
+{ 0x010, 0x100, 0x010 },
+{ 0x208, 0x040, 0x208 },
+{ 0x104, 0x820, 0x108 },
+{ 0x844, 0x210, 0x884 },
+{ 0x444, 0x110, 0x444 },
+{ 0x122, 0x888, 0x224 },
+{ 0x912, 0x448, 0x924 },
+{ 0x492, 0x248, 0x492 },
+{ 0x252, 0x928, 0x292 },
+{ 0x94A, 0x4A4, 0xA52 },
+{ 0x52A, 0xAA4, 0x54A },
+{ 0xAAA, 0x954, 0x4AA },
+{ 0xAAA, 0x554, 0xAAB },
+{ 0x555, 0xAD4, 0x55A },
+{ 0xB55, 0xAB4, 0x55A },
+{ 0x6B5, 0x5AC, 0xB56 },
+{ 0x5B5, 0xD6C, 0x6D6 },
+{ 0xB6D, 0xB6A, 0xD6B },
+{ 0x76D, 0x6DA, 0xBB6 },
+{ 0xEDD, 0xDDA, 0x76E },
+{ 0xDDD, 0xBBA, 0xEEE },
+{ 0x7BB, 0xF7A, 0xDDE },
+{ 0xF7B, 0xEF6, 0x7DE },
+{ 0xDF7, 0xBF6, 0xF7E },
+{ 0x7F7, 0xFEE, 0xEF6 },
+{ 0xFDF, 0xFB6, 0x7FE },
+}
static int xr21v141x_set_baud_rate(struct xr_usb_serial *xr_usb_serial, unsigned int rate)
{
    unsigned int divisor = 48000000 / rate;
    unsigned int i = ((32 * 48000000) / rate) & 0x1f;
    unsigned int tx_mask = xr21v141x_baud_rates[i].tx;
    unsigned int rx_mask = (divisor & 1) ? xr21v141x_baud_rates[i].rx1 : xr21v141x_baud_rates[i].rx0;
    
    dev_dbg(&xr_usb_serial->control->dev, "Setting baud rate to %d: i=%u div=%u tx=%03x rx=%03x\n", rate, i, divisor, tx_mask, rx_mask);
    
    xr_usb_serial_set_reg(xr_usb_serial,UART_CLOCK_DIVISOR_0, (divisor >> 0) & 0xff);
    xr_usb_serial_set_reg(xr_usb_serial,UART_CLOCK_DIVISOR_1, (divisor >> 8) & 0xff);
    xr_usb_serial_set_reg(xr_usb_serial,UART_CLOCK_DIVISOR_2, (divisor >> 16) & 0xff);
    xr_usb_serial_set_reg(xr_usb_serial,UART_TX_CLOCK_MASK_0, (tx_mask >> 0) & 0xff);
    xr_usb_serial_set_reg(xr_usb_serial,UART_TX_CLOCK_MASK_1, (tx_mask >> 8) & 0xff);
    xr_usb_serial_set_reg(xr_usb_serial,UART_RX_CLOCK_MASK_0, (rx_mask >> 0) & 0xff);
    xr_usb_serial_set_reg(xr_usb_serial,UART_RX_CLOCK_MASK_1, (rx_mask >> 8) & 0xff);
    
    return 0;
}
+ xr_usb_serial_set_reg(xr_usb_serial,xr_usb_serial->reg_map.uart_gpio_clr_addr, 0x20);
+ } else
+ { 
+   ret = xr_usb_serial_ctrl_msg(xr_usb_serial, USB_CDC_REQ_SET_CONTROL_LINE_STATE, control, NULL, 0);
+ } 
+ return ret;
+ 
+ int xr_usb_serial_set_line(struct xr_usb_serial *xr_usb_serial, struct usb_cdc_line_coding* line)
+ { 
+   int ret = 0;
+   unsigned int format_size;
+   unsigned int format_parity;
+   unsigned int format_stop;
+   if((xr_usb_serial->DeviceProduct == 0x1410) ||
+       (xr_usb_serial->DeviceProduct == 0x1412) ||
+       (xr_usb_serial->DeviceProduct == 0x1414))
+   { 
+     xr21v141x_set_baud_rate(xr_usb_serial,line->dwDTERate);
+     format_size = line->bDataBits;
+     format_parity = line->bParityType;
+     format_stop = line->bCharFormat;
+     xr_usb_serial_set_reg(xr_usb_serial,
+       xr_usb_serial->reg_map.uart_format_addr,
+       format_size << 0) | (format_parity << 4) | (format_stop << 7) ;
+   } 
+   else
+   { 
+     ret = xr_usb_serial_ctrl_msg(xr_usb_serial, USB_CDC_REQ_SET_LINE_CODING, 0, line, sizeof *(line));
+   } 
+   return ret;
+ } 
+ int xr_usb_serial_set_flow_mode(struct xr_usb_serial *xr_usb_serial,
+                                     struct tty_struct *tty, unsigned int cflag)
+ { 
+   unsigned int flow;
+   unsigned int gpio_mode;
+   if (cflag & CRTSCTS)
+   { 
+     dev_dbg(&xr_usb_serial->control->dev, "xr_usb_serial_set_flow_mode:hardware\n");
+     flow = UART_FLOW_MODE_HW;
```c
+ gpio_mode = UART_GPIO_MODE_SEL_RTS_CTS;
+ }
+ else if (I_IXOFF(tty) || I_IXON(tty))
+ {
+     unsigned char start_char = START_CHAR(tty);
+     unsigned char stop_char = STOP_CHAR(tty);
+     dev_dbg(&xr_usb_serial->control->dev, "xr_usb_serial_set_flow_mode:software\n");
+     flow = UART_FLOW_MODE_SW;
+     gpio_mode = UART_GPIO_MODE_SEL_GPIO;
+     xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_xon_char_addr, start_char);
+     xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_xoff_char_addr, stop_char);
+ }
+ else
+ {
+     dev_dbg(&xr_usb_serial->control->dev, "xr_usb_serial_set_flow_mode:none\n");
+     flow = UART_FLOW_MODE_NONE;
+     gpio_mode = UART_GPIO_MODE_SEL_GPIO;
+ }
+// rs485.rs422 FD/HD mode
+if (xr_usb_serial->rs485_422_en) {
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_flow_addr, 0x00);
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_mode_addr, 0x0B);
+ } else {
+    //rs232, default mode
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_flow_addr, flow);
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_mode_addr, gpio_mode);
+ }
+ return 0;
+ }
+ int xr_usb_serial_send_break(struct xr_usb_serial *xr_usb_serial, int state)
+ {
+     int ret = 0;
+     if((xr_usb_serial->DeviceProduct == 0x1410)||
+        (xr_usb_serial->DeviceProduct == 0x1412)||
+        (xr_usb_serial->DeviceProduct == 0x1414))
+     {
+         if(state)
+             ret = xr_usb_serial_set_reg(xr_usb_serial,xr_usb_serial->reg_map.tx_break_addr,0xffff);
+         else
+             ret = xr_usb_serial_set_reg(xr_usb_serial,xr_usb_serial->reg_map.tx_break_addr,0);
+     }
+     else
+     {
+         ret = xr_usb_serial_ctrl_msg(xr_usb_serial, USB_CDC_REQ_SEND_BREAK, state, NULL, 0);
```
int xr_usb_serial_enable(struct xr_usb_serial *xr_usb_serial)
{
    int ret = 0;
    int channel = xr_usb_serial->channel;
    if((xr_usb_serial->DeviceProduct == 0x1410) ||
       (xr_usb_serial->DeviceProduct == 0x1412) ||
       (xr_usb_serial->DeviceProduct == 0x1414))
    {
        ret = xr_usb_serial_set_reg_ext(xr_usb_serial, URM_REG_BLOCK, URM_ENABLE_BASE + channel, URM_ENABLE_0_TX);
        ret = xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_enable_addr, UART_ENABLE_TX | UART_ENABLE_RX);
        ret = xr_usb_serial_set_reg_ext(xr_usb_serial, URM_REG_BLOCK, URM_ENABLE_BASE + channel, URM_ENABLE_0_TX | URM_ENABLE_0_RX);
    }
    else
    {
        ret = xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_enable_addr, UART_ENABLE_TX | UART_ENABLE_RX);
    }
    return ret;
}

int xr_usb_serial_disable(struct xr_usb_serial *xr_usb_serial)
{
    int ret = 0;
    int channel = xr_usb_serial->channel;
    ret = xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_enable_addr, 0);
    if((xr_usb_serial->DeviceProduct == 0x1410) ||
       (xr_usb_serial->DeviceProduct == 0x1412) ||
       (xr_usb_serial->DeviceProduct == 0x1414))
    {
        ret = xr_usb_serial_set_reg_ext(xr_usb_serial, URM_REG_BLOCK, URM_ENABLE_BASE + channel, URM_ENABLE_0_TX);
    }
    return ret;
}

int xr_usb_serial_set_loopback(struct xr_usb_serial *xr_usb_serial, int channel)
int ret = 0;
xr_usb_serial_disable(xr_usb_serial);
ret = xr_usb_serial_set_reg_ext(xr_usb_serial, channel,
   xr_usb_serial->reg_map.uart_loopback_addr, 0x07);
xr_usb_serial_enable(xr_usb_serial);
return ret;

static int xr_usb_serial_tiocmget(struct xr_usb_serial *xr_usb_serial)
{
    short data;
    int result;
    result = xr_usb_serial_get_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_status_addr, &data);
    dev_dbg(&xr_usb_serial->control->dev, "xr_usb_serial_tiocmget uart_gpio_status_addr:0x%04x\n", data);
    if (result)
        return ((data & 0x8) ? 0: TIOCM_DTR) | ((data & 0x20) ? 0:TIOCM_RTS) | ((data & 0x4) ? 0:TIOCM_DSR) |
        ((data & 0x1) ? 0 : TIOCM_RI) | ((data & 0x2) ? 0:TIOCM_CD) | ((data & 0x10) ? 0 : TIOCM_CTS);
    return -EFAULT;
}

static int xr_usb_serial_tiocmset(struct xr_usb_serial *xr_usb_serial,
    unsigned int set, unsigned int clear)
{
    unsigned int newctrl = 0;
    newctrl = xr_usb_serial->ctrlout;
    set = (set & TIOCM_DTR ? XR_USB_SERIAL_CTRL_DTR : 0) | (set & TIOCM_RTS ? XR_USB_SERIAL_CTRL_RTS : 0);
    clear = (clear & TIOCM_DTR ? XR_USB_SERIAL_CTRL_DTR : 0) | (clear & TIOCM_RTS ? XR_USB_SERIAL_CTRL_RTS : 0);
    newctrl = (newctrl & ~clear) | set;
    if (xr_usb_serial->ctrllout == newctrl)
        return 0;
    if (newctrl & XR_USB_SERIAL_CTRL_DTR)
        xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_clr_addr, 0x08);
    else
        xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_set_addr, 0x08);
if (newctrl & XR_USB_SERIAL_CTRL_RTS)
    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_clr_addr, 0x20);
else
    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_set_addr, 0x20);
+
    return 0;
+
+
static struct reg_addr_map xr21b140x_reg_map;
static struct reg_addr_map xr21b1411_reg_map;
static struct reg_addr_map xr21v141x_reg_map;
static struct reg_addr_map xr21b142x_reg_map;
+
static void init_xr21b140x_reg_map(void)
{
    xr21b140x_reg_map.uart_enable_addr = 0x00;
    xr21b140x_reg_map.uart_format_addr = 0x05;
    xr21b140x_reg_map.uart_flow_addr = 0x06;
    xr21b140x_reg_map.uart_loopback_addr = 0x16;
    xr21b140x_reg_map.uart_xon_char_addr = 0x07;
    xr21b140x_reg_map.uart_xoff_char_addr = 0x08;
    xr21b140x_reg_map.uart_gpio_mode_addr = 0x0c;
    xr21b140x_reg_map.uart_gpio_dir_addr = 0x0d;
    xr21b140x_reg_map.uart_gpio_set_addr = 0x0e;
    xr21b140x_reg_map.uart_gpio_clr_addr = 0x0f;
    xr21b140x_reg_map.uart_gpio_status_addr = 0x10;
    xr21b140x_reg_map.tx_break_addr = 0x0a;
    xr21b140x_reg_map.uart_custom_driver = 0x41;
+
static void init_xr21b1411_reg_map(void)
{
    xr21b1411_reg_map.uart_enable_addr = 0xc00;
    xr21b1411_reg_map.uart_format_addr = 0xc05;
    xr21b1411_reg_map.uart_flow_addr = 0xc06;
    xr21b1411_reg_map.uart_loopback_addr = 0xc16;
    xr21b1411_reg_map.uart_xon_char_addr = 0xc07;
    xr21b1411_reg_map.uart_xoff_char_addr = 0xc08;
    xr21b1411_reg_map.uart_gpio_mode_addr = 0xc0c;
    xr21b1411_reg_map.uart_gpio_dir_addr = 0xc0d;
    xr21b1411_reg_map.uart_gpio_set_addr = 0xc0e;
    xr21b1411_reg_map.uart_gpio_clr_addr = 0xc0f;
    xr21b1411_reg_map.uart_gpio_status_addr = 0xc10;
    xr21b1411_reg_map.tx_break_addr = 0xc0a;
    xr21b1411_reg_map.uart_custom_driver = 0xc20;
+

Open Source Used In 5GaaS Edge AC-4 40256
```c
+static void init_xr21v141x_reg_map(void)
+{
+    xr21v141x_reg_map.uart_enable_addr = 0x03;
+    xr21v141x_reg_map.uart_format_addr = 0x0b;
+    xr21v141x_reg_map.uart_flow_addr = 0x0c;
+    xr21v141x_reg_map.uart_loopback_addr = 0x12;
+    xr21v141x_reg_map.uart_xon_char_addr = 0x10;
+    xr21v141x_reg_map.uart_xoff_char_addr = 0x11;
+    xr21v141x_reg_map.uart_gpio_mode_addr = 0x1a;
+    xr21v141x_reg_map.uart_gpio_dir_addr = 0x1b;
+    xr21v141x_reg_map.uart_gpio_set_addr = 0x1d;
+    xr21v141x_reg_map.uart_gpio_clr_addr = 0x1e;
+    xr21v141x_reg_map.uart_gpio_status_addr = 0x1f;
+    xr21v141x_reg_map.tx_break_addr = 0x14;
+}
+static void init_xr21b142x_reg_map(void)
+{
+    xr21b142x_reg_map.uart_enable_addr = 0x00;
+    xr21b142x_reg_map.uart_flow_addr = 0x06;
+    xr21b142x_reg_map.uart_loopback_addr = 0x16;
+    xr21b142x_reg_map.uart_xon_char_addr = 0x07;
+    xr21b142x_reg_map.uart_xoff_char_addr = 0x08;
+    xr21b142x_reg_map.uart_gpio_mode_addr = 0x0c;
+    xr21b142x_reg_map.uart_gpio_dir_addr = 0x0d;
+    xr21b142x_reg_map.uart_gpio_set_addr = 0x0e;
+    xr21b142x_reg_map.uart_gpio_clr_addr = 0x0f;
+    xr21b142x_reg_map.uart_gpio_status_addr = 0x10;
+    xr21b140x_reg_map.tx_break_addr = 0x0a;
+    xr21b140x_reg_map.uart_custom_driver = 0x60;
+    xr21b140x_reg_map.uart_low_latency = 0x46;
+}
+
+int xr_usb_serial_pre_setup(struct xr_usb_serial *xr_usb_serial)
+{
+    int ret = 0;
+    +init_xr21b140x_reg_map();
+    +init_xr21b1411_reg_map();
+    +init_xr21v141x_reg_map();
+    +init_xr21b142x_reg_map();
+    +if((xr_usb_serial->DeviceProduct&0xfff0) == 0x1400)
+    +    memcpysy(&xrx_usb_serial->reg_map),&xr21b140x_reg_map.sizeof(struct reg_addr_map));
+    +}
+else if(xr_usb_serial->DeviceProduct == 0x1411)
+    +memcpysy(&xrx_usb_serial->reg_map),&xr21b1411_reg_map.sizeof(struct reg_addr_map));
```
+
+   if((xr_usb_serial->DeviceProduct == 0x1410)||
+ (xr_usb_serial->DeviceProduct == 0x1412)||
+ (xr_usb_serial->DeviceProduct == 0x1414))
+ {
+     memcpy(&(xr_usb_serial->reg_map),&xr21v141x_reg_map,sizeof(struct reg_addr_map));
+ }
+   else if((xr_usb_serial->DeviceProduct == 0x1420)||
+ (xr_usb_serial->DeviceProduct == 0x1422)||
+ (xr_usb_serial->DeviceProduct == 0x1424))
+ {
+     memcpy(&(xr_usb_serial->reg_map),&xr21b142x_reg_map,sizeof(struct reg_addr_map));
+ }
+   else
+   {
+     ret = -1;
+   }
+   if(xr_usb_serial->reg_map.uart_custom_driver)
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_custom_driver, 1);
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_mode_addr, 0);
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_dir_addr, 0x28);
+    xr_usb_serial_set_reg(xr_usb_serial, xr_usb_serial->reg_map.uart_gpio_set_addr, UART_GPIO_SET_DTR | UART_GPIO_SET_RTS);
+    return ret;
+  
+--- linux-4.15.0.orig/ubuntu/xr-usb-serial/xr_usb_serial_ioctl.h
+++ linux-4.15.0/ubuntu/xr-usb-serial/xr_usb_serial_ioctl.h
@@ -0,0 +1,31 @@
+/*
+ * This program is free software; you can redistribute it and/or modify
+ * it under the terms of the GNU General Public License as published by
+ * the Free Software Foundation; either version 2 of the License, or
+ * (at your option) any later version.
+ *
+ * This program distributed in the hope that it will be useful,
+ * but WITHOUT ANY WARRANTY; without even the implied warranty of
+ * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
+ * GNU General Public License for more details.
+ *
+ * You should have received a copy of the GNU General Public License
+ * along with this program; if not, write to the Free Software
+ * Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
+ */
+ */
+##include <linux/ioctl.h>
+
+#define XR_USB_SERIAL_IOC_MAGIC 'v'
+
+#define XR_USB_SERIAL_GET_REG _IOWR(XR_USB_SERIAL_IOC_MAGIC, 1, int)
+#define XR_USB_SERIAL_SET_REG _IOWR(XR_USB_SERIAL_IOC_MAGIC, 2, int)
+#define XR_USB_SERIAL_SET_ADDRESS_MATCH _IO(XR_USB_SERIAL_IOC_MAGIC, 3)
+#define XR_USB_SERIAL_SET_PRECISE_FLAGS _IO(XR_USB_SERIAL_IOC_MAGIC, 4)
+#define XR_USB_SERIAL_TEST_MODE _IO(XR_USB_SERIAL_IOC_MAGIC, 5)
+#define XR_USB_SERIAL_LOOPBACK _IO(XR_USB_SERIAL_IOC_MAGIC, 6)
+
+#define VZ_ADDRESS_UNICAST_S 0
+#define VZ_ADDRESS_BROADCAST_S 8
+#define VZ_ADDRESS_MATCH(U, B) (0x8000000 | ((B) << VZ_ADDRESS_BROADCAST_S) | ((U) << VZ_ADDRESS_UNICAST_S))
+#define VZ_ADDRESS_MATCH_DISABLE 0
--- linux-4.15.0.orig/update-dkms-versions
+++ linux-4.15.0/update-dkms-versions
@@ -0,0 +1,181 @@
+#!/bin/bash
+
+remote_repo=''
+sru_cycle=
+while :
+    if [ "$1" = "--remote-repo" ]; then
+        remote_repo="$2"
+    fi
+    shift 2
+    if [ "$1" = "--sru-cycle" ]; then
+        sru_cycle="$2"
+    fi
+    shift 2
+    else
+        break
+fi
+done
+if [ "$#" -ne 0 ]; then
+    echo "Usage: $0 [<options>]
+    --remote-repo <url>
+    --sru-cycle <cycle>"
+    exit 1
+fi
+
+default_sru_cycle()
local tracking_bug
local version
+
## Pick out the cycle from the tracking bug file.
+if [-f "$DEBIAN/tracking-bug"];
+read tracking_bug sru_cycle X <$DEBIAN/tracking-bug
+fi
+
+if [-z "$sru_cycle"];
+echo "$0: sru-cycle not found via debian/tracking-bug; specify --sru-cycle" 1>&2
+exit 1
+fi
+
sru_cycle=$(echo "$sru_cycle" | sed -e 's/-[0-9]*/\//' -e 's/^kernel-sru-cycle-//')
+
#echo "default_sru_cycle: version<$version> sru_cycle<$sru_cycle>"
+
+
## Determine where our changelog is.
+DEBIAN=debian
+[ -f `debian/debian.env` ] && . `debian/debian.env`
+
+[ -z "$sru_cycle"] && default_sru_cycle
+if [-z "$remote_repo"];
+case "$sru_cycle" in
+s[0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]
+remote_repo='security';
+*)
+remote_repo='main';;
+esac
+fi
+
+case "$remote_repo" in
+security)
+remote_repo='ssh+git://git.launchpad.net/~canonical-kernel-security-team/canonical-kernel-private/+git/kernel-versions'
+remote_name='security'
+;;
+main)
+remote_repo='git://git.launchpad.net/~canonical-kernel/+git/kernel-versions'
+remote_name='main'
+;;
+*)
+remote_name='adhoc'
+;;
+esac
+
## kernel-versoins repository dkms-version mapping see below for details:
+linux-restricted-modules*)our_type="lrm" ;;
+*)our_type="main" ;;
+esac
+
+## Update rules are complex. We update development series kernels to the
+## versions in development. For stable series we update versions against
+## the series in which our prime kernel was built. This is expressed
+## via the map/dkms-versions namespace. Attempt to map via our series
+## and then our mainline-version.
+
+## Try and find a package specific dkms-versions fragment. Try:
+## handle+type
+## series+type
+## mainline+type
+## series- backwards compatibility
+## mainline- backwards compatibility
+for versions_path_tail in \
+  "$our_series:$our_source:$our_type"
+  "$our_series:$our_type"
+  "$our_mainline:$our_type"
+  "$our_series"
+  "$our_mainline"
+  "$our_mainline"
+do
+  echo "II: trying $versions_path_tail ..."
+  versions_paths=$(echo $(cat_file -p "$git_base:map/dkms-versions/$versions_path_tail" 2>/dev/null))
+  [ -n "$versions_paths" ] && break
+done
+
+if [ -z "$versions_paths" ]; then
+  echo "$0: unable to identify dkms-versions mapping" 1>&2
+  exit 1
+fi
+
+echo "git_base<$git_base> versions_paths<$versions_paths"
+for versions_path in $versions_paths
+do
+  cat_file -p "$git_base:$versions_path" >>"debian/dkms-versions.new"
+  if [ "$?" -ne 0 ]; then
+    echo "$0: unable to download an updated dkms-versions file" 1>&2
+    exit 1
+  fi
+done
+mv "debian/dkms-versions.new" "debian/dkms-versions"
+
+thing="debian/dkms-versions"
+if ! git diff --exit-code -- "$thing" >/dev/null; then
+git commit -m "UBUNTU: $thing -- update from kernel-versions ($git_base)" \
+-m "BugLink: https://bugs.launchpad.net/bugs/1786013" \
+-s -- "$thing"
+else
+echo "$thing: no changes from kernel-versions"
+fi
+
+exit 0

--- linux-4.15.0.orig/update-version-dkms
+++ linux-4.15.0/update-version-dkms
@@ -0,0 +1,4 @@
+#!/bin/bash
+
+echo "EE: run update-dkms-versions after link-to-tracker" 1>&2
+exit 1

--- linux-4.15.0.orig/usr/Kconfig
+++ linux-4.15.0/usr/Kconfig
@@ -131,17 +131,6 @@
If in doubt, select 'None'

-config INITRAMFS_COMPRESSION_NONE
-bool "None"
-help
- Do not compress the built-in initramfs at all. This may sound wasteful
- in space, but, you should be aware that the built-in initramfs will be
- compressed at a later stage anyways along with the rest of the kernel,
- on those architectures that support this. However, not compressing the
- initramfs may lead to slightly higher memory consumption during a
- short time at boot, while both the cpio image and the unpacked
- filesystem image will be present in memory simultaneously
-
-config INITRAMFS_COMPRESSION_GZIP
bool "Gzip"
depends on RD_GZIP
@@ -214,6 +203,17 @@
If you choose this, keep in mind that most distros don't provide lz4
by default which could cause a build failure.

-config INITRAMFS_COMPRESSION_NONE
+bool "None"
+help
+ Do not compress the built-in initramfs at all. This may sound wasteful
+ in space, but, you should be aware that the built-in initramfs will be
+ compressed at a later stage anyways along with the rest of the kernel,
+ on those architectures that support this. However, not compressing the
+ initramfs may lead to slightly higher memory consumption during a
+ short time at boot, while both the cpio image and the unpacked
+ filesystem image will be present in memory simultaneously
+
endchoice

config INITRAMFS_COMPRESSION
--- linux-4.15.0.orig/usr/Makefile
+++ linux-4.15.0/usr/Makefile
@@ -11,6 +11,9 @@
datafile_d_y = .$(datafile_y).d
AFLAGS_initramfs_data.o += -DINITRAMFS_IMAGE="usr/$(datafile_y)"
+
+# clean rules do not have CONFIG_INITRAMFS_COMPRESSION. So clean up after all
+# possible compression formats.
+clean-files += initramfs_data.cpio*

# Generate builtin.o based on initramfs_data.o
obj-$(CONFIG_BLK_DEV_INITRD) := initramfs_data.o
--- linux-4.15.0.orig/virt/kvm/arm/aarch32.c
+++ linux-4.15.0/virt/kvm/arm/aarch32.c
@@ -25,6 +25,10 @@
#define DFSR_FSC_EXTABT_LPAE	0x10
#define DFSR_FSC_EXTABT_nLPAE	0x08
#define DFSR_LPAE		BIT(9)

/* stolen from arch/arm/kernel/opcodes.c
 *
@@ -163,8 +167,8 @@
static void prepare_fault32(struct kvm_vcpu *vcpu, u32 mode, u32 vect_offset)
{
 unsigned long cpsr;
-unsigned long new_spsr_value = *vcpu_cpsr(vcpu);
+unsigned long spsr = *vcpu_cpsr(vcpu);
 -bool is_thumb = (new_spsr_value & COMPAT_PSR_T_BIT);
 +bool is_thumb = (spsr & COMPAT_PSR_T_BIT);
 u32 return_offset = return_offsets[vect_offset >> 2][is_thumb];
 u32 sctlr = vcpu_cp15(vcpu, c1_SCTLR);

 @@ -178,7 +182,7 @@
 *vcpu_cpsr(vcpu) = cpsr;

 /* Note: These now point to the banked copies */
- *vcpu_spsr(vcpu) = new_spsr_value;
+ *vcpu_spsr(vcpu) = host_spsr_to_spsr32(spsr);
*vcpu_reg32(vcpu, 14) = *vcpu_pc(vcpu) + return_offset;

/* Branch to exception vector */
@@ -222,10 +226,12 @@
/* Give the guest an IMPLEMENTATION DEFINED exception */
is_lpaem = (vcpu_cp15(vcpu, c2_TTBCR) >> 31);
-if (is_lpaem) 
- *fsr = 1 << 9 | 0x34;
-else 
- *fsr = 0x14;
+if (is_lpaem) {
+ *fsr = DFSR_LPAE | DFSR_FSC_EXTABT_LPAE;
+} else {
+ /* no need to shuffle FS[4] into DFSR[10] as its 0 */
+ *fsr = DFSR_FSC_EXTABT_nLPAE;
+}
}

void kvm_inject_dabt32(struct kvm_vcpu *vcpu, unsigned long addr)
--- linux-4.15.0.orig/virt/kvm/arm/arch_timer.c
+++ linux-4.15.0/virt/kvm/arm/arch_timer.c
@@ -309,9 +309,9 @@
 struct arch_timer_context *ptimer = vcpu_ptimer(vcpu);

 /*
- * If the timer can fire now we have just raised the IRQ line and we
- * don't need to have a soft timer scheduled for the future. If the
- * timer cannot fire at all, then we also don't need a soft timer.
+ * If the timer can fire now, we don't need to have a soft timer
+ * scheduled for the future. If the timer cannot fire at all,
+ * then we also don't need a soft timer.
 */
 if (kvm_timer_should_fire(ptimer) || kvm_timer_irq_can_fire(ptimer)) {
    soft_timer_cancel(&timer->phys_timer, NULL);
@@ -338,10 +338,10 @@
    if (kvm_timer_should_fire(vtimer) != vtimer->irq.level)
        kvm_timer_update_irq(vcpu, !vtimer->irq.level, vtimer);

+    phys_timer_emulate(vcpu);
+}
+if (kvm_timer_should_fire(ptimer) != ptimer->irq.level)
+kvm_timer_update_irq(vcpu, !ptimer->irq.level, ptimer);
-    phys_timer_emulate(vcpu);
}

static void vtimer_save_state(struct kvm_vcpu *vcpu)
struct arch_timer_cpu *timer = &vcpu->arch.timer_cpu;
struct arch_timer_context *vtimer = vcpu_vtimer(vcpu);
+struct arch_timer_context *ptimer = vcpu_ptimer(vcpu);

if (unlikely(!timer->enabled))
    return;

/* Set the background timer for the physical timer emulation. */
phys_timer_emulate(vcpu);
+
/* If the timer fired while we weren't running, inject it now */
+if (kvm_timer_should_fire(ptimer) != ptimer->irq.level)
+kvm_timer_update_irq(vcpu, !ptimer->irq.level, ptimer);
}

bool kvm_timer_should_notify_user(struct kvm_vcpu *vcpu)
{
    struct arch_timer_cpu *timer = &vcpu->arch.timer_cpu;
    struct arch_timer_context *vtimer = vcpu_vtimer(vcpu);
    struct arch_timer_context *ptimer = vcpu_ptimer(vcpu);

    kvm_timer_update_state(vcpu);
+
    kvm_vgic_reset_mapped_irq(vcpu, vtimer->irq.irq);
    return 0;
}

int kvm_timer_vcpu_reset(struct kvm_vcpu *vcpu)
{
    struct arch_timer_cpu *timer = &vcpu->arch.timer_cpu;
    struct arch_timer_context *vtimer = vcpu_vtimer(vcpu);
    struct arch_timer_context *ptimer = vcpu_ptimer(vcpu);

    ptimer->cnt_ctl = 0;
    kvm_timer_update_state(vcpu);
+
    kvm_vgic_reset_mapped_irq(vcpu, vtimer->irq.irq);
    return 0;
}

-kvm_info("virtual timer IRQ%d
", host_vtimer_irq);
+kvm_debug("virtual timer IRQ%d
", host_vtimer_irq);

cpuhp_setup_state(CPUHP_AP_KVM_ARM_TIMER_STARTING,
    "kvm/arm/timer:starting", kvm_timer_starting_cpu,
--- linux-4.15.0.orig/virt/kvm/arm/arm.c
+++ linux-4.15.0/virt/kvm/arm/arm.c

Open Source Used In 5GasS Edge AC-4  40266
```c
#include <linux/irqbypass.h>
#include <trace/events/kvm.h>
#include <kvm/arm_pmu.h>
+#include <kvm/arm_psci.h>
#define CREATE_TRACE_POINTS
#include "trace.h"
@ @ -46,15 +47,14 @ @
#include <asm/kvm_mmu.h>
#include <asm/kvm_emulate.h>
#include <asm/kvm_coproc.h>
-#include <asm/kvm_psci.h>
#include <asm/sections.h>
#endif

+DEFINE_PER_CPU(kvm_cpu_context_t, kvm_host_cpu_state);
static DEFINE_PER_CPU(unsigned long, kvm_arm_hyp_stack_page);
-#include <asm/kvm_psci.h>
#include <asm/sections.h.h>

#ifdef REQUIRES_VIRT
__asm__(".arch_extension	virt");
#endif

+DEFINE_PER_CPU(kvm_cpu_context_t, kvm_host_cpu_state);
static DEFINE_PER_CPU(unsigned long, kvm_arm_hyp_stack_page);

/* Per-CPU variable containing the currently running vcpu. */
static DEFINE_PER_CPU(struct kvm_vcpu *, kvm_arm_running_vcpu);
@ @ -220,6 +220,9 @ @
case KVM_CAP_MAX_VCPUS:
    r = KVM_MAX_VCPUS;
    break;
+case KVM_CAP_MAX_VCPU_ID:
    +r = KVM_MAX_VCPU_ID;
    +break;
    case KVM_CAP_NR_MEMSLOTS:
    r = KVM_USER_MEM_SLOTS;
    break;
    @ @ -315,6 +318,17 @ @
void kvm_arch_vcpu_blocking(struct kvm_vcpu *vcpu)
{
    kvm_timer_schedule(vcpu);
    /*
    * If we're about to block (most likely because we've just hit a
    * WFI), we need to sync back the state of the GIC CPU interface
    * so that we have the lastest PMR and group enables. This ensures
    * that kvm_arch_vcpu_runnable has up-to-date data to decide
    * whether we have pending interrupts.
    */
    +preempt_disable();
    +kvm_vgic_vmcr_sync(vcpu);
```
+preempt_enable();
+
kvm_vgic_v4_enable_doorbell(vcpu);
}

@@ -354,7 +368,7 @@
}

vcpu->cpu = cpu;
-vcpu->arch.host_cpu_context = this_cpu_ptr(kvm_host_cpu_state);
+vcpu->arch.host_cpu_context = this_cpu_ptr(&kvm_host_cpu_state);

kvm_arm_set_running_vcpu(vcpu);
kvm_vgic_load(vcpu);
@@ -450,7 +464,9 @@
 */
 static bool need_new_vmid_gen(struct kvm *kvm)
 {
- return unlikely(kvm->arch.vmid_gen != atomic64_read(&kvm_vmid_gen));
+ u64 current_vmid_gen = atomic64_read(&kvm_vmid_gen);
+ smp_rmb(); /* Orders read of kvm_vmid_gen and kvm->arch.vmid */
+ return unlikely(READ_ONCE(kvm->arch.vmid_gen) != current_vmid_gen);
 }

 /**
@@ -500,7 +516,6 @@
 kvp->call_hyp(__kvm_flush_vm_context);
 }

-kvm->arch.vmid_gen = atomic64_read(&kvm_vmid_gen);
 kvm->arch.vmid = kvm_next_vmid;
 kvm_next_vmid++;
 kvm_next_vmid &= (1 << kvm_vmid_bits) - 1;
@@ -511,6 +526,9 @@
 vmid = ((u64)(kvm->arch.vmid) << VTTBR_VMID_SHIFT) & VTTBR_VMID_MASK(kvm_vmid_bits);
 kvm->arch.vttbr = pgd_phys | vmid;

+smp_wmb();
+WRITE_ONCE(kvm->arch.vmid_gen, atomic64_read(&kvm_vmid_gen));
+
spin_unlock(&kvm_vmid_lock);
}

@@ -580,6 +598,13 @@
/* Awaken to handle a signal, request we sleep again later. */
kvm_make_request(KVM_REQ_SLEEP, vcpu);
}

+}
+/*
 + * Make sure we will observe a potential reset request if we've
 + * observed a change to the power state. Pairs with the smp_wmb() in
 + * kvm_psci_vcpu_on().
 + */
+smp_rmb();
}

static int kvm_vcpu_initialized(struct kvm_vcpu *vcpu)
@@ -593,6 +618,9 @@
 if (kvm_check_request(KVM_REQ_SLEEP, vcpu))
  vcpu_req_sleep(vcpu);

+if (kvm_check_request(KVM_REQ_VCPU_RESET, vcpu))
+kvm_reset_vcpu(vcpu);
+
+/*
 * Clear IRQ_PENDING requests that were made to guarantee
 * that a VCPU sees new virtual interrupts.
 @@ -704,9 +732,13 @@
 */
 trace_kvm_entry(*vcpu_pc(vcpu));
 guest_enter_irqoff();
+if (has_vhe())
+kvm_arm_vhe_guest_enter();

 ret = kvm_call_hyp(__kvm_vcpu_run, vcpu);

+if (has_vhe())
+kvm_arm_vhe_guest_exit();
 vcpu->mode = OUTSIDE_GUEST_MODE;
 vcpu->stat.exits++;
+/*
 @@ -759,6 +791,9 @@
 guest_exit();
 trace_kvm_exit(ret, kvm_vcpu_trap_get_class(vcpu), *vcpu_pc(vcpu));

+/* Exit types that need handling before we can be preempted */
+handle_exit_early(vcpu, run, ret);
+ preempt_enable();

 ret = handle_exit(vcpu, run, ret);
 @@ -871,7 +906,7 @@
 static int kvm_vcpu_set_target(struct kvm_vcpu *vcpu,
                              const struct kvm_vcpu_init *init)
 { 
-unsigned int i;


unsigned int i, ret;
int phys_target = kvm_target_cpu();

if (init->target != phys_target)
@@ -906,9 +941,14 @@
cpu->arch.target = phys_target;

/* Now we know what it is, we can reset it. */
return kvm_reset_vcpu(vcpu);
-*}
+ret = kvm_reset_vcpu(vcpu);
+if (ret) {
+cpu->arch.target = -1;
+bitmap_zero(cpu->arch.features, KVM_VCPU_MAX_FEATURES);
+}

+return ret;
+}

static int kvm_arch_vcpu_ioctl_vcpu_init(struct kvm_vcpu *vcpu,
  struct kvm_vcpu_init *init)
@@ -1006,6 +1046,14 @@
    argp, sizeof(reg)))
  return -EFAULT;
+/*
+ * We could owe a reset due to PSCI. Handle the pending reset
+ * here to ensure userspace register accesses are ordered after
+ * the reset.
+ */
+if (kvm_check_request(KVM_REQ_VCPU_RESET, vcpu))
+kvm_reset_vcpu(vcpu);
+
 if (ioctl == KVM_SET_ONE_REG)
return kvm_arm_set_reg(vcpu, &reg);
else
@@ -1158,12 +1206,10 @@
pgd_ptr = kvm_mmu_get_httbr();
 stack_page = this_cpu_read(kvm_arm_hyp_stack_page);
 hyp_stack_ptr = stack_page + PAGE_SIZE;
-vector_ptr = (unsigned long)kvm_ksym_ref(__kvm_hyp_vector);
+vector_ptr = (unsigned long)kvm_get_hyp_vector();

__cpu_init_hyp_mode(pgd_ptr, hyp_stack_ptr, vector_ptr);
__cpu_init_stage2();
-
-kvm_arm_init_debug();
}
static void cpu_hyp_reset(void)
@@ -1187,6 +1233,8 @@
cpu_init_hyp_mode(NULL);
}

+kvm_arm_init_debug();
+
if (vgic_present)
kvm_vgic_init_cpu_hardware();
}
@@ -1239,6 +1287,7 @@
cpu_hyp_reset();

return NOTIFY_OK;
+case CPU_PM_ENTER_FAILED:
case CPU_PM_EXIT:
if (__this_cpu_read(kvm_arm_hardware_enabled))
/* The hardware was enabled before suspend. */
@@ -1272,19 +1321,8 @@
#endif

-static void teardown_common_resources(void)
-{ 
-free_percpu(kvm_host_cpu_state);
-}
-
static int init_common_resources(void)
{ 
-kvm_host_cpu_state = alloc_percpu(kvm_cpu_context_t);
-if (!kvm_host_cpu_state) {
-kvm_err("Cannot allocate host CPU state\n");
-return -ENOMEM;
-}
-
/* set size of VMID supported by CPU */
kvm_vmid_bits = kvm_get_vmid_bits();
kvm_info("%d-bit VMID\n", kvm_vmid_bits);
@@ -1403,6 +1441,12 @@
goto out_err;
}

+err = kvm_map_vectors();
+if (err) {
+kvm_err("Cannot map vectors\n");
+goto out_err;
+}
/*
 * Map the Hyp stack pages
 */

for_each_possible_cpu(cpu) {
    kvm_cpu_context_t *cpu_ctxt;

    cpu_ctxt = per_cpu_ptr(kvm_host_cpu_state, cpu);
    err = create_hyp_mappings(cpu_ctxt, cpu_ctxt + 1, PAGE_HYP);

    if (err) {
        kvm_err("Cannot map host auxiliary data: %d\n", err);
    }

    err = hyp_map_aux_data();
    if (err)
        kvm_err("Cannot map host auxiliary data: %d\n", err);

    return 0;
}

out_err:

if (!in_hyp_mode)
    teardown_hyp_mode();
out_err:
    teardown_common_resources();
return err;

--- linux-4.15.0.orig/virt/kvm/arm/hyp/vgic-v2-sr.c
+++ linux-4.15.0/virt/kvm/arm/hyp/vgic-v2-sr.c
@@ -139,7 +139,7 @@
    return -1;

rd = kvm_vcpu_dabt_get_rd(vcpu);
-addr  = kern_hyp_va((kern_hyp_va(&kvm_vgic_global_state))->vcpu_base_va);
+addr  = kern_hyp_va(hyp_symbol_addr(kvm_vgic_global_state)->vcpu_base_va);
addr += fault_ipa - vgic->vgic_cpu_base;

if (kvm_vcpu_dabt_iswrite(vcpu)) {
--- linux-4.15.0.orig/virt/kvm/arm/hyp/vgic-v3-sr.c
+++ linux-4.15.0/virt/kvm/arm/hyp/vgic-v3-sr.c
@@ -215,7 +215,8 @@
    * are now visible to the system register interface.
 */

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if (!cpu_if->vgic_sre) {
    -dsb(st);
    +dsb(sy);
    +isb();
    cpu_if->vgic_vmcr = read_gicreg(ICH_VMCR_EL2);
}

--- linux-4.15.0.orig/virt/kvm/arm/mmio.c
+++ linux-4.15.0/virt/kvm/arm/mmio.c
@@ -98,6 +98,12 @@
    unsigned int len;
    int mask;

+/* Detect an already handled MMIO return */
+if (unlikely(!vcpu->mmio_needed))
+    return 0;
+
+vcpu->mmio_needed = 0;
+
    if (!run->mmio.is_write) {
        len = run->mmio.len;
        if (len > sizeof(unsigned long))
@@ -111,12 +117,21 @@
            data = (data ^ mask) - mask;
        }

+/*
+ * The MMIO instruction is emulated and should not be re-executed
+ * in the guest.
+ */
+    +kvm_skip_instr(vcpu, kvm_vcpu_trap_il_is32bit(vcpu));
+    return 0;
}
bool sixty_four;

if (kvm_vcpu_dabt_iss1tw(vcpu)) {
    if (kvm_vcpu_abt_iss1tw(vcpu)) {
        /* page table accesses IO mem: tell guest to fix its TTBR */
        kvm_inject_dabt(vcpu, kvm_vcpu_get_hfar(vcpu));
        return 1;
    }
    *is_write = kvm_vcpu_dabt_iswrite(vcpu);
    sign_extend = kvm_vcpu_dabt_issext(vcpu);
    sixty_four = kvm_vcpu_dabt_issf(vcpu);
    rt = kvm_vcpu_dabt_get_rd(vcpu);
}

*len = access_size;
vcpu->arch.mmio_decode.sign_extend = sign_extend;
vcpu->arch.mmio_decode.rt = rt;
vcpu->arch.mmio_decode.sixty_four = sixty_four;

/*
 * The MMIO instruction is emulated and should not be re-executed
 * in the guest.
 * */
kvm_skip_instr(vcpu, kvm_vcpu_trap_il_is32bit(vcpu));
return 0;
}

run->mmio.is_write = is_write;
run->mmio.phys_addr = fault_ipa;
run->mmio.len = len;
vcpu->mmio_needed = 1;

if (!ret) {
    /* We handled the access successfully in the kernel. */
--- linux-4.15.0.orig/virt/kvm/arm/mmu.c
+++ linux-4.15.0/virt/kvm/arm/mmu.c
@@ -307,12 +307,6 @@
next = stage2_pgd_addr_end(addr, end);
if (!stage2_pgd_none(*pgd))
    unmap_stage2_puds(kvm, pgd, addr, next);
/*
 * If the range is too large, release the kvm->mmu_lock
 * to prevent starvation and lockup detector warnings.
 * */
-if (next != end)
    cond_resched_lock(&kvm->mmu_lock);
} while (pgd++, addr = next, addr != end);
@@ -375,7 +369,8 @@
pdg = kvm->arch.pgd + stage2_pgd_index(addr);
do {
    next = stage2_pgd_addr_end(addr, end);
-   stage2_flush_puds(kvm, pgd, addr, next);
+   if (!stage2_pgd_nonempty(pgd))
+      stage2_flush_puds(kvm, pgd, addr, next);
} while (pgd++, addr = next, addr != end);
}

@@ -901,19 +896,35 @@
pmd = stage2_get_pmd(kvm, cache, addr);
VM_BUG_ON(!pmd);

/*
 - * Mapping in huge pages should only happen through a fault. If a
 - * page is merged into a transparent huge page, the individual
 - * subpages of that huge page should be unmapped through MMU
 - * notifiers before we get here.
 - *
 - * Merging of CompoundPages is not supported; they should become
 - * splitting first, unmapped, merged, and mapped back in on-demand.
 - */
-VM_BUG_ON(pmd_present(pmd) && pmd_pfn(pmd) != pmd_pfn(*new_pmd));
-
old_pmd = *pmd;
if (pmd_present(old_pmd)) {
+ /*
+ * Multiple vcpus faulting on the same PMD entry, can
+ * lead to them sequentially updating the PMD with the
+ * same value. Following the break-before-make
+ * (pmd_clear() followed by tlb_flush()) process can
+ * hinder forward progress due to refaults generated
+ * on missing translations.
+ *
+ * Skip updating the page table if the entry is
+ * unchanged.
+ */
+if (pmd_val(old_pmd) == pmd_val(*new_pmd))
+return 0;
+
+/*
+ * Mapping in huge pages should only happen through a
+ * fault. If a page is merged into a transparent huge
+ * page, the individual subpages of that huge page
+ * should be unmapped through MMU notifiers before we
* get here.

* Merging of CompoundPages is not supported; they should become splitting first, unmapped, merged, and mapped back in on-demand.

*/

VM_BUG_ON(pmd_pfn(old_pmd) != pmd_pfn(*new_pmd));
+
pmd_clear(pmd);
kvm_tlb_flush_vmid_ipa(kvm, addr);
} else {
    @ @ -969,6 +980,10 @@
/* Create 2nd stage page table mapping - Level 3 */
old_pte = *pte;
if (pte_present(old_pte)) {
    /* Skip page table update if there is no change */
    +if (pte_val(old_pte) == pte_val(*new_pte))
        +return 0;
    +
kvm_set_pte(pte, __pte(0));
kvm_tlb_flush_vmid_ipa(kvm, addr);
} else {
    @ @ -1048,8 +1063,14 @@
    {
        kvm_pfn_t pfn = *pfnp;
gfn_t gfn = *ipap >> PAGE_SHIFT;
        +struct page *page = pfn_to_page(pfn);

        -if (PageTransCompoundMap(pfn_to_page(pfn))) {
            +/*
            + * PageTransCompoungMap() returns true for THP and hugetlbs. Make sure the adjustment is done only for THP
            + * pages.
            + */
            +if (!PageHuge(page) && PageTransCompoundMap(page)) {
                unsigned long mask;
                /*
                * The address we faulted on is backed by a transparent huge
                */
                @@ -1087,6 +1108,9 @@

                static bool kvm_is_write_fault(struct kvm_vcpu *vcpu)
                {
                    if (kvm_vcpu_abt_iss1tw(vcpu))
                        +return true;
                    +
                    if (kvm_vcpu_trap_is_iabt(vcpu))
                        return false;
if (!kvm->arch.pgd)
return 0;
trace_kvm_test_age_hva(hva);
return handle_hva_to_gpa(kvm, hva, hva, kvm_test_age_hva_handler, NULL);
+return handle_hva_to_gpa(kvm, hva, hva + PAGE_SIZE,
+kvm_test_age_hva_handler, NULL);
}

void kvm_mmu_free_memory_caches(struct kvm_vcpu *vcpu)
BUG_ON((hyp_idmap_start ^ (hyp_idmap_end - 1)) & PAGE_MASK);

-kvm_info("IDMAP page: %lx\n", hyp_idmap_start);
-kvm_info("HYP VA range: %lx:%lx\n",
-kern_hyp_va(PAGE_OFFSET), kern_hyp_va(~0UL));
+kvm_debug("IDMAP page: %lx\n", hyp_idmap_start);
+kvm_debug("HYP VA range: %lx:%lx\n",
+kern_hyp_va(PAGE_OFFSET), kern_hyp_va(~0UL));

if (hyp_idmap_start >= kern_hyp_va(PAGE_OFFSET) &&
hyp_idmap_start <  kern_hyp_va(~0UL) &&
@@ -1848,7 +1873,7 @@
	* Prevent userspace from creating a memory region outside of the IPA
	* space addressable by the KVM guest IPA space.
	*/
-if (memslot->base_gfn + memslot->npages >=
+if (memslot->base_gfn + memslot->npages >
(KVM_PHYS_SIZE >> PAGE_SHIFT))
return -EFAULT;

@@ -1935,7 +1960,7 @@
return 0;
}

-void kvm_arch_memslots_updated(struct kvm *kvm, struct kvm_memslots *slots)
+void kvm_arch_memslots_updated(struct kvm *kvm, u64 gen)
{
}

--- linux-4.15.0.orig/virt/kvm/arm/psci.c
+++ linux-4.15.0/virt/kvm/arm/psci.c
@@ -15,16 +15,17 @@
* along with this program. If not, see <http://www.gnu.org/licenses/>.
 */

+#include <linux/arm-smccc.h>
#include <linux/preempt.h>
#include <linux/kvm_host.h>
+include <linux/uaccess.h>
#include <linux/wait.h>

#include <asm/cputype.h>
#include <asm/kvm_emulate.h>
+include <asm/kvm_host.h>

+include <uapi/linux/psci.h>
+include <kvm/arm_psci.h>

/*
 * This is an implementation of the Power State Coordination Interface
@@ -33,6 +34,38 @@
#define AFFINITY_MASK(level)~((0x1UL << ((level) * MPIDR_LEVEL_BITS)) - 1)

+static u32 smccc_get_function(struct kvm_vcpu *vcpu)
+{
+    return vcpu_get_reg(vcpu, 0);
+}
+
+static unsigned long smccc_get_arg1(struct kvm_vcpu *vcpu)
+{
+    return vcpu_get_reg(vcpu, 1);
+}
+
+static unsigned long smccc_get_arg2(struct kvm_vcpu *vcpu)
+{
+    return vcpu_get_reg(vcpu, 2);
+}
+
+static unsigned long smccc_get_arg3(struct kvm_vcpu *vcpu)
+{
+    return vcpu_get_reg(vcpu, 3);
+}
+
+static void smccc_set_retval(struct kvm_vcpu *vcpu,
+    unsigned long a0,
+    unsigned long a1,
+    unsigned long a2,
+    unsigned long a3)
+{
    +vcpu_set_reg(vcpu, 0, a0);
    +vcpu_set_reg(vcpu, 1, a1);
    +vcpu_set_reg(vcpu, 2, a2);
static unsigned long kvm_psci_vcpu_on(struct kvm_vcpu *source_vcpu)
{
+struct vcpu_reset_state *reset_state;
struct kvm *kvm = source_vcpu->kvm;
struct kvm_vcpu *vcpu = NULL;
-struct swait_queue_head *wq;
unsigned long cpu_id;
-unsigned long context_id;
-phys_addr_t target_pc;

-cpu_id = vcpu_get_reg(source_vcpu, 1) & MPIDR_HWID_BITMASK;
+cpu_id = smccc_get_arg1(source_vcpu) & MPIDR_HWID_BITMASK;
if (vcpu_mode_is_32bit(source_vcpu))
cpu_id &= ~(u32) 0);

@@ -91,38 +122,36 @@
if (!vcpu)
return PSCI_RET_INVALID_PARAMS;
if (!vcpu->arch.power_off) {
-  if (kvm_psci_version(source_vcpu) != KVM_ARM_PSCI_0_1)
+  if (kvm_psci_version(source_vcpu, kvm) != KVM_ARM_PSCI_0_1)
    return PSCI_RET_ALREADY_ON;
  else
    return PSCI_RET_INVALID_PARAMS;
}

-target_pc = vcpu_get_reg(source_vcpu, 2);
-context_id = vcpu_get_reg(source_vcpu, 3);
-
-kvm_reset_vcpu(vcpu);
+reset_state = &vcpu->arch.reset_state;

-/* Gracefully handle Thumb2 entry point */
-  if (vcpu_mode_is_32bit(vcpu) && (target_pc & 1)) {
-    target_pc &= ~((phys_addr_t) 1);
-    vcpu_set_thumb(vcpu);
-  }
+reset_state->pc = smccc_get_arg2(source_vcpu);

  /* Propagate caller endianness */
-if (kvm_vcpu_is_be(source_vcpu))
-kvm_vcpu_set_be(vcpu);
+reset_state->be = kvm_vcpu_is_be(source_vcpu);

-/*vcpu_pc(vcpu) = target_pc;
 /*
 * NOTE: We always update r0 (or x0) because for PSCI v0.1
 *     the general purpose registers are undefined upon CPU_ON.
 */
-vcpu_set_reg(vcpu, 0, context_id);
-vcpu->arch.power_off = false;
-smp_mb();/* Make sure the above is visible */
+reset_state->r0 = smccc_get_arg3(source_vcpu);

-wq = kvm_arch_vcpu_wq(vcpu);
-swake_up(wq);
+WRITE_ONCE(reset_state->reset, true);
+kvm_make_request(KVM_REQ_VCPU_RESET, vcpu);
+
+/*
 + * Make sure the reset request is observed if the change to
 + * power_state is observed.
 + */
+smp_wmb();
+
+vcpu->arch.power_off = false;
+kvm_vcpu_wake_up(vcpu);

return PSCI_RET_SUCCESS;
}
return KVM_ARM_PSCI_0_2;
-
return KVM_ARM_PSCI_0_1;
-}
-
static int kvm_psci_0_2_call(struct kvm_vcpu *vcpu)
{
    struct kvm *kvm = vcpu->kvm;
    unsigned long psci_fn = vcpu_get_reg(vcpu, 0) & ~((u32) 0);
    u32 psci_fn = smccc_get_function(vcpu);
    unsigned long val;
    int ret = 1;

    @ @ -221.7 +242.7 @ @
    * Bits[31:16] = Major Version = 0
    * Bits[15:0] = Minor Version = 2
    */
    -val = 2;
    +val = KVM_ARM_PSCI_0_2;
    break;
    case PSCI_0_2_FN_CPU_SUSPEND:
    case PSCI_0_2_FN64_CPU_SUSPEND:
    @@ -278,14 +299,56 @@
        break;
    }
    -vcpu_set_reg(vcpu, 0, val);
    +smccc_set_retval(vcpu, val, 0, 0);
    +return ret;

    +
    +static int kvm_psci_1_0_call(struct kvm_vcpu *vcpu)
    +{
        +u32 psci_fn = smccc_get_function(vcpu);
        +u32 feature;
        +unsigned long val;
        +int ret = 1;
        +
        +switch(psci_fn) {
            +case PSCI_0_2_FN_PSCI_VERSION:
                +val = KVM_ARM_PSCI_1_0;
                +break;
            +case PSCI_1_0_FN_PSCI_FEATURES:
                +feature = smccc_get_arg1(vcpu);
                +switch(feature) {
                    +case PSCI_0_2_FN_PSCI_VERSION:
                    +case PSCI_0_2_FN_PSCI_FEATURES:
                    +case PSCI_0_2_FN64_CPU_SUSPEND:
                    +case PSCI_0_2_FN64_CPU_SUSPEND:


+case PSCI_0_2_FN_CPU_OFF:
+case PSCI_0_2_FN_CPU_ON:
+case PSCI_0_2_FN64_CPU_ON:
+case PSCI_0_2_FN_AFFINITY_INFO:
+case PSCI_0_2_FN64_AFFINITY_INFO:
+case PSCI_0_2_FN_MIGRATE_INFO_TYPE:
+case PSCI_0_2_FN_SYSTEM_OFF:
+case PSCI_0_2_FN_SYSTEM_RESET:
+case PSCI_1_0_FN_PSCI_FEATURES:
+case ARM_SMCCC_VERSION_FUNC_ID:
+val = 0;
+break;
+default:
+val = PSCI_RET_NOT_SUPPORTED;
+break;
+
+default:
+break;
+default:
+return kvm_psci_0_2_call(vcpu);
+
+smccc_set_retval(vcpu, val, 0, 0, 0);
+return ret;
+
+static int kvm_psci_0_1_call(struct kvm_vcpu *vcpu) {
+struct kvm *kvm = vcpu->kvm;
+-unsigned long psci_fn = vcpu_get_reg(vcpu, 0) & ~((u32) 0);
+u32 psci_fn = smccc_get_function(vcpu);
+unsigned long val;
+
+switch (psci_fn) {
+@ @ .303,7 +366,7 @ @
+break;
+}
+
-vcpu_set_reg(vcpu, 0, val);
+smccc_set_retval(vcpu, val, 0, 0, 0);
+return 1;
+
+@
+* Errors:
+* EINVAL: Unrecognized PSCI function
+*/
+int kvm_psci_call(struct kvm_vcpu *vcpu) {
+static int kvm_psci_call(struct kvm_vcpu *vcpu)
switch (kvm_psci_version(vcpu)) {
    case KVM_ARM_PSCI_1_0:
        return kvm_psci_1_0_call(vcpu);
    case KVM_ARM_PSCI_0_2:
        return kvm_psci_0_2_call(vcpu);
    case KVM_ARM_PSCI_0_1:
        return -EINVAL;
};

int kvm_hvc_call_handler(struct kvm_vcpu *vcpu) {
    u32 func_id = smccc_get_function(vcpu);
    u32 val = SMCCC_RET_NOT_SUPPORTED;
    u32 feature;

    switch (func_id) {
        case ARM_SMCCC_VERSION_FUNC_ID:
            val = ARM_SMCCC_VERSION_1_1;
            break;
        case ARM_SMCCC_ARCH_FEATURES_FUNC_ID:
            feature = smccc_get_arg1(vcpu);
            switch(feature) {
                case ARM_SMCCC_ARCH_WORKAROUND_1:
                    if (kvm_arm_harden_branch_predictor())
                        val = SMCCC_RET_SUCCESS;
                    break;
                case ARM_SMCCC_ARCH_WORKAROUND_2:
                switch (kvm_arm_have_ssbd()) {
                    case KVM_SSBD_FORCE_DISABLE:
                        break;
                    case KVM_SSBD_FORCE_ENABLE:
                        case KVM_SSBD_MITIGATED:
                            val = SMCCC_RET_NOT_REQUIRED;
                            break;
                    default:
                        return kvm_psci_call(vcpu);
                }
            }
    }
    return val;
}
+} + +smccc_set_retval(vcpu, val, 0, 0, 0); +return 1; +} + +int kvm_arm_get_fw_num_regs(struct kvm_vcpu *vcpu) +{ +return 1; /* PSCI version */ +} + +int kvm_arm_copy_fw_reg_indices(struct kvm_vcpu *vcpu, u64 __user *uindices) +{ +if (put_user(KVM_REG_ARM_PSCI_VERSION, uindices)) +return -EFAULT; + +return 0; +} + +int kvm_arm_get_fw_reg(struct kvm_vcpu *vcpu, const struct kvm_one_reg *reg) +{ +if (reg->id == KVM_REG_ARM_PSCI_VERSION) { +void __user *uaddr = (void __user*)(long)reg->addr; +u64 val; + +val = kvm_psci_version(vcpu, vcpu->kvm); +if (copy_to_user(uaddr, &val, KVM_REG_SIZE(reg->id))) +return -EFAULT; + +return 0; +} + +return -EINVAL; +} + +int kvm_arm_set_fw_reg(struct kvm_vcpu *vcpu, const struct kvm_one_reg *reg) +{ +if (reg->id == KVM_REG_ARM_PSCI_VERSION) { +void __user *uaddr = (void __user*)(long)reg->addr; +bool wants_02; +u64 val; + +if (copy_from_user(&val, uaddr, KVM_REG_SIZE(reg->id))) +return -EFAULT; + +wants_02 = test_bit(KVM_ARM_VCPU_PSCI_0_2, vcpu->arch.features); + +switch (val) {
case KVM_ARM_PSCI_0_1:
+if (wants_02)
+return -EINVAL;
+vcpu->kvm->arch.psci_version = val;
+return 0;
+case KVM_ARM_PSCI_0_2:
+case KVM_ARM_PSCI_1_0:
+if (!wants_02)
+return -EINVAL;
+vcpu->kvm->arch.psci_version = val;
+return 0;
+
+return -EINVAL;
+
+--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic-debug.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic-debug.c
@@ -211,6 +211,7 @@
struct vgic_state_iter *iter = (struct vgic_state_iter *)v;
struct vgic_irq *irq;
struct kvm_vcpu *vcpu = NULL;
+unsigned long flags;

if (iter->dist_id == 0) {
print_dist_state(s, &kvm->arch.vgic);
@@ -227,9 +228,9 @@
irq = &kvm->arch.vgic.spis[iter->intid - VGIC_NR_PRIVATE_IRQS];
 }

-spin_lock(&irq->irq_lock);
+spin_lock_irqsave(&irq->irq_lock, flags);
print_irq_state(s, irq, vcpu);
-spin_unlock(&irq->irq_lock);
+spin_unlock_irqrestore(&irq->irq_lock, flags);

return 0;
}

--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic-init.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic-init.c
@@ -64,7 +64,7 @@
struct vgic_dist *dist = &kvm->arch.vgic;
 }

INIT_LIST_HEAD(&dist->lpi_list_head);
-spin_lock_init(&dist->lpi_list_lock);
+raw_spin_lock_init(&dist->lpi_list_lock);
}
if (vgic_initialized(kvm))
return 0;

/* Are we also in the middle of creating a VCPU? */
++if (kvm->created_vcpus != atomic_read(&kvm->online_vcpus))
+return -EBUSY;
+
/* freeze the number of spis */
++if (!dist->nr_spis)
dist->nr_spis = VGIC_NR_IRQS_LEGACY - VGIC_NR_PRIVATE_IRQS;
--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic-its.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic-its.c
@@ -52,6 +52,7 @@
{                        
  struct vgic_dist *dist = &kvm->arch.vgic;
  struct vgic_irq *irq = vgic_get_irq(kvm, NULL, intid), *oldirq;
+  unsigned long flags;
  int ret;

  /* In this case there is no put, since we keep the reference. */
@@ -71,7 +72,7 @@
    irq->intid = intid;
    irq->target_vcpu = vcpu;

-    spin_lock(&dist->lpi_list_lock);
-    raw_spin_lock_irqsave(&dist->lpi_list_lock, flags);
+
/*
 * There could be a race with another vgic_add_lpi(), so we need to
 @@ -99,20 +100,27 @@
    out_unlock:
    spin_unlock(&dist->lpi_list_lock);
    raw_spin_unlock_irqrestore(&dist->lpi_list_lock, flags);

/*
 * We "cache" the configuration table entries in our struct vgic_irq's.
 * However we only have those structs for mapped IRQs, so we read in
 * the respective config data from memory here upon mapping the LPI.
 + *
 + * Should any of these fail, behave as if we couldn't create the LPI
 + * by dropping the refcount and returning the error.
 */
    ret = update_lpi_config(kvm, irq, NULL, false);
-    if (ret)
+if (ret) {
+vgic_put_irq(kvm, irq);
+return ERR_PTR(ret);
+
+
+ret = vgic_v3_lpi_sync_pending_status(kvm, irq);
- if (ret)
+ if (ret) {
+vgic_put_irq(kvm, irq);
+return ERR_PTR(ret);
+
return irq;
}
@@ -280,8 +288,8 @@
int ret;
unsigned long flags;

-ret = kvm_read_guest(kvm, propbase + irq->intid - GIC_LPI_OFFSET,
- &prop, 1);
+ret = kvm_read_guest_lock(kvm, propbase + irq->intid - GIC_LPI_OFFSET,
+ &prop, 1);

if (ret)
return ret;
@@ -315,28 +323,32 @@
{
struct vgic_dist *dist = &vcpu->kvm->arch.vgic;
struct vgic_irq *irq;
+unsigned long flags;
+u32 *intids;
-int irq_count = dist->lpi_list_count, i = 0;
+int irq_count, i = 0;

/*@ -315,28 +323,32 @@ *
*/
- * We use the current value of the list length, which may change
- * after the kmalloc. We don’t care, because the guest shouldn’t
- * change anything while the command handling is still running,
- * and in the worst case we would miss a new IRQ, which one wouldn’t
- * expect to be covered by this command anyway.
+ * There is an obvious race between allocating the array and LPIs
+ * being mapped/unmapped. If we ended up here as a result of a
+ * command, we’re safe (locks are held, preventing another
+ * command). If coming from another path (such as enabling LPIs),
+ * we must be careful not to overrun the array.
 */
+irq_count = READ_ONCE(dist->lpi_list_count);
intids = kmalloc_array(irq_count, sizeof(intids[0]), GFP_KERNEL);

if (!intids)
    return -ENOMEM;

    -spin_lock(&dist->lpi_list_lock);
+raw_spin_lock_irqsave(&dist->lpi_list_lock, flags);
list_for_each_entry(irq, &dist->lpi_list_head, lpi_list) {
+if (i == irq_count)
    +break;
/* We don't need to "get" the IRQ, as we hold the list lock. */
if (irq->target_vcpu != vcpu)
    continue;
intids[i++] = irq->intid;
}
    -spin_unlock(&dist->lpi_list_lock);
+raw_spin_unlock_irqrestore(&dist->lpi_list_lock, flags);

*intid_ptr = intids;
return i;
@@ -345,10 +357,11 @@
static int update_affinity(struct vgic_irq *irq, struct kvm_vcpu *vcpu)
{
    int ret = 0;
    +unsigned long flags;

-    spin_lock(&irq->irq_lock);
+    spin_lock_irqsave(&irq->irq_lock, flags);
    irq->target_vcpu = vcpu;
-    spin_unlock(&irq->irq_lock);
+    spin_unlock_irqrestore(&irq->irq_lock, flags);

    if (irq->hw) {
        struct its_vlpi_map map;
        @@ -438,8 +451,9 @@
            * this very same byte in the last iteration. Reuse that.
            */
        if (byte_offset != last_byte_offset) {
+            ret = kvm_read_guest_lock(vcpu->kvm, pendbase + byte_offset,
-            &pendmask, 1);
+            ret = kvm_read_guest(vcpu->kvm, pendbase + byte_offset,
+                &pendmask, 1);
            if (ret) {
                kfree(intids);
                return ret;
            }
        }
    }

    int l1_tbl_size = GITS_BASER_NR_PAGES(baser) * SZ_64K;
    u64 indirect_ptr, type = GITS_BASER_TYPE(baser);
    int esz = GITS_BASER_ENTRY_SIZE(baser);
-int index;
+int index, idx;
gfn_t gfn;
+bool ret;

switch (type) {
  case GITS_BASER_TYPE_DEVICE:
    @ @ -774,7 +789,8 @@

    if (eaddr)
      *eaddr = addr;
    -return kvm_is_visible_gfn(its->dev->kvm, gfn);
    +
    +goto out;
  }

  /* calculate and check the index into the 1st level */
  @ @ -783,7 +799,7 @@
  return false;

  /* Each 1st level entry is represented by a 64-bit value. */
  -if (kvm_read_guest(its->dev->kvm,
  +if (kvm_read_guest_lock(its->dev->kvm,
      BASER_ADDRESS(baser) + index * sizeof(indirect_ptr),
      &indirect_ptr, sizeof(indirect_ptr)))
  return false;
  @ @ -808,7 +824,12 @@

  if (eaddr)
    *eaddr = indirect_ptr;
  -return kvm_is_visible_gfn(its->dev->kvm, gfn);
  +
  +out:
  +idx = srcu_read_lock(&its->dev->kvm->srcu);
  +ret = kvm_is_visible_gfn(its->dev->kvm, gfn);
  +srcu_read_unlock(&its->dev->kvm->srcu, idx);
  +return ret;
  }

static int vgic_its_alloc_collection(struct vgic_its *its,
  @ @ -1366,8 +1387,8 @@
  cbaser = CBASER_ADDRESS(its->cbaser);

    while (its->cwriter != its->creadr) {
      -int ret = kvm_read_guest(kvm, cbaser + its->creadr,
        -cmd_buf, ITS_CMD_SIZE);
      +int ret = kvm_read_guest_lock(kvm, cbaser + its->creadr,
        +cmd_buf, ITS_CMD_SIZE);
If `kvm_read_guest()` fails, this could be due to the guest
programming a bogus value in CBASER or something else going

```c
mutex_unlock(&(its->its_lock);
kfree(its);
+kfree(kvm_dev); /* alloc by kvm_ioctl_create_device, free by .destroy */
}
```

```c
int vgic_its_has_attr_regs(struct kvm_device *dev,
 @@ -1892,7 +1914,7 @@
 int next_offset;
 size_t byte_offset;

 -ret = kvm_read_guest(kvm, gpa, entry, esz);
 +ret = kvm_read_guest_lock(kvm, gpa, entry, esz);
 if (ret)
 return ret;

 @@ -2070,7 +2092,7 @@
     ((u64)ite->irq->intid << KVM_ITS_ITE_PINTID_SHIFT) |
     ite->collection->collection_id;
     val = cpu_to_le64(val);
 -return kvm_write_guest(kvm, gpa, &val, ite_esz);
 +return kvm_write_guest_lock(kvm, gpa, &val, ite_esz);
 }

 /**
 @@ -2250,7 +2272,7 @@
     ((u64)collection->target_addr << KVM_ITS_CTE_RDBASE_SHIFT) |
     collection->collection_id);
     val = cpu_to_le64(val);
 -return kvm_write_guest(its->dev->kvm, gpa, &val, esz);
 +return kvm_write_guest_lock(its->dev->kvm, gpa, &val, esz);
 }

 static int vgic_its_restore_cte(struct vgic_its *its, gpa_t gpa, int esz)
 @@ -2262,7 +2284,7 @@
```
int ret;

BUG_ON(esz > sizeof(val));
- ret = kvm_read_guest(kvm, gpa, &val, esz);
+ ret = kvm_read_guest_lock(kvm, gpa, &val, esz);
if (ret)
 return ret;
val = le64_to_cpu(val);
@@ -2272,7 +2294,8 @@
target_addr = (u32)(val >> KVM_ITS_CTE_RDBASE_SHIFT);
coll_id = val & KVM_ITS_CTE_ICID_MASK;

- if (target_addr >= atomic_read(&kvm->online_vcpus))
+ if (target_addr != COLLECTION_NOT_MAPPED &&
+ target_addr >= atomic_read(&kvm->online_vcpus))
 return -EINVAL;

collection = find_collection(its, coll_id);
@@ -2321,7 +2344,7 @@ */
 val = 0;
 BUG_ON(cte_esz > sizeof(val));
- ret = kvm_write_guest(its->dev->kvm, gpa, &val, cte_esz);
+ ret = kvm_write_guest_lock(its->dev->kvm, gpa, &val, cte_esz);
 return ret;
}

--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic-mmio-v2.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic-mmio-v2.c
@@ -14,6 +14,8 @@
 #include <linux/irqchip/arm-gic.h>
 #include <linux/kvm.h>
 #include <linux/kvm_host.h>
+#include <linux/nospec.h>
+
 #include <kvm/iodev.h>
 #include <kvm/arm_vgic.h>

@@ -324,6 +326,9 @@
 if (n > vgic_v3_max_apr_idx(vcpu))
 return 0;
+
+n = array_index_nospec(n, 4);
+/* GICv3 only uses ICH_AP1Rn for memory mapped (GICv2) guests */
 return vgicv3->vgic_ap1r[n];
}
if (n > vgic_v3_max_apr_idx(vcpu))
return;
+
+n = array_index_nospec(n, 4);
+
/* GICv3 only uses ICH_AP1Rn for memory mapped (GICv2) guests */
vgicv3->vgic_ap1r[n] = val;
}
--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic-mmio.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic-mmio.c
@@ -112,9 +112,12 @@*/
     /* Loop over all IRQs affected by this read */
     for (i = 0; i < len * 8; i++) {
       struct vgic_irq *irq = vgic_get_irq(vcpu->kvm, vcpu, intid + i);
+       unsigned long flags;
       +spin_lock_irqsave(&irq->irq_lock, flags);
       if (irq_is_pending(irq))
         value |= (1U << i);
+       spin_unlock_irqrestore(&irq->irq_lock, flags);

       vgic_put_irq(vcpu->kvm, irq);
     }
@@ -122,6 +125,12 @@*/
 return value;
}
+static bool is_vgic_v2_sgi(struct kvm_vcpu *vcpu, struct vgic_irq *irq)
+{
+  return (vgic_irq_is_sgi(irq->intid) &&
+    vcpu->kvm->arch.vgic.vgic_model == KVM_DEV_TYPE_ARM_VGIC_V2);
+}
+
void vgic_mmio_write_spending(struct kvm_vcpu *vcpu,
    gpa_t addr, unsigned int len,
    unsigned long val)
@@ -133,6 +142,12 @@*/
     for_each_set_bit(i, &val, len * 8) {
       struct vgic_irq *irq = vgic_get_irq(vcpu->kvm, vcpu, intid + i);
+
/* GICD_ISPENDR0 SGI bits are WI */
+if (is_vgic_v2_sgi(vcpu, irq)) {
+  vgic_put_irq(vcpu->kvm, irq);
+  continue;
+}
+
spin_lock_irqsave(&irq->irq_lock, flags);
irq->pending_latch = true;

@@ -152,6 +167,12 @@
for_each_set_bit(i, &val, len * 8) {
    struct vgic_irq *irq = vgic_get_irq(vcpu->kvm, vcpu, intid + i);
    +/* GICD_ICPENDR0 SG1 bits are WI */
    +if (is_vgic_v2_sgi(vcpu, irq)) {
    +vgic_put_irq(vcpu->kvm, irq);
    +continue;
    +}
    +
    spin_lock_irqsave(&irq->irq_lock, flags);

    irq->pending_latch = false;
@@ -203,22 +224,6 @@ */
    requester_vcpu = kvm_arm_get_running_vcpu();

    /*
    - * If this virtual IRQ was written into a list register, we
    - * have to make sure the CPU that runs the VCPU thread has
    - * synced back the LR state to the struct vgic_irq.
    - *
    - * As long as the conditions below are true, we know the VCPU thread
    - * may be on its way back from the guest (we kicked the VCPU thread in
    - * vgic_change_active_prepare) and still has to sync back this IRQ,
    - * so we release and re-acquire the spin_lock to let the other thread
    - * sync back the IRQ.
    - */
    -while (irq->vcpu && /* IRQ may have state in an LR somewhere */
    -     irq->vcpu != requester_vcpu && /* Current thread is not the VCPU thread */
    -     irq->vcpu->cpu != -1) /* VCPU thread is running */
    -cond_resched_lock(&irq->irq_lock);
    -
    irq->active = new_active_state;
    if (new_active_state)
    vgic_queue_irq_unlock(vcpu->kvm, irq, flags);
@@ -243,14 +248,16 @@ */
    static void vgic_change_active_prepare(struct kvm_vcpu *vcpu, u32 intid)
    {
    -if (intid > VGIC_NR_PRIVATE_IRQS)
        +if (vcpu->kvm->arch.vgic.vgic_model == KVM_DEV_TYPE_ARM_VGIC_V3 ||
        +    intid >= VGIC_NR_PRIVATE_IRQS)
            kvm_arm_halt_guest(vcpu->kvm);
    }
static void vgic_change_active_finish(struct kvm_vcpu *vcpu, u32 intid)
{
    if (intid > VGIC_NR_PRIVATE_IRQS)
    {
        kvm_arm_resume_guest(vcpu->kvm);
    }
}

void vgic_v2_set_npie(struct kvm_vcpu *vcpu)
{
    struct vgic_v2_cpu_if *cpuif = &vcpu->arch.vgic_cpu.vgic_v2;
    cpuif->vgic_hcr |= GICH_HCR_NPIE;
}

void vgic_v2_set_underflow(struct kvm_vcpu *vcpu)
{
    struct vgic_v2_cpu_if *cpuif = &vcpu->arch.vgic_cpu.vgic_v2;
    cpuif->vgic_hcr &= ~(GICH_HCR_UIE | GICH_HCR_NPIE);
    for (lr = 0; lr < vgic_cpu->used_lrs; lr++) {
        u32 val = cpuif->vgic_lr[lr];
        if (vgic_irq_is_sgi(irq->intid)) {
            u32 src = ffs(irq->source);
            if (WARN_RATELIMIT(!src, "No SGI source for INTID %d\n",
                irq->intid))
                return;
            val |= (src - 1) << GICH_LR_PHYSID_CPUID_SHIFT;
            irq->source &= ~(1 << (src - 1));
        }
    }
}

--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic-v2.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic-v2.c
@@ -37,6 +37,13 @@
     vgic_v2_write_lr(i, 0);
 }

+void vgic_v2_set_npie(struct kvm_vcpu *vcpu)
+{
+    struct vgic_v2_cpu_if *cpuif = &vcpu->arch.vgic_cpu.vgic_v2;
+    cpuif->vgic_hcr |= GICH_HCR_NPIE;
+}
+
+void vgic_v2_set_underflow(struct kvm_vcpu *vcpu)
+{
+    struct vgic_v2_cpu_if *cpuif = &vcpu->arch.vgic_cpu.vgic_v2;
+    cpuif->vgic_hcr &= ~GICH_HCR_UIE;
+    cpuif->vgic_hcr &= ~(GICH_HCR_UIE | GICH_HCR_NPIE);
+
    for (lr = 0; lr < vgic_cpu->used_lrs; lr++) {
        u32 val = cpuif->vgic_lr[lr];
        if (vgic_irq_is_sgi(irq->intid)) {
            u32 src = ffs(irq->source);
            if (WARN_RATELIMIT(!src, "No SGI source for INTID %d\n",
                irq->intid))
                return;
            val |= (src - 1) << GICH_LR_PHYSID_CPUID_SHIFT;
            irq->source &= ~(1 << (src - 1));
        }
    }
"}
kvm_vgic_global_state.type = VGIC_V2;
kvm_vgic_global_state.max_gic_vcpus = VGIC_V2_MAX_CPUS;

-kvm_info("vgic-v2@%llx\n", info->vctrl.start);
+kvm_debug("vgic-v2@%llx\n", info->vctrl.start);

return 0;
out:
@@ -401,10 +411,19 @@
writel_relaxed(cpu_if->vgic_vmcr, vgic->vctrl_base + GICH_VMCR);
}

-void vgic_v2_put(struct kvm_vcpu *vcpu)
+void vgic_v2_vmcr_sync(struct kvm_vcpu *vcpu)
{
 struct vgic_v2_cpu_if *cpu_if = &vcpu->arch.vgic_cpu.vgic_v2;
 struct vgic_dist *vgic = &vcpu->kvm->arch.vgic;

cpu_if->vgic_vmcr = readl_relaxed(vgic->vctrl_base + GICH_VMCR);
}
+
+void vgic_v2_put(struct kvm_vcpu *vcpu)
+{
+  struct vgic_v2_cpu_if *cpu_if = &vcpu->arch.vgic_cpu.vgic_v2;
+  struct vgic_dist *vgic = &vcpu->kvm->arch.vgic;
+  vgic_v2_vmcr_sync(vcpu);
+  cpu_if->vgic_apr = readl_relaxed(vgic->vctrl_base + GICH_APR);
+}
--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic-v3.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic-v3.c
@@ -26,6 +26,13 @@
static bool common_trap;
static bool gicv4_enable;
+void vgic_v3_set_npie(struct kvm_vcpu *vcpu)
+{
+  struct vgic_v3_cpu_if *cpuif = &vcpu->arch.vgic_cpu.vgic_v3;
+  cpuif->vgic_hcr |= ICH_HCR_NPIE;
+}
+void vgic_v3_set_underflow(struct kvm_vcpu *vcpu)
{
 struct vgic_v3_cpu_if *cpuif = &vcpu->arch.vgic_cpu.vgic_v3;
 @@ -47,7 +54,7 @@
int lr;
unsigned long flags;
cpuif->vgic_hcr &= ~ICH_HCR_UIE;
+cpuif->vgic_hcr &= ~(ICH_HCR_UIE | ICH_HCR_NPIE);

for (lr = 0; lr < vgic_cpu->used_lrs; lr++) {
  u64 val = cpuif->vgic_lr[lr];
  @ @ -119,7 +126,10 @@
    model == KVM_DEV_TYPE_ARM_VGIC_V2) {
    u32 src = ffs(irq->source);

    -BUG_ON(!src);
    +if (WARN_RATELIMIT(!src, "No SGI source for INTID %d\n",
      +  irq->intid))
      +return;
    +
    val |= (src - 1) << GICH_LR_PHYSID_CPUID_SHIFT;
    irq->source &= ~(1 << (src - 1));
    if (irq->source)
      @@ -293,7 +303,7 @@
        bit_nr = irq->intid % BITS_PER_BYTE;
        ptr = pendbase + byte_offset;

        -ret = kvm_read_guest(kvm, ptr, &val, 1);
        +ret = kvm_read_guest_lock(kvm, ptr, &val, 1);
        if (ret)
          return ret;
      @@ -310,7 +320,7 @@
      if (status) {
        /* clear consumed data */
        val &= ~(1 << bit_nr);
        -ret = kvm_write_guest(kvm, ptr, &val, 1);
        +ret = kvm_write_guest_lock(kvm, ptr, &val, 1);
        if (ret)
          return ret;
      } @ @ -324,8 +334,8 @@
      int vgic_v3_save_pending_tables(struct kvm *kvm)
      {
        struct vgic_dist *dist = &kvm->arch.vgic;
        -int last_byte_offset = -1;
        struct vgic_irq *irq;
        +gpa_t last_ptr = ~(gpa_t)0;
        int ret;
        u8 val;

        @@ -345,11 +355,11 @@
        bit_nr = irq->intid % BITS_PER_BYTE;
ptr = pendbase + byte_offset;

- if (byte_offset != last_byte_offset) {
- ret = kvm_read_guest(kvm, ptr, &val, 1);
+ if (ptr != last_ptr) {
+ ret = kvm_read_guest_lock(kvm, ptr, &val, 1);
if (ret)
return ret;
- last_byte_offset = byte_offset;
+ last_ptr = ptr;
}

stored = val & (1U << bit_nr);
@@ -361,7 +371,7 @@
else
val &= ~((1U << bit_nr);

- ret = kvm_write_guest(kvm, ptr, &val, 1);
+ ret = kvm_write_guest_lock(kvm, ptr, &val, 1);
if (ret)
return ret;
}
@@ -501,11 +511,6 @@
pr_warn("GICV physical address 0x%llx not page aligned\n",
(unsigned long long)info->vcpu.start);
kvm_vgic_global_state.vcpu_base = 0;
- } else if (!PAGE_ALIGNED(resource_size(&info->vcpu))) {
- pr_warn("GICV size 0x%llx not a multiple of page size 0x%lx\n",
- (unsigned long long)resource_size(&info->vcpu),
- PAGE_SIZE);
- kvm_vgic_global_state.vcpu_base = 0;
} else {
    kvm_vgic_global_state.vcpu_base = info->vcpu.start;
kvm_vgic_global_state.can_emulate_gicv2 = true;
@@ -561,10 +566,15 @@
kvm_call_hyp(__vgic_v3_write_vmcr, cpu_if->vgic_vmcr);
}

-void vgic_v3_put(struct kvm_vcpu *vcpu)
+void vgic_v3_vmcr_sync(struct kvm_vcpu *vcpu)
{
struct vgic_v3_cpu_if *cpu_if = &vcpu->arch.vgic_cpu.vgic_v3;

if (likely(cpu_if->vgic_sre))
    cpu_if->vgic_vmcr = kvm_call_hyp(__vgic_v3_read_vmcr);
}
+void vgic_v3_put(struct kvm_vcpu *vcpu)
+{  
+vgic_v3_vmcr_sync(vcpu);  
+
--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic.c
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic.c
@@ -14,11 +14,12 @@
* along with this program. If not, see <http://www.gnu.org/licenses/>. *
*/

+#include <linux/interrupt.h>
+#include <linux/irq.h>
#include <linux/kvm.h>
#include <linux/kvm_host.h>
#include <linux/list_sort.h>
-#include <linux/interrupt.h>
-#include <linux/irq.h>
+#include <linux/nospec.h>

#include "vgic.h"

@@ -40,9 +41,13 @@
* kvm->lock (mutex)
* its->cmd_lock (mutex)
* its->its_lock (mutex)
- *       vgic_cpu->ap_list_lock
- *         kvm->lpi_list_lock
- *           vgic_irq->irq_lock
+ *       vgic_cpu->ap_list_lock		must be taken with IRQs disabled
+ *         kvm->lpi_list_lock		must be taken with IRQs disabled
+ *           vgic_irq->irq_lock		must be taken with IRQs disabled
+ *
+ * As the ap_list_lock might be taken from the timer interrupt handler,
+ * we have to disable IRQs before taking this lock and everything lower
+ * than it.
*
+ * If you need to take multiple locks, always take the upper lock first,
+ * then the lower ones, e.g. first take the its_lock, then the irq_lock.
@@ -69,8 +74,9 @@
{
struct vgic_dist *dist = &kvm->arch.vgic;
struct vgic_irq *irq = NULL;
+unsigned long flags;

-spin_lock(&dist->lpi_list_lock);
+raw_spin_lock_irqsave(&dist->lpi_list_lock, flags);

list_for_each_entry(irq, &dist->lpi_list_head, lpi_list) {
  if (irq->intid != intid)
irq = NULL;

out_unlock:
- spin_unlock(&dist->lpi_list_lock);
+ raw_spin_unlock_irqrestore(&dist->lpi_list_lock, flags);

return irq;
}

/* SGIs and PPIs */
-if (intid <= VGIC_MAX_PRIVATE)
+if (intid <= VGIC_MAX_PRIVATE) {
- intid = array_index_nospec(intid, VGIC_MAX_PRIVATE + 1);
+ intid = array_index_nospec(intid, VGIC_MAX_PRIVATE + 1);
  return &vcpu->arch.vgic_cpu.private_irqs[intid];
+

/* SPIs */
-if (intid <= VGIC_MAX_SPI)
+if (intid < (kvm->arch.vgic.nr_spis + VGIC_NR_PRIVATE_IRQS)) {
  intid = array_index_nospec(intid, kvm->arch.vgic.nr_spis + VGIC_NR_PRIVATE_IRQS);
  return &kvm->arch.vgic.spis[intid - VGIC_NR_PRIVATE_IRQS];
+}

/* LPIs */
if (intid >= VGIC_MIN_LPI)

void vgic_put_irq(struct kvm *kvm, struct vgic_irq *irq)
{
  struct vgic_dist *dist = &kvm->arch.vgic;
+ unsigned long flags;

  if (irq->intid < VGIC_MIN_LPI)
    return;

  - spin_lock(&dist->lpi_list_lock);
+ raw_spin_lock_irqsave(&dist->lpi_list_lock, flags);
  if (!kref_put(&irq->refcount, vgic_irq_release)) {
- spin_unlock(&dist->lpi_list_lock);
+ raw_spin_unlock_irqrestore(&dist->lpi_list_lock, flags);
    return;
  }

  list_del(&irq->lpi_list);
  dist->lpi_list_count--;
  - spin_unlock(&dist->lpi_list_lock);

  /*...*/
raw spin_unlock_irqrestore(&dist->lpi_list_lock, flags);

kfree(irq);
}
@@ -205,6 +216,13 @@
bool penda, pendb;
int ret;

/*
 * list_sort may call this function with the same element when
 * the list is fairly long.
 */
+if (unlikely(irqa == irqb))
+  return 0;
+
spin_lock(&irqa->irq_lock);
spin_lock_nested(&irqb->irq_lock, SINGLE_DEPTH_NESTING);
@@ -460,6 +478,32 @@
return ret;
}

/*
 * kvm_vgic_reset_mapped_irq - Reset a mapped IRQ
 * @vcpu: The VCPU pointer
 * @vintid: The INTID of the interrupt
 */
+void kvm_vgic_reset_mapped_irq(struct kvm_vcpu *vcpu, u32 vintid)
+{
+  struct vgic_irq *irq = vgic_get_irq(vcpu->kvm, vcpu, vintid);
+  unsigned long flags;
+
+  if (!irq->hw)
+    goto out;
+
+spin_lock_irqsave(&irq->irq_lock, flags);
+  irq->active = false;
+  irq->pending_latch = false;
+  irq->line_level = false;
+  spin_unlock_irqrestore(&irq->irq_lock, flags);
+out:
+  vgic_put_irq(vcpu->kvm, irq);
+}
int kvm_vgic_unmap_phys_irq(struct kvm_vcpu *vcpu, unsigned int vintid)
{
    struct vgic_irq *irq;
    list_for_each_entry_safe(irq, tmp, &vgic_cpu->ap_list_head, ap_list) {
        struct kvm_vcpu *target_vcpu, *vcpuA, *vcpuB;
        bool target_vcpu_needs_kick = false;

        spin_lock(&irq->irq_lock);

        list_del(&irq->ap_list);
        irq->vcpu = target_vcpu;
        list_add_tail(&irq->ap_list, &new_cpu->ap_list_head);
        target_vcpu_needs_kick = true;
    }

    spin_unlock(&irq->irq_lock);
    spin_unlock(&vcpuB->arch.vgic_cpu.ap_list_lock);
    spin_unlock_irqrestore(&vcpuA->arch.vgic_cpu.ap_list_lock, flags);
    +
    +if (target_vcpu_needs_kick) {
        +kvm_make_request(KVM_REQ_IRQ_PENDING, target_vcpu);
        +kvm_vcpu_kick(target_vcpu);
    +}
    +
    goto retry;
}

static inline void vgic_set_npie(struct kvm_vcpu *vcpu)
{
    if (kvm_vgic_global_state.type == VGIC_V2)
        vgic_v2_set_npie(vcpu);
    else
        vgic_v3_set_npie(vcpu);
}

/* Requires the ap_list_lock to be held. */
+static int compute_ap_list_depth(struct kvm_vcpu *vcpu, bool *multi_sgi)
{
    struct vgic_cpu *vgic_cpu = &vcpu->arch.vgic_cpu;
struct vgic_irq *irq;
int count = 0;

/*!multi_sgi = false;
+
DEBUG_SPINLOCK_BUG_ON(!spin_is_locked(&vgic_cpu->ap_list_lock));

list_for_each_entry(irq, &vgic_cpu->ap_list_head, ap_list) {
spin_lock(&irq->irq_lock);
/* GICv2 SGIs can count for more than one... */
-if (vgic_irq_is_sgi(irq->intid) && irq->source)
-count += hweight8(irq->source);
-else
+if (vgic_irq_is_sgi(irq->intid) && irq->source) {
  int w = hweight8(irq->source);
  +
  +count += w;
  +*multi_sgi |= (w > 1);
  +} else {
    count++;
    +}
spin_unlock(&irq->irq_lock);
}
return count;
@@ -675,28 +742,43 @@
{
struct vgic_cpu *vgic_cpu = &vcpu->arch.vgic_cpu;
struct vgic_irq *irq;
-int count = 0;
+int count;
+bool npie = false;
+bool multi_sgi;
+u8 prio = 0xff;

DEBUG_SPINLOCK_BUG_ON(!spin_is_locked(&vgic_cpu->ap_list_lock));

-if (compute_ap_list_depth(vcpu) > kvm_vgic_global_state.nr_Lr)
+count = compute_ap_list_depth(vcpu, &multi_sgi);
+if (count > kvm_vgic_global_state.nr_Lr || multi_sgi)
vgic_sort_ap_list(vcpu);

+count = 0;
+
list_for_each_entry(irq, &vgic_cpu->ap_list_head, ap_list) {
spin_lock(&irq->irq_lock);

-if (unlikely(vgic_target_oracle(irq) != vcpu))
-goto next;
/*
- * If we get an SGI with multiple sources, try to get
- * them in all at once.
+ * If we have multi-SGIs in the pipeline, we need to
+ * guarantee that they are all seen before any IRQ of
+ * lower priority. In that case, we need to filter out
+ * these interrupts by exiting early. This is easy as
+ * the AP list has been sorted already.
 */

do {
if (multi_sgi && irq->priority > prio) {
    spin_unlock(&irq->irq_lock);
    break;
}
    if (likely(vgic_target_oracle(irq) == vcpu)) {
        vgic_populate_lr(vcpu, irq, count++);
    }
} while (irq->source && count < kvm_vgic_global_state.nr_lr);

next:
if (irq->source) {
    npie = true;
    prio = irq->priority;
    if (!npie)
    vgic_set_npie(vcpu);
    vcpu->arch.vgic_cpu.used_lrs = count;

/* Nuke remaining LRs */
if (count == kvm_vgic_global_state.nr_lr) {
    vgic_v3_put(vcpu);
}

if (npie)
    vgic_set_npie(vcpu);

void kvm_vgic_vmcr_sync(struct kvm_vcpu *vcpu)
{
    if (unlikely(!irqchip_in_kernel(vcpu->kvm)))
        return;
}
+if (kvm_vgic_global_state.type == VGIC_V2)
+vgic_v2_vmrer_sync(vcpu);
+else
+vgic_v3_vmrer_sync(vcpu);
+
+int kvm_vgic_vcpu_pending_irq(struct kvm_vcpu *vcpu)
{  
    struct vgic_cpu *vgic_cpu = &vcpu->arch.vgic_cpu;
--- linux-4.15.0.orig/virt/kvm/arm/vgic/vgic.h
+++ linux-4.15.0/virt/kvm/arm/vgic/vgic.h
@@ -96,6 +96,7 @@
/* we only support 64 kB translation table page size */
#define KVM_ITS_L1E_ADDR_MASK GENMASK_ULL(51, 16)
+/* Requires the irq_lock to be held by the caller. */
static inline bool irq_is_pending(struct vgic_irq *irq)
{  
    if (irq->config == VGIC_CONFIG_EDGE)
@@ -151,6 +152,7 @@
void vgic_v2_populate_lr(struct kvm_vcpu *vcpu, struct vgic_irq *irq, int lr);
void vgic_v2_clear_lr(struct kvm_vcpu *vcpu, int lr);
void vgic_v2_set_underflow(struct kvm_vcpu *vcpu);
+void vgic_v2_set_npie(struct kvm_vcpu *vcpu);
int vgic_v2_has_attr_regs(struct kvm_device *dev, struct kvm_device_attr *attr);
int vgic_v2_dist_uaccess(struct kvm_vcpu *vcpu, bool is_write,
    int offset, u32 *val);
@@ -167,6 +169,7 @@
void vgic_v2_init_lrs(void);
void vgic_v2_load(struct kvm_vcpu *vcpu);
void vgic_v2_put(struct kvm_vcpu *vcpu);
+void vgic_v2_vmrer_sync(struct kvm_vcpu *vcpu);

static inline void vgic_get_irq_kref(struct vgic_irq *irq)
{  
    @ @ -180,6 +183,7 @@
void vgic_v3_populate_lr(struct kvm_vcpu *vcpu, struct vgic_irq *irq, int lr);
void vgic_v3_clear_lr(struct kvm_vcpu *vcpu, int lr);
void vgic_v3_set_underflow(struct kvm_vcpu *vcpu);
+void vgic_v3_set_npie(struct kvm_vcpu *vcpu);
void vgic_v3_set_vmrer(struct kvm_vcpu *vcpu, struct vgic_vmrer *vmcr);
void vgic_v3_get_vmrer(struct kvm_vcpu *vcpu, struct vgic_vmrer *vmcr);
void vgic_v3_enable(struct kvm_vcpu *vcpu);
@@ -193,6 +197,7 @@
void vgic_v3_load(struct kvm_vcpu *vcpu);
void vgic_v3_put(struct kvm_vcpu *vcpu);

void vgic_v3_load(struct kvm_vcpu *vcpu);
void vgic_v3_put(struct kvm_vcpu *vcpu);
+void vgic_v3_vmc_r_sync(struct kvm_vcpu *vcpu);

bool vgic_has_its(struct kvm *kvm);
int kvm_vgic_register_its_device(void);
--- linux-4.15.0.orig/virt/kvm/async_pf.c
+++ linux-4.15.0/virt/kvm/async_pf.c
@@ -76,7 +76,7 @@
 struct mm_struct *mm = apf->mm;
 struct kvm_vcpu *vcpu = apf->vcpu;
 unsigned long addr = apf->addr;
-gva_t gva = apf->gva;
+gpa_t cr2_or_gpa = apf->cr2_or_gpa;
 int locked = 1;

 might_sleep();
@@ -104,7 +104,7 @@
 * this point
 */

-int kvm_setup_async_pf(struct kvm_vcpu *vcpu, gva_t gva, unsigned long hva,
-\t	       struct kvm_arch_async_pf *arch)
+int kvm_setup_async_pf(struct kvm_vcpu *vcpu, gpa_t cr2_or_gpa,
\t	       unsigned long hva, struct kvm_arch_async_pf *arch)
 {
 struct kvm_async_pf *work;
@@ -197,7 +197,7 @@
 work->wakeup_all = false;
 work->vcpu = vcpu;
 -work->gva = gva;
+work->cr2_or_gpa = cr2_or_gpa;
 work->addr = hva;
 work->arch = *arch;
 work->mm = current->mm;
--- linux-4.15.0.orig/virt/kvm/coalesced_mmio.c
+++ linux-4.15.0/virt/kvm/coalesced_mmio.c
@@ -40,7 +40,7 @@
 return 1;
static int coalesced_mmio_has_room(struct kvm_coalesced_mmio_dev *dev) {
    unsigned avail;
    @@ -52,7 +52,7 @@
    * there is always one unused entry in the buffer */
    ring = dev->kvm->coalesced_mmio_ring;
    -avail = (ring->first - ring->last - 1) % KVM_COALESCED_MMIO_MAX;
    +avail = (ring->first - last - 1) % KVM_COALESCED_MMIO_MAX;
    if (avail == 0) {
        /* full */
        return 0;
    }
    /* copy data in first free entry of the ring */
    -ring->coalesced_mmio[ring->last].phys_addr = addr;
    -ring->coalesced_mmio[ring->last].len = len;
    -memcpy(ring->coalesced_mmio[ring->last].data, val, len);
    +ring->coalesced_mmio[insert].phys_addr = addr;
    +ring->coalesced_mmio[insert].len = len;
    +memcpy(ring->coalesced_mmio[insert].data, val, len);
    smp_wmb();
    -ring->last = (ring->last + 1) % KVM_COALESCED_MMIO_MAX;
    +ring->last = (insert + 1) % KVM_COALESCED_MMIO_MAX;
    spin_unlock(&dev->kvm->ring_lock);
    return 0;
}

static int coalesced_mmio_has_room(struct kvm_coalesced_mmio_dev *dev, u32 last) {
    struct kvm_coalesced_mmio_ring *ring;
    spin_lock(&dev->kvm->ring_lock);
    @@ -67,24 +67,27 @@
    }
    struct kvm_coalesced_mmio_dev *dev = to_mmio(this);
    struct kvm_coalesced_mmio_ring *ring = dev->kvm->coalesced_mmio_ring;
    +__u32 insert;
    if (!coalesced_mmio_in_range(dev, addr, len))
        return -EOPNOTSUPP;
    if (!coalesced_mmio_has_room(dev)) {
        insert = READ_ONCE(ring->last);
        if (!coalesced_mmio_has_room(dev, insert) ||
            insert >= KVM_COALESCED_MMIO_MAX) {
            spin_unlock(&dev->kvm->ring_lock);
            return -EOPNOTSUPP;
        }
    }
    /* copy data in first free entry of the ring */
    -ring->coalesced_mmio[ring->last].phys_addr = addr;
    -ring->coalesced_mmio[ring->last].len = len;
    -memcpy(ring->coalesced_mmio[ring->last].data, val, len);
    +ring->coalesced_mmio[insert].phys_addr = addr;
    +ring->coalesced_mmio[insert].len = len;
    +memcpy(ring->coalesced_mmio[insert].data, val, len);
    smp_wmb();
    -ring->last = (ring->last + 1) % KVM_COALESCED_MMIO_MAX;
    +ring->last = (insert + 1) % KVM_COALESCED_MMIO_MAX;
    spin_unlock(&dev->kvm->ring_lock);
    return 0;
static struct workqueue_struct *irqfd_cleanup_wq;

bool __attribute__((weak))
kvm_arch_irqfd_allowed(struct kvm *kvm, struct kvm_irqfd *args)
{
  return true;
}

static void
irqfd_inject(struct work_struct *work)
{
  struct kvm_kernel_irqfd *irqfd =
  container_of(work, struct kvm_kernel_irqfd, shutdown);
  struct kvm *kvm = irqfd->kvm;
  u64 cnt;

  /* Make sure irqfd has been initialized in assign path. */
  synchronize_srcu(&kvm->irq_srcu);

  /* Synchronize with the wait-queue and unhook ourselves to prevent
   * further events.
   */
  if (!kvm_arch_irqfd_allowed(kvm, args))
    return -EINVAL;

  irqfd = kzalloc(sizeof(*irqfd), GFP_KERNEL);
  if (!irqfd)
    return -ENOMEM;

  idx = srcu_read_lock(&kvm->irq_srcu);
  irqfd_update(kvm, irqfd);
  srcu_read_unlock(&kvm->irq_srcu, idx);
  list_add_tail(&irqfd->list, &kvm->irqfds.items);
}

+if (!kvm_arch_irqfd_allowed(kvm, args))
+return -EINVAL;
+
+irqfd = kzalloc(sizeof(*irqfd), GFP_KERNEL);
+if (!irqfd)
+  return -ENOMEM;
+
+idx = srcu_read_lock(&kvm->irq_srcu);
+irqfd_update(kvm, irqfd);
+-srcu_read_unlock(&kvm->irq_srcu, idx);
+
+list_add_tail(&irqfd->list, &kvm->irqfds.items);
if (events & POLLIN)
schedule_work(&irqfd->inject);

/*
 * do not drop the file until the irqfd is fully initialized, otherwise
 * we might race against the POLLHUP
 */
-fdput(f);
#endif

/*
 * do not drop the file until the irqfd is fully initialized, otherwise
 * we might race against the EPOLLHUP
 */
-fdput(f);
return 0;

fail:
--- linux-4.15.0.orig/virt/kvm/irqchip.c
+++ linux-4.15.0/virt/kvm/irqchip.c
@@ -144,18 +144,19 @@
{
    struct kvm_kernel_irq_routing_entry *ei;
    int r;
    +u32 gsi = array_index_nospec(ue->gsi, KVM_MAX_IRQ_ROUTES);

    /*
     * Do not allow GSI to be mapped to the same irqchip more than once.
     * Allow only one to one mapping between GSI and non-irqchip routing.
     */
-    hlist_for_each_entry(ei, &rt->map[ue->gsi], link)
+    hlist_for_each_entry(ei, &rt->map[gsi], link)
    if (ei->type != KVM_IRQ_ROUTING_IRQCHIP ||
        ue->type != KVM_IRQ_ROUTING_IRQCHIP ||
        ue->u.irqchip.irqchip == ei->irqchip.irqchip)
        return -EINVAL;
    -e->gsi = ue->gsi;
    +e->gsi = gsi;
    e->type = ue->type;
    r = kvm_set_routing_entry(kvm, e, ue);
if (r)
--- linux-4.15.0.orig/virt/kvm/kvm_main.c
+++ linux-4.15.0/virt/kvm/kvm_main.c
@@ -51,9 +51,10 @@
#include <linux/slab.h>
#include <linux/sort.h>
#include <linux/bsearch.h>
+#include <linux/kthread.h>
+#include <linux/io.h>

#include <asm/processor.h>
-#include <asm/io.h>
#include <asm/ioctl.h>
#include <linux/uaccess.h>
#include <asm/pgtable.h>
@@ -92,7 +93,7 @@
 *kvm->lock --> kvm->slots_lock --> kvm->irq_lock
 */

-DEFINE_SPINLOCK(kvm_lock);
+DEFINE_MUTEX(kvm_lock);
static DEFINE_RAW_SPINLOCK(kvm_count_lock);
LIST_HEAD(vm_list);
@@ -140,10 +141,31 @@
{
}

+bool kvm_is_zone_device_pfn(kvm_pfn_t pfn)
+{
+/*
+ * The metadata used by is_zone_device_page() to determine whether or
+ * not a page is ZONE_DEVICE is guaranteed to be valid if and only if
+ * the device has been pinned, e.g. by get_user_pages(). WARN if the
+ * page_count() is zero to help detect bad usage of this helper.
+ */
+if (!pfn_valid(pfn) || WARN_ON_ONCE(!page_count(pfn_to_page(pfn))))
+return false;
+
+return is_zone_device_page(pfn_to_page(pfn));
+
+bool kvm_is_reserved_pfn(kvm_pfn_t pfn)
{ /*
+ * ZONE_DEVICE pages currently set PG_reserved, but from a refcounting
+ * perspective they are "normal" pages, albeit with slightly different
+ * usage rules.
if (pfn_valid(pfn))
    return PageReserved(pfn_to_page(pfn)) &&
    !is_zero_pfn(pfn) &&
    !kvm_is_zone_device_pfn(pfn);

return true;
}

kvm->mmu_notifier_count++;

need_tlb_flush = kvm_unmap_hva_range(kvm, start, end);

/* we've to flush the tlb before the pages can be freed */
-if (need_tlb_flush)
+if (need_tlb_flush || kvm->tlbs_dirty)
    kvm_flush_remote_tlbs(kvm);

spin_unlock(&kvm->mmu_lock);

stat_data->kvm = kvm;
stat_data->offset = p->offset;
+stat_data->mode = p->mode ? p->mode : 0644;

kvm->debugfs_stat_data[p->debugfs_entries] = stat_data;
-if (!debugfs_create_file(p->name, 0644,
+if (!debugfs_create_file(p->name, stat_data->mode,
    kvm->debugfs_dentry,
    stat_data,
    stat_fops_per_vm[p->kind]))

return 0;

+/
+ * Called after the VM is otherwise initialized, but just before adding it to
+ * the vm_list.
+ */
+int __weak kvm_arch_post_init_vm(struct kvm *kvm)
+{
+  return 0;
+
+/*
+ * Called just after removing the VM from the vm_list, but before doing any
+ * other destruction.
+ */
+void __weak kvm_arch_pre_destroy_vm(struct kvm *kvm)  
+{  
+}  
+  
static struct kvm *kvm_create_vm(unsigned long type)  
{  
  int r, i;  
  @@ -659,22 +698,31 @@  
  rcu_assign_pointer(kvm->buses[i],  
  kzalloc(sizeof(struct kvm_io_bus), GFP_KERNEL));  
  if (!kvm->buses[i])  
-    goto out_err;  
-    goto out_err_no_mmu_notifier;  
+    goto out_err;  
+    goto out_err_no_mmu_notifier;  
  }  
  r = kvm_init_mmu_notifier(kvm);  
  if (r)  
+    goto out_err_no_mmu_notifier;  
  +  
+  r = kvm_arch_post_init_vm(kvm);  
+  if (r)  
  goto out_err;  
  -spin_lock(&kvm_lock);  
+mutex_lock(&kvm_lock);  
  list_add(&kvm->vm_list, &vm_list);  
-spin_unlock(&kvm_lock);  
+mutex_unlock(&kvm_lock);  
  preempt_notifier_inc();  
  
  return kvm;  
  
out_err:  
+  +#if defined(CONFIG_MMU_NOTIFIER) && defined(KVM_ARCH_WANT_MMU_NOTIFIER)  
+  +#if (kvm->mmu_notifier.ops)  
+  +mmu_notifier_unregister(&kvm->mmu_notifier, current->mm);  
+  +#endif  
+  +out_err_no_mmu_notifier:  
  cleanup_srcu_struct(&kvm->irq_srcu);  
  out_err_no_irq_srcu:  
  cleanup_srcu_struct(&kvm->srcu);  
  @@ -714,9 +762,11 @@  
  kvm_uevent_notify_change(KVM_EVENT_DESTROY_VM, kvm);  
  kvm_destroy_vm_debugfs(kvm);  
  kvm_arch_sync_events(kvm);  
  -spin_lock(&kvm_lock);  
  +mutex_lock(&kvm_lock);
list_del(&kvm->vm_list);
-spin_unlock(&kvm_lock);
+mutex_unlock(&kvm_lock);
+kvm_arch_pre_destroy_vm(kvm);
+
kvm_free_irq_routing(kvm);
for (i = 0; i < KVM_NR_BUSES; i++) {
    struct kvm_io_bus *bus = kvm_get_bus(kvm, i);
@@ -855,6 +905,7 @@
    int as_id, struct kvm_memslots *slots)
    {
        struct kvm_memslots *old_memslots = __kvm_memslots(kvm, as_id);
@@ -877,9 +928,11 @@
            * space 0 will use generations 0, 4, 8, ... while * address space 1 will
            * use generations 2, 6, 10, 14, ... */
@@ -974,8 +1027,7 @@
        if (slot->id >= KVM_USER_MEM_SLOTS) ||
            ((base_gfn + npages <= slot->base_gfn) ||
@@ -1224,14 +1276,14 @@
        continue;
    };
    @ @ -1224,14 +1276,14 @@
} EXPORT_SYMBOL_GPL(kvm_is_visible_gfn);
}

unsigned long kvm_host_page_size(struct kvm_vcpu *vcpu, gfn_t gfn)
{ struct vm_area_struct *vma;

-unsigned long kvm_host_page_size(struct kvm *kvm, gfn_t gfn)
+unsigned long kvm_host_page_size(struct kvm_vcpu *vcpu, gfn_t gfn)
{ struct vm_area_struct *vma;
unsigned long addr, size;

size = PAGE_SIZE;

addr = gfn_to_hva(kvm, gfn);
+addr = kvm_vcpu_gfn_to_hva_prot(vcpu, gfn, NULL);
if (kvm_is_error_hva(addr))
return PAGE_SIZE;

@@ -1432,14 +1484,24 @@
return true;
}

+static int kvm_try_get_pfn(kvm_pfn_t pfn)
+{
+if (kvm_is_reserved_pfn(pfn))
+return 1;
+return get_page_unless_zero(pfn_to_page(pfn));
+}
+
+static int hva_to_pfn_remapped(struct vm_area_struct *vma,
   unsigned long addr, bool *async,
   - bool write_fault, kvm_pfn_t *p_pfn)  
+ bool write_fault, bool *writable, 
+ kvm_pfn_t *p_pfn)
{
-unsigned long pfn;
+  kvm_pfn_t pfn;
+  pte_t *ptep;
+  spinlock_t *ptl;
+  int r;

  -r = follow_pfn(vma, addr, &pfn);
  +r = follow_pte_pmd(vma->vm_mm, addr, NULL, NULL, &ptep, NULL, &ptl);
  if (r) {
    /*
     * get_user_pages fails for VM_IO and VM_PFNMAP vmas and does
    @@ -1454,12 +1516,19 @@
     if (r)
     return r;
    
    -r = follow_pfn(vma, addr, &pfn);
    +r = follow_pte_pmd(vma->vm_mm, addr, NULL, NULL, &ptep, NULL, &ptl);
    if (r)
    return r;
    +}
  
  +if (write_fault && !pte_write(*ptep)) {

+if (writable)
+  *writable = pte_write(*ptep);
+  pfn = pte_pfn(*ptep);

/*
 * Get a reference here because callers of *hva_to_pfn* and
 * Whoever called remap_pfn_range is also going to call e.g.
 * unmap_mapping_range before the underlying pages are freed,
 * causing a call to our MMU notifier.
 */
-kvm_get_pfn(pfn);
+if (!kvm_try_get_pfn(pfn))
  r = -EFAULT;

out:
+pte_unmap_unlock(ptep, ptl);
*p_pfn = pfn;
-return 0;
+
+return r;

/ *
@@ -1525,7 +1604,7 @@
if (vma == NULL)
  pfn = KVM_PFN_ERR_FAULT;
else if (vma->vm_flags & (VM_IO | VM_PFNMAP)) {
-r = hva_to_pfn_remapped(vma, addr, async, write_fault, &pfn);
+r = hva_to_pfn_remapped(vma, addr, async, write_fault, writable, &pfn);
if (r == -EAGAIN)
  goto retry;
if (r < 0)
@@ -1653,6 +1732,153 @@
} EXPORT_SYMBOL_GPL(gfn_to_page);

+void kvm_release_pfn(kvm_pfn_t pfn, bool dirty, struct gfn_to_pfn_cache *cache)
+{  
+if (pfn == 0)  
+return;  
+  
+if (cache)  
+cache->pfn = cache->gfn = 0;  
+  
+if (dirty)  
+kvm_release_pfn_dirty(pfn);  
+else  
+kvm_release_pfn_clean(pfn);  
+}  
+  
+static void kvm_cache_gfn_to_pfn(struct kvm_memory_slot *slot, gfn_t gfn,  
+ struct gfn_to_pfn_cache *cache, u64 gen)  
+{  
+kvm_release_pfn(cache->pfn, cache->dirty, cache);  
+  
+cache->pfn = gfn_to_pfn_memslot(slot, gfn);  
+cache->gfn = gfn;  
+cache->dirty = false;  
+cache->generation = gen;  
+}  
+  
+static int __kvm_map_gfn(struct kvm_memslots *slots, gfn_t gfn,  
+ struct kvm_host_map *map,  
+ struct gfn_to_pfn_cache *cache,  
+ bool atomic)  
+{  
+kvm_pfn_t pfn;  
+void *hva = NULL;  
+struct page *page = KVM_UNMAPPED_PAGE;  
+struct kvm_memory_slot *slot = __gfn_to_memslot(slots, gfn);  
+u64 gen = slots->generation;  
+  
+if (!map)  
+return -EINVAL;  
+  
+if (cache) {  
+if (!cache->pfn || cache->gfn != gfn ||  
+cache->generation != gen) {  
+if (atomic)  
+return -EAGAIN;  
+kvm_cache_gfn_to_pfn(slot, gfn, cache, gen);  
+}  
+pfn = cache->pfn;  
+} else {  
+if (atomic)
+return -EAGAIN;
+pfn = gfn_to_pfn_memslot(slot, gfn);
+
+if (is_error_noslot_pfn(pfn))
+return -EINVAL;
+
+if (pfn_valid(pfn)) {
+page = pfn_to_page(pfn);
+if (atomic)
+hva = kmap_atomic(page);
+else
+hva = kmap(page);
+#ifdef CONFIG_HAS_IOMEM
+} else if (!atomic) {
+hva = memremap(pfn_to_hpa(pfn), PAGE_SIZE, MEMREMAP_WB);
+} else {
+return -EINVAL;
+#endif
+}
+
+if (!hva)
+return -EFAULT;
+
+map->page = page;
+map->hva = hva;
+map->pfn = pfn;
+map->gfn = gfn;
+
+return 0;
+
+int __kvm_map_gfn(struct kvm_vcpu *vcpu, gfn_t gfn, struct kvm_host_map *map,
+struct gfn_to_pfn_cache *cache, bool atomic)
+{
+return __kvm_map_gfn(kvm_memslots(vcpu->kvm), gfn, map,
+cache, atomic);
+}
+EXPORT_SYMBOL_GPL(kvm_map_gfn);
+
+int kvm_vcpu_map(struct kvm_vcpu *vcpu, gfn_t gfn, struct kvm_host_map *map)
+{
+return __kvm_map_gfn(kvm_vcpu_memslots(vcpu->kvm), gfn, map,
+NULL, false);
+}
+EXPORT_SYMBOL_GPL(kvm_vcpu_map);
+
+static void __kvm_unmap_gfn(struct kvm_memory_slot *memslot,
+struct kvm_host_map *map,
struct gfn_to_pfn_cache *cache,
+bool dirty, bool atomic)
+
+if (!map)
+return;
+
+if (!map->hva)
+return;
+
+if (map->page != KVM_UNMAPPED_PAGE) {
+if (atomic)
+kunmap_atomic(map->hva);
+else
+kunmap(map->page);
+}
+
+#ifndef CONFIG_HAS_IOMEM
+else if (!atomic)
+memunmap(map->hva);
+else
+WARN_ONCE(1, "Unexpected unmapping in atomic context");
+endif
+
+if (dirty)
+mark_page_dirty_in_slot(memslot, map->gfn);
+
+if (cache)
+cache->dirty |= dirty;
+else
+kvm_release_pfn(map->pfn, dirty, NULL);
+
+map->hva = NULL;
+map->page = NULL;
+}
+
+EXPORT_SYMBOL_GPL(kvm_unmap_gfn);
+
+void kvm_vcpu_unmap(struct kvm_vcpu *vcpu, struct kvm_host_map *map, bool dirty)
+{
+__kvm_unmap_gfn(vcpu->kvm, map->gfn_to_memsnode, map, NULL, kvm_vcpu_gfn_to_memsnode(vcpu), map, NULL, dirty, false);
+EXPORT_SYMBOL_GPL(kvm_vcpu_unmap);
+
struct page *kvm_vcpu_gfn_to_page(struct kvm_vcpu *vcpu, gfn_t gfn)
{
    kvm_pfn_t pfn;
    //@ -1695,7 +1921,7 @@

    void kvm_set_pfn_dirty(kvm_pfn_t pfn)
    {
        -if (!kvm_is_reserved_pfn(pfn)) {
        +if (!kvm_is_reserved_pfn(pfn) && !kvm_is_zone_device_pfn(pfn)) {
            struct page *page = pfn_to_page(pfn);

            if (!PageReserved(page))
            //@ -1706,7 +1932,7 @@

        void kvm_set_pfn_accessed(kvm_pfn_t pfn)
        {
        -if (!kvm_is_reserved_pfn(pfn))
        +if (!kvm_is_reserved_pfn(pfn) && !kvm_is_zone_device_pfn(pfn))
            mark_page_accessed(pfn_to_page(pfn));
        }
        
        EXPORT_SYMBOL_GPL(kvm_set_pfn_accessed);
        //@ -1960,7 +2186,8 @@
        
        EXPORT_SYMBOL_GPL(kvm_gfn_to_hva_cache_init);

        int kvm_write_guest_offset_cached(struct kvm *kvm, struct gfn_to_hva_cache *ghc,
        - void *data, int offset, unsigned long len)
        + void *data, unsigned int offset,
        + unsigned long len)
        {
            struct kvm_memslots *slots = kvm_memslots(kvm);
            int r;
            //@ -1971,12 +2198,12 @@
            if (slots->generation != ghc->generation)
                __kvm_gfn_to_hva_cache_init(slots, ghc, ghc->gpa, ghc->len);

            -if (unlikely(!ghc->memslot))
                return kvm_write_guest(kvm, gpa, data, len);
            -
            if (kvm_is_error_hva(ghc->hva))
                return -EFAULT;

            +if (unlikely(!ghc->memslot))
                +return kvm_write_guest(kvm, gpa, data, len);
            +
            r = __copy_to_user((void __user *)ghc->hva + offset, data, len);
            if (r)
return -EFAULT;
@@ -2004,12 +2231,12 @@
if (slots->generation != ghc->generation)
    __kvm_gfn_to_hva_cache_init(slots, ghc, ghc->gpa, ghc->len);

-if (unlikely(!ghc->memslot))
-    return kvm_read_guest(kvm, ghc->gpa, data, len);
-
if (kvm_is_error_hva(ghc->hva))
    return -EFAULT;

+if (unlikely(!ghc->memslot))
+    return kvm_read_guest(kvm, ghc->gpa, data, len);
+
    r = __copy_from_user(data, (void __user *)ghc->hva, len);
    if (r)
        return -EFAULT;
@@ -2308,6 +2535,29 @@
#endif
}

+/*
+ * Unlike kvm_arch_vcpu_runnable, this function is called outside
+ * a vcpu_load/vcpu_put pair. However, for most architectures
+ * kvm_arch_vcpu_runnable does not require vcpu_load.
+ */
+bool __weak kvm_arch_dy_runnable(struct kvm_vcpu *vcpu)
+{
+    return kvm_arch_vcpu_runnable(vcpu);
+}
+
+static bool vcpu_dy_runnable(struct kvm_vcpu *vcpu)
+{
+    if (kvm_arch_dy_runnable(vcpu))
+        return true;
+    +#ifdef CONFIG_KVM_ASYNC_PF
+    if (!list_empty_careful(&vcpu->async_pf.done))
+        return true;
+    +#endif
+    +
+    +return false;
+}
+
void kvm_vcpu_on_spin(struct kvm_vcpu *me, bool yield_to_kernel_mode)
{
    struct kvm *kvm = me->kvm;
@@ -2337,7 +2587,7 @@
continue;
if (vcpu == me)
continue;
-if (swait_active(&vcpu->wq) && !kvm_arch_vcpuunnable(vcpu))
+if (swait_active(&vcpu->wq) && !vcpu_dy_runnable(vcpu))
continue;
if (yield_to_kernel_mode && !kvm_arch_vcpu_in_kernel(vcpu))
continue;
@@ -2803,6 +3053,9 @@
 {
 struct kvm_device *dev = filp->private_data;

+if (dev->kvm->mm != current->mm)
+return -EIO;
+
+switch (ioctl) {
+ case KVM_SET_DEVICE_ATTR:
+ return kvm_device_ioctl_attr(dev, dev->ops->set_attr, arg);
+@@ -2874,12 +3127,14 @@
+ struct kvm_device_ops *ops = NULL;
+ struct kvm_device *dev;
+ bool test = cd->flags & KVM_CREATEDEVICE_TEST;
+ int type;
+ int ret;
+
+if (cd->type >= ARRAY_SIZE(kvm_device_ops_table))
+ return -ENODEV;
+
+-ops = kvm_device_ops_table[cd->type];
+type = array_index_nospec(cd->type, ARRAY_SIZE(kvm_device_ops_table));
+ops = kvm_device_ops_table[type];
+if (ops == NULL)
+ return -ENODEV;

@@ -2894,7 +3149,7 @@
 dev->kvm = kvm;

 mutex_lock(&kvm->lock);
- ret = ops->create(dev, cd->type);
+ ret = ops->create(dev, type);
 if (ret < 0) {
 mutex_unlock(&kvm->lock);
 kfree(dev);
@@ -2906,8 +3161,10 @@
 if (ops->init)
 ops->init(dev);
+
+kvm_get_kvm(kvm);
ret = anon_inode_getfd(ops->name, &kvm_device_fops, dev, O_RDWR | O_CLOEXEC);
if (ret < 0) {
    kvm_put_kvm(kvm);
    mutex_lock(&kvm->lock);
    list_del(&dev->vm_node);
    mutex_unlock(&kvm->lock);
    return ret;
}
-kvm_get_kvm(kvm);
cd->fd = ret;
return 0;
}
@@ -2915,7 +3172,6 @@
return ret;
}
-kvm_get_kvm(kvm);

-case KVM_CAP_MULTI_ADDRESS_SPACE:
    return KVM_ADDRESS_SPACE_NUM;
@endif
-case KVM_CAP_MAX_VCPU_ID:
    -return KVM_MAX_VCPU_ID;
    default:
    break;
}
@@ -3602,7 +3856,7 @@
void kvm_io_bus_unregister_dev(struct kvm *kvm, enum kvm_bus bus_idx,
    struct kvm_io_device *dev)
{
    int i;
    int i, j;
    struct kvm_io_bus *new_bus, *bus;

    bus = kvm_get_bus(kvm, bus_idx);
    @@ -3619,17 +3873,20 @@
    new_bus = kmalloc(sizeof(*bus) + ((bus->dev_count - 1) *
    sizeof(struct kvm_io_range)), GFP_KERNEL);
    -if (!new_bus) {
    +if (new_bus) {
    +    memcpy(new_bus, bus, sizeof(*bus) + i * sizeof(struct kvm_io_range));
    +    new_bus->dev_count--;
    +    memcpy(new_bus->range + i, bus->range + i + 1,
    +           (new_bus->dev_count - i) * sizeof(struct kvm_io_range));
    +} else {
    pr_err("kvm: failed to shrink bus, removing it completely\n");
    -    goto broken;
    +    for (j = 0; j < bus->dev_count; j++) {
    +        if (j == i)
    +            continue;
+kvm_iodevice_destructor(bus->range[j].dev);
+
-
-memcpy(new_bus, bus, sizeof(*bus) + i * sizeof(struct kvm_io_range));
-new_bus->dev_count--;
-memcpy((new_bus->range + i, bus->range + i + 1, 
- (new_bus->dev_count - i) * sizeof(struct kvm_io_range));
-
-broken:
rcu_assign_pointer(kvm->buses[bus_idx], new_bus);
synchronize_srcu_expedited(&kvm->srcu);
kfree(bus);
@@ -3677,7 +3934,9 @@
if (!refcount_inc_not_zero(&stat_data->kvm->users_count))
return -ENOENT;

-if (simple_attr_open(inode, file, get, set, fmt)) {
+if (simple_attr_open(inode, file, get,
+ stat_data->mode & S_IWUGO ? set : NULL, 
+ fmt)) {
kvm_put_kvm(stat_data->kvm);
return -ENOMEM;
}
@@ -3791,13 +4050,13 @@
u64 tmp_val;

*val = 0;
-spin_lock(&kvm_lock);
+mutex_lock(&kvm_lock);
list_for_each_entry(kvm, &vm_list, vm_list) {
  stat_tmp.kvm = kvm;
  vm_stat_get_per_vm((void *)&stat_tmp, &tmp_val);
  *val += tmp_val;
}
-spin_unlock(&kvm_lock);
+mutex_unlock(&kvm_lock);
return 0;
}

@@ -3810,12 +4069,12 @@
if (val)
return -EINVAL;
-spin_lock(&kvm_lock);
+mutex_lock(&kvm_lock);
list_for_each_entry(kvm, &vm_list, vm_list) {
  stat_tmp.kvm = kvm;

vm_stat_clear_per_vm((void *)&stat_tmp, 0);
}  
-spin_unlock(&kvm_lock);
+mutex_unlock(&kvm_lock);

return 0;
}
@@ -3830,13 +4089,13 @@
u64 tmp_val;

*val = 0;
-spin_lock(&kvm_lock);
+mutex_lock(&kvm_lock);
list_for_each_entry(kvm, &vm_list, vm_list) {
  stat_tmp.kvm = kvm;
  vcpu_stat_get_per_vm((void *)&stat_tmp, &tmp_val);
  *val += tmp_val;
}
-spin_unlock(&kvm_lock);
+mutex_unlock(&kvm_lock);
return 0;
}
@@ -3849,12 +4108,12 @@
if (val)
return -EINVAL;
-spin_lock(&kvm_lock);
+mutex_lock(&kvm_lock);
list_for_each_entry(kvm, &vm_list, vm_list) {
  stat_tmp.kvm = kvm;
  vcpu_stat_clear_per_vm((void *)&stat_tmp, 0);
}
-spin_unlock(&kvm_lock);
+mutex_unlock(&kvm_lock);
return 0;
}
@@ -3875,7 +4134,7 @@
if (!kvm_dev.this_device || !kvm)
return;

-spin_lock(&kvm_lock);
+mutex_lock(&kvm_lock);
list_for_each_entry(kvm, &vm_list, vm_list) {
  stat_tmp.kvm = kvm;
  vcpu_stat_clear_per_vm((void *)&stat_tmp, 0);
}
-spin_unlock(&kvm_lock);
+mutex_unlock(&kvm_lock);

return 0;
}
@@ -3875,7 +4134,7 @@
if (kvm_dev.this_device || !kvm)
return;

-spin_lock(&kvm_lock);
+mutex_lock(&kvm_lock);
if (type == KVM_EVENT_CREATE_VM) {
  kvm_createvm_count++;
  kvm_active_vms++;
@@ -3884,7 +4143,7 @@
created = kvm_createvm_count;
active = kvm_active_vms;
spin_unlock(&kvm_lock);
+mutex_unlock(&kvm_lock);

env = kzalloc(sizeof(*env), GFP_KERNEL);
if (!env)
@@ -3901,7 +4160,7 @@
}
add_uevent_var(env, "PID=%d", kvm->userspace_pid);

-if (kvm->debugfs_dentry) {
+if (!IS_ERR_OR_NULL(kvm->debugfs_dentry)) {
char *tmp, *p = kmalloc(PATH_MAX, GFP_KERNEL);
if (p) {
@@ -3928,7 +4187,8 @@
kvm_debugfs_num_entries = 0;
for (p = debugfs_entries; p->name; ++p, kvm_debugfs_num_entries++) {
-\tif (!debugfs_create_file(p->name, 0644, kvm_debugfs_dir,
+\tint mode = p->mode ? p->mode : 0644;
+\tif (!debugfs_create_file(p->name, mode, kvm_debugfs_dir,
(\void *)\(long\)p->offset,
stat_fops[p->kind]))
goto out_dir;
@@ -4115,3 +4375,86 @@
kvm_vfio_ops_exit();
}
EXPORT_SYMBOL_GPL(kvm_exit);
+struct kvm_vm_worker_thread_context {
+struct kvm *kvm;
+struct task_struct *parent;
+struct completion init_done;
+kvm_vm_thread_fn_t thread_fn;
+uintptr_t data;
+int err;
+};
+
+static int kvm_vm_worker_thread(void *context)
+{
+/*
+ * The init_context is allocated on the stack of the parent thread, so
+ * we have to locally copy anything that is needed beyond initialization
+ */
+struct kvm_vm_worker_thread_context *init_context = context;
+struct kvm *kvm = init_context->kvm;
+kvm_vm_thread_fn_t thread_fn = init_context->thread_fn;
+uintptr_t data = init_context->data;
+int err;
+
+err = kthread_park(current);
+"/kthread_park(current) is never supposed to return an error */
+WARN_ON(err != 0);
+if (err)
+goto init_complete;
+
+err = cgroup_attach_task_all(init_context->parent, current);
+if (err) {
+kvm_err("%s: cgroup_attach_task_all failed with err %d\n", 
+__func__, err);
+goto init_complete;
+}
+
+set_user_nice(current, task_nice(init_context->parent));
+
+init_complete:
+init_context->err = err;
+complete(&init_context->init_done);
+init_context = NULL;
+
+if (err)
+return err;
+
+"/ Wait to be woken up by the spawner before proceeding. */
+kthread_parkme();
+
+if (!kthread_should_stop())
+err = thread_fn(kvm, data);
+
+return err;
+}
+
+int kvm_vm_create_worker_thread(struct kvm *kvm, kvm_vm_thread_fn_t thread_fn,
+uintptr_t data, const char *name,
+struct task_struct **thread_ptr)
+{
+struct kvm_vm_worker_thread_context init_context = { }; 
+struct task_struct *thread;
+
+*thread_ptr = NULL;
+init_context.kvm = kvm;
+init_context.parent = current;
+init_context.thread_fn = thread_fn;
init_context.data = data;
init_completion(&init_context.init_done);

thread = kthread_run(kvm_vm_worker_thread, &init_context,
    "%s-%d", name, task_pid_nr(current));
if (IS_ERR(thread))
    return PTR_ERR(thread);
/* kthread_run is never supposed to return NULL */
WARN_ON(thread == NULL);
wait_for_completion(&init_context.init_done);
if (!init_context.err)
    *thread_ptr = thread;
return init_context.err;

1.959 jjwt 0.9.1

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Manifest-Version: 1.0
Export-Package: io.jsonwebtoken;version="0.9.1",io.jsonwebtoken.lang;version="0.9.1"
Implementation-Title: JSON Web Token support for the JVM
Implementation-Version: 0.9.1
Built-By: lhazlewood
Tool: Bnd-3.3.0.201609221906
Bundle-Name: JSON Web Token support for the JVM
Created-By: Apache Maven Bundle Plugin
Implementation-URL: https://github.com/jjwt/jjwt
Require-Capability: osgi.ee;filter:="(&(osgi.ee=JavaSE)(version=1.7))"
Implementation-Vendor-Id: io.jsonwebtoken
Bundle-Version: 0.9.1
Build-Jdk: 1.7.0_80
Bnd-LastModified: 1530831044984
Bundle-ManifestVersion: 2
Specification-Title: JSON Web Token support for the JVM
Bundle-License: http://www.apache.org/licenses/LICENSE-2.0
Bundle-Description: Sonatype helps open source projects to set up Maven repositories on https://oss.sonatype.org/
Bundle-SymbolicName: io.jsonwebtoken.jjwt
Specification-Version: 0.9.1

1.960 grep 3.4 1

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-------------------------------------------------------------------------
Patch for Ubuntu bug #399071

Display the contents of /etc/legal as part of the MOTD, the first time the
user logs in, and set a flag in the user's homedir if possible to prevent
repeat displays.

Authors: Dustin Kirkland <kirkland@canonical.com>

Upstream status: Ubuntu-specific, maybe submit to Debian

Index: pam.ubuntu/modules/pam_motd/pam_motd.c
===================================================================
--- pam.ubuntu.orig/modules/pam_motd/pam_motd.c
+++ pam.ubuntu/modules/pam_motd/pam_motd.c
@@ -73,6 +73,61 @@
close(fd);
}

+int display_legal(pam_handle_t *pamh)
+{
+    int retval = PAM_IGNORE, rc;
+    char *user = NULL;
+
+    if ((rc = pam_open_auth(pamh)) != PAM_SUCCESS)
+        goto done;
+    if (rc != PAM_GRANTED) { print_errno(); goto done; }
+
+    if ((rc = pam_get_option(pamh, PAM_USER, &user)) < 0) { print_errno();
+        goto done; }
+    if (strlen(user) == 0) { print_errno(); goto done; }
+
+    if ((rc = pam_open_file(0, "/etc/legal")) < 0) { print_errno();
+        goto done; }
+    if ((rc = pam_read_line(pamh)) <= 0) { print_errno(); goto done; }
+    if ((rc = pam_close_file(pamh)) < 0) { print_errno(); goto done; }
+    if ((rc = pam_read_line(pamh)) <= 0) { print_errno(); goto done; }
+    if ((rc = pam_close_file(pamh)) < 0) { print_errno(); goto done; }
+    if ((rc = pam_open_file(1, "/etc/legal")) < 0) { print_errno();
+        goto done; }
+    if ((rc = pam_write_line(pamh, user)) < 0) { print_errno(); goto done; }
+    if ((rc = pam_close_file(pamh)) < 0) { print_errno(); goto done; }
+}
+
+done:
+    return retval;
+
+--- pam.ubuntu.org/modules/pam_motd/pam_motd.c
+++ pam.ubuntu/modules/pam_motd/pam_motd.c
@@ -73,6 +73,61 @@
close(fd);
}

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+    if ((rc = pam_open_file(1, "/etc/legal")) < 0) { print_errno();
+        goto done; }
+    if ((rc = pam_write_line(pamh, user)) < 0) { print_errno(); goto done; }
+    if ((rc = pam_close_file(pamh)) < 0) { print_errno(); goto done; }
+}
+
+done:
+    return retval;
    char *dir = NULL;
    char *flag = NULL;
    struct passwd *pwd = NULL;
    struct stat s;
    int f;
    /* Get the user name to determine if we need to print the disclaimer */
    rc = pam_get_item(pamh, PAM_USER, &user);
    if (rc == PAM_SUCCESS && user != NULL && *(const char *)user != '\0')
    {
        PAM_MODUTIL_DEF_PRIVS(privs);
        /* Get the password entry */
        pwd = pam_modutil_getpwnam (pamh, user);
        if (pwd != NULL)
        {
            if (pam_modutil_drop_priv(pamh, &privs, pwd)) {
                pam_syslog(pamh, LOG_ERR,
                            "Unable to change UID to %d temporarily\n",
                            pwd->pw_uid);
                retval = PAM_SESSION_ERR;
                goto finished;
            }

            if (asprintf(&dir, "%s/.cache", pwd->pw_dir) == -1 || !dir)
                goto finished;
            if (asprintf(&flag, "%s/motd.legal-displayed", dir) == -1 || !flag)
                goto finished;

            if (stat(flag, &s) != 0)
            {
                display_file(pamh, "/etc/legal");
                mkdir(dir, 0700);
                f = open(flag, O_WRONLY|O_CREAT|O_EXCL,
                         S_IRUSR|S_IWUSR|S_IRGRP|S_IROTH);
                if (f>=0) close(f);
            }
        }
        if (asprintf(&dir, "%s/.cache", pwd->pw_dir) == -1 || !dir)
            goto finished;
        if (asprintf(&flag, "%s/motd.legal-displayed", dir) == -1 || !flag)
            goto finished;

        if (stat(flag, &s) != 0)
        {
            display_file(pamh, "/etc/legal");
            mkdir(dir, 0700);
            f = open(flag, O_WRONLY|O_CREAT|O_EXCL,
                     S_IRUSR|S_IWUSR|S_IRGRP|S_IROTH);
            if (f>=0) close(f);
        }
        if (pam_modutil_regain_priv(pamh, &privs)) {
            pam_syslog(pamh, LOG_ERR,
                        "Unable to change UID back to %d\n", privs.old_uid);
            retval = PAM_SESSION_ERR;
        }
        _pam_drop(flag);
        _pam_drop(dir);
    }
    finished:
+    return retval;
+
+PAM_EXTERN
+int pam_sm_open_session(pam_handle_t *pamh, int flags,
+int argc, const char **argv)
@@ -116,6 +171,9 @@
 /* Display the updated motd */
     display_file(pamh, motd_path);
+
+/* Display the legal disclaimer only if necessary */
+    retval = display_legal(pamh);
+
+    return retval;
}

This package was debianized by J.H.M. Dassen (Ray) jdassen@debian.org on

It was downloaded from ftp://ftp.kernel.org/pub/linux/libs/pam/pre/

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**1.962 bash 5.0 6ubuntu1.1**

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Version 3, 29 June 2007

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1.966 go-wordwrap 1.0.0

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/**
* A decoder that splits the received {@link ByteBuf}s dynamically by the
* value of the length field in the message. It is particularly useful when you
* decode a binary message which has an integer header field that represents the
* length of the message body or the whole message.
* <p>
* {@link LengthFieldBasedFrameDecoder} has many configuration parameters so
* that it can decode any message with a length field, which is often seen in
* proprietary client-server protocols. Here are some example that will give
* you the basic idea on which option does what.
*<pre>
*<b>lengthFieldOffset</b>   = <b>0</b>
*<b>lengthFieldLength</b>   = <b>2</b>
* lengthAdjustment    = 0
* initialBytesToStrip = 0 (= do not strip header)
* </pre>

* The value of the length field in this example is <tt>12 (0x0C)</tt> which
* represents the length of "HELLO, WORLD". By default, the decoder assumes
* that the length field represents the number of the bytes that follows the
* length field. Therefore, it can be decoded with the simplistic parameter
* combination.
*<pre>
*<b>lengthFieldOffset</b> = <b>0</b>
*<b>lengthFieldLength</b> = <b>2</b>
* lengthAdjustment = 0
* initialBytesToStrip = 0 (= do not strip header)
Because we can get the length of the content by calling
* {@link ByteBuf#readableBytes()}, you might want to strip the length
* field by specifying <tt>initialBytesToStrip</tt>. In this example, we
* specified <tt>2</tt>, that is same with the length of the length field, to
* strip the first two bytes.

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* you might want to strip the length field by specifying <tt>initialBytesToStrip</tt>. In this example, we
* specified <tt>2</tt>, that is same with the length of the length field, to
* strip the first two bytes.

In most cases, the length field represents the length of the message body
* only, as shown in the previous examples. However, in some protocols, the
* length field represents the length of the whole message, including the
* message header. In such a case, we specify a non-zero
* <tt>lengthAdjustment</tt>. Because the length value in this example message
* is always greater than the body length by <tt>2</tt>, we specify <tt>-2</tt>
* as <tt>lengthAdjustment</tt> for compensation.

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* only, as shown in the previous examples. However, in some protocols, the
* length field represents the length of the whole message, including the
* message header. In such a case, we specify a non-zero
* <tt>lengthAdjustment</tt>. Because the length value in this example message
* is always greater than the body length by <tt>2</tt>, we specify <tt>-2</tt>
* as <tt>lengthAdjustment</tt> for compensation.
The following message is a simple variation of the first example. An extra header value is prepended to the message. \texttt{lengthAdjustment} is zero again because the decoder always takes the length of the prepended data into account during frame length calculation.

```plaintext
lengthFieldOffset   = 2 (= the length of Header 1)
lengthFieldLength   = 3
lengthAdjustment    = 0
initialBytesToStrip = 0
```

**BEFORE DECODE (17 bytes)                      AFTER DECODE (17 bytes)**

```
<table>
<thead>
<tr>
<th>Header 1</th>
<th>Length</th>
<th>Actual Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xCAFE</td>
<td>0x00000C</td>
<td>&quot;HELLO, WORLD&quot;</td>
</tr>
</tbody>
</table>
```

This is an advanced example that shows the case where there is an extra header between the length field and the message body. You have to specify a positive \texttt{lengthAdjustment} so that the decoder counts the extra header into the frame length calculation.

```plaintext
lengthFieldOffset   = 0
lengthFieldLength   = 3
lengthAdjustment    = 2 (= the length of Header 1)
initialBytesToStrip = 0
```

**BEFORE DECODE (17 bytes)                      AFTER DECODE (17 bytes)**

```
<table>
<thead>
<tr>
<th>Length</th>
<th>Header 1</th>
<th>Actual Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00000C</td>
<td>0xCAFE</td>
<td>&quot;HELLO, WORLD&quot;</td>
</tr>
</tbody>
</table>
```

This is a combination of all the examples above. There are the prepended header before the length field and the extra header after the length field. The prepended header affects the \texttt{lengthFieldOffset} and the extra header affects the \texttt{lengthAdjustment}. We also specified a non-zero
* <tt>initialBytesToStrip</tt> to strip the length field and the prepended
  header from the frame. If you don't want to strip the prepended header, you
  could specify <tt>0</tt> for <tt>initialBytesToSkip</tt>.
* <pre>
  * lengthFieldOffset   = 1 (= the length of HDR1)
  * lengthFieldLength   = 2
  * <tt>b</tt>lengthAdjustment</tt><tt>b</tt>   = <tt>b</tt>1</tt><tt>b</tt> (= the length of HDR2)
  * <tt>b</tt>initialBytesToStrip</tt><tt>b</tt>   = <tt>b</tt>3</tt><tt>b</tt> (= the length of HDR1 + LEN)
  *
  * BEFORE DECODE (16 bytes) AFTER DECODE (13 bytes)
  *
  * +-----+--------+-----+----------------+-      +-----+------------------+
  * | HDR1 | Length | HDR2 | Actual Content |----->| HDR2 | Actual Content |
  * | 0xCA | 0x000C | 0xFE | "HELLO, WORLD" |      | 0xFE | "HELLO, WORLD" |
  * +-----+--------+-----+----------------+-      +-----+------------------+
  *
  * @see LengthFieldPrepender
*

* Let's give another twist to the previous example. The only difference from
  the previous example is that the length field represents the length of the
  whole message instead of the message body, just like the third example.
  We have to count the length of HDR1 and Length into <tt>lengthAdjustment</tt>.
  Please note that we don't need to take the length of HDR2 into account
  because the length field already includes the whole header length.
* <pre>
  * lengthFieldOffset   = 1
  * lengthFieldLength   = 2
  * <tt>b</tt>lengthAdjustment</tt><tt>b</tt>   = <tt>b</tt>-3</tt><tt>b</tt> (= the length of HDR1 + LEN, negative)
  * <tt>b</tt>initialBytesToStrip</tt><tt>b</tt>   = <tt>b</tt> 3</tt><tt>b</tt>
  *
  * BEFORE DECODE (16 bytes) AFTER DECODE (13 bytes)
  *
  * +-----+--------+-----+----------------+-      +-----+------------------+
  * | HDR1 | Length | HDR2 | Actual Content |----->| HDR2 | Actual Content |
  * | 0xCA | 0x0010 | 0xFE | "HELLO, WORLD" |      | 0xFE | "HELLO, WORLD" |
  * +-----+--------+-----+----------------+-      +-----+------------------+
  *
  * @see LengthFieldPrepender
*/

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* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-jar/io/netty/handler/codec/compression/Lz4XXHash32.java

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/**
 * Enumeration of supported Base64 dialects.
 * <p>
 * The internal lookup tables in this class has been derived from
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 * Base64 Encoder/Decoder</a>.
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jar/io/netty/handler/codec/serialization/CompactObjectOutputStream.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/ObjectDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/CompatibleMarshallingDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/DelimiterBasedFrameDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/protobuf/package-info.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/xml/package-info.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/DefaultMarshallerProvider.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec-package-info.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/SnappyFrameEncoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/JdkZlibEncoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/string/StringDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/ContextBoundUnmarshallerProvider.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/FixedLengthFrameDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/ChannelBufferByteOutput.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/Delimiterites.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/ClassLoaderClassResolver.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/TooLongFrameException.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/CompactObjectInputstream.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/ZlibUtil.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/ClassResolvers.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/ObjectDecoderInputStream.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/MarshallingDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/ZlibCodecFactory.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/ClassResolver.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/UnmarshalData.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/SoftReferenceMap.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/DefaultUnmarshallerProvider.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/bytes/package-info.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/package-info.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/ByteToMessageDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/ZlibEncoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/DecompressionException.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/EncoderException.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/PrematureChannelClosureException.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/ObjectEncoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/MessageToMessageEncoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/CompatibleObjectEncoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/JZlibEncoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/marshalling/ThreadLocalMarshallerProvider.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/ReplayingDecoder.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/Snappy.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/MessageAggregator.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/package-info.java
* /opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/serialization/CachingClassResolver.java

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jar/io/netty/handler/codec/DefaultHeaders.java
*/opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/Headers.java
*/opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/EmptyHeaders.java

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jar/io/netty/handler/codec/DatagramPacketDecoder.java
*/opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/ByteBufChecksum.java
*/opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/DateFormatter.java
*/opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/string/LineSeparator.java
*/opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/compression/CompressionUtil.java
*/opt/cola/permits/1196668504_1629951698.8/0/netty-codec-4-1-67-final-sources-
jar/io/netty/handler/codec/DatagramPacketEncoder.java
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/**
* Utility class for {@link ByteBuf} that encodes and decodes to and from
* <a href="https://en.wikipedia.org/wiki/Base64">Base64</a> notation.
* 
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Go support for Protocol Buffers - Google's data interchange format

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1.970 types-cryptography 3.3.10
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## Typing stubs for cryptography

This is a PEP 561 type stub package for the `cryptography` package. It can be used by type-checking tools like mypy, PyCharm, pytype etc. to check code that uses `cryptography`. The source for this package can be found at https://github.com/python/typeshed/tree/master/stubs/cryptography. All fixes for types and metadata should be contributed there.

*Note:* The `cryptography` package includes type annotations or type stubs since version 3.4.4. Please uninstall the `types-cryptography` package if you use this or a newer version.

See https://github.com/python/typeshed/blob/master/README.md for more details.

This package was generated from typeshed commit `48f13e451a3ef21002cca3f3b325ff3635f32d66`.

1.971 x-text 0.3.4

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1.972 x-sync 0.0.0-20190911185100-cd5d95a43a6e

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1.973 libsemanage 2.7 2build2

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1.978 init-system-helpers 1.51

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1.980 x-sync 0.0.0-20201207232520-09787c993a3a

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1.981 go-runtime 1.13.1

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1.982 testify 1.7.0

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1.984 python-minimal 3.6.7-1~18.04
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This is the Debian GNU/Linux prepackaged version of the Python programming language. Python was written by Guido van Rossum <guido@cwi.nl> and others.

This package was put together by Klee Dienes <klee@debian.org> from sources from ftp.python.org:/pub/python, based on the Debianization by the previous maintainers Bernd S. Brentrup <bsb@uni-muenster.de> and Bruce Perens.

Current maintainer is Matthias Klose <doko@debian.org> until the final 2.3 version is released.

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A. HISTORY OF THE SOFTWARE
Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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A. HISTORY OF THE SOFTWARE

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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python’s principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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    A C-program for MT19937, with initialization improved 2002/1/26.
    Coded by Takuji Nishimura and Makoto Matsumoto.

    Before using, initialize the state by using init_genrand(seed)
    or init_by_array(init_key, key_length).

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Any feedback is very welcome.
http://www.math.keio.ac.jp/matumoto/emt.html
e-mail: matumoto@math.keio.ac.jp

Sockets
------

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Modified by Jack Jansen, CWI, July 1995:
- Use binascii module to do the actual line-by-line conversion between ascii and binary. This results in a 1000-fold speedup. The C version is still 5 times faster, though.
- Arguments more compliant with python standard

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--------------------------

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